

## CHAPTER 9

### JOINING PROCEDURES FOR THE MISSILE BODY AND ROCKET MOTOR CLUSTER

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#### Section I. TRANSPORTING THE MISSILE BODY AND THE ROCKET MOTOR CLUSTER TO THE LAUNCHING AREA

##### 9-1. 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 with a maximum ground resistance of 20 ohms must be attached from the component to a grounding stake. 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.

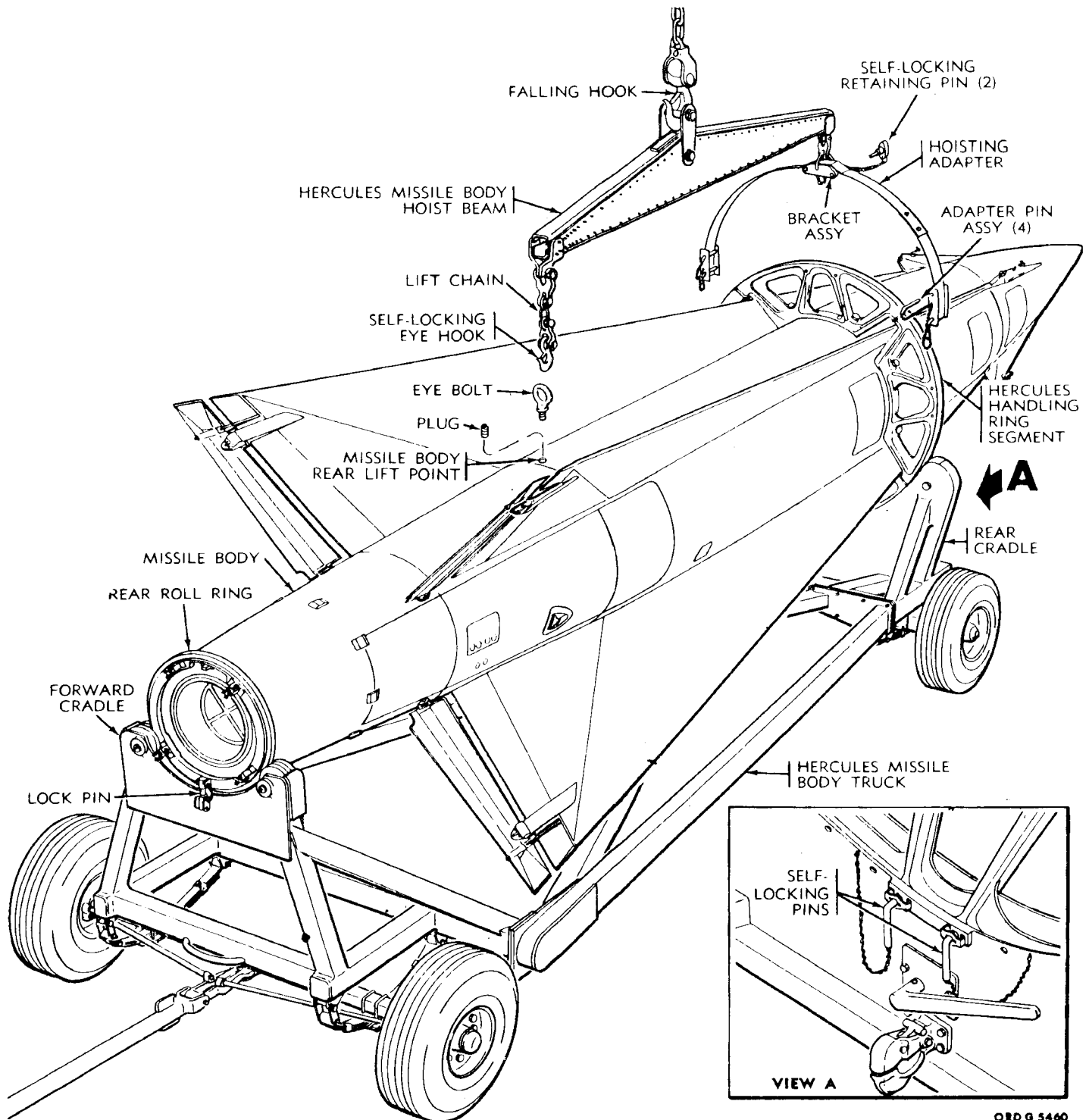
*b.* Attach the falling hook (fig. 9-1) to the missile body hoist beam.

*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 eyhook.



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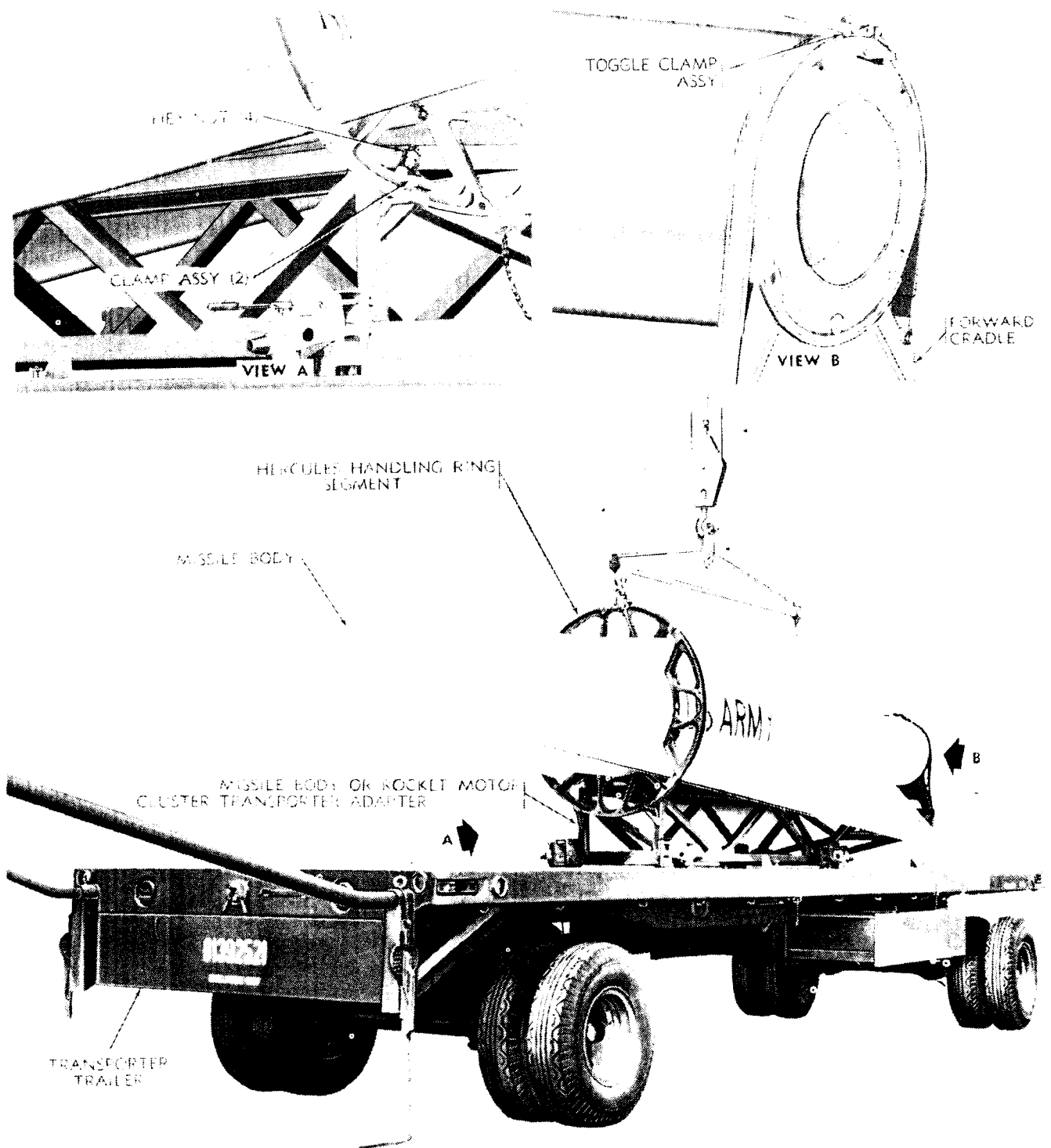
Figure 9-1. Missile body on the missile body truck.

**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 *l* below.

*l.* Raise the missile body hoist beam slightly to apply tension to the hoist beam.

*m.* Remove the lock pin that secure 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.

*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).

*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 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 hexagon-head screws (12) and flat washers (11) that secure the rear retaining rail bars (10) to the rear slippers (13), and remove the retaining rail bars.

*j.* Remove the internal-wrenching or hexagon-head bolts (15) and recessed washers (16) that secure the forward retaining rail bars (21) to the forward slipper assemblies (20), and remove the retaining rail bars.

*k.* Loosen the locknut (19) and the adjusting bolt (18) at each support (17 and 14) to release the rocket motor cluster, and lift the 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).

