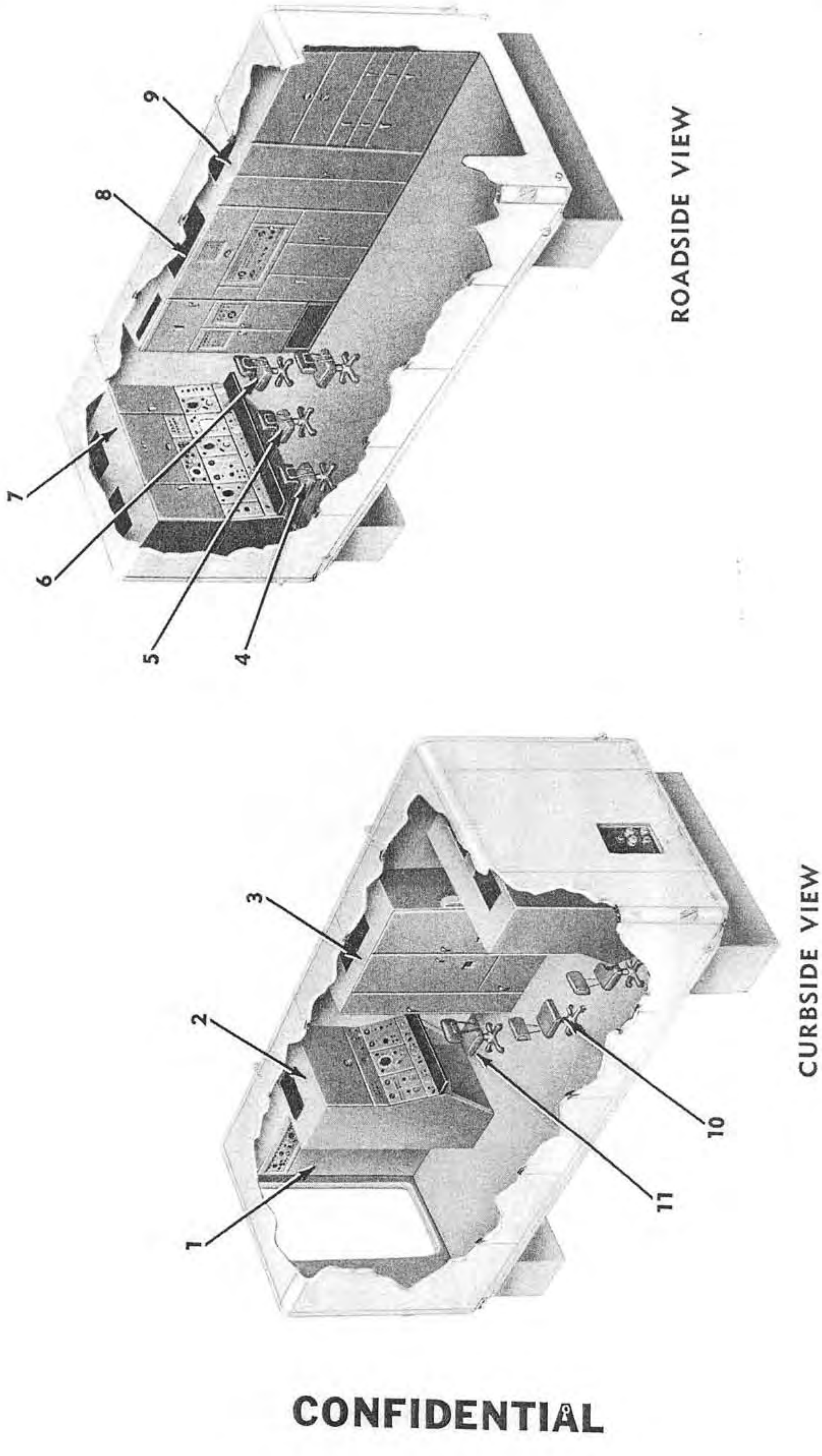
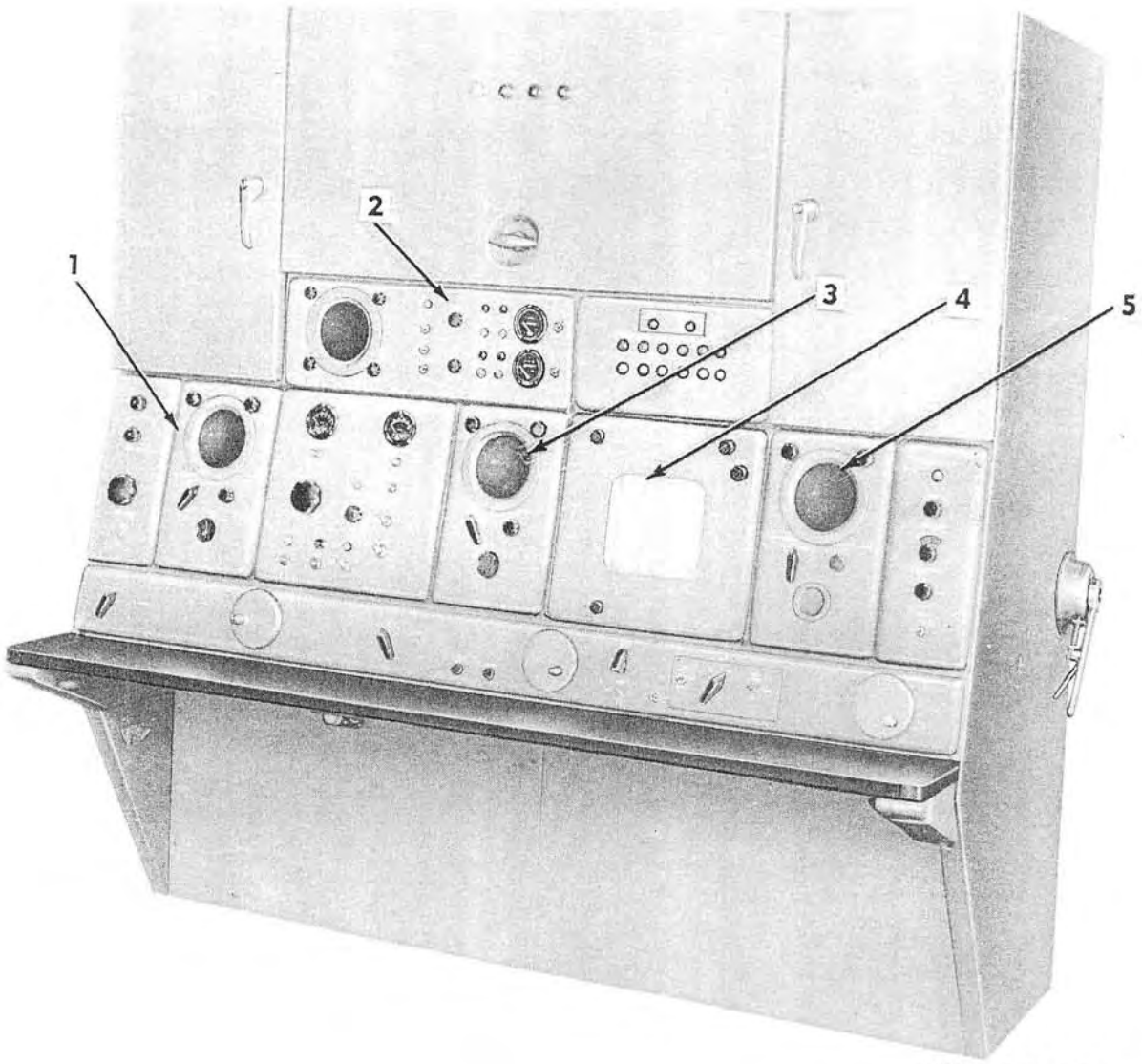


