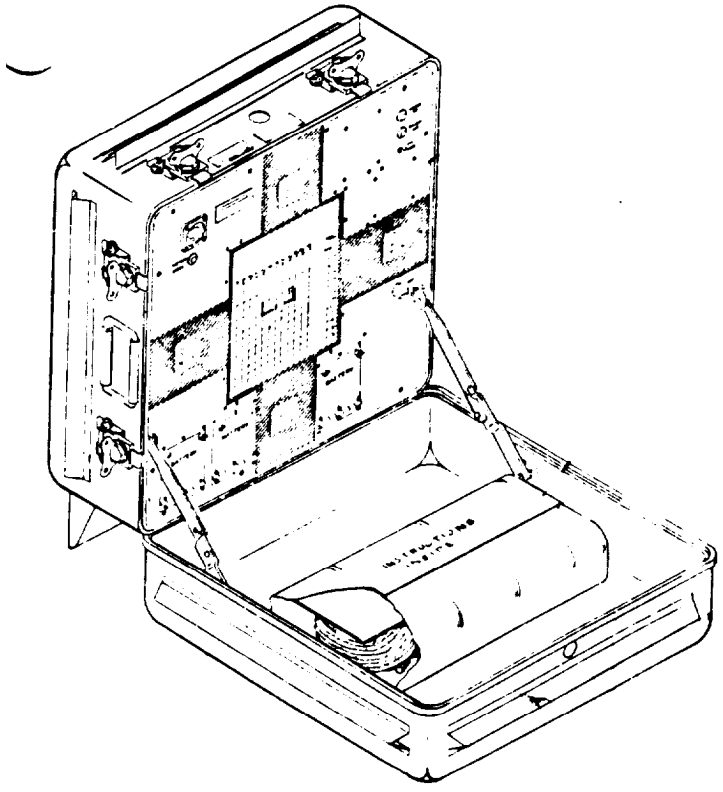
TM9-4931-436-14&P

Technical Manual

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE

Alignment Device, Laser Transmitter: Short Range



FEBRUARY 1982

WARNING

Although the laser light emitted by MILES equipment transmitters is considered eye safe by the Bureau of Radiological Health, suitable precautions must be taken to avoid possible damage to the eye from overexposure to this radiated energy. Precautionary measures include the following:

- Avoid viewing the laser emitter at close range (less than 12 meters). Increasing the distance from the eye to the laser source greatly reduces the risks of overexposure.

- Avoid viewing the emitter directly along the optical axis of radiated beam.

- Especially avoid viewing the emitter directly along the optical axis of the beam through stabilized optics such as binoculars, telescopes or periscopes, at ranges less than 75 meters.

RECORD OF CHANGES

CHANGE NO.	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY

LIST OF EFFECTIVE PAGES

NOTE:
The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:
Original..0.. *26 February 1982.*

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS *78* CONSISTING OF THE FOLLOWING:

Page No.	*Change No.
Cover	0
A	0
i - iii	0
iv blank	0
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TECHNICAL MANUAL

TM-5860-436-14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON DC, 26 February 1982

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE, INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

FOR

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

Current as of October 1980

REPORTING OF ERRORS

You can improve this manual by recommending improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual and mailing the form directly to Commander, US Army Armament Readiness and Development Command, Attn : DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished directly to you.

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. SCOPE. This manual contains operating and maintenance instructions for the Alignment Device, Laser Transmitter: Short Range, which is part of the the Multiple Integrated Laser Engagement System (MILES). Maintenance Instructions are for operator/crew, organizational, direct support, and general support maintenance levels.

The Alignment Device, Laser Transmitter: Short Range is referred to in this manual as the device, or alignment device.

Appendix A contains a list of references applicable to operation and maintenance of the alignment fixture. Appendix B outlines the Maintenance Allocation Chart (MAC). Appendix C contains the Repair Parts and Special Tools List (RPSTL).

1-2. FORMS AND RECORDS. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-3. REPORTING OF ERRORS. Reports of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, "Recommended Changes to DA Publications," and forwarded directly to: US Army ARRCOM, ATTN : DRSAR-MAS, Rook Island, IL 61299. A reply will be furnished to you.

Section II. DESCRIPTION AND DATA

1-4. DESCRIPTION. The Alignment Devices, Laser Transmitter: Short Range, also referred to herein as alignment fixture, and fixture, is an alignment device used to aid in aligning Ml6Al rifle and M60 machine gun sights to the laser beam emitted from the MILES transmitter mounted on the weapon. This procedure is conducted when a MILES laser transmitter is first attached to the weapon and at any other time that a soldier would normally be expected to adjust his sights. The fixture is erected in an open case which rests on the ground. As shown in figure l-1, the bottom portion of the case remains flat on the ground, and the top opens to a vertical position similar to a suitcase. Since the vertical portion contains all of the operating components of the fixture, most of the weight is concentrated in this portion of the case. Therefore, to support and stabilize the heavy open portion of the case, a small stand is attached to the side that would normally face the ground when the case is open and two support braces lock with the case in the 90 degree open position.

Two handles, one on each side of the case swing open for use and have spring returns. Six cam action positive locking latches are provided to secure and seal the case during transportation. Pressure relief valves are installed in each half of the case.

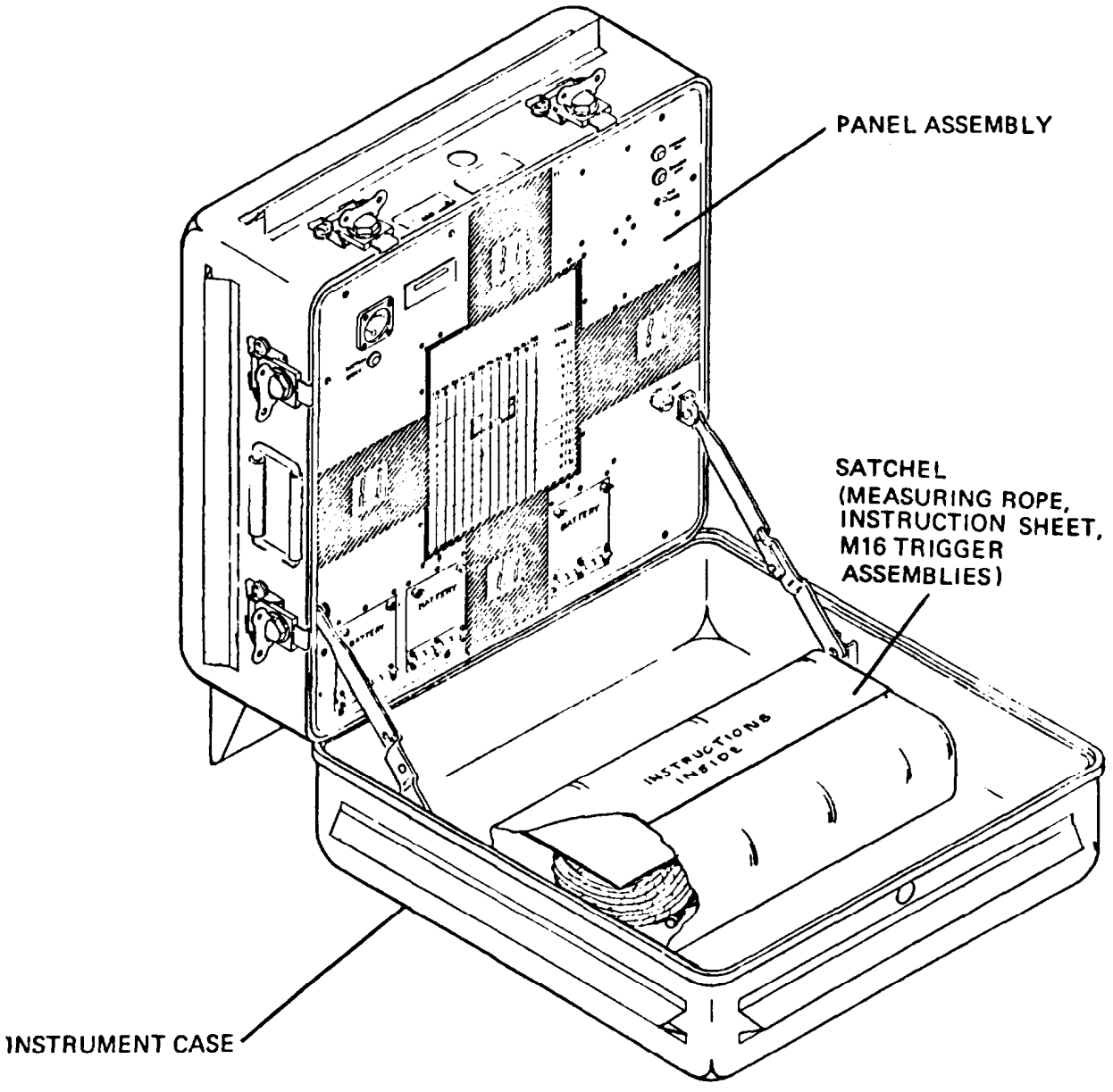

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Figure 1-1. Alignment Device, Laser Transmitter: Short Arms

All operating controls and displays are located on the front panel. Three hinged doors, also located on the front pane 1, provide access to the three 6-volt lantern type batteries which power the fixture.

To assure that the soldiers boresight their weapons at the proper distance of 25 meters, a cord 25 meters in length is stored in a nylon bag located in the bottom portion of the case. The bag also contains an instruction card. There is adequate room in the bag to store ten small arms trigger cable assemblies. The front panel of the Device contains an array of 144 high speed photodiodes. These diodes detect the laser beam. Analog and digital processing circuitry interpret the received signals to provide accurate beam positioning data.

The array of receiving diodes, located behind the target face, receives the laser signal and calculates how far, and the direction, the laser signal was from the center.

Four positions on the fixture face (up, down, right, and left, as referenced to the center) contain numerical double-digit displays. The display is of such size and contrast that an individual can distinguish the numerals with an unaided eye at a distance of up to 25 meters. The display indicates the number of sight adjustment clicks and direction, i.e., up, down, right, or left, that the laser beam strike point must be moved to accomplish alignment with the weapon sight axis.

A front panel switch is provided to change the magnitude of displayed numbers for M16Al or M60 operation.

1-5. TABULATED DATA. Technical data for the alignment device are listed in table 1-1.

Table 1-1. Alignment Device Data

Used with	M16Al rifle and M60 machine gun
Weight	60 lb.
Dimensions	Height: 12 in. Width: 23 in. Depth : 23 in.
Power	3 ea. 6-volt batteries, BA-200/U or BA-3200/U
Special features	Displayed numbers that surround the target area of the front panel correspond exactly to the required number of Ml6 or M60 sight adjustment clicks. The case is aluminum and is painted white.
Temperature environment	May be used at any ambient temperature between -31.7°C (-25°F) and 62.8°C (+145°F)

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. PREPARATION FOR OPERATION

2-1. PRELIMINARY INSPECTION. When a new or reconditioned alignment device is received, the using organization must determine whether the device has been properly prepared for service.

a. Visual Inspection. Check general condition and appearance of the alignment device. All lettering on identification plate and controls should be clearly defined and easily read.

A copy of this tecnnical manual should accompany the alignment device.

b. Inspection and Cleaning. To inspect and clean the alignment device, perform the following steps:

(1) Remove any dirt or oil with a soft cloth. Use a wet cloth to remove stubborn dirt.

(2) Inspect switches for proper operation.

(3) Inspect for any damage that would make the alignment device unserviceable.

(4) Report any damage on DA Form 2404 and, if necessary, replace damaged item.

2-2. PREOPERATIONAL PROCEDURES. Before operating the alignment device, perform the following steps:

a. Press both pressure relief valves to equalize inside/outside case pressure.

b. Release six latches (2, figure 2-1). Open case (1). Lock two staybolts (4).

C. Visually inspect to ensure that case is level and not tilted and there is no damage that would make the device unserviceable.

d. Report any damage on DA Form 2404 and, if necessary, replace device.

e. Ensure that target area (3) is positioned to minimize glare from sunlight.

f. Use 25-meter line, inside satchel (5) to measure distance to the firing point.

Section II. OPERATION OF ALIGNMENT DEVICE

2-3. OPERATIONAL PROCEDURES. The alignment device is powered by three 6-volt lantern type batteries. The battery compartments are designed to accommodate either MIL-Spec battery (BA2OO/U or BA3200/U) or commercial equivalent batteries. Power to the device is turned on and off by pushbutton switches located on the front panel. A panel-mounted voltmeter is used to measure battery voltage. The meter face is marked with a green zone to allow easy determination of the condition of the batteries. The minimum voltage as indicated by the green band on the voltmeter is 13 volts. A pushbutton on the front panel must be pressed to connect the voltmeter into the battery circuit.

Functions and operating positions of device controls and indicators are listed in table 2-1.

When power is first turned on, each of the four displays show the number "18" This number indicates that the displays and the electronic circuits are operating properly. The numbers remain on until receipt of the first laser round or until power is turned off. To save battery power and prevent inadvertent battery discharge, power to the devise

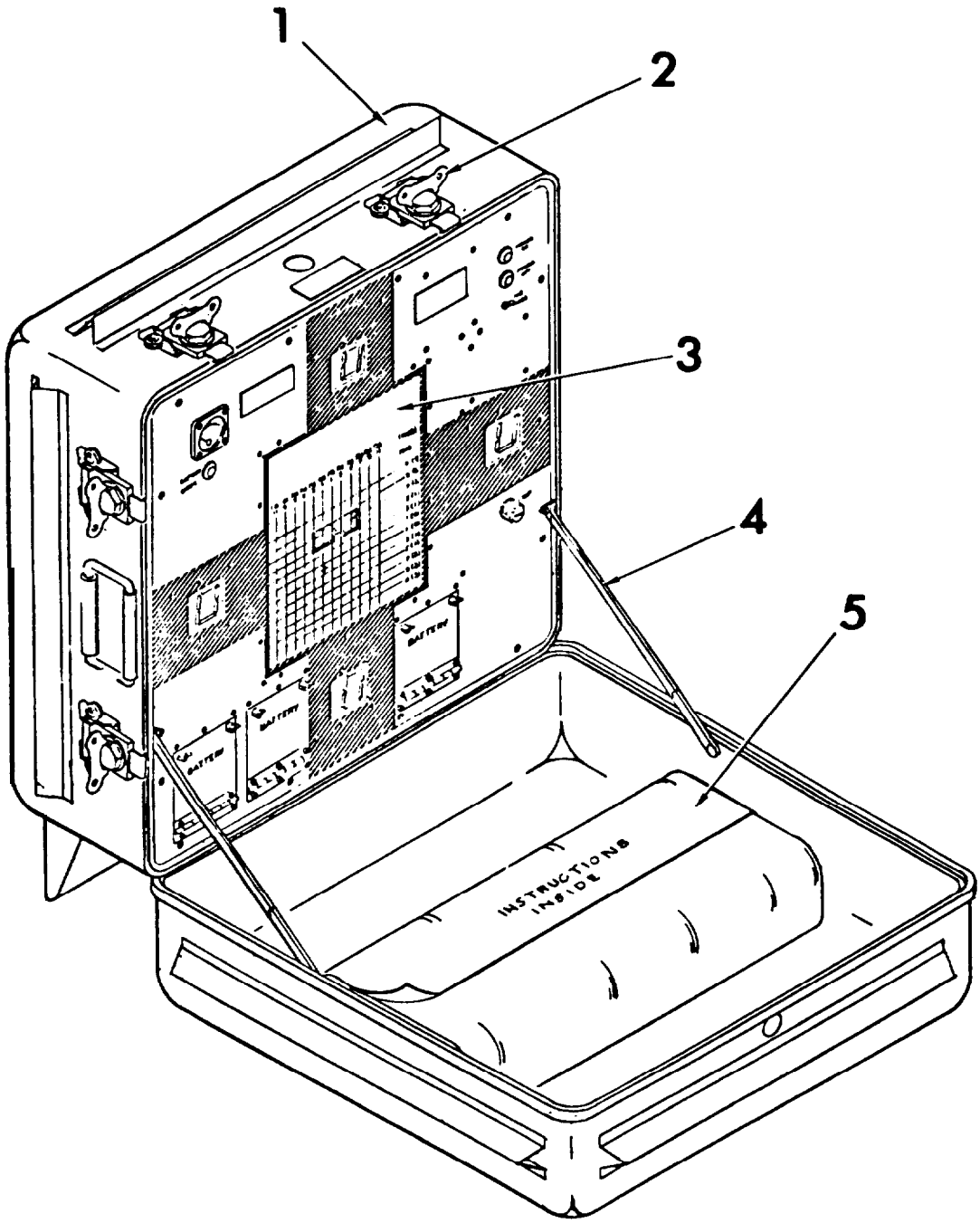

Figure 2-1. Alignment Device Case and Target Area

Table 2-1. Alignment Device Controls and Indicators

NAME	DESCRIPTION	FUNCTION	OPERATING POSITION	ILLUSTRATION REFERENCE
POWER ON	Pushbutton Switch	Energize Device	Press for ON	Figure 2-2
POWER OFF	Pushbutton Switch	Turn power off	Press for OFF	Figure 2-2
M16/M60	Toggle Switch	Select magnitude of displayed numbers	Up for Ml6	Figure 2-2
			Down for M60	Figure 2-2
BATTERY CHECK	Pushbutton Switch	Verify battery voltage	Press	Figure 2-2
VOLTAGE METER	Meter	Indicate battery voltage	N/A	Figure 2-2
DIGITAL DISPLAY	Double-digit, 7-segment	Indicate sight adjustment	N/A	Figure 2-2

is automatically disconnected approximately 24 minutes after the last laser round is received. If no laser round has been received, power is disconnected 24 minutes after the device has been turned on. Power may be restored to the fixture by pressing the ON pushbutton.

The displays are triggered by receipt of the proper coded MILES laser signal on the target face of the alignment device. The Device will respond only to code number 27, which is the M16Al rifle and M60 machine gun hit code. If the transmitters are operated in the dry fire mode, the device will also respond to the boresight code. (The dry fire mode is normally not used on the battlefield.) The electronic circuit will reject all other codes including code number 29, which is the near miss code for the M16Al and M60. Upon receipt of a valid code, the displays blank for approximately one half second and then indicate the appropriate aim correction data.

The displays will show misalignment of the small arms sight, when the weapons are fired from a distance of 25 meters, to within ±1 "click" of the weapon's sights. For example, a "6" in the top display and a "3" in the right side display indicates that the strike point must be moved up 6 clicks and to the right 3 clicks in order to hit the center of the target bullseye.