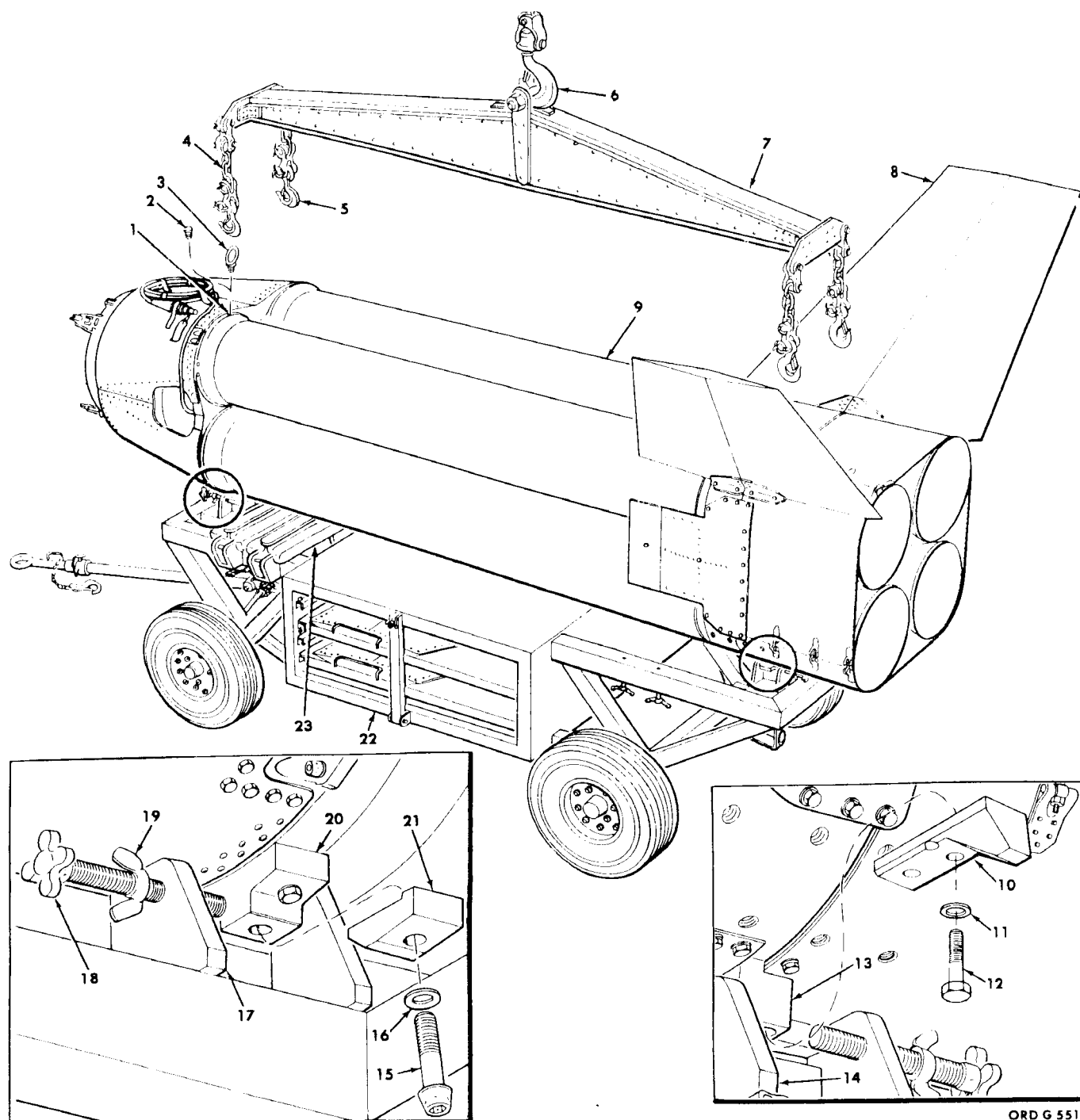
*o.* Remove the self-locking eyehooks (5) from the eyebolts (3).

*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.

*s.* Move the rocket motor cluster to the launching area.



ORD G 5514

- 1—Lift point (4)
- 2—Plug (4)
- 3—5/8-18 x 7/8 eyebolt (4)
- 4—Lift chain (4)
- 5—Self-locking eyehook (4)
- 6—Falling hook
- 7—Rocket motor cluster hoist beam
- 8—Rocket motor cluster fin assembly
- 9—Rocket motor cluster
- 10—Rear retaining rail bar (2)

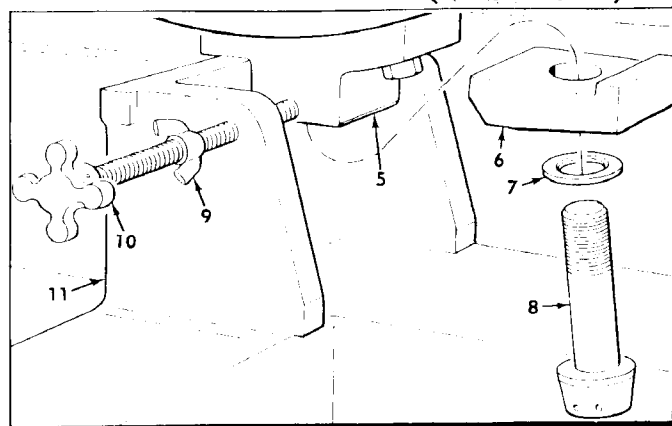
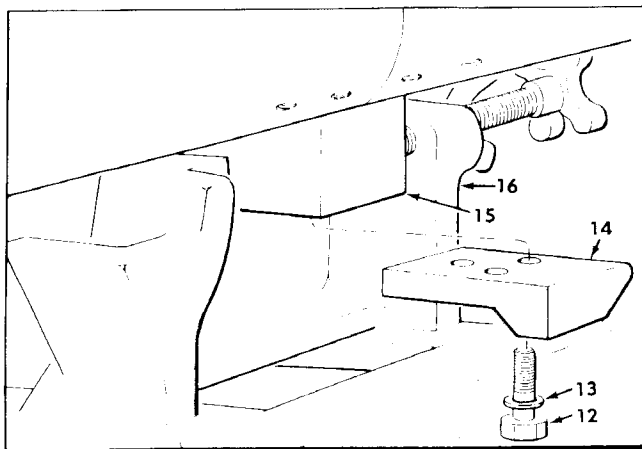
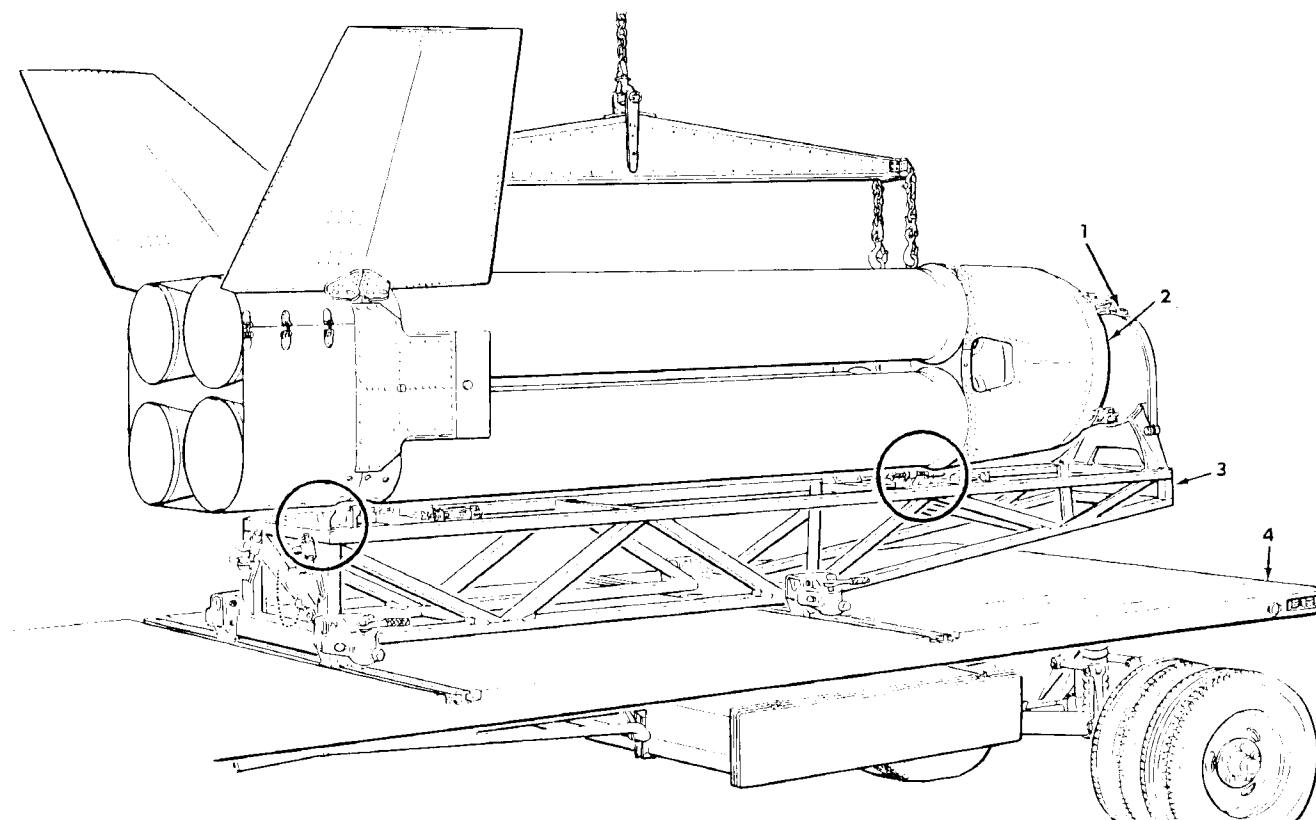
- 11—0.453-in-id fl washer (4)
- 12—7/16-14 x 1-1/2 hex-hd screw (4)
- 13—Rear slipper (2)
- 14—Support (2)
- 15—5/8-18 x 2-9/16 int-wrenching bolt (2) or 5/8-18 x 2.340 hex-hd bolt (2)
- 16—0.636-in-id recessed washer (2)
- 17—Support (2)
- 18—Adjusting bolt (4)
- 19—Locknut (4)

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

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>2,3</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

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
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>2</sup>	16	J105A	A
P72A <sup>2</sup>	17	J105A	B
P72A <sup>2</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	33	J105A	g
P72A	35	J105A	h
P72A	36	J105A	j
P72A	37	J105A	J
P72A	38	J105A	m
P72A	39	J105A	n
P72A	40	J105A	H
P72A	41	J105A	r
P72A	42	J105A	s
P72A	44	J105A	I
P72A	47	J105A	O
P72A <sup>3</sup>	48	J105A	P
P72A	49	J105A	R
P72A	50	J105A	S
P72A	51	J105A	T

<sup>1</sup> The meter indicates infinity. If MWO's ORD Y75-W84 and ORD Y86-W6 have been applied, the meter indicates 135 to 165 ohms.