ORD G62100

Figure 20 (U). Trailer mounted tracking station – cutaway view.



ORD G30673

1. Elevation indicator
2. Countermeasures control-indicator
3. Azimuth indicator
4. B scope indicator
5. Target range indicator

Figure 21 (CMHA). Target radar control console.

24 (CMHA). Trailer Mounted Tracking Station

The trailer mounted tracking station (fig. 20) contains the equipment required for operating the target tracking, target ranging, and missile tracking radar systems. Major units located within the trailer mounted tracking station are described in *a* through *f* below.

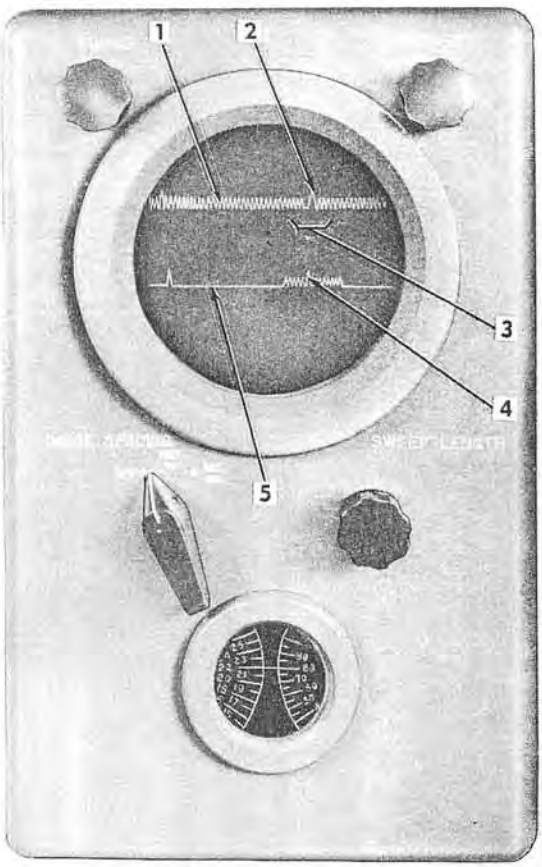
a. Radar Coder Set. The radar coder set (9, fig. 20) is located against the curbside wall of the trailer mounted tracking station. The radar coder set consists of equipment that converts computer data into steering and burst orders which are transmitted to the NIKE-HERCULES missile. Coding equipment used with NIKE-AJAX missiles is located in the upper part of the missile radar control console (2, fig. 20). The coding equipment used (NIKE-HERCULES or NIKE-AJAX) is automatically determined when the battery control officer selects the type of missile for firing.

b. Radar Power Supply Group. The radar power supply group (8, fig. 20) is located against the curbside wall of the trailer mounted tracking station. The radar power supply group consists of power equipment for the target tracking and missile tracking radar systems.

c. Target Radar Control Console. The target radar control console (7, fig. 20) is located against the front wall of the trailer mounted tracking station. The target radar control console contains controls, presentation indicators, and other equipment associated with the target tracking and target ranging radar systems. Data required by the tracking supervisor and the elevation, azimuth, and target range operators during operation is displayed on the elevation indicator (1, fig. 21), azimuth indicator (3, fig. 21), B scope indicator (4, fig. 21), target range indicator (5, fig. 21), and countermeasures control-indicator (2, fig. 21). The displays on the indicators are described in (1) through (5) below.

Note. The key numbers shown in parentheses in (1) and (2) below refer to figure 22 except where otherwise indicated.

(1) *Elevation indicator.* The elevation indicator (1, fig. 21) displays two traces (1 and 5) that extend across the face of the indicator. Each trace represents a maximum range of 40,000 yards or 200,000 yards. A range notch (3) appears on the upper trace (1). When



ORD G30676

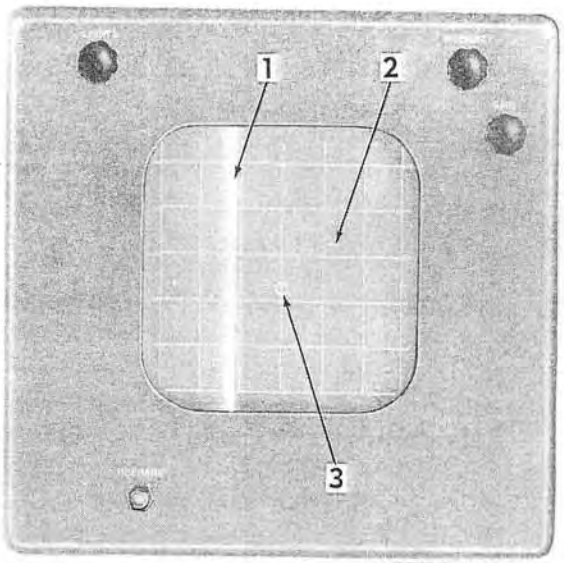
1. Upper trace
2. Target pip
3. Range notch
4. Error pip
5. Lower trace

Figure 22 (CHMA). Elevation or azimuth indicator — typical presentation.

420-354 O - 71 - 5

the target is being accurately tracked in elevation, the target pip (2) appears, centered in the range notch on the upper trace, and no error pip (4) appears on the lower trace (5). When the target track antenna is directed below the target, an error pip (4) appears below the lower trace; when the target track antenna is directed above the target, the error pip appears above the lower trace.

