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**FM 6-38**

DEPARTMENT OF THE ARMY FIELD MANUAL

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**FIELD ARTILLERY BATTERY  
SERGEANT**

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HEADQUARTERS, DEPARTMENT OF THE ARMY  
MARCH, 1964



FIELD MANUAL }  
No. 6-38 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D. C., 2 March 1964

## FIELD ARTILLERY BATTERY, SERGEANT

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\* This manual supersedes FM 6-38, 25 April 1962.

## SECTION I

### GENERAL

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#### I. Purpose and Scope

a. This manual guides commanders in training the personnel of a Sergeant firing battery into efficient, smooth working, disciplined teams that will operate effectively in combat. It prescribes individual duties, section drills, methods of inspection and maintenance, methods of decontamination and destruction, safety precautions, training, and tests for qualification of missilemen.

b. The material presented herein is applicable without modification to both nuclear and non-nuclear warfare.

c. Drills prescribed in this manual cover duties of individuals in emplacement, assembly, disassembly, and march order.

d. Tables I through IV are fold-ins and are placed in the back of the manual. Table V is a nomograph for Rocket Motor Q Temperature and is placed in back of table IV for easy use.

e. This manual applies only to the Sergeant firing battery.

f. Users of this manual are encouraged to submit recommended changes or comments for its improvement. Comments should be submitted on DA Form 1598 (Record of Comments on publications) and should be keyed to the specific page, paragraph, and line of text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commandant, ATTN: AKPSIPL, U. S. Army Artillery and Missile School, Fort Sill, Okla.

#### 2. Definition and Terms

a. *Azimuth orientation system* (AOS)—An integrated group of components that includes the azimuth orientation unit (AOU), the refer-

ence theodolite (RT), the traverse target group (TT) and the missile orientation target (MOT).

b. *Couple*—To attach the lunette or kingpin of a trailer or semitrailer to the pintle or the fifth wheel of a prime mover, connect all brake and light cables, and retract the landing gear.

c. *Firing set (FS)*—The firing set is used to insert the parameters into the missile. It consists of an enclosure, associated cabling, and electronic assemblies. The enclosure is mounted on the front of the launching station semitrailer frame.

d. *Gas turbine generator set (GTGS)* — A generator that is mounted on the launching station and the organizational maintenance test station to supply power.

e. *Launching Station (L/S)* — A modified semitrailer comprised of four major assemblies (the zero length launcher, the AOS, the GTGS, and the Firing Set) used to assemble, prepare, and fire the missile.

f. *Organizational maintenance test station (OMTS)*—A specially designed van that is mounted on a semitrailer, which is used to test missile sections.

g. *Orientation*—

(1) Front.

(a) The front of all trailer or semitrailer-mounted equipment is the end that is coupled to the prime mover.

(b) The front of the missile in the horizontal position is the direction in which the missile points.

(2) Right (left)—The direction of right (left) is the right (left) when standing to the rear and facing to the front of the equipment or the missile.

*h. Special ammunition load (SAL)* — The specific quantity of special ammunition to be carried by a delivery unit.

*i. Sergeant missile* — the assembled missile which consists of four principal missile sections, as follows:

- (1) A warhead section.
- (2) A guidance section.
- (3) A rocket motor section.
- (4) Four control surface assemblies.

*j. Transporter*—

- (1) Motor Guidance Transporter (MGTT)—A specially designed semitrailer used to transport the missile guidance section, the rocket motor section, and control surface assemblies.
- (2) Warhead Section Transporter — A general purpose 2½-ton cargo truck

that is equipped and used in the battalion to transport a warhead section in a container.

*k. Uncouple*—To detach the lunette or kingpin of a trailer or semitrailer from the pintle or the fifth wheel of a prime mover, disconnect all brake and light cables, and extend the landing gear.

### 3. References

References pertaining to the Sergeant missile and associated equipment and covering related matters not discussed in detail in this manual are listed in the appendix. In the event of conflict between procedures outlined herein and those prescribed in the appropriate technical manual, the procedures outlined in the technical manual apply.

## SECTION II

### ORGANIZATION

---

#### 4. Composition of the Sergeant Firing Battery

a. *The Firing Battery.* The battery consists of three primary units (fig. 1) as follows:

- (1) Battery headquarters.
- (2) Battery detail.
- (3) Firing platoon.

b. *Battery Headquarters.* The battery headquarters is responsible for administration, mess, supply, and maintenance within the firing battery. The responsibilities are comparable to those provided for similar type organizations.

c. *Battery Detail.* The battery detail consists of three elements as follows:

(1) *Detail headquarters.* The detail commander is responsible for the supervision and functioning of the communication and survey sections.

(2) *Communication section.* The communication section is responsible for wire and radio communication nets of the battery 24 hours per day. Information pertaining to communication is included in FM 6-10 and chapter 8 of FM 6-37.

(3) *Survey section.* The survey section is required to provide the necessary survey control at the firing positions of the battery. Battery survey information is included in FM 6-2 and chapter 9, FM 6-37.

d. *Firing Platoon.* The firing platoon consists of a headquarters and three sections as follows:

(1) *Firing platoon headquarters.* The functions and responsibilities of the firing platoon headquarters are comparable to those of similar units.

(a) Training and proficiency of personnel.

(b) Performance of duties in section drill, duties in preparing for action and traveling, duties in firing, and duties in inspection and maintenance of all platoon equipment, including the prime movers.

(c) Security of warhead sections and missiles transported by the ammunition section.

(d) Observance of safety precautions.

(e) Preparation of field fortifications for protection of personnel and equipment.

(f) Maintenance of records on the missile and support equipment as specified in appropriate technical manuals.

(g) Operation of communication networks within the firing platoon.

(h) Assistance in selection of the firing positions.

(2) *Firing section.* The functions of the firing section are to prepare the firing position, emplace the launching station, assemble the missile, conduct self test of the firing set, insert the firing data, orient the missile, monitor the automatic countdown, and perform the organizational maintenance on the launching station. Personnel assigned to this section must have a security clearance of SECRET.

(3) *Missile test section.* The functions of the missile test section are to emplace and operate the organizational maintenance test station, test the Guidance Section and control surface assemblies, and perform organizational maintenance on the organizational

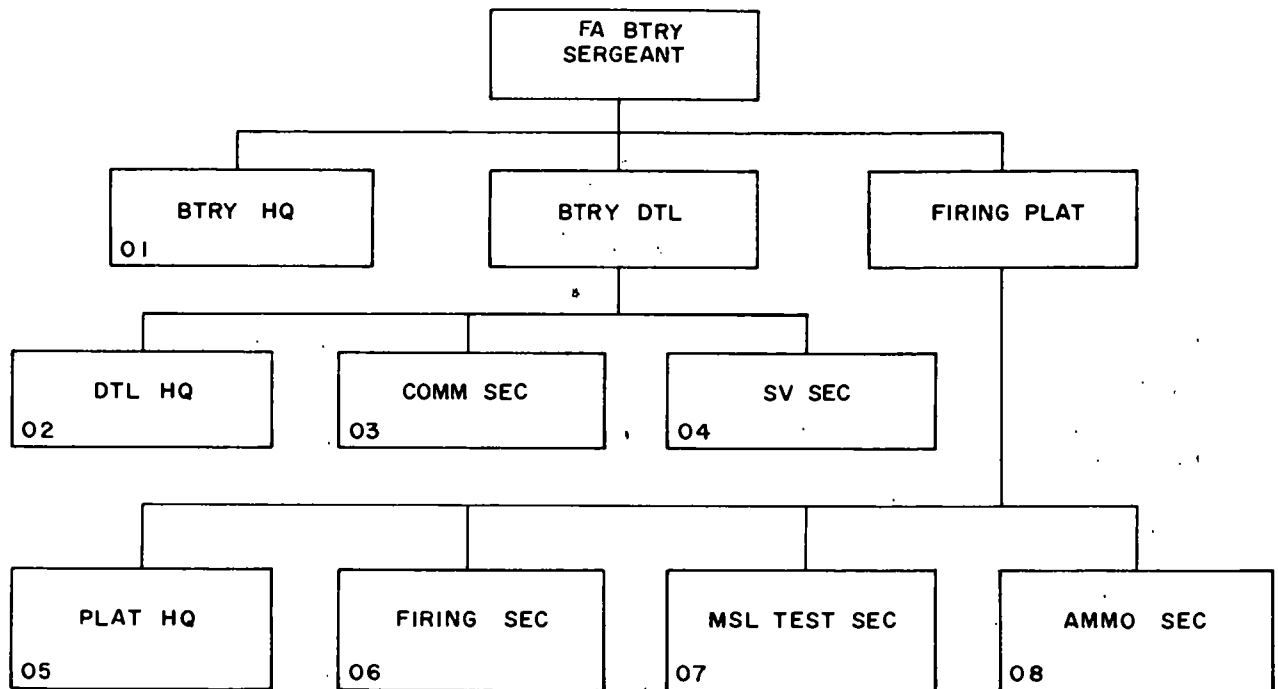


Figure 1. Field artillery battery, Sergeant.

maintenance test station and missiles. Personnel assigned to this section must have a security clearance of SECRET.

- (4) *Ammunition section.* The functions of the ammunition section are to draw (if directed by battalion), transport, and store the missiles and to perform organizational maintenance on missile transport equipment and containers. Personnel assigned to this section must have a security clearance of SECRET.

## 5. General Duties of Personnel

### a. Personnel.

- (1) The personnel in the battery headquarters and battery detail and their duties are not described in this manual, since they are comparable to those of other field artillery batteries and their duties are described in detail in appropriate field and technical manuals.
- (2) Personnel duties of the firing platoon will be covered in detail in this manual because of dissimilarity to other field artillery units.

b. *Platoon Commander.* The platoon commander has all the responsibilities inherent to commanding a field artillery firing platoon. Particular attention must be given to maintenance, training and security, due to the complexity of the equipment within the platoon.

c. *Missile Assembly Technician.* The missile assembly technician, a warrant officer, is a technical adviser to the platoon commander on matters pertaining to the operation and maintenance of the technical testing and firing equipment and assists him in performing the duties prescribed in paragraph 4d(1) above. The missile assembly technician coordinates the technical operations of the three sections of the platoon. He monitors the Firing Set Operator during missile firing procedures. He must also be qualified to replace the platoon commander.

d. *Platoon Sergeant.* The platoon sergeant is the noncommissioned officer in charge of the firing platoon. He coordinates platoon operations and assists the platoon commander in performing his duties.

e. *Chiefs of Sections.* Each section in the firing platoon is commanded by a noncommissioned officer who is the chief of section.

*f. Firing Section Personnel.*

- (1) *Chief of the firing section.* The chief of the firing section is responsible to the platoon commander for the—
  - (a) Training and efficiency of firing section personnel.
  - (b) Performance of duties in section drill; duties in firing, duties in preparing for firing and traveling, missile assembly, limited testing of the assembled missile, and inspection and maintenance of all section equipment including the prime mover.
  - (c) Observance of safety precautions and the decontamination of equipment and materiel within the section.
  - (d) Preparation of field fortifications for protection of personnel and equipment.
  - (e) Camouflage discipline; local security; and chemical, biological, and radiological (CBR) and security discipline.
- (2) *Assistant chief of the firing section.* The assistant chief of section assists the chief of section in performing the duties described in (1) above. His specific duties pertain to supervision of assembly and disassembly of the missile. He performs any other duties the chief of the firing section prescribes.
- (3) *Boom operator.* The boom operator operates the launching station boom during assembly and disassembly of the missile as listed in paragraphs 8 through 17 and in TM 9-1440-301-12.
- (4) *Firing set operator.* The firing set operator operates the firing set during the automatic self-test and inserts firing parameters.  
See paragraphs 14 and 26 of this manual and TM 9-1440-301-12 for specific duties.
- (5) *Senior AOS operator.* The senior AOS operator emplaces and employs the azimuth orientation unit in laying the Sergeant missile. He must be proficient in maintenance of the azimuth orientation unit. His duties are out-

lined in paragraphs 8 through 17 of this manual, in TM 9-1440-301-12, and in TM 5-6675-205-15.

- (6) *AOS operator. (RT Operator)* The AOS operator assists the senior AOS operator in performing his duties and normally performs duties at the reference theodolite.
- (7) *Numbered crewmen and drivers.* The numbered crewmen and drivers perform duties as directed by the chief of section. Section drivers perform operator's maintenance on assigned vehicles.

*g. Missile Test Section Personnel.*

- (1) *The chief of the missile test section* is responsible to the platoon commander for the—
  - (a) Training and efficiency of the missile test section crewmen.
  - (b) Performance of duties in section drill, duties in preparing for missile section tests, duties in checkout, duties during travel, and duties required for inspection and maintenance of all section equipment including the prime mover.
  - (c) Performance of all other duties of the chief of firing section as listed in *f*(1) above, for section personnel.
- (2) *The senior test station operator and the test station operators* perform duties on the organizational maintenance test station (OMTS) and the missile sections as prescribed in paragraphs 19 through 25 and in TM 9-1410-302-20, TM 9-4935-303-12, and TM 5-6115-294-12 and perform any other duties the chief of section prescribes.

*h. Ammunition Section Personnel.*

- (1) *The chief of the ammunition section* is responsible to the platoon commander for the—
  - (a) Handling and delivery of ammunition to the missile test and firing sections, as required. Security of the ammunition is a primary duty and responsibility that requires constant alertness on the part of the chief of section.



- (b) Performance of all other duties of the chief of firing section as listed in f(1) above, for section personnel.
- (2) *The truck drivers perform operator maintenance on their vehicles, utilizing the appropriate vehicle manual, and perform any other duties prescribed by the chief of section.*
- (3) *The numbered crewmen of the ammunition section act as assistant drivers and assist the assigned drivers in performing maintenance on the vehicles. The crewmen perform maintenance on the ammunition containers and perform any other duties prescribed by the chief of section.*

## SECTION III

### SECTION DRILL

---

#### 6. Objective

The objective of section drill is to attain maximum efficiency and precision combined with speed.

#### 7. Instructions

a. To develop maximum efficiency and to prevent injuries to personnel and damage to equipment, the drills prescribed by the unit standing operating procedure (SOP) should be observed. Section drill is conducted in silence except for commands and reports. A section should be drilled until reactions to commands are automatic, rapid, and efficient.

b. Errors are corrected immediately. Each member of a section must be impressed with

the importance of reporting promptly to the chief of section any errors discovered before or after firing. The chief of section will report errors immediately to the platoon sergeant or platoon commander.

c. Battery officers supervise the drills to insure that instructions are carried out and that maximum efficiency is attained.

d. Duties should be rotated among personnel during training so that each member of a section can perform the duties of each crewman in his section. In addition, battery personnel not assigned specific duties during drill periods should be trained in the fundamentals of section drill so that they will be capable of functioning efficiently with a battery detail section or a firing platoon section if required.

## SECTION IV

### PREPARING FOR ACTION AND TRAVELING

---

#### 8. General

Both the firing platoon and the battery detail are involved in preparing for action.

*a. Survey.* The battery or battalion survey section will extend survey to the firing position. This action normally will be performed prior to the arrival of the launching station in the area. The survey team will use the procedures, techniques, and specifications set forth in FM 6-37. A detailed discussion of survey planning is contained in FM 6-2 and possibly unit SOP's.

*b. Communication.* The battery communication section will install both wire and radio communications within the battery area. The duties of the communication section are discussed in detail in FM 6-10, FM 6-37, and possibly battalion and battery SOP's.

*c. Firing Section.* The firing section emplaces the launcher, and notifies the ammunition section to deliver the transporters with the ammunition to be fired.

*d. Missile Test Section.* The missile test section emplaces the organization test station and notifies the ammunition section to deliver untested guidance sections and control surface assemblies to the OMTS.

*e. Ammunition Section.* The ammunition section physically checks and prepares to deliver ammunition as requested.

#### 9. Launching Station

*a. Pioneer Work.* Prior to occupation, the selected firing position should be prepared. A level area is preferable but the launching station may be emplaced on a slope not exceeding a grade of 1 in 10 (100 mils).

*b. Firing Position.* The firing position includes the firing point and approaches and is approximately 150 meters in diameter. Within

the firing position is a cleared area 15 meters wide (perpendicular to the launching station centerline) and 18 meters long (parallel to the launching station centerline). This cleared area includes space on the right and left of the launching station for the missile section transporters, Boom Traverse and Missile Orientation. This is illustrated in figures 2 and 3. This area should include at least one good approach and exit. If the area has no exit, the width should be doubled to allow the transporters to turn around.

*c. Ground Conditions for the Launching Station.* If it is necessary to position the launching station on loose or soft soil, it may be necessary to reinforce the soil under the jack pads to keep them from settling. However, this can be determined only through experience gained from training under varying field conditions.

*d. Launching Station Settling.* The weight of the missile and motions of the superstructure boom may cause the launching station to settle. Therefore, a check of the level of the launching station is required, after the missile assembly operation has been completed.

*e. Prime Mover.* The prime mover is a 5-ton truck tractor. The prime mover driver tows the launching station to its position in the most expeditious manner consistent with proper camouflage. The assistant chief of section directs the driver to the desired position and halts the vehicle. Hand signals for guiding the driver are contained in FM 21-60.

#### 10. Procedures for Launching Station Emplacement

*a.* In order for the outrigger and rear leveling jacks to level the launching station, the launching station must be emplaced on terrain which does not exceed a slope of 1 in 10 (100

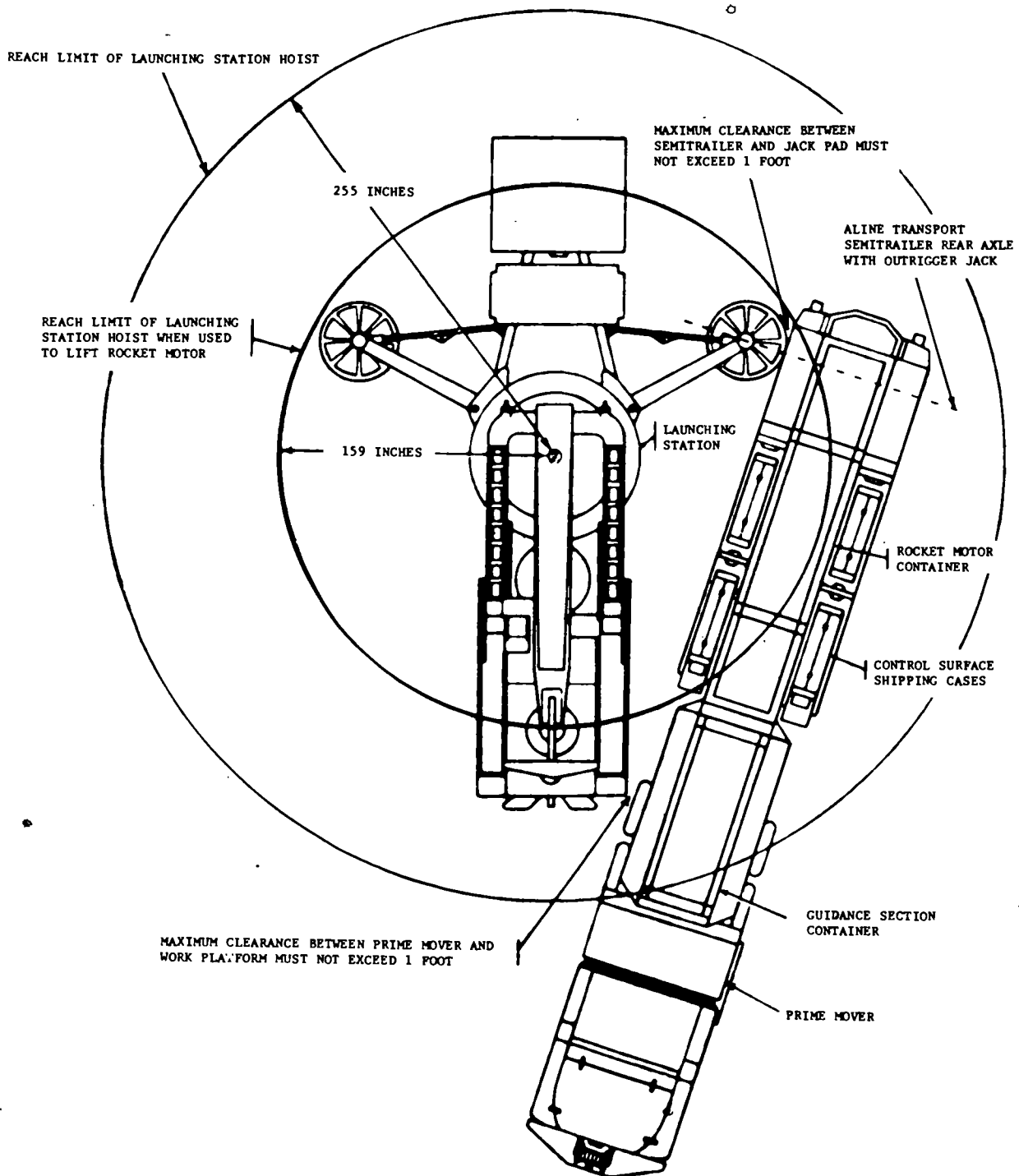


Figure 2. Positioning the rocket motor and guidance section transporter.

mils). The surface of the ground must be firm enough to allow the equipment to remain level.

b. The duties performed by the individuals in the firing section in emplacing the launching station are given in table I.

## 11. Preparation for Missile Assembly

a. After the launching station has been emplaced and leveled, the missile section transporters are brought forward and positioned as shown in figures 2 and 3. The missile sections

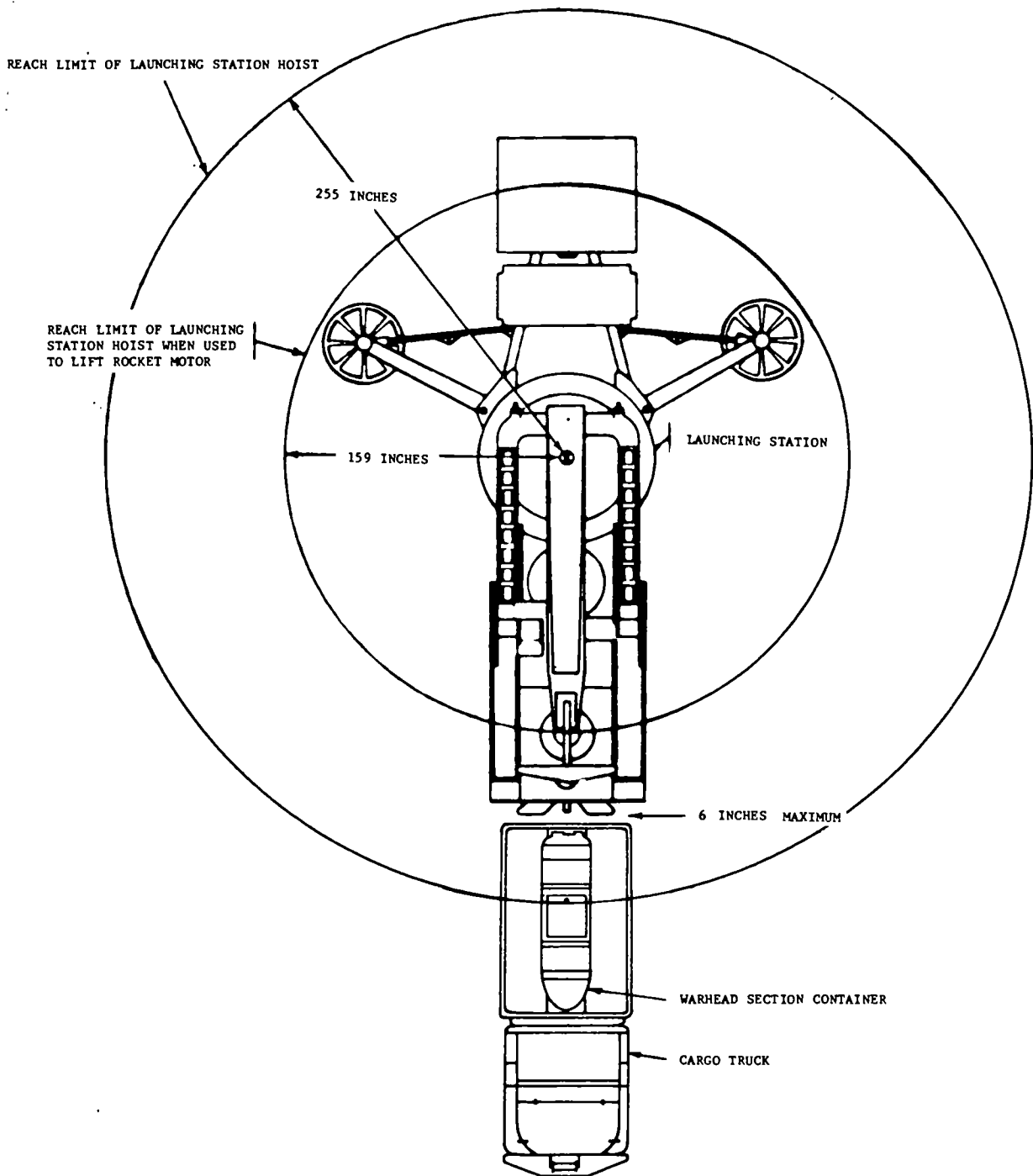


Figure 3. Positioning the warhead section transporter.

are assembled into a complete missile on the launching station boom.

b. For instructions on missile assembly, see table II (in the back of the manual) and figure 4. The assistant chief of section is responsible

for all hand signals during the assembly of the missile except emergency stops which any crewman may give. This will insure that the operation is completed in as short a time as possible, commensurate with safe operating conditions for personnel and equipment.



**RAISE HOIST**



**LOWER HOIST**



**SLOW MOVEMENT**



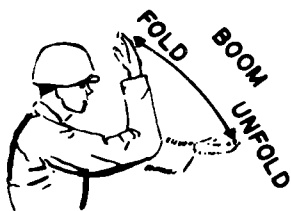
**BOOM TRAVERSING**



**TROLLEY MOVEMENT**



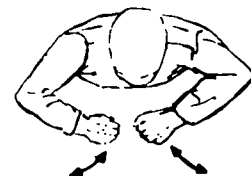
**U-FRAME MOVEMENT**



**FOLD OR EXTEND  
EXTENSION BOOM**



**STOP**



**EMERGENCY STOP**

*Figure 4. Missile assembly and disassembly hand signals.*

## 12. Emplacement of AOS Equipment and Determination of the Launching Station Azimuth

a. There are two azimuth orientation system (AOS) operators in the firing section. The senior AOS operator normally is responsible for the operation of the azimuth orientation unit (AOU) on the launching station, and the AOS operator is responsible for the operation of the reference theodolite (figs. 5 and 6).

b. The AOS operator removes the reference theodolite and associated equipment from the launching station. He then places the reference theodolite over the primary reference stake and levels and plumbs it over the reference stake mark.

c. Crewman number 6 removes the target set from the launching station, places it over the secondary reference stake and levels and plumbs it over the reference stake mark.

d. The senior AOS operator emplaces and levels the azimuth orientation unit. He checks with the assistant chief of section to see that the launching station is level.

e. The AOS operators determine  $A_1$ ,  $A_2$ ,  $A_3$ , and  $A_m$ . The senior AOS operator transmits the values of  $A_m$  and  $A_1$  to the firing set (F/S) operator and chief of section (C/S) and records the values of  $A_1$ ,  $A_2$ , and  $A_m$  in the data book. Refer to figure 6 and table I.

f. The AOS operators should follow the detailed instructions in TM 9-1440-301-12 for the orientation of the azimuth orientation unit (AOU) and associated equipment and refer to figures 5 and 6.

## 13. Missile Assembly

When the launching station has been emplaced and leveled and the grid azimuth of the launching station ( $A_m$ ) has been determined, the launching station is ready for missile assembly.

a. A method of positioning the rocket motor and guidance section transporter is shown in figure 2.

b. For safety, the transporter carrying the warhead section is positioned at least 75 meters away from the launching station until the rocket motor section has been engaged with the

boom and the HOOKS ENGAGED YES indicator lamp has lighted. Then the warhead section transporter can be moved into position, as shown in figure 3.

c. Missile assembly will be accomplished by using table II; figures 4 and 7 through 13; and TM 9-1440-301-12.