<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.

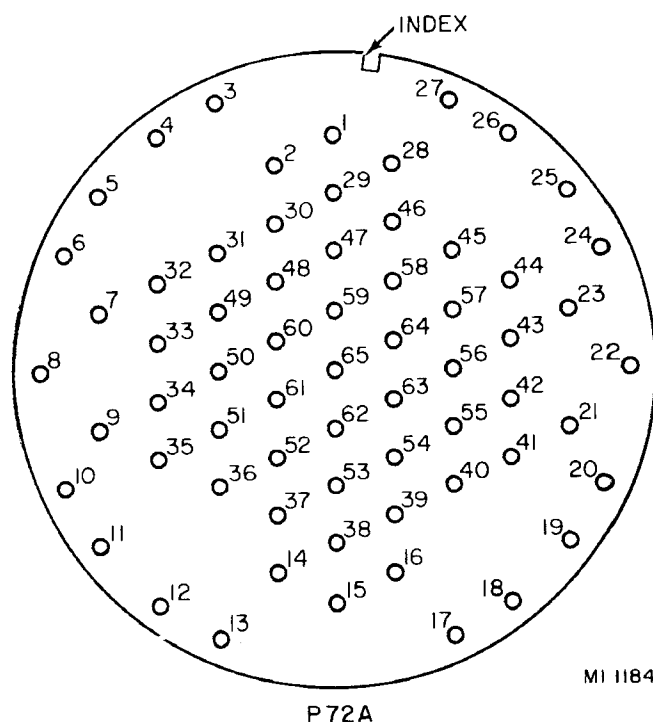


Figure 9-5. Pin location diagram of connector P72A.

**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. 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 of the launching-handling rail is on a launcher, assure that the TEST-FIRE switch is in the TEST position

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.

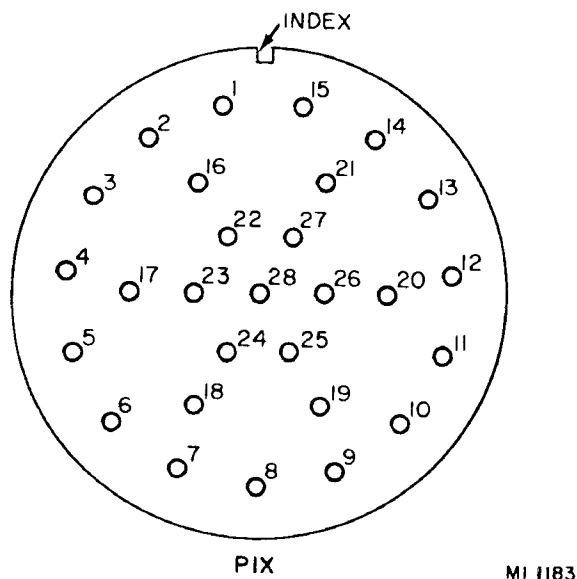
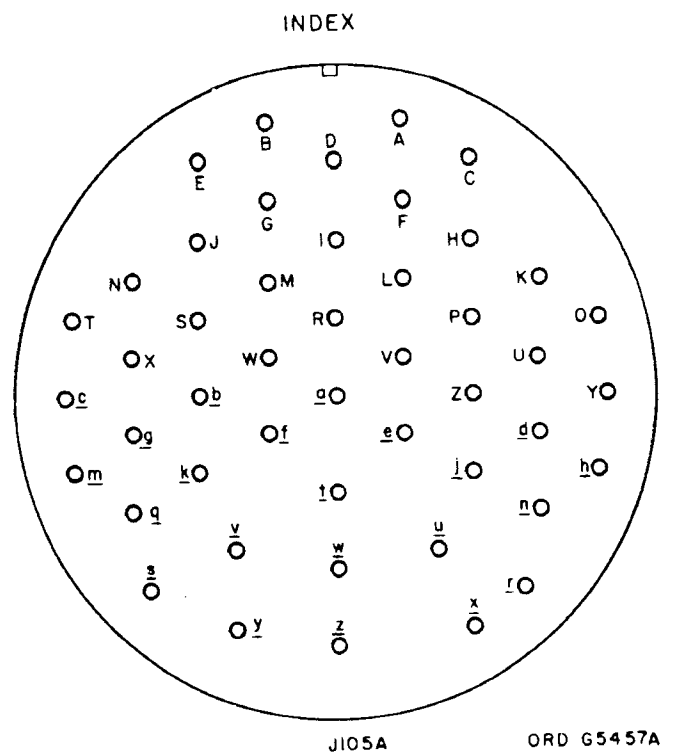
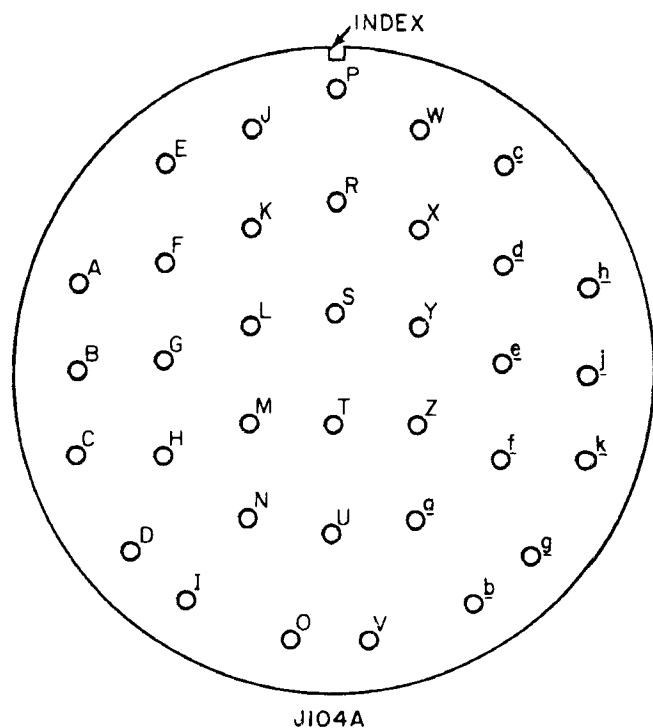


Figure 9-6. Pin location diagrams of connectors J104A and PIX.

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 PIX (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 PIX are properly installed in the dummy connectors on the launching-handling rail prior to performing the joining procedures.

**WARNING:** Refer to TM 9-2330-225-14 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.

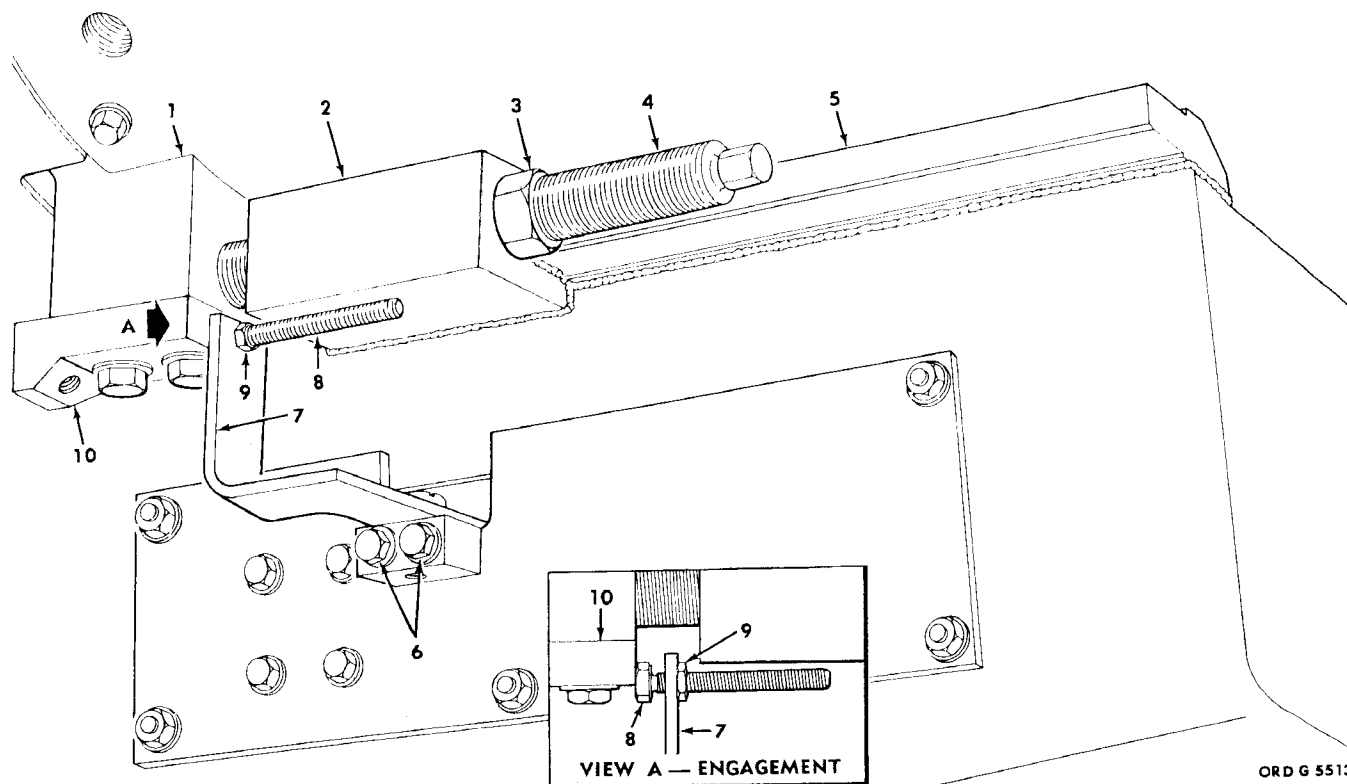
d. Secure the rocket motor cluster (1, fig. 9-10) to the launching-handling rail (2) as prescribed in steps (1) and (2) below.