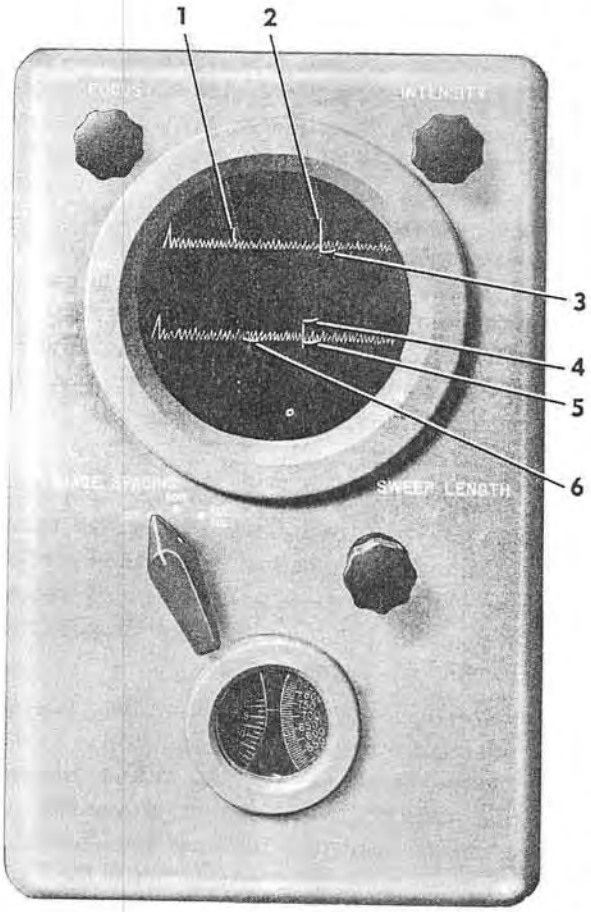
(2) *Azimuth indicator.* The azimuth indicator (3, fig. 21) presents a display similar to the display on the elevation indicator (1, fig. 21). However, the display is interpreted in terms of azimuth instead of elevation. When the target is being accurately tracked in azimuth, the target pip (2) appears centered in the range notch (3) on the upper trace (1), and no error pip appears on the lower trace (5). When the target track antenna is directed to the left of the target, an error pip (4) ap-



ORD G30572

1. Vertical sweep
2. Return signal (designated target)
3. Target track antenna position circle

Figure 23 (CMHA). B scope indicator – basic presentation.



ORD G30677

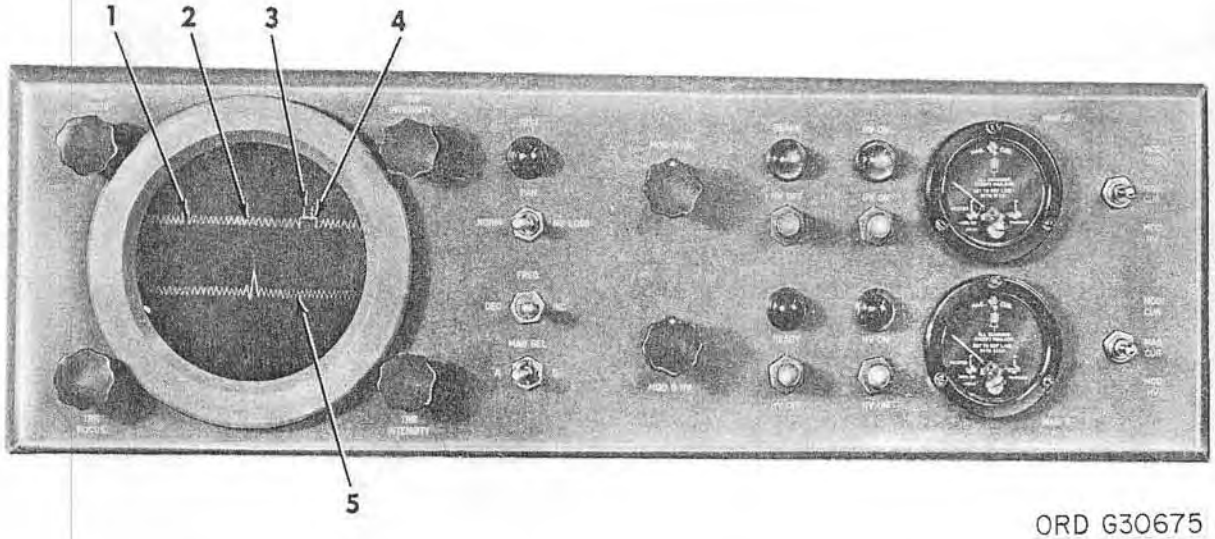
1. Upper trace (target track radar)
2. Target pip (target track radar)
3. Range notch (target track radar)
4. Target pip (target range radar)
5. Range notch (target range radar)
6. Lower trace (target range radar)

Figure 24 (CHMA). Target range indicator – typical presentation.

pears below the lower trace; when the target track antenna is directed to the right of the target, the error pip appears above the lower trace.

(3) *B scope indicator.* The B scope indicator (4, fig. 21) displays a sector of the PPI display covering 60 degrees (1066 mils) in azimuth and 220,000 yards in range. The vertical sweep (1, fig. 23) is an illuminated vertical line that extends from the upper edge to the lower edge of the face of the indicator. The vertical sweep corresponds to the rotating radial sweep (11, fig. 18) on the PPI, and travels across the face of the indicator from left to right in synchronism with the rotation of the selected acquisition radar antenna (HIPAR/AAR or LOPAR). The return signal (designated target) (2, fig. 23) appears as a brightened line on the face of the indicator. Because of normal B scope scan distortion, the return signal increases in length as it moves toward the lower edge of the face of the indicator, and decreases to a small dot when it moves to the upper edge. The target track antenna circle (3, fig. 23) represents the setting of the target track antenna in azimuth and range. For rapid acquisition of the designated target in azimuth and range, the operators adjust azimuth and range controls until the target track antenna circle coincides with the return signal. All displays on the face of the indicator brighten once during each revolution of the selected acquisition radar antenna except the target track antenna circle. During a jamming environment, the azimuth video contains strobe information. The strobe line can be used to acquire jamming targets.

