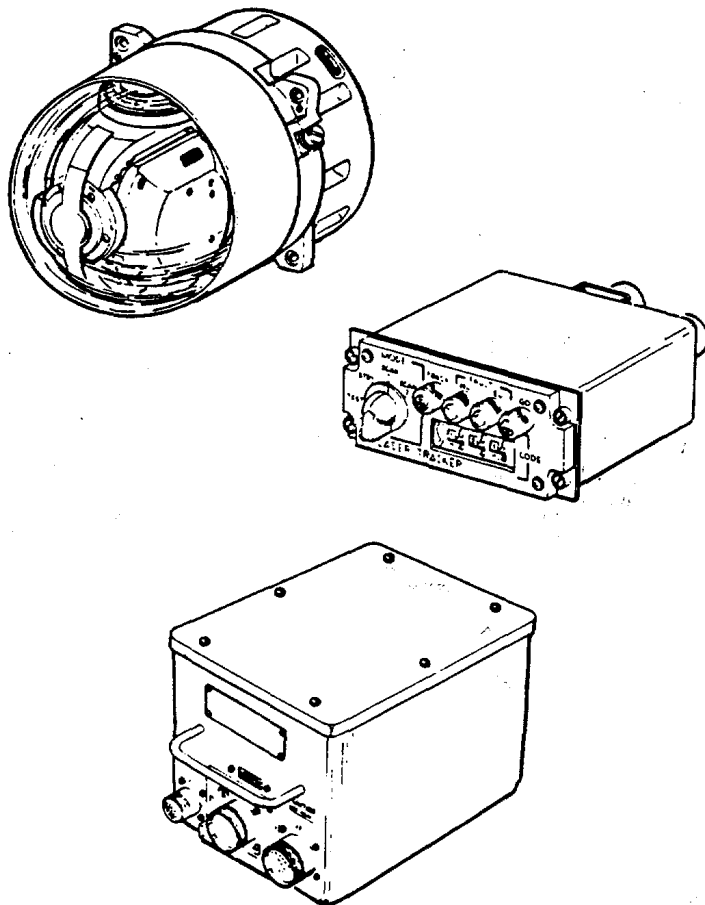


**OPERATOR'S AND ORGANIZATIONAL  
MAINTENANCE MANUAL**



**AIRBORNE LASER TRACKER  
AN/AAS-32  
(NSN 5860-01-070-3841)**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**26 MARCH 1984**



EL8TM023

**WARNING**

The light source from the laser simulator is an infrared light source. The light beam is invisible to the naked eye. The lens should not be viewed directly to prevent possible eye damage.

**WARNING**

Do not view laser simulator through Telescopic Sight Unit, as possible eye damage could occur.

**WARNING**

Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.

**WARNING**

Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.

Refer to FM 21-11 for First Aid.

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**OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL  
AIRBORNE LASER TRACKER AN/AAS-32  
(NSN 5860-01-070-3841)**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual If you find any mistakes or if you know of a way to improve the procedures. please let us know. Mail your letter. DA Form 2028 (Recommended Changes to Publications and Blank Forms). or DA Form 2028-2 located in back of this manual direct to: Commander. US Army Communications - Electronics Command and Fort Monmouth ATTN: DRSEL-ME-MP Fort Monmouth. New Jersey. 07703. A reply will be furnished to you.

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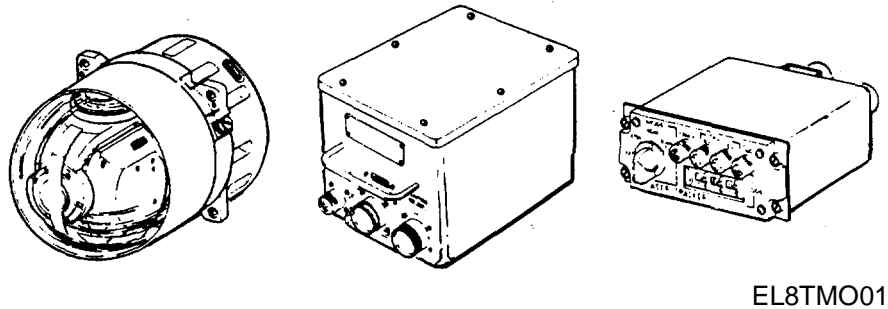
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## CHAPTER 1

### INTRODUCTION

---

#### Section I. GENERAL INFORMATION



**Figure 1-1. Airborne Laser Tracker AN/AAS-32.**

#### 1-1. Scope

- a. The purpose of this manual is to tell you how to operate and maintain the Airborne Laser Tracker (ALT) AN/AAS-32.
- b. The ALT is used in the Cobra attack helicopter to automatically scan the terrain, detect and lock onto a laser designated target. The ALT automatically tracks the target and when commanded, aims the helicopter optical sight (telescopic sight unit) to the ALT line of sight.

#### 1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

#### 1-3. Maintenance Forms, Records, and Reports

- a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 730-750 as contained in Maintenance Management Update.
- b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy, ROD), as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A AFR 400-54/MCO 4430.3F.
- c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D DLAR 4500.15.



**1-4. Destruction of Army Materiel to Prevent Enemy Use**

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

**1-5. Preparation for Storage or Shipment**

Before storing or shipping ALT equipment, preventive maintenance checks and services (PMCS) must be performed. These procedures are outlined in paragraph 2-2. Packing of equipment for shipment or limited storage is provided in paragraphs 3-25, 3-26, and 3-27.

**1-6. Reporting Equipment Improvement Recommendations (EIR)**

If your ALT needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications - Electronics Command and Fort Monmouth. ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

**1-7. Nomenclature Cross-Reference List**

Official and common nomenclature is listed in table 1-1.

**Table 1-1. Nomenclature Cross-Reference List**

Official Nomenclature	Common Name
Airborne Laser Tracker AN/AAS-32	ALT
Receiver-Tracker, Laser R-1920/AAS-32	Receiver
Electronic Components Assembly MX-9623/AAS-32	Electronics assembly
Control, Laser Tracker C-9641/AAS-32	Control panel
Mount, Receiver-Tracker MT-4698/AAS-32	Receiver mount
Case, Electronic Components Control CY-7441/AAS-32	Electronic assembly panel control transit case
Simulator, Laser SM-706/AAM-56	Laser Simulator

**Section II. EQUIPMENT DESCRIPTION**

**1-8. Equipment Characteristics, Features, and Capabilities**

- a. Characteristics and features of the Airborne Laser Tracker are as follows:
  - (1) All weather operational.
  - (2) Receiver may be replaced without performing additional boresighting and alignment procedures.
  - (3) Automatic terrain scanning, target acquisition, and target tracking.
  - (4) Upon command, aims the helicopter's optical sight (telescopic sight unit).
- b. Contains self-test circuits (built-in test equipment).

**1-9. Equipment Data**

**PRIMARY POWER REQUIREMENTS**

<b>DC power</b>	<b>28 vdc, 5.0 A</b>
<b>AC power</b>	<b>115 vac, 400 Hz, 0.25 A</b>

**ENVIRONMENTAL OPERATING RANGES**

<b>Temperature</b>	<b>-50° to 131° F</b>
<b>Humidity</b>	<b>0 to 100%</b>
<b>Altitude</b>	<b>15,000 ft maximum</b>

**INSTANTANEOUS FIELD OF VIEW**

**Rectangular, 20 degrees in azimuth,  
by 10 degrees in elevation**

**LASER SEEKER COVERAGE  
(gimbal coverage)**

**30 degrees (up)  
60 degrees (down)  
90 degrees (left)  
90 degrees (right)**

**SCAN COVERAGE**

<b>SCAN 1</b>	<b>0 and -8.3 degrees elevation, ±15 degrees azimuth</b>
<b>SCAN 2</b>	<b>0 to -25 degrees elevation (0, -8.3, -16.6, and -25 degrees) ±60 degrees azimuth</b>

**DIMENSIONS (in inches)**

<b>Receiver</b>	<b>Length: 8.892 Diameter: 8.000</b>
<b>Electronics Assembly</b>	<b>Length: 8.740 Width: 6.240 Height: 5.960</b>
<b>Control Panel</b>	<b>Length: 6.370 Width: 5.750 Height: 2.620</b>

**WEIGHT (in lbs)**

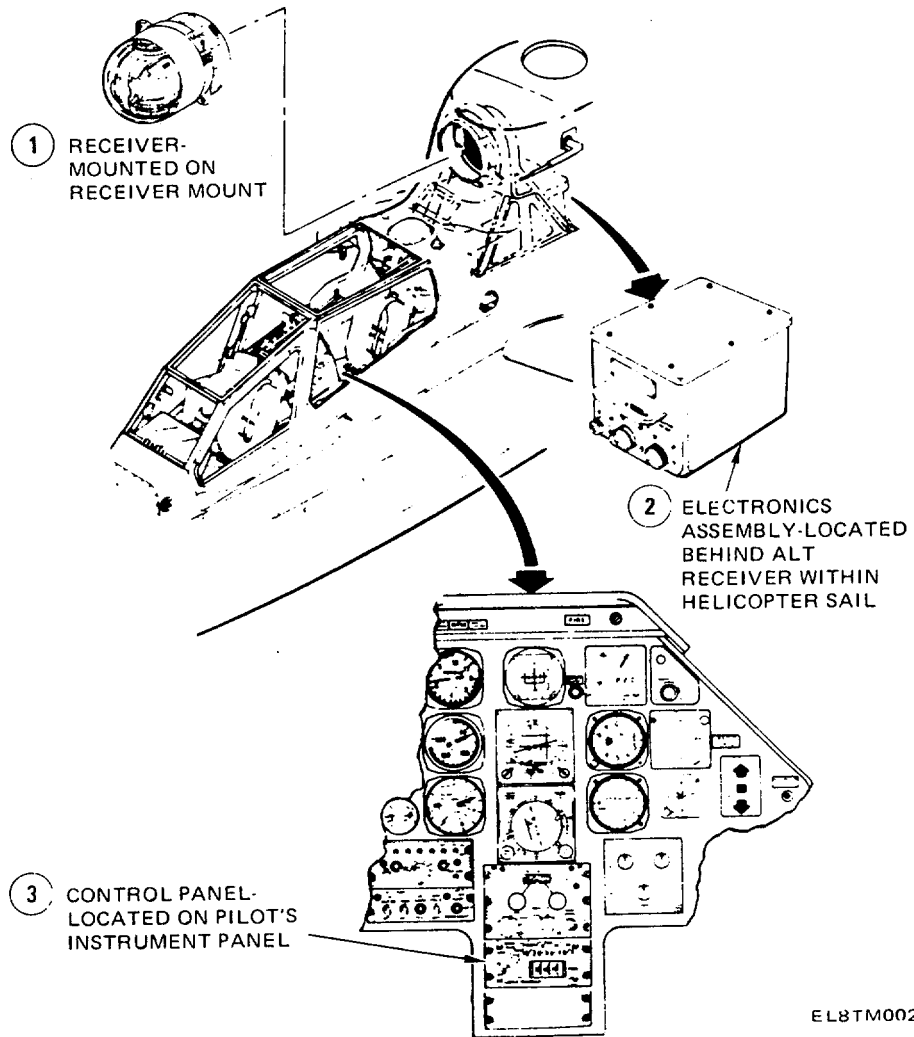
<b>Receiver</b>	<b>20.00</b>
<b>Electronics Assembly</b>	<b>7.50</b>
<b>Control Panel</b>	<b>1.25</b>
<b>Receiver Mount</b>	<b>2.75</b>
<b>Total</b>	<b>31.50</b>

**1-10. Location and Description of ALT Major Components (fig. 1-2)**

a. Receiver (1). This unit is a barrel-shaped housing with a glass dome. The unit contains the laser seeker. It senses the reflected laser signal from the target. The housing circuits are used to track the incoming laser signal from the target. A receiver fault during self-test is indicated by the RU lamp on the control panel.

b. Electronics Assembly (2). This unit contains the ALT plug-in modules and power supply. Three front panel connectors provide power and signals to the unit. A top cover seals the unit. This cover is not removed, except when the unit is being repaired. The cover protects the modules, power supply, and wiring, The unit is located in the aircraft behind the receiver. An electronic assembly fault during self-test is indicated by the EU lamp on the control panel.

c. Control Panel (3). The control panel contains the ALT controls, lamps, and lights. The two controls are the MODE and CODE thumbwheel switches. The four lamps are the TRACK, RU FAULT, EU FAULT, and GO lamps. The mode switch is lit by a light embedded in the plastic (edge-light panel). The control panel is located in the pilot's cockpit.



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Figure 1-2. ALT Major Components - Helicopter Locations.