(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.

*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 holdown 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).

*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-ag 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 Truck or Transporter Adapter

**Note.** If the transporter adapter is used to transport the rocket motor cluster, omit *a* and *a.1* below.

*a.* Perform the lifting procedures (par. 9-2b through *k*).

**Note.** If the rocket motor truck is used to transport the rocket motor, omit *b* through *c.2* below.

*b.* Perform the lifting procedures (para 9-2b 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.

c.1. Remove the internal wrenching hexagon head bolts (8) and recessed washers (7) that secure the forward retaining rail bars (6) to the forward slipper assemblies (5), and remove the forward retaining rail bars.

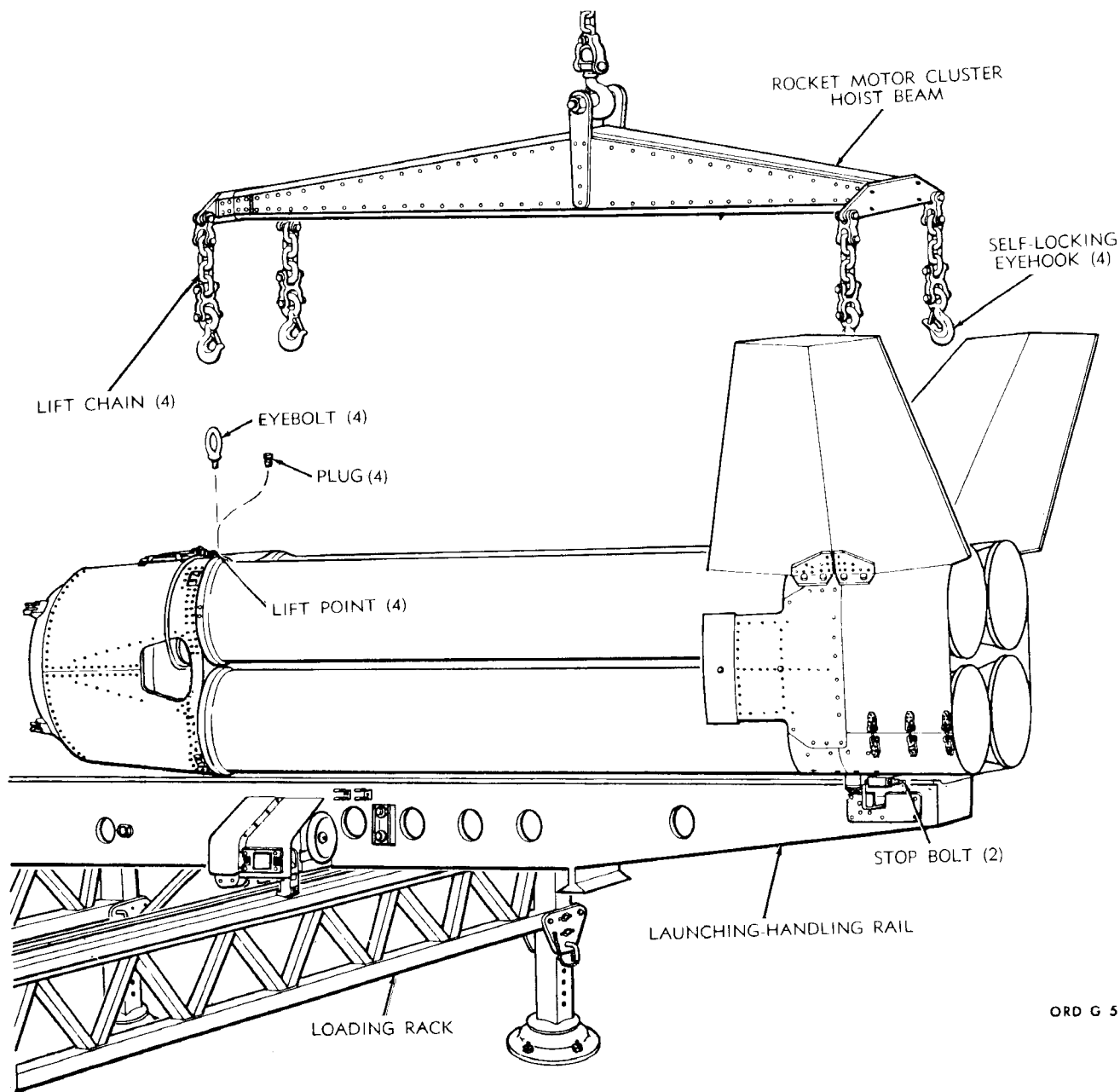
c.2. Loosen the locknut (9) and the adjusting bolt (10) at each support (11 and 16) to release the rocket motor cluster (2); lift the rocket motor cluster clear.

d. Liberally coat the mating surfaces of the launching-handling rail and the forward and

rear slippers, and the mating surfaces of the forward and rear slippers and the forward and rear retaining rail bars with soft-film corrosion-preventive compound.

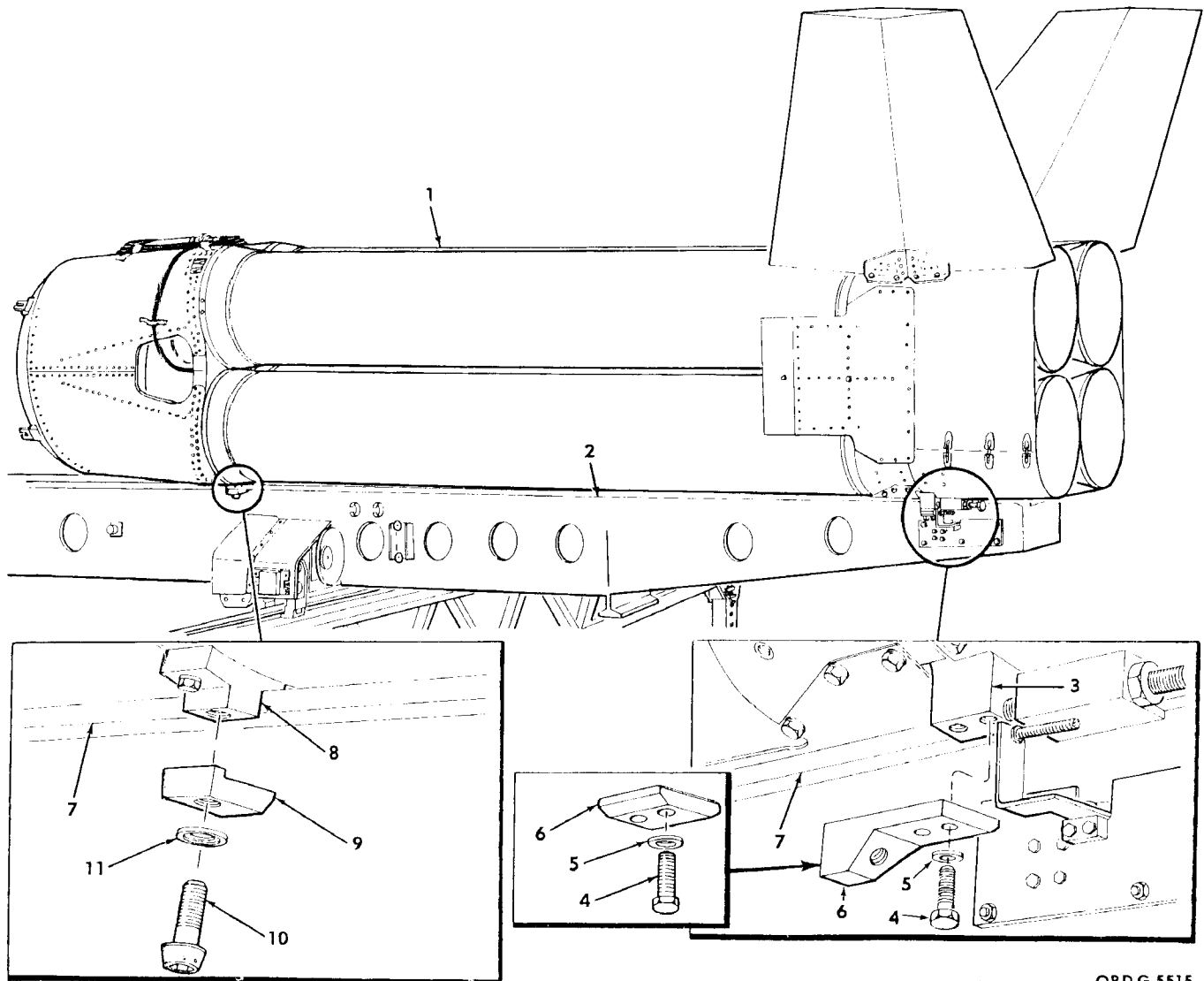
e. Position the rocket motor cluster on the rear end of the launcher-handling rail (fig. 9-9) against the stop bolts.

f. Secure the rocket motor cluster (1, fig. 9-10) to the launching-handling rail (2) as prescribed in steps (1) through (3) below.



ORD G 5555

Figure 9-9. Launching-handling rail in the joining procedure position.



ORD G 5515

- |                                    |  |
|------------------------------------|--|
| 1—Rocket motor cluster             | 7—Launching-handling rail track              |
| 2—Launching-handling rail          | 8—Forward slipper assembly (2)               |
| 3—Rear slipper                     | 9—Forward retaining rail bar (2)             |
| 4—7/16-14 x 1-1/2 hex-hd screw (4) | 10—5/8-18 x 2-9/16 int-wrenching bolt (2) or |
| 5—0.453-in-id fl washer (4)        | 5/8-18 x 2-11/32 hex-hd bolt (2)             |
| 6—Rear retaining rail bar (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.*

(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) 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.

(3) 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.

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.