## 14. Self-Testing the Firing Set

a. The self test of the firing set should be started as soon as the launching station is placed in position and uncoupled from the prime mover.

b. Since detailed instructions pertaining to the firing set self test are covered in TM 9-1440-301-12, only a brief outline of the procedure is given in c through e below.

c. The firing set is composed of two identical electronic systems, which are referred to as system A and system B. Either system may be used. At approximately X-44 minutes, the firing set should be energized. The PUMP MOTORS switch on the azimuth control box should be turned on, and the three air conditioner doors must be opened and the COOL-HEAT switch should be set to the desired positions.

- (1) Check inclosure lights.
- (2) Check that system A and system B transfer box switches are in the TEST position.
- (3) The firing set operator will follow the guide below for the self test of the firing set.

### FIRING SET OPERATIONS

(normal tactical operations)

Time (approximate)	Operations
X-44 min -----	Preheat. Set the transfer box switches to TEST position.
X-39 min -----	Turn power on. Begin self test.
X-34 -----	Self Test Complete. Insert and check firing data parameters.
to -----	Compute and check flight parameters.
X-28 -----	Make required readouts.
X-21 -----	Clear the program. Set the transfer box switch to OPERATE position.

d. At approximately X-34 minutes the firing set operator requests the chief of section to furnish the motor temperature parameter.

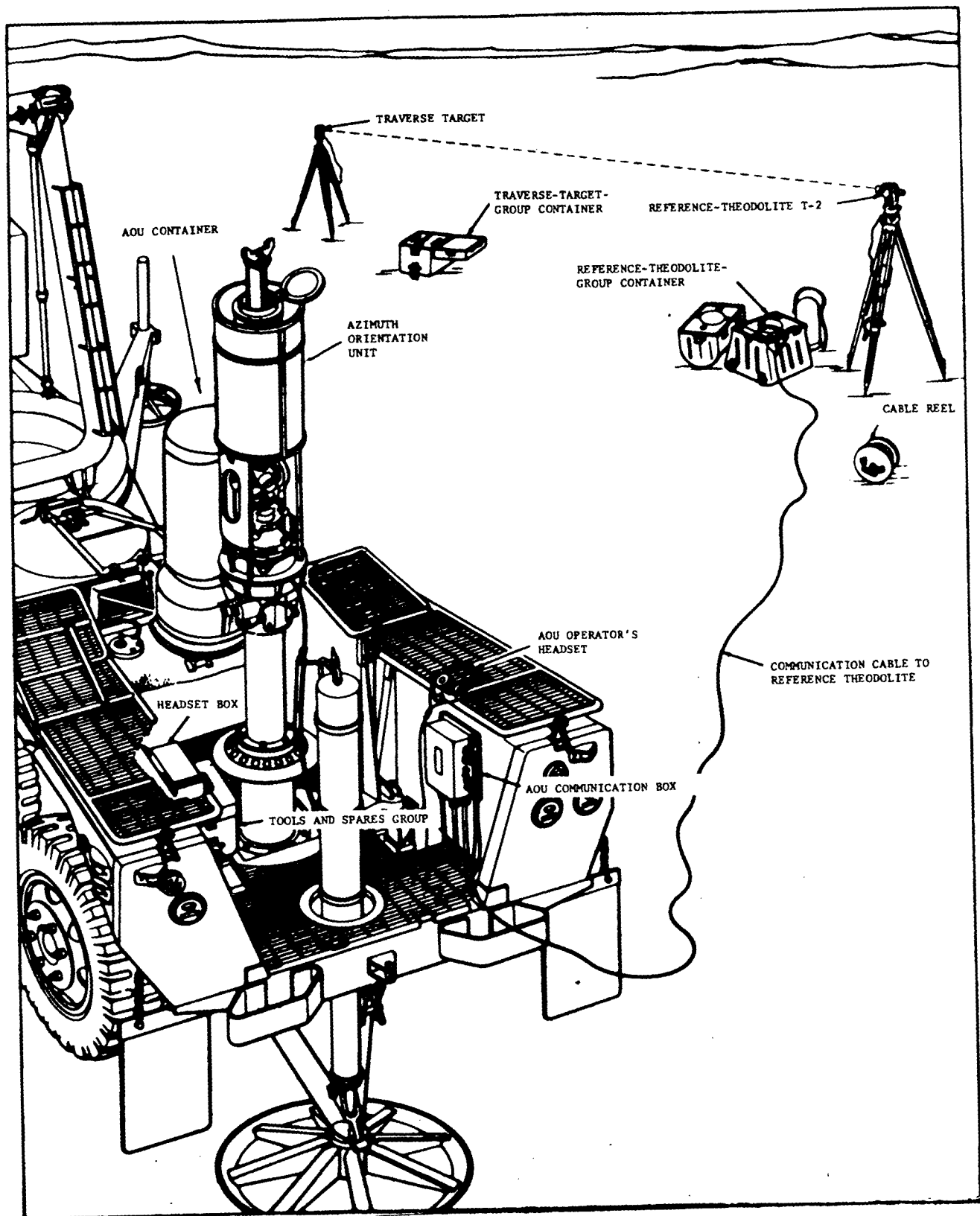


Figure 5. Azimuth orientation equipment.



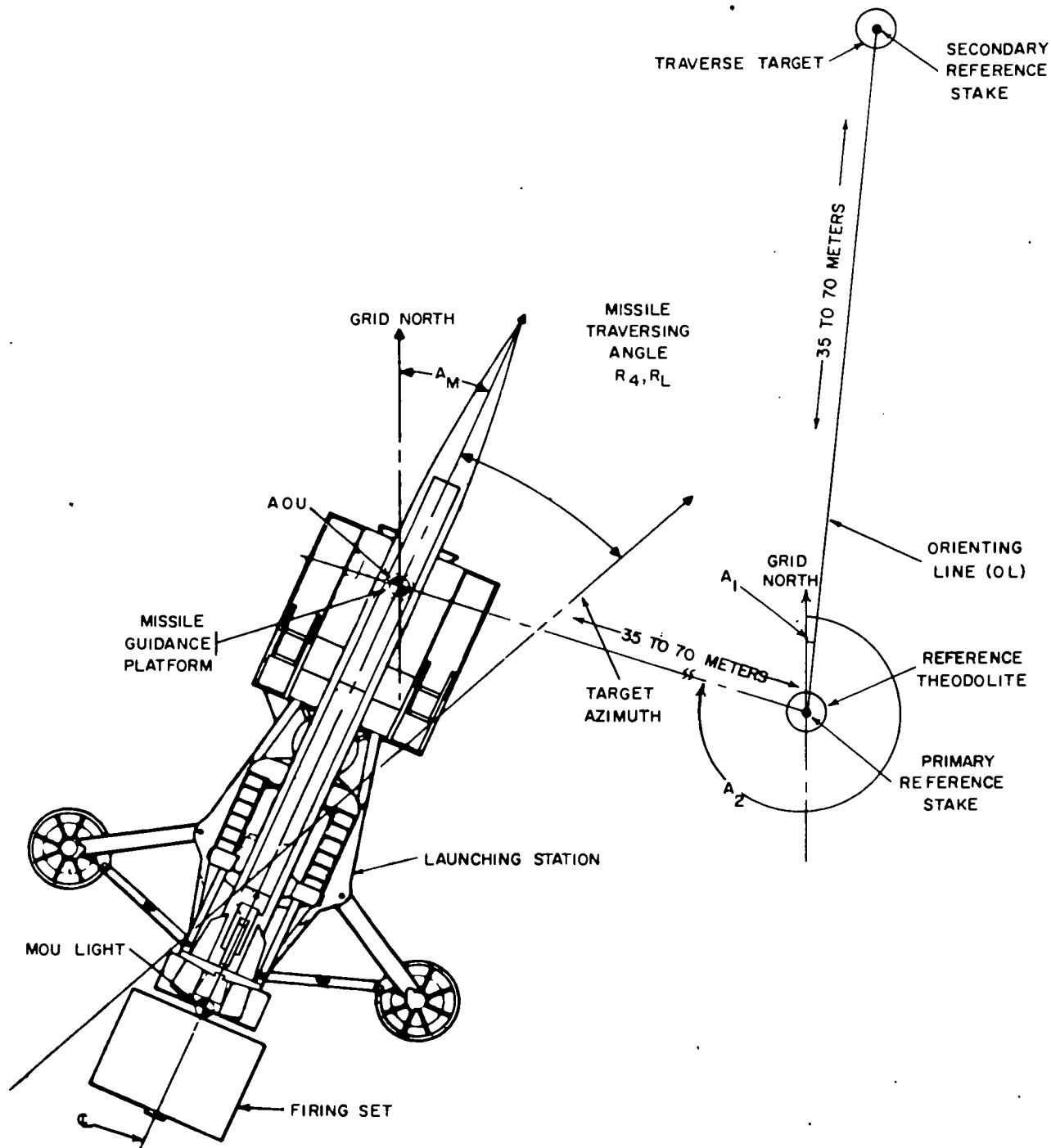
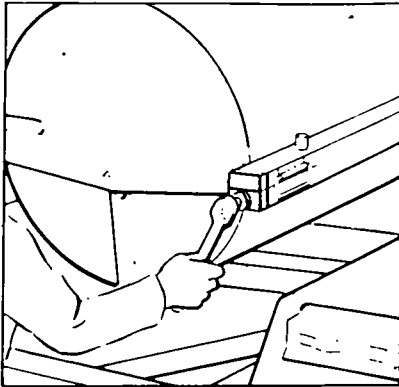


Figure 6. Azimuth orientation equipment positioning.

- (1) The chief of section or a designated crewman computes the motor temperature parameter prior to X-34 minutes using a monograph (table V) or the following formula:

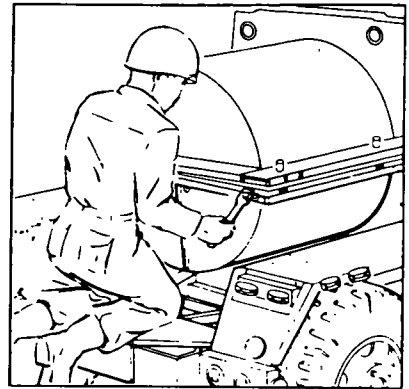
$$Q = K_1 T_c + K_2 T_A$$

$Q$  = effective temperature,  
 $K_1 = 0.84$  ( a constant ),  
 $K_2 = 0.16$  ( a constant ),  
 $T_c$  = cavity (motor nozzle) temperature measured by the firing battery, and

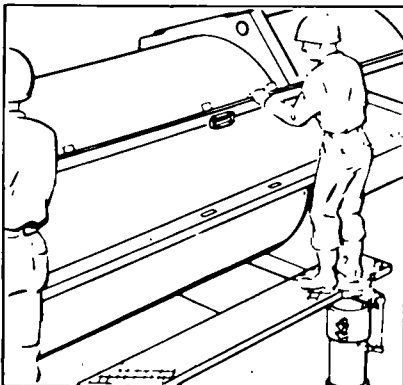
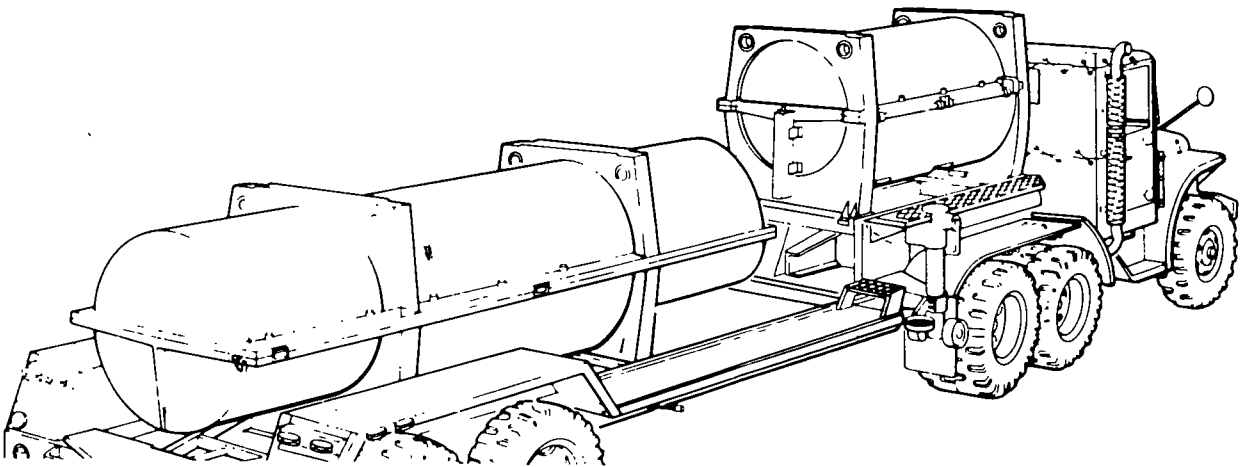


1. REMOVE THE LATCH SCREW DUST CAP BY TURNING THE CAP COUNTERCLOCKWISE TO RELEASE ANY AIR PRESSURE.

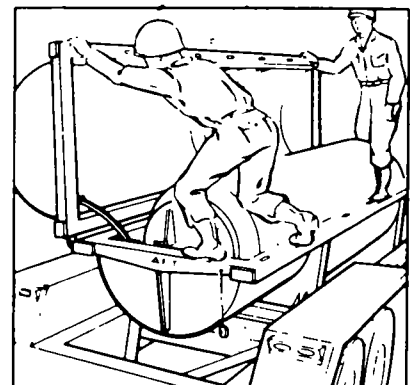
**NOTE. CHECK TO SEE THAT THE CONTAINER IS BOLTED DOWN BEFORE OPENING THE LID. IF THE CONTAINER IS EMPTY, IT WILL FALL FROM THE TRAILER.**



2. TURN THE LATCH SCREW COUNTERCLOCKWISE UNTIL THE LID SPRINGS PARTIALLY OPEN.

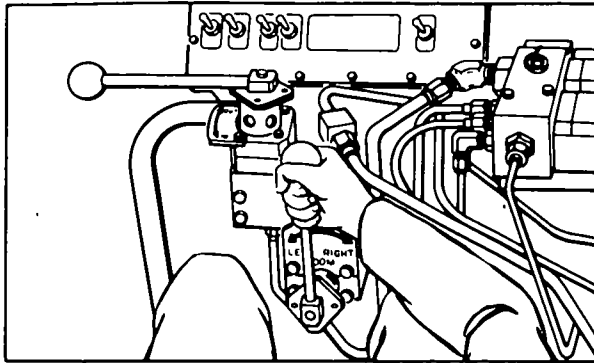


3. WITH ONE MAN AT EACH END, RAISE THE CONTAINER LID TO THE BALANCED POSITION.



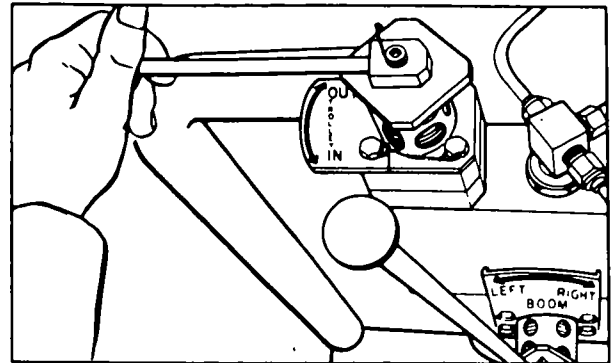
4. LOWER THE CONTAINER LID CAREFULLY TO THE TRAVEL LIMIT OF THE RESTRAINING ARM.

*Figure 7. Opening a missile section container.*



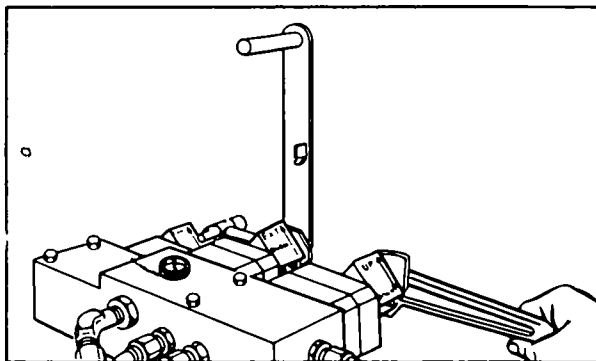
1. PLACE THE BOOM RIGHT LEFT VALVE TO EITHER RIGHT OR LEFT UNTIL THE BOOM IS POSITIONED OVER THE ROCKET MOTOR CONTAINER.

NOTE. RIGHT POSITION MOVES THE BOOM CLOCKWISE, AND LEFT POSITION MOVES THE BOOM COUNTERCLOCKWISE.



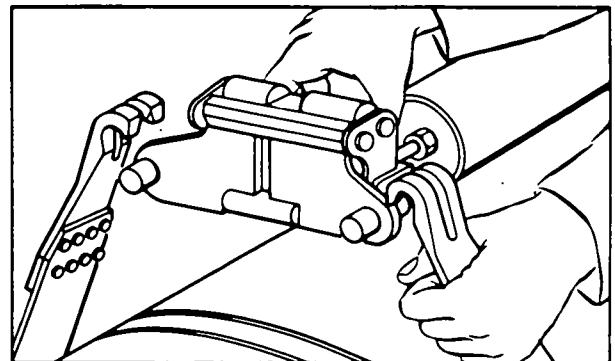
2. PLACE THE FRAME VALVE TO UP UNTIL THE U-FRAME STOPS AT THE 88-DEGREE POSITION; THEN LOCK THE FRAME VALVE IN THE UP POSITION. PLACE THE TROLLEY VALVE TO OUT UNTIL THE TROLLEY IS IN POSITION OVER THE ROCKET-MOTOR HANDLING FIXTURE.

WARNING: DO NOT ALLOW THE TROLLEY TO TRAVEL OUTWARD PAST THE PAINTED SAFETY MARK ON THE BOOM.

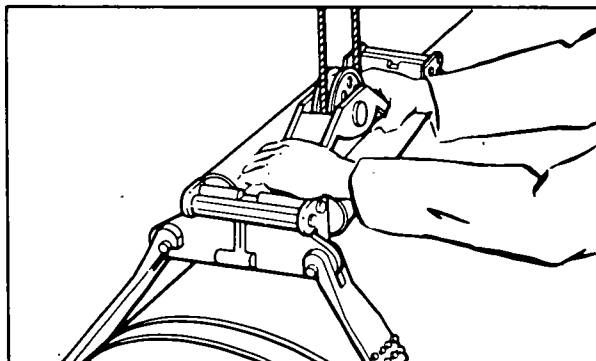


3. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST IS IN POSITION TO ENGAGE THE ROCKET-MOTOR HANDLING FIXTURE.

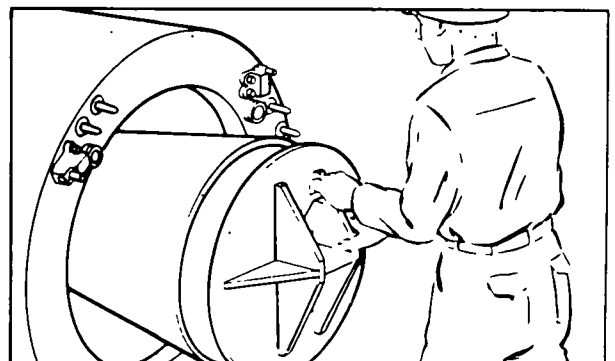
CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY



4. HOOK THE ENDS OF THE ROCKET-MOTOR HANDLING FIXTURE ON THE HOIST HANGER PINS.

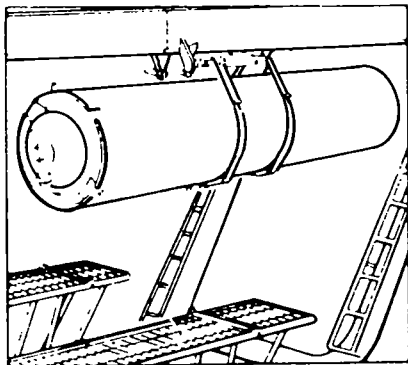


5. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE SLACK IS GONE FROM THE HOIST CABLE. CHECK THE HANDLING FIXTURE FOR PROPER ENGAGEMENT WITH THE HOIST HANGER PINS.



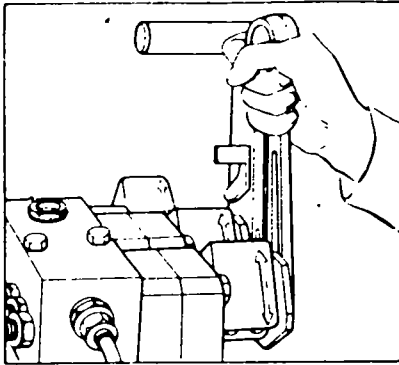
6. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE ROCKET MOTOR CLEARS THE CONTAINER. REMOVE THE NOZZLE CLAMP AND PLATE FROM THE ROCKET MOTOR AND PLACE THEM IN THE CONTAINER. REMOVE THE TWO PRIMER BAGS FROM THE CONTAINER AND PLACE THEM IN A SAFE LOCATION.

Figure 8. Removing the rocket motor from the rocket motor containers.



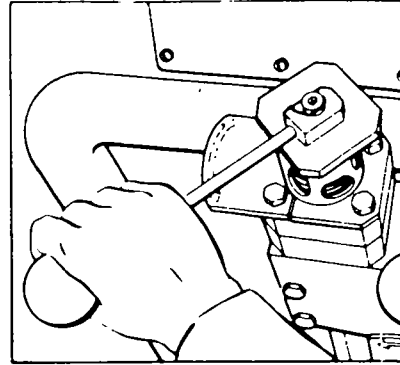
1. ALINE THE ROCKET MOTOR WITH THE BOOM.

NOTE: IF NECESSARY, PLACE THE TROLLEY VALVE IN THE OUT POSITION UNTIL THE ROCKET MOTOR NOZZLE CLEARS THE U-FRAME.

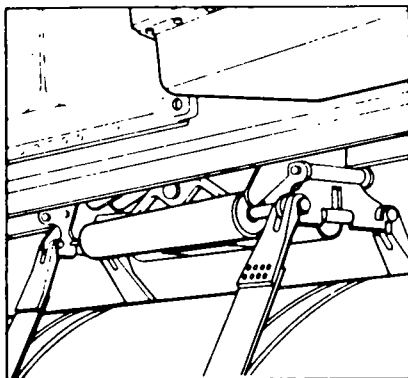


2. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE ROCKET MOTOR IS APPROXIMATELY 6 INCHES FROM THE BOOM.

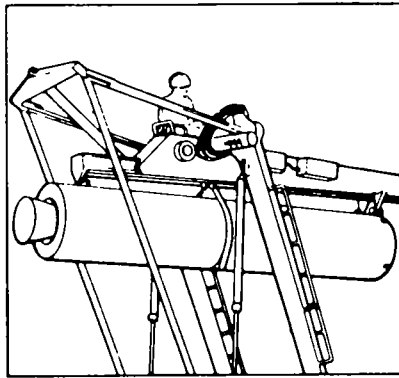
CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



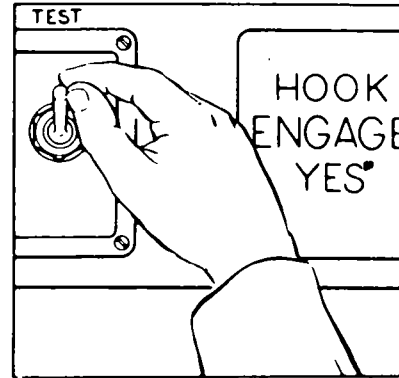
3. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE ROCKET-MOTOR HANDLING FIXTURE IS CLEAR OF THE FORWARD HANGERS



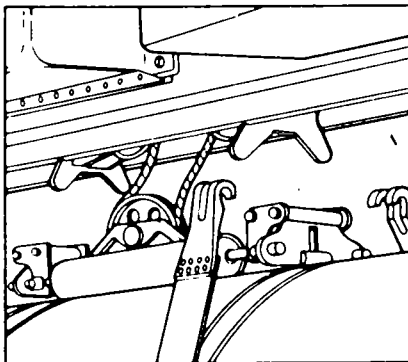
4. PLACE THE HOIST VALVE IN THE UP POSITION. LOCK THE VALVE IN THE UP POSITION WHEN THE MOTOR SECTION IS IN THE "FULL UP" POSITION.



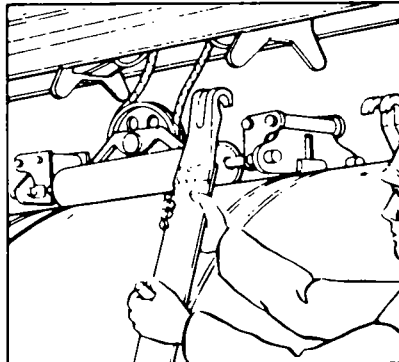
5. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE ROCKET MOTOR ENGAGES THE FORWARD AND REAR HANGERS.



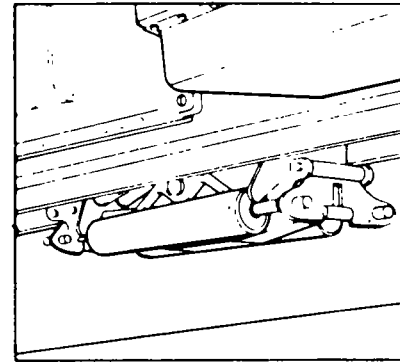
6. OPERATE THE HOOK TEST SWITCH AND CHECK THAT THE HOOKS ENGAGED YES INDICATOR LAMP GLOWS. VISUALLY AFFIRM THAT ALL HOOKS ARE ENGAGED.



7. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST CABLE BEGINS TO SLACKEN.

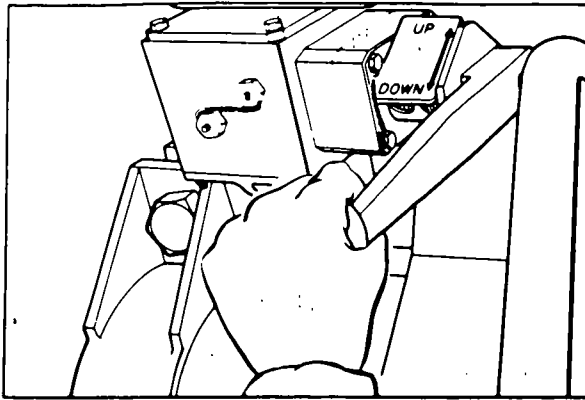


8. UNHOOK THE ENDS OF THE ROCKET-MOTOR HANDLING FIXTURE FROM THE HOIST HANGER PINS. DISENGAGE THE HANDLING FIXTURE FROM THE ROCKET MOTOR BY LIFTING UP ON EACH HANDLING FIXTURE HANDLE. RETURN THE ROCKET MOTOR HANDLING FIXTURE TO THE ROCKET MOTOR CONTAINER.

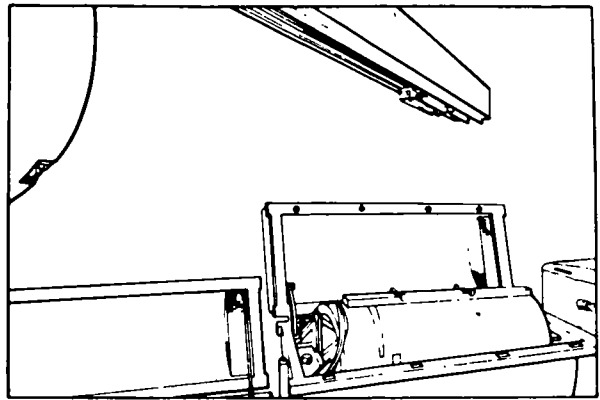


9. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY.

