TM 9-4935-473-14-1

TECHNICAL MANUAL

OPERATOR, DIRECT SUPPORT AND GENERAL SUPPORT

MAINTENANCE MANUAL

FOR

TEST SET, GUIDED MISSILE SYSTEM

(TSGMS)

TOW Airborne System

This copy is a reprint which includes current pages from Changes 1 through 12.

HEADQUARTERS, DEPARTMENT OF THE ARMY

SEPTEMBER 1976

WARNING

Paint, primer, toluol, alcohol and solvents are toxic and flammable. Keep away from heat and open flames. Use only in well-ventilated area. Avoid repeated contact with the skin.

Ensure that aircraft switches have been set for initial conditions for Control Monitor self test per TM 9-1425-473-34 prior to performing self test.

Ensure that front panel ON/OFF switch is set to OFF prior to any repair. Presence of power during replacement may injure personnel or may damage equipment.

Ensure that the cable on which repair is performed is disconnected from all equipment. Presence of power during replacement may injure personnel or may damage equipment.

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin 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:

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Department of the Army
Washington, D. C., 30 September 1976

OPERATOR, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR TEST SET, GUIDED MISSILE SYSTEM (TSGMS)

REPORTING OF ERRORS

You can improve this manual by recommending improvements using DA Form 2028 (Recommended Changes to DA Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual and mail direct to: Commander, U.S Army Missile Command, ATTN: AMSMI-LC-ME-PMS, Redstone Arsenal, Alabama 35898-3298. A reply will be furnished direct to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope.

Test Set, Guided Missile System (TSGMS) technical manual consists of two volumes. Volume 1, TM 9-4935-473-14-1, provides operator and DS/GS instructions for maintenance and operation of the TSGMS. Volume 2, TM 9-4935-473-14-2, provides troubleshooting procedures and circuit theory for the TSGMS. Appendix A of TM 9-4935-473-14-1 contains a list of current references. Appendix B of TM 9-4935-473-14-1 contains the Maintenance Allocation Chart (MAC). The Maintenance Allocation Chart also contains a list of special tools that are required for the maintenance of the TSGMS.

1-2. Forms, Records, and Reports.

a. General. All personnel and organizations responsible for operating or maintaining the TSGMS are responsible for the preparation and disposition of U.S. Army equipment records.

b. Authorization Forms. Forms that are required for operation and maintenance of equipment are listed and explained in DA PAM 738-750. A complete list of DA Forms is given in DA PAM 25-30.

c. Reports of Accidents. Any accident that injures personnel or damages equipment shall be reported as required by AR 385-40.

1-2.1 Quality Assurance/Quality Control

a. General. Support maintenance performed under the guidelines given in this manual must be accomplished in a manner that will provide adequate confidence that the repaired item will perform satisfactorily in actual operation. To achieve this level of confidence the support unit must establish an effective quality management program as outlined in DA 750-19. Additional quality assurance data can be found in FM 9-59.

b. Inspection procedure. When an item is received for test and repair, it will be inspected by personnel in charge of repair. A survey of the item will be made and the findings reported on DA Form 2404. Generally, the QC inspector will inspect the finished test or repair, except when reassembly procedures make the repaired item inaccessible. In this case, QC inspections must be made in process during repair.

c. QC Criteria - Appendix E. Appendix E contains inspection criteria necessary to assure that repair accomplished meets an acceptable level of quality. Reference is made to appropriate documents containing QA/QC criteria, or, in the absence of such documents, inspection criteria is contained in Appendix E. Included also is a tabular listing of the paragraphs in text where QA/QC checks are required.

1-3. Administrative Storage.

Refer to TM 740-90-1 for administrative storage procedures for the TSGMS.

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

The major components of TSGMS shall be destroyed in the following order to prevent enemy use. The Monitor and Control Unit (MCU), the Test Set, Guided Missile Launcher Alignment - Circuit Amplitude (TSGMLACA), and the Cable Assembly Case (CAC).

1-5. Abbreviations/Acronyms.

The following abbreviations/acronyms are used throughout this manual and are not found in MIL-STD-12.

AMS	Analog meter switch
BI	Blank input
CAC	Cable assembly case
COMP	Comparator
CVAC	Continually variable amplitude carrier
DMM	Digital multimeter
DPM	Digital panel meter
DS	Direct support
EPS	Electronic power supply
GS	General support
Inh	Inhibit
IRTA	IR Target assembly
Kl(t)	Az and el channels detector margins variable gain term

LED	Light emitting diodes
MAC	Maintenance allocation chart
MCA	Missile command amplifier
MCU	Monitor and control unit
Meg	Megohms
MOD F	Modulation frequency
N/A	Not applicable
mr	Milliradian
NEI	Noise equivalent irradiance
OLC	Open-loop command
Ph	Phase
PSBI	Pitch self-balance integrator
PVCO	Pitch voltage controlled oscillator
Pwr	Power
RBI	Ripple blank input
RBO	Ripple blank output
ROM	Read only memory
SCA	Stabilization control amplifier
Sec	Second
SMA	System monitor assembly
S/N	Signal to noise ratio
t	Time
TAC	Test Access connector
T/C	Test connector
TML	TOW missile launcher
TOW	Tube-launched, optically-tracked, wire command-linked missile
TP	Test point
TSEM	TOW system evaluation missile
TSGMLACA	Test set, guided missile launcher alignment-circuit amplitude
TSGMS	Test set, guided missile system
TSU	Telescopic sight unit
V_h	Helicopter velocity
VS1	Voltage, Signal 1
W/S	Wire signal
M65	TOW guided missile, helicopter, armament subsystem
YOLC	Yaw open loop command
YSBI	Yaw self-balance integrator
YVCO	Yaw voltage controlled oscillator
α	Synchro angles
Δ	Deviation
θ	Aircraft pitch angle
ρ	Component of computer angle
σ_Z	Line of sight depression angle
ϕ	Aircraft roll angle

Section II. DESCRIPTION AND DATA

1-6. General.

The purpose of the TSGMS is to provide test capability for field level maintenance of the Armament Subsystem, Helicopter, TOW Guided Missile: M65. The TSGMS verifies the M65 System as well as isolates system faults not detected by built-in-test (BIT). Throughout this manual the designation XM65 and M65 are used interchangeably. The correct designation is M65. All items unique to a TSGMS equipped to support M65 with C-NITE shall be designated as such.

1-7. Monitor and Control Unit (MCU), (Figure 1-1).

The MCU consists of the control monitor and the IR target assembly. These assemblies supply stimuli to and measure the response of the M65.

a. Control Monitor. Maximizes use of automatic signal processing and minimizes the amount of operator participation. The control monitor, when operated as part of the TSGMS, performs the following M65 tests:

(1) M65 power. Checks the M65 primary and secondary power forms for amplitude, frequency, and phasing.

(2) Programmer timing. Verifies selected M65 timing function for amplitude and time.

(3) Noise equivalent irradiance (NEI). Measures NEI in the wide, medium and narrow fields of view with the use of a calibrated IR source.

(4) Angular noise. Measures noise in the wide, medium, and narrow fields of view using a calibrated source.

(5) IR boresight. Measures the boresight error between the wide, medium and narrow fields of view.

(6) Open loop command. Measures the yaw open loop command for the values of azimuth gimbal angle, airspeed, and missile selected.

(7) Missile command, electronic control, amplifier (MCA) limits, continually variable amplitude carrier (CVAC) and G-bias. Measures the G-bias dc level and CVAC peak-to-peak amplitude. MCA limits are verified by applying VS1 error signals of sufficient magnitude to be limited in the MCA pitch and yaw channels.

(8) System step response. Measures at the pitch and yaw output amplifiers the system response to a 2.0 mr peak, 1 Hz, IR error.

(9) Launch constraints. Verifies the M65 azimuth gimbal angle, helicopter roll angle, line of sight rates and launcher position status launch constraint logic for proper operation.

(10) Stabilization frequency response. Measures the az and el stabilization servo frequency response.

(11) BIT verification. Verifies the M65 BIT for proper operation by performing BIT and monitoring the SCA BIT functions for a pass condition.

(12) Self-test. Determines the functional capability by providing GO/NO-GO displays.

b. IR Target Assembly. Provides targets for visual and IR boresight checks. An IR source array consists of five IR light emitting diodes (LED) arranged on the assembly in a cross configuration spaced 1 inch apart for boresighting the wide, medium, and narrow field detectors. In the M65 with C-NITE application, a thermal patch mounted on the front panel along with left IR diode of target 2 is used to check out the boresight of the FLIR to the direct view optics tracker (Figure 2-3, item 9).

c. Extender Cards and Test Probes. Provide access to test points during troubleshooting.

◀ NOTE ▶

MCU serial numbers 200046 and subsequent come with the purge adapter. On serial numbers 200001 thru 200045, the purge adapter must be requisitioned and assembled from the piece parts listed in Appendix C and paragraph 3-19.

d. Purge Adapter. Two fittings and a seal are used together to provide connection of purge hose to TSU for purging.

e. Card Ejector. Used to prevent spreading and bending of MCU and TSEM circuit cards connector pins.

1-8. Test Set, Guided Missile Launcher Alignment-Circuit Amplitude (TSGMLACA), (Figure 1-2).

The TSGMLACA contains the tripod assembly and adjustable head adapter assembly, distance measuring device, gunner's quadrant, boresight device telescopic sight unit (TSU), boresight telescope, passive target assembly, target alignment assembly, TOW system evaluation missile (TSEM), and TSEM power cable.

a. Tripod and Geared Panhead Assemblies. The field-type tripod with the geared panhead assembly is capable of three rotational degrees of movement (pitch, yaw, roll) plus lateral adjustment. The tripod and geared panhead assemblies are used to position either the IR target or passive target assemblies for launcher boresight verification.

b. Distance Measuring Device. Marks the distance from the front of the aircraft to either the IR or passive target assemblies.

c. Gunner's Quadrant. Aligns in pitch and roll either the IR or passive target assemblies to the launchers using the TSU as a reference point.

d. Boresight Device TSU. Aligns either the IR or passive target assemblies to the TSU.

e. Boresight Telescope. Aligns either the IR or passive target assemblies with the TSU. The boresight telescope also checks the launcher's alignment.

f. Passive Target Assembly. Determines the existence of launcher boresight errors.

g. TSEM Power Cable, W10. Provides dc power for the TSEM.

h. TSEM. Verifies the missile interface signals, shear pin depression and launcher alignment checks. Simulates the TOW missile prefire, fire and wirecut squibs and checks the M65 firing signals. Verifies the M65 wire signal components pitch and yaw open loop frequency response. Monitors shear pin depression sensor signal. Performs self-test.

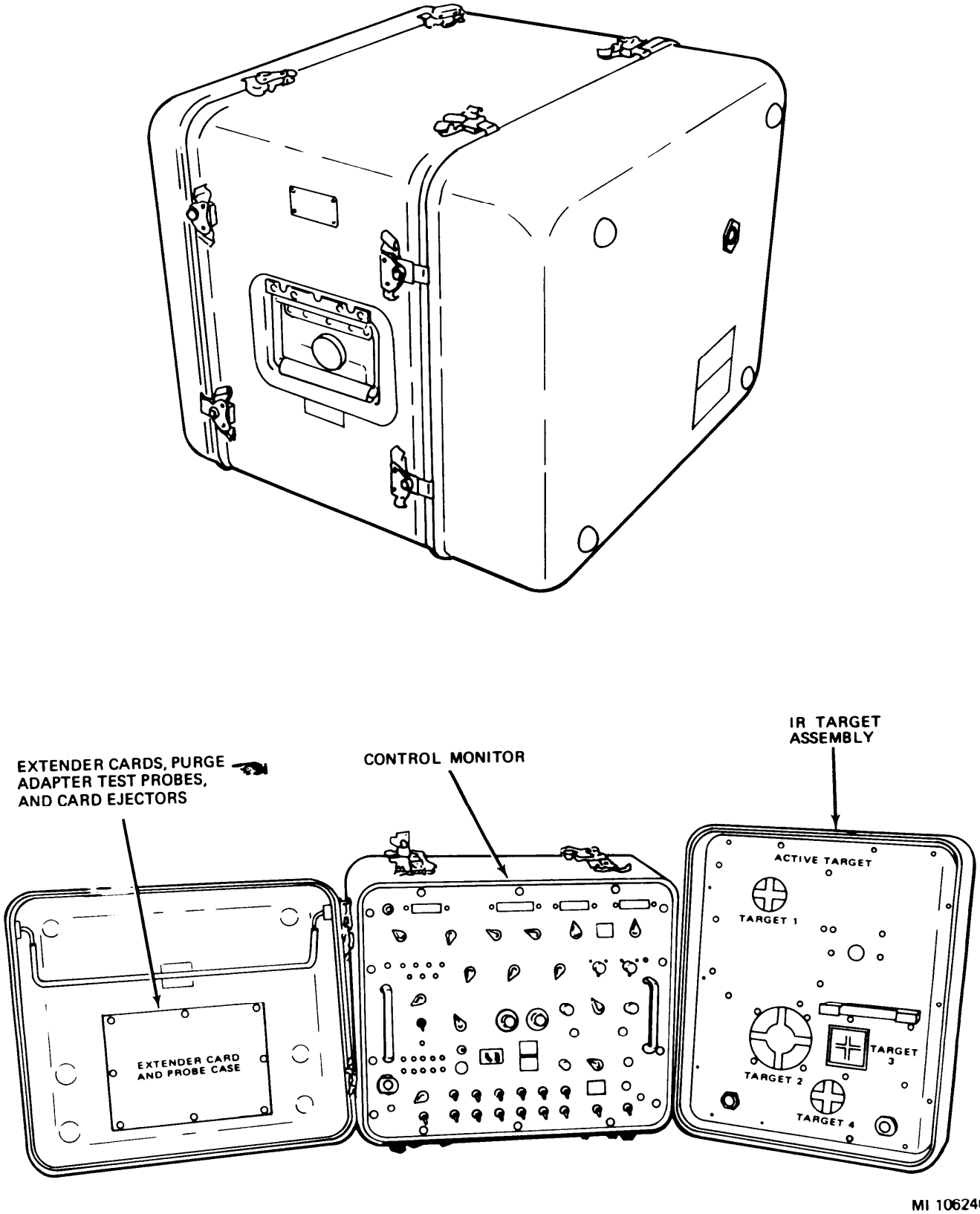
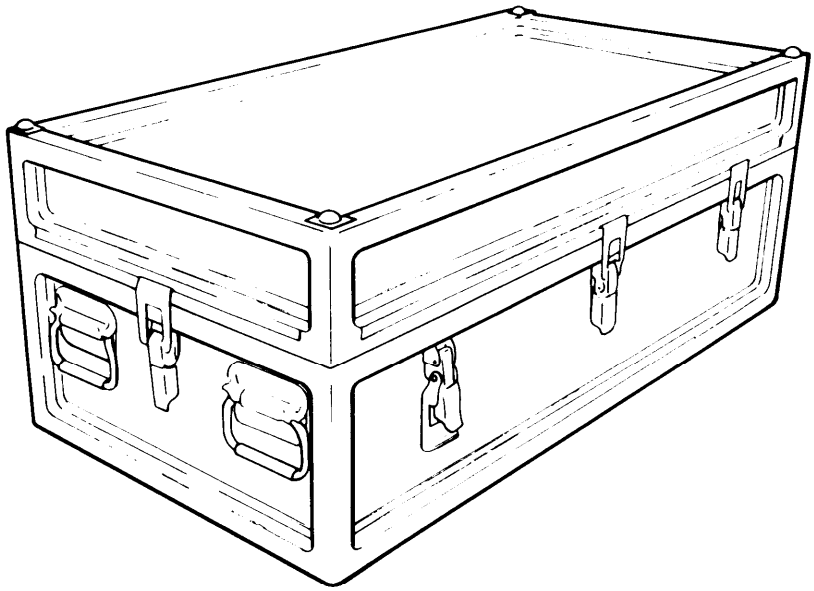


Figure 1-l. Monitor and Control Unit (MCU)



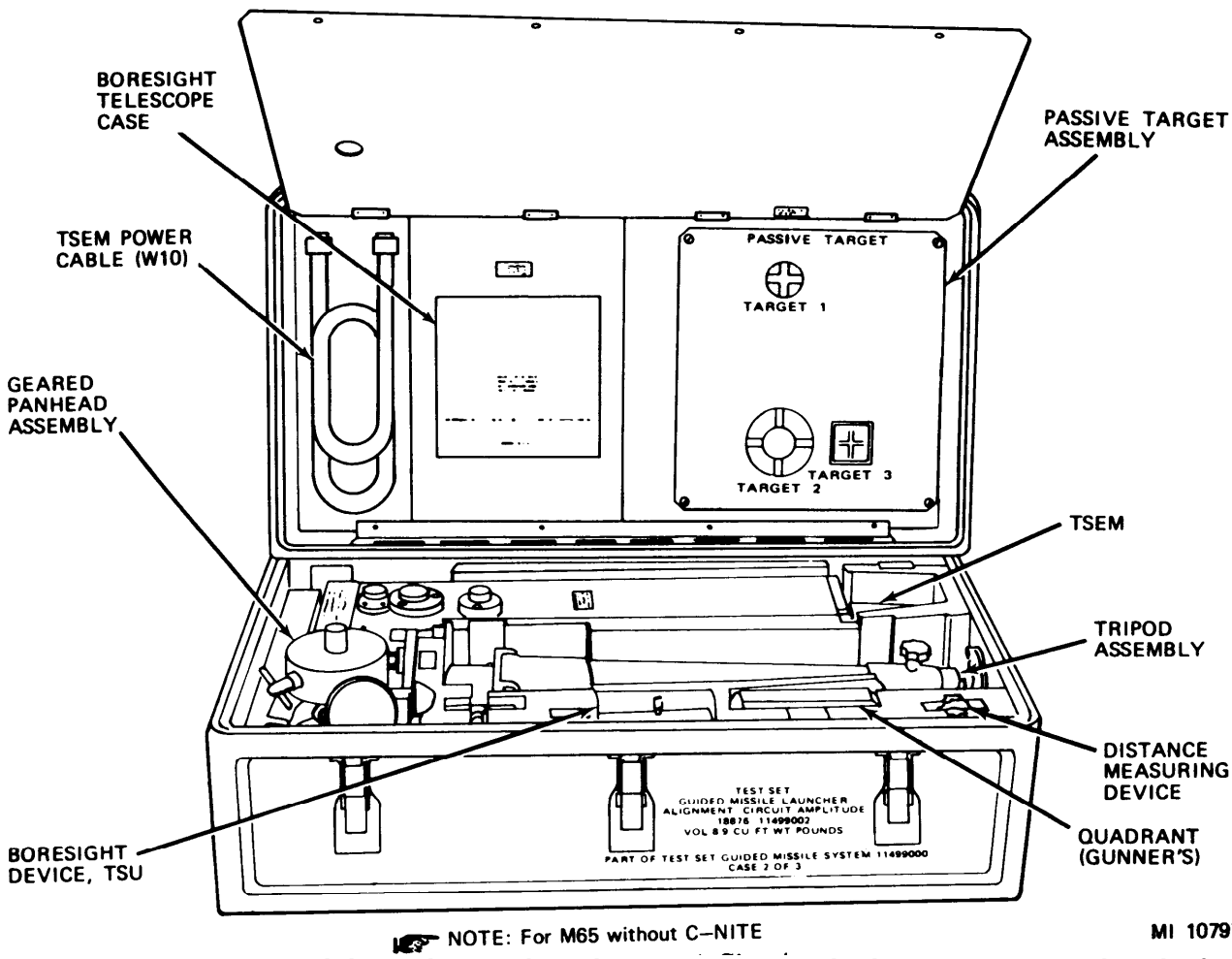


Figure 1-2. Test Set, Guided Missile Launcher Alignment-Circuit Amplitude (TSGMLACA) (Sheet 1 of 2)

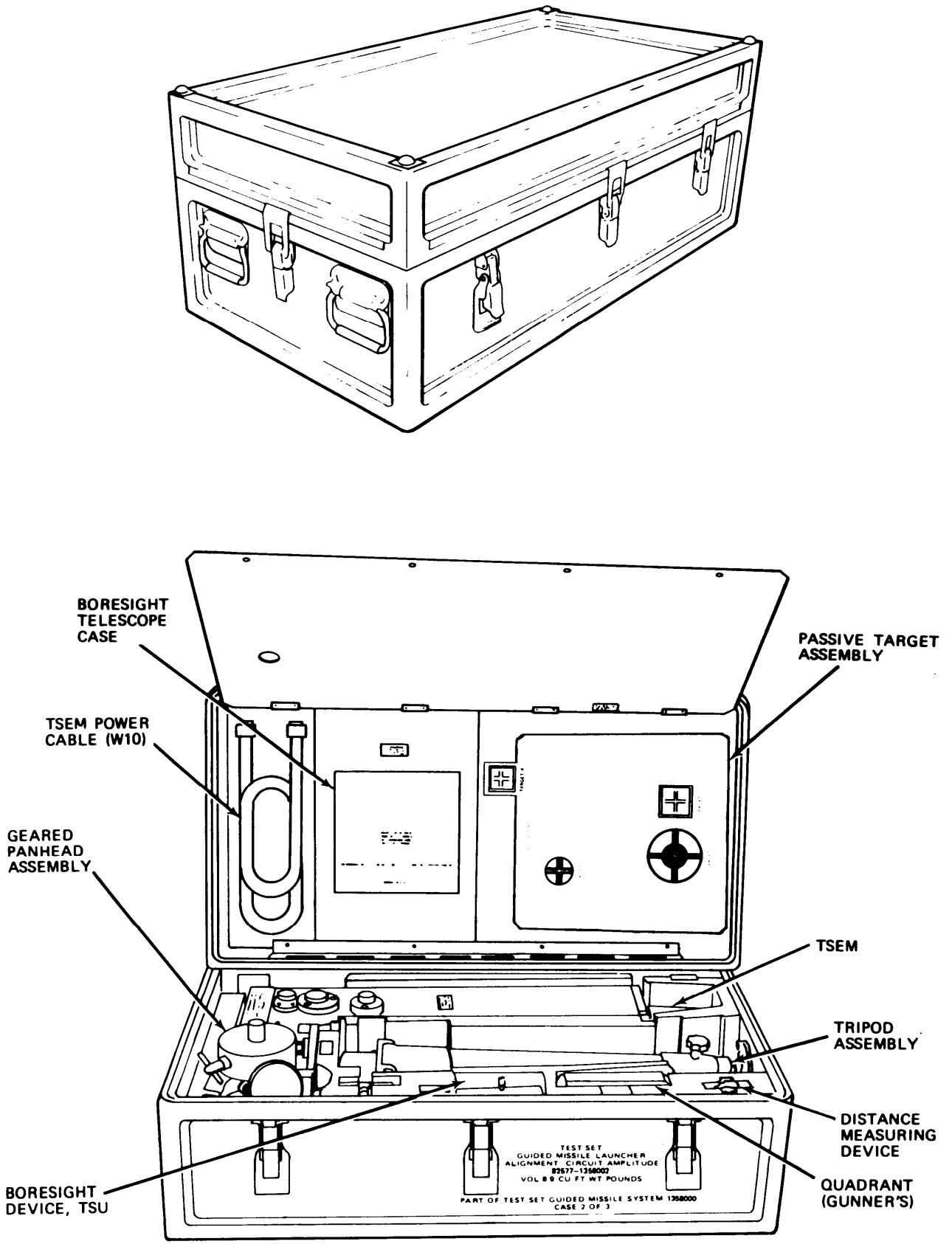


Figure 1-2. Test Set, Guided Missile Launcher Alignment-Circuit Amplitude (TSGMLACA) (Sheet 2 of 2)

1-9. Cable Assembly Case (CAC), (Figure 1-3).

The CAC contains the power cable (W1), target cable (W2), SCA cable (W3), fwd TAC cable (W4), aft TAC cable (W5), tailboom cable (W6), EPS T/C cable (W7), TSEM signal cable (W8), SECU cable (W9), target power cable (W11), corrector lens, and the signal monitor assembly.

a. Power Cable (W1). Provides dc power from the aircraft dc power connector (J237) to the control monitor rear panel Jl, POWER connector.

b. Target Cable (W2). Provides electrical interconnections between the IR target assembly and the control monitor real panel J2/TARGET connector.

c. SCA Cable (W3). Provides electrical interconnections between the SCA unit test connector (2J05) and control monitor rear panel J3/SCA connector.

d. Fwd TAC Cable (W4). Provides electrical interconnections between the forward test connector (TEST 2) and control monitor rear panel J4/T2 connector.

e. Aft TAC Cable (W5). Provides electrical interconnection between the aft test access connector (TEST 1) and control monitor rear panel J5/T1 connector.

g. EPS T/C Cable (W7). Provides electrical inter- (J327) and control monitor rear panel J6/J327 connector.

f. Tailboom Cable (W6). Provides electrical interconnections between aircraft gyro access connector connections between the EPS unit test connector (7J04) and control monitor rear panel J7/EPS connector.

h. TSEM Signal Cable (W8). Provides electrical interconnections between the TSEM test connector (Jl) and the signal monitor assembly.

i. SECU Cable (W9). Provides electrical interconnections between the SECU unit test connector and the signal monitor assembly.

j. Corrector Lens. Focuses the TSU IR and visual optics at a point located 500 inches from the TSU IR/ optical telescope. The frame of the corrector lens provides for positioning the corrector lens concentric with the TSU IR narrow field of view.

k. Signal Monitor Assembly. Provides test access for the forward (TEST 2), SECU or the TSEM (Jl) connectors.

l. Target Power Cable (W11). Provides electrical interface between the power adapter and the thermal patch along with the left IR diode on the IR target assembly.

m. Power Adapter. Converts external battery power to the levels required to activate thermal patch and left IR diode of target 2 on the IR target assembly. Checks that the battery and log H function properly to verify the operation of the IR target assembly.

1-10. Unit Data.

Table 1-1 shows the physical description of the TSGMS major components.

Table 1-1. TSGMS Components Physical Description

Component	Length	Height	Width	Weight
Monitor and control unit (MCU)	20 in	17 in	20 in	Approx. 88 lbs.
Test set guided missile launcher alignment - circuit amplitude (TSGMLACA)	42 in	17 in	22 in	Approx. 158 lbs.
Cable Assembly Case (CAC)	42 in	17 in	22 in	Approx. 170 lbs.