A mode switch located on the front panel must be set to the type of weapon being aligned. When set for the Ml6 rifle, the display will read a maximum number of "11" indicating 11 clicks of sight adjustment. When set to the M60 position, the display drivers will compensate for the difference in weapon sight adjustment and will read a maximum number of "3" indicating 3 clicks of sight adjustment in the right and left displays and a maximum reading of "13" indicating 13 clicks of sight adjustment in the up and down displays.

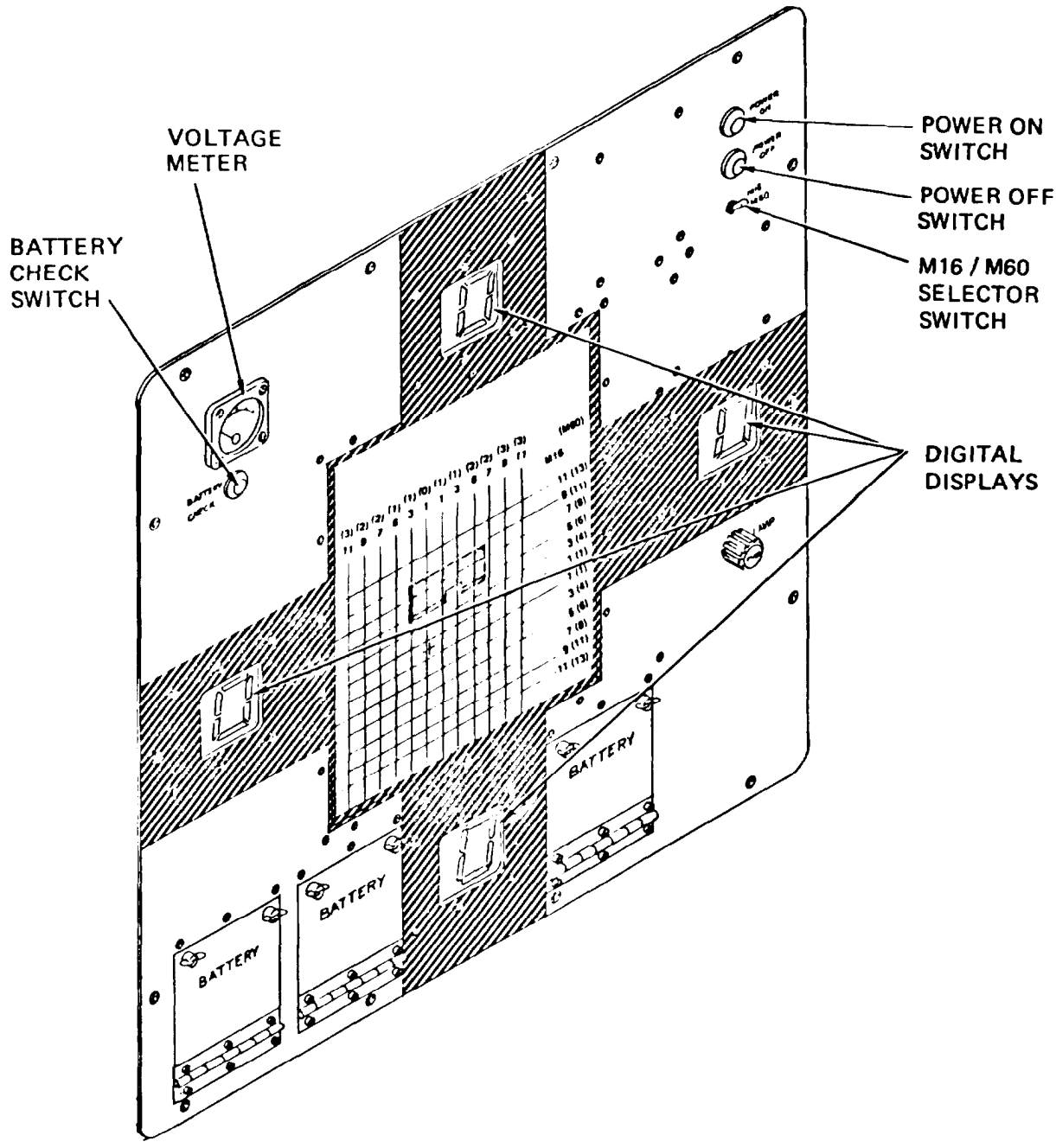

Figure 2-2. Alignment Device Controls and Indicators

To operate the alignment device perform the following steps:

a. Test total voltage by pressing BATTERY CHECK pushbutton (1, figure 2-3) and reading voltage on built-in voltmeter (2). Acceptable voltage is in the 13 to 18-volt range.

b. If voltage reading is not in acceptable range, replace batteries (9) in battery case assembly (7) by opening door assembly (8) and inserting batteries spring end toward the rear.

c. Refer to step "a" and test voltage again. If voltage is not in acceptable range deliver device to next higher level of maintenance.

d. Press POWER ON pushbutton (3). Ensure that "18" appears in all four displays (6).

e. If "18" does not appear, press POWER OFF pushbutton (4) then POWER ON (3) pushbutton again. If "18" does not appear in all four displays deliver device to next higher level of maintenance.

f. Use the M16/M60 toggle switch (5) to select appropriate display for weapon used.

g. Ensure that a 2 second interval is allowed between rounds.

2-4. M16A1 DRY-FIRE ALIGNMENT OPERATION. Before operating the M16A1 rifle in the dry-fire mode, ensure that the trigger cable assembly has no cracks or tears. Check for bent pins in the connector. Ensure that there are three clips on the cable, and that fastener strap is attached.

To operate the M16Al rifle in the dry-fire mode perform the following steps:

a. Push out M16Al trigger guard, release pin and open trigger guard.

b. Notice slot in top of trigger cover. Put trigger in slot and slide trigger cover over trigger.

c. Unscrew protective cover from transmitter connector. Connect cable to transmitter.

d. Close trigger guard.

e. Open ejection port cover. Run cable under it.

f. Put clips on hand guard.

g. Wrap fastener strap around slip ring.

h. Remove yellow weapon key from M16Al transmitter.

i. Insert green key in transmitter. Turn to CONT ON (this sets a basic load of 210 rounds). Remove green key.

j. Put yellow key back in transmitter. Turn to WEAPON ON.

k. Watch red firing light and pull trigger once. The lamp should light briefly. If no light, make sure trigger cable connection is tight and fire again. If still no light, report on DA Form 2404, and replace trigger cable assembly.

NOTE

The M16Al rifle is now ready for dry-fire. It will fire 210 rounds. If switch is set to SEMI, transmitter will fire once each time the trigger is pressed. If switch is set to AUTO, transmitter will fire at a rate of 678 rounds per minute (11.3 rounds per second) 30 rounds can be fired each time the trigger is pressed; (this simulates firing one magazine).

2-5. POST-OPERATIONAL PROCEDURES. To secure the alignment Device perform the following steps:

NOTE

Remove batteries after each operation to prevent corrosion of battery case.

Press POWER OFF pushbutton (4, fig. 2-3).

b. Return 25-meter line,instruction sheet, and trigger cables (if included) to satchel (5, fig. 2-1). Close satchel.

c. Release staybolts (4).

Close case and secure six latches (2).

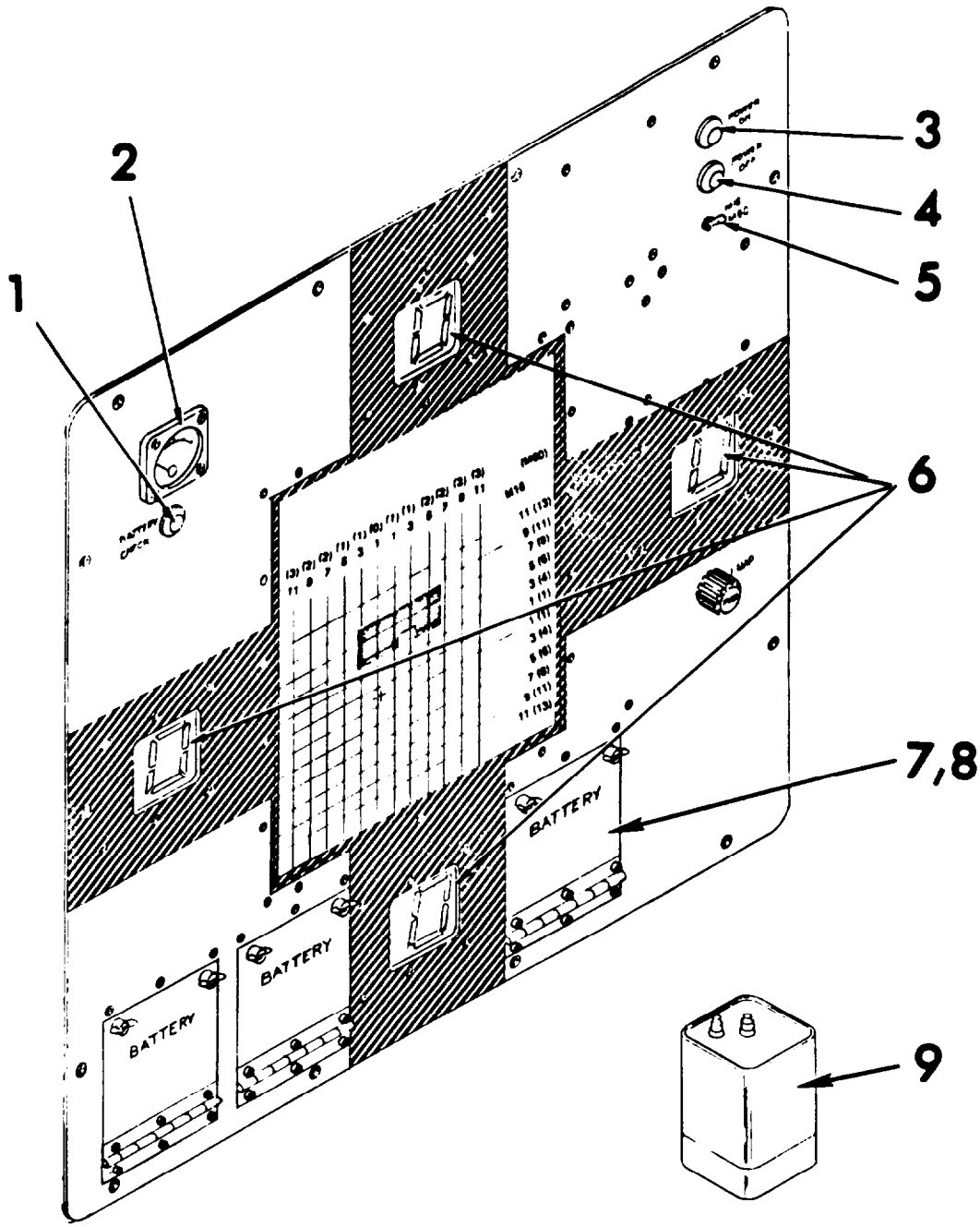

Figure 2-3. Alignment Device Operating Controls and Displays

CHAPTER 3

OPERATOR/CREW MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-1. OPERATOR/CREW PREVENTIVE MAINTENANCE. The purpose of preventive maintenance is to ensure that the alignment device is always ready for operation. The operator must perform a systematic inspection to discover defects before they result in operational failure of eqiupment, Defects or malfunctions discovered by the operator during use, or as a result of performing daily maintenance checks and services, will be reported to organizational maintenance for inspection and correction.

Operator/crew preventive maintenance checks and services are outlined in table 3-1. Tasks to be performed before operating the alignment device are numbered sequentially and appear in the "B" column under the heading Interval and Sequence No. The work-time for each task is given in manhours, to one decimal place, in the work time (M/H) column.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

B - Before Operation Time Required: 0.8	D - During Operation Time Required:	A - After Operation Time Required: 0.8

Interval and Sequence No.			ITEM TO BE INSPECTED PROCEDURE	Work Time (M/H)
B	D	A		
1		9	INSTRUMENT CASE - Visually inspect for damaged latches, case damage, and dirt. Report to higher level maintenance if damaged.	0.1
2		10	BUILT-IN VOLTAGE METER - Visually inspect to ensure face covering is undamaged. Report to higher level of maintenance if damaged.	0.1
3		11	25-METER LINE - Visually inspect to ensure that line is unknotted and intact. Replace if damaged.	0.1
4		12	BATTERY CHECK Pushbutton Switch - Visually inspect to ensure switch is undamaged. Press to ensure free action. Report to higher level maintenance if damaged.	0.1
5		13	POWER ON Pushbutton Switch - Visually inspect to ensure switch is undamaged. Press to ensure free action. Report to higher level maintenance if damaged.	0.1

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - continued

B - Before Operation Time Required: 0.8	D - During Operation Time Required:	A - After Operation Time Required: 0.8

Interval and Sequence No. B D A	ITEM TO BE INSPECTED PROCEDURE	Work Time (M/H)
6 14	POWER OFF Pushbutton Switch - Visually inspect to ensure switch is undamaged. Press to ensure free action. Report to higher level maintenance if damaged.	0.1
7 15	M16/M60 Toggle Switch - Visually inspect to ensure switch is undamaged. Activate to ensure free action. Report to higher level maintenance if damaged.	0.1
8 16	DIGITAL DISPLAY WINDOWS - Visually check to ensure windows are undamaged. Report to higher level maintenance if damaged.	0.1

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

4-l. INSPECTION, SERVICE, INSTALLATION, AND SETUP INSTRUCTIONS. Refer to paragraph 2-l.

Section II. PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-2. PARTS, SPECIAL TOOLS AND EQUIPMENT. Tools and repair parts, including bulk material s, required for organizational maintenance are contained in the maintenance allocation chart (MAC), appendix B, and the repair parts and special tools list (RPSTL), appendix C. No special tools are required for alignment device organizational maintenance.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-3. ORGANIZATIONAL PREVENTIVE MAINTENANCE. Preventive maintenance is necessary to ensure that MILES equipment is always ready for operation. Organizational maintenance personnel must perform a systematic inspection to discover and correct defects before they result in operational failure of the equipment. Defects or malfunctions discovered by the operator during use, or as a result of performing daily maintenance checks and services, will be reported to organizational maintenance for inspection and correction as authorized.

4-4, ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES. Organizational (before, during, and after operation) preventive maintenance checks and services are outlined in table 4-l. If any part is defective or missing, other than those parts authorized for replacement or repair at organizational maintenance, refer the equipment to the next higher level of maintenance.

Table 4-l. Organizational Preventive Maintenance Checks and Services, Alignment Device

B - Before Operation Time Required:	D - During Operation Time Required:	A - After Operation Time Required:

Interval and Sequence No. B D A	ITEM TO BE INSPECTED PROCEDURE	Work Time (M/H)
	NOTE Organizational preventive maintenance checks and services are the same as at operator/crew maintenance level as of the publication date, refer to table 3-l.	

Section IV. TROUBLESHOOTING

4-5. ORGANIZATIONAL TROUBLESHOOTING. There are no organizational troubleshooting procedures. If the alignment device does not operate properly deliver the device to the next higher level of maintenance.

Section V. MAINTENANCE OF ALIGNNENT DEVICE

4-6. ORGANIZATIONAL MAINTENANCE OF ALIGNMENT DEVICE. Organizational maintenance for the alignment device consists of the inspection and checks discussed above. If inoperable, deliver the device to the next higher level of maintenance.

CHAPTER 5

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

5-l. SPECIAL TOOLS AND EQUIPMENT. No special tools are required for maintenance of the alignment device.

5-2. REPAIR PARTS. Direct support and general support maintenance repair parts are listed and illustrated in the repair parts and special tools list (RPSTL), appendix C.

Section II. TROUBLESHOOTING

5-3. SCOPE OF DIRECT AND GENERAL SUPPORT TROUBLESHOOTING. Troubleshooting procedures are provided for the alignment device.

During system test (chapter 7), if a malfunction of the alignment device occurs, troubleshooting procedures are performed in order to locate the source of trouble and to return the equipment to normal operating condition. Table 5-l provides logical procedures for troubleshooting at the direct and general support maintenance levels. The wire table and electrical connection diagram are in figure 5-1.

NOTE

The troubleshooting table is designed to be used with system tests described in chapter 7.

When a malfunction indicates the need for troubleshooting, it is important to note the following points:

a. This section contains troubleshooting or malfunction information and tests for locating and correcting most of the troubles which may develop in the alignment device. Each malfunction or trouble symptom for an individual component, unit, or system is listed along with probable causes and suggested corrective actions to remedy the malfunction.

b. This manual cannot list all possible malfunctions that may occur or all test, inspections, and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, report it on DA Form 2028-2 located in the back of this manual.

c. Table 5-1 lists the common malfunctions that you may find during the operation or maintenance of the alignment device. Perform the tests/ inspections and corrective actions in the order listed.

d. Whenever a malfunction is noted, the first action to take is a visual inspection of the equipment. Carefully inspect electrical cables, connectors, and mounting hardware. Look for broken or frayed wires, loose connectors, damaged equipment, and insecure mountings.

Table 5-1. Alignment Device, Direct Support Troubleshooting Table

NOTE

Before you use this table be sure you have performed all normal operational checks. Use figure 5-1 for electrical tests. Refer to chapter 6 for removal and replacement instructions. Refer to chapter 7 for test instructions.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1. VOLTAGE METER FAILS TO READ (Refer to fig. 5-2, retest per chapter 7)	1. Inspect for broken wire. 2. Inspect for loose connector. 3. Inspect for bad solder connection. 4. Test for defective meter. 5. Test for defective regulator board A3. 6. Test for power at input and output on regulator board.	1. Repair or replace harness assembly W10 2. Tighten or replace connector. 3. Resolder connection. 4. Replace defective meter. 5. Replace PWB A3. 6. Replace regulator board.
2. VOLTAGE METER READS INCORRECTLY (Refer to fig. 5-2, retest per chapter 7)	1. Inspect and test batteries. 2. Inspect for broken wire. 3. Inspect for bad solder connection. 4. Test for defective Ml. 5. Test for defective regulator board A3 by substitution.	1. Replace batteries. 2. Repair or replace wiring/harness assembly W1O. 3. Resolder connection. 4. Replace Ml. 5. Replace A3.
3. DISPLAYS DO NOT APPEAR WITHIN ONE SECOND WHEN DEVICE INITIALLY TURNED ON. (Refer to fig. 5-2, retest per chapter 7)	1. Press BATTERY CHECK pushbutton and verify voltage is 13 to 18 volts. 2. Test battery contacts. 3. Test for power on regulator board A3 at input and output. 4. Test logic boards A2A2, A2A3, and A2A4 by substitution. 5. Test continuity between S2 and regulator board A3.	1. Go to MALFUNCTION No. 1. 2. Replace battery contacts. 3. Replace A3. 4. Replace defective board 5. Repair or replace wiring/harness assembly W1O.