(4) *Target range indicator.* The target range indicator (5, fig. 21) displays two traces that extend across the face of the indicator. Both traces represent



ORD G30675

1—Paired pip (nonradiating magnetron)
2—Panoramic sweep
3—Paired pip (radiating magnetron)
4—Pedestal
5—Range sweep

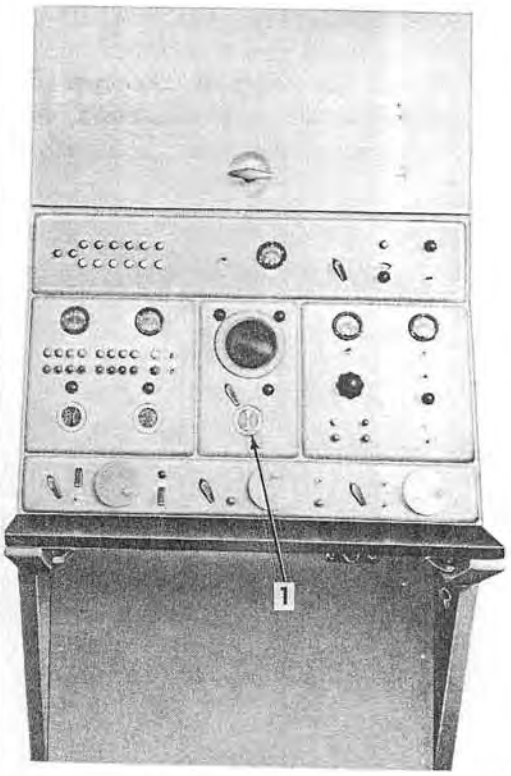
Figure 25 (C). Countermeasures control-indicator—basic presentation (U).

a maximum range of 40,000 yards or 200,000 yards. The return signal that produces the target pip (2, fig. 24) on the upper trace (1, fig. 24) is obtained from the target tracking radar system. The return signal that produces the target pip (4, fig. 24) on the lower trace (6, fig. 24) is obtained from the target ranging radar system. The range notches (3 and 5, fig. 24) on the upper and lower traces represent the range setting of a common range unit which may be controlled by the target range operator. When the radar systems are accurately tracking in range, the target pips are centered in the range notches.

(5) *Countermeasures control-indicator.* The countermeasures control-indicator (2, fig. 21) displays two traces across the face of the indicator. The upper trace is the panoramic sweep (2, fig. 25) and represents the tunable frequency spectrum of the target ranging radar system. Two pairs of pips (1 and 3, fig. 25) represent the two magnetrons of the target ranging radar system. The pips (3, fig. 25) representing the radiating magnetron are displayed on a pedestal (4, fig. 25). The position of the pedestal along the panoramic sweep represents the relative frequency of the radiating magnetron. The pairs of pips (1, fig. 25) not on a pedestal represents the relative frequency of a standby (nonradiating) magnetron. The lower trace is the range sweep (5, fig. 25), and is a duplication of the lower trace (6, fig. 24) on the target range indicator.

d. Radar Set Group. The radar set group (3, fig. 20) is located against the roadside wall of the trailer mounted tracking station. The radar set group consists of electrical and electronic equipment associated with the operation of the target tracking, target ranging, and missile tracking radar systems.

e. Missile Radar Control Console. The missile radar control console (2, fig. 20) is located against the roadside wall of the trailer mounted tracking station. The missile radar control console contains controls, a range indicator, and other equipment associated with the missile tracking radar system. The range indicator (1, fig. 26) displays a single trace similar to the upper trace (1, fig. 24) of the target range indicator. The missile is tracked in range on the range indicator in the same manner that the target is tracked in range on the upper trace of



ORD G30678

1. Range indicator

Figure 26 (C). Missile radar control console.

the target range indicator. The trace represents a range of either 52,000 or 200,000 yards, depending upon the type of missile (NIKE-AJAX or NIKE-HERCULES, respectively) selected for the engagement.

f. Target Ranging Radar Control. The target ranging radar control (1, fig. 20) is located against the roadside wall of the trailer mounted tracking station. The target ranging radar control contains controls, a test scope, an IF signal generator, power equipment, and other equipment associated with the target ranging radar system.

25 (U). LOPAR Antenna-Receiver-Transmitter Group

Note. The key numbers shown in parentheses in *a* through *f* below refer to figure 27.

a. General. The LOPAR antenna-receiver-transmitter group (fig. 27) consists of the antenna and the receiving and transmitting equipment for the low power acquisition radar (LOPAR) system. The group consists of the acquisition antenna (2), acquisition antenna pedestal (5), acquisition receiver-transmitter (3), the acquisition modulator (4), and an auxiliary antenna (1). The pedestal, receiver-transmitter, and modulator are cylindrical tubs stacked one on the other. The auxiliary antenna is mounted on the acquisition antenna. The entire group is supported by a tripod secured to the pedestal at the top and to leveling jacks at the bottom.

b. Acquisition Antenna. The acquisition antenna (2) is mounted on the acquisition antenna pedestal (5) and rotates continuously in azimuth during operation. The elevation scan of the antenna reflector is variable within the range from 0 to +391 mils. A protective Fiberglas radome encloses the antenna reflector. Selective identification feature/identification friend or foe (SIF/IFF) equipment is attached to a holding bar mounted on the lower portion of the antenna.

c. Acquisition Antenna Pedestal. The acquisition antenna pedestal (5) supports the acquisition antenna (2). The pedestal contains the antenna drive equipment and the equipment that electrically couples the antenna, the acquisition receiver-transmitter (3), and the acquisition modulator (4).

d. Acquisition Receiver-Transmitter. The acquisition receiver-transmitter (3) contains receiving and transmitting equipment associated with the LOPAR system. Built-in test equipment is incorporated in the acquisition receiver-transmitter to facilitate maintenance.

e. Acquisition Modulator. The acquisition modulator (4) contains the high voltage and pulse generating equipment for the transmitting system of the LOPAR system.

f. Auxiliary Antenna. The auxiliary antenna (1) is mounted on top of the main acquisition antenna and rotates in synchronism with it.

26 (U). Target Track, Target Range, and Missile Track Antenna-Receiver Transmitter Groups

a. Target Track Antenna-Receiver-Transmitter Group. The target track antenna-receiver-transmitter group (fig. 28) consists of the antenna and the receiving and transmitting equipment for the target tracking radar system. The track antenna reflector and the target track receiver-transmitter are gimbal mounted on the target track antenna support (3, fig. 28) and enclosed by the track antenna radome (1, fig. 28). The reflector and receiver-transmitter are rotated in elevation by elevation drive equipment located in the antenna support. Azimuth rotation is accomplished by means of azimuth drive equipment that rotates the entire antenna support. The azimuth drive equipment is housed within the target track antenna support base (2, fig. 28). With special purpose kits 1430–051–2916 and 1430–799–8679 incorporated, the ability to operate effectively during severe winds is increased by the addition of antenna pedestal fairings (1, fig. 28.1).