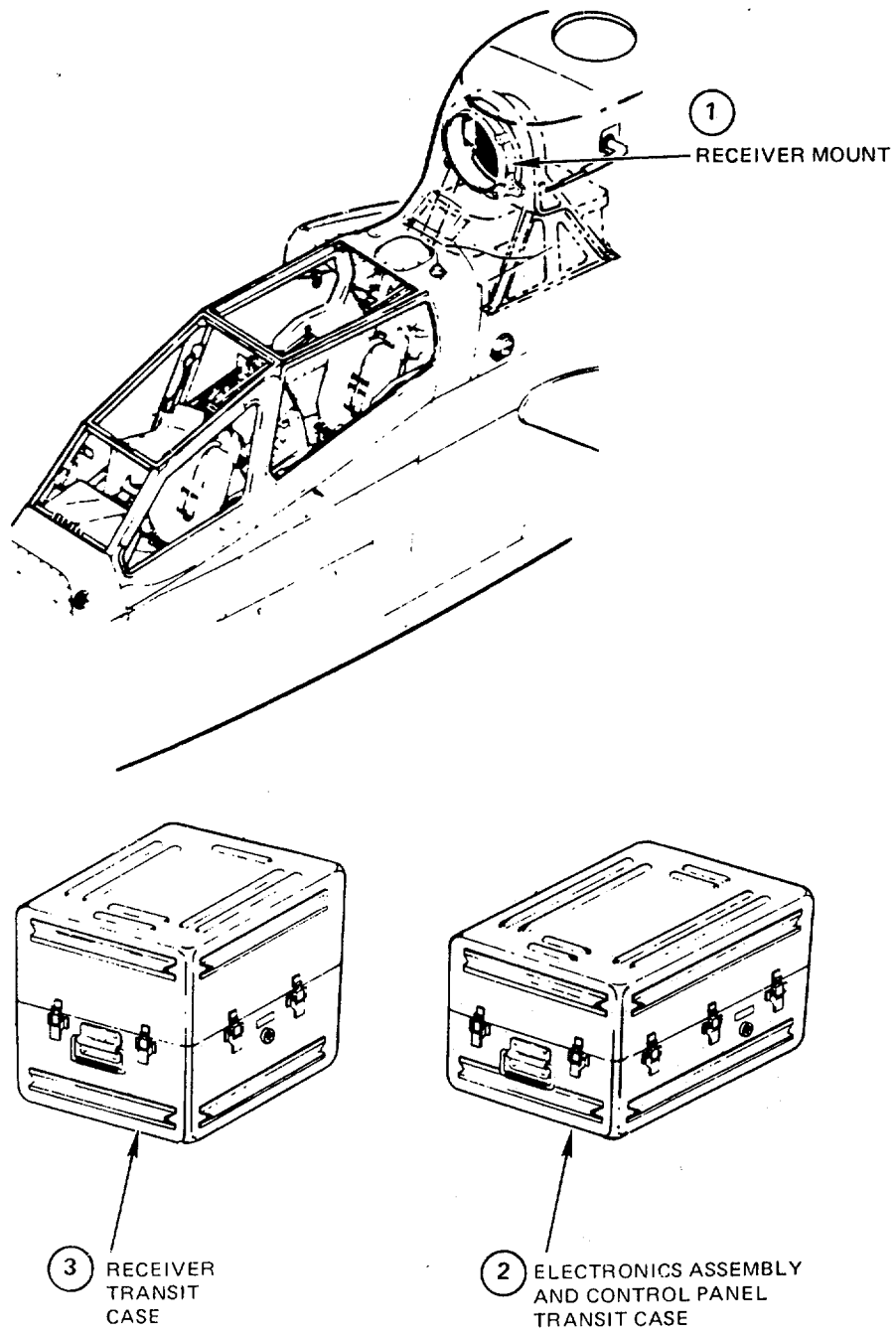
**1-11. Location and Description of Ancillary Equipment (fig. 1-3)**

The following ancillary equipment is used with the ALT, but is not part of Airborne Laser Tracker AN/AAS-32.

a. Receiver Mount (1). This unit holds the receiver. It is located between the receiver and the aircraft bulkhead. The mount contains connectors which provide contact between the receiver and the electronics assembly.

b. Electronics Assembly and Control Panel Transit Case (2). This case stores the control panel and electronics assembly when removed from the aircraft. The case is used during transport of these units.

c. Receiver Transit Case (3). This case stores the receiver when it is not in the aircraft. The case is used during receiver transport.



EL8TM003

Figure 1-3. ALT Auxiliary Equipment.

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-12. Operating Principles

The ALT is designed to reduce the time needed by helicopter crews to sight, aim and fire air-to-ground weapons. The ALT relies upon a target spotter (a soldier on the battlefield itself or in another helicopter) who, equipped with a laser designator, can train a coded laser beam on the target. The ALT on board the attack helicopter uses a receiver that can detect low level energy reflecting from the laser spot. The ALT scans the terrain, finds and tracks the target. and its output can be used to aim the helicopter's optical sight (telescopic sight unit).

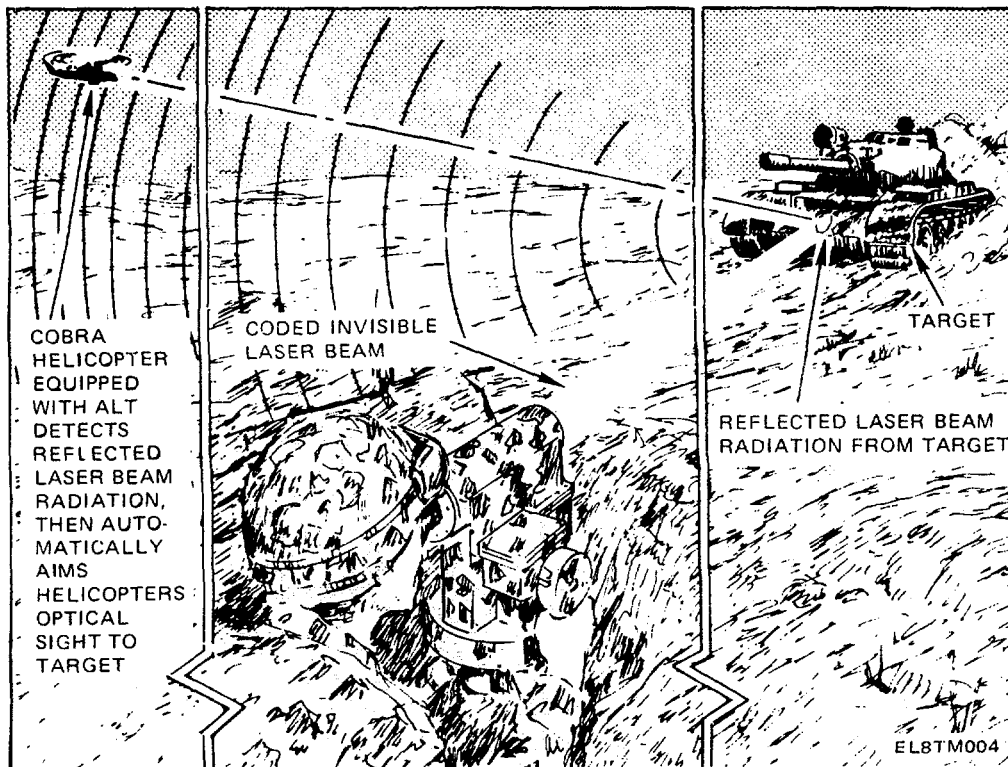


Figure 1-4. ALT Operating Principle.

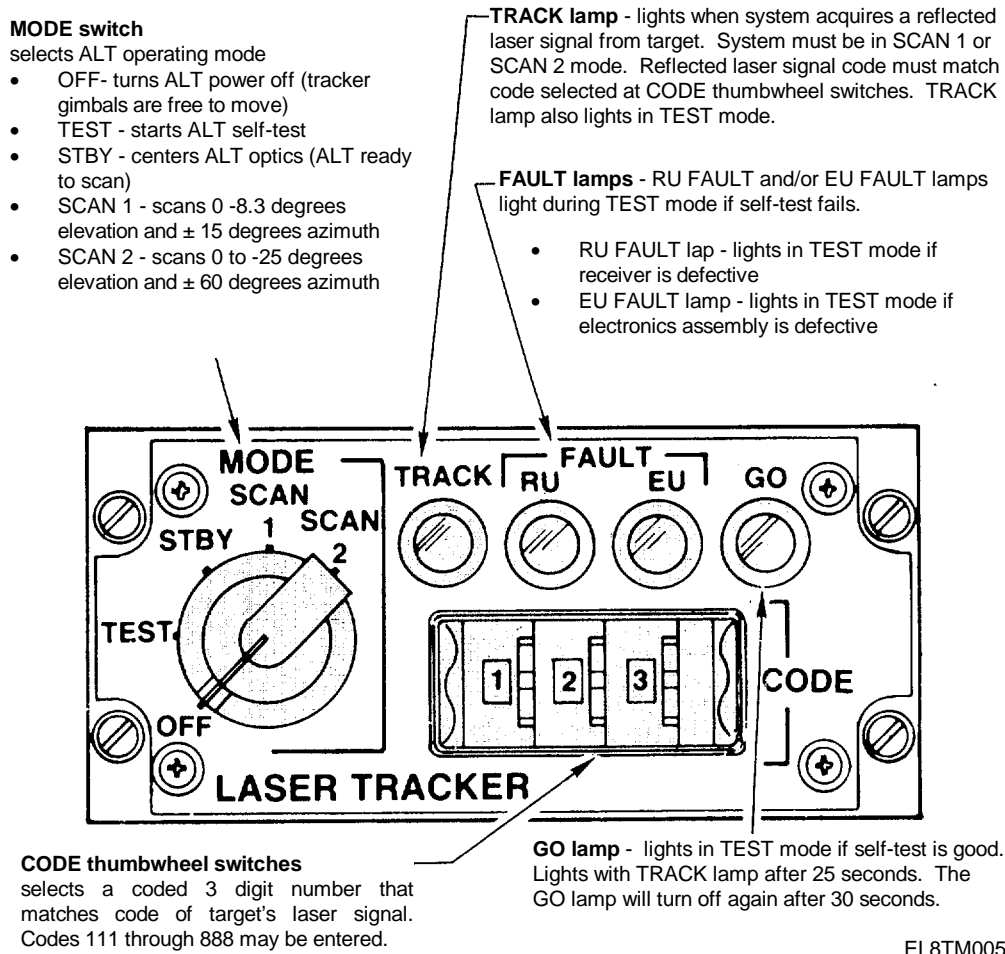
CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. Controls and Indicators (fig. 2-1)

The airborne laser tracker is operated through the ALT control panel located in the lower middle console of the pilot's cockpit control panel.



EL8TM005

Figure 2-1. ALT Controls and Indicators.



## Section II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

### 2-2. Operator Preventive Maintenance Checks and Services

- a. **Before you operate.** Perform visual inspection.
- b. **While you operate.** No PMCS required.
- c. **After you operate.** No PMCS required.
- d. **If your equipment fails to operate.** Refer to higher category of maintenance.

### 2-3. Routine Checks and Services

Routine checks and services are not performed during operator PMCS. As a matter of routine, the following checks should be performed by you:

- Check for dented, bent, or broken components.
- Check for loose mounting of components.
- Check for cut or frayed cables.
- Check for broken control knobs, switches, and lamp lenses.

**Section III. OPERATION UNDER USUAL CONDITIONS**

**2-4. Preliminary Operating Procedures**

This section contains operating instructions for the ALT. The ALT is operated with the LASER TRACKER control panel. This panel is located in the lower middle console of the pilot's instrument panel (fig. 2-2). To turn the ALT on, the following aircraft switches/circuit breakers must be in the positions listed.

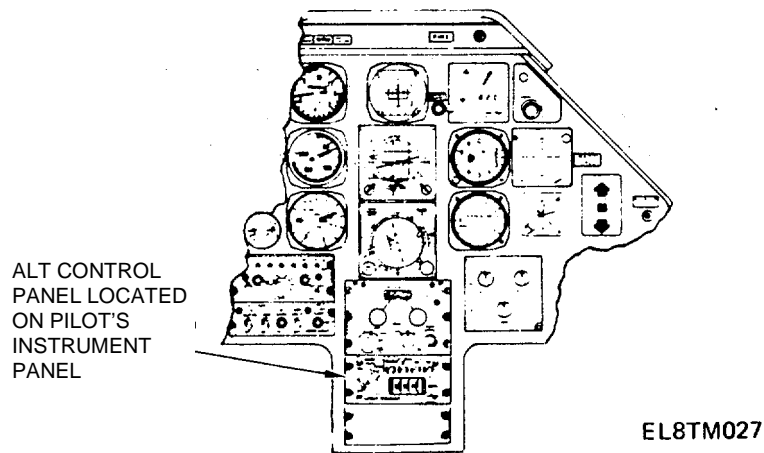
a. 28 vdc to aircraft (either battery or auxiliary power unit).

b. All circuit breakers in on except:

- |                        |     |
|------------------------|-----|
| 1. WING STORE PLT JETT | OFF |
| 2. WING STORE GNR JETT | OFF |
| 3. TURRET STOW         | OUT |
| 4. START RLY           | OUT |
| 5. IGN SOL             | OUT |
| 6. RPM WARN            | OUT |

c. Battery Switch                 RUN

d. Master Arm Switch         STBY



**Figure 2-2. Pilot's Instrument Panel.**

2-5. Preflight Checkout

NOTE

- If during preflight checkout the equipment fails to work, complete step, then refer to higher category of maintenance.
- All switches and controls are located on the control panel (fig. 2-3).

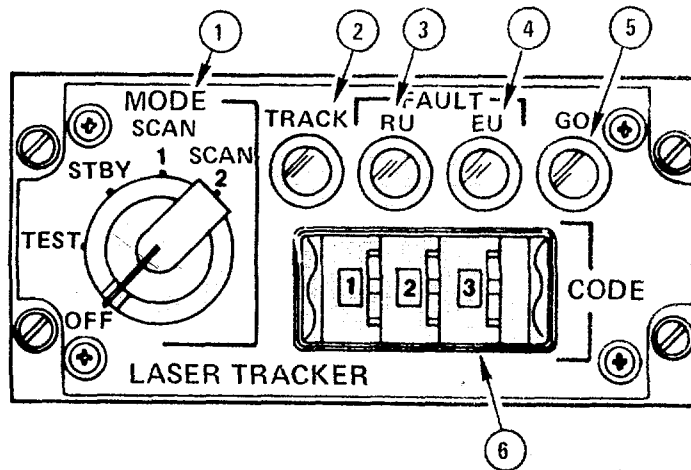
a. Set MODE switch (1) to OFF.

NOTE

Ensure aircraft ALT circuit breakers are on.

b. Press to test the following lamps. When released the lamps go out.

- TRACK (2)
- RU FAULT (3)
- EU FAULT (4)
- GO (5)



EL8TM006

Figure 2-3. ALT Control Panel.

c. Set CODE switch (6) to desired code.

**NOTE**

- **If RU FAULT (3) or EU FAULT (4) lamps light in TEST mode, rotate MODE switch to STBY and back to TEST. If either RU FAULT or EU FAULT lamps light again, refer to higher category of maintenance.**
- **TRACK lamp (2) may light a few times in TEST mode.**

d. Set MODE switch (1) to TEST.

e. Wait about 25 seconds until GO lamp (5) and track lamp (2) lights.

f. The GO lamp (5) goes off after about 30 seconds.

**2-5/(2-6 blank)**

## CHAPTER 3

## ORGANIZATIONAL MAINTENANCE

**Section I. REPAIR PARTS, SPECIAL TOOLS; TEST,  
MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE) AND  
SUPPORT EQUIPMENT**

**3-1. Common Tools And Equipment**

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

**3-2. Special Tools, TMDE, And Support Equipment**

Special tools, TMDE, and support equipment are listed in Appendix B.