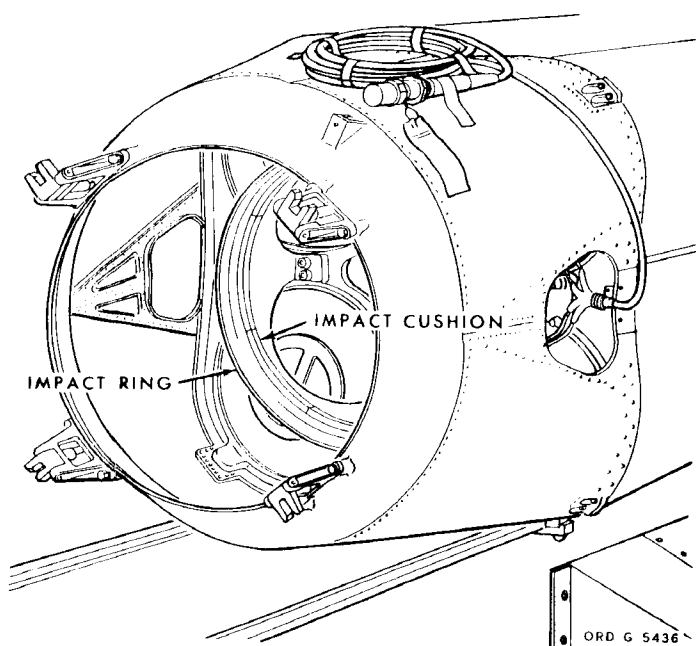


Figure 9-11. Impact ring and cushion in the rocket motor thrust ring assembly.

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.

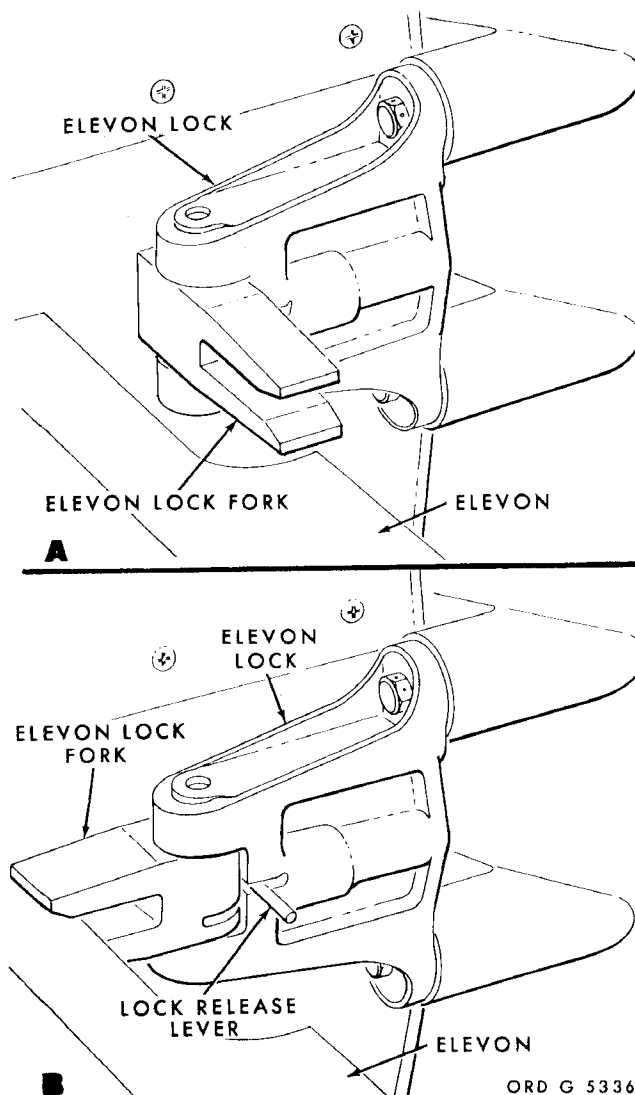


Figure 9-12. Elevon hinge lock operation.

*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.

#### **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.

*Note.* If the missile body has been transported on a missile body truck, perform the procedures in paragraph 9-1*m* instead of *d* and *e* below.

*c.* Prepare the missile body for hoisting (par. 9-1*b* through *l*).

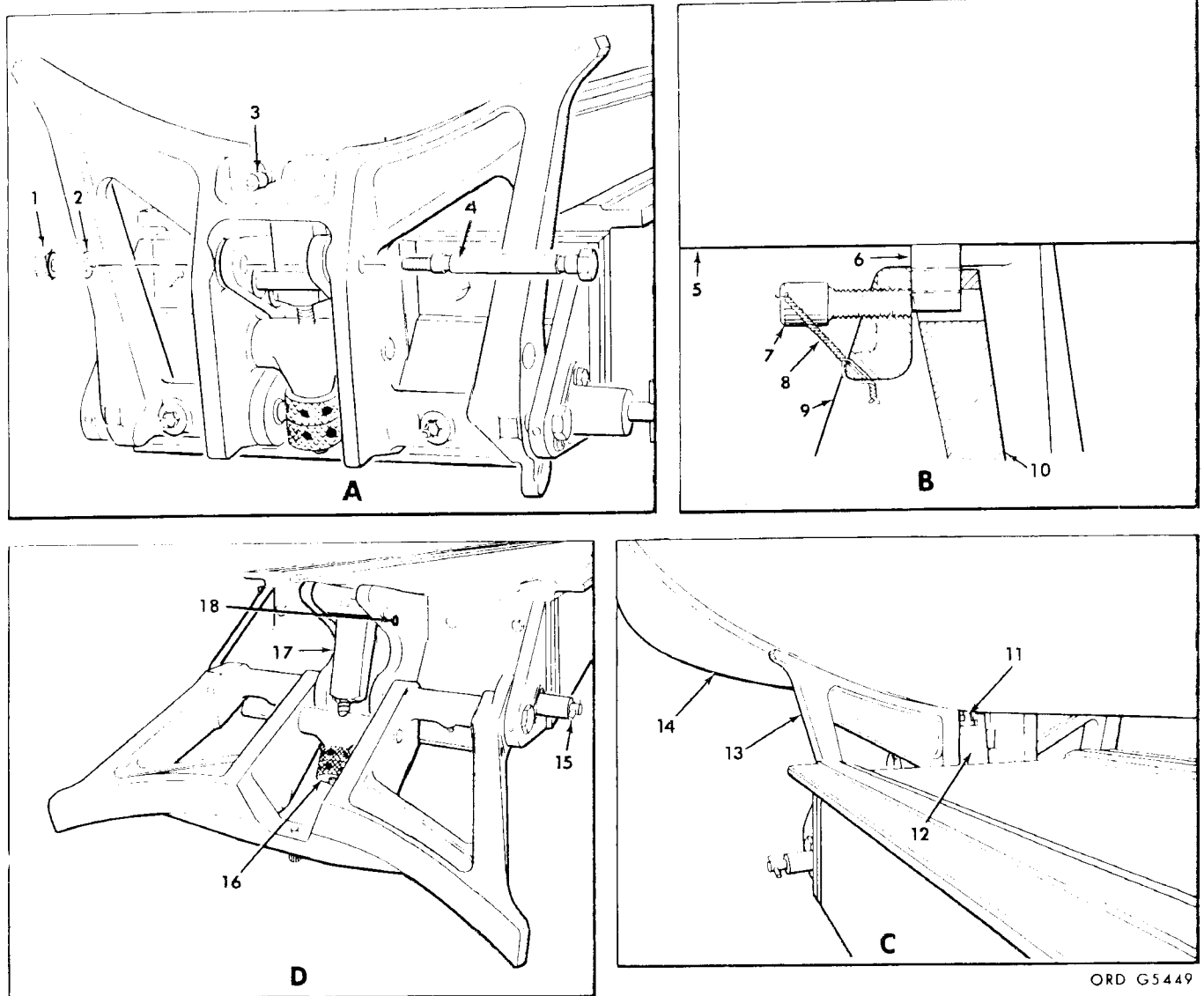
*d.* Release the toggle clamp assembly (view B, fig. 9-2) that secures the missile body to the forward cradle. Loosen the hexagon nuts (view A) that secure the clamp assemblies to the handling ring segment on the rear cradle.

*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

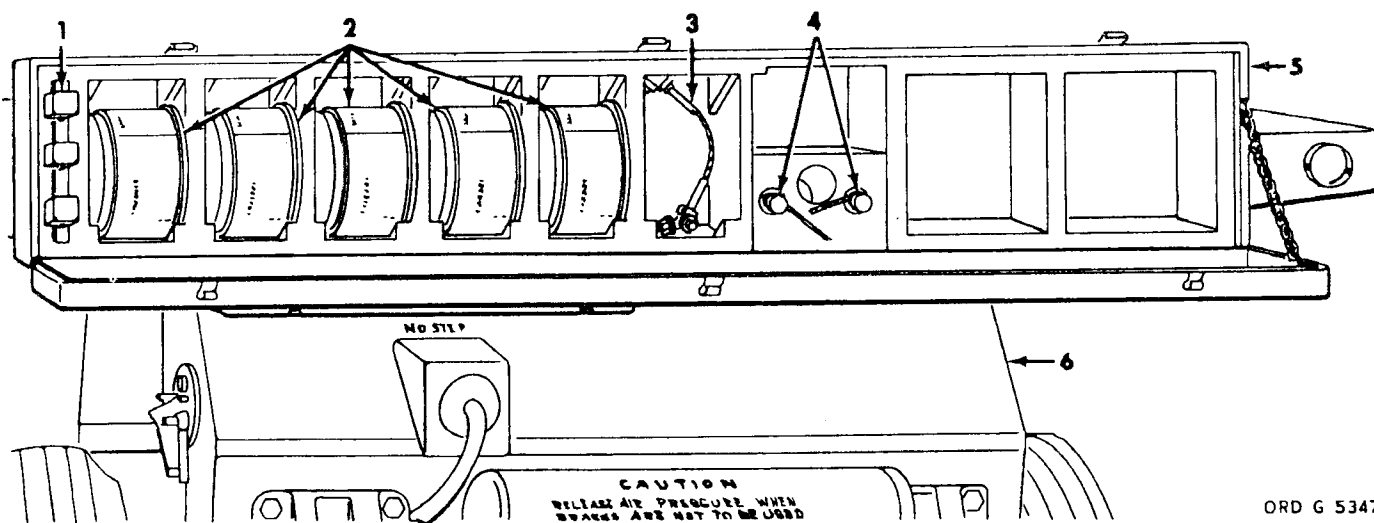
- 15—Yoke latch pin
- 16—Knurled knob (2)
- 17—Holder
- 18—Rear guide pin

Figure 9-13. Disconnection and connection of the rail release.