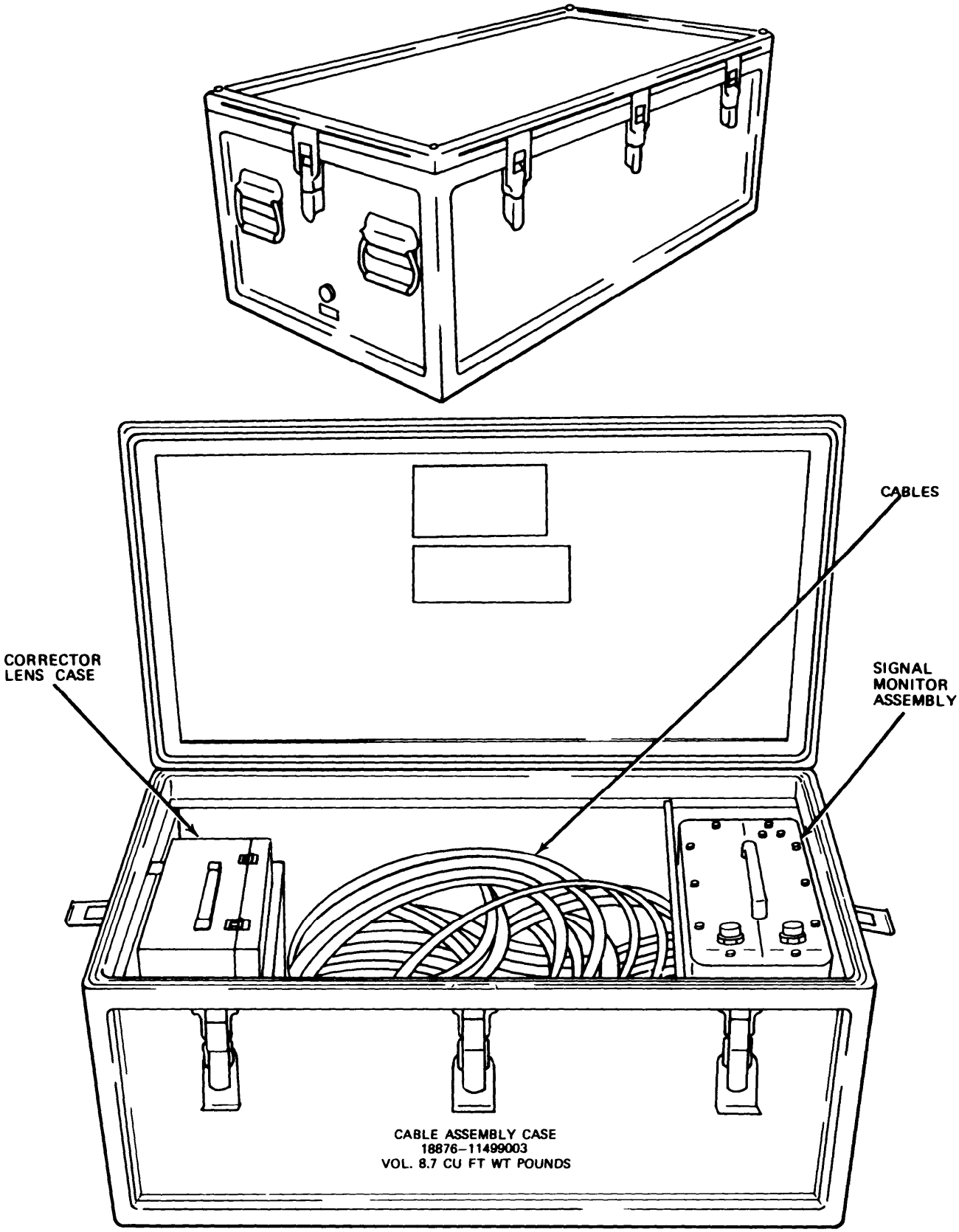
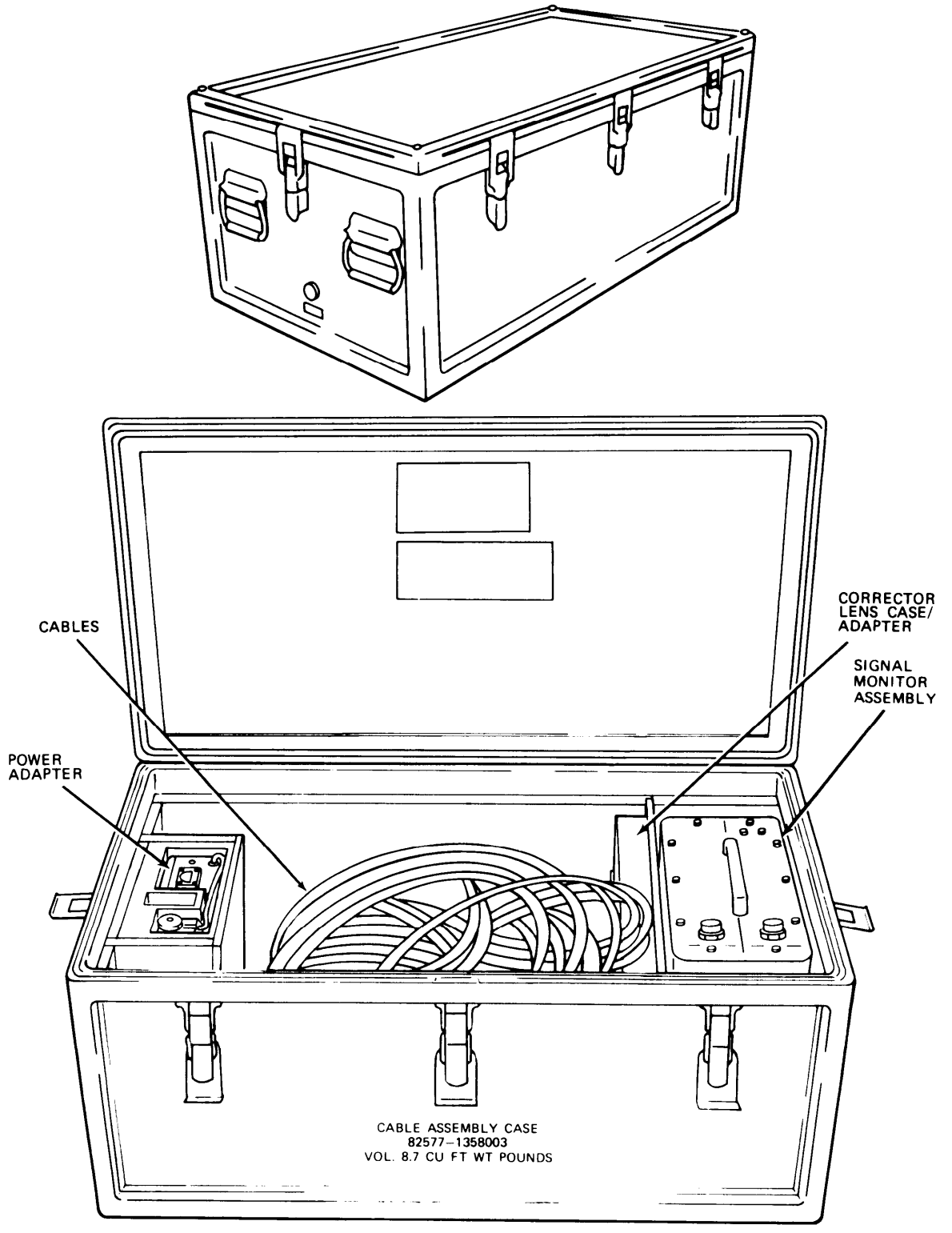


Figure 1-3. Cable Assembly Case (CAC) (Sheet 1 of 2)



NOTE: Equipped to support M65 with C-NITE

Figure 1-3. Cable Assembly Case (CAC) (Sheet 2 of 2)

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INDICATORS

2-1. General.

This section describes the various controls and indicaters and provides the operator sufficient information to ensure the proper operation of the TSGMS.

2-2. Monitor and Control Unit (MCU).

a. Control Monitor (Figures 2-1, 2-2). Consists of controls, displays and indicators used to perform tests on the M65. Table 2-1 defines the function of each control or instrument on the front panel using figure 2-1. Table 2-5 defines the function of each instrument on the back panel using figure 2-2. Tables 2-2 and 2-3, which describe the switch combinations of the TEST SELECTOR 1, TEST SELECTOR 2, and CHANNEL SELECTOR switches are to be used in conjunction with figure 2-1. Table 2-4 lists the automatic tests available on the Control Monitor.

b. IR Target Assembly (Figure 2-3). Consists of controls used to perform M65 and M65 with C-NITE tests. Table 2-6 defines the functions of each display and indicator.

2-3. Test Set, Guided Missile Launcher Alignment-Circuit Amplitude (TSGMLACA).

a. Tripod and Adjustable Head Adapter Assembly (Figure 2-4). Positions either the IR or passive target assemblies for launcher bore sight verification. Table 2-7 defines the function of each control.

b. Boresight Device (Figure 2-5). Aligns the passive or IR target assemblies to TSU mounted on the aircraft. Table 2-8 defines the function of each control or instrument.

c. Passive Target Assembly (Figure 2-6). Consists of displays used to perform M65 boresight. Table 2-9 defines the function of each display.

d. TSEM (Figure 2-7). Consists of controls, displays and indicators used to perform the M65 tests. Table 2-10 defines the function of each control or indicator on the front panel.

2-4. Cable Assembly Case (CAC).

a. Corrector Lens (Figure 2-8). Focuses the TSU IR and visual optics. Also provides a lookback target used to align corrector lens and target board. Table 2-11 defines the function of the controls.

b. Signal Monitor Assembly (Figure 2-9). Provides test access from the aircraft or the TSEM. Table 2-12 defines the functions of the controls or instruments. For hook-up procedures from SECU or the TSEM refer to TM 9-1425-473-34.

c. Power Adapter (Figure 2-9.1). Converts external battery power to the levels required to activate the thermal patch on the IR target assembly. Checks the battery and log H functions to verify the operation of the IR target assembly.

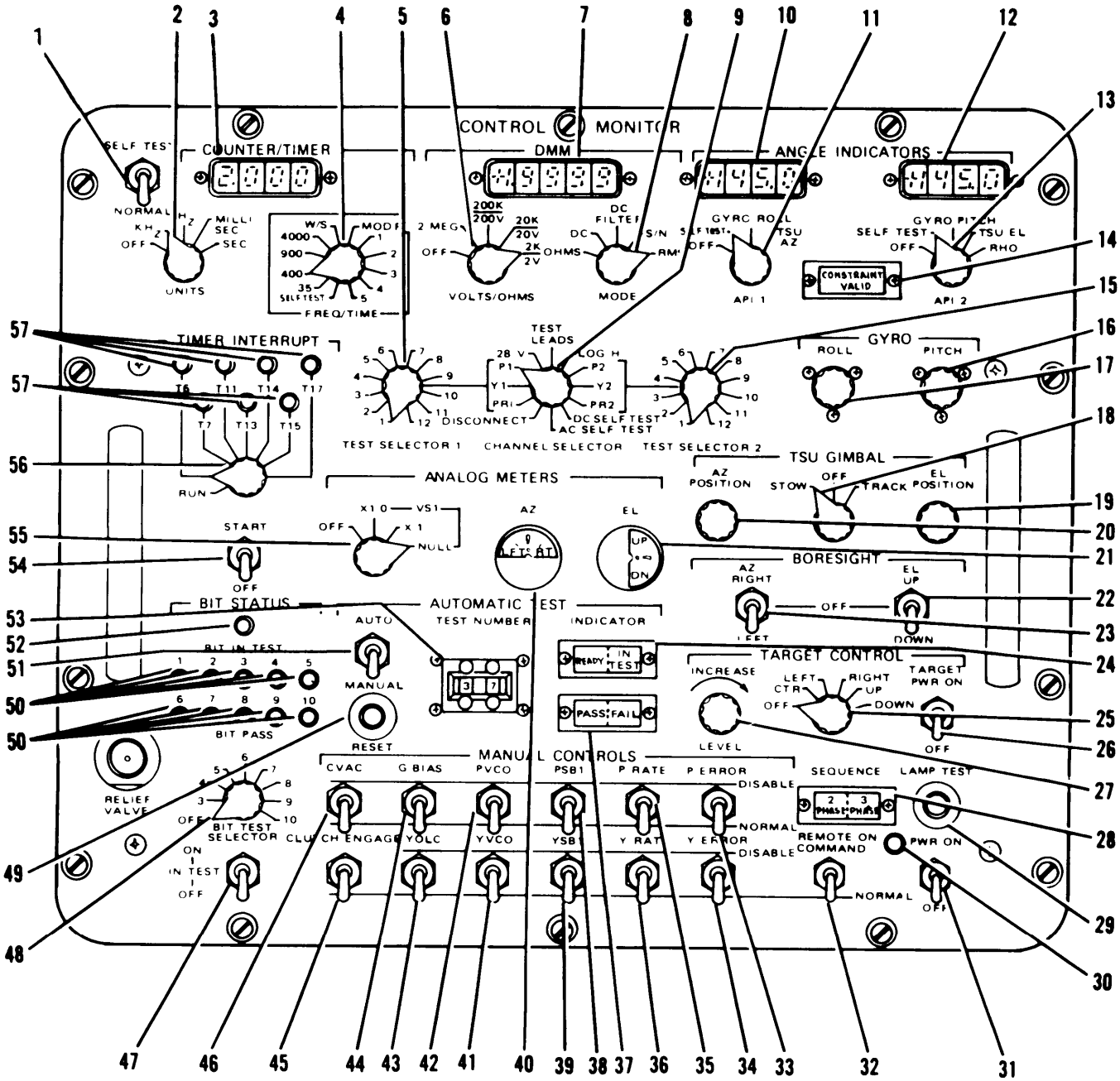


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Figure 2-1. Front Panel, Control Monitor

Table 2-1. Front Panel, Control Monitor Controls and Indicators

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
1	N/A	SELF TEST/NORMAL switch	Selects normal operation or enables self test circuits to verify proper operation of the control monitor
2	COUNTER/TIMER	UNITS switch	Five position rotary switch used to select mode of operation of COUNTER/TIMER
		OFF	Removes power from COUNTER/ TIMER display
		KHz	Enables counter to operate and display frequency in KHz
		Hz	Enables counter to operate and display frequency in Hz
		MILLISEC	Enables timer to operate and display time in milliseconds
		SEC	Enables timer to operate and display time in seconds
3		Digital display	Indicates frequency/time measurements
4		FREQ/TIME switch	Twelve position rotary switch used to select the following inputs:
		SELF TEST	Internal 1 kHz
		35	Internal 35 Hz
		400	Internal 400 Hz/400 Hz from XM65
		900	900 Hz from XM65
		4000	4 kHz from XM65
		W/S	Wire signals from XM65
		MOD F	IR Source frequency from XM65
		1	Time-start to T_0
		2	Time- T_0 to selected time
		3	Azimuth slewing time
		4	Elevation slewing time
		5	Not used
5	DMM	TEST SELECTOR 1	Twelve position rotary switch used with CHANNEL SELECTOR to select DMM input signals (See Tables 2-2 and 2-3)

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
6	DMM - Continued	VOLTS/OHMS switch	Five position rotary switch used to control DMM sensitivity
		OFF	Removes power from DMM display
		2 MEG	Enables DMM to operate in ohms mode with maximum value of 2 meg ohms
		200K/200V	Enables DMM to operate in ohms or volts mode with maximum value of 200K ohms, or 200 volts
		20K/20V	Enables DMM to operate in ohms or volts mode with maximum value of 20K ohms or 20 volts
		2K/2V	Enables DMM to operate in ohms or volts mode, with maximum value of 2K ohms or 2 volts
7		Digital display	Indicates voltage and resistance measurements
8		MODE switch	Five position rotary switch used to select operation of DMM
		OHMS	Enables DMM to operate as an ohmmeter
		DC	Enables DMM to operate as a DC voltmeter
		DC FILTER	Enables DMM to operate as a DC voltmeter and also provides a low pass filter on input to DMM
		S/N	Enables DMM to monitor signal-to-noise ratio during signal-to-noise ratio test
		RMS	Enables DMM to measure AC voltages and display a value in true RMS
9		CHANNEL SELECTOR switch	Twelve position rotary switch used with TEST SELECTOR 1 and TEST SELECTOR 2 to select DMM input signals (See Tables 2-2 and 2-3)
10	ANGLE INDICATORS	API 1 display	Indicates, in degrees, functions selected by API 1

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
11	ANGLE INDICATORS-Continued	API 1 switch	Four position rotary switch used to select the following signals for measurement:
		OFF	Removes power from API 1 display
		SELF TEST	Provides and measures an internal test signal that simulates +45.0 degrees
		GYRO ROLL	Measures simulated gyro roll from ROLL control
		TSU AZ	Provides TSU AZ gimbal angle
12		API 2 display	Indicates, in degrees, functions selected by API 2
13		API 2 switch	Five position rotary switch used to select the following signals for measurement:
		OFF	Removes power from API 2
		SELF TEST	Provides and measures an internal test signal that simulates +45.0 degrees
		GYRO PITCH	Provides simulated gyro pitch from PITCH control
		TSU EL	Measures TSU EL gimbal angle
		RHO	Measures rho computer angle
14	N/A	CONSTRAINT VALID indicator	Lights when launch constraints of XM65 are satisfied during tests
15	DMM	TEST SELECTOR 2 switch	Twelve position rotary switch used with CHANNEL SELECTOR to select DMM input signals (See Tables 2-2 and 2-3)
16	GYRO	PITCH control	Controls simulated aircraft pitch angle to XM65
17		ROLL control	Controls simulated aircraft roll angle to XM65
18	TSU GIMBAL	Gimbal switch	Three position rotary switch used to select the following modes of operation:
		STOW	Enables control of TSU telescope with AZ POSITION and EL POSITION controls when XM65 is in STOW

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
18 - Continued	TSU GIMBAL - Continued	OFF	XM65 in normal operation
		TRACK	Enables control of TSU telescope with AZ POSITION and EL POSITION controls when XM65 is in TRACK
19		EL POSITION control	Ten turn potentiometer used to manually position the TSU in el
20		AZ POSITION control	Ten turn potentiometer used to manually position the TSU In az
21	ANALOG METERS	EL meter	Analog meter used to monitor el VS1
22	BORESIGHT	EL switch	Three position momentary toggle switch used to control el boresight motor
		UP	Causes boresight motors to produce an upward movement in boresight optics
		OFF	Removes external stimuli from el boresight motor
		DOWN	Causes boresight motor to produce a downward movement in boresight optics
23		AZ switch	Three position momentary toggle switch used to control az boresight motor
		RIGHT	Causes boresight motors to produce a right movement in boresight optics
		OFF	Removes external stimuli from az boresight motor
		LEFT	Causes boresight motor to produce a left movement in boresight optics
24	AUTOMATIC TEST	INDICATOR	Indicates to the operator the following:
		READY	When the XM65 is ready to begin the AUTO TESTS
		IN TEST	Lights when test begins and remains on until T_0 - 20 sec

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
25	TARGET CONTROL	Target selector switch	Six position rotary switch used to select the following IR target positions:
		OFF	No target diodes activated
		CTR	Selects the center target diode
		LEFT	Selects the left target diode
		RIGHT	Selects the right target diode
		UP	Selects the up target diode
		DOWN	Selects the down target diode
26		TARGET PWR	Two position circuit breaker which controls power to the IR target board
27		LEVEL control	Potentiometer which controls IR target intensity level
28	N/A	SEQUENCE	Indicates the sequence status of two and three phase power
	N/A	3 PHASE	Lights when 115V 400 Hz power is present and the three phase sequence is ABC
	N/A	2 PHASE	Lights when the 900 Hz power is present and the two phase sequence is correct
29	N/A	LAMP TEST switch	Pushbutton switch used to illuminate all lamps on MCU front panel to verify their proper operation
30	N/A	Power Indicator	Lights to indicate 28V power to MCU is present
31	N/A	Power switch	Two position circuit breaker which controls 28V power to the MCU
32	MANUAL CONTROLS	REMOTE ON COMMAND switch	XM65 power is controlled from MCU when in up position
33		P ERROR switch	Shorts the XM65 pitch error signal when set to DISABLE
34		Y ERROR switch	Shorts the XM65 yaw error signal when set to DISABLE

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
35	MANUAL CONTROLS - Continued	P RATE switch	Shorts the XM65 pitch rate signal when set to DISABLE
36		Y RATE switch	Shorts the XM65 yaw rate signal when set to DISABLE
37	AUTOMATIC TEST	INDICATOR	Indicates to the operator the following:
		PASS	Lights at T_0 + 20 sec if test conditions are met
		FAIL	Lights immediately upon the sensing of an out of tolerance condition
38	MANUAL CONTROLS	PSBI switch	Shorts the XM65 pitch self-balance integrator when set to DISABLE
39		YSBI switch	Shorts the XM65 yaw self-balance integrator when set to DISABLE
40	ANALOG METERS	AZ meter	Analog meter used to monitor az VS1
41	MANUAL CONTROLS	YVCO switch	Disables the XM65 yaw VCO
42		PVCO switch	Disables the XM65 pitch VCO
43		YOLC switch	Shorts the XM65 yaw open loop command when set to DISABLE
44		G BIAS switch	Disables the XM65 G-bias signal
45		CLUTCH ENGAGE switch	Engages the XM65 $\Delta\rho$ clutch
46		CVAC switch	Disables the XM65 continuously variable amplitude carrier
47	BIT STATUS	IN TEST switch	Two position toggle switch used to control XM65 BIT tests as follows:
		ON	Initiates operation of BIT tests as selected by the BIT TEST SELECTOR
		OFF	Allows BIT to operate in normal status
48		BIT TEST SELECTOR switch	Nine position rotary switch used with the IN TEST switch to select and perform BIT TESTS 3 to 10

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
49	AUTOMATIC TEST	RESET switch	Pushbutton switch used to reset AUTOMATIC TEST and BIT STATUS
50	BIT STATUS	BIT PASS indicators	Ten lamps which light as each BIT test begins and remain lit if the test passes
51	AUTOMATIC TEST	Mode switch	Two position toggle switch used to automatically activate MCU testing
52	BIT STATUS	BIT IN TEST indicator	Lights during the time the BIT tests are in progress
53	AUTOMATIC TEST	TEST NUMBER switch	Binary coded decimal switch with positions 00 through 99 which controls selection of automatic tests (See Table 2-4)
54	TIMER INTERRUPT	Start switch	Two position toggle switch which provides a timer start signal to the XM65 when the switch is placed in the START position
55	ANALOG METERS	Meter range	Four position rotary switch which controls sensitivity of ANALOG METERS
56	TIMER INTERRUPT	Interval switch	Eight position rotary switch used to select XM65 programmer interrupt times as follows:
		RUN	Programmer progresses to end of sequence without interruption
		T6	Programmer interrupted at T_0 sec
		T7	Programmer interrupted at T_0 + 0.170 sec
		T11	Programmer interrupted at T_0 + 0.790 sec
		T13	Programmer interrupted at T_0 + 1.350 sec
		T14	Programmer interrupted at T_0 + 2.340 sec
		T15	Programmer interrupted at T_0 + 4.325 sec
		T17	Programmer interrupted at T_0 + 13.48 sec

Table 2-1. Front Panel, Control Monitor Controls and Indicators - Continued

Key to Figure 2-1	Functional Group	Switch, Control, or Instrument	Description
57	TIMER INTERRUPT - Continued	Interval indicators	Seven lamps which light to indicate when the programmer reaches the time which they represent

Table 2-2. CHANNEL SELECTOR Switch Operation

CHANNEL SELECTOR Position	Function
DISCONNECT	DMM not connected
PR1	TEST SELECTOR 1 monitors internal and XM65 power forms
Y1	TEST SELECTOR 1 monitors yaw channel
P1	TEST SELECTOR 1 monitors pitch channel
28V	Connects +28V for measurement
TEST LEADS	Connects external test jack on MCU rear panel
LOG H	Monitors logarithm of target intensity
P2	TEST SELECTOR 2 monitors pitch channel
Y2	TEST SELECTOR 2 monitors yaw channel
PR2	TEST SELECTOR 2 monitors XM65 power forms and timer and torquer signals
DC SELF TEST	Monitors +1.5000 volts
AC SELF TEST	Monitors 1.50 volts rms

Table 2-3. TEST SELECTOR/CHANNEL SELECTOR Switch Operation

TEST SELECTOR 1	CHANNEL SELECTOR Positions		
	PR1	Y1	P 1
1	TSGMS +60 V	Az bandpass	El bandpass
2	TSGMS +18 V	Az VS1	El VS1
3	TSGMS +10 V	Az VS1 filtered	El VS1 filtered
4	TSGMS +5 V	Window servo rate	Denotation servo rate
5	TSGMS -18 V	Yaw LOS rate	Pitch LOS rate
6	TSGMS -60 V	Az motion compensation	El motion compensation
7	TSGMS -10 V	Yaw error	Pitch error
8	115 V 400 Hz ph A	Yaw limit and sum	Pitch limit and sum
9	115 V 400 Hz ph C	Yaw output	Pitch output
10	+28 V XM65	Az torquer buffered	El torquer buffered
11	Remote on CMD	Az gimbal angle	El gimbal angle
12	+40 V XM65	NC	NC
TEST SELECTOR 2	CHANNEL SELECTOR Positions		
	PR2	Y2	P 2
1	+20 V XM65	Az reference signal	El reference signal
2	+10 V XM65	Az sample pulse	El sample pulse
3	-20 V XM65	Az stick command out	El stick command out
4	-40 V XM65	Az in	El in
5	20 Vrms 4 kHz	Az out	El out
6	7 V 900 Hz ph A	Az error	El error
7	7 V 900 Hz ph B	Launch constraint	10 sin σz
8	Timer start	Yaw OLC	BIT comp No. 1
9	Timer interrupt	Air speed	BIT comp No. 2
10	Az torquer current	11.8 sin ϕ	BIT comp No. 3
11	El torquer current	Wiresignal C	BIT comp No. 4
12	28V Squib Power	NC	SCA BIT pass

Table 2-4. Control Monitor Automatic Tests

Test Number	Test Name
00	OFF
01	Control monitor self test
02	Not assigned
03	Az S/N test
04	El S/N test
05	Az boresight
06	El boresight
07	Not assigned
08	Kl(t) left target
09	Kl(t) right target
10	Kl(t) up target
11	Kl(t) down target
12	Az slew rate left
13	Az slew rate right
14	El slew rate up
15	El slew rate down
16,17	Not assigned
18	Az motion compensation high
19	El motion compensation high
20	$\Delta\rho$ resolution
21	Yaw OLC $V_H < 35$ knots
22	Yaw OLC $V_H > 35$ knots
23	G-bias number 1
24	G-bias number 2
25	CVAC
26	G-bias number 3
27	Pitch plus limits
28	Pitch minus limits

Table 2-4. Control Monitor Automatic Tests - Continued

Test Number	Test Name
29	Yaw plus limits
30	Yaw minus limits
31	Not assigned
32	Az step response
33	El step response
34	Az gimbal constraint number 1
35	Az gimbal constraint number 2
36	Roll angle constraint
37	Az LOS high mag number 1
38	Az LOS high mag number 2
39	El LOS high mag number 1
40	El LOS high mag number 2
41	El LOS high mag number 3
42	Az stabilization response
43	El stabilization response
44	BIT comp number 1 high limit
45	BIT comp number 1 low limit
46	BIT comp number 2 high limit
47	BIT comp number 2 low limit
48	BIT comp number 3 high limit
49	BIT comp number 3 low limit
50	BIT comp number 4 high limit
51	BIT comp number 4 low limit
52-60	Not assigned
61	G-bias number 1
62	G-bias number 2
63	G-bias number 3
64-91	Not assigned
92	All 0's test signal
93	All 1's test signal
94	Time code G-bias
95	Time code motion compensation

Table 2-4. Control Monitor Automatic Tests - Continued

Test Number	Test Name
96	Time code step response
97	Time code Kl(t)
98	Time code FOV
99	Comparator calibration

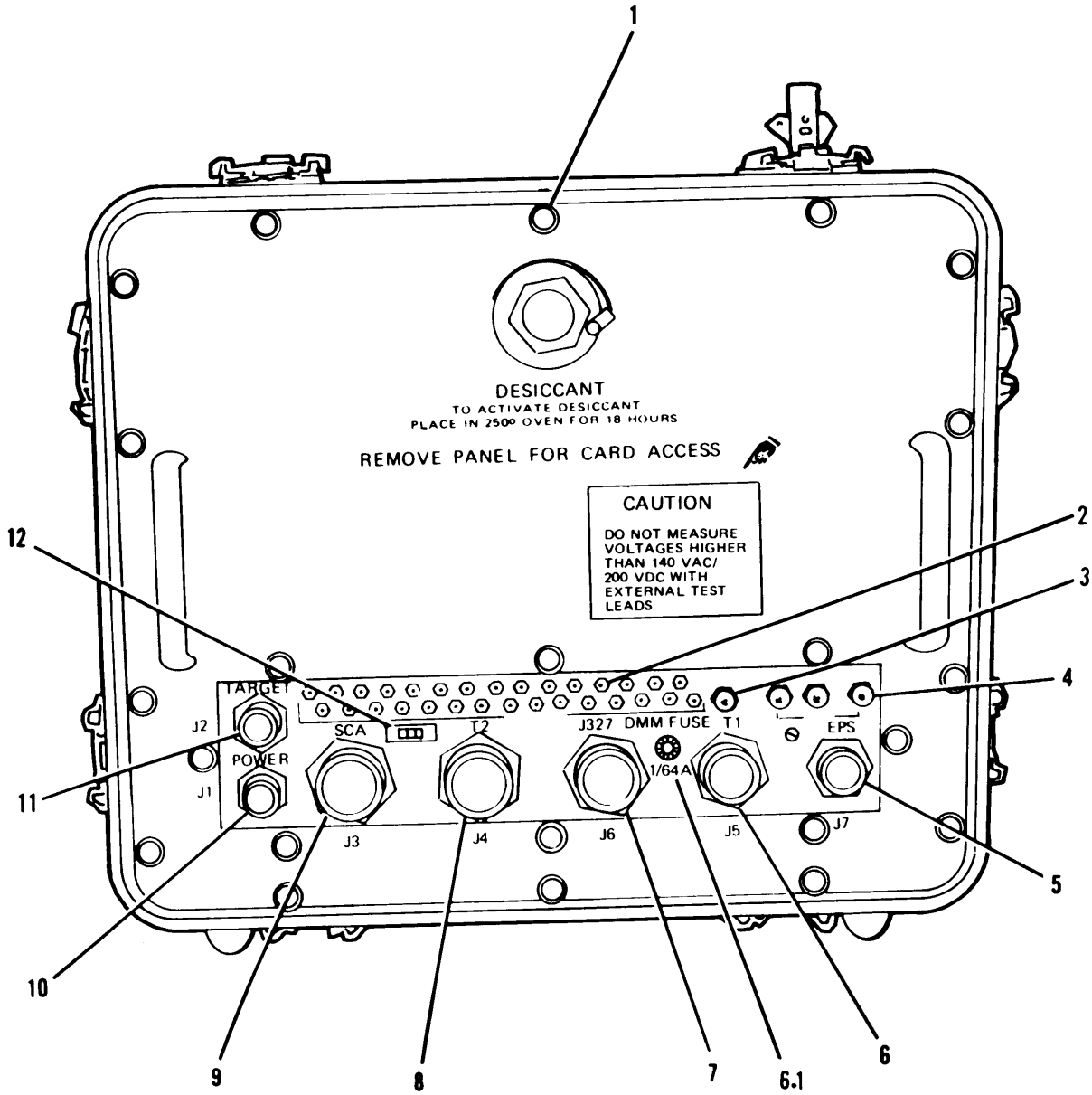
Table 2-5. Rear Panel, Control Monitor Controls and Indicators

Key to Figure 2-2	Controls or Instruments	Function
1	DESICCANT container	Drying agent container
2	TEST POINTS jacks	External access to signals for testing (Refer to table 2-5.1)
3	DMM jack	External access to DMM input
4	SCOPE jacks	Double ended signal and sync jacks which enable the use of an oscilloscope to display signals being monitored on the DMM
5	J7/EPS connector	EPS T/C cable connector
6	J5/Tl connector	Aft TAC cable connector
6.1	DMM FUSE	Protect DMM circuitry if a voltage is applied when OHMS mode is selected
7	J6/J327 connector	Tailboom, J327 connector
8	J4/T2 connector	Forward TAC cable connector
9	J3/SCA connector	SCA cable connector
10	J1/POWER connector	Power cable connector
11	J2/TARGET connector	Target cable connector
*12	Time totalizing meter	Keeps track of total operation time of MCU

*Applicable to Serial Nos. 200,046 and up.