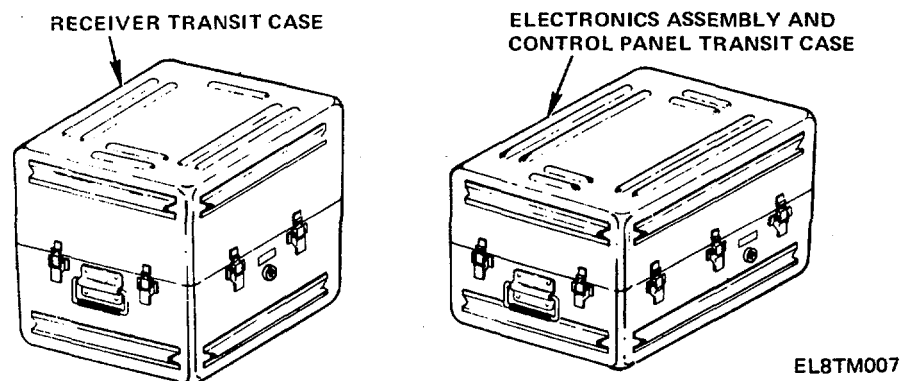
**3-3. Repair Parts**

Repair parts are listed and shown in the Organizational and Direct Support, Maintenance Repair Parts and Special Tools List, TM 11-5860-200-23P.

**Section II. SERVICE UPON RECEIPT**

**3-4. General**

The ALT is packaged in two transit cases when not installed in the aircraft. These transit cases protect ALT components during storage and transport (fig. 3-1). Inspect ALT equipment upon receipt (table 3-1).



**Figure 3-1. ALT Transit Cases.**

Table 3-1. Inspection Requirements

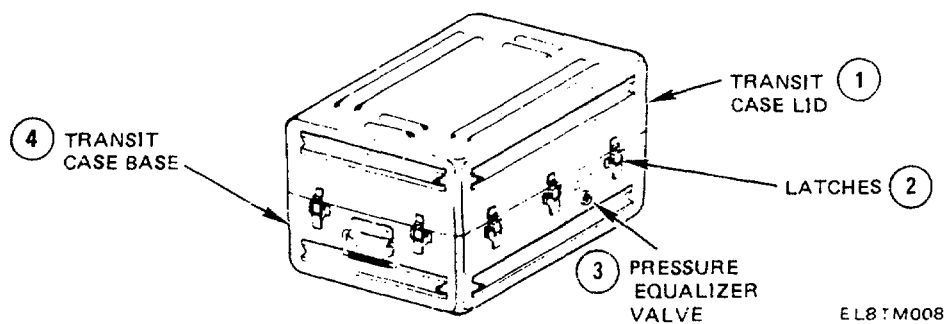
STEP	INSTRUCTIONS	CORRECTIVE ACTION
1	Unpack equipment (para 3-6 and 3-7).	
2	Check received item against packing slip to see if shipment is complete.	Report all discrepancies using instructions in TM 38-750.
3	Inspect equipment for damage incurred during shipment.	If equipment has been damaged due to packaging, report the damage on SF 364, Report of Packaging and Handling Deficiencies.
4	Inspect chassis and covers for condition of paint finish and panel markings. All surfaces should be in good condition. Control panel markings should be legible.	Refer to following paragraphs for paint touch-up:  Receiver (para 3-22a) Electronic Assy (para 3-22b) Control Panel (para 3-22c)  Transit Cases (para 3-22d)
5	Inspect control panel spring lock fasteners and connectors. They should be in good condition.	Refer to higher category of maintenance.
6	Inspect connector pins. All connectors must be tightly mounted. Connectors should have no bent, broken, or missing pins. No foreign material should be in connectors.	Refer to higher category of maintenance.
7	Operate all control panel controls through their positions. All controls should operate smoothly with no binding.	Refer to higher category of maintenance.

### 3-5. Checking Unpacked Equipment

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy.
- b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions in TM 38-750. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.
- c. Check the equipment for modification. Equipment which has been modified will have an MWO number on front panel, near the nameplate.
- d. Check to see whether all current MWO's have been applied. (Current MWO's applicable to equipment are listed in DA Pam 310-1.)

### 3-6. Unpacking the Electronics Assembly, Control Panel, or Technical Manual (fig. 3-2)

- a. Release pressure equalizer valve (3).
- b. Unhook latches (2) securing transit case lid (1).
- c. Lift transit case lid (1) from base (4).
- d. Lift component, as required, from case.
- e. Replace lid (1) on base (4), and secure latches (2).

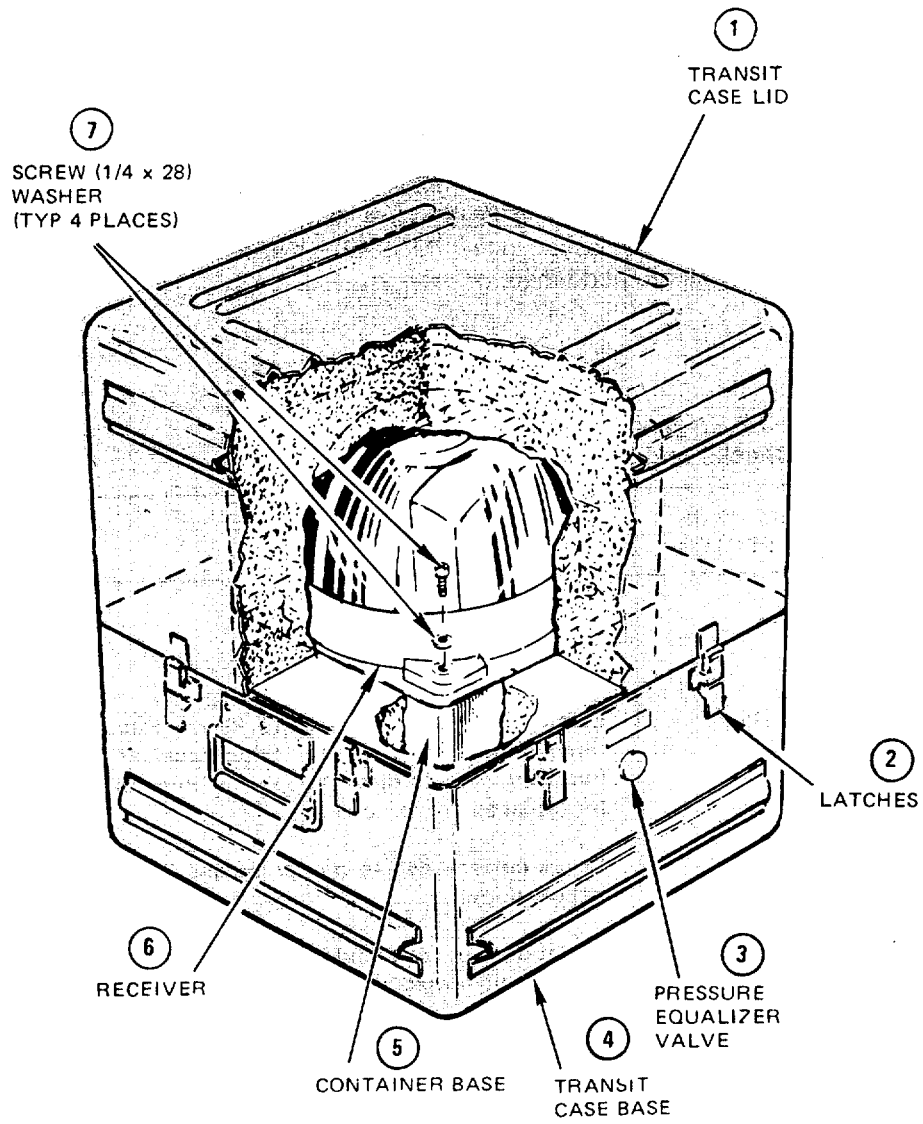


**Figure 3-2. Unpacking Electronics Assembly, Control Panel, or Technical Manual.**

**3-7. Unpacking the Receiver (fig. 3-3)****CAUTION**

- **Use care when handling receiver. It contains delicate instruments.**
  - **The receiver dome is made of glass and should be protected at all times. Do not touch glass with bare fingers. Use plastic gloves. Skin oils will damage the optical surface.**
- a. Before releasing latches and opening the lid, press the pressure equalizer valve (3) located on the side of the transit case.
  - b. Unhook latches (2) securing transit case lid (1).
  - c. Lift lid carefully from transit case base (4).
  - d. Remove four bolts and four washers (7) securing receiver (6) to container base (5).
  - e. Carefully lift receiver (6) from transit case base (4).
  - f. Install transit case lid (1) on transit case base (4).
  - g. Secure latches (2).





EL8TM009

Figure 3-3. Unpacking Receiver from Transit Case.

**Section III. ORGANIZATIONAL PREVENTIVE MAINTENANCE  
CHECKS AND SERVICES (PMCS)**

**3-8. Organizational PMCS (table 3-2)**

The ALT must be inspected weekly to make sure it is ready for operation. Also, during PMCS, certain defects may be found and fixed: If a defect is found, but not fixed, a serious ALT failure or damage may occur. In the PMCS table, the item number indicates the order in which the steps are performed.

**Table 3-2. Organizational Preventive Maintenance  
Checks and Services - Weekly Schedule**

ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
1	Optical Dome	<p align="center"><b>NOTE</b></p> <p align="center"><b>The ALT does not require lubrication.</b></p> <p>Clean dome (para 3-21a). If cracks are present, remove receiver (para 3-14). When receiver is removed, send to direct support maintenance for replacement of dome.</p>
2	Desiccant	<p>Check color of desiccant by looking through optical dome.</p> <p>Bright blue beads should be present. If blue beads have turned white, remove receiver (para 3-14). When receiver is removed, send to direct support maintenance for replacement of desiccant.</p>

**Section IV. ORGANIZATIONAL TROUBLESHOOTING PROCEDURES**

**3-9. ALT Troubleshooting Procedures**

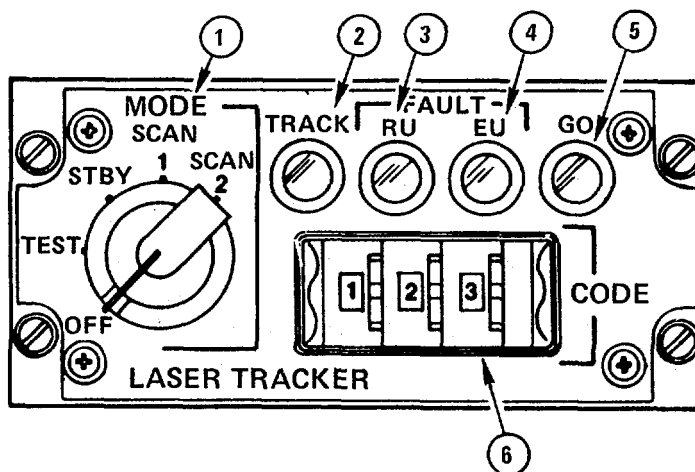
This section contains troubleshooting information for the ALT. The following self-test and slewing procedure will assist in locating and correcting ALT operating faults. If any faults occur in self-test, refer to troubleshooting (table 3-3). Repeat self-test if any ALT components are replaced.

**NOTE**

For ALT turn on, refer to chapter 2, para 2-4.

**3-10. Self-Test**

Perform self-test on ALT control panel (fig. 3-4) in aircraft as follows:



EL8TM006

Figure 3-4. ALT Control Panel.

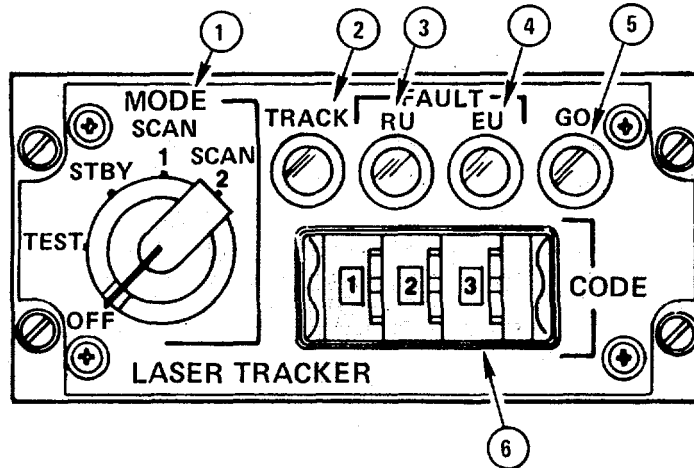
**NOTE**

Release lenses after lamp lights.

- a. Press-to-test the following lens: TRACK (2), RU FAULT (3), EU FAULT (4), and GO (5).

NOTE

- If RU FAULT or EU FAULT lamp lights in TEST mode, rotate MODE switch to STBY and back to TEST. If either fault lamp lights again, refer to table 3-3.
  - TRACK lamp (2) may light a few times during TEST mode.
- b. Set MODE switch (1) to TEST.
  - c. Wait about 25 seconds until GO lamp (5) and TRACK lamp (2) lights.
  - d. Set MODE switch (1) to STBY. Check that TRACK lamp (2) goes out, and GO lamp (5) will turn off after about 30 seconds.



EL8TM006

Figure 3-5. ALT Control Panel.

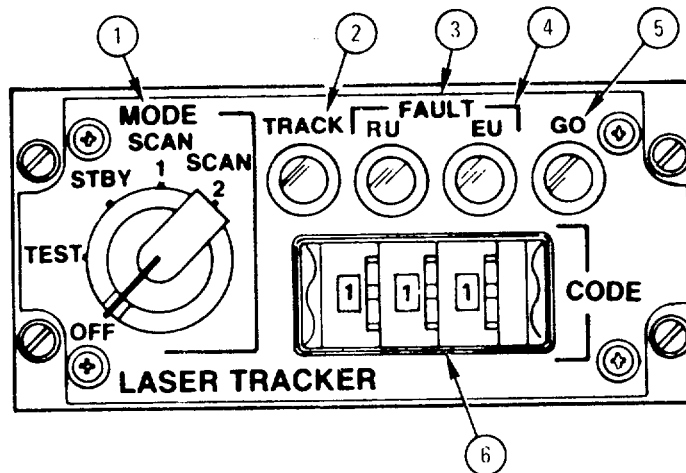
### 3-11. ALT/Telescopic Sight Unit (TSU) Slewing Procedure

The following ALT slewing procedure will determine that the ALT can command (slew) the TSU. If any faults occur during slewing, refer to table 3-3.

#### NOTE

**This procedure will require three persons. Two will remain in aircraft. Another will stand approximately 15 feet in front of aircraft holding laser simulator at eye level.**

- a. Turn on ALT (para 2-4).
- b. Set MODE switch (1) on control panel (fig. 3-6) to STBY.
- c. Set CODE thumbwheel switches (6) on control panel to 111.
- d. Set MODE switch (1) on control panel to SCAN 2.



