

TECHNICAL MANUAL

**AVIATION UNIT AND INTERMEDIATE
MAINTENANCE MANUAL**

**CONTROL/DISPLAY
SUBSYSTEMS
(CDS)**

**PART NUMBER 8521308-902
NSN 1260-01-432-8523**

**PART NUMBER 8521308-903
NSN 1260-01-432-8524**

**PART NUMBER 8521308-904
NSN 1260-01-473-3542**

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DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

* This manual supersedes TM 1-1427-779-20 and TM 1-1427-779-30 dated 31 March 1992.

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6 AUGUST 1997

CHANGE

NO. 5

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Remove pages

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1-7 and 1-8
2-1 through 2-8
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5-9 through 5-12
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8-9 and 8-10
8-13 through 8-20
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9-7 through 9-10
A-1/(A-2 Blank)
B-21 through B-24

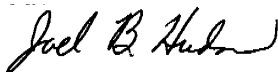
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3-48.1 and 3-48.2
4-11 through 4-16
5-9 through 5-12
6-3 and 6-4
6-7 through 6-12
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7-7/(7-8 Blank)
8-3 and 8-4
8-9 and 8-10
8-13 through 8-20
9-1 and 9-2
9-7 through 9-10
A-1/(A-2 Blank)
B-21 through B-24

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Remove pages

A and B

i and ii

2-23 through 2-26

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Insert pages

A and B

i and ii

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3-27 through 3-30.2

3-37 through 3-42

3-47 through 3-48.2

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Remove pages

A/(B blank)

i and ii

1-1 through 1-8

2-1 and 2-2

2-13 through 2-28

3-1 and 3-2

3-25 through 3-30

3-31 through 3-36

Insert pages

A and B

i and ii

vii/(viii blank)

1-1 through 1-8

1-9/(1-10 blank)

2-1 and 2-2

2-13 through 2-28

3-1 and 3-2

3-25 through 3-30

3-30.1 and 3-30.2

3-31 through 3-36

Remove pages

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3-51 through 3-54

4-5 through 4-8

B-17 through B-24

B-27 and B-28

Cover 1/(Cover 2 blank)

Insert pages

3-39 and 3-48

3-48.1 and 3-48.2

3-51 through 3-54

4-5 through 4-8

B-17 through B-24

B-27 and B-28

Cover 1/(Cover 2 blank)

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MAINTENANCE MANUAL

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Remove pages

a and b
A/(B blank)
i and ii
1-1 through 1-6
2-3 and 2-4
2-11 through 2-22
3-5 and 3-6
3-19 and 3-20
3-25 through 3-34
3-39 and 3-40
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Insert pages

a and b
A and B
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1-1 through 1-6
2-3 and 2-4
2-11 through 2-22
3-5 and 3-6
3-19 and 3-20
3-25 through 3-34
3-39 and 3-40
3-45 and 3-46
3-49 and 3-50
4-91 through 4-94
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8-3 through 8-8
8-13 through 8-21/(8-22 blank)
A-1/(A-2 blank)
B-5 through B-28
Glossary 1 and Glossary 2

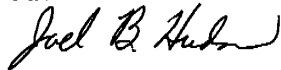
Insert pages

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8-3 through 8-8
8-13 through 8-21/(8-22 blank)
A-1/(A-2 blank)
B-5 through B-28
Glossary 1 and Glossary 2

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Remove pages

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2-13 and 2-14
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3-1 through 3-6
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Insert pages

a and b
A and B
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B-19 and B-20
C-1 and C-2
C-3/(C-4 blank)

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WARNING SUMMARY

Personnel performing operations, procedures, and practices which are included or implied in this work requirement shall observe the following warnings. Disregard of these warnings and precautionary information may cause serious injury, death, or destruction of materiel.

Definitions. The following definitions apply to warnings, cautions, and notes found throughout this manual.

WARNING

An operation or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in injury to, or death of, personnel.

CAUTION

An operation or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment.

NOTE

An essential operating or maintenance procedure, condition, or statement which must be highlighted.

WARNING

CRT IMPLOSION HAZARDS

There is danger of Cathode Ray Tube (CRT) implosion if CRT is exposed to abrupt temperature change or if CRT is handled improperly. Rapid expansion/contraction of CRT glass envelope may cause the tube to crack or burst. Do not spray aerosol cleaners on the CRT and do not use hot air blower to dry cleaned areas. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

WARNING SUMMARY (CONT)

WARNING

ELECTRICAL SHOCK HAZARDS

Electrical shock hazards can be created by improper grounding techniques. Current limiting resistors are built into the static control ground cord and wrist strap for personal safety.

Care should be taken to prevent grounded conductive objects from touching the bare metal snaps on the table mat or the edge of the floor mat where the center conductive scrim is visible. This could create an alternative direct path to ground.

WARNING

ACETONE

Acetone is flammable. It can be toxic. Avoid inhaling. Use only with adequate ventilation. Avoid contact with skin, eyes, or clothing. Keep away from heat, sparks, or open flame. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

ELECTROSTATIC DISCHARGE (ESD)

The MCPU, IMCPU, ISP, MFD, KU, and RFD all contain devices sensitive to Electrostatic Discharge (ESD). To protect the LRU from degradation or destruction due to ESD, observe these precautionary measures:

Never perform maintenance on the LRU unless it is on a static control grounded workbench. Never perform maintenance on the LRU unless you are grounded by a properly grounded static control wrist strap.

CAUTION

COMPRESSED AIR

Do not use compressed air to remove dust from bezel. Compressed air may damage the rubber switch seals.

WARNING SUMMARY (CONT)

EXPLANATION OF HAZARD ICONS



The icon of raised hand is a symbol that indicates all appropriate safety precautions must be observed when performing on-aircraft maintenance tasks on the OH-58D.



The symbol of drops of a liquid onto a hand shows that the material will cause burns or irritation of human skin or tissue.



The symbol of a person wearing goggles shows that the material will injure your eyes.



The symbol of a human figure in a cloud shows that the material gives off vapors that are danger to life or health.



The symbol of a flame shows that the material can ignite and burn.

WARNING SUMMARY (CONT)

EXPLANATION OF HAZARD ICON GROUPINGS



General Safety Warning

1

WARNING

Observe all appropriate safety precautions when performing on-aircraft maintenance tasks on the OH-58D. Refer to TM 1-1520-248-23.



Compressed Air

2

WARNING

Compressed air used for cleaning and drying purposes creates airborne particles that may enter the eyes. Pressure shall not exceed 30 pounds-force per square inch gauge (psig). Use with adequate chip guards and goggles only.



Isopropyl Alcohol

3

WARNING

Keep isopropyl alcohol away from heat and open flame. Keep container closed while not in use. Avoid prolonged breathing of alcohol vapors. Use with adequate ventilation only.

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

NOTE

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Dates of issue for original and changed pages are:

Original	0	6 August 1997
Change.....	1	18 May 2000
Change.....	2	16 October 2000
Change.....	3	2 July 2001
Change.....	4	28 February 2002
Change.....	5	30 May 2002

Total number of pages in this publication is 369 consisting of the following:

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find mistakes or know a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5230. You may also submit your recommended changes by E-mail directly to 2028@redstone.army.mil in the format provided in the back of this manual immediately preceding the hard copy 2028. DA Form 2028s may also be FAXed to DSN 788-6546 or Commercial FAX 256-842-6546. A reply will be furnished to you.

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	GLOSSARY	Glossary 1
	ALPHABETICAL INDEX	Index 1

HOW TO USE THIS MANUAL

This manual contains all of the information you will need to maintain the equipment. **DO NOT ASSUME THAT YOU KNOW HOW TO USE THIS MANUAL.** Follow the guidelines contained herein in their designated order before performing any maintenance. If you do not use this manual as instructed, you could damage the equipment.

1. **READ** the **WARNING SUMMARY** which begins on page a. This is for your own protection. You could be seriously injured if you do not take necessary precautions.

2. **READ** the **INTRODUCTION** which begins on page 1-1. This will provide you with general information on the equipment covered in this manual.

3. **LOOK** in the Table of Contents on page i and find the chapter heading **MAINTENANCE**. Go to the indicated page.

4. **READ** Sections I, II and III of each maintenance chapter. These sections contain essential information about the equipment. You will learn how the equipment works, what subassemblies it contains, how to safely handle it, what Test, Measurement, and Diagnostic Equipment (TMDE) is required for testing and troubleshooting, and how to service the equipment upon receipt.

5. You are now ready to test and troubleshoot the equipment. **READ** Section III of Chapter 2 for proper instructions. A testing and troubleshooting flow diagram is provided in this section. The maintenance instructions for the Control/Display Subsystem (CDS) Line Replaceable Units (LRUs) are contained in Chapters 3 through 8. **READ** Section IV for proper instructions. You will have to check the unit visually. A checklist is provided in Section V for this purpose. **USE IT.** Follow the instructions in the checklist.

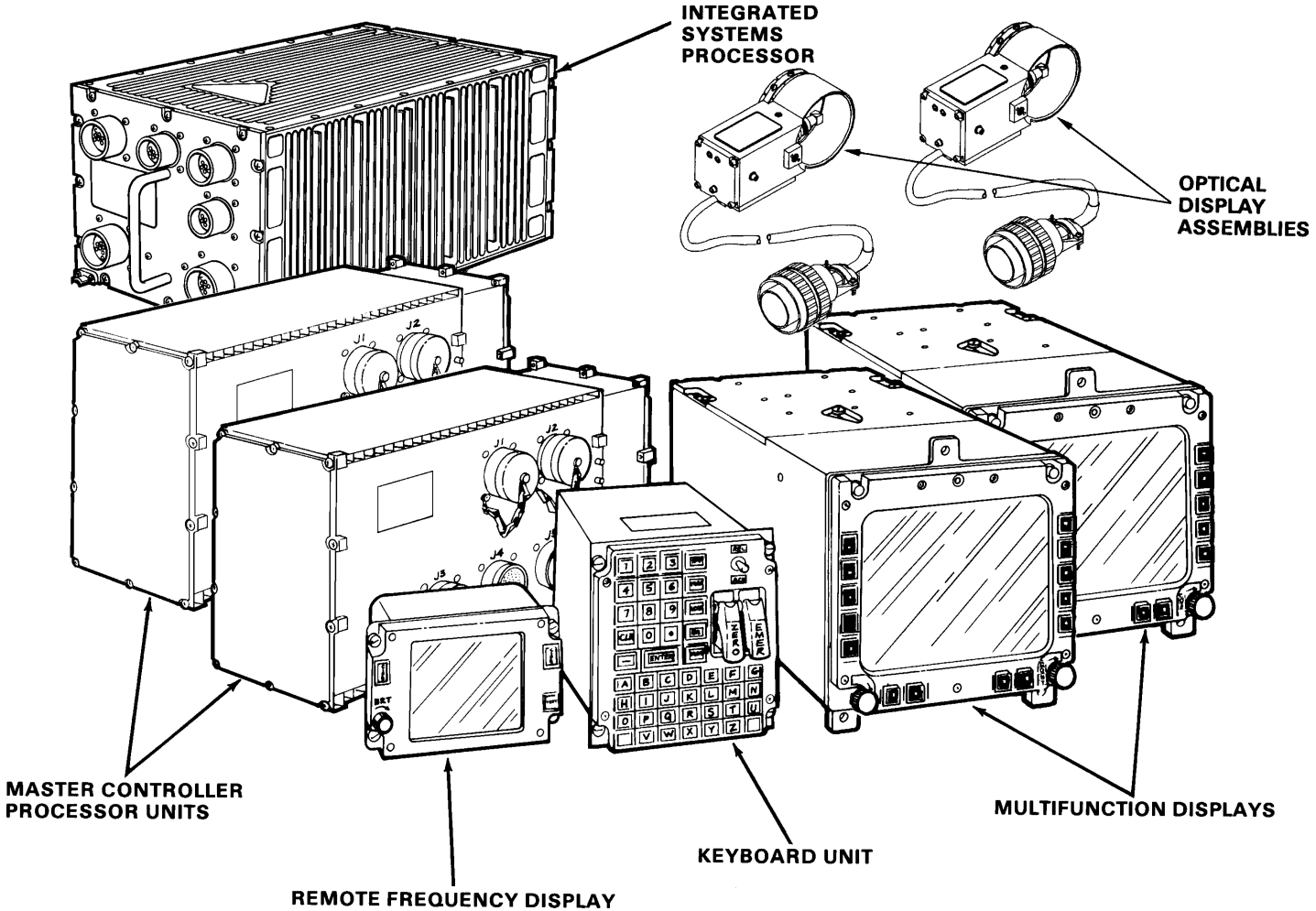
6. You are now ready to repair the equipment. The List of Tasks in Section V will direct you to the maintenance tasks. Turn to the task. **READ** the task description to be certain you are at the correct task. Read and perform **INITIAL SETUP**. Be certain all conditions are satisfied.

7. **READ** all maintenance steps from beginning to end without performing any maintenance procedures. This will help familiarize you with the task. Look at all the pictures. This will help familiarize you with the equipment. Always orient yourself with the equipment so that the equipment appears the same as in the picture. This way you will always be able to locate the parts called out in the maintenance steps.

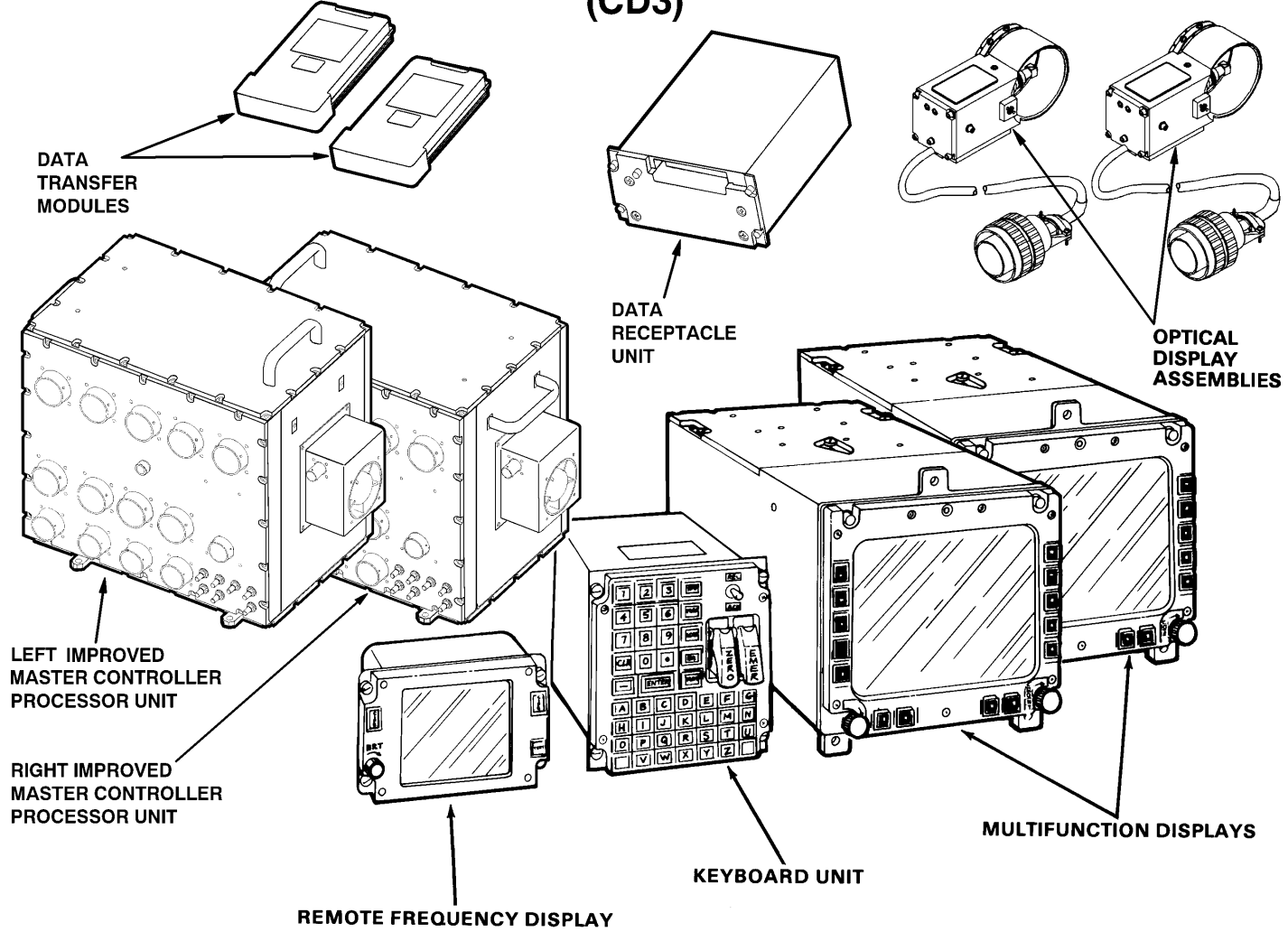
8. You are now ready to begin the task. Follow all maintenance steps in numerical order. **DO NOT SKIP ANY STEPS. DO NOT MAKE UP ANY STEPS OF YOUR OWN.** The maintenance procedures will work only if you follow them exactly as specified. When you reach the words **END OF TASK**, you have completed that task.

A glossary and a subject index are located at the back of this manual. Use the glossary if you find acronyms or abbreviations which you do not recognize. Use the subject index if you need to find any information.

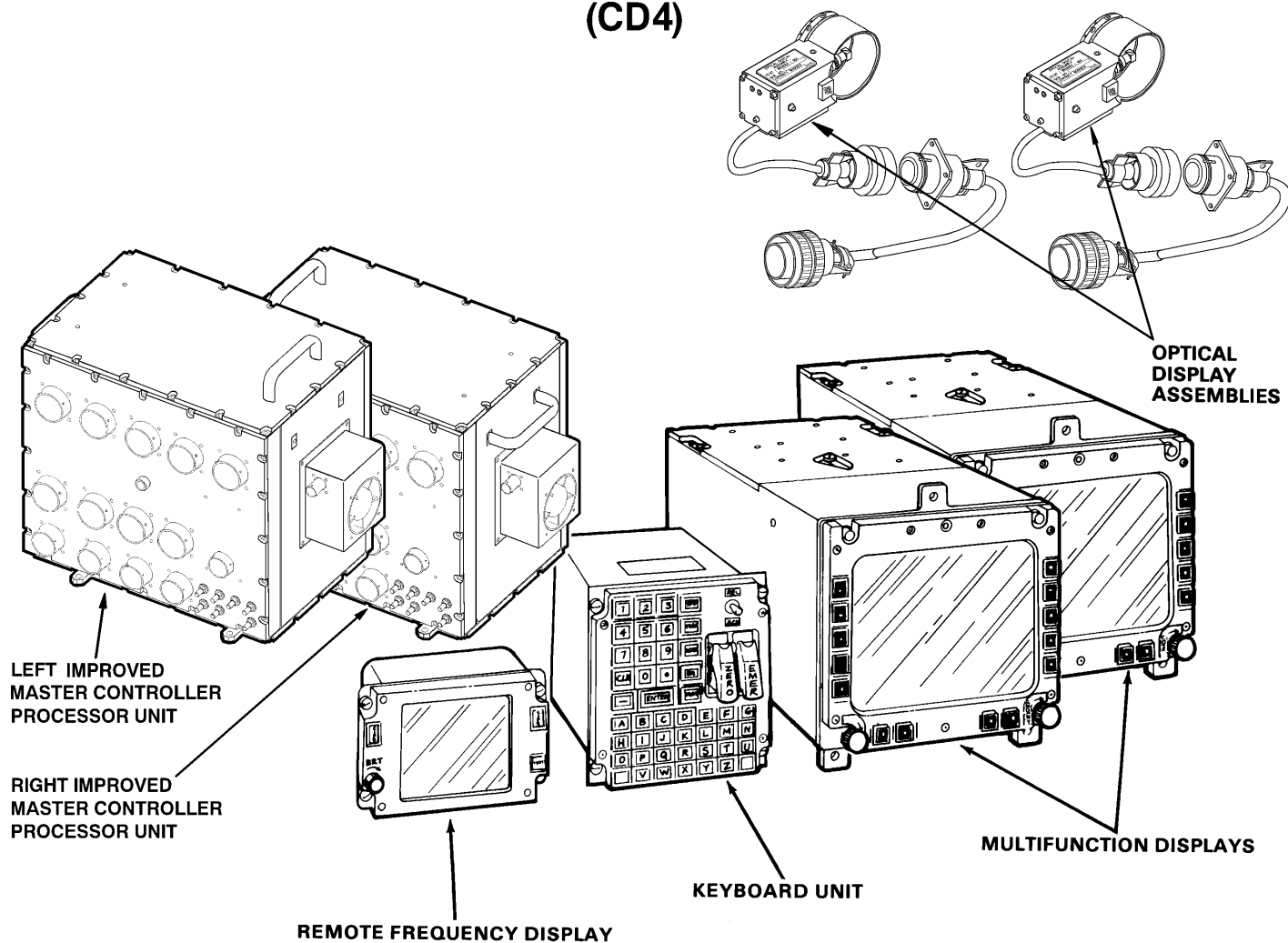
CONTROL/DISPLAY SUBSYSTEM (CDS) (CD2)



CONTROL/DISPLAY SUBSYSTEM (CDS) (CD3)



CONTROL/DISPLAY SUBSYSTEM (CDS) (CD4)



**CHAPTER 1
CONTROL/ DISPLAY SUBSYSTEM INTRODUCTION**

Section I	General Information	1-1
Section II	Equipment Description and Data	1-3
Section III	Principles of Operation	1-4

Section I

GENERAL INFORMATION

1-1. SCOPE

Type of Manual:

This manual describes the Aviation Unit Maintenance (AVUM) and Aviation Intermediate Maintenance (AVIM) of the line replaceable units (LRUs) which comprise the Control/Display Subsystem (CDS) of the OH-58D Helicopter.

For AVUM, the aircraft built-in test (BIT) and fault detection/location system (FD/LS) are utilized to automatically test and fault isolate LRUs in the aircraft. The subsystem is then repaired by replacement of the faulty LRU, and tested again to verify serviceability.

For AVIM, the Test Support System (TSS), or equivalent, is utilized to fault isolate the LRU to the shop replaceable unit (SRU) level. The LRU is then repaired by replacement of the faulty SRU, and tested to verify serviceability.

Equipment Covered by TM 1-1427-779-23:

CDS Manufacturer Part Number:

8521308-902, 8521308-903, 8521308-904

Purpose of Equipment:

The CDS provides the primary man/machine interface for three fielded versions of the OH-58D. Throughout this manual, the CDS configuration that contains two MCPU's and an ISP shall be referred to as CD2. The CD2 manufacturer part number is 8521308-902.

The OH-58D version that contains two IMCPU's and no ISP shall be referred to as CD3. The CD3 manufacturer part number is 8521308-903.

The IMCPU's have been upgraded for increased functionality. The OH-58D version that contains the upgraded models shall be referred to as CD4. The CD4 manufacturer part number is 8521308-904.

The CDS allows the crew to perform nap-of-the-earth missions with greatly reduced workloads. Information from helicopter subsystems is collected, organized, and displayed to the crew on demand. Crew commands are interpreted and the proper control signals are sent to the subsystems.

The CD3 version (PN 8521308-903) provides the same features of the earlier configurations, with additional functional capabilities. The CD3 with the Improved MCPU (IMCPU) incorporates the functionality of the ISP. This design eliminates the need for a separate ISP LRU. The added capability for the IMCPUs design includes: Rotorcraft Map System (RMS), Video Downlink/Uplink (VDU), and control/display functions for the improved Mast Mounted Sight (MMS) processor. The CD3 configuration also incorporates the capability for utilizing a Data Receptacle Unit (DRU) and a Data Transfer Module (DTM).

The CD4 subsystem adds the necessary capabilities and/or interfaces to control and/or operate the AN/ARC-220 High Frequency Radio, Switchable Eye Safe Laser Rangefinder Designator (SELRD) and Joint Variable Message Format (JVMF) Capability.

1-2. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751, Functional Users Manual for the Army Maintenance Management System - Aviation (TAMMS-A). The DA PAM is published in the Maintenance Management UPDATE. Accidents involving injury to personnel or damage to material will be reported on DA Form 285 (Accident Report) in accordance with AR 385-40.

1-3. DESTRUCTION TO PREVENT ENEMY USE

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

1-4. PREPARATION FOR STORAGE OR SHIPMENT

The information needed for packaging and administrative storage is included in the maintenance chapter.

1-5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The QA/QC procedures used for equipment maintenance will be those prescribed in AR 702-11.

1-6. NOMENCLATURE CROSS-REFERENCE LIST

Common Name: CDS

Official Nomenclature:

Control/Display Subsystem

Part Number 8521308-902, 8521308-903,
8521308-904

1-7. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your CDS equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at:

Commander,
U.S. Army Aviation and Missile Command
ATTN: AMSAM-MMC-RE-FD
Redstone Arsenal, AL 35898-5222

We'll send you a reply.

Section II

EQUIPMENT DESCRIPTION AND DATA

1-8. MAJOR EQUIPMENT CHARACTERISTICS

The CDS collects information from the avionics, Mast Mounted Sight (MMS), and helicopter subsystems. The CDS organizes the information and displays it to the crew on demand. Crew commands are interpreted and the proper control signals are output from the CDS.

There are three (3) fielded versions of the CDS. The three versions are referred to in this technical publication as CD2, CD3 or CD4. Each version consists of the following Line Replaceable Units (LRUs):

<u>CD2</u>		
<u>COMMON NAME</u>	<u>OFFICIAL NOMENCLATURE</u>	<u>QUANTITY IN CDS</u>
MCPU	Master Controller Processor Unit (906)	2
MFD	Multifunction Display	2
KU	Keyboard Unit	1
RFD	Remote Frequency Display	1
ISP	Integrated Systems Processor	1
ODA	Optical Display Assembly	2

<u>CD3</u>		
<u>COMMON NAME</u>	<u>OFFICIAL NOMENCLATURE</u>	<u>QUANTITY IN CDS</u>
LEFT IMCPU	Left Improved Master Controller Processor Unit (921)	1
RIGHT IMCPU	Right Improved Master Controller Processor Unit (940)	1
MFD	Multifunction Display	2
KU	Keyboard Unit	1
RFD	Remote Frequency Display	1
ODA	Optical Display Assembly	2
DTM	Data Transfer Module	2
DRU	Data Receptacle Unit	1

<u>CD4</u>		
<u>COMMON NAME</u>	<u>OFFICIAL NOMENCLATURE</u>	<u>QUANTITY IN CDS</u>
LEFT IMCPU	Left Improved Master Controller Processor Unit (923)	1
RIGHT IMCPU	Right Improved Master Controller Processor Unit (943)	1
MFD	Multifunction Display	2
KU	Keyboard Unit	1
RFD	Remote Frequency Display	1
ODA	Optical Display Assembly	2

1-9. FUNCTIONAL CAPABILITIES

CDS performs the following system data processing functions:

Control and Display of Subsystem Data

Air Data Processing

Airborne Target Handover System (ATHS) Management

Target and Waypoint Storage

Data Bus Control

Nonvolatile Memory Processing

Communication Subsystem Management

Engine/Transmission Monitoring

Caution, Warning, and Advisory System Management

Navigation Subsystem Management

Stability and Control Augmentation System (SCAS) Computation and Control

Mast Mounted Sight (MMS) Control and Display Subsystem Diagnostics

Flight Controls

Data Transfer System (DTS) Interface and Control

Weapon Subsystems Control

Aviation Night Vision Imaging System (ANVIS) Display Symbology System (ADSS) Interface and Control

Aircraft Survivability Equipment (ASE) Control Flight Recorder (FDR) Processing

Rotorcraft Map System (RMS) Processing*

Video Tape Recorder (VTR) Control

Initiation/Display of Fault Detection and Location (FDL) Subsystem

Symbol Generation

Video Downlink/Uplink Capability

Full Authority Digital Engine Control (FADEC)*

AN/ARC-220 High Frequency Radio**

Switchable Eye Safe Laser Rangefinder Designator (SELRD)**

Joint Variable Message Formatting (JVMF) Capability**

* applies to CD3, CD4

** applies to CD4

1-10. SYSTEM FEATURES

Integrated Cockpit

Integrated Hands-on Control of Display

Integrated Programmable Displays

Digital Multiplex Data Transfer

Information Furnished on Demand

Three Modes of Operation:
Shutdown, Normal, and Start

Built-In Test Equipment

Equipment Status Indicator on Surface of LRUs

Signals Alert Crew to Abnormal Subsystem Conditions

Night-Time Head-Up Displays

Section III

PRINCIPLES OF OPERATION

1-11. CDS GENERAL INFORMATION AND MODES OF OPERATION

The CDS provides the means of controlling subsystem equipment. It provides the means of displaying subsystem data to the crew. Data and subsystem commands can be entered into the CDS by means of the following:

Keyboard

Multifunction Line Address and Mode Select Keys on the MFD Bezel

Various Cockpit Switches and Controls

Flight data is displayed to the crew on two MFDs, one RFD, and two ODAs.

The CDS provides three modes of operation as follows:

- SHUTDOWN
- NORMAL
- START

SHUTDOWN. When +28 VDC primary input power is removed from the CDS, LRU shutdown occurs.

NORMAL. When +28 VDC primary is applied to the CDS, the CDS provides all interface, data transfer, and processing functions.

START. The CDS automatically goes into start mode when it senses that primary input power has dropped. At this time the CDS provides engine and transmission data to the vertical scale instruments. When primary input returns to normal, the CDS automatically returns to normal.

1-12. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Master Controller Processor Unit (MCPU). The OH-58D (CD2) contains two (2) MCPUs. One MCU is located behind the pilot's seat. The other MCU is located behind the observer's seat. The MCPUs control external subsystem interface.

The MCPUs are the core of the CDS. They process all CDS information. Both MCPUs interface with most of the same subsystems. This allows one MCU to monitor and control most system functions by itself in case the other MCU fails.

The major elements of each MCU are as follows:

- Central Processor Unit No. 1 (CPU 1)
- Central Processor Unit No. 2 (CPU 2)
- Subsystem Interface
- Dual Redundant MIL-STD-1553B Data Bus
- Symbol Generator

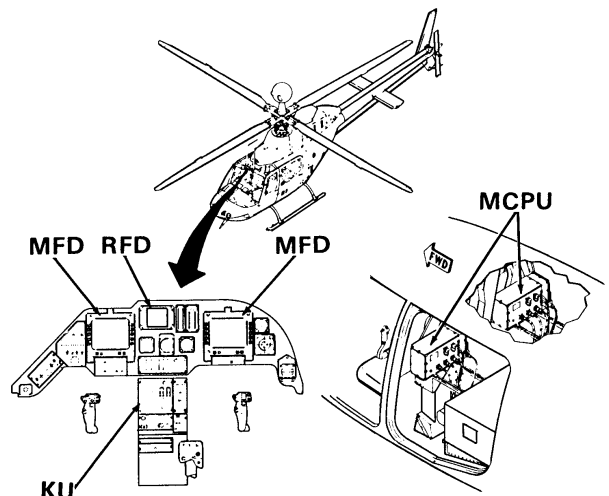
The primary functions of CPU 1 are display processing and data bus control. CPU 1 also monitors Built-In Test Equipment (BITE) and manages target handoff.