Table 5-1. Alignment Device, Direct Support Troubleshooting Table - continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. ONE DISPLAY MALFUNCTIONS (Refer to fig. 5-2, retest per chapter 7)	1. Inspect for broken wire.	1. Replace cable assembly.
	2. Inspect for loose connector.	2. Tighten or replace cable assembly.
	3. Test for defective display board by substitution.	3. Replace board.
	4. Test output board by substitution.	4. Replace board.
5. DEVICE CANNOT BE TURNED OFF MANUALLY (Refer to fig. 5-2, retest per chapter 7)	1. Inspect for broken wire.	1. Repair or replace wiring/harness assembly W10.
	2. Inspect for bad solder connection.	2. Resolder connection
	3. Inspect for loose connector.	3. Tighten or replace cable assembly.
	4. Test for defective S3.	4. Replace S3.
	5. Test for defective regulator board A3 by substitution.	5. Replace A3.
	6. Test for defective timing logic board A2A2 by substitution.	6. Replace A2A2.
	7. Test for defective microprocessor logic board A2A3 by substitution.	7. Replace A2A3.
6. INCORRECT RESPONSE ON LEFT DISPLAY. (Refer to fig. 5-2, retest per chapter 7)	Use MILES programmer test set, and transmitter test set fitted with aperture adapter to test detector array. Step 1. On right side of detector array fire at each cross point until an incorrect response is received at test point 1. Test preamplifier boards in line with horizontal coordinates, and adjacent boards. Defective board will show no pulse when appropriate area of array is illuminated.	1. Replace defective preamplifier board.

Table 5-1. Alignment Device, Direct Support Troubleshooting Table - continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
7. INCORRECT RESPONSE ON RIGHT DISPLAY (Refer to fig. 5-2, retest per chapter 7)	Use programmer test set, and transmitter test set fitted with aperture adapter to test detector array. Step 1. On left side of detector array fire at each cross point until an incorrect response is received. Test preamplifier boards at test point 2 in line with horizontal coordinates, and adjacent boards, Defective board will show no pulse when appropriate area of array iS illuminated.	1. Replace defective preamplifier board.
8. INCORRECT RESPONSE ON TOP DISPLAY (Refer to fig. 5-2, retest per chapter 7)	Use programmer test set, and transmitter test set fitted with aperture adapter to test detector array. Step 1. On bottom half of detector array fire at each cross point until an incorrect response is received. Test preamplifier boards at test point 1 in line with vertical coordinates, and adjacent boards. Defective board will show no pulse when appropriate area of array is illuminated.	1. Replace defective preamplifier board.
9. INCORRECT RESPONSE ON BOTTOM DISPLAY (Refer to fig. 5-2, retest per chapter 7)	Use programmer test set, and transmitter test set fitted with aperture adapter to test detector array. Step 1. On top half of detector array fire at each cross point until an incorrect response is received. Test preamplifier boards in line with vertical coordinates, and adjacent boards. Defective board will show no pulse when appropriate area of array is illuminated.	1. Replace defective preamplifier board.

Table 5-1. Alignment Device, Direct Support Troubleshooting Table - continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
10. INCORRECT RESPONSE ON TWO DISPLAYS; ONE ON VERTICAL AXIS; ONE ON HORIZONTAL AXIS (Refer to fig. 5-2, retest per chapter 7)	Use programmer test set, and transmitter test set fitted with aperture adapter to test detector array.	
	Step 1. Test preamplifier boards in line with both horizontal and vertical coordinates in shared quadrant as shown in figure 5-3. Board not receiving signal from defective detector will show no pulse when detector is illuminated.	1. Replace defective preamplifier board.
	NOTE When both displays associated with one cross point show incorrect responses, a detector at that cross point is usually at fault.	
	Step 2. Test for defective detector by firing at each cross point in the appropriate quadrant of the detector array that can affect the preamplifier board isolated in step 1.	2. Replace defective detector.
	Step 3. Test input board Al by substitution.	3. Replace input board A1.
11. FIXTURE DOES NOT TURN OFF AUTOMATICALLY (Refer to fig. 5-2, retest per chapter 7)	1. Inspect for broken wire.	1. Replace wiring cable assembly.
	2. Inspect for bad solder connection.	2. Resolder connection,
	3. Inspect for loose connector .	3. Tighten or replace cable assembly.
	4. Test for defective timing logic board A2A2.	4. Replace A2A2.
	5. Test for defective microprocessor logic board A2A3.	5. Replace A2A3.

Table 5-1. Alignment Device, Direct Support Troubleshooting Table - continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
12. DEVICE RESPONDS TO CODE OTHER THAN 27 (Refer to fig. 5-2, retest per chapter 7)	1. Test for defective microprocessor logic board A2A3.	1. Replace A2A3.
13. DEVICE UPDATES AIM CORRECTION NUMBERS FASTER THAN EVERY 2 SECONDS (Refer to fig. 5-2, retest per chapter 7)	1. Test for defective microprocessor logic board A2A3. 2. Test for defective timing logic board A2A2.	1. Replace A2A3. 2. Replace A2A2.
14. DEVICE UPDATES AIM CORRECTION NUMBERS SLOWER THAN EVERY 2 SECONDS (Refer to fig. 5-2, retest per chapter 7)	1. Test for defective microprocessor logic board A2A3. 2. Test for defective timing logic board A2A2.	1. Replace A2A3. 2. Replace A2A2.
15. ALL DISPLAYS ARE FAULTY (Refer to fig. 5-2, retest per chapter 7)	1. Test for defective automatic gain control AlA13. 2. Test for defective output logic board A2A4. 3. Test for defective microprocessor logic board A2A3.	1. Replace AlA13. 2. Replace A2A4. 3. Replace A2A3.
16. DEVICE DOES NOT RESPOND TO CODE 27 OR BORESIGHT CODE.	1. Test for defective input board. 2. Test for defective timing board. 3. Test for defective microprocessor board.	1. Replace A2Al. 2. Replace A2A2. 3. Replace A2A3.

WIRE TABLE

WIRE CODE NUMBER	FROM		TO	
	SYM NO	PIN	SYM NO.	PIN
1	BT 2	−	BT3	+
2	BT 1	−	BT 2	+
3	F1	2	BT 1	+
4	M1	+	S1	5
5	S3	5	S4	2
—	Q1	E	A3	E3
—	Q1	B	A3	E1
—	Q1	C	A3	E2

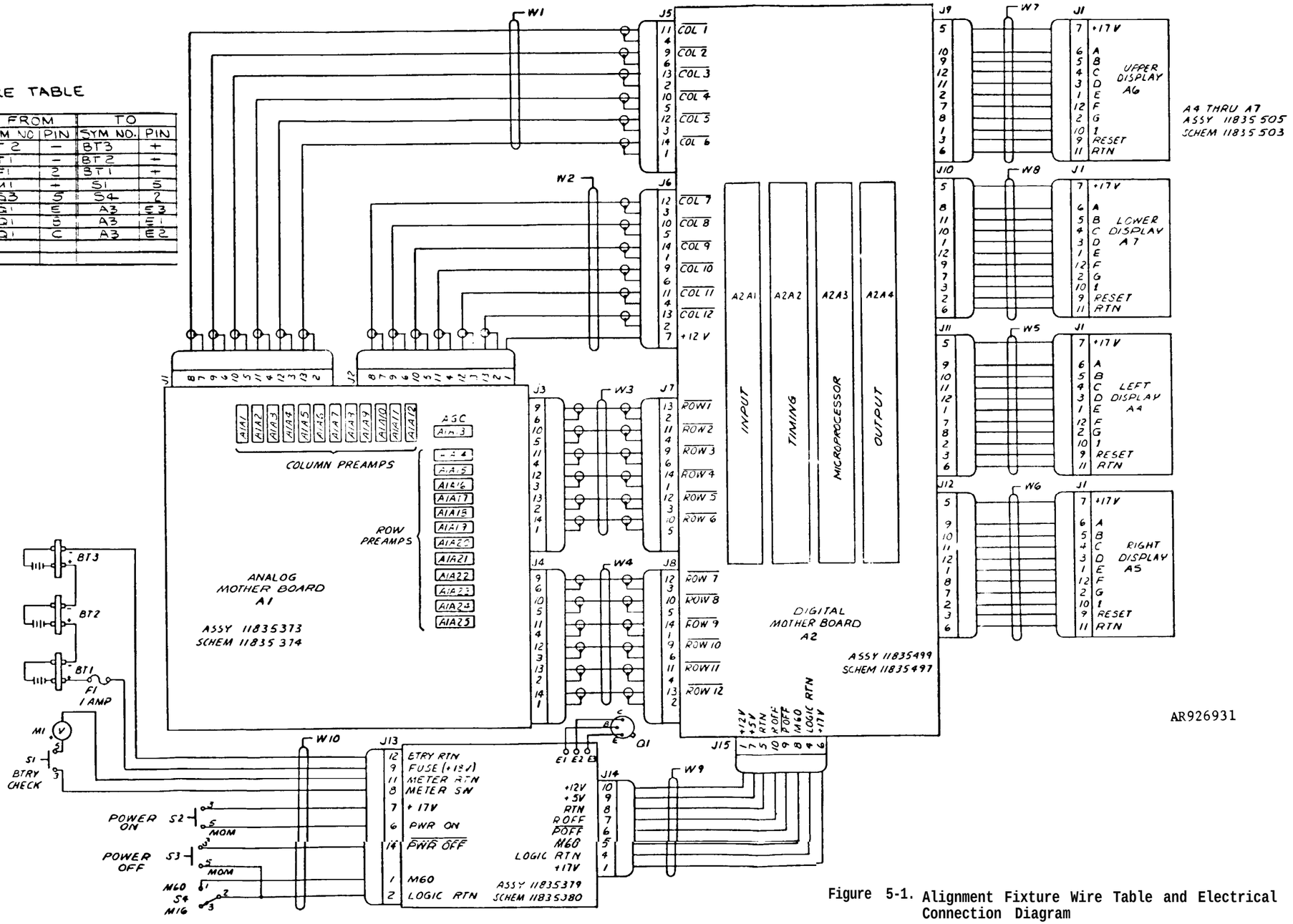

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Figure 5-1. Alignment Fixture Wire Table and Electrical Connection Diagram

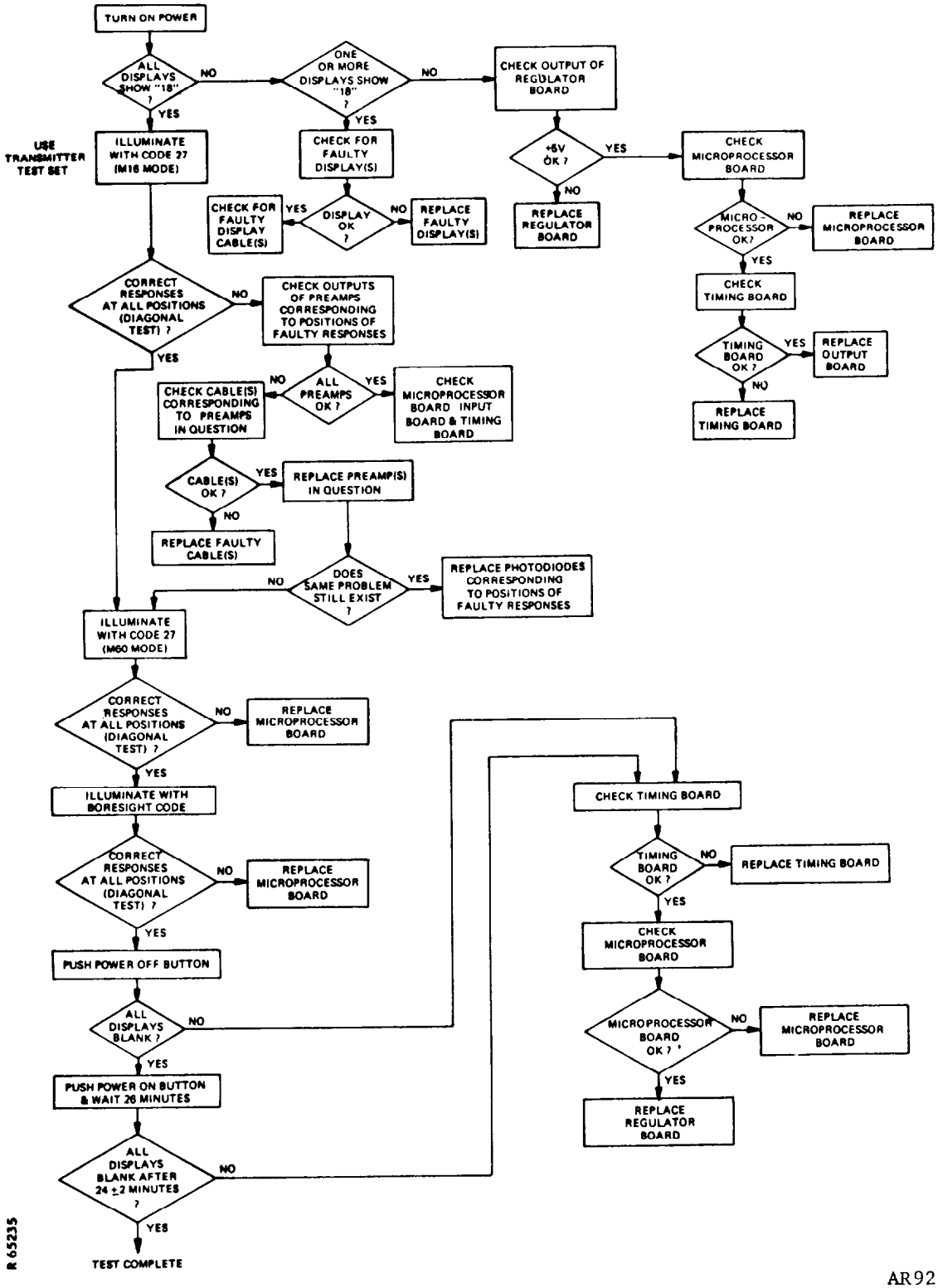

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Figure 5-2. Alignment Device Troubleshooting Logic Tree

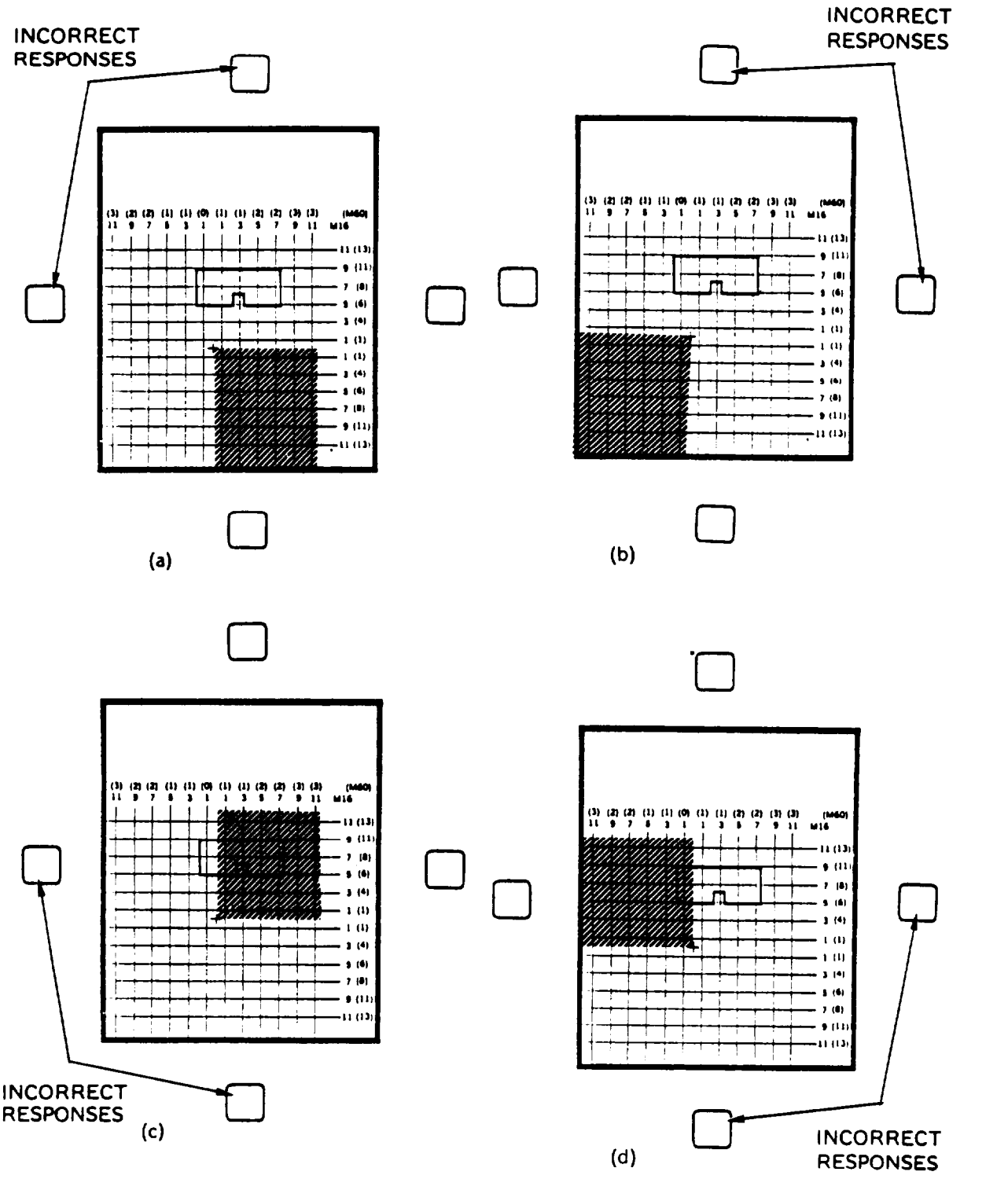

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Figure 5-3. Detector Quadrants to be Tested

5-4. LOGIC TREE DIAGRAM. The CORRECTIVE ACTION column of table 5-l contains reference to a logic tree (fig. 5-2) and/or direct actions.

The logic tree begins with theassumption that the initial condition identified in the system test (chapter 7) has been established before troubleshooting activity is started. The logic tree must be used from the beginning.