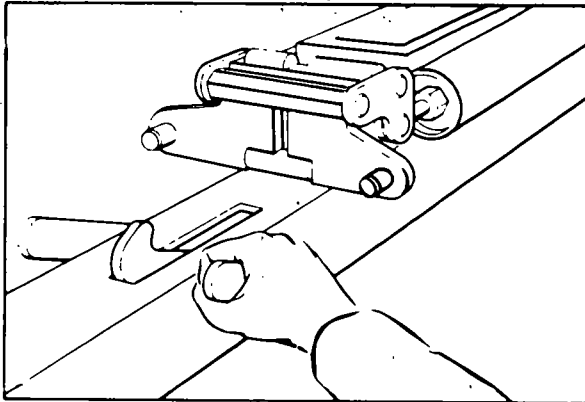
Figure 9. Engaging the rocket motor with the boom hangers.



1. PLACE THE FRAME VALVE IN THE DOWN POSITION UNTIL THE FRAME ACTUATORS ARE RETRACTED TO THE MECHANICAL STOPS.

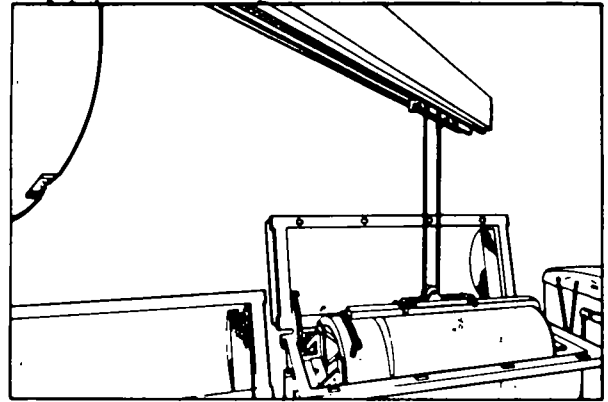


2. POSITION THE BOOM OVER THE GUIDANCE SECTION AND PLACE THE TROLLEY VALVE IN THE OUT POSITION UNTIL THE TROLLEY IS IN POSITION OVER THE GUIDANCE SECTION

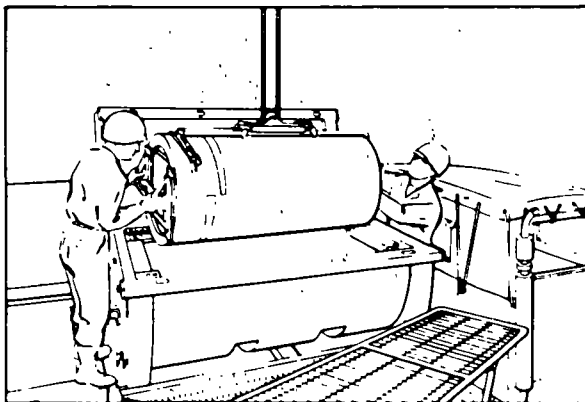


3. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST RESTS ON THE GUIDANCE SECTION HANDLING FIXTURE.

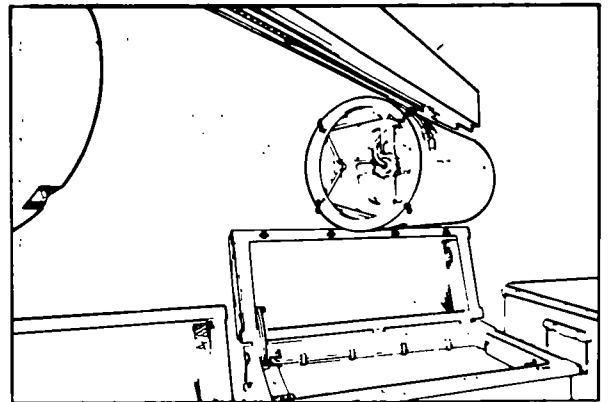
**CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.**



4. DISCONNECT THE NINE CONTAINER ELECTRICAL CONNECTORS FROM THE GUIDANCE SECTION AND REMOVE THE FORWARD- AND REAR-SUPPORT T-BOLTS. ORAPE THE GUIDANCE-SECTION CABLES OVER THE GUIDANCE SECTION. SWING THE HOIST HANGERS DOWN AND ENGAGE THEM WITH THE HOOKS ON THE GUIDANCE-SECTION HANDLING FIXTURE.

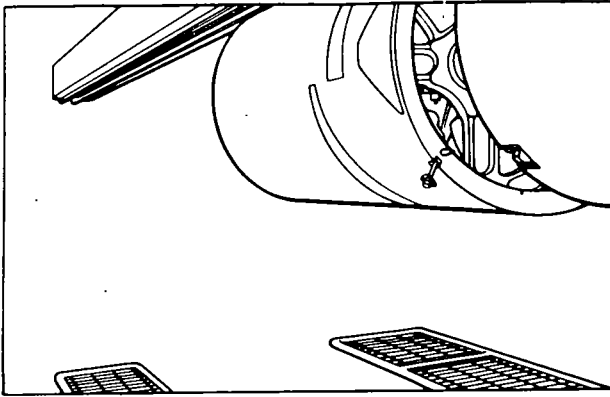


5. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE GUIDANCE SECTION CLEARS THE CONTAINER.

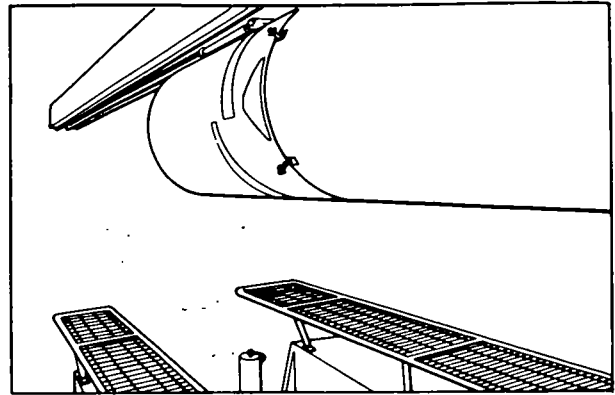


6. REMOVE THE FORWARD AND REAR SUPPORTS AND PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST SEATS IN THE TROLLEY.

*Figure 10. Removing the guidance section from its container.*

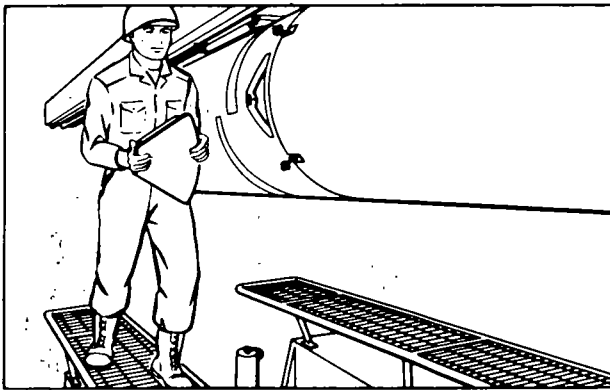


1. PLACE THE BOOM RIGHT LEFT VALVE IN THE RIGHT OR LEFT POSITION UNTIL THE BOOM IS POSITIONED OVER THE WORK PLATFORMS.

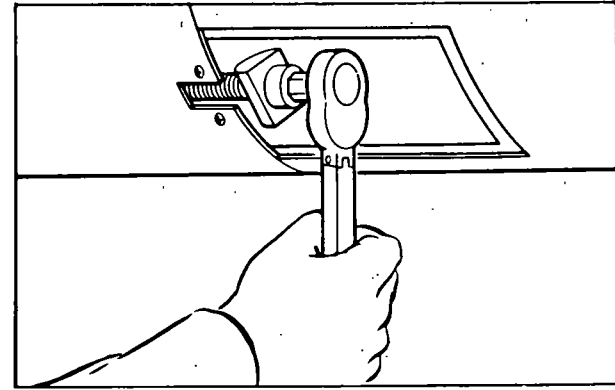


2. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE GUIDANCE SECTION MATES WITH THE ROCKET MOTOR.

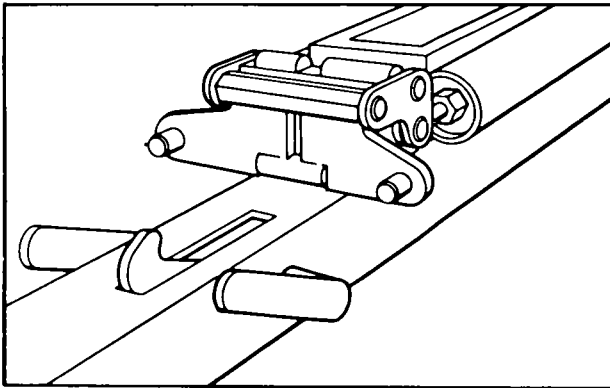
**WARNING: KEEP HANDS CLEAR OF THE GAP BETWEEN THE GUIDANCE SECTION AND ROCKET MOTOR.**



3. REMOVE THE DESTROY-COMPARTMENT SIDE PANEL AND PLACE IT ON THE WORK PLATFORM.

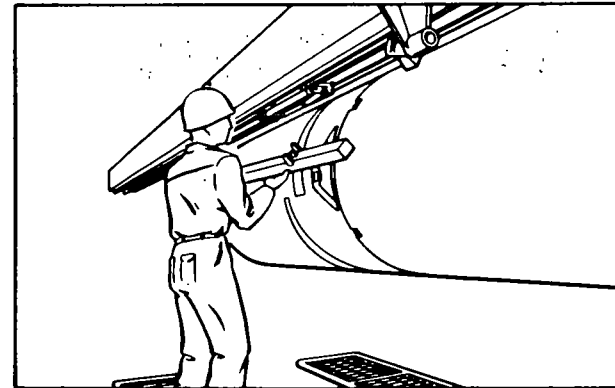


4. ATTACH THE GUIDANCE SECTION TO THE ROCKET MOTOR BY TIGHTENING THE GUIDANCE-SECTION TO ROCKET-MOTOR SWING BOLTS. TIGHTEN THE SWING BOLTS FIRST WITH A SPEED WRENCH; THEN USE A TORQUE WRENCH TO TIGHTEN THE BOLTS TO 1250 POUND-INCHES OF TORQUE.



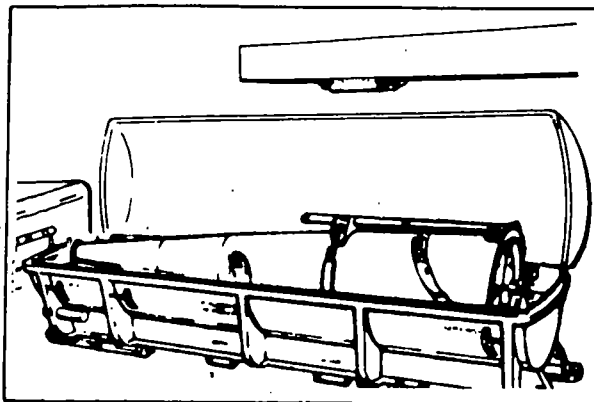
5. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOOKS IN THE GUIDANCE-SECTION HANDLING FIXTURE DISENGAGE THE HOIST; THEN PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY.

**CAUTION: DO NOT ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.**



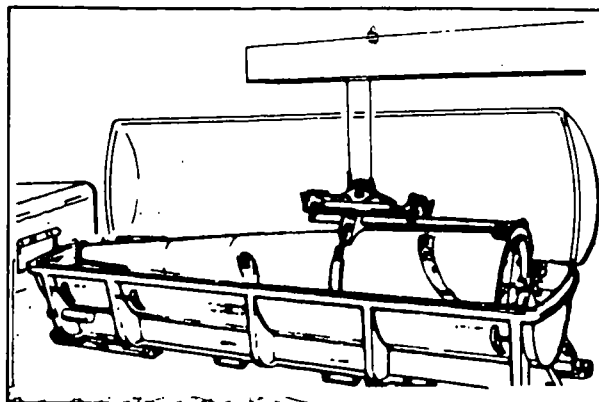
6. REMOVE THE GUIDANCE-SECTION HANDLING FIXTURE FROM THE GUIDANCE SECTION AND RETURN IT TO THE GUIDANCE SECTION CONTAINER.

Figure 11. Assembling the guidance section and the rocket motor.



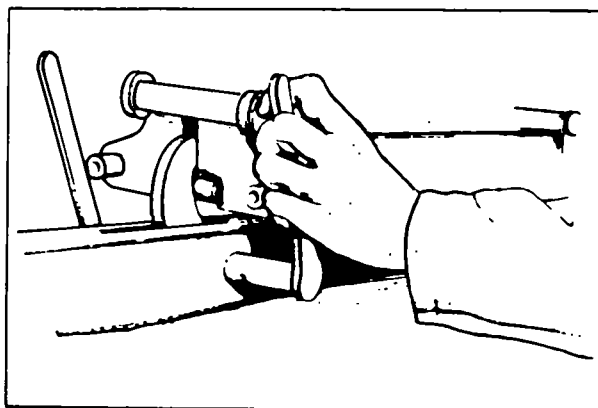
1. PLACE THE BOOM RIGHT LEFT VALVE TO RIGHT OR LEFT UNTIL THE BOOM IS POSITIONED OVER THE WARHEAD SECTION CONTAINER; THEN PLACE THE TROLLEY VALVE IN THE OUT POSITION UNTIL THE TROLLEY IS POSITIONED OVER THE WARHEAD SECTION.

NOTE. THE FRAME VALVE MAY BE PLACED IN THE UP POSITION AS REQUIRED FOR PROPER POSITIONING OF THE TROLLEY OVER THE WARHEAD SECTION.



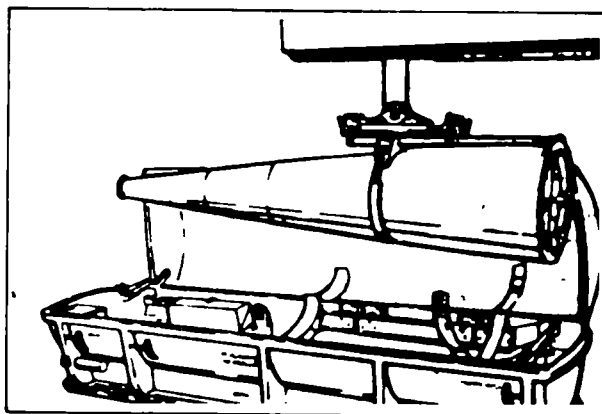
2. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST RESTS ON THE WARHEAD SECTION HANDLING FIXTURE.

CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



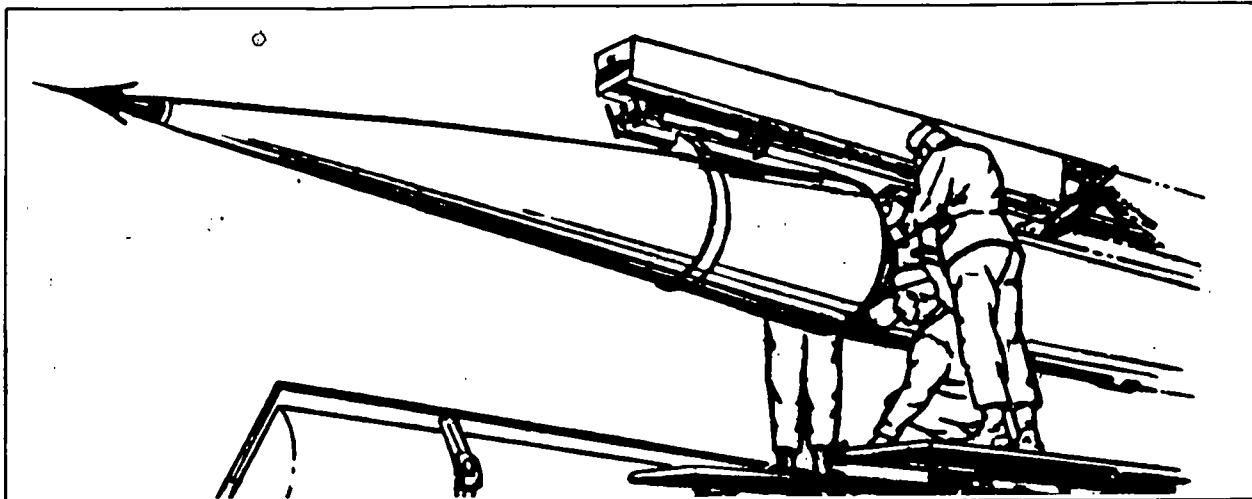
3. SWING THE HOIST HANGERS DOWNWARD AND ENGAGE THEM WITH THE HOOKS ON THE WARHEAD SECTION HANDLING FIXTURE. REMOVE T-BOLTS IN REAR SUPPORT AND RELEASE TIEDOWN CABLE CLAMP.

CAUTION: INSURE THAT THE PORE BODY SECTION DOES NOT HIT ANY MISSILE SECTION CONTAINER DURING ROTATION.



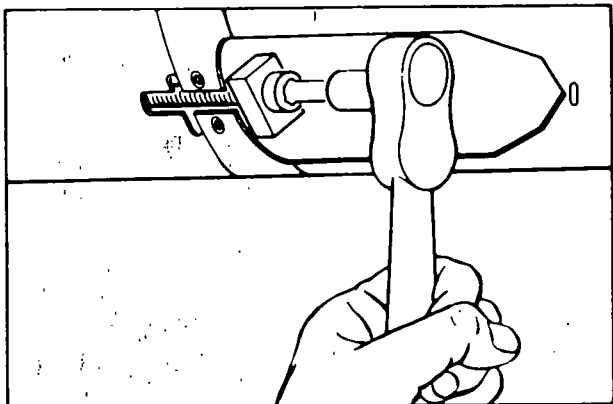
4. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE WARHEAD SECTION CLEARS THE PORE BODY SECTION CONTAINER. INSTALL WARHEAD PROBE SECTION.

Figure 12. Removing the warhead section from its container.

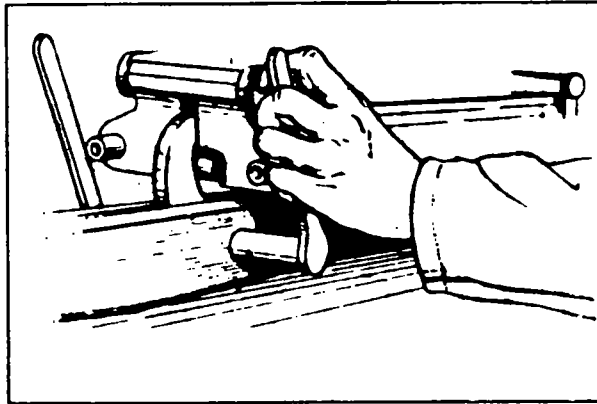


1. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE WARHEAD SECTION MATES WITH THE GUIDANCE SECTION.

**WARNING:** KEEP HANDS CLEAR OF THE GAP BETWEEN THE FUSE BODY SECTION AND THE GUIDANCE SECTION.

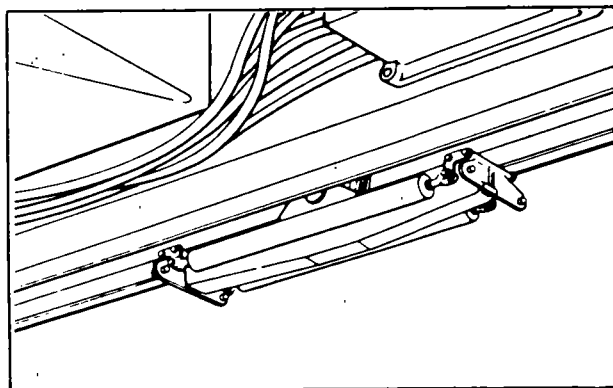


2. TIGHTEN THE WARHEAD SECTION GUIDANCE-SECTION SWING BOLTS FIRST WITH A SPEED WRENCH, THEN USE A TORQUE WRENCH TO TIGHTEN THE BOLTS TO 1250 POUND-INCHES OF TORQUE.

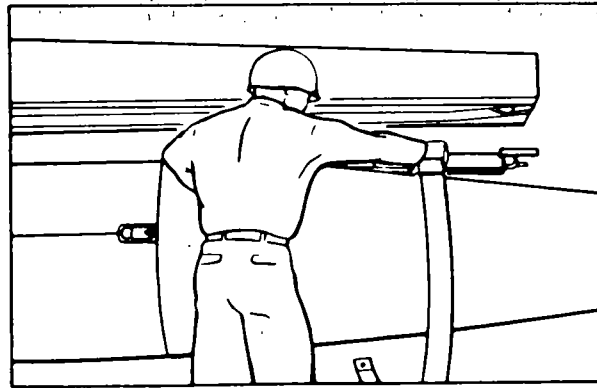


3. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOOKS IN WARHEAD SECTION HANDLING FIXTURE DISENGAGE FROM THE HOIST.

**CAUTION:** NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



4. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE TROLLEY STOPS.



5. REMOVE THE WARHEAD SECTION HANDLING FIXTURE FROM THE WARHEAD SECTION. RETURN THE WARHEAD SECTION HANDLING FIXTURE TO THE CONTAINER.

*Figure 13. Assembling the warhead section and the guidance section.*



$T_A$  = aft-body (tail fairing) temperature measured by the firing battery.

- (2) For further information, refer to chapter 2 of FM 6-40-2, Field Artillery Missile Gunnery.

e. Prior to X-20 minutes crewman number 6 removes the cable and firing box from the door of the firing set, makes necessary cable connections and then—

- (1) Prior to X-20 minutes, contacts the firing set operator to insure that he is ready to check the firing box and cabling.
- (2) Insures that the power switch is in the POWER ON position to test the firing box, and checks the firing box.
- (3) Extend the cable and firing box to the remote firing pit.

f. There are two types of holds that can occur—command holds and automatic holds. It is possible to hold the automatic countdown intentionally (command holds) at X-20 minutes, X-7½ minutes, X-2 minutes (programmed into equipment), X-20 seconds, and X-100 milliseconds. An automatic hold will stop (fail) the countdown when it occurs.

(1) Command holds.

(a) If a command hold is initiated between X-20 minutes and X-7½ minutes, the countdown must be reset to X-20 minutes and held. In addition, a hold at X-20 minutes can be exercised before the automatic countdown is even started. If a command hold is initiated between X-7½ minutes and X-2 minutes, the countdown must be reset to X-7½ minutes or X-20 minutes before the countdown can be resumed. A command hold may be called after the X-2 MIN indicator lights and before the X-90 SEC indicator lights. When the time X-90 has been passed a command hold can be initiated at any time, but the hold will not occur until X-20 seconds or X-100 milliseconds depending upon the initiating time of the command hold.

(b) Duration of holds are tabulated below.

*Time sequence*

*Time limit*

Prior to:

X-20 minutes	-----	Indefinite up to several days (excluding warmup time).
X-7½ minutes	-----	2 hours depending on motor temperature and sensitive equipment.
X-2 minutes	-----	10 minutes.
* X-20 seconds	-----	2 minutes.
* X-100 milliseconds	-----	2 minutes.

\* Total time for holds at X-20 seconds and 100 milliseconds cannot exceed 2 minutes.

- (2) *Automatic holds.* An automatic hold caused by the sensing circuits stops the program, lights the HOLD indicator, and indicates the area of failure. An automatic hold at any time requires the countdown to be reset to X-20 minutes and appropriate corrective action must be taken in accordance with TM 9-1440-301-12.

g. A sample firing data sheet is illustrated in figure 14.

## 15. Firing Procedures

Procedures for firing the missile are generally outlined in this section. The missile firing procedures consume the last 20 minutes before firing.

a. The fire mission will call for a time on target (TOT). The time to fire is obtained as follows:

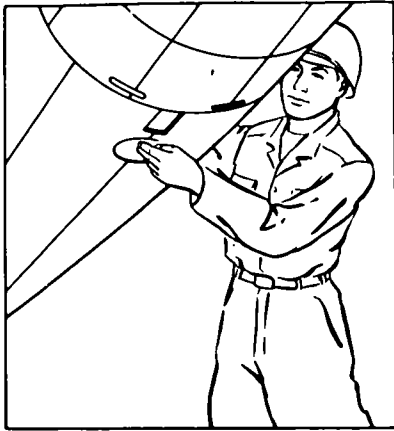
- (1) Obtain the time of flight for mission. Refer to time of flight graph in FM 6-40-2.
- (2) Add 90 seconds to the time of flight to compensate for the automatic sequencing of the countdown.
- (3) Subtract the total of (1) and (2) above from the TOT. The result is the time at which the FIRE-HOLD switch must be placed in the FIRE position to meet the time on target (TOT) requirement.

b. As soon as the missile is assembled, the senior AOS operator positions and inserts the alinement tube as shown in figure 15. He then alines the guidance platform to the firing azimuth with the AOU as shown in figure 16. (Readings are recorded, as they are obtained, in the AOS data book.) (TM 9-1440-301-12.)

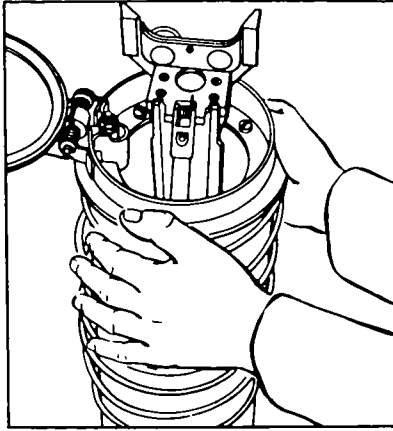
# FIRING DATA SHEET

FIRING DATA			TIME ON TARGET	Conc No	TIME OF FLIGHT	
Day _____ Month _____ Year _____			hours _____	_____	Seconds _____	
	Para No.	Parameter				Para No.
Data From Battalion Headquarters	00	Target Easting (ET)	_____	Meters		00
	01	Target Zone (ZT)	_____			01
	02	Target Northing (NT)	_____	Meters		02
	03	Target Million Section (MT)	_____	Megameters		03
	08	Spheroid (SP)	_____			08
	10	Target Altitude (YT)	_____	Meters		10
	12	Warhead Parameter (WP)	_____			12
	13	Arming Bound (B)	_____			13
Local Data	04	Launch Easting (EL)	_____	Meters		04
	05	Launch Zone (ZL)	_____			05
	06	Launch Northing (NL)	_____	Meters		06
	07	Launch Million Section (ML)	_____	Megameters		07
	09	Launch Altitude (YL)	_____	Meters		09
	11	Motor Temperature (Q)	_____	° F		11
	14	Weight Adjustment Factor (W)	_____			14
	15	Baro Adjustment Factor (C)	_____			15
Azimuth Reference Readings	16	Missile Azimuth (AM)	_____	Decimils		16
	20	UTM Survey Reference Line (A <sub>1</sub> )	_____	Decimils		20
	21	Azimuth Scale Reading No. 1 (R <sub>1</sub> )	_____	Decimils		22
	22	Azimuth Scale Reading No. 2 (R <sub>2</sub> )	_____	Decimils		22
	23	Azimuth Scale Reading No. 3 (R <sub>3</sub> )	_____	Decimils		23
Readouts	18	Range (R)	_____	Meters		18
	19	Azimuth (A)	_____	Decimils		19
	24	Firing Azimuth Scale Setting (R <sub>4</sub> )	_____	Decimils		24
	17	Launcher Slew Angle (R <sub>L</sub> )	_____	Decimils		17
	25	Burst Time (T <sub>B</sub> )	_____			25

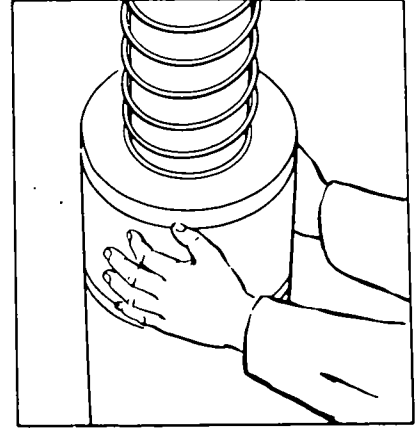
Figure 14. Sample firing data sheet.