Table 2-5.1. Rear Panel, Test Points

Test Points	Function
1	RHO servo error
2	RHO servo rate
3	SCA BIT pass
4	Derotation servo error
5	Window servo error
6	NC
7	EPS return
8	28V return
9	TSU return
10	SCA return
11	Prefire/Fire/Wirecut
12	T11, t = 0.79
13	26V, 400 Hz, ph A
14	Roll syn ph A (S3)
15	Roll syn ph B (S2)
16	Roll syn ph C (S1)
17	Pitch syn ph A (S3)
18	Pitch syn ph B (S2)
19	Pitch syn ph C (S1)
20	MCA return
21	TOW trigger armed
22	Stow BITE enable
23	Acquisition
24	Wide-medium switch
25	Medium-narrow switch
26	MSL present/selector
27	Weapon select SCA
28	Indicator test
29	NC
30	MCU return



NOTE: ITEM 12 APPLICABLE TO SERIAL NO. 200,046 AND UP.

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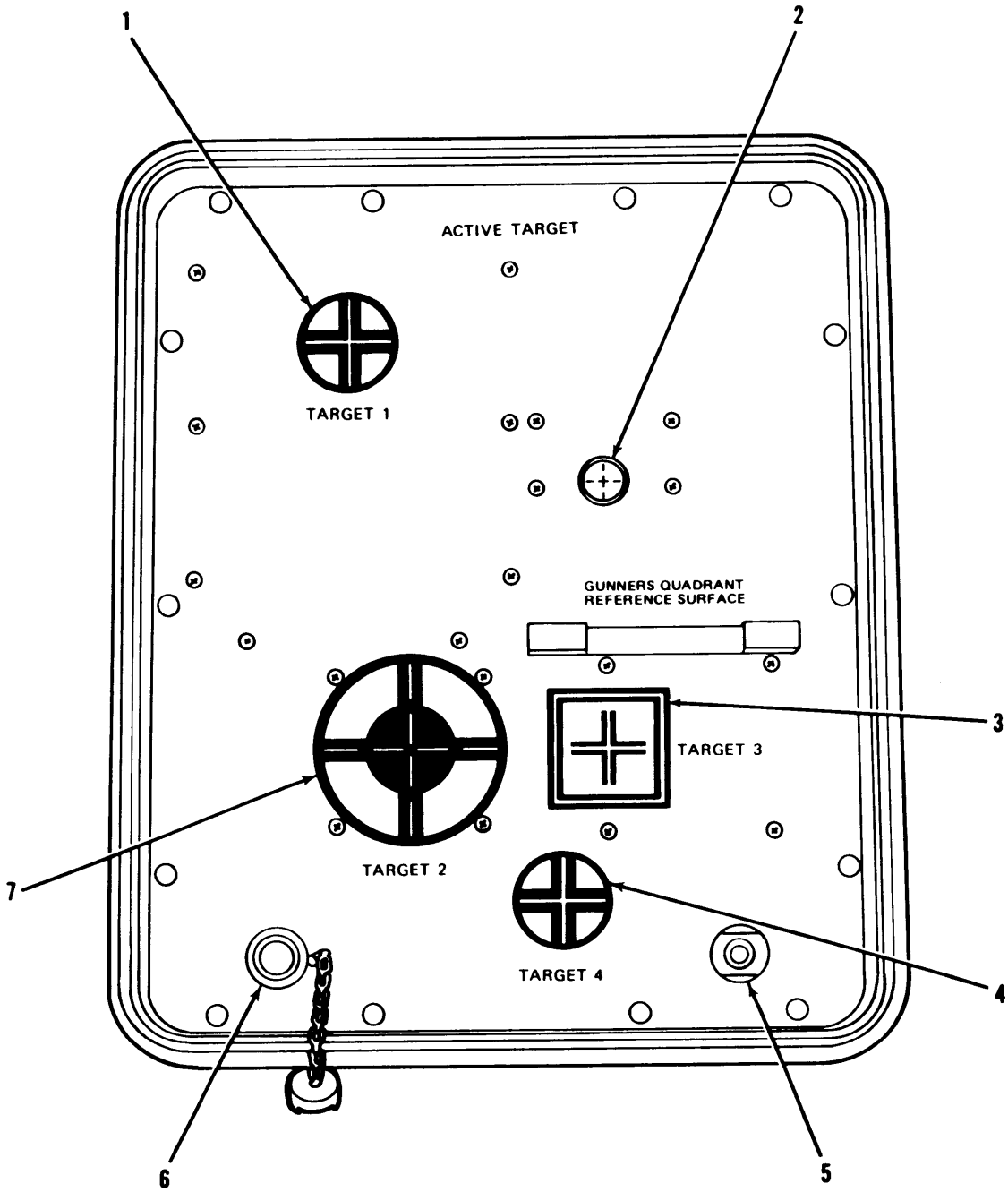
Figure 2-2. Rear Panel, Control Monitor

Table 2-6. IR Target Assembly Displays and Indicators

Key to Figure 2-3	Instruments	Function
1	Target No. 1 display	Used to align target assembly to the TSU
2	Look back telescope	Provides capability to look back at a target marked on the corrector lens
3	Target No. 3 display	Used for launcher/TSEM bore-sighting
4	Target No. 4 display	Used for alignment of corrector lens assembly
5	Breather valve	Equalizes air pressure of inside with outside
6	Target cable connector	Provides electrical interface between the MCU and the IRTA
7	Target No. 2 display	Used for IR boresighting
8	Look back fixture	Provides fixture to hold telescope for the capability to look back at a target marked on the corrector lens
9	Thermal Patch assembly	Used for C-NITE bore sighting
10	Beam steering assembly	Used to focus IR energy



NOTE: For serial number 200001 thru 200105

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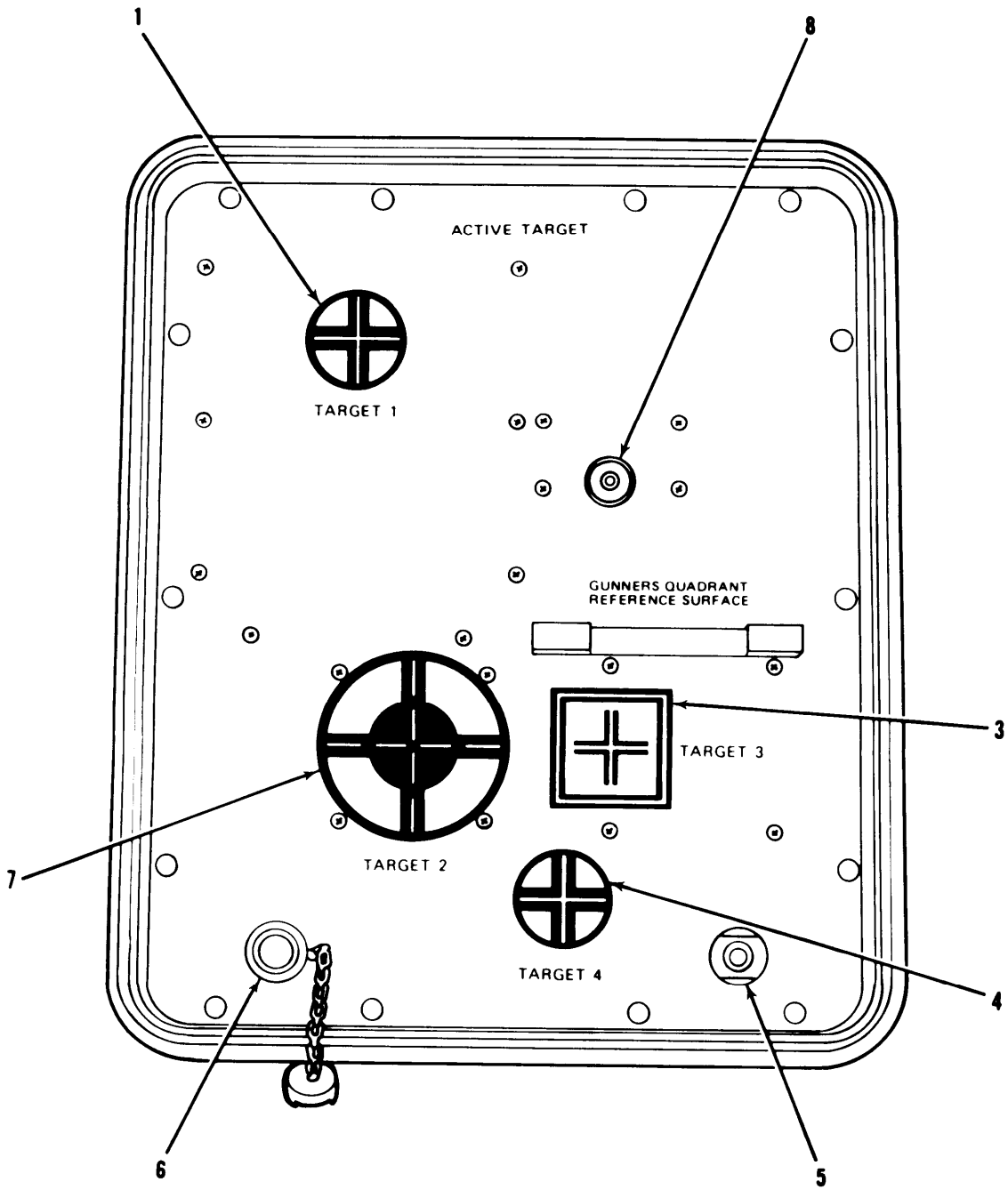
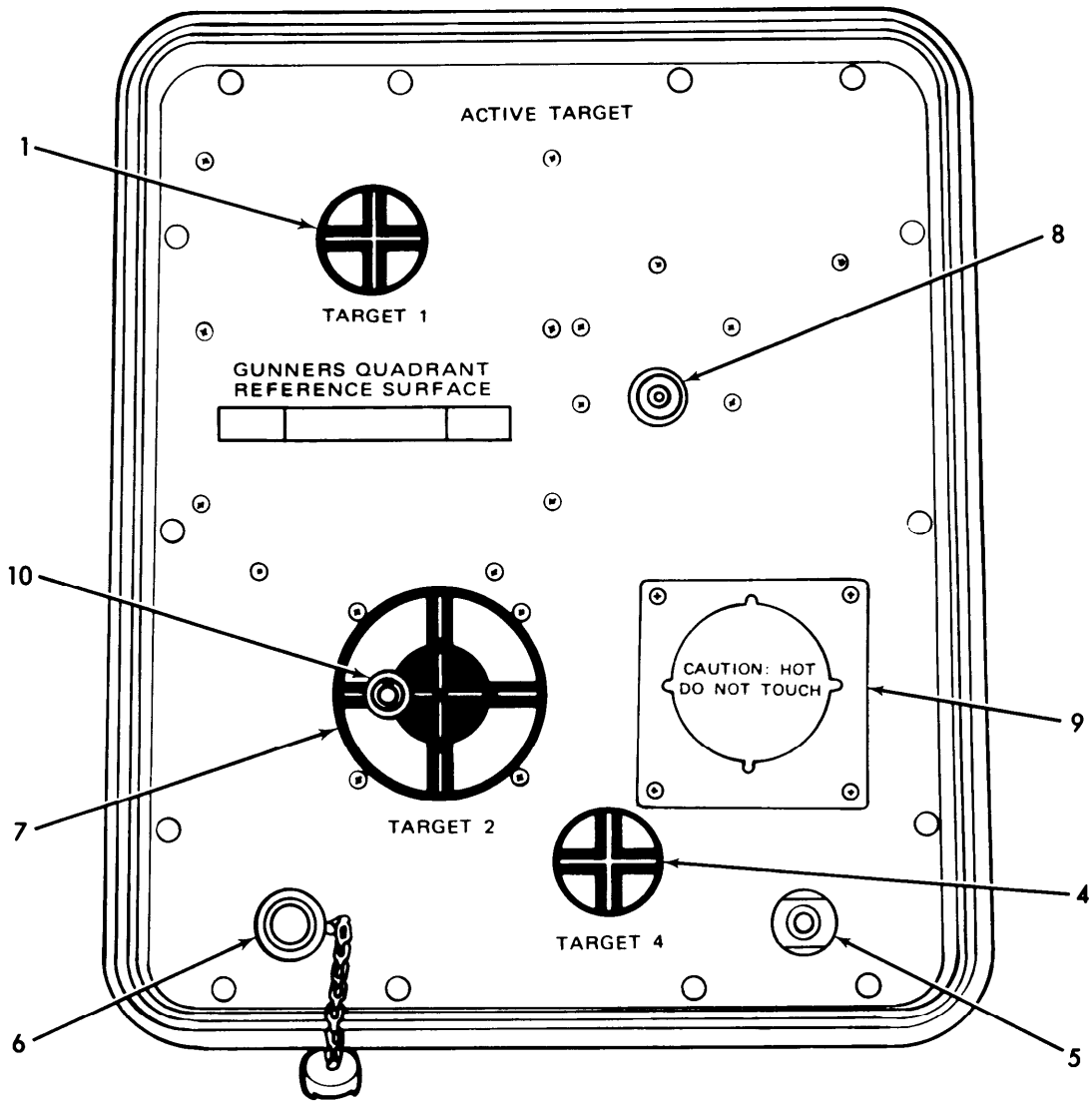
Figure 2-3. IR Target Assembly (Sheet l of 3)



NOTE: For serial number 200106 and up

Figure 2-3. IR Target Assembly (Sheet 2 of 3)



NOTE: Equipment to support M65 with C–NITE

MI 105760

Figure 2-3. IR Target Assembly (Sheet 3 of 3)

Table 2-7. Tripod and Adjustable Head Adapter Assembly Controls

Key to Figure 2-4	Control	Function
1	Captive screws	Hold the target assemblies in position
2	Roll lock	Locks the top in a desired roll position
3	Az lock	Locks the top in a desired az position
4	Az adjust	Rotates the top in az
5	El adjust	Moves the top up and down
6	Leg lock	Locks the leg to the desired extended position
7	Adjustable head adapter tool	Tightens the adjustable head adapter to the tripod
8	Center lock	Locks all three legs to the desired expanded position
9	El lock	Locks top in desired el position
10	Pitch adjust	Tilts top forward and backward as required
11	Pitch lock	Locks the top in desired pitch position
12	Lateral positioning locks	Allows the top to slide laterally. Locks the top in place

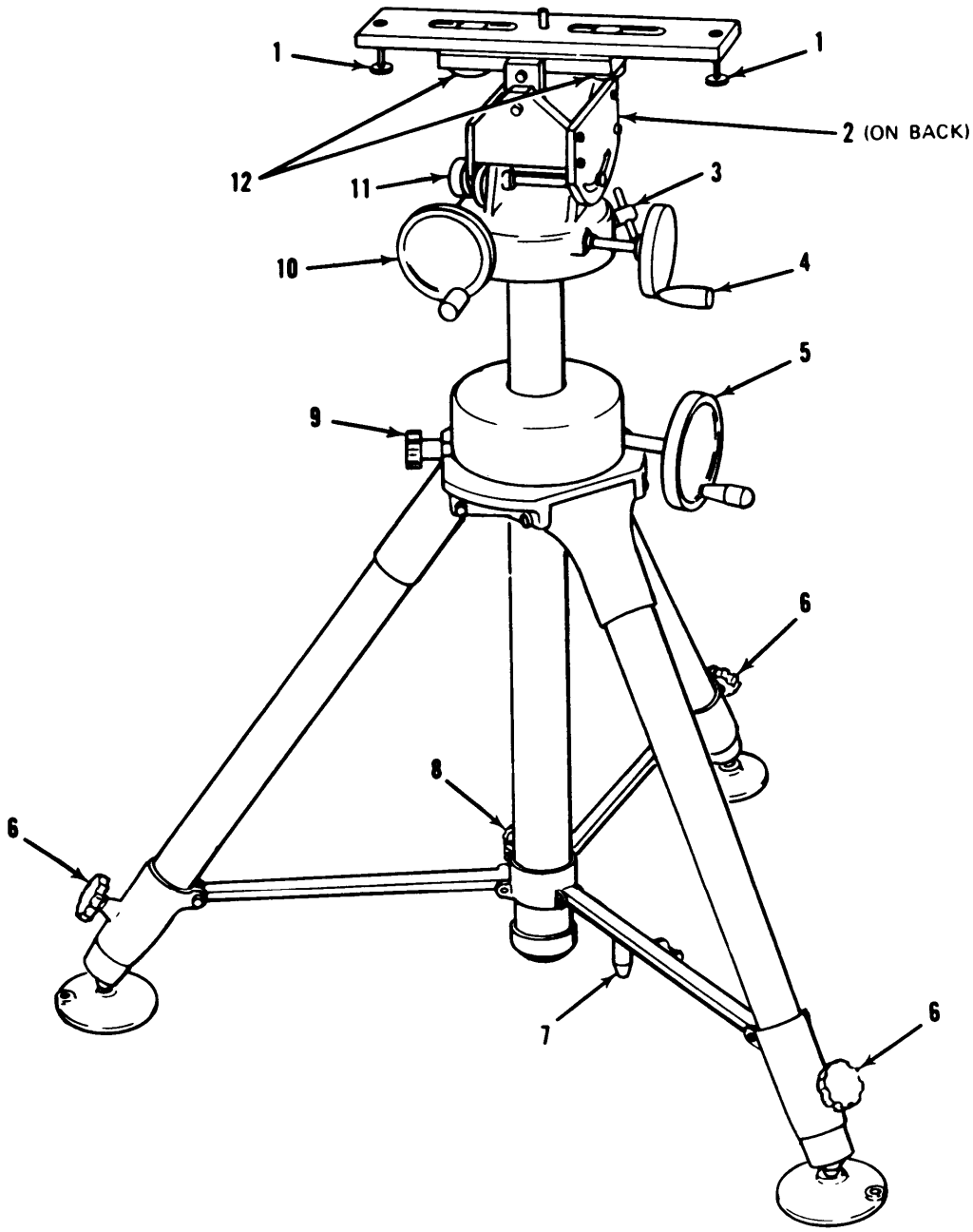


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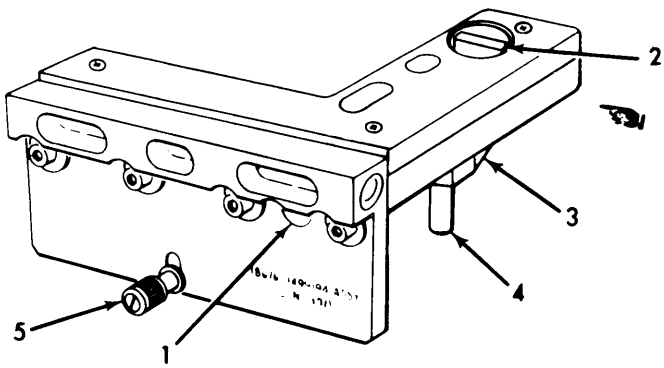
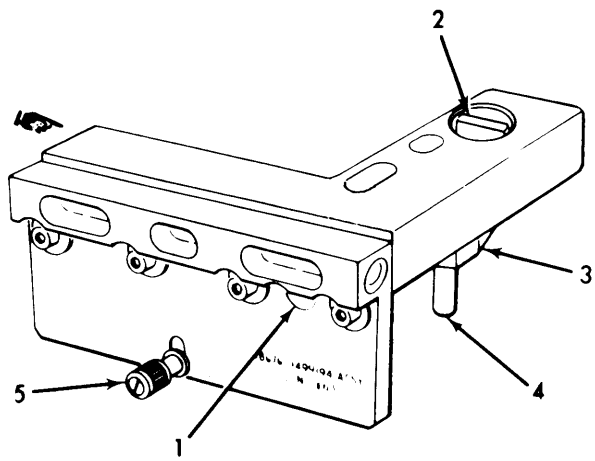
Figure 2-4. Tripod and Adjustable Head Adapter Assembly

Table 2-8. Boresight Device Controls

Key to Figure 2-5	Control	Function
1	Socket hole	Tapered hole which holds the telescope
2	Thumbscrew	Threaded pin which tightens the mounting plate
3	Mounting plate	Fastens the TSU boresight device to the TSU
4	Straight pin	Guides the mounting plate
5	Captive screw	Fastens the TSU boresight device to the TSU



CONFIGURATION APPLICABLE TO SERIAL NO. 200301 THRU 200330



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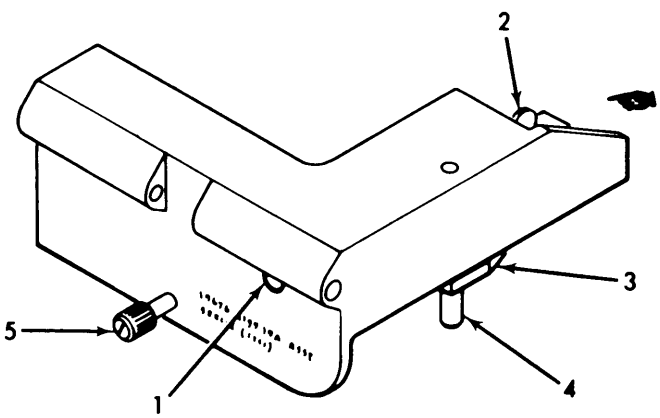


CONFIGURATION APPLICABLE TO SERIAL NO. 200350 AND UP

MI 106247C

Figure 2-5. Boresight Device

Table 2-9. Passive Target Assembly Displays

Key to Figure 2-6	Control	Function
1	Target No. l display	Used to align target assembly to the TSU
2	Target No. 3 display	Used for launcher/TSEM boresighting
3	Target No. 2 display	Used for launcher boresighting
4	Target No. 4 display	Used for launcher/TSEM boresight on M65 with C-NITE

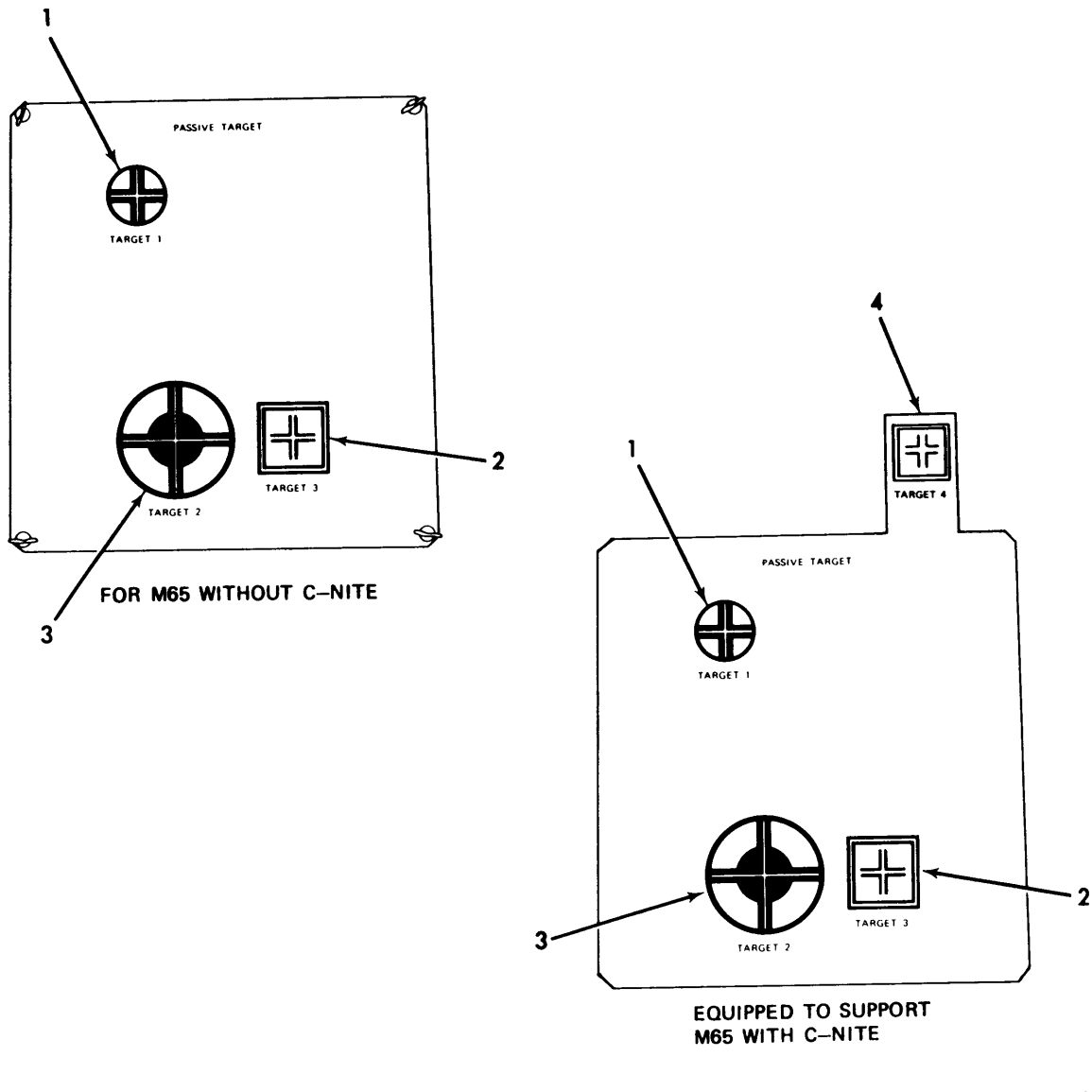
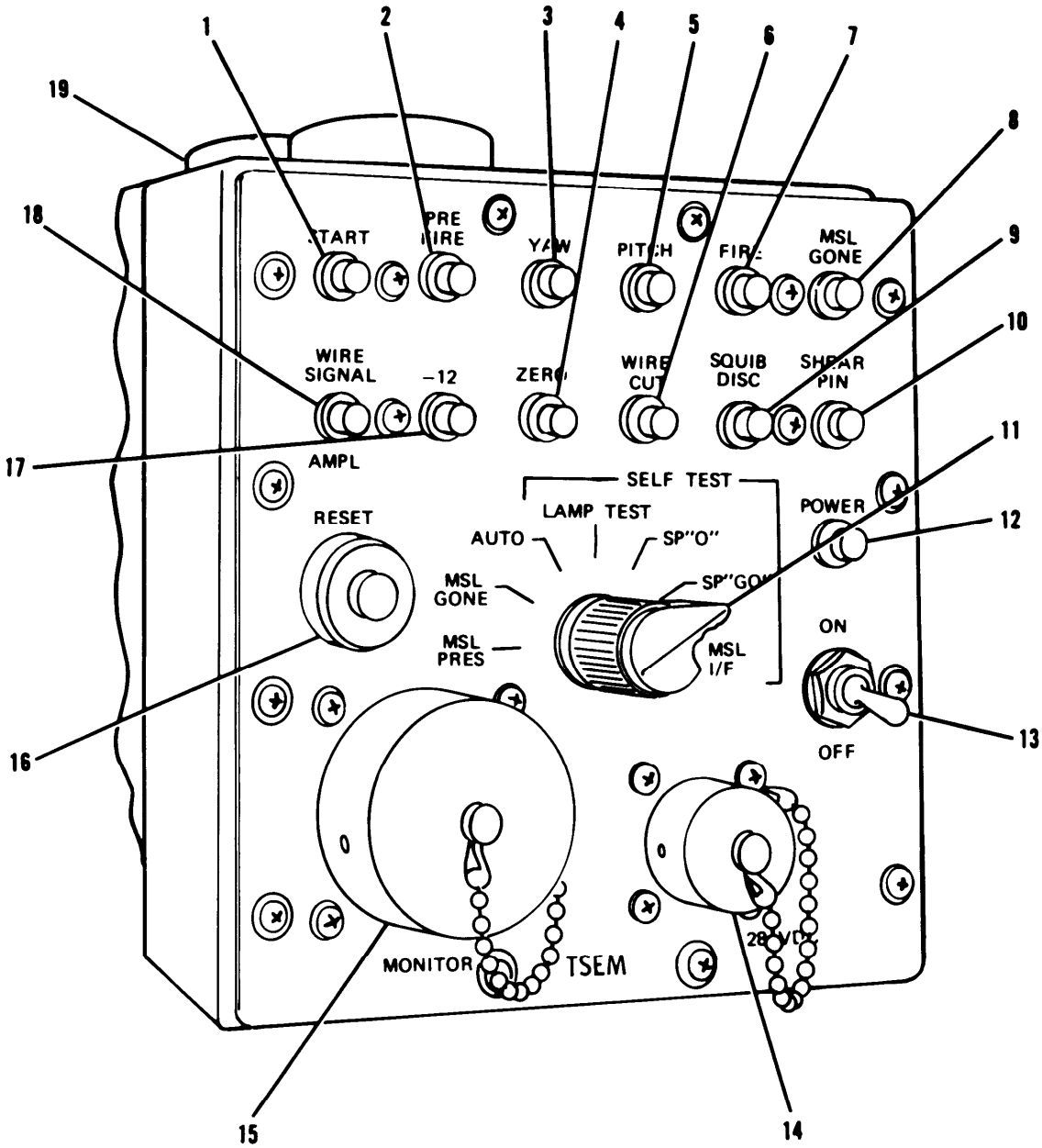