Following fault isolation and repair, the logic tree directs the user to return to the system test in chapter 7 to perform system test from the beginning to validate the troubleshooting and repair activity.

Section III. GENERAL MAINTENANCE

5-5. ALIGNMENT DEVICE GENERAL MAINTENANCE. This section contains general repair instructions (not specific to one component or assembly) which would otherwise have to be repeated several times. These instructions relate to cleaning of components, lubricants, sealing and insulating compounds, soldering, and workmanship.

5-6. CLEANING OF COMPONENTS.

a. Metal Surfaces. Clean all exposed metal surfaces with a lint-free cloth. If necessary, dampen the cloth with water. Allow these surfaces to dry thoroughly before storing.

b. Display Faces. Clean display faces with a soft, lint-free cloth. If necessary, dampen the cloth with water. Wipe dry with a soft, lint-free cloth.

5-7. SEALING AND INSULATING. Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all fastener screws and threaded components. Insulating compound, (Part No. 11749371), should be applied to all new solder connections. (Refer to note below.)

5-8. SOLDERING. All soldering operations should comply with MIL-STD-454, Requirement 5. Comply with MIL-STD-454, Requirement 1, for grounding and safety instructions.

5-9. WORKMANSHIP. Comply with MIL-STD-454, Requirement 9, for workmanship.

NOTE

To obtain accurate voltage and current readings, use a needle point probe because of insulating compound on solder connections. Cure time for insulating compound is 2 hours at 60°C $\pm 5^{0}$ or 24 hours at room temperature.

CHAPTER 6

REPAIR OF ALIGNMENT DEVICE LASER: M1 FOR MILES SMALL ARMS

Section I. REPAIR

6-1. TECHNICAL DESCRIPTION. The alignment device is used to align M16A1 rifle and M60 machine gun sights to MILES transmitters. Analog and digital processing circuitry interpret signals from a photodiode array to provide accurate beam position data. Power is provided by three 6-volt batteries.

6-2. REMOVAL AND REPLACEMENT OF ALIGNMENT DEVICE COMPONENTS. The alignment fixture is broken down in appendix C as follows:

Nomenclature	Figure No.
Alignment Device Laser: Mil for MILES Small Arms	C-1
Panel Assembly, Alignment Device, Laser Transmitter: Short Range	C-2 (2 sheets)

Procedures for removal and replacement of repairable components are described in the following paragraphs. Refer to appendix C for illustration references. Also, pay particular attention to chapter 5, section III, which contains special instructions that apply to all removal, disassembly, and replacement of parts discussed in chapter 6.

NOTE

The key numbers shown below in ( ) refer to figures in appendix C.

a. Panel Assembly Removal (fig. C-1).

(1) Press pressure relief valves. Open latches on instrument case (1). Open case.

(2) Remove two screws (5) securing each staybolt bracket to panel assembly (3).

(3) Remove screws securing panel assembly to case. Remove panel assembly.

b. Panel Assembly Replacement (fig. C-1).

(1) Install panel assembly (3) in instrument case (1). Secure with screws. Torque to 17-20 in.-lb.

(2) Install staybolt brackets on panel assembly. Secure with two screws each. Torque to 17-20 in.-lb.

(3) Close case. Close latches.

c. Voltmeter (M1) Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Unsolder and tag two wires from voltmeter M1 (41, fig. C-2).

(3) Remove four hex nuts (35) and four flat washers (36) securing M1 and gasket (40) to front panel (34). Remove Ml and gasket.

d. Voltmeter (M1) Replacement (fig. C-2).

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of M1 (41).

(2) Install gasket (40) and M1 on front panel (34). Secure with four flat washers (36) and four hex nuts (35).

(3) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder two wires to back of M1.

(4) Replace panel assembly (refer to paragraph 6-2.b).

e. Switch, Pushbutton (S1, S2, and S3) Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Unsolder and tag two wires from S1, S2, or S3 (32).

(3) Remove hex nut, keying washer, lock washer, and dress ring securing S1 switch to front panel (34). Remove switch.

f. Switch, Pushbutton (S1, S2, and S3) Replacement (fig. C-2).

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of Sl, S2, or S3 (32).

(2) Install switch in front panel (34). Secure with hex nut, keying washer, lock washer, and dress ring. Torque to 84-103 in.-lb.

(3) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder two wires to back of switch.

(4) Replace panel assembly (refer to paragraph 6-2 .b) .

M16/M60 Toggle Switch (S4) Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Unsolder and tag two wires from back of S4 (33).

(3) Remove hex nut and lock washer securing S4 to front panel (34).

h. M16/M60 Toggle Switch (S4) Replacement (fig. C-2).

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of S4 (33).

(2) Install S4 on front panel (34). Secure with hex nut and lock washer. Torque to 7-9 in.-lb.

(3) Refer to figure 5-l. Use a grounded soldering iron (25 watts). Solder two wires to back of S4.

(4) Replace panel assembly (refer to paragraph 6-2.b).

i. Column Preamp PWB Assemblies Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly back ensuring that cables secured to top of retaining bar are not damaged.

(4) Remove column preamp PWB assembly (4) from connectors on PWB A1.

j. Column Preamp PWB Assemblies Replacement (fig. C-2).

(1) Install column preamp PWB assembly (4) in connector on PWB A1 (9).

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(3) Install retainer bar assembly (3) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 9-12 in.-lb.

(4) Replace panel assembly (refer to paragraph 6-2.b).

k. AGC PWB Assembly Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1 (9).

(3) Carefully fold back retaining bar assembly. Ensure that cables secured to top of retaining bar are not damaged.

(4) Remove AGC PWB assembly (6) from connector on PWB A1.

1. AGC PWB Assembly Replacement (fig. C-2).

(1) Install AGC PWB (6) in connector on PWB A1 (9).

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(3) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(4) Replace panel assembly (refer to paragraph 6-2 .b).

m. Row Preamp PWB Assemblies Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2,a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1 (9).

(3) Carefully fold back retaining bar assembly. Ensure that cables secured to top of retaining bar are not damaged.

(4) Remove preamp PWB assembly from connector on PWB A1.

n. Row Preamp PWB Assemblies Replacement (fig. C-2).

(1) Install preamp PWB in connector on PWB A1 (9).

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(3) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(4) Replace panel assembly (refer to paragraph 6-2 .b).

o. Analog Motherboard Assembly (A1) Removal (fig, C-2).

(1) Remove panel assembly (refer to paragraph 6-2 .a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly back ensuring that cables secured to top of retaining bar are not damaged.

(4) Remove column preamp PWB assemblies (4) from connectors on PWB A1.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1.

(6) Carefully fold back retaining bar assembly. Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1. Remove row preamp PWB assemblies (7) from connectors on PWB A1.

(8) Disconnect connectors J1, J2, J3, and J4 from PWB A1.

(9) Remove 18 screws (62), 18 flat washers (2), and cable clamps (70) securing PWB A1 to front panel (34). Carefully remove PWB A1.

Analog Motherboard Assembly (A1) Replacement (fig. C-2)

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(2) Install PWB A1 (9) on front panel (34). Secure with 18 flat washers (2), 18 screws (62), and cable clamps (70). Torque to 6-8 in--lb.

(3) Connect connectors J1, J2, J3, and J4 to PWB A1.

(4) Install column preamp PWB assemblies (4) in connectors on PWB A1.

(5) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(6) Install retainer bar assembly (3) on FWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(7) Install AGC PWB (6) in connector on PWB A1.

(8) Install row preamp PWB assemblies (7) in connectors in PWB A1.

(9) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(10) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(11) Install screws on four cable clamps (73) securing cables to PWB A1.

9. Detector Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly (3) back ensuring that cables secured to top of retaining bar are not damaged.

(4) Remove column preamp PWB assemblies (4) from connectors on PWB Al.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1.

(6) Carefully fold back retaining bar assembly (5). Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1.

(8) Remove row preamp PWB assemblies (7) from connectors on PWB A1.

(9) Disconnect Jl, J2, J3, and J4 from PWB A1.

(10) Remove 18 screws (62), 18 flat washers (2), and cable clamps (70) securing PWB Al to front panel (34). Carefully remove PWB A1.

(11) Use a grounded soldering iron (25 watts). Unsolder detector from PWB A1. Remove detector and insulator.

r. Detector Replacement (fig. C-2).

(1) Refer to figure 5-l. Use a grounded soldering iron (25 watts). Carefully solder detector and insulator to PWB A1 (9).

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(3) Install PWB A1 on front panel (34). Secure with 18 flat washers (2) and 18 screws (62). Torque to 6-8 in.-lb.

(4) Connect Jl, J2, J3, and J4 to PWB A1.

(5) Install column preamp PWB assemblies (4) in connectors on PWB A1.

(6) Install retainer bar assembly (3) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in-lb.

(7) Install AGC PWB AlA13 (6) in connector on PWB A1.

(8) Install row preamp PWB assemblies (7) in connectors in PWB A1.

(9) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(10) Install screws on four cable clamps (73) securing cables to PWB A1.

(11) Replace panel assembly (refer to paragraph 6-2.b).

S. Output Logic PWB Assembly Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Disconnect J9, JlO, Jll, and J12 from PWB A2 (25).

(3) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (19) to two standoffs (20).

(4) Carefully fold back retainer bar assembly. Ensure that cables on top of retainer bar assembly are not damaged.

(5) Remove output logic PWB (21) from connector on PWB A2.

t. Output Logic PWB Assembly Replacement (fig. C-2).

(1) Install output logic PWB (21) on connector on PWB A2 (25).

(2) Connect J9, J10, Jll, and J12 to PWB A2.

(3) Apply primer (MIL-S-22473, grade T) and Locking compound (MIL-S-22473, grade C) to threads of all screws.

(4) Install retainer bar assembly (19) on standoffs (20). Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(5) Replace panel assembly (refer to paragraph 6-2.b).

U. Microprocessor Logic PWB Assembly A2A3 Removal (fig. C-2). To remove microprocessor logic PWB assembly follow instructions for removing output logic PWB assembly, paragraph s.

V. Microprocessor Logic PWB Assembly A2A3 Replacement (fig. C-2). To replace microprocessor logic PWB assembly follow instructions for replacing output logic PWB assembly, paragraph t.

W. Timing Logic-PWB Assembly A2A2 Removal (fig. C-2). To remove timing logic PWB assembly follow instructions for removing output logic PWB assembly, paragraph s.

Timing Logic PWB Assembly A2A2 Replacement (fig. C-2). To replace timing Logic PWB assembly follow instructions for replacing output logic PWB assembly, paragraph t.

y. Input Logic PWB Assembly A2A1 Removal (fig. C-2). To remove input logic PWB assembly follow instructions for removing output logic PWB assembly, paragraph s.

Z. Input Logic PWB Assembly A2A1 Replacement (fig. C-2). To replace input logic PWB assembly follow instructions for replacing output logic PWB assembly, paragraph t.

aa. Digital Motherboard (A2) Assembly Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Disconnect J9, J10, Jll, J12, J7, J8, J6, J5, and J15 from PWB A2 (25).

(3) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (19) to two standoffs (20).

(4) Remove two standoffs (20) and two flat washers (2) from PWB A2.

(5) Carefully fold back retainer bar assembly. Ensure that cables secured to top of retainer bar assembly are not damaged.

(6) Remove output logic PWB (21), microprocessor logic PWB assembly (22), timing Logic PWB assembly (23), and input logic PWB assembly (24) from connectors on PWB A2.

(7) Remove four screws (1) and four flat washers (2) securing PWB A2 to standoffs. Remove PWB A2.

ab. Digital Motherboard (A2) Assembly Replacement (fig. C-1).

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(2) Install FWB A2 (25) on stand-offs (20). Secure with four flat washers (2) and four screws (1). Torque to 6-8 in.-lb.

(3) Install two flat washers (2) and two standoffs (20) on PWB A2. Torque to 6-8 in.-lb.

(4) Install output logic PWB (21), microprocessor logic PWB (22), timing Logic PWB (23), and input logic PWB (24) in connectors on PWB A2.

(5) Connect J9, J10, Jll, J12, J7, J8, J6, J5, and J15 to PWB A2.

(6) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(7) Install retainer bar assembly (19) on standoffs (20). Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-Lb.

(8) Replace panel assembly (refer to paragraph 6-2.b).

ac. Door Assembly Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove three screws (44), three flat washers (36), and three hex nuts (35) securing door assembly (45) to front panel (34), battery box gasket (48), and battery case assembly (49).

ad. Door Assembly Replacement (fig. C-2).

(1) Apply sealing compound (MIL-S-8802, CLA-½) under screw heads prior to installation.

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(3) Install door assembly (45) on front panel (34). Secure to front panel: battery box gasket (48) and battery case assembly (49) with three screws (44), three flat washers (36), and three hex nuts (35). Torque to 50-60 in.-oz.

(4) Replace panel assembly (refer to paragraph 6-2.b).

ae. Single Battery PWB Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Unsolder and tag two wires from single battery PWB (52).

(3) Remove eight screws (53), 16 flat washers (2), and eight hex nuts (50) securing single battery PWB (52), cable clamps (71), and PWB gasket (51) to battery case assembly (49).

af. Single Battery PWB Replacement (fig. C-2).

(1) Apply primer (MZL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(2) Install single battery PWB (52), cable clamps (71), and PWB gasket (51) on battery case assembly (49). Secure with eight screws (53), 16 flat washers (2), and eight hex nuts (50). Torque to 6-8 in.-lb.

(3) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder two wires to single battery PWB.

(4) Replace panel assembly (refer to paragraph 6-2 .b).

ag. Battery Case Assembly Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2 .a).

(2) Remove three screws (44), three flat washers (36), and three hex nuts (35) securing door assembly (45) to front panel (34), battery box gasket (48), and battery case assembly (49).

(3) Use a grounded soldering iron (25 watts). Unsolder and tag two wires from single battery PWB (52).

(4) Remove eight screws (53) 16 flat washers (2), eight hex nuts (50) securing single battery PWB (52), cable clamps (71), and single battery PWB gasket (51) to battery case assembly (49).

(5) Remove three screws (37), three flat washers (2), and three hex nuts (50) securing battery case assembly (49) and battery box gasket (48) to front panel (34).

ah. Battery Case Assembly Replacement (fig. C-2).

(1) Apply sealing compound (MIL-S-8802, CLA-½) under screw heads prior to installation.

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(3) Install battery case assembly (49) and battery box gasket (48) on front panel (34). Secure with three screws (37), three flat washers (2), and three hex nuts (50). Torque to 13-17 in.-lb.

(4) Install single battery PWB (52), cable clamps (71), and single battery PWB gasket (51) on battery case assembly (49). Secure with eight screws (53), 16 flat washers (2), and eight hex nuts (50). Torque to 6-8 in.-lb.

(5) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder two wires to single battery PWB (52).

(6) Install door assembly (45) on front panel (34). Secure to front panel : battery box gasket (48) and battery case assembly (49) with three screws (44), three flat washers (36), and three hex nuts (35). Torque to 50-60 in.-oz.

(7) Replace panel assembly (refer to paragraph 6-2 .b) .

ai. Fuseholder (F1) Removal (fig. c-2).

(1) Remove panel assembly (refer to paragraph 6-2 .a).

(2) Use a grounded soldering iron (25 watts). Unsolder and tag two wires from back of F1 (38).

(3) Remove hex nut and lock washers securing F1 to front panel (34).

aj. Fuseholder (FL) Replacement (fig. c-2).

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of F1 (38).

(2) Install F1 on front panel (34). Secure with hex nut and Lock washer.

(3) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder wires to fuseholder.

(4) Replace panel assembly (refer to paragraph 6-2.b).

ak. Fuse Removal (fig. C-2).

(1) Open latches on instrument case. Open case.

(2) Remove F1 (38) knob from fuseholder (38).

(3) Remove fuse (39).

al. Fuse Replacement (fig. C-2).

(1) Install fuse (39) in fuseholder (38).

(2) Install fuseholder knob on fuseholder.

(3) Close case. Close latches.

. Target Window Backing Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2 .a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly back ensuring that cables secured to top of retaining bar are not damaged.

(4) Remove column preamp PWB assemblies (4) from connectors on PWB A1.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1.

(6) Carefully fold back retaining bar assembly (5). Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1.

(8) Remove row preamp PWB assemblies (7) from connectors on PWB A1.

(9) Disconnect Jl, J2, J3, and J4 from PWB A1.

(10) Remove 18 screws (62), 18 flat washers (2), and cable clamps (70) securing PWB AL to front panel (34). Carefully remove PWB A1.

(11) Remove top spacer (11) and bottom spacer (13).

(12) Remove 18 screws (42) securing left side support (LO), right side support (15), top support (l2), and bottom support (14).

(13) Remove target window gasket (16) and window backing (17).

an. Window backing Replacement (fig. c-2).

(1) Install window backing (17) and target window gasket (16) on top of I.R. pass filter (18).

(2) Apply sealing compound (MIL-S-8802, CLA-½) under screw heads prior to installation.

(3) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of allscrews.

(4) Install top support (12), bottom support (14), right side support (10), and left side support (1.5). Secure with 18 screws (42). Torque to 7-9 in.-lb.

(5) Install top spacer (11) and bottom spacer (13).

(6) Install PWB A1 (16) on front panel (34). Secure with 18 flat washers (2) and 18 screws (62). Torque to 6-8 in.-lb.

(7) Connect J1, J2, J3, and J4 to PWB A1 (9).

(8) Install column preamp PWB assemblies (4) in connectors on PWB A1.

(9) Install retainer bar assembly (3) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(10) Install AGC PWB (6) in connector on PWB A1.

(11) Install row preamp PWB assemblies (7) in connectors in PWB A1.

(12) Install retainer bar assembly (5) on PWB AL. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(13) Install screws on four cable clamps (73) securing cables to PWB A1.

(14) Replace panel assembly (refer to paragraph 6-2.b).

ao. I.R. Pass Filter Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly back ensuring that cables secured to top retaining bar are not damaged.

(4) Remove column preamp PWB assemblies (4) from connectors on PWB A1.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB Al.

(6) Carefully fold back retaining bar assembly (5). Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1.

(8) Remove row preamp PWB assemblies (7) from connectors on PWB AL.

(9) Disconnect Jl, J2, J3, and J4 from PWB A1.

(LO) Remove 18 screws (62), 18 flat washers (2), and cable clamps (70) securing PWB Al to front panel (34). Carefully remove PWB A1.

(11) Remove top spacer (11) and bottom spacer (13).

(12) Remove 18 screws (42) securing left side support (15), right side support (l0), top support (12), and bottom support (14).

(13) Remove target window gasket (16) and window backing (17). Remove I.R. pass filter (18).

ap. I.R. Pass Filter Replacement (fig. C-2).