**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.



- 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.

*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.

**CAUTION:** Do not exceed 300 pound-inches of torque when adjusting the stop bolts to prevent damage to them.

*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) is 100 percent engaged with the holder (10). The forward surface of the T-hook adapter is flush with, or indented up to approximately 1/8 inch from the forward edge of the holder. All references should be made from the forward-upper-inner edges of the holder slot and the most forward point on the T-hook adapter.

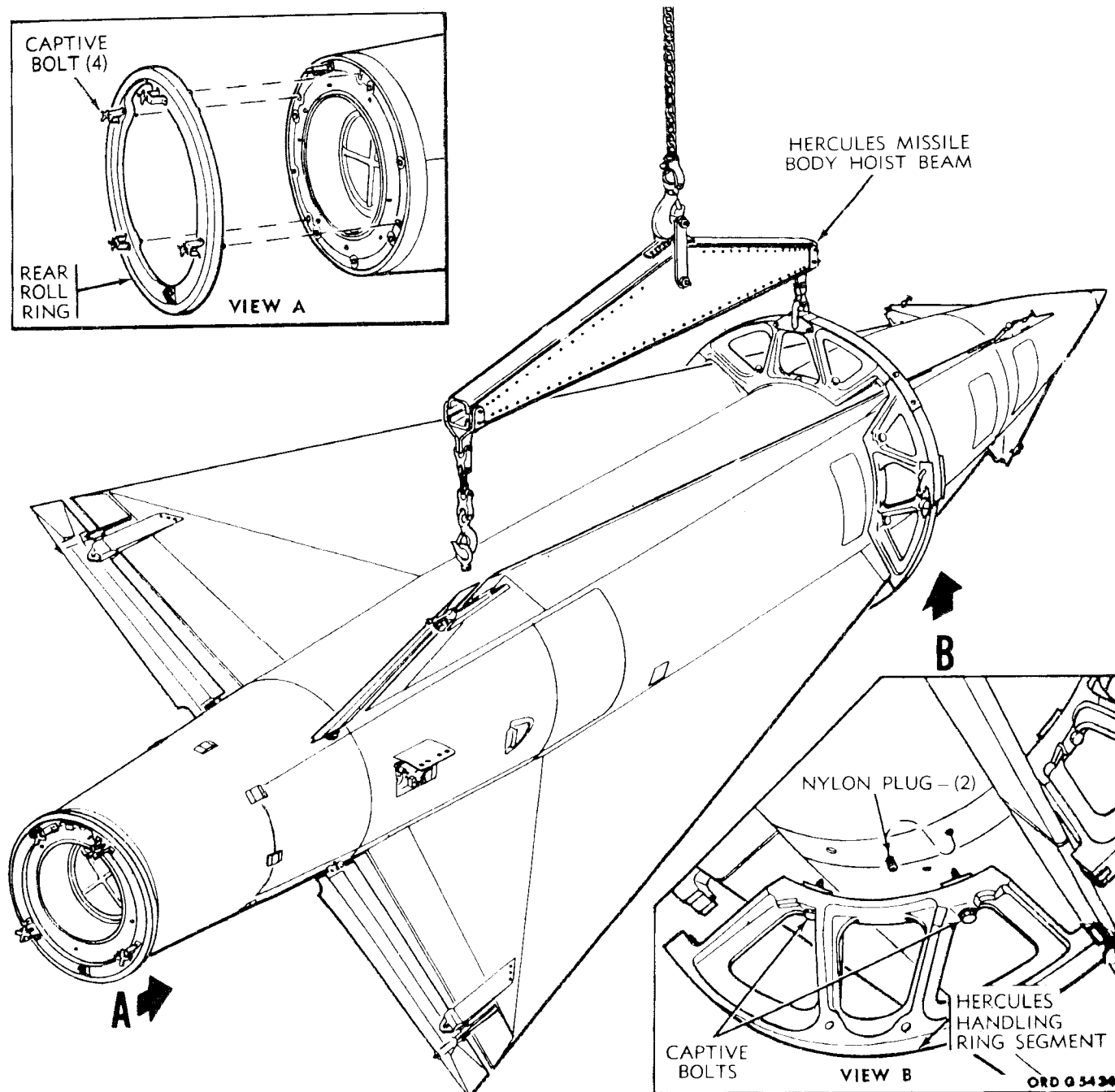


Figure 9-15. Removal and installation of the lower handling ring segment and the rear roll ring.

o. Release the hoisting cable tension.

p. Turn the internal-wrenching bolt or thumbscrew (7) clockwise until the end of the bolt or thumbscrew contacts the forward surface of the T-hook adapter. Tighten fingertight.

**CAUTION:** Do not exceed 300 pound-inches of torque when adjusting the stop bolts to prevent damage to them.

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).

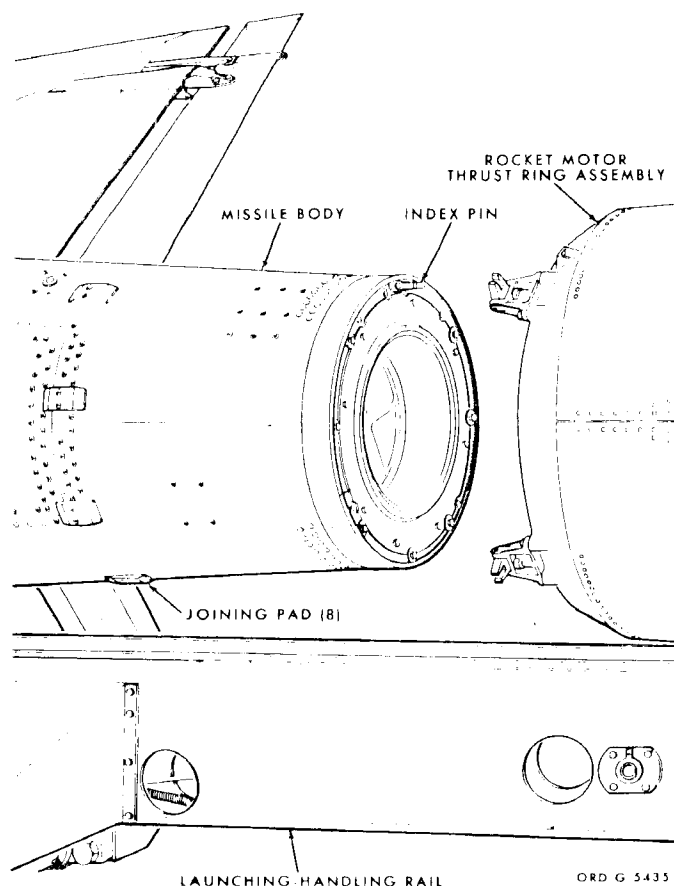


Figure 9-16. Alignment of the missile body and the rocket motor cluster.

**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.

*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.

*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.

*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.

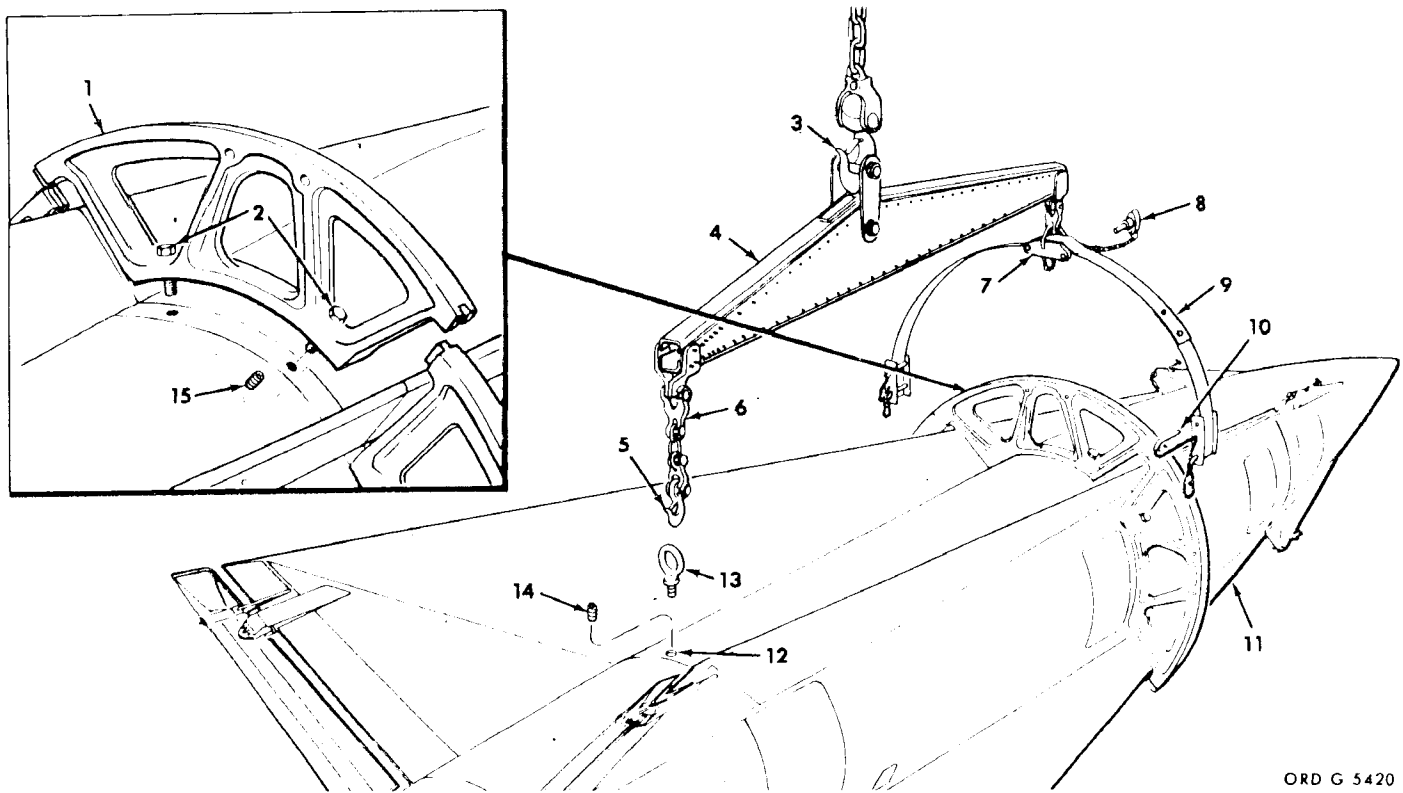
*ah.* Push the launching-handling rail, with the missile attached, onto the launcher erecting beam. Use the inching wheel to move the launching-handling rail until it locks onto the erecting beam.