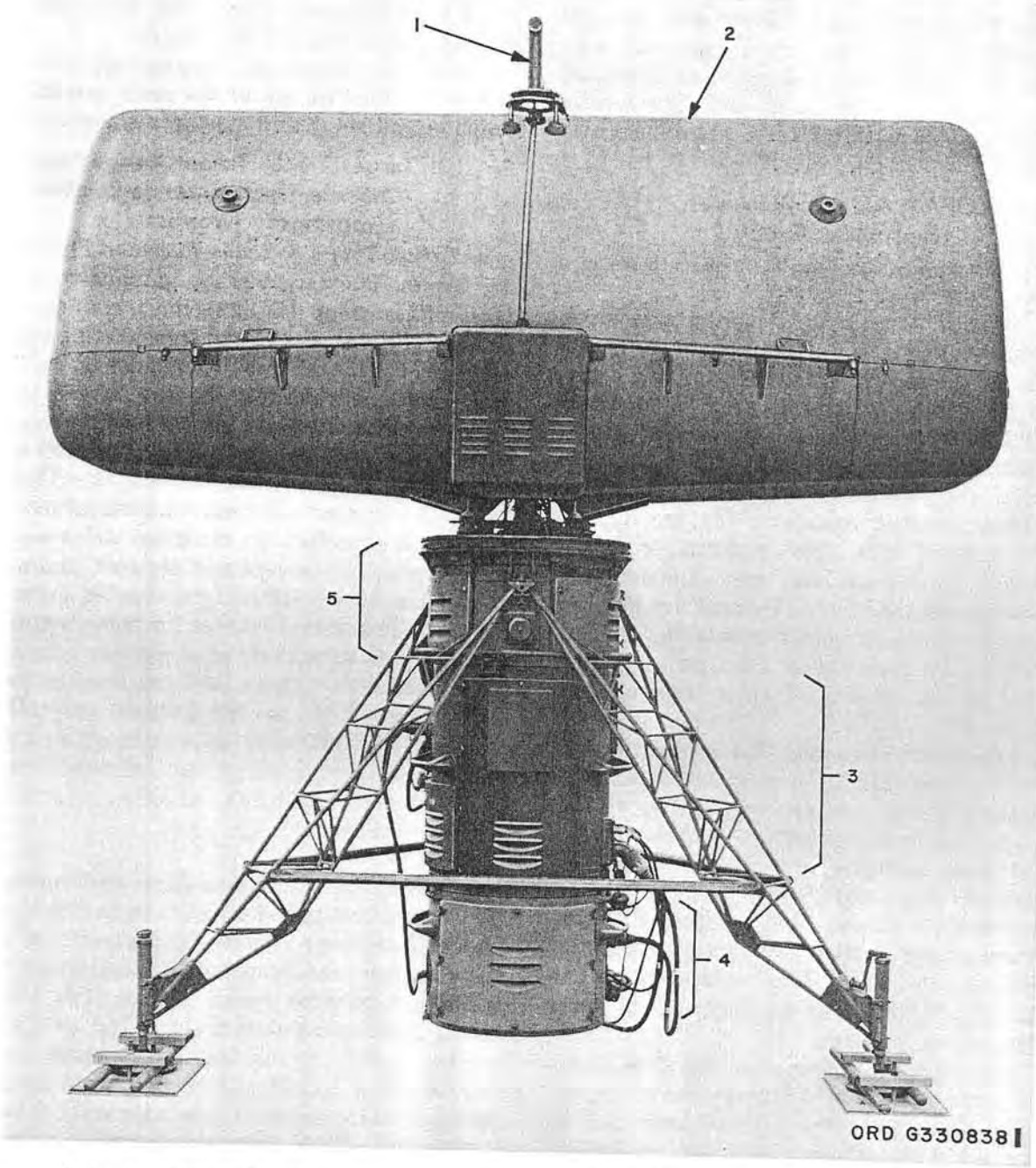
b. Target Range Antenna-Receiver-Transmitter Group. The target range antenna-receiver-transmitter group consists of the antenna and the receiving and transmitting equipment for the target ranging radar system. The target range antenna-receiver-transmitter group is similar to the target track antenna-receiver-transmitter group (fig. 28) described in *a* above except that the target range antenna-receiver-transmitter group contains two receiver-transmitters.

c. Missile Track Antenna-Receiver-Transmitter Group. The missile track antenna-receiver-transmitter group consists of the antenna and

the receiving and transmitting equipment for the missile tracking radar system. The missile track antenna-receiver-transmitter group is similar to the target track antenna-receiver-transmitter group (fig. 28) described in *a* above.

27 (U). Radar Test Set Group

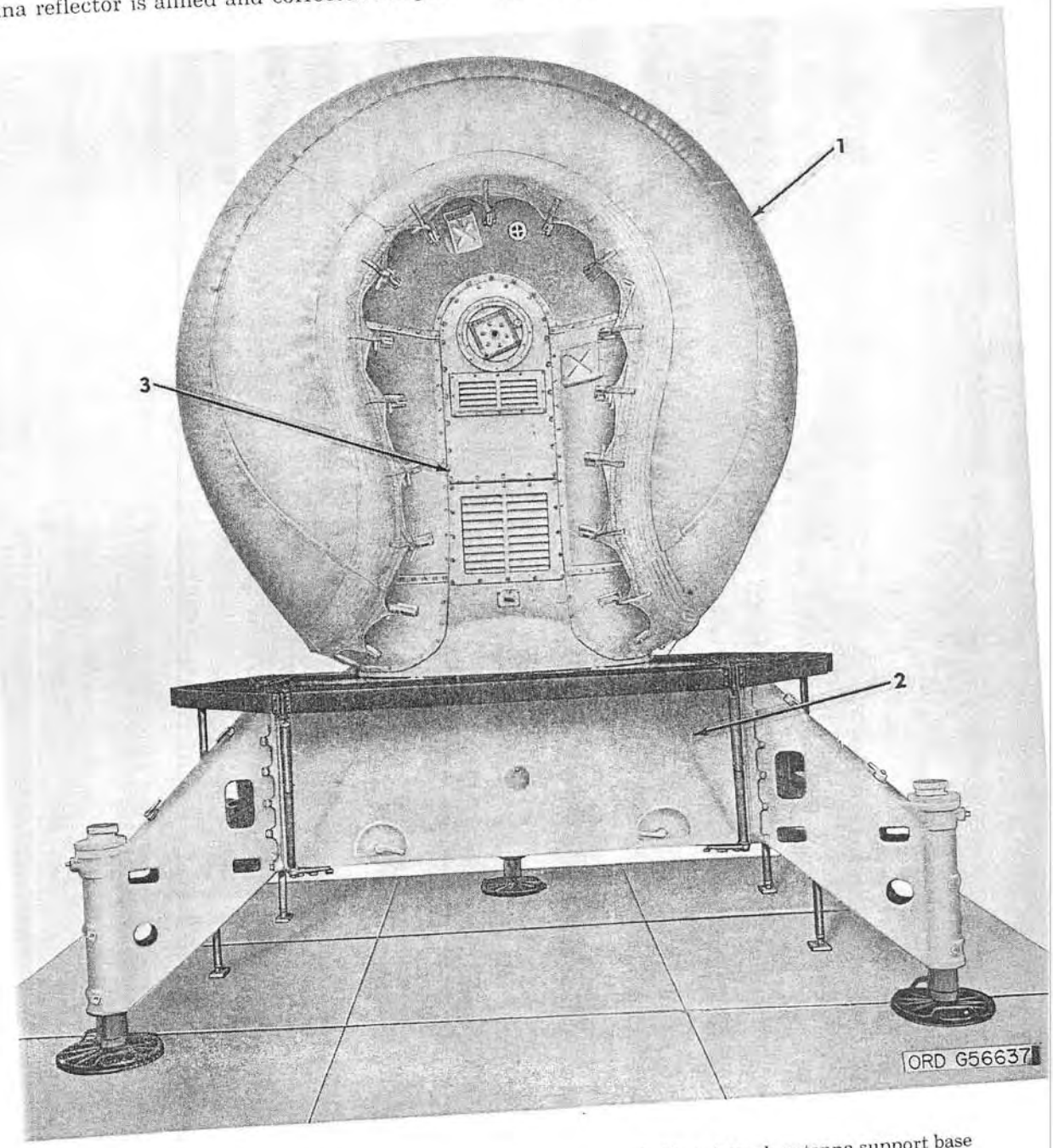
The radar test set group (fig. 29) consists of the radar test set (2, fig. 29), the RF detector (3, fig. 29), and the antenna assembly-mast group (1, fig. 29). The radar test set group is