Figure 2-6. Passive Target Assembly



MI 106249A

Figure 2-7. Front Panel, TSEM

Table 2-10. TSEM Controls and Indicators

Key to Figure 2-7	Control or Instrument	Function
1	START indicator	Lights when the M65 launch sequence is initiated for test (t = -1.52 sec)
2	PREFIRE indicator	Lights when prefire signal from M65 has been received (t = -1.48 sec)
3	YAW indicator	Lights during self test and system test to show that yaw self-balance loop is present and of proper magnitude
4	ZERO indicator	Lights when dc bias of wire signal reaches zero
5	PITCH indicator	Lights during self test and system test to show that pitch self-balance loop is present and of proper magnitude
6	WIRECUT indicator	Lights when wirecut signal from M65 has been received
7	FIRE indicator	Lights when fire signal from M65 has been received (t=0)
8	MSL GONE indicator	Lights at proper time during firing sequence to show a missile gone indication has been supplied to the M65 Lights when function rotary switch is in MSL GONE position
9	SQUIB DISC indicator	Lights to show that all TSEM squibs have been disconnected
10	SHEAR PIN indicator	Lights in system test if shear pin is in low-shear position. Lights when function rotary switch is in SP"0" position and shear pin is in high-shear position. Lights when function rotary switch is in SP"GO" position
11	Function rotary switch	The master control switch for the TSEM with position functions as follows:
	MSL PRES	Provides indication to the M65 that the TSEM missile position contains a missile

Table 2-10. TSEM Controls and Indicators - Continued

Key to Figure 2-7	Control or Instrument	Function
11-Continued	MSL GONE	Provides indication to the XM65 that the TSEM missile position has no missile
	AUTO	Establishes conditions in TSEM to test complete XM65 firing sequence
	SELF-TEST LAMP TEST	Lights all indicator lamps on TSEM control panel
	SELF TEST SP "0"	Lights shear pin indicator if TSEM shear pin transducer is in zero position
	SELF TEST SP "GO"	Lights shear pin indicator if TSEM circuitry is functioning properly
	SELF TEST MSL I/F	Tests TSEM using its own simulated wire signal
12	POWER indicator	Lights when power is present and power ON OFF switch is in ON position
13	Power ON/OFF switch	Controls power to the TSEM through circuit breaker CB1
14	28 VDC connector	Power cable jack for TSEM power cable
15	MONITOR connector	TSEM signal cable jack for breakout of internal TSEM signals
16	RESET switch	A pushbutton switch used to reset TSEM in preparation for tests
17	-12 indicator	Lights to show that the - 12V bias is present in wiresignals at time of launch
18	WIRE SIGNAL AMPL indicator	Lights to show that the wire-signal from the XM65 is of proper amplitude
19	Transducer	Measures plunger movement

Table 2-11. Corrector Lens Controls and Displays

Key to Figure 2-8	Control or Instrument	Function
1	Rod assembly	Support corrector lens assembly while unfolded
2	Adjustment screws	Aligns the corrector lens to the IR target assembly
3	Corrector lens	Provides optical and IR correction when using the IR target assembly
4	Boresight telescope holder	Holds boresight telescope

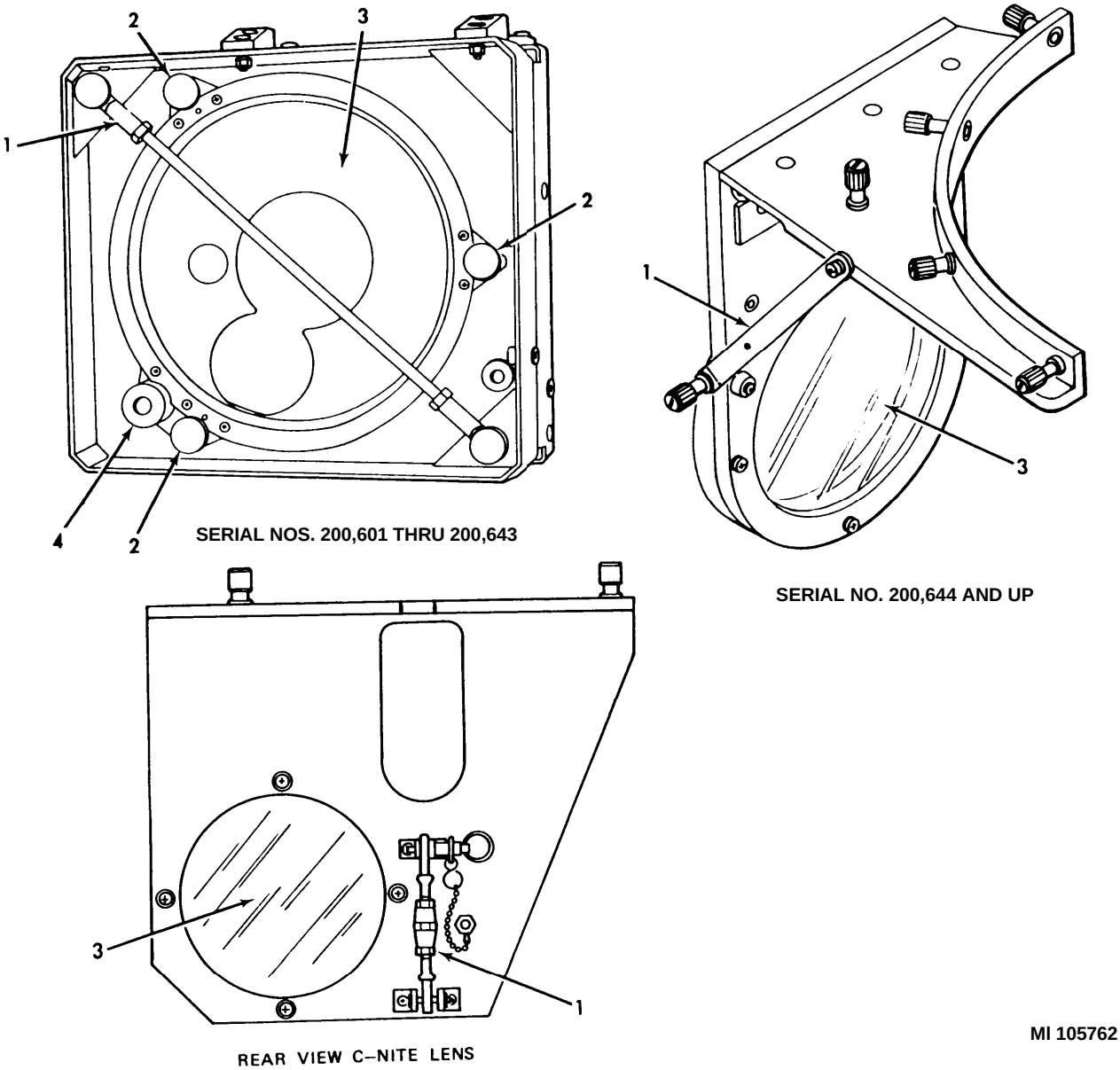


Figure 2-8. Corrector Lens

Table 2-12. Signal Monitor Assembly Controls and Indicators

Key to Figure 2-9	Controls or Instruments	Function
1	SECU TSEM J2 connector	TSEM/SECU breakout connector
2	TEST 2 switch	Controls track mode of XM65 during testing
	TRACK	Connects pins EE and MM of FORWARD TEST connector J1
	OFF	Disconnects pin EE from pin MM of FORWARD TEST connector J1
3	TEST 1 switch	Controls turret and pilot acquisition during testing
	TURRET ACTION (NN)	Connects pins MM and NN of FORWARD TEST connector J1
	OFF	Disconnects pin NN and pin PP from MM of FORWARD TEST connector J1
	PILOT ACQ (PP)	Connects pins MM and PP of FORWARD TEST connector J1
4	FORWARD TEST **J** 1 connector	FORWARD TEST breakout connector

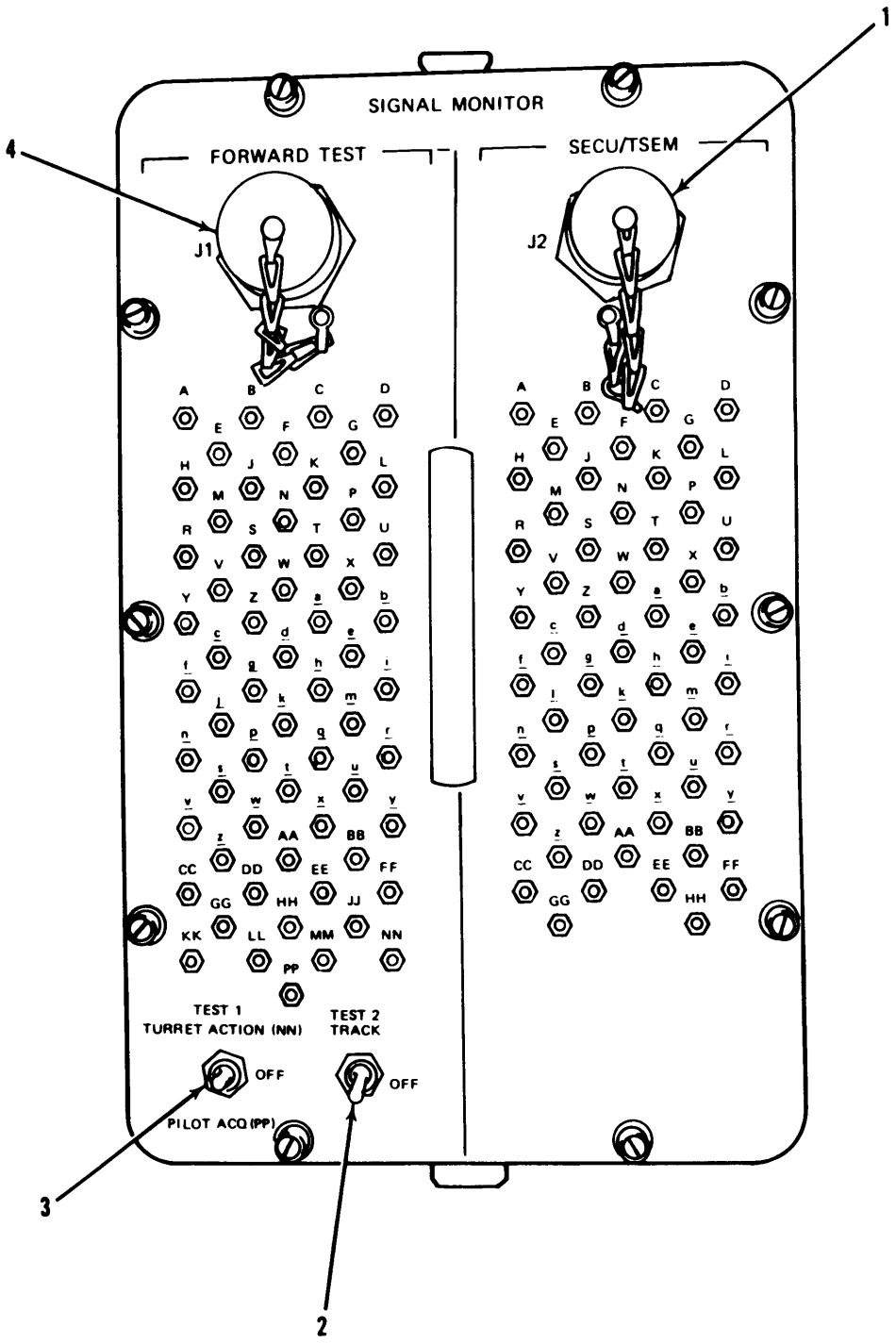


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Figure 2-9. Signal Monitor Assembly

Table 2-12.1 Power Adapter Controls and Indicators

◄ NOTE ►

This table applicable to a TSGMS equipped to support M65 with C-NITE only.

Key to Figure 2-9.1	Control or Instrument	Function
1	Connector (J2)	Power cable jack for target power cable (W11)
2	PATCH switch	Controls power to thermal patch on IR target assembly
3	Connector (P1)	Power cable connection to battery power source
4	DIODE switch	Controls power to the left IR diode of target 2 on IR target assembly
5	Meter	Indicates if battery and log H tests pass
6	BATT/LOG H	Checks battery and log H functions of IR target assembly

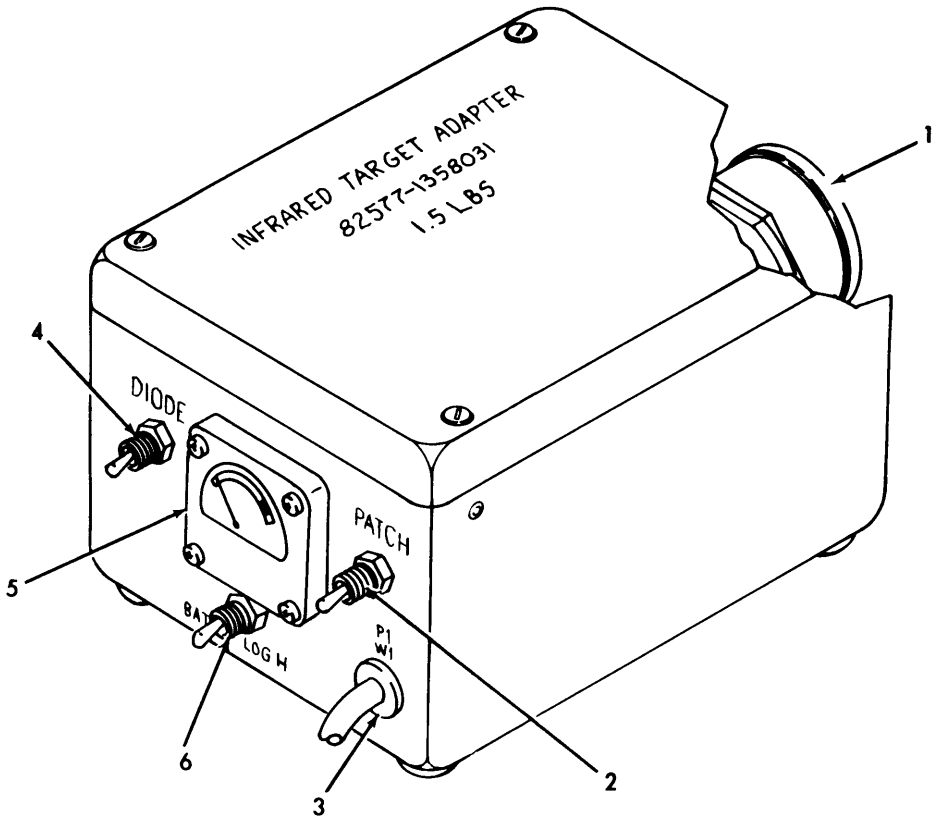


Figure 2-9.1 Power Adapter

Section II. OPERATING INSTRUCTIONS

2-5. General.

This section contains initial switch settings and self-test procedures for the Control Monitor and TSEM.

2-6. Control Monitor.

CAUTION

Ensure that the DMM is not used to read voltage in the Ohms mode, otherwise the DMM fuse on the back of the MCU will blow (for those MCU that have the DMM fuse) or the DMM circuitry will be damaged (for those MCU that do not have the DMM fuse).

Table 2-13 1ists initial switch settings for the Control Monitor. Table 2-14 contains self-test procedures for the Control Monitor. Before performing the self-test procedures of table 2-14. ensure that all the initial switch settings on the Control Monitor are in accordance with table 2-13. The ellipsis (...), when used, indicates an intentional blank.

2-7. TSEM.

Table 2-15 contains the initial switch settings as well as the self-test procedures for the TSEM. The ellipsis (...), when used, indicates an intentional blank.

Table 2-13. Control Monitor Initial Switch Setiings

MCU Controller Assembly	Switch	Position
Power	Power switch	OFF
Self test	SELF TEST/NORMAL	NORMAL
COUNTER/TIMER	UNITS	OFF
	FREQ/TIME	SELF TEST
DMM	VOLTS/OHMS	OFF
	MODE	DC
	TEST SELECTOR 1	1
	TEST SELECTOR 2	1
	CHANNEL SELECTOR	DISCONNECT
ANGLE INDICATORS	API 1	OFF
	API 2	OFF
TSU GIMBAL	Gimbal switch	OFF
BORESIGHT	AZ	OFF
	EL	OFF
TARGET CONTROL	LEVEL control	Full **CW**
	Target selector	OFF
	TARGET	OFF
ANALOG METERS	Meter Range	OFF
AUTOMATIC TEST	TEST NUMBER	00
	Mode switch	MANUAL
TIMER INTERRUPT	Interval switch	RUN
	Start switch	OFF

Table 2-13. Control Monitor Initial Switch Settings - Continued

MCU Controller Assembly	Switch	Position
BIT STATUS	BIT TEST SELECTOR	OFF
	IN TEST	OFF
MANUAL CONTROLS	CVAC	NORMAL
	G BIAS	NORMAL
	PVCO	NORMAL
	PSBI	NORMAL
	P RATE	NORMAL
	P ERROR	NORMAL
	CLUTCH ENGAGE	NORMAL
	YOLC	NORMAL
	YVCO	NORMAL
	YSBI	NORMAL
	Y RATE	NORMAL
	Y ERROR	NORMAL
	REMOTE ON COMMAND	NORMAL

Table 2-14. Control Monitor Self-Test Procedures

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
		Exercise care when connecting and disconnecting cables to prevent damage to equipment due to electrostatic discharge and erroneous connections. Prior to connecting or disconnecting cables, be sure all power is turned off and that sources of electrostatic charge are not present at either end of the cables. Since the majority of the pins on each cable lead to components which are ESD, personnel must not touch, or otherwise allow static charges to reach the exposed pins of connector cables. A protective cap must be installed on any connector when cable is disconnected.			
		Take care to avoid bending pins when connecting the following cables.			
Set-Up	1	. . .	Connect plug W1XP1 to J1/POWER connector on Control Monitor	. . .	. . .
	2	. . .	Connect plug W1XP237 to a +28 volt power source	. . .	. . .
	3	. . .	Connect plug W2XP2 to J2/TARGET connector on Control Monitor	. . ,	. . .
	4	. . .	Connect plug W2XP1 to IR Target Assembly	. . .	l . .
		◄NOTE►			
		1. If DMM display numbers flash, readjust VOLTS/OHMS to a lower scale. If DMM display flashes zeros, adjust VOLTS/OHMS to higher scale.			
		2. Replacement of circuit card or subassembly shall be in accordance with Chapter 3.			
Lamp Test	1	PWR switch	Set to ON	Power indicator lights (BIT STATUS indicators may light also)	Replace power indicator lamp; if fault persists, replace Control Monitor
	2	AUTOMATIC TEST-RESET	Press and release	BIT STATUS indicators extinguish	Replace A22 card; if fault persists, replace A21 card; if fault persists, replace Control Monitor
	3	LAMP TEST	Press and hold	CONSTRAINT VALID, READY, IN TEST, PASS, FAIL, and 3 PHASE indicators light	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
				T6, T7, Tll, T13 T14, T15, T17, and 2 PHASE indicators light	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
Lamp Test-Continued	3	LAMP TEST	Press and hold	BIT IN TEST, BIT PASS 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 indicators light	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
				COUNTER/TIMER displays 8.8.8.8.	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
				DMM displays +1.8.8.88	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
				ANGLE INDICATOR API 1 displays +188.8	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
				ANGLE INDICATOR API 2 displays +188.8	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	4	LAMP TEST	Release	All indicators, except power indicator extinguish	Press and release AUTOMATIC TEST RESET pushbutton switch
DMM	1	DMM-CHANNEL SELECTOR	Set to DC SELF TEST	. . .	. . .
	2	DMM-VOLTS/OHMS	Set to 2K/2V	. . .	. . .
		◄NOTE►			
		Allow 5 minute warm-up before proceeding.			
	3	DMM-MODE	DC	DMM indicates between +1. 494 to + 1.506	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	4	DMM-VOLTS/OHMS	Set to 20K/20V	DMM flashes	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	5	DMM-VOLTS/OHMS	Set to 200K/ 200V	DMM flashes	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	6	DMM-CHANNEL SELECTOR	Set to AC SELF TEST	. . .	. . .
	7	DMM-VOLTS/OHMS	Set to 2K/2V	. . .	. . .

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
DMM-Continued	8	DMM -MODE	Set to RMS	DMM indicates between 1.48 and 1. 52 V RMS	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
TSGMS power	1	DMM-VOLTS,0HMS	Set to 200K/200V	. . .	. . .
	2	DMM - MODE	Set to DC	. . .	. . .
	3	DMM-CHANNEL SELECTOR	Set to 28V	DMM indicates between +25. 0 and +28. 5 V	Adjust external power supply
	4	DMM-CHANNEL SELECTOR	Set to PRI	. . .	. . .
	5	DMM-TEST SELECTOR 1	Set to position 1	DMM indicates between +59. 0 and +61. 0 V	Go to 9-4935-473-14-2, trouble-shooting procedures entrance key
	6	DMM-VOLTS/ OHMS	Set to 20K/20V	. . .	. . .
	7	DMM-TEST SELECTOR 1	Set to position 2	DMM indicates between +18. 1 and +18.9 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	8		Set to position 3	DMM indicates between +9.0 and +ll. 0 V	Go to TM 9-4935-473-14-2, trouble - shooting procedures entrance key
	9		Set to position 4	DMM indicates between +4. 75 and +5.25 V	Go to TM 9-4935-473-14-2, trouble - shooting procedures entrance key
	10		Set to position 5	DMM indicates between -18.1 and -18.9 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	11	DMM-VOLTS/ OHMS	Set to 200K/200V	. . .	. . .
	12	DMM-TEST SELECTOR 1	Set to position 6	DMM indicates between -59.0 and -61.0 V	Go to TM 9-4935-473-14-2, trouble - shooting procedures entrance key
	13	DMM-VOLTS/ OHMS	Set to 20K/20V	. . .	. . .
	14	DMM-TEST SELECTOR 1	Set to position 7	DMM indicates between -9.5 and -10.5 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key

Table 2-14. Control Monitor Self- Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
TSGMS power - Continued	15	DMM-CHANNEL SELECTOR	Set to DISCONNECT	. . .	. . .
	16	DMM-VOLTS/ OHMS	Set to OFF	DMM display goes off	. . .
COUNTER/ TIMER	1	COUNTER/ TIMER-UNITS	Set to KHz	. . .	. . .
	2	COUNTER/TIMER-FREQ/TIME	Set to SELF TEST	Counter indicates between .999 and 1.001 kHz	Go to TM 9-4935-473-14-2, trouble-shooting procedures
		'1' will not appear as left most digit on counter/timer display; reading of 000.3 represents 1000.3 Hz.			
	3	COUNTER/ TIMER-UNITS	Set to Hz	Counter indicates between 999.7 and 1000.3 Hz	Replace A15 card; if malfunction persists, replace Control Monitor
	4	COUNTER/TIMER-FREQ/TIME	Set to 35	Counter indicates between 33 and 37 Hz	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	5	SELF TEST/ NORMAL	Set to SELF TEST	. . .	. . .
	6	COUNTER/TIMER-FREQ/TIME	Set to 400	Counter indicates between 380 and 420 **Hz**	Go to TM 9-4935-473-14-2, trouble shooting procedures entrance key
	7	COUNTER/ TIMER-UNITS	Set to OFF	Counter display goes off	. . .
API	1	ANGLE INDICATORS API 1 switch	Set to SELF TEST	ANGLE INDICATOR API 1 indicates between +44.5 and +45.5	Replace A3 card; if malfunction persists, replace API 1 display; if malfunctioning persists, replace Control Monitor
	2	ANGLE INDICATORS API 2 switch	Set to SELF TEST	ANGLE INDICATOR API 2 indicates between +44.5 and +45.5	Replace A2 card; if malfunction persists, replace API 2 display; if malfunction persists, replace Control Monitor
	3	ANGLE INDICATORS API 1 switch	Set to GYRO ROLL	. . .	. . .
	4	ANGLE INDICATORS API 2 switch	Set to GYRO PITCH	. . .	. . .
	5	GYRO ROLL control	Adjust for 0.0 + 0.1°	ANGLE INDICATOR API 1 indicates 0.0 + 0.1°	Replace A3 card: if fault persists, replace Control Monitor

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
API - Continued	6	GYRO PITCH control	Adjust for 0.0 ±0. 1°	ANGLE INDICATOR API 2 indicates 0.0 +0.1°	Replace A2 card; if fault persists, replace Control Monitor
	7	ANGLE INDICATORS API 1 switch	Set to OFF	ANGLE INDICATOR API 1 display is off	. . .
	8	ANGLE INDICATORS API 2 switch	Set to OFF	ANGLE INDICATOR API 2 display is off	. . .
AUTOMATIC TEST	1	AUTOMATIC TEST TEST NUMBER	Set to 01	. . .	. . .
	2	AUTOMATIC TEST RESET	Press and release	. . .	. . .
	3	AUTOMATIC TEST AUTO/MANUAL	Set to AUTO	The following occurs in sequence: (a) IN TEST indicator lights (b) PASS indicator lights and extinguishes (c) FAIL indicator lights and extinguishes (d) PASS indicator lights and extinguishes (e) FAIL indicator lights and extinguishes (f) PASS indicator lights (g) IN TEST indicator extinguishes (h) PASS indicator remains lit	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	4	AUTOMATIC TEST - AUTO/MANUAL	Set to MANUAL	PASS indicator extinguishes	. . .
	5	AUTOMATIC TEST - RESET	Press and release	. . .	. . .
IR TARGET LOG H	1	AUTOMATIC TEST - TEST NUMBER	Set to 02	. . .	. . .
	2	AUTOMATIC TEST - RESET	Press and release	. . .	. . .

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
IR TARGET LOG H - Continued	3	TARGET CONTROL - TARGET PWR	Set to ON	. . .	. . .
	4	DMM - CHANNEL SELECTOR	Set to LOG H	. . .	. . .
	5	IMM - VOLTS/ OHMS	Set to 2K/2V	. . .	. . .
	6	DMM-MODE	Set to DC	. . .	. . .
	7	TARGET CONTROL- target selector	Set to CTR	DMM indicates more negative than -0.964V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	8		Set to OFF	. . .	. . .
	9	TARGET CONTROL - TARGET PWR	Set to OFF	. . .	. . .
MCU Stimuli	1	ANGLE INDICATOR API 1	Set to GYRO ROLL	ANGLE INDICATOR API 1 indicates 0.0 ±0.5°	Adjust GYRO ROLL control for 0.0 ~0.50
	2	ANGLE INDICATOR API 2	Set to GYRO PITCH	ANGLE INDICATOR API 2 indicates .0. ±0.5°	Adjust GYRO PITCH control for 0.0 ±0. 5°
	3	AUTOMATIC TEST - TEST NUMBER	Set to 13		. . .
	4	AUTOMATIC TEST - AUTO/MANUAL	Set to AUTO	. . .	. . .
	5	DMM-CHANNEL SELECTOR	Set to Y2	. . .	. . .
	6	DMM-VOLTS/ OHMS	Set to 200K/ 200V	. . .	. . .
	7	DMM-TEST SELECTOR 2	Set to 3	DMM indicates between -36.0 and -40.0 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
MCU Stimuli Continued	8	AUTOMATIC TEST - AUTO/MANUAL	Set to MANUAL	. . .	. . .
	9	AUTOMATIC TEST - TEST NUMBER	Set to 15	. . .	. . .
	10	AUTOMATIC TEST - AUTO/MANUAL	Set to AUTO	. . .	. . .
	11	DMM-CHANNEL SELECTOR	Set to P2	DMM indicates between -36.0 and -40.0 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key.
	12	AUTOMATIC TEST - TEST NUMBER	Set to 20	. . .	. . .
	13	AUTOMATIC TEST - AUTO/MANUAL	Set to MANUAL	. . .	. . .
	14	DMM-CHANNEL SELECTOR	Set to Y1	. . .	. . .
	15	DMM-VOLTS/ OHMS	Set to 2K/2V	. . .	. . .
	16	DMM-TEST SELECTOR 1	Set to 10	DMM indicates between +1. 48 and +l.52 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	17	DMM-CHANNEL SELECTOR	Set to P1	DMM indicates between +1. 48 and +1. 52 V	Go to TM 9-4935-473-14-2, troubleshooting procedures entrance key
	18	DELETED			
	19	DMM-VOLTS/ OHMS	Set to 20K/ 20V	. . .	. . .
	20	DMM-TEST SELECTOR 1	Set to 2	DMM indicates between +4. 95 and +5. 05 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	21	DMM-CHANNEL SELECTOR	Set to Y1	DMM indicates between +4. 95 and +5 .05 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	22	DELETED			
	23	DMM-TEST SELECTOR 1	Set to 3	DMM indicates between +4. 90 and +5.10 V	Replace A4 card; if malfunction still persists replace control monitor

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
MCU Stimuli. Continued	24	DMM-CHANNEL SELECTOR	set to P1	DMM indicates between +4. 90 and +5.10 V	Replace A4 card; if malfunction persists, replace Control Monitor
	25	AUTOMATIC TEST-TEST NUMBER	Set to 27	. . .	. . .
	26	DMM-TEST SELECTOR 1	Set to 2	DMM indicates between +4.5 and +6. 5 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	27	AUTOMATIC TEST-TEST NUMBER	Set to 28	. . .	. . .
	28	DMM-CHANNEL SELECTOR	Set to Y1	DMM indicates between -4.5 and -6.5 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	29	AUTOMATIC TEST-TEST NUMBER	Set to 32	. . .	. . .
	30	DMM-VOLTS/ OHMS	Set to 2K/ 2V	. . .	. . .
	31	DMM-TEST SELECTOR 1	Set to 2	DMM indicates between +0. 493 and +0. 527 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	32	ANALOG METERS-meter range switch	Set to NULL	AZ meter deflects full scale to left	Replace Control Monitor
	33	ANALOG METERS-meter range switch	Set to OFF	AZ meter returns to zero	. . .
	34	AUTOMATIC TEST-TEST NUMBER	Set to 33	. . .	. . .
	35	DMM-CHANNEL SELECTOR	Set to P1	DMM indicates between +0. 493 and O. 527 V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	36	ANALOG METERS-meter range switch	Set to NULL	EL meter deflects full scale up	Replace Control Monitor
	37	AUTOMATIC TEST-TEST NUMBER	Set to 42	. . .	. . .
	38	ANALOG METERS-meter range switch	Set to OFF	. . .	. . .

