

**TM 9-1410-1250-12/1(FMS)**

**TECHNICAL MANUAL**

**OPERATOR AND ORGANIZATIONAL  
MAINTENANCE MANUAL**

**INTERCEPT-AERIAL GUIDED MISSILE  
MIM-14A, MIM-14B, AND MIM-14C**

**IMPROVED NIKE-HERCULES AIR DEFENSE GUIDED MISSILE SYSTEM**

**(ALLIED CONFIGURATION)**

**DEPARTMENT OF THE ARMY**

**JULY 1981**

Technical Manual

No. 9-1410-1250-12/1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D. C., 31 July 1981

**Operator and Organizational Maintenance Manual:**  
**INTERCEPT—AERIAL**  
**GUIDED MISSILE MIM-14A, MIM-14B, and MIM-14C**  
**(IMPROVED NIKE-HERCULES GUIDED MISSILE SYSTEMS)**

	Paragraphs	Pages
<b>PART ONE. ASSEMBLY AND SERVICE OPERATIONS</b>		
Chapter 1. INTRODUCTION	1-1-1-11	1-1-1-2
Section I. General	1-1-1-10	1-1
II. Allied configuration manuals	1-11, 1-12	1-2
Chapter 2. PARTS, TOOLS, AND EQUIPMENT		
Section I. Parts, common tools, and equipment	2-1-2-3	2-1
II. Special tools and equipment and fabricated tools	2-4-2-6	2-1-2-3
Chapter 3. ASSEMBLY OF THE MISSILE FOR ELECTRICAL CHECKOUT		
Section I. General	3-1-3-3.1	3-1-3-3
II. Inspection of containers	3-4, 3-5	3-8
III. Uncrating and assembling the missile	3-6-3-14	3-8-3-33
Chapter 4. AIR AND OIL SERVICING AND MISSILE ELECTRICAL CHECKOUT		
Section I. Air and oil servicing the accessory power supply (APS)	4-1-4-7	4-1-4-8
II. Air and oil servicing the hydraulic pumping unit (HPU)	4-8-4-11	4-25, 4-26
III. Missile electrical checkout	4-12-4-16	4-43-4-73
IV. Fuel servicing and operational test (hot-run) of the accessory power supply (APS)	4-17-4-19	4-74-4-80
Chapter 5. UNCRATING AND INSTALLING THE MISSILE ROCKET MOTOR ASSEMBLY		
Section I. Preliminary procedures	5-1-5-6.1	5-1-5-4.1
II. Uncrating the missile rocket motor subassembly	5-7, 5-8	5-6-5-7
III. Installation of the missile rocket motor subassembly	5-9, 5-10	5-12-5-14
Chapter 6. UNCRATING AND INSTALLING THE WARHEAD BODY SECTION	6-1-6-3	6-1-6-4
Chapter 7. FINAL PREPARATION OF THE WARHEAD BODY SECTION AND THE FORWARD BODY SECTION		
Section I. Electrical cable connections	7-1-7-4	7-1-7-3
II. Installation of the forward main fin and the forward body section	7-5-7-10	7-7-7-16
III. Installation of the rear roll ring	7-11, 7-12	7-17-7-18
Chapter 8. ASSEMBLY OF THE ROCKET MOTOR ASSEMBLY	8-1-8-9	8-1-8-22
Chapter 9. JOINING PROCEDURES FOR THE MISSILE BODY AND ROCKET MOTOR CLUSTER		
Section I. Transporting the missile body and the rocket motor cluster to the launching area	9-1, 9-2	9-1-9-4
II. Joining the missile body and the rocket motor cluster on the launching-handling rail	9-3-9-8	9-8-9-16
Chapter 10. FINAL PREPARATION OF THE MISSILE	10-1-10-6	10-1-10-17
<b>PART TWO. DEACTIVATION, CORRECTIVE MAINTENANCE, AND STORAGE</b>		

\*This technical manual effective upon application of CIP 9-1410-1250-50-1.



	Paragraphs	Pages
<b>Chapter 11. NORMAL DEACTIVATION PROCEDURES</b>		
Section I. General	11-1—11-3	11-1
II. Preliminary procedures	11-4—11-7	11-1—11-4
III. Removal of the missile from the launching area, using guided missile low-bed trailer M529	11-8, 11-9	11-5
IV. Removal of the missile body from the launching-handling rail	11-10—11-11	11-6—11-7
V. Removal of the rocket motor cluster from the launching-handling rail	11-12, 11-13	11-8
VI. Removal of the forward body section	11-14, 11-15	11-9
VII. Removal of the forward main fins and preparation for removal of the warhead body section	11-16—11-19	11-10, 11-11
VIII. Removal of the warhead body section	11-20—11-22	11-11, 11-12
IX. Removal of the missile rocket motor subassembly	11-23—11-26	11-13—11-15
X. Defueling, depressurizing, and purging the accessory power supply (APS)	11-27—11-31	11-16—11-18
XI. Removing and packaging the main fins and the elevons	11-32—11-34	11-20
XII. Preparation of the forward and rear body sections for shipment or storage	11-35—11-37	11-21, 11-22
<b>Chapter 12. CORRECTIVE MAINTENANCE</b>		
Section I. General	12-1—12-3	12-1—12-6
II. Corrective maintenance of the missile guidance set (MUSHROOM)	12-4—12-21	12-7—12-25
III. Corrective maintenance of the missile guidance set (STOVEPIPE)	12-21, 1-12-46	12-25—12-45
IV. Corrective maintenance of the forward body section	12-47—12-55	12-45—12-50
V. Corrective maintenance of the warhead body section	12-56—12-60	12-51—12-54
VI. Corrective maintenance of the missile motor section	12-61—12-64	12-55, 12-56
VII. Corrective maintenance of the equipment section	12-65—12-68	12-56—12-58
VIII. Corrective maintenance of the accessory power supply (APS) and the hydraulic pumping unit (HPU)	12-69—12-73	12-59—12-69
IX. Accessory power supply (APS) servicing system cleanup—launching area	12-74—12-79	12-70—12-76
X. Hydraulic pumping unit (HPU) servicing and system cleanup—launching area	12-80—12-84	12-81—12-84
XI. Corrective maintenance of the actuator section	12-85—12-87	12-86, 12-87
XII. Corrective maintenance of main fins and elevons	12-88—12-90	12-90, 12-91
XIII. Corrective maintenance of the shipping and storage containers	12-91—12-99	12-91—12-96
XIV. Corrective maintenance of the rocket motor cluster	12-100—12-117	12-96—12-103
<b>Chapter 13. WINTERIZATION INSTRUCTIONS</b>		
Section I. General	13-1—13-4	13-1—13-3
II. Rocket motor cluster winterization kit	13-5—13-20	13-6—13-22
III. APS and battery box winterization kit	13-21—13-24	13-22—13-25
IV. Corrective maintenance of winterization kits	13-25—13-27	13-26—13-27
<b>Chapter 14. NIKE-HERCULES GUIDED MISSILE TRAINING BODY SECTION M84</b>		
Section I. General	14-1, 14-2	14-1
II. Physical, description	14-3—14-8	14-1—14-3
III. Shipment, inspection, and uncrating	14-9—14-15	14-8—14-14
IV. Assembly procedures	14-16—14-26	14-14—14-16
V. Disassembly procedures	14-27—14-37	14-16, 14-17
VI. Corrective maintenance	14-38—14-41	14-18
<b>Chapter 15. HANDLING, SHIPMENT, AND LIMITED STORAGE</b>		
Section I. General	15-1—15-4	15-1, 15-2
II. Shipment	15-5—15-7	15-2—15-5
III. Limited storage	15-8—15-18	15-7—15-12
IV. Torque requirements	15-19—15-21	15-14
<b>APPENDIX A. NIKE-HERCULES MAJOR ITEMS COMPONENTS</b>		A-1
<b>B. CLEANING AND PRESERVING MATERIALS</b>		B-1
<b>C. INSPECTION CRITERIA FOR CONNECTOR P1</b>		C-1
<b>D. MOISTURE SEALING PROCEDURES FOR TRANSPONDER CONTROL GROUP WIRING HARNESS CONNECTORS P1 (9033947 AND 9976269) AND TRANSPONDER CONTROL GROUP CONNECTORS J1 (9011427 AND 9144528)</b>		D-1
<b>Index</b>		1

# INDEX

	Paragraphs	Pages
<b>Air and oil servicing the accessory power supply (APS):</b>		
APS lubrication	4-5	4-7
Arm safety check	4-6	4-7
General—the missile, how shipped	4-1	4-1
Glow plug continuity check	4-7	4-7
Hydraulic oil low-temperature limitations	4-2	4-1
With winterization kit	4-2a	4-1
Without winterization kit	4-2b	4-1
Preliminary procedure for APS servicing	4-4	4-1
Servicing and test equipment—facilities required	4-3	4-1
<b>Air and oil servicing the hydraulic pumping unit (HPU):</b>		
General—the missile, how shipped	4-8	4-25
Hydraulic oil low-temperature limitations	4-9	4-25
General—specific limits set in table 4-12	4-9a	4-25
Limitations—oil used at various temperatures	4-9b	4-25
Preliminary procedures for HPU servicing	4-11	4-25
Servicing and test equipment	4-10	4-25
<b>Fuel servicing and operational test (hot-run) of the accessory power supply (APS):</b>		
Adjustment of the arm SAFETY SWITCH	4-19	4-80
General—time limit on ethylene oxide storage	4-17	4-73
Servicing and test equipment	4-18	4-73
<b>Missile electrical checkout:</b>		
Check of the HPU squib battery activating circuit	4-14	4-64
Check of the missile heater circuits	4-13	4-63
Removal of the test equipment	4-16	4-72
Test equipment	4-12	4-43
Transponder control group air leakage test	4-15	4-66
<b>Assembly of the missile for electrical checkout</b>		
Containers, inspection of:		
General	3-4	3-8
Rear and forward body section and warhead body section	3-5	3-3
General:		
Assembly and service	3-2	3-2
General: differences in facilities of permanent- and mobile-type facilities	3-2a	3-2
Sequence of assembly and service operations	3-2b	3-3
Handling explosives	3-3	3-3
Shipment of the missile components	3-1	3-1
<b>Uncrating and assembling the missile:</b>		
Access doors, cover plates, and door assemblies, removal of	3-8	3-20
Actuator section, inspection of	3-9	3-21
Elevons, installation of	3-12	3-24
Forward body section, installation for missile electrical checkout (missiles 10206 through 11935)	3-13	3-26
Forward body section, installation for missile electrical checkout (missiles 13001 and subsequent)	3-14	3-33
Motor start delay timer, removal, test, and installation of	3-10	3-22
General	3-10a	3-22
Installation	3-10d	3-23
Removal	3-10b	3-22

**PART ONE**  
**ASSEMBLY AND SERVICE OPERATIONS**

---

**CHAPTER 1**  
**INTRODUCTION**

---

**Section I. GENERAL**

**1-1. Scope**

a. This is one of a series of technical manuals prepared for the Allied configuration. The purpose of this manual is to provide information needed by personnel responsible for the organizational maintenance of NIKE-HERCULES Air Defense Guided Missiles.

b. Information for assembly, testing, corrective maintenance, winterization, and deactivation performed by assembly and service personnel is contained in this manual.

**1-2. Organizational Maintenance Allocation**

In general, the maintenance responsibilities of the organizational maintenance technician will apply as reflected in TM 9-1410-1250-24P/1/1 and TM 9-1410-1250-24P/2/1. In cases where the nature of repair, modification, or adjustment is beyond the scope of the maintenance technician, the DS maintenance unit should be informed so that personnel with suitable tools and equipment may be provided or other proper instructions issued.

**1-3. Forms, Records, and Reports**

Refer to TM 38-750 for instructions on the use and completion of all forms required for operating and maintaining this equipment.

**1-4. Reporting of Equipment Publication Improvements**

Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded directly to: Commander, U. S. Army Missile Command, ATTN: DRSMI-SNPMH, Redstone Arsenal, Alabama 35898.

**1-5. References**

Refer to TM 9-1425-1250-L for a listing of publications pertaining to the Allied NIKE system.

**1-6. Using This Manual**

a. Instructions in this manual are written for personnel trained on the NIKE-HERCULES weapon system.

b. Procedures in this manual which are not dependent on other procedures may be done in any order desired to suit operational requirements, provided that:

- (1) No required tests or inspections are invalidated.
- (2) No safety features are violated.
- (3) No sequences of related or dependent operations or tests are changed.
- (4) No equipment is subjected to adverse environmental conditions which would not have happened if the order of procedure in the manual had been followed.

c. Individual procedures in this manual may be omitted if the condition does not exist (for example, a plug not installed cannot be removed).

d. Illustrations in this manual show how tools and equipment are usually placed, but there is no requirement that they must be placed exactly that way unless so stated.

e. If judgement is required while performing procedures in this manual, the person performing the procedure will make the judgement.

### 1-7. Differences Among Models

Basic differences among models of the missile body are found in the forward body section, the equipment section, and the actuator section. TM 9-1410-1250-12/2 lists the components of the mushroom missile guidance set and indicates the interchangeability of the different models of the components. Electrical indications throughout this manual are the same for MIM-14C as for MIM-14B unless otherwise specified.

### 1-8. Forward Body Section

a. In missiles 11188 through 11935 and 13001 and subsequent, there is a change in the configuration of the forward body section, the break being made at station 40.000 instead of station 18.000.

b. Missiles 10206 through 11935 are equipped with a missile guidance set (stovepipe), and missiles 13001 and subsequent are equipped with a missile guidance set (mushroom). Many minor circuit differences exist between missile guidance sets (mushroom) with serial numbers prior to GS-111 and missile guidance sets with serial numbers GS-111 and subsequent. These circuit differences cause the voltages and waveforms observed at various test points within the

missile guidance sets to differ between the two models. Since these differences are minor, only missile guidance sets with serial numbers GS-111 and subsequent are given detailed coverage in this manual.

### 1-9. Equipment Section

In missiles 13684 and subsequent, the missile battery is squib-activated. The use of a squib-activated battery results in differences in the internal wiring of the missile distribution box and changes of the battery cable assemblies and the support structure. There is also a change in the configuration of the accessory power supply (APS). Minor differences in connectors and placarding exist between APS 9032190 and APS 9030900. On missiles 14965 and subsequent, the APS is replaced by the hydraulic pumping unit (HPU). The HPU and the APS are interchangeable at this effectivity.

### 1-10. Actuator Section

In missiles 10206 through 10603, there is only one overlapping joining pad on each actuator section access door assembly. In missiles 10604 through 11935 and 13001 and subsequent, there are two overlapping joining pads on each actuator section access door assembly.

## Section II. ALLIED CONFIGURATION MANUALS

### 1-11. General

a. This manual is one of a series of technical manuals published for the Allied configuration. The baseline for this manual is TM 9-1410-250-12/1 including change 15 and with the Missile Four-Way Valve change incorporated.

b. The U. S. configuration manuals utilize a 3-digit numbering system (-250, etc). The Allied configuration converts this number to a 4-digit numbering system (-1250, etc.).

### 1-12. Referencing

a. References are not changed within the manuals; however, when a new Allied configuration TM has been published, the 3-digit to 4-digit conversion system described in 1-11b above should be used for proper referencing. TM's not affected by the Allied modifications maintain the U. S. configuration numbering system and will apply to both configurations.

b. Listed in the table below is a cross-reference between the U. S. and Allied configuration TM's.



U. S. TM NO.	ALLIED TM NO.	U. S. TM NO.	ALLIED TM NO.
9-1400-250-10/2	9-1400-1250-10/2	9-1430-251-12/3	9-1430-1251-12-3
9-1400-250-15/3	9-1400-1250-15/3	9-1430-251-34	9-1430-1251-34
9-1410-250-12/1	9-1410-1250-12/1	9-1430-252-34/2	9-1430-1252-34-2
9-1410-250-12/2	9-1410-1250-12/2	9-1430-253-12/4	9-1430-1253-12/4
9-1410-250-34	9-1410-1250-34	9-1430-253-34	9-1430-1253-34
9-1410-250-35/2	9-1410-1250-35/2	9-1430-254-12/7	9-1430-254-12/7
9-1410-250-35-3	9-1410-250-35-3	9-1430-254-12/8	9-1430-254-12/8
9-1410-250-35-4	9-1410-250-35-4	9-1430-254-20/2	9-1430-1254-20/2
9-1410-250-35-5	9-1410-250-35-5	9-1430-254-34	9-1430-1254-34
9-1425-250-12/1	9-1425-1250-12/1	9-1430-255-12/1	9-1430-1255-12-1
9-1425-250-34-1-1	9-1425-250-34-1-1	9-1430-255-12/2	9-1430-1255-12/2
NONE	9-1425-1250-34-1-1	9-1430-255-20	9-1430-1251-12-3
9-1425-250-34-1-2	9-1425-250-34-1-2	9-1430-256-12/1	9-1430-1256-12-1
9-1425-250-34-1-3	9-1425-250-34-1-3	9-1430-256-12/2	9-1430-1256-12/2
9-1425-250-34-1-4	9-1425-250-34-1-4	9-1430-256-20/3	9-1430-1256-20/3
9-1425-250-34-2-1	9-1425-250-34-2-1	9-1440-250-12/1	9-1440-1250-12/1
NONE	9-1425-1250-34-2-1	9-1440-250-20/1	9-1440-1250-20/1
9-1425-250-34-2-2	9-1425-250-34-2-2	9-1440-252-34	9-1440-1252-34
9-1425-250-34-2-3	9-1425-250-34-2-3	9-4935-250-14	9-4935-250-14
9-1425-250-34-3-1	9-1425-250-34-3-1	9-4935-252-14-1	9-4935-252-14-1
NONE	9-1425-1250-34-3-1	9-4935-252-14-2	9-4935-252-14-2
9-1425-250-34-3-2	9-1425-250-34-3-2	9-4935-271-14-1	9-4935-1271-14-1
9-1425-250-34-4-1	9-1425-250-34-4-1	9-4935-271-14-2	9-4935-1271-14-2
NONE	9-1425-1250-34-4-1	9-4935-271-14-3	9-4935-1271-14-3
9-1425-250-34-4-2	9-1425-250-34-4-2	9-4935-272-14-1	9-4935-1272-14-1
NONE	9-1425-1250-34-4-2	9-4935-272-14-2	9-4935-1272-14-2
9-1425-250-34-4-3	9-1425-250-34-4-3	9-4935-272-14-3	9-4935-1272-14-3
9-1425-250-34-4-4	9-1425-250-34-4-4	9-4935-273-14-1	9-4935-1273-14-1
9-1425-250-34-5-1	9-1425-250-34-5-1	9-4935-273-14-2	9-4935-1273-14-2
NONE	9-1425-1250-34-5-1	9-4935-273-14-3	9-4935-1273-14-3
9-1425-250-34-5-2	9-1425-250-34-5-2		
9-1425-250-34-5-3	9-1425-250-34-5-3		(TB's)
9-1425-250-34-6-1	9-1425-250-34-6-1		
NONE	9-1425-1250-34-6-1	9-1430-250-20/6/1	9-1430-250-20/6/1
9-1425-250-34-6-2	9-1425-250-34-6-2	9-4900-250-35/1	9-4900-1250-35/1
9-1425-250-34-6-3	9-1425-250-34-6-3		
9-1425-250-34-6-4	9-1425-250-34-6-4		(LPI TM's)
9-1425-250-34-7-1	9-1425-250-34-7-1		
NONE	9-1425-1250-34-7-1	9-1410-250-24P-2-2	9-1410-250-24P-2-2
9-1425-250-34-7-2	9-1425-250-34-7-2	9-1430-250-24P-2-2	9-1430-1250-24P-2-2
9-1425-250-34-7-3	9-1425-250-34-7-3	9-1430-250-24P-7-2	9-1430-1250-24P-7-2
9-1425-250-34-7-4	9-1425-250-34-7-4	9-1430-250-24P-8-2	9-1430-1250-24P-8-2
9-1425-250-34-7-5	9-1425-250-34-7-5	9-1430-250-14P-9-2	9-1430-1250-24P-9-2
9-1425-250-34-7-6	9-1425-250-34-7-6	9-1430-250-24P-10-2	9-1430-1250-24P-10-2
NONE	9-1425-1250-34-8-1	9-1430-250-24P-13-2	9-1430-1250-24P-13-2
9-1430-250-10/3	9-1430-250-10/3	9-1430-250-24P-22-2	9-1430-1250-24P-22-2
9-1430-250-20/3	NONE	9-4940-250-34P-2-2	9-4935-1271-24P-1-2
9-1430-250-20/5	9-1430-1250-20-5	9-4940-251-34P-2-2	9-4935-1272-24P-1-2
9-1430-250-20/6	9-1430-1250-20/6	9-4935-273-24P-1-2	9-4935-1273-24P-1-2
9-1430-250-20/7	9-1430-1250-20/7		
9-1430-251-10	9-1430-1251-10		(LO's)
9-1430-251-10/2	9-1430-1251-10/2		
9-1430-251-12/1	9-1430-1251-12-1	9-1400-250-20	9-1400-1250-20
NONE	9-1430-1251-12-2	9-1430-250-20	9-1430-250-20

	Paragraphs	Pages
Test .....	8-10c	8-23
Rear body section and forward body section .....	8-6	8-8
Container cover, removal of .....	8-6c	8-9
Container depressurization .....	8-6b	8-8
Final uncrating procedures .....	8-6g	8-16
Forward body section, removal of .....	8-6e	8-11
Inspection .....	8-6a	8-8
Rear body section and forward body section, preparation for removal of .....	8-6d	8-9
Rear body section, removal of .....	8-6f	8-16
Rear main fin, removal and installation of .....	8-11	8-23
Uncrating the main fins and elevons .....	8-7	8-19
Assembly of the rocket motor assembly:		
Assembly of the rocket motor cluster .....	8-6	8-7
General—rocket motor cluster, how shipped .....	8-1	8-1
Rocket motor igniter cable assembly, installation of .....	8-9	8-22
Rocket motor igniter cable assembly test, using multimeter TS-352/U .....	8-8	8-21
Uncrating and inspecting the assembled rocket motor cluster .....	8-7	8-15
Uncrating rocket motor components shipping and storage box XM36 .....	8-4	8-3
Uncrating rocket motor fins shipping and storage box M32 .....	8-2	8-1
Uncrating rocket motor fins shipping and storage box XM39 .....	8-3	8-2
Uncrating rocket motor shipping and storage box .....	8-5	8-6
Corrective maintenance of		
Accessory power supply (APS) and hydraulic pumping unit (HPU):		
Accessory power supply (APS), replacement of .....	12-69	12-69
Installation .....	12-69b	12-61
Removal .....	12-69a	12-69
Hydraulic pumping unit (HPU), replacement of .....	12-70	12-61
Installation .....	12-70b	12-64
Removal .....	12-70a	12-61
HPU squib battery, replacement of .....	12-72	12-67
Installation .....	12-72b	12-68
Removal .....	12-72a	12-67
Replacement of APS 9032190 or 9030900 with the HPU .....	12-73	12-69
Installation .....	12-73b	12-70
Removal .....	12-73a	12-69
Ventilator assembly, replacement of .....	12-71	12-66
Installation .....	12-71b	12-66
Removal .....	12-71a	12-66
Actuator section:		
Actuator section door assemblies, replacement of .....	12-85	12-86
Installation .....	12-85b	12-86
Removal .....	12-85a	12-86
Index pin, replacement of .....	12-86	12-86
Installation .....	12-86b	12-86
Removal .....	12-86a	12-86
Thermal battery assembly, replacement of .....	12-87	12-87
Assembly .....	12-87e	12-90
Disassembly .....	12-87d	12-87
General .....	12-87a	12-87
Inspection and test .....	12-87c	12-87
Installation .....	12-87f	12-90
Removal .....	12-87b	12-87
APS servicing and system cleanup—launching area:		
Air servicing .....	12-74	12-70
Fuel servicing .....	12-77	12-75
Hydraulic oil servicing, using the launching area oil fill valve assembly .....	12-76	12-78
Hydraulic oil servicing, using the portable oil fill and filter unit .....	12-75	12-71

## CHAPTER 2

## PARTS, TOOLS, AND EQUIPMENT

## Section I. PARTS, COMMON TOOLS, AND EQUIPMENT

## 2-1. General

Repair parts, tools, and equipment are issued to the using organization for assembling, servicing, operating, and maintaining the missile. Tools and equipment should not be used for purposes other than those prescribed and, when not in use, should be stored in the storage boxes or cabinets provided.

## 2-2. Repair Parts

Repair parts for replacement of those parts likely to become worn, broken, or otherwise unserviceable are supplied for such operations as are within the scope of organizational maintenance functions. Repair parts and equipment supplied for assembly of missile material are listed in TM 9-1410-250-24P/1/1 and TM 9-1410-250-24P/2/1, which are the authority for requisitioning replacements.

## 2-3. Common Tools and Equipment

a. Common tools and equipment required for assembling, servicing, operating and maintaining the missile are described in b through e below.

b. Tools and equipment listed in SC 4935-95-CL-A42 are general-purpose tools issued to the organizational maintenance personnel for assembling and maintaining the missile.

c. Tools and equipment listed in SC 5180-95-CL-A02 are general-purpose tools issued to the mechanical maintenance personnel for performing their assigned duties.

d. Tools and equipment listed in SC 4935-95-CL-A32 are general-purpose tools issued to the mechanical maintenance personnel for performing their assigned duties.

e. Tools and equipment listed in SC 4935-95-CL-A33 are issued to the electronic maintenance personnel for assembling, maintaining, and adjusting electrical and electronic components of the missile.

Section II. SPECIAL TOOLS AND EQUIPMENT AND  
FABRICATED TOOLS

## 2-4. General

Special tools and equipment listed in para. 2-5 are listed in the applicable columns of SC 4935-92-CL-001. Paragraph 2-5 contains only those special tools necessary to perform the operations described in this manual. Instructions for fabricating tools necessary to perform the operations described in this manual are contained in paragraph 2-6.

## 2-5. Special Tools and Equipment

a. Rocket motor hoist beam 8003042 is used to place an individual rocket motor on the rocket motor cluster truck during the assembly of the rocket motor cluster. The two slings that fit around the body of the rocket motor are attached to the hoist beam by means of sling pins attached to a chain and secured with safety pins. The slings are lined with synthetic

rubber to cushion the rocket motor. The beam weighs 125 pounds and has a maximum capacity of 1,400 pounds.

b. The multimeter is a general purpose multimeter for checking resistance and continuity of electronic and electrical components, for checking current, resistance, and voltage in ac or dc circuits.

c. The arming mechanism ohmmeter is used for checking resistance of the rocket motor initiators and the safety-and-arming devices and for checking continuity of the guidance set and HPU squib batteries. The ohmmeter scale indicates 0 to 25 dc milliamperes on the bottom half of the scale, and 0 ohm to infinity on the top half of the scale. The two terminal posts on top of the unit provide the contact points for the two test leads that are included with the ohmmeter. Two test leads are furnished with an alligator clip soldered to one end and a test prod to the other end. The other test lead is a three-lead test cable.

d. Squib test sets 8522168 and 8525871 are used to check internal resistance of the rocket motor igniter. The scale indicates 0 to 1.00 dc milliamperes. A calibration table on the inside cover of the test set indicates the equivalent in resistance to the dc milliamperes indication on the scale. The adapter supplied

with test set 8525871 has a 4-position switch to permit checking of all four rocket motor igniter cable assemblies used in the missile.

e. The electrical circuit test set is used for checking the initiator wiring harness for continuity and stray voltage.

f. The air leakage test set is a pressure regulated test set used with an air source to check for air leakage in the transponder control group.

g. Battery test set TS-737/U is used for checking the voltage of individual cells of the missile guidance set battery (BB-401/U).

h. Deleted.

i. The spanner wrench is an adapter wrench used to remove the igniter receptacle shipping closure from the rocket motor and to install the rocket motor igniter. The wrench is constructed of steel plate with four pins welded to the end. These pins engage holes in the shipping closures and in the igniters. On the other end of the wrench is a hexagon shaft used for attaching a socket wrench.

j. The hygrometer is used to measure the moisture content of the air supply used in serv-



icing the APS and HPU. Operation of the hygrometer is described in TM 5-6685-200-15.

k. The portable oil fill and filter unit is used for servicing the missile hydraulic system. A filtering system contained in the unit filters all oil delivered and permits recirculation of oil in the missile for cleaning.

## 2-6. Fabricated Tools

a. *General.* This paragraph contains in-

structions for fabricating tools required to maintain the missile.

b. *Ram-Pressure Probe Alinement Template.* Using scrap plywood, aluminum, or plastic, fabricate the ram-pressure probe alinement template as shown in figure 2-1.

c. *Safety-and-Arming Switch Sling.* Using available material, fabricate the safety and arming switch sling, using either of the two configurations shown in figure 2-2.

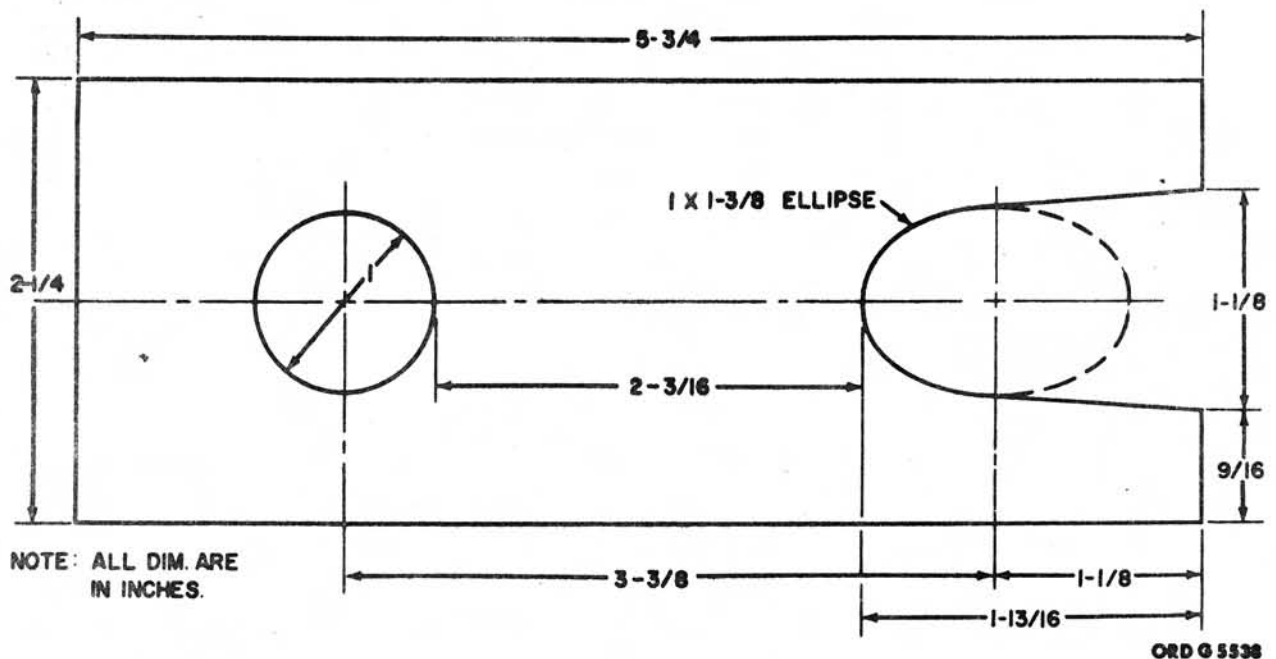
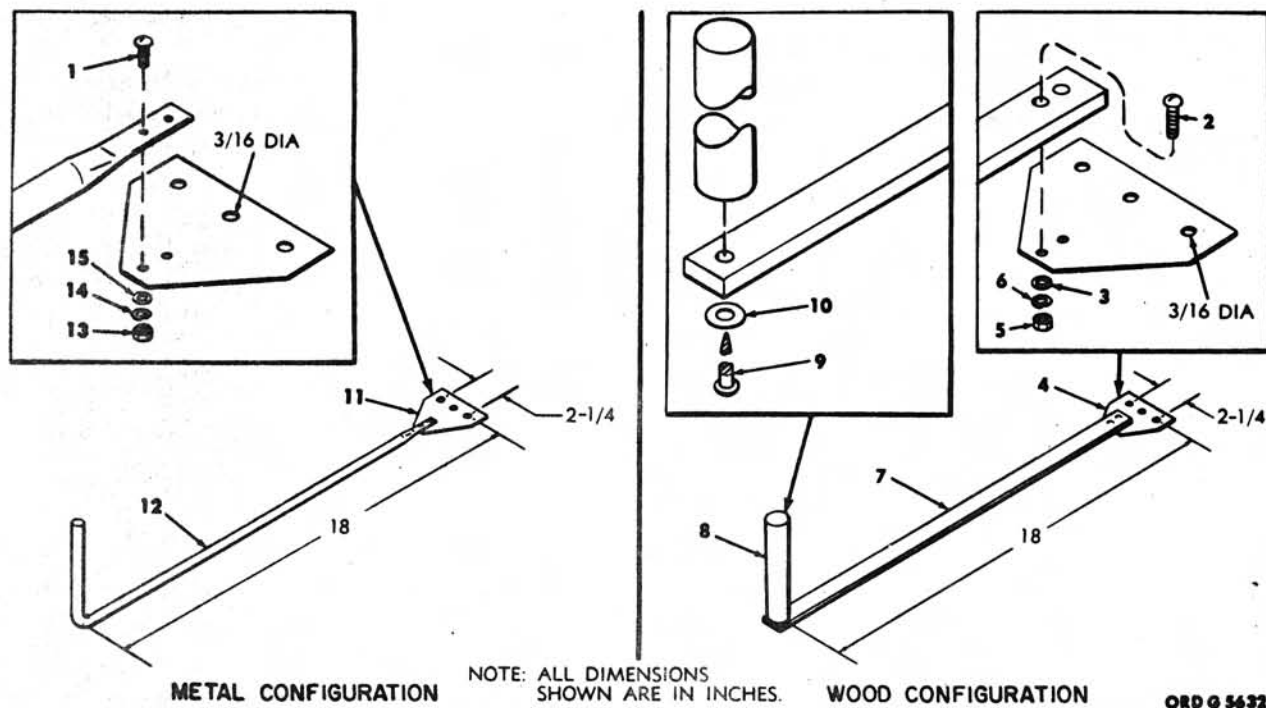


Figure 2-1. Fabrication of the ram-pressure probe alinement template.



- 1—Rd-hd screw (2)
- 2—Rd-hd screw (2)
- 3—F1 washer
- 4—1/4-in. plywood mtg plate
- 5—Hex nut (2)
- 6—Lockwasher (2)
- 7—1/4 x 3/4-in. plywood arm
- 8—1-in. hardwood doweling handling (or equivalent)

- 9—Wood screw
- 10—F1 washer (2)
- 11—1/8-in. al mtg plate
- 12—1/2-in. al tubing
- 13—Hex nut (2)
- 14—Lockwasher (2)
- 15—Flat washer (2)

Figure 2-2. Fabrication of the safety-and-arming switch sling.

	Paragraphs	Pages
Oil purging .....	12-78	12-76
System cleanup .....	12-79	12-76
<b>Equipment section:</b>		
Battery box cover, replacement of (missiles 10206 through 11935 and 13001 through 13683) .....	12-66	12-57
Installation .....	12-66b	12-57
Rearming the missile .....	12-66c	12-57
Removal .....	12-66a	12-57
Guidance set squib battery, replacement of (missiles 18684 and subsequent) .....	12-68	12-58
Installation .....	12-68b	12-58
Removal .....	12-68a	12-58
Guidance set storage battery and heater assembly (missiles 10206 through 11935 and 13001 through 13683) .....	12-67	12-57
Installation .....	12-67b	12-58
Rearming the missile .....	12-67c	12-58
Removal .....	12-67a	12-58
<b>Forward body section:</b>		
Access door assemblies .....	12-47	12-45
Boltwell covers .....	12-55	12-50
Installation .....	12-55b	12-51
Removal .....	12-55a	12-50
Forward fin assembly, replacement of (missiles 10206 through 11935) .....	12-50	12-48
Installation .....	12-50b	12-47
Removal .....	12-50a	12-46
Forward fin assembly, replacement of (missiles 13001 and subsequent) .....	12-51	12-48
Installation .....	12-51b	12-48
Removal .....	12-51a	12-48
Nose tip, replacement of .....	12-54	12-50
Installation .....	12-54b	12-50
Removal .....	12-54a	12-50
Ram-pressure probe, replacement of (missiles 10206 through 11935) .....	12-48	12-45
Installation .....	12-48b	12-45
Removal .....	12-48a	12-45
Ram-pressure probe, replacement of (missiles 13001 and subsequent) .....	12-49	12-45
Installation .....	12-49b	12-46
Removal .....	12-49a	12-45
Stagnation tube assembly, replacement of (missiles 10206 through 11935) .....	12-52	12-49
Installation .....	12-52b	12-49
Removal .....	12-52a	12-49
Stagnation tube assembly, replacement of (missiles 13001 and subsequent) .....	12-53	12-49
Installation .....	12-53b	12-49
Removal .....	12-53a	12-49
<b>General:</b>		
Exterior surface skin damage .....	12-2	12-6
Safety precautions applicable to corrective maintenance operations in the launching area and the revetted area .....	12-3	12-6
General—summary of precautions .....	12-3a	12-6
Safety precautions applicable to launching area corrective maintenance procedures .....	12-3b	12-6
Scope—summary of chapter contents .....	12-1	12-1
<b>HPU servicing and system cleanup—launching area:</b>		
Air servicing .....	12-80	12-81
Hydraulic oil servicing, using the launching area oil fill valve assembly .....	12-82	12-82
Hydraulic oil servicing, using the portable oil fill and filter unit .....	12-81	12-81
Oil purging .....	12-83	12-83
System cleanup .....	12-84	12-84
<b>Main fins and elevons:</b>		
Elevons, replacement of .....	12-90	12-91

## CHAPTER 3

### ASSEMBLY OF THE MISSILE FOR ELECTRICAL CHECKOUT

#### Section I. GENERAL

#### 3-1. Shipment of the Missile Components

a. The missile is normally shipped disassembled to the using organization in the major components listed below:

- (1) Rear body and forward body sections.
- (2) Main fins and elevons.
- (3) Missile rocket motor subassembly and initiators.
- (4) Warhead body section.
- (5) Rocket motor cluster fin assemblies.
- (6) Rocket motor.

b. Packaged components of the missile are normally shipped from the manufacturer to a depot for storage or distribution. The depot may assemble all components of the rocket motor cluster, except the rocket motor cluster fin assemblies, before distribution to the using organization. The depot installs the warhead in the warhead body section before distribution.

c. The rear body and forward body sections, and the warhead body section are packaged in end-opening, reusable, steel containers with access coverplates and with an inspection window for observation of humidity indicators within the containers. The containers also provide shock, vibration, and environmental protection to their contents throughout a temperature range of  $-65^{\circ}$  to  $+165^{\circ}\text{F}$ . The rear body section and forward body section container may be pressurized to 5 psi with dry air for protection of components susceptible to damage from moisture. The remaining major components of the missile are shipped and stored in wooden boxes designed for their specific

content. The contents of the shipping containers for the missile are listed in table 3-1.

*Table 3-1. Contents of Guided Missile MIM-14A and MIM-14B Shipping and Storage Containers.*

<i>Container</i>	<i>Contents</i>
Rear body and forward body section container.	Rear body section and forward body section.
Warhead body section container.	Warhead body section with warhead installed.
Main fin and elevon shipping and storage box.	Four main fins, four elevons and four forward fins.
Missile rocket motor subassembly shipping and storage box.	Solid-propellant missile rocket motor subassembly and metal container carrying missile rocket motor initiators and gaskets.
Rocket motor fins shipping and storage box M39 or M32.	Four rocket motor cluster fin assemblies and attaching hardware, when rocket motor cluster is shipped assembled. Also contains some items of assembling hardware, when rocket motor cluster is shipped disassembled.
Rocket motor components shipping and storage box M36.	Rocket motor thrust ring assembly and attaching hardware.
Rocket motor shipping and storage box.	Rocket motor and a metal container containing a rocket motor igniter.
Rocket motor cluster shipping and storage box.	Assembled rocket motor cluster, less fin assemblies, and four metal containers each containing a rocket motor igniter.



d. The using organization inspects all containers for external damage. The rear body and forward body section container and the warhead body section container are also examined to determine whether they are reusable. In the event of damage to the containers, the office in charge determines the acceptability of the contents.

e. Missile components are uncured as required for assembly of the missile.

### 3-2. Assembly and Service

a. *General.* Some differences exist in facilities and the sequence of assembly and service operations of a permanent-type assembly area installation and those of a mobile-type assembly area installation. These differences are reflected below:

(1) The permanent-type assembly area installation contains the assembly area building, the receiving area (adjacent to the assembly area building), and the test area within the assembly area building. Upon completion of assembly test and service procedures, the missile rocket motor subassembly and the warhead body section are installed in a revetted area. The assembled missile body is then transported to the launching area. The packaged items received by the using organization are routed as listed in (a) through (g) below:

	Items	Location
(a)	Rear body and forward body sections	Receiving area
(b)	Main fins and elevons	Receiving area
(c)	Missile rocket motor subassembly and initiators	Revetted area
(d)	Warhead body section	Revetted area
(e)	Rocket motor cluster fin assemblies	Revetted area
(f)	Rocket motor cluster	Revetted area
(g)	Rocket motor	Revetted area

(2) The mobile-type assembly area installation is composed of three distinct sections: the checkout area with an air-inflated shelter, the warheading area with an air-inflated shelter, and the explosive-storage area. (For a detailed description of these sections and the specific functions, refer to TM 9-1400-250-10 or TM 9-1400-250-10/2.) Upon completion of assembly, test, and service operations in the checkout shelter, the missile body is moved to the warheading shelter. In the warheading shelter, the missile rocket motor subassembly and the warhead body section are installed. The assembled missile body is then moved to the joining area adjacent to the warheading shelter for final assembly with the rocket motor cluster. In the explosive-storage area, the rocket motor cluster is removed from its container, installed on the trailer-mounted launching-handling rail, and fins added. The loaded trailer is then moved to the joining area for joining of the missile body with the rocket motor cluster. After joining, the complete trailer-mounted missile is moved to the mobile-type launching area. The packaged items received by the using organization are routed as listed in (a) through (f) below:

	Items	Location
(a)	Rear body and forward body sections	Receiving area adjacent checkout shelter
(b)	Main fins and elevons	Receiving area adjacent checkout shelter
(c)	Missile rocket motor subassembly and initiators	Warheading area shelter
(d)	Warhead body section	Warheading area shelter
(e)	Rocket motor cluster fin assemblies	Explosive-storage area
(f)	Rocket motor cluster	Explosive-storage area

*b. Sequence of Assembly and Service Operations.*

(1) The sequence of the assembly and service operations is illustrated in figure 3-1 for a permanent-type assembly area installation and figure 3-2 for a mobile-type assembly area installation and described in the associated legends.

(2) After all operations shown in figures 3-1 or 3-2 are complete, final preparation of the missile is performed as described in (a) through (e) below:

(a) The missile, assembled on the launching-handling rail, is positioned on the monorail launcher, and the ground power cables are connected.

(b) The missile rocket motor initiators are installed.

(c) The propulsion arming lanyard is installed, and the missile-away switch adjusted.

(d) Four rocket motor igniters are installed.

(e) The two safety-and-arming devices are checked for safe indication and installed.

### 3-3. Explosive Safety Requirements

*a. General.* The following explosive safety standards are the minimum requirements that must be observed in all operations involving high-explosive materials. These requirements may be augmented by local directives to cover conditions which are peculiar to a particular area of operation.

*b. Explosive Handling Areas.*

(1) The NIKE-HERCULES missile and the rocket motor cluster both contain explosive components. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in specifically designated areas. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved.

(2) The assembly areas and the launching areas of NIKE-HERCULES tactical sites contain buildings, facilities, and equipment specifically designed and located for designated types of operations. Quantity-distance safety requirements dictate the positioning of these buildings and facilities and always establish limitations on both the type and volume of operations that may be safely performed therein.

*c. Handling Explosive Components.*

(1) All handling operations of explosive components will be supervised by qualified explosive-trained personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted in or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed and the area thoroughly decontaminated before work continues.

(2) Personnel handling explosive components of the missile must be familiar with all applicable safety regulations. Published instructions for the use and care of tools must be observed. Fire fighting equipment must be kept in good working order and made readily available. Sparkproof safety tools and equipment are not required for normal missile assembly and disassembly operations, except as specified in this manual. Using the authorized spanner wrench to install the rocket motor igniter is considered normal missile assembly operation.

(3) To reduce the possibility of explosive detonation due to mechanical shock, do not strike or drop explosive components.

*d. Corrective Maintenance.* Before performing corrective maintenance on the missile body, the rocket motor cluster, or their components, the steps necessary for deenergization or disarming must be performed as prescribed in table 12-1.

*e. Electrical Precautions.*

(1) *Grounding.* During missile assembly operations, all NIKE-HERCULES explosive components shall be grounded at the common ground stake. Each ground strap shall be connected between the explosive component and the common ground stake so that the maximum resistance between the explosive component and earth ground is not greater than 20 ohms. This will prevent the explosive component from building up a static electrical charge.

(2) *Ground strap.* Any authorized ordnance or signal corps grounding strap may be used provided its length is sufficient to meet the individual requirements. Before attaching the grounding strap to the grounding rod or to the component to be grounded, all oxidation and other foreign matter shall be removed from the mating surface.

(3) *Electrical charges.* Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. Do not perform handling operations during electrical storms or in the vicinity of strong electromagnetic fields such as are found near power lines and transmitting antennas.

(4) *Electrical shocks.* While not necessarily lethal, electrical shocks can cause personnel to react in such a manner as to cause bodily injury to themselves and/or damage to equipment. Personnel operating electrical equipment should stand on a dry surface.

(5) *Fuses.* Use only the correct size and type fuses for replacement as specified in the maintenance instructions for the particular equipment involved.

*f. Fire Precautions.*

(1) Open flames, smoking, matches, or other flame producing devices are prohibited within 60 feet of locations containing explosives.

(2) At least one fire extinguisher of the type approved for fighting electrical fires shall be on hand and immediately available prior to using any piece of electrical test equipment. Water or foam type extinguishers shall not be used to fight electrical fires. During the handling of explosives, a CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size and weight makes handling difficult.

(3) Drilling, cutting, sawing, soldering, and similar heat producing operations are prohibited on missiles with assembled components. Operations of this nature are also prohibited on equipment associated with the missile (launchers, storage racks, handling trucks, etc.) whenever a missile is on or affixed to the equipment.

(4) Generally, no attempt will be made to fight fires involving explosive materials. In the case of a fire involving a NIKE-HERCULES, unnecessary personnel should be evacuated from the area by at least 2000 feet.

*g. Equipment Connectors Precautions.*

(1) When making electrical connections, care should be taken not to overtighten cable connections. Connectors should be tightened finger tight. Excessive handtightening or the use of tools should be avoided. Inspect the threaded portions of connectors and receptacles, and reject the connector or receptacle where damage will prevent proper mating.

(2) Inspect connector and receptacles for corrosion, fungus, and other types of foreign material. Clean connectors and receptacles when required. Foreign matter which cannot be removed will be cause for rejection only if it prevents proper mating, functioning, testing, etc.

(3) Inspect cables, harnesses, and connectors in accordance with appendix C.

(4) Never disconnect cables by pulling on the cables themselves. Always disconnect or connect cables by means of the end connector.

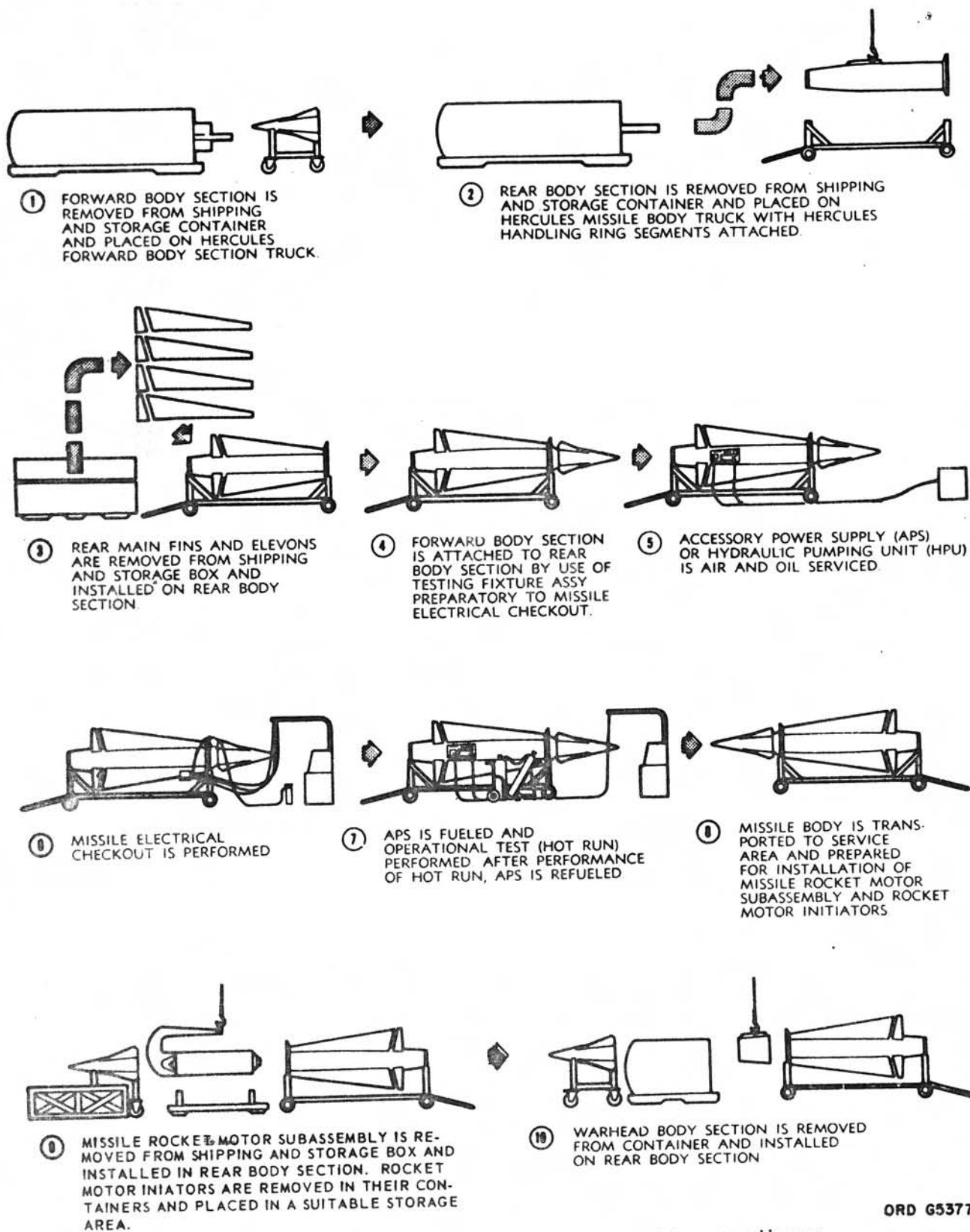
(5) In the event of power failure while test equipment is in operation, the power switches on the test equipment shall be turned off and the power cable disconnected from the power source until power is restored.

*h. Handling Equipment.* All material handling equipment and hand tools shall be visually inspected before first use each day of use for damage and/or obvious wear which may result in an unsafe condition. Such tools and/or equipment shall be rejected. Hoisting or handling equipment shall be periodically load tested in accordance with the instructions contained in the applicable publications.

### 3-3.1. Installation of Common Hardware

*a.* The direction of installation of common mounting hardware is not important as long as fit and function are not impaired.

*b.* Illustrations concerning assembly in this manual are to be used as guides only and are not to be cited as the only approved configuration for missile assemblies, subassemblies, or components unless it is recognized in this manual as the required method or configuration of assembly.



ORD 65377

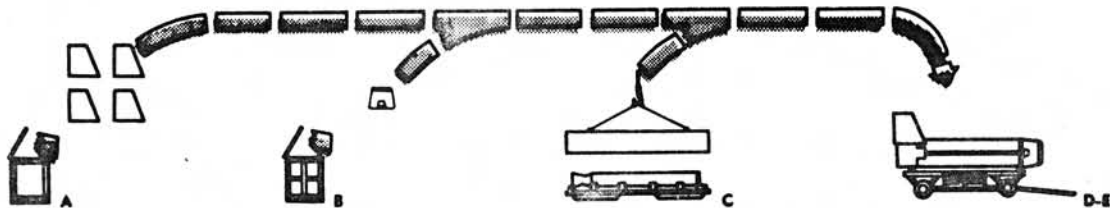
Figure 8-1. Assembly and service operations — permanent-type assembly area installation — flow chart (Sheet 1 of 2).





- ⑪ MISSILE ELECTRICAL WIRING HARNESES ARE CONNECTED TO WARHEAD BODY SECTION AND FORWARD MAIN FINS (REMOVED FROM SHIPPING AND STORAGE BOX) ARE INSTALLED ON WARHEAD BODY SECTION.

- ⑫ FORWARD BODY SECTION IS INSTALLED ON WARHEAD BODY SECTION. GUIDANCE SET BATTERY INSTALLED.



- ⑬ IF ROCKET MOTOR CLUSTER IS RECEIVED DISASSEMBLED, IT IS ASSEMBLED AS DESCRIBED IN A THROUGH E BELOW:

A — ROCKET MOTOR CLUSTER FIN ASSEMBLIES ARE REMOVED FROM SHIPPING AND STORAGE BOX.

B — ROCKET MOTOR THRUST RING ASSEMBLY AND MISCELLANEOUS HARDWARE CONTAINER COMPONENTS ARE REMOVED.

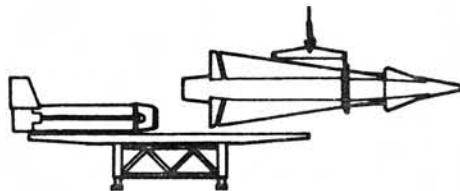
C — ROCKET MOTOR IGNITER IS REMOVED FROM COMPARTMENT AND ROCKET MOTOR IS REMOVED FROM SHIPPING AND STORAGE BOX.

D — ROCKET MOTOR CLUSTER IS ASSEMBLED ON ROCKET MOTOR CLUSTER TRUCK AND THE TWO UPPER FIN ASSEMBLIES ARE INSTALLED.

E — CONTINUITY CHECK OF ROCKET MOTOR IGNITER CABLE IS PERFORMED AND CABLE IS INSTALLED ON ROCKET MOTOR CLUSTER.



- ⑭ IF ROCKET MOTOR CLUSTER IS RECEIVED ASSEMBLED, IT IS REMOVED FROM SHIPPING AND STORAGE BOX, PLACED ON ROCKET MOTOR CLUSTER TRUCK, AND THE TWO UPPER FIN ASSEMBLIES INSTALLED.



- ⑮ ASSEMBLED MISSILE BODY AND ROCKET MOTOR CLUSTER ARE TRANSPORTED TO LAUNCHING AREA, JOINED ON A LAUNCHING-HANDLING RAIL, AND THE TWO LOWER FIN ASSEMBLIES INSTALLED ON ROCKET MOTOR CLUSTER.

ORD G 5539

Figure 3-1. Assembly and service operations—permanent-type assembly area installation—flow chart (Sheet 2 of 2).

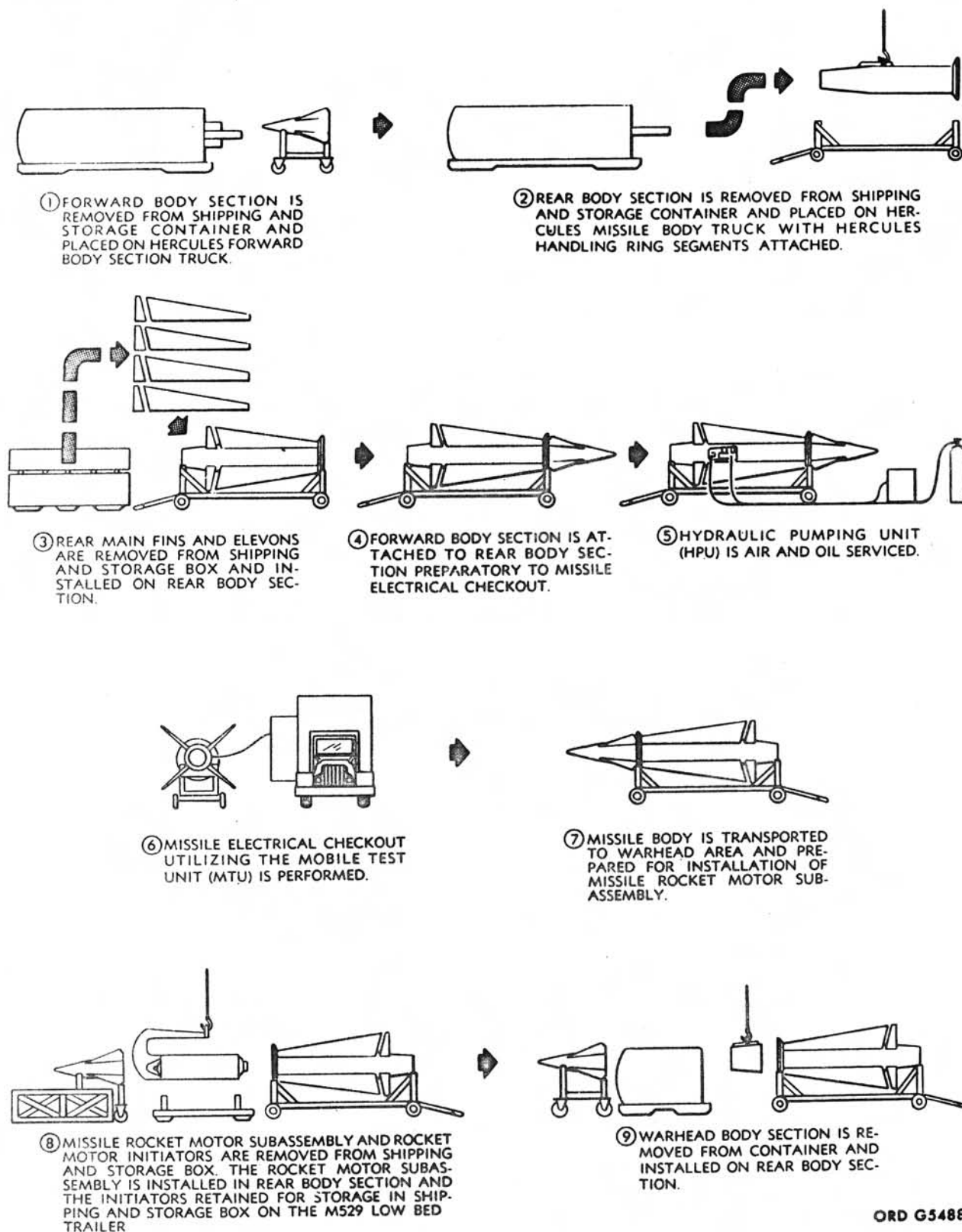


Figure 3-2. Assembly and service operations—mobile-type assembly area installation—flow chart (Sheet 1 of 2).

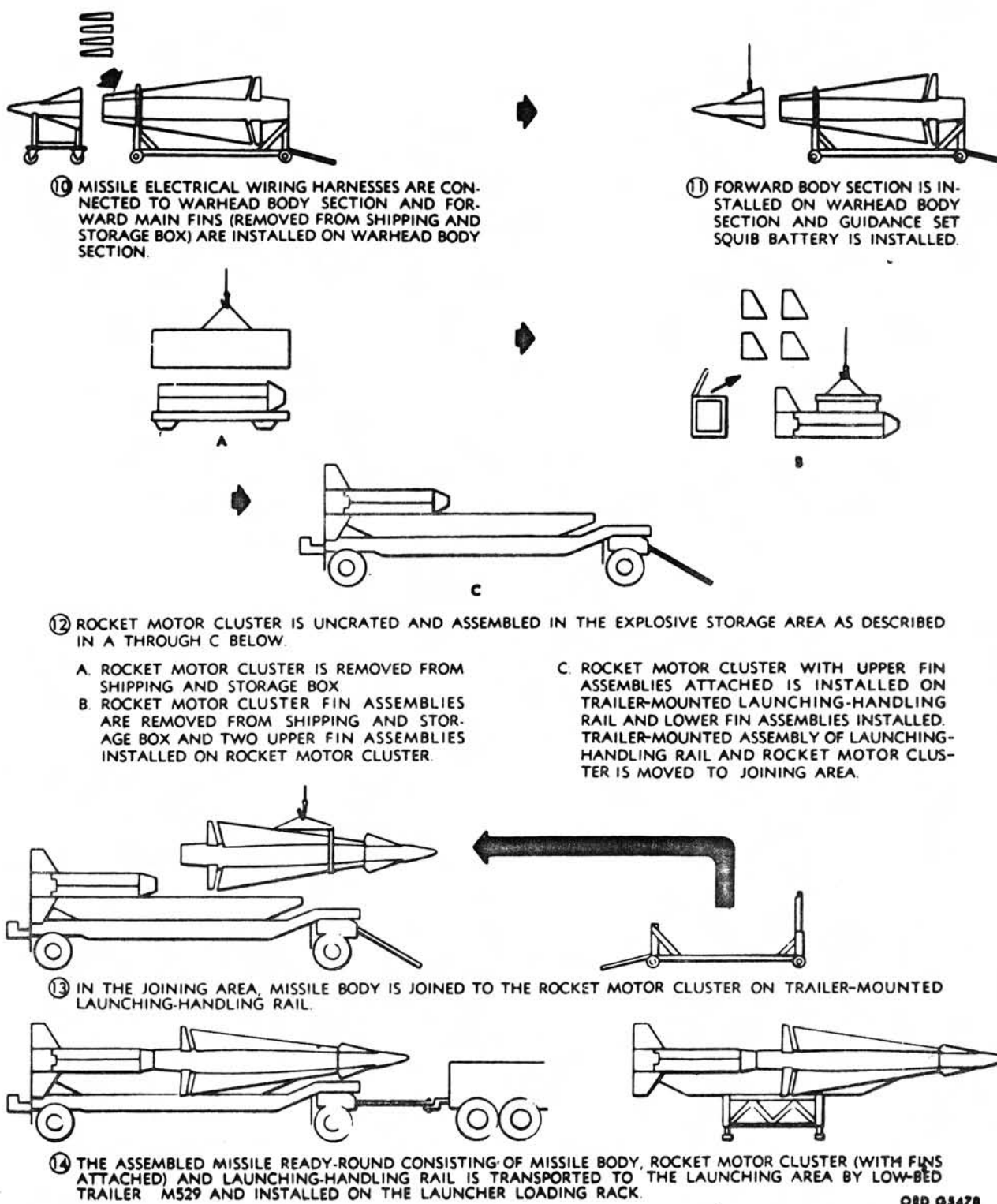


Figure 3-2. Assembly and service operation—mobile-type assembly area installation—flow chart (sheet 2 of 2).

## Section II. INSPECTION OF CONTAINERS

### 3-4. General

Inspect all shipping and storage containers (table 3-1) for exterior damage or evidence of tampering. Include in the inspection a check for broken straps and hinges and for broken or missing seals on the fasteners. Report any damage or evidence of tampering to the proper authorities.

### 3-5. Inspection of the Rear and Forward Body Sections and Warhead Body Section Containers

*Note.* Some containers have only one access cover plate.

a. In addition to the inspection in paragraph 3-4, perform the inspection in b through h below for the rear and forward body section and warhead body section containers.

b. Loosen the wing nuts (3, fig. 3-3) on each of the two access cover plates (5) on the ends of the container.

c. Swing each of the access cover plates downward to expose the humidity indicator window (4) and the air valves (2).

d. Check the humidity indicator card (6) on each end of the container. If the indicator card is not blue, carefully inspect the rear and forward body sections or warhead body section when removed from the container for deterioration due to moisture.

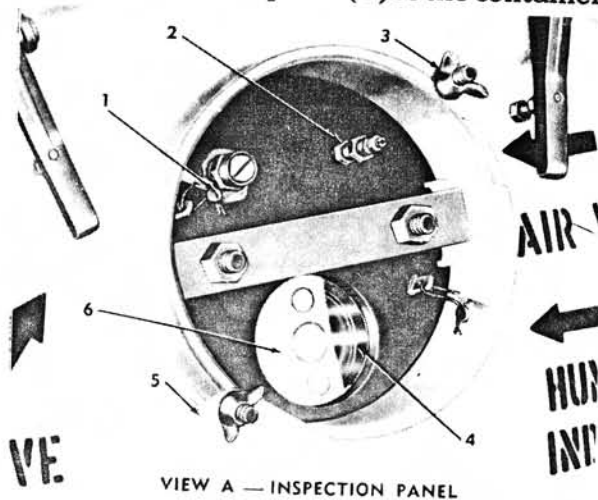
e. Inspect the seals (1), two on the container cover, two on each end of the container, and one on the log tube cover plate.

f. Report any damage, defects, broken seals, or absence of seals to the proper authorities.

*Note.* Omit g and h below if uncrating is to follow immediately.

g. Swing the two access cover plates (5) up to close.

h. Tighten the wing nuts (3) to secure each access cover plate (5) to the container.



VIEW A - INSPECTION PANEL



- 1 - Lead seal (7)
- 2 - Air valve (2)
- 3 - Wing nut (4)
- 4 - Humidity indicator window (2)
- 5 - Access cover plate (2)
- 6 - Humidity indicator card (2)

Figure 3-3. Rear and forward body section container and warhead body section container (typical).

## Section III. UNCRATING AND ASSEMBLING THE MISSILE

### 3-6. Uncrating the Rear Body Section and the Forward Body Section

*Note.* Some containers have only one access cover plate.

a. *Inspection.* Perform the inspection of the container (par. 3-5).

b. *Container Depressurization* (fig. 3-4).

(1) Loosen the wing nuts that secure the access cover plate over the inspection panel.

- (2) Open the access cover plate.
- (3) Remove the valve cap from the upper valve assembly.
- (4) Remove the upper valve assembly from the lower valve stem.

**WARNING:** Remove the lower valve core cautiously. Wait until the air pressure equalizes before attempting to remove the cover.

(5) Use the slotted tip of the valve cap as a wrench, and remove the lower valve core from the lower valve stem.

(6) Repeat steps (1) through (5) above on the opposite end of the container, and allow the container to depressurize completely.

(7) Install the lower valve core in the lower valve stem.

(8) Install the upper valve assembly in the lower valve stem.

(9) Install the valve cap on the upper valve assembly.

(10) Swing the access cover plate closed, and secure with the wing nuts.

(11) If required, repeat steps (7) through (10) above on the opposite end of the container.

*c. Removal of the Container Cover (fig. 3-5).*

**WARNING:** Be sure the container pressure is completely equalized before removing the container cover.

(1) Cut and remove the lead seals on the outer edge of the container cover and the log tube cover plate.

(2) Loosen the wing nuts that secure the log tube cover plate to the log tube.

(3) Swing the log tube cover plate upward, and remove the extension handle from the log tube.

*Note.* Release the top clamps last in step (4) below.

(4) Use the extension handle and disconnect the quick-release clamps that secure the container cover to the container.

**WARNING:** Due to the weight of the container cover, it must be removed by two men.

(5) Use the container cover handles, and remove the container cover.

*d. Preparation for Removal of the Rear Body Section and the Forward Body Section.*

(1) Remove the hexagon-head bolts (6, fig. 3-6), flat washers (7), and self-locking hexagon nuts (9) that secure the missile motor heat heater (5) to the heater brackets (8); remove the heater.

(2) Remove the hexagon-head bolts (3), flat washers (2), and self-locking hexagon nuts (10) that secure each heater bracket to the rear of the forward body section (1); remove the brackets.

(3) Break and remove the lockwire, if present, through the heads of the hexagon-head screws (20, fig. 3-7) that secure each movable track (22).

**WARNING:** Insure that track stops are present before removing track locking bolts (20).

(4) Remove the hexagon-head screw (20) and lockwasher (21) that secure each movable track to the stationary tracks (1).

(5) Slide the movable tracks out as far as possible.

*Note.* For external missile markings, refer to table 3-2 and figures 3-32 and 3-33.

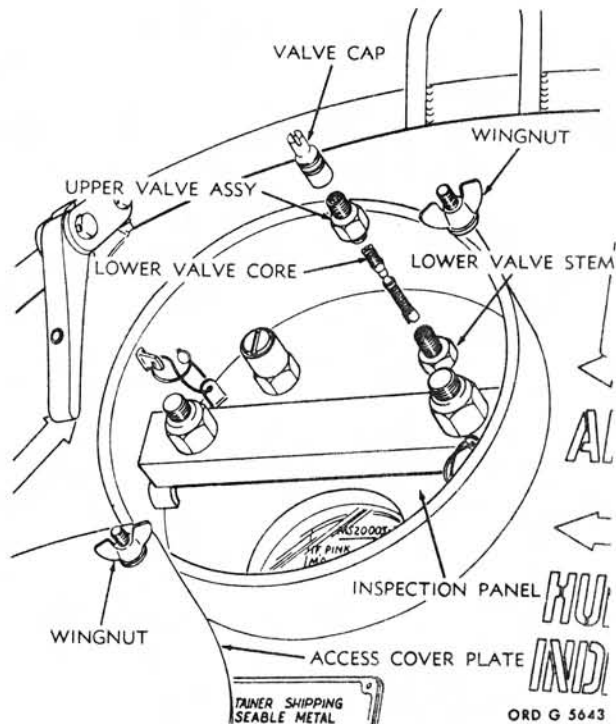


Figure 3-4. Container depressurization.



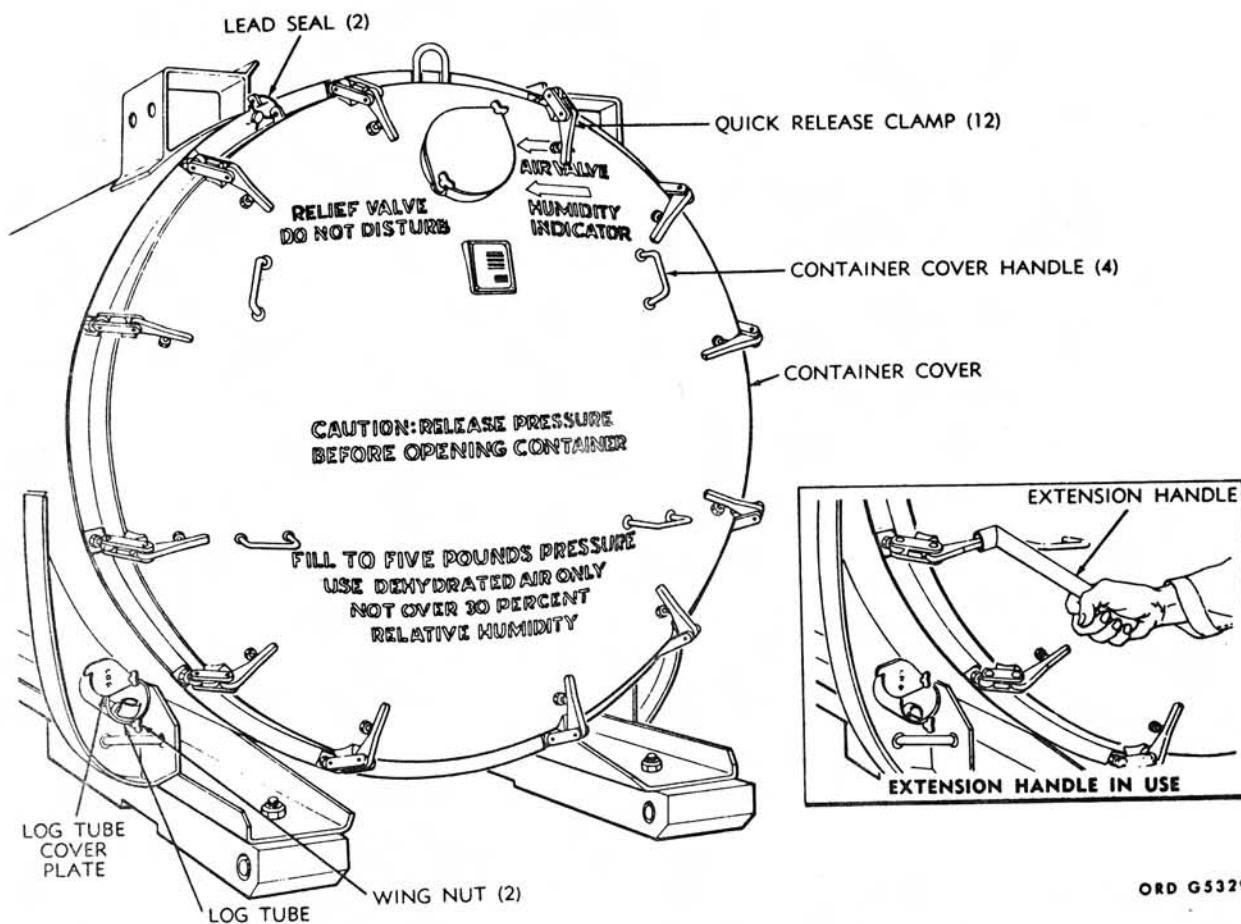


Figure 3-5. Removal and installation of the container cover.

(6) Inspect the rear body section and the forward body section for visible damage, proper external markings, and loose or missing components. Refer to paragraph 12-2 for standards of acceptability of skin defects.

*Note.* Perform (7) through (10) below for missiles 13001 and subsequent.

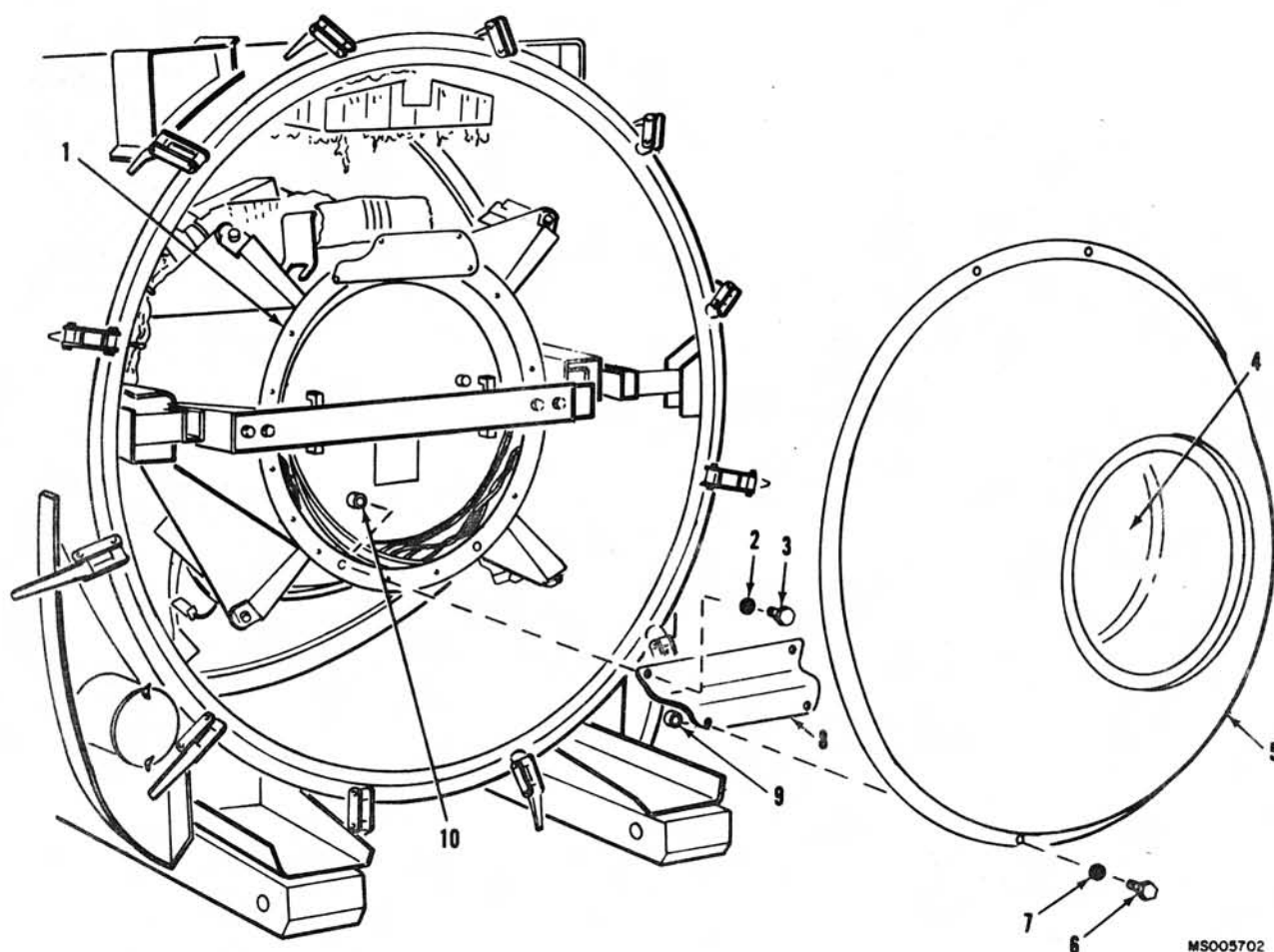
(7) Disconnect the storage loop clamps (4, fig. 3-27), and remove the fail-safe wiring

harness (8) from the shipping position in the forward body section.

(8) Remove the hose and cable assembly (7); remove the protective cover from the hose and cable assembly.

(9) Inspect the end of the hose for cracks and damage to the threads of the fitting.

(10) Install the hose and cable assembly in the forward body section, and secure with the storage loop clamps.



MS005702

- 1-Forward body section
- 2-No. 10 fl washer (4)
- 3-No. 10-32 X 25/32 hex-hd bolt (4)
- 4-Special shape insulation (missiles 10206 through 11935 and 13001 through 17055)

- 5-Missile motor head heater
- 6-No. 10-32 X 17/32 hex-hd bolt (4)
- 7-No. 10 fl washer (4)
- 8-Heater bracket (2)
- 9-No. 10-32 self-lkg hex nut (4)
- 10-No. 10-32 self-lkg hex nut (4)

Figure 3-6. Removal and installation of the missile motor head heater.

*e. Removal of the Forward Body Section.*

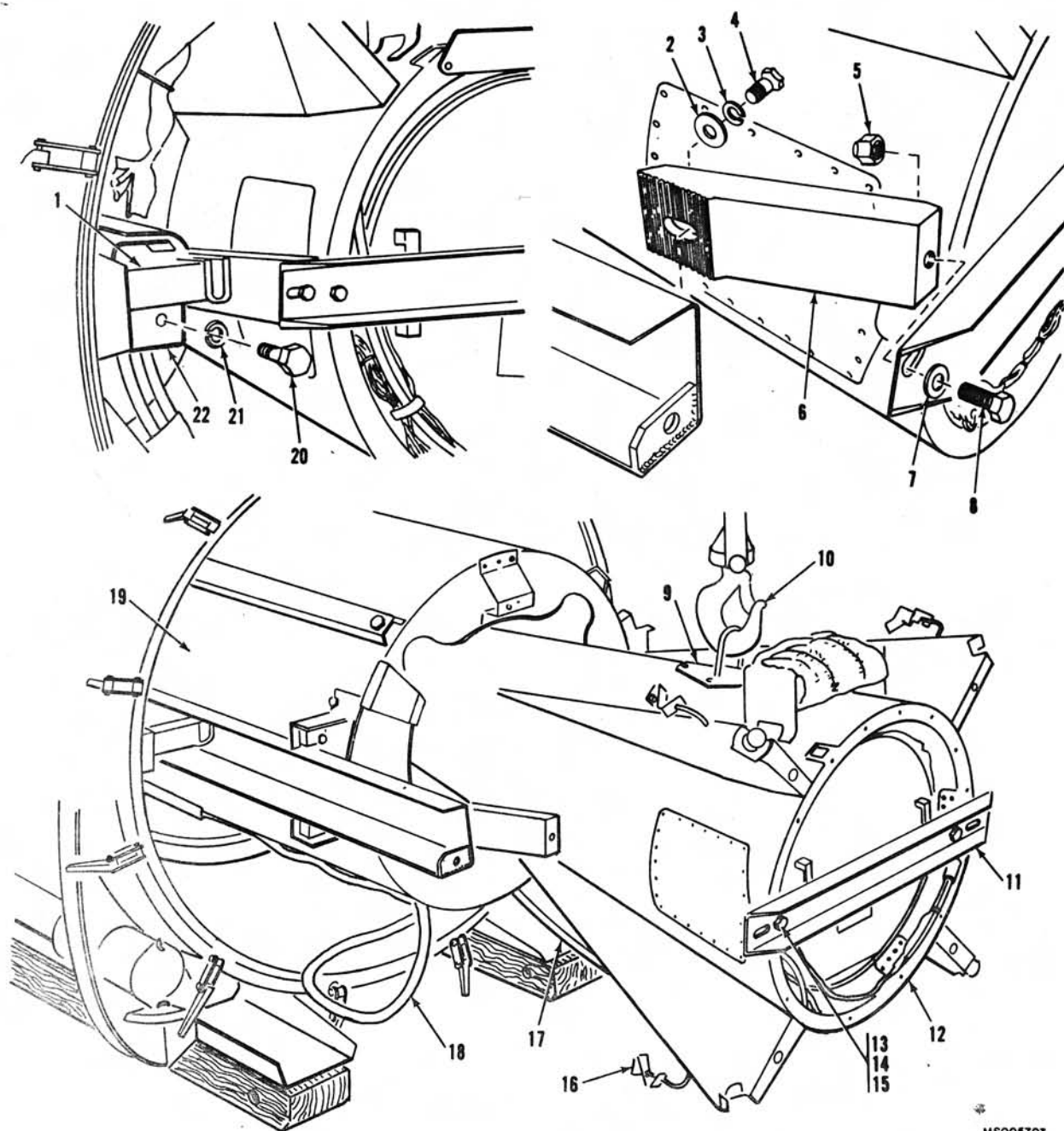
**CAUTION:** Use care to prevent damage to the exterior electrical cabling.

(1) Remove the shipping cords that secure the transponder control group wiring harness (18, fig. 3-7) and the warhead wiring harness (17) around the forward body section; allow the end of the wiring harnesses to rest temporarily on the floor.

(2) Position the hoisting device capable of lifting at least 300 pounds so that the falling hook (10) may be attached to the hoist (9).

**CAUTION:** Insure that the hoist is secure.

(3) Attach the falling hook to the hoist, and take up the slack in the cable to support the weight of the forward body section.



MS005703

- |                                   |                                      |   |
|-----------------------------------|--------------------------------------|---|
| 1—Stationary track (2)            | 9—Hoist                              | 18—Transponder control group wiring harness |
| 2—1/2 fl washer (2)               | 10—Falling hook                      | 19—Rear body section                        |
| 3—1/2 lockwasher (2)              | 11—Shipping support channel          | 20—3/4-10 X 1/4 hex-hd screw (2)            |
| 4—1/2-13 X 1/4 hex-hd screw (2)   | 12—Forward body section              | 21—3/4 lockwasher (2)                       |
| 5—1/2-13 self-lkg hex nut (2)     | 13—5/16-18 self-lkg hex nut (2)      | 22—Moveable track (2)                       |
| 6—Support arm (2)                 | 14—5/16 fl washer (2)                |   |
| 7—1/2 fl washer (2)               | 15—5/16-18 X 1 1/4 hex-hd screw (2)  |   |
| 8—1/2-13 x 1 3/4 hex-hd screw (2) | 16—Ram probe pressure tube cover (4) |   |
|                                   | 17—Warhead wiring harness            |   |

Figure 3-7. Removal and installation of the forward body section.

- (4) Remove the hexagon-head screws (8), flat washers (7), and self-locking hexagon nuts (5) that secure the shipping support channel (11) to each of the two support arms (6) at the forward end of the movable tracks.
- (5) Remove the hexagon-head screws (4), lockwashers (3), and flat washers (2) that secure each of the two support arms to the movable tracks. Remove the support arms.
- (6) Remove the hexagon-head screws (15), flat washers (14), and self-locking hexagon nuts (13) that secure the channel to the forward body section; remove the channel.
- (7) Hold the forward body section steady, and slide the movable tracks, with the rear body section attached, into the container until the forward body section completely separates from the rear body section.
- (8) Place the forward body section (2, fig. 3-8) on the forward body section truck (10).
- (9) Secure the front of the forward body section to the forward cradle (11) of the truck with the holddown strap (1).

**Caution:** Be sure that the hose and cable assembly (7, fig. 3-27) is clear of the hand clamp (6) before securing the hand clamp.

- (10) Secure the rear of the forward body section to the rear cradle (9, fig. 3-8) of the truck with the hand clamp (8).
- (11) Remove the falling hook from the hoist (3).

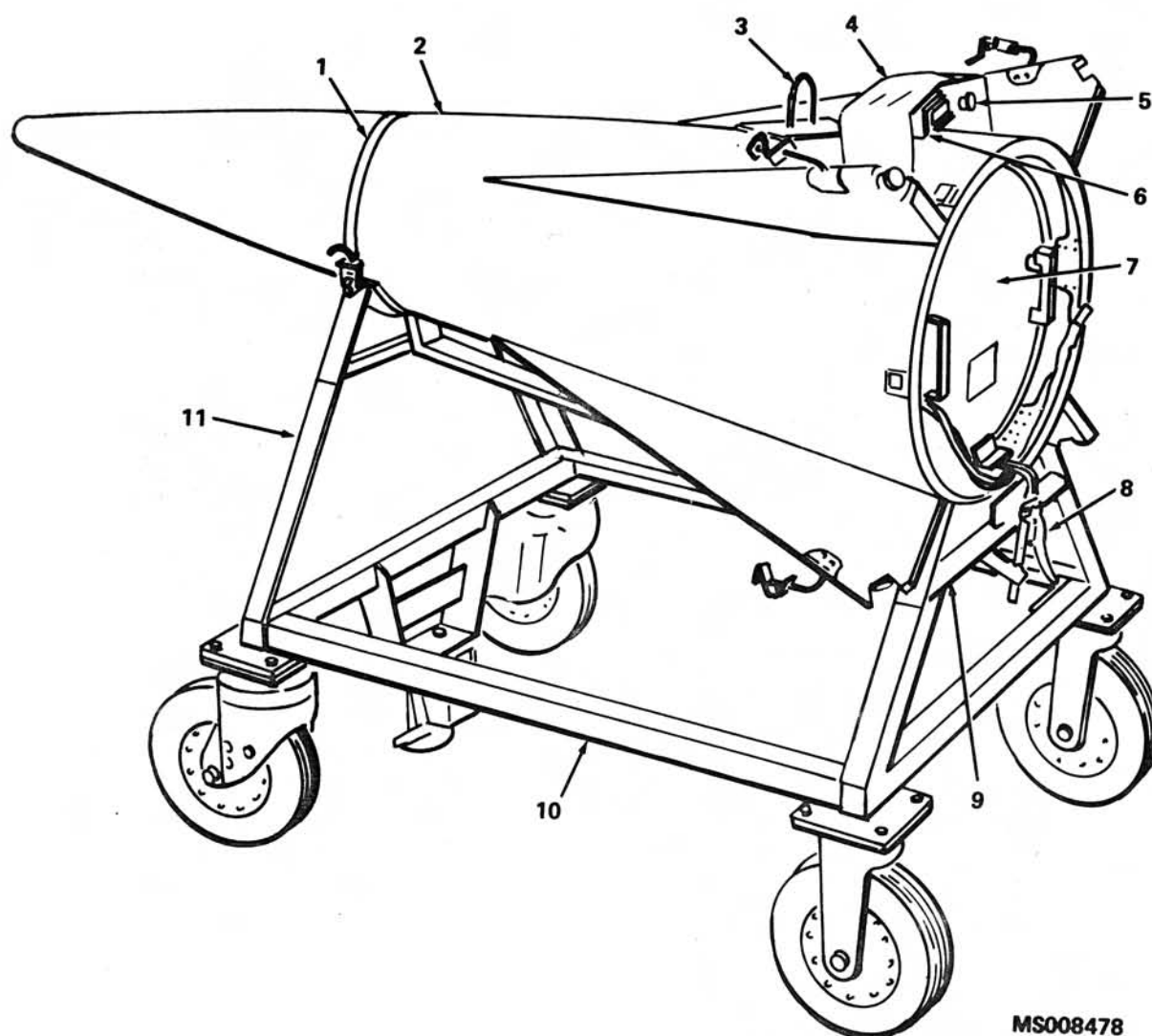
*Note.* On some series missiles, the sequential timer is packed for shipping in the accessory carton.

- (12) Inspect the forward body section for visible damage to the skin, fins, antenna horns, ram-pressure probes, fail-safe and timer bracket (4), fail-safe control (6), and sequential timer (5), and for loose or missing components.

- (13) Remove the equipment log from the log tube (fig. 3-5), and check that the missile serial number agrees with the serial number in the equipment log.
- (14) Remove the flathead screws (6, fig. 3-26 or 9, fig. 3-27) that secure the J1 + XMTR ACCESS DOOR (missiles 10206 through 11935) or the GUIDANCE TEST AND ADJUST ACCESS DOOR (missiles 13001 and subsequent); remove the access door.
- (15) Check that the transponder control group serial number agrees with the serial number in the equipment log.

*f. Removal of the Rear Body Section.*

- (1) Place the forward portions of the transponder control group wiring harness (fig. 3-9) and warhead wiring harness inside the rear body section.
- (2) Slide the movable tracks, with the attached rear body section, out of the container as far as possible.
- (3) Loosen the captive bolts that secure each of the two rear body support mounts to the movable tracks.
- (4) Loosen the rear body section captive bolts that secure each of the two rear body support mounts to the rear body section.
- (5) Slide the rear body support mounts forward along the movable tracks until they are clear of the rear body section; remove the mounts.
- (6) Loosen the forward shipping clamp captive bolts that secure the forward shipping clamp to the forward cradle; remove the shipping clamp.
- (7) Reach into container and loosen the captive bolts (fig. 3-10) that secure the rear shipping clamp to the rear cradle.
- (8) Remove the rear shipping clamp from the rear cradle.
- (9) Remove the plugs (8, fig. 3-11) from the handling ring segment mounting bolt holes on the forward end of the rear body section.



MS008478

- 1—Holddown strap
- 2—Forward body section
- 3—Hoist
- 4—Fail-safe and timer bracket
- 5—Sequential timer
- 6—Fail-safe control

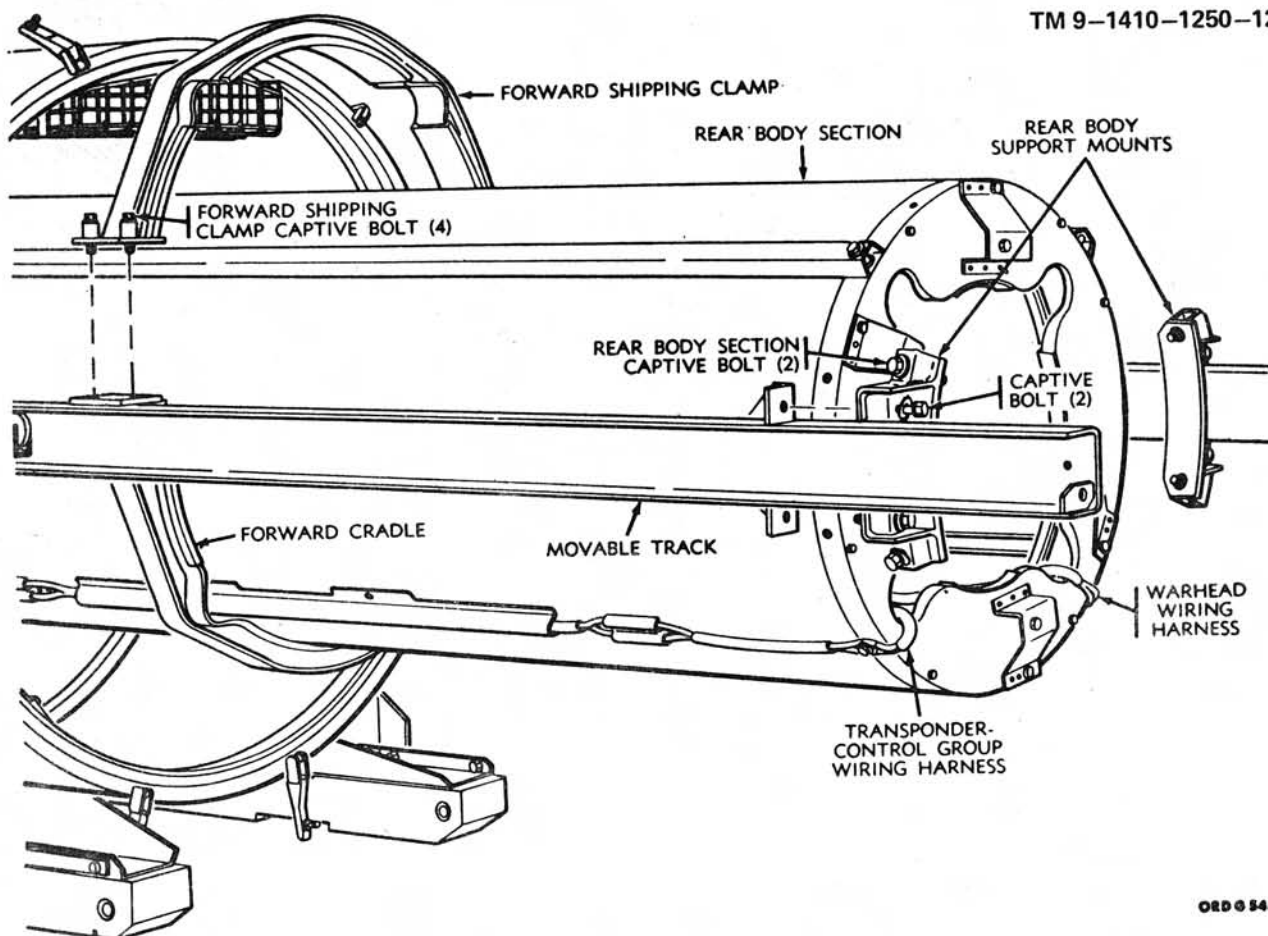
- 7—Transponder control group
- 8—Hand clamp
- 9—Rear cradle
- 10—Forward body section truck
- 11—Forward cradle

Figure 3-8. Installation of the forward body section on the track.

**Warning:** Check that the threads of the captive bolts (6) in the handling ring segments (7) and the bolt holes in the rear body section are in good condition.

- (10) Position the handling ring segments on the top and bottom of the rear body section with the AFT markings on the segments facing the rear;





ORD G 5481

Figure 3-9. Removal and installation of the rear body support mounts and the forward shipping clamp.

secure in position with the two captive bolts on each segment, and tighten the captive bolts to the torque value prescribed in table 15-9.

(11) Remove the plugs (1 and 5) from the rear body section hoist beam attach points on top of the rear body section.

*Note.* Check that the safety straps and the threads of the captive bolts on the rear body section hoist beam are in good condition. Check that the bolt holes in aft body section are in good condition.

(11.1) Secure the rear body section hoist beam to the rear body section by alternately tightening the two captive bolts on the hoist beam.

**WARNING:** The two captive bolts on the rear body section hoist beam (4, fig. 3-11) must be completely engaged before installing the two safety straps (2, fig. 3-11).

**CAUTION:** Position the safety strap buckles near the hoist beam so that the buckles will not touch the rear body section.

(12) Position the two safety straps of the rear body section hoist beam around the rear body section, and insert the end of each strap through its respective buckle. Pull the two safety straps tight and insure that they are properly secured by grasping the push-to-release lever on each buckle and pulling out.

(13) Attach the hoisting device to the hoist beam; take up the slack in the hoist chain.

**CAUTION:** Exercise care to prevent damage to the missile umbilical cable as the rear body section is lifted from the cradles.

(14) Slowly raise the rear body section until the hoist beam will just clear the de-siccant basket if present.

(15) Slide the movable tracks (9) into the container (10).

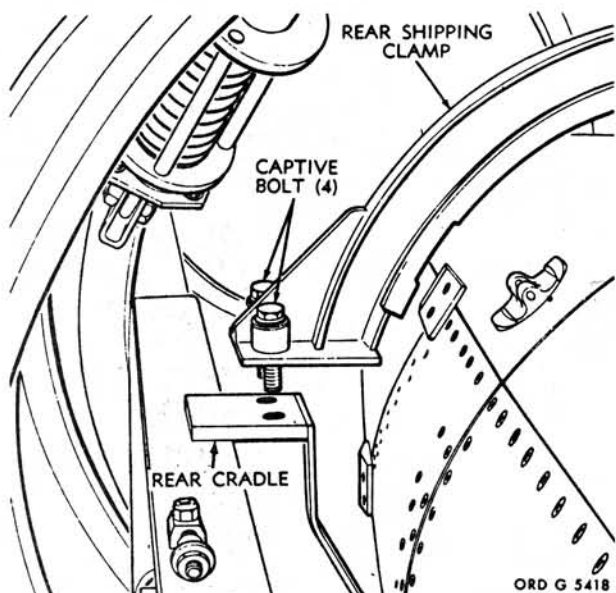


Figure 3-10. Installation and removal of the rear shipping clamp.

(16) Move the rear body section away from the container.

*Note.* The rear roll ring is clamped and stowed on the forward cradle of the missile body truck.

(17) Position the rear roll ring on the rear body section as shown in figure 3-12 and secure with the four captive bolts.

(18) Position the handling ring segments (6, fig. 3-13) on the sides of the forward end of the rear body section (3) with the AFT marking on the segments facing the rear of the rear body section; secure in position with the captive bolts (6, fig. 3-11) on each segment, and tighten to the torque value-prescribed in table 15-9.

(19) Position the rear body section on the missile body truck (8, fig. 3-13) by placing the handling ring segments in the rear cradle (7) and the rear roll ring (2) in the forward cradle (10).

**CAUTION:** Make certain that the rear roll ring is fully seated in the groove of the wheels (11) as shown in figure 3-13.

(20) Lock the rear body section in position on the truck with the self-locking pins (fig. 9-1).

(21) Remove the falling hook.

(22) Release the safety strap assemblies (2, fig. 3-11) and loosen the captive bolts (3) on the rear body section hoist beam (4); remove the hoist beam.

(23) Install the two plugs (1 and 5) in the rear body section.

#### *g. Final Uncrating Procedures.*

(1) Remove the steel strapping that secures the accessory carton to the inside of the container; remove the accessory carton.

(2) Inspect and inventory the accessories and hardware shipment against the enclosed packing list.

(3) Report any damaged or missing parts to the supervisor.

(4) Remove the hexagon-head bolt (5, fig. 3-14), flat washer (4), round-head screws (2), and flat washers (1) that secure each shipping tunnel section (3 and 7) to the rear body section; remove the tunnel sections, and place in the container.

*Note.* Perform step (5) below for missiles 11839 through 11935, and 13001 and subsequent.

(5) Remove the hexagon-head bolt (5), flat washer (4), and shipping tape (6) that secure each lower cable assembly to the forward end of the rear body section.

(6) Remove the roundhead screws (10) and flat washer (9) that secure each tunnel section bracket (8) to the rear body section; remove the brackets.

**CAUTION:** Use care to prevent damage to exterior electrical cabling.

(7) Remove the unattached ends of the transponder control group wiring harness (fig. 3-9) and the warhead wiring harness from the rear body section; allow the wiring harnesses to rest temporarily on the floor.

(8) Remove the hexagon-head bolts (fig. 3-15), lockwashers, and flat washers that secure the shipping adapter to the forward end of the rear body section; remove the shipping adapter.

(9) Place the unattached ends of the transponder control group wiring harness and warhead wiring harness inside the rear body section.

(10) Insure that the motor head heater wiring harness connectors P172 and P173 are connected to rear body section connectors J172 and J173 respectively. Make certain that the orange bands on connectors P172 and P173 are visible and a positive mechanical connection has been made.

*Note.* The check of safety-and-arming switch S31 must be accomplished during missile assembly and at three month intervals thereafter.

(11) Perform the check of safety-and-arming switch S31 as follows:

(a) Disconnect connector P177A (3, fig. 3-16) from connector J177.

(b) Remove the eight flathead screws that secure safety-and-arming switch S31 to the missile motor section and remove the switch. Hold it overhead with the window facing downward and shake it. If any foreign material is visible through the window reject the switch.

*Note.* Switches which fail either the electrical or arm check should be replaced. Switches which pass the tests may be used.

(c) Position safety-and-arming switch S31 (4, fig. 3-17) on the safety-and-arming switch sling (7), with connector J177 (2) pointed away from the handle (8) of the sling, and secure in position with the 3 flat-head screws (6).

**CAUTION:** Do not twist or turn the PUSH TO RESET switch when depressing it in step (d) below.

(d) Depress the PUSH TO RESET switch on S31, and check that the green field is visible through the inspection window (1).

(e) Revolve the sling at 3 revolutions per second for a minimum of 3 revolutions. A click is heard when the switch is armed.

(f) Check that the red field is visible through the inspection window. If the red field is not visible, repeat (e) above. If the red field still is not visible, reject safety-and-arming switch S31.

(g) With switch S31 in the armed position (red field visible), measure the resistance with a multimeter on RX1 between pins J177-2 and J177-3 and between pins J177-5 and J177-6. If the resistance exceeds 1 ohm, reject the switch.

(h) Depress the PUSH TO RESET switch on S31, and check that the green field is visible through the inspection window.

(i) With switch S31 in the safe position (green field is visible through the inspection window) measure the resistance with a multimeter between pins J177-1 and J177-2, and between pins J177-4 and J177-5. If the resistance exceeds 1 ohm, reject the switch.

(j) Remove the flathead screws that secure the switch to the sling and remove the switch.

(k) Position safety-and-arming switch S31 (1, fig. 3-16) in the missile motor section, and secure it in position with the eight flathead screws. Torque the screws to 15 pound-inches.

(l) Connect connector P177A to connector J177, and check that the entire width of the orange band on the connector is visible after the connection is made.

(12) Inspect the rear body section for visible damage to the skin and for loose or missing components. For skin defects, refer to paragraph 12-2 for standards of acceptability.

### 3-7. Uncrating the Main Fins and Elevons

a. Perform inspection of the shipping and storage box (par. 3-4).

b. Break the lead seals located on the cover fasteners.

c. Turn the swivel on each of the cover fasteners.

d. Remove the nails that secure the steel straps to the box cover, and bend the straps outward.

e. Release the hasp from each of the cover fasteners, and raise the box cover.

f. Remove the elevon support block (fig. 3-18) that secures the four forward main fins and four elevons in the box.

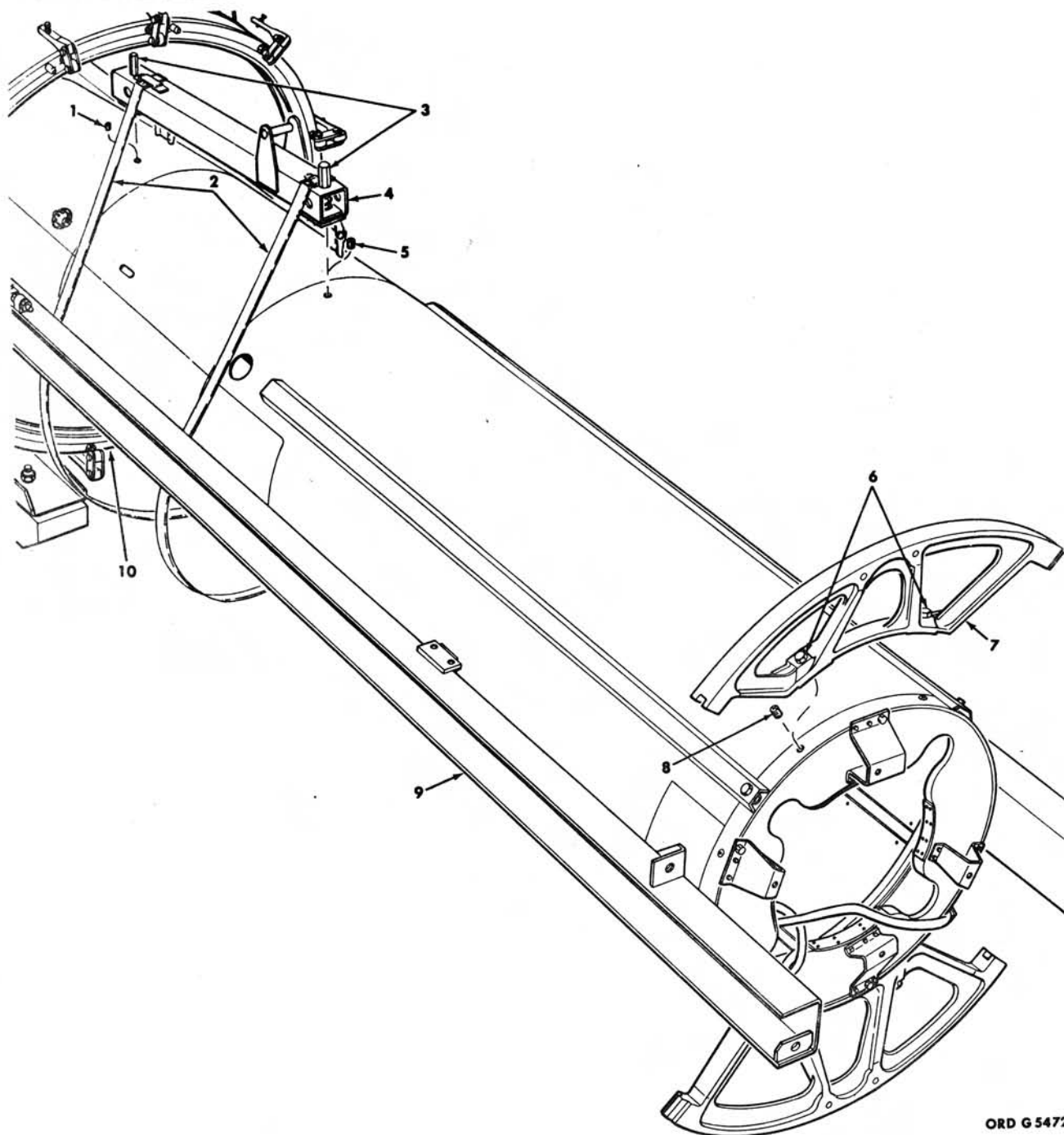
g. Remove the square nuts, lockwashers, and flat washers that secure the forward main fin support block inside the box. Remove the forward main fin support block.

h. Remove the accessory carton from the forward main fin support block, and place it in a suitable area.

i. Remove the four elevons and four forward main fins.

j. Remove the square nuts (fig. 3-19), lockwashers, flat washers, and square-neck bolts that secure the rear main fin support block to the box. Remove the support block.

*Note.* The rear main fins should be removed one at a time, inspected for damage, reinstalled in the box, and left there until they are required for installation.



ORD G 5472

- |                                |                             |
|--------------------------------|-----------------------------|
| 1—Plug                         | 6—Captive bolt (4)          |
| 2—Safety strap assy            | 7—Handling ring segment (2) |
| 3—Captive bolt                 | 8—Plug (8)                  |
| 4—Rear body section hoist beam | 9—Moveable track (2)        |
| 5—Plug                         | 10—Container                |

Figure 3-11. Removal and installation of the handling ring segments and the rear body section hoist beam.

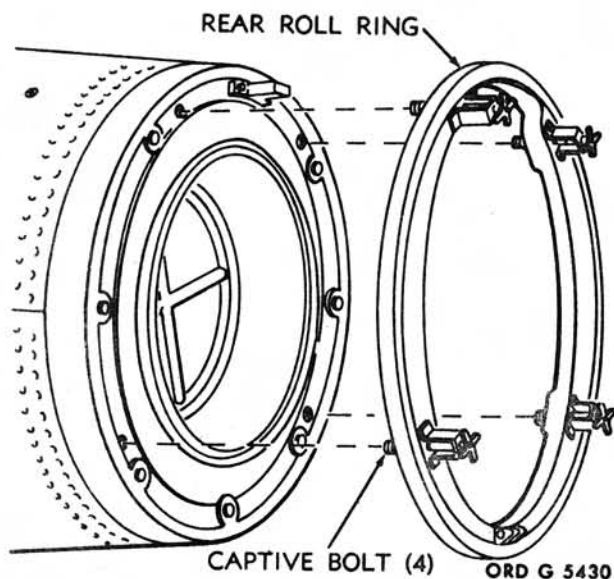


Figure 3-12. Removal and installation of the rear roll ring.

k. Inspect the forward main fins and elevons for damage.

l. Inventory all parts against the inclosed packing list.

m. Report any damaged or missing parts to the supervisor.

### 3-8. Removal of Access Doors, Cover Plates and Door Assemblies

a. Remove the flat-head screws (2 and 4, fig. 3-20) from the two missile motor section access doors, and remove the doors.

b. Remove the flathead screws (3 and 10 or 7 and 9 fig. 3-21) from the two equipment section access cover plates, and remove the cover plates.

c. Perform the operations listed in steps (1) through (3) below to remove the two actuator section door assemblies (fig. 3-22), one on each side of the actuator section.

(1) Remove a flathead screw from each joining pad that overlaps the edge of the door assembly.

(2) Loosen the remaining flathead screw, and turn the joining pad so that it does not overlap the door assembly.

(3) Remove the flathead screws that secure each door assembly to the actuator section, and remove the door assemblies.



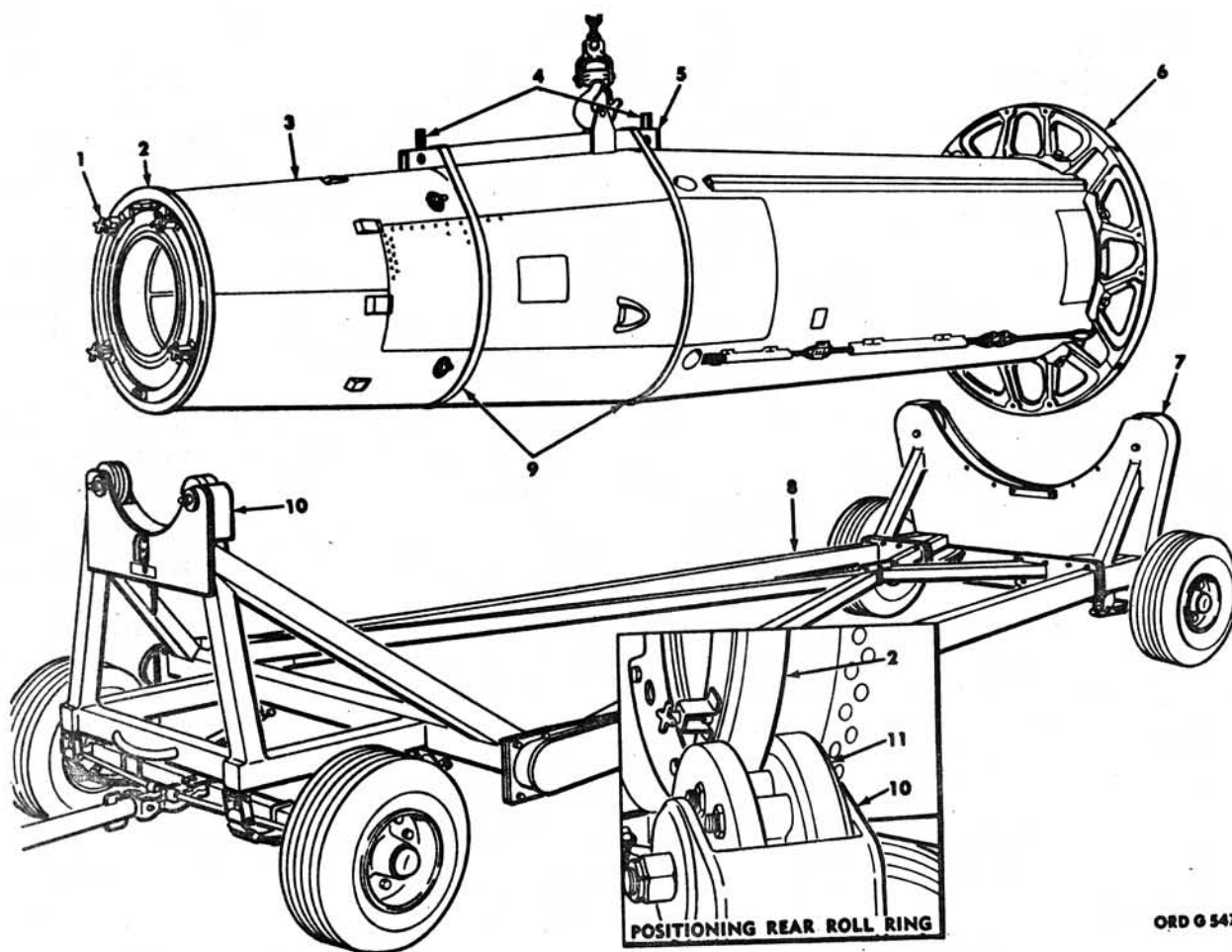
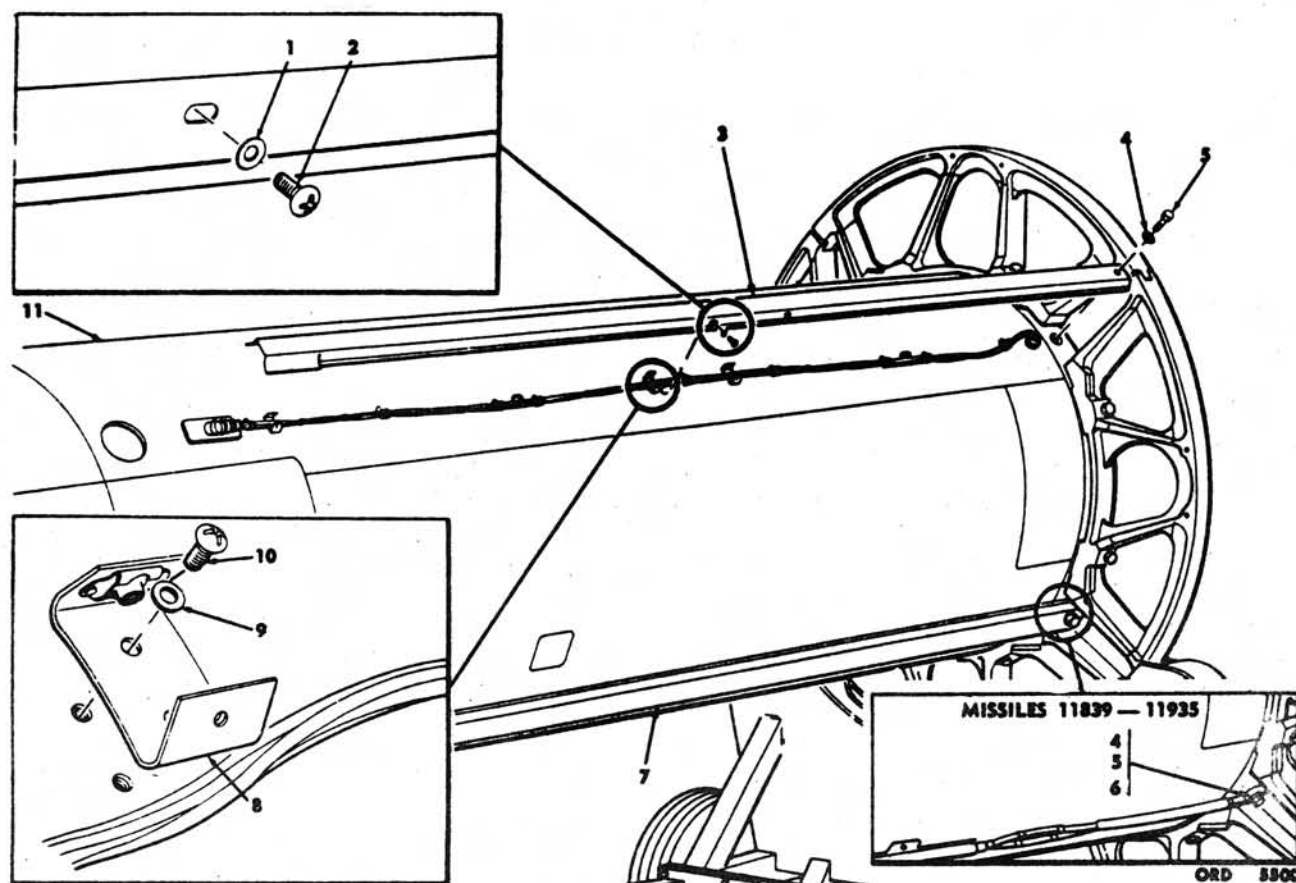


Figure 3-13. Installation of the rear body section on the missile body truck.



- 1—13/64-in-id fl washer (16) (missiles 10206 through 11745); (24) (missiles 11746 through 11838); (12) (missiles 11839 through 11935 and 13001 and subsequent)
- 2—No. 10-32 x 3/8 rd-hd screw (16) (missiles 10206 through 11745); (24) (missiles 11746 through 11838); (12) (missiles 11839 through 11935 and 13001 and subsequent)
- 3—Shipping tunnel section 9033218 (2) (fins no. 1 and 2)
- 4—0.765 id x 1.312 od fl washer 8170127 (4) (missiles 10206 through 11935 and 13001 through 13683) or 3/4 id x 1 1/2 od fl washer MS15795-322 (4) (missiles 13684 and subsequent)
- 5—3/4-16 x 1-17/32 hex-hd bolt AN182-13A (4) (missiles 10206 through 11935 and 13001 through 13683) or 3/4-16 x 1 5/8 hex-hd bolt NAS464P12A17 (4) (missiles 13684 and subsequent)
- 6—Shipping tape (missiles 11839 through 11935 and 13001 and subsequent)
- 7—Shipping tunnel section 9033218 (2) (missiles 10206 through 10569) or 9019530 (2) (missiles 10570 through 11838) (fins no. 3 and 4)
- 8—Tunnel section bracket 9033221 (8) (missiles 10206 through 11745); (12) (missiles 11746 through 11838); (6) (missiles 11839 through 11935 and 13001 and subsequent)
- 9—13/64-in-id fl washer (16) (missiles 10206 through 11745); (24) (missiles 11746 through 11838); (12) (missiles 11839 through 11935 and 13001 and subsequent)
- 10—No. 10-32 x 1/2 rd-hd screw (16) (missiles 10206 through 11745); (24) (missiles 11839 through 11935 and 13001 and subsequent)
- 11—Rear body section

Figure 3-14. Removal of the shipping tunnel sections.

### 3-9. Inspection of the Actuator Section

a. Visually inspect the actuator assemblies and mechanical linkage to determine if any

damage or defects exist. Refer any obvious damage or defects to the support unit for disposition.

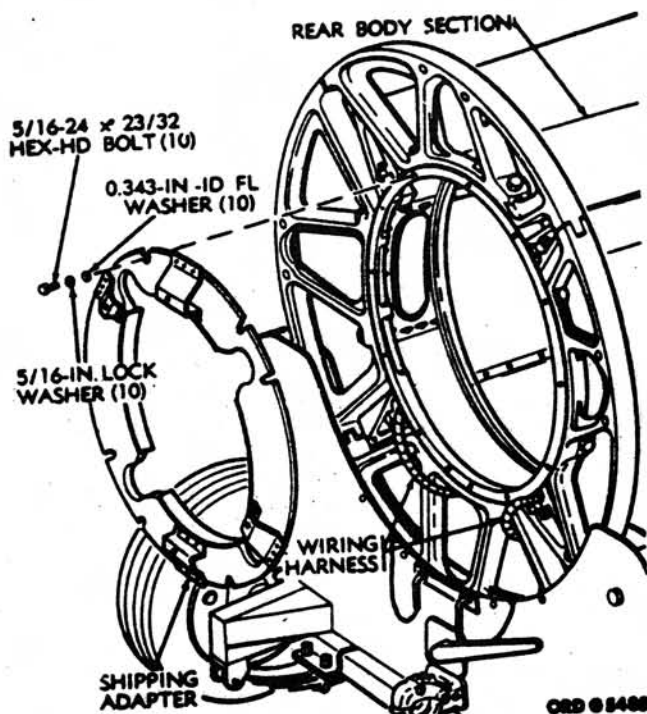
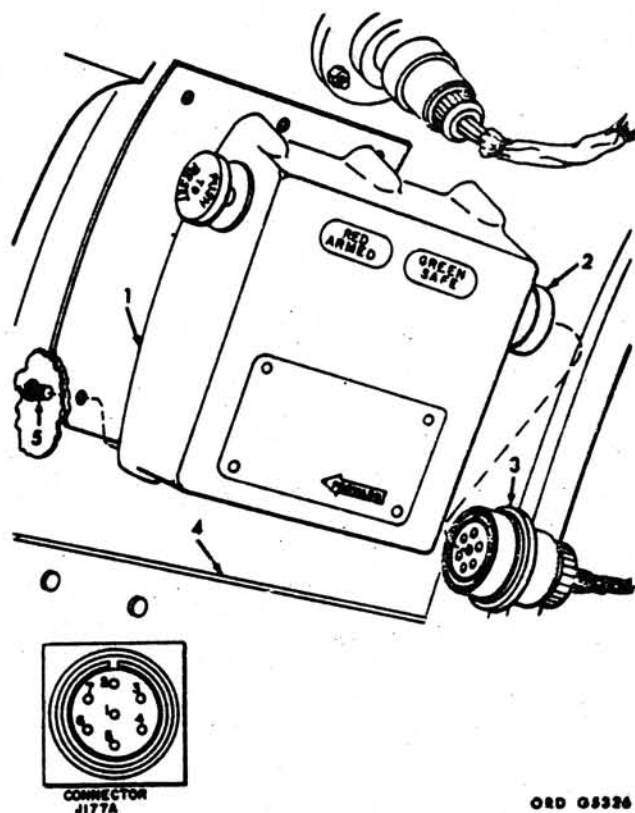


Figure 3-15. Removal and installation of the shipping adapter.

**b. Wiring Harness Check.**

- (1) Insure that P178 and P179 (6 and 5, fig. 3-23) are connected.
- (2) Disconnect P181 and P182 from battery BA-617.
- (3) Insure that P170 is connected to J170 (orange band showing).
- (4) Disconnect P177A from J177 (3 and 2, fig. 3-16) on the safety and arming switch S31.
- (5) Apply a short between pins A and B of P181.
- (6) Using the TS-352 on the RX1 scale, check for continuity between pins 1 and 3 of P177A.
- (7) Remove the short between pins A and B of P181, and recheck pins 1 and 3 of P177A for an open circuit.
- (8) Apply a short between pins A and B of P182.
- (9) Using the TS-352 on the RX1 scale, check for continuity between pins 4 and 6 of P177A.
- (10) Remove the short between pins A and B of P182, and recheck pins 4 and 6 of P177A for an open circuit.

3-22



- 1—Safety and arming switch S31
- 2—Connector J177
- 3—Connector P177A
- 4—Missile motor section
- 5—No. 10-32 x 13/32 fl-hd screw (b)

Figure 3-16. Removal and installation of safety-and-arming switch S31.

- (11) Check for an open circuit from missile frame to pins 1 through 6 of P177A.

**c. Remove and test the thermal battery pack (par. 12-87). Inspect the initiator pins, striker arms, percussion caps, springs, and related linkage on the thermal batteries. Insure that the shipping safety pin has been removed from each terminal.**

**WARNING:** Insure that the spring pin (5, fig. 12-53) or the drilled fillister head screw (5, fig. 12-54) is fully engaged in the plug (4, fig. 12-53 and 12-54). The spring pin (5) or the drilled fillister head screw is properly installed when no portion of it protrudes outside the plug (4).

Note. The date of manufacture can be determined by a four-digit code located approximately one inch from the connector end of the thermal battery. The first two digits indicate the month and the second two digits indicate the year of manufacture. Replace any undated batteries.

d. Check each thermal battery (2 and 5, fig. 12-52) to insure that the shelf life has not exceeded the limits indicated in table 15-8. If the shelf life will expire within three months, replace the battery. Document expiration dates for batteries if the expiration date is within two years.

Note. Periodic maintenance services on thermal battery bracket (2, fig. 12-54) must be accomplished during missile assembly and Biennial- and Quadrennial intervals.

e. Disassemble and assemble plug (4, fig. 12-54) from thermal battery bracket in accordance with para 12-87 to make sure that the plug will be properly extracted during missile flight at booster separation.

f. Notify the support unit (DS) that the umbilical cable is to be removed and tested in accordance with chapter 5 of TM 9-1410-250-34/2, and then reinstalled.

Note. If the motor start delay timer has been replaced with a dummy conector, check that the dummy connector is properly connected between P178 and P179, and omit paragraph 3-10.

Note. The check of the motor start delay timer relay must be performed during missile assembly and at 90-day intervals thereafter.

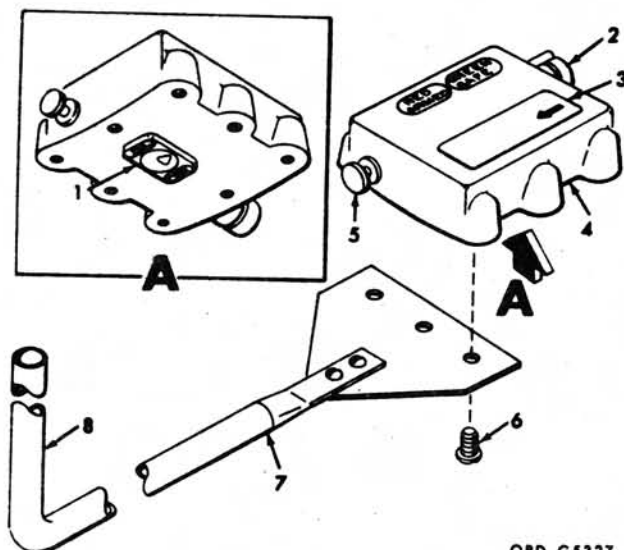
### 3-10. Removal, Test, and Installation of the Motor Start Delay Timer Relay

Note. The battery box may be removed if necessary.

a. *General.* The motor start delay timer relay (7, fig. 3-23) is secured to the bracket (8) mounted on the longeron (4), directly above the missile batteries.

b. *Removal.* Remove the hexagon nuts (1), lockwashers (2), and flat washers (3), that secure the relay to the bracket.

c. *Test.* Disconnect connectors P178 (6) and P179 (5) from connectors J178 and J179 of the relay. Using multimeter set to the RX1 scale, check for continuity and resistance between relay connector J179, pins A and G, B and C, and E and F. Replace the relay with connector 9978535 if the resistance exceeds 2 ohms.



ORD G5327

- 1—Inspection window
- 2—Connector J177
- 3—Arrow
- 4—Safety-and-arming switch S31
- 5—PUSH TO RESET switch
- 6—No. 10-32 X 1-3/32 fl-hd screw (3)
- 7—Safety-and-arming switch sling
- 8—Handle

Figure 3-17. Removal and installation of safety-and-arming switch S31 from the safety-and-arming switch sling.

d. **Installation.** Secure the relay to the bracket with the flatwashers, lockwashers, and hexagon nuts. Connect connectors P178 and P179 to connectors J178 and J179.

### 3-11. Installation of the Rear Main Fins

a. Install the rear main fin attach studs (6, fig. 3-24) with the retaining ring installed, at the rear main fin attach points and tighten to the torque value given in table 15-9.

b. Locate the stud retainers (5) on the rear main fin attach studs. Install the retainer screws (4) and tighten the screws to the torque value given in table 15-9.

**CAUTION:** Make a thorough inspection of all missile cable connectors to determine that all connectors are in place and securely fastened. If the connector is equipped with an orange band, insure that the entire width of the orange band is visible.

*Note.* Insure that the cover (2, fig. 7-2) is installed on the bracket (13), with the wide side up.

c. The wiring harness under fins 3 and 4 should measure  $50 \pm 1/4$  inches from the forward end of the rear body section to the rear edges of the covers (15, fig. 7-1 and 2, fig. 7-2). These measurements will be taken with the brackets (10, fig. 7-1 and 13, fig. 7-2) fully to the rear and the covers fully forward.

*Note.* If the above measurement cannot be made because the cable is too short or too long, adjustment may be made by loosening the cable clamps along the inside and outside the rear body section. Shorten or lengthen the cable as necessary to attain the measurement of  $50 \pm 1/4$  inches. Secure all cable clamps.

d. Using a cleaning solvent, remove all corrosion-preventive compound from the fin spar sockets (11, fig. 3-24), and apply a light coat of general-purpose lubrication-grade oil.

e. Remove the two self-locking pins (view A, fig. 9-1) on the rear cradle of the missile body truck. Rotate the rear body section so that a rear main fin can be installed at approximately 90 degrees clockwise and 90 degrees counterclockwise from the top center position. Relock the rear body section in position.

*Note.* The fins and elevons should be removed from the shipping and storage box to perform f and g below and replaced when the steps are complete.

f. Remove all tape from the main fins and elevons.

g. Using a cleaning solvent, remove the corrosion-preventive compound from the unpainted surfaces on all the main fins, elevons, and attaching hardware, and apply a light coat of general-purpose lubrication-grade oil. Do not lubricate threaded surfaces.

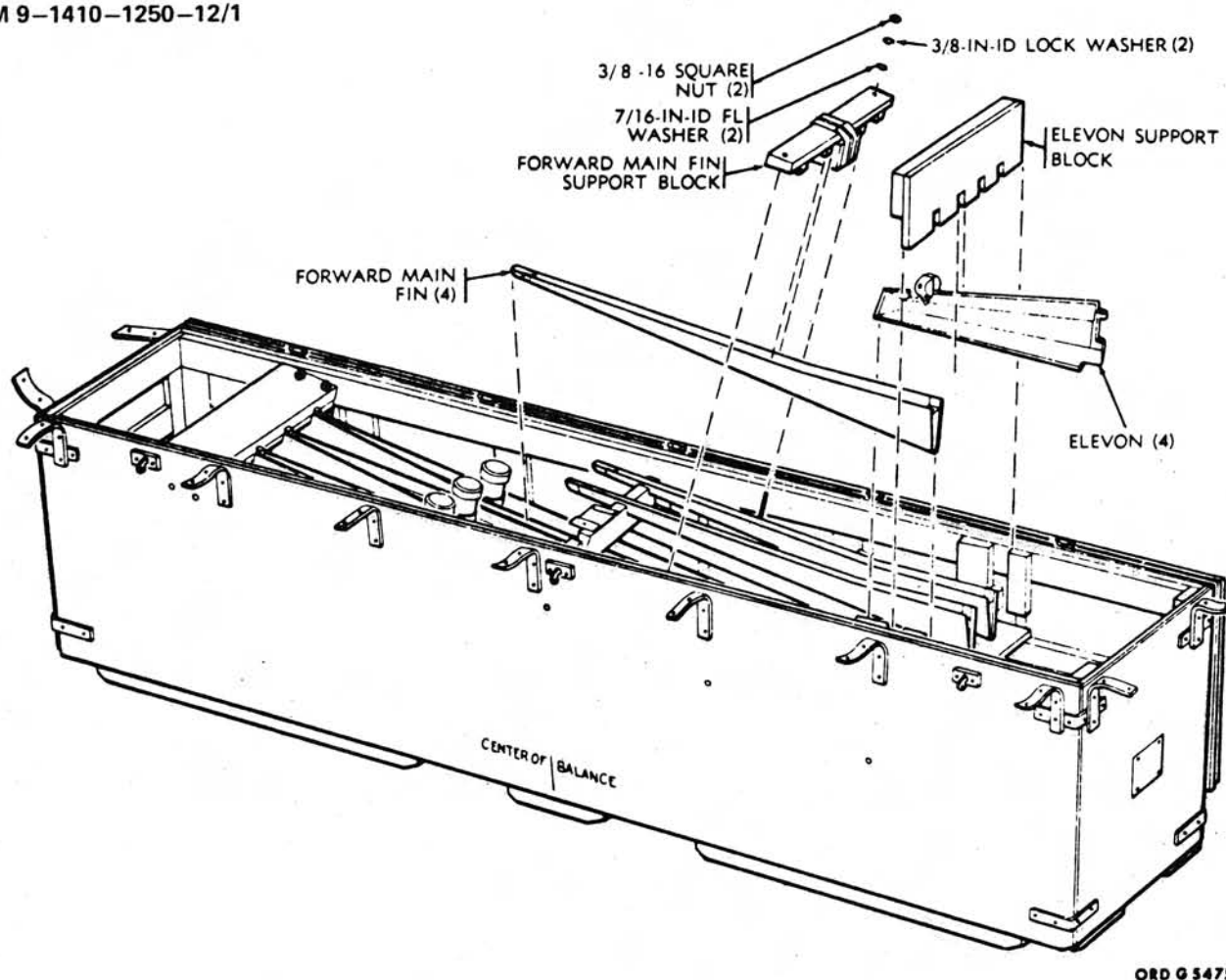
*Note.* Verify that each hanger-point setscrew contains a teflon insert or nylon coating.

*Note.* If setscrews with teflon inserts or nylon coating have been used previously, check the screws by turning them into their mounting holes by finger pressure. If they can be turned as many as 7 turns, they must not be reused.

h. Remove a rear main fin from the shipping and storage box.

**CAUTION:** Insure that all wiring harnesses are clear of the fin indexing holes before seating the fin.





ORD G 5475

Figure 3-18. Removal and installation of the forward main fins and elevons.

i. Aline the rear main fin spar (10, fig. 3-24) with the fin spar socket; aline the indexing pins (14) with the indexing holes; aline the fin (12) with the fin attach stud at the forward end of the rear body section; push the fin into position on the rear body section.

*Note.* Connectors P506 and P505 may be disconnected to eliminate interference when applying torque to the hanger-point setscrew (1) for fin 4 in *j* below. Perform steps *j* and *k* in sequence.

*Note.* Check that the setscrew hole in the spar socket is alined with the setscrew hole in the rear main fin spar. If the holes are not properly alined, position the rear main fin until correct alinement is obtained.

j. Install the hanger-point setscrew to secure the rear main fin to the rear body section. Reach through the rear main fin spar opening and make certain that the tapered end of the setscrew protrudes through the rear main fin spar wall. Then tighten until the tapered end of the setscrew makes contact with the beveled hole in the

rear main fin spar. Torque the setscrew to the torque value given in table 15-9. Check that the setscrew is bottomed against the beveled hole in the fin spar. If it is not bottomed, apply a torque of 450 pound-inches and recheck for bottoming. If the hanger-point setscrew is still not bottomed against the beveled hole in the fin spar, remove it and repeat the procedure with a new setscrew.

k. Install the flat washer (8) and double hexagon nut (9) on the rear main fin attach stud, and tighten to the torque value given in table 15-9.

l. Repeat steps *h* through *k* above to install the opposite rear main fin.

m. Repeat steps *e* and *h* through *l* above to install the remaining two rear main fins.

*Note.* If connectors P506 and P505 were disconnected in *j* above, reconnect them when the step is completed.

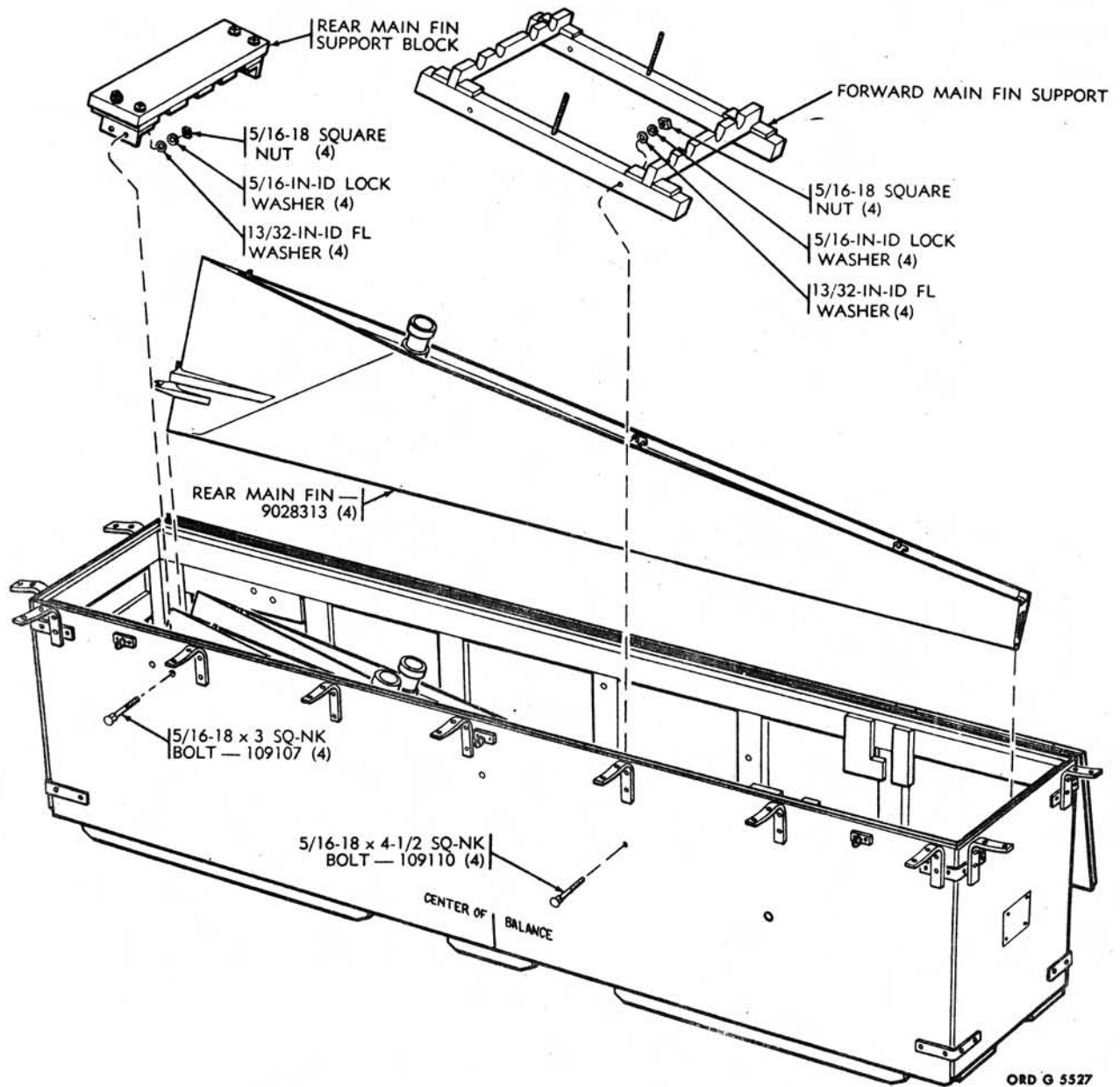
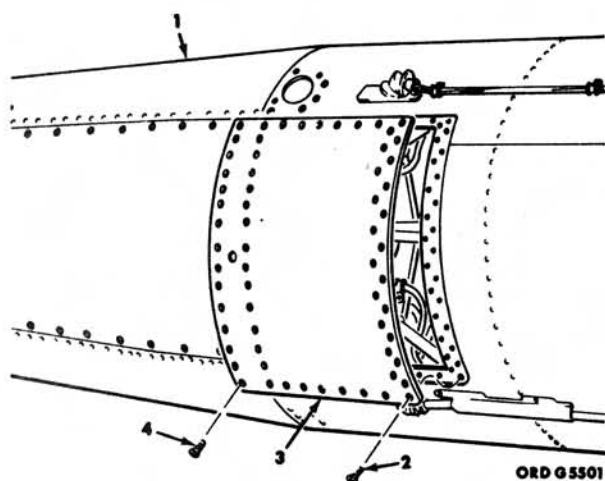


Figure 3-19. Removal and installation of the rear main fins.

### 3-12. Installation of the Elevons

a. Position the elevon hinge clevis (4, fig. 3-25) to the hinge fitting (2) on the rear main fin (1); install the elevon hinge pin (3) through the hinge clevis and the hinge fitting on the fin.

b. Aline the clevis hole on the elevon (9) with the clevis attached to the hinge fitting. Install the elevon on the elevon hinge clevis; install the flat washer (7) and double hexagon nut (8) to the end of the elevon hinge clevis; do not tighten.



- 1—Missile section
- 2—1/4-28 x 21/32 fl-hd screw (62) missile 10206 through 10388) (35) (missiles 10339 through 11935 and 13001 and subsequent)
- 3—Missile motor section access door (2)
- 4—1/4-28 x 17/32 fl-hd screw (27) (missiles 10339 through 11935 and 13001 and subsequent)

Figure 3-20. Removal and installation of the missile motor section access doors.

c. Aline the elevon holes and universal joint holes; insert the elevon attach pin (13) through the elevon and universal joint (12); aline the groove on the attach pin with the spring pin hole and secure the elevon attach pin in position by inserting the spring pin (11) until it does not protrude beyond the surfaces of the elevon.

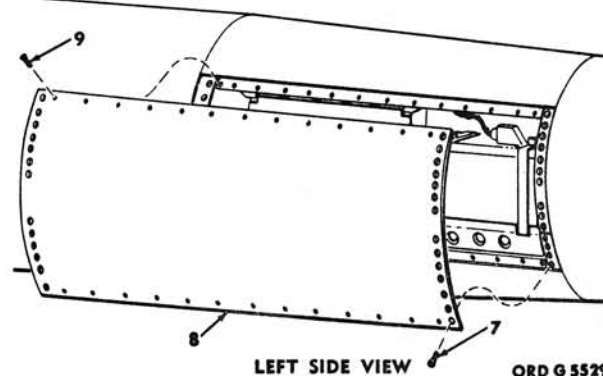
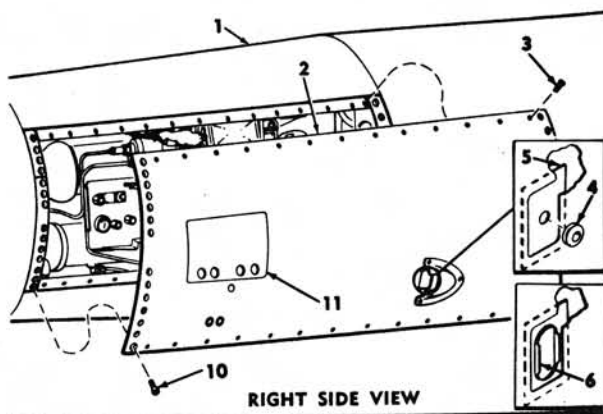
d. Tighten the double hexagon nut on the end of the elevon hinge clevis to the torque value given in table 15-9.

e. Repeat steps a through d above to install the three remaining elevons.

f. Return all rear main fin box components and attaching hardware to the main fin and elevon shipping and storage box.

g. Close the box cover; position the hasps on the swivels; turn the swivels to secure.

h. Bend the shipping straps inward over the cover and flatten the straps.



- 1—Equipment section
- 2—Right equipment section access cover plate
- 3—1/4-28 x 21/32 fl-hd screw (26)
- 4—Grommet (missiles 14965 and subsequent)
- 5—Plate (missiles 14965 and subsequent)
- 6—Seal (missiles 10206 through 14964)
- 7—5/16-24 x 23/32 fl-hd screw (27)
- 8—Left equipment section access cover plate
- 9—1/4-28 x 21/32 fl-hd screw (26)
- 10—5/16-24 x 23/32 fl-hd screw (27)
- 11—APS SERVICE DOOR or HPU SERVICE DOOR

Figure 3-21. Removal and installation of the equipment section access cover plates.

### 3-13. Installation of the Forward Body Section for the Missile Electrical Checkout (Missiles 10206 through 11935)

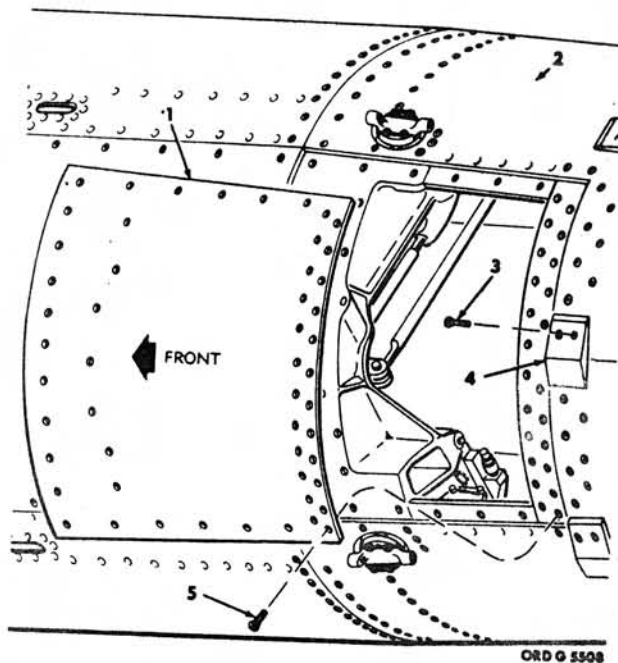
Note. Ascertain that preformed packing (13, fig. 12-2) is properly seated and firmly cemented on the antenna horn (25).

a. Install the receiving antenna horns in the forward fin assemblies in accordance with paragraph 12-24b.

b. Remove the flathead screws (13, fig. 3-26) that secure the GUIDANCE TEST AND ADJUST ACCESS DOOR assembly (1) to the left side of the forward body section; remove the access door assembly and the fail-safe wiring harness (11).

**CAUTION:** Avoid damage to the wiring harness.

c. Remove the flathead screws (2) that secure the INERTIA SWITCH AND ADJUST ACCESS DOOR assembly (3) to the left side of the forward body section; remove the access door assembly.



- 1—Actuator section door assembly
- 2—Actuator section
- 3—No. 10-32 X 23/32 fl-hd screw (2)
- 4—Joining pad
- 5—1/4-28 X 21/32 fl-hd screw (51)

Figure 3-22. Removal and installation of the actuator section door assemblies.

d. Remove the unattached ends of the wiring harnesses (4 and 9, fig. 3-28) from the rear body section (1). Place each wiring harness through the opening in the handling ring segment (3) on top of the missile.

e. Tape the missile motor head heater (fig. 4-31) inside the rear body section.

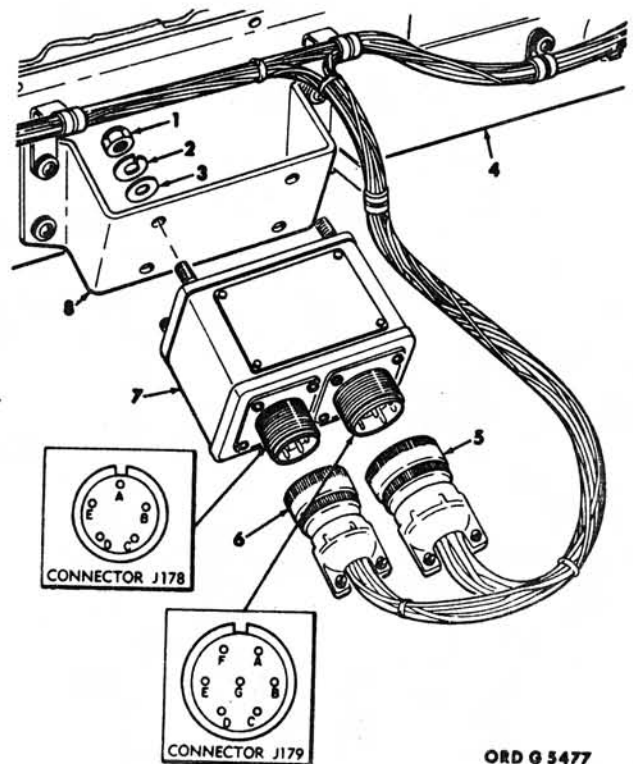
f. Attach the falling hook (5, fig. 3-28) of the hoisting device to the hoist-bolt (6) of the testing fixture (7), and slowly raise the testing fixture.

g. Position the testing fixture at the forward end of the rear body section.

h. Remove the two self-locking pins (view A, fig. 9-1) on the rear cradle of the missile body truck.

Note. Step i below is a convenient method of positioning the rear body section 24 degrees clockwise from the flight position.

i. Rotate the rear body section 24 degrees clockwise so that the nine holes in the rear



- 1—No. 8-32 hex. nut (4)
- 2—No. 8 lockwasher (4)
- 3—No. 8 fl washer (4)
- 4—Longeron
- 5—Connector P179
- 6—Connector P178
- 7—Motor start delay timer relay
- 8—Bracket

Figure 3-23. Removal and installation of the motor start delay timer relay.

body section aline with the captive bolts (8, fig. 3-28) on the testing fixture.

j. Lock the rear body section in position on the missile body truck.

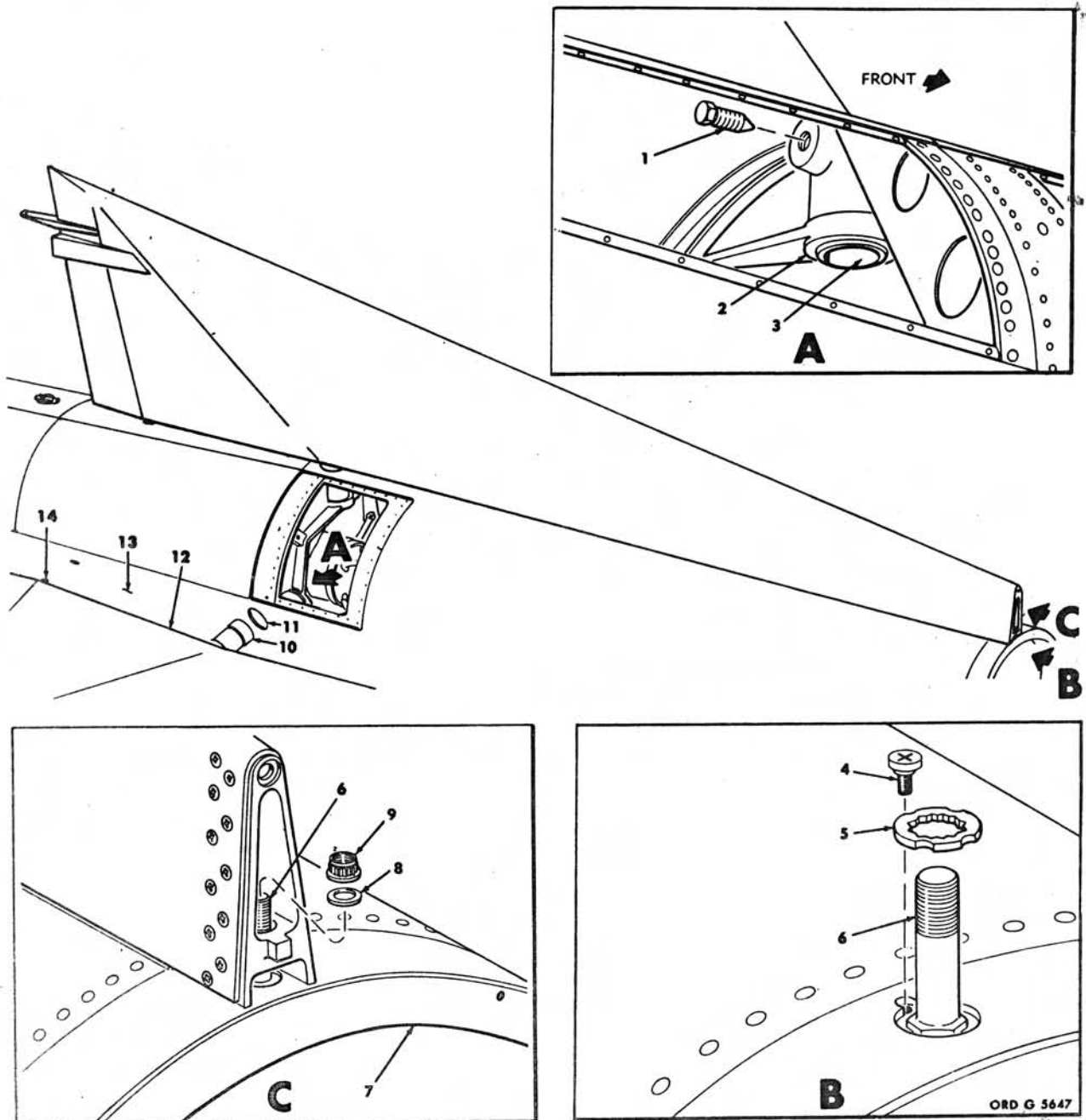
k. Secure the testing fixture with the captive bolts, and torque the bolts to the value given in table 15-9.

l. Remove the falling hook from the hoist-bolt.

m. Remove the four flathead screws (9, fig. 3-29). Install the screws in the storage holes in the hinge of the testing fixture (5).

**Caution:** Insure that the hoisting device is secure.





- 1—3/4-10 X 21/2 hanger-pt setscrew
- 2—Fin spar socket
- 3—Rear main fin spar
- 4—Retainer screw (4)
- 5—Stud retainer (4)
- 6—Rear main fin attach stud (4)
- 7—Rear body section

- 8—0.640-in-id fl washer (4)
- 9—5/8-18 dble hex nut (4)
- 10—Rear main fin spar
- 11—Fin spar socket
- 12—Rear main fin (4)
- 13—Rear body section
- 14—Indexing pin (3)

Figure 3-24. Removal and installation of the rear main fin.

n. Attach the falling hook (6) of the hoisting device to the forward body section hoist (7).

o. Release the hand clamp (9, fig. 3-26) and the holddown strap (5) that secure the forward body section (4) to the truck.

p. Lift the forward body section from the truck, and position it on the testing fixture; secure the right side of the testing fixture to the forward body section with the captive bolts (2, fig. 3-29). Torque the bolts to the value given in table 15-9.

q. Remove the falling hook from the forward body section hoist.

**WARNING:** Insure that the self-locking pins (view A, fig. 9-1) are inserted through the handling ring segment prior to performing r below.

**CAUTION:** Check the placement of the wiring harness before opening or closing the forward body section hinged to the testing fixture, to make certain they will not be damaged.

r. Swing the forward body section to the right until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

**CAUTION:** When performing s through u below, care must be taken to prevent damage to the connector.

s. Remove the protective wrapping from the transponder control group wiring harness (13), if not removed during inspection.

t. Insert the transponder control group wiring harness (24, fig. 3-30) through the hole in the testing fixture near fin 2, and insert connector P1 (13) between the right side of the transponder control group (22) and the forward body section; move connector P1 forward to the access opening.

u. Disconnect connector P177B (8, fig. 4-20) from connector J177 (7).

v. Remove the screw (1), lockwasher (2), and flat washer (3) that secure the clamp (4) to the bracket (9) and safety-and-arming switch S30 (6). Move the barometer probe hose and cable (5), with the attached clamp clear of the bracket.

w. Remove the flathead screws (10) that secure the bracket to the forward body section (15) and remove the switch assembly.

Hold it overhead with the window facing downward and shake it. If any foreign material is visible through the window, reject the switch.

**Note.** The check of safety-and-arming switch S-30 must be performed during missile assembly and in accordance with TM 9-1400-250-15/3 thereafter.

x. Remove the two roundhead screws (14), lockwashers (13), and flat washers (12) from the forward end of the bracket.

y. Position safety-and-arming switch S30 (2, fig. 4-21) and the bracket (3) on the safety and arming switch sling (5) with connector J177 (7, fig. 4-20) pointing away from the handle of the sling and secure it in position with the three screws (4, fig. 4-21).

z. Depress the PUSH TO RESET switch (1) on switch S30, and check that the green field is visible through the inspection window (6).

aa. Remove the sling at three revolutions per second for a minimum of three revolutions. An audible click is heard when switch S30 arms.

ab. Check that the red field is visible through the inspection window. If the red field is not visible, repeat aa above and ab. If the red field still is not visible after the second test, reject switch S30.

ac. With switch S30 in the armed position, using a multimeter on the R X 1 scale, measure the resistance between pins J177-2 and J177-3 and between J177-5 and J177-6. The resistance should not exceed 1 ohm. If this value is exceeded, reject switch S30.

ad. Depress the PUSH TO RESET switch on switch S30, and check that the green field is visible through the inspection window.

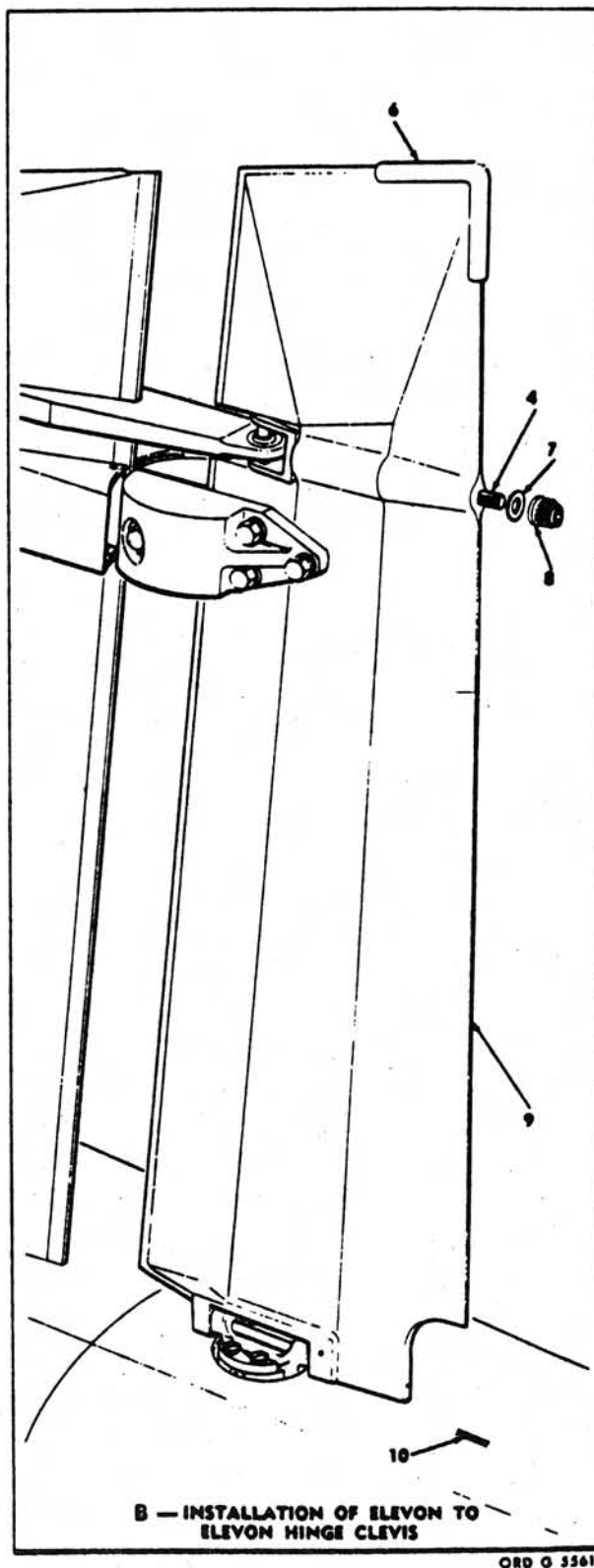
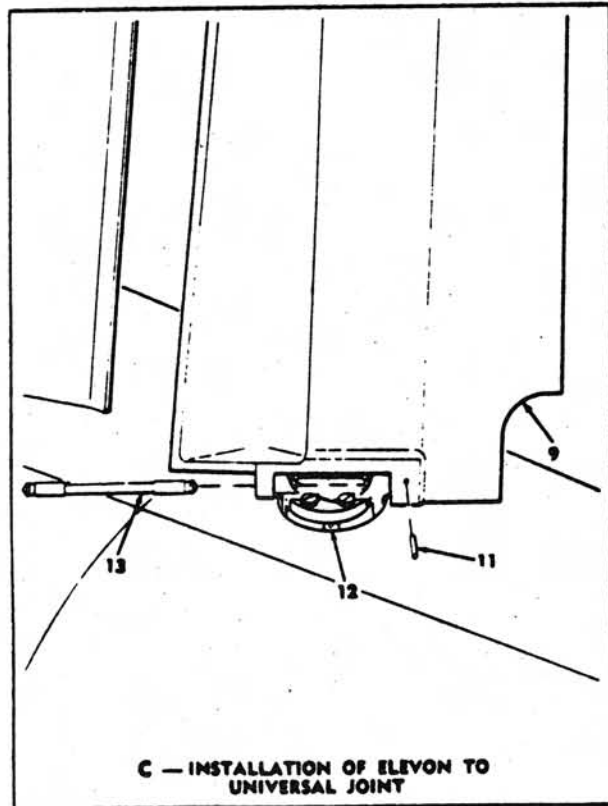
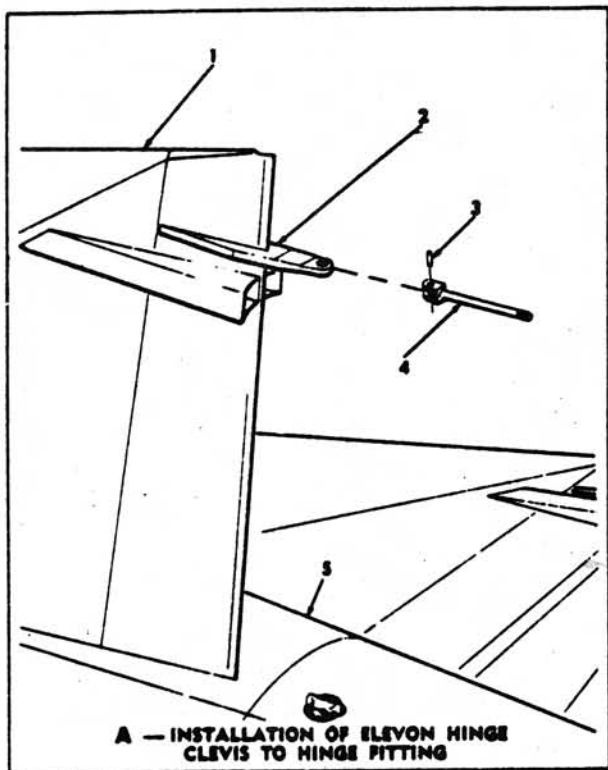
ae. With switch S30 in the safe position, measure the resistance between J177-1 and J177-2 and between J177-4 and J177-5. The resistance should not exceed 1 ohm. If this value is exceeded, reject switch S30.

af. Remove the screws that secure switch S30 and the bracket to the sling.

ag. Install the two roundhead screws, lockwashers, and flat washers removed in x above.

ah. Position switch S30 and the bracket (9, fig. 4-20) in the forward body section and secure with flathead screws (10).

ai. Position the barometer probe hose and cable (5), with the attached clamp (4) on the bracket (9), and secure with the truss-head screw (1), lockwasher (2), and flat washer (3).

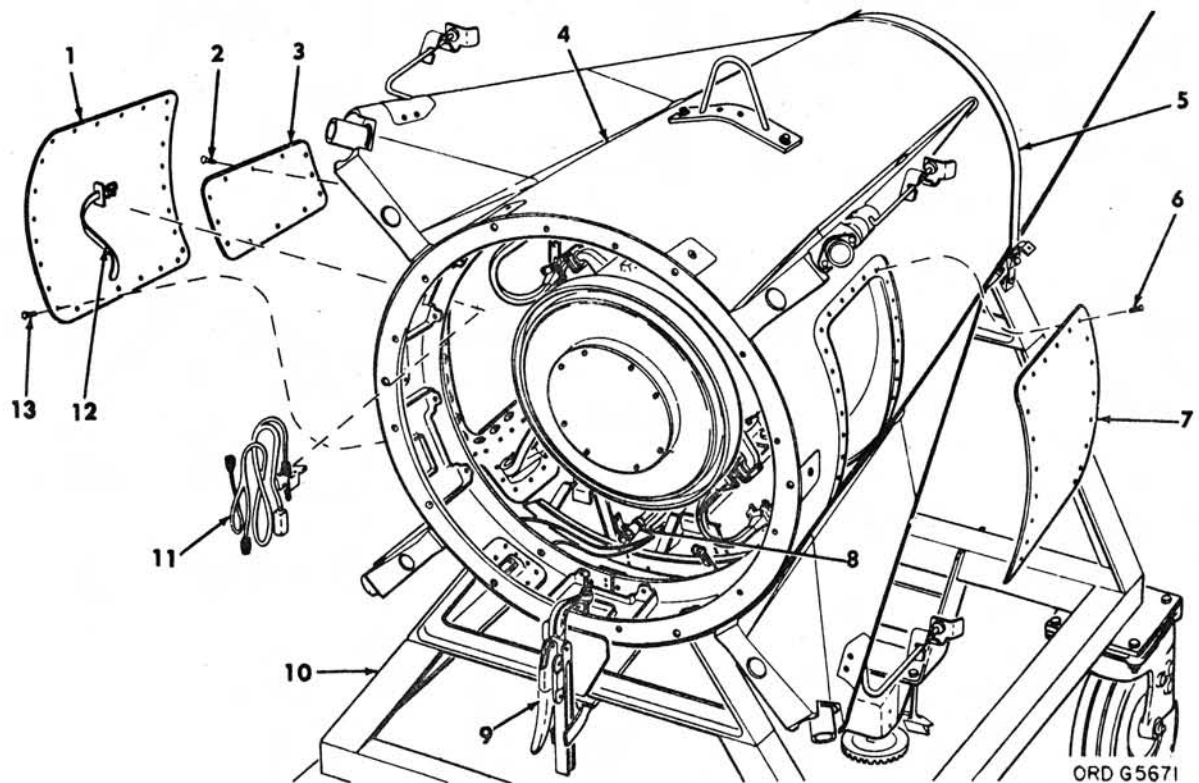


ORD G 3561

Figure 3-25. Removal and installation of the elevons.

- |                                       |  |
|---------------------------------------|--|
| 1—Rear main fin                       | 8—3/8-24 dble-hex nut (4)              |
| 2—Hinge fitting                       | 9—Elevon (4)                           |
| 3—0.311 X 1.219 elevon hinge pin (4)  | 10—Elevon centering scribe lines       |
| 4—3/8 X 5.437 elevon hinge clevis (4) | 11—3/32 X 1/2 spg pin (4)              |
| 5—Rear body section                   | 12—Universal joint                     |
| 6—Protective guard (4)                | 13—0.260 X 4 3/4 elevon attach pin (4) |
| 7—0.390-in-id fl washer (4)           |  |

Figure 3-25. Removal and installation of the elevons—legend.



ORD G5671

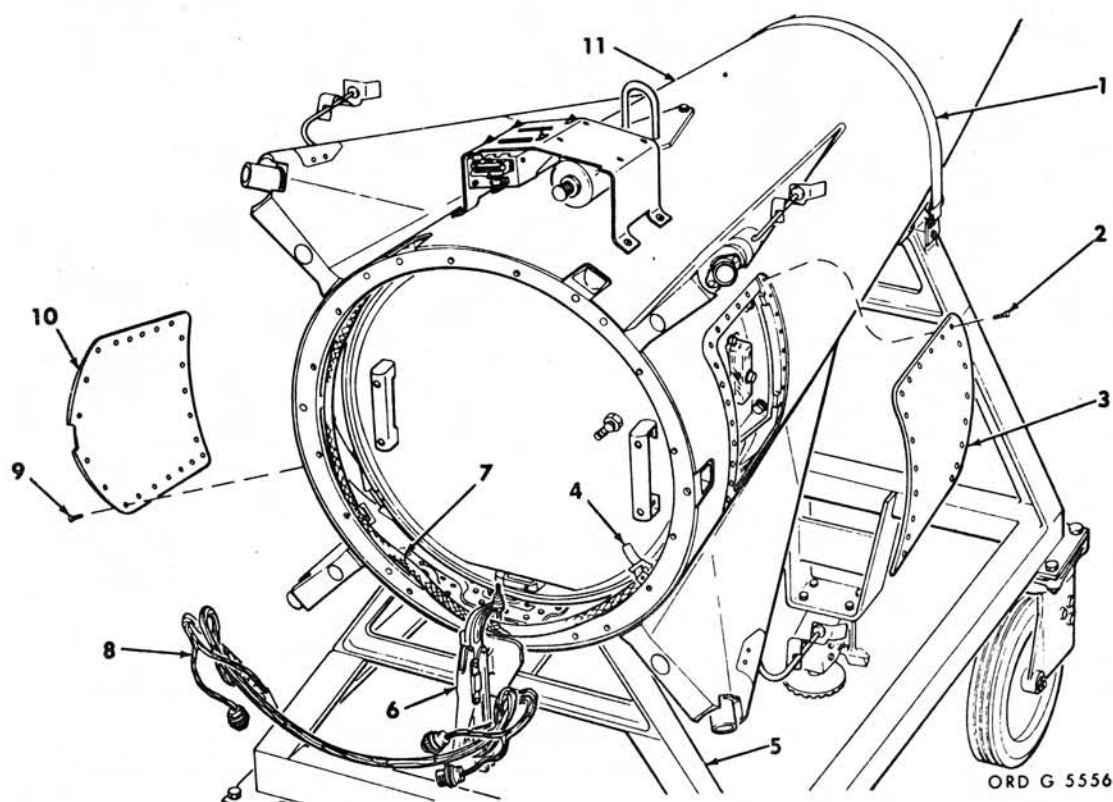
- |  |                                       |
|--|---------------------------------------|
| 1—GUIDANCE TEST AND ADJUST ACCESS DOOR assembly  | 7—J1 + XMTR ACCESS DOOR assembly      |
| 2—No. 10-32 X 15/32 fl-hd screw (12)             | 8—Hose and cable assembly             |
| 3—INERTIA SWITCH AND ADJUST ACCESS DOOR assembly | 9—Hand clamp                          |
| 4—Forward body section                           | 10—Forward body section truck         |
| 5—Holddown strap                                 | 11—Fail-safe wiring harness           |
| 6—No. 10-32 X 15/32 fl-hd screw (26)             | 12—Storage strap                      |
|  | 13—No. 10-32 X 15/32 fl-hd screw (26) |

Figure 3-26. Removal and installation of the forward body section access door (missiles 10206 through 11935).

aj. Connect connector P177B (8) to connector J177(7), and check that the entire width of the orange band on the connector is visible after the connection is made.

ak. Perform the operations listed below to connect the wiring harnesses.

- (1) Connect connector P513 (16, fig. 3-30) to connector J513 (17). The



ORD G 5556

- 1—Holddown strap
- 2—No. 10-32 X 23/32 fl-hd screw (24)
- 3—J1 + XMTR ACCESS DOOR
- 4—Storage loop clamp (2)
- 5—Forward body section truck
- 6—Hand clamp

- 7—Hose and cable assembly
- 8—Fail-safe wiring harness
- 9—No. 10-32 X 23/32 fl-hd screw (23)
- 10—GUIDANCE TEST AND ADJUST ACCESS DOOR
- 11—Forward body section

Figure 3-27. Removal and installation of the forward body section access doors—  
(missiles 13001 and subsequent).

entire width of the orange band on the connector is visible after the connection is made.

- (2) Check that connector P177B (18) is connected to connector J177 (20). The entire width of the orange band on the connector is visible after the connection is made.
- (3) Remove the protective cover (14) from connector J1 (15).

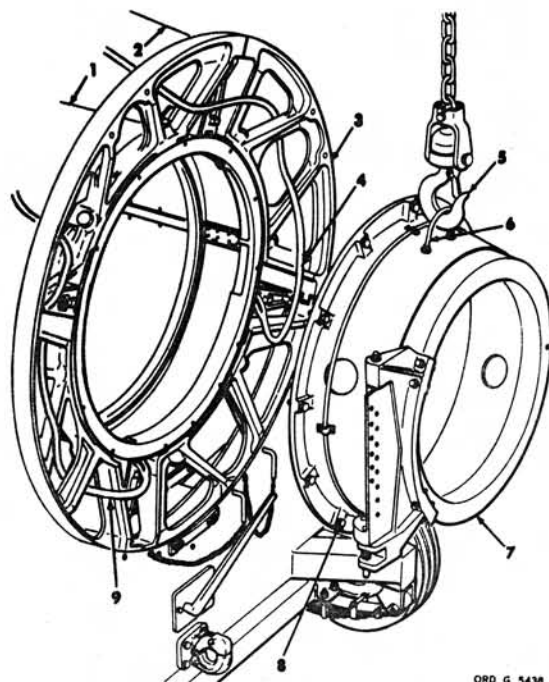
**Caution:** Do not install the shoulder bolt (2, fig. 7-13) of connector P1 until the connector is properly positioned for attachment.

- (4) Install the gasket and secure connector P1 to connector J1, then insert the shoulder bolt and torque to 30 plus or minus 5 pound-inches. No torque test of the shoulder bolt is required, due to

setting or cold flow of the gasket. Care should be taken to insure that the connector fits snugly and that the shoulder bolt is not over-tightened. (If the guide pins bottom, remove the excess potting compound from the guide pin holes.)

- (5) Connect connector P503 (2, fig. 3-30) to connector J503 (3).
- (6) Connect connector P502 (8) to connector J1 (9), and secure it by putting the latch (2, fig. 7-6) over the stud (4).
- (7) Connect connector P511 (5, fig. 3-30) to JUMPER connector J2 (6), and secure the sequential timer (7) in an appropriate place in the forward body section.





- 1 — Rear body section
- 2 — Rear main fin (4)
- 3 — Handling ring segment (4)
- 4 — Warhead wiring harness
- 5 — Falling hook
- 6 — Hoisting bolt
- 7 — Testing fixture
- 8 — Captive bolt
- 9 — Transponder control group wiring harness

Figure 3-28. Removal and installation of the testing fixture.

*al.* Weave the warhead wiring harness (4, fig. 3-28) through the struts of the handling ring segment (3), until all the slack is taken up. Make certain that no part of the wiring harness extends beyond the outer edges of the handling ring segment. Tie the loose end of the wiring harness to one of the struts of the handling ring segment.

*am.* Swing the forward section (8, fig. 3-29) to the left until the hinge lock pin (12) snaps into the locked position.

**Caution:** Lift and support the forward body section while installing and tightening the hexagon-head bolt in *an* below.

*an.* Secure the left side of the forward body section to the testing fixture (5) with a hexagon-head bolt (11) and flat washer (10).

*ao.* Remove the self-locking pins (view A, fig. 9-1), and rotate the rear body section to the normal flight position. Replace the self-locking pins.

### 3-14. Installation of the Forward Body Section for the Missile Electrical Check-out (Missiles 13001 and Subsequent)

*a.* Ascertain that the preformed packing (13, fig. 12-2) is properly seated and firmly cemented on the antenna horn (25).

*a.1.* Install the receiving antenna horns in the forward fin assemblies in accordance with paragraph 12-7b.

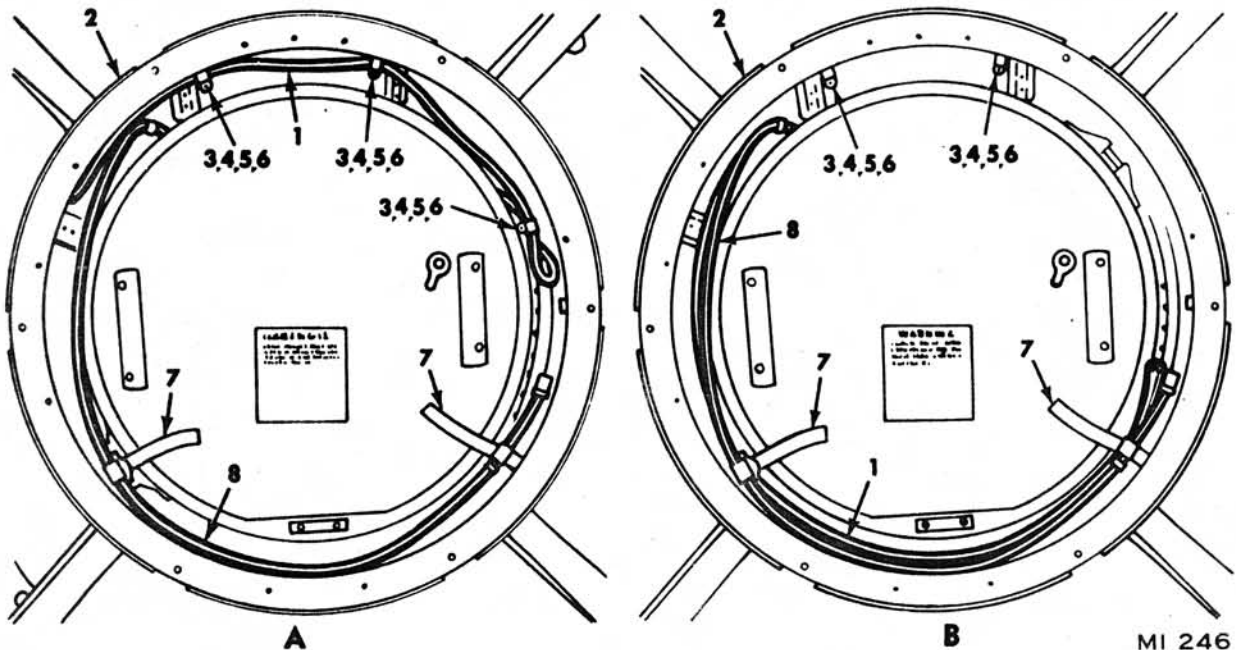
*b.* Remove the flathead screws (2, fig. 3-27) that secure the J1 + XMTR ACCESS DOOR to the right side of the forward body section; remove the access door.

*b.1.* Release the cable section of the hose and cable assembly (A1, fig. 3-28.1) from the top of the forward body section (A2) by removing the flathead screws (A3), flat washers (A4), loop clamps (A5), and hexagon nuts (A6).

*b.2.* Loosen the storage loop clamps (A7) on the lower edge of the forward body section (A2).

*b.3.* Route the cable section (B1) along the forward body section (B2) beside the hose section of the hose and cable assembly (B8), and secure it with the storage loop clamps (B7).

*b.4.* Install the flat head screws (B3), flat washers (B4), loop clamps (B5), and hexagon nuts (B6) removed in *b.1* above, in the top of the forward body section.



- 1— Cable section of the hose and cable assy
- 2— Forward body section
- 3— No. 8-32 x 1/2 fl-hd screw (3)
- 4— 0.174-in-id fl washer (3)

- 5— Loop clamp (3)
- 6— No. 8-32 hex. nut (3)
- 7— Storage loop clamp (2)
- 8— Hose section of the hose and cable assy

Figure 3-28.1 Relocation of the cable section of the hose and cable assembly (missiles 13001 and subsequent).

**Caution:** Avoid damage to the harnesses.

c. Remove the wiring harnesses (4 and 9, fig. 3-28) from the rear body section (1). Insert each harness through the openings in the handling ring segments (3), and place the harnesses on top of the rear main fins (2).

d. Secure the missile motor head heater (fig. 4-31) inside the rear body section.

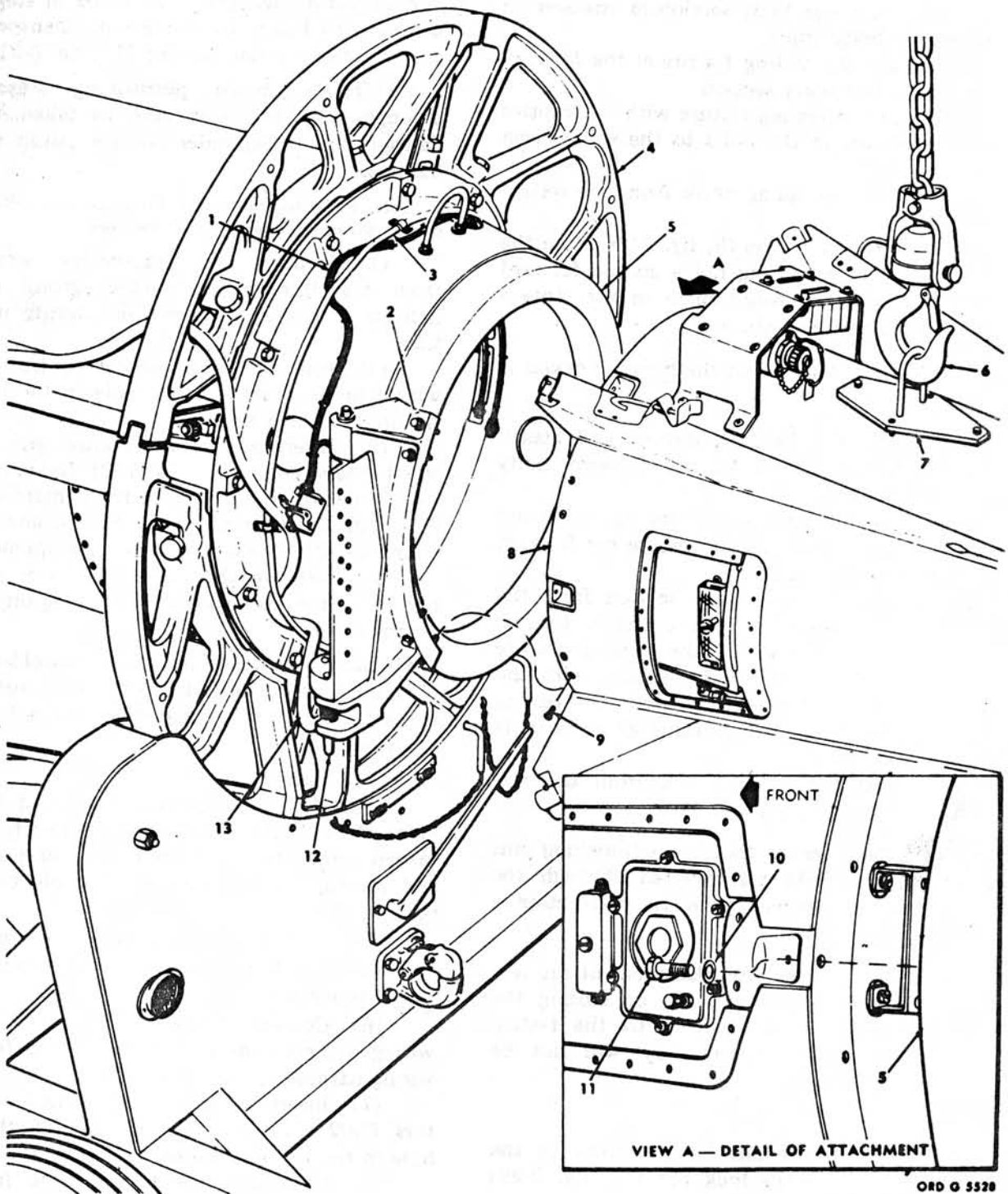
e. Attach the falling hook (5, fig. 3-28) of the hoisting device to the hoisting bolt (6) of the testing fixture (7), and slowly raise the fixture.

f. (Deleted).

g. Remove the two self-locking pins (view A, fig. 9-1) on the rear cradle of the missile body truck.

*Note.* Step h below is a convenient method of positioning the rear body section 24 degrees clockwise from flight position.

h. Rotate the rear body section 24 degrees clockwise so that the nine holes in the rear body section align with the captive bolts (8, fig. 3-28) on the testing fixture.



ORD G 5528

- 1—Fail-safe wiring harness
- 2—Captive bolt (4)
- 3—Shock cord
- 4—Handling ring segment
- 5—Testing fixture
- 6—Falling hook
- 7—Forward body section hoist

- 8—Forward body section
- 9—1/4-28 x 27/32 fl-hd screw (4)
- 10—0.328-in-id fl washer
- 11—5/13-24 x 27/32 hex-hd bolt
- 12—Hinge lock pin
- 13—Transponder control group wiring harness

Figure 3-29. Removal and installation of the forward body section from the testing fixture.

i. Lock the rear body section in position on the missile body truck.

i.1. Position the testing fixture at the forward end of the rear body section.

j. Secure the testing fixture with the captive bolts, and torque the bolts to the value given in table 15-9.

k. Remove the falling hook from the testing fixture.

l. Remove the screws (9, fig. 3-29) from the testing fixture mounting holes on the forward body section and install them in the storage holes in the testing fixture.

**CAUTION:** Insure that the hoisting device is secure.

m. Position the hoisting device, and attach the falling hook (6) to the forward body section hoist (7).

n. Release the hand clamp (6, fig. 3-27) and the holddown strap (1) that secure the forward body section to the truck.

o. Lift the forward body section from the truck, and position it to the testing fixture; secure the right side of the testing fixture hinge to the forward body section with the captive bolts (2, fig. 3-29). Torque the testing fixture hinge bolts to the value given in table 15-9.

p. Remove the falling hook from the forward body section hoist.

**WARNING:** Insure that the self-locking pins (view A, fig. 9-1) are inserted through the handling ring segment prior to performing q below.

**CAUTION:** Check the placement of the wiring harnesses before opening or closing the forward body section hinged to the testing fixture, to make certain they will not be damaged.

q. Swing the forward body section to the right until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

r. Perform the operations listed in steps (1) through (9) below to connect the transponder-control group wiring harness (13, fig. 3-31).

**CAUTION:** When performing steps (1) through (9) below, care must be taken not to damage the transponder control group wiring harness.

*Note.* Refer to appendix C for inspection criteria on cables, wiring harnesses and connectors.

(1) Remove the protective wrapping from the transponder control group wiring harness if it was not removed during inspection.

(2) Insert the transponder control group wiring harness through the hole in the testing fixture (12) near main fin 2 (8).

(3) Insert transponder control group wiring harness connector P1 (19) between the right side of the transponder control group (15) and the forward body section, and move connector P1 forward to the access opening.

(4) Remove the protective cover assembly (17) from transponder control group connector J1 (16).

**CAUTION:** Do not install the shoulder bolt (18) until connector P1 is properly positioned for attachment to transponder control group connector J1.

(5) Mate P1 to J1.

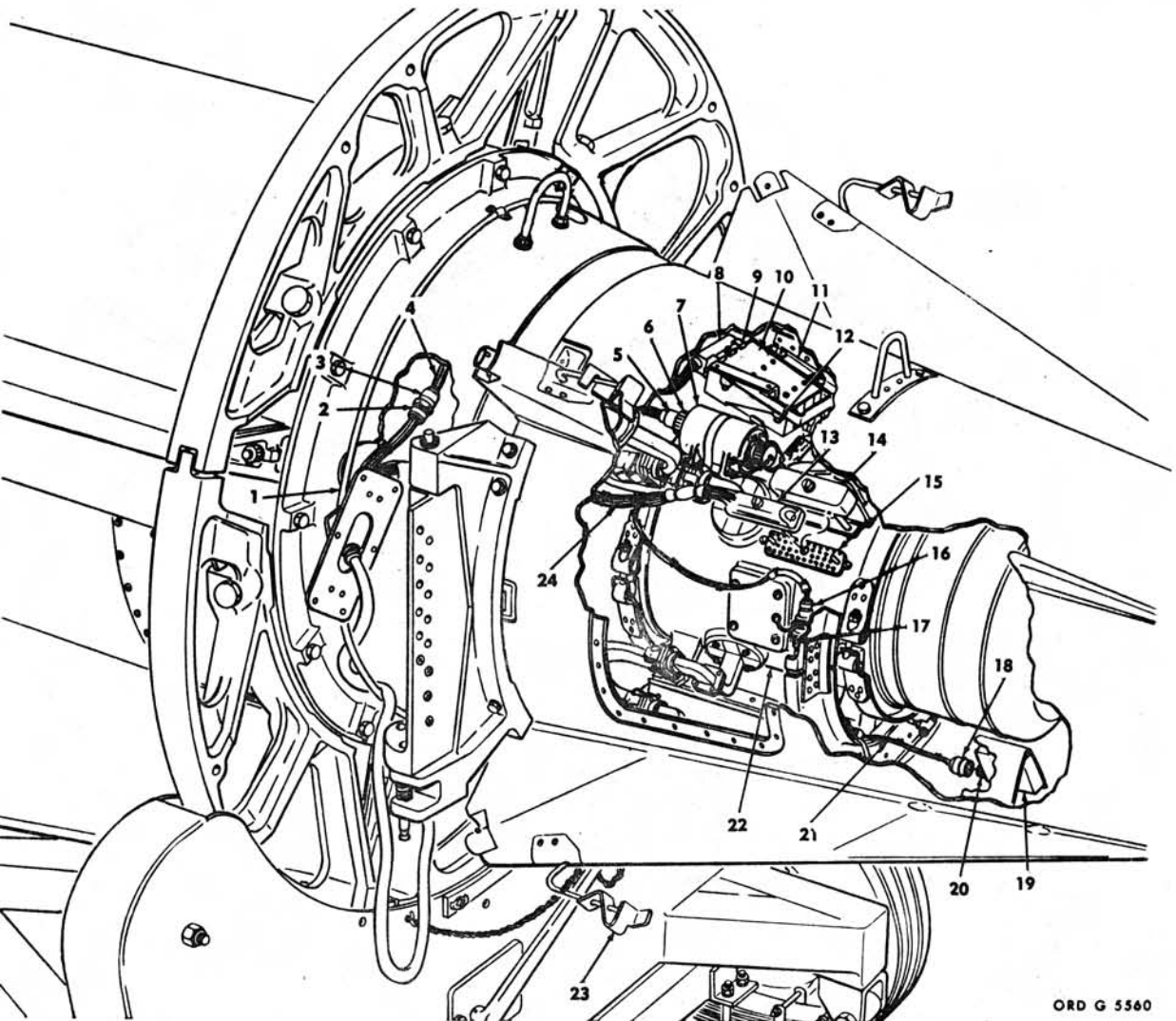
(a) Using a nonmetallic pointed instrument at J1 of the TCG, insure that each spring loaded pin-protecting ferrule will depress fully and return. Exercise caution to avoid bending contact pins.

(b) Remove and discard the rubber gasket, then mate P1 to J1 and torque the shoulder bolt to  $20 \pm 5$  pound-inches.

(6) Connect transponder control group wiring harness connector P503 (11) to fail-safe wiring harness connector J503 (10).

(7) Insert fail-safe wiring harness connectors P502 (2) and P511 (4) through the top hole in the testing fixture.

(8) Connect connector P502 to fail-safe control connector J1 (1). Secure the connection with the latch.



ORD G 5560

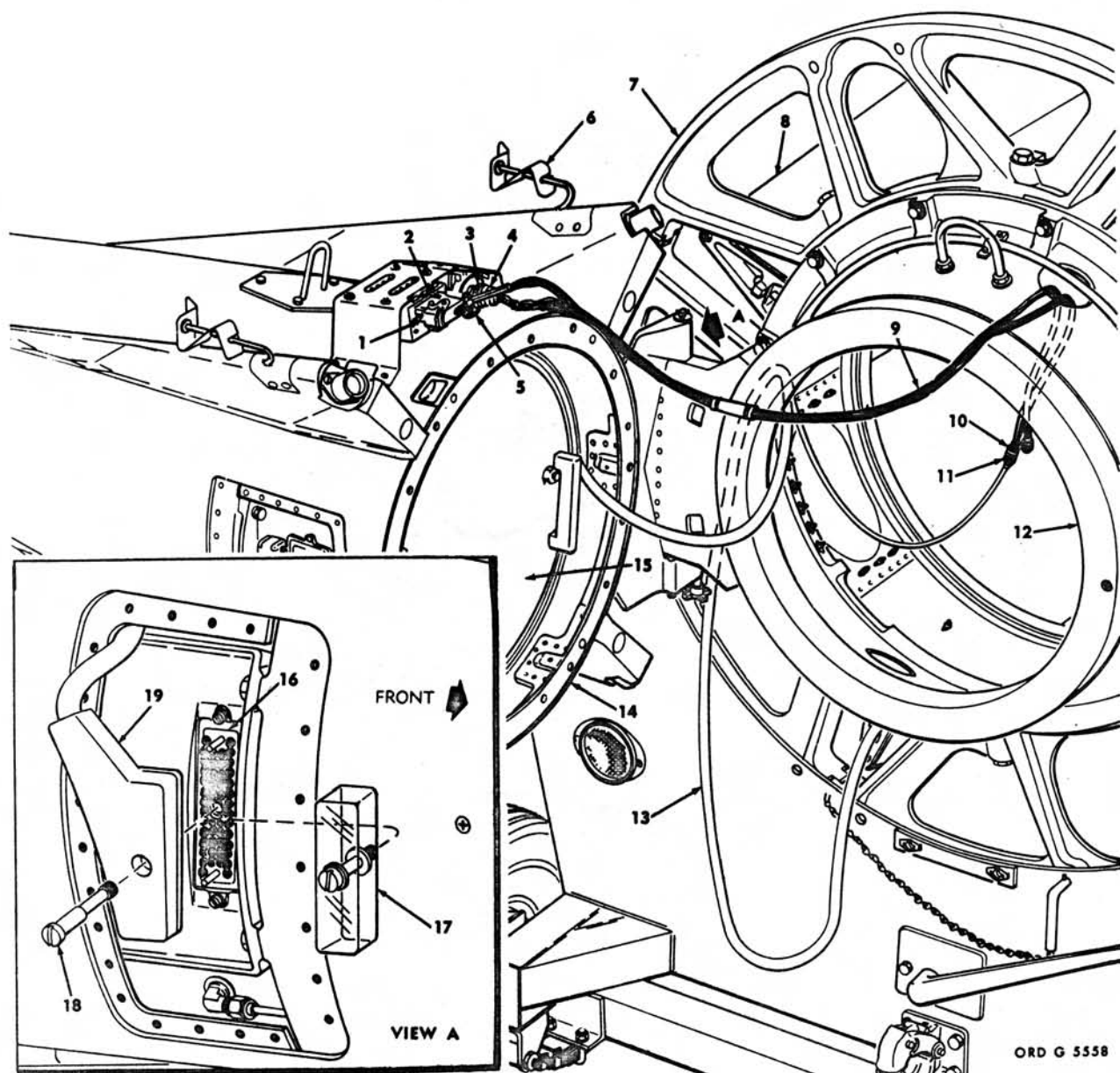
- |                              |   |
|------------------------------|---|
| 1—Shock cord                 | 13—Connector P1                             |
| 2—Connector P503             | 14—Protective cover                         |
| 3—Connector J503             | 15—Connector J1                             |
| 4—Fail-safe wiring harness   | 16—Connector P513                           |
| 5—Connector P511             | 17—Connector J513                           |
| 6—JUMPER connector J2        | 18—Connector P177B                          |
| 7—Sequential timer           | 19—Safety-and-arming switch S30             |
| 8—Connector P502             | 20—Connector J177                           |
| 9—Connector J1               | 21—Safety-and-arming switch wiring harness  |
| 10—Fail-safe control         | 22—Transponder control group                |
| 11—Fail-safe control bracket | 23—Closure                                  |
| 12—Captive screw (4)         | 24—Transponder control group wiring harness |

*Figure 3-30. Wiring harness connection for missile electrical checkout (missile 10806 through 11935).*

(9) Connect connector P511 to sequential timer JUMPER connector J2 (3).

s. Weave the warhead wiring harness (4, fig. 3-28) through the struts of the handling





- 1—Fail-safe control connector J1
- 2—Fail-safe wiring harness connector P502
- 3—JUMPER connector J2
- 4—Fail-safe wiring harness connector P511
- 5—Sequential timer
- 6—Closure (4)
- 7—Handling ring segment
- 8—Main fin 2
- 9—Fail-safe wiring harness
- 10—Fail-safe wiring harness connector J503

- 11—Transponder control group wiring harness connector P503
- 12—Testing fixture
- 13—Transponder control group wiring harness
- 14—Forward body section
- 15—Transponder control group
- 16—Transponder control group connector J1
- 17—Protective cover assembly
- 18—1/4-28 x 13/16 shoulder bolt
- 19—Transponder control group wiring harness connector P1

Figure 3-31. Wiring harness connections for missile electrical checkout (missiles 13001 and subsequent).

ring segment (7, fig. 3-31) until all slack is taken up. Make certain that no part of the wiring harness extends beyond the outer edges of the handling ring segment. Secure the loose end of the wiring harness to one of the struts of the handling ring segment.

**CAUTION:** When performing *t* below, do not allow slack of the fail-safe wiring harness (9, fig. 3-31) to be pinched between the forward body section and the testing fixture.

*t.* Swing the forward body section (14) to the left until the hinge lock pin snaps into the locked position.

**CAUTION:** Lift and support the forward body section while installing and tightening the hexagon-head bolt in *u* below.

*u.* Secure the left side of the forward body section to the testing fixture with the hexagon-head bolt and flatwasher.

*v.* Remove the self-locking pins (view A, fig. 9-1), and rotate the rear body section to the normal flight position. Replace the self-locking pins.

Table 3-2. Missile Body External Markings

Markings	Missile body reference station	Between the fins number
U.S. ARMY NOMENCLATURE	150.000	2 and 3
SERIAL NO.	247.500	1 and 4
BODY GM MIM-14A <sup>1</sup> , 14B <sup>4</sup> , 14C <sup>4</sup>	63.750	1 and 4
APS <sup>5</sup> or HPU <sup>5</sup> EXHAUST	259.337	2 and 3
<b>Caution:</b>		
DISCONNECT WAVEGUIDE & RAM PRESSURE TUBES BEFORE REMOVING FIN	87.500	2 and 3
IGNITOR	156.125	1 and 4
GROUND POWER RECEPTACLE	255.000	2 and 3
GUIDANCE TEST AND ADJUST ACCESS DOOR	76.500	3 and 4
<b>Caution:</b>		
DONOT USE IMPACT SCREWDRIVER FOR REMOVING THIS DOOR		1 and 4
J1 + XMTR ACCESS DOOR	76.500	2 and 3
<b>Caution:</b>		
DO NOT USE IMPACT SCREWDRIVER FOR REMOVING THIS DOOR		
APS SERVICE DOOR <sup>4</sup> or HPU SERVICE DOOR <sup>4</sup>	277.431	2 and 3
ARMING MECHANISM INDICATES LOCKED POSITION	94.250	3 and 4
<b>Caution:</b>		
REMOVE DOOR BEFORE INSTALLING OR REMOVING MOTOR	175.250	1 and 4
<sup>1</sup> USE BA472 BATTERY	212.250	2 and 3
MISSILE LOT NO. XXXX	285.875	1 and 4
<sup>4</sup> AFT BODY LOT NO. XXXX	150.000	1 and 4
LOT NO. XXX	150.000	1 and 4
4-in. color code square	87.500	1 and 4
	141.000	1 and 2
		2 and 3
		3 and 4
		4 and 1

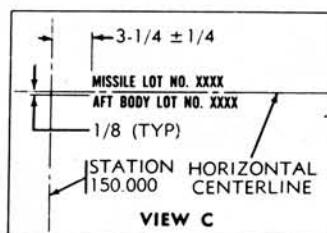
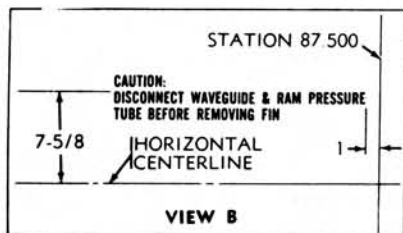
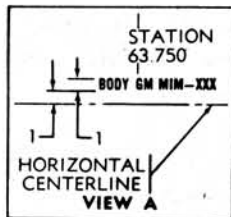
<sup>1</sup> On missiles 10206 through 11935.

<sup>2</sup> On missiles 13684 and subsequent.

<sup>3</sup> On missiles 10206 through 11935 and 13001 through 15975.

<sup>4</sup> On missiles 13001 and subsequent.

<sup>5</sup> Use the appropriate marking.



# NOTES:

1. ALL DIMENSIONS SHOWN ARE IN INCHES
2. ALL LETTERING PAINTED DULL BLACK
3. ALL LETTERING IS 1/4 INCHES UNLESS OTHERWISE INDICATED
4. ALL TOLERANCES ARE + 1/8 INCH UNLESS OTHERWISE INDICATED

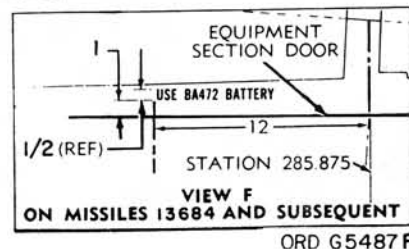
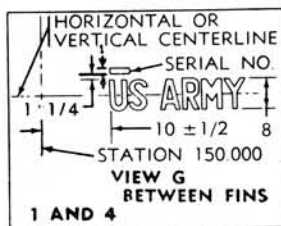
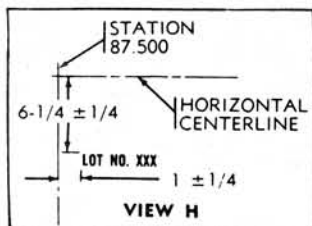
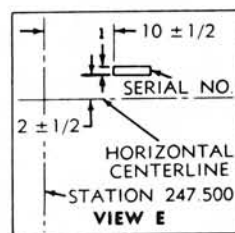
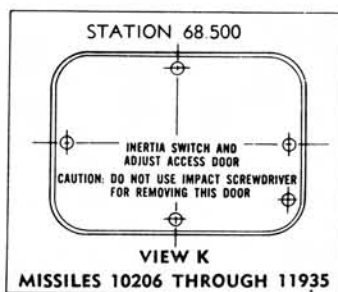
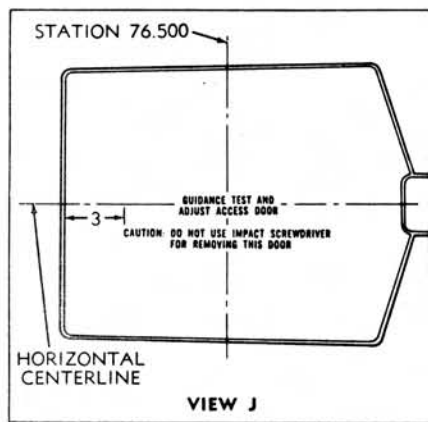
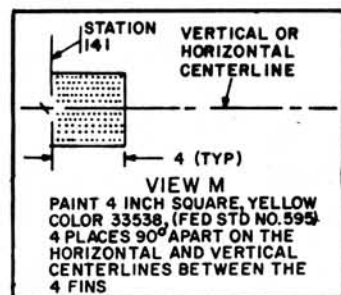
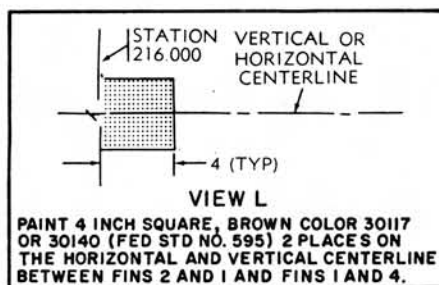
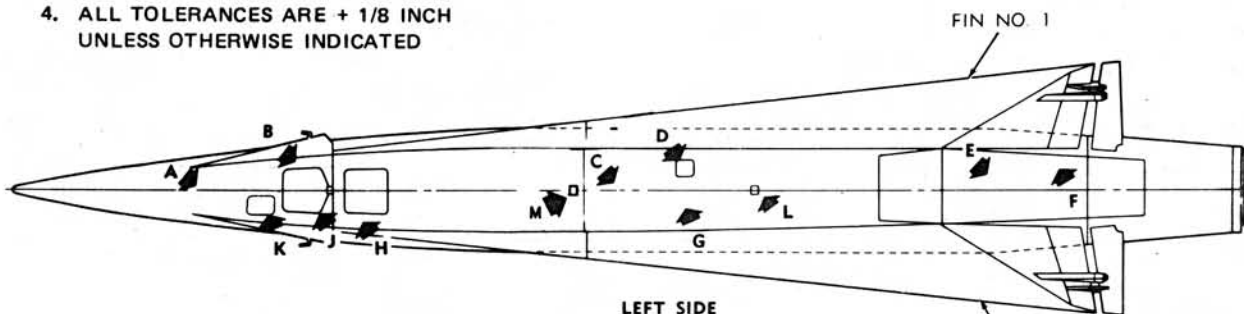


Figure 3-32. Missile body - external markings.

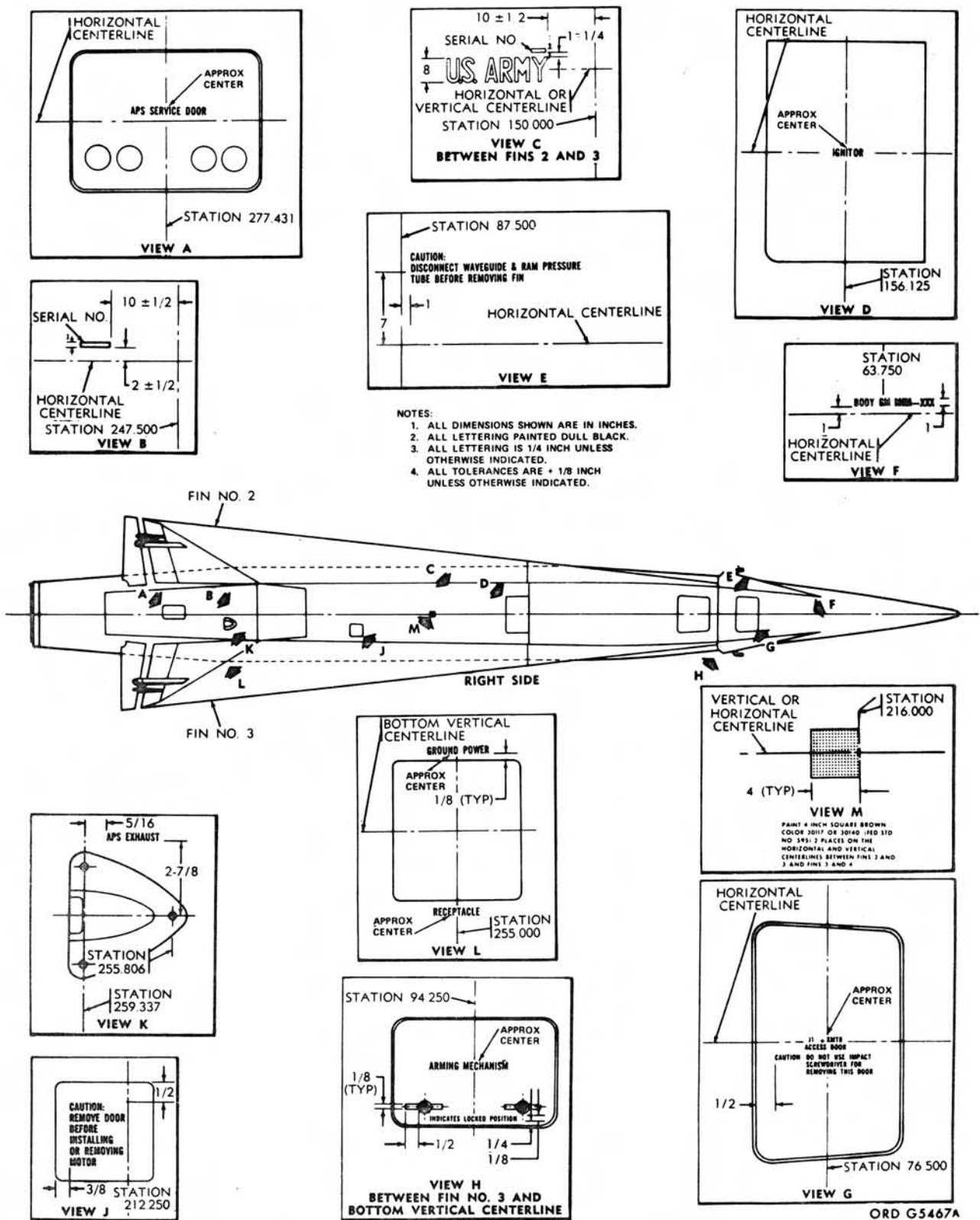


Figure 3-33. Missile body - external markings.