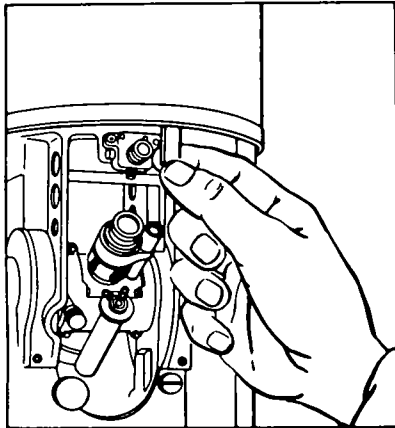
1. OPEN THE ACCESS DOOR ON THE UNDER-SIDE OF THE GUIDANCE SECTION. PULL THE INDUCTOSYN COVER LOOSE.



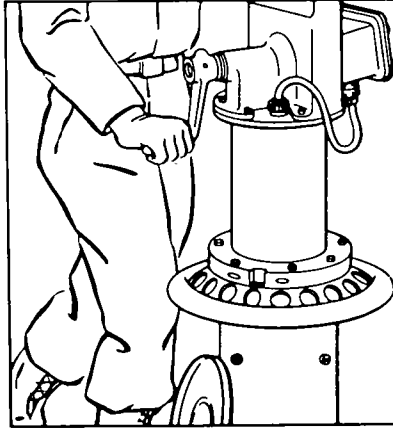
2. DEPRESS THE UPPER BLAST SHIELD. INSURE THAT THE AOU AND LAUNCHING STATION ARE LEVEL.



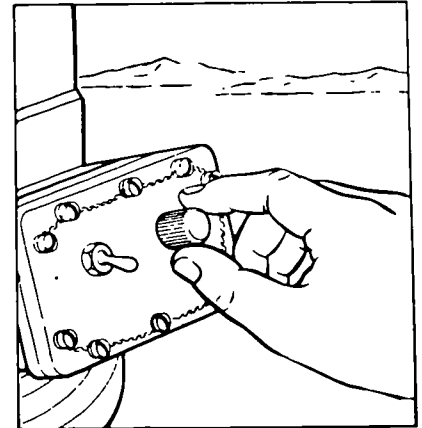
3. POSITION THE AOU ALINEMENT FLATS TOWARD THE FIRING SET.



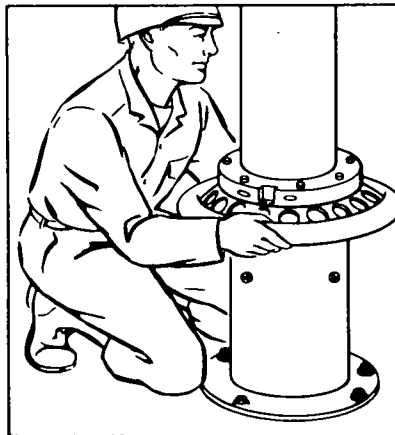
4. RAISE THE CAM FOLLOWER ON THE AOU ALINEMENT TUBE.



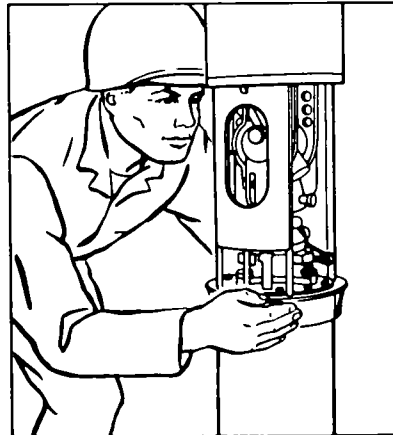
5. CRANK THE PEDESTAL UP TO START THE TUBE INTO THE GUIDANCE-SECTION ACCESS DOOR.



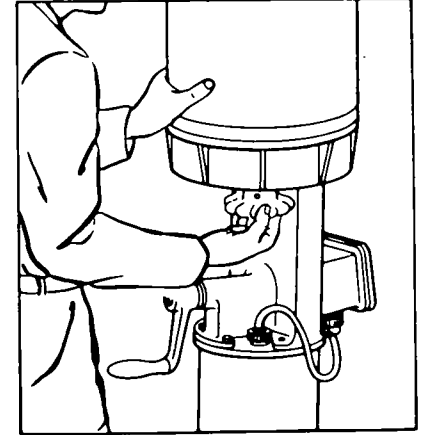
6. TURN ON THE AOU ALINEMENT AND SCALE LIGHTS.



7. RAISE THE PEDESTAL UNTIL IT IS STOPPED. TURN THE HAND WHEEL TO LOCK IT.



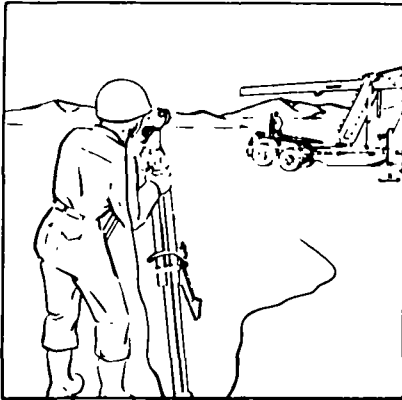
8. SEE THAT THE BEAD AND CROSSHAIRS ARE ALINED WITH THE CENTER OF THE INDUCTOSYN SHAFT (THRU THE OPTICAL PLUNGET). CAM FOLLOWER IS RELEASED.



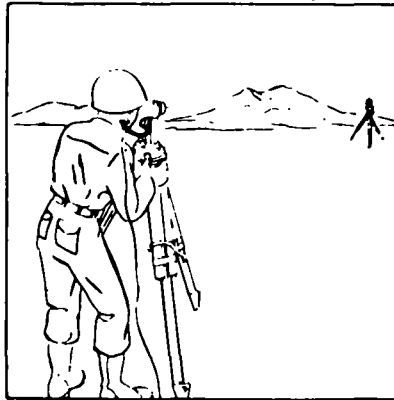
9. ADJUST AOU POSITIONING IF NECESSARY.

Figure 15. Inserting the alinement tube.

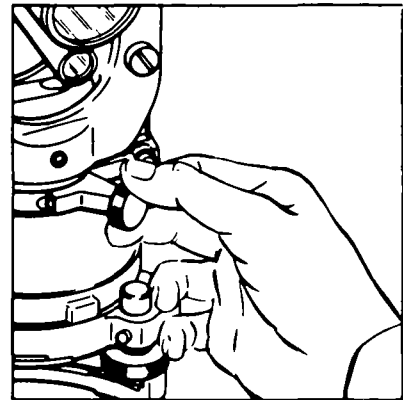
- (1) The reference theodolite operator monitors the orientation of the AOU base and remains in constant communication with the firing set operator.



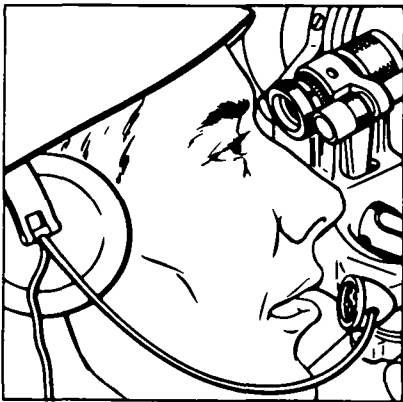
1. UNLOCK THE HORIZONTAL CIRCLE ON THE AOU AND SET THE CIRCLE TO SOME RANDOM READING. LOCK THE CIRCLE.



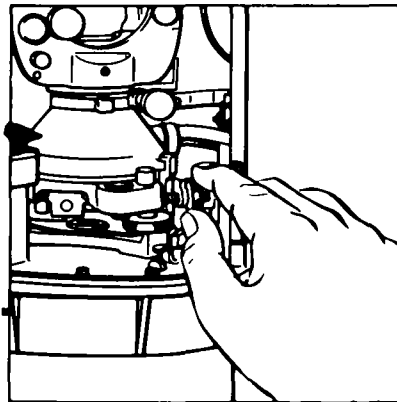
2. TURN ON THE TRAVERSE-TARGET LIGHT. REPEAT STEP 1 ON THE REFERENCE THEODOLITE. SIGHT THE REFERENCE THEODOLITE ON THE TRAVERSE TARGET TO OBTAIN  $R_1$ .



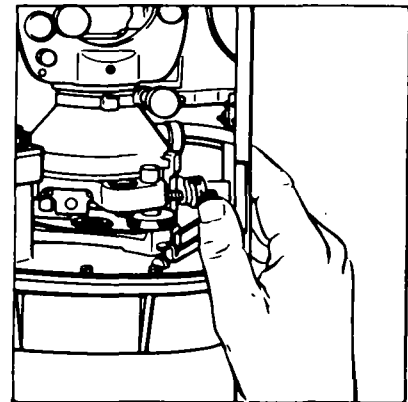
3. QUALIFY THE AOU AND THE REFERENCE THEODOLITE. THE REFERENCE THEODOLITE OPERATOR WILL NOW HAVE  $R_2$  ON HIS HORIZONTAL CIRCLE. HE WILL CALL IN THE  $R_1$  AND  $R_2$  VALUES TO THE AOU OPERATOR.



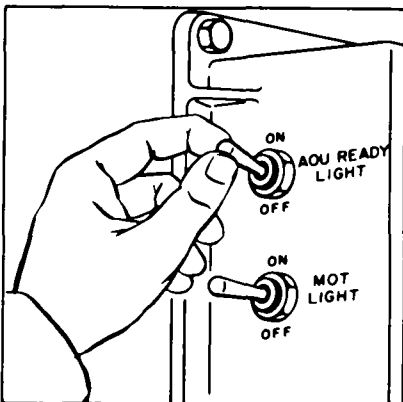
4. READ THE AOU HORIZONTAL CIRCLE AND RECORD THIS VALUE,  $R_3$ . TRANSMIT  $R_1$ ,  $R_2$ , AND  $R_3$  TO THE FIRING SET OPERATOR.



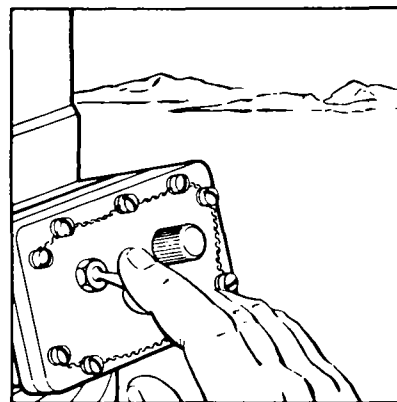
5. ALINE (PSEUDO). QUALIFY THE MONITORING PRISM ON THE AOU WITH THE REFERENCE THEODOLITE.



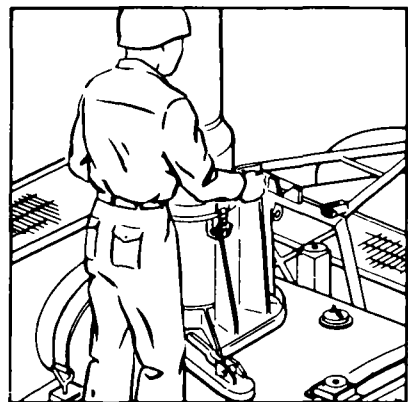
6. RECEIVE THE COMPUTED VALUE  $R_4$  FROM THE FIRING SET OPERATOR. ROTATE THE AOU TO THIS SETTING AS SHOWN BY THE HORIZONTAL CIRCLE.



7. PLACE THE AOU READY LIGHT SWITCH ON THE AOU COMMUNICATIONS BOX TO ON. UNPLUG THE AOU HEADSET FROM THE AOU COMMUNICATIONS BOX.



8. TURN OFF THE AOU QUALIFICATION LIGHT LOWER THE BLAST SHIELD TO THE MONITORING (PARTIALLY CLOSED) POSITION.



9. REINSTALL THE AOU CONTAINER IN ITS TRAVEL POSITION. CAREFULLY CLIMB DOWN AND WALK TO A SAFETY AREA.

Figure 16. Alining the AOU.

- (2) At X-3 minutes the reference theodolite operator secures the theodolite by installing and latching the dome cover over it and moves quickly to the safety area.

c. Operation of the firing set requires an attentiveness to duty and procedure. A general outline of duties is listed below. For detailed instructions, refer to TM 9-1440-301-12. The firing set can be placed in a standby condition at any time during the automatic countdown (all the information within the firing set computer will be retained even though the power is turned off). Information on operational hold limits is in paragraph 14f.

- (1) At X-20 minutes, begin the automatic countdown using the following time chart and steps in figures 17, 18, 19, and 20.

- |          |   |
|----------|---|
| (a) X-20 | Press the START PROGRAM button.   |
| (b) X-19 | Press the START button for insertion of first block of parameters.  |
| (c) X-13 | Input (insertion of random readings). Output (check inserted random readings). AOU compute (AOU setting).                           |
| (d) X-9  | Place computer to transfer. Press START button for second block of parameter insertion.   |
| (e) X-6  | At X-6 minutes, the assistant chief of section supervises crewman number 1 in inserting the primer into the rocket motor (fig. 19). |
| (f) X-3  | Leave station and proceed to the remote firing position (fig. 20) and wait for the X-2 MIN lamp to light on the firing box.         |

- (g) X-90 sec. Set the FIRE-HOLD switch to FIRE position.

*Note.* The LEAVE STATION lamp will start blinking at exactly X-3 minutes, and the X-2 MIN lamp on the firing box will start glowing at exactly X-2 minutes.

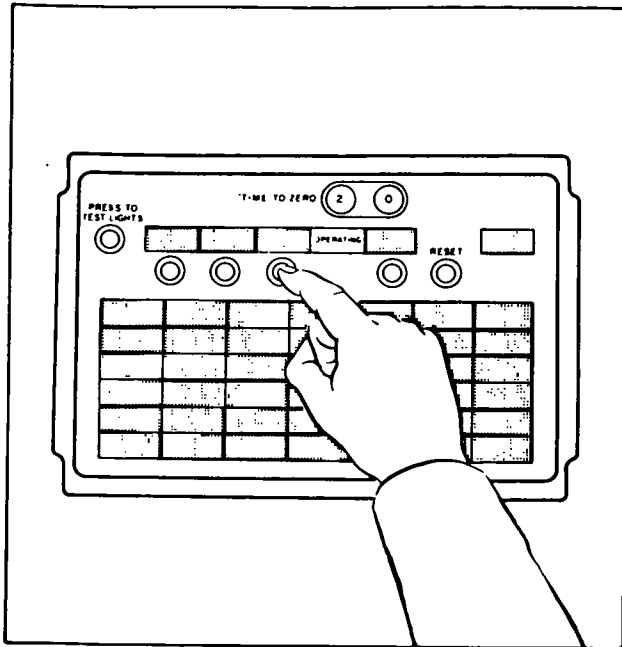
- (2) Upon the command to fire the operator will set the FIRE-HOLD switch to the FIRE position; 90 seconds later the missile will fire unless the FIRE-HOLD switch is repositioned to the HOLD position.
- (3) At X-20 seconds, the X-20 SEC indicator lamp on the firing box will light (fig. 20).

*Note.* When the FIRE-HOLD switch on the firing box is placed in the HOLD position after X-90 seconds, it will not cause a hold until X-20 seconds. Once the X-20 SEC indicator lamp lights, it will not cause a hold until X-100 milliseconds. If a hold time of 2 minutes is exceeded between X-20 SEC and X-100 milliseconds, the missile batteries must be replaced and the entire countdown repeated from X-20 minutes.

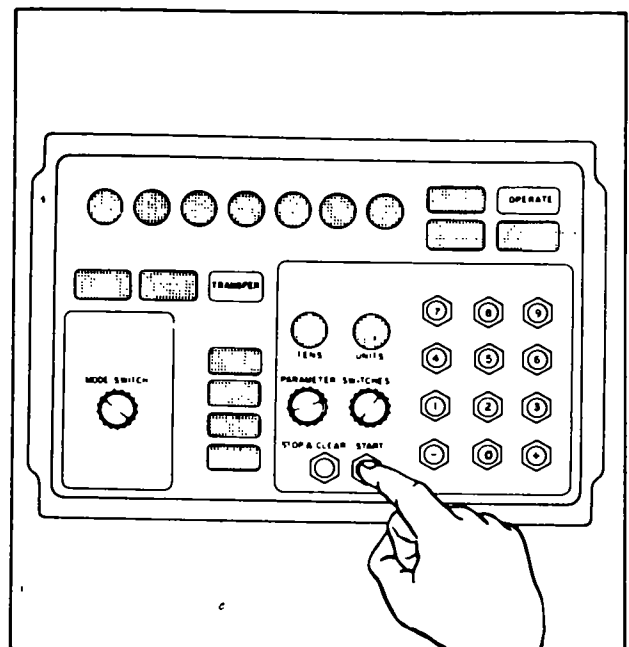
- (4) At X-0, the missile will fire automatically. As soon as the missile has left the launcher, press the SAFE button on the firing box.
- (5) At X+1 minute, the firing set operator enters the firing set inclosure and places the appropriate transfer switch to TEST position. The operator presses the CLEAR PROGRAM button on the monitor control panel and confirm fired data. The boom operator in the meantime returns the boom to the horizontal and positions it over the A-frame. The chief of section checks for blast and fire damage.

## 16. March Order of Launching Station

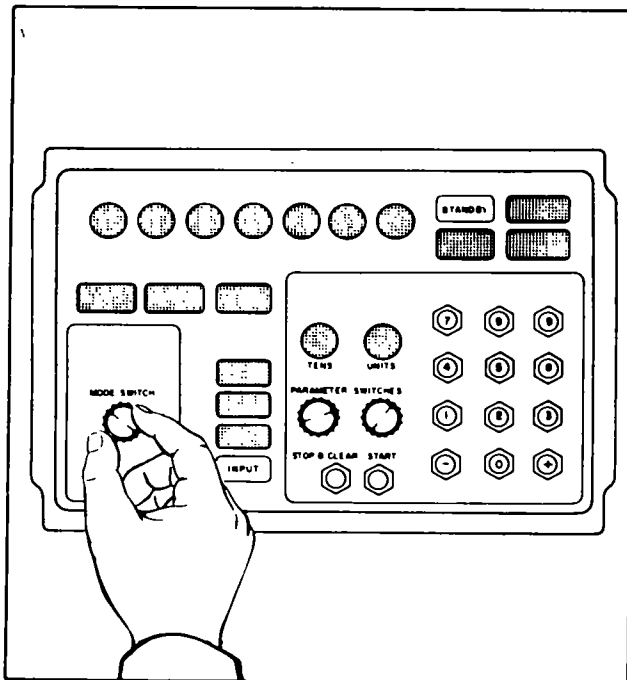
If an assembled missile is to be disassembled because of the cancellation of the fire mission, missile malfunction, or for training purposes; figures 2 and 3 will be used for positioning the missile section transporters, figure 4 for hand signals, figure 7 for opening the missile section containers, figure 21 for removing the primer from the rocket motor, table III for missile sec-



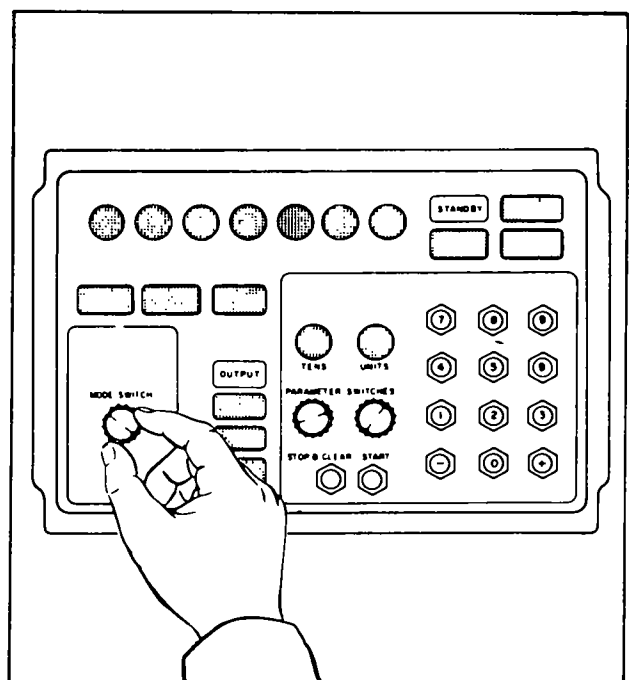
1. DEPRESS THE START PROGRAM BUTTON. THE START PROGRAM INDICATOR LAMP CEASES TO GLOW AND THE OPERATING INDICATOR LAMP GLOWS.



2. AT X-19 MINUTES, PRESS THE START BUTTON. THE STANDBY LAMP WILL CEASE TO GLOW, THE OPERATE INDICATOR LAMP WILL START TO GLOW AND WILL GLOW UNTIL TRANSFER IS COMPLETE. PRIOR TO X-13 MINUTES, THE OPERATE LAMP WILL CEASE TO GLOW AND THE STANDBY LAMP WILL GLOW AGAIN.



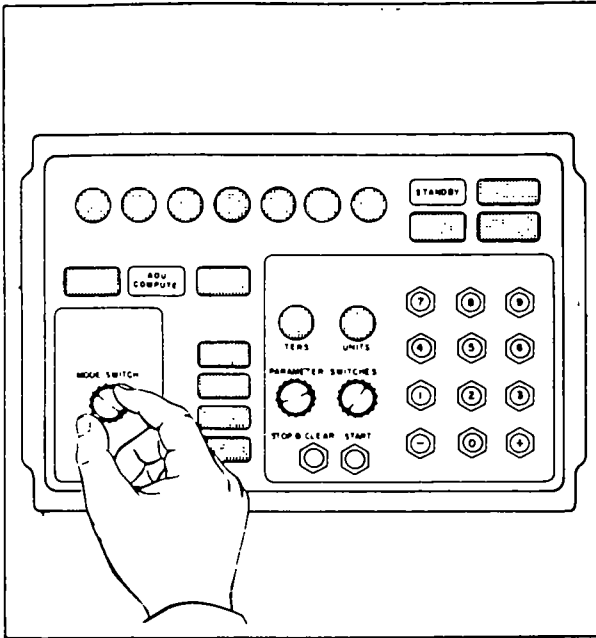
3. AT X-13 MINUTES, ROTATE THE MODE SWITCH UNTIL THE INPUT INDICATOR LAMP GLOWS. ENTER INPUTS  $R_1$ ,  $R_2$ , AND  $R_3$ , AND DEPRESS THE START BUTTON.



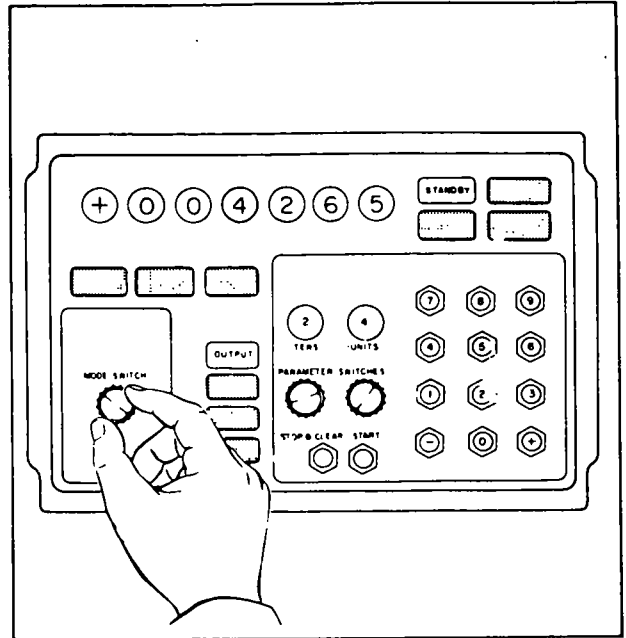
4. AT X-12 MINUTES 50 SECONDS, ROTATE THE MODE SWITCH UNTIL THE OUTPUT INDICATOR LAMP GLOWS.

NOTE. VERIFY THE INPUTS ENTERED IN STEP 3.

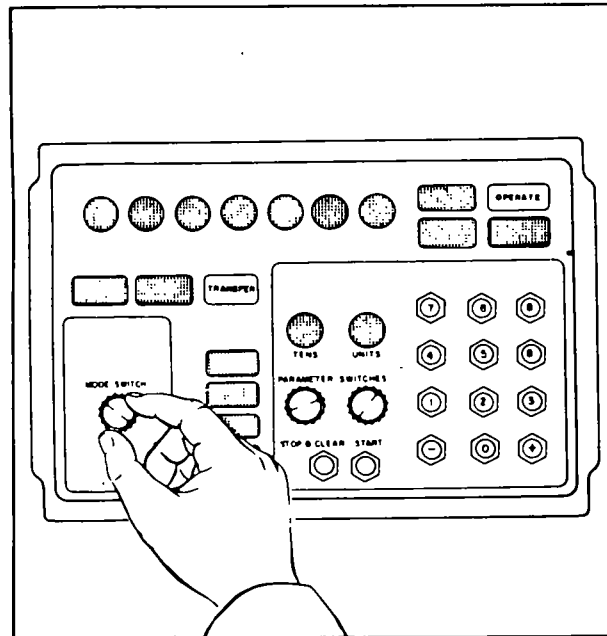
Figure 17. Operations during automatic countdown (steps 1 through 4).



5. AT X-12 MINUTES 30 SECONDS, ROTATE THE MODE SWITCH UNTIL THE AOU COMPUTE INDICATOR LAMP GLOWS. DEPRESS THE START BUTTON.

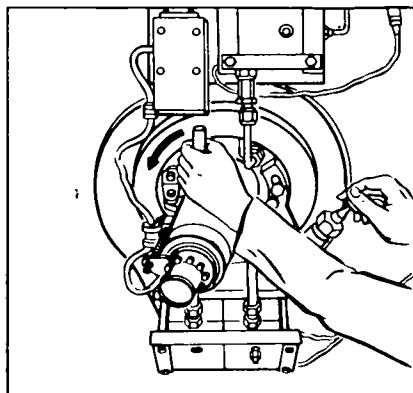


6. AT APPROXIMATELY X-12 MINUTES, POSITION THE PARAMETER SWITCHES TO SHOW THE DIGITS 2 AND 4 ON THE TENS AND UNITS INDICATORS. ROTATE THE MODE SWITCH UNTIL THE OUTPUT INDICATOR LAMP GLOWS. DEPRESS THE START BUTTON. READ THE VALUE (THE  $R_4$  PARAMETER) ON THE NUMERICAL INDICATORS TO THE AOU OPERATOR AND THE CHIEF OF SECTION. DEPRESS THE STOP & CLEAR BUTTON.

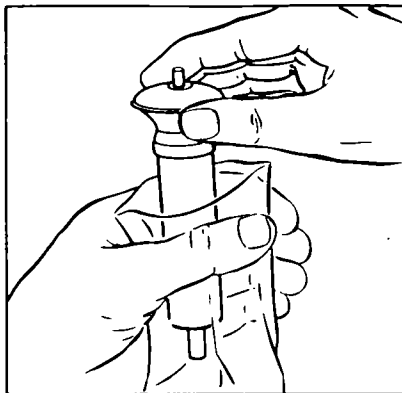


7. AT X-9 MINUTES, ROTATE THE MODE SWITCH UNTIL THE TRANSFER LAMP GLOWS. DEPRESS THE START BUTTON. OBSERVE THAT THE STANDBY LAMP CEASES TO GLOW AND THAT THE OPERATE LAMP GLOWS UNTIL THE COMPLETION OF THE PARAMETER INSERTION, WHEN THE STANDBY LAMP GLOWS AGAIN.

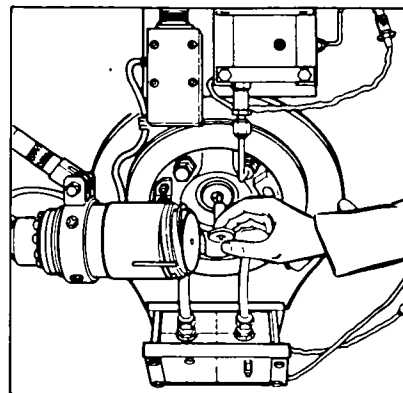
Figure 18. Operations during automatic countdown (steps 5 through 7).