EL8TM021

Figure 3-6. ALT Control Panel.

- e. Energize the TSU (refer to TM 55-1520-236-10 or TM 55-1520-239-23-1).

**WARNING**

The light source from the laser simulator is an infrared light source. The light beam is invisible to the naked eye. The lens should not be viewed directly to prevent possible eye damage.

**CAUTION**

Do not touch the lens with bare fingers. Skin oils will damage the optical surface.

- f. Place mode switch (1) on laser simulator to HI position (fig. 3-7).

**NOTE**

Simulator has a narrow beam and must be manipulated carefully in step g below to obtain ALT track.

- g. Stand 15 feet (approximately) in front of aircraft, and point laser simulator's lens assembly toward ALT receiver in aircraft.

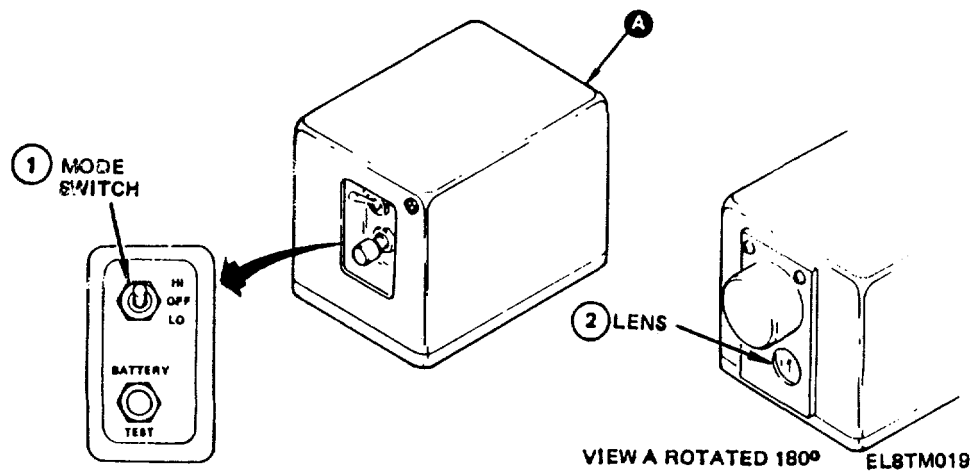
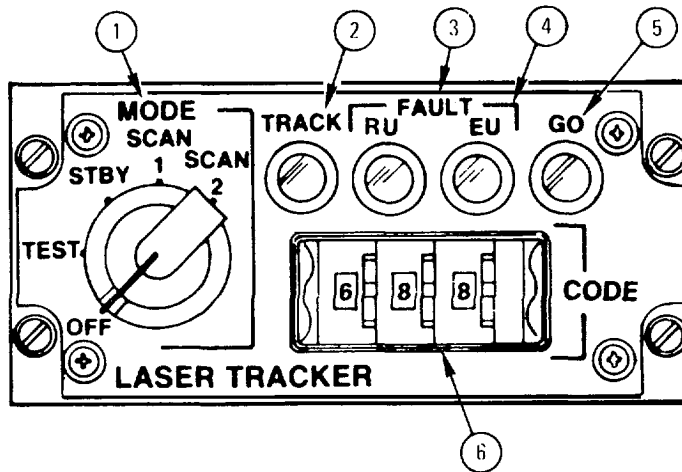


Figure 3-7. Laser Simulator.

- h. Visually ensure that ALT enters track (the ALT should stop scanning and point towards operator).
- i. Set CODE thumbwheel switches on control panel to 112.
- j. Verify that ALT starts scanning again.
- k. Return CODE thumbwheel switches on control panel to 111, and verify that ALT reenters track.
- l. Set CODE thumbwheel switches (6) on control panel to 688.
- m. Ensure MODE switch (1) on control panel is at SCAN 2.



EL8TM025

Figure 3-8. ALT Control Panel.

**WARNING**

The light source from the laser simulator is an infrared light source. The light beam is invisible to the naked eye. The lens should not be viewed directly to prevent possible eye damage.

**CAUTION**

Do not touch the lens with bare fingers. Skin oils will damage the optical surface.

- n. Place mode switch (1) on laser simulator to LO position (fig. 3-9).

**NOTE**

Simulator has a narrow beam and must be manipulated carefully in step o below to obtain ALT track.

- o. Point laser simulator's lens assembly toward ALT receiver in aircraft.

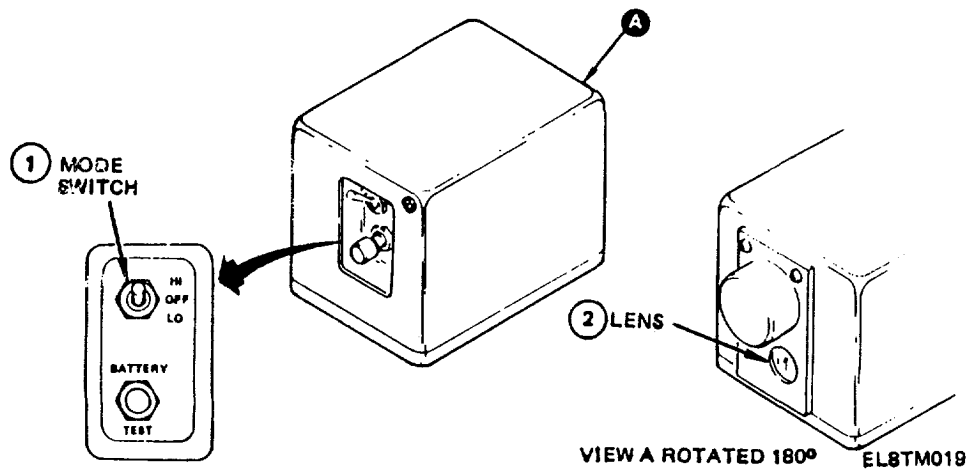


Figure 3-9. Laser Simulator.

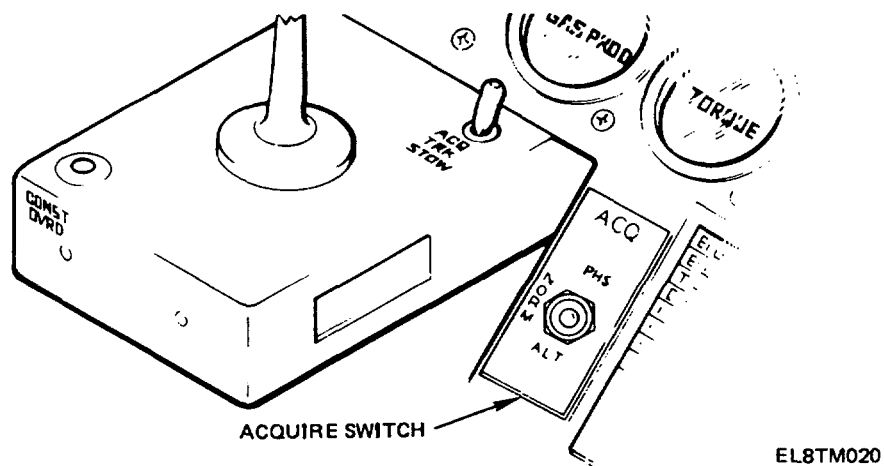


- p. Visually ensure that ALT enters track (the ALT should stop scanning and point towards operator).
- q. Set CODE thumbwheel switches on control panel to 687.
- r. Verify that ALT starts scanning again.
- s. Return CODE thumbwheel switches on control panel to 688, and verify that ALT reenters track.

**WARNING**

**Do not view laser simulator through TSU, as possible eye damage could occur.**

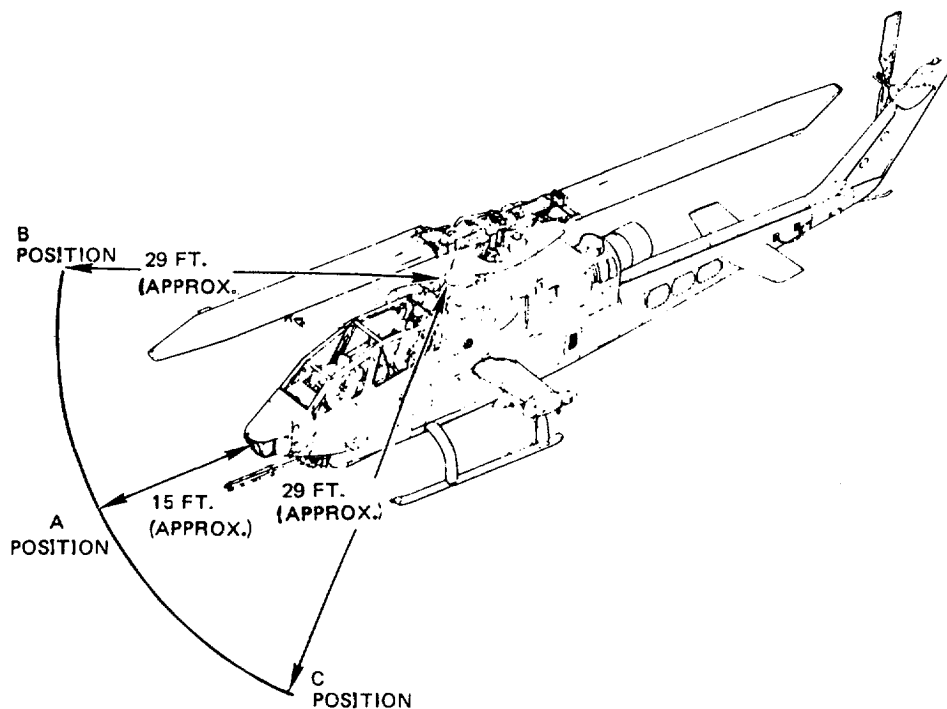
- t. Place ACQ (acquire) switch (fig. 3-10) located on gunner's instrument panel to ALT position.



**Figure 3-10. ACQ Switch Location.**

## NOTE

- In step u below the ALT may break track. If this occurs, stop walking, realign laser simulator's lens assembly with ALT receiver. Then continue walking.
  - The distance between B and A or C and A in step u below is approximately 27 feet.
- u. With laser simulator lens pointed at ALT receiver, walk in an arc, from position A to B, and back to position C (fig. 3-11).
- v. Ensure that TSU follows laser simulator by watching (from outside of the helicopter) the TSU move toward the laser simulator.
- w. Turn all equipment off.



EL8TM018

Figure 3-11. ALT/TSU Slewing.

**Table 3-3. ALT Troubleshooting Procedures.**

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
<p>Press-to-test lamps do not light when pressed on control panel.</p> <p>RU FAULT lamp on control panel lights during TEST mode.</p> <p>EU FAULT lamp on control panel lights during TEST mode.</p> <p>RU FAULT, EU FAULT and GO lamps on control panel do not light</p>	<p>No lamp circuit power.</p> <p>Defective lamps.</p> <p>Connectors on receiver and boresight mount may not be properly mated.</p> <p>Failure in receiver.</p> <p>Failure in electronics assembly.</p> <p>Connectors on electronics assembly not properly mated.</p> <p>Failure in electronics assembly.</p> <p>Failure in receiver.</p> <p>Failure in electronics assembly.</p> <p>Failure in receiver assembly (check gimbal freedom).</p>	<p>Ensure aircraft switches are in proper position (para 2-4).</p> <p>Replace lamps (para 3-20a).</p> <p>Check security and proper mating of connectors.</p> <p>Replace receiver (para 3-14 and 3-15).</p> <p>Replace electronics assembly (para 3-16 and 3-17).</p> <p>Check security and proper mating of connectors.</p> <p>Replace electronics assembly (para 3-16 and 3-17).</p> <p>Replace receiver (para 3-14 and 3-15).</p> <p>Replace electronics assembly (para 3-16 and 3-17).</p> <p>Replace receiver (para 3-14 and 3-15).</p>

Table 3-3. ALT Troubleshooting Procedures - Continued.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
<p>GO lamp lights in TEST mode, but system (ALT) will not scan or track.</p> <p>RU FAULT or EU FAULT lamp lights and TRACK lamp stays on during TEST mode.</p> <p>TSU fails to track ALT.</p> <p>ALT tracks laser with different code.</p>	<p>Failure in control panel.</p> <p>Laser operating in equipment field of view.</p> <p>Failure in receiver.</p> <p>Failure in receiver.</p> <p>Failure in electronics assembly.</p> <p>Failure in interfacing systems.</p> <p>Failure in electronics assembly.</p> <p>Failure in receiver.</p>	<p>Replace control panel (para 3-18 and 3-19).</p> <p>Stop laser operation if possible and repeat self-test.</p> <p>Replace receiver (para 3-14 and 3-15).</p> <p>a. Perform self-test (para 3-10).</p> <p>b. Replace receiver if required (para 3-14 and 3-15).</p> <p>a. Perform self-test (para 3-10).</p> <p>b. Replace electronics assembly (para 3-16 and 3-17).</p> <p>Refer to higher category of maintenance.</p> <p>Replace electronics assembly (para 3-16 and 3-17).</p> <p>Replace receiver (para 3-14 and 3-15).</p>

Table 3-3. ALT Troubleshooting Procedures - Continued.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
<p>TRACK light on control panel lights with no laser input, during SCAN MODE.</p> <p>Receiver platform does not move at all.</p>	<p>Failure in electronics assembly.</p> <p>Failure in receiver.</p> <p>Failure in receiver.</p> <p>Failure in electronics assembly.</p>	<p>Replace electronics assembly (para 3-16 and 3-17).</p> <p>Replace receiver (para 3-14 and 3-15).</p> <p>Replace receiver (para 3-14 and 3-15).</p> <p>Replace electronics assembly (para 3-16 and 3-17).</p>

**Section V. REMOVAL AND INSTALLATION PROCEDURES****3-12. Gaining Access to Receiver and Electronics Assembly (fig. 3-12).****WARNING**

- **Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.**
- **Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**