	Paragraphs	Pages
Installation .....	12-90b	12-91
Removal .....	12-90a	12-91
Forward main fins, replacement of .....	12-88	12-90
Installation .....	12-88b	12-90
Removal .....	12-88a	12-90
Rear main fins, replacement of .....	12-89	12-90
Installation .....	12-89b	12-91
Removal .....	12-89a	12-90
Missile guidance set (MUSHROOM):		
Adjustment of the missile response time .....	12-21	12-25
General—summary of section contents .....	12-4	12-7
Handling, cleaning, and inspection .....	12-6	12-9
Cleaning .....	12-6d	12-10
Cleaning metal surfaces .....	12-6d(2)	12-10
Removing loose dirt .....	12-6d(1)	12-10
General—procedures rigidly controlled .....	12-6a	12-9
Handling disassembled parts .....	12-6b	12-9
Hazards of magnesium .....	12-6c	12-10
Corrosion .....	12-6c(2)	12-10
Fire .....	12-6c(1)	12-10
Inspection .....	12-6e	12-10
Cabling .....	12-6e(2)	12-10
Hardware .....	12-6e(1)	12-10
Installation and removal of the nose hinge assembly .....	12-5	12-7
Installation .....	12-5a	12-7
Removal .....	12-5b	12-9
Removal and installation of the rear housing cover .....	12-10	12-11
Installation .....	12-10d	12-13
Removal .....	12-10a	12-11
Replacement of activated desiccant .....	12-10c	12-13
Replacement of preformed packing .....	12-10b	12-13
Replacement of the:		
Antenna horn .....	12-7	12-11
Installation .....	12-7b	12-11
Removal .....	12-7a	12-11
Fail-safe control .....	12-8	12-11
Installation .....	12-8b	12-11
Rearming the missile .....	12-8c	12-11
Removal .....	12-8a	12-11
Flight control group .....	12-16	12-19
Installation .....	12-16b	12-19
Removal .....	12-16a	12-19
Interconnecting board .....	12-17	12-21
Installation .....	12-17b	12-21
Removal .....	12-17a	12-21
Replacement of the:		
Magnetron electron tube .....	12-12	12-14
Installation .....	12-12b	12-14
Removal .....	12-12a	12-14
Missile-code delay line .....	12-11	12-14
Installation .....	12-11b	12-14
Removal .....	12-11a	12-14
Preformed packing from the front housing cover .....	12-15	12-19
Installation .....	12-15b	12-19
Removal .....	12-15a	12-19
Radio set components:		
Amplifier-decoder .....	12-14	12-13
Installation .....	12-14c	12-19
Installation .....	12-14c(2)	12-19



## CHAPTER 4

AIR AND OIL SERVICING AND MISSILE  
ELECTRICAL CHECKOUTSection I. AIR AND OIL SERVICING THE ACCESSORY  
POWER SUPPLY (APS)

## 4-1. General

The missile is shipped to the user with the APS fuel drained and the accumulator depressurized. The hydraulic system may contain some residual oil.

**Warning:** Do not allow smoking within 60 feet of the working area. Although the fuel is drained from the APS fuel tank and the accumulator air charge is depressurized prior to shipment to the using organization, residual fuel vapors in the APS fuel tank are subject to a small buildup.

**Note.** Paragraph 4-2 is not applicable to missiles with actuator assemblies 13060137 and 13060138. For those missiles, refer to paragraphs 4-9 and 4-9.1 for hydraulic oil and HPU low-temperature operation limitations.

## 4-2. Hydraulic Oil

MIL-H-5606 hydraulic oil is authorized for use in the NIKE system HPU or APS within the temperature range of  $-60^{\circ}\text{F}$  to  $160^{\circ}\text{F}$  on a year-round basis without restrictions.

## 4-3. Servicing and Test Equipment

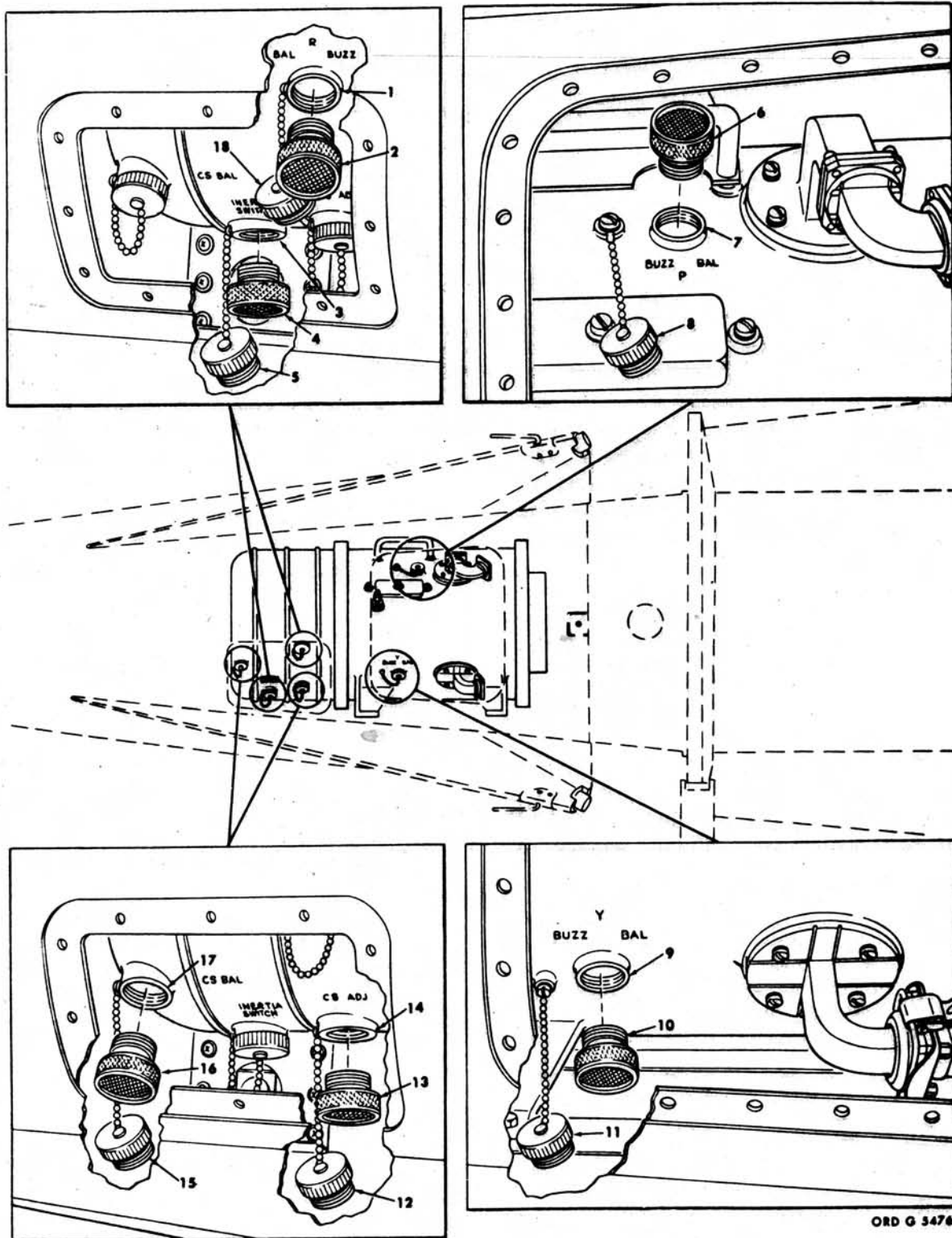
The servicing and test equipment necessary to service and check the operation of the APS is listed below:

- a. The missile electrical test set group.
- b. Lubricating oil MS35900-273 and a syring-type means of transferring the oil into the APS gear box.
- c. A 3,500-psi source of clean, dry, compressed air, with a dew point of  $-40^{\circ}\text{F}$ .
- d. The portable oil fill and filter unit.
- e. One 2-1/2-gallon (minimum) container and a hose for discharge of the oil from the overboard dump tube fitting on the APS.
- f. Hydraulic oil, unopened can (minimum 3 gal).

## 4-4. Preliminary Procedure for APS Servicing

**Note.** The preliminary procedures in this paragraph include those for missile electrical checkout.

- a. Using a grounding strap, ground the missile frame at a point where proper electrical contact can be made, insuring that there is less than 20 ohms resistance between the missile frame and ground.
- b. Visually inspect the APS and all associated hydraulic lines and electrical connections. Make sure that the APS is securely mounted.



ORD G 3476

Figure 4-1. Removal and installation of the air filters (missiles 10206 through 11935).

- 1—R-BUZZ-BALL adjustment port
- 2—Air Filter 9020193
- 3—INERTIA SWITCH adjustment port
- 4—Air filter 9020193
- 5—Screw-type access plug
- 6—Air filter 9020193
- 7—P-BUZZ-BAL adjustment port
- 8—Screw-type access plug
- 9—Y-BUZZ-BAL adjustment port

- 10—Air filter 9020193
- 11—Screw-type access plug
- 12—Screw-type access plug
- 13—Air filter 9020361
- 14—CS ADJ adjustment port
- 15—Screw-type access plug
- 16—Air filter 9020361
- 17—CS BAL adjustment port
- 18—Screw-type access plug

Figure 4-1. Removal and installation of air filters (10206 through 11935)—legend.

*Note.* Illustrated tables of controls and indicators for the missile electrical test set group are contained in TM 9-4935-253-12.

c. Check that the AC POWER, HEATERS EXTERNAL, PLATE POWER EXTERNAL, and GLOW COIL switches on the test power control unit (TPCU) are set to OFF.

d. Set the TEST SELECTOR NO. 1 switch on the test control unit (TCU) to OFF and the TEST SELECTOR NO. 2 switch to TRANS. NO. 1.

e. Connect the ground power cable assembly (fig. 4-13) to connectors P104A and P105A on the missile umbilical cable, and to connector J7 on the rear of the missile electrical test set group.

f. Connect the missile test cable assembly to connector J2 on the transponder control group, and to connector J1 on the rear of the missile electrical test set group.

g. Connect a power cable assembly to connector J8 on the rear of the missile electrical test set group and to a 120-volt, 400—V single-phase source of power.

*Note.* Perform h through n below for missile 10206 through 11935.

h. Remove the screw-type access plugs (18, 5, 8, and 11, fig. 4-1) from the R-BUZZ-BAL adjustment port (1), INERTIA SWITCH adjustment port (3), P-BUZZ-BAL adjustment port (7), and Y-BUZZ-BAL adjustment port (9); and install the air filters (2, 4, 6, and 10).

i. Remove the screw-type access plugs (12 and 15) from the CS ADJ adjustment port (14) and CS BAL adjustment port (17), and install the air filters (13 and 16).

j. Loosen the captive screws (1, fig. 4-2), and remove the cover plate (2).

k. Install the missile-code delay line (5, fig. 12-3) in the transponder control group (1) as prescribed in steps (1) through (3) below, to insure that it is properly mated with the connector on the interconnecting board.

(1) Insert the delay line (fig. 12-15) slowly into the holder (PN 9009321) until the delay line pins first begin to make contact with the receptacles of the connector on the interconnecting board.

(2) Firmly press the delay line securely in place until it is squarely seated in the holder and the connectors are fully engaged.

**CAUTION:** Do not use the knob and lever to "seat" the delay line.

(3) Turn the knob 90 degrees to lock the delay line in the holder.

l. Check that the gasket (3, fig. 4-2) is properly seated in the groove around the missile-code delay line access port (4).

m. Install the adapter plate (6) on the access port, and secure with the captive screws (5).

n. Install the hose coupling adapter (9) on the adapter plate (7), and secure it with the captive screws (8).

o. Install the air hose assembly (1, fig. 4-3) on the cooling unit (8).

p. Connect connector P1 (12) of the power cable assembly (9) to connector J1 (11) and to 120/208V, 3 phase, 400 cycle.

**CAUTION:** While performing q below, exercise extreme care. Avoid applying lateral stress to the guidance cooling access door hinge.

q. Connect the air hose assembly to the hose coupling adapter (2) or the hose assembly (5).

**CAUTION:** Check that the AC POWER switch on the test power control unit is set to OFF before connecting the cables.

**CAUTION:** The ground strap connected in *a* above must remain connected during missile electrical checkout.

*r.* Connect a power cable assembly (fig. 4-13) to the 120V-400-~ connector on the rear of the missile RF test set group and to a 120-volt, 400-~ power source.

*s.* Set the TEST SELECTOR switch on the RF test set to CAL, CALIBRATE switch to ADJ, and FAIL-SAFE TEST-CONTACT-NORMAL-TIME switch to NORMAL.

*t.* Set the AC POWER switch on the RF test set to ON.

*u.* After 60 seconds, momentarily operate the RESPONSE-250V switch on the RF test set to 250V. If the RESPONSE OR VOLTAGE meter does not deflect to the right, immediately set the AC POWER switch to OFF.

*v.* Set the CALIBRATE switch to TEST, and allow at least a 30-minute warmup. Proceed with equipment and cable connections while the RF test set is warming up.

*w.* Connect test equipment as prescribed below.

(1) Remove the three stud assemblies (fig. 4-22) from the forward body section. Install antenna coupler test adapter 9139F53 over forward fin assembly 3. Secure the adapter over the fin assembly by aligning the three captive fasteners of the mounting brackets with the mating parts in the missile skin of the forward body section, and rotate the fasteners to the locked position by hand.

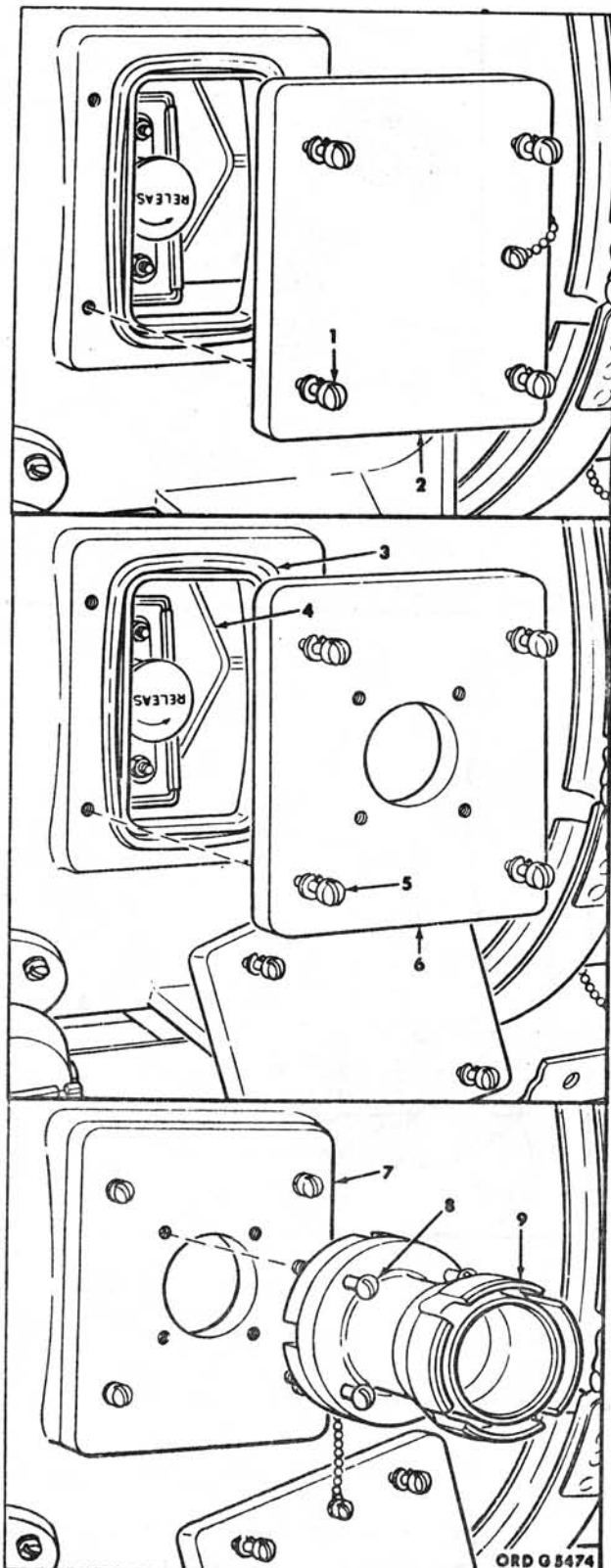
(2) Install waveguide coupling (RF terminator) 9000245 (fig. 4-23) on transmitting antenna horn 1.

(3) Connect waveguide assembly 9138481 to receiving antenna horn 4.

(4) Connect waveguide assembly 9138342 to waveguide assembly 9138481 and to one RECEIVER ANTENNA Connector on the antenna coupler test adapter.

(5) Connect waveguide assembly 9138483 to receiving antenna horn 2.

(6) Connect waveguide assembly 9138341 to waveguide assembly 9138483 and to the other RECEIVER ANTENNA connector on the antenna coupler test adapter.



- 1—Captive screw (4)
- 2—Cover plate
- 3—Gasket
- 4—Missile-code delay line access port
- 5—Captive screw (4)
- 6—Adapter plate 9020197
- 7—Adapter plate 9020197
- 8—Captive screw (4)
- 9—Hose coupling adapter 9017764

Figure 4-2—Continued

(7) Connect waveguide assembly 9138482 to transmitting antenna horn 3.

(8) Connect waveguide assembly 9138340 to waveguide assembly 9138482 and to the TRANSMITTING ANTENNA connector on the antenna coupler test adapter.

(9) Connect waveguide assembly 9005430 to the RF TEST SET connector on the antenna coupler test adapter and to the waveguide connector (fig. 4-13) on the rear of the missile RF test set group.

(10) Connect the switch attenuator cable assembly to connector J1 on the antenna coupler test adapter and to the WAVEGUIDE ASSEMBLY connector on the rear of the missile RF test set group.

(11) Connect the fail-safe test cable assembly (fig. 4-13) to connector J2 on the fail-safe control and to the FAIL-SAFE TEST connector on the rear of the missile RF test set group.

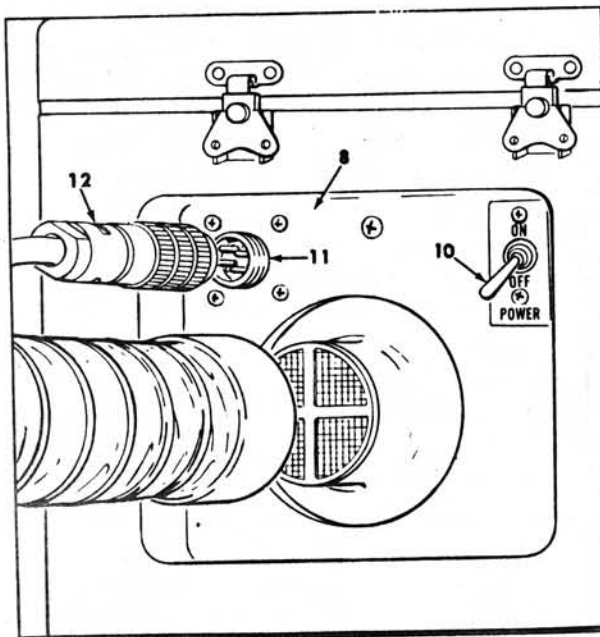
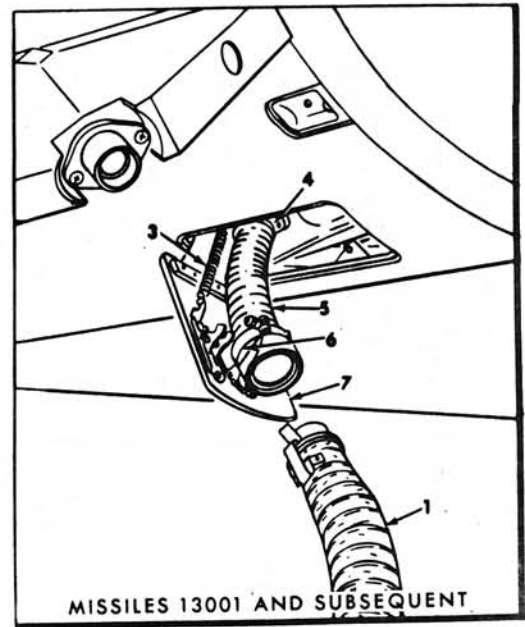
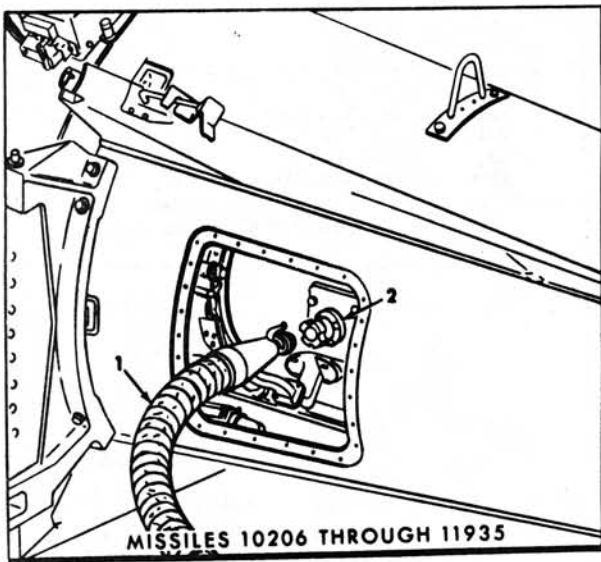
(12) Check that transponder control group wiring harness connector P1 (13, fig. 3-30 or 19, fig. 3-31) is connected to transponder control group connector J1 (15, fig. 3-30 or 16, fig. 3-31) in the forward body section.

*Note.* Perform step (13) below for missiles 10206 through 11935 and 13001 through 13683.

(13) Disconnect connector J510 on the battery wiring harness from connector P510 on the distribution box, if not previously disconnected, and connect the battery simulator cable assembly (fig. 4-13) from connector P510 on the missile distribution box

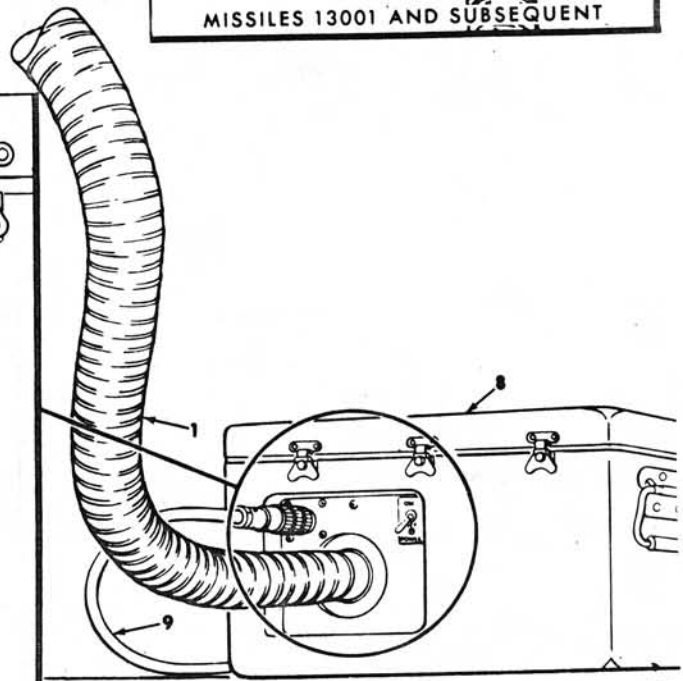
Figure 4-2. Removal and installation of the cover plate, adapter plate, and hose coupling adapter.





- 1—Air hose assembly
- 2—Hose coupling adapter
- 3—Spring (2)
- 4—Screw (4)

- 5—Hose assembly
- 6—Clamp
- 7—Cooling access door
- 8—Cooling unit



- 9—Power cable assembly
- 10—POWER switch
- 11—Connector J1
- 12—Connector P1

ORD G 5559

Figure 4-3. Removal and installation of the cooling unit.

to connector J6 on the rear of the missile electrical test set group.

*Note.* Perform step (14) below for missile 13684 and subsequent.

(14) Connect the battery simulator cable assembly to connector P510 on the mounting panel and to connector J6 on the rear of the missile electrical test set group.

- (15) Connect the power and continuity test cable assembly to connector J2 on the rear of the missile electrical test set group and to connector J183 on the missile distribution box.
  - (16) Inspect the ram-pressure probes for damage, dents, abnormal bends, paint, and alinement. Spot paint if required. Reject probes which are dented, or which have abnormal bends, or which cannot be realigned using the procedures in paragraph 10-6.
  - (17) Remove the closures (6, fig. 3-31) from the four ram-pressure probes (2, fig. 4-24).
  - (18) Perform the following procedures in sequence of the four ram-pressure probes to be cleared of dust and dirt.
    - (a) Install the adapter hose assembly (1, fig. 4-24) on the ram-pressure probe (2), and install a plug hose assembly (4) on each of the remaining probes. Secure the adapter hose and plug hoses with hose clamps (3).
    - (b) Remove the four screws (4, fig. 12-28) securing the ram-pressure probe (5) to the forward fin assembly (3).
    - (c) Separate the ram-pressure probe (5) from the forward fin assembly (3), and disconnect the hose assembly (1).
    - (d) Connect the hose assembly (5, fig. 4-24) from the stagnation pressure pump (8) to the adapter hose assembly (1) on the ram-pressure probe to be cleared.
    - (e) Set the VAC-OFF-PRESS knob (6) to PRESS, operate the handle (7), and allow the pressurized air to blow the dust and dirt out of the ram-pressure probe.
    - (f) Disconnect the hose assembly (5) from the adapter hose assembly (1).
    - (g) Connect the hose assembly (1, fig. 12-28) to the ram-pressure probe (5).
    - (h) Install the ram-pressure probe (5) on the forward fin assembly (3), and torque the screws (4) to  $22 \pm 2$  pound inches.
      - (i) Repeat steps (a) through (h) above for the remaining ram-pressure probes.
- Note.* Perform x through ag below for missile 13001 and subsequent.
- x. Rotate the mated forward and rear body sections so that the forward body section is in the flight position (B, fig. 4-28).
  - y. Remove the hexagon-head bolt (11, fig. 3-29) and flat washer (10) that secure the left side of the forward body section (8) to the testing fixture (5).
- WARNING:** Insure that the self-locking pins (view A, fig. 9-1) are inserted through the handling ring segment prior to performing z below.
- z. Swing the forward body section to the right until the hinge lock pin (12, fig. 3-29) snaps into the locked position.
  - aa. Loosen the six captive screws that secure the access cover plate to the transponder control group sufficiently to insure depletion of air pressure.
- WARNING:** Potentials of 4,000 volts exist on the magnetron connector shell and under the radio transmitter cover. Be careful not to contact high voltage components.
- CAUTION:** Do not remove the rear housing cover (10, fig. 12-2) unless the forward body section is swung fully open and the hinge lock pin (12, fig. 3-29) is locked in position.
- ab. Remove the rear housing cover from the transponder control group (1, fig. 12-2) as prescribed in steps (1) and (2) below.
    - (1) Loosen the retaining screw (11), and disengage the lever arm (12).
    - (2) Exert a steady pull on the two hook handles (23), and remove the rear housing cover from the transponder control group.
  - ac. Install the missile-code delay line (5, fig. 12-3) in the transponder control group (1).
  - ad. Insure that the missile code delay line is fully seated, and insure that the locking tab on the missile code-delay line will not move clockwise sufficiently to clear the locking slot.
    - ad.1. Using a screwdriver, insure that all captive screws securing plug-in components or modules are properly tightened.

*ad.2.* Insure a positive mechanical mating of connectors P1 and J1, P1 and J8, and P2 and J2 (4, 22, and 23, fig. 12-6).

*ae.* Install the rear housing cover on the transponder control group as prescribed in steps (1) and (6) below.

**CAUTION:** Do not use any type of tool on the rear housing cover to assist seating. Support the forward body section while installing the rear housing cover.

- (1) (Deleted)
- (2) With the pressure valve (7, fig. 12-2) on the right, seat the rear housing cover on the transponder control group until the retaining ring (14) is approximately flush with the rim of the housing.
- (3) Apply pressure to the right hook handle while maintaining a retaining pressure on the left hook handle. When the rear housing cover has seated on the right side, hold a retaining pressure on the right hook handle, and increase pressure on the left hook handle until the rear housing cover seats on the left side.
- (4) Press firmly on all sides of the rear housing cover and on each side of the lever arm to insure proper seating.

**CAUTION:** Do not force the lever arm which should close freely to approximately three-eighths of an inch. If force is required to engage the lever arm, the rear housing cover is not seated properly.

- (5) Engage the lever arm (12), and tighten the retaining screw (11) to secure the rear housing cover (10) to the transponder control group.
- (6) Inspect the entire retaining ring (14) for proper seating.

**CAUTION:** Lift and support the forward body section while installing and tightening the hexagon-head bolt in *af* below.

*af.* Swing the forward body section to the left until the hinge lock pin (12, fig. 3-29) snaps into the locked position. Install the hexagon-head bolt (11) and the flat washer

(10) that secure the left side of the forward body section (8) to the testing fixture (5).

*af.1.* Rotate the missile body to the normal flight position.

*ag.* Insure that the cooling unit is connected.

#### 4-5. APS Lubrication

**CAUTION:** The APS turbine gear box must be lubricated prior to operation and after every hour of cumulative run time, whether operated by the external drive motor or with fuel (EThO).

*Note.* Insure that the rear body section is in the normal flight position.

*a.* Remove the oil fill plug (fig. 4-4) and oil drain plug from the turbine gear box. Check for oil drainage from the oil drain plug port. If there is oil drainage, allow the excess to drain, and omit *b* below.

*b.* Fill the turbine gear box with lubricating oil MS35900-273 through the oil fill port until the oil begins to drain out of the oil drain port.

*c.* Inspect the preformed packings on the oil fill plug and oil drain plug, and, if damaged, remove the packings, and install new packings. Install the oil fill plug and oil drain plug on the turbine gear box.

#### 4-6. Arm Safety Check

*Note.* Illustrated tables of the controls and indicators for the missile electrical test set group are contained in TM 9-4935-253-12.

*a.* Check that the AC POWER switch on the TPCU is set to OFF.

*b.* Check that the GLOW COIL switch is set to OFF.

*c.* Depress the arm SAFETY SWITCH (fig. 4-6) on the APS service panel to the limit of its travel (view A, step 1), and allow the switch to return to the center safe position (view A, step 2).

#### 4-7. Glow Plug Continuity Check

*Note.* Perform *a* through *g* below for APS 9030900.

*a.* Disconnect connector P9 (fig. 4-5) from connector J9 on the APS service panel.

*b.* Using a multimeter, set to R X 1, and check the resistance between pins 2 and 3 of connector P9. The multimeter should indicate 8 to 14 ohms.

c. Use the multimeter to check the resistance between pins 4 and 5 of connector J9. The multimeter should indicate infinity. Check the resistance between pins 6 and 7 of J9. The multimeter should indicate infinity.

d. Set the arm SAFETY SWITCH (view A, step 3, fig. 4-6) to the maintenance (fully out) position. Use the multimeter to check the resistance between pins 4 and 5 of connector J9. The multimeter should indicate 0. Check

the resistance between pins 6 and 7 of J9. The multimeter should indicate 0.

e. Repeat step d above with the arm SAFETY SWITCH in the armed (fully depressed) position.

f. Set the arm SAFETY SWITCH to the center (safe) position.

g. Connect connector P9 (fig. 4-5) to connector J9, and check that the entire width of the orange band is visible after the connection is made.

Note. Perform *h* below for APS 9032190.

*h.* Use a multimeter with the RANGE knob set to R X 1 to check the resistance between the

terminals of the glow plug at the gas generator on the APS. The multimeter should indicate 8 to 14 ohms.

Table 4-1. Initial Air Fill of the Accessory Power Supply (APS)

Step	Operation	Normal indication	Corrective Procedure
	<p>Note. Use clean, dry, compressed air, with a dewpoint of <math>-40^{\circ}\text{F}</math> and a maximum pressure of 3500 psi, or use nitrogen.</p> <p><b>Warning:</b> Weight the air supply hose with sand bags, and secure it to the missile body truck. Assure that the air fill valve on the end of the air supply hose is fully closed.</p> <p>Note. The arm safety check in paragraph 4-6 must be performed before performing step 1.</p>		
1.	Set the AC POWER switch on the TPCU to ON.		
	The POWER ON indicator light illuminates.		
1.1	Loosen the six captive screws that secure the access cover plate to the TCG sufficiently to ensure depletion of the air pressure. Remove the cover plate and allow it to hang by the chain.		
	<b>Caution:</b> Check that the weights of the INERTIA SWITCHES in the TCG are in the forward (dearmed) position.		
2.	Set the POWER switch on the TCU to ON.		
	The POWER LIGHT illuminates.		
	<b>Caution:</b> If the GYRO UNCAGE indicator light illuminates, immediately operate the GYRO switch to CAGE.		
3.	Set the HEATERS EXTERNAL switch to ON.		
	The HEATERS EXTERNAL indicator light illuminates.		
4.	Operate the AUXILIARY POWER SUPPLY switch to START and hold for a minimum of 1 second and a maximum of 2 seconds.		
5.	Set the HEATERS EXTERNAL switch to OFF.		
	The HEATERS EXTERNAL indicator light extinguishes.		
6.	At the TCU, set the POWER switch to OFF.		
	The POWER LIGHT extinguishes.		
7.	At the TPCU, set the AC POWER switch to OFF.		
	The POWER ON indicator light extinguishes.		
8.	Remove the AIR FILL fitting cap from the AIR FILL fitting on the APS service panel.		
9.	Connect the air supply hose from the air supply to the AIR FILL fitting.		
10.	Open the air supply shutoff valve.		
11.	Open the AIR FILL fitting by turning the AIR FILL fitting locknut counterclockwise.		
12.	Slowly open the air valve on the air supply hose until pressurization starts.		
13.	Depress and hold the TRANSFER valve until the APS is pressurized to the ambient temperature $\pm 25^{\circ}\text{F}$ as indicated on the upper scale of the ACC. AIR PRESS. gage.		
	Ambient temperature $\pm 25^{\circ}\text{F}$ on the ACC. AIR PRESS. gage.		
	If the accumulator does not fill, or will only partially fill, loosen the locknut until pressurization is obtained.		
14.	Simultaneously turn the AIR FILL fitting locknut fully clockwise, and close the air fill valve.		
15.	Allow the ACC. AIR PRESS. gage indication to stabilize.		
	Repeat steps 11 through 14 above as necessary to obtain a stable pressure indication of ambient temperature $\pm 25^{\circ}\text{F}$ .		



Table 4-1. Initial Air Fill of the Accessory Power Supply (APS) — Continued

Step	Operation	Normal indication	Corrective Procedure
16.	Close the air supply shutoff valve.		
17.	Open the valve on the air supply hose to bleed the pressure.		
	<b>Warning:</b> Make certain that all pressure is bled from the hose before performing step 18.		
18.	Disconnect the air supply hose and install the AIR FILL fitting cap on the AIR FILL fitting. Torque the AIR FILL fitting locknut to 50 pound-inches.		

Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply, using the Portable Oil Fill and Filter Unit

Step	Operation	Normal indication	Corrective Procedure
	<b>Caution:</b> The initial air fill of the APS must be completed as prescribed in table 4-1 before performing the procedures below.		
	<b>Caution:</b> The oil drained from the APS must not be reused.		
1.	Unscrew the external drive motor spline cap (7, fig. 4-8).		
2.	Unscrew the turbine shaft cap (6) and remove the gasket (5).		
3.	Replace the gasket if it has nicks and compressed areas.		
4.	Install the gasket, and screw the turbine shaft cap on the external drive motor spline cap to protect both caps.		
5.	Connect the power cable assembly (fig. 4-9) to the power connector (8, fig. 4-8) on the external drive motor (1) and to a 208-volt, 400-~, 3-phase power source.		
6.	Set the external drive motor switch (fig. 4-9) to ON, and check for counterclockwise rotation of the shaft (viewed from the power connector side).		
7.	Set the external drive motor switch to OFF, and disconnect the power cable assembly.		
8.	Insure that the external drive motor spline (2, fig. 4-8) and the turbine shaft (3) are clean and free of foreign matter.		
9.	Align and engage the external drive motor spline with the turbine shaft, engage the threads on the external drive motor with the threads on the turbine housing (4), and rotate the external drive motor clockwise to secure in position. Back the motor off approximately one-quarter turn.		
	<b>Warning:</b> Assure that the external drive motor switch is set to OFF.		
10.	Connect the power cable assembly to the power connector on the external drive motor.		
11.	Remove the reservoir filler cap (11, fig. 4-10) on the portable oil fill and filter unit (10), and fill the reservoir with hydraulic oil until the oil level gage (9) indicates FULL. Replace the reservoir filler cap.		
12.	Connect the portable oil and filter unit power cable assembly (8) to POWER connector J1 (14) on the portable oil fill and filter unit.		
	<b>Caution:</b> Make certain that the OPERATE circuit breaker (2) on the portable oil fill and filter unit is set to OFF before performing steps 13 through 16 below.		
13.	Connect the other end of the power cable assembly to a 208-volt, 400-~, 3-phase power source.		
	<b>The LINE POWER indicator light (1) on the portable oil fill and filter unit illuminates.</b>		
14.	Connect the hydraulic oil supply hose (7) to the quick-disconnect fitting on the manifold return port (12).		

*Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply, using the Portable Oil Fill and Filter Unit — Continued*

Step	Operation	Normal indication	Corrective Procedure
15.	Turn the BYPASS valve (4) fully counterclockwise.		
16.	Turn the RELIEF VALVE knob (3) fully counterclockwise.		
	<b>Caution:</b> When the OPERATE circuit breaker is set to ON, check for a pressure indication on the OIL PRESSURE gage. If there is no pressure indication, immediately set the OPERATE circuit breaker to OFF; verify correct power phasing and perform corrective maintenance procedures.		
17.	Set the OPERATE circuit breaker to ON.		
	<b>Note.</b> When performing step 18 below, monitor the OIL PRESSURE gage (5) indication. If the indication exceeds 100 psi, refer the portable oil fill and filter unit to the support unit for primary filter replacement.		
18.	Allow the portable oil fill and filter unit to operate for 30 minutes. Set the OPERATE circuit breaker to OFF.		
	<b>Note.</b> The system cleanup is to be performed first during missile assembly, and thereafter as specified in Table 4-3 of TM 9-1400-250-15/3, and whenever major repair or replacement of the hydraulic system is accomplished.		
19.	Disconnect the hydraulic oil supply hose from the quick-disconnect fitting on the manifold return port.		
	<b>Note.</b> Check the spring action of the HYD. RES. LEVEL indicator on the APS service panel to be certain it is operating properly.		

**Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply,  
Using the Portable Oil Fill and Filter Unit—Continued**

<b>Step</b>	<b>Operation</b>	<b>Normal indication</b>	<b>Corrective procedure</b>
20	Remove the right equipment section cover plate (2, fig. 3-21), if not previously removed.		
21	Connect the hydraulic oil supply hose to the OIL FILL fitting (fig. 4-11) on the APS service panel.		
22	Remove the overboard dump tube from the oil bleed port on the APS. Connect the flexible hose assembly to the oil bleed port, and place the other end of the hose into a 2-1/2-gallon (minimum) container.		
23	Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, set the external drive motor switch to OFF.		
24	Open the OIL BLEED valve, and drain the oil into the container. When the oil flow stops, depress and hold TRANSFER valve until the oil flow ceases.		
25	Set the OPERATE circuit breaker (2, fig. 4-10) on the portable oil fill and filter unit to ON.		
26	Turn the BYPASS valve fully clockwise, and close the OIL BLEED valve when the oil stream is free of air bubbles.		
27	Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates $150 \pm 10$ psi, and turn the locknut fully clockwise.		
28	Set the OPERATE circuit breaker to OFF when the HYD RES LEVEL indicator moves into the BLD position.		
29	Turn the BYPASS VALVE and RELIEF VALVE knob fully counterclockwise. <b>CAUTION:</b> If the cooling unit is not used in the procedures below, insure that operation of the TCG is limited to cycles, not to exceed those prescribed in tables 4-7, 4-8, and 4-9.		
30	At the TPCU, set the AC POWER switch to ON. <b>POWER ON indicator light illuminates.</b>		
31	At the TCU, set the POWER switch ON. <b>POWER LIGHT illuminates.</b> <b>CAUTION:</b> Check that the weights of the INERTIA SWITCHES in the TCG are in the forward position.		
32	Set the POWER switch on the cooling unit to ON. <b>CAUTION:</b> If the GYRO UNCAGED indicator light illuminates, immediately operate GYRO switch to CAGE.		
33	Set HEATERS EXTERNAL and PLATE POWER EXTERNAL switches on the TPCU to ON. <b>The HEATERS EXTERNAL indicator light illuminates. After approximately 30 seconds, the PLATE POWER EXTERNAL indicator light illuminates.</b> <b>WARNING:</b> Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure. <b>CAUTION:</b> The external drive motor must not be operated continuously for more than 20 minutes. The APS oil must be allowed to cool for a minimum of 30 minutes between runs.		
34	Set the external drive motor switch to ON. <b>The ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi.</b>		

**Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply,  
Using the Portable Oil Fill and Filter Unit—Continued**

<b>Step</b>	<b>Operation</b>	<b>Normal indication</b>	<b>Corrective procedure</b>
35	Set the ROLL POSITION switch on the TCU to GROUND.		
36	Set the TEST SELECTOR NO. 1 switch to BUZZ. V, and depress the ROLL pushbutton.		
		<b>The NULL METER indicates within the white zone.</b>	Adjust the R-BUZZ variable resistor (D, fig. 4-25 or A, fig. 4-26) in the TCG until the NULL METER indicates 1.
37	Depress the YAW pushbutton.		
		<b>The NULL METER indicates within the white zone.</b>	Adjust the Y-BUZZ variable resistor (D, fig. 4-25 or A, fig. 4-26) in the TCG until the NULL METER indicates 1.
38	Depress the PITCH pushbutton.		
		<b>The NULL METER indicates within the white zone.</b>	Adjust the P-BUZZ variable resistor (A, fig. 4-25 or A, fig. 4-26) in the TCG until the NULL METER indicates 1.
39	Set the ROLL POSITION switch to NORMAL.		
40	Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.		
	<i>Note.</i> From the rear of the missile, the trailing edges of the Y elevons deflect to the left when the YAW pushbutton is depressed and the TEST SELECTOR NO. 2 switch is set to +G, and to the right when the YAW pushbutton is depressed and the TEST SELECTOR NO. 2 is set to -G. The trailing edges of the P elevons deflect to the right when the PITCH pushbutton is depressed and the TEST SELECTOR NO. 2 switch is set to -G.		
41	Depress the YAW pushbutton, and alternately rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute.		
		<b>The elevons deflect accordingly.</b>	
42	Depress the PITCH pushbutton, and alternately rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute.		
		<b>The elevons deflect accordingly.</b>	
43	Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1, the TEST SELECTOR NO. 1 switch to GYRO PRESET, and the PRESET-FLIGHT switch to FLIGHT.		
44	Depress the ROLL pushbutton.		
45	Operate the GYRO PRESET switch to CW or CCW for approximately 1 minute.		
		<b>The elevons and NULL METER deflect accordingly, and the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi.</b>	
46	Set the PLATE POWER EXTERNAL switch on the TPCU to OFF.		
		<b>The PLATE POWER EXTERNAL indicator light extinguishes.</b>	

*Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply,  
Using the Portable Oil Fill and Filter Unit—Continued*

Step	Operation	Normal indication	Corrective procedure
47	Set the HEATERS EXTERNAL switch to OFF.	The HEATERS EXTERNAL indicator light extinguishes.	
48	Set the POWER switch on the cooling unit to OFF.		
49	Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.		
50	Set the external drive motor switch to OFF.		
51	Open the OIL BLEED valve, and bleed all the oil from the APS.	The HYD. RES. LEVEL indicator moves to -45°.	
52	Depress and hold the TRANSFER valve until oil flow stops.		
53	Repeat steps 25 through 29, 32 through 34, and 40 through 52, eight times.		
54	Attach the quick-disconnect coupling half (fig. 4-11) to the free end of the hydraulic oil supply flexible hose (6, fig. 4-10) and connect this end to the quick-disconnect fitting on the manifold return port (12) in the portable oil fill and filter unit.		
	<i>Note.</i> If oil is visible in the oil level gage (9), sufficient oil is available for the remainder of the clean-up procedure.		
55	Insure that the OIL BLEED valve is open.		
56	Insure that the RELIEF knob and BYPASS valve are fully counterclockwise. Set the OPERATE circuit breaker to ON and allow the oil to circulate for 5 minutes.		
57	Set the OPERATE circuit breaker to OFF. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, set the external drive motor switch to OFF. Depress the TRANSFER valve, and hold until the ACC. AIR PRESS. gage indicator ceases to move.		
58	Close the OIL BLEED valve.		
59	Set the OPERATE circuit breaker to ON.		
60	Turn the BYPASS valve fully clockwise.		
	<b>CAUTION:</b> Do not allow the OIL PRESSURE gage indication to exceed 160 psi in step 61 below.		
61	Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates $150 \pm 10$ psi, and turn the locknut fully clockwise.		
62	Set the OPERATE circuit breaker to OFF when the HYD. RES. LEVEL indicator moves into the BLD position.		
	<b>CAUTION:</b> When performing step 63, do not allow the ACC. AIR PRESS. gage indication to fall below 2,500 psi.		
63	Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, depress the TRANSFER valve until the ACC. AIR PRESS. gage indicates 2,500 psi. Repeat this cycling of the TRANSFER valve for 30 seconds.		
64	Set the external drive motor switch to OFF.		
65	Open the OIL BLEED valve, and allow the oil to drain into the portable oil fill and filter unit reservoir. Depress the TRANSFER valve, and hold it until the indication on the ACC. AIR PRESS. gage ceases to move.		
66	Repeat steps 56 through 65 five times.		
67	Close the OIL BLEED valve.		
68	Turn the RELIEF VALVE knob fully counterclockwise.		
69	Repeat steps 25, 27 through 29, 32 through 34, 40 through 50, and 65.		
70	Repeat steps 55 through 65 six times.		



**Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply,  
Using the Portable Oil Fill and Filter Unit—Continued**

<b>Step</b>	<b>Operation</b>	<b>Normal indication</b>	<b>Corrective procedure</b>
71	Repeat steps 67, 68, 25, 27 through 29, 32 through 34, 40 through 50, and 65.		
72	Repeat steps 55 through 65 six times.		
73	Repeat steps 67, 68, 25, 27 through 29, 32 through 34, 40 through 50, and 65.		
74	Repeat 55 through 65 six times.		
75	Repeat steps 67, 68, 25, 27 through 29, 32 through 34, 40 through 50, and 65.		
76	Repeat steps 55 through 65 six times.		
77	Repeat steps 67, 68, 25, 27 through 29, 32 through 34, 40 through 50, and 65.		
78	Repeat 55 through 65 six times.		
79	Insure that the OIL BLEED valve is closed, the BYPASS valve is fully clockwise, and the RELIEF VALVE knob is fully counterclockwise.		
80	Set the OPERATE circuit breaker on the portable oil fill and filter unit to ON. <b>CAUTION: Do not allow the OIL PRESSURE gage indication to exceed 160 psi in step 81 below.</b>		
81	Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates $150 \pm 10$ psi, and turn the locknut fully clockwise.		
82	Set the OPERATE circuit breaker to OFF when the HYD. RES. LEVEL indicator moves into the BLD position.		
83	Set the HEATERS EXTERNAL switch to ON. <b>The HEATERS EXTERNAL light illuminates.</b>		
84	Operate the AUXILIARY POWER SUPPLY switch on the TPCU to STOP, and hold it for a minimum of 1 second and a maximum of 2 seconds.		
85	Set the HEATERS EXTERNAL switch to OFF. <b>The HEATERS EXTERNAL light extinguishes.</b>		
86	Set the AC POWER switch on the TPCU and the POWER switch on the TCU to OFF. <b>The POWER ON indicator light on the TPCU extinguishes. The POWER LIGHT on the TCU extinguishes.</b>		
87	Set the external drive motor switch to on. <b>When the ACC. AIR PRESS. gage reaches maximum pressure between 2,500 and 3,000 psi, immediately set the external drive motor switch to OFF.</b>		<p>If the ACC. AIR PRESS. gage indication exceeds 3,000 psi, perform the following corrective procedures.</p> <ol style="list-style-type: none"> <li>(1) Set the AC POWER switch on the TPCU to ON.</li> <li>(2) Set the POWER switch on the cooling unit to ON.</li> </ol> <p><b>CAUTION: If the GYRO UNCAGE indicator light illuminates, immediately operate the GYRO switch to CAGE.</b></p>

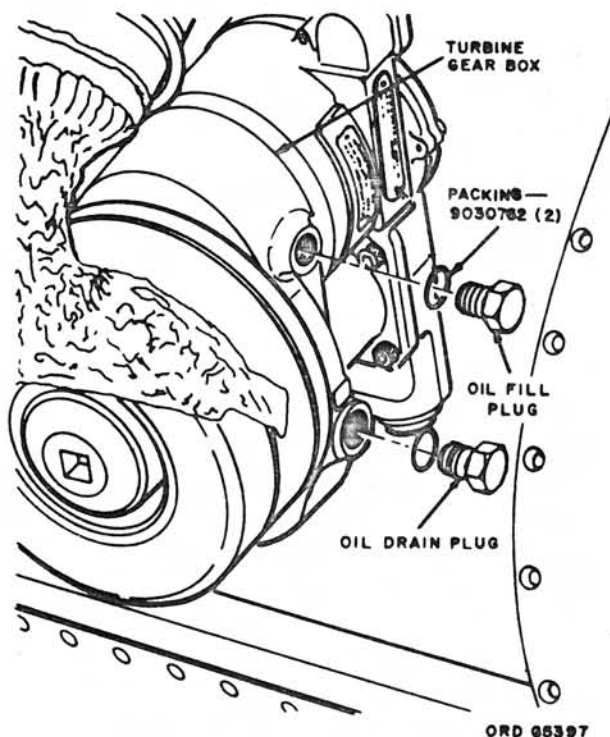
*Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply,  
Using the Portable Oil Fill and Filter Unit—Continued*

<i>Step</i>	<i>Operation</i>	<i>Normal indication</i>	<i>Corrective procedure</i>
87 Cont			<p>(3) Set the HEATERS EXTERNAL and the PLATE POWER EXTERNAL switches to ON.</p> <p>(4) Operate the AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 1 second and a maximum of 2 seconds.</p> <p>(5) Depress and hold the TRANSFER valve until oil flow stops. Allow the ACC. AIR PRESS. gage indication to decrease to the ambient temperature.</p> <p>(6) Operate the AUXILIARY POWER SUPPLY switch to STOP, and hold for a minimum of 1 second and a maximum of 2 seconds.</p> <p>(7) Set the PLATE POWER EXTERNAL switch to OFF.</p> <p>(8) Set the HEATERS EXTERNAL switch to OFF.</p> <p>(9) Set the POWER switch on the cooling unit to OFF.</p> <p>(10) Set the AC POWER switch on the TPCU to OFF.</p> <p>(11) Repeat step 87.</p>
88	Disconnect the flexible line from the manifold return port on the portable oil fill and filter unit.		
89	Remove the quick-disconnect fitting from the free end of the flexible line, and place the end of the line in a 2-1/2-gallon (minimum) container.		
90	If necessary, slowly open the OIL BLEED valve, and, when the HYD. RES. LEVEL indicator moves to a position midway between 100° and 165°, close the BLEED valve.		
91	Remove the external drive motor from the APS, and install the turbine cap. Torque the cap to a value of 60 pound-inches if the missile electrical checkout is not to follow.		

*Table 4-2. Hydraulic Oil Fill and System Cleanup of the Accessory Power Supply,  
Using the Portable Oil Fill and Filter Unit—Continued*

Step	Operation	Normal indication	Corrective procedure
92	Disconnect the hydraulic oil supply hose from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port.		
93	Disconnect the flexible hose assembly from the oil bleed port on the APS.		
94	Install the overboard dump tube on the oil bleed port.		

*Table 4-3. (Deleted)*



*Figure 4-4. Inspection of the APS Turbine.*

(The next numbered page is 4-19)

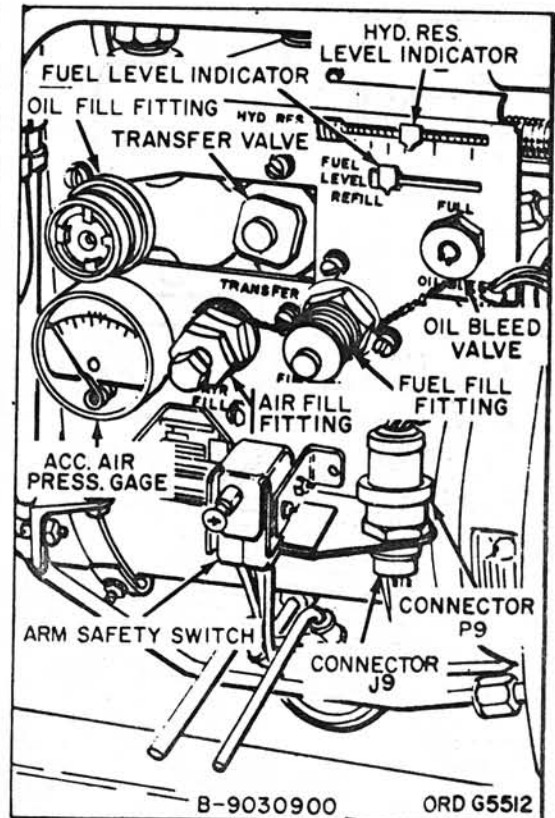
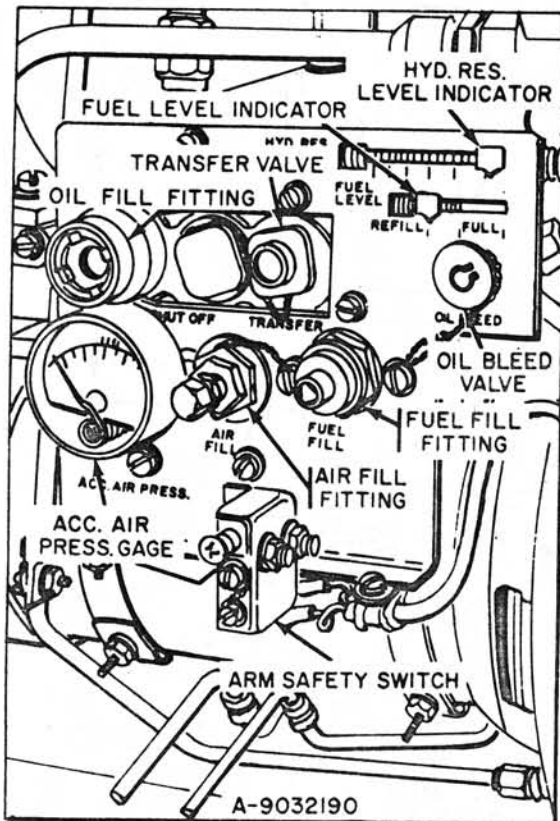


Figure 4-5. APS Service Panel.

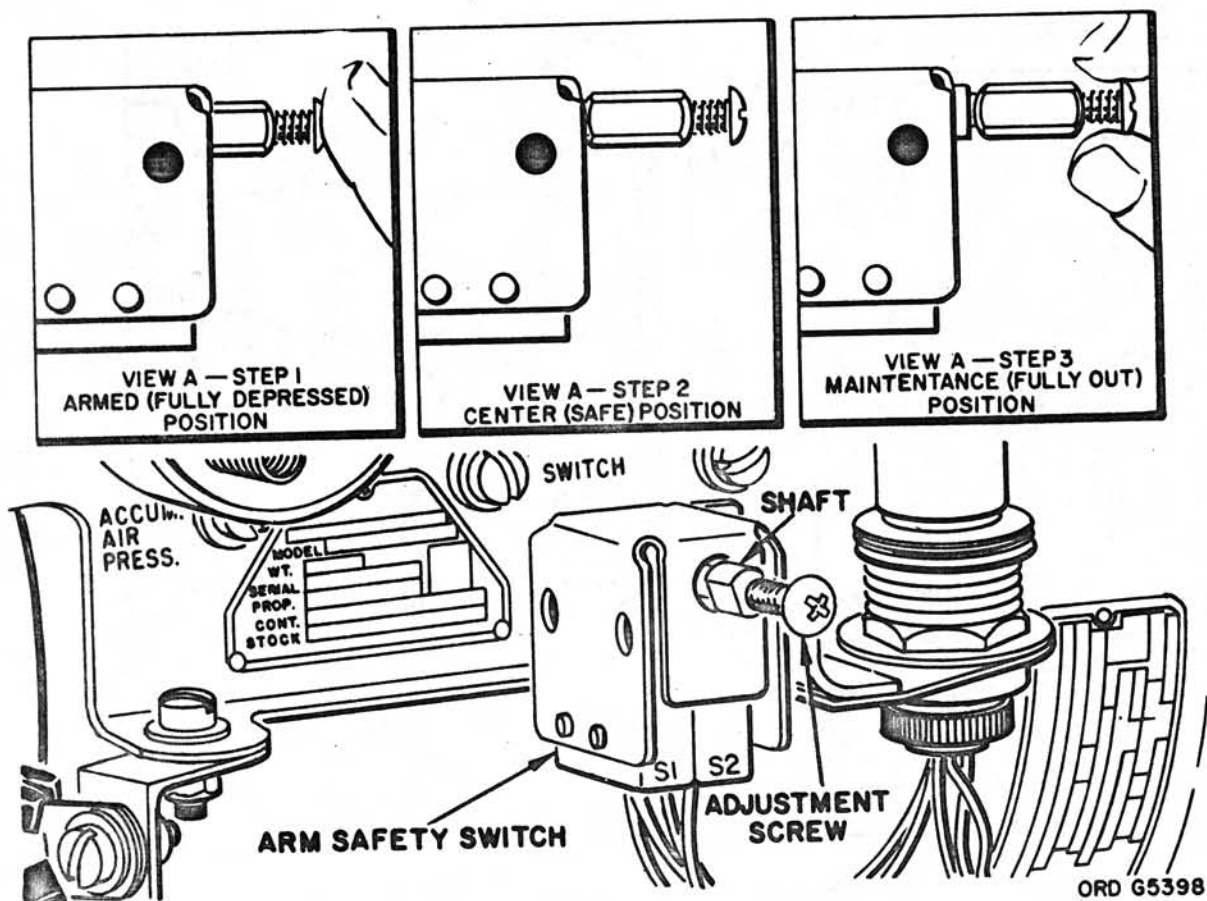


Figure 4-6. Arm Safety Check of the APS Arm SAFETY SWITCH.

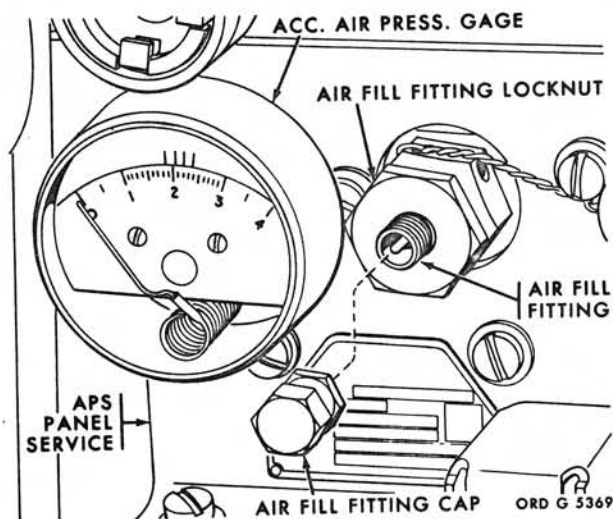
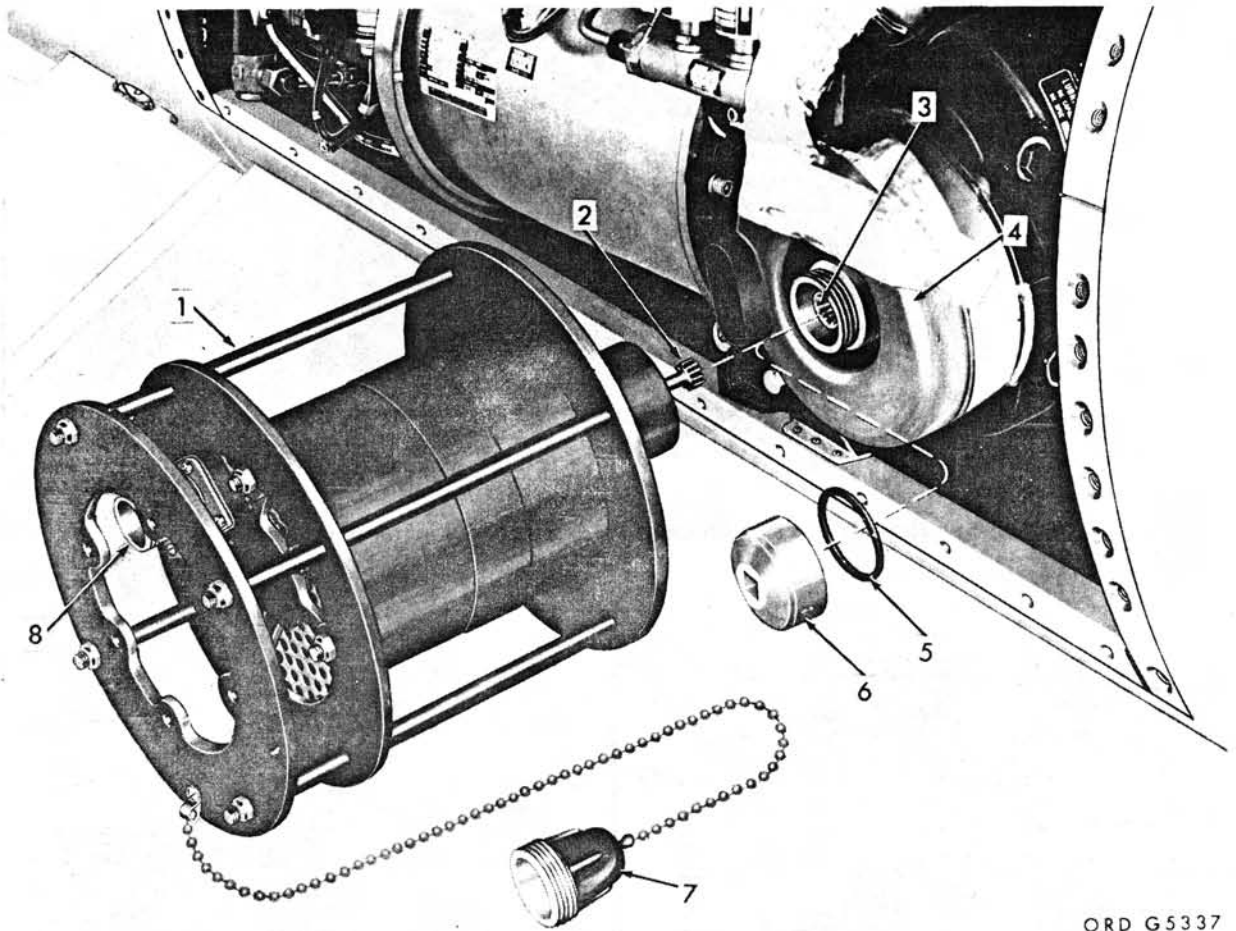


Figure 4-7. APS—accumulator air pressure gage and air fill fitting.





ORD G5337

1—External drive motor  
2—External drive motor spline  
3—Turbine shaft

4—Turbine housing  
5—Gasket  
6—Turbine shaft cap

7—External drive motor spline cap  
8—Power connector

Figure 4-8. Removal and installation of the external drive motor.

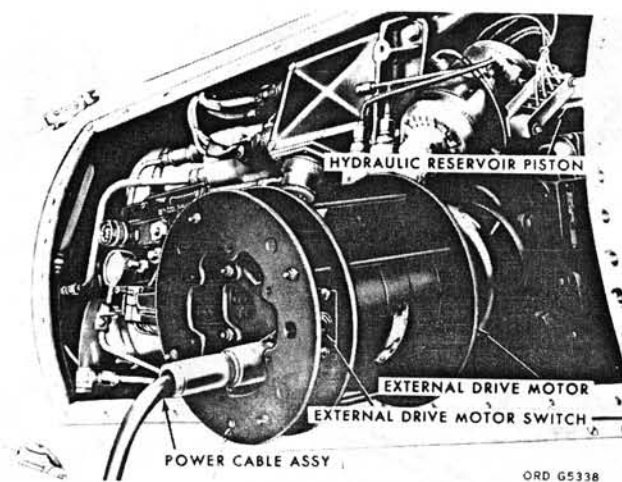


Figure 4-9. Removal and installation of the external drive motor power cable.

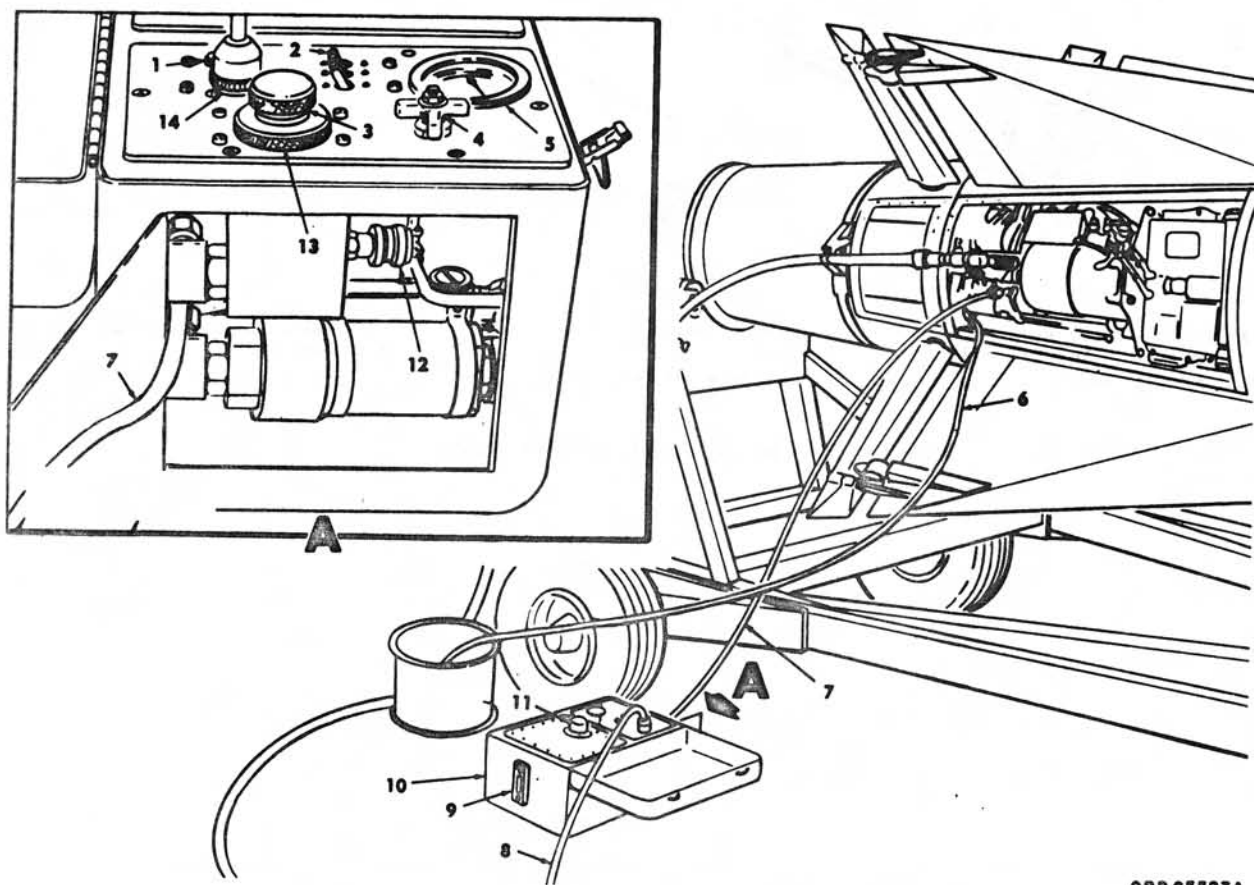


Figure 4-10. Oil fill and bleed of the HPU and APS, using the portable oil fill and filter unit.

1—LINE POWER indicator light  
2—OPERATE circuit breaker  
3—RELIEF VALVE knob  
4—BYPASS valve  
5—OIL PRESSURE gage  
6—Drain hose  
7—Hydraulic oil supply hose

8—Portable oil fill and filter unit power cable  
assembly  
9—Oil level gage  
10—Portable oil fill and filter unit  
11—Reservoir filler cap  
12—Manifold return port  
13—Locknut  
14—POWER connector J1

*Figure 4-10—Continued.*

---

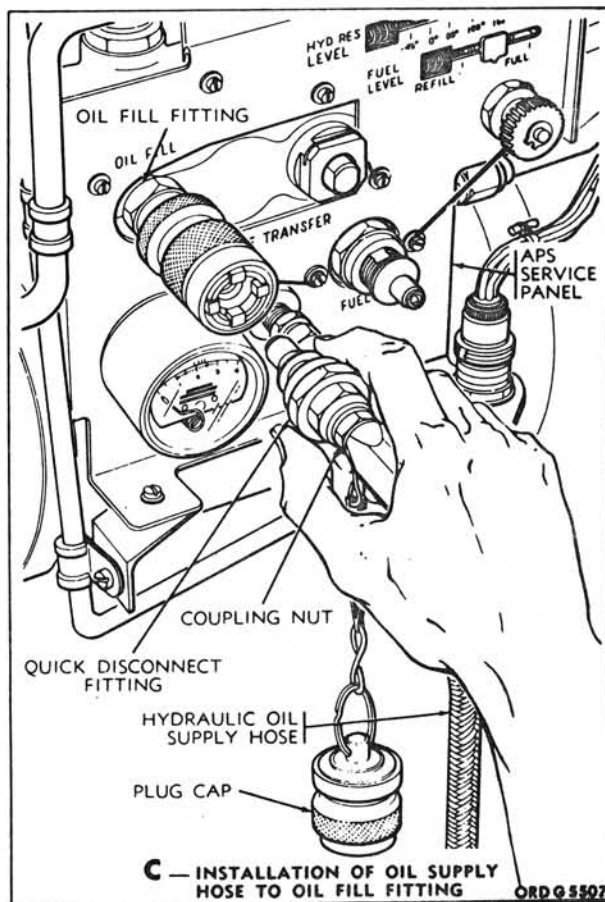
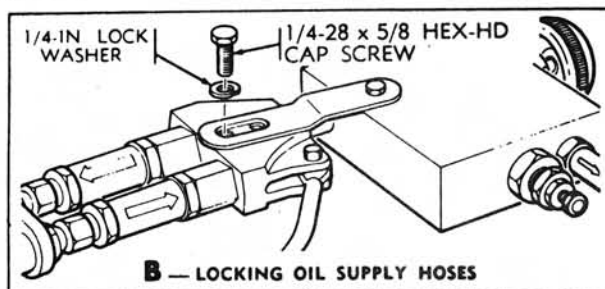
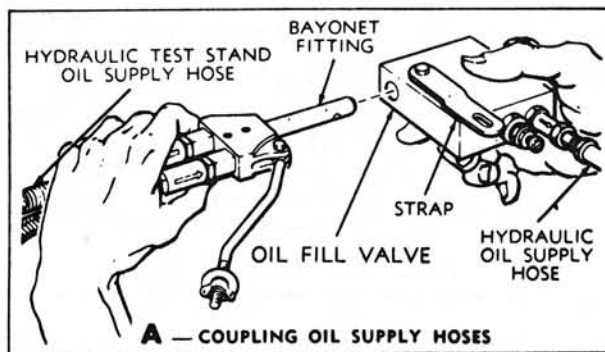


Figure 4-11. Oil fill valve installation.

Figure 4-12. (Deleted)

## Section II. AIR AND OIL SERVICING THE HYDRAULIC PUMPING UNIT (HPU)

### 4-8. General

The missile is shipped to the user with the accumulator depressurized and the HPU hydraulic system drained; however, it may contain some residual oil.

*Note.* Paragraphs 4-9 and 4-9.1 are applicable to missiles with actuator assemblies 13060137 and 13060138.

### 4-9. Hydraulic Oil

MIL-H-5606 hydraulic oil is authorized for use in the NIKE system HPU within the temperature range of  $-65^{\circ}\text{F}$  to  $160^{\circ}\text{F}$  on a year-round basis. The missile may not be exposed to ambient temperatures below  $-15^{\circ}\text{F}$  for periods exceeding the limits specified in paragraph 4-9.1.

#### 4-9.1. HPU Low-Temperature Operation Limitations

a. Certain limitations in the operation of the HPU are required during extremely cold weather. The length of time the missile can be exposed to outside ambient temperatures below  $-15^{\circ}\text{F}$  is determined in accordance with figures 4-12.1 and 4-12.2.

b. Perform the procedures below to determine the length of time the missile can be exposed to outside ambient temperatures below  $-15^{\circ}\text{F}$ .

- (1) Determine the storage chamber temperature from which the missile was removed, and select the applicable curve (fig. 4-12.1).
- (2) Determine the outside ambient temperature.
- (3) On figure 4-12.1, from the point of intersection of the storage chamber temperature curve and the outside ambient temperature line, read down the vertical line to determine the outside exposure time in hours.
- (4) Determine the wind velocity.
- (5) On figure 4-12.2, determine the wind velocity correction factor.
- (6) Multiply the outside exposure time in hours determined in step (3) above by the wind velocity correction factor determined in step (5) to determine the

length of time the missile can be exposed to outside ambient temperatures below  $-15^{\circ}\text{F}$ . For example, if the storage chamber is  $+50^{\circ}\text{F}$  and the outside ambient temperature is  $-25^{\circ}\text{F}$ , the outside exposure time is 1 hour and 55 minutes (fig. 4-12.1). If the wind velocity is 30 miles per hour, the correction factor is 0.82 (fig. 4-12.2). Multiply 1 hour and 55 minutes by 0.82, and the length of time the missile can be exposed is 1 hour and 34 minutes.

- (7) If a missile with MIL-H-5606 hydraulic fluid in the HPU is exposed to temperatures below  $-15^{\circ}\text{F}$  for periods exceeding the time limits shown in figure 4-12.1, perform the following steps to determine the operational recovery time of the HPU (time required to bring the HPU up to its operational temperature of  $-15^{\circ}\text{F}$ ).
- (a) Note and record the initial ACC. AIR PRECHARGE pressure according to table 4-4, step 2, for expected outside temperatures of  $+30^{\circ}\text{F}$  to  $+165^{\circ}\text{F}$ .
- (b) Assuming that the missile has been exposed to a low ambient temperature for a period of time in excess of that shown in figure 4-12.1, note and record the air pressure on the ACC. AIR PRECHARGE pressure gage while the HPU is in the cold condition.
- (c) Using the initial ACC. AIR PRECHARGE pressure in (a) above and the present ACC. AIR PRECHARGE pressure in (b) above, determine the equivalent accumulator gas temperature from figure 4-12.3.
- (d) Using the known equivalent accumulator gas temperature in (c) above and the known temperature of the storage building, determine the operational recovery time of the HPU from figure 4-12.4.
- (e) The operational recovery time shown in figure 4-12.4, which is accomplished with the HPU access cover installed,



can be reduced by 15 percent if the HPU access cover is removed to allow natural convection of the ambient air in the storage building. The operational recovery time of the HPU can be reduced still further if ambient air is blown into and across the HPU section of the missile to provide forced convective warmup of the system. However, since many factors are involved in the efficiency of forced convective heating, the operational recovery time of the HPU cannot be determined in advance. Therefore, using this method, the HPU warmup status must be monitored periodically as in (c) above until the HPU reaches its operational temperature of  $-15^{\circ}\text{F}$ .

#### 4-10. Servicing and Test Equipment

The servicing and test equipment necessary to service and check the operation of the HPU is listed below:

- a. The missile electrical test set group.
- b. The power conversion unit (fig. 4-14) (permanent-type installation) or the distribution box in the test station truck (fig. 4-15) (mobile-type installation).
- c. A source of clean, dry, compressed air (3,500 psi maximum with a dew point of  $-40^{\circ}\text{F}$  to provide the initial air fill of the HPU).
- d. The portable oil fill and filter unit (permanent-type or mobile-type installation).
- e. A 2-1/2-gallon (minimum) container and a hose for discharge of oil from the dump tube fitting on the HPU.
- f. Hydraulic oil, unopened cans, minimum 3 gallons.
- g. Hygrometer.
- h. Flexible hydraulic hose.

#### 4-11. Preliminary Procedure for HPU Servicing

*Note.* The preliminary procedures in this paragraph include those necessary for missile electrical checkout (p through q below).

- a. Connect a ground strap between the missile frame, at a point where proper electrical contact can be made, and to ground, insuring that there is less than 20 ohms resistance between the

missile frame and ground.

- b. Visually inspect the HPU and all associated hydraulic lines and electrical connections. Make certain the HPU is securely mounted and properly torqued.

*Note.* Illustrated tables of controls and indicators for the missile electrical test set group are contained in TM 9-4935-253-12.

- c. Check that AC POWER, HEATERS EXTERNAL, PLATE POWER EXTERNAL, and GLOW COIL switches on the test power control unit (TPCU) are set to OFF.

- d. Set TEST SELECTOR NO. 1 switch on the test control unit (TCU) to OFF and TEST SELECTOR NO. 2 switch to TRANS NO. 1.

*Note.* Perform e below for a permanent-type installation or f and g below for a mobile-type installation.

- e. Connect the ground power cable assembly (fig. 4-13) to connector P104A and P105A on the missile umbilical cable assembly and to connector J7 on the rear of the missile electrical test set group.

*Note.* Refer to Appendix C for inspection criteria on cables, wiring harnesses, and connectors.

- f. Connect the ground power cable assembly to connectors P104A and P105A on the missile umbilical cable assembly and to the ground power extension cable assembly.

- g. Connect the opposite end of the ground power extension cable assembly to connector J7 on the rear of the missile electrical test set group.

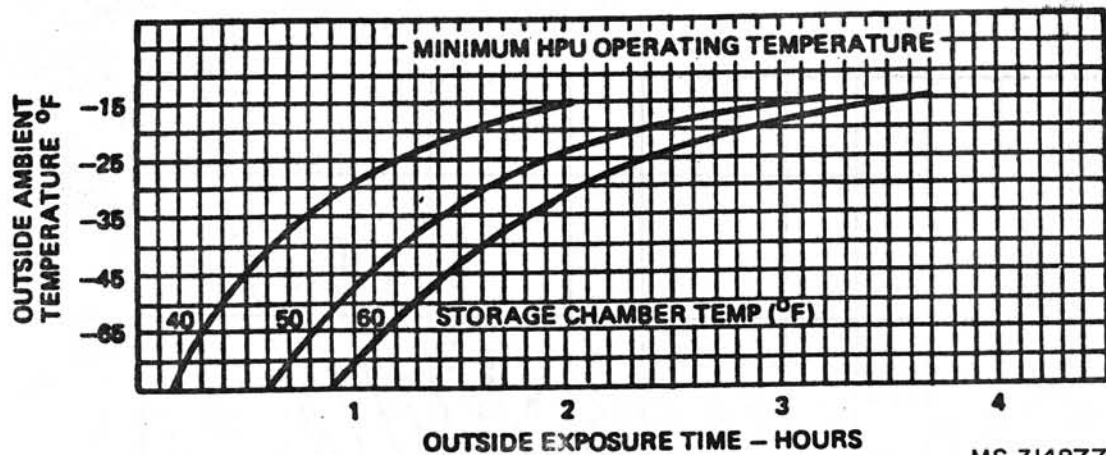
- h. Connect the missile test cable assembly to connector J2 on the transponder control group and to connector J1 on the rear of the missile electrical test set group. Secure the cable assembly to the forward body section hoist.

*Caution:* Check that the AC POWER switch on the TPCU is set to OFF before connecting the cables.

*Note.* Perform i below for a permanent-type installation or j below for a mobile-type installation.

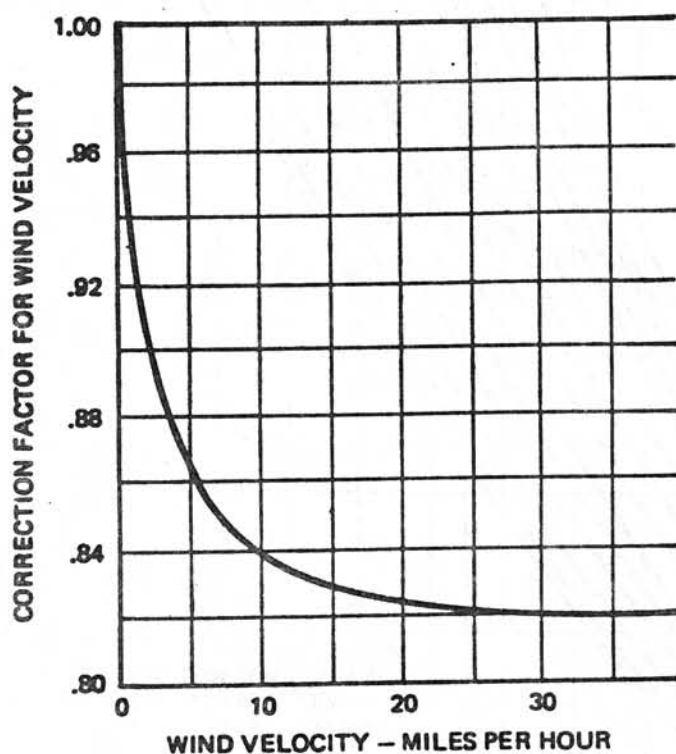
- i. Connect a power cable assembly to connector J8 on the rear of the missile electrical test set group and to a 120-volt, 400- $\sim$  single-phase power source.

- j. Connect a power cable assembly to connector J8 on the rear of the missile electrical test set group and to connector J13 on the distribution box in the test station truck.



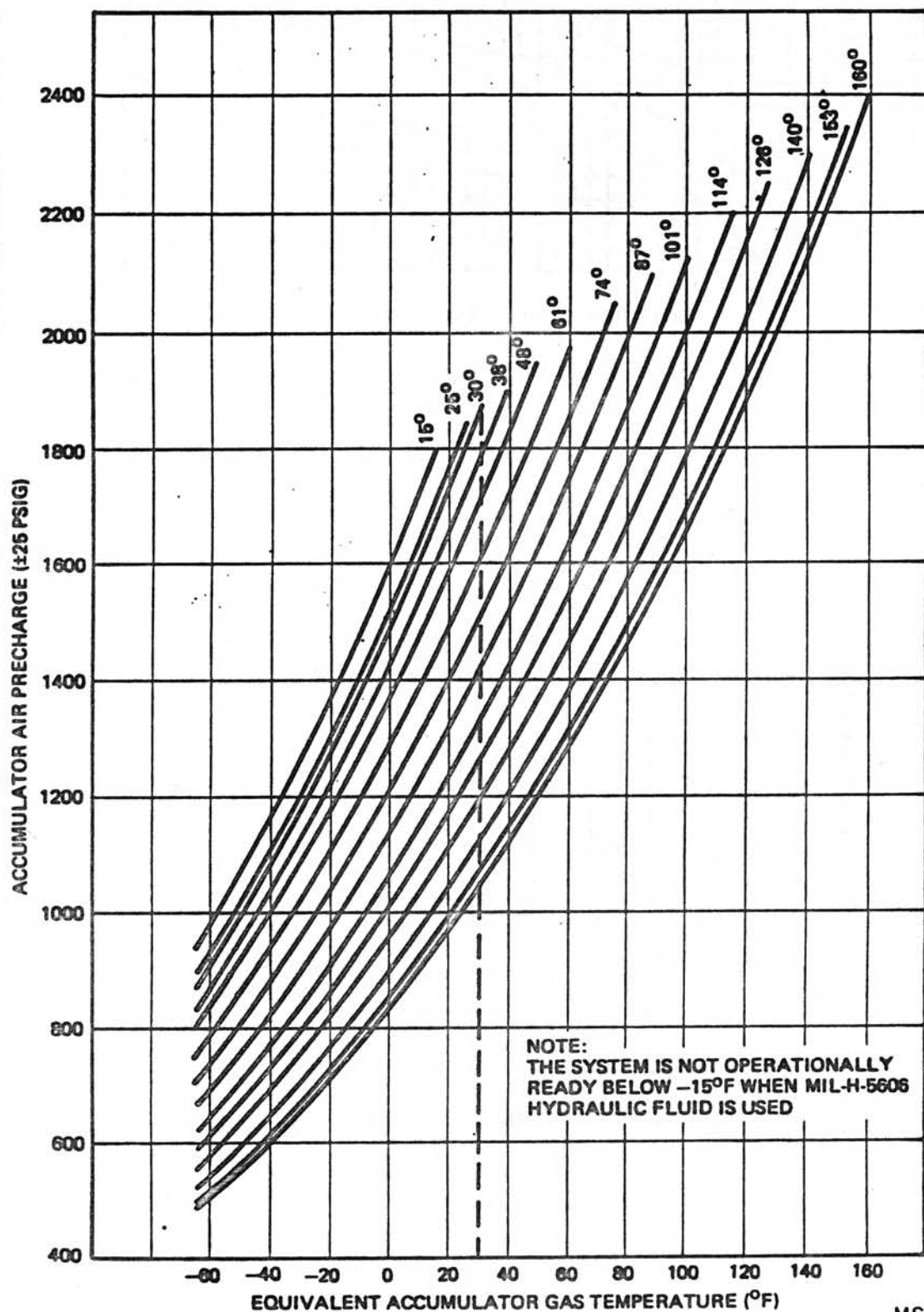
MS 314877

Figure 4-12.1. Temperature-time graph for the HPU.



MS 314878

Figure 4-12.2. Wind velocity correction factor graph for the HPU.



MS 314879

Figure 4-12.3. Pressure-temperature graph for accumulator air precharge unit.

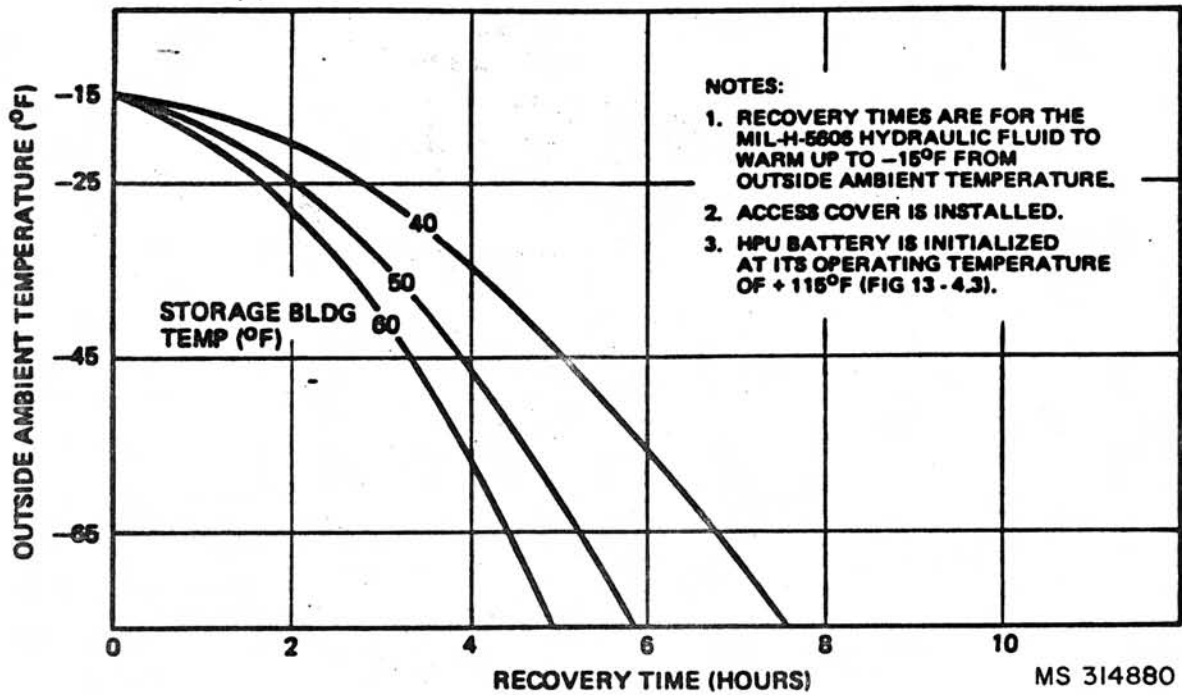
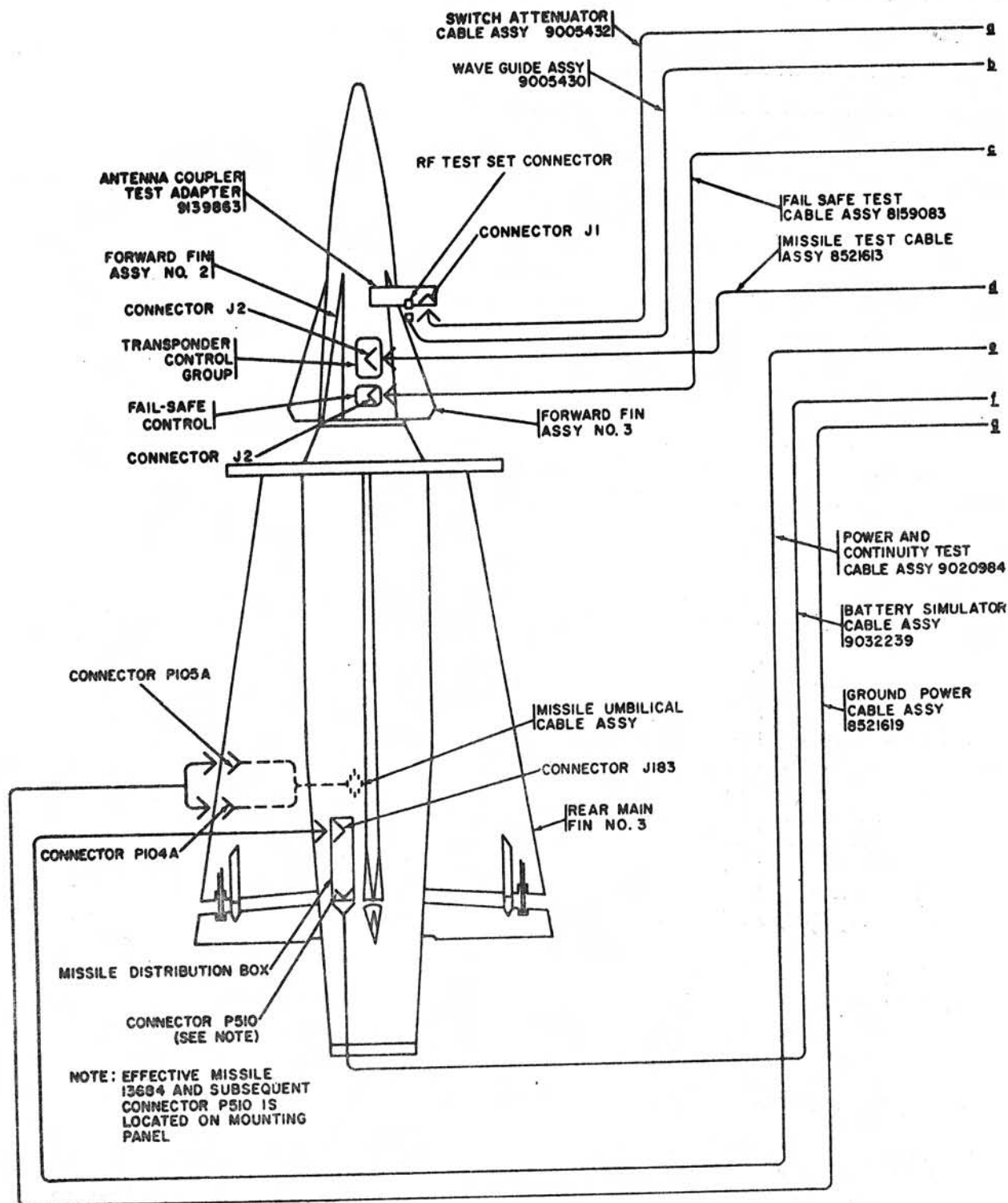


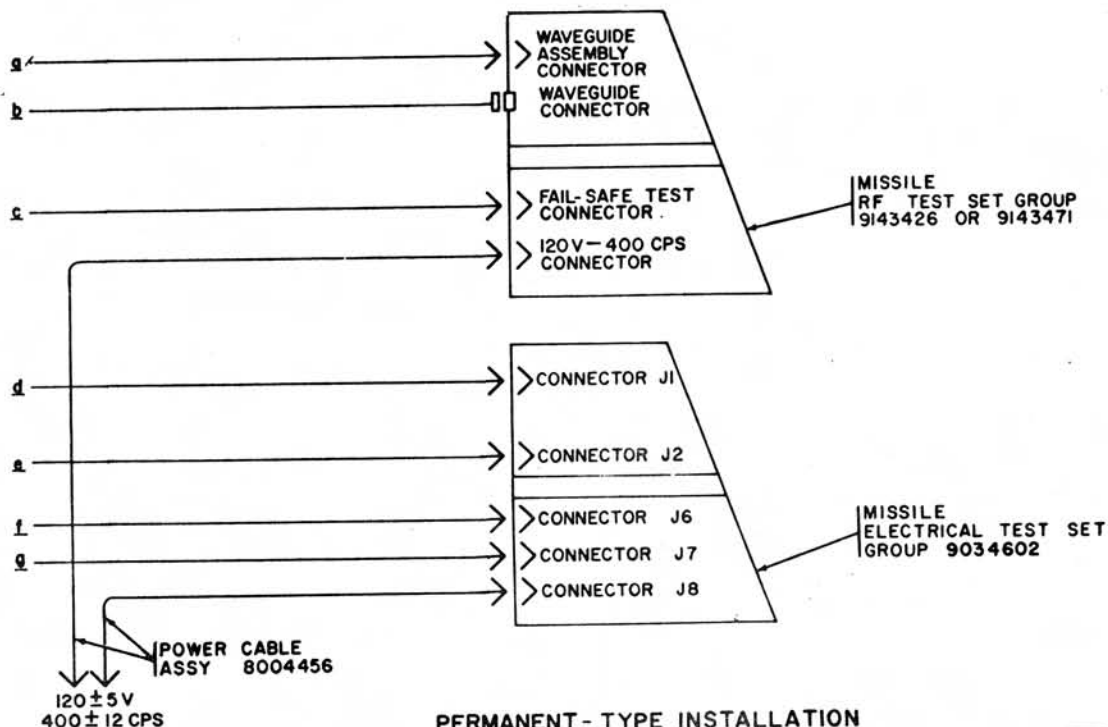
Figure 4-12.4. Temperature-time graph for HPU warmup.



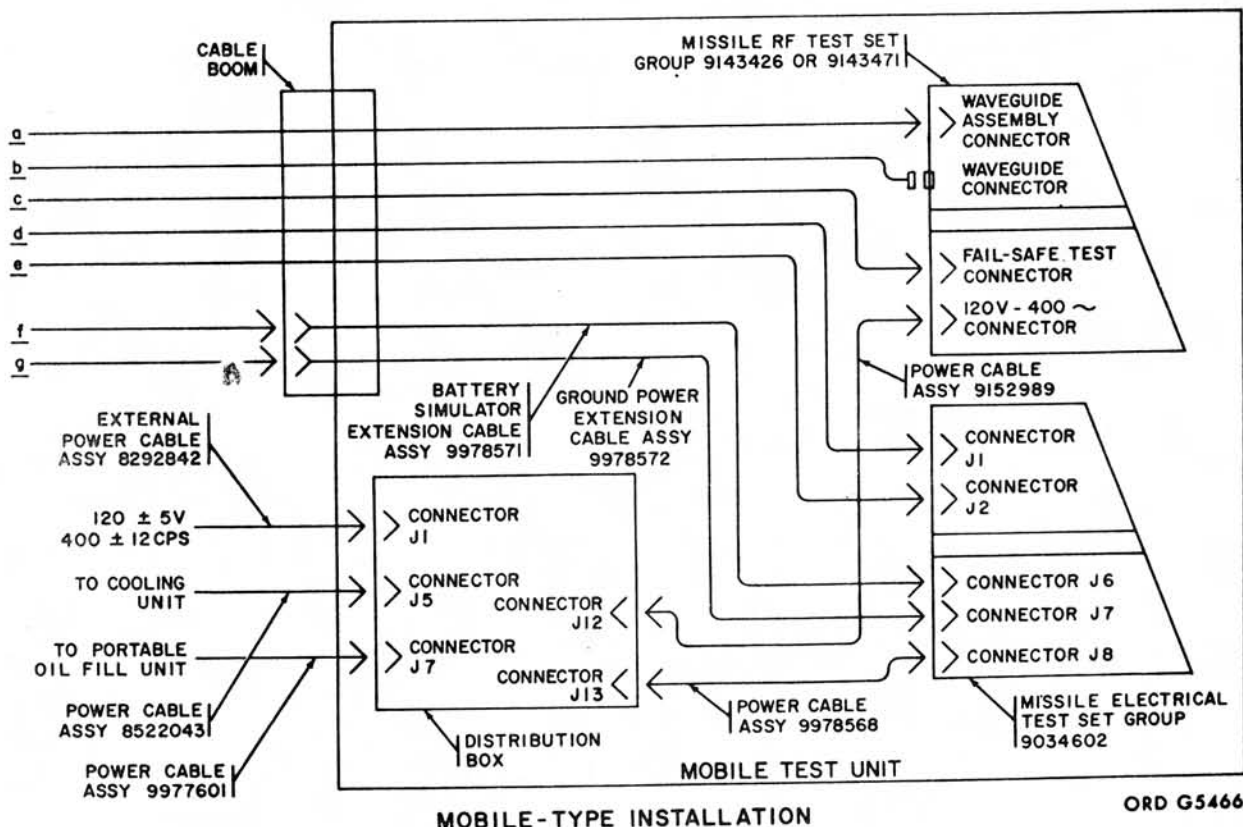
ORD G5483

Figure 4-13. Cable connections for air and oil servicing and missile electrical checkout.  
(Sheet 1 of 2).





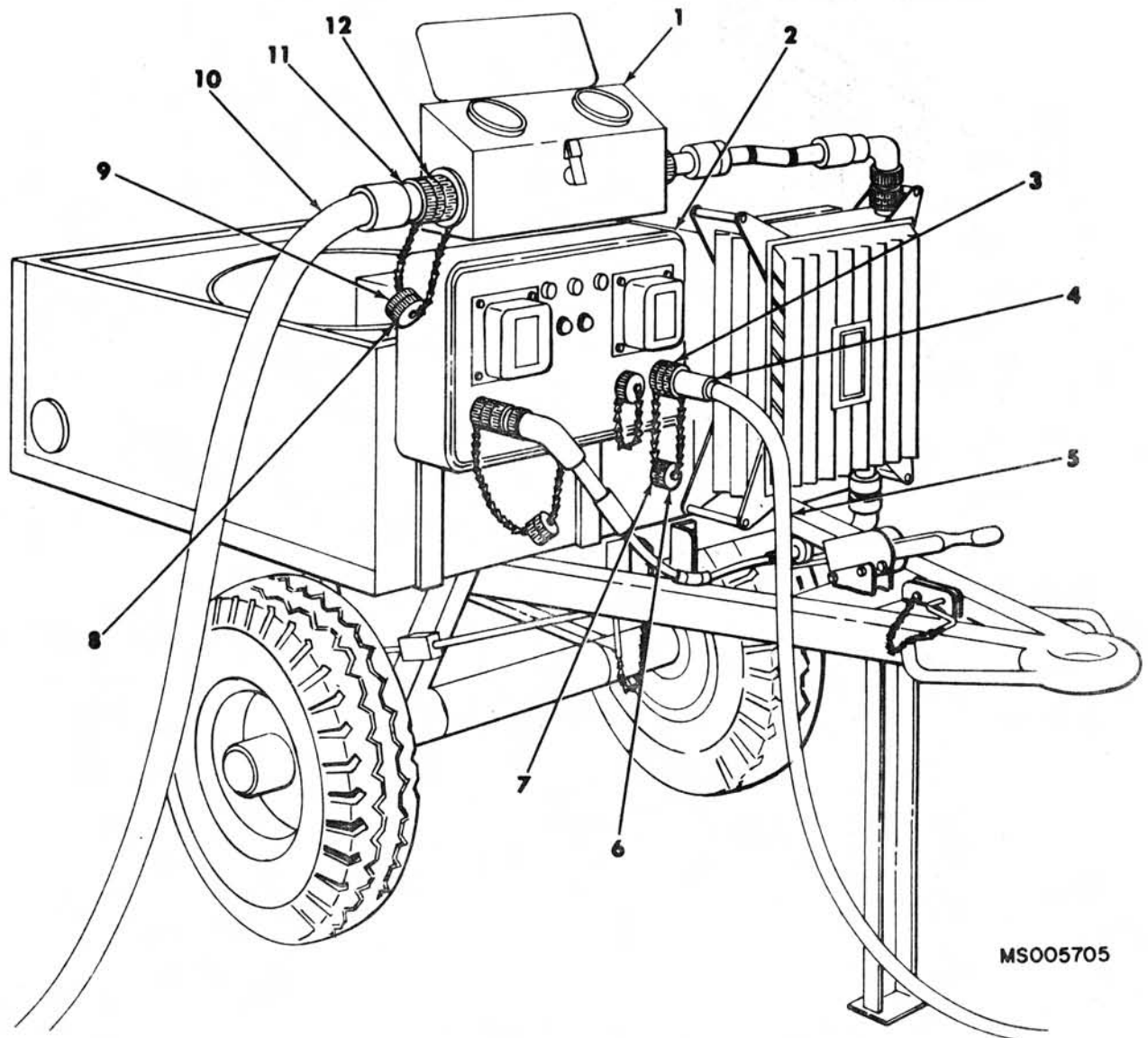
PERMANENT - TYPE INSTALLATION



MOBILE - TYPE INSTALLATION

ORD G5466

Figure 4-13. (Sheet 2 of 2).



MS005705

1—Meter cabinet  
2—Distribution box  
3—Connector J1  
4—Connector P1

5—External power cable assembly  
6—P1 protective cap  
7—J1 protective cap  
8—J2 protective cap

9—P2 protective cap  
10—HPU power cable assembly  
11—Connector P2  
12—Connector J2

Figure 4-14. Cable disconnection and connection for the power conversion unit.

k. Install the air hose assembly (1, fig. 4-3) on the cooling unit (8).

l. Connect connector P1 (12) of the power cable assembly (9) to connector J1 (11).

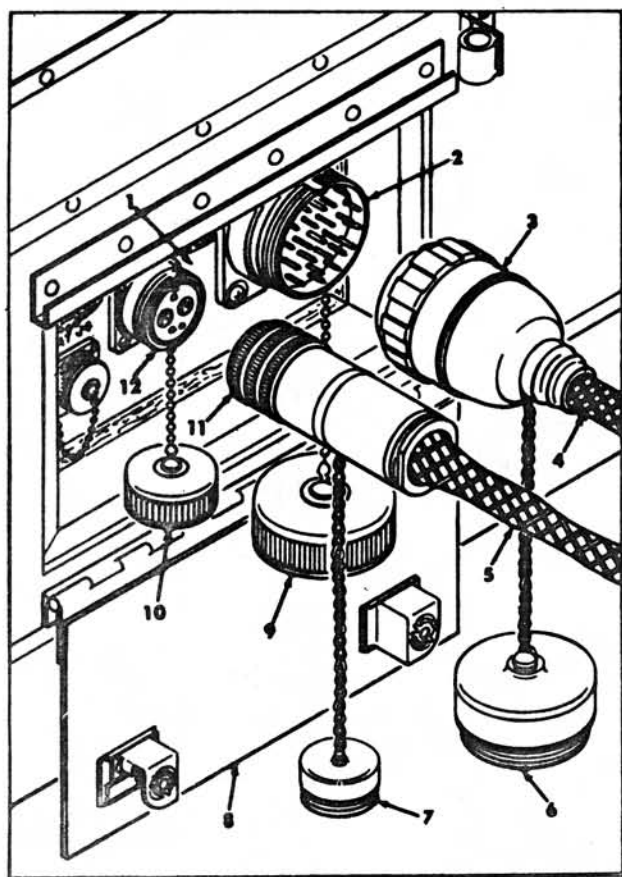
Note. Perform *m* below for a mobile-type installation and *n* below for a permanent-type installation.

m. Connect the opposite end of the power cable assembly to connector J5 on the distribution box (fig. 4-13) in the mobile test unit.

n. Connect the opposite end of the power cable assembly to a 208-volt, 400  $\sim$ , 3-phase power source.

o. Deleted.

**CAUTION:** Check that AC POWER switch on the RF test set is set to OFF before connecting the cables.



- 1-Distribution box
- 2-Connector J1
- 3-Connector P1
- 4-External power cable assembly
- 5-HPU power cable assembly
- 6-P1 protective cap
- 7-P8 protective cap
- 8-Access door
- 9-J1 protective cap
- 10-J8 protective cap
- 11-Connector P8
- 12-Connector J8

Figure 4-15. Cable disconnection and connection for the test station truck.

**CAUTION:** The ground strap connection in *a* above must remain connected during missile electrical checkout.

*Note.* Perform *p* below for a permanent-type installation or *q* and *r* below for a mobile-type installation.

*p.* Connect a power cable assembly (fig. 4-13) to 120V, 400- $\sim$  connector on the rear of the missile RF test set group and to a 120-volt, 400- $\sim$  power source.

*q.* Connect a power cable assembly (fig. 4-13) to 120V-400  $\sim$  connector on the rear

of the missile RF test set group and to connector J12 on the distribution box in the mobile test unit.

*r.* Connect the external power cable assembly to connector J1 on the distribution box in the mobile test unit and to a 120-volt, 400  $\sim$  power source.

*s.* Set TEST SELECTOR switch on the RF test set to CAL, CALIBRATE switch to ADJ, and FAIL-SAFE TEST—CONTACT-NORMAL-TIME switch to NORMAL.

*t.* Set AC POWER switch on the RF test set to ON.

*u.* After 60 seconds, momentarily operate RESPONSE -250V switch on the RF test set to -250V. If RESPONSE OR VOLTAGE meter does not deflect to the right, immediately set AC POWER switch to OFF.

*v.* Set CALIBRATE switch to TEST, and allow at least a 30 minute warmup. Proceed with equipment and cable connections while the RF test set is warming up.

*w.* Connect test equipment as prescribed below.

(1) Remove the three stud assemblies (fig. 4-22) from the forward body section. Install the antenna coupler test adapter over forward fin assembly No. 3. Secure the adapter over the fin assembly by aligning the three captive fasteners of the mounting brackets with the mating parts in the missile skin of the forward body section, and rotate the fasteners to the locked position by hand.

(2) Install waveguide coupling (RF terminator) 9000245 (fig. 4-23) on transmitting antenna horn no. 1.

(3) Connect waveguide assembly 9138481 to receiving antenna horn 4.

(4) Connect waveguide assembly 9138342 to waveguide assembly 9128481 and to one RECEIVER ANTENNA connector on the antenna coupler test adapter.

- (5) Connect waveguide assembly 9138483 to receiving antenna horn 2.
  - (6) Connect waveguide assembly 9138341 to waveguide assembly 9138383 and to the other RECEIVER ANTENNA connector on the antenna coupler test adapter.
  - (7) Connect waveguide assembly 9138482 to transmitting antenna horn 3.
  - (8) Connect waveguide assembly 9138340 to waveguide assembly 9138482 and to TRANSMITTING ANTENNA connector on the antenna coupler test adapter.
  - (9) Connect waveguide assembly 9005430 to RF TEST SET connector on the antenna coupler test adapter and to the waveguide connector (fig. 4-13) on the rear of the missile RF test set group.
  - (10) Connect the switch attenuator cable assembly to connector J1 on the antenna coupler test adapter and to WAVEGUIDE ASSEMBLY connector on the rear of the missile RF test set group.
  - (11) Connect the fail-safe test cable assembly (fig. 4-13) to connector J2 on the fail-safe control and to FAIL-SAFE TEST connector on the rear of the missile RF test set group.
  - (12) Check that the transponder control group wiring harness connector P1 (19, fig. 3-31) is connected to transponder control group connector J1 (16, fig. 3-31) in forward body section.
- Note.* Perform step (13) below for missiles 10206 through 11935 and 13001 through 13683.
- (13) Disconnect connector J510 on the battery wiring harness from connector P510 on the distribution box, and connect the battery simulator cable assembly (fig. 4-13) from connector P510 on the missile distribution box to connector J6 on the rear of the missile electrical test set group.
- Note.* Perform step (14) or (15) and (16) below for missiles 13684 and subsequent.
- Note.* Perform step (14) below for a permanent-type installation or steps (15) and (16) below for a mobile-type installation.
- (14) Connect the battery simulator cable assembly to connector P510 on the mounting panel and to connector J6 on the rear of the missile electrical test set group.
  - (15) Connect the battery simulator cable assembly to connector P510 on the mounting panel and to the battery simulator extension cable assembly test unit.
  - (16) Connect the opposite end of the battery simulator extension cable assembly to connector J6 on the rear of the missile electrical test set group.
  - (17) Connect the power and continuity test cable assembly to connector J2 on the rear of the missile electrical test set group and to connector J183 on the missile distribution box.
  - (18) Inspect the ram-pressure probes for damage, dents, abnormal bends, paint, and alignment. Spot paint if required. Reject probes which are dented, or which have abnormal bends, or which cannot be realigned using the procedures in paragraph 10-6.
  - (19) Remove the closures (6, fig. 3-31) from the four ram-pressure probes (2, fig. 4-24).
  - (20) Perform the following procedures in sequence for the four ram-pressure probes to be cleared of dust and dirt.
    - (a) Install the adapter hose assembly (1, fig. 4-24) on the ram-pressure probe (2), and install a plug hose assembly (4) on each of the remaining probes. Secure the adapter hose and plug hoses with hose clamps (3).
    - (b) Remove the four screws (4, fig. 12-28) securing the ram-pressure probe (5) to the forward fin assembly (3).
    - (c) Separate the ram-pressure probe (5) from the forward fin assembly (3), and disconnect the hose assembly (1).
    - (d) Connect the hose assembly (5, fig. 4-24) from the stagnation pressure pump (8) to the adapter hose assembly (1) on the ram-pressure probe to be cleared.

- (e) Set the VAC-OFF-PRESS knob (6) to PRESS, operate the handle (7), and allow the pressurized air to blow the dust and dirt out of the ram-pressure probe.
- (f) Disconnect the hose assembly (5) from the adapter hose assembly (1).
- (g) Connect the hose assembly (1, fig. 12-28) to the ram-pressure probe (5).
- (h) Install the ram-pressure probe (5) on the forward fin assembly (3), and torque the screws (4) to  $22 \pm 2$  pound inches.
- (i) Repeat (a) through (h) above for the remaining ram-pressure probes.

*Note.* Perform w.1 through ab below for missiles 13001 and subsequent.

w.1. Rotate the mated forward and rear body section so that the forward body section is in the flight position.

x. Remove the hexagon-head bolt (11, fig. 3-29) and flat washer (10) that secure the left side of the forward body section (8) to the testing fixture (5).

**Caution:** Check the placement of the wiring harnesses before opening or closing the forward body section hinged to the testing fixture to make certain they will not be damaged.

**Warning:** Insure that the self-locking pins (view A, fig. 9-1) are inserted through the handling ring segment prior to performing y below.

y. Swing the forward body section to the right until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

z. Loosen the six captive screws that secure the access cover plate to the transponder control group sufficiently to insure depletion of air-pressure.

**Warning:** Potentials of 4,000 volts exist on the magnetron connector shell and under the radio transmitter cover. Be careful not to contact high voltage components.

**Caution:** Do not remove the rear housing cover (10, fig. 12-2) unless the forward body section is swung fully open and the hinge lock pin (12, fig. 3-29) is locked in position.

aa. Remove the rear housing cover from the transponder control group (1, fig. 12-2) as prescribed in steps (1) and (2) below.

- (1) Loosen the retaining screw (11), and disengage the lever arm (12).
- (2) Exert a steady pull on the two hook handles (23), and remove the rear housing cover from the transponder control group.

*Note.* Perform step (3) below for missiles with actuator assemblies 13060137 and 13060138.

- (3) Set transponder control group variable resistors R12, R21, and R27 (A, fig. 4-26) at minimum setting (fully ccw).

ab. Install the missile-code delay line (5, fig. 12-3) in the transponder control group (1) as prescribed in steps (1) through (3) below, to insure that it is properly mated with the connector on the interconnecting board.

- (1) Insert the delay line (fig. 12-15) slowly into the holder (PN 9009321) until the delay line pins first begin to make contact with the receptacles of the connector on the interconnecting board.
- (2) Firmly press the delay line securely in place until it is squarely seated in the holder and the connectors are fully engaged.

**Caution:** Do not use the knob and lever to "seat" the delay line.

- (3) Turn the knob 90 degrees to lock the delay line in the holder.

ac. Deleted.

ad. Insure that the locking tab on the missile-code delay line will not move clockwise sufficiently to clear the locking slot.

ad.1. Using a screwdriver, insure that all captive screws securing plug-in components or modules are properly tightened.

ad.2. Insure a positive mechanical mating of connectors P1 and J1, P1 and J8, and P2 and J2 (4, 22, and 23, fig. 12-6).

ae. Install the rear housing cover on the transponder control group as described in steps (1) through (6) below.



**Caution:** Do not use any type of tool on the rear housing cover to assist seating. Support the forward body section while installing the rear housing cover.

- (1) (Deleted)
- (2) With the pressure valve (7, fig. 12-2) on the right, seat the rear housing cover on the transponder control group until the retaining ring (14) is approximately flush with the rim of the housing.
- (3) Apply pressure to the right hook handle while maintaining a retaining pressure on the left hook handle. When the rear housing cover has seated on the right side, hold a retaining pressure on the right hook handle, and increase pressure on the left hook handle until the rear housing cover seats on the left side.
- (4) Press firmly on all sides of the rear housing cover and on each side of the lever arm to insure proper seating.

**Caution:** Do not force the lever arm, which should close freely to approximately three-eighths of an inch. If force is required to engage the lever arm, the rear housing cover is not seated properly.

- (5) Engage the lever arm (12), and tighten the retaining screw (11) to secure the rear housing cover (10) to the transponder control group.
- (6) Inspect the entire retaining ring (14) for proper seating.

**Caution:** Check the placement of the wiring harnesses before opening or closing the forward body section hinged to the testing fixture, to make certain they will not be damaged.

**Caution:** Lift and support the forward body section while installing and tightening the hexagon-head bolt in *af* below.

*af.* Swing the forward body section to the left until the hinge lock pin (12, fig. 3-29) snaps into the locked position. Install the hexagon-head bolt (11) and the flat washer (10) that secure the left side of the forward body section (8) to the testing fixture (5).

*af.1.* Rotate the missile body to the normal flight position.

*ag.* Insure that the cooling unit is connected.

**Caution:** While performing *ah* below, exercise extreme care. Avoid applying lateral stress to the guidance cooling access door hinge.

*ah.* Connect the air hose assembly (1, fig. 4-3) to the hose coupling adapter (2) or the hose assembly (5).

Table 4-4. Initial Air Fill of the Hydraulic Pumping Unit (HPU)

Step	Operation	Normal indication	Corrective Procedure																
	<p><i>Note.</i> Use clean, dry, compressed air, with a dewpoint of <math>-40^{\circ}\text{F}</math> and a maximum pressure of 3500 psi, or use nitrogen.</p> <p><b>Warning:</b> Weight the air supply hose with sand bags, and secure it to the missile body truck. Assure that the air fill valve on the end of the air supply hose is fully closed.</p>																		
1.	Remove the AIR FILL valve cap (5, fig. 4-18) from the AIR FILL valve (3) on the indicator panel.																		
2.	Connect the air supply hose from the air supply to the AIR FILL valve.																		
	<p><i>Note.</i> For expected outside temperatures of from <math>+30^{\circ}</math> to <math>+165^{\circ}\text{F}</math>, apply air pressure until the ACC. AIR PRESS. gage (2) indicates the ambient temperature <math>\pm 25^{\circ}\text{F}</math>. For an expected outside operating temperature of from <math>+30^{\circ}</math> to <math>-40^{\circ}\text{F}</math>, apply air pressure until the ACC. AIR PRESS. gage indicates as shown below with corresponding building temperature:</p> <table><tr><th>Building temperature</th><th>AIR accumulator precharge pressure (<math>\pm 25</math> psi)</th></tr><tr><td><math>80^{\circ}\text{F}</math> .....</td><td>2400</td></tr><tr><td><math>72^{\circ}\text{F}</math> .....</td><td>2350</td></tr><tr><td><math>63^{\circ}\text{F}</math> .....</td><td>2300</td></tr><tr><td><math>55^{\circ}\text{F}</math> .....</td><td>2250</td></tr><tr><td><math>47^{\circ}\text{F}</math> .....</td><td>2200</td></tr><tr><td><math>38^{\circ}\text{F}</math> .....</td><td>2150</td></tr><tr><td><math>30^{\circ}\text{F}</math> .....</td><td>2100</td></tr></table>			Building temperature	AIR accumulator precharge pressure ( $\pm 25$ psi)	$80^{\circ}\text{F}$ .....	2400	$72^{\circ}\text{F}$ .....	2350	$63^{\circ}\text{F}$ .....	2300	$55^{\circ}\text{F}$ .....	2250	$47^{\circ}\text{F}$ .....	2200	$38^{\circ}\text{F}$ .....	2150	$30^{\circ}\text{F}$ .....	2100
Building temperature	AIR accumulator precharge pressure ( $\pm 25$ psi)																		
$80^{\circ}\text{F}$ .....	2400																		
$72^{\circ}\text{F}$ .....	2350																		
$63^{\circ}\text{F}$ .....	2300																		
$55^{\circ}\text{F}$ .....	2250																		
$47^{\circ}\text{F}$ .....	2200																		
$38^{\circ}\text{F}$ .....	2150																		
$30^{\circ}\text{F}$ .....	2100																		
3.	Set the AC POWER switch on the TPCU to ON.																		
	<b>The POWER ON indicator light illuminates.</b>																		
3.1	Loosen the six captive screws that secure the access cover plate to the TCG sufficiently to insure depletion of the air pressure. Remove the cover plate and allow it to hang by the chain.																		
	<p><b>Caution:</b> Check that the weights of the INERTIA SWITCHES in the TCG are in the forward (dearmed) position.</p> <p><i>Note.</i> Perform step 3.2 below for missiles with actuator assemblies 13060137 and 13060138.</p>																		
3.2	Verify transponder control group variable resistors R12, R21, and R27 (A, fig. 4-26) are at minimum setting.																		
4.	Set the POWER switch on the TCU to ON.																		
	<b>The POWER LIGHT indicator illuminates.</b>																		
5.	Set the POWER switch (10, fig. 4-3) on the cooling unit to ON.																		
	<p><b>Caution:</b> If the GYRO UNCAGE indicator light illuminates, immediately operate the GYRO switch to CAGE.</p>																		
6.	Set the HEATERS EXTERNAL and the PLATE POWER EXTERNAL switches on the TPCU to ON.																		
	<b>The HEATERS EXTERNAL indicator light illuminates. After approximately 30 seconds, the PLATE POWER EXTERNAL indicator light illuminates.</b>																		
7.	Open the air supply shutoff valve.																		
8.	Open the AIR FILL valve locknut (4, fig. 4-18) counterclockwise.																		
9.	Slowly open the air fill valve on the air supply hose.																		
10.	When the ACC. AIR PRESS. gage (2) indicates the correct pressure, as prescribed in the precharge list (step 2), close the air fill valve on the air supply hose.																		
10.1	Turn the AIR FILL valve locknut (4) fully clockwise.																		
11.	(Deleted)																		

Table 4-4. Initial Air Fill of the Hydraulic Pumping Unit (HPU) — Continued

Step	Operation	Normal indication	Corrective Procedure
12.	Repeat steps 8 through 10.1 as necessary to obtain a stable indication as prescribed in the precharge list (step 2).		
13.	Close the air supply shutoff valve.		
14.	Open the AIR FILL valve (3) on the air supply hose.		
14.1	Bleed the pressure from the air supply hose.		
	<b>Warning:</b> Make certain all pressure is bled from the hose before performing step 15.		
15.	Disconnect the air supply hose and install the AIR FILL valve cap (5) on the AIR FILL valve. Torque the AIR FILL valve locknut (4) to 50 pound-inches.		
16.	Set the PLATE POWER EXTERNAL switch on the TPCU to OFF.		
	The PLATE POWER EXTERNAL indicator light extinguishes.		
17.	Set the HEATERS EXTERNAL switch to OFF.		
	The HEATERS EXTERNAL indicator light extinguishes.		
18.	Set the POWER switch on the cooling unit to OFF.		
19.	At the TCU, set the POWER switch to OFF.		
	The POWER LIGHT extinguishes.		
20.	At the TPCU, set the AC POWER switch to OFF.		
	The POWER ON light extinguishes.		

Table 4-5. Hydraulic Oil Fill and System Cleanup of the Hydraulic Pumping Unit, using the Portable Oil Fill and Filter Unit

Step	Operation	Normal indication	Corrective Procedure
	<b>Warning:</b> Voltage is present on the negative and positive leads of HPU cable assembly 9019903 when the power conversion unit is turned on. Insure that the leads are completely covered with rubber cable nipples.		
	<b>Caution:</b> The initial air fill of the HPU must be completed as prescribed in table 4-4 before performing the procedures prescribed below.		
	<b>Caution:</b> The oil drained from the HPU must not be reused.		
1.	Perform the procedures prescribed in paragraph 4-11, if applicable.		
	<i>Note.</i> The system cleanup is to be performed during assembly, semi-annually, and whenever major repair or replacement of the hydraulic system is accomplished.		
	<i>Note.</i> Perform step 2 for a permanent-type installation or step 3 for a mobile-type installation.		
2.	Connect the cables on the power conversion unit as prescribed in steps a through h below.		
	a. Remove the J1 protective cap (7, fig. 4-14) from connector J1 (3).		
	b. Remove the P1 protective cap (6) from connector P1 (4).		
	c. Connect the external power cable assembly (5) to connector J1 on the distribution box (2).		
	d. Install the P1 protective cap on the J1 protective cap.		
	e. Remove the J2 protective cap (8) from connector J2 (12).		
	f. Remove the P2 protective cap (9) from connector P2 (11).		
	g. Connect the HPU power cable assembly (10) to connector J2 on the meter cabinet (1).		
	h. Install the P2 protective cap on the J2 protective cap.		
3.	Connect the cables on the mobile test unit as prescribed in steps a through g below.		
	a. Open the access door (8, fig. 4-15) on the mobile test unit.		
	b. Remove the J1 protective cap (9) from connector J1 (2).		

Table 4-5. Hydraulic Oil Fill and System Cleanup of the Hydraulic Pumping Unit, using the Portable Oil Fill and Filter Unit — Continued

Step	Operation	Normal indication	Corrective procedure
3— Cont	c. Remove the P1 protective cap (6) from connector P1 (3). d. Connect the external power cable assembly (4) to connector J1 on the distribution box (1). e. Remove the J8 protective cap (10) from connector J8 (12). f. Remove the P8 protective cap (7) from connector P8 (11). g. Connect the HPU power cable assembly (5) to connector J8 on the distribution box.		
4.	Connect the HPU power cable assembly as prescribed in steps a through g below. <b>Caution:</b> Check that the ELECTRICAL HPU POWER switch on the power conversion unit (permanent-type installation) is set to OFF, or that the ELECTRICAL HPU STOP pushbutton (mobile-type installation) has been depressed. a. Connect the external power cable assembly (5, fig. 4-14) to a 120/208-volt, 3-phase, 400-~ power source. b. Install the cable retainer assembly (1, fig. 4-16) on the actuator section in the position shown, and secure firmly with the buckle and strap (2). c. Remove the GROUND PLUG protective cap (6) from connector J546 (7). d. Remove the P546 protective cap (4) from connector P546 (3). <b>Caution:</b> The HPU power cable assembly (9) must be properly supported to prevent damage to the GROUND PLUG connector J546 and the indicator panel (8). Insure that the cable head connector P546 is properly seated in the GROUND PLUG connector J546 and that the cable assembly is firmly secured in the cable retainer assembly when performing steps e and f below. <b>Note.</b> Refer to appendix C for inspection criteria on cables, wiring harnesses and connectors. e. Connect the HPU power cable assembly to the GROUND PLUG connector J546 on the indicator panel. f. Install the HPU power cable assembly in the cable retainer assembly. g. Install the P546 protective cap on the GROUND PLUG protective cap. <b>Note.</b> Before connecting the portable oil fill and filter unit to the HPU, preliminary filtration procedures must be performed as prescribed in 5 through 14 below.		
5.	Remove the reservoir filler cap (11, fig. 4-10) on the portable oil fill and filter unit (10) and fill the reservoir with hydraulic oil until the oil level gage (9) indicates FULL. Replace the reservoir filler cap.		
6.	Connect the portable oil fill and filter unit power cable assembly (8) to the POWER connector J1 (14) on the portable oil fill and filter unit. <b>Caution:</b> Make certain that the OPERATE circuit breaker (2) on the portable oil fill and filter unit is set to OFF before performing steps 7 through 12 below. <b>Note.</b> Perform steps 7 and 8 below for a permanent-type installation or steps 9 and 10 for a mobile-type installation.		
7.	Connect the other end of the power cable assembly to the ETO APS RUNUP MOTOR connector J2 on the distribution box (2, fig. 4-14) at the power conversion unit.		
8.	Set the ETO APS RUNUP MOTOR circuit breaker to ON. The LINE POWER indicator light (1, fig. 4-10) on the portable oil fill and filter unit illuminates.		
9.	Connect the other end of the power cable assembly to J7 (fig. 4-13) on the distribution box in the test station truck.		
10.	Set circuit breaker CB4 to ON. The LINE POWER indicator light on the portable oil fill and filter unit illuminates.		

Table 4-5. Hydraulic Oil Fill and System Cleanup of the Hydraulic Pumping Unit, using the Portable Oil Fill and Filter Unit — Continued

Step	Operation	Normal indication	Corrective procedure
11.	Connect the hydraulic oil supply hose (7, fig. 4-10) to the quick-disconnect fitting on the manifold return port (12).		
12.	Turn the BYPASS valve (4) fully counterclockwise. Unlock and turn the RELIEF VALVE knob (3) fully counterclockwise.		
	<b>Caution:</b> When the OPERATE circuit breaker is set to ON, check for a pressure indication on the OIL PRESSURE gage. If there is no pressure indication, immediately set the OPERATE circuit breaker to OFF and verify correct power phasing, perform corrective maintenance procedures.		
13.	Set the OPERATE circuit breaker to ON.		
	<b>Note.</b> When performing step 14 below, check the OIL PRESSURE gage (5) indication. If the indication exceeds 100 psi, refer the portable oil fill and filter unit to the support unit for primary filter replacement.		
14.	Operate the portable oil fill and filter unit for 30 minutes, and then set the OPERATE circuit breaker to OFF.		
15.	Remove the right equipment section access cover plate (2, fig. 3-21), if not previously removed.		
16.	Connect the hydraulic oil supply hose to the OIL FILL valve (6, fig. 4-17) on the HPU indicator panel (1).		
17.	Remove the dump tube assembly (5, fig. 12-44) from the oil bleed port (4) on the HPU. Connect the drain hose (6, fig. 4-10) to the oil bleed port and place the other end of the hose into a 2½ gallon (minimum) container. Open the OIL BLEED valve, and drain all the oil into the container.		
18.	Set the OPERATE circuit breaker (2) on the portable oil fill and filter unit to ON.		
19.	Turn the BYPASS valve fully clockwise, and close the OIL BLEED valve when the oil stream is free of air bubbles.		
20.	Turn the RELIEF valve knob (3) until the OIL PRESSURE gage (5) indicates 100 ± 10 psi, and turn the locknut (13) fully clockwise.		
21.	Set the OPERATE circuit breaker to OFF when the hydraulic reservoir level indicator moves into the BLD position.		
22.	Turn the BYPASS valve and the RELIEF VALVE knob fully counterclockwise.		
23.	Perform the HPU pressure switch check as prescribed in steps a through n below.		
	<b>Note.</b> The HPU pressure switch check must be performed during assembly and at six-month intervals thereafter.		
	a. Remove the left equipment access cover plate, if not previously removed.		
	b. Disconnect connector P514 from connector J514 on the missile distribution box.		
	c. Prepare the multimeter to read continuity on the R X 10,000 ohms scale.		
	d. Place the multimeter leads across pins B and C of connector P514.		
	<b>The multimeter indicates an open circuit.</b>		
	e. Remove the leads from pins B & C and prepare the multimeter to read continuity on the R X 1 ohm scale. Place the leads on pins B & C of connector P514.		
	<b>Note.</b> Perform f below for permanent-type installation or g below for a mobile-type installation.		
	f. Set the ELECTRICAL HPU circuit breaker to ON.		
	<b>The ELECTRICAL HPU POWER indicator light illuminates.</b>		
	<b>Warning:</b> Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.		
	g. Set the circuit breaker CB2 on the distribution box at the test station truck to ON.		



Table 4-5. Hydraulic Oil Fill and System Cleanup of the Hydraulic Pumping Unit, using the Portable Oil Fill and Filter Unit — Continued

Step	Operation	Normal indication	Corrective procedure
23— Cont	<p><i>h.</i> Depress the ELECTRICAL HPU START pushbutton. The multimeter indicates continuity (less than 1 ohm), which verifies that the pressure switch is closed.</p> <p><i>i.</i> Depress the ELECTRICAL STOP pushbutton.</p> <p><i>Note.</i> Perform step <i>j</i> below for a permanent-type installation or step <i>k</i> below for a mobile-type installation.</p> <p><i>j.</i> Set the ELECTRICAL HPU circuit breaker to OFF.</p> <p><b>The ELECTRICAL HPU POWER indicator light extinguishes.</b></p> <p><i>k.</i> Set the circuit breaker CB2 to OFF.</p> <p><i>l.</i> Repeat steps <i>c</i> and <i>d</i> above.</p> <p><i>m.</i> Connect connector P514 to connector J514 on the missile distribution box.</p> <p><i>n.</i> Install the left equipment access cover plate if not required for subsequent checks.</p> <p><b>Caution:</b> If the cooling unit is not used in the procedures below, insure that operation of the TCG is limited to cycles not to exceed those prescribed in tables 4-7, 4-8, and 4-9.</p>		
24.	<p>At the TPCU, set the AC POWER switch to ON.</p> <p><b>The POWER ON indicator light illuminates.</b></p>		
25.	<p>At the TCU, set the POWER switch to ON.</p> <p><b>The POWER LIGHT indicator light illuminates.</b></p> <p><b>Caution:</b> Check that the weights of the INERTIA SWITCHES in the TCG are in the forward (dearmed) position.</p>		
26.	<p>Set the POWER switch on the cooling unit to ON.</p> <p><b>Caution:</b> If the GYRO UNCAGED indicator light on the TPCU illuminates, immediately operate the GYRO switch to CAGE.</p>		
27.	<p>Set the HEATERS EXTERNAL and the PLATE POWER EXTERNAL switches on the TPCU to ON.</p> <p><b>The HEATERS EXTERNAL indicator light illuminates.</b></p> <p>After approximately 30 seconds, the PLATE POWER EXTERNAL indicator light illuminates.</p>		
28.	<p>Set the ELECTRICAL HPU circuit breaker to ON.</p> <p><b>The ELECTRICAL HPU POWER indicator light illuminates.</b></p> <p><i>Note.</i> If the HPU stops automatically and the ELECTRICAL HPU HIGH TEMPERATURE indicator light on the power conversion unit or the distribution box in the test station truck illuminates, do not depress the ELECTRICAL HPU START pushbutton until the ELECTRICAL HPU HIGH TEMPERATURE light extinguishes.</p> <p><b>Caution:</b> Do not depress the PUSH TO READ DC CURRENT pushbutton when depressing the ELECTRICAL HPU START pushbutton.</p>		
29.	<p>Depress the ELECTRICAL HPU START pushbutton.</p> <p><b>The ACC. AIR PRESS. gage indicates 2700 to 3200 psi.</b></p>		
30.	<p>Depress the PUSH TO READ DC CURRENT pushbutton.</p> <p><b>The DC CURRENT METER does not exceed 120 amperes.</b></p> <p><b>The DC VOLTAGE meter indicates 27.9 to 35.6 volts.</b></p>		
31.	<p>Set the ROLL POSITION switch on the TCU to GROUND.</p> <p><i>Note.</i> Omit steps 32, 33, and 34 for missiles with actuator assemblies 13060137 and 13060138.</p>		
32.	<p>Set the TEST SELECTOR NO. 1 switch to BUZZ V, and depress the ROLL pushbutton.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>Adjust the R-BUZZ variable resistor (D, fig. 4-25 or A, fig. 4-26) in the TCG until the NULL METER indicates 1.</p>		

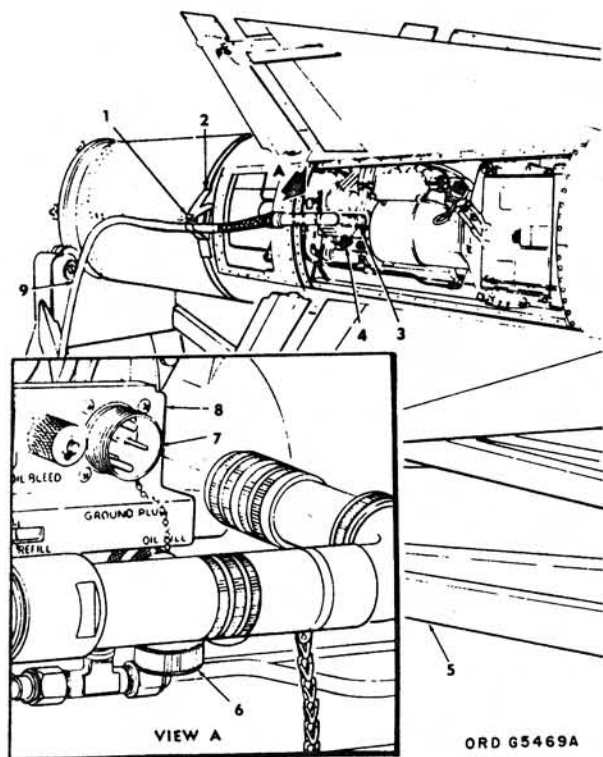
*Table 4-5. Hydraulic Oil Fill and System Cleanup of the Hydraulic Pumping Unit,  
using the Portable Oil Fill and Filter Unit — Continued*

Step	Operation	Normal indication	Corrective procedure
33.	Depress the YAW pushbutton.	<b>The NULL METER indicates within the white zone.</b>	Adjust the Y-BUZZ variable resistor (D, fig. 4-25 or A, fig. 4-26) in the TCG until the NULL METER indicates 1.
34.	Depress the PITCH pushbutton.	<b>The NULL METER indicates within the white zone.</b>	Adjust the P-BUZZ variable resistor (A, fig. 4-25 or A, fig. 4-26) in the TCG until the NULL METER indicates 1.
35.	Set the ROLL POSITION switch to NORMAL.		
36.	Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.		
	<i>Note.</i> From the rear of the missile, the trailing edges of the Y elevons deflect to the left when the YAW pushbutton is depressed and the TEST SELECTOR NO. 2 switch is set to +G, and to the right when the YAW pushbutton is depressed and the TEST SELECTOR NO. 2 switch is set to -G. The trailing edges of the P elevons deflect to the right when the PITCH pushbutton is depressed and the TEST SELECTOR NO. 2 switch is set to +G, and to the left when the PITCH pushbutton is depressed and the TEST SELECTOR NO. 2 switch is set to -G.		
37.	Depress the YAW pushbutton, and alternately rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute.		
	<b>The elevons deflect accordingly.</b>		
38.	Depress the PITCH pushbutton, and alternately rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute.		
	<b>The elevons deflect accordingly.</b>		
39.	Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1, the TEST SELECTOR NO. 1 switch to GYRO PRESET and the PRESET-FLIGHT switch to FLIGHT.		
40.	Depress the ROLL pushbutton.		
41.	Operate the GYRO PRESET switch to CW or CCW for approximately one minute.		
	<b>The elevons and the NULL METER deflect accordingly, and the ACC. AIR PRESS. gage indicates 2700 to 3200 psi.</b>		
	<i>Note.</i> Momentary hesitation of elevons may occur during travel and is not cause for rejection.		
42.	Depress the ELECTRICAL HPU STOP pushbutton.		
43.	Allow the high-pressure accumulator to bleed down and the ACC. AIR PRESS. gage indication to stabilize.		
	<b>The ACC. AIR PRESS. gage indicates the approximate pressure as shown in the precharge list (table 4-4).</b>		
44.	Set the PLATE POWER EXTERNAL switch on the TPCU to OFF.		
	<b>The PLATE POWER EXTERNAL indicator light extinguishes.</b>		
45.	Set the HEATERS EXTERNAL switch to OFF.		
	<b>The HEATERS EXTERNAL indicator light extinguishes.</b>		
46.	Set the POWER switch on the TCU to OFF.		
	<b>The POWER LIGHT indicator light extinguishes.</b>		
47.	Set the POWER switch on the cooling unit to OFF.		
48.	Set the AC POWER switch on the TPCU to OFF.		
	<b>The POWER ON indicator light extinguishes.</b>		
49.	Open the OIL BLEED valve, and bleed all the oil from the HPU into a 2½ gallon (minimum) container.		
50.	Repeat steps 18 thru 22, 24 thru 30, and 35 thru 49 above.		

Table 4-5. Hydraulic Oil Fill and System Cleanup of the Hydraulic Pumping Unit,  
Using the Portable Oil Fill and Filter Unit—Continued

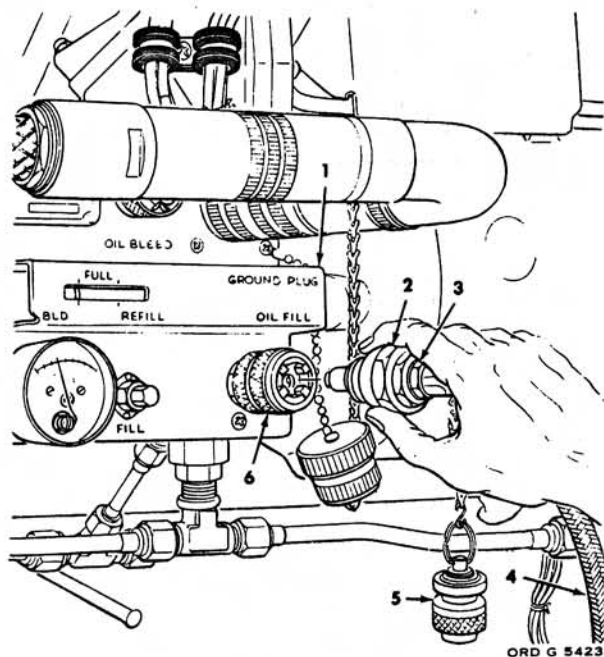
Step	Operation	Normal indication	Corrective procedure
51.	Attach the quick-disconnect coupling half (fig. 4-11) to the free end of the drain hose (6, fig. 4-10), and connect this end to the quick-disconnect fitting on the manifold and return port (12) in the portable oil fill and filter unit.		
	<i>Note.</i> If oil is visible in the oil level gage (9), sufficient oil is available for the remainder of the cleanup procedure.		
52.	Insure that the OIL BLEED valve is open.		
	<i>Note.</i> The hydraulic reservoir level indicator should not move to FULL while performing step 53 below.		
53.	Insure that the RELIEF VALVE knob (3) and the BYPASS valve (4) are fully counterclockwise. Set the OPERATE circuit breaker (2) to ON and allow the oil to circulate for 30 minutes.		
54.	Close the OIL BLEED valve and turn the BYPASS valve (4) fully clockwise.		
55.	Turn the RELIEF VALVE knob until the OIL PRESSURE gage (5) indicates $100 \pm 10$ psi, and turn the locknut (13) fully clockwise.		
	The hydraulic reservoir level indicator moves to BLD.		
56.	Set the OPERATE circuit breaker (2) to OFF.		
57.	(Deleted)		
58.	(Deleted)		
59.	(Deleted)		
60.	(Deleted)		
	<i>Note.</i> Perform step 61 below for a permanent-type installation or step 62 below for a mobile-type installation.		
61.	Set the ELECTRICAL HPU POWER circuit breaker to OFF.		
	The ELECTRICAL HPU POWER indicator light extinguishes.		
62.	Set the circuit breakers CB2, CB6, CB7, and CB9 to OFF.		
63.	Set the ETO APS RUNUP MOTOR circuit breaker to OFF for permanent-type installation or the circuit breaker CB4 to OFF for mobile-type installation.		
	The LINE POWER indicator light extinguishes.		
64.	Disconnect the drain hose (6) from the quick-disconnect fitting on the manifold return port. Remove the quick-disconnect coupling half connected in step 51.		
64.1.	Open the oil bleed valve and check for air bubbles as oil is drained into the 2 1/2 gal. (minimum) container. When the stream of oil is free of air bubbles, bleed the reservoir down to FULL and close the OIL BLEED valve.		
64.2.	Repeat steps 54 through 64.1 as necessary to attain this condition, reinstalling and removing the quick-disconnect coupling half on the flexible drain hose assembly as necessary.		
65.	Disconnect the hydraulic oil supply hose (7) from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port (12).		
66.	Disconnect the drain hose from the oil bleed port on the HPU.		
67.	Install the overboard dump tube on the oil bleed port.		

Table 4-6. (Deleted)



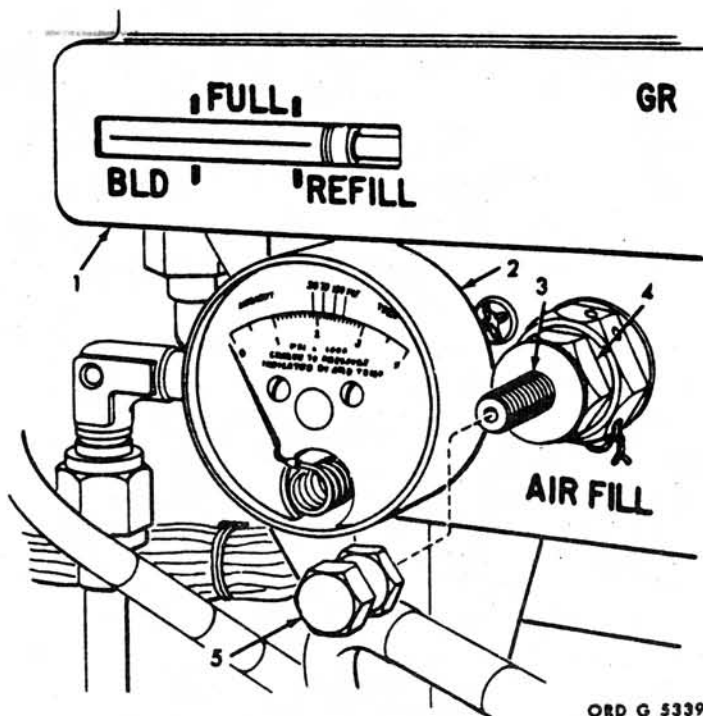
- 1—Cable retainer assembly
- 2—Buckle and strap
- 3—Connector P546
- 4—P546 protective cap
- 5—Missile body truck
- 6—GROUND PLUG protective cap
- 7—GROUND PLUG connector J546
- 8—Indicator panel
- 9—HPU power cable assembly

Figure 4-16. Disconnection and connection of the HPU power cable assembly.



- 1—HPU indicator panel
- 2—Quick-disconnect fitting
- 3—Coupling nut
- 4—Hydraulic oil supply hose
- 5—Plug cap
- 6—OIL FILL valve

Figure 4-17. Removal and installation of the hydraulic oil supply hose.



- 1 — Indicator panel
- 2 — Accumulator air pressure gage
- 3 — AIR FILL valve
- 4 — AIR FILL valve locknut
- 5 — AIR FILL valve cap

Figure 4-18. HPU-accumulator air pressure gage and AIR FILL valve.

### Section III. MISSILE ELECTRICAL CHECKOUT

**Caution:** Observe the operating cycles indicated in tables 4-7, 4-8, and 4-9 when the transponder control group is energized.

**Note.** If NULL METER indicates full-scale deflection at any time during the following procedures, the needle remains at full right or left scale deflection until the RESET pushbutton is depressed.

**Note.** If the HPU stops automatically and ELECTRICAL HPU HIGH TEMPERATURE indicator light on the power conversion unit or the distribution box in the test station truck illuminates, do not depress ELECTRICAL HPU START pushbutton until ELECTRICAL HPU HIGH TEMPERATURE indicator light extinguishes. If the HPU stops automatically again before completing the procedure below, allow the HPU to cool for 1 hour before depressing ELECTRICAL HPU START pushbutton and continuing with the test.

**Note.** Deleted.

Table 4-7. Operating Cycles for the Transponder-Control Groups without the Cooling Unit during Ground Operating Procedures

Ambient temperature (°F)	Missile exposed to solar radiation				Missile shaded from solar radiation or at night	
	White		Green <sup>1</sup>		All colors	
	Transponder operating cycles in minutes					
	On	Off	On	Off	On	Off
Below 80°	20	40	15	20	30	40

<sup>1</sup>See footnote at end of table.



Table 4-7. Operating Cycles for the Transponder-Control Groups without the Cooling Unit during Ground Operating Procedures — Continued

Ambient temperature (°F)	Missile exposed to solar radiation				Missile shaded from solar radiation or at night	
	White		Green <sup>1</sup>		All colors	
	Transponder operating cycles in minutes					
	On	Off	On	Off	On	Off
80° to 100°	10	20	8	20	20	40
	15	45				
	20	90				
100° to 125°					10	40

<sup>1</sup> Military specification MIL-E-46061 (NO).

Table 4-8. Operating Cycles for the Transponder-Control Groups using the Cooling Unit in a White Missile during Ground Operating Procedures

Ambient temperature (°F)	Missile exposed to solar radiation			Missile shaded from solar radiation or at night (all colors)		
	Transponder operating cycles in minutes					
	Initial operation <sup>1</sup>	After initial operation		Initial operation <sup>1</sup>	After initial operation	
	On	Off	On	On	Off	On
Below 100°	Continuous			Continuous		
100° to 110°	40	10	10	Continuous		
110° to 125°	30	15	7	40	10	10

<sup>1</sup> A 2-hour cooling period (off condition) will reestablish conditions for initial operation.

Table 4-9. Running Periods for the Transponder-Control Groups using the Cooling Unit in a Camouflage-Painted Missile Exposed to Solar Radiation

Solar exposure hours <sup>1</sup>	Ambient temperature, *F <sup>2</sup>				
	80°	90°	100°	110°	125°
	Green <sup>3</sup>	Green <sup>3</sup>	Green <sup>3</sup>	Green <sup>3</sup>	Green <sup>3</sup>
	Transponder running period in minutes <sup>4</sup>				
0	Continuous	90	90	60	40
2		73	44	29	20
4		65	32	21	11
6		55	25	15	6
8		47	21	11	5
10		42	20	11	4

<sup>1</sup> Continuous exposure measured from sunrise.<sup>2</sup> Maximum temperature expected during a specific day, based on locality.<sup>3</sup> Military specification MIL-E-46061 (NO).<sup>4</sup> A 2-hour cooling period (off condition) will reestablish conditions for the listed running periods.

#### 4-12. Test Equipment

The test equipment necessary to perform the missile electrical checkout is listed below.

- a. The missile electrical test set group.
- b. The power conversion unit (permanent-type installation) or the distribution box in the mobile test unit (mobile-type installation).
- c. The air leakage test set.
- d. A source of clean, dry compressed air or nitrogen (regulated 200 psi maximum).
- e. The assembly area missile RF test set group.

Table 4-10. Alinement of the HERCULES Missile RF Test Set Group

Step	Operation	Normal indication	Corrective procedure
1.	Alinement of the power supply:		
	a.	Set the TEST SELECTOR switch to CAL, the CALIBRATE switch to ADJ, and the FAILSAFE TEST—CONTACT—NORMAL TIME switch to NORMAL.	
	b.	Set the AC POWER switch to ON.	
	c.	After 60 seconds, momentarily operate the RESPONSE—-250V switch to -250V.	
		<b>The RESPONSE OR VOLTAGE meter deflects to the right.</b>	
		Immediately set the AC POWER switch to OFF.	
	d.	Set the CALIBRATE switch to TEST, and allow 30 minutes to warm up.	
	e.	Set the PWR METER CAL switch to ADJ V and the CALIBRATE switch to ADJ.	
	f.	Adjust the CAL V knob until the RF POWER meter indicates V (right end of meter scale).	
	g.	Operate the RESPONSE—-250V switch to -250V.	
		<b>The RESPONSE OR VOLTAGE meter indicates ADJ VOLTS (80 on the meter scale).</b>	
		Adjust the ADJ -250V variable resistor until the RESPONSE OR VOLTAGE meter indicates ADJ VOLTS.	
	h.	Release the RESPONSE—-250V switch.	
	i.	Operate the BALANCE switch to -250V.	
		<b>The BALANCE meter indicates 0 (center of the meter scale).</b>	
		Adjust the ADJ -250V variable resistor until the BALANCE meter indicates 0.	
	j.	Release the BALANCE switch.	
		<b>The BALANCE meter indicates on scale.</b>	
		Adjust the V.D. ADJ variable resistor until the BALANCE meter indicates 0.	
2.	Alinement of the microsecond oscillator:		
	a.	Set the CALIBRATE switch to ADJ.	
	b.	Set the TIME - MICROSECONDS switches to any whole value.	
	<i>Note.</i> When reference is made to this step from subsequent steps, use the value as required. If a fractional value is required, set the TIME-MICROSECONDS switches to the nearest whole value, and, following c below, set in the fraction.		
	c.	Observe the oscilloscope presentation. Adjust the TIME variable resistor for a pattern (A, fig. 4-19) either stationary or repeating itself less than twice per second.	
3.	Alinement of the RF power meter:		
	a.	Adjust the ATTEN-DB knob until the ATTEN-DB dial indicates 30 or greater.	
	b.	Set the TEST SELECTOR switch to RF TEST SIG and the PWR METER CAL switch to ADJ∞.	
	c.	Adjust the CAL ∞ knob until the RF POWER meter indicates within one-quarter of an inch or less of the left end of the meter scale.	

Table 4-10. Alinement of the HERCULES Missile RF Test Set Group — Continued

Step	Operation	Normal indication	Corrective procedure
3— Cont	d. Set the PWR METER CAL switch to ADJ 0. e. Adjust the CAL 0 knob until the RF POWER meter indicates 0 (right end of the meter scale). f. Repeat a through e above until no further adjustment is necessary.		
4.	Calibration of the RF test signal frequency: a. Adjust the ATTEN-DB knob until the ATTEN-DB dial indicates 30 or greater. b. Set the TIME-MICROSECONDS switches to 00.00 and the TEST SELECTOR switch to RF TEST SIG. c. Turn the OUTPUT knob fully clockwise. d. Set the PWR METER CAL switch to MEAS. e. <b>The attenuators click audibly.</b> f. Adjust the ATTEN-DB knob until the RF POWER meter indicates between 2 and 0, or until the ATTEN-DB dial indicates 0. g. Adjust the REPELLER knob for a maximum indication on the RF POWER meter (right end of the meter scale). Use the ATTEN-DB knob to keep the RF POWER meter indication between 2 and 0. h. Adjust the MEAS FREQ knob for a maximum dip to the left on the RF POWER meter. Adjust the MEAS FREQ knob for the exact low point of the dip. i. Determine and record the test frequency from the calibration chart on the test set, and compare the test set frequency with the assigned frequency. j. <b>The measured test frequency is within 5 megacycles of the assigned frequency.</b> k. <b>If the measured frequency is above the assigned value, turn the FREQ knob several degrees clockwise. Repeat e through h above.</b> l. <b>If the measured frequency is below the assigned value, turn the FREQ knob several degrees counterclockwise. Repeat e through h above.</b> m. Turn the MEAS FREQ knob a minimum of three turns in either direction. n. Set the TIME-MICROSECONDS switches to 04.00. o. <b>The RF POWER meter indicates within one-half of an inch of ∞ (left end of the scale).</b> p. Adjust the ATTEN-DB knob until the RF POWER meter indicates between 2 and 0. q. Adjust the MEAS FREQ knob for a maximum dip to the left on the RF POWER meter. Adjust the MEAS FREQ knob for the exact low point of the dip. r. Determine the frequency from the calibration chart on the test set. s. <b>The frequency must be within 15 megacycles of that recorded in h above.</b> t. <b>Repeat a through m above.</b> u. Turn the MEAS FREQ knob fully counterclockwise.		
5.	Alinement of the RF test signal power output: a. Set the TEST SELECTOR switch to RF TEST SIG, the PWR METER CAL switch to MEAS, and the TIME-MICROSECONDS switches to 04.00. b. Simultaneously adjust the ATTEN-DB knob and the OUTPUT knob until the RF POWER meter indicates 0 (right end of the meter scale) and the ATTEN-DB dial indicates 0.		
6.	Alinement of the sawtooth circuit: a. Set the TEST SELECTOR switch to CAL. b. Aline the microsecond oscillator for 17.50 microseconds (refer to step 2).		

Table 4-10. Alinement of the HERCULES Missile RF Test Set Group — Continued

Step	Operation	Normal indication	Corrective procedure
6— Cont	<p>c. Set the CALIBRATE switch to P&amp;Y, the PITCH switch to —MAX G, and the YAW switch to +MAX G.</p> <p><b>The COM GATE-PITCH and the COM GATE-YAW indicator lights are illuminated.</b></p> <p>d. Observe the oscilloscope presentation. Set the SCOPE WIDTH adjustment to obtain a 2-inch sweep. Adjust the MISSILE CODE (DELAY) knob until the pulses are centered on the oscilloscope sweep.</p> <p><b>The two pulses must be vertically alined at the starting point of their leading edge (B, fig. 4-19).</b></p> <p><i>Note.</i> The leading edge has a sharp rise and may face either to the left or the right.</p> <p>Adjust the S.T. ADJ variable resistor until the pulse starting points are vertically alined.</p> <p>e. Set the PITCH switch to +MAX G and the YAW switch to —MAX G.</p> <p><b>The pulses remain vertically alined within one-eighth of an inch of vertical alinement with a 2-inch oscilloscope sweep.</b></p> <p>Adjust the S.T. ADJ variable resistor to bring the pulses half-way back to vertical alinement.</p> <p>f. Set the PITCH switch to —MAX G and the YAW switch to +MAX G.</p> <p><b>The pulses remain vertically alined within one-eighth of an inch of vertical alinement with a 2-inch oscilloscope sweep.</b></p>		

Table 4-10. Alinement of the HERCULES Missile RF Test Set Group — Continued

Step	Operation	Normal indication	Corrective procedure										
6 Cont	<p>g. Aline the microsecond oscillator for 09.00 microseconds (refer to step 2).</p> <p>h. Set the CALIBRATE switch to PITCH.</p> <p>i. Set the PITCH switch to —MAX G and the YAW switch to OG.</p> <p>j. Position the MISSILE CODE (DELAY) dial to 23.50.</p> <p>k. Observe the oscilloscope presentation.</p> <p><b>The two pulses must be vertically alined at the starting point of their leading edge (C, fig. 4-19).</b></p>		<p>Adjust the S.T. ADJ variable resistor to bring pulses halfway back to vertical alinement and repeat c through f above.</p> <p>Adjust the V.D. ADJ variable resistor for pulse alinement. Repeat a through k above until no further adjustment is necessary.</p>										
7	<p>Alinement of D2 delay and response time A:</p> <p>a. Set the TEST SELECTOR switch to CAL, the YAW switch to —MAX G, and the PITCH switch to FINS.</p> <p>b. Aline the microsecond oscillator for the missile code + 2 microseconds (refer to step 2).</p> <p>c. Set the CALIBRATE switch to Y &amp; #4 RESP. A. Turn the RESPONSE TIME MILLI-MICROSECONDS handwheel fully clockwise.</p> <p>d. Set the D2 DELAY COARSE switch to nearest value below missile code + 2 microseconds (see chart below).</p> <table><tr><td>Switch position</td><td>Value</td></tr><tr><td>A.....</td><td>0.5</td></tr><tr><td>B.....</td><td>7</td></tr><tr><td>C.....</td><td>14</td></tr><tr><td>D.....</td><td>22</td></tr></table> <p>e. Subtract the D2 DELAY COARSE value determined in d above from the missile code + 2 microseconds.</p> <p>f. Adjust the D2 DELAY FINE knob until the D2 DELAY FINE dial indicates the value determined in e above.</p> <p>g. Set the SCOPE BRIGHTNESS knob for sharpest possible oscilloscope presentation.</p> <p>h. Observe oscilloscope presentation. Adjust the FINS knob to separate clearly the moveable pulse from the remaining two pulses (D and E, fig. 4-19). Turn the MISSILE CODE (DELAY) knob a few degrees CW to center pulse on oscilloscope sweep (D and E).</p> <p>i. Observe the oscilloscope presentation. Adjust the D2 DELAY FINE knob so that the remaining two pulses are in coincidence slightly above the starting point (approximately 90-percent amplitude of their leading edge).</p> <p>j. Set the PITCH switch to OG, the YAW switch to OG, and the CALIBRATE switch to TRAIN.</p> <p><b>Three pulses or pulse groups are visible on the oscilloscope.</b></p>	Switch position	Value	A.....	0.5	B.....	7	C.....	14	D.....	22		
Switch position	Value												
A.....	0.5												
B.....	7												
C.....	14												
D.....	22												



Table 4-10. Alinement of the HERCULES Missile RF Test Set Group — Continued

Step	Operation	Normal indication	Corrective procedure
7 Cont	<p>k. Observe the oscilloscope presentation. Turn the MISSILE CODE (DELAY) knob a few degrees CW or CCW to separate clearly the moveable pulse from the stationary pulse.</p> <p><b>One pulse group (nos. 1 and 2 pulses) remains stationary and appears in coincidence.</b></p> <p>l. Adjust the MISSILE CODE (DELAY) knob until both moveable pulse groups are to the right of the stationary pulse group. Identify center pulse group (Y no. 3, Y no. 4, and P no. 4 pulses) (F, fig. 4-19), adjust the MISSILE CODE (DELAY) knob until this pulse group is centered on the oscilloscope sweep.</p> <p>m. Set the PITCH switch to FINS.</p> <p>n. Observe the oscilloscope presentation. Adjust the FINS knob to separate the clearly movable pulse (part of the pulse group identified in l above) from the remaining two pulses (Y no. 3 and Y no. 4 pulses).</p> <p><b>The remaining two pulses are in exact coincidence.</b></p> <p>Adjust the D2 DELAY FINE knob until the pulses are in exact coincidence.</p> <p>o. Set the CALIBRATE switch to Y &amp; #4 RESP. A.</p> <p>p. Adjust the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates 80, or until the RESPONSE knob is fully clockwise.</p> <p>q. Rotate the RESPONSE TIME MILLI-MICROSECONDS handwheel for a maximum indication on the RESPONSE or VOLTAGE meter. Keep the meter indication on scale by use of the RESPONSE knob, and continue until peak is attained.</p> <p>r. Adjust the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates 80.</p> <p>s. Rotate the RESPONSE TIME MILLI-MICROSECONDS handwheel in a clockwise direction until the RESPONSE OR VOLTAGE METER indicates 60. Record value indicated on the RESPONSE TIME MILLI-MICROSECONDS dial.</p> <p>t. Rotate the RESPONSE TIME MILLI-MICROSECONDS handwheel in a counterclockwise direction until the RESPONSE OR VOLTAGE meter indicates maximum and then drops to 60. Record value indicated on the RESPONSE TIME MILLI-MICROSECONDS dial.</p> <p>u. Add the values recorded in s and t above. Divide the total by two. The value obtained is response time A in millimicroseconds.</p> <p><b>Response time A is 50 to 140 millimicroseconds.</b></p> <p>v. Turn the response knob fully counterclockwise.</p>		
8	<p>Final alinement of sawtooth circuits and check of steering command accuracy:</p> <p>a. Aline the microsecond oscillator for 17.50 microseconds (refer to step 2 above).</p> <p>b. Set the CALIBRATE switch to TRAIN, the PITCH switch to OG, and the YAW switch to OG.</p> <p>c. Adjust the MISSILE CODE (DELAY) knob to the missile code.</p> <p>d. Observe the oscilloscope presentation.</p> <p><b>Four pulses or pulse groups are visible on oscilloscope.</b></p> <p><i>Note.</i> The first and second pulse groups are approximately coincident and may appear as one pulse.</p> <p>e. Adjust the MISSILE CODE (DELAY) knob to separate clearly the first and second pulse groups (G, fig. 4-19).</p> <p><b>The pulses of the second pulse group (P no. 4 and Y no. 4 pulses are coincident.)</b></p>		

Table 4-10. Alinement of the HERCULES Missile RF Test Set Group—Continued

Step	Operation	Normal indication	Corrective procedure
8 Cont			Adjust the S. T. BAL variable resistor until the pulses are coincident.
	f. Adjust the MISSILE CODE (DELAY) knob to the missile code.	The first and second pulse groups are coincident.	Adjust the S. T. ADJ variable resistor until the first and second pulse groups are as close to coincidence as possible.
	g. Set the PITCH switch to—MAX G and the YAW switch to—MAX G.	The first and second pulse groups are coincident.	Adjust the V. D. ADJ variable resistor until the first and second pulse groups are as close to coincidence as possible. Repeat b through g.
	h. Set the PITCH switch to OG and then to—MAX G.	The first and second pulse groups are coincident for both switch positions.	Adjust V. D. ADJ variable resistor until the first and second pulse groups are close to coincidence as possible for both switch positions.
	i. Set the PITCH switch to OG and YAW switch to OG.	The first and second pulse groups are coincident.	Adjust the S. T. ADJ variable resistor for coincidence.
	j. Set the YAW switch to—MAX G.	The first and second pulse groups are coincident.	Adjust the S. T. ADJ variable resistor until pulses are coincident. Repeat h and i above and j until the first and second pulse groups are as close to coincidence as possible.
	k. Set the YAW switch to +MAX G.		
	l. Turn the FINS knob fully clockwise.		
	<i>Note.</i> If the FINS knob does not remain in the fully clockwise position, hold it in the fully clockwise position while performing step 8m.		
	m. Observe the oscilloscope presentation. Set the YAW switch to FINS.	Coincidence between the first and second pulse groups does not change.	
	<i>Note.</i> To identify the Y no. 4 pulse, turn the FINS knob slightly. The pulse which moves is Y no. 4. Return the FINS knob to bring the first and second pulse groups back into coincidence.		
	n. Set the YAW switch to +MAX G.		
	o. Observe the oscilloscope presentation. Turn the MISSILE CODE (DELAY) knob a few degrees counterclockwise, and identify the pulse (Y no. 4 pulse) that moves away from the second pulse group.		

Table 4-10. Alinement of the *HERCULES* Missile RF Test Set Group — Continued

Step	Operation	Normal indication	Corrective procedure
8— Cont.	<p><i>p.</i> Adjust the MISSILE CODE (DELAY) knob until the pulse identified in <i>o</i> above is coincident with the first pulse group.</p> <p><b>The MISSILE CODE (DELAY) dial indicates within <math>\pm 0.25</math> microsecond of the missile code.</b></p> <p>Repeat steps 7 and 8.</p>		

Table 4-11. Missile Electrical Checks

Step	Operation	Normal indication	Corrective procedure
1.	Aline the missile RF test group (table 4-10).		
2.	Aline the RF test set group microsecond oscillator for the missile code.		
3.	(Deleted)		
4.	Set the TEST SELECTOR switch to REC SENS, the CALIBRATE switch to TEST, and the ATTEN-DB dial to 0.		
	<i>Note.</i> Perform 5 below for missiles with an APS.		
5.	Perform the arm safety check (para 4-6).		
6.	Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.		
7.	Remove the self-locking pins and rotate the forward body section to the normal flight position. Install the self-locking pins.		
8.	Set the AC POWER switch on the TPCU to ON, and the POWER switch on the TCU to ON.		
	<b>The POWER ON indicator light on the TPCU and the POWER LIGHT indicator on the TCU illuminate.</b>		
	<i>Note.</i> Perform steps 9 and 10 for missiles 10206 through 11935 or step 11 for missiles 13001 and subsequent.		
9.	Remove the air filter from the INERTIA SWITCH adjustment port on the TCG. Insert a stubby screwdriver through the port; move the switch arm to the rear (armed) position; then move the switch arm to the forward (safe) position.		
10.	Install the air filter on the INERTIA SWITCH adjustment port.		
11.	Insure that the INERTIA switches S1 and S2 are in the forward (dearmed) position.		
12.	Operate the GYRO switch to CAGE, and hold.		
13.	Set the HEATERS EXTERNAL switch to ON, and release the GYRO switch.		
	<b>The HEATERS EXTERNAL indicator light illuminates.</b>		
	<b>The GUIDANCE SECTION OPERATING TIME indicator starts timing.</b>		
	<b>The GYRO FREQ. NO GO indicator light illuminates (missiles 10206 through 11935).</b>		
	<b>The GYRO FREQ. GO indicator light illuminates (missiles 13001 and subsequent). If not, adjust R5 (Freq. Adj.) on the transistor oscillator-inverter (A1).</b>		
	<b>The DELAY LINE indicator light illuminates within 3 minutes (missiles 13001 and subsequent).</b>		
14.	Set the POWER switch on the cooling unit to ON.		
15.	Set the PLATE POWER EXTERNAL switch to ON.		
	<b>The PLATE POWER EXTERNAL indicator light illuminates.</b>		
16.	Set the TEST SELECTOR NO. 1 switch to 5V REF.		
	<b>The NULL METER indicates within one-sixteenth of an inch of the small white mark on the right side of the scale.</b>		
	<i>Note.</i> Failure to meet the tolerance indicates a malfunction in the TCU.		
17.	Set the TEST SELECTOR NO. 1 switch to MISSILE V.		
	<b>The NULL METER indicates within the white zone.</b>		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
	<i>Note.</i> Perform step 18 for missiles 13684 and subsequent.		
18.	Disconnect the connectors P542 and P543 from the connectors on the dummy batteries.		
19.	Set the TEST SELECTOR NO. 1 switch to MISSILE I.		
	The NULL METER indicates within the white zone (missiles 10206 through 11935), or within the white zone or left black zone (missile 13001 and subsequent).		
	<i>Note.</i> Perform step 20 for missiles 13684 and subsequent.		
20.	Connect P542 and P543 to the dummy batteries.		
21.	Check the TCG power supply.		
	<i>Note.</i> Perform a through c below only for missiles 13001 and subsequent.		
	a. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.		
	b. Set the TEST SELECTOR NO. 2 switch to FIL V.		
	The NULL METER indicates within the white zone.		
	If the NULL METER does not indicate within the white zone, adjust R4 Fil Volt Adj. (5, fig. 4-30) on the radio set power supply (A-2).		
	c. Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1.		
	<i>Note.</i> Mushroom: On TCG 9017425, do not perform the 300V test. On TCG 9141460 or 10666973, do not perform the 240V test.		
	<i>Note.</i> Stovepipe: Do not perform the GYRO VOLTS test.		
	d. Set the TEST SELECTOR NO. 1 switch to the following positions in order: -75V; 150V; 240V; 300V; GYRO VOLTS; CONT. SIG. V; STRG. PL. V; CONT. SIG. BAL.; and STRG. PL. BAL.		
	The NULL METER indicates within the white zone.		
	If the NULL METER does not indicate in the white zone:		
	(1) <i>Mushroom.</i> When selecting -75V, 150V, 240V, and 300V, adjust R10 B + Volt Adj (4, fig. 4-30) on radio set power supply (A2). When selecting CONT. SIG. BAL., adjust R5 CS BAL ADJ (3, fig. 4-30) on radio set power supply (A2). When selecting GYRO VOLTS, replace the transistor oscillator-inverter (A1).		
	(2) <i>Stovepipe.</i> When selecting CONT. SIG. V, adjust R9 (CS ADJUST). When selecting -75V, 150V, 240V, 300V, STRG. PL. V, CONT. SIG. BAL., or STRG. PL. BAL., replace the TCG power supply.		
	e. Set the TEST SELECTOR NO. 1 switch to CONT. SIG. BAL., and depress the sensitivity switch.		
	The NULL METER indicates within the white zone.		
22.	Measure the receiver sensitivity.		
	<i>Note.</i> Perform a, b, and c below if 15 minutes have elapsed since the RF test set was aligned.		
	a. Aline the RF POWER meter (table 4-10).		
	b. Aline the RF test signal frequency and the RF test signal power output (table (4-10).		
	c. Aline the RFTS microsecond oscillator for the missile code.		
	d. Insure that the MISSILE CODE (DELAY) dial is set to the missile code.		
	e. Set the CALIBRATE switch to TEST, the TEST SELECTOR switch to REC SENS, the ANT2-ANT4 switch to ANT2, and the PWR METER CAL switch to MEASURE.		
	f. Adjust the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates approximately 80.		
	g. Adjust the ATTEN-DB knob counterclockwise until the RESPONSE OR VOLTAGE meter indication averages 60.		

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
22— Cont	<p><b>The ATTEN-DB dial indicates 11 or greater.</b></p> <p><i>h.</i> Set the ANT2-ANT4 switch to ANT4.  <b>A click is heard at the antenna-coupler test adapter.</b></p> <p><i>i.</i> Adjust the ATTEN-DB knob until the ATTEN-DB dial indicates 0.</p> <p><i>j.</i> Repeat <i>f</i>, <i>g</i>, and <i>i</i> above.  <b>The difference between the indications for ANT2 and ANT4 is less than 5 db.</b></p> <p><i>k.</i> Set the TEST SELECTOR NO. 1 switch to A.G.C.V.  <b>The NULL METER indicates within the white zone.</b></p> <p><i>l.</i> Turn the ATTEN-DB knob counterclockwise.  <b>The NULL METER indication increases (toward the right end of the meter scale.)</b></p> <p><i>m.</i> Adjust the ATTEN-DB knob until the ATTEN-DB dial indicates 0.</p> <p><i>n.</i> Set the TEST SELECTOR NO. 1 switch to OFF.</p>		
23.	<p>Perform the missile transmitter test.</p> <p><i>Note.</i> Turn the RESPONSE knob counterclockwise to prevent pegging of the RESPONSE OR VOLTAGE meter when <i>a</i> below is performed.</p> <p><i>a.</i> Set the TEST SELECTOR switch to TRANS. TEST.</p> <p><i>b.</i> Set the RF POWER DB switch so that the RF POWER meter indicates as near to 0 as possible without being off scale.</p> <p><i>c.</i> Add the value of the RF POWER meter indication to the value of the RF POWER DB switch setting.  <b>The sum is equal to or less than 17 for missiles 13001 and subsequent.</b>  <b>The sum is equal to or less than 20 for missiles 10206 through 11935.</b></p> <p><i>d.</i> Adjust the MEAS. FREQ knob for a dip to the left on the RF POWER meter. Adjust the MEAS. FREQ knob for the exact low point of the dip.</p> <p><i>Note.</i> Perform <i>e</i> below for missiles 10206 through 11935 or <i>f</i> for missiles 13001 and subsequent.</p> <p><i>e.</i> Determine the frequency from the calibration chart on the RF test set.  <b>The measured frequency is within 5 mc of the assigned missile frequency.</b>  Remove the plug from the MAG ADJ port (B, fig. 4-25) on the TCG. If the measured frequency is above tolerance, turn the MAG ADJ adjustment a few degrees clockwise. Repeat <i>d</i> and <i>e</i> above until the tolerance is met. Install the MAG ADJ port plug.  If the measured frequency is below tolerance, turn the MAG ADJ adjustment a few degrees counterclockwise. Repeat <i>d</i> and <i>e</i> above until the tolerance is met. Install the MAG ADJ port plug.</p> <p><i>f.</i> Determine the frequency from the calibration chart on the missile RF test set group.  <b>The measured frequency is within 3 mc of the assigned missile frequency.</b>  Swing the forward body section to the right until the hinge lockpin snaps into the locked position, and remove the rear housing cover from the TCG.  If the measured frequency is above tolerance, turn the magnetron adjustment nut a few degrees clockwise. Repeat <i>d</i> and <i>f</i> above until the tolerance is met. If the measured frequency is below tolerance, turn the magnetron adjustment nut a few degrees counterclockwise. Repeat <i>d</i> and <i>f</i> above until the tolerance is met.</p>		



Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
23— Cont			<p>Install the cover on the TCG. Swing the forward body section to the left until the hinge lockpin (12, fig. 3-29) snaps into the locked position. Secure the forward section to the testing fixture with the bolt (11, fig. 3-29) and washer (10).</p> <p>g. Turn the MEAS FREQ knob fully counterclockwise.</p> <p>h. Turn the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates approximately 80.</p> <p>i. Set the TIME-MICROSECONDS switches in turn to all missile codes.</p> <p><b>The RESPONSE OR VOLTAGE meter deflects to the right only at the assigned code.</b></p> <p>j. Set the TIME-MICROSECONDS switches to the assigned missile code +0.4 microseconds.</p> <p><b>The RESPONSE OR VOLTAGE meter indicates near 0.</b></p> <p>k. Set the TIME-MICROSECONDS switches to the assigned missile code -0.5 microseconds.</p> <p><b>The RESPONSE OR VOLTAGE meter indicates near 0.</b></p> <p>l. Set the TIME-MICROSECONDS switches to the assigned missile code.</p>
24.	Measure the missile response time.		<p><i>Note. Alinement of the D2 delay and response time A and of the microsecond oscillator is required if the missile response time is not within tolerance.</i></p> <p>a. Set the TEST SELECTOR switch to COMM SIG RESP B.</p> <p>b. and c. (Deleted)</p> <p>d. Turn the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates approximately 80, or until the RESPONSE knob is fully clockwise.</p> <p>e. Using the RESPONSE knob to keep the indication on scale, rotate the RESPONSE TIME MILLI-MICROSECONDS handwheel for a maximum indication on the RESPONSE OR VOLTAGE meter.</p> <p>f. Adjust the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates 80 or until the RESPONSE knob is fully clockwise.</p> <p>g. Rotate the RESPONSE TIME MILLI-MICROSECONDS handwheel clockwise until the RESPONSE OR VOLTAGE meter indicates a value 20 less than the value indicated in f above. Record the value indicated on the RESPONSE TIME MILLI-MICROSECONDS dial.</p> <p>h. Rotate the RESPONSE TIME MILLI-MICROSECONDS handwheel counterclockwise until the RESPONSE OR VOLTAGE meter indicates maximum and then drops to a value 20 less than the value in f above. Record the value indicated on the RESPONSE TIME MILLI-MICROSECONDS dial.</p> <p>i. Add the values recorded in g and h above. Divide the total value by two. This value is response time B in millimicroseconds.</p> <p><i>Note. Response time B is in millimicroseconds and the fixed delay is in microseconds. To convert fixed delay to millimicroseconds, multiply by 1,000. Example: 0.87 microseconds is equal to 870 millimicroseconds. All values must be in millimicroseconds.</i></p> <p>j. Add response time B to the fixed delay stamped on the front of the RF test set. Record the value.</p> <p>k. Add response time A to 60 millimicroseconds (fixed waveguide delay). Record the value.</p>

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
24— Cont	l. Subtract the value determined in <i>k</i> above from the value determined in <i>j</i> above. This is the missile response time.		
	<b>The missile response time is 830 to 870 millimicroseconds.</b>		
			Perform alinement of D2 delay and response time A (table 4-10). Repeat steps <i>a</i> through <i>l</i> above. If missile response time is still not within tolerance, perform the procedures in para 12-21 (mushroom) or para 12-46 (stovepipe). Repeat steps <i>a</i> through <i>l</i> above.
25.	Adjust the dead time delay (missiles 13001 and subsequent).		
	a. Set the TEST SELECTOR switch to REC SENS.		
	b. Adjust the ATTEN-DB knob until the ATTEN-DB dial indicates 0.		
	c. Adjust the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates an average of 80.		
	d. Set the PITCH switch to —MAX G and the YAW switch to —MAX G.		
	e. Increase the indication of the MISSILE CODE (DELAY) dial until the RESPONSE OR VOLTAGE meter indication decreases to between 30 and 50.		
	<b>The MISSILE CODE (DELAY) dial indicates between missile code +2 and missile code +3.</b>		
			Remove the rear housing cover from the TCG. Position the MISSILE CODE (DELAY) dial to missile code +2.5.
			Adjust the delay time variable resistor R13 (fig. 4-30) on the pulse delay oscillator until the RESPONSE OR VOLTAGE meter indicates between 30 and 50.
			Install the rear housing cover on the TCG.
			Swing the forward body hinge to the left until the hinge lockpin (12, fig. 3-29) snaps into the locked position. Install the hexagon-head bolt (11, fig. 3-29) and the flat washer (10) to secure the left side of the forward body section to the testing fixture (5).
	e. 1. Set the PITCH and the YAW switches to 0G.		
	f. Position the MISSILE CODE (DELAY) dial to the missile code and adjust the RESPONSE knob until the RESPONSE OR VOLTAGE meter indicates an average of 80.		
26.	Test the fail-safe contacts.		
	a. Set the PLATE POWER EXTERNAL switch to OFF.		
	<b>The PLATE POWER EXTERNAL indicator light extinguishes.</b>		
	b. At the RF test set, set the TEST SELECTOR switch to FAIL-SAFE.		
	c. Set the CONTACT-NORMAL-TIME switch to CONTACT.		
	d. Set the FAIL-SAFE TEST — CONTACT switch to each position in sequence, starting with 1.		
	<b>The RESPONSE OR VOLTAGE meter indicates within the green area for each position of the FAIL-SAFE TEST —CONTACT switch.</b>		
	e. Set the CONTACT-NORMAL-TIME switch to TIME.		
	f. Set the PLATE POWER EXTERNAL switch to ON.		
	<b>The PLATE POWER EXTERNAL indicator light illuminates.</b>		
27.	Perform the fail-safe time check.		
	a. Set the FAIL-SAFE TEST—TIME switch to A + B.		
	<b>Note.</b> Allow 10 seconds between operating the RESET and the START switches.		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
27— Cont	b. Operate the RESET switch.	The counter tubes indicate at the reset position (between 0 and 1).	
	c. Operate the START switch.	The counter tubes indicate between 1 and 5.	
	d. Set the FAIL-SAFE TEST — TIME switch to B + C.		
	e. Repeat b and c above.		
	f. Set the FAIL-SAFE TEST — TIME switch to A + C.		
	g. Repeat b and c above.		
	h. Set the FAIL-SAFE TEST — TIME switch to FAST 1.		
	i. Repeat b and c above.		
	j. Set the FAIL-SAFE TEST — TIME switch to FAST 2.		
	k. Repeat b and c above.		
	l. Set the CONTACT-NORMAL-TIME switch to NORMAL.		
	m. Repeat b and c above 10 times.		
28.	Measure the missile burst time.		
	a. At the RF test set, set the TEST SELECTOR switch to BURST.		
	b. Set the BURST TEST switch to NORMAL.		
	c. Operate the RESET switch.	The counter tubes indicate at the reset position (between 0 and 1).	
	<i>Note.</i> Allow 10 seconds between operating the reset and the START SWITCHES.		
	d. Operate the START switch.	The counter tubes indicate between 16 and 26 milliseconds, and the RESPONSE OR VOLTAGE meter indicates near 0 (loss of missile response).	
		<i>Note.</i> "Loss of missile response" indication will not occur when ASP kits are installed in the missile.	
			If normal indication is not obtained:
			(1) <i>Mushroom.</i> Adjust R11 (BURST TIMING) on the command detonation electronic switch (A13).
			(2) <i>Stovepipe.</i> Adjust R16 (BIAS CONTROL) on the command detonation control.
			<i>Note.</i> After proper indication has been obtained perform e and f below and repeat step d.
	e. Operate the RESET switch.	The counter tubes indicate at the reset position (between 0 and 1).	
	f. Set the PLATE POWER EXTERNAL switch to OFF and then to ON.	The RESPONSE OR VOLTAGE meter indicates to the right (missile response).	
	g. Repeat d through f above 9 times.	The counter tubes indicate between 16 and 26 milliseconds for all readings.	
	h. Set the BURST TEST switch to B + EN.		
	i. Operate the START switch.	The counter tubes indicate between 33 and 96 milliseconds, and the RESPONSE OR VOLTAGE meter indicates near 0 (loss of missile response).	
		<i>Note.</i> "Loss of missile response" indication will not occur when ASP kits are installed in the missile.	
	j. Operate the RESET switch.	The counter tubes indicate at the reset position (between 0 and 1).	
	k. Set the PLATE POWER EXTERNAL switch to OFF and then to ON.		

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
28— Cont	<p><b>The RESPONSE OR VOLTAGE meter indicates to the right (missile response).</b></p> <p>l. Set the BURST TEST switch to B ONLY.</p> <p>m. Operate the START switch.</p> <p><b>The counter tubes indicate a continuous count.</b></p> <p>n. Operate the RESET switch.</p> <p><b>The counter tubes indicate at the reset position (between 0 and 1).</b></p> <p>o. Set the BURST TEST switch to EN ONLY.</p> <p>p. Operate the START switch.</p> <p><b>The counter tubes indicate a continuous count.</b></p> <p>q. Operate the RESET switch.</p> <p><b>The counter tubes indicate at the reset position (between 0 and 1).</b></p> <p>r. Set the BURST TEST switch to NORMAL.</p> <p>s. Set the PLATE POWER EXTERNAL and the HEATERS EXTERNAL switches to OFF.</p> <p>t. Disconnect the fail-safe harness connector P511 from JUMPER connector J2.</p> <p><i>Note.</i> Perform u and v below for missiles 13001 and subsequent.</p> <p>u. Remove the bolts, flat washers, and the sequential timer from the fail-safe and timer bracket.</p> <p>v. Position the sequential timer with JUMPER connector J2 forward, in the fail-safe and timer bracket and secure with the bolts and flat washers.</p> <p>w. Remove the electrical wire and tag from TIMER connector J1. Retain the wire and tag for later use.</p> <p>x. Remove the protective dust cap from TIMER connector J1, and install on JUMPER connector J2.</p> <p>y. Connect the fail-safe harness connector P511 to TIMER connector J1.</p> <p>z. Set the HEATERS EXTERNAL switch to ON.</p> <p>aa. Set the PLATE POWER EXTERNAL switch to ON.</p> <p><b>After approximately 30 seconds, the PLATE POWER EXTERNAL indicator light illuminates.</b></p> <p>ab. Operate the START switch.</p> <p><b>The counter tubes indicate between 341 and 361 milliseconds and the RESPONSE OR VOLTAGE meter indicates near 0 (loss of missile response).</b></p> <p><i>Note.</i> "Loss of missile response" indication will not occur when ASP kits are installed in the missile.</p> <p>ac. Operate the RESET switch.</p> <p><b>The counter tubes indicate at the reset position (between 0 and 1).</b></p> <p>ad. Set the PLATE POWER EXTERNAL switch to OFF and then to ON.</p> <p><b>The RESPONSE OR VOLTAGE meter indicates to the right (missile response).</b></p> <p><i>Note.</i> Allow 10 seconds between each repetition in ac below.</p> <p>ae. Repeat ab through ad above 9 times.</p> <p><b>All counter tube indications must be between 341 and 361 milliseconds.</b></p>		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
29	<p>Check the operation of the roll servo system (static).</p> <p><i>Note.</i> Perform <i>a</i> below for missiles 10206 through 11935.</p> <p><i>Note.</i> Due to variations in output noise inherent in NH rate gyros, a low-level random movement of elevons within the area between the outer scribed lines may be observed for zero command on some systems. This type of movement may be identified by correlation of elevon movement and NULL METER indication with TEST SELECTOR NO. 1 set to RATE. This condition is acceptable if all other requirements of the servo system are met, and the total elevon movement is contained within the area between the outer scribed lines.</p> <p><i>a.</i> Depress the PUSH TO RESET switch (16, fig. 4-20) on safety-and-arming switch S30 (6), and check that the green field is visible through the inspection window (11).</p> <p><i>b.</i> Set the switch to the positions listed in (1) through (6) below.</p> <p>(1) PITCH switch to OG.</p> <p>(2) YAW switch to OG.</p> <p>(3) TEST SELECTOR switch to COMM SIG RESP B.</p> <p>(4) PRESET-FLIGHT switch to PRESET.</p> <p>(5) TEST SELECTOR NO. 1 switch to GYRO PRESET.</p> <p>(6) ROLL POSITION switch to NORMAL.</p> <p><i>c.</i> Depress the ROLL pushbutton.</p> <p><i>d.</i> Operate the GYRO PRESET switch to CW.</p> <p style="padding-left: 40px;">The NULL METER indicates 1, 2, 3, and 4 in sequence.</p> <p><i>e.</i> Operate the GYRO switch to CCW.</p> <p style="padding-left: 40px;">The NULL METER indicates 1, 2, 3, and 4 in sequence.</p> <p><i>f.</i> Set the PRESET-FLIGHT switch to FLIGHT.</p> <p><i>g.</i> Operate the GYRO PRESET switch to CW.</p> <p style="padding-left: 40px;">The NULL METER deflects equally and smoothly on both sides of 1.</p> <p><i>h.</i> Operate the GYRO PRESET switch to CCW.</p> <p style="padding-left: 40px;">The NULL METER deflects equally and smoothly on both sides of 1.</p> <p><i>i.</i> Operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates 1.</p> <p><i>j.</i> Set the PRESET-FLIGHT switch to PRESET.</p> <p style="padding-left: 40px;">The NULL METER indicates 1.</p> <p style="padding-left: 80px;">Repeat <i>f</i>, <i>i</i>, and <i>j</i> above.</p> <p><i>k.</i> Set the PRESET-FLIGHT switch to FLIGHT.</p> <p><i>l.</i> Operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates one-eighth of an inch to the left side of 1.</p> <p><i>Note.</i> Perform <i>m</i> through <i>p</i> below for missiles with an APS.</p> <p><i>m.</i> Set the PLATE POWER EXTERNAL and HEATERS EXTERNAL switches to OFF.</p> <p style="padding-left: 40px;">The PLATE POWER EXTERNAL and HEATER EXTERNAL indicator lights extinguish.</p> <p><i>n.</i> Perform the arm safety check (par. 4-6).</p> <p><i>o.</i> Set the AC POWER switch on the TPCU to ON.</p> <p style="padding-left: 40px;">The POWER ON indicator light illuminates.</p> <p><i>p.</i> Set the HEATERS EXTERNAL and PLATE POWER EXTERNAL switches to ON.</p> <p style="padding-left: 40px;">The HEATERS EXTERNAL indicator light illuminates. After approximately 30 seconds, the PLATE POWER EXTERNAL indicator light illuminates.</p>		



Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
29	q. Set the TEST SELECTOR NO. 1 switch to RATE.		
Cont		The NULL METER indicates within the white zone.	
	r. (Deleted)		
	Note. Perform s and t below for missiles with an APS or u through x below for missiles with an HPU.		
	s. Operate the AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 1 second and a maximum of 2 seconds.		
	WARNING: Insure that all personnel stay clear of the area surrounding the missile elevons while applying hydraulic pressure.		
	CAUTION: APS running time with the external drive motor is 20 minutes ON, 30 minutes OFF.		
	t. Set the external drive motor switch (fig. 4-9) to ON.		
		The external drive motor accelerates to operating speed as indicated by a change in pitch of the external drive motor sound. The ACC. AIR PRESS. gage (fig. 4-7) indicates 2,500 to 3,000 psi.	
	t.1. Set the ROLL POSITION switch to NORMAL and the TEST SELECTOR NO. 1 switch to GYRO PRESET.		
	t.2. Operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates 1 in both positions of the PRESET FLIGHT switch.		
	t.3. Set the PRESET-FLIGHT switch to FLIGHT and operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates one-eighth of an inch to the left of 1.		
	t.4. Set the ROLL POSITION switch to GROUND.		
		There is no elevon oscillation.	
	Note. Perform u below for a permanent-type installation or v below for a mobile-type installation.		
	u. Set the ELECTRICAL HPU POWER circuit breaker on the power conversion unit (fig. 4-14) to ON.		
		The ELECTRICAL HPU POWER indicator light illuminates.	
	v. Set circuit breaker CB2 on the distribution box in the test station truck to ON.		
	CAUTION: Do not depress PUSH TO READ DC CURRENT pushbutton when depressing ELECTRICAL HPU START pushbutton on the power conversion unit or the distribution box in the test station truck.		
	w. Depress the ELECTRICAL HPU START pushbutton.		
		The accumulator air pressure gage (fig. 4-18) indicates 2,700 to 3,200 psi.	
	x. Depress the PUSH TO READ DC CURRENT pushbutton.		
		The DC CURRENT meter does not exceed 120 amperes.	
		The DC VOLTAGE meter indicates 27.9 to 35.6 volts.	
	x.1. Set the ROLL POSITION switch to NORMAL and the TEST SELECTOR NO. 1 switch to GYRO PRESET.		
	x.2. Operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates 1 in both positions of the PRESET FLIGHT switch.		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective action
29. (Cont)	<p>x.3. Set the PRESET—FLIGHT switch to FLIGHT and operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates one-eighth of an inch to the left of 1.</p> <p>x.4. Set the ROLL POSITION switch to GROUND.</p> <p>There is no elevon oscillation.</p> <p><i>Note.</i> Omit steps y, z, aa, ab, and ac for missiles with actuator assemblies 13060137 and 13060138.</p> <p>y. Set the TEST SELECTOR NO. 1 switch to BUZZ V., and depress the ROLL pushbutton.</p> <p>The NULL METER indicates as shown in table 4-12.</p> <p>z. Depress the YAW pushbutton.</p> <p>The NULL METER should indicate as shown in table 4-12.</p> <p>aa. Depress the PITCH pushbutton.</p> <p>The NULL METER should indicate as shown in table 4-12.</p> <p>ab. Operate the YAW switch to +MAX G, then to 0G.</p> <p>ac. Operate the PITCH switch to +MAX G, then to 0G.</p> <p>ad. Depress the ROLL pushbutton, and set the TEST SELECTOR NO. 1 switch to FIN.</p> <p>The NULL METER indicates 1.</p> <p><i>Note.</i> Omit steps ae and af for missiles with actuator assemblies 13060137 and 13060138.</p> <p>ae. Check the ROLL buzz voltage in accordance with y above.</p> <p>af. Repeat ad and ae above until no further adjustment is necessary.</p> <p><i>Note.</i> Perform ag below for missiles 10206 through 11935.</p> <p>ag. Install the air filter on the R-BUZZ-BAL adjustment port.</p> <p>ah. Set the ROLL POSITION switch to NORMAL.</p>		<p>Adjust the R-BUZZ variable resistor (D, fig. 4-25 or A, fig. 4-26) in the transponder control group.</p> <p>Adjust the Y-BUZZ variable resistor (D, fig. 4-25 or A, fig. 4-26) in the transponder control group.</p> <p>Adjust the P-BUZZ variable resistor (A, fig. 4-25 or A, fig. 4-26) in the transponder control group.</p> <p>Adjust the R-BALL variable resistor (D, fig. 4-25) or R-CENT variable resistor R33 (A, fig. 4-26) in the transponder control group until the NULL METER indicates 1.</p>
30.	<p>Check the operation of the yaw servo system.</p> <p><i>Warning:</i> Insure that the left side of the forward body section (8, fig. 3-29) is secure to the testing fixture (5) with the hexagon-head bolt (11) and flat washer (10) prior to performing a below.</p>		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
30. (Cont)	<p><i>Note.</i> Due to variations in output noise inherent in NH rate gyros, a low-level random movement of elevons within the area between the outer scribed lines may be observed for zero command on some systems. This type of movement may be identified by correlation of elevon movement and NULL METER indication with TEST SELECTOR NO. 1 set to RATE. This condition is acceptable if all other requirements of the servo system are met, and the total elevon movement is contained within the area between the outer scribed lines.</p> <p>a. Rotate the mated forward and rear body sections so that the forward body section is in the test position. Forward fin assembly 1 (A, fig. 4-28) is at the 12 o'clock position.</p> <p>b. Set the TEST SELECTOR NO. 1 switch to ACC.</p> <p>c. Depress the PITCH pushbutton.</p> <p style="padding-left: 40px;">The NULL METER indicates hard over to the left.</p> <p>d. Depress the YAW pushbutton.</p> <p style="padding-left: 40px;">The NULL METER indicates within the white zone.</p> <p>e. Set the TEST SELECTOR NO. 1 switch to RATE.</p> <p style="padding-left: 40px;">The NULL METER indicates within the white zone.</p> <p>f. Move the forward body section sharply to the right and simultaneously observe the NULL METER.</p> <p style="padding-left: 40px;">The NULL METER deflects to the left as the forward body section is moved.</p> <p><i>Note.</i> Omit step g for missiles with actuator assemblies 13060137 and 13060138.</p> <p>g. Operate the YAW switch to +MAX G, then to 0G.</p> <p>g.1. Set the ROLL POSITION switch to GROUND.</p> <p>h. Set the TEST SELECTOR NO. 1 switch to FIN.</p> <p style="padding-left: 40px;">The NULL METER indicates 1.</p> <p style="text-align: right;">Adjust the Y-BAL variable resistor (D, fig. 4-25) or the Y-CENT variable resistor R7 (A, fig. 4-26) in the TCG until the NULL METER indicates 1.</p> <p><i>Note.</i> Omit steps i and j for missiles with actuator assemblies 13060137 and 13060138.</p> <p>i. Set the TEST SELECTOR NO. 1 switch to BUZZ V.</p> <p style="padding-left: 40px;">The NULL METER indicates as shown in table 4-12.</p> <p style="text-align: right;">Adjust the Y-BUZZ variable resistor as necessary.</p> <p>j. Repeat h and i above until no further adjustments are necessary.</p> <p><i>Note.</i> Perform k below for missiles 10206 through 11935.</p> <p>k. Install the air filter on the Y-BUZZ-BAL adjustment port.</p> <p>l. Set the ROLL POSITION switch to NORMAL.</p> <p>m. Set the TEST SELECTOR NO. 1 switch to GYRO PRESET, and depress the ROLL pushbutton. Set the roll amount gyro to its control point (steps 29f, i, j, and k).</p> <p>n. Check that the Y elevons are between the two outer scribe lines, and set the TEST SELECTOR NO. 1 switch to OFF.</p> <p>o. Set the YAW switch to +MAX G.</p>		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
30.	The trailing edge of the Y elevon (A, fig. 4-29) deflects to the right.		
(Cont)	p. Set the YAW switch to 0G.	The elevons return to a position between the two outer scribe lines.	
	q. Set the YAW switch to -MAX G.	The trailing edge of the Y elevons (B, fig. 4-29) deflects to the left.	
	r. Set the YAW switch to 0G.	The Y elevons return to a position between the two outer scribe lines.	
	s. Set the YAW switch to FINS.		
	t. Slowly turn the FINS knob fully clockwise and fully counterclockwise several times.	The Y elevons deflect smoothly.	
	u. Set the YAW switch to 0G.		
31.	Check the operation of the roll servo system (dynamic) and the flipover circuits.		
	<i>Note.</i> Due to variations in output inherent to NH rate gyros, a low-level random movement of elevons within the area between the outer scribed lines may be observed for zero command on some systems. This type of movement may be identified by correlation of elevon movement and NULL METER indication with TEST SELECTOR NO. 1 set to RATE. This condition is acceptable if all other requirements of the servo system are met, and the total elevon movement is contained within the area between the outer scribed lines.		
	a. Operate the GYRO switch to UNCAGE.	The GYRO UNCAGE indicator light illuminates.	
	b. Set the TEST SELECTOR NO. 1 switch to ROLL 0°.		
	c. Depress the ROLL pushbutton.	The NULL METER indicates within the white zone.	
	d. Set the TEST SELECTOR NO. 1 switch to RATE.	The NULL METER indicates within the white zone.	
	e. Set the power switch on the cooling unit to OFF.		
	f. Disconnect the cooling unit air hose assembly from the hose coupling adapter (2, fig. 4-3) or hose assembly (5).		
	<i>Caution:</i> Observe the guidance package operating cycles in accordance with tables 4-7, 4-8, and 4-9.		
	<i>Warning:</i> Insure that the left side of the forward body section (8, fig. 3-29) is secured to the testing fixture (5) with the hexagon-head bolt (11) and flat washer (10) prior to performing g below.		
	g. Roll the missile clockwise, and simultaneously observe the NULL METER.	The NULL METER deflects to the right as the missile is rolled.	
	h. Continue rolling the missile to the 90° clockwise position.	The elevons deflect to produce counterclockwise roll (C, fig. 4-29).	
	i. Set the TEST SELECTOR NO. 1 switch to FIN.	The NULL METER indicates hard over to the left.	
	j. Set the TEST SELECTOR NO. 1 switch to ROLL 90° CW. Depress and release the RESET switch.	The NULL METER indicates within the white zone.	
	k. Set the TEST SELECTOR switch to BURST.		
	l. Operate the RESET switch on the RF test set.		
	m. Operate the START switch.		

Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
31. (Cont)	<p>The elevons deflect in the opposite direction and the RESPONSE OR VOLTAGE meter indicates near 0.</p> <p>n. Set the TEST SELECTOR switch to COMM SIG RESP B.</p> <p>o. Set the PLATE POWER EXTERNAL switch to OFF and then to ON.</p> <p>The RESPONSE OR VOLTAGE meter indicates to the right (missile response).</p> <p>p. Set the GYRO switch to CAGE.</p> <p>The GYRO UNCAGE indicator light extinguishes.</p> <p>q. Set the TEST SELECTOR NO. 1 switch to GYRO PRESET.</p> <p>r. Set the roll amount gyro to its control point (steps 29f, i, j, and k).</p> <p>s. Operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates one-eighth of an inch to the left side of 1.</p>		
32.	<p>Check the operation of the pitch servo system.</p> <p><i>Note.</i> Due to variations in output noise inherent in NH rate gyros, a low-level random movement of elevons within the area between the outer scribed lines may be observed for zero command on some systems. This type of movement may be identified by correlation of elevon movement and NULL METER indication with TEST SELECTOR NO. 1 set to RATE. This condition is acceptable if all other requirements of the servo system are met, and the total elevon movement is contained within the area between the outer scribed lines.</p> <p>a. Set the TEST SELECTOR NO. 1 switch to ACC., and depress the YAW pushbutton.</p> <p>The NULL METER indicates hard over to the right.</p> <p>b. Depress the PITCH pushbutton.</p> <p>The NULL METER indicates within the white zone.</p> <p>c. Set the TEST SELECTOR NO. 1 switch to RATE.</p> <p>The NULL METER indicates within the white zone.</p> <p>d. Move the forward body section sharply to the right and simultaneously observe the NULL METER.</p> <p>The NULL METER deflects to the left as the forward body section is moved.</p> <p><i>Note.</i> Omit step e for missiles with actuator assemblies 13060137 and 13060138.</p> <p>e. Operate the PITCH switch to +MAX G, then to 0G.</p> <p>f. Set the ROLL POSITION switch to GROUND.</p> <p>g. Set the TEST SELECTOR NO. 1 switch to FIN.</p> <p>The NULL METER indicates 1.</p> <p>Adjust the P-BAL variable resistor (A, fig. 4-25) or the P-CENT variable resistor R19 (A, fig. 4-26) in the TCG until the NULL METER indicates 1.</p> <p><i>Note.</i> Omit steps h and i for missiles with actuator assemblies 13060137 and 13060138.</p> <p>h. Set the TEST SELECTOR NO. 1 switch to BUZZ-V.</p> <p>The NULL METER indicates as shown in table 4-12.</p> <p>Adjust the P-BUZZ variable resistor as necessary.</p> <p>i. Repeat g and h above until no further adjustments are necessary.</p> <p><i>Note.</i> Perform j below for missiles 10206 through 11935.</p>		



Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
32. (Cont)	<p><i>j.</i> Install the air filter on the P-BUZZ BAL adjustment port.</p> <p><i>k.</i> Set the ROLL POSITION switch to NORMAL.</p> <p><i>l.</i> Depress the ROLL pushbutton.</p> <p><i>m.</i> Set the TEST SELECTOR NO. 1 switch to GYRO PRESET. Set the roll amount gyro to its control point (steps 29<i>f</i>, <i>i</i>, <i>j</i>, and <i>k</i>).</p>		

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
32 Cont	<p>n. Check that the P elevons are between the two outer scribe lines, and set the TEST SELECTOR NO. 1 switch to OFF.</p> <p>o. Set the PITCH switch to + MAX G.  <b>The trailing edge of the P elevons (D, fig. 4-29) deflects to the right.</b></p> <p>p. Set the PITCH switch to 0G.  <b>The P elevons return to a position between the two outer scribe lines.</b></p> <p>q. Set the PITCH switch to - MAX G.  <b>The trailing edge of the P elevons (E, fig. 4-29) deflects to the left.</b></p> <p>r. Set the PITCH switch to 0G.  <b>The P elevons return to a position between the two outer scribe lines.</b></p> <p>s. Set the PITCH switch to FINS.</p> <p>t. Slowly turn the FINS knob fully clockwise and fully counterclockwise several times.  <b>The P elevons deflect smoothly.</b></p>		
33	<p>u. Set the PITCH switch to 0G.  Check the pressure transmitter.</p> <p><b>WARNING: Insure that the left side of the forward body section (8, fig. 3-29) is secured to the testing fixture (5) with the hexagon-head bolt (11) and flat washer (10) prior to performing a below.</b></p> <p>a. Rotate the mated forward and rear body sections so that the forward body section is in the flight position (B, fig. 4-28).</p> <p>b. Connect the cooling unit air hose assembly (1, fig. 4-3) to the hose coupling adapter (2) or the hose assembly (5).</p> <p>c. Set the POWER switch (10) on the cooling unit to ON.  <b>WARNING: Insure that the self-locking pins (view A, fig. 9-1) are inserted through the handling ring segment.</b></p> <p>d. Connect the hose assembly (5, fig. 4-24) to the adapter hose assembly (1) on the ram-pressure probe (2) and to the LINE fitting (9) on top of the stagnation pressure pump (8).</p> <p>e. Remove the cap from the VENT fitting (10) on the top of the stagnation pressure pump.</p> <p>f. Set the VAC-OFF PRESS knob (6) on top of the stagnation pressure pump to PRESS.</p> <p>g. Operate the handle (7) to apply pressure until the gage indicates 50 to 60 on the PRESS scale.  <b>All elevons deflect toward the center scribe lines.</b></p> <p>h. Loosen a plug on a plug hose assembly (4).  <b>The Indication on the gage decreases to 0.</b>  <b>All elevons deflect smoothly and continuously away from the center scribe lines.</b></p> <p><i>Note.</i> Loosen a plug on a different plug hose assembly for each check.</p> <p>i. Tighten the plug on the plug hose assembly.</p> <p>j. Set the VAC-OFF-PRESS knob on the stagnation pressure pump to VAC.</p> <p>k. Operate the handle to apply a vacuum until the gage indicates 8 to 12 on the VAC scale.  <b>All elevons deflect away from the center scribe lines.</b></p> <p>l. Loosen a plug on a plug hose assembly.  <b>The indication on the gage decreases to 0.</b>  <b>All elevons deflect smoothly and continuously toward the center scribe lines.</b></p> <p>m. Tighten the plug on the plug hose assembly.</p> <p>n. Set the VAC-OFF-PRESS knob on the stagnation pressure pump to PRESS.</p> <p><i>Note.</i> Perform o below for missiles with an APS or p below for missiles with an HPU.</p>		

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
33 Cont	<p>o. Set the external drive motor switch to OFF.</p> <p>p. Depress the ELECTRICAL HPU STOP pushbutton.</p> <p>q. Set the PITCH and YAW switches to FINS, and rotate the FINS knob until the hydraulic pressure is too low to obtain elevon response.</p> <p>r. Manually position all elevons between the two outer scribe lines and hold them.</p> <p>s. Set the PITCH and YAW switches to 0G.</p> <p>t. Depress the ROLL pushbutton.</p> <p>u. Operate the D.C. VOLTS switch to the up position and hold while performing v through y below.</p> <p>v. Operate the GYRO PRESET switch to CW or CCW until the NULL METER indicates near the small white mark on the right of the dial.</p> <p>w. Operate the handle to apply pressure until the gage indicates 50 to 60 on the PRESS scale.</p> <p><b>The NULL METER indication decreases.</b></p> <p>x. Set the VAC-OFF-PRESS knob on the stagnation pressure pump to VAC.</p> <p>y. Operate the handle to apply a vacuum of 8 to 12 on the VAC scale.</p> <p><b>The NULL METER indication increases.</b></p> <p>z. Release the elevons and DC VALVE VOLTS switch.</p> <p>aa. Set the VAC-OFF-PRESS knob on the stagnation pressure pump to PRESS.</p> <p>ab. Operate the handle to apply pressure until the gage indicates 50 to 60 on the PRESS scale.</p> <p>ac. Set the VAC-OFF-PRESS knob to OFF, retaining in excess of 30 psi on the PRESS scale.</p> <p>ad. After 1 minute, check the pressure. The pressure loss does not exceed 10 percent.</p> <p>ae. Loosen the plug from the plug hose assembly.</p> <p><b>The pressure decreases to 0.</b></p> <p>af. Disconnect the hose assembly from the adapter hose assembly and the stagnation pressure pump.</p> <p>ag. Set the TEST SELECTOR NO. 1 switch to GYRO PRESET.</p> <p>ah. Set the roll amount gyro to its control point (steps 29f, i, j, and k).</p> <p>ai. Release the ROLL pushbutton.</p>		
34	<p>Perform the precise command check.</p> <p><i>Note.</i> Perform a through d below for missiles with an APS.</p> <p>a. Set the PLATE POWER EXTERNAL and HEATERS EXTERNAL switches to OFF.</p> <p><b>The PLATE POWER EXTERNAL and HEATERS EXTERNAL indicator lights extinguish.</b></p> <p>b. Perform the arm safety check (par. 4-6).</p> <p>c. Set the AC POWER, HEATERS EXTERNAL, and PLATE POWER EXTERNAL switches on the TPCU to ON.</p> <p><b>The POWER ON and HEATERS EXTERNAL indicator lights illuminate. After approximately 30 seconds, PLATE POWER EXTERNAL indicator light illuminates.</b></p> <p>d. Set the external drive motor switch to ON.</p> <p><b>The external drive motor accelerates to operating speed as indicated by the change in pitch of the external drive motor sound.</b></p> <p><b>The ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi.</b></p> <p><i>Note.</i> Perform e through o below for missiles with an HPU.</p>		

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
34 Cont	<p><b>Note.</b> Make certain that connector P544 is disconnected from connector J544 on the HPU squib battery, and that the shorting dummy connector (with pin C shorted to pin E) is installed on connector J544.</p> <p>e. Set the GLOW COIL switch on the TPCU to ON.</p> <p>f. Depress the APS ACCEL indicator light on the TCU.</p> <p><b>The APS ACCEL indicator light illuminates.</b></p> <p>g. Depress the RESET pushbutton on the TCU.</p> <p>h. Operate the AUXILIARY POWER SUPPLY switch to START, and hold for approximately 1 second and a maximum of 2 seconds.</p> <p><b>The APS ACCEL indicator light does not illuminate.</b></p> <p>i. Depress RESET pushbutton on the TCU.</p> <p><b>CAUTION: Do not depress the PUSH TO READ DC CURRENT pushbutton when depressing the ELECTRICAL HPU START pushbutton.</b></p> <p>j. Depress the ELECTRICAL HPU START pushbutton.</p> <p><b>The accumulator air pressure gage indicates 2,700 to 3,200 psi.</b></p> <p>k. Depress the RESET pushbutton on the TCU.</p> <p>l. Depress the PUSH TO READ DC CURRENT pushbutton.</p> <p><b>The DC CURRENT meter does not exceed 120 amperes.</b></p> <p><b>The DC VOLTAGE meter indicates 27.9 to 35.6 volts.</b></p> <p>m. Operate the AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 1 second and a maximum of 2 seconds.</p> <p><b>The APS ACCEL indicator light illuminates.</b></p> <p>n. Set the GLOW COIL switch to OFF.</p> <p>o. Depress the RESET pushbutton on the TCU.</p> <p><b>The APS ACCEL indicator light extinguishes.</b></p> <p>p. Set the TEST SELECTOR switch to COM SIG RESP B.</p> <p>q. Set the YAW switch to + MAX G.</p> <p>r. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.</p> <p>s. Set the TEST SELECTOR NO. 2 switch to + G.</p> <p>t. Depress the YAW pushbutton.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>u. Set the YAW switch to - MAX G.</p> <p>v. Set the TEST SELECTOR NO. 2 switch to - G.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>w. Set the YAW switch to 0G.</p> <p>x. Set the PITCH switch to + MAX G.</p> <p>x.1. Set the TEST SELECTOR NO. 2 switch to + G.</p> <p>y. Depress the PITCH pushbutton.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>aa. Set the PITCH switch to - MAX G.</p> <p>ab. Set the TEST SELECTOR NO. 2 switch to - G.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>ac. Set the PITCH switch to 0G.</p> <p>ad. Release the PITCH pushbutton.</p> <p>ae. Set the TEST SELECTOR NO. 2 switch to TRANS. No. 1.</p> <p>af. Set the SELECTOR NO. 1 switch to OFF,</p>		

Table 4-11. Missile Electrical Checks — Continued

Step	Operation	Normal indication	Corrective procedure
35	<p>Perform the internal operation check.</p> <p><i>Note.</i> When operating the MISSILE POWER switch to INT, hold for approximately 2 seconds.</p> <p><i>Note.</i> The RESPONSE OR VOLTAGE meter indication may change momentarily and return to approximately the original reading. If the indication does not return to approximately the original reading, perform troubleshooting procedures.</p> <p>a. Operate the MISSILE POWER switch to INT.</p> <p><b>The MISSILE POWER INTERNAL indicator light illuminates. The HEATERS EXTERNAL and PLATE POWER EXTERNAL indicator lights extinguish. The elevons drift hard over (missiles 10206 through 11935 with transponder control group 9006596 or 9006599 and missiles 13001 and subsequent).</b></p> <p><i>Note.</i> Perform b through d for missiles 10206 through 11935.</p> <p>b. Set the TEST SELECTOR NO. 1 switch to MISSILE V.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>c. Set the TEST SELECTOR NO. 1 switch to MISSILE I.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p>d. Set the TEST SELECTOR NO. 1 switch to BAT. V.</p> <p><b>The NULL METER indicates within the white zone.</b></p> <p><b>CAUTION: Do not operate the MISSILE POWER switch to EXT with INERTIA switches S1 and S2 in the armed position (C, fig. 4-25, or A, fig. 4-26).</b></p> <p>e. Operate the MISSILE POWER switch to EXT.</p> <p><b>The MISSILE POWER INTERNAL indicator light extinguishes. The HEATERS EXTERNAL and PLATE POWER EXTERNAL indicator lights illuminate. The elevons return to the original position (missile 10206 through 11935 with transponder control group 9006596 or 9006599 and missiles 13001 and subsequent).</b></p> <p><i>Note.</i> Perform f through j below for missiles 10206 through 11935 or k and l below for missiles 13001 and subsequent.</p> <p>f. Remove the air filter from the INERTIA SWITCH adjustment port.</p> <p>g. Insert a stubby screwdriver through the INERTIA SWITCH adjustment port (C, fig. 4-25) on the transponder control group and move the switch arm to the rear (armed) position.</p> <p><b>The MISSILE POWER INTERNAL and GYRO UNCAGE indicator lights illuminate.</b></p> <p><b>The HEATERS EXTERNAL and PLATE POWER EXTERNAL indicator lights extinguish.</b></p>		



Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
85 Cont.		The RESPONSE OR VOLTAGE meter indication does not change. The elevons drift hard over on missiles with transponder-control group 9006596 or 9006599.	
	h. Set the TEST SELECTOR NO. 1 switch to OFF.		
	i. Insert a stubby screw driver through the INERTIA SWITCH adjustment port on the transponder control group, and move the switch to the forward (safe) position.	The MISSILE POWER INTERNAL indicator light dims. If the MISSILE POWER INTERNAL indicator light does not dim repeat <i>i</i> .	
	j. Install the air filter on the INERTIA SWITCH adjustment port.		
	k. Arm INERTIA switches S1 and S2 (B, fig. 4-26) in the transponder control group by pushing the weights to the rear position.		
	<p>Note. The MISSILE POWER INTERNAL indicator light illuminates and dims appreciably 1 to 2 seconds later and remains dim through <i>m</i> below, indicating normal operation of the K-512 timer (missile 13684 and subsequent).</p> <p>The MISSILE POWER INTERNAL and GYRO UNCAGE indicator lights illuminate. The HEATERS EXTERNAL and PLATE POWER EXTERNAL indicator lights extinguish. The RESPONSE OR VOLTAGE meter indication may change momentarily and return to approximately original reading. The elevons drift hard over.</p> <p>If the missile power internal indication light does not dim, perform <i>l</i> below and repeat <i>k</i>.</p>		
	Notes: (Deleted)		
	l. Dearm INERTIA switches S1 and S2 in the transponder control group by pushing the weights forward.	The MISSILE POWER INTERNAL indicator light dims, if it did not already dim as indicated in the note following step 35k above.	
	m. Operate the GYRO switch to CAGE.	The GYRO UNCAGE indicator light extinguishes.	If the GYRO UNCAGE indicator light does not extinguish, repeat <i>i</i> or <i>l</i> above.
	n. Operate the MISSILE POWER INTERNAL switch to EXT.	The MISSILE POWER INTERNAL indicator light extinguishes. The HEATERS EXTERNAL and PLATE POWER EXTERNAL indicator lights illuminate. The elevons return to the original position (missiles 10206 through 11935 with transponder control group 9006596 or 9006599 and missiles 13001 and subsequent).	
	<p>Note. Perform <i>o</i> below for missiles with an APS or <i>p</i> through <i>r</i> below for missiles with an HPU.</p> <p><i>o</i>. Set the external drive motor switch to OFF.</p> <p><i>p</i>. Depress the ELECTRICAL HPU STOP pushbutton.</p> <p>Note. Perform <i>q</i> below for a permanent-type installation or <i>r</i> below mobile-type installation.</p>		

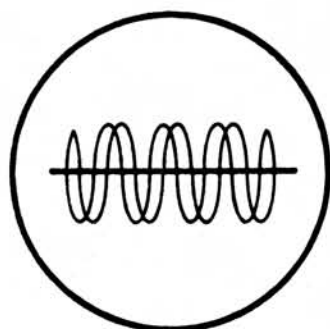
Table 4-11. Missile Electrical Checks—Continued

Step	Operation	Normal indication	Corrective procedure
35 Cont	<p>q. Set the ELECTRICAL HPU POWER circuit breaker on the power conversion unit to OFF.</p> <p>The ELECTRICAL HPU POWER indicator light extinguishes.</p> <p>r. Set circuit breaker CB2 on the distribution box in the mobile test unit to OFF.</p> <p>s. Bleed the pressure from the elevons.</p> <p>Note. Turn the RESPONSE knob counterclockwise to prevent pegging the RESPONSE or VOLTAGE meter when <i>t</i> below is performed.</p> <p>t. Set the TEST SELECTOR switch to TRANS. TEST.</p> <p>u. Check the magnetron frequency (step 23b through <i>g</i>).</p> <p>For missiles 10206 through 11935, the measured frequency is within 5 mc of the assigned frequency.</p> <p>For missiles 13001 and subsequent, the measured frequency is within 3 mc of the assigned frequency.</p> <p>If the measured frequency is within 10 mc of the assigned frequency, adjust the magnetron to within the normal indication tolerance of the assigned frequency.</p> <p>If the measured frequency is more than 10 mc from the assigned frequency, replace the magnetron tubes (par. 12-12 mushroom or par. 12-38 stovepipe).</p> <p>v. Set the PLATE POWER EXTERNAL switch to OFF.</p> <p>The PLATE POWER EXTERNAL indicator light extinguishes.</p> <p>w. Set the HEATERS EXTERNAL switch to OFF.</p> <p>The HEATERS EXTERNAL indicator light extinguishes.</p> <p>x. Set the POWER switch on the cooling unit to OFF.</p> <p>Note. Perform <i>y</i> through <i>aa</i> below for missiles 13001 and subsequent.</p> <p>y. Clean the seal and surfaces of the access cover plate (5, fig. 12-2) and the transponder control group (1) with toluene 6810-00-281-2002.</p> <p>z. Lubricate the seal surfaces with insulating compound, MIL-S-8660.</p> <p>aa. Install the six captive screws (3) to secure the access cover plate to the transponder control group.</p> <p>Note. Perform <i>ab</i> below for missiles 10206 through 11935.</p> <p>ab. Remove the air filters, install all screw-type plugs (5, 8, 11, 12, 15, and 18, fig. 4-1) in the transponder control group.</p> <p>Note. When the HPU has been deenergized after several minutes of operation, the HPU hydraulic level indicator may indicate in the BLEED area because of the rise in oil temperature. The indicator will move to the FULL area when the oil returns to ambient temperature.</p>		

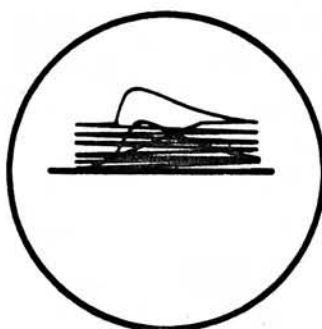
*Note.* The buzz voltage requirements of table 4-12 are not applicable to missiles with actuator assemblies 13060137 and 13060138.