(1) Install I.R. pass filter (18), window backing (17), and window gasket (16) on top of diffuser (61).

(2) Apply sealing compound (MIL-S-8802, CLA-½) under screw heads prior to installation.

(3) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(4) Install top support (12), bottom support (14), right side support (LO), and left side support (15). Secure with 18 screws (42). Torque to 7-9 in.-Lb.

(5) Install top spacer (11) and bottom spacer (13).

(6) Install PWB A1 (9) on front panel (34). Secure with 18 flat washers (2), cable clamps (70), and 18 screws (62). Torque to 6-8 in.-lb.

(7) Connect J1, J2, J3, and J4 to PWB A1.

(8) Install column preamp PWB assemblies (4) in connectors on PWB A1.

(9) Install retainer bar assembly (3) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-Lb.

(10) Install AGC PWB (6) in connector on PWB A1.

(11) Install row preamp PWB assemblies (7) in connectors in PWB A1.

(12) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(13) Replace panel assembly (refer to paragraph 6-2.b).

aq. Diffusers Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly back ensuring that cables secured to top of retainer bar are not damaged.

(4) Remove column preamp PWB assemblies (4) from connectors on PWB A1.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1.

(6) Carefully fold back retaining bar assembly (5). Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1.

(8) Remove row preamp PWB assemblies (7) from connectors on PWB A1.

(9) Disconnect Jl, J2, J3, and J4 from PWB A1.

(10) Remove 18 screws (62), cable clamps (70), and 18 flat washers (2) securing PWB A1 to front panel (34). Carefully remove PWB A1.

(11) Remove top spacer (11) and bottom spacer (13).

(12) Remove 18 screws (42) securing left side support (15), right side support 10), top support (12), and bottom support (14).

(13) Remove target window gasket (l6), window backing (17), I.R. pass filter (18), and diffusers (61).

ar. Diffusers Replacement (fig. C-2).

(1) Install diffusers (61), I.R. pass filter (18), window backing (17), and window gaskets (16).

(2) Apply sealing compound (MIL-S-8802, CLA-5) under screw heads prior to installation.

(3) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(4) Install top support (12), bottom support (14), right side support (10), and left side support (15). Secure with 18 screws (42). Torque to 7-9 in.-lb.

(5) Install top spacer (11) and bottom spacer (13).

(6) Install PWB A1 (9) on front panel (34). Secure with 18 flat washers (2), cable clamps (70), and 18 screws (62). Torque to 6-8 in.-lb.

(7) Connect Jl, J2, J3, and J4 to PWB A1.

(8) Install column preamp PWB assemblies (4) in connectors on PWB A1.

(9) Install retainer bar assembly (3) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(10) Install AGC PWB (6) in connector on PWB A1.

(11) Install row preamp PWB assemblies (7) in connectors on PWB A1.

(12) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(13) Replace panel assembly (refer to paragraph 6-2.b).

as. Target Face Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly (3) back ensuring that cables secured to top of retaining bar are not damaged.

(4) Remove column preamp PWB assemblies (4) from connectors on PWB A1.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1.

(6) Carefully fold back retaining bar assembly (5). Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1.

(8) Remove row preamp PWB assemblies (7) from connectors on PWB A1.

(9) Disconnect J1, J2, J3, and J4 from PWB A1.

(10) Remove 18 screws (62), cable clamps (70), and 18 flat washers (2) securing PWB AL to front panel (34). Carefully remove PWB A1.

(11) Remove top spacer (11) and bottom spacer (12).

(12) Remove 18 screws (42) securing left side support (10), right side support (15), top support (12), and bottom Support (13).

(13) Remove target window gasket (l6), window backing (17), I.R. pass filter (18), diffusers (61), and target face (60).

at. Target Face Replacement (fig. c-2).

(1) Install target face (60), diffusers (61), I.R. pass filter (18), window backing (17), and target window gasket (16) on top of window front (59).

(2) Apply sealing compound (MIL-S-8802, CLA-½) under screw heads prior to installation.

(3) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(4) Install top support (12), bottom support (14), right side support (15), and Left side support (10). Secure with 18 screws (42). Torque to 7-9 in.-lb.

(5) Install top spacer (11) and bottom spacer (13).

(6) Install PWB A1 (9) on front panel (34). Secure with 18 flat washers (2), cable clamps (70), and 18 screws (62). Torque to 6-8 in.-lb.

(7) Connect Jl, J2, J3, and J4 to PWB Al.

(8) Install column preamp PWB assemblies (4) in connectors on PWB Al.

(9) Install retainer bar assembly (3) on PWB A1 (9). Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(10) Install AGC PWB (6) in connector on PWB A1.

(11) Install row preamp PWB assemblies (4) in connectors in PWB A1.

(12) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(13) Replace panel assembly (refer to paragraph 6-2.b).

au. Window Front Removal (fig. C-1).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (3) to PWB A1 (9).

(3) Carefully fold retainer bar assembly back ensuring that cables secured to top of retaining bar are not damaged.

(4) Remove column preamp PWB assembly (4) from connectors on PWB A1.

(5) Remove two screws (1) and two flat washers (2) securing retainer bar assembly (5) to PWB A1.

(6) Carefully fold back retaining bar assembly (5). Ensure that cables secured to top of retaining bar are not damaged.

(7) Remove AGC PWB assembly (6) from connector on PWB A1.

(8) Remove row preamp PWB assemblies (7) from connectors on PWB A1.

(9) Disconnect Jl, J2, J3, and J4 from PWB A1.

(10) Remove 18 screws (62) cable clamps (70), and 18 flat washers (2) securing PWB Al to front panel (34). Carefully remove PWB A1.

(11) Remove top spacer (11) and bottom spacer (13).

(12) Remove 18 screws (42) securing left side support (15), right side support (10), top support (12), and bottom support (13).

(13) Remove target window gasket (16), window backing (17), I .R. pass filter (18), diffusers (61), target face (60), window front (59), and target window gasket (16).

av. Window Front Replacement (fig. C-2).

(1) Install target window gasket (16), window front (59) target face (60), diffuser (61), I.R. pass filter (18), window backing (17), and target window gasket (16).

(2) Apply sealing compound (MIL-S-8802, CLA-½) under screw heads prior to installation.

(3) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of all screws.

(4) Install top support (12), bottom support (14), right side support (10), and left side support (15). Secure with 18 screws (42). Torque to 7-9 in.-lb.

(5) Install top spacer (11) and bottom spacer (13).

(6) Install PWB A1 (9) on front panel (34). Secure with 18 flat washers (2), cable clamps (70), and 18 screws (62). Torque to 6-8 in.-lb.

(7) Connect Jl, J2, J3, and J4 to PWB A1.

(8) Install column preamp PWB assemblies (4) in connectors on PWB A1.

(9) Install retainer bar assembly (3) on FWB A1. Secure with two washers (2) and two screws (1). Torque to 6-8 in.-lb.

(10) Install AGC PWB (6) in connector on PWB A1.

(11) Install row preamp PWB assemblies (7) in connectors in PWB A1.

(12) Install retainer bar assembly (5) on PWB A1. Secure with two flat washers (2) and two screws (1). Torque to 6-8 in.-lb.

(13) Replace panel assembly (refer to paragraph 6-2 .b).

aw. Display Module Assembly PWBs (A4, A5, A6, and A7) Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2 .a).

N O T E

A dust-free environment must be maintained within the display housing (55).

(2) Unplug cables from Jl connectore on display modules (57) A4, A5, A6, or A7, as appropriate.

(3) Remove screws (58), flat washers (36), and cable clamps (71) securing PWB (57) and display FWB gasket (56) to display housing (55).

(4) Remove A4, A5, A6, or A7 as required.

ax. Display Module Assembly PWBs A4, A5, A6, and A7 Replacement (fig. C-2).

(1) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of screws (58).

(2) Install A4, A5, A6, or A7 (57) on display housing (55). Secure with screws (58), flat washers (36), and cable clamps (71). Torque to 50-60 in.-oz.

(3) Plug cable into connector J1 on A4, A5, A6, or A7.

(4) Replace panel assembly (refer to paragraph 6-2.b).

ay. Display Housing Removal (fig. C-2).

NOTE

A dust-free environment must be maintained within the display housing (55).

(1) Remove panel assembly (refer to paragraph 6-2-a).

(2) Unplug cables from J1 connectors on display module PWBs (57).

(3) Remove screws (58), flat washers (36), and cable clamps (71) securing A4, A5, A6, and A7, and display PWB gasket (56) to display housing (55).

(4) Remove six screws (43) securing display housing and display housing gasket (54) to front panel (34).

(5) Remove display housing.

az. Display Housing Replacement (fig. C-2)

(1) Apply sealing compound (MIL-S-8802, CLA-½) under screw (58) heads prior to installation.

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of screws (58) .

(3) Ensure digital display window (47) and display window gasket (46) are in place on front panel (34).

(4) Install display housing (55) and display housing gasket (54) on front panel (34). Secure with six screws (43). Torque to 50-60 in.-oz.

(5) Install PWBs A4, A5, A6, and A7 (57) and display PWB gasket (56) on display housing (55). Secure with screws (58), flat washers (36), and cable clamps (71). Torque to 50-60 in.-oz.

(6) Plug cables into connectors Jl on PWBs (57).

(7) Replace panel assembly (refer to paragraph 6-2.b).

aaa. Digital Display Window and Gasket Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Unplug cables from Jl connectors on PWBs (57).

NOTE

A dust-free environment must be maintained within the display housing (55).

(3) Remove screws (58), flat washers (36), and cable clamps (71) securing A4, A5, A6, or A7 and display PWB gasket (56) to display housing.

(4) Remove six screws (43) securing display housing (55), display housing gasket (54), digital display window (47) and display window gasket (46) to front panel (34).

aab. Digital Display Window and Gasket Replacement (fig. C-2).

(1) Apply sealing compound (MIL-S-8802, CLA-½) under screw (58) heads prior to installation.

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of screws (58) .

(3) Install digital display window (47) and display window gasket (46) on front panel (34).

(4) Install display housing (55) and display housing gasket (54) on front panel. Secure with six screws (43). Torque to 50-60 in.-oz.

(5) Install PWBs A4, A5, A6, and A7 (57) and display PWB gasket (56) on display housing. Secure with screws (58), flat washers (36), and cable clamps (71). Torque to 50-60 in.-oz.

(6) Plug connectors Jl into PWBs (57).

(7) Replace panel assembly (refer to paragraph 6-2.b).

aac. Cable Assembly Wl Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Unplug cable Wl (69) connector Jl from PWB Al (9).

(3) Unplug Wl connector J5 from PWB A2 (25).

(4) Cut cable ties to release cable assemblies.

aad. Cable Assembly Wl Replacement (fig. C-2).

(1) Plug appropriately labeled end of W1l (69) into connector Jl on PWB Al (9).

(2) Plug appropriately labeled end of W1l into connector Jl on PWB A2 (25).

(3) Replace cable ties.
(4) Replace panel assembly (refer to paragraph 6-2.b).

aae. Cable Assembly W2 Removal (fig. c-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).
(2) Unplug W2 (68) connector J6 from PWB A2 (25).
(3) Cut cable ties to release cable assemblies.

aaf. Cable Assembly W2 Replacement (fig. C-2).

(11) Plug appropriately labeled end of W2 (68) into connector J6 on PWB A2 (25).
(2) Plug appropriately labeled end of W2 into connector J2 on PWB A1 (9).
(3) Replace cable ties.
(4) Replace panel assembly (refer to paragraph 6-2.b).

aag. Cable Assembly W3 Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).
(2) Unplug W3 (75) connector J3 from PWB A1 (9).
(3) Unplug W3 connector J7 from PWB A2 (25).
(4) Cut cable ties to release cable assemblies.

aah. Cable Assembly W3 Replacement (fig. c-2).

(1) Plugappropriately labeled end of W3 (75) into connector 57 on PWB A2 (25).
(2) Plug appropriately labeled end of W3 into connector J3 on PWB A1 (9).
(3) Replace cable ties.
(4) Replace panel assembly (refer to paragraph 6-2.b).

aai. Cable Assembly W4 Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2-a).
(2) Unplug W4 (74) connector J4 from PWB Al (9).
(3) Unplug W4 connector J8 from PWB A2 (25).
(4) Cut cable ties to release cable assemblies.

aaj. Cable Assembly W4 Replacement (fig. C-2)

(1) Plug appropriately labeled end of W4 (74)into connector 18 and PWB A2 (25).
(2) Plug appropriately labeled end of W4 into connector J4 on PWB A1 (9).
(3) Replace cable ties.
(4) Replace panel assembly (refer to paragraph 6-2.b).

aak. Cable Assembly W5 Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).
(2) Unplug W5 (64) connector J11 from PWB A2 (25).
(3) Unplug W5 connector J1 from PWB A4 (57).
(4) Cut cable ties to release cable assemblies.

aa1. Cable Assembly W5 Replacement (fig. C-2).

(1) Plug W5 (64) connector Jl into PWB A4 (57).
(2) Plug W5 connector Jll into PWB A2 (25).
(3) Replace cable ties.
(4) Replace panel assembly (refer to paragraph 6-2.b).

aam. Cable Assembly W6 Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).
(2) Unplug connector J12 from PWB A2 (25).
(3) Unplug connector J1 from PWB A5 (57).
(4) Cut cable ties to release cable assemblies.

aan. Cable Assembly W6 Replacement (fig. C-2).

(1) Plug W6 (65) connector J1 into PWB A5.
(2) Plug W6 connector Jl2 into PWB A2 (25).
(3) Replace cable ties.
(4) Replace panel assembly (refer to paragraph 6-2.b).

aao. Cable Assembly W7 Removal (fig. C-2.

(1) Remove panel assembly (refer to paragraph 6-2.a).
(2) Unplug W7 (67) connector J1 from PWB A6.
(3) Unplug W7 connector J9 from PWB A2 (25).
(4) Cut cable ties to release cable assemblies.

aap. Cable Assembly W7 Replacement (fig. C-2).

(1) Plug W7 (67) connector J9 into PWB A2 (25).

(2) Plug W7 connector Jl into PWB A6.

(3) Replace cable ties.

(4) Replace panel assembly (refer to paragraph 6-2.b).

aaq. Cable Assembly W8 Removal (fig. c-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Unplug W8 (66) connector J10 from PWB A2 (25).

(3) Unplug W8 connector Jl from PWB A7.

(4) Cut cable ties to release cable assemblies.

aar. Cable Assembly W8 Replacement fig. C-2).

(1) Plug W8 (66) connector Jl into PWB A7.

(2) Plug W8 connector J10 into FWB A2 (25).

(3) Replace cable ties.

(4) Replace panel assembly (refer to paragraph 6-2.b).

aas. Cable Assembly W9 Removal (fig. c-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Unplug W9 (63) connector J15 from PWB A2 (25).

(3) Unplug W9 connector J14 from PWB A3 (31).

(4) Cut cable ties to release cable assemblies.

aat. Cable Assembly W9 Replacement (fig. C-2).

(1) Plug W9 (63) connector J14 into A3 (31).

(2) Plug W9 connector J15 into PWB A2 (25).

(3) Replace cable ties.

(4) Replace panel assembly (refer to paragraph 6-2.b).

aau. Cable Assembly WlO Removal (fig. C-2.

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Unsolder two Wl0 (76) wires from each of the following locations:

- M1 (34)
- S1 (32)
- S2 (32)
- S3 (32)
- S4 (33)
- Fl (38)
- BT 1 (52)
- BT 2 (52)
- BT 3 (52)

(3) Remove six screws (53, 58), flat washers (2, 36), and four nuts (50) from cable clamps (71).

(4) Remove cable ties.

aav. Cable Assembly Wl0 Replacement (fig. C-2).

(1) Use a grounded soldering iron (25 watts). Solder two Wl0 (74) wires to each of the following locations:

- M1 (34)
- S1 (32)
- S2 (32)
- S3 (32)
- S4 (33)
- F1 (38)
- BT 1 (52)
- BT 2 (52)
- BT 3 (52)

(2) Install six screws (53, 58), flat washers (2, 36), and four nuts (50) on cable clamps (71).

(3) Replace cable ties.

(4) Replace panel assembly (refer to paragraph 6-2.b).

aaw. Transistor Ql Removal (fig. c-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Unsolder and tag three wires from PWB A3 (31) at E1, E2, and E3.

(3) Remove Q1 (27) from heat sink (29).

aax. Transistor Q1 Replacement (fig. C-2).

(1) Install Ql (27) in heat sink (29).

(2) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder three wires to PWB A3 (31) at E1, E2, and E3.

(3) Replace panel assembly (refer to paragraph 6-2.b).

aay. Heat Sink Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Use a grounded soldering iron (25 watts). Solder and tag 3 wires from PWB A3 (31) at E1, E2, and E3.

(3) Remove heat sink (29) and Q1 (27) together from standoff (28).

aaz. Heat Sink Replacement (fig. C-2).

(1) Install heat sink (29) with Ql (27) on standoff (28)

(2) Ensure that insulation tubing is on Ql leads.

(3) Refer to figure 5-l. Use a grounded soldering iron (25 watts). Solder 3 wires on Ql at El, El, and E3.

(4) Replace panel assembly (refer to paragraph 6-2.b).

aaaa. Regulator Assembly PWB Removal (fig. C-2).

(1) Remove panel assembly (refer to paragraph 6-2.a).

(2) Remove connectors (513, 514).

(3) Use a grounded soldering iron (25 watts). Unsolder wires from regulator assembly PWB (31).

(4) Remove four screws (1) and washers (2) securing PWB to front panel (34). Remove PWB.

aaab. Regulator Assembly PWB Replacement (fig. C-2).

(1) Install regulator assembly PWB (31) on front panel (34).

(2) Apply primer (MIL-S-22473, grade T) and locking compound (MIL-S-22473, grade C) to threads of four screws (1). Secure PWB with four screws (1). Torque to 6-8 in.-lb.

(3) Refer to figure 5-1. Use a grounded soldering iron (25 watts). Solder wires to PWB.

(4) Replace connectors (513, 514).

(5) Replace panel assembly (refer to paragraph 6-2.b).

aaac. Front Panel Removal (fig. C-2). Perform steps in paragraphs listed below to remove components from front panel (34, fig. C-2).

NOTE

Remove panel assembly (3, fig. C-1) only once, under paragraph 6-2.a.