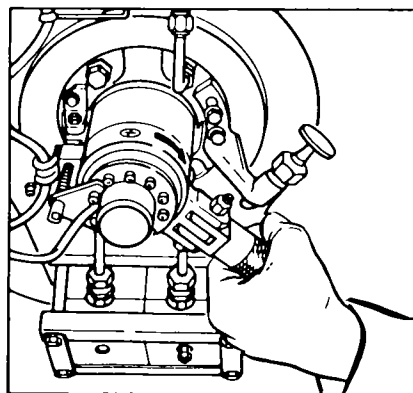
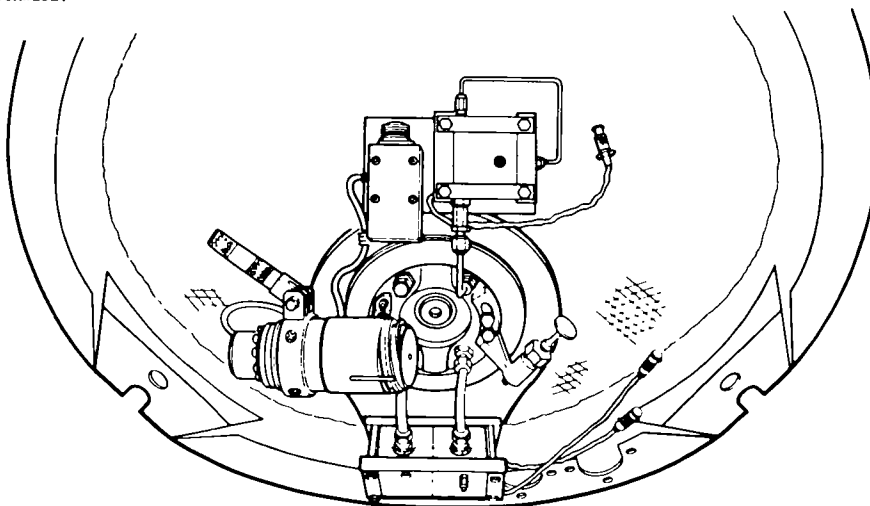
1. REACH THROUGH THE DESTROY COMPARTMENT AND PULL UP ON THE BREECH HANDLE LOCK ON THE FRONT OF THE ROCKET MOTOR. SWING THE BREECH HANDLE OUTWARD AND ROTATE THE HANDLE COUNTERCLOCKWISE.



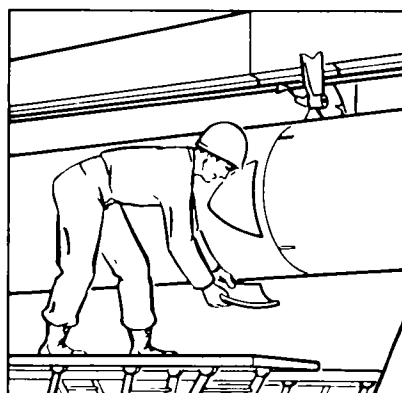
2. REMOVE THE PRIMER FROM ITS PLASTIC CONTAINER.



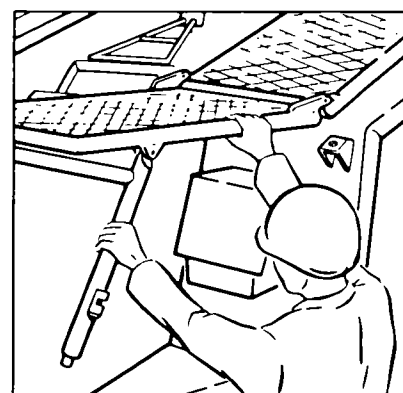
3. FOLD BACK THE ACTUATOR AND INSERT THE PRIMER INTO THE PRIMER RECEPTACLE. PUSH THE PRIMER INSERTER RELEASE BUTTON AND REMOVE THE PRIMER INSERTER.



4. FOLD THE ACTUATOR AND ROTATE IT IN PLACE WITH THE BREECH HANDLE. SWING THE BREECH HANDLE TOWARD THE MOTOR AND LATCH IT IN PLACE WITH THE BREECH HANDLE LOCK.



5. REPLACE THE DESTROY COMPARTMENT SIDE PANEL.



6. LOWER BOTH WORK PLATFORMS.

Figure 19. Operations during automatic countdown at X-6.

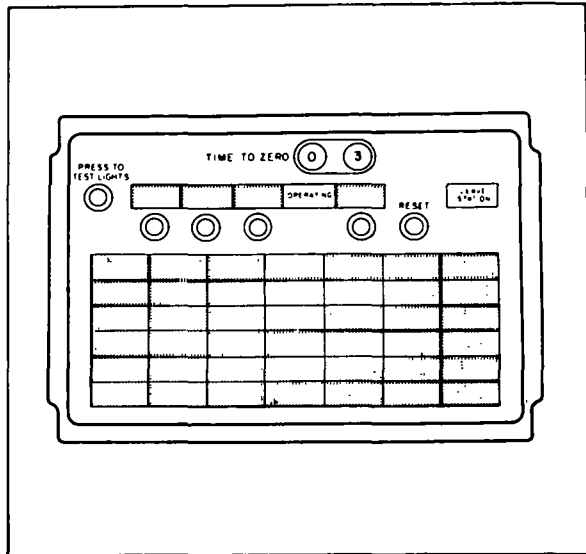


tion disassembly, table IV for march order of launching station equipment.

## 17. Positioning Missile for Disassembly

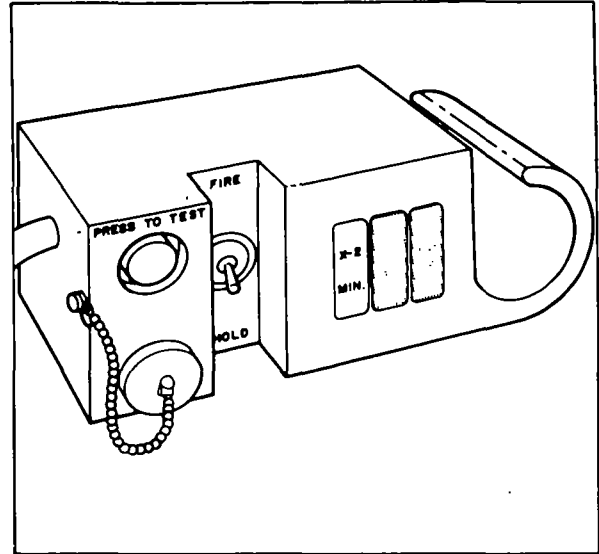
a. Press the SAFE button on the firing box, which will lower the missile to 25°. The senior AOS operator lowers the azimuth orienting unit (AOU).

b. The firing set (F/S) operator enters the firing set and pushes the CLEAR PROGRAM button on the monitor control panel and confirms data. The boom operator, supervised by the assistant chief of section (ACS) lowers and centers the missile between the work platforms.

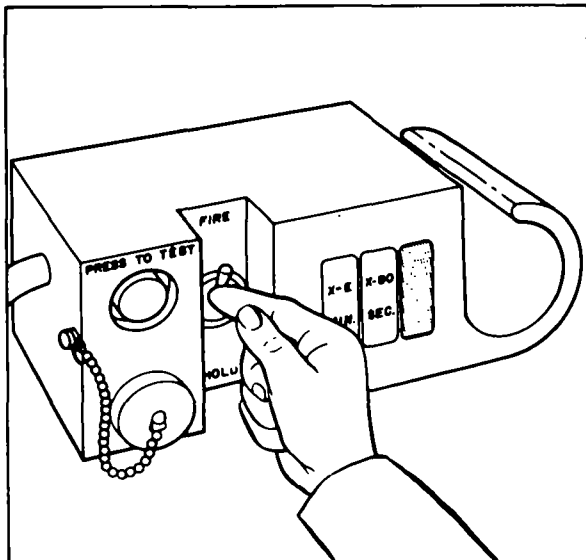


1. AT X-3 MINUTES, THE LEAVE STATION INDICATOR LAMP BEGINS BLINKING. EVACUATE THE FIRING AREA AND PROCEED TO THE REMOTE FIRING POSITION.

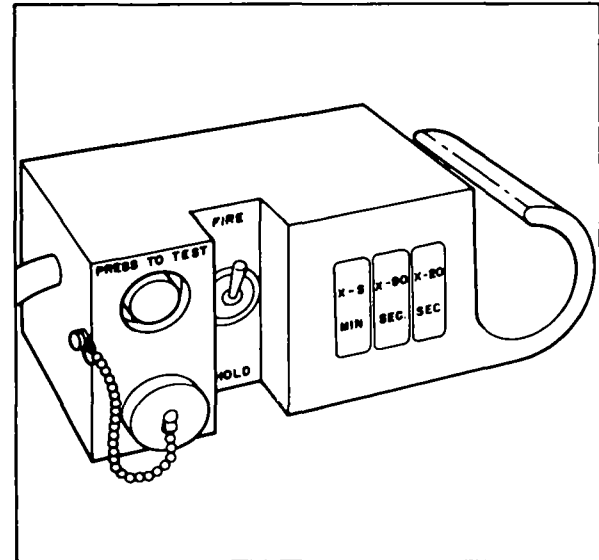
NOTE. TURN OFF THE STATION LIGHTS AND VENTILATING FAN. CLOSE THE VENT UPON LEAVING THE STATION.



2. AT X-2 MINUTES, THE X-2 MIN. LAMP ON THE FIRING BOX WILL START GLOWING.

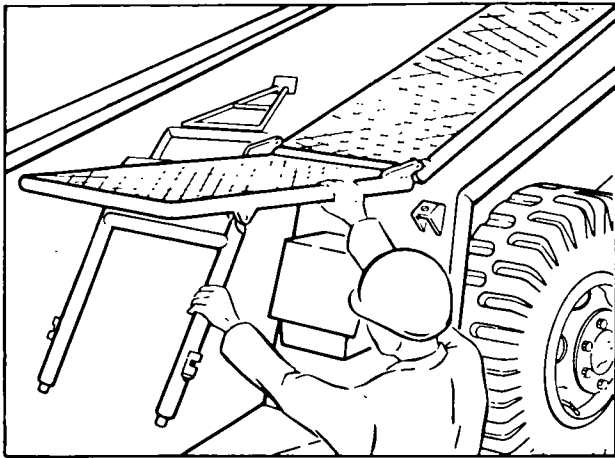


3. UPON COMMAND, PLACE THE HOLD FIRE SWITCH TO THE FIRE POSITION. OBSERVE THAT THE X-90 SEC. LAMP STARTS GLOWING. THE X-2 MIN. LAMP CONTINUES TO GLOW.

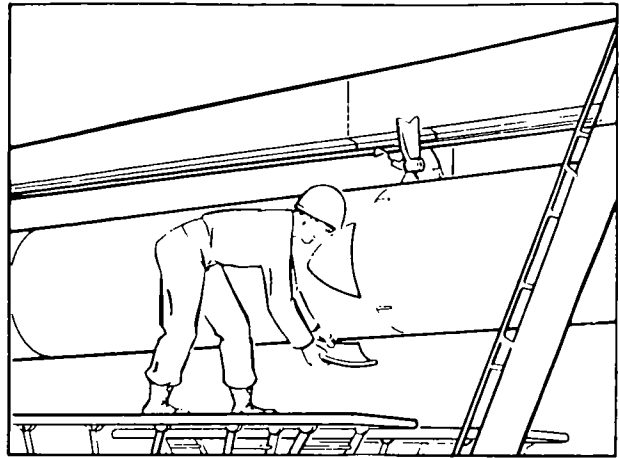


4. AT X-20 SECONDS, OBSERVE THAT THE X-20 SEC. LAMP STARTS GLOWING. THE X-2 MIN. AND X-90 SEC. LAMPS CONTINUE TO GLOW.

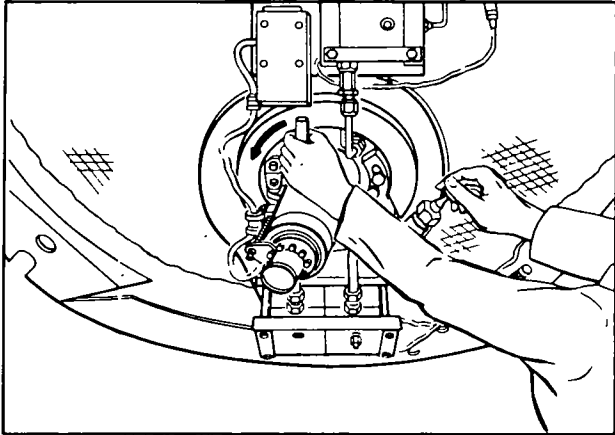
Figure 20. Operations during automatic countdown from X-3 minutes.



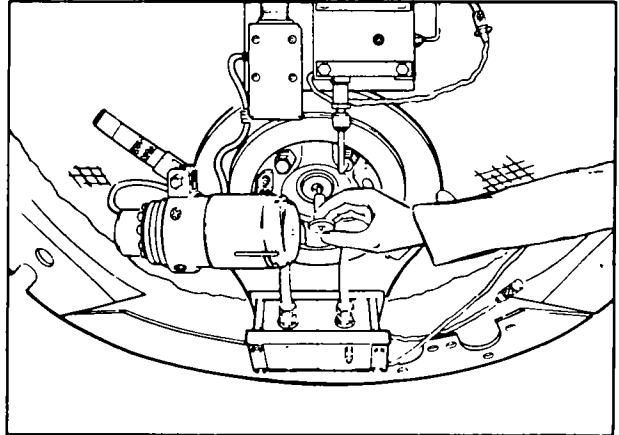
1. RAISE THE WORK PLATFORMS.



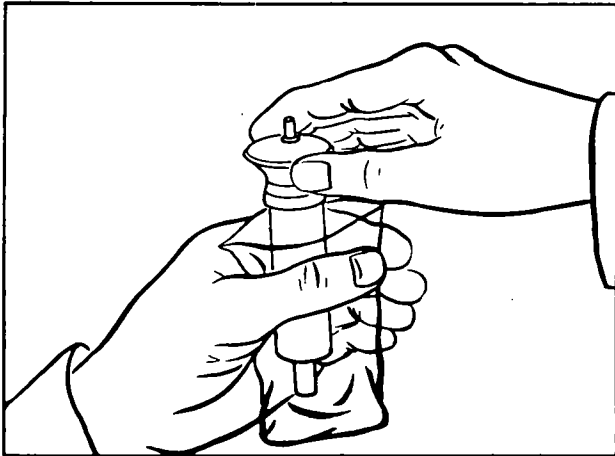
2. REMOVE THE DESTROY-COMPARTMENT SIDE PANEL.



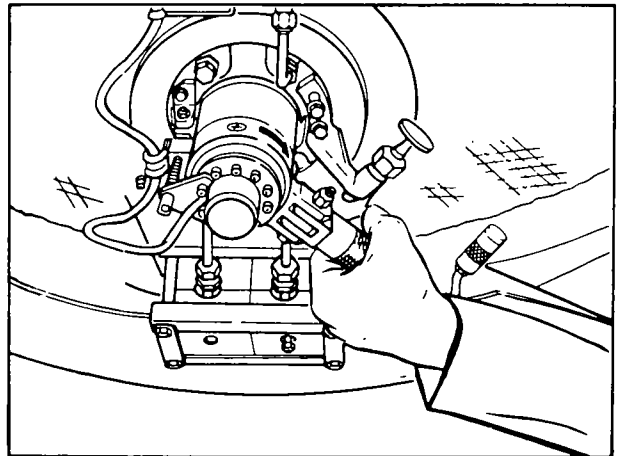
3. PULL UP ON THE BREECH HANDLE LOCK. SWING THE BREECH HANDLE OUTWARD AND ROTATE THE BREECH BLOCK COUNTERCLOCKWISE.



4. FOLD BACK THE ACTUATOR. INSERT THE PRIMER INSERTER INTO THE PRIMER. PULL OUTWARD ON THE INSERTER TO REMOVE THE PRIMER.



5. PLACE THE PRIMER IN ITS CONTAINER; THEN PLACE THE PRIMER IN THE ROCKET-MOTOR CONTAINER.



6. CLOSE THE BREECH BY ROTATING THE BREECH BLOCK CLOCKWISE. SWING THE BREECH HANDLE TOWARD THE MOTOR AND LATCH IT IN PLACE WITH THE BREECH-HANDLE LOCK.

*Figure 21. Removing the primer from the rocket motor.*

c. The assistant chief of section will remove the primer from the rocket motor (fig. 21) before any other disassembly step is taken.

*Note.* Personnel who are not actually involved in positioning the boom will remain clear of the area until the primer is removed.

d. As soon as the primer has been removed, the warhead transporter is positioned and dis-

assembly of the missile is accomplished by using Table III and Table IV.

e. Safety should be stressed in all phases of disassembly, and the missile sections should be packaged in a clean and dry condition for immediate reuse.

*Note.* Stress proper container cable connections and locking of inductosyn bar.

## SECTION V

# ORGANIZATIONAL MAINTENANCE TEST STATION AND MISSILE SECTION TEST AND ASSEMBLY REPLACEMENT

### 18. General

The organizational maintenance test station (OMTS) is a special testing van that is mounted on a semitrailer. The OMTS is designed to test the guidance section and the control surface assemblies in their containers. The OMTS is also designed so that it performs a self-test of its electronic assemblies within the van prior to the missile guidance section and control surface assemblies tests. This self-test gives greater assurance that the testing equipment is functioning properly when the missile guidance section and the control surface assemblies are tested. The test station is powered by a gas turbine generator set (GTGS) which is mounted on the same semitrailer chassis as the OMTS van (figs. 22, 23, and 24). (The references used by the missile test section are TM 9-1410-302-20, TM 9-4935-303-12, and TM 5-6115-294-12).

### 19. Emplacement

Several factors should be considered when choosing a good position for emplacing the organizational maintenance test station. Select a position that has a smooth, hard ground to support the test station and provides easy accessibility for the motor guidance transport trailer. The maximum slope of this area cannot exceed 1 in 10.

a. It is not necessary to uncouple the prime mover from the OMTS semitrailer van in order to perform missile guidance section and control surface assembly tests.

b. If the prime mover is to be uncoupled, and the ground is soft or muddy, it will be necessary to place planks or rocks under the OMTS landing gear to keep the van from sinking.

c. Refer to figure 25 and 26 for emplacing the OMTS.

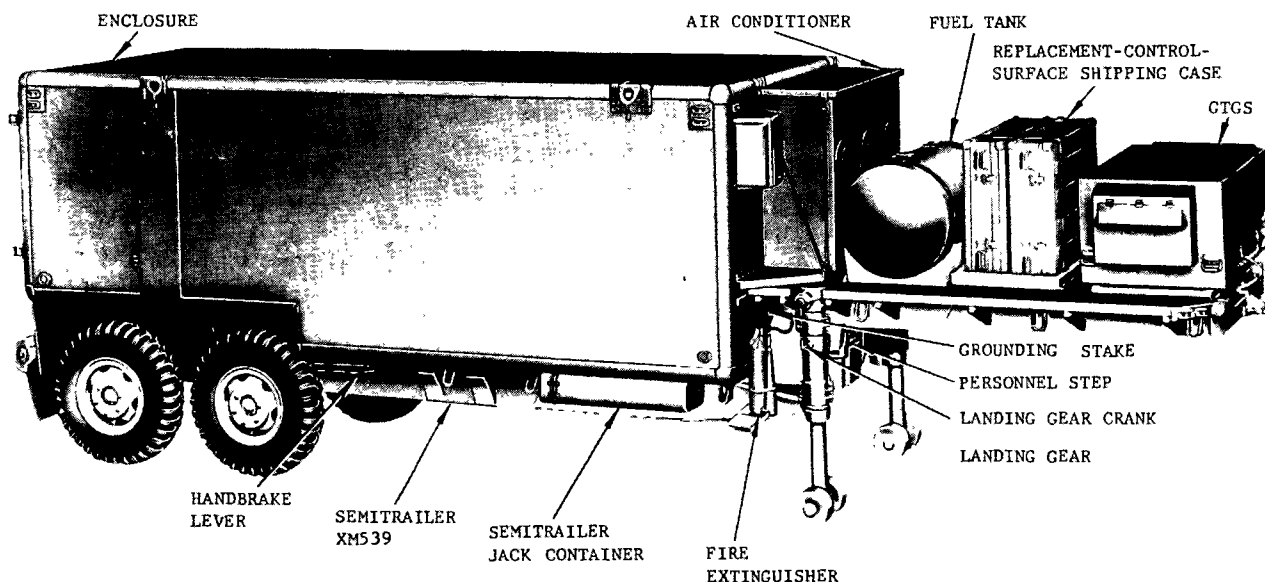


Figure 22. Organizational maintenance test station—right front.

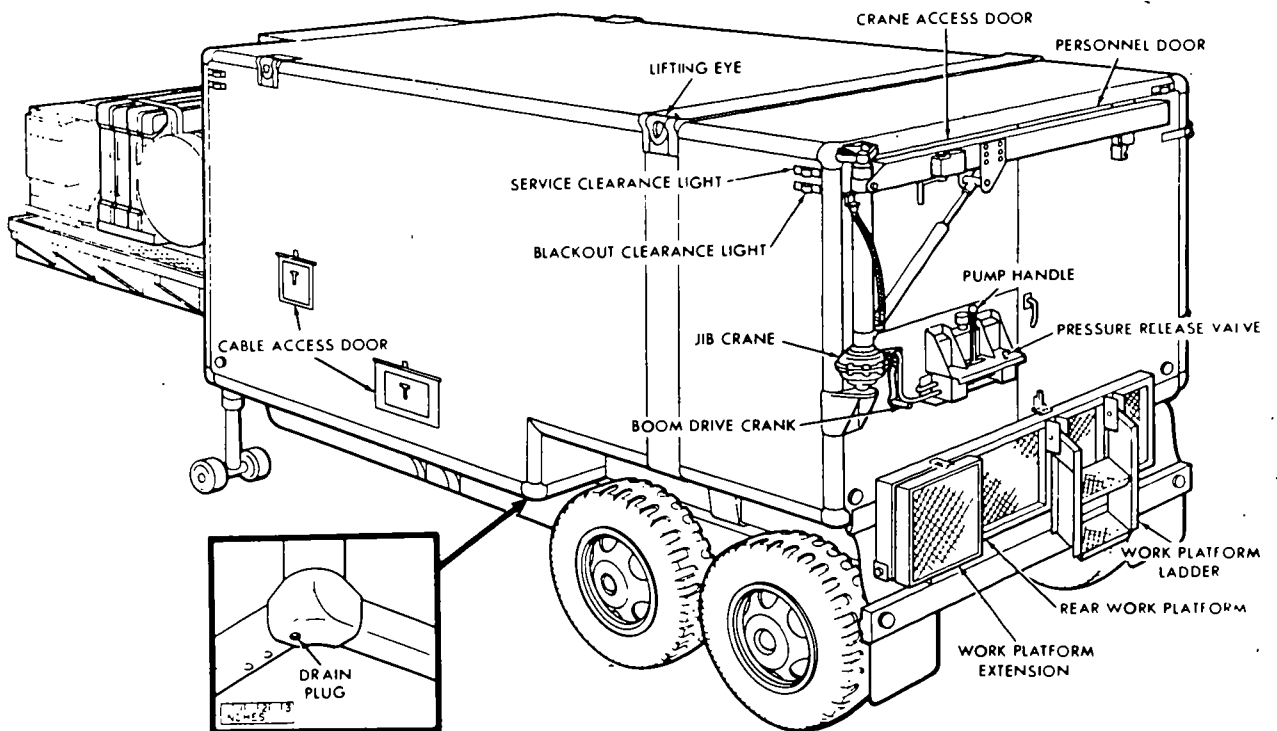


Figure 23. Organizational maintenance test station—left rear.

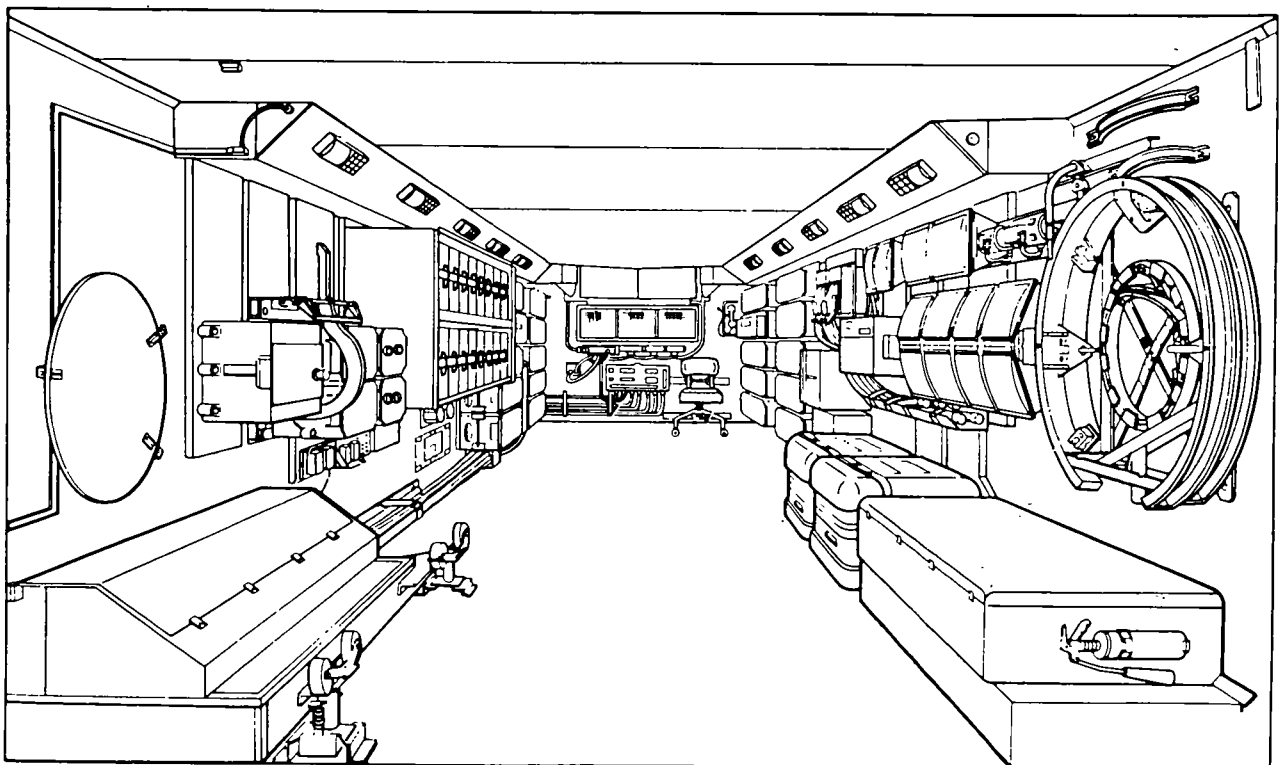


Figure 24. Organizational maintenance test station—cutaway interior rear view.