**NOTE**

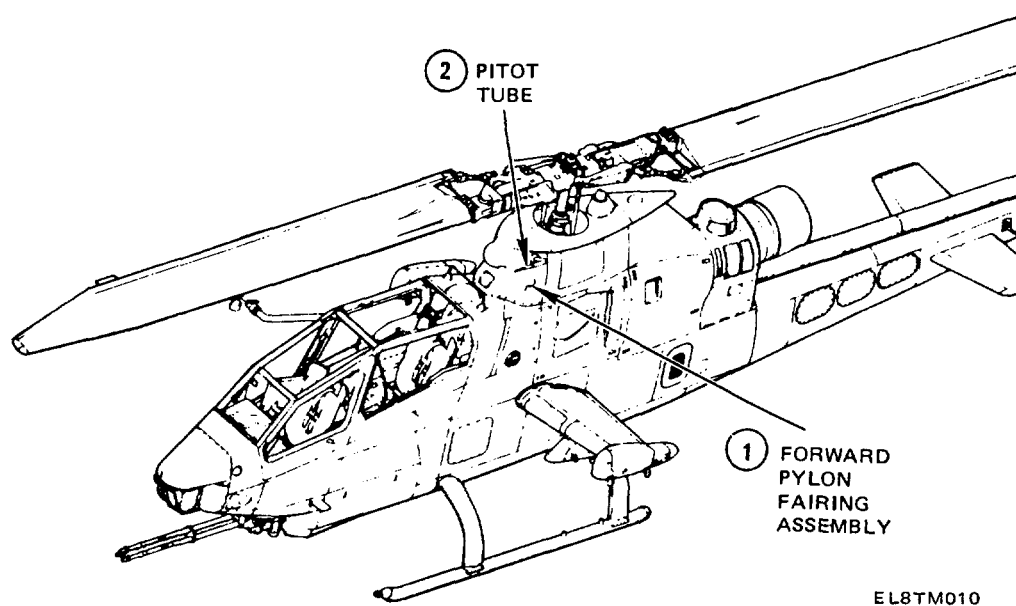
**When removing the forward pylon fairing assembly, do not disconnect the static pressure line from pitot tube.**

- a. Disconnect attaching hardware from forward pylon fairing assembly (1) with the exception of the pitot tube static pressure line (refer to TM 55-1520-236-20 or TM 55-1520-239-23-1).
- b. Disconnect electrical connector at bulkhead from pitot tube (2) heater system.
- c. Pull forward pylon fairing assembly (1) forward enough to remove clamp holding pitot tube heater wires, and static pressure line forward lower clamp.
- d. Place forward pylon fairing assembly on canopy using care not to damage static pressure line.

**3-13. Installing Forward Pylon Fairing Assembly (fig. 3-12).****WARNING**

- **Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.**
  - **Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**
- a. Connect electrical connector to pitot tube (2) heater system.

- b. Install the static pressure line forward bottom clamp, and clamp holding pitot tube heater wires.
- c. Connect forward pylon fairing assembly (1) (refer to TM 55-1520-236-20 or TM 55-1520-239-23-1).



EL8TM010

Figure 3-12. Receiver and Electronics Assembly Access Locations.

## 3-14. Removal of Receiver from Helicopter (fig. 3-13).

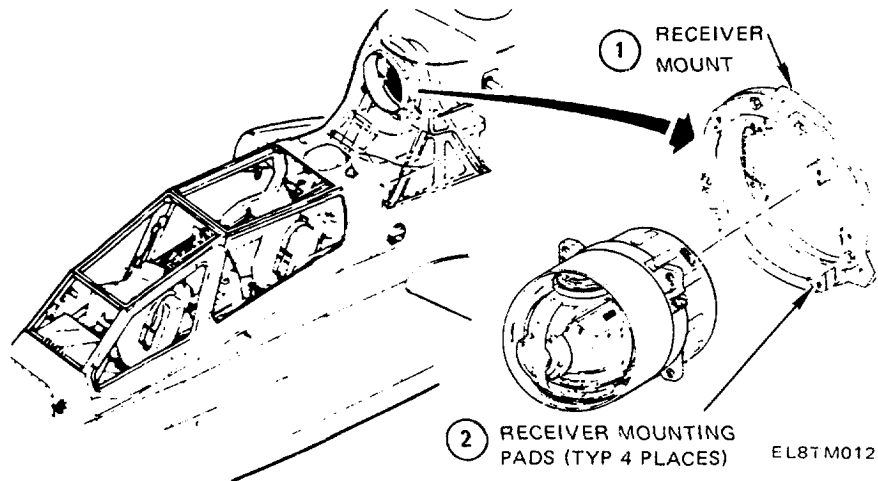


Figure 3-13. Removal and Replacement of Receiver from Helicopter.

**WARNING**

- Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.
- Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.

**CAUTION**

Use care when handling receiver. It contains delicate instruments. The receiver dome is made of glass and should be protected at all times. Do not touch glass with bare fingers. Use plastic gloves. Skin oils will damage the optical surface.

- a. Gain access to receiver and electronics assembly (para 3-12).



- b. Remove the four mounting bolts and washers from pads (2) that secure receiver to receiver mount (1). Hold receiver firmly to prevent dropping.
- c. Pull receiver straight out from mount.

**CAUTION**

**The receiver shall not be transported without first being installed in the transit case (para 3-26) or damage to the receiver will occur.**

**3-15. Installation of Receiver into Helicopter (fig. 3-13).****CAUTION**

**Use care when handling receiver. It contains delicate instruments. The receiver dome is made of glass and should be protected at all times. Do not touch glass with bare fingers. Use plastic gloves. Skin oils will damage the optical surface.**

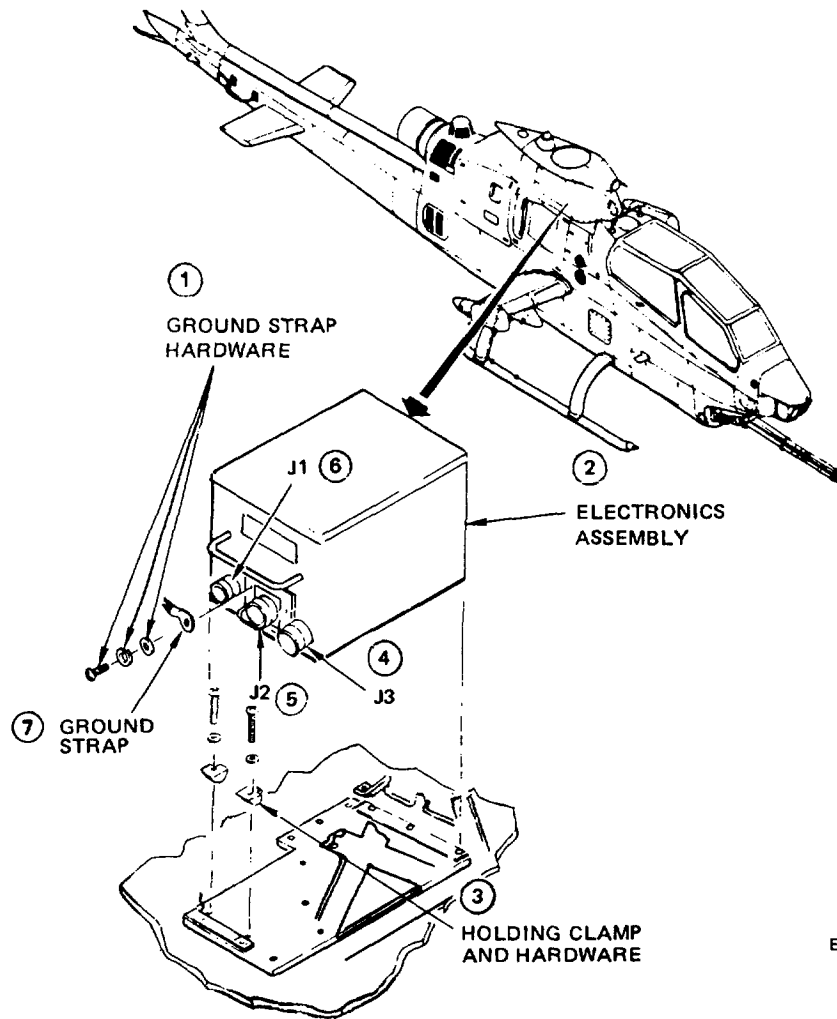
- a. Remove receiver from transit case (para 3-7).

**WARNING**

- **Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.**
  - **Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**
- b. Lift receiver carefully to pads (2) on receiver mount guiding the mount's alignment pins into receiver's mating holes.
  - c. Ensure the two cable connectors are properly aligned to back of receiver.
  - d. Hold receiver in place. Install four bolts and washers through receiver mounting flanges to secure receiver to receiver mount.
  - e. Torque receiver mounting bolts to  $90 \pm 10$  inch-pounds.
  - f. Install forward pylon fairing assembly (para 3-13).

**3-16. Removal of Electronics Assembly (fig. 3-14).****WARNING**

- **Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.**
  - **Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**
- a. Gain access to receiver and electronics assembly (para 3-12).
  - b. Disconnect cables connector 16A4P1 from J1 (6).
  - c. Remove the holding clamps and hardware (3) from the mount.
  - d. Position the electronics assembly (2) so that the ground strap (7) and remaining cables can be disconnected.
  - e. Disconnect cable connector 16A4P2 from J2 (5).
  - f. Disconnect cable connector 16A4P3 from J3 (4).
  - g. Remove ground strap hardware (1) and ground strap (7) from electronics assembly (2).
  - h. If the same electronics assembly (2) is to be re-installed, replace ground strap hardware (1) on electronics assembly (2).
  - i. Using the handle on the front panel, lift the electronics assembly (2) from the mounting.

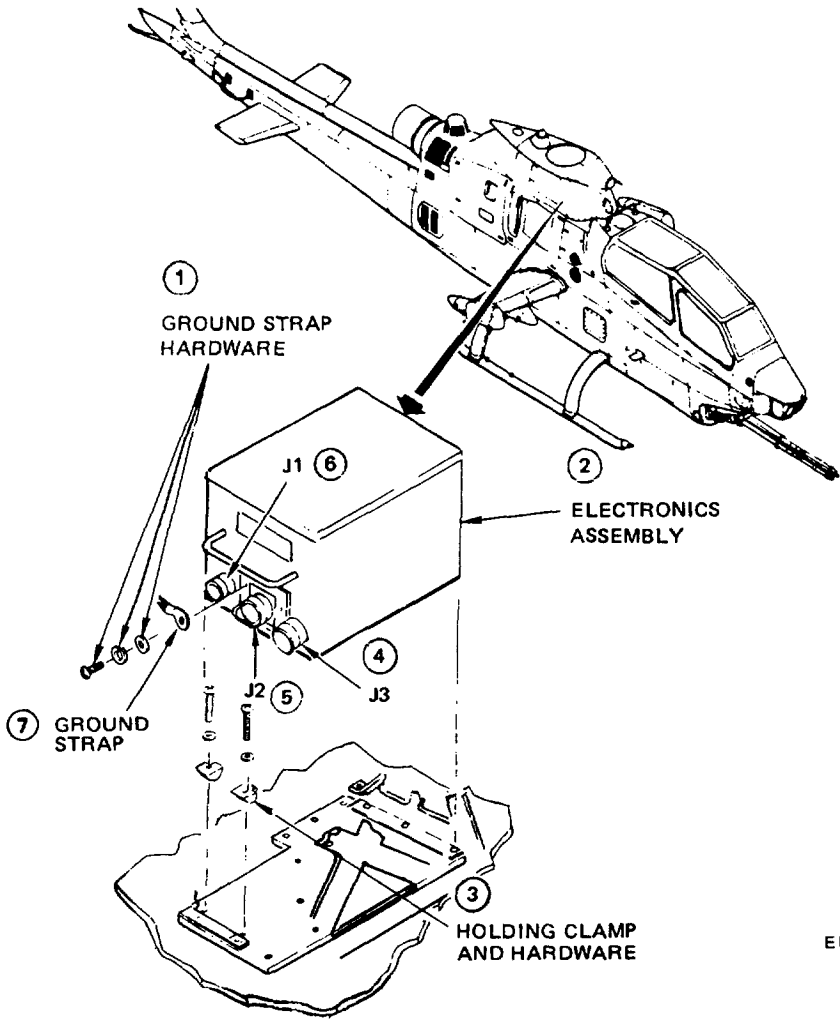


EL8TM013

Figure 3-14. Removal of Electronics Assembly.

**3-17. Installation of Electronics Assembly (fig. 3-15).****WARNING**

- **Do not work on or near forward pylon fairing assembly until helicopter rotor stops turning.**
  - **Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**
- a. Gain access to receiver and electronics assembly (para 3-12).
  - b. Remove electronics assembly (2) from transit case (para 3-6).
  - c. Remove two holding clamps and hardware (3) from aircraft.
  - d. Place the electronic assembly on the mount in a position that will allow the ground strap (7) and cables to J2 (5) and J3 (4) to be connected.
  - e. Connect ground strap (7) to electronics assembly (2) (in 10 o'clock position) using ground strap hardware (1).
  - f. Connect cable connector 16A4P3 to J3 (4).
  - g. Connect cable connector 16A4P2 to J2 (5).
  - h. Place the electronics assembly (2) on aircraft mounting so that holding clamps and hardware (3) can be replaced.
  - i. Install the holding clamps and hardware (3).
  - j. Connect cable connector 16A4P1 to J1 (6).
  - k. Install forward pylon fairing assembly on helicopter (para 3-13).



EL8TM013

Figure 3-15. Installation of Electronics Assembly.

**3-18. Removal of Control Panel (fig. 3-16).**

**WARNING**

**Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**

**NOTE**

**Cyclic control stick must be in full aft position.**

- a. Loosen the four spring-lock fasteners (2) that secure control panel (3) to the pilot's instrument panel (1).
- b. Lift the control panel from the instrument panel.
- c. Disconnect the two electrical connectors from rear of control panel.
- d. Remove control panel.