**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 PIX and P72A to the launcher erecting beam connectors J72D and J1G.

*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 5420

- 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 PIX 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. If no adjustment is required, in-

stall 0.032-inch diameter steel safety wire through the head of the internal-wrenching bolt or thumbscrew and secure to the hole in the yoke assembly.

(1) Loosen the two knurled knobs (16) on the holder (17).

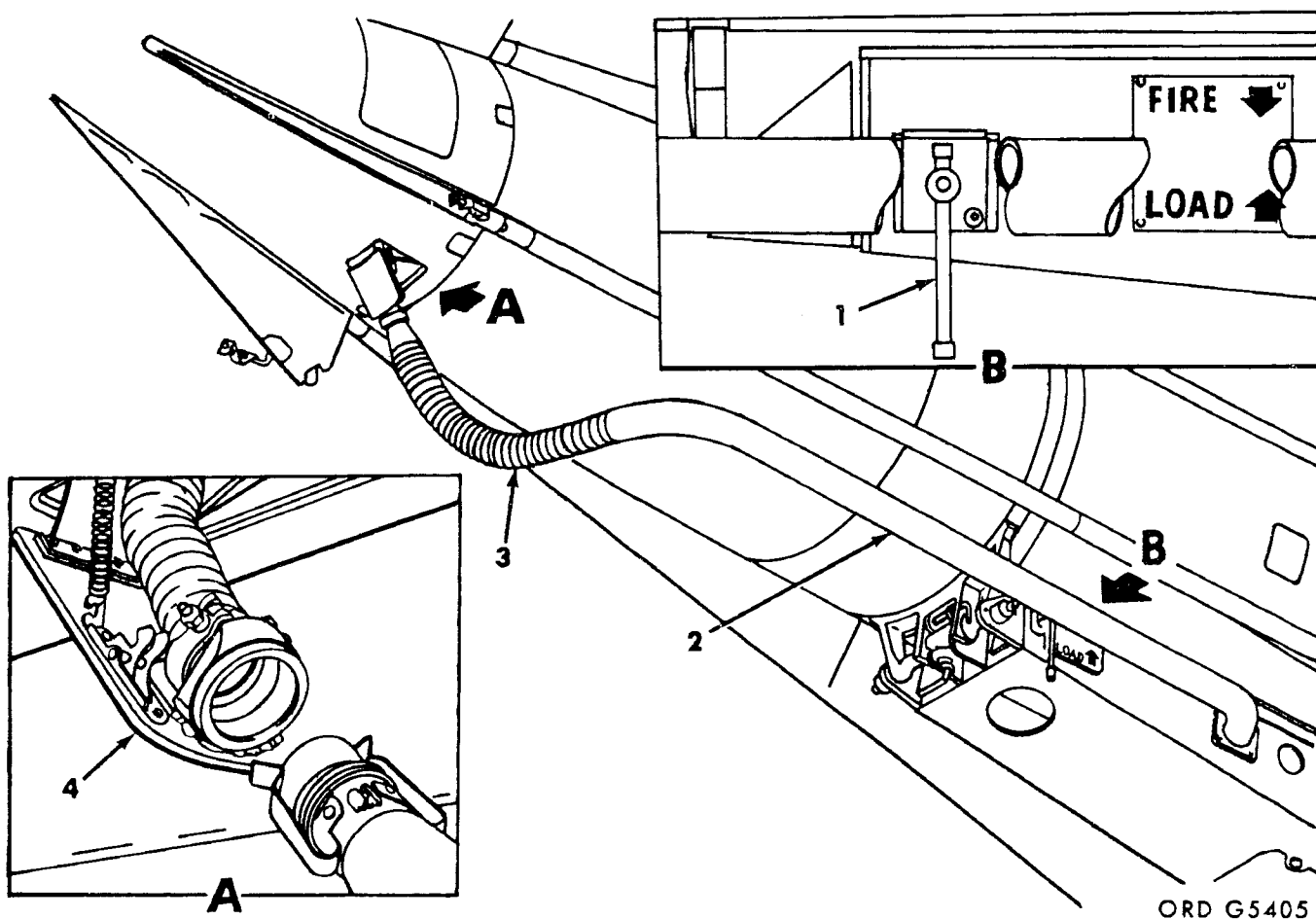
**CAUTION:** Do not exceed 300 pound-inches of torque when adjusting the stop bolts to prevent damage to them.

(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) is 100 percent engaged with the holder (10). The forward surface of the T-hook adapter is flush with, or indented up to  $\frac{1}{8}$  inch from the surface of the holder.

- (3) 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. Tighten finger-tight. Install steel safety wire (8) through the head of the internal-wrenching bolt or thumbscrew, and secure to the hole in the yoke assembly (9).



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 stop bolts to prevent damage to them.

- (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

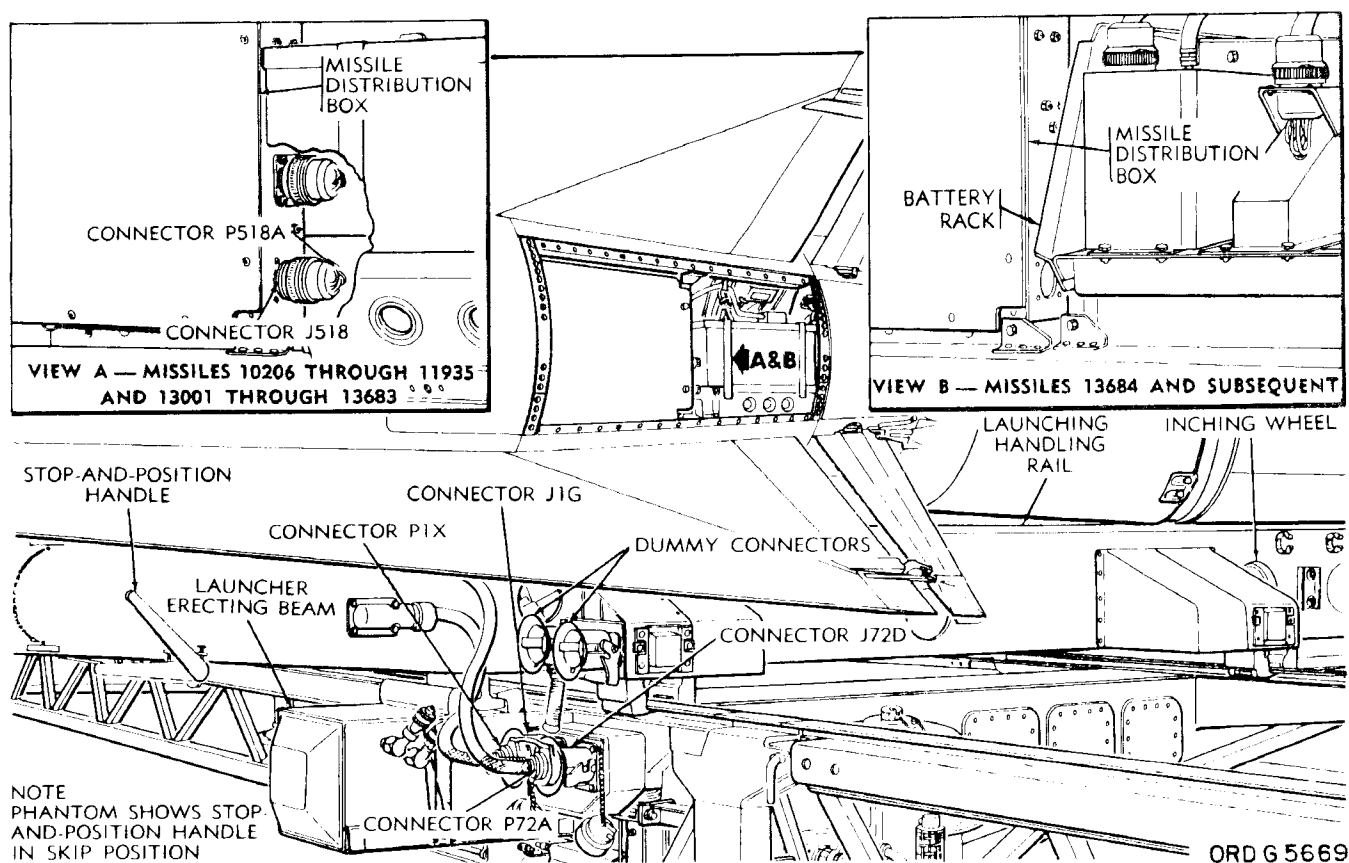


Figure 9-19. Installation of the missile on the launcher.