The symbol generator display function and the 1553B data bus control processing have been allocated to CPU 1.

Serial digital interfaces are controlled by CPU 2.

Either CPU 1 or CPU 2 may perform I/O processing. The following types of I/O signals can be processed:

- Analog inputs/outputs
- Variable frequency inputs
- Discrete inputs/outputs Subsystem



Interface electronics converts subsystem inputs into digital form. It loads the digital data into memory and converts memory data into MCPU outputs.

The dual redundant 1553B Data Bus is used for external subsystem interfaces.

The symbol generator uses vector generation electronics in conjunction with a direct memory access. A video interface is used to output the symbol generation to the MFD.

Improved Master Controller Processor Unit (IMCPU). The OH-58D (CD3 or CD4) CDS contains two separately configured IMCPUs. The IMCPUs have all the features of the MCPU with additional functional capability.

The initial IMCPU design (CD3) eliminated the need for a separate ISP LRU by incorporating the ISP functions in the left IMCPU (-921) and right IMCPU (-940). The left IMCPU (-921) and right IMCPU (-940) have the same features but differ in the additional functional capabilities unique to each configuration.

The upgraded IMCPUs for the CD4 configuration provide additional functionality. The left IMCPU (-923) and right IMCPU (-943) incorporate a new General Purpose Processor (GPP) which replaced the i960 CCA and the 1553 BIOC CCA. A new Aircraft Survival Equipment/Serial Controller Interface (ASE/SCI) CCA replaced the ASE CCA to accommodate the new HF ARC-220 radio. The chassis was modified to accommodate a new motherboard (Backplane Assembly).

The major differences between the left and right IMCPUs (CD3 and/or CD4) are listed below:

Left IMCPU (-921/923) - Contains two additional SRUs, the Video Tape Recorder (VTR) I/O, and the Video Downlink/Uplink (VDU).

Right IMCPU (-940) - contains three additional SRUs, the Rotorcraft Map System (RMS), the Aircraft Survivability Equipment (ASE) I/O (-943 contains the ASE/SCI CCA), and the Weapons I/O.

The major elements of the left IMCPU (-921/-923) and right IMCPU (-940/-943) are as follows:

- Central Processor Unit
- Subsystem Interface
- Dual Redundant MIL-STD-1553B Data Bus
- Symbol Generator
- ANVIS Display Symbology System (ADSS)
- Video Tape Recorder (VTR) I/O (-921/-923)
- Video Downlink/Uplink (VDU) (-921/-923)
- Weapons I/O (-940/-943)
- Aircraft Survivability Equipment (ASE)(-940)
- Aircraft Survivability Equipment/Serial Controller Interface (ASE/SCI) I/O (-943)
- Rotorcraft Map System (RMS) (-940/-943)

The ADSS serves as the interface between the CPU and the Optical Display Assembly (ODA). It receives display data from the CPU and puts the information on the ODA.

The VTR card receives video signals from the Symbol Generator (SG) and Airborne Video Tape Recorder installed on the aircraft and drives the copilot MFD.

The VDU circuit card provides the aircraft with the ability to send/receive digital video images to and from a ground station and/or other aircraft.

The Weapons I/O provides the armament control and display processing required to interface the weapons system in the helicopter.

The ASE provides the interface and control capabilities necessary to receive, interpret, and process aural and visual information associated with the survivability environment of the helicopter.

The RMS card receives map data over the Small Computer System Interface (SCSI) bus and uses this data to create a digital map display.

Multifunction Display (MFD). One MFD is located directly in front of the pilot on the cockpit control panel. The other MFD is located directly in front of the observer on the cockpit control panel.

The MFD is a multipurpose Cathode Ray Tube (CRT) video display, used for many CDS functions. The MFD serves as the pilot's main

display of information related to flight control, navigation, mission status, and subsystem monitoring.

The MFD provides visual data to crew and maintenance personnel regarding maintenance setup and fault detection/location analysis for CDS, MMS, engine, and drive train.

The MFD reproduces television images seen by the MMS. It displays letters, numbers, and messages generated by MCPU or IMCPU software.

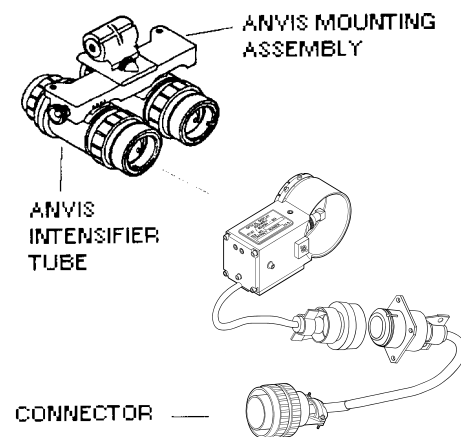
Desired multifunction display modes are selected through 14 pushbutton switches on the MFD bezel.

There are two opto-sensors located in the upper right and left corners of the MFD. The opto-sensors automatically adjust display contrast when the contrast control knob is in the automatic mode.

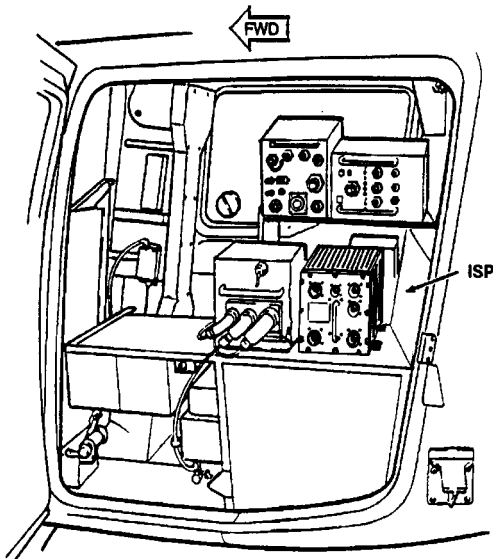
Keyboard Unit (KU). The KU is located on the center console panel between the pilot and observer. The KU is used for CDS display format call-up, CDS data control and alphanumeric entry into the CDS. Cockpit switches, keypad closures, and bezel switch closures are collected by the KU and transmitted to either the MCPUs or IMCPUs upon request.

Remote Frequency Display (RFD). The RFD is located between the two MFDs on the cockpit control panel. The RFD automatically displays the selected frequency of each of the five communications radios without interaction by crew members. The RFD receives serial digital data from the MCPUs and IMCPUs. It presents the current timed frequency of five transceivers at the same time on a sunlight readable display.

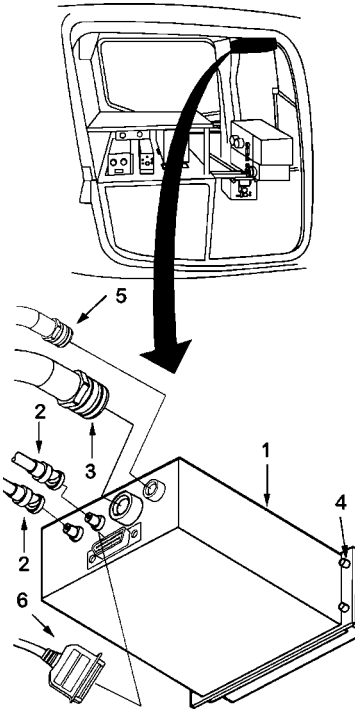
Optical Display Assembly (ODA). The ODA attaches to the pilot's/copilot's Night Vision Goggles (NVG). The ODA provides night-time head-up display of flight data. The CD2 configuration ISP or the CD3/CD4 configuration IMCPU processor controls how often data is displayed, and the intensity (brightness) of the display. All of this information is passed through each of the two ADSS CCAs in either the ISP or IMCPU, to their respective ODAs.



Integrated Systems Processor (ISP)(CD2). The ISP is located behind the observer's seat, aft of the MCPU. The ISP provides external subsystem interface. The ISP provides a powerful central processing unit (CPU) for avionics applications including interfacing to aircraft subsystems and control of the ODAs. It performs processing functions on data received through interfaces to external systems via two dual-redundant MIL-STD-1553B multiplex data buses and other memory-mapped analog, serial digital, and discrete input/output (I/O) lines. Specifically, the ISP interfaces with the weapons subsystems, the Video Tape Recorder, and Aircraft Survivability Equipment. It also converts information from the MCPU into signals for display by the ODAs.



Data Receptacle Unit (DRU)/ Data Transfer Module (DTM). The DRU/DTM provides memory storage. The DRU is mounted in the helicopter. The DTM is a portable data transfer and recording memory device.



1-13. EQUIPMENT DATA

Power Requirements:

115 VAC, 400 Hz, single phase +28 VDC

Weight:

IMCPU (-921):	31.30	pounds
IMCPU (-940):	32.70	pounds
IMCPU (-923):	30.70	pounds
IMCPU (-943):	32.10	pounds
MCPU:	24.50	pounds
MFD:	20.10	pounds
KU:	4.40	pounds
RFD:	1.90	pounds
ISP:	24.50	pounds
ODA:	0.53	pounds
DRU/DTM:	5.13	pounds

Dimensions:

IMCPU (-921/923 and -940/-943):		
Height:	12.27	inches
Width:	9.75	inches
Length:	16.21	inches
MCPU**:		
Height:	7.91	inches
Width:	9.20	inches
Length:	16.65	inches
MFD:		
Height:	8.60	inches
Width:	8.10	inches
Length:	17.00	inches
KU:		
Height:	6.00	inches
Width:	5.75	inches
Length:	7.40	inches
RFD:		
Height:	3.94	inches
Width:	5.77	inches
Length:	4.70	inches
ISP**:		
Height:	7.98	inches
Width:	8.04	inches
Length:	12.61	inches
ODA:		
Height:	1.90	inches
Width:	1.49	inches
Length:	3.56	inches
DRU*:		
Height:	3.00	inches
Width:	5.75	inches
Length:	7.00	inches
DTM*:		
Height:	0.81	inches
Width:	3.26	inches
Length:	5.91	inches

* The DRU/DTM are included on the CD3 only.

** CD2 only

1-14. SAFETY, CARE, AND HANDLING

To protect an LRU from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not expose to strong electromagnetic fields.
- Do not probe connector pins or receptacles.

CHAPTER 2

CDS MAINTENANCE

Section I	Repair Parts, Special Tools, TMDE, and Support Equipment	2-1
Section II	Service Upon Receipt	2-1
Section III	Troubleshooting	2-2
	CD2	2-3
	CD3	2-13
	CD4	2-13
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Section I

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT

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

2-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment are required for testing and troubleshooting the Control/Display Subsystem (CDS). Refer to the Maintenance Allocation Chart (MAC) in Appendix B when repair of the CDS is required.

Section II

SERVICE UPON RECEIPT

2-3. UNPACKING INSTRUCTIONS

The Line Replaceable Units (LRUs) and each of its Shop Replaceable Units (SRUs), are shipped in reusable containers. Be careful not to damage the shipping container when unpacking a unit. When replacing a faulty LRU, remove the new LRU from the shipping container. Package the faulty LRU in the empty shipping container in the same manner that the new LRU was packaged.

Save the shipping container(s) and packaging materials for use when the following conditions exist:

- a. Repaired LRU is repacked for shipment to AVUM.
- b. AVIM non-repairable LRU is repacked for shipment to depot repair.

- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

2-4. CHECKING UNPACKED EQUIPMENT

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.
- b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-751.

Section III

TROUBLESHOOTING

2-5. TEST AND TROUBLESHOOT

The CDS for the OH-58D utilizes one of three different fielded configurations. The three different CDS configurations are defined as: CD2, CD3 and CD4. The LRUs contained in each version are as follows:

CD2

- 2 MCPUs
- 2 MFDs
- 1 KU
- 1 RFD
- 1 ISP
- 2 ODAs

CD3

- 1 RIGHT IMCPU
- 1 LEFT IMCPU
- 2 MFDs
- 1 KU
- 1 RFD
- 2 ODAs
- 1 DRU
- 2 DTMs

CD4

- 1 RIGHT IMCPU
- 1 LEFT IMCPU
- 2 MFDs
- 1 KU
- 1 RFD
- 2 ODAs

The Testing and Troubleshooting Flow Diagram in this section contains all instructions necessary for testing and troubleshooting the CDS. To use the flow diagram, follow these guidelines:

- a. Follow instructions in the first box located directly beneath START.
- b. Answer the question YES or NO.
- c. Follow the appropriate arrow down to the next box.
- d. Follow instructions in that box.
- e. Answer the question YES or NO.
- f. Return to step c.

Continue with this procedure until you reach the last box which states SYSTEM OPERATIVE. Only at that point has the CDS successfully passed the test.

If a fault is found in the CDS, the Testing and Troubleshooting Flow Diagram will locate it. When you are instructed to replace a faulty LRU, go to Section IV, Maintenance Procedures. Locate the referenced task(s) in List of Tasks.

After replacing the suspected faulty LRU, return to START at the beginning of the flow diagram. Follow the same procedures as outlined previously. If the flow diagram takes you to a box which instructs you to replace the same LRU that you just replaced, the fault is not in the CDS. You must then refer to TM 1-1520-248-23 in order to locate the fault.

NOTE

The Test and Troubleshoot Flow Diagrams for the CD2 begins on page 2-3. The Test and Troubleshoot Flow Diagrams for CD3 and CD4 begin on page 2-13.

Clear cautions and warnings prior to troubleshooting.

TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

START

• Visually inspect CDS Components for damage. Is any bezel or chassis broken or cracked?

NO

YES

- Replace faulty LRU.

LRU	TASK
MCPU	3-15 and 3-16
MFD	4-15 and 4-16
KU	5-15 and 5-16
RFD	6-15 and 6-16
ISP	8-15 and 8-16

- Retest.

• Are any of the following loose, missing, or damaged?
 KU Switch Guards
 RFD Brightness Knob
 MFD Brightness or Contrast Knobs

NO

YES

- Perform the following tasks as needed:

ITEM	TASK
KU Switch Guards	5-17
RFD Brightness Knob	6-18
MFD Brightness or Contrast Control Knob	4-17

• Do the RFD or MFD faceplates or ODA eyepiece require cleaning?

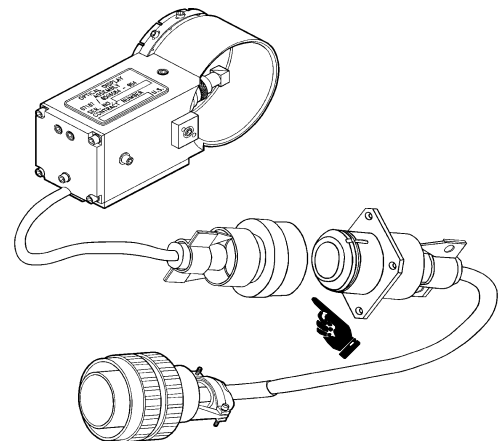
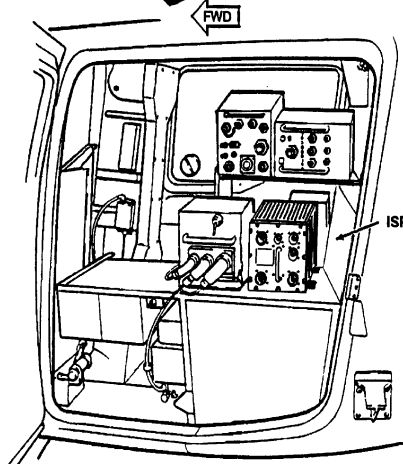
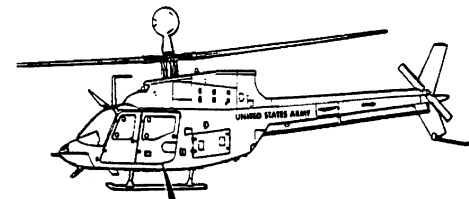
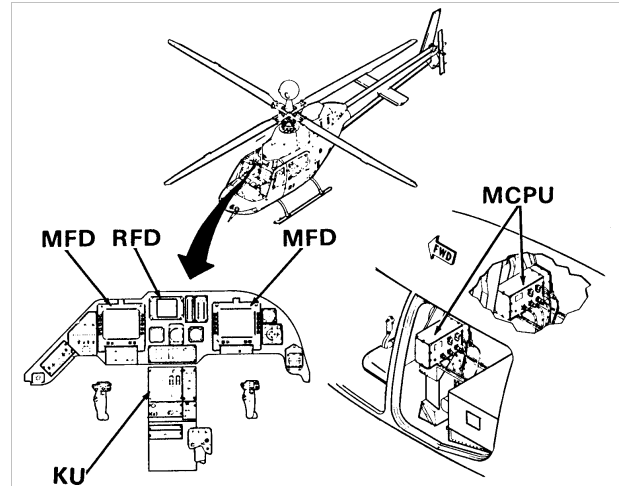
NO

YES

- Perform cleaning tasks as needed:

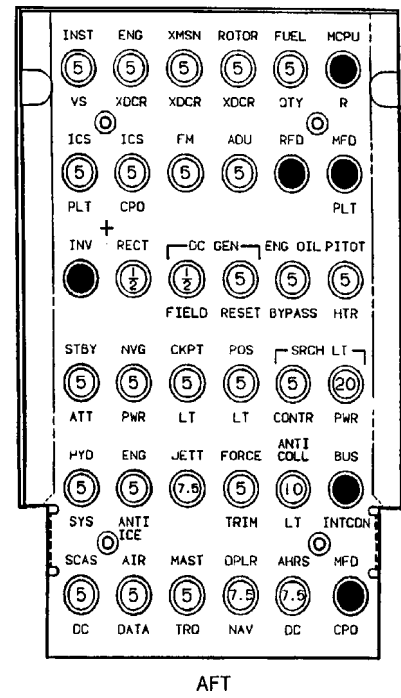
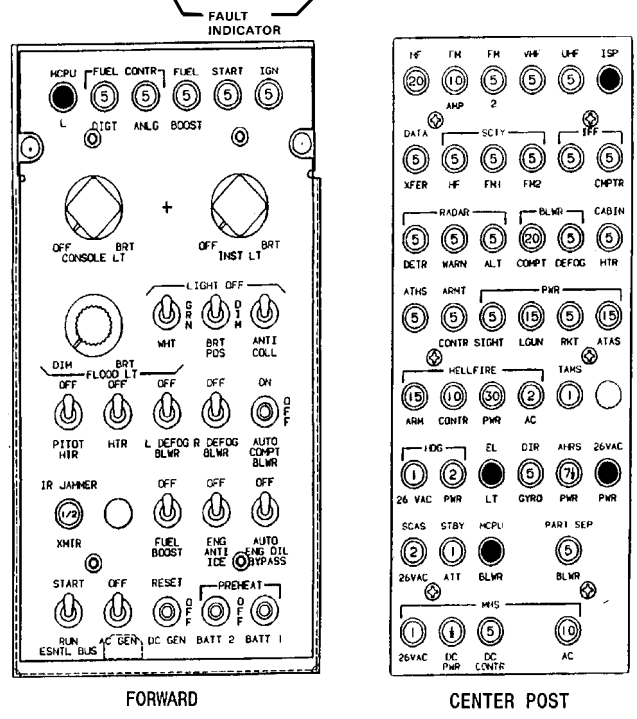
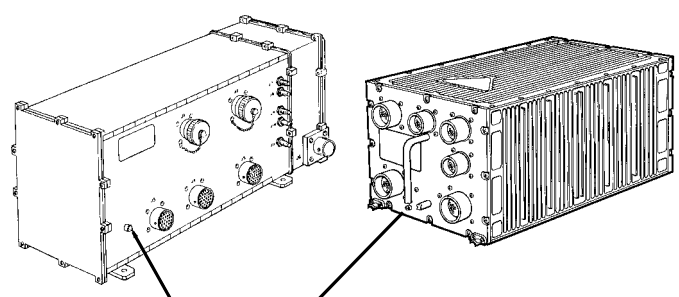
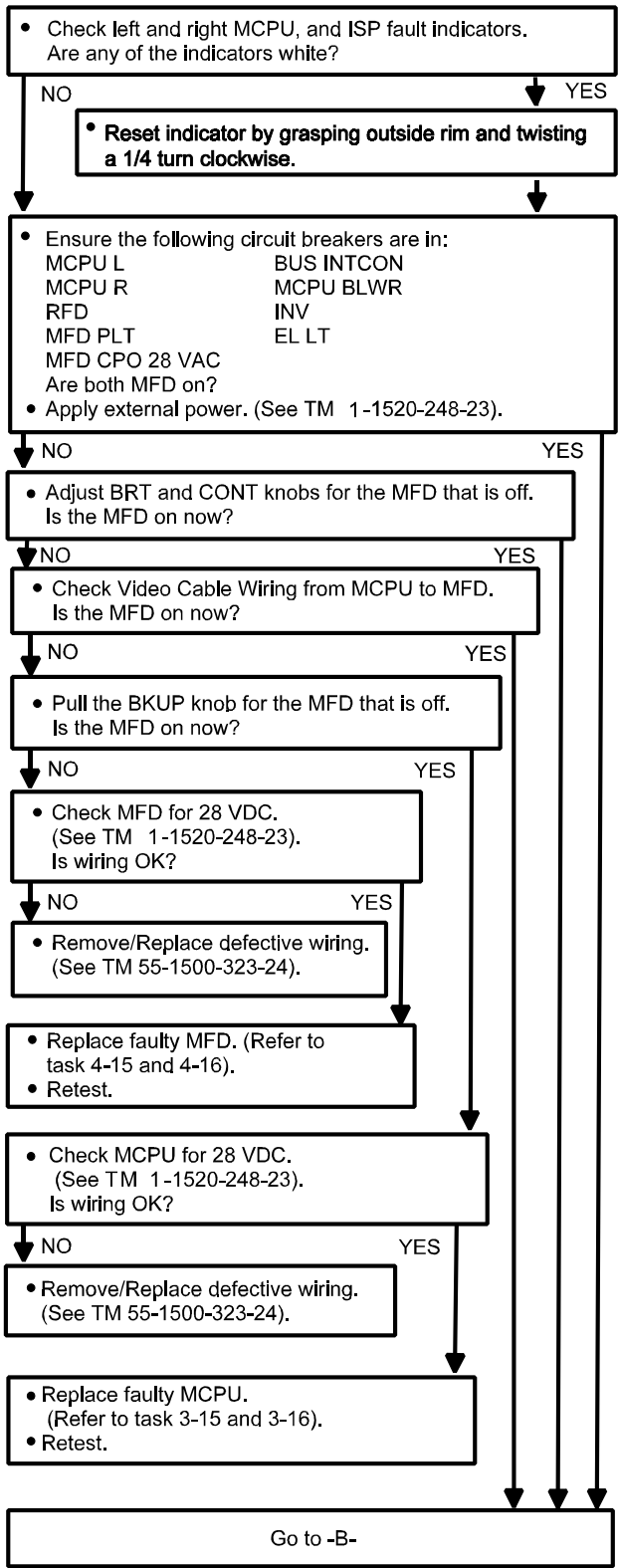
ITEM	TASK
RFD Faceplates	6-17
MFD Faceplates	4-18
ODA Eyepiece	7-15

Go to -A-



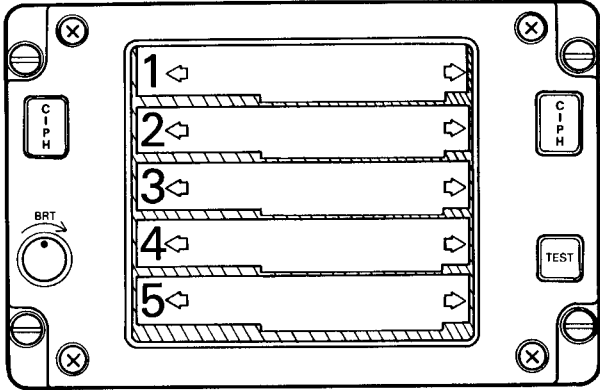
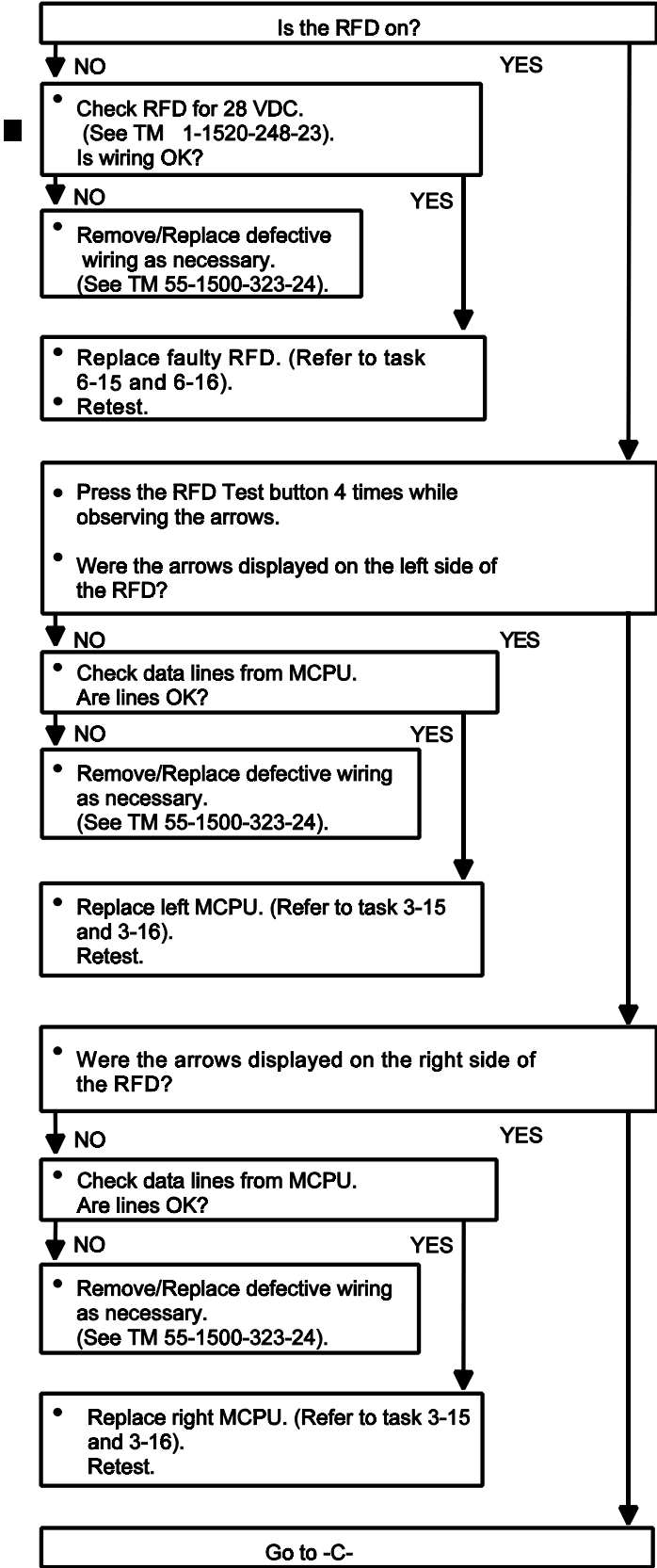
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-A-



TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-B-



TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-C-

- Clear any cautions and advisories from MFD screens by repeated toggling of the KU ACK switch.

NOTE: If toggling does not clear one MFD, pull out then push in circuit breaker for the MCPU on same side of helicopter as non-cleared MFD. Repeat toggling.

Does toggling the ACK switch clear cautions and advisories on both MFD?

NO

YES

- Inspect wiring. (See TM 1-1520-248-23). Is wiring OK?

NO

YES

- Remove/Replace defective wiring as necessary. (See TM 55-1500-323-24).

- Replace KU. (Refer to task 5-15 and 5-16). If cautions cannot be cleared from one MFD after replacing KU, reinstall original KU and replace MCPU on same side of helicopter as non-cleared MFD.
- Retest.

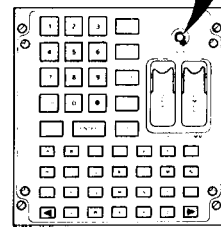
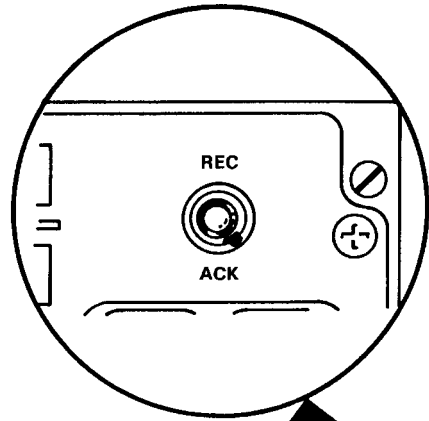
- Press INIT button on each auxiliary panel. Do any of the following conditions exist on the MFD on the same side as the INIT button pressed?
 - Words running off screen.
 - Words not aligned with line address keys (too high or too low).
 - Words appear to be moving on screen.

NO

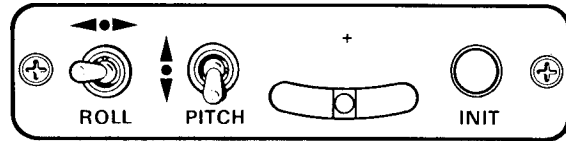
YES

- Align or replace faulty MFD. (Refer to task 4-15 and 4-16).
- Retest.