**3-19. Installation of Control Panel (fig. 3-16).**

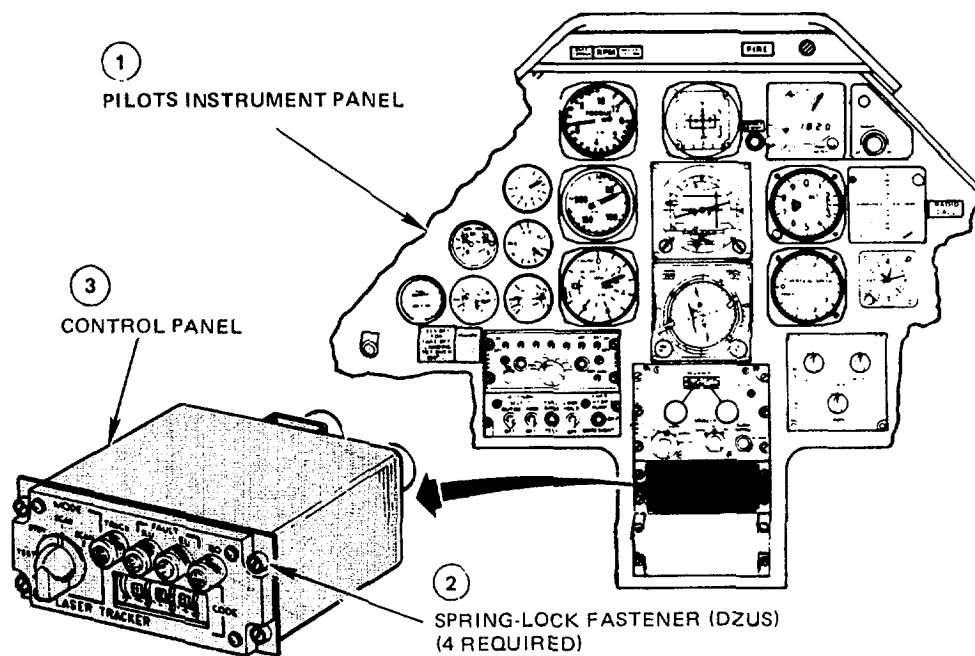
**WARNING**

**Ensure aircraft battery is disconnected before installing or removing any ALT component. Death or serious injury could result if aircraft battery remains connected.**

**NOTE**

**Cyclic control stick must be in full aft position.**

- a. Connect the two electrical connectors to the rear of control panel.
- b. Position control panel (3) in the pilot's instrument panel (1).
- c. Secure control panel by tightening the four spring-lock fasteners (2).



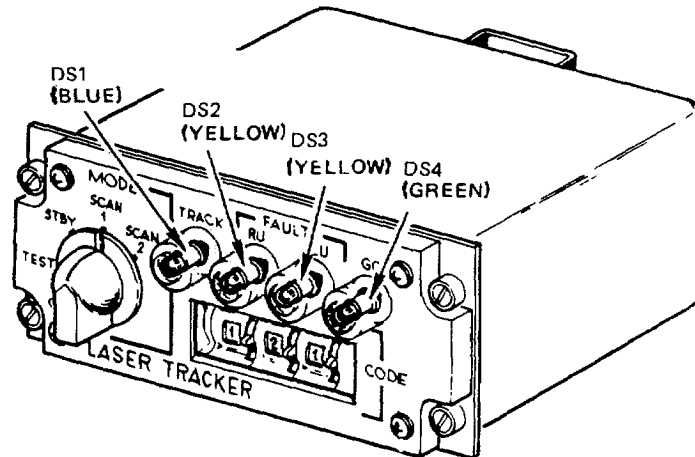
EL8TM011

Figure 3-16. Removal and Replacement of Control Panel.

## Section VI. REPAIR, CHECKOUT, SHIPMENT

### 3-20. Repair of Control Panel (fig. 3-17).

- a. Removal and replacement of press-to-test lamps (DS1-DS4).



EL8TM015

**Figure 3-17. Removal and Replacement of Control Panel Lamps.**

- (1) Remove lens from front of press-to-test lamp assembly by turning counter clockwise (CCW).
- (2) Pull lamp (DS1-DS4) from back of lens.
- (3) Press new lamp into lens.
- (4) Replace lens on lamp assembly by turning clockwise (CW).
- (5) Test lamp by pressing in on lens to verify that lamp lights.



- b. Removal and replacement of code switch lamps (fig. 3-18).
- (1) Remove control panel from aircraft (para 3-18).
  - (2) Remove four screws (1) that secure access cover (6).
  - (3) Remove access cover (6) and gasket (5).
  - (4) Loosen lamp contact screw (2) and turn lamp contact (3) to side.
  - (5) Remove lamp (4) from code switch and install new lamp in place.
  - (6) Turn lamp contact (3) to lamp base (4) and tighten screw (2).
  - (7) Carefully replace gasket (5) on control panel and install cover (6) in place.
  - (8) Install four screws (1) that secure access cover (6) in place.

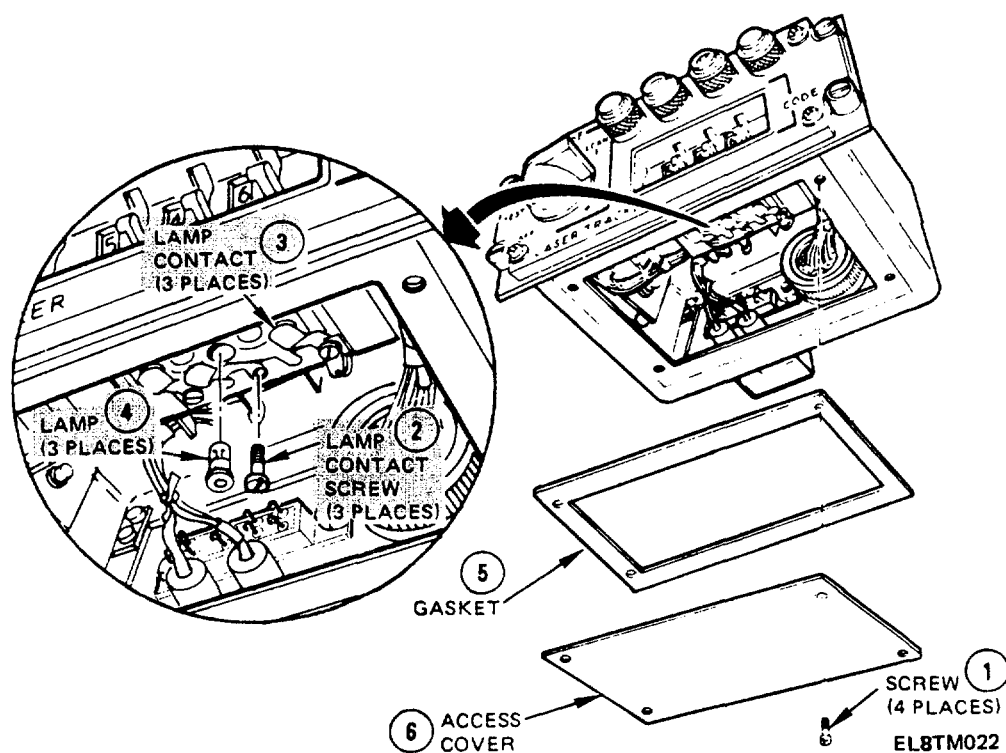


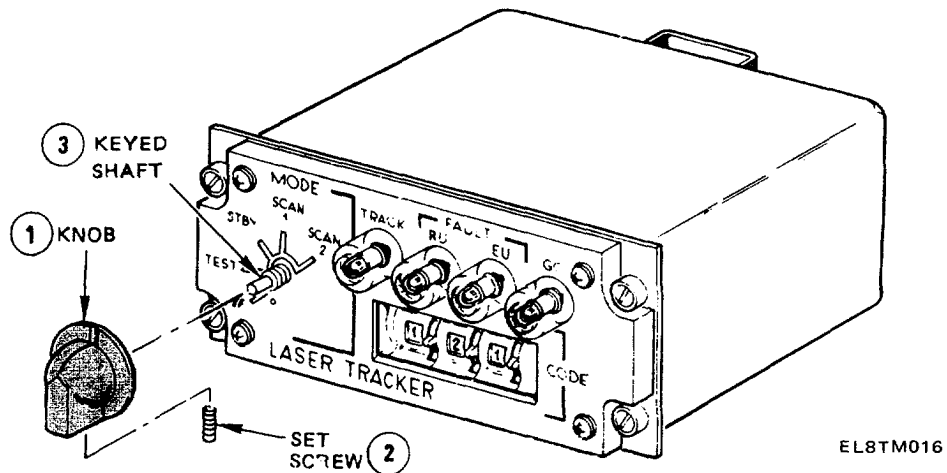
Figure 3-18. Removal and Replacement of Code Switch Lamps.

- c. Remove MODE switch knob (fig. 3-19).
  - (1) On MODE switch knob (1), loosen setscrew (2).
  - (2) Remove MODE switch knob (1) from shaft (3).
- d. Replace MODE switch knob (fig. 3-19).
  - (1) Install MODE switch knob (1) on shaft (3).

**NOTE**

**Ensure MODE switch knob is keyed to shaft.**

- (2) Tighten setscrew (2).



**Figure 3-19. Removal and Replacement of Control Panel MODE Switch Knob.**

**3-21. Cleaning.**

- a. Cleaning optical dome.

**CAUTION**

**Do not touch glass with bare fingers, use plastic gloves (item 10, App D). Skin oils will damage the optical surface. Do not wipe dome with dry materials that may scratch the optical surface.**

- (1) Remove loose dirt from dome with a clean, dry, soft brush or low pressure stream of clean dry air.

**CAUTION**

**The optical dome shall be cleaned only with authorized cleaning compound, (item 1, App D). Type II cleaning compound can be used at temperatures as low as -40°F. Any other cleaning compound will damage optical dome.**

- (2) Lightly wipe the glass surface with a clean, absorbent lint-free cloth (item 4, App D) slightly dampened with cleaning compound. Use cleaning compound sparingly.
- (3) Wipe dome with another clean, absorbent, lint-free cloth (item 4, App D) until surface is clean.

- b. Cleaning control panel and component cases. The following materials are used when cleaning this equipment:

**Materials**

**Cleaning Compound (item 6, App D)**

**Lint-free cloth (item 4, App D)**

**Soft-bristled brush (item 7, App D)**

- (1) Remove dust and dirt using lint-free cloth (item 4, App D) and soft-bristled brush (item 7, App D).
- (2) Remove grease, dirt, and fungus from component cases using cloth dampened with cleaning compound (item 6, App D).
- (3) Clean front of control panel using lint-free cloth (item 4, App D). If necessary, use damp cloth, then wipe with dry lint-free cloth (item 4, App D).

**3-22. Paint Touch-Up.**

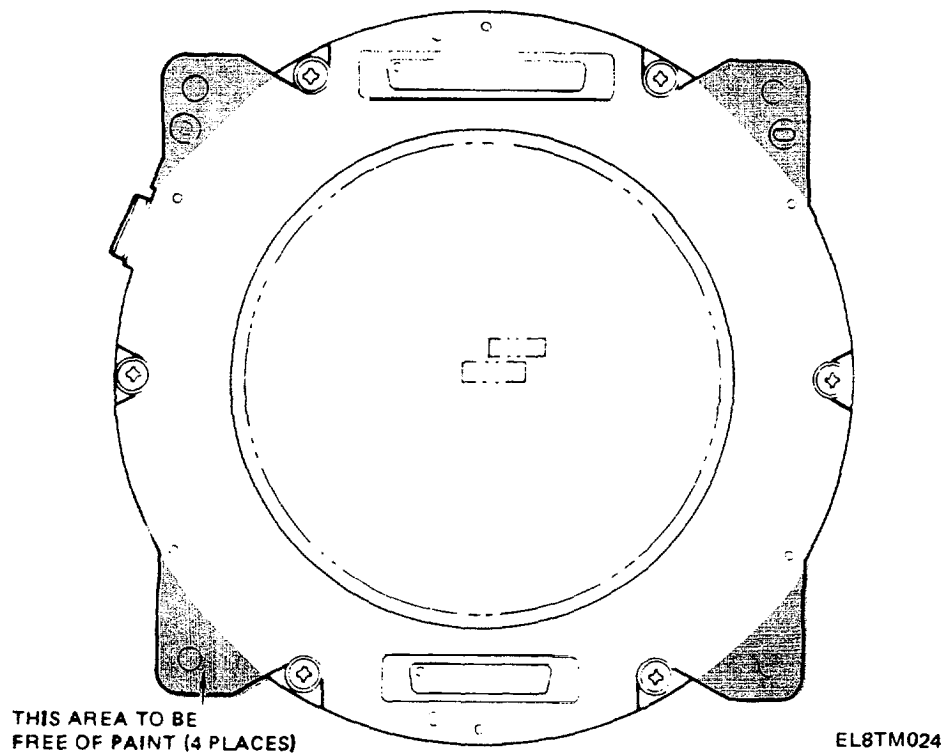
a. Receiver paint touch-up (fig. 3-20). Non-reflective surfaces on the receiver have been treated with a black dye. These surfaces can be touched-up in accordance with TB 746-10 using the paint and primer listed below. Apply an even coating. Paint will dry tack-free in one hour and be hard after 24 hours.

**NOTE**

**Do not apply paint to the four receiver mounting surfaces as indicated in figure 3-20. Avoid getting paint on any surfaces not previously treated with black dye.**

Materials

Paint (item 2, App D)  
Primer (item 3, App D)

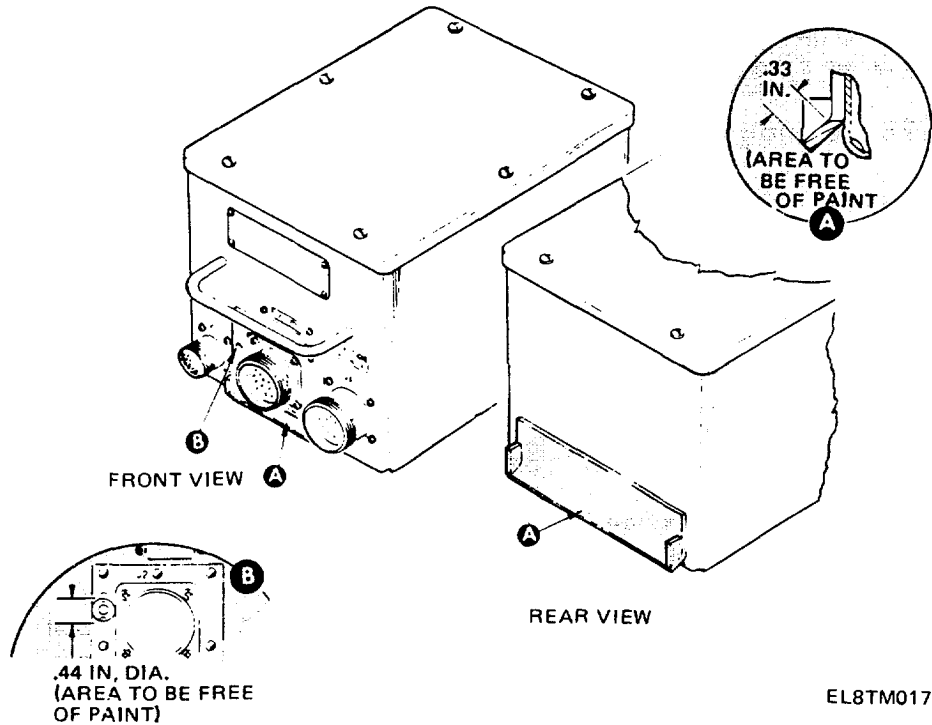


**Figure 3-20. Receiver Unpainted Surfaces.**

b. Electronic assembly paint touch-up (fig. 3-21). Touch-up chips and scratches on painted surfaces in accordance with TB 746-10 using paint (item 5, App D).