*Table 4-12. Buzz Voltage Requirements*

Ambient temperature of the missile environment	Buzz voltage indication on the TCU NULL METER
160°F to 50°F	Within the white zone (to the right of 1)
70°F to 40°F	In the right black zone



A. ALINEMENT OF MICRO-SECOND OSCILLATOR



B. ALINEMENT OF SAWTOOTH CIRCUIT-CALIBRATE SWITCH SET TO P AND Y



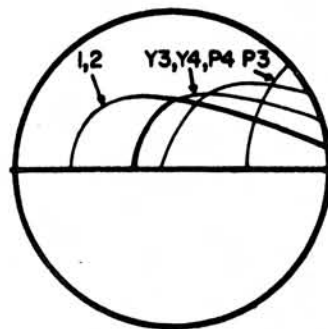
C. ALINEMENT OF SAWTOOTH CIRCUIT-CALIBRATE SWITCH SET TO PITCH



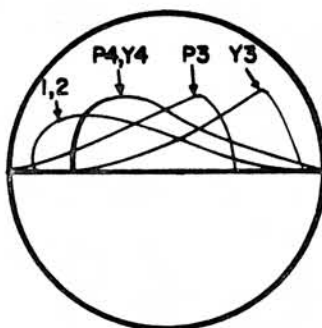
D. ALINEMENT OF D2 DELAY-L1 MISSILE CODE CALIBRATE SWITCH SET TO Y8#4 RESP. A



E. ALINEMENT OF D2 DELAY-L5 MISSILE CODE CALIBRATE SWITCH SET TO Y8# 4 RESP. A



F. ALINEMENT OF D2 DELAY-CALIBRATE SWITCH SET TO TRAIN



G. FINAL ALINEMENT OF SAWTOOTH CIRCUIT

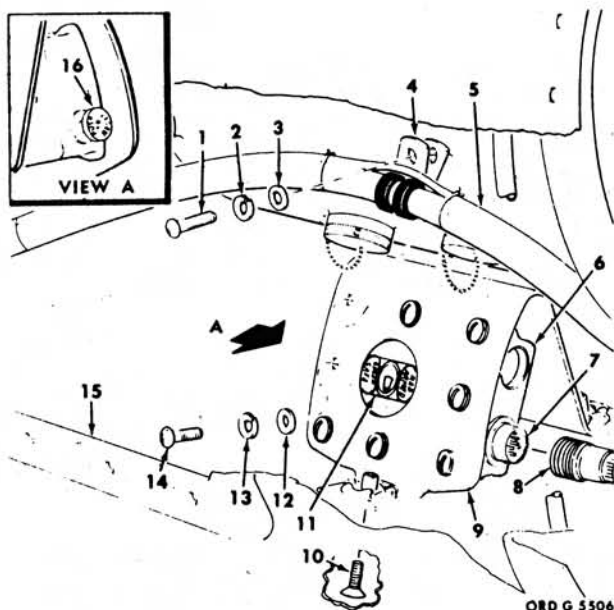
ORD G5373

Figure 4-19. Alinement waveforms.

#### 4-13. Check of the Missile Heater Circuits

a. Remove the hexagon-head bolt (11, fig. 3-29) and flat washer (10) that secure the

left side of the forward body section (8) to the testing fixture (5).



ORD G 5506

- 1—No. 10-32 x 9/16 truss-hd screw
- 2—No. 10 lockwasher
- 3—0.203 in-id fl washer
- 4—Clamp
- 5—Barometer probe hose and cable
- 6—Safety-and-arming switch S30
- 7—Connector J177
- 8—Connector P177B
- 9—Bracket
- 10—No. 10-32 x 5/8 fl-hd screw (3)
- 11—Inspection window
- 12—0.203 in-id fl washer (2)
- 13—No. 10 lockwasher (2)
- 14—No. 10-32 x 3/8 rd-hd screw (2)
- 15—Forward body section
- 16—PUSH TO RESET switch

Figure 4-20. Removal and installation of safety-and-arming switch S30 (missiles 10206 through 11935).

**WARNING:** Insure that the self-locking pins (fig. 9-1) are inserted through the lower handling ring segment.

b. Swing the forward body section to the right until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

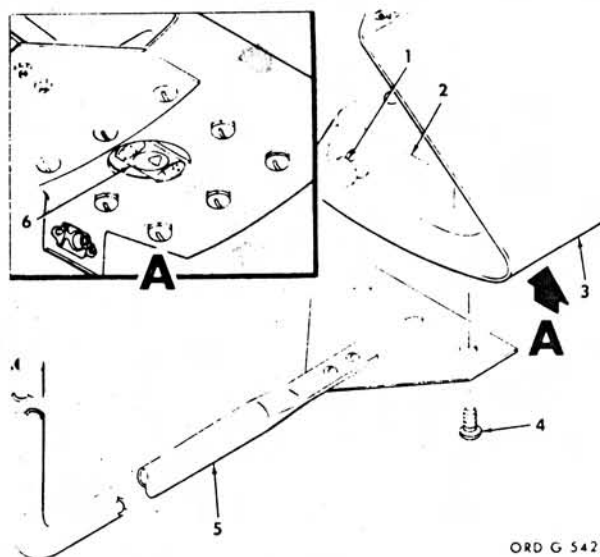
c. Connect connector P171 (2, fig. 4-31) to connector J171 (4) in the rear body section. Make certain that the orange band on connector P171 is visible after the connection is made.

d. Set TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

e. Set TEST SELECTOR NO. 2 switch to HTRS  $\phi$ A. NULL METER indicates within the white zone.

f. Set TEST SELECTOR NO. 2 switch to HTRS  $\phi$ B. NULL METER indicates within the white zone.

g. Set TEST SELECTOR NO. 2 switch to HTRS  $\phi$ C. NULL METER indicates within the white zone.



ORD G 5427

- 1—PUSH TO RESET switch
- 2—Safety-and-arming switch S30
- 3—Bracket
- 4—No. 10-32 x 1-3/32 fl-hd screw (3)
- 5—Safety-and-arming switch sling
- 6—Inspection window

Figure 4-21. Removal and installation of safety-and-arming switch S30 from the sling.

h. Disconnect connector P171 from connector J171.

i. Set TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and TEST SELECTOR NO. 1 switch to OFF.

*Note.* Perform steps j through n below for missiles equipped with an APS.

j. At the TCU, set POWER ON switch to OFF. POWER LIGHT extinguishes.

k. At the TPCU, set AC POWER switch to OFF. POWER ON light extinguishes.

*Note.* The cooling unit must remain connected during the missile assembly operations and testing or if the hot run in table 4-13 is to be performed.

l. Remove the cooling unit and associated equipment.

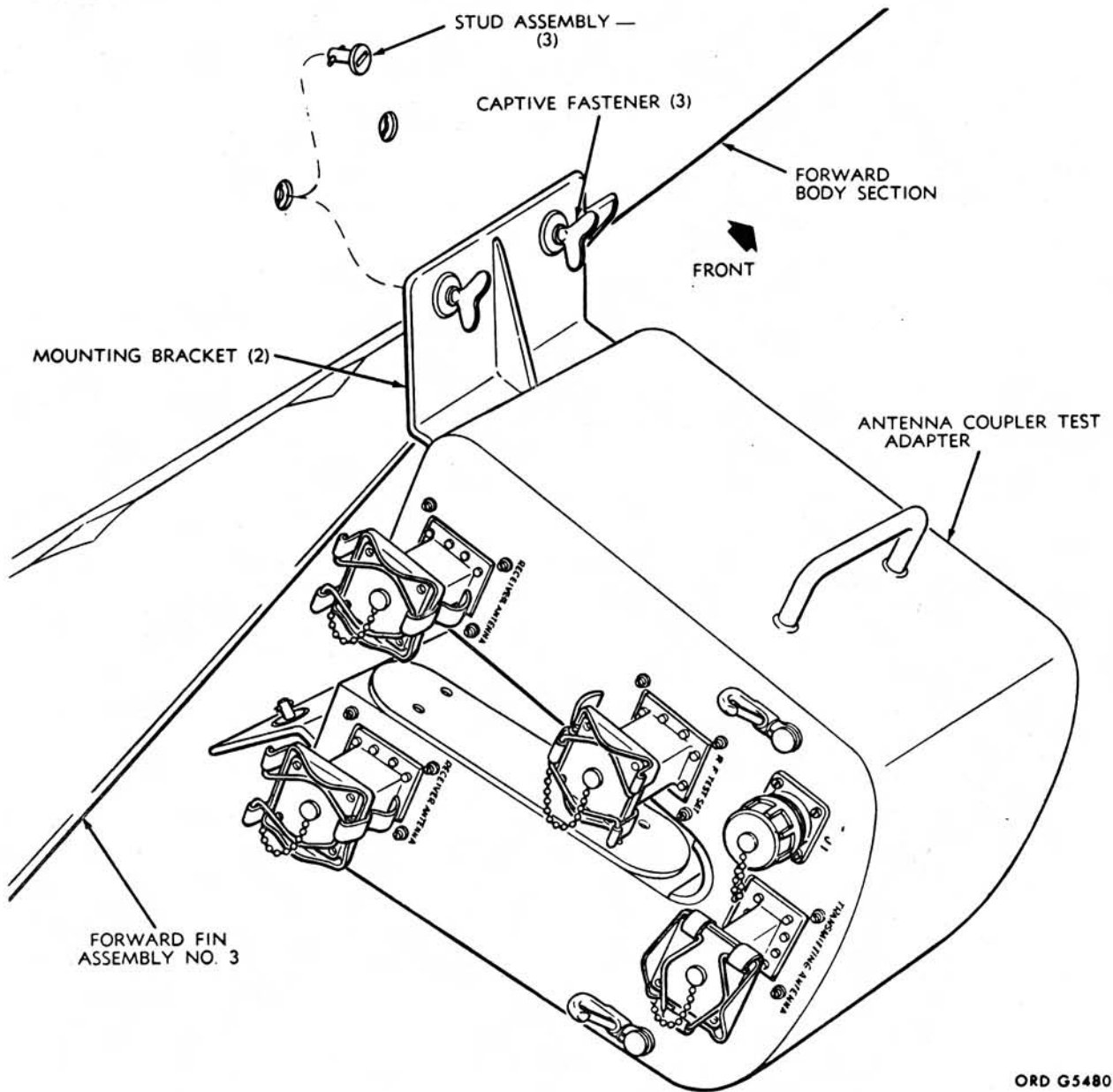
m. Check that the gasket (3, fig. 4-2) is properly seated in the groove around the missile-code delay line access port.

n. Install the cover plate (2).

#### 4-14. Check of the HPU Squib Battery Activation Circuit

**CAUTION:** Verify that P544 has been disconnected from the HPU squib battery and that the missile and warhead batteries have not been connected.





ORD G5480

Figure 4-22. Removal and installation of the antenna coupler test adapter.

a. Prepare the multimeter to read 250 volts ac.

b. Place a multimeter across pins C and E of connector P544.

b.1. Set the AC POWER switch to ON.

b.2. Set the HEATERS EXTERNAL and PLATE POWER EXTERNAL switches to ON.

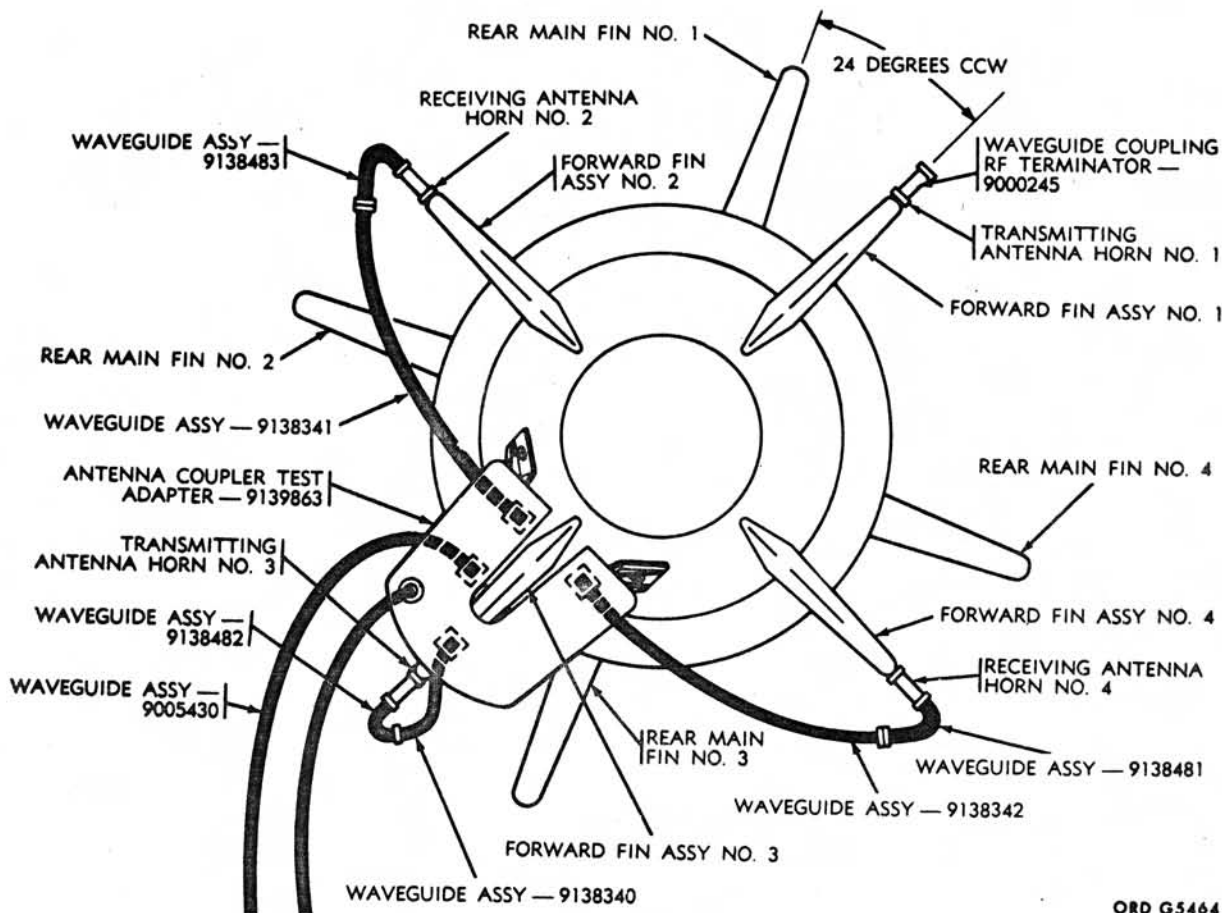
c. Operate the GLOW COIL switch to ON and the AUXILIARY POWER SUPPLY

switch to START. The multimeter must indicate approximately 120 volts ac. (If MWO 9-4935-252-50/2/28 has not been applied, any ac indication is acceptable).

d. Release AUXILIARY POWER SUPPLY switch, and operate the GLOW COIL switch to OFF.

e. Set PLATE POWER EXTERNAL and HEATERS EXTERNAL switches to OFF.

f. Set AC POWER switch to OFF.



ORD G5464

Figure 4-23. Removal and installation of the waveguide assemblies.

g. Remove the cooling unit and associated equipment.

#### 4-15. Transponder Control Group Air Leakage Test

**WARNING:** Do not test the transponder control group for air leakage unless the forward body section (8, fig. 3-29) is swung fully open and the hinge lock pin (12) is in the locked position. If the testing fixture (5) is not available, or if maintenance operations dictate, remove the forward body section, and perform the air leakage test with the forward body section on the forward body section truck. (Steps a through m below.)

*Note.* Test of the transponder control group for air leakage should be delayed until satisfactory completion of the required electrical checks after performing the corrective maintenance on the transponder control group.

*Note.* Perform a through e below for missiles 13001 and subsequent.

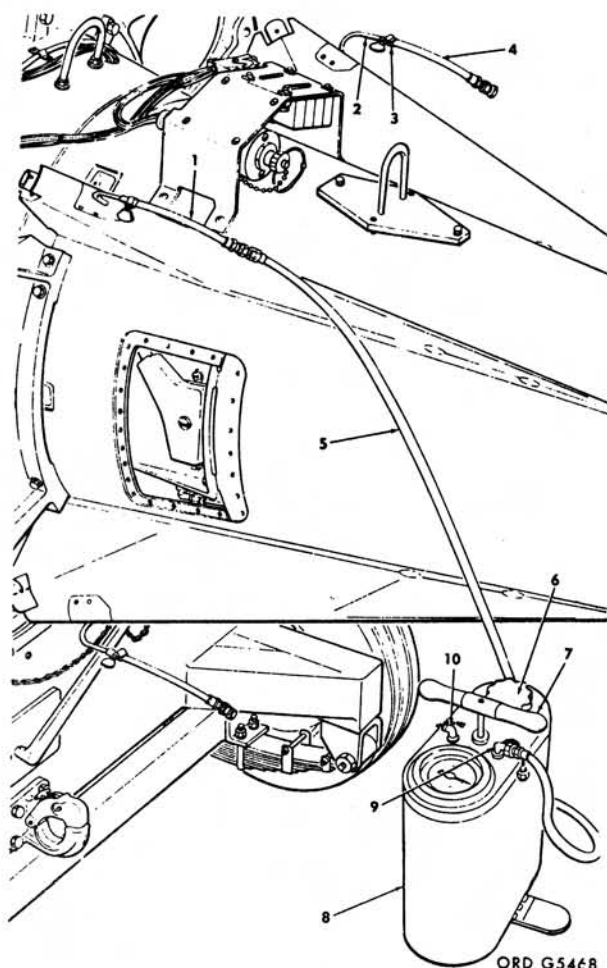
a. Loosen the captive screws (3, fig. 12-2) that secure the access cover plate (5) to the transponder control group (1) sufficiently to ensure depletion of the air pressure.

b. Remove the rear housing cover (10) and desiccant (17) from the transponder control group as prescribed in steps (1) through (3) below.

(1) Loosen the retaining screw (11), and disengage the lever arm (12).

(2) Exert a steady pull on the two hook handles (23), and remove the rear housing cover from the transponder control group.

(3) Loosen the captive screws (16) that secure the desiccant holder (15) to the inside of the rear housing cover; hinge the desiccant holder and remove the desiccant.



- 1—Adapter hose assy
- 2—Ram-pressure probe (4)
- 3—Hose clamp (4)
- 4—Plug hose assy (3)
- 5—Hose assy
- 6—VAC-OFF-PRESS knob
- 7—Handle
- 8—Stagnation pressure pump
- 9—LINE fitting
- 10—VENT fitting

Figure 4-24. Removal and installation of the pressure fittings.

c. Install activated desiccant, and install the rear housing cover from the transponder con-

trol group as prescribed in steps (1) through (7) below.

**CAUTION:** Do not use any type of tool on the rear housing cover to assist seating.

(1) Remove the preformed packing (24) from the packing seat in the rear housing cover (10). Clean the preformed packing, preformed packing seat, and metal sealing surface of the housing with a clean, dry cloth saturated with toluene 6810-281-2002. Apply a thin coat of silicone compound MIL-S-8660 to the preformed packing, preformed packing seat, and metal sealing surface. Place the preformed packing in the preformed packing seat.

(2) (Deleted)

(3) With the pressure valve (7) on the right, seat the rear housing cover on the transponder control group until the retaining ring (14) is approximately flush with the rim of the housing.

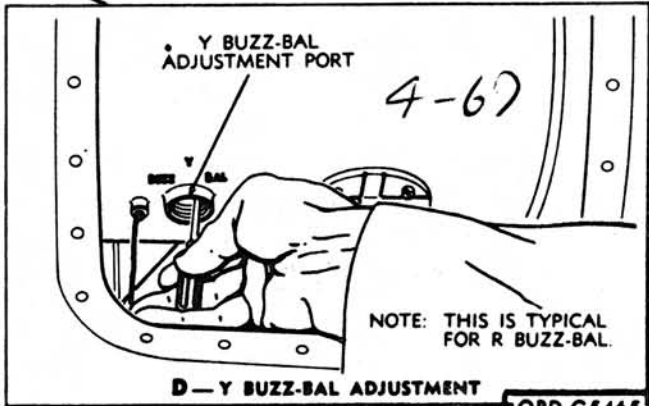
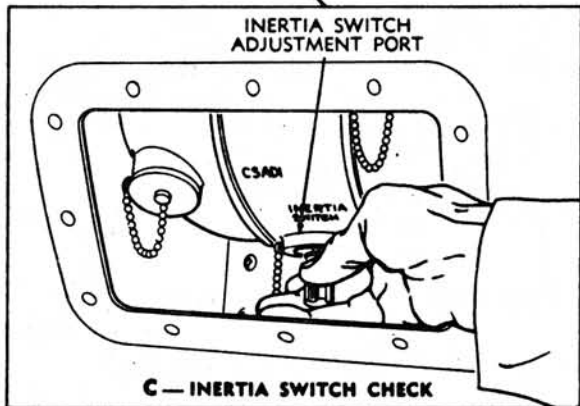
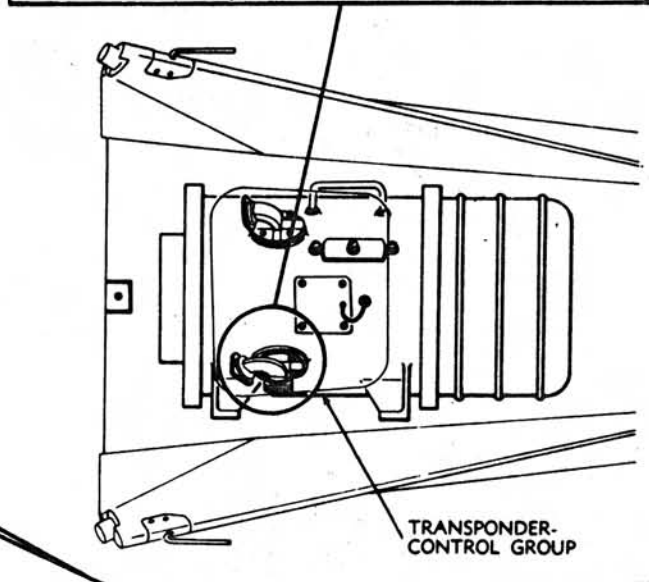
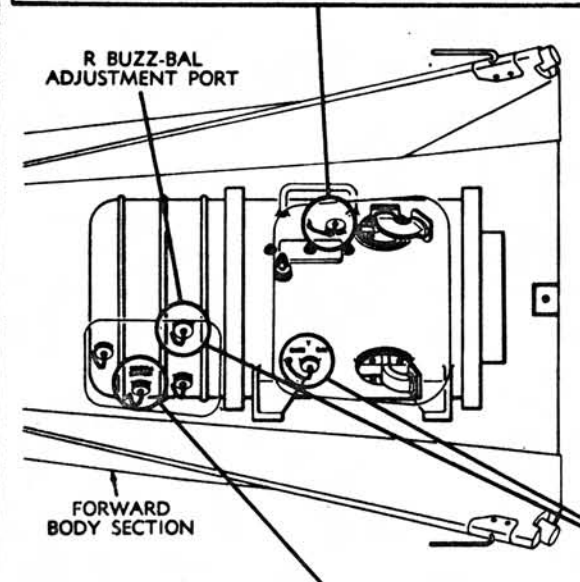
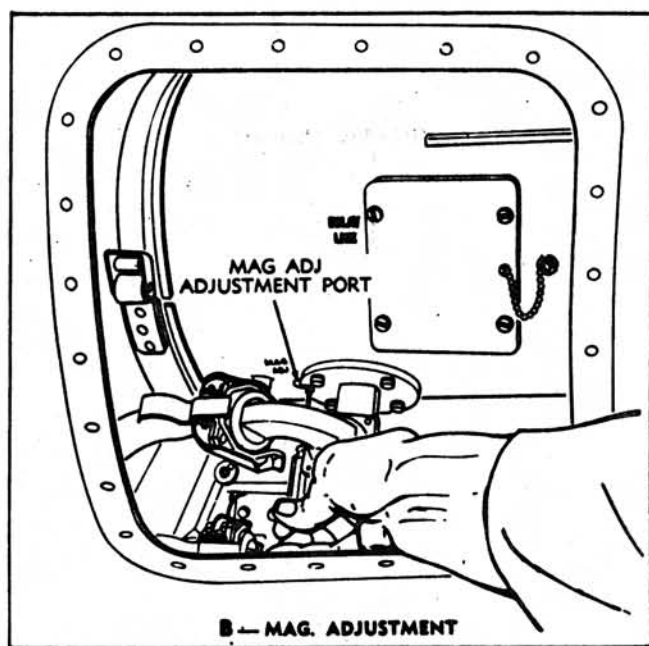
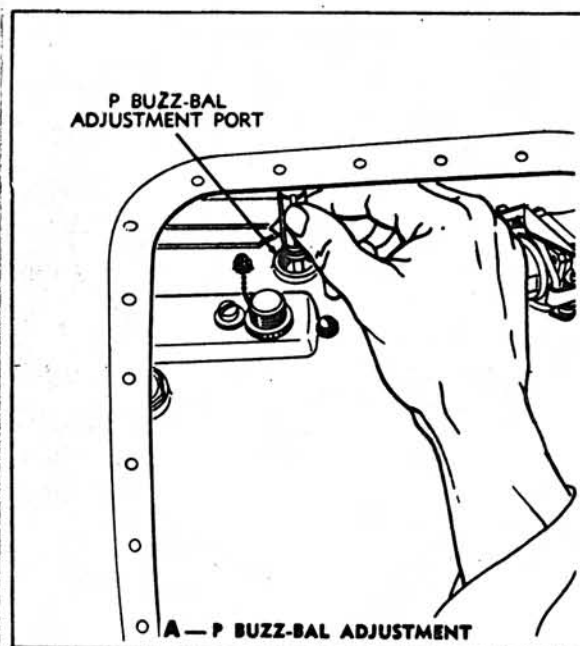
(4) Apply pressure to the right hook handle (23) while maintaining a retaining pressure on the left handle. When the rear housing has seated on the right side, hold a retaining pressure on the right hook handle, and increase the pressure on the left handle until the rear housing cover (10) seats on the left side.

(5) Press firmly all sides of the rear housing cover and on each side of the lever arm (12) to insure proper seating.

**CAUTION:** Do not force the lever arm which should close freely to approximately three-eighths of an inch. If force is required to engage the lever arm, the rear housing cover is not properly seated.

(6) Engage the lever arm (12), and tighten the retaining screw (11) to secure the rear housing cover (10) to the transponder control group (1).

(7) Inspect the entire retaining ring (14) for proper seating.



ORD G5463

Figure 4-25. Transponder control group adjustments (missiles 10206 through 11935).

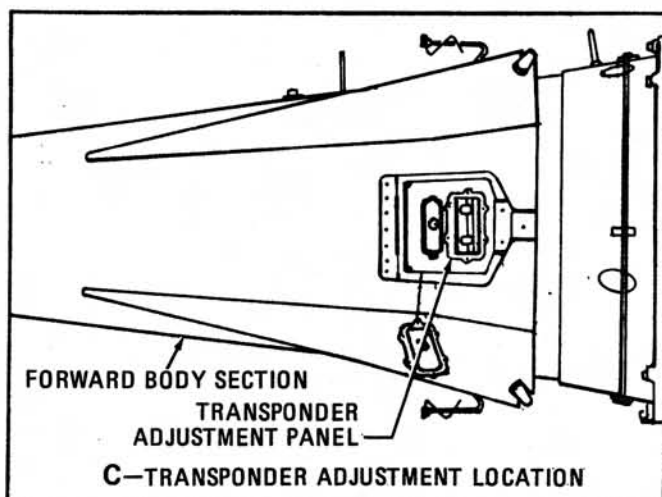
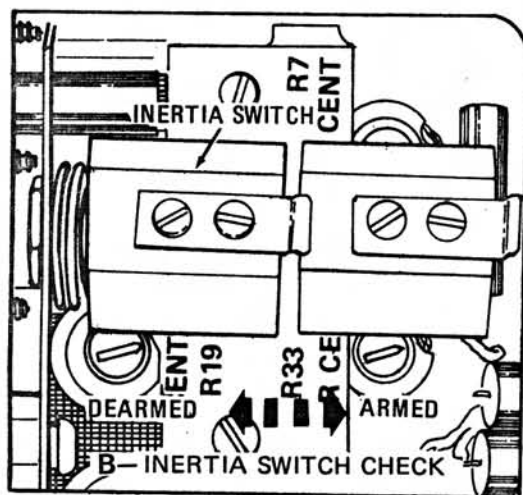
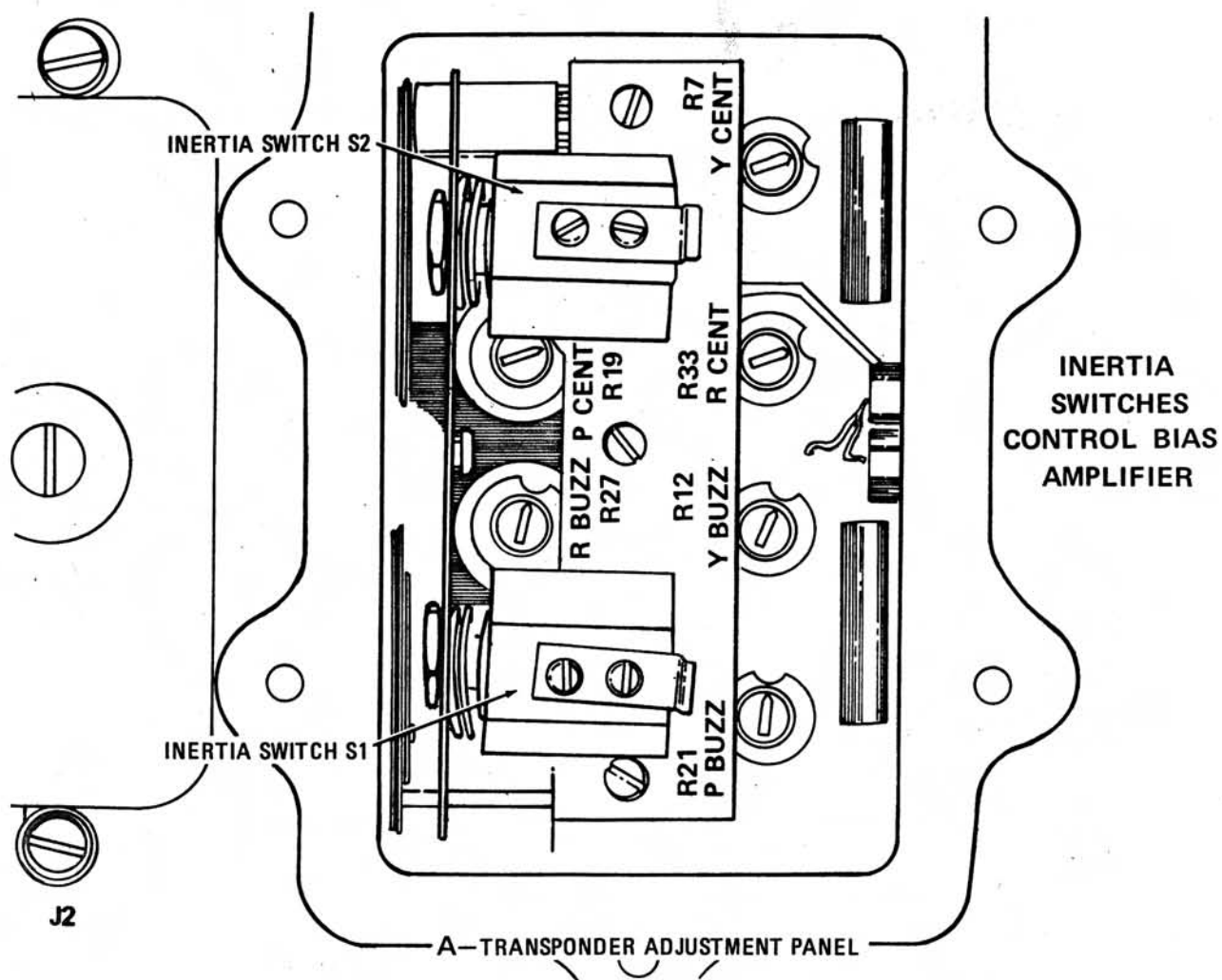


Figure 4-26. Transponder control group adjustments (missiles 13001 and subsequent.)



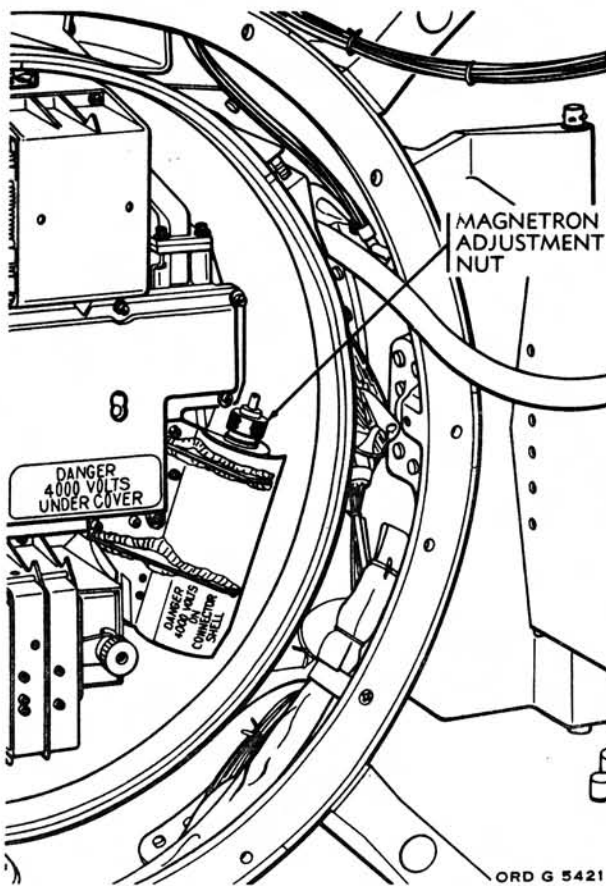


Figure 4-27. Magnetron adjustment (missiles 13001 and subsequent).

d. Tighten the six captive screws (3) that secure the access cover plate (5) to the transponder control group (1).

e. Place the shipping support channel (fig. 4-32) on the forward body section, with the attach holes at the 1- and 7-o'clock positions, or the 3- and 9-o'clock positions, as appropriate. Secure with the hexagon-head screws, flat washers, and hexagon nuts.

**CAUTION:** Use a clean, dry air or nitrogen source only.

f. Connect the hose assembly from the INLET connector on the air leakage test set to a compressed air or nitrogen source (200-psi maximum).

g. Connect the hose assembly from the OUTLET connector on the air leakage test

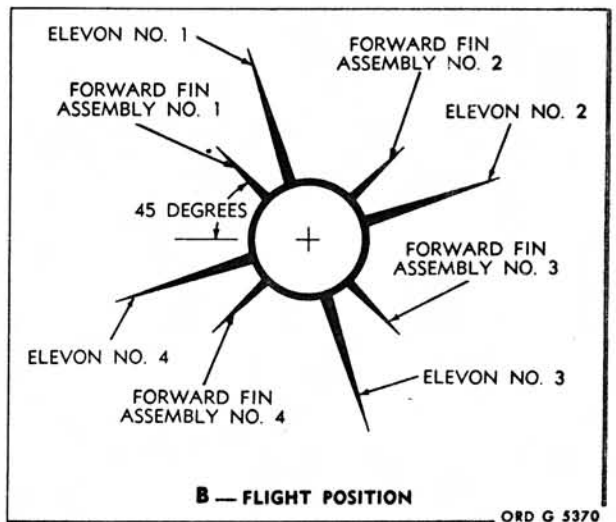
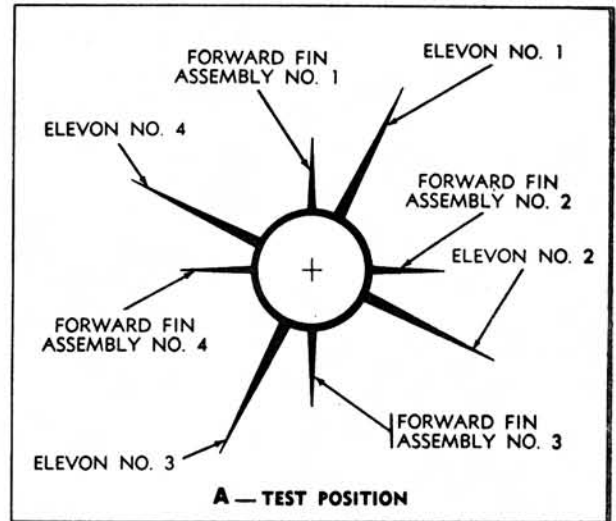


Figure 4-28. Missile positions for missile electrical checkout.

set to the AIR FILLER VALVE on the transponder control group.

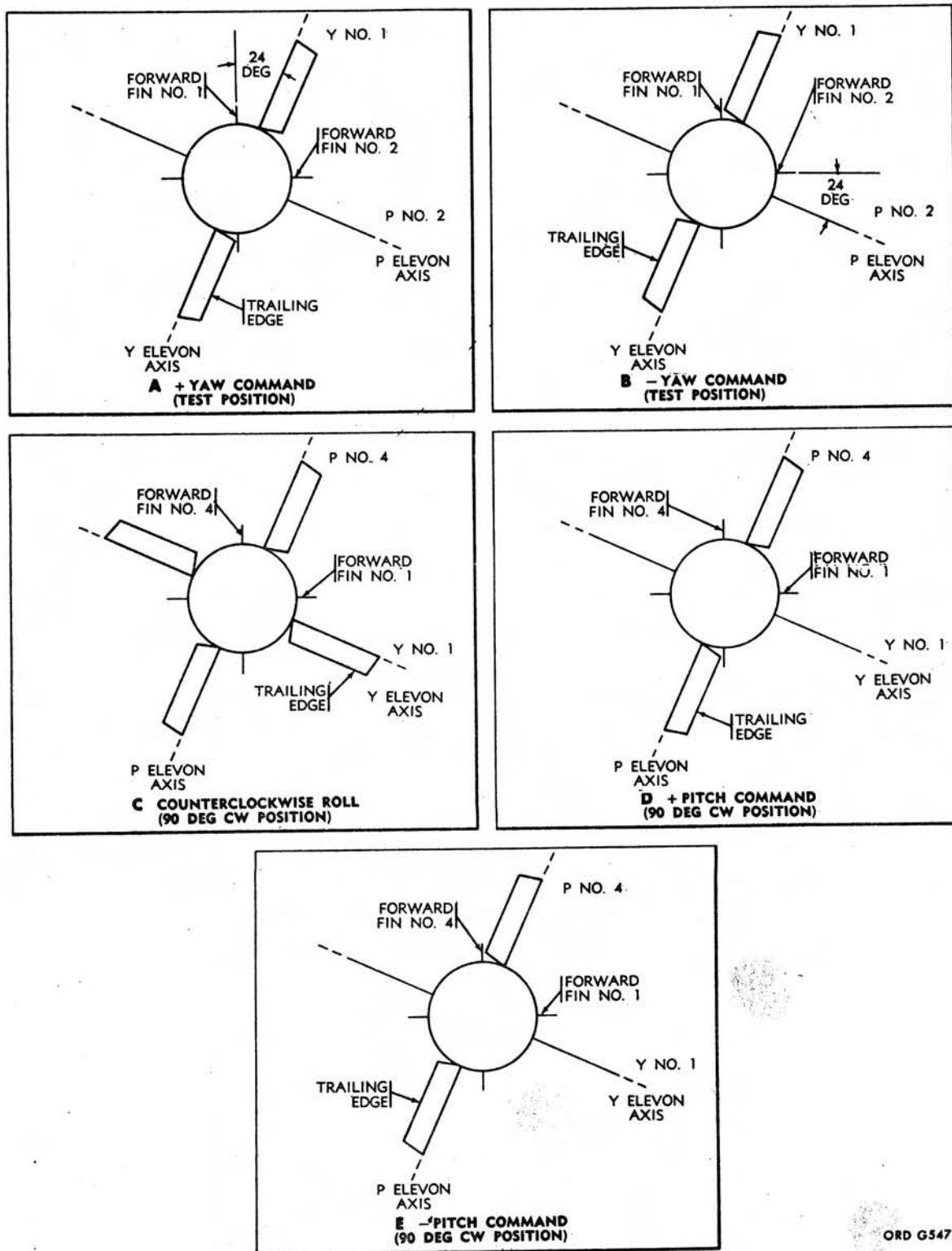
**WARNING:** While performing *h* through *i* below, insure that there are no personnel in direct line with the rear cover of the transponder control group (missile 13001 and subsequent).

h. Turn the valve on the air leakage test set counterclockwise until the gage indicates 16 to 20 psi; turn the valve fully clockwise.

i. After 3 minutes, check the pressure indication on the gage. The pressure loss is 1 psi

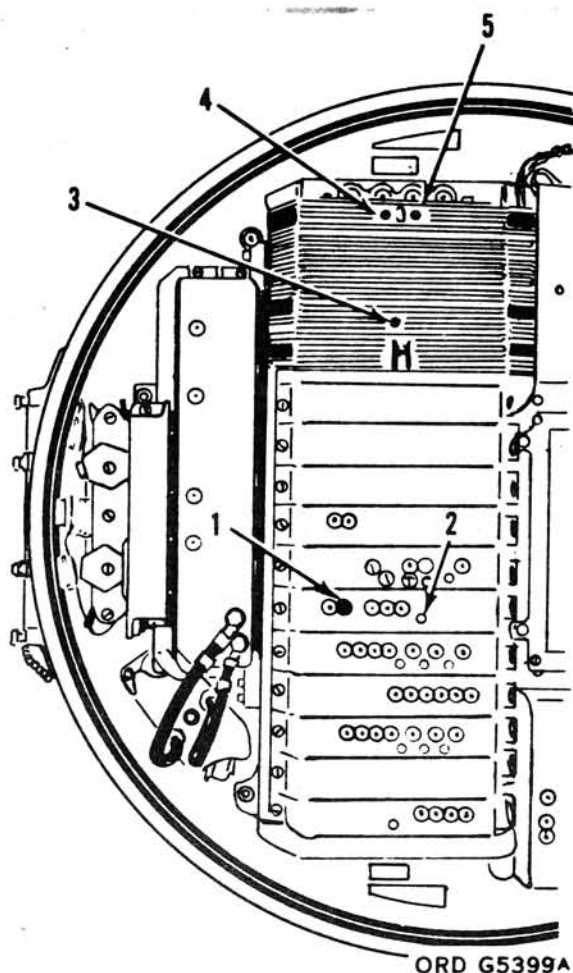
or less. If the pressure loss is in excess of 1 psi, check for proper installation of the screw-type access plugs (fig. 4-1) (missiles 10206 through 11935) or the access cover plate and

rear housing cover (5 and 10, fig. 12-2) (missiles 13001 and subsequent) on the transponder control group, and repeat *h* above and *i*.



ORD G5479

Figure 4-29. Test commands and resulting elevon displacements.



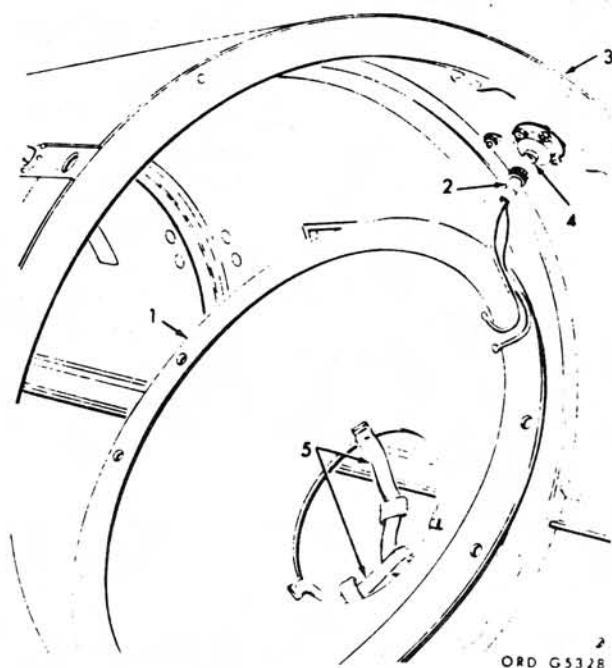
- 1—Pulse delay oscillator
- 2—Delay time variable resistor R13
- 3—CS BAL ADJ
- 4—B + VOLTS ADJ
- 5—FIL VOLTS ADJ

Figure 4-30. Power supply and pulse delay oscillator adjustment.

j. Turn the valve to OFF at the compressed air or nitrogen source, and disconnect the hose from the INLET connector and from the source.

k. Disconnect the hose assembly from the OUTLET connector on the air leakage test set, and allow the transponder control group pressure to deplete through the hose. When the pressure is depleted, disconnect the hose from the transponder control group.

l. If MWO ORD Y77-W45 and MWO ORD Y77-W46 have been applied (mushroom only) depress the air-release pushbutton on the rear housing cover plate to insure that air pressure is depleted (missile 13001 and subsequent).



- 1—Missile motor head heater
- 2—Connector P171
- 3—Rear body section
- 4—Connector J171
- 5—Tape

Figure 4-31. Disconnection, and connection of the motor head heater.

m. Remove the shipping support channel (missiles 13001 and subsequent).

n. Swing the forward body section to the left until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

o. Install the hexagon-head bolt and flat washer to secure the left side of the forward body section to the testing fixture.

#### 4-16. Removal of the Test Equipment

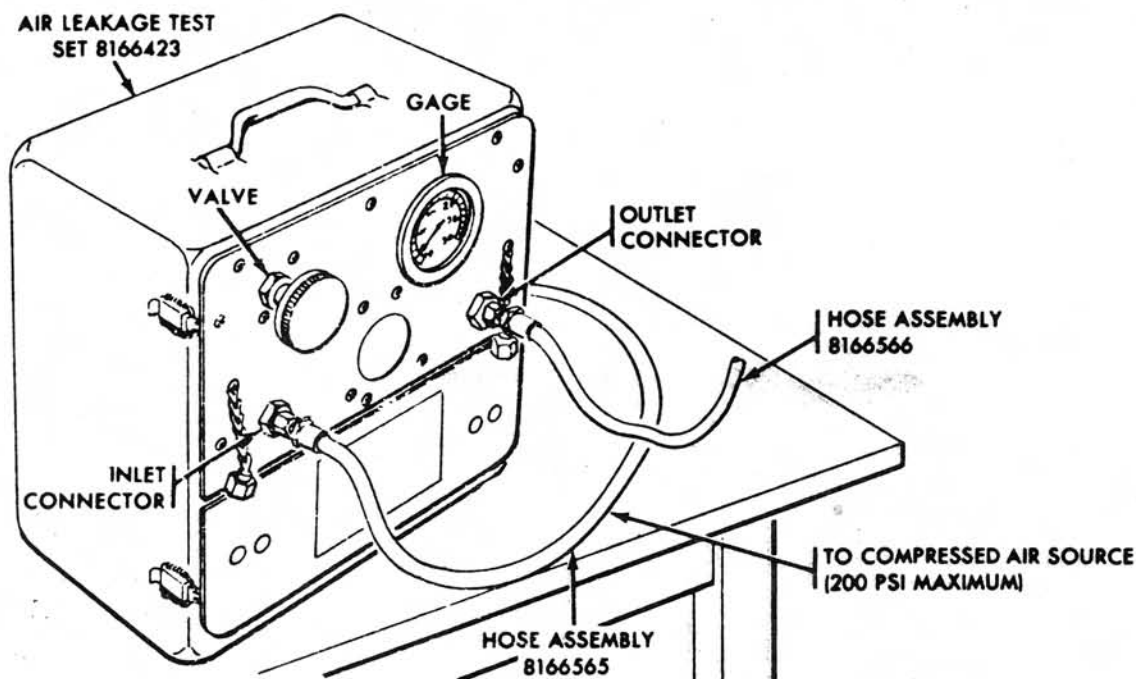
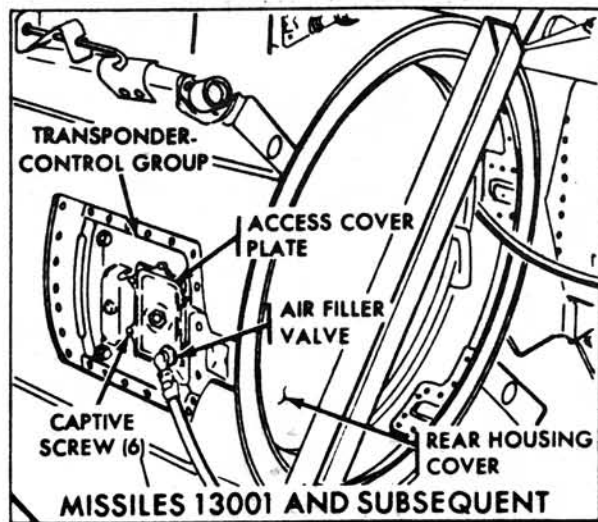
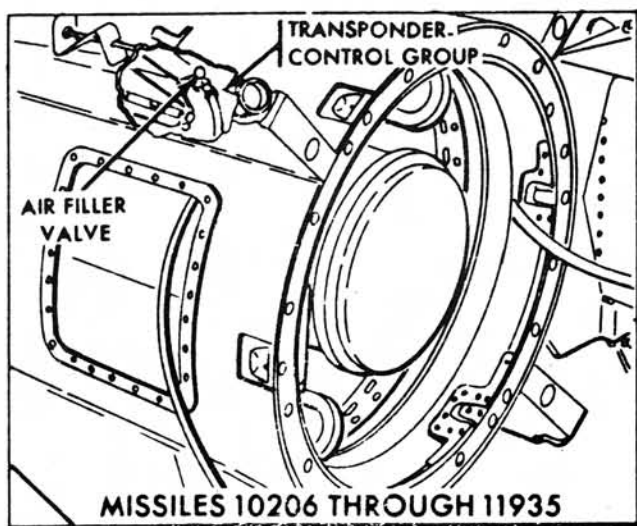
*Note.* Perform the procedure in a through d below only for missiles equipped with an HPU.

a. Remove all cables and test equipment except the testing fixture.

b. Install the three stud assemblies (fig. 4-22) in the forward body section.

c. Install the motor section, actuator section, and equipment section access doors.

d. Install a closure (6, fig. 3-31) on each ram-pressure probe.



ORD G5400

Figure 4-32. Air leakage test of the transponder control group.

#### Section IV. FUEL SERVICING AND OPERATIONAL TEST (HOT-RUN) OF THE ACCESSORY POWER SUPPLY (APS)

##### 4-17. General

The missile must not be stored for a period longer than 12 months with ethylene oxide ( $ET_hO$ ) in the tank. When recapping the APS fuel tank (refueling after a hot-run), it is not necessary to drain the APS fuel tank.

**WARNING:** The fuel servicing procedure must be performed outside the assembly

building, but not necessarily in a revetted area.

##### 4-18. Servicing and Test Equipment

The servicing and test equipment necessary for the fuel fill and operational test (hot-run) of the APS is listed below:

- The  $ET_hO$  fuel tank and fuel tank cart complete with the drain valve, drain



**hose, fuel transfer hose with a static ground lead attached, and fuel fill hose with a static ground lead attached.**

**b. The nitrogen tank, nitrogen tank cart, and regulator valve with the nitrogen supply**

**ply hose.**

**c. One 2-1/2-gallon (minimum) container at least half filled with water.**

**d. The missile electrical test set group.**

**e. An APS exhaust assembly.**

*Table 4-13. Fuel Servicing and Operational Test (HOT RUN) of the Accessory Power Supply (APS)*

Step	Operation	Normal indication	Corrective procedure
1	<p>Perform the APS fuel fill.</p> <p><b>WARNING:</b> ET<sub>h</sub>O liquid and vapor cause severe burns if allowed to become confined between the skin and clothing. Exercise care to keep the ET<sub>h</sub>O from dropping on or into the shoes or clothing. Should the ET<sub>h</sub>O become confined between the skin and clothing, remove the clothing, and immediately wash the skin with soap and water, and allow the clothing to air dry for several hours. Dispose of contaminated shoes. Should ET<sub>h</sub>O get into the eyes, flush the eyes with water, and report to the proper authorities.</p> <p><b>WARNING:</b> The maximum allowable concentration of ET<sub>h</sub>O vapor is 50 parts of ET<sub>h</sub>O per million parts of air, for an 8-hour exposure. Where high vapor concentrations exist, and when working is confined to un-ventilated areas, an approved type self-contained breathing apparatus must be worn.</p> <p><b>WARNING:</b> Clear the testing area of all nonparticipating personnel and flammable materials. Position two manned CO<sub>2</sub> fire extinguishers within 4 feet of the APS, and prohibit smoking within 60 feet. Operating personnel must wear goggles or a face mask, rubber gloves, and a rubber apron.</p> <p><b>WARNING:</b> Small quantities of unserviceable ET<sub>h</sub>O should be disposed of by burning in accordance with applicable instructions or by diluting with a minimum of 22 parts of water to each part of ET<sub>h</sub>O and dumping into a sanitary sewer or into a fast moving stream of water.</p> <p><b>WARNING:</b> During the fuel servicing and operational test (hot-run) procedures, the missile body must be grounded.</p> <p>a. Perform the arm safety check (par. 4-6).</p> <p>b. Vent the fuel reservoir as prescribed below.</p> <p>(1) Place the end of the fuel drain hose (fig. 11-2) into a 2-1/2-gallon (minimum) container at least half-filled with water. Do not submerge the end of the hose.</p> <p>(2) Depress and hold TRANSFER valve for 25 seconds.</p> <p>(3) Connect the static ground lead, attached to the end of the fuel transfer hose, to the APS service panel wherever a satisfactory ground connection can be made.</p> <p>(4) Connect the fuel transfer hose to FUEL FILL fitting on the APS service panel.</p> <p>(5) Turn the drain valve on the fuel tank cart counterclockwise.</p> <p>(6) Set the external drive motor switch (fig. 4-9) to ON. When ACC. AIR PRESS. gage (fig. 4-7) indicates 2,500 to 3,000 psi, set the external drive motor switch to OFF.</p> <p>(7) Remove the fuel transfer hose (fig. 4-33) from FUEL FILL fitting on the APS service panel.</p> <p>c. Connect the nitrogen supply hose (fig. 4-33) to the supply valve on the ET<sub>h</sub>O fuel tank.</p> <p>d. Turn the tank valve on the nitrogen tank fully counterclockwise. Turn the regulator valve on the nitrogen tank clockwise until the regulator pressure gage indicates 200 psi.</p> <p><b>WARNING:</b> Direct the bleeder valve away from operating personnel.</p> <p>e. Open the supply valve on the ET<sub>h</sub>O tank. Open the bleeder valve on the fuel transfer hose until the air is exhausted, and clear ET<sub>h</sub>O flows from the bleeder valve. Immediately close the bleeder valve.</p> <p>f. Close the supply valve on the ET<sub>h</sub>O fuel tank.</p> <p>g. Set AC POWER switch on the TPCU to ON. POWER ON indicator light illuminates.</p> <p>h. Set HEATERS EXTERNAL switch to ON. HEATER EXTERNAL indicator light illuminates.</p> <p>i. Operate AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 1 second and a maximum of 2 seconds.</p> <p>j. Set HEATERS EXTERNAL switch to OFF. HEATERS EXTERNAL indicator light extinguishes.</p> <p>k. Set AC POWER switch on the TPCU to OFF.</p>		

Table 4-13. Fuel servicing and Operational Test (HOT RUN) of the Accessory Power Supply (APS)—Continued

Step	Operation	Normal indication	Corrective procedure
1		POWER ON indicator light extinguishes.	
Cont			
	l. Depress TRANSFER valve on the APS service panel, and hold until ACC. AIR PRESS gage needle ceases to move, then release TRANSFER VALVE.		
	m. Connect the static ground lead (fig. 4-33), attached to the end of the fuel transfer hose, to the APS service panel wherever a satisfactory ground connection can be made.		
	n. Connect the fuel transfer hose to FUEL FILL fitting by pushing the quick-disconnect fitting securely in place.		
	o. Turn the supply valve on the ET <sub>h</sub> O fuel tank fully counterclockwise.		
	p. Depress and hold TRANSFER valve on the APS service panel. FUEL LEVEL indicator moves to FULL area.		
	q. When the ET <sub>h</sub> O stops flowing through the fuel transfer hose, after one minute, release TRANSFER valve.		
	Note. If the fueling operations cannot be performed at 200 psi, the pressure may be adjusted to 240 psi.		
	r. Turn the supply valve on the ET <sub>h</sub> O fuel tank fully clockwise.		
	s. Turn the regulator valve on the nitrogen tank fully counterclockwise.		
	t. Turn the tank valve on the nitrogen tank fully clockwise.		
	u. Disconnect the fuel transfer hose from FUEL FILL fitting on the APS service panel. Disconnect the static ground lead from the APS service panel, and place the fuel transfer hose on the fuel tank cart.		
	v. Disconnect the nitrogen supply hose from the supply valve on the ET <sub>h</sub> O fuel tank.		
	w. Set AC POWER switch on the TPCU to ON. POWER ON indicator light illuminates.		
	x. Set HEATERS EXTERNAL switch to ON. HEATERS EXTERNAL indicator light illuminates.		
	y. Operate AUXILIARY POWER SUPPLY switch to STOP, and hold for approximately 1 second and a maximum of 2 seconds.		
	z. Set HEATERS EXTERNAL switch to OFF. HEATERS EXTERNAL indicator light extinguishes.		
	aa. Set AC POWER switch on the TPCU to OFF. POWER ON indicator light extinguishes.		
	ab. Set the external drive motor switch to ON. When ACC. AIR PRESS. gage reaches maximum pressure between 2,500 and 3,000 psi, set the external drive motor switch to OFF. If ACC. AIR PRES. gage indication exceeds 3,000 psi, perform the procedures prescribed in table 4-2, step 87(1) through (11) or table 4-3, step 64(1) through (11).		
	ac. Observe that FUEL LEVEL indicator (fig. 4-33) remains within FULL area. If FUEL LEVEL indicator has moved into the REFILL area, repeat the APS fuel-fill procedures as prescribed in d through ab above and ac; use 240 psi while performing d above. If, after performing the fueling operations using 240 psi, FUEL LEVEL indicator does not remain in full area, defuel the APS (chapter 11, section X), and repeat the APS fuel fill procedure.		
	ad. Observe HYD. RES. LEVEL indicator (fig. 4-33). If the indicator indicates the ambient temperature $\pm 25^{\circ}\text{F}$ , the system is balanced correctly.		

**Table 4-13. Fuel Servicing and Operating Test (HOT RUN) of the Accessory Power Supply (APS)—Continued**

Step	Operation	Normal indication	Corrective procedure
1 Cont			<p>If the indication is more than 25°F above the ambient temperature, install the oil drain line and open the OIL BLEED valve until the HYD. RES. LEVEL indicator indicates ambient temperature. Close the OIL BLEED VALVE. If the indication is more than 25°F below the ambient temperature, perform the steps below:</p> <ol style="list-style-type: none"> <li>(1) Perform the arm safety check (par. 4-6).</li> <li>(2) Set the AC POWER switch on the TPCU to ON.</li> <li>(3) Set the POWER switch on the TCU to ON.</li> <li>(4) Set the POWER switch on the cooling unit to ON.</li> <li>(5) Set the HEATERS EXTERNAL switch to ON.</li> <li>(6) After approximately 30 seconds, operate AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 1 second and a maximum of 2 seconds.</li> <li>(7) Depress and hold the TRANSFER valve until ACC. AIR PRESS. gage indicates the ambient temperature.</li> <li>(8) Operate AUXILIARY POWER SUPPLY switch to STOP, and hold for a minimum of 1 second and a maximum of 2 seconds.</li> <li>(9) Set the HEATERS EXTERNAL switch to OFF.</li> <li>(10) Set the POWER switch on the cooling unit to OFF.</li> </ol>

**Table 4-13. Fuel Servicing and Operational Test (HOT RUN) of the  
Accessory Power Supply (APS)—Continued**

Step	Operation	Normal indication	Corrective procedure
1 Cont			<p>(11) Set the AC POWER switch on the TPCU to OFF.</p> <p>(12) Perform the procedures prescribed in table 4-2, steps 21, 22, 79 through 82 or table 4-3, steps 20 through 26. Slowly open the OIL BLEED VALVE until the HYD. RES. LEVEL indicates full and the flow of oil is free of air bubbles.</p> <p>(13) Turn the BY-PASS valve on the portable oil fill and filter unit or the hydraulic test stand fully counterclockwise.</p> <p>(14) Set or depress the STOP switch on the hydraulic test stand.</p> <p>(15) Disconnect the hydraulic oil supply hose (C, fig. 4-11) from the OIL FILL fitting.</p> <p>(16) Perform procedures as prescribed in steps (2) through (5) above and paragraphs <i>y</i> through <i>aa</i> above.</p> <p>(17) Slowly open the OIL BLEED valve until the HYD. RES. LEVEL indicator indicates the ambient temperature. Close the OIL BLEED valve.</p> <p>(18) Remove the drain hose from the overboard dump tube.</p>
2	<p><i>ae.</i> Remove the external drive motor (1, fig. 4-8), and install the turbine shaft cap (6) and gasket (5). Tighten to a torque value of 60 pound-inches.</p> <p>Perform the operational test (HOT RUN) of the APS.</p> <p><b>WARNING:</b> Restrict the APS operational test (hot-run) to the authorized test area. Place two manned CO<sub>2</sub> fire extinguishers within 4 feet of the APS. Prohibit smoking within 60 feet of the test area.</p> <p><i>Note.</i> Check that the right equipment section access cover plate (2, fig. 3-21) has been removed before performing the hot-run.</p>		

**Table 4-13. Fuel Servicing and Operational Test (HOT RUN) of the Accessory Power Supply (APS)—Continued**

Step	Operation	Normal indication	Corrective procedure
2 -Cont	a. Check that the HYD. RES. LEVEL indicator indicates the ambient temperatures $\pm 25^{\circ}\text{F}$ .		
	b. Check that the ACC. AIR PRESS. gage indicates not less than 2,500 psi.		If the indication is less than 2,500 psi, install the external drive motor (table 4-2 steps 1 through 10), and pressurize the system (table 4-2, step 87).
	c. Position the exhaust pipe (1, fig. 4-34) over the APS turbine exhaust port, and secure the pipe to the equipment section with the four captive thumbscrews.		
	d. Energize the exhaust blower.		
	e. Pull out the arm SAFETY SWITCH to the maintenance (fully out) position (A, step 3, fig. 4-6).		
	f. Set the AC POWER switch on the TPCU to ON.		
		The POWER ON indicator light illuminates.	
	g. Set the POWER switch on TCU to ON.		
		The POWER LIGHT illuminates.	
	h. Set the HEATERS EXTERNAL switch to ON.		
		The HEATERS EXTERNAL indicator light illuminates.	
	i. Set the GLOW COIL switch to ON.		
	j. Depress the A.P.S. ACCEL. indicator light.		
		The A.P.S. ACCEL. indicator light illuminates.	
<p>Note. Step j above is a test only of the A.P.S. ACCEL. indicator light.</p> <p>Note. Observe the ACC. AIR PRESS. gage to assure that the pressure does not drop below 2,500 psi during the hot-run.</p> <p><b>WARNING:</b> If the APS does not cycle audibly after performing step k below, operate the AUXILIARY POWER SUPPLY switch to STOP, and hold for a minimum of 2 seconds and a maximum of 5 seconds. If the APS does not stop immediately, set the AC POWER switch on the TPCU to OFF, and immediately evacuate the area. Wait until the fuel is exhausted and the APS has stopped before reentering the area.</p> <p>Note. While performing k and l below, the AUXILIARY POWER SUPPLY switch must be held in START and STOP positions as noted instead of the normal minimum of 1 second and maximum of 2 seconds. This is necessary to insure that the relays in the APS control assembly are properly sequenced so that the APS will start and stop properly.</p> <p>k. Forty-five seconds after the GLOW COIL SWITCH is set to ON, operate the AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 2 seconds and a maximum of 5 seconds.</p> <p>The A.P.S. ACCEL. indicator light illuminates, and the APS cycles audibly.</p> <p>l. Set the GLOW COIL switch to OFF.</p> <p>Note. In m below, any motion of the ACC. AIR PRESS. gage is acceptable.</p> <p>m. Set the PLATE POWER EXTERNAL switch to ON.</p> <p>The PLATE POWER EXTERNAL indicator light illuminates, and the ACC. AIR PRESS gage and the unloader valve cycle.</p>			

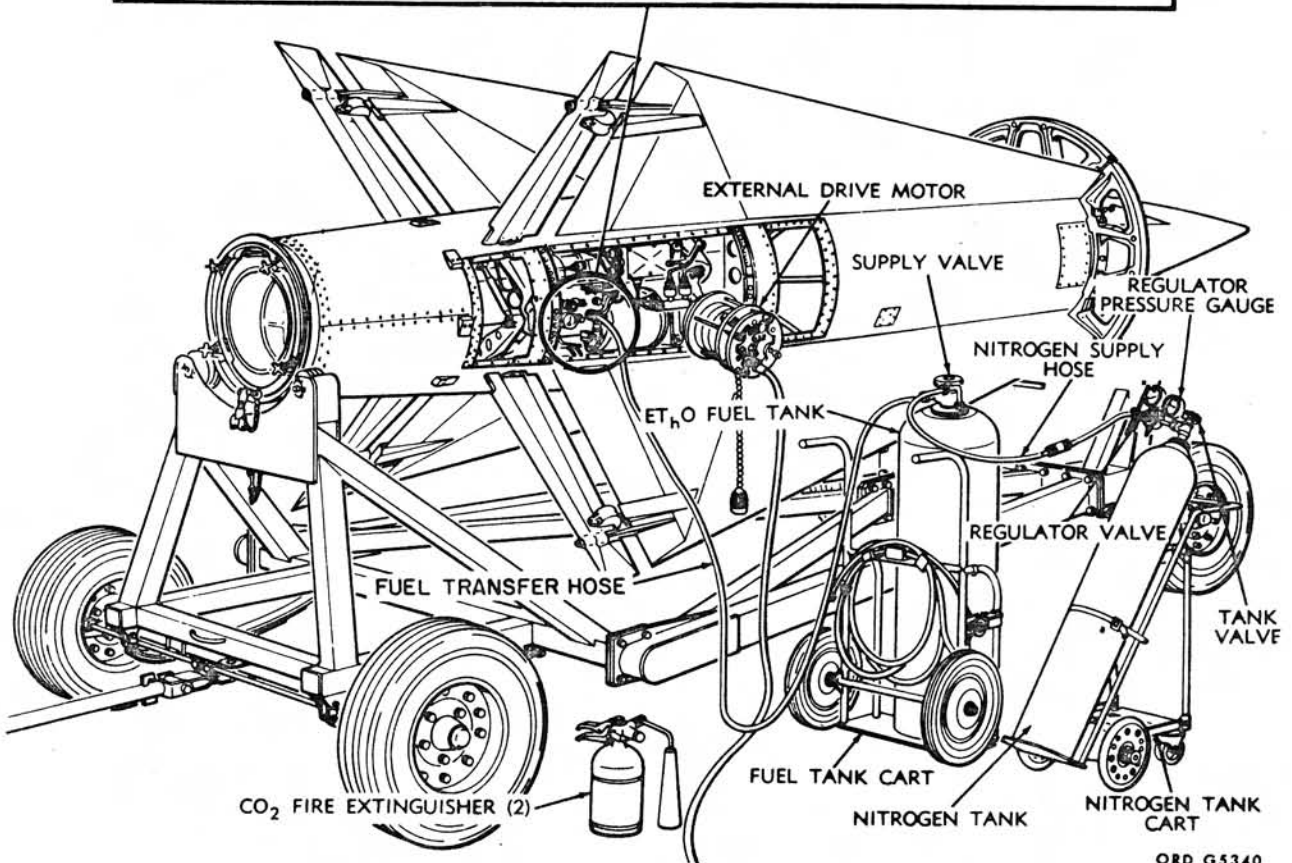
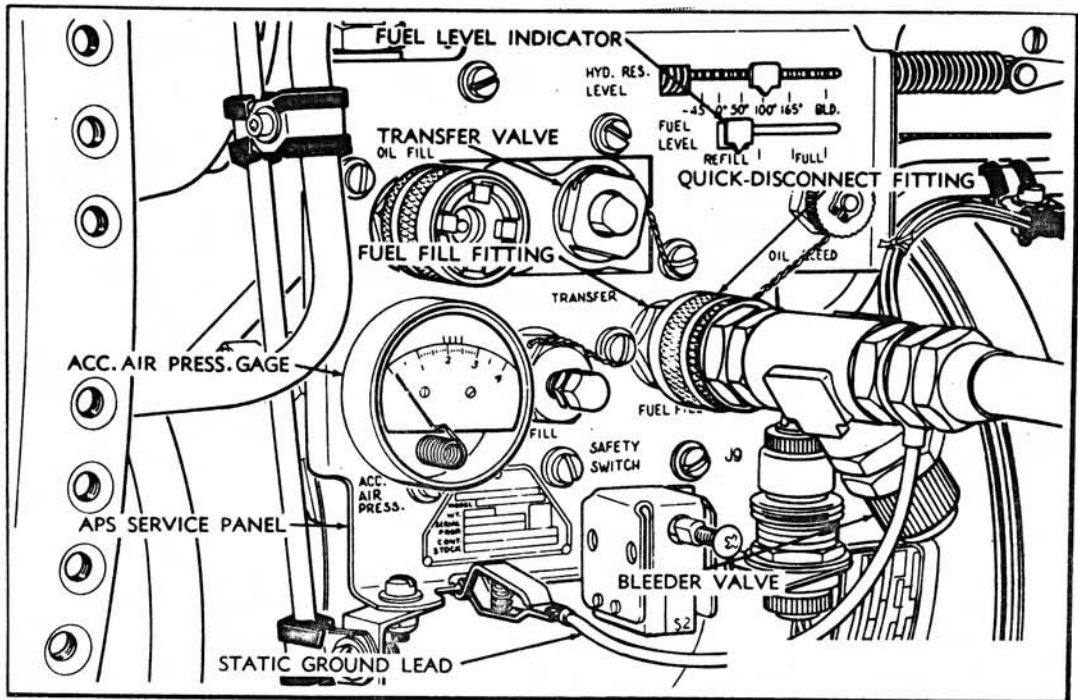
**Table 4-13. Fuel Servicing and Operational Test (HOT RUN) of the Accessory  
Power Supply (APS)—Continued**

<i>Step</i>	<i>Operation</i>	<i>Normal indication</i>	<i>Corrective procedure</i>
2.	n. Set the TEST SELECTOR NO. 1 switch to TRANS NO. 2.		
Cont	o. Depress the YAW pushbutton, and alternately rotate the TEST SELECTOR NO. 2 switch between +G and -G.		
		The Y elevons will deflect to the left on +G and to the right on -G.	
	p. Depress the PITCH pushbutton, and alternately rotate the TEST SELECTOR NO. 2 switch +G and -G.		
		The P elevons will deflect to the right on +G and to the left on -G.	



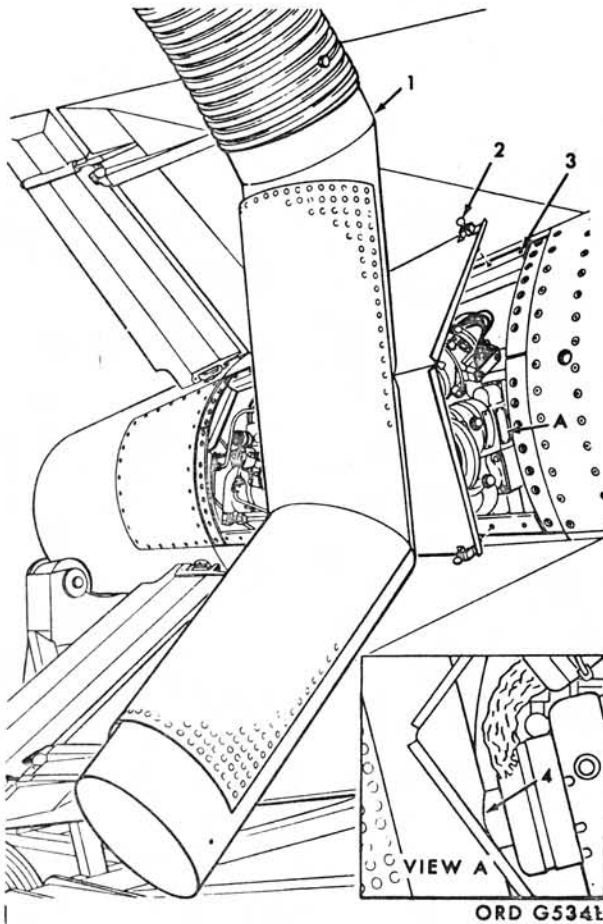
Table 4-13. Fuel Servicing and Operational Test (HOT RUN) of the Accessory Power Supply (APS)—Continued

Step	Operation	Normal indication	Corrective procedure
2 (Cont)	<p>q. Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1, the TEST SELECTOR NO. 1 switch to GYRO PRESET, and the PRESET—FLIGHT switch to FLIGHT.</p> <p>r. Depress the ROLL pushbutton, and set the ROLL POSITION switch to NORMAL.</p> <p>s. Operate the GYRO PRESET switch to CW or CCW. All elevons will deflect accordingly.</p> <p>t. Depress the RESET pushbutton. The A.P.S. ACCEL. indicator light extinguishes.</p> <p>u. Set the PLATE POWER EXTERNAL switch to OFF. The PLATE POWER EXTERNAL indicator light extinguishes.</p> <p><b>Warning:</b> If the APS does not stop immediately after performing step v below, set the AC POWER switch on the TPCU to OFF, and immediately evacuate the area. Wait until the fuel is exhausted and the APS has stopped before reentering the area.</p> <p>v. After a minimum of 5 seconds, operate the AUXILIARY POWER SUPPLY switch to STOP, and hold for a minimum of 2 seconds and a maximum of 5 seconds. The APS stops.</p> <p>w. Set the HEATERS EXTERNAL switch to OFF. The HEATERS EXTERNAL indicator light extinguishes.</p> <p>x. Set the POWER ON switch on the TCU to OFF. The POWER LIGHT extinguishes.</p> <p>y. Set the AC POWER switch on the TPCU to OFF. The POWER ON indicator light extinguishes.</p> <p>z. Move the arm SAFETY SWITCH to the center (safe) position (A, step 2, fig. 4-6).</p> <p>aa. Deenergize the exhaust blower.</p> <p>ab. Loosen the four captive thumbscrews, and remove the exhaust pipe.</p> <p>ac. After 30 minutes, visually inspect the APS for fuel and oil leaks.</p> <p>ad. Perform the glow plug continuity check (para. 4-7).</p> <p><b>Caution:</b> Do not cover the exhaust port with tape.</p> <p>ae. Install the plug in the APS turbine exhaust port, or cover the exhaust port with paper, and tape it in place.</p> <p>af. Fuel fill the APS (step 1 above).</p> <p>ag. Remove all cables and test equipment except the testing fixture.</p> <p><b>Warning:</b> Before installing the right equipment section access cover plate, make certain the APS exhaust seal is installed under the retaining clips on the cover plate with the exhaust seal flange pointing outward. The exhaust seal must be installed to prevent an explosion hazard caused by the return of turbine exhaust fumes into the rear body section.</p> <p>ah. Install the missile motor section, actuator section, and equipment section access doors. Tighten the screws in the equipment section access door on the right side to the values specified in table 15-9.</p> <p>ai. Install the three stud assemblies (fig. 4-22) in the forward body section.</p> <p>aj. (Deleted)</p> <p>ak. Install a closure (6, fig. 3-31) on each ram-pressure probe.</p>		



ORD G5340

Figure 4-33. APS fuel fill.



- 1—Exhaust pipe
- 2—Captive thumbscrew (4)
- 3—Equipment section
- 4—APS turbine exhaust port

Figure 4-34. Removal and installation of the exhaust pipe.

#### 4-19. Adjustment of the Arm SAFETY SWITCH

a. Open the APS SERVICE DOOR (fig. 4-35).

**Warning:** When the APS SERVICE DOOR is closed, the APS is in the ready condition. When open or unlatched, the APS is in a safe condition. The APS SERVICE DOOR must be open before the missile is installed on the launcher but closed prior to firing.

b. Place a straight edge horizontally on the

outer surface of the skin, in line with the arm SAFETY SWITCH. Depress the arm SAFETY SWITCH to the armed position (A, step 1, fig. 4-6). There should be a clearance of approximately  $\frac{3}{16}$  inch between the inside edge of the straight edge and the adjustment screw of the arm SAFETY SWITCH. If the clearance is not correct, adjust by holding the shaft of the arm SAFETY SWITCH and turning the adjustment screw until a clearance of approximately  $\frac{3}{16}$  inch is obtained.

c. Close the APS SERVICE DOOR, and listen for the audible click that indicates the arm SAFETY SWITCH has depressed to the armed position (A, step 1, fig. 4-6). Readjust the switch as required to obtain an audible click when the APS SERVICE DOOR is closed.

d. Open the APS SERVICE DOOR.

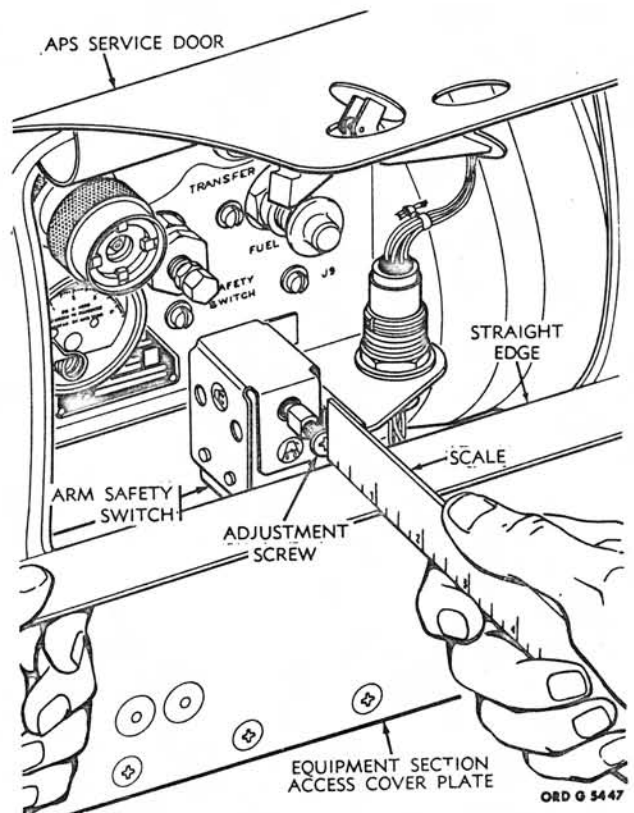


Figure 4-35. Adjustment of the arm SAFETY SWITCH.

	Paragraphs	Pages
Removal	12-14e(1)	12-19
Plug-in components	12-14a	12-18
Installation	12-14b(2)	12-18
Removal	12-14a(1)	12-18
Radio receiver	12-14f	12-19
Installation	12-14f(2)	12-19
Removal	12-14f(1)	12-19
Radio set power supply	12-14d	12-18
Installation	12-14d(2)	12-18
Removal	12-14d(1)	12-18
Radio transmitter	12-14b	12-18
Installation	12-14b(2)	12-18
Removal	12-14b(1)	12-18
Transistor oscillator inverter	12-14c	12-18
Installation	12-14c(2)	12-18
Removal	12-14c(1)	12-18
Sequential timer	12-9	12-11
Installation	12-9b	12-11
Rearming the missile	12-9c	12-11
Removal	12-9a	12-11
Transponder control group	12-13	12-14
Installation	12-13b	12-16
Removal	12-13a	12-14
Waveguide assembly	12-18	12-23
Installation	12-18b	12-23
Removal	12-18a	12-23
Waveguide assembly 9007632	12-20	12-25
Installation	12-20b	12-25
Removal	12-20a	12-25
Waveguide assemblies 9009051 and 9009558	12-19	12-24
Installation	12-19b	12-24
Removal	12-19a	12-24
Missile guidance set (STOVEPIPE):		
Adjustment of the missile response time	12-46	12-45
Handling, cleaning, and inspection	12-23	12-25
Installation and removal of the nose hinge assembly	12-22	12-25
Installation	12-22a	12-25
Removal	12-22b	12-25
Replacement of the:		
Amplifier-decoder	12-37	12-40
Installation	12-37b	12-40
Removal	12-37a	12-40
Antenna horn	12-24	12-25
Installation	12-24b	12-25
Removal	12-24a	12-25
Delay line driver-detector	12-36	12-39
Installation	12-36b	12-40
Removal	12-36a	12-39
Fail-safe control	12-25	12-25
Installation	12-25b	12-25
Rearming the missile	12-25c	12-25
Removal	12-25a	12-25
Gyro servo control	12-32	12-34
Installation	12-32b	12-36
Removal	12-32a	12-34
Magnetron electron tube	12-38	12-41
Installation	12-38b	12-41
Removal	12-38a	12-41
Missile-code delay line	12-29	12-28

## CHAPTER 5

UNCRATING AND INSTALLING THE MISSILE ROCKET  
MOTOR ASSEMBLY

## Section I. PRELIMINARY PROCEDURES

## 5-1. Removal of the Forward Body Section

a. Rotate the forward body section to the normal flight position.

b. Remove the hexagon-head bolt (11, fig. 3-29) and flat washer (10) that secure the left side of the forward body section (8) to the testing fixture (5).

**Warning:** Insure that the self-locking pins (view A, fig. 9-1) are inserted through the handling ring segment prior to performing c below.

c. Swing the forward body section to the right until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

d. Disconnect fail-safe wiring harness connector P502 (8, fig. 3-30 or 2, fig. 3-31).

e. Disconnect fail-safe wiring harness connector P511 (5, fig. 3-30 or 4, fig. 3-31) from sequential timer.

f. Disconnect transponder control group wiring harness connector P503 (2, fig. 3-30 or 11, fig. 3-31) from fail-safe control wiring harness connector J503 (3, fig. 3-30 or 10, fig. 3-31).

g. Remove the shoulder bolt (18, fig. 3-31), and disconnect transponder control group wiring harness connector P1 (13, fig. 3-30 or 19, fig. 3-31) from transponder control group connector J1 (15, fig. 3-30 or 16, fig. 3-31). Install the protective cover on J1.

h. Remove the transponder control group wiring harness (24, fig. 3-30 or 13, fig. 3-31) from the forward body section.

i. Remove the transponder control group wiring harness from the hole in the testing fixture (12, fig. 3-31). Insert the harness through the opening in the handling ring segment (7) above the upper fin, and place it on top of the missile.

j. Swing the forward body section (14) to the left until the hinge lock pin (12, fig. 3-29) snaps into the locked position.

k. Position a hoisting device capable of lifting 6,000 pounds for removal of the forward body section from the testing fixture.

**Caution:** Insure that the forward body section hoist is secure.

l. Attach the falling hook (6) from the hoisting device to the forward body section hoist (7), and take up the slack in the hoist cable.

m. Loosen the captive bolts (2) that secure the forward body section to the hinge assembly.

n. Remove the forward body section from the hinge assembly, and place on the forward body section truck (10, fig. 3-8); secure with the hand clamp (8) and hold-down strap (1).

o. Install the flathead screws (9, fig. 3-29) in the testing fixture mounting holes in the forward body section.

p. Remove the falling hook from the forward body section hoist.

q. Move the truck and the forward body section (2, fig. 3-8) to a temporary storage area.

## 5-2. Removal of the Testing Fixture

a. (Deleted.)

b. Loosen the captive bolts (8, fig. 3-28) that secure the testing fixture to the rear body section (1). Remove the fixture.

c. Remove the motor head heater (1, fig. 4-31).

d. Secure all the wiring harnesses extending from the rear main fins to prevent damage to the wiring harnesses.



### 5-3. Removal of the Rear Roll Ring

a. Remove the two plugs (1 and 5, fig. 3-11) from the lift points on the rear body section.

**Warning:** Check that the threads of the captive bolts of the rear body section hoist beam (4) and the bolt holes in the rear body section are in serviceable condition.

a.1. Rotate the rear body section to the normal flight position.

b. Position the rear body section hoist beam on top of the rear body section; secure with the two captive bolts (3).

c. Attach the hoisting device to the rear body section hoist beam (5, fig. 3-13), and raise the rear body section (3) enough to lift the rear roll ring (2) from the missile body truck (8).

d. Loosen the captive bolts (6, fig. 3-12), and remove the rear roll ring.

e. Lower the rear body section onto the missile body truck; remove the hoisting device from the hoist beam.

f. Remove the hoist beam.

g. Coat the threads of the plugs (1 and 5, fig. 3-11) liberally with soft film corrosion preventive compound, and install the two plugs in the rear body section.

### 5-4. Removal of the Access Doors and Door Assemblies

a. Remove the flathead screws (fig. 3-20) from each of the two missile motor section access doors; remove the access doors, if not previously removed.

b. Remove the flathead screws (fig. 3-22) from each of the two actuator section door assemblies; remove the door assemblies if not previously removed.

**Caution:** A thermostat wiring harness is attached to each of the two motor heater thermostat access cover plates. Carefully remove the thermostat access cover plate to prevent damage to the thermostat wiring harness or terminals.

c. Remove the two motor heater thermostat access cover plates (fig. 5-1) as prescribed in steps (1) through (3) below.

(1) Remove the six flathead screws (2) from the cover plate.

(2) Carefully remove the cover plate (3) and allow it to hang loosely from the thermostat wiring harness (4).

(3) Repeat steps (1) and (2) above, and remove the cover plate from the opposite side of the rear body section (1).

### 5-5. Removal of Wiring Harness

a. Release the two shipping straps (1, fig. 5-2) that secure the rocket motor initiator wiring harness (2) in position.

b. Disconnect connector P177A (7) from connector J177 (8).

c. Disconnect connector P170 (6) from connector J170 (9).

d. Remove the hexagon nut (3), lock-washer, if present, trusshead screw (10), and clamp (5) from the bracket (4), and remove the rocket motor initiator wiring harness.

### 5-6. Removal of the Blast Tube Shipping Support

a. Reach through the access door opening on the left rear end of the missile motor section, and loosen the nut (7, fig. 5-3) on the captive bolt (6). Move the V-band coupling (9) from the blast tube shipping support (1) onto the blast tube (8).

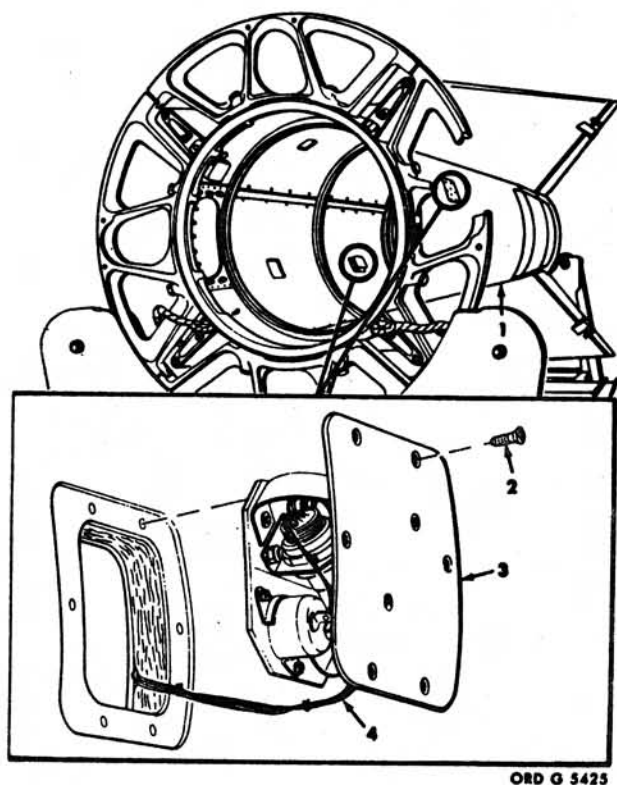
b. Remove the hexagon-head bolts (13), flat washers (12), and hexagon nuts (11) that secure the blast tube shipping support to the missile rocket motor mounting ring (10).

c. Manipulate the blast tube shipping support out of the access door opening.

d. Remove the V-band coupling from the blast tube, and secure in position on the blast tube shipping support.

**Note.** Place the blast tube shipping support, attaching hardware, and V-band coupling in the forward and rear body section shipping container, and secure in place.





ORD G 5425

- 1 — Rear body section
- 2 — No. 10-32 X  $1\frac{1}{32}$  fl-hd screw (6).
- 3 — Motor heater thermostat access cover plate (2)
- 4 — Thermostat wiring harness

Figure 5-1. Removal and installation of the heater thermostat access cover plates.

e. Inspect the liner of the blast tube for defects, pits, and scratches. Refer to paragraph 12-2 for standards of acceptability.

f. Reach through the opening at the rear end of the rear body section, and loosen the locknut (2) on the upper blast tube support assembly (3); turn the blast tube adjusting knob (4) to loosen the blast tube support shoe (5).

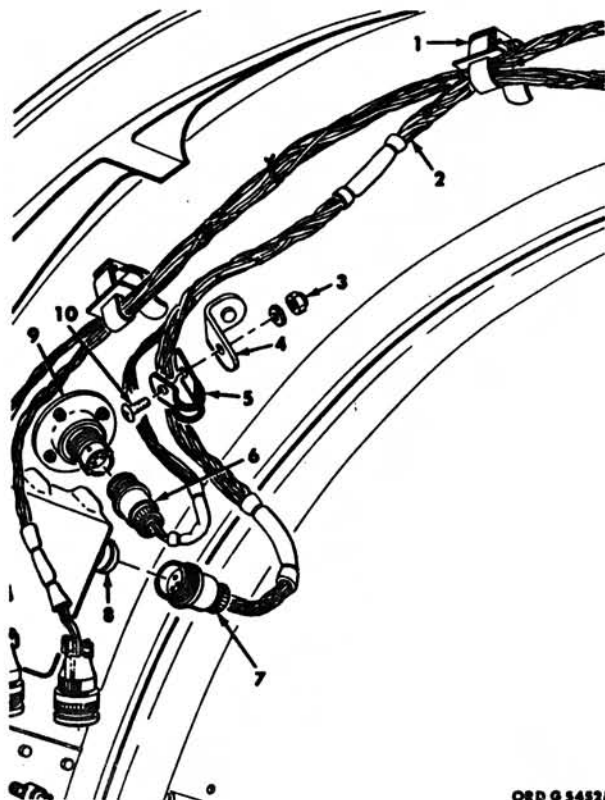
Note. (Deleted.)

Note. (Deleted.)

g. (Deleted.)

h. (Deleted.)

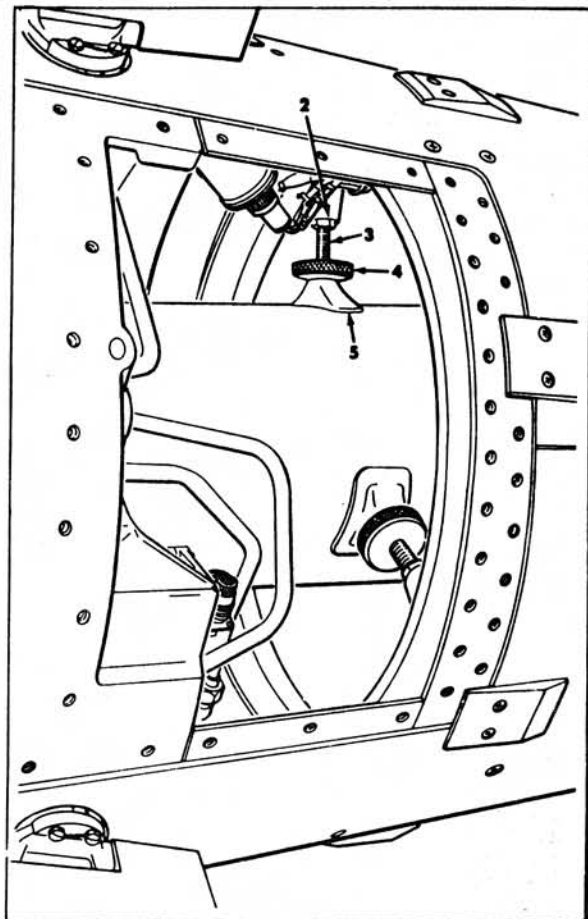
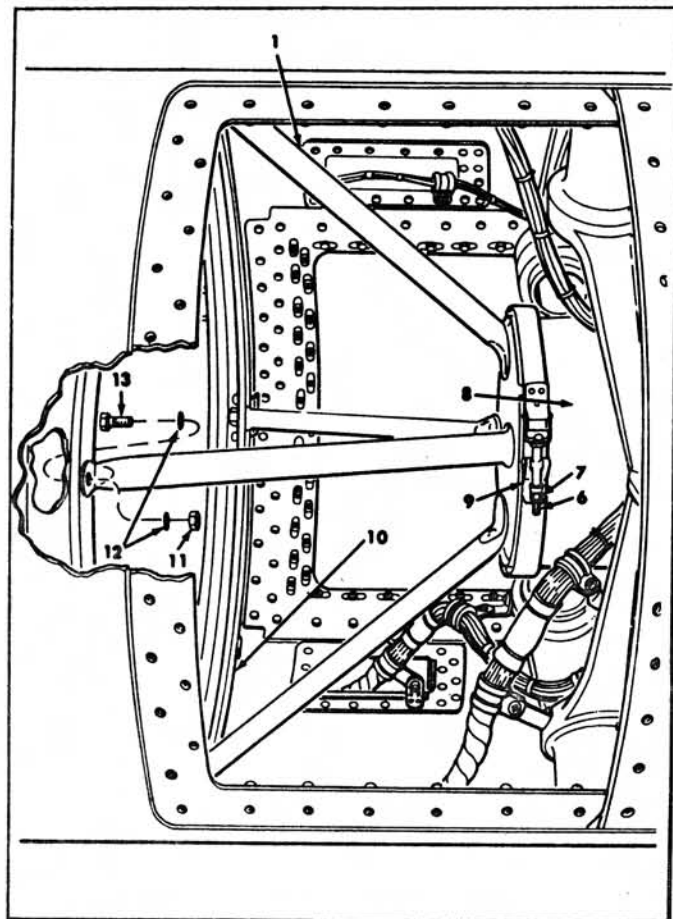
i. (Deleted.)



ORD G 5452A

- 1 — Shipping strap
- 2 — Rocket motor initiator wiring harness
- 3 — No. 10-32 self-locking hex nut
- 4 — Bracket
- 5 — Clamp
- 6 — Connector P170
- 7 — Connector P177A
- 8 — Connector J177
- 9 — Connector J170
- 10 — No. 10-32 X  $\frac{1}{16}$  truss-hd screw

Figure 5-2. Removal and installation of the rocket motor initiator wiring harness.



ORD 65530

- 1 — Blast tube shipping support
- 2 — Locknut
- 3 — Blast tube support assembly (3)
- 4 — Blast tube adjusting knob (3)
- 5 — Blast tube support shoe (3)
- 6 — Captive bolt
- 7 — Nut

- 8 — Blast tube
- 9 — V-band coupling
- 10 — Missile rocket motor mounting ring
- 11 — 7/16 hex nut (4)
- 12 — 0.453-in.-id fl washer (8)
- 13 — 7/16-20 X 1-11/32 hex-hd bolt (4)

Figure 5-3. Removal and installation of the blast tube shipping support.

j. (Deleted.)

k. (Deleted.)

Note. Perform l below for missiles 10206 through 11935 and 13001 through 13938.

l. Loosen, but do not remove, the two internal-

wrenching bolts that secure the index pin and the 15 hexagon-head bolts (fig. 5-4) that secure the mounting ring to the rear of the actuator section.

Note. Perform m below for missiles 13939 and subsequent.

m. Loosen, but do not remove, the two internal-wrenching bolts that secure the index pin and the seven hexagon-head bolts that secure the mounting plate to the rear of the actuator section.

### 5-6.1. Preparation of the Container for Shipment

(1) Slide the moveable tracks (22, fig. 3-7) out of the container.

(2) Secure the rear body support mounts (fig. 3-9) to the moveable tracks.

(3) Secure each of the two support arms (6, fig. 3-7) to the movable tracks with the hexagon-head screws (4), flat washers (2), and lockwashers (3).

(4) Secure the forward shipping clamp (fig. 3-9) to the forward cradle with the captive bolts.

(5) Secure the rear shipping clamp (fig. 3-10) to the rear cradle with the captive bolts.

(6) Slide the moveable tracks into the container.

(7) Secure the moveable tracks to the stationary tracks (1, fig. 3-7) with the hexagon-head screws (20) and lockwashers (21).

(8) Secure the shipping support channel (11) to the support arms with the hexagon-head screws (8), flat washers (7), and self-locking hexagon nuts (5).

(9) Place and secure all shipping hardware, tunnels, brackets, and the shipping adapter, removed during uncrating, inside the container.

(10) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.

(11) Replace the extension handle in the log tube, and swing the log tube cover plate closed; secure the cover plate in position.

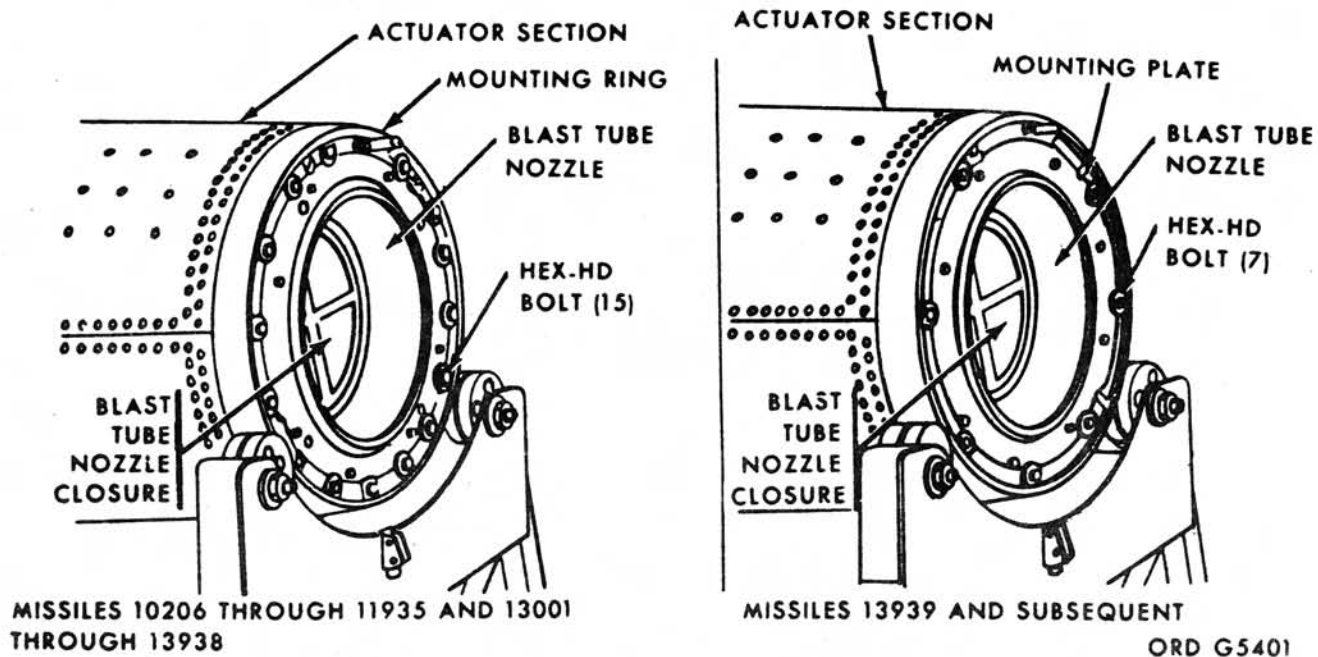
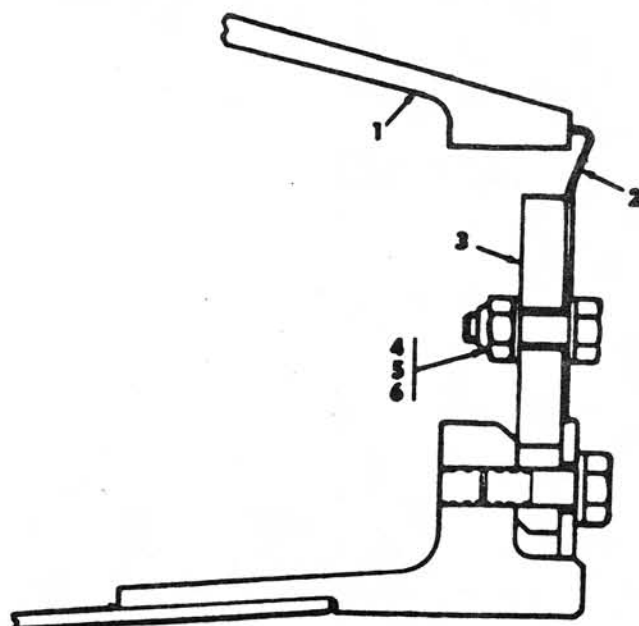


Figure 5-4. Adjustment of the mounting ring or mounting plate.



- 1—Blast tube nozzle
- 2—Closure ring
- 3—Mounting ring or mounting plate

- 4—1/4-28 hex nut (8)
- 5—1/2-28 x 29/32 hex-hd bolt (8)
- 6—0.265-in-id fl washer

MI 3301

Figure 5-5. Removal and installation of the closure ring.

## Section II. UNCRATING THE MISSILE ROCKET MOTOR SUBASSEMBLY

### 5-7. Removal from the Shipping Container

**WARNING:** The missile rocket motor subassembly contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosive involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile rocket motor subassembly will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to the common ground stake, so that the maximum resistance between the component and earth ground is not greater than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**CAUTION:** The propellant grain and the metal parts of the missile rocket motor subassembly can be damaged unduly by rough handling or dropping. A rocket motor which has been subjected to such damage or to extreme temperature could cause a malfunction when the missile is fired. Rocket motors so exposed will not be used until a complete inspection of the grain for serviceability has been made.

a. Perform an inspection of the shipping and storage container (par. 3-4).

b. Cut and remove seals on the base of the container.

c. Remove the nuts (27, fig. 5-6) or bolts and flat washers (28) from the box base (29).

**CAUTION:** Use the lifting cleats on the four corners of the box cover to remove it from the shipping frame. Lift the complete container with a forklift or other approved lifting device that uses the base of the container as a support.

d. Attach a sling (3) of the lifting cleats (4) on each corner of the box cover (1).

e. Attach the falling hook (2) of the hoisting device capable of lifting 5,000 pounds to the sling, and remove the box cover.

**Note.** Use the common ground stake in all grounding operations. The maximum resistance between the component and earth ground shall not be greater than 20 ohms.

f. Attach the ground strap (25) from the forward end of the rocket motor to the grounding stake (26).

g. Visually inspect the missile rocket motor subassembly (10) to make sure that the service life (table 15-8) has not been exceeded and there are no signs of external damage. If the service life has been exceeded, return the rocket motor subassembly, and obtain a newer one. Report any damage to the proper authorities.

h. (Deleted)

**WARNING:** Do not attempt to adjust or remove the gas generator retaining ring (engine and adapter assembly ring) under any circumstances.

**CAUTION:** Use extreme caution in removing the shipping cover (20, fig. 5-6), as the desiccant container is attached to the inside of the shipping cover. Support the shipping cover to prevent the desiccant container from dropping and damaging the liner of the motor adapter.

i. Loosen the nut (21) on the captive bolt (22) that secures the V-band coupling (19) to the motor adapter.

**Note.** Retain the shipping cover for replacement in the shipping container.

j. Carefully remove the shipping cover and V-band coupling. Inspect and clean the V-band coupling.

k. Apply molybdenum disulphide lubricant to the internal surface of the V-band



coupling, and install it loosely on the blast tube forward flange (11, fig. 5-11).

**Warning:** An explosion-proof flashlight must be used to avoid any possibility of an electrical spark. Turn on the flashlight before inspection of the missile rocket motor subassembly.

l. Using an explosion-proof flashlight, inspect the rear of the missile rocket motor subassembly for presence of foreign matter, cracks in grain structure, and moisture. Inspect the liner of the motor adapter for pits and chips.

- (1) Remove moisture, using clean cotton rags or waste.
- (2) Wipe or sponge the moisture from the motor.
- (3) Dispose of contaminated cotton rags or waste used in removing moisture in accordance with existing safety regulations.

**Warning:** The possible presence of perchlorate crystals could cause an explosion during assembly and installation to the blast tube on the missile rocket motor subassembly. The rocket motor adapter must be wiped clean with a clean cloth prior to installation to the blast tube. Dispose of contaminated cloths used in removing perchlorate crystals in accordance with existing safety regulations.

m. Inspect for the presence of the pressure tap plugs (14, fig. 5-11) on the motor adapter (12). Insure that the plugs are tight.

n. Remove the truss-head screws (6, fig. 5-6) that secure the missile rocket motor initiator container (17) to the box base (12).

o. Remove and inspect the rocket motor initiator container (23) for signs of external damage.

**Warning:** Rocket motor initiators are explosive items. Exercise care in handling.

p. Loosen the screw (fig. 5-14) on the clamp that secures the container cover to the container.

q. Remove the container cover.

r. Remove the top styrofoam packing.

**Note.** There are two packing configurations of the missile rocket initiator container. One configuration con-

tains three initiators with a gasket on each; the other, two initiators and four gaskets.

s. Remove the missile rocket motor initiators, with shorting connectors attached, from the lower styrofoam packing.

**Caution:** Handle the initiators carefully to avoid puncturing or damaging the foil seal on the base of the initiator.

t. Check the quantity of gaskets. Remove one gasket, and replace the remainder of the gaskets and the rocket motor initiators in the lower styrofoam packing.

t.1. Remove and inspect the motor adapter gasket for serviceability.

u. Remove the third shipping plug from the gas generator (approximately the 3 o'clock position).

v. Remove the old copper gasket (fig. 5-7) from the shipping plug, and install a new copper gasket.

w. Apply a coat of molybdenum disulphide lubricant to the threads of the shipping plug.

x. Install the shipping plug in the gas generator, and tighten to a torque value of 250 pound-inches.

y. Replace the top styrofoam packing in the container.

z. Replace the cover on the initiator container, and secure the clamp.

aa. Place the container in a suitable storage area.

ab. Remove the hexagon nuts (8, fig. 5-6) and lockwashers (9) that secure the two support clamps (7) to the two shipping supports, and remove the clamps.

ac. Loosen, but do not remove, the bolts (15) that secure the two half rings (14) to the two shipping supports (13).

## 5-8. Removal of the Shipping Rings

**Note.** If a two piece shipping ring is installed, omit a and b below.

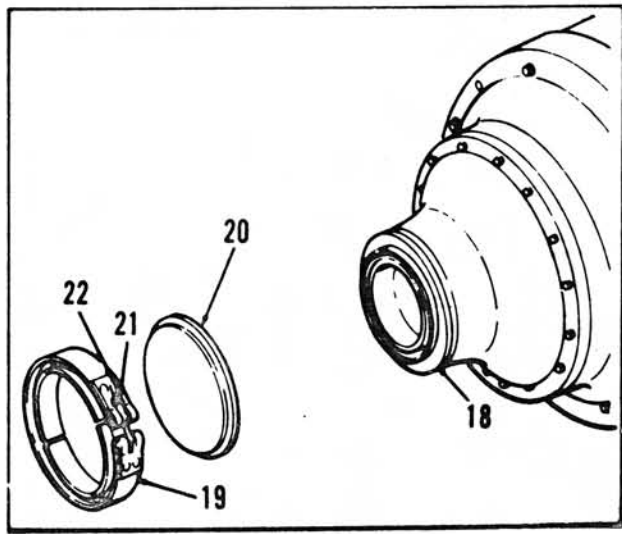
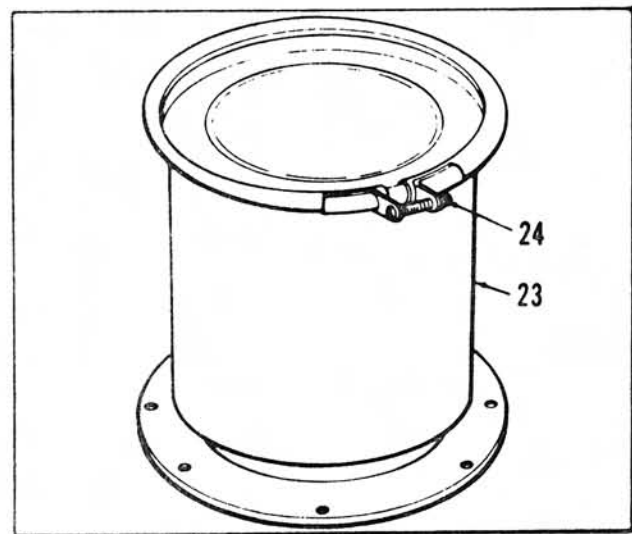
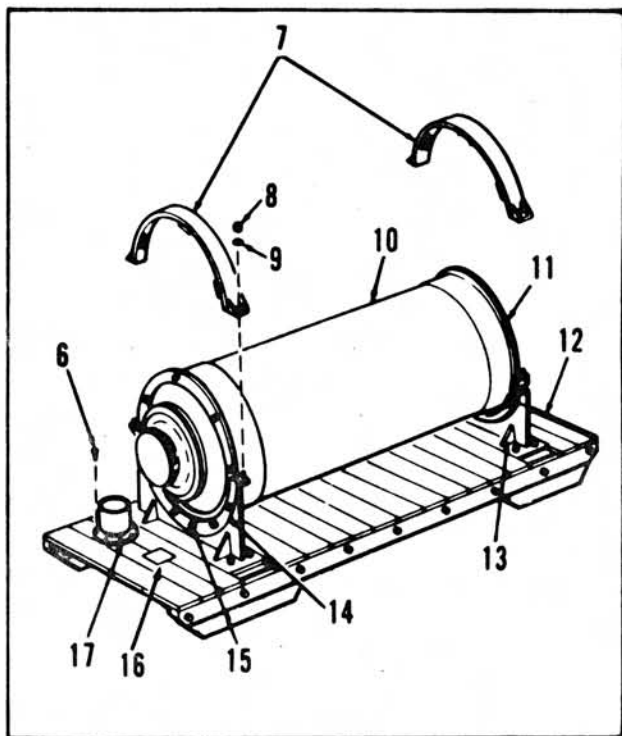
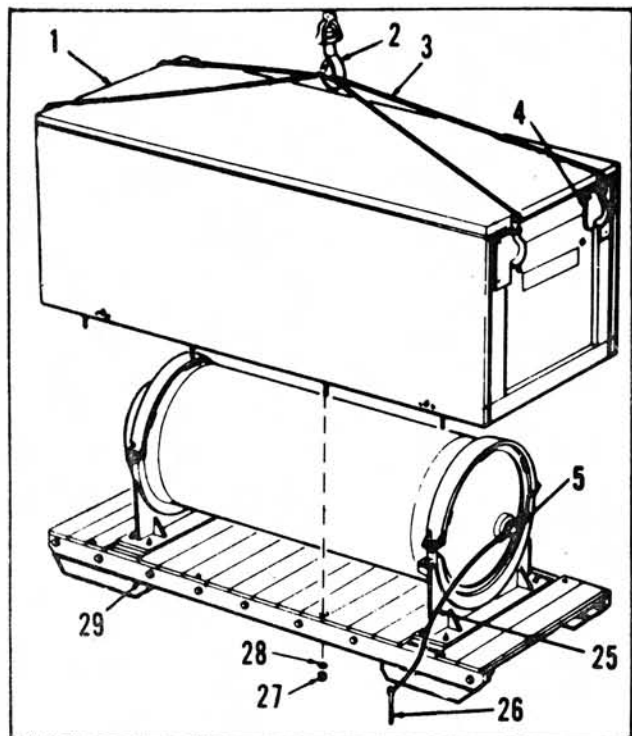
a. Insert the wooden pallet (11, fig. 5-8) beneath the missile rocket motor subassembly (6). Block (10) each side of the missile rocket motor subassembly to prevent rolling, and raise with a fork-lift (7) or other approved lifting device.

b. Remove the hexagon-head bolts (5,8)



that secure the forward shipping ring (4, 9) to the forward end of the missile rocket motor sub-

assembly; remove the forward shipping ring.



MI 2135A

- 1 — Box cover
- 2 — Falling hook
- 3 — Sling
- 4 — Lifting cleat
- 5 — Gas generator
- 6 — Truss-head screw
- 7 — Support clamp
- 8 —  $\frac{1}{4}$ -in hex nut
- 9 —  $\frac{1}{4}$ -in-int teeth lockwasher

- 10 — Missile rocket motor subassembly
- 11 — Shipping ring
- 12 — Box base
- 13 — Shipping support
- 14 — Half ring
- 15 — Hex-hd bolt
- 16 — Gasket package
- 17 — Missile rocket motor initiator container

- 18 — Motor adapter
- 19 — V-band coupling
- 20 — Shipping cover
- 21 — Nut
- 22 — Captive bolt

Figure 5-6. Uncrating and crating of the missile rocket motor subassembly.

23—Missile rocket motor initiator container  
 24—Clamp  
 25—Ground strap  
 26—Grounding stake

27—1/2-28 hex nut (8)  
 28—1/16-in-id fl washer (8)  
 29—Box base

Figure 5-6—Continued.

**WARNING:** Check that the threads of the captive bolts in the missile rocket motor hoist beam and the bolt holes in the missile rocket motor subassembly are in good condition.

*Note.* Guide pins on the "C" beam may be removed.

**CAUTION:** During *c* and *d* below, handle the missile rocket motor hoist beam (5, fig. 5-9) with the falling hook of the hoisting device attached at the **HOIST POINT BEAM ONLY** lifting point.

*c.* Attach the falling hook (3) from a hoisting device capable of lifting 5,000 pounds to the **HOIST POINT BEAM ONLY** lifting point (4) of the missile rocket motor hoist beam (5).

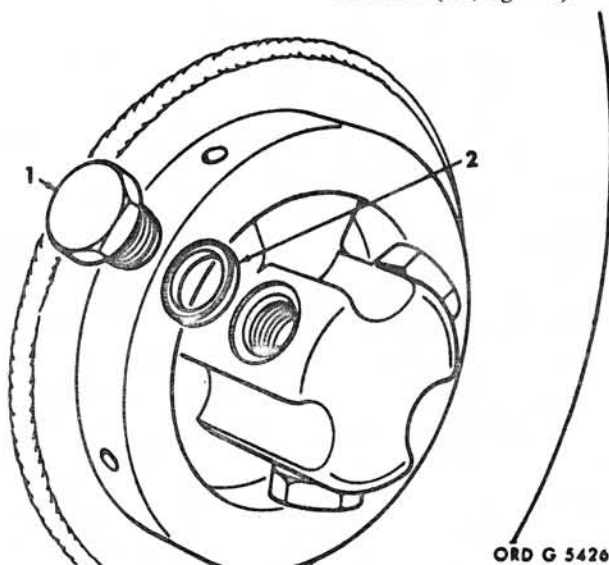
*d.* Position the hoist beam near the missile rocket motor subassembly (8). Align the four captive bolts (7) located on the hoist beam with the bolt holes in the forward end of the missile rocket motor subassembly. Tighten the captive bolts.

*e.* Transfer the falling hook of the hoisting device to the **HOIST POINT CAP 3,000 LBS** lifting point (2) on the hoist beam.

*f.* Lift the missile rocket motor subassembly clear of the box base (6).

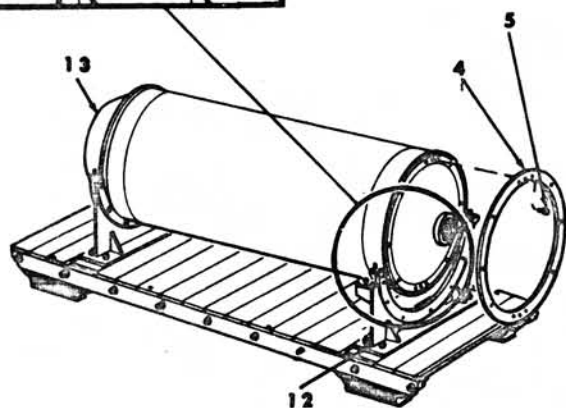
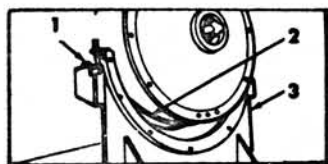
*g.* Remove the hexagon-head bolts (1) that secure the rear shipping ring (9) to the rear end and the split ring (if present) to the front end of the rocket motor subassembly. Remove the rear shipping ring and the front split ring (if present). Check that the rocket motor attach nut plates are in good condition.

*h.* Steady the missile rocket motor subassembly and slowly move the hoisting device away from the motor box base (12, fig. 5-6).

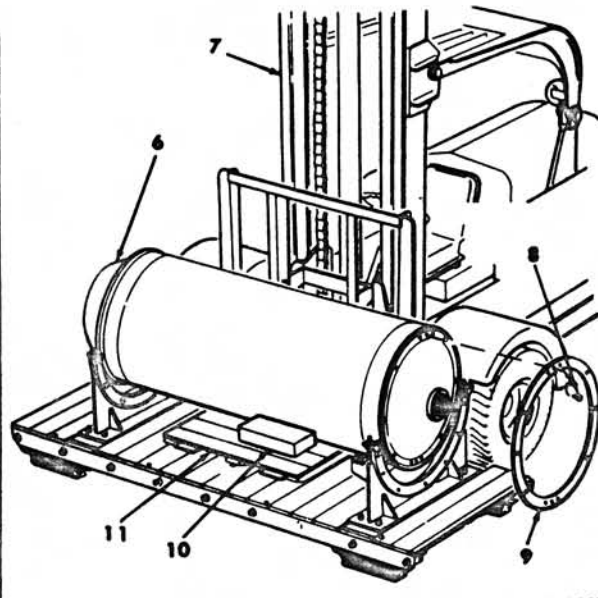


1—Initiator shipping plug (3)  
 2—Copper gasket (3)

Figure 5-7. Removal and installation of the initiator shipping plug.



- 1—Bolt (2)
- 2—Lifting band (2)
- 3—Shipping support
- 4—Forward shipping ring
- 5—1/2-20 X 1-1/2 hex-hd bolt (8)
- 6—Missile rocket motor subassembly
- 7—Forklift



- 8—1/2-20 X 1-1/2 hex-hd bolt (8)
- 9—Forward shipping ring
- 10—Block (2)
- 11—Wooden pallet
- 12—Shipping support
- 13—Missile rocket motor subassembly

ORD G 5557

Figure 5-8. Removal and installation of the forward shipping ring.

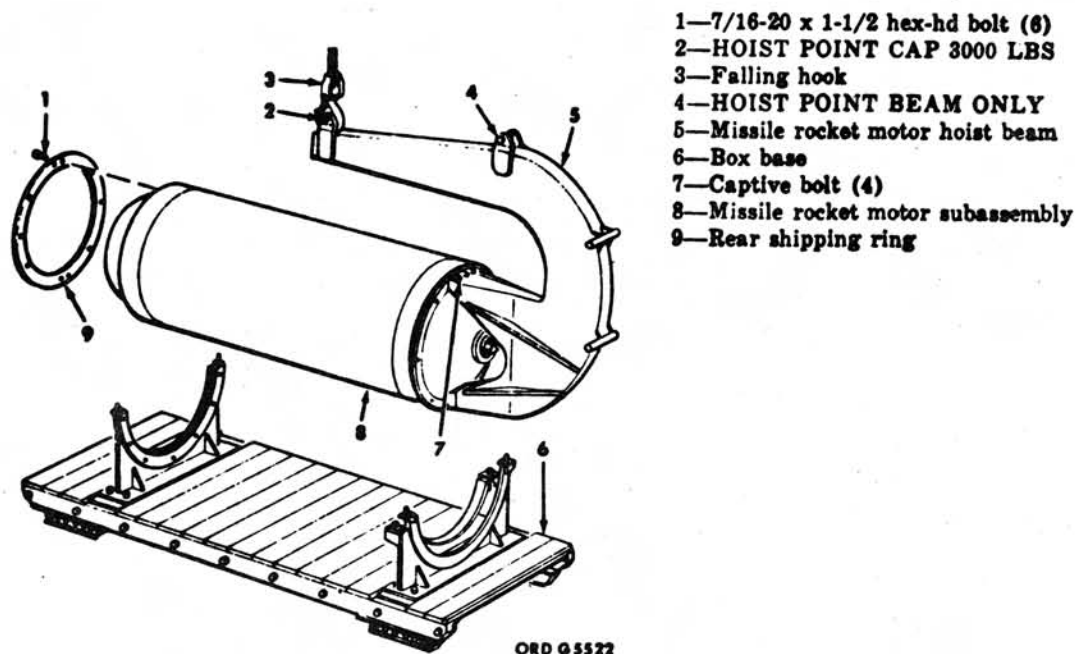


Figure 5-9. Removal and installation of the rear shipping ring.

### Section III. INSTALLATION OF THE MISSILE ROCKET MOTOR SUBASSEMBLY

**WARNING:** The missile rocket motor subassembly contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile rocket motor subassembly will be supervised by qualified personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltage or induced electrical currents. A ground strap must be attached from the component to the common ground stake, so that the maximum resistance between the component and earth ground is not greater than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**CAUTION:** The propellant grain and the metal parts of the missile rocket motor subassembly can be damaged unduly by rough handling or dropping. A rocket motor which has been subjected to such damage or to extreme temperature could cause a malfunction when the missile is fired. Rocket motors so exposed will not be used until a complete inspection of the grain for serviceability has been made.

**Caution:** Be sure the surface upon which the missile body truck is to be moved is smooth terrain or paved.

### 5-9. Installation of Missile Rocket Motor Subassembly

a. Aline the longitudinal axis of the suspended missile rocket motor subassembly (fig. 5-10) with the axis of the rear body section on the missile body truck.

*Note.* The misalignment in *b* below prevents the possibility of the missile rocket motor subassembly colliding with the blast tube in the rear body section.

b. Rotate the rear body section slightly on the missile body truck to misalign alignment pins (17, fig. 5-11) on the missile rocket motor subassembly (13) and the alignment holes (16) on the motor mounting ring (8) in the rear body section.

*Note.* Use the common ground stake in all grounding operations. The maximum resistance between the component and earth ground shall not be greater than 20 ohms.

c. Attach the ground strap from the rear body section to the grounding stake.

d. Check the interior of the rear body section (fig. 5-10) to assure that no connectors or fittings will interfere with the missile rocket motor subassembly as it enters the rear body section.

e. Hold the motor subassembly stationary, and slowly roll the missile body truck forward until the motor subassembly is encased in the rear body section.

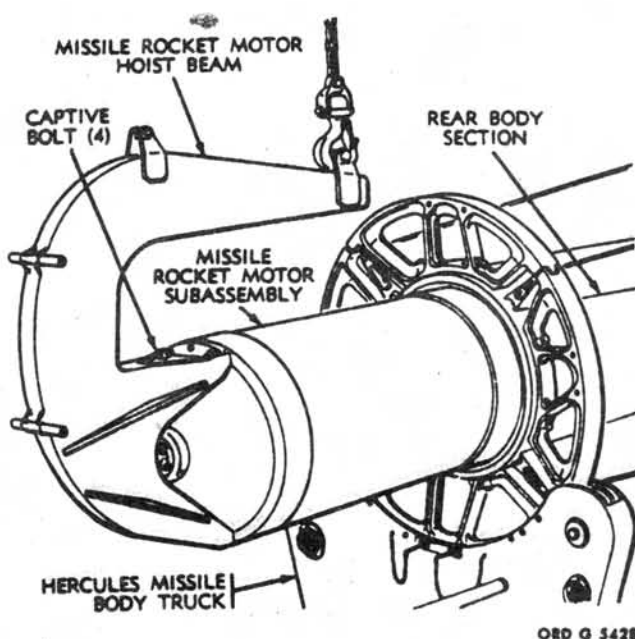
f. Reach through the opening on the rear body section, and place the gasket on the motor adapter.

g. Rotate the rear body section to aline the alignment pins (17) with the corresponding alignment holes (16) in the motor mounting ring (8).

h. Check the vertical alignment between the blast tube forward flange and the flanges of the motor adapter. Turn the nut on the captive screw (7, Fig. 5-11) on the blast tube clamp (9) until proper alignment is obtained.

**CAUTION:** Use care to prevent damage to the mating end of the blast tube and the motor adapter during the mating operation.

i. Inch the missile body truck forward until the two alignment pins on the missile rocket motor subassembly are seated in the alignment holes, and the flanges of the motor adapter and blast tube forward flanges are seated.



Figures 5-10. Removal and installation of the missile rocket motor subassembly.

*Note.* Place one metallic washer (1) next to the bolt head and one nonmetallic washer (15) on the bolt (2).

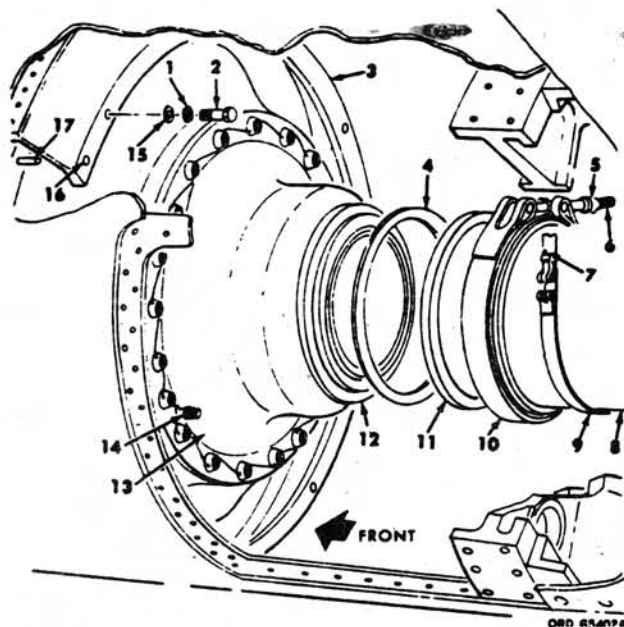
j. Reach through the motor section access openings, and install the hexagon-head bolts (2), nonmetallic washers (15), and flat washers (1) that secure the missile rocket motor subassembly to the motor mounting ring. Tighten the bolts to the torque value given in table 15-9.

k. Reach through the openings, and position the V-band coupling over the mated flanges of the motor adapter and the blast tube forward flange with the captive bolt (6) on top and pointing toward right opening in the body section. Torque the nut (5) of the captive bolt (6) on the V-band coupling to 150 pound-inches, while tapping with a rubber or plastic mallet.

l. Reach through the actuator section opening on either side of the rear body section; loosen the locknut (2, fig. 5-3) and turn the blast tube adjusting knob (4) to loosen the lower blast tube support shoe (5). Repeat the procedure on the opposite side.

m. Reach through the right opening at the rear end of the missile motor section, and tighten the V-band coupling nut (5, fig. 5-11) to the torque value given in table 15-9, while tapping with a rubber or plastic mallet.





- 1—0.453-in-id fl washer (8)
- 2—7/16-20UNF-3A X 1-15/32 hex-hd bolt (8)
- 3—Motor mounting ring
- 4—Gasket
- 5—Nut
- 6—Captive screw
- 7—Captive screw
- 8—Blast tube
- 9—Blast tube clamp
- 10—V-band coupling
- 11—Blast tube forward flange
- 12—Motor adapter
- 13—Missile rocket motor subassembly
- 14—Pressure tap plug (2)
- 15—0.457-in-id nonmetallic washer (8)
- 16—Alignment hole (2)
- 17—Alignment pin (2)

Figure 5-11. Alinement of the missile rocket motor subassembly in the rear body section.

n. Reach through the actuator section opening, and adjust the blast tube adjusting knobs (4, fig. 5-3) on the three blast tube support shoes (5) until they contact the blast tube. Insure the adjusting knobs are tight.

o. Deleted.

p. Insert the self-locking pins through the handling ring segment.

q. Transfer the falling hook (3, fig. 5-9) to the HOIST POINT BEAM ONLY (4) lifting point on the missile rocket motor hoist beam (5).

r. Loosen the captive bolts (7) on the hoist beam; remove the hoist beam.

Note. Perform s below for missiles 10206 through 11935 and 13001 through 13938.

Note. A gap not to exceed one-eighth of an inch is permissible between the closure ring and the blast tube nozzle.

s. Aline the closure ring (2, fig. 5-5) concentric with the blast tube nozzle, and secure the mounting ring assembly by tightening the 15 hexagon-head and the two internal-wrenching bolts to a torque value of 120 pound-inches. Secure the wire index pin bolts with safety wire.

Note. Perform t below for missiles 13939 and subsequent.

Note. The closure plate should be centered. Adjust the blast tube adjusting knobs as necessary to perform t below with a centered closure plate.

t. Aline the closure plate and ring concentric with the blast tube nozzle, and secure the closure plate and ring by tightening the seven hexagon-head and two internal-wrenching bolts to a torque value of 120 pound-inches. Secure the index pin bolts with steel safety wire.

t.1. Secure the three blast tube supporting assemblies by tightening the three locknuts. Tighten the locknuts to a torque value of 325 pound-inches.

u. Inspect the blast tube nozzle closure to insure that it is not cracked or broken and is securely and completely cemented to the nozzle.

u.1. Install rear roll ring adapter which was removed in paragraph 5-3.

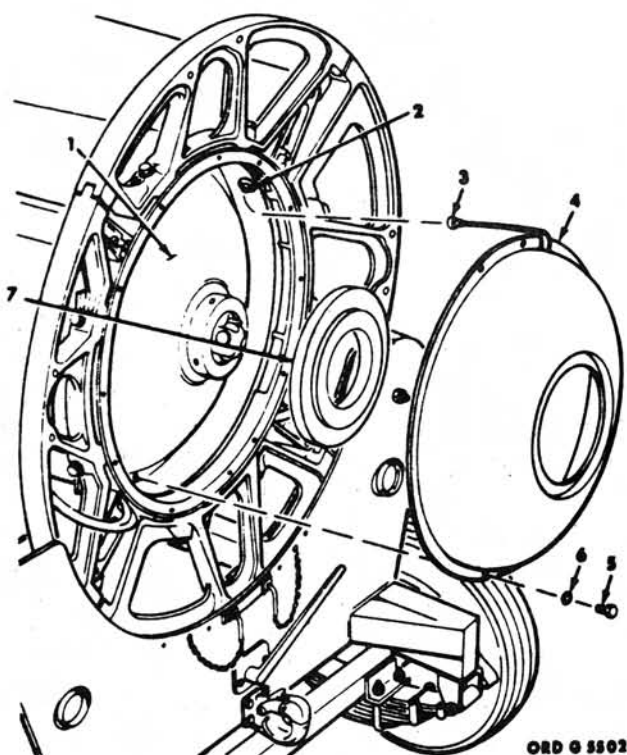
Note. If sufficient clearance does not exist to install the rear roll ring adapter without lifting the body section, defer installation until required in paragraphs 7-11 and 7-12.

v. Remove the ground strap from the missile rocket motor. Place insulator 9978376 around the gas generator with the rubber facing away from the motor. Position the motor head heater (4, fig. 5-12) on the forward end of the missile rocket motor subassembly (1) with the hexagon-head bolts (5) and nonmetallic washers (6). Center the motor head heater on the missile rocket motor subassembly and tighten the bolts snugly.

Note. Insulator 9978376 replaces insulator 9032022 on all missiles.

w. Connect the wiring harness assemblies inside the forward portion of the missile motor section as prescribed in steps (1) through (3) below. In each case, insure positive mechanical mating.





- 1—Missile rocket motor subassembly
- 2—Connector J171
- 3—Connector P171
- 4—Motor head heater
- 5—7/16-20 x 23/32 hex-hd bolt (4)
- 6—7/16-in-id nonmetallic washer (4)
- 7—Insulator

Figure 5-12. Removal and installation of the motor head heater.

(1) Connect connector P171 (3) to connector J171 (2). Make certain that the orange band on P171 is visible after the connection is made.

(2) Connect connector P170 (fig. 5-13) to connector J170. Make certain that the orange band on P170 is visible after the connection is made.

(3) Connect connector P177A to connector J177. Make certain that the orange band on P177A is visible after the connection is made.

x. Secure the rocket motor initiator wiring harness branch leg for connector P177A to the bracket (4, fig. 5-2) with a clamp (5), trusshead

screw (10), self-locking nut (3) and washer, if present.

y. Deleted.

## 5-10. Final Assembly of the Missile Rocket Motor Subassembly

**CAUTION:** The thermostat wiring harness must be completely inside the motor section when the thermostat access cover plates are installed to insure that the harness is not pinched between a cover plate and the rear body section.

a. Install the two motor heater thermostat access cover plates (3, fig. 5-1), one on each side of the rear body section, and secure each cover plate to the rear body section with the six flathead screws. Torque to 25 pound-inches.

b. (Deleted)

c. Perform steps (1) through (3) below to install the two actuator section door assemblies (fig. 3-22) on the actuator section.

(1) Secure each door assembly to the actuator section with the flathead screws. Tighten the screws to the torque value given in table 15-9.

(2) Rotate each of the joining pads so that they extend over the access door and install the flathead screws.

(3) Tighten the flathead screws in each pad to a torque value of 25 pound-inches.

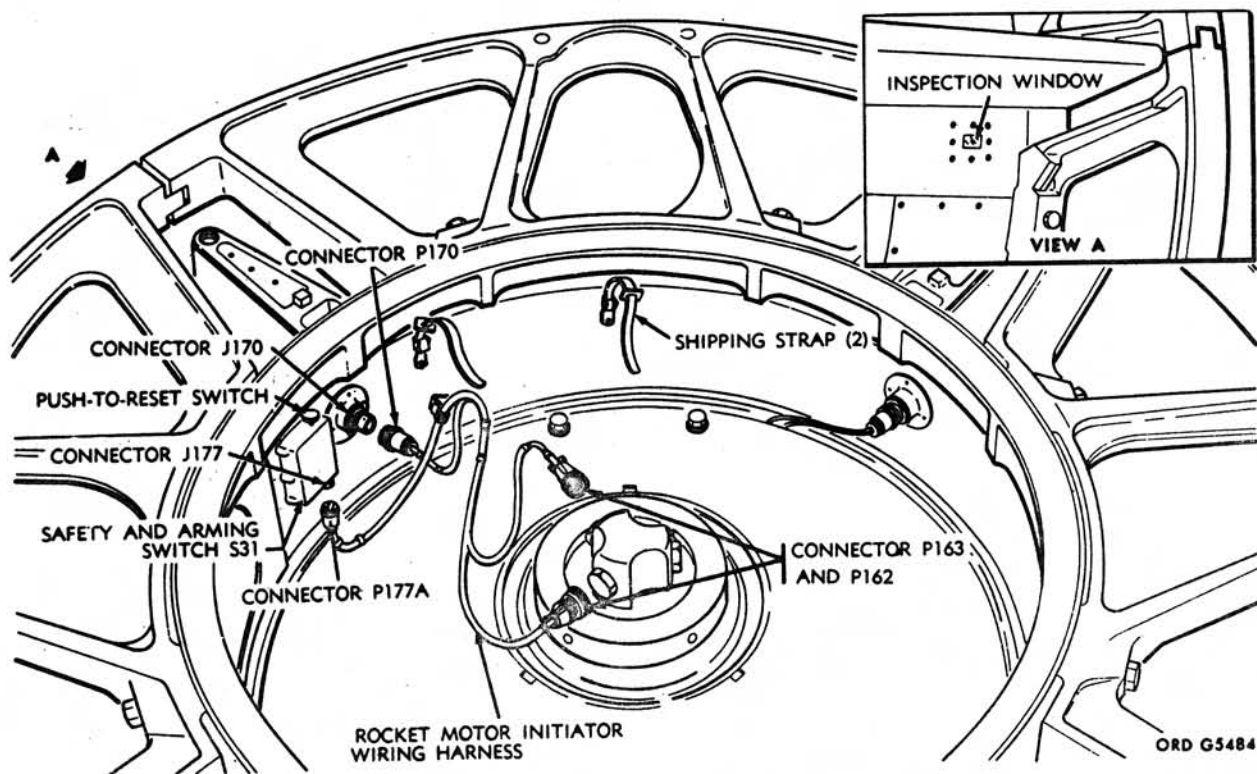
d. Perform steps (1) through (4) below to prepare the missile rocket motor subassembly shipping container for shipment or storage.

(1) Stow the two shipping rings (11, fig. 5-6), the shipping cover (20), hexagon-head bolts (5, 8, fig. 5-8), and hexagon-head bolts (1, fig. 5-9) inside the shipping container.

(2) Install the two support clamps (7, fig. 5-6) on the shipping supports (13), and secure each clamp with two internal-teeth lockwashers (9) and hexagon nuts (8).

(3) Install the box cover (1), and secure to the box base (29) with the flat washers (28) and hexagon nuts (27).

(4) Remove the missile rocket motor subassembly shipping container (1, 12, fig. 5-6) to a suitable area.



**Figure 5-13. Disconnection and connection of rocket motor initiator wiring harness connectors P170 and P177A.**

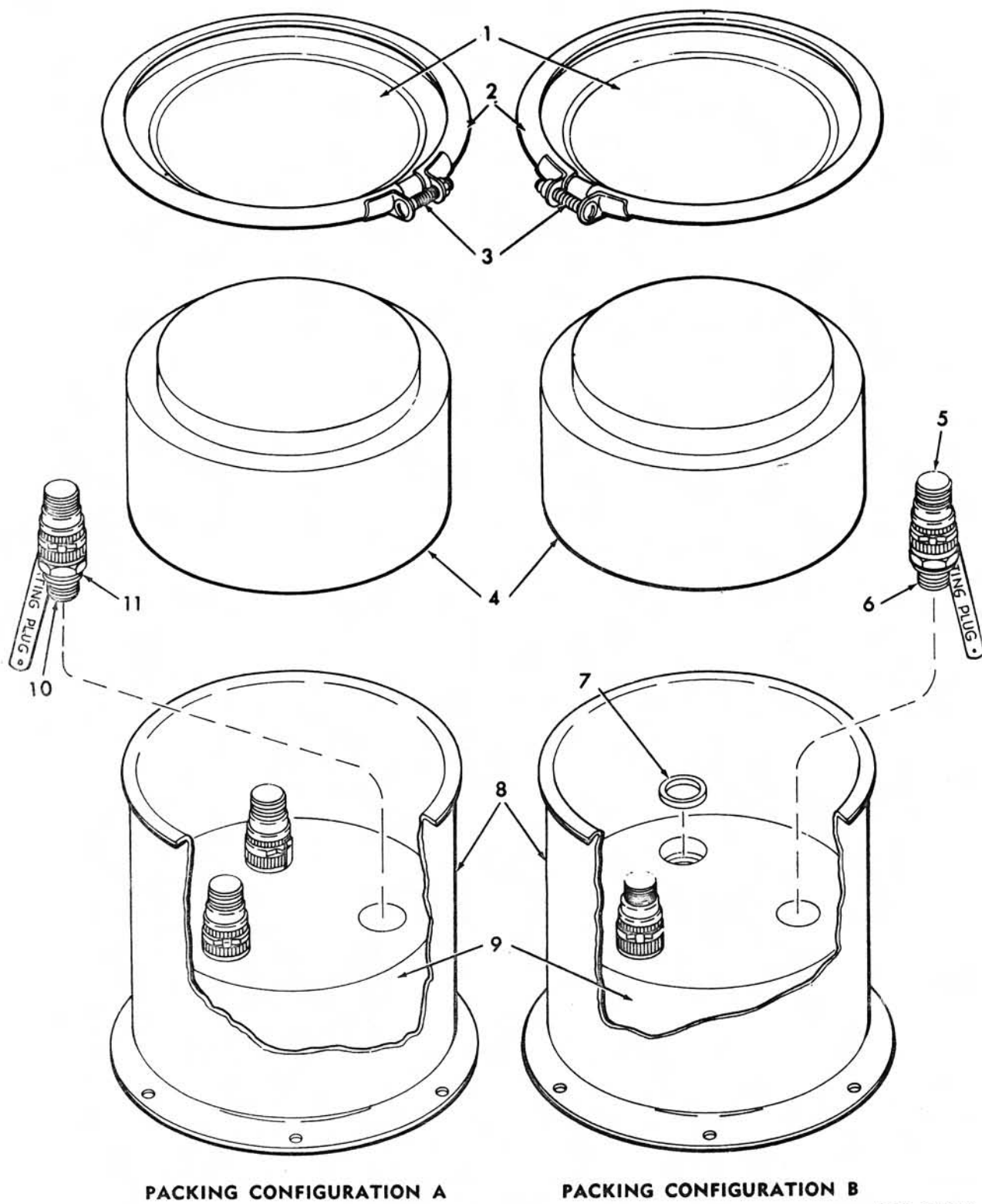
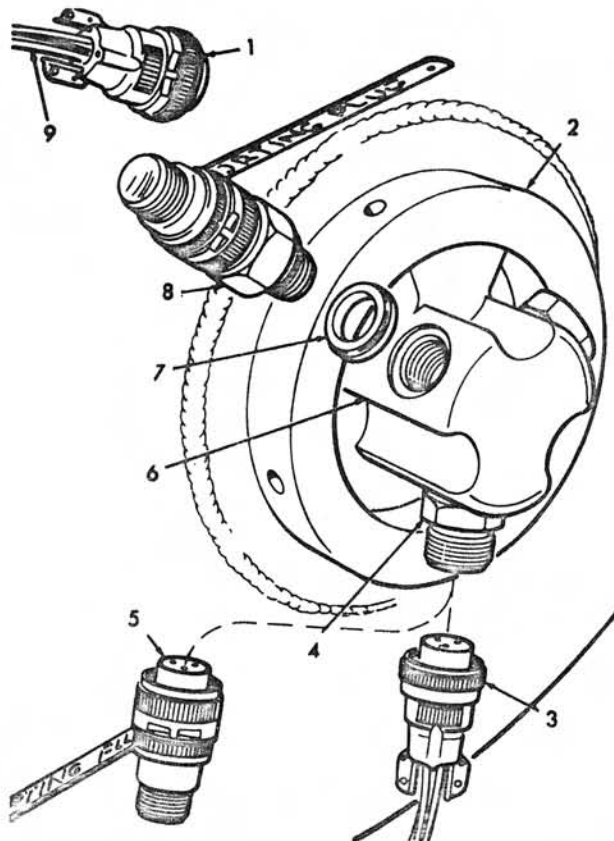


Figure 5-14. Uncrating and crating of the missile rocket motor initiators.

- 1—Container cover
- 2—Clamp
- 3—Screw
- 4—Top styrofoam packing
- 5—Shorting connector (2)
- 6—Missile rocket motor initiator (2)

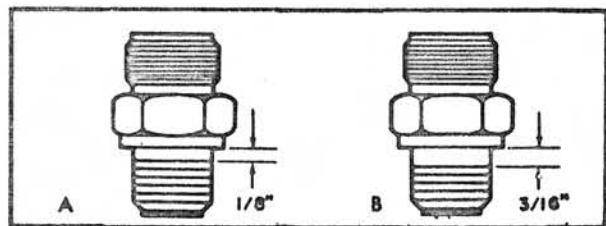
- 7—Gasket (4)
- 8—Missile rocket motor initiator container.
- 9—Lower styrofoam packing
- 10—Missile rocket motor initiator (3)
- 11—Gasket (4)

Figure 5-14—Continued.



- 1—Connector P163
- 2—Retaining ring
- 3—Connector P162
- 4—Connector J162
- 5—Shorting connector (2)
- 6—Gas generator
- 7—Copper gasket (3)
- 8—Connector J163
- 9—Rocket motor initiator wiring harness

Figure 5-15—Continued.



ORD G 5343

Figure 5-15. Removal and installation of the missile rocket motor initiators.

Figure 5-16. (Deleted)

	Paragraphs	Pages
Installation -----	12-29b	12-29
Removal -----	12-29a	12-28
P steering amplifier -----	12-43	12-44
Installation -----	12-43b	12-44
Removal -----	12-43a	12-44
Power supply -----	12-33	12-38
Installation -----	12-33b	12-38
Removal -----	12-33a	12-38
Radar modulator -----	12-34	12-38
Installation -----	12-34b	12-39
Removal -----	12-34a	12-38
Radar modulator thyratron electron tube -----	12-35	12-39
Installation -----	12-35b	12-39
Removal -----	12-35a	12-39
Radio set -----	12-30	12-29
Installation -----	12-30b	12-29
Removal -----	12-30a	12-29
RF detectors 8172668 and 8172699 -----	12-45	12-45
Installation -----	12-45b	12-45
Removal -----	12-45a	12-45
Rear cover gasket -----	12-27	12-26
Installation -----	12-27b	12-26
Removal -----	12-27a	12-26
Rectifying crystal unit -----	12-39	12-42
Installation -----	12-39b	12-42
Removal -----	12-39a	12-42
Roll control amplifier -----	12-41	12-42
Installation -----	12-41b	12-44
Removal -----	12-41a	12-42
Sequential timer -----	12-26	12-26
Installation -----	12-26b	12-26
Removal -----	12-26a	12-26
Signal data converter -----	12-31	12-31
Installation -----	12-31b	12-32
Removal -----	12-31a	12-31
Tapped delay line -----	12-44	12-44
Installation -----	12-44b	12-45
Removal -----	12-44a	12-44
Transponder control group -----	12-28	12-27
Installation -----	12-28b	12-27
Removal -----	12-28a	12-27
Voltage regulator tubes V1, V2, and V3 -----	12-40	12-42
Installation -----	12-40b	12-42
Removal -----	12-40a	12-42
Y steering amplifier -----	12-42	12-44
Installation -----	12-42b	12-44
Removal -----	12-42a	12-44
Missile motor section:		
Replacement of:		
Missile motor section access doors -----	12-61	12-55
Installation -----	12-61b	12-55
Removal -----	12-61a	12-55
Missile rocket motor subassembly -----	12-64	12-56
Installation -----	12-64b	12-56
Removal -----	12-64a	12-56
Motor head heater -----	12-63	12-56
Installation -----	12-63b	12-56
Removal -----	12-63a	12-56

## UNCRATING AND INSTALLING THE WARHEAD BODY SECTION

### 6-1. Preliminary Procedures

**WARNING:** The warhead body section contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the warhead body section will be supervised by qualified explosive personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted in or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to the common ground stake, so that the maximum resistance between the component and earth ground is not greater than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

a. Check the threads of 13 hexagon-head bolts (15, fig. 6-4) for damage that may impair proper installation of the warhead body section to the rear body section. Replace any damaged bolts with acceptable bolts.

b. Check the 13 mounting holes in the rear body section by inserting and removing acceptable mounting bolts. Visually inspect the threaded inserts after removing the bolts to assure that the inserts are properly seated and not broken.

*Note.* If the helicoil is defective, or not properly seated, notify the supervisor.

c. In the rear body section, install three guide pins in mounting holes 7, 8, and 13 as shown in figure 6-5.

d. Inspect the six mounting holes at the rear of the forward body section for damage that may impair proper installation with the warhead body section. If any holes are damaged, notify the supervisor.

### 6-2. Uncrating the Warhead Body Section

a. Perform an inspection of the warhead body section container, as prescribed in paragraph 3-5.

b. (Deleted).

c. Remove the container cover (par. 3-5c).

*Note.* Use the common ground stake in all grounding operations. The maximum resistance between the component and earth ground shall not be greater than 20 ohms.

c.1. Attach a ground strap from the warhead body section (10, fig. 6-1) the ground stake.

d. Remove the Equipment Maintenance Log (EML) from the log tube (13, fig. 6-1), and check that the warhead body section serial number agrees with the serial number in the EML.

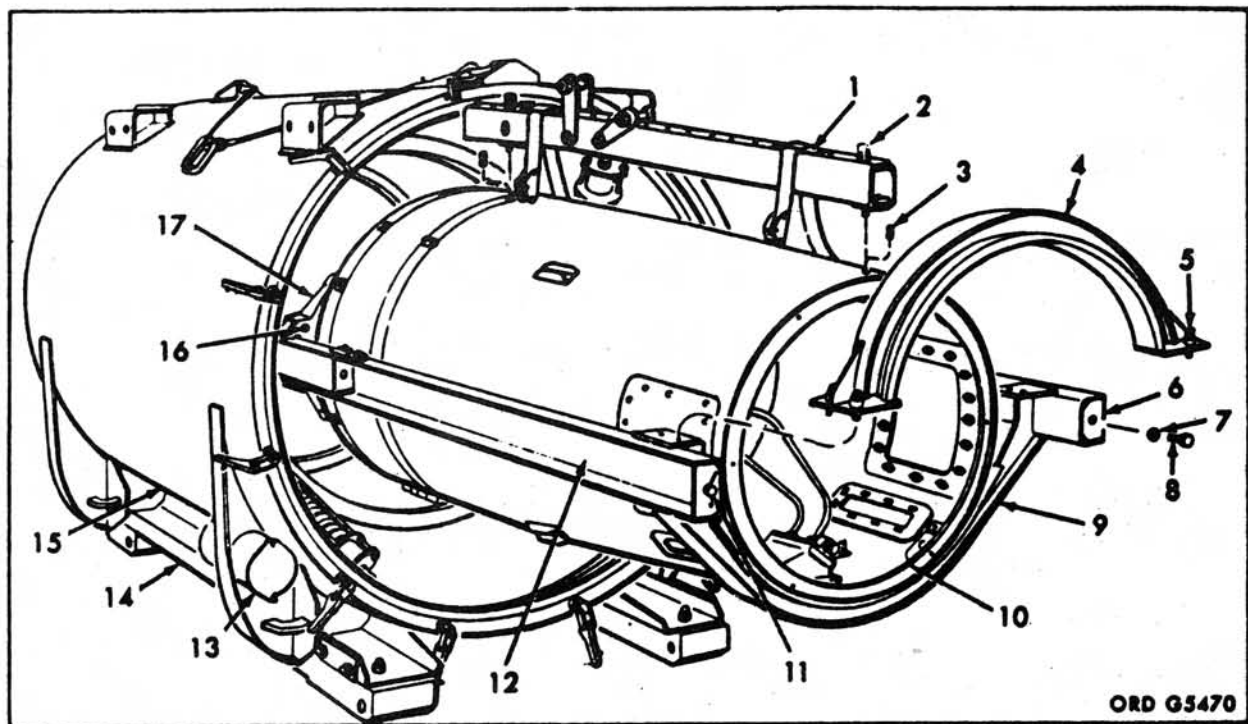
e. Store the EML and other papers in accordance with local directives.

f. Check the threads of the six forward body section mounting bolts (3, fig. 7-8) for damage which may impair proper installation of the forward section to the warhead body section.

g. Check the six mounting holes at the forward end of the warhead body section by inserting and removing acceptable bolts. Visually inspect the threaded inserts after removing the bolts to assure that the inserts are properly seated and not damaged.

*Note.* If thread damage to the mounting bolts is evident, replace them with acceptable bolts. If the helicoil, or keylock, is defective, or not properly seated, notify the supervisor.





ORD G5470

- 1—Warhead body section hoist beam
- 2—Captive bolt (2)
- 3—Plug 8530410 (2) or 9978716 (2)
- 4—Movable track clamp
- 5—Captive bolt (6)
- 6—Moveable track
- 7—3/4 in-id lockwasher (2)
- 8—3/4-10 X 1-14 hex-hd screw MS35297-183 (2) or hex-hd bolt 215199(2)

- 9—Movable track cradle
- 10—Warhead body section
- 11—Safety wire
- 12—Movable track
- 13—Log tube
- 14—Warhead body section container base
- 15—Warhead body section container
- 16—Captive bolt (4)
- 17—Thrust mount bracket

Figure 6-1. Uncrating and crating the warhead body section

h. Inspect the underside of the right moveable track and the stationary tracks for the presence of stops. If stop, or stops, are missing, notify supervisor.

i. Cut and remove the safety wire (11, fig. 6-1) through the heads of the hexagon-head screws (8) that secure the moveable tracks (6).

j. Remove the hexagon-head screws (8) and lockwashers (7) that secure the moveable tracks to the stationary tracks.

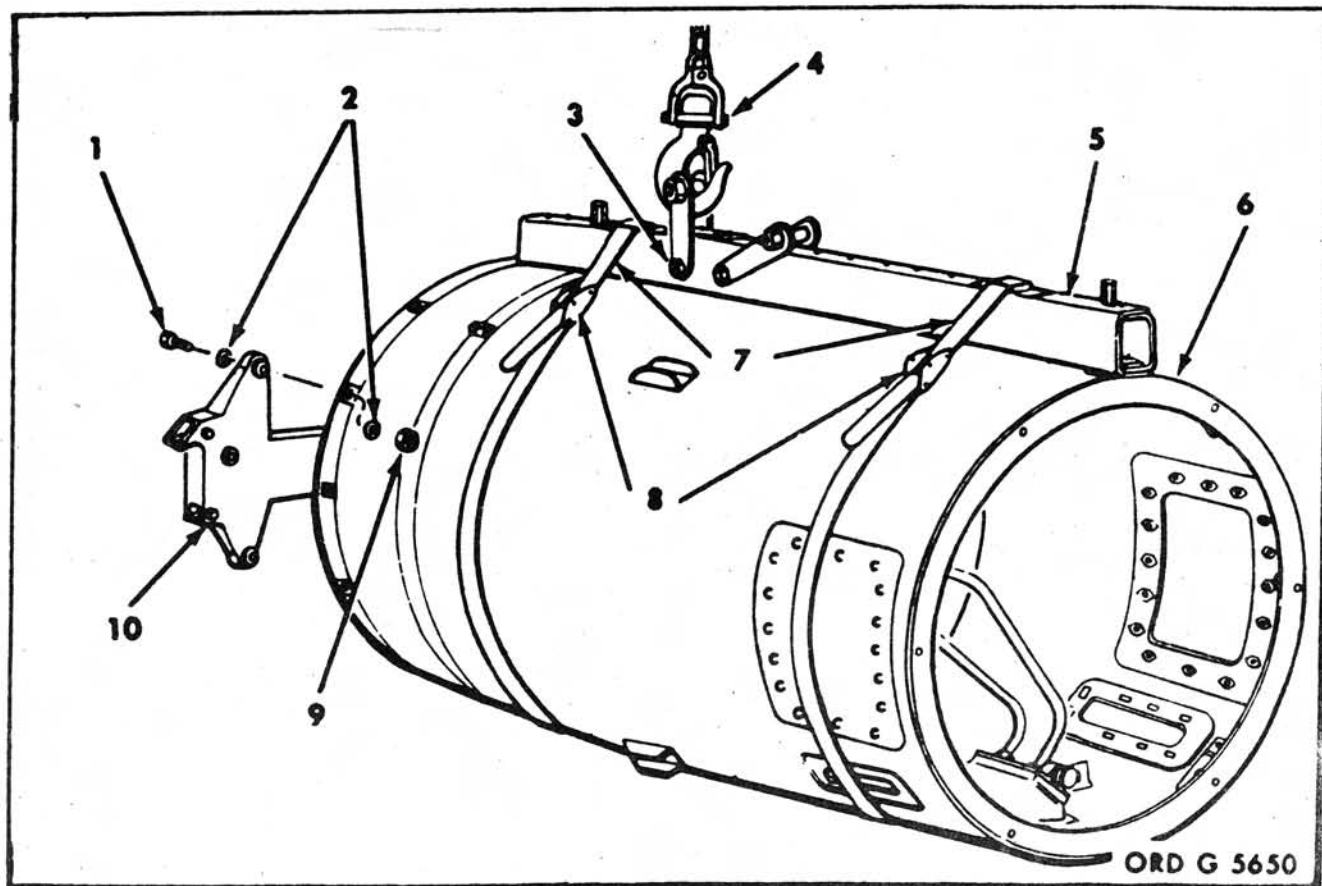
k. Slide the moveable tracks and the attached warhead body section out of the container until the moveable tracks contact the stops.

**CAUTION:** To avoid damaging the bolt retaining pin, alternately loosen bolts that se-

cure moveable track clamp to moveable track assembly.

l. Loosen the captive bolts (5, fig. 6-1) that secure the moveable track clamp (4) to the moveable track (6) at the forward end of the moveable tracks. Remove the moveable track clamp.

m. Inspect the exterior of the warhead body section for damage and proper markings; report any damage to the supervisor.



- 1-3/8-16 X 3 hex-hd screw (6)  
 2-25/64 in-id fl washer (12)  
 3-Rear lift point  
 4-Falling hook  
 5-Warhead body section hoist beam

- 6-Warhead body section  
 7-Safety strap (2)  
 8-Buckle (2)  
 9-3/8-16 hex nut (6)  
 10-Thrust mount bracket

Figure 6-2. Removal of the warhead body section.

m.1. Remove plugs (3, fig. 6-1) from the warhead body section.

n. Insure that the safety strap assemblies (7, fig. 6-2), the threads of the captive bolts (2, fig. 6-1) on the warhead body section hoist beam, (1, fig. 6-1) and the bolt holes in the warhead body section are in serviceable condition.

**WARNING:** (Deleted.)

o. Secure the warhead body section hoist beam to the warhead body section by alternately tightening the two captive bolts on the hoist beam.

**WARNING:** The two captive bolts on the warhead body section hoist beam (5, fig. 6-2) must be completely engaged before installing the two safety straps (7) to

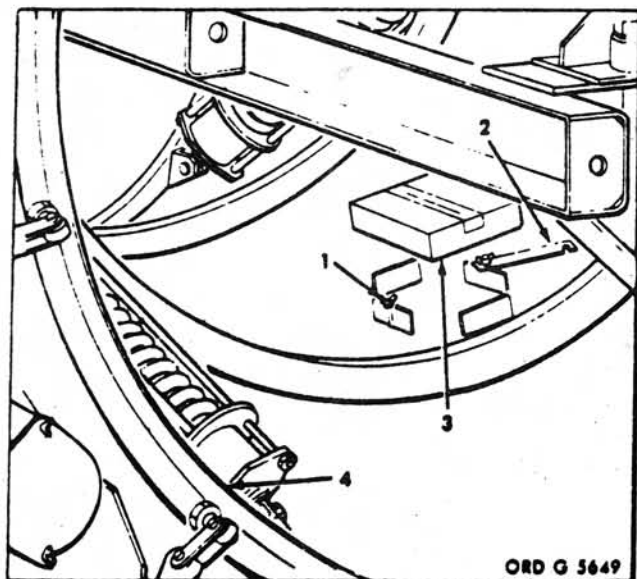
insure proper installation of the safety straps.

**CAUTION:** Position the safety strap buckles (8) near the hoist beam so that the buckles will not touch the warhead body section (6).

p. Pull the two safety straps tight and insure that they are properly secured by grasping the push-to-release lever on each buckle and pulling out.

q. Attach the falling hook (4) of a hoisting device capable of lifting 5,000 pounds to the rear lift point (3) of the warhead body section hoist beam, and take up the slack in the hoist chain.

q.1. (Deleted)



- 1—Wing nut  
2—Holddown bar  
3—Accessory carton  
4—Warhead body section container

Figure 6-3. Removal of the accessory carton.

r. Loosen the captive bolts (16, fig. 6-1) that secure the thrust mount bracket (17) to the rear end of the movable tracks.

**CAUTION:** Manually guide the warhead body section to prevent contact with any obstruction on the movable tracks.

s. Lift the warhead body section enough to clear the movable tracks and move it away from the container. Complete the inspection of the warhead body section. Slide the movable tracks into the container (15), and install the two track-locking bolts and washers.

t. Remove the hexagon-head bolts (1, fig. 6-2), flat washers (2), and hexagon nuts (9), and remove the thrust mount bracket (10) from the rear end of the warhead body section.

u. Inspect the rear warhead body section mounting holes for damage.

### 6-3. Installing the Warhead Body Section

*Note.* Insure that the missile is in the flight position, with the self-locking pins (view A, fig. 9-1) inserted through the lower handling ring segments, prior to mating the warhead body section to the rear body section.

a. Lift the warhead body section ((7) fig. 6-4), and mate with the forward end of the rear body section (3).

b. Install two hexagon-head bolts (15)

and flat washers (14) through the boltwells (13) in the warhead body section at the right and left of top center, but do not tighten. Install the remaining bolts and washers through the boltwells in the warhead body section where guide pins are not installed.

c. Tighten the bolts which have been installed.

d. Remove the guide pins, and install the remaining bolts and washers.

e. Tighten the hexagon-head bolts to a torque value of 90 pound-inches, alternating as shown in figure 6-5.

f. Lower the falling hook enough to remove tension from the hoist cable.

g. Alternating as shown in figure 6-5, back off each bolt (one at a time) approximately two turns; then, torque each bolt to the value given in table 15-9.

g.l. Inspect the "T" hook adapter. Maximum permissible movements (measured at the skin surface) of the upper end of the "T" hook adapter (6, fig. 6-4) are: 7/64 inch longitudinal, 1/32 inch lateral, and 1/32 inch vertical.

h. Remove the falling hook (2, fig. 6-4) from the warhead body section hoist beam (1).

h.1. Remove the ground strap from the warhead section.

i. Disconnect the two safety strap buckles, and remove the warhead body section hoist beam.

j. Liberally coat the threads of the plugs (3, fig. 6-1) with corrosion-preventive compound, MIL-C-16173, Grade 2, (soft film) before installing in the warhead body section.

k. Install two plugs in the hoist beam attach holes in the warhead body section.

l. Loosen the two wing nuts (1, fig. 6-3); slide back the holddown bar (2); and remove the accessory carton (3) from inside the warhead body section container (4).

m. Inspect and inventory the contents of the accessory carton against the packing list. Report any damaged or missing parts to the supervisor.

n. Slide the holddown bar to the locked position, and tighten the wing nuts.

*Note.* Perform o and p below on warheads received with three-part boltwells.

o. Position the three boltwell covers (8, 12, fig. 6-4) on the warhead body section, and assemble with two flathead screws (9) and boltwell cover nuts (10).

*Note.* When torquing the attaching hardware on boltwell covers, either the screws (9) or the nuts (10) may be torqued.

p. Secure the assembled boltwell covers (4) to the warhead body section (7) with four flathead screws (5); torque the screws (5) and the screw (9) or nut (10) to the torque value prescribed in table 15-9.

*Note.* Perform q below on warheads received with single piece boltwells.

q. Position the boltwell cover (12) on the warhead body section (11), and secure with the flathead screw (9) and boltwell cover nut (10).

r. Tighten the boltwell cover screw (9) or nut (10) to the torque value given in table 15-9.

s. Remove the forward warhead body section boltwell cover.

t. Inspect for presence and correct number of bolts and flat washers that join the forward warhead section to the rear warhead section.

**CAUTION:** Tightening of the attach bolts in the sequence shown in figure 6-6 will prevent stress and damage to the frame members of the forward and rear warhead sections.

u. Alternating as shown in figure 6-6, back off each bolt (one at a time) approximately two turns; then, torque each bolt to 120-pound-inches.

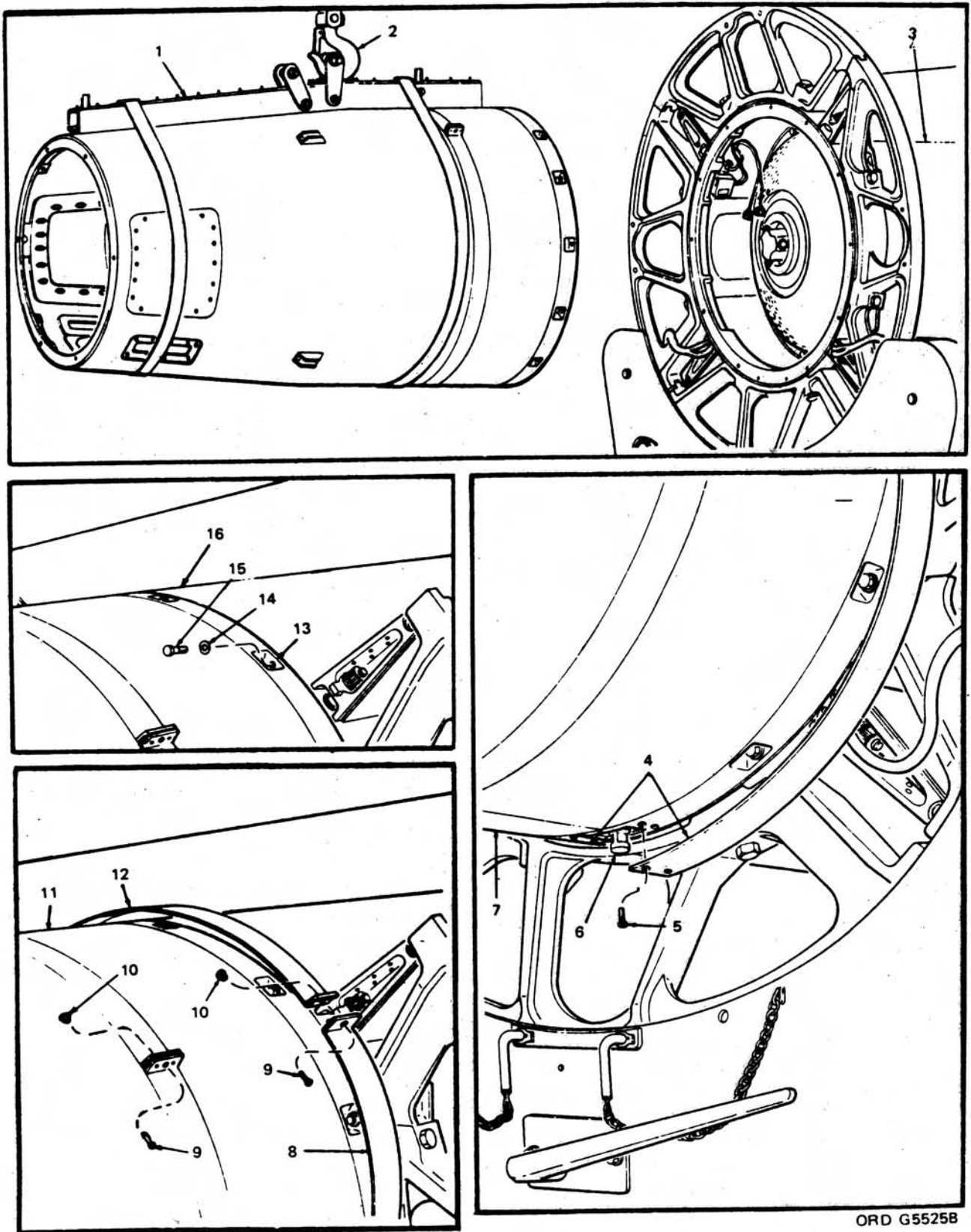
v. Install the forward warhead body section boltwell covers, and torque the boltwell cover screw (9) or nut (10) to the value given in table 15-9.

w. Attach the hexagon-head bolts (1, fig. 6-2), flat washers (2), and hexagon nuts (9) to the thrust mount bracket (10). Remove the track locking bolts; slide the movable tracks (12, fig. 6-1) out of the warhead body section container (15); and install the thrust mount bracket to the moveable tracks.

x. Install the moveable track clamp (4) to the moveable track (6), and secure with the captive bolts (5).

y. Slide the movable track into the container, and secure it to the stationary track with the hexagon-head screws (8) and lock washers (7).

z. Install the container cover (fig. 3-5), and secure it with the quick-release clamps. Return the extension handle to the log tube, and secure the log tube cover plate with the wing nuts.



ORD G5525B

Figure 6-4. Removal and installation of the warhead body section.



- 1—Warhead body section hoist beam
- 2—Falling hook
- 3—Rear body section
- 4—Boltwell cover 8166968
- 5—No. 10-32 X 3/8 fl-hd screw (4)
- 6—T-hook adapter
- 7—Warhead body section
- 8—Boltwell cover 8166968 (2) (warhead body section 11001 through 15744)
- 9—No. 10-32 X 17/32 fl-hd screw (2) (warhead body sections 11001 through 15744) or (1) (warhead body section 15745 and subsequent)
- 10—No. 10-32 X 7/32 boltwell cover nut (2) (warhead body sections 11001 through 15744) or (1) (warhead body sections 15745 and subsequent)
- 11—Warhead body section
- 12—Boltwell cover 8521079 (warhead body section 11001 through 15744) or 9019866 (warhead body section 15745 and subsequent)
- 13—Boltwell
- 14—21/64-in-id fl washer (13)
- 15—5/16-24 X 31/32 hex-hd bolt (13)
- 16—Warhead body section

Figure 6-4—Continued.

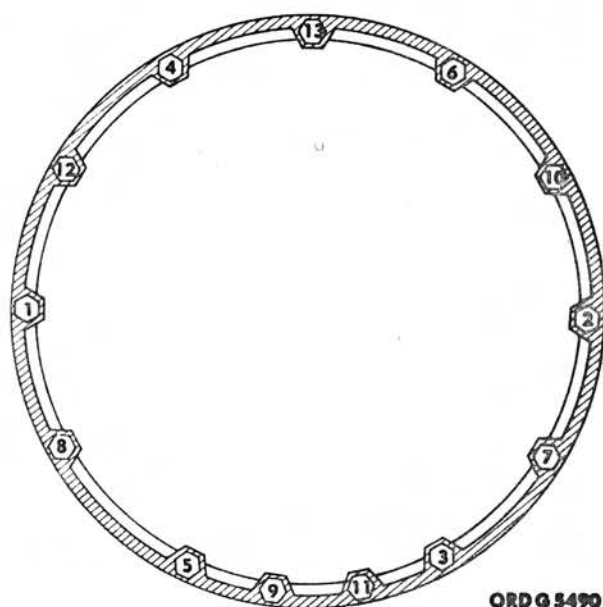
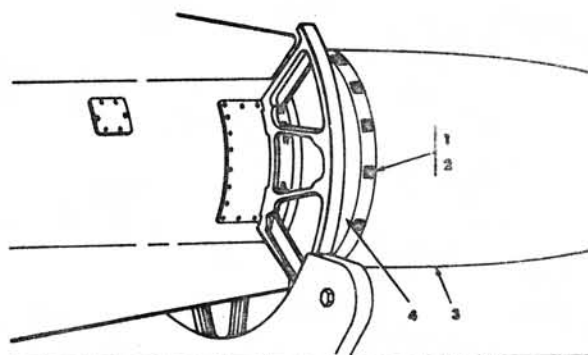


Figure 6-5. Tightening sequence for the warhead body section to the rear body section attach bolts.



- 1—5/16-24 X 1-3/32 hexagon head bolt (12)
- 2—0.328 in-id flat washer (12)
- 3—Forward warhead section
- 4—Rear warhead section

Figure 6-6. Inspection and retightening of the forward to rear warhead section attach bolts.



	Paragraphs	Pages
Special shape insulation (missiles 10206 through 11935 and 13001 through 17055) -----	12-62	12-55
Installation -----	12-62b	12-55
Removal -----	12-62a	12-55
Rocket motor cluster:		
General—summary of section contents -----	12-100	12-96
Replacement of:		
Elevon lock -----	12-116	12-102
Installation -----	12-116b	12-102
Removal -----	12-116a	12-102
Fairing wedges -----	12-103	12-97
Installation -----	12-103b	12-97
Removal -----	12-103a	12-97
Filler blocks -----	12-106	12-98
Installation -----	12-106b	12-98
Removal -----	12-106a	12-98
Forward nozzle fairings -----	12-104	12-98
Installation -----	12-104b	12-98
Removal -----	12-104a	12-98
Forward retaining rail bars -----	12-113	12-101
Installation -----	12-113b	12-102
Removal -----	12-113a	12-101
Forward slipper -----	12-114	12-102
Installation -----	12-114b	12-102
Removal -----	12-114a	12-102
Impact cushion -----	12-117	12-103
Installation -----	12-117b	12-103
Removal -----	12-117a	12-103
Lower right or lower left fitting assembly -----	12-111	12-101
Installation -----	12-111b	12-101
Removal -----	12-111a	12-101
Lower rocket motors M5E1 -----	12-110	12-100
Installation -----	12-110b	12-100
Removal -----	12-110a	12-100
Nozzle fairings -----	12-105	12-98
Installation -----	12-105b	12-98
Removal -----	12-105a	12-98
Rear retaining rail bars -----	12-112	12-101
Installation -----	12-112b	12-101
Removal -----	12-112a	12-101
Rocket motor cluster fin assemblies -----	12-102	12-97
Installation -----	12-102b	12-97
Removal -----	12-102a	12-97
Rocket motor igniter cable assembly -----	12-115	12-102
Installation -----	12-115b	12-102
Removal -----	12-115a	12-102
Rocket motor igniters -----	12-101	12-97
Installation -----	12-101b	12-97
Removal -----	12-101a	12-97
Rocket motor thrust assembly -----	12-109	12-100
Installation -----	12-109b	12-100
Removal -----	12-109a	12-100
Upper right or upper left fitting assembly -----	12-107	12-99
Installation -----	12-107b	12-99
Removal -----	12-107a	12-99
Upper rocket motors M5E1 -----	12-108	12-99
Installation -----	12-108b	12-99
Removal -----	12-108a	12-99

## CHAPTER 7

### FINAL PREPARATION OF THE WARHEAD BODY SECTION AND THE FORWARD BODY SECTION

#### Section I. ELECTRICAL CABLE CONNECTIONS

##### 7-1. Installation of the Warhead Wiring Harness

a. Secure the warhead wiring harness (4, fig. 7-1) to the warhead body section (1) as prescribed in steps b through f below.

b. Place the warhead wiring harness, emerging from rear main fin 4, (5) along the surface of the warhead body section (1), and position the wiring harness in the fin bracket (3).

c. Insert the bracket (10) and wiring harness through the opening in the warhead body section. Place the cover (15) over the opening, secure to the warhead body section with the flathead screws (14), and torque to a value of 25 pound-inches.

d. Insert the flathead screws (14) through the cover of the warhead body section (1) and bracket (10). Install the flat washers (12) and (13) and hexagon nuts (11); do not tighten. Slide the bracket forward until the wiring harness fits snugly on the warhead body section. Torque to a value of 25 pound-inches.

*Note.* When replacing cables, the clamps inside the missile motor section between the boot and P508 and P509 may be removed if the cable assembly is too short. After removing the clamps, repeat step d above.

*Note.* Perform step e below for missiles 10206 through 11935.

e. Secure the wiring harness to the warhead body section with the clamps (6), truss-head screws (7), lockwashers (8), and flat washers (9).

f. Tie the wiring harness to the fin bracket (3) with nylon cord (2).

##### 7-2. Installation of the Transponder Control Group Wiring Harness

a. Secure the transponder control group wiring harness (6, fig. 7-2) to the warhead body section (1) as prescribed in b through h below.

b. Place the transponder control group wiring harness, emerging from rear main fin 3 (28), along the surface of the warhead body section, and position the wiring harness in the fin bracket (4).

c. Insert the bracket (13) and the wiring harness through the opening in the warhead body section. Place the cover (2) over the opening; secure to the warhead body section with the flathead screws (3); and torque to a value of 25 pound-inches.

d. Slide the bracket forward until the wiring harness fits snugly on the warhead body section; tighten the nuts (11) to a torque value of 25 pound-inches.

e. Secure the wiring harness to the bracket (22) with a clamp (27), roundhead screw (26), flat washer (21), and hexagon nut (20).

f. Secure the wiring harness to the bracket with a clamp (14), roundhead screw (18), flat washer (16), and hexagon nut (15).

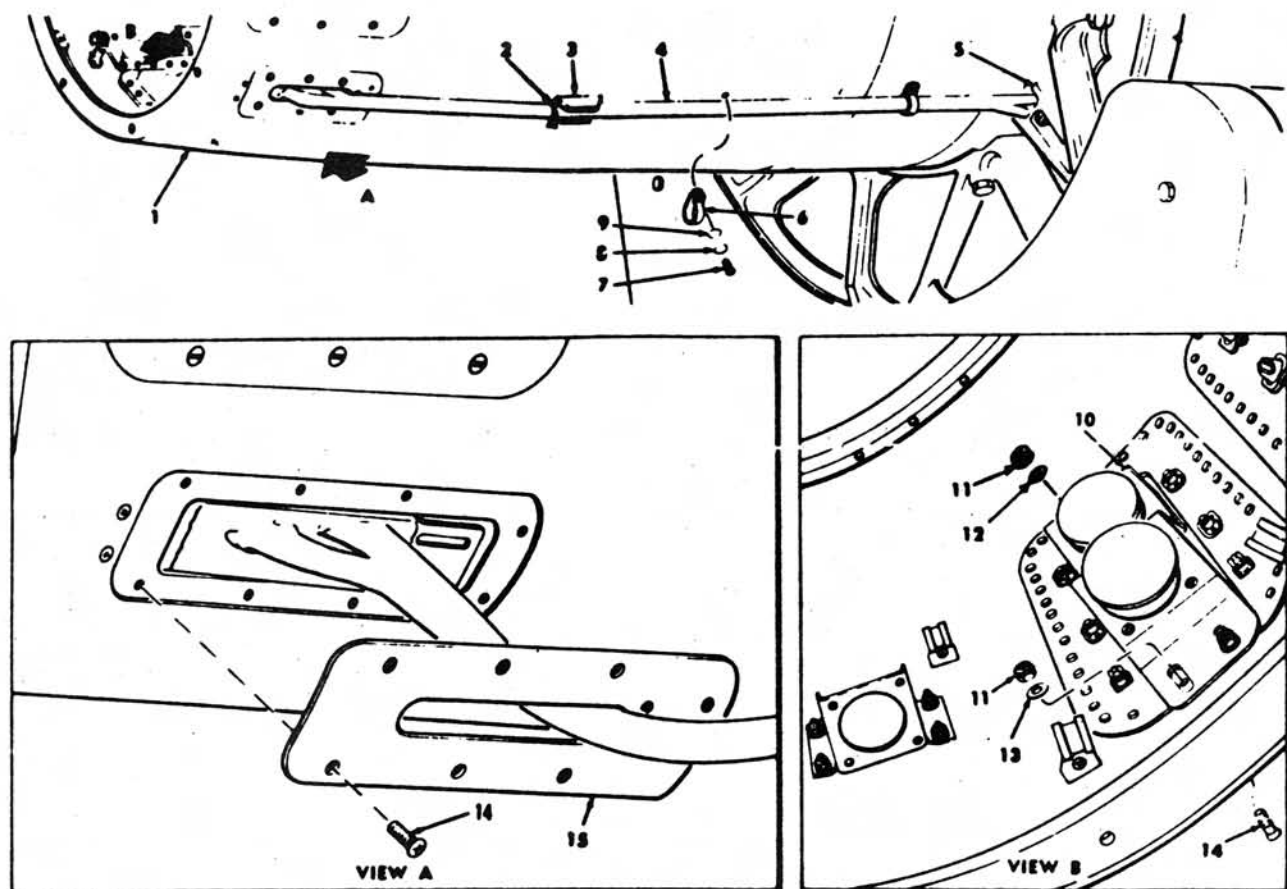
*Note.* Perform g below for missiles 10206 through 11935.

g. Secure the wiring harness to the warhead body section with the clamps (7), truss-head screws (10), lockwashers (9), and flat washers (8).

h. Tie the wiring harness to the fin bracket (4) with nylon cord (5).

##### 7-3. Installation of the Fail-Safe Control and Sequential Timer

*Note.* Perform a below for missiles 10206 through 11935. Perform b through d below for missiles 13001 and subsequent.



ORD 65368 B

- 1—Warhead body section
- 2—Nylon tape
- 3—Fin bracket
- 4—Warhead wiring harness
- 5—Rear main fin 4
- 6—Clamp S177096 (2)
- 7—No. 8-32 X 1/2 truss-hd screw 587437 (2)
- 8—No. 8 lockwasher MS35337-23 (2)

- 9—0.174-in-id fl washer AN960-3L (2)
- 10—Bracket
- 11—No. 10-32 hex nut MS20364-1032A (4)
- 12—0.203-in-id fl washer AN960-10 (2)
- 13—0.203-in-id fl washer AN960-10L (2)
- 14—No. 10-32 X 3/4 fl hd screw AN MS24693-S-274 (12)
- 15—Cover

**Figure 7-1. Removal and installation of the warhead wiring harness.**

a. Loosen the captive screws (12, fig. 3-30) that secure the fail-safe control (10) to the fail-safe control bracket (11) in the forward body section. Remove the fail-safe control and the sequential timer (7).

b. Remove the round head screws (5, fig. 7-3) and flat washers (6) that secure the fail-safe and timer bracket (2) to the forward body section (9). Remove the bracket, and replace the roundhead screws (5) and flat washers (6) in the forward body section (9).

c. Loosen the captive screws (1) that secure the fail-safe control (8) to the fail-safe and timer bracket; remove the fail-safe control.

d. Remove the hexagon-head bolts (3) and flat washers (4) that secure the sequential timer (7) to the fail-safe and timer bracket. Remove the sequential timer.

e. Visually inspect the fail-safe and sequential timer for damage. Report any damage to the supervisor.

f. Check that the insulation blanket (2, fig. 7-4) is installed in the fail-safe control bracket (1) in the warhead body section (3). Position the fail-safe control (6) on the fail-safe control bracket with connector J1 (8) forward, and secure with the captive screws (7).

*Note.* Whichever sequential timer connector is directed to be used by higher authority must be installed in the forward position.

g. Position the sequential timer (5) next to the fail-safe control, and secure with the flat-head screws (4). Torque the screws to 25 pound-inches.

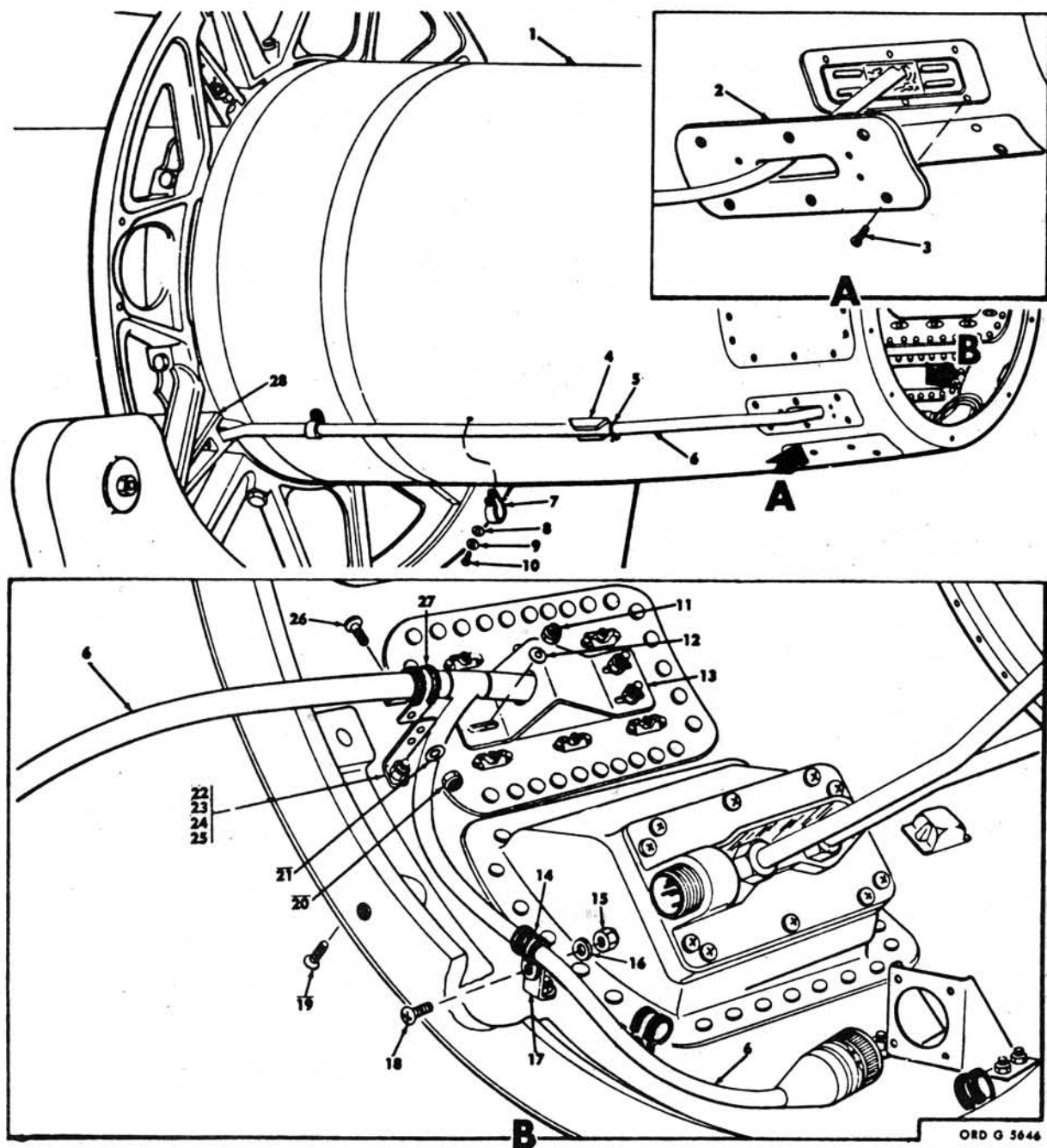
#### **7-4. Installation of the Fail-Safe Wiring Harness**

a. Install the fail-safe wiring harness in the warhead body section as prescribed in (1) through (8) below.

- (1) Install connector J503 (7, fig. 7-5) on the bracket (4) with the round-head screws (3), flat washers (8), and hexagon nuts (9).
- (2) Connect transponder control group wiring harness connector P503 (16) to connector J503 (7).
- (3) Connect fail-safe wiring harness connector P504 (1) to the connector on

safety-and-arming device mounting plate (2).

- (4) Connect fail-safe wiring harness connector P502 (3, fig. 7-6) to fail-safe control connector J1 (5), and secure by putting the latch (2) of connector P502 on the stud (4) of connector J1. Lock with safety wire (1).
  - (5) Connect fail-safe harness connector P511 (7) to TIMER connector J1 (8) or JUMPER connector J2 (9) on the sequential timer (10).
  - (6) Secure the fail-safe wiring harness (6) to the bracket (13) with a clamp (12), round head screw (11), flat washer (14), and hexagon nut (15).
  - (7) Secure the fail-safe wiring harness to the brackets (19) with the clamps (18), roundhead screws (20), flat washers (17), and hexagon nuts (16).
  - (8) Secure the fail-safe wiring harness (14, fig. 7-5) to the brackets (12) with the clamps (6, and 13), screws (5 and 15), washers (11) and hexagon nuts (10).
- b. Recheck connectors P503 (16) and P504 (1) and P502 (3, fig. 7-6) and P511 (7) for positive mechanical mating.



- 1—Warhead body section
- 2—Cover
- 3—No. 10-32 X 3/4 fl-hd screw (6)
- 4—Fin bracket
- 5—Nylon tape

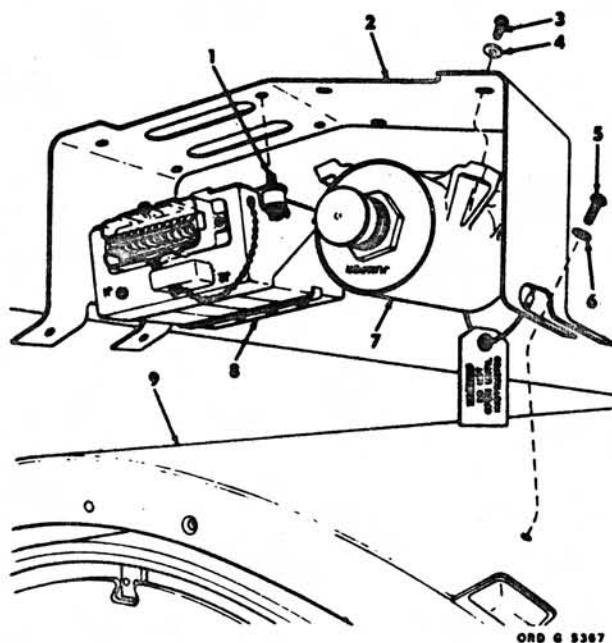
- 6—Transponder control group wiring harness
- 7—Clamp (2)
- 8—0.174-in-id fl washer AN960-8L (2)
- 9—No. 8 lockwasher (2)

Figure 7-2. Removal and installation of the transponder control group wiring harness.

- 10—No. 8-32 X 1/2 truss-hd screw (2) (missiles 10206 through 11935)
- 11—No. 10-32 hex nut (4)
- 12—0.203-in-id fl washer AN960-10 (4)
- 13—Bracket
- 14—Clamp
- 15—No. 8-32 hex nut
- 16—0.174-in-id fl washer
- 17—Bracket
- 18—No. 8-32 X 7/16 rd-hd screw

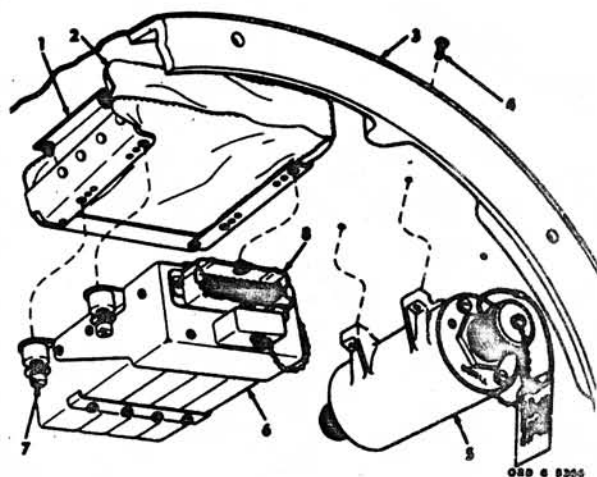
- 19—No. 10-32 X 3/4 fl-hd screw
- 20—No. 8-32 hex nut
- 21—0.174-in-id fl washer
- 22—Bracket
- 23—No. 10-32 X 1/2 fl-hd screw
- 24—0.203-in-id fl washer
- 25—No. 10-32 hex nut
- 26—No. 8-32 X 7/16 rd-hd screw
- 27—Clamp
- 28—Rear main fin 3

Figure 7-2—Continued.



- 1—Captive screw (4)
- 2—Fail-safe and timer bracket
- 3—No. 10-32 X 25/32 hex-hd bolt (4)
- 4—0.208-in-id fl washer
- 5—No. 8-32 X 5/8 rd-hd screw
- 6—0.174-in-id fl washer
- 7—Sequential timer
- 8—Fail-safe control
- 9—Forward body section

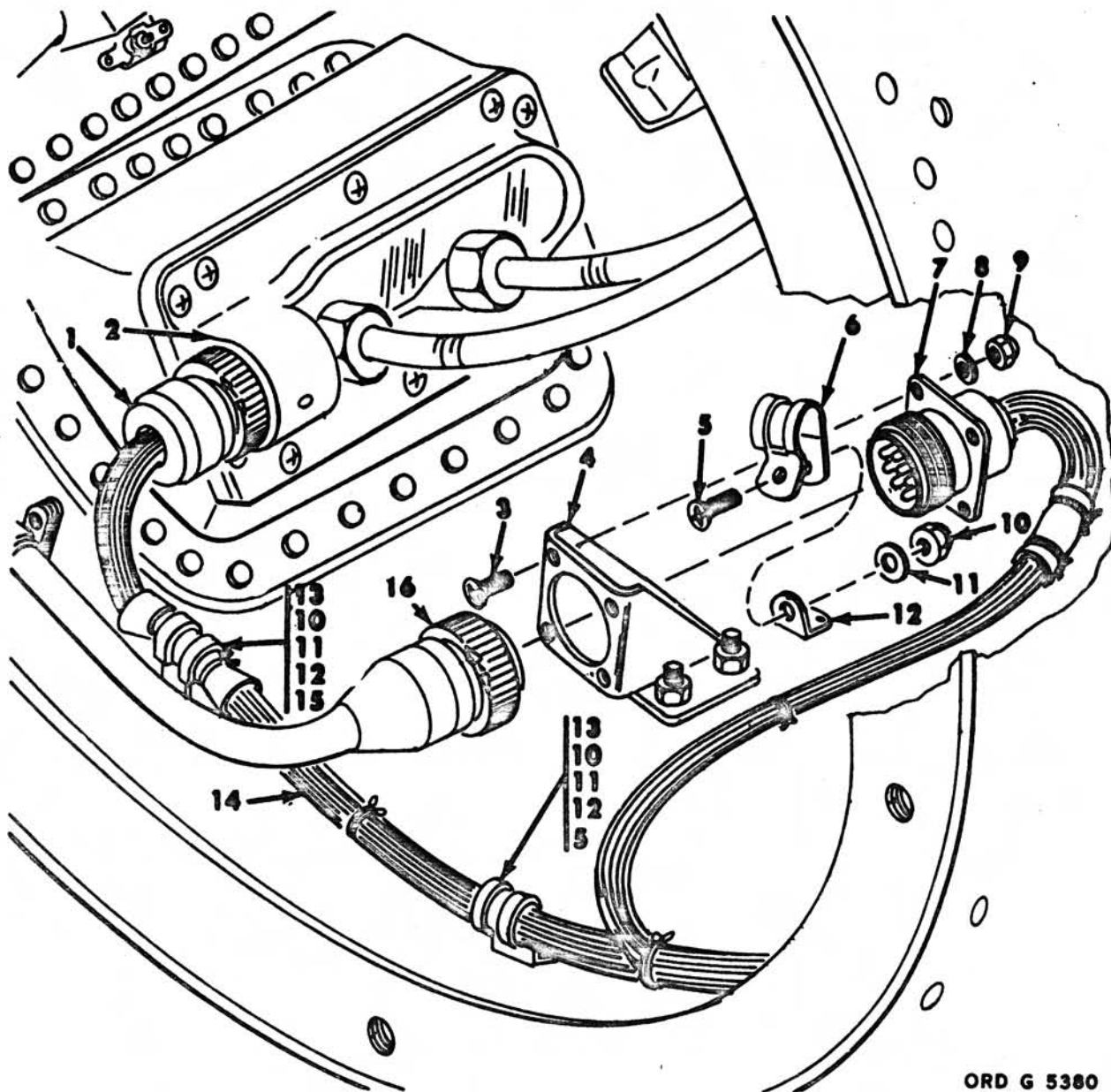
Figure 7-3. Removal and installation of the fail-safe bracket (missiles 13001 and subsequent).



- 1—Fail-safe control bracket
- 2—Insulation blanket
- 3—Warhead body section
- 4—No. 10-32 X 7/8 fl-hd screw (4)
- 5—Sequential timer
- 6—Fail-safe control
- 7—Captive screw (4)
- 8—Connector J1

Figure 7-4. Removal and installation of the fail-safe control and sequential timer.

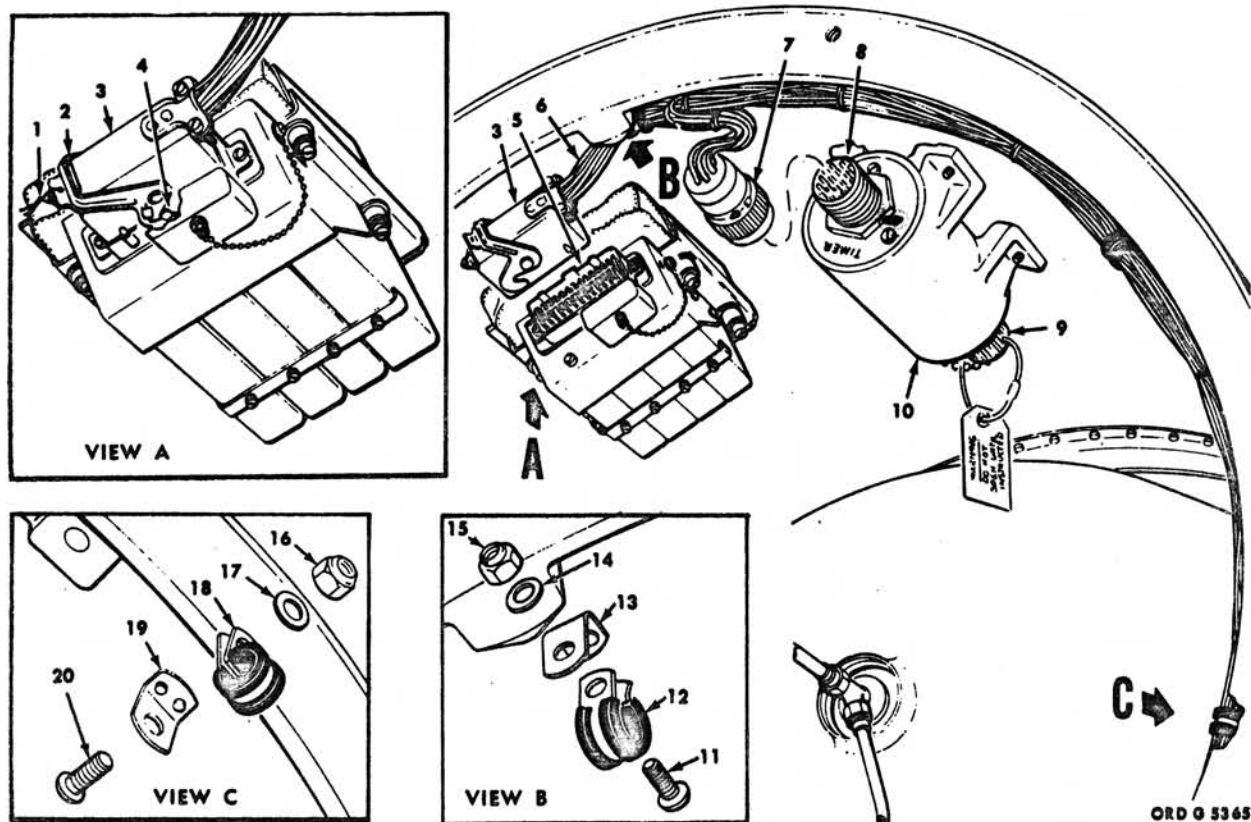




ORD G 5380

- |   |                                |
|---|--------------------------------|
| 1—Connector P504                          | 9—No. 4-40 hex nut (4)         |
| 2—Safety and arming device mounting plate | 10—No. 8-32 hex nut            |
| 3—No. 4-40 X 7/16 rd-hd screw (4)         | 11—0.174-in-id fl washer       |
| 4—Bracket                                 | 12—Bracket                     |
| 5—No. 8-32 X 1/2 rd-hd screw              | 13—Clamp                       |
| 6—Clamp                                   | 14—Fail-safe wiring harness    |
| 7—Connector J503                          | 15—No. 8-32 X 7/16 rd-hd screw |
| 8—0.125-in-id fl washer (4)               | 16—Connector P503              |

Figure 7-5. Removal and installation of the fail-safe wiring harness.



ORD G 5345

- 1—Safety wire
- 2—Latch
- 3—Connector P502
- 4—Stud
- 5—Fail-safe control connector J1
- 6—Fail-safe wiring harness
- 7—Connector P511
- 8—TIMER connector J1
- 9—JUMPER connector J2
- 10—Sequential timer

- 11—No. 8-32 X 1/2 rd-hd screw
- 12—Clamp
- 13—Bracket
- 14—0.174-in-id fl washer
- 15—No. 8-32 hex nut
- 16—No. 8-32 hex nut (2)
- 17—0.174-in-id fl washer (2)
- 18—Clamp (2)
- 19—Bracket (2)
- 20—No. 8-32 X 1/2 rd-hd screw (2)

Figure 7-6. Removal and installation of the fail-safe wiring harness.

## Section II. INSTALLATION OF THE FORWARD MAIN FIN AND THE FORWARD BODY SECTION

### 7-5. Installation of Forward Main Fins

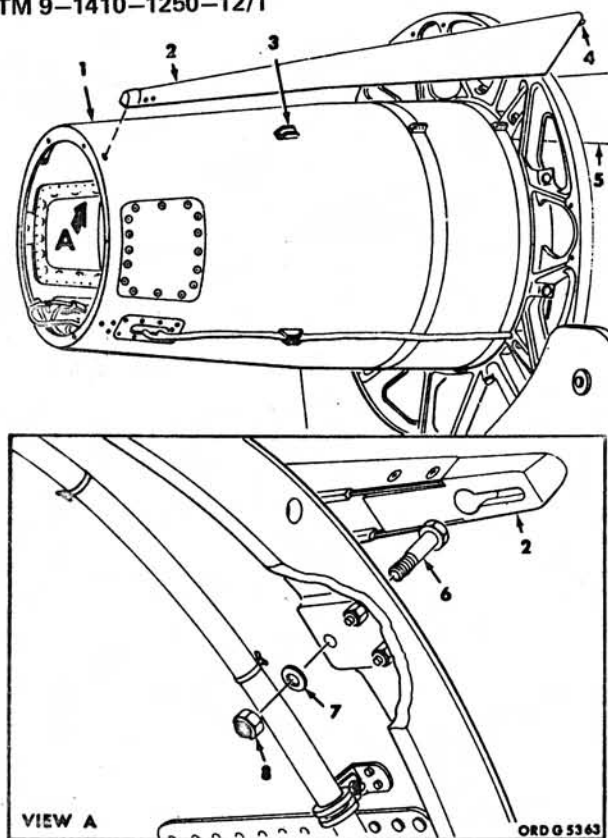
a. Install the forward main fin (2, fig. 7-7) on the warhead body section (1) as prescribed in (1) through (5) below.