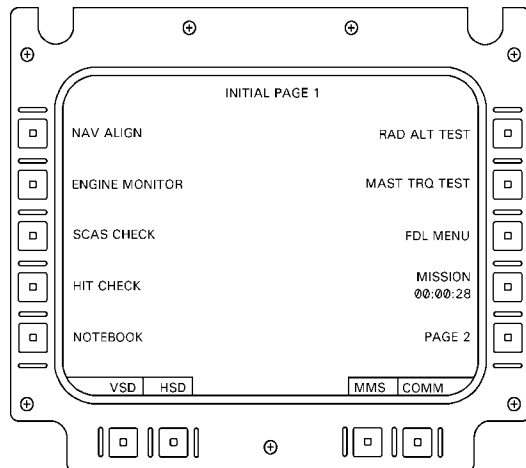
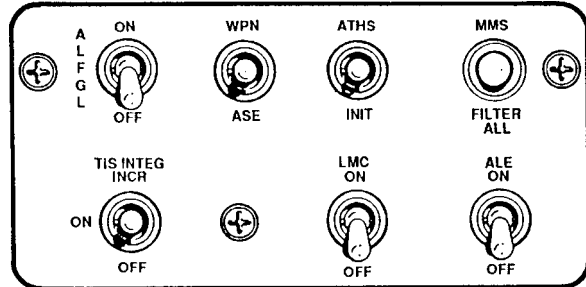
Go to -D-



PILOT AUXILIARY PANEL

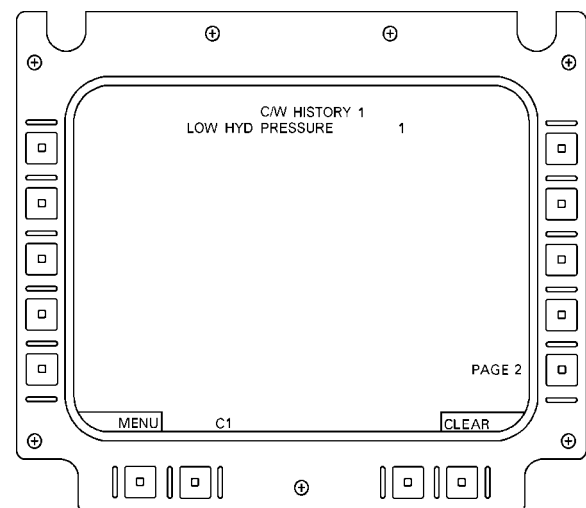
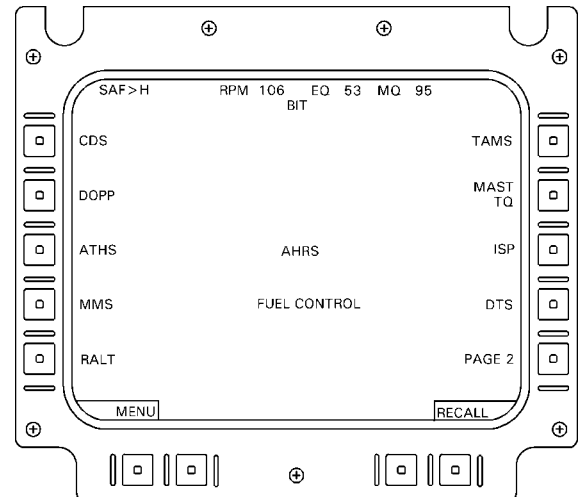
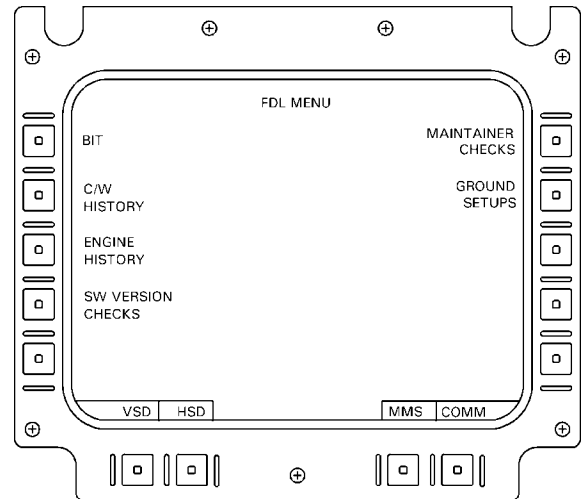
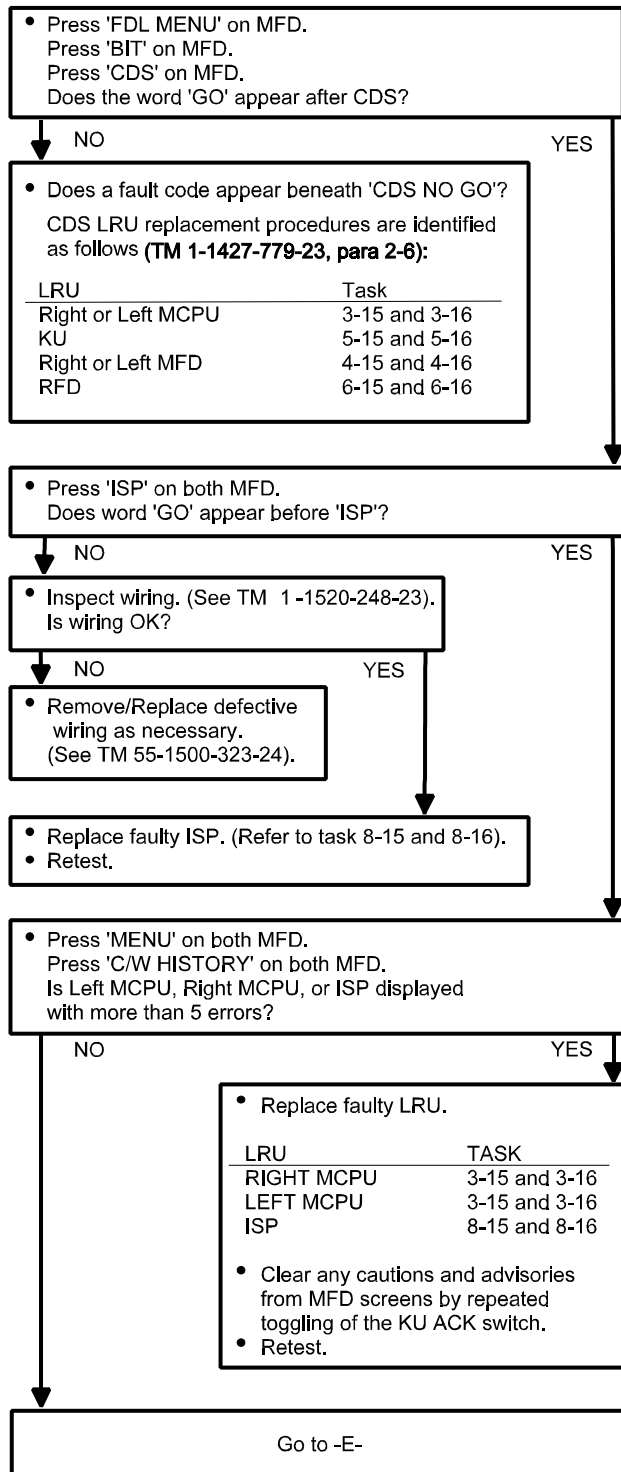


CPO AUXILIARY PANEL



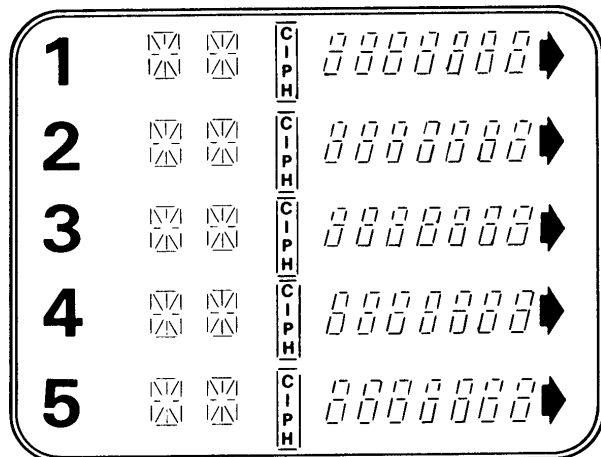
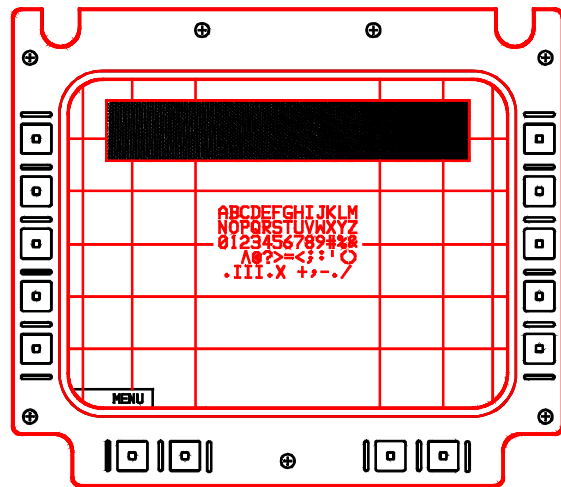
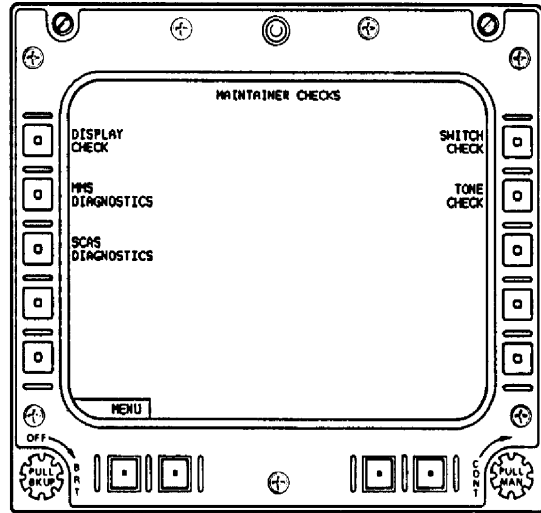
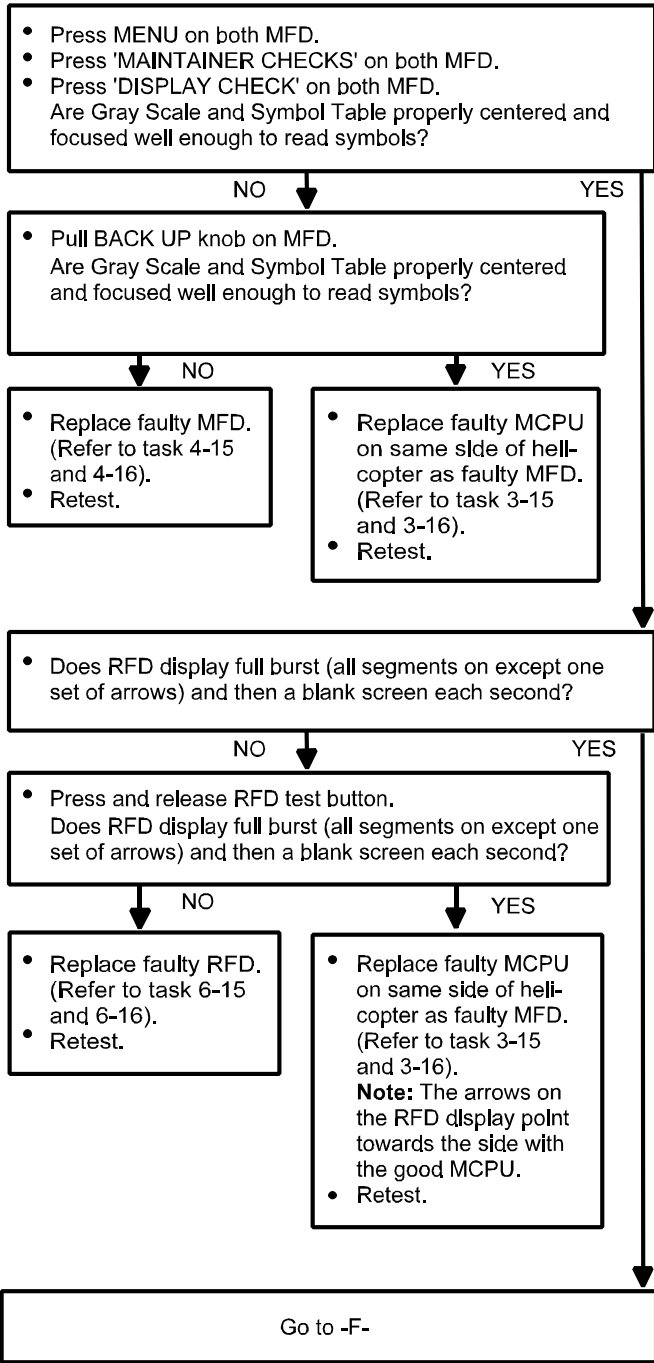
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-D-



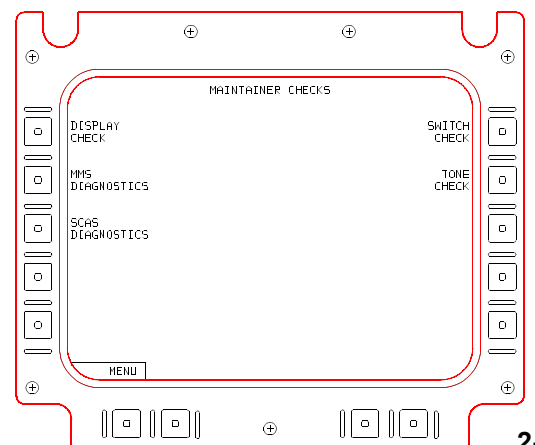
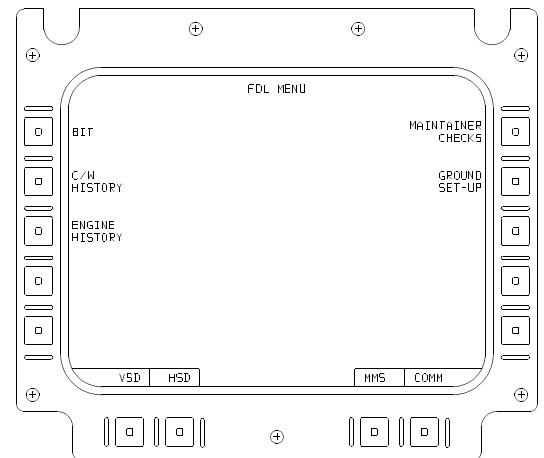
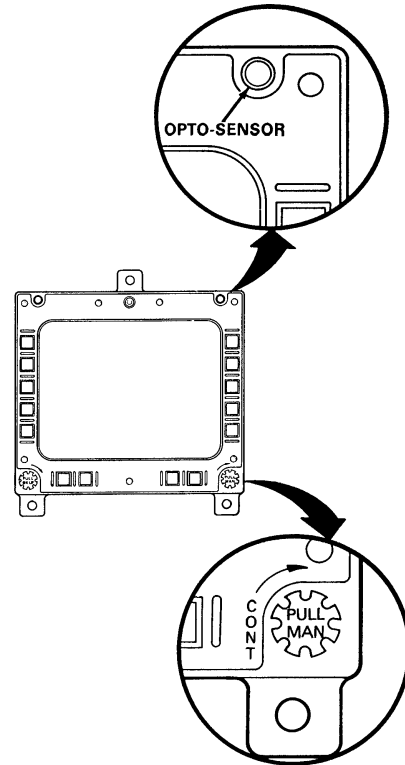
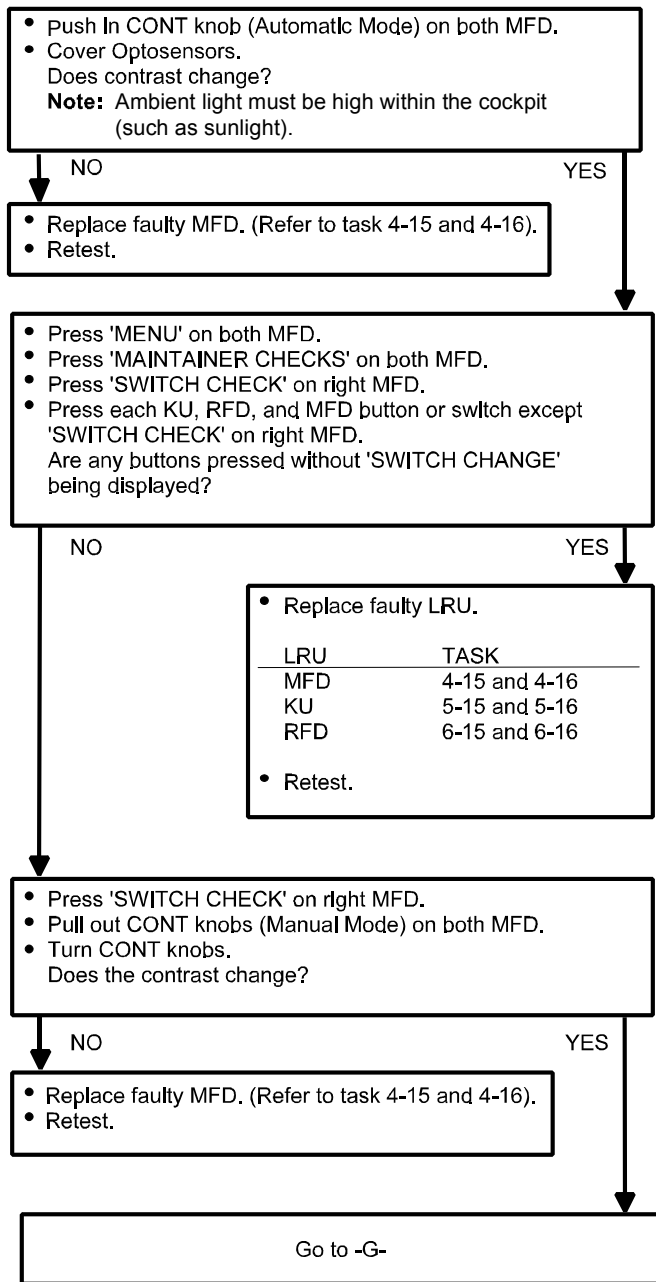
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-E-



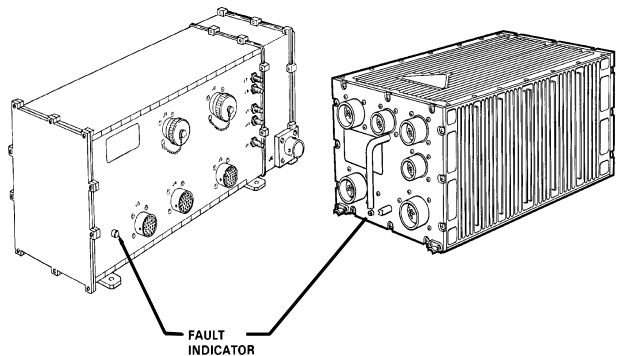
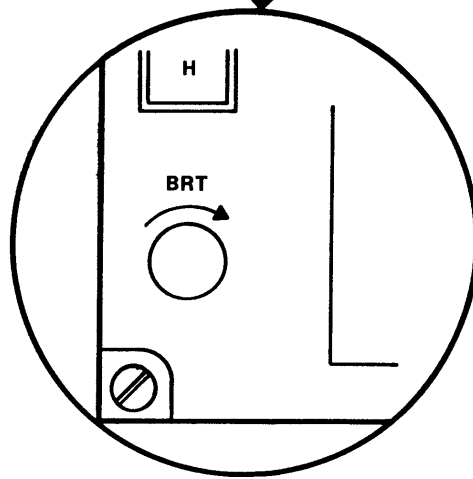
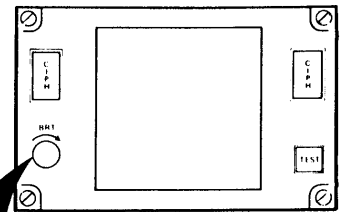
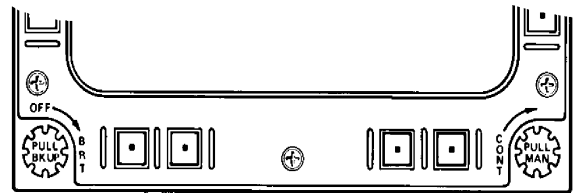
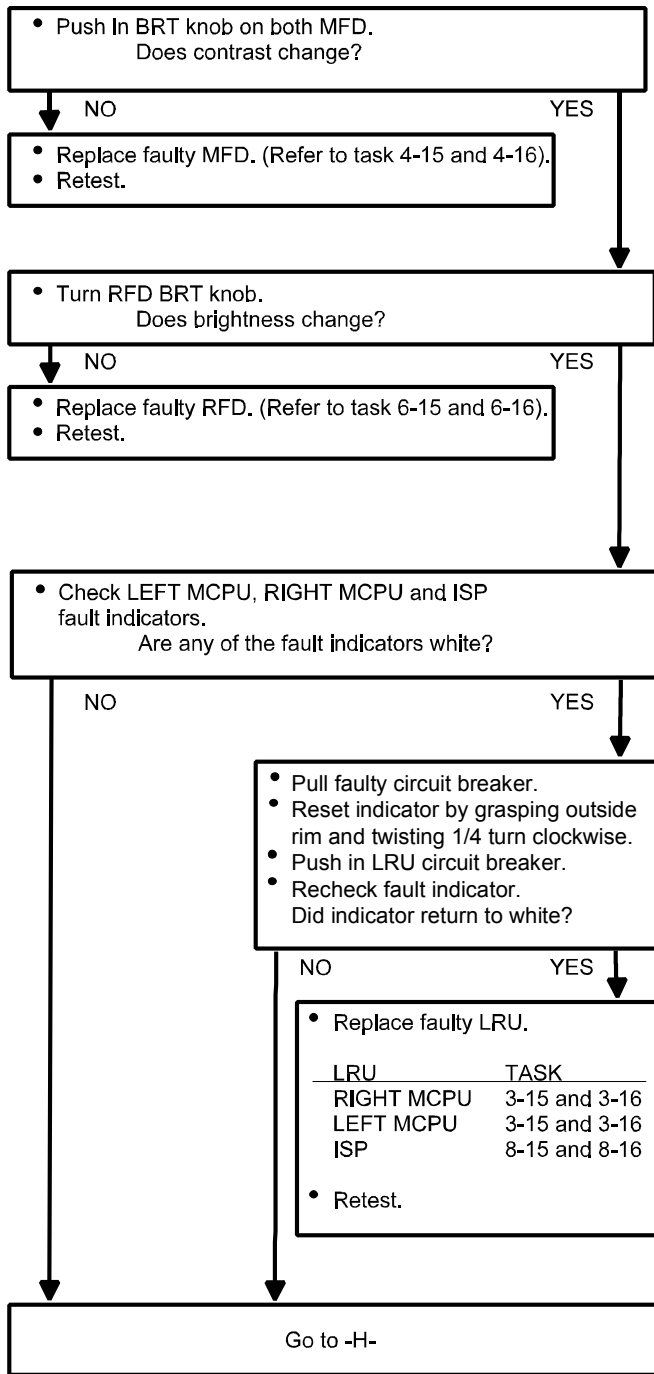
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-F-



TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-G-



TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-H-

- Press INIT button on each auxiliary panel.
- Press 'PAGE 2' on both MFD.
- Select LEFT or RIGHT eye using R4.
- Press 'ADSS ODA TEST' on copilot MFD.
- Press ODA button on pilot's cyclic grip.
- View ADSS display pattern on each ODA.

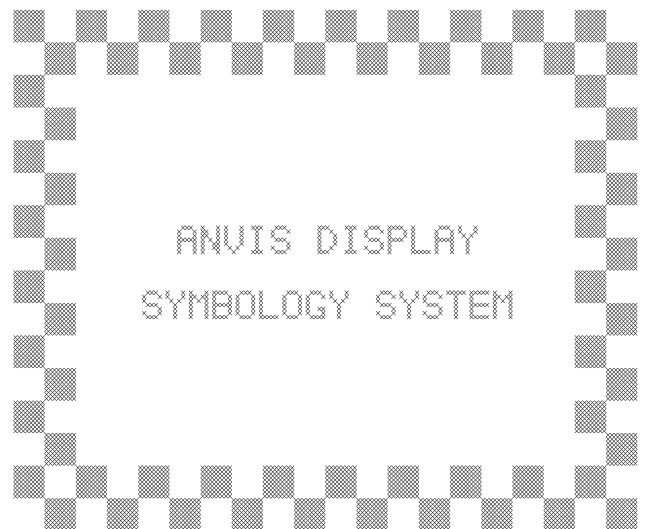
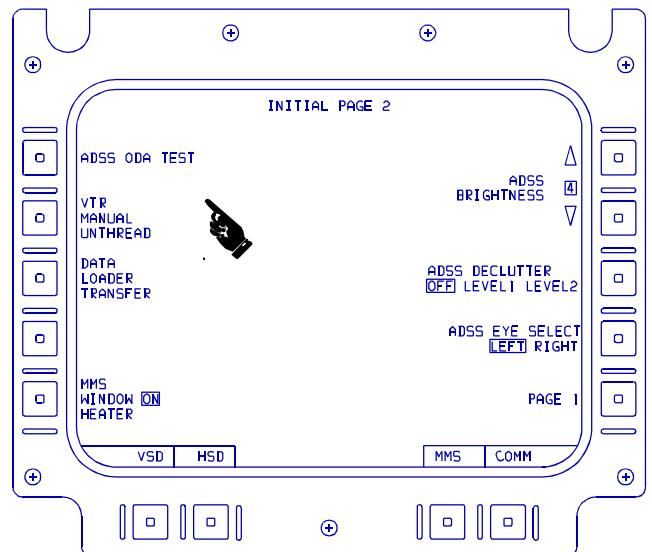
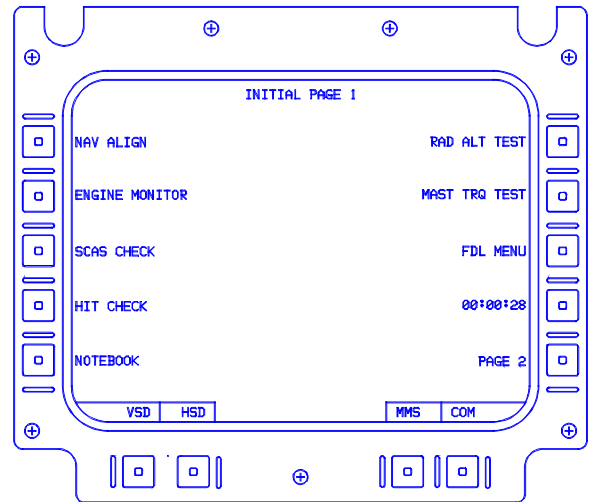
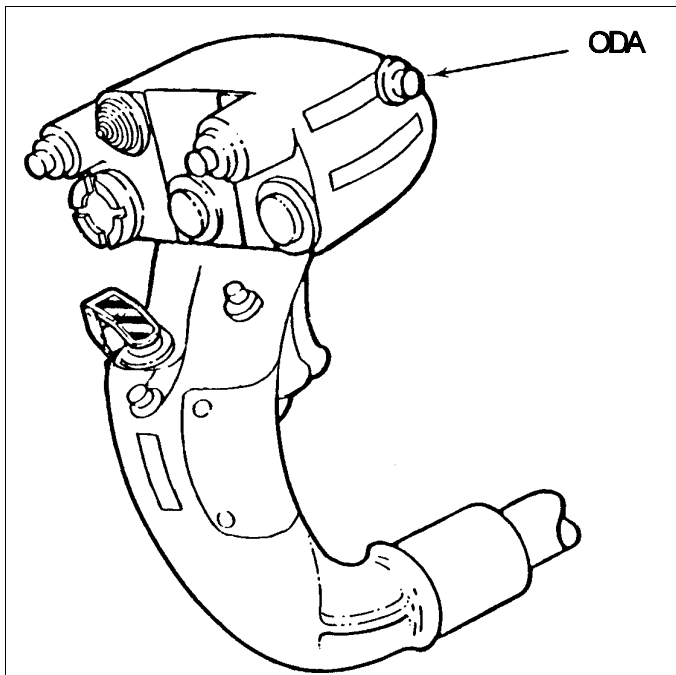
Is the display collapsed horizontally or are there any unevenly spaced black or missing horizontal bands in the pattern?

NO

YES

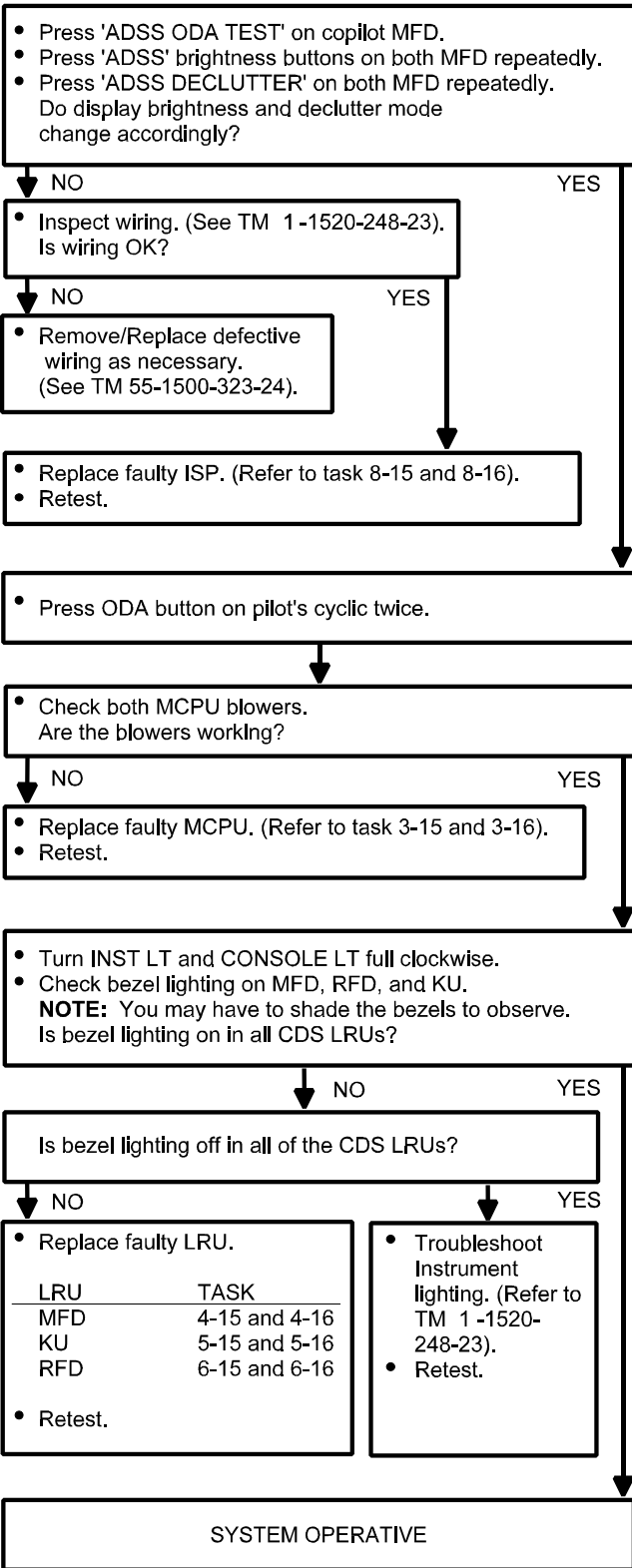
- ODA is faulty; return to depot.
- Retest.