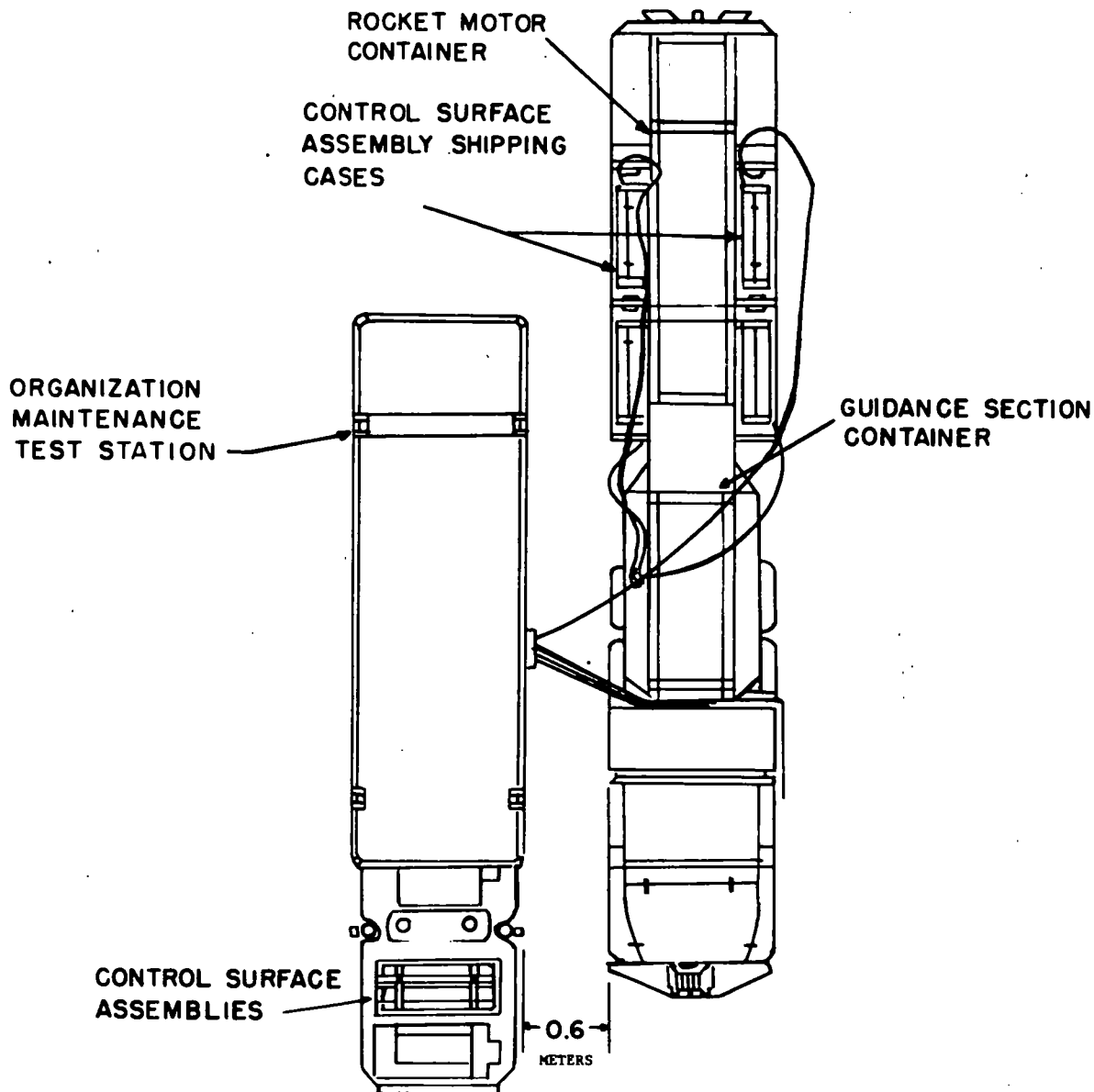


Figure 25. Transporter in position at organizational maintenance test station.

## 20. Operation and Maintenance of the Gas Turbine Generator Set

The gas turbine generator set is a high-speed, gas turbine engine that is mounted on the front of the OMTS. The operation and maintenance of the generator are covered in TM 5-6115-294-12.

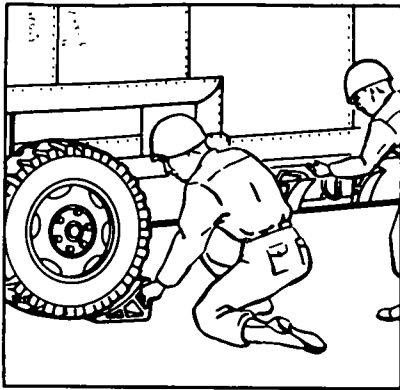
## 21. Preparing for Test

a. Position the MGTT to the left rear of the OMTS van (fig. 25) and attach the plugs and cables to the missile containers as shown in figure 27 and described in TM 9-4935-303-12.

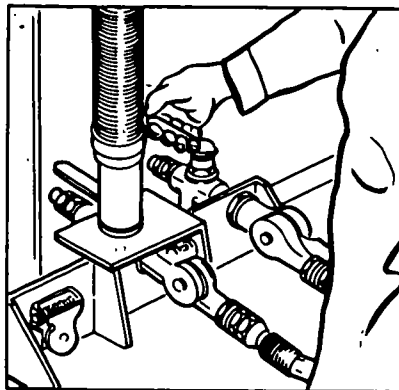
b. Start the GTGS and check the power distribution assembly for illuminated indicators in the upper left corner. Open the circuit breaker access door and check that all the circuit breakers are in the UP or ON position.

## 22. Self-Test of Organizational Maintenance Test Station

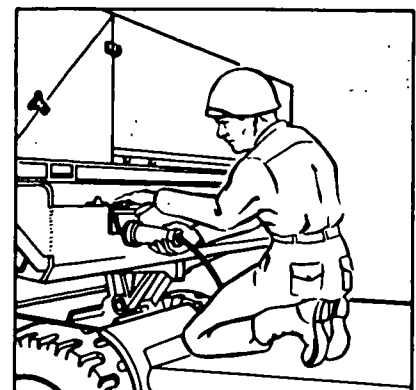
a. Set the control panel function switch to the OMTS position. Then position the test equipment power switch on the power distribution assembly to the ON position. The test equipment power indicator *must* light. Depress



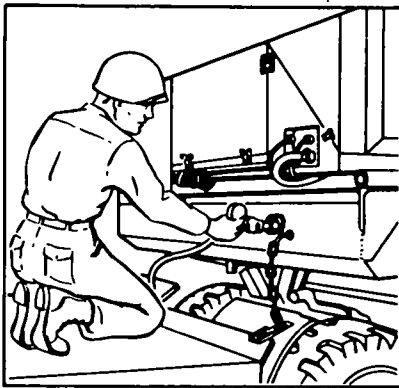
1. SET THE MECHANICAL PARKING BRAKES AND CHOCK THE WHEELS.



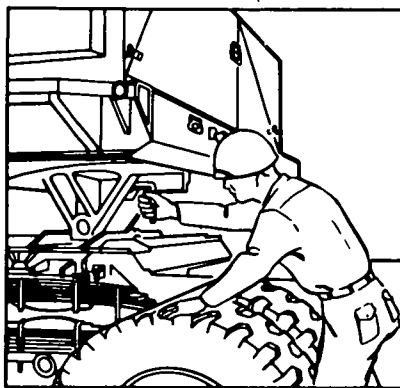
2. ROTATE THE PRIME MOVER AIR VALVES TO THE CLOSED POSITION.



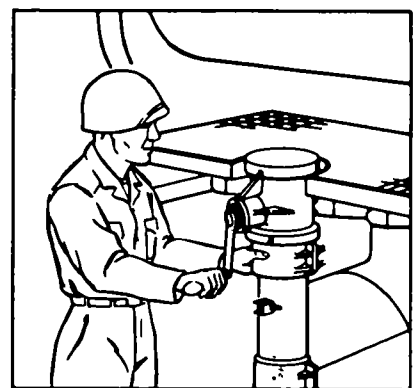
3. DISCONNECT THE PRIME MOVER ELECTRICAL PLUG FROM THE TEST STATION.



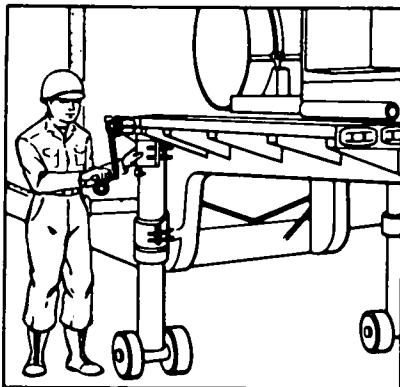
4. DISCONNECT THE TWO PRIME MOVER AIR-BRAKE CONNECTORS. REPLACE THE DUST COVERS ON THE AIR LINES. TO KEEP THE SERVICE BRAKES APPLIED, DO NOT DRAIN THE AIRBRAKE RESERVOIR.



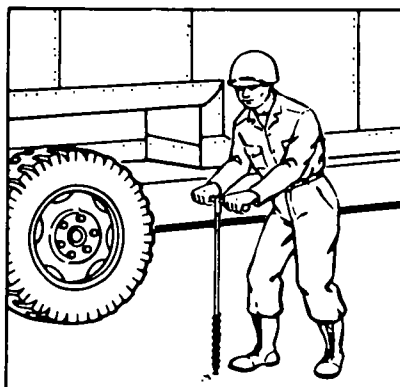
5. MOVE THE FIFTH-WHEEL SAFETY LOCK AND PULL THE FIFTH-WHEEL RELEASE HANDLE.



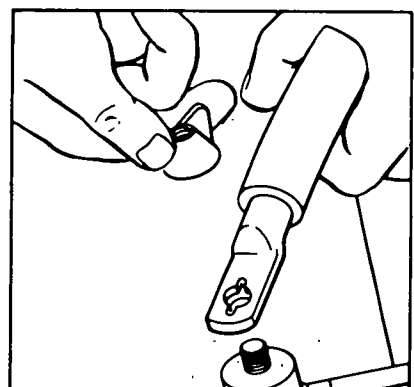
6. LOWER THE LANDING GEAR ON BOTH SIDES OF THE TEST STATION UNTIL THE TEST STATION WEIGHT IS TAKEN OFF THE PRIME MOVER. IF THE GROUND IS SOFT, ADD PLANKS, LOGS, OR ROCKS UNDER THE LANDING GEAR TO KEEP THE GEAR FROM SINKING. THEN DRIVE THE PRIME MOVER AWAY.



7. LEVEL THE TEST STATION LENGTHWISE WITH THE LANDING GEAR. DO NOT ATTEMPT TO LEVEL THE TEST STATION SIDEWAYS WITH THE LANDING GEAR.



8. REMOVE THE GROUNDING STAKE FROM THE OUTSIDE FRONT WALL OF THE ENCLOSURE AND PUSH IT INTO THE GROUND.



9. CONNECT ONE END OF THE GROUNDING CABLE (STORED INSIDE THE ENCLOSURE) TO THE WINGNUT ON THE STAKE AND CONNECT THE OTHER END TO THE WINCH ON THE SEMITRAILER FRAME NEAR THE LANDING GEAR.

Figure 26. Emplacing the test station.

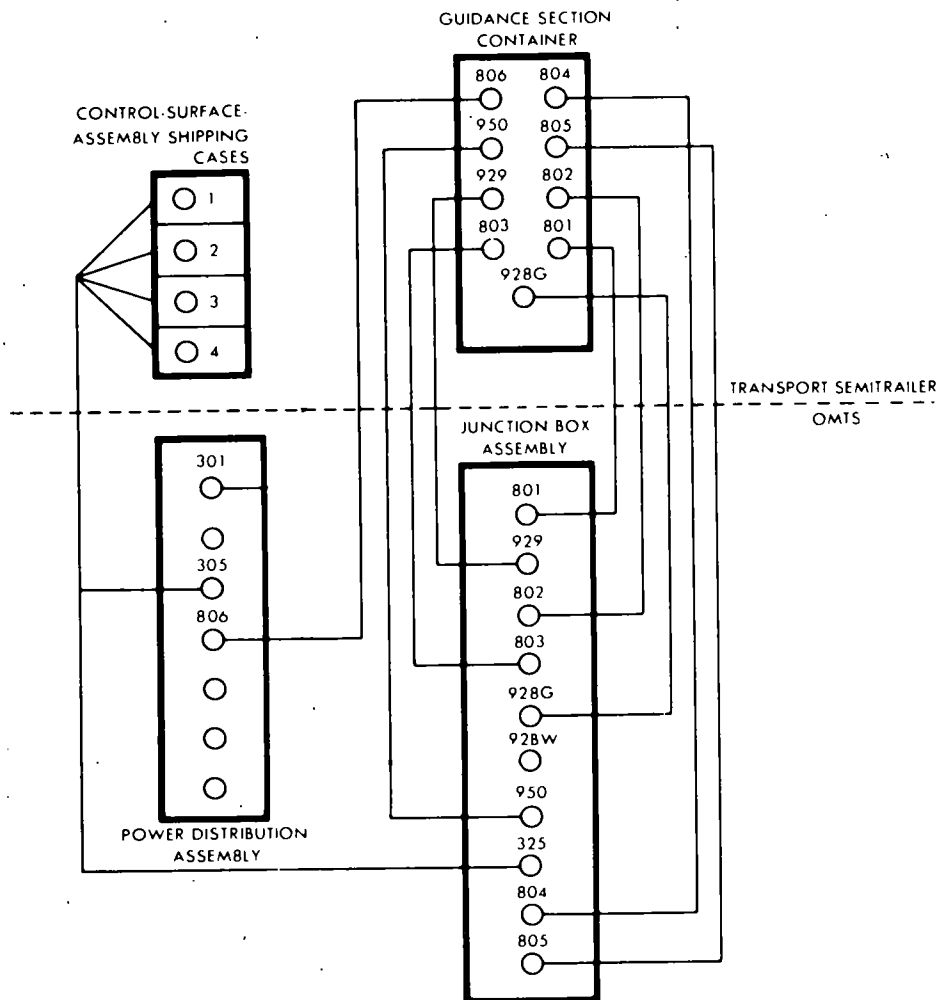


Figure 27. Interconnecting diagram.

the **PRESS TO TEST LIGHTS** button on the control panel.

b. Press the **START** button on the control panel. If a failure occurs, refer to TM 9-4935-303-12 and locate the number displayed in the **ASSEMBLY NO** indicator. Replace the faulty assembly and switch the control panel momentarily to the **GUIDANCE SECTION** position and then back to the **OMTS** position to reset the stepping switch. Press the **START** button again to initiate a retest.

c. Leave the power switches in their **ON** positions, after the **COMPLETE** indicator lights, unless no further testing is to be performed.

*Note.* Cables should not be connected with **GUIDANCE Ready**, **ADD Ready**, and **FIN Ready** switches **ON**.

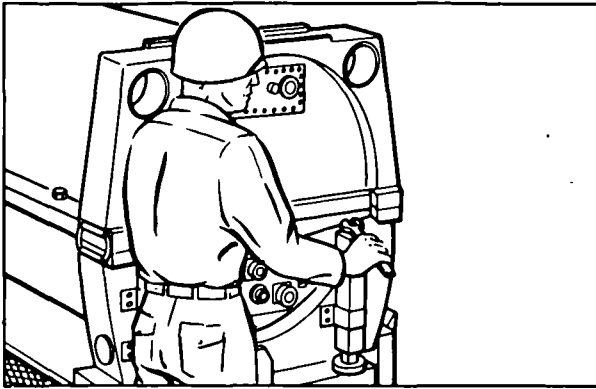
d. Certain operations in the test section can be performed simultaneously. While the **OMTS** is going through its self-test, the cables can be connected to the guidance section and the control surface assemblies. The interconnection diagram for testing the missile sections in their containers (fig. 27) and a procedure for leveling the guidance section container (fig. 28) are included to assist personnel in performing these operations.

## 23. Guidance Section Test

Prior to testing the guidance section, the section container must be leveled and cabled as illustrated in figures 27 and 28.

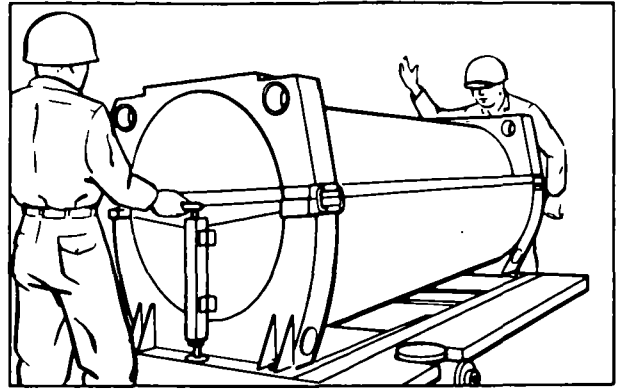
a. Place the **TEST** equipment power switch in the **ON** position. The indicator must light.



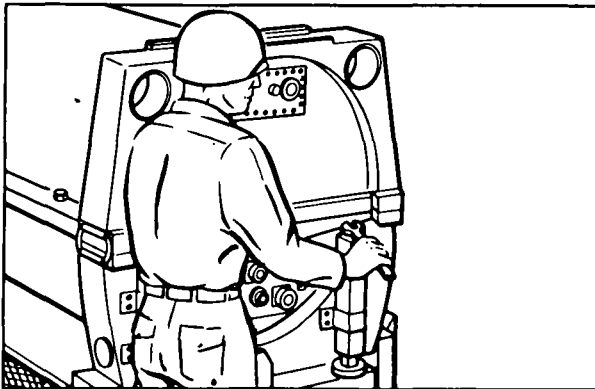
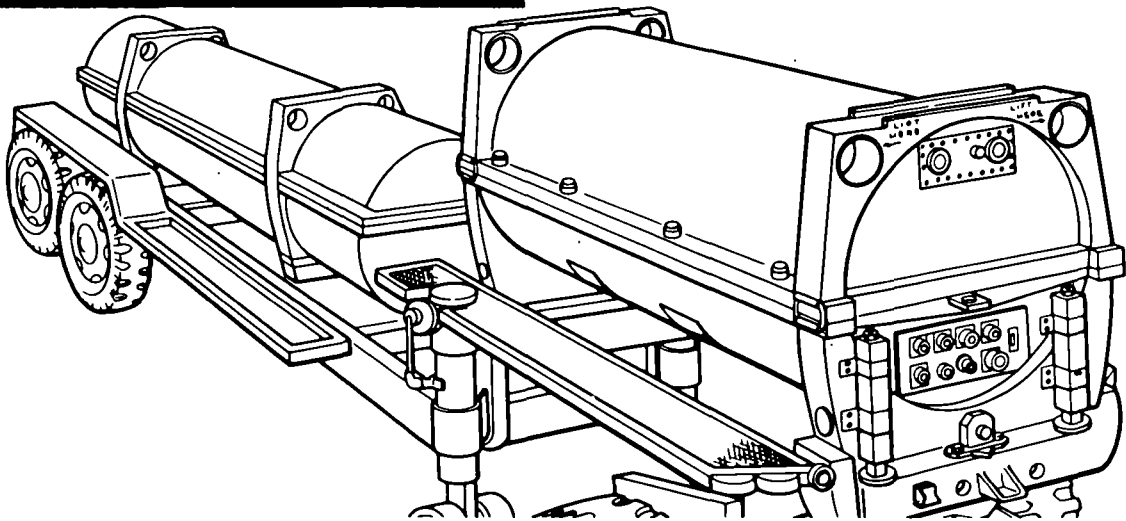


1. TURN THE HEXAGONAL BOLT HEAD ON TOP OF THE LEVELING JACKS IN A CLOCKWISE DIRECTION UNTIL THE JACKS ENGAGE THE JACKPADS ON THE SEMITRAILER FRAME.

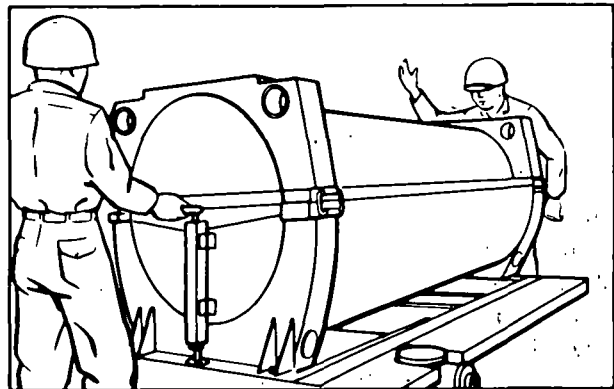
NOTE. THE MONOBALL-BEARING ASSEMBLY AND THE ANCHOR-BOLT ASSEMBLIES MUST BE DISCONNECTED FROM THE TRAILER FRAME BEFORE THE LEVELING OPERATION IS BEGUN.



2. OPERATE THE REAR LEVELING JACK TO ADJUST THE PITCH OF THE CONTAINER. THE REAR LEVELING JACK OPERATOR RAISES OR LOWERS THE REAR END OF THE CONTAINER ACCORDING TO INSTRUCTIONS FROM THE FORWARD LEVELING JACK OPERATOR, WHO WATCHES THE LEVEL BUBBLE.



3. ADJUST THE ROLL OF THE CONTAINER BY OPERATING THE TWO LEVELING JACKS ON THE FORWARD END OF THE CONTAINER.



4. READJUST THE CONTAINER PITCH BY OPERATING THE REAR LEVELING JACK AS DESCRIBED IN STEP 2 ABOVE.

NOTE. REPEAT STEPS 2, 3, AND 4 UNTIL THE LEVEL BUBBLE IS WITHIN THE CIRCLE.

Figure 28. Leveling the guidance section container.

b. Set the control panel function switch to the GUIDANCE SECTION position. Place the GUIDANCE READY switch on the power distribution assembly in the ON position. The GUIDANCE READY indicator must light.

c. Press the START button on the control panel. The test will progress automatically. If a failure occurs refer to TM 9-4935-303-12 for the troubleshooting procedure. Faulty assemblies are replaced in accordance with the procedures outlined in TM 9-1410-302-20. After the faulty assembly has been replaced, the function switch on the control panel must be moved momentarily to the FINS or OMTS position and then back to the GUIDANCE SECTION position (TM 9-4935-303-12). This action is necessary to reset the stepping switches. Press the START button again to initiate a re-test.

d. Place the GUIDANCE READY switch in the OFF position after the COMPLETE indicator on the control panel has lighted. Leave the TEST EQUIPMENT POWER switch in the ON position unless no further testing is to be performed.

## 24. Control Surface Assembly Test

The four control surface assemblies are identical and interchangeable. One, two, three, or all four can be tested at the same time. However, if only one assembly is to be tested, the cable marked FLAP 1 must be used. If two assemblies are to be tested, the cables marked FLAP 1 and FLAP 2 must be used, and so on.

a. Set the function switch on the control panel to the FINS position. Place the FIN READY switch in the ON position. The FIN READY indicator must light.

b. Press the START button on the control panel. After the COMPLETE indicator lights, place the FIN READY switch in the OFF position.

c. If troubles occur during the automatic test, refer to TM 9-4935-303-12. Replace the fin assembly and retest using TM 9-4935-303-12 as a guide.

## 25. Assembly Replacement

The Sergeant missile system introduced a new concept to corrective maintenance in the artillery missile systems by limiting repair of

the missile by artillery personnel to the replacement of defective assemblies.

a. Replacement of defective assemblies by artillery personnel is further limited to assemblies in the guidance section of the missile.

b. The replacement of missile sections and control surface assemblies is briefly discussed below:

- (1) *Rocket motor.* The rocket motor section cannot be tested by the organizational maintenance test station. Therefore, when the following conditions are observed or suspected, the entire section will be returned to the ordnance missile maintenance platoon for repair or replacement:
  - (a) Whenever the rocket motor has been dropped or severely bumped, whether in or out of its shipping container.
  - (b) Upon receipt of a rocket motor in a damaged shipping container.
  - (c) Whenever excessive moisture is indicated by the humidity indicator card within the shipping container.
- (2) *Control surface assemblies.* If one or more of the four control surface assemblies are defective, the defective assemblies will be replaced with replacement assemblies carried on the organizational maintenance test station. The defective assembly will be returned to the ordnance missile maintenance platoon for repair or replacement.
- (3) *Warhead section.* The warhead section is a controlled item and cannot be tested by the organizational maintenance test station. It will be repaired only by technically qualified ordnance personnel. For details on maintenance of the warhead section see TM 9-1100-300-series.
- (4) *Guidance section.* If a defective guidance section assembly is found while testing with the OMTS, the missile test section personnel will replace the assembly. If tactical conditions permit, the guidance computer assembly, the guidance control assembly, and the guidance power supply assembly can

be replaced with the guidance section in its container.

(a) The procedure for installing the guidance section in the organizational maintenance test station is as follows:

1. Position the transport semitrailer for removal of the guidance section (fig. 29).
2. Open the guidance section container as described in TM 9-1410-302-20.

3. Prepare the guidance section for removal from its container.

4. Remove the guidance section from its container and install it in the OMTS.

5. Level the guidance section on the missile level supports.

(b) TM 9-1410-302-20 and TM 9-4935-303-12 should be used by the missile test section personnel for replacing defective assemblies in the guidance section.

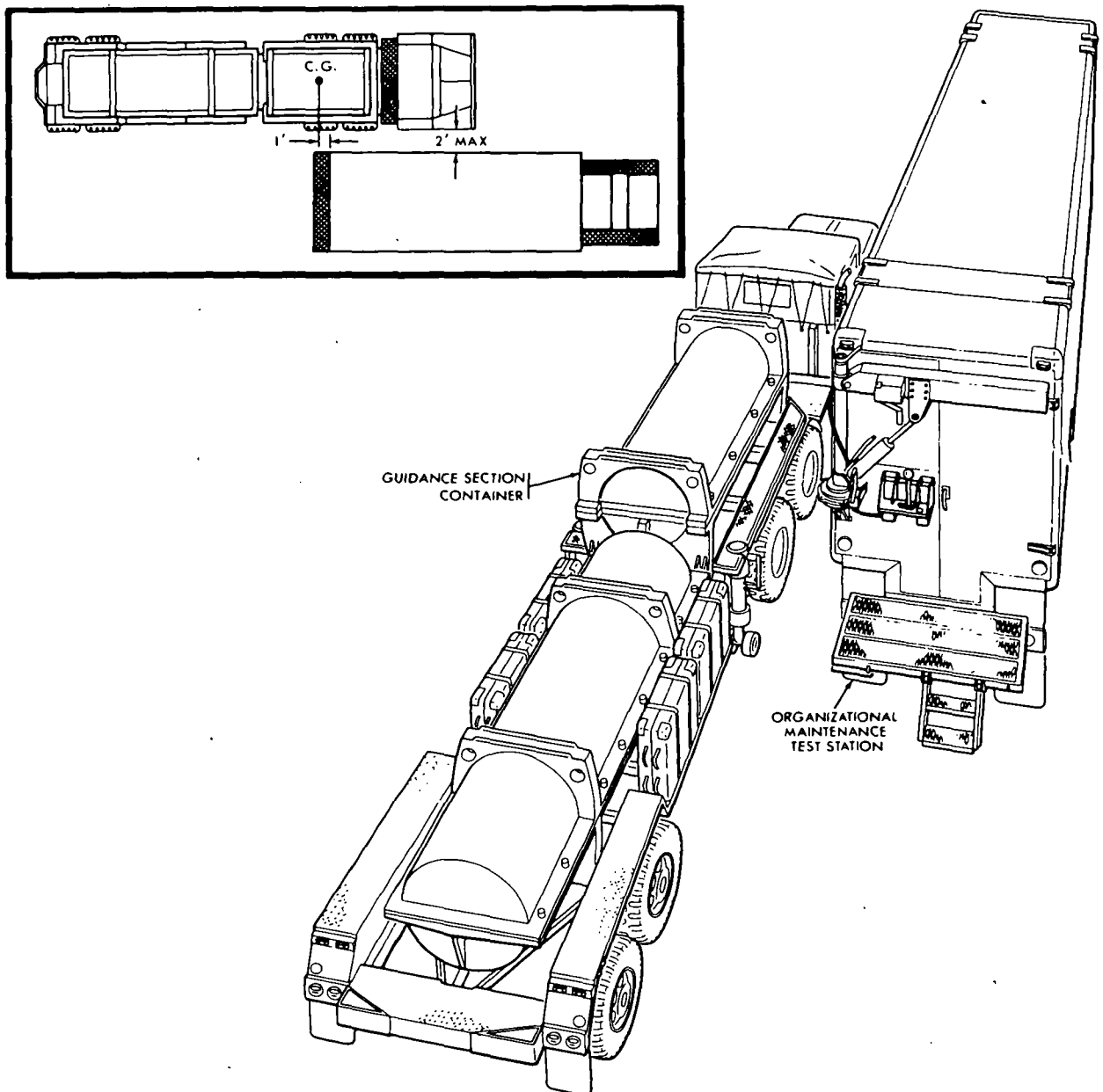


Figure 29. Emplacement of the transporter at OMTS for removal of guidance section.

## 26. March Order the Organizational Maintenance Test Station

*a.* Deenergize the organizational maintenance test station.

*b.* Secure all equipment inside the organizational maintenance test station.

*c.* Make sure that all ventilator ports are closed against dust and weather.

*d.* Store cables after they have been cleaned and capped.

*e.* Shut down the gas turbine generator set.