**NOTE**

**Do not apply paint or primer to any surfaces that were not originally painted.**



**Figure 3-21. Electronics Assembly Unpainted Surfaces.**

c. Control Panel Paint Touch-Up. Touch-up chips and scratches on painted surfaces in accordance with TB 746-10 using paint (item 5, App D).

d. Transit Cases. Touch-up chips and scratches on painted surfaces in accordance with TB 746-10 using the paint and primer listed below.

Materials

- Paint (item 8, App D)
- Primer, Zinc Chromate (item 9, App D)

**3-23. Lubrication.**

The ALT does not require lubrication.

**3-24. Checkout.**

Operation of the ALT is verified by performing self-test procedures (para 3-10).

**3-25. Preparation for Shipment.**

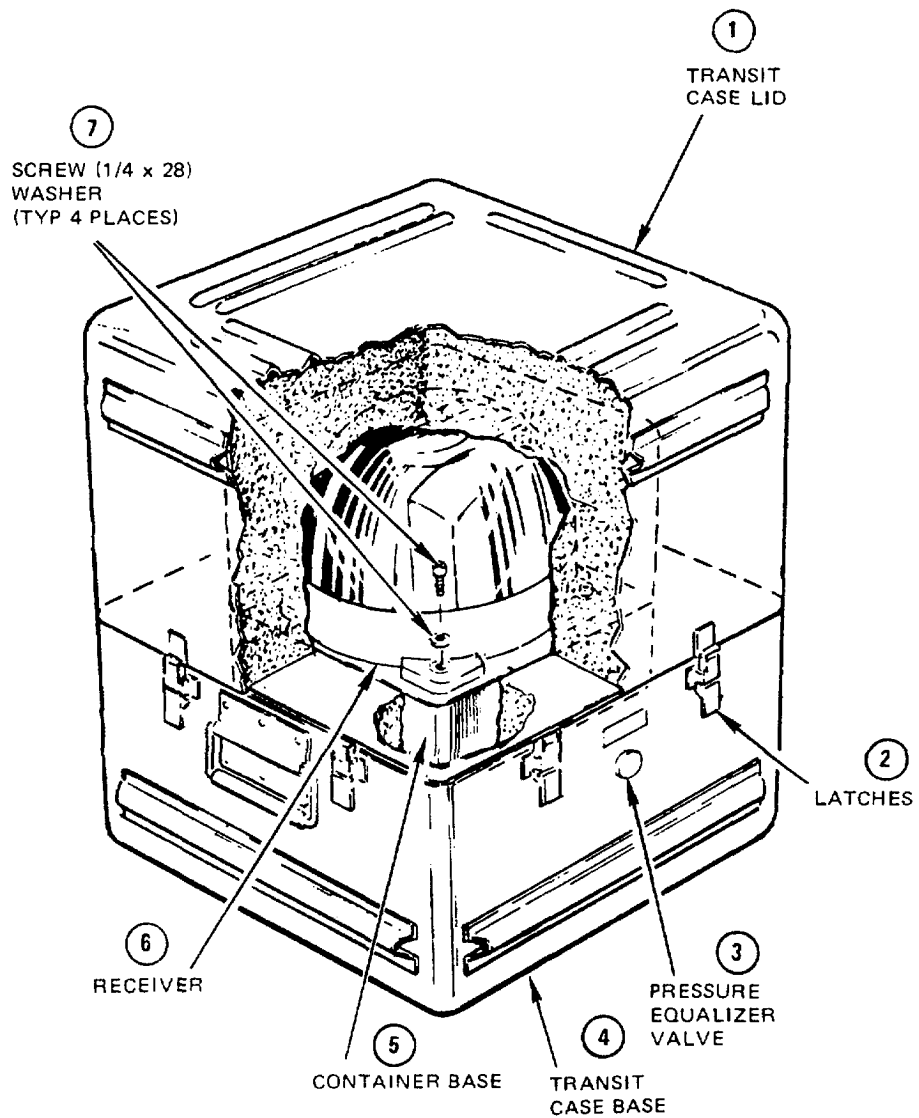
When receiving or shipping equipment, always check equipment against the packing slip to see if the shipment is complete.

**3-26. Packing the Receiver (fig. 3-22).**

- a. Before releasing latches and opening the lid, press the pressure equalizer (3) valve located on the side of the transit case.
- b. Unhook latches (2) securing transit case lid (1).
- c. Lift lid carefully from transit case base (4).

**CAUTION**

- **Use care when handling receiver. It contains delicate instruments.**
  - **The receiver dome is made of glass and should be protected at all times. Do not touch glass with bare fingers. Use plastic gloves (item 10, App D). Skin oils will damage the optical surface.**
- d. Carefully lower receiver (6) on container base (5) and secure with four bolts and washers (7).
  - e. Install transit case lid (1) on transit case base (4).
  - f. Secure latches (2).

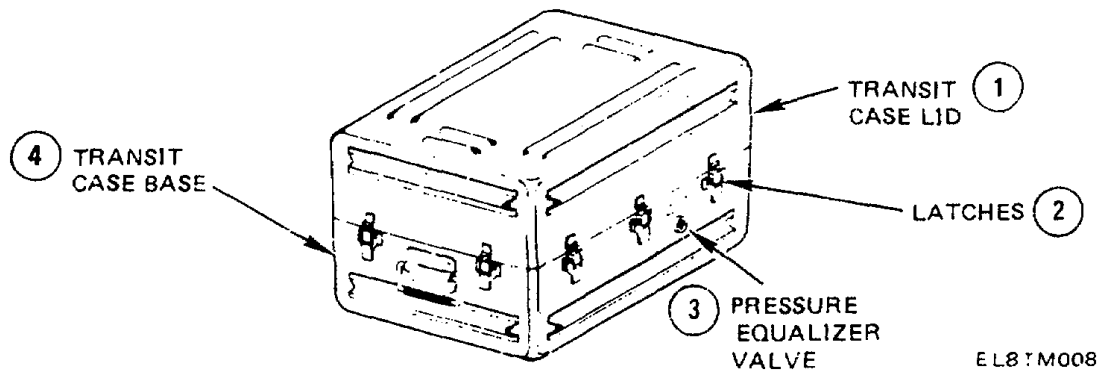


EL8TM009

Figure 3-22. Packing Receiver into Transit Case.

**3-27. Packing the Electronics Assembly, Control Panel, or Technical Manual (fig. 3-23).**

- a. Before releasing latches and opening the lid, press the pressure equalizer valve (3) located on the side of the transit case.
- b. Unhook latches (2) securing transit case lid (1).
- c. Lift transit case lid (1) from base (4).
- d. Install component, as required, into case.
- e. Replace lid (1) on base (4), and secure latches (2).

**Figure 3-23. Packing the Electronics Assembly, Control Panel, or Technical Manual.**



**APPENDIX A**  
**REFERENCES**

---

**A-1. PUBLICATION INDEXES**

Consult indexes for latest changes and revisions to the forms, records, and publications listed in this appendix.

Consolidated Index of Army Publications and Blank Forms ..... DA Pam 310-1

**A-2. FORMS AND RECORDS**

Recommended Changes to Publications ..... DA Form 2028

Discrepancy in Shipment Report (DISREP) ..... SF 361

Report of Discrepancy ..... SF 364

Quality Deficiency Report ..... SF 368

**A-3. GENERAL PUBLICATIONS**

Procedures for Destruction of Electronics Materiel to Prevent Enemy Use ..... TM 750-244-2

The Army Maintenance Management System (TAMMS) ..... DA Pam 738-750

Electronics Command Equipment ..... SB 11-573

Federal Supply Codes for Manufacturers ..... SB 708-42

Field Instructions for Painting and Preserving Electronics Command Equipment ..... TB 746-10

Administrative Storage of Equipment ..... TM 740-90-1

Painting Instructions for Field Use ..... TM 9-213

Organizational and Direct Support Maintenance Repair Parts and Special Tools List ..... TM 11-5860-200-23P

Direct Support Maintenance Manual.....TM 11-5860-200-30

Operator's Manual Army Model AH-1S  
(PROD). AH-1S (ECAS), and AH-1S  
(Modernized Cobra) Helicopters .....TM 55-1520-236-10

Operator's Manual Army Model AH-1S (Modernized Cobra) Helicopter .....TM 55-1520-239-10

First Aid for Soldiers..... FM 21-11

**APPENDIX B****MAINTENANCE ALLOCATION**

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**Section I. INTRODUCTION****B-1. MAINTENANCE ALLOCATION CHART**

a. This Maintenance Allocation Chart (MAC) assigns maintenance functions in accordance with the Three Levels of Maintenance concept for Army aviation. These maintenance levels (categories) - Aviation Unit Maintenance (AVUM), Aviation Intermediate Maintenance (AVIM), and Depot Maintenance - are depicted on the MAC as:

AVUM, which corresponds to a 0 Code in the Repair Parts and Special Tools List (RPSTL).

AVIM, which corresponds to a F code in the Repair Parts and Special Tools List (RPSTL).

DEPOT, which corresponds to a D code in the Repair Parts and Special Tools List (RPSTL).

b. The maintenance to be performed below depot and in the field is described as follows:

(1) Aviation Unit Maintenance (AVUM) activities will be staffed and equipped to perform high frequency "On-Aircraft" maintenance tasks required to retain or return aircraft systems to a serviceable condition. The maintenance capability of the AVUM will be governed by the Maintenance Allocation Chart (MAC) and limited by the amount and complexity of ground support equipment (GSE), facilities required, authorized manning strength, and critical skills available. The range and quantity of authorized spare modules/components will be consistent with the mobility requirements dictated by the air mobility concept. (Assignments of maintenance tasks to divisional company size aviation units will consider the overall maintenance capability of the division, the requirement to conserve personnel and equipment resources, and air mobility requirements.)

(a) Company Size Aviation Units: Perform those tasks which consist primarily of preventive maintenance and maintenance repair and replacement functions associated with sustaining a high level of aircraft operational readiness. Perform maintenance inspections and servicing to include preflight, daily, intermediate, periodic (or phased), and special inspections as authorized by the MAC or higher headquarters. Identify the cause of equipment/system malfunctions using applicable technical manual troubleshooting instructions, built-in test equipment (BITE), installed aircraft instruments, or test, measurement, and diagnostic equipment (TMDE). Replace worn or damaged modules/components that do not require complex adjustments or system alignment and which can be removed/installed with available skills, tools, and ground support equipment. Perform operational and continuity checks and make minor repairs to the electrical system. Inspect, service and make operational, capacity, and pressure checks to hydraulic systems. Perform servicing, functional adjustments, and minor repair/replacement to the flight control, propulsion, power train, and fuel systems. Accomplish air frame repair that does not require extensive disassembly, jiggling, or alignment. The manufacture of air frame parts will be limited to those items which can be fabricated with tools and equipment found in current air mobile tool and shop sets. Evacuate unserviceable modules/components and end items beyond the repair capability of AVUM to the supporting AVIM.

(b) Less than Company Size Aviation Units: Aviation elements organic to brigade, group, battalion headquarters, and detachment size units are normally small and have less than ten aircraft assigned. Maintenance tasks performed by these units will be those which can be accomplished by the aircraft crew chief or assigned aircraft repairman and will normally be limited to preventive maintenance, inspections, servicing, spot painting, stop drilling, application of non-stress patches, minor adjustments, module/component fault diagnosis, and replacement of selected modules/components. Repair functions will normally be accomplished by the supporting AVIM unit.

(2) Aviation Intermediate Maintenance (AVIM) provides mobile, responsive "One-Stop" maintenance support. (Maintenance functions which are not conducive to sustaining air mobility will be assigned to depot maintenance.) AVIM may perform all maintenance functions authorized to be done at AVUM. Repair of equipment for return to user will emphasize support or operational readiness requirements. Authorized maintenance includes replacement and repair of modules/components and end items which can be accomplished efficiently with available skills, tools, and equipment. AVIM establishes the Direct Exchange (DX) program for AVUM units by repairing selected items for return to stock when such repairs cannot be accomplished at the AVUM level. The AVIM level inspects, troubleshoots, performs diagnostic tests, repairs, adjusts, calibrates, and aligns aircraft system modules/components. AVIM units will have capability to determine the serviceability of specified modules/components removed prior to the expiration of the Time Between Overhaul (TBO) or finite life. Module/component disassembly and repair will support the DX program and will normally be limited to tasks requiring cleaning and the replacement of seals, fittings, and items of common hardware. Air frame repair and fabrication of parts will be limited to those maintenance tasks which can be performed with available tools and test equipment. Unserviceable reparable modules/components and end items which are beyond the capability of AVIM to repair will be evacuated to Depot Maintenance. AVIM will perform aircraft weight and balance inspections and other special inspections which exceed AVUM capability. Provides quick response maintenance support, including aircraft recovery and air evacuation, on-the-job training, and technical assistance through the use of mobile maintenance contact teams. Maintains authorized operational readiness float aircraft. Provides collection and classification services for serviceable/unserviceable material. Operates a cannibalization activity in accordance with AR 710-2. (The aircraft maintenance company within the maintenance battalion of a division will perform AVIM functions consistent with air mobility requirements and conservation of personnel and equipment resources. Additional intermediate maintenance support will be provided by the supporting nondivisional AVIM unit.)