Go to -I-

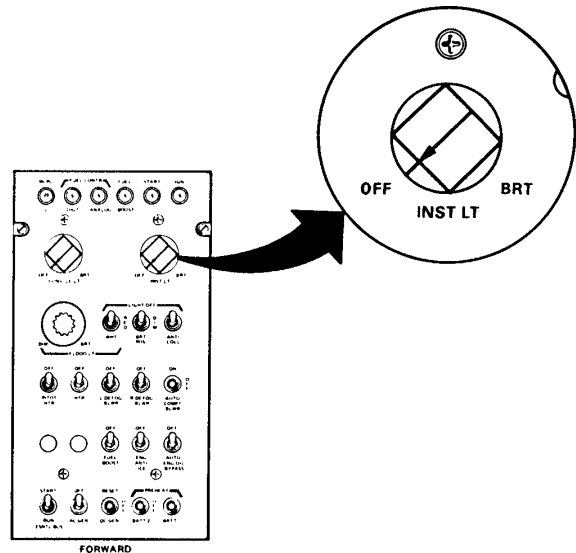
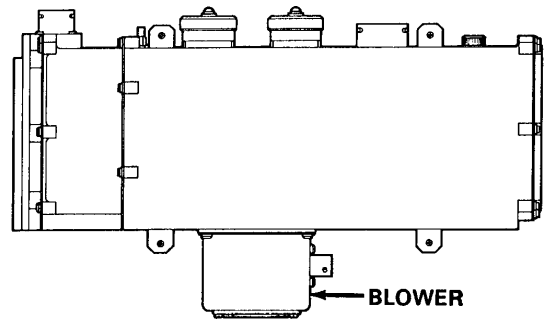


TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD2

-I-



	FULL	1ST LEVEL DECLUTTER	2ND LEVEL DECLUTTER
NORMAL			
HOVER			
HOVER BOB-UP			



TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

START

• Visually inspect CDS components for damage.
Is any bezel or chassis broken or cracked?

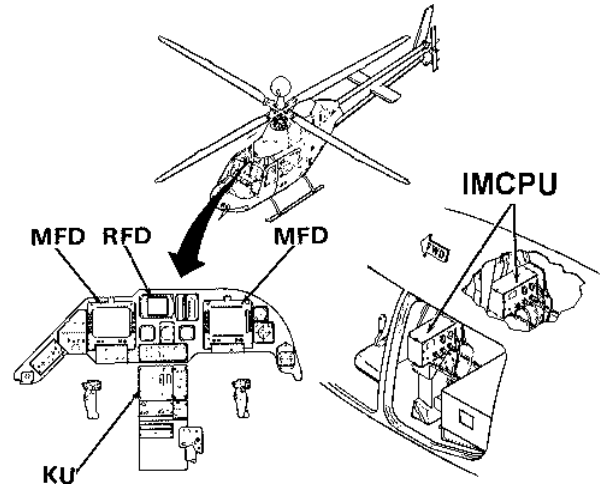
NO

YES

• Replace faulty LRU.

LRU	TASK
IMCPU (CD3)	3-39 and 3-40
IMCPU (CD4)	3-39 and 3-40
MFD	4-15 and 4-16
KU	5-15 and 5-16
RFD	6-15 and 6-16

• Retest.



• Are any of the following loose, missing, or damaged?
KU Switch Guards
RFD Brightness Knob
MFD Brightness or Contrast Knobs

NO

YES

• Perform the following tasks as needed:

ITEM	TASK
KU Switch Guards	5-17
RFD Brightness Knob	6-18
MFD Brightness or Contrast Control Knob	4-17

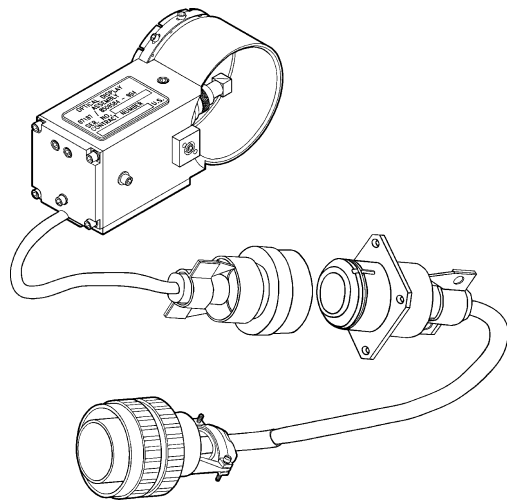
• Do the RFD or MFD faceplates or ODA eyepeice require cleaning?

NO

YES

• Perform cleaning tasks as needed:

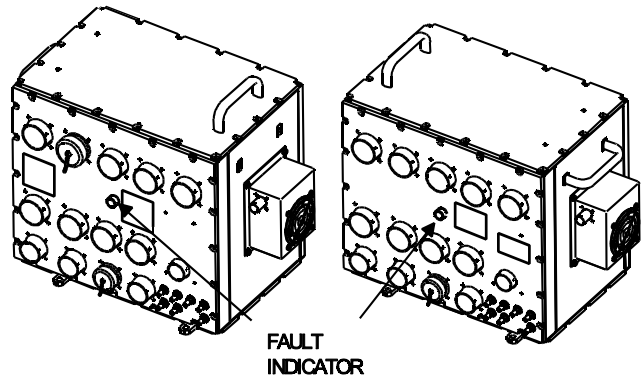
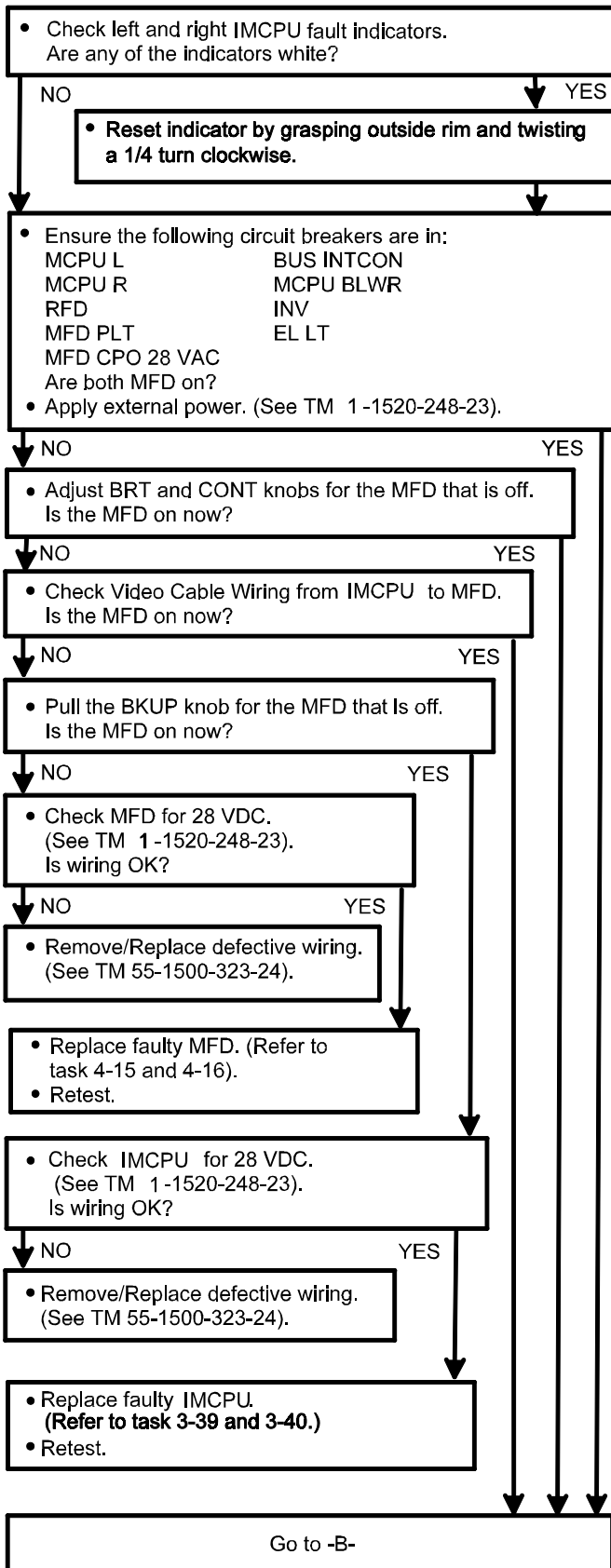
ITEM	TASK
RFD Faceplates	6-18
MFD Faceplates	4-18
ODA Eyepeice	7-15



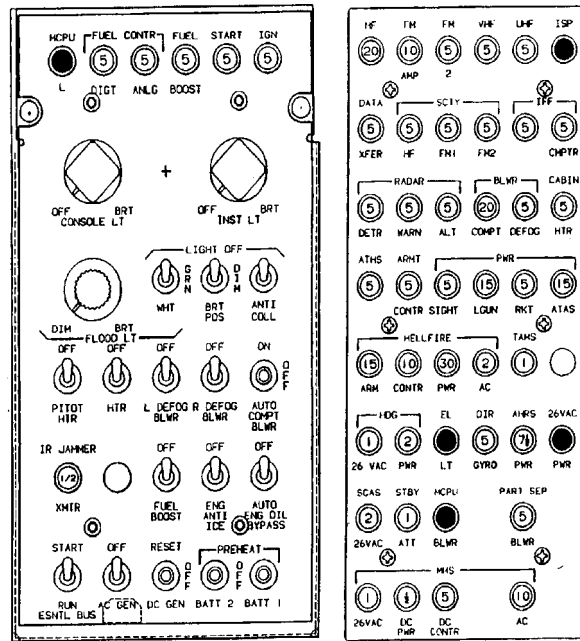
Go to -A-

TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-A-

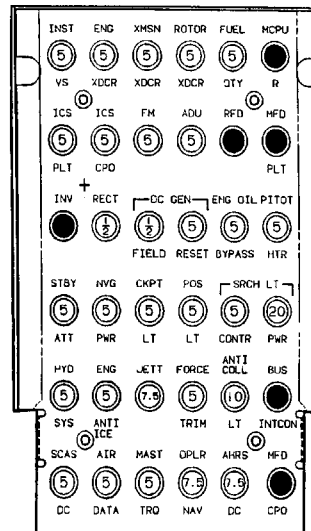


FAULT INDICATOR



FORWARD

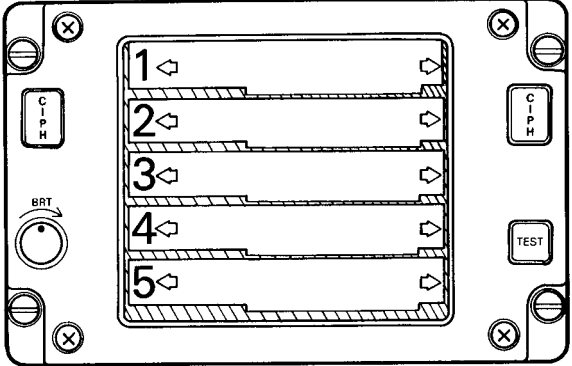
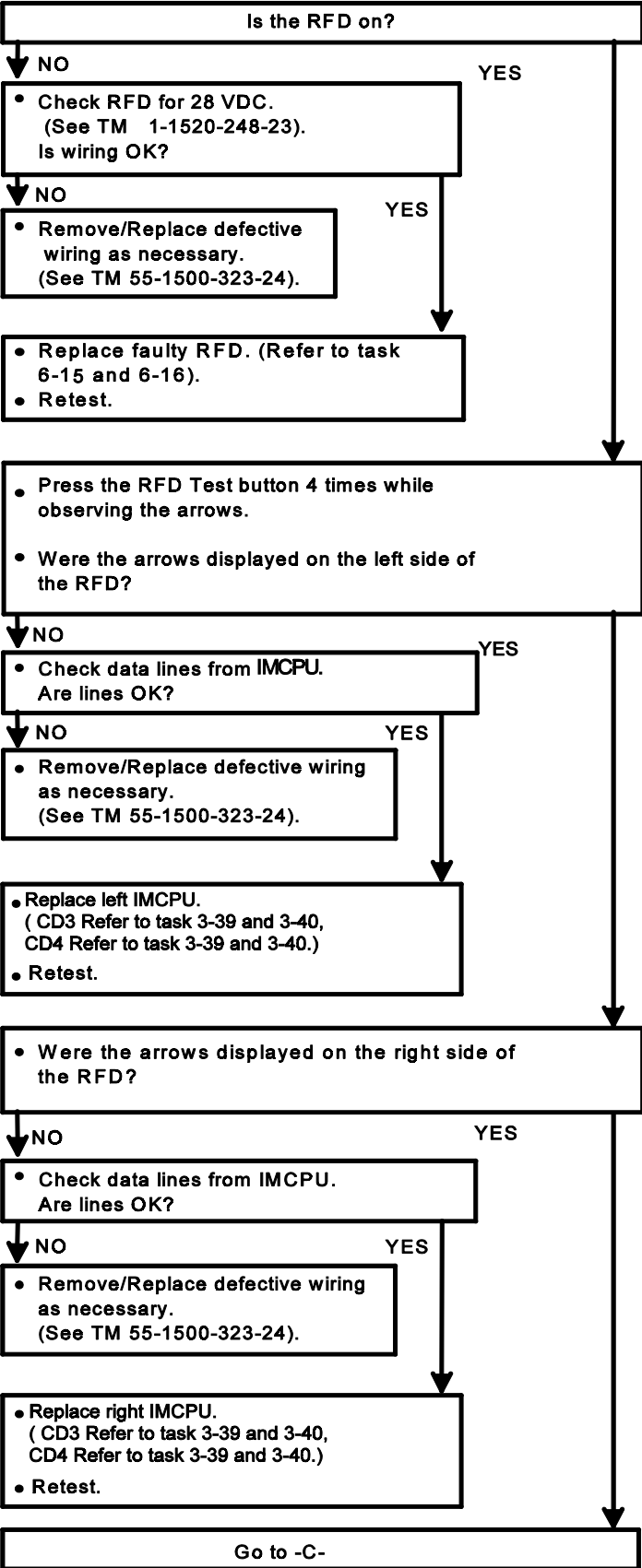
CENTER POST



AFT

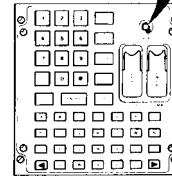
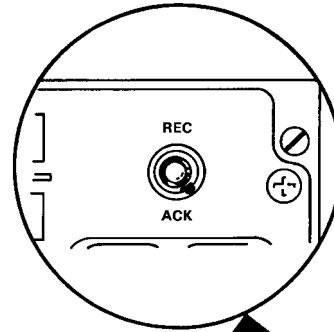
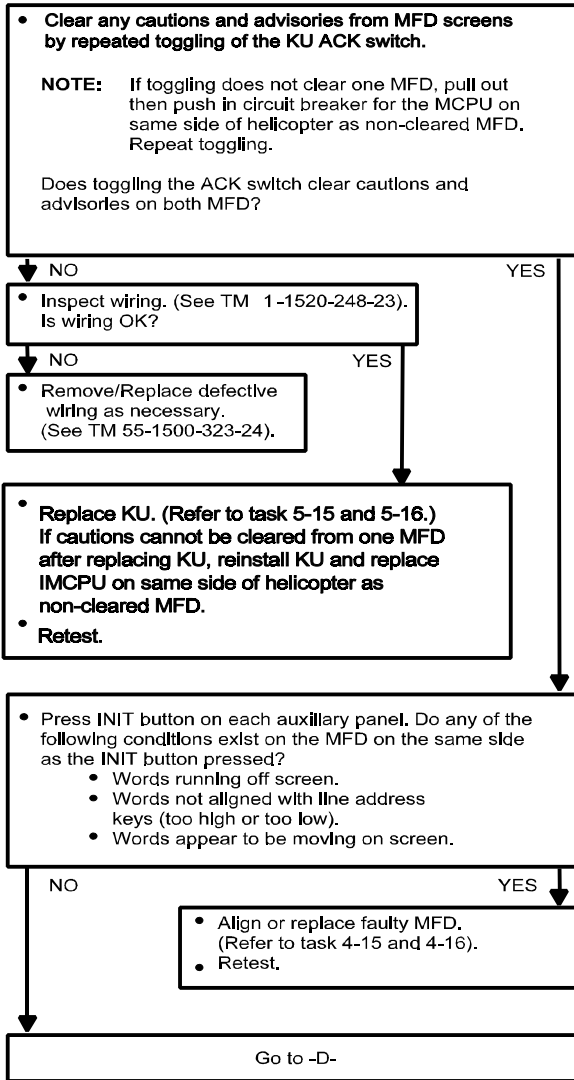
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-B-

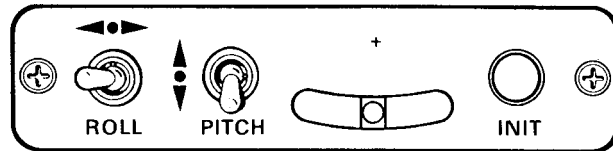


TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

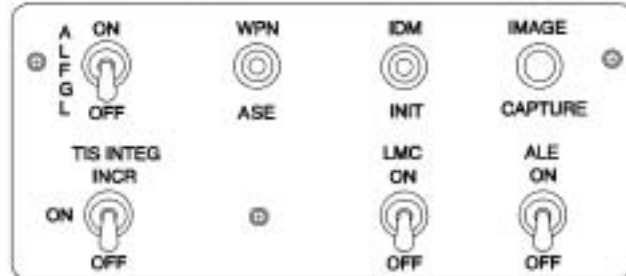
-C-



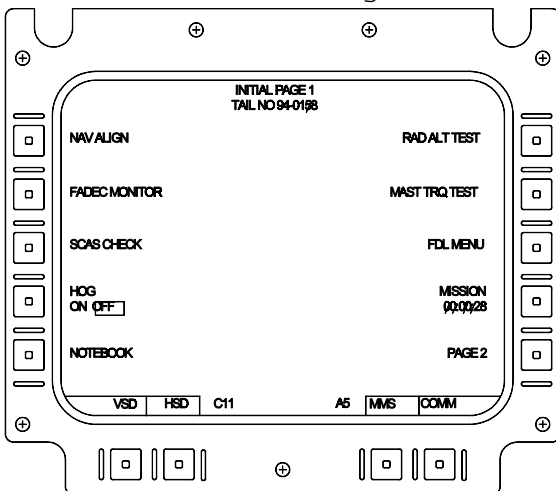
PILOT AUXILIARY PANEL



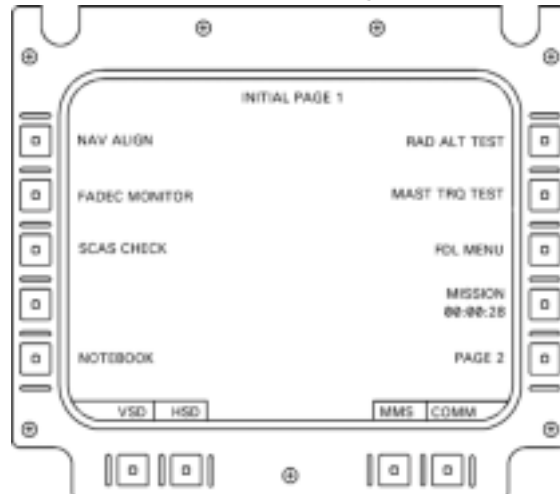
CPO AUXILIARY PANEL



CD4 Initial Page 1

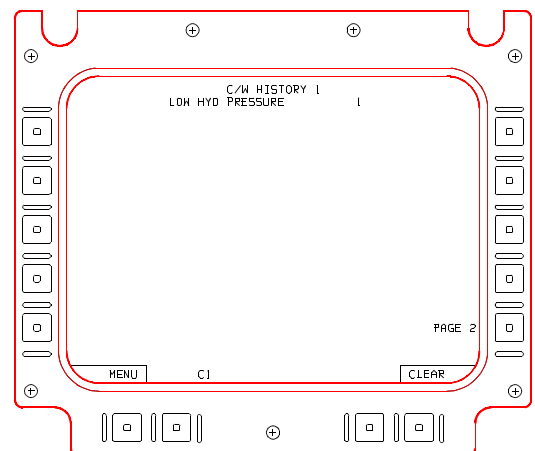
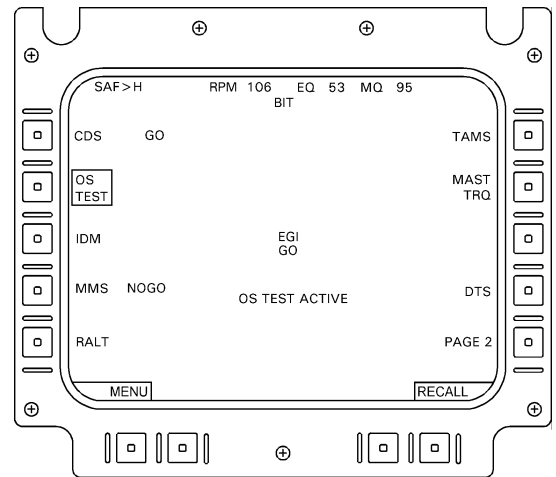
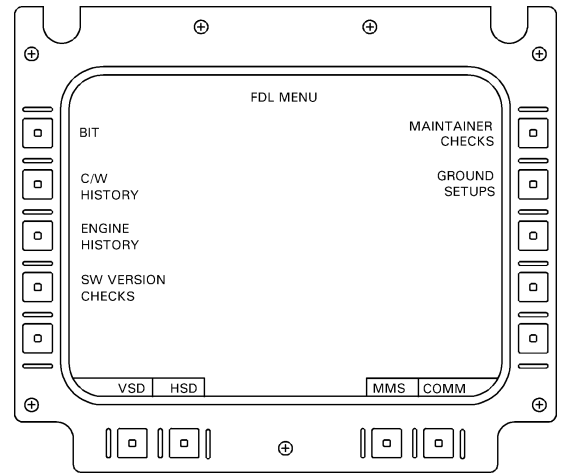
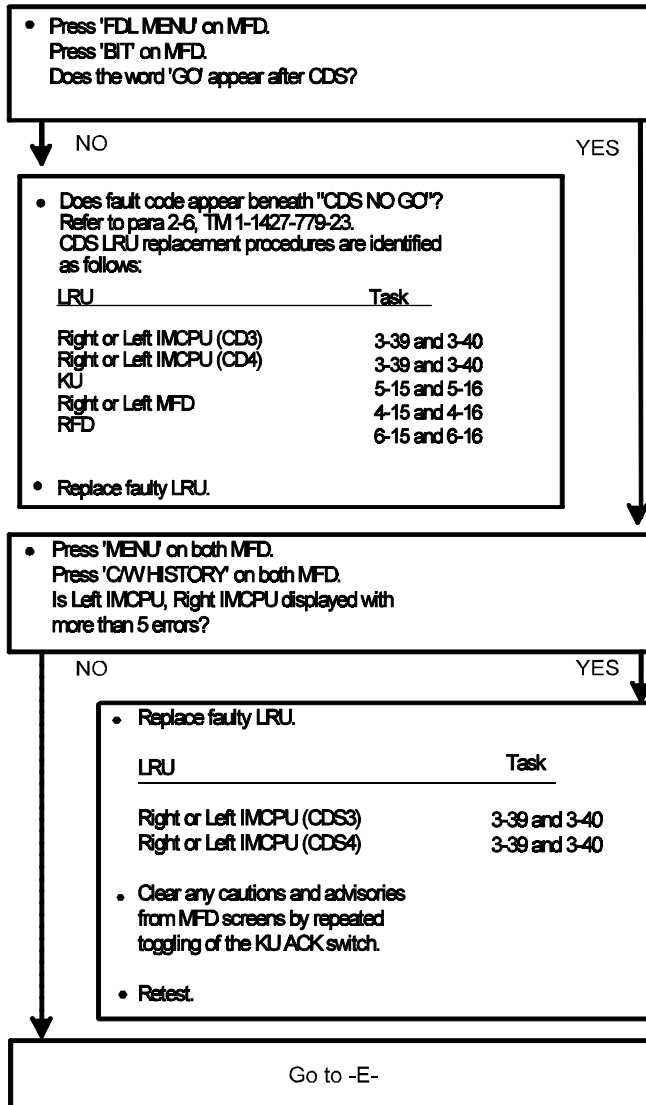


CD3 Initial Page 1



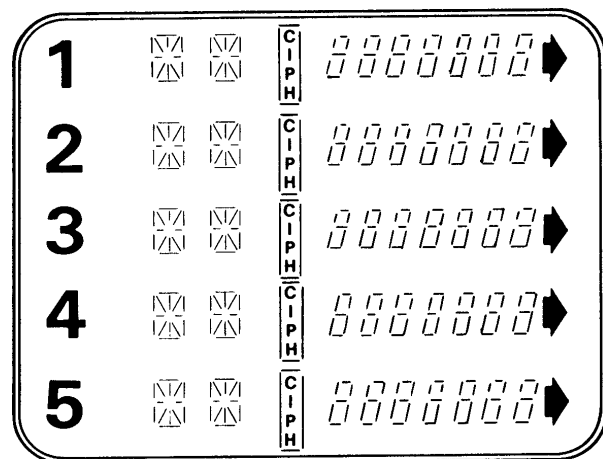
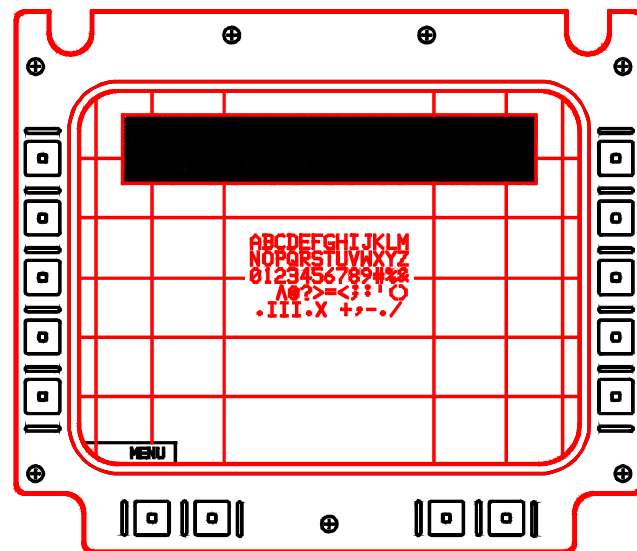
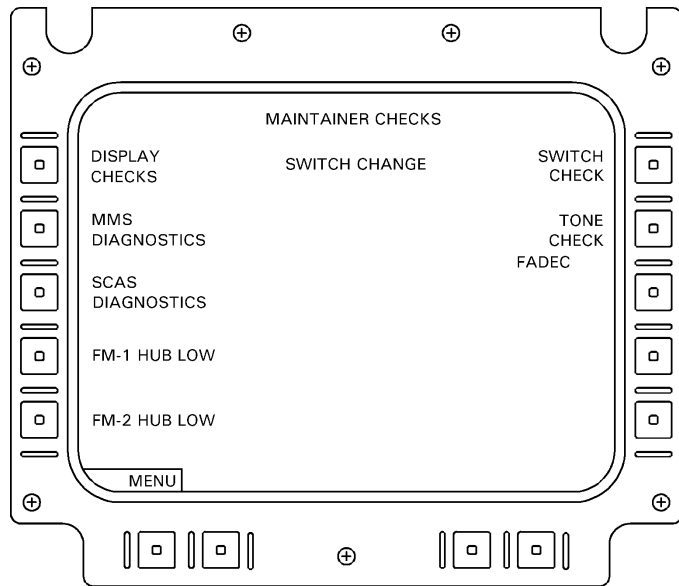
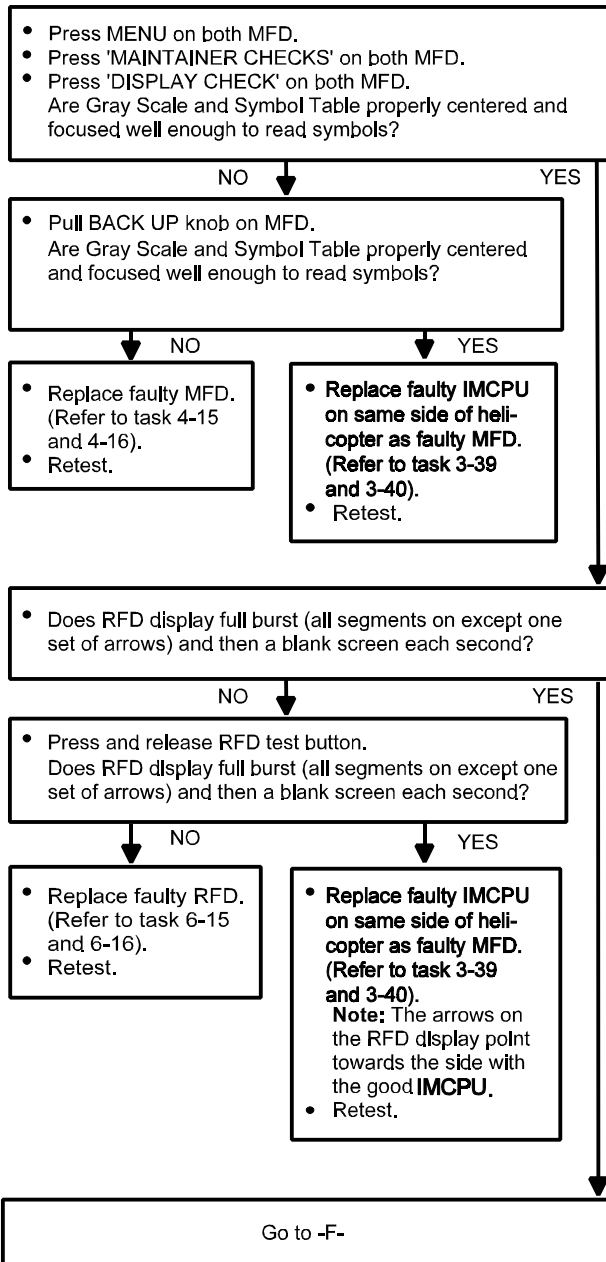
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-D-