Component	Paragraph 6-2
Pushbutton Switches	e
Toggleswitch	g
Voltmeter	**C**
Battery Cases	ag
Fuseholder	ai
Display Housing	a y
Regulator	aaaa
Digital Motherboard, A2	aa
Analog Motherboard, A1	**0**

aaad. Front Panel Replacement (fig. c-2). Perform steps in paragraphs listed below to replace components on front panel (34, fig. C-2).

NOTE

Replace panel assembly (3, fig. C-l) only once, under paragraph 6-2.b.

Component	Paragraph 6-2
Pushbutton Switches	f
Toggleswitch	h
Voltmeter	d
Battery Cases	ah
Fuseholder	a j
Display Housing	az
Regulator	aaab
Digital Motherboard, A2	ab
Analog Motherboard, A1	P

aaae. Instrument Case Removal (fig. C-1).

(1) Open six latches on instrument case (1). open case.

(2) Remove two screws (5) each, securing two staybolts to panel assembly (3).

(3) Remove 14 screws (5) securing panel assembly to case (1). Remove panel assembly.

aaaf. Instrument Case Replacement (fig. C-1).

(1) Install panel assembly (3) in instrument case (i). Secure with 14 screws (5). Torque to 17-20 in.-lb.

(2) Install two staybolts on panel assembly. Secure with two screws (5) each. Torque to 17-20 in.-lb.

(3) Close case. Secure six latches.

CHAPTER 7

FINAL INSPECTION/TEST

Section I. GENERAL

7-1. SCOPE. Final inspection includes visual inspections and system tests performed by intermediate maintenance personnel to detect malfunctions and to validate system operation after troubleshooting and repair have been completed. A system test must be performed completely each time, whether identifying malfunctions or validating repair. Test configuration diagrams are provided. During system test, when a malfunction is identified, appropriate reference is made to troubleshooting procedures in chapter 5. Probable malfunctions are marked with an *.

Successful completion of system test of the alignment device indicates that the equipment is acceptable for "return to user" or "return to stock."

7-2. COMPLETION OF INSPECTION. Upon completion of final inspection and the alignment device is restored to a completely serviceable condition, certification shall be made that the equipment is acceptable for "return to user" or for "return to stock."

Section II. ALIGNMENT FIXTURE FINAL INSPECTION

7-3. VISUAL INSPECTION. Check the alignment device for completeness and general appearance. Painted surfaces will be free of bare spots, scratches deep enough to expose bare metal, and chipped or loose paint. There will be no signs of corrosion. Check panel surfaces for nicks, burrs, dents, or deformities. Surfaces will be free of all foreign matter. Inspect sealed portions of the case. All lettering on identification plates and controls will be clearly defined and easily read.

7-4. ALIGNMENT DEVICE SYSTEMS TESTS. The alignment device is tested by observing its response to MILES laser transmitter signals.

a. Test Equipment Required. The following test equipment is required:

(1) MILES programmer test set

(2) MILES transmitter test set with aperture adapter

(3) BA-200/U or BA-3200/U, 6-volt batteries, 3 each, or equivalent

(4) Volt-ohmmeter

(5) DC power supply, O-20 volts, or equivalent

(6) MILES laser transmitter, M-16, P/N 11749083

WARNING

Although the laser light emitted by MILES equipment transmitters is considered eye safe by the Bureau of Radiological Health, suitable precautions must be taken to avoid possible damage to the eye from overexposure to this radiated energy. Precautionary measures include the following:

- Avoid viewing the laser emitter at close range (less than 12 meters). Increasing the distance from the eye to the laser source greatly reduces the risks of overexposure.
- Avoid viewing the emitter directly along the optical axis of radiated beam.
- Especially avoid viewing the emitter directly along the optical axis of the beam through stabilized optics such as binoculars, telescopes or periscopes, at ranges less than 75 meters.

b. Initial Conditions. Set up the alignment device and test equipment as shown in figure 7-1.

C. Power Supply and Display Self Test. Perform the following steps:

(1) Verify that green band on battery check voltmeter extends from 13 to 18 volts.

NOTE

With batteries removed from alignment device, connect power supply positive lead to outer ring contact in far right battery compartment and negative lead to center contact in far left battery compartment.

(2) Apply 18.0 ±O.lV dc to alignment device with a calibrated DC power source.

*(3) Depress BATTERY CHECK pushbutton. Verify that battery check meter indicates 18.0 ±l.OV dc. If meter reading is incorrect, test voltmeter in accordance with chapter 5, table 5-1, steps 1 or 2, as appropriate.

(4) Apply 13.0 ±O.lV dc to alignment device with a calibrated DC power source.

*(5) Press BATTERY CHECK pushbutton. Verify that battery check meter indicates 13.0 ±l.OV dc. If meter reading is incorrect, test voltmeter in accordance with chapter 5, table 5-1, steps 1 or 2, as appropriate.

(6) Remove calibrated DC power source. Insert 3 MIL-STD-(BA-200/U or BA-3200/U) 6 volt batteries.

*(7) Press POWER ON pushbutton. Verify that all four displays indicate 18. If displays do not indicate 18, test device in accordance with chapter 5, table 5-1, step 3.

*(8) Illuminate center area of alignment device target face with 4 words of MILES code 27, using programmer and transmitter test sets as shown in figure 7-1. Verify that displays go blank for approximately ½ second and then indicate 2 aim correction numbers (one for right-left axis and one for up-down axis). If displays are incorrect, test device in accordance with chapter 5, table 5-1, steps 4 and 6 through 9.

(9) Press POWER OFF pushbutton. Verify that all displays go blank. If displays do not go blank, test in accordance with chapter 5, table 5-1, step 5.

(10) Press POWER ON pushbutton. Verify that all displays indicate 18. If displays do not indicate 18, test device in accordance with chapter 5, table 5-1, step 3.

d. Display Visibility Test. Perform the following steps:

(1) Place alignment device outdoors with display panel turned toward bright sunlight.

(2) Turn POWER ON. Verify that display numerals can be read from a distance of 3 meters.

(3) Turn power off.

e. Response to MILES Codes. Perform the following steps:

(1) Press POWER ON pushbutton.

(2) Illuminate center area of device target face (figure 7-2) with 128 NEAR MISS words (MILES code 29) using programmer and transmitter test sets.

*(3) Verify that device does NOT respond. (If device responds, test in accordance with chapter 5, table 5-1, step 12.

(4) Illuminate center area of target face with continuous MILES boresight code using a MILES Ml6 transmitter.

* (5) Verify that device displays aim correction numbers, and that these numbers are updated approximately every two (2) seconds. If device malfunctions, test in accordance with chapter 5, table 5-1, steps 13 and 14.

(6) Turn power off.

f. Display Selection and Accuracy. Perform the following steps:

(1) Place Ml6/M60 display selection switch in Ml6 position.

(2) Press POWER ON pushbutton.

(3) Illuminate sample position shown in figure 7-3 with four (4) words of MILES code 27.

*(4) Verify that left display indicates 9 ±1 and that upper display

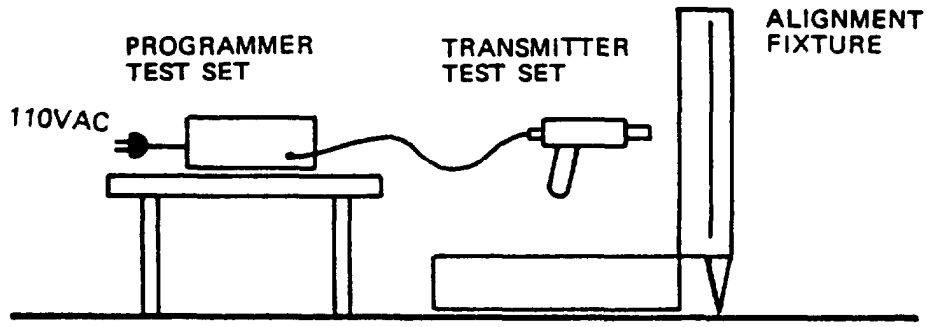

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Figure 7-1. Alignment Device Test Setup

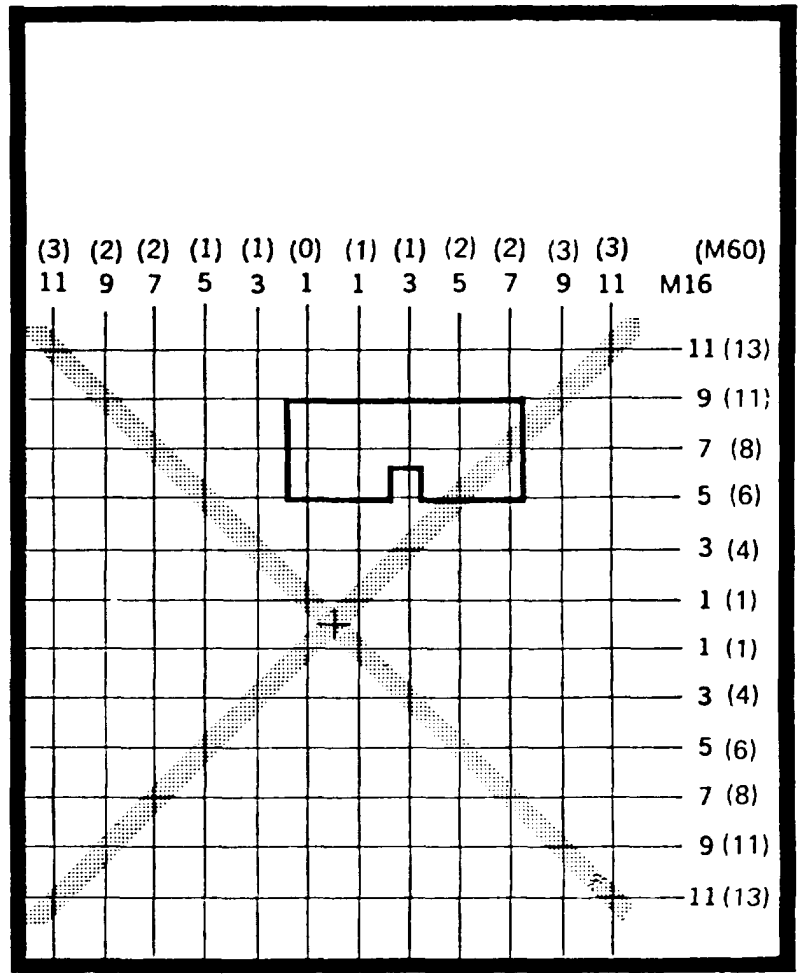

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Figure 7 -2. Target Face with General Function Test Pattern

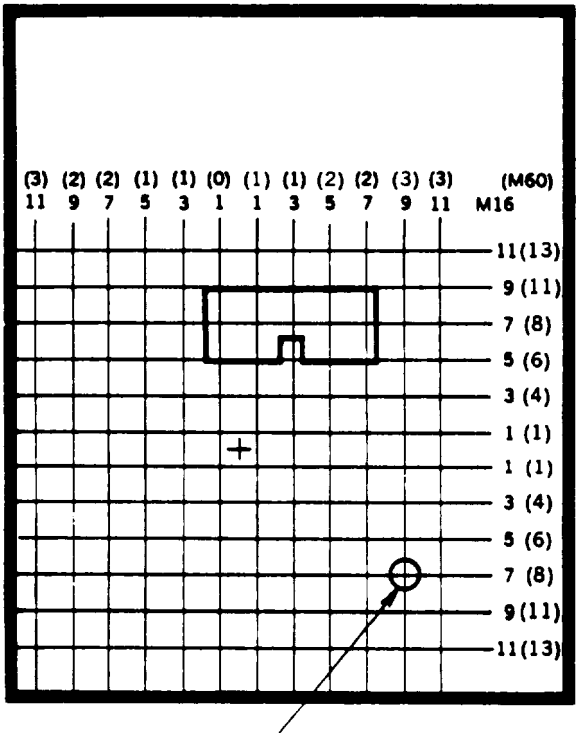

Figure 7-3. Sample Target Position

indicates 7 ±l. If displays are incorrect , test in accordance with chapter 5, table 5-1, step 4 or 10, as appropriate. (Incorrect responses are shown in figure 5-3.)

(5) Move transmitter test set slowly past left and right edges of target face, while repeatedly firing bursts of MILES code 27.

*(6) Verify that highest number indicated by right or left display is 11. If display is incorrect, test in accordance with chapter 5, table 5-1, steps 4, 6, and 7, as appropriate.

(7) Repeat step 5 for upper and lower edges of target face.

*(8) Verify that highest number indicated by upper or lower displays is 11. If display is incorrect, test in accordance with chapter 5, table 5-1, step 4.

(9) Set Ml6/M60 display selection switch in M60 position. Illuminate sample position shown in figure 7-3 with four (4) words of MILES code 27.

*(10) Verify that left display indicates 3 ±l and that upper display indicates 8 ±l. If displays are incorrect, teat in accordance with chapter 5, table 5-1, steps 4, 6, 8, and 10, as appropriate.

(11) Repeat step 5 for right and left edges of the target face.

*(12) Verify that highest number indicated by right or left display is 3. If display is incorrect, teat according to chapter 5, table 5-1, steps 4, 6, 7, or 10.

(13) Repeat step 5 for upper and lower edges of target face.

*(14) Verify that highest number indicated by upper or lower display is 13. If display is incorrect, teat in accordance with chapter 5, table 5-1, steps 4, 8, 9, or 10, as appropriate.

(15) Press POWER OFF pushbutton

g. Power Saving Feature. Perform the following a steps :

(1) Install three (3) fresh BA-200/U or BA-3200/U batteries.

(2) Press POWER ON pushbutton and observe “18,18,18,18” on displays.

(3) Record time.

(4) Allow unit to remain undisturbed .

*(5) Verify that system shuts off automatically within 24 ±3 minutes (display goes blank). If system does not shut off, teat in accordance with chapter 5, table 5-1, step 11.

*(6) Verify that unit comes back on by pressing POWER ON pushbutton and that “18,18,18,18” appears on displays. If displays do not appear, test fixture in accordance with chapter 5, table 5-1, step 3.

(7) Press POWER OFF pushbutton.

APPENDIX A

REFERENCES

TM9-1265-370-10-1	Operator's Manuel for Simulator System, Firing, Laser: M60 for M16A1 Rifle.
TM9-1265-370-10-2	Operator's Manual for Simulator System, Firing, Laser: M61 for M60 Machine Gun.
TM9-6625-3101-14&P (to be published)	Operator, Organizational, Direct Support, and General Support Maintenance Manual for Test Set, Programmer: For Simulator System, Laser.
TM9-6625-3104-14&P (to be published)	Operator, Organizational, Direct Support, and General Support Maintenance Manuel for Test Sets: Transmitter, Microphone, ATWESS, and CVKI: For Simulator System, Laser.

APPENDIX B

MAINTENANCE ALLOCATION CHART

FOR

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. 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.

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 equipments 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. 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, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to 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 in appropriate technical publications (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-3. Explanation of Columns in the MAC, Section II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time, in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C . . . . . Operator or crew.
O . . . Organizational maintenance.
F . . . Direct support maintenance.
H . . General support maintenance.
D . . . . . Depot maintenance.

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column, when applicable, contains a letter code, in alphabetic order, which is keyed to the remarks contained in section IV.

B-4. Explanation of Columns in Tool and Test Equipment Requirements, Section III

a. Column 1. Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. Explanation of Columns in Remarks, Section IV

a. Column 1, Reference Code. The code recorded in column 6, section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

SECTION II. MAINTENANCE ALLOCATION CHART

FOR

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	C	(5) TOOLS AND EQPT.	REMARKS
14A	SMALL ARMS ALIGNMENT DEVICE, LASER DEVICE	Inspect		0.1					
		Test			1.0			9 thru 13	
		Replace		0.1					
14A01	PANEL ASSY	Inspect			0.1				
		Replace			0.1			4,7	
14A0101	VOLTMETER	Test			0.2			11,12	
		Replace						1 thru 7	
14A0102	SWITCH, PUSHBUTTON	Test			0.2			11,12	
		Replace			0.2			1 thru 7	
14A0103	SWITCH, TOGGLE	Test			0.2			11,12	
		Replace						1 thru 7	
14A0104	PWB ASSY, COLUMN PREAMP	Test			0.2			11,12	
		Replace			0.2			4,7	
14A0105	PWB ASSY, AGC	Test			0.2			11,12	
		Replace			0.2			4,7	
14A0106	PWB ASSY, ROW PREAMP	Test			0.2			11,12	
		Replace			0.2			4,7	
14A0107	PWB ASSY, ANALOG A1	Test			0.2			11,12	
		Replace			0.5			4,7	
14A010701	DETECTOR	Test			0.2			9,10	
		Replace			0.5			1,2,4,6 7	
14A0108	PWB ASSY, OUTPUT	Test			0.2			11,12	
		Replace			0.3			4,7	
14A0109	PWB ASSY, LOGIC	Test			0.2			11,12	
		Replace			0.2			4,7	
14A0110	PWB ASSY, TIMING	Test			0.2			11,12	
		Replace			0.2			4,7	
14A0111	PWB ASSY, INPUT	Test			0.2			11,12	
		Replace			0.2			4,7	
14A0112	PWB ASSY, DIGITAL	Test			0.2			11,12	
		Replace			0.4			4,7	
14A0113	DOOR ASSY	Inspect			0.2				
		Replace			0.2			3,4,7	

SECTION II . MAINTENANCE ALLOCATION CHART

FOR

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	REMARKS
			C	O	F	H	D		
14A0114	PWB ASSY, SINGLE BATTERY	Test Replace			0.2 0.3			11,12 1 thru 7	
14A0115	BATTERY CASE ASSY	Test Replace			0.2 0.2			11,12 1 thru 7	
14A0116	FUSEHOLDER	Test Replace			0.2 0.2			11,12 1 thru 7	
14A0117	FUSE	Replace			0.1				
14A0118	WINDOW BACKING	Inspect Replace			0.2 1.5			3 thru 7	
14A0119	IR PASS FILTER	Test Replace			0.2			11,12 3 thru 7	
14A0120	DIFFUSER	Test Replace			0.2 1.2			9,10 3 thru 7	
14A0121	TARGET FACE	Inspect Replace			0.2 1.8			3 thru 7	
14A0122	WINDOW, FRONT	Inspect Replace			0.2 1.8			3 thru 7	
14A0123	PWB ASSY, DISPLAY	Test Replace			0.2			11,12 3 thru 7	
14A0124	DISPLAY HOUSING	Inspect Replace			0.2 0.9			3 thru 7	
14A0125	WINDOW DISPLAY	Test Replace			0.2 0.3			11,12 4,7	
14A0126	CABLE ASSY, W1	Test Replace			0.2 0.1			11	
14A0127	CABLE ASSY, W2	Test Replace			0.2 0.1			11	
14A0128	CABLE ASSY, W3	Test Replace			0.2 0.1			11	
14A0129	CABLE ASSY, W4	Test Replace			0.2 0.1			11	
14A0130	CABLE ASSY, W5	Test Replace			0.2 0.1			11	

SECTION II . MAINTENANCE ALLOCATION CHART

FOR

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	REMARKS
			C	O	F	H	D		
14A0131	CABLE ASSY, W6	Test Replace			0.2 0.1			11	
14A0132	CABLE ASSY, W7	Test Replace			0.2 0.1			11	
14A0133	CABLE ASSY, W8	Test Replace			0.2 0.1			11	
14A0134	CABLE ASSY, W9	Test Replace			0.2 0.1			11	
14A0135	HARNESS, W10	Test Replace			0.2 0.6			11 1,2,4, 6,7	
14A0136	TRANSISTOR, Q1	Test Replace			0.2 0.4			11,12 1,2,4, 6,7	
14A0137	HEAT SINK	Replace			0.4			1,2,4, 6,7	
14A0139	PWB ASSY, REGULATOR	Test Replace			0.2 0.4			11,12 1,2,4, 6,7	
14A0140	FRONT PANEL	Inspect Replace			0.2 0.8			1 thru 7	
14A02	CASE, INSTRUMENT	Inspect Replace			0.2 0.2			4,7	
14A03	ROPE, MEASURING	Inspect Replace			0.1 0.1				
14A04	TRIGGER ASSY, M16	Inspect Replace			0.1 0.1				

* Included only when required by contract.