1—Auxiliary antenna
2—Acquisition antenna
3—Acquisition receiver-transmitter
4—Acquisition modulator
5—Acquisition antenna pedestal

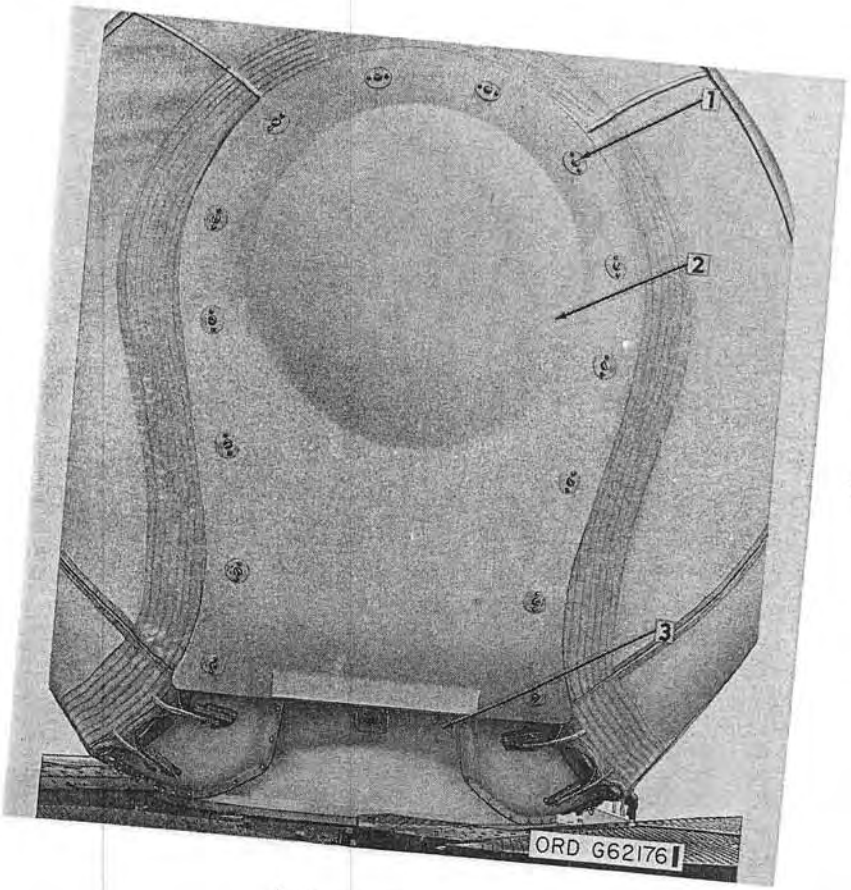
Figure 27 (U). LOPAR antenna-receiver-transmitter group (U).

used to aline and test the target tracking, target ranging, and missile tracking radar systems. The target track and missile track antenna reflectors are alined optically by sighting and alining the axis of the antenna reflector with a point on the graduated arms at the top of the antenna assembly-mast group (1, fig. 29). The target range antenna reflector is alined and corrected for parallax by radiating rf energy from the target range antenna-receiver-transmitter group to a feedhorn at the top of the antenna assembly-mast group. The rf energy received from the feedhorn is converted to a dc voltage by the RF detector (3, fig. 29) to produce an indication of the alinement of the antenna reflector. The radar test set (2, fig. 29) generates rf test signals that are radiated



1- Track antenna radome
2 -Target track antenna support base
3- Target track antenna support

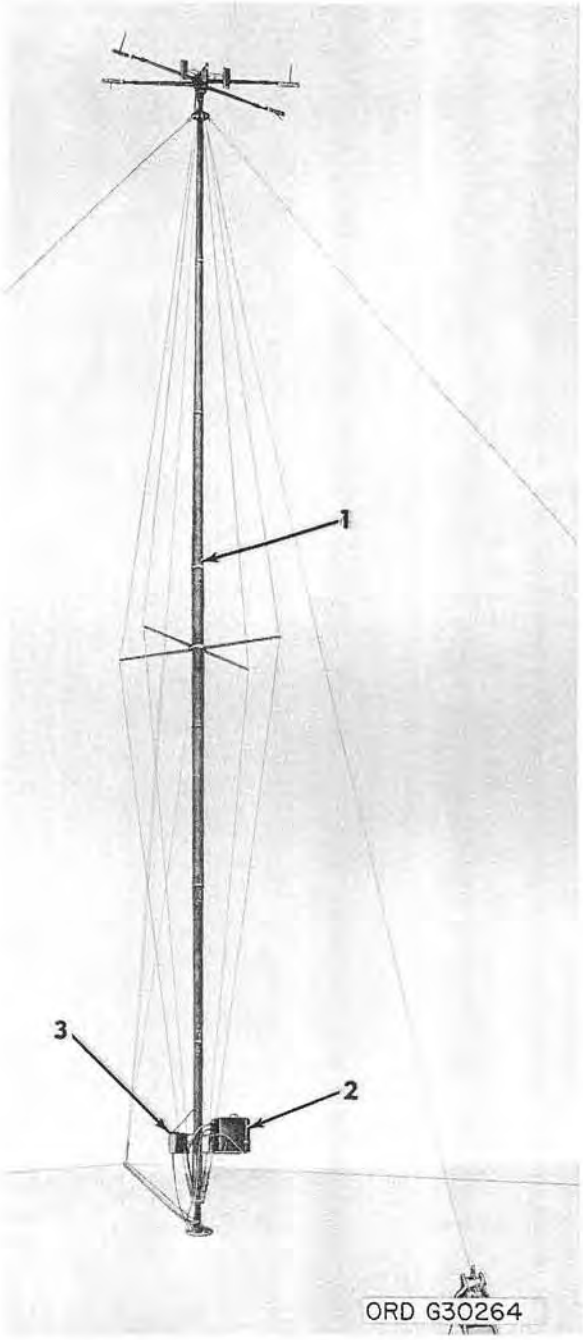
Figure 28 (U). Target track antenna-receiver-transmitter group (U).