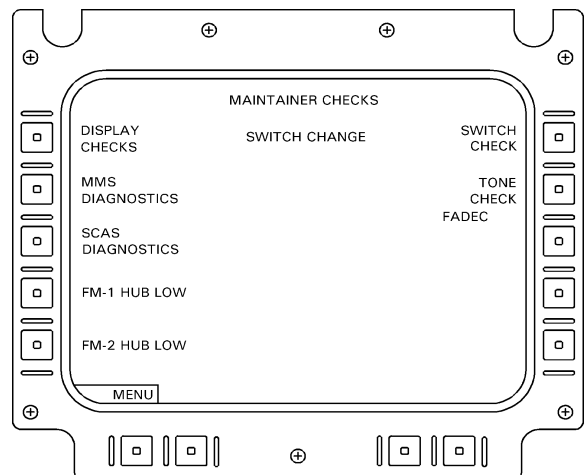
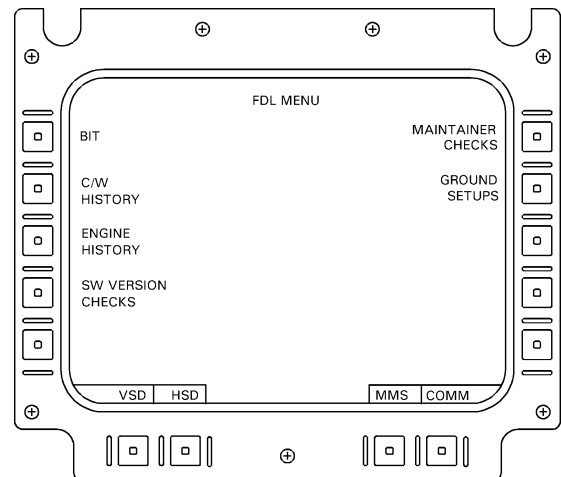
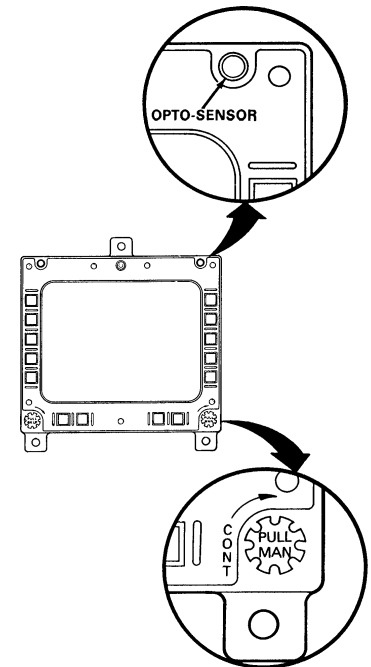
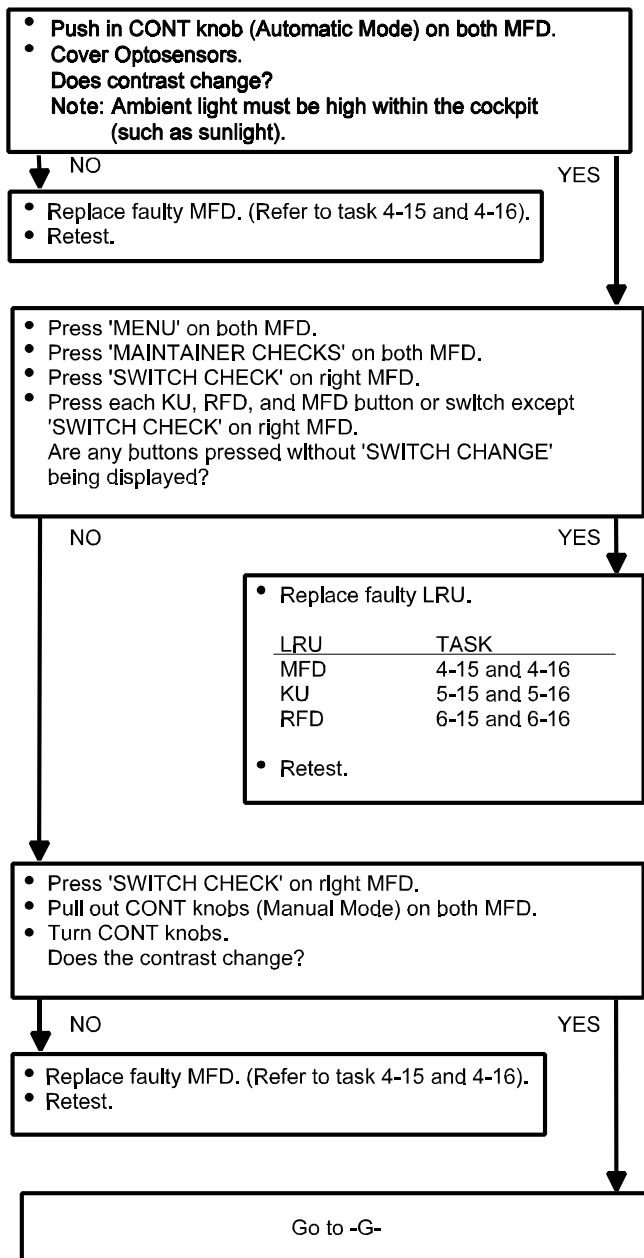
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-E-



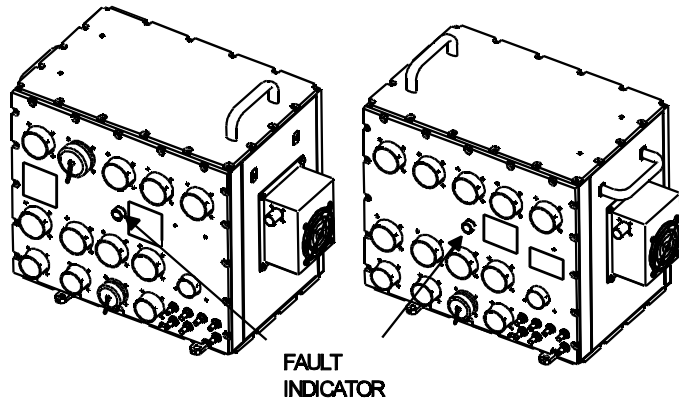
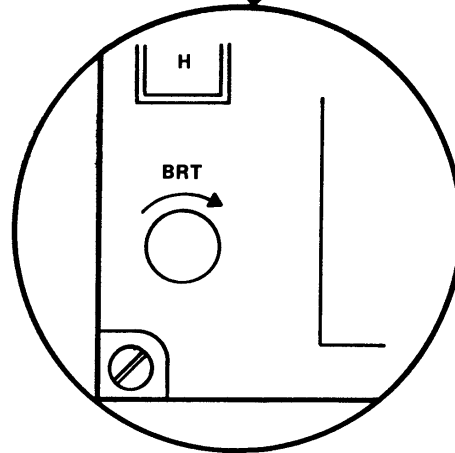
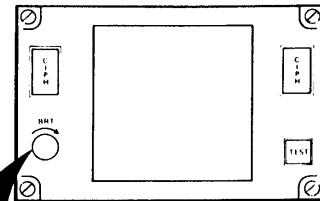
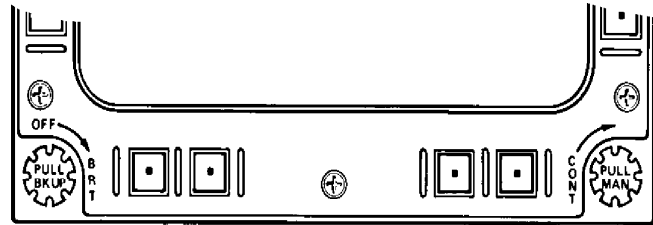
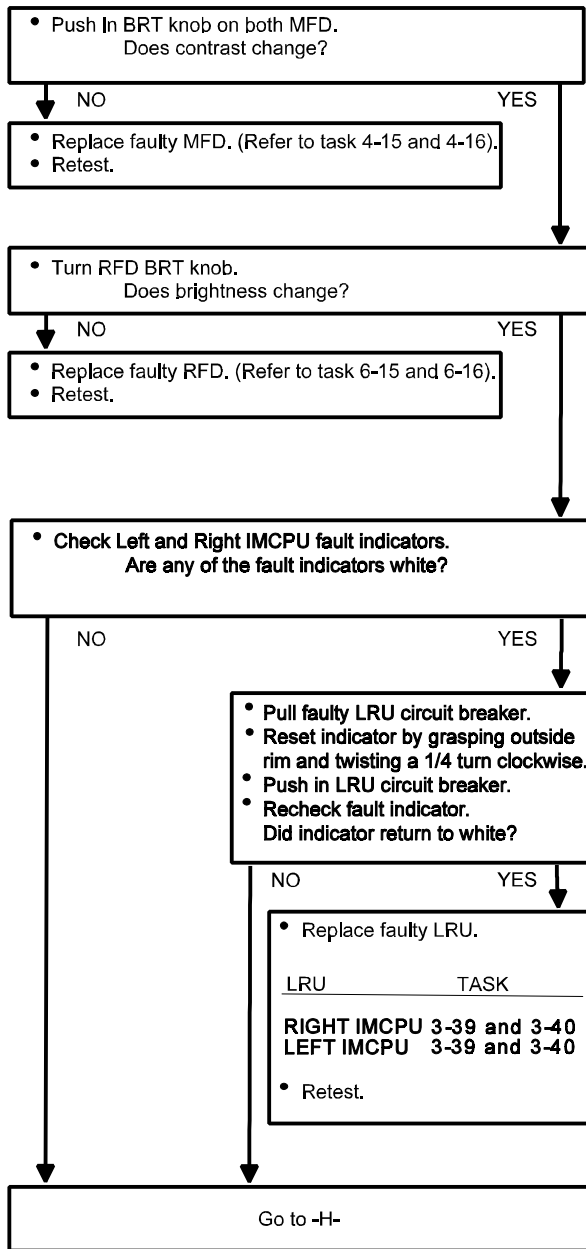
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-F-



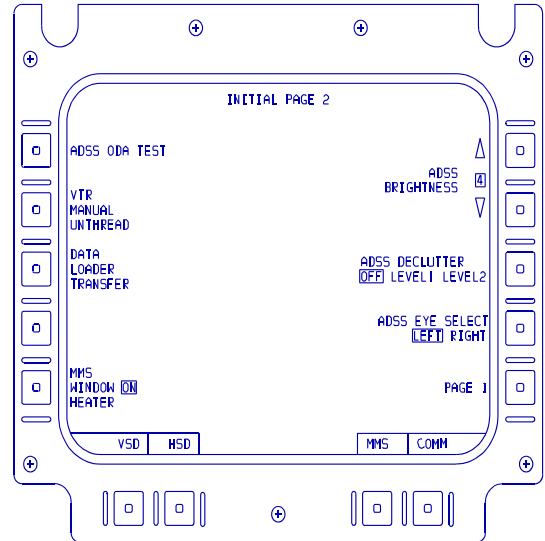
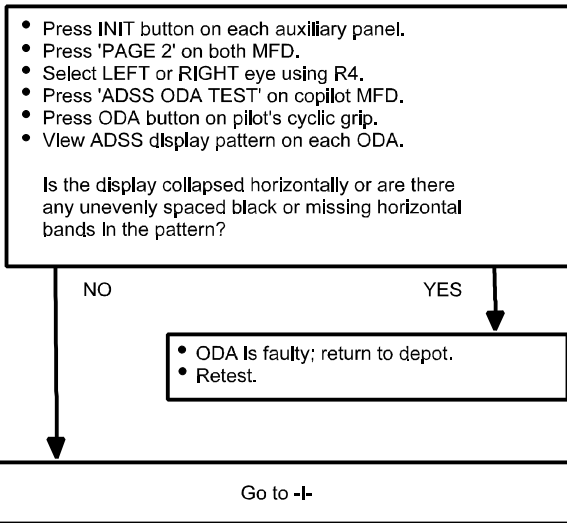
TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-G-

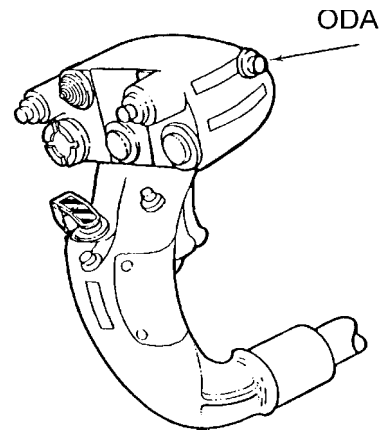
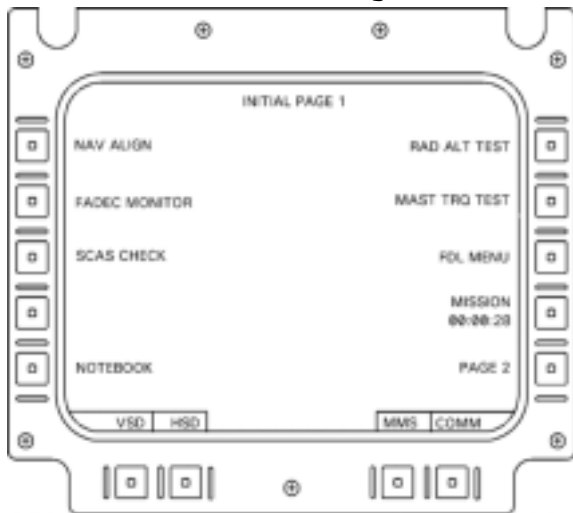


TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

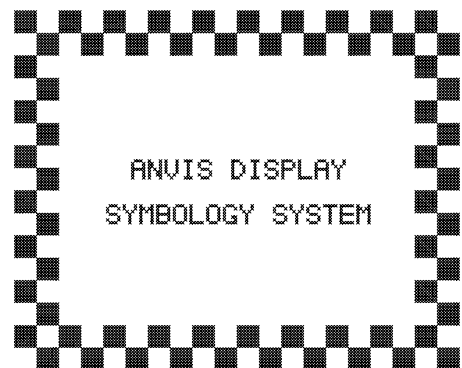
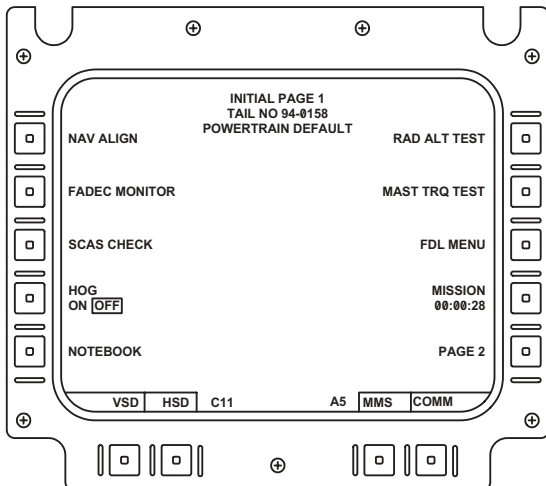
-H-



CD3 Initial Page 1



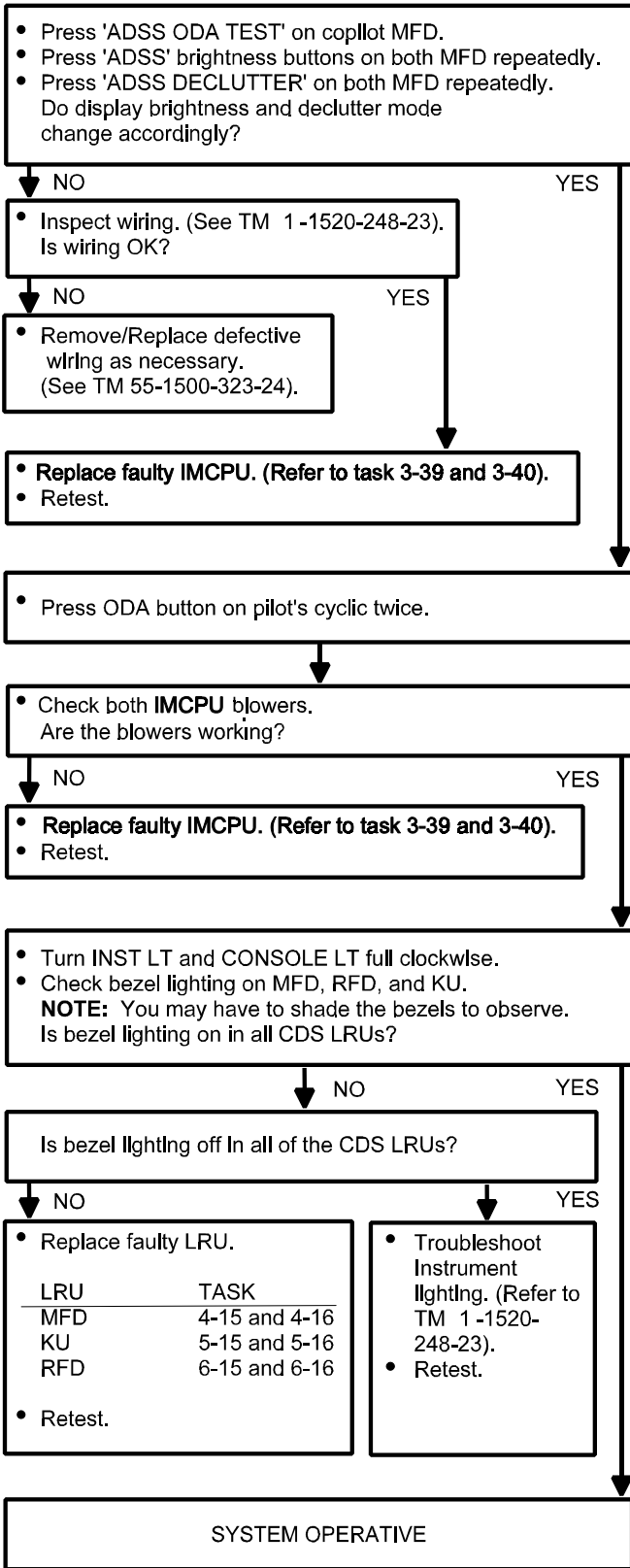
CD4 Initial Page 1



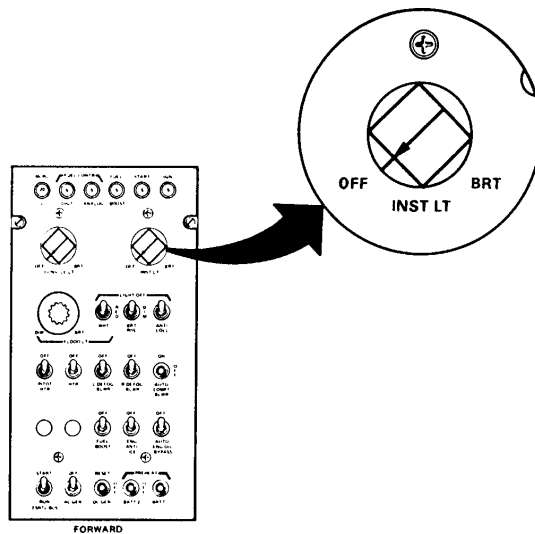
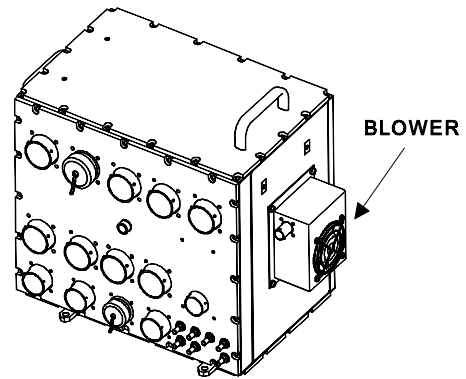
CA-000000

TESTING AND TROUBLESHOOTING FLOW DIAGRAM CD3/CD4

-I-



	FULL	1 ST LEVEL DECLUTTER	2 ND LEVEL DECLUTTER
NORMAL			
HOVER			
HOVER BOB-UP			



2-6. FAULT CODES

The CD2 can display a fault code when an LRU has failed a self-test. The fault code is a four digit number which appears beneath the words 'CDS NO GO' on the Multifunction Display (MFD) screen. (Follow the procedure in TM 1-1520-248-T-1, Appendix F, Fault Detection Location System (FDLS) Failure Codes for fault codes.) The fault codes, shown in the following table, identify potential faulty LRUs. Troubleshoot an LRU when a numeral appears on the same line as the fault code. Troubleshoot the LRUs in sequence according to the number given on the chart.

The CD3/CD4 can display a fault code when an LRU has failed a self-test. When bezel L1 labelled "CDS" is pressed, the capability shall initiate the CDS BIT function. The capability shall use the results of the CDS continuous BIT to determine the status of the CDS equipment. The capability will display the text "GO" next to the label "CDS" when all defined tests pass. Failure of any one test will cause the capability to display the text "NOGO". When a "NOGO" condition exists within the CDS, the capability will display a fault code directly below the text "NOGO" (RIGHT IMCPU - 0001, LEFT IMCPU - 0002).

CDS Fault Codes (CD2, CD3, CD4)

LRU FOR TROUBLESHOOTING

FAULT CODES	LEFT MFD	RIGHT MFD	RFD	KU	LEFT MCPU/IMCPU	RIGHT MCPU/IMCPU
0001						1
0002					1	
0003					1	2
0004				1		
0005				2		1
0006				2	1	
0007				3	1	2
0008			1			
0009			2			1
000A					1	
000B			3		1	2
000C			1	2		
000D			2	3		1

CDS Fault Codes (CD2, CD3, CD4) (CONT)

LRU FOR TROUBLESHOOTING

FAULT CODES	LEFT MFD	RIGHT MFD	RFD	KU	LEFT MCPU/IMCPU	RIGHT MCPU/IMCPU
000E			2	3	1	
000F			3	4	1	2
0010			1			
0011		1				2
0012		1			2	
0013		1			2	3
0014		1		2		
0015		1		3		2
0016		1		3	2	
0017		1		4	2	3
0018		1	2			
0019		1	3			2
001A		1	3		2	
001B		1	4		2	3
001C		1	2	3		
001D		1	3	4		2
001E		1	3	4	2	
001F		1	4	5	2	3
0020	1					
0021	1					2
0022	1				2	
0023	1				2	3
0024	1			2		
0025	1			3		2
0026	1			3	2	
0027	1			4	2	3
0028	1		2			
0029	1		3			2
002A	1		3		2	
002B	1		4		2	3
002C	1		2	3		

CDS Fault Codes (CD2, CD3, CD4) (CONT)

LRU FOR TROUBLESHOOTING

FAULT CODES	LEFT MFD	RIGHT MFD	RFD	KU	LEFT MCPU/IMCPU	RIGHT MCPU/IMCPU
002D	1		3	4		2
002E	1		3	4	2	
002F	1		4	5	2	3
0030	1	2				
0031	1	2				3
0032	1	2			3	
0033	1	2			3	4
0034	1	2		3		
0035	1	2		4		3
0036	1	2		4	3	
0037	1	2		5	3	4
0038	1	2	3			
0039	1	2	4			3
003A	1	2	4		3	
003B	1	2	5		3	4
003C	1	2	3	4		
003D	1	2	4	5		3
003E	1	2	4	5	3	
003F	1	2	5	6	3	4

Section IV

MAINTENANCE PROCEDURES

2-7. INTRODUCTION

Complete maintenance procedures for unit and intermediate maintenance are contained herein. For general aircraft maintenance practices, refer to TM 1-1500-204-23 and refer to TM 55-1500-323-24 for Installation Practices for Aircraft Electric and Electronic Wiring.

Type of Manual:

Aviation Unit and Intermediate Maintenance (AVUM and AVIM)



General Safety Warning

Equipment Covered:

<u>Common Name</u>	<u>Official Nomenclature</u>	<u>Manufacturer Part Number</u>	<u>Maintenance Instructions</u>
MCPU	Master Controller Processor Unit	8500088-906	Chapter 3
IMCPU (Left, CD3)	Improved MCPU	8500088-921	
IMCPU (Right, CD3)	Improved MCPU	8500088-940	
IMCPU (Left, CD4)	Improved MCPU	8500088-923	
IMCPU (Right, CD4)	Improved MCPU	8500088-943	
MFD	Multifunction Display	8001671-902	Chapter 4
KU	Keyboard Unit	8500132-902 8500132-903	Chapter 5
RFD	Remote Frequency Display	8500233-902	Chapter 6
ODA	Optical Display Assembly	8506584-904	Chapter 7
ISP	Integrated Systems Processor	8515231-903	Chapter 8
DRU DTM	Data Receptacle Unit Data Transfer Module	8521852-5 8521852-4	Chapter 9

Purpose of Equipment:

The MCPU, IMCPU, MFD, RFD, KU, ODA, ISP and DRU/DTM are Line Replaceable Units (LRUs) of the CDS (CD2, CD3, CD4).

Management System - Aviation (TAMMS-A). The DA PAM is published in the Maintenance Management UPDATE. Accidents involving injury to personnel or damage to material will be reported on DA Form 285 (Accident Report) in accordance with AR 385-40.

2-8. MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-751, Functional Users Manual for the Army Maintenance

2-9. PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 38-230-1 for Packaging of Materiel: Preservation and TM 38-230-2, Packaging of Materiel: Packing.

2-10. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The QA/QC procedures used for equipment maintenance will conform to the requirements of AR 702-11.

2-11. NOMENCLATURE CROSS-REFERENCE LIST

Refer to 2-7.

2-12. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your CDS equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at:

Commander
U.S. Army Aviation and Missile Command
ATTN: AMSAM-MMC-RE-FD
Redstone Arsenal, AL 35898-5222

We'll send you a reply.

2-13. MAJOR EQUIPMENT CHARACTERISTICS

The CDS provides the primary man/machine interface for the OH-58D. It collects information from the avionics, Mast Mounted Sight (MMS), and helicopter subsystems. The CDS organizes the information and displays it to the crew on demand. Crew commands are interpreted and the proper control signals are output from the CDS.

The CDS of the OH-58D consists of the following:

Refer to 2-2.

For functional data on a particular LRU, refer to Section I of the appropriate maintenance instruction chapter:

- MCPU and IMCPU - Chapter 3
- MFD - Chapter 4
- KU - Chapter 5
- RFD - Chapter 6
- ODA - Chapter 7
- ISP - Chapter 8
- DRU/DTM - Chapter 9

2-14. FUNCTIONAL CAPABILITIES AND FEATURES

Refer to 1-9 and 1-10.

2-15. LOCATION AND DESCRIPTION OF MAJOR LRU COMPONENTS

Refer to 1-11.

2-16. LOCATION AND DESCRIPTION OF MAJOR SRU COMPONENTS

Refer to Section I of the appropriate maintenance instruction chapter:

- MCPU and IMCPU - Chapter 3
- MFD - Chapter 4
- KU - Chapter 5
- RFD - Chapter 6
- ODA - Chapter 7
- ISP - Chapter 8
- DRU/DTM - Chapter 9

2-17. LOCATION AND CONTENTS OF IDENTIFICATION PLATES

Refer to Section I of the appropriate maintenance instruction chapter:

- MCPU and IMCPU - Chapter 3
- MFD - Chapter 4
- KU - Chapter 5
- RFD - Chapter 6
- ODA - Chapter 7
- ISP - Chapter 8
- DRU/DTM - Chapter 9

2-18. DIFFERENCES BETWEEN MODELS

The IMCPUs -921/-923 and -940/-943 are designed specifically for the pilot and co-pilot positions of the OH-58D. They have all of the features of the -906. In addition, the -921/-923 and -940/-943 have expanded processing capabilities which eliminates the requirement for a separate ISP.

2-19. EQUIPMENT DATA

Refer to Section I of the appropriate maintenance instruction chapter:

- MCPU and IMCPU - Chapter 3
- MFD - Chapter 4
- KU - Chapter 5
- RFD - Chapter 6
- ODA - Chapter 7
- ISP - Chapter 8
- DRU/DTM - Chapter 9

2-20. SAFETY, CARE, AND HANDLING

Refer to Section I of the appropriate maintenance instruction chapter:

- | | |
|------------------|-----------|
| MCPU and IMCPU - | Chapter 3 |
| MFD - | Chapter 4 |
| KU - | Chapter 5 |
| RFD - | Chapter 6 |
| ODA - | Chapter 7 |
| ISP - | Chapter 8 |
| DRU/DTM - | Chapter 9 |

2-21. EQUIPMENT CONFIGURATION

Refer to individual equipment models.

2-22. DESTRUCTION OF EQUIPMENT TO PREVENT ENEMY USE

Refer to TM 750-244-2.

CHAPTER 3

MASTER CONTROLLER PROCESSOR UNIT &
IMPROVED MASTER CONTROLLER PROCESSOR UNIT
- MAINTENANCE

PART I - MASTER CONTROLLER PROCESSOR UNIT (MCPU)
PART NUMBER 8500088-906

Section I	MCPU (-906) Principles of Operation	3-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	3-5
Section III	Service Upon Receipt	3-5
Section IV	Troubleshooting	3-6
Section V	Maintenance Procedures	3-6

NOTE

PART II - Maintenance Procedures for the IMPROVED MASTER CONTROLLER PROCESSOR UNIT (IMCPU) (PN 8500088-921/-923 and 8500088-940/-943) begin on page 3-25. The IMCPUs -921/-923 and -940/-943 are designed specifically for the pilot and co-pilot positions of the OH-58D. They have all of the features of the -906. In addition, the -921/-923 and -940/-943 have expanded processing capabilities which eliminates the requirement for a separate ISP.

Section I

MCPU (-906) PRINCIPLES OF OPERATION

3-1. PRINCIPLES OF OPERATION

The CD2 contains two identical MCPUs. The MCPUs are the core of the CDS. They process all CDS information. Both MCPUs interface with most of the same subsystems. This allows one MCPU to monitor and control most system functions by itself in case the other MCPU fails.

The major elements of each MCPU are as follows:

- Central Processor Unit No. 1 (CPU 1)
- Central Processor Unit No. 2 (CPU 2)
- Subsystem Interface
- Dual Redundant MIL-STD-1553 Data Bus
- Symbol Generator

3-2. FUNCTIONAL DESCRIPTION

a. CPU 1. The primary functions of CPU 1 are display processing and data bus control. CPU 1 also monitors Built-In Test Equipment (BITE) and manages target handoff.

b. CPU 2. The primary function of CPU 2 is Input/Output (I/O) processing. It performs the following:

- Communication Management
- Navigation Management
- Air Data Processing
- Caution/Warning/Advisory
- Stability Control Augmentation System (SCAS) Control
- Law Processing
- Fault Detection and Location

c. **Subsystem Interface.** Subsystem Interface electronics convert subsystem inputs into digital form. It loads the digital data into memory. It converts memory data into MCPU outputs. Subsystem Interfaces include the following:

- Keyboard Unit (KU)
- Cockpit Switches (via KU)
- Radios
- Remote Frequency Display (RFD)
- Multifunction Displays (MFD)
- Integrated Systems Processor (ISP)
- Optical Display Assemblies (ODA)
- Vertical Scale Instruments
- Aircraft Sensors and Actuators
- Attitude and Heading Reference System (AHRS)
- Airborne Target Handover System (ATHS)
- Mast Mounted Sight (MMS)
- Doppler
- Video Tape Recorder (VTR)
- Weapons Subsystems
- Aircraft Survivability Equipment (ASE)

d. **Dual Redundant MIL-STD-1553B Data Bus.** The dual redundant 1553B data bus is used for the following subsystem interfaces:

- ATHS VTR
- AHRS ISP
- MMS ASE Equipment
- Doppler Weapons Subsystems
- IFM
- HF Radio

e. **Symbol Generator.** The symbol generator uses vector generation electronics in conjunction with a Direct Memory Access (DMA) interface to CPU 1. A video interface is used to output the symbol generation to the MFD.