(1) Insert the head of the hexagon-head bolt (6) in the slot in the forward main fin.

(2) Position the fin on the warhead body section; align the hexagon-head bolt with the

hole in the forward end of the warhead body section, align the fin over the fin bracket (3); insert the hexagon-head bolt in the hole in the warhead body section.

(3) Slide the fin toward the rear of the missile until the aligning pin (4) is seated in the hole in the rear main fin (5).



- 1—Warhead body section
- 2—Forward main fin
- 3—Fin bracket
- 4—Aligning pin
- 5—Rear main fin
- 6—5/16-24 X 1-17/32 hex-hd bolt
- 7—0.328-in-id fl washer
- 8—5/16-24 hex nut

Figure 7-7. Removal and installation of the forward main fins.

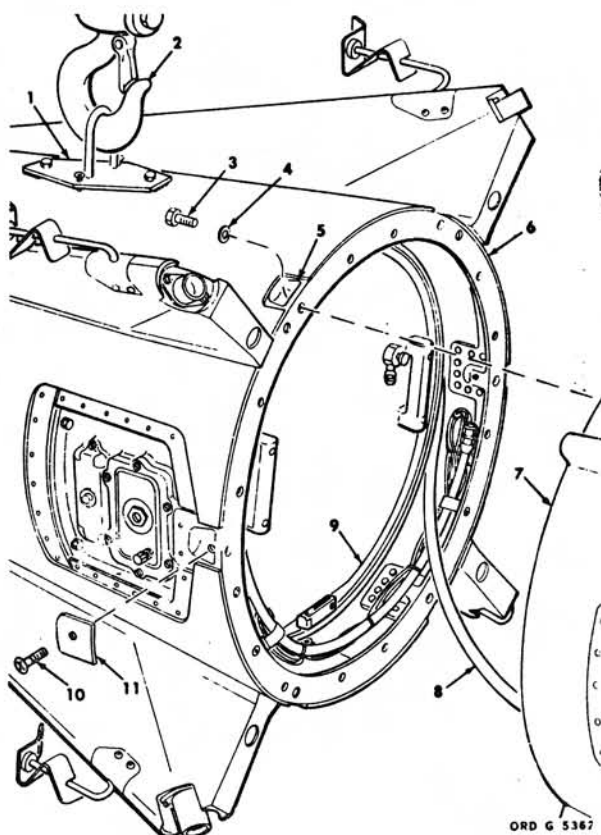
(4) Install a flat washer (7) and hexagon nut (8) on the hexagon-head bolt. Tighten the nut to the torque value given in table 15-9.

(5) Inspect the fin for gaps between the fin seal and warhead skin. A maximum gap of three-sixteenth of an inch is permissible between the bottom of the fin seal and the warhead skin.

b. Repeat the procedures in a above to install the three remaining forward main fins.

#### 7-6. Installation of the Forward Body Section

a. Perform the safety-and-arming device grounding continuity check, using the arming mechanism ohmmeter as prescribed in steps (1) through (13) below.



- 1—Forward body section hoist
- 2—Falling hook
- 3—5/16-24 X 27/32 hex-hd bolt (6)
- 4—0.328-in-id fl washer (6)
- 5—Boltwell (6)
- 6—Forward body section
- 7—Warhead body section
- 8—Transponder control group wiring harness
- 9—Transponder control group
- 10—No. 10-32 X 1-11/32 fl-hd screw (6)
- 11—Boltwell cover (6)

Figure 7-8. Removal and installation of the forward body section.

**Note.** Prior to using the arming mechanism ohmmeter, check the battery condition by shorting the ohmmeter terminals, using both test leads. If maximum needle deflection is to the left of the 16-ohm graduation on the upper scale, the battery should be replaced. Any deflection to the right of the 16-ohm graduation should be considered a full-scale deflection when performing this test.

(1) Disconnect connector P503 (16, fig. 7-5) from connector J503 (7).

(2) Connect a test lead to each terminal post of the arming mechanism ohmmeter, using an alligator clip on the end of each test lead.

(3) Place the probe of one test lead on pin K of connector P503. Check for conti-

nuity by placing the probe of the second test lead to pin L of the same connector. The ohmmeter indicates full-scale deflection. Remove the probes.

(4) Reach through the motor section access door opening, and disconnect missile umbilical cable connectors P145 and P146 (fig. 7-12) from connectors J145 and P146, respectively, on the bottom of the missile distribution box.

(5) Place the probe of one test lead on pin K of connector P503. Check for an open circuit by placing the probe of the second test lead to pin L of the same connector. The ohmmeter does not deflect. Remove the probes.

(6) Repeat step (5) using pins D and F of connector P503.

(7) Connect connector P145 to connector J145 and connect P146 to connector J146.

(8) Repeat step (3) above.

(9) Disconnect fail-safe wiring connector P504 (1, fig. 7-5) from the safety-and-arming device mounting plate (2).

(10) Place the probe of one test lead on pin A of connector P504. Check for an open circuit by placing the test probe of the second test lead on pin B of the same connector. The ohmmeter does not deflect. Remove the probes.

(11) Connect connector P503 to connector J503.

(12) Place the probe of one test lead on pin A of connector P504. Check for continuity by placing the probe of the second test lead on pin B of the same connector. The ohmmeter indicates full scale deflection.

(13) Connect connector P504 to the connector on the safety-and-arming device mounting plate.

b. Check the humidity indicator (4, fig. 12-2) (missiles 13001 and subsequent). The indicator color should be blue.

c. Install the forward body section (6, fig. 7-8) on the warhead body section (7) as prescribed below.

(1) Attach the falling hook (2) of a hoisting device capable of lifting at least 300 pounds to the forward body section hoist (1).

(2) Release the hand clamp (6, fig. 3-27) that secures the rear of the forward body section to the forward body section truck.

(3) Release the holddown strap that secures the front of the forward body section to the truck.

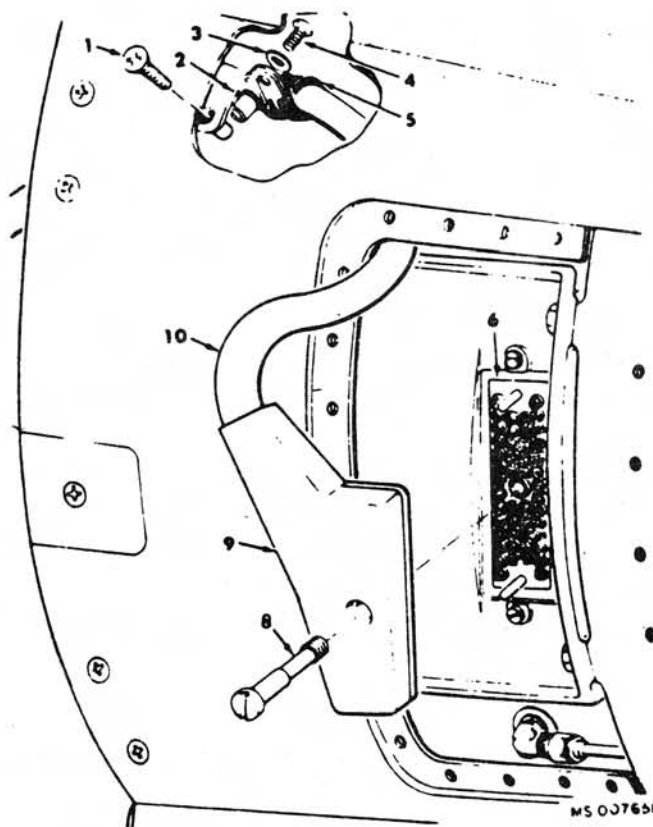
(3.1) Attach the ground strap from the forward body section (6, fig. 7-8) to the ground stake.

(4) Lift and position the forward body section close to the forward end of the warhead body section.

*Note.* Perform step (5) below for missiles 10206 through 11935.

(5) Remove the transponder control group wiring harness from the warhead body section, and place in the forward body section.

*Note.* Perform steps (6) through (15) below for missiles 13001 and subsequent.



- 1—No. 8-32 X 1/2 fl-hd screw
- 2—Support bracket
- 3—0.174-in-id fl washer
- 4—No. 8-32 X 5/8 truss-hd screw
- 5—Clamp
- 6—Connector J1
- 7—Deleted
- 8—1/4-28 X 1-13/16 shoulder bolt
- 9—Connector P1
- 10—Transponder control group wiring harness

Figure 7-9. Removal and installation of the transponder control group wiring harness.

(6) Insert the transponder control group wiring harness (8, fig. 7-8) between the right side of the transponder control group (9) and the forward body section. Move connector P1 (9, fig. 7-9) forward to the access opening.

(7) Remove the protective cover assembly from connector J1 (6).

(8) Position connector P1 (9, fig. 7-9) to connector J1 (6).

(9) Locate the approximate position of the support bracket (2) and clamp (5), on the wiring harness (10).

(10) Remove connector P1 from connector J1.

(11) Position the clamp around the wiring harness at the position determined in step (9) above, and assemble to the short end of the support bracket with a truss-head screw (4) and flat washer (3).

(12) Secure the support bracket to the missile skin with a flathead screw (1).

(13) Deleted.

(14) Insure that the rubber gasket has been removed and discarded, then mate P1 with J1 and torque the shoulder bolt to  $20 \pm 5$  pound-inches.

(15) Deleted.

**CAUTION:** Exercise care to prevent damage to the wiring harness while mating the forward body section to the warhead body section in step (16) below.

(16) Mate the forward body section (6, fig. 7-8) to the warhead body section (7), and insert the hexagon-head bolts (3) and flat washers (4) into the boltwells (5) in the forward body section.

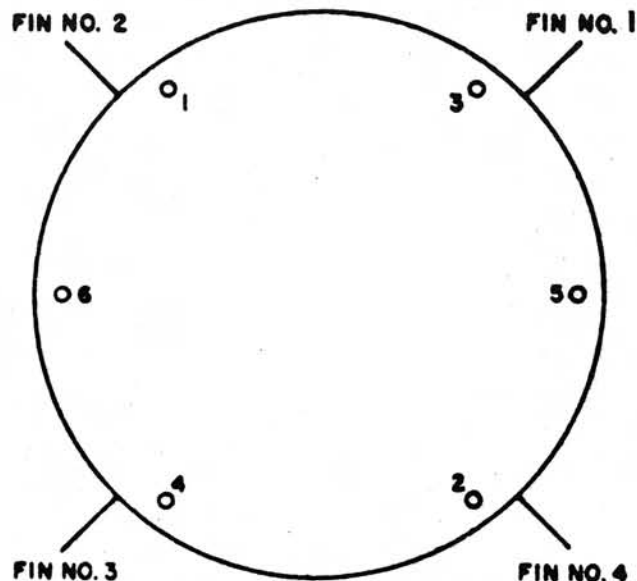
(17) Following the sequence of figure 7-10, tighten the hexagon-head bolts to an initial torque value of 90 pound-inches.

(18) Remove the tension from the forward body section hoist (1, fig. 7-8).

(19) Following the sequence in figure 7-10, loosen the hexagon-head bolts one at a time, and torque to the value given in table 15-9.

(19.1) Remove the ground strap from the forward body section.

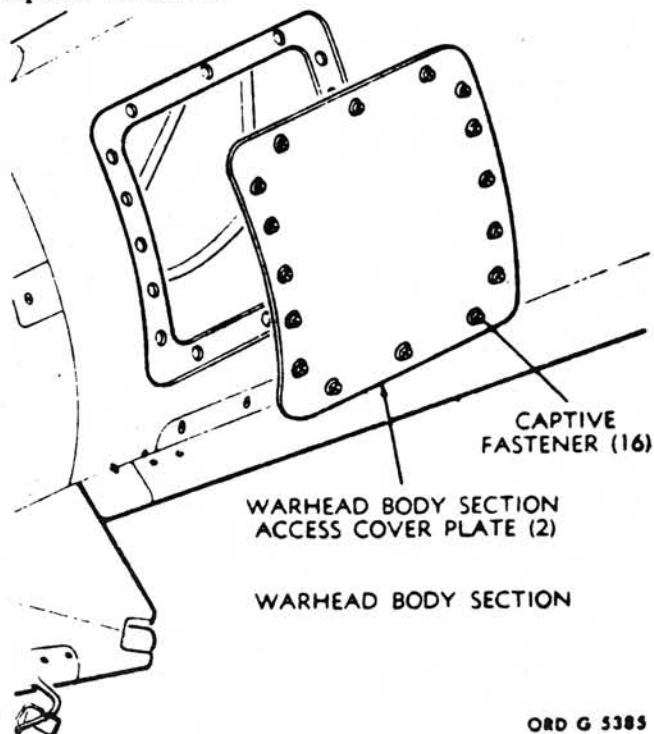
(20) Install the boltwell covers over the boltwells, and secure with the flathead screws. Tighten the screws to the torque value given in table 15-9.



ORD G 4576

Figure 7-10. Tightening sequence of the forward body section to the forward warhead section.

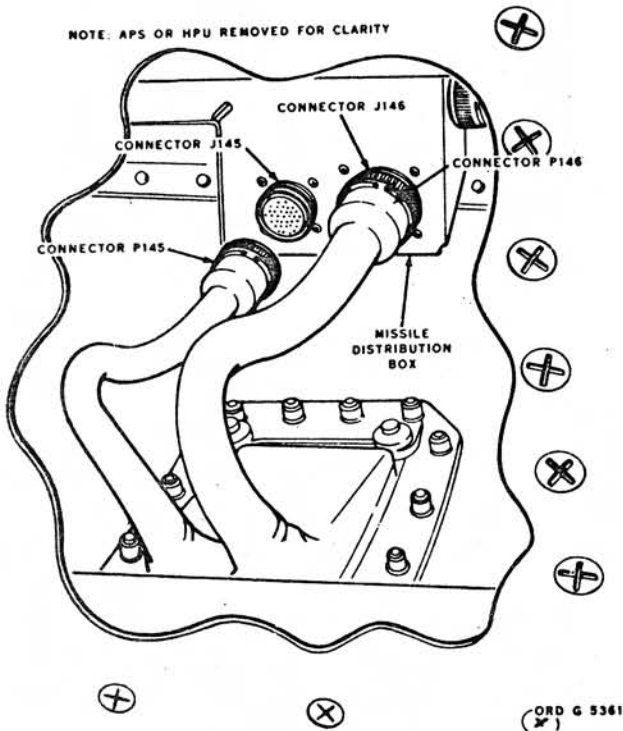
d. Remove the two warhead body section access cover plates (fig. 7-11) by releasing the captive fasteners.



ORD G 5385

Figure 7-11. Removal and installation of the warhead body section access cover plates.



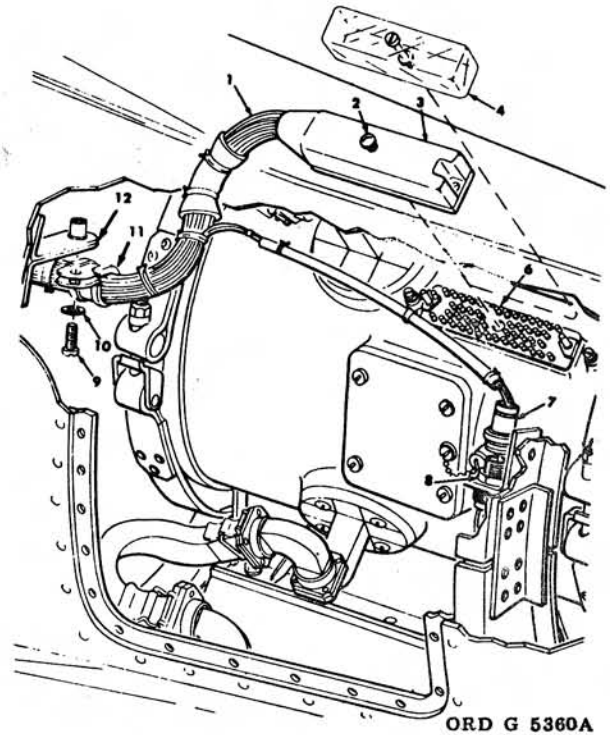


**Figure 7-12. Disconnection and connection of the missile umbilical cable connectors.**

Note. Perform (1) through (3) below for missiles 10206 through 11935.

(1) Remove the protective cover assembly (4, fig. 7-13); place a gasket (5) on connector J1 (6); connect connector J1; and secure with a shoulder bolt (2).

(2) Secure the transponder control group wiring harness (1) to the bracket (12) with a clamp (11), truss-head screw (9), and flat washer (10).



- 1—Transponder control group wiring harness
- 2—Shoulder bolt
- 3—Connector P1
- 4—Protective cover
- 5—Deleted
- 6—Connector J1
- 7—Connector P518
- 8—Connector J518
- 9—No. 10-32 X 1/2 truss-hd screw
- 10—0.203-in-id fl washer
- 11—Clamp
- 12—Bracket

**Figure 7-13. Removal and installation of the transponder control group wiring harness.**



(3) Connect connector P513 (7) to connector J513 (8).

e. Recheck connector P1 (9, fig. 7-9 or 3, fig. 7-13) and P513 (7, fig. 7-13) for positive mechanical mating.

f. Disengage the falling hook (2, fig. 7-8) from the hoist (1, fig. 7-14).

g. Remove the hexagon-head bolts (3, fig. 7-14) and flat washers (2) that secure the forward body section hoist (1) to the forward body section (4); remove the forward body section hoist.

h. Remove the flathead screws (5) stored in the hoist, and install in the hoist mounting holes in the forward body section.

i. Install the flat washers and hexagon-head bolts in the forward body section hoist, and place the hoist in the forward and rear body section container.

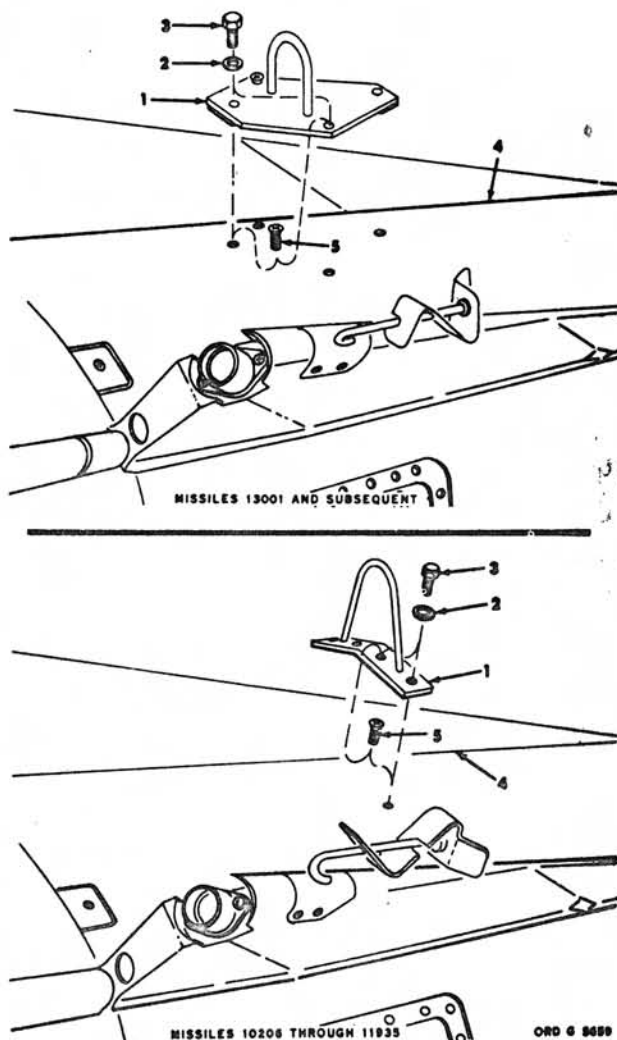
j. Install the GUIDANCE TEST AND ADJUST ACCESS DOOR (1, fig. 3-26 or 10, fig. 3-27) on the left side of the forward body section with the flathead screws. Tighten the screws to the torque value given in table 15-9.

**Caution:** On missiles 13001 and subsequent, prior to installing the J1 + XMTR ACCESS DOOR, insure that the transponder control group wiring harness is routed between the two self-locking nuts located on the upper left-hand corner of the access door opening to prevent penetration of the transponder control group wiring harness by the access door screws.

k. Install the J1 + XMTR ACCESS DOOR (7, fig. 3-26 or 3, fig. 3-27) on the right side of the forward body section with the flathead screws. Tighten the screws to the torque value given in table 15-9.

**Note.** Perform l below for missiles 10206 through 11935.

l. Install the INERTIA SWITCH AND ADJUST ACCESS DOOR assembly (3, fig. 3-26) on the left side of the forward body section with the flathead screws. Tighten the screws to the torque value given in table 15-9.



- 1—Forward body section hoist 9032986 (missiles 10206 through 11187) or 9028230 (missiles 11118 through 11935) or 9028292 13001 and subsequent)
- 2—3/8-in.-id fl washer (2) (missiles 10206 through 11935) or 0.2 81-in.-id fl washer (2) (missiles 13001 and subsequent)
- 3—1/4-28 X 7/8 hex-hd bolt (2) (missiles 10206 through 11935) or 1/4-28 X 1 hex-hd bolt (2) (missiles 13001 and subsequent).
- 4—Forward body section.
- 5—1/4-28 X 17/32 fl-hd screw (2) (missiles 10206 through 11935) or 1/4-28 X 21/32 fl-hd screw (2) (missiles 13001 and subsequent).

Figure 7-14. Removal and installation of the forward body section hoist.

m. Install the two warhead body section access cover plates (fig. 7-11) by securing with the captive fasteners.

n. Install the right and left missile motor section access doors (3, fig. 3-20), and secure with the flathead screws. Tighten the screws to the torque value given in table 15-9.

## 7-7. Test of the Guidance Set Squib Battery (Missiles 13684 and Subsequent)

### a. General.

(1) There are several configurations of the guidance set squib battery BA-472 series (7, fig. 10-3). The differences in the models lie in the heater and the heater monitor circuits.

(2) Precondition the battery to be tested to ambient temperatures below +80°F for a period of not less than four hours to insure that the heater circuit and the heat monitor circuit may be effectively tested in accordance with these procedures.

(3) The connector cap provided by MWO 11-6135-200-30/1 assures a method of accomplishing the battery electrical test with the battery squib circuit (pins I and J) properly shorted. If the connector cap (1, fig. 7-15) was not provided by MWO 11-6135-200-30/1 or not reworked as prescribed in steps (a) through (c) below, then perform steps (a) through (c) below.

(a) Remove the connector cap from the battery, and take the cap to a suitable work area.

(b) Using a no. 8 drill, drill the holes connected by the dotted lines, as illustrated in figure 7-16.

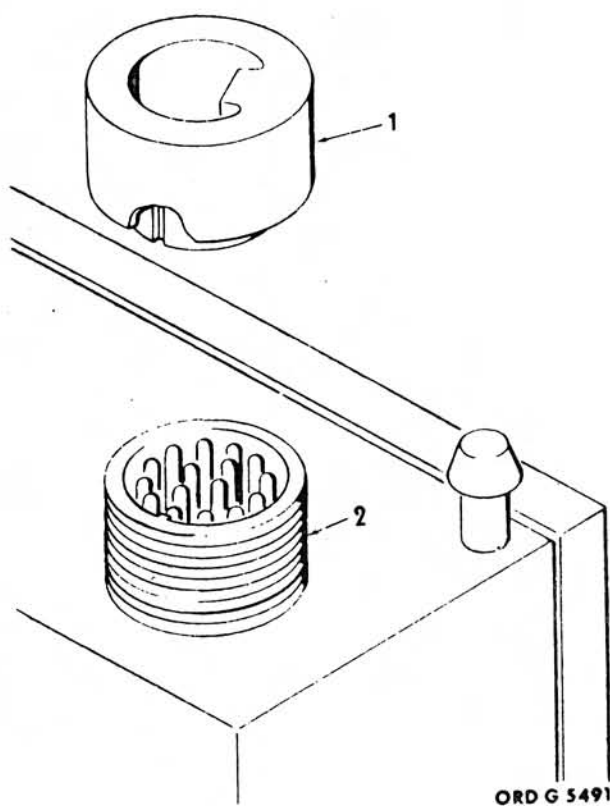
(c) Remove the drilled-out portion, and smooth all rough edges.

### b. Visual Inspection.

(1) Remove the connector cap (1, fig. 7-15), and inspect the threads of the electrical connector for damage and foreign matter.

(2) Inspect the electrical connector for corrosion, damage, or bent pins.

(3) Inspect the base of the electrical connector for foreign matter, moisture, metal chips, and dust. Remove all traces of foreign matter. Use a small wad of cotton on a wooden probe or clean, dry air to remove foreign matter.



1—Connector cap

2—Electrical connector

Figure 7-15. Removal and installation of the guidance set squib battery connector cap.

(4) Inspect the base of the electrical connector for damage to the silicone rubber gasket. A damaged silicone rubber gasket in the base of the electrical connector shall be removed and replaced by a serviceable gasket.

(5) Clean the connector cap, and install it on the electrical connector.

(6) Inspect the exterior of the battery case for corrosion. Remove any corrosion with bronze or aluminum wool. Apply a thin coat of soft film corrosion preventive compound to the cleaned area.

### c. Electrical Test.

**CAUTION:** Electrical currents insufficient to cause battery activation may be large enough to desensitize the battery squib match. A current in excess of 10 milliamperes may render the squib match insensitive.

**CAUTION:** Only the equipment referenced below will be used in performing the battery electrical tests.

(1) In the connector cap, use a multimeter to insure that continuity exists between I and J receptacles.

(2) Assure that the connector cap (1, fig. 7-15) is properly installed in the electrical connector.

(3) With a multimeter set to the 0- to 50-volt range and the negative probe connected to pin N, determine if any potential difference exists between pins N and P. A difference in potential indicates that the battery has been activated.

(4) Set the multimeter to the RX 10000 range, and test for an open circuit between pins F and O. A closed circuit indicates the battery is defective.

(5) Set the multimeter to the RX10 range, and test for a closed circuit between pins A and L. The meter indicates full scale deflection.

(6) Measure the resistance between heater circuit pins D and E. The meter indicates 110 to 160 ohms.

(7) Measure the resistance of the heat monitor circuit pins G and H. The meter indicates 0 to 40 ohms.

(8) Set the multimeter to the RX 10000 range, and measure the resistance between the battery case and each exposed pin in turn. The meter indicates in excess of one megohm.

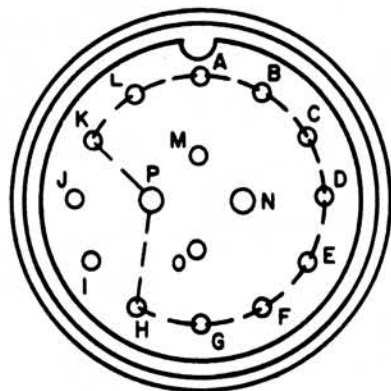
(9) Remove the connector cap (1, fig. 7-15) from the electrical connector (2).

**CAUTION:** Do not introduce current between pins I and J in performing the following tests.

(10) Measure the resistance between pins I and J to the case. The meter indicates in excess of one megohm for each pin.

**CAUTION:** The arming mechanism ohmmeter (blasting galvanometer) is to be used for establishing continuity between battery squib circuit pins I and J.

(11) Short the test leads of the ohmmeter together to determine the serviceability of the ohmmeter battery and establish a meter indication.



ORD G5499A

Figure 7-16. Rework of the connector cap.

**Note.** If the maximum needle deflection is to the left of the 16-ohm graduation on the upper scale, replace the battery. Any deflection to the right of the 16-ohm graduation should be considered a full-scale deflection when performing this test.

**CAUTION:** Do not allow the test leads to touch the case when performing the test.

(12) Touch the ohmmeter test leads to pins I and J. The meter indication should not be more than 1 ohm higher than the indication obtained in step (11) above.

(13) Replace the connector cap on the electrical connector.

#### 7-8. Installation of the Guidance Set Squib Battery (Missiles 13684 and Subsequent)

**WARNING:** A possible explosion hazard exists if hydrogen from an activated battery is not properly vented externally to the missile.

a. Remove the flathead screws (7 and 9, fig. 3-21) from the equipment section access cover plate on the left side of the missile; remove the cover plate.

b. Place the guidance set squib battery (7, fig. 10-3) on the missile battery rack (10), and secure with the fillister-head screws (8) and flat washers (9). Do not connect the connector.

c. Place the hose clamp (5) on the battery drain hose (3); position the drain hose on the battery vent (6); and secure with the hose clamp.

c.1. Ascertain that connector P540 on the mounting panel is connected to connector J540 on the missile distribution box.

**Caution:** The shorting spring across the squib circuit pins of the guidance set squib battery connector or the shorting connector on the squib battery must be removed prior to performing *d* below.

**Caution:** Prior to installation of the battery in the missile, inspect the base of the electrical connector for the presence of the silicone rubber gasket. Inspect the electrical connector for the presence of moisture or foreign material on top of the silicone rubber gasket. Use a small wad of cotton on a wooden probe or clean, dry air to remove moisture or foreign material from the connector and gasket. A damaged silicone rubber gasket in the base of the electrical connector is to be removed and replaced by a serviceable gasket.

d. Connect connector P541 to the connector on the guidance set squib battery.

e. Install the left equipment section access cover plate (8, fig. 3-21) on the left side of the missile, and secure with the flathead screws (7 and 9). Tighten the screws to the torque value given in table 15-9.

### 7-9. Test of the HPU Squib Battery BA-485/U (Missiles 14965 and Subsequent)

**Note.** Precondition the battery at temperatures below +85°F for four hours prior to performing the electrical tests.

#### a. Visual Inspection.

- (1) Remove the shorting dummy connector (1, fig. 10-4) from connector J544 (3).
- (2) Inspect the external threads of connector J544 for damage or foreign material. Clean the threads if necessary.
- (3) Inspect the interior of connector J544 for corrosion, foreign material, and bent pins.
- (4) Use a small wad of cotton on a wooden probe or clean, dry air to remove all traces of foreign material.

- (5) Assure that all foreign material has been removed from the interior of connector J544.

- (5.1) Use a multimeter to insure continuity between C and E receptacles of the connector cap.
- (6) Install the shorting dummy connector on connector J544.
- (7) Inspect and clean the + and - power output terminals.

#### b. Electrical Tests.

**Caution:** Electrical currents insufficient to cause battery activation may be large enough to desensitize the battery squib match. A current in excess of 10 milliamperes may render the squib match insensitive.

- (1) Set the multimeter to its 0- to 50-volt range.
- (2) Make certain that a potential difference does not exist between the + or - power output terminals. If a difference exists, the battery has been activated and should be rejected.
- (3) Set the multimeter to the R X 10,000 range.
- (4) Check for an open circuit between the + and - power output terminals. If a closed circuit is indicated, the battery has been activated and should be rejected.
- (5) Remove the shorting dummy connector (1, fig. 10-4) from connector J544 (3).

**Caution:** Do not introduce current between pins C and E in performing the following tests.

- (6) Check for an open circuit between pins A and G of connector J544. A closed circuit indicates that the battery is defective and should be rejected.
- (7) Check for an open circuit between pins D and F, D and J, F and J, C and case, and E and case of connector J544. Reject the battery if the resistance is less than one megohm.
- (8) Check the resistance between each of the remaining pins in connector J544 and the battery case. The resistance



readings should be in excess of one megohm. If this requirement is not met, reject the battery.

- (9) Set the multimeter to the R X 10 range.
- (10) Measure the resistance between pins A and I. The resistance should be 0 ohms when the battery temperature is below +85°F. If this requirement is not met, reject the battery.
- (11) Measure the resistance between pins B and H. Reject the battery if the indication is not between 45 and 65 ohms.

**CAUTION:** The arming-mechanism ohmmeter (blasting galvanometer) is to be used for establishing continuity between battery squib circuit pins C and E.

*Note.* If corrective maintenance is being performed due to a heat monitoring problem, although the above checks indicate that the battery is good, further checks are necessary. The battery should be returned to the support shop and checked according to TB 11-6135-200-25.

- (12) Short the test leads of the ohmmeter together to determine the serviceability of the ohmmeter battery and establish a meter indication.

**CAUTION:** Do not allow the test leads to touch the case when performing the test.

*Note.* If the maximum needle deflection is to the left of the 16-ohm graduation of the upper scale, replace the battery. Any deflection to the right of the 16-ohm graduation should be considered a full-scale deflection when performing this test.

- (13) Touch the ohmmeter test leads to pins C and E. The meter indication should be between 20 and 35 ohms. If this requirement is not met, reject the battery.

- (14) Replace the shorting dummy connector J544.

## 7-10. Installation of the HPU Squib Battery (Missiles 14965 and Subsequent)

**WARNING:** A possible explosion hazard exists if hydrogen from an activated battery is not properly vented externally to the missile.

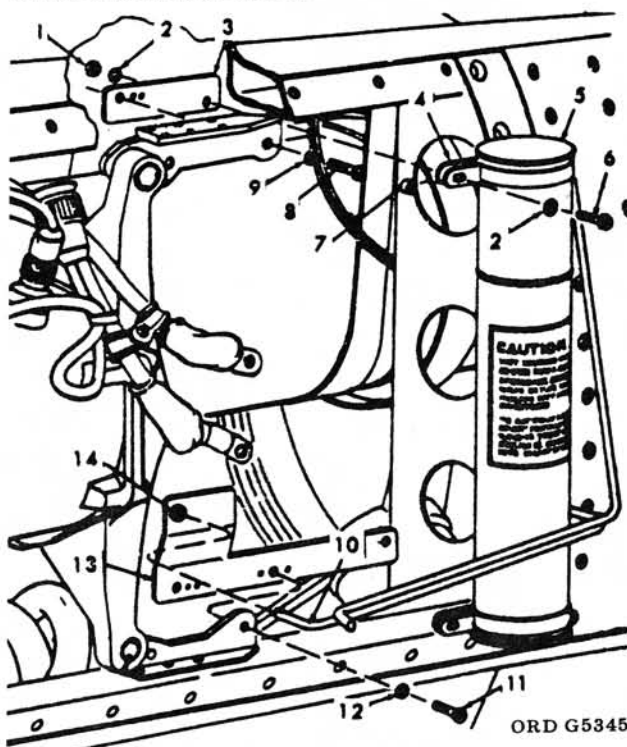
a. Remove the flathead screws (3 and 10, fig. 3-21) from the right equipment section

access cover plate (2) on the right side of the missile body; remove the cover plate.

b. Remove the hexagon nuts (1, fig. 7-17), flat washers (2), spacers (7), and truss-head screws (6). Remove the ventilator assembly (5).

c. Remove the panhead screw (8), flat washer (9), and the shipping support (3), and place the shipping support in the forward and rear body section shipping container.

d. Place the HPU squib battery (3, fig. 12-47) in the equipment section, and align the mounting holes in the battery with the mounting holes in the missile structure.



- 1—No. 10-32 hex nut (2)
- 2—0.203-in-id fl washer (4)
- 3—Shipping support
- 4—Support bracket (2)
- 5—Ventilator assembly
- 6—No. 10-32 X 5/8 truss-hd screw (2)
- 7—0.214 X 3/32 spacer (2)
- 8—1/4-28 X 3/4 pan-hd screw
- 9—0.265-in-id fl washer
- 10—Overflow tube
- 11—1/4-28 X 3/4 pan-hd screw (2)
- 12—0.265-in-id fl washer (2)
- 13—Shipping support
- 14—Grommet

Figure 7-17. Removal and installation of the shipping supports (missiles 15976 and subsequent).



e. Install the hexagon-head bolts (9), flat washers (10), and hexagon nuts (11) to secure the HPU squib battery to the missile structure. Tighten the bolts to the torque value given in table 15-9.

f. Place the coupling nut (7) and the sleeve (8) on the overflow tube (6) of the ventilator assembly (4).

g. Remove the shipping plug from the ventilator assembly.

h. Position the ventilator assembly on the HPU squib battery, and secure with the hexagon nuts (5), flat washers (2), and truss-head screws (1).

*Note.* Insure that the overflow tube is fully bottomed in the battery vent fitting before tightening the coupling nut.

i. Connect the coupling nut to the squib battery, and tighten to the torque value given in table 15-9.

j. Remove the hexagon nut (9, fig. 12-43), lockwasher (8), and flat washers (7), from the positive terminal stud (11).

k. Connect the positive lead (10) to the positive terminal stud, and secure with flat

washer, lockwasher, and hexagon nut. Position the cable nipple (6) over the terminal.

l. Repeat steps j and k above to connect the negative lead (5).

m. Remove the shorting dummy connector from connector J544, and connect connector P544 to J544.

**Caution:** Exercise care when installing the right equipment section access cover plate to prevent damage to the HPU squib battery overflow tube.

*Note.* The battery overflow tube may be misaligned or not properly seated, causing a gap between the equipment section access cover plate and the plate (5, fig. 3-21). If the misalignment cannot be corrected without damage to the tube or grommet, a gap not to exceed 1/8 inch is acceptable. Weather cracks are acceptable provided the grommet holds the battery overflow tube securely. The grommet should be replaced when the access door is removed for maintenance.

n. Install the flathead screws (3 and 10) to secure the equipment section access cover plate in position on the right side of the missile body. Tighten the screws to the torque value given in table 15-9.

### Section III. INSTALLATION OF THE REAR ROLL RING

#### 7-11. Preparation to Lift the Missile

*Note.* In certain units where the hoist in the warhead building does not travel from end to end, the missile body truck may be moved the required distance to accomplish the procedures in this section.

a. Attach the missile body hoist beam (fig. 9-17) to the falling hook of a hoisting device capable of lifting 6,000 pounds.

b. Remove the self-locking retaining pins from the bracket assembly and adapter pin assemblies from the hoisting adapter.

c. Lower the missile body hoist beam into position above the handling ring segments and the missile body rear lift point.

d. Remove the eyebolt from the self-locking eyehook.

**Warning:** Check that the threads of the eyebolt and the missile body rear lift point are in good condition.

e. Install the eyebolt in the missile body rear lift point.

**Warning:** Check that the flange of the eyebolt is flush with the missile body.

f. Attach the self-locking eyehook to the eyebolt.

g. Lower the missile body hoist beam, and guide the hoisting adapter onto the handling ring segments.

h. Aline the pin holes in the bracket assembly with the pin holes in the upper handling ring segment, and install the two self-locking retaining pins.

i. Aline the pin holes in the hoisting adapter with the pin holes in the handling ring segment on the side of the missile body, and install the four adapter pin assemblies.

j. Raise the missile body hoist beam slightly to apply tension to the hoist beam.

k. Remove the self-locking pins that secure the handling ring segment to the rear cradle on the missile body truck, and lift the missile body enough to install the rear roll ring.

#### 7-12. Installation of the Rear Roll Ring

a. Install the rear roll ring (fig. 3-12) on the rear body section, and secure in position with the captive bolts.

b. Lower the missile body (fig. 9-1) onto the missile body truck.

**Caution:** Make certain that the rear roll ring is fully seated in the groove of the wheels as shown in figure 3-13.

c. Lock the rear body section in position on the missile body truck with the lock pin on the forward cradle and the self-locking pins on the rear cradle of the missile body truck.

d. Lower the missile body hoist beam to release tension on the hoist beam.

e. Remove the self-locking retaining pins that attached the bracket assembly to the handling ring segment, and the adapter pin assemblies that attached the hoisting adapter to the handling ring segments.

f. Remove the self-locking eyehook from the eyebolt.

g. Remove the eyebolt from the missile body rear left point, and attach the eyebolt to the self-locking eyehook.

h. (Deleted)

i. Install the plug in the missile body rear lift point.

j. Remove the hoist beam from the missile body.

k. Install the self-locking retaining pins in the bracket assembly and the adapter pin assemblies in the hoisting adapter.

l. Remove the ground strap from the aft body section before the missile is moved from the area.

	Paragraphs	Pages
<b>Shipping and storage containers:</b>		
General—summary of section contents .....	12-91	12-91
<b>Replacement of:</b>		
Air valve .....	12-92	12-91
Installation .....	12-92b	12-91
Removal .....	12-92a	12-91
Container cover seal .....	12-97	12-94
Installation .....	12-97b	12-94
Removal .....	12-97a	12-94
Forward body section shipping support channel .....	12-98	12-94
Installation .....	12-98b	12-96
Removal .....	12-98a	12-94
Handle on the quick-release clamp .....	12-94	12-91
Installation .....	12-94b	12-92
Removal .....	12-94a	12-92
Inspection panel and gasket .....	12-95	12-92
Installation .....	12-95b	12-92
Removal .....	12-95a	12-92
Relief valve .....	12-93	12-91
Installation .....	12-93b	12-91
Removal .....	12-93a	12-91
Support arm .....	12-99	12-96
Installation .....	12-99b	12-96
Removal .....	12-99a	12-96
Window frame and gasket .....	12-96	12-93
Installation .....	12-96b	12-93
Removal .....	12-96a	12-93
<b>Warhead body section:</b>		
<b>Replacement of:</b>		
Fail-safe control bracket and insulation blanket .....	12-57	12-52
Installation .....	12-57b	12-52
Removal .....	12-57a	12-52
Missile fin bracket .....	12-58	12-53
Installation .....	12-58b	12-53
Removal .....	12-58a	12-53
Safety-and-arming device clip and clip bracket .....	12-59	12-53
Installation .....	12-59b	12-54
Removal .....	12-59a	12-53
Warhead body section access cover plates .....	12-56	12-51
Installation .....	12-56b	12-51
Removal .....	12-56a	12-51
Warhead body section boltwell covers .....	12-60	12-54
Installation .....	12-60b	12-54
Removal .....	12-60a	12-54
<b>Differences among models:</b>		
Actuator section .....	1-11	1-3
Equipment section .....	1-10	1-3
Forward body section .....	1-9	1-3
General .....	1-8	1-3
<b>Final preparation of the missile:</b>		
Adjustment of the missile-away switch .....	10-3	10-9
Inspection and alignment of the ram-pressure probes .....	10-6	10-16
Installing the missile on the launcher .....	10-1	10-1
Propulsion arming lanyard, installation of .....	10-2	10-8
Rocket motor igniters M24A1, M65, or M69, installation of .....	10-4	10-9
Safety-and-arming device M20A1, installation of .....	10-5	10-13
<b>Final preparation of the warhead body section and the forward body section</b>		
<b>Electrical cable connections:</b>		
Fail-safe control and sequential timer, installation of .....	7-3	7-1
Fail-safe wiring harness, installation of .....	7-4	7-3

## CHAPTER 8

### ASSEMBLY OF THE ROCKET MOTOR ASSEMBLY

#### 8-1. General

The rocket motor cluster is shipped in an individual shipping and storage box (less fins) as an assembled unit, or in six separate shipping and storage boxes as a disassembled unit. The uncrating procedures are outlined below for both the assembled and the disassembled units. Rocket motor fins shipping and storage box M32 is shipped with disassembled units. Rocket motor fins shipping and storage box M39 is shipped with assembled units.

#### 8-2. Uncrating Rocket Motor Fins Shipping and Storage Box M32

a. Perform the inspection of rocket motor fins shipping and storage box M32 (par. 3-4).

b. Break the lead seals located on the two cover fasteners.

c. Cut the shipping straps that secure the cover to the box.

d. Turn the swivels (A, fig. 8-1) on the two cover fasteners.

e. Release the hasp from each of the two cover fasteners, and raise the cover.

f. Use the finger holes (B) at each end of the fin assembly fittings container, and lift the container from the box.

g. Remove the nozzle fairing and miscellaneous hardware container from the box.

h. Remove the wing nut (C) lock-washer, flat washer, and squareneck bolt from each of the two braces that secure the fin assemblies shipping support in the box.

i. Place the shipping and storage box (D) on its side, with the cover on top to facilitate the removal of the rocket motor cluster fin assemblies.

j. Remove the fin assemblies shipping support.

k. Carefully remove the rocket motor cluster fin assemblies.

l. Remove all corrosion-preventive compound from the unpainted surfaces of the fin assemblies.

m. Inspect each fin assembly for external damage.

n. Place two fin assemblies (fig. 8-2) in the right side of the fin storage rack on the rocket motor cluster truck by performing the operations listed in steps (1) through (3) below.

(1) Loosen the hand nut that secures the channel to the fin storage rack on the truck, and lower the channel.

(2) Place the fin assemblies in the fin storage rack.

(3) Raise the channel, and secure it to the truck with the hand nut.

o. Repeat *n* above to place the two remaining fin assemblies in the left side of the fin storage rack on the rocket motor cluster truck.

p. Check the components shipped in the fin assembly fittings container (B, fig. 8-1) and the nozzle fairing and miscellaneous hardware container against their respective packing lists, and place in a suitable area.

q. Report any damaged or missing parts to the supervisor.

r. Remove all corrosion-preventive compound from the unpainted or interior surfaces of the components.

s. Close the cover (A), and secure it with the hasps and swivels.

t. Return the shipping and storage box to the storage area.

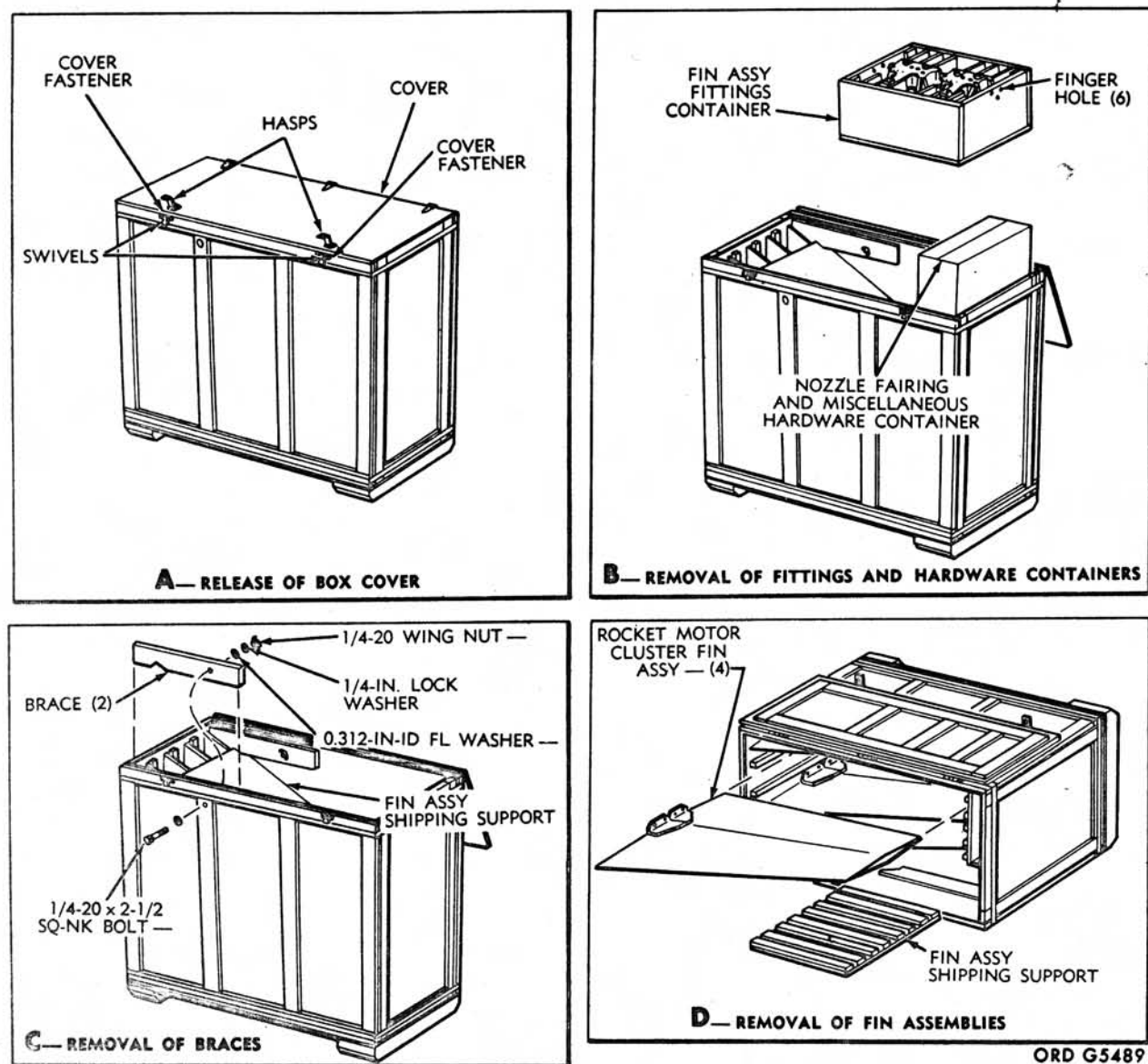


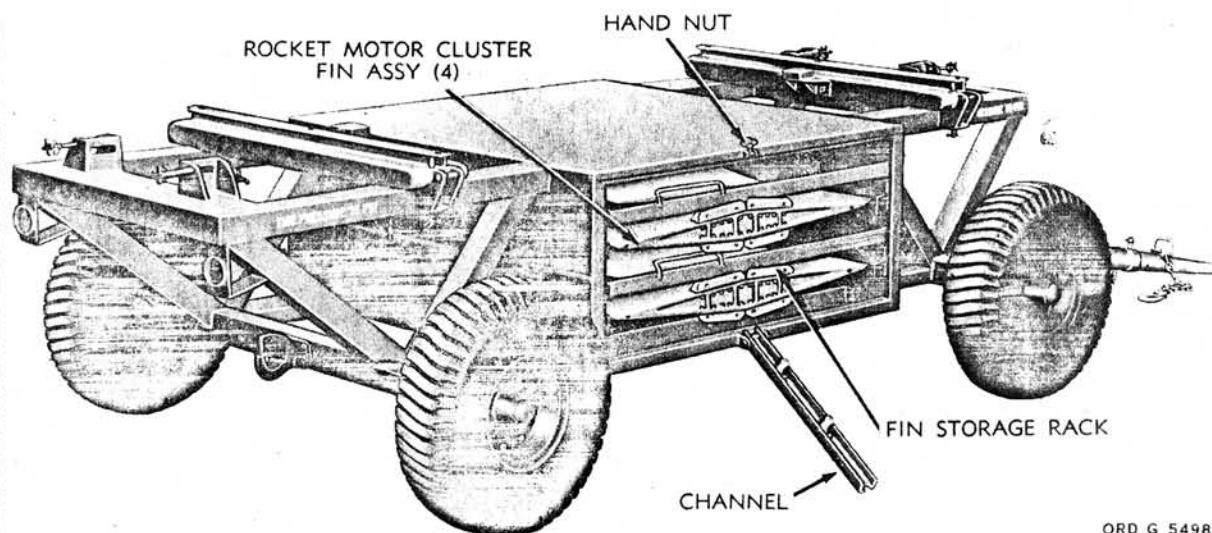
Figure 8-1. Uncrating rocket motor cluster fins shipping and storage box M32.

### 8-3. Uncrating Rocket Motor Fins Shipping and Storage Box XM39

- Perform inspection of rocket motor fins shipping and storage box M39 (par. 3-4).
- Break the lead seals on the two cover fasteners.
- Cut the shipping straps that secure the cover to the box.
- Turn the swivels (A, fig. 8-3) on each of the two cover fasteners.

- Release the hasp from each of the two fasteners, and raise the cover.
- Remove the hardware carton (B).
- Remove the wing nut (C), lock-washer, flat washer, and square-neck bolt that secure each of the two braces to the box.
- Place the shipping and storage box (D, fig. 8-3) on its side, and remove the fin assemblies shipping support.





ORD G 5498

Figure 8-2. Storage of the rocket motor cluster fin assemblies on the rocket motor cluster truck.

i. Carefully remove the four rocket motor cluster fin assemblies.

j. Remove all corrosion-preventive compound from unpainted surfaces of the fin assemblies.

k. Inspect each fin assembly for external damage.

l. Place two fin assemblies (fig. 8-2) in the right side of the fin storage rack on the rocket motor cluster truck by performing the operations listed in steps (1) through (3) below.

(1) Loosen the hand nut that secures the channel to the fin storage rack on the rocket motor cluster truck, and lower the channel.

(2) Place the fin assemblies in the fin storage rack.

(3) Raise the channel, and secure it to the rocket motor cluster truck with the hand nut.

m. Repeat l above to place the two remaining fin assemblies in the left side of the fin storage rack on the rocket motor cluster truck.

n. Check the components shipped in the hardware carton (B, fig. 8-3) against the

enclosed packing list, and place in a suitable area.

o. Report any damaged or missing parts to the supervisor.

p. Remove all corrosion-preventive compound from the unpainted surfaces of the components.

q. Close the cover (A), and secure with the hasps and swivels.

r. Return the rocket motor cluster fins shipping and storage box to the storage area.

#### 8-4. Uncrating Rocket Motor Components Shipping and Storage Box XM36

a. Perform inspection of rocket motor components shipping and storage box XM-36 (par. 3-4).

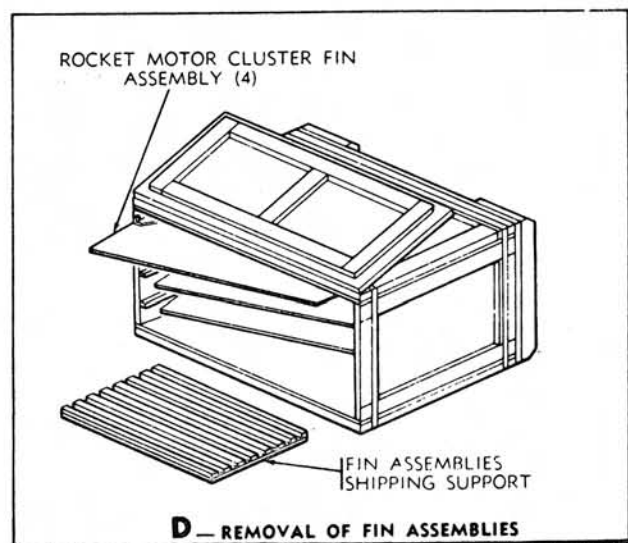
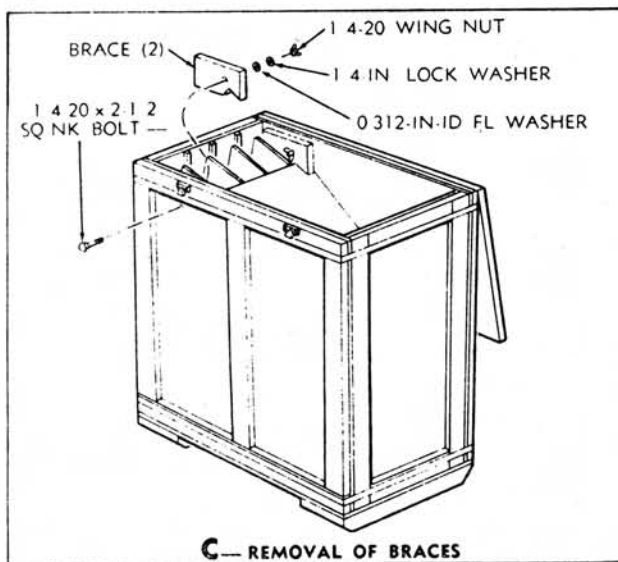
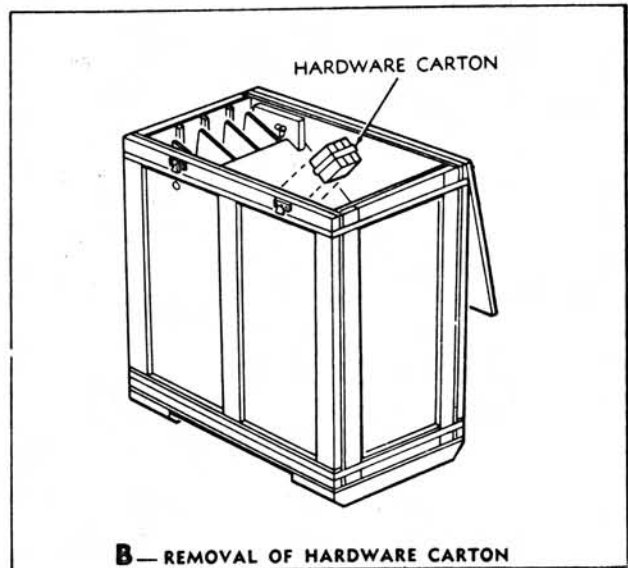
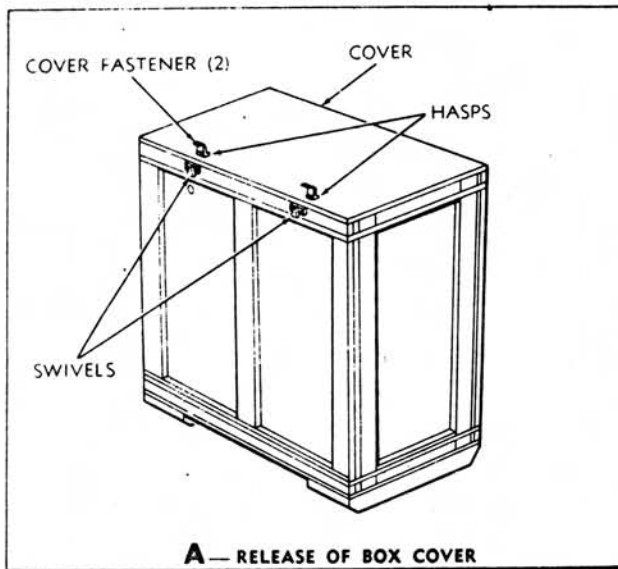
b. Break the lead seal (A, fig. 8-4) on the cover fastener.

c. Cut the shipping straps that secure the cover to the box.

d. Turn the swivel on the box.

e. Release the hasp, and raise the cover.

f. Remove the upper blocking assembly (B) from the box.



ORD G5495

Figure 8-3. Uncrating the rocket motor cluster fins shipping and storage box XM39.

*g.* Remove the wing nuts, flat washers, and square-neck bolts that secure each of the four wooden supports to the inside corners of the box.

*h.* Remove the intermediate container from the center of the rocket motor thrust ring assembly (B).

*i.* Remove the lower blocking assembly from the bottom of the box (C).

*j.* Remove the thrust ring assembly.

*k.* Remove the shipping straps that secure the rocket motor igniter cable to the thrust ring assembly, and remove the cable.

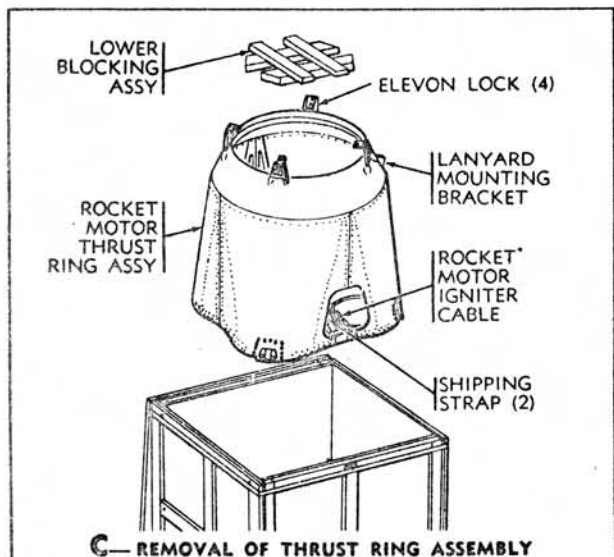
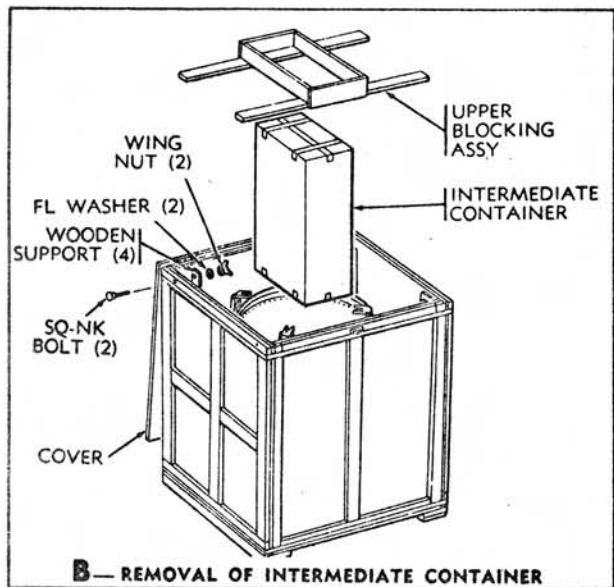
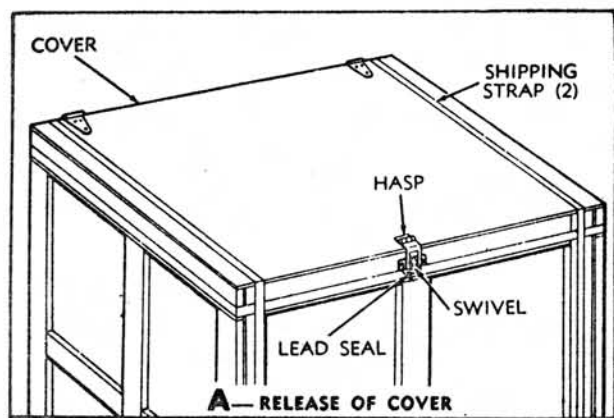
*l.* Inspect the thrust ring assembly for visible damage.

*m.* Inspect the four elevon locks and lanyard mounting bracket.

*n.* Check the components shipped in the intermediate container against the enclosed packing list, and place in a suitable area.

*o.* Report any damaged or missing parts to the supervisor.

*p.* Return the box to the storage area.



ORD G5496

Figure 8-4. Uncrating rocket motor components shipping and storage box M56.

### 8-5. Uncrating the Rocket Motor Shipping and Storage Box

**Warning:** The rocket motor contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**Warning:** Handling operations of the rocket motor will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and quantities of explosive materials will be kept to a minimum. Explosive materials spilled will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**Caution:** The propellant grain and the metal parts of the rocket motor can be damaged unduly by rough handling or dropping. A rocket motor which has been subjected to such damage or to extreme temperature could cause a malfunction when the missile is fired. Rocket motors so exposed will not be used until a complete inspection of the grain for serviceability has been made.

a. Perform the inspection of rocket motor M5E1 shipping and storage box (par. 3-4).

b. Break the lead seal on the end of the box.

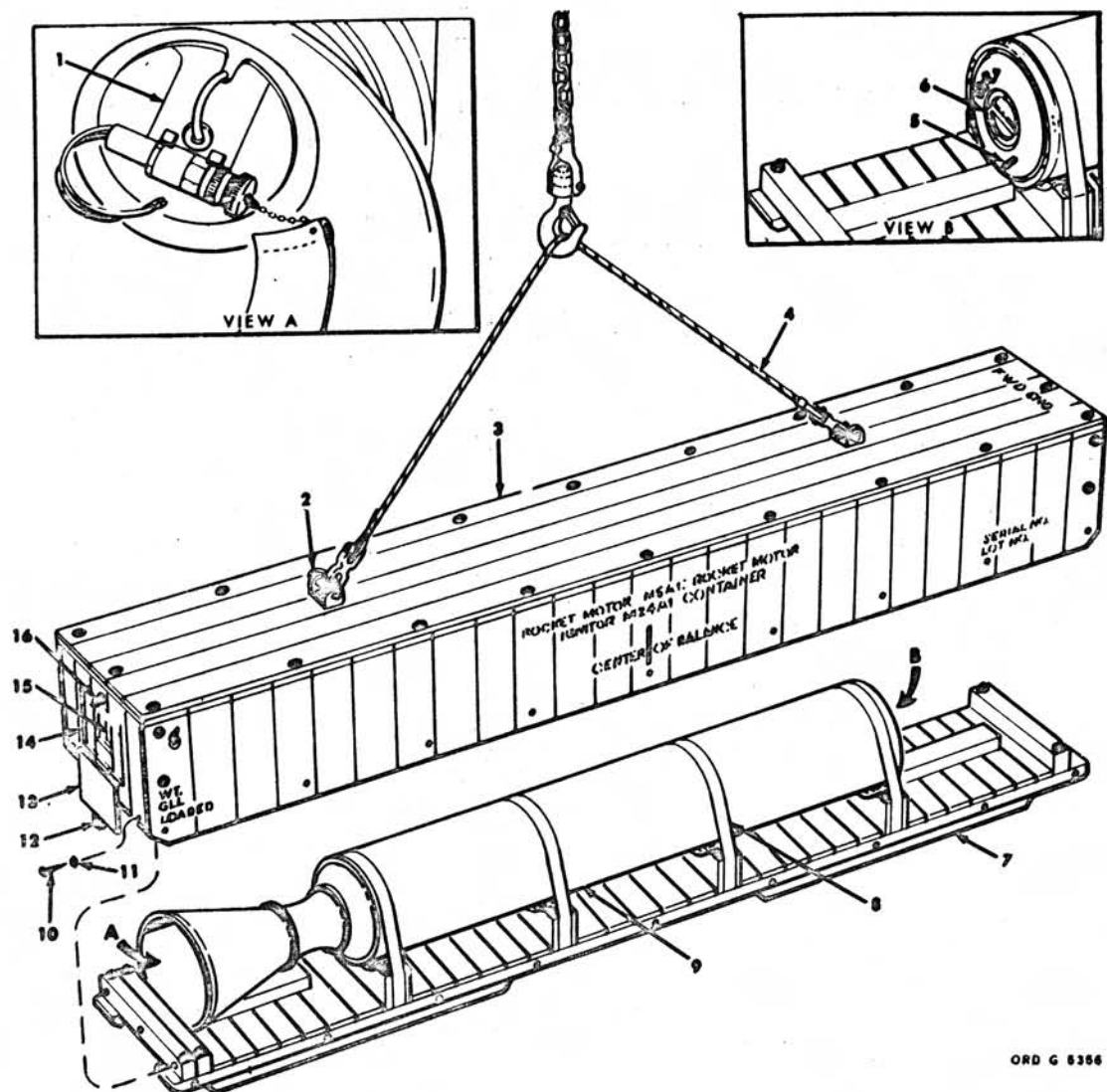
c. Turn the swivel (16, fig. 8-5) on the cover (3).

d. Release the hasp (12) on the access door (13) and open the door.

*Note.* If guided missile low-bed trailer M529 is to be used for transporting the missile, refer to fig. 9-14 for igniter storage.

e. Remove the rocket motor igniter container (15, fig. 8-5) from the igniter compartment (14). Store in the igniter storage area.

f. Close the access door, and secure with the hasp and swivel.



1—Nozzle shipping closure

2—Top lift point (2)

3—Cover

4—Hoist sling

5—Pressure fitting cap

6—Igniter receptacle shipping closure

7—Base

8—Shipping strap (4)

9—Rocket motor

10—Lag bolt (16)

11—Flat washer (16)

12—Hasp

13—Access door

14—Igniter compartment

15—Rocket motor igniter container

16—Swivel

Figure 8-5. Uncrating and inspecting the rocket motor.

*g.* Cut the four shipping straps that secure the cover (3) to the base (7).

*h.* Remove the lag bolts (10) and flat washers (11) that secure the cover to the base.

*i.* Attach the hoist sling (4) to the top lift points (2) on the cover.

*j.* Lift the cover from the base.

**WARNING:** Brown or red fumes emanating from the interior of the rocket motor indicate the presence of nitrous fumes within the rocket motor case. If fumes are present, evacuate the area immediately, and notify the proper authorities.

*Note.* Rocket motor must be grounded with not more than 20 ohms resistance between component and ground.

*k.* Inspect the rocket motor (9) as prescribed in (1) through (8) below.

(1) Inspect the rocket motor for visible damage. Ascertain that the rocket motor head and retaining ring are properly seated in the forward end of each rocket motor.

*Note.* Rocket motors evidencing improperly seated heads are to be reported to the direct support (DS) unit for disposition instructions.

(2) Inspect the igniter receptacle shipping closure (6) for proper installation.

(3) Use the spanner wrench, and remove the shipping closure from the igniter receptacle.

**WARNING:** Use a clean, explosion-proof flashlight when performing (4) below.

**WARNING:** Prior to inspection, turn on the flashlight to prevent possible ignition.

(4) Inspect the grain structure for cracks, evidence of moisture, unusual discoloration of the visible portion of the grain, and broken resonance rods. Inspect the heavy helical spring for proper seating between the rocket motor head and the resonance rod assembly (centered in the assembly).

*Note.* Minor rust or discoloration of the spring is not cause for rejection.

(5) Inspect the threads at the forward end of the rocket motor that are used for securing the igniter receptacle shipping closure or the rocket motor igniter.

(6) Install the shipping closure finger-tight.

(7) Check that the pressure fitting cap is tight.

(8) Inspect the nozzle shipping closure inside the nozzle at the rear end of the rocket motor to insure that it is not cracked or broken and is securely and completely cemented to the nozzle.

*l.* Repeat steps *a* through *k* above for the three remaining rocket motors.

## 8-6. Assembly of the Rocket Motor Cluster

*Note.* When procedures in chapter 8 call for the application of corrosion-preventive compound, use a soft-film, cold-application corrosion-preventive compound.

*a.* Position the lower-left fitting assembly (2, fig. 8-6) to the lower-right fitting assembly (3), and secure together with the four internal-wrenching bolts (5), four recessed washers (6), four (or as required, min. 1, max. 3 per bolt) flat washers (7), and four hexagon nuts (8).

*b.* Position the assembled lower-left and lower-right fitting assemblies on the supports (4).

*c.* Install the hexagon-head screws (9) and flat washers (10) to secure the two rear retaining rail bars (11) to the rear slippers (12).

*d.* Cut the shipping straps (8, fig. 8-5) on the base (7) to position the attach holes and facilitate alignment with the lower left fitting assembly.

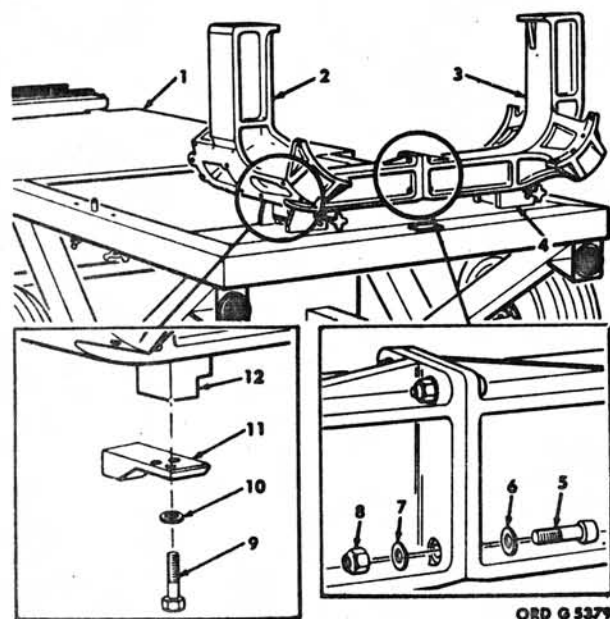
*Note.* Make certain that a hoisting device capable of lifting 6,000 pounds is used to install the rocket motor on the rocket motor cluster truck.

*f.* Attach the hoisting device to the rocket motor hoist beam (4, fig. 8-7).

*g.* Position the hoist beam over the rocket motor (5), and install the hoist slings (10) on the motor observing the center-line mark.

*h.* Lift the rocket motor (9, fig. 8-5) clear of the base (7).





ORD G 5379

- 1—Rocket motor cluster truck
- 2—Lower-left fitting assembly
- 3—Lower-right fitting assembly
- 4—Support (4)
- 5—3/8-24 x 1-3/4 int-wrenching bolt (4)
- 6—0.383-in-id recessed washer (4)
- 7—0.383-in-id fl washer (4)
- 8—3/8-24 hex nut (4)
- 9—7/16-14 x 1-1/2 hex-hd screw (4)
- 10—0.453-in-id fl washer (4)
- 11—Rear retaining rail bar (2)
- 12—Rear slipper (2)

Figure 8-6. Removal and installation of the lower fitting assemblies.

i. Install the hexagon-head bolt (3, fig. 8-7) and washer (2) to secure the forward slipper assembly (1) to the rocket motor thrust forming ring (9). Tighten the bolt to the torque value given in the table 15-10.

j. Loosely install the internal-wrenching or hexagon-head bolt (8) and the recessed washer (7) to attach the forward retaining rail bar (6) to the forward slipper assembly (1).

k. Liberally coat with corrosion-preventive compound the mating surfaces of the rocket motor (1, fig. 8-8) that will be installed in the 4 position, and the lower-left fitting assembly (2).

l. Position the rocket motor into the 4 position on the lower left fitting assembly (2). Block the forward end of the rocket motor to prevent rolling.

m. Loosely install the hexagon-head bolts (5), lockwashers (4), and flat washers (3) to secure the motor on the fitting assembly (2); do not tighten the bolts.

n. Remove the hoist slings from the rocket motor, and lift the hoist beam clear.

o. Prepare to install the rocket motor in the 3 position as prescribed in d through j above.

p. Liberally coat with corrosion-preventive compound the mating surfaces of the rocket motor that will be installed in the 3 position, and the lower-right fitting assembly (2).

q. Position the rocket motor in the 3 position on the lower-right fitting assembly. Block the forward end of the rocket motor to prevent rolling.

r. Loosely install the hexagon-head bolts (5), lockwashers (4), and flat washers (3) to secure the rocket motor in the 3 position on the lower right fitting assembly. Do not tighten the bolts.

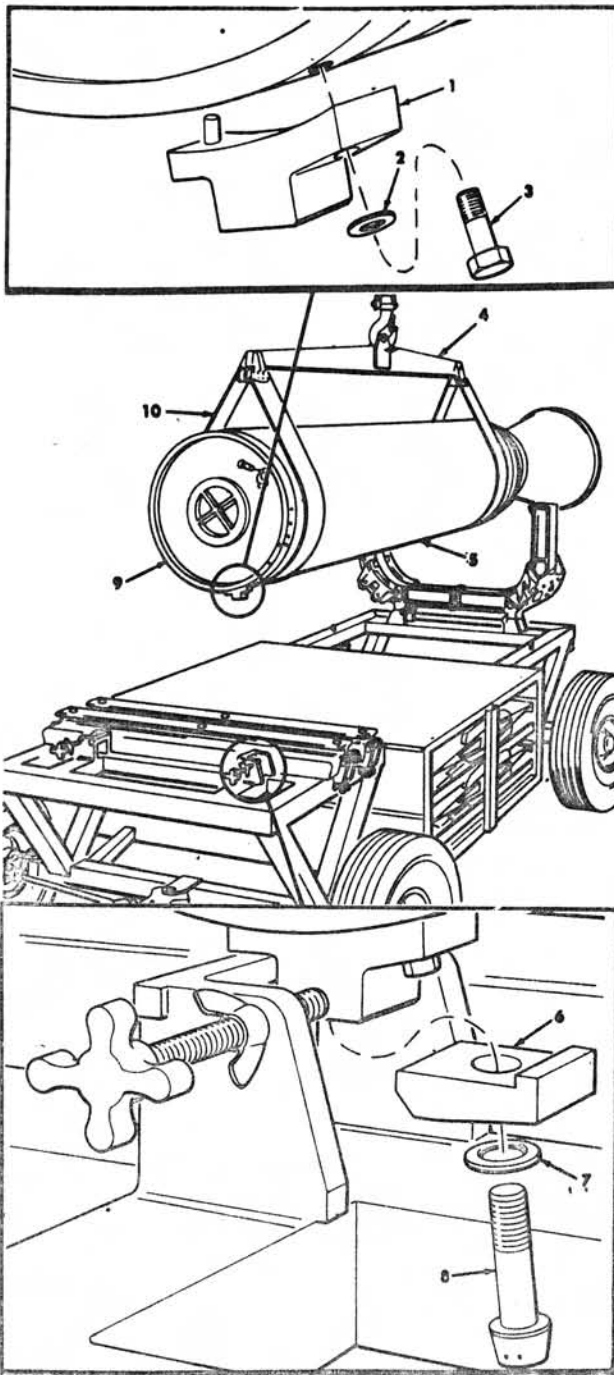
s. Remove the hoist slings from the rocket motor, and lift the hoist beam clear.

t. Liberally coat the mating surfaces of the rocket motor thrust ring assembly (6, fig. 8-9) and the rocket motors in the 3 and 4 position with corrosion-preventive compound.

u. Make certain that the lanyard mounting bracket (1) on the thrust ring assembly is oriented at the top before lifting. Lift and position the thrust ring assembly on the forward end of the rocket motors installed in the 3 and 4 positions.

v. Install (finger tight) eight internal-wrenching bolts (2) and recessed washers (3) to the inside of the thrust ring assembly; install (fingertight) four internal-wrenching bolts (8) and recessed washers (7) to the outside of the thrust ring assembly.

w. Prepare to install the rocket motor in the 2 position as prescribed in d through h above.

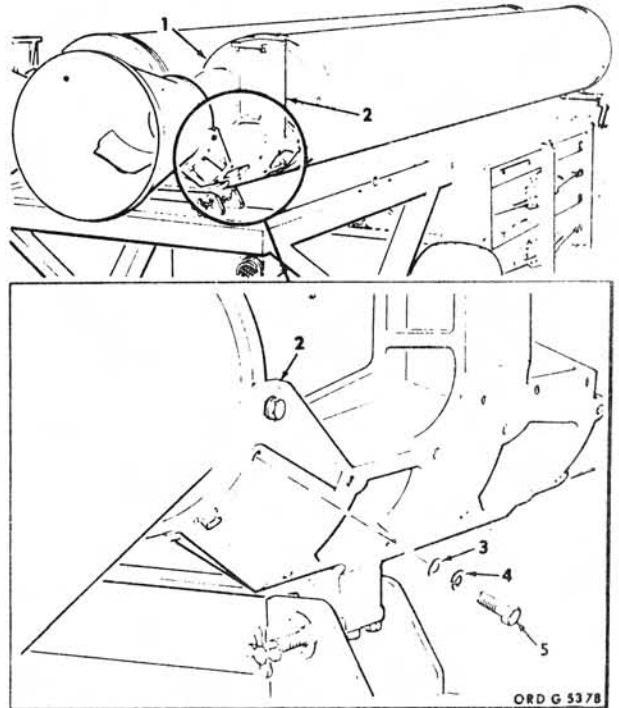


- 1—Forward slipper assembly
- 2—25/64-in-id fl washer
- 3—3/8-24 x 1-13/64 hex-hd bolt
- 4—Rocket motor hoist beam
- 5—Rocket motor

Figure 8-7. Positioning the rocket motor.

- 6—Forward retaining rail bar
- 7—0.636-in-id recessed washer
- 8—5/8-18 x 2-9/16 in-wrenching bolt or 5/8-18 x 2-11/32 hex-hd bolt
- 9—Rocket motor forming ring
- 10—Hoist sling (2)

Figure 8-7—Continued.



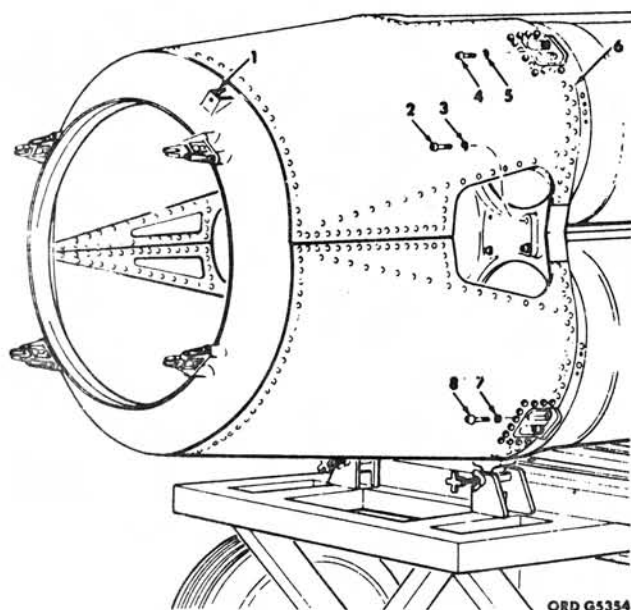
- 1—Rocket motor
- 2—Lower-right fitting assembly
- 3—13/32-in-id fl washer (8)
- 4—3/8 in. lockwasher (8)
- 5—3/8-24 x 61/64 hex-hd bolt (8)

Figure 8-8. Removal and installation of the rocket motor in the 3 and 4 position—typical.

x. Liberally coat with corrosion-preventive compound the mating surfaces of the rocket motor that will be installed in the 2 position, and the upper-right fitting assembly (9, fig. 8-10).

y. Position the upper-right fitting assembly on the rocket motor (11), and loosely install the hexagon-head bolts (2), lockwashers (3) and flat washers (4). Do not tighten the bolts.

z. Liberally coat with corrosion-preventive compound the mating surfaces of the rocket thrust ring assembly (16), and the rocket motor that will be installed in the 2 position.



- 1 - Lanyard mounting bracket
- 2 - 7/16-20 x 2 int-wrenching bolt (8)
- 3 - 0.446-in-id recessed washer (12)
- 4 - 7/16-20 x 1 1/4 int-wrenching bolt (4)
- 5 - 0.446-in-id recessed washer (12)
- 6 - Rocket motor thrust ring assembly
- 7 - 0.446-in-id recessed washer (12)
- 8 - 7/16-20 x 1 1/4 int-wrenching bolt (8)

Figures 8-9. Removal and installation of the rocket motor thrust ring assembly - typical.

**CAUTION:** Do not disconnect the hoist beam from the rocket motor (11) until both the forward and rear ends of the motor are secured.

*aa.* Position the rocket motor into the 2 position as prescribed in (1) through (5) below.

(1) Lower and guide the rocket motor until the forward end is seated properly inside of the rocket motor thrust ring assembly and the rear end is in place directly over the 3 rocket motor (12).

(2) Align the upper-right fitting assembly with the lower-right fitting assembly.

(3) Install the four internal-wrenching bolts (5), four recessed washers (6), four (or as required, min 1, max. 3 per bolt) washers (7), and four hexagon nuts (8) to secure the upper-right fitting assembly (9) to the lower-right fitting assembly.

(4) Install (fingertight) four internal-wrenching bolts (2, fig. 8-9) and recessed washers (3) to the inside of the thrust ring assembly (6); install (fingertight) two internal-wrenching bolts (4) and recessed washers (5) to the outside of the thrust ring assembly.

(5) Remove the hoist slings from the rocket motor, and lift the hoist beam clear.

*ab.* Prepare to install the rocket motor into the 1 position as prescribed in *ac* through *ag* below.

*ac.* Liberally coat with corrosion-preventive compound the mating surfaces of the rocket motor that will be installed in the 1 position (10, fig. 8-10), and the upper-left fitting assembly (15).

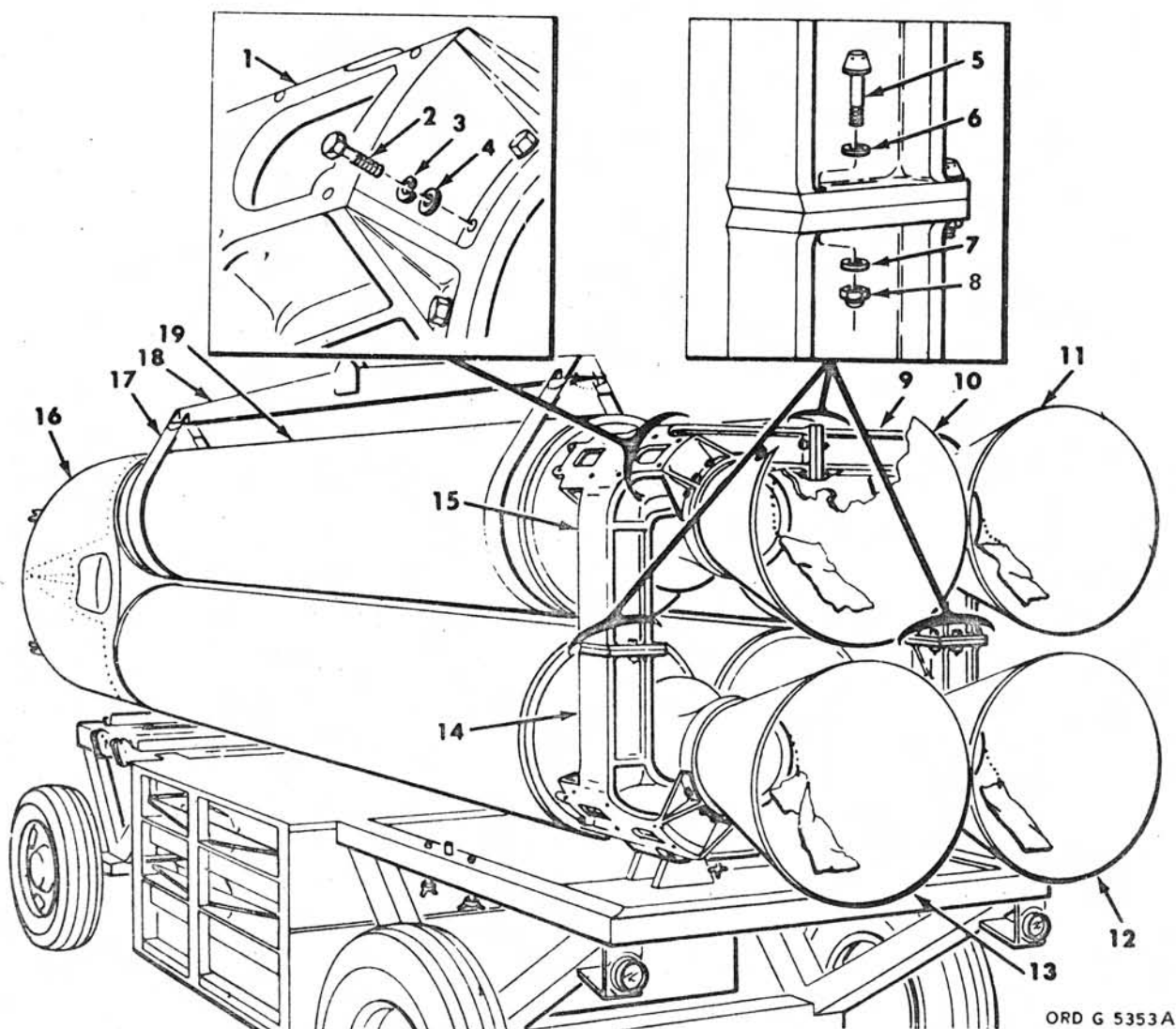
*ab.* Position the upper-left fitting assembly on the rocket motor (10), and loosely install the hexagon-head bolts (2), lock-washers (3), and flat washers (4). Do not tighten the bolts.

*ad.* Liberally coat with corrosion-preventive compound the mating surfaces of the rocket motor thrust ring assembly (16) and the rocket motor that will be installed in the 1 position.

**CAUTION:** Do not disconnect the hoist beam from the rocket motor until both the forward and rear ends of the motor are secured.

*af.* Position the rocket motor into the 1 position (10) as prescribed in (1) through (5) below.

(1) Lower and guide the rocket motor until the forward end is seated properly inside the rocket motor thrust ring assembly and the rear end is in place directly over



ORD G 5353 A

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 1—Upper-left fitting assembly       | 11—Rocket motor in 2 position        |
| 2—3/8-24 x 61/64 hex-hd bolt        | 12—Rocket motor in 3 position        |
| 3—3/8-in lockwasher                 | 13—Rocket motor in 4 position        |
| 4—13/32-in-id fl washer             | 14—Lower-left fitting assembly       |
| 5—3/8-24 x 1-3/4 int-wrenching bolt | 15—Upper-left fitting assembly       |
| 6—0.383-in-id recessed washer       | 16—Rocket motor thrust ring assembly |
| 7—0.383-in-id fl washer             | 17—Hoist sling                       |
| 8—3/8-24 hex nut                    | 18—Rocket motor hoist beam           |
| 9—Upper right fitting assembly      | 19—Rocket motor                      |
| 10—Rocket motor in 1 position       |                                      |

Figure 8-10. Positioning the rocket motor in position—typical.

the 4 rocket motor (13).

(2) Align the upper-left fitting assembly (15) with the lower left fitting assembly (14).

(3) Install the four internal-wrenching bolts (5), four recessed washers (6), four (or as required, min. 1, max. 3 per bolt) flat washers (7), and four hexagon nuts (8)

to secure the upper-left assembly (15) to the lower-left fitting assembly (14).

(4) Install (fingertight) four internal-wrenching bolts (2, fig. 8-9) and recessed washers (3) to the inside of the thrust ring assembly (6); install (fingeright) two internal-wrenching bolts (4) and recessed washers (5) to the outside of the thrust ring assembly.

(5) Remove the hoist slings from the rocket motor and lift the hoist beam clear.

*ag.* Align the upper-left fitting assembly (15, fig. 8-10) to the upper right fitting assembly (9), and secure together with the four internal-wrenching bolts (5), four recessed washers (6), four (or as required min. 1, max. 3 per bolt) washers (7), and four hexagon nuts (8).

*ah.* Tighten all bolts, screws, and nuts in *a* through *ag* above to the torque values as given in table 15-10. The maximum allowable gap between the fittings is  $3/32$  inch. If more than  $3/32$  inch appears, loosen the internal wrenching bolts and retorquing to the correct value. If the  $3/32$  inch or less clearance cannot be met, replace the fin fitting.

*ai.* Join the four nozzle fairings (1, 2, 6, and 9, fig. 8-11) together as prescribed in (1) through (4) below.

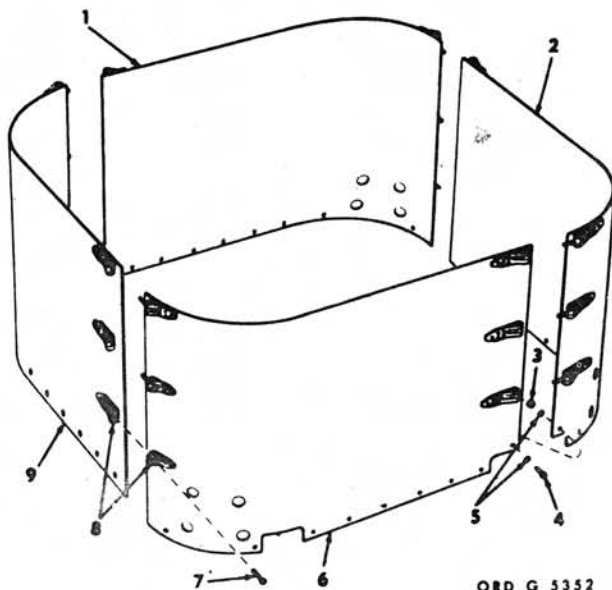
*Note.* The left nozzle fairing (9) and the top nozzle fairing (1) are identical and identified by the same part number. The bottom nozzle fairing (6) may be identified by one full and one half recess on the forward edge, which recesses mate with the rear slippers, which are an integral part of the two lower fitting assemblies. The right nozzle fairing (2) may be identified by a half recess on the forward left edge.

(1) Join the nozzle fairings (6) and (9) together, with the nozzle fairing (9) overlapping nozzle fairing (6) at the band clamp (8); install (fingertight) three fillister-head screws (7).

(2) Join the nozzle fairings (6) and (2) together, with the nozzle fairing (6) overlapping nozzle fairing (2) at the band clamp (8); install (fingertight) three fillister-head screws (7).

(3) Join the nozzle fairings (1) and (2) together, with the nozzle fairing (2) overlapping the nozzle fairing (1) at the band clamp (8). Install (fingertight) three fillister-head screws (7).

(4) Join the nozzle fairings (9) and (1) together, with the nozzle fairing (1) overlapping the nozzle fairing (9) at the band clamp (8). Install (fingertight) three fillister-head screws (7).



ORD G 5352

- 1—Nozzle fairing 8166293
- 2—Nozzle fairing 8166292
- 3— $1/4$ -28 hex nut
- 4— $1/4$ -28 x  $17/32$  hex-hd bolt
- 5—0.265-in-id fl washer (2)
- 6—Nozzle fairing 8166278
- 7— $1/4$ -28 x  $1-1/2$  fil-hd screw (12)
- 8—Band clamp (12)
- 9—Nozzle fairing 8166293

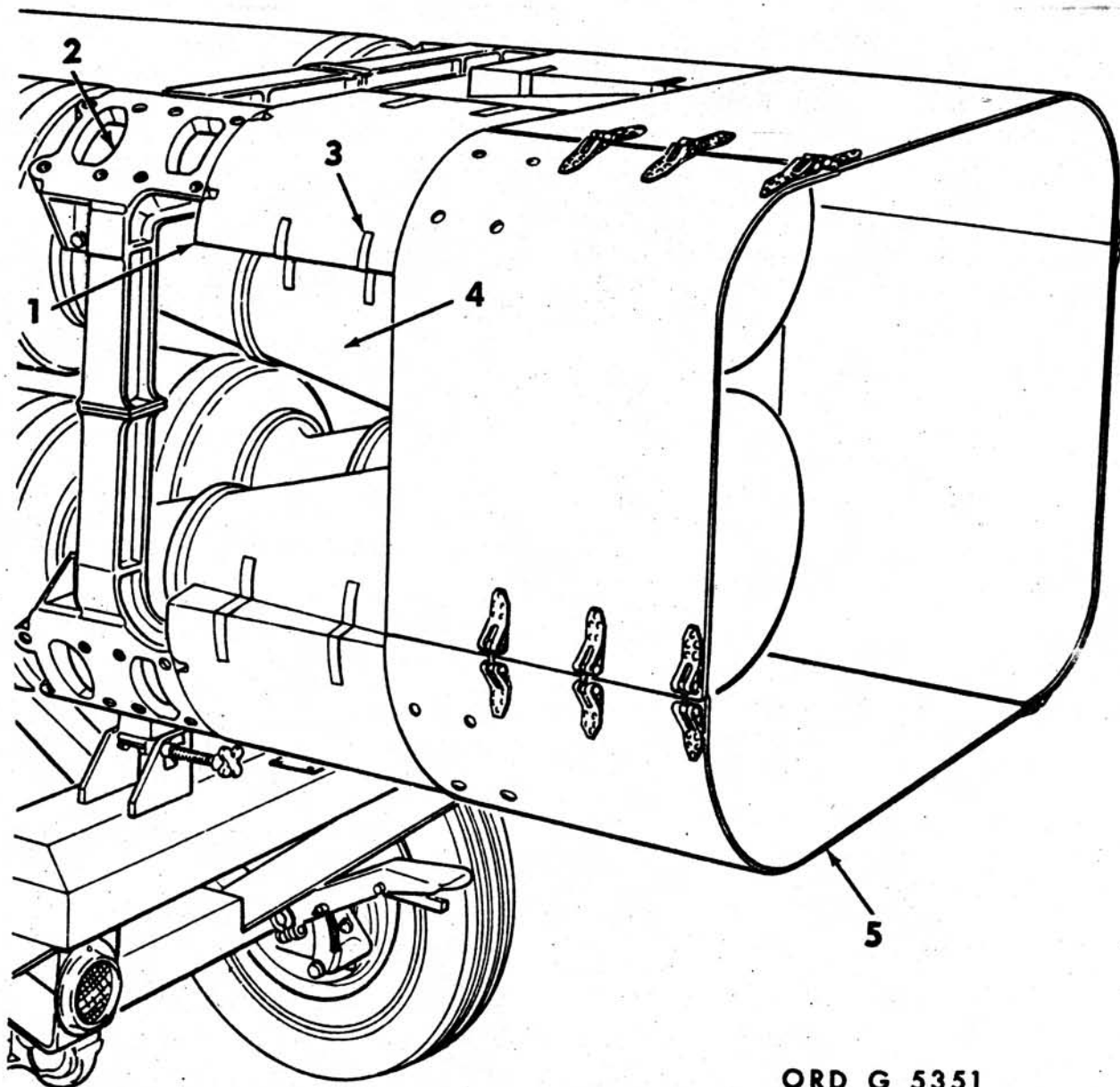
Figure 8-11. Disassembly and assembly of the nozzle fairings.

(5) Install the hexagon-head bolt (4), two flat washers (5), and hexagon nut (3) through the aligned holes in nozzle fairings (2) and (6).

*aj.* Tape (3, fig. 8-12) the four filler blocks (1) in position, one on each rocket motor nozzle (4), flush with each fitting assembly (2).

*ak.* Liberally coat the mating surfaces of the fitting assemblies and the assembled nozzle fairings (5) with corrosion-preventive compound.





ORD G 5351

- 1—Filler block (4)
- 2—Fitting assembly (4)
- 3—Tape

- 4—Rocket motor nozzle (4)
- 5—Assembled nozzle fairings

*Figure 8-12. Removal and installation of the nozzle fairings.*

*al.* Position the assembled nozzle fairings over the nozzles of the assembled rocket motors. Slide the assembled nozzle fairings

forward until the attach holes on the forward end of the assembled nozzle fairings are aligned with the attach holes in the fitting assemblies.

*am.* Liberally coat the mating surfaces of the forward nozzle fairings (1, fig. 8-13), the fitting assemblies (2, fig. 8-12), and the rocket motor forming ring (9, fig. 8-7) with corrosion-preventive compound.

*an.* Position the four forward nozzle fairings. Aline the attach holes in the forward nozzle fairings with the attach holes in the rocket motors; tape the forward nozzle fairings in position.

*Note.* The top fairing wedge (3, fig. 8-14) has two lift point holes. The bottom fairing wedge (8) has a notch at each rear corner. The side fairing wedges (5, fig. 8-13) are identical.

*ao.* Liberally coat the mating surfaces of the side fairing wedges, and the rocket motor forming ring, the forward nozzle fairings, and the assembled nozzle fairings (4, fig. 8-13) with corrosion-preventive compound.

*ap.* Position the two side fairing wedges overlapping the four forward nozzle fairings and the assembled nozzle fairings; secure the two side fairing wedges and the four forward nozzle fairings to the fitting assemblies (2, fig. 8-12) with 12 hexagon-head bolts (7, fig. 8-13), and flat washers (8). Secure the two side fairing wedges and the assembled nozzle fairings (4) to the fitting assemblies (2, fig. 8-12) with 16 hexagon-head bolts (7, fig. 8-13), and washers (8); tighten the bolts fingertight.

*aq.* Liberally coat the mating surfaces of the top fairing wedge (3, fig. 8-14), assembled nozzle fairings (6), the rocket motors, and the forward nozzle fairings (7), with corrosion-preventive compound.

*ar.* Position the top fairing wedge, overlapping the two forward nozzle fairings and the assembled nozzle fairings. Secure the top fairing wedge and the two forward nozzle fairings to the fitting assemblies ((2) fig. 8-12) with six hexagon-head bolts (4, fig. 8-14) and flat washers (5); secure the top fairing wedge and the assembled nozzle fairing to

the fitting assemblies with eight hexagon bolts (4) and flat washers (5); tighten the bolts fingertight.

*as.* Liberally coat the mating surfaces of the bottom fairing wedge (8), the assembled nozzle fairings, the rocket motors, and the forward nozzle fairings with corrosion preventive compound.

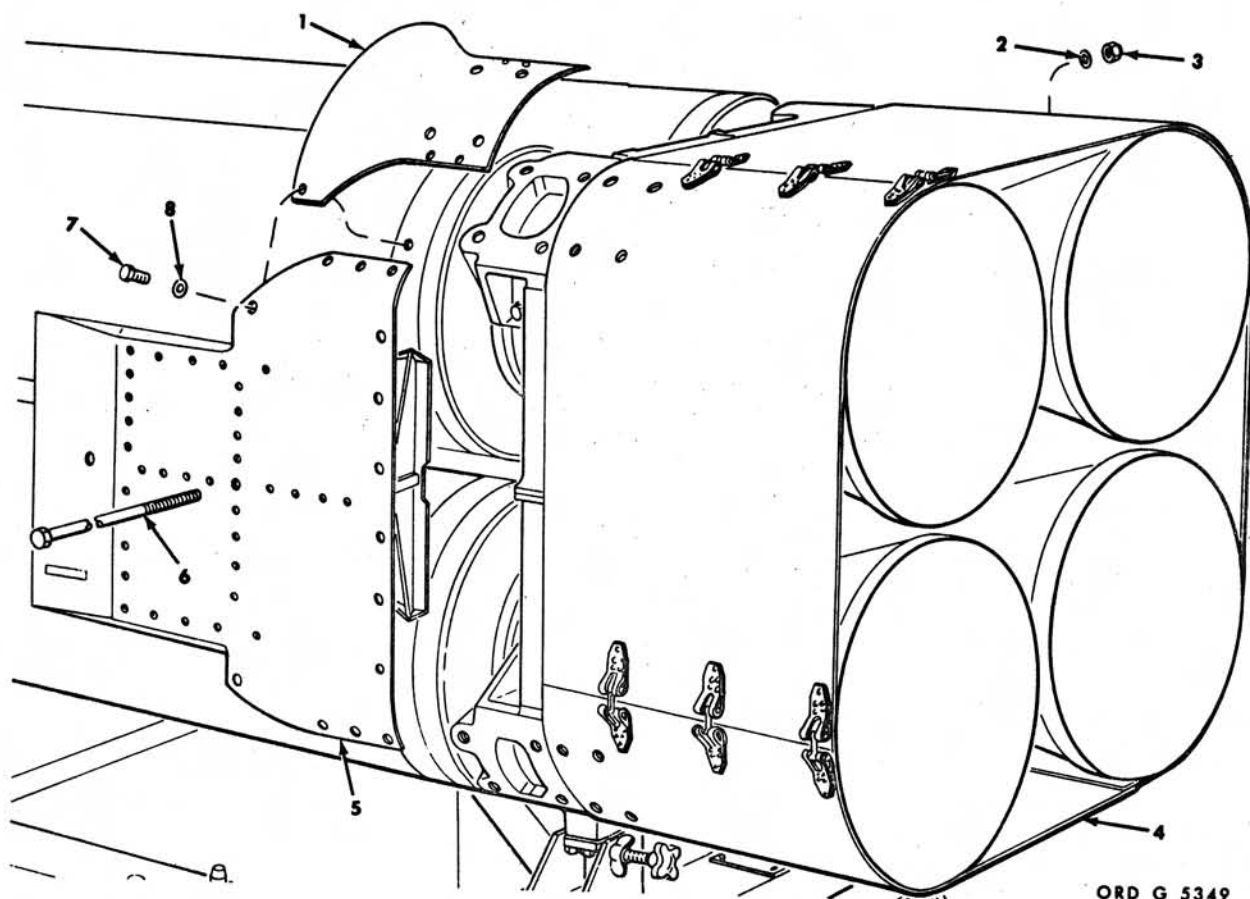
*at.* Position the bottom fairing wedge overlapping the two forward nozzle fairings and the assembled nozzle fairings. Secure the bottom fairing wedge and the two forward nozzle fairings to the fitting assemblies with six hexagon-head bolts (10) and flat washers (9); secure the bottom fairing wedge and the assembled nozzle fairing to the fitting assemblies with six hexagon-head bolts (10) and flat washers (9); tighten the bolts finger tight.

*au.* Liberally coat the two hex-head bolts (6, fig. 8-13) with corrosive preventive compound and loosely install them and the flat washers (2), and hexagon nuts (3) through the side fairing wedges (5); then coat the two hex-head bolts (11, fig. 8-14) with corrosive preventive compound and install them and the flat washers (2), and hexagon nuts (1) through the top and bottom fairing wedges (3 and 8) and the bolt heads underneath.

*av.* Position the two rocket motor cluster fin assemblies (3, fig. 8-15) on the upper side of the rocket motor cluster. Secure with the eight hexagon-head bolts (1) and flat washers (2) to each fin. Torque all hardware to the values specified in table 15-10.

*Note.* When misalignment or interference with the eyebolt flange prevents the proper insertion of the eyebolts, rework the top wedge (8, fig. 8-14) as prescribed in paragraph 8-7w and x.

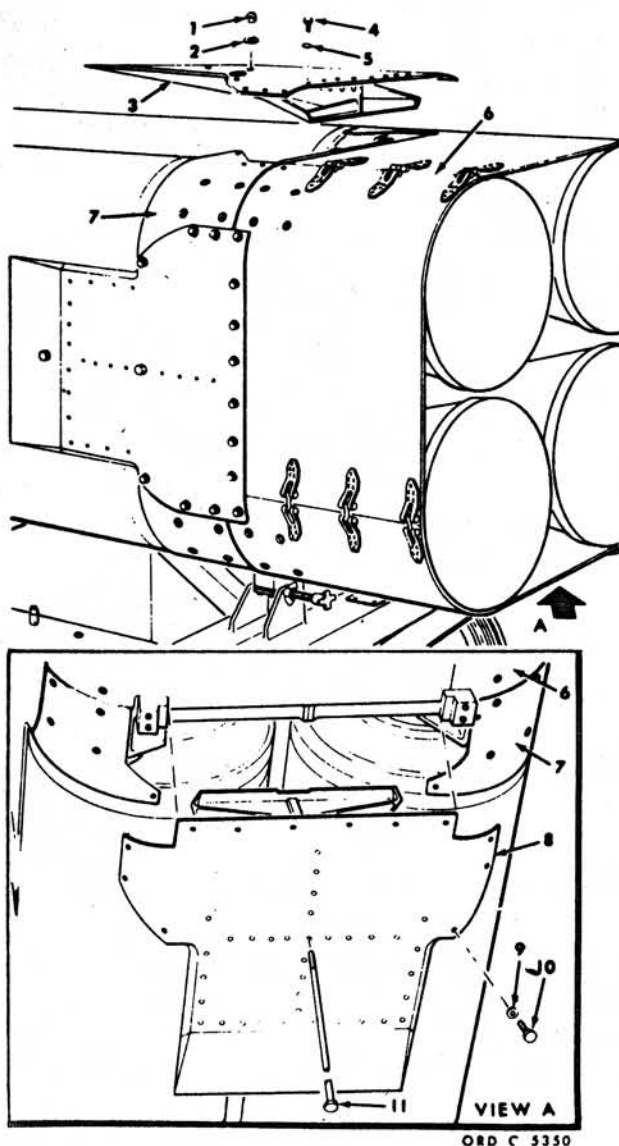
*aw.* Tighten the adjusting bolt (18, fig. 9-3) and the locknut (19) at each support (14 and 17) on the track.



ORD G 5349

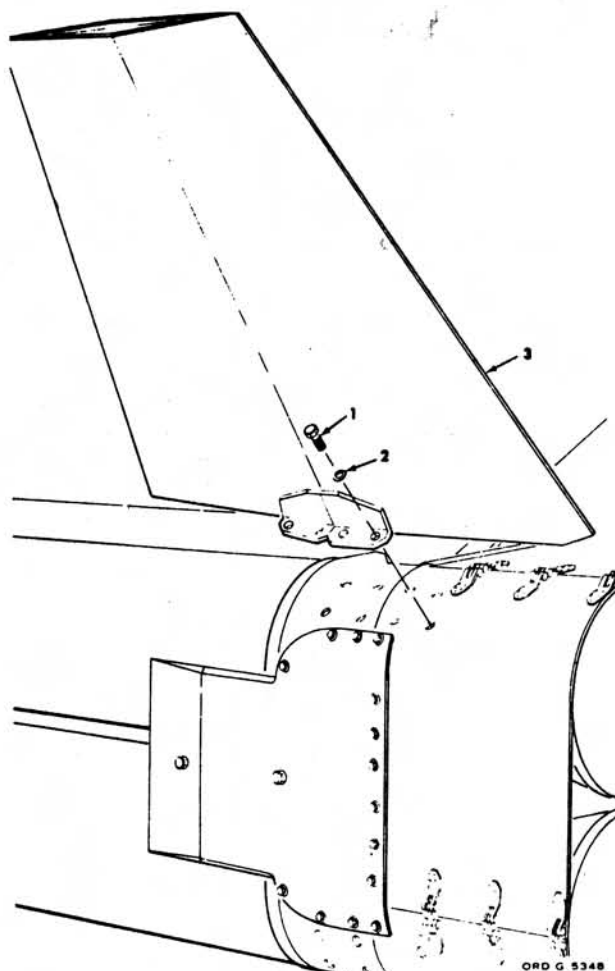
- |                              |                                   |                                   |
|------------------------------|-----------------------------------|-----------------------------------|
| 1—Forward nozzle fairing (4) | 4—Assembled nozzle fairings       | 7—1/4-28 X 17/32 hex-hd bolt (28) |
| 2—25/64-in-id fl washer (2)  | 5—Side fairing wedge (2)          | 8—9/32-in-id fl washer (28)       |
| 3—3/8-24 hex nut (2)         | 6—3/8-24 X 35-1/2 hex-hd bolt (2) |                                   |

*Figure 8-13. Removal and installation of the forward nozzle fairings and side fairing wedges.*



- 1-3/8-24 hex. nut (2)
- 2-25/64-in-id fl washer (2)
- 3-Top fairing wedge
- 4-1/4-28 x 17/32 hex-hd bolt (14)
- 5-9/32-in-id fl washer (14)
- 6-Assembled nozzle fairings
- 7-Forward nozzle fairing (4)
- 8-Bottom fairing wedge
- 9-9/32-in-id fl washer (12)
- 10-1/4-28 x 17/32 hex-hd bolt (12)
- 11-3/8-24 x 35-1/2 hex-hd bolt (2)

Figure 8-14. Removal and installation of the top and bottom fairing wedges.



- 1-1/2-20 x 1-19/32 hex-hd bolt (16)
- 2-33/64-in-id fl washer (16)
- 3-Rocket motor cluster fin assembly (2)

Figure 8-15. Removal and installation of the upper fin assemblies.

## 8-7. Uncrating and Inspecting the Assembled Rocket Motor Cluster

**WARNING:** The rocket motor cluster contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the area specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the rocket motor cluster will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**CAUTION:** The propellant grain and the metal parts of the rocket motor cluster can be damaged unduly by rough handling or dropping. A rocket motor which has been subjected to such damage or to extreme temperature could cause a malfunction when the missile is fired. Rocket motors so exposed will not be used until a complete inspection of the grain for serviceability has been made.

a. Perform the inspection of the rocket motor cluster shipping and storage box (par. 3-4).

b. Cut and remove all the lead seals.

c. Cut and remove the banding straps.

d. Remove the squarehead lag bolts (fig. 8-16) and flat washers that secure the cover to the base.

e. Position a hoisting device capable of lifting 6,000 pounds over the cover.

f. Remove the square nuts and flat washers from the studs on the base, and disengage the sling assemblies, if present, from the studs.

g. Turn the swivel on the cover fastener, and release the hasp.

h. Remove the cover and place in the storage area.

i. Remove the screws (fig. 8-17) and flat washers that secure the strap over the rocket motor igniter containers.

*Note.* If guided missile low-bed trailer M529 is to be used for transporting the missile, refer to figure 9-14 for igniter storage.

j. Remove the four rocket motor igniter containers (fig. 8-17), and store in the igniter storage area.

**WARNING:** Brown or red fumes emanating from the interior of the rocket motor indicates the presence of nitrous fumes within the rocket motor case. If the fumes are present, evacuate the area immediately and notify the supervisor.

*Note.* During handling operations the rocket motor must be grounded with not more than 20 ohms resistance between the component and ground.

k. Inspect each rocket motor (9, fig. 8-5) as prescribed below.

(1) Inspect the rocket motor for external damage.

(2) Inspect the igniter receptacle shipping closure (A, fig. 10-9) for proper installation.

(3) Remove the igniter receptacle shipping closure.

**WARNING:** Use an explosion-proof flashlight when performing step (4) below.

**WARNING:** Prior to the inspection, turn on the flashlight to prevent possible ignition.

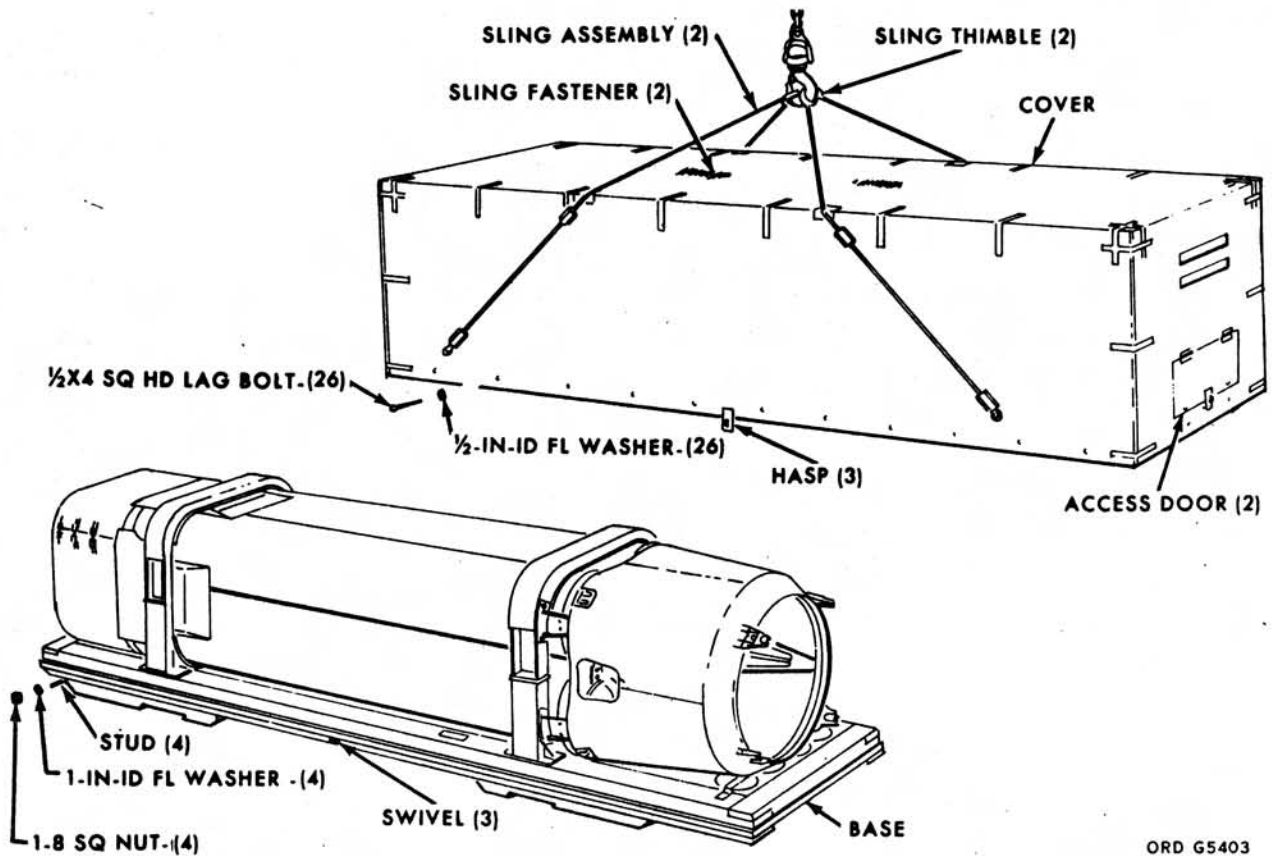
(4) Inspect the grain structure for cracks, evidence of moisture, unusual discoloration of the visible portion of the grain, and broken resonance rods.

(5) If the rocket motors are M5E1, perform (a) through (e) below.

(a) Inspect the exposed portion of the internal harness assembly for deterioration or damage. If the harness assembly is deteriorated or damaged, perform (b) through (e) below.

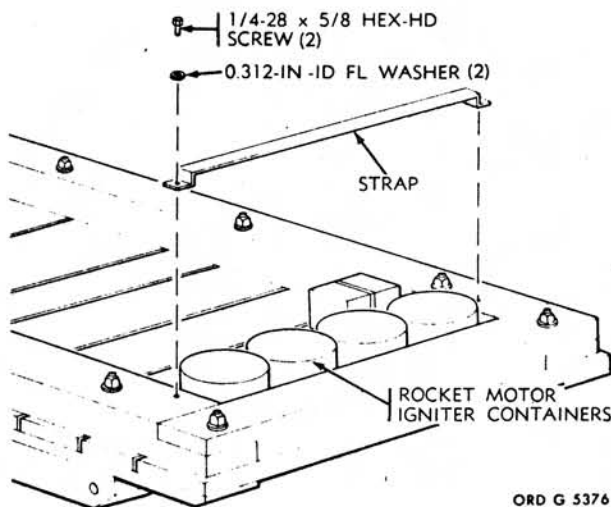
(b) Remove the electrical connector of the harness assembly from the nozzle closure retaining clip.





ORD G5403

Figure 8-16. Removal and installation of the rocket motor cluster shipping and storage box cover.



ORD G 5376

Figure 8-17. Removal and installation of rocket motor igniter container.

(c) Using a knife or electrician's side-cutting pliers, cut the harness assembly 2 inches to the rear of the nozzle closure.

(d) Tape the end of the harness with electrician's tape.

(e) Remove and retain the shorting connector.

(6) Inspect the four elevon locks (C, fig. 8-4) and the lanyard mounting bracket on the forward end of the rocket motor thrust ring assembly for damage.

(7) Inspect the threads at the forward end of the rocket motor which secure the igniter receptacle shipping closures or the rocket motor igniter.

(8) Report any damaged or missing parts to the supervisor.

(9) Install the igniter receptacle shipping closure.

(9.1) Inspect elevon locks and attach bolts and tighten to the torque value given in table 15-10.

(10) Check that the pressure fitting cap (5, fig. 8-5) is tight.

(11) Check the nozzle shipping closure (1) to insure that it is not cracked or broken and is securely and completely cemented to the nozzle.

(12) If the nozzle closure is not securely attached to the motor nozzle, proceed as follows:

(a) Using sparkproof tools, separate the loose or damaged nozzle closure from the nozzle.

**CAUTION:** Do not damage the finish of the nozzle.

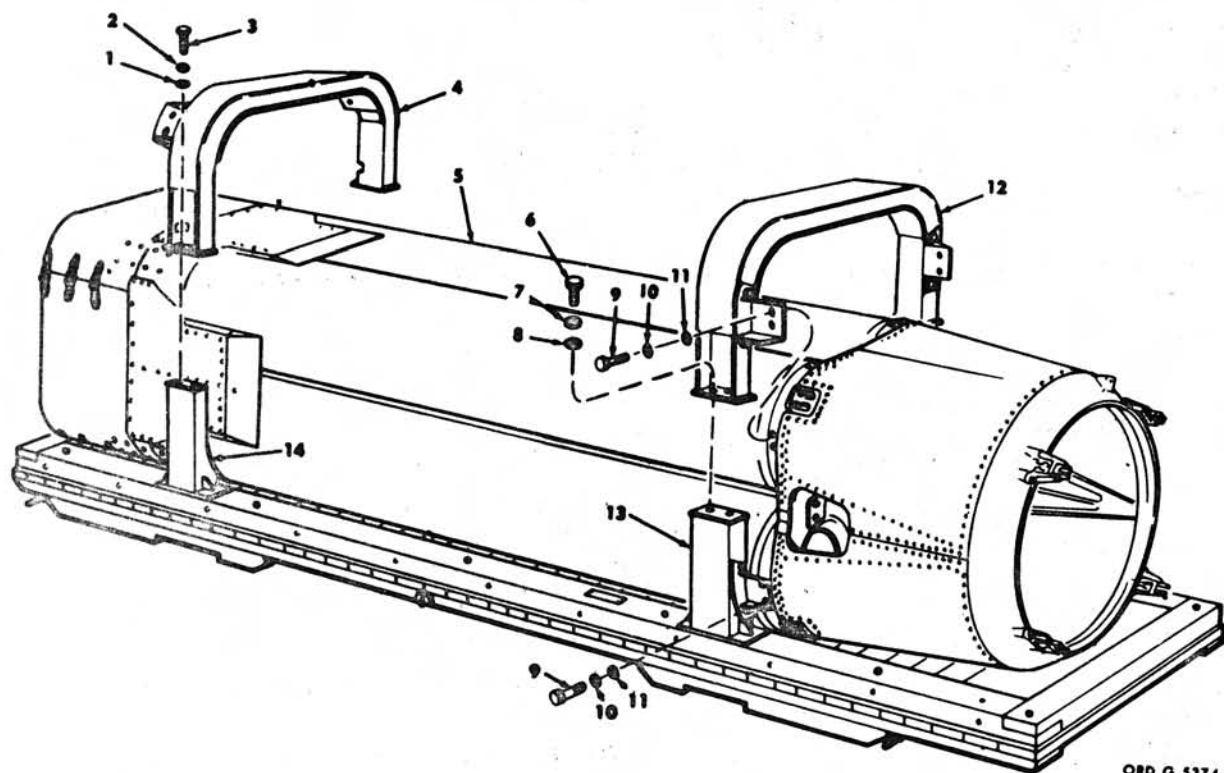
(b) Using copper or aluminum wool, clean the sealant and closure residue from the surface of the nozzle.

(c) Seal the nozzle closure in place with sealing compound MPD 5010.

**WARNING:** The rocket motor cluster must be grounded with not more than 20 ohms resistance between the component and ground.

l. Remove the hexagon-head screws (6, fig. 8-18), internal-teeth lockwashers (7), and flat washers (8) that secure the forward clamp assembly (12) to the forward cradle assembly (13).

m. Remove the hexagon-head screws (9), internal-teeth lockwashers (10), and flat-



ORD G 5374

1—5/8 in. fl washer (4)  
2—5/8-in. int-teeth lockwasher (4)  
3—5/8-18 x 1-3/4 hex-hd screw (4)  
4—Rear clamp assembly  
5—Rocket motor cluster

6—5/8-18 x 1-3/4 hex-hd screw (4)  
7—5/8-in. int-teeth lockwasher (4)  
8—5/8-in. fl washer (4)  
9—5/8-18 x 1-1/4 hex-hd screw (8)  
10—5/8-in. int-teeth lockwasher (8)

11—5/8-in. fl washer (8)  
12—Forward clamp assembly  
13—Forward cradle assembly  
14—Rear cradle assembly

Figure 8-18. Removal and installation of the clamp assemblies.

washers (11) that secure the forward clamp assembly (12) and the forward cradle assembly (13) to the rocket motor cluster (5).

n. Remove the forward clamp assembly.

o. Remove the hexagon-head screws (3), internal-teeth lockwashers (2), and flat washers (1) that secure the rear clamp assembly (4) to the rear cradle assembly (14).

o.1. Remove the hexagon-head screws (9), internal-teeth lockwashers (10), and flat washers (11) that secure the rear clamp assembly (4) and the rear cradle assembly (14) to the rocket motor cluster.

p. Place the screws and washers removed in m and o.1 above in a bag.

q. Remove the rear clamp assembly.

**CAUTION:** Make certain that a hoisting device capable of lifting 6,000 pounds is used to hoist the rocket motor cluster from the box.

r. Attach the falling hook (6, fig. 9-3) to the rocket motor cluster hoist beam (7).

s. Remove the four plugs (2) from the lift points.

t. Lower the hoist beam into position with the four self-locking eyehooks (5) directly over the four lift points (1) in the rocket motor cluster (9).

u. Remove the eyebolts (3) from the self-locking eyehooks.

**WARNING:** Check that the threads of the eyebolts and lift point holes (1) in the rocket motor cluster are in good condition.

**WARNING:** Insure that the flange of the eyebolt fits flush against the surface of the rocket motor. If the eyebolt does not fit flush, determine if it is caused by interference with the fairing wedge or excessive length of the threads on the eyebolt.

v. Install the eyebolts in the lift points.

*Note.* When the eyebolt will not fit flush against the surface of the rocket motor due to excessive thread length, install 5/8-in. id flat steel washers of sufficient thickness on the eyebolt. Do not install more washers than necessary to compensate for excessive thread length.

*Note.* When misalignment or interference with the eyebolt flange is encountered, preventing the proper insertion of the eyebolts, rework the top fairing wedge (3, fig. 8-14) as prescribed in w and x below.

**WARNING:** Remove the top fairing wedge from the rocket motor cluster, and take it to a properly distant work area before performing the procedures in w (1) and (2) and x (1) below.

w. When lateral misalignment exists, perform (1) through (3) below.

**CAUTION:** Do not file into the magnesium framework supporting the fairing wedge skin.

**CAUTION:** Do not remove more than three thirty-seconds of an inch of material from the fairing wedge skin.

(1) Using a rattail file, rework both cut-outs by filing the fairing wedge skin sufficiently to obtain a fit within the dimensions shown in view A, of figure 8-19.

(2) Touch up the reworked area with zinc-chromate primer coating 8010-161-7339 and white lusterless enamel 8010-297-2111 or olive drab lusterless enamel 8010-297-2116, as applicable.

(3) Install the fairing wedge.

x. When the longitudinal misalignment exists, perform (1) and (2) below.

(1) Perform the operation in w (1) above to obtain a fit within the dimensions shown in view B of figure 8-19, and touch up the fairing wedge as prescribed in w (2) above.

(2) Install the fairing wedge.

y. Attach the self-locking eyehooks to the eyebolts.

z. Raise the hoist beam slightly to apply tension to the lift chains (4, fig. 9-3).

*Note.* Both track assemblies (23) must be on the forward end of the rocket motor cluster truck (22) before placing the rocket motor cluster (9) on the truck.

*Note.* Back off the adjusting bolt (18) and locknut (19) to insure that the slippers (13 and 20) will clear them.

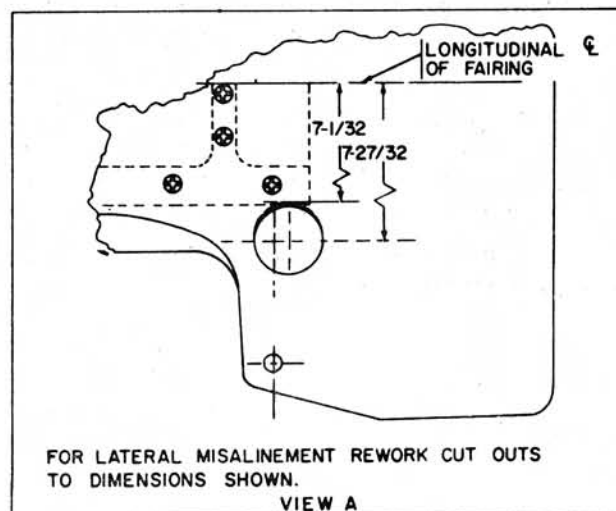
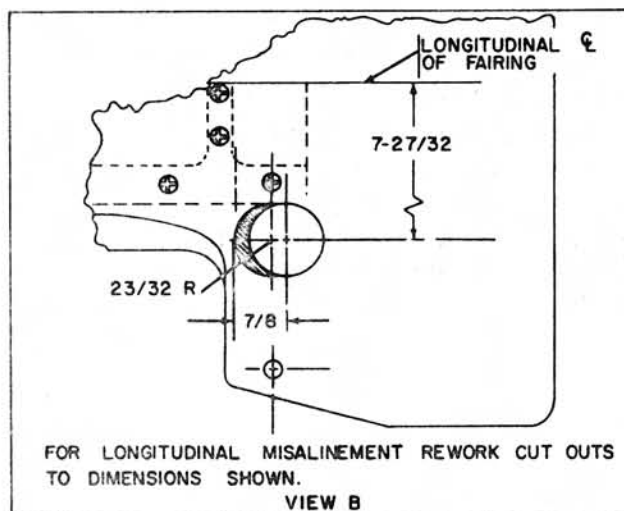
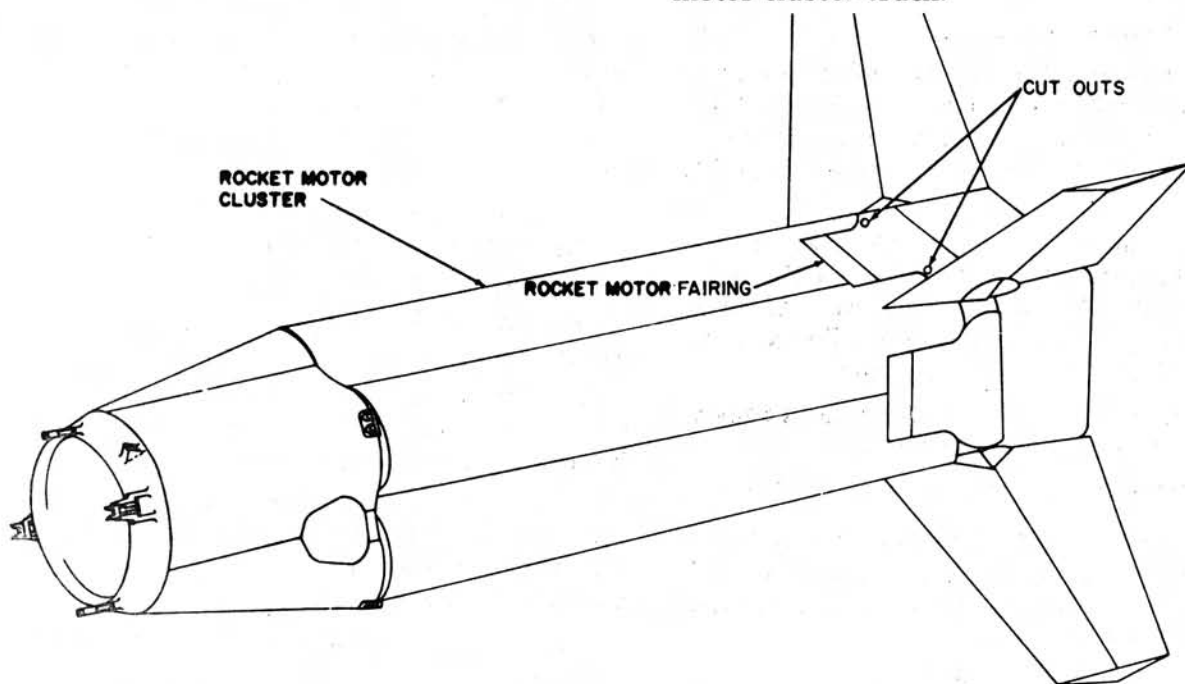
aa. Lift the rocket motor cluster (5, fig. 8-18) clear of the base.

*Note.* Inspect the rocket motor cluster for damage in the area where the clamp assemblies (4 and 12, fig. 8-18) and the cradle assemblies (13 and 14) were secured to the rocket motor cluster.

ab. Tighten the hexagon-head bolt (3, fig. 8-7) in each forward slipper assembly (1) to the torque value given in table 15-10.

ac. Position the rocket motor cluster on the rocket motor cluster truck; make certain

that the slippers seat properly into the supports (14 and 17, fig. 9-3) on the rocket motor cluster truck.



NOTE:

1. ALL DIMENSIONS SHOWN ARE IN INCHES
2. TOLERANCE ON DIMENSIONS SHOWN IS  $\pm 1/32$

ORD G 5346

Figure 8-19. Rework of the rocket motor cluster cutouts.

ad. Secure the cluster to the truck as prescribed below:

- (1) Install the two internal-wrenching or hexagon-head bolts (15) and recessed

washers (16) to secure the two forward retaining rail bars (21) to the two forward slipper assemblies.

- (2) Install the four hexagon-head

screws (12) and flat washers (11) to secure the two rear retaining rail bars (10) to the rear slippers.

- (3) Tighten the adjusting bolt and lock-nut at each support on the truck.

*ae.* Remove the hoist beam (7) from the cluster (9) as prescribed below.

- (1) Remove the self-locking eyehooks (5) from the eyebolts (3).
- (2) Remove the eyebolts from the lift points (1), and attach to the self-locking eyehooks.
- (3) Install the plugs (2) in the four lift points.
- (4) Remove the hoist beam from the cluster, and lift the hoist beam clear.

*Note.* When the top, bottom, and side fairing wedges are removed, the forward fairings must be supported.

*af.* Remove the two side fairing wedges (5, fig. 8-13) as prescribed below.

- (1) Remove the hexagon nuts (3), flat washers (2), and hexagon-head bolts (6).
- (2) Remove the hexagon-head bolts (7) and flat washers (8).
- (3) Remove the two side fairing wedges.

*ag.* Remove the top and bottom fairing wedges (3 and 8, fig. 8-14) as prescribed below.

- (1) Remove the hexagon nuts (1), flat washers (2), and hexagon-head bolts (11).
- (2) Remove the hexagon-head bolts (4) and flat washers (5) that secure the top fairing wedge; remove the fairing wedge.
- (3) Remove the hexagon-head bolts (10) and flat washers (9) that secure the bottom fairing wedge; remove the fairing wedge.

*ah.* Remove the four forward nozzle fairings (1, fig. 8-13).

*ai.* Remove the assembled nozzle fairings (5, fig. 8-12) as prescribed in (1) and (2) below:

- (1) Loosen the fillister-head screws (7, fig. 8-11) that secure the four nozzle fairings (1, 2, 6, and 9, fig. 8-11) together.

*Note.* Make certain that the filler blocks (1, fig. 8-12) are taped in place before completely removing the assembled nozzle fairings.

- (2) Slide the assembled nozzle fairings from the rear of the rocket motor cluster.

*aj.* Remove the four filler blocks by removing the tape holding each block in position.

*ak.* Tighten the following bolts to the torque value given in table 15-10.

*Note.* Do not loosen bolts before torquing.

- (1) The fitting assembly hexagon-head bolts (5, fig. 8-8; 2, fig. 8-10).
- (2) The fitting assembly nuts (8, fig. 8-6, 8, fig. 8-10).
- (3) The rocket motor thrust ring assembly internal-wrenching bolts (2 and 8, fig. 8-9).

*al.* Install the four filler blocks, assembled nozzle fairing, four forward nozzle fairings, and four fairing wedges in accordance with para 8-6 *aj* through *au*.

*am.* Tighten the following bolts and screws to the torque value given in table 15-10.

- (1) Tighten all the nozzle fairing fillister-head screws (7, fig. 8-11) to 50 pound-inches prior to tightening them to the torque value given in table 15-10.
- (2) The nozzle fairing hexagon-head bolts (7, fig. 8-13 and 4, fig. 8-14).
- (3) The fitting assembly hexagon nuts (3, fig. 8-13 and 1, fig. 8-14).
- (4) The hexagon nut (3, fig. 8-11).

*an.* Remove the rocket motor fins from the fin storage racks on the rocket motor truck.

*ao.* Position the two rocket motor cluster fin assemblies (fig. 8-15) on the upper sides of the rocket motor cluster. Secure with eight hexagon-head bolts and eight flat washers in each fin. Tighten all bolts to the torque values given in table 15-10.

*ap.* Perform the steps below to prepare the rocket motor cluster shipping and storage box for storage or shipment.

- (1) Position and secure the strap with the two hexagon-head screws and flat washers (fig. 8-17).
- (2) Install the forward and the rear clamp



assemblies (12 and 4, fig. 8-18) to the forward and rear cradle assemblies (13 and 14) respectively, and secure each clamp with the hexagon-head screws (6 and 3), internal-teeth lock-washers (7 and 2), and flat washers (8 and 1).

- (3) Tie the bag containing the screws and the washers removed in *m* and *o.1* above to the forward clamp.
- (4) (Deleted)
- (5) Secure the cover (fig. 8-16) to the base with the lag bolts and flat washers.
- (6) Turn the swivels securing the hasps of the cover and the two access doors.

*aq.* (Deleted).

## 8-8. Rocket Motor Igniter Cable Assembly Test, using A Multimeter

*a.* Visually inspect the rocket motor igniter cable assembly (4, fig. 13-9) for external damage, cuts, dents, and pinched or broken insulation. Remove the shorting plug from P109A, and inspect the connector for the presence of corrosion or moisture and damaged, bent, or missing pins. Inspect P1, P2, P3, and P4 connectors for the presence of corrosion or moisture and damaged, bent, or missing pins.

*b.* This test is to be performed only on the following occasions:

- (1) Initially, or prior to installation of the cable assembly.
- (2) Semiannually, concurrent with the removal of the rocket motor igniters (para 12-101).
- (3) Whenever the cable assembly is removed for any other reason.

*c.* Perform the continuity test in accordance with table 8-1, using the R X 1 scale of the multimeter.

Table 8-1. Continuity Test of the Rocket Motor Igniter Cable Assembly

Positive test probe connected to:		Negative test probe connected to:		Normal indication
Connector	Pin	Connector	Pin	
P109A	A	P1 through P4	1	9 to 11
P109A	A	P1	Shell	Open circuit (infinity)
P109A	B	P1 through P4	2	Continuity (less than 1 ohm)
P109A	B	P1	Shell	Open circuit (infinity)
P109A	A	P109A	C	Continuity (less than 1 ohm)
P109A	A	P109A	E	Continuity (less than 1 ohm)
P109A	A	P109A	G	Continuity (less than 1 ohm)
P109A	A	P109A	B	Open circuit (infinity)
P109A	A	P109A	J	Open circuit (infinity)
P109A	A	P109A	Shell	Open circuit (infinity)
P109A	B	P109A	D	Continuity (less than 1 ohm)
P109A	B	P109A	F	Continuity (less than 1 ohm)
P109A	B	P109A	H	Continuity (less than 1 ohm)
P109A	B	P109A	J	Open circuit (infinity)
P109A	B	P109A	Shell	Open circuit (infinity)
P109A	K	P109A	J	Continuity (less than 1 ohm)
P1 <sup>1</sup>	1	P2 <sup>1</sup>	2	9 to 11 ohms

<sup>1</sup> Replace the shorting connector on P109A while performing this test.

## 8-9. Installation of the Rocket Motor Igniter Cable Assembly

*Note.* If the rocket motor igniter cable assembly is installed, verify that it is installed in accordance with the following procedures:

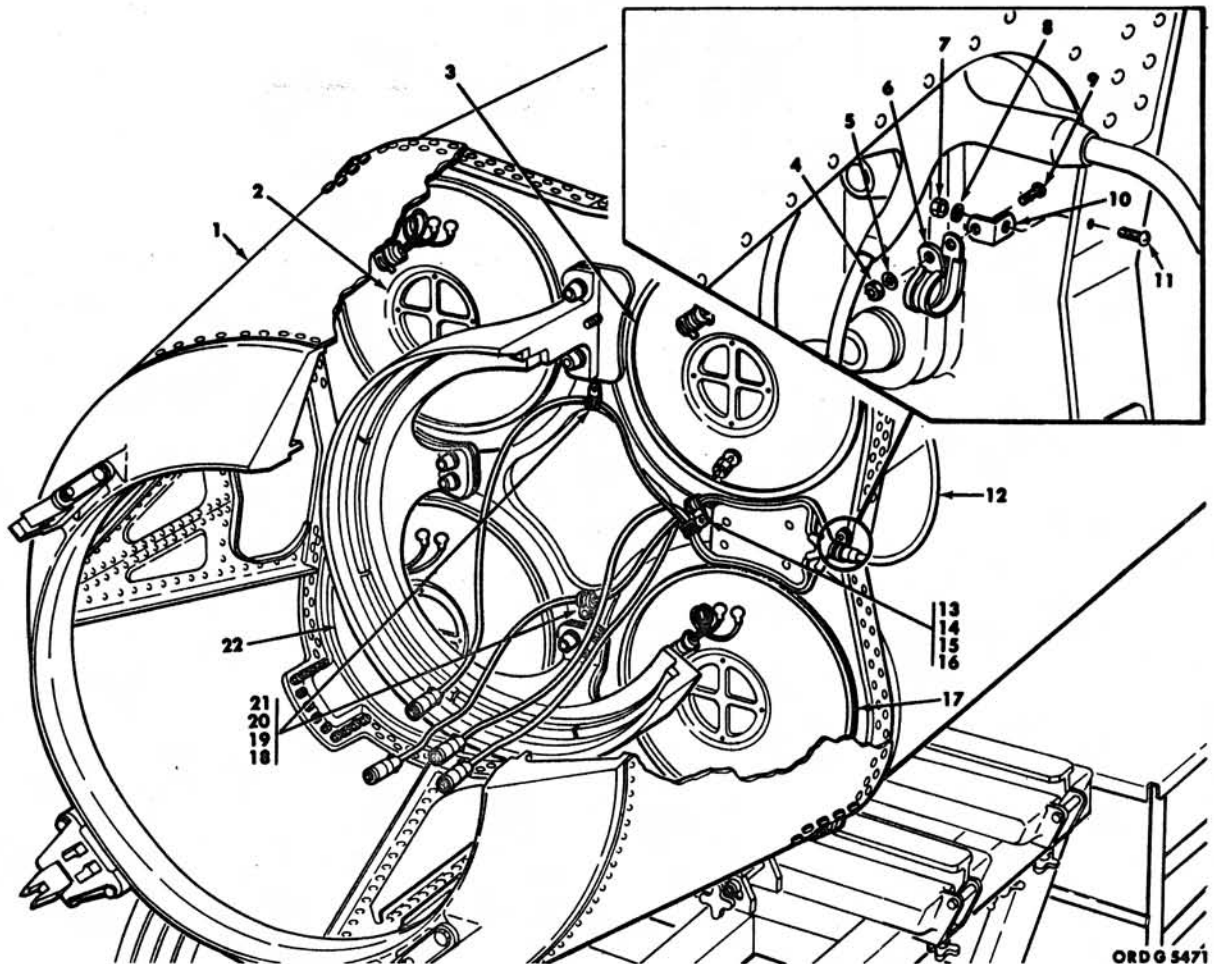
*a.* Check that the shorting connector (fig. 10-9) is installed on connector P109A of the rocket motor igniters cable assembly (12, fig. 8-20).

*b.* Position the bracket (10) on the rocket

motor thrust ring assembly (1), and secure in position with the truss-head screw (11), flat washer (8), and hexagon nut (7).

assembly, and secure to the bracket with the truss-head screw (9), flat washer (5), and hexagon nut (4).

c. Assemble the clamp (6) to the cable



ORDG 5471

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| 1—Rocket motor thrust ring assy   | 12—Rocket motor igniter cable assy  |
| 2—Rocket motor 2                  | 13—Clamp MS21919WDG9 (2)            |
| 3—Rocket motor 1                  | 14—No. 10-32 X 1-1/4 truss-hd screw |
| 4—No. 10-32 hex nut               | 15—No. 10 fl washer                 |
| 5—No. 10 fl washer                | 16—No. 10-32 hex. washer            |
| 6—Clamp MS21919DG15               | 17—Rocket motor 4                   |
| 7—No. 10-32 hex. nut              | 18—No. 10-32 hex. nut               |
| 8—No. 10 fl washer                | 19—No. 10 fl washer                 |
| 9—No. 10-32 X 5/8 truss-hd screw  | 20—No. 10-32 X 1-1/4 truss-hd screw |
| 10—Bracket                        | 21—Clamp MS21919WDG5                |
| 11—No. 10-32 X 3/4 truss-hd screw | 22—Rocket motor 3                   |

Figure 8-20. Removal and installation of the rocket motor igniter cable assembly.

d. Assemble the two clamps (13) to the cable assembly, and secure the clamps to the thrust ring assembly with the truss-head screw (14), flat washer (15), and hexagon nut (16).

e. Assemble the clamp (21) to the cable containing connector P1, and secure the clamp to the lower position on the thrust ring assembly with the truss-head screw (20), flat washer (19), and hexagon nut (18).

f. Assemble the clamp (21) to the remaining cable, and secure the clamp to the upper

position on the thrust ring assembly with the truss-head screw, flat washer, and hexagon nut.

g. Place the rocket motor igniter cable assembly connectors P1, P2, P3, and P4 with the excess cable between the thrust structure pedestal and the base to assure that the connectors are not damaged in subsequent operations.

h. Roll up the loose end of the rocket motor igniter cable assembly, and securely tape or tie the roll in place on top of the thrust structure.

i. (Deleted.)

	Paragraphs	Pages
Transponder control group wiring harness, installation of	7-2	7-1
Warhead wiring harness, removal and installation of	7-1	7-1
Installation of the forward main fin and the forward body section:		
Forward body section, installation of	7-6	7-8
Forward main fins, installation of	7-5	7-7
Guidance set squib battery (missiles 13684 and subsequent), installation of	7-8	7-14
Guidance set squib battery (missiles 13684 and subsequent), test of	7-7	7-13
HPU squib battery (missiles 14965 and subsequent), installation of	7-10	7-16
HPU squib battery BA-485/U (missiles 14965 and subsequent), test of	7-9	7-15
Electrical tests	7-9b	7-15
Visual inspection	7-9a	7-15
Installation of the rear roll ring:		
Preparation to lift the missile	7-11	7-17
Rear roll ring, installation of	7-12	7-17
Forms, records, and reports	1-3	1-1
Handling, shipment, and limited storage		
General:		
Class V and general supply items	15-4	15-2
Class V items	15-4a	15-2
General supply items	15-4b	15-2
General precautions	15-1	15-1
Handling	15-2	15-1
General—summary of precautions	15-2a	15-1
Packaged items	15-2b	15-1
Unpackaged items	15-2c	15-1
Safety	15-3	15-1
Limited storage:		
Combination (mixed) storage of explosive components	15-13	15-8
Destruction to prevent enemy use	15-17	15-11
Explosive components	15-10	15-7
Fuel (ethylene oxide— $\text{ET}_h\text{O}$ )	15-11	15-7
General—rules for storage	15-8	15-7
Groups for storage	15-9	15-7
Nonexplosive components	15-12	15-8
Periodic inspection in storage	15-15	15-11
Ethylene oxide ( $\text{ET}_h\text{O}$ )	15-15b	15-11
General—summary	15-15a	15-11
Inspection	15-15d	15-11
Inspection of pressurized, dehydrated containers	15-15c	15-11
Removal from storage, priority of	15-15e	15-11
Safeguarding classified items and components	15-16	15-11
Shelf or service life	15-18	15-12
Special handling instructions for storage	15-14	15-8
Explosive components	15-14a	15-8
Fuel (ethylene oxide— $\text{ET}_h\text{O}$ )	15-14b	15-8
Nonexplosive components	15-14c	15-11
Shipment:		
Loading guided missiles and components on railroad cars and trucks	15-6	15-3
Blocking and staying of freight cars	15-6g	15-4
Compatibility	15-6f	15-3
General	15-6f(1)	15-3
Loading compatibility	15-6f(2)	15-3
Markings, labels, and placards	15-6b	15-3
Methods of loading	15-6c	15-3
Motor truck shipments: regulations and precautions	15-6h	15-4
Precautions	15-6h(2)	15-4
Regulations	15-6h(1)	15-4



## CHAPTER 9

JOINING PROCEDURES FOR THE MISSILE BODY AND  
ROCKET MOTOR CLUSTERSection I. TRANSPORTING THE MISSILE BODY AND THE ROCKET  
MOTOR CLUSTER TO THE LAUNCHING AREA9-1. Transporting the Missile Body, using  
the Missile Body Truck or the Missile  
Body or Rocket Motor Cluster  
Transporter Adapter

**WARNING:** The missile body and the rocket motor cluster contain explosives. All applicable safety regulations will be strictly enforced. Where adjacent missile bodies and rocket motor clusters are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile body and rocket motor cluster will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

a. During the assembly and service procedures, the missile body (fig. 9-1) is installed on the missile body truck. The missile body truck is used to transport the missile body over smooth terrain (or paved surfaces). When the terrain is rough, the missile body must be moved on the missile body or rocket motor cluster transporter adapter (fig. 9-2), mounted on the transporter trailer.

**WARNING:** When the missile body is moved from the assembly area to the launching area over rough terrain, the procedures in steps *b* through *w* below must be performed to prevent injury to personnel and damage to the equipment.

*Note.* Make certain that a hoisting device capable of lifting 6,000 pounds is used to install the missile body on the missile body or rocket motor cluster transporter adapter.

b. Attach the falling hook (fig. 9-1) to the missile body hoist beam.

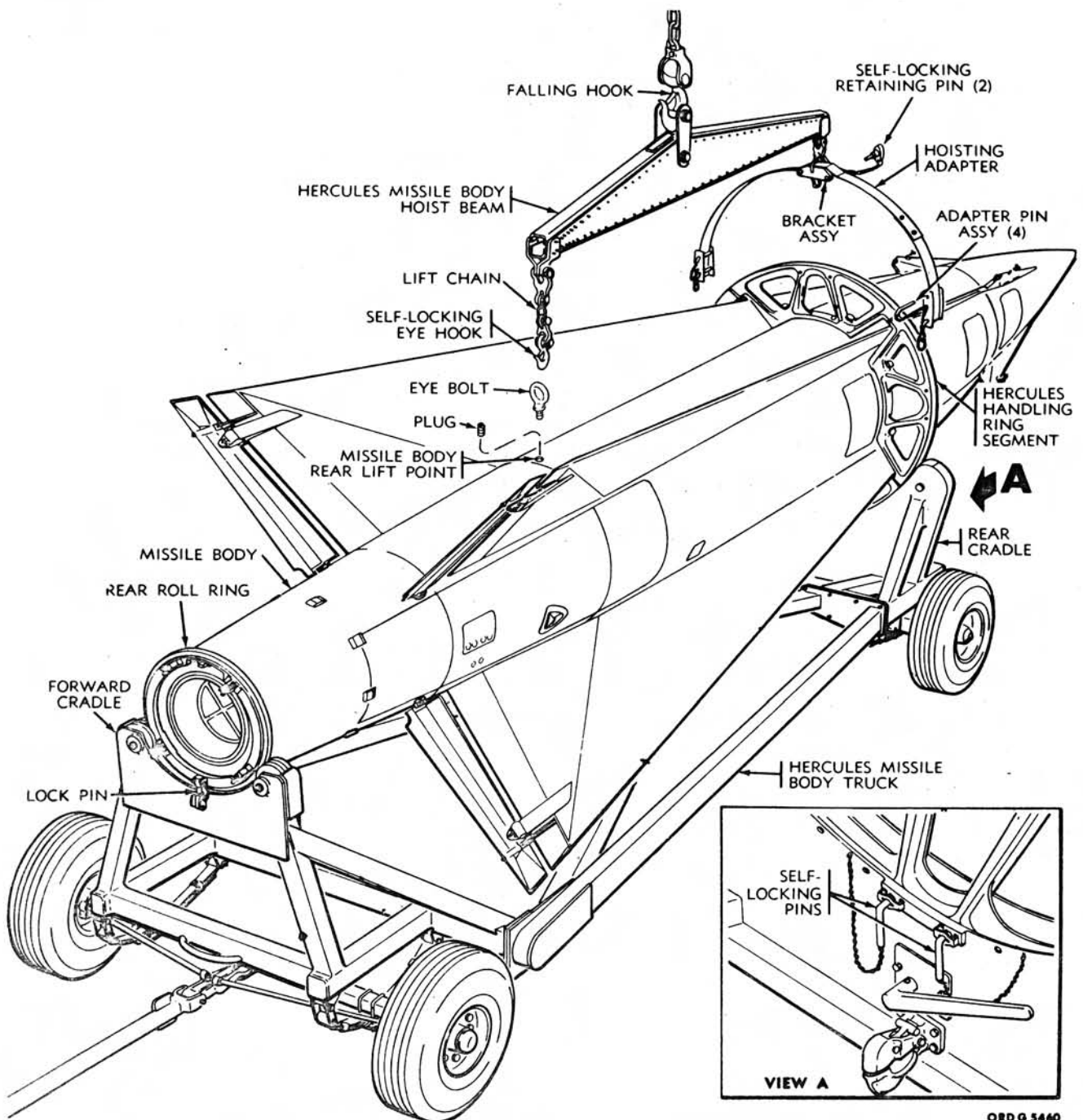
b.1. Connect the ground strap to the missile body.

c. Remove the self-locking retaining pins from the bracket assembly and the adapter pin assemblies from the hoisting adapter.

d. Lower the missile body hoist beam into position above the handling ring segment and the missile body rear lift point.

e. Remove the plug from the missile body rear lift point.

f. Remove the eyebolt from the self-locking eyehook.



ORD Q 5460

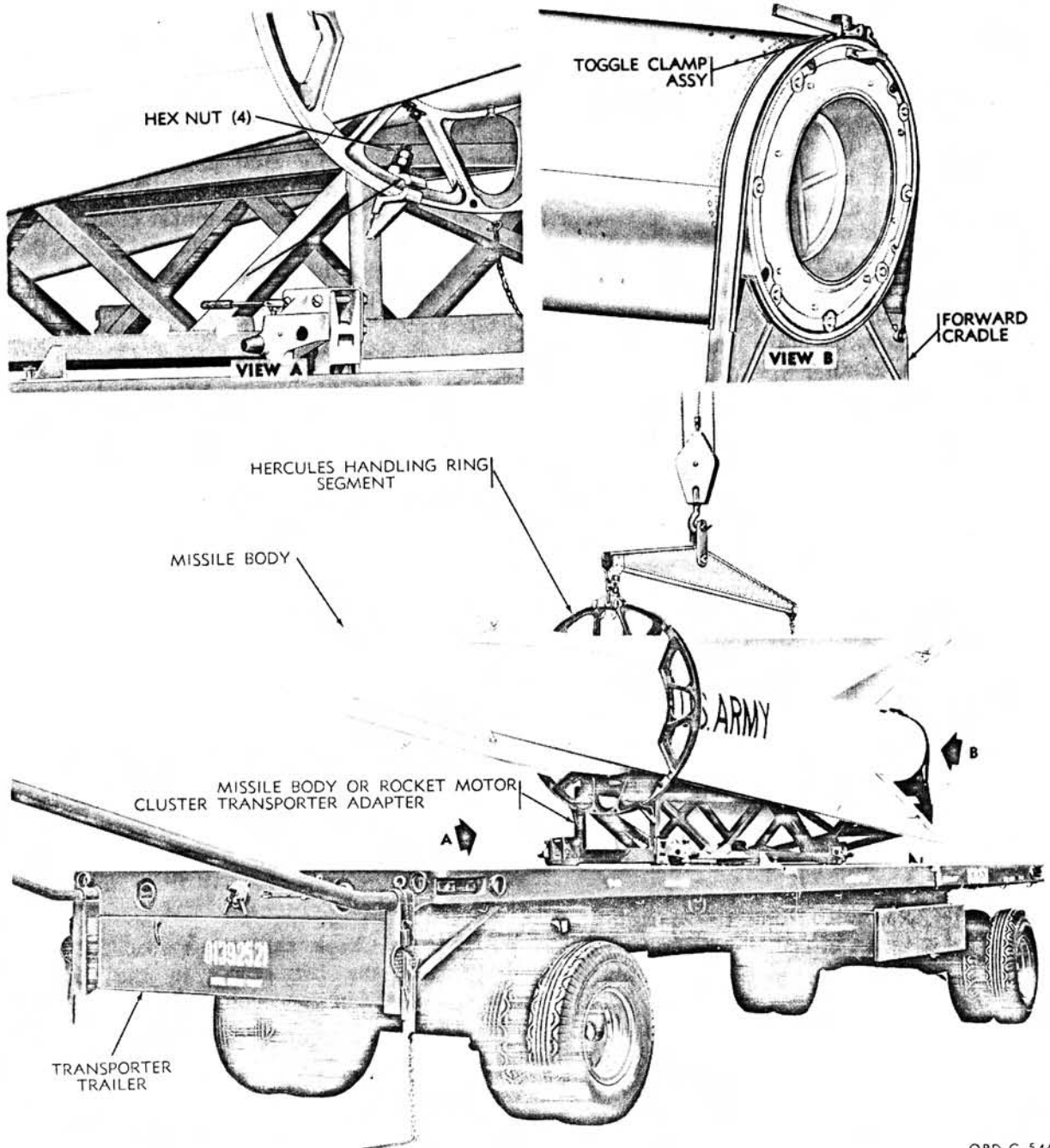
Figure 9-1. Missile body on the missile body truck.

**WARNING:** Check that the threads of the eyebolt and the missile body rear lift point are in good condition.

**WARNING:** Check that the flange of the eyebolt is flush with the missile body.

*g.* Install the eyebolt in the missile body rear lift point.

*h.* Attach the self-locking eyehook to the eyebolt.



ORD G 5463

Figure 9-2. Missile body on the missile body or rocket cluster transporter adapter.

i. Lower the missile body hoist beam, and guide the hoisting adapter onto the handling ring segments.

j. Align the pin holes in the bracket assembly with the pin holes in the upper handling ring segment, and install the self-

locking retaining pins.

k. Align the pin holes in the hoisting adapter with the pin holes in the handling ring segment on the sides of the missile body, and install the adapter pin assemblies.

**CAUTION:** Make sure that the captive bolts (6, fig. 3-11) on the top and two side handling ring segments are torqued to 100 pound-inches before performing step 1 below. Do not loosen bolts before torquing.

l. Raise the missile body hoist beam slightly to apply tension to the hoist beam.

m. Remove the lock pin that secures the rear roll ring to the forward cradle of the missile body truck. Remove the two self-locking pins that secure the handling ring segments to the rear cradle on the missile body truck; lift the missile body clear. Remove the rear roll ring.

n. Position the missile body on the missile body or rocket motor cluster transporter adapter (fig. 9-2).

o. Engage the toggle clamp assembly to secure the missile body to the forward cradle on the transporter adapter. Position the clamp assemblies on the handling ring segment. Tighten the hexagon nuts to secure the missile body on the transporter adapter.

p. Lower the falling hook (fig. 9-1) to release the tension on the missile body hoist beam.

q. Remove the self-locking retaining pins that attach the bracket assembly to the handling ring segment and the adapter pin assemblies that attach the hoisting adapter to the segments.

r. Remove the self-locking eyehook from the eyebolt.

s. Remove the eyebolt from the missile body rear lift point, and attach the eyebolt to the self-locking eyehook.

t. (Deleted)

u. Install the plug in the missile body rear lift point.

v. Lift the missile body hoist beam clear of the missile body.

w. Install the self-locking retaining pins in the bracket assembly and the adapter pin assemblies in the hoisting adapter.

w.1. Disconnect the ground strap from the missile body.

x. Move the missile body (fig. 9-2) to the launching area.

## 9-2. Transporting the Rocket Motor Cluster, Using the Rocket Motor Cluster Truck or the Missile Body or Rocket Motor Transporter Adapter

a. During assembly procedures, the rocket motor cluster (9, fig. 9-3) is installed on the rocket motor cluster truck (22). This truck is used to transport the rocket motor cluster over smooth terrain or paved surfaces. When the terrain is rough, the rocket motor cluster (2, fig. 9-4) must be moved on the missile body or rocket motor cluster transporter adapter (3) mounted on the transporter trailer (4).

**WARNING:** When the rocket motor cluster is moved from the assembly area to the launching area over rough terrain, the procedures in b through r below must be performed to prevent injury to personnel and damage to equipment.

*Note.* Make certain that a hoisting device capable of lifting 6,000 pounds is used to install the rocket motor cluster on the missile body or rocket motor cluster transporter adapter.

b. Attach the falling hook (6, fig. 9-3) to the rocket motor cluster hoist beam (7).

b.1. Connect the ground strap to the rocket motor cluster.

c. Lower the hoist beam into position with the self-locking eyehooks (5) directly over the lift points (1) in the rocket motor cluster (9).

d. Remove the plugs (2) from the lift points.

e. Remove the eyebolts (3) from the self-locking eyehooks.

**WARNING:** Check that the threads of the eyebolts and the lift points in the rocket motor cluster are in good condition.

f. Install the eyebolts in the inboard lift points.

**WARNING:** Check that the flanges of the eyebolts are flush with the rocket motor cluster.

*Note.* When the eyebolt will not fit flush against the surface of the rocket motor due to excessive thread length, install 5/8-inch id flat washers of sufficient thickness on the eyebolt. Do not install more washers than necessary to compensate for the excessive thread length.

*g.* Attach the self-locking eyehooks to the eyebolts.

*h.* Raise the hoist beam slightly to apply tension to the four lift chains (4).

*i.* Remove the forward and rear retaining rail bars (21 and 10) from their slipper assemblies (20 and 13).

*j.* Loosen the locknuts and adjusting bolts (19 and 18) until each is flush with the face of its support (17 and 14) to release the rocket motor cluster.

*k.* Lift the rocket motor cluster clear.

*l.* Position the rocket motor cluster (2, fig. 9-4) on the missile body or rocket motor cluster transporter adapter (3).

*m.* Secure the rocket motor cluster to the missile body or rocket motor cluster transporter adapter as prescribed in (1) through (4) below.

(1) Install the internal-wrenching or hexagon-head bolts (8) and recessed washers (7) to secure the retaining rail bars (6) to the forward slipper assemblies (5). Tighten the bolts to the torque value given in table 15-10.

(2) Install the hexagon-head screws (12) and flat washers (13) to secure the rear

retaining rail bars (14) to the rear slippers (15). Tighten the bolts to the torque value given in table 15-10.

(3) Tighten the adjusting bolt (10) and the locknut (9) at each support (11 and 16) on the transporter adapter (3).

(4) Engage the toggle clamp assembly (1) to secure the supports. Make certain that the adjusting bolts and locknuts are tightened sufficiently to secure the rocket motor cluster to the missile body or rocket motor cluster transporter adapter.

*n.* Lower the rocket motor cluster hoist beam (7, fig. 9-3) to remove the tension from the lift chains (4).

*o.* Remove the self-locking eyehooks (5) from the eyebolts (3).

*p.* Remove the four eyebolts from the four lift points (1), and attach to the self-locking eyehooks.

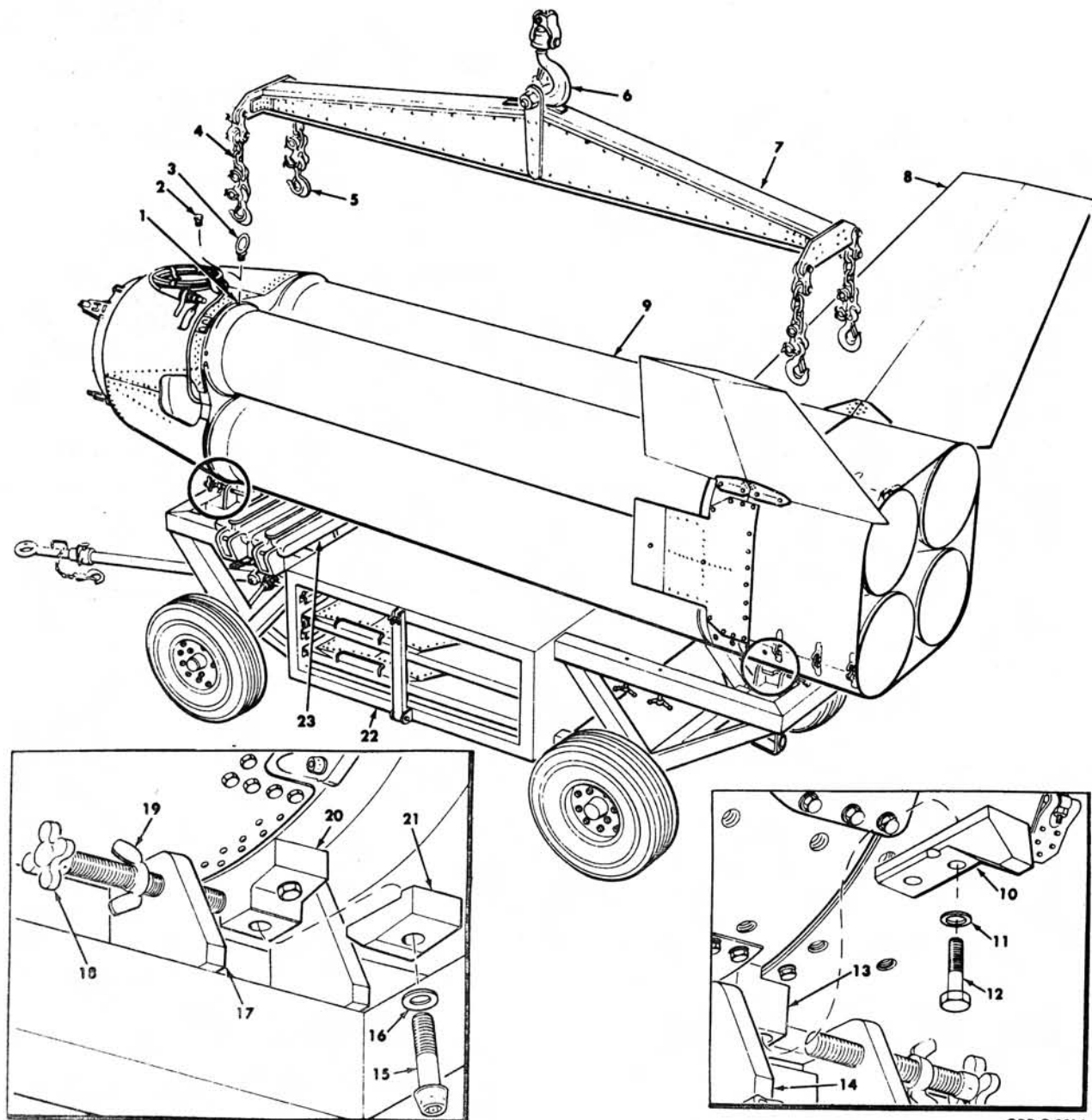
*q.* Install the plugs (2) in the lift points.

*r.* Remove the hoist beam.

*r.1.* Disconnect the ground strap from the rocket motor cluster.

*s.* Move the rocket motor cluster to the launching area.





ORD G 5514

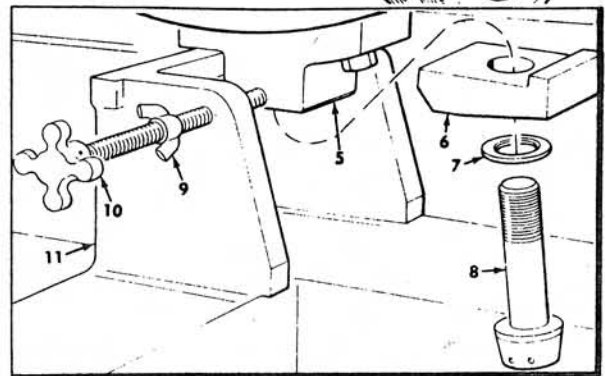
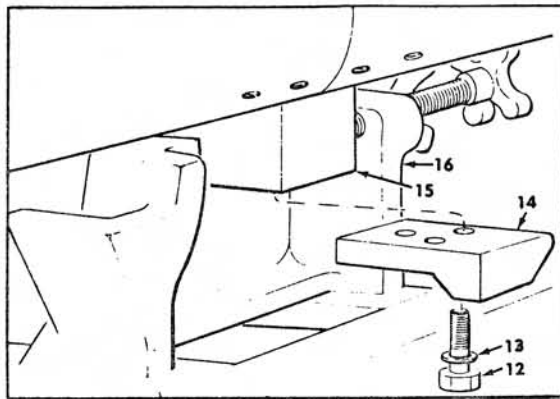
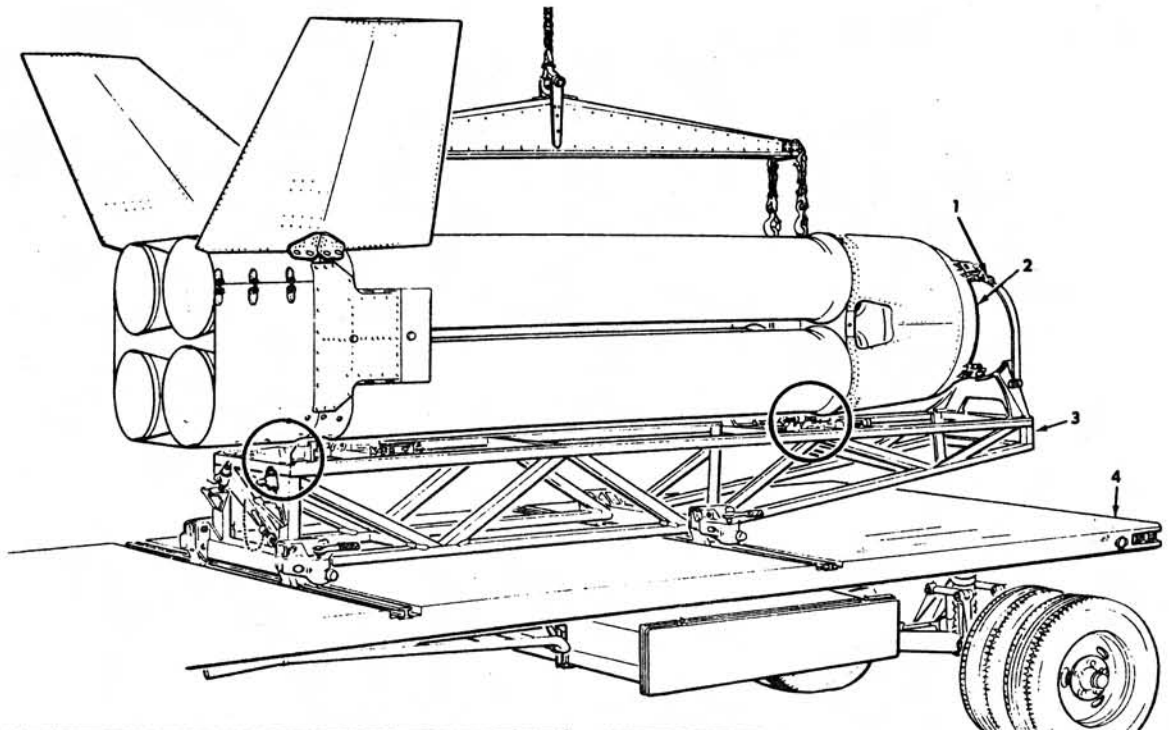
- |                                     |   |
|-------------------------------------|---|
| 1—Lift point (4)                    | 11—0.453-in-id fl washer (4)  |
| 2—Plug (4)                          | 12—7/16-14 x 1-1/2 hex-hd screw (4)   |
| 3—5/8-18 x 7/8 eyebolt (4)          | 13—Rear slipper (2)   |
| 4—Lift chain (4)                    | 14—Support (2)  |
| 5—Self-locking eyehook (4)          | 15—5/8-18 x 2-9/16 int-wrenching bolt (2) or 5/8-18 x 2.340 hex-hd bolt (2) |
| 6—Falling hook                      | 16—0.636-in-id recessed washer (2)  |
| 7—Rocket motor cluster hoist beam   | 17—Support (2)  |
| 8—Rocket motor cluster fin assembly | 18—Adjusting bolt (4)   |
| 9—Rocket motor cluster              | 19—Locknut (4)  |
| 10—Rear retaining rail bar (2)      |   |

Figure 9-3. Removal and installation of the rocket motor cluster on the rocket motor cluster truck.

- 20—Forward slipper assembly (2)  
21—Forward retaining rail bar (2)

- 22—Rocket motor cluster truck  
23—Track assemblies (2)

Figure 9-3. Removal and installation of the rocket motor cluster on the rocket motor cluster truck—legend—Continued.



ORD G 5516

- 1—Toggle clamp assembly  
2—Rocket motor cluster  
3—Missile body or rocket motor cluster transporter adapter  
4—Transporter trailer  
5—Forward slipper assembly (2)  
6—Forward retaining rail bar (2)  
7—0.636-in-id recessed washer (2)  
8—5/8-18 x 2-9/16 int-wrenching bolt (2) or 5/8-18 x 2-11/32 hex-hd bolt (2)

- 9—Locknut (4)  
10—Adjusting bolt (4)  
11—Support (2)  
12—7/16-14 x 1 1/2 hex-hd screw (4)  
13—0.452-in-id fl washer (4)  
14—Rear retaining rail bar (2)  
15—Rear slipper (2)  
16—Support (2)

Figure 9-4. Removal and installation of the rocket motor cluster on the missile body or rocket motor cluster transporter adapter.

## Section II. JOINING THE MISSILE BODY AND THE ROCKET MOTOR CLUSTER ON THE LAUNCHING-HANDLING RAIL

### 9-3. Preparation for Joining the Missile Body and the Rocket Motor Cluster on the Launching-Handling Rail, Using a Missile Body Truck or Transporter-Adapter for Transporting

*Note.* Prior to installing a round on the launching-handling rail, visually inspect the launching and handling quick-disconnect cables for damage and check the hydraulic reservoir oil level.

a. Perform a continuity check of the launching-handling rail cables in accordance with table 9-1, using the R X 1 scale of the multimeter. The meter indicates continuity (less than 1 ohm) for each check, unless otherwise noted.

Table 9-1. Continuity Test of the Launching-Handling Rail Cables—Continued

Positive test probe connected to:		Negative test probe connected to:	
Connector	Pin	Connector	Pin
P72A	1	P1X	4
P72A	1	P1X	9
P72A	12	P1X	13
P72A <sup>1</sup>	12	P1X	11
P72A <sup>1</sup>	12	P1X	1
P72A <sup>1</sup>	12	P1X	12
P72A	22	P1X	13
P72A <sup>1</sup>	22	P1X	11
P72A <sup>1</sup>	22	P1X	1
P72A	28	P1X	14
P72A	34	P1X	7
P72A	1	J104A	0
P72A	2	J104A	j
P72A	3	J104A	h
P72A	4	J104A	g
P72A	5	J104A	f
P72A	6	J104A	e
P72A	7	J104A	d
P72A	8	J104A	c
P72A	9	J104A	a
P72A	19	J104A	k
P72A	20	J104A	L
P72A	28	J104A	J
P72A	34	J104A	G
P72A	43	J104A	b
P72A	45	J104A	N
P72A	46	J104A	M
P1X	1	J104A	P

Positive test probe connected to:		Negative test probe connected to:	
Connector	Pin	Connector	Pin
P1X	5	J104A	E
P1X	6	J104A	U
P1X	7	J104A	G
P1X	8	J104A	R
P1X	9	J104A	O
P1X	10	J104A	F
P1X	11	J104A	P
P1X	14	J104A	J
P1X	15	J104A	K
P1X	17	J104A	C
P1X	18	J104A	V
P1X	19	J104A	D
P1X	21	J104A	S
P1X	22	J104A	H
P1X	23	J104A	T
P1X	26	J104A	I
P1X	27	J104A	A
P1X	28	J104A	B
P72A	12	J105A	u
P72A <sup>1</sup>	16	J105A	A
P72A <sup>1</sup>	17	J105A	B
P72A <sup>1</sup>	18	J105A	C
P72A	24	J105A	M
P72A	29	J105A	b
P72A	30	J105A	c
P72A	31	J105A	d
P72A	32	J105A	e
P72A	33	J105A	f
P72A	35	J105A	g
P72A	36	J105A	h
P72A	37	J105A	j
P72A	38	J105A	J
P72A	39	J105A	m
P72A	40	J105A	n
P72A	41	J105A	H
P72A	42	J105A	r
P72A	44	J105A	s
P72A	47	J105A	I
P72A <sup>1</sup>	48	J105A	O
P72A	49	J105A	P
P72A	50	J105A	R
P72A	51	J105A	S
P72A		J105A	T

<sup>1</sup> The meter indicates 135 to 165 ohms if the ambient temperature is above 20°F, and if MWO's ORD Y75-W84 and ORD Y86-W5 have been applied; otherwise the meter indicates infinity.

<sup>2</sup> The meter indicates an open circuit (infinity).

<sup>3</sup> With the missile-away switch closed, the meter indicates continuity. With the missile-away switch open, the meter indicates infinity.

Table 9-1. Continuity Test of the Launching-Handling Rail Cables—Continued

Positive test probe connected to:		Negative test probe connected to:	
Connector	Pin	Connector	Pin
P72A	52	J105A	U
P72A	53	J105A	V
P72A	54	J105A	W
P72A	55	J105A	X
P72A	56	J105A	Y
P72A	57	J105A	Z
P72A	58	J105A	a
P72A	59	J105A	w
P72A	60	J105A	p
P72A	61	J105A	x
P72A	63	J105A	L
P72A	64	J105A	N
P1X	2	J105A	t
P1X	16	J105A	v

Note. On complete rounds prepared for annual service practice, wrap the launching-handling rail quick-disconnect cables with thermal-insulation tape MIL-T-4117, 2CG7. Secure the tape with wire MS20995-N51.

b. Secure connector P72A and P1X (fig. 9-19) to the dummy connectors on the launching-handling rail.

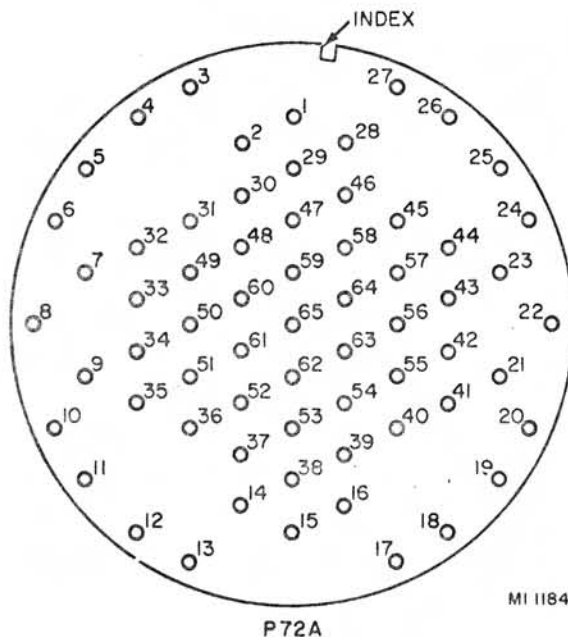


Figure 9-5. Pin location diagram of connector P72A.

**WARNING:** Make certain that connectors P72A and P1X are properly installed in the dummy connectors on the launching-handling rail prior to performing the joining procedures.

Note. Due to differences between site configurations, it may be necessary to remove the adjoining loading racks before performing paragraphs c and d.

c. If the launching-handling rail is on a launcher, assure that the TEST-FIRE switch is in the TEST position. Position the launching-handling rail on any launcher (except elevator-mounted launchers) or at the end of the loading racks, for joining of the missile body and the rocket motor cluster.

d. Perform the adjustments prescribed below on the launching-handling rail:

(1) Loosen the locknut (3, fig. 9-8) on the stop bolt (4) on the left side of the launching-handling rail (5), and retract the stop bolt until approximately 1-1/4 inches remain exposed in front of the forward face of the stop-block (2).

(2) Loosen the locknut on the stop bolt on the right side of the launching-handling rail, and retract the stop bolt until approximately 1-1/4 inches remain exposed in front of the forward face of the stopblock.

(3) Loosen the locknut (9) on the arm adjusting setscrew or arm adjusting bolt (8). Retract the setscrew or bolt until it is flush with the missile-away switch arm (7).

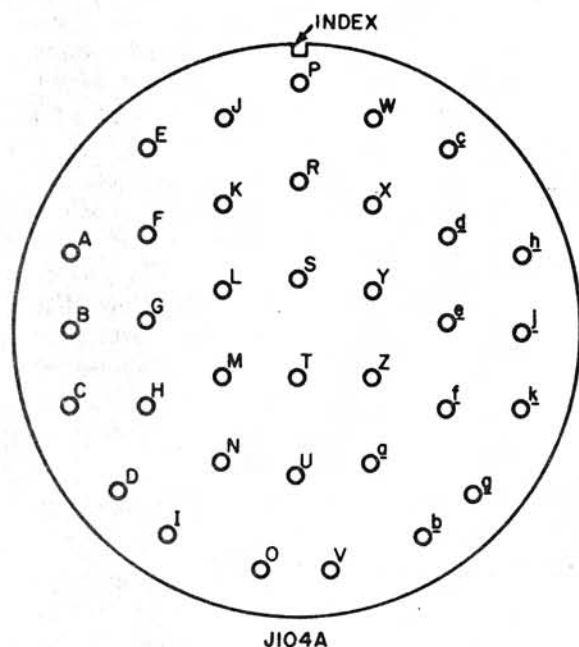
e. (Deleted)

f. (Deleted)

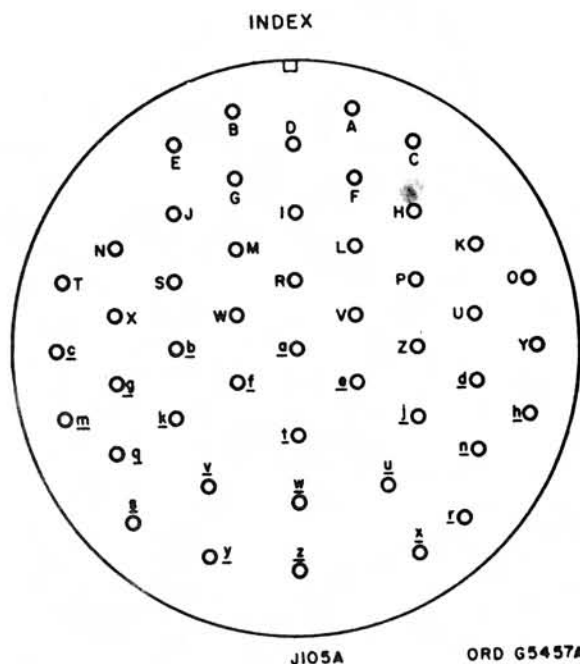
#### 9-4. Preparation for Joining the Missile Body and the Rocket Motor Cluster on the Launching-Handling Rail, Using an M529 Trailer for Transporting

Note. Prior to installing a round on the launching-handling rail, visually inspect the launching and handling quick-disconnect cables for damage and check the hydraulic oil reservoir oil levels.

a. Perform a continuity check of the launching-handling rail cables in accordance with table 9-1, using the R X 1 scale of the multimeter. The meter indicates continuity (less than 1 ohm) for each check, unless otherwise noted.

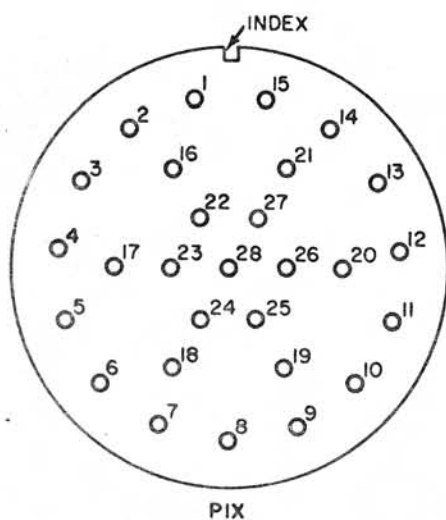


J104A



J105A

ORD G5457A



PIX

MI 1183

Figure 9-6. Pin location diagrams of connectors J104A and PIX.

Note. On complete rounds prepared for annual service practice, wrap the launching-handling rail quick-disconnect cables with thermal-insulation tape MIL-T-4117, 2CG7. Secure the tape with wire MS20995-N51.

b. Secure connector P72A and P1X (fig. 9-19) to the dummy connectors on the launching-handling rail.

Figure 9-7. Pin location diagram of connector J105A.

**WARNING:** Make certain that connectors P72A and P1X are properly installed in the dummy connectors on the launching-handling rail prior to performing the joining procedures.

**WARNING:** Refer to TM 9-2330-255-14 to insure that the launching-handling rail is properly positioned and locked to the trailer.

c. Perform the adjustments prescribed below on the launching-handling rail.

(1) Loosen the locknut (3, fig. 9-8) on the stop bolt (4) on the left side of the launching-handling rail (5), and retract the stop bolt until approximately 1-1/4 inches remain exposed in front of the forward face of the stopblock (2).

(2) Loosen the locknut on the stop bolt on the right side of the launching handling rail, and retract the stop bolt until approximately 1-1/4 inches remain exposed in front of the forward face of the stopblock.

(3) Loosen the locknut (9) on the arm adjusting setscrew or arm adjusting bolt (8). Retract the setscrew or bolt until it is flush with the missile-away switch arm (7).



d. (Deleted)

e. (Deleted)

### 9-5. Joining the Rocket Motor Cluster to the Launching-Handling Rail on the M529 Trailer

a. Perform the lifting procedures (par. 9-2b through k).

b. Liberally coat the mating surfaces of the launching-handling rail, of the forward and rear slippers, and of the forward and rear retaining rail bars with corrosion-preventive compound.

c. Position the rocket motor cluster on the rear end of the launching-handling rail (fig. 9-9) against the stop bolts. Insure that item 1—rear slipper (fig. 9-8) is not jarred or sharply impacted against stop bolt—item 4. A sharp impact or jar may cause damage to the booster fin fittings.

d. Secure the rocket motor cluster (1, fig.

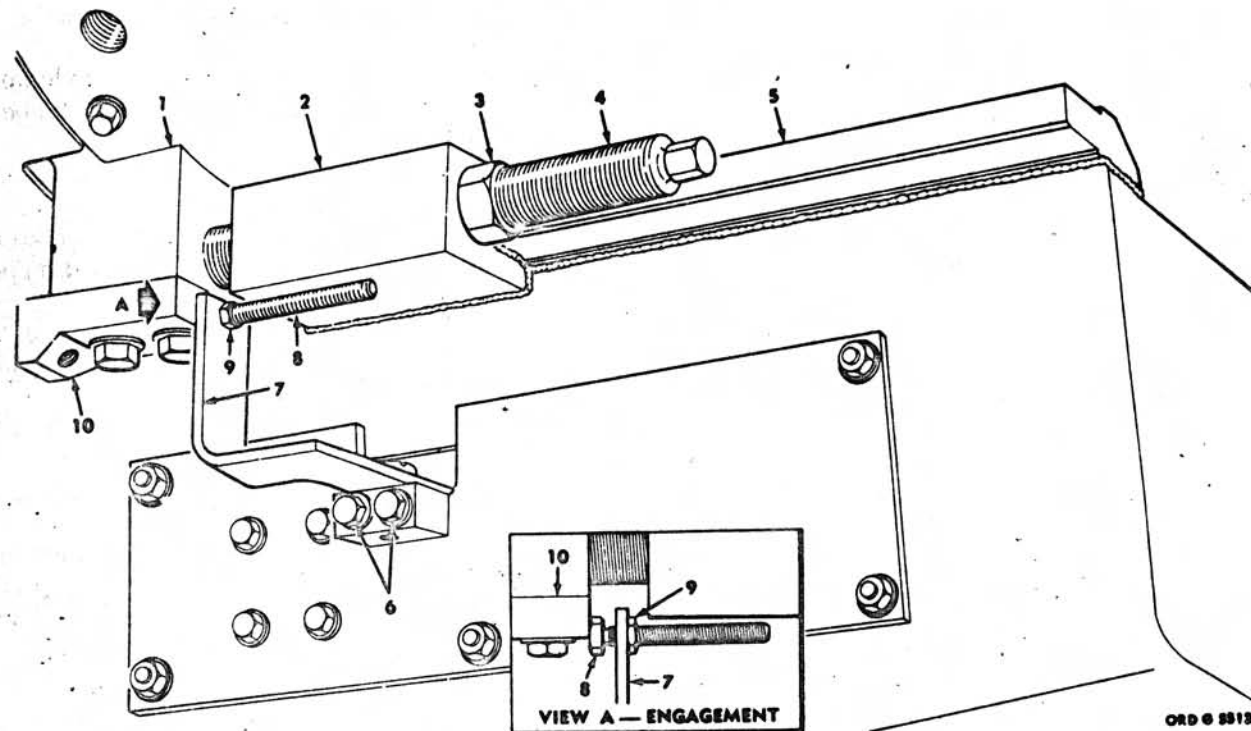
9-10) to the launching-handling rail (2) as prescribed in steps (1) and (2) below.

(1) Install the internal-wrenching or hexagon head bolts (10) and recessed washers (11) to secure the forward retaining rail bars (9) to the forward slipper assemblies (8). Tighten the bolts to the torque value given in table 15-10.

(2) Install the hexagon-head screws (4) and flat washers (5) to secure the rear retaining rail bars (6) to the rear slippers (3). Tighten the screws to the torque value given in table 15-10.

*Note.* The rear edges of the rear retaining-rail bars must be flush with, or forward of, the rear edges of the rear slippers. If necessary, file the rear edges of the rear retaining-rail bars to make them flush.

e. Check that all segments of the impact cushion (fig. 9-11) are cemented inside the impact-ring.



- 1—Rear slipper
- 2—Stopblock (2)
- 3—Locknut (2)
- 4—Stop bolt (2)
- 5—Launching-handling rail

- 6—Hex-hd bolt (2)
- 7—Missile-away switch arm
- 8—Arm adjusting setscrew or arm adjusting bolt
- 9—Locknut
- 10—Rear retaining rail bar

Figure 9-8. Adjustment of the stop bolts and the missile-away switch.

*Note.* If any segment of the impact cushion is warped or deformed, refer to paragraph 12-117 for corrective maintenance.

*f.* Release the lock release lever (B, fig. 9-12) on the elevon lock; turn the elevon lock fork toward the rear until the elevon lock fork is open.

*g.* Repeat step *f* above until the three remaining elevon lock forks are open.

*h.* Lower the rocket motor cluster hoist beam (fig. 9-9) to remove the tension from the lift chains.

*i.* Remove the self-locking eyehooks from the eyebolts.

*j.* Remove the eyebolts from the lift points; attach the eyebolts to the self-locking eyehooks.

*k.* Liberally coat the threads of the plugs with soft film corrosion preventive compound.

*l.* Install the plugs in the lift points.

*m.* Remove the rocket motor cluster hoist beam.

**CAUTION:** Assure that rocket motor igniter cable connectors P1, P2, P3, and P4 are placed between the thrust structure pedestal and the base. Assure that the looped end of the cable is securely tied or taped on top of the thrust structure to preclude damage during missile and rocket motor joining operation.

*n.* Loosen the knurled knobs (16, fig. 9-13) on the holder (17) until the holder has sufficient slack to receive the T-hook adapter.

*o.* Turn the internal-wrenching bolt or thumbscrew (3) counterclockwise until the end of the bolt or thumbscrew is flush with the rear surface of the yoke assembly (9).

*p.* Check that the internal-wrenching bolt or thumbscrew is clean and not damaged.

*p.1.* Preposition the internal-wrenching bolt or thumbscrew by performing steps (1) through (4) below.

(1) Raise the yoke assembly and install the shear bolt (4, fig. 9-13).

(2) While holding the holder (10) against the rear guide pin (18), turn the internal-wrenching bolt or thumbscrew (7) until it extends approximately 1/8 inch into the slot in the top of the holder.

(3) Install 0.032 inch diameter steel safety wire through the head of the internal-wrenching bolt or thumbscrew and secure it to the hole in the yoke assembly (9).

(4) Remove the shear bolt and lower the yoke assembly.

*q.* Position the two lower rocket motor cluster fin assemblies (3, fig. 9-23), and secure each in position with eight hexagon-head bolts and flat washers. Tighten the bolts to the torque value given in table 15-10.

**WARNING:** Exercise care in handling the safety-and-arming device.

*r.* Store the missile components in the explosive-storage container on trailer M529 as indicated in figure 9-14.

#### 9-6. Joining the Missile Body and the Rocket Motor Cluster on M529 Trailer

*a.* Perform the procedures in steps 9-8a through *ad*.

*b.* Connect the missile umbilical cable and hook latch as prescribed in steps 9-8am through *ao*.

*c.* Install the missile holddown arm assemblies as prescribed in TM 9-2330-255-14.

*d.* Connect the rail power cable assemblies as prescribed in TM 9-2330-255-14, as directed by local authorities.

*e.* Energize the engine-driver generator set as prescribed in TM 5-6115-255-10, as directed by local authorities.

*f.* Connect the hose assembly (3, fig. 9-18) to the cooling access door (4).

*f.1.* Disconnect the ground strap from the missile.

*g.* Move the missile to the desired location. Unload the missile from the trailer onto the launcher loading rack as prescribed in TM 9-2330-255-14.

*h.* Loosen the nut with bar; lower the pipe to FIRE position; tighten the nut with bar.

*i.* Perform the procedures as prescribed in steps 9-8ag through *al*.

*j.* Release the lock release lever (fig. 9-12) on the elevon lock; turn the lock forward on the hinge until the elevon lock fork is engaged with the elevon.

*k.* Repeat step *j* above until the three remaining elevons are securely locked.

**9-7. Joining the Rocket Motor Cluster to the Launching-Handling Rail, Using Rocket Motor Cluster Truck or Transporter Adapter**

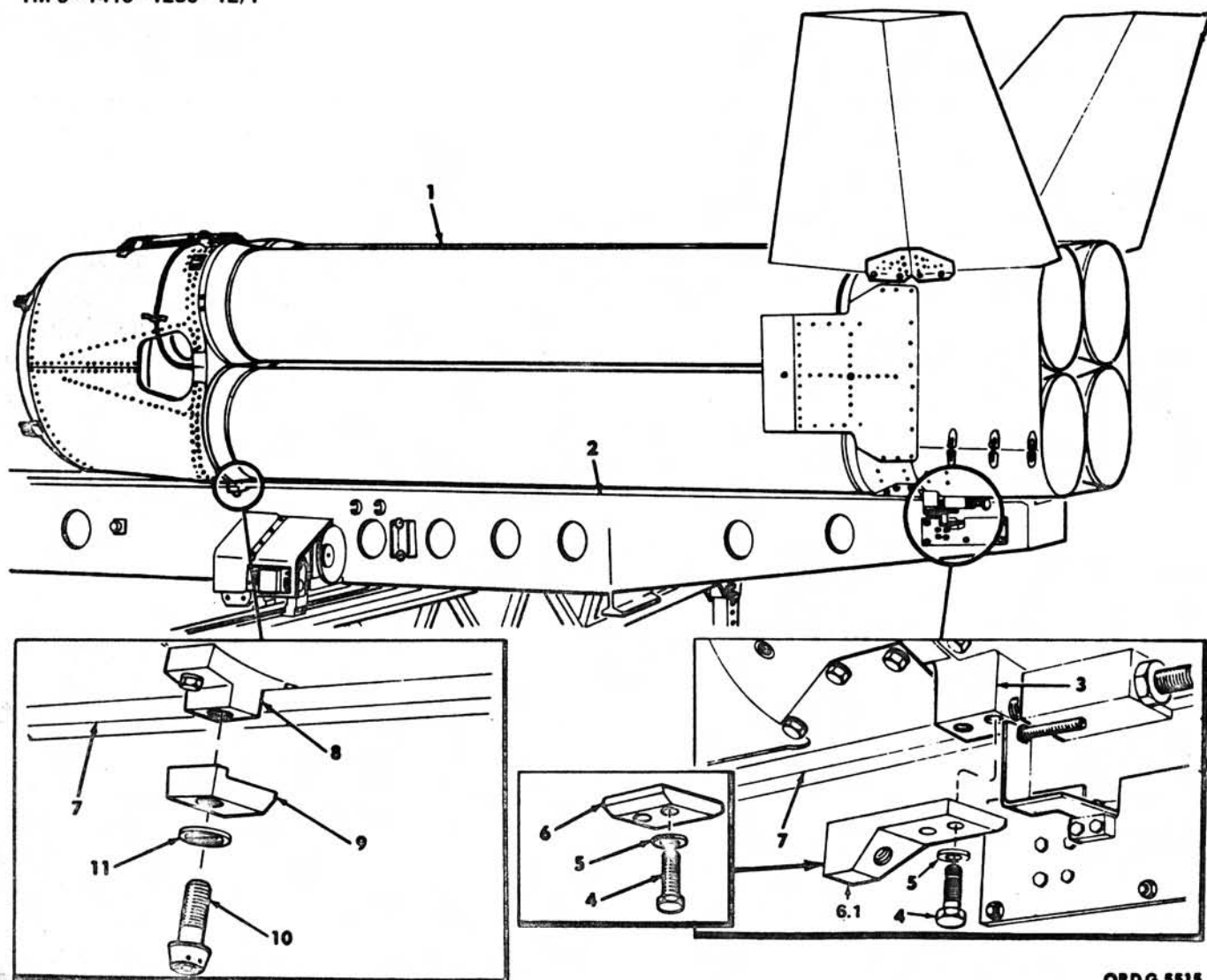
*Note.* If the transporter adapter is used to transport the rocket motor cluster, omit *a* below.

*a.* Perform the lifting procedures (par. 9-2*b* through *k*).

*Note.* If the rocket motor cluster truck is used to transport the rocket motor, omit *b* through *c.2* below.

*b.* Perform the lifting procedures (para 9-2*b* through *h*).

*c.* Remove the hexagon-head screws (12, fig. 9-4) and flat washers (13) that secure the rear retaining bars (14) to the rear slippers (15), and remove the retaining rail bars.



ORDG 5515

- 1—Rocket motor cluster
- 2—Launching-handling rail
- 3—Rear slipper
- 4—7/16-14 x 1-1/2 hex-hd screw (4)
- 5—0.453-in-id fl washer (4)
- 6—Rear retaining rail bar (2)<sup>1</sup>
- 6.1—Left rear retaining rail bar<sup>2</sup>

- 7—Launching-handling rail track
- 8—Forward slipper assembly (2)
- 9—Forward retaining rail bar (2)
- 10—5/8-18 x 2-9/16 int-wrenching bolt (2) or 5/8-18 x 2-11/32 hex-hd bolt (2)
- 11—0.636-in-id recessed washer (2)

Figure 9-10. Removal and installation of the forward and rear retaining rail bars on the launching-handling rail.

<sup>1</sup>The rear retaining rail bar may be used on any rocket motor cluster transporter vehicle or on any launching handling rail except when on the M529 ready round transporter.

<sup>2</sup>The left rear retaining rail bar (9978991-1) and the right rear retaining rail bar (9978991-2) only in matched pairs may be used on any rocket motor cluster transporter vehicle, but must be used when transporting with the M529 ready round transporter.

(1) Assure that the hexagon-head bolts (3, fig. 8-7) in each forward slipper assembly (1) have been torqued to the value given in table 15-10.

(2) At the forward slipper assy (8, fig. 9-12), install the bolts (10) and washers (11) that secure the forward retaining rail bars (9). Tighten the bolts until

the retaining rail bars are approximately 1/4 inch from contact with the rail tracks (7). Do not torque the bolts at this time.

(3) At the rear slippers (3), install the screws (4) and washers (5) that secure the rear retaining rail bars (6 or 6.1). Tighten the screws until the rear retaining rail bars are approximately 1/8 inch from contact with the rail tracks (7). Do not torque the screws at this time.

**Note.** The rear edges of the rear retaining-rail bars must be flush with, or forward of, the rear edges of the rear slippers. If necessary, file the rear edges of the rear retaining-rail bars to make them flush.

g. Check that all segments of the impact cushion (fig. 9-11) are cemented inside the impact-ring.

**Note.** If any segment of the impact cushion is warped or deformed, refer to paragraph 12-117 for corrective maintenance.

h. Release the lock release lever (B, fig. 9-12) on the elevon lock; turn the elevon lock fork toward the rear until the elevon lock fork is open.

i. Repeat step h above until the three remaining elevon lock forks are open.

j. Lower the rocket motor cluster hoist beam (fig. 9-9) to remove the tension from the lift chains.

k. Remove the self-locking eyehooks from the eyebolts.

l. Remove the eyebolts from the lift points; attach the eyebolts to the self-locking eyehooks.

m. Liberally coat the threads of the plugs with soft-film corrosion-preventive compound.

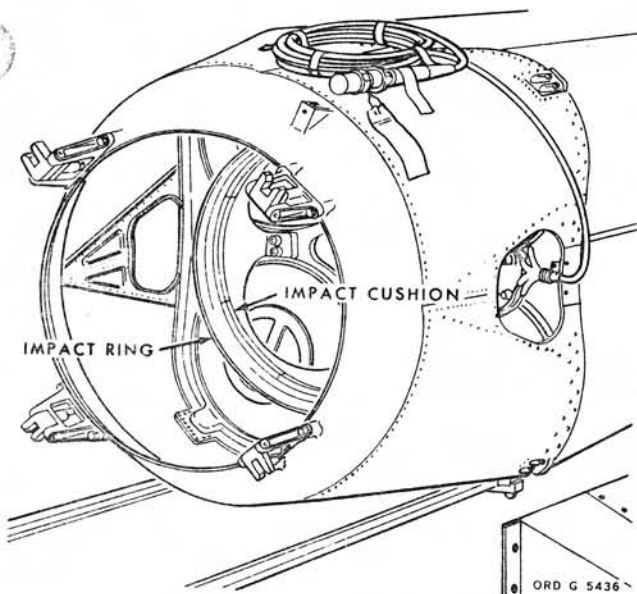


Figure 9-11. Impact ring and cushion in the rocket motor thrust ring assembly.

n. Install the plugs in the lift points.  
o. Remove the rocket motor cluster hoist beam.

**CAUTION:** Assure that rocket motor igniter cable connectors P1, P2, P3, and P4 are placed between the thrust structure pedestal and the base. Assure that the looped end of the cable is securely tied or taped on top of the thrust structure to preclude damage during missile and rocket motor joining operations.

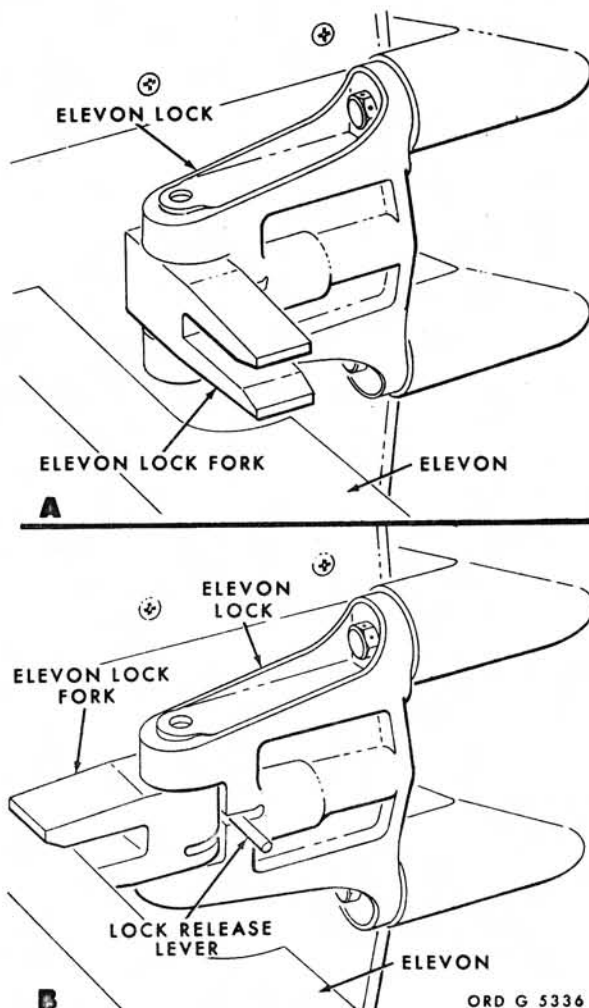


Figure 9-12. Elevon hinge lock operation.



p. Loosen the knurled knobs (16, fig. 9-13) on the holder (17) until the holder has sufficient slack to receive the T-hook adapter (11).

q. Turn the internal-wrenching bolt or thumbscrew (3) counterclockwise until the end of the bolt or thumbscrew is flush with the rear surface of the yoke assembly (9).

r. Check that the internal-wrenching bolt or thumbscrew is clean and not damaged.

s. Preposition the internal-wrenching bolt or thumbscrew by performing steps (1) through (4) below.

(1) Raise the yoke assembly and install the shear bolt (7, fig. 9-13).

(2) While holding the holder (10) against the rear guide pin (18), turn the internal-wrenching bolt or thumbscrew (7) until it extends approximately 1/8 inch into the slot in the top of the holder.

(3) Install 0.032 inch diameter steel safety wire through the head of the internal-wrenching bolt or thumbscrew, and secure it to the hole in the yoke assembly (9).

(4) Remove the shear bolt and lower the yoke assembly.

## 9-8. Joining the Missile Body and the Rocket Motor Cluster

a. (Deleted)

b. Open the APS SERVICE DOOR (11, fig. 3-21), on missiles equipped with an APS.

c. Prepare the missile body for hoisting (par. 9-1b through l).

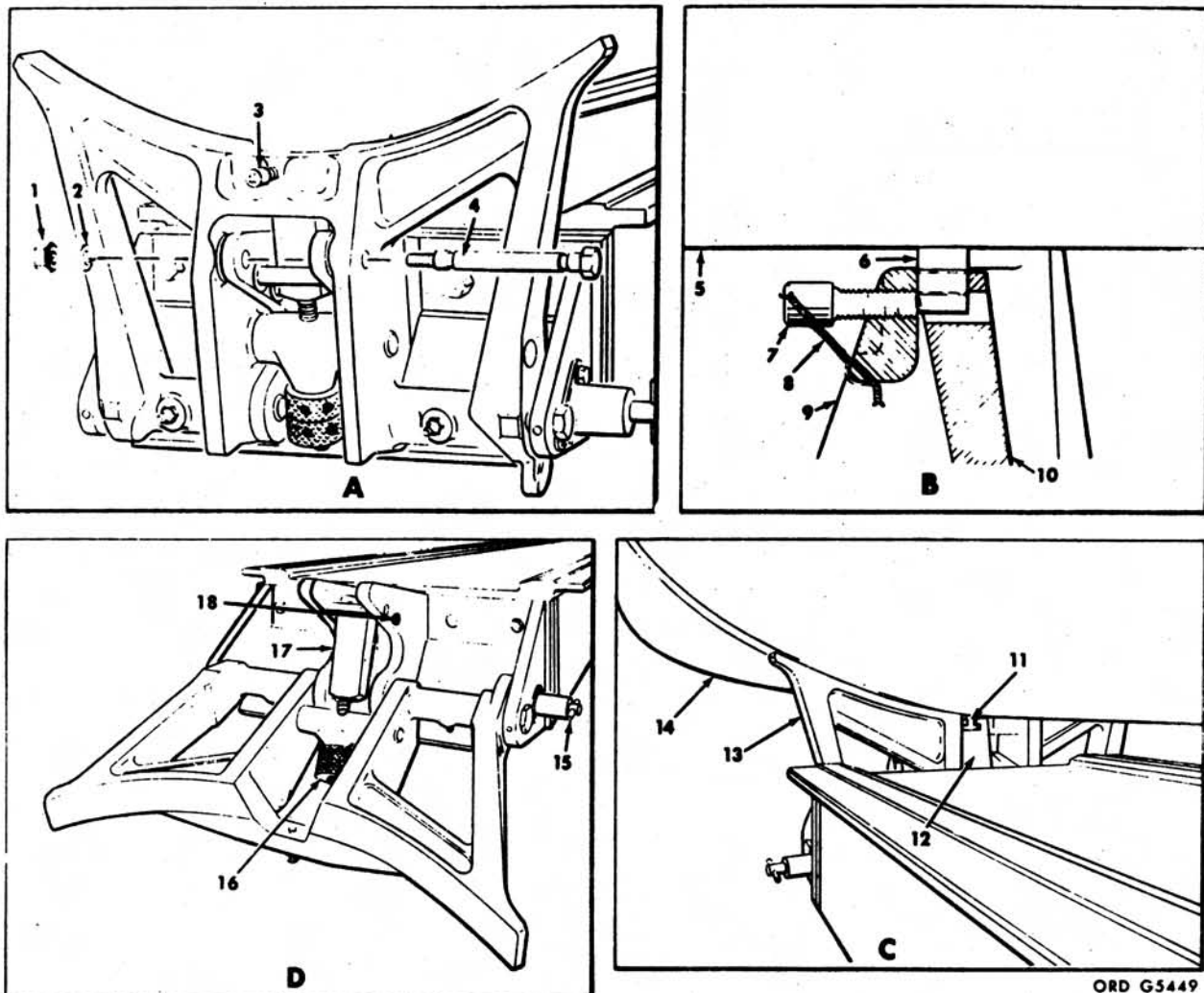
*Note.* If the missile body has been transported on a missile body truck, perform the procedures in paragraph 9-1m instead of d and e below.

d. Release the toggle clamp assembly (view B, fig. 9-2) that secures the missile body to the forward cradle. Loosen the hexagon nuts (view A) that secure the clamp assemblies to the handling ring segment on the rear cradle.

e. Lift the missile body clear of the missile body or rocket motor cluster transporter adapter.

f. Loosen the two captive bolts (view B, fig. 9-15), and remove the lower handling ring segment.

g. Loosen the captive bolts (view A) that secure the rear roll ring to the missile body, and remove the rear roll ring.