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS

FOR

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
1	F	SOLDERING IRON	3439-00-294-9009	WS570
2	F	PLIERS, DIAGONAL CUT, 6"	5110-00-239-8253	GGG-P-468
3	F	WRENCH SET, COMBINATION	5120-00-148-7917	GGG-W 636
4	F	SCREWDRIVER, CROSS-TIP, 1-1/2"	5120-00-227-7293	GGG-S-121
5	F	WRENCH, TORQUE	5120-00-230-6380	GGG-W-686
6	F	PLIERS, NEEDLE NOSE	5120-00-293-3481	GGG-P-471
7	F	TORQUE SCREWDRIVER KIT	5180-01-007-8999	
8	F	ALIGNMENT DEVICE, LASER TRANSMITTER SHORT RANGE		11835282
9	F	TEST SET, PROGRAMMER		11835286
10	F	TEST SET, TRANSMITTER		11835287
11	F	VOLT-OHMMETER	6625-00-649-3290	
12	F	POWER SUPPLY, 0-20V		
13	F	M16A1 RIFLE LASER TRANSMITTER		11749083

SECTION IV. REMARKS

Reference Code	Remarks
A	Operator/crew and organizational maintenance personnel inspect for any damage and replace if not operable.
B	Direct support maintenance personnel only are authorized to replace an inoperable component, or to repair a repairable component.
C	See chapter 8 for test procedures.
D	See chapter 6 for replace procedures.

APPENDIX C

REPAIR PARTS LIST

Section I. INTRODUCTION

C-1. Scope

This appendix lists spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of organizational, direct support, and general support maintenance of the Short Range Alignment Device. The appendix authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

C-2. General

This Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in numeric sequence, with the parts in each group listed in figure and item number sequence. Bulk materials are listed in NSN sequence.

b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized for the performance of maintenance.

c. Section IV. National Stock Number and Part Number Index. A list, in National item identification number (NIIN) sequence, of all National stock numbers (NSN) appearing in the listings, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross referenced to each illustration figure and item number appearance. This index is followed by a cross reference list of reference designators to figure and item numbers.

C-3. Explanation of Columns

a. Illustration. This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown.

(2) Item Number. The number used to identify item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1). Source Code. Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the uniform SMR Code format as follows:

Code	Definition
PA	Item procured and stocked for anticipated or known usage.
PB	Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply system.
PC	Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
PD	Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent

Code	Definition
	or additional initial issues or outfittings. Not subject to automatic replenishment.
PE	Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.
PF	Support equipment which will not be stocked but which will be centrally procured on demand.
PG	Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shut down of production facilities, would prove uneconomical to reproduce at a later time.
KD	An item of depot overhaul/ repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.
KF	An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
KB	Item included in both a depot overhaul/repair kit and a maintenance kit.
MO	Item to be manufactured or fabricated at organizational level.
MF	Item to be manufactured or fabricated in the direct support maintenance level.
MH	Item to be manufactured or fabricated at the general support maintenance level.
MD	Item to be manufactured or fabricated at the depot maintenance level.
AO	Item to be assembled at organizational level.
AF	Item to be assembled at direct support maintenance level.
AH	Item to be assembled at general support maintenance level.
AD	Item to be assembled at depot maintenance level.
XA	Item is not procured or stocked because the requirements for the item will result in the replacement of the next higher assembly.
XB	Item is not procured or stocked. If not available through salvage, requisition.
XC	Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD	A support item that is not stocked. When required, item will be procured through normal supply channels.

NOTE

Cannibalization of salvage may be used as a source of supply for any items coded above except those coded XA and aircraft support items as restricted by AR 700-42.

(2) Maintenance Code. Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance.

Code	Application/Explanation
C	- Crew or operator maintenance performed within organizational maintenance,
O	- Support item is removed, replaced, used at the organizational level.
F	- Support item is removed, replaced, used at the direct support level.
H	- Support item is removed, replaced, used at the general support level.
D	- Support items that are removed, replaced, used at depot, mobile depot, or specialized repair activity only.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	- The lowest maintenance level capable of complete repair of the support item is the organizational level.
F	- The lowest maintenance level capable of complete repair of the support item is the direct support level.
H	- The lowest maintenance level capable of complete repair of the support item is the general support level.
D	- The lowest maintenance level capable of complete repair of the support item is the depot level.
L	- Repair restricted to (enter applicable designated specialized repair activity), Specialized Repair Activity.
Z	- Nonreparable. No repair is authorized.
B	- No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item.

(3) Recoverability Code. Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows :

Recoverability Codes	Definition
Z	- Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.
O	- Reparable item. When uneconomically reparable, condemn and dispose at organizational level.
F	- Reparable item. When uneconomically reparable, condemn and dispose at the direct support level.
H	- Reparable item. When uneconomically reparable, condemn and dispose at the general support level.
D	- Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.
L	- Reparable item. Repair, condemnation, and disposal not authorized below depot /specialized repair activity Level.

Recoverability Codes	Definition
A	- Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/ directives for specific instructions.

c. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

d. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item. The physical security classification of the item is indicated by the parenthetical entry (e.g., Phy Sec C1 (C)-Confidential, Phy Sec C1 (S)-Secret, Phy Sec C1 (T)-Top Secret). Items that are included in kits and sets are listed below the name of the kit or set with the quantity of each item in the kit or set indicated in the quantity incorporated in the unit column. When the part to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description. In the Special Tools List, the initial basis of issue (BOI) appears as the last line in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased accordingly.

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shims, spacers, etc.).

C-4. SPECIAL INFORMATION

a. Detailed assembly instructions for items source coded to be assembled are found in chapter 6, of this manual. Assembly components are listed immediately following the item to be assembled.

C-5. HOW TO LOCATE REPAIR PARTS

a. When National Stock Number or Part Number is Unknown:

(1) First. Using the table of contents, determine the subgroup within which the item belongs. This is necessary since illustrations are prepared for subgroups, and listings are divided into the same groups.

(2) Second. Find the illustration covering the subgroup to which the item belongs.

(3) Third. Identify the item on the illustration and note the illustration figure and item number of the item.

(4) Fourth. Using the Repair Parts Listing, find the figure and item number noted on the illustration.

b. When National Stock Number or Part Number is Known:

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in NIIN sequence followed by a list of part numbers in alphanumeric sequence, cross referenced to the illustration figure number and item number.

(2) Second. After finding the figure and item number, locate the figure and item number in the repair parts list.

C-6. Abbreviations

Abbreviations	Explanation
ASSY	assembly
CLA	class
GR	grade
HD	head
HEX	hexagon
HDW	hardware
I.R.	infra red
LED	light emitting diode
LG	long
SAAF	small arms alignment fixture

Section II. REPAIR PARTS LIST

ALIGNMENT DEVICE. LASER TRANSMITTER: SHORT RANGE

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	(7) U/M	(8) QTY INC. IN UNIT	
						GROUP: 14, ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE			
C-1		PBHHH	*	11835282	19200	SHORT RANGE ALIGNMENT DEVICE	EA	1	
C-1	1	PBHZZ	*	11835360	19200	INSTRUMENT CASE	EA	1	
C-1	2	PBHZZ	9905-01-078-4566	11748863-1	19200	PLATE, IDENT.	EA	2	
C-1	3	PBHHH	*	11835481	19200	PANEL ASSY	EA	1	
C-1	4	PAHZZ	*	11835278	19200	GASKET, HINGE	EA	2	
C-1	5	PAHZZ	*	MS3213-38	96906	SCREW, PAN HD	EA	18	
C-1	6	PAHZZ	*	11835561	19200	SATCHEL	EA	1	
C-1	7	PAHZZ	1265-01-083-2155	11749096	19200	SWITCH ASSY, TRIGGER, M16	EA	10	**
C-1	8	PAHZZ	*	11835556	19200	ROPE, MEASURING	EA	1	
C-1	9	PAHZZ	*	11749257	19200	INSTRUCTION SHEET	EA	1	
						GROUP: 14A01 PANEL ASSY, SHORT RANGE ALIGNMENT DEVICE			
C-2	1	PAHZZ	5305-00-054-6654	MS51957-30	96906	SCREW, PAN HD, NO. 6 -32 UNC-2A x .500 LG	EA	14	
C-2	2	PAHZZ	5310-00-722-5998	MS15795-805	96906	WASHER, FLAT, NO. 6	EA	93	
C-2	3	PBHZZ	*	11835530	19200	RETAINER BAR ASSY, COLUMN PREAMPS	EA	1	
C-2	4	PAHZZ	*	11835367	19200	COLUMN PREAMP ASSY, PWB	EA	12	
C-2	5	PBHZZ	*	11835529	19200	RETAINER BAR ASSEMBLY, ROW PREAMPS	EA	1	
C-2	6	PAHZZ	*	11835370	19200	AGC ASSY, PWB	EA	1	
C-2	7	PAHZZ	*	11835382	19200	ROW PREAMP ASSY, PWB	EA	12	
C-2	8	PAHZZ	*	MS51957-33	96906	SCREW, PAN HD, NO. 6 -32 UNC-2A x .875 LG	EA	2	
C-2	9	PAHZZ	*	11835373	19200	ASSY, PWB ANALOG MOTHERBOARD, A1	EA	1	
C-2	10	XBHZZ	*	11835507	19200	SUPPORT, RIGHT SIDE	EA	1	
C-2	11	XBHZZ	*	11835512	19200	SPACER, TOP	EA	1	
C-2	12	XBHZZ	*	11835511	19200	SUPPORT, TOP	EA	1	
C-2	13	XBHZZ	*	11835514	19200	SPACER, BOTTOM	EA	1	
C-2	14	XBHZZ	*	11835513	19200	SUPPORT, BOTTOM	EA	1	
C-2	15	XBHZZ	*	11835509	19200	SUPPORT, LEFT SIDE	EA	1	
C-2	16	PBHZZ	*	11835518	19200	GASKET, TARGET WINDOW	EA	2	
C-2	17	PBHZZ	*	11835519	19200	WINDOW, BACKING	EA	1	

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Section II. REPAIR PARTS LIST

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	(7) U/M	(8) QTY INC. IN UNIT
C-2	18	PBHZZ	*	11835520	19200	I.R. PASS FILTER	EA	1
C-2	19	PBHZZ	*	11835534	19200	RETAINER BAR ASSY, DIGITAL PWB	EA	1
C-2	20	PAHZZ	*	11835537	19200	STANDOFF, LOGIC PWB	EA	2
C-2	21	PAHZZ	*	11835276	19200	OUTPUT ASSY, PWB	EA	1
C-2	22	PAHZZ	*	11835273	19200	MICROPROCESSOR LOGIC ASSY, PWB	EA	1
C-2	23	PAHZZ	*	11835385	19200	TIMING ASSY, PWB	EA	1
C-2	24	PAHZZ	*	11835376	19200	INPUT ASSY, PWB	EA	1
C-2	25	PAHZZ	*	11835499	19200	ASSY, PWB, DIGITAL MOTHERBOARD, A2	EA	1
C-2	26	PAHZZ	*	MS51859-3	96906	WASHER, FLAT PLASTIC	EA	3
C-2	27	PAHZZ	*	11835885	19200	TRANSISTOR Q1	EA	1
C-2	28	PAHZZ	*	11835535	19200	STANDOFF	EA	14
C-2	29	PAHZZ	*	11835560	19200	HEAT SINK	EA	1
C-2	30	PAHZZ	*	11835734	19200	SPACER	EA	1
C-2	31	PAHZZ	*	11835379	19200	REGULATOR ASSY, PWB	EA	1
C-2	32	PBHZZ	*	M8805/99-025	81349	SWITCH, PUSH	EA	3
C-2	33	PBHZZ	5930-00-083-5807	11748985	19200	SWITCH, TOGGLE, WATERTIGHT	EA	1
C-2	34	PBHZZ	*	11835494	19200	FRONT PANEL	EA	1
C-2	35	PAHZZ	5310-00-934-9748	MS35649-244	96906	NUT, HEXAGON NO. 4 -40 UNC-2B	EA	13
C-2	36	PAHZZ	5310-00-595-6211	MS15795-803	96906	WASHER, FLAT, NO. 4	EA	45
C-2	37	PAHZZ	*	MS51959-30	96906	SCREW, 82° FLAT HD, NO. 6 -32 UNC-2A x .500 LG	EA	24
C-2	38	PBHZZ	*	FHN 26W	81349	FUSEHOLDER	EA	1
C-2	39	PAHZZ	*	F02A250 V1A	81340	FUSE	EA	1
C-2	40	PBHZZ	*	11835884	19200	GASKET, METER	EA	1
C-2	41	PBHZZ	*	MR13A020DCVVR	81349	VOLTMETER	EA	1
C-2	42	PAHZZ	*	MS51959-31	96906	SCREW, 82° FLAT HD, NO. 6 -32 UNC-2A x .625 LG	EA	18
C-2	43	PAHZZ	*	MS51959-15	96906	SCREW, 82° FLAT HD, NO. 4 -40 UNC-2A x .375 LG	EA	24
C-2	44	PAHZZ	5305-00-054-5651	MS51957-17	96906	SCREW, PAN HD, NO. 4 -40 UNC-2A x .500 LG	EA	9
C-2	45	PBHZZ	*	11835482	19200	DOOR ASSEMBLY	EA	3

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Section II. REPAIR PARTS LIST

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

(1) ILLUSRATION (a) FIG. NO.	(b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	FSCM	DESCRIPTION	(7) U/M	(8) QTY INC. IN UNIT
C-2	46	PBHZZ	*	11835487	19200	GASKET, DISPLAY WINDOW	EA	4
C-2	47	PABZZ	*	11835488	19200	WINDOW, DIGITAL DISPLAY	EA	4
C-2	48	PBHZZ	*	11835539	19200	GASKET, BATTERY BOX	EA	3
C-2	49	PBHZZ	*	11835490	19200	BATTERY CASE, SINGLE	EA	3
C-2	50	PAHZZ	5310-00-934-9761	MS35649-264	96906	NUT, HEXAGON, NO. 6 -32 UNC-2B	EA	33
C-2	51	PBHZZ	*	11835538	19200	GASKET, PWB, BATTERY	EA	3
C-2	52	PAHZZ	*	11835500	19200	PWB, SINGLE BATTERY	EA	3
C-2	53	PAHZZ	5305-00-054-6655	MS51957-31	96906	SCREW, PAN HD, NO. 6 -32 UNC-2A x . 625 LG	EA	24
C-2	54	PBHZZ	*	11835493	19200	GASKET, DISPLAY HOUSING	EA	4
C-2	55	PBHZZ	*	11835486	19200	DISPLAY HOUSING	EA	4
C-2	56	PBHZZ	*	11835531	19200	GASKET, DISPLAY, PWB	EA	4
C-2	57	PAHZZ	*	11835505	19200	ASSY, PWB, DISPLAY MODULE	EA	4
C-2	58	PAHZZ	5305-00-054-5649	MS51957-15	96906	SCREW, PAN HD, NO. 4 -40 UNC-2A x .375 LG	EA	32
C-2	59	PAHZZ	*	11835543	19200	WINDOW, FRONT	EA	1
C-2	60	PAHZZ	*	11835522	19200	TARGET FACE	EA	1
C-2	61	PBHZZ	*	11835521	19200	DIFFUSER	EA	2
C-2	62	PAHZZ	*	MS51957-32	96906	SCREW, PAN HD, NO. 6 -32 UNC-2A x .750 LG	EA	18
C-2	63	PBHZZ	*	11835552	19200	CABLE ASSY, W9	EA	1
C-2	64	PBHZZ	*	11835551-1	19200	CABLE ASSY, W5	EA	1
C-2	65	PBHZZ	*	11835551-2	19200	CABLE ASSY, W6	EA	1
C-2	66	PBHZZ	*	11835551-4	19200	CABLE ASSY, W8	EA	1
C-2	67	PBHZZ	*	11835551-3	19200	CABLE ASSY, W7	EA	1
C-2	68	PBHZZ	*	11835550-2	19200	CABLE ASSY, W2	EA	1
C-2	69	PBHZZ	*	11835550-1	19200	CABLE ASSY, W1	EA	1
C-2	70	PAHZZ	*	11749784-2	19200	CABLE CLAMP, ADJUST	EA	24
C-2	71	PAHZZ	*	11749784-1	19200	CABLE CLAMP, ADJUST	EA	6
C-2	72	PBHZZ	*	11835550-4	19200	CABLE ASSY, W4	EA	1
C-2	73	PBHZZ	*	11835550-3	19200	CABLE ASSY, W3	EA	1

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Section II. REPAIR PARTS LIST

ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE

(1) ILUSTRATION (a) FIG. NO.	(1) ILUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION	(7) U/M	(8) QTY INC. IN UNIT
C-2	74	PBHZZ	*	11835553	19200	HARNESS, W10	EA	1
						GROUP: 14X TOOLS		
		*	3439-00-294-9009	WS570	*	SOLDERING IRON	EA	1
		*	5110-00-239-8253	GGG-P-468	*	PLIERS, DIAGONAL CUT, 6"	EA	1
		*	5120-00-148-7917	GGG-W-636	*	WRENCH SET, COMBINATION	EA	1
		*	5120-00-227-7293	GGG-S-	*	SCREWDRIVER, CROSS-TIP 1 1/2"	EA	1
		*	5120-00-230-6380	GGG-W-686	*	WRENCH, TORQUE	EA	1
		*	5120-00-293-3481	GGG-P-471	*	PLIERS, NEEDLE NOSE	EA	1
		*	5180-01-007-8999	KIT-1	*	TORQUE SCREWDRIVER KIT	EA	1
		*				GROUP: 14Y TEST EQUIPMENT		
		*	*	11835282	19200	ALIGNMENT DEVICE, LASER TRANSMITTER: SHORT RANGE	EA	1
		*	*	11835286	19200	TEST SET, PROGRAMMER	EA	1
		*	*	11835287	19200	TEST SET, TRANSMITTER	EA	1
		*	6625-00-649-3290	*	*	VOLT-OHMETER	EA	1
				*	*	POWER SUPPLY, 0-20V	EA	1
		*	1265-01-079-5264	11749083	19200	M16A1 RIFLE LASER TRANSMITTER	EA	1
						GROUP: 14Z BULK MATERIAL		
BULK		*	*	MIL-I-22129	81349	INSULATION TUBING, AWG SIZE 24		AR
BULK		*	*	11749371	19200	INSULATING COMPOUND		AR
BULK		*	8030-00-823-7917	MIL-S-22473	81349	LOCKING COMPOUND, GRADE C		AR
BULK		*	8030-00-081-2338	MIL-S-22473	81349	PRIMER, GRADE T		AR
BULK		*	*	MIL-S-8802	81349	SEALANT, CLA-1/2		AR
BULK		*	*	MIL-W-16878/1	81349	WIRE, 24 AWG, TYPE B24, WHITE		AR
BULK		*	*	MIL-T-43435	81349	TAPE, LACING, TYPE I, FINISH B, SIZE 3		AR
BULK		*	*	MIL-I-19166	81349	INSULATION TAPE, GLASS, .010 THK x .38-.50 WIDE		AR
BULK		*	3439-00-163-4347	Q-QS-571	81349	SOLDER		AR
BULK		*	*	11749046		MOUNT, CABLE TIE		AR
BULK		*	*	MMS8		SOLVENT		
BULK		*	*	MS3367-5-9		STRAP, TIE DOWN		AR

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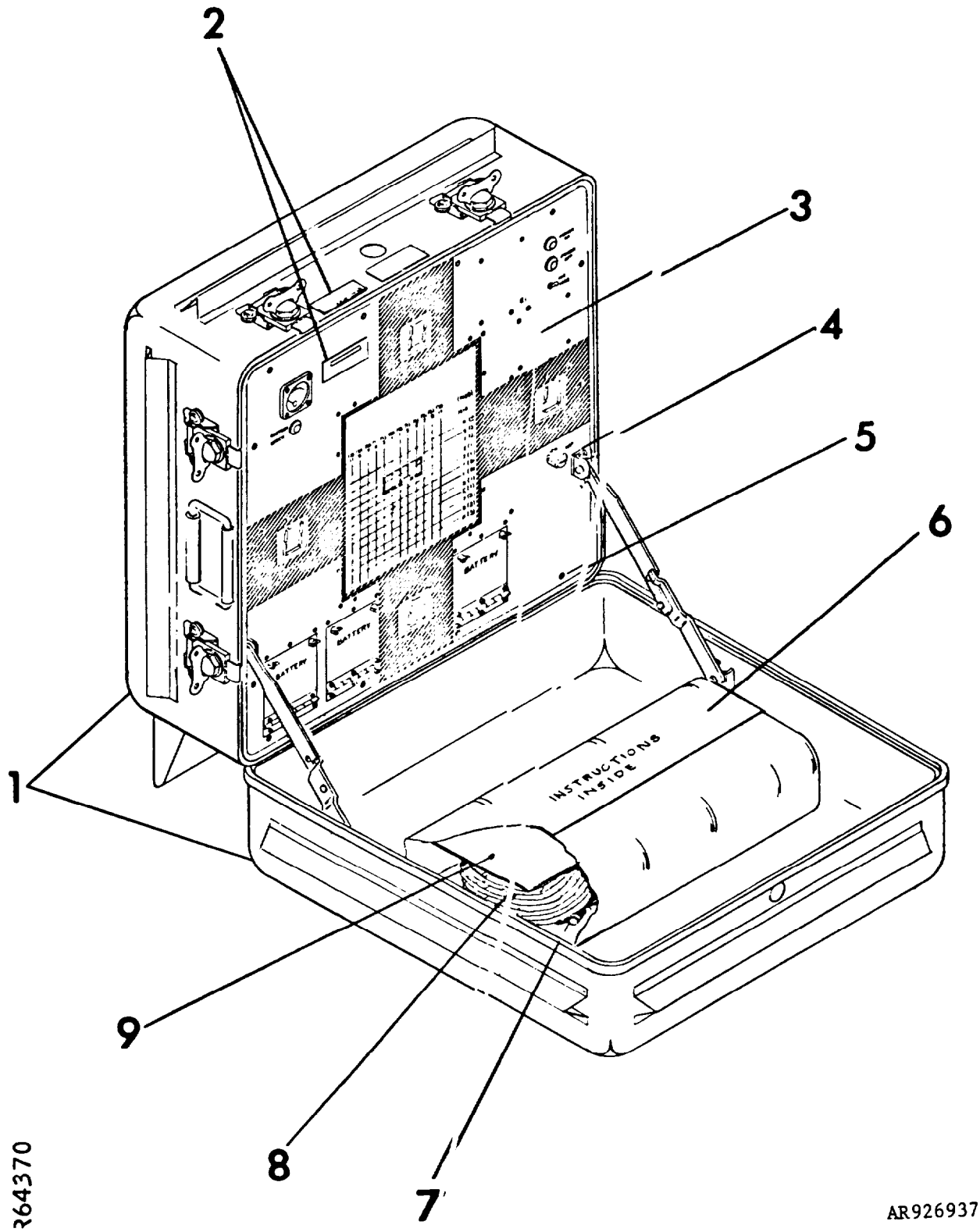

Figure C-1. Alignment Device, Laser Transmitter: Short Range

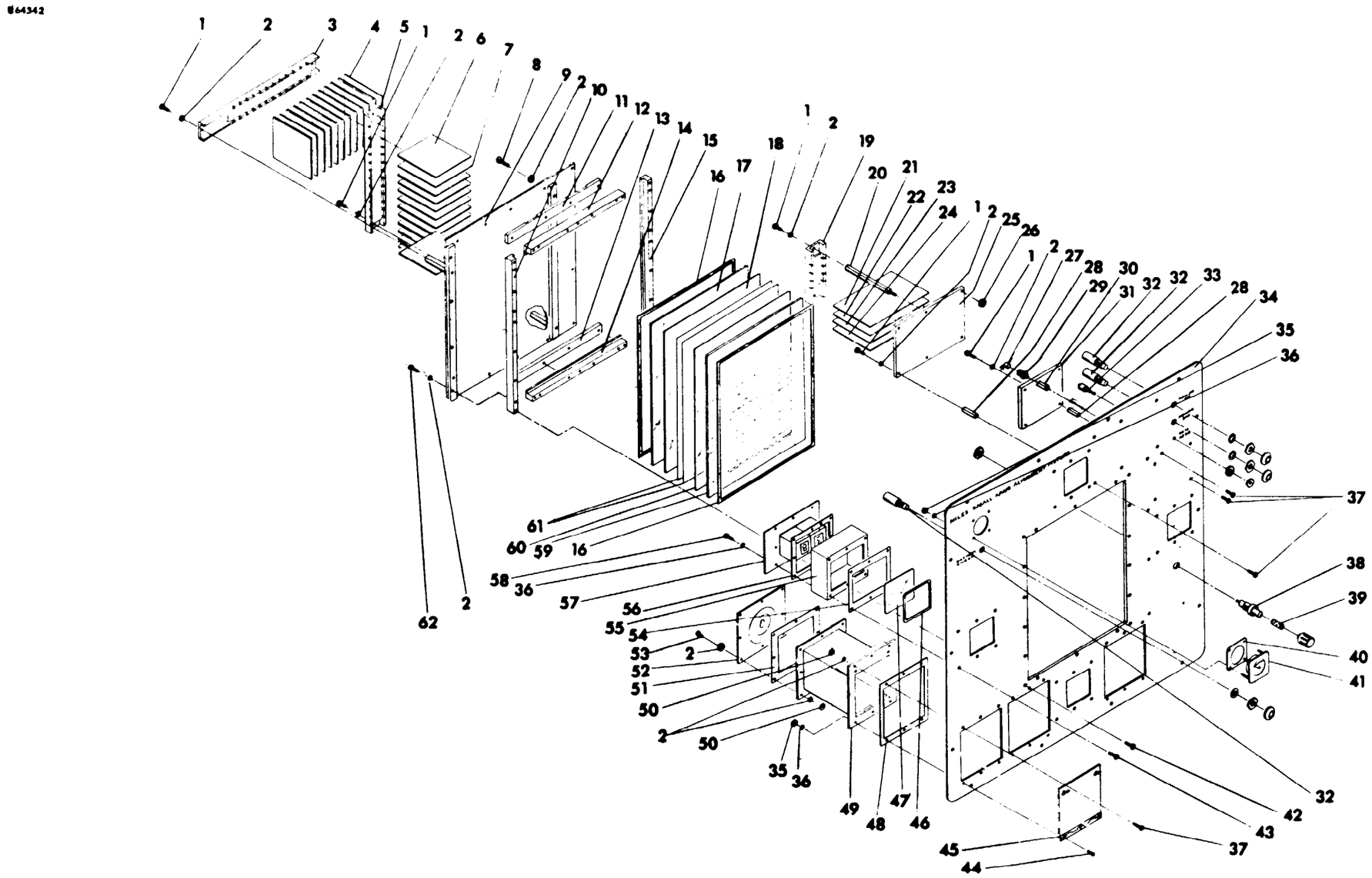

Figure C-2. Panel Assembly, Alignment Fixture Laser: M1 for Small Arms (sheet 1 of 2)

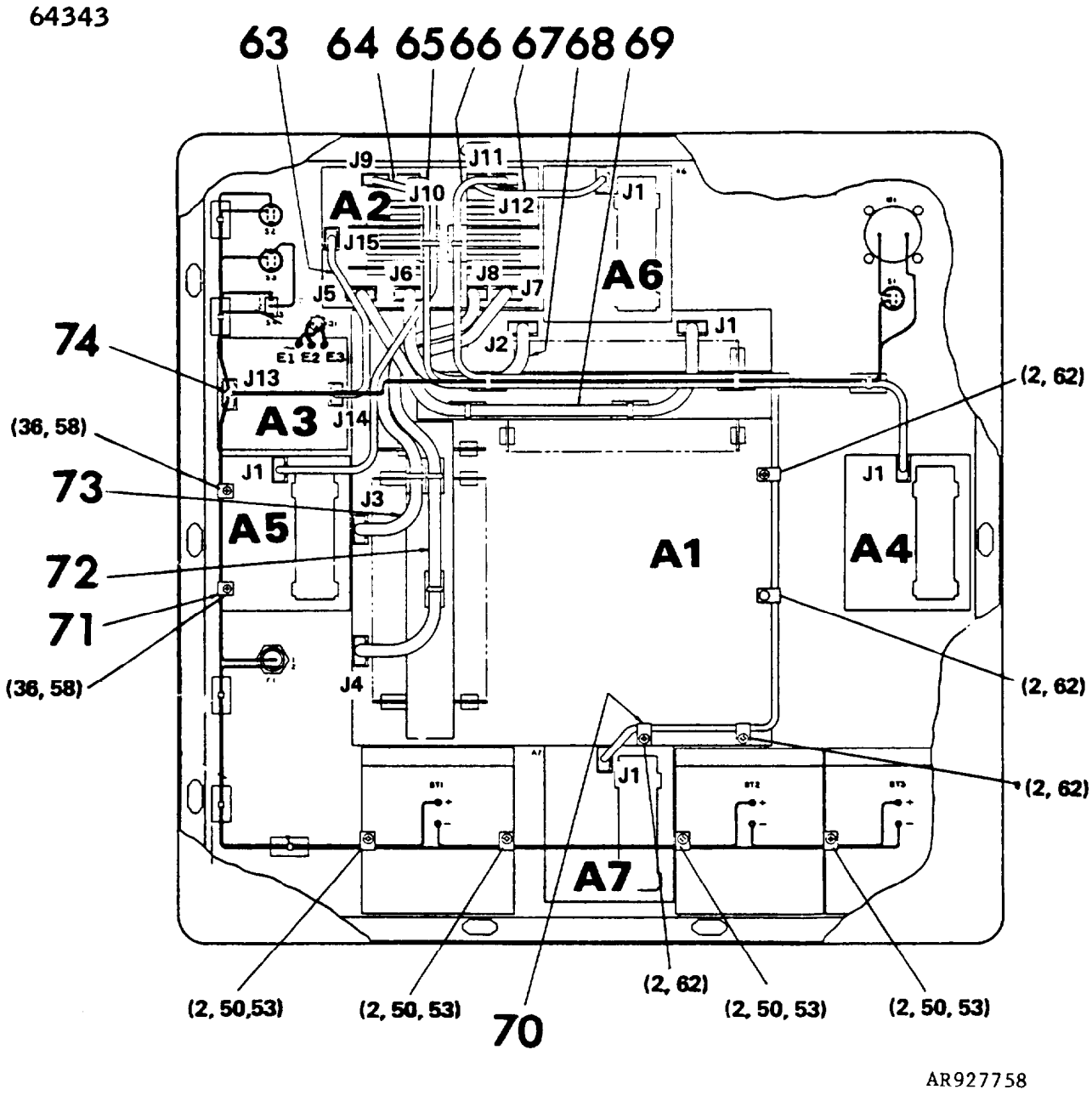

Figure C-2. Panel Assembly, Alignment Device, Laser Transmitter: Short Range (sheet 2 of 2)

SECTION IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

Stock Number	Figure No.	Item No.	Stock Number	Figure No.	Item No.

(To be supplied after NSNs are assigned)

Part Number	FSCM	Fig. No.	Item No.
FHN-26W	81349	C-2	38
F02A250V1A	81349	C-2	39
MR13A020DCVVR	81349	C-2	41
MS15795-803	96906	C-2	36
MS15795-805	96906	C-2	2
MS3213-38	96906	C-1	5
MS3367-5-9	96906	C-2	71
MS35649-244	96906	C-2	35
MS35649-264	96906	C-2	50
MS51859-3	96906	C-2	26
MS51957-15	96906	C-2	58
MS51957-17	96906	C-2	44
MS51957-30	96906	C-2	1
MS51957-31	96906	C-2	53
MS51957-32	96906	C-2	62
MS51957-33	96906	C-2	8
MS51959-15	96906	C-2	43
MS51959-30	96906	C-2	37
MS51959-31	96906	C-2	42
M8805/99-025	81349	C-2	32
11748863-1	19200	C-1	2
11748985	19200	C-2	33
11749046	19200	C-2	72
11749096	19200	C-1	7
11749257	19200	C-1	9
11749784-1	19200	C-2	71
11749784-2	19200	C-2	70
11835273	19200	C-2	22
11835276	19200	C-2	21
11835278	19200	C-1	4
11835282	19200	C-1	
11835360	19200	C-1	1
11835367	19200	C-2	4
11835370	19200	C-2	6
11835373	19200	C-2	9
11835376	19200	C-2	24
11835379	19200	C-2	31
11835382	19200	C-2	7
11835385	19200	C-2	23
11835481	19200	C-2	
11835481	19200	C-1	3
11835482	19200	C-2	45
11835486	19200	C-2	55
11835487	19200	C-2	46
11835488	19200	C-2	47
11835489	19200	C-2	49
11835493	19200	C-2	54
11835494	19200	C-2	34
11835499	19200	C-2	25
11835500	19200	C-2	52
11835505	19200	C-2	57
11835507	19200	C-2	10
11835509	19200	C-2	15
11835511	19200	C-2	12
11835512	19200	C-2	11
11835513	19200	C-2	14
11835514	19200	C-2	13
11835518	19200	C-2	16
11835519	19200	C-2	17
11835520	19200	C-2	18
11835521	19200	C-2	61
11835522	19200	C-2	60
11835529	19200	C-2	5
11835530	19200	C-2	3
11835531	19200	C-2	56
11835534	19200	C-2	19
11835535	19200	C-2	28
11835537	19200	C-2	20
11835538	19200	C-2	51
11835539	19200	C-2	48
11835543	19200	C-2	59
11835550-1	19200	C-2	69
11835550-2	19200	C-2	68
11835550-3	19200	C-2	73
11835550-4	19200	C-2	72
11835551-1	19200	C-2	64
11835551-2	19200	C-2	65
11835551-3	19200	C-2	67
11835551-4	19200	C-2	66
11835552	19200	C-2	63
11835553	19200	C-2	76
11835556	19200	C-1	8
11835560	19200	C-2	29
11835561	19200	C-1	6
11835734	19200	C-2	30
11835884	19200	C-2	40
11835885	19200	C-2	27

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INDEX - Continued

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DA FORM 2028-2 (1 JUL 79)

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P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE

REVERSE OF DA FORM 2028-2

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

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TEAR ALONG PERFORATED LINE

Commander
US Army Armament Materiel Readiness Command
ATTN: DRSAR-MAS
Rock Island, IL 61299

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

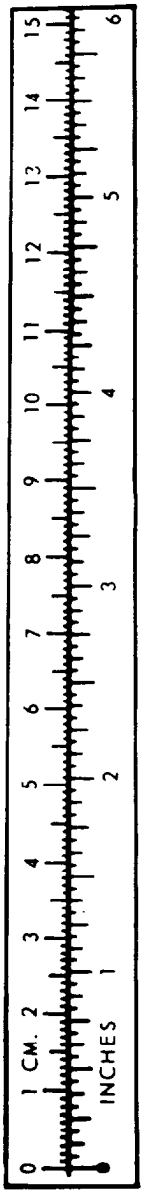
TEMPERATURE

$5/9\,(^0F - 32) = {}^0C$
212^0 Fahrenheit is equivalent to 100^0 Celsius
90^0 Fahrenheit is equivalent to 32.2^0 Celsius
32^0 Fahrenheit is equivalent to 0^0 Celsius
$9/5\,C^0 + 32 = F^0$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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