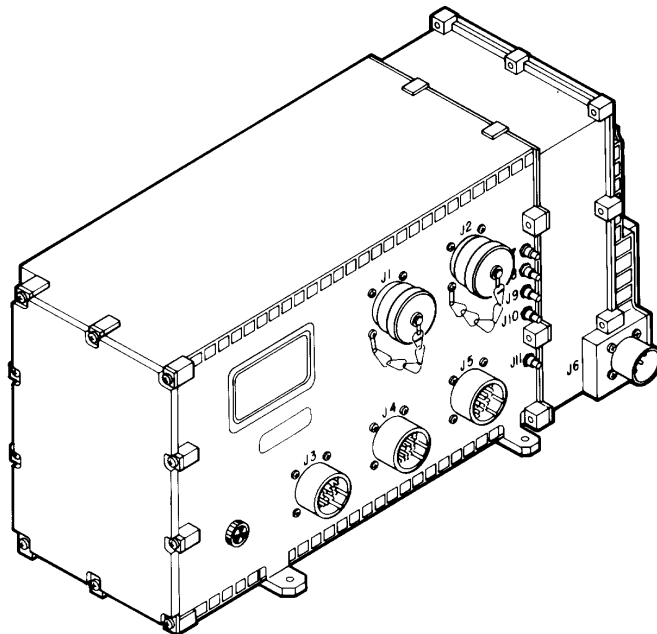
3-3. EQUIPMENT DATA

Weight: 24.50 pounds

Dimensions:
Height: 7.91 inches
Width: 9.20 inches
Length: 16.65 inches

Electrical Power Requirements:

115 VAC, 400 Hz, 1A, single phase
 +28 VDC, 10A

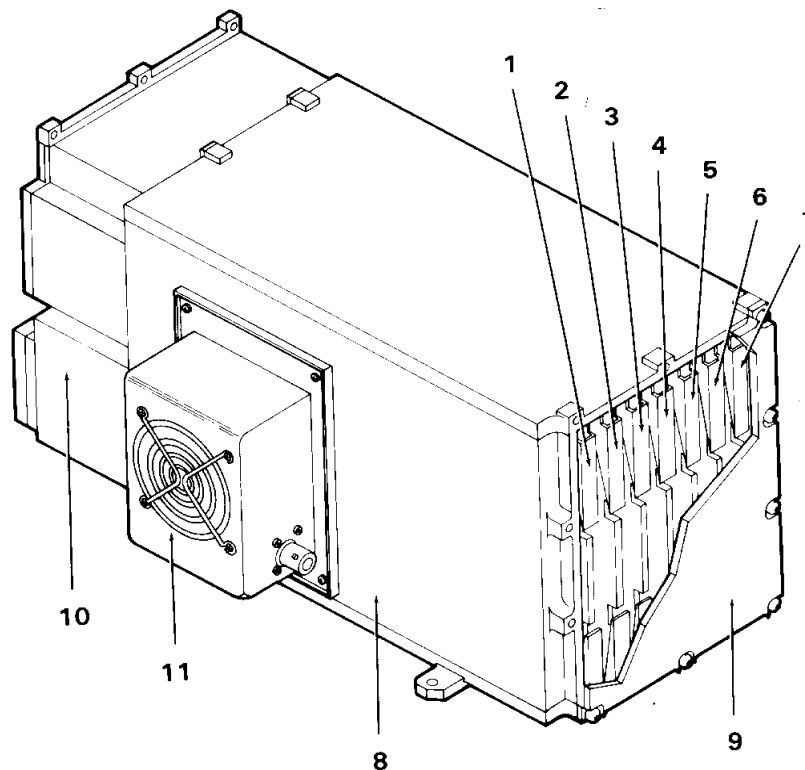


MCPU

3-4. SUBASSEMBLY LIST/NOMENCLATURE CROSS-REFERENCE

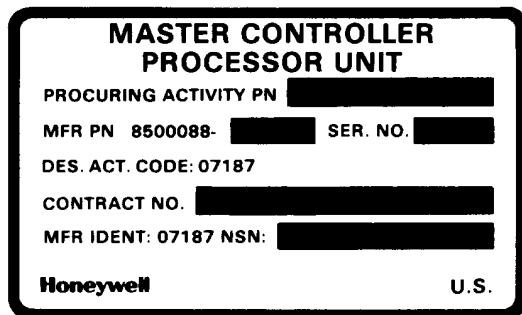
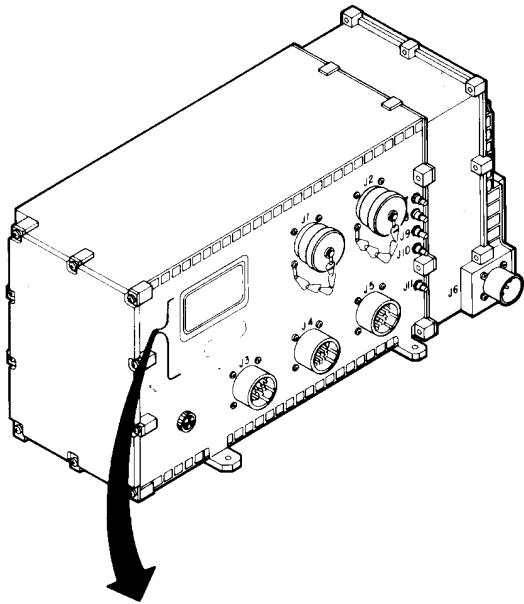
INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NUMBER
MASTER CONTROLLER PROCESSOR UNIT PN 8500088-906				
1	A1 CCA	A1	Circuit Card Assembly, Vector Generator	8500083-903
2	A2 CCA	A2	Circuit Card Assembly, CPU/Memory	8513161-901
3	A3 CCA	A3	Circuit Card Assembly, CPU/Memory	8513161-901
4	A4 CCA	A4	Circuit Card Assembly, Remote Terminal Interface	8500092-904
5	A5 CCA	A5	Circuit Card Assembly, Digital I/O	8500107-902
6	A6 CCA	A6	Circuit Card Assembly, Analog I/O	8500100-902
7	A7 CCA	A7	Circuit Card Assembly, Video Discrete	8500179-901
8	Chassis	None	Chassis Assembly, Electrical Equipment	8500716-902
9	Cover Assembly	None	Cover Assembly	8500118
10	Power Supply	None	Power Supply	8500727-904
11	Blower Assembly	None	Housing, Blower Assembly	8500811-902

Note: A2 and A3 are the same.



3-5. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

The identification plate for the MCPU is located on the right side panel.



3-6. SAFETY, CARE, AND HANDLING

Personal Safety:

To avoid accidental electrical shock, never perform maintenance on the MCPU while power is applied to the unit.

MCPU Care and Handling:

To protect the MCPU from Electrostatic Discharge (ESD) during maintenance (Section V), observe these general precautions:

Never perform maintenance on the MCPU unless the unit is on a static control grounded work bench.

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks.

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the MCPU from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not expose to strong electromagnetic fields.
- Do not probe connector pins or receptacles.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-7. COMMON TOOLS AND EQUIPMENT

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

3-8. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

The Test Support System (TSS) and Test Program Sets (TPS) (refer to TM 9-4935-780-13-1) or the Base Shop Test Facility/Base Shop Test Station (BSTF/BSTS) and CDS TPS (refer to TM 11-6625-778-13&P-1) provide the necessary equipment for testing and troubleshooting the MCPU. No special tools or other support equipment are required.

Section III

SERVICE UPON RECEIPT

3-9. UNPACKING INSTRUCTIONS

The MCPU and each of its Shop Replaceable Units (SRUs) are shipped in reusable containers.

Be careful not to damage the shipping container when unpacking a unit.

Save the shipping container(s) and packaging materials for use when the following conditions exist:

- a. Repaired MCPU is repacked for shipment to AVUM.
- b. AVIM non-repairable MCPU is repacked for shipment to depot repair.
- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

3-10. CHECKING UNPACKED EQUIPMENT

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.
- b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

3-11. SCOPE

This section contains information on testing and troubleshooting a defective MCPU.

If the MCPU does not pass visual check, repair the unit. While a diagnostic test is being run, operator actions will appear on the display. The operator is to respond to these prompts. ■

3-12. TEST AND TROUBLESHOOT

Preparation and setup for testing an MCPU is contained in TM 9-4935-780-13-1 or TM 11-6625-778-13&P-1.

If the MCPU passes the test, return the MCPU to AVUM. If the MCPU fails the test, replace the SRU indicated by the printout. ■

Prior to running a diagnostic test, visually check the MCPU for physical damage. Refer to paragraph 3-14. If the MCPU passes visual check, proceed with the test.

After SRU replacement, retest the MCPU. If the MCPU fails the test a second time, and the printout indicates that the same SRU is faulty, send the MCPU to depot repair. If the printout indicates that a different SRU is faulty, replace the newly suspected SRU. ■

Section V

MAINTENANCE PROCEDURES

3-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform the necessary replacement tasks indicated by

List of Tasks to repair the defective MCPU. For general aircraft maintenance practices, refer to TM 1-1500-204-23. For Installation Practices for Aircraft Electric and Electronic Wiring refer to TM 55-1500-323-24.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove Master Controller Processor Unit	3-15	3-8
Install Master Controller Processor Unit	3-16	3-9
Clean and Inspect Master Controller Processor Unit	3-17	3-11
Set Up Static Control Work Station	3-18	3-12
Remove Circuit Card Assembly	3-19	3-15
Remove Power Supply	3-20	3-17
Remove Blower Assembly	3-21	3-18
Remove Fan on Blower Assembly	3-21.1	3-18.1
Install Fan on Blower Assembly	3-21.2	3-18.2
Install Circuit Card Assembly	3-22	3-19
Install Power Supply	3-23	3-22
Install Blower Assembly	3-24	3-24
Remove and Install Handles	3-49	3-54

3-14. VISUAL CHECKS

Visually check the MCPU to determine if it is in good physical condition. Go through the checklist below.

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions listed in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair as required.
2. Is any connector loose?	Tighten connector hardware.
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Refer to task 3-17.
5. Do any screws appear reddish-brown?	Refer to task 3-17.
6. Does the external surface of the LRU contain white or gray powdery deposits, similar to dust?	Refer to task 3-17.
7. Does the external surface appear rough or frosted?	Refer to task 3-17.
8. Does the external surface appear dull?	Refer to task 3-17.
9. Does the external surface contain tiny pits or holes?	Refer to task 3-17.
10. Does the external surface appear to be swelling or lifting up?	Refer to task 3-17.
11. Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 3-17.
12. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 3-17.
13. Is paint discolored?	Refer to task 3-17.
14. Is paint cracked or chipped?	Refer to task 3-17.
15. Does the external surface need cleaning?	Refer to task 3-17.
16. Are any of the four mounting flanges broken?	Repair as required.
17. Is the external surface dented, cracked, or punctured at all?	Repair as required.
18. Is the external surface scratched or gouged at all?	Refer to task 3-17.

3-15. REMOVE MASTER CONTROLLER PROCESSOR UNIT

This task covers: Removal of MASTER CONTROLLER PROCESSOR UNIT (MCPU).

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

General Safety Instructions:



General Safety Warning

1

1. Open left or right access door (refer to ■ TM 1-1520-248-23) to gain access to applicable MCPU (1).

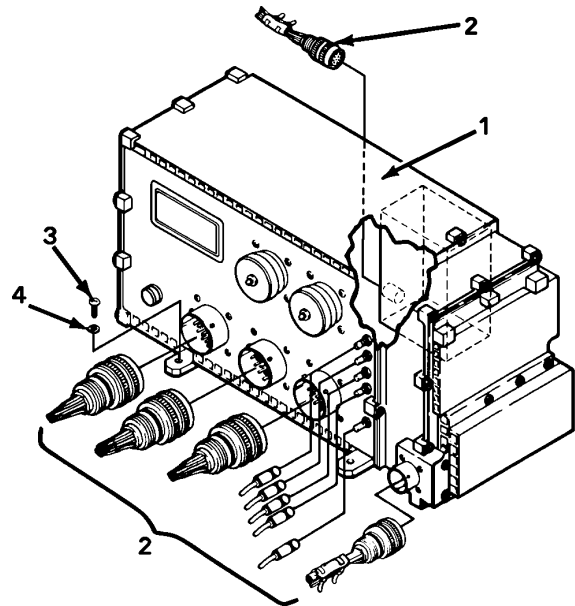
2. Tag and identify ten connectors (2).

3. Disconnect ten connectors (2).

4. Remove four screws and washers (3,4).

5. Remove MCPU (1).

6. Close access door opened in step 1.



END OF TASK

3-8 Change 5

3-16. INSTALL MASTER CONTROLLER PROCESSOR UNIT

This task covers: Installation of MASTER CONTROLLER PROCESSOR UNIT (MCPU).

INITIAL SETUP**Applicable Configurations:**

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

TM 1-1520-248-23
TM 9-1240-778-23

General Safety Instructions:

General Safety Warning

1

CAUTION

Both MCPUs must have the same dash number (i.e. both 8500088-906) and software part number. Ensure MCPU software configurations are applicable to aircraft configuration.

1. Open or remove left or right access door (refer to TM 1-1520-248-23) to gain access to applicable MCPU mounting area.

2. Position MCPU (1) in place. Align four mounting holes and install four washers and screws (2 and 3).

3. Visually inspect 10 connectors (4) for missing or bent pins, corrosion or cracked housing.

4. Connect 10 tagged connectors (4) to mating connectors.

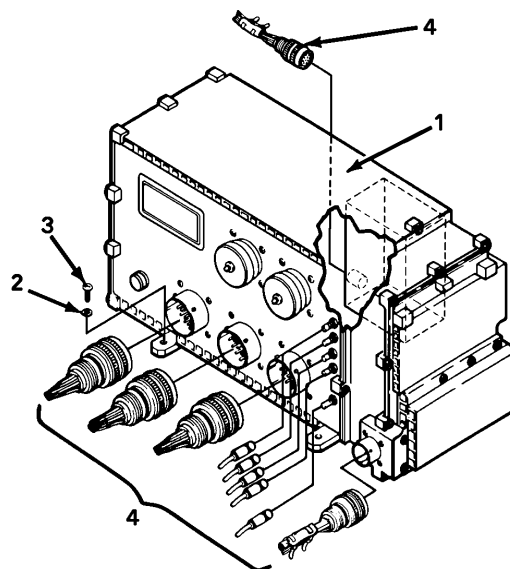
5. Close or install access door opened in step 1.

INSPECT

GO TO NEXT PAGE

FOLLOW-ON MAINTENANCE**1. Perform Data Transfer:**

Ensure MCPU L and MCPU R circuit breakers are pulled. Apply external power. (Refer to TM 1-1520-248-23.)



3-16. INSTALL MASTER CONTROLLER PROCESSOR UNIT (CONT)

If left MCPU was replaced, transfer data from right MCPU by pushing in MCPU R circuit breaker, wait 5 seconds, then push in MCPU L circuit breaker. If right MCPU was replaced, transfer data from left MCPU by pushing in MCPU L circuit breaker, wait 5 seconds, then push in MCPU R circuit breaker.

2. Download MMS data constants. (Refer to TM 9-1240-778-23.)

3. Perform operational checks:

Test and Troubleshoot procedure, paragraph 2-5.

END OF TASK

3-17. CLEAN AND INSPECT MASTER CONTROLLER PROCESSOR UNIT

This task covers: General external cleaning and inspection procedures for the MCPU.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Safety Goggles
 Chip Guards
 Enco Model 310 (or equivalent)

Materials:

Isopropyl Alcohol (C3)
 Clean Soft Cloth (C1)
 (or equivalent)
 Cotton Swab (C2) (or equivalent)

Equipment Condition:

No power applied

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1500-343-23 ■

General Safety Instructions:



Compressed Air 2



Isopropyl Alcohol 3

CAUTION

Use of cleaning solvents on electrical parts is not recommended. Application of cleaning solvents, particularly to areas of dense wiring, may cause damage.

Prevent the entrance of water or other solvents into electrical components, ducts, or other openings to avoid damaging the equipment.

CLEAN

1. Remove dust and foreign matter with a clean soft cloth (C1).

2. Clean painted surfaces with a cloth (C1) moistened with alcohol (C3).

3. Clean areas difficult to reach with a cotton swab (C2) dampened with alcohol (C3).

INSPECT

4. Inspect for evidence of corrosion. If detected, refer to TM 1-1500-343-23. ■

END OF TASK

3-18. SET UP STATIC CONTROL WORK STATION (AVIM)

This task covers: Setting up a static control work station for maintenance of an LRU. The purpose of the static control work station is to prevent Electrostatic Discharge (ESD), thereby avoiding the degradation or destruction of any static sensitive devices. This task is mandatory.

INITIAL SETUP

General Safety Instructions:

Applicable Configurations:

WARNING

All

Potentials of up to 20,000 volts are present in the LRUs while power is applied. For personal safety a one megohm resistor has been molded into the ground strap leads of both the table and floor mats. Daily resistance checks should be made to both. If the proper resistance is not present, replace the defective lead immediately. Prevent conductive material from touching the bare metal straps on the table mat or the conductive scrim on the edge of the floor mat. This could create an alternate direct path to ground.

Tools:

Static Control Table Mat with
Ground Cord
Static Control Wrist Strap with
Ground Cord
Ohmmeter
3M Corp. Static Control Floor Mat
PN 8200 (or equivalent)

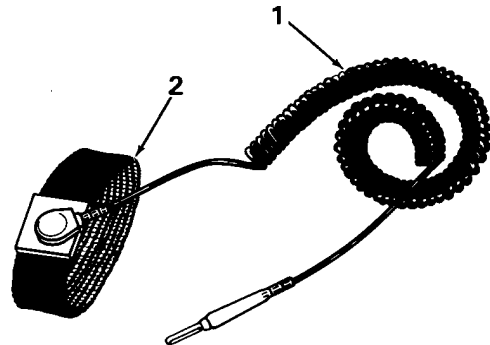
Personnel Required:

68R Avionic Special Equipment
Repairer

CAUTION

All CDS LRUs have components that are sensitive to ESD. Proper handling and grounding techniques must be observed.

-
1. Unsnap wrist strap ground cord (1) from wrist strap (2).

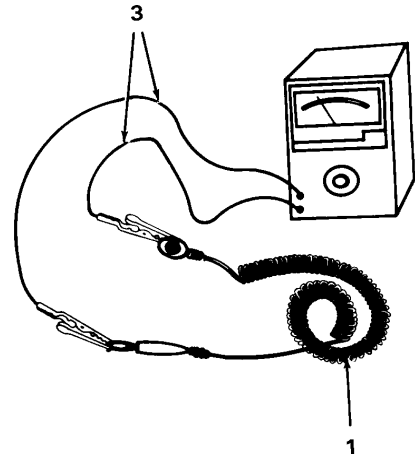


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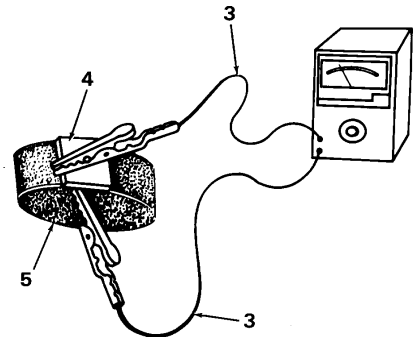
3-18. SET UP STATIC CONTROL WORK STATION (AVIM) (CONT)

2. Attach ohmmeter leads (3) to ends of wrist strap ground cord (1).

3. Verify that the resistance value is $1.0 \pm .20$ megohm. If wrist strap ground cord (1) does not meet these specifications, replace it.



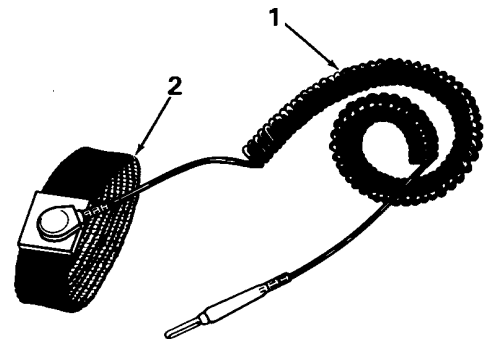
4. Attach one ohmmeter lead (3) to wrist strap faceplate stud (4). Attach the other ohmmeter lead (3) across elastic band material (5) directly opposite faceplate.



5. Verify that the resistance value is less than 0.1 megohm. If the resistance value is greater than 0.1 megohm, wrist strap (2) may be contaminated with debris from the skin. Follow these procedures:

- a. Wash wrist strap (2).
- b. Retest wrist strap (2) per steps 4 and 5.
- c. If the resistance value is still greater than 0.1 megohm, replace wrist strap (2).

6. Snap wrist strap ground cord (1) back onto wrist strap (2).



GO TO NEXT PAGE

3-18. SET UP STATIC CONTROL WORK STATION (AVIM) (CONT)

7. Unsnap table mat ground cord (6) from table mat (7).

8. Attach ohmmeter leads (3) to ends of table mat ground cord (6).

9. Verify that the resistance value is $1.0 \pm .20$ megohm. If table mat ground cord (6) does not meet these specifications, replace it.

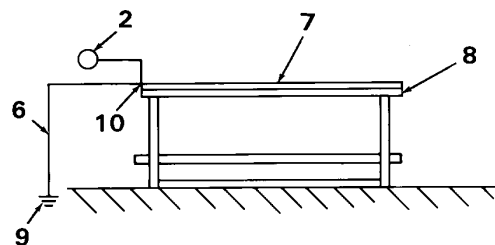
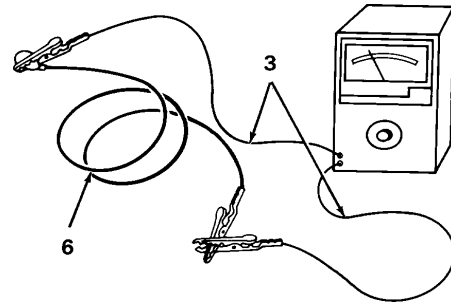
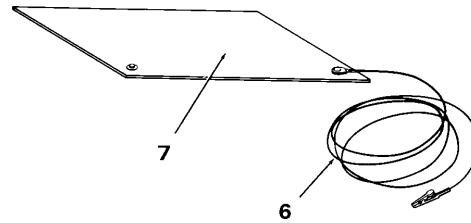
10. Snap table mat ground cord (6) back onto table mat (7).

11. Place table mat (7) dull side down on top surface of work bench (8).

12. Connect table mat ground cord (6) to suitable electric ground (9).

13. Place static control floor mat on floor in front of work bench.

14. Attach wrist strap (2) to wrist.



CAUTION

Wrist straps must be worn in direct contact with bare skin and not over clothing. Direct skin contact is essential for maintaining an effective discharge path to ground.

15. Connect wrist strap banana plug to table mat grounding point (10).

END OF TASK

3-19. REMOVE CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Removal of a Circuit Card Assembly (CCA) from the Master Controller Processor Unit (MCPU). All seven CCAs are removed in the same manner.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
MCPU on bench
No power applied

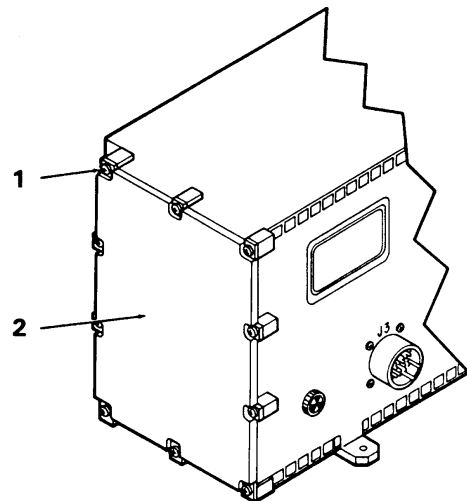
General Safety Instructions:

CAUTION

The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen ten captive screws (1) on cover assembly (2).

2. Remove cover assembly (2).



GO TO NEXT PAGE

3-19. REMOVE CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

3. Identify CCA to be removed:

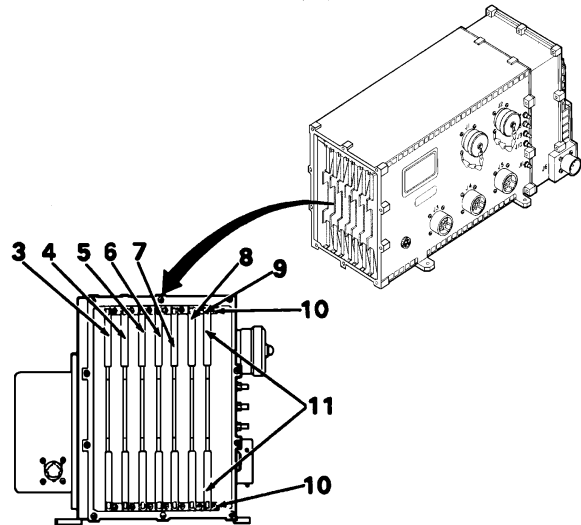
CCA Part Number Common Name Index No.

A1	8500083-903	Vector Generator	(3)
A2	8513161-901	CPU/Memory	(4)
A3	8513161-901	CPU/Memory	(5)
A4	8500092-904	Remote Terminal Interface	(6)
A5	8500107-902	Digital I/O	(7)
A6	8500100-902	Analog I/O	(8)
A7	8500179-901	Video Discrete	(9)

4. Loosen but do not remove two wedge lock screws (10) located to the right of the desired CCA.

5. Pull out two card extractor levers (11). Slide CCA out from MCPU.

6. Place CCA in static shielding bag (C7) to protect it from ESD.



END OF TASK

3-20. REMOVE POWER SUPPLY (AVIM)

This task covers: Removal of a power supply from the MCPU.

INITIALAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
setup (3-18)
MCPU on bench
No power applied

General Safety Instructions:

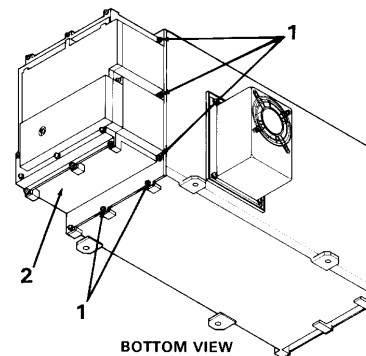
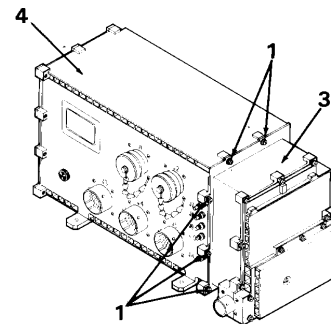
CAUTION

The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen ten captive screws (1) on rear panel (2) of MCPU.

2. Remove power supply (3) from chassis (4) by gently rocking power supply (3) from side to side as you pull back.

3. Place power supply (3) in static shielding bag (C7) to protect it from ESD.



END OF TASK

3-21. REMOVE BLOWER ASSEMBLY

This task covers: Removal of the blower assembly from the MCPU.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

Equipment Condition:

Static control work station
setup (3-18)
MCPU on bench
No power applied

General Safety Instructions:

CAUTION

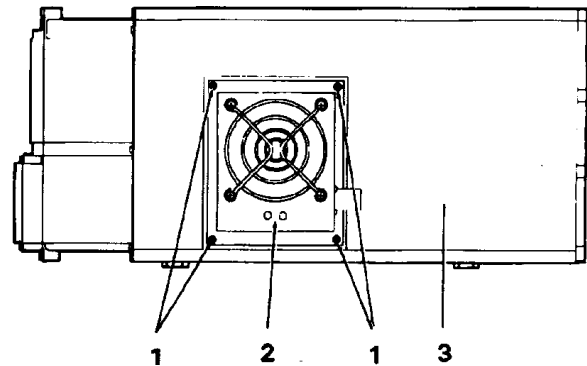
The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen four captive screws (1) on blower assembly (2).

2. Remove blower assembly (2) from chassis (3).

3. Inspect gasket. Replace if worn.

4. Repair as required.



END OF TASK

3-21.1. REMOVE FAN ON BLOWER ASSEMBLY

This task covers: Removal of the fan on the blower assembly.

INITIAL SETUP**Applicable Configurations:**

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

Equipment Condition:

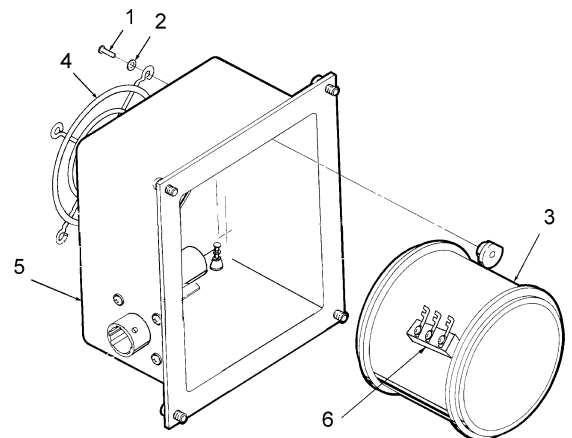
Static control work station
setup (3-18)
MCPU on bench
No power applied

General Safety Instructions:**CAUTION**

The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

REMOVAL

1. Remove four screws (1) and washers (2) securing the fan (3) and the fan impeller guard (4) to the blower assembly (5).
2. Disconnect three lugs from fan terminal block (6).
3. Remove the fan (3) from blower assembly (5). Carefully position fan (3) to one side to clear work area.

**END OF TASK**

3-21.2. INSTALL FAN ON BLOWER ASSEMBLY

This task covers: Installation of the fan on the blower assembly.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
68P Technical Inspector

Equipment Condition:

Static control work station
setup (3-18)
MCPU on bench
No power applied

General Safety Instructions:

CAUTION

The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

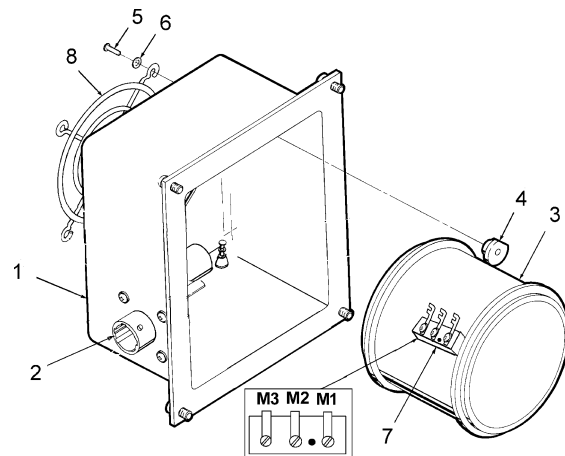
INSTALLATION

1. Set the blower assembly (1) on its side on table mat. Be certain connector J12 (2) is facing the operator.
2. Position fan (3) on blower assembly (1).
3. Connect three lugs on fan terminal block (7).

TERMINATION TABLE

<u>COLOR</u>	<u>TO</u>	<u>FROM</u>
BLACK	M1	J12-1
BROWN	M2	E-1
RED	M3	E-2

4. Rotate fan clamps (4) and install and tighten four screws (5) and washers (6) to secure the fan (3) and the fan impeller guard (8) to the blower assembly (1).



INSPECT

END OF TASK

3-22. INSTALL CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Installation of a Circuit Card Assembly (CCA) in the MCPU.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

- Electronic Equipment Tool Kit
- Screwdriver Torque Wrench
- Torque Tip 3/32 in.
- Torque Tip Screwdriver No. 2

Personnel Required:

- 68R Avionic Special Equipment Repairer
- 68P Technical Inspector

Reference:

- TM 9-4935-780-13-1
- TM 11-6625-778-13&P-1

Equipment Condition:

- Static control work station setup (3-18)
- MCPU on bench
- No power applied

General Safety Instructions:

CAUTION

The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

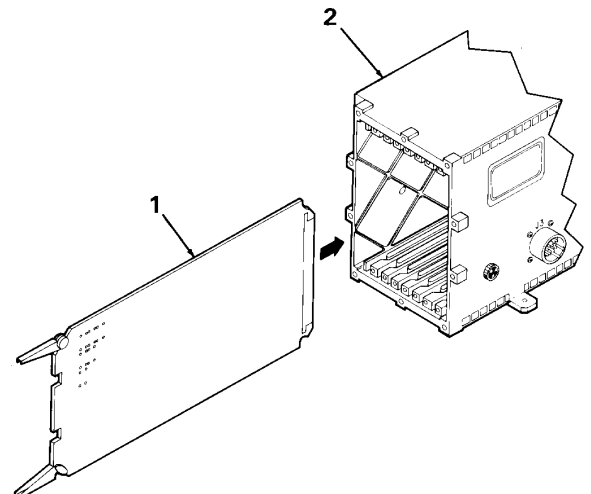
1. Verify correct CCA (1) to be installed in MCPU (2).