ORD G5449

**A—Rail release-front view**

- 1—3/8-24 hex. nut
- 2—3/8-in. lockwasher
- 3—Int-wrenching bolt or thumbscrew
- 4—3/8-24 x 5.74 shear bolt

**B—Cross section showing the T-hook adapter in the joined position**

- 5—Missile body
- 6—T-hook adapter
- 7—Int-wrenching bolt or thumbscrew
- 8—Steel safety wire
- 9—Yoke assembly

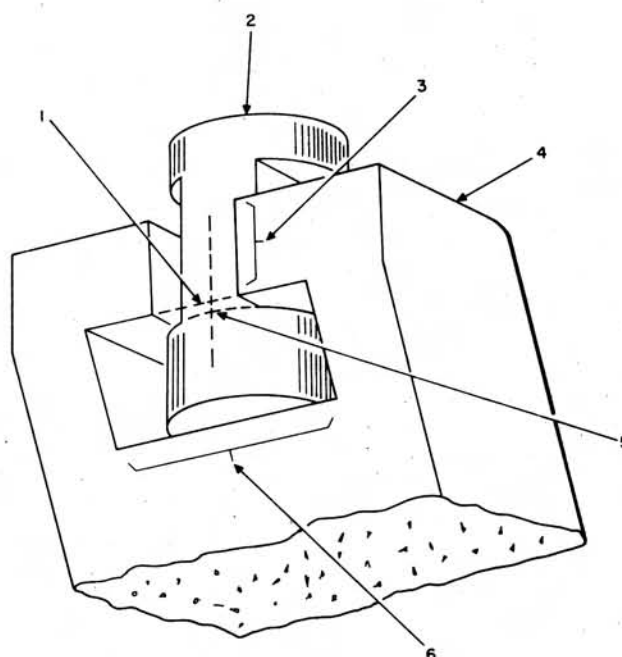
**10—Holder****C—Rail release-connected-view looking forward**

- 11—T-hook adapter
- 12—Holder
- 13—Yoke assembly
- 14—Missile body

**D—Rail release-disconnected-view looking to the rear**

- 15—Yoke latch pin
- 16—Knurled knob (2)
- 17—Holder
- 18—Rear guide pin

*Figure 9-13. Disconnection and connection of the rail release.*

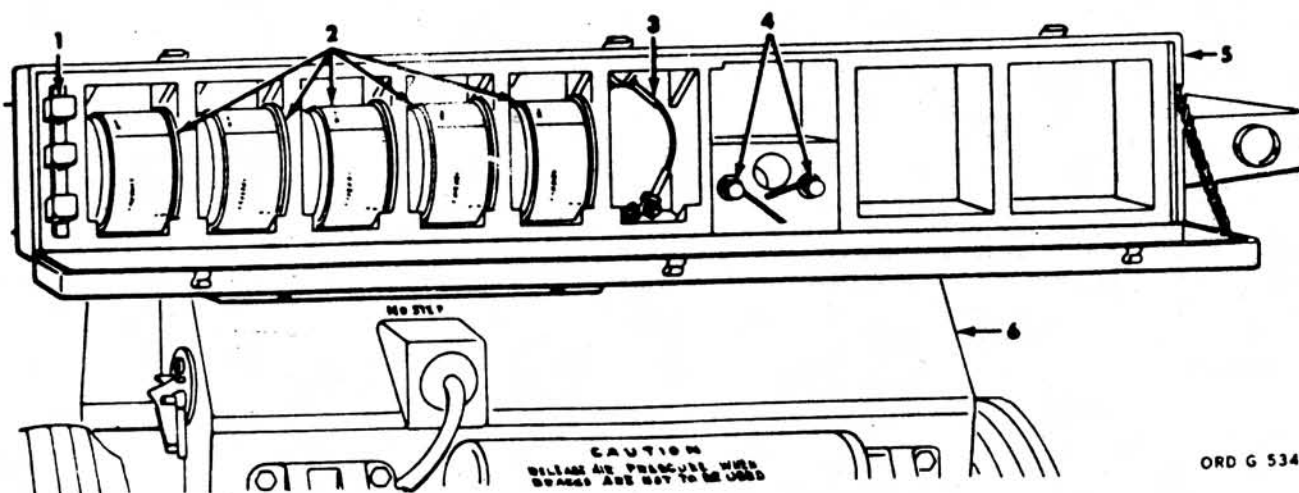


MS 316145

- 1—Holder reference
- 2—T-hook adapter
- 3—Vertical slot

- 4—Holder
- 5—T-hook adapter reference
- 6—Horizontal slot

Figure 9-13.1. Holder/T-hook adapter references.



ORD G 5347

- 1—Safety-and-arming device (3)
- 2—Rocket motor igniter (5)
- 3—Propulsion arming lanyard

- 4—Missile rocket motor initiator (2)
- 5—Explosive-storage container
- 6—Guided missile low-bed trailer M529

Figure 9-14. Trailer M529 explosive storage container.

**CAUTION:** Do not allow slack in the lift chains while performing *h* below.

*h.* Lift and position the missile body (fig. 9-16) over the launching-handling rail. Align the index pin on the rear of the missile body with the index slot in the rocket motor thrust ring assembly.

*i.* Liberally coat the bottom half of the mating surface of the rear missile frame at station 325.000 and the bottom half of the mating surface of the impact ring (fig. 9-11) with soft-film corrosion-preventive compound.

**CAUTION:** Assure that the rocket motor igniter cable assembly connectors P1, P2, P3, and P4 and the excess cable are clear of the thrust structure pedestal and not in an area where they may be damaged during missile and rocket motor joining.

*j.* Slowly guide the missile body (fig. 9-16) into the rocket motor thrust ring assembly until the index pin seats properly into the index slot. The missile will not be firmly seated in the thrust ring assembly at this point. The T-hook adapter (11, fig. 9-13) on the missile should be approximately centered above the holder (12).

*k.* Pull out the spring-loaded yoke latch pin (15), and raise the yoke assembly (13), simultaneously engaging the holder with the T-hook adapter. Continue to raise the yoke assembly until it is in a vertical position.

*l.* Insert the shear bolt (4) into the yoke assembly, and install the lockwasher (2) and

hexagon nut (1). Tighten the nut only until the lockwasher is compressed.

*m.* Lower the missile body (14) onto the yoke assembly, retaining sufficient tension on the hoisting device to hold the weight of the missile. Insure that the T-hook adapter does not rest upon the prepositioned int-wrenching bolt or thumbscrew.

**CAUTION:** Insure that the hoisting device does not restrict the forward movement of the missile and booster assembly. Do not exceed 300 pound-inches of torque when adjusting the left stop bolt to prevent damage to the booster fin fittings.

*n.* With the holder (17) contacting the rear guide pin (18), adjust the stop bolt (4, fig. 9-8) on the left side of the launching-handling rail until the T-hook adapter (6, fig. 9-13) contacts the int-wrenching bolt or thumbscrew. This insures that the T-hook adapter is 100 percent engaged with the holder. The most forward surface of the T-hook adapter (2, fig. 9-13.1) is flush with or recessed up to approximately 1/8-inch from the forward-upper edge of the horizontal slot (6) in the holder (4). This measurement is made between the holder reference (1) and the T-hook adapter reference (5). (The holder reference is a horizontal line along the forward-upper edge of the horizontal slot and extends across the vertical slot (3); the T-hook adapter reference is a vertical line along the most forward edge of the T-hook adapter.)

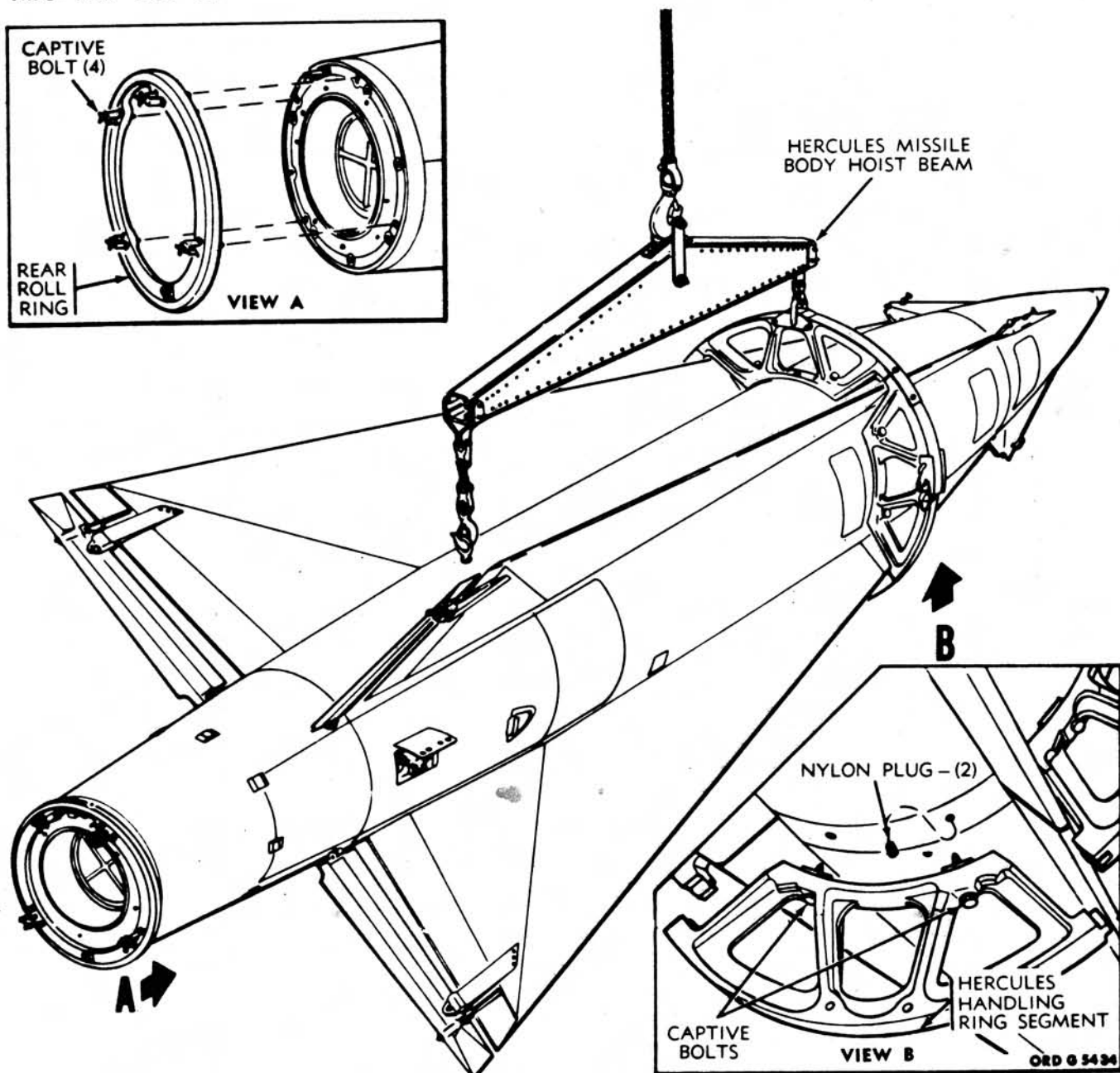


Figure 9-15. Removal and installation of the lower handling ring segment and the rear roll ring.

o. Release the hoisting cable tension.  
 p. Insure that the forward surface of the T-hook adapter contacts the prepositioned internal-wrenching bolt or thumbscrew.

**CAUTION:** Do not exceed 300 pound-inches of torque when adjusting the left stop bolt to prevent damage to the booster fin fittings.

q. Tighten the stop bolt (4, fig. 9-8) on the left side of the launching-handling rail to a

torque value of 300 pound-inches. Tighten the locknut (3).

**CAUTION:** While performing *r* below, do not continue turning the stop bolt after the bolt has contacted the rear slipper.

r. Turn the stop bolt (4) on the right side of the launching handling rail (5) until the stop bolt is snug against the rear slipper (1). Tighten the locknut.



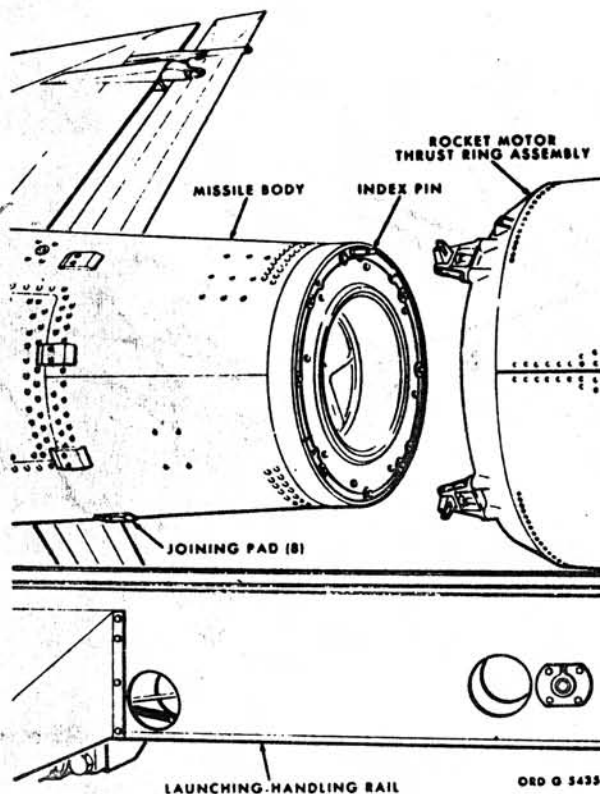


Figure 9-16. Alignment of the missile body and the rocket motor cluster.

s. Using a 1/4-inch drift pin, tighten the upper knurled knob (16, fig. 9-13) to secure the holder (17). Using a 1/4-inch drift pin, tighten the lower knurled knob until it is snug against the upper knurled knob.

t. Lower the missile body hoist beam. At the booster forward and rear slipper assemblies (fig. 9-10), tighten the forward retaining rail bar bolts (10) and the rear retaining rail bar hexagon-head screws (4) to the torque value given in table 15-10.

u. Remove the self-locking retaining pins (8, fig. 9-17) that attach the bracket assembly (7) to the handling ring segment (1) and the adapter pin assemblies (10) that attach the hoisting adapter (9) to the segments.

v. Remove the self-locking eyehook (5) from the eyebolt.

w. Remove the eyebolt (13) from the missile body rear lift point, and attach the eyebolt to the self-locking eyehook (5).

x. Liberally coat the threads of the plug (14) with a soft-film corrosion preventive compound.

y. Install the plug in the missile body rear lift point (12).

z. Lift the missile body hoist beam clear of the missile body.

aa. Install the self-locking retaining pins (8) in the bracket assembly (7), and the adapter pin assemblies (10) in the hoisting adapter (9).

ab. Loosen the captive bolts (2), and remove the three handling ring segments from the missile body.

ac. Liberally coat the threads of the plugs (15) with a soft-film corrosion preventive compound.

ad. Install the plugs in the handling ring segment mounting bolt holes.

ae. Loosen the nut with bar (1, fig. 9-18), and position the pipe in the FIRE position; tighten the nut with bar.

**CAUTION:** While performing *af* below, exercise extreme care. Avoid applying lateral stress to the guidance cooling access door hinge.

af. Connect the hose assembly (3) to the cooling access door (4).

*Note.* If the joining procedures were performed on a launcher, omit steps *ag* and *ah* below.

ag. Move the stop-and-position handle (fig. 9-19) on the launching-handling rail to the SKIP position.

ah. Push the launching-handling rail, with the missile attached, onto the launcher erecting beam. Use the inching wheel to move the launching-handling rail until it locks onto the erecting beam.

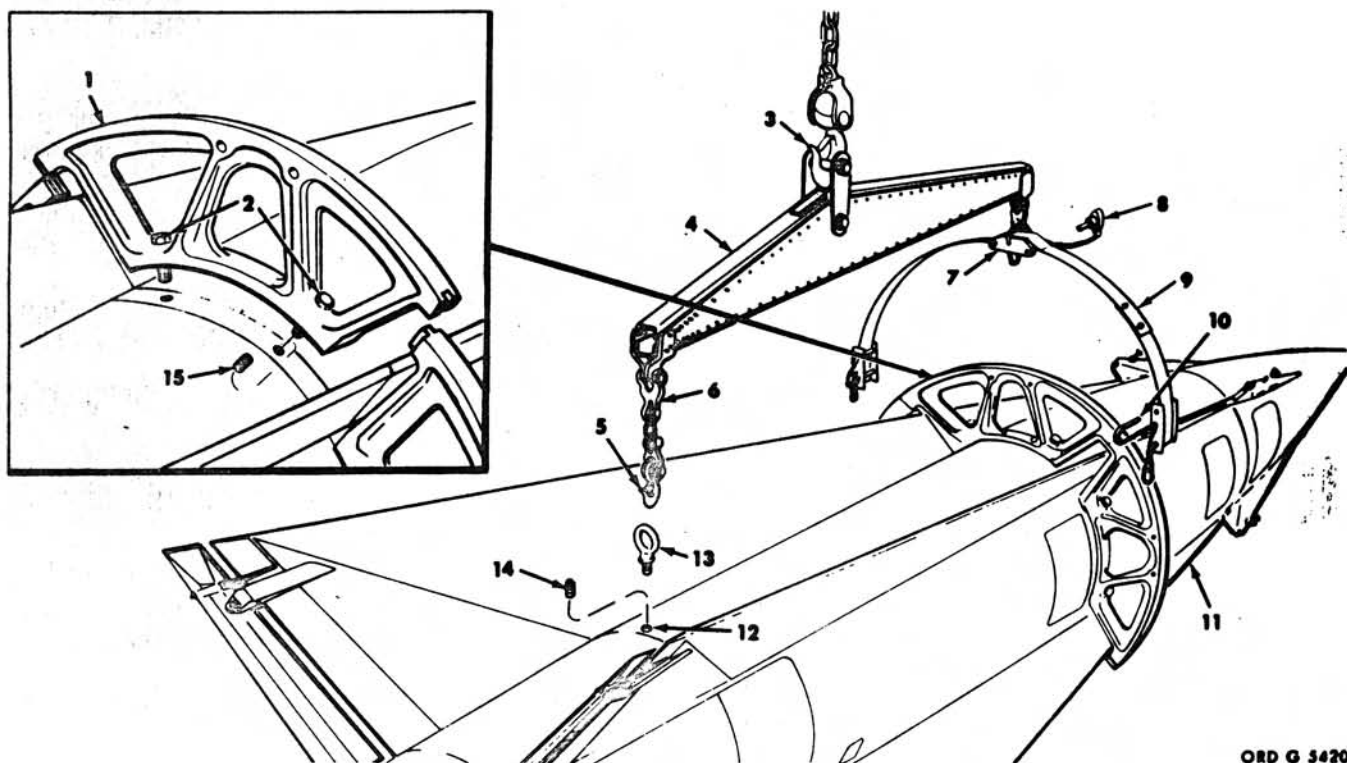
ah.1. Disconnect the ground strap from the missile.

**WARNING:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

ai. Connect connectors P1X and P72A to the launcher erecting beam connectors J72D and J1G.

**WARNING:** Before raising the launcher erecting beam, insure that the stop bolts are contacting the rear slippers.

aj. Raise the launcher erecting beam to 45 degrees, and then lower, to assure the proper seating of the missile body into the rocket motor thrust ring assembly.



ORD G 3420

- 1—Upper handling ring segment
- 2—Captive bolts
- 3—Falling hook
- 4—Missile body hoist beam
- 5—Self-locking eyehook
- 6—Lift chain
- 7—Bracket assembly
- 8—Self-locking retaining pin (2)

- 9—Hoisting adapter
- 10—Adapter pin assembly (4)
- 11—Missile body
- 12—Missile body rear lift point
- 13—Eyebolt
- 14—Plug
- 15—Nylon plug

Figure 9-17. Removal of the upper and side handling ring segments.

**WARNING:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKRS, MISSILE BATTERY HEAT and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

ak. Disconnect connectors P1X and P72A from the launcher erecting beam and install them in the dummy connectors.

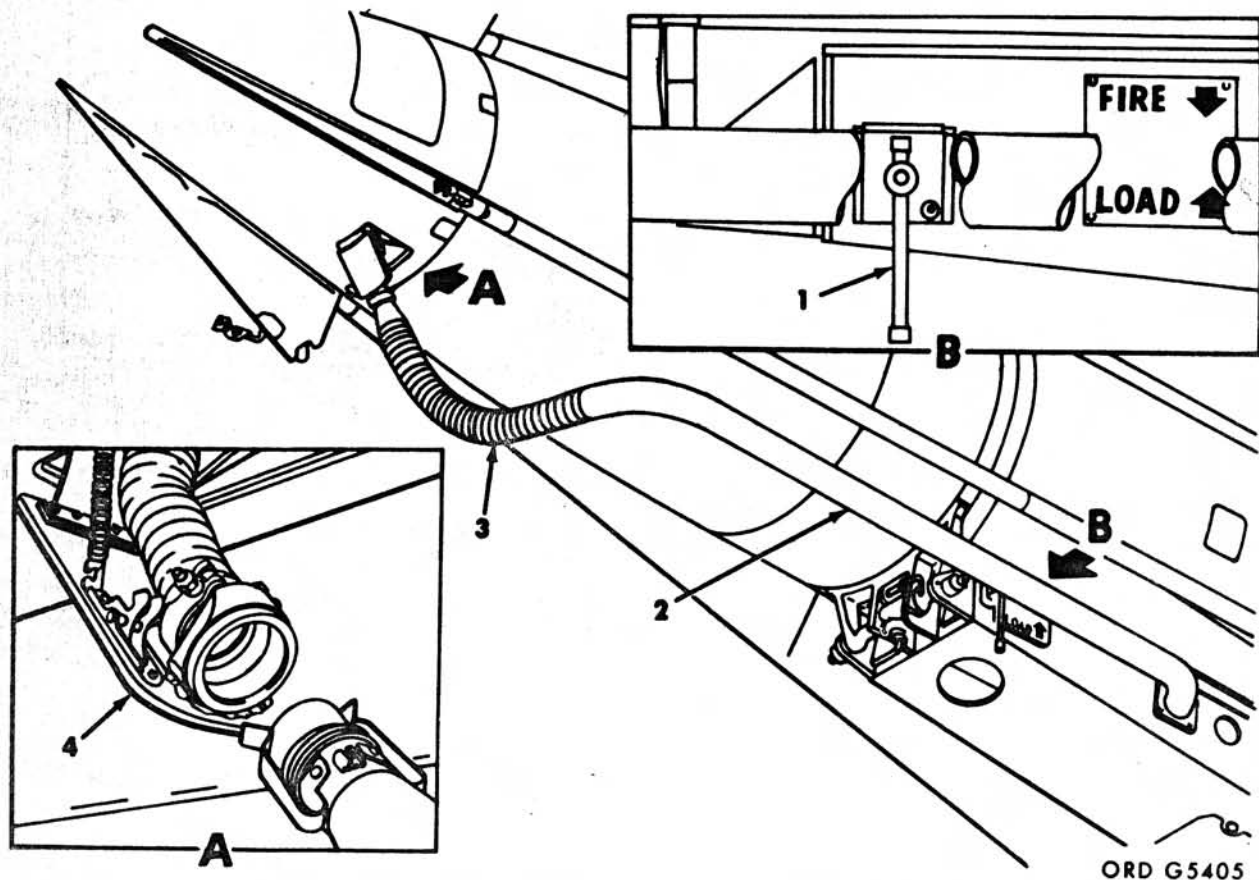
al. Check the internal-wrenching bolt or thumbscrew (7, fig. 9-13) on the yoke assembly (9) contacts the forward surface of the T-hook adapter (6). Readjust if necessary, as prescribed in (1) through (6) below.

(1) Loosen the two knurled knobs (16) on the holder (17).

**CAUTION:** (Deleted)

(2) Loosen the locknuts (3, fig. 9-8) on the stop bolts (4) on both sides of the launching-handling rail (5). With the holder (17, fig. 9-13) contacting the rear guide pin (18), turn the stop bolt (4, fig. 9-8) on the left side of the launching-handling rail (5, fig. 9-8) clockwise until the T-hook adapter (6, fig. 9-13) contacts the internal-wrenching bolt or thumbscrew.

(3) (Deleted)



ORD G5405

1 — Nut with bar  
2 — Pipe

3 — Hose assembly  
4 — Cooling access door

Figure 9-18. Disconnection and connection of the guidance set cooling system.

**CAUTION:** Do not exceed 300 pound-inches of torque when adjusting the left stop bolt to prevent damage to the booster fin fittings.

(4) Tighten the stop bolt (4, fig. 9-8) on the left side of launching-handling rail to a torque value of 300 pound-inches. Tighten the locknut (3).

**CAUTION:** Do not continue tightening the stop bolt after it has contacted the rear slipper.

(5) Turn the stop bolt on the right side of the launching-handling rail until the stop bolt is snug against the rear slipper (1). Tighten the locknut.

(6) Using a drift pin, tighten the upper knurled knob (16, fig. 9-13) to secure the holder (17). Using a drift pin, tighten the lower knurled knob until it is snug against the upper knurled knob.

am. Remove the wing nut (fig. 9-20) and clamp that secure the missile umbilical cable to the missile body. Place the umbilical cable (1, fig. 9-21) through the opening in the top of the launching-handling rail (4) so that the right and left legs straddle the hook latch (3) inside the launching-handling rail, then pull each one forward and out through the openings in the sides of the rail.

am.1. Place the clamps (6) around the right and left legs of the umbilical cable assembly (1) and secure the clamps to the brackets (5) with the fillister-head screws (7), and self-locking nuts (8).

an. Remove the protective covers (11) and place them on the storage shells (12). Connect umbilical cable connectors P104A (10) and P105A (13) to connectors J104A (9) and J105A (14), respectively, on each side of the rail.

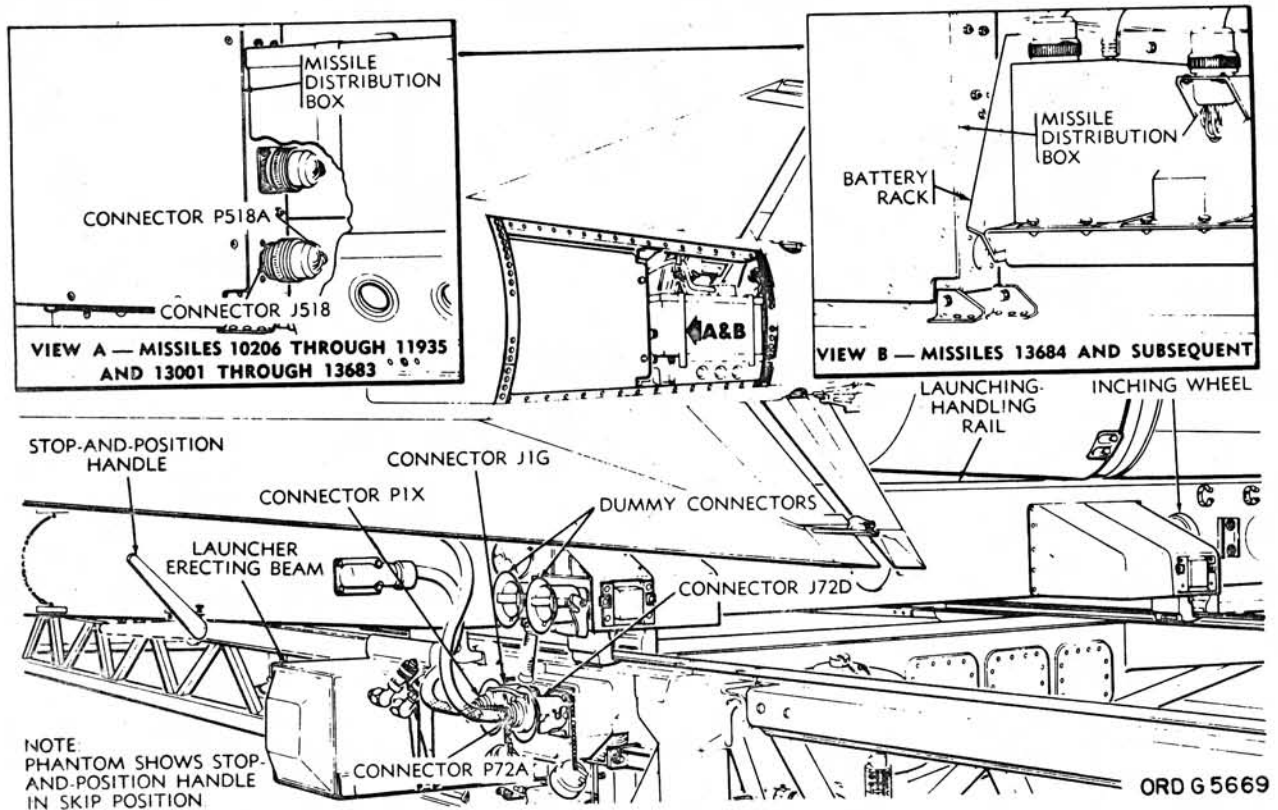


Figure 9-19. Installation of the missile on the launcher.

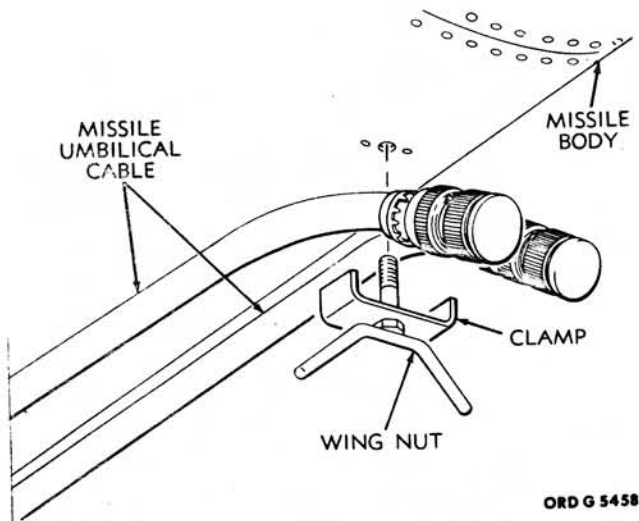


Figure 9-20. Removal and installation of the missile umbilical cable.

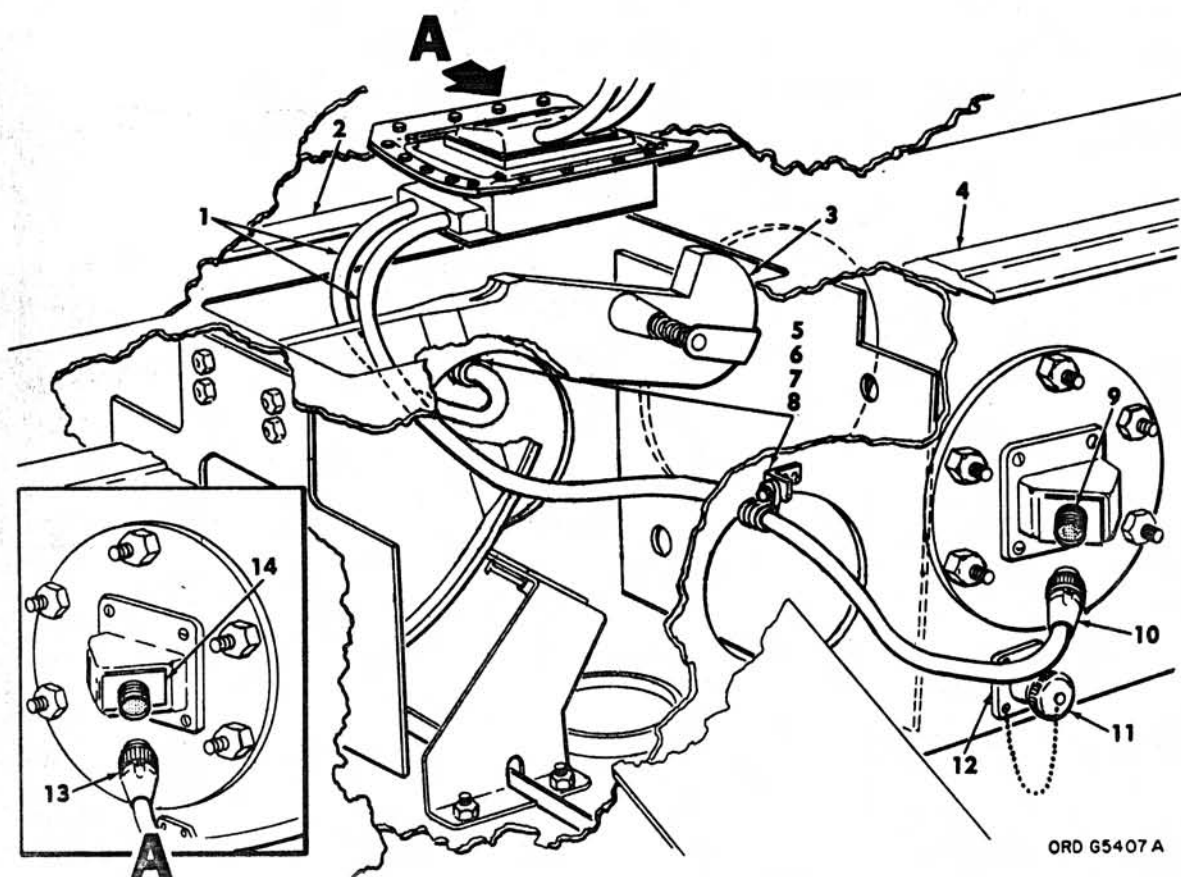
**WARNING:** Complete seating of connectors P104A and P105A and the associated coupling nuts must be verified by visual inspection.

*Note.* The hook latch (4, fig. 9-22) is properly engaged when the spring-loaded retaining pin (3) is seated in the slot of the shear plug hook (2).

ao. Pull the hook latch up, and engage with the shear plug. If the spring-loaded retaining pin does not properly engage the shear plug hook, proceed as prescribed in (1) through (7) below.

(1) Loosen the two knurled knobs (16), fig. 9-13) on the holder (17).

*Note.* If the thumbscrew cannot be turned by hand when performing (2) below, loosen the stop bolts approximately one turn.



ORD 65407 A

- 1 — Umbilical cable
- 2 — Missile body
- 3 — Hook latch
- 4 — Launching-handling rail
- 5 — Bracket (2)
- 6 — Clamp (2)
- 7 — 10-32 x 1/2-in.-fil hd screw (2)

- 8 — 10-32NF-3B, self-locking hex-hd nut (2)
- 9 — Connector J104A
- 10 — Connector P104A
- 11 — Protective cover (2)
- 12 — Storage shell (2)
- 13 — Connector P105A
- 14 — Connector J105A

Figure 9-21. Removal and installation of the missile umbilical cable on the launching-handling rail.

- (2) Cut and remove the safety wire (8) from the internal-wrenching bolt or thumbscrew (7) on the forward side of the yoke assembly (9). Turn the bolt or thumbscrew counterclockwise several complete turns.

**Caution:** Do not continue turning the stop bolt after the spring-loaded retaining pin properly engages the shear plug.

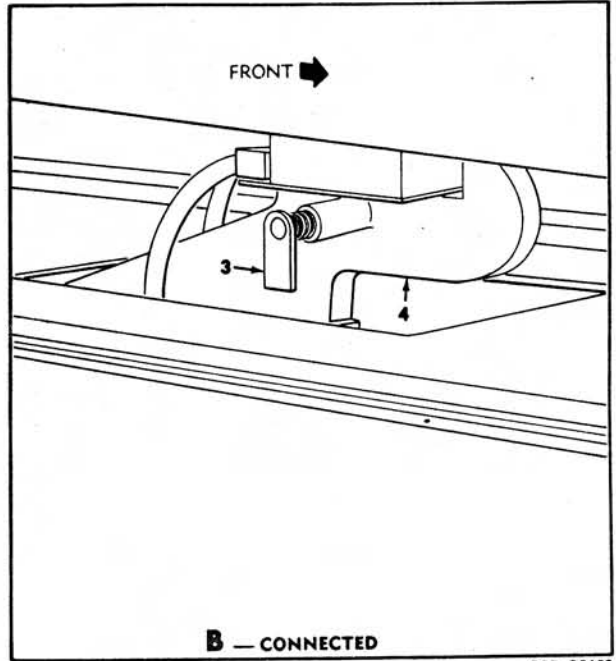
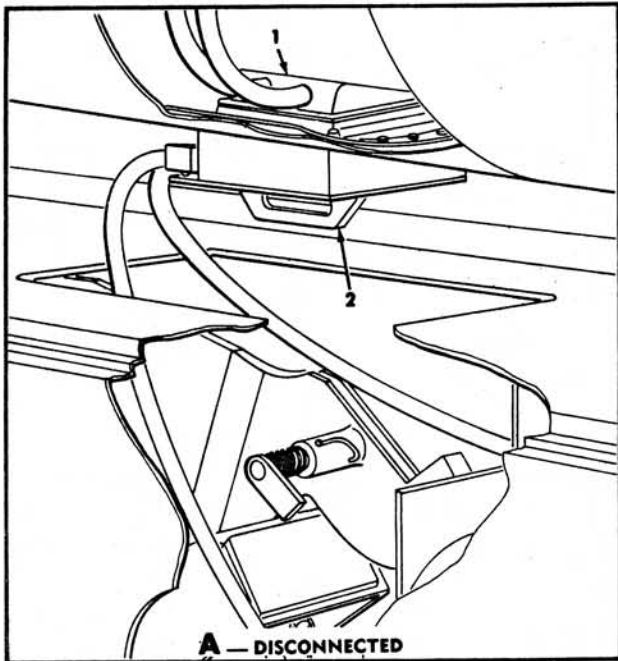
**Caution:** Do not exceed 300 pound-inches of torque when adjusting the left stop bolt to prevent damage to it.

- (3) Loosen the locknut (3, fig. 9-8) on the stop bolt (4) on the left side of

the launching-handling rail (5), and turn the stop bolt clockwise until the spring-loaded retaining pin (B3, fig. 9-22) properly engages the shear plug hook (A2).

- (4) Turn the internal-wrenching bolt or thumbscrew clockwise until the end of the bolt or thumbscrew contacts the forward surface of the T-hook adapter (B6, fig. 9-13). Tighten finger-tight. Install steel safety wire through the head of the internal-wrenching bolt or thumbscrew, and secure to the hole in the yoke assembly.





ORD 65439

A — Disconnected  
1 — Shear plug  
2 — Shear plug hook

B — Connected  
3 — Spring-loaded retaining pin  
4 — Hook latch

Figure 9-22. Disconnection and connection of the shear plug group.

- (5) Tighten the stop bolt (4, fig. 9-8) on the left side of the launching-handling rail (5) to a torque value of 300 pound-inches. Tighten the locknut (3) on the left stop bolt.

**Caution:** While performing step (6) below, do not continue turning the stop bolt after the stop bolt has contacted the rear slipper (1).

- (6) Loosen the locknut on the stop bolt on the right side of the launching-handling rail. Turn the stop bolt clockwise until it is snug against the rear slipper. Tighten the locknut.
- (7) Using a drift pin, tighten the upper knurled knob (16, fig. 9-13) to secure the holder (17). Using a drift pin,

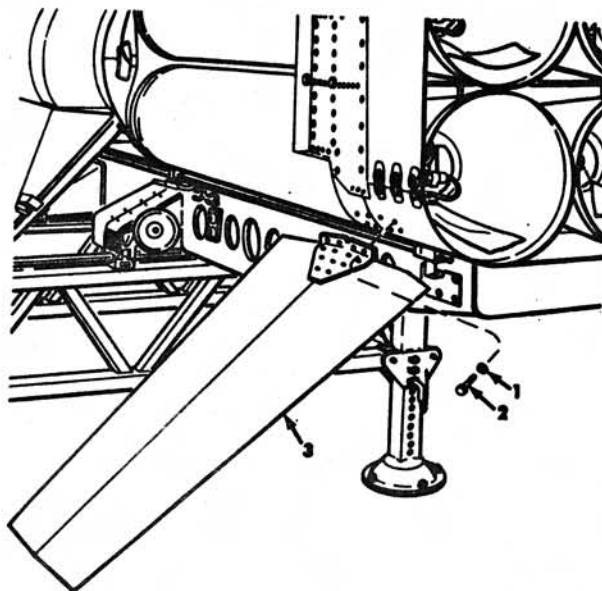
tighten the lower knurled knob until it is snug against the upper knurled knob.

*ap.* Release the lock release lever (B, fig. 9-12) on the elevon lock; turn the lock forward on the hinge until the elevon lock fork is engaged with the elevon.

*aq.* Repeat step *ap* above until the three remaining elevons are securely locked.

*ar.* Position a rocket motor cluster fin assembly (3, fig. 9-23), and secure in position with the hexagon-head bolts (2) and flat washers (1). Tighten the bolts to the torque value given in table 15-10.

*as.* Repeat step *ar* above to install the remaining rocket motor cluster fin assembly.



ORD 6453

- 1—33/64-in-id fl washer (16)
- 2—1/2-20 x 1-19/32 hex-hd bolt (16)
- 3—Rocket motor cluster fin assembly (2)

**Figure 9-23. Removal and installation of the lower fin assemblies.**

	Paragraphs	Pages
Preparation -----	15-6a	15-3
Types of freight cars -----	15-6d	15-3
Types of motor trucks -----	15-6e	15-3
Regulations for transportation and shipment of missiles and missile components -----	15-7	15-5
General—applicability -----	15-7a	15-5
Regulations -----	15-7b	15-5
Bureau of Explosives pamphlet nos. 6 and 6A -----	15-7b(3)	15-7
Civil Aeronautics Authority regulations: Official Air Transport Restricted Articles Tariff No. 6-A -----	15-7b(5)	15-7
Code of Federal Regulations, Title 49—Transportation (Parts 71 to 90) -----	15-7b(2)	15-5
Department of the Army Technical Bulletin 59-1 -----	15-7b(6)	15-7
Interstate Commerce Commission: Motor Carrier Safety Regulations -----	15-7b(1)	15-5
Tariff No. 10 Publishing Interstate Commerce Commission Regulations for Transportation of Explosives and Other Dangerous Articles by Land and Water, in Rail Freight Service and by Motor Vehicle (Highway) and Water: Including Specifications for Shipping Containers -----	15-7b(4)	15-7
Shipment:		
Shipping instructions -----	15-5	15-2
General—responsibility -----	15-5a	15-2
Air pressurization -----	15-5a(5)	15-2
Containers -----	15-5a(4)	15-2
Decontamination or purging -----	15-5a(2)	15-2
Inspection -----	15-5a(1)	15-2
Preservation -----	15-5a(3)	15-2
Recording data -----	15-5a(7)	15-3
Shipping crates -----	15-5a(6)	15-2
Torque requirements:		
General—summary of section comments -----	15-19	15-14
Torque values -----	15-21	15-14
Structural and functional applications -----	15-21a	15-14
Tube fitting locknut applications -----	15-21c	15-16
Tubing applications -----	15-21b	15-16
Torque wrenches -----	15-20	15-14
Missile body, joining procedures for		
Joining the missile body and the rocket motor cluster on the launching- handling rail:		
Transporting the missile body and the rocket motor cluster to the launching area:		
Transporting the missile body, using the missile body truck or the missile body or rocket motor cluster transporter adapter -----	9-1	9-1
Transporting the rocket motor cluster, using the rocket motor cluster truck or the missile body or rocket motor or rocket motor transporter adapter -----	9-2	9-4
Joining the missile body and the rocket motor cluster -----	9-3	9-15
Joining the missile body and the rocket motor cluster on M529 trailer -----	9-6	9-12
Joining the rocket motor cluster to the launching-handling rail on the M529 trailer -----	9-5	9-10
Joining the rocket motor cluster to the launching-handling rail, using rocket motor truck or transporter adapter -----	9-7	9-12
Preparation for joining the missile body and the rocket motor cluster on the launching-handling rail, using an M529 trailer for transporting -----	9-4	9-10
Preparation for joining the missile body and the rocket motor cluster on the launching-handling rail, using a missile body truck or transporter adapter for transporting -----	9-3	9-8
Modification work orders (MWO's) -----	1-6, 1-7	1-1, 1-2

## CHAPTER 10

## FINAL PREPARATION OF THE MISSILE

## 10-1. Installing the Missile on the Launcher

**Warning:** The missile contains explosives. All applicable safety regulations will be strictly enforced. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**Warning:** Handling operations of the missile will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**Warning:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A CO fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight make handling difficult.

a. Make sure that the section control-indicator and the launching control-indicator are in the initial operating condition and that the MISSILE HEAT switch is set to OFF.

**Note.** Do not perform b below for missiles 13684 and subsequent.

b. Remove the left equipment section access cover plate.

c. (Deleted)

**Note.** Perform d, e, and f below for missiles 10206 through 11935 and 13001 through 13683.

d. Insure that missile wiring harness connector P518A (view A, fig. 9-19) is connected

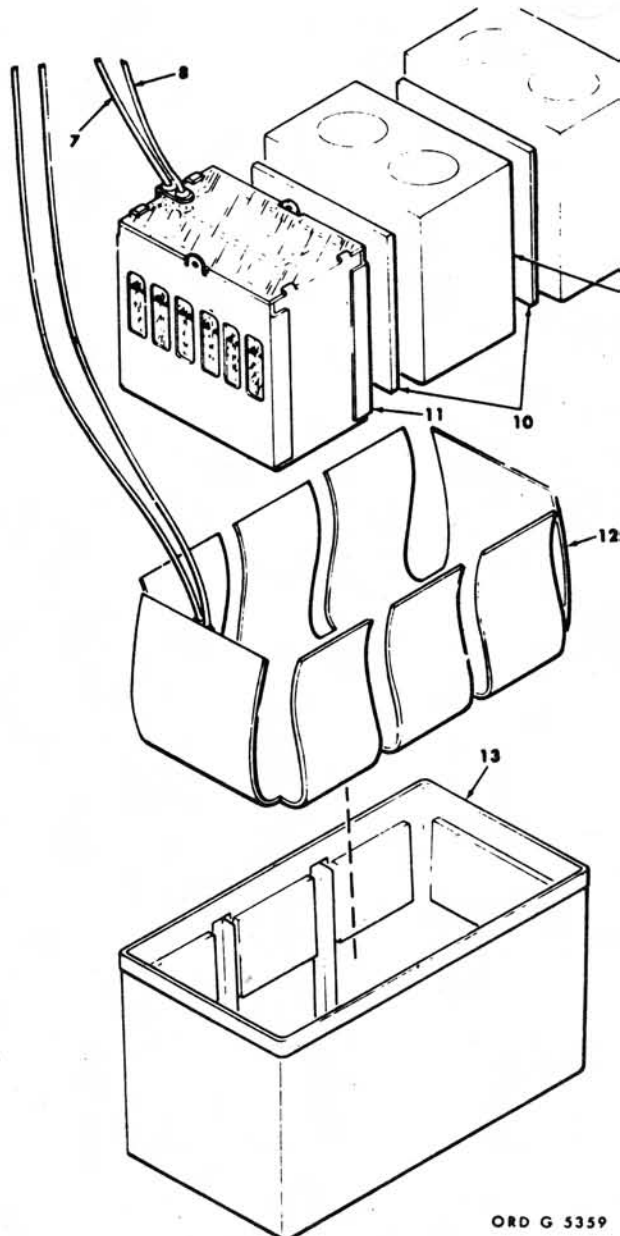
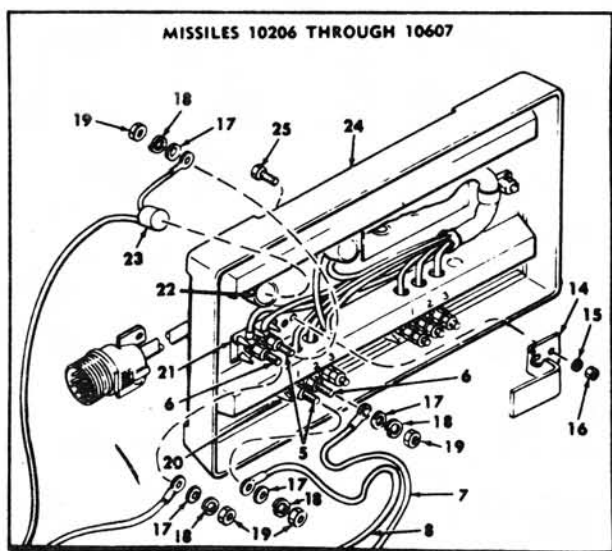
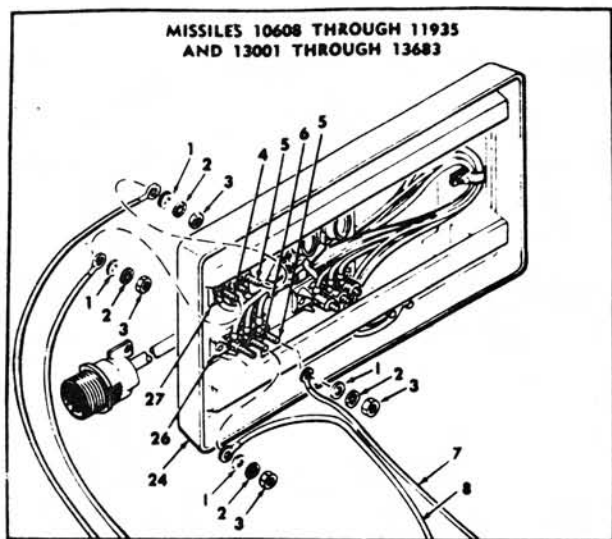
to connector J518 on the missile distribution box.

**Caution:** Make certain that connectors P1X and P72A are installed in the dummy connectors, and that missile umbilical cable connectors P104A (6, fig. 9-21) and P105A (9) are properly installed in connectors J104A (5) and J105A (10) on the launching-handling rail (4) before performing e or f below.

e. Install the guidance set storage battery (missiles 10206 through 11935 and 13001 through 13683) as follows:

- (1) (Deleted)
- (2) Remove the truss-head screw, lock-washer, and flat washer that secure the loop clamp to the bracket on the missile structure.
- (3) Loosen the hose clamp on the battery drain hose. Disconnect the battery drain hose from the vent in the cover of the missile battery box.
- (4) Remove the truss-head screws that secure the battery box straps; allow the straps to hang from the battery box support.
- (5) Remove the battery box from the battery box support.
- (6) Inspect connectors J510 and P510 to insure that they are correctly indexed, and that the pins of P510 match the corresponding receptacles in J510. Tape J510 to prevent damage.

**Caution:** Exercise care to prevent damage to the leads while performing (7) below.



- 1—0.149 in-id fl washer
- 2—No. 6 int-teeth lock washer
- 3—No. 6-32 hex nut
- 4—Terminal no 3
- 5—Terminal no 1
- 6—Terminal no 2
- 7—Red lead
- 8—Black lead
- 9—Dummy battery

- 10—Spacer
- 11—Guidance set storage battery
- 12—Heater assembly
- 13—Battery tray
- 14—Bracket
- 15— $\frac{1}{8}$  in-id fl washer (2)
- 16—No. 4-40 hex nut (2)
- 17—0.174 in-id fl washer
- 18—No. 8 lockwasher

- 19—No. 8-32 hex nut
- 20—Terminal board TB30
- 21—Terminal board TB31
- 22—Clamp
- 23—Thermostat S24
- 24—Battery box cover
- 25—No. 4-40 x 5/16 rd-hd screw (2)
- 26—Terminal board TB536
- 27—Terminal board TB537

Figure 10-1. Removal and installation of the guidance set storage battery (missiles 10206 through 11935 and 13001 through 13683).



(7) Remove the battery box cover (24, fig. 10-1) from the top of the battery tray (13).

*Note.* Use figure 10-2 for reference when connecting or disconnecting the storage batteries and heaters.

*Note.* Perform (8) through (11) below for missiles 10206 through 10607.

(8) Remove the roundhead screws (25, fig. 10-1), flat washers (15), and hexagon nuts (16) that secure the bracket (14) over terminal board TB31 (21); remove the bracket.

(9) Disconnect the lead of thermostat S24 (23) from terminal 1 (5) of terminal board TB31.

(10) Loosen the clamp (22) holding S24; remove the thermostat.

(11) Disconnect the lead of the heater assembly (12) from terminal 2 (6) of terminal board TB31.

(12) On missiles 10608 through 11935 and 13001 through 13683, disconnect the leads of the heater assembly from terminal 1 and terminal 3 of terminal board TB537 (27).

(13) Set the battery box cover aside.

(14) Remove the dummy batteries (9).

(15) Remove and inspect the heater assembly.

*Note.* Apply electrical insulating compound to the inner surfaces of the battery tray prior to installing the storage batteries or dummy batteries.

*Note.* If the vertical heater pads slide down when the storage batteries or dummy batteries are installed, tape the pads in position with masking tape.

(16) Position the heater assembly in the battery tray, but do not connect.

*Note.* The storage batteries must be serviced as prescribed in TM 11-6140-200-15 before performing (17) below.

(17) Place the guidance set storage battery (11) in the left end compartment of the battery tray, but do not connect.

(18) Place a dummy battery in each of the two remaining compartments.

(19) Install the battery spacers (10).

(20) On missiles 10608 through 11935 and 13001 through 13683, connect the leads of the heater assembly to terminal 1 (5) and terminal 3 (4) of terminal board TB537 (27). Secure each

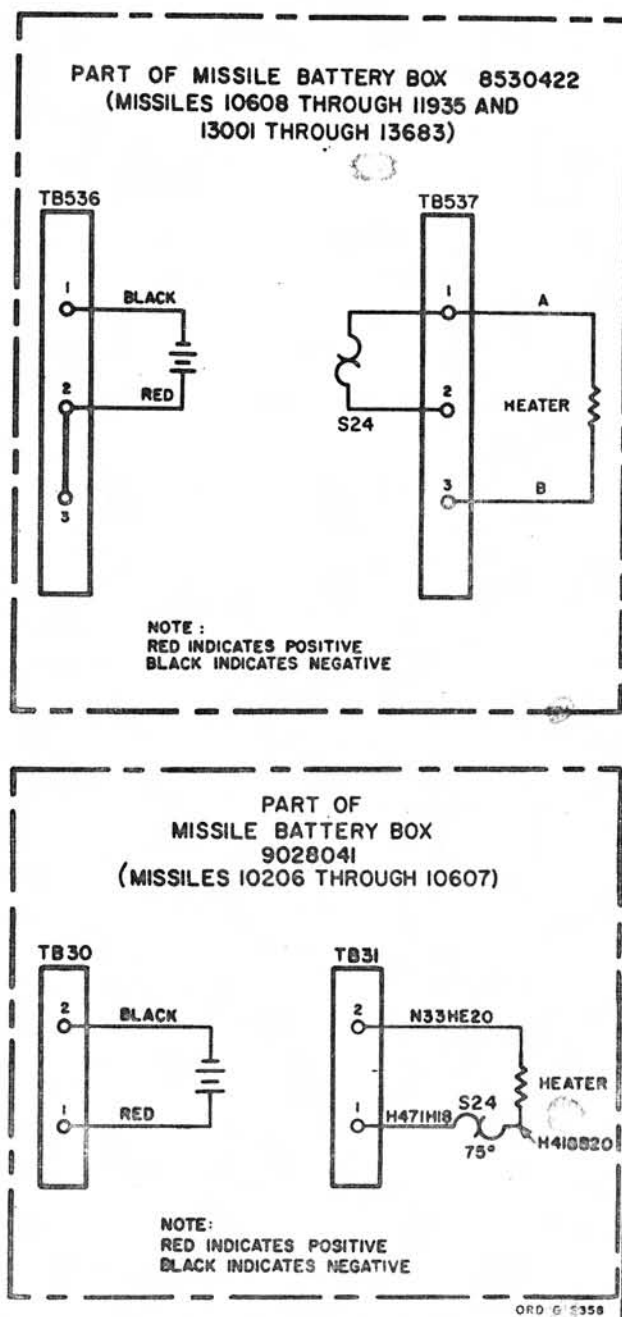


Figure 10-2. Guidance set storage battery and heater wiring schematic.

terminal with a flat washer (1), internal-teeth lockwasher (2), and hexagon nut (3).

*Note.* Perform (21) through (26) below for missiles 10206 through 10607.

(21) Connect the lead of the heater assembly to terminal 2 of terminal board TB31 (21), and secure with a flat washer (17), lockwasher (18), and hexagon nut (19).

(22) Place thermostat S24 in the clamp (22); tighten the clamp.

(23) Connect the lead of thermostat S24 to terminal 1 of terminal board TB31; secure with a flat washer (17), lockwasher (18), and hexagon nut (19).

(24) Install the bracket over terminal board TB31 with two roundhead screws (25), flat washers (15), and hexagon nuts (16).

**Caution:** Insure that the red (positive) and black (negative) terminals of the storage battery leads do not touch each other as they will fuse. The rubber terminal tips should be left on the terminals until the terminals are connected. After the connections are made, loop and tape the slack storage battery lead wire.

(25) Connect the black (negative) lead (8) of the guidance set storage battery to terminal 2 of terminal board TB30 (20); secure with a flat washer (17), lockwasher (18), and hexagon nut (19).

(26) Connect the red (positive) lead (7) of the storage battery to terminal 1 of terminal board TB30; secure with a flat washer, lockwasher, and hexagon nut.

*Note.* Perform (27) and (28) below for missiles 10608 through 11935 and 13001 through 13683.

(27) Connect the black (negative) lead (8) of the guidance set storage battery (11) to terminal 1 of terminal board TB536 (26); secure with a flat washer (1), internal-teeth lockwasher (2), and hexagon nut (3).

(28) Connect the red (positive) lead (7) of the storage battery to terminal 2 of terminal board TB536; secure with a flat washer, internal-teeth lockwasher, and hexagon nut.

**Caution:** Care should be exercised to prevent damage to the wires while performing (29) below.

(29) Place the battery box cover on the battery tray.

(3) Carefully place the missile battery box on the battery box support.

(31) Install the two battery box straps that secure the missile battery box to the battery box support with two truss-head screws.

(32) Connect the battery drain hose to the vent on the battery box cover; tighten the hose clamp.

(33) Position the loop clamp on the battery wiring harness, and secure to the bracket on the missile structure with truss-head screw, lockwasher, and flat washer.

f. Connect connector J510 on the battery wiring harness to connector P510 on the missile distribution box.

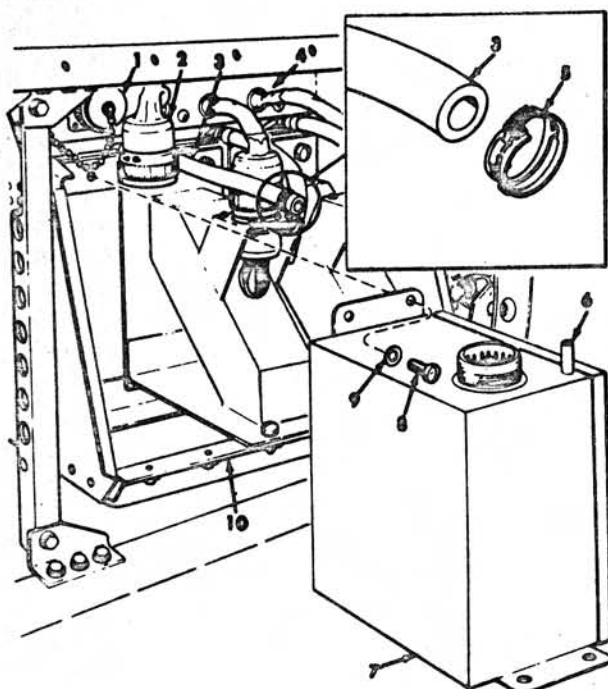
g. (Deleted)

h. (Deleted)

i. (Deleted)

**Warning:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT, and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF. Inspect connectors P1X, J1G, P72A, and J72D to assure that there is no moisture damage or foreign material present prior to connecting them.

j. Connect quick-disconnect connectors P1X and P72A (fig. 9-19) into launcher erecting beam connectors J1G and J72D respectively.



ORD G 5357

- 1—Connector P510
- 2—Connector P541
- 3—Battery drain hose
- 4—Component mounting panel
- 5—Hose clamp
- 6—Battery vent
- 7—Guidance set squib battery BA-472 / U, BA-472A / U, BA-472B / U, or BA-472C / U
- 8—No. 10-32 NF-2A x 5/8 fil-hd screw (4)
- 9—0.203 in-id fl washer (4)
- 10—Missile battery rack

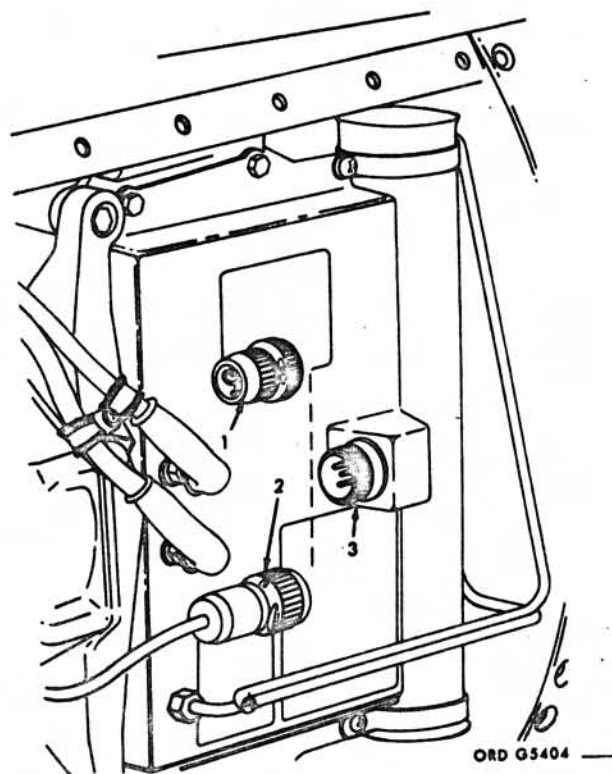
Figure 10-3. Removal and installation of the guidance set squib battery (missile 13684 and subsequent).

k. Insure that missiles with BB-401/U batteries are receiving a charge (TM 9-1440-250-12/1, table 2).

Note. Battery charger voltage should be  $33.6 \pm 0.3$  volts.

Note. Perform l below for missiles 10206 through 11935 and 13001 through 13683.

l. Install the flathead screws (7 and 9) to secure the left equipment section access cover plate in position on the missile body. Tighten the screws to the torque value given in table 15-9.



ORD G 5404

- 1—Shorting dummy connector
- 2—Connector P544
- 3—Connector J544

Figure 10-4. Removal and installation of the shorting dummy connector and connector P544.

m. Remove the flathead screws (fig. 11-1), and remove the IGNITOR access cover plate.

**WARNING:** Check safety-and-arming switch S31 (fig. 5-13) for a safe indication. The green field is visible through the inspection window.

n. At the LCI, set the TEST-FIRE switch to TEST.

n.1. Set the MISSILE HEAT switch to the ON (up) position. The HEAT MONITOR indicator light extinguishes after the battery reaches operating temperature.

*Note.* The maximum heating time required to raise the temperature of the missile squib activated batteries from the ambient temperature to the correct operating temperature is shown in table 10-1.

n.2. Set the LAUNCHER DC POWER switch to ON. The voltmeter indicates in the white area up to 30 volts.

*Note.* If the voltmeter does not contain a white zone, the indication shall be between 26.6 and 30 volts.

n.3. Set the HEATERS AND GYROS switch to ON. For missiles MIM-14A, ammeter indicates 3 to 6 after the initial surge. For missiles MIM-14B and MIM-14C, ammeter indicates 7 to 9 after the initial surge.

n.4. Set the VIBRATOR switch to ON. For missiles MIM-14A, ammeter indicates 7 to 9 after a 60-second delay. For missiles MIM-14B and MIM-14C, ammeter indicates 10 to 14 after a 60-second delay.

n.5. (Deleted).

*Figure 10-5. (Deleted).*

n.6. Test the initiator wiring harness with the multimeter as follows:

(1) Set the FUNCTION switch to 20,000  $\Omega$ /VDC DIRECT and insert the red test lead in the 2.5V receptacle on the left side of the multimeter.

(2) To verify that the DC voltmeter is functioning properly, check the voltage across a good 1.5 volt dry cell (or equivalent voltage source).

(a) If the meter indicates more than 1.4 volts, proceed with step (3).

(b) If the meter indicates less than 1.4 volts, replace the multimeter and repeat steps (1) and (2) above.

(3) Check connector P162 for positive or negative stray dc voltage between pins A and B, A and C, B and C, and between each pin and the missile frame. The meter must indicate 0 volts.

*Note.* Position the FUNCTION switch to REV. to check for negative DC.

(4) Repeat step (3) above for connector P163.

(5) Set the FUNCTION switch to AC VOLTS and insert the red test lead in the 2.5V receptacle on the right side of the multimeter.

(6) To verify that the AC voltmeter is functioning properly, check the voltage in both directions across a good 1.5 volt dry cell.

(a) Normal direction: Touch the black test lead to the (-) terminal and the red test lead to the (+) terminal.

(b) Reverse direction: Touch the red test lead to the (-) terminal and the black test lead to the (+) terminal.

*Note.* This procedure checks the conditions of the meter rectifier.

(c) If the meter indicates more than 1.4 volts in both directions, proceed with step (7).

(d) If the meter indicates less than 1.4 volts in either direction, replace the multimeter and repeat steps (5) and (6) above.

(7) Check connector P162 for stray ac voltage between pins A and B, A and C, B and C, and between each pin and the missile frame. The meter must indicate 0 volts.

(8) Repeat step (7) above for connector P163.

(9) Set the FUNCTION switch to OHMS and the range switch to RX1. Insert the red test lead in the OHMS receptacle.

(10) To verify that the ohmmeter is functioning properly, short both test leads together and adjust the OHMS ZERO ADJ knob for zero ohms.

(a) If the meter can be adjusted to zero ohms, proceed to step (11).

(b) If the meter cannot be adjusted to zero ohms, replace the internal 1.5 volt battery and repeat steps (9) and (10) above.

*Note.* If any of the continuity readings in (11) and (12) below are not within tolerance, clean connectors P170, P177A, and J177 using cleaning compound solvent 6850-00-984-5853 and repeat the test.

(11) Check connector P162 for continuity between pins A and B, A and C, and B and C. The meter must indicate less than one ohm.

(12) Repeat step (11) above for connector P163.

o. At the LCI, place the VIBRATOR, HEATERS AND GYROS, and LCHR DC POWER switches to OFF.

**WARNING:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT, and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

o.1. Disconnect P1X and P72A and install them in the dummy receptacle.

*Note.* The three-terminal test leads may be used when performing the tests in steps q(1) through (10) below. If the test lead is used, perform the test in par. 10-5c1(2)(a) prior to performing the initiator continuity tests.

Table 10-1. Maximum Battery Heating Time (Minutes)

Ambient Temperature Degrees Fahrenheit	BA472/U	BA485/U
-60	210	300
-40	190	270
-20	170	240
0	150	210
20	130	180
40	110	150
60	90	120
80	70	90
100	50	60
120	30	30



**Note.** Do not use the two lead test cable 8020265 if the three lead test cable 8030966 is available when performing steps q(1) through (10) below. Prior to using the arming mechanism ohmmeter with 2-lead test cable 8020265, check the battery condition by shorting the ohmmeter terminals, using both test leads. If the maximum needle deflection is to the left of the 16-ohm graduation on the upper scale, the battery should be replaced. Any deflection to the right of the 16-ohm graduation should be considered a full-scale deflection when performing this test.

**Caution:** Handle the initiators carefully to avoid puncturing or damaging the foil seal on the base of the initiator.

p. Inspect the rocket motor initiators for bent or missing pins, corrosion, damaged threads, and punctured or damaged foil seals. If any of these conditions exist, reject the initiator.

**WARNING:** Connect a ground strap from the frame of the portable barricade to ground with a maximum resistance of 20 ohms between the component and ground.

q. Perform the continuity check of the rocket motor initiators, using the arming mechanism ohmmeter (blasting galvanometer) and a portable barricade in an authorized area as prescribed in steps (1) through (10) below.

- (1) Open the sliding door on the portable barricade (fig. 10-8) and feed the test leads up through the hole in the bottom of the barricade (view A) and out through the door.
- (2) Remove the shorting connector from the initiator (XM-4 squib).
- (3) Clip the test leads to pin A and B on the initiator.

**Note.** When placing the initiator into the barricade, make sure the alligator clips on the test leads are not shorted against each other or against the shell of the initiator or against any other pin, otherwise erroneous indications could be obtained during the continuity check.

- (4) Carefully place the initiator in the barricade and close the sliding door.
- (5) Touch the test leads to the arming mechanism ohmmeter. The meter should indicate continuity.
- (6) Remove the test leads from the arming mechanism ohmmeter.
- (7) Open the sliding door on the portable barricade, and remove the initiator.

- (8) Repeat steps (2) through (7) above, using pins B and C, and pins A and C.

- (9) Install the initiator shorting connector on the initiator.
- (10) Repeat steps (1) through (9) above for each rocket motor initiator.

**Note.** Before proceeding with the installation of the rocket motor initiators, make certain that the test of the missile rocket motor initiator wiring prescribed in paragraphs 10-1 n through n.6 has been performed.

**Note.** Access to the shipping plugs in step r below can be accomplished only by removing the IGNITOR access cover plate.

**Warning:** Do not attempt to adjust or remove the gas generator retaining ring (engine and adapter assembly ring) under any circumstances.

r. Reach through the forward end of the missile motor section, and remove the two ignitor shipping plugs (fig. 5-7) nearest the IGNITOR access cover plate.

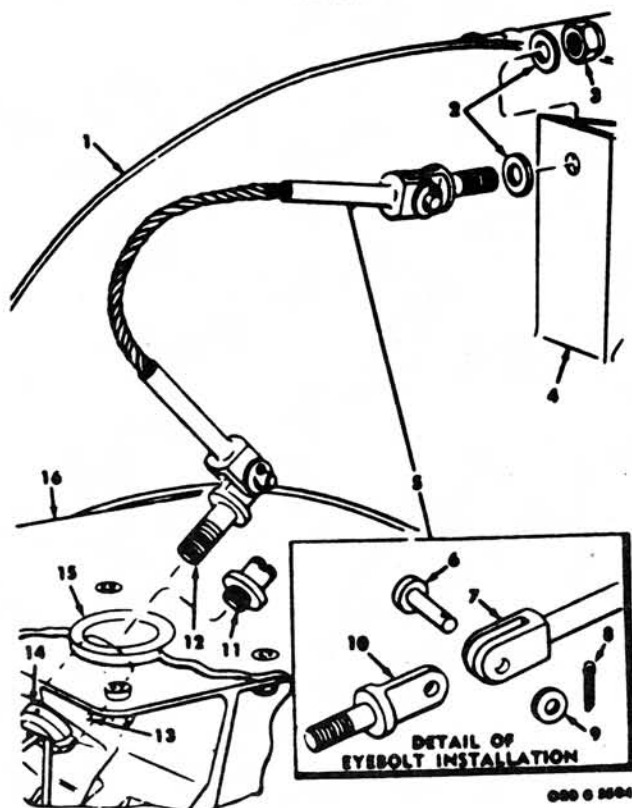
**Caution:** Do not remove the shorting connectors from the missile rocket motor initiators at this time.

**Note.** Install a new gasket each time an initiator is loosened or removed.

- s. Install a new gasket on each initiator.
- t. Apply a coat of molybdenum disulphide lubricant to the threads of the initiators.
- u. Install the two initiators with new gaskets in the gas generator where the shipping plugs were removed. Tighten the initiators to a torque value of 250 pound-inches.
- v. Remove the two shorting connectors (5, fig. 5-15) from the two initiators in the gas generators.
- w. Connect connectors P162 (3) and P163 (1) to the initiators.
- x. Recheck P162 and P163 for positive mechanical mating.
- y. Install the flathead screws to secure the IGNITOR access cover plate (2, fig. 11-1) to the rear body section. Tighten the screws to the torque value prescribed in table 15-9.
- z. Place the remaining gaskets and initiators in the container (fig. 5-14). Secure the container cover and store in the designated area.

## 10-2. Installation of the Propulsion Arming Lanyard

- a. Remove and retain the shipping plug (11, fig. 10-6) from the trigger operating plug (14).



- 1—Rocket motor thrust ring assembly
- 2—0.265-in-id fl washer
- 3—1/4-28 hex nut
- 4—Lanyard mounting bracket
- 5—Lanyard assembly
- 6—3/16 x 17/32 fl-hd pin (2)
- 7—Lanyard
- 8—1/16 x 3/8 cotter pin (2)
- 9—0.203-in-id fl washer (2)
- 10—Eye bolt (2)
- 11—Shipping plug
- 12—Eyebolt
- 13—Aluminum rivet
- 14—Trigger operating plug
- 15—Lanyard receptacle
- 16—Missile body

Figure 10-6. Removal and installation of the propulsion arming lanyard.

**Caution:** The trigger operating plug is secured in position with an aluminum rivet (13). Do not use more than finger pressure to engage the threads of the eyebolt (12) with the threads in the trigger operating plug.

b. Apply antiseize compound to the threads of the eyebolt, and screw it into the trigger operating plug approximately 10 complete turns, using finger pressure only.

**Note.** Position the eyebolts so that the plane of free movement for the lanyard assembly (5) is vertical to the missile skin.

**Note.** If the lanyard mounting bracket has two holes, insert the eyebolt through the upper hole when performing step c below.

c. Place a flat washer (2) on the remaining eyebolt, and insert it through the hole in the lanyard mounting bracket on the rocket motor thrust ring assembly (1).

**Caution:** Do not permit the lanyard assembly to rotate while performing step d below.

d. Install a flat washer (2) and a hexagon nut (3) on the eyebolt, and secure the lanyard assembly (5) to the lanyard mounting bracket (4).

### 10-3. Adjustment of the Missile-Away Switch

a. Move the missile-away switch arm (7, fig. 9-8) to the rear, by hand, until the missile-away switch produces an audible click. Hold the arm in this position, and advance the arm adjusting bolt (8) until the bolt contacts the rear retaining rail bar (10).

**Note.** At least 50% of the bolt head (8, view A) shall extend above the bottom surface of the rear retaining rail bar (10).

b. Advance the bolt an additional one-half turn. If at least one-half of the head of the bolt is not engaged with the rail bar, perform steps (1) through (3) below.

- (1) Loosen the hexagon-head bolts (6).
- (2) Move the switch arm up.
- (3) Tighten the bolts.

**Note.** In some cases it may be necessary to form the missile-away switch arm slightly to obtain the desired adjustment.

c. Hold the bolt to prevent turning, and tighten the locknut (9).

### 10-4. Installation of Rocket Motor Igniters M65, or M69

**WARNING:** M65 and M69 igniters are not to be mixed in the same M42/M42A1 rocket motor cluster.

**Note.** Surface corrosion or foreign matter that can be removed from the igniter with a clean, dry cloth may be removed and is not cause for rejection.

a. Carefully examine each rocket motor igniter (fig. 10-7) for the presence of the shorting connector.

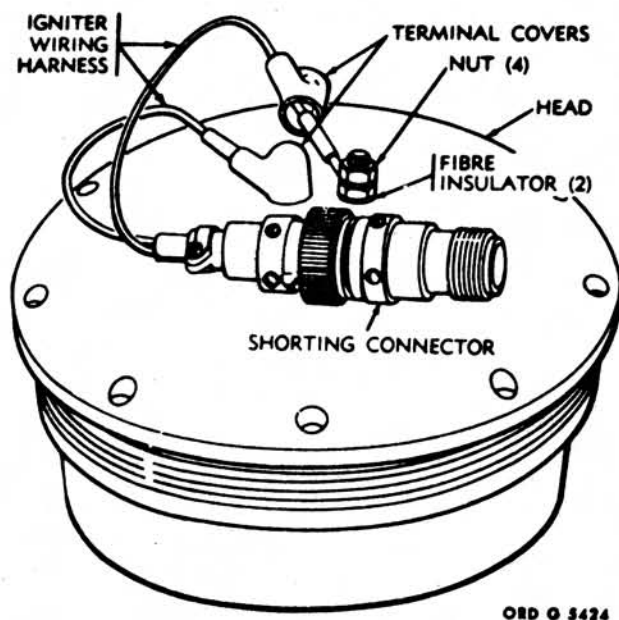


Figure 10-7. Inspection of the rocket motor igniter for corrosion.

a.1. Inspect the wiring harness for damaged insulation, and if cracks, nicks, cuts, or abrasions are present, replace the igniter.

a.2. Inspect the wiring harness connector and shorting connector for damaged, dirty, or corroded components.

- (1) Repair of M69 igniter assemblies must be performed by Direct Support personnel only.
- (2) No repair is authorized for M65 igniter assemblies. If damaged, they must be replaced.
- (3) Dirty or corroded components may be cleaned with solvent cleaning compound 6850-00-984-5853.

b. Inspect the igniter for corrosion of metal parts, broken or cracked plastic closure cup, and damaged threads or loose terminals. Insure that there is no leakage of black powder from the plastic closure cup. If any of these conditions exist, reject the igniter and return it to the support unit for correction of defects.

**Caution:** When performing step (1) below, exercise care to avoid pulling on the wires of the connecting harness.

- (1) Pull the terminal covers back on the igniter wiring harness, perform para-

graph a.1 above for that portion of the wiring harness under the terminal covers, and inspect that the nuts on the terminals are tight.

**Caution:** If terminals are loose, evacuate the igniter to support maintenance for servicing as specified in TM 9-1410-206-35.

- (2) Carefully clean the head and the terminals with a clean, dry cloth.
- (3) (Deleted)
- (4) Push the terminal covers over the terminals.

c. Prior to testing an igniter, the squib test set 8522168 must be checked as prescribed in steps (1) through (6) below.

- (1) Connect the HERCULES LAUNCHER cable to the TEST RECEPTACLE of the test set. Set the CIRCUIT SELECTOR switch to the No. 1 position.
- (2) Operate the D.C.—A.C.—CONT. switch to the CONT. position, and hold for a minimum of 30 seconds.
  - (a) For squib test set equipped with battery BA 245/U, the meter stabilizes at 0.39 to 0.50.
  - (b) For squib test set equipped with battery BA 2245/U, the meter stabilizes at 0.36 to 0.48.
- (3) Hold the D.C.—A.C.—CONT. switch in the CONT. position, and momentarily set the CIRCUIT SELECTOR switch to the 2, 3, and 4 positions.
  - (a) For squib test set equipped with battery BA 245/U, the meter indicates 0.39 to 0.50 for each CIRCUIT SELECTOR switch position.
  - (b) For squib test set equipped with battery BA 2245/U, the meter indicates 0.36 to 0.48 for each CIRCUIT SELECTOR switch position.

**Note.** If the meter indications in steps (2) and (3) above are not within tolerance, replace the squib test set. Refer the unacceptable squib test set to the supervisor.

- (4) Disconnect the HERCULES LAUNCHER cable from the TEST RECEPTACLE.
- (5) Set the CIRCUIT SELECTOR switch to the No. 1 position.
- (6) Place resistor RW31V270 across the terminals of the IGNITER cable of the squib test set. Be sure the resistor leads make contact. Do not allow the resistor leads to contact the connector shell. Operate the D.C.—A.C.—CONT. switch to the CONT. position, and hold for a minimum of 30 seconds. Record the indication, and remove the resistor.

**Warning:** The rocket motor igniters must not be tested while installed in the rocket motors. The portable barricade must be vented to the outside atmosphere if used inside a building.

d. Perform the continuity check of the igniters (view A, fig. 10-8), using squib test set 8522168 and portable barricade 8030779 in a suitable area, as prescribed below.

**Warning:** Connect a ground strap between the barricade frame at a point where proper

electrical contact can be made, and to ground, insuring that there is not more than 20 ohms resistance between the barricade frame and (earth) ground. The portable barricade must be vented to the outside when used inside any building to test igniters. Any type of vent assembly (vented through a window, wall, or roof) which is deemed adequate by the local safety office is considered adequate. The portable barricade when used outside a building to test any igniter (M69 or M65) does not require a vent assembly.

- (1) Open the door of the portable barricade and remove the attaching ring from the base. Put the igniter wiring harness through the hole in the stand while placing the igniter on the base. Install the attaching ring over the igniter and secure it to the base with quick-disconnect fasteners (view A). Close the sliding door.
- (2) Remove the shorting connector from the igniter wiring harness.
- (3) Connect the igniter cable of the squib test set to the igniter wiring harness.

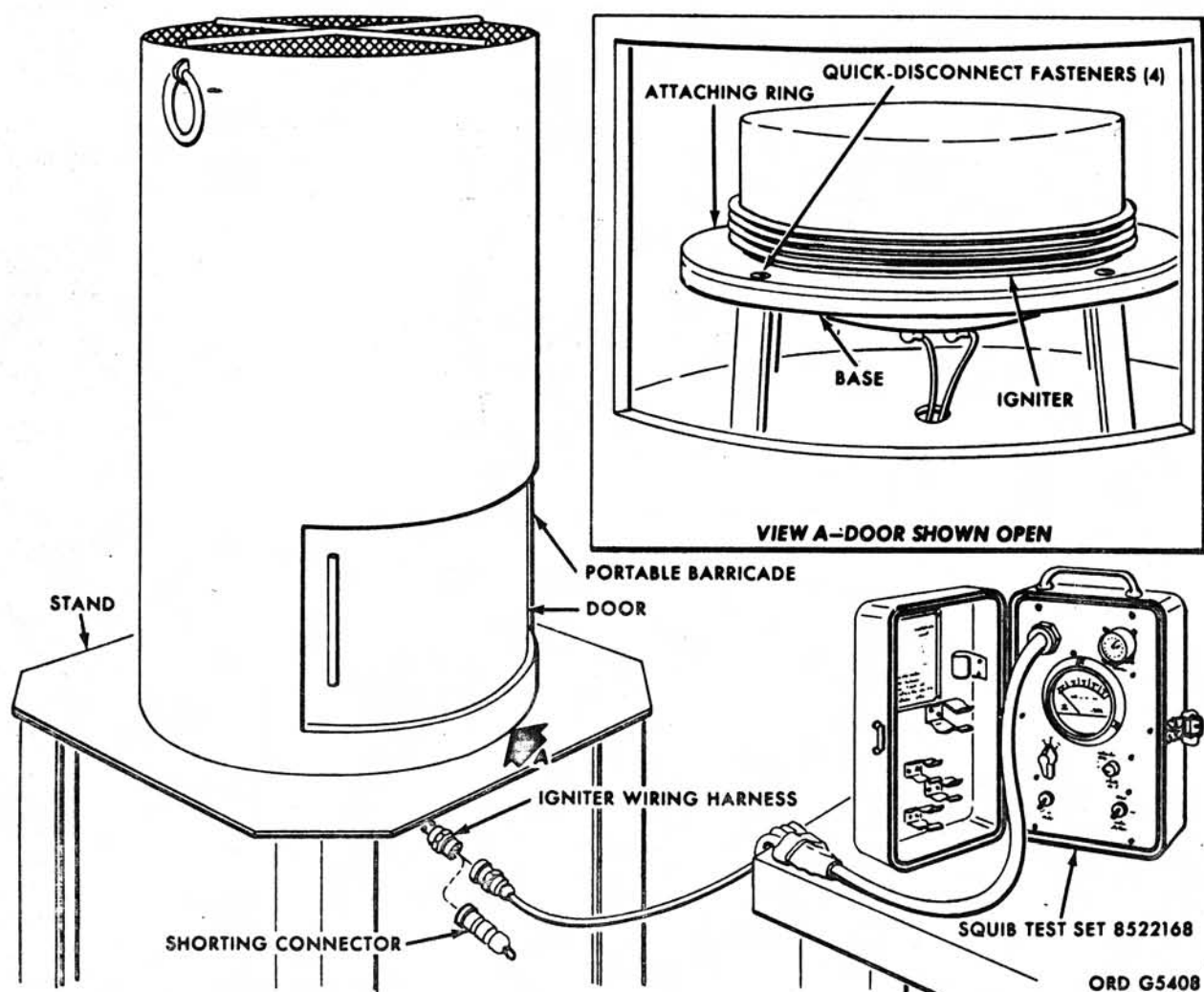


Figure 10-8. Test of the rocket motor igniter.

**Warning:** Before proceeding with the test, insure that the sliding door on the barricade is closed and the area is clear of all excess personnel.

- (4) Operate the D.C.-A.C.-CONT. switch to the CONT. position, and hold for a minimum of 30 seconds. The meter indicates from 0.38 to the indication established in c(6) above. Igniters that do not indicate within the specified tolerance will be rejected and referred to the proper authorities for maintenance.
- (5) Disconnect the IGNITER cable of the squib test set from the igniter wiring harness. Replace the shorting connector on the wiring harness.

- (6) Open the sliding door on the portable barricade.
- (7) Release the quick-disconnect fasteners that secure the igniter and attaching ring to the base, and remove the attaching ring from the igniter. Remove the igniter, being careful not to damage the igniter wiring harness.

**Warning:** Rocket motor igniters must be inspected and continuity tested prior to installation and semi-annually. The rocket motor igniters must not be tested while installed.

**Caution:** Do not install the gasket removed in e below. The igniter is to be installed without the gasket.



**Caution:** Install the rocket motor igniter immediately after removal of the shipping plug; the propellant grains absorb moisture if left exposed to the atmosphere.

e. Apply a thin coat of corrosion-preventive compound 6850-880-7616 to the threads of the rocket motor igniter. This is to be accomplished semi-annually to preclude seizure of the igniter in the rocket motor head.

f. Remove the igniter receptacle shipping closure (A, fig. 10-9) and gasket from the rocket motor.

g. Using the spanner wrench, install the rocket motor igniter (view B).

**Caution:** Visually inspect the igniter to insure that the threads are fully engaged in the head of the rocket motor (view C). The igniter is properly installed when point A of the head of the rocket motor igniter is flush with, or below, point B of the head of the rocket motor.

h. Repeat a.1, a.2, b, and d through g above to test and install each of the three remaining igniters. Upon completion of the last igniter test, repeat c (1) through (5) above.

**Warning:** Before connecting the rocket motor igniter cable assembly to the igniters, make certain that the shorting connector (view D) is installed in P109A of the rocket motor igniter cable assembly.

i. Remove the shorting connector from the rocket motor igniter connector, and connect the rocket motor igniter cable assembly connector to the rocket motor igniter connector.

j. Repeat i above for each of the three remaining igniters.

k. Loosen the hexagon nuts (fig. 10-10) on the snubber channel sufficiently to permit the installation of the rocket motor igniter cable assembly.

**Caution:** The cable assembly can be easily damaged. Exercise care when performing l below.

l. Install the cable assembly on the snubber channel, and tighten the hexagon nuts sufficiently to hold the cable assembly in position.

**Note.** For launching-handling rails (serial numbers 1001 through 1433) which do not have clips for the P109A connector, place the connector inside of the rail-lightening hole adjacent to and aft of the snubber channel. Assure that a minimum length of cable remains outside of the hole to preclude damage to the cable during movement of the missile-rocket motor cluster-rail combination.

m. Install rocket motor igniter cable assembly connector P109A, with the shorting connector installed, in the clips on the launching-handling rail.

**Warning:** Do not connect rocket motor igniter cable assembly connector P109A to the connector on the launching erecting beam until directed by proper authorities.

#### 10-4.1 Auxiliary Fail-Safe Device Checkout

**Note.** This procedure is to be performed only when auxiliary fail-safe devices are installed and prior to installation of the M30A1 safety-and-arming devices.

**Note.** Coordinate with the missile track radar operator in performing the following checks.

**Warning:** Insure that all M30A1 devices are removed from the warhead section.

a. Set all controls and switches at the section control-indicator (SCI) and launcher control-indicator (LCI) to the initial operating condition.

**Warning:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

**Warning:** Insure that the shorting plug is connected to P109A of the rocket motor cluster igniter cable.

**Caution:** If the missile firing test set is connected to missiles containing BB401/U batteries, the BATTERY CHARGER switch on the electrical test panel in the section simulator group must remain in the OFF position.

b. Install the missile firing test set equipment group.

- (1) At the SCI, check that the launcher power switch for the appropriate launcher is set to OFF.
- (2) At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to OFF.
- (3) Set the MISSILE BATTERY HEAT circuit breakers to OFF.
- (4) Set the BOOSTER HEAT circuit breakers to OFF, if applicable.
- (5) Position and secure the missile firing sequence test set to the lower front end of the launcher-erecting beam.
- (6) Connect connectors P1Y and P72B of the missile firing sequence test set to receptacles J1G and J72D, respectively, on the erecting beam.

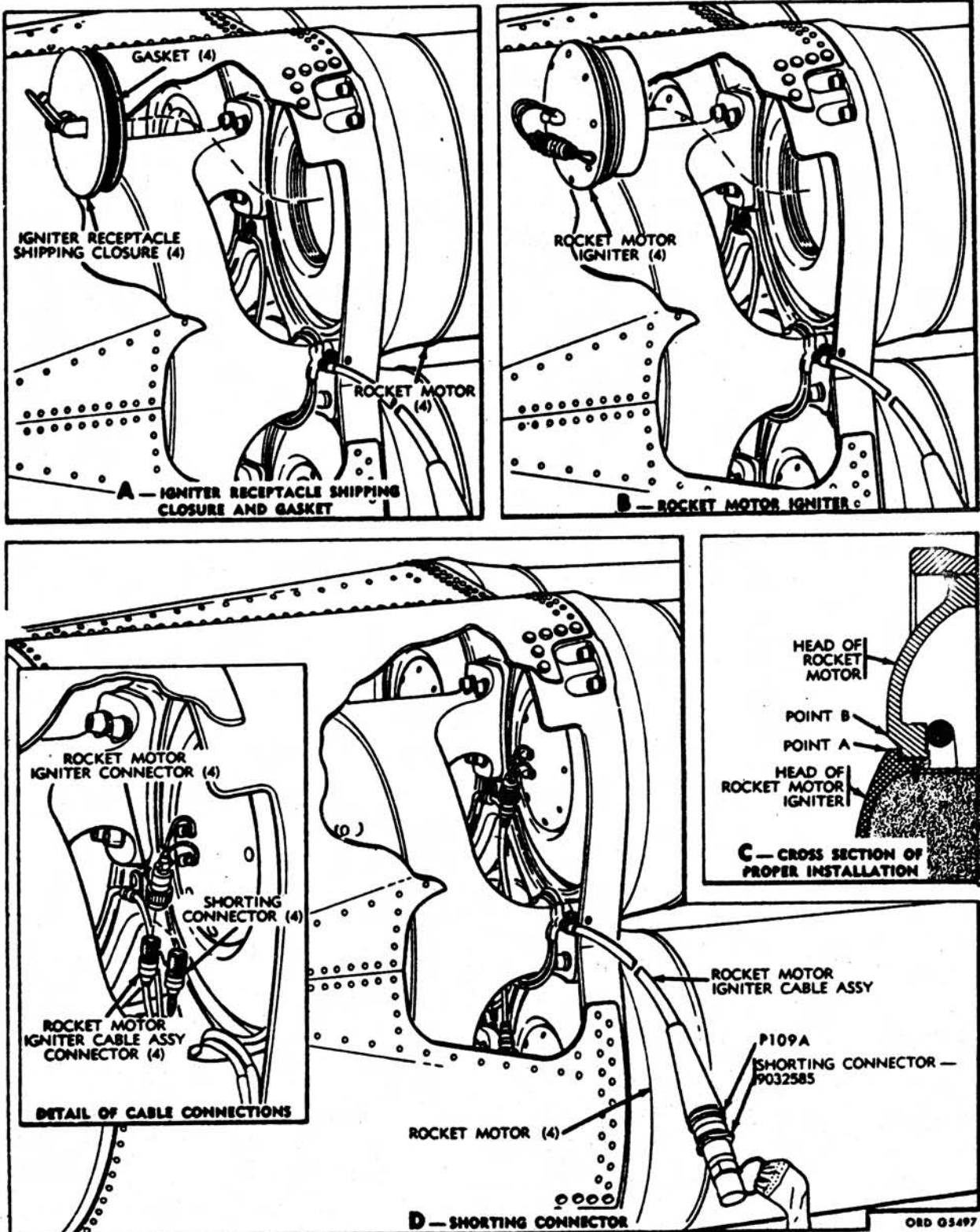


Figure 10-9. Removal and installation of the rocket motor ignitor.

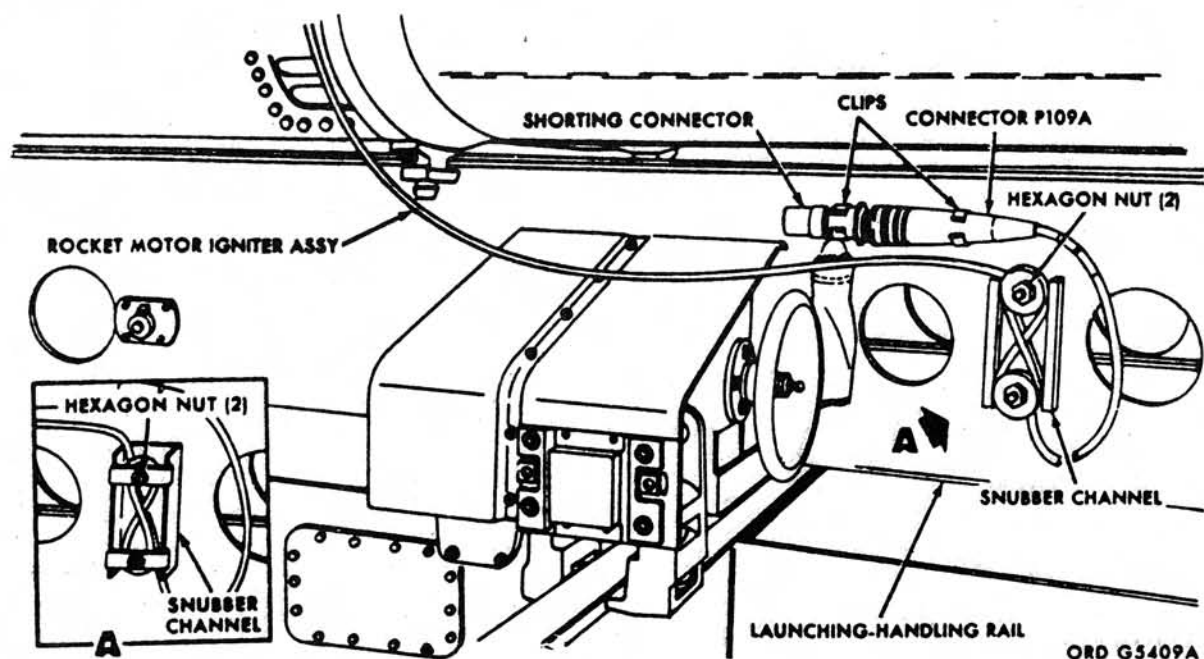


Figure 10-10. Rocket motor igniter cable assembly stowed on the launching-handling rail.

- (7) Connect connectors P1X and P72A of the launching-handling rail to quick-disconnect receptacles J1K and J72E, respectively, on the missile firing sequence test set.
  - (8) Open the cover on launcher-squib connector J109A, and connect connector P109C of the missile firing sequence test set to J109A.
  - (9) Connect cable assembly 9019558 between the missile firing sequence test set and the firing sequence indicator.
  - (10) At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to ON.
  - (11) Set the MISSILE BATTERY HEAT circuit breakers to ON.
  - (12) Set the BOOSTER HEAT circuit breakers to ON, if applicable.
- c. At the SCI, set the appropriate LAUNCHER POWER switch and all of the INTERCOMM switches to ON.
  - d. At the firing sequence indicator, set the MISSION switch to SS-SA.
  - e. Depress the ON push switch.
  - f. Remove the access door from the forward warhead section.
  - g. Remove connector P616 from the safety-and-arming switch, on branched wiring harness 9020714, in the warhead section.
  - h. At the LCI, set the TEST-FIRE switch to TEST and the DC POWER switch to ON.
  - i. Set the LAUNCHER DC POWER, HEATERS & GYROS, and VIBRATOR switches to ON, at the LCI.
  - j. Confirm that the missile track radar operator is receiving the missile beacon.
  - k. Using a multimeter with a 20,000 ohm per volt sensitivity, set to the 500 volt dc scale, place the leads on the aft connector of the M30A1 safety-and-arming device mounting plate (aft pin-plus, forward pin-minus).
  - l. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.
  - m. Request the missile track operator to send a burst command on a short count. Verify a voltage reading on the multimeter of 250 to 325 volts dc. On the electrical test panel, set the BURST ENABLE switch to BURST ENABLE and, after a short delay, set the BURST switch to BURST.
  - n. Set the VIBRATOR switch to OFF then to ON.
  - o. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.
  - p. Set the VIBRATOR switch to OFF.

*Note.* When the VIBRATOR switch is set to OFF or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.

q. Remove the multimeter leads from the aft connector and reconnect the leads to the forward connector (aft pin-plus, forward pin-minus).

r. Set the VIBRATOR switch to ON.

s. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

t. Request the missile track operator to send a burst command on a short count. Verify a voltage reading on the multimeter of 250 to 325 volts dc. On the electrical test panel, set the BURST ENABLE switch to BURST ENABLE, and, after a short delay, set the BURST switch to BURST.

u. Set the VIBRATOR switch to OFF, then ON.

v. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

w. Set the VIBRATOR switch to OFF.

*Note.* When the VIBRATOR switch is set to OFF, or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.

x. Set HEATERS & GYROS switch and the DC POWER switch to OFF.

y. Depress the OFF push switch at the firing sequence indicator.

z. At the SCI, set the LAUNCHER POWER switch and all of the INTER COMM switches to OFF.

aa. Set the BOOSTER HEAT circuit breakers to OFF.

ab. Set the MISSILE BATTERY HEAT circuit breakers to OFF.

ac. At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to OFF.

ad. Remove the missile firing test set equipment group from the missile.

ad.1. Connect connector P616 to the safety and arming switch on branched wiring harness 9020714 in the warhead section.

ae. Replace the access door on the forward warhead section.

## 10-4.2 Surface-To-Surface (Firing T-45) Kit Checkout with Auxiliary Fail-Safe Device Installed

*Note.* This procedure is to be performed only when surface-to-surface (Firing T-45) and auxiliary fail-safe devices are installed and prior to installation of the M30A1 safety-and-arming devices.

*Note.* Coordinate with the missile track radar operator in performing the following checks.

**Warning:** Insure that all M30A1 devices are removed from the warhead section.

a. Set all controls and switches at the section control-indicator (SCI) and launcher control-indicator (LCI) to the initial operating condition.

**Warning:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

**Warning:** Insure that the shorting plug is connected to P109A of the rocket motor cluster igniter cable.

**Caution:** If the missile firing test set is connected to missiles containing BB401/U batteries, the BATTERY CHARGER switch on the electrical test panel in the section simulator group must remain in the OFF position.

b. Install the missile firing test set equipment group.

(1) At the SCI, check that the launcher power switch for the appropriate launcher is set to OFF.

(2) At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to OFF.

(3) Set the MISSILE BATTERY HEAT circuit breakers to OFF.

(4) Set the BOOSTER HEAT circuit breakers to OFF, if applicable.

(5) Position and secure the missile firing sequence test set to the lower front end of the launcher-erecting beam.

(6) Connect connectors P1Y and P72B of the missile firing sequence test set to receptacles J1G and J72D, respectively, on the erecting beam.



(7) Connect connectors P1X and P72A of the launching-handling rail to quick-disconnect receptacles J1K and J72E, respectively, on the missile firing sequence test set.

(8) Open the cover on launcher-squib connector J109A, and connect connector P109C of the missile firing sequence test set to J109A.

(9) Connect cable assembly 9019558 between the missile firing sequence test set and the firing sequence indicator.

*Note. Remove missile distribution box cover 9019871 and stow wire A250MD20 from TB530-C7. Insure that wire A250MD20 is insulated during the remainder of the test.*

(10) At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to ON.

(11) Set the MISSILE BATTERY HEAT circuit breakers to ON.

(12) Set the BOOSTER HEAT circuit breakers to ON, if applicable.

c. At the SCI, set the appropriate LAUNCHER POWER switch and all of the INTERCOMM switches to ON.

d. At the firing sequence indicator, set the MISSION switch to SS-SA.

e. Depress the ON switch.

f. Remove the access door from the forward warhead section.

g. Disconnect P515 of wiring harness 8530415 from J515 of electronic components assembly 9979212. Jumper pins A and B of J515.

h. At the LCI, set the TEST-FIRE switch to TEST and the DC POWER switch to ON.

i. Set the HEATERS & GYROS and VIBRATOR switches to ON, at the LCI.

j. Confirm that the missile track radar operator is receiving the missile beacon.

k. Using a multimeter set for 20,000 ohms per volt on the 500 volt dc scale, place the leads on the aft connector of the M30A1 safety-and-arming device mounting plate (aft pin-plus, forward pin-minus).

l. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

m. Request the missile track operator to send a burst command on a short count. Verify a voltage reading on the multimeter of 250 to 325

volts dc. On the electrical test panel, set the BURST ENABLE switch to BURST ENABLE, and, after a short delay, set the BURST switch to BURST.

n. Set the VIBRATOR switch to OFF then to ON.

o. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

p. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

q. Remove the multimeter leads from the aft connector and reconnect the leads to the forward connector (aft pin-plus, forward pin-minus).

r. Remove jumper from pins A and B of J515 and install a jumper between pins C and D of J515.

s. Set the VIBRATOR switch to ON.

t. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

u. Request the missile track operator to send a burst command on a short count. Verify a voltage reading on the multimeter of 250 to 325 volts dc. On the electrical test panel, set the BURST ENABLE switch to BURST ENABLE, and, after a short delay, set the BURST switch to BURST.

v. Set the VIBRATOR switch to OFF, then ON.

w. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

x. Set the VIBRATOR switch to OFF.

y. Remove jumper from pins C and D of J515.

z. At the LCI, set the TEST-FIRE switch to TEST.

aa. Set the HEATERS & GYROS and VIBRATOR switches to ON, at the LCI.

ab. Confirm that the missile track radar operator is receiving the missile beacon.



4 feet of the APS, and prohibit smoking within 60 feet. Operating personnel must wear goggles or a face mask, rubber gloves, and a rubber apron.

**Warning:** Small quantities of unserviceable ET<sub>n</sub>O should be disposed of by burning in accordance with applicable instructions or by diluting with a minimum of 22 parts of water to each part of ET<sub>n</sub>O and dumping into a sanitary sewer or fast moving stream of water.

a. Remove the flathead screws (8 and 10, fig. 3-21), and remove the equipment section access cover plate on the right side of the missile body.

**WARNING:** Make certain that the drain valve on the fuel tank cart is fully clockwise. (closed).

b. Connect the static ground lead (fig. 11-2), attached to the end of the fuel transfer hose, to the APS service panel wherever a satisfactory ground connection can be made.

c. Depress the TRANSFER valve on the APS service panel, and hold for a minimum of 25 seconds; release the TRANSFER valve.

d. Connect the fuel transfer hose to the FUEL FILL fitting on the APS service panel.

e. Place the end of the fuel drain hose in the 2-1/2-gallon minimum container at least half filled with water.

**WARNING:** Before performing *f* below, make certain the end of the fuel drain hose is immersed in the water and the hose securely attached to the 2-1/2-gallon (minimum) container. During the performance of *f* below, keep the end of the fuel drain hose immersed until ET<sub>n</sub>O bubbles have stopped. Remove the end of the fuel drain hose from the water, but be prepared to immerse the end of the hose immediately in the water if the ET<sub>n</sub>O appears.

ac. Using a multimeter set for 20,000 ohms per volt on the 500 volt dc scale, place the leads on the aft connector of the M30A1 safety-and-arming device mounting plate (aft pin-plus, forward pin-minus).

ad. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ae. Request the missile track operator to send a burst command on a short count. Verify no voltage or less than 20 volts dc stray voltage is indicated on the multimeter. On the electrical test panel, set the BURST ENABLE switch to BURST ENABLE, and, after a short delay, set the BURST switch to BURST.

af. Set the VIBRATOR switch to OFF then to ON.

ag. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ah. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

ai. Remove the multimeter leads from the aft connector and reconnect the leads to the forward connector (aft pin-plus, forward pin-minus).

aj. Set the VIBRATOR switch to ON.

ak. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

al. Request the operator, using the electrical test panel, to send a 5-second burst command. Verify no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

am. Set the VIBRATOR switch to OFF, then ON.

an. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ao. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF, or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

ap. Set HEATERS & GYROS switch and the DC POWER switch to OFF.

*Note. Request integrated fire control (I.F.C.) to release B-HE-SS MISSION. Perform fire and launch sequence in accordance with TM 9-1440-250-10/1. Verify that normal firing sequence is obtained.*

aq. Depress the OFF push switch at the firing sequence indicator.

ar. At the SCI, set the LAUNCHER POWER switch and all of the INTER COMM switches to OFF.

as. Set the BOOSTER HEAT circuit breakers to OFF.

at. Set the MISSILE BATTERY HEAT circuit breakers to OFF.

au. At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to OFF.

av. Remove the missile firing test set equipment group from the missile.

aw. Using a multimeter set on R x 1 scale perform the following measurements on P515 of wiring harness 8530415:

From	To	Indication
P515 Pin A	Missile Skin	Continuity
P515 Pin B	Missile Skin	Discontinuity
P515 Pin C	Missile Skin	Continuity
P515 Pin D	Missile Skin	Discontinuity

ax. Reconnect P515 of wiring harness 8530405 to J515 of electronic components assembly 9979212.

ay. Replace the access door on the forward warhead section.

az. Reinstall wire A250MD20 to TB530-C7 in the missile distribution box and replace cover 9019871.

#### 10-4.3 Surface-to-Surface (Firing T-45) Checkout

*Note. This procedure is to be performed prior to installation of the M30A1 safety-and-arming devices.*

*Note. Coordinate with the missile track radar operator in performing the following checks.*

**Warning:** Insure that all M30A1 devices are removed from the warhead section.

a. Set all controls and switches at the section control-indicator (SCI) and launcher control-launcher (LCI) to the initial operating condition.

**Warning:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

**Warning:** Insure that the shorting plug is connected to P109A of the rocket motor cluster igniter cable.

**Caution:** If the missile firing test set is connected to missiles containing BB401/U batteries, the BATTERY CHARGER switch on the electrical test panel in the section simulator group must remain in the OFF position.

b. Install the missile firing test set equipment group.

(1) At the SCI, check that the launcher power switch for the appropriate launcher is set to OFF.

(2) At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to OFF.

(3) Set the MISSILE BATTERY HEAT circuit breakers to OFF.

(4) Set the BOOSTER HEAT circuit breakers to OFF, if applicable.

(5) Position and secure the missile firing sequence test set to the lower front end of the launcher-erecting beam.

(6) Connect connectors P1Y and P72B of the missile firing sequence test set to receptacles J1G and J72D, respectively, on the erecting beam.

(7) Connect connectors P1X and P72A of the launching-handling rail to quick-disconnect receptacles J1K and J72E, respectively, on the missile firing sequence test set.

(8) Open the cover on launcher-squib connector J109A, and connect connector P109C of the missile firing sequence test set to J109A.

(9) Connect cable assembly 9019558 between the missile firing sequence test set and the firing sequence indicator.

*Note.* Remove distribution box cover 9019871 and stow wire A250MD20 from TB530-C7. Insure that wire A350MD20 is insulated during the remainder of the test.

(10) At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to ON.

(11) Set the MISSILE BATTERY HEAT circuit breakers to ON.

(12) Set the BOOSTER HEAT circuit breakers to ON, if applicable.

c. At the SCI, set the appropriate LAUNCHER POWER switch and all of the INTERCOMM switches to ON.

d. At the firing sequence indicator, set the MISSION switch to SS-SA.

e. Depress the ON push switch.

f. Remove the access door from the forward warhead section.

g. Disconnect P515 of wiring harness 8530415 from J515 of electronic components assembly 9979212. Jumper pins A and B of J515.

h. At the LCI, set the TEST-FIRE switch to TEST and the DC POWER switch to ON.

i. Set the HEATERS & GYROS and VIBRATOR switches to ON, at the LCI.

j. Confirm that the missile track radar operator is receiving the missile beacon.

k. Using a multimeter set for 20,000 ohms per volt on the 500 volt dc scale, place the leads on the aft connector of the M30A1 safety-and-arming device mounting plate (aft pin-plus, forward pin-minus).

l. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

m. Request the missile track operator to send a burst command on a short count. Verify a voltage reading on the multimeter of 250 to 325 volts dc.

n. Set the VIBRATOR switch to OFF then to ON.

o. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

p. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

q. Remove the multimeter leads from the aft connector and reconnect the leads to the forward connector (aft pin-plus, forward pin-minus).

r. Remove jumper from pins A and B of J515 and install a jumper between pins C and D of J515.

s. Set the VIBRATOR switch to ON.

t. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

u. Request the missile track operator to send a burst command on a short count. Verify a voltage reading on the multimeter of 250 to 325 volts dc.

v. Set the VIBRATOR switch to OFF, then ON.

w. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

x. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF, or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

y. Remove jumper from pins C and D of J515.

z. Set the VIBRATOR switches to ON.

aa. Confirm that the missile track radar operator is receiving the missile beacon.

ab. Using a multimeter set for 20,000 ohms per volt on the 500 volt dc scale, place the leads on the aft connector of the M30A1 safety-and-arming device mounting plate (aft pin-plus, forward pin-minus).

ac. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ad. Request the missile track operator to send a burst command on a short count. Verify no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ae. Set the VIBRATOR switch to OFF then to ON.

af. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ag. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

ah. Remove the multimeter leads from the aft connector and reconnect the leads to the forward connector (aft pin-plus, forward pin-minus).

ai. Set the VIBRATOR switch to ON.

aj. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

ak. Request the missile track operator to send a burst command on a short count. Verify no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

al. Set the VIBRATOR switch to OFF, then ON.

am. Confirm that the missile track operator is receiving the missile beacon. Verify that no voltage or less than 20 volts dc stray voltage is indicated on the multimeter.

an. Set the VIBRATOR switch to OFF.

*Note. When the VIBRATOR switch is set to OFF, or the missile track operator has stopped receiving the missile beacon, the multimeter will indicate 250 to 325 volts dc and will decay to 0 or stray voltage level after normal fail-safe time has elapsed.*

ao. Set HEATERS & GYROS switch and the DC POWER switch to OFF.

ap. Depress the OFF push switch at the firing sequence indicator.

aq. At the SCI, set the LAUNCHER POWER switch and all of the INTER COMM switches to OFF.

ar. Set the BOOSTER HEAT circuit breakers to OFF.

as. Set the missile battery HEAT circuit breakers to OFF.



at. At the launcher power distribution box, set the MAIN POWER BKR circuit breaker to OFF.

au. Remove the missile firing test set equipment group from the missile.

av. Using a multimeter set on R x 1 scale perform the following measurements on P515 of wiring harness 8530415:

From	To	Indication
P515 Pin A	Missile Skin	Continuity
P515 Pin B	Missile Skin	Discontinuity
P515 Pin C	Missile Skin	Continuity
P515 Pin D	Missile Skin	Discontinuity

aw. Reconnect P515 of wiring harness 8530405 to J515 of electronic components assembly 9979212.

ax. Replace the access door on the forward warhead section.

ay. Reinstall wire A250MD20 to TB530-C7 in the missile distribution box and replace cover 9019871.

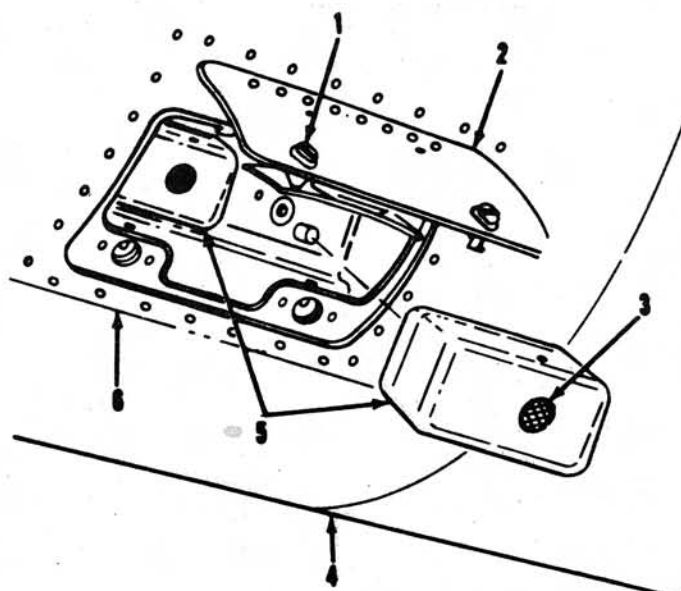
#### 10-5. Installation of Safety-and-Arming Device M30A1

**Warning:** The safety-and-arming devices are installed in the missile when the missile is in the launching area.

**Warning:** Exercise care in handling each safety-and-arming device. Always handle with the inspection window facing the handler and the base pointing away from the body.

**Warning:** If the safety-and-arming devices indicate an armed (red field) condition, remove the devices to a suitable isolated area, and notify explosive ordnance disposal personnel. Do not continue with the installation procedures.

a. Check the color visible through the inspection window (3, fig. 10-11) of each safety-and-arming device. If white is visible, the device is in a safe condition. If red is visible, the device is armed.



- 1—Captive stud fastener (2)  
2—Arming mechanism access cover plate  
3—Inspection window  
4—Warhead body section  
5—Safety-and-arming device  
6—Bottom centerline

Figure 10-11. Removal and installation of the safety and arming device.

b. If the wire bail is present on the safety-and-arming device (5, fig. 10-11), remove and discard it.

c. Using an inspection mirror, inspect the contact pins (B, fig. 10-12) for the presence of corrosion and for distortion. Devices with corroded or distorted pins will be rejected and replaced with serviceable devices.

**Note.** Prior to using arming mechanism ohmmeter with two-lead test cable 8020265, check the battery condition by shorting the ohmmeter terminals, using both test leads. If the maximum needle deflection is to the left of the 16-ohm graduation on the upper scale, the battery should be replaced. Any deflection to the right of the 16-ohm graduation should be considered a full-scale deflection when performing this test.

c.1. Test each safety-and-arming device for electrical noncontinuity (open circuit), using arming mechanism ohmmeter (blasting galvanometer) 8020264 and a portable barricade in a suitable area as described in (1) or (2) below.

**Warning:** Connect a ground strap from the frame of the portable barricade to ground with a maximum resistance of 20 ohms between the component and ground.



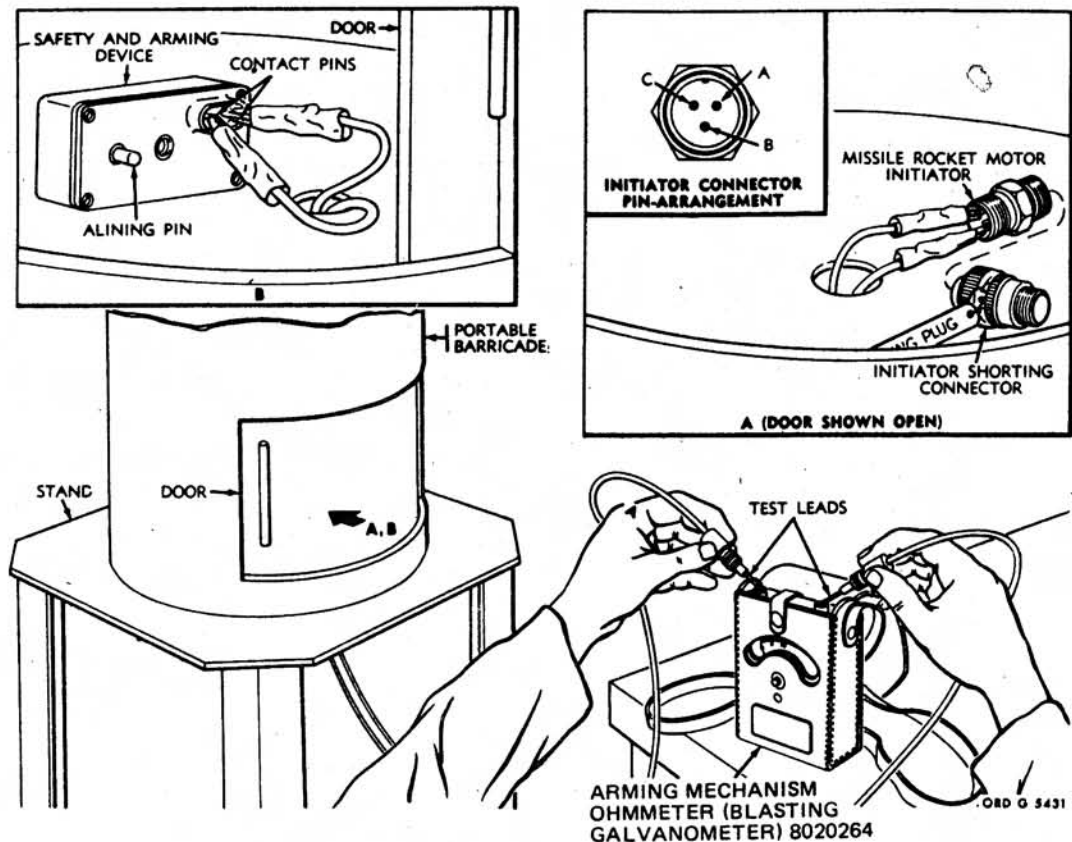


Figure 10-12. Test of the safety-and-arming device.

Note. Do not use procedure (1) if 3 lead test cable 8030966 is available.

(1) Use a two-lead test cable 8020265.

(a) With the safety-and-arming device (B, fig. 10-12) located in a portable barricade, attach the alligator clips of the two arming mechanism ohmmeter leads to the contact pins of the safety-and-arming device; insure that the uninsulated portion of the test leads do not touch each other or the safety-and-arming device. Feed the test leads through the hole in the bottom of the barricade. Close the door of the barricade.

(b) Touch the opposite ends of the test leads to the terminal posts on top of the arming mechanism ohmmeter. The meter should indicate an open circuit (no deflection of the needle).

(c) Open the door of the portable barricade. Remove one alligator clip from the contact pin, and attach it to the alining pin. Close the door of the portable barricade.

(d) Touch the opposite ends of the test leads to the terminal post on top of the arming mechanism ohmmeter. The meter should indicate an open circuit (no deflection of the needle).

(e) Open the door of the portable barricade. Remove the alligator clip from the first contact pin, and connect to the second contact pin. Close the door of the portable barricade. Repeat step (d) above.

(f) If the needle deflects during any of the above steps and the connections were properly made, the device is to be rejected, and the proper authorities notified.

(g) Disconnect the arming mechanism ohmmeter leads from the safety-and-arming device.

(h) After completing the test of the last safety and arming devices, test the ohmmeter in accordance with note after par. 10-5c. If the ohmmeter fails the test, replace the batteries and perform (a) through (g) above.

(2) Use of the three-lead test cable 8030966.

*Note.* Some three-lead test cables used in (a) through (g) below have a lead with clear sleeving in place of a lead with red sleeving. The lead with clear sleeving should be used in procedures calling for use of the red lead.

(a) Prior to using the cable, perform the following continuity and battery test with the arming mechanism ohmmeter.

1. Check for continuity between the alligator clip and the red test lead probe. If the maximum needle deflection is to the left of the 16-ohm graduation on the upper scale, the battery should be replaced. Any deflection to the right of the 16-ohm graduation should be considered a full-scale deflection when performing this test.

2. Install a shorting wire between the connector assembly receptacles.

3. Check for continuity between the black and white probes.

(b) With the safety-and-arming device located on the portable barricade, attach the connector assembly to the receptacle on the base of the arming device, and attach the alligator clip of the red test lead to the aligning pin on the arming device.

(c) Feed the other end of the test leads through the holes in the bottom of the portable barricade and close the door.

(d) Touch the probes of the white and black test leads to the studs on the arming mechanism ohmmeter. The meter should indicate an open circuit; there is no deflection of the needle.

(e) Release the white test lead and the black test lead.

(f) Touch the probes of the red and black test leads to the studs of the arming mechanism ohmmeter. The meter should indicate an open circuit; there is no deflection of the needle.

(g) Touch the probes of the red and white test leads to the studs of the arming mechanism ohmmeter. The meter should indicate an open circuit; there is no deflection of the needle.

(h) After completing the test of the last safety and arming device, test the ohmmeter in accordance with (a) above. If the ohmmeter fails the test, replace the batteries and perform (a) through (g) above.

d. Release the captive stud fasteners that secure the ARMING MECHANISM access cover plate, and open the cover plate.

e. Insert the two arming devices into their receptacles.

f. Close the access cover plate, and secure with the captive stud fasteners.

g. Seal P1/J1 connectors according to the procedures in appendix D.

**WARNING:** When connecting or disconnecting connectors P1X and P72A, the MAIN POWER BKR, MISSILE BATTERY HEAT, and BOOSTER HEAT circuit breakers at the launcher power distribution box for the appropriate launcher must be set to OFF.

h. Connect P1X and P72A to the launcher erecting beam.

#### 10-6. Alinement of the Ram-Pressure Probes

a. Remove the closure (6, fig. 3-31) from the ram-pressure probe tube.

b. Position the ram-pressure probe alinement template (fig. 2-1) over the forward fin assembly, approximately 6 inches forward of the rear edge of the saddle.

*Note.* It may be necessary to hand-fit the template ellipse over the fin assembly.

c. Manually slide the template to the rear, while holding it perpendicular to the missile center line, until the tube protrudes approximately 1/16-inch through the circular cutout. The end of a serviceable probe will fit in the circular cutout.

d. If the end of the tube does not fit in the circular cutout, aline the tube as outlined in (1) and (2) below.

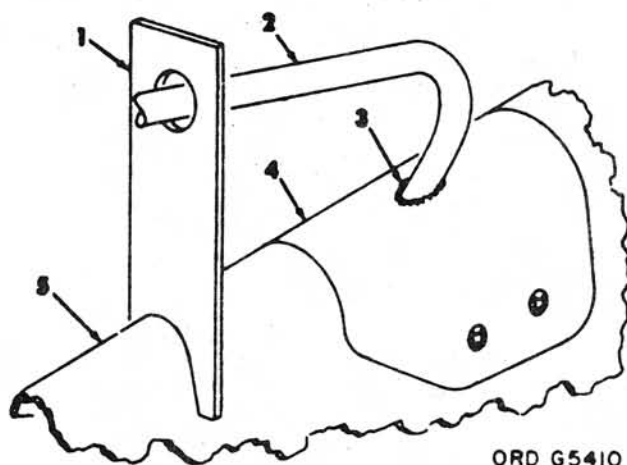
**CAUTION:** The probe tube is brazed in the saddle. To prevent damage to the brazing when bending the tube, rubber tape must be wrapped around the tube just above the brazing, and the taped portion of the tube must be held in position with pliers.

(1) Using rubber tape 5970-184-2002, wrap the tape around the tube just above the brazing and hold in position with pliers.

(2) Using hand pressure, bend the tube until the end of the tube fits within the circular cutout in the template.

e. Remove the template and tape, and install the closure (6, fig. 3-31) on the tube.

f. Repeat steps a through e above for the remaining tubes.



- 1—Ram-pressure probe alinement template
- 2—Ram-pressure probe tube
- 3—Brazing
- 4—Saddle
- 5—Forward fin assembly

Figure 10-13. Ram-pressure probe alinement check.

## NIKE-HERCULES guided missile training body section M84

## Assembly procedures:

	Paragraphs	Pages
Final preparation of the missile trainer on the launcher	14-25	14-16
Installation of:		
Trainer access doors, cover plates, and door assemblies	14-22	14-15
Trainer elevons	14-18	14-14
Trainer rear main fins	14-17	14-14
Joining the missile body trainer and the rocket motor cluster trainer	14-24	14-15
Postmating assembly tests	14-26	14-16
Removal of the trainer access doors, cover plates, and door assemblies	14-16	14-14
Uncrating and installation of:		
Inert rocket motor subassembly	14-19	14-14
Rocket motor cluster trainer	14-23	14-15
Training forward body section	14-21	14-15
Training warhead section	14-20	14-14
Corrective maintenance:		
General—summary of section	14-38	14-18
Replacement of:		
Lanyard assembly	14-40	14-18
Trainer forward main fin	14-41	14-18
Trainer body section index pin	14-39	14-18
Disassembly procedures:		
Packaging trainer rear main fins, trainer forward main fins, and trainer elevons for shipment or storage	14-37	14-17
Trainer main fin shipping box	14-37b	14-18
Trainer main fin shipping crate	14-37a	14-18
Preliminary procedures	14-27	14-16
Preparation of the trainer body section for shipment or storage	14-36	14-16
Rear body section and forward body section container	14-36a	14-16
Trainer body section shipping box	14-36c	14-17
Trainer body section shipping crate	14-36b	14-16
Removal of:		
Inert rocket motor subassembly	14-33	14-16
Missile body trainer from the launcher	14-28	14-16
Rocket motor cluster trainer from the launcher	14-29	14-16
Trainer elevons	14-34	14-16
Trainer forward main fins and preparation for removal of the training warhead section	14-31	14-16
Trainer rear main fins	14-35	14-16
Training forward body section	14-30	14-16
Training warhead section	14-32	14-16
General:		
Differences among models	14-2	14-1
Basic differences	14-2b	14-1
General differences	14-2a	14-1
Scope	14-1	14-1
Physical description:		
General—overall summarized description	14-3	14-1
Trainer actuator section	14-6	14-2
Trainer body section external markings	14-8	14-3
Trainer equipment section	14-5	14-2
Trainer main fin	14-7	14-2
Trainer motor section	14-4	14-1
Shipment, inspection, and uncrating:		
Container, inspection of	14-10	14-8
Rear body section and forward body section container	14-10c	14-8
Trainer body section shipping box	14-10b	14-8
Trainer body section shipping crate	14-10a	14-8
Trainer main fin shipping box	14-10e	14-8

## PART TWO

# DEACTIVATION, CORRECTIVE MAINTENANCE, AND STORAGE

## CHAPTER 11

### NORMAL DEACTIVATION PROCEDURES

#### Section I. GENERAL

##### 11-1. Introduction

This chapter contains the normal deactivation procedures for assembled missiles. Missiles must be deactivated in the appropriate areas, following the procedures prescribed in paragraphs 11-2 through 11-37. The two safety-and-arming devices, the propulsion arming lanyard, the four rocket motor igniters, and the rocket motor initiators are removed. Squib-activated batteries may be disconnected in the launching area. The location for removal of batteries has options indicated in the procedures (para 11-5 through 11-7). After the missile has been disarmed, the missile is either transported to the service area on trailer M529, or the missile body is separated from the rocket motor cluster and each component is transported to the service area. If trailer M529 is used, the missile body is separated from the cluster in a prescribed area. There, all components are deactivated and prepared for shipment, storage,

or removal to repair shops. All loose hardware is placed in appropriate containers for shipment or storage.

##### 11-2. Deactivation Sequence

To insure the maximum safety of personnel and equipment, the deactivation procedures must be performed in the exact sequence prescribed in paragraphs 11-3 through 11-37.

##### 11-3. Handling Explosives

Personnel handling explosive components of the missile must be familiar with all applicable safety regulations. Published rules for the use and care of tools must be observed. Fire fighting equipment must be kept in good working order and readily available. Spark-proof safety tools and equipment are not required for normal missile assembly and disassembly operations. The installation or removal of the rocket motor igniter, using the authorized spanner wrench, is considered normal missile operation.

#### Section II. PRELIMINARY PROCEDURES

##### 11-4. Disarming the Missile

**WARNING:** The missile contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical

storms.

**WARNING:** Handling operations of the missile will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.



**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**WARNING:** If the missile is being deactivated on a launcher, insure that the launcher control-indicator (LCI) is in the initial operating condition; the missile HEAT switch is set to OFF; the TEST-FIRE switch is in the TEST position; and the main power switch in the launcher-power distribution box is set to OFF.

**WARNING:** When connecting or disconnecting connectors P1X or P72A, the main power BKR, missile battery heat, and booster heat circuit breakers at the launcher power distribution box for the appropriate launcher must be set to off.

**CAUTION:** Place connectors P1X and P72A in the dummy connectors, taking care not to touch the pins to the adjoining metal surfaces.

a. Disconnect connectors P1X and P72A (fig. 9-19) from connectors J1G and J72D on the launcher erecting beam.

b. Release the captive stud fasteners that secure the ARMING MECHANISM access cover plate (fig. 10-11) and open the cover plate.

**WARNING:** Exercise care in handling each safety-and-arming device. Always handle with the inspection window facing the handler and the base pointing away from the body.

c. Remove each safety-and-arming device by grasping the device and pulling out.

*Note.* If trailer M529 is to be used, store the two safety-and-arming devices, removed in step b above, in the explosive storage container on the trailer as indicated in figure 9-14, and omit step d and e below.

d. Deleted.

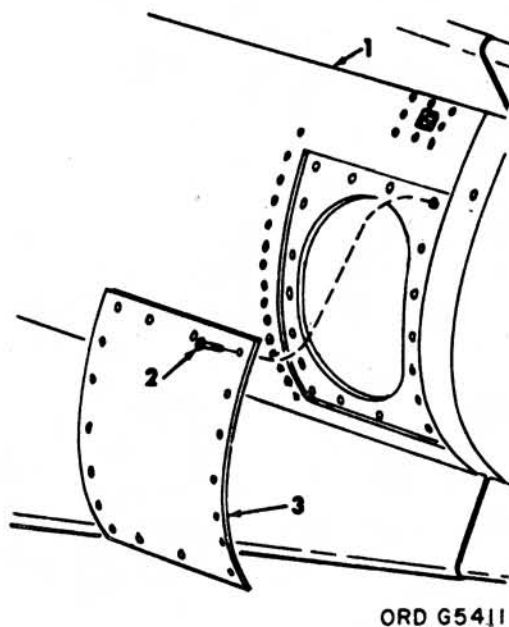
e. Repack and store the two safety-and-arming devices in the area designated.

f. Close the access cover plate, and secure with the captive stud fasteners.

g. Inspect the rocket motor igniter cable assembly (fig. 10-10) to insure that the shorting connector is properly installed on P109A.

h. Remove the flathead screws (2, fig. 11-1), and remove the IGNITOR access cover plate.

i. Disconnect connectors P162 (3, fig. 5-15) and P163 (1) from the missile rocket motor initiators.



- 1—Rear body section
- 2—1/4 x 23/32 fl-hd screw (18)
- 3—IGNITOR access cover plate

Figure 11-1. Removal and installation of the IGNITOR access cover plate.

j. Install the shorting connectors (5) on the two missile rocket motor initiators.

k. Remove the two initiators from the forward end of the rocket motor subassembly.

l. Install the two shipping plugs (fig. 5-7) with gaskets in the receptacles from which the initiators were removed, and torque to 250 pound-inches.

m. Store the two initiators removed in step k above in the explosive storage container on trailer M529, as indicated in figure 9-14, or place in the designated storage area.

n. Install the flathead screws (2, fig. 11-1) to secure the IGNITOR access cover plate to the rear body section. Torque the screws to the value given in table 15-9.

o. Remove the flat washers (2, fig. 10-6) and the nut (3) securing the propulsion arming lanyard assembly (5) to the lanyard mounting bracket (4).

**CAUTION:** The trigger operating plug (14) is secured in position with an aluminum rivet (13). If more than finger pressure is required to disengage the threads of the eyebolt (12) from the threads in the trigger operating plug, refer the item to support unit for maintenance.

p. Remove the eyebolt from the trigger operating plug in the lanyard receptacle (15).

q. Install the shipping plug (11) into the trigger operating plug.

*Note.* If trailer M529 is to be used, store the lanyard assembly removed in p above in the explosive storage container on the trailer as indicated in figure 9-14, and omit r below.

r. Release elevon locks (fig. 9-12) by pulling the lock release levers and rotating the elevon lock forks toward the rocket motor cluster.

s. Disconnect the rocket motor igniter cable assembly connector (D, fig. 10-9) from one rocket motor igniter connector. Immediately install the rocket motor igniter shorting connector.

t. Repeat s above for the three remaining igniters.

*Note.* Place igniter cable assembly connectors P1, P2, P3, and P4 between the thrust structure pedestal and base to preclude damage to the connectors.

**CAUTION:** Install the igniter receptacle shipping closures (A) with gaskets immediately after removing the rocket motor igniters, as the propellant grains absorb moisture if left exposed to the atmosphere.

u. Using the spanner wrench, remove one rocket motor igniter (B, fig. 10-9) and install the igniter receptacle shipping closure and gasket (A).

v. Repeat u above for the three remaining igniters. Store the igniters in a suitable area

*Note.* If trailer M529 is to be used, place the igniters removed in u and v above in shipping containers, and store in the explosive storage container on the trailer as indicated in figure 9-14.

#### 11-5. Removal of the Guidance Set Storage Battery (Missiles 10206 through 11935 and 13001 through 13683)

**CAUTION:** Before disconnecting or connecting the battery, make certain that the section control-indicator controls and switches are in the initial operating condition; the MISSILE HEAT switch is set to OFF; connectors P1X and P72A are installed in the dummy connectors; and connectors P104A and P105A are properly installed in connectors J104A and J105A, respectively.

a. Remove the flathead screws (7 and 9, fig. 3-21) that secure the equipment section access cover plate on the left side of the missile body, and remove the cover plate.

b. Disconnect connector J510 on the battery wiring harness from connector P510 on the missile distribution box.

**WARNING:** Connector J510 should be taped to prevent damage due to accidental shorting of the connector.

c. Remove the truss-head screw, lockwasher, and flat washer that secure the loop clamp to the bracket on the missile structure.

d. Loosen the hose clamp on the battery drain hose, and remove the battery drain hose from the vent in the cover of the missile battery box.

e. Remove the truss-head screws from the two battery box straps that secure the missile battery box to the battery box support.

*f.* Carefully remove the missile battery box from the battery box support.

**CAUTION:** Exercise care to prevent damage to wires while performing *g* below.

*g.* Remove the battery box cover (24, fig. 10-1) from the top of the battery tray (13).

**CAUTION:** Care must be taken to insure that the red (positive) lead (7) and the black (negative) lead (8) terminal of the storage battery leads do not touch each other, or they will fuse together. The terminal protector tips or tape immediately after disconnecting.

*h.* Remove the two hexagon nuts (3 or 19), lockwasher (2 or 18), and flat washers (1 or 17) that secure the guidance set storage battery leads to the terminal board (20 or 26).

*i.* Remove the guidance set storage battery (11) from the battery tray.

**CAUTION:** Exercise care to prevent damage to wires while performing *j* below.

*j.* Place the battery box cover on the battery tray.

*k.* Place the missile battery box on the battery box support.

*l.* Install the two straps that secure the missile battery box to the battery box support with the truss-head screws.

*m.* Connect the battery drain hose to the vent in the cover of the battery box. Tighten the hose clamp.

*n.* Secure the loop clamp to the bracket on the missile structure with the truss-head screw, lockwasher, and flat washer.

*o.* Connect connector J510 on the battery wiring harness to connector P510 on the missile distribution box.

*p.* Install the equipment section access cover plate (8, fig. 3-21) in position on the left side of the missile body, and secure with the flathead screws. Torque the screws to the value given in table 15-9.

#### 11-6. Removal of the Squib Batteries (Missiles 13684 and Subsequent)

**CAUTION:** Before disconnecting or connecting the squib battery, make certain that the section control-indicator controls and switches are in the initial operating condition; the MISSILE HEAT switch is set to OFF; connectors P1X and P72A are in-

stalled in the dummy connectors; and connectors P104A and P105A are properly installed in connectors J104A and J105A respectively.

*Note.* If the missile is being deactivated for the purpose of transportation to another area, para 11-6 may be omitted for missiles subsequent to 13684.

*a.* Remove the flathead screws (7 and 9, fig. 3-21); remove the equipment section access cover plate on the left side of the missile body.

*b.* Disconnect connector P541 (2, fig. 10-3) guidance set squib battery (7). Install the connector cap.

*c.* Remove the hose clamp (5) and battery drain hose (3) from the battery vent (6).

*d.* Remove the four fillister-head screws (8) and flat washers (9) that secure the guidance set squib battery (7) to the missile battery rack (10), and remove the battery.

*e.* Install the equipment section access cover plate (8, fig. 3-21) on the left side of the missile body, and secure the cover plate with the flathead screws. Torque the screws to the value given in table 15-9.

#### 11-7. Removal of the HPU Squib Battery

**WARNING:** If the HPU battery has been activated, the ventilator assembly will contain a caustic solution injurious to personnel and equipment and must be handled with caution. Do not remove the ventilator assembly from the battery. The ventilator assembly must not be reused.

*Note.* If the missile is being deactivated for the purpose of transportation to another area, para 11-7 may be omitted.

*a.* Remove the flathead screws (3 and 10, fig. 3-21) that secure the equipment section access cover plate on the right side of the missile body, and remove the cover plate.

*b.* Disconnect connector P544 (2, fig. 10-4) from connector J544. Immediately install the shorting dummy connector J544.

*c.* Disconnect the coupling nut (7, fig. 12-47) from the HPU squib battery (3).

*Note.* The coupling nut and sleeve (8) will remain on the tube (6).

d. Remove the two hexagon nuts (5), four flat washers (2), and two truss-head screws (1) securing the ventilator assembly (4) to the HPU squib battery, and remove the ventilator assembly.

e. Pull back the cable nipple (6, fig. 12-43), and remove the hexagon nut (9), lockwasher (8), and flat washer (7) securing the positive lead (10) to the positive terminal stud (11), and remove the lead.

f. Repeat e above to disconnect the negative lead (5).

g. Remove the hexagon nuts (11, fig. 12-47) flat washers (10) and hexagon-head bolts (9) securing the HPU squib battery (3) to the missile structure, and remove the battery.

h. Position the shipping support (3, fig. 7-17)

on the missile structure, and install the panhead screw (8) and flat washers (9).

i. Position the shipping support (13) on the missile structure, and install the panhead screws (11) and flat washers (12).

j. Insert the two spacers (7) between the support brackets (4). Insert the end of the tube (10) into the grommet (14), and position the ventilator assembly (5) on the shipping supports. Install the truss-head screws (6), flat washers (2), and hexagon nuts (1).

k. Install the equipment section access cover plate (2, fig. 3-21) in position on the right side of the missile body, and secure with the flathead screws (3 and 10). Torque the screws to the value given in table 15-9.

### Section III. REMOVAL OF THE MISSILE FROM THE LAUNCHING AREA, USING GUIDED MISSILE LOW-BED TRAILER M529

#### 11-8. (Deleted)

**WARNING:** The missile contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical

currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

When the missile on the launching-handling rail is to be transported on guided missile low-bed trailer M529, the two safety and arming devices, the two missile rocket motor initiators, the propulsion arming lanyard assembly, and the four rocket motor igniters are removed and stored in the trailer explosive storage container (fig. 9-14).

**WARNING:** Before continuing with the deactivation procedures, check that the preliminary procedures in paragraphs 11-4 and 11-5 have been performed.

#### 11-9. Removal of the Missile from the Launcher Using Guided Missile Low-Bed Trailer M529

a. Release the stop-and-position handle (fig. 9-19) on the launching-handling rail, and position the launching-handling rail at the end of the loading rack (fig. 9-9).



b. Loosen the nut with bar (1, fig. 9-18); raise the pipe to the LOAD position; and tighten the nut with bar.

c. Refer to TM 9-2330-255-14 for missile loading procedures.

d. Move trailer M529 to the appropriate area.

e. (Deleted)

f. (Deleted)

g. Remove missile holddown arm assemblies as prescribed in TM 9-2330-255-14.

#### Section IV. REMOVAL OF THE MISSILE BODY FROM THE LAUNCHING-HANDLING RAIL

**WARNING:** Before continuing with the deactivation procedures, check that the preliminary procedures in paragraphs 11-4 through 11-7 have been performed.

**WARNING:** The missile body contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile body will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

#### 11-10. Removal of the Missile Body

*Note.* If guided missile low-bed trailer M529 has been used to transport the missile to the assembly area, omit step a below.

*Note.* Due to differences between site configurations, it may be necessary to remove the adjoining loading racks before performing paragraphs 11-10 and 11-12.

a. Position the launching-handling rail on any launcher (except elevator-mounted launchers) or at the end of the loading racks for separation of the missile body from the rocket motor cluster.

*Note.* Perform step b below for missiles 13001 and subsequent.

b. Disconnect the hose assembly (3, fig. 9-18) from the cooling access door.

**WARNING:** Exercise extreme care when releasing the spring-loaded retaining pin as injury to personnel may result when the hook latch snaps into position.

c. Pull back the spring-loaded retaining pin (B3, fig. 9-22) to release the hook latch on the shear plug.

d. Disconnect missile umbilical cable connectors P104A (6, fig. 9-21) and P105A (9) from connectors J104A (5) and J105A (10), respectively; remove the umbilical cable.

e. Position the missile umbilical cable (fig. 9-20) on the missile body; secure with the clamp and wing nut.

e.1. Release the elevon locks (fig. 9-12) by pulling the lock release levers and rotating the elevon lock forks toward the rocket motor cluster.



f. Perform the adjustments prescribed in steps (1) through (3) below on the launching-handling rail.

(1) Loosen the locknut (9, fig. 9-8) on the missile-away switch arm adjusting bolt (8), and retract the bolt until flush with the missile-away switch arm (7).

(2) Loosen the locknut (3) on the stop bolt (4) on the left side of the launching-handling rail (5). Turn the stop bolt counterclockwise until the end of the bolt is flush with the missile-away switch arm.

(3) Loosen the locknut on the stop bolt on the right side of the launching-handling rail, and turn the bolt counterclockwise until the end of the stop bolt is flush with the forward end of the stop block (2).

g. Remove the plugs (15, fig. 9-17) from holes on the top and sides of the missile body.

**WARNING:** Check that the threads and bolt holes in the missile body are in good condition.

h. Position the handling ring segments on the top and sides of the missile body; secure with captive bolts, and tighten to the torque value given in table 15-9.

**CAUTION:** Make certain a hoisting device capable of lifting 6,000 pounds is used to remove the missile body from the launching-handling rail.

i. Prepare to lift the missile body (par. 9-1b through l).

j. Assure that the APS SERVICE DOOR (11, fig. 3-21) is open for missile with an APS.

k. Raise the missile body hoist beam (fig. 9-17) slightly to apply tension to the bracket assembly and lift chain.

l. Loosen the knurled knobs (16, fig. 9-13) on the holder (17).

m. Remove the safety wire (8) from the internal wrenching bolt or thumb-screw (7) on the forward side of the yoke assembly (13). Turn the bolt or thumbscrew counterclockwise until flush with the rear surface of the yoke assembly.

n. Remove the hexagon nut (1), lockwashers (2), and shear bolt (4) from the yoke assembly.

o. Pull the yoke assembly forward to disengage the holder (12) from the T-hook adapter (11).

p. Slowly guide the missile body (fig. 9-16) out of the rocket motor thrust ring assembly until the missile body is clear of the rocket motor cluster.

q. Lift the missile body clear of the launching handling rail.

r. Remove the plugs (view B, fig. 9-15) from the handling ring segment mounting bolt holes on the bottom of the missile body.

s. Position the handling ring segment on the missile body; secure with the captive bolts; and tighten the captive bolts to the torque value given in table 15-9.

t. Position the rear roll ring (view A) on the missile body and secure with the captive bolts.

## 11-11. Transporting the Missile Body to the Service Area

*Note.* If guided missile low-bed trailer M529 has been used to transport the missile, perform a(1) through (3) below and omit the remainder of the paragraph. The missile body truck (fig. 9-1) is used to transport the missile body over smooth terrain (or paved surfaces). When the terrain is rough, the missile body must be moved on the missile body or rocket motor cluster transporter adapter (fig. 9-2) mounted on the transporter trailer.

*a. Transporting the Missile Body on the Missile Body Truck.*

(1) Position the missile body (fig. 9-1) on the missile body truck.

**CAUTION:** Make certain the rear roll ring is fully seated in the groove of the wheel as shown in figure 3-13.

(2) Install the lock pin to secure the rear roll ring to the forward cradle of the missile body truck. Install the two self-locking pins to secure the lower handling ring segment to the rear cradle on the missile body truck.

(3) Remove the missile body hoist beam self-locking eyehook and bracket assembly (par. 9-1p through w).

(4) Move the missile body truck to the service area.

*b. Transporting the Missile Body on the Transporter Adapter Mounted on the Transporter Trailer.*

(1) Position the missile body (fig. 9-2) on the transporter adapter.

(2) Secure the missile body to the transporter adapter, and remove the missile body hoist beam (par. 9-1o through w).

(3) Move the transporter adapter to the service area.

## Section V. REMOVAL OF THE ROCKET MOTOR CLUSTER FROM THE LAUNCHING-HANDLING RAIL

**WARNING:** Before continuing with deactivation procedures check that the preliminary procedures in paragraphs 11-4 through 11-7 have been performed.

**WARNING:** The rocket motor cluster contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the rocket motor cluster will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

### 11-12. Removal of the Rocket Motor Cluster

**CAUTION:** Make certain a hoisting device capable of lifting 6,000 pounds is used to remove the rocket motor cluster from the launching-handling rail.

a. Remove the hexagon-head bolts (2, fig. 9-23) and flat washers (1) that secure each lower fin assembly to the rocket motor cluster; remove the fin assemblies.

b. Loosen the hexagon nuts (fig. 10-10) on the snubber channel sufficiently to permit the removal of the rocket motor igniter cable assembly; remove the cable assembly from the snubber channel and clips.

c. Coil the rocket motor igniter cable assembly, and tape to place the coil on top of the thrust structure, and tie or tape it in place.

d. Prepare to lift the rocket motor cluster (par. 9-2b through h).

e. Remove the two rear and forward retaining rail bars (par. 9-2i and j).

f. Lift the rocket motor cluster clear of the launching-handling rail.

*Note.* If trailer M529 has been used, prepare the rocket motor cluster for shipment or storage.

### 11-13. Transporting the Rocket Motor Cluster to the Service Area

*Note.* If guided missile low-bed trailer M529 has been used to transport the missile, omit paragraph 11-13. The rocket motor cluster truck is used to transport the rocket motor cluster over smooth terrain (or paved surface). When the terrain is rough, the rocket motor cluster must be moved on the missile body or rocket motor cluster transport adapter mounted on the transporter trailer.

**a. Transporting the Rocket Motor Cluster on the Rocket Motor Cluster Truck**

(1) Position the rocket motor cluster (9, fig. 9-3) on the rocket motor cluster truck (22).

(2) Secure the rocket motor cluster to the rocket motor cluster truck as prescribed below:

(a) Install the internal-wrenching or hexagon-head bolts (15) and recessed washers (16) to secure the forward retaining rail bars (21) to the forward slipper assemblies (20).

(b) Install the hexagon-head capscrews (12) and flat washers (11) to secure the rear retaining rail bars (10) to the rear slippers (13).

(c) Tighten the adjusting bolts (18) and locknuts (19) to secure the rocket motor cluster to the four supports (14 and 17) on the rocket motor cluster truck.

(3) Remove the rocket motor cluster hoist beam (para 9-2n through r).

(4) Move the rocket motor cluster truck to the service area.

**b. Transporting the Rocket Motor Cluster on the Transporter Adapter Mounted on the Transporter Trailer.**

(1) Position the rocket motor cluster (2, fig. 9-4) on the missile body or rocket motor cluster transporter adapter.

(2) Secure the rocket motor cluster to the transporter adapter (par. 9-2 m).

(3) Remove the rocket motor cluster hoist beam (par 9-2 n through r).

(4) Move the transporter adapter mounted on the transporter trailer to the service area.

## Section VI. REMOVAL OF THE FORWARD BODY SECTION

**Warning:** Before continuing with deactivation procedures, check that the preliminary procedures in paragraphs 11-4 through 11-7 have been performed.

### 11-14. Preparation for Removal of the Forward Body Section

a. Remove the flathead screws (6, fig. 3-26 or 2, fig. 3-27) that secure the J1 + XMTR ACCESS DOOR to the right side of the forward body section; remove the access door.

b. Attach the forward body section hoist (1, fig. 7-14) to the top of the forward body section (4) as prescribed below.

(1) Remove the hexagon-head bolts and flat washers stowed in the forward body section hoist.

(2) Remove the flathead screws in the forward body section, and stow in the holes in the forward body section hoist.

(3) Secure the forward body section hoist to the forward body section with the hexagon-head bolts (3) and flat washers (2).

c. Disconnect P1 from J1 according to the procedures in appendix D.

d. Install the protective cover assembly (4, fig. 7-13 or 17, fig. 3-31) on the transponder control group connector.

**Note.** Perform e below for missiles 10206 through 11935.

e. Remove the truss-head screw (9, fig. 7-13) and flat washer (10) that secure the transponder control group wiring harness clamp (11) to the bracket (12).

**Note.** Perform f below for missiles 13001 and subsequent.

f. Remove the flathead screw (1, fig. 7-9) that secures the support bracket to the missile skin.

g. Attach the falling hook from a hoisting device capable of lifting at least 300 pounds to the forward body section hoist; take up the slack in the hoisting device cable.

h. Remove the flathead screws (10, fig. 7-8), and remove the six boltwell covers (11) from the boltwells (5).

## 11-15. Removal of the Forward Body Section

a. Remove the hexagon-head bolts (3, fig. 7-8) flat washers (4) that secure the forward body section (6) to the warhead body section (7).

**CAUTION:** When separating the forward body section from the warhead body section, be sure that the transponder control group wiring harness (8) does not become entangled in the forward body section.

b. Separate the forward body section from the warhead body section.

c. Remove the transponder control group wiring harness from the forward body section.

d. Remove the truss-head screw (9, fig. 7-13 or 4, fig. 7-9), flat washer (10, fig. 7-13 or 3, fig. 7-9), support bracket (12, fig. 7-13 or 2, fig. 7-9), and clamp (11, fig. 7-13 or 5, fig. 7-9).

e. Place the forward body section on the forward body section truck.

f. Secure the rear of the forward body section to the truck with the hand clamp.

g. Secure the front of the forward body section to the truck with the holddown strap.

h. Remove the falling hook.

*Note.* Perform step *i* below for missiles 13001 and subsequent.

i. Remove the rear housing cover (par. 4-15 *b*) and remove the missile-code delay line (5, fig. 12-3). Replace the cover (par. 4-11 *ae*).

j. Remove the receiving antenna horns (25, fig. 12-2) from forward fin assemblies 2 and 4. Install the dust covers.

*Note.* Perform step *k* below for missile 10206 thru 11935.

k. Remove the missile-code delay line (par. 12-29 *a* (2) through (4) and 12-29 *b* (3), and replace the J1 + XMTR access door.

*Note.* Perform *l* and *m* below for missiles 13001 and subsequent.

l. Loosen the two storage loop clamps on the lower edge of the forward body section, and remove the cable section of the hose and cable assembly.

m. Route the cable section along the top of the forward body section, and secure with three flathead screws, flat washers, loop clamps, and hexagon nuts.

n. Place the transponder control group wiring harness in the warhead body section.

## Section VII. REMOVAL OF THE FORWARD MAIN FINS AND PREPARATION FOR REMOVAL OF THE WARHEAD BODY SECTION

**Warning:** Before continuing with deactivation procedures, check that the preliminary procedures in paragraphs 11-4 through 11-7 have been performed.

11-16. Removal of the Forward Main Fins

a. Remove a forward main fin as prescribed below.

(1) Remove the hexagon nut (8, fig. 7-7) and flat washer (7) from the hexagon-head bolts (6).

(2) Slide the forward main fin toward the front of the missile until the aligning pin (4) is clear of the rear main fin (5).

(3) Remove the forward main fin from the warhead body section (1).

(4) Remove the hexagon-head bolt from the

forward main fin.

b. Repeat *a* above to remove the three remaining forward main fins.

## 11-17. Removal of the Fail-Safe Wiring Harness

a. Remove the fail-safe wiring harness as prescribed below:

(1) Remove the roundhead screws (5 and 15, fig. 7-5), flat washers (11), and hexagon nuts (10); remove the clamps (6, and 13) that secure the fail-safe wiring harness (14) to the lower surface of the warhead body section.

(2) Remove the roundhead screws (11 and 20, fig. 7-6), flat washers (14 and 17), and hexagon nuts (15 and 16); remove the



clamps (12 and 18) that secure the fail-safe wiring harness (6) to the upper surface of the warhead body section.

(3) Disconnect fail-safe wiring harness connector P511 (7) from connector J1 (8) or J2 (9) on the sequential timer (10).

(4) Disconnect fail-safe wiring harness connector P540 (1, fig. 7-5) from the connector on the safety-and-arming device mounting plate (2).

(5) Remove the safety wire (1, fig. 7-6) from the latch (2), and disconnect fail-safe wiring harness connector P502 (3) from connector J1 (5) on the fail-safe control (6, fig. 7-4).

(6) Disconnect connector P503 (16, fig. 7-5) of the transponder control group wiring harness from connector J503 (7) on the bottom of the warhead body section.

(7) Remove the roundhead screws (3), flat washers (8), and hexagon nuts (9); remove connector J503 from the bracket (4) at the bottom of the warhead body section.

(8) Remove the fail-safe wiring harness from the warhead body section.

*Note.* Perform step (9) below for missiles 10206 through 11935.

(9) Secure the fail-safe wiring harness (11, fig. 3-26) in the storage strap (12) on the GUIDANCE TEST AND ADJUST ACCESS DOOR assembly (1).

*Note.* Perform step (10) below for missiles 13001 and subsequent.

(10) Secure the fail-safe wiring harness (8, fig. 3-27) in the storage clamps (4) in the forward body section.

b. Release the captive screws (7, fig. 7-4) that secure the fail-safe control to the top of the warhead body section; remove the fail safe control.

*Note.* Perform c below for missiles 10206 through 11935 or d below for missiles 13001 and subsequent.

c. Position the fail-safe control (6) on the fail-safe control bracket (1) in the forward body section, and secure with the captive screws.

d. Position the fail-safe control (8, fig. 7-3) on the fail-safe and timer bracket (2), and secure with the captive screws (1).

e. Remove the flathead screws (4, fig. 7-4) that secure the sequential timer (5) to the warhead body section (3); remove the sequential timer.

*Note.* Perform f below for missiles 10206 through 11935 or g and h below for missiles 13001 and subsequent.

f. Store the sequential timer in the missile shipping container accessory carton.

g. Position the sequential timer (7, fig. 7-3) on the fail-safe and timer bracket (2); secure with the flat washers (4) and hexagon-head bolts (3).

h. Position the fail-safe and timer bracket on top of the forward body section (9); secure to the forward body section with four flat washers (6) and roundhead screws (5).

## 11-18. Removal of the Transponder Control Group Wiring Harness

a. Remove the roundhead screws (18 and 26, fig. 7-2), flat washers (16 and 21), and hexagon nuts (15 and 20); remove the clamps (14 and 27) that secure the transponder control group wiring harness (6) to the warhead body section (1).

b. Replace the clamp (14) on the bracket (17), and secure with the roundhead screw (18), flat washer (16), and hexagon nut (15).

c. Remove the flathead screws (19), flat washers (12), and hexagon nuts (11) that secure the bracket (13) to the cover (2).

d. Remove the flathead screws (3) that secure the cover to the warhead body section.

e. Push the bracket and the connectors through the opening in the warhead body section, and remove the wiring harness. Remove the twine securing the wiring harness to the warhead body section.

*Note.* Perform step f for missiles 10206 through 11935.

f. Remove the clamp (7, fig. 7-2), and the attaching hardware.

g. Place the clamps (27) and (7 and 27, fig. 7-2) in a bag, and tie the bag to the transponder control group cable.

h. Insert the wiring harness (13, fig. 3-29) through an opening in the handling ring segment, and tape to the top of the fin.



## 11-19. Removal of the Warhead Wiring Harness

a. Remove the flathead screws (14, fig. 7-1), flat washers (12 and 13), and hexagon nuts (14) that secure the bracket (10) to the cover (15) and to the warhead body section (1).

b. Remove the flathead screws (16) that secure the cover to the warhead body section.

c. Push the bracket and connectors through the opening in the warhead body section, and

remove the warhead wiring harness (4). Remove the twine securing the wiring harness to the warhead body section.

*Note:* Perform steps c.1 and c.2 for missiles 10206 through 11935.

c.1. Remove the clamp (6, fig. 7-1) and the attaching hardware.

c.2. Place the clamp (6) in a bag and tie the bag to the warhead wiring harness.

d. Insert the wiring harness through an opening in the handling ring segment (4, fig. 3-29), and tape to the top of the fin.

## Section VIII. REMOVAL OF THE WARHEAD BODY SECTION

**Warning:** Before continuing with deactivation procedures, check that the preliminary procedures in paragraphs 11-4 through 11-7 have been performed.

**Warning:** The warhead body section contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**Warning:** Handling operations of the warhead body section will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**Warning:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

## 11-20. Removal of the Boltwell Covers

*Note.* Perform a and b below for warhead body sections equipped with a three-section boltwell cover, or c below for warhead body sections equipped with a one-piece boltwell cover.

a. Remove the four flathead screws (5, fig. 6-4) that secure the assembled boltwell covers (4) to the warhead body section (7). Remove the boltwell covers.

b. Remove two flathead screws (9, fig. 6-4) and boltwell cover nuts (10) that secure the three boltwell covers together (8 and 12).

c. Remove the flathead screw (9) and the boltwell cover nut (10) that secure the boltwell cover (12); remove the boltwell cover.

## 11-21. Removal of the Warhead Body Section

a. Remove the two plugs (3, fig. 6-1) from the warhead body section hoist beam attach holes.

**Warning:** Check that the threads of the captive bolts (2) in the warhead body section hoist beam (1) and the attach holes in the warhead body section (10) are in good condition.

b. Install the captive bolts in the hoist beam attach holes, and attach the warhead body section hoist beam to the warhead body section.

**Warning:** The two captive bolts on the warhead body section hoist beam must be completely engaged before installing the two safety straps (7, fig. 6-2) to insure proper installation of the safety straps.

**Caution:** Position the safety strap buckles (8) near the hoist beam so that the buckles do not touch the warhead body section (6).

c. Position the two safety straps of the warhead body section hoist beam around the warhead body section (6), and insert the end of each strap through its respective buckle (8); pull the two safety straps tight.

d. Attach the falling hook (4) of a hoisting device capable of lifting 5,000 pounds to the rear lift point (3) of the hoist beam (5), and take up the hoist chain slack.

e. Remove the hexagon-head bolts (15, fig. 6-4) and flat washers (14) that secure the warhead body section to the rear body section, and move the warhead body section clear of the rear body section.

## 11-22. Preparation for Shipment or Storage

a. Remove the warhead body section container cover (par. 3-6).

b. Remove the hexagon-head screws (8, fig. 6-1) and the lockwashers (7) that secure the moveable tracks (6) to the stationary tracks.

c. Slide the moveable tracks forward as far as possible.

d. Loosen the captive bolts (5) that secure the moveable track clamps (4) to the moveable track cradle (9) at the forward end of the moveable tracks (6).

e. Loosen the captive bolts (16) that secure the thrust mount bracket (17) to the rear end of the moveable tracks.

f. Remove the hexagon-head screws (1, fig. 6-2), flat washers (2), and hexagon nuts (9) from the thrust mount bracket (10).

g. Coil the boltwell covers, and place them with the attaching hardware into the accessory carton (3, fig. 6-3). Loosen the wing nuts (1); slide back the holddown bar (2); and place the accessory carton in the warhead body section container (4).

h. Slide the holddown bar (2) to the locked position, and tighten the wing nut (1) to secure accessory carton (3).

i. Position the thrust mount bracket to the warhead body section, and secure with the hexagon-head screws (1, fig. 6-2), flat washers (2), and hexagon nuts (9).

j. Initially, in sequential order to diametrically opposite screws, apply 90 pound-inches torque.

k. Finally, in the same order as above, apply 100-pound-inches torque.

**CAUTION:** Guide the warhead body section to prevent contact with obstructions on the moveable tracks.

l. Slowly lower the warhead body section into the moveable tracks.

m. Secure the thrust mount bracket to the moveable tracks with the captive bolts.

n. Remove the falling hook from the warhead body section hoist beam.

o. Remove the warhead body section hoist beam.

p. Install the two plugs (3, fig. 6-1) in the hoist beam attach holes.

q. Install the moveable track clamp (4) to the moveable track cradle (9), and secure with the captive bolts (5).

r. Slide the moveable tracks and attached warhead body section into the warhead section container. Secure to the stationary tracks with the hexagon-head screws or bolts (8) and lockwashers (7). Secure the screws to the moveable tracks with safety wire (11).

s. Install the container cover (fig. 3-5), and secure with the quick-release clamps. Return the extension handle to the log tube, and secure the log tube cover plate with the wing nuts. Seal the container and log tube cover with lead seals.

t. Process the container for shipment or storage.

## Section IX. REMOVAL OF THE MISSILE ROCKET MOTOR SUBASSEMBLY

**WARNING:** Before continuing with deactivation procedures, check that the preliminary

procedures in paragraphs 11-4 through 11-7 have been performed.

**WARNING:** The missile rocket motor subassembly contains explosives. Operations involving handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile rocket motor subassembly will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**CAUTION:** The propellant grain and the metal parts of the missile rocket motor subassembly can be damaged unduly by rough handling or dropping. A rocket motor which has been subjected to such damage or to extreme temperature could cause a malfunction when the missile is fired. Rocket motors so exposed will not be used until a complete inspection of the grain for serviceability has been made.

#### 11-23. Preparation for Removal of the Missile Rocket Motor Subassembly

a. Remove the two motor section access doors (par. 3-8).

b. Loosen the screw (3, fig. 5-14) that secures the container cover to the missile rocket

motor initiator containers, and remove the cover (1).

c. Remove the top styrofoam packing (4) from the container.

d. Obtain the two initiators and place into the lower styrofoam packing in the container.

e. Install the top styrofoam packing.

f. Place the container cover on the container, and secure with the captive screw.

g. Store the container in the storage area.

h. Install a ground strap from the forward end of the rocket motor to the ground stake.

i. Disconnect missile rocket motor initiator wiring harness connector P177A (fig. 5-18) from safety-and-arming switch S31 connector J177, and connector P170 from connector J170.

j. Remove the hexagon nut (8, fig. 5-2), truss-head screw (10), and clamp (5) from the bracket (4), and remove the initiator wiring harness (2) from the rear body section.

k. Disconnect connector P171 (3, fig. 5-12) from connector J171 (2).

l. Remove the hexagon-head bolts (5) and nonmetallic washers (6) that secure the motor head heater (4) to the forward end of the missile rocket motor subassembly (1); remove the motor head heater. Remove the insulator (7).

**CAUTION:** A thermostat wiring harness is attached to each of the two motor heater thermostat access cover plates. Carefully remove these cover plates to prevent damage to the thermostat wiring harness and terminals.

m. Remove the two motor heater thermostat access cover plates (3, fig. 5-1) as prescribed below.

(1) Remove the flathead screws (2) from the cover plate.

(2) Carefully remove the cover plate and allow it to hang from the wiring harness (4).

(3) Repeat steps (1) and (2) above, and remove the cover plate from the opposite side of the rear body section.

n. Reach through the motor section access opening, and loosen the nut (5, fig. 5-11) on the captive bolt (6) on the V-band coupling.

*Note.* Do not remove the V-band coupling from the missile rocket motor subassembly.

**WARNING:** The missile rocket motor subassembly contains explosives. Operations involving handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**WARNING:** Handling operations of the missile rocket motor subassembly will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials will be kept to a minimum. Spilled explosive materials will be immediately removed and the area thoroughly decontaminated before work continues.

**WARNING:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

**CAUTION:** The propellant grain and the metal parts of the missile rocket motor subassembly can be damaged unduly by rough handling or dropping. A rocket motor which has been subjected to such damage or to extreme temperature could cause a malfunction when the missile is fired. Rocket motors so exposed will not be used until a complete inspection of the grain for serviceability has been made.

#### 11-23. Preparation for Removal of the Missile Rocket Motor Subassembly

a. Remove the two motor section access doors (par. 3-8).

b. Loosen the screw (3, fig. 5-14) that secures the container cover to the missile rocket

motor initiator containers, and remove the cover (1).

c. Remove the top styrofoam packing (4) from the container.

d. Obtain the two initiators and place into the lower styrofoam packing in the container.

e. Install the top styrofoam packing.

f. Place the container cover on the container, and secure with the captive screw.

g. Store the container in the storage area.

h. Install a ground strap from the forward end of the rocket motor to the ground stake.

i. Disconnect missile rocket motor initiator wiring harness connector P177A (fig. 5-13) from safety-and-arming switch S31 connector J177, and connector P170 from connector J170.

j. Remove the hexagon nut (8, fig. 5-2), truss-head screw (10), and clamp (5) from the bracket (4), and remove the initiator wiring harness (2) from the rear body section.

k. Disconnect connector P171 (3, fig. 5-12) from connector J171 (2).

l. Remove the hexagon-head bolts (5) and nonmetallic washers (6) that secure the motor head heater (4) to the forward end of the missile rocket motor subassembly (1); remove the motor head heater. Remove the insulator (7).

**CAUTION:** A thermostat wiring harness is attached to each of the two motor heater thermostat access cover plates. Carefully remove these cover plates to prevent damage to the thermostat wiring harness and terminals.

m. Remove the two motor heater thermostat access cover plates (3, fig. 5-1) as prescribed below.

(1) Remove the flathead screws (2) from the cover plate.

(2) Carefully remove the cover plate and allow it to hang from the wiring harness (4).

(3) Repeat steps (1) and (2) above, and remove the cover plate from the opposite side of the rear body section.

n. Reach through the motor section access opening, and loosen the nut (5, fig. 5-11) on the captive bolt (6) on the V-band coupling.

*Note.* Do not remove the V-band coupling from the missile rocket motor subassembly.



# **11-24. Removal of the Missile Rocket Motor Subassembly**

**CAUTION:** Use the lifting cleats (4, fig. 5-6) located at the four corners of the box cover (1) only for lifting the container cover from the container base (29). Lift the complete container with an approved lifting device.

a. Remove the container cover from the missile rocket motor subassembly container (para. 5-7a through e).

b. Remove the hexagon nuts (8) and the lockwashers (9) that secure each of the two support clamps (7) to the shipping supports (13).

c. Remove the two shipping rings (11) and hexagon-head bolts (15) from the box.

**WARNING:** Check that the threads of the captive bolts (fig. 5-10) in the missile rocket motor hoist beam and the bolt holes in the missile rocket motor subassembly are in good condition.

**CAUTION:** Handle the beam with the falling hook engaged at the HOIST POINT BEAM ONLY lifting point (4, fig. 5-9) when performing d below.

d. Attach the falling hook (3) of a hoisting device capable of lifting 5,000 pounds to the HOIST POINT BEAM ONLY lifting point on the missile rocket motor hoist beam (5).

*Note.* Guide pins on the "C" beam may be removed.

e. Position the missile rocket motor hoist beam (fig. 5-10) near the missile rocket motor subassembly; align the captive bolts



# **11-24. Removal of the Missile Rocket Motor Subassembly**

**CAUTION:** Use the lifting cleats (4, fig. 5-6) located at the four corners of the box cover (1) only for lifting the container cover from the container base (29). Lift the complete container with an approved lifting device.

a. Remove the container cover from the missile rocket motor subassembly container (para. 5-7a through e).

b. Remove the hexagon nuts (8) and the lockwashers (9) that secure each of the two support clamps (7) to the shipping supports (13).

c. Remove the two shipping rings (11) and hexagon-head bolts (15) from the box.

**WARNING:** Check that the threads of the captive bolts (fig. 5-10) in the missile rocket motor hoist beam and the bolt holes in the missile rocket motor subassembly are in good condition.

**CAUTION:** Handle the beam with the falling hook engaged at the HOIST POINT BEAM ONLY lifting point (4, fig. 5-9) when performing d below.

d. Attach the falling hook (3) of a hoisting device capable of lifting 5,000 pounds to the HOIST POINT BEAM ONLY lifting point on the missile rocket motor hoist beam (5).

*Note.* Guide pins on the "C" beam may be removed.

e. Position the missile rocket motor hoist beam (fig. 5-10) near the missile rocket motor subassembly; align the captive bolts

in the hoist beam with the bolt holes in the missile rocket motor subassembly; tighten the captive bolts.

f. Transfer the falling hook of the hoisting device to the HOIST POINT CAPACITY 3,000 lbs. lifting point (2, fig. 5-9) on the missile rocket motor hoist beam.

g. Take the slack out of the hoisting cable, and apply a slight tension.

h. Reach through the motor section access openings, and remove the hexagon-head bolts (2, fig. 5-11), nonmetallic washers (15), and flat washers (1) that secure the missile rocket motor subassembly (13) to the motor mounting ring (3) in the rear of the missile body section.

i. Slowly move the missile body truck (fig. 5-10) away until the motor subassembly is clear of the rear body section.

#### 11-25. Crating the Missile Rocket Motor Subassembly

a. Position the missile rocket motor subassembly (8, fig. 5-9) over the shipping supports (13, fig. 5-6) of the container.

b. Install the rear shipping ring (9, fig. 5-9) on the rear end of the rocket motor subassembly and secure with the hexagon-head bolts (1).

c. Secure the split ring (if present) to the front end of the missile rocket subassembly.

Note: Omit c and c.1 below if a 1-piece shipping ring is used.

c. Secure the 2-piece shipping rings to the front end of the missile rocket subassembly.

c.1. Lower the motor subassembly, guiding the shipping rings into the shipping supports.

**Caution:** Insure that the half-rings (14, fig. 5-3) are loose.

d. Lower the motor subassembly, guiding the rear shipping ring into the rear shipping support. Using an adequate lifting device, support the forward end of the missile rocket motor.

e. Transfer the falling hook (3, fig. 5-9) to the HOIST POINT BEAM ONLY lifting point (4) on the missile rocket motor hoist beam (5).

f. Loosen the captive bolts (7) on the hoist beam, and remove the hoist beam from the motor subassembly.

Note: If 2-piece shipping rings are installed, omit g and h.

g. Install the forward shipping ring (4, fig. 5-8) on the forward end of the missile rocket motor subassembly (6), and secure with the hexagon-head bolts (8).

h. Lower the missile rocket motor subassembly (13) until the forward shipping ring (4) seats in the forward shipping support (12).

i. Tighten the bolts (15, fig. 5-6) that secure the two half rings (14) to the shipping supports (13).

j. Install the two support clamps (7) on the shipping supports (13), and secure with the lockwashers (9) and hexagon nuts (8).

k. Install the missile rocket motor initiator container (17) on the box base (12), and secure with the truss-head screws (6).

k.1. Remove the gasket from the rocket motor adapter.

l. Install the shipping cover (20) in the V-band coupling (19) on the motor adapter (18), and secure with the nut (21) on the captive bolt (22) on the V-band coupling.

l.1. Place the gasket in an envelope and fasten it to the container base under the rear of the rocket motor.

m. Remove the ground strap.

n. Install the box cover (1) on the box base (29), and secure with the attaching hardware.

o. Remove the container to the proper area for storage.

#### 11-26. Final Preparation of the Rear Body Section for Storage or Shipment

a. Reach through either motor section access opening, and install the V-band coupling (9, fig. 5-3) on the forward end of the blast tube (8).

b. Work the blast tube shipping support (1) through either motor section access opening by inserting one leg of the support through the opening then turning the support until another leg is through the opening. Turn the support until all legs are inside the motor section, with the legs forward.

c. Position the blast tube shipping support so that it is seated in the forward end of the blast tube and the legs are aligned with the holes on the missile rocket motor mounting ring (10); secure with the hexagon-head bolts (18), flat washers (12), and hexagon nuts (11).

d. Secure the V-band coupling over the blast tube shipping support and the forward end of the blast tube by tightening the nut (7) on the

captive bolt (6) on the V-band coupling (9).

e. Connect rocket motor initiator wiring harness connectors P170 (6, fig. 5-2) and P177A (7) to connector J170 (9) and J177 (8).

f. Secure the rocket motor initiator wiring harness (2) to the shipping straps (1) in the upper portion of the forward motor section, and secure the clamp to forward motor section with the attaching hardware.

g. Install the two motor heater thermostat access cover plates (para 5-10a).

h. Install the motor section access doors with the flathead screws. Tighten the screws to the torque value given in table 15-9.

## Section X. DEFUELING, DEPRESSURIZING, AND PURGING THE ACCESSORY POWER SUPPLY (APS)

### 11-27. General

Defueling and depressurizing of the APS is required when the missile is being deactivated under normal conditions. When the missile is to be deactivated and stored, the APS is defueled, depressurized, and the APS fuel system purged with nitrogen.

### 11-28. Servicing and Test Equipment

The servicing and test equipment necessary to defuel, depressurize, and purge the APS are listed below.

a. An ET<sub>2</sub>O fuel tank and fuel tank cart, complete with drain valve, drain hose, fuel transfer hose with a static ground lead attached, and a fuel fill hose with a static lead attached.

b. A nitrogen tank and nitrogen tank cart, with a regulator valve and a nitrogen supply hose.

c. One 2½-gallon (minimum) container, at least half-filled with water to catch drained ET<sub>2</sub>O.

d. An adequate supply of water must be available immediately for personnel decontami-

nation or diluting spilled ET<sub>2</sub>O.

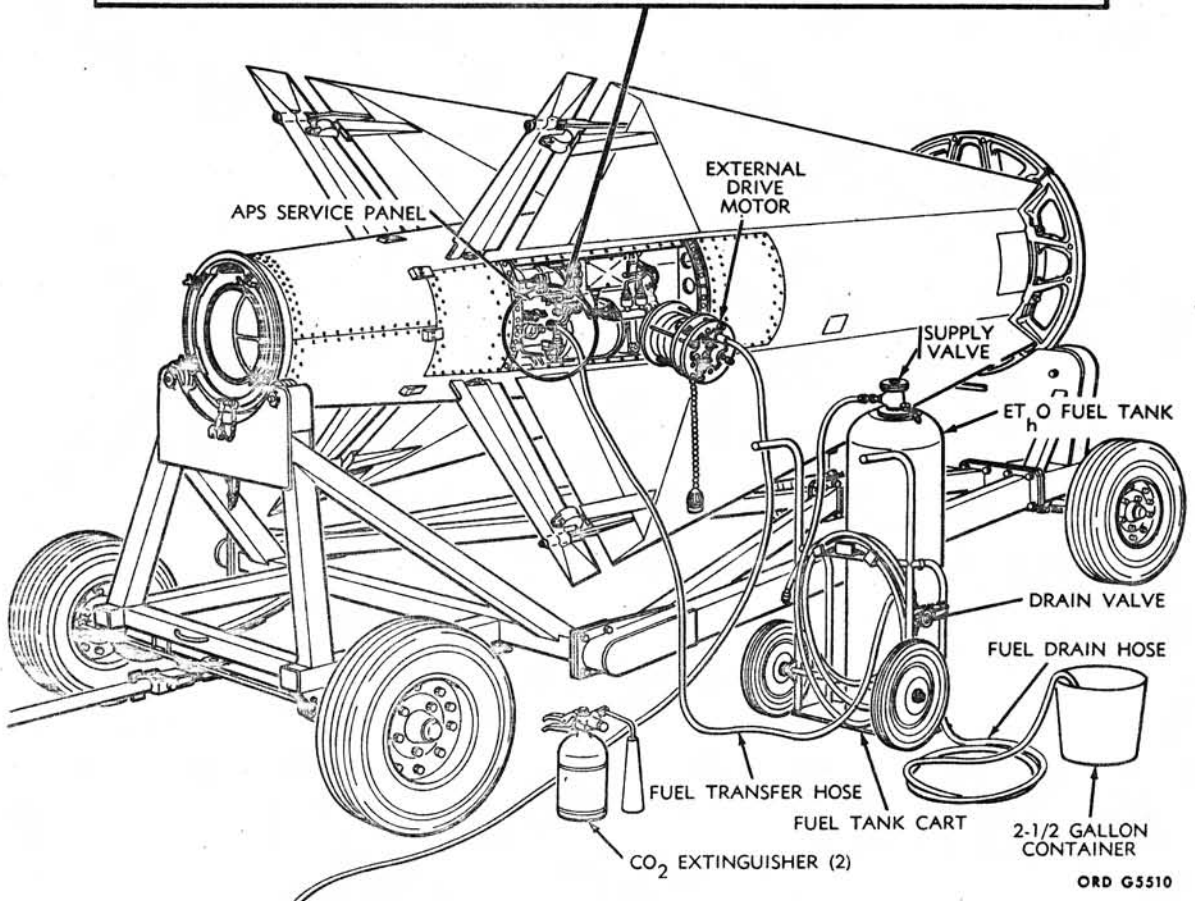
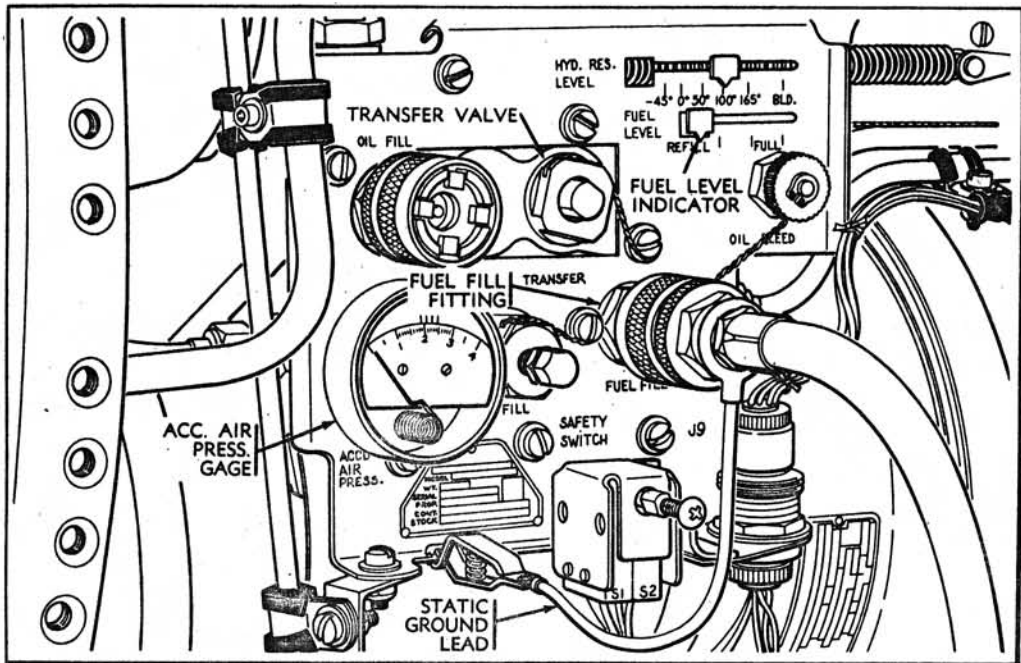
e. The missile electrical test set group.

### 11-29. APS Defueling

**Warning:** ET<sub>2</sub>O liquid and vapor cause severe burns if allowed to become confined between the skin and clothing. Care should be exercised to keep ET<sub>2</sub>O from dropping on or into shoes or clothing. Should ET<sub>2</sub>O become confined between the skin and clothing, remove the clothing, and immediately wash the skin with soap and water, and allow clothing to air-dry for several hours. Dispose of contaminated shoes. Should ET<sub>2</sub>O get into the eyes, flush the eyes with water, and report to the proper authorities.

**Warning:** The maximum allowable concentration of ET<sub>2</sub>O vapors is 50 parts of ET<sub>2</sub>O per million parts of air for an 8-hour exposure. Where high-vapor concentrations exist, and when working in confined, unventilated areas, an approved type self-contained breathing apparatus must be worn.

**Warning:** Clear the area of all nonparticipating personnel and flammable materials. Position two manned CO<sub>2</sub> fire extinguishers within



ORD G5510

Figure 11-2. APS Defueling.

f. Slowly turn the drain valve on the fuel tank cart counterclockwise, allowing the ET.O to drain from the APS into the 2-1/2-gallon (minimum) container.

g. Install the external drive motor on the APS (table 4-2).

h. Connect the ground power cable assembly (fig. 4-13) to connectors P104A and P105A on the missile umbilical cable, and to connector J7 on the rear of the missile electrical test set group.

i. Perform the arm safety check (par. 4-6).

*Note.* The illustrated tables of controls and indicators for the missile electrical test set group are contained in TM 9-4935-253-12.

j. Set the AC POWER switch to ON. The POWER ON indicator light illuminates.

k. Set the HEATERS EXTERNAL switch to ON. The HEATERS EXTERNAL indicator light illuminates.

l. After approximately 30 seconds, operate the AUXILIARY POWER SUPPLY switch to START, and hold for a minimum of 1 second and a maximum of 2 seconds.

m. Set the HEATERS EXTERNAL switch to OFF. The HEATERS EXTERNAL indicator light extinguishes.

n. Set the AC POWER switch to OFF. The POWER ON indicator light extinguishes.

o. Set the external drive motor switch (fig. 4-9) to ON. Allow the external drive motor to accelerate to operating speed as indicated by the change in the pitch of the external drive motor sound. The ACC. AIR PRESS. gage (fig. 11-2) indicates 2,500 to 3,000 psi.

p. Set the external drive motor switch to OFF.

q. Repeat o and p above until the ET.O stops flowing.

r. Remove the external drive motor.

s. Depress the TRANSFER valve (fig. 11-2) on the APS service panel, and hold for a minimum of 25 seconds. The ACC. AIR PRESS. gage indicates the ambient temperature; release the TRANSFER valve.

t. Turn the drain valve on the fuel tank cart fully clockwise.

u. Disconnect the fuel transfer hose from the FUEL FILL fitting on the APS service panel. Disconnect the static ground lead from

the APS service panel, and place the fuel transfer hose on the fuel tank cart. Disconnect the ground power cable assembly from connectors P104A and P105A.

### 11-30. APS and HPU Depressurizing

a. Make certain that the air line bleed valve on the air supply hose is open.

*Warning:* Weight the air supply hose with sand bags, and secure it to the missile body truck. Assure that the air fill valve on the end of the air supply hose is fully closed.

b. Remove the AIR FILL fitting cap (fig. 4-7 or fig. 4-18) from the AIR FILL fitting on the APS service panel. Connect the air supply hose from the air supply to the AIR FILL fitting.

c. Open the air fill valve on the end of the air supply hose.

d. Slowly turn the AIR FILL fitting locknut counterclockwise. The ACC. AIR PRESS. gage indication decreases to 0.

e. Turn the AIR FILL fitting locknut fully clockwise.

f. Disconnect the air supply hose, and install the AIR FILL fitting cap on the AIR FILL fitting.

### 11-31. APS Purging

*Warning:* Make certain that the procedures in paragraphs 11-29 and 11-30 have been performed before performing a through i below.

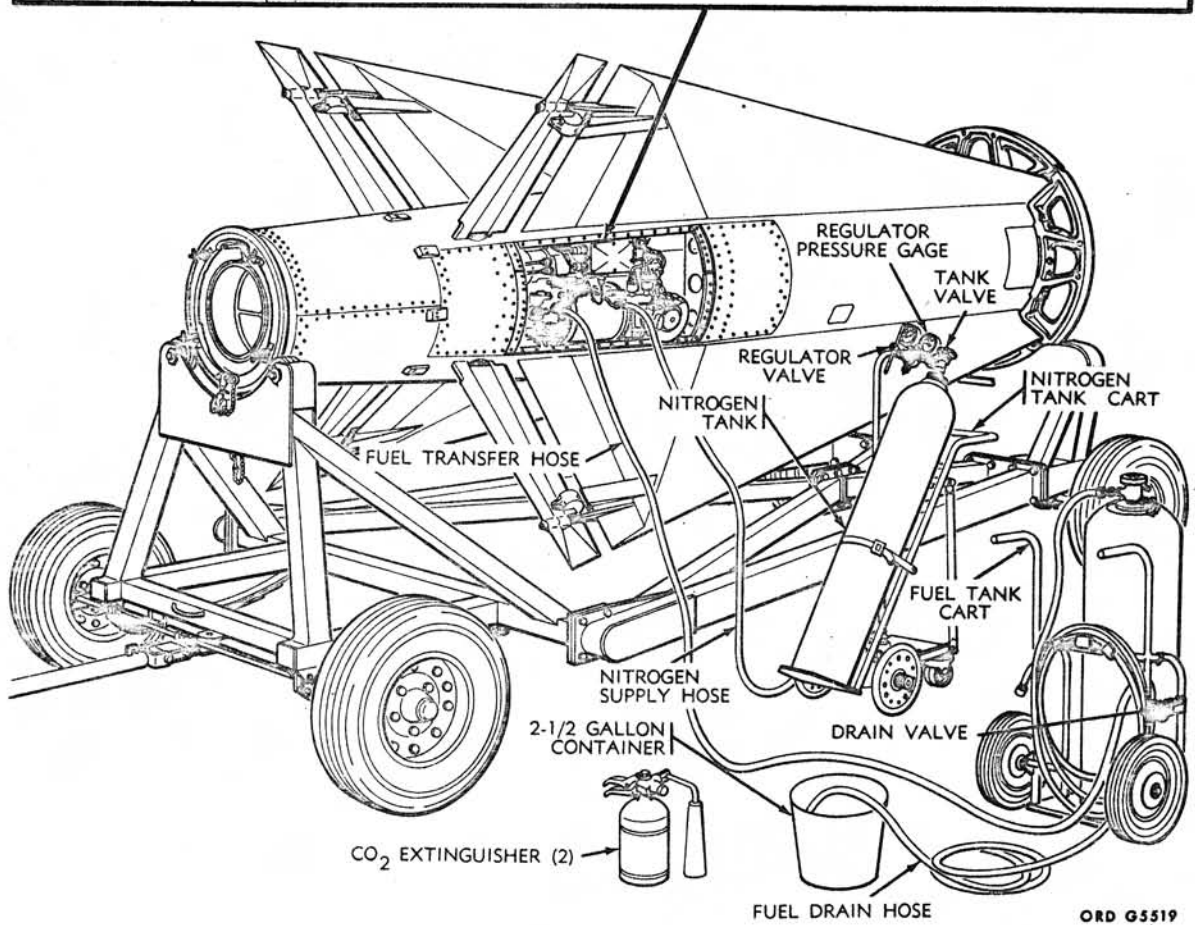
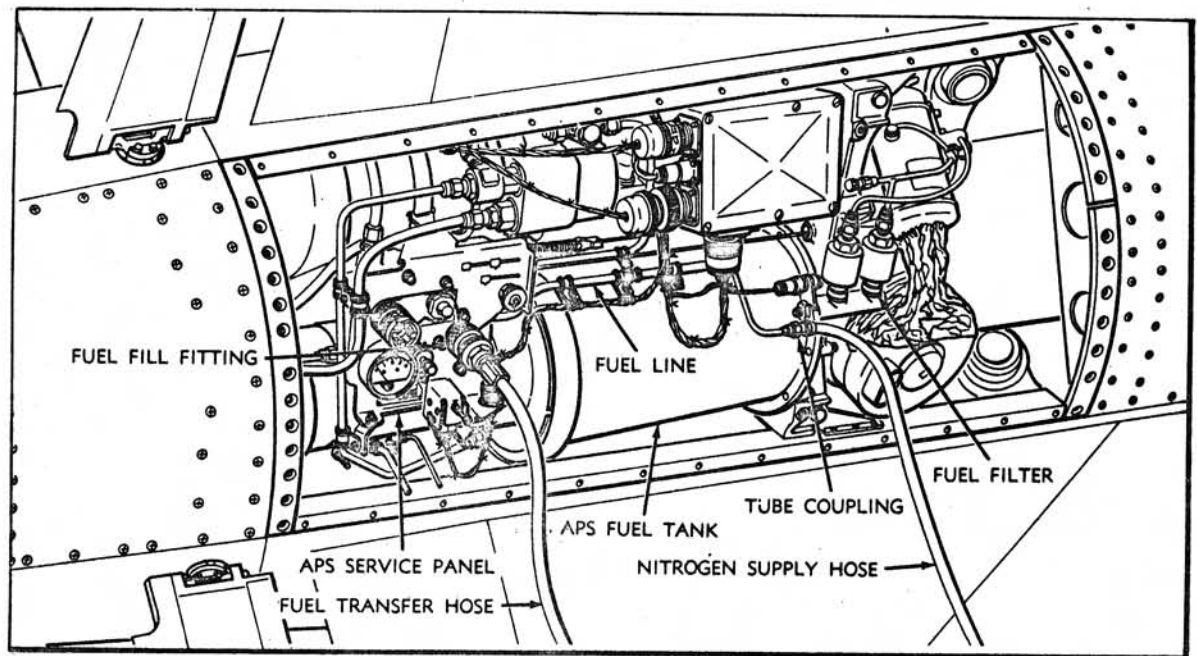
*Note.* When the missile is to be deactivated and stored, the APS fuel system will be purged, using nitrogen only.

a. Connect the fuel transfer hose (fig. 11-3) from the fuel cart to the FUEL FILL fitting on the APS service panel. Place the end of the fuel drain hose in the 2-1/2-gallon (minimum) container at least half filled with water.

b. Open the drain valve on the fuel tank cart.

*Warning:* Do not perform c below until the ET.O ceases to flow from the fuel drain hose.





ORD G5519

Figure 11-3. APS purging.

c. Disconnect the fuel line from the fuel filter on the APS fuel tank, and connect to nitrogen supply hose on the nitrogen tank. Tighten the tube coupling on the end of the fuel line.

**WARNING:** Before performing *d* through *g* below, make certain the end of the fuel drain hose is immersed in the water and the hose is securely attached to the 2-1/2-gallon (minimum) container. During the performance of *d* through *g* below, keep the end of the fuel drain hose immersed until the  $\text{ET}_2\text{O}$  bubbles have stopped. Remove the end of the fuel drain hose from the water, but be prepared to immerse the end of the hose immediately in the water if  $\text{ET}_2\text{O}$  appears.

*d.* Turn the tank valve on the nitrogen tank fully counterclockwise.

*e.* Turn the regulator valve on the nitrogen tank clockwise until the regulator pressure gage indicates 15 psi.

*f.* After a minimum of 5 minutes, turn the regulator valve on the nitrogen tank fully counterclockwise. The regulator pressure gage indication decreases to 0.

*g.* Turn the tank valve on the nitrogen tank fully clockwise.

*h.* Disconnect the nitrogen supply hose from the fuel line on the APS fuel tank, and place the hose on the nitrogen tank cart. Connect the fuel line to the fuel filter on the APS fuel tank, and torque the tube coupling on the end of the fuel line to 50 pound-inches.

*i.* Disconnect the fuel transfer hose from the FUEL FILL fitting on the APS service panel.

## Section XI. REMOVING AND PACKAGING THE MAIN FINS AND THE ELEVONS

### 11-32. Removal of the Elevons

*a.* Remove the double-hexagon nut (8, fig. 3-25) and flat washer (7) from the elevon hinge clevis (4).

*b.* Remove the spring pin (11).

*c.* Remove the elevon attach pin (13).

*d.* Rotate the elevon until free of the universal joint (12).

*e.* Pull the elevon (9) from the elevon hinge clevis.

*f.* Repeat (*d*) through (*e*) above to remove the remaining three elevons.

*d.* Carefully remove the rear main fin from the rear body section (13).

*e.* Remove the retainer screw (4) and stud retainer (5).

*f.* Remove the rear main fin attach stud (6).

*g.* Repeat *b* through *f* above to remove the remaining rear main fins.

*h.* Install the two equipment section access cover plates (2 and 8 fig. 3-21) and secure each cover plate with the flathead screws. Tighten the screws to the torque value given in table 15-9.

### 11-33. Removal of the Rear Main Fin

*a.* Remove the flathead screws (3, 7, 9, and 10 fig. 3-21); remove the equipment section access cover plates (2 and 8).

*b.* Remove the double-hexagon nut (9, fig. 3-24) and flat washer (8) from the rear main fin attach stud (6) at the forward end of the rear main fin (12).

*c.* Remove the fin retaining hanger-point set-screws (1) from the spar socket (2).

**CAUTION:** While performing *d* below, use extreme care to guide the indexing pins (14) and the rear main fin spar (10) out of their respective mounting holes.

### 11-34. Packaging the Main Fins and Elevons

*a.* Position the four rear main fins (fig. 3-19) in the main fin and elevon shipping and storage box.

*b.* Position the forward main fin support in the box, and secure with the square-neck bolts, flat washers, lockwashers, and square nuts.

*c.* Position the rear main fin support block in the box, and secure with the square-neck, bolts, flat washers, lock-washers, and square nuts.

*d.* Position the four forward main fins (fig. 3-18) and the four elevons in the box.

e. Position the forward main fin support block, and secure with the flat washers, lockwashers, and square nuts.

f. Position the elevon support block in the box.

g. Inventory and repackage the hardware, and place the hardware in the shipping and storage box.

h. Close the box cover, and position the hasp on each of the three cover fasteners.

i. Position the straps, and secure to the cover with nails.

j. Turn the swivel on each of the three cover fasteners, and seal with lead seals.

k. Process the box for shipment or storage.

## Section XII. PREPARATION OF THE FORWARD AND REAR BODY SECTIONS FOR SHIPMENT OR STORAGE

### 11-35. Preparation of the Shipping Container

a. Remove the rear body section and forward body section container cover (par. 3-6).

b. Remove all the loose shipping hardware stowed in the container.

c. Remove the hexagon-head screws (20, fig. 3-7) and lockwashers (21) that secure the moveable tracks (22) to the stationary tracks (1).

d. Slide the moveable tracks forward as far as possible.

e. Loosen the four forward shipping clamp captive bolts (fig. 3-9), and remove the forward shipping clamp.

f. Loosen the captive bolts (fig. 3-10), and remove the rear shipping clamps.

g. Remove the hexagon-head screws (8, fig. 3-7, flat washers (7), and hexagon nuts (5) that secure the forward body section shipping support channel (11) to the support arms (6). Remove the shipping support channel.

h. Remove the hexagon-head screws (4), lockwashers (3), and flat washers (2) that secure the support arms to the moveable tracks; remove the support arms.

i. Inventory and repackage the hardware in the accessory carton. Secure the accessory carton in the forward and rear body section container.

### 11-36. Preparation of the Rear Body Section for Shipment

a. Position the tunnel section brackets (8, fig. 3-14) on the rear body section (11) in the 1 and 2 fin positions, and secure each bracket with the two roundhead screws (10) and flat washers (9).

b. Position the shipping tunnel sections (3 and 7) over the tunnel section brackets, and secure each with the flat washers (1) and roundhead screws (2), and the flat washers (4) and the hexagon-head bolts (5).

**CAUTION:** To prevent damage to the cable insulation, hold the branches of the wiring harnesses spread apart and not touching the bolt until the bolt has been tightened.

c. On missiles 11839 through 11935, spread the branches of each lower wiring harness, and install the hexagon-head bolt (5) and flat washers (4) into each lower main fin mounting bolt hole. Using the tape (6), tape the wiring harness to the hexagon-head bolt.

d. Position the shipping adapter (fig. 3-15) on the forward end of the rear body section, and secure with the hexagon-head bolts, lock washers, and flat washers.

e. Remove the plugs (1, and 5, fig. 3-11) on the top of the rear body section.

f. Position the safety strap buckles near the hoist beam so that the buckles do not touch the missile skin.

g. Position the rear body section hoist beam (4) on top of the rear body section; secure with the captive bolts (3) and the safety strap assemblies (2).

h. Position a hoisting device capable of lifting 4,000 pounds, and attach the hoist beam to the hoisting device.

i. Release the lock pin (fig. 9-1) from the rear roll ring and the self-locking pins from the handling ring segment.

j. Lift the rear body section (3, fig. 3-13) clear of the missile body truck.

k. Loosen the captive bolts that secure the side handling ring segments; remove the segments.

l. Loosen the captive bolts (fig. 3-12) that secure the rear roll ring to the rear body section; remove the rear roll ring and store on the missile body truck.

m. Position the rear body section over the moveable tracks (9, fig. 3-11). Do not release the tension from the hoisting device, but hold the rear body section slightly above the moveable tracks.

n. Manipulate the rear body section into the container until properly positioned over the moveable tracks.

o. Release the tension from the hoisting device.

p. Slide the two rear body support mounts (fig. 3-9) into place between the rear body section and moveable tracks; secure to the rear body section with the captive bolts and to the moveable tracks with the captive bolts.

q. Loosen the captive bolts (6, fig. 3-11) that secure the upper and lower handling-ring segments (7). Remove the segments.

r. Coat the plugs (8) with soft-film corrosion preventive compound and install them in the upper and lower segment mounting bolt holes.

s. Loosen the captive bolts (3), and release the safety strap assemblies (2) that secure the hoist beam to the rear body section; remove the hoist beam.

t. Coat the plugs (1 and 5) with soft-film corrosion preventive compound and install them in the hoist beam attach points.

u. Position the forward shipping clamp (fig.

3-9), and secure with the forward shipping clamp captive bolts.

v. Position the rear shipping clamp (fig. 3-10), and secure with the captive bolts.

w. Slide the moveable tracks (fig. 3-9) with the rear body section attached partway into the container.

### 11-37. Preparation of the Forward Body Section for Shipment

a. Install the shipping support channel (11, fig. 3-7) on the forward body section, and secure with the hexagon-head screws (15), flat washers (14), and hexagon nuts (13).

b. Position the two support arms (6) on the moveable tracks (22) with the hexagon-head screws (4), lockwashers (3), and flat washers (2).

c. Allow the ends of the transponder control group wiring harness (18) and the war-head wiring harness (17) to rest on the floor.

d. Attach the hoisting unit capable of lifting at least 300 pounds to the hoist (9).

e. Release the hand clamp (8, fig. 3-8) and the holddown strap (1) on the forward body section truck (10).

f. Lift the forward body section (12, fig. 3-7) from the forward body section truck, and carefully slide the forward body section into the rear body section (19).

g. Secure the shipping support arms (6) with the hexagon-head screws (8), flat washers (7), and hexagon nuts (5).

h. Remove the falling hook from the forward body section hoist.

i. Wrap the transponder control group wiring harness and the warhead wiring harness around the forward body section, and secure them with shipping cord.

j. Slide the moveable tracks fully into the containers, and secure with the lockwashers (21) and hexagon-head screws (20). Secure the screws to the moveable tracks with safety wire.

k. Install the two heater brackets (8, fig. 3-6) on the forward body section (1) with the hexagon-head bolts (3), flat washers (2), and hexagon nuts (10).

l. Secure the special shape insulation (4) inside the missile motor head heater (5).

m. Install the motor head heater on the

heater brackets with the hexagon-head bolts (6), flat washers (7), and hexagon nuts (9).

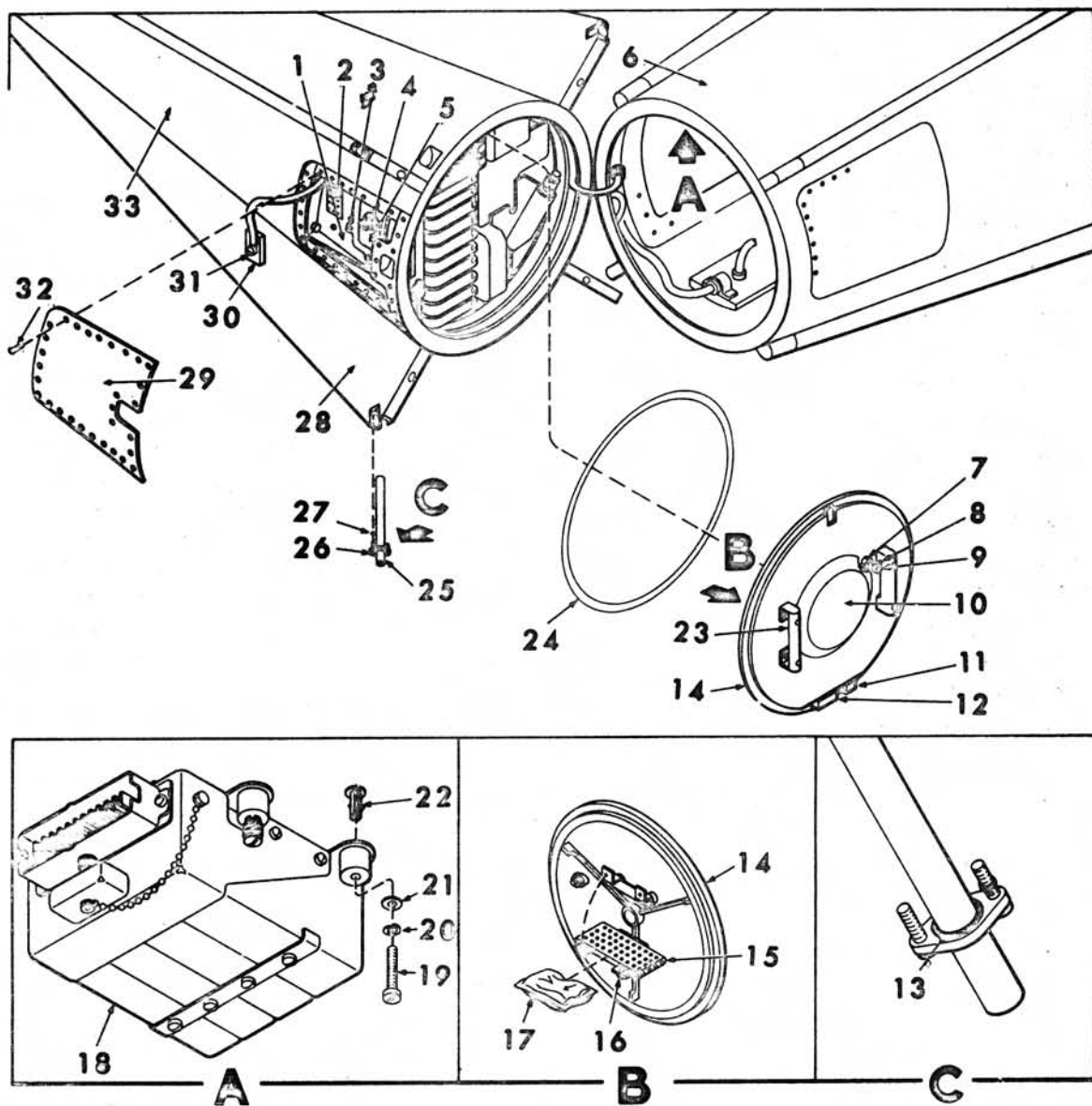
n. Install the container cover (fig. 3-5) on the rear body section and forward body section container, and secure the quick release clamps.

o. Place the extension handle and the missile system record book in the log tube, and swing the log tube cover plate closed; secure the log tube cover plate in position with the wing nuts.

p. Seal the container and log tube cover with the lead seals.

q. Process the container for shipment or storage.





ORD G5304A

- 1—Transponder control group
- 2—Connector J2
- 3—Captive screw (6)
- 4—Humidity indicator
- 5—Access cover plate
- 6—Warhead body section
- 7—Pressure valve
- 8—Air valve cap
- 9—Plunger cap
- 10—Rear housing cover
- 11—Retaining screw
- 12—Lever arm

- 13—Performed packing
- 14—Retaining ring
- 15—Desiccant holder
- 16—Captive screw (2)
- 17—Activated desiccant
- 18—Fail-safe control 9141841 or 9141836
- 19—No. 10-32 x 1 fil-hd screw
- 20—No. 10 lock washer
- 21—No. 10 flat washer
- 22—Fastener retainer
- 23—Hook handle (2)
- 24—Preformed packing

Figure 12-2. Forward body section and warhead body section.

	Paragraphs	Page
Trainer main fin shipping crate .....	14-10d	14-8
Removed of:		
Trainer body section from the trainer body section shipping box .....	14-12	14-18
Trainer body section from the trainer body section shipping crate .....	14-11	14-8
Trainer body section from the rear body section and forward body section container .....	14-14	14-18
Trainer rear main fins, trainer forward main fins, and trainer elevons from the trainer main fin shipping box .....	14-15	14-14
Trainer rear main fins, trainer forward main fins, and the trainer elevons from the trainer main fin shipping crate .....	14-13	14-18
Shipment of training body section M84 components .....	14-9	14-8
General—how normally shipped .....	14-9a	14-8
Trainer body section container .....	14-9b	14-8
Normal deactivation procedures		
Defueling, depressurizing, and purging the accessory power supply (APS):		
APS defueling .....	11-29	11-16
APS and HPU depressurizing .....	11-30	11-18
APS purging .....	11-31	11-18
General—when required .....	11-27	11-16
Servicing and test equipment .....	11-28	11-16
General:		
Deactivation sequence .....	11-2	11-1
Handling explosives .....	11-3	11-1
Introduction—summary of chapter contents .....	11-1	11-1
Preliminary procedures:		
Disarming the missile .....	11-4	11-1
Guidance set storage battery, removal of (missiles 10206 through 11935 and 13001 through 13683) .....	11-5	11-8
HPU squib battery, removal of .....	11-7	11-4
Squib batteries, removal of (missiles 13684 and subsequent) .....	11-6	11-4
Preparation of the forward and rear body sections for shipment or storage:		
Forward body section, preparation of, for shipment .....	11-37	11-22
Rear body section, preparation of, for shipment .....	11-36	11-21
Shipping container .....	11-35	11-21
Removal of the forward body section:		
Forward body section, preparation for removal of .....	11-14	11-9
Forward body section, removal of .....	11-15	11-9
Removal of the forward main fins and preparation for removal of the warhead body section:		
Fail-safe wiring harness, removal of .....	11-17	11-10
Forward main fins, removal of .....	11-16	11-10
Transponder control group wiring harness, removal of .....	11-18	11-11
Warhead wiring harness, removal of .....	11-19	11-11
Removal of the missile body from the launching-handling rail:		
Missile body, removal of .....	11-10	11-6
Transporting the missile body to the surface area .....	11-11	11-7
Removal of the missile from the launching area, using guided missile low-bed trailer M529:		
General—disposition of explosive components for transportation .....	11-8	11-5
Removal of the missile from the launcher .....	11-9	11-5
Removal of the missile rocket motor subassembly:		
Ortting the missile rocket motor subassembly .....	11-25	11-15
Missile rocket motor subassembly, removal of .....	11-24	11-14
Preparation for removal of the missile rocket motor subassembly .....	11-23	11-13
Rear body section, final preparation of, for storage or shipment .....	11-26	11-15
Removal of the rocket motor cluster from the launching-handling rail:		
Rocket motor cluster, removal of .....	11-12	11-8
Transporting the rocket motor cluster to the service area .....	11-13	11-8
Rocket motor cluster, transporting on the rocket motor cluster truck .....	11-23a	11-8
Rocket motor cluster, transporting on the transporter adapter mounted on the transporter trailer .....	11-13b	11-8

## CHAPTER 12

### CORRECTIVE MAINTENANCE

#### Section I. GENERAL

#### 12-1. Scope

This chapter contains specific procedures for the replacement of authorized parts in the missile guidance set, forward body section, warhead body section, missile motor section, equipment section, actuator section, main fins and elevons, rocket motor cluster, and the shipping and

storage containers.

**WARNING:** Before performing corrective maintenance of the missile body, the rocket motor cluster, or their components, the steps necessary for deenergizing or disarming must be performed as prescribed in table 12-1.

*Table 12-1. Deactivation Procedures That Must Be Performed Before  
Corrective Maintenance Operations (X)*

Component being removed or replaced	Authorized area for removal <sup>1</sup>	Authorized area for corrective maintenance test or repair <sup>1</sup>	Inspect S&A device M30A1 for safe condition	Inspect S&A switch S31 for safe condition	Inspect rocket motor igniter cable for proper shorting (fig. 10-10)	Place connectors P1X-P72A in dummy connectors (fig. 9-19) <sup>3</sup>	Remove S&A devices M30A1 (para 11-4, a thru e)	Remove initiators (para 11-4, h thru n)	Disconnect missile batteries (para 11-5 or 11-6) <sup>4</sup>	Install nose hinge assembly (para 12-5g)	Remove propulsion arming lanyard (para 11-4, o thru q)	Remove igniters (para 11-4, s thru v)	Remove missile body from launching handling rail (chapter 11, sec IV) <sup>4,5</sup>	Remove rocket motor cluster from launching-handling rail (chapter 11, sec V)
Missile body section, aft														
Accessory power supply	A <sup>4,7</sup>	C <sup>8</sup>	X	X	X	X	—	—	X <sup>12</sup>	—	—	—	—	—
Battery, BA472/U and BA485/U series	A <sup>6</sup>	C <sup>8</sup>	X	X	X	X	X	—	X	—	—	—	—	—
Elevons	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Equipment section access cover plates	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
S&A switch—S31	A <sup>6,9</sup>	C	X	X	X	X	—	—	—	—	—	—	—	—
Hydraulic pumping unit	A <sup>6</sup>	C <sup>8</sup>	X	X	X	X	—	—	—	—	—	—	—	—
Propulsion arming lanyard	A <sup>6,9</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Missile rocket motor—M30A2	B	B	X	X	X	X	X	X	X	—	X	X	X	—
Missile motor section cover plates	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—

See footnotes at end of table.