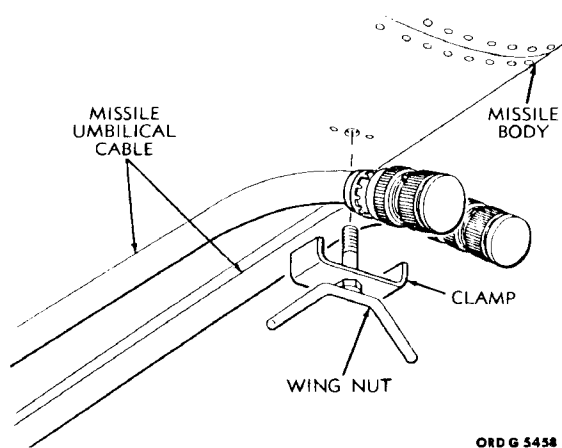


Figure 9-20. Removal and installation of the missile umbilical cable.

(1, fig. 9-21) through the opening in the top of the launching-handling rail (4). Pull the cable (one on either side of the hook latch (3) inside the rail) 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.

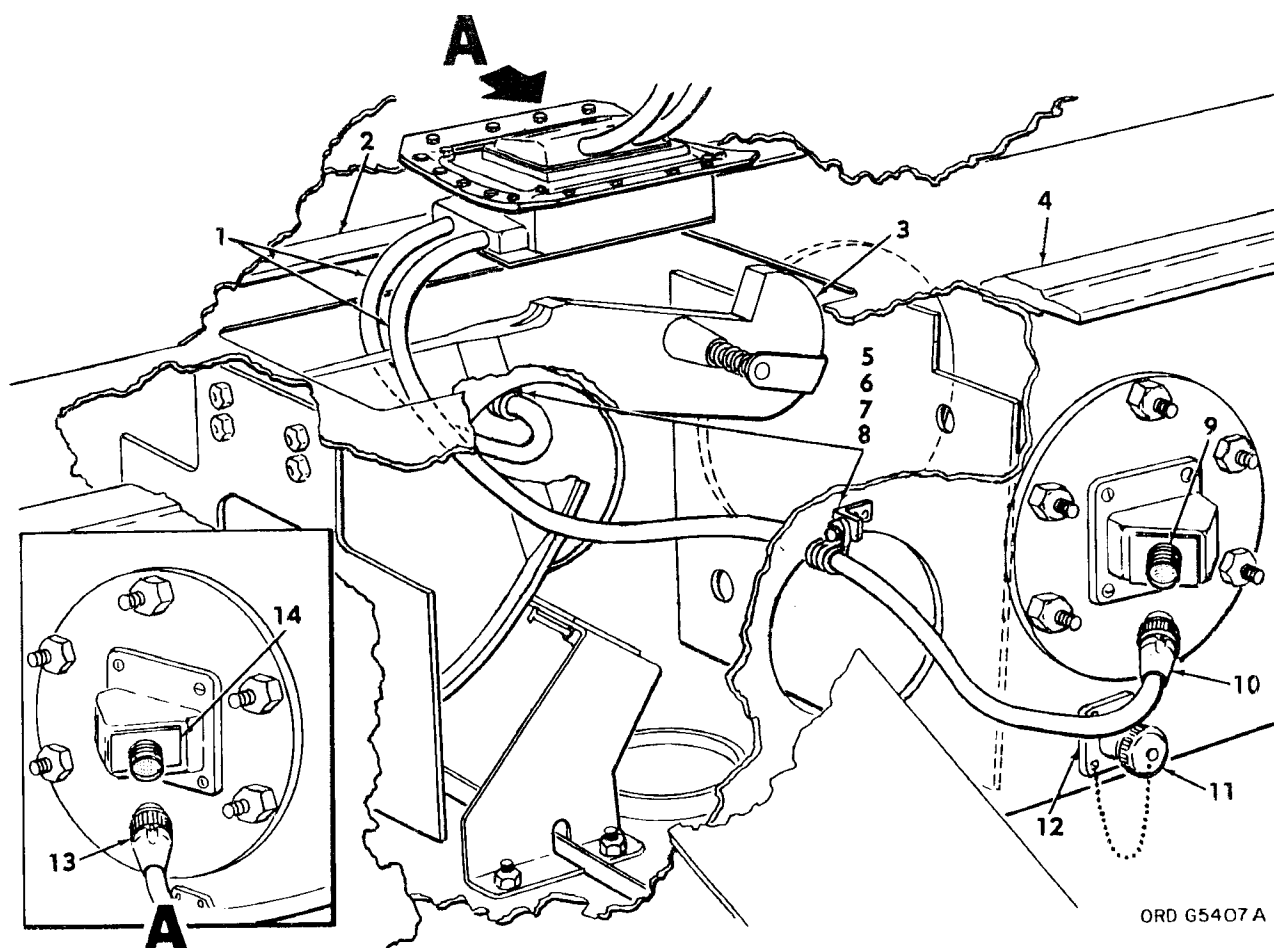
**Warning:** Complete seating of connectors P104A and P105A and the associated coupling nuts must be verified by visual inspection.

*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 G5407 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.

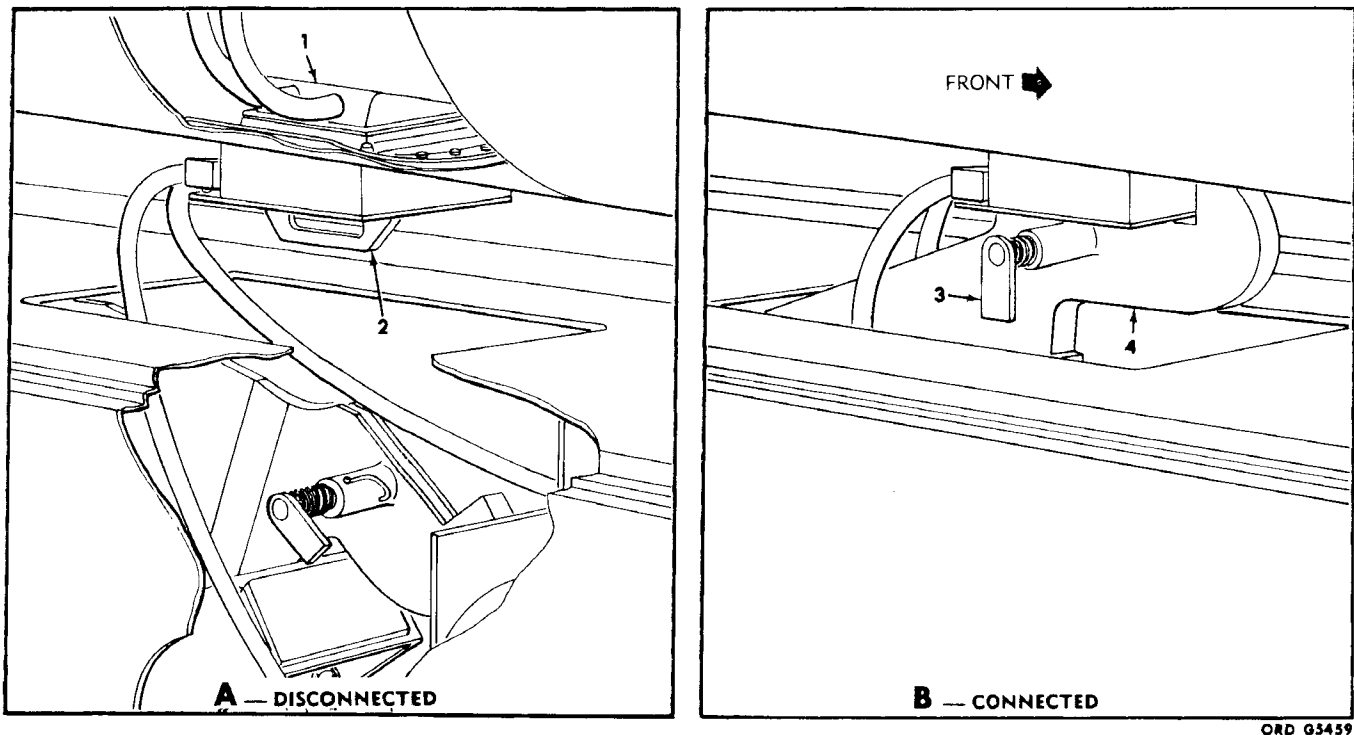
**Caution:** Do not exceed 300 pound-inches of torque when adjusting the stop bolts to prevent damage to them.

- (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.





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,

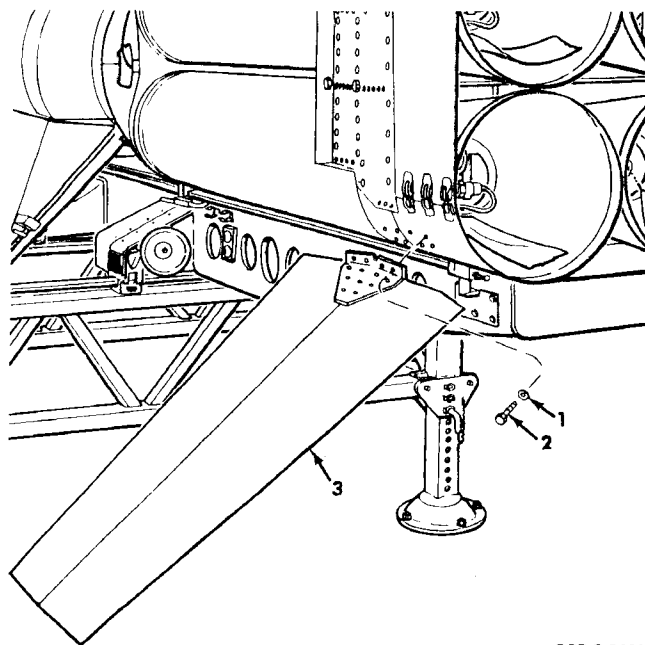
tighten the lower knurled knob until it is snug against the upper knurled knob.

*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.



- 1—3/8-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.