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
MCU Stimuli-Continued	39	DMM CHANNEL SELECTOR	Set to Y2	. . .	. . .
	40	DMM-MODE	Set to RMS	. . .	. . .
	41	DMM-TEST SELECTOR 2	Set to 4	DMM indicates between 0.324 and 0.383 V RMS	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	42	AUTOMATIC TEST-TEST NUMBER	Set to 43	. . .	. . .
	43	DMM-CHANNEL SELECTOR	Set to P2	DMM indicates between 0.324 and 0. 383 V RMS	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	44	AUTOMATIC TEST-TEST NUMBER	Set to 44	. . .	. . .
	45	DMM-MODE	Set to DC	. . .	. . .
	46	DMM-TEST SELECTOR 2	Set to 8	DMM indicates between +1.31 and+1.39V	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	47	AUTOMATIC TEST-TEST NUMBER	Set to 45	DMM indicates between +0.72 and +0.78 V	Replace Al card; if malfunction still persists replace control monitor
	47.1	DMM-TEST SELECTOR 2	Set to 9		
	47.2	AUTOMATIC TEST-TEST NUMBER	Set to 46	DMM indicates between +1.31 and +1.39 V	Replace A4 card: if malfunction still persists replace control monitor
	47.3	AUTOMATIC TEST - TEST NUMBER	Set to 47	DMM indicates between +0.72 and +0. 78 V	Replace A4 card: if malfunction still persists replace control monitor
	47.4	DMM-TEST SELECTOR 2	Set to 10		
	47.5	AUTOMATIC TEST-TEST NUMBER	Set to 48	DMM indicates between + 1.31 and +1.39 V	Replace A4 card: if malfunction still persists replace control monitor
	47.6	AUTOMATIC TEST-TEST NUMBER	Set to 49	DMM indicates between +0.72 and +0.78 V	Replace A4 card: if malfunction still persists replace control monitor

Table 2-14. Control Monitor Self -Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
MCU Stimuli Continued	47.7	DMM-TEST SELECTOR 2	Set to 11		
	47.8	AUTOMATIC TEST-TEST NUMBER	Set to 50	DMM indicates between +1. 31 and +1.39 v	Replace A4 card; if malfunction still persists replace control monitor
	47.9	AUTOMATIC TEST-TEST NUMBER	Set to 51	DMM indicates between +0. 72 and +0.78 V	Replace A4 card; if malfunction still persists replace control monitor
	48	AUTOMATIC TEST TEST NUMBER	Set to 21	. . .	. . .
	49	DMM-CHANNEL SELECTOR	set to Y2	. . .	. . .
	50	DMM- TEST SELECTOR 2	set to 7	. . .	. . .
	51	DMM-VOLTS/OHMS	Set to 2K/2V	. . .	. . .
	52	DMM-MODE	Set to RMS	DMM indicates between 0.00 and 0. 30 V RMS	Replace A4 card; if malfunction still persists replace control monitor
	53	. . .	R&urn control monitor to initial conditions as listed in table 2-13	. . .	. . .

Table 2-14. Control Monitor Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
		◀ NOTE ▶			
		This self-test is applicable to a TSGMS equipped to support M65 with C-NITE only.			
Thermal Patch Self-test					
			WARNING		
			Thermal patch on the IR target assembly is hot and may cause burns. To verify heat generated by thermal patch, get near but do not touch patch.		
			◀ NOTE ▶		
			Ensure battery used is fully charged. Battery is the same type used on the AH-IF aircraft.		
	1	. . .	Connect plug W11XP1 of target power cable to J1 connector on IR target assembly	. . .	. . .
	2	. . .	Connect plug W11XP2 of target power cable to J2 connector on power adapter	. . .	. . .
	3	PATCH on power adapter	Set to down (off)	. . .	. . . .
	4	DIODE on power adapter	Set to down (off)	. . .	. . .
	5	BATT/LOG H on power adapter	Set to left (BATT)	. . .	. . .
	6	. . .	Connect battery to power adapter	. . .	. . .
	7	PATCH on power adapter	Set to up (on)	After 2 minutes thermal patch gives off heat	Go to TM 9-4935-473-14-2, troubleshooting procedure entrance key

Table 2-14. Control Monitor Self-Test Procedures -Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
Thermal Patch Self-test - Continued	8	PATCH on power adapter	Set to down (off)	. . .	. . .
	9	. . .	Disconnect battery from power adapter	. . .	. . .
	10	. . .	Disconnect plug WllXP2 of target power cable from J2 connector of power adapter	. . .	. . .
	11	. . .	Disconnect plug WllxPl of target power cable from J1 connector of IR target assembly	. . .	. . .

Table 2-15. TSEM Self-Test Procedures

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
			◀NOTE▶		
			Whenever, pressing TSEM RESET switch, wait 15 seconds after performing previous switch setting; then press TSEM RESET switch.		
Initial Conditions	1	Power	Set to OFF	. . .	. . .
	2	Function rotary	Set to MSL PRES	. . .	. . .
			CAUTION		
			Exercise care when connecting and disconnecting cables to prevent damage to equipment due to electrostatic discharge and erroneous connections. Prior to connecting or disconnecting cables, be sure all power is turned off and that sources of electrostatic charge are not present at either end of the cables. Since the majority of the pins on each cable lead to components which are ESD, personnel must not touch, or otherwise allow static charges to reach the exposed pins of connector cables. A protective cap must be installed on any connector when cable is disconnected.		
			◀NOTE▶		
			Replacement of circuit cards or subassemblies shall be in accordance with Chapter 3.		
Set-up	1	. . .	Connect W10XP1 of TSEM power cable (W10) to 28 VDC jack on TSEM. Connect W10XP237 of TSEM power cable (W10) to W1XJ237 of MCU power cable (W1) or to a +28 V power source if +28 V is not applied to MCU power cable	. . .	. . .
	2	ON/OFF switch	Set to ON	POWER indicator lights (other indicators may light also)	Verify +26 to +28.5 V power source; if fault persists, replace POWER indicator lamp; if fault persists, replace TSEM
	3	RESET pushbutton switch	Press and release	All indicators, except POWER indicator, are extinguished	. . .
			◀NOTE▶		
			POWER indicator will remain lit during TSEM self-test check as long as the ON/OFF switch is set to ON.		
Self-Test	1	Function rotary switch	Set to SELF TEST-LAMP TEST	All indicators light	Replace defective lamp(s); if fault persists, replace TSEM
	2	RESET pushbutton switch	Press and release	. . .	. . .
	3	Function rotary switch	Set to MSL GONE	MSL GONE indicator lights	Replace A1 card and tag TSE M for calibration; if fault persists, replace TSEM

Table 2-15. TSEM Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
Self -Test Continued	4	RESET pushbutton switch		. . .	. . .
	5	Function rotary switch	Set to AUTO	All indicators, except POWER indicator, are extinguished	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	6	RESET pushbutton switch	Press and release	. . .	. . .
	7	Function rotary switch	Set to SELF TEST-SP "0"	SHEAR PIN indicator lights	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	8	RESET pushbutton switch	Press and release	. . .	. . .
	9	Transducer	Press and hold	SHEAR PIN indicator is extinguished	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	10	Transducer	Release	SHEAR PIN indicator lights	Replace TSEM
	11	RESET pushbutton switch	Press and release	. . .	. . .
	12	Function rotary switch	Set to SELF TEST-SP "0"	SHEAR PIN indicator remains lit	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	13	RESET pushbutton switch	Press and release	. . .	. . .
	14	Function rotary switch	Set to SELF TEST MSL I/F	All indicators except SHEAR PIN indicator light	Go to TM 9-4935-473-14-2, trouble-shooting procedures entrance key
	15	Function rotary switch	Set to AUTO	. . .	. . .
	16	RESET pushbutton switch	Press and release	All indicators extinguish	Replace A8 card and tag TSEM for calibration, if fault persists, replace TSEM
	17	Function rotary switch	Set to MSL PRES	. . .	. . .
	18	RESET pushbutton switch	Press and release	. . .	. . .
Power Off	1	ON/OFF switch	Set to OFF	POWER indicator is extinguished	Replace TSEM

Table 2-15. TSEM Self-Test Procedures - Continued

Self-Test	Step	Function Switch	Operation	Normal Indication	Corrective Action
Power Off Continued	2	. . .	Disconnect W10XP237 of TSEM power cable (W10) from +28V or W1XJ237 of MCU power cable (W1). Disconnect W1OXP1 of TSEM power cable (W 10) from 28 VDC jack (J2) on TSEM and install dust cover on TSEM 28 VDC connector	. . .	. . .

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-8. General.

This section contains instructions for the operation of TSGMS under unusual conditions.

2-9. Cold Weather.

When the TSGMS is initially set up, check the optical surfaces and test all mechanical devices for proper operation. Ice, visible or perhaps not noticeable, may have formed on optical surfaces, rotating mechanisms, and the like, and may be sufficient to hamper TSGMS operation. Make sure that snow and ice does not collect between connector pins. Avoid breathing on the corrector lens assembly. The TSGMS operation may deteriorate if ambient temperature is less than -30” F.

2-10. Hot Weather.

The operation of the TSGMS may deteriorate if the ambient temperature is higher than 130°F.

2-11. High Humidity.

The TSGMS is designed to operate properly regardless of humidity conditions. Even though the TSGMS is capable of operating in all humidity conditions, it is inadvisable to expose the corrector lens assembly to rain, snow or hail to allow moisture, frost or ice to collect on the corrector lens assembly. When the corrector lens assembly has been exposed to moisture, snow, frost or ice, refer to paragraph 3-5. Avoid getting water into electrical connector or on exposed electrical pins.

CHAPTER 3
MAINTENANCE

Section I. SERVICE UPON RECEIPT OF MATERIEL

3-1. General.

This section describes the services that are required when the materiel is first received.

3-2. Duties of Using Organization.

a. General. When handling, inspecting and maintaining the equipment, observe the following instructions.

(1) Always handle the TSGMS components with care; rough handling could cause a malfunction, inaccurate testing, or a possible safety hazard.

(2) Do not force levels, knobs, switches, or controls beyond their mechanical stops.

(3) If a component cannot be adjusted or repaired in accordance with authorized procedures, refer the problem to the supporting maintenance unit.

(4) Use on1y those tools and equipment items authorized for performance of maintenance as specified in Appendix B.

(5) Use only those paints, cleaning agents, solvents, and other materials which are specifically authorized in Table 3-1.

WARNING

Paint, primer, solvent, and alcohol listed in Table 3-1 are toxic and flammable. Keep away from heat and open flames. Avoid prolonged or repeated breathing and contact with skin.

Table 3-1. Bulk and Consumable Items

Item Number	Item Name	NSN Number/Specification
1	Alcohol	6810-00-856-2914
2	Brush	6020-00-245-4509
3	De-icer	6850-00-835-0484
4	Soap, liquid	7930-00-764-5075
5	Paint	13538, FED STD 595
6	Glycerine	MIL-C-675
7	Oil	MIL-L-25681
8	Solvent	6810-00-257-2488
9	Tissue, lens	6640-00-597-6745
10	Wiping rag	7920-00-205-1711
11	Polychloroprene adhesive	EC1357 (MIL-A-5092, Type II)
12	Polychloroprene adhesive	EC 1300L (MMM-A-121)
13	Tape	MIL-T-27730
14	Primer, zinc chromate	TT-P-1757
15	Primer, adhesive	8040-00-104-5263
16	Stick, orange wood	5120-00-408-4036

b. Services.

(1) Make an initial inventory per Appendix C when the equipment is received. Note any missing items and report them promptly.

(2) Check stock numbers and serial numbers to ensure that the correct items were received.

(3) Perform necessary cleaning in accordance with paragraph 3-5.

(4) Perform an inspection of TSGMS components in accordance with paragraph 3-6.

(5) Perform TSGMS self test in accordance with the procedures in paragraphs 2-6 and 2-7.

(6) Report any deficiencies using applicable reports, records, and forms required for inventories and inspections.

(7) MCU serial numbers 200,046 and up come with the purge adapter. On serial numbers 200,001 thru 200,045, the purge adapter must be requisitioned and assembled from the piece parts listed in appendix C and per paragraph 3-19.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-3. General

The maintenance checks and service instructions provided by this manual outline functions to be performed during scheduled/unscheduled maintenance. These checks and services are required to maintain the system in good operating condition. If the equipment is continuously used, perform the checks and services on a daily basis. Refer to Table 3-2 for Preventive Maintenance Checks and Service.

3-4. Maintenance Checks and Services.

a. Lubrication. Lubrication requirements consist of checking the adjustable head adaptor assembly P/N 11499256 at 1 month intervals. Lubricate as necessary using oil (7, table 3-1).

b. Desiccant. Inspect the humidity indicators on the control mounted rear panel on a weekly basis or daily if the equipment has been in continuous use. The humidity indicator shows the relative humidity of the air within the case. Indications of 20, 30, 40 and 50% relative humidity are given. When a segment is pink the relative humidity is greater than the percentage number of that segment. If a segment is blue the relative humidity is less than the percentage number of that segment. The desiccant should be replaced when the 40 or 50% segments are lavender or pink in color. After the desiccant is replaced the humidity indicator will return to blue. Several hours may be required for the indicators to show proper indications after replacing desiccant, Procedure for replacing desiccant is given in paragraph 3-10 for the Control Monitor and paragraph 3-14 for the TSEM.

3-5. Cleaning.

a. General Cleaning Instructions. The TSGMS components should always be clean. Otherwise, performance may be degraded, and relatively obvious defects that would be noted in a visual inspection may be hidden by dust, grease, or other foreign matter. See table 3-1 for general cleaning materials applicable to the various components of the TSGMS.

WARNING

Solvent and alcohol used in the following procedures are toxic and flammable. Keep all flammable cleaning materials away from heat and open flames. Use only in a well ventilated area. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with the skin.

CAUTION

Do not get alcohol on the rubber parts of sealants. Alcohol may cause rubber parts to deteriorate and may cause some sealants to dissolve.

(1) Metal parts. Use dry, clean wiping rags (10, table 3-1) to remove dust, dirt, grease, moisture, or other foreign matter from the TSGMS components. If the foreign matter cannot be removed using dry wiping rags (10, table 3-1) dampen a rag with alcohol (1, table 3-1) or solvent (8, table 3-1) and gently wipe the area.

(2) Rubber Parts. Clean rubber parts using a liquid soap (4, table 3-1) and warm water and dry the parts using a clean, absorbent wiping rag (10, table 3-l).

CAUTION

Do not clean glass surface of the corrector lens assembly with rags or other materials that might scratch and thereby degrade system performance.

(3) Glass. Use a brush (2, table 3-1) to remove loose particles of dust and lint from glass surfaces. Wipe the surface in a circular motion using tissue (9, table 3-1) either dry or moistened with alcohol (1, table 3-l). If dirt, lint, or smears remain on the glass, wrap a piece of tissue (9, table 3-1) around the end of an orange wood stick (16, table 3-1) to form a swab. Beginning at the center of the surface, swab with a circular motion while applying a light downward pressure. Gradually increase the radius of the area being cleaned until the entire surface has been cleaned. If necessary, use a rubber syringe to remove any remaining dust or lint.

b. Cleaning Procedures for Cold Weather Operation.

CAUTION

Do not use warm liquids on frozen glass surfaces since thermal shock can cause breakage

(1) If the temperature is below 0 °C, (+32° F), add glycerin (6, table 3-1) to cleaning water. This will prevent it from freezing on the part being cleaned.

Table 3-2. Operator, Direct and General Support Preventive Maintenance Checks and Services

NOTE: Intervals are keyed to utilization. Within designated interval, these checks are to be performed in the order listed:

B-Before D-During A-After W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready/ available if:
						MONITOR AND CONTROL UNIT		
1	●		●		●	Control Monitor	Clean and remove dirt and foreign material	
1.1	●					Control Monitor	Calibration label (DA Label 80) indicates calibration has been performed within last 240 days	Calibration overdue
2	●					Switch knobs	Knobs missing, damaged, or inoperative	Knobs missing or inoperative
3	●					Toggle switches	Damaged or inoperative	Switch inoperative
4	●					Digital displays window	Windows broken, cracked, scratched, vision impaired	Windows broken or cracked, vision impaired
5	●					AZ and EL meter windows	Window broken, cracked, scratched, vision impaired	Windows broken or cracked, vision impaired
6	●					Indicators	Glass cracked or scratched	Glass cracked
7	●					AUTOMATIC TEST-TEST NUMBER switch	Switch damaged or inoperative	Switch inoperative
8	●					Handle	Handle loose or broken	
9	●			●		Humidity indicator	Insure that humidity indicator is not in the 40% or greater sector (lavender or pink)	
10	●					Electrical connectors	Check for corrosion and damaged receptacle and pins	Connector damaged beyond use
11	●		●		●	IR Target Assembly	Clean and remove dirt and foreign material	
11.1	●					IR Target Assembly (C-NITE)	Check that beam steering assembly present	Assembly missing
12	●					Target markings	Markings scratched and or faded	Target faded and not visible
13	●					Breather valve	Valve missing, loose or broken	
14	●					Look back telescope	Lens broken, cracked, scratched, vision impaired	Lens broken or cracked
15	●					Target cable connector	Check connector for corrosion and damaged receptacle and pins	Connector damaged beyond use

Table 3-2. Operator, Direct and General Support Preventive Maintenance Checks and Services - Continued

B-Before D-During A–After W–Weekly M–Monthly

Item No.	Interval B	D	A	W	M	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready/ available if:
16	•		•		•	Extender Cards	Cards cracked, bent pins, wires broken	Cards damaged beyond use
17	•		•			Purge Adapter	Threads damaged, parts missing	Parts missing
18	•		•		•	Test Probe Kit	Inspect for pins and alligator clips damage; damaged wiring	Damaged wiring, pins, and/or alligator clips
19	•		•		•	Case, carrying TEST SET, GUIDED MISSILE LAUNCHER ALIGNMENT CIRCUIT AMPLITUDE (TSGMLACA)	Inspect for damage to case, close case and check for tight fit and proper latching	Case punctured or cracked
20	•		•		•	TOW System Evaluation Missile	Clean and remove dirt and foreign material	
20.1	•					TOW System Evaluation Missile	Calibration label (DA Label 80) indicates calibration has been performed within 240 days	Calibration overdue
21	•					Switch knob	Knob missing, damaged or inoperative	Knob missing or inoperative
22	•					Toggle switch	Switch damaged or inoperative	Switch inoperative
23	•					Indicators	Glass cracked or scratched	Glass cracked
24	•					Pushbutton switch	Switch damaged or inoperative	Switch inoperative
25	•					Connector caps	Damaged cap, chain broken or threads damaged	
26	•					Electrical connectors	Check for corrosion and damaged receptacle and pins	Connector damaged beyond use
27	•			•		Humidity indicator	Insure that humidity indicator is not in the 40% or greater sector (lavender or pink)	
28	•		•		•	Tripod Assembly	Clean and remove dirt and foreign material	
29	•					Leg and center locks and El lock	Knobs missing, damaged, or locks inoperative	Knob missing or locks inoperative

Table 3-2. Operator, Direct and General Support Preventive Maintenance Checks and Services - Continued

B-Before D-During A-After W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready/ available if:
30	•					El adjust knob	Knobs missing or damaged, and/or inoperative	Knob missing and/or adjustment control inoperative
31	•		•		•	Geared Panhead Assembly	Clean and remove dirt and foreign material	
32	•					Az and pitch adjustment knobs	Knobs missing, damaged and/or inoperative	Knobs missing and/or adjustment controls inoperative
33	•					Az, el, pitch and lateral positioning locks	Knobs on lock missing, damaged and/or locks inoperative	Knob missing and/or locks inoperative
34	•					Mounting surface	Check for damaged surface; check mounting screws for damaged threads	
35	•		•		•	Distance Measuring Device	Clean and check for serviceability of tape	Tape broken
36	•		•		•	Passive Target Assembly	Clean and remove dirt and foreign material	
37	•					Target markings	Markings scratched and/or faded	Target faded and not visible
38	•		•		•	Boresight Device, TSU	Clean and remove dirt and foreign material	
39	•					Thumbscrew	Thumbscrew missing and/or screw threads damaged	Screw missing or screw threads damaged beyond use
40	•					Captive screws	Screws missing and/or screw threads damaged	Screws missing or screw threads damaged beyond use
41	•					Straight pin	Pin bent, broken	Pin damaged beyond use
42	•					Mounting plate	Check for damaged surface	
43	•		•		•	Boresight Telescope Case	Inspect for damage to case, close case and check for tight fit and proper latching	Case punctured or cracked
44	•					TSEM Power Cable W10	Check cable for cuts and fraying; check connectors for dirt/corrosion and damaged receptacle and pins	Connector damaged beyond use

Table 3-2. Operator, Direct and General Support Preventive Maintenance Checks and Services - Continued

B-Before D-During A-After W-Weekly M-Monthly

Item No.	Interval B	D	A	W	M	Item to be inspected	Procedure Check for and have repaired or adjusted as necessary	For readiness reporting equipment is not ready available if:
45	•		•		•	Case, Boresight Equipment	Inspect for damage to case, close case and check for tight fit and proper latching	Case punctured or cracked
46	•					Breather valve	Valve missing, loose or broken	
						CABLE ASSEMBLY CASE		
47	•					Cables W1 thru W9 and (Wll ; C-NITE)	Check cable for cuts and fraying; check connectors for dirt/corrosion and damaged receptacle and pins; check connector cap for broken or damaged threads.	Connector damaged beyond use
48	•		•		•	Signal Monitor Assembly	Clean and remove dirt and foreign material	
49	•					Toggle switches	Damaged or inoperative	Switch inoperative
50	•					Electrical connectors	Check for corrosion and damaged receptacle and pins	Connector damaged beyond use
51	•					Connector caps	Damaged cap, chain broken or threads damaged	
52	•		•		•	Corrector Lens Assembly	Clean and remove dirt and foreign material	
53	•					Lens	Lens broken or cracked, scratched, vision impaired	Lens broken or cracked, vision impaired
54	•					Hinge assemblies	Assemblies broken, too loose or too binding	Assemblies damaged beyond use
55	•		•		•	Corrector Lens Case	Inspect for damage to case, close case for tight fit and proper latching	Case punctured or cracked
56	•		•		•	System Cable Case	Inspect for damage to case, close case for tight fit and proper latching	Case punctured or cracked
57	•					Breather valve	Valve missing, loose or broken	
58	•					IR Target Power Adapter (C-NITE)	Check that adapter is present and not damaged	Adapter missing or damaged

(2) Alcohol (1, table 3-1) applied with a tissue (9, table 3-1) may be used to clean glass surfaces if dry tissue (9, table 3-1) does not work satisfactorily.

(3) If moisture has frozen on glass surface, apply de-icer (3, table 3-1) or place the component in a warm area until the ice melts. Then pat the surface with a clean absorbent wiping rag (10, table 3-1). DO NOT RUB. Clean with tissue (9, table 3-1) when the surface is dry.

3-6. Inspection

a. A visual inspection of the TSGMS components will be conducted to make sure that all portions are in good condition.

b. Replacement components should be substituted for those found to be damaged or worn near or beyond serviceable limits. Dirt, grease, and foreign matter should be removed from all inspected surfaces per paragraph 3-5. Preservatives and foreign matter should be removed from electrical connectors. Areas in which the paint is scratched, chipped, or worn should be repainted per paragraph 3-7. Other specific repair functions which are authorized for various levels of maintenance are given in the MAC.

c. After completion of the visual inspection, the self-tests (tables 2-14 and 2-15) are performed to ensure the serviceability of the TSGMS.

d. The complete inspection is performed for initally received TSGMS to ensure that it is not damaged. The inspection, including the self-tests, should be performed weekly to make sure the equipment is maintained in a state of operational readiness. The inspection should be performed daily if the equipment is in continuous use.

3-7. Painting.

WARNING

Solvent, primer and paint used in the following procedure are toxic and flammable. Keep away from heat and open flames. Use only in a well-ventilated area. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with the skin.

CAUTION

Optical elements, bearings, rubber or other components may be damaged by cleaning, masking or painting.

CAUTION

Use masking tape to insure that no paint is applied to the following: countersinks, counterbores, bolts holes, bearing surfaces, attaching surfaces, o-ring grooves, and those areas treated with solid film lubricant.

In general, painting requirements for the TSGMS are limited to spot painting with yellow paint (5, table 3-1). Clean surface with wiping rag (10, table 3-1) dalpened with solvent (8, table 3-l). Then apply primer (14, table 3-1) and two coats of paint (5, table 3-1) to bare area. In spot painting, care must be taken not to obliterate any unit markings.

3-7.1 Electrostatic Sensitive Device Handling.

CAUTION

Low relative humidity (less than 30 percent) greatly increases the chance of damage to electrostatic sensitive devices due to discharge.

Before handling circuit cards the following precautions shall be taken: (1) Working surface shall be of electrostatic-free material and at ground potential; (2) All tools and equipment used in repair shall be at the same potential as the working surface; (3) Components, devices and circuit cards shall be at the same potential as work surface; (4) Personnel shall wear wrist strap, made of electrostatic-free material, which shall be electrically connected to working surface; (5) Avoid touching pins of integrated circuits with fingers; (6) When wearing long sleeved clothing, personnel shall cover sleeves from wrist to elbow with electrostatic-free material or remove that article of clothing or roll up the sleeves past the elbows thereby removing from close proximity any static carrying potential hazard.

Upon removing a circuit card, the circuit card should be placed immediately into a static shielding bag prior to being set on any surface. This will reduce the probability of inducing damage to other electrostatic sensitive components on the circuit card. If there is any delay in moving the repaired circuit card from the static-free work area to the LRU, the circuit card must be placed in a static shielding bag before it is moved away from static-free work area.

Field personnel should utilize a grounded floor mat in addition to the above mentioned grounded work surface. This will act as an added precaution against peripheral personnel such as supervisors or personnel not educated in the proper handling of electrostatic sensitive components. Accordingly it will keep the working field personnel from accidentally incurring further damage to other electrostatic sensitive components in the event they should happen to forget to reattach the grounded wrist strap after returning to the static-free work station from some electrostatically unstable or unsafe area.

Section III. REPAIR OF TSGMS CONTROL MONITOR

3-8. General.

This section contains repair procedures for the TSGMS Control Monitor. Only those tools contained in the Tool Kit, Aircraft Fire Control Repairman, MOS 68J (Basic), tool number 4933-00-967-9816, may be used to perform repair on the TSGMS Control Monitor.

3-9. Front Panel Components Replacement (Figure 3-1).

WARNING

Ensure that front panel ON/OFF switch is set to OFF. Presence of power during replacement may injure personnel or may damage equipment.

a. Front Panel Indicators.

(1) Turn lamp holder (1) ccw until lamp holder (1) comes off front panel.

(2) Remove lamp from lamp holder (l).

(3) Install lamp into lamp holder (l).

(4) Place lamp holder (1) at appropriate front panel position and install lamp holder (1) by turning it cw until tight.

b. Front Panel Knobs.

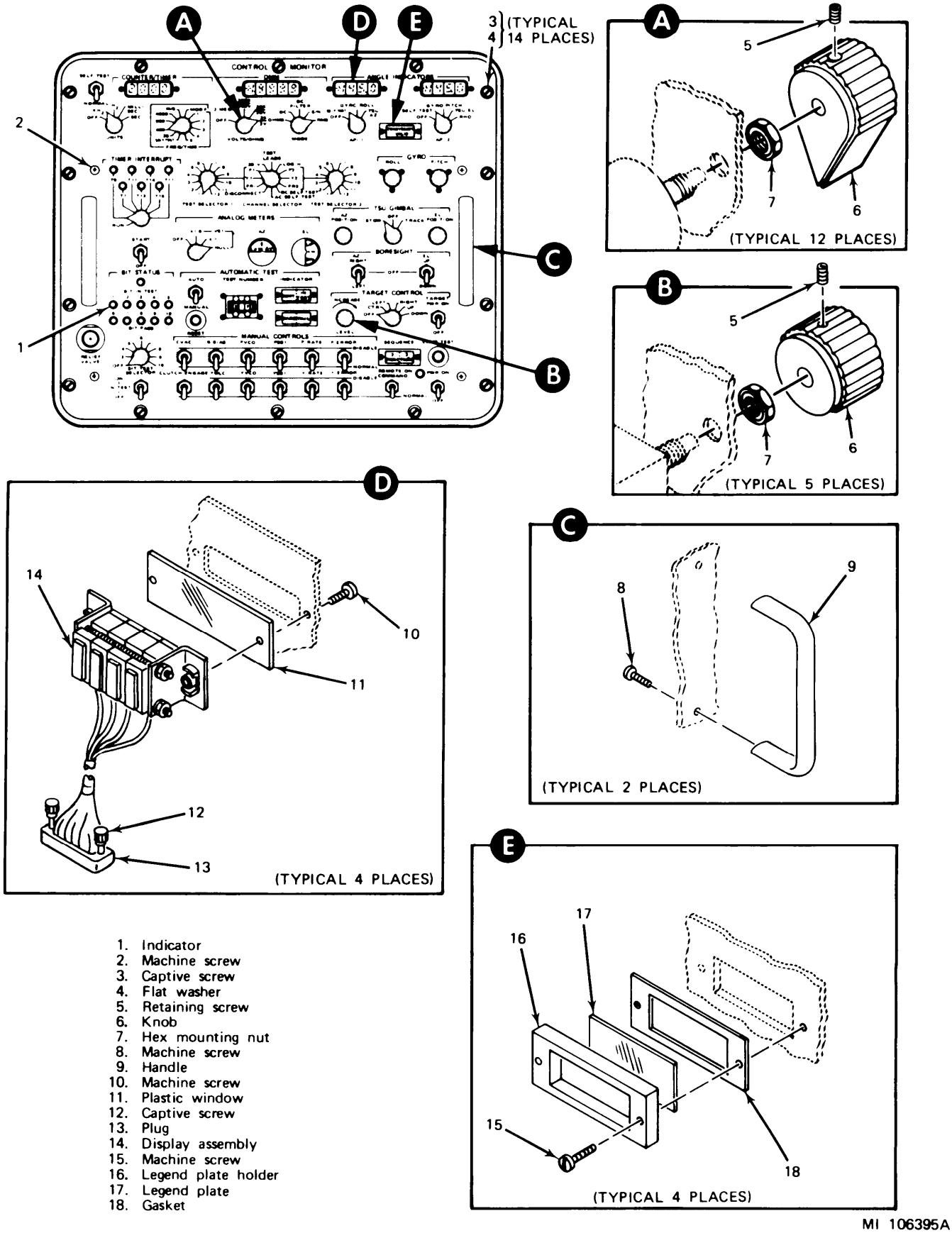
(1) Loosen retaining screw (5) and pull knob (6) off shaft.

(2) Install knob (6) on shaft and tighten retaining screw (5).

c. Front Panel Handle.

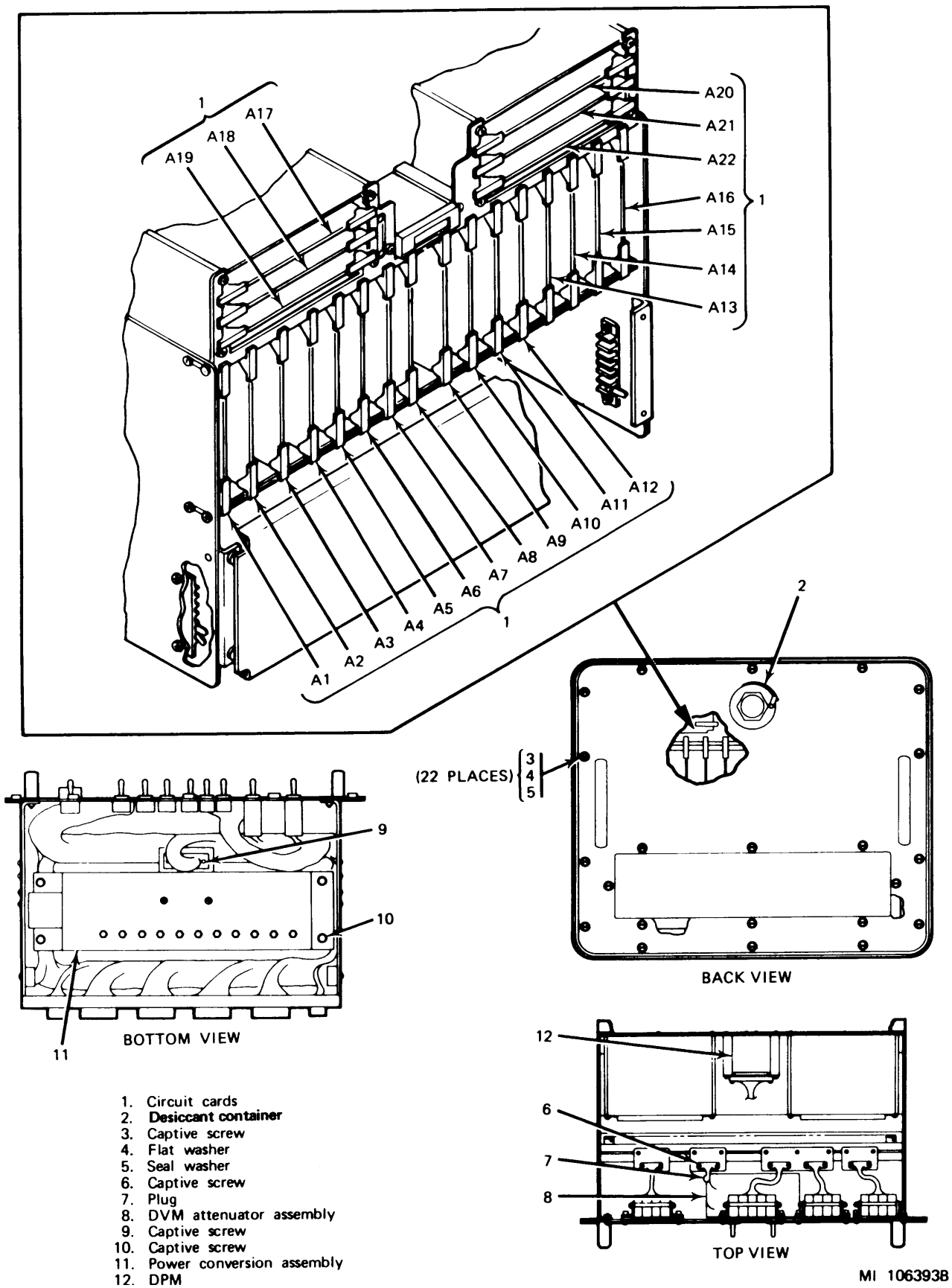
(1) Loosen 14 captive screws (3).

(2) Loosen 22 captive screws (3, figure 3-2) and remove back panel.



1. Indicator
2. Machine screw
3. Captive screw
4. Flat washer
5. Retaining screw
6. Knob
7. Hex mounting nut
8. Machine screw
9. Handle
10. Machine screw
11. Plastic window
12. Captive screw
13. Plug
14. Display assembly
15. Machine screw
16. Legend plate holder
17. Legend plate
18. Gasket

Figure 3-1. Control Monitor Front Panel Components



1. Circuit cards
2. Desiccant container
3. Captive screw
4. Flat washer
5. Seal washer
6. Captive screw
7. Plug
8. DVM attenuator assembly
9. Captive screw
10. Captive screw
11. Power conversion assembly
12. DPM

Figure 3-2. Control Monitor Internal Components and Desiccant

(3) Remove Control Monitor from case.

(4) Remove 2 machine screws (8, figure 3-l).

(5) Remove handle (9).

(6) Install handle (9).

(7) Install 2 machine screws (8) and tighten 2 machine screws (8).

(8) Install Control Monitor in case.

(9) Tighten 14 captive screws (3).

(10) Tighten 22 captive screws (3, figure 3-2).

d. COUNTER / TIMER, DMM, ANGLE INDICATORS Displays/Plastic Windows.

(1) Loosen 22 captive screws (3, figure 3-2) and remove back panel.

(2) Loosen 14 captive screws (3, figure 3- 1).

(3) Remove Control Monitor from case.

(4) Loosen 2 captive screws (12) and disconnect plug (13).

(5) Remove 2 machine screws (10), plastic window (11), and display assembly (14).

(6) Install plastic window (11), display assembly (14), and 2 machine screws (10); tighten 2 machine screws (10).

(7) Connect plug (13) and tighten 2 captive screws (12).

(8) Install Control Monitor in case.

(9) Tighten 14 captive screws (3).

(10) Install back panel by tightening 22 captive screws (3, figure 3-2).

e. CONSTRAINT VALID, READY/IN TEST, PASS/ FAIL, 2 PHASE/3 PHASE Indicators.

(1) Remove 2 machine screws (15, figure 3- 1), legend plate holder (16), legend plate (17), and gasket (18).

(2) Remove indicator lamp.

(3) Install indicator lamp.

(4) Install gasket (18), legend plate (17), and legend plate holder (16) and tighten 2 machine screws (15).

3-10. Internal Components and Desiccant Replacement (Figure 3-2).

WARNING

Ensure that front panel ON/OFF switch is set to OFF. Presence of power during replacement may injure personnel or may damage equipment.

a. Circuit Cards.

(1) Loosen 22 captive screws (3, figure 3-2) and remove back panel.

CAUTION

Ensure that circuit cards are handled per paragraph 3-7.1 to prevent damage to circuit card components.

(2) Remove circuit card (l).

(3) Install circuit card (1) in appropriate slot.

(4) Install back panel and tighten 22 captive screws (3).

b. DVM Attenuator Assembly.

(1) Loosen 22 captive screws (3, figure 3-2) and remove back panel.

(2) Loosen 14 captive screws (3, figure 3-1).

(3) Remove Control Monitor from case.

(4) Loosen 2 captive screws (6, figure 3-2).

(5) On front panel, remove VOLTS/OHMS and MODE knobs (6, figure 3-1) off shaft by loosening retaining screws (5).

(6) Remove hex mounting nuts (7).

(7) Disconnect plug (7, figure 3-2).

(8) Remove DVM attenuator assembly (8).

(9) Install DVM attenuator assembly (8).

(10) Connect plug (7) and tighten 2 captive screws (6).

(11) Install hex mounting nuts (7, figure 3-1).

(12) Install VOLTS/OHMS and MODE knobs (6) on shafts and tighten retaining screws (5).

(13) Install Control Monitor in case.

(14) Tighten 14 captive screws (3).

(15) Install back panel and tighten 22 captive screws (3, figure 3-2).

c. Power Conversion Assembly.

(1) Loosen 22 captive screws (3, figure 3-2) and remove back panel.

(2) Loosen 14 captive screws (3, figure 3-l).

(3) Remove Control Monitor from case.

(4) Turn Control Monitor such that bottom side faces up.

(5) Loosen 2 captive screws (9, figure 3-2) and disconnect plug from power conversion assembly (11).

(6) Loosen 4 captive screws (10) and remove power conversion assembly (11).

(7) Install power conversion assembly (11) and tighten 4 captive screws (10).

(8) Install plug on power conversion assembly by tightening 2 captive screws (9).

(9) Turn Control Monitor such that top faces up.

(10) Install Control Monitor in case.

(11) Tighten 14 captive screws (3. figure 3-l).

(12) Install back panel and tighten 22 captive screws (3, figure 3-2).

d. DPM.

(1) Loosen 22 captive screws (3) and remove back panel.

(2) Unplug DPM module (12).

(3) Plug in DPM module (12).

(4) Install back panel and tighten 22 captive screws (3).

e. Desiccant.

(1) Press and turn desiccant container (2) ccw until free.

(2) Rernove desiccant bag.

(3) Install desiccant bag.

(4) Install desiccant container (2) by pressing and turning desiccant container (2) cw until tight.

3-11. Back Panel Components Replacement (Figure 3-3).

WARNING

Ensure that front panel ON/OFF switch is set to OFF. Presence of power during replacement may injure personnel or may damage equipment.

a. Back Panel/Back Panel Gaskets/Back Panel Cushoning Pads,

(1) Loosen 22 captive screws (8) and remove back panel (11).

(2) Peel off and remove gaskets (3, 4).

(3) Peel off and remove cushoning pads (5, 6, 7).

WARNING

Solvent used in the following procedure is toxic and flammable. Keep away from heat and open flames. Use only in a well-ventilated area. Avoid prolonged or repeated contact with the skin.

(4) Using sharp knife scrape off remaining residue on back panel (11) and clean area with wiping rag (10, table 3-1) dampened with solvent (8, table 3-l).

(5) Position cushoning pads (5, 6, 7) at appropriate places on back panel (11) and bond in place with poly - chloroprene adhesive (11, table 3-1).

(6) Position gaskets (3. 4) at appropriate places on back panel (11) and bond in place with polychloroprene adhesive (11, table 3-1).

(7) Install back panel (11) and tighten 22 captive screws (8).

b. Back Panel Handles.

(1) Loosen 22 captive screws (8) and remove back panel (11).

(2) Remove 2 machine screws (1) from handle (2) and remove handle (2).

(3) Install handle (2) and 2 machine screws (1) on back panel (11) and tighten 2 machine screws (l).

(4) Install back panel (11) and tighten 22 captive screws (8).

SECTION IV. REPAIR OF TSGMS TSEM

3-12. General.

This section contains repair procedures for the TSGMS TSEM. Only tools contained in the Tool Kit, Aircraft Fire Control Repairman, MOS 68J (Basic), tool number 4933-00-967-9816, may be used to perform repair on the TSGMS TSEM.

3-13. Front Panel Components Replacement (Figure 3-4).

WARNING

Ensure that front panel ON/OFF switch is set to OFF. Presence of power during replacement may injure personnel or may damage equipment.

a. Front Panel Indicators.

(1) Turn lamp holder (1) ccw until lamp holder (1) comes off front panel.

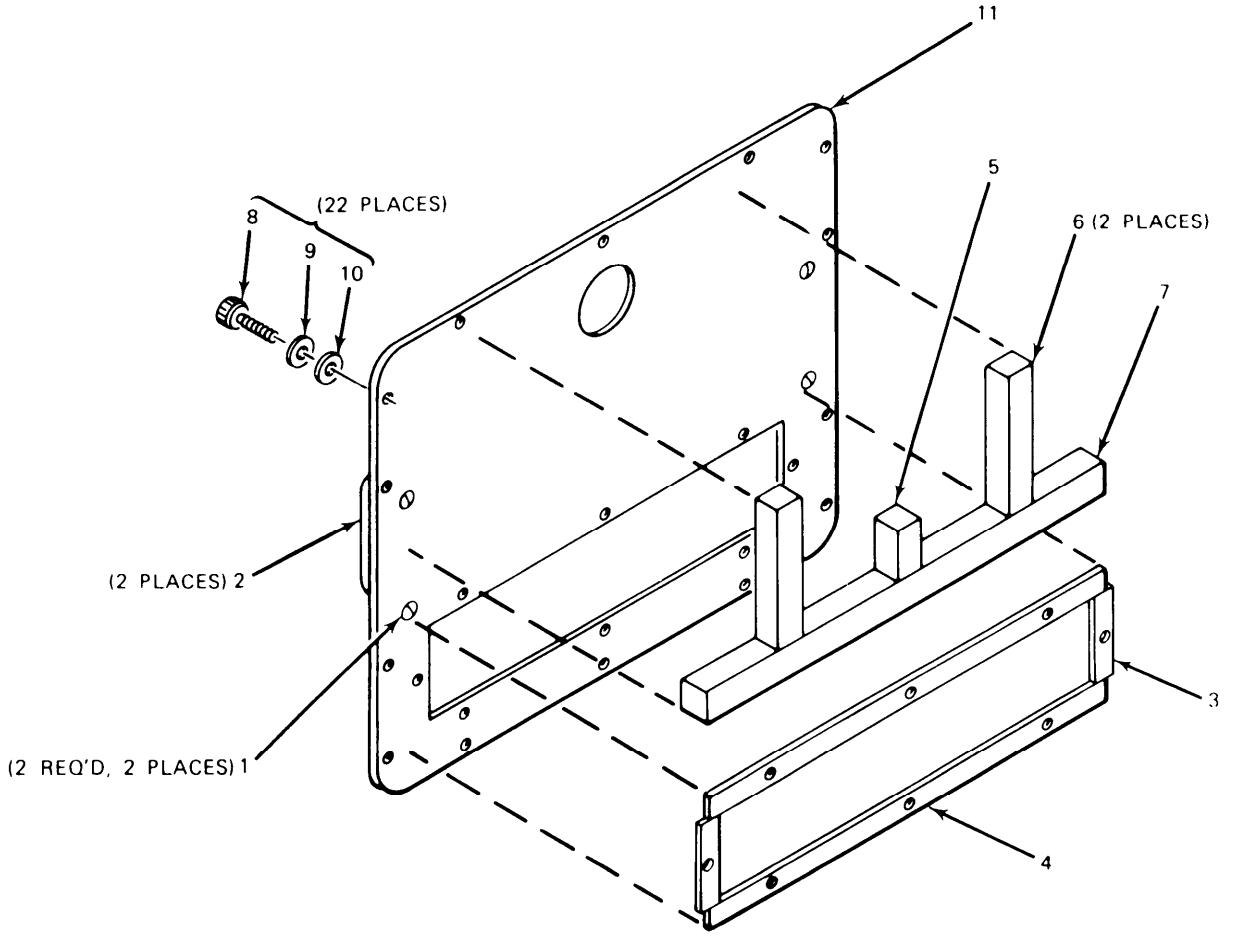
(2) Remove lamp from lamp holder (l).

(3) Install lamp into lamp holder (l).

(4) Place lamp holder (1) at appropriate front panel position and install lamp holder (1) by turning it cw until tight.

b. Front Panel Knob.

(1) Loosen retaining screws (2) and pull knob (3) off shaft.



1. Screw
2. Handle
3. Gasket
4. Gasket
5. Insulating pad
6. Insulating pad
7. Insulating pad
8. Captive screw
9. Flat washer
10. Seal washer
11. Panel assembly

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Figure 3-3. Control Monitor Back Panel Components

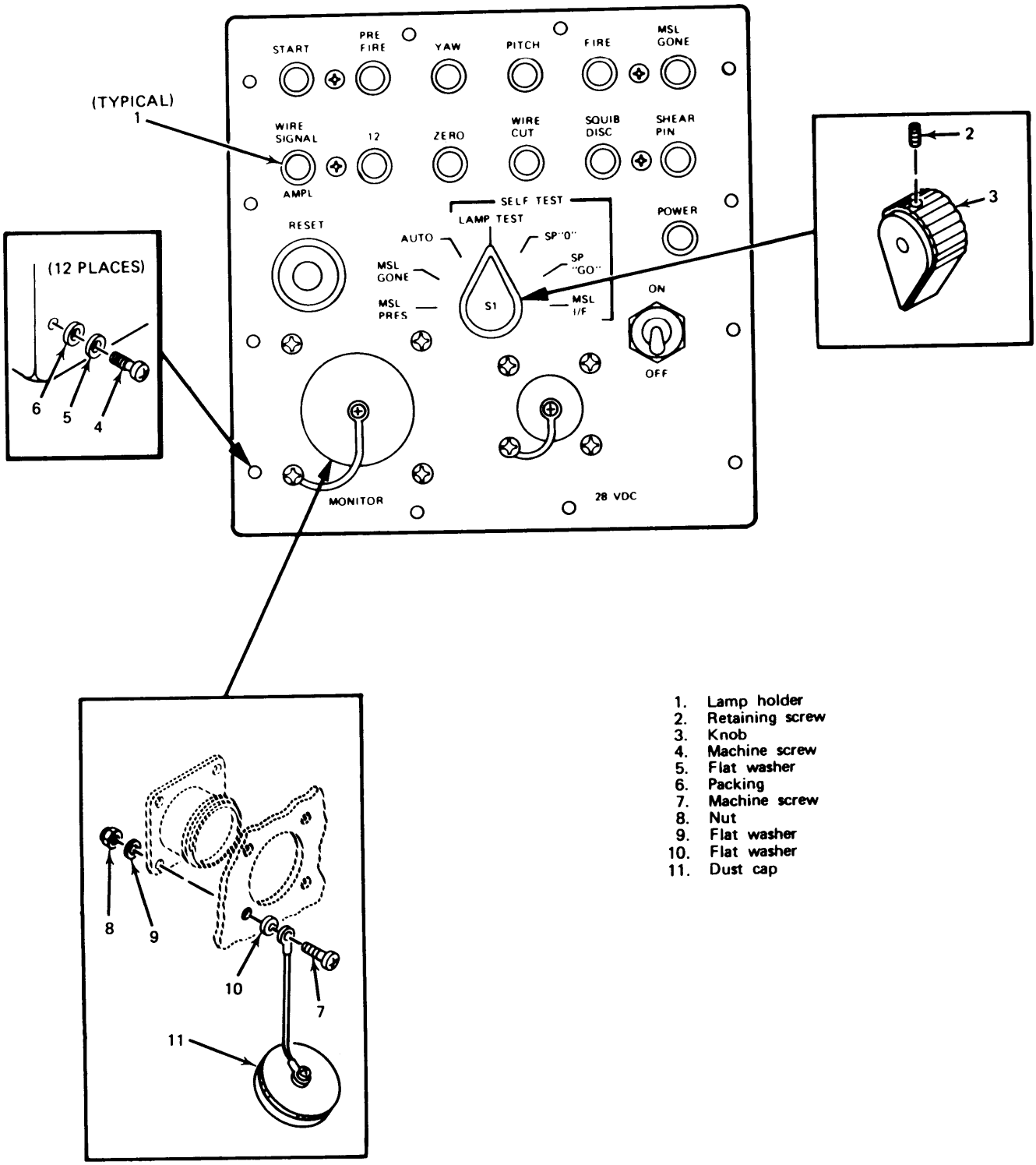


Figure 3-4. TSEM Front Panel Components

(2) Install knob (3) on shaft and tighten retaining screw (2).

c Dust Cap.

(1) Remove 12 front panel machine screws (4), flat washers (5), and packings (6); pull front panel loose.

(2) Remove machine screw (7), nut (8), flat washers (9, 10) and dust cap (11).

(3) Install dust cap (11) with machine screw (7) , flat washers (9, 10) and nut (8): reinstall front panel.

(4) Install 12 front panel machine screws (4), flat washers (5), and packings (6) and tighten 12 screws (4) .

3-14. Desiccant Replacement (Figure 3-4. 1).

a. Press and turn desiccant container (1) ccw until free.

b. Remove desiccant bag.

c. Install desiccant bag.

d. Install desiccant container (1) by pressing and turning desiccant container (1) cw until tight.

3-15. Circuit Cards Replacement (Figure 3-4. 1).

WARNING

Ensure that front panel ON/OFF switch is set to OFF. Presence of power during replacement may injure personnel or may damage equipment.

a. Remove 22 machine screws (2) and 22 flat washers (3).

b. Remove 4 machine screws (4), 4 flat washers (5), and 4 packings (6).

c. Remove bottom panel (7).

CAUTION

Ensure that circuit cards are handled per paragraph 3-7.1 to prevent damage to circuit card components.

d. Remove appropriate circuit card (9).

e. Install circuit card (9) in appropriate slot.

f. Install bottom panel (7).

g. Install 4 packings (6), 4 flat washers (5), and 4 machine screws (4); tighten 4 machine screws (4).

h. Install 22 flat washers (3) and 22 machine screws (2) tighten 22 machine screws (2).

3-15.1 Bottom Panel Gasket (Figure 3-4. 1).

a. Remove bottom panel (7) per paragraph 3-15, steps d thru c.

b. Peel off and remove gasket (8) from bottom panel (7).

WARNING

Solvent used in the following step is toxic and flammable. Keep away from heat and open flames. Use only in a well-ventilated area. Avoid prolonged or repeated breathing of the vapor. Avoid prolonged or repeated contact with the skin.

c. Using sharp knife scrape off remaining residue on bottom panel (7) and clean area with wiping rag, (10, table 3-1) dampened with solvent (8, table 3-1).

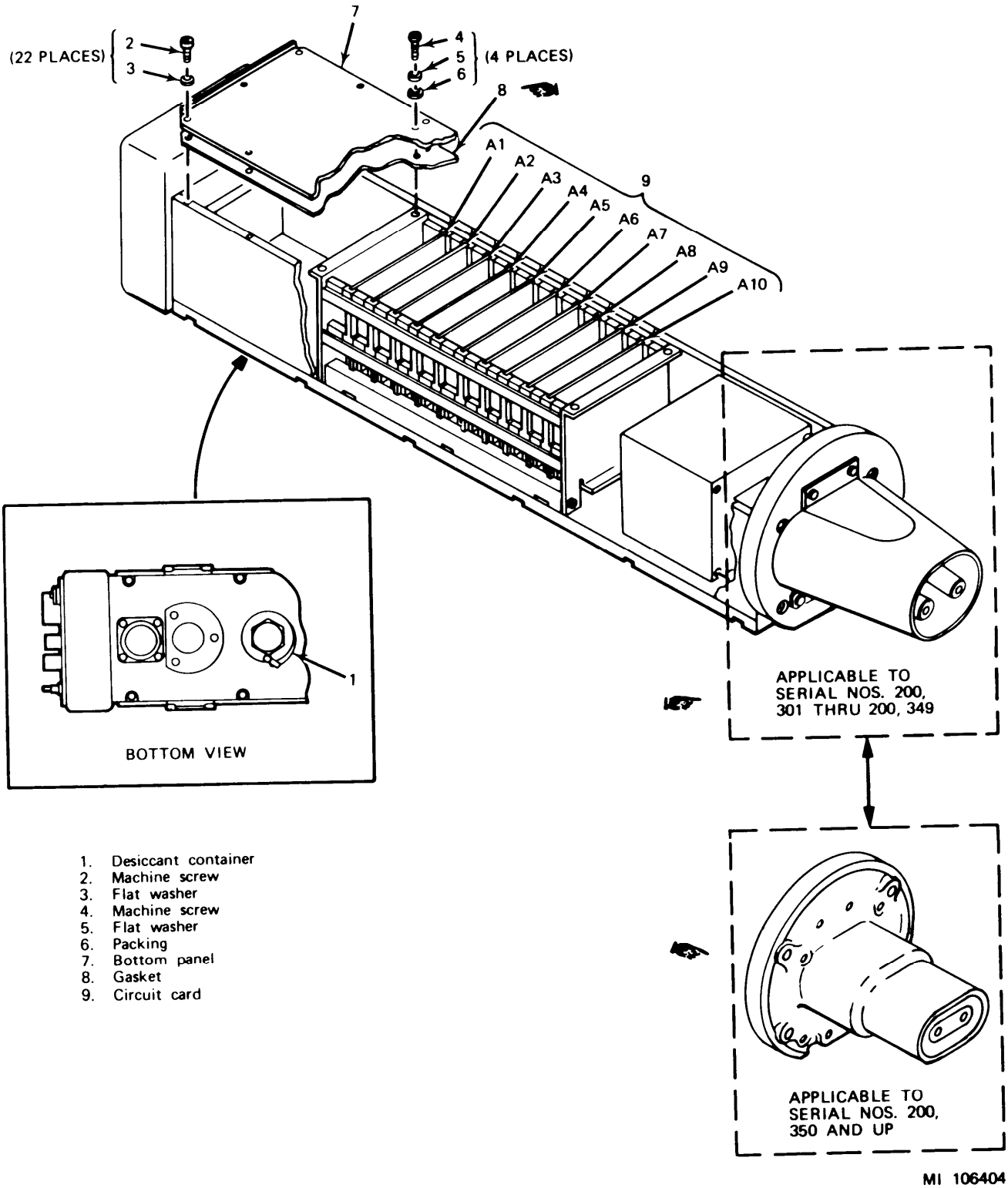
WARNING

Primer is toxic and flammable. Keep away from heat and open flames. Use only in well-ventilated area. Avoid repeated contact wit h the skin.

d. Apply primer (15, table 3-1) to surface of gasket (8), then apply polychloroprene adhesive (12, table 3-1) to gasket.

g. Install gasket (8) to bottom panel (7).

f. Install bottom panel (7) per paragraph 3-15, steps f thru h.



1. Desiccant container
2. Machine screw
3. Flat washer
4. Machine screw
5. Flat washer
6. Packing
7. Bottom panel
8. Gasket
9. Circuit card

Figure 3-4.1. TSEM Internal Components and Desiccant

Section V. REPAIR OF TSGMS CABLES

3-16. General.

This section contains repair procedures for the TSGMS cables. Only tools contained in the Tool Kit, Aircraft Fire Control Repairman, MOS 68J (Basic), tool number 4933-00-967-9816, may be used to perform repair on the TSGMS cables.

3-17. Cable Components Replacement (Figure 3-5).

WARNING

Ensure that the cable on which repair is performed is disconnected from all equipment. Presence of power during replacement may injure personnel or may damage equipment.

CAUTION

Exercise care when connecting and disconnecting cables to prevent damage to equipment due to electrostatic discharge and erroneous connections. Prior to connecting or disconnecting cables, be sure all power is turned off and that sources of electrostatic charge are not present at either end of the cables. Since the majority of the pins on each cable lead to components which are ESD, personnel must not touch, or otherwise allow static charges to reach the exposed pins of connector cables. A protective cap must be installed on any connector when cable is disconnected.

a. Remove machine screw (3) and flat washer (4) from self locking nut (5).

b. Remove dust cap (1) and clamp (2).

c. Place clamp (2) on cable.

d. Place chain of dust cap (1) and flat washer (4) on machine screw (3).

e. Place machine screw (3) through clamp (2) onto self locking nut (5).

f. Position clamp (2) at proper place on cable and tighten machine screw (3).

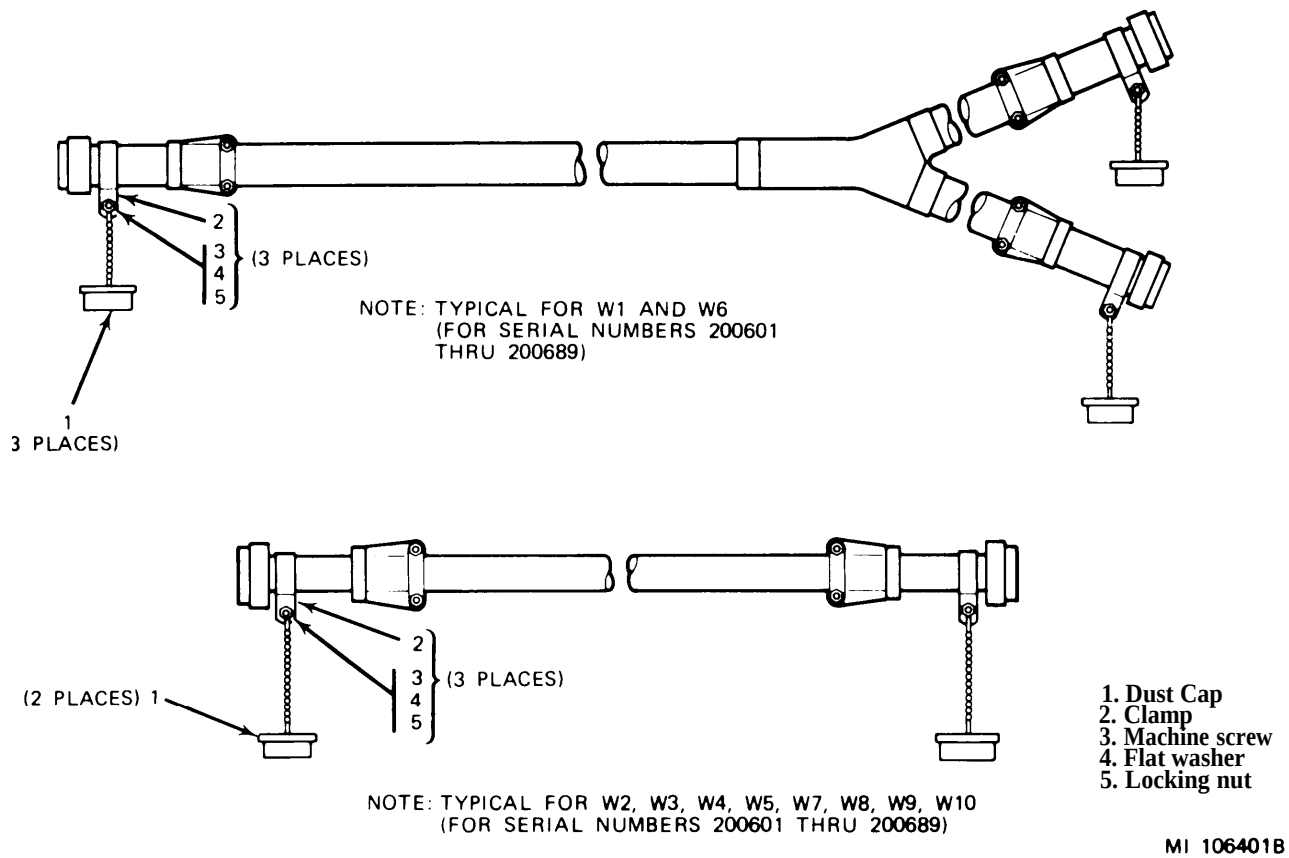


Figure 3-5. Cable Components (Sheet 1 of 2)

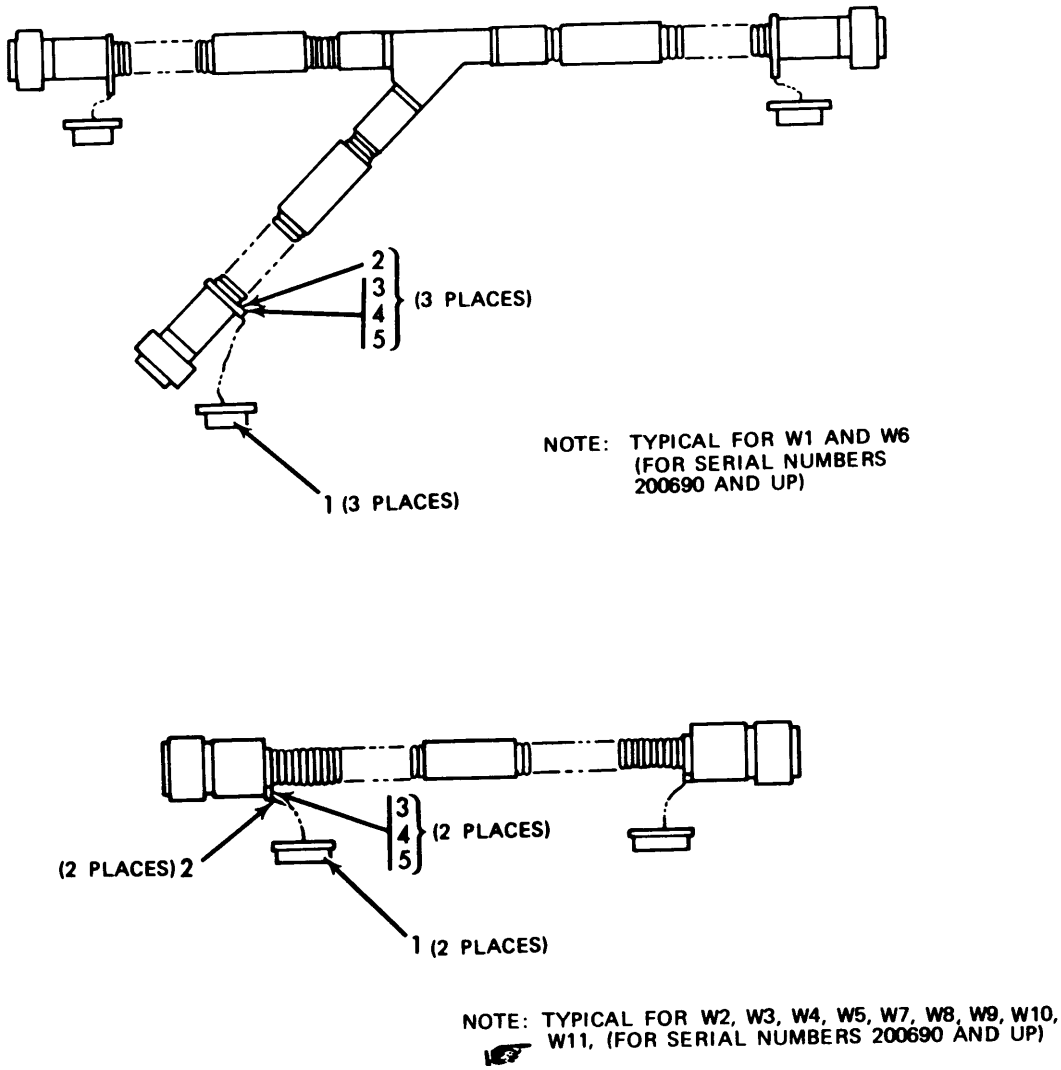


Figure 3-5. Cable Components (Sheet 2 of 2)

Section VI. REPAIR OF PURGE ADAPTER

3-18. General.

This section contains repair procedures for the purge adapter.

3-19. Purge Adapter Repair (Figure 3-6).

a. Remove seal (l).

b. Remove valve stem (2) from straight adapter (3).

c. Apply tape (13, table 3-l) to valve stem threads (2, figure 3-6) that interface straight adapter (3).

d. Install valve stem (2) into straight adapter (3).

e. Install seal (l).

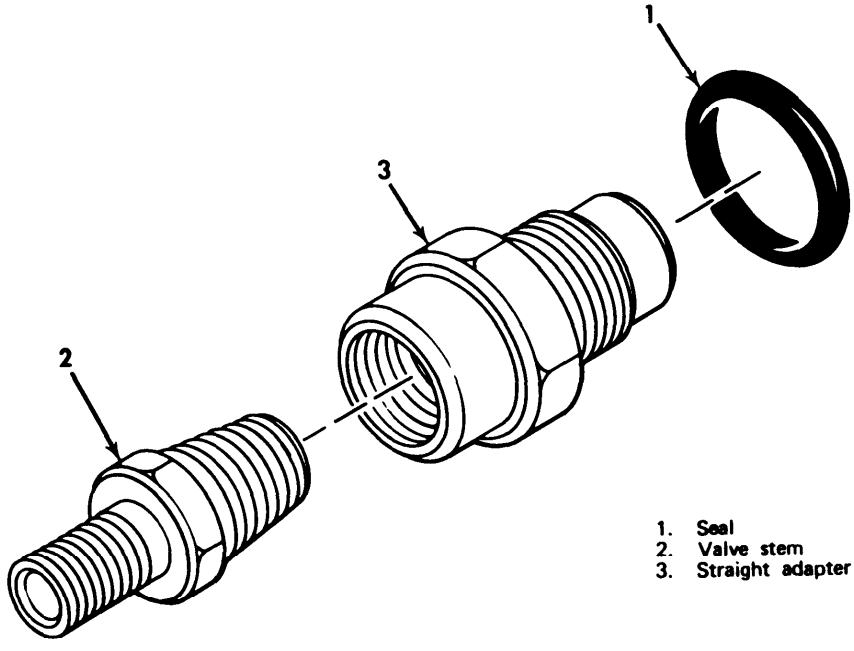


Figure 3-6. Repair of Purge Adapter

Section VII. REPAIR OF TSGMS IRTA

3-20. General

This section contains repair procedure for the TSGMS IRTA. Only those tools contained in the Tool Kit, Aircraft Fire Control Repairman, MOS 68J (Basic), tool number 4933-00-967-9816, may be used to perform repair on the TSGMS IRTA.

3-21. IRTA Repair

a. IR Source Modulator Card Replacement (Figure 3-7)

WARNING

Ensure that control monitor front panel ON/OFF switch is set to OFF or W2 cable is not connected to IRTA. Presence of power during replacement may injure personnel or may damage equipment.

(1) Loosen 14 captive screws (1) and remove panel (2) from case (3).

(2) Remove 2 screws (4) and 2 flatwashers (5).

CAUTION

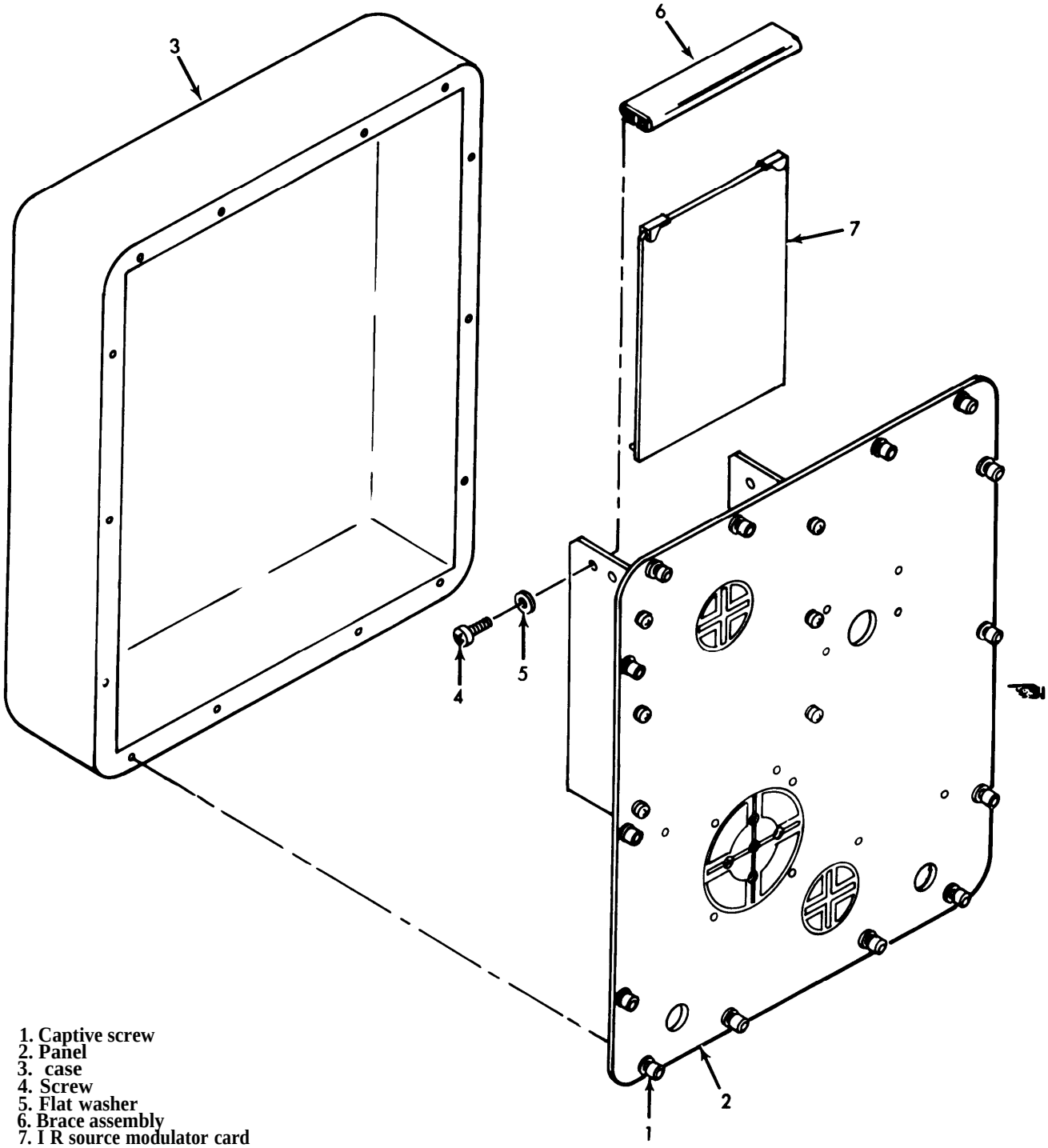
Ensure that circuit cards are handled per paragraph 3-7.1 to prevent damage to circuit card components.

(3) Pull IR source modulator card (6) straight out from backside of IRTA.

(4) Install replacement IR source modulator card (6) in its card guide and push back into IRTA.

(5) Install 2 flatwashers (5) and 2 screws (4).

(6) Install panel (2) into case (3) and tighten 14 captive screws (1).



1. Captive screw
2. Panel
3. case
4. Screw
5. Flat washer
6. Brace assembly
7. I R source modulator card

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Figure 3-7. IR Source Modulator Card Replacement

Section VIII, REPAIR OF TSGMS CARRYING CASES

3-22 General

This section contains repair procedures for the TSGMS carrying cases made with fiber glass,

3-23. Components Replacement for MCU Carrying Case (Figure 3-8).

a. Push Latch

(1) Remove nut (1) from push latch (2).

(2) Install push latch (2) and tighten nut (l).

b. Sight Glass

(1) Remove nut (3) from sight glass (4).

Ensure 2 retained gaskets are in place.

(2) Install sight glass (4) and tighten nut (3).

c. Breather Valve

(1) Remove nut (5) and washer (6) from breather valve (7).

(2) Install breather valve (7), washer (6) and nut (5) cm case and tighten nut (5).

3-24. Components Replacement for TSGM LACA Carrying Case (Figure 3-9).

a. Adjustable Latch

(1) Remove 40 flat head screws (l), 40 flat washers (2), 40 packings with retainer (3), 40 locking nuts (4) and 8 adjustable latches (5).

(2) Install 8 adjustable latches (5), 40 packings with retainers (3), 40 flat head screws (1), 40 flat wash-washers (2), 40 locking nuts (4).

b. Stacking Feet

(1) Remove 4 cap screws (6), 4 lock washers (7), and O-Ring (8) from 4 stacking feet (9).

(2) Install 4 O-Ring (8), 4 stacking feet (9), 4 cap screws (6), and 4 lock washers (7); tighten 4 screws (6).

c. Clip on Receptacles

(1) Remove 4 clip on receptacles (10).

(2) Install 4 clip on receptacles (10). Ensure threaded side of clip on under side of bracket.

d. Breather Valve

(1) Remove nut (11) and washer (12) from breather valve (13).

(2) Install breather valve (13), washer (12), and nut (11); tighten nut (11).

e. Push Latches

(1) Remove 4 nuts (14) from 4 push latches (15).

(2) Install 4 push latches (15) and 4 nuts (14); tighten nuts (14).

f. Foam Pads

(1) Remove upper foam pad (16).

(2) Remove lower foam pad (17).

(3) Install lower foam pad (17).

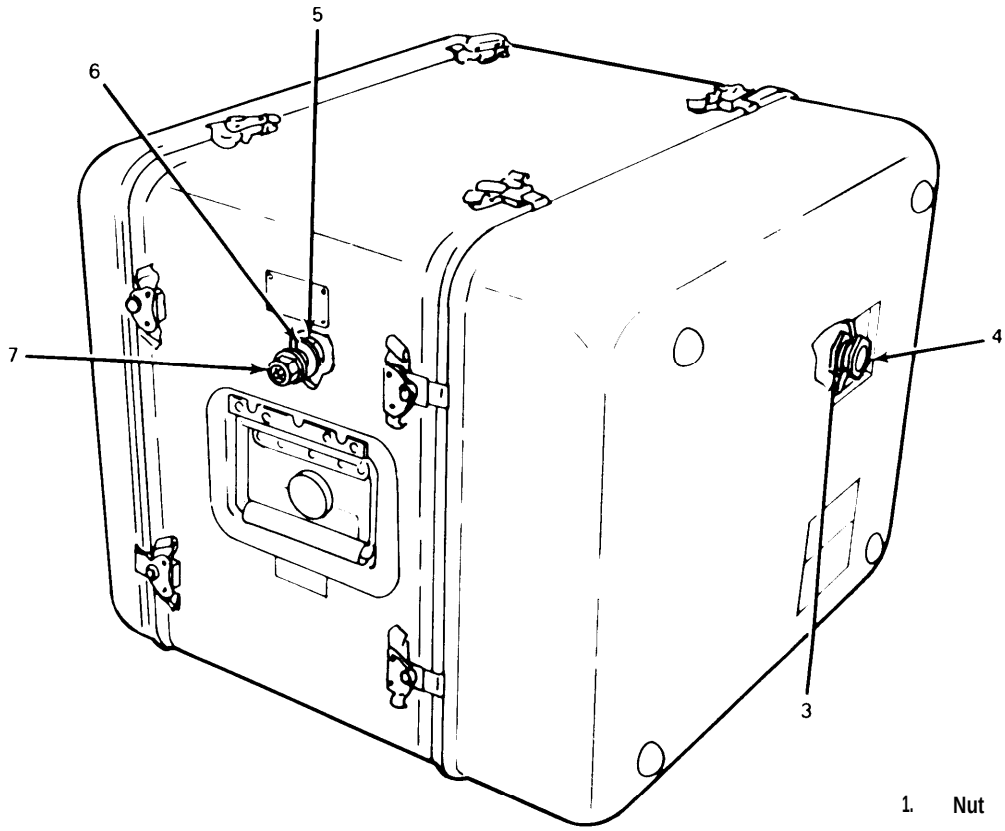
(4) Install upper foam pad (16).

3-25. Component Replacement for CAC Carrying Case (Figure 3-10).

a. Adjustable Latches

(1) Remove 40 flat head screws (1), 40 flat washers (2), 40 locking nuts (3), 40 packings with retainers (4) and 8 adjustable latches (5).

(2) Install 8 adjustable latches (5), 40 packings with retainers (4), 40 flat head screws (1), 40 flat washers (2) and 40 locking nuts (3); tighten screws (1).



1. Nut
2. Push latch
3. Nut
4. Sight glass
5. Nut
6. Washer
7. Breather valve

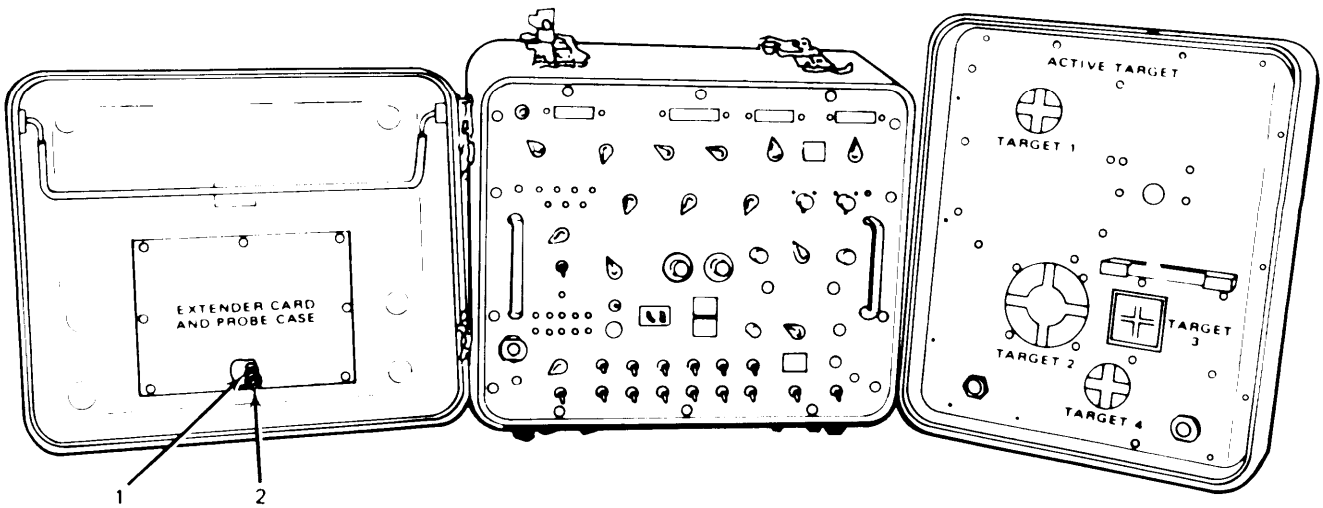


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Figure 3-8. Component Replacement of MCU Carrying Case

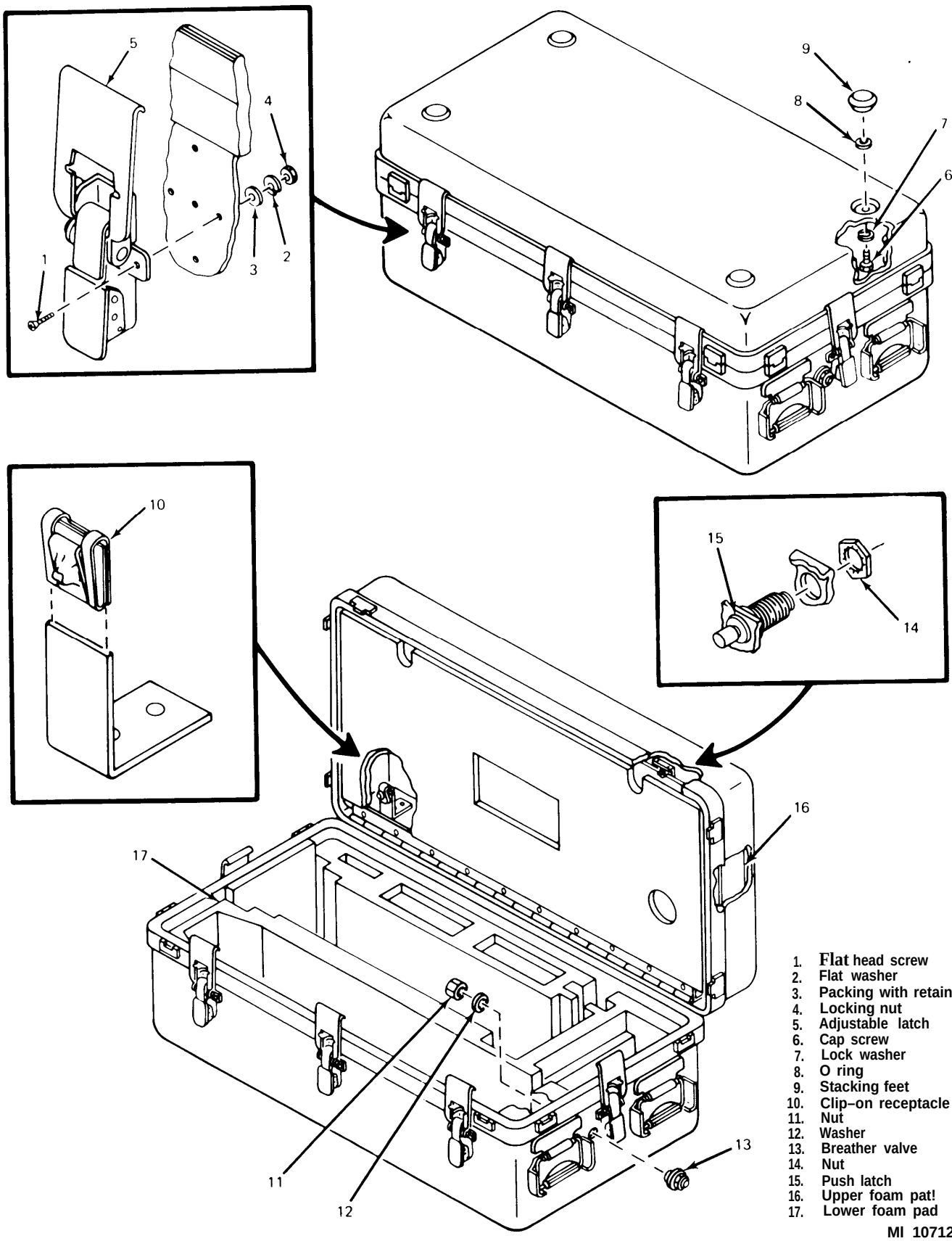
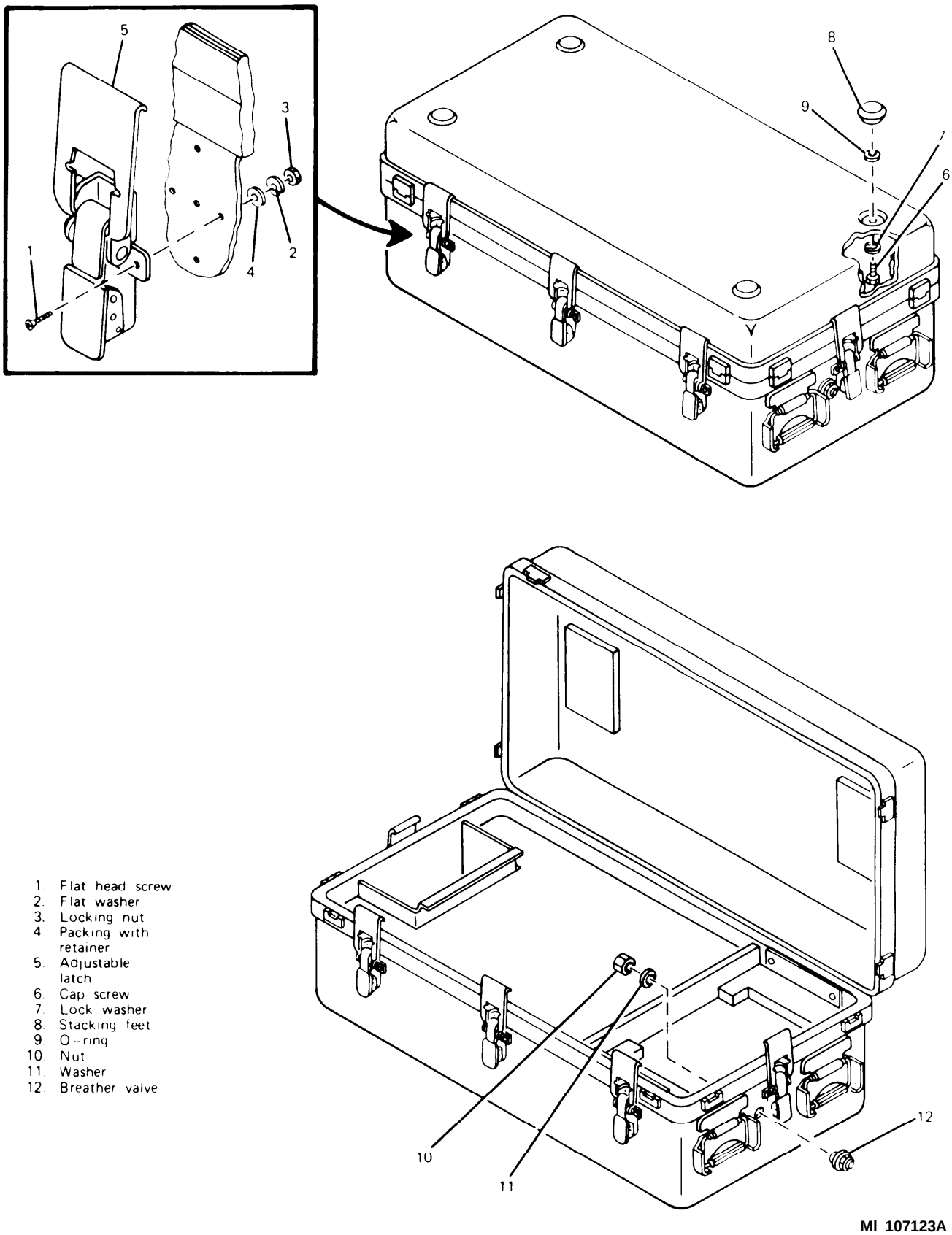


Figure 3-9. Component Replacement of TSGMLACA Carrying Case



1. Flat head screw
2. Flat washer
3. Locking nut
4. Packing with retainer
5. Adjustable latch
6. Cap screw
7. Lock washer
8. Stacking feet
9. O-ring
10. Nut
11. Washer
12. Breather valve

Figure 3-10. Component Replacement of CAC Carrying Case

b. Stacking Feet

(1) Remove 4 cap screws (6). 4 lock washers(7), 4 stacking t'eet (8) and 4 O-rings (9).