## **B-2. USE OF THE MAINTENANCE ALLOCATION CHART (Section II)**

a. The Maintenance Allocation Chart assigns maintenance functions to the lowest category of maintenance based on past experience and the following considerations:

- (1) Skills available.
- (2) Work time required.
- (3) Tools and test equipment required and/or available.

b. Only the lowest category of maintenance authorized to perform a maintenance function is indicated. If the lowest maintenance category cannot perform all tasks of any single maintenance function (e.g., test, repair), then the higher maintenance levels that can accomplish additional tasks will also be indicated.

c. A maintenance function assigned to a maintenance category will automatically be authorized to be performed at any higher maintenance category.

d. A maintenance function that cannot be performed at the assigned category of maintenance for any reason may be evacuated to the next higher maintenance category. Higher maintenance categories will perform the maintenance functions of lower maintenance categories when required or directed by the commander that has the authority to direct such tasking.

e. The assignment of a maintenance function will not be construed as authorization to carry the related repair parts or spares in stock. Information to requisition or otherwise secure the necessary repair parts will be as specified in the associated Repair Parts and Special Tools List (RPSTL).

f. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, maintenance functions assigned to a maintenance level may, on a one-time basis and at the request of the lower maintenance level, be specifically authorized by the maintenance officer of the level of maintenance to which the function is assigned. The special tools, equipment, etc. required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility for the function. The higher level of maintenance will provide technical supervision and inspection of the function being performed at the lower level.

g. Changes to the Maintenance Allocation Chart will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

### B-3. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

- a. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).
- b. **Test.** To verify serviceability by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. **Service.** Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.
- d. **Adjust.** To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.
- e. **Align.** To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- g. **Install.** To remove and install the same item when required to perform service or other maintenance functions. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- h. **Replace.** The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.
- i. **Repair.** The application of maintenance services (inspect, test, service, adjust, align, calibrate, and/or replace) including fault location/troubleshooting (the process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test; UUT) procedures, and maintenance actions (welding, grinding, riveting, straightening, facing, remachining and/or resurfacing) to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable operational condition as prescribed by maintenance standards (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

#### **B-4. FUNCTIONAL GROUPS (Columns 1 and 2)**

The functional groupings shown in the sample below identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

#### **B-5. MAINTENANCE FUNCTION (Column 3)**

Column 3 lists the functions to be performed on the items listed in column 2.

#### **B-6. MAINTENANCE CATEGORIES AND WORK TIMES (Column 4)**

The maintenance categories (levels) AVUM, AVIM, and DEPOT are listed on the Maintenance Allocation Chart with individual columns that include the work times for maintenance functions at each maintenance level. Work time presentations such as "0.1" indicate the average time it requires a maintenance level to perform a specified maintenance function. If a work time has not been established, the columnar presentation shall indicate "-.-." Maintenance levels higher than the level of maintenance indicated are authorized to perform the indicated function.

#### **B-7. TOOLS AND TEST EQUIPMENT (Column 5 and Section III)**

Common tool sets (not individual tools), special tools, test, and support equipment required to perform maintenance functions are listed alphabetically in Section III with a reference number to permit cross-referencing to column 5 in the MAC. In addition, the maintenance category authorized to use the device is listed along with the item National Stock Number (NSN) and, if applicable, the tool number to aid in identifying the tool/device.

#### **B-8. REMARKS (Column 6 and Section IV)**

Remarks (identified by an alphabetic code in column 6) and other notes (identified by a number in parentheses in the applicable column) are listed in section IV to provide a ready reference to the definition of the remark/note.



**SECTION II. MAINTENANCE ALLOCATION CHART  
FOR  
AIRBORNE LASER TRACKER AN/AAS-32**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	AVIM	DEPOT		
00	AIRBORNE LASER AN/AAS-32	Inspect	0.1			29	A,L B C,L E
		Test	0.1				
		Service	0.3				
		Align		0.5			
		Repair	0.3				
		Install		2.0			
01	RECEIVER TRACKER R-1920/ AAS-32	Replace	0.3			2,3 4 thru 15, 2,3 16,17 18,28	F
		Test		0.5			
		Repair		0.3			
		Repair			7.0		
0101	PLATFORM ASSY, LASER SEEKER	Repair		0.3		4 thru 11, 19 19	F
		Repair			4.0		
		Align			2.0		
010101	MOTOR, TORQUE ASSY, EL	Repair			3.0	2,3	
010102	MOTOR, TORQUE ASSY, AZ	Repair			3.0	2,3	
010103	DOME ASSEMBLY	Replace Repair	2.0	0.1		1,13,14,15	
010104	WIRE HARNESS BRANCHED (W2)	Repair			2.0	2,3,10	

**SECTION II. MAINTENANCE ALLOCATION CHART  
FOR  
AIRBORNE LASER TRACKER AN/AAS-32 - Continued**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	AVIM	DEPOT		
010105	CIRCUIT CARD ASSY, RESISTOR	Repair			2.0	2,3,10	
010106	SIGNAL PROCESSOR ASSEMBLY	Replace Repair		0.2	3.0	2,3 16, 21,28	
010107	OPTICAL ASSEMBLY	Replace Repair		0.3	6.0	2,3 20	I
0102	AMPLIFIER CONTROL GROUP	Replace Repair		0.1	3.0	2,3 2,3 16,22 28	
02	CONTROL LASER C-9641 AAS-32	Replace Repair Test Repair Repair	0.5 1.0	1.0 0.5	2.0	1 1 9,10 2 2,9,10	E J
03	ELECTRONIC ASSY MX-9623 AAS-32	Replace Test  Repair Repair	0.1	0.3  0.1	3.0	1 4 thru 12, 2,3 16,22, 28	K
0301	WIRING ASSY, ELEC. COMPONENT	Repair			8.6	2,3 9,10	

**SECTION II. MAINTENANCE ALLOCATION CHART  
FOR  
AIRBORNE LASER TRACKER AN/AAS-32 - Continued**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	AVIM	DEPOT		
0302	POWER SUPPLY	Replace Repair		0.1	2.5	2 2,3 27, 28	
0303	CIRCUIT CARD ASSY, LOGIC	Replace Repair		0.1	2.5	2 2,3 16,26, 28	
0304	AMPLIFIER CONTROL GROUP, SERVO INTERFACE	Replace Repair		0.1	2.5	2 2,3 16,25, 28	
0305	CIRCUIT CARD ASSY, BITE	Replace Repair		0.1	2.5	2 2,3 16,24 28	
0306	CIRCUIT CARD ASSY, DE- CODER CMD., SIGNAL DRF	Replace Repair		0.1	2.5	2 2,3 16,23, 28	
04	MOUNT, RECEIVER TRACKER MT-4698/ AAS-32	Replace Repair	0.2	0.2		2 1	H
05	CASE, ELECTRONIC COMPONENT CONTROL CY-7441/ AAS-32	Replace Repair	0.1		1.0	2,3	D
06	CASE, RECEIVER TRACKER CY- 74401AAS-32	Replace Repair	0.1		1.0	2,3	D

**SECTION III. TOOLS AND TEST EQUIPMENT REQUIREMENTS  
FOR  
AIRBORNE LASER TRACKER AN/AAS-32**

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	AVUM	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G OR ARMAMENT TOOL KIT (BASIC AND SUPPLEMENT)	5180-00-064-5178	
2	AVIM, DEPOT	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G OR ARMAMENT TOOL KIT (BASIC AND SUPPLEMENT)	5180-00-610-8177	
3	AVIM, DEPOT	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G OR ARMAMENT TOOL KIT (BASIC AND SUPPLEMENT)	5180-00-605-0079	
4	AVIM, DEPOT	OSCILLOSCOPE AN/USM-281C	6625-00-106-9622	
5	AVIM, DEPOT	DIGITAL VOLTMETER AN/GSM-64B	6625-00-022-7894	
6	AVIM, DEPOT	METASCOPE AN/PAS-6	5855-00-790-6197	
7	AVIM, DEPOT	SIGNAL GENERATOR SG-117/ U	6625-01-133-6160	
8	AVIM, DEPOT	COUNTER ELECTRONIC AN/USM-459	6625-01-061-8928	
9	AVIM, DEPOT	POWER SUPPLY PP-3940/G (2 EACH)	6130-00-953-7500	
10	AVIM, DEPOT	MULTIMETER ME-26B/U	6625-00-646-9409	

**SECTION III. TOOLS AND TEST EQUIPMENT REQUIREMENTS  
FOR  
AIRBORNE LASER TRACKER AN/AAS-32**

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
11	AVIM, DEPOT	TEST SET, AIRBORNE LASER TRACKER AN/AAM-55	5860-01-070-3842	SM-C-703721
12	AVIM DEPOT	OSCILLOSCOPE, STORAGE OS-262 (P)/U	6625-01-007-9416	
13	AVIM DEPOT	FIRE CONTROL PURGE KIT	4931-00-065-1110	
14	AVIM, DEPOT	ADAPTER, 1/4 X 28		
15	AVIM, DEPOT	NITROGEN, TECHNICAL, TANK	6830-00-782-2641	BBN411 (81348)
16	DEPOT	ALT AUTOMATIC TEST STATION (TP101)		10725-707
17	DEPOT	ADAPTER MULTIFUNCTION (TA211)		13167-707
18	DEPOT	ALT OPTICAL BENCH (TP114)		13064-707
19	DEPOT	RESOLVER ALIGNMENT TEST STATION (TP105)		13023-707
20	DEPOT	OPTICAL TEST STATION TBD		
21	DEPOT	ADAPTER SIG PROC. (TA202)		10761-707
22	DEPOT	ADAPTER AMPL. GROUP (TA203)		13100-707
23	DEPOT	ADAPTER DECODER (TA204)		10752-707
24	DEPOT	ADAPTER BITE (TA205)		13112-707
25	DEPOT	ADAPTER SERVO (TA206)		13124-707
26	DEPOT	ADAPTER LOGIC (TA207)		10743-707
27	DEPOT	ADAPTER POWER SUPPLY (TA208)		13130-707
28	DEPOT	SELF TEST ADAPTER (TA201)		10736-707
29	AVUM AVIM	ALIGNMENT SET AN/AAM-56	5860-01-070-3843	10736-707

**SECTION IV. REMARKS**

REFERENCE CODE	REMARKS
A	Test using Built-in-Test Equipment (BITE).
B	Clean receiver dome.
C	Boresight ALT to aircraft.
D	Repair by replacing foam, pressure relief valve, latches or handle.
E	By replacement of lamps, knobs, etc.
F	Repair of the platform assembly is accomplished while installed in the receiver tracker. Repair by R/R the Dome Assy, Az or El Gyro, Optics Assy, Signal Processor, or Desiccant. Purge before installing.
G	Not used.
H	By replacing attaching hardware.
I	Repair optics by R/R Lens, Detector or Pre-Amp Assembly.
J	By replacement of front panel switch.
K	Repair by R/R faulty modules.
L	Ensure ALT will Track/Slew/Align the TSU.

**APPENDIX C****COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST**

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**Section I. INTRODUCTION****C-1. SCOPE**

This appendix lists components of end item and basic issue items for the ALT to help you inventory items required for safe and efficient operation.

**C-2. GENERAL**

The Components of End Item List is divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items (BII). These are the minimum essential items required to place the ALT in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the ALT during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

**C-3. EXPLANATION OF COLUMNS**

The following provides an explanation of columns found in the tabular listing:

a. Column (1) - Illustration Number (Illus No.). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4) - Unit of Measure (U/M) Indicates the used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity Required (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.



**SECTION II. COMPONENTS OF END ITEM**

(1) Illus. No.	(2) National Stock Number	(3) Description FCSM And Part Number	(4) U/M	(5) Qty rqr
1-1	5860-01-072-1017	RECEIVER-TRACKER, LASER R-1920/AAS-32 FSCM:54490, P/N SM-D-703678	EA	1
1-1	5860-01-071-5152	ELECTRONIC COMPONENTS ASSEMBLY MX-9623/AAS-32 FSCM :54490, P/N SM-D-703697	EA	1
1-1	5860-01-071-5061	CONTROL, LASER TRACKER C-9641/AAS-32 FSCM:54490, P/N SM-D-703726	EA	1

**SECTION III. BASIC ISSUE ITEMS (Ancillary Equipment)**

(1) Illus. No.	(2) National Stock Number	(3) Description FCSM And Part Number	(4) U/M	(5) Qty rqr
1-3		MOUNT RECEIVER TRACKER MT-4698/AAS-32 FSCM:54490, P/N SM-D-703780	EA	1
1-3		CASE, RECEIVER TRACKER CY-7440/AAS-32 FSCM:54490, P/N D27459	EA	1
1-3		CASE, ELECTRONIC COMPONENTS - CONTROL CY-7441/AAS-32 FSCM:54490, P/N D27458	EA	1

## APPENDIX D

### EXPENDABLE SUPPLIES AND MATERIALS LIST

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#### Section I. INTRODUCTION

##### D-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the ALT. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

##### D-2. EXPLANATION OF COLUMNS

a. Column (1) - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App D").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C	Operator/Crew
O	Organizational Maintenance (AVUM)
F	Direct Support Maintenance (AVIM)
H	General Support Maintenance

c. Column (3) - National Stock. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

**SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST**

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	0		CLEANING COMPOUND MIL-C-43454A FSN TYPE II	1
2	0		PAINT, MIL-C-22750, COLOR NO. 37038 (FED-STD-595)	1
3	0		PRIMER, MIL-P-23377	
4	0	7920-00-401-8034	LINT-FREE CLOTH	
5	0		PAINT, MIL-14072, FINISH P513P	1
6	0	7930-00-395-9452	CLEANING COMPOUND	
7	0	7920-00-178-8315	SOFT-BRISTLED BRUSH	1
8	0		PAINT, MILITARY SPECIFICATION TT-E-527, COLOR NO. X34087 PER FED-STD-595 (OLIVE DRAB)	1
9	0		PRIMER, ZINC CHROMATE, MILITARY SPECIFICATION TT-P-1 157	1
10	0	0415-00-682-6786	PLASTIC GLOVES	1

**GLOSSARY**

**ABBREVIATIONS AND TERMS**

ACQ.....	Acquire
ALT.....	Airborne Laser Tracker
ARMT.....	Armament
ASSY.....	Assembly
CONTR.....	Controller
EU.....	Electronics Unit
MTOE.....	Modified Table of Organization and Equipment
MWO.....	Modification Work Order
PMCS.....	Preventive Maintenance Checks and Services
RU.....	Receiver Unit
TAMMS.....	The Army Maintenance Management System
TMDE.....	Test, Measurement, and Diagnostic Equipment
TSU.....	Telescopic Sight Unit
VDC.....	Voltage Direct Current
WPN.....	Weapon

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## The Metric System and Equivalents

### *Linear Measure*

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

### *Weights*

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

### *Liquid Measure*

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

### *Square Measure*

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### *Cubic Measure*

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

## Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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**PIN: 055070-000**