*f.* Close all doors and fold the work platform and secure it for travel.

*g.* Rotate and tighten the gastank cap fully clockwise to seal the tanks, then remove the ground stake and secure. Turn off the fuel shutoff valve.

*h.* Couple the prime mover to the OMTS semitrailer if it has been uncoupled, raise landing gear, then release the mechanical brakes and store the wheel chocks.

## SECTION VI

### SITUATIONS REQUIRING SPECIAL ATTENTION

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#### 27. Hold Procedure

a. The term "hold" is defined as the suspension of the firing procedure and may be called at any time during the countdown prior to firing the missile.

b. A hold may be requested by any individual connected with the firing activities.

c. When a HOLD is called, the individual requesting the hold will announce the reason and, if possible, the length of time required before operations can be resumed.

d. The firing platoon commander will investigate the condition that caused the command to be given. He will determine the length of time necessary for the hold and report the conditions to the battery commander.

e. The battery commander will weigh the conditions and advise the battalion and the battery of the point in the countdown where operations can be resumed.

f. If the mission is *aborted* after X-20 seconds for any reason other than an indicated *warhead hazard*, the missile should be returned to the horizontal position as quickly as possible, and as soon as the rocket motor primer is removed, two crewmen, wearing protective clothing should disconnect and remove the activated missile primary wet battery assembly.

#### 28. Misfires and Hangfires

##### a. General.

(1) A misfire is a failure of the propellant, igniter, or firing mechanism to function when the firing signal is generated. A hangfire is a temporary failure to function; that is, there is an unexpected delay between the time that the firing mechanism operates and the ignition of the propellant.

(2) Since the difference between a misfire and a hangfire cannot be distinguished

immediately, any failure to fire will be regarded as a hangfire.

(3) A failure to fire may be caused by failure of electrical power, by a poor connection in the firing circuits, by broken lead wires, or by a faulty primer in the igniter.

b. *Procedures.* If the missile does not leave the launcher 10 seconds (X+10) after the automatic fire time, the FIREHOLD switch should move to the HOLD position. If the FIREHOLD switch does not move to the HOLD position at X+10, manually place the switch in the HOLD position and—

(1) Wait 60 minutes.

(2) Press the SAFE button on the firing box, which lowers the missile to 25°.

(3) Firing set operator enters the firing set and pushes the CLEAR PROGRAM button on the monitor control panel and confirms fire data.

(4) The boom operator, supervised by the assistant chief of section, partially lowers the missile, and the senior AOS operator lowers the AOU pedestal. Then the boom operator lowers and centers the missile between the work platforms.

(5) Crewman number 1 removes the primer from the rocket motor as illustrated in figure 21.

(6) After the reason has been determined for the missile not firing, steps must be taken to place the missile back into operation. The time required to do so must be estimated.

#### 29. Duds

A dud in a unit area must be regarded as liable to function at any time. The dud will

not be moved but will be destroyed in place by authorized personnel. An explosive ordnance disposal team (EOD) will be notified and the necessary security personnel will be posted.

### **30. Warhead Hazard—Indication and Procedure**

*a. General.* If a WARHEAD HAZARD is indicated in the firing set, a tone generator in

the communication system generates a warning signal to all telephone communications in the firing area (TM 9-1100-300-12).

*b. Procedure.* Proceed as indicated in paragraph 28b.

### **31. Emergency Procedures**

For emergency procedures, refer to the appropriate technical manual (see app.).

## SECTION VII

### MAINTENANCE AND INSPECTION

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#### 32. General

a. Maintenance and inspection are essential to insure that the section is prepared to perform its mission immediately. Systematic maintenance and inspection provide the best insurance against unexpected breakdown at the critical moment when maximum performance is essential.

b. Calibration service of special weapons test equipment will be provided by the supporting special weapons Ordnance unit.

#### 33. Disassembly, Adjustment, and Assembly

Disassembly and adjustment of the firing platoon equipment, authorized to be performed by battery personnel, are prescribed in appropriate technical manuals and supplemented by instructions contained in Department of the Army supply manuals. No deviation from these procedures is permitted unless authorized by the responsible Ordnance officer.

#### 34. Records

The principal records pertaining to the missile are the missile log and test record and launching station log and record. Complete instructions regarding the procedure for making entries are printed in the missile log and test record. The entries must be kept up to date and the logbook must accompany the missile at all times until the missile has been fired. The logbook is then returned through channels for disposition.

#### 35. Maintenance

Detailed instructions concerning the maintenance of missile ground support equipment are published in the appropriate technical manuals, and lubrication orders are furnished with each major item of equipment.

#### 36. Inspections

Regular inspections are required to insure that the materiel is maintained in serviceable condition.

a. Each chief of section is responsible for the equipment within his section. He should inspect it generally each day. When he sees the need for repair or adjustment, he notifies the platoon or detail commander immediately so that the necessary corrective action may be taken.

b. The platoon or detail commander, accompanied by the chief of section, should make a daily spot check inspection. The chief of section inspects different parts of the materiel each day to insure complete coverage every few days. The platoon and detail commanders make a thorough mechanical inspection of each major item of equipment as often as they deem necessary. This inspection should include auxiliary equipment, tools, and replacement items.

c. Battery, battalion, and higher commanders should make frequent command inspections to assure themselves that the equipment in their command is being maintained at prescribed standards.

d. See the appropriate technical manuals listed in the appendix for details on inspecting the ground support equipment. Deficiencies found during inspections should be corrected promptly.

e. Duties of individuals in performing the necessary inspections and maintenance of equipment within each section are assigned by the chief of section. Work will be made routine, thorough, and rapid. When the section is reduced in strength, the chief of section must reassign duties to insure that all maintenance is performed.

### **37. Inspection Before Operation (March)**

The inspection performed before operation is a final check on materiel prior to leaving the motor park for training in the field or the bivouac area, for combat, or before displacement. After inspection and correction of all deficiencies, the equipment is ready for operation.

### **38. Inspection During Operation (March)**

The inspections performed during operation are constant checks on the functioning of the vehicles and the security of all transported equipment. The responsibilities and duties of section personnel are as follows:

*a.* The chief of section supervises march discipline, and assists the drivers in detecting obstacles that would cause injury to personnel or damage to equipment.

*b.* The other crewmen inspect security of stored equipment and act as air sentinels as directed by the chief of section.

### **39. Inspection During Halt**

The inspection at the halt is made at the discretion of the unit commander. The halt provides the personnel an opportunity to inspect for malfunctions that can not be detected during movement.

### **40. Inspection and Maintenance After Operation**

Immediately after operation, all equipment is serviced and maintained in preparation for further sustained operation and is inspected to determine the need for maintenance by higher echelons. These inspections may be performed in the position area. Individual duties of section personnel are designated by the chief of section.

### **41. Periodic Inspection and Maintenance**

*a.* Inspection and maintenance are performed on vehicles and equipment, whether in garrison or combat.

*b.* The chief of section supervises the daily inspection and maintenance of section equipment.



## SECTION VIII

### DECONTAMINATION

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#### 42. General

*a. Contamination.* Equipment which has been contaminated by chemical, biological, or radiological agents constitutes a danger to personnel. Contamination means the spreading of an injurious agent in any form and by any means. Persons, objects, or terrain may be contaminated.

*b. Decontamination.* The process of making any contaminated place or item safe for unprotected personnel, can be accomplished by covering, removing, destroying, or changing into harmless substances the contaminating agent or agents. Generally, only equipment contaminated by persistent agents need be decontaminated.

#### 43. Decontamination for Chemical Agents

The procedure for removing chemical agents from equipment is to wipe off visible contamination with rags, apply DANC solution (decontamination agent, noncorrosive, M4), wipe with solvent soaked rags, then dry (FM 21-40). If DANC is not available, scrub equipment with soap and cool water, then carefully wipe all parts dry. If the equipment cannot be decontaminated in the battery area, it will be evacuated to an echelon where decontamination or disposal can be accomplished in accordance with local regulations.

## SECTION IX

### DESTRUCTION OF MATERIEL

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#### 44. General

*a.* Procedure for the destruction of materiel, including authority, destruction areas, precautions, methods available, plans, and training, and the procedures for special types of equipment are contained in FM 5-25. The principles and procedures in FM 5-25 apply to the Sergeant system. Only those items not covered in FM 5-25 will be discussed in this chapter.

*b.* Destruction of the Sergeant missile system and related materiel will be effected when the equipment is subject to possible capture or abandonment in a combat zone. The conditions under which equipment will be destroyed involve command decisions related to the tactical situation. Destruction of materiel will be effected by the using troops only when they are directed to do so by their unit or action commander. The specific destruction procedures are in pertinent technical manuals.

#### 45. Possible Conservation on Model Units

Major units of the battery are housed or built into mobile vans and special semitrailers that can be quickly readied for evacuation. These units are extremely costly and difficult to replace. Therefore, every effort should be made to evacuate as many of these vans and trailers as possible.

#### 46. Destruction of Essential Parts

*a. General.* If destruction is ordered, equipment that cannot be evacuated must be so thoroughly damaged that it cannot be restored to a usable condition in the combat zone, by either repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the system, including replacement parts, be destroyed. When lack of personnel and time prevents destruction of all essential parts, priority is given to the destruction of those parts most difficult to replace. When sev-

eral units of identical equipment are being destroyed, the same essential parts must be destroyed on each so that the enemy cannot construct a usable unit from several damaged ones. Because of the complexity of the Sergeant missile system, almost every unit is vital to its operation. Since certain units are more easily fabricated than others; when time is limited, priorities must be assigned to destroy those units most difficult to reproduce.

##### *b. Missile.*

- (1) *General.* It is preferable to completely demolish some sections of the missile rather than to partially destroy all the missile sections. Destruction of the missile will be accomplished only upon the order of the senior person present in the unit. Priorities should be established as follows: Classified technical manuals, and the warhead section. The warhead section requires special handling; reference should be made to TM 9-1100-300-12 for instructions on the destruction of the warhead section.
- (2) *Guidance Section.* Demolition by using explosives is the most effective way of destroying the *guidance section*.
  - (a) If the section is in its container, open the container and remove the section covers.
  - (b) Place the charges in the brake compartment and among the guidance assemblies particularly the platform.
  - (c) When the use of explosives is not possible, use a heavy object and smash the guidance assemblies; pour gasoline over all the section.
  - (d) Place incendiary grenades inside the guidance assemblies and the brake compartment.

- (3) *Rocket Motor.* Do not attempt destruction of the motor by burning. Wrap primacord around the motor case or set up shaped charges to rupture the motor.
- (4) *The Control Surface Assemblies.* The control surface assemblies can be effectively destroyed by gunfire or by smashing them with a pickax.
- (5) *Cabling.* Use a heavy ax and cut up the cabling, then burn by using gasoline.

*c. Launching Station.* The launching station may be destroyed by burning, by demolition, or by gunfire. It is important that the same essential parts on each unit be completely destroyed so that the enemy cannot construct a complete unit from two or more damaged units.

- (1) *Burning.* Use an ax, pick mattack, sledge, or other heavy implement, smash all vital parts. Then pour gasoline and hydraulic fluid over the entire launching station and light the fire from a safe distance, using a train of flammable material.
- (2) *Demolition.* Smash all vital parts, then place the TNT or other explosive charges as follows:
  - (a) Place the first charge on the turntable.
  - (b) Place the second charge at the top of the boom support and tape the charge to the hydraulic lines.
  - (c) Place the third charge inside the firing set and tape it to the electronic assemblies.
  - (d) Place the fourth and fifth charges between the wheels on each side of launcher.
  - (e) Place the sixth charge on the trailer control panel.
  - (f) Place the seventh charge on the trolley.
  - (g) Place the eighth charge on the cable reel.
  - (h) Place the ninth and tenth charges between the trailer frame and the wheels on each side of the launcher.
  - (i) Connect the 10 charges together with a detonating cord for simultaneous detonation.

- (j) Tires should be destroyed by placing an incendiary grenade under each tire.

- (3) *Gunfire.* Destruction by gunfire includes the use of artillery, machineguns, rifles with rifle grenades, or launchers with antitank rockets. Gunfire is the most unsatisfactory method of destruction as distance is required and destruction is not always properly executed.

*d.* For other major pieces of equipment, see pertinent technical manuals.

## 47. Methods of Destruction

Selection of the method of destruction most suited to the Sergeant firing battery will require utilization of materials immediately at hand. Several means of destruction are generally available to the battery and materials are easily found in the Sergeant installation. These mechanical means include axes, sledge hammers, and similar heavy implements. Gasoline, oil, and other flammables are suitable for burning materials. Destruction may also be effected by using explosives, such as 1-pound blocks of TNT readied for insertion into critical spaces. Destruction by gunfire, including artillery, antitank weapons, machineguns, and rifles with rifle grenades may be used, if necessary. Incendiary grenades and hand grenades may be used under some circumstances.

**Warning:** All safety precautions should be exercised in handling demolition explosives and flammable materials. When igniting gasoline, consideration should be given to the highly flammable nature of gasoline and its vapor. Carelessness in its use may result in explosions and painful burns. If destruction is to be accomplished with demolition materials, all units to be destroyed should be completely disconnected from sources of electrical energy and grounded prior to placing the explosives. This will lessen the possibility of injury to personnel from contact with high-voltage conductors or from premature detonation of explosives primed for electrical ignition.

*Note.* Assemble demolitions in accordance with FM 5-25. In general, destruction of essential parts followed by burning will be sufficient to render the Sergeant missile useless. It is important that destruction of units of the Sergeant missile system be accomplished in a manner that will insure the security of all classified components.

## SECTION X

### SAFETY PRECAUTIONS

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#### 48. References

Safety precautions to be observed are prescribed in AR 385-62.

#### 49. Purpose and Scope

The purpose of this chapter is to outline the more important safety precautions to be observed by personnel in the Sergeant firing battery. Emphasis is placed on precautionary measures required to avoid bodily injury caused by hydraulic pressure or electric shock. Included in this chapter is a summary of first aid treatment for electric shock.

#### 50. Principles

The cardinal safety principle to be observed in operations involving explosives, toxic agents, and fire hazards is to limit the exposure time of a minimum number of personnel to a minimum amount of hazardous material consistent with safe and efficient operation. This principle implies that—

a. Hazardous working areas be separated from all other areas.

b. The minimum number of personnel needed for efficient operation be employed in hazardous working areas.

c. Only the necessary amount of hazardous material be present in the working area.

d. For details about warhead safety refer to TM 9-1100-300-12.

#### 51. Solid Propellant Missiles

The safety precautions for handling solid propellant missiles do not differ greatly from those for handling artillery ammunition of similar size and weight. Rocket motors must be treated in the same manner as artillery propelling charges, which are sensitive to friction, flame, and sparks. If improperly handled or stored, propellants may become highly ex-

plosive. The propellant should not be used if it is suspected that it may have been dropped or otherwise severely jarred. A crack in a solid propellant may cause sufficient chamber pressure to result in an explosion when the propellant is ignited.

a. Personnel working with the propellant should be aware of the safe temperature range. Storage temperature should always be within the limits prescribed by ordnance or the manufacturer of the propellant. Reference TM 9-1410-302-20 and appropriate technical bulletins.

b. All propellant igniters will be handled in accordance with the manufacturer's specifications and/or ordnance instructions. Specifically, items that use shorting assemblies will not be disconnected until the igniter is fixed in the missile and all appropriate precautions have been taken.

c. Smoking will be prohibited within 35 meters of the launching station and storage areas. Smoking will also be prohibited on any vehicles used in transporting the propellants or explosives. The possession of matches or other flame-producing devices will be prohibited in no smoking areas.

#### 52. First Aid for Electrical Shock

A brief outline of the steps necessary to begin rescue and first aid for a person suffering from electrical shock is given below. This outline is very general and does not give the details for administering artificial respiration. The time to become proficient is now, before it is needed, as personnel will not have time to learn after an accident occurs.

a. *Rescue.*

(1) Shut off the high-voltage source and ground the circuits.

- (2) If the high-voltage source cannot be turned off without delay, free the victim from contact with the live conductor. However, avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim (ax, shovel, rake). An ax with a dry wooden handle may be used to cut the high-voltage wire. Use extreme caution to avoid injury from the resulting electric flash.

*b. Symptoms.*

- (1) Normal breathing stops.
- (2) Victim is usually very white or blue.
- (3) Pulse is weak or absent and the victim is unconscious.
- (4) Burns are usually present.
- (5) The victim's body may become rigid or still in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis.

*c. Treatment.*

- (1) Start artificial respiration immediately.
- (2) Send for a doctor if assistance is available.
- (3) Do not leave the victim unattended.
- (4) Keep the victim warm to lessen the degree of shock.
- (5) Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. If it is necessary to move the victim, move him no further than necessary for safety.

## 53. Hydraulic Safety

Hydraulic pressure is used for many purposes in Sergeant peculiar equipment, such as lifting and swinging great weights. The following precautions should be taken and observed by personnel in the area where hydraulic power is being used.

a. Do not move underneath a load being lifted. Hydraulic lines may rupture or pumps may fail and the load could drop suddenly.

b. A ruptured hydraulic line will spew fluid which can blind or burn.

c. The slewing or swinging of a boom is accomplished by using hydraulic power, and personnel must remain out of the path that the boom will take.

## 54. Battery Electrolyte Safety

At X-20 seconds in the countdown, the primary wet battery assembly is activated. If the mission is aborted after X-20 seconds, the primary wet battery assembly will spew its electrolyte and will have to be replaced. Crewmen should wear protective clothing and guard against becoming injured or contaminated by the electrolyte when removing the activated battery. If contamination does occur, immediately wash the skin area with cool clean water and cover the area with a mild acetic acid (vinegar) solution, if available. If the acetic acid solution is not available, continue to gently wash the contaminated skin area with cool clean water and report to the medical aid man as soon as possible.

## SECTION XI

### TRAINING

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#### 55. Purpose and Scope

The purpose of this chapter is to present the minimum requirements for training the personnel of a firing platoon in the performance of their duties. The training requirements are based only on the material contained in the text of this manual. This chapter includes general information on the conduct of training and a minimum training schedule.

#### 56. Objectives

The objectives are to train crewmen to perform their individual duties rapidly and, through drill, to form them into an effective, coordinated team that is able to function efficiently in combat.

#### 57. Conduct of Training

a. Training will be conducted in accordance with the principles in FM 21-5 and FM 21-6. The training goal is outlined in Army Training Program 6-555, Field Artillery Battalion, Sergeant, and in AR 611-201.

b. In general, individual training is conducted by noncommissioned officers as far as practicable. Officers are responsible for preparing training plans, for conducting unit training, and for supervising and testing individual training.

c. Throughout training, the application of prior instruction to current training must be emphasized.

d. A record of training received by each individual should be kept on a progress card, which may be maintained by each chief of section for each crewman in his section. This card should show each period of instruction attended, tests taken, and remarks pertaining to progress. Progress cards should be inspected frequently by the battery commander to be sure

they are being kept properly and to determine the state of training. *Requiring the chief of section to keep these records emphasizes his responsibility toward his section.*

e. The firing platoon must be able to perform the operations prescribed in this manual equally well during daylight and under blackout conditions. Night training under blackout conditions must be stressed.

f. Realistic training is especially important for a guided missile unit. Simulating essential operations because of safety, the labor involved, or the complex nature of the equipment must be avoided. Maximum use should be made of mock firings of training missiles to include crew drills on—

- (1) Transfer of missile sections to the launching station and assembly of the missile.
- (2) Check out of missile sections at the organizational maintenance test station.
- (3) Check and prefire procedures at the launching station.
- (4) Countdown and firing (mock included).
- (5) Survey by time and accuracy.
- (6) Communications to include wire nets, radio nets, alertness, and promptness in decoding incoming messages and encoding outgoing messages.

#### 58. Standards To Be Obtained

The qualifications established in AR 611-201 should be used as a guide for standards to be obtained by individuals. The qualifications established in Army Training Test 6-555 should be used as a guide for standards to be obtained by Sergeant units.

## SECTION XII

### TESTS FOR QUALIFICATION OF MISSILEMEN

#### 59. Purpose and Scope

This chapter prescribes the tests to be given in the qualification of missilemen. The tests are designed to measure a soldier's knowledge of all major components in the Sergeant missile system; these tests do not require a technical background or school training. Successful completion of these tests qualifies an individual for award of the missile qualification badge in the degree of proficiency as shown in paragraph 62. The purposes of the tests are—

a. To provide a means of determining the relative proficiency of the individual artillery soldier in the performance of duties required of members of the Sergeant firing battery. The tests will not be a basis for determining the relative proficiency of batteries.

b. To serve as an incentive for individuals within the Sergeant firing battery to expand their knowledge of the complete Sergeant missile system, thereby increasing their value to the unit.

c. To serve as an adjunct to training.

#### 60. Standards

The candidate will be required to perform the tests in accordance with the procedures listed in this manual and the appropriate technical references. In those tests in which a candidate is required to direct assistants, he will do so in the manner of a noncommissioned officer, regardless of his actual rank. Although time limits have not been imposed for these tests, an obvious display of technical inefficiency (fumblings, uncertainties) or trial and error solutions will be cause for halting a test and failing the candidate.

#### 61. Qualification Test

In an endeavor to standardize the requirements for the awarding of the missile qualifica-

tion badge in all units the following test has been prepared, although this test does not include all possible areas of interest, successful completion should insure a qualified SERGEANT missileman.

Area	Test	Maximum Credit
I	Missile: (18 points total) (6 tests).	
	1. Can the examinee demonstrate the proper opening/closing procedures for section containers?	3
	2. Can the examinee explain the proper procedures for emergency destruction?	3
	3. Can the examinee satisfactorily direct the missile guidance transport trailer to its recommended location at the launching station and at the Organizational Maintenance Test Station.	3
	4. Is the examinee familiar with the missile technical manuals (TM 1410-302-20 and TM 9-1100-300-12)?	3
	5. Is the examinee familiar with the special tools that are available for maintenance TM 9-1410-302-20) and their use.	3
	6. Is the examinee familiar with the rocket motor sling assembly, guidance section handling fixture, and warhead strongback.	3
II	Azimuth Orientation System: (15 points total) (5 tests).	
	1. Can the examinee properly emplace the traverse target, and reference theodolite?	3
	2. Can the examinee operate the reference theodolite accurately.	3
	3. Can the examinee operate the AOU accurately and install the alinement tube properly?	3
	4. Is the examinee familiar with the alinement plate check, plunge check and collimation-light-target check?	3

Area	Test	Maximum Credit
	5. Is the examinee familiar with the appropriate technical manuals (TM 9-1440-301-12. and TM 5-6675-205-15)?	3
III	Launching Station: (22 points total) (5 tests).	
	1. Does the examinee understand the functions of all crew members during emplacement, assembly, disassembly, and march order?	8
	2. Does the examinee perform proficiently the functions of the boom operator and recognize and understand the appropriate hand signals?	
	3. Can the examinee properly level the launching station and does he know how to perform a proof load test?	3
	4. Is the examinee familiar with the communication equipment on the launching station and proper radio telephone procedures.	3
	5. Is the examinee familiar with the manual for the launching station (TM 9-1440-301-12)?	3
IV	Firing Set: (15 points total) (5 tests).	
	1. Can the examinee perform a self-test of the firing set?	3
	2. Can the examinee correctly insert all necessary information to fire a mission?	3
	3. Does the examinee understand the use of the Test/Operate switches, azimuth control panel, operator control panel, and monitor control panel?	3
	4. Can the examinee properly "check-out" the remote firing box?	3
	5. Is the examinee familiar with the appropriate technical manual for the firing set (TM 9-1440-301-12)?	3
V	Organizational Maintenance Test Station: (15 points total) (5 tests).	
	1. Can the examinee properly conduct a self-test of the organizational maintenance test station?	3
	2. Can the examinee properly connect the required cables to the guidance section container and the individual fin containers?	3
	3. Can the examinee properly operate the jib crane?	3
	4. Is the examinee familiar with the organizational maintenance test station control panel, air-conditioning system controls and guidance test procedures?	3

Area	Test	Maximum Credit
	5. Is the examinee familiar with the appropriate technical manual for the organizational maintenance test station (TM 9-4935-303-12)?	3
VI	Gas Turbine Generator Set: (15 points total) (5 tests).	
	1. Does the examinee know the proper preoperation checks?	3
	2. Is the examinee familiar with the control panel?	3
	3. Can the examinee start and stop the equipment and utilize proper procedures for false starts?	3
	4. Does the examinee realize where the danger areas are around the equipment?	3
	5. Is the examinee familiar with the technical manual for the equipment (TM 5-6115-294-13)?	3
Maximum possible -----		100

Successful completion (without fumbling and uncertainties) of each test entitles the examinee to maximum credit. (Anything short of the previously mentioned standard should be weighted accordingly, i.e., successful completion with guidance or some uncertainty/fumblings, a one point deduction, etc.; complete failure—no credit.)

## 62. Qualification Scores

Minimum scores required for qualification of missilemen are:

Expert Missileman -----90 points  
 First-class Missileman -----80 points  
 Second-class Missileman ---70 points

## 63. Assistance

The candidate will receive no unauthorized assistance. Assistants will be furnished to the candidate as required for each test. The assistants will perform duties as they are assigned by the candidate. Assistants will not volunteer information but will execute the candidate's commands to the best of their ability. When erroneous commands are given, the assistants should so inform the examiner prior to acting on the command. If a candidate fails a test because of the fault of the examiner or an assistant, the test will be disregarded, and the candidate will be given another test of the same nature.



#### 64. Conduct of Tests

At the start of a test, the condition of the equipment will be the same as it would be during normal operation. The examiner will explain to the candidate the scope of the test and indicate the men who will act as assistants. He will also furnish the candidate with any check-sheets or related materials available. During the test, the examiner will prevent the candidate from making any mistakes that would be

harmful to personnel or equipment. At the completion of the test, the examiner will critique the candidate's performance and turn tentative score in to the battery commander, who will question the candidate and the examiner as to the reasons for the examiner's tentative score. The battery commander will finalize the score and forward the test score to battalion.

## APPENDIX

### REFERENCES

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(C) AR 190-60	Physical Security of Atomic Weapons (U).
AR 310-1	Military Publications—General Policies.
AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Codes.
AR 330-12	Effective Date of Change of Strength Accountability.
AR 335-60	Morning Report (Reports Control Symbol AG-140 (R31)).
AR 385-62	Firing Guided Missiles and Heavy Rockets for Training, Target Practice, and Combat.
AR 385-63	Regulations for Firing Ammunition for Training, Target Practice, and Combat.
AR 600-20	Army Command Policy and Procedures.
AR 611-201	Manual of Enlisted Military Occupational Specialties.
AR 700-2300-1	Motor Vehicles.
AR 735-5	Property Accountability—General Principles and Policies.
AR 735-35	Supply Procedures for TOE Units, Organizations, and Non-TOE Activities.
DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recording.
DA Pam 310-series	Military Publications Indexes.
ATP 6-555	(Army Training Program).
ATT 6-555	(Army Training Test) Field Artillery Battalion, Sergeant.
FM 5-20-series	Camouflage.
FM 5-25	Explosives and Demolitions.
FM 6-2	Artillery Survey.
FM 6-10	Field Artillery Communications.
FM 6-20-1	Field Artillery Tactics.
FM 6-20-2	Field Artillery Techniques.
(C) FM 6-37	Field Artillery Battalion Sergeant (U).
FM 6-40	Field Artillery Cannon Gunnery.
(C) FM 6-40	Field Artillery Missile Gunnery (U).
FM 6-121	Field Artillery Target Acquisition.
FM 6-140	The Field Artillery Battery.
FM 21-5	Military Training.
FM 21-6	Techniques of Military Instruction.
FM 21-30	Military Symbols.
FM 21-40	Small Unit Procedures in Chemical, Biological, Radiological (CBR) Operations.
FM 21-60	Visual Signals.
FM 22-5	Drill and Ceremonies.
FM 24-18	Field Radio Techniques.
FM 24-20	Field Wire and Field Cable Techniques.