1 - Latch (14)
2 - Antenna pedestal fairing
3 - Track antenna pedestal

Figure 28.1 (U). Target track or missile track antenna-receiver-transmitter group—overall view with special purpose kit 1430-051-2916 or target range antenna-receiver-transmitter group with special purpose kit 1430-799-8679 (U).

from the feedhorn at the top of the antenna assembly-mast group. These signals simulate missile transmitted signals or target return signals and are used in checks and adjustments of the missile and target tracking radar systems.



1—Antenna assembly mast group
2—Radar test set
3—RF detector

Figure 29 (U). Radar test set group (U).

27.1 (U). T1 Trainer

The T1 trainer (fig. 29.1) associated with the radar course directing central (RCDC), consists of trailer mounted equipment and interconnecting cables that provide simulated radar signals for training personnel in the operation of the RCDC.

28 (U). Operator Positions and Duties

The positions and duties of the operators in the trailer mounted director station and the trailer mounted tracking station are described in *a* and *b* below.

Note. The key numbers in parentheses in *a* below refer to figure 14.

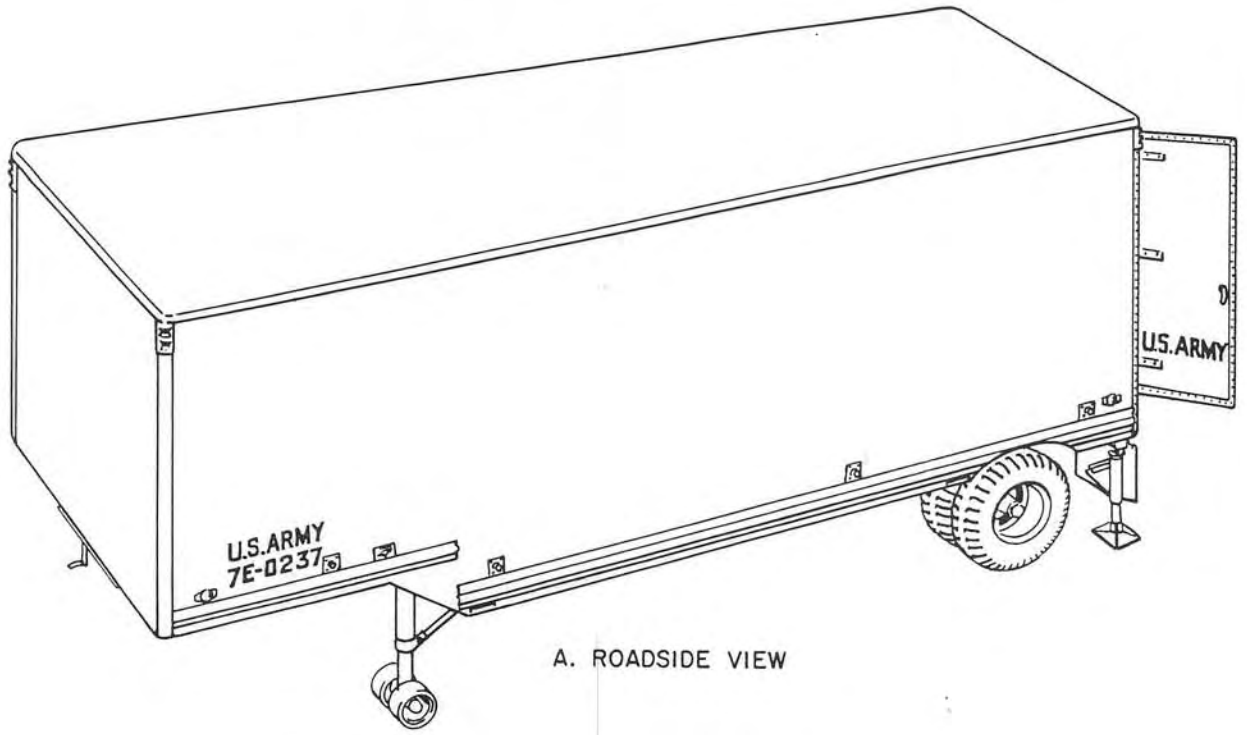
a. Trailer Mounted Director Station.

Note. The battery control officer is normally the battery commander. To cover the situation where the battery commander is absent or a duty officer is performing his duties, the designation "battery control officer" is used instead of "battery commander."