Table 12-1. Deactivation Procedures That Must Be Performed Before  
Corrective Maintenance Operations (X)—Continued

Component being removed or replaced	Authorized area for removal <sup>1</sup>	Authorized area for corrective maintenance test or repair <sup>1</sup>	Inspect S&A device M30A1 for safe condition	Inspect S&A switch S31 for safe condition <sup>14</sup>	Inspect rocket motor igniter cable for proper shorting (fig. 10-10)	Place connectors P1X-P72A in dummy connectors (fig. 9-19) <sup>3</sup>	Remove S&A devices M30A1 (para 11-4, a thru e)	Remove initiators (para 11-4, h thru n)	Disconnect missile batteries (para 11-5 or 11-6) <sup>4</sup>	Install nose hinge assembly (para 12-5g)	Remove propulsion arming lanyard (para 11-4, o thru q)	Remove igniters (para 11-4, s thru v)	Remove missile body from launching handling rail (chapter 11, sec IV) <sup>5</sup>	Remove rocket motor cluster from launching-handling rail (chapter 11, sec V)
Missile motor head heater and special shape insulation	B	C	X	X	X	X	X	X	X	—	X	X	X	—
Initiator—M30A2 motor	A <sup>7</sup>	C <sup>8 13</sup>	X	X	X	X	—	—	—	—	—	—	—	—
Rear main fins	A <sup>6 9</sup>	C	X	X	X	X	X	—	X <sup>12</sup>	X	X	—	—	—
Thermal battery assembly—9031082	A <sup>7 9</sup>	C <sup>10</sup>	X	X	X	X	X	—	X	—	X	—	—	—
Ventilator assembly	A <sup>6</sup>	C	X	X	X	X	—	—	—	—	—	—	—	—
Battery BB 401/U box and components	A <sup>4 6</sup>	C <sup>8</sup>	X	X	X	X	X	—	X	—	—	—	—	—
Missile body section, warhead														
Warhead body section access cover plates	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Warhead body section, boltwell covers (Sta 136)	A <sup>6</sup>	C	X	X	X	X	—	—	—	X	—	—	—	—
Warhead body section, boltwell covers (Sta 150)	A <sup>7</sup>	C	X	X	X	X	X	X	X <sup>12</sup>	X	X	X	X	—
S&A device, M30A1	A <sup>6</sup>	C <sup>8 13</sup>	X	X	X	—	—	—	—	—	—	—	—	—
Stabilizer fins	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Warhead fin bracket	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Control, detonation fail-safe	A <sup>6</sup>	C	X	X	X	X	X	—	X <sup>12</sup>	X	—	—	—	—
Fail-safe bracket	A <sup>6</sup>	C	X	X	X	X	X	—	X <sup>12</sup>	X	—	—	—	—
Sequential timer	A <sup>6</sup>	C	X	X	X	X	X	—	X <sup>12</sup>	X	—	—	—	—
Missile body section, forward	A <sup>6</sup>	C	X	X	X	X	X	X	X <sup>12</sup>	—	—	—	—	—
Forward body section access doors	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Forward body section boltwell covers	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Forward fins	A <sup>6</sup>	C	X	X	X	X	X	—	X <sup>12</sup>	X	—	—	—	—
Nose tip	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Ram pressure probes	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Stagnation tube assemblies 8529069 and 9034674	A <sup>6</sup>	C	X	X	X	X	X	X	X <sup>12</sup>	X	—	—	—	—

See footnotes at end of table.

**Table 12-1. Deactivation Procedures That Must Be Performed Before  
Corrective Maintenance Operations (X)—Continued**

Component being removed or replaced	Authorized area for removal <sup>1</sup>	Authorized area for corrective maintenance test or repair <sup>1</sup>	Inspect S&A device M30A1 for safe condition	Inspect S&A switch S31 for safe condition <sup>14</sup>	Inspect rocket motor igniter cable for proper shorting (fig. 10-10)	Place connectors P1X-P72A in dummy connectors (fig. 9-19) <sup>3</sup>	Remove S&A devices M30A1 (para 11-4, e thru e)	Remove initiators (para 11-4, h thru n)	Disconnect missile batteries (para 11-6 or 11-6 <sup>4</sup> )	Install nose hinge assembly (para 12-5c)	Remove propulsion arming laneyard (para 11-4, o thru q)	Remove igniters (para 11-4, s thru v)	Remove missile body from launching- handling rail (chapter 11, sec IV) <sup>4 5</sup>	Remove rocket motor cluster from launching-handling rail (chapter 11, sec V)
<b>Rocket motor M42 or M42A1</b>														
Thrust fitting (9028004)	B	C	X	X	X	X	X	X	—	—	X	X	X	X
Cluster fin assembly	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Rocket motor igniter cable assembly 9978099	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Igniters, M24, M65, M69	A <sup>7</sup>	C <sup>8 13</sup>	X	X	X	X	X	—	—	—	—	—	—	—
Slipper assembly	B	C	X	X	X	X	X	X	X <sup>12</sup>	—	X	X	X	X
Fairing assembly (top and bottom)	B	C	X	X	X	X	X	X	X <sup>12</sup>	—	X	X	X	X
Fairing assembly (sides)	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Filler blocks	B	C	X	X	X	—	—	—	—	—	—	—	—	—
Fin fitting assembly	B	C	X	X	X	—	—	—	—	—	—	—	—	—
Nozzle fairings	B	C	X	X	X	—	—	—	—	—	—	—	—	—
Forward retaining rail bars—8163507	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Rear retaining rail bars—9978991-1&2	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Rocket motor, M5E1 or M5B	B	B	X	X	X	X	X	X	X <sup>12</sup>	—	X	X	X	X
<b>Missile guidance set, stovepipe</b>														
Amplifier decoder	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Antenna horn	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Delay line driver detector	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Magnetron electron tube	A <sup>6 11</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Missile code delay line	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
P steering amplifier	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Y steering amplifier	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Radar modulator	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Radar modulator thyatron	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Electron tube rectifying crystal unit	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Roll control amplifier	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—

See footnotes at end of table.



Table 12-1. Deactivation Procedures That Must Be Performed Before Corrective Maintenance Operations (X)—Continued

Component being removed or replaced	Authorized area for removal <sup>1</sup>	Authorized area for corrective maintenance test or repair <sup>1</sup>	Inspect S&A device M30A1 for safe condition	Inspect S&A switch S31 for safe condition <sup>1,4</sup>	Inspect rocket motor igniter cable for proper shorting (fig. 10-10)	Place connectors P1X-P72A in dummy connectors (fig. 9-19) <sup>3</sup>	Remove S&A devices M30A1 (para 11-4, a thru e)	Remove initiators (para 11-4, h thru n)	Disconnect missile batteries (para 11-5 or 11-6) <sup>4</sup>	Install nose hinge assembly (para 12-5c)	Remove propulsion arming lanyard (para 11-4, o thru q)	Remove igniters (para 11-4, s thru v)	Remove missile body from launching-handling rail (chapter 11, sec IV) <sup>5</sup>	Remove rocket motor cluster from launching-handling rail (chapter 11, sec V)
Tapped delay line	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Transponder control group	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Voltage regulator tubes, V1, V2, and V3	A <sup>6</sup>	C	X	X	X	X	X	—	X	X	—	—	—	—
Waveguide assemblies 9002084, 9002546, 9002655, 9002261, and 9002659	A <sup>6</sup>	C	X	X	X	—	—	—	—	X	—	—	—	—
Missile guidance set, mushroom	A <sup>6</sup>	C	X	X	X	—	—	—	—	—	—	—	—	—
Antenna horn	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Interconnecting board	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Magnetron electron tube	A <sup>6</sup> <sup>11</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Missile code delay line	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Rear housing cover, seal and desiccant	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Radio set components	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Transponder control group or front housing cover and seal	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—
Waveguide assemblies 9007629, 9007631, 9007632, 9009051, and 9009558	A <sup>6</sup>	C	X	X	X	X	X	—	—	X	—	—	—	—

<sup>1</sup> Area in which removal, corrective maintenance, test or repair may be performed:

A = Launching area.

B = Revetted area.

C = Area for corrective maintenance. (Test or repair is normally unrestricted except as indicated by footnotes 8, 10, and 13.)

<sup>2</sup> A safe condition is indicated by a white area visible through the inspection window. A visible red area indicates an armed device. Missiles containing an armed device will be isolated and reported immediately to EOD support for disposition. If the armed M30A1 is in a missile equipped with a prime warhead, close and secure the access and perform the disarm procedures in TM 9-1100-250-12.

<sup>3</sup>CAUTION: Avoid grounding connectors P1X and P72A against the metal surfaces of equipment.

<sup>4</sup>WARNING: (Missiles 10206 — 13683) In no case will missile umbilical cable connectors P104A and P105A be disconnected from the launching handling rail before the missile battery is disconnected from the missile distribution box and connectors P1X and P72A have been placed in the launching handling rail dummy connectors.

<sup>5</sup>WARNING: (Missiles 13684 and subsequent) In no case will umbilical cable connectors P104A and P105A be disconnected from the launching-handling rail before connectors P1X and P72A have been placed in the launching and handling rail dummy connectors.

<sup>6</sup>Removal and replacement may be performed below ground or at the above ground storage location.

<sup>7</sup>Removal and replacement must be performed above ground. For above ground sites, the affected round will be isolated within the section to the maximum extent.

<sup>8</sup>Maintenance and repair will not be performed below ground or in the immediate area of the above ground storage location.

<sup>9</sup>Disconnect connectors P162 and P163 from missile rocket motor initiators and install shorting connectors.

<sup>10</sup>WARNING: Actual removal of the batteries (BA 617/U) from the bracket will not be performed below ground or in the immediate area of the above ground storage location. Assembly or disassembly must be performed in an area free of explosives, flammable or combustible liquids, or easily ignitable solids such as rags or paper.

<sup>11</sup>Nonferrous tools should be used in removing a magnetron to eliminate the magnetic attraction that impairs efficiency. Keep iron, steel and magnets at least two inches from the magnetron.

<sup>12</sup>For missiles 10206 — 13683 only (BB-401/U batteries).

<sup>13</sup>When the portable barricade is required, it will be located in a suitable area.

<sup>14</sup>If the safe and arm switch (S31) indicates ARMED (red), clear the area of all personnel and notify Explosive Ordnance Disposal (EOD) personnel. Do not continue with the checks.

## 12-2. Exterior Surface Skin Damage

a. Damage to the missile body skin is classified as listed below:

(1) *Dent*. A slight hollow in a surface, generally circular in shape and having a low point near the center of the circular area. The surface of the metal is not cut.

(2) *Scratch or gouge*. A surface skin damage in which the metal has been displaced to the sides of the scratch or gouge, resulting from striking or scraping of the skin surface with a sharp instrument.

(3) *Pit*. A small circular indentation in the surface, resulting from chemical action or corrosion.

(4) *Puncture*. A complete surface penetration, usually from a sharp object. Any puncture is cause for rejection.

b. Surface damage to the missile, rocket motor adapter, and blast tube liners will not necessarily be cause for rejection. However, if any of the conditions described in a(1) through a(3) above exist, have the defect inspected by the direct support (DS) unit to determine whether the missile is serviceable or must be rejected.

## 12-3. Safety Precautions Applicable to Corrective Maintenance Operations in the Launching Area and the Revetted Area

a. *General*. The missile contains explosives. All applicable safety precautions will be strictly enforced. Do not perform handling operations during electrical storms. Only a minimum of personnel will be permitted at or near the work location. The quantity of explosive material at any work location will be kept to an absolute minimum. Spilled explosive material will be removed immediately, and the area decontaminated thoroughly before work is resumed. Explosive components that contain electrical wiring must be protected at all times from stray voltages or induced currents. Extreme care will be exercised when handling explosive components when size or weight makes handling difficult.

## b. Safety Precautions Applicable to Launching Area Corrective Maintenance Procedures.

**NOTE.** Preparation will be accomplished by organizational personnel. This work will be supervised by qualified explosives trained personnel. The number of personnel to prepare a missile for maintenance will be held to the minimum consistent with safe and efficient operation.

### (1) Corrective maintenance.

**WARNING:** The missile on which corrective maintenance is to be performed shall be located as follows:

#### (a) CONUS TYPE INSTALLATIONS.

Above-ground on any launcher, except the elevator-mounted launcher, except for those operations that are authorized to be performed below ground. (See table 12-1.)

(b) USARAL- AND USAREUR-TYPE INSTALLATIONS. On the launching pad, except for those operations that are authorized to be performed within the storage building.

(c) MOBILE-TYPE INSTALLATIONS. There is no barricaded (revetted) launching area. The degree of organizational maintenance and the area in which these operations will be accomplished will be determined by the officer in charge.

### (2) Storage.

**WARNING:** All missiles or components containing explosives other than those prepared for corrective maintenance will be stored as follows:

#### (a) CONUS-TYPE INSTALLATIONS.

Missiles or components will be stored in the underground casemate.

(b) USARAL- AND USAREUR-TYPE INSTALLATIONS. Missiles or explosive components will be stored within the storage building and the doors will be closed.

(c) MOBILE-TYPE INSTALLATIONS. Missiles and explosive components other than the normal launcher complement will not be stored in the launching area. Missiles on standby will be separated the maximum distance possible from the launcher.

**WARNING:** The following safety precautions will be observed in the launching area during the preparation of the missile or component for corrective maintenance:

(1) Fire-, flame-, or spark producing devices will not be permitted in the area when work is being accomplished on a guided missile or a component containing explosives or hazardous material.

(2) Limit the number of personnel in the area to the number consistent with safe and efficient operation.

(3) Only one missile will be permitted in the revetted area. No concurrent operations will

be permitted during corrective maintenance operations.

(4) The location where corrective maintenance is being performed upon a missile will be separated from underground magazines, explosive-component storage locations, and other facilities within the launching area by the maximum distance possible.

(5) The location will be separated from public highways and public railways by the maximum distance possible.

(6) The location will be separated from inhabited buildings, including barracks, mess halls, and headquarters buildings, by the maximum distance possible.

## Section II. CORRECTIVE MAINTENANCE OF THE MISSILE GUIDANCE SET (MUSHROOM)

### 12-4. General

This section contains instructions for the performance of authorized corrective maintenance of the mushroom missile guidance set. Corrective maintenance consists of the replacement of parts listed in TM 9-1410-250-15P/1/1 and related cleaning and inspection functions.

### 12-5. Installation and Removal of the Nose Hinge Assembly

#### a. Installation.

(1) Remove the flat-head screws (1, fig. 12-1): four from the right side of the forward body section (16) and four from the right side of the warhead body section (17).

(2) Remove the six boltwell covers (3).

**CAUTION:** Care must be exercised to prevent damage to threads when performing the steps below.

(3) Remove the hexagon-head bolt and flat washer (4 and 5) from the boltwell located between forward fin assemblies No. 2 and 3 (12 and 13).

*Note.* When performing step (4) below, install all of the captive bolts, finger-tight, before torquing any of them.

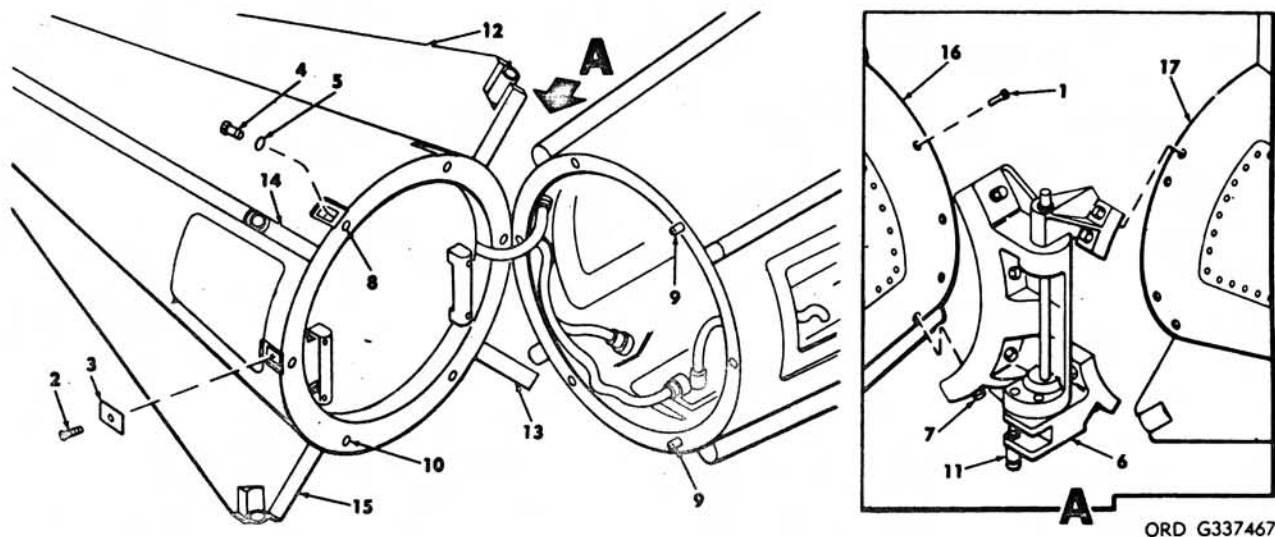
(4) Attach the nose hinge assembly (6) to the right side of the missile with the captive bolts (7); torque the bolts to the value given in table 15-9.

(5) Remove the hexagon-head bolt and flat washer from the boltwell mounting hole (8) located between forward fin assembly No. 1 (14) and forward fin assembly No. 2.

*Note.* The guide pins installed in steps (6) and (7) below are stored in two of the tapped holes in the flange of the nose hinge assembly until ready for use.

(6) Install a guide pin (9) through the boltwell mounting hole (8) and secure in the threaded body section attach hole in the warhead body section.

(7) Repeat steps (5) and (6) above for the boltwell mounting hole (10) located between forward fin assembly No. 3 (13) and forward fin assembly No. 4 (15).



ORD G337467

- 1—1/4-28 x 27/32 fl-hd screw (8)
- 2—No. 10-32 x 1-11/32 fl-hd screw (6)
- 3—Boltwell cover (6)
- 4—5/16-24 x 27/32 hex-hd bolt (6)
- 5—0.328-in-id fl washer (6)
- 6—Nose hinge assy
- 7—Captive bolt (8) (p/o nose hinge assy)
- 8—Boltwell mounting hole
- 9—Guide pin (p/o nose hinge assy)

- 10—Boltwell mounting hole
- 11—Locking pin (p/o nose hinge assy)
- 12—Forward fin assy No. 2
- 13—Forward fin assy No. 3
- 14—Forward fin assy No. 1
- 15—Forward fin assy No. 4
- 16—Forward body section
- 17—Warhead body section

Figure 12-1. Removal and installation of the nose hinge assembly.

(8) Remove the hexagon-head bolts and flat washers from the remaining boltwell mounting holes in the forward body section.

**Caution:** Exercise care to prevent damage to cable assemblies when opening the forward body section.

(9) Swing the forward body section to the right until the nose hinge assembly locks.

**b. Removal.**

**Caution:** Exercise care in returning the nose section to the mating position to prevent damage to the cable assemblies.

(1) Release the locking pin (11, fig. 12-1) if required.

(2) Swing the forward body section (16) carefully into fully closed position so that the guide pins (9) in the warhead body section (17) align with and enter the boltwell mounting holes (8 and 10) in the forward body section.

(3) Install the hexagon head bolts (4) and flat washers (5) in the open boltwell mounting holes in the top, bottom, and

left side of the missile. Torque the bolts to an original value of 90 inch-pounds.

(4) Remove the guide pin from the boltwell mounting hole (8) and install a hexagon-head bolt and flat washer. Torque the bolt to an original value of 90 inch-pounds.

(5) Repeat step (4) above for the guide pin installed in the boltwell mounting hole (10).

**Note.** Stow the guide pins removed in steps (4) and (5) above in two of the tapped holes in the flange of the nose hinge assembly.

**Caution:** To prevent damage to the threads, support the nose hinge assembly during removal.

(6) Remove the nose hinge assembly (6) and install the remaining hexagon-head bolt and flat washer in the boltwell mounting hole on the right side of the missile, torquing to an initial 90 inch-pounds.

**Note.** If the nose hinge assembly mounting holes in the forward body section or in the warhead section are not countersunk, substitute setscrew MS51966-65 for screws (1, fig. 12-1), tighten until head is flush with outer skin surface.



(7) Install the flat-head screws (1) in the nose hinge assembly mounting holes: four in the right side of the forward body section and four in the right side of the warhead body section.

(8) Following the sequence shown in figure 7-10 loosen one at a time and torque the hexagon-head bolts installed in steps (3) through (6) above to the value given in table 15-9.

(9) Install the six boltwell covers (3, fig. 12-1) and secure with the flat-head screws (2). Torque the screws to the value given in table 15-9.

## 12-6. Handling, Cleaning, and Inspection

*a. General.* To insure proper operation of the missile guidance set, it is necessary to enforce rigidly controlled procedures whenever the transponder-control group is opened for the performance of corrective maintenance. Maintenance personnel must be certain that all parts are mechanically secure because of the high acceleration that the guidance set must withstand during missile flight. Exercise care to prevent the entry of dust or dirt into the transponder-control group. The recommended procedures for handling, cleaning, and inspecting the missile guidance set and its parts are outlined in b through f below.

**CAUTION:** Be certain that all items such as bolts, screws, and washers that may have fallen into the transponder-control group during replacement procedures have been removed, as failure to remove these may seriously affect missile functioning.

### *b. Handling Disassembled Parts.*

(1) Provide a parts tray or some other suitable container for the storage of small parts as they are removed. Keep large parts on a work bench or in some other safe place where they will not be damaged. In disassembly, keep the disassembled parts in logical order.

**WARNING:** When using trichlorethane or mineral spirits be sure that the area is well-ventilated, as the fumes are toxic and the mineral spirits flammable.

(2) When the parts are to remain disassembled over a long period of time, clean the bare metal surfaces with trichloroethane. Wipe the parts completely dry. Before assem-

bling parts, clean them with trichloroethane, and apply permanent lubrication as required.

(3) The rectifying crystal units are sensitive to voltage differences and can be damaged by stray voltage. They can safely carry only minute currents. When dissimilar metals are joined, or when maintenance personnel touch a rectifying crystal unit, voltages may be applied that could damage the unit. Maintenance personnel should avoid touching both ends of a rectifying crystal at the same time. If this is impracticable, the organizational maintenance technician should first ground himself to release any static charges and then handle the crystal unit, using only the fingers of one hand.

### *c. Hazards of Magnesium.*

(1) *Fire.* Magnesium and its alloys are used extensively in the missile guidance set. As magnesium is flammable, buckets of dry sand should be placed throughout the maintenance building to smother small fires. Larger containers of dry sand should be kept nearby to smother larger magnesium fires.

**Caution:** Do not use water, any common liquid, or foam-type extinguisher on magnesium fires, as these only intensify the fire. Use only dry sand.

(2) *Corrosion.* Magnesium is highly susceptible to corrosion, especially in salty atmospheres. Keep the parts as clean and dry as possible.

*d. Cleaning.* After the removal of an assembly or part, clean it thoroughly to remove all corrosion, dust, grit, grease, mold, fungi, and other foreign substances according to the procedures prescribed in (1) and (2) below.

**Warning:** Wear goggles during cleaning operations involving the use of compressed air or chemical solvents.

(1) Remove the loose dirt and grit with compressed air or a dry, lint-free brush. When compressed air is used, maintain the pressure between 15 and 18 psi. Using a small air hose, direct the air stream from a distance sufficient to prevent damage to the equipment.

**Warning:** As chemicals used in the cleaning processes are harmful to personnel, always wear protective clothing and goggles when using these chemicals. Avoid skin contact with solvents and inhalation of their fumes and vapors. Use trichloroethane or other toxic chemicals out of doors, under a ventilation hood, or in a well-ventilated area.

**Caution:** Do not allow cleaning chemicals to contact rubber compound parts or electrical insulation, as the chemicals may cause them to deteriorate.

(2) Clean the metal surfaces with trichloroethane. Wash rubber compound parts with soap and water, and dry thoroughly. Wipe the electrical wiring insulation clean with a cloth moistened with denatured alcohol.

(3) Surfaces covered with damaged paint should be painted.

*e. Inspection.* Reject assemblies, or any parts of an assembly, that do not meet the standards prescribed in (1) through (3) below.

(1) *Hardware.*

(a) The screw slots are undamaged.

(b) The clamps are not twisted or crooked.

(2) *Cabling.*

**Caution:** When checking the cabling or wiring harnesses attached to the connectors, use finger pressure to avoid breaking the connections.

*Note.* Refer to appendix C for inspection criteria on cables, wiring harnesses, and connectors.

(a) The cabling or wiring harness is neither pulled too taut nor left too slack.

(b) The lacing or taping is not defective. Check particularly at breakout points and bends for burns, loose lacing and taping, and for damage to the insulation. Check to ascertain that the nylon lacing tape is tight and properly positioned inside the clamps or brackets that secure the cable.

(c) The clamps, brackets, and straps are secure.

(3) *Connectors.*

(a) The type and position are correct.

(b) The mounting is secure, correct, and properly oriented.

(c) There is no contamination by fungus or corrosion.

(d) The connectors are secure on the cables.

(e) The connectors are properly mated and locked.

(f) The insulation is not chipped, cracked or broken.

(g) The cases are undamaged.

## 12-7. Replacement of the Antenna Horn

### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Loosen the two captive screws (26, fig. 12-2) that secure the antenna horn (25) to the forward fin assembly (28). Remove the antenna horn.

### *b. Installation.*

**Caution:** Do not apply more than 15 pound-inches of torque to the antenna horn captive screws.

(1) Ascertain that preformed packing (13, fig. 12-2) is properly seated and firmly cemented on the antenna horn (25).

(2) Check the retaining rings (27) for damage. Replace them if necessary.

(3) Position the antenna horn on the forward fin assembly, and secure it with the two captive screws. Tighten the captive screws to the torque value given in table 15-9.

## 12-8. Replacement of the Fail-Safe Control

### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the fail-safe control (par. 11-17).

### *b. Installation.*

(1) Check the fastener retainer (22, fig. 12-2) for damage. Replace if necessary.

(2) Install the fail-safe control (par. 7-3).

*c. Rearming the missile.* Rearm the missile as instructed in chapter 10.

## 12-9. Replacement of Sequential Timer

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Disconnect connector P511 (7, fig. 7-6) from TIMER connector J1 (8) or JUMPER connector J2 (9) on the sequential timer (10).

(3) Remove the four flathead screws (4, fig. 7-4) that secure the sequential timer (5) to the inside of the warhead body section. Remove the timer.

### b. Installation.

(1) Position the sequential timer (5) in the warhead body section, and secure it with the four flathead screws (4). Apply 25 pound-inches of torque to the screw.

*Note.* The connector on the timer that is used in (2) below should be in the forward position.

(2) Connect the fail-safe wiring harness connector P511 (7, fig. 7-6) to the TIMER connector J1 (8) or the JUMPER connector J2 (9) on the sequential timer (10).

c. *Rearming the missile.* Rearm the missile as instructed in chapter 10.

## 12-10. Removal and Installation of the Rear Housing Cover

### a. Removal.

*Note.* Replacement procedures referencing this paragraph require that the missile be prepared in accordance with the entry in table 12-1 covering the item being replaced.

(1) Prepare the missile as prescribed under the preformed packing entry in table 12-1.

**WARNING:** Extreme caution must be exercised when removing the forward and rear covers of the missile guidance set. A defective seal on the pressure relief valve can give a no-pressure indication when the valve stem is depressed, even though the guidance set is fully pressurized. Attempting to remove either the fore or aft cover under these circumstances could lead to serious injury or death.

(2) (Deleted)

25 — Antenna horn (4)  
 26 — Captive screw  
 27 — Retaining ring  
 28 — Forward fin assembly  
 29 — GUIDANCE TEST AND ADJUST ACCESS DOOR

30 — Connector P2  
 31 — Captive screw  
 32 — No. 10-32 x  $\frac{3}{32}$  fl-hd screw  
 33 — Forward body section

Figure 12-2. Forward body section and warhead body section — Legend — Continued.

- (3) Remove the GUIDANCE TEST AND ADJUST ACCESS DOOR (29).
- (4) Loosen the six captive screws (3) that secure the access cover plate (5) to the transponder control group (1) sufficiently to ensure the depletion of the air pressure.
- (5) Loosen the retaining screw (11), and disengage the lever arm (12).
- (6) Exert a steady pull on the two hook handles (23), and remove the rear housing cover (10) from the transponder control group.

*b. Replacement of Preformed Packing.*

- (1) Remove the preformed packing (24) from the rear housing cover.
- (2) Clean the packing, packing seat, and metal sealing surfaces with a lint-free cloth saturated with toluene 6810-281-2002. Apply a thin coat of insulating compound MIL-S-8660 to the packing, packing seat, and metal sealing surface.

- (3) Install packing on housing cover.

*c. Replacement of Activated Desiccant.*

- (1) Loosen the two captive screws (16) that secure the desiccant holder (15) to the inside of the housing cover; hinge the desiccant holder back; and remove the desiccant (17) if deactivated.
- (2) Insert the desiccant into the desiccant holder, and secure the holder to the housing cover with the two captive screws.

*d. Installation.*

*Note.* Test of the transponder control group for a leakage should be delayed until satisfactory completion of the required electrical checks after performing the corrective maintenance on the transponder control group.

- (1) Check to ascertain the forward body section is fully open and that the hinge

lock pin (12, fig. 3-29) snaps into the locked position.

- (2) With the pressure valve on the right, seat the housing cover on the transponder control group until the retaining ring (14, fig. 12-2) is flush with the rim of the housing.
- (3) Install the cover fully within the transponder control group housing, and press firmly on all sides of the housing cover and on each side of the lever arm to ensure proper seating.

**Caution:** Do not force the lever arm. The lever arm should close freely to three-eighths of an inch. If force is required to engage the lever arm, the rear housing cover is not seated properly.

- (4) Engage the lever arm, and tighten the retaining screw to secure the rear housing cover to the transponder control group.
- (5) Inspect the entire retaining ring for the proper seating.
- (6) Tighten the six captive screws that secure the access cover plate to the housing.
- (7) Perform the air leakage test on the transponder control group (para 4-15e through 4-15o).
- (8) Check the humidity indicator (4, fig. 12-2) for the normal indication (blue); recheck the humidity indicator an hour later.
- (9) Position the GUIDANCE TEST AND ADJUST ACCESS DOOR on the forward body section (33), and secure it with the 23 flat-head screws.
- (10) Remove the nose hinge assembly (para 12-5b).
- (11) Rearm the missile as instructed in chapter 10.



## 12-11. Replacement of the Missile-Code Delay Line

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the rear housing cover (para 12-10a).
- (3) Remove the missile-code delay line (5, fig. 12-3).

### b. Installation.

- (1) Install the missile-code delay line.
- (2) Install the rear housing cover (para 12-10b through 12-10d).

## 12-12. Replacement of the Magnetron Electron Tube

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the rear housing cover (para 12-10a).

**Caution:** To prevent damage to the magnetron electron tube (11, fig. 12-3), use a non-ferrous screwdriver to loosen the four captive screws in (4) below.

- (3) Remove the four screws (9) and four lockwashers (8) that secure the electron tube shield (7) to the radio transmitter (4).
- (4) Loosen the four captive screws (3) that secure the transmitter to the transponder control group.
- (5) Remove the two screws (10) and two lockwashers (12) that secure the transmitter to the heat exchanger (2); carefully remove the transmitter.
- (6) Disconnect the radio transmitter connector from the magnetron electron tube connector (fig. 12-4).

**Caution:** To minimize magnetic effects, keep iron, steel, or magnets at least 2 inches from the magnetron electron tube.

- (7) Remove the four screws and four lockwashers that secure the magnetron electron tube to the RF reflector isolator.

### b. Installation.

**Caution:** To minimize magnetic effects, keep iron, steel, or magnets at least 2 inches from the magnetron electron tube.

- (1) Place the magnetron electron tube (fig. 12-4) in the mounting position, and secure it to the RF reflector isolator with the four screws and four lockwashers.
- (2) Connect the magnetron electron tube connector to the radio transmitter connector.
- (3) Clean the preformed packing on the ends of the waveguide assembly, packing seat, and metal sealing surface with a lint-free cloth saturated with cleaning solution 9156817. Apply lubricant insulating compound MIL-S-8660 to the packing seat, and metal sealing surface.
- (4) Carefully position the transmitter in the heat exchanger, and secure it to the exchanger with the two pan-head screws and two lock washers.

**Caution:** To prevent damage to the magnetron electron tube, a nonferrous screwdriver should be used to tighten the four captive screws in (5) below.

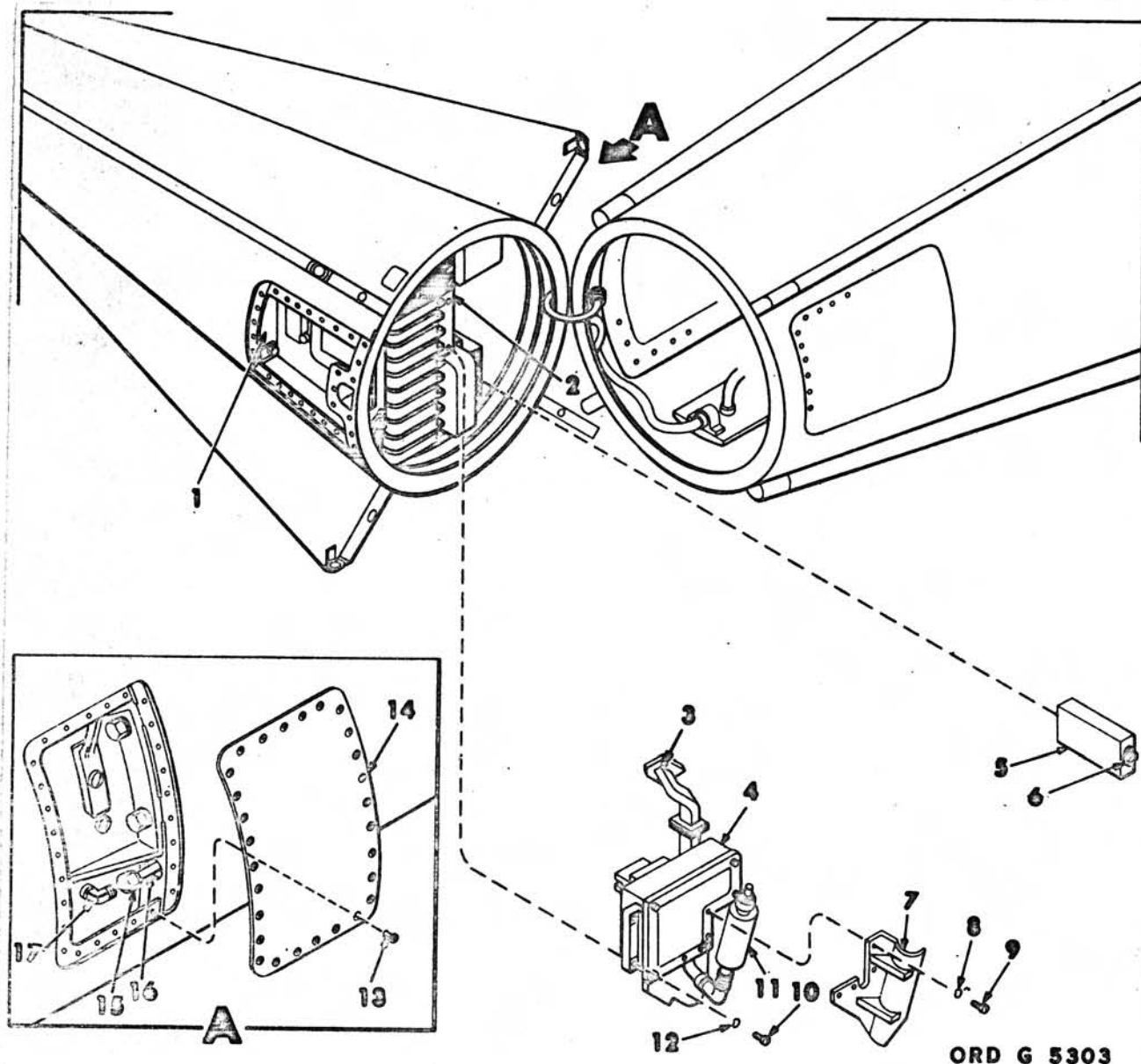
- (5) Secure the transmitter to the transponder control group with the four captive screws (fig. 12-4).
- (6) Place the electron tube shield in the mounting position, and secure it to the transmitter with the four pan-head screws and four lock washers.
- (7) Install the rear housing cover (para 12-10b through 12-10d).

## 12-13. Replacement of Transponder Control Group

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the access door assemblies (3 and 10, fig. 3-27).
- (3) Disconnect the transponder control group wiring harness connector P1 (19, fig. 3-31) from the transponder control group connector J1 (16) according to procedures in appendix D.





- 1-Transponder control group
- 2-Heat exchanger
- 3-Captive screw (4)
- 4-Radio transmitter
- 5-Missile-code delay line
- 6-Knob
- 7-Electron tube shield
- 8-No. 6 lockwasher (4)
- 9-No. 6-32 x 5/16 pan-hd screw (4)

- 10-No. 10-24 x 3/4 pan-hd screw (2)
- 11-Magnetron electron tube
- 12-No. 10 lockwasher
- 13-No. 10-32 x 25/32 fl-hd screw (24)
- 14-J1 + XMTR access door
- 15-Stagnation tube fitting
- 16-Stagnation pressure tube
- 17-Elbow

ORD G 5303

Figure 12-3. Partially exploded view of the forward body section.

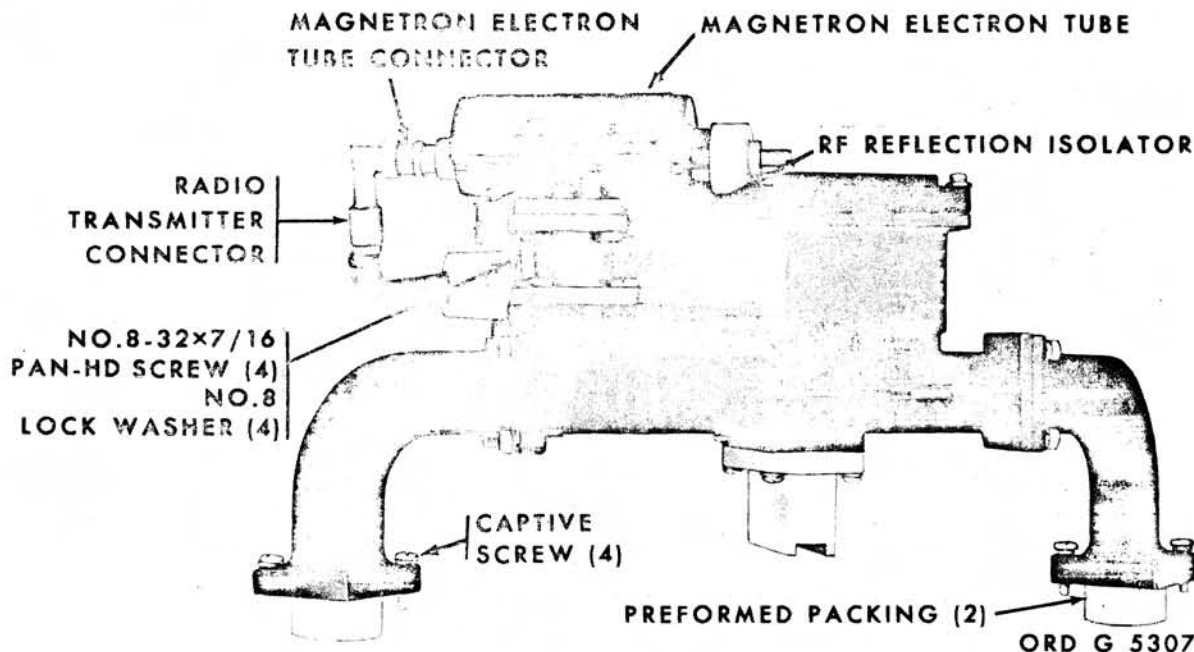


Figure 12-4. Radio transmitter with electron-tube shield removed.

(4) Install the protective cover assembly (17) on the transponder control group connector (17).

(5) Remove the flathead screw (1, fig. 7-9) that secures the support bracket (2) to the missile skin.

(6) Remove the transponder control group wiring harness (10) from the forward body section.

(7) Disconnect the stagnation pressure tube (16, fig. 12-3) from the elbow (17).

(8) Install the protective cap on the elbow and the protective plug in the end of the stagnation pressure tube. In the event the cap or the plug is not available, tape may be used.

(9) Open the cooling access door (7, fig. 4-3) located on the bottom of the missile. Remove the two springs (3) and the hose clamp (6).

(10) Loosen the four captive screws (4), and remove the hose assembly (5) and the spacer between the hose assembly and the missile guidance set.

(11) Remove the eight hexagon-head bolts (fig. 12-5), flat-washers, and lockwashers that secure the transponder control group inside the forward body section.

**WARNING:** The transponder control group weighs approximately 80 pounds. Provide adequate support during removal.

(12) Carefully remove the transponder control group from the forward body section.

#### b. Installation.

**NOTE.** Inspect the waveguide windows in the transponder control group housing for damage.

**WARNING:** The transponder control group weighs approximately 80 pounds. Provide adequate support during the installation.

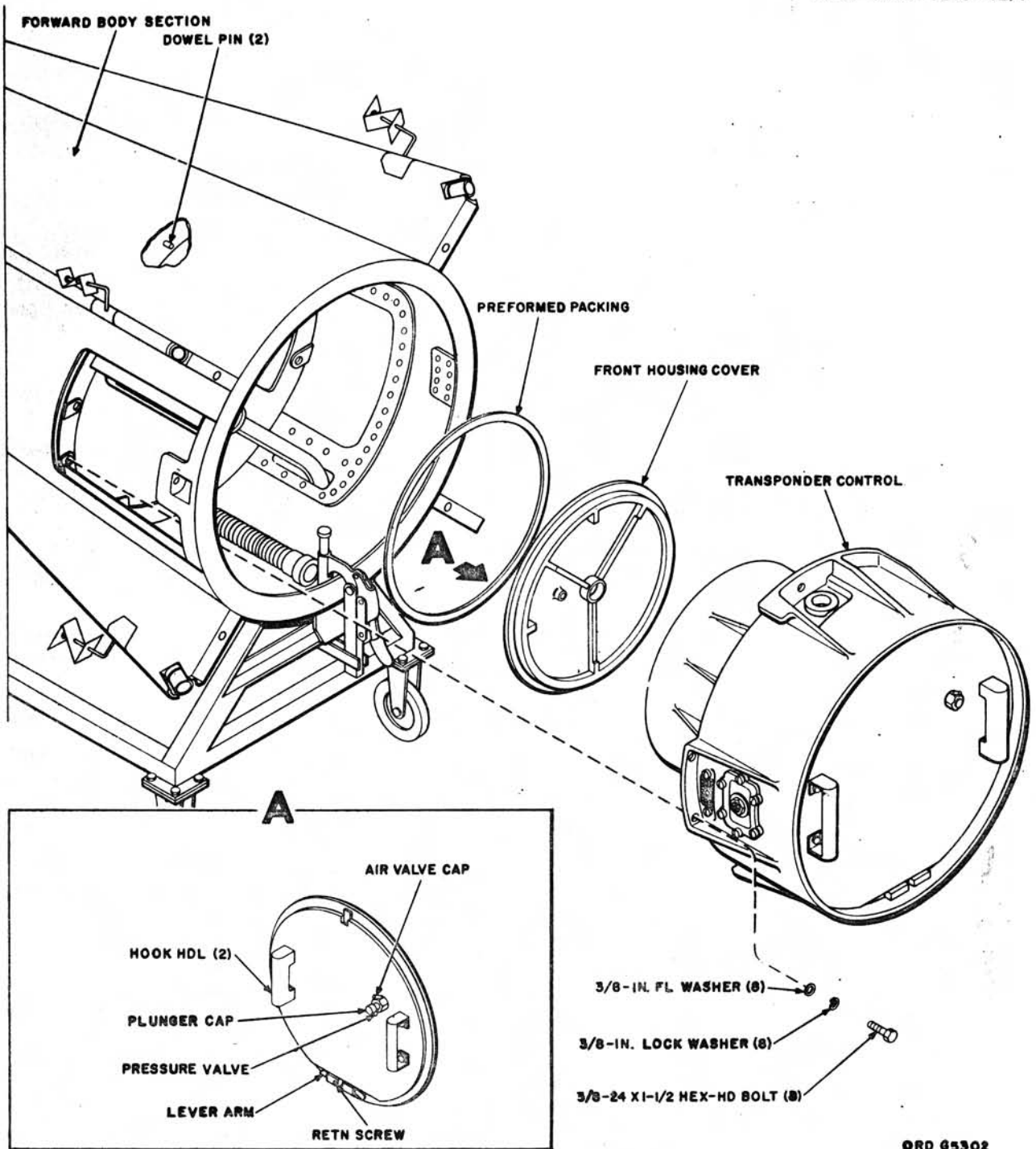


Figure 12-5. Partially exploded view of the forward body section and the transponder control group.

(1) Align the transponder control group with the two dowel pins inside the forward body section, and carefully install the group in the for-

ward body section.

(2) Secure the transponder control to the forward body section with the eight hexagon-head

bolts, eight lock washers, and eight flat washers. Tighten the hexagon-head bolts to 175 pound-inches.

(3) Place the spacer and hose assembly in the mounting position, and secure it with the four captive screws.

(4) Install the hose clamp and two springs, and close the cooling access door.

(5) Remove the cap from the elbow, and remove the plug from the end of the stagnation pressure tube.

(6) Blow out the stagnation pressure tube from the elbow end with clean, dry, compressed air.

(7) Apply sealing compound MIL-S-7502 to the threads of the elbow and connect the stagnation pressure tube.

(8) Place the transponder control group wiring harness in the forward body section, and secure the support bracket to the missile skin with the flathead screw.

(9) Remove the protective cover assembly from the transponder control group connector J1.

(10) Connect the transponder control group wiring harness connector P1 to the transponder control group connector J1 according to procedures in appendix D.

(11) Install the access door assemblies and tighten the screws to the torque value given in table 15-9.

(12) Remove the nose hinge assembly in accordance with paragraph 12-5b.

(13) Rearm the missile in accordance with chapter 10.

## 12-14. Replacement of Radio Set Components

### a. Plug-In Components.

**NOTE.** The dc power filter (2, fig. 12-6), P steering amplifier (29), Y steering amplifier (28), roll control amplifier (25), sweep generator (24), pulse delay oscillator (21), P command signal converter (19), Y command signal converter (17), command signal decoder (18), P-Y burst delay network (16), command detonation electronic switch (15), delay line driver (13), RF detector (12), and amplifier bias control (27) are dimensionally identical. A typical removal and installation are prescribed in (1) and (2) below.

#### (1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Loosen the two captive screws, and remove the plug-in component.

#### (2) Installation.

(a) Insert the plug-in component into the heat exchanger, and secure it with the two captive screws.

(b) Install the rear housing cover (pars. 12-10b through 12-10d).

### b. Radio Transmitter.

#### (1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Remove the radio transmitter (pars. 12-12a (3) through (5)).

#### (2) Installation.

(a) Install the radio transmitter (par. 12-12b (4) through (6)).

(b) Install the rear housing cover (pars. 12-10b through 12-10d).

### c. Transistor Oscillator Inverter.

#### (1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Loosen the four captive screws (8, fig. 12-6), and remove the transistor oscillator inverter (5).

#### (2) Installation.

(a) Position the oscillator inverter in the heat exchanger (14), and secure it with the four captive screws.

(b) Install the rear housing cover (pars. 12-10b through 12-10d).

### d. Radio Set Power Supply.

#### (1) Removal.

(a) Remove the rear housing cover (par. 12-10a).

(b) Remove the transistor oscillator inverter (c above).

(c) Disconnect connectors P1 and J8 (4).

(d) Loosen the six captive screws (9), and remove the radio set power supply (3).

#### (2) Installation.

(a) Position the power supply in the heat exchanger (14), and secure it with the six captive screws (9).

(b) Connect the connectors P1 and J8; rotate the locking tab to secure the connectors.

(c) Install the transistor oscillator inverter (c above).

(d) Install the rear housing cover (pars. 12-10b through 12-10d).

*e. Amplifier-Decoder.*

(1) *Removal.*

(a) Remove the rear housing cover (par. 12-10a).

(b) Disconnect the connectors J1 and P1 (23) and J2 and P2 (22).

(c) Loosen the four captive screws (8), and remove the amplifier-decoder (1).

(2) *Installation.*

(a) Position the amplifier-decoder in the heat exchanger (14), and secure it with the four captive screws (8).

(b) Connect the connectors J1 and P1 (23) and J2 and P2 (22).

(c) Install the rear housing cover (pars. 12-10b through 12-10d).

*f. Radio Receiver.*

(1) *Removal.*

(a) Remove the rear housing cover (par. 12-10a).

(b) Disconnect the connectors J1 and P1 (23) and J2 and P2 (22).

(c) Loosen the captive screw (8), and remove the radio receiver (20).

(2) *Installation.*

(a) Position the receiver in the transponder control group housing (6), and secure it with the captive screw.

(b) Connect the connectors J1 and P1, and J2 and P2.

(c) Install the rear housing cover (pars. 12-10b through 12-10d).

**12-15. Replacement of the Preformed Packing from the Front Housing Cover**

*a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder control group (par. 12-13a).

(3) Loosen the six captive screws (3, fig. 12-2) sufficiently to ensure the depletion of the air pressure from the guidance set, but do not remove the screws that secure the access cover plate (5).

(4) Loosen the retaining screw (fig. 12-5), and disengage the lever arm.

(5) Exert steady pull on the two hook handles, and remove the front housing cover from the transponder control group.

(6) Remove the preformed packing from the front housing cover.

*b. Installation.*

(1) Clean the packing, packing seat, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-S-8660 to the packing, packing seat, and metal sealing surface.

(2) Install the packing on the housing cover.

(3) Install the housing cover on the transponder control group, and press into position.

(4) Engage the lever arm, and tighten the retaining screw.

(5) Tighten the six captive screws (3, fig. 12-2) that secure the access cover (5) plate to the transponder control group (1).

(6) Install the transponder control group (par. 12-13b).

(7) Pressure test the transponder control group as prescribed in paragraph 4-15.

**12-16. Replacement of the Flight Control Group**

*a. Removal.*

(1) Remove the front housing cover (par. 12-15a (1) through (5)).

(2) Remove the metal hose assembly (3, fig. 12-7).

(3) Remove the cap screws (1), and remove the flight control group (24).

*b. Installation.*

(1) Install the flight control group.

(2) Install the metal hose assembly.

(3) Install the front housing cover (par. 12-15b (1) through (7)).

(4) (Deleted)

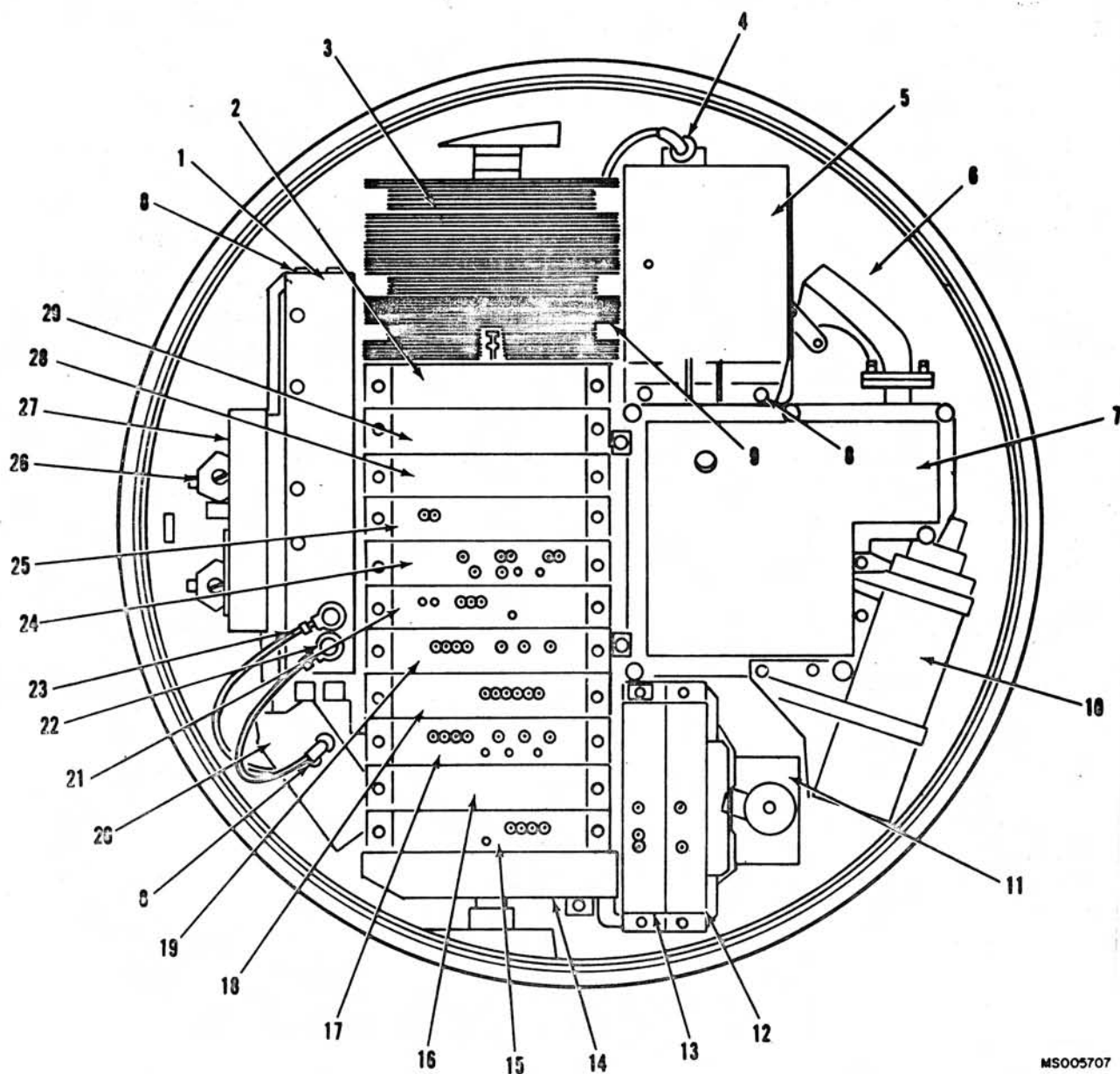
**12-17. Replacement of the Interconnecting Board**

*a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the rear housing cover (par. 12-10a).





MS005707

- 1—Amplifier-decoder A-17
- 2—Dc power filter A-3
- 3—Radio set power supply A-2
- 4—Connectors P1 and J8
- 5—Transistor oscillator inverter A-1
- 6—Transponder/control group housing
- 7—Radio transmitter A-18
- 8—Captive screw (4)
- 9—Captive screw (6)
- 10—Magnetron
- 11—Missile-code delay line

- 12—Radio frequency detector A-15
- 13—Delay line driver A-14
- 14—Heat exchanger
- 15—Command detonation electronic switch A-13
- 16—P-Y burst delay network A-12
- 17—Command signal converter (Y) A-11
- 18—Command signal decoder A-10
- 19—Command signal converter (P) A-9
- 20—Radio receiver A-19
- 21—Pulse delay oscillator A-8
- 22—Connectors P2 and J2

Figure 12-6. Interior view of the mushroom transponder-control group.

23—Connector P1 and J1  
 24—Sweep generator A-7  
 25—Roll control amplifier A-6  
 26—Inertia switcher

27—Amplifier bias control A-16  
 28—Y steering amplifier A-4, A-5  
 29—P steering amplifier A-4, A-5

Figure 12-6—Continued.

(3) Remove the missile-code delay line (par. 12-11a).

(4) Remove each radio set plug-in component (par. 12-14a(1)).

(5) Remove the radio transmitter (par. 12-14b(1)).

(6) Remove the radio set power supply (par. 12-14d(1)).

(7) Remove the amplifier-decoder (par. 12-4e(1)).

(8) Remove the front housing cover (par. 12-15a(4) and (5)).

(9) Remove the metal hose assembly (3, fig. 12-7).

(10) Install the protective cap on the elbow (4) in the pressure transmitter (5).

(11) Remove the capscrews (1) and lockwashers (2) that secure the flight control group (24) in the transponder control group housing (8); remove the flight control group.

(12) Remove the screws (21), lockwashers (22), and flat washers (23) that secure the 2 screens (20) to the transponder control group; remove the 2 screens.

(13) Remove the two tubes (19) from the transponder control group housing.

(14) Remove the capscrews (6) and lockwashers (7) from the transponder control group housing.

(15) Remove the screw (12), lockwasher (13), and flat washer (14) that secure the end of the bus bar (17) to the transponder control group housing.

(16) Remove the capscrews (15) and lockwashers (7) that secure the heat exchanger (16) to the rear of the transponder control group housing. Remove the heat exchanger.

(17) Remove the 13 panhead screws (11), lockwashers (10), and flat washers (9) that se-

cure the interconnecting board (18) to the transponder control group housing.

**CAUTION:** Exercise extreme care when removing the interconnecting board to prevent damage to the board and connectors.

(18) Carefully remove the interconnecting board.

#### *b. Installation.*

**CAUTION:** Exercise extreme care when installing the interconnecting board to prevent damage to the board and connectors.

(1) Carefully position the interconnecting board in the transponder control group housing.

(2) Secure the interconnecting board to the housing with the screws (11), lockwashers (10), and flat washers (9).

(3) Position the heat exchanger in the housing, and secure the heat exchanger to the rear of the housing with the capscrews (15) and lockwashers (7).

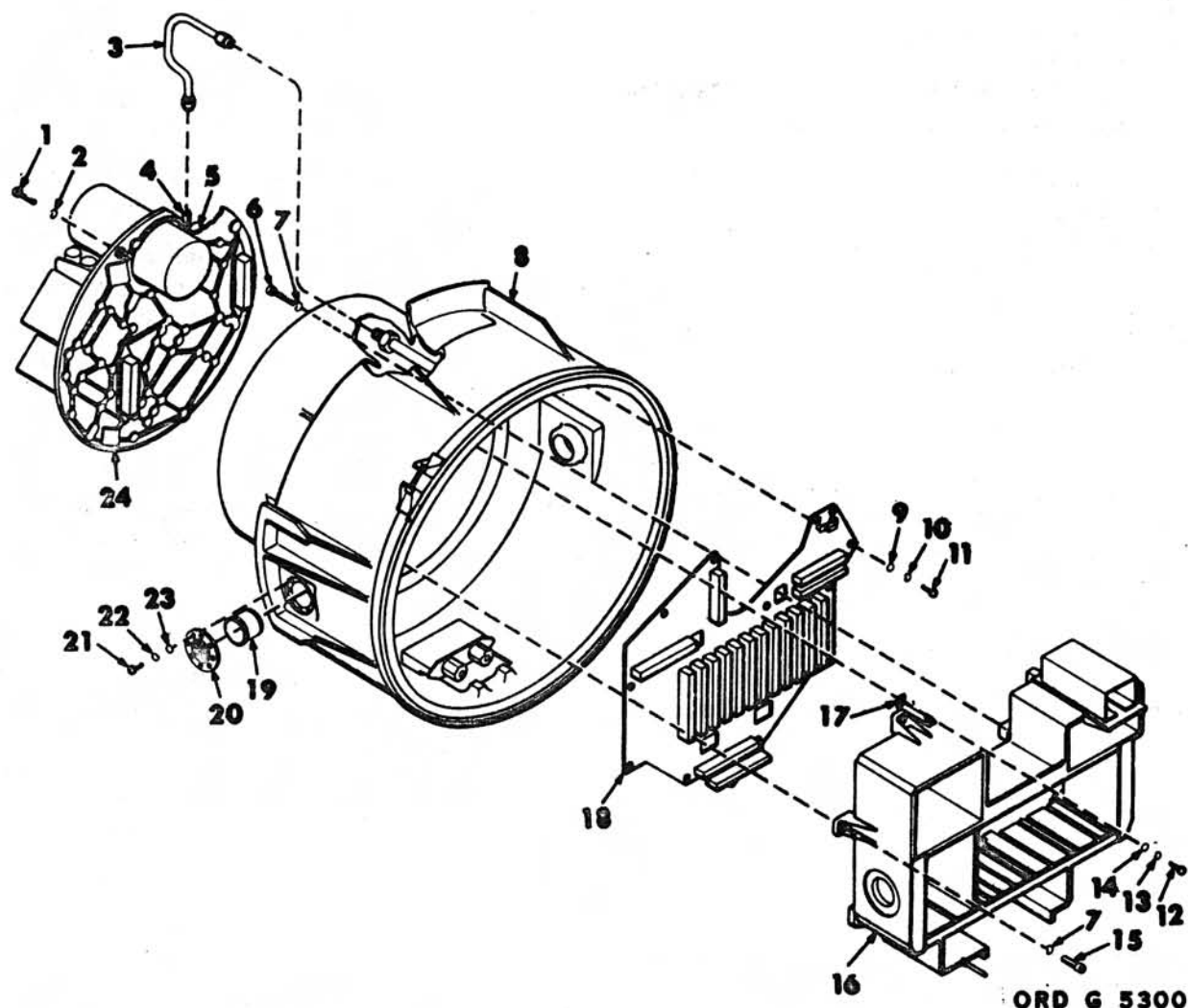
(4) Secure the end of the bus bar (17) to the housing with the screw (12), lockwasher (13), and flat washer (14).

(5) Install the capscrews (6) and lockwashers (7) in the transponder control group housing (8).

(6) Clean the preformed packing on metal tubes, packing seat, and metal sealing surface with a lint-free cloth saturated with cleaning solution 9156817. Apply insulating compound MIL-S-8660 to the packing, packing seat, and metal sealing surface.

(7) Insert the two tubes into the housing.

(8) Apply antiseize compound to the threads of the screws (21).



ORD G 5300

- |  |  |
|--|--|
| 1—1/4-20 x 1 1/8 socket-hd capscREW (9)  | 13—No. 8 lockwasher                    |
| 2—1/4-in. lockwasher                     | 14—No. 8 fl washer                     |
| 3—Metal hose assy                        | 15—1/4-20 x 5/8 socket-hd capscREW (7) |
| 4—Elbow                                  | 16—Heat exchanger                      |
| 5—Pressure transmitter                   | 17—Bus bar                             |
| 6—1/4-20 x 2-1/16 socket-hd capscREW (5) | 18—Interconnecting board               |
| 7—1/4-in. lockwasher (12)                | 19—Tube (2)                            |
| 8—Transponder control group housing      | 20—Screen (2)                          |
| 9—No. 10 fl washer (13)                  | 21—No. 8-32 x 1/2 pan-hd screw (12)    |
| 10—No. 10 lockwasher (13)                | 22—No. 8 lockwasher (12)               |
| 11—No. 10-24 x 5/8 pan-hd screw (13)     | 23—Fl washer (12)                      |
| 12—No. 8-32 x 5/16 pan-hd screw          | 24—Flight control group                |

Figure 12-7. Partially exploded view of the mushroom transponder control group.

(9) Position the 2 screens on the housing, and secure them with the screws (21), lockwashers (22), and flat washers (23).

(10) Apply insulating compound MIL-I-8660 to the flight-control alignment pins.

(11) Carefully position the flight-control group in the transponder control group housing, and secure it with the capscrews (1) and lockwashers (2).

(12) Remove the cap from the elbow in the pressure transmitter.

(13) Install the metal hose assembly.

(14) Install the front housing cover (par. 12-15b (3) and (4)).

(15) Install the amplifier-decoder (par. 12-14e (2)).

(16) Install the radio set power supply (par. 12-14d (2)).

(17) Install the radio transmitter (par. 12-14b (2)).

(18) Install each radio set plug-in component (par. 12-14a (2) (a)).

(19) Install the missile-code delay line (par. 12-11b).

(20) Install the rear housing cover (pars. 12-10b through 12-10d).

## 12-18. Replacement of Waveguide Assembly 9007629

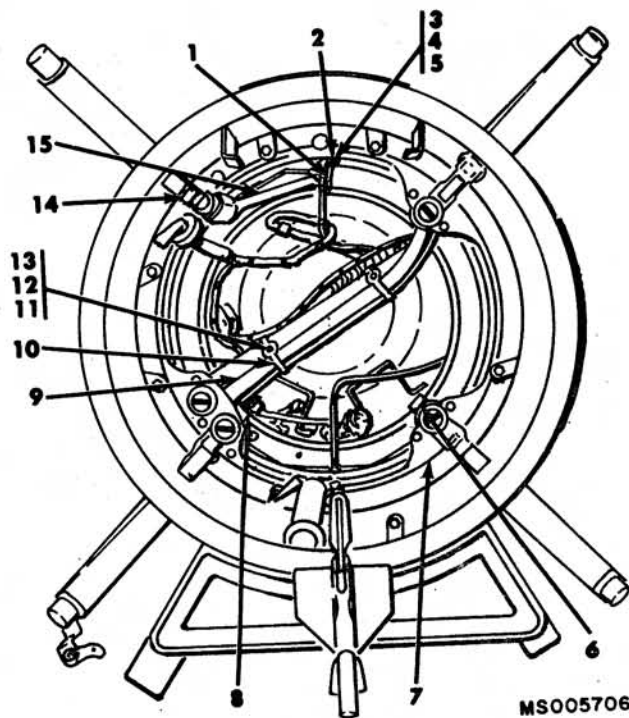
### a. Removal.

(1) Remove the transponder control group from the forward body section (par. 12-13a).

(2) Remove the screws (11, fig. 12-8), flat washers (12), and sleeve spacers (13) that secure the two clamps to waveguide assembly 9007629.

(3) Remove the screws (fig. 12-9) and lockwashers that secure waveguide assembly 9007629 (fig. 12-8) to waveguide assembly 9007632.

(4) Remove the self-locking hexagon nuts (fig. 12-9), flat washers, springs, and shoulder screws that secure waveguide assembly 9007629 (9, fig. 12-8) to the frame. Remove the waveguide assembly.



MS005706

- 1-Clamp
- 2-Bracket
- 3-No. 10-32 x 5/8 cross-recess truss-hd screw
- 4-No. 10 fl washer
- 5-No. 10 lockwasher
- 6-Waveguide assy 9009558
- 7-Frame
- 8-Waveguide assy 9009051
- 9-Waveguide assy 9007629
- 10-Clamp
- 11-No. 8-32 x 1-1/8 cross-recess rdl-hd screw
- 12-0.174-in id fl washer
- 13-Sleeve spacer
- 14-Waveguide assy 9007632
- 15-Waveguide assy 9007631

Figure 12-8. Interior view of the forward body section with the transponder control group removed.

(5) Spring open the two clamps, and remove them from the waveguide assembly.

### b. Installation.

(1) Assemble the two clamps (10, fig. 12-8) to waveguide assembly 9007629.

(2) Position the end of the waveguide assembly on the frame, and secure it with the two shoulder screws (fig. 12-9), four flat washers, two springs, and two self-locking hexagon nuts.

- (8) Install the transponder control group (par. 12-13b).

#### 12-20. Replacement of Waveguide Assembly 9007632

##### a. Removal.

- (1) Prepare the transponder control group from the forward body section (par. 12-18a).

- (3) Disconnect or remove the appropriate waveguide assembly as prescribed in paragraphs 12-18, 12-19, or 12-20.

- (4) Remove the capscrew (fig. 12-9) and lockwasher that secure the waveguide assembly to the forward body section.

- (5) Carefully remove the waveguide assembly.

##### b. Installation.

- (1) Assemble the waveguide assembly to the interior of the forward body section, and

secure it in position with the cap screw and lockwasher.

- (2) Replace the appropriate waveguide assembly as instructed in paragraphs 12-18, 12-19, or 12-20.

- (3) Install the transponder control group (par. 12-13b).

#### 12-21. Adjustment of the Missile Response Time

Adjust the DELAY LINE ADJUST switch on radio transmitter A18 to  $850 \pm 20$  millimicroseconds. If the response time is shorter than the lower limit, rotate the DELAY LINE adjust switch in a clockwise direction. If the response time is longer than the higher limit, rotate the DELAY LINE ADJUST switch in a counterclockwise direction. Each step of the switch changes the delay by 20 millimicroseconds.

### Section III. CORRECTIVE MAINTENANCE OF THE MISSILE GUIDANCE SET (STOVEPIPE)

#### 12-21.1. General

This section contains instructions for the performance of authorized corrective maintenance of the stovepipe missile guidance set. The corrective maintenance consists of the replacement of parts listed in TM 9-1410-250-25P/2/1 and the related cleaning and inspection functions.

#### 12-22. Installation and Removal of the Nose Hinge Assembly

- a. Installation. Install the nose hinge assembly (par. 12-15a).

- b. Removal. Remove the nose hinge assembly (par. 12-15b).

#### 12-23. Handling, Cleaning, and Inspection

Refer to paragraph 12-6 for handling, cleaning, and inspection procedures.

#### 12-24. Replacement of the Antenna Horn

##### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.

- (2) Loosen the captive screws (26, fig. 12-2) that secure the antenna horn (25) to the forward fin assembly (28), and remove the horn.

##### b. Installation.

- (1) Ascertain that preformed packing (18, fig. 12-2) is properly seated and firmly cemented on the antenna horn (25).

- (2) Check the retaining rings (27) for damage, replace them if necessary.

- (3) Position the antenna horn on the forward fin assembly and secure it with the two captive screws. Tighten the captive screws to the torque value given in table 15-9.

#### 12-25. Replacement of the Fail-Safe Control

##### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.

- (2) Remove the fail-safe control (par. 11-17).

*Note.* Check the fastener retainer (22, fig. 12-2) for damage. Replace if necessary.

- b. Installation. Install the fail-safe control (par. 7-3).

- c. Rearming the Missile. Rearm the missile in accordance with Chapter 10.



## 12-26. Replacement of the Sequential Timer

- a. *Removal.* Remove the sequential timer (par. 12-9a).
- b. *Installation.* Install the sequential timer (par 12-9b).

## 12-27. Replacement of the Rear Cover Gasket

### a. *Removal.*

- (1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

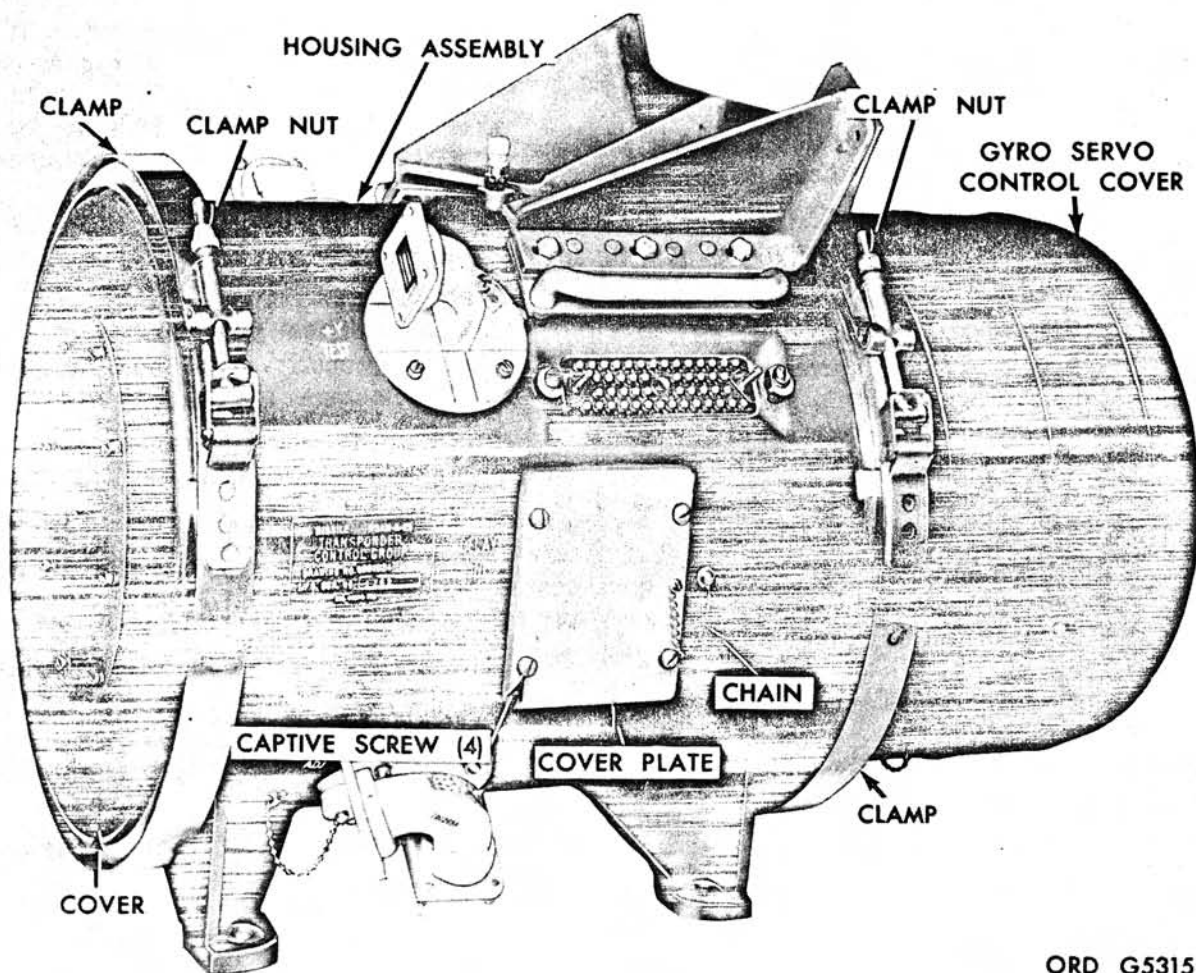
**WARNING:** Insure that the TCG is depressurized by depressing the valve core in the air valve (3, fig. 12-11) before removing the clamp.

- (2) Loosen the clamp nut (fig. 12-10), and remove the cover.

- (3) Remove the gasket (12, fig. 12-11) from the rear cover.

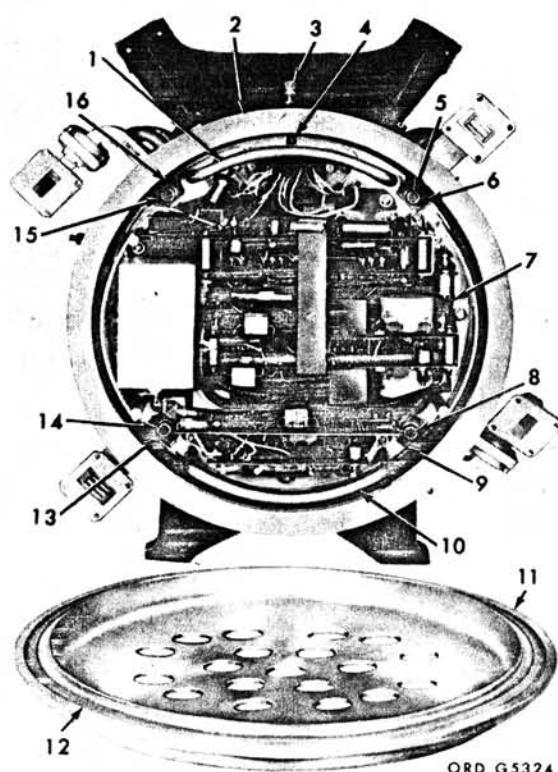
### b. *Installation.*

- (1) Clean the gasket, gasket seat, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002. Apply insulating com-



ORD G5315

Figure 12-10. Stovepipe transponder control group.



- 1—Bow handle
- 2—Housing assembly
- 3—Air valve
- 4—Pin
- 5—Hexagon adapter
- 6—Locking plate
- 7—Radio set
- 8—Hexagon adapter
- 9—Locking plate
- 10—Bow handle
- 11—Cover
- 12—Gasket
- 13—Locking plate
- 14—Hexagon adapter
- 15—Hexagon adapter
- 16—Locking plate

Figure 12-11. View of the stovepipe transponder control group with the cover removed.

- pound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.
- (2) Install the gasket on the rear housing cover.
- (3) Position the cover; install the clamp; and tighten the clamp nut.

- (4) Perform the air leakage test on the transponder control group (par. 4-15).
- (5) Remove the nose hinge assembly (par. 12-5b).
- (6) Rearm the missile, using the applicable procedures in chapter 10.

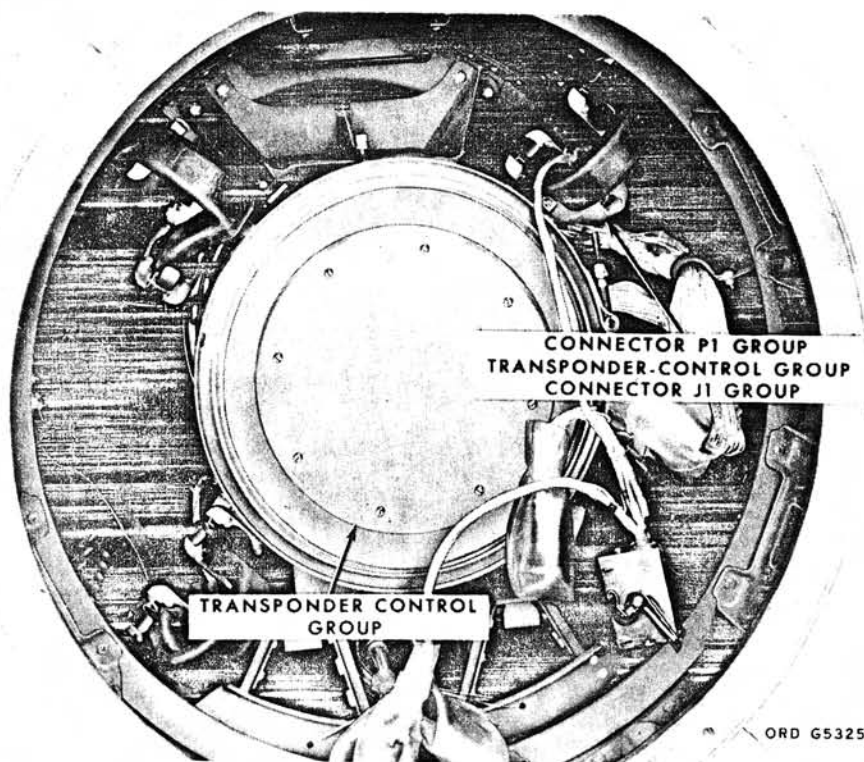
## 12-28. Replacement of the Transponder Control Group

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1
- (2) Disconnect the stagnation tube fitting (fig. 12-12) from the transponder control group.
- (3) Install the protective cap on the stagnation tube fitting and the protective plug on the end of the stagnation tube.
- (4) Disconnect the four waveguide assembly sets (6, fig. 12-13) from the transponder control group.
- (5) Disconnect the connector P1 group (fig. 12-14) from the transponder control group connector J1 group.
- (6) Remove the bolts (fig. 12-12), flat washers, and nuts securing the fitting assembly to the forward body section.
- (7) Remove the bolts, flat washers, and nuts securing the feet of the transponder control group.
- (8) Remove the transponder control group.

### b. Installation.

- (1) Position the transponder control group (fig. 12-12) in the forward body section.
- (2) Install the bolts, flat washers, and nuts to the feet of the transponder control group; do not tighten.
- (3) Install the bolts, flat washers, and nuts to secure the fitting assembly to the forward body section.
- (4) Torque the nuts and bolts listed in step (2) above to 175 pound-inches and the nuts and bolts listed in step (3) above to a 25 pound-inches.



ORD G5325

Figure 12-12. Transponder control group mounted in the forward body section, showing the hardware.

- (5) Connect the connector P1 group (fig. 12-14) to the transponder control group connector J1 group.
- (6) Connect the four waveguide assembly sets (3, fig. 12-18) to the transponder control group.
- (7) Blow out the stagnation tube with clean, dry, compressed air.
- (8) Apply sealing compound MIL-S-7502 to the stagnation tube fitting on the transponder control group.
- (9) Connect the stagnation tube (fig. 12-12) to the transponder control group.
- (10) Rearm the missile as prescribed in chapter 10.

## 12-29. Replacement of the Missile-Code Delay Line

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the J1  $\pm$  XMTR access door.
- (3) Loosen the captive screws (fig. 12-10) holding the cover plate to the housing assembly, and allow the cover plate to hang by the chain.
- (4) Rotate the knob and lever assembly (fig. 12-15) 90 degrees counterclockwise, and carefully slide the missile-code delay line out of the housing assembly.

assembly; and secure it in position with the captive screws.

- (4) Perform the air leakage test (par. 4-15).
- (5) Install the J1  $\pm$ XMTR access door.

## 12-30. Replacement of the Radio Set

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.
- (2) Insure that the transponder control group is depressurized by depressing the core in the air valve (3, fig. 12-11).

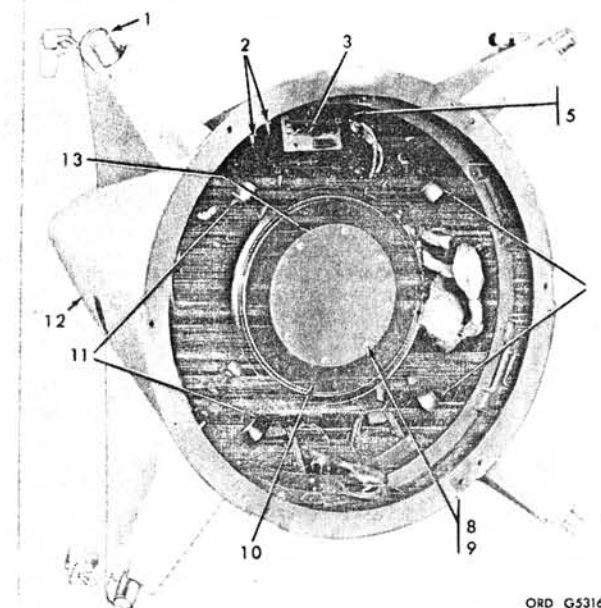
*Note.* Steps (3) and (4) are not required when replacing components of the radio set.

- (3) Remove the transponder control group (par. 12-28a).
- (4) Block up the gyro servo control cover (fig. 12-10) to prevent the transponder control group from tipping when the radio set is removed from the housing assembly.
- (5) Loosen the clamp nut, and remove the cover (fig. 12-11) and the gasket (12).
- (6) Rotate the four hexagon adapters on the radio set 90 degrees counter-clockwise to disengage the four locking plates from locking groove in the housing assembly.
- (7) Grasp the two bow handles, and carefully slide the radio set out of the housing assembly.

### b. Installation.

**Caution:** When inserting the radio set into the housing assembly, be careful that the wires and harnesses do not become jammed or pinched.

- (1) Align the groove of the mounting panel (9, fig. 12-16) with the pins in the housing assembly, and carefully slide the radio set into the housing assembly.



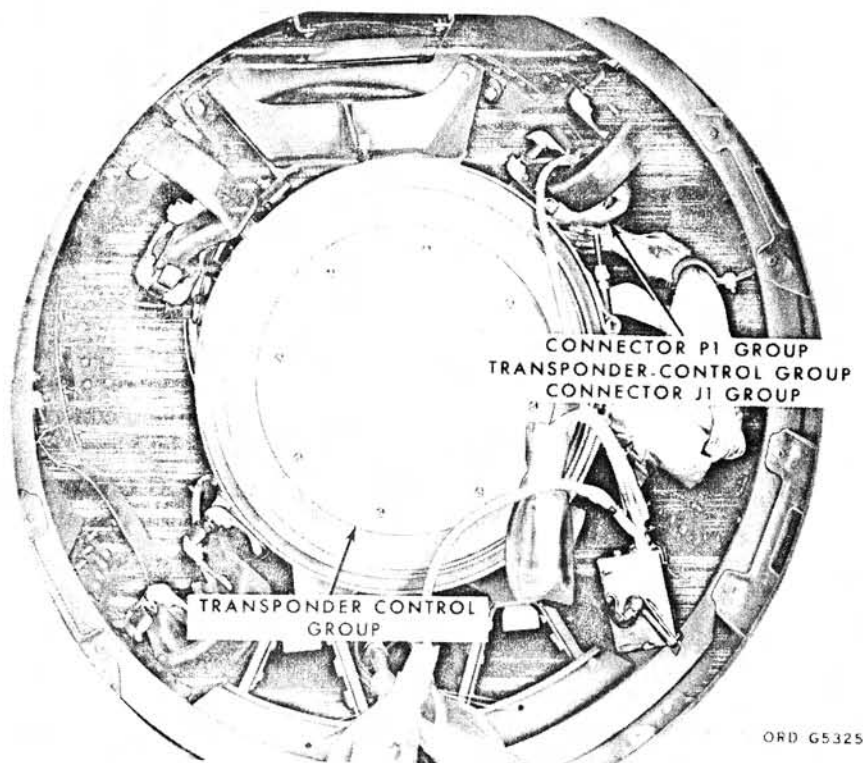
ORD G5316

- 1—Antenna horn
- 2—Captive screws
- 3—Fail-safe control
- 4—Connector P502 group
- 5—Fail-safe control connector J1 group
- 6—Waveguide assembly set
- 7—No. 10-24 x 5/8 pan-hd screw
- 8—No. 10 lockwasher
- 9—No. 10 fl washer
- 10—Transponder control group
- 11—Waveguide assembly set
- 12—Forward body section
- 13—Encased seal

Figure 12-13. Rear view of the forward body section.

### b. Installation.

- (1) Insert the missile-code delay line through the opening in the housing assembly, and rotate the knob and lever assembly to lock the missile-code delay line in position.
- (2) Clean the gasket, gasket seat, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.
- (3) Check that the gasket (fig. 12-15) is properly seated in the groove; assemble the cover plate to the housing



ORD G5325

*Figure 12-14. Stovepipe transponder-control group mounted in the forward body section, showing connectors.*

- (2) Rotate the four hexagon adapters on the radio set 90 degrees clockwise to engage the four locking plates in locking groove in the housing assembly.
  - (3) Remove the screws (7, fig. 12-13), lockwashers (8), and flat washers (9); remove the encased seal (13) and the desiccant. If the desiccant is deactivated, install new desiccant.
  - (4) Install the desiccant and the encased seal, and secure with the screws, lockwashers, and flat washers.
  - (5) Clean the gasket, gasket seal, and metal sealing surface with a lint-free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-I-8660 to the gasket, gasket seal, and metal sealing surface.
  - (6) Install the gasket in the groove in the cover.
  - (7) Position the cover; install clamp (fig. 12-10); and tighten the clamp nut.
- Notes.* Install the transponder control group (par. 12-28b) if removed in a above.
- (8) Perform the air leakage test (par. 4-15).



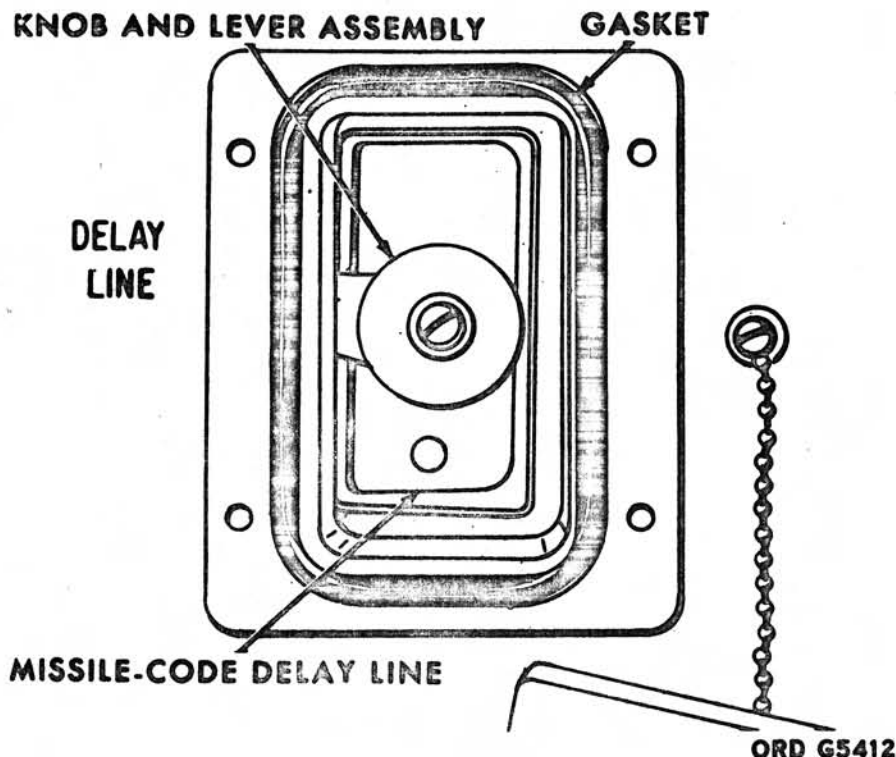


Figure 12-15. Removal of the missile-code delay line cover plate.

(9) Remove the nose hinge assembly (par. 12-5b).

(10) Rearm the missile as prescribed in chapter 10.

### 12-31. Replacement of the Signal Data Converter

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

(2) Insure that the transponder control group is depressurized by depressing the core in the air valve (3, fig. 12-11).

(3) Remove the radio set (par. 12-30a).

(4) Position the radio set with the bow handles resting on the bench.

(5) Loosen the plate captive screws (6, fig. 12-17) that secure the mounting plate group to the radio set.

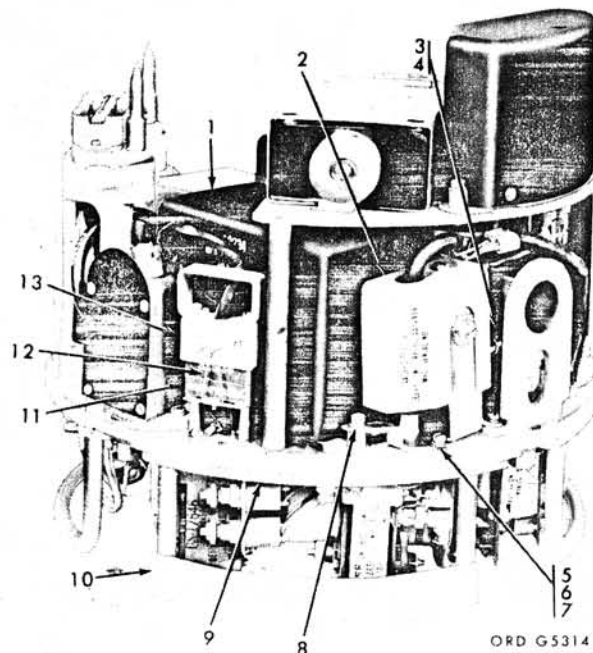
(6) Loosen and remove the screw (7, fig. 12-17), and remove the mounting plate group (3) from the radio set.

(7) Disconnect the signal data converter connectors P3 (6, fig. 12-18) P2 (8), and the amplifier-decoder connectors P4 (10) and P5 (7) from the delay line driver-detector connectors J3 (14); J5 (11), J2 (13), and J4 (12), respectively.

(8) Remove the screw (5, fig. 12-16), flat washer (6), and lockwasher (7) that partially secure the tapped delay line (2) to the mounting panel.

(9) Loosen the captive screw (8) securing the tapped delay line (2) to the radar modulator (1) and carefully pull out far enough to provide access to the tapped delay line connector J1 (3)

(10) Disconnect the signal data converter connector P4 (15, fig. 12-18) from the tapped delay line connector J1 (15).



- 1-Radar modulator
- 2-Tapped delay line
- 3-Tapped delay line connector J1
- 4-Signal data converter connector P4
- 5-No. 8-32 x 3/8 fl-hd screw
- 6-No. 6 fl washer
- 7-No. 6 lockwasher
- 8-Captive screw
- 9-Mounting panel
- 10-Signal data converter
- 11-Mounting panel connector J2 group
- 12-Connector spring clamp
- 13-Radar modulator connector P1 group

Figure 12-16. Side view of the radio set.

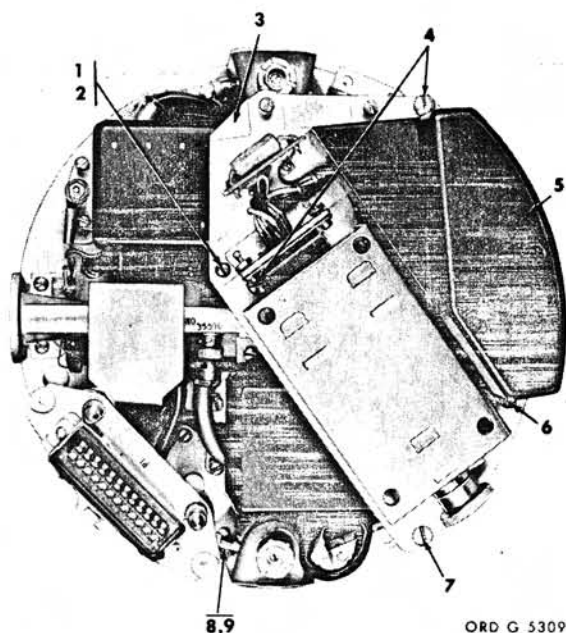
(11) Disconnect the signal data converter connector P5 (5) from the amplifier-decoder connector J1 (4).

(12) Loosen the captive screws (fig. 12-19) that secure the signal data converter to the radio set.

(13) Remove the signal data converter from the radio set.

#### b. Installation.

(1) Insert the four cables from the signal data converter through the opening in the mounting panel of the radio set, and carefully align the signal data converter to the radio set.



- 1-No. 8-32 x 1/4 fl-hd screw
- 2-No. 8 Lockwasher
- 3-Mounting plate group
- 4-Plate captive screws
- 5-Delay line driver-detector
- 6-Captive screw
- 7-No. 10-24 x 5/8 fl-hd screw
- 8-RF detector connector J2
- 9-Amplifier-decoder connector P3

Figure 12-17. Top view of the radio set.

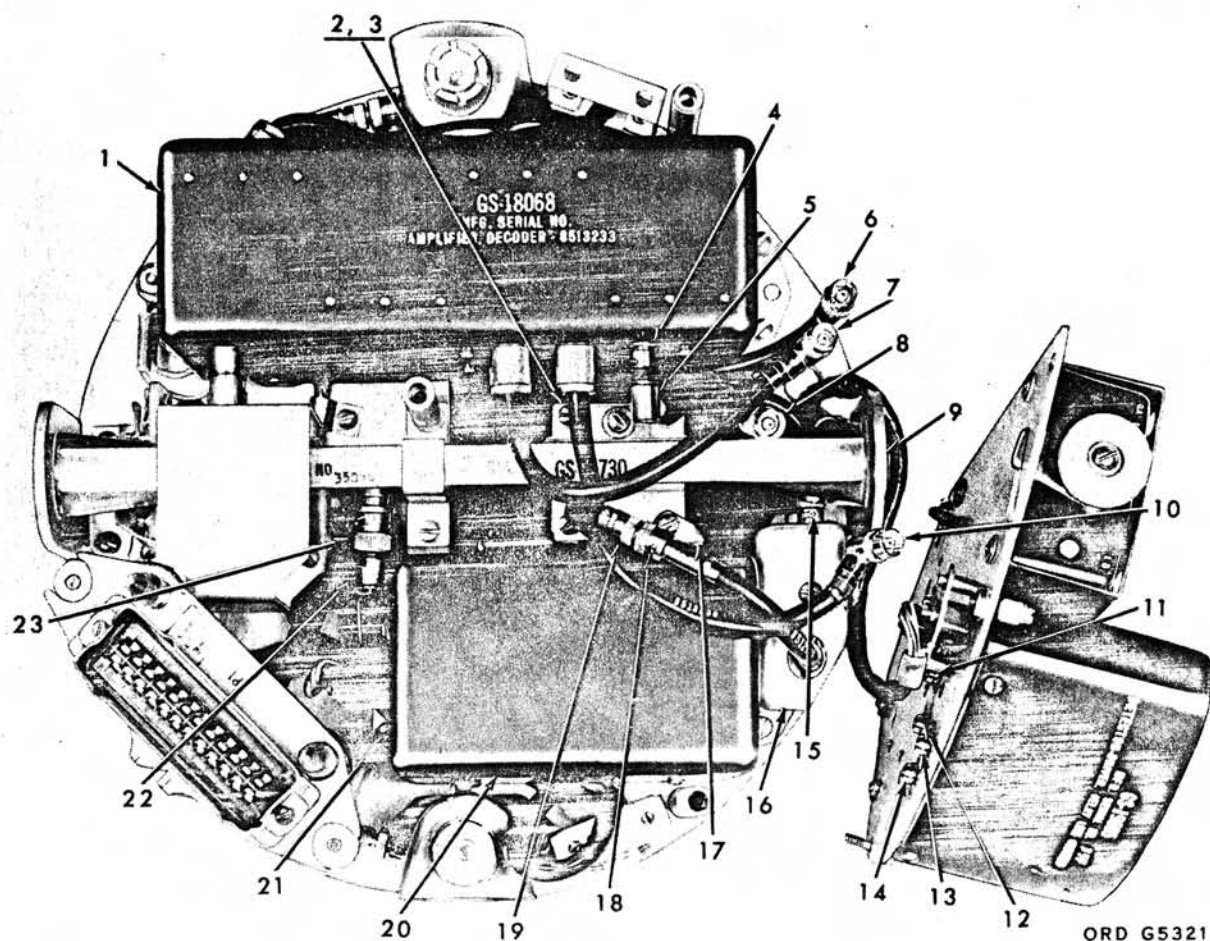
(2) Tighten the four captive screws that secure the signal data converter to the radio set.

(3) Connect the signal data converter connector P5 to the amplifier-decoder connector J1.

(4) Connect the signal data converter connector P4 to the tapped delay line connector J1.

(5) Position the tapped delay line, and secure it with the captive screw, fillister-head screw, flat washer, and lockwasher.

(6) Connect the signal data converter connectors P2 (8, fig. 12-18), P3 (6), and the amplifier-decoder connectors P4 (10) and P5 (7) to the



ORD G5321

- |  |  |
|--|--|
| 1—Amplifier decoder                        | 13—Delay line driver-detector connector J2                               |
| 2—No. 8-32 x 1/4 fil-hd screw (4)          | 14—Delay line driver-detector connector J3                               |
| 3—No. 8 lockwasher (4)                     | 15—Signal data converter connector P4 and tapped delay line connector J1 |
| 4—Amplifier-decoder connector J1           | 16—Tapped delay line   |
| 5—Signal data converter connector P5       | 17—Ground strap  |
| 6—Signal data converter connector P3       | 18—Tapped delay line connector P1  |
| 7—Amplifier-decoder connector P5           | 19—Radar modulator connector P2  |
| 8—Signal data converter connector P2       | 20—Radar modulator   |
| 9—Transmitter waveguide assembly           | 21—Captive screw   |
| 10—Amplifier decoder connector P4          | 22—Radar modulator connector P3  |
| 11—Delay line driver-detector connector J5 | 23—Magnetron electron tube connector J4                                  |
| 12—Delay line driver-detector connector J4 |  |

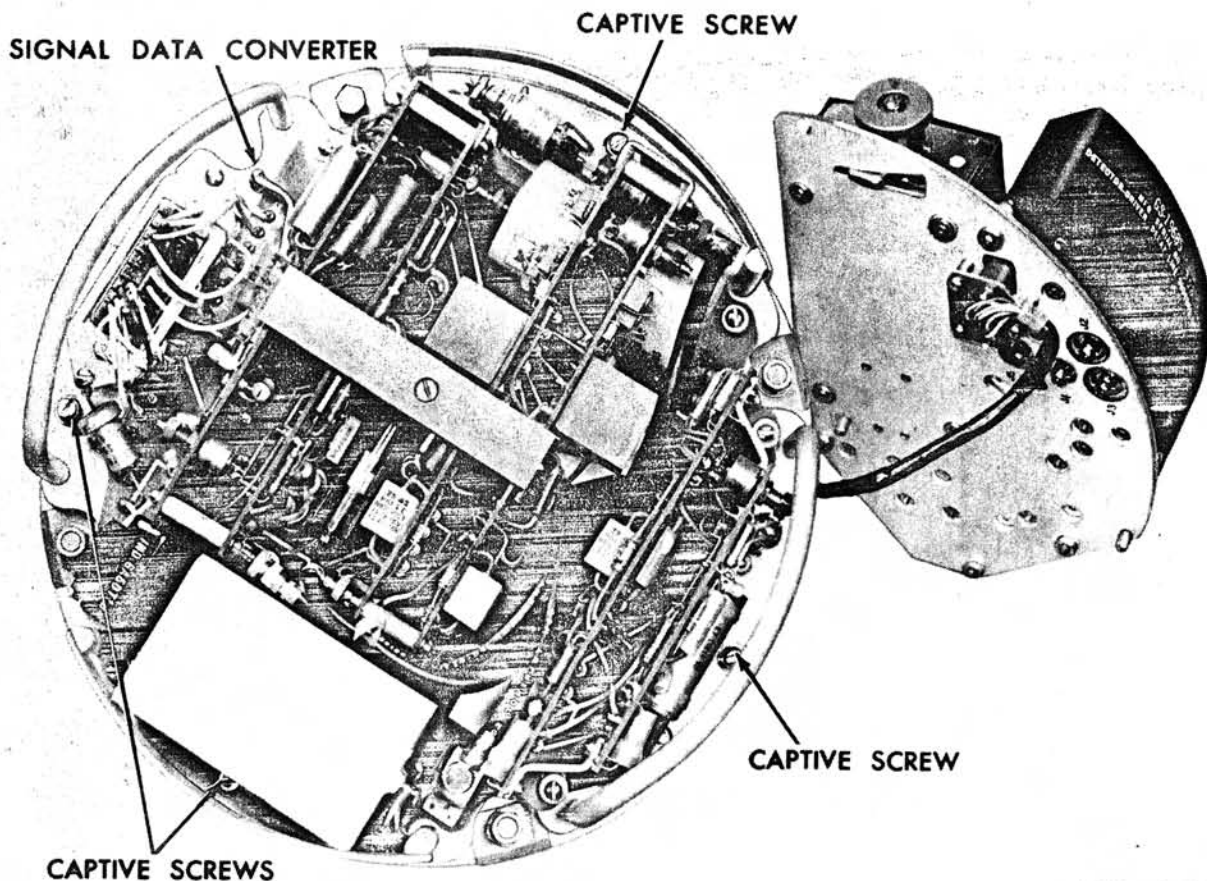
Figure 12-18. Top view of a partially disassembled radio set.

delay line driver-detector connectors J5 (11), J3 (14), J2 (13), and J4 (12), respectively.

(7) Secure the mounting plate group (3, fig.

12-17) in position with the two plate captive screws (4).

(8) Install the flathead screw on the mounting plate group and tighten them.



ORD G5310

Figure 12-19. Bottom view of the radio set.

- (9) Install the radio set (par. 12-30b).

## 12-32. Replacement of Gyro Servo Control

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

(2) Remove the radio set (par. 12-30a).

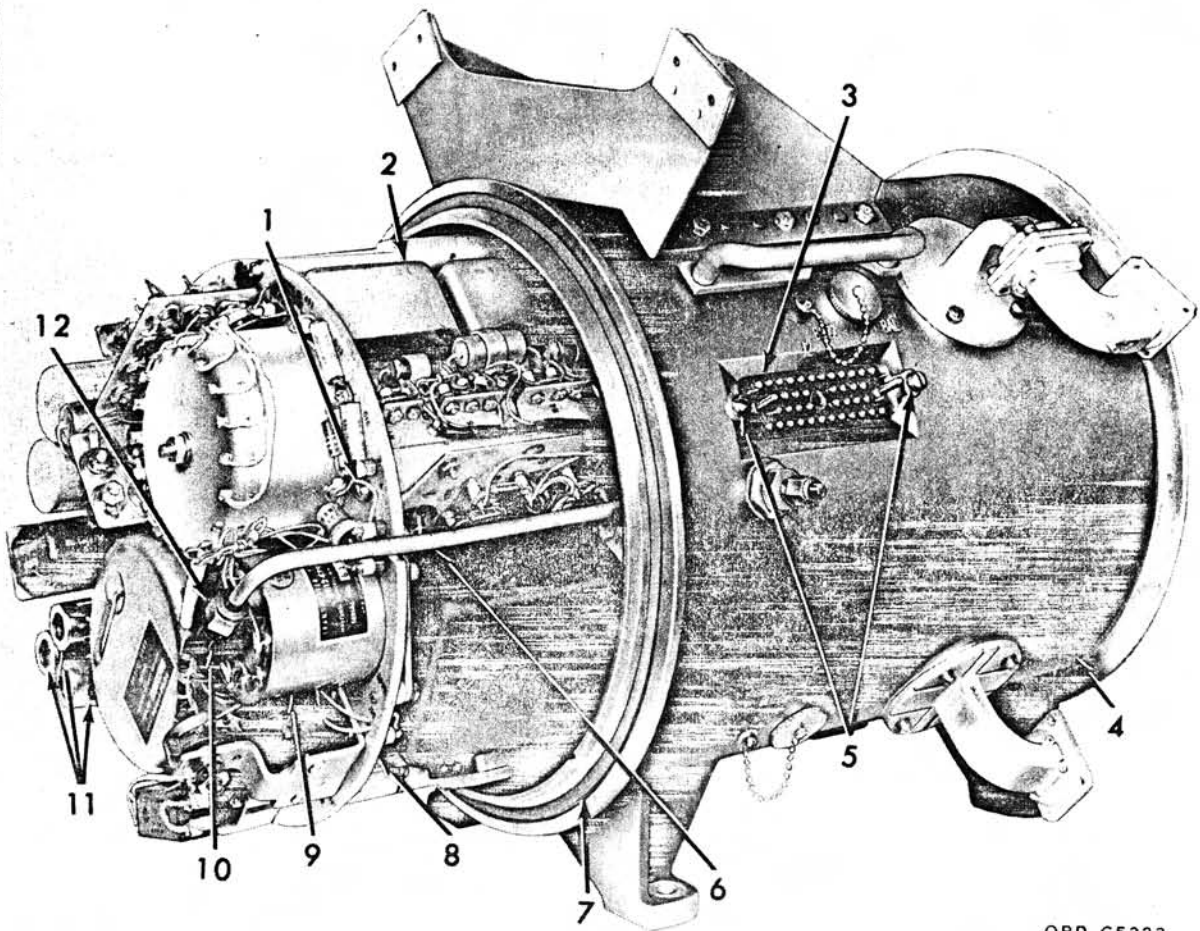
(3) Loosen the clamp nut (fig. 12-10), and remove the clamp, gyro servo control cover, and gasket.

(4) Disengage the female fitting of the pressure tube at the pressure transmitter.

(5) Cover the male fitting on the pressure transmitter with the protective cap or with masking tape, and cap the end of the pressure tube attached to the housing assembly.

(6) Rotate the five hexagon adapters (10, fig. 12-21) on the gyro servo control 90 degrees counterclockwise to disengage the five locking plates from the locking groove in the housing assembly.

(7) Loosen the two captive screws (fig. 12-20) that secure the housing assembly connector J2 group and its gasket to the housing assembly.



ORD G5323

- |  |                                     |
|--|-------------------------------------|
| 1—No. 10 lock washer and no. 10-24 x 5/8 fill-hd screw | 6—Pressure tube                     |
| 2—Gyro servo control                                   | 7—Gasket                            |
| 3—Housing assembly connector J2 group and gasket       | 8—Power supply                      |
| 4—Housing assembly                                     | 9—Pressure transmitter              |
| 5—Captive screw  | 10—Female fitting                   |
|  | 11—Voltage regulator electron tubes |
|  | 12—Male fitting                     |

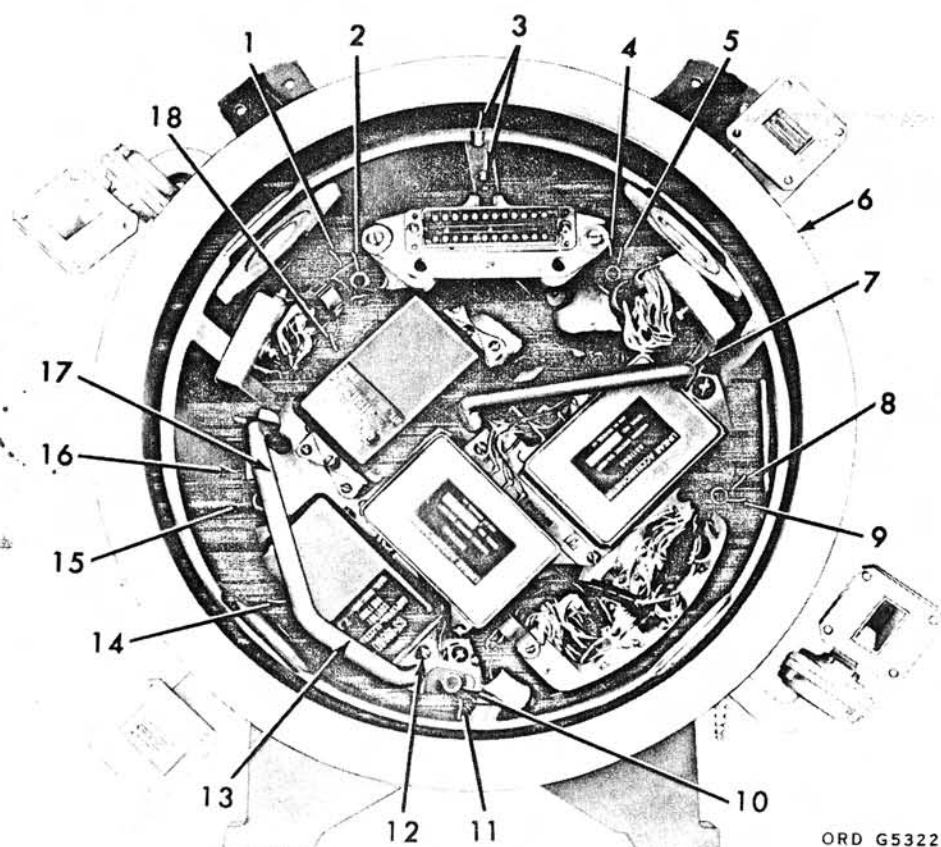
Figure 12-20. Transponder control group with the gyro servo control cover removed.

- (8) Loosen the two captive screws (fig. 12-22) that secure the housing assembly connector J1 group and its gasket to the housing assembly.
- (9) Carefully manipulate the housing assembly connector J1 group (2, 12-22) and gasket (8) and housing as-

sembly connector J2 group and gasket (3, fig. 12-20) out of openings in the housing assembly to prevent damage to the connector prongs.

- (10) Remove the gaskets from the housing assembly connector groups J1 and J2 (figs. 12-20 and 12-22).





ORD G5322

- |                    |                    |                         |
|--------------------|--------------------|-------------------------|
| 1—Locking plate    | 7—Bow handle       | 18—Y steering amplifier |
| 2—Hexagon adapter  | 8—Locking plate    | 14—Bow handle           |
| 3—Pin              | 9—Hexagon adapter  | 15—Hexagon adapter      |
| 4—Locking plate    | 10—Hexagon adapter | 16—Locking plate        |
| 5—Hexagon adapter  | 11—Locking plate   | 17—Gyro servo control   |
| 6—Housing assembly | 12—Captive screw   | 18—P steering amplifier |

Figure 12-21. Rear view of the transponder control group with the radio set removed.

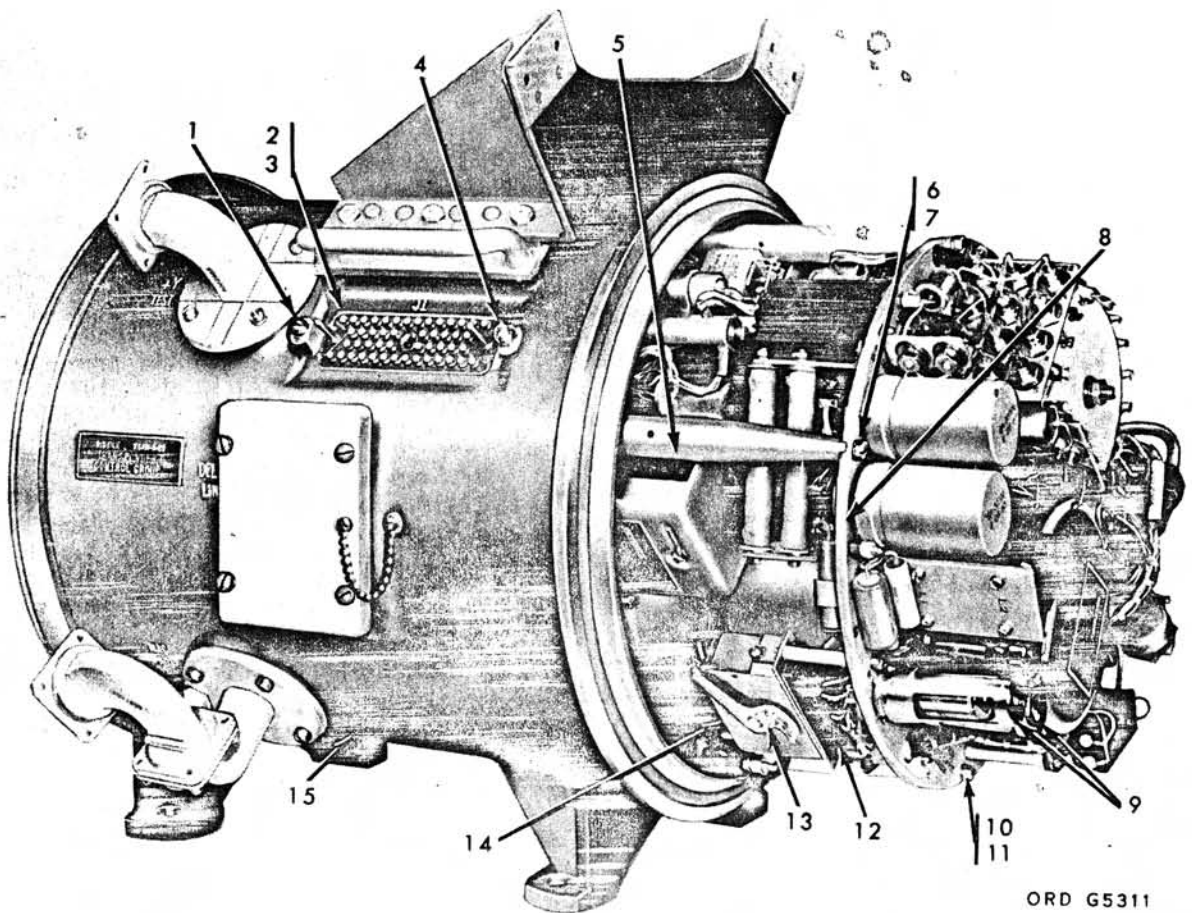
**Caution:** Carefully slide the gyro servo control out of the housing assembly to avoid damaging the connector prongs.

- (11) Grasp the bow handles (7, fig. 12-21), and remove the gyro servo control (17) from the housing assembly.

**b. Installation.**

**Caution:** Install the gyro servo control in the housing assembly carefully to prevent pinching the wires and damaging the connectors.

- (1) Align the groove of the gyro servo control to the pins in the housing assembly, and carefully slide the gyro servo control into the housing assembly.
- (2) Position the corresponding gaskets on the housing assembly connector J1 group and the housing assembly connector J2 group on the gyro servo control.
- (3) Carefully manipulate the housing assembly connector J1 group and its gasket and housing assembly con-



ORD G5311

- 1—Captive screw
- 2—Housing assembly connector J1 group
- 3—Gasket
- 4—Captive screw
- 5—Gyro servo control
- 6—No. 10-24 x 5/8 fil-hd screw
- 7—No. 10 lockwasher
- 8—Power supply

- 9—Tube shield
- 10—No. 10-24 x 5/8 fil-hd screw
- 11—No. 10 lockwasher
- 12—Power supply connector P1 group
- 13—Connector latch
- 14—Gyro servo control connector, P1 group
- 15—Housing assembly

Figure 12-22. Transponder control group, showing the gyro servo control.

connector J2 group and its gasket through openings in the housing assembly to prevent damage to the connector prongs.

(4) With the two captive screws, secure the housing assembly connector J2 group and its gasket to the housing assembly.

(5) Secure the housing assembly connector J1 group and its gasket to the housing assembly with the two captive screws.

(6) Rotate the five hexagon adapters on the gyro servo control 90 degrees clockwise to engage

the five locking plates with the locking groove in the housing assembly.

(7) Remove the cap on the end of the pressure tube, and blow out the tube with clean, dry, compressed air.

(8) Connect the female fitting of the pressure tube to the male fitting on the pressure transmitter, and tighten.

**NOTE.** It may be necessary to bend the tube slightly to achieve alignment with the fitting. Bend the tube only as much as it is necessary to achieve alignment.

(9) Install the gasket in the groove on the housing assembly.

(10) Align the gyro servo control cover, and assemble the clamp around the housing assembly.

(11) Tighten the clamp nut to seat the clamp.

(12) Install the radio set (par. 12-30b).

### 12-33. Replacement of Power Supply

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1 for replacement of the transponder control group.

(2) Remove the transponder control group (par. 12-28a).

(3) Loosen the clamp nut (fig. 12-10, and remove the gyro servo control cover and gasket.

(4) Disconnect the female fitting of the pressure tube at the pressure transmitter.

(5) Release the connector latch on the gyro servo control connector P1 group, and disconnect the connector P1 group from the power supply connector J1 group.

(6) Remove the screws (figs. 12-20 and 12-22) and lockwashers that secure the power supply.

**CAUTION:** Be careful when removing the power supply from the gyro servo control to prevent damage to the connectors and wires.

(7) Remove the power supply from the gyro servo control.

#### b. Installation.

(1) Position the power supply on the gyro servo control.

(2) Secure the power supply to the gyro servo control with the screws (figs. 12-20 and 12-22) and lockwashers.

(3) Connect the gyro servo control connector P1 group to the power supply connector J1 group and secure it with the connector latch.

(4) Install the gyro servo control in the housing assembly (par. 12-32b).

### 12-34. Replacement of the Radar Modulator

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a).

(3) Loosen the two plate captive screws (4, fig. 12-17) that secure the mounting plate (3) to the radio set.

(4) Remove the screw partially securing the mounting plate group (3) to the radio set.

(5) Disconnect the signal data converter connectors P3 (6, fig. 12-18), P2 (8), and the amplifier-decoder connectors P4 (10) and P5 (7) from the delay-line driver-detector connectors J3 (14), and J4 (12), respectively.

(6) Release the connector spring clamp (12, fig. 12-16) on the radar modulator connector P1 group (13), and disconnect the connector P1 group from the mounting panel connector J2 group (11).

(7) Disconnect the radar modulator connector P2 (19, fig. 12-18) from the tapped delay line connector P1 (18).

(8) Remove the screw, flat washer, and lockwasher partially securing the tapped delay line to the mounting panel.

(9) Loosen the captive screw (21) securing the tapped delay line (16) to the radar modulator and carefully move the tapped delay line to provide access to the captive screws.

(10) Loosen the captive screws (21) securing the radar modulator (20) to the mounting panel.

(11) Disconnect the radar modulator connector P3 (22) from the magnetron electron tube con-

necter J4 (23) and lift the radar modulator out of the radio set.

#### b. Installation.

(1) Connect the radar modulator connector P3 to the magnetron electron tube connector J4, and position the radar modulator (20) on the mounting panel.

(2) Tighten the captive screws securing the radar modulator (20) to the mounting panel.

(3) Position the tapped delay line, and secure it with the captive screw, flat washer, and lockwasher.

(4) Connect the tapped delay line connector P1 to the radar modulator connector P2.

(5) Connect the radar modulator connector P1 group to the mounting panel connector J2 group, and engage the connector spring clamp.

(6) Connect the signal data converter connectors P2 and P3 and the amplifier-decoder connectors P4 and P5 to the delay-line driver-detector connectors, J5, J3, J2, and J4, respectively.

(7) Secure the mounting plate group in position with the two plate captive screws.

(8) Apply sealing compound MIL-S-7502 to threads of the flathead screw.

(9) Install the flathead screw (fig. 12-17) on the mounting plate, and tighten.

(10) Install the radio set (par. 12-30b).

### 12-35. Replacement of the Radar Modulator Thyatron Electron Tube

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radar modulator (par. 12-34a).

(3) Remove the electron tube shield (fig. 12-23) and the thyatron electron tube.

#### b. Installation.

**NOTE.** To prevent accidental bending, ascertain that base pins of the electron tube are straight before installing it. Use a pin straightener, if available.

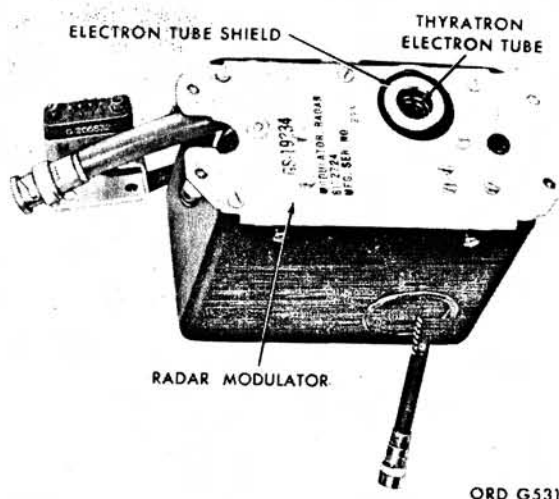


Figure 12-23. Bottom view of the radar modulator.

(1) Insert the thyatron electron tube (fig. 12-23) firmly in the radar modulator.

(2) Install the electron tube shield.

(3) Install the radar modulator (par. 12-34b).

### 12-36. Replacement of the Delay Line Driver-Detector

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a). Position the radio set with the bow handles resting on the bench.

(3) Loosen the two plate captive screws (4, fig. 12-17) that secure the mounting plate (3) to the radio set.

(4) Remove the flathead (1) screw partially securing the mounting plate group to the radio set.

(5) Disconnect signal data converter connectors P3 (6, fig. 12-18) P2 (8) and amplifier-decoder connectors P4 (10) and P5 (7) from delay line driver-detector connectors J3 (14), J5 (11), J2 (13), and J4 (12), respectively.

(6) Rotate the knob and lever assembly (fig. 12-15) 90 degrees counterclockwise, and carefully remove the missile-code delay line.

(7) Loosen the captive screws (fig. 12-17), and remove the screw and lockwasher securing the delay line driver-detector to the mounting plate group.

(8) Remove the delay line driver-detector from the mounting plate group.

#### *b. Installation.*

(1) Position the delay line driver-detector on the mounting plate group, and secure it in position with the three captive screws, fillister-head screw, and lockwasher.

(2) Connect signal data converter connectors P2 and P3 (fig. 12-18) and amplifier-decoder connectors P4 and P5 to delay line driver-detector connectors J5, J3, J2, and J4, respectively.

(3) Secure the mounting plate group in position with the two plate captive screws.

(4) Apply a sealing compound to the threads of the flathead screw, and install the flathead screw on the mounting plate and tighten.

(5) Install the missile-code delay line (fig. 12-15), and rotate the knob and lever assembly 90 degrees clockwise to lock the missile-code delay line in position.

(6) Install the radio set (par. 12-30b).

### **12-17. Replacement of the Amplifier-Decoder**

#### *Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a), and position it with the bow handles resting on the bench.

(3) Loosen the two plate captive screws (4, fig. 12-17) that secure the mounting plate group (3) to the radio set.

(4) Loosen and remove the flathead screw that partially secures the mounting plate group to the radio set.

(5) Disconnect signal data converter connectors P3 (6, fig. 12-18) and P2 (8), and amplifier-decoder connectors P4 (10) and P5 (7) from delay line driver-detector connectors J3 (14), J5 (11), J2 (13), and J4 (12), respectively.

(6) Disconnect signal data converter connector P5 (5) from amplifier-decoder connector J1 (4).

(7) Release the connector spring clamp (9, fig. 12-24) on amplifier-decoder connector P1 group (10), and disconnect connector P1 group from mounting panel connector J3 group (8).

(8) Disconnect amplifier-decoder connector P2 (3) from RF detector connector J1 (4).

(9) Disconnect amplifier-decoder connector P3 (9, fig. 12-17) from RF detector connector J2 (8).

(10) Loosen the four captive screws (5, fig. 12-24), and carefully lift the amplifier-decoder (2) out of the radio set.

#### *b. Installation.*

(1) Install the amplifier-decoder (2) on the radio set, and secure in position with the four captive screws.

(2) Connect amplifier-decoder connector P3 (9, 12-17) to RF detector connector J2 (8).

(3) Connect amplifier-decoder connector P2 (3, 12-24) to RF detector connector J1 (4).

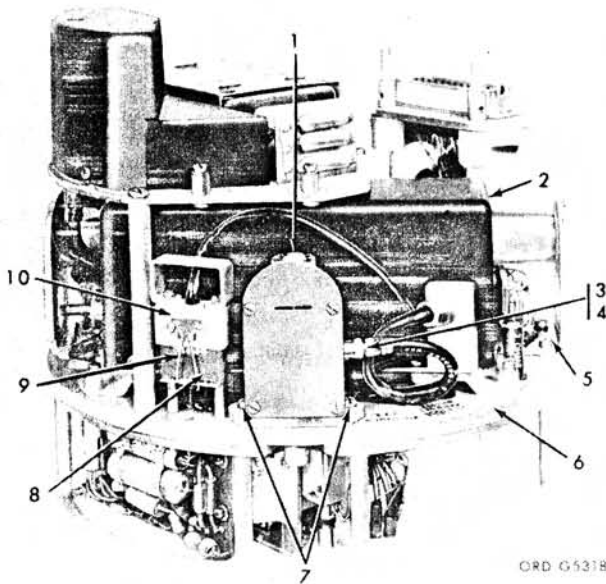
(4) Connect amplifier-decoder connector P1 group (10) to mounting panel connector J3 group (8), and engage the connector spring clamp (9).

(7) Secure the mounting plate group (3, fig. 12-17) in position with the two plate captive screws (4).

(8) Apply sealing compound to the threads of the flathead screw, and install the screw to the mounting plate group; tighten screw.

(9) Install the radio set (par. 12-30b).





- 1—RF detector
- 2—Amplifier decoder
- 3—Amplifier decoder connector P2
- 4—RF detector connector J1
- 5—Captive screws
- 6—Mounting panel
- 7—No. 8-32 x 1/2 fil-hd screws
- 8—Mounting panel connector J3 group
- 9—Connector spring clamp
- 10—Amplifier decoder connector P1 group

Figure 12-24. Side view of the radio set showing the RF detector.

### 12-38. Replacement of the Magnetron Electron Tube

#### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the signal data converter (par. 12-31a).
- (3) Remove the four captive screws securing the radar modulator (fig. 12-16) to the radio set.
- (4) Disconnect the radar modulator connector P3 (22, fig. 12-18) from the magnetron electron tube connector J4 (23) and remove the radar modulator (20).
- (5) Remove the screws (2) and lockwashers (3) securing the magnetron electron tube (fig.

12-25) to the transmitter waveguide assembly (9, fig. 12-18).

**CAUTION:** Use care in removing the magnetron electron tube to prevent dropping or knocking it.

(6) Manipulate the magnetron electron tube (fig. 12-25) through opening in the mounting panel.

**CAUTION:** Keep iron, steel, or magnets at least 2 inches from the magnetron electron tube after its removal to minimize magnetic attraction which will impair its efficiency.

#### b. Installation.

(1) Manipulate the magnetron electron tube into position through opening in the mounting panel.

**CAUTION:** Be sure the ground is installed so that it does not touch the magnetron electron tube.

(2) Position the group strap (17, fig. 12-18), and secure the magnetron electron tube (fig. 12-25) to the transmitter waveguide assembly (9, fig. 12-18) with the screws (2) and lockwashers (3).

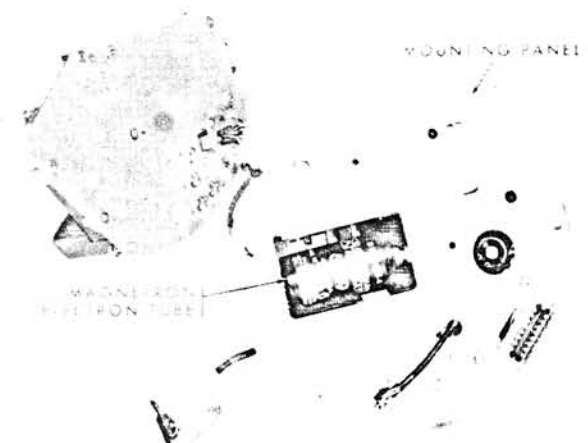


Figure 12-25. Radio set with the signal data converter removed.

(3) Connect radar modulator connector P3 22) to magnetron electron tube connector J4 (23).

(4) Install the radar modulator (20) and secure it with the four captive screws (21).

(5) Install the signal data converter (par. 2-31b).

### 2-39. Replacement of the Rectifying Crystal Unit

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the radio set (par. 12-30a) and position it with the bow handles resting on the bench.

(3) Use a spanner wrench to unscrew and remove the cap (fig. 12-26) from the RF detector.

(4) Remove the chuck with the rectifying crystal unit attached.

**CAUTION:** Ground the chuck to prevent the rectifying crystal unit from being damaged by static charges from maintenance personnel or from ungrounded equipment.

(5) Push the rectifying crystal unit from the chuck.

#### b. Installation.

**NOTE.** If only one rectifying crystal unit is to be replaced in the radio set, it must be replaced with a rectifying crystal unit of the same type as the one already installed.

**CAUTION:** Handle the rectifying crystal unit by the ground (large end) ONLY.

(1) Carefully insert the replacement rectifying crystal unit (fig. 12-26) in the chuck, and check that the jaws of the chuck exert light pressure on the crystal unit.

(2) Secure the crystal unit fingertight in the chuck.

(3) Insert the chuck in the RF detector.

(4) Install the cap, and secure it with the spanner wrench.

(5) Ensure that the crystal is securely seated in the chuck.

(6) Install the radio set (par. 12-30b).

### 12-40. Replacement of Voltage Regulator Tubes V1, V2, and V3

#### a. Removal.

(1) Remove the transponder control group (par. 12-28a).

(2) Loosen the clamp nut (fig. 12-10); remove the clamp, gyro servo control cover, and gasket (fig. 12-20).

(3) Remove the three tube shields (9, fig. 12-22) and three voltage regulator tubes (fig. 12-26) from the power supply.

#### b. Installation.

**NOTE.** Ascertain that the base pins of each tube are straight before installing to prevent accidental bending. Use a pin straightener, if available.

(1) Insert the tubes firmly into the power supply.

(2) Install the three tube shields.

(3) Clean the gasket, gasket seat, and free cloth saturated with toluene 6810-281-2002; apply insulating compound MIL-I-8660 to the gasket, gasket seat, and metal sealing surface.

(4) Assemble the gasket to the groove in the housing assembly.

(5) Align the gyro servo control cover, and assemble the clamp around the housing assembly.

(6) Tighten the clamp nut to the seat clamp.

(7) Install the transponder control group (par. 12-28b).

### 12-41. Replacement of Roll Control Amplifier

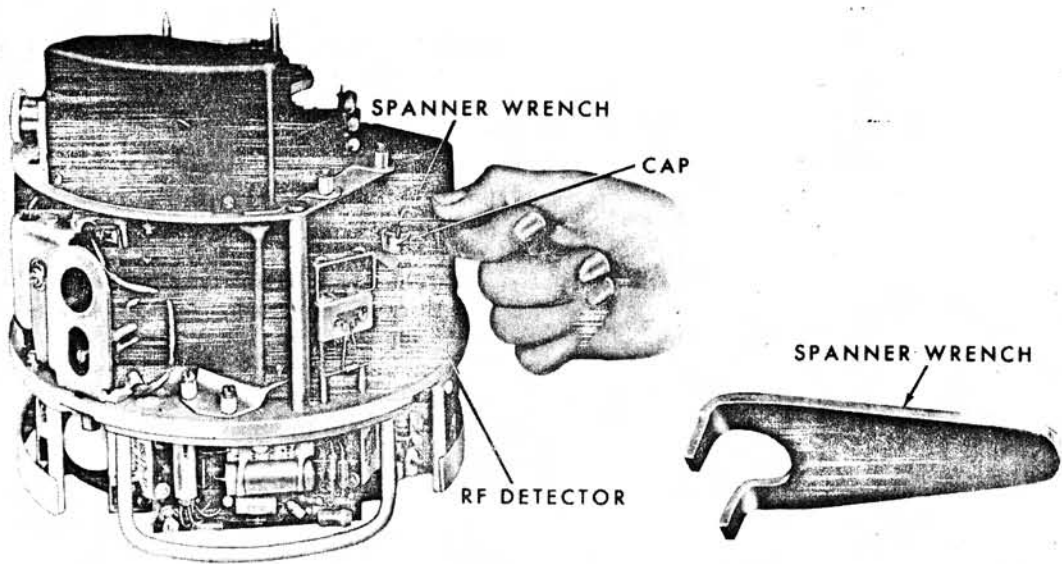
#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

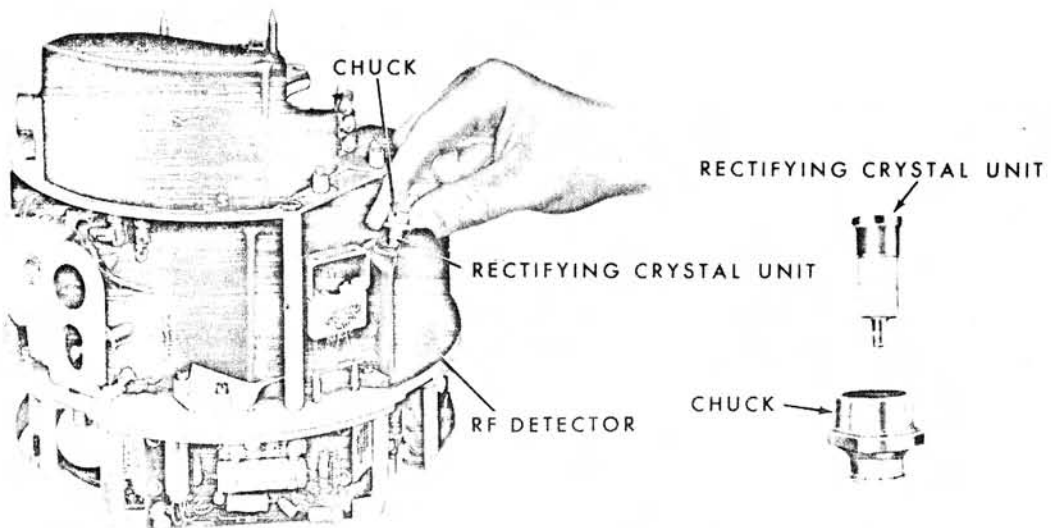
(2) Remove the power supply (par. 12-33a).

(3) Loosen the two captive screws (fig. 12-27) that secure the roll control amplifier to the gyro servo control.

(4) Remove the roll control amplifier from the gyro servo control.



A—REMOVING CAP WITH SPANNER WRENCH



B—REMOVING RECTIFYING CRYSTAL UNIT  
FROM RF DETECTOR

ORD G5312

Figure 12-26. Removal of the rectifying crystal unit.

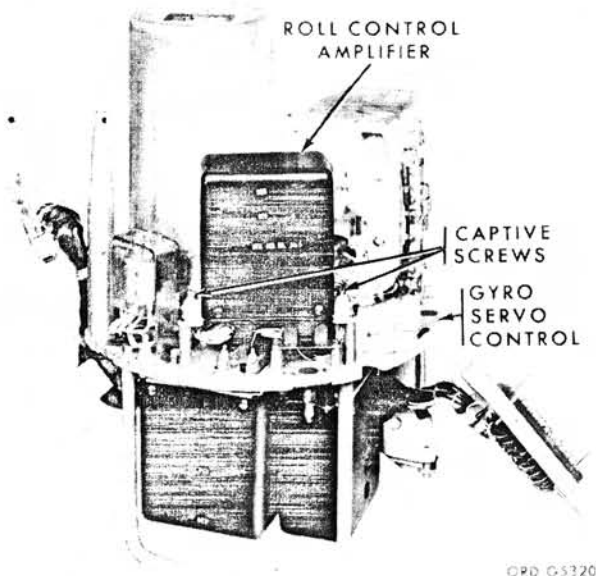


Figure 12-27. Gyro servo control with the power supply removed.

*b. Installation.*

- (1) Install the roll control amplifier on the gyro servo control, and secure the amplifier in position with the two captive screws.
- (2) Install the power supply (par. 12-33b).

**12-42. Replacement of the Y Steering Amplifier**

*a. Removal.*

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the gyro servo control (par. 12-32a), and position it carefully on its side.
- (3) Loosen the captive screws (fig. 12-21) securing the Y steering amplifier to the gyro servo control.
- (4) Remove the Y steering amplifier from the gyro servo control.

*b. Installation.*

- (1) Install the Y steering amplifier on the gyro servo control, and secure the amplifier in position with the captive screws.

- (2) Install the gyro servo control (par. 12-32b).

**12-43. Replacement of the P Steering Amplifier**

*a. Removal.*

- (1) Remove the radio set (par. 12-30a) and position the radio set with the bow handles resting on the bench.

**NOTE.** The P steering amplifier removal is performed with the gyro servo control in the housing assembly.

- (2) Loosen the captive screws (12, fig. 12-21) securing the P steering amplifier (18) to the gyro servo control (17).
- (3) Remove the P steering amplifier from the gyro servo control.

*b. Installation.*

- (1) Install the P steering amplifier on the gyro servo control, and secure the amplifier in position with the captive screws.
- (2) Install the radio set (par. 12-30b).

**12-44. Replacement of the Tapped Delay Line**

*a. Removal.*

- (1) Remove the radio set (par. 12-30a), and position the radio set with the bow handles resting on the bench.
- (2) Remove the screw (fig. 12-16), flat washer, and lockwasher partially securing the tapped delay line to the mounting panel.
- (3) Loosen the captive screw securing the tapped delay line to the radar modulator, and carefully pull the tapped delay line out of the way to provide access to tapped delay line connector P1 (18, fig. 12-18) and tapped delay line connector J1 (15).
- (4) Disconnect radar modulator connector P2 (19) from tapped delay line connector P1 (18).
- (5) Disconnect signal data converter connector P4 (15) from tapped delay line connector J1, and remove the tapped delay line (16).

### b. Installation.

(1) Connect signal data converter connector P4 to tapped delay line connector J1.

(2) Connect radar modulator connector P2 to tapped delay line connector P1.

(3) Position the tapped delay line, and secure it in position with the captive screw, screw, flat washer, and lockwasher.

(4) Install the radio set (par. 12-30b).

## 12-45. Replacement of RF Detectors 8172668 and 8172699

### a. Removal.

(1) Remove the radio set (par. 12-30a), and position it with the bow handles resting on the bench.

(2) Disconnect amplifier-decoder connector P2 (fig. 12-24) from RF detector connector J1.

(3) Remove the screws, and carefully lift the RF detector from the mounting panel.

**NOTE.** Both the RF detectors are removed in a similar manner. The RF detector which is not specified above

is wired from amplifier-decoder connector P3 to RF detector connector J2.

### b. Installation.

(1) Position the RF detector (1, fig. 12-24), and secure it in position with the screws.

(2) Connect amplifier-decoder connector P2 (3) to RF detector connector J1 (4).

(3) Install the radio set (par. 12-30b).

## 12-46. Adjustment of the Missile Response Time

a. Remove the radio set (par. 12-30a).

b. Adjust the DELAY LINE ADJUST switch on the TAPPED DELAY LINE (fig. 12-16) to  $850 \pm 15$  millimicroseconds. If the response time is longer than the higher limit, rotate the DELAY LINE ADJUST switch in a counterclockwise direction. If the response time is shorter than lower limit, rotate the DELAY LINE ADJUST switch in a clockwise direction. Each step of the switch changes the delay by 15 millimicroseconds.

c. Install the radio set (par. 12-30b).

## Section IV. CORRECTIVE MAINTENANCE OF THE FORWARD BODY SECTION

### 12-47. Replacement of the Access Door Assemblies

a. Prepare the missile as prescribed in table 12-1.

b. For detailed removal and installation procedures, refer to paragraphs 3-13, 3-14, and 7-6.

### 12-48. Replacement of the Ram-Pressure Probe (Missiles 10206 through 11935)

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward body section access door assemblies (par. 3-13).

(3) Reach through the opening, and disconnect the reducer (1, fig. 12-29) from the ram-pressure probe (5).

(4) Remove the screws (4) that secure the ram-pressure probe to the forward fin assembly (2).

(5) Remove the closure (3) from the ram-pressure probe.

#### b. Installation.

(1) Place the ram-pressure probe (5) in the hole in the forward fin assembly (2).

(2) Install the screws (4), and tighten them.

(3) Reach through the opening, and connect the reducer (1) to the end of the ram-pressure probe.

(4) Install the forward body section access door assemblies and tighten the screws to the torque value given in table 15-9.

(5) Check the alignment for the ram-pressure probe (chapter 10).

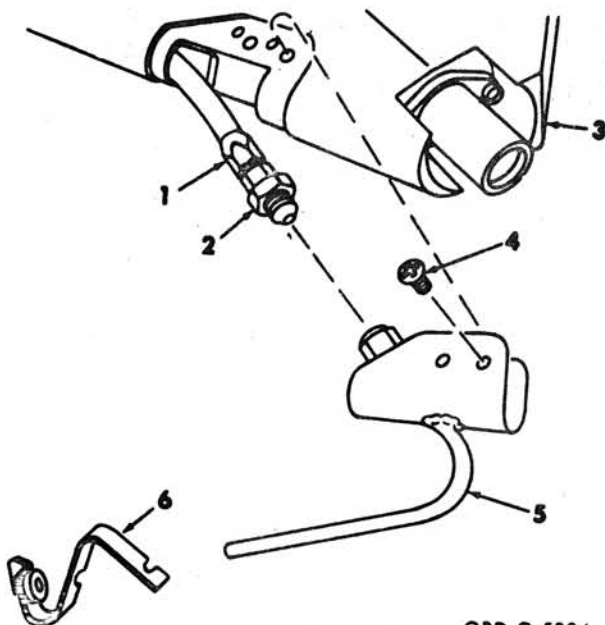
(6) Install the closure (3) on the ram-pressure probe.

### 12-49. Replacement of the Ram-Pressure Probe (Missiles 13001 and Subsequent)

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.





ORD G 5334

- 1—Hose assembly
- 2—Reducer
- 3—Forward fin assembly
- 4—No. 10-32 x 17/32 brazier-hd screw (4)
- 5—Ram-pressure probe
- 6—Closure

Figure 12-28. Removal and installation of the ram-pressure probe (missiles 13001 and subsequent).

(2) Remove the closure (6, fig. 12-28) from the ram-pressure probe (5).

(3) Remove the screws (4) securing the ram-pressure probe to the forward fin assembly (3).

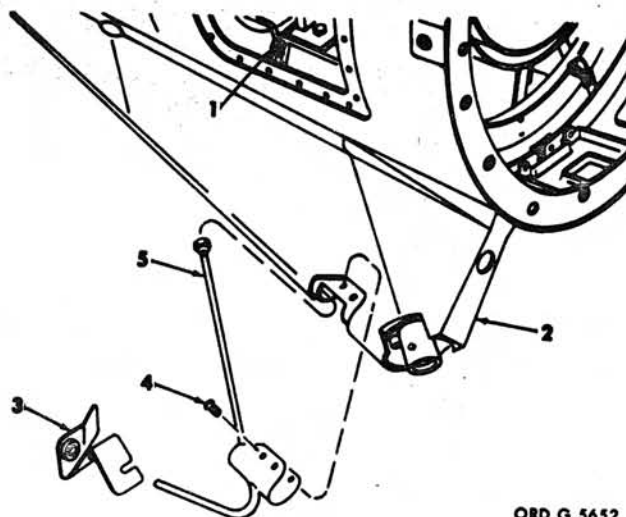
(4) Slowly pull the ram-pressure probe from the forward fin assembly until the hose assembly (1) and the reducer (2) are outside the forward fin assembly.

(5) Disconnect the ram-pressure probe from the reducer.

#### b. Installation.

(1) Install the ram-pressure probe (5) on the reducer (2).

(2) Push the hose assembly (1) into the forward fin assembly (3) until the ram-pressure probe is in place on the forward fin assembly.



ORD G 5652

- 1—Reducer
- 2—Forward fin assembly
- 3—Closure
- 4—No. 10-32 x 17/32 brazier-hd screw (4)
- 5—Ram-pressure probe

Figure 12-29. Removal and installation of the ram-pressure probe (missiles 10206 through 11935).

(3) Secure the ram-pressure probe to the forward fin assembly with the screws (4).

(4) Check the alignment of the ram-pressure probe (chapter 10).

(5) Install the closure (6) on the ram-pressure probe.

### 12-50. Replacement of the Forward Fin Assembly (Missiles 10206 through 11935)

#### a. Removal.

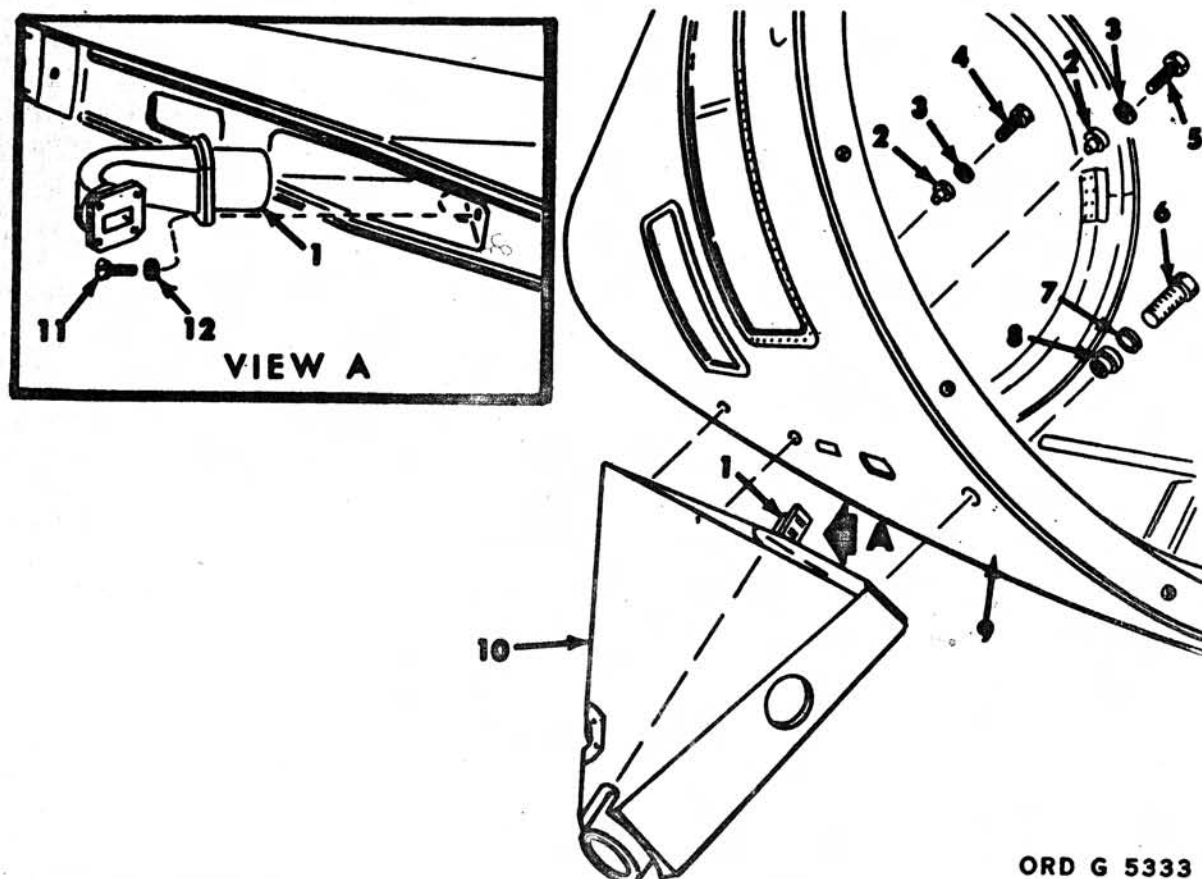
(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder-control group (par. 12-28a).

(3) Remove the waveguide assembly set (fig. 12-13) from the waveguide gooseneck (1, fig. 12-30).

(4) Remove the ram-pressure probe (par. 12-48a).

**CAUTION:** Support the forward fin assembly while removing the attaching hardware.



ORD G 5333

- 1—Waveguide gooseneck
- 2—1/4 in-id gasket (missiles 10206 through 10370)
- 3—0.265-in-id fl washer
- 4—1/4-28 x 21/32 hex-hd bolt (missiles 10206 through 11187) 1/4-28 x 17/32 hex-hd bolt (missiles 11188 through 11935)
- 5—1/4-28 x 21/32 hex-hd bolt

- 6—3/8-24 x 1-5/64 hex-hd bolt
- 7—0.390-in-id fl washer
- 8—3/8 in-id gasket (missiles 10206 through 10370)
- 9—Forward body section
- 10—Forward fin assembly (4)
- 11—No. 10-32 x 3/4 pan-hd screw (2)
- 12—No. 10 lockwasher (2)

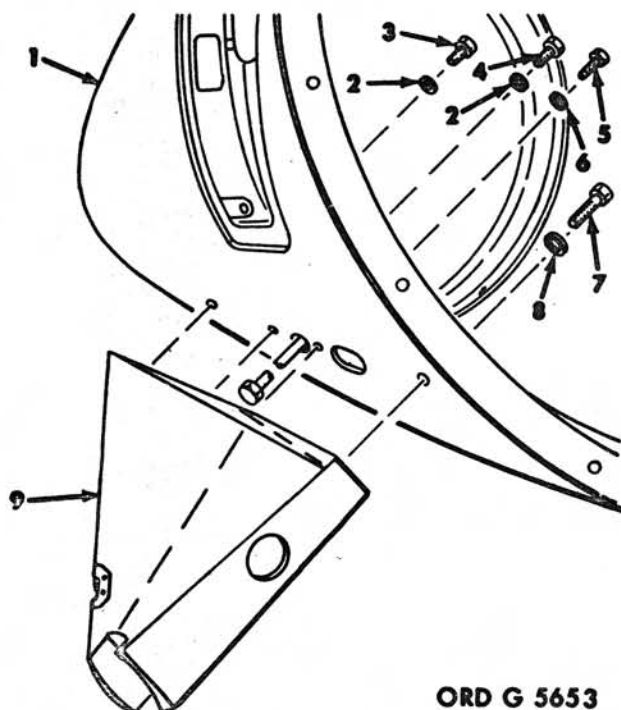
Figure 12-30. Removal and installation of the forward fin assembly (Missiles 10206 through 11935).

- (5) Remove the bolts (4, 5, and 6) flat washers (3 and 7), and gaskets (2 and 8) that secure the forward fin assembly (10) to the forward body section (9).
- (6) Carefully remove the forward fin assembly, sliding the waveguide gooseneck through the opening in the forward body section.
- (7) Remove the two panhead screws (11) and lockwashers (12) that secure the waveguide gooseneck to the forward fin assembly.

#### b. Installation.

- (1) Install the waveguide gooseneck (1) on the forward fin assembly (10), and secure with the two panhead screws (11) and lockwashers (12).
- (2) Carefully position the forward fin assembly on the forward body section (9), inserting the waveguide gooseneck through the opening in the forward body section.

**Note.** Discard the three gaskets (2 and 8) on missiles 10206 through 10370, as they are no longer required.



ORD G 5653

- 1—Forward body section
- 2—0.265-in-id fl washer
- 3—1/4-28 x 17/32 hex-hd bolt
- 4—1/4-28 x 21/32 hex-hd bolt
- 5—1/4 x 0.906 brazier-hd bolt
- 6—0.255-in-id fl washer
- 7—3/8-24 x 1-5/64 hex-hd bolt
- 8—0.390-in-id fl washer
- 9—Forward fin assembly (4)

Figure 12-31. Removal and installation of the forward fin assembly (missiles 13001 and subsequent).

- (3) Install three flat washers (3 and 7) and hexagon-head bolts (4, 5, and 6) to secure the forward fin assembly to the forward body section. Torque the bolts to the value given in table 15-9.
- (4) Install the ram-pressure probe (par. 12-48b).
- (5) Connect the waveguide assembly set (fig. 12-13) to the waveguide gooseneck (1, fig. 12-30).
- (6) Install the transponder-control group (par. 12-28b).
- (7) Remove the nose hinge assembly (par. 12-5b).

- (8) Rearm the missile, using applicable procedures in chapter 10.

## 12-51. Replacement of Forward Fin Assembly (Missiles 13001 and Subsequent)

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the transponder control group (par. 12-13a).
- (3) Remove the antenna horn (par. 12-7a).
- (4) Remove the appropriate waveguide assembly (pars. 12-18, 12-19, or 12-20).
- (5) Remove the ram-pressure probe (par. 12-49a).

**Caution:** Support the forward fin assembly while removing the attaching hardware.

- (6) Remove the three hexagon-head bolts (3, 4, and 7, fig. 12-31), the brazier-head bolt (5), and the four flat washers (2, 6, and 8) that secure the forward fin assembly (9) to the forward body section (1).
- (7) Remove the forward fin assembly.

### b. Installation.

- (1) Position the forward fin assembly (9) on the forward body section (1), and secure with the four flat washers (2, 6, and 8), the brazier-head bolt (5), and the three hexagon-head bolts (3, 4, and 7). Tighten the bolts and screw to the torque value given in table 15-9.
- (2) Install the ram-pressure probe (par. 12-49b).

**Note.** Prior to the installation of the lockwasher (fig. 12-9) and cap screw, spread silastic sealing material 8030-893-4816 under the washer and between the washer and the screw.

- (3) Install the appropriate waveguide assembly (pars. 12-18, 12-19, or 12-20).
- (4) Install the antenna horn (par. 12-7b).
- (5) Install the transponder control group (par. 12-13b).

(6) Remove the nose hinge assembly (par. 12-5b).

(7) Rearm the missile, using applicable procedures in chapter 10.

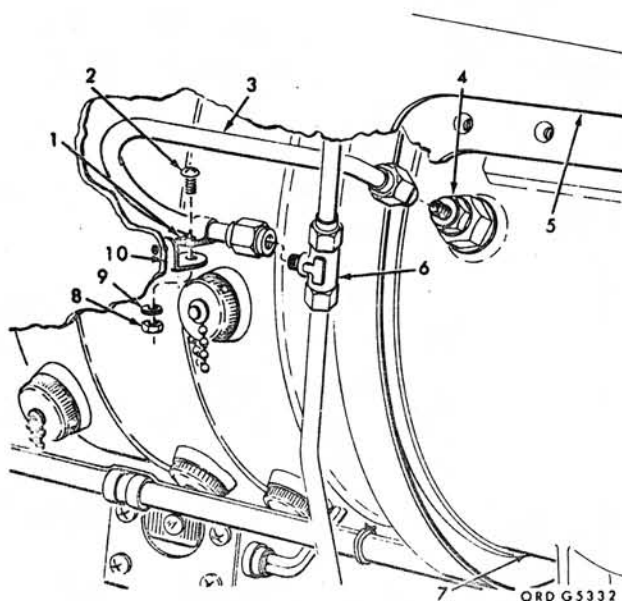
## 12-52. Replacement of Stagnation Tube Assembly (Missiles 10206 through 11935)

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward body section access door assemblies.

(3) Remove the hexagon nut (8, fig. 12-32), flat washer (9), and truss-head screw (2) that secure the clamp (1) to the clip (10); remove the clamp from the stagnation tube assembly (3).



- 1-Clamp AN742D3
- 2-No. 8-32 x 1/2 truss-hd screw
- 3-Stagnation tube assembly
- 4-Stagnation tube fitting
- 5-Forward body section
- 6-Tee
- 7-Transponder control group
- 8-No. 8-32 hex-nut
- 9-0.174-in-id fl washer
- 10-Clip

Figure 12-32. Removal and installation of the stagnation tube assembly (missiles 10206 through 11935).

(4) Disconnect the stagnation tube assembly from the stagnation tube fitting (4) on the transponder control group (7) and the tee (6); remove the stagnation tube assembly.

(5) Install protective caps on the stagnation tube fitting and the tee.

### b. Installation.

(1) Remove the protective caps from the stagnation tube fitting (4) and the tee (6).

(2) Connect the stagnation tube assembly (3) to the stagnation tube fitting and the tee.

(3) Install the clamp (1) on the stagnation tube assembly, and secure the clamp to the clip (10) with the truss-head screw (2), flat washer (9), and hexagon nut (8).

(4) Install the forward body section access door assemblies (par. 12-47.)

## 12-53. Replacement of Stagnation Tube Assembly (Missile 13001 and Subsequent)

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the transponder control group (par. 12-13a).

(3) Remove the flathead screw (6, fig. 12-33), flat washer (5), lockwasher (4), and hexagon nut (3) that secure the clamp (9) to the stagnation tube assembly (8) and the skin of the forward body section (7); remove the clamp.

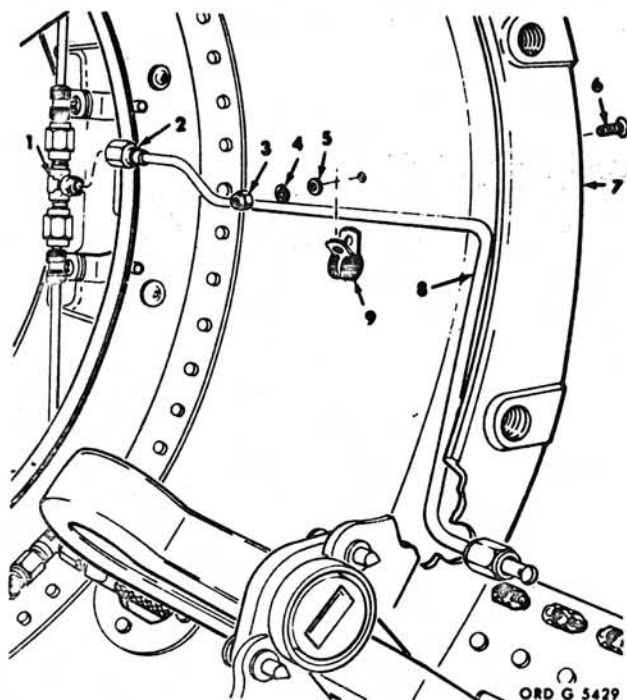
(4) Disconnect the coupling nut (2) securing the stagnation tube assembly to the tee (1); remove the stagnation tube assembly.

### b. Installation.

(1) Position the stagnation tube assembly (8) within the forward body section (7).

(2) Secure the stagnation tube assembly to the tee (1) by tightening the coupling nut (2).

(3) Secure the stagnation tube assembly to the skin of the forward body section with the



- 1-Tee
- 2-Coupling nut
- 3-No. 8-32 hex nut
- 4-No. 8 lockwasher
- 5-0.174 in = id
- 6-No. 8-32 x 1/2 fl-hd screw
- 7-Forward body section
- 8-Stagnation tube assembly
- 9-Clamp

Figure 12-33. Removal and installation of the stagnation tube assembly (missiles 13001 and subsequent).

clamp (9), flathead screw (6), flat washer (5), lockwasher (4), and hexagon nut (3).

(4) Install the transponder control group (par. 12-13b).

(5) Remove the nose hinge assembly (par. 12-5b).

(6) Rearm the missile, using applicable procedure in chapter 10.

#### 12-54. Replacement of Nose Tip

##### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the nose tip by turning counter-clockwise with a strap wrench.

b. Installation. Install the nose tip by turning clockwise handtight.

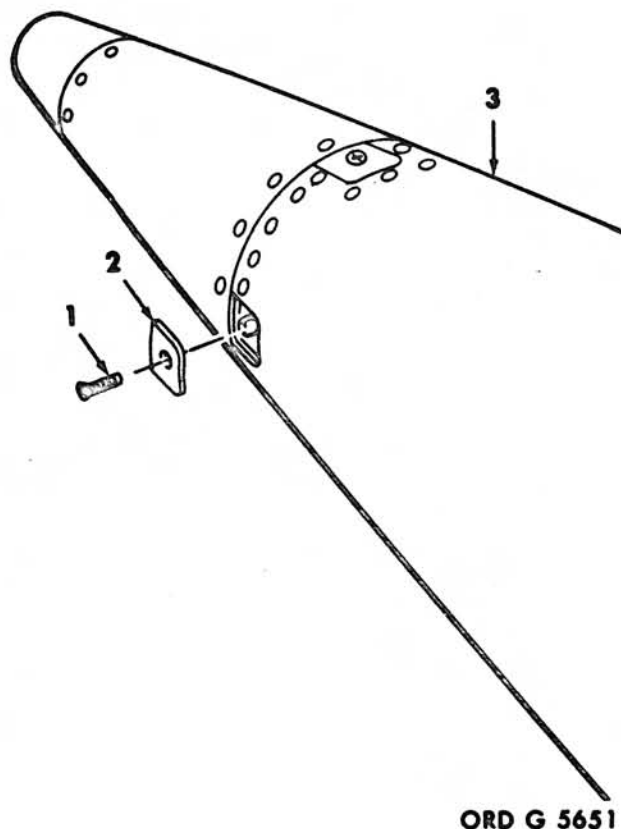
#### 12-55. Replacement of Boltwell Covers

##### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the four flat-head screws (1, fig. 12-34 or 3, fig. 12-35) and (2, fig. 12-34 or 2, fig. 12-35) boltwell covers from the forward body section (3, fig. 12-34 or 1, fig. 12-35).

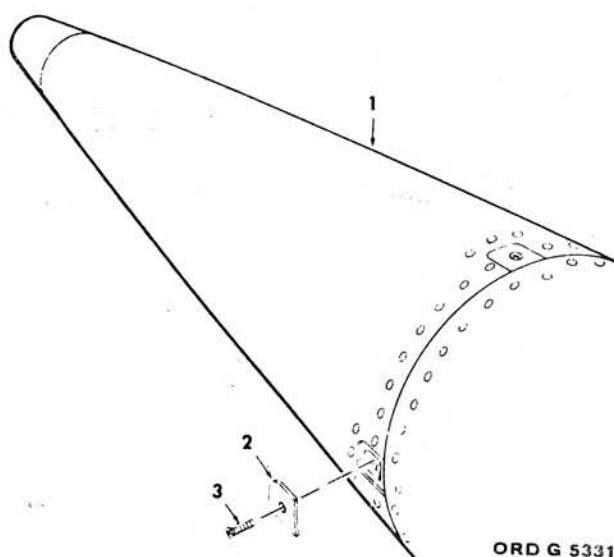
(3) Remove the six flathead screws (10, fig. 7-8) and the boltwell covers (11) from the forward body section (6).



- 1-No. 10-32 x 1-3/16 fl-hd screw (4)
- 2-Boltwell cover (4)
- 3-Forward body section

Figure 12-34. Removal and installation of the boltwell covers (missiles 10206 through 11187).





- 1—Forward body section  
2—Boltwell cover  
3—No. 10-32 x 1-5/32 fl-hd screw

ORD G 5331

Figure 12-35. Removal and installation of the boltwell covers (missiles 11188 through 11935 and 13001 and subsequent).

## Section V. CORRECTIVE MAINTENANCE OF WARHEAD BODY SECTION

**Warning:** The warhead body section contains explosives. All applicable safety regulations will be enforced. Operations involving the handling of explosive items will be performed only in the areas specifically designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**Warning:** Handling operations of the warhead body section will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials must be kept to a minimum. Spilled explosive materials will be immediately removed, and the area thoroughly decontaminated before work continues.

**Warning:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical

### b. Installation.

- (1) Position the four boltwell covers (2, fig. 12-34 or 2, fig. 12-35) on the forward body section (3, fig. 12-34 or 1, fig. 12-35), and secure with the flathead screws (1, fig. 12-34 or 3, fig. 12-35). Tighten the screws to the torque value given in table 15-9.
- (2) Position the six boltwell covers (11, fig. 7-8) on the forward body section (6), and secure with the six flathead screws (10). Tighten the screws to the torque value given in table 15-9.

### 12-55.1. Replacement of Forward Body Section

#### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) For detailed removal procedures refer to paragraphs 11-14 and 11-15.

b. Installation. For detailed installation procedures refer to paragraph 7-6.

currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight make handling difficult.

### 12-56. Replacement of Warhead Body Section Access Cover Plates

**Note.** The procedures prescribed in *a* and *b* below are typical for both warhead body section access cover plates.

#### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Loosen the captive fasteners (fig. 7-11) that secure the warhead body section access cover plate to the warhead body section.
- (3) Remove the access cover plate.

b. Installation. Position the warhead body section access cover plate on the warhead body section, and secure with the captive fasteners.

## 12-57. Replacement of Fail-Safe Control Bracket and Insulation Blanket

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Cut the safety wire (1, fig. 7-6) that secures the latch.
- (3) Disconnect connector P502 (10, fig. 12-36) from connector J1 (9) on the fail-safe control (8).
- (4) Release the captive screws (7), and remove the fail-safe control.

- (5) Remove the insulation blanket (1) from the fail-safe control bracket (5).
- (6) Remove the hexagon nuts (2), flat washers (3), and flathead screws (4) that secure the fail-safe control bracket to the warhead body section (6); remove the bracket.

### b. Installation.

- (1) Secure the fail-safe control bracket (5) to the warhead body section (6) with the flathead screws (4), flat washers (3), and hexagon nuts (2).

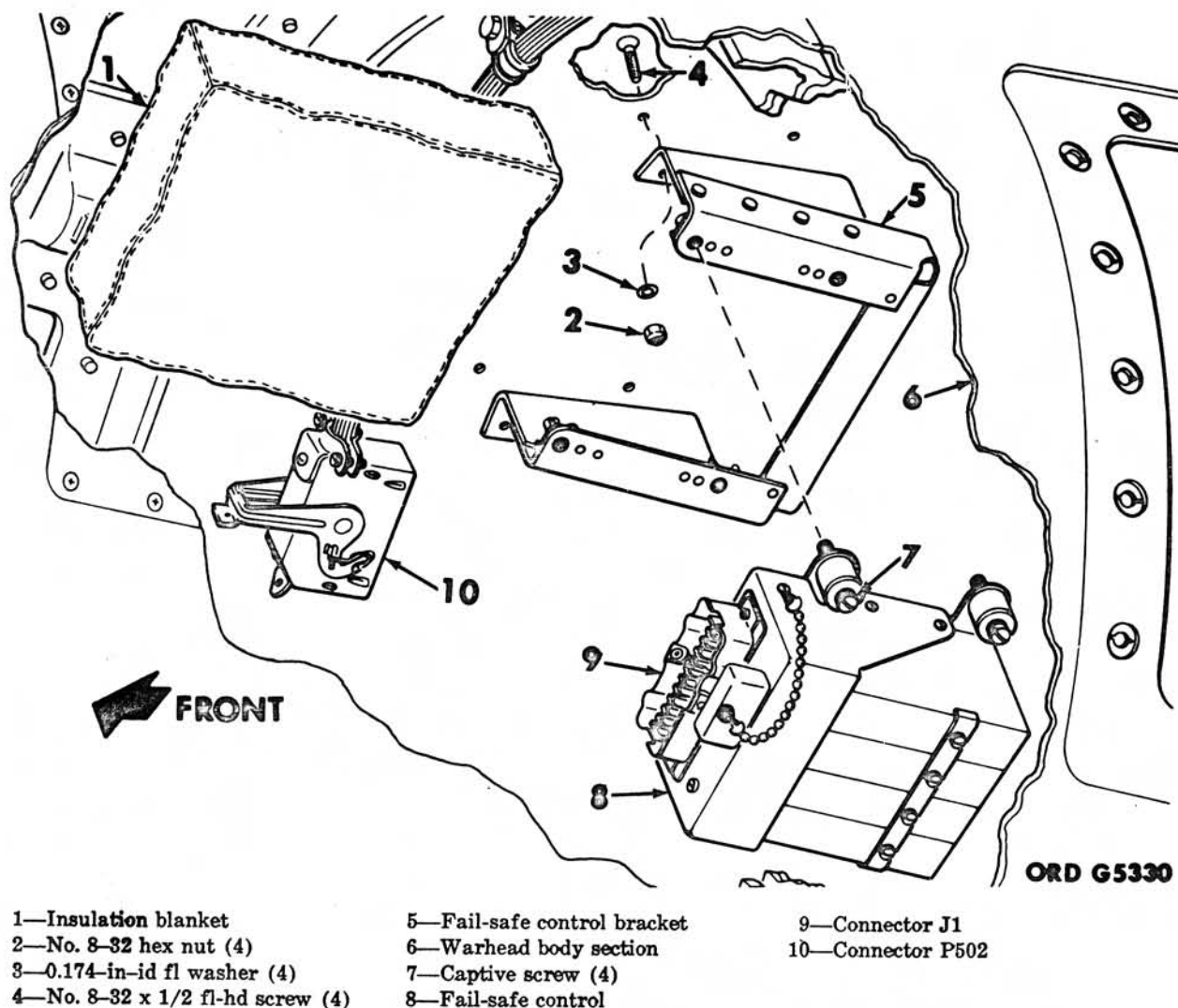


Figure 12-36. Removal and installation of the fail-safe control and insulation blanket.

- (2) Position the insulation blanket (1) in the fail-safe control bracket (5).
- (3) Secure the fail-safe control (8) to the bracket with the captive screws (7).
- (4) Connect fail-safe wiring harness connector P502 (10) to connector J1 (9), and secure by putting the latch (2, fig. 7-6) of connector P502 on the stud of connector J1 (5). Lock with 0.032-inch diameter steel safety wire (1).
- (5) Remove the nose hinge assembly (par. 12-5b).
- (6) Rearm the missile, using applicable procedures in chapter 10.

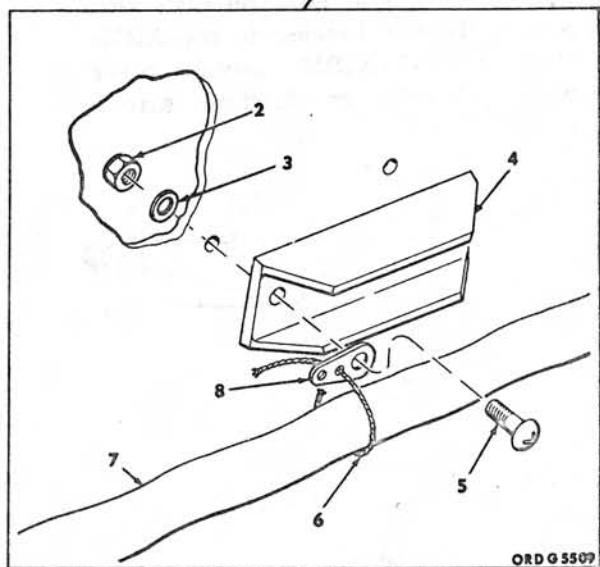
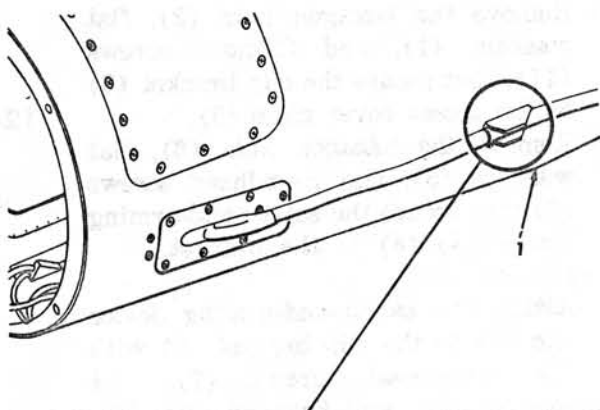
## 12-58. Replacement of Missile Fin Bracket

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the forward main fin (par. 11-16).
- (3) Remove the hexagon nut (2, fig. 12-37), flat washers (3), and brazier-head screws (5) that secure the missile fin bracket (4) to the warhead body section (1) (on the fin bracket for fin 3 or 4) also remove the string tie (6) securing the wiring harness (7) and the spacer (8); and remove the bracket.

### b. Installation.

- (1) Secure each missile fin bracket (4) to the warhead body section (1) with the brazier-head screws (5), flat washers (3), and hexagon nuts (2) (on the fin bracket for fin 3 or 4; also install the spacer (8)).
- (2) Place the wiring harness (7) on the fin bracket (4), and install the string tie (6).
- (3) Install the forward main fin (par. 7-5).
- (4) Remove the nose hinge assembly (par. 12-5b).
- (5) Rearm the missile using applicable procedures in chapter 10.



- 1—Warhead body section
- 2—1/4-28 hex nut (2)
- 3—0.265-in-id fl washer (2)
- 4—Missile fin bracket (4)
- 5—1/4-28 x 27/32 brazier-head screw (2)
- 6—String tie (fins 3 and 4 only)
- 7—Wiring harness (fins 3 and 4 only)
- 8—Spacer (fins 3 and 4 only)

Figure 12-37. Removal and installation of the missile fin brackets.

## 12-59. Replacement of Safety-and-Arming Device Clip and Clip Bracket

### a. Removal.

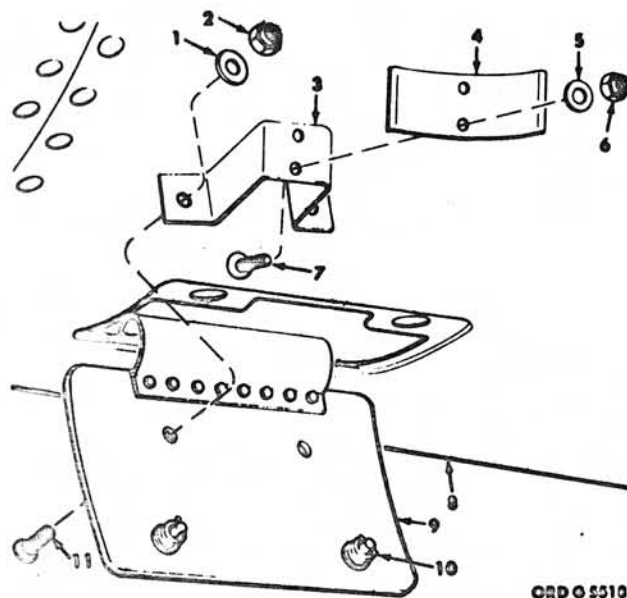
- (1) Prepare the missile as prescribed in table 12-1.
- (2) Release the captive fasteners (10, fig. 12-38) on the ARMING

**MECHANISM** access cover plate (9); open the cover plate.

- (3) Remove the hexagon nuts (2), flat washers (1), and flathead screws (11), that secure the clip bracket (3) to the access cover plate (9).
- (4) Remove the hexagon nuts (6), flat washers (5), and roundhead screws (7) that secure the safety-and-arming device clip (4) to the bracket.

**b. Installation.**

- (1) Attach the safety-and-arming device clip (4) to the clip bracket (3) with the roundhead screws (7), flat washers (5), and hexagon nuts (6).
- (2) Attach the clip bracket to the **ARMING MECHANISM** access cover plate (9) with two flathead screws



ORD 05310

- 1—No. 10 fl-washer (2)
- 2—No. 10-32 hex nut (2)
- 3—Clip bracket
- 4—Safety and arming device clip
- 5—0.174 in-id fl washer (2)
- 6—No. 8-32 hex nut (2)
- 7—No. 8-32 x 3/8 rd-hd screw (2)
- 8—Warhead body section
- 9—ARMING MECHANISM access cover plate
- 10—Captive fastener (2)
- 11—No. 10-32 x 21/32 fl-hd screw (2)

Figure 12-38. Removal and installation of the safety-and-arming device clip and clip bracket.

(11), flat washers (1), and hexagon nuts (2).

- (3) Rearm the missile, using applicable procedures in chapter 10.

## 12-60. Replacement of Warhead Body Section Boltwell Covers

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the forward main fins (par. 11-16).

*Note.* Perform (3) through (5) below for warhead body sections equipped with 2- or 3-piece boltwell covers.

- (3) Remove the four flathead screws (5, fig. 6-4) that secure the boltwell covers (4) to the rear of the warhead body section (7).
- (4) Remove the two flathead screws (9) and boltwell cover nuts (10) that secure the three boltwell covers (12) together; remove the boltwell covers.
- (5) Remove the two flathead screws (3, fig. 12-39) and boltwell cover nuts (2) that secure the two forward warhead section boltwell covers together (1 and 4); remove the boltwell covers.

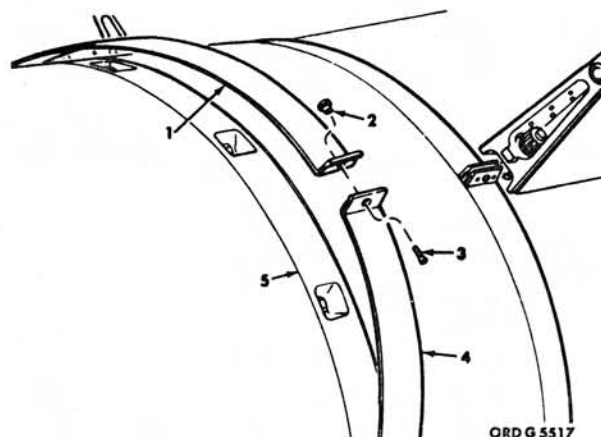
*Note.* Perform (6) and (7) below, for warhead body sections equipped with 1-piece boltwell covers.

- (6) Remove the flathead screw (9, fig. 6-4) and boltwell cover nut (10) that secure the boltwell cover (12) together at the rear of the warhead body section (11); remove the boltwell cover.
- (7) Remove the flathead screw (3, fig. 12-39) and the boltwell cover nut (2) that secure the forward warhead section boltwell cover (1) together; remove the boltwell cover.

### b. Installation.

*Note.* Perform (1) through (3) below for warhead body sections equipped with two- or three-piece boltwell covers.

- (1) Position the two forward warhead section boltwell covers (1 and 4) on the warhead body section (5), and as-



- 1—Forward warhead section boltwell cover (warhead body sections 11001 through 15744)
- 2—No. 10-32 x 7/32 boltwell cover nut (2) (warhead body sections 11001 through 15744) or (1) (warhead body sections 15745 and subsequent)
- 3—No. 10-32 x 17/32 fl-hd screw (2) (warhead body section 11001 through 15744) or (1) (warhead body section 15745 and subsequent)
- 4—Forward warhead section boltwell cover 8521081 (warhead body sections 11001 through 15744) or 9019865 (warhead body sections 15745 and subsequent)
- 5—Warhead body section

Figure 12-39. Removal and installation of the forward warhead section boltwell covers.

semble with the two flathead screws (3) and boltwell cover nuts (2).

- (2) Position three boltwell covers (12 and 8, fig. 6-4) at the rear of the warhead body section (11), and assemble loosely with the two flathead screws (9) and boltwell cover nuts (10).
- (3) Secure the assembled boltwell covers to the warhead body section with four flathead screws (5).

*Note.* Perform (4) and (5) below, for warhead body sections equipped with one-piece boltwell covers.

- (4) Position the forward warhead section boltwell cover (4, fig. 12-39) on the warhead body section (5), and secure the boltwell cover together with the flathead screw (3) and boltwell cover nut (2).
- (5) Position the boltwell cover (12, fig. 6-4) on the rear of the warhead body section (11), and secure the boltwell cover together with the flathead screw (9) and boltwell cover nut (10).
- (6) Tighten the flathead screws to the torque value given in table 15-9.
- (7) Install the forward main fins (par. 7-5).
- (8) Remove the nose hinge assembly (par. 12-5b).
- (9) Rearm the missile, using applicable procedures in chapter 10.

## Section VI. CORRECTIVE MAINTENANCE OF MISSILE

### MOTOR SECTION

#### 12-61. Replacement of Missile Motor Section Access Doors

##### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the missile motor section access door (par. 3-8).

b. Installation. Install the missile motor section access doors (par. 5-10b).

#### 12-62. Replacement of Special Shape Insulation (Missiles 10206 through 11935 and 13001 through 17055)

##### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.

*Note.* Observe the safety precautions prescribed in paragraph 12-3.

- (2) Remove the forward body section (pars. 11-14 and 11-15).
  - (3) Remove the forward main fins, and prepare for the removal of the warhead body section (pars. 11-16 through 11-19).
  - (4) Remove the warhead body section (pars. 11-20 and 11-21).
  - (5) Remove the special shape insulation by turning counterclockwise.
- b. Installation.
- (1) Position the special shape insulation on the motor head heater and turn clockwise to lock in position.



(2) Install the warhead body section (par. 6-3).

(3) Complete the final assembly and preparation of the warhead body section and the forward body section (chapter 7).

(4) Reactivate the missile using applicable procedures in chapter 10.

### 12-63. Replacement of Motor Head Heater

#### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

*Note.* Observe the safety requirements prescribed in paragraph 12-3.

(2) Remove the forward body section (pars. 11-14 and 11-15).

(3) Remove the forward main fins, and prepare for the removal of the warhead body section (pars. 11-16 through 11-19).

(4) Remove the warhead body section (pars. 11-20 and 11-21).

(5) Disconnect connector P171 (3, fig. 5-12) from connector J171 (2).

(6) Remove the motor head heater (4) by removing the four hexagon-head bolts (5) and four nonmetallic washers (6).

#### *b. Installation.*

(1) Place the motor head heater (4) in position on the missile rocket motor subassembly (1).

(2) Install four nonmetallic washers (6) and hexagon-head bolts (6); tighten the bolts.

(3) Connect connector P171 (3) to connector J171 (2). Make certain that the entire width of the orange band on connector P171 is visible after the connection is made.

(4) Install the warhead body section (par. 6-3).

(5) Complete the assembly and preparation of the warhead body section and the forward body section (chapter 7).

(6) Reactivate the missile, using applicable procedures in chapter 10.

### 12-64. Replacement of Missile Rocket Motor Subassembly

#### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward body section (pars. 11-14 and 11-15).

(3) Remove the forward main fins and prepare for the removal of the warhead body section (pars. 11-16 through 11-19).

(4) Remove the warhead body section (pars. 11-20 and 11-21).

(5) Remove the missile rocket motor subassembly (pars. 11-23 and 11-24) for a permanent-type installation.

#### *b. Installation.*

(1) Install the missile rocket motor subassembly (chapter 5, sections II and III).

(2) Install the warhead body section (par. 6-3).

(3) Complete the preparation of the warhead body section and the forward body section (chapter 7).

(4) Reactivate the missile, using applicable procedures in chapters 9 and 10.

### 12-64.1. Replacement of Transponder Control Group Wiring Harness

Refer to TM 9-1410-250-34, page 3-144 paragraph 3-110 for removal and installation procedures.

## Section VII. CORRECTIVE MAINTENANCE OF THE EQUIPMENT SECTION

### 12-65. Replacement of Propulsion Arming Lanyard Components

#### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

**Caution:** Check that safety-and-arming switch S31, (fig. 5-13) is in a safe condition as indicated by a green field visible through the inspection window.

(2) Remove the hexagon nut (3, fig. 10-6) and flat washers (2) securing the lanyard assembly (5) to the lanyard mounting bracket (4).

**CAUTION:** Avoid rotating the trigger operating plug (14) to avoid shearing the aluminum rivet (13). Shearing this rivet may activate the battery.

(3) Remove the lanyard assembly (5) from the trigger operating plug in the lanyard receptacle (15).

(4) Install the shipping plug (11) in the trigger operating plug in the lanyard receptacle. Apply approximately 5 turns with finger pressure only.

*b. Disassembly.* Remove the two cotter pins (8), flat washers (9), and flathead pins (6) that secure the eyebolts (10) to the lanyard (7).

*c. Assembly.* Secure each eyebolt (10) to the lanyard (7) with a flathead pin (6), flat washer (9), and cotter pin (8).

*d. Installation.* Install the propulsion arming lanyard (par. 10-2).

#### 12-66. Replacement of Battery Box Cover (Missiles 10206 through 11935 and 13001 through 13683)

##### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the equipment section access cover plate from the left side of the missile body.

(3) Remove the missile battery box from the equipment section.

(4) Remove the battery box cover from the battery tray and disconnect the heater assembly leads from the battery box cover.

**CAUTION:** Care must be taken to insure that the red (positive) lead (7, fig. 10-1) and the black (negative) lead (8) terminals of the guidance set storage battery (11) do not touch each other as they will fuse together. The terminals should be covered with rubber terminal protector tips or tape immediately after disconnecting.

**NOTE.** Perform (5) and (6) below for missiles 10206 through 10607 or (7) and (8) for missiles 10608 through 11935 and 13001 through 13683.

(5) Remove the hexagon nut (19), lockwasher (18), and flatwasher (17) that secure the red (positive) lead (7) of the guidance set storage battery (11) to terminal 1 (5) of board TB30 (20).

(6) Remove the hexagon nut, lockwasher, and flat washer that secure the black (negative) lead (8) of the guidance set storage battery to terminal 2 (6) of terminal board TB 30 (20).

(7) Remove the hexagon nut (3), internal-teeth lockwasher (2), and flat washer (1) that secure the red (positive lead) (7) of the guidance set storage battery (11) to terminal 2 of terminal board TB536 (26).

(8) Remove the hexagon nut, internal-teeth lockwasher, and flat washer that secure the black (negative) lead (8) of the guidance set storage battery to terminal No. 1 (5) of terminal board TB 356.

(9) Remove the battery box cover (24).

##### *b. Installation.*

(1) Connect the heater assembly and the guidance set storage battery (par. 10-1e (20) through (28)).

**CAUTION:** Care should be exercised to prevent damage to wires while performing (2) below.

(2) Install the missile battery box (par. 10-1e (29) through (33)).

*c. Rearming the missile.* Use applicable procedures in chapter 10.

#### 12-67. Replacement of Guidance Set Storage Battery and Heater Assembly (Missiles 10206 through 11935 and 13001 through 13683)

**CAUTION:** Before disconnecting or connecting the guidance set storage battery, make certain that the section control-indicator controls and switches are in the initial operating condition, the MISSILE HEAT switch is set to OFF, connectors PIX and P72A are installed in the dummy connectors, and connectors P104A and P105A are properly installed in connectors J104 and J105A respectively.

*a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the equipment section access cover plate from the left side of the missile body.

(3) Remove the missile battery box from the equipment section.

(4) Remove the battery box cover, and disconnect the heater assembly leads from the battery box cover (par. 10-1e (7) through (15)).

(5) Disconnect the storage battery (par. 12-66a (5) through (9)).

(6) Remove the spacers (10, fig. 10-1).

(7) Remove the two dummy batteries (9).

(8) Remove the guidance set storage battery (11).

(9) Remove the heater assembly (12) from the battery tray (13).

*b. Installation.*

(1) Install the heater assembly and storage battery (par. 10-1e and f).

(2) Install the access cover plate and tighten the screws to the torque value given in table 15-9.

*c. Rearming the missile.* Use applicable procedures in Chapter 10.

**12-68. Replacement of Guidance Set Squib Battery (Missiles 13684 and Subsequent)**

**CAUTION:** Before disconnecting or connecting the guidance set squib battery, make certain that the section control-indicator controls and switches are in the initial operating condition, the MISSILE HEAT switch is set to OFF, connectors P1X and P72A are installed in the dummy connectors, and connectors P104A and P105A are properly installed in connectors J104A and J105A respectively.

*a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the equipment section access cover plate from the left side of the missile body.

(3) Disconnect connector P541 (2, fig. 10-3) from the connector on the guidance set squib battery (7).

(4) Release the hose clamp (5) and remove the battery drain hose (3) from the battery vent (6).

(5) Remove the four fillister-head screws (8) and flat washers (9) that secure the guidance set squib battery to the missile battery rack (10), and remove the battery.

*b. Installation.*

**CAUTION:** Insure that all BA-472/U batteries have been removed from the missile before performing steps (1) through (11) below.

*Note.* Inadvertent activation of the installed battery may cause damage to the battery squib activating circuit. To assure serviceability of the circuit, the following checks must be performed.

(1) Disconnect connector P540 from connector J540 on the missile distribution box.

(2) Set the ohmmeter on RX1 and make a resistance measurement from pin N to pin U of J540. The ohmmeter should indicate less than 3 ohms.

(3) Set the ohmmeter on RX10,000 and make resistance measurements from pin I of P541, P542, and P543 to ground. In each measurement the ohmmeter should indicate an open circuit.

*Note.* For missiles with mounting panel 9019678, perform step (4) below. For missiles with mounting panel 9978069, perform steps (5) through (7) below.

(4) Set the ohmmeter on RX1 and make resistance measurements from pin N of P540 to pin I of P541, P542, and P543. In each measurement the ohmmeter should indicate between 30 and 50 ohms.

(5) Set the ohmmeter on RX1 and make resistance measurements from pin J to pin I of P541, P542, and P543. The ohmmeter should indicate less than 3 ohms.

*Note.* For missiles 16885 and subsequent, inspect the component mounting panel 4 to determine if transformers 8109-HS436 or 80223-DS771 have been used.

(6) For component mounting panels equipped with transformers 81095-HS436, set the ohmmeter on RX1 and make a resistance measurement from pin N to pin U of P540. The ohmmeter should indicate between 22 and 32 ohms.

(7) For component mounting panels equipped with transformers 80223-DS771, set the ohmmeter on RX1 and make a resistance measurement from pin N to pin U of P540. The ohmmeter should indicate between 8 and 16 ohms.

(8) Perform the squib battery test (par. 7-7).

(9) Place the guidance set squib battery (7, fig. 10-3) on the missile battery rack (10), and secure with the flat washers (9) and fillister-head screws (8).

(10) Place the battery drain hose (3) on the battery vent (6); secure with the hose clamp (5).

(11) Connect connector P540 to connector J540 on the missile distribution box.

**CAUTION:** The shorting spring or shorting connector across the squib circuit pins of the connector on the guidance set squib battery must be removed to perform step (12) below.

(12) Connect connector P541 (2) to the connector on the guidance set squib battery.

(13) Install the equipment section access cover plate on the left side of the missile and tighten the screws to the torque value given in table 15-9.

(14) Rearm the missile, using the applicable procedures in chapter 10.

## Section VIII. CORRECTIVE MAINTENANCE OF THE ACCESSORY POWER SUPPLY (APS) AND THE HYDRAULIC PUMPING UNIT (HPU)

### 12-69. Replacement of the Accessory Power Supply (APS)

#### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the right equipment section access cover plate.

**WARNING:**  $ET_2O$  liquid and vapor cause severe burns if allowed to become confined between the skin and clothing. Care should be exercised to keep the  $ET_2O$  from dropping on or into the shoes or clothing. Should the  $ET_2O$  become confined between the skin and clothing, remove the clothing, and immediately wash the skin with soap and water; allow the clothing to air-dry for several hours. Dispose of the contaminated shoes. Should  $ET_2O$  get into the eyes, flush the eyes with water, and report to the proper authorities.

**WARNING:** Approved respirator protectors (self-contained breathing apparatus) must be worn

where there is a possibility of harmful concentrations of  $ET_2O$ . The maximum allowable concentration of  $ET_2O$  is 50 parts per million parts of air for an 8-hour exposure. Where high vapor concentrations exist, and when working in confined unventilated areas, approved type self-contained breathing apparatus must be worn.

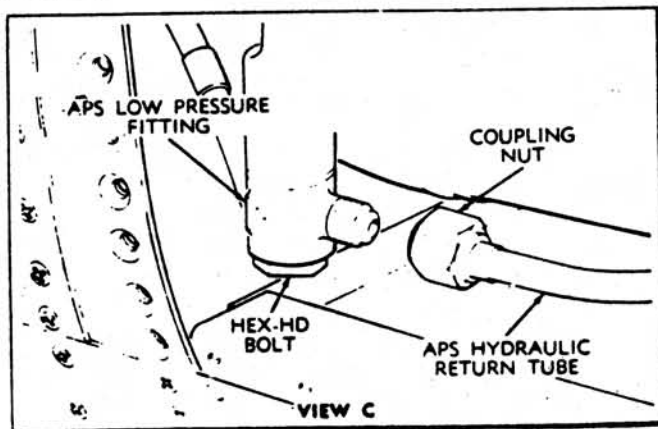
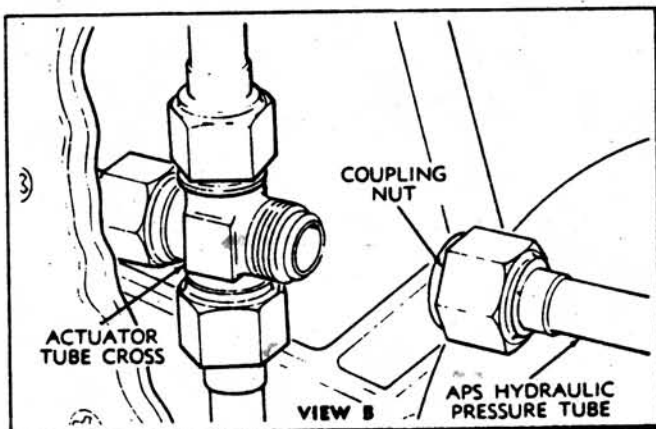
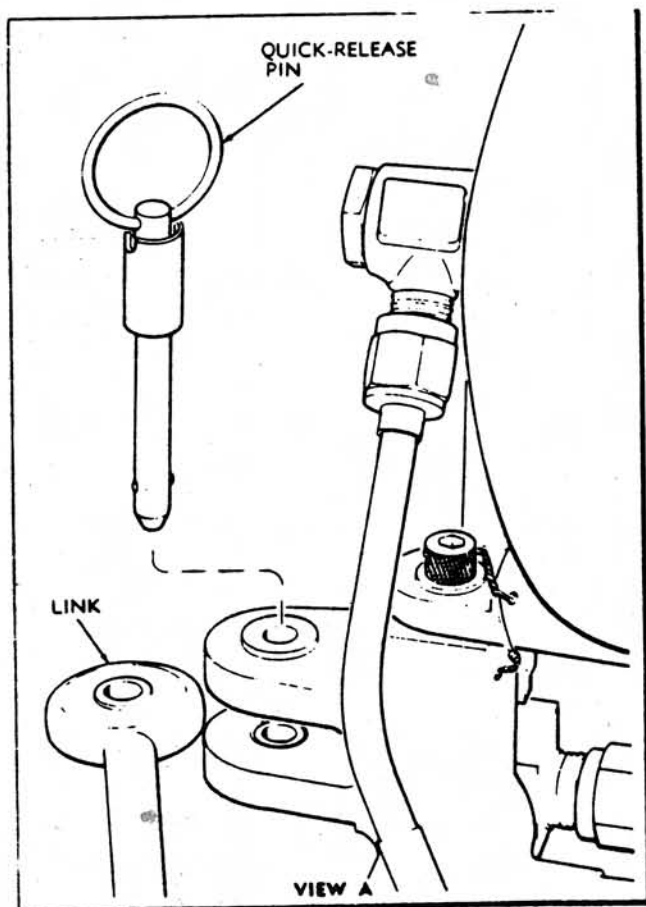
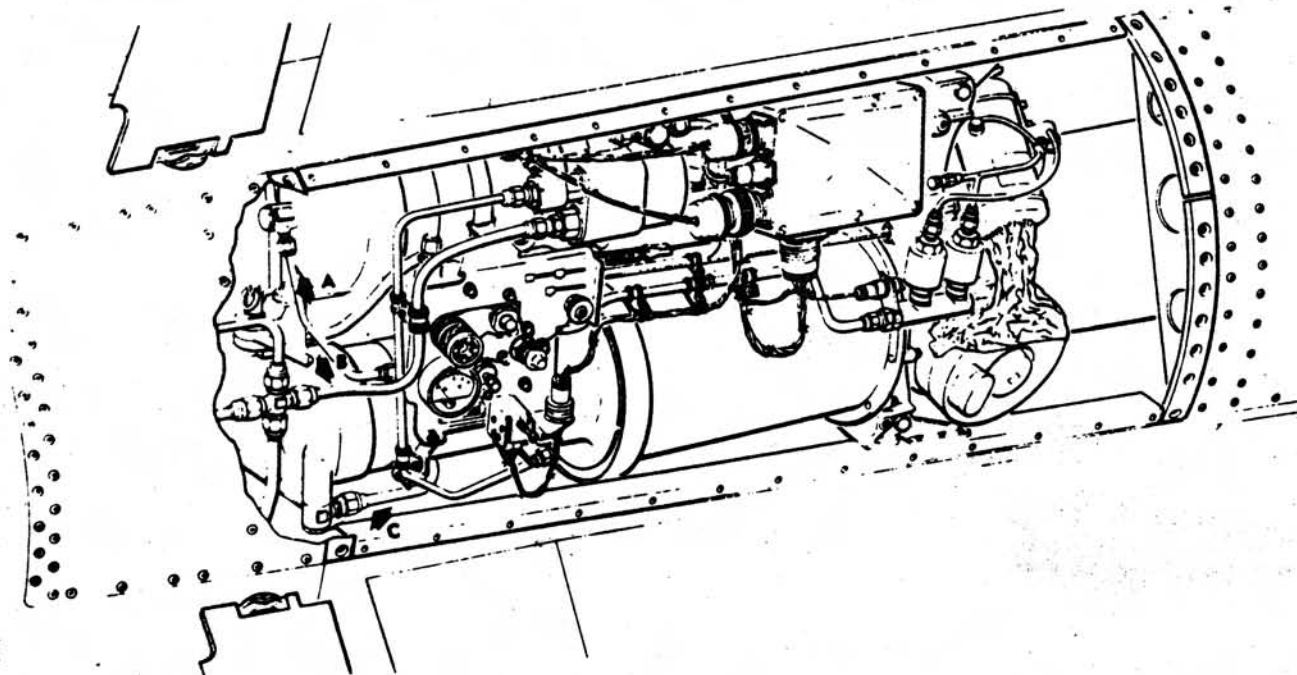
**WARNING:** Clear the area of all non-participating personnel and flammable materials. Position two manned  $CO_2$  fire extinguishers within 4 feet of the APS, and prohibit smoking within 60 feet. The operating personnel must wear goggles or face masks, rubber gloves and a rubber apron.

(3) Depressurize the APS (par. 11-30).

(4) Loosen the APS hydraulic pressure tube coupling nut (view B, fig. 12-40), and detach the APS hydraulic pressure tube from the actuator tube cross.

(7) Loosen the APS hydraulic return tube coupling nut (view C), and detach the APS hydraulic return tube from the APS low-pressure fitting.





ORD G5493

Figure 12-40. Removal and installation of the rear attachment for the accessory power supply.



(8) Loosen the hexagon-head bolt on the APS low-pressure fitting, and rotate the fitting approximately 90 degrees toward the outside of the missile to prevent interference during the APS removal.

(9) Disconnect the APS wiring harness connectors P143 and P144 (view A, fig. 12-41) from APS connectors J3 and J1 respectively.

(10) Remove the quick-release pin (view A, fig. 12-40). Pivot the link toward the rear of the equipment section to prevent interference when the APS is removed.

**CAUTION:** The weight of the APS (approximately 90 pounds) should be supported while performing (11) below to prevent binding of the bolts.

(11) Remove the two hexagon-head bolts (views B and C, fig. 12-41) flat washers, and hexagon nuts, and allow the APS to rest on the bottom of the equipment section access opening.

(12) Move the APS approximately  $\frac{1}{4}$  inch to the rear of the equipment section to insure clearance from the structure on removal.

(13) Move the forward end of the APS partially out of the equipment section (fig. 12-42). Tip the APS slightly back into the section, and carefully remove it from the equipment section.

#### *b. Installation.*

(1) Place the APS in the equipment section (fig. 12-42).

(2) Pivot the link (view A, fig. 12-40) to position on the APS, and insert the quick-release pin.

(3) Connect the APS hydraulic pressure tube (view B) to the actuator tube cross. Tighten the coupling nut to a torque value of 300 pound inches.

(4) Install the hexagon-head bolts (6 and 10, fig. 12-41), flat washers (8 and 12), and hexagon nuts (9 and 13) to secure the APS to the upper bracket (11) and the lower bracket (7). Tighten the hexagon nuts to a torque value of 120 pound-inches.

(5) Loosen the hexagon-head bolt (view C, fig. 12-40), and rotate the APS low-pressure fitting approximately 90 degrees to the position shown in view C.

(6) Connect the APS hydraulic return tube (view C) to the APS low-pressure fitting. Tighten the coupling nut to a torque value of 110 pound-inches.

(7) Connect APS wiring harness connectors P143 and P144 (3 and 2 fig. 12-41) to APS connectors J3 and J1 (4 and 5) respectively.

(8) Perform the air, oil, and fuel servicing of the APS (tables 4-1, 4-2, and section IV, chapter 4).

(9) Install the right equipment section access cover plate (2, fig. 3-21) on the right side of the missile, and secure with the flathead screws (3 and 10). Tighten the screws to the torque value given in table 15-9.

(10) Rearm the missile, using the applicable procedures in chapter 10.

### **12-70. Replacement of the Hydraulic Pumping Unit (HPU)**

#### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the right equipment section access cover plate (2, fig. 3-21).

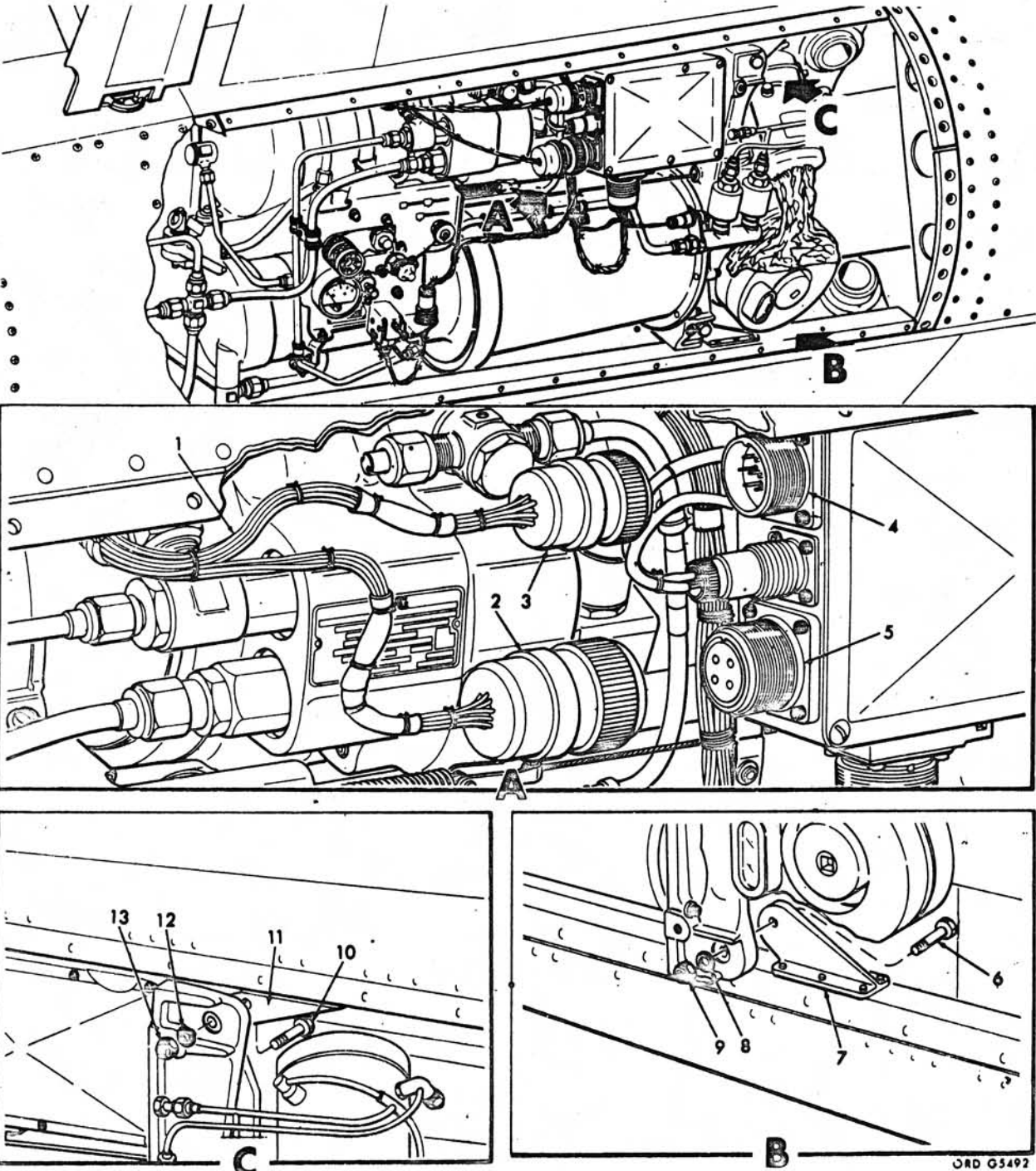
(3) Disconnect connector P544 (2, fig. 10-4) from connector J544 (3) and install the shorting dummy connector on J544.

(4) Depressurize the HPU (par. 11-30).

(5) Pull back the cable nipple (6, fig. 12-43); remove the hexagon nut (9), lockwasher (8), and flat washer (7) securing the positive lead (10) to the positive terminal stud (11); and remove the lead.

(6) Repeat step (5) above to disconnect the negative lead (5).

(7) Disconnect connectors P143 (3) and P144 (1) from connectors J143 (4) and J144 (2), respectively.



- A-Connections  
1-APS wiring harness  
2-Connector P144

- 3-Connector P143  
4-Connector J3  
5-Connector J1

Figure 12-41. Removal and installation of the forward attachments for the accessory power supply.

**B-Lower bracket**

6-5/16-24 x 1-15/32 hex-hd bolt AN5-13A

7-Lower bracket

8-5/16-inch-id fl washer

9-5/16-24 hex. nut

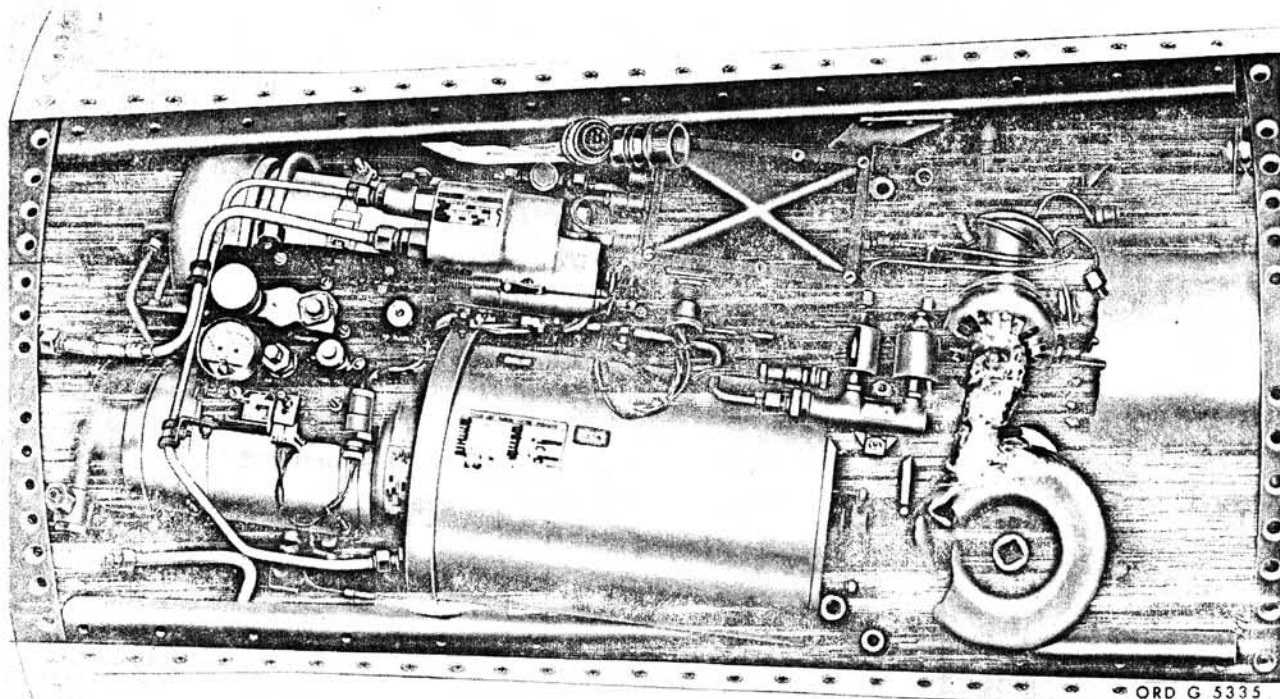
**C-Upper bracket**

10-5/16-24 x 1-15/32 hex-hd bolt

11-Upper bracket

12-5/16-inch-id fl washer

13-5/16-24 hex nut

*Figure 12-41 - Continued.**Figure 12-42. Removal and installation of the accessory power supply.*

**CAUTION:** As each tube assembly is disconnected, immediately seal the tube assembly with a clean protective cap.

(8) Remove the clamps (7 and 11, fig. 12-44) that secure the dump tube assembly (5), and return tube assembly (6).