FM 30-7	Combat Intelligence Battle Group, Combat Command, and Smaller Units.
(CM) FM 32-5	Communications Security (U).
FM 100-5	Field Service Regulations: Operations.
FM 101-5	Staff Officer's Field Manual; Staff Organization and Procedure.
FM 101-10	Staff Officer's Field Manual; Organizational, Technical and Logistical
parts 1 and 2	Data.
FM 101-31-1, and -3	Staff Officer's Field Manual; Nuclear Weapons Employment (U).
and	
(S) FM 101-31-2	
TM 5-236	Surveying Tables and Graphs.
TM 5-241-1	Grids and Grid References.
TM 5-241-2	Universal Transverse Mercator Grid: Zone-to-Zone Transformation
	Tables.
TM 5-6115-294-12	Operator, Organizational Maintenance Manual: Generator Set, Gas Tur-
	bine Engine: 30kw, ac, 120/208 v, 3 phase, 400 Cycle: Skid Mtd
	(Sperry Utah Engineering Laboratories Model GTGE70-2-1) FSN
	6115-778-8788.
TM 5-6675-205-15	Operator Maintenance Manual Theodolite: Directional 0.002 Mil Gradua-
	tion, 5.9 in long Telescope Detachable Triback W/Accessories and
	Tripod (Wild Heerbrugg Model T-2-56-C-Mil) FSN 6675-682-4635
	(Wild Heerbrugg Model T-2-56-M-Mil) FSN 6675-796-9439.
TM 5-6675-207-15	Operator, Organizational, Field and Depot Maintenance Manual: Sur-
	veying Instrument Azimuth: Gyro; Artillery; with Gyroscope Hous-
	ing, Electronic Null Indicator and Mounting Base (Autonetics Model
	ABLE C2A) Serial Nos. A001 Through A124, FSN 6675-606-3378.
TM 6-230	Logarithmic and Mathematical Tables.
(S) TM 9-1100-300-12	Operator and Organizational Maintenance Manual (Prefire Procedures) :
	Warhead Sections XM62 and XM63 (U).
TM 9-1410-302-20	Organizational Maintenance Manual: Sergeant Artillery Guided Missile
	System).
TM 9-1440-301-12	Operator and Organizational Maintenance Manual: Four-Wheel Semi-
	trailer-Mounted Guided Missile Launching Station XM504 (Sergeant
	Artillery Guided Missile System).
TM 9-2330-300-14	Operator, Organizational, and Field Maintenance Manual for Semi-
	trailer, Low Bed: 6-Ton, 4-Wheel, XM527 and Chassis, Semitrailer:
	6-Ton, 4-Wheel, XM539.
TM 9-4935-303-12/1	Operator and Organizational Maintenance Manual: Guided Missile Sys-
	tem Components Organizational Maintenance Test Station AN/MSM-
	35 (Sergeant Artillery Guided Missile System).
TM 38-750	The Army Equipment Record System and Procedures.
TOE 6-555	Field Artillery Battalion, Sergeant.
TOE 6-556	Headquarters and Headquarters Battery, Field Artillery Battalion,
	Sergeant.
TOE 6-557	Field Artillery Battery, Sergeant.

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Table I. Emplacement

Step	Chief of Section (CS)	Assistant chief of section (ACS)	Boom operator (B Op)	Crewman No. 1	Crewman No. 2	Crewman No. 3	Crewman No. 4	Crewman No. 5	Crewman No. 6	Senior AOS operator	AOS operator	Firing set operator
1	Indicates launching station (L/S) position to assistant chief of section (ACS). Supervises emplacement.	Directs crewman No. 5 to position launching station over firing position marker.	Reports to ACS at launching station.	Sets the trailer right handbrake. Removes right outrigger jack pad and positions it on the ground under the right outrigger. Checks level of hydraulic fluid reservoirs.	Sets the trailer left handbrake. Removes the left outrigger jack pad and positions on the ground under the left outrigger.	Assists No. 4 to unload equipment. Reports to ACS.	Unloads equipment from cargo vehicle.	Assists No. 3 and No. 4.	Removes tripod from tripod container.	Swings out left outrigger and locks. Removes travel collar. <b>Caution: Do not jam locking pin.</b>	Swings out right outrigger and locks. Removes travel collar. <b>Caution: Do not jam locking pin.</b> Removes tripod from container. Sets up and levels theodolite over stake. Connects headset.	Uncouples airhose and electrical cables between prime mover. Checks that firing set power switch is off and notifies CS. Places fire extinguisher by gas turbine generator set control panel. Pulls fifth wheel lock handle on prime mover on direction of CS.
2	Verifies that the air hose and electrical cables are disconnected from the launching station.	Inserts grounding rod into ground, No. 3 will assist.	Disconnects the boom locks. Releases blast shield travel locks. Loosens GTGS fuel tank cap, and checks fuel level.			Assists ACS to install grounding rod into ground. Connects grounding cable to grounding rod. Opens main fuel shutoff valve on GTGS.	Reports to ACS.	Sets trailer air brakes.	Sets up and levels the traverse target over the stake on the orienting line.			
3		Checks that control valves and switches on the launching station are in their preoperating positions. Determines that boom operator and firing set operator have made their preoperation checks. Directs No. 3 to energize GTGS. Connects headset.	Checks that control valves and switches on the boom are in their normal preoperating position. Signals the ACS when check is completed. Connect headset.			Performs preoperation checks on the GTGS (TM 5-6115-294-13.) Turns on GTGS when directed by ACS.	Releases rear jack travel locks. Removes rear jack pad and positions beneath jack.	Reports to ACS for further duty assignments.	Reports to CS for further duty assignments.	Obtains azimuth of orienting line (A <sub>1</sub> ) from platoon leader.	Obtains A <sub>1</sub> from senior AOS operator. Sights reference theodolite on target and sets A <sub>1</sub> on horizontal scale. Turns reference theodolite to the azimuth orienting unit and stands by.	Checks that TRANSFER switches are in TEST. Signals ACS when preoperations check is complete.
4		Tests launching station control panel lights. Turns on hydraulic pumps, checks hydraulic pressure and indicator lights.										
5	Directs ACS to extend jacks until launcher weight is removed from prime mover. Directs FS Op to pull fifth wheel lock handle. Directs movement of prime mover.	Extends outrigger jacks until jack pads engage with ball ends of jacks. Extends outrigger jacks to raise launching station off the fifth wheel of prime mover.	Tests boom control panel lights. Turns on hydraulic pumps, checks hydraulic pressure and indicator lights.	Engages right jack pad with ball end of jack.	Engages left jack pad with ball end of jack.							Places firing set power switch to PRE-HEAT for a minimum of 5 minutes. Connects headset. Energizes azimuth control panel (turn pump switch on).
6	Gives firing position coordinates to the firing set operator.	Extends rear jack until jack pad engages with ball end of jack. Lowers blast shield. Levels launching station. Turns hydraulic system off.					Engages rear jack pad with ball end of jack.					Obtains firing position data from the CS.
7		Signals boom operator to raise U-frame above 66° position.	Raises U-frame as directed by ACS.	Locks right actuator.	Locks left actuator.							Turns power switch ON. Begins self-test and auto test of firing set. Checks that the AUTO TEST of the computer is complete.
8		Directs boom operator.	Determines that side actuators are locked by lowering U-frame to 66° position.							Installs and levels azimuth orientation unit (AOU) when superstructure is raised. Connects headset.		
9										Reciprocally lays AOU with reference theodolite. Records azimuth of orienting line, A <sub>1</sub> , A <sub>2</sub> , A <sub>3</sub> . Sights AOU on missile orientation target and records missile azimuth (Am). Reports A <sub>1</sub> and Am to firing set operator and records data in log book.	Reciprocally lays AOU from reference theodolite and transmits A <sub>2</sub> to senior AOS operator.	Receives A <sub>1</sub> and Am from senior AOS operator. Receives target data from platoon leader. Insert known parameters into computer for computation.
10												Places computer in TRANSFER mode when computations are completed.

Table II. Assembly and Countdown

Step	Chief of section	Assistant chief of section	Boom operator	Crewman No. 1	Crewman No. 2	Crewman No. 3	Crewman No. 4	Crewman No. 5	Crewman No. 6	Senior AOS operator	AOS operator	Firing set operator
1	Supervises operations, watches for safety.	Directs No. 3 to energize GTGS if necessary.	When power is applied: Checks lights on boom control panel. Turns on hydraulic system. Checks for any malfunctions. Unlocks and unfolds boom.	Raises and locks curbside work platform into position.	Raises and locks roadside work platform into position.	Energizes GTGS, if necessary and assists No. 1 with platform.	Assists No. 2 with platform.		Assists with work platform.	Directs missile guidance transport trailer into position.		Note. If operations during emplacement have not been completed, they will be performed at this time.
2		Directs the boom operator to position the boom over the rocket motor container. Directs the boom operator to raise U-frame to 88°.	Positions boom over the rocket motor container. Raises boom to 88° position and locks.									
3		Caution: Do not allow trolley to exceed the motor safe travel limit mark.										
4	Receives the two rocket motor primers from No. 5. Store them in the firing set.	Directs boom operator to position boom and engages rocket motor slings with hoist yoke.	Positions boom hoist yoke to engage with the rocket motor slings.				Engages rocket motor slings to hoist yoke.	Assists No. 3 in opening rocket motor container lid.	Assists No. 5.	Assists AOS operator to remove curbside (right) control surface containers and places them on the ground.	Removes curbside (right) control surface containers.	Begins insertion of mission data. Requests temperature. Recheck if missile has been suspended any length of time. Checks insertion of mission data. Computes flight parameters. Checks computation of flight parameters. Reads out A, T <sub>b</sub> and R and reports to section chief. Reads out R <sub>L</sub> and places the value on the azimuth control panel.
5		Directs boom operator to raise the rocket motor until it clears its container. Stops trolley hoist yoke until No. 3 removes the rear nozzle plate. Raises the rocket motor and positions it along the boom. Engages the rocket motor hooks with the boom hangers.	Positions the boom hoist yoke to engage the rocket motor hooks with the boom hangers. CHECK H O O K S E N - G A G E D YES indication and then runs trolley hoist out until motor stalls.				Releases rear nozzle plate from rocket motor, when motor clears the container. Guides rear end of rocket motor.					
6		Directs boom operator to lower U-frame to 66° position and position the rocket motor between the work platforms.	Positions the U-frame to 66° position. Positions rocket motor between the work platforms. Acts on instructions from No. 1 during disengagement of yoke from rocket motor slings.				Engages rocket motor slings to hoist yoke.					
7		Directs boom operator to position hoist yoke over guidance section strong back. Supervises engaging hoist yoke with strongback and directs section be raised until it clears its container. Halts hoist as No. 3 and No. 4 remove the supports. Directs guidance section be positioned 12 to 15 inches from rocket motor.	Positions hoist yoke over guidance section strongback. Positions guidance section 12 to 15 inches from the rocket motor along the boom.	Directs boom operator while disengaging hoist yoke from rocket motor sling. Hands slings to No. 5.	Assists No. 1 to disengage rocket motor sling from yoke.	Opens and locks guidance section container lid. Disconnects P801 through P806 and P950. Removes rear T-bolt.	Assists No. 3 with guidance section container lid and disconnects P928 and P929. Removes forward T-bolt.	Places rocket motor slings in rocket motor container. Closes the rocket motor container lid.	Assists No. 5.	Directs warhead transport vehicle into position.		Places computer in TRANSFER mode.
8		Directs boom operator to position boom over work platforms. To engage guidance section with rocket motor. Caution: Do not damage cabling and motor blanket.	Positions boom over the work platforms while guidance section is engaged with rocket motor section. Releases tension on hoist yoke to disengage guidance section strongback.									
9		Directs boom operator to seat trolley against forward stop and positions hoist yoke over warhead section strongback. Supervises engaging of hoist yoke with strongback. Directs raising of warhead section until it clears its containers.	Positions hoist yoke against forward stops. Positions hoist yoke over warhead section strongback, engages and raises warhead section, until it clears container.									
10	Removes SAFE plug. Obtains the fire plug from the warhead section container and inserts it in warhead section.	Directs boom operator to position warhead section along the boom.	Positions warhead section along the boom.	Torques curbside (right) swing bolts on the guidance section to 1250 inch-pounds. (Torque Top bolt first.) Removes guidance section strongback and hands to No. 5.	Torque roadside (left) swing bolts on the guidance section to 1250 inch-pounds. (Torque top bolt first.)	Opens warhead section container and locks lid. Disconnects 7W2 and loosens swing bolts.	Assists No. 3 to open warhead section container.	Places guidance section strongback in container. Closes guidance section container.	Assists No. 5.			
11		Directs engagement of warhead section with guidance section.	Positions boom between work platforms. Engages warhead section with guidance section.									
12		Directs disengagement of hoist yoke from warhead section strongback.	Positions the boom hoist to disengage hoist yoke from warhead section strongback.									
13	Directs warhead section transport vehicle from the area. Checks liquid quantity indicator on sump.	Directs alignment of missile over A-frame.	Positions missile over A-frame.	Opens the guidance section access door and connects the electrical connections to the rocket motor. Connects and adjusts missile electrical break away arm. Opens inertial doors in warhead. Connects guidance section cables to boom.	Engages missile support A-frame. Opens inertial doors in warhead.	Installs control surface assemblies. (Stands on top of firing set.)	Assists No. 3 with control surface assemblies (stands on top of gas turbine generator set).	Hands control surfaces faces to crewman No. 4.	Performs the self test on the remote firing box. Carries the remote firing box to the remote firing pit and assists in preparing the remote firing pit.	Inserts azimuth orientation unit into missile, insuring that proper contact with inductosyn is made.	Sights the reference theodolite on the traverse target and places a random reading on horizontal scale (R <sub>1</sub> ). Reports R <sub>1</sub> to senior AOS operator.	Starts program.
14			Retracts yoke to rear travel limit, folds and locks boom. Turns hydraulic system off. Leaves launching station.		Lowest and locks left work platform in travel position. Evacuates launching station.	Evacuates launching station.	Evacuates launching station.	Assists in preparing remote firing pit.		Sights AOU on reference theodolite and places random reading on horizontal scale (R <sub>2</sub> ), records R <sub>1</sub> , R <sub>2</sub> , R <sub>3</sub> .	Sights reference theodolite on azimuth orientation unit (R <sub>2</sub> ), reports R <sub>2</sub> to senior AOS operator. Evacuates launching station.	
15		Obtains primer from Firing Set and hands to No. 1.	Insures that connections are made properly and that the primer has been inserted.	Inserts primer into rocket motor breech. Closes access door.						Gives random readings of R <sub>1</sub> , R <sub>2</sub> , R <sub>3</sub> to firing set operator, orients the porroprism with reference theodolite.		
16	Checks the level of launching station. Evacuates launching station.	Assists chief of section to check the level of launching station. Evacuates launching station.		Lowest and locks right work platform in the travel position. Evacuates launching station.						Turns azimuth orientation unit until R <sub>1</sub> is shown on scale. when completed turns azimuth orientation unit ready light switch ON. Monitors the azimuth shift of the AOU base until X-3 minutes from the reference theodolite.		Check insertion of random readings and compute R <sub>4</sub> . Informs senior AOU operator the value of R <sub>4</sub> .
17										At X-3 minutes secures theodolite. Evacuates to the SAFETY PIT.		At X-3 Leave Station.

Table III. Disassembly

Step	Chief of section	Assistant chief of section	Boom operator	Crewman No. 1	Crewman No. 2	Crewman No. 3	Crewman No. 4	Crewman No. 5	Crewman No. 6	Senior AOS operator	AOS operator	Firing set operator			
1	Supervises all operations for safety.	Directs No. 3 to energize GTGS and boom operator to turn on boom hydraulic system.	Checks that all controls are in pre-operating position. Turns on hydraulic system.	Raises and locks curbside (right) work platform into position. Disconnects cables attached to boom	Raises and locks roadside (left) work platform into position.	Energizes GTGS.	Assists No. 1 and No. 2 with work platforms.	Places assembly tools on rear of work platforms. Directs motor guidance transport trailer into position.	Directs warhead transport vehicle into position.	Removes AOU from its pedestal and returns it to its container.		Clears program that had been inserted in guidance section and warhead section. Turns azimuth control panel switch off (pump switch).			
2	Receives rocket motor primer from No. 1.		Unlocks boom lock. Extends boom and tightens cables. Seats hoist yoke in in trolley.	Removes primer from rocket motor breech and hand the primer to CS.			Opens warhead section container and locks lid in place.						Assists No. 3.	Removes control surfaces from rocket motor while standing on top of firing set.	Removes control surfaces from rocket motor while standing of GTGS. Hands control surfaces to No. 5.
3				Assists No. 2 with warhead strongback.	Receives warhead strongback from No. 5. Attaches strongback to warhead section. Lowers A-frame.				Assists No. 5.	Assists No. 5.	Assists No. 5.	Assists No. 5.			
4			Directs positioning and engaging hoist yoke with warhead strongback.	Positions hoist yoke with warhead strongback.	Engages hoist yoke with strongback. Disengages roadside swingbolts. Disconnects breakaway arm.	Engages hoist yoke with strongback. Disengages roadside swingbolts.				Connects checkout cables to control surface assemblies and inserts locking pin.	Assists No. 5.	Assists No. 5.	Assists No. 5.	Assists No. 5.	
5	Directs boom operator to seat trolley hoist against forward stops in order to disengage warhead section from guidance section.		Seats trolley hoist as directed.												
6	Obtain SAFE plug and direct No. 1 to remove FIRE plug and replace it with SAFE plug. Hand FIRE plug to No. 4.	Directs boom operator to position boom over warhead section container and lower the boom until warhead can be handled by No. 3.	Positions boom over warhead section container and lower warhead section until directed to stop.	Removes FIRING PLUG from warhead and replace it with SAFE plug.			Disconnects static-probe and returns it to the static probe container and receive FIRE plug from CS and place it in the container.								
7		Directs boom operator to lower warhead section into container.	Lowers warhead section into warhead section container.	Opens guidance section access door and disconnects the electrical connections to the rocket motor. Closes access door.		Guides rear of warhead section into container. Disengage hoist yoke from strongback.	Guides front of warhead section into container. Engages warhead container restraining bands.								
8		Directs boom operator to position boom over work platforms.	Positions boom over work platforms.	Receives guidance section strongback from No. 3. Attaches strongback to the guidance section.	Assists No. 1 with guidance section strongback.	Opens guidance section container and locks the lid in place. Hands guidance section strongback to No. 1.	Assists No. 3.	Connects electrical cable to 7W2 in warhead section container. Closes container and latches lid.	Assists No. 5.	Assists No. 5.	Directs warhead transport vehicle from area.				
9		Directs boom operator to position hoist yoke in line with guidance section strongback.	Positions hoist yoke with guidance section strongback.	Engages hoist yoke with guidance section strongback. Disengages curbside swingbolts.	Assists No. 1 to engage hoist yoke. Disengages roadside swingbolt.	Opens rocket motor section container and locks lid in place. Hands rocket motor sling to No. 1 and No. 2.	Assists No. 3.								
10		Directs boom operator to disengage guidance section from rocket motor and positions boom over guidance section container. Lower guidance section until No. 3 and No. 4 can handle and guide it.	Disengages guidance section as directed. Lowers section over container until directed to stop.	Receives rocket motor slings from No. 3 and No. 4. Installs rocket motor slings.	Assists No. 1 with rocket motor slings.		Installs front support on guidance section.								
11		Directs boom operator to lower guidance section into container and disengage hoist yoke from strongback.	Lowers section into container. Disengages and retracts hoist yoke.			Guides rear of guidance section into container. Installs rear T-bolts in guidance section support frame. Connects guidance section connectors.	Installs forward T-bolt into guidance section support frame. Guides front of guidance section into container. Disengages hoist from strongback. Closes container lid.								
12		Directs boom operator to position boom over work platforms, and engage hoist yoke with rocket motor slings.	Positions boom over work platform and engages hoist yoke with rocket motor slings as directed.	Engages hoist yoke with rocket motor sling.	Engages hoist yoke with rocket motor sling.										
13		Directs boom operator to disengage rocket motor from the boom. Directs boom operator to lower rocket motor section until No. 3 can attach rear nozzle plate.	Pulls HOOK RELEASE handle and disengages rocket motor section from the boom. Lowers rocket motor as directed.			Attaches rear nozzle plate on rocket motor.									
14		Directs boom operator to lower rocket motor section into container and disengages hoist yoke from rocket motor sling.	Lowers rocket motor into container.			Guides rear of rocket motor into container. Disengages hoist yoke from rocket motor slings.	Guides front of rocket motor into container. Disengages hoist yoke from rocket motor sling.	Closes rocket motor container and latches lid. Directs motor guidance transport trailer from area.	Assists No. 5.	Installs control surface containers on motor guidance transport trailer.	Assists senior AOS operator.	Assists senior AOS operator.			



Table IV. March Order

Step	Chief of section	Assistant chief of section	Boom operator	Crewman No. 1	Crewman No. 2	Crewman No. 3	Crewman No. 4	Crewman No. 5	Crewman No. 6	Senior AOS operator	AOS operator	Firing set operator
1	Supervises operation.	Directs No. 3 to energize GTGS if it is not already running.	Insures that control valves and switches are in preoperation position. Checks control panel lights and turns on hydraulic system.	Checks that curbside work platforms are locked in travel position.	Checks that roadside work platforms are locked in travel position.	Energizes GTGS.			Removes traverse target from the tripod and places it in its container.	Removes AOU from pedestal and places AOU into container and installs container cover. Affirms that AOU container mounting clamps are in travel position.	Removes the reference theodolite from tripod and places it in containers. Fold tripod for transporting.	Returns remote firing box and cabling to the firing set. Places transfer switches in TEST. Turns pump switch on azimuth control panel to OFF.
2	Directs positioning of prime mover.	Directs BO to center boom over firing set and to fold the boom.	Operates boom as directed and secures travel lock.						Attaches traverse target container to rear of the launching station.	Locks missile support A-frame in travel position.	Places tripod in container.	Pushes CLEAR program button. After firing set repositions itself turns POWER switch to OFF position.
3		Directs No. 1 and No. 2 to unlock the boom actuators.		Unlocks boom actuators on curbside.	Unlocks boom actuators on roadside.				Folds tripod for transporting and places it in tripod container.			
4		Directs boom operator to lower superstructure to travel position.	Retracts side erection actuators until superstructure is in travel position.									
5		Checks trailer control panel lights. Turns on semitrailer hydraulic system. Raises blast shield to the travel position. Retracts rear jack to the FULL-UP position.	Turns off boom hydraulic system. Lock forward and rear travel locks on boom.									
6		Operates the two outrigger jacks to aline semitrailer fifth wheel pin with tractor fifth wheel plate.	Engages the three blast shield travel locks.				Engages rear jack, travel support latch.					
7	Directs No. 5 to engage launching station with prime mover.	Retracts both outrigger jacks to their FULL-UP positions. Turns off hydraulic system.		Places curbside outrigger jack pad in its travel position and latches it in place.	Places roadside outrigger jack pad in its travel position and latches it in place.		Locks rear jack pad into its travel position.	Engages launching station fifth wheel pin with tractor fifth wheel.				
8	Directs No. 3 to turn turn off GTGS.					Turns off GTGS. Closes main fuel shutoff valve. Tightens gas tank cap.			Releases roadside trailer handbrake. Installs outrigger jack travel collars.	Releases curbside trailer handbrake. Installs outrigger jack travel collars.	Connects all tractor-trailer electrical and brake connections. Turns tractor-to-trailer air valves to their ON position.	
9	Disconnects grounding cable from grounding rod. Stores grounding rod in travel position.		Swings curbside outrigger arm against launching station frame and lock it into the travel position.	Swings roadside outrigger arm against the launching frame and lock it into the travel position.	Assists ACS with grounding cable and grounding rod.			Assists No. 1 with curbside outrigger arm.	Assists No. 2 with roadside outrigger arm.			
10	Inspects the launching station to see that it is secure and that all equipment is accounted for.											

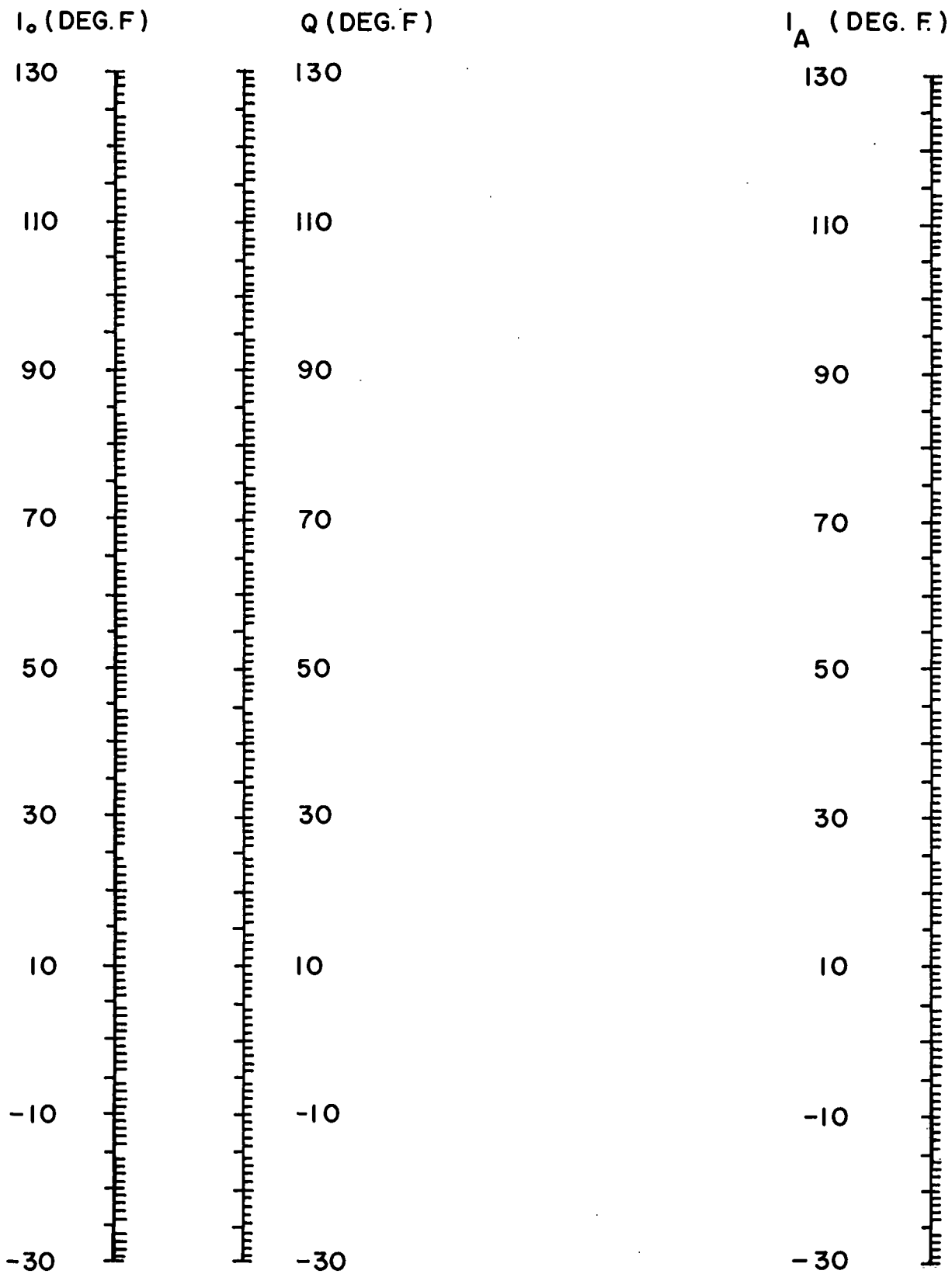


Table V. Nomograph For Rocket Motor Q Temperature

By Order of the Secretary of the Army:

EARLE G. WHEELER,  
*General, United States Army,*  
*Chief of Staff.*

Official:

J. C. LAMBERT,  
*Major General, United States Army,*  
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6-555 (10)

*NG:* None.

*USAR:* None.

For explanation of abbreviations used, see AR 320-50.



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