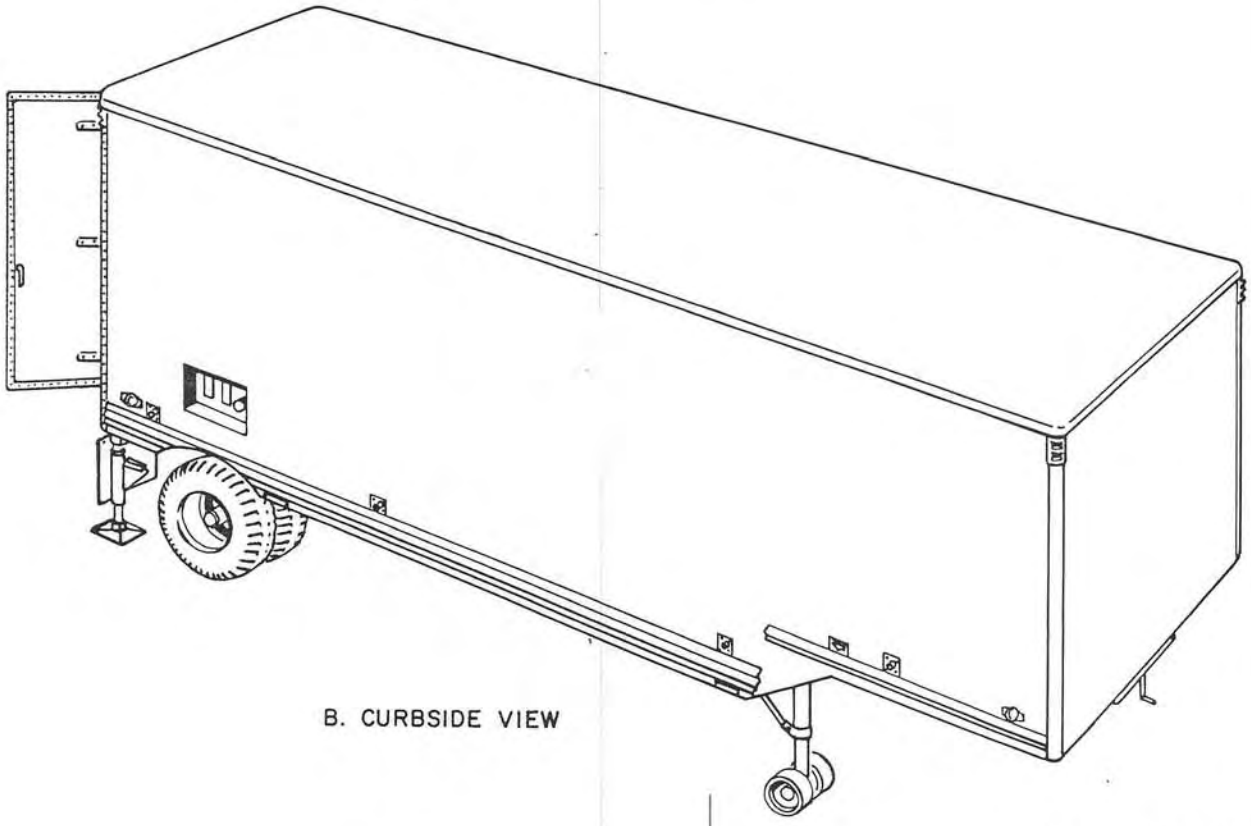
(1) *Battery control officer.* Under normal alert conditions of surveillance or when an attack is expected but not in progress, the battery control officer's position (12) is the right operating position in front of the battery control console (8). During an engagement, the computer operator takes over this position and the battery control officer takes over the center operating position (13) in front of the battery control console. In this position, the battery control officer can view and monitor the early warning information, local threat, equipment status, and conduct of the mission as displayed on the plotting boards and indicators. A detailed description of the tactical responsibilities of the battery control officer is contained in chapter 7.

(2) (Deleted).

(3) *Acquisition radar operator.* The acquisition radar operator's position (7) is the left operating position in front of the battery control console (8). The duties of the acquisition radar operator include operation of the acquisition radar, both LOPAR and HIPAR/



A. ROADSIDE VIEW



B. CURBSIDE VIEW

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Figure 29.1 (U). Radar signal simulator station AN/MPQ—T1 (T1 trainer) (U).

AAR, performance of target designation procedure, and operation of the SIF/IFF equipment in association with and under the direction of, the battery control officer.

(4) *Computer operator.* The computer operator stands in front of the computer group (1) and places the computer group in full operation prior to an engagement. During an engagement, the computer operator's position (12) is at the right end of the battery control console (8) in front of the altitude plotting board. This is the position occupied by the battery control officer prior to an engagement. The duties of the computer operator during an engagement consist of monitoring equipment status and operating tactical controls at the direction of the battery control officer.

(5) *Early warning plotting board operator.* The early warning plotting board operator stands in front of the early warning plotting board (5) and manually marks target early warning information on the plotting board. The plotting board operator receives this plotting information over the telephone from an Army Air Defense Command Post (AADCP).

(6) *Switchboard operator.* The switchboard operator's position (11) is in front of the recorder group (9). His duties consist of operating the telephone switchboard and the recording equipment.

a.1. NIKE–HERCULES ATBM Trailer Mounted Director Station.

(1) In the trailer mounted director station (fig. 19.2) for the NIKE–HERCULES ATBM System, the short range surveillance operator occupies the left chair at the battery control console, the battery control officer, the center chair, and the long range surveillance operator, the right chair.

(2) Equipment available to the short range surveillance operator is the short range PPI (8, fig. 19.3), the short range target designate control (9, fig. 19.3) and the LOPAR control-indicator (7, fig. 19.3).

(3) Equipment available to the long range surveillance operator is the long range PPI (4, fig. 19.3), the long range target designate control (3, fig. 19.3), and the HIPAR control-indicator (5, fig. 19.3).

(4) The battery control officer is seated in front of the fire control-indicator (6, fig. 19.3). He may monitor both PPI's from this position.

(5) The long range and short range surveillance operators have radar and designation controls available to them. The battery control officer has his battery and firing controls directly in front of him and has access to the surveillance operators' controls.

(6) The position and duties of the early warning plotting board operator and the switchboard operator are the same as in an Improved NIKE–HERCULES System.

Note. The key numbers shown in parentheses in *b* below refer to figure 20 except where otherwise indicated.

b. Trailer Mounted Tracking Station.

(1) *Azimuth operator.* The azimuth operator's position (5) is the center operating position in front of the target radar control console (7). The azimuth operator monitors the B scope indicator (4, fig. 21) and the azimuth indicator (3, fig. 21). The duties of the azimuth operator are to acquire and track the designated target in azimuth. The azimuth operator is responsible for signaling the battery control officer that the target is being tracked or is not being tracked.

(2) *Elevation operator.* The elevation operator's position (4) is the left operating position in front of the target radar control console (7). The elevation operator monitors the elevation indicator (1, fig. 21). The duties of

the elevation operator are to manually search for, acquire, and track the designated target in elevation.

(3) *Target range operator.* The target range operator's position (6) is the right operating position in front of the target radar control console (7). The target range operator monitors the B scope indicator (4, fig. 21) and the target range indicator (5, fig. 21). The duties of the target range operator are to manually track and gate the designated target in range.

(4) *Tracking supervisor.* The tracking supervisor's position (10) is centered behind the positions of the azimuth, elevation, and target range operators. The tracking supervisor monitors the B scope indicator (4, fig. 21), countermeasures control-indicator (2, fig. 21), and the elevation, azimuth, and target range indicators, (1, 3, and 5, fig. 21). The duties of the tracking supervisor are to coordinate and supervise the operation of the target tracking and target ranging radar systems, and when the countermeasures control-indicator indicates that interference is present, to utilize the techniques required to maintain effective operation.

(5) *Missile tracking operator.* The missile tracking operator's position (11) is in front of the missile radar control console (2). Under normal operating conditions, he is continuously advised of the equipment status when a target has been designated, acquired, and tracked. After a missile has been designated and acquired, he ascertains, by means of indicators on the console, that the missile tracking radar system is locked on the designated missile. After the missile is launched, he monitors the range indicator to see that the missile is being accurately tracked. Under emergency conditions, in addition to monitoring missile tracking before and after launch, the missile tracking operator can manually select the launching section and missile to be fired and designate "missile ready" and "missile fired" by means of controls on the console.