CCA Part Number

- A1 8500083-903
- A2 8513161-901
- A3 8513161-901
- A4 8500092-904
- A5 8500107-902
- A6 8500100-902
- A7 8500179-901

Common Name for CCAs

- A1 Vector Generator
- A2 CPU/Memory
- A3 CPU/Memory
- A4 Remote Terminal Interface
- A5 Digital I/O
- A6 Analog I/O
- A7 Video Discrete



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3-22. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

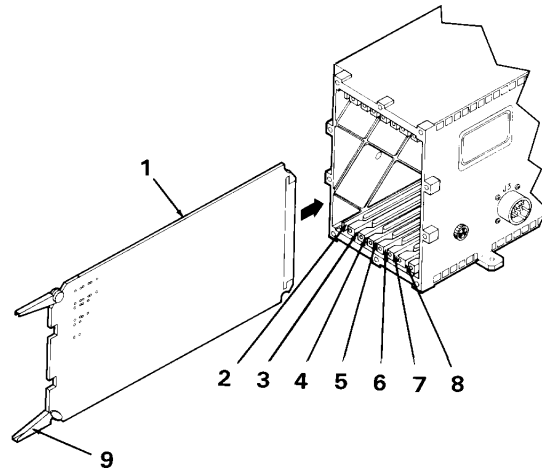
2. Slide CCA (1) into proper wedge lock guide in MCPU:

- A1 CCA wedge lock guide (2)
- A2 CCA wedge lock guide (3)
- A3 CCA wedge lock guide (4)
- A4 CCA wedge lock guide (5)
- A5 CCA wedge lock lock guide (6)
- A6 CCA wedge lock guide (7)
- A7 CCA wedge lock guide (8)

Push card extractor levers (9) in toward CCA (1).

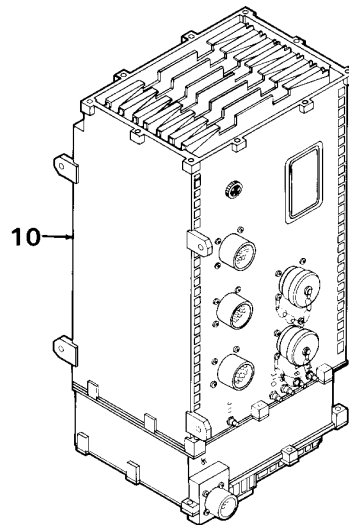
NOTE

When installing CCA, ensure that connectors are properly seated



3. Applying even pressure to both card extractor levers (9), push CCA (1) back into MCPU (10) to mate connectors.

4. Position MCPU (10) on rear panel of power supply. Apply even pressure to both card extractor levers (9) and push down on CCA (1) to ensure that connectors have mated.

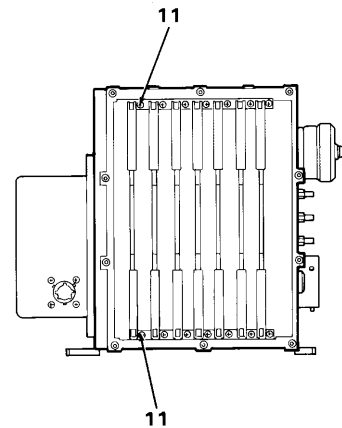


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3-22. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

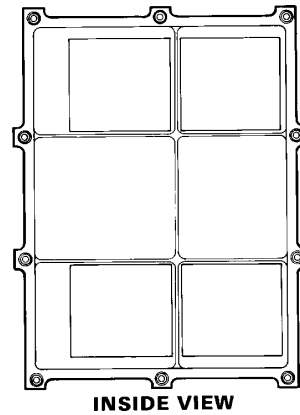
5. Position MCPU back down on chassis bottom.

6. Tighten two wedge lock screws (11) to 7 INCH-POUNDS using screwdriver torque wrench and 3/32 Hex torque tip.

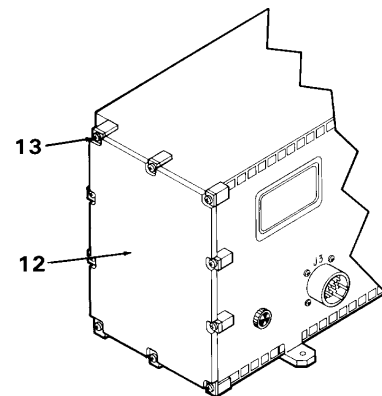


INSPECT

7. Position cover assembly (12) on MCPU so that the inside of cover assembly is positioned as shown.



8. Tighten 10 captive screws (13) on cover assembly (12) to 13 INCH-POUNDS using torque screwdriver.



END OF TASK

3-23. INSTALL POWER SUPPLY (AVIM)

This task covers: Installation of the power supply on the MCPU.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
setup (3-18)
MCPU on bench
No power applied

General Safety Instructions:

CAUTION

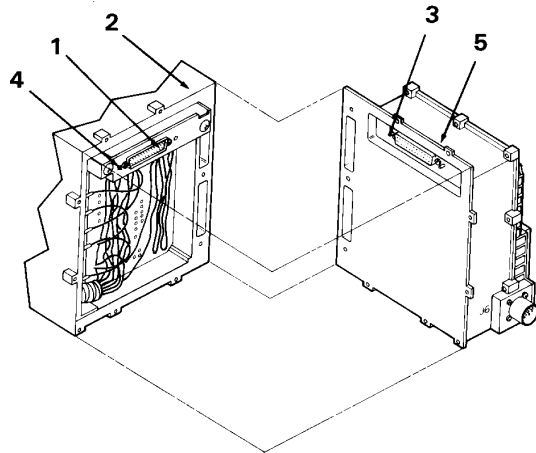
The MCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Visually check that pins (1) on chassis (2) are not damaged. If damaged, depot repair is required.

2. Visually check that power supply connector guidepins (3) are not damaged. If damaged, depot repair is required.

3. Align guidepins (3) with receptacles (4) on chassis.

4. Connect power supply (5) to chassis (2) by pushing power supply (5) straight in towards chassis (2).

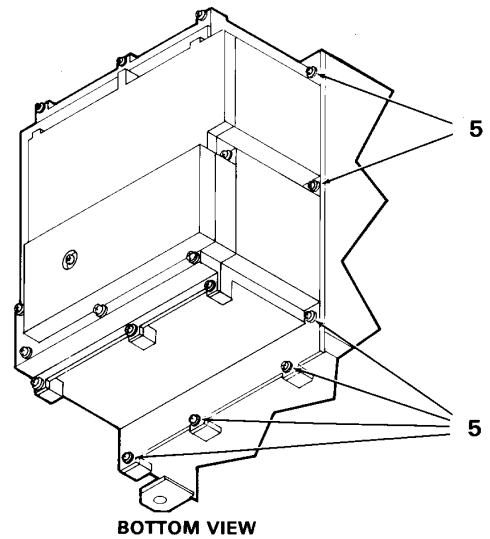
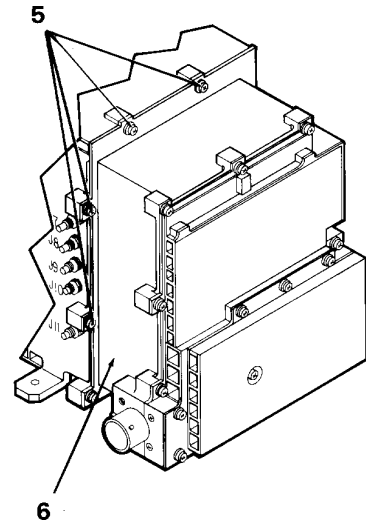


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3-23. INSTALL POWER SUPPLY (AVIM) (CONT)

5. Tighten ten captive screws (5) on rear panel (6) of MCPU to 13 INCH-POUNDS.

INSPECT



END OF TASK

3-24. INSTALL BLOWER ASSEMBLY

This task covers: Installation of the blower assembly on the MCPU.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
68P Technical Inspector

Materials:

Gasket

Equipment Condition:

Static control work station
setup (3-18)
MCPU on bench
No power applied

General Safety Instructions:

CAUTION

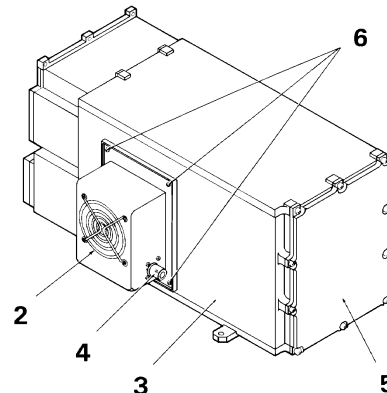
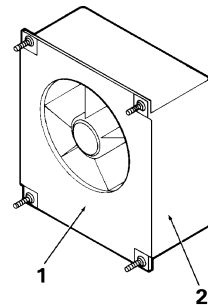
The MCPU contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Position gasket (1) on blower assembly (2) by aligning cutout in gasket around fan.

CAUTION

The MCPU can be damaged if the blower assembly is installed upside down.

2. Position blower assembly (2) on chassis (3) so that J12 connector (4) is oriented towards cover assembly (5).
3. Tighten four captive screws (6) on blower assembly (2) to 13 INCH-POUNDS.



INSPECT

END OF TASK

CHAPTER 3 (CONT.)

MASTER CONTROLLER PROCESSOR UNIT &
IMPROVED MASTER CONTROLLER PROCESSOR UNIT
- MAINTENANCE

PART II - LEFT AND RIGHT IMPROVED MASTER CONTROLLER PROCESSOR UNIT (IMCPU)
CD3 IMCPU PART NUMBER 8500088-921/940
CD4 IMCPU PART NUMBER 8500088-923/943

Section I	Principles/Theory of Operation	3-25
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	3-32
Section III	Service Upon Receipt	3-32
Section IV	Troubleshooting	3-33
Section V	Maintenance Procedures	3-33

Section I

IMCPU PRINCIPLES OF OPERATION

3-25. PRINCIPLES OF OPERATION

The IMCPUs in the CDS (CD3 or CD4) are configured separately and identified as a Left or Right IMCPU. They are designed specifically for the pilot and co-pilot positions of the OH-58D.

The Left IMCPU in the CD4 configuration is a modified version of the Left IMCPU in the CD3. The Right IMCPUs are also different in the CD3 and CD4 configurations. The CD3 and CD4 IMCPUs contain different processors, backplane assemblies and ASE or ASE/SCI CCAs. The CD3 and CD4 IMCPU Part Numbers are as follows:

CD3 Left IMCPU	8500088-921
CD3 Right IMCPU	8500088-940
CD4 Left IMCPU	8500088-923
CD4 Right IMCPU	8500088-943

The IMCPUs are the core of the CDS. The IMCPUs process all CDS information. The IMCPU performs processing functions on data received through interfaces to external systems via two dual-redundant MIL-STD-1553B data busses and other memory-mapped analog, serial digital, and discrete input output (I/O)

lines. Upon initial power-up the left IMCPU will serve as the 1553B bus controller or remote terminal. The two IMCPUs provide redundant data bus control. The left IMCPU assumes the role of bus controller while the right IMCPU monitors its performance. The bus controller commands each terminal to send to receiver specific data. The left IMCPU acting as bus controller, sends mode and status data to the right IMCPU so that if a failure occurs the right IMCPU can assume bus control with minimum disruption of display control functions.

Both the left IMCPU and the right IMCPU contain the following subassemblies:

- Chassis Electrical Assembly
- Central Processor Unit (CPU)*
- ANVIS Display Symbology Subsystem (ADSS)
- Digital I/O
- Analog I/O
- Dual Channel Symbol Generator (SG)
- Dual 1553 Bus and I/O Controller (BIOC)*
- Power Supply
- General Purpose Processor** (combines CPU and BIOC functions)

* CD3 only
** CD4 only

In addition to the common subassemblies listed, the Left IMCPU contains the following:

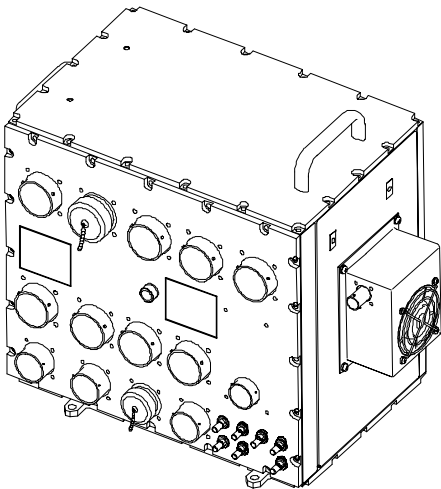
- Video Tape Recorder (VTR)
- Video Downlink/Uplink (VDU)

In addition to the common subassemblies listed, the Right IMCPU contains the following:

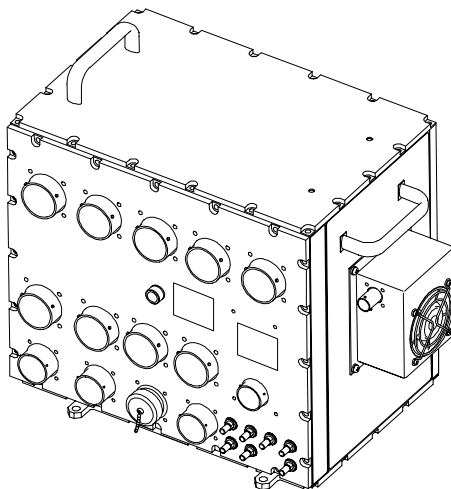
- Rotorcraft Mapping System (RMS)
- Aircraft Survivability Equipment (ASE) I/O*
- Weapons I/O
- Aircraft Survivability Equipment/Serial Controller Interface (ASE/SCI) I/O**

* CD3 only

** CD4 only



LEFT IMCPU (-921/-923)



RIGHT IMCPU (-940/-943)

3-26. FUNCTIONAL DESCRIPTION

a. Chassis Electrical Assembly. The chassis cases are identical for both the Left and Right IMCPUs (CD3 and CD4). The backplane assemblies (motherboards) are identical between the Left (-921) and Right (-940) IMCPUs in the CD3 configuration. The motherboards are also identical between the Left (-923) and Right (-943) IMCPUs in the CD4 configuration. CD3 and CD4 motherboards are not identical or interchangeable.

(Note the positions of the Left and Right IMCPU handles.)

b. i960 CPU CCA (used on -921/-940). The CPU provides all the processing power and memory storage space required by the IMCPU. The CPU contains a mixture of Flash memory for Non-Volatile Memory (NVM) storage, RAM, and EEPROM for custom data base storage. The primary functions of the CPU in both IMCPUs is to provide bus processing to the two independent MIL-STD-1553B avionics busses, data processing internal to the IMCPU, display processing, data bus control, Input/Output (I/O) processing, and subsystem interface. The CPU also monitors most of the Built-In Test Equipment (BITE), and manages target handoff.

The CPU performs the following Input/Output (I/O) processing functions:

- Power-on Processing
- System Input Processing
- Cockpit Switch Processing
- Keyboard Data Entry
- 1553B Control Processing
- Initial Page Processing
- Mast Mounted Sight (MMS) Control
- Communication Subsystem Management Processing
- Caution/Warning/Advisory (CWA) Processing
- Navigation Subsystem Management Processing
- Air Data Processing
- Subsystem Diagnostic Processing
- Airborne Target Handover System (ATHS) Control and Display
- Full Authority Digital Engine Control (FADEC) Monitor Processing
- Flight Controls
- Armament Control and Display Processing
- Aircraft Survivability Equipment (ASE) Interface and Control Processing

Data Transfer System Interface and Control
 Video Tape Recorder (VTR) Control
 ANVIS Display Symbology System (ADSS)
 Flight Data Recorder (FDR)
 Rotorcraft Mapping System (RMS) Processing
 Fault Detection and Location
 Stability Control Augmentation

c. Video Tape Recorder (VTR) I/O CCA (used on -921/-923). The VTR card receives video signals from the Symbol Generator (SG) and Airborne Video Tape Recorder installed on the aircraft and drives the co-pilot MFD. During record operations it converts the higher Left IMCPU line rate video to the lower rate required by the AVTR. In the case for on-aircraft playback, the AVTR lower line rate video is converted to the higher line rate for the MFD. It also controls VTR functions over an RS-232 serial port.

d. CCA Rotorcraft Mapping System (RMS) CCA (used on -940/-943). The purpose of the RMS card is to receive map data over the SCSI bus and use this data to create a digital map display.

e. Video Downlink/Uplink (VDU) CCA (used on -921/-923). The VDU circuit card provides an aircraft with the ability to send/receive/display video images to and from a ground station and/or other aircraft. The VDU card contains all of the memory components, computational units, support logic, and interface circuitry required to process the video imagery. The VDU functional capabilities include: video downlink, video uplink, image data management, image preview, and data annotation. The VDU CCA also provides the interface between the CDS and the Full Authority Digital Engine Control (FADEC) device for engine monitoring and display.

f. ANVIS Display Symbology System (ADSS) CCA (used on -921/-923 and -940/-943). The ADSS serves as the interface between the CPU and the Optical Display Assembly (ODA). The ADSS receives display data from the CPU and puts the information on the ODA. The CPU controls what data is displayed, how often data is updated, and the intensity (brightness) of the display. The Left IMCPU ADSS provides the interface to the Copilot ODA and the Right IMCPU ADSS is designated for the Pilot ODA. The ADSS is identical to both the Left and Right IMCPU.

g. Aircraft Survivability Equipment (ASE) I/O CCA (used on -940). The ASE provides the interface and control capabilities necessary to receive, interpret, and process aural and visual information associated with the survivability environment of the helicopter. The ASE responds to the following equipment: Radar Warning Receiver, Laser Detection System, CW Radar Warning System, and IR Jammer.

h. Weapons I/O CCA (used on -940/-943). Provides the armament control and display processing required to interface the weapons systems in the helicopter. The weapons systems include the Hellfire Missile System (HAS), M2.50 Caliber Gun System (GS), BEI 2.75-inch Rocket System (AMS), and Air To Air Stinger (ATAS). These interfaces are comprised of analog, discrete, and serial digital circuits. The requirement for additional interfaces for the Weapons card required the utilization of spare circuitry in the ASE card.

i. Digital I/O (DIO) CCA ((used on -921/-923 and -940/-943). The DIO provides serial, discrete, and digital I/O data conversion interface circuitry necessary to perform the processing functions for the Remote Frequency Display (RFD) data, Vertical Scale Instruments (VSI) and Multiparameter Display (MPD) data, KU data, Tach data, and KY58 data. The AIO is mapped into the global bus address. When the global bus master tells the DIO to transmit serial data to the RFD or VSI/MPD, the I/O sequencer will load the appropriate data from RAM to the UART's transmitter buffer registers. Data is transmitted through the appropriate output via the serial data mux in the Programmable Logic Device (PLD). The DIO provides handshake communication with the KU. The KU signal is controlled by the I/O sequencer in the PLD.

j. Analog I/O (AIO) CCA (used on -921/-923 and -940/-943). The AIO receives several analog signal types which are conditioned and digitized through a 12 bit analog-to-digital converter (ADC). The on card I/O sequencer stores this data in multiport memory (MPM) for access by the controller processor unit (CPU) via the global bus. The AIO also provides the Stability and Control Augmentation System (SCAS) outputs. The I/O sequencer grabs data in RAM, written by the CPU, and latches it into a 12 bit digital-to-analog converter (DAC). The DAC output is demultiplexed and used to control

multiple drivers.

k. Symbol Generator (SG) CCA (used on -921/-923 and -940/-943). Provides the symbol generation capabilities for display of subsystem data and control information on the MFD. The SG uses vector generation electronics in conjunction with a Direct Memory Access (DMA) interface to the CPU. A video interface is used to output the symbol generation to the MFD. It combines input MMS video, RMS video, with symbology and direct composite image to the MFD as commanded by the CPU. The CPU Global Bus Interface provides control information to the SG and status from the SG to the CPU.

l. 1553 I/OC CCA (used on -921 and -940). Provides the interface between the two MIL-STD-1553 dual redundant avionics data buses and the IMCPU. This interface allows the IMCPU to perform the processing necessary to format, transfer data and bus messages to and from other components via the redundant data bus. The dual redundant 1553B data bus is used for the following subsystem interfaces:

- Left IMCPU
- Right IMCPU
- MMS
- EGI
- ATHS
- TACAN
- RHE
- IFF
- AM RADIO
- FM RADIO
- FM SINCGARS
- HF RADIO
- FM Amplifier
- DRU
- RADIO Set

m. Power Supply. The function of the power supply is to convert the 28 V dc aircraft power to various dc output voltages. It uses a current mode pulse width modulated converter with push-pull topology. The core power supply consists of two cards, one large and one small. The large card contains essentially all of the power conversion circuitry. The small card consists primarily of monitor and BIT circuitry. The power supply provides the following dc voltages:

- 5 V dc (Main)
- 5 V dc (RAM)
- +15 V dc
- 15 V dc

The power supply is identical in both the left and right IMCPU (used on -921/-923 and -940/-943).

n. General Purpose Processor (GPP) CCA (used on -923/943). The General Purpose Processor, used in the CD4 configuration, replaces and consolidates all the functions of the i960 CPU CCA and the 1553 I/OC CCA. The GPP is a high performance processing module capable of performing a multitude of user defined tasks including 1553 serial bus communication.

o. Aircraft Survivability Equipment/Serial Controller Interface (ASE/SCI) I/O CCA (used on -943). This ASE/SCI provides all the functionality of the ASE CCA. It also provides a serial interface between the right IMCPU and the KY-100 Communications Security (COMSEC) device.

3-27. EQUIPMENT DATA

Weight:

CD3 Left IMCPU	31.30	pounds
CD3 Right IMCPU	32.70	pounds
CD4 Left IMCPU	30.70	pounds
CD4 Right IMCPU	32.10	pounds

Dimensions:

- Height: 12.27 inches
- Width: 9.75 inches
- Length: 16.20 inches

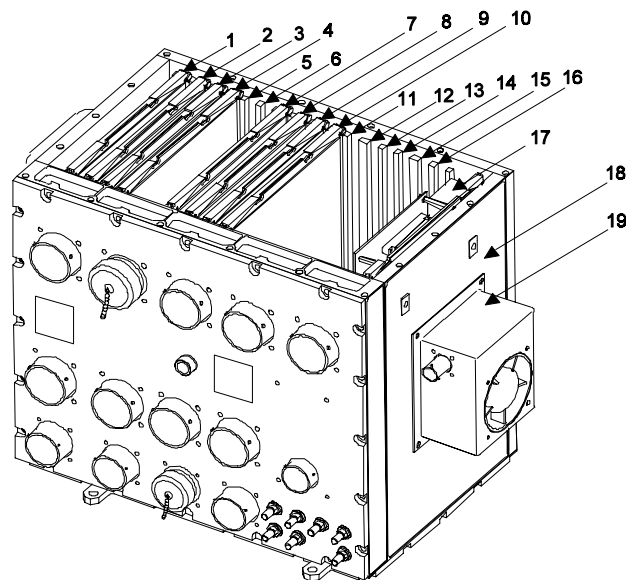
Electrical Power Requirements:

- 115 VAC, 400 Hz, 1A, single phase
- +28 VDC, 10A

3-28. LEFT AND RIGHT IMCPU SUBASSEMBLY LIST/NOMENCLATURE CROSS REFERENCE

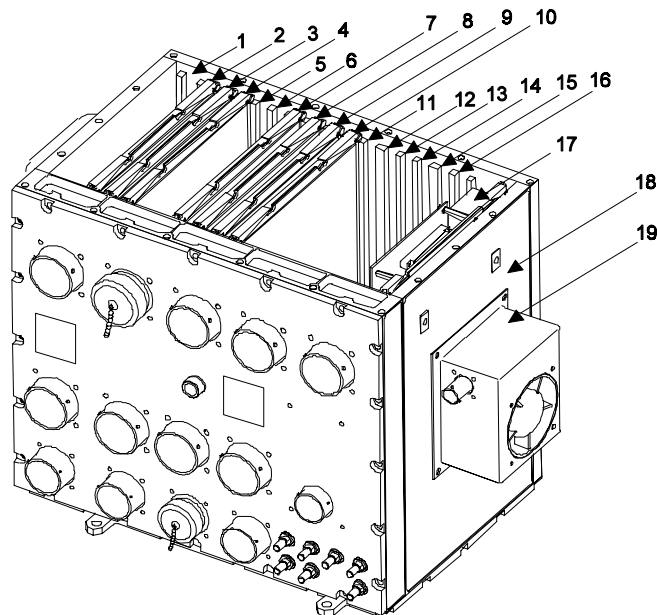
a. CD3 Left IMCPU (PN 8500088-921).

INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NUMBER
1	A1 CCA	A1	Circuit Card Assembly, i960 CPU	8520662-902
2	A2 CCA	A2	Circuit Card Assembly, VTR I/F	8517387-914 8517387-915
3	A3 CCA	A3	Circuit Card Assembly, VDU	8521307-902 8521307-903 8521307-904
4	A4 CCA	A4	Circuit Card Assembly, ADSS I/O	8515287-904
5-6	not used			
7	A7 CCA	A7	Circuit Card Assembly, Digital I/O	8520656-901
8	A8 CCA	A8	Circuit Card Assembly, Analog I/O	8520659-902
9	A9 CCA	A9	Circuit Card Assembly, Symbol Generator	8520668-902
10	A10 CCA	A10	Circuit Card Assembly, 1553 I/OC	8513076-908
11-16	not used			
17	A17 CCA	A17	Circuit Card Assembly, Power Supply	8521512-902 8521512-903 8521512-904
18	Chassis	None	Chassis Assembly, Electrical Equipment	8521751-903
19	Blower Assembly	None	Housing, Blower Assembly	8521763-901



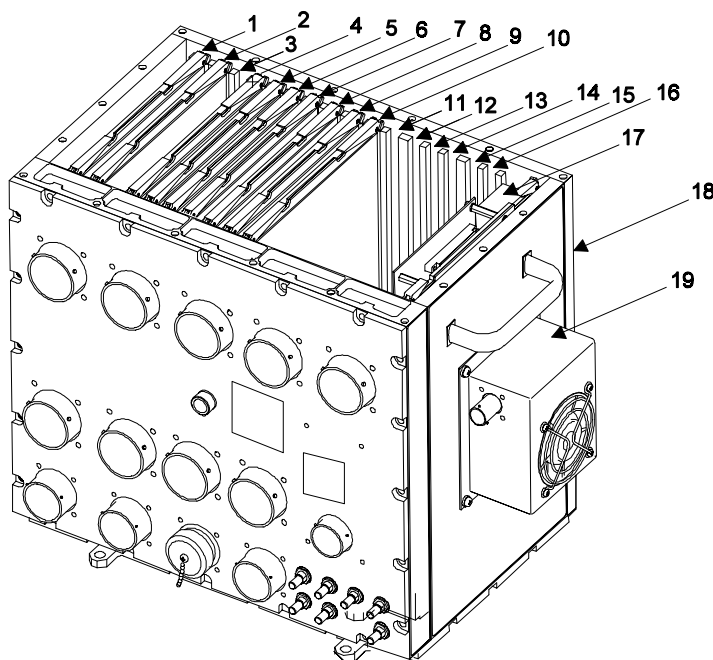
a.1. CD4 Left IMCPU (PN 8500088-923).

INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NUMBER
1	not used			
2	A2 CCA	A2	Circuit Card Assembly, VTR I/F	8517387-914 8517387-915 8517387-917
3	A3 CCA	A3	Circuit Card Assembly, VDU	8521307-902 8521307-903 8521307-904 8521307-905
4	A4 CCA	A4	Circuit Card Assembly, ADSS I/O	8515287-904 8515287-905
5-6	not used			
7	A7 CCA	A7	Circuit Card Assembly, Digital I/O	8520656-901 8520656-902
8	A8 CCA	A8	Circuit Card Assembly, Analog I/O	8520659-902 8520659-903
9	A9 CCA	A9	Circuit Card Assembly, Symbol Generator	8520668-902 8520668-903
10	A10 CCA	A10	Circuit Card Assembly, General Purpose Processor	CP8524875-901
11-16	not used			
17	A17 CCA	A17	Circuit Card Assembly, Power Supply	8521512-902 8521512-903 8521512-904
18	Chassis	None	Chassis Assembly, Electrical Equipment	8521751-905
19	Blower Assembly	None	Housing, Blower Assembly	8521763-901



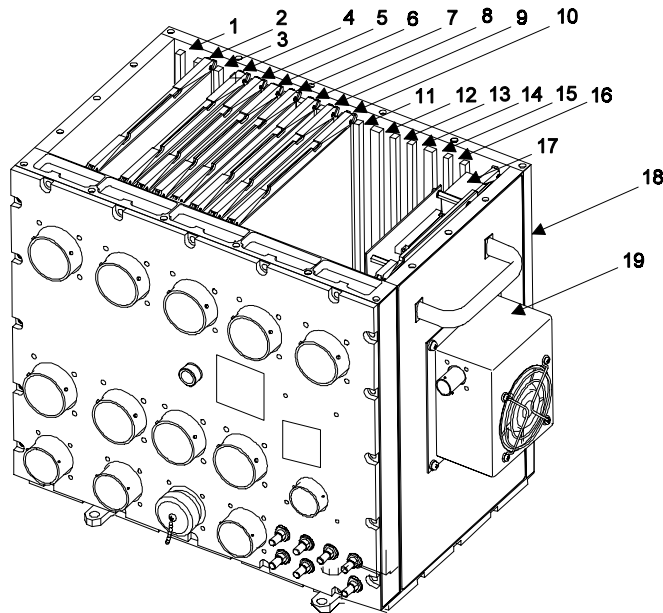
b. CD3 Right IMCPU (850088-940).

INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NUMBER
1	A1 CCA	A1	Circuit Card Assembly, i960 CPU	8520662-902
2	A2 CCA	A2	Circuit Card Assembly, RMS	8520992-901 8520992-902
3	not used			
4	A4 CCA	A4	Circuit Card Assembly, ADSS I/O	8515287-904
5	A5 CCA	A5	Circuit Card Assembly, ASE I/O	8507082-904
6	A6 CCA	A6	Circuit Card Assembly, Weapons I/O	8515279-902
7	A7 CCA	A7	Circuit Card Assembly, Digital I/O	8520656-901
8	A8 CCA	A8	Circuit Card Assembly, Analog I/O	8520659-902
9	A9 CCA	A9	Circuit Card Assembly, Symbol Generator	8520668-902
10	A10 CCA	A10	Circuit Card Assembly, 1553 I/OC	8513076-908
11-16	not used			
17	A17 CCA	A17	Circuit Card Assembly, Power Supply	8521512-902 8521512-903 8521512-904
18	Chassis	None	Chassis Assembly, Electrical Equipment	8521751-903
19	Blower Assembly	None	Housing, Blower Assembly	8521763-901



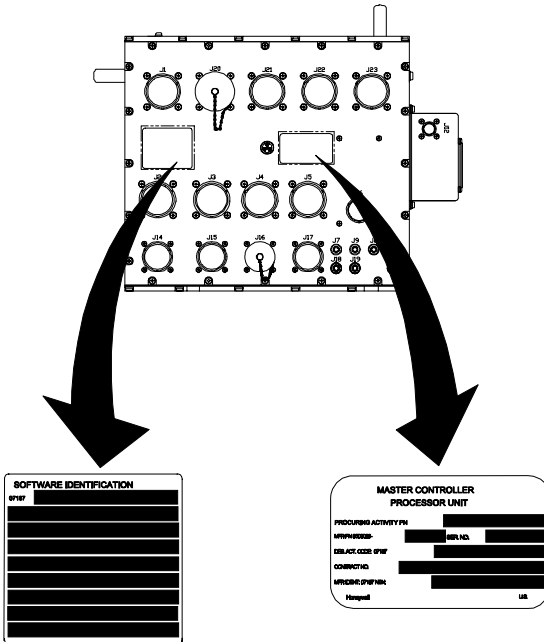
b.1. CD4 Right IMCPU (8500088-943).

INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NUMBER
1	not used			
2	A2 CCA	A2	Circuit Card Assembly, RMS	8520992-901 8520992-902 8520992-903
3	not used			
4	A4 CCA	A4	Circuit Card Assembly, ADSS I/O	8515287-904 8515287-905
5	A5 CCA	A5	Circuit Card Assembly, ASE/SCI I/O	8524327-901
6	A6 CCA	A6	Circuit Card Assembly, Weapons I/O	8515279-902 8515279-903
7	A7 CCA	A7	Circuit Card Assembly, Digital I/O	8520656-901 8520656-902
8	A8 CCA	A8	Circuit Card Assembly, Analog I/O	8520659-902 8520659-903
9	A9 CCA	A9	Circuit Card Assembly, Symbol Generator	8520668-902 8520668-903
10	A10 CCA	A10	Circuit Card Assembly, General Purpose Processor	CP8524875-901
11-16	not used			
17	A17 CCA	A17	Circuit Card Assembly, Power Supply	8521512-902 8521512-903 8521512-904
18	Chassis	None	Chassis Assembly, Electrical Equipment	8521751-905
19	Blower Assembly	None	Housing, Blower Assembly	8521763-901

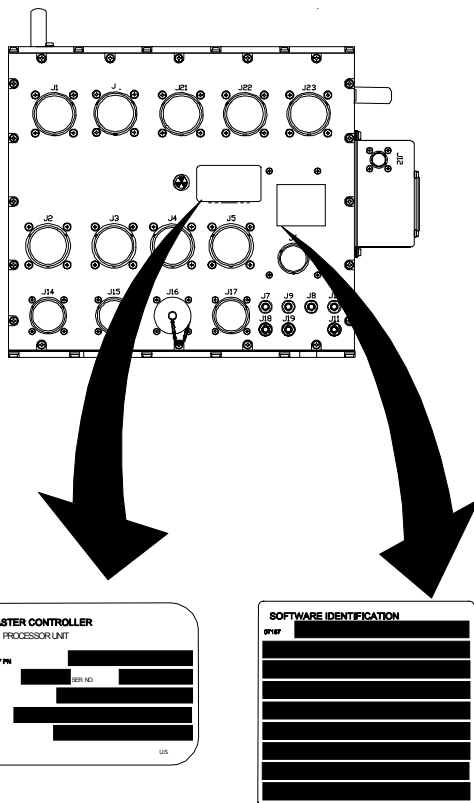


3-29. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

a. The identification plates for the IMCPU (left or right) are located on the right side panel.



LEFT IMCPU (-921/-923)



RIGHT IMCPU (-940/-943)

3-30. SAFETY, CARE, AND HANDLING

Personal Safety:

To avoid accidental electrical shock, never perform maintenance on the IMCPU while power is applied to the unit.

IMCPU Care and Handling:

To protect the IMCPU from Electrostatic Discharge (ESD) during maintenance (Section V), observe these general precautions:

Never perform maintenance on the IMCPU unless the unit is on a static control grounded work bench.

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks.

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the IMCPU from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not expose to strong electromagnetic fields.
- Do not probe connector pins or receptacles.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-31. COMMON TOOLS AND EQUIPMENT

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

3-32. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

The BSTF/BSTS and CDS TPS (refer to TM 11-6625-778-13&P-1) provide the necessary equipment for testing and troubleshooting the IMCPU.

Section III

SERVICE UPON RECEIPT

3-33. UNPACKING INSTRUCTIONS

The IMCPU and each of its Shop Replaceable Units (SRUs) are shipped in reusable containers.

Be careful not to damage the shipping container when unpacking a unit.

Save the shipping container(s) and packaging materials for use when the following conditions exist:

- a. Repaired IMCPU is repacked for shipment to AVUM.
- b. AVIM non-repairable IMCPU is repacked for shipment to depot repair.
- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

3-34. CHECKING UNPACKED EQUIPMENT

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

3-35. SCOPE

This section contains information on testing and troubleshooting a defective IMCPU.

If the IMCPU does not pass visual check, repair the unit. While a diagnostic test is being run, operator actions will appear on the BSTF/BSTS display. The operator is to respond to these prompts.

3-36. TEST AND TROUBLESHOOT

Follow established procedures for setup and testing an IMCPU.

If the IMCPU passes the test, return the IMCPU to AVUM. If the IMCPU fails the test, replace the SRU indicated by the BSTF/BSTS display.

Prior to running a diagnostic test, visually check the IMCPU for physical damage. Refer to paragraph 3-38. If the IMCPU passes visual check, proceed with testing.

After SRU replacement, retest the IMCPU. If the IMCPU fails the test a second time, and the BSTF/BSTS printout indicates that the same SRU is faulty, send the IMCPU to depot repair. If the printout indicates that a different SRU is faulty, replace the newly suspected SRU.

Section V

MAINTENANCE PROCEDURES

3-37. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform the

necessary replacement tasks indicated by List of Tasks to repair the defective IMCPU. For general aircraft maintenance practices, refer to TM 1-1500-204-23 or TM 55-1500-323-24.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove Left IMCPU	3-39	3-35
Remove Right IMCPU	3-39	3-35
Install Left IMCPU	3-40	3-36
Install Right IMCPU	3-40	3-36
Clean and Inspect IMCPU	3-41	3-38
Set Up Static Control Work Station	3-42	3-38
Remove Circuit Card Assembly	3-43	3-39
Remove Power Supply	3-44	3-43
Remove Blower Assembly	3-45	3-45
Install Circuit Card Assembly	3-46	3-46
Install Power Supply	3-47	3-51
Install Blower Assembly	3-48	3-53

3-38. VISUAL CHECKS

Visually check the IMCPU to determine if it is in good physical condition. Go through the checklist below.

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions listed in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair as required.
2. Is any connector loose?	Tighten connector hardware.
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Refer to task 3-41.
5. Do any screws appear reddish-brown?	Refer to task 3-41.
6. Does the external surface of the LRU contain white or gray powdery deposits, similar to dust?	Refer to task 3-41.
7. Does the external surface appear rough or frosted?	Refer to task 3-41.
8. Does the external surface appear dull?	Refer to task 3-41.
9. Does the external surface contain tiny pits or holes?	Refer to task 3-41.
10. Does the external surface appear to be swelling or lifting up?	Refer to task 3-41.
11. Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 3-41.
12. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 3-41.
13. Is paint discolored?	Refer to task 3-41.
14. Is paint cracked or chipped?	Refer to task 3-41.
15. Does the external surface need cleaning?	Refer to task 3-41.
16. Are any of the four mounting flanges broken?	Repair as required.
17. Is the external surface dented, cracked, or punctured at all?	Repair as required.
18. Is the external surface scratched or gouged at all?	Refer to task 3-41.

3-39. REMOVE IMPROVED MASTER CONTROLLER PROCESSOR UNIT

This task covers: Removal of LEFT or RIGHT IMCPU

INITIAL SETUP

Applicable Configurations:

CD3, CD4

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

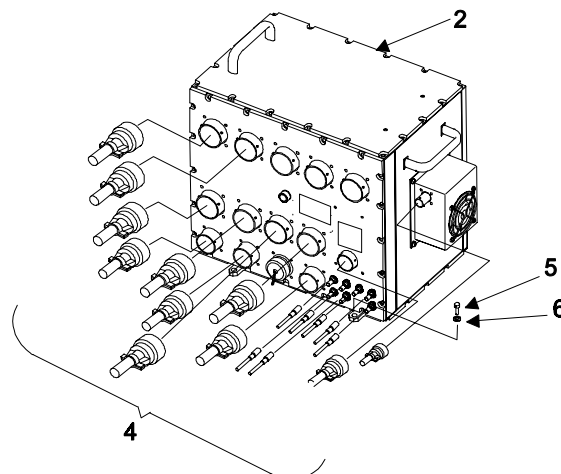
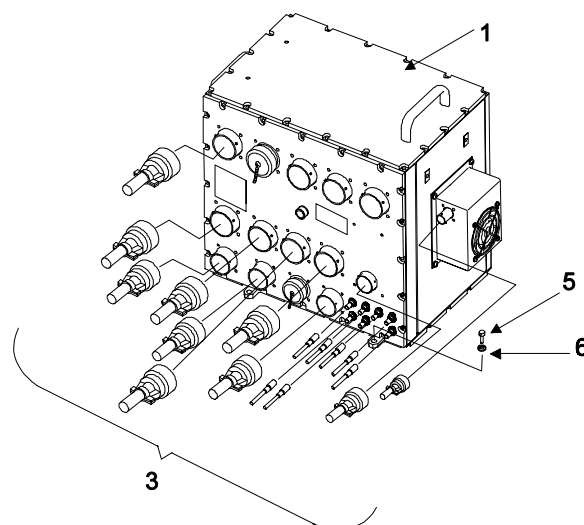
General Safety Instructions:



General Safety Warning

1

1. Open left or right access door (refer to TM 1-1520-248-23) to gain access to the Left IMCPU (1) or Right IMCPU (2).
2. Tag and identify 17 connectors (3) for Left IMCPU (1).
3. Tag and identify 18 connectors (4) for Right IMCPU (2).
4. Disconnect 17 connectors (3) on Left IMCPU.
5. Disconnect 18 connectors (4) on Right IMCPU.
6. Remove two screws and washers (5 and 6) on Left IMCPU (1) or Right IMCPU (2).
7. Remove Left IMCPU (1) or Right IMCPU (2).
8. Close access door opened in step 1.



END OF TASK

3-40. INSTALL IMPROVED MASTER CONTROLLER PROCESSOR UNIT

This task covers: Installation of LEFT or RIGHT IMCPU.

INITIAL SETUP

Applicable Configurations:

CD3, CD4

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

TM 1-1520-248-23
TM 9-1240-778-20

General Safety Instructions:



General Safety Warning

1

CAUTION

Both IMCPUs must have the proper dash number (i.e. 8500088-921/-923 and 8500088-940/-943) and software part number. Ensure IMCPU software configurations are applicable to aircraft configuration.

1. Open or remove left or right access door (refer to TM 1-1520-248-23) to gain access to the Left IMCPU (1) or Right IMCPU (2) mounting area.

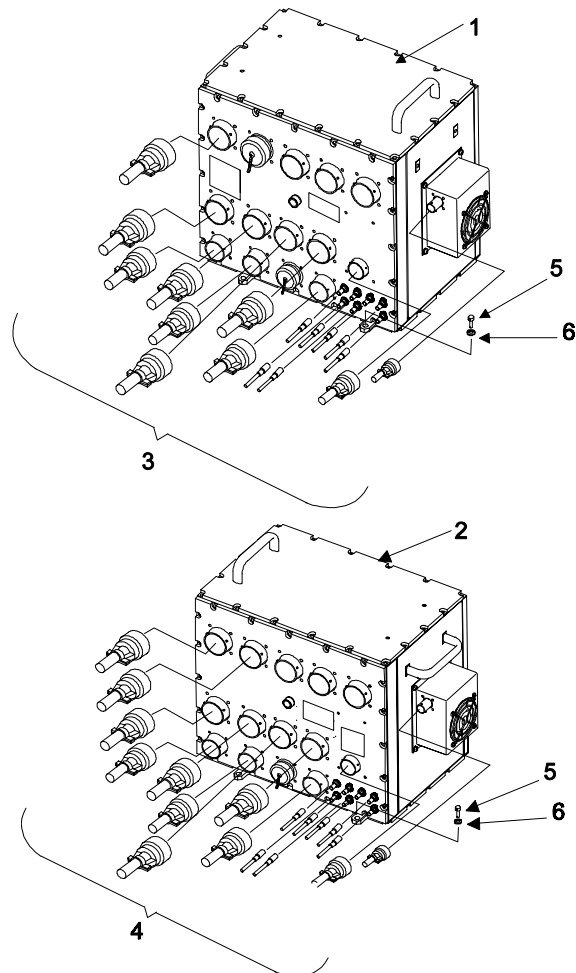
2. Visually inspect 17 connectors (3) for Left IMCPU or 18 connectors (4) for Right IMCPU for missing or bent pins, corrosion or cracked housing.

3. Position Left IMCPU (1) or Right IMCPU (2) in place. Align two mounting holes and install two screws and washers (5 and 6).

4. Connect 17 tagged connectors (3) for Left IMCPU (1) or 18 connectors (4) for Right IMCPU (2) to mating connectors.

INSPECT

GO TO NEXT PAGE



3-40. INSTALL IMPROVED MASTER CONTROLLER PROCESSOR UNIT (CONT)**FOLLOW-ON MAINTENANCE**

1. Close or install access door opened in step 1.

2. Perform Data Transfer:

a. If the IMCPU being replaced is part number 8500088-921 (left) or 8500088-940 (right), perform steps b and c. If the IMCPU being replaced is part number 8500088-923 (left), go to step d. If the IMCPU being replaced is part number 8500088-943 (right), go to step s.

NOTE

With CDS3 configured IMCPUs, the first LRU to complete its power-up sequence assumes the bus controller role. Therefore, either LRU can function as bus controller. The purpose of this procedure is to ensure that the IMCPU that did not fail is allowed to power-up as the bus controller. This ensures that the data previously stored in NVM, such as engine history, is not lost.

b. Ensure that the left IMCPU and right IMCPU circuit breakers are pulled (off). Apply external power. (Refer to TM 1-1520-248-23.)

c. If the left IMCPU was replaced, transfer data from the right IMCPU by pushing in the right IMCPU circuit breaker, wait 30 seconds, then push in the left IMCPU circuit breaker. If the right IMCPU was replaced, transfer data from the left IMCPU by pushing in the left IMCPU circuit breaker, wait 30 seconds, then push in the right IMCPU circuit breaker. Go to step s.

NOTE

With CDS4 configured IMCPUs, the left IMCPU is always the bus controller when both IMCPUs are operational. The purpose of this procedure is to ensure whenever the left IMCPU is replaced that any erroneous engine history data from other aircraft is not preserved and to restore the aircraft tail number, engine starts, QM>125% and QM>150% data associated with this aircraft.

d. Ensure that the left IMCPU and right IMCPU circuit breakers are pulled (off). Apply external power. (Refer to TM 1-1520-248-23.)

e. Push in the circuit breaker for the right IMCPU. After the LRU has completed its power-up sequence, perform steps f through r.

f. Ensure that Initial Page 1 is displayed. Record the aircraft tail number that is displayed on line 2 of the title.

g. On Initial Page 1, press bezel R3 to display the FDL Menu Page.

h. On the FDL Menu Page, press L3 to display Engine History Page 1.

i. On Engine History Page 1, press R5 to display Engine History Page 2. Record the number of counts for QM>125% and QM>150%.

j. On Engine History Page 2, press R5 to display Engine History Page 3. Record the number of Engine starts.

NOTE

If during power-up of the left IMCPU it is detected that the right IMCPU is bus controller, a reset command is sent to the right IMCPU. This allows the left IMCPU to take over as the bus controller.

k. Push in the circuit breaker for the left IMCPU and wait for both IMCPUs to complete their power-up sequence. Initial Page 1 should be displayed on both IMCPUs.

l. On either IMCPU, ensure that Initial Page 1 is displayed, press R3 to display the FDL Menu, and press R2 to display the Ground Set-up Page.

m. On the Ground Set-up Page, press L4 and, using the Keyboard, enter the aircraft tail number recorded in step f.

n. Return to Initial Page 1 and press the R3 bezel to display the FDL Menu Page.

3-40. INSTALL IMPROVED MASTER CONTROLLER PROCESSOR UNIT (CONT)

- o. On the FDL Menu Page, press L3 to display Engine History Page 1.
- p. On Engine History Page 1, press CLEAR (mode D bezel) to initiate the clear the engine history procedure. Complete the clear engine procedure.
- q. On Engine History Page 1, press R5 to display Engine History Page 2. Press L4 and, using the Keyboard, enter the number of QM>125% counts recorded in step i. Press L5 and, using the Keyboard, enter the number of QM>150% counts recorded in step i.
- r. On Engine History Page 2, press R5 to display Engine History Page 3. Press L4 and, using the Keyboard, enter the number of Engine Starts recorded in step j. Go to step s.
- s. Apply external power. (Refer to TM 1-1520-248-23.)
- t. Download MMS data constants. (Refer to TM 9-1240-778-20.)
- u. Perform operational checks

Test and troubleshoot procedure, paragraph 2-5.

END OF TASK

3-40. INSTALL IMPROVED MASTER CONTROLLER PROCESSOR UNIT (CONT)**FOLLOW-ON MAINTENANCE**

1. Close or install access door opened in step 1.

2. Perform Data Transfer:

Ensure Left IMCPU and Right IMCPU circuit breakers are pulled. Apply external power. (Refer to TM 55-1520-248-23.)

NOTE

With CDS4 configured IMCPUs, if both boxes are operational at the same time, the left IMCPU will always be the bus controller. The purpose of this procedure is to allow the IMCPU that did not fail, to come up as the bus controller and transfer data. This ensures that no data, such as engine history, is lost.

a. If Left IMCPU was replaced, transfer data from Right IMCPU by pushing in Right IMCPU circuit breaker, wait 5 seconds, then push in Left IMCPU circuit breaker. If Right IMCPU was replaced, transfer data from Left IMCPU by pushing in Left IMCPU circuit breaker, wait 5 seconds, then push in Right IMCPU circuit breaker.

a. If Left IMCPU was replaced, transfer data from Right IMCPU by pushing in Right IMCPU circuit breaker, wait 5 seconds, then push in Left IMCPU circuit breaker. If Right IMCPU was replaced, transfer data from Left IMCPU by pushing in Left IMCPU circuit breaker, wait 5 seconds, then push in Right IMCPU circuit breaker.

b. If the Left IMCPU was replaced, To prevent loss of data, the right box must be powered up and any data recovered before powering up the left box. Assuming the left box was the one being replaced.

c. Download MMS data constants. (Refer to TM 9-1240-778-23.)

d. Perform operational checks:

Test and Troubleshoot procedure, paragraph 2-5.

END OF TASK

3-41. CLEAN AND INSPECT IMPROVED MASTER CONTROLLER PROCESSOR UNIT

This task covers: General external cleaning and inspection procedures for the IMCPU.

Refer to paragraph 3-17.

3-42. STATIC CONTROL WORK STATION (AVIM)

This task covers: Setting up a static control work station for maintenance of an LRU. The purpose of the static control work station is to prevent Electrostatic Discharge (ESD), thereby avoiding the degradation or destruction of any static sensitive devices. This task is mandatory.

Refer to paragraph 3-18.

GO TO NEXT PAGE

3-43. REMOVE CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Removal of a Circuit Card Assembly (CCA) from the IMCPU. All CCAs are removed in the same manner.

INITIAL SETUP

Applicable Configurations:

- CD3, CD4

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-42)
IMCPU on bench
No power applied

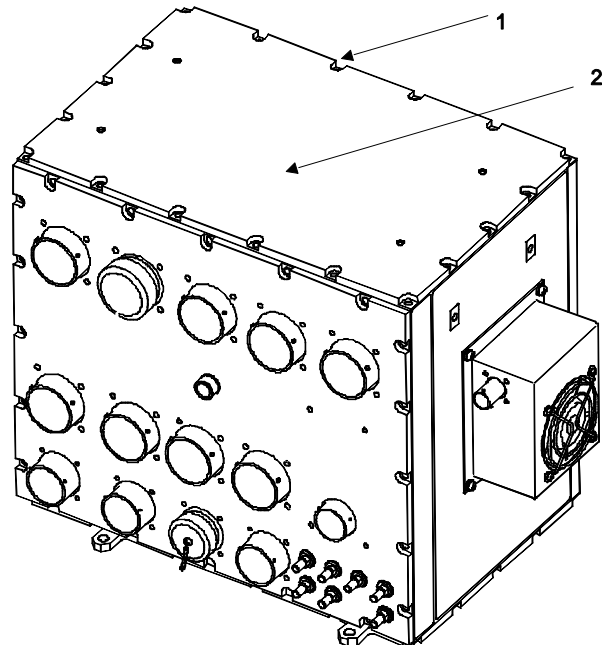
General Safety Instructions:

CAUTION

The IMCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen 18 captive screws (1) on left or right IMCPU cover assembly (2).

2. Remove cover assembly (2).



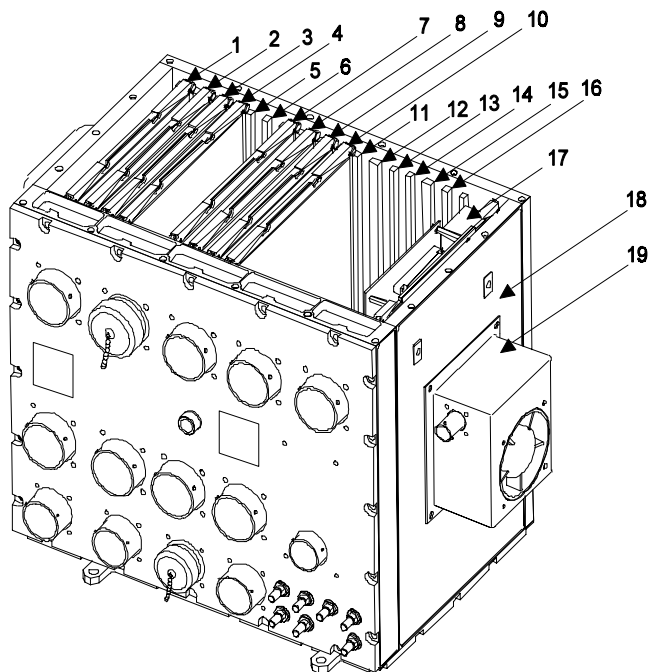
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3-43. REMOVE CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

3. Identify CCA to be removed.

a. CD3 Left IMCPU (PN 8500088-921):

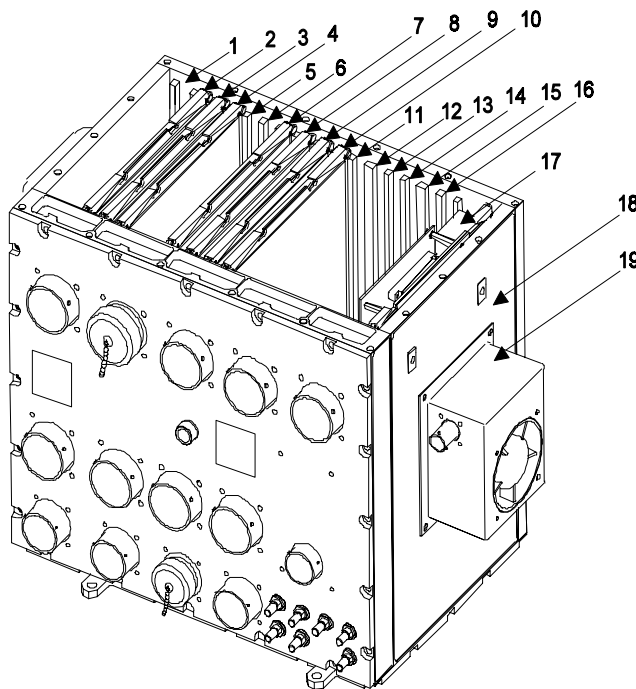
<u>CCA</u>	<u>Part Number</u>	<u>Common Name</u>	<u>Index No.</u>
A1	8520662-902	i960 CPU	(1)
A2	8517387-914	VTR I/F	(2)
A2	8517387-915	VTR I/F	(2)
A3	8521307-902	VDU	(3)
A3	8521307-903	VDU	(3)
A3	8521307-904	VDU	(3)
A4	8515287-904	ADSS I/O	(4)
A7	8520656-901	Digital I/O	(7)
A8	8520659-902	Analog I/O	(8)
A9	8520668-902	Symbol Generator	(9)
A10	8513076-908	1553 I/OC	(10)
A17	8521512-902	Power Supply	(17)
A17	8521512-903	Power Supply	(17)
■ A17	8521512-904	Power Supply	(17)



-921

a.1. CD4 Left IMCPU (PN 8500088-923):

<u>CCA</u>	<u>Part Number</u>	<u>Common Name</u>	<u>Index No.</u>
A2	8517387-914	VTR I/F	(2)
A2	8517387-915	VTR I/F	(2)
■ A2	8517387-917	VTR I/F	(2)
A3	8521307-902	VDU	(3)
A3	8521307-903	VDU	(3)
A3	8521307-904	VDU	(3)
■ A3	8521307-905	VDU	(3)
A4	8515287-904	ADSS I/O	(4)
■ A4	8515287-905	ADSS I/O	(4)
A7	8520656-901	Digital I/O	(7)
■ A7	8520656-902	Digital I/O	(7)
A8	8520659-902	Analog I/O	(8)
■ A8	8520659-903	Analog I/O	(8)
A9	8520668-902	Symbol Generator	(9)
■ A9	8520668-903	Symbol Generator	(9)
A10	CP8524875-901	GPP CCA	(10)
A17	8521512-902	Power Supply	(17)
A17	8521512-903	Power Supply	(17)
■ A17	8521512-904	Power Supply	(17)



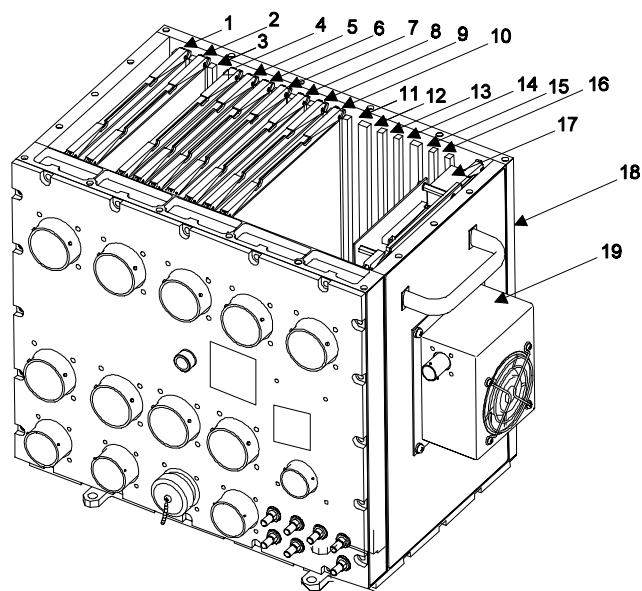
-923

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3-43. REMOVE CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

b. CD3 Right IMCPU (PN 850088-940):

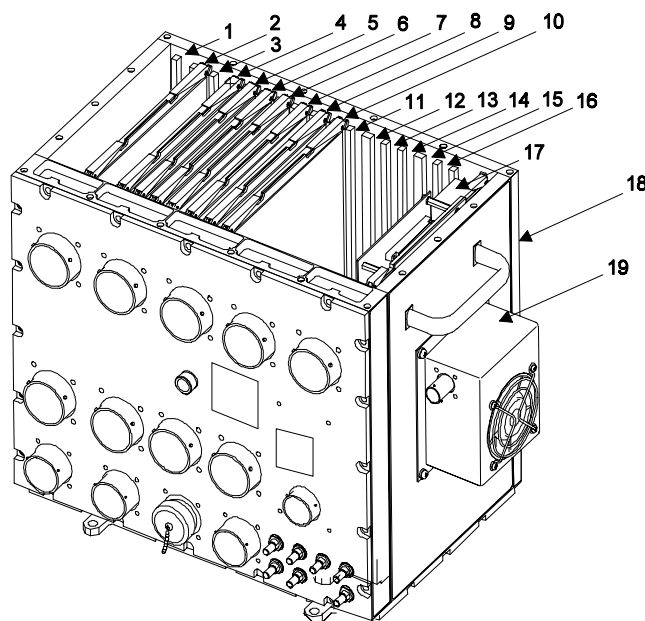
<u>CCA</u>	<u>Part Number</u>	<u>Common Name</u>	<u>Index No.</u>
A1	8520662-902	i960 CPU	(1)
A2	8520992-901	RMS CCA	(2)
A2	8520992-902	RMS CCA	(2)
A4	8515287-904	ADSS I/O	(4)
A5	8507082-904	ASE I/O	(5)
A6	8515279-902	Weapons I/O	(6)
A7	8520656-901	Digital I/O	(7)
A8	8520659-902	Analog I/O	(8)
A9	8520668-902	Symbol Generator	(9)
A10	8513076-908	1553 I/OC	(10)
A17	8521512-902	Power Supply	(17)
A17	8521512-903	Power Supply	(17)
■ A17	8521512-904	Power Supply	(17)



-940

b.1. CD4 Right IMCPU (PN 850088-943):

<u>CCA</u>	<u>Part Number</u>	<u>Common Name</u>	<u>Index No.</u>
A2	8520992-901	RMS CCA	(2)
A2	8520992-902	RMS CCA	(2)
■ A2	8520992-903	RMS CCA	(2)
A4	8515287-904	ADSS I/O	(4)
■ A4	8515287-905	ADSS I/O	(4)
A5	8524327-901	ASE/SCI I/O	(5)
A6	8515279-902	Weapons I/O	(6)
■ A6	8515279-903	Weapons I/O	(6)
A7	8520656-901	Digital I/O	(7)
■ A7	8520656-902	Digital I/O	(7)
A8	8520659-902	Analog I/O	(8)
■ A8	8520659-903	Analog I/O	(8)
A9	8520668-902	Symbol Generator	(9)
■ A9	8520668-903	Symbol Generator	(9)
A10	CP8524875-901	GPP CCA	(10)
A17	8521512-902	Power Supply	(17)
A17	8521512-903	Power Supply	(17)
■ A17	8521512-904	Power Supply	(17)