(9) Loosen the coupling nut (3), and detach the dump tube assembly from the manifold assembly (4).

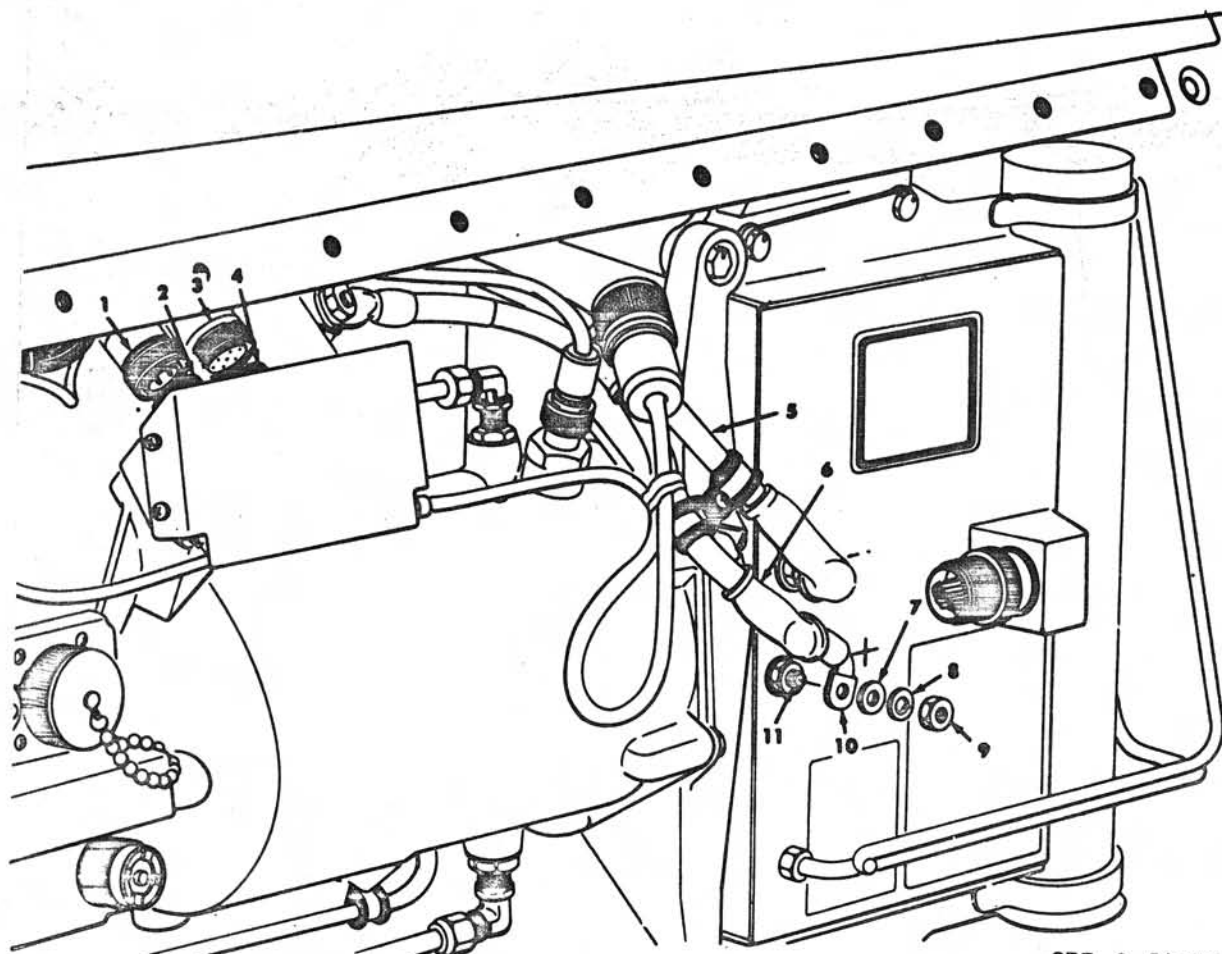
(10) Loosen the coupling nut (13), and detach the return tube assembly from the check valve (12).

(11) Loosen the coupling nut (15), and detach the pressure tube assembly (14) from the tube cross (16).

(12) Remove the quick-release pin (2) or straight pin (19). Pivot the link assembly (1) toward the rear of the equipment section to prevent interference when the HPU is removed.

**CAUTION:** The weight of the HPU (approximately 61 pounds) should be supported while performing step (15) below, to prevent binding of bolts.

(13) Remove the hexagon-head bolts (1, fig. 12-45), flat washers (2), and hexagon nuts (3),



ORD G 5433B

- 1-Connector P144
- 2-Connector J144
- 3-Connector P143
- 4-Connector J143

- 5-Negative lead
- 6-Cable nipple (2)
- 7-0.328-in-id fl-washer (2)
- 8-5/16-in-id lock washer (2)

- 9-5/16-24 hex nut (2)
- 10-Positive lead
- 11-Positive terminal stud

Figure 12-43. Disconnection and connection of the hydraulic pumping unit electrical wiring.

and allow the HPU to rest on the bottom of the equipment section access opening.

(14) Move the HPU approximately  $\frac{1}{4}$  inch to the rear of the equipment section, to insure clearance from the structure upon removal.

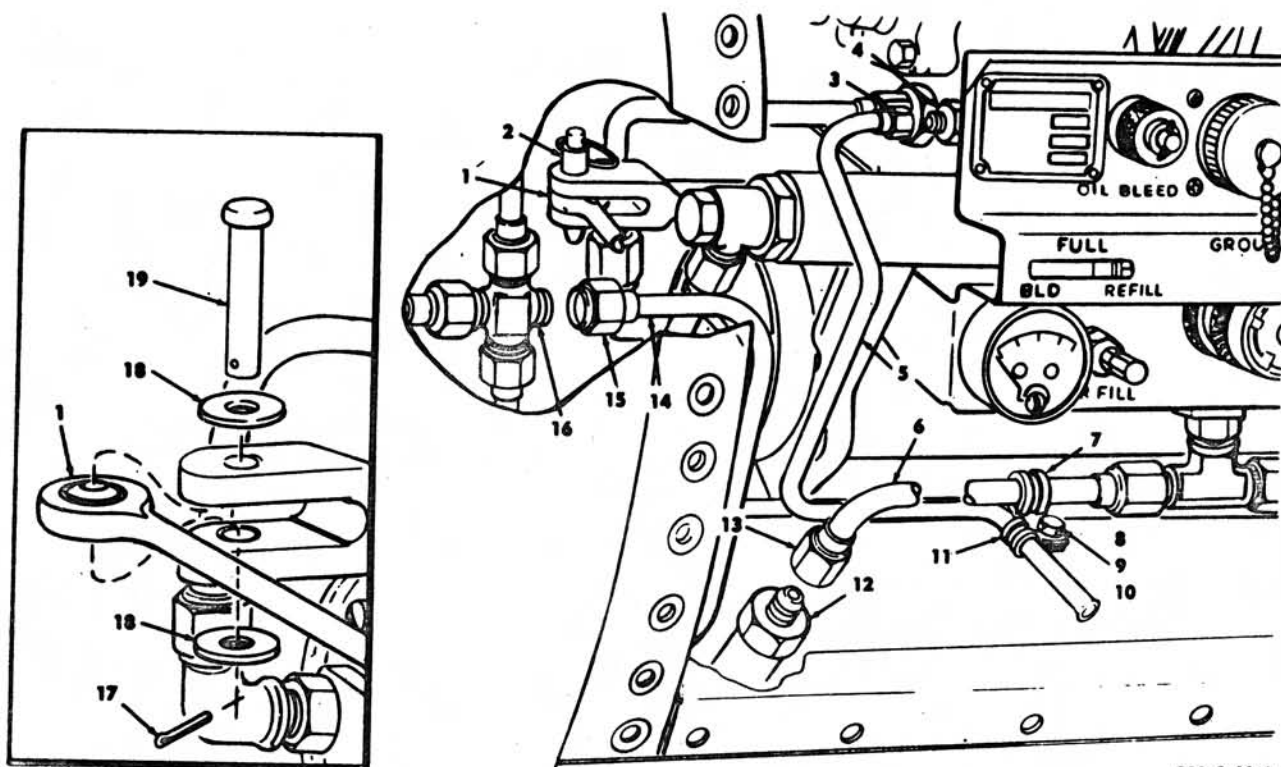
(15) Move the forward end of the HPU (fig. 12-46) partially out of the equipment section. Tilt the HPU slightly back into the equipment section, and carefully remove the HPU.

(16) Position the dump tube assembly (5, fig. 12-44), and attach to the manifold assembly (4).

(17) Install the quick-release pin (2) or straight pin (19) in the link assembly (1).

#### b. Installation.

(1) Check that the shorting connector (fig. 10-9) is installed on rocket motor igniter cable connector P109A.



ORD G 5546

- 1-Link assy
- 2-Quick-release pin
- 3-Coupling nut
- 4-Manifold assy
- 5-Dump tube assy
- 6-Return tube assy
- 7-Clamp
- 8-No. 10-32 x 15/32 hex-hd bolt
- 9-No. 10 washer
- 10-No. 10-32 hex. nut

- 11-Clamp
- 12-Check valve
- 13-Coupling nut
- 14-Pressure tube assy
- 15-Coupling nut
- 16-Tube cross
- 17-1/16 dia x 1/2 cotter pin
- 18-1/4 fl washer
- 19-1/4 dia x 1.484 str pin

Figure 12-44. Removal and installation of the hydraulic pumping unit rear attachments.

(2) Loosen the coupling nut (3, fig. 12-44), and detach the dump tube assembly (5) from the manifold assembly (4).

**CAUTION:** The weight of the HPU (approximately 61 pounds) should be supported while installing the HPU to prevent binding.

(3) Pivot the link assembly (1, fig. 12-44) to position on the HPU and insert the quick-release pin (2) or straight pin (19).

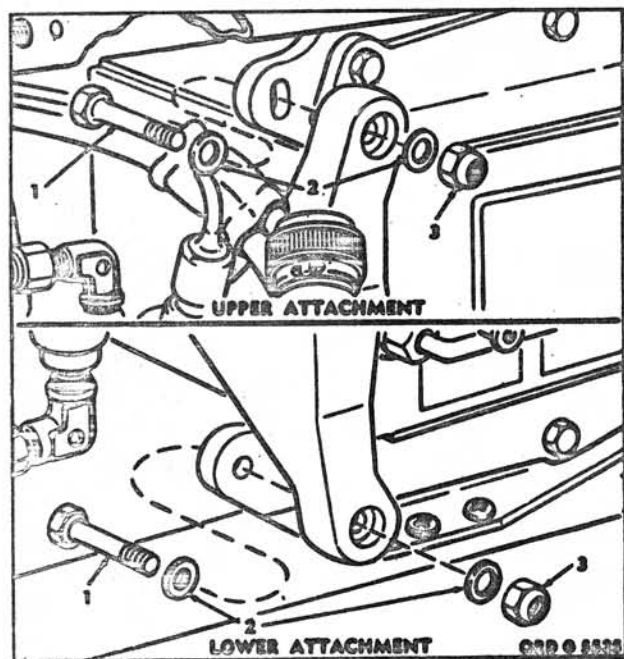
(4) Place the HPU in the equipment sec-

tion (fig. 12-46), and align the mounting holes in the HPU (fig. 12-45) with the mounting holes in the missile structure.

(5) Install the hexagon-head bolts, flat washers, and hexagon nuts (fig. 12-45) to secure the HPU to the missile structure. Tighten the nuts to a torque value of 120 pound-inches.

(6) Attach the pressure tube assembly (14, fig. 12-44) to the tube cross (16). Tighten to a torque value of 300 pound-inches.





- 1-5/16-24 x 1-15/32 hex-hd bolt  
 2-5/16 fl washer  
 3-5/16-24 hex. nut

Figure 12-45. Removal and installation of the hydraulic pumping unit front attachments.

(7) Attach the return tube assembly (6) to the check valve (12). Tighten to a torque value of 110 pound-inches.

(8) Attach the dump tube assembly (5) to the manifold assembly (4).

(9) Position the clamps (7 and 11) on the dump tube assembly and the return tube assembly, and secure them with the hexagon-head bolt (8), flat washer (9), and hexagon nut (10).

(10) Connect connectors P143 (3, fig. 12-43) and P144 (1) to connectors J143 (4) and J144 (2), respectively.

(11) Connect the positive lead (10) to the positive terminal stud (11), and secure with the flat washer (7), lockwasher (8), and hexagon nut (9). Position the cable nipple (6) over the positive terminal stud.

(12) Repeat step (11) above to connect the negative lead (5).

(13) Remove the shorting dummy connector (1, fig. 10-4) from connector J544 (3) and connect connector P544 (2) to connector J544.

(14) Perform the air and oil servicing of the HPU as prescribed in chapter 4, section II.

(15) Install the equipment section access cover plate (2, fig. 3-21) on the right side of the missile and tighten the screws to the torque value given in table 15-9.

(16) Rearm the missile, using applicable procedures in chapter 10.

## 12-71. Replacement of the Ventilator Assembly

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the right equipment section access cover plate (2, fig. 3-21).

**WARNING:** If the HPU battery has been activated, the ventilator assembly will contain a caustic solution injurious to personnel and equipment. Do not remove the ventilator assembly from the battery. The ventilator assembly must not be reused.

(3) Disconnect the coupling nut (7, fig. 12-47) from the HPU squib battery (3).

(4) Remove the hexagon nuts (5), flat washers (2), and truss-head screws (1) securing the ventilator assembly (4) to the HPU squib battery; remove the ventilator assembly.

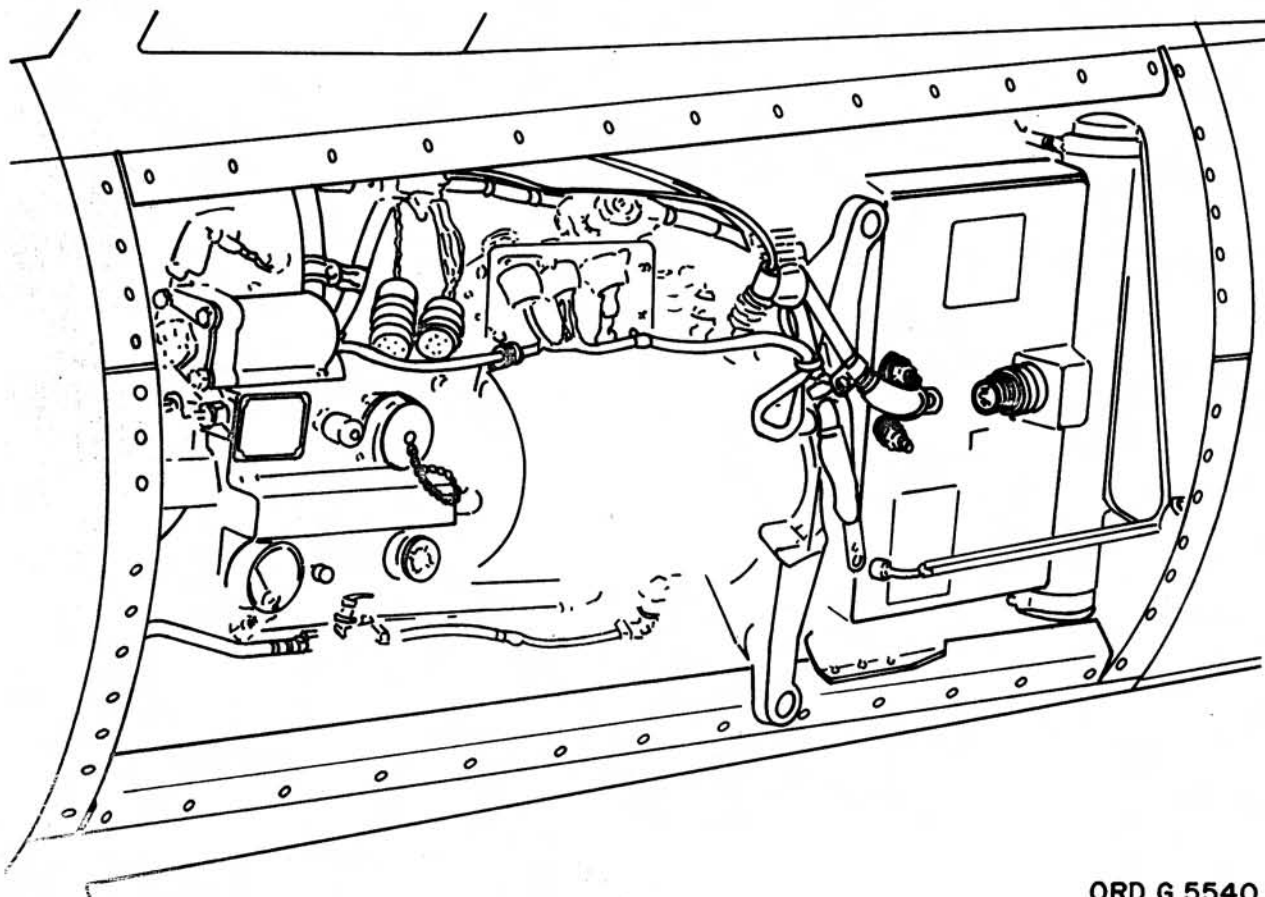
### b. Installation.

(1) Place the coupling nut (7) and the sleeve (8) on the overflow tube (6) of the ventilator assembly.

(2) Position the ventilator assembly (4) on the HPU squib battery (3), and secure with the hexagon nuts (5), flat washers (2), and truss-head screws (1).

**NOTE.** Insure that the overflow tube is fully bottomed in the battery vent fitting before tightening the coupling nut.

(3) Connect the coupling nut to the HPU squib battery, and tighten to the torque value in table 15-9.



ORD G 5540

Figure 12-46. Removal and installation of the hydraulic pumping unit.

(4) Install the equipment section access cover plate (2, fig. 3-21) on the right side of the missile, and secure with the flathead screws (3 and 10). Tighten the screws to the torque value given in table 15-9.

(5) Rearm the missile, using applicable procedures in chapter 10.

#### 12-72. Replacement of the HPU Squib Battery

##### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

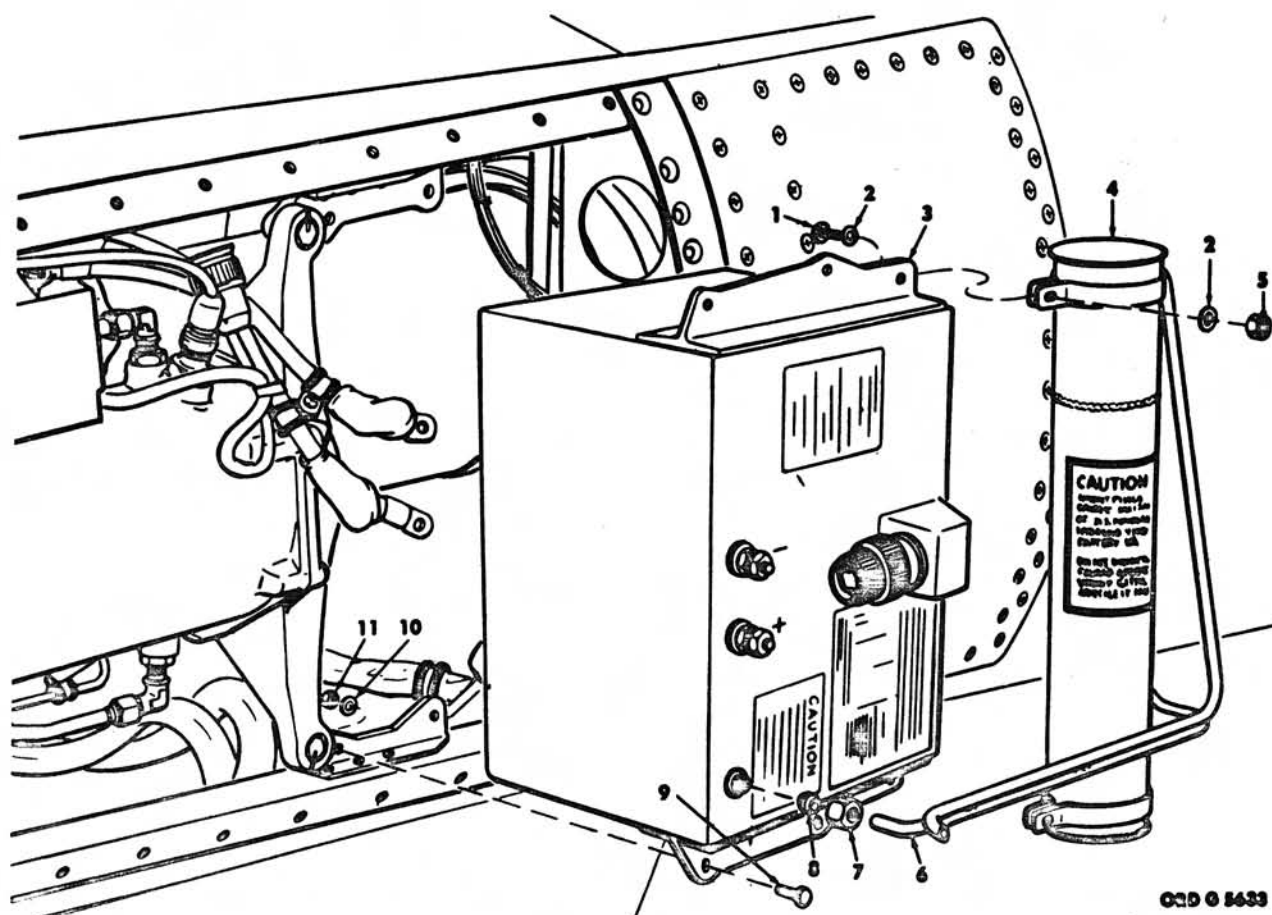
**WARNING:** If the HPU squib battery has been activated, the ventilator assembly will contain a

caustic solution injurious to personnel and equipment. Do not remove the ventilator assembly from the battery. The ventilator assembly must not be reused.

**WARNING:** If the HPU squib battery has been activated, perform the procedures in paragraph 4-14, and refer the missile to the direct support unit for replacement of the P, Y, and roll actuators.

(2) Remove the ventilator assembly (par. 12-71a (2) through (4)).

(3) Disconnect the positive and negative leads (par. 12-70a (5) and (6)).



ORD O 1433

- 1—No. 10-32 x 5/8 truss-hd screw (2)
- 2—0.203-in-id fl washer (4)
- 3—HPU squib battery
- 4—Ventilator assembly
- 5—No. 10-32 hex nut (2)
- 6—Overflow tube

- 7—Coupling nut
- 8—Sleeve
- 9—1/4-28 x 1-1/32 hex-hd bolt (4)
- 10—0.205-in-id fl washer (4)
- 11—1/4-28 hex. nut (4)

Figure 12-47. Removal and installation of the HPU squib battery and ventilator assembly.

**CAUTION:** The weight of the HPU squib battery (approximately 47 pounds) should be supported while performing step (4) below, to prevent binding of the bolts.

(4) Remove the hexagon nuts (11, fig. 12-47), flat washers (10), and hexagon-head bolts (9) securing the HPU squib battery (3) to the missile structure; remove the battery.

#### b. Installation.

(1) Test the HPU squib battery (par. 7-9).

**CAUTION:** The weight of the HPU squib battery (approximately 47 pounds) should be supported

while installing the battery to prevent binding.

(2) Place the HPU squib battery (3, fig. 12-47) in the equipment section, and align the mounting holes in the battery with the mounting holes in the missile structure.

(3) Install the hexagon-head bolts (9), flat washers (10), and hexagon nuts (11) to secure the HPU squib battery to the missile structure. Tighten the bolts to the value given in table 15-9.

(4) Install the ventilator assembly (par. 12-71b (1) through (3)).

(5) Connect the positive lead (10, fig. 12-43) to the positive terminal stud (11), and secure with the flat washer (7), lockwasher (8), and hexagon nut (9). Position the cable nipple (6) over the positive terminal stud.

(6) Repeat step (5) above to connect the negative lead (5).

(6.1) Remove the shorting dummy connector from J544, and connect P544 to J544.

(7) Install the equipment section access cover plate (2, fig. 3-21) on the right side of the missile, and secure with the flathead screws (3 and 10). Tighten the screws to the torque value given in table 15-9.

(8) Rearm the missile, using applicable procedures in chapter 10.

#### 12-73. Replacement of Accessory Power Supply (APS) 9032190 or 9030900 with the Hydraulic Pumping Unit (HPU)

**NOTE.** MWO Y77-W30 must be applied to the missile prior to installing the HPU (missile 10206 through 11935 and 13001 through 13683).

##### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the APS (par. 12-69a (2) through (13)).

**NOTE.** Prior to the installation of the HPU, bracket 9028219 and lower bracket 9028195 must be replaced with upper support 9019695 and lower support 9019696 (missiles 10206 through 11935 and 13001 through 13683).

**NOTE.** Dispose of upper bracket 9028219 and lower bracket 9028195 in accordance with AR 755-5 (CONUS) or AR 755-10 (foreign).

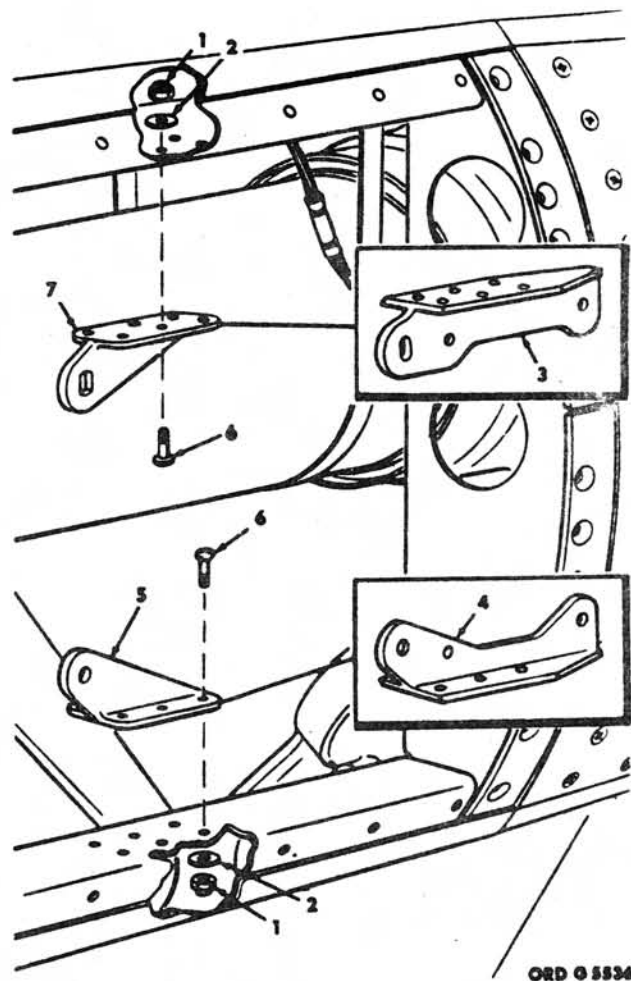
(3) Remove the hexagon nuts (1, fig. 12-48), flat washers (2), and brazier-head screws (6) that secure the upper bracket (7) and the lower bracket (5) to the missile structure; remove the brackets. Retain the nuts, washers, and screws.

(4) Install the support (3 or 4) as prescribed in (a) through (c) below.

(a) Position the support on the missile structure, and align the mounting holes with the holes in the missile structure.

(b) Install the brazier-head screws (6), flat washers (2), and hexagon nuts (1) to secure the support (3 or 4) to the missile structure.

(c) Tighten the nuts to a torque value of 25 pound-inches.



- 1—No. 10-32 hex. nut (12)
- 2—0.203-in-id fl washer (12)
- 3—Upper support
- 4—Lower support
- 5—Lower bracket
- 6—No. 10-32 x 23/32 brazier-hd screw (12)
- 7—Upper bracket

Figure 12-48. Removal of the upper and lower brackets and installation of the upper and lower supports.

(5) Install the remaining support to the missile structure as prescribed in step (4) above.

(6) Remove the seal (6, fig. 3-21) from the equipment section access cover plate (2).

(7) Insert the grommet (4) into the hole in the plate (5) and install the plate in the equipment section access cover plate.

*b. Installation.*

(1) Install the HPU (par. 12-70b (1) through (13)).

(2) Install the HPU squib battery (par. 12-72b (1) through (6)).

(3) Install the ventilator assembly (par. 12-71b (1) through (4)).

(4) Perform the air and oil servicing of the HPU as prescribed in chapter 4, section II.

(5) Rearm the missile, using applicable procedures in chapter 10.

## Section IX. ACCESSORY POWER SUPPLY (APS) SERVICING AND SYSTEM CLEANUP-LAUNCHING AREA

### 12-74. Air Servicing

**WARNING:** Safety-and-arming devices M30A1 must be installed in a ready missile at all times to provide fail-safe capability in case of accidental launch.

**WARNING:** If either or both safety-and-arming devices M30A1 indicate armed (red field), clear the area of all personnel, and notify EOD.

**CAUTION:** Do not operate the APS continuously for more than 20 minutes. Allow the oil to cool for at least 40 minutes between runs.

**CAUTION:** Observe the TCG operating cycles as prescribed by tables 4-7, 4-8, and 4-9.

**NOTE.** Refer to paragraph 4-2 for low temperature operation limitations data and to table 4-12 for hydraulic oil change and buzz voltage requirements.

*a.* At the launcher control-indicator, set the TEST-FIRE switch to TEST.

*b.* Open the APS SERVICE DOOR, and check that the arm SAFETY SWITCH is in the center (safe) position (view A, step 2, fig. 4-6).

*c.* Remove the exhaust vent assembly.

*d.* Unscrew the external drive motor spline cap (7, fig. 4-8). Unscrew the turbine shaft cap (6), and remove the gasket (5). Inspect the gasket for nicks and compressed areas, and replace it, if necessary. Assemble the turbine shaft cap on the external drive motor spline cap to protect both caps.

*e.* Connect the power cable assembly (fig. 4-9) to the power connector (8, fig. 4-8) on the external drive motor (1) and to J8B on the launcher power distribution box.

*f.* Momentarily set the external drive motor switch (fig. 4-9) to ON, and check for counter-clockwise rotation of the external drive motor shaft (view from the power connector side). If the shaft rotation is incorrect, notify the proper authorities.

*g.* Set the external drive motor switch to OFF, and disconnect the power cable assembly.

*h.* Make certain that the external drive motor spline (2, fig. 4-8) and turbine shaft (3) are clean and free of foreign matter. Align and engage the external drive motor spline with the turbine shaft. Engage the threads on the external drive motor with the threads on the turbine housing (4), and rotate the external drive motor clockwise to secure in position. Back the motor off approximately  $\frac{1}{4}$  of a turn.

**WARNING:** Check that the external drive motor switch is set to OFF.

*i.* Connect the power cable assembly to the power connector on the external drive motor.

*j.* Unlock the elevons (fig. 9-12).

*k.* At the launcher control-indicator, set the test station selector switch to the appropriate position, the LAUNCHER DC POWER switch to ON; and the HEATERS AND GYRO switch to ON.



**CAUTION:** Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

l. Set the APS switch to START, and hold between 1 and 2 seconds.

m. Depress the TRANSFER valve (fig. 4-5) on the APS service panel, and hold for a minimum of 5 seconds.

n. Check that the ACC. AIR PRESS. gage (fig. 4-7) indicates at ambient temperature  $\pm 25^{\circ}\text{F}$ . If the indication is more than  $25^{\circ}\text{F}$  below the ambient temperature, pressurize as prescribed below:

(1) Remove the cap from the AIR FILL fitting on the APS, and connect the air hose from a source of clean, dry air or nitrogen. Open the air or nitrogen supply valve.

(2) Turn the locknut on the AIR FILL fitting counterclockwise until the accumulator begins to fill. Depress and hold the TRANSFER valve until pressurization is obtained.

(3) Pressurize the accumulator to the pressure indication corresponding to the ambient temperature on the scale of the ACC. AIR PRESS. gage. Allow the indication to stabilize.

(4) Tighten the locknut of the AIR FILL fitting, and close the air or nitrogen supply valve.

(5) Momentarily depress the TRANSFER valve, and check that the pressure indication on the ACC. AIR PRESS. gage does not decrease. If the indication does decrease, repeat step (2) through (4) above.

(6) Disconnect the air hose, and install the cap on the AIR FILL fitting.

o. Set the APS switch to STOP, and hold between 1 and 2 seconds.

p. Set the HEATERS AND GYROS switch to OFF.

q. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates between 2,500 and 3,000 psi, immediately set the external drive motor switch to OFF.

r. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in *q* above, perform the steps below.

(1) Set the HEATERS AND GYROS switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYROS switch to OFF.

(6) Repeat *q* above.

s. Disconnect the external drive motor power cable assembly from J8B.

#### 12-75. Hydraulic Oil Servicing, Using the Portable Oil Fill and Filter Unit

**NOTE.** The portable oil fill and filter unit must be used if available. If not, perform the procedures in paragraph 12-76.

**NOTE.** Perform the air servicing procedure in paragraph 12-74 above prior to performing the procedures below.

**NOTE.** Do not reuse oil drained from the APS.

**NOTE.** If the oil level gage (9, fig. 4-10) on the portable oil fill and filter unit (10) reservoir indicates below REFILL, perform the procedures prescribed in table 4-2, step 11 through 19, using J8B on the launcher power distribution box as the power source, and omit *a* below.

a. Connect the portable oil fill and filter unit power cable assembly (8, fig. 4-10) to J8B on the launcher power distribution box and to POWER connector J1 (14). The LINE POWER indicator light (1) illuminates.

b. Connect the hydraulic oil supply hose (7) to the OIL FILL fitting (fig. 4-5) on the APS service panel.

**CAUTION:** Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

c. At the launcher control-indicator, check that the TEST-FIRE switch is set to TEST, the test station selector switch to the appropriate position,

and the LAUNCHER DC POWER and HEATERS and GYRO switches to ON.

Set the APS switch to START, and hold between 1 and 2 seconds.

d. Turn the BYPASS valve fully clockwise.

e. Set the OPERATE circuit breaker to ON, and open the OIL BLEED valve (fig. 4-5) on the APS service panel. Allow the oil to flow from the drain hose into a suitable container until free of air bubbles.

f. Close the OIL BLEED valve. Turn the RELIEF valve knob until the OIL PRESS gages indicate  $150 \pm 10$  psi, and turn the locknut fully clockwise. When the HYD. RES. LEVEL indicator moves to BLD., set the OPERATE circuit breaker to OFF.

g. If air bubbles were present in e above, perform the steps below.

(1) At the launcher control-indicator, set the VIBRATOR switch to ON (up).

(2) Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

(3) Connect the external drive motor power cable assembly to J8B.

(4) Set the external drive motor switch to ON.

(5) At the section control-indicator, set the launcher designator switch to the appropriate position, and depress and hold the SLEW pushbutton for 10 seconds. The elevons deflect evenly and smoothly.

(6) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

(7) Set the VIBRATOR switch and the external drive motor switch to OFF.

(8) Open the OIL BLEED valve, and allow the oil to flow from the drain hose into a suitable container. Check the oil flow for air bubbles. When the HYD. RES. LEVEL indicator moves to -45°, close the OIL BLEED valve.

(9) Disconnect the external drive motor power cable assembly from J8B.

(10) Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

(11) If air bubbles were present in step (8) above, set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator moves to BLD, set the OPERATE circuit breaker to OFF and repeat steps (1) through (10) above.

(12) If air bubbles were not present in step (8) above, set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator moves to BLD, set the OPERATE circuit breaker to OFF.

h. Set the APS switch to STOP, and hold between 1 and 2 seconds.

i. Set the HEATERS AND GYROS switch to OFF.

j. Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

k. Connect the external drive motor power cable assembly to J8B.

l. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, immediately set the external drive motor switch to OFF.

m. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in l above, perform the steps below:

(1) Set the HEATERS AND GYROS switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYROS switch to OFF.

(6) Repeat l above.

n. Allow the ACC. AIR PRESS. gage indication to stabilize. If it does not stabilize above 2,500 psi, repeat l above.

o. Open the OIL BLEED valve. When the HYD. RES. LEVEL indicator moves to ambient

temperature  $\pm 25^\circ$ , close the OIL BLEED valve.

p. If the HYD. RES. LEVEL indicator moves lower than the ambient temperature in *o* above, disconnect the external drive motor power cable assembly from J8B, and repeat *a*, and *c* through *o* above.

q. Disconnect the hydraulic oil supply hose from the OIL FILL fitting, and connect it to the quick-disconnect fitting on the manifold return port (12, fig. 4-10) in the portable oil fill and filter unit.

r. Remove the external drive motor from the APS (1, fig. 4-8), and install the turbine shaft cap (6). Torque the cap to 60 pound-inches.

s. Lock the elevons (fig. 9-12).

t. Set all switches to the initial operating condition.

u. Close the APS SERVICE DOOR as directed by higher authority.

## 12-76. (Deleted)

Figure 12-49. (Deleted)

## 12-77. Fuel Servicing

**WARNING:** ET<sub>2</sub>O liquid and vapor cause severe burns if allowed to become confined between the skin and clothing. Care should be exercised to keep the ET<sub>2</sub>O from dropping on or into the shoes or clothing. Should the ET<sub>2</sub>O become confined between the skin and clothing, remove the clothing; immediately wash the skin with soap and water; and allow the clothing to air-dry for several hours. Dispose of contaminated shoes. Should ET<sub>2</sub>O get into the eyes, flush them with water, and report to the proper authorities.

**WARNING:** The Threshold Limit Value (TLV) for ETO vapor is 50 parts per mil-

lion for an 8-hour work day. Where high vapor concentration exists, and when working in confined, unventilated areas, an approved type self-contained breathing apparatus must be worn.

**WARNING:** Clear the testing area of all non-participating personnel and flammable materials. Position two manned CO<sub>2</sub> fire extinguishers within 4 feet of the APS, and prohibit smoking within 60 feet. Operating personnel must wear goggles or face masks, rubber gloves, and rubber aprons.

**WARNING:** Small quantities of unservicable ET<sub>2</sub>O should be disposed of by burning, in accordance with applicable instruction, or by diluting with a minimum of 22 parts of water to each part of ET<sub>2</sub>O and dumping into a sanitary sewer or closed sewer system.

**WARNING:** Permit only the missile that is being refilled to be above ground during the transfer of ET<sub>2</sub>O.

**WARNING:** Insure that the shorting plug is installed in the rocket motor igniter cable.

**WARNING:** Check that rocket motor safety-and-arming switch S31 indicates SAFE (green field).

a. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, and the LAUNCHER DC POWER and HEATERS AND GYRO switches to ON (up).

**CAUTION:** Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

b. Set the APS switch to START, and hold between 1 and 2 seconds.

c. Set the HEATERS AND GYRO switch to OFF.

d. Open the APS SERVICE DOOR, and depress the TRANSFER valve (fig. 4-33) on the APS service panel until the ACC. AIR PRESS. gage indication stabilizes.

e. Place the APS filler and nitrogen tank in position, with the nitrogen tank connected to the ET<sub>2</sub>O fuel tank.

f. Open the nitrogen tank control valve, and adjust the nitrogen tank regulator valve until the regulator pressure gage indicates 5 psi. Open the ET<sub>2</sub>O supply valve, and open the bleeder valve

on the fuel fill hose until all air is exhausted and clear ET<sub>h</sub>O flows from the bleeder valve. Immediately close the valve.

g. Connect the static ground lead to the APS service panel.

h. Close the nitrogen tank control valve and the ET<sub>h</sub>O supply valve.

**WARNING:** Before proceeding with the transfer of ET<sub>h</sub>O operations, set all controls at the section selector and launcher control-indicator to the shutdown condition.

i. Connect the fuel fill hose to the FUEL FILL fitting on the APS service panel by pushing the quick-disconnect fitting securely into place.

j. Open the nitrogen tank control valve. Adjust the nitrogen tank regulator valve on the nitrogen tank until the regulator pressure gage indicates 200 psi.

k. Open the ET<sub>h</sub>O supply valve on the ET<sub>h</sub>O fuel tank.

l. Depress and hold the TRANSFER valve until the FUEL LEVEL gage moves from REFILL to FULL. When ET<sub>h</sub>O stops flowing in the fuel fill hose, release the TRANSFER valve.

**NOTE.** Wait at least 1 minute to allow the pressure and the temperature to stabilize as indicated on the ACC. AIR PRESS. gage before performing m below.

m. Close the ET<sub>h</sub>O supply valve on the ET<sub>h</sub>O fuel tank.

n. Remove the fuel fill hose from the FUEL FILL fitting.

o. Disconnect the static ground lead from the APS service panel, and connect it to the plug. Place the fuel fill hose on the APS filler.

p. Set the TEST-FIRE switch to TEST, test station selector switch to the appropriate position, and the LAUNCHER DC POWER and HEATERS AND GYRO switches to ON (up).

q. Set the APS switch to STOP, and hold between 1 and 2 seconds.

r. Set the HEATER AND GYRO switch to OFF.

s. Install the external drive motor (par. 12-74c through i).

t. Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates 2,500 to 3,000 psi, immediately set the external drive motor switch to OFF.

u. If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in t above, perform the steps below.

(1) Set the HEATERS AND GYRO switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYRO switch to OFF.

(6) Repeat t above.

v. Check that the FUEL LEVEL gage indicates above REFILL. If the gage indicates below REFILL, repeat a through t above as required, except set the nitrogen tank regulator valve for an indication of 240 psi in j above.

w. Set all switches to the initial operating condition.

x. Remove the external drive motor from the APS and install the turbine shaft cap. Torque the cap to 60 pound-inches.

y. Close the APS SERVICE DOOR as directed by higher authority.

12-78. Deleted.

## 12-79. System Cleanup

**Note.** The procedure below is to be performed semi-annually or whenever major repair or replacement of the missile hydraulic system is accomplished.

**NOTE.** Do not reuse oil drained from the APS.

a. Remove the reservoir filler cap (11, fig. 4-10) on the portable oil fill and filter unit (10), and fill the reservoir with hydraulic oil until the oil level gage (9) indicates FULL. Replace the cap.

b. Connect the portable oil fill and filter unit power cable assembly (8) to POWER connector J1 (14) on the portable oil fill and filter unit.



c. At the section control-indicator, set the POWER switch to ON.

**Caution:** Make certain that the OPERATE circuit breaker (2) on the portable oil fill and filter unit is set to OFF before performing d through g below.

d. Connect the other end of the power cable assembly to J8B on the launcher power distribution box. The LINE POWER indicator light (1) on the portable oil fill and filter unit illuminates.

e. Connect the hydraulic oil supply hose (7) to the quick-disconnect fitting on the manifold return port (12).

f. Turn the BYPASS valve (4) fully counterclockwise.

g. Turn the RELIEF VALVE knob (3) fully counterclockwise.

**Caution:** When the OPERATE circuit breaker is set to ON, check for an oil pressure indication on the OIL PRESSURE gage. If there is no pressure indication, immediately set the OPERATE circuit breaker to OFF; verify correct power phasing, and perform corrective maintenance procedures.

h. Set the OPERATE circuit breaker to ON.

**Note.** When performing i below, monitor the OIL PRESSURE gage (5) indication. If the indication exceeds 100 psi, refer the portable oil fill and filter unit to the direct support unit for primary filter replacement.

i. Operate the portable oil fill and filter unit for 30 minutes, and then set the OPERATE circuit breaker to OFF.

j. Disconnect the hydraulic oil supply hose from the quick-disconnect fitting on the manifold return port, and turn the BYPASS valve fully clockwise.

k. Remove the right equipment section access cover plate (2, fig. 3-21), and visually inspect the APS and all associated hydraulic lines and electrical connections. Insure that the APS is securely mounted.

l. Connect the hydraulic oil supply hose to the OIL FILL fitting on the APS service panel.

m. Remove the overboard dump tube from the oil bleed port. Connect the drain hose assembly (6, fig. 4-10) to the oil bleed port, and place

the other end in a 2½ gallon (minimum) container.

n. Remove the GUIDANCE TEST AND ADJUST ACCESS DOOR (1, fig. 3-26 or 10, fig. 3-27).

o. Connect cable assembly 8521613 to J1 on the rear of the test control unit and to J2 on the transponder control group.

p. Connect cable assembly 9152989 to J3 on the rear of the test control unit and to J13A on the launcher control-indicator.

q. Unlock the elevons (fig. 9-12).

r. Check that the arm SAFETY SWITCH is in the center (safe) position (view A, step 2, fig. 4-6).

s. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, and the LAUNCHER DC POWER and HEATERS AND GYROS switches to ON (up).

**Caution:** Insure that the APS switch is not held to START or STOP for less than 1 second or more than 2 seconds. Otherwise, damage to solenoids L1 and L2 in the APS could occur.

t. Set the APS switch to START, and hold between 1 and 2 seconds.

u. Set the HEATERS AND GYROS switch to OFF.

v. Depress the TRANSFER valve (fig. 4-5) on the APS service panel until the ACC. AIR PRESS. gage indication stabilizes.

w. Set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator on the APS service panel moves to BLD., set the OPERATE circuit breaker to OFF.

x. Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

y. Install the external drive motor on the APS (para 12-74d through i).

z. At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

aa. After 60 seconds, set the external drive motor switch to ON.

**Warning:** Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.



*Figure 12-50. (Deleted)*

*ab.* At the TCU, set the POWER switch to ON and the POWER LIGHT indicator light illuminates. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

*ac.* Depress the YAW pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately one minute. The elevons deflect accordingly.

*ad.* Depress the PITCH pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately one minute. The

elevons deflect accordingly. Release the PITCH pushbutton.

*ae.* Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.

*af.* At the section control-indicator, set the launcher designator switch to the appropriate position.

*ag.* Depress and hold the SLEW pushbutton for approximately one minute. The elevons deflect evenly and smoothly.

*ah.* At the test control unit, set the POWER switch to OFF. The POWER LIGHT indicator light extinguishes.

*ai.* Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF.

*aj.* Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

*ak.* Set the external drive motor switch to OFF.

*al.* Immediately open the OIL BLEED valve. The HYD. RES. LEVEL indicator moves to the -45° position.

*am.* Depress and hold the transfer valve until oil flow stops. Close the OIL BLEED valve.

*an.* Disconnect the external drive motor power cable assembly from J8B.

*ao.* Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

*ap.* Repeat *w* through *ao* above 8 times.

*aq.* Attach the quick-disconnect coupling half to the free end of the flexible hose assembly (6, fig. 4-10), and connect this end to the quick-disconnect fitting on the manifold return port (12) in the portable oil fill and filter unit (10).

*ar.* Open the OIL BLEED valve, and turn the RELIEF VALVE knob and BYPASS valve fully counterclockwise.

*as.* Set the OPERATE circuit breaker to ON, and allow the oil to circulate for 5 minutes.

*at.* Close the OIL BLEED valve, and turn the BYPASS valve fully clockwise.

**CAUTION:** Do not allow OIL PRESSURE gage indication to exceed 160 psi in *au* below.

*au.* Turn the RELIEF VALVE knob clockwise sufficiently to allow the HYD. RES. LEVEL indicator to move to BLD.

*av.* Set the OPERATE circuit breaker to OFF.

*aw.* Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

*ax.* Connect the external drive motor power cable assembly to J8B.

**CAUTION:** When performing *ay* below, do not allow the ACC. AIR PRESS. gage indication to fall below 2,500 psi.

*ay.* Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates between 2,500 and 3,000 psi, depress the TRANSFER valve until the ACC. AIR PRESS. gage indicates 2,500 psi. Repeat this cycling of the TRANSFER valve for 30 seconds. Set the external drive motor switch to OFF.

*az.* Disconnect the external drive motor power cable assembly from J8B.

*ba.* Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

*bb.* Repeat *ar* through *ba* above 4 times.

*bc.* Repeat *ar* through *ay* above.

*bd.* At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

*be.* After 60 seconds, set the external drive motor switch to ON.

**WARNING:** Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.

*bf.* At the test control unit, set the POWER switch to ON. The POWER LIGHT indicator light illuminates. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

*bg.* Depress the YAW pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute. The elevons deflect accordingly.

*bh.* Depress the PITCH pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute. The elevons deflect accordingly. Release the PITCH pushbutton.

*bi.* Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.

*bj.* At the section control-indicator, set the launcher designator switch to the appropriate position.

*bk.* Depress and hold the SLEW pushbutton for approximately 1 minute. The elevons deflect evenly and smoothly.

*bl.* At the test control unit, set the POWER switch to OFF. The POWER LIGHT indicator light extinguishes.

*bm.* Set the HEATERS AND GYROS switch and VIBRATOR switch to OFF.

*bn.* Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indicates down to 2,500 psi. Repeat 4 times.

*bo.* Set the external drive motor switch to OFF.

*bp.* Immediately open the OIL BLEED valve. The HYD. RES. LEVEL indicator moves to the -45° position.

*bq.* Depress and hold the transfer valve until oil flow stops.

*br.* Close the OIL BLEED valve.

*bs.* Disconnect the external drive motor power cable assembly from J8B.

*bt.* Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

*bu.* Repeat *ar* through *ba* above 5 times.

*bv.* Repeat *ar* through *ay* above.

*bw.* Repeat *bd* through *bt* above.

*bx.* Repeat *ar* through *ba* above 5 times.

*by.* Repeat *ar* through *ay* above.

*bz.* Repeat *bd* through *bt* above.

*ca.* Repeat *ar* through *ba* above 5 times.

*cb.* Repeat *ar* through *ay* above.

*cc.* Repeat *bd* through *bt* above.

*cd.* Repeat *ar* through *ba* above 5 times.

*ce.* Repeat *ar* through *ay* above.

*cf.* Repeat *bd* through *bt* above.

*cg.* Repeat *ar* through *ba* above 6 times.

*ch.* Check that the OIL BLEED valve is closed and the BYPASS valve is turned fully clockwise.

*ci.* Set the OPERATE circuit breaker to ON.

**CAUTION:** Do not allow the OIL PRESSURE gage indication to exceed 160 psi in *cj* below.

*cj.* Turn the RELIEF VALVE knob clockwise sufficiently to allow the HYD. RES. LEVEL indicator to move to BLD.

*ck.* Set the OPERATE circuit breaker to OFF.

*cl.* Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

*cm.* Connect the external drive motor power cable assembly to J8B.

*cn.* Set the HEATERS AND GYRO switch to ON.

*co.* Set the APS switch to STOP, and hold between 1 and 2 seconds.

*cp.* Set the HEATERS AND GYRO switch to OFF.

*cq.* Set the external drive motor switch to ON. When the ACC. AIR PRESS. gage indicates between 2,500 and 3,000 psi, immediately set the external drive motor switch to OFF.

*cr.* If the ACC. AIR PRESS. gage indication exceeds 3,000 psi in *cq* above, perform the steps below:

(1) Set the HEATERS AND GYRO switch to ON.

(2) Set the APS switch to START, and hold between 1 and 2 seconds.

(3) Depress and hold the TRANSFER valve until the ACC. AIR PRESS. gage indication stabilizes.

(4) Set the APS switch to STOP, and hold between 1 and 2 seconds.

(5) Set the HEATERS AND GYROS switch to OFF.

(6) Repeat *cq.* above.

*cs.* If the HYD. RES. LEVEL indicator reads less than 25° below the ambient temperature, perform the steps below:

(1) Disconnect the external drive motor power cable assembly from J8B.

(2) Connect the portable oil fill and filter unit power cable assembly to J8B. The LINE POWER indicator light illuminates.

(3) Set the HEATERS AND GYRO switch to ON.

(4) Set the APS switch to START, and hold between 1 and 2 seconds.

(5) Set the OPERATE circuit breaker to ON. When the HYD. RES. LEVEL indicator moves to the ambient temperature  $\pm 25^\circ$ , set the OPERATE circuit breaker to OFF.

(6) Repeat steps *cn* through *cs.*

(7) Disconnect the portable oil fill and filter unit power cable assembly from J8B. The LINE POWER indicator light extinguishes.

*ct.* If the HYD. RES. LEVEL indicator reads more than 25° above the ambient temperature, allow the oil to cool. Open the OIL BLEED valve, and allow oil to drain until the HYD. RES.

LEVEL indicator moves to the ambient temperature  $\pm 25^\circ$ . Close the OIL BLEED valve.

cu. Remove the external drive motor from the APS, and install the turbine shaft cap. Torque the cap to 60 pound-inches.

ov. Disconnect the flexible hose assembly from the oil bleed port on the APS and the quick-disconnect fitting on the manifold return port in the portable oil fill and filter unit.

cw. Disconnect the hydraulic oil supply hose from the OIL FILL fitting, and connect it to the quick-disconnect fitting on the manifold return port.

cx. Connect the overboard dump tube to the oil bleed port.

cy. Remove all test cable assemblies.

cz. Lock the elevons (fig. 9-12).

da. Install the right equipment section access cover plate (2, fig. 3-21). Tighten the screws to the torque values given in table 15-9.

db. Install the GUIDANCE TEST AND ADJUST ACCESS DOOR (1, fig. 3-26 or 10, 3-27). Tighten the screws to the torque value given in table 15-9.

dc. Set all switches to the initial operating condition.

## Section X. HYDRAULIC PUMPING UNIT (HPU) SERVICING AND SYSTEM CLEANUP-LAUNCHING AREA

### 12-80. Air Servicing

**WARNING:** Weight the air supply hose with sand bags. Assure that the air fill valve on the end of the air supply hose is fully closed.

**NOTE.** Use clean, dry, compressed air, with a dew-point of  $-40^\circ\text{F}$  and a maximum pressure of 3,500 psi, or use nitrogen.

**NOTE.** Refer to paragraph 4-9 for low-temperature operation limitations data, and to table 4-12 for hydraulic oil change and bump voltage requirements.

a. Open the APS SERVICE DOOR.

b. Remove the cap from the AIR FILL valve (3, fig. 4-18) on the HPU, and connect the air supply hose from the air or nitrogen source.

c. At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector switch to the appropriate position, the LAUNCHER DC POWER and HEATER AND GYRO switches to ON (up), and the VIBRATOR switch to ON (up).

d. Open the air or nitrogen supply valve.

e. Open the AIR FILL valve by turning the locknut counterclockwise until the accumulator begins to fill.

f. Pressurize the accumulator to the accumulator air pressure gage indication corresponding to the ambient temperature reading as prescribed in TM 9-1440-250-12/1.

g. Tighten the locknut of the AIR FILL valve clockwise, and close the air supply valve. Allow the ACC. AIR PRESS. gage indication to stabilize.

Repeat steps c through f to obtain a stable indication.

h. Close the air supply shutoff valve; disconnect the air supply hose; and install the cap (5) on the AIR FILL valve (3). Torque the AIR FILL locknut to 50 pound-inches.

i. Return all switches to the initial operating condition.

### 12-81. Hydraulic Oil Servicing, Using the Portable Oil Fill and Filter Unit

**NOTE.** The portable oil fill and filter unit must be used if available. If not, perform the procedures in paragraph 12-82 below.

**NOTE.** Perform the air servicing procedure in paragraph 12-80 above prior to performing the procedures below.

**NOTE.** Do not reuse oil drained from the HPU.

a. Connect the external power cable assembly (5, fig. 4-14) to J1 (3) on the distribution box (2) at the power conversion unit and to J8B at the launcher power distribution box.

b. Connect the HPU power cable assembly to J2 (12) on the meter cabinet (1) at the power conversion unit and to GROUND PLUG connector J546 (7, fig. 4-16) on the HPU indicator panel.

c. Install the strap (2) on the missile.

d. Connect the portable oil fill and filter unit power cable assembly (8, fig. 4-10) to POWER connector J1 (14) on the portable oil fill and filter unit.

e. Connect the other end of the power cable assembly to ETO APS RUNUP MOTOR connector J2 on the distribution box (2, fig. 4-14) at the power conversion unit.

f. Set the ETO APS RUNUP MOTOR circuit breaker to ON; the LINE POWER indicator light (1, fig. 4-10) on the portable oil fill and filter unit illuminates.

g. Connect the hydraulic oil supply hose to the OIL FILL valve (8, fig. 4-17) on the HPU indicator panel (1).

h. Set the OPERATE circuit breaker (2, fig. 4-10) to ON.

i. Turn the RELIEF VALVE knob (3) until the OIL PRESSURE gage (5) indicates  $110 \pm 10$  psi, and turn the locknut (13) fully clockwise.

j. Open the OIL BLEED valve on the HPU indicator panel. Allow the oil to flow from the drain hose into a suitable container until free of air bubbles.

k. Close the OIL BLEED valve. When the hydraulic reservoir level indicator moves to FULL, set the OPERATE circuit breaker to OFF.

l. If air bubbles were present in j above, perform the steps below.

(1) Unlock the elevons (fig. 9-12).

(2) At the launcher control-indicator, set the TEST-FIRE switch to TEST, the station selector switch to the appropriate position, the LAUNCHER DC POWER switch to ON (up), the HEATERS AND GYROS switch to ON (up), and the VIBRATOR switch to ON (up).

(3) At the power conversion unit, set the ELECTRICAL HPU POWER circuit breaker to ON. The ELECTRICAL HPU POWER indicator light illuminates.

(4) Depress the ELECTRICAL HPU START pushbutton.

(5) Depress the PUSH TO READ DC current pushbutton. The DC CURRENT meter does not exceed 120 amperes. The DC VOLTAGE meter indicates 27.9 to 35.6 volts.

(6) At the section control-indicator, set the launcher designator switch to the appropriate position; depress and hold the SLEW pushbutton

for 10 seconds. The elevons deflect evenly and smoothly.

(7) Depress the ELECTRICAL HPU STOP pushbutton.

(8) Set the ELECTRICAL HPU POWER circuit breaker to OFF. The ELECTRICAL HPU POWER indicator light extinguishes.

(9) Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF.

(10) Open the OIL BLEED valve, and allow the oil to flow from the drain hose into a suitable container.

(11) Set the OPERATE circuit breaker to ON, and close the OIL BLEED valve when the oil stream is free of air bubbles. When the hydraulic reservoir level indicator moves to FULL, set the OPERATE circuit breaker to OFF. Repeat steps (1) through (10) above as necessary to remove all air bubbles.

(12) Lock the elevons.

m. Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

n. Disconnect the hydraulic oil supply hose from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port in the portable oil fill and filter unit.

o. Remove the cable assemblies and test equipment.

p. Set all switches to the initial operating condition.

q. Close the APS SERVICE DOOR.

12-82. Deleted.



## 12-83. (Deleted)

## 12-84. System Cleanup

*Note.* This procedure is to be performed wherever major repair or replacement of hydraulic components is required in the launching area. This procedure is also to be performed periodically as specified in TM 9-1400-250-15/3. The quarterly checks of the transporter control group (mushroom) specified in TM 9-1440-250-12/1 may be performed concurrently with portions of this procedure.

*Note.* Do not reuse oil drained from the HPU.

a. Remove the reservoir filler cap (11, fig. 4-10) on the portable oil fill and filter unit (10), and fill the reservoir with hydraulic oil until the oil level gage (9) indicates FULL. Replace the cap.

b. At the section control-indicator, set the POWER switch to ON.

c. Connect the portable oil fill and filter unit power cable assembly (8) to POWER connector J1 (14) on the portable oil fill and filter unit.

**Caution:** Make certain that the OPERATE circuit breaker (2, fig. 4-10) is set to OFF before performing d through i below.

d. Connect the external power cable assembly (5, fig. 4-14) to J1 (3) on the distribution box (2) at the power conversion unit and to J8B at the launcher power distribution box.

e. Connect the other end of the portable oil fill and filter unit power cable assembly to ETO APS RUNUP MOTOR connector J2 on the distribution box at the power conversion unit.

f. Set the ETO APS RUNUP MOTOR circuit breaker to ON, and the LINE POWER indicator light (1, fig. 4-10) on the portable oil fill and filter unit illuminates.

*Note.* Perform g through i below for a mobile-type installation only.

g. Open the door on the test station truck, and lock the cable boom in operating position.

h. Open the access door (8, fig. 4-15) at the test station truck distribution box.

i. Connect cable assembly 8004456 to J9 on the test station truck distribution box and to J13B at the launcher power distribution box.

*Note.* Before making hydraulic hose connections on the oil fill and filter unit or HPU, all connector fittings should be rinsed thoroughly with cleaning compound solvent 6850-984-5853 or equivalent.

j. Connect the hydraulic oil supply hose (7, fig. 4-10) to the quick-disconnect fitting on the manifold return port (12).

k. Turn the BYPASS VALVE knob (4) fully counterclockwise.

l. Turn the RELIEF VALVE knob (3) fully counterclockwise.

m. Clean up the hydraulic oil in the portable oil fill and filter unit as follows:

- (1) Set the OPERATE circuit breaker to ON.
- (2) Check for a pressure indication on the OIL PRESSURE gage. If there is no pressure indication, immediately set the OPERATE circuit breaker to OFF; verify correct power phasing from the power conversion unit, and perform corrective maintenance procedures.

**Caution:** If the OIL PRESSURE gage indicates in excess of 80 psi during the last 5 minutes of the 30 minute oil clean up time, refer the portable oil fill unit to the direct support unit for primary filter replacement and secondary filter back flushing.

- (3) Allow the hydraulic oil in the portable oil fill unit to circulate for 30 minutes.

*Note.* Steps n through r may be performed during the 30 minute hydraulic clean up time.

- (4) Set the OPERATE circuit breaker to OFF.

n. Remove the right equipment section access cover plate (2, fig. 3-21).

**o.** Visually inspect the HPU and all associated hydraulic lines and electrical connections. Insure that the HPU is securely mounted.

**p.** Remove the overboard dump tube from the oil bleed port on the HPU. Connect hydraulic hose 90033978 to the oil bleed port.

**Caution:** Insure the ELECTRICAL HPU STOP pushbutton on the power conversion unit is depressed and the ELECTRICAL HPU POWER circuit breaker is set to OFF before performing **q** below.

**q.** Connect the HPU power cable assembly to J2 (12, fig. 4-14) on the meter cabinet (1) at the power conversion unit and to GROUND PLUG connector J546 (7, fig. 4-16) on the HPU indicator panel.

**r.** Unlock the elevons.

**s.** Disconnect the hydraulic oil supply hose from the quick-disconnect fitting on the manifold return port, and connect it to the OIL FILL valve (6, fig. 4-17) on the HPU indicator panel. Turn the BYPASS VALVE knob fully clockwise.

**t.** Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

**u.** Install the cable holding strap (2) on the missile.

**v.** Set the ETO APS RUNUP MOTOR circuit breaker to ON. The LINE POWER indicator light illuminates.

**Note.** If the hydraulic reservoir level indicates FULL, omit steps **w** through **y** below.

**w.** Check that the BYPASS valve is turned fully clockwise.

**x.** Set the OPERATE circuit breaker to ON.

**y.** Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates  $110 \pm 10$  psi and turn the locknut fully clockwise.

**z.** At the launcher control-indicator, set the TEST-FIRE switch to TEST, the test station selector-switch to the appropriate position, and the LAUNCHER DC POWER switch to ON (up).

**Note.** Perform **aa** below for a mobile-type installation only.

**aa.** At the test station track distribution box, set circuit breaker CB9 to ON.

**ab.** At the power conversion unit, set the ELECTRICAL HPU POWER circuit breaker to ON. The ELECTRICAL HPU POWER indication light illuminates.

**WARNING:** Insure that all personnel remain clear of the area surrounding the missile elevons while applying hydraulic pressure.

**ac.** At the launcher control-indicator, set the HEATERS AND GYROS switch and the VIBRATOR switch to ON (up).

**ad.** Depress the ELECTRICAL HPU START pushbutton.

**ae.** At the test control unit, set the POWER switch to ON. The POWER LIGHT indicator light illuminates. Set the TEST SELECTOR NO. 1 switch to TRANS. NO. 2.

**af.** Depress the YAW pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute. The elevons deflect accordingly.

**ag.** Depress the PITCH pushbutton, and rotate the TEST SELECTOR NO. 2 switch between +G and -G for approximately 1 minute. The elevons deflect accordingly. Release the PITCH pushbutton.

**ah.** Set the TEST SELECTOR NO. 2 switch to TRANS. NO. 1 and the TEST SELECTOR NO. 1 switch to OFF.

**ai.** At the section control-indicator, set the launcher designator switch to the appropriate position.

**aj.** Depress and hold the SLEW pushbutton for approximately 1 minute. The elevons deflect evenly and smoothly.

**ak.** At the TCU, set the POWER switch to OFF. The POWER LIGHT indicator light extinguishes.

**al.** Depress the ELECTRICAL HPU STOP pushbutton. The HPU stops, but the elevons continue to deflect evenly and smoothly.

When the pressure in the hydraulic lines equalizes, the elevons stop moving.

*am.* Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF after the pressure has equalized.

*an.* Open the OIL BLEED valve, and drain all the oil from the HPU into a 2 1/2 gallon (minimum) container.

*ao.* Repeat *w*, *x*, and *y* above and when the hydraulic reservoir level indicator moves to the BLD AREA, set the OPERATE circuit breaker to OFF.

*ap.* Repeat *z* through *an* above.

*aq.* Repeat *ao* and *ap* above.

*ar.* Attach the quick-disconnect coupling half to the free-end of the flexible hose assembly (6, fig. 4-10), and connect this end to the quick-disconnect fitting on the manifold return port (12) in the portable oil and filter unit.

*Note.* If oil is visible on the oil level gage (9) on the portable oil fill and filter unit, sufficient oil is available for the remainder of the cleanup procedure. If oil is not visible, repeat steps *a*, *b*, *c*, *f*, *j*, *k*, *l*, and *s* before proceeding.

*as.* Check that the OIL BLEED valve is open.

*at.* Turn the RELIEF VALVE knob and the BYPASS valve fully counterclockwise. Set the OPERATE circuit breaker to ON, and allow the oil to circulate for 30 minutes.

*Note.* During the 30 minute oil circulation time, the quarterly RF checks in TM 9-1440-250-12/1 may be started.

*au.* Close the OIL BLEED valve, and turn the BYPASS valve fully clockwise.

*av.* Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates 110 ±10 psi, and turn the locknut fully clockwise.

*aw.* When the hydraulic reservoir level indicator moves to BLD., set the OPERATE circuit breaker to OFF.

*ax.* Set the ELECTRICAL HPU POWER circuit breaker to OFF. The ELECTRICAL HPU POWER indicator light extinguishes.

*ay.* Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

*az.* Disconnect the drain hose from the manifold return port in the portable oil fill and filter unit. Remove the quick disconnect coupling half from the free end of the drain hose.

*ba.* Open the OIL BLEED valve and check for air bubbles as oil is drained into the 2 1/2 gal (minimum) container. When the stream of oil is free of air bubbles, bleed the reservoir down to FULL and close the OIL BLEED valve.

*bb.* Repeat steps *au* through *ba* as necessary to attain this condition, reinstalling and removing the quick-disconnect coupling half on the flexible drain hose assembly as necessary.

*bc.* Disconnect the hydraulic oil supply hose from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port.

*bd.* Connect the overboard dump tube to the oil bleed port.

*be.* Lock the elevons.

*bf.* Remove all cable assemblies and test equipment.

*Note.* If the right equipment access cover plate is not required to be off for other operations, it may be replaced at this time.

*bg.* Install the right equipment section access cover plate (2, fig. 3-21). Tighten the screws to the torque values given in table 15-9.

*bh.* Set all switches to the initial operating condition.

When the pressure in the hydraulic lines equalizes, the elevons stop moving.

*am.* Set the HEATERS AND GYROS switch and the VIBRATOR switch to OFF after the pressure has equalized.

*an.* Open the OIL BLEED valve, and drain all the oil from the HPU into a 2 1/2 gallon (minimum) container.

*ao.* Repeat *w*, *x*, and *y* above and when the hydraulic reservoir level indicator moves to the BLD AREA, set the OPERATE circuit breaker to OFF.

*ap.* Repeat *z* through *an* above.

*aq.* Repeat *ao* and *ap* above.

*ar.* Attach the quick-disconnect coupling half to the free-end of the flexible hose assembly (6, fig. 4-10), and connect this end to the quick-disconnect fitting on the manifold return port (12) in the portable oil and filter unit.

*Note.* If oil is visible on the oil level gage (9) on the portable oil fill and filter unit, sufficient oil is available for the remainder of the cleanup procedure. If oil is not visible, repeat steps *a*, *b*, *c*, *f*, *j*, *k*, *l*, and *s* before proceeding.

*as.* Check that the OIL BLEED valve is open.

*at.* Turn the RELIEF VALVE knob and the BYPASS valve fully counterclockwise. Set the OPERATE circuit breaker to ON, and allow the oil to circulate for 30 minutes.

*Note.* During the 30 minute oil circulation time, the quarterly RF checks in TM 9-1440-250-12/1 may be started.

*au.* Close the OIL BLEED valve, and turn the BYPASS valve fully clockwise.

*av.* Turn the RELIEF VALVE knob until the OIL PRESSURE gage indicates 110 ±10 psi, and turn the locknut fully clockwise.

*aw.* When the hydraulic reservoir level indicator moves to BLD., set the OPERATE circuit breaker to OFF.

*ax.* Set the ELECTRICAL HPU POWER circuit breaker to OFF. The ELECTRICAL HPU POWER indicator light extinguishes.

*ay.* Set the ETO APS RUNUP MOTOR circuit breaker to OFF. The LINE POWER indicator light extinguishes.

*az.* Disconnect the drain hose from the manifold return port in the portable oil fill and filter unit. Remove the quick disconnect coupling half from the free end of the drain hose.

*ba.* Open the OIL BLEED valve and check for air bubbles as oil is drained into the 2 1/2 gal (minimum) container. When the stream of oil is free of air bubbles, bleed the reservoir down to FULL and close the OIL BLEED valve.

*bb.* Repeat steps *au* through *ba* as necessary to attain this condition, reinstalling and removing the quick-disconnect coupling half on the flexible drain hose assembly as necessary.

*bc.* Disconnect the hydraulic oil supply hose from the OIL FILL valve, and connect it to the quick-disconnect fitting on the manifold return port.

*bd.* Connect the overboard dump tube to the oil bleed port.

*be.* Lock the elevons.

*bf.* Remove all cable assemblies and test equipment.

*Note.* If the right equipment access cover plate is not required to be off for other operations, it may be replaced at this time.

*bg.* Install the right equipment section access cover plate (2, fig. 3-21). Tighten the screws to the torque values given in table 15-9.

*bh.* Set all switches to the initial operating condition.

## Section XI. CORRECTIVE MAINTENANCE OF THE ACTUATOR SECTION

### 12-85. Replacement of the Actuator Section Door Assemblies

#### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the actuator section door assemblies.

#### *b. Installation.*

(1) Install the actuator section door assemblies and tighten the screws to the torque value given in table 15-9.

(2) Reactivate the missile, using applicable procedures in chapters 9 and 10.

### 12-86. Replacement of the Index Pin

#### *a. Removal.*

(1) Prepare the missile as prescribed in

table 12-1.

(2) Remove the internal-wrenching bolts (3, fig. 12-51), recessed washers (4), and the shim (5) (missiles 10206 through 11187) that secure the index pin (2) to the rear of the actuator section (1); remove the index pin.

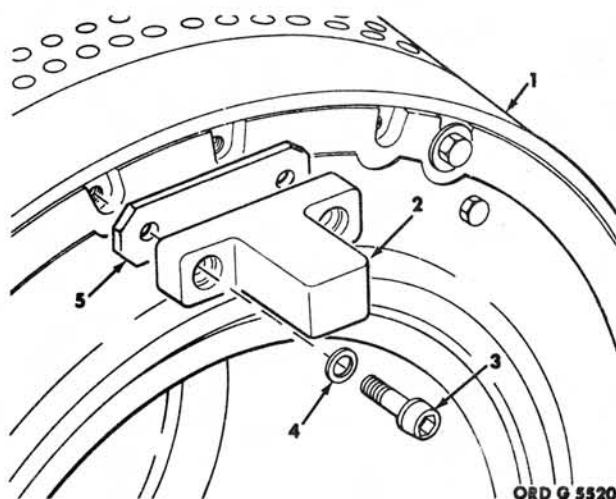
#### *b. Installation.*

(1) On missiles 10206 through 11187, place the shim (5) between the rear of the actuator section (1) and the index pin (2).

(2) Secure the index pin to the rear of the actuator section (1) with the internal-wrenching bolts (3) and recessed washers (4). Tighten the bolts to a torque value of 120 pound-inches, and secure with safety wire.

(3) Reactivate the missile, using applicable procedures in chapters 9 and 10.





- 1—Actuator section
- 2—Index pin 8162978 (missiles 10206 through 11187) or 9029046 (missiles 11188 through 11935 and 13001 and subsequent)
- 3—5/16-24 x 1-1/4 int-wrenching bolt (2)
- 4—0.324-in-id recessed washer (2)
- 5—Shim (missiles 10206 through 11187)

Figure 12-51. Removal and installation of the index pin.

## 12-87. Replacement of the Thermal Battery Assembly

a. *General.* The thermal battery assembly (fig. 12-52) contains two thermal batteries which provide electrical power for igniting the missile rocket motor initiators. The battery assembly is located near the top centerline of the actuator section.

**WARNING:** Use care when making repairs on the thermal battery assembly. If a thermal battery is discharged, its chemical properties raise the temperature of the battery case to between 300° and 400°F.

*Note.* If the missile is dejoined for other reasons and the thermal battery assembly required exchange, omit the procedures in paragraphs b (1) and (3) below. If the thermal batteries are to be replaced while the missile is positioned on the launching handling rail, omit the procedures in paragraph b (2) below.

### b. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the actuator section door assembly from the left side of the actuator section. Disconnect connectors P181 and P182 (9 and 11, fig. 12-52) from the thermal battery.

(3) Disconnect connectors P162 and P163 (fig. 5-13) from the rocket motor initiators, and install shorting connectors, using applicable procedures in paragraph 11-4. Remove the BA 472/U battery as prescribed in table 12-1. Disconnect P540 on the mounting panel from connector J540 on the missile distribution box. Disconnect the flexible rubber vent hose from the missile battery box vent tube. Remove the four bolts, nuts, and washers securing the battery rack, and carefully remove the battery rack to facilitate removal and replacement of the thermal battery assembly. Disconnect connectors P181 and P182 (9 and 11, fig. 12-52) from the thermal battery.

(4) Remove the four flathead screws (1) (missiles 10608 through 11935 and 13001 and subsequent), or four self-locking hexagon nuts (8), flat washers (7), and flathead screws (6) (missile 10206 through 10607), securing the thermal battery bracket (12) in the actuator section.

**CAUTION:** Hold the thermal battery assembly securely to prevent its falling and possibly discharging the batteries.

*Note.* If the missile is positioned on the launching handling rail the following positioning of the thermal battery assembly will permit easy removal and reinstallation. With reference to the thermal battery assembly when installed, position the underneath side of the thermal battery assembly against the blast tube with the plug connectors pointing up during removal and reinstallation.

(5) Immediately remove the battery assembly to an area free of explosives and flammable material.

### c. Inspection and Test.

(1) Inspect each thermal battery (2) for looseness in the thermal battery bracket or for damage to the bracket. Check that the initiator pins (12, figs. 12-53 and 12-54) are intact; perform the inspection outlined in par. 3-9b and c.

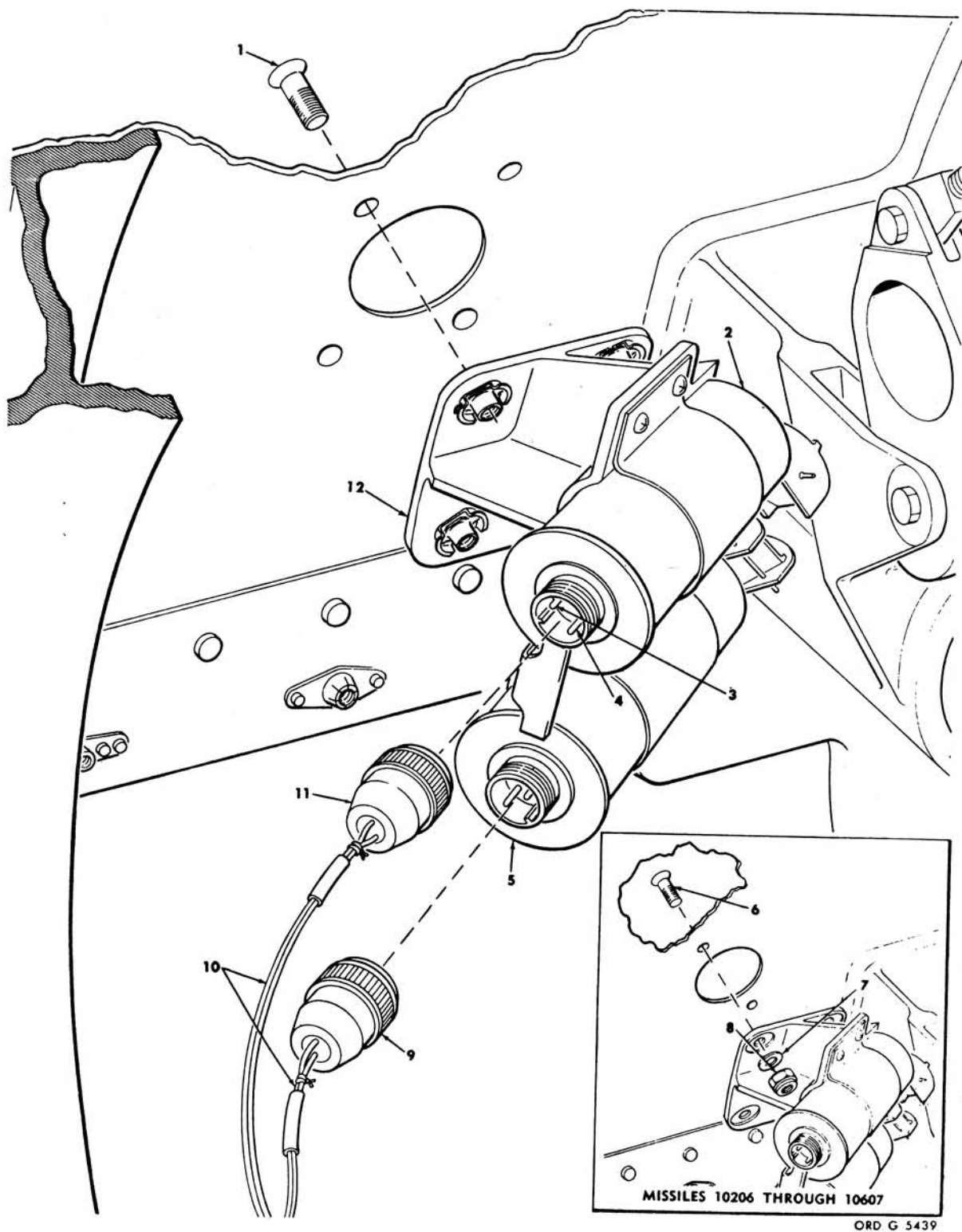


Figure 12-52. Removal and installation of the thermal battery assembly.

(2) Using a multimeter, measure the terminal-to-terminal resistance for a minimum of 0.2 megohm.

*d. Disassembly.*

**WARNING:** Actual removal of batteries from the bracket will not be performed below ground or in the immediate area of the above-ground storage buildings. Disassembly must be performed in an area free of explosives, flammable or combustible liquids, or easily ignitable solids such as rags or paper.

(1) Remove the spring pin (5, fig. 12-53) (missiles 10206 through 10607) or the drilled fillister-head screws (5, fig. 12-54) (missiles 10608 through 11935 and 13001 and subsequent) from the plug (4).

(2) Push the two initiator pins (12) deeper into the holes until the looped head of each pin bottoms against the striker arm bracket (9).

(3) Remove the strap attach screw group (14, fig. 12-53) or five panhead screws (14, fig. 12-54) that fasten the strap (13) to the thermal battery bracket (2).

(4) Install the safety cotter pin (11) through the second pair of holes in the striker arm bracket (9), and spread the ends of the pin.

(5) Remove and install the plug (4) as outlined in (a) through (i) below.

(a) Using a No. 40 drill, remove the plug retaining rivet (1) from the thermal battery bracket (2) and plug (4).

(b) Exert pressure on the exposed end of plug (4) and remove the plug.

(c) Remove excess material from the drilled holes in the plug and thermal battery bracket.

(d) Remove preformed packing (3) from the packing seat in the plug.

(e) Inspect plug and thermal battery hole for paint and foreign matter, if present remove with aluminum wool NSN 5330-00-286-4851. If corroded, replace the defective item.

(f) Clean the preformed packing, plug and thermal battery bracket hole with solvent cleaning compound NSN 6850-00-984-5853 and apply a thin coat of corrosion preventive compound MIL-C-16173, NSN 8030-00-244-1298.

(g) Place the preformed packing in the packing seat.

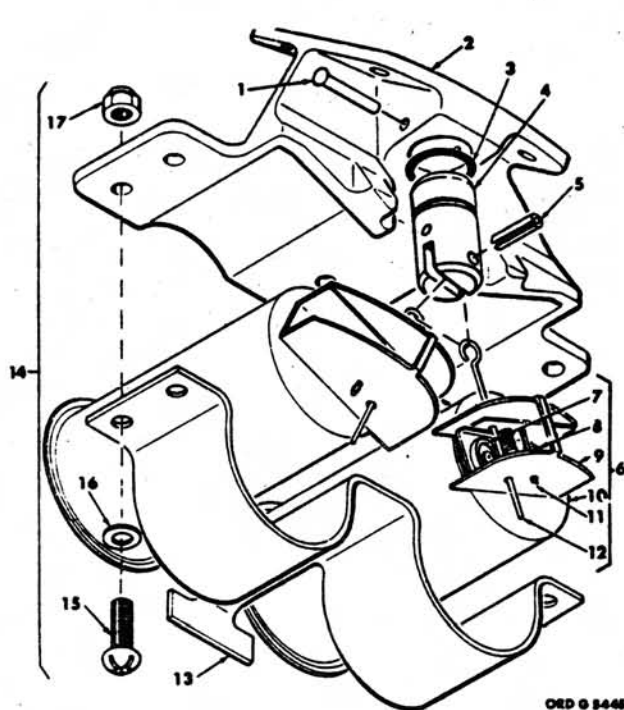
(h) Insert the plug in thermal battery bracket. Prior to aligning the holes in the plug with those in the bracket, check for free movement of the plug.

(i) Install new plug retaining rivet in the hole alignment, step (h) above, and peen the end of the rivet to secure it in position.

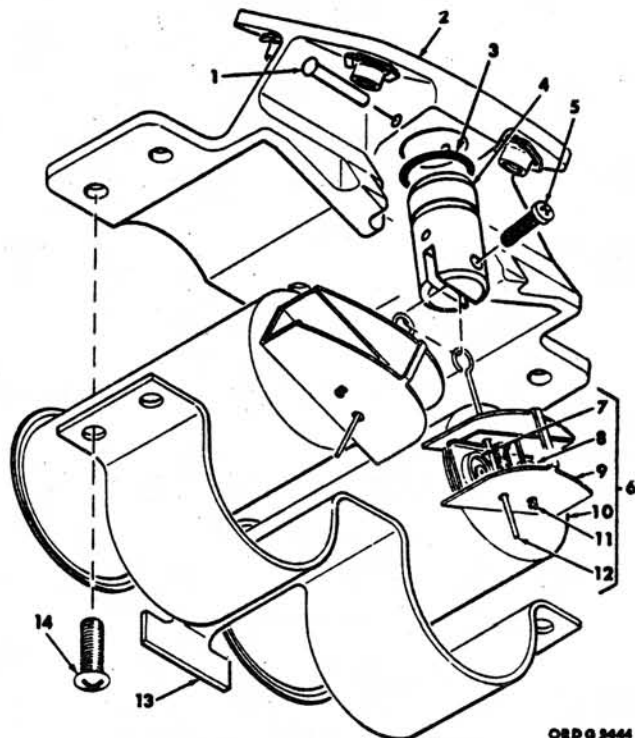
- 1—No. 10-32 x 19/32 fl-hd screw (4)
- 2—Thermal battery (2)
- 3—Negative terminal
- 4—Positive terminal
- 5—Thermal battery case (2)
- 6—No. 10-32 x 23/32 fl-hd screw (4)

- 7—No. 10 fl washer (4)
- 8—No. 10-32 self-lkg hex, nut (4)
- 9—Plug connector P181
- 10—Motor igniter wiring harness
- 11—Plug connector P182
- 12—Thermal battery bracket

Figure 12-52—Continued.



ORD G 3446



ORD G 3444

- 1—3/32 x 1 plug retaining rivet
- 2—Thermal battery bracket
- 3—7/16-in-id x 3/32-in. thk preformed packing
- 4—Plug
- 5—0.094 x 0.500 sp pin
- 6—Thermal battery group (2)
- 7—Strike arm
- 8—Percussion cap
- 9—Striker arm bracket
- 10—Battery
- 11—Safety cotter pin
- 12—Initiator pin
- 13—Strap
- 14—Strap attach screw group (2)
- 15—No. 8-32 x 3/4 truss-hd screw (5)
- 16—No. 8 fl washer (5)
- 17—No. 8-32 self-lkg hex. nut (5)

Figure 12-53. Disassembly and assembly of the thermal battery assembly for missiles 10206 through 10607.

- 1—3/32 x 1-in. plug retaining rivet
- 2—Thermal battery bracket
- 3—7/16-in-id 3/32-in. thk preformed packing
- 4—Plug
- 5—No. 4-40 x 1/2-in. drilled fillister-hd screw AN500A4-8 (missiles 10608 through 11187) or 9018658 (missiles 11188 through 11935 and 13001 and subsequent)
- 6—Thermal battery group (2)
- 7—Strike arm
- 8—Percussion cap
- 9—Striker arm bracket
- 10—Battery
- 11—Safety cotter pin
- 12—Initiator pin
- 13—Strap
- 14—No. 10-32 x 5/8-in pan-hd screw AN520-10-R10 (5)

Figure 12-54. Disassembly and assembly of the thermal battery assembly for missiles 10608 through 11935 and 13001 and subsequent.

(b) Using a No. 40 drill, remove the sheared plug retaining rivet (1) from the plug.

*e. Assembly.*

**WARNING:** Assembly must be performed in an area free of explosives, flammable or combustible liquids, or easily ignitable solids such as rags or paper.

(1) Check that a safety cotter pin (11) is installed through the pair of holes in the striker arm bracket (9) located just behind the percussion cap (8) in each of the thermal battery groups (6).

(2) Check that an initiator pin (12) is installed in each of the thermal battery groups.

Note. The looped head of the initiator pin installation for one thermal battery group is reversed from the installation in the other thermal battery group.

**CAUTION:** Use extreme care in performing the following operations to prevent dislodging the initiator pins and discharging the battery.

(3) Remove the safety cotter pin (11).

(4) Position each thermal battery group (6) in the thermal battery bracket (2) with the looped heads of the initiator pins aligned with the slot in the plug (4).

(5) Install the strap (13).

(6) Carefully move the two initiator pins (12) into the slot in the plug (4) until the looped heads of the pins align with the hole.

(7) Secure the initiator pins as outlined in (a) and (b) below.

(a) Missiles 10206 through 10607. Insert a spring pin (5, fig. 12-53) through the alignment in step (6) above.

**WARNING:** Insure that no portion of the spring pin (5) protrudes outside the plug (4).

(b) Missiles 10608 through 11935, and 13001 and subsequent.

1. Apply a coat of insulation compound 5970-162-7523 to the threads of the screw (5, fig. 12-53).

2. Install the screw (5) in the holes aligned in (6) above.

**WARNING:** Insure that no portion of the head screw (5) protrudes outside the plug (4).

*f. Installation.*

(1) Secure the thermal battery assembly (fig. 12-52) to the skin in the actuator section, and torque the screws to the value given in table 15-9.

(2) Connect the plug connectors (9 and 11) to the thermal batteries (2).

Note. Perform (2.1) and (2.2) below only when the missile is on the launcher-handling rail.

(2.1) Install the battery rack, and secure with four bolts, washers, and nuts.

(2.2) Connect the flexible rubber vent hose to the battery box vent tube and connect P540 on the mounting panel to connector J540 on the missile distribution box.

(3) Install the actuator section door assembly in the left side of the actuator section, and torque to a value as prescribed in table 15-9.

(4) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## Section XII. CORRECTIVE MAINTENANCE OF MAIN FINS AND ELEVONS

### 12-88. Replacement of Forward Main Fins

*a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward main fins (par. 11-16).

*b. Installation.*

(1) Install the forward main fins (par. 7-5).

(2) Remove the nose hinge assembly (par. 12-5 b).

(3) Rearm the missile, using applicable procedures in chapter 10.

### 12-89. Replacement of the Rear Main Fins

*a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the forward main fins (par. 12-88).

(3) Remove the rear main fins (par. 11-33).



**b. Installation.**

- (1) Install the rear main fins (par. 3-11).
- (2) Install the forward main fins (par. 7-5).
- (3) Remove the nose hinge assembly (par. 12-5b).
- (4) Rearm the missile, using applicable procedures in chapter 10.

### Section XIII. CORRECTIVE MAINTENANCE OF THE SHIPPING AND STORAGE CONTAINERS

**12-91. General**

a. This section provides instructions for corrective maintenance of the components of shipping and storage containers M409 and M410.

b. The corrective maintenance procedures prescribed in paragraphs 12-91 through 12-97 are applicable to both containers. The procedures prescribed in paragraphs 12-98 and 12-99 are applicable to only the rear body section and forward body section container (M410).

c. Whenever the container cover on the rear body section and forward body section shipping and storage container is removed to perform corrective maintenance, all missile shipping hardware should be inspected and replaced if necessary.

d. Refinish all containers in temporary storage (on-site or in support maintenance) as required, to maintain them in serviceable condition.

**12-92. Replacement of the Air Valve****a. Removal.**

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the air valve (2, fig. 12-55) from the inspection panel (1).

**b. Installation.**

- (1) Install the air valve (2) in the inspection panel (1).
- (2) Swing the access cover plate (fig. 3-4) closed, and secure with the two wingnuts.

**12-93. Replacement of Relief Valve****a. Removal.****12-90. Replacement of the Elevons****a. Removal.**

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the elevons (par. 11-32).

b. **Installation.** Install the elevons (par. 3-12).

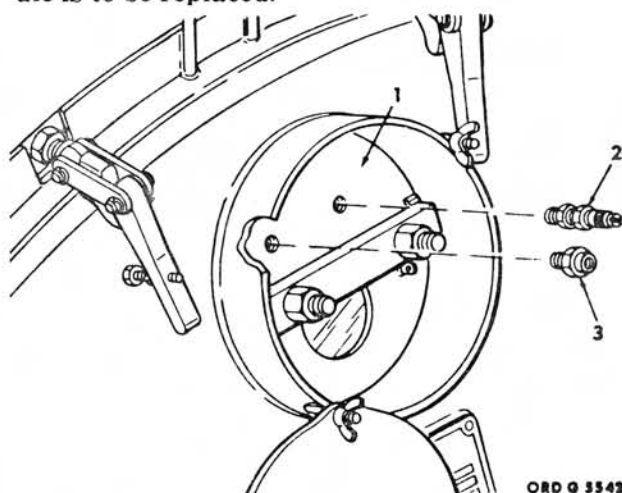
- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the relief valve (3, fig. 12-55) from the inspection panel (1).

**b. Installation.**

- (1) Install the relief valve (3) in the inspection panel (1).
- (2) Swing the access cover plate (fig. 3-4) closed, and secure with the two wingnuts.

**12-94. Replacement of the Handle on the Quick-Release Clamp**

**Warning:** Make certain that all of the quick-release clamps (fig. 3-5) are in the position which secures the container cover to the container except the clamp on which the handle is to be replaced.



1—Inspection panel  
2—Air valve  
3—Relief valve

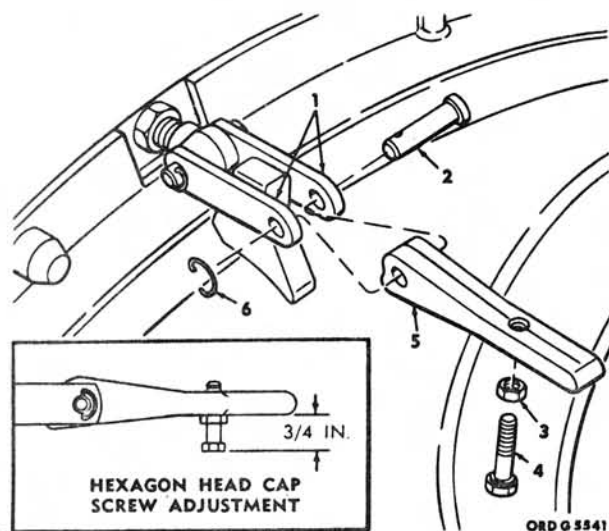
Figure 12-55. Removal and installation of the air valve and relief valve.

**a. Removal.**

- (1) Loosen the wingnuts (fig. 3-5) that secure the log tube cover plate to the log tube.
- (2) Swing the log tube cover plate upward, and remove the extension handle from the log tube.
- (3) Use the extension handle to disconnect the quick-release clamp on which the handle is to be replaced.
- (4) Remove the hexagon-head capscrew (4, fig. 12-56) and hexagon nut (3) from the handle (5).
- (5) Remove the lockpin (6) that secures the flathead pin (2) in position.
- (6) Remove the flathead pin from the two links (1) and the handle; remove the handle.

**b. Installation.**

- (1) Position the handle (5) between the two links (1), and align the hole in each of the two links with the hole in the handle.



- 1—Link (2)  
 2—7/16 x 1-9/16 fl-hd pin  
 3—5/16-18 hex nut  
 4—5/16-18 x 1-1/4 hex-hd capscrew  
 5—Handle  
 6—Lockpin

Figure 12-56. Removal and installation of the handle on the quick release clamp.

- (2) Install the flathead pin (2) through the two links and the handle.
- (3) Install the lockpin (6) that secures the flathead pin in position.
- (4) Install the hexagon nut (3) on the hexagon-head capscrew (4) and install the capscrew in the handle.
- (5) Turn the capscrew into the handle until the 3/4-inch dimension shown in figure 12-56 is obtained.
- (6) Hold the hexagon-head capscrew in position, and tighten the hexagon nut against the surface of the handle.
- (7) Use the extension handle (fig. 3-5), and secure the quick-release clamp.
- (8) Replace the extension handle in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.

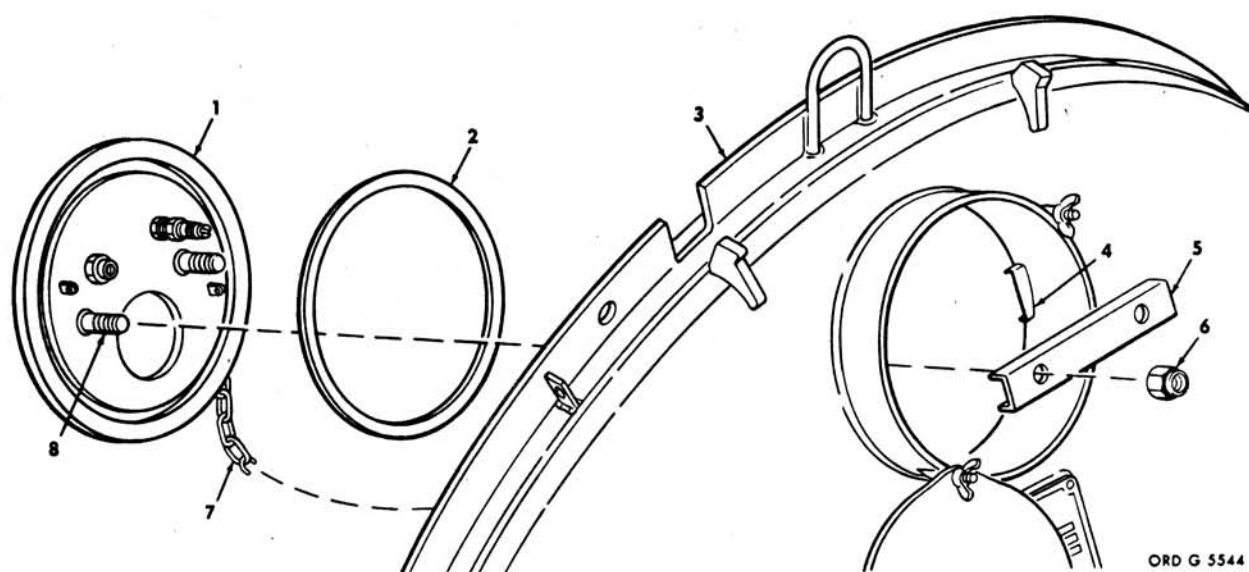
## 12-95. Replacement of Inspection Panel Clamping Bar and Gasket

**a. Removal.**

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the container cover (par. 3-6c).
- (3) Remove the hexagon nuts (6, fig. 12-57) that secure the inspection panel clamping bar (5) on the panel group (1).
- (4) Remove the clamping bar from the panel group and the container cover (3).
- (5) Push the panel group out the rear of the container cover, and remove the inspection panel gasket (2).
- (6) Lower the panel group, and allow to hang by the chain (7).

**b. Installation.**

- (1) Install the inspection panel gasket (2) on the panel group (1).
- (2) Position the panel group, with the gasket installed, in the opening in the container cover (3), and align the studs (8) on the panel group with the retainers (4) on the container cover.



1—Panel group  
2—Inspection panel gasket  
3—Container cover

4—Retainer (2)  
5—Inspection panel clamping bar  
6—1/2-13 hex nut (2)

7—Chain  
8—Stud (2)

*Figure 12-57. Removal and installation of the inspection panel clamping bar and gasket.*

- (3) Install the inspection panel clamping bar (5) on the studs and over the retainers.
- (4) Install the hexagon nuts (6) that secure the clamping bar to the panel group.
- (5) Check that the inspection panel gasket contacts the mating surface of the container cover.
- (6) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (7) Check that the container cover contacts the container cover seal (3, fig. 12-59).
- (8) Replace the extension handle (fig. 3-5) in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.
- (9) Swing the access cover plate (fig. 3-4) closed, and secure with the wingnuts.

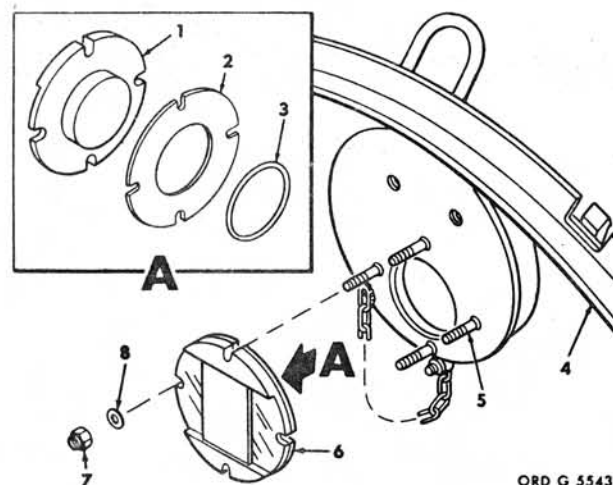
## 12-96. Replacement of Window Frame and Gasket

### a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).
- (2) Remove the container cover (par. 3-5c).
- (3) Remove the hexagon nuts (7, fig. 12-58) and flat washers (8) that secure the window and frame group (6) to the container cover (4).
- (4) Remove the window and frame group from the container cover.
- (5) Remove the gasket (3) and the window frame (2) from the window (1).

### b. Installation.

- (1) With the chamfered side of the window frame (2) facing the window (1), install the frame on the window, and align the slots in the frame with the slots in the window.
- (2) Install the gasket (3) on the window.



ORD G 5543

- 1—Window
- 2—Window frame
- 3—Gasket
- 4—Container cover
- 5—Stud (4)
- 6—Window frame group
- 7—1/4-20 hex nut (4)
- 8—1/4-in. fl washer (4)

Figure 12-58. Removal and installation of the window frame and gasket.

- (3) Install the window and frame group (6) on the studs (5) on the container cover (4).
- (4) Install the hexagon nuts (7) and flat washers (8) that secure the window and frame group to the container cover.
- (5) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (6) Check that the container cover contacts the container cover seal (3, fig. 12-59).
- (7) Replace the extension handle (fig. 3-5) in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.
- (8) Swing the access cover plate (fig. 3-4) closed, and secure with the wingnuts.

## 12-97. Replacement of the Container Cover Seal

### a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).

**Warning:** Be sure the container pressure is completely equalized before removing the container cover.

- (2) Remove the container cover (par. 3-5c).
- (3) Remove the container cover-seal (3, fig. 12-59) from the seal retaining ring (1).

### b. Installation.

- (1) Install the container cover seal (3) in the seal retaining ring (1) with the serrated side (2) facing in.
- (2) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (3) Check that the container cover contacts the container cover seal.
- (4) Replace the extension handle in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wingnuts.

## 12-97.1. Replacement of Container Skids

### a. Removal.

- (1) Elevate the container and secure it in an elevated position on blocks.
- (2) Remove the two bottom screws and nuts and the two side screws and nuts from the skid, and then remove skid.

### b. Installation.

- (1) Place the skid into position and install the two bottom screws and nuts and the two side screws and nuts.
- (2) Lift the container and remove the elevation blocks, and then lower the container to the normal position.

## 12-97.2. Replacement of Fiber Washers on the Thrust Mount Bracket

### a. Removal.

- (1) Remove the damaged fiber washers, pads, or gaskets found on the thrust mount bracket.
- (2) Remove the old adhesive with toluene 6810-00-281-2002 or any equivalent cleaning solvent.

*Note.* Do not apply corrosion preventive compound or paint to the area where the washer adhesive is to be applied.

*b. Installation.* Cement the fiber washer(s) 5310-00-930-7254 to the thrust mount bracket using adhesive 8040-00-264-5840.

## 12-98. Replacement of the Forward Body Section Shipping Support Channel

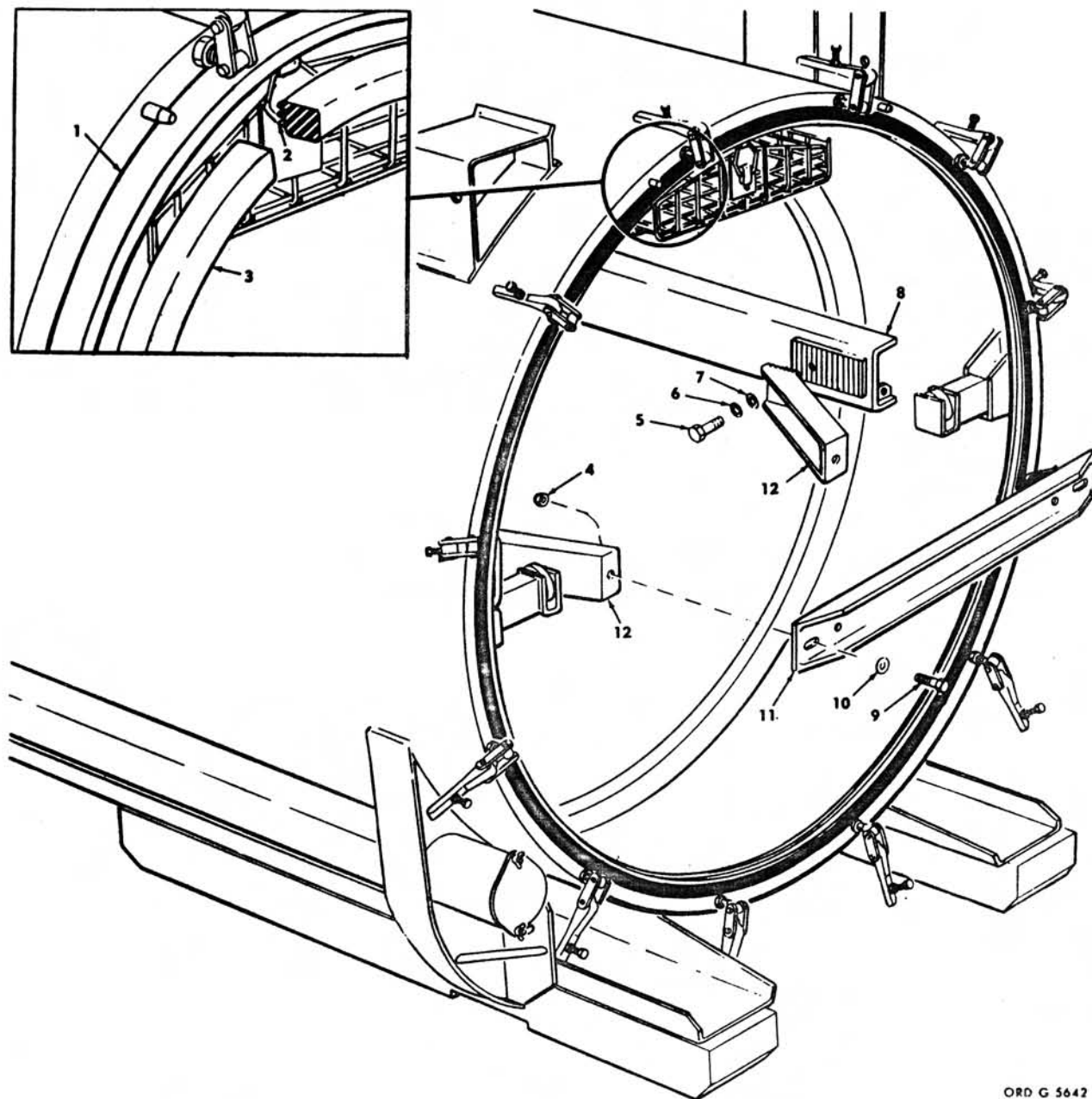
### a. Removal.

- (1) Depressurize the shipping and storage container (par. 3-6b (1) through (9)).

**Warning:** Be sure the container pressure is completely equalized before removing the container cover.

- (2) Remove the container cover (par. 3-6c).
- (3) Remove the hexagon nuts (4, fig. 12-59), hexagon-head capscrews (9), and flat washers (10) that secure the forward body section shipping support channel (11) to the two support arms (12), and remove the shipping support channel.





ORD G 5642

- 1—Seal retaining ring
- 2—Serrated side
- 3—Container cover seal
- 4—1/2-13 hex nut (2)
- 5—1/2-13 x 1-1/8 hex-hd capscREW
- 6—1/2-in. lockwasher

- 7—1/2-in. fl washer
- 8—Moveable track
- 9—1/2-13 x 1-5/8 hex-hd capscREW (2)
- 10—1/2-in. fl washer (2)
- 11—Forward body section shipping support channel
- 12—Support arm

*Figure 12-59. Removal and installation of the container cover seal, forward body section support channel, and support arm.*

**b. Installation.**

- (1) Position the forward body section shipping support channel (11) on the two support arms (12), and secure with the hexagon-head capscrews (9), flat washers (10), and hexagon nuts (4).
- (2) Position the container cover (fig. 3-5) on the container, and secure with the quick-release clamps.
- (3) Check that the container cover contacts the container cover seal (3, fig. 12-59).
- (4) Replace the extension handle (fig. 3-5) in the log tube, and swing the log tube cover plate closed; secure the cover plate in position with the wing-nuts.

**12-99. Replacement of the Support Arm****a. Removal.**

- (1) Remove the forward body section shipping support channel (par. 12-98a).
- (2) Remove the hexagon-head capscrew (5), lockwasher (6, fig. 12-59), and flat washer (7) that secure the support arm (12) to the moveable tracks (8), and remove the support arm.

**b. Installation.**

- (1) Position the support arm (12) on the moveable tracks (8) and secure with the flat washer (7), lockwasher (6), and hexagon-head capscrew (5).
- (2) Install the forward body section shipping support channel (par. 12-98b).

## Section XIV. CORRECTIVE MAINTENANCE OF THE ROCKET MOTOR CLUSTER

**12-100. General**

a. This section contains instructions for the authorized corrective maintenance of the rocket motor cluster listed in TM 9-1410-250-24P-1-1.

b. Prior to performing the replacement of the rocket motor cluster components as prescribed in paragraphs 12-101 through 12-117, the missile will be prepared as prescribed in table 12-1. The safety requirements prescribed in paragraph 12-3 will apply to the operations performed in the launching and revetted areas.

c. In the event it is necessary to move the rocket motor cluster to the revetted area as prescribed in table 12-1 to perform corrective maintenance, removal of the missile body will be accomplished as prescribed in paragraphs 11-10 and 11-11. Removal of the rocket motor cluster to the revetted area will be accomplished as prescribed in paragraphs 11-12 and 11-13.

**Warning:** The rocket motor cluster contains explosives. All applicable safety regulations will be strictly enforced. Operations involving the handling of explosive items will be performed only in the areas specifically

designated. These areas will meet quantity-distance requirements based upon the type and quantity of explosives involved. Where adjacent missiles are a hazard, a barrier will be provided for protection. Do not perform handling operations during electrical storms.

**Warning:** Handling operations of the rocket motor cluster, will be supervised by qualified explosives personnel who thoroughly understand the hazards and risks involved. A minimum number of personnel will be permitted on or near the work location, and the quantities of explosive materials must be kept to a minimum. Spilled explosive materials will be thoroughly decontaminated before work continues.

**Warning:** Explosive components containing electrical wiring must be protected at all times from stray voltages or induced electrical currents. A ground strap must be attached from the component to ground with a maximum resistance of less than 20 ohms. A CO<sub>2</sub> fire extinguisher will be provided. Extreme care will be exercised when handling explosive components whose size or weight makes handling difficult.

## 12-101. Replacement of the Rocket Motor Igniters

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Disconnect the rocket motor igniter cable assembly connector (D, fig. 10-9) from the connector of the rocket motor igniter. Immediately install the shorting connector.

(3) Using the spanner wrench, remove the rocket motor igniter (B).

(4) Perform a continuity check of the igniter (par. 10-4c and d or e and f).

### b. Installation.

**NOTE.** The rocket motor igniter must be tested as prescribed in paragraphs 10-4c and d or e and f prior to installation.

(1) Apply a thin coat of soft-film, silicone, corrosion preventive compound to the threads of the rocket motor igniter. Do this semiannually to preclude seizure of the igniter in the rocket motor head.

(2) Using the spanner wrench, install the rocket motor igniter (B, fig. 10-9).

(3) Remove the shorting connector (fig. 10-9) from the rocket motor igniter connector, and connect the rocket motor igniter cable assembly connector to the rocket motor igniter connector.

(4) Rearm the missile, using applicable procedures in chapter 10.

## 12-102. Replacement of the Rocket Motor Cluster Fin Assemblies

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the eight hexagon-head bolts (fig. 9-23) and flat washers that secure the rocket motor cluster fin assembly to the rocket motor cluster.

**b. Installation.** Position the rocket motor cluster fin assembly (fig. 9-23), and secure in position with the eight hexagon-head bolts and flat wash-

ers. Tighten the bolts to the torque value given in table 15-10.

## 12-103. Replacement of the Fairing Wedges

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the hexagon nuts (1, fig. 8-14) and flat washers (2) from the hexagon-head bolts (11) through the bottom and top fairing wedges (8 and 3), or remove the hexagon nuts (3, fig. 8-13) and flat washers (2) from the hexagon-head bolts (6) through the two side fairing wedges (5). Remove the bolts.

(3) Remove the hexagon-head bolts (4 and 10, fig. 8-14) and flat washers (5) and (9) or hexagon-head bolts (7, fig. 8-13) and flat washers (8) that secure the side fairing wedge and the bottom fairing wedge to the assembled nozzle fairings (4, fig. 8-13) and the forward nozzle fairings (1).

### b. Installation.

**NOTE.** The fairing wedge in step (1) below pertains to the applicable side fairing wedges (5), the top fairing wedge (3, fig. 8-14), or the bottom fairing wedge (8).

(1) Liberally coat the mating surfaces of the fairing wedges (5, fig. 8-13), or (3 and 8, fig. 8-14), the rocket motors, and the holes in the fairing wedges for the hexagon-head bolt (6, fig. 8-13) with corrosion-preventive compound.

(2) Position the fairing wedge (5) or (3 or 8, fig. 8-14), and secure to the forward nozzle fairings (1, fig. 8-13) with six hexagon-head bolts (7) and flat washers (8).

(3) Secure either side fairing wedge (5) or top fairing wedge (3, fig. 8-14) to the assembled nozzle fairings (4, fig. 8-13) with eight flat washers (8) and hexagon-head bolts (7), or secure the bottom fairing wedge (8, fig. 8-14) to the assembled nozzle fairings (6) with six flat washers (9) and hexagon-head bolts (10).

(4) Position the hexagon-head bolts (6, fig. 8-13) through the two side fairing wedges (5),

or position two hexagon-head bolts (11, fig. 8-14) through the top and bottom fairing wedges (3 and 8). Install flat washers (2, fig. 8-13) or (2, fig. 8-14) and hexagon nuts (3, fig. 8-13) or (1, fig. 8-14).

(4.1) Torque the nuts and bolts to the values given in table 15-10.

(5) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## 12-104. Replacement of the Forward Nozzle Fairings

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the rocket motor cluster fin assembly over the forward nozzle fairing to be replaced (par. 12-102a).

(3) Remove six hexagon-head bolts (7, fig. 8-13) or (4 or 10, fig. 8-14) that secure the two fairing wedges (5, fig. 8-13), or (3 and 8, fig. 8-14) to the forward nozzle fairings (1, fig. 8-13) to be replaced. Slide the forward nozzle fairing forward to remove.

### b. Installation.

(1) Liberally coat the mating surfaces of the forward nozzle fairings (1, fig. 8-13) and the fitting assemblies (fig. 8-12) with corrosion-preventive compound.

(2) Slide the forward nozzle fairing (1, fig. 8-13) rearward under the two fairing wedges (5) or (3 and 8, fig. 8-14). Secure the fairing wedges and the forward nozzle fairings to the fitting assemblies with six flat washers (8, fig. 8-13) and hexagon-head bolts (7).

(2.1) Torque the bolts to the value given in table 15-10.

(3) Install the fin assembly (par. 12-102b).

(4) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## 12-105. Replacement of the Nozzle Fairings

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the four fairing wedges (par. 12-103a). Remove the four forward nozzle fairings (par. 12-104a).

(4) Loosen the fillister-head screws (7, fig. 8-11) in the band clamps (8) that secure the four nozzle fairings (1, 2, 6, and 9) together.

**NOTE.** Make certain the filler blocks (1, fig. 8-12) are taped in place before completely removing the assembled nozzle fairings.

(5) Slide the assembled nozzle fairings from the rear of the rocket motor cluster.

(6) Remove six fillister-head screws (7, fig. 8-11) from the band clamps on any one of the four nozzle fairings. To remove the bottom or right nozzle fairings (2 and 6), also remove the hexagon-head bolt (4), flat washers (5), and hexagon nut (3) that secure the fairings together.

### b. Installation.

(1) Install the assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *al* through *av*).

(2) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## 12-106. Replacement of the Filler Blocks

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (2) through (4)).

(4) Remove the filler blocks (1, fig. 8-12).

### b. Installation.

(1) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(2) Reactivate the missile using applicable procedures in chapters 9 and 10.

## 12-107. Replacement of the Upper Right or Upper Left Fitting Assembly

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (2) through 4)).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Attach the rocket motor hoist beam (18, fig. 8-10) to a hoisting device capable of lifting 6,000 pounds.

(6) Position the rocket motor hoist beam over the rocket motor (19) in position 1 or 2 (10 or 11), and install the hoist slings (17) on the rocket motor. Lift the hoisting device just enough to support the rocket motor.

(7) Remove the hexagon-head bolts (2), flat washers (4), and lockwashers (3) that secure either upper fitting assembly (1) to the rocket motor.

(8) Remove the hexagon nuts (8), flat washers (7), recessed washers (6), and internal-wrenching bolts (5) that secure either upper fitting assembly (9 or 15) to the remaining upper fitting assembly and the lower fitting assembly.

### b. Installation.

(1) Liberally coat the mating surfaces of the upper fitting assemblies (2, fig. 8-12) and the rocket motor (19, fig. 8-10) with corrosion-preventive compound.

(2) Install the internal-wrenching bolts (5), recessed washers (6), flat washers (7) and eight hexagon nuts (8) to secure either upper fitting assembly (9 or 15) to the lower fitting assembly (14) and remaining upper fitting assembly. Do not tighten the nuts.

(3) Install the hexagon-head bolts (2, fig. 8-10), lockwashers (3), and flat washers (4) to secure the upper fitting assembly (15) to the rocket motor (19).

(4) Tighten the nuts to the torque value given in table 15-10.

(5) Relieve the tension on the hoisting device. Remove the hoist beam slings from the rocket motor; remove the hoisting device.

(6) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(7) Reactivate the missile using applicable procedures in chapters 9 and 10.

## 12-108. Replacement of Upper Rocket Motors M5E1

### a. Removal.

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairing and assembled nozzle fairings (par. 12-103 through 12-105).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Remove the upper fitting assembly (par. 12-107a (5) through (7)).

(6) Remove the six internal-wrenching bolts (2 and 4, fig. 8-9) and recessed washers (3) that secure the rocket motor to the rocket motor thrust ring assembly (6) in position 1 or 2.

(7) Lift the rocket motor clear of the rocket motor cluster truck, and position on the base (7, fig. 8-5) of the shipping and storage box. Contact the proper authority for disposition.

### b. Installation.

(1) Prepare to install the rocket motor (par. 8-6*d* through *h*).

(2) Install the upper left fitting assembly and the rocket motor in position 1 (par. 8-6 *ac* through *af*) or the upper right fitting assembly and rocket motor in position 2 (par. 8-6 *x* through *aa*).

(3) Tighten all bolts in (2) above to the torque value given in table 15-10.



(4) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(5) Reactivate the missile, using applicable procedures in chapters 9 and 10.

#### 12-109. Replacement of the Rocket Motor Thrust Ring Assembly

##### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings and assembled nozzle fairings (par. 12-105a (3) through (5)).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Prepare to remove the rocket motor from position 1 (par. 12-108a (5) and (6)). Remove the rocket motor and position on the base (7, fig. 8-5) of the shipping and storage box or a suitable storage area.

(6) Repeat (5) above for the rocket motor in position 2.

(7) Remove the internal-wrenching bolts (2 and 4, fig. 8-9) and recessed washers (3) that secure the rocket motor thrust ring assembly (6) to the two lower rocket motors, and lift the thrust ring assembly clear of the rocket motors.

##### *b. Installation.*

(1) Install the rocket motor thrust ring assembly and the two rocket motors (par. 8-6 *t* through *ah*).

(2) Install filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).

(3) Reactivate the missile, using applicable procedures in chapters 9 and 10.

#### 12-110. Replacement of the Lower Rocket Motors M5E1

##### *a. Removal.*

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).

(3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (3) through (5)).

(4) Remove the two upper filler blocks (1, fig. 8-12).

(5) Prepare to remove the rocket motor from position 1 (par. 12-108a (5) and (6)). Remove the rocket motor and position on the base of the shipping and storage box (7, fig. 8-5) or a suitable storage area.

(6) Repeat step (5) above for the rocket motor in position 2.

(7) Remove the rocket motor thrust ring assembly (par. 12-109a (7)).

(8) Remove the hexagon-head bolts (5, fig. 8-8), flat washers (3), and lock washers (4) that secure the rocket motor in position 3 or 4 to the lower fitting assembly (2).

(9) Remove the hexagon-head bolt (3, fig. 8-7) and flat washer (2) that secures the forward slipper assembly (1) to the rocket motor forming ring (9).

(10) Attach the rocket motor hoist beam (4) to a hoisting device capable of lifting 6,000 pounds.

(11) Position the rocket motor hoisting beam over the rocket motor (5) in position 3 or 4 (fig. 8-8), and install the hoist slings on the rocket motor.

(12) Lift the rocket motor clear of the rocket motor cluster truck, and position on the base (7, fig. 8-5) of the shipping and storage box. Contact the proper authorities for disposition.

##### *b. Installation.*

(1) Prepare to install the two lower rocket motors (par. 8-6*d* through *j*).

(2) Install the rocket motor in position 3 (par. 8-6*p* through *s*) or in position 4 (par. 8-6*k* through *n*).

(3) Install the rocket motor thrust ring assembly and the two rocket motors (par. 8-6*t* through *ah*).

- (4) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).
- (5) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## 12-111. Replacement of Lower Right or Lower Left Fitting Assembly

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the two upper rocket motor cluster fin assemblies (par. 12-102a).
- (3) Remove the fairing wedges, forward nozzle fairings, and assembled nozzle fairings (par. 12-105a (3) through (5)).
- (4) Remove the two upper filler blocks (1, fig. 8-12).
- (5) Prepare to remove the rocket motor from position 1 (par. 12-108a (5) and (6)). Remove the rocket motor, and position on the base (7, fig. 8-5) of the shipping and storage box or a suitable storage area.
- (6) Repeat step (5) above for the rocket motor in position 2.
- (7) Remove the rocket motor thrust ring assembly (par. 12-109a (7)).
- (8) Remove the hexagon-head bolts (fig. 8-8), flat washers, and lockwashers that secure the rocket motor in position 3 or 4 to the lower fitting assembly.
- (9) Prepare to lift the rocket motor (par. 12-110a (10) and (11)).
- (10) Remove the two hexagon-head screws (9, fig. 8-6) and flat washers (10) that secure either rear retaining rail bar (11) to the rear slipper (12).
- (11) Lift the rocket motor (5, fig. 8-7) clear of the rocket motor cluster truck. Leave the rocket motor suspended.
- (12) Remove the internal-wrenching bolts (5, fig. 8-10), recessed washers (6), flat washers (7), and hexagon nuts (8) that secure the two lower fitting assemblies together, and remove the

fitting assembly.

### b. Installation.

- (1) Position either lower fitting assembly on the rocket motor cluster truck, and secure to the other lower fitting assembly with the internal-wrenching bolts (5), recessed washers (6), flat washers (7), and hexagon nuts (8).
- (2) Secure the rear retaining rail bar (11, 8-6) to the rear slipper (12) with two hexagon-head screws (9) and flat washers (10).
- (3) Liberally coat the mating surfaces of the rocket motor (fig. 8-8) that will be installed in position 3 or 4 and the lower fitting assembly with corrosion-preventive compound.
- (4) Position the rocket motor to position 3 or 4 and secure to the lower fitting assembly with eight hexagon-head bolts, flat washers, and lockwashers.
- (5) Install the rocket motor thrust ring assembly and the two rocket motors (par. 8-6t through *ah*).
- (6) Install the filler blocks, assembled nozzle fairings, forward nozzle fairings, fairing wedges, and upper fin assemblies (par. 8-6 *aj* through *av*).
- (7) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## 12-112. Replacement of the Rear Retaining Rail Bars

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the hexagon-head screws (9, fig. 8-6) and flat washers (10) that secure either rear retaining rail bar (11) to the rear slipper (12).

b. Installation. Install two hexagon-head screws (9) and flat washers (10) to secure either rear retaining rail bar (11) to the rear slipper (12). Tighten the hexagon-head screws to the torque values given in table 15-10.

## 12-113. Replacement of the Forward Retaining Rail Bars

### a. Removal.

- (1) Prepare the missile as prescribed in table 12-1.

- (2) Remove the internal-wrenching or hexagon-head bolt (8, fig. 8-7) and recessed washer (7) that secure either forward retaining rail bar (6) to the forward slipper assembly (1).

**b. Installation.** Install the internal-wrenching or hexagon-head bolt (8) and recessed washer (7) to secure the forward retaining rail bar (6) to the forward slipper assembly (1). Tighten the bolt to the torque value given in table 15-10.

## 12-114. Replacement of the Forward Slipper

**Note.** The procedures in paragraphs *a* and *b* below are typical for removal of the forward slipper from rocket motors in either position 3 or 4 (fig. 8-7).

### *a. Removal.*

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Raise the rocket motor cluster clear.
- (3) Remove the hexagon-head bolt (3), and flat washer (2) that secure the forward slipper assembly (1) to the rocket motor forming ring (9).

### *b. Installation.*

- (1) Install the hexagon-head bolt and flat washer to secure the forward slipper assembly to the rocket motor forming ring. Tighten the bolt to the torque value given in table 15-10.
- (3) Reactivate the missile, using applicable procedures in chapters 9 and 10.

## 12-115. Replacement of the Rocket Motor Igniter Cable Assembly

### *a. Removal.*

**Warning:** Insure that the rocket motor igniter shorting connector is installed in each rocket motor igniter connector when the rocket motor igniter cable assembly is disconnected.

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the truss-head screws (9, 14, and 20, fig. 8-20), flat washers (5, 15, and 19), and hexagon nuts (4, 16, and 18) that secure five clamps (6, 13, and 21) to the bracket (10)

and the rocket motor thrust ring assembly (1).

### *b. Installation.*

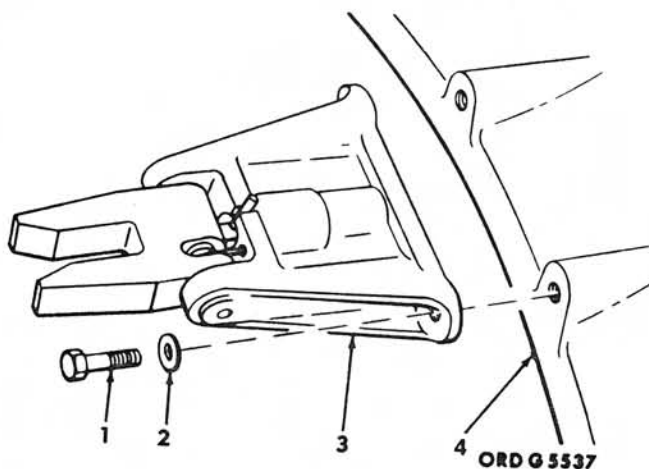
- (1) Check that the shorting connector (fig. 10-7) is inserted in connector P109A at the end of the rocket motor igniter cable assembly.
- (2) Perform the continuity check of the rocket motor igniter cable assembly (par. 8-8).
- (3) Install the rocket motor igniter cable assembly (par. 8-9 *b* through *i*).
- (4) Reactivate the missile, using applicable procedures in chapter 10.

## 12-116. Replacement of the Elevon Lock

### *a. Removal.*

- (1) Prepare the missile as prescribed in table 12-1.
- (2) Remove the hexagon-head bolts (1, fig. 12-60), and flat washers (2) that secure the elevon lock (3) to the rocket motor thrust ring assembly (4).

**b. Installation.** Secure the elevon lock to the rocket motor thrust ring assembly with the hexagon-head bolts and flat washers. Tighten the bolts to the torque value given in table 15-10.



- 1—1/4-20 x 21/32 hex-hd bolt (2)  
2—17/64 in-id fl washer (2)  
3—Elevon lock (4)  
4—Rocket motor thrust ring assembly

Figure 12-60. Removal and installation of the elevon lock.

**12-117. Replacement of the Impact Cushion**

**NOTE.** The following procedure is typical for each segment of the impact cushion.

**a. Removal.**

(1) Prepare the missile as prescribed in table 12-1.

(2) Remove the impact cushion (fig. 9-11) from the impact ring.

**b. Installation.**

(1) Clean both faying surfaces with a clean cloth dampened with toluene, and wipe them immediately with a clean dry cloth. Insure that all old adhesive is removed from the metal surface before rebonding.

(2) Allow the surfaces to air-dry 30 to 60 minutes.

(3) Apply a brush coat of adhesive 9978012 to the faying surfaces.

(4) Allow the adhesive to dry a minimum of 1 hour at 77°F, 2 hours at 33°F, and extend the times for colder ambient temperatures.

(5) Apply a second brush coat of adhesive 9978012 to the faying surfaces, and allow it to dry until it is tacky to the touch, but will not transfer to the finger.

(6) Join the impact cushion (fig. 9-11) to the impact ring firmly.

**NOTE.** For a stronger or more uniform bond, secure the cushion to the ring with clamps.

(7) Allow the adhesive to dry for 24 hours at 77°F, 48 hours at 50°F, 7 days at 33°F, and extend the times for colder ambient temperatures.

(8) Reactivate the missile, using applicable procedures in chapters 9 and 10.

	Paragraphs	Pages
Removal of the warhead body section:		
Boitwell covers, removal of -----	11-20	11-12
Preparation for shipment or storage -----	11-22	11-12
Warhead body section, removal of -----	11-21	11-12
Removing and packaging the main fins and the elevons:		
Elevons, removal of -----	11-32	11-20
Main fins and elevons, packaging -----	11-34	11-20
Rear main fin, removal of -----	11-33	11-20
Organizational maintenance allocation -----	1-2	1-1
Parts, common tools, and equipment:		
Common tools and equipment -----	2-3	2-1
General -----	2-1	2-1
Repair parts -----	2-2	2-1
References -----	1-5	1-1
Reporting equipment publication improvements -----	1-4	1-1
Scope of manual -----	1-1	1-1
Special tools and equipment and fabricated tools:		
Fabricated tools -----	2-6	2-3
General -----	2-4	2-1
Special tools and equipment -----	2-5	2-1
Tables:		
Alinement of the HERCULES missile RF test set group (table 4-10) -----		4-44
Combination (mixed) storage of explosive components (table 15-5) -----		15-9
Contents of guided missile MIM-14A and MIM-14B shipping and storage containers (table 3-1) -----		8-1
Continuity test of the launching-handling rail cables (table 9-1) -----		9-8
Continuity test of the rocket motor igniter cable assembly (table 8-1) -----		8-22
Deactivation procedures that must be performed before corrective maintenance operations (table 12-1) -----		12-1
Established shelf or service life data (table 15-8) -----		15-12
Explosive weight, quantity-distance classes, and storage compatibility for class V items (table 15-1) -----		15-2
Fuel servicing and operational test (HOT-RUN) of the accessory power supply (APS) (table 4-13) -----		4-74
Hydraulic oil change and buzz voltage requirements (table 4-12) -----		4-62
Hydraulic oil fill and system bleed of the accessory power supply, using hydraulic test stand M14 (table 4-3) -----		4-13
Hydraulic oil fill and system cleanup of the accessory power supply, using the portable oil fill and filter unit (table 4-2) -----		4-9
Hydraulic oil fill and system bleed of the hydraulic pumping unit, using hydraulic test stand M14 (table 4-6) -----		4-39
Hydraulic oil fill and system cleanup of the hydraulic pumping unit, using the portable oil fill and filter unit (table 4-5) -----		4-34
Initial air fill of the accessory power supply (APS) (table 4-1) -----		4-8
Initial air fill of the hydraulic pumping unit (HPU) (table 4-4) -----		4-33
Loading compatibility for hazardous missile components for rail and motor truck shipment (table 15-3) -----		15-4
Markings, labels, and placards for rail and truck shipment of explosive and flammable missile components (table 15-2) -----		15-3
Missile body external markings (table 3-2) -----		3-38
Missile body torque values (table 15-9) -----		15-15
Missile electrical checks (table 4-11) -----		4-48
Operating cycles for the transponder control groups, using the cooling unit in a white missile during ground operating procedures (table 4-8) -----		4-43
Operating cycles for the transponder control groups, without the coding unit, during ground operating procedures (table 4-7) -----		4-42
Package data (table 15-4) -----		15-6
Rocket motor cluster torque values (table 15-10) -----		15-15
Rocket motor M5E1 or cluster M42—safe firing temperature (table 13-1) -----		13-2



## CHAPTER 13

### WINTERIZATION INSTRUCTIONS

#### SECTION I. GENERAL

##### 13-1. Introduction

*a. Scope.* This chapter contains information for the installation, removal, and maintenance of the winterization kits for the rocket motor cluster (fig. 13-1), the APS (fig. 13-21), and the missile battery box.

*b. Purpose.* For efficient operation in extreme cold weather, the rocket motor cluster and the APS must be maintained at or above minimum operating temperatures. The minimum operating temperature is  $-20^{\circ}\text{F}$  for the rocket motor cluster and  $+30^{\circ}\text{F}$  for the APS. These minimum temperature requirements are maintained through the use of winterization kits, which are designed to be launched with the missile and need not be removed because of seasonal changes.

##### 13-2. Physical Description

*a. Rocket Motor Cluster Winterization Kit.* This kit contains a forward insulation blanket; four heating blankets; a cover plate; four rear insulation blankets; four honeycomb fairings; four fairings; two thermometer assemblies, each assembly containing six thermometers, six capillary tubes, and six thermometer bulbs; and the necessary hardware to install these items.

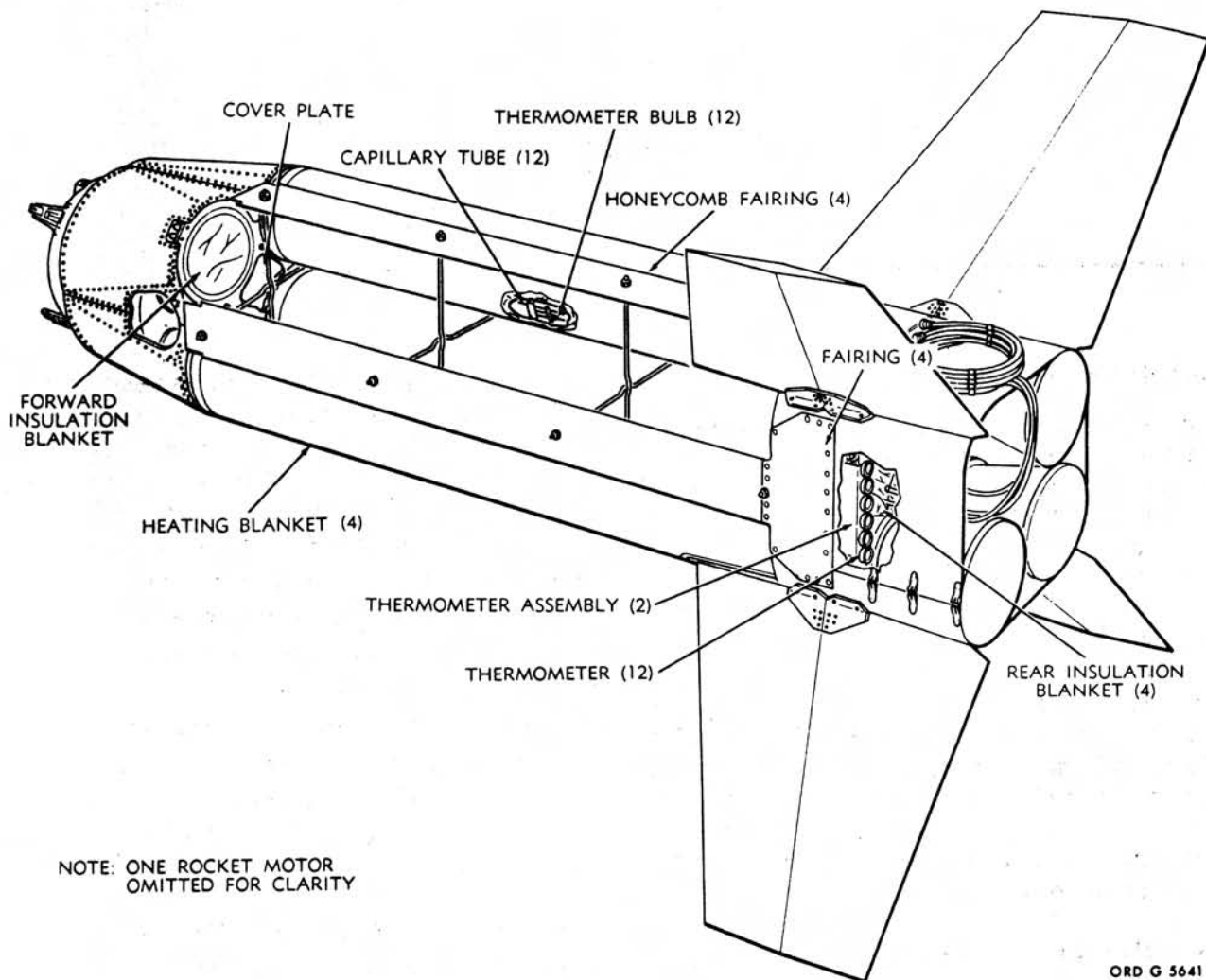
*b. APS Winterization Kit.* This kit contains an APS heating blanket, an access cover plate insulating blanket, and a missile battery box insulation blanket.

##### 13-3. Functional Description

*a. Rocket Motor Cluster Winterization Kit.* Four heating blankets hold the temperature of the rocket motors above  $+15^{\circ}\text{F}$ , if the am-

bient temperature is below  $+15^{\circ}\text{F}$ . One blanket encircles each rocket motor. When the temperature within the blanket becomes less than  $+15^{\circ}\text{F}$ , the thermostats close and connect it across 3-phase, 120/208-volt, 400-cycle power supplied from the distribution box on the launcher. When the temperature becomes greater than  $+15^{\circ}\text{F}$ , the thermostats open. The cycle repeats itself as often as required. In order to equalize the load on the power source, each heating blanket contains three heaters of equal capacity connected across a separate phase. Two thermometer assemblies (fig. 13-1) are provided to indicate whether the blankets are functioning properly.

*b. APS Winterization Kit.* The APS heating blanket is installed around the APS to hold the temperature of the APS above  $+35^{\circ}\text{F}$ , if the ambient temperature is below  $+35^{\circ}\text{F}$ . When the temperature within the area surrounded by the APS heating blanket and the access cover plate insulating blanket becomes less than  $+35^{\circ}\text{F}$ , the thermostat closes and connects the APS heating blanket across phase B power. When the temperature becomes greater than  $+35^{\circ}\text{F}$ , the thermostat opens. If the APS heating blanket fails to operate, and the temperature becomes less than  $+15^{\circ}\text{F}$ , the monitor thermostat closes, and the appropriate HEAT MONITOR indicator light illuminates on both the launcher control-indicator and the section control-indicator.



*Figure 13-1. Winterization Kit for the rocket motor cluster.*

13-4. Deleted

*Table 13-1. Deleted*

*Figure 13-2. Deleted*

*Figure 13-3. Deleted*

*Figure 13-4. Deleted*

*Figure 13-4.1. Deleted*

*Figure 13-4.2. Deleted*

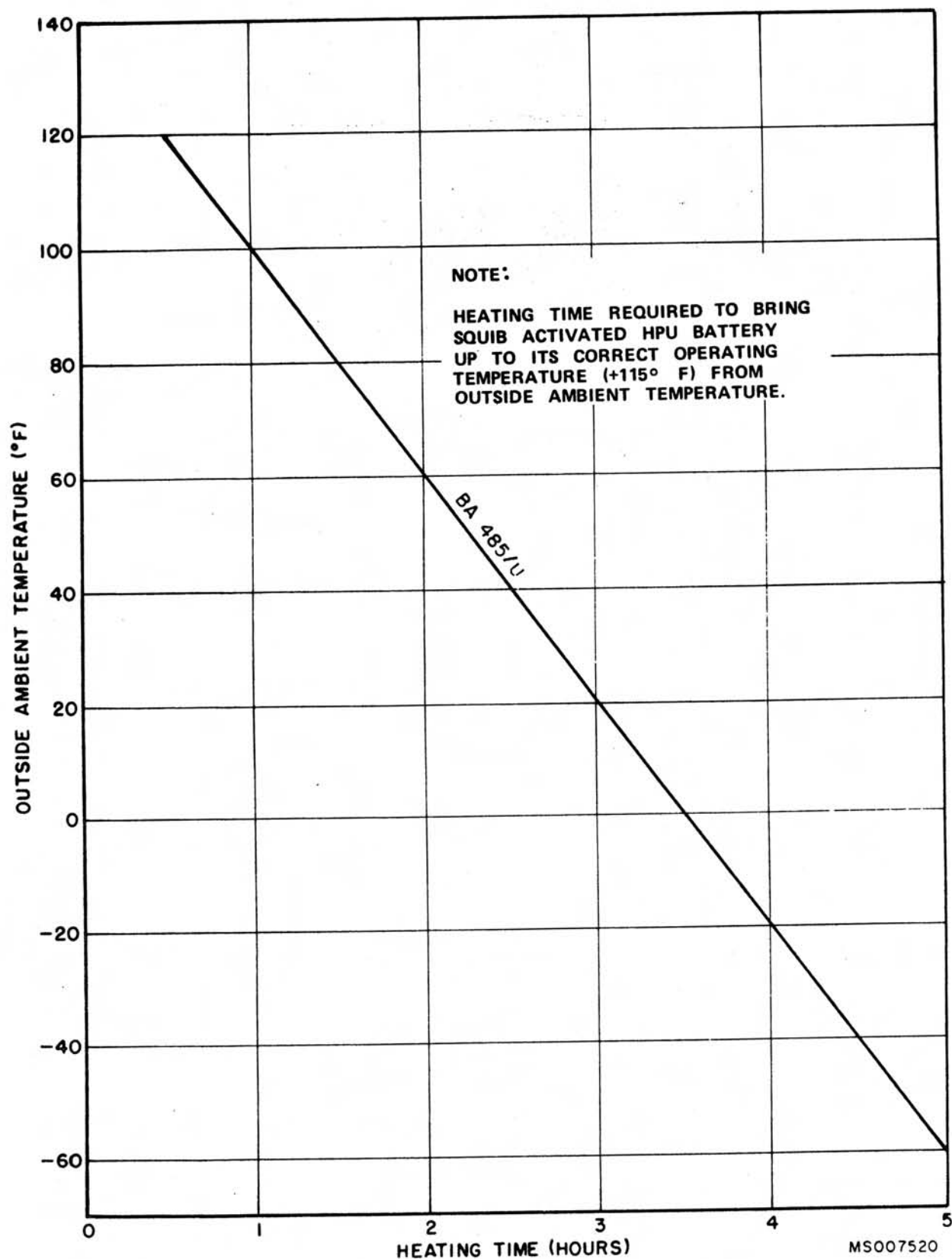


Figure 13-4.3. Temperature-time graph for HPU battery warmup.

## Section II. ROCKET MOTOR CLUSTER WINTERIZATION KIT

### 13-5. Preparation for Installing the Rocket Motor Cluster Winterization Kit

*Note.* If guided missile low-bed trailer M529 is to be used for transporting the missile, omit *a* below, and perform *b*.

*a.* Deactivate the missile and the rocket motor cluster (pars. 11-4 through 11-13).

*b.* Remove the hexagon-head bolts (1, fig. 8-15) and flat washers (2) that secure the upper rocket motor cluster fin assemblies (3) to the rocket motor cluster; remove the fin assemblies.

*c.* Remove the side fairing wedges as prescribed below:

(1) Remove the hexagon nuts (3, fig. 8-13), flat washers (2), and hexagon-head bolts (6).

(2) Remove the hexagon-head bolts (7) and flat washers (8).

(3) Remove the side fairing wedges (5).

*d.* Remove the top and bottom fairing wedges as prescribed below:

(1) Remove the hexagon nuts (1, fig. 8-14), flat washers (2), and hexagon-head bolts (11).

(2) Remove the hexagon-head bolts (4) and flat washers (5) that secure the top fairing wedge (3); remove the fairing wedge.

(3) Remove the hexagon-head bolts (10) and flat washers (9) that secure the bottom fairing wedge (8); remove the fairing wedge.

*Note.* Side, top, and bottom fairing wedges will not be reinstalled, but should be retained for use if the winterization kit is removed.

*e.* Remove the four forward nozzle fairings (1, fig. 8-13).

*f.* Remove the nozzle fairings as prescribed below.

(1) Loosen the fillister-head screws (7, fig. 8-11) that secure the four nozzle fairings together.

*Note.* Make certain that the filler blocks (1, fig. 8-12) are taped in place before completely removing the assembled nozzle fairings.

(2) Slide the assembled nozzle fairings from the rear of the rocket motor cluster.

### 13-6. Inspection of the Shipping and Storage Box

*a.* Inspect the exterior of the shipping and storage box (fig. 13-5) for any damage. Report any damage to the proper authorities.

*b.* Inspect the lead seals attached to the cover fasteners for evidence of tampering or absence of the seals; report any damage, evidence of tampering or absence of the seal to the proper authorities.

### 13-7. Uncrating the Rocket Motor Cluster Winterization Kit

*a.* Break the lead seals (fig. 13-5) located on the cover fasteners.

*b.* Turn the swivel, and release the hasp from each of the cover fasteners.

**Caution:** Remove the nails from the straps, and bend the straps backward to prevent damage to the contents of the box during unpacking.

*c.* Remove the straps from the box cover.

*d.* Remove the box cover (fig. 13-6).

*e.* Remove the screws, flat washers, and retainers that secure the four honeycomb fairings; remove the honeycomb fairings.

*f.* Inspect each honeycomb fairing for external damage.

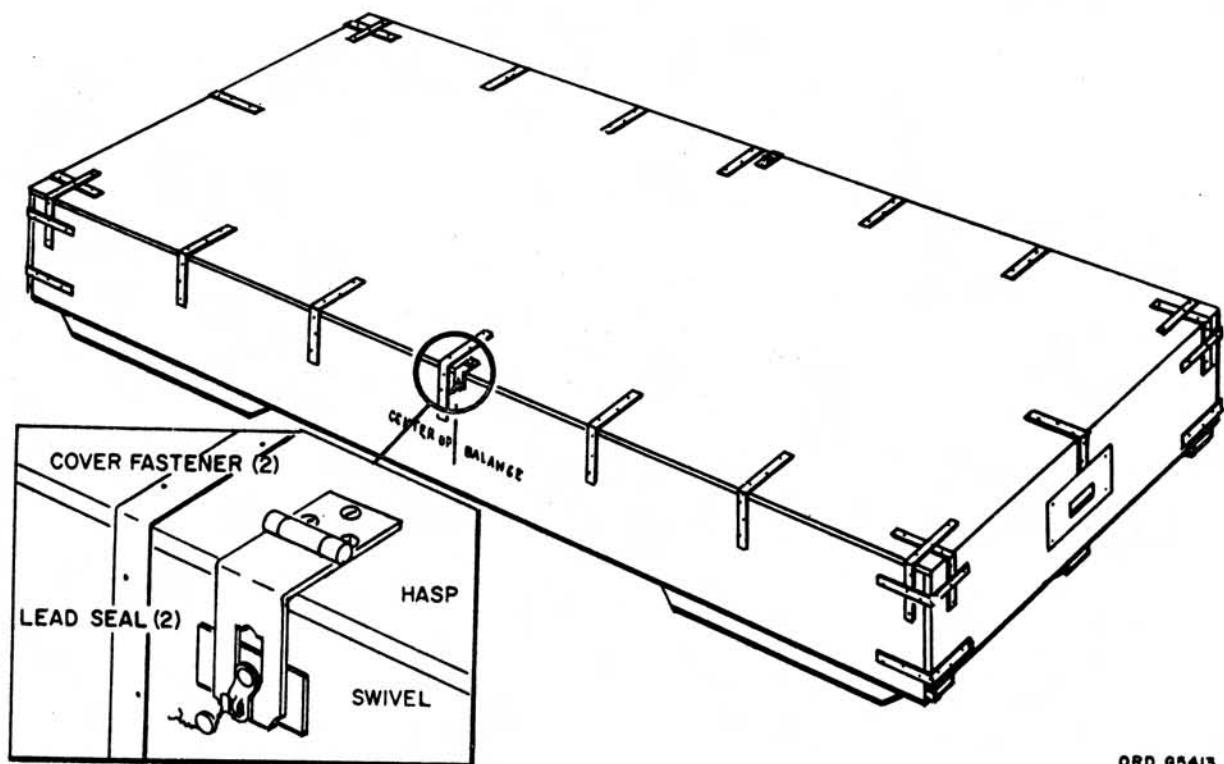
**Caution:** During unpacking, the heating blankets are to be lifted clear of the shipping and storage box. Do not drag blankets over surfaces that are liable to cause damage.

*g.* Remove the retainers (fig. 13-7) and the two heating blankets.

*h.* Repeat *g* above for the two remaining blankets.

*i.* Inspect each heating blanket for holes, punctures, abraded areas, or damage to the electrical wiring harness and connector.

*j.* Remove the thermometer assembly carton (fig. 13-8) and the accessory carton.



ORD 65413

Figure 13-5. Inspection and release of the box cover on the shipping and storage box.

**Caution** Care must be taken to prevent damage to the capillary tubes when performing *k* through *m* below.

*k.* Open the thermometer assembly carton, and remove the retainer (A, fig. 13-8).

*l.* Remove the screws, flat washers, and tape that secure the thermometer assembly to the retainer; remove the thermometer assembly.

*m.* Repeat *l* above for the remaining thermometer assembly.

*n.* Open the accessory carton (fig. 13-8), and remove the accessories.

*o.* Inventory all the parts removed from the shipping and storage box against the enclosed packing list.

*p.* Report any damaged or missing parts to the supervisor.

*q.* Place all the shipping and storage box hardware inside the shipping and storage box.

*r.* Close the box cover (fig. 13-5), and secure with the hasps and swivels.

*s.* Return the shipping and storage box to the storage area.

### 13-8. Installation of Cover Plate

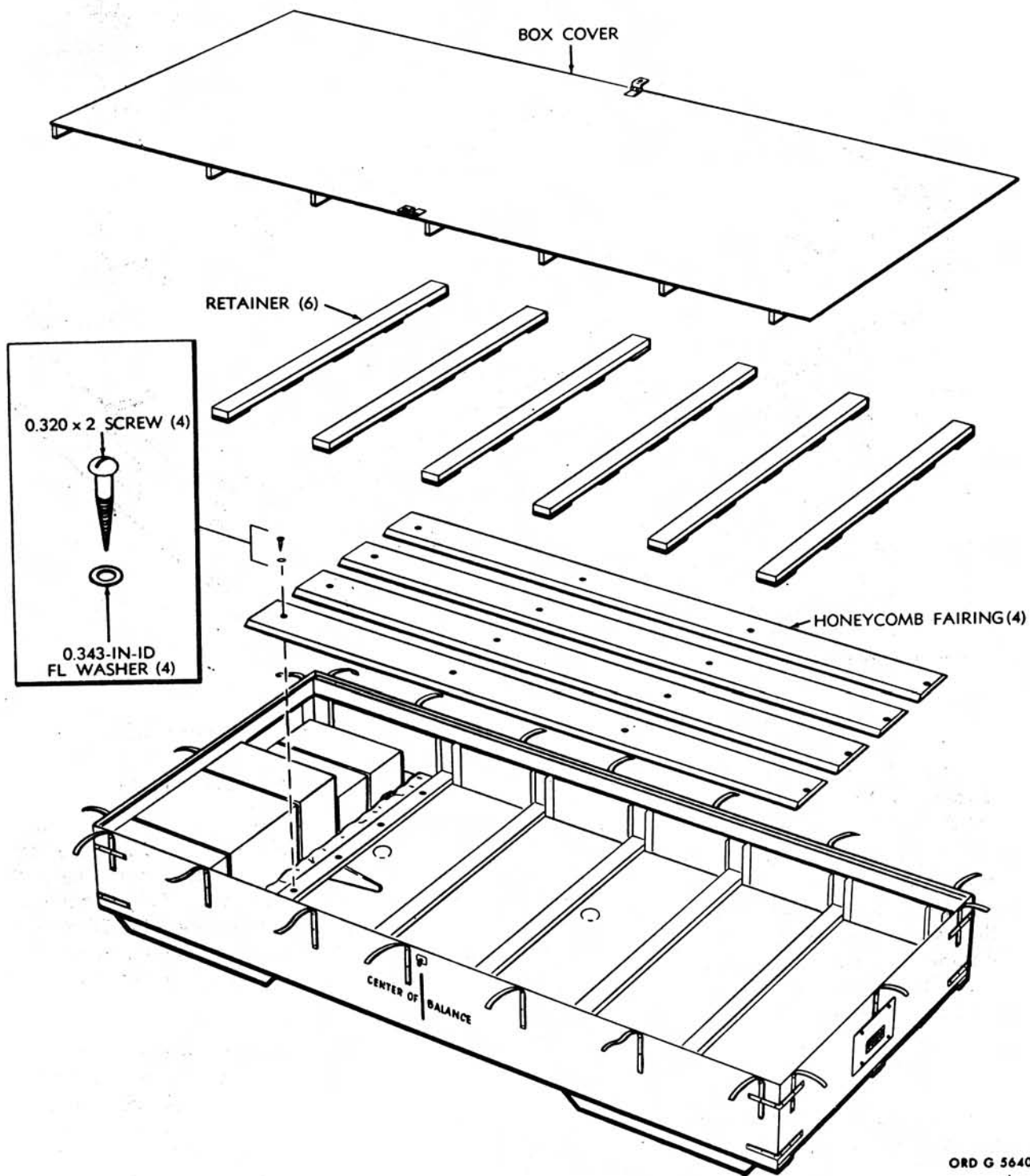
*a.* Remove the truss-head screws (14 and 20, fig. 8-20), flat washers (15 and 19), and hexagon nuts (16 and 18) that secure the rocket motor igniter cable assembly (12) to the rocket motor thrust ring assembly (1). Discard the screws, but retain the washers and nuts, and leave the clamps (13 and 21) on the igniter cable assembly.

*b.* Position the cover plate (6, fig. 13-9), with the beveled edges facing to the rear, inside the rocket motor thrust ring assembly (5), and secure the cover plate and the rocket motor igniter cable assembly (4) with the clamps (3), hexagon-head bolts (7), flat washers (1), and hexagon nuts (2).

### 13-9. Installation of Spring Tension Clips

*a.* Remove the hexagon-head bolt (2, fig. 13-10), flat washer (4), and hexagon nut (5) from the rocket motor thrust ring assembly (1).





ORD G 5640

Figure 13-6. Removal of the honeycomb fairings.

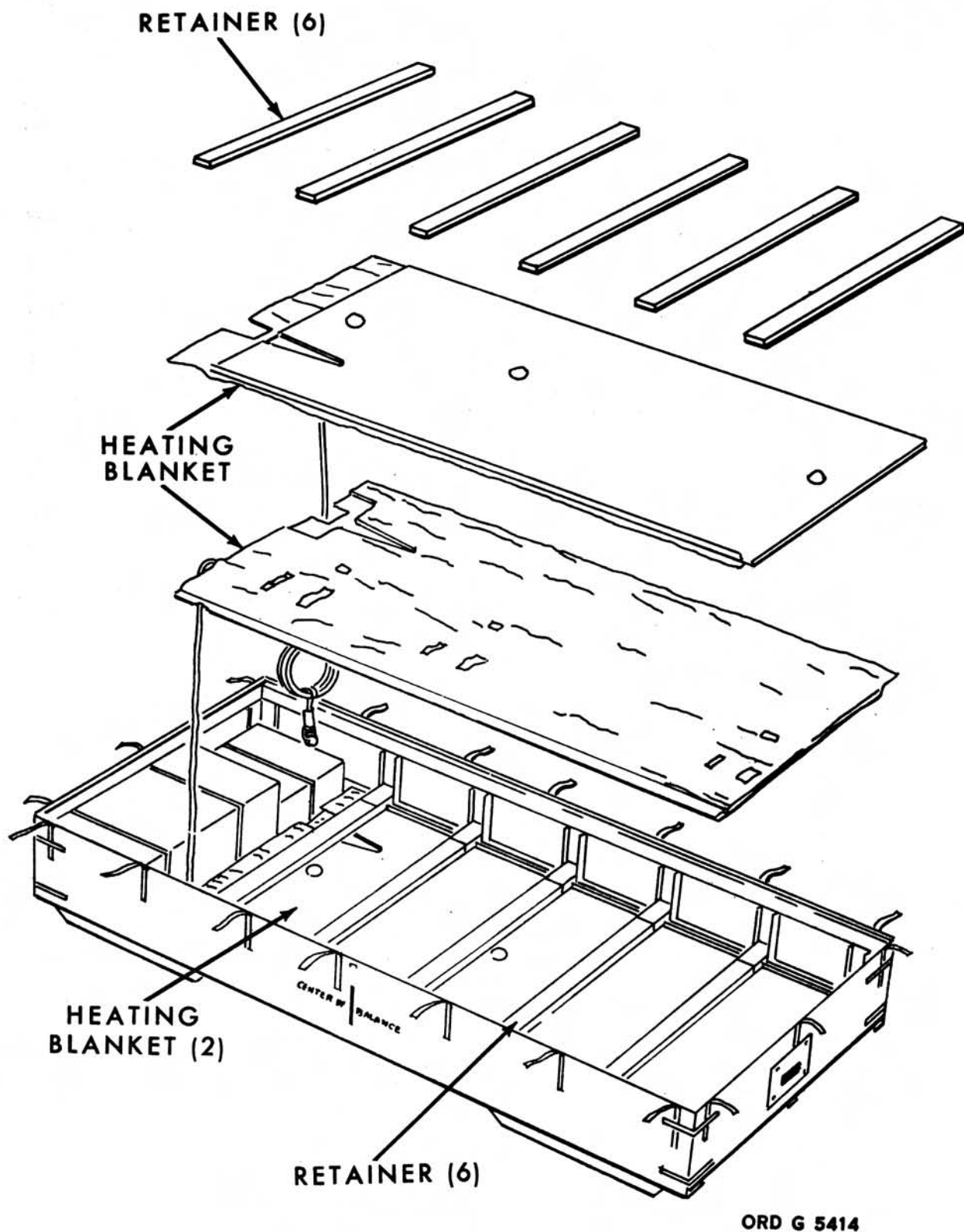
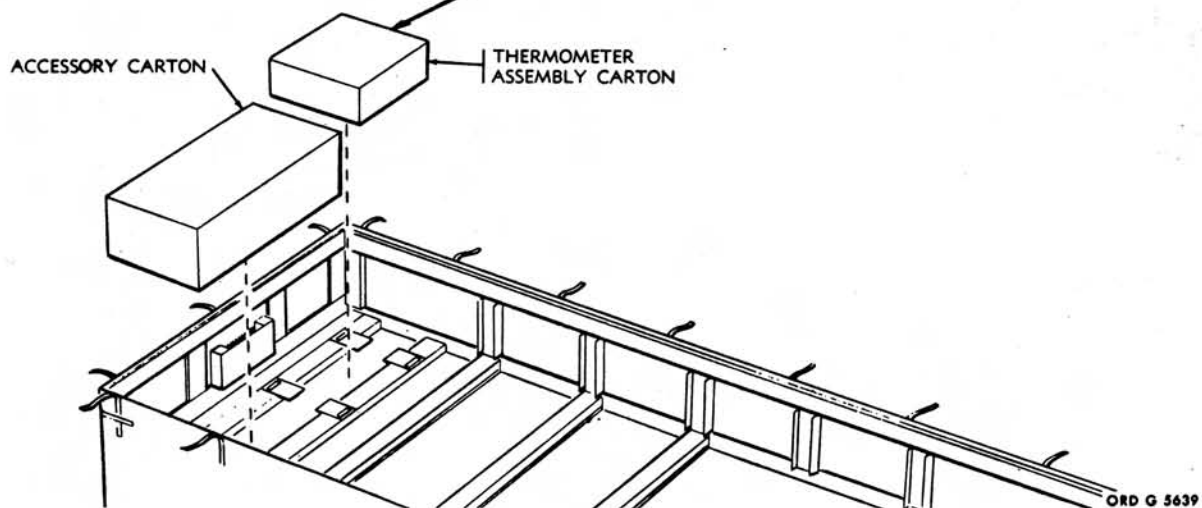
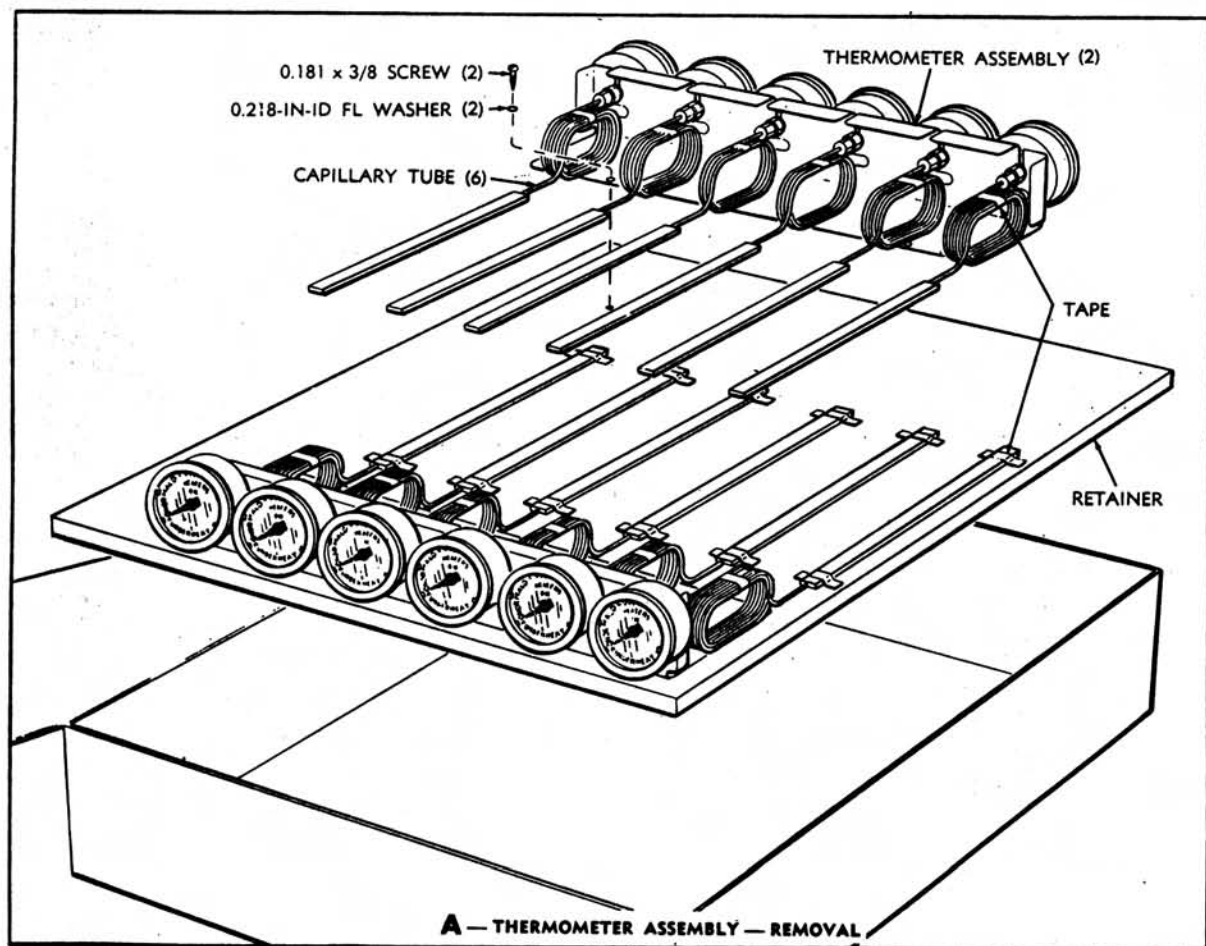
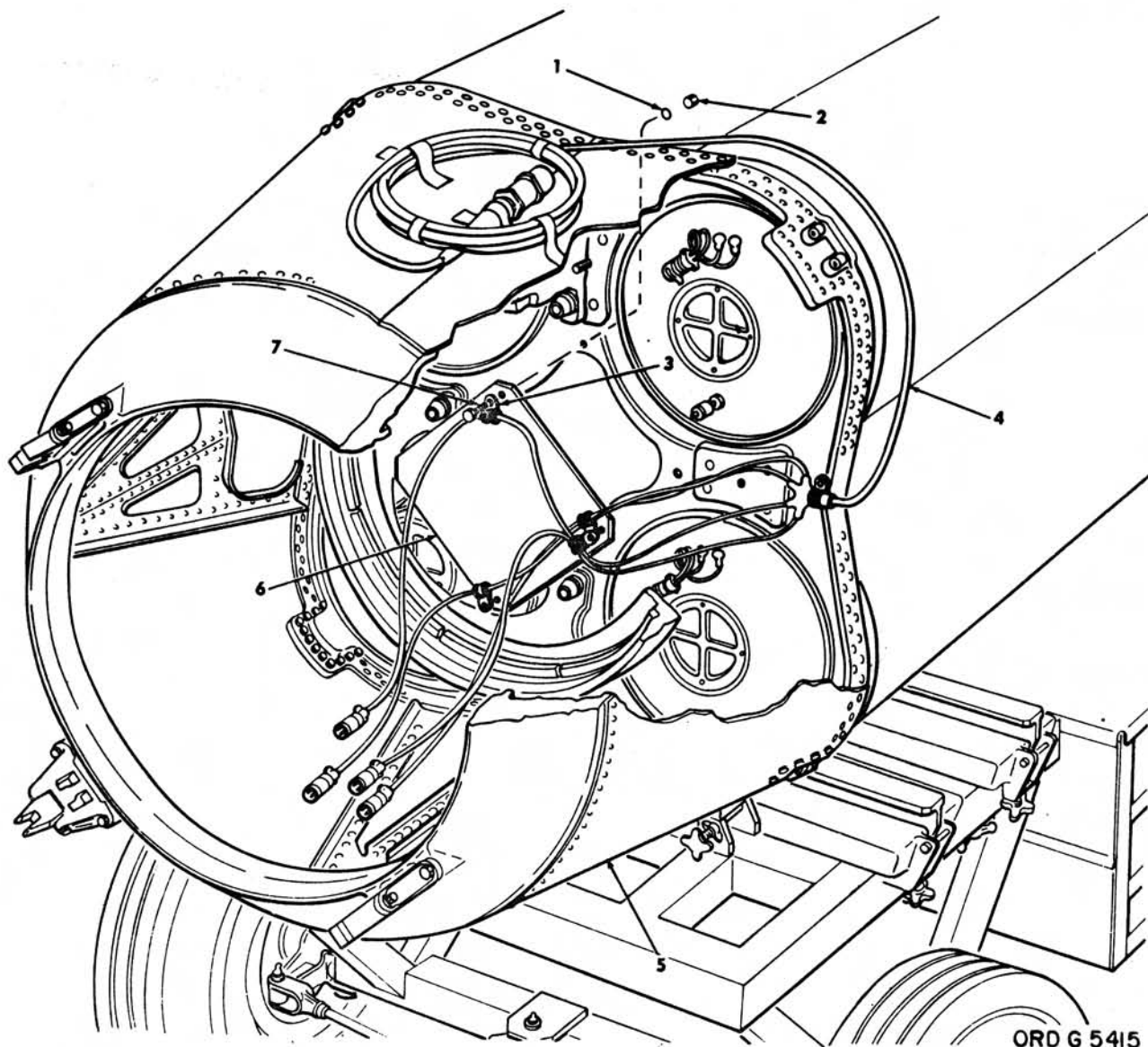


Figure 13-7. Removal of the heating blankets.



**Figure 13-8. Removal of the thermometer assembly cartons.**



ORD G 5415

- 1—13/64-in-id fl washer (3)
- 2—No. 10/32 hex. nut (3)
- 3—Clamp (4)
- 4—Rocket motor igniter cable assembly

- 5—Rocket motor thrust ring assembly
- 6—Cover plate
- 7—No. 10-32 x 1-9/32 hex hd-bolt (3)

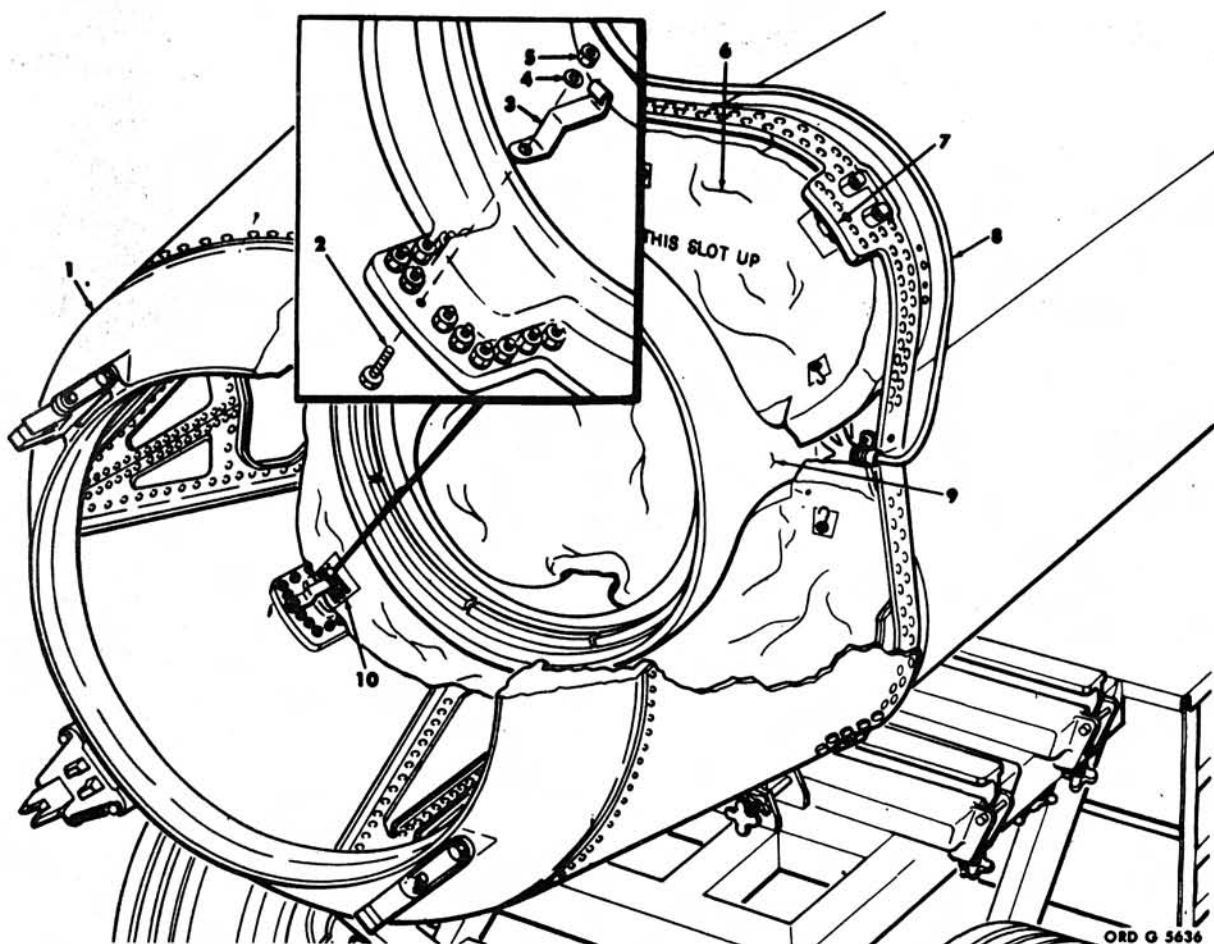
Figure 13-9. Removal and installation of the cover plate.

b. Install the spring tension clip (3), and secure to the rocket motor thrust ring assembly with the hexagon-head bolt, flat washer, and hexagon nut.

c. Repeat a and b above to install the three remaining spring tension clips.

### 13-10. Installation of Forward Insulation Blanket

a. Insert the forward insulation blanket (6, fig. 13-10) through the forward opening of the rocket motor thrust ring assembly (1) and the pedestal (9).



- 1—Rocket motor thrust ring assembly
- 2—5/16-24 x 27/32 hex-hd bolt (4)
- 3—Spring tension clip (4)
- 4—0.343-in-id fl washer (4)
- 5—5/16-24 hex nut (4)

- 6—Forward insulation blanket
- 7—Base plate
- 8—Rocket motor igniter cable assembly
- 9—Pedestal
- 10—Loop (12)

Figure 13-10. Removal and installation of the spring tension clip and forward insulation blanket.

b. Position the blanket so that the loops (10) are facing forward, and the placard, THIS SLOT UP, is positioned correctly.

c. Fit the slots in the blanket around the legs of the pedestal, and spread the blanket edges to meet the inside surface of the base plate (7).

Note. Do not connect the loops on the blanket to the spring tension clips at this time.

d. Roll up the loose end of the rocket motor igniter cable assembly (8), and securely tape or tie the roll in place on top of the rocket motor thrust ring assembly.

### 13-11. Installation of Rear Insulation Blanket

a. Position the rear insulation blanket (fig. 13-11) around the nozzle of the rocket motor



with the loop (view A), facing the rear of the nozzle.

b. Fit the rear insulation blanket against the fitting assembly.

c. Insert the clamp (view A) through the slit in the loop, and pull the band through the loop.

d. Position the clamp so that the thumb screw faces inward, and install the band (view B) in the clamp as shown.

e. Repeat *c* through *d* above for the three remaining insulation blankets.

### 13-12. Installation of the Heating Blankets

**Note.** Make certain that the correct heating blanket (2 or 12, fig. 13-12) is installed on each rocket motor. Looking from the rear, they are installed on the rocket motors as follows: blankets 9017836 are installed on the upper right and lower left rocket motors; blankets 9017837 are installed on the upper left and lower right rocket motors.

**Note.** Tie four pieces of cord 6 feet long, at equidistant points in the hook-bolt holes (fig. 13-13) along the flat edge of the heating blanket. The cord will be useful in the final alinement, adjustment, and installation.

**Note.** When installing the upper heating blankets positioned with the electrical harness and connector to the rear, feed the flat edge of the blanket, with the four lengths of cord inserted, downward between the upper rocket motors. When installing the lower blankets positioned with the electrical harness and connector to the rear, feed the flat edge of the blanket, with the four lengths of cord inserted, upward between the lower rocket motors.

a. Position the heating blanket (2 or 12, fig. 13-12) over the upper rocket motor (13), with the heater cable (9) to the rear.

b. Guide the heater cable through the fitting assemblies (11), and allow the heater cable to hang between the lower nozzles (10).

c. Install the thermometer assembly (7) and the three upper thermometer bulbs (1) as prescribed in steps (1) through (3) below.

(1) Position the thermometer assembly between the upper and lower nozzles; and align the holes with the holes in the upper and lower fitting assemblies; temporarily secure the thermometer assembly with two hexagon-head bolts (6).

**CAUTION:** Care must be exercised to prevent crossing the capillary tubes (5) while performing steps (2) and (3) below.

(2) Lift the heating blanket; feed the three thermometer bulbs forward; and thread each bulb through the guides (4).

(3) Position each thermometer bulb in its respective thermometer bulb receiver (3).

d. Install the hook bolts (13, fig. 13-13) through the holes in the flat edge of the blanket from the inner side.

e. Align the cover collar holes (8) in the heating blanket (6 or 7) with the 1/4-inch holes in the rocket motor (9). Temporarily install two hexagon-head bolts (15, fig. 13-15) and flat washer (14) through the aligned holes of each cover so that the cover remains in the proper position.

f. Position the forward edge of the heating blanket two inches from the rocket motor thrust ring assembly (5, fig. 13-13), and insure that all edges are parallel to the rocket motor.

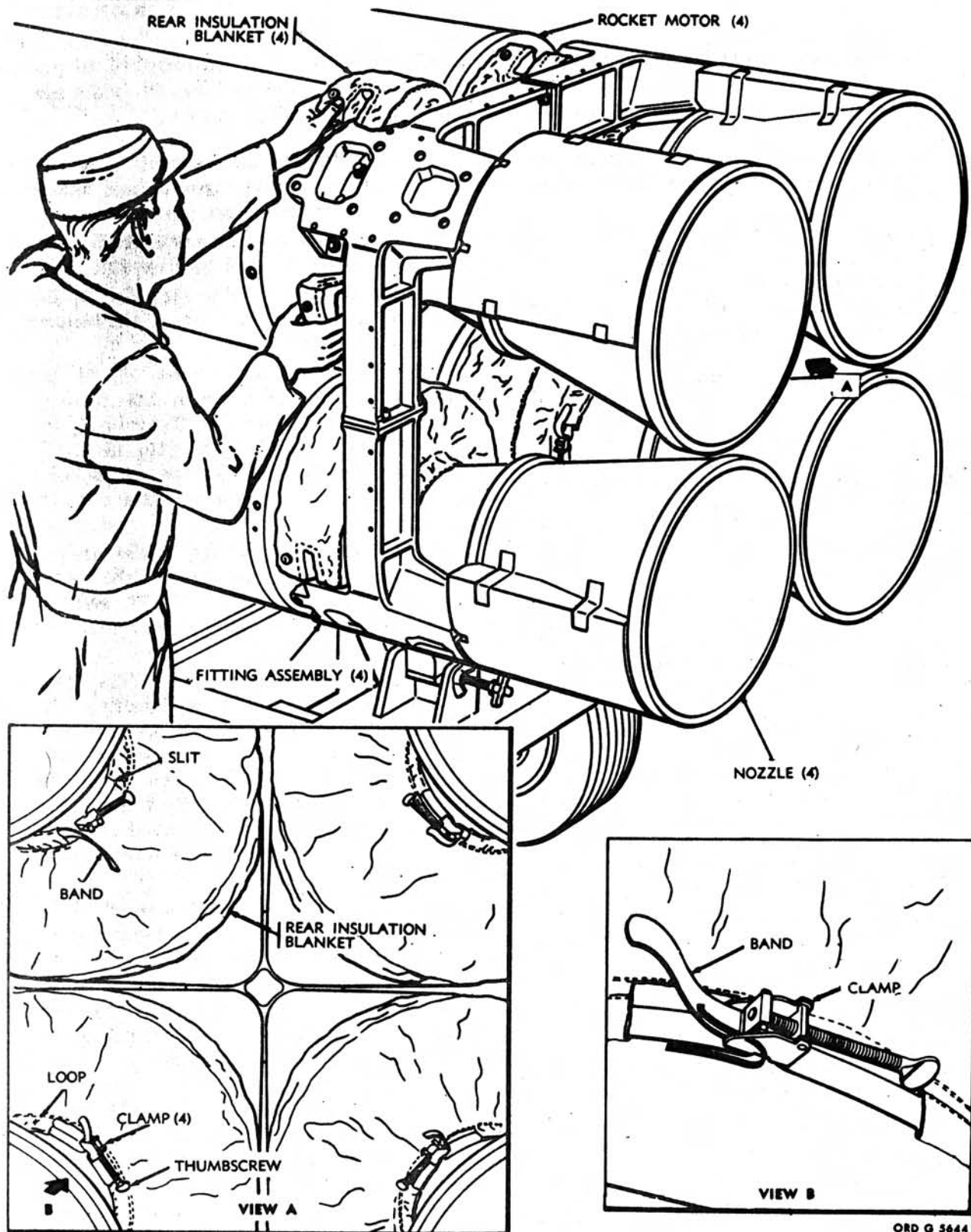
g. Starting at the rear of the blanket, pull the edges together, and start inserting the hook bolts through the holes in the opposite edge of the cover; install the flat washer (15) and hexagon nut (14), and tighten until the next hook bolt projects sufficiently through the hole to install the next flat washer and hexagon nut. Repeat the procedures for all hook bolts, flat washers, and hexagon nuts.

h. Check *e* and *f* above to make certain that the blanket is in the correct position before tightening the attaching hardware.

i. Tighten each hexagon nut a few turns at a time, and work progressively from the rear to the front of the blanket; repeat the procedure until all the hook bolts are secured.

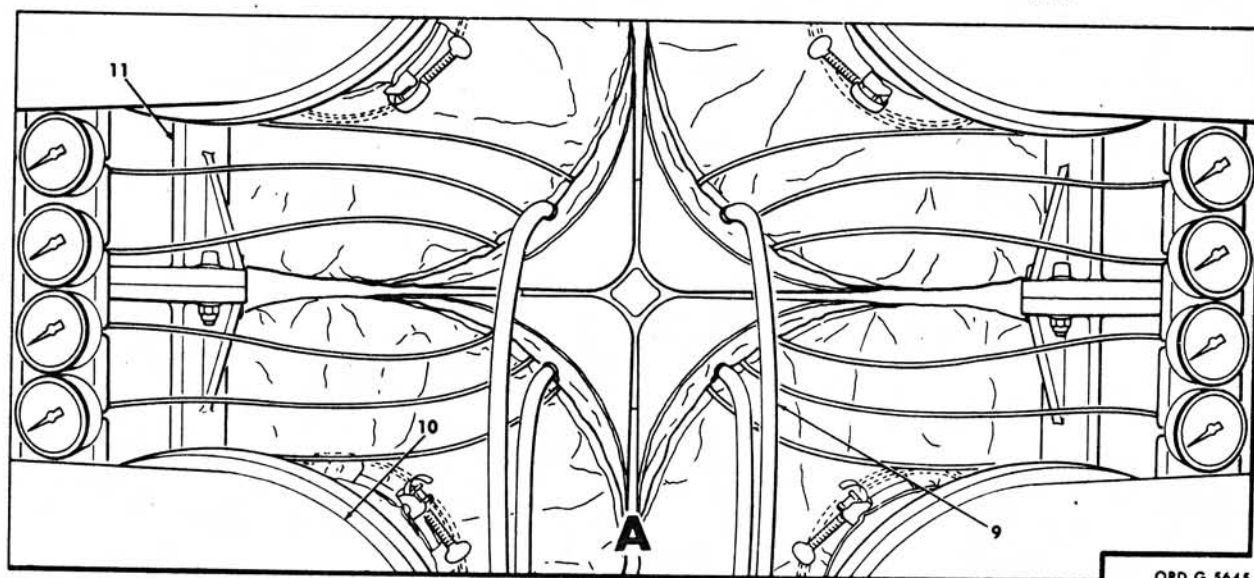
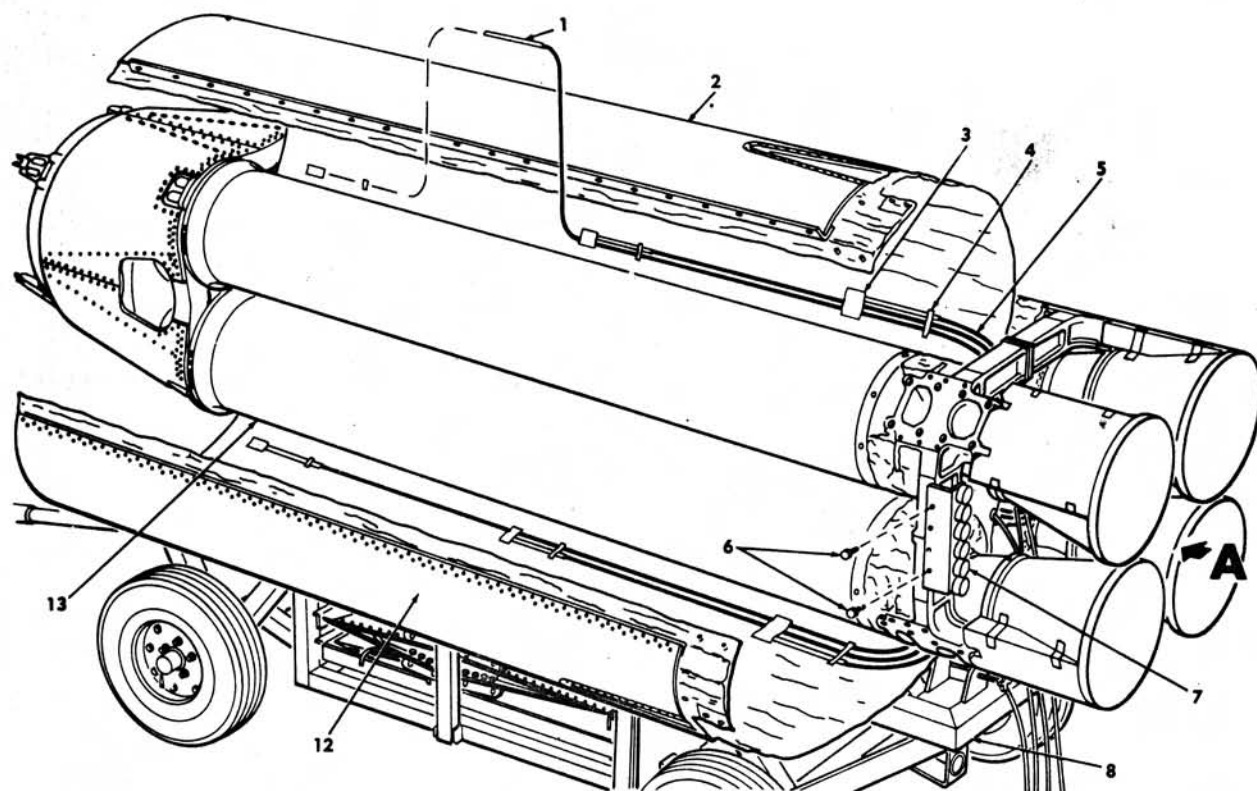
**CAUTION:** If the blanket cover collar holes are not properly aligned, loosen the hook bolts, and align the heating blanket alinement holes as prescribed in *e* above.

j. Secure the collar (2) by pushing the snaps (1) through the holes and twisting the snaps a quarter-turn in either direction.



ORD G 5644

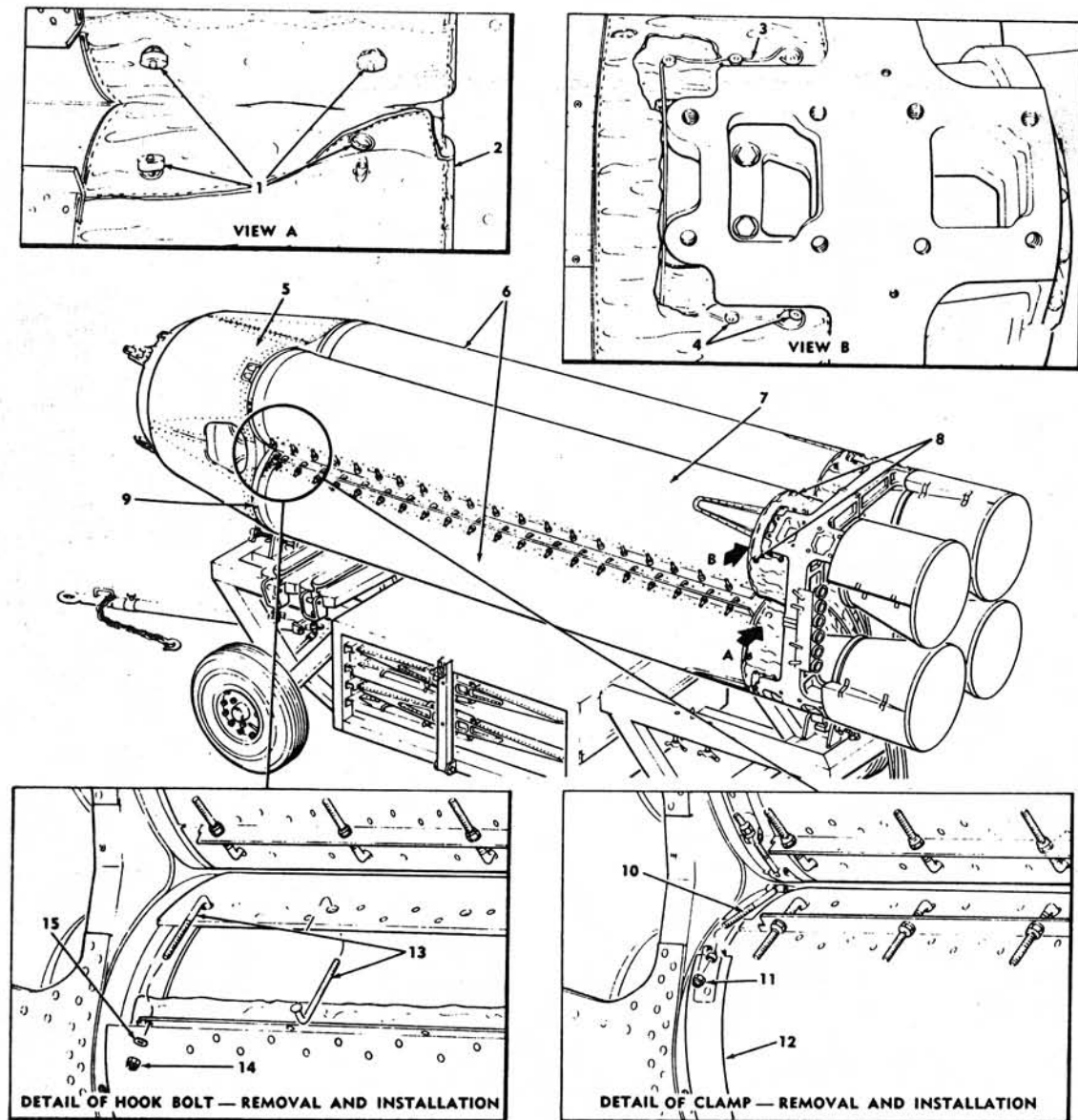
Figure 13-11. Removal and installation of the rear insulation blanket.



ORD G 5645

- |                                  |                                  |                                |
|----------------------------------|----------------------------------|--------------------------------|
| 1—Thermometer bulb (12)          | 6—1/4-28 x 17/32 hex-hd bolt (4) | 11—Fitting assembly (4)        |
| 2—Heating blanket 9017837 (2)    | 7—Thermometer assy (2)           | 12—Heating blanket 9017836 (2) |
| 3—Thermometer bulb receiver (12) | 8—Rocket motor cluster truck     | 13—Rocket motor (4)            |
| 4—Guide (12)                     | 9—Heater cable (4)               |                                |
| 5—Capillary tube (12)            | 10—Nozzle (4)                    |                                |

Figure 13-12. Removal and installation of the heating blankets.



ORD 65396

- 1—Snap
- 2—Collar
- 3—Retaining clip (4)
- 4—Button
- 5—Rocket motor thrust ring assembly
- 6—Heating blanket
- 7—Heating blanket (2)
- 8—Cover collar hole

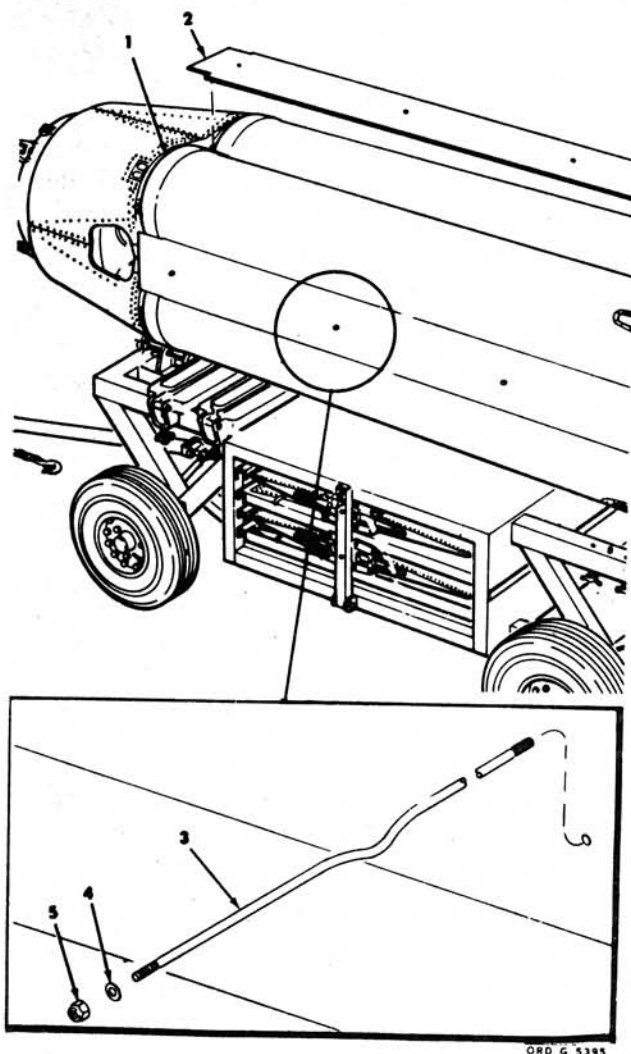
- 9—Rocket motor (4)
- 10—Captive bolt
- 11—5/16-24 self-lkg hex nut
- 12—Clamp 8018829
- 13—Hook bolt 9017823 (20)
- 14—No. 10-32 hex nut (20)
- 15—0.218-in-id fl washer (20)

Figure 13-13. Removal and installation of the heating blankets.

k. Install the retaining clip (3) under the buttons (4).

l. Position the heating blanket (2 or 12, fig.

13-12) for the lower rocket motor (13) on the rocket motor cluster truck (8) with the heater cable (9) to the rear.



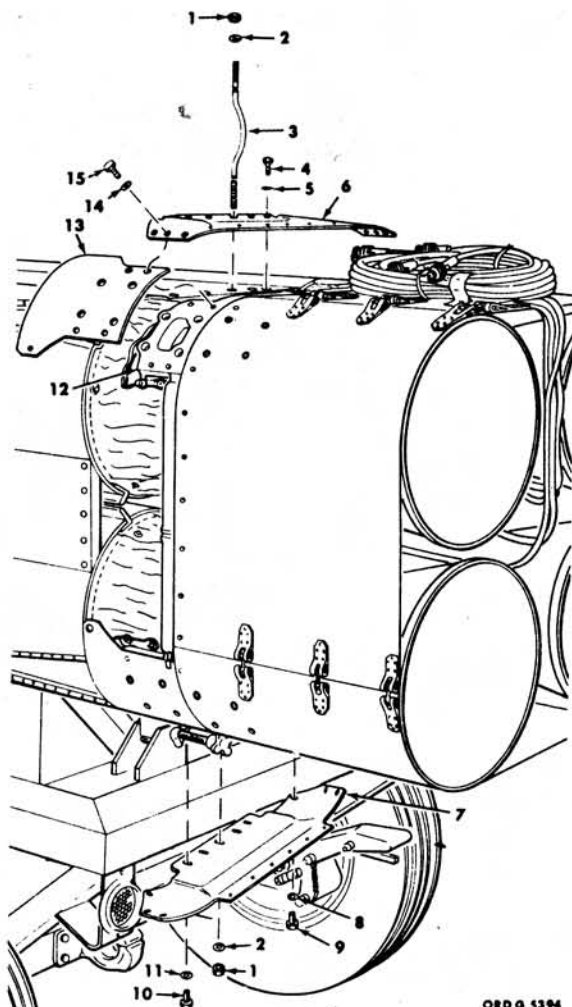
- 1—Heating blanket (4)
- 2—Honeycomb fairing (4)
- 3—Threaded end rod (6)
- 4—0.375-in-id fl washer (12)
- 5—5/16-24 hex. nut (12)

Figure 13-14. Removal and installation of the honeycomb fairing.

m. Guide the heater cable through the fitting assemblies (11), and allow the heater cable to hang between the lower nozzles (10).

**CAUTION:** Avoid the creation of kinks or pinch points in the capillary tubes (5) during the installation of the thermometer assembly (7) and thermometer bulb (1) while performing n below.

n. Install the lower three thermometer bulbs as prescribed in steps (1) and (2) below:



- 1—5/16 hex. nut
- 2—0.375-in-id fl washer
- 3—Threaded end rod
- 4—No. 10-32 x 17/32 hex-hd bolt (4)
- 5—0.218-in-id fl washer (4)
- 6—Top fairing
- 7—Bottom fairing
- 8—9/32-in-id fl washer (12)
- 9—1/4-28 x 17/32 hex-hd bolt (12)
- 10—No. 10-32 x 17/32 hex-hd bolt (4)
- 11—0.218-in-id fl washer (4)
- 12—Fitting assemblies
- 13—Forward nozzle fairing (4)
- 14—9/32-in-id fl washer (14)
- 15—1/4 x 17/32 hex-hd bolt (4)

Figure 13-15. Removal and installation of the top and bottom fairings.

(1) Feed the three remaining thermometer bulbs forward, and thread each bulb through the guides (4, fig. 13-12).



(2) Position each thermometer bulb in its respective thermometer bulb receiver (3).

**CAUTION:** The modification (elongation) of the cover collar holes (8, fig. 13-13) is prohibited, as the heating element wires are near the cover collar holes and modification or alteration may result in permanent damage to the heating blanket.

*o.* Repeat *d* through *k* above for the heating blanket on the lower rocket motor.

*p.* Remove the bolts and washers installed in *e* above.

*q.* Repeat *a* through *p* above for the two remaining blankets and the remaining thermometer assembly.

*r.* Place the clamps (12) around the forward end of the blankets and assemble them with the self-locking hexagon nuts (11).

*Note.* It may be necessary to put the clamps around the rear end of the blankets and slide them forward.

*s.* Position the captive bolts (10) parallel to the hook bolts; tighten the self-locking nuts.

### 13-13. Installation of the Honeycomb Fairings

*a.* Position the two honeycomb fairings (2, fig. 13-14) between the heating blankets (1), insuring that the forward ends are flush with the rocket motor thrust ring assembly.

*b.* Insert the threaded end rods (3) through the holes in the honeycomb fairings, and secure the fairing and each threaded end rod with the flat washers (4) and hexagon nuts (5); tighten to the torque value given in table 15-11.

*c.* Repeat *a* and *b* above for the remaining two honeycomb fairings.

### 13-14. Installation of the Top and Bottom Fairings

*a.* Position the four forward nozzle fairings (13, fig. 13-15) over the fitting assemblies (12); align the holes, and tape in place.

*b.* Position the top fairing (6), and secure with the flat washers (14) and hexagon-head bolts (15) and flat washers (5), and hexagon-

head bolts (4); tighten to the torque values given in table 15-10.

*c.* Position the bottom fairing (7), and secure with the flat washers (8), hexagon-head bolts (9), flat washers (11), and hexagon-head bolts (10); tighten to the torque values given in table 15-10.

*d.* Insert the threaded end rod (3) through the top fairing; pass it through the bottom fairing; and secure it with the flat washers (2) and hexagon nuts (1); tighten to the torque value given in tables 15-10 and 15-11.

### 13-15. Installation of the Side Fairings

*Note.* Make certain that the holes in the thermometer assembly are aligned with the holes in the fitting assemblies, nozzle fairings, and side fairings.

*a.* Remove the hexagon-head bolts (6, fig. 13-12) temporarily securing the thermometer assemblies (7), and support the thermometer assemblies until they are secured by the side fairings (5, fig. 13-16).

*b.* Position the side fairings, and secure each with the flat washer (2), hexagon-head bolts (1), flat washers (6), and hexagon-head bolts (7); tighten to the torque values given in table 15-10.

*c.* Install the threaded end rod (8), and secure with the flat washers (3) and hexagon nuts (4); tighten to the torque value given in table 15-10 and 15-11.

*d.* Position the two rocket motor cluster fin assemblies (fig. 8-15), and secure with the 16 hexagon-head bolts and flat washers.

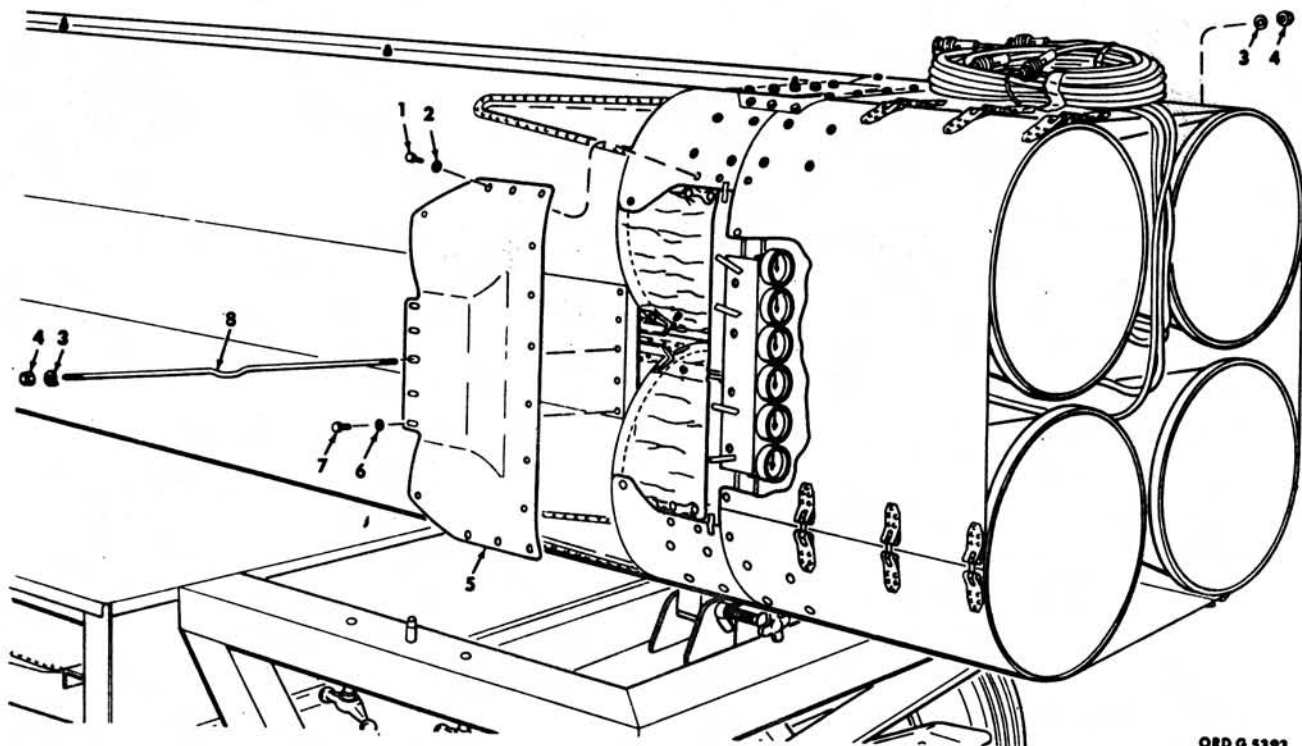
### 13-16. Joining Procedures and Final Installation

*a.* Perform the joining procedures for the missile body and the rocket motor cluster (chapter 9).

*b.* Perform the final preparation of the missile (chapter 10).

*c.* Secure the loops (3, fig. 13-17) on the forward insulation blanket (4) to the spring tension clips (2). Select the proper loop so that the blanket fits snugly around the inside of the rocket motor thrust ring assembly (1).

*d.* Attach each spring (5) to the hook (6) on the forward insulation blanket; stretch to the opposite hook; and secure in place.



ORD G 5393

- 1—1/4-28 x 17/32 hex-hd bolt (14)
- 2—9°32-in-id fl washer (14)
- 3—0.375-in-id fl washer
- 4—5/16 hex. nut

- 5—Side fairing (2)
- 6—0.218-in-id fl washer (4)
- 7—No. 10-32 x 17°32 hex-head bolt (4)
- 8—Threaded end rod

Figure 13-16. Removal and installation of the side fairings.

### 13-17. Installation of the Heater Cable Shearing Clamp

a. Weave the heater cables (7, fig. 13-18) through the slots (5) in each side of the heater cable shearing clamp (6) (two cables on each side) so that all the cables go in and come out one end.

b. Secure the shearing clamp to the rail with the hexagon head bolts (4), lockwashers (3), and hexagon nuts (2). Tighten the bolts to the torque value given in table 15-11.

c. Connect the four heater connectors (fig. 13-19) to connectors J115-1, J115-2, J115-3, and J115-4 on the distribution box mounted on the launcher.

### 13-18. Preparation for Removal of the Rocket Motor Cluster Winterization Kit

a. Disconnect the four heater connectors (fig.

13-19) from connectors J115-1, J115-2, J115-3, and J115-4 on the distribution box on the launcher.

b. Remove the hexagon nuts (2, fig. 13-18), lockwashers (3), and hexagon-head bolts (4) that secure the heater cable shearing clamp (6) to the underside of the launching-handling rail (1); remove the shearing clamp.

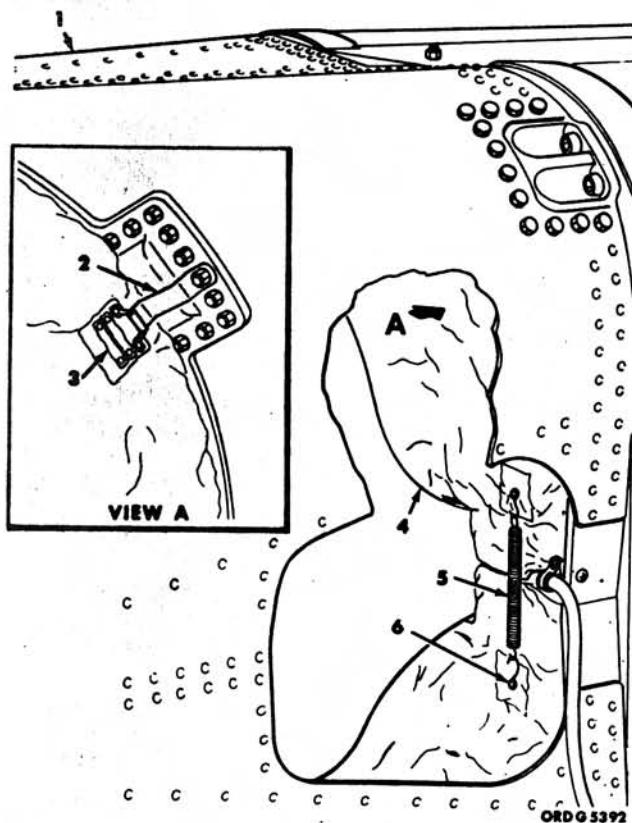
c. Remove the heater cables (7) from the slots (5) in the shearing clamp.

d. Remove the four springs (5, fig. 13-17) from the eight hooks (6) on the forward insulation blanket (4).

e. Disconnect the four spring tension clips (2) from the four loops (3).

f. Fold the forward insulation blanket forward, and tape in place.

*Note.* If guided missile low-bed trailer M529 is to be used to transport the missile, omit g below, and perform h through j below.



- 1—Rocket motor thrust ring assembly
- 2—Spring tension clip (4)
- 3—Loop (12)
- 4—Forward insulation blanket
- 5—Spring (4)
- 6—Hook (8)

Figure 13-17. Final Preparation of the forward insulation blanket.

g. Deactivate the missile and the rocket motor cluster (pars. 11-4 through 11-13).

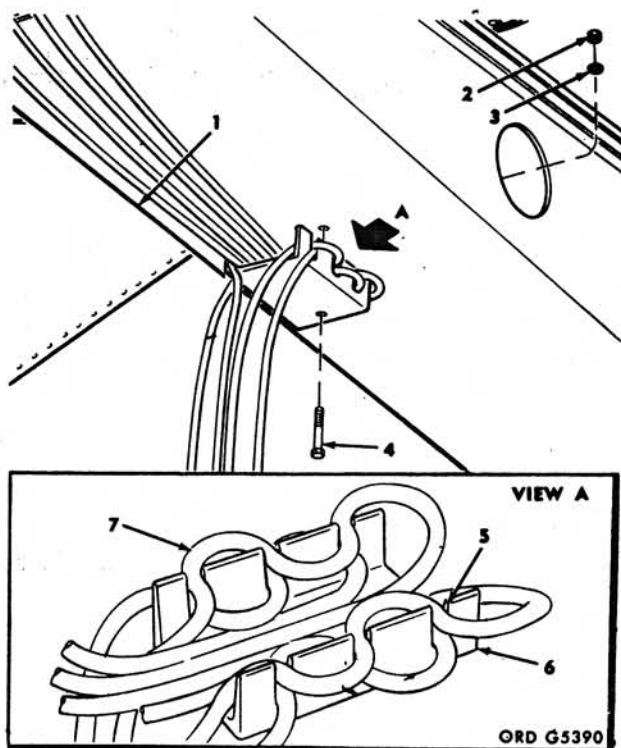
h. Deactivate the missile and the rocket motor cluster (pars. 11-4, 11-5, 11-6a, b, and e and 11-7a and b).

i. Disconnect the rocket motor heater cables from the J10 connectors on guided missile low-bed trailer M529 as prescribed in TM 9-2330-255-14.

j. Deactivate the missile and the rocket motor cluster (pars. 11-10 through 11-13a (3)).

### 13-19. Removal of the Rocket Motor Cluster Winterization Kit

a. Remove the rocket motor cluster fin assemblies (par. 12-102).



- 1—Launching-handling rail
- 2—1/2-20 hex. nut (2)
- 3—0.509-in-id lockwasher (2)
- 4—1/2-20 x 2-1/4 hex-hd bolt (2)
- 5—Slot
- 6—Heater cable shearing clamp
- 7—Heater cables

Figure 13-18. Removal and installation of the heater cable shearing clamp.

b. Remove the hexagon nuts (4, fig. 13-16) and flat washers (3) that secure the threaded end rod (8); remove the rod.

*Note.* Support the thermometer assemblies when removing the side fairings (5).

c. Remove the hexagon-head bolts (1 and 7) and flat washers (2 and 6) that secure each side fairing; remove the fairings.

d. Temporarily secure each thermometer assembly (7, fig. 13-12) with two hexagon-head bolts (6).

e. Remove the hexagon nuts (1, fig. 13-15) and flat washers (2) that secure the threaded end rod (3); remove the rod.