(2) Install 4 O-rings (9), 4 stacking feet (8), 4 cap screws (6), and 4 lock washers (7); tighten 4 screws.

c. Breather Valve

(1) Remove nut (10), washer (11) from breather valve (12),

(2) Install breather valve (12) washer (11), and nut (10): tighten nut (10).

3-26. Component Replacement for Signal Monitor Carrying Case. (See figure 3-11.)

a. Rubber Bumper

(1) Loosen 10 screws (1) and remove panel (2).

(2) Remove 4 screws (3) 4 flat washers (4) 4 self locking nuts (5) and 4 rubber bumpers (6).

(3) Install 4 rubber bumpers (6), 4 screws (3), 4 flat washers (4) + and 4 self locking nuts (5): tighten screws (3).

(4) Position panel (2) and secure with 10 screws (l).

3-27. Repair of Carrying Case,

WARNING

Methyl ethyl ketone is toxic and flammable. Keep away from heat and open flames, Use only in well-ventilated area. Avoid repeated contact with the skin.

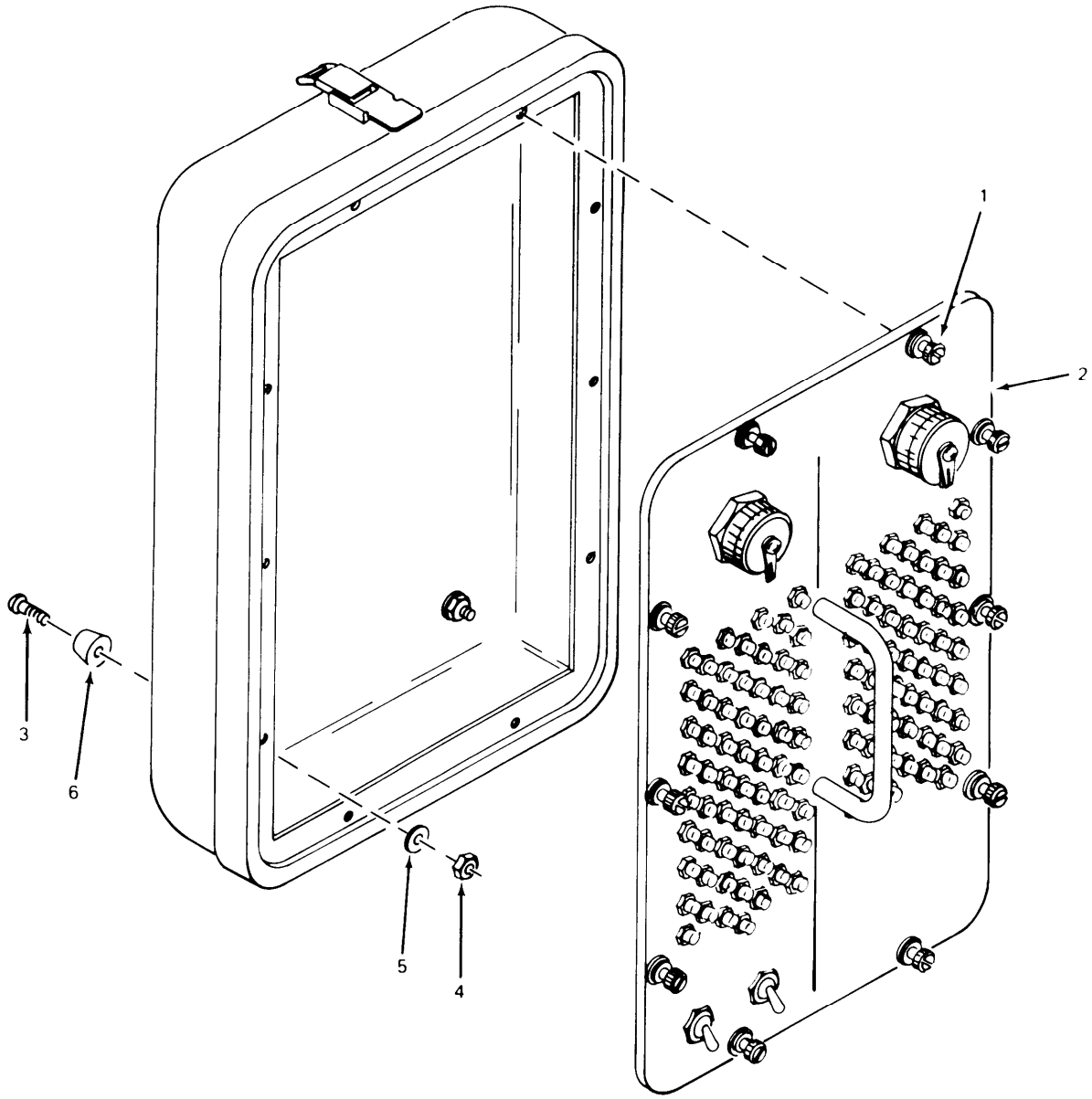
a. Using a fine grit sandpaper (17, table 3-1) and methyl ethyl ketone (18. table 3-1). scuff sand and clean around the damaged area of carrying case,

b. Thoroughly mix equal parts (1 to 1 ratio) of EPON 828 resin (19, table 3-1) with hardener (20, table 3-l). This mixture must be used within 30 minutes.

c. Apply a coat of pre-mixed resin to surface of damaged area.

d. Cut sufficient amount of fiber glass tape (21, table 3-1) to cover damaged area.

e. Apply tape over damaged area while saturating tape with resin. Allow resin to cure for 24 hours at room temperature.



1. Screw
2. Panel
3. Screw
4. Self locking nut
5. Flat washer
6. Rubber bumper

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Figure 3-11. Component Replacement of Signal Monitor Carrying Case

APPENDIX A

REFERENCES

A-1. General.

Applicable publication indexes should be consulted frequently for latest change or revisions to the publications listed in this appendix, and for new publications relating to the material covered in this manual.

A-2. Publications Indexes.

Consolidated Index of Army Publications and Blank Forms . . . . . DA PAM 25-30

Index of Army Motion Pictures, Television Recordings, and Film strips . . . . . DA PAM 108-1

Index of Modification Work Orders .. .. DA PAM 750-10

A-3. Technical Manuals.

Operator and Organizational Maintenance for M28A1E1 Turret System . . . . . TM 9-1090-203-12-1

Operator's and Organization Maintenance Manual for TOW Heavy Antitank/ Assault Weapon System . . . . . TM 9-1425-470-12

Organizational Maintenance Manual for Armament Subsystem, Helicopter, TOW Guided Missile XM65 . . . . . TM 9-1425-473-20

Direct Support and General Support Repair Parts and Special Tools List for Test Set, Guided Missile System . . . . . TM 9-4935-473-34P

Direct Support and General Support Maintenance Manual for Armament Subsystem, Helicopter, TOW Guided Missile XM65 . . . . . TM 9-1425-473-34

Organizational and Direct Support and General Support Maintenance Repair Parts and Special Tool List for M65. . . . . TM 9-1425-473-24P

Procedure for Destruction of TOW ACAHEMP/Assault to Prevent Enemy Use . . . . . TM 750-244-4-2

A-4. Forms.

In addition to the forms required by DA PAM 738-750, the following forms pertain to this material:

Recommended Changes to DA Technical Manuals, Parts List or Supply Manual 7, 8, or 9. . . . . DA Form 2028

Equipment Maintenance Log (Consolidated) . . . . . DA Form 2409

Report of Damaged or Improper Shipment . . . . . DD Form 6

A-5. Other Publications.

Accident Reporting and Records . . . . . AR 385-40

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

Army Safety Program . . . . . AR 385-10

Care, Handling, and Preservation of Ammunition . . . . . TM 9-1300-206

Chemical, Biological, and Radiological (CBR) Decontamination . . . . . TB 3-220

Explosives and Demolitions . . . . FM 5-25

Explosives: Malfunctions Involving Ammunition and Explosives Reports Control Symbol AMC -132 (MIN) . . . . AR 75-1

Malfunctions Involving Ammunition and Explosives . . . . . AR 700-1300-8

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

Noise and Conservation of Hearing . . . .TB MED 251

Safeguarding Defense Information . . . . . AR 380-5

Safeguarding Defense Information in Movement of Persons and Things . . . . . AR 380-55

Safety . ……. .. ….. . . . . AR 385-62

Security Classification of Missile and Large Rocket Systems and Components TB9-380-101

Small Unit Procedures in Nuclear, Biological, and Chemical Warfare . . . . .FM 21-40

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

APPENDIX B

MAINTENANCE ALLOCATION CHART

B-1. General.

This appendix contains the maintenance allocation chart which indicates the lowest level of maintenance authorized to perform particular maintenance operations.

B-2. Maintenance Functions.

Maintenance functions shall 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 examinaion.

b. Test. To verify serviceability and to detect incipient failure 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, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) in a manner to allow the proper functioning of an equipment/system.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, 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/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 (e. g. , DMWR) 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 equipment/components.

B-3. Column Entries.

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

b. Column 2, Component/Assembly. Column 2 contains the noun 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 CO1-umn 2.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level 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 number of man-hours specified by 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 allocation chart.

e. Column 5, Tools and Equipment. Column five (5) specified by code, those common tool sets and special tools, test and support equipment required to perform the designated function.

MAINTENANCE ALLOCATION CHART

NOMENCALTURE OF END ITEMS

TEST SET, GUIDED MISSLE SYTEM (TSGMS)

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARK
0100	Cable Assembly Case (CAC)						
	Signal Monitor	inspect	0.2	0.2			
		test	0.5	0.5			
		service	0.2	0.2			
		replace	0.2	0.2			
		repair			1.0		
	Cables W1 through W9 and (Wll; C-NITE)	inspect	0.2	0.2		6	
		test	0.5	0.5			
		service	0.2	0.2			
		replace	0.2	0.2			
		repair		0.2			
	Corrector Lens Assembly	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
		repair			1.5		
0300	Test Set Guided Missile Launcher Alignment-Circuit Amplitude (TSGMLACA)						
	TOW System Evaluation Missile (TSEM)	inspect	0.2	0.2		1 thru 6	
		test	0.5	0.5			
		service	0.2	0.2			
		calibrate*			6.0		
		replace	0.3	0.3			
		repair		0.3			
	Circuit Cards Al thru A10	inspect		0.1			
		test		0.5			
		service		0.1			
		adjust		1.0			
		replace		0.6			
		repair			2.0		
	Tripod Assembly	inspect	0.3	0.3			
		service	0.1	0.1			
		replace	0.3	0.3			
		repair			1.5		

*By area calibration team at AVIM location

MAINTENANCE ALLOCATION CHART

NOMENCALTURE OF END ITEMS

TEST SET, GUIDED MISSLE SYTEM (TSGMS) - Continued

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARK
	Power Adapter (C-NITE)	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
		repair			2.5		

MAINTENANCE ALLOCATION CHART

NOMLNCLATURE OF END ITEMS

TEST SET, GUIDED MISSILE SYSTEM (TSGMS) - Continued

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	Geared Panhead Assembly	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
		repair			2.5		
	Boresight Telescope	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
		repair			1.5		
	Gunner's Quadrant	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
		repair			1.0		
	Boresight Device	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
		repair			1.0		
	Passive Target Assembly	inspect	0.2	0.2			
		service	0.2	0.2			
		replace	0.2	0.2			
		repair			1.0		
	TSEM Power Cable	inspect	0.2	0.2		6	
		test	0.2	0.2			
		service	0.2	0.2			
		replace	0.2	0.2			
		repair		0.2			
	Distance Measuring Device	inspect	0.2	0.2			
		service	0.1	0.1			
		replace	0.2	0.2			
2000	Monitor and Control Unit (MCU)						
	Control Monitor	inspect	0.2	0.2		1 thru 6	
		test	1.0	1.0			
		service	0.2	0.2			
		calibrate*			6.0		
		replace	0.2	0.2			
		repair		0.3			

*By area calibration team at AVIM location.

MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS

TEST SET, GUIDED MISSILE SYSTEM (TSGMS) - Continued

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY AVUM	AVIM	DEPOT	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	Circuit Cards Al thru A22	inspect		0.1			
		test		0.5			
		service		0.0			
		adjust		1.0			
		replace		0.5			
		repair			2.0		
	Digital Display Assembly	inspect		0.1			
		test		0.5			
		service		0.1			
		replace		0.8			
		repair			2.0		
	Power Conversion Assembly	inspect		0.1			
		test		0.5			
		service		0.1			
		replace		0.8			
		repair			2.2		
	DVM Attenuator	inspect		0.1			
		test		0.5			
		service		0.1			
		replac		0.8			
		repair			2.1		
	Infrared Target Assembly	inspect	0.1	0.1			
		test	0.5	0.5			
		service	0.1	0.1			
		repair		0.8			

MAINTENANCE ALLOCATION CHART

for

TEST SET, GUIDED MISSILE SYSTEM (TSGMS)

TOOLS REQUIRED PAGE

TOOL CODE	CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F	Oscilloscope, AN/USM-281A	6625-00-228-2201	N/A
2	F	Multimeter, Digital	1430-00-366-8753	N/A
3	F	Counter, AN/USM 459	6625-01-061-8928	N/A
4	F	Decade Resistor, ZM-16/U	6625-00-669-0266	N/A
5	F	Power supply, PP-3940A/G	6130-00-460-2148	N/A
6	F	Tool Kit, Aircraft Fire Control Repairman, MOS 68J (Basic)	4933-00-967-9816	N/A

APPENDIX C

COMPONENTS OF END ITEM LIST

C-1. Scope.

This appendix lists integral components of and basic issue items for the TOW Weapon System to help you inventory items required for safe and efficient operat ion.

C-2. General.

This components of end item list is divided into the following section: Section II. Integral Components of the End Item. These items, when assembled, comprise the TSGMS and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these items.

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

c. Part Number. Indicates the primary number used by the manufacturer, 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.

d. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code. "USABLE ON" codes are included to help you identify which component items are used on the different models.

g. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

h. Quantity. This column is left blank for use during an inventory. Under the Rcv'd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item at a later date; such as for shipment to another site.

COMPONENTS OF END ITEM LIST'

Illustration		National Stock Number	Part No.	Description	Location	Usable Code	Quantity				
(a) Figure No.	(b) Item No.						Qty Reqd	Rcv 'd	Date	Date	Date
				Section II							
				INTEGRAL COMPONENTS OF END ITEMS							
1-1		4935-00-629-3485 or	11499001 or	Monitor and Control Unit			1				
		5895-01- a 276-1304	1358001[a]								
l - l		4935-00-629-3389 or	11499012 or	Control Monitor			1				
		. . .	1358004[a]								
1-1		4935-00-629-3421 or	11499068 or	IR Target Assembly			1				
		. . *	1358008[a]								
1-1		4935-01-016-9214	11499061	Extender Card, 35 Pins			1				
1-1		4935-01-016-9213	11499064	Extender Card, 47 Pins			1				
1-1		4935-01-077-8009	11499312-1	Card Ejector			1				
1-1		4935-01-077-8010	11499312-2	Card Ejector			1				
3-6		. . .	11499370	Purge Adapter			1				
3-6	3	4730-00-288-9964	MS39159-4	Adapter Straight			1				
3-6	2	2640-00-114-1096	MS51607-1	Valve stem			1				
3-6	1	5330-00-579-8108	MS28775-111	Seal			1				
1-2		4935-00-148-7474	11499002 or	Test Set, Guided Missile Launcher Alignment-Circuit Amplitude			1				
		4935-01- a 276-5542	1358002 a								

COMPONENTS OF END ITEM LIST - Continued

Illustration		National Stock Number	Part No.	Description	Location	Usable on Code	Quantity				
(a) Figure No.	(b) tern No.						Qty Reqd	Rcv'd	Date	Date	Date
1-2		. . .	11499192	Tripod Assembly			1				
1-2		4935-00-629-3412	11499256	Gearhead Panhead Assembly			1				
1-2		6650-0l-021-7259	11499191	Boresight Telescope Case			1				
1-2		4935-00-867-6607	. . .	Boresight Telescope			1				
1-2		5210-00-234-6745	GGG-T-106TY 2CLBC ASEVSTY 1-50 ft.	Tape, Measuring			1				
1-2		1290-00-891-9999	7197156	Quadrant (Gunner's)			1				
1-2		. . .	11499194	Boresight Device, TSU			1				
1-2		4935-00-629-3393 or 4935-01 030-3288	11499098 or 11499350	Cable, TSEM power (W10)			1				
1-2		. . . or 6920-01- a 277-7003	11499196 or a 1358025	Passive Target Assembly			1				
1-2		4935-00-629-3472	11499037	TOW System Evaluation Missile			1				
2-9.1		4935-01- a 276-1297	1358031[a]	Power Adapter			1				
1-3		4935-00-629-3482 or	11499003 or	Cable Assem-bly Case			1				
		6150-01- a 277-6972	1358003[a]								
1-3		4935-01-007-3832	11499088 or	Cable, Power (Wl)			1				
		4935-01-030-3295	11499341								

COMPONENTS OF END ITEM LIST' - Continued

Illustration		National Stock Number	Part No.	Description	Location	Usable Code	Quantity				
(a) Figure No.	(b) Item No						Qty Reqd	Rcv'd	Date	Date	Date
1-3		4935-01-004-8059 or 4935-01-030-3287	11499089 or 11499342	Cable, Target (W2)			1				
1-3		4935-01-004-8058 or 4935-01-030-3291	11499090 or 11499343	Cable, SCA (W3)			1				
1-3		4935-01-004-8057 or 4935-01-030-3290	11499091 or 11499344	Cable, Fwd TAC (W4)			1				
1-3		4935-01-004-8056 or 4935-01-030-3289	11499092 or 11499345	Cable, Aft TAC (W5)			1				
1-3		4935-01-004-8184 or 4935-0l-030-5621	11499093 or 11499346	Cable, Tail-boom (W6)			1				
1-3		4935-01-004-8055 or 4935-01-030-3294	11499094 or	Cable, EPS T/C (W7)			1				
1-3		4935-01-004-8054 or 4935-01-030-3293	11499095 or 11499348	Cable, TSEM Signal, (W8)			1				
1-3		4935-01-004-8060 or 4935-01-030-3292	11499096 or 11499349	Cable, SECU (W9)			1				
1-3		8140-01-017-9226 or 6920-01-053-8793 or	11499169 or 11499306 or	Case, Corrector Lens			1				
		. . .	1358034[a]								

COMPONENTS OF END ITEM LIST - Continued

Illustration		National Stock Number	Part No.	Description	Location	Usable on Code	Quantity				
(a) Figure No.	(b) Item No.						Qty Reqd	Rcv'd	Date	Date	Date
2-8		4935-01-019-1571	11499170 or	Corrector Lens			1				
		4935-01-049-5350 or	11499305 or								
		6650-01- a 277-7002	1358033[a]								
1-3		4935-01-017-9227	11499164	Monitor Assembly Signal			1				
3-5		6150-01- a 276-1308	1358016[a]	Cable, Target Power (Wll)			1				

a For M65 with C-NITE.

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. Scope.

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

D-2. Explanation of Columns.

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

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

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support

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

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

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

Section II.

EXPENDABLE SUPPLIES AND MATERIALS LIST

WARNING

Some materials in this section are toxic and/or flammable. See footnotes at the end of this listing.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION		(5) U/M
1	F	6810-00-856-2914	Alchol[1,2]		PT
2	F	6020-00-245-4509	Brush		EA
3	F	6850-00-835-0484	De-icer	(81348)	OZ
4	F	7930-00-764-5075	Soap, liquid		
5	F		Paint 13538, FED STD595[1,2]	(06542)	
6	F		Glycerine MIL-C-675		
7	F		Oil MIL-L-25681		
8	F	6810-00-257-2488	Solvent [1,2]	(81348)	
9	F	6640-00-597-6745	Tissue, lens	(81348)	EA
10	F	7920-00-205-1711	Rag, wiping	(96906)	LB
11	F	8040-01-018-2845	Polychloroprene adhesive EC 1357 (MIL-A-5092, type II)		
12	F		Polychloroprene adhesive EC1300L (MMM-A-121)		
13	F	8030-00-889-3534	Tape MIL-T-27730	(81349)	24 FT, RL
14	F		Primer, zinc chronlate[1,2] TT-P-1757	(81349)	
15	F	8040-00-104-5263	Primer, adhesive[1,2]	(30676)	PT
16	F	5120-00-408-4036	Stick, orange wood		

[1] Denotes toxicity.

[2] Denotes flammability.

APPENDIX E

QUALITY ASSURANCE PROVISIONS

E-1. General

This appendix provides inspection criteria for use by quality assurance/quality control (QA/QC) inspection personnel at the direct (DS) and general support (GS) maintenance level.

E-2. Operations and Management

The primary responsibility for effective performance of quality work rests with designated supervisors who must assure that procedures foIlowed are those prescribed by command policies. Commanders must insure that, as a part of command policy, supervisory and inspection personnel are provided latitude sufficient to allow independent assessment of the procedures and criteria presented in FM 9-59 and Department of the Army Pamphlet 750-19. It is the responsibility of the QC inspector to determine the depth and scope of the QC inspection. In all cases, it will be the prerogative of the QC inspector to tispect each maintenance or test operation performed by the repairman. However, the level of QA/QC checks will not exceed the scope of maintenance performed on the item, nor will QA/ QC require repair to be accomplished to the extent of returning the item to an as-new condition when a repaired-as-received condition is adequate.

E-3. Tools and Equipment Required

All tools and equipment required for QA/QC checks are available in the organization. They are authorized to each inspector either through individual MOS tool kits or as a part of the major items of equipment.

E-4. Inspection Criteria

The paragraphs which follow contain inspection criteria to be used in performing QA/QC checks of item tested and repaired by support maintenance. Where possible, procedures are provided by reference to documents available to the using activity and in which detail is presented at a level sufficient to establish confidence in the quality of the work performed. Where required procedures were not available for reference, supplementary procedures complete in their entirety were prepared and are provided in paragraph form below.

In order to avoid repetitious testing or disassembly of the item, the inspector should when possible, witness the test or repair while it is being accomplished. The QA/AC inspector will use DA Forms 2404 and/ or 2407 to determine and annotate in-process inspection points, and to indicate that QA/QC inspection has been performed on the test or repair.

a. Adhesive bonding. Refer to TM 750-245-4.

b. Adhesive priming. Refer to TM 750-245-4.

c. Captive screw removal and installation. Refer to TM 750-24-4.

d. Cleaning. Refer to TM 750-245-4.

e. Crimping of terminals. Refer to TM 750-245-4.

f. Electrical miscellaneous. Refer to TM 750-245-4.

g. Gasket and pad fabrication. QA checks of gasket and pad fabrication may be conducted in process, if the replacement gasket ‘is not to be bonded to the item, or after installation and prior to assembly, if attachment by adhesive bonding is used. The gasket or pad should be checked for conformance to material type and thickness as specified in the TM and for general configuration of the surface to be sealed. The gasket or pad shall be free of nicks, cuts or abrasions that affect sealing quality. Alignment of holes through which components or mounting hardware will pass shall be such that bunching or waviness of the gasket will not occur during trainer assembly.

h. Sleeving and heat shrinkable sleeving Sleeving and heat shrinkable sleeving shall exhibit the following characteristics. All steps below apply to sleeving of the heat shrinkable type, however, other types are required to conform to steps 1 and 2 only.

(1) Sleeving length is as specified in the TM, or if unspecified is sufficient to assure adequate insulation of the connection.

(2) Correct sizes and colors of tubing have been used.

(3) Identification marking which may be present is not obliterated by heat applied to tubing or is not covered by the tubing installation.

(4) Heat applied was sufficient to adequately shrink the tubing and that no melting or wrinkling has occurred.

(5) The tubing produces a non-mobile, smooth, continuous sheathing over the connection.

i. Priming and painting. Refer to TM 750-245-4.

j. Soldering. Refer to TM 750-245-4.

k. Torquing . A torque check will be performed when steps in the repair procedure require the application of specific torque values. The QA inspector should observe the application of torque, as specified in the TM, while repair is in process. The TM procedure shall be followed closely to assure that critical alignment of mating surfaces is maintained.

E-5. QA/QC Checks

Table E-1 contains a list of inspection points identified by references to the manual. The QA/QC inspection is not limited to the inspections listed in table E-1 nor will inspection be required on each listed inspection point depending on the extent of repair performed on the trainer.

Table E-1. Quality Assurance

Repair Procedure	Step	Figure	Inspection Objectives
REPAIR OF TSGMS CONTROL MONITOR			
3-9. Front Panel Components Replacement	"WARNING"		SWITCH OFF
a. Front Panel Indicators	(3) & (4)		Lamp and holder installed
b. Front Panel Knobs	(2)	3-1A & B	Knob installed; screw tightened
c. Front Panel Handle	(6) & (7)	3-1C	*Handle and screws installed; screws tightened
	(lo)	3-1	Control monitor installed
		3-2	
d. COUNTER/TIMER, DMM, ANGLE INDICATORS Displays/Plastic Windows	(6)	3-1D	*Plastic window, display assembly and screws installed; screws tightened
	(7)	3-1D	*Plug connected; screws tightened
	(8) & (9)	3-1	Control monitor installed; screws tightened
		3-2	
	(10)	3-1	Panel installed; screws tightened
		3-2	
e. CONSTRAINT VALID, READY/IN TEST , PASS/ FAIL , 2 PHASE/3 PHASE Indicators	(3) & (4)	3-1E	Lamp, gasket, plate, and plate holder installed

Table E-1. Quality Assurance - Continued

Repair Procedure	Step	Figure	Inspection Objectives
REPAIR OF TSGMS CONTROL MONITOR (Cont)			
3-10. Internal Components and Desiccant Replacement		3-1 & 2	
	"WARNING"		SWITCH OFF
a. Circuit Cards	**(3) & (4)**		*Circuit cards and back panel installed; screws tightened
b. DVM Attenuator Assembly	(9)		***Assembly installed**
	(l0)		*Plug connected; screws tightened
	(12) & (13)		*Nuts and knobs installed
	(14)		Screws tightened
	(15)		Panel installed; screws tightened
c. Power Conversion Assembly	(7) & (8)		*Assembly and plug installed; screws tightened
	(lo) & (11)		Control monitor installed screws tightened
	(12)		Panel installed; screws tightened
	"WARNING"		SWITCH OFF
d. DPM	(3)		*DPM module installed
	(4)		Back panel installed; screws tightened
e. Desiccant	(4)		Desiccant bag installed and humidity indication less than 40%
3-11. Back Panel Components Replacement		3-3	
	"WARNING"		SWITCH OFF
a. Back panel/Back panel Gaskets/Back Panel Cushioning Pads	(5)		*Residue removed and cushioning pads bonded
	(6)		*Residue removed and gaskets bonded
	(7)		Back panel installed; screws tightened
b. Back Panel Handles	(3) & (4)		*Handles, screws and back panel installed; screws tightened

Table E-1. Quality Assurance- Continued

Repair Procedure	Step	Figure	Inspection Objectives
REPAIR OF TSGMS TSEM			
3-13. Front Panel Components Replacement		3-4	
	"WARNING"		SWITCH OFF
a. Front Panel Indicators	(3) & (4)		Lamp and holder installed
b. Front Panel Knob	(2)		Knob installed; screw tightened
c. Dust Caps	(3)		Screws, washers, dust cap and front panel installed
	(4)		*Screws, flat washers and packings installed; screws tightened
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	c. & d.		Bag and container installed; humidity indication less than 40%
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	"WARNING"		SWITCH OFF
	e.		*Circuit card(s) installed
	f. & g.		Panel packings, flat washers and screws installed; screws tightened
	h.		Flat washers and screws installed; screws tightened
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	f.		Dust cap, chain and clamp installed

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By Order of the Secretary of the Army:

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9-19		9-5	
21-2	step 1C		21-2

SAMPLE

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

"B" Ready Relay K11 is shown with two #9 contacts. That contact which is wired to pin 8 of relay K16 should be changed to contact #10.

Reads: Multimeter B indicates 600 K ohms to 9000 K ohms.

Change to read: Multimeter B indicates 600 K ohms minimum.

Reason: Circuit being checked could measure infinity. Multimeter can read above 9000 K ohms and still be correct.

NOTE TO THE READER:

Your comments will go directly to the writer responsible for this manual, and he will prepare the reply that is returned to you. To help him in his evaluation of your recommendations, please explain the reason for each of your recommendations, unless the reason is obvious.

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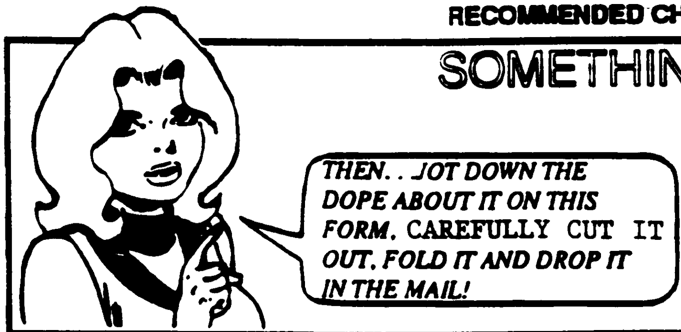

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