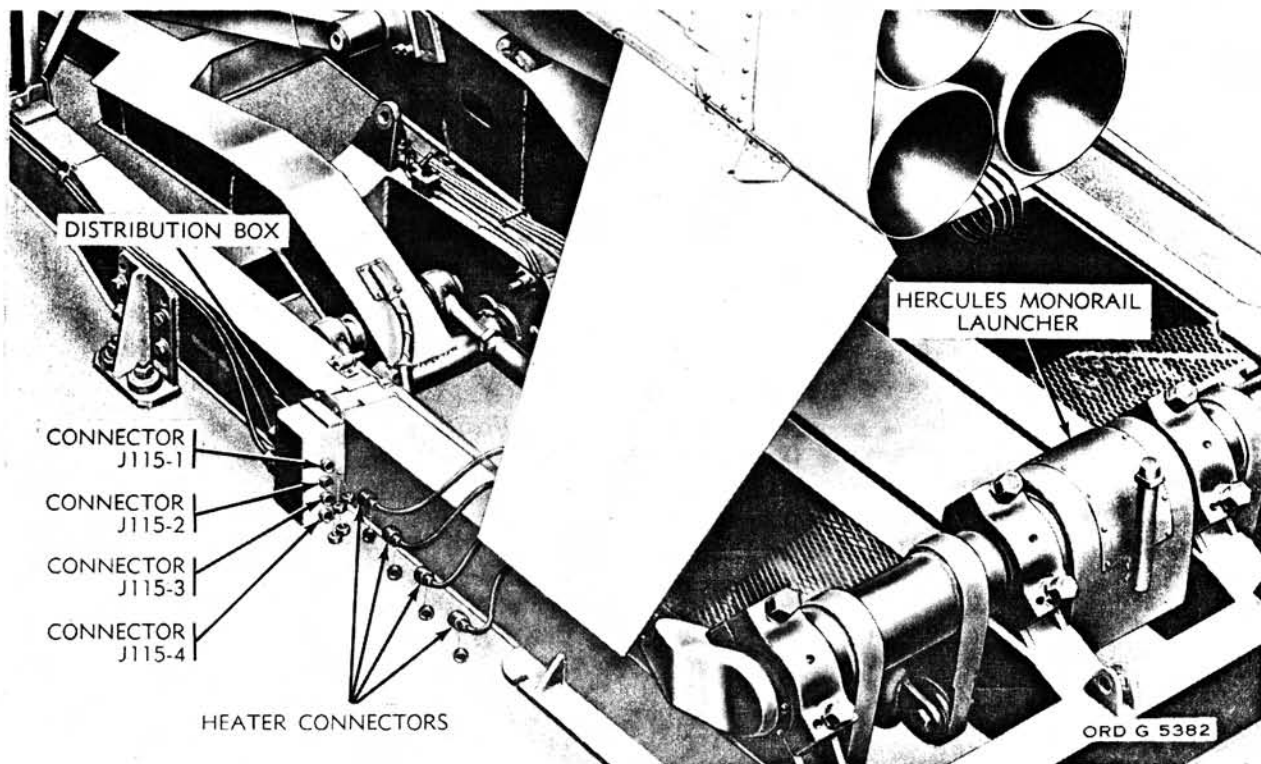


Figure 13-19. Disconnection and connection of the heater cables.

f. Remove the hexagon-head bolts (4 and 15) and flat washers (5 and 14) that secure the top fairing (6); remove the fairing.

g. Remove the hexagon-head bolts (9 and 10) and flat washers (8 and 11) that secure the bottom fairing (7); remove the fairing.

h. Remove the forward nozzle fairings (13).

i. Remove the hexagon nuts (5, fig. 13-14) and flat washers (4) that secure the three threaded end rods (3) and two honeycomb fairings (2); remove the rods and fairings.

j. Repeat *i* above for the three remaining threaded end rods and the two remaining honeycomb fairings.

k. Twist the snaps (1, fig. 13-13 in either direction and release them.

l. Remove the retaining clips (3) that secure the collars (2).

m. Remove the self-locking hexagon nut (11) that secures the clamp (12); remove the clamp.

n. Repeat *m* above for the three remaining clamps.

o. Remove the hexagon nuts (14) and flat washers (15) that secure the hook bolts (13) to the lower heating blanket (6 or 7); remove the hook bolts.

p. Repeat *o* above for the upper heating blanket.

**CAUTION:** Care must be exercised to prevent damage to the capillary tubes (5, fig. 13-12) when the thermometer bulbs (1) are being removed.

q. Slide the thermometer bulbs from the thermometer bulb receivers (3) and guides (4) on each heating blanket (2 and 12).

r. Remove the hexagon-head bolts (6) that secure the thermometer assembly (7) between the nozzles (10); remove the thermometer assembly.

s. Remove the upper and lower heating blankets.

t. Repeat *o* through *s* above for the two remaining heating blankets and the thermometer assembly.



*u.* Remove the four clamps (view A, fig. 13-11) that secure the rear insulation blankets; remove the blankets.

*v.* Pass the forward insulation blanket (6, fig. 13-10) through the forward opening in the pedestal (9); remove the blanket.

*w.* Remove the hexagon nut (5), flat washer (4), and hexagon-head bolt (2) that secure the spring tension clip (3); remove the clip.

*x.* Repeat *w* above for the three remaining spring tension clips.

*y.* Reinstall the hexagon nuts, flat washers, and hexagon-head bolts on the rocket motor thrust ring assembly (1).

*z.* Remove the hexagon nuts (2, fig. 13-9), flat washers (1), and hexagon-head bolts (7) that secure the rocket motor igniter cable assembly (4) and cover plate (6) to the rocket motor thrust ring assembly (5); remove the plate.

*aa.* Reinstall the rocket motor igniter cable assembly (par. 8-9).

*ab.* Assemble the rocket motor cluster (par. 8-6 *ad* through *ak*).

*ac.* Perform the joining and final preparation procedures (chapters 9 and 10).

### 13-20. Packaging the Rocket Motor Cluster Winterization Kit

*a.* Position the thermometer assembly (A, fig. 13-8) in the thermometer assembly carton,

and secure to the retainer with the screws and flat washers; secure the capillary tubes with tape.

*b.* Repeat *a* above for the remaining thermometer assembly.

*c.* Position the accessories in the accessory carton (fig. 13-8).

*d.* Position the thermometer assembly carton and the accessory carton in the shipping and storage box, and secure in place.

*e.* Position two heating blankets (fig. 13-7) in the shipping and storage box, and position six retainers over the covers.

*f.* Position the two remaining heating blankets over the retainers, and position six retainers over the covers.

*g.* Position the four honeycomb fairings (fig. 13-6) in the shipping and storage box, and secure with the screws and flat washers; position the six retainers over the fairings.

*h.* Position the box cover over the shipping and storage box, and position the hasp (fig. 13-5) on each of the cover fasteners.

*i.* Position the straps, and secure to the cover with nails.

*j.* Turn the swivels on each of the cover fasteners, and seal with lead seals.

*k.* Process the shipping and storage box for shipment or storage.

## Section III. APS AND BATTERY BOX WINTERIZATION KIT

### 13-21. Installation of the APS Winterization Kit

*a.* Remove the APS from the equipment section (par. 12-69*a*).

*b.* Insert the APS heating blanket (4, fig. 13-20) into the equipment section (1).

*c.* Connect connector P520 (2) to connector J520 (3).

*d.* Remove the protective cloth (fig. 13-21) from the tape on the edges of the blanket.

*e.* Aline the holes in the blanket with the holes in the structure, and secure the blanket in place by pressing the tape around the edges of the opening.

*f.* Position the regulating thermostat bracket so that it hangs outside the equipment section, and tape to the rear main fin.

*g.* Install the APS (par. 12-69*b*).

*h.* Remove the roundhead screws (4, fig. 13-22) and flat washers (3) from the control assembly (1).



m. Perform air and oil servicing of the APS as prescribed in chapter 4.

### 13-22. Installation of the Missile Battery Box Blanket

a. Check that the shorting connector (d, fig. 10-9) is installed on rocket motor igniter cable assembly connector P109A.

b. Remove the two safety-and-arming devices (11-4a through c).

c. Remove the flathead screws (2, fig. 11-1), and remove the IGNITOR access cover plate (3).

d. Depress the PUSH TO RESET switch (fig. 5-13) on safety-and-arming switch S31, located above the IGNITOR access cover plate. Check that the green field is visible through the inspection window (view A, fig. 5-13) of S31.

e. Remove the equipment section access cover plate from the left side of the missile.

f. Disconnect connector J510 on the battery wiring harness from connector P510 on the missile distribution box.

g. Remove the truss-head screw, flat washers, and lockwashers that secure the loop clamp to the missile structure; remove the clamp from the structure.

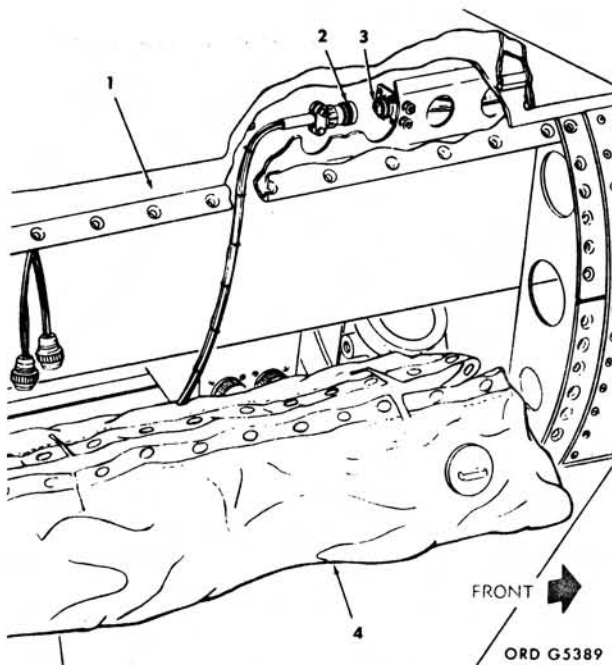
h. Slip the battery box insulation blanket (2, fig. 13-23) over the missile battery box (4) so that the bottom drawstring (3) and the inclined side of the top are facing the missile distribution box (5). While fitting the blanket over the missile battery box, guide the battery wiring harness (1) through the top opening in the blanket.

i. Connect connector J510 on the battery wiring harness (1) to connector P510 on the missile distribution box (5).

j. Secure the loop clamp to the missile structure with the truss-head screw, flat washers, and lockwasher.

k. Tighten and secure the drawstrings (3, fig. 13-23) around the top and bottom of the blanket.

l. Install the flathead screws (2, fig. 11-1) to secure the IGNITER access cover plate (3) to the rear body section (1).



- 1—Equipment section
- 2—Connector P520
- 3—Connector J520
- 4—APS heating blanket

Figure 13-20. Disconnection and connection of the APS heating blanket power.

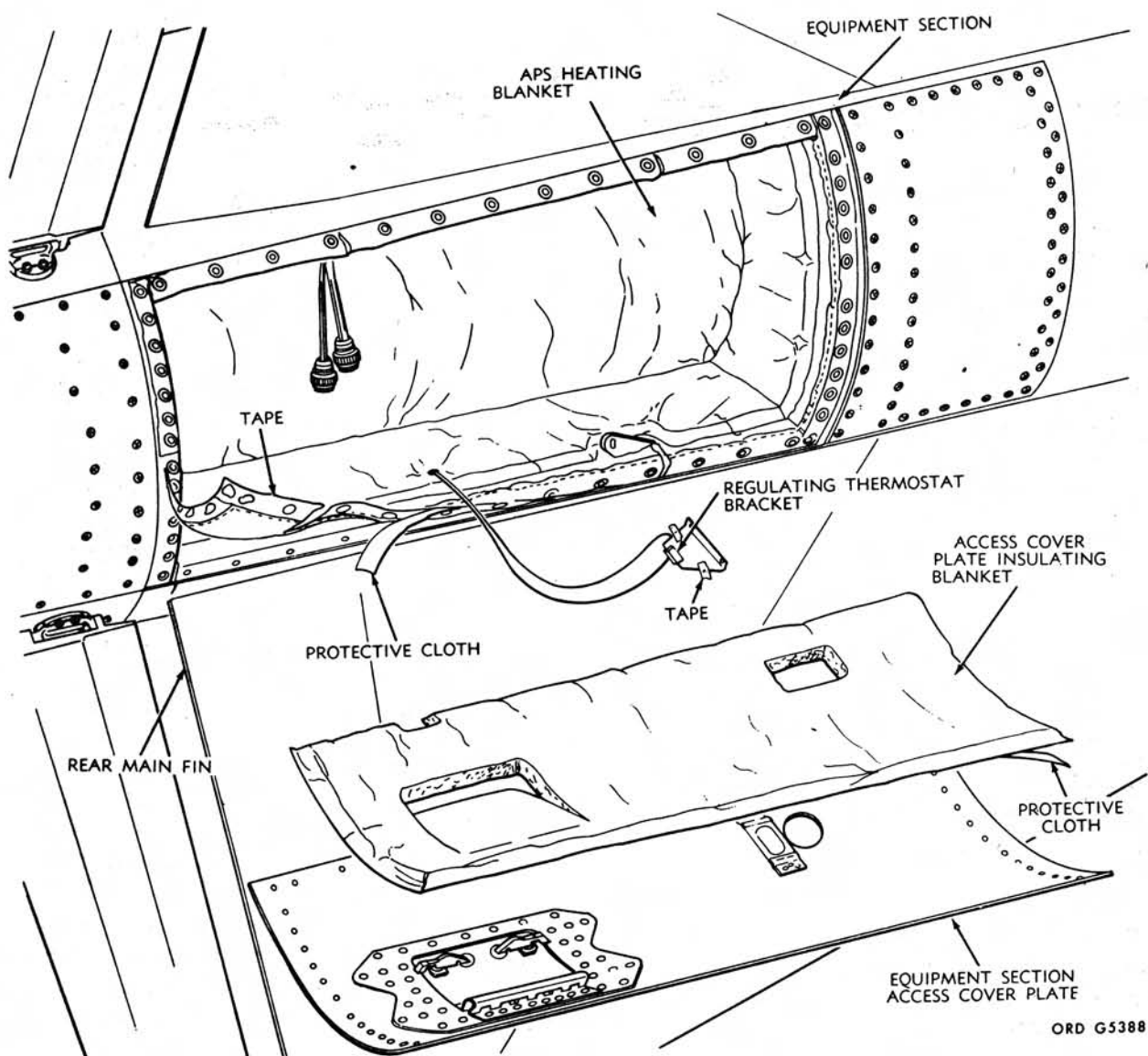
i. Place the regulating thermostat bracket (2) against the control assembly, and align the two holes in the bracket with the holes in the control assembly.

j. Secure the bracket to the control assembly with the roundhead screws and flat washers.

k. Remove the protective cloth (fig. 13-21) from around the edges of the access cover plate insulating blanket.

*Note.* If the pressure-sensitive tape does not properly adhere, remove the existing adhesive from the tape with dry-cleaning solvent 6850-264-9038. Allow the tape to dry thoroughly, and coat with adhesive 8040-614-4079.

l. Align the cutouts in the blanket with the corresponding openings on the inside of the equipment section access cover plate, and secure in place by pressing the adhesive edges of the blanket against the inside of the cover plate.



ORD G5388

*Figure 13-21. Removal and installation of the APS heating blanket and access cover plate insulating blanket.*

m. Install the equipment section access cover plate on the left side of the missile.

n. Install safety-and-arming devices M30A1 (par. 10-5).

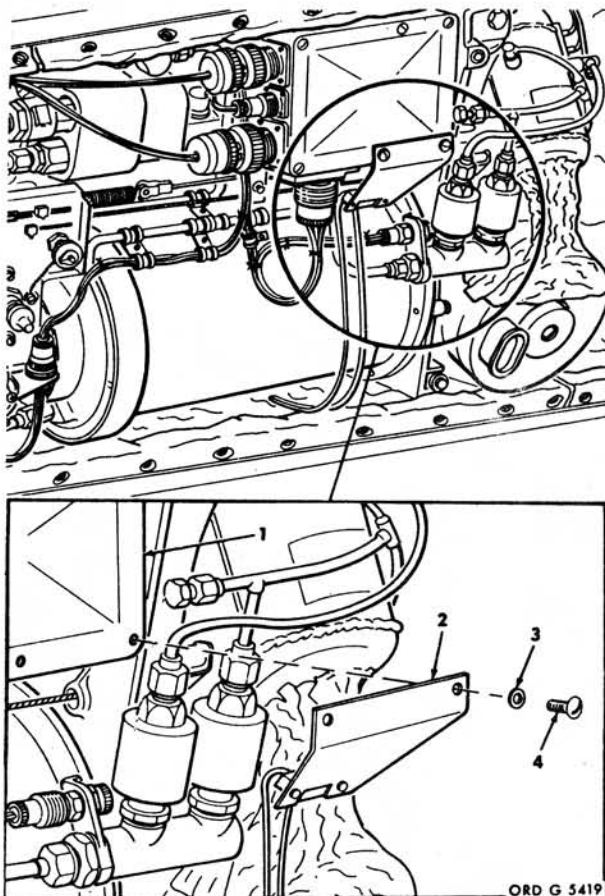
### 13-23. Removal of the APS Winterization Kit

a. Check that the shorting connector (fig. 10-9) is installed on rocket motor igniter cable assembly connector P109A.

b. Remove the two safety-and-arming devices (11-4a through c).

c. Remove the flathead screws (2, fig. 11-1), and remove the IGNITOR access cover plate (3).

d. Depress the PUSH TO RESET switch (fig. 5-13) on safety-and-arming switch S31, located above the IGNITOR access cover plate. Check that the green field is visible through the inspection window (view A) of S31.



- 1—Control assembly
- 2—Regulating thermostat bracket (part of APS heating blanket 9027080)
- 3—No. 6 fl washer (2)
- 4—No. 6-32 rd-hd screw (2)

*Figure 13-22. Removal and installation of the regulating thermostat bracket.*

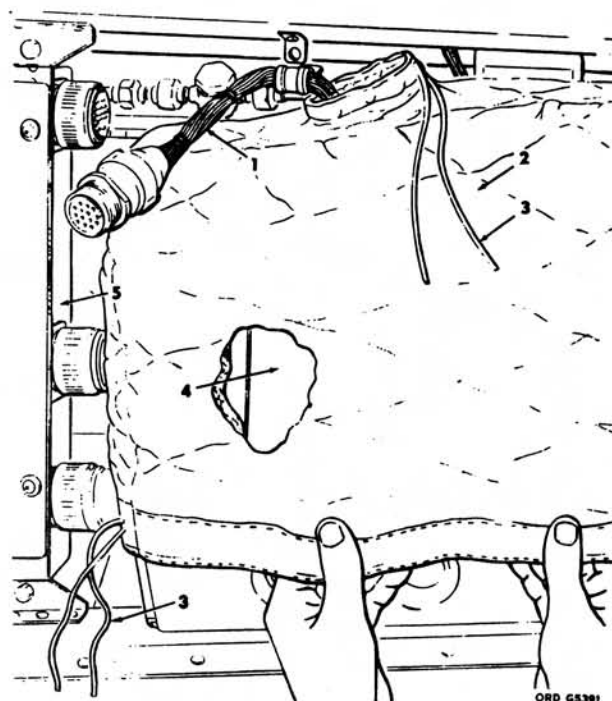
e. Remove the equipment section access cover plate from the right side of the missile.

f. Remove the two lower right side round-head screws (4, fig. 13-22) and two flat washers (3) that secure the regulating thermostat bracket (2) to the control assembly (1); remove the bracket.

g. Reinstall the roundhead screws (4) and flat washers on the control assembly.

h. Remove the APS from the equipment section (par. 12-69a).

i. Pull the tape (fig. 13-21) from the edges of the equipment section.



- 1—Battery wiring harness
- 2—Battery box insulation blanket
- 3—Drawstring
- 4—Missile battery box
- 5—Missile distribution box

*Figure 13-23. Removal and installation of the battery box insulation blanket.*

j. Disconnect connector P520 (2, fig. 13-20) from connector J520 (3) and remove the APS heating blanket (4).

k. Remove the access cover plate insulating blanket from the equipment section access cover plate.

l. Install the APS (par. 12-69b).

### 13-24. Removal of the Missile Box Blanket

a. Check that the shorting connector (fig. 10-9) is installed on rocket motor igniter cable assembly connector P109A.

b. Remove the two safety-and-arming devices (par. 11-4a through c).

c. Remove the flathead screws (2, fig. 11-1) and remove the IGNITOR access cover plate (3).

d. Depress the PUSH TO RESET switch (fig. 5-13) on safety-and-arming switch S31, located above the IGNITOR access cover plate. Check that the green field is visible through the inspection window (view A) of S31.

e. Remove the left equipment section access cover plate.

f. Disconnect connector J510 on the battery wiring harness from connector P510 on the missile distribution box.

g. Remove the truss-head screw, flat washer, and lockwasher that secure the loop clamp to the missile structure; remove the clamp from the structure.

h. Loosen the drawstrings (3, fig. 13-23)

around the top and bottom of the battery box insulation blanket; remove the blanket.

i. Install the loop clamp, and secure with the truss-head screw, flat washer, and lockwasher.

j. Connect connector J510 on the battery wiring harness (1) to connector P510 on the missile distribution box (5).

k. Install the flathead screws (2, fig. 11-1) to secure the IGNITOR access cover plate (3) to the rear body section (1).

l. Install the left equipment section access cover plate.

m. Install safety-and-arming devices M30A1 (par. 10-5).

#### Section IV. CORRECTIVE MAINTENANCE OF WINTERIZATION KITS

##### 13-25. Replacement of Rocket Motor Cluster Heating Blankets

###### a. Removal.

(1) Prepare for the removal of the rocket motor cluster heating blankets (par. 13-18).

(2) Remove the rocket motor cluster fin assemblies and fairings (par. 13-19a through j).

*Note.* The procedures in (3) through (6) below apply to any one of the rocket motors upon which heating blanket is to be replaced.

(3) Twist the snaps (1, fig. 13-13) in either direction and release the collar (2) from the snaps.

(4) Remove the retaining clip (3) that secures the collar.

(5) Remove the self-locking hexagon nut (11) that secures the clamp (12); remove the clamp.

(6) Remove the hexagon nuts (14) and flat washers (15) that secure the hook bolts (13) to cover; remove the hook bolts.

**Caution:** Care must be exercised to prevent damage to the capillary tubes (5, 13-12) when performing (7) or (8) below.

*Note.* Perform (7) below if a blanket is to be removed from a lower rocket motor.

(7) Position the blanket on the rocket motor cluster truck.

*Note.* Perform (8) below if a blanket is to be removed from a upper rocket motor.

(8) Lift the blanket above the rocket motor.

**Caution:** Care must be exercised to prevent damage to the capillary tubes (5) when the thermometer bulbs (1) are being removed.

(9) Slide the three thermometer bulbs from the thermometer bulb receivers (3) and guides (4).

(10) Remove the blanket.

###### b. Installation.

*Note.* Perform (1) through (3) below if a blanket is to be installed on a lower rocket motor.

*Note.* When installing a blanket, start feeding the flat edge of the blanket with the collar to the rear, up between the lower rocket motors.

(1) Position the blanket (2, fig. 13-12) with the collar and the heater cable (view A) to the rear for the lower rocket motor on the rocket motor cluster.

(2) Guide the heater cable through the fitting assemblies, and allow the cable to hang between the lower nozzles.

- (3) Install the three thermometer bulbs (3, fig. 13-12) as prescribed in (a) and (b) below.

**Caution:** Care must be exercised to prevent crossing the capillary tubes while performing (a) and (b) below.

- (a) Feed the three thermometer bulbs forward, and thread each bulb through the guides.
- (b) Position each thermometer bulb in its respective thermometer bulb receiver.

**Note.** Perform (4) through (6) below if a blanket is to be installed on an upper rocket motor.

**Note.** When installing a blanket, start feeding the flat edge of the blanket with the collar to the rear, down between the upper rocket motors.

- (4) Position a blanket with the collar to the rear, over the upper rocket motor.
- (5) Guide the heater cable (view A) through the fitting assemblies, and allow the heater cable to hang between the lower nozzles.
- (6) Install the three thermometer bulbs (fig. 13-12) as prescribed in (a) and (b) below.
- (a) Lift the blanket; feed the three thermometer bulbs forward; and thread each bulb through the guides.
- (b) Position each thermometer bulb in its respective thermometer bulb receiver.
- (7) Complete the installation of the heating blankets (pars. 13-12 g through p).
- (8) Install the fairings and the fin assemblies (par. 13-13 through 13-15).
- (9) Join the missile body to the rocket motor cluster, and perform final installation (par. 13-16).
- (10) Install the heater cable shearing clamp (par. 13-17).

### 13-26. Repair of Punctured Rocket Motor Cluster Heating Blankets

**Note.** In the event that either of the heating blankets (fig. 13-7) is inadvertently punctured during uncrating or installation, it will be repaired as prescribed in a through g below.

a. Using neoprene-coated nylon cloth 90200-22, cut a patch of sufficient size to cover the puncture by a minimum of 1 inch on all sides of the puncture.

b. Slightly roughen the faying (joining) surfaces of the blanket and patch, using wet or dry medium-grit carborundum paper 5350-271-7991.

c. Clean the roughened faying surfaces with a clean cloth, dampened with toluene 6810-281-2002. Care must be taken to rotate the dampened cloth to assure clean faying surfaces. Allow the toluene to dry one-half to one hour.

d. Apply a thin, even brush coat of adhesive 8040-221-3811 to both faying surfaces.

e. Allow the adhesive to dry until tacky, usually 10 to 15 minutes, or until the adhesive does not transfer to the hand when lightly touched.

f. Before allowing the faying surfaces of the patch to come in contact with the prepared surfaces of the blanket, assure proper position.

g. Press the prepared surfaces of the patch and blanket together, using maximum hand pressure or a hard hand roller.

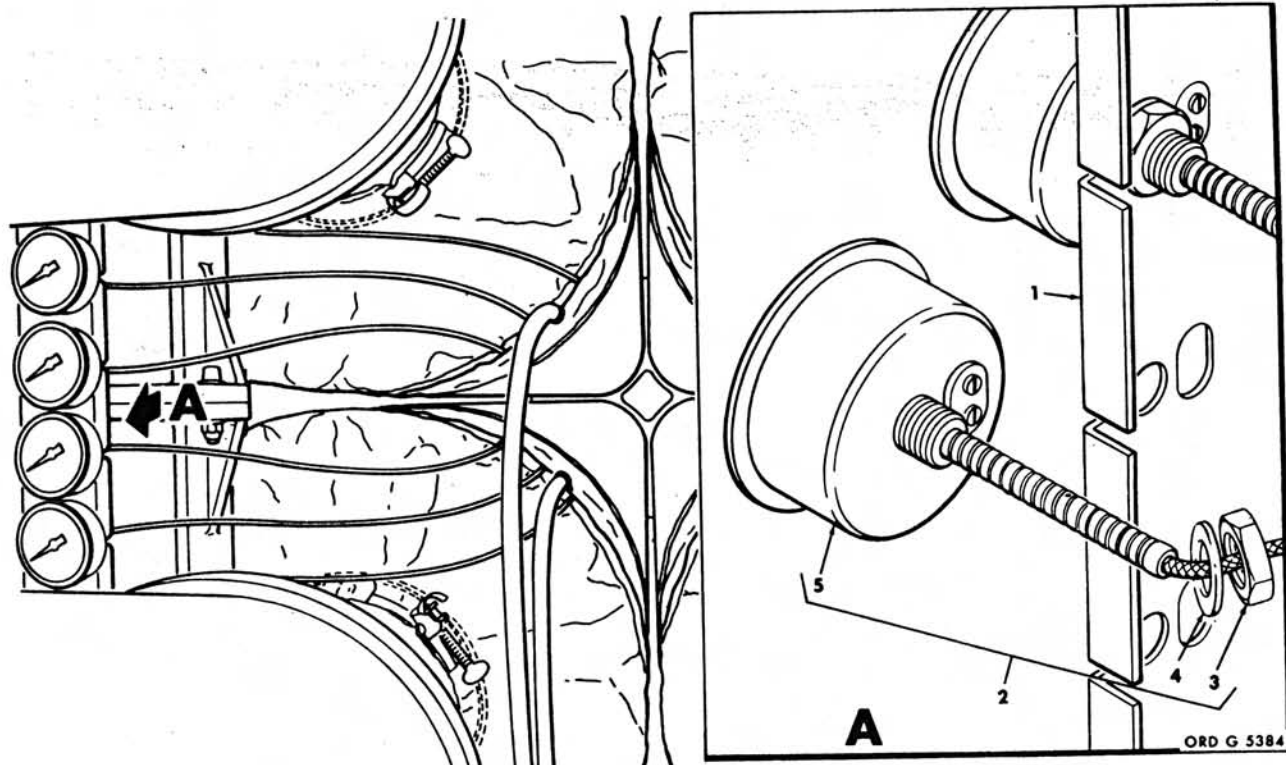
**Caution:** Care should be exercised to protect the repaired blanket from severe handling for 8 hours.

### 13-27. Replacement of Indicating Thermometer

#### a. Removal.

- (1) Deactivate the missile (par. 13-25a (1) through (10)).
- (2) Remove the hexagon nut (3, fig. 13-24) and flat washer (4) from the indicator (5).
- (3) Remove the thermometer from the support bracket (1).
- (4) Slide the thermometer bulb (1, fig. 13-12) from the thermometer bulb receiver (3) and guide (4).





- 1—Support bracket 9019229  
2—Indicating thermometer  
3—Hex nut

- 4—Fl washer  
5—Indicator

Figure 13-24. Removal and installation of the indicating thermometer.

*b. Installation.*

- (1) Install the indicating thermometer (2) as prescribed in (a) through (d) below.

**Caution:** Care must be exercised to prevent damage to the capillary tube while performing (a) through (d) below.

- (a) Feed the thermometer bulb forward, and thread through each guide.  
(b) Position the thermometer bulb in the thermometer bulb receiver.  
(c) Remove the hexagon nut (3, fig.

13-24) and flat washer (4) from the indicator (5).

- (d) Position the indicating thermometer (2) on the support bracket (1), and secure with the nut and washer.  
(2) Install the cover (par. 13-12g through p).  
(3) Install the honeycomb fairings (par. 13-13).  
(4) Install the top and bottom fairing (par. 13-14).  
(5) Install the side fairings (par. 13-15).  
(6) Assemble the missile (par. 13-16).  
(7) Install the heater cable shearing clamp (par. 13-17).

	Paragraphs	Pages
Running periods for the transponder control groups, using the cooling unit in a camouflage-painted missile exposed to solar radiation (table 4-9) -----		4-43
Special handling instructions for explosive components (table 15-6) -----		15-10
Special handling instructions for nonexplosive components (table 15-7) -----		15-10
Special tools and equipment (table 2-1) -----		2-2
Torque values for coupling nuts used with aluminum alloy tubing (table 15-12) -----		15-16
Torque values for coupling nuts used with steel tubing (table 15-13) -----		15-16
Torque values for locknuts used with gasket type tube fittings, unions, and elbows (table 15-14) -----		15-16
Trainer body section external markings (table 14-1) -----		14-4
Winterization kit torque values (table 15-11) -----		15-16
Uncrating and installing the missile rocket motor assembly		
Installation of the missile rocket motor assembly:		
Final assembly -----	5-10	5-14
Installation -----	5-9	5-12
Preliminary Procedures:		
Access doors and door assemblies, removal of -----	5-4	5-2
Blast tube shipping support, removal of -----	5-6	5-2
Forward body section, removal of -----	5-1	5-1
Rear roll ring, removal of -----	5-3	5-2
Testing fixture, removal of -----	5-2	5-1
Wiring harness, removal of -----	5-5	5-2
Uncrating the missile rocket motor subassembly:		
Shipping container, removal from -----	5-7	5-6
Shipping rings, removal of -----	5-8	5-7
Uncrating and installing the warhead body section:		
Installing the warhead body section -----	6-3	6-4
Preliminary procedures -----	6-1	6-1
Uncrating the warhead body section -----	6-2	6-1
Winterization instructions		
APS and battery box winterization kit:		
APS winterization kit, installation of -----	13-21	13-22
Missile battery box blanket, installation of -----	13-22	13-23
APS winterization kit, removal of -----	13-23	13-24
Missile battery box blanket, removal of -----	13-24	13-25
Corrective maintenance of winterization kits:		
Repair of punctured rocket motor cluster heating blankets -----	13-26	13-27
Indicating thermometer, replacement of -----	13-27	13-27
Installation -----	13-27b	13-28
Removal -----	13-27a	13-27
Rocket motor cluster heating blankets, replacement of -----	13-25	13-26
Installation -----	13-25b	13-26
Removal -----	13-25a	13-26
General:		
APS and HPU low-temperature operation limitations -----	13-4	13-3
Functional description -----	13-3	13-1
APS winterization kit -----	13-3b	13-1
Rocket motor cluster winterization kit -----	13-3a	13-1
Introduction -----	13-1	13-1
Purpose -----	13-1b	13-1
Scope -----	13-1a	13-1
Physical description -----	13-2	13-1
APS winterization kit -----	13-2b	13-1
Rocket motor cluster winterization kit -----	13-2a	13-1
Rocket motor cluster winterization kit:		
Inspection of the shipping and storage box -----	13-6	13-6

## CHAPTER 14

## NIKE-HERCULES GUIDED MISSILE TRAINING BODY

## SECTION M84

## SECTION I. GENERAL

## 14-1. Scope

a. The purpose of this chapter is to provide information for the operation and organizational maintenance of NIKE-HERCULES guided missile training body section M84 (fig. 14-1). This chapter includes physical description, assembly and handling operations, and corrective maintenance for the organizational maintenance technician. In general, the prescribed maintenance responsibilities of the operator and the organizational maintenance technician will apply as reflected in the allocation or repair parts in TM 9-1410-250-25P/1/1.

b. Training body section M84 is used primarily to provide a handling fixture for the training warhead section. The external configuration of M84 is similar to that of the rear body section of the guided missile, and consists of the components, or simulated components, required to train personnel in basic assembly and handling procedures for the rear body section of the guided missile. M84 also serves as a connecting section between the training warhead section and the rocket motor cluster trainer.

c. The trainer forward main fins, trainer rear main fins, and trainer elevons are not interchangeable with those of the guided missile.

**CAUTION:** A component that has been installed on training body section M84 will not subsequently be installed on a tactical missile.

## 14-2. Difference Among Models

a. *General.* Two models of M84 exist: 1001 through 1160 and 2001 through 2050. A basic difference between the two may be found in the index pin. Minor differences are found in the thermal battery bracket, the trainer motor section access doors, the IGNITOR access cover plate, the equipment section access cover plates, and the actuator section door assemblies.

b. *Basic Differences.* M84, 1001 through 1160, is equipped with index pin 9029046. M84, 2001 through 2050, is equipped with either index pin 9029046 or index pin 8162978 and shim 9031201.

## SECTION II. PHYSICAL DESCRIPTION

## 14-3. General

a. M84 (fig. 14-1) consists of a trainer body section and four trainer fins. The trainer body section consists of a trainer motor section, a trainer equipment section, and a trainer actuator section. The trainer main fins consists of the trainer forward main fins, trainer rear main fins, and trainer elevons.

b. Training body section M84 is painted olive drab and external markings are painted white.

## 14-4. Trainer Motor Section

The trainer motor section is formed of aluminum skin riveted to five structural members. The motor section equipment consists of a for-

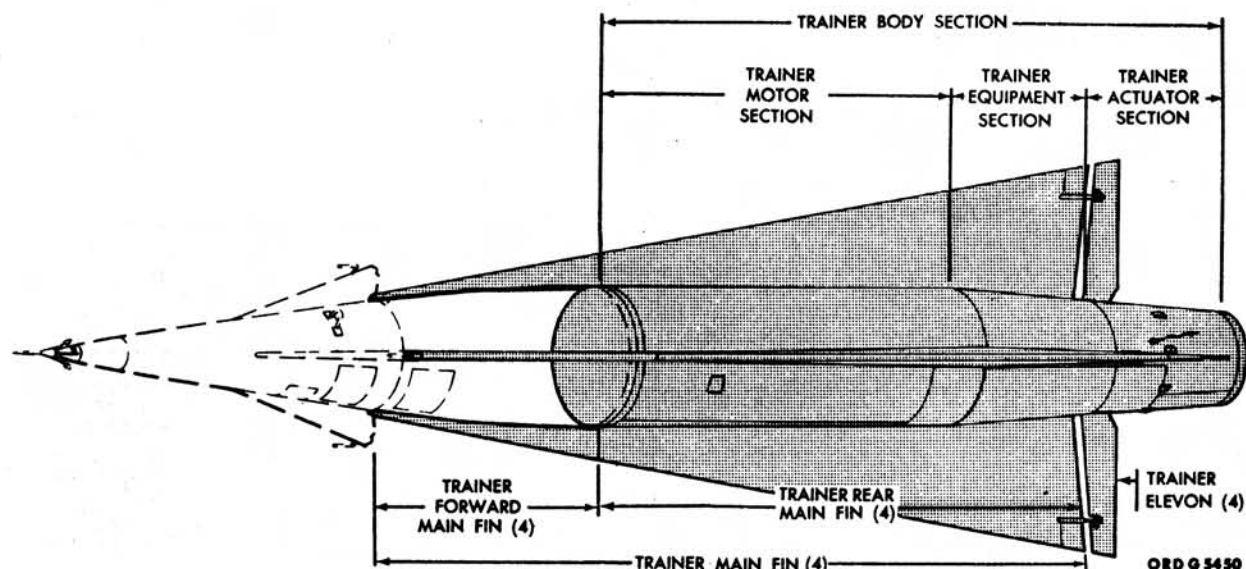


Figure 14-1. NIKE-HERCULES guided missile training body section M84.

ward dome dummy heater assembly (4, fig. 14-2), a forward dome heater assembly cap (5), and a receptable dummy connector (1). The two motor section access doors (2), one on each side of the rear portion of the motor section, provide access to internal equipment. An IGNITOR access cover plate (7) is located on the right side of the motor section.

#### 14-5. Trainer Equipment Section

The trainer equipment section (fig. 14-3) is formed of aluminum skin riveted to structural members. The equipment contained in the equipment section consists of a cable support simulating the missile distribution box, the forward portion of the trainer blast tube and closure installation, and necessary ballast. The trainer umbilical cable assembly passes through the trainer skin in the lower portion of the equipment section. Two equipment section access cover plates, one on each side of the equipment section, provide access to internal equipment.

#### 14-6. Trainer Actuator Section

The trainer actuator section is formed of aluminum skin riveted to three structural frames. The actuator section equipment consists of a

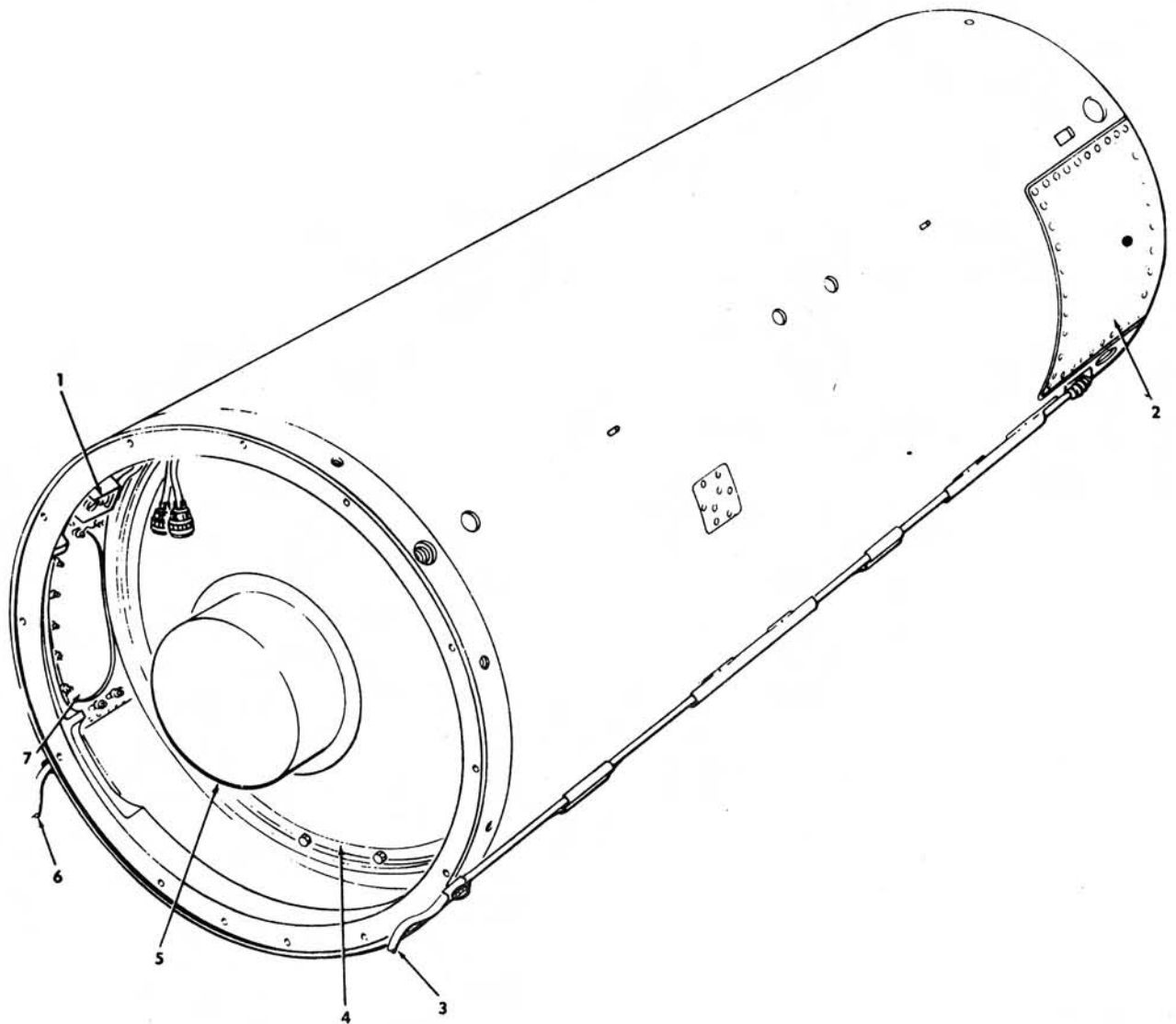
lanyard assembly (2, fig. 14-4) a bracket assembly (5) and plug (4) or a plate (3) for attaching the lanyard assembly, and ballast (6). The rear portion of the trainer blast tube and closure installation (1) is located in this section. Eight alignment spacers (7) are located at equal intervals around the center circumference of the actuator section. Two actuator section door assemblies (8), one on each side of the actuator section, provide access to internal equipment.

#### 14-7. Trainer Main Fin

a. The trainer four main fins (fig. 14-1), located at 90-degree angles around the circumference of the training warhead section and trainer body section, are aligned with the four forward fins on the training forward body section. Each trainer main fin consists of a trainer forward main fin, trainer rear main fin, and trainer elevon.

b. Each trainer forward main fin is attached to and extends the entire length of the training warhead section. Each trainer forward main fin is formed of aluminum skin attached to structural members.

c. Each trainer rear main fin is attached to and extends most of the length of the trainer body section. Each trainer rear main fin is



ORD G 5534

- 1—Receptacle dummy connector
- 2—Motor section access door (2)
- 3—Trainer warhead wiring harness
- 4—Forward dome dummy heater assembly

- 5—Forward dome heater assembly cap
- 6—Trainer transponder control group wiring harness
- 7—IGNITOR access cover plate

Figure 14-2. Trainer motor section.

formed of aluminum skin attached to several structural members.

d. Each trainer elevon is attached to the trailing edge of a trainer rear main fin and secured to the trainer actuator section.

#### 14-8. Trainer Body Section External Markings

The external markings are listed in table 14-1 and illustrated in figures 14-5 and 14-6.

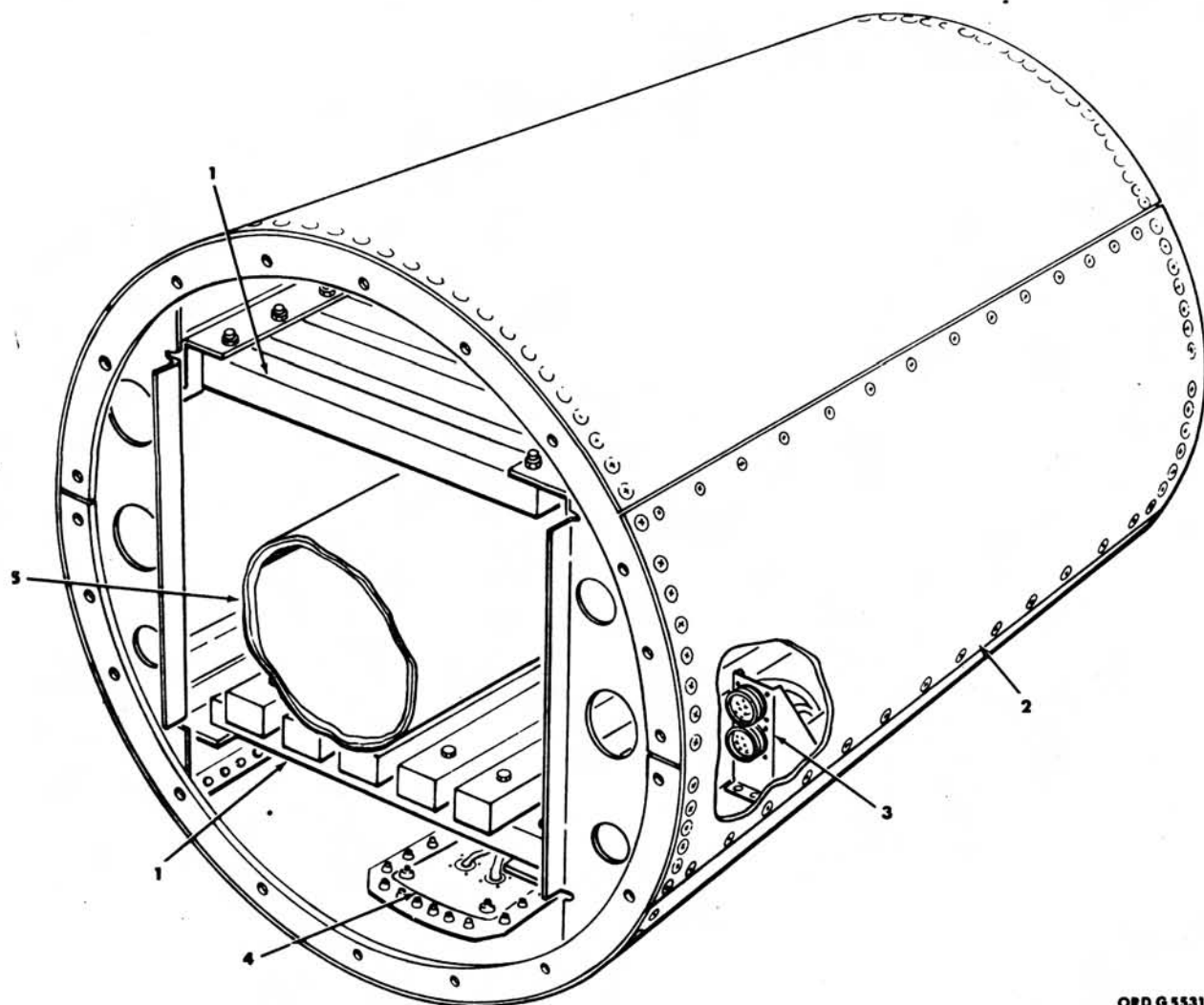


Table 14-1. Trainer Body Section External Markings

Markings	Trainer body section reference station	Between fins number
U. S. ARMY	150.000	2 and 3 1 and 4
SERIAL NO.	150.000	2 and 3 1 and 4
	247.500	1 and 4 2 and 3
INERT	150.000	2 and 3 1 and 4
IGNITOR	156.125	2 and 3

Table 14-1. Trainer Body Section External Markings—Continued

Markings	Trainer body section reference station	Between fins number
<b>Caution: Remove door before installing or removing motor.</b>		
	172.250	1 and 4
	212.250	2 and 3
GROUND POWER RECEPTACLE	255.000	3 and 4
APS EXHAUST	247.500	2 and 3
APS SERVICE DOOR	277.431	2 and 3
USE BA472 BATTERY	285.875	1 and 4



ORD G 5531

1—Ballast

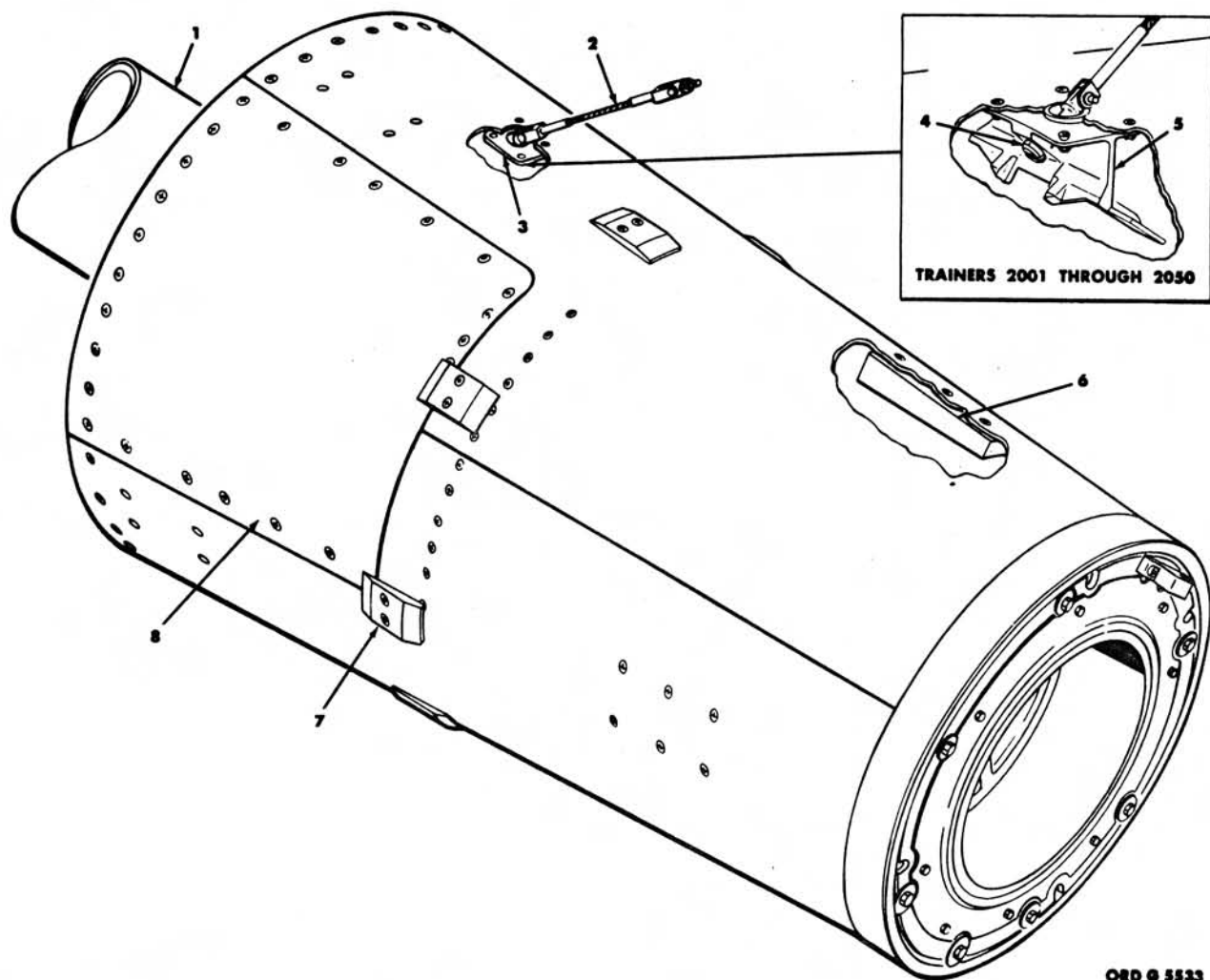
2—Equipment section access cover plate

3—Cable support

4—Trainer umbilical cable assembly

5—Trainer blast tube and closure installation

Figure 14-3. Trainer equipment section.



ORD 6 5533

- 1—Trainer blast tube and closure installation
- 2—Lanyard assembly
- 3—Plate
- 4—Plug

- 5—Bracket assembly
- 6—Ballast (3)
- 7—Alinement spacers (8)
- 8—Actuator section door assembly (2)

Figure 14-4. Trainer actuator section.

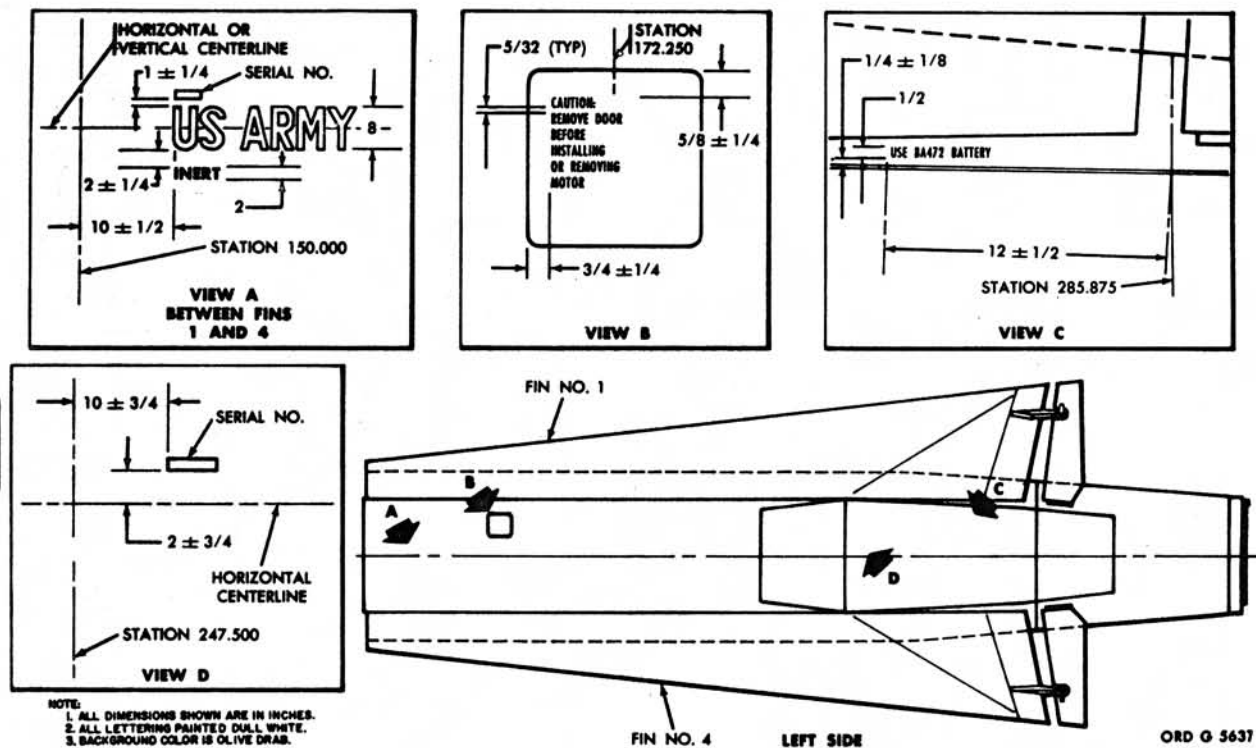
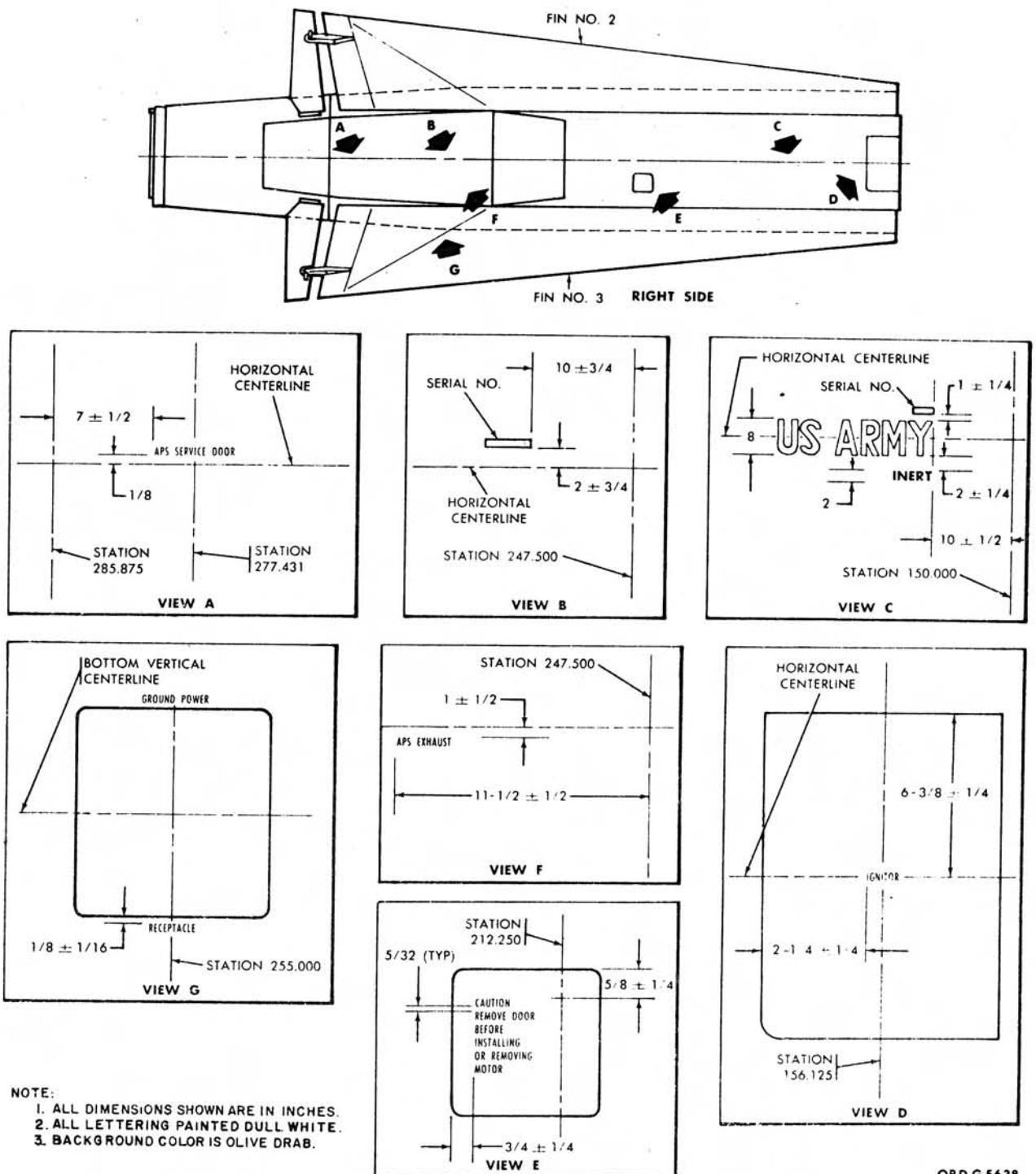


Figure 14-5. Trainer body section external markings (Sheet 1 of 2).



ORD G 5638

Figure 14-5. Trainer body section external markings (Sheet 2 of 2).

### SECTION III. SHIPMENT, INSPECTION, AND UNCRATING

#### 14-9. Shipment of Training Body Section M84 Components

*a. General.* The training body section M84 is normally shipped to the using organization in the major components listed below.

- (1) The trainer body section.
- (2) The trainer main fins.

*b. Trainer Body Section Container.* The trainer body section is shipped in a trainer body section shipping crate, or a trainer body section shipping box. Each contains the trainer body section, the forward dome dummy heater assembly, the forward dome heater assembly cap, the lanyard assembly, and attaching hardware.

- (1) (Deleted)

(2) The trainer body section shipping crate (fig. 14-6) is a wooden framework. A protective cover is provided for the components.

(3) The trainer body section shipping box (fig. 14-7) is a wooden box with a removable cover.

*c. Trainer Main Fin Shipping Container.* The trainer main fins are shipped either in a trainer main fin shipping crate (fig. 14-8) or a trainer main fin shipping box (fig. 14-9). Each contains the trainer forward main fins, trainer rear main fins, trainer elevons, and attaching hardware.

#### 14-10. Inspection of Container

*a. Trainer Body Section Shipping Crate (fig. 14-6).*

- (1) Inspect the shipping crate for exterior damage.
- (2) Inspect for evidence of tampering or broken shipping straps.
- (3) Inspect the protective cover for damage.

(4) Report any damage or evidence of tampering to the proper authorities.

*b. Training Body Section Shipping Box (fig. 14-7).* Inspect the box using the procedures prescribed in *a* (1), (2), and (4) above.

*c. (Deleted)*

*d. Trainer Main Fin Shipping Crate (fig. 14-8).*

(1) Inspect the shipping crate for exterior damage.

(2) Inspect for evidence of tampering or broken brace.

(3) Inspect the protective cover for damage.

(4) Report any damage or evidence of tampering to the proper authorities.

*e. Trainer Main Fin Shipping Box (fig. 14-9).* Inspect the box, using the procedures prescribed in *a* (1), (2), and (4) above.

#### 14-11. Removal of the Trainer Body Section from the Trainer Body Section Shipping Crate

*a.* Remove the braces (1, fig. 14-6) from the top of the shipping crate.

*b.* Remove the diagonals (3) from the top of the shipping crate.

*c.* Remove the headers (4).

*d.* Cut the shipping straps (6) that secure the trainer body section (7) to the shipping crate. Remove the cushioning material (2).

*e.* Remove the protective cover (5) from the top of the trainer body section.

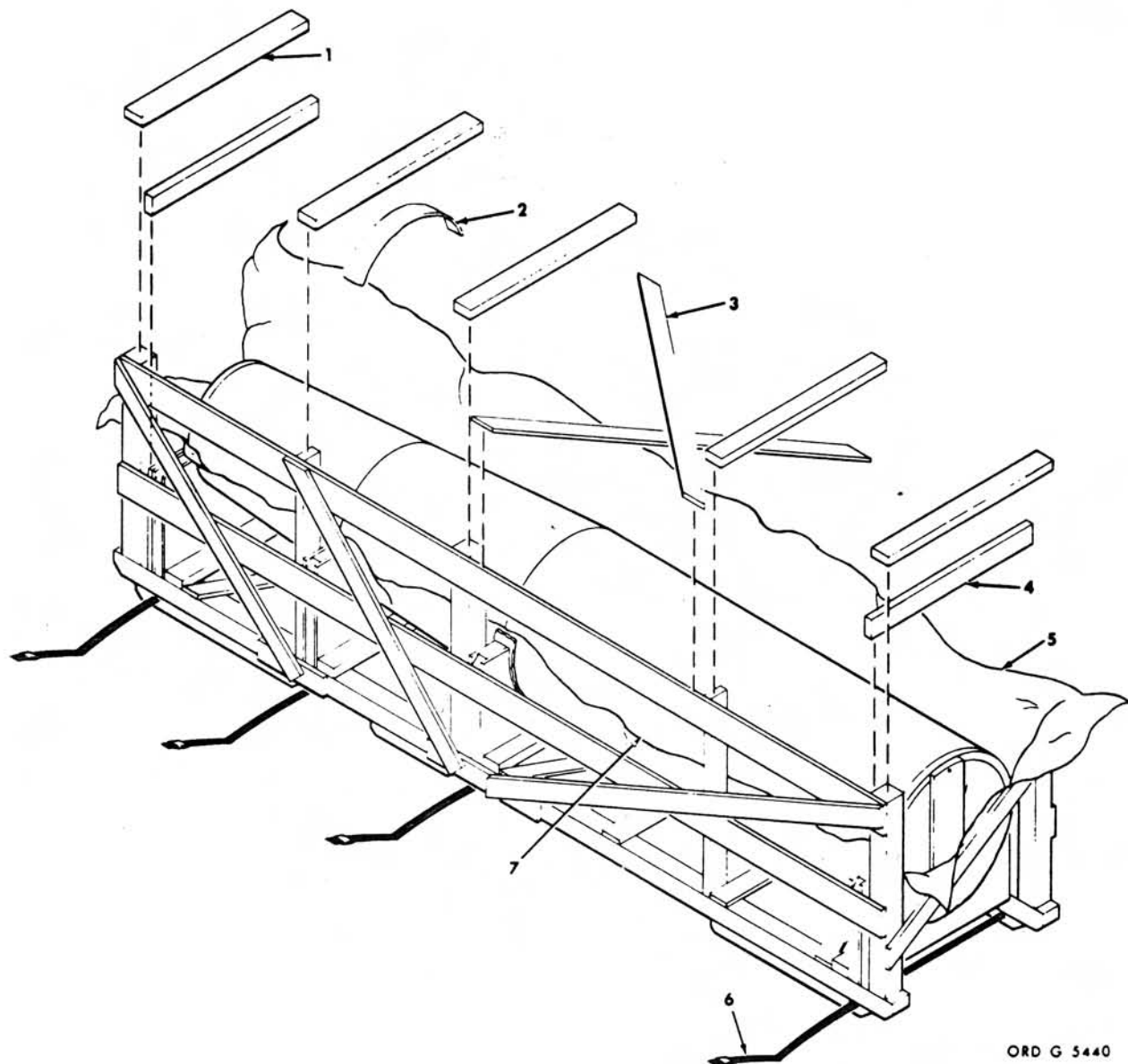
*f.* Remove the two plugs (1 and 5, fig. 3-11) from the trainer body section hoist beam attach points on the top of the trainer body section.

**WARNING:** Check that the threads of the captive bolts (3) in the rear body section hoist beam (4) and the bolt holes in the rear body section are in good condition.

*g.* Position the rear body section hoist beam on top of the trainer body section; secure with the two captive bolts and safety strap assemblies (2).

*h.* Position a hoisting device capable of lifting 6,000 pounds, and attach the device to the rear body section hoist beam; take up the slack in the cable.





ORD G 5440

- 1—Brace (5)  
 2—Cushioning material (4)  
 3—Diagonal (2)

- 4—Header (2)  
 5—Protective cover  
 6—Shipping strap (4)

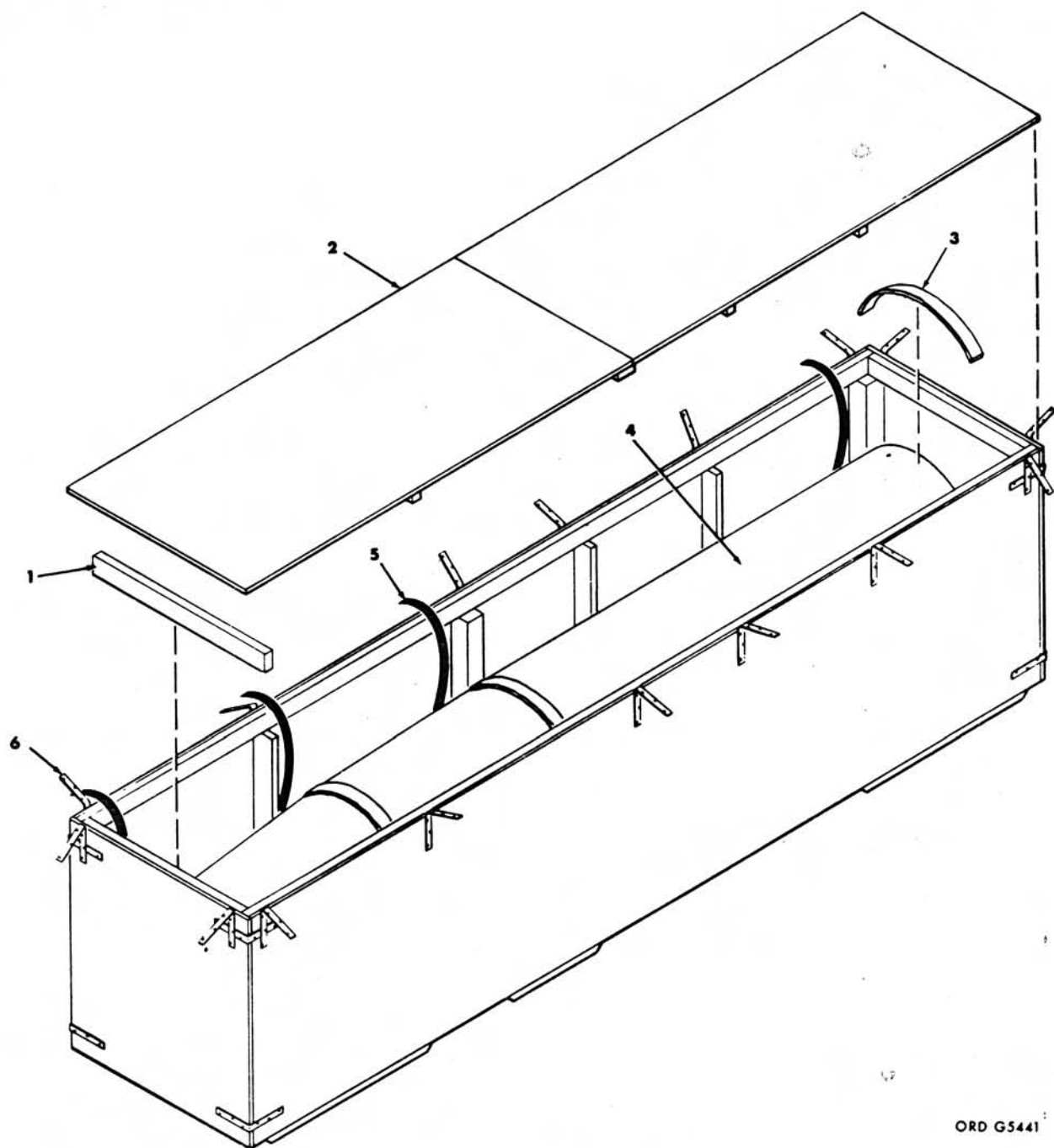
7—Trainer body section

Figure 14-6. Removal and installation of the trainer body section from the shipping crate.

**Caution:** Care should be exercised to prevent damage to the trainer umbilical cable assembly and the trainer wiring harnesses as the trainer body section is lifted from the shipping crate.

i. Slowly raise the trainer body section until it is just clear of the shipping crate.

j. Move the trainer body section away from the crate.

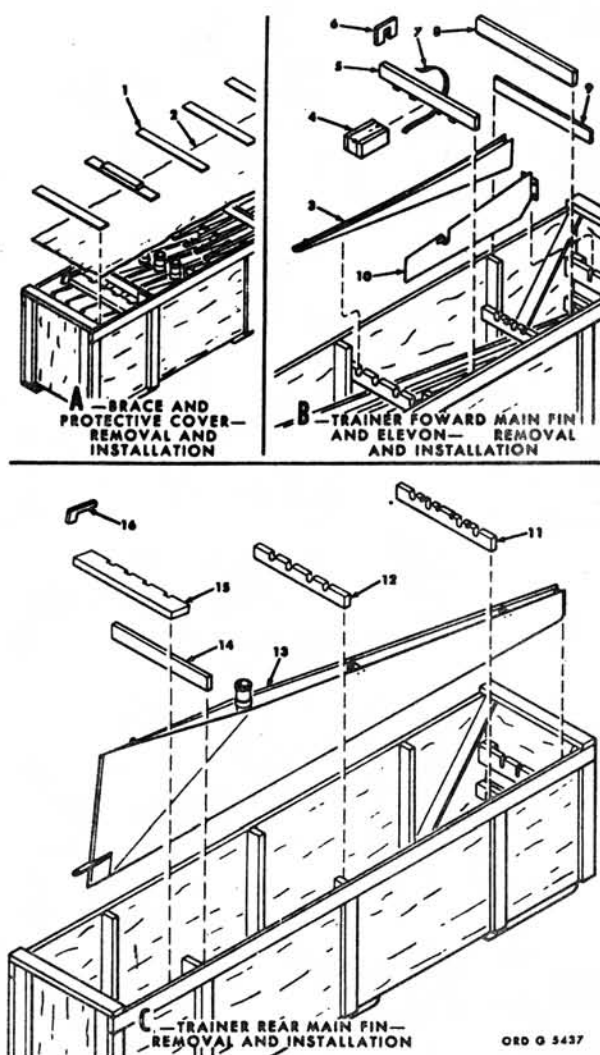


ORD G5441

- 1—Header (2)
- 2—Cover
- 3—Cushioning material

- 4—Trainer body section
- 5—Shipping strap (4)
- 6—Metal strap (16)

*Figure 14-7. Removal and installation of the trainer body section from the shipping box.*



- 1—Cover brace (7)
- 2—Protective cover
- 3—Trainer forward main fin (4)
- 4—Box
- 5—Support block
- 6—Holddown block (2)
- 7—Strap
- 8—Forward brace
- 9—Rear brace
- 10—Trainer elevon (4)
- 11—Support
- 12—Support
- 13—Trainer rear main fin (4)
- 14—Brace
- 15—Support
- 16—Holddown block (2)

Figure 14-8. Removal and installation of the fins from the trainer main fin shipping cradle.

k. Remove the plugs (8) from the handling ring segment (7) mounting holes on the forward end of the trainer body section.

**Warning:** Check that the threads of the captive bolts (6) in the handling ring segments (7) and the bolt holes of the trainer body section are in good condition.

l. Position the handling ring segments on the top and bottom of the forward end of the trainer body section with the AFT markings on the handling ring segments facing the rear of the trainer body section; secure in position with the captive bolts. Tighten the captive bolts to the torque value prescribed in table 15-9.

**Note.** The rear roll ring is clamped and stowed on the forward cradle of the missile body truck.

m. Position the rear roll ring (fig. 3-12) on the rear of the trainer body section, and secure with the captive bolts.

n. Position the handling ring segments (6, fig. 3-13) on the sides of the forward end of the trainer body section (3), with the AFT markings on the segments facing the rear of the trainer body section. Secure in position with the captive bolts (6, fig. 3-11).

o. Position the trainer body section on the missile body truck (8, fig. 3-13) by placing the handling ring segments in the rear cradle (7) and the rear roll ring (2) in the forward cradle (10).

**Caution:** Make certain the rear roll ring is fully seated in the groove of the wheel (11).

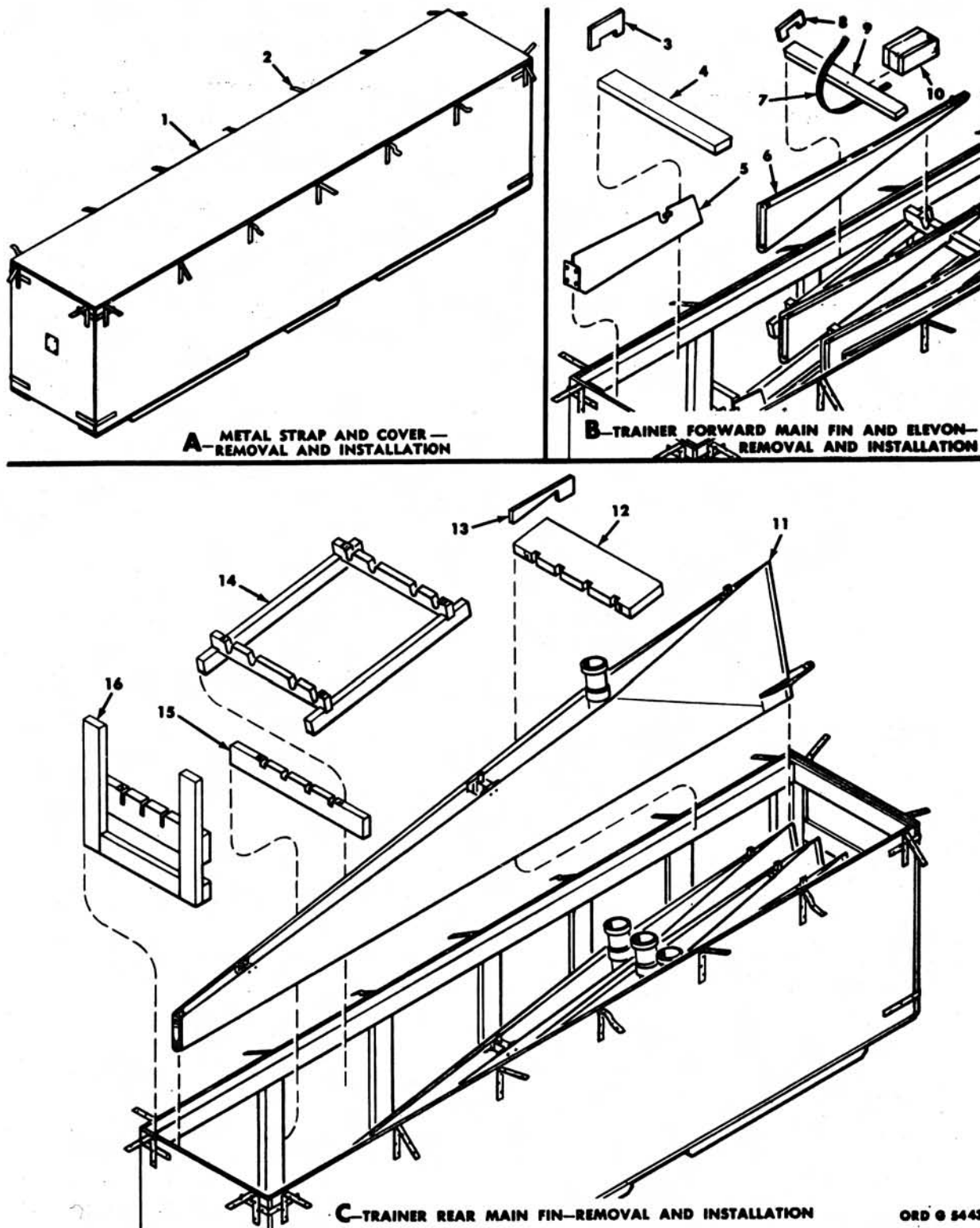
p. Lock the trainer body section in position on the missile body truck with the self-locking pins (view A, fig. 9-1).

q. Remove the hoist hook from the hoist beam.

r. Loosen the captive bolts (3, fig. 3-11) and safety strap assemblies (2) on the rear body section hoist beam (4); remove the hoist beam.

s. Coat the threads of the plugs (1 and 5) liberally with soft-film corrosion preventive compound before installing in the trainer body section.

t. Install the plugs in the hoist beam attach points on the top of the trainer body section.



ORD 6 5443

Figure 14-9. Removal and installation of the fins from the trainer main fin shipping box.

- 1—Cover
- 2—Metal strap (18)
- 3—Holddown block (2)
- 4—Brace
- 5—Trainer elevon (4)
- 6—Trainer forward main fin (4)
- 7—Strap
- 8—Holddown block (2)

- 9—Support block
- 10—Box
- 11—Trainer rear main fin (4)
- 12—Trainer rear main fin support
- 13—Holddown block (2)
- 14—Trainer forward main fin support
- 15—Support block
- 16—Rear support

Figure 14-9—Continued.

u. Remove the forward dome dummy heater assembly from the forward end of the trainer body section.

v. Remove, inspect, and inventory the accessories and hardware shipped inside the trainer body section against the enclosed packing list.

w. Report any damage or missing parts to the proper authorities.

x. Remove the hexagon-head bolts (5, fig. 3-14) flat washers (4), and shipping tapes (6) that secure the trainer transponder control group wiring harness (6, fig. 14-2) and the trainer warhead wiring harness (3) to the forward end of the trainer body section at fin positions 3 and 4.

y. Place the braces and the protective cover in the trainer body section shipping crate.

#### **14-12. Removal of the Trainer Body Section from the Trainer Body Section Shipping Box**

a. Remove the metal straps (6, fig. 14-7) that secure the cover (2) of the shipping box; remove the cover.

b. Remove the headers (1).

c. Cut the shipping straps (5) that secure the trainer body section (4) to the shipping box. Remove the cushioning material (3).

d. Remove the trainer body section from the shipping box (par. 14-11f through r).

e. Place the metal straps, headers, cushioning material, and the shipping straps in the shipping box.

#### **14-13. Removal of the Trainer Rear Main Fins, Trainer Forward Main Fins, and the Trainer Elevons from the Trainer Main Fin Shipping Crate**

a. Remove the cover braces (1, fig. 14-8) from the top of the trainer main fin shipping crate.

b. Remove the protective cover (2) from the top of the shipping crate.

c. Remove the accessory package from the shipping crate.

d. Cut the strap (7), and remove the box (4) containing the hardware from the support block (5) in the top of the shipping crate.

e. Remove the holddown blocks (6), support block, forward brace (8), and the rear brace (9) that secure the trainer forward main fins (3) and the trainer elevons (10).

f. Remove the trainer forward main fins and the trainer elevons.

g. Remove the supports (11 and 12), brace (14), holddown blocks (16), and support (15) that secure the trainer rear main fins (13) in the shipping crate.

h. Remove the trainer rear main fins.

i. Place all the shipping crate components in the shipping crate.

j. Inventory all the parts removed from the shipping crate against the enclosed packing list.

k. Report any damaged or missing parts to the proper authorities.

#### **14-14. Removal of the Trainer Body Section from the Rear Body Section and Forward Body Section Container**

a. Remove the trainer body section from the rear body section and forward body section container, using the applicable procedures prescribed in paragraph 3-6.

b. Uncrate the training forward body section, using the applicable procedures prescribed in paragraph 3-6.



#### 14-15. Removal of the Trainer Rear Main Fins, Trainer Forward Main Fins, and Trainer Elevons from the Trainer Main Fin Shipping Box

a. Remove the metal straps (2, fig. 14-9) that secure the cover (1) of the shipping box; remove the cover.

b. Cut the strap (7), and remove the box (10) containing the hardware from the support block (9) in the top of the shipping box.

c. Remove the holddown blocks (8), support block, holddown blocks (3), and brace (4) that secure the trainer forward main fins (6) and the trainer elevons (5) in the shipping box.

d. Remove the trainer forward main fins and the trainer elevons.

e. Remove the rear support (16), support block (15), trainer forward main fin support (14), holddown blocks (13), and trainer rear main fin support (12).

f. Remove the trainer rear main fins (11).

g. Place all the shipping box components in the shipping box and replace the cover.

h. Inventory all the parts removed from the shipping box against the enclosed packing list.

i. Report any damaged or missing parts to the proper authorities.

### Section IV. ASSEMBLY PROCEDURES

#### 14-16. Removal of the Trainer Access Doors, Cover Plates, and Door Assemblies

*Note.* All torque values prescribed in this section which reference assembly procedures in other chapters will be reduced to one-half of normal values.

*Note.* The access doors, cover plates, and door assemblies on trainer body sections 2001 through 2050 were drilled on assembly and must be replaced in the locations and positions from which they were removed.

*Note.* On trainer body sections 1001 through 1160, the trainer motor section access doors are secured with 39 flathead screws. On trainer body sections 2001 through 2050, the trainer motor section access doors are secured with 64 flathead screws.

a. Remove the trainer motor section access doors, using the applicable procedures prescribed in paragraph 3-8.

b. Remove the trainer equipment section access cover plates, using the applicable procedures prescribed in paragraph 3-8.

*Note.* On trainer body sections 1001 through 1160, the actuator section door assemblies are secured with 32 flathead screws. On trainer body sections 2001 through 2050, the actuator section door assemblies are secured with 51 flathead screws.

*Note.* One alignment spacer overlaps each actuator section door assembly on trainer body sections 2001 through 2050. Two alignment spacers overlap each actuator section door assembly on trainer body sections 1001 through 1160.

c. Remove the trainer actuator section door assemblies, using the applicable procedures prescribed in paragraph 3-8.

#### 14-17. Installation of the Trainer Rear Main Fins

*Note.* The trainer rear main fins are installed on the rear body section trainer.

Install the trainer rear main fins, using the applicable procedures prescribed in paragraph 3-11.

#### 14-18. Installation of the Trainer Elevons

a. Install the pin ((2), fig. 14-10) of the trainer elevon in the trainer rear main fin fitting (1).

b. Aline the holes in the elevon with the holes in the trainer actuator section.

c. Secure the elevon (3) to the actuator section with the hexagon-head capscrews (4) and flat washers (5).

d. Tighten the capscrews to a torque value of 60 pound-inches.

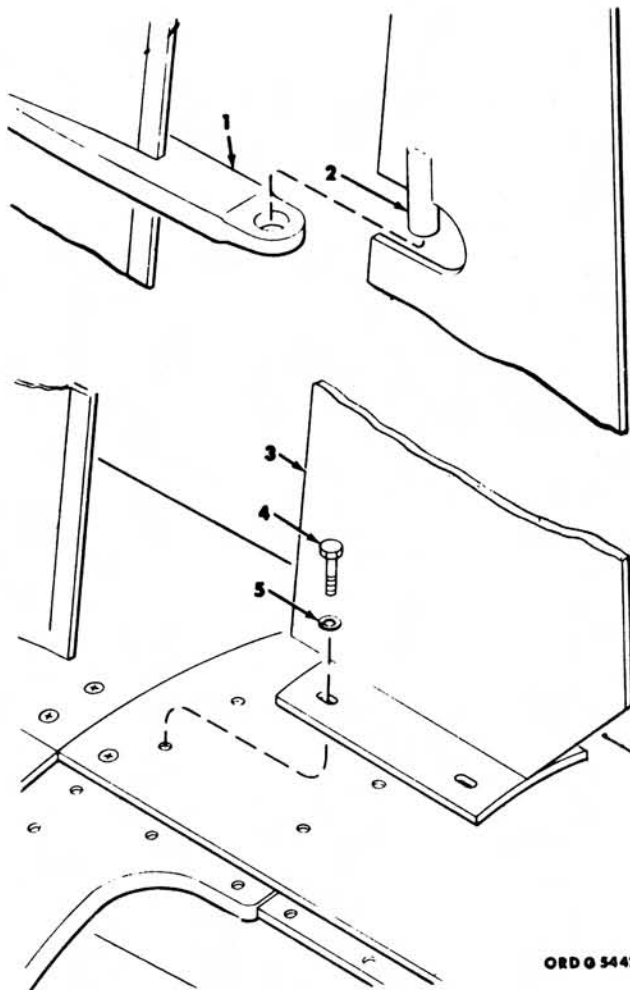
e. Repeat steps a through d above to install the three remaining elevons.

#### 14-19. Uncrating and Installation of the Inert Rocket Motor Subassembly

Uncrate and install the inert rocket motor subassembly, using the applicable procedures prescribed in paragraphs 5-1 through 5-10.

#### 14-20. Uncrating and Installation of the Training Warhead Section

a. Uncrate and install the training warhead section using the applicable procedures prescribed in paragraphs 6-1 through 7-1.



ORD 6 5442

- 1—Trainer rear main fin fitting
- 2—Pin
- 3—Trainer eleven
- 4—1/4-28 x 7/8 hex-hd capscrew (4)
- 5—1/4 fl washer

Figure 14-10. Removal and installation of the trainer eleven.

*Note.* The trainer forward main fin is installed on the training warhead section. A pin is incorporated in the front fitting of the trainer forward main fin to mate with the training warhead section.

b. Install the trainer forward main fins, using the applicable procedures prescribed in paragraph 7-5.

#### 14-21. Uncrating and Installation of the Training Forward Body Section

Install the training forward body section, using the applicable procedures prescribed in paragraph 7-6.

#### 14-22. Installation of the Trainer Access Doors, Cover Plates, and Door Assemblies

*Note.* Access doors, cover plates, and door assemblies on trainer body sections 2001 through 2050 were drilled on assembly and must be replaced in the locations and positions from which they were removed.

*Note.* Trainer body sections 1001 through 1160 equipped with two trainer motor section access doors 10119278; each is screws and fifteen 1/4-28 x 17/32 flathead screws. Trainer body sections 2001 through 2050 are equipped with two trainer motor section access doors 8524410; each is secured with sixty-four 1/4-28 x 21/32 flathead screws.

a. Install the trainer motor section access doors (fig. 3-20).

*Note.* Trainer body sections 1001 through 1160 are equipped with two equipment section access cover plates 9028165, one on each side of the trainer equipment section. Trainer body sections 2001 through 2050 are equipped with trainer equipment section access cover plate 8524628 on the left side and trainer equipment section access cover plate 8524629 on the right side.

*Note.* On trainer body sections 1001 through 1160, the equipment section access cover plates with APS placard are installed on the right side.

b. Install the trainer equipment section access cover plates.

*Note.* Trainer body sections 1001 through 1160 are equipped with two trainer actuator section door assemblies; each is secured with thirty-two 1/4-28 x 21/32 flathead screws.

*Note.* On trainer body sections 1001 through 1160, the alignment spacers on the outside of the actuator section are located 10 degrees clockwise from the positions of the spacers on trainer body sections 2001 through 2050.

c. Install the trainer actuator section door assemblies.

#### 14-23. Uncrating and Installation of the Rocket Motor Cluster Trainer

Uncrate and install the rocket motor cluster trainer on the launcher using the applicable procedures prescribed in paragraphs 8-1 and 9-1 through 9-3.

#### 14-24. Joining the Missile Body Trainer and the Rocket Motor Cluster Trainer

Join the missile body trainer and the rocket motor cluster trainer, using the applicable procedures prescribed in paragraphs 9-1 and 9-2.

**WARNING:** The joined training missile (M84 missile body, M74 warhead, training missile rocket motor, M29 booster cluster) will not be elevated on the launcher, because all hardware components cannot safely withstand the stresses of repeated elevation without presenting a safety hazard to equipment and personnel.

## SECTION V. DISASSEMBLY PROCEDURES

### 14-27. Preliminary Procedures

Perform the applicable preliminary procedures prescribed in paragraph 11-4.

### 14-28. Removal of the Missile Body Trainer from the Launcher

Remove the missile body trainer from the launcher using the applicable procedures prescribed in paragraphs 11-10 and 11-11.

### 14-29. Removal of the Rocket Motor Cluster Trainer from the Launcher

Remove the rocket motor cluster trainer from the launcher, using the applicable procedures prescribed in paragraphs 11-12 and 11-13.

### 14-30. Removal of the Training Forward Body Section

Remove the training forward body section using the applicable procedures prescribed in paragraphs 11-14 and 11-15.

### 14-31. Removal of the Trainer Forward Main Fins and Preparation for Removal of the Training Warhead Section

a. Remove the trainer forward main fins as prescribed in paragraph 11-16.

b. Remove the trainer transponder control group wiring harness (6, fig. 14-2), using the applicable procedures prescribed in paragraph 11-18.

c. Remove the trainer warhead wiring harness (3, fig. 14-2), using the applicable procedures prescribed in paragraph 11-19.

### 14-32. Removal of the Training Warhead Section

Remove the training warhead section, using the applicable procedures prescribed in paragraphs 11-4 through 11-22.

### 14-25. Final Preparation of the Missile Trainer on the Launcher

Prepare the missile trainer on the launcher using the applicable procedures prescribed in paragraphs 10-1 through 10-5.

### 14-26. Postmating Assembly Tests

Perform the postmating assembly tests as prescribed in TM 9-1100-251-12.

### 14-33. Removal of the Inert Rocket Motor Subassembly

Remove the inert rocket motor subassembly, using the applicable procedures prescribed in paragraphs 11-23 through 11-25.

### 14-34. Removal of the Trainer Elevons

a. Remove the hexagon-head capscrews (4, fig. 14-10) and flat washers (5) that secure the trainer elevon (3) to the trainer actuator section.

b. Lift the pin (2) on the trainer elevon out of the trainer rear main fin fitting (1).

c. Remove the trainer elevon.

d. Repeat steps a through c above to remove the three remaining trainer elevons.

### 14-35. Removal of the Trainer Rear Main Fins

Remove the trainer rear main fins (par. 11-33).

### 14-36. Preparation of the Trainer Body Section for Shipment of Storage

The trainer body section is prepared for shipment or storage either in a rear body section and forward body section container, a trainer body section shipping crate, or a trainer body section shipping box.

a. *Rear Body Section and Forward Body Section Container.* Prepare the trainer body section for shipment or storage, using the applicable procedures prescribed in paragraphs 11-35 through 11-37.

b. *Trainer Body Section Shipping Crate.*

(1) Remove the braces (1, fig. 14-6) and the protective cover (5) stowed in the trainer body section shipping crate.

(2) Position the shipping straps (6) and the protective cover as shown in figure 14-6.

(3) Spread the braces of each trainer wiring harness, and install a hexagon-head bolt (5, fig. 3-14) and flat washer (4) into each lower main fin mounting bolt hole. Tape the wiring harnesses to the hexagon-head bolts.

(4) Remove the plugs (1 and 5, fig. 3-11) from the hoist beam attach points on the top of the trainer body section.

(5) Position the rear body section hoist beam (4) on the top of the trainer body section; secure with the captive bolts (3) and safety strap assemblies (2).

(6) Position a hoisting device capable of lifting 6,000 pounds, and attach the hoist beam to the hoisting device.

(7) Release the lock pin (fig. 9-1) from the rear roll ring and the self locking pins from the handling ring segment.

(8) Lift the trainer body section clear of the missile body truck (8, fig. 3-13).

(9) Loosen the captive bolts (view B, fig. 9-15 and 2, fig. 9-17) that secure the handling ring segments; remove the segments.

(10) Install the plugs (8, fig. 3-11) in the upper and lower segment mounting bolt holes.

(11) Loosen the captive bolts (view A, fig. 9-15) that secure the rear roll ring to the trainer body section; remove the rear roll ring, and store on the missile body truck.

(12) Position the trainer body section over the trainer shipping crate.

(13) Place the forward dome heater assembly cap in the forward dome dummy heater assembly, and secure with cord.

(14) Place the forward dome dummy heater assembly in the forward end of the trainer motor section.

(15) Manipulate the trainer body section until properly seated in the shipping crate supports.

(16) Remove the hoisting device.

(17) Loosen the captive bolts (3, fig. 3-11) and safety strap assemblies (2) that secure the hoist beam; remove the hoist beam.

(18) Install the plugs (1 and 5) in the hoist beam attach points.

(19) Position the protective cover (5, fig. 14-6) over the trainer body section (7).

(20) Position the cushioning material (2) at each point on the trainer body section where a shipping strap will be used.

(21) Install the headers (4) at the forward and rear ends of the shipping crate.

(22) Secure the trainer body section to the shipping crate with the shipping straps (6) and the cushioning material.

(23) Install the diagonals (3).

(24) Install the braces (1).

#### *c. Trainer Body Section Shipping Box.*

(1) Remove the metal straps (6, fig. 14-7), heater (1), cushioning material (3), and shipping straps (5) from the trainer body section shipping box.

(2) Position the shipping straps as shown in figure 14-7.

(3) Prepare the trainer body section for shipment as prescribed in *b* (3) through (18) above.

(4) Position the cushioning material at each point on the trainer body section where a shipping strap will be used.

(5) Install the headers at the forward and rear ends of the shipping box.

(6) Secure the trainer body section (4) to the shipping box with the shipping straps.

(7) Position the cover (2) on the shipping box, and secure with the metal straps.

#### **14-37. Packaging Trainer Rear Main Fins, Trainer Forward Main Fins, and Trainer Elevons for Shipment or Storage**

The trainer forward main fins, trainer rear main fins, and trainer elevons are packaged in either a trainer main fin shipping crate or a trainer main fin shipping box.

##### *a. Trainer Main Fin Shipping Crate.*

(1) Position the trainer rear main fins (13 fig. 14-8) in the trainer main fin shipping crate.

(2) Install the supports (11 and 12), brace (14), support (15), and holddown blocks (16) in the shipping crate.

(3) Position the trainer elevons (10) and the trainer forward main fins (3) in the shipping crate.

(4) Install the support block (5), braces (8 and 9), and holddown blocks (6).



(5) Place the hardware in the box (4) and secure to the support block with the strap (7).

(6) Position the protective cover (2) on the shipping crate.

(7) Install the cover braces (1).

*b. Trainer Main Fin Shipping Box.*

(1) Position the trainer main fins (11, fig. 14-9) in the trainer main fin shipping box.

(2) Install the trainer rear main fin support (12), holddown blocks (13), trainer forward main fin support (14), support block (15), and rear support (16).

(3) Position the trainer elevons (5) and the trainer forward main fins (6) in the shipping box.

(4) Install the brace (4) and the hold-down blocks (3).

(5) Install the support block (9) and the holddown blocks (8).

(6) Place the hardware in the box (10) and secure to the support block with the strap (7).

(7) Place the cover (1) on the shipping box, and secure with the metal straps (2).

## SECTION VI. CORRECTIVE MAINTENANCE

### 14-38. General

Corrective maintenance instructions provided in this section for the trainer body section do not establish the scope and limit of maintenance that may be performed by the using organization. The scope and limit are determined by the allocation of repair parts and tools authorized in TM 9-1410-250-25P/1/1.

### 14-39. Replacement of the Trainer Body Section Index Pin

*Note.* Trainer body sections 2001 through 2050 may be equipped with index pin 8162978 or 9029046. If index pin 8162978 is to be replaced, replace it and shim 9031201 with index pin 9029046.

Replace index pin as prescribed in paragraph 12-86.

### 14-40. Replacement of the Lanyard Assembly

*Note.* On trainer body sections 1001 through 1160, the lanyard assembly is attached to a metal plate. On trainer body sections 2001 through 2050, the lanyard assembly is attached to a bracket assembly and plug.

Replace the lanyard assembly, using the applicable procedures prescribed in paragraph 12-65.

### 14-41. Replacement of the Trainer Forward Main Fin

*Note.* The trainer forward main fin is installed on the training warhead section. A pin is incorporated in the front fitting of the trainer forward main fin to mate with the training warhead section.

a. Remove the trainer forward main fin (par. 11-16).

b. Install the trainer forward main fin (par. 7-5).



	Paragraphs	Pages
<b>Installation of:</b>		
Cover plate .....	13-8	13-7
Forward insulation blanket .....	13-10	13-11
Heater cable shearing clamp .....	13-17	13-19
Heating blankets .....	13-12	13-13
Honeycomb fairings .....	13-13	13-18
Rear insulation blanket .....	13-11	13-12
Side fairing .....	13-15	13-18
Spring tension clips .....	13-9	13-7
Top and bottom fairings .....	13-14	13-18
Joining procedures and final installation .....	13-16	13-18
Packaging the rocket cluster winterization kit .....	13-20	13-22
Preparation for installing the rocket motor cluster winterization kit .....	13-5	13-6
Preparation for removal of the rocket motor cluster winterization kit .....	13-18	13-19
Removal of the rocket motor cluster winterization kit .....	13-19	13-20
Uncrating the rocket motor cluster winterization kit .....	13-7	13-6

## CHAPTER 15

### HANDLING, SHIPMENT, AND LIMITED STORAGE

---

#### Section I. GENERAL

##### 15-1. General Precautions

a. The NIKE HERCULES guided missile, in common with other types of ammunition, is designed to be as safe in handling as is consistent with its function and is packed to withstand all conditions ordinarily encountered in storage and transit except extremes in temperature. In order to insure that the guided missile will be in a serviceable condition when required for use and to provide the highest possible protection to personnel and materiel, the precautions outlined in this paragraph, in addition to those general instructions for the storage, care, handling, and preservation of ammunition prescribed in TM 9-1300-206 and FM 9-5 will be observed.

b. Disassembly of the NIKE HERCULES guided missile or its components beyond the limits authorized for the operator or organizational personnel must never be attempted.

c. Packages should not be opened until required for use or inspection.

d. Explosive components should at all times be protected from induced electric currents, such as those encountered in the vicinity of radio communication equipment, high-tension wires, radar units, etc.

e. In making electrical connections during assembly, testing, or prefiring operations, care must be exercised to see that connections are good and that insulated sections are properly protected.

f. Shorting clips and plugs on electrical circuits and/or explosive components shall be removed only when necessary for assembly, testing, or firing.

##### 15-1.1. Quantity-Distance Requirements

a. When one to eleven NIKE-HERCULES missiles are stored above ground, the minimum distance to inhabited buildings shall be determined by the fragmentation hazard.

- (1) When one NIKE-HERCULES missile is stored above ground, the distance to inhabited buildings shall be not less than 900 feet.
- (2) When two to eleven NIKE-HERCULES missiles are stored above ground, the distance to inhabited buildings shall be not less than 1150 feet.

b. When 12 or more NIKE-HERCULES missiles are stored above ground, the minimum distance to inhabited buildings shall be determined by the high explosive (TNT) equivalency of 2174 pounds for each missile.

c. When all NIKE-HERCULES missiles are stored below ground at CONUS sites, the fragmentation hazard distance does not apply. The minimum distance of 528 feet to inhabited buildings is satisfactory.

##### 15-2. Handling

a. *General.* The missile must be handled only with issued or approved equipment. In handling, care must be taken not to damage the missile or its components. The propellant grain and the metal parts of the missile are susceptible to damage by rough handling, dropping, etc. Such mishandling could cause a misfire at launch. The propellant grain is particularly subject to damage at low temperatures. Dents in body or fins can cause erratic flight, while dents in the rocket motor can cause dangerous pressure build-ups. Motors which have

damaged propellant grain or metal parts must not be used. Crated or uncrated motors which have been dropped shall not be used until motor and propellant grains have been inspected and their serviceability determined.

*b. Packaged Items.* Those packaged items, which, because of their weight or size, present handling problems, must be lifted with a wrecker, forklift, or crane of adequate capacity.

*c. Unpackaged Items.* The missile components must be handled only with approved handling fixtures, using a hoist, wrecker, or crane of adequate capacity.

### 15-3. Safety

*a.* The explosive components removed from a missile or missile component, or a missile from which components have been removed for repair, will be stored as follows:

- (1) CONUS installations—those in any one launching section will be stored in the underground casements.
- (2) USARAL and USAREUR-type installations—within the storage buildings and the doors closed.

(3) Mobile installations—moved to a location not less than 30 feet from the launcher.

*b.* No repair operation involving the use of power tools, welding, soldering, cutting, etc., will be permitted on any item, component, or assembly containing explosives.

### 15-4. Class V and General Supply Items

*a. Class V Items.* These items are as listed in table 15-1. Information necessary for determination of quantity-distance requirements and storage compatibility is included in this table. These items will be requisitioned or returned through class V ammunition supply channels. Handling and storage of these items will be in accordance with the safety precautions and general instructions contained in TM 9-1300-206 and FM 9-6.

*b. General Supply Items.* All components of the guided missile not listed in table 15-1 are general supply items when handled or requisitioned as separate components or assemblies. These items will be requisitioned or returned through general supply channels.

Table 15-1. Explosive Weight, Quantity-Distance Classes, and Storage Compatibility Group for Class V Items

Component	Explosive weight (lb)	Quantity-distance class	Storage compatibility group
EXPLOSIVE HARNESS ASSY XM38, XM84	0.25	1.1	B
ELECTRIC SQUIB M4	1440 mg	1.4	S
ROCKET MOTOR IGNITER M65, M69	2.2	1.1	C
ROCKET MOTOR M5E1, M88	750	1.3	C
ROCKET MOTOR M30A2	2183	1.3	C
ROCKET MOTOR (with four igniters) M42, M42A1	3008.8	1.3	C
SAFETY-AND-ARMING DEVICE M30A1	0.015	(04) 1.2	B
WARHEAD ASSY, HE	651	(09) 1.1	D
WARHEAD SECTION, HE, M135	651	(09) 1.1	D
BATTERY BA 472, BA 485, BA 617		1.4	S

## Section II. SHIPMENT

### 15-5. Shipping Instructions

*a. General.* When shipping guided missiles or any of their packaged components, the officer in charge of the preparation will be responsible for furnishing the items and their packages in a properly cleaned, preserved, painted, and marked condition for safe rail, truck, or air shipment. Such preparation will be in conformance with instructions in this section and in accordance with the elements outlined below.

*Note.* The shipment of classified items must be in accordance with AR 380-55 and AR 55-355.

- (1) *Inspection.* Determine by inspection the necessary steps for preparation of items prior to shipment.
- (2) *Decontamination or Purging.* If decontamination or purging is required

after defueling and depressurization, perform same in accordance with the procedures in paragraph 11-31.

- (3) *Preservation.* Application of any required desiccants, cleaning materials, and preservatives should be performed in accordance with procedures in chapter 11:
- (4) *Containers.* Unpackaged items should be repackaged in their original containers, or equivalent, prior to shipment.
- (5) *Air Pressurization.* Packages requiring pressurization should be pressurized in accordance with instructions marked on the containers.
- (6) *Shipping Crates.* Containers should be assembled to their appropriate crates and skids.

- (7) *Recording Data.* The necessary entries should be recorded in the log book and on the shipping documents.

b. *Shipping Documents.* Prepare shipping documents accompanying shipments in accordance with AR 725-5.

c. *Regulations.* Regulations pertaining to the transportation and shipment of missiles and missile components are given in paragraph 15-7.

## 15-6. Loading Guided Missiles and Components on Railroad Cars and Trucks

a. *Preparation.* All items requiring loading by means of cranes, A-frames, hoists, lift trucks, or other means should be properly prepared for safety and ease of handling.

b. *Markings, Labels, and Placards.* The markings, labels, and placards required for rail and truck shipment of explosive and flammable missile components are given in table 15-2. All rolling stock used for transporting missiles and rocket motors must be placarded with DO NOT HUMP signs to prevent damage when loading due to excessive impacts during coupling and shunting operations at the railroad yards. For additional information on markings and labels refer to h.(2)(g) below.

c. *Methods of Loading.* Exercise care at all times when loading freight cars or trucks. Loading this type of materiel should be planned carefully. When packages are being loaded on vehicles, the packages should be handled by their lifting rings or lifting handles. Appropriate

lift points should be used in order to eliminate hazards and prevent damage to the materiel. General handling precautions are given in paragraphs 15-1 and 15-2. Package data is given in table 15-4 as an aid in planning the shipment of missile components by freight car or motor truck.

d. *Types of Freight Cars.* Missile components may be loaded on flatcars equipped with stake pockets, gondola cars (flat-bottom, open-top) having fixed or drop ends, or boxcars. The packages are loaded in the cars and are blocked and stayed in position as indicated in g below.

e. *Types of Motor Trucks.* Inspected and approved motor trucks, open or closed, may be used for the shipment of missiles or missile components. Regulations and precautions pertaining to motor truck shipment are given in h below. Additional shipping regulations are given in paragraph 15-7.

### f. Compatibility.

- (1) *General.* For greater safety during shipment, missile components are grouped for compatibility. These groups are based upon such factors as sensitivity to initiation by fire or by explosion and quantity of explosive (if any) contained in the unit.

- (2) *Loading compatibility.* Loading compatibility for explosive missile components for shipment by rail or motor vehicle is given in Department of Transportation Directives.

*Note.* Inert components are not included since they may be loaded with other inert or explosive components without compatibility considerations.

Table 15-2. Marking, Labels, and Placards for Rail and Truck Shipment of Explosive and Flammable Missile Components

Component	Marking	Placard
ETHYLENE OXIDE EXPLOSIVE HARNESS ASSEMBLY	Flammable liquid Boosters (Explosive), Handle Carefully	Dangerous* Explosive
IGNITER, ROCKET MOTOR	Igniter, Rocket Motor, Class A Explosive	Explosive
ROCKET MOTOR M5E1 OR CLUSTER M42	Rocket Motor, Class B Explosive	Dangerous
ROCKET MOTOR M30	Rocket Motor, Class B Explosive	Dangerous
SAFETY-AND-ARMING DEVICE M30A1	Percussion Fuzes, Handle Carefully	None
WARHEAD ASSEMBLY M135	Explosive Projectile	Explosive

\*Trucks loaded with less than 2,500 pounds gross weight do not require placards.



Table 15-3. Deleted.

*g. Blocking and Staying of Freight Cars.* The correct application of blocking and staying of ammunition is extremely important from the standpoint of safety and prevention of damage to the materiel. In many cases, the required amount of bracing may seem excessive for the packages involved. However, the carrying vehicle may be accidentally subjected to impacts of greater magnitude than desirable. These impacts result in high momentary pressures and may displace or damage packages not sufficiently secured. The blocking and staying instructions and information given in Bureau of Explosives Pamphlets Nos. 6 and 6A are minimum. Additional instructions, if required, should be obtained in order to insure adequacy of blocking and staying for any particular shipment. For complete information on typical methods of blocking and staying and on regulations pertaining thereto, consult the list of applicable references included in paragraph 15-7.

*h. Motor Truck Shipments; Regulations and Precautions.*

(1) *Regulations.*

- (a) Regulations governing the transportation of ammunition and explosives by commercial motor truck are governed by Department of Transportation regulations; regulations for government-owned vehicles are covered by Army regulations.

- (b) Most states, cities, and towns have their own regulations concerning the transportation of explosives within their jurisdiction. Local authorities of sections through which motor truck shipments will pass should be consulted and their recommendations as to the least hazardous and least congested areas adhered to.
- (c) Commercial highway carriers must file a certificate with the controlling transportation officer stating that said carriers will comply with all laws promulgated by Federal, State, and local governments applicable to the type of explosive or other dangerous article to be transported.
- (d) When government-operated vehicles are used for transporting explosive or dangerous materiel, the shipping officer will take all necessary precautions to insure safe transit and will provide for full compliance with DOT regulations. If the commanding officer or other appropriate authority declares the shipment to be an emergency, the shipping officer will take every reasonable precaution to insure safe movement of the explosives or other dangerous articles while in transit.

- (e) When trucks have been loaded and are ready for movement, the drivers will be informed by means of written instructions of the true nature of materiel on the trucks, the fire hazards involved, the methods to be used in fighting fires involving the cargo or truck, the missile distance in case of explosion, the proper distance to maintain between trucks, and any other information that will aid in bringing about safe delivery of the shipment.

**(2) Precautions.**

- (a) Every precaution against fire must be observed. Trucks should be inspected before loading to ascertain that electric wiring, light, brakes, fuel tanks, and lines are in good working order, the engine free of oil and dust, and the engine pan free of accumulations of grease and dirt. Accumulations of grease or oil on universal joints, transmissions, and the underside of bodies should be removed. When necessary to use matches, only safety matches may be used. The use of strike-anywhere matches is prohibited.
- (b) All trucks must be provided with two filled fire extinguishers inspected and labeled in conformity with EXPLOSIVE (class A) and DANGEROUS (class B) requirements of the Underwriters Laboratories or equal thereof. Preferred types of extinguisher are vaporizing-liquid types (minimum 1-quart capacity each). All drivers and other persons handling ammunition and explosives should be instructed as to the best methods in using the fire extinguishers and procedures for extinguishing fires in gasoline, fuel oil, or truck tires.
- (c) When possible, explosives and ammunition will be transported during daylight hours.
- (d) For any continuous trips longer than 8 hours, military vehicles

carrying class A or B materiel require an assistant driver.

- (e) Smoking is not permitted in the cabs of vehicles transporting class A or B materiel.
- (f) Vehicles will not be left unattended on a public street or highway. Parking on public streets and urban or suburban areas is prohibited.
- (g) Motor vehicles carrying explosives or ammunition will bear four of the required reflectorized placards indicating either EXPLOSIVES or DANGEROUS, whichever is appropriate.
- (h) In case of accident, all packages should be removed carefully and placed in a location of safety. If vehicle is entangled with another vehicle or object, the load should first be removed to a place of safety prior to disentanglement.

## 15-7. Regulations for Transportation and Shipment of Missiles and Missile Components

a. *General.* The regulations governing transportation and shipment of missiles and their components by common carrier are given in b below. These regulations are equally applicable to military establishments concerned with these activities.

b. *Regulations.*

- (1) *Interstate Commerce Commission; Motor Carrier Safety Regulations.* These regulations provide rules and regulations for the operation of commercial vehicles and other information applicable to carriers.
- (2) *Code of Federal Regulations, Title 49—Transportation (Parts 71 to 90)* These regulations cover transportation of explosives and other dangerous articles by rail. Rules are also prescribed for blocking, loading, and staving of shipments, as well as quantities of items allowed for railway express shipments. These regulations are published by the U.S. Government Printing Office.

Table 15-4. Package Data

Component	Container	Dimensions (L W H)	Cubic feet	Weight (lb)
BATTERY STORAGE, BB 401/U	4/wdn bx	17-3/8 x 11-3/16 x 11-3/32	1.34	75
BODY, Rear Section	1/mtd cntr	222-1/2 x 54-1/2 x 61-3/4	433.33	4,618
CLUSTER, ROCKET MOTOR, M42	1/wdn cr	180-3/4 x 45-3/4 x 51-5/8	214.60	7,267
ETHYLENE OXIDE	25 gal/comm cyl	15-1/2 dia x 49-1/2	6.82	280
EXPLOSIVE HARNESS Assembly	1/ctn, 10 ctn/ wdn bx	29-1/16 x 21-1/4 x 13-5/16	4.76	37.34
FIN, MAIN, FORWARD AND REAR	4 fwd & 4 rear/ wdn cr	146-7/8 x 29 x 41-1/8	101.37	960
FIN, ROCKET MOTOR CLUSTER	4/wdn cr	51-1/16 x 29-5/16 x 51-1/2	45.12	600
ROCKET MOTOR M5E1	1/wdn cr	173-1/2 x 25 x 28-1/2	71.44	1,970
ROCKET MOTOR M30	1/wdn cr	105-1/8 x 43-1/4 x 47-7/16	124.81	2,678.52
SAFETY-AND-ARMING DEVICE M30A1	1/mtd cntr, 20	15-1/2 x 9-1/4 x 8	0.66	25
THRUST STRUCTURE W/CLUSTER COMPONENTS	1 set/wdn bx	38-1/2 x 38-1/2 x 46	38.6	309
WARHEAD ASSEMBLY M435	1/mtd cntr	162 x 54-1/4 x 61-9/16	313.1	3,625

- (3) *Bureau of Explosives Pamphlets No. 6 and 6A.* These publications illustrate proper methods of loading and bracing of freight car shipments of explosives, dangerous articles, loaded bombs, and similar items. The publications are issued by the Bureau of Explosives, 30 Vesey St., New York, New York 10007.
- (4) *Tariff No. 10 Publishing Interstate Commerce Commission Regulations for Transportation of Explosives and Other Dangerous Articles by Land and Water, in Rail Freight Service and by Motor Vehicle (Highway) and*

*Water: Including Specifications for Shipping Containers.* This publication is issued by H.A. Campbell, Agent, 30 Vesey St. New York, New York 10007.

- (5) *Civil Aeronautics Authority Regulations: Official Air Transport Restricted Articles Tariff No. 6-A.* These regulations are published by the U. S. Civil Aeronautics Board.
- (6) *Department of the Army Technical Bulletin 59-1.* This publication covers the transportation, packaging, and handling of dangerous materials for military aircraft, including the Military Air Transport Service.

### Section III. LIMITED STORAGE

#### 15-8. General

Proper storage of guided missiles and components is necessary in order to insure safety and serviceability of the items for use. Only undamaged packages will be stored at storage sites. Damaged packages will be placed in a segregated location pending determination of the hazards involved and damage to the item. The elements outlined in *a* through *b* below and in subsequent paragraphs should be observed.

*a.* Sheltered storage is preferred whenever possible, although pressurized containers require no special storage facilities.

*b.* Open storage sites should be on firm, well-drained land. Suitable trenches should be dug to prevent water from running under piles.

*c.* When it is necessary to leave ammunition in the open, raise it on dunnage at least 6 inches above the ground, and cover it with a double thickness of flameproofed paulin, leaving enough space for the circulation of air.

*d.* Protect storage site from high heat such as full impact of solar radiation or flame.

*e.* The storage site should be free of dry grass, leaves, and underbrush, since they may be ignited by sparks from vehicles, by smoking, or the careless use of matches in adjacent areas. Firebreaks free of flammable material should be provided around each storage site.

*f.* Items having similar explosion and fire hazards should be stored together.

*g.* The storage site should be protected to prevent entry of unauthorized persons and tampering with the ammunition. Classified items should be stored separately from unclassified items and appropriately secured.

*h.* Areas under or within the span of overhead transmission lines should not be used for storage.

*i.* Water barrels, pails, and hand equipment should be available for fighting incipient fires in storage areas.

*j.* Storage of components should be in such a manner that periodic inspection and easy removal is possible.

#### 15-9. Groups for Storage

For safety in storage, guided missile components are grouped in three types, based upon the hazards involved: explosive, nonexplosive, and fuel.

#### 15-10. Explosive Components

Explosive components should be stored in a location removed from fuel by a distance of at least 100 meters.

#### 15-11. Fuel (Ethylene Oxide - $\text{ET}_2\text{O}$ )

Fuel should be stored in a well-ventilated shed. The location should be well-removed from explosive components or nonexplosive components. Fuels must be separated from other combustible material by a minimum distance of at least 50 meters.

## 15-12. Nonexplosive Components

Nonexplosive items should be stored in dry, well-ventilated locations. Although such items may be stored with explosive components, it is preferable to store these components in a separate location.

## 15-13. Combination (Mixed) Storage of Explosive Components

Separate storage for each type of explosive component is preferred. For ease in storage, however, combination storage of hazardous components is permitted as shown in table 15-5, provided the net weight of explosive content does not exceed 1,000 pounds.

## 15-14. Special Handling Instructions for Storage

*a. Explosive Components.* Special handling instructions for storage of explosive components are given in table 15-6.

*b. Fuel (Ethylene Oxide-ET.O).*

- (1) Ethylene oxide should not be stored at a location where a possibility

exists of contaminating water used for drinking purposes or in an area where leaves or other organic material accumulates.

- (2) Adequate fire protection, water supply, and access roads should be available.
- (3) Buildings should be provided with mast-type lightning protection and must be surrounded by an area extending at least 50 feet in all directions and maintained free of vegetation or combustible material.
- (4) Containers of ethylene oxide must always be stored in a vertical position in a well-ventilated area and away from sources of excessive heat. Should containers be stored in the open, provisions must be made to shield them from direct rays of the sun and to prevent the accumulation of dirt, snow, ice, or water on valves and safety devices.



Table 15-5. Combination (Mixed) Storage of Explosive Components

	Explosive harness assembly	Igniter, rocket motor	Rocket motor M5E1 or cluster M42	Rocket motor M300	Safety- and arming device M30A1	Warhead assembly M135
EXPLOSIVE HARNESS ASSEMBLY	YES.....	NO	NO	NO	L	L
IGNITER, ROCKET MOTOR	NO.....	YES.....	NO*	NO	NO	NO
ROCKET MOTOR M5E1 OR CLUSTER M42	NO.....	NO*	YES	YES	NO	NO
ROCKET MOTOR M30	NO.....	NO.....	YES	YES	NO	NO
SAFETY-AND-ARMING DEVICE	L.....	NO	NO	NO	YES	NO
30A1						
WARHEAD ASSEMBLY M135	L.....	NO	NO	NO	NO	YES

\*Rocket motors and igniters can be stored together when these items are packaged together.

YES—Indicates permissible storage.

NO—Indicates prohibited storage.

L—Indicates limited storage, not to exceed 1,000 pounds net of explosive.

Table 15-6. Special Handling Instructions for Explosive Components

Component	Special handling Instructions
EXPLOSIVE HARNESS ASSEMBLY	Sensitive to heat, friction, and impact. May be subject to detonation when large quantities are burning. Do not drop, slide, tumble, or drag containers over floors or containers.
IGNITER, ROCKET MOTOR	Sensitive to heat, impact, friction, and static charge. Do not drop, slide, tumble, or drag containers over floor or containers.
INITIATOR	Sensitive to heat, flame, and rough handling. Handle all packages carefully.
ROCKET MOTOR M5E1* or CLUSTER M42 or ROCKET MOTOR M30	Handle with care, since propellant grain is fragile and susceptible to damage by rough treatments. Always lift unit by two points with total bearing surface of at least 12 inches. Storage temperature limits for M5E1 and M42, -20° to +130°F; firing temperature limits, -20° to +130° F. M30 storage temperature limits, to +125°F, firing temperature limits, 0° to +125°F.
SAFETY-AND-ARMING DEVICE M30A1	Avoid all rough handling, as devices contain delicate clockwork mechanisms and detonators. Sensitive to heat, friction, and impact. Storage temperature limits, -40° to +140°F.
WARHEAD ASSEMBLY M135	Use only approved handling beam for lifting. Keep number of handling personnel to a minimum. Do not drop, slide, or tumble.

\*The rocket motors should never be exposed to temperatures below -65° for any period of time.

(5) Use a minimum of wooden dunnage for storage of ET<sub>n</sub> O.

(6) All electrical equipment, motors,

lights, and flashlights used in an area in which this fuel is handled must be vapor-tight or explosion-proof.

Table 15-7. Special Handling Instructions for Nonexplosive Components

Component	Special handling Instructions
STORAGE BATTERY BB 401/U	Store base down on a firm base and within temperature range of -80° to +180°F, charged, discharged, or on continuous (float) charge. Do not allow the caustic liquid to come in contact with the skin. Handle batteries in an upright position.
FINS AND THRUST STRUCTURES	Do not allow the critical fin surfaces or the thrust structure to become damaged or distorted. Handle and store the packages carefully. Do not drop.
MISSILE BODY AND NOSE SECTION	Handle carefully. Do not drop or tumble. All personnel must be indoctrinated in proper handling of missile bodies and nose sections. Store on firm footings, pallets, or dunnage. Containers may be stored two high in outside storage and three high in sheltered storage. The number of containers high should not be more than the number of containers wide.

(7) Adequate water supplies to decontaminate any spills or leaks must be available at all handling sites.

(8) Containers must not be rolled or dropped.

(9) Loading and unloading operations must be conducted in an area which meets the quantity-distance requirements for the amount of fuel being handled. During these operations, the following precautions must be observed:

(a) Necessary warning signs must be placed at all approaches and must remain in place until loading is complete.

(b) No smoking will be allowed in the vicinity of the loading and unloading operations.

(10) Each shelter in which ethylene oxide is stored must be posted with a fire symbol in accordance with TM9-1300-206. A warning sign (fig. 15-1) will be posted at each shelter storing ethylene oxide. This sign should be 36 inches wide and 41 inches high, with a white background and black lettering. Three 2-inch, colored stripes should be painted at the top of the sign. The stripe at the top edge should be yellow; the middle stripe, blue; and the lowest stripe, grey. Lettering and spacing on the sign should be proportional to the overall size of the sign.

(11) Small fires involving ethylene oxide can be extinguished with carbon dioxide or dry chemical agents if properly applied. Fires involving larger quantities of ethylene oxide are difficult to extinguish, although it is soluble in water. The fire will continue to burn until the liquid is diluted with approximately 22 volumes of water to one of ethylene oxide.

(12) Decontamination is required if leaks or spills occur. The following precautions must be taken immediately:

(a) Evacuate all personnel.

(b) Remove all possible sources of ignition.

(c) Flush away all ethylene oxide with large quantities of water.

(d) Immediately remove all articles of clothing, contaminated by ethylene oxide, including shoes, and wash body to remove any ethylene oxide which may have penetrated clothing. Discard or decontaminate clothing; discard shoes.

c. *Nonexplosive Components.* Special handling instructions for storage of nonexplosive components are given in table 15-7. Since the packages contain delicate electronic components and parts that are manufactured to critical

specifications, these instructions must be observed.

### 15-15. Periodic Inspection in Storage

a. *General.* Periodic inspection of missiles or components in sheltered or open storage is required. Open storage should be reinspected after periods of heavy rainfall, windstorm, or electrical storm. If paulins or other protective cover have been damaged or unfastened, corrective action should be taken.

b. *Ethylene Oxide (ET<sub>h</sub>O).* Frequent inspections of ET<sub>h</sub>O in storage is required. Leaking containers constitute a serious fire and health hazard and therefore should be kept under adequate surveillance.

c. *Inspection of Pressurized, Dehydrated Containers.* These containers should be checked monthly for change in humidity indicator and depressurization. Depressurize container (refer to chapter 11), and replace spent desiccant bags with activated desiccant when required. Pressurize in accordance with instructions on the container. Make the proper entry on the shipping papers. Check the container for pressure retention after 24 hours, then weekly for 1 month, and monthly thereafter, with the following exceptions:

(1) M409 containers with HE or W31 warheads do not require pressurization or related markings. They are neither pressurized in CONUS storage nor shipped in a pressurized state. Personnel may be injured during the uncrating process should pressurized containers be received.

(2) M410 containers with fwd and aft body sections are required to be checked monthly for pressurization and humidity. Empty M410 containers need to be checked only every six months.

d. *Inspection.* Inspect inert missiles weekly for corrosion or damage from improper handling. Keep the missile clean and dry.

e. *Priority of Removal from Storage.* Withdraw missile from storage using the inventory system of first in, first out. Overage materiel should be returned to Ordinance.

**15-16. Safeguarding Classified Items and Components**

Every effort must be made to safeguard missiles and their components classified for handling, shipping, and storage in accordance with AR 380-55 and AR 55-355.

**15-17. Destruction to Prevent Enemy Use**

For information on the destruction of materiel to prevent enemy use, refer to TM 9-1400-250-15/2.

**15-18. Shelf or Service Life**

a. Ammunition components are marked with the date loaded or the date of manufacture. The dates marked on components are to be used for computing the shelf or service life of the components. Record the dates in the missile record book as required by TM 38-750.

b. If the date of manufacture or loading is not legible, the date should be requested from the Commanding General, Aberdeen Proving Ground, Maryland 21005. The request should include the National stock number, nomenclature, and the lot or serial number.

*Table 15-8. Established Shelf or Service Life Data*

Component	For Maximum Shelf or Service Life Refer to
Battery BA 472/U series	SB 740-91-052
Battery BA 485/U	SB 740-91-052
Battery BA 617/U	SB 740-91-052
Igniter M65	SB 742-1337-92-011
Igniter M69	SB 742-1337-92-011
Rocket motor M30A1	SB 742-1337-92-012
Rocket motor M30A2	SB 742-1337-92-012
Rocket motor cluster M42 series	SB 742-1337-92-013
Safety and arming device M30A1	SB 742-1336-92-007

2 IN. YELLOW

2 IN. BLUE

2 IN. GREY

## **ETHELENE OXIDE**

**EXTREMELY FLAMMABLE-  
BURNS LIKE GASOLENE.**

**TOXICITY- TOXIC BY INHALATION  
OF VAPORS OR ABSORPTION OF THE  
LIQUID THROUGH THE SKIN.  
MAY CAUSE BURNS.**

**EXPLOSIVE VAPORS- VAPORS  
ARE EASILY DETONATED BY HEAT,  
SPARKS, AND FLAMES.**

**FIRE- SHOULD BE FOUGHT WITH CO<sub>2</sub>  
EXTINGUISHERS, DRY POWDER  
EXTINGUISHERS, OR WATER FOG.**

**PERSONAL PROTECTION-  
PRESCRIBED PROTECTIVE CLOTHING  
AND EQUIPMENT MUST BE WORN.**

**OFF LIMITS  
TO UNAUTHORIZED PERSONS**

**ORD G5416**

*Figure 15-1. Warning sign for ethylene oxide.*



## Section IV. TORQUE REQUIREMENTS

### 15-19. General

This section contains instructions for the proper method of using torque wrenches and provides tables of mean torque values applicable to organizational maintenance operations outlined in this manual. It includes information pertinent to the torquing of missile hardware for maximum strength.

### 15-20. Torque Wrenches

The instructions outlined below must be rigidly observed when using a torque wrench.

a. Clean all lubricant and foreign matter from the threaded surfaces.

b. Do not take torque readings on bolts that have corroded or painted threads.

c. Use a torque wrench of correct size and capacity.

*Note.* The torque reading to be made should be as near 50 percent as possible and not less than 20 percent of full scale deflection of the torque wrench used.

d. While torquing, do not permit the mating member to rotate.

e. Torque by using a continuous rotation of the wrench rather than by short, jerky movements.

f. Take final torque readings while the member being torqued is still rotating.

**CAUTION:** Always loosen or remove nuts with a standard wrench; do not use a torque wrench.

g. If the maximum allowable torque is applied without rotation, use a standard wrench to back off, and then repeat the torquing operation.

h. When, due to the physical limitations at the point of torquing, an adapter must be used in conjunction with a torque wrench. Reference TM 9-1400-250-15/3 for additional instructions on the use of torque wrenches and computing torque values.

### 15-21. Torque Values

a. *Structural and Functional Applications.* Torque data is provided in table form for ready reference by organizational maintenance personnel. Tables 15-9, 15-10, and 15-11 list the bolted connections and torque values for joining the members of the missile body and rocket motor and associated cluster assemblies.

Table 15-9. Missile Body Torque Values

Description	Mean Torque (pound-inches)
Handling ring segment captive bolt	100
Rear main fin attach stud	200
Rear main fin attach double hexagon nut	500
Rear main fin retaining hanger-point setscrew	350
Elevon hinge clevis double hexagon nut	175
Antenna horn captive screw	15
V-Band coupling nut	375
Missile rocket motor mounting bolt	225
HPU squib battery coupling nut	50
HPU squib battery mounting bolt	60
Missile motor section access door set	60
Equipment section access cover plate screw (5/16-24)	100
Equipment section access cover plate screw (1/4-28)	60
Actuator section door assembly cover screw	60
Igniter access cover plate screw	60
Warhead section mounting bolt	120
Boltwell cover nut	25
Boltwell cover screw	25
Forward fin assembly attach bolt—center	60
Forward fin assembly attach bolt—forward	40
Forward fin assembly attach bolt—aft	175
Forward fin assembly attach screw	60
Forward main fin mounting hexagon nut	95
Forward body section mounting bolt	120
Retainer screw	15
Forward body section boltwell cover screw	25
Forward body section access door screw	25
Sequential timer mounting screw	25
Forward nose to rear nose attach bolt	60
Testing fixture captive bolt	120
Testing fixture hinge captive bolt	60
Thermal battery assembly mounting screw	25

Table 15-10. Rocket Motor Cluster Torque Values

Description	Mean torque
Nozzle fairing hexagon-head bolt	40 lb-in.
Forward retaining rail bar bolt	145 lb-ft.
Elevon lock attach bolt	60 lb-in.
Nozzle fairing hexagon nut	60 lb-in.
Rear retaining rail bar hexagon-head screw	245 lb-in.
Fitting assembly hexagon nut	175 lb-in.
Fitting assembly bolt	175 lb-in.
Forward slipper hexagon-head bolt	175 lb-in.
Fairing wedge hexagon-head bolt	175 lb-in.
Rocket motor cluster fin assembly hexagon-head bolt	585 lb-in.
Fitting assembly internal-wrenching bolt	175 lb-in.
Rocket motor thrust ring assembly internal-wrenching bolt	475 lb-in.
Nozzle fairing-fillister-head screw	60 lb-in.

Note. The above values apply only to nonlubricated parts.

Table 15-11. Winterization Kit Torque Values

Description	Mean torque (pound-inches)
Rocket motor cluster nozzle fairing hexagon-head bolt	40
Honeycomb fairing hexagon-head bolt	25
Threaded-end rod nut	25
Heater cable shearing clamp hexagon-head bolt	175

Note. The above values apply only to nonlubricated parts.

b. *Tubing Applications.* Tables 15-12 and 15-13 list the standard sizes of aluminum alloy and steel tubing and specify the required torque values for the tubing coupling nuts.

Note. When the end connections of the tubing are made from aluminum alloy, the tubing coupling nuts, whether made from aluminum alloy or steel, must be torqued to the value listed for aluminum alloy.

c. *Tube Fitting Locknut Applications.* Table 15-14 lists the standard torque values for locknuts used with gasket-type steel and aluminum alloy tube fittings, unions, and elbows. Refer to the appropriate tubing size in the "Tubing OD" column and read across for locknut size and torque value.

Table 15-12. Torque Values for Coupling Nuts Used With Aluminum Alloy Tubing

Tubing diameter (inches)	Mean torque value <sup>1</sup> (pound-inches)
1/8	12.5
3/16	28.5
1/4	50
5/16	78
3/8	112
7/16	153
1/2	200

See footnote at end of table.

Table 15-12. Torque Values for Coupling Nuts Used With Aluminum Alloy Tubing — Continued

Tubing diameter (inches)	Mean torque value <sup>1</sup> (pound-inches)
9/16	253
5/8	312
3/4	450
7/8	525
1	600
1 1/8	675
1 1/4	750
1 1/2	900
1 3/4	1050
2	1200

<sup>1</sup> Overtorquing of 1/6-turn is permissible.

Table 15-13. Torque Values for Coupling Nuts Used With Steel Tubing

Tubing diameter (inches)	Mean torque value <sup>1</sup> (pound-inches)
3/16	100
1/4	150
5/16	200
3/8	300
1/2	500
5/8	700
3/4	1000
1	1300
1 1/4	1700
1 1/2	2100
1 3/4	2500
2	2900

<sup>1</sup> Overtorquing of 1/6-turn is permissible.

Table 15-14. Torque Values for Locknuts Used With Gasket-Type Tube Fittings, Unions and Elbows

Tubing OD (inches)	Locknut size across flats (inches)	Mean torque value <sup>1</sup> (pound-inches)	
		Steel	Al Alloy
3/16	5/8	200	78
1/4	1 1/16	300	112
5/16	3/4	300	115
3/8	1 3/16	400	150
1/2	1	700	312
5/8	1 1/8	1,000	450
3/4	1 3/8	1,250	650
1	1 5/8	1,650	1,040
1 1/8	1 7/8	2,550	1,300

See footnote at end of table.

**Table 15-14. Torque Values for Locknuts Used With Gasket-Type Tube Fittings, Unions and Elbows—Continued**

Tubing OD (inches)	Locknut size across flats (inches)	Mean torque value <sup>1</sup> (pound-inches)	
		Steel	Al alloy
1 1/4	1 15/16	3,550	1,550
1 1/2	2 3/16	4,700	1,950
1 3/4	2 9/16		2,580
2	2 18/16	5,750	3,000

<sup>1</sup> Overtorquing of 1/6-turn is permissible.

## APPENDIX A

## NIKE-HERCULES MAJOR ITEMS COMPONENTS

The items listed in this appendix are for reference use only and are the components of Intercept-Aerial Guided Missile MIM-14A, MIM-14B, and MIM-14C (NIKE-HERCULES), which are required to assemble a complete round. These components are packaged separately and issued initially as ammunition items. Requisitions are issued and governed by applicable TOE, TA or other Department of the Army directives. There are no allowances for on vehicle maintenance equipment.

<i>FSN</i>	<i>Nomenclature</i>	<i>Model No.</i>	<i>Qty Req with Complete Msl</i>
1420-624-4528	Body section with container M410, S/N 13,001 and subsequent (After removal of body section, return container to depot)	MIM-14B	1
or			
1420-078-0418	Body section with container M410, S/N 13,001 and subsequent (SAMCAP) (After removal of body section return container to depot)	MIM-14C	1
1420-647-2602	Control surfaces kit	None	1
1337-646-7324	Rocket motor with shipping and storage container, (After removal of rocket motor, return container to depot)	M42	1
or			
1337-891-5470	Rocket motor with shipping and storage container (After removal of rocket motor, return container to depot)	M42A1	1
1336-856-7869	Warhead section with container M409 (After removal of warhead, return container to depot)	M135 & M17A	1
or			
1336-677-0775	Warhead section with container M409 (After removal of warhead, return container to depot)	M135 & M17/T45	1
1337-832-5102	Rocket motor with shipping and storage container (After removal of motor, return container to depot)	M30A2	1
	Delay lines GA-10424 series (For authorization, see TM 9-1410-250-24P/2/1)	None	1
	Horn waveguide, GS-18756 series (For authorization, see TM 9-1410-250-24P/2/1)	None	1
6135-837-5331	Battery (effective missile serial numbers 14,965 and subsequent)	BA-485/U Series	1



<i>FSN</i>	<i>Nomenclature</i>	<i>Model No.</i>	<i>Qty Req with Complete Mal</i>
6135-823-3034	Battery (effective missile serial numbers 13,684 and subsequent) (Three each required when other than warheads above are used)	BA-472/U	1
6140-643-4826	Battery (effective missile serial numbers 13,001 through 13,683)	BB-401/U	1
1336-575-3457	S&A Device, guided missile	M30A1	2
1336-624-4529	Fin assembly, rocket motor	None	1

## APPENDIX B

### CLEANING AND PRESERVING MATERIALS

NSN	Description
<b>BODY, GUIDED MISSILE</b>	
6810-00-264-6517	Acid, chromic chromium trioxide, technical, flake form, Spec O-C-303 (5 GL CN) Ref No. OC303TYPE25LBCN 5 LB CAN
8040-00-887-1450	Adhesive, polymerized acrylic resin base, clear liquid, heat and chemical resistant, used w/solvent (toluol) 40% solids, 1 GL CN, Ref No. 8607093
8040-00-701-9546	Adhesive, silicone rubber, paste form (5 oz tube) (FED-STD-313)
8040-00-844-9707	Adhesive, syn resin, liquid form, laminates to wood and S (1 PT PER CN) Ref No. 9978017
8040-00-721-9091	Adhesive, syn-ru, liquid form, 1 PT CN, w/separate catalyst Ref No. MILA25457-1 PT
8040-00-290-4301	Adhesive, syn-ru, liquid form, 1 QT CN, Ref No. 8162031, Ref No. MILA5092TYPE2
8040-00-262-9011	Adhesive, syn-ru, liquid form, 1 PT CN, Ref No. MILA5092TYPE3-1 PT
8040-00-264-5840	Adhesive, syn-ru, liquid, general bonding, 1 GL CN, Ref No. MILA13883, ORD, TYPE II, 1 GA CA
8040-00-887-5857	Adhesive, 3 parts of thermosetting liquid resin and 2 parts of polyamid resin, two to three hours pot life, air cure in six to eight hrs, 1 QT CN, Ref No. 9141496
6810-00-543-7415	Alcohol, denatured, formula No. 3A, 1 GL CN, Ref No. 0E760 GRADE 3
5350-00-286-4851	Aluminum wool, Ref No. MILA4864
8030-00-201-0996	Antiseize compound, asphalt, graphite, lubr oil petrolatum, and white lead ingredients, 1 PT CN, Ref No. TTA00580
8020-00-202-7266	Brush, paint, FL, hog bristle, SQ edge, 3 W, 7/8 thk, 3-1/4 exposed lg, FED SPEC H-B-0420, Class 1, Grade B, size 3, Ref No. 8034078
6850-00-224-6663	Cleaning compound, solvent solution type, 1 GA CA, Ref No. 9156817
6850-00-826-2156	Cleaning compound, solvent Type 1, 1 GA CA, Ref No. PC576ATYPE1, Ref No. PC444TYPE1
1420-00-475-1016	Cloth, lint free (9 in. sq 300 percent) Ref No. 9005198
8030-00-231-2345	Corrosion preventive compound, hard film, for cold application, 1 GL CN (CT) Ref No. MILC16173GRADE1
8030-00-244-1298	Corrosion preventive compound, solvent cutback, cold application, soft film, MIL-C-16173, GR2, 5 GL PL (CL)
6850-00-901-0591	Deicing-defrosting, Ref No. MILA8243A

FSN	Description
6850-281-1985	Dry cleaning solvent, liquid form, for degreasing MTL and dry cleaning, 1 GL CN, Ref No. PD680TYPE1
6850-264-6574	Desiccant, activated, Type D-3464A, Class 2, four desiccant units per bag, Ref No. MKD3464-4, Ref No. 9024584 (U/O Ser No. 13,001 and subsequent)
6850-264-9038	Dry cleaning solvent, liquid form, to remove soil from surfaces in dry cleaning process, FEDP5661B, TYPE 1 (5 GL PL), Ref No. PD 680TY1-5GALPL
6850-264-9037	Dry cleaning solvent, liquid form, to remove soil from surfaces in dry cleaning process, PD680TY1-55 GAL DR, Ref No. 880PS661B, Type 1, 55GALDR1, 6GA, Ref No. PD680TY1-55 GAL DR
6850-285-8012	Dry cleaning solvent, liquid form, to remove soil from surfaces in dry cleaning process, FED-P-S-661B, Type 1, 55 GAL DR, 18 GA, Ref No. 51S4385-55
8010-828-3191	Enamel, brown, lusterless, 1 GL CN, Ref No. MILE10687, Ref No. TTE516
8010-297-3819	Enamel, green, eggshell gloss, 16 hr max air dry hard time, color 3412, FED-TT-C-595, MIL-E-12507, 1 QT CN
8010-297-2111	Enamel, insigna white, lusterless, for ammo, 1 GL CN, Ref No. TTE516-37875
8010-878-5761	Enamel, insigna white, lusterless, 1 PT CN, Ref No. TTE516-37875160ZCN
8010-297-2122	Enamel, jet black, lusterless, for ammo, 1 GL CN, Ref No. TTE516-37038
8010-297-2116	Enamel, OD, lusterless, for ammo, 1 GL CN, Ref No. TTE516-34087, Ref No. TTE516X34087, Ref No. MILE10687X34087
8010-914-3081	Enamel, OD, lusterless, solar heat reflecting, 1 GL CN, Ref No. MILE46096
8010-297-2112	Enamel, orange yellow, lusterless, for ammo, 1 GL CN, Ref No. TTE516-33538
8010-297-2114	Enamel, red, lusterless, quick drying, for ammo, FS-TT-C-595, MIL-E-10687, No. 31136, 1 GL CN
8010-286-7725	Enamel, black, gloss, 5 GL PL, Ref No. TTE489A,BLK
8010-297-2121	Enamel, lusterless, FS-TT-C-595, MIL-E-10687, jet black, No. 37038, 1 QT CN, Ref No. 52-3423-010-025, Ref No. MILE10687-37038, Ref No. TTE516-37038
9150-269-8255	Grease, aircraft, w/gelling agent and liquid lubricant, low evaporation and oxidation resistant, 260 to 300 worked penetration at 77 deg F, 325 deg F min dropping pt, MILL4343A (1 LB CN) (GPS), Ref No. MILL4343, 1 LB CN
8520-527-9942	Hand cleaner, 1 PT CN, Ref No. PH31TYPE1CLASS1
9150-223-4134	Hydraulic fluid, petroleum base, corrosion and oxidation resistant, designed for syn-ru seal, 1 GL CN (DHA) Ref No. MS35900-219, Ref No. MILH5606

<i>FSN</i>	<i>Description</i>
5970-888-2954	Insulating compound, electrical liquid form, resistant to oil, acid and alkalies, 8 oz CN, Ref No. 9029986
5970-162-7523	Insulating varnish, electrical saltwater resistant, purple, Ref No. ZV903, Ref No. 9059935
5970-647-3676	Insulating varnish, electrical, air drying, clear, for general purpose use, 1 PT CN, Ref No. 9017118, Ref No. 8150350, Ref No. MILV173 1 PT
5970-285-0271	Insulating varnish, electrical, clear, air drying, resistant to fungus and moisture, 1 GL CN, Ref No. MS35632-1, Ref No. MILV173,1GA (U/C rocket motor igniters)
5970-184-2002	Insulation tape, electrical ins, ru, 3/4 in. w. 0.033 in. thk, Spec HH-T-111C, 30 FT RO, Ref No. 875910
5970-965-9639	Insulation tape, electrical ru, adhesive, 1-1/4 W. 0.02 thk, 12 yd lg, Ref No. MPD3350, (U/C Ser No. 13,001 and subsequent)
6810-286-5435	Isopropyl alcohol, 1 GL CN, Ref No. MIL-I-10428A, Ref No. TT-I-735, GRADE A
5970-548-9520	Insulating varnish, electrical clear, moisture and fungus resistant 1 QT CN, Ref No. MIL-V-173, TYPE 1 Clear
9150-754-0064	Lubricant, solid film, acetone 10 0/0 solid content, 12 oz spray CN, Ref No. MILL23398
9150-782-2627	Lubricating oil, aircraft, turbine engine, synthetic base, Ref No. MILL78081QTCA, Ref No. W14-0-2382, Ref No. MILL007808-1QTCN
9150-231-6689	Lubricating oil, general purpose corrosion and oxidation resistant, 1 QT CN (PL-SPECIAL), Ref No. MILL644, Ref No. VVL800
9150-252-6174	Lubricating oil, general purpose LT, Type V, Class 4, FEDVVL820 (1 QT CN)
9150-273-2389	Lubricating oil, general purpose noncorrosive, low temp, symbol PL SP, -7C deg F max pour PT, 275 deg F min flash PT, MIL-L-644A, amend 2, 4 OZ CN (PL-SPECIAL), Ref No. VVL800
6810-264-6715	Molybdenum disulfide, technical powder form, 1 LB CN, Ref No. MILM7866
6830-292-0732	Nitrogen, technical (Used for transferring ETO from commercial container into the fuel tank of the APS unit) (U/O Ser No. 10,206 thru 14,964)
5350-598-5537	Paper, abrasive flint, paper backing, closed coat, 9 x 10 SH, 100 SH SV, GR fine, Ref No. PP105CLASSZFINE
5350-598-6105	Paper, abrasive flint, paper backing, closed coat, 9 x 10 SH, 100 SH SV, GR med, Ref No. PP105CLASS2MEDIUM
5350-264-3483	Paper, abrasive flint, paper backing, closed coat, 9 x 10 SH, 50 SH SV, coarse GR, Ref No. PP105CLASSZCOARSE, Ref No. 42P01175120

<i>FSN</i>	<i>Description</i>
5350-264-3485	Paper, abrasive flint, rope or wood FBR or kraft paper backing, closed-coat, 9 x 10 SH, 100 SH sleeve, P-P-105, Class 2, extra fine GR 4/0 or 3/0, Ref No. 42P01205000
8010-161-7419	Primer coating, 6 hr max air drying time for recoating, pigments C/P magnesium silicate stenna, titanium dioxide fin., clean yellow, 1 GL CN
8010-161-7339	Primer coating, yellow, corrosion resistant, 2 hr drying time, 1 GL CN, Ref No. TTP666
8010-582-5318	Primer coating, color T pretinted to match interior green Color No. 34151, 5 minutes drying time, 1 GL CN, Ref No. MILP8585A, Color T 34151
7920-205-1711	Rag, wiping, cotton, bleached or unbleached, mixture of white and colored, designed for general purpose use, Spec DDD-R-30, 50 LB BE, Ref No. MS16746-131, Ref No. DDDR300L2
8030-881-5238	Sealing compound, syn-ru, w/separate catalyst, semisolid, 1 QT CN, Ref No. MILS8516C, Class I
8030-262-9041	Sealing compound, syn-ru, paste form, block 1/2 PT CN, Ref No. 8050300, Ref No. MILS7124A12, Ref No. MILS7124
8030-721-8929	Sealing compound, syn-ru, semisolid, 1 QT CN Class A base, 1 QT CN Class B base, 1 JR Class B catalyst, w/two 8 OZ CN topcoat, MILS7502CLASSB2
8030-853-6649	Sealing compound liquid polymer, 100 GRAN CN or TU, Ref No. MPD 5010
6850-880-7616	Silicone compound (8 OZ per TU), Ref No. 10581521-1, Ref No. MILS8660
8520-228-0598	Soap, toilet, liquid form, 1 GL CO, Ref No. PS624-1
7920-240-2559	Sponge, cellulose, rectangular, Ref No. LS00626TYPEIICLASS2POROSITYA
6810-270-9989	Talc, technical powdered soap stone, ZZ-T-416A Type IV, Class C, 1 LB sifter type can w/cap
1420-875-6300	Tape, insulation, ru silicone, 1-1/4 x 72 FT RL, Ref No. 9027250, (U/O Ser No. 10,206 and subsequent)
8030-772-2941	Tape, pressure sensitive, adhesive AL foil, w/silicone adhesive, 1 W, 0.002 thk (36 YD per RL), Ref No. 9020003
7510-756-9470	Tape, pressure sensitive adhesive cloth backing, coated w/adhesive on both sides, heat and moisture resistance, 1 w (50 FT RO), Ref No. 9021502
8030-775-2310	Tape, pressure sensitive adhesive, fiberglass, adhesive, 1.5 w, 0.009 thk (72 YD per RL), Ref No. 9027208
7510-266-6711	Tape, pressure sensitive adhesive, paper backing, opaque, FED-UU-T-106A, Type 1, 3/4 w
8010-242-2089	Thinner, paint, mineral spirits, 302 to 410 deg F distillation range, 1 GL CN, Ref No. FEDTTT291A, 1 GA CA



<i>FSN</i>	<i>Description</i>
8010-558-7026	Thinner, paint, mineral spirits, 340 to 485 deg F distillation range, TT-T-291AGR1, 5 GL PL
8010-087-1953	Thinner, synthetic resin enamel, 257 to 410 deg F distillation range, 1 QT CN, Ref No. TTT306
8010-254-4218	Thinner, synthetic resin enamel, 257 to 410 deg F distillation range, FED-TT-T-306, 53 GL DR, Ref No. TTT306-1
6810-281-2002	Toluene, technical, 1 GL CN, Ref No 9060184, Ref No. TTT548
6810-184-4794	Trichloroethylene, technical (5 GL DR), Ref No. OT634-2
6810-664-0387	Trichloroethane, technical, inhibited, 1 GL CN, Ref No. OT620
6850-285-9432	Wetting agent, sodium alkyl aryl sulfonate active ingredient, liquid form, water solvent, 1 QT CN, Ref No. 8162033
4020-00-789-0802	Tape, nylon lacing and tying, MPD 1508
8030-520-6375	Tape, opaque white, adhesive corrosion, resistant 1" 12/48, Ref No. MIL-T-4053B
8010-721-9752	Lacquer, brass, acrylic resin 1 PT pressurized can, Ref No. FED SPEC TTL-50
6850-984-5853	Cleaning compound, solvent, Ref No. MIL-C-81302 5 Gal

POSTED 24 FEB 86

TM 9-1410-1250-12/1  
C1

Change )  
 )  
No. 1 )

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
Washington, D.C., 1 November 1982

Operator and Organizational Maintenance Manual:

INTERCEPT--AERIAL  
GUIDED MISSILE MIM-14A, MIM-14B, AND MIM-14C  
(IMPROVED NIKE-HERCULES GUIDED MISSILE SYSTEMS)

TM 9-1410-1250-12/1, 31 July 1981, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical line in the margin of the page.

Remove pages

None  
10-1, 10-2  
10-9 thru 10-10.1

Insert pages

Frontis material (4 pages)  
10-1, 10-2  
10-9 thru 10-10.1

2. This transmittal sheet should be filed in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

E. C. MEYER  
General, United States Army  
Chief of Staff

Official:

ROBERT M. JOYCE  
Major General, United States Army  
The Adjutant General

## APPENDIX C

INSPECTION CRITERIA FOR CONNECTORS, CABLES, AND WIRING  
HARNESSES ON ALL TACTICAL MISSILES**1. In-Flight Connectors, Cables, and Wiring Harnesses**

*Note.* Test connectors which serve NO INFLIGHT FUNCTION (J2 of the TCG, J2 of the fail-safe control, J183 of the distribution box, P510 of the mounting panel, and J546 of the HPU, etc.) are exempt from these criteria as long as mechanical and electrical functions are not impaired.

a. Visually inspect the connector, cable, and wiring harness for damage. Any component which does not meet the requirements in b through g below shall be rejected.

b. Insure that the connector clamp for each cable and wiring harness is properly secured and that it protects the cable or wiring harness where it enters the connector shell.

c. Insure that each cable and wiring harness is properly marked and that breakout points and bends have no burns, loose lacing or taping, and that insulation is not damaged.

d. Insure that neither connector shells nor contacts have any visible corrosion or foreign matter present.

e. Insure that all contacts are present and straight.

f. Insure that the connector shell is not bent or cracked and that the threads are not damaged.

g. Insure that the connector insert is not cracked except for connector P1 as specified in paragraph 2 below.

**2. Transponder Control Group Wiring Harness Connectors P1 (9033947 and 9976269)**

a. Hairline cracks which run between active pins or which may provide a path between active pins are cause for rejection.

*Note.* All pins are active except pins 6, 11, 20, 22, 41, 42, 43, and 48, which are spares.

b. Hairline cracks in P1 are permissible if the cable assembly passes all electrical checks but contain hairline cracks of the following configuration.

(1) Hairline cracks that run from an active pin to the connector attach bolt hole and/or from the attach bolt hole to the connector edge but that could not provide a conductive path between active pins.

(2) Hairline cracks that run from the outer edge of the connector to the bolt hole and pass between active pins.

c. A sample of permissible hairline cracks is shown in each of the three illustrations in figure C-1. A combination of cracks in more than one of the illustrations is not permissible. It is noted that all of the cracks will not be present at one time, but a combination of the cracks shown in only one of the illustrations is permissible.

Remove pages

10-17  
12-57 thru 12-60  
12-69, 12-70  
12-73 thru 12-76  
12-81 thru 12-84  
12-88.1  
12-89, 12-90  
15-1, 15-2  
15-3, 15-4  
15-9, 15-10  
B1, B2  
B-5  
C-1, C-2  
D-1, D-2

Insert pages

10-17  
12-57 thru 12-60  
12-69, 12-70  
12-73, 12-74  
12-81 thru 12-83/(12-84 blank)  
12-88.1/(12-88.2 blank)  
12-89, 12-90  
15-1, 15-2  
15-3, 15-4  
15-9, 15-10  
B1, B2  
B-5  
C-1, C-2  
D-1, D-2

2. Retain this transmittal sheet in the front of the manual for reference purposes.

By Order of the Secretary of the Army:

**E. C. MEYER**  
*General, United States Army*  
*Chief of Staff*

Official:

**ROBERT M. JOYCE**  
*Major General, United States Army*  
*The Adjutant General*

POSTED 24 FEB 86

TM 9-1410-1250-12/1 (FMS)  
C2

Change )  
No. 2 )

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
Washington, D. C., 19 APRIL 83

Operator and Organizational Maintenance Manual:

INTERCEPT-AERIAL  
GUIDED MISSILE MIM-14A, MIM-14B, AND MIM-14C  
(IMPROVED NIKE-HERCULES GUIDED MISSILE SYSTEM)

(ALLIED CONFIGURATION)

TM 9-1410-1250-12/1 (FMS), 31 July 1981, is changed as follows:

1. Remove the old pages and insert the new pages as indicated below. New or changed material is indicated by a vertical line in the margin of the page. New or revised illustrations are indicated by a letter suffix adjacent to the identification number.

Remove pages

1-1, 1-2  
2-1, 2-2  
3-2.1  
3-21, 3-22  
3-23, 3-24  
3-29, 3-30  
4-1 thru 4-4  
4-7, 4-8  
4-10.1  
4-25, 4-26  
4-31, 4-32  
4-35, 4-36  
4-43, 4-44  
4-73, 4-74  
5-5, 5-6  
5-11 thru 5-14  
6-1 thru 6-6  
7-1 thru 7-4  
7-9, 7-10  
7-15 thru 7-18  
8-13, 8-14  
9-16.1/(9-16.2 blank)  
9-17, 9-18  
10-7 thru 10-10  
10-13 thru 10-16  
10-16.1 thru 10-16.4

Insert pages

1-1, 1-2, 1-3/(1-4 blank)  
2-1, 2-2  
3-2.1/(3-2.2 blank)  
3-21, 3-22, 3-22.1/(3-22.2 blank)  
3-23, 3-24  
3-29, 3-30  
4-1 thru 4-4  
4-7, 4-8, 4-8.1/(4-8.2 blank)  
4-10.1/(4-10.2 blank)  
4-25, 4-26  
4-31, 4-32, 4-32.1/(4-32.2 blank)  
4-35, 4-36  
4-43, 4-44  
4-73, 4-74  
5-5, 5-6  
5-11 thru 5-14  
6-1 thru 6-6  
7-1 thru 7-4  
7-9, 7-10  
7-15 thru 7-18  
8-13, 8-14  
9-16.1, 9-16.2  
9-17, 9-18  
10-7 thru 10-10  
10-13 thru 10-16  
10-16.1 thru 10-16.4



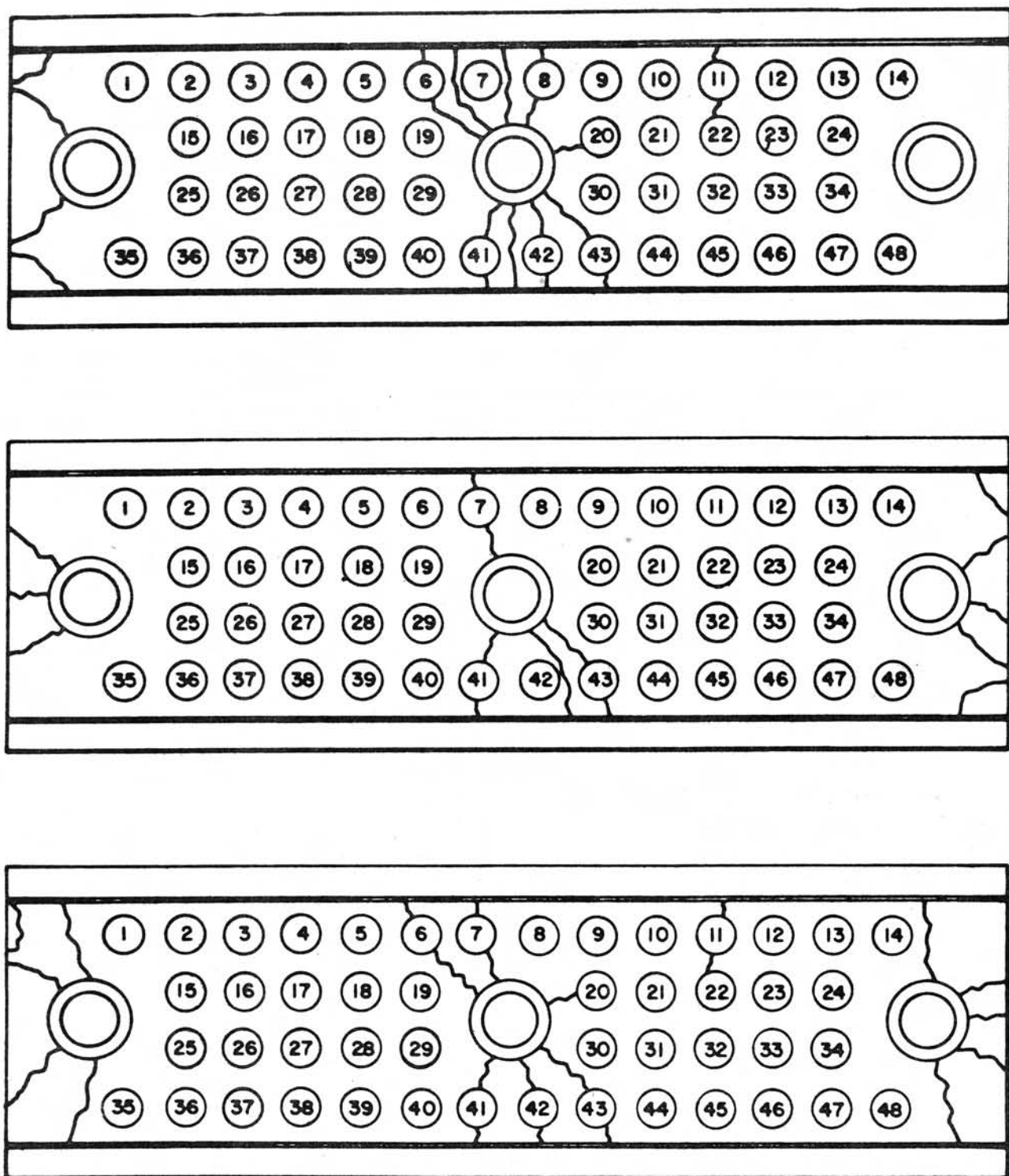


Figure C-1. Samples of permissible hairline cracks.

POSTED 24 FEB 1986

TM 9-1410-1250-12/1 (FMS)  
C3

Change )  
No. 3 )

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
Washington, D. C., 3 JULY 1984

Operator and Organizational Maintenance Manual:

INTERCEPT - AERIAL  
GUIDED MISSILE MIM-14A, MIM-14B, AND MIM-14C  
(IMPROVED NIKE-HERCULES GUIDED MISSILE SYSTEMS)

TM 9-1410-1250-12/1 (FMS), 31 July 1981, is changed as follows:

1. Remove the old pages and insert the new pages as indicated below. New or changed material is indicated by a vertical line in the margin of the page.

Remove pages

4-31 thru 4-32.1  
7-15 thru 7-18

Insert pages

4-31, 4-32, 4-32.1/(4-32.2 blank)  
7-15 thru 7-18

2. This transmittal sheet should be filed in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.  
General, United States Army  
Chief of Staff

Official:

ROBERT M. JOYCE  
Major General, United States Army  
The Adjutant General

## APPENDIX D

**MOISTURE SEALING PROCEDURES FOR  
TRANSPONDER CONTROL GROUP WIRING HARNESS CONNECTORS P1  
(9033947 AND 9976269) AND TRANSPONDER CONTROL GROUP  
CONNECTORS J1 (9011247 AND 9144528)**

**D-1. Purpose**

The purpose of these procedures is to provide a moisture seal between the transponder control group wiring harness connector P1 and the transponder control group connector J1, thereby permitting the use of P1 connectors which have minor cracks. These procedures are applicable to missiles 13,001 and subsequent (MIM-14B and MIM-14C). This procedure does not apply to training missiles.

**D-2. Supplies**

a. The kits, tools, parts, and materials required to perform these procedures are listed in table D-1.

b. Inventory the kit items against the listing in table D-1 before performing the procedures in D-2. Verify that the kit expiration date has not been exceeded.

*Table D-1. Sealing Materials and Equipment Required*

Item	Description	Quantity
Kit a	PART NUMBER 11510060	1
	Sealant application materials for wiring harness connectors P1 (9033947 and 9976269) and transponder control group connectors J1 (9011437 and 9144528) consisting of:	
	Cartridge gun, SEMCO #850	2
	Mirror, inspection	3
CLEANING MATERIALS		
	Trichloroethane <sup>1</sup> , technical, inhibited NSN 6810-00-664-0387	1 gallon (3.8 liters)
SPECIAL TOOLS AND EQUIPMENT		
	Container <sup>2</sup> , clean	1
	Torque wrench, 30 pound-inches (3.4 N·m)	1
	Dry air supply, dewpoint -40°F (-40°C) or better, 40-175 psi (276-1206 kPa)	1
	Stepladder <sup>3</sup> , heavy duty, 8 ft (2.5 m) (or equivalent)	1
	Flashlight, rough surface, 2 cell, NSN 6230-00-168-1856	1

See footnotes at end of table.

Table D-1. Sealing Materials and Equipment Required

Item	Description	Quantity
Kit b	PART NUMBER 11510061	1
	Sealing materials for wiring harness connectors P1 (9033947 and 9976269) and transponder control group connectors J1 (9011437 and 9144528) consisting of:	
	Brush, acid	4
	Cord, unwaxed, nylon, (or equivalent) 40 lb (18 kg) test 3 ft. (1m) long	1
	Gloves, rubber, disposable	8
	Hand cream, 2 1/2 oz. (74cc)	1
	Cloth, lint free, 12 in. X 12 in. (0.3m X 0.3m)	6
	Knife	1
	Marker, felt tip	1
	Tape, roll, 1 in. X 3 ft lg (2.5cm X 1m)	1
	Nozzle, SEMCO #410	2
	Orangewood sticks (or equivalent)	4
	Sealant, silicone, SEMCO cartridge, 2 1/2 oz. (74cc), GE RTV-162	1
	Spatula, polyethelene	1
	Template, double sided	1
	Tongue depressor	12

<sup>1</sup> Obtain from supply.<sup>2</sup> Compatible for use with 1,1,1-trichloroethane.<sup>3</sup> Required if procedures are performed at the launching area.

### D-3. Procedures

#### a. Missile Preparation.

*Note.* Where tolerances are not specified in the procedures and judgement is required, the person performing the procedures will make the judgement.

*Note.* If the missile quarterly checks have been performed within the last 45 days omit (1) below.

(1) If this sealing procedure is performed at the launching area, perform the quarterly

checks on the missile as prescribed in TM 9-1440-250-12/1, table 20, steps 1 through 14 and 16u.

(2) Prepare the missile as prescribed in table 12-1.

**Caution:** Do not perform this sealing procedure if the ambient temperature of the working area is less than 40°F (4°C). The sealant material cannot be properly applied below this temperature.

(3) Remove the flathead screws (2, fig. 3-27) that secure the J1 + XMTR ACCESS DOOR to the right side of the forward body section; remove the access door.

*Note.* If this sealing procedure has been previously performed on the transponder control group wiring harness connector P1 and the transponder control group connector J1, perform the procedures described in paragraph *i* and omit (4) through (6) below.

(4) Reach through the right access opening, and remove the shoulder bolt (8, fig. 7-9) that secures transponder control group wiring harness connector P1 (9, fig. 7-9) to the transponder control group connector J1 (6, fig. 7-9).

(5) Disconnect P1 from J1.

(6) Insure that the rubber gasket has been removed from J1 and discarded.

(7) Inspect P1 and J1 for obvious physical damage and hairline cracks according to inspection criteria in appendix C.

#### *b. Cleaning J1 and P1.*

**Warning:** Trichloroethane fumes are toxic. The area where trichloroethane solvent is used must be well ventilated. Avoid inhalation of fumes, avoid skin contact with solvent or with cloths moistened with solvent.

**Caution:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(1) Wearing rubber gloves pour approximately 1/2 ounce (15cc) of trichloroethane into a container.

(2) Using an acid brush, brush the trichloroethane onto the J1 connector area (see fig. D-1) starting at the top of the area working down.

(3) Discard the brush and the trichloroethane remaining in the container.

(4) Pour approximately 1/2 ounce (15cc) of trichloroethane into a container.

(5) Using a new acid brush, brush the trichloroethane onto the J1 contacts.

(6) Discard the brush and the trichloroethane remaining in the container.

**Caution:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(7) Wearing rubber gloves, pour approximately 1/2 ounce (15cc) of trichloroethane into a container.

(8) Using a new acid brush, brush the trichloroethane onto the P1 connector starting at the top of P1 and working down.

(9) Discard the brush and the solvent remaining in the container.

(10) Using a lint free cloth moistened with trichloroethane, wipe the P1 connector and its backshell potting material up to the harness insulation tubing.

*Note.* If the cloth dries before P1 and its backshell are cleaned, use a new cloth.

#### *c. Drying Procedures.*

(1) Set the dry air supply between 40 and 175 psi (517-1206 kPa).

**Caution:** When positioning the dry air supply do not allow dust and debris into the cleaned connectors. Gloves must be worn when handling the cleaned connectors because skin oil can inhibit the effectiveness of the sealing compound.

**Caution:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(2) Blow dry J1 by sweeping the dry air supply nozzle across the face of the connector from a distance of approximately one inch (2.5cm) for one minute.

(3) Blow dry P1 by sweeping the dry air supply nozzle across the face of the connector from a distance of approximately one inch (2.5cm) for one minute.



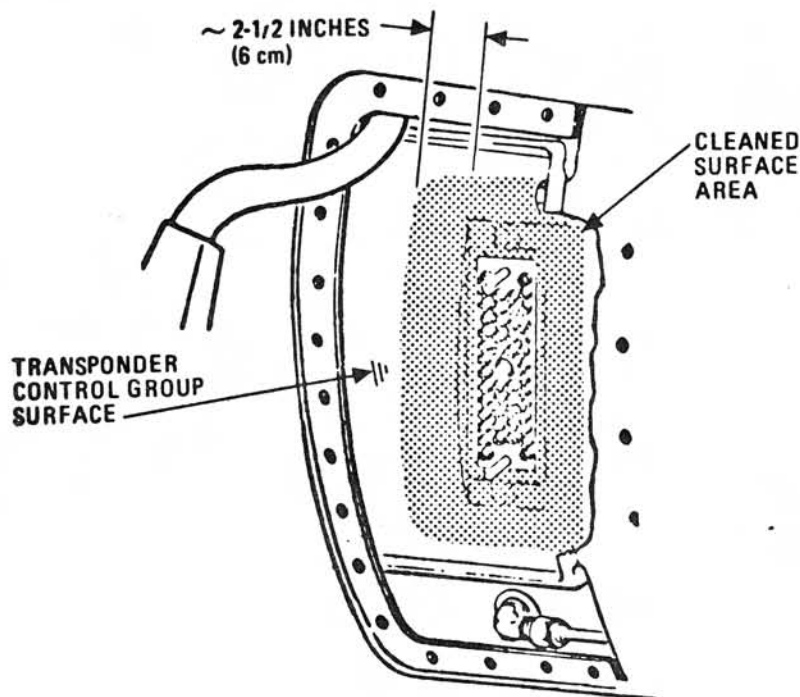


Figure D-1. Transponder control group surface cleaning area.

*d. Sealing the Exposed Interface of the P1/J1 Junction.*

*Note.* This procedure must be accomplished as a continuous operation with only minor time lapses between steps. All sealant material must be applied within 30 minutes of first application to insure that sealant beads stick to previously applied beads. Figure D-2 shows P1 as it should appear after this sealing procedure has been accomplished.

**Caution:** Rubber gloves must be worn when handling the cleaned connectors because skin oil can inhibit the effectiveness of the sealing compound.

**Caution:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(1) Place the template in position over the J1 connector guide pins as shown on figure D-3.

(2) Using the marker, mark the surface of the transponder control group by tracing the full outline of the slot in the template.

(3) Remove the template from J1.

(4) Place the template on the face of the P1 connector. Aline the template with P1 by inserting the tapered ends of two orangewood sticks through the holes of the template and the P1 guide pin holes as shown on figure D-4.

(5) Using the marker, mark the inner surface of the P1 backshell potting by tracing through the full outline of the slot in the template.

(6) Remove the orangewood sticks from the P1 guide pin holes.

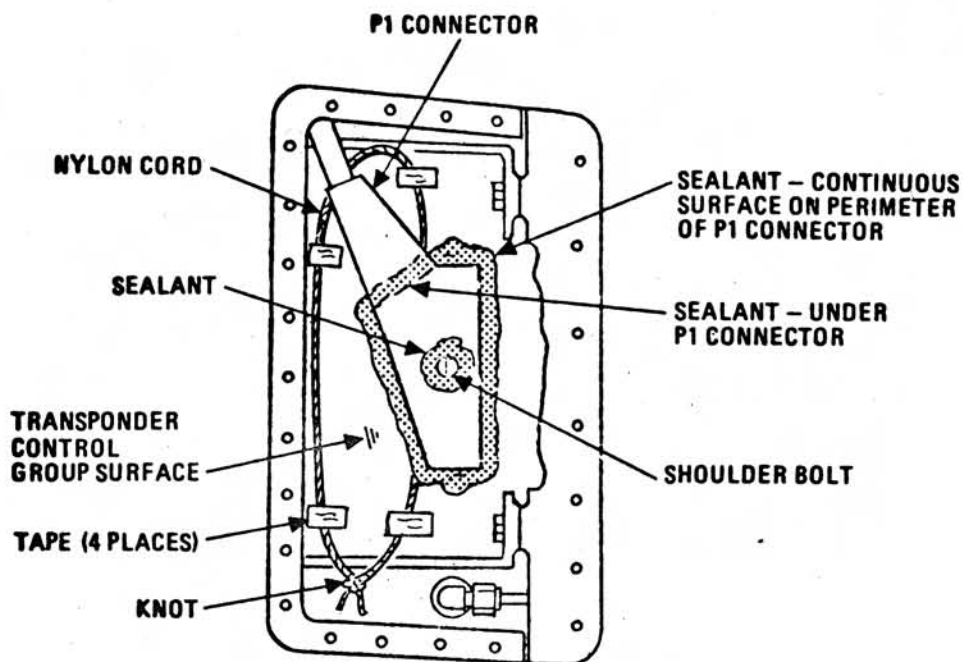


Figure D-2. Completed sealant application.

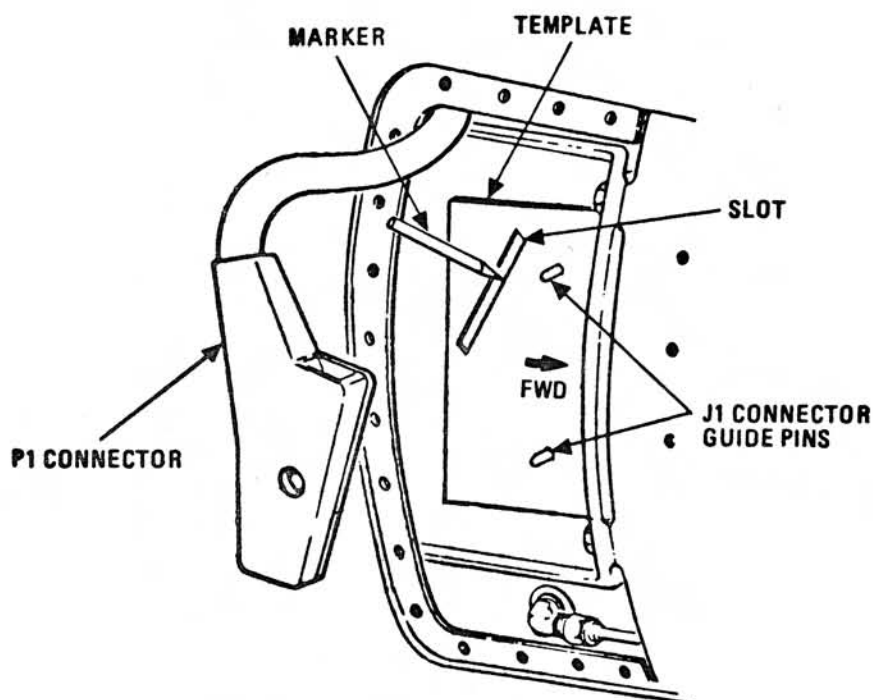


Figure D-3. Template orientation on J1 connector.

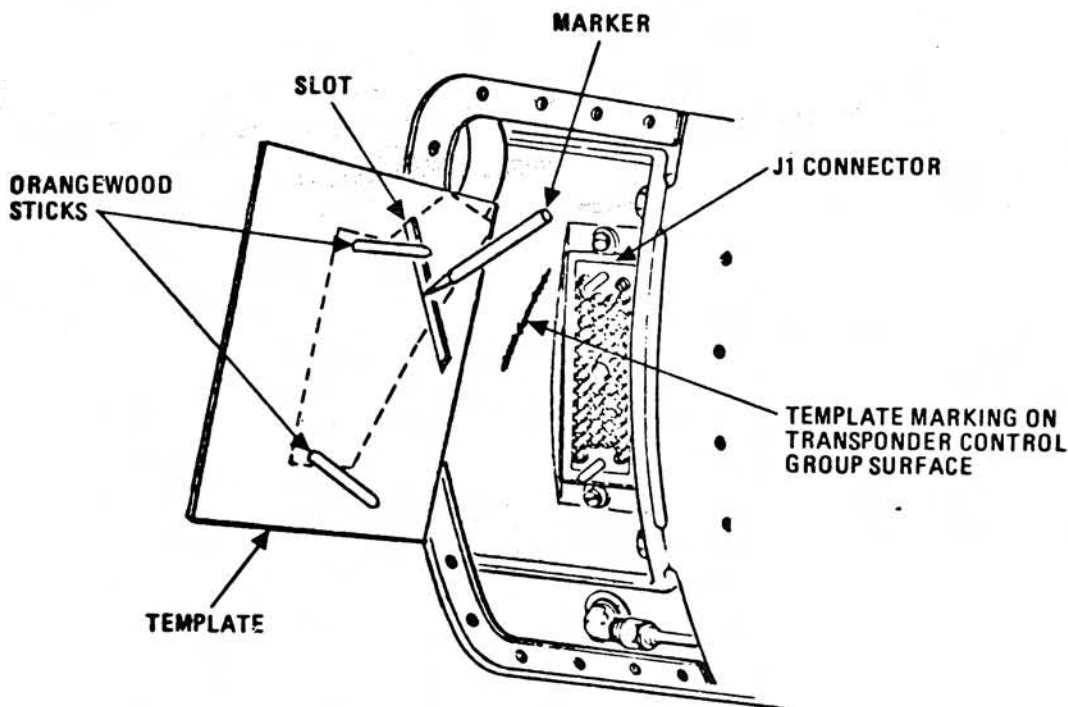


Figure D-4. Orientation of template on P1 connector.

(7) Using tape secure the nylon cord onto the transponder control group as shown on figure D-5.

(8) Tie the ends of the cord together securely to prevent accidental removal and secure with tape as shown on figure D-5.

(9) Cut two approximately one-inch (2.5 cm) squares of tape.

(10) Apply one square each over the top and bottom P1 guide relief holes as shown on figure D-6.

(11) Verify that approximately 1/16 inch (2mm) of the P1 backshell potting surface remains around the edges of the tape to assure a good surface for adhesion of sealant to the P1 backshell potting surface and to the tape as shown in figure D-6A.

(12) Using a tongue depressor, burnish the tape onto the P1 connector.

(13) Assemble the cartridge gun, nozzle and sealant cartridge as follows:

(a) Using a knife, cut approximately one inch (2.5cm) off the end of the nozzle tip. Discard the nozzle tip.

**Warning:** Silicone sealant may be harmful if swallowed. Contact with eyes can cause eye irritation. In the case of contact, immediately flush eyes with water for at least 15 minutes and obtain medical attention.

**Caution:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(b) Wearing rubber gloves, remove and discard the red cap on the end of the sealant cartridge.

(c) Screw the nozzle into the end of the cartridge.

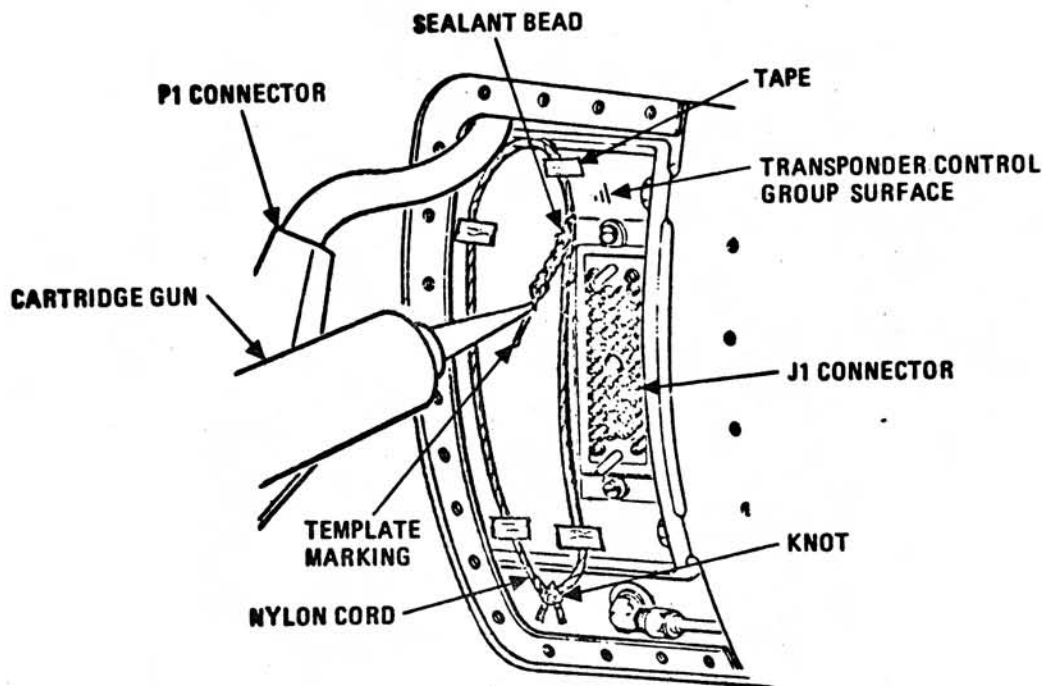


Figure D-5. Application of sealant and nylon cord to transponder control group surface.

(d) Unscrew the body of the cartridge gun from the handle.

(e) Insert the sealant cartridge into the body of the cartridge gun.

(f) Fully retract the notched rod of the cartridge gun handle by rotating the notches upward and pulling on the hooked end of the rod.

(g) Screw the body of the cartridge gun onto the gun handle.

(h) Rotate the notches on the handle rod downward. Squeeze the gun trigger until the sealant appears in the nozzle. Continue squeezing the trigger until the sealant is within approximately 1/2 inch (1 cm) of the nozzle tip.

*Note.* After using the cartridge gun, the sealant will tend to ooze out of the nozzle tip. To avoid an unintentional application of sealant, squeeze a small amount out of the nozzle tip and use a dry cloth to wipe the excess sealant from the tip before applying the next bead of sealant.

(14) Place the P1 connector in a position to avoid interference with the application of sealant on the transponder control group surface.

(15) Using the cartridge gun, apply a continuous bead of sealant approximately 3/16-inch (5mm) wide over the template mark on the transponder control group surface. The mark should be completely covered (see figure D-5). The height of the bead must be a minimum of 1/4 inch (7mm) to assure sealing to the P1 connector potted backshell when P1 is mated to J1.

*Note.* Since the purpose of this procedure is to provide a moisture seal around the P1/J1 interface, it is more desirable to apply a generous amount of sealant than a sparse amount.

(16) Apply a continuous bead of sealant approximately 3/16-inch (5mm) wide over the template mark on the P1 connector potted backshell. The mark should be completely

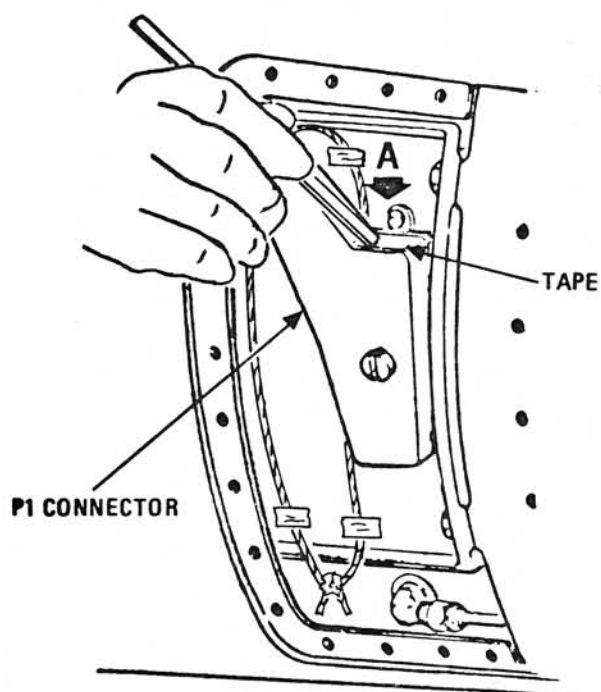
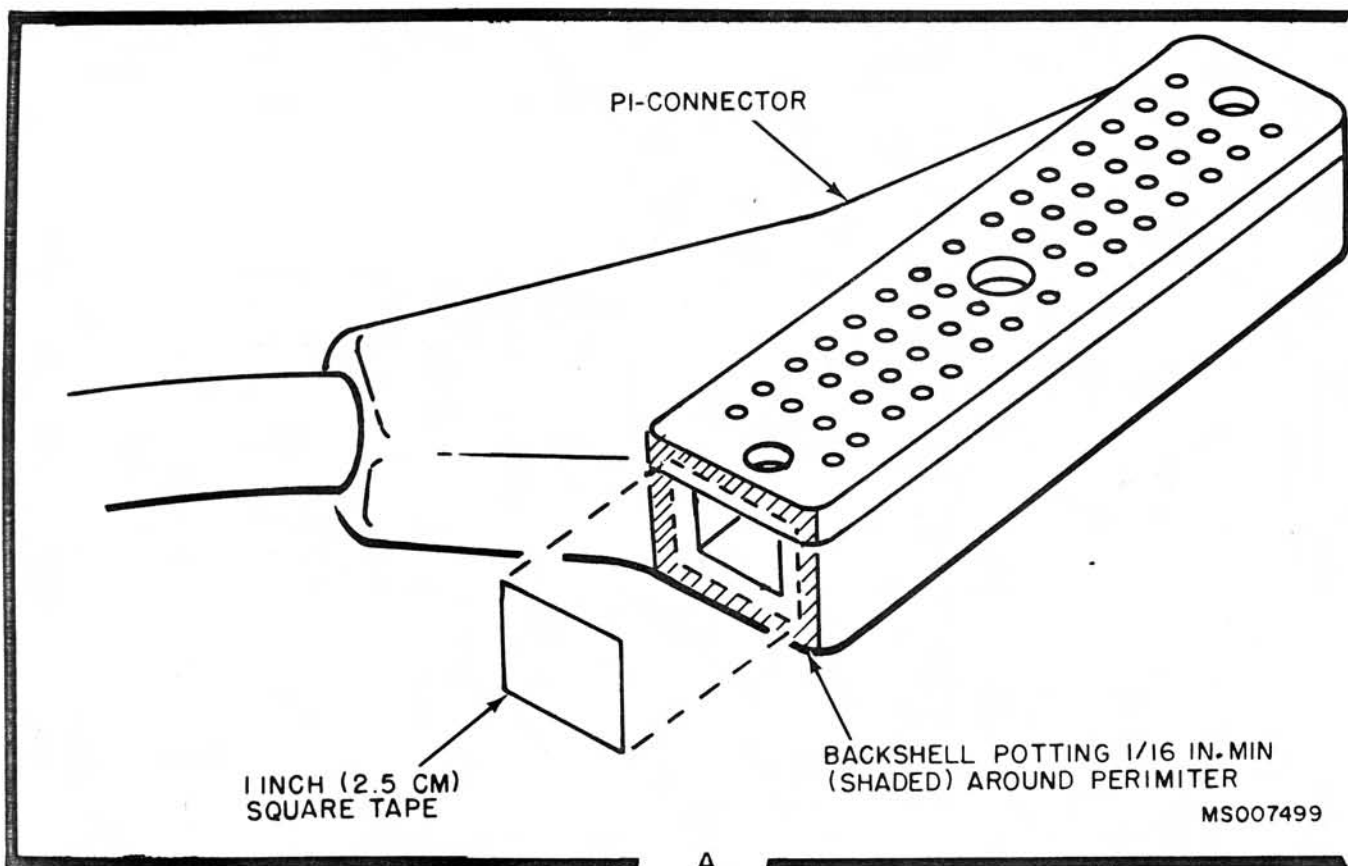


Figure D-6. Tape application over P1 connector guide relief holes—typical top and bottom.



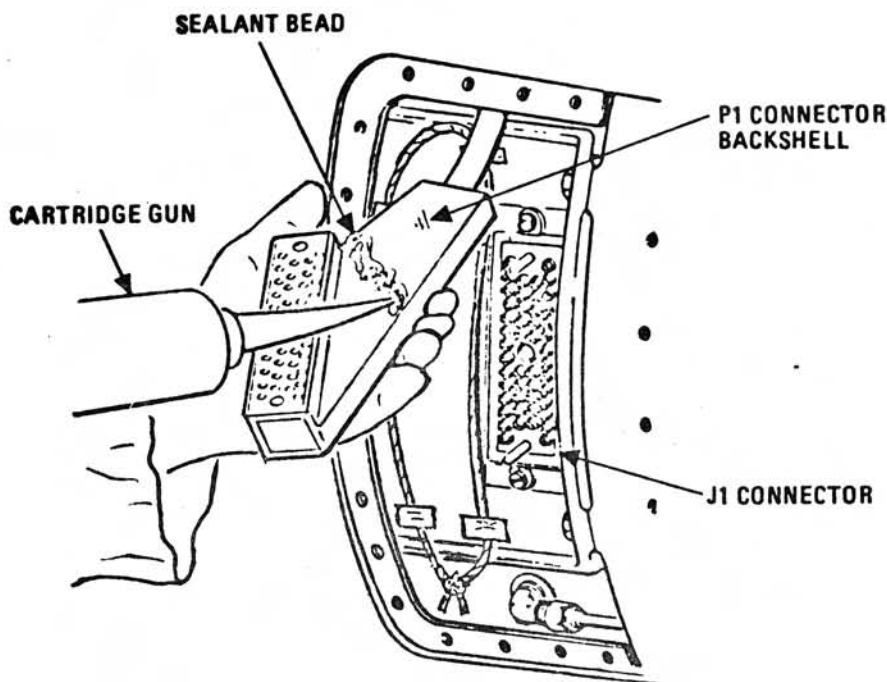


Figure D-7. Application of sealant to P1 connector backshell.

covered (see figure D-7). The height of the bead must be a minimum of 1/4 inch (7mm) to assure sealing to the transponder control group when P1 is mated to J1.

(17) Exercising care not to smear the sealant or to allow sealant on the faces of the connectors, connect P1 to J1. If the sealant is smeared, perform the corrective actions described in *g* below.

(18) Insert the P1 shoulder bolt and torque to  $30 \pm 5$  pound-inches ( $3.4 \pm 0.6 \text{ N}\cdot\text{m}$ ).

(19) Using the inspection mirror, verify that the gap under the P1 potted backshell has been continuously filled with sealant. If there is evidence of voids or gaps between the two sealant beads, perform the corrective actions described in *h* below.

(20) Apply a continuous bead of sealant around connector P1 as follows (see figure D-8):

*Note.* When a bead of sealant is stopped and then restarted, always begin the new bead by overlapping the old bead approximately 1/8 inch (3mm) to assure proper sealing.

(a) Begin at the top aft edge and overlap the squeeze-out from the sealant previously applied to P1 and the transponder control group surface.

(b) Completely cover the gaps between P1 and the transponder control group surface.

(c) Continue applying sealant around the P1 potted backshell to meet and overlap the squeeze-out at the aft diagonal edge of the connector.

(21) Apply sealant to the top and bottom of P1 as follows (see figure D-9):

(a) Work in an "S-motion" as shown on figure D-9A. Overlap each leg of the "S" assuring that each leg sticks to the previous leg.

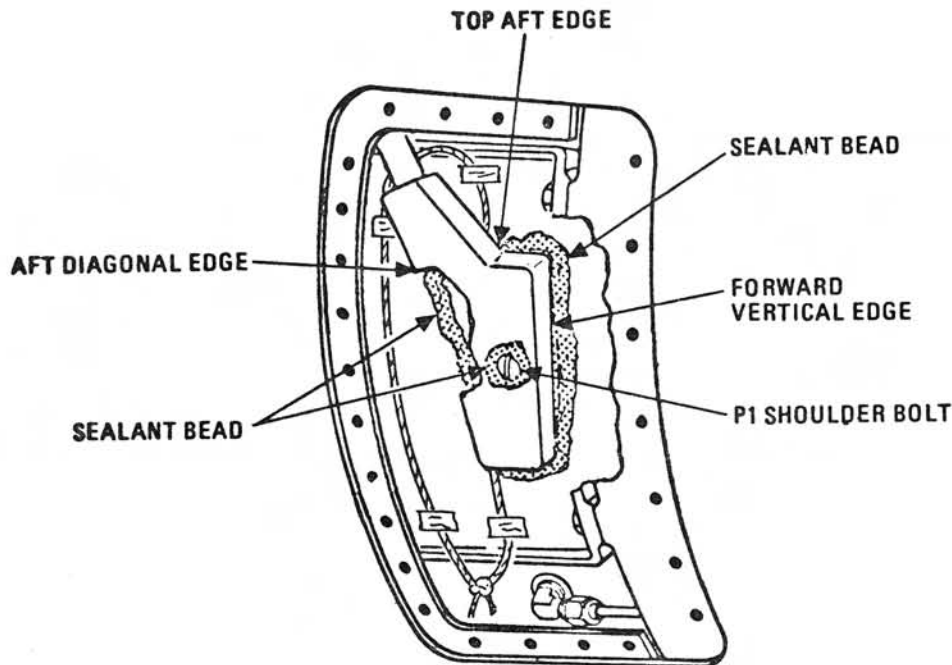


Figure D-8. Application of sealant around P1 connector and shoulder bolt.

(b) Continue applying sealant until the tape applied in (10) and the exposed 1/16-inch (2mm) surface of the potting backshell are completely covered.

(22) Apply sealant around the P1 shoulder bolt leaving the center portion of the bolt slot free of sealant (see figure D-8) to facilitate subsequent removal.

(23) Apply a second sealant bead down the forward vertical edge of P1 by overlapping the previously applied bead and completely covering the metal portion of the connector (see figure D-8).

(24) Using a spatula, smooth the surface of all accessible applied sealant. Assure a continuous sealant surface and remove any excess material (see figures D-10 and D-11).

*Note.* The spatula must be used with a light touch to avoid the formation of gaps and thin sealant coating.

(25) Verify complete sealant application to all connector areas specified in this procedure (see figure D-2) to assure that no voids or gaps exist that would allow moisture to penetrate into the P1/J1 interface area.

(26) Discard any material remaining from sealant kit *b*.

(27) Retain the items from sealant application kit *a* for subsequent use.

(28) Clean the hands with the hand cream to minimize the drying and irritating affect of the cleaning and sealant materials.

*e.* Replace the J1 + XMTR access door in accordance with paragraph 7-6*k*.

*f.* If this sealing procedure was performed at the launching area, perform the quarterly checks of the missile in accordance with TM 9-1440-250-12/1, table 20, steps 1 through 14 and 16*u*.

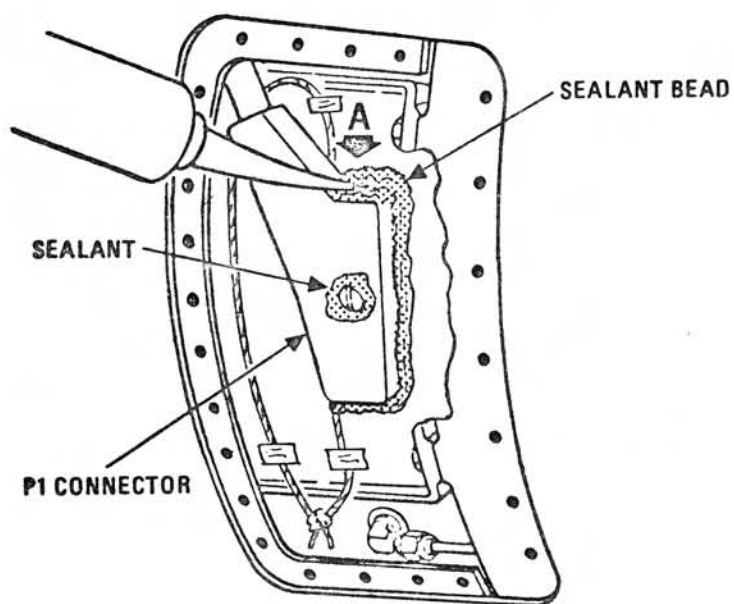
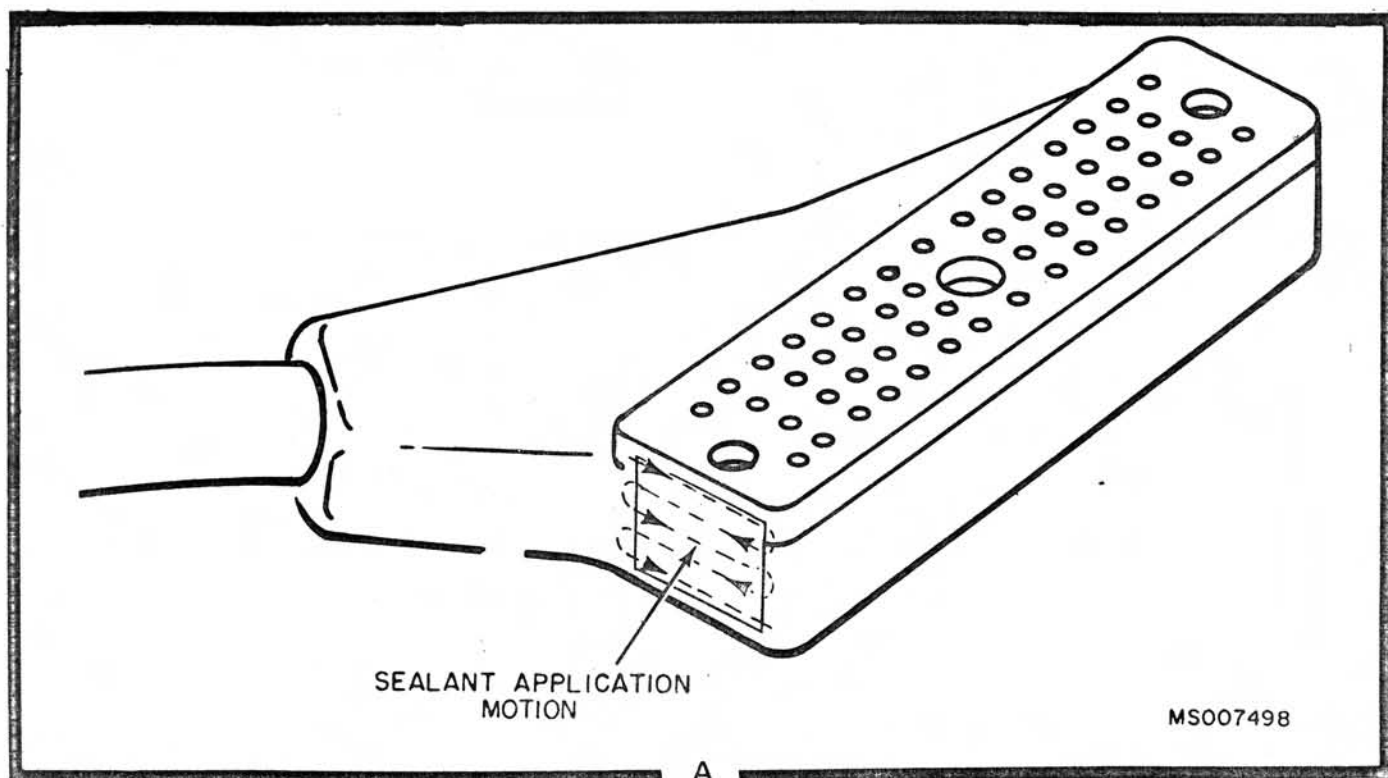


Figure D-9. Sealant application to P1 connector top and bottom.

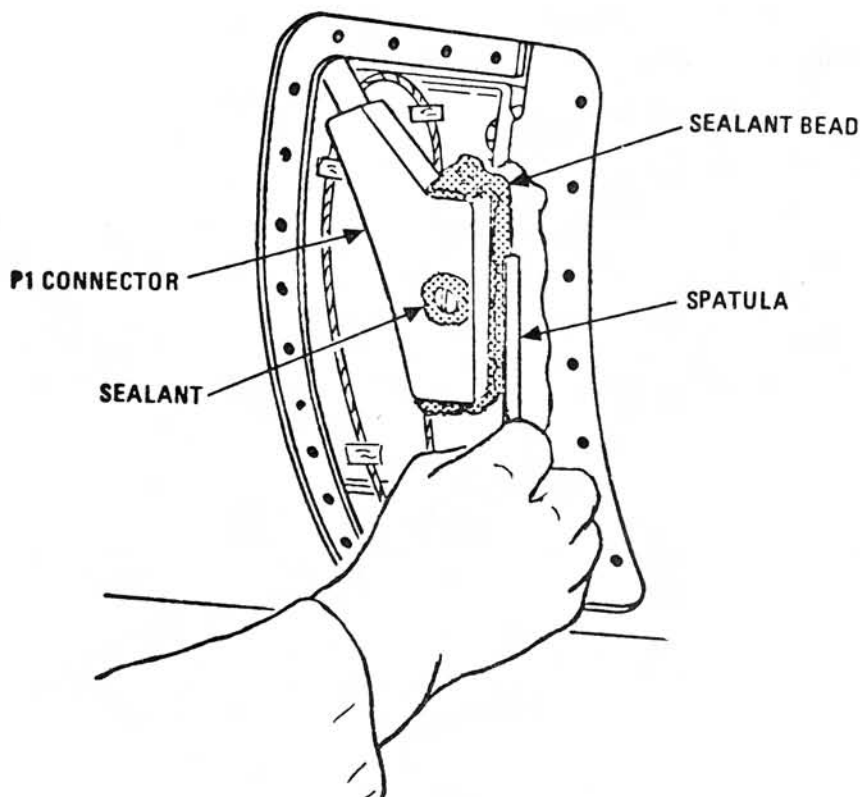


Figure D-10. Completion of sealant application.

g. If sealant was smeared when connecting P1 to J1 in d(17) above, perform the following corrective actions as applicable.

**Warning:** Silicone sealant may be harmful if swallowed. Contact with eyes can cause eye irritation. In case of contact flush eyes with water for at least 15 minutes and obtain medical attention.

**Warning:** Trichloroethane fumes are toxic. The area where trichloroethane solvent is used must be well ventilated. Avoid inhalation of fumes, avoid skin contact with solvent or with cloths moistened with solvent.

**Caution:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(1) Wearing rubber gloves, separate P1 from J1.

(2) Using tongue depressors and a lint free cloth moistened with trichloroethane, remove all sealant from P1 and the transponder control group surface.

(3) Using a dry cloth dry the surface of the transponder control group and P1.

(4) If the template marks on P1 and/or the transponder control group were removed, repeat d(1) through (6) above.

(5) If trichloroethane from the cloth in (2) above was allowed on P1 or J1, dry the connectors in accordance with c above before applying new sealant.

(6) If sealant was allowed on the face of P1 or J1, remove the sealant using a lint free cloth moistened with solvent and an acid brush dipped in trichloroethane; then repeat the sealing procedure beginning with b above.

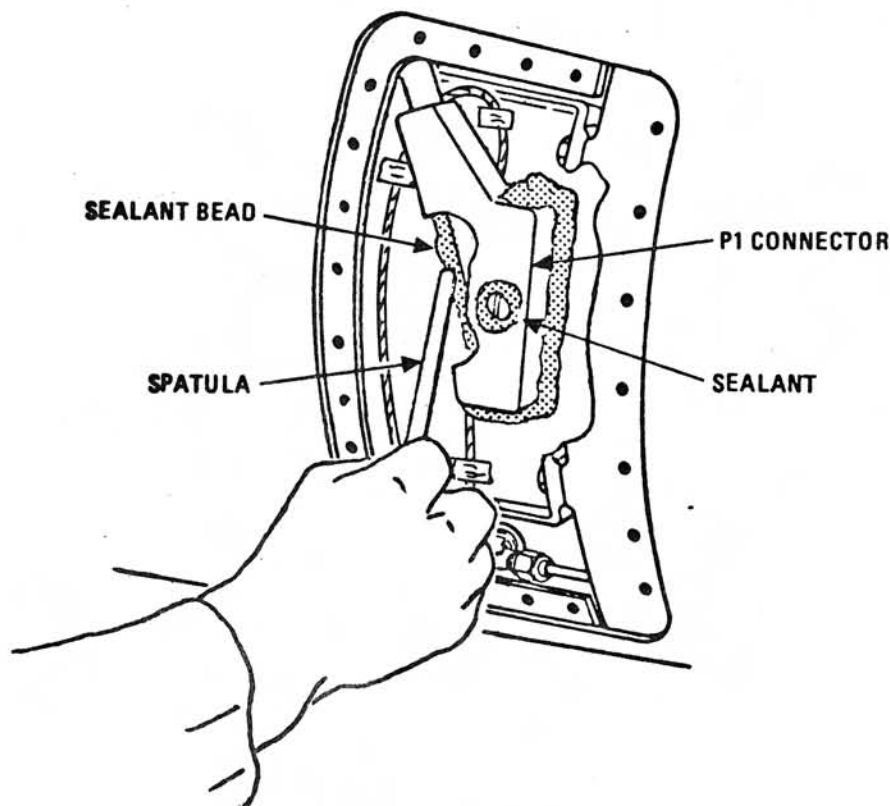


Figure D-11. Completion of sealant application.

**h.** If voids or gaps in the sealant beads were detected when performing d(19) above, perform the following corrective actions as applicable:

**Warning:** Silicone sealant may be harmful if swallowed. Contact with eyes can cause eye irritation. In case of contact flush eyes with water for at least 15 minutes and obtain medical attention.

**CAUTION:** Talc may inhibit the effectiveness of the sealing compound. Insure that the gloves are clean and free of talc by washing the exterior of the gloves with trichloroethane solvent prior to applying or removing sealant.

(1) Wearing rubber gloves, remove the shoulder bolt securing P1 to J1.

(2) Exercising care not to allow sealant on the face of the connectors, disconnect P1 from J1.

**Warning:** Trichloroethane fumes are toxic. The area where trichloroethane solvent is used must be well ventilated. Avoid inhalation of fumes, avoid skin contact with solvent or with cloths moistened with solvent.

(3) Using tongue depressors and a lint free cloth moistened with trichloroethane, remove all sealant from P1 and the surface of the transponder control group.

(4) Using a dry cloth, dry the surface of the transponder control group and P1.



(5) If the template marks on P1 or the transponder control group surface were removed, repeat *d*(1) through (6) above.

(6) If trichloroethane in (3) above was allowed on P1 or J1, dry the connectors in accordance with *c* above before applying new sealant.

(7) If sealant was allowed on the face of P1 or J1, remove the sealant using a lint free cloth moistened with solvent and an acid brush dipped in trichloroethane; then repeat the sealing procedure beginning with *b* above.

*i.* If the transponder control group wiring harness connector P1 is to be disconnected from the transponder control group connector J1, and if sealant has been previously applied to the interface area, perform the following procedure:

(1) Obtain the following items from supply:

<i>Item Name</i>	<i>Qty</i>
Orangewood sticks	4
Tongue depressors	6
Knife, Craftsman's taper point 4 inch (10cm) or equivalent	1
Stepladder, heavy duty, 8 ft. (2.5m)	1 <sup>1</sup>

(2) Remove the flathead screws (2, fig. 3-27) that secure the J1 + XMTR ACCESS DOOR to the right side of the forward body section; remove the access door.

(3) Remove the tape securing the cord to the transponder control group surface as shown on figure D-2.

(4) Pull down on the cord to cut the sealant bead under the P1 connector potting backshell.

(5) Discard the cord.

(6) Using the knife, cut the sealant which is applied around the perimeter of P1.

(7) Reach through the right access opening, and remove the shoulder bolt (8, fig. 7-9) that secures transponder control group wiring harness connector P1 (9, fig. 7-9) to the transponder control group connector J1 (6, fig. 7-9).

(8) Disconnect P1 from J1.

**Caution:** Exercise care not to damage the J1 pins.

(9) Using the orangewood sticks and tongue depressors scrape the sealant material from the P1 potting backshell and the transponder control group surface.

*Note.* Remove as much sealant as possible. However, it is not necessary to remove every small piece of sealant.

<sup>1</sup> Required if procedure is performed in launching area.

By Order of the Secretary of the Army:

**E. C. MEYER**  
*General, United States Army*  
*Chief of Staff*

Official:

**ROBERT M. JOYCE**  
*Brigadier General, United States Army*  
*The Adjutant General*



# SOMETHING WRONG WITH THIS MANUAL?

THEN...JOT DOWN THE  
DOPE ABOUT IT ON THIS  
FORM, TEAR IT OUT, FOLD  
IT AND DROP IT IN THE  
MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER

DATE

TITLE

TM 9-1410-1250-12/1 (FMS)

31 July 1981

Op/Org Maint Manual: Intercept-  
Aerial Guided Missile

BE EXACT...PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG  
AND WHAT SHOULD BE DONE ABOUT IT:

PAGE  
NO.

PARA-  
GRAPH

FIGURE  
NO.

TABLE  
NO.

TEAR ALONG DOTTED LINE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

FILL IN YOUR  
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

POSTAGE AND FEES PAID  
DEPARTMENT OF THE ARMY

DOD-314

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, \$300

Commander  
U. S. Army Missile Command  
ATTN: DRSMI-SNPM  
Redstone Arsenal, AL 35898

FOLD BACK

TEAR ALONG DOTTED LINE

# SOMETHING WRONG WITH THIS MANUAL?



THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

CDR, 1st Bn, 65th ADA  
ATTN: SP4 John Doe  
Key West, FL 33040

DATE 14 January 1975

PUBLICATION NUMBER

TM 9-1430-550-34-1

DATE

7 Sep 72

TITLE

Unit of Radar Set AN/MPQ-50  
Tested at the HFC

BE EXACT... PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PAGE NO.

PARA-GRAPH

FIGURE NO.

TABLE NO.

9-19

9-5

"B" Ready Relay K11 is shown with two #9 contacts. That contact which is wired to pin 8 of relay K16 should be changed to contact #10.

21-2

step 1C

21-2

Reads: Multimeter B indicates 600 K ohms to 9000 K ohms.

Change to read: Multimeter B indicates 600 K ohms minimum.

Reason: Circuit being checked could measure infinity. Multimeter can read above 9000 K ohms and still be correct.

## NOTE TO THE READER:

*Your comments will go directly to the writer responsible for this manual, and he will prepare the reply that is returned to you. To help him in his evaluation of your recommendations, please explain the reason for each of your recommendations, unless the reason is obvious.*

*All comments will be appreciated, and will be given immediate attention. Handwritten comments are acceptable.*

*For your convenience, blank "tear out" forms, preprinted, addressed, and ready to mail, are included in this manual.*

SAMPLE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SP4 John Doe, Autovon 222-2222

SIGN HERE

*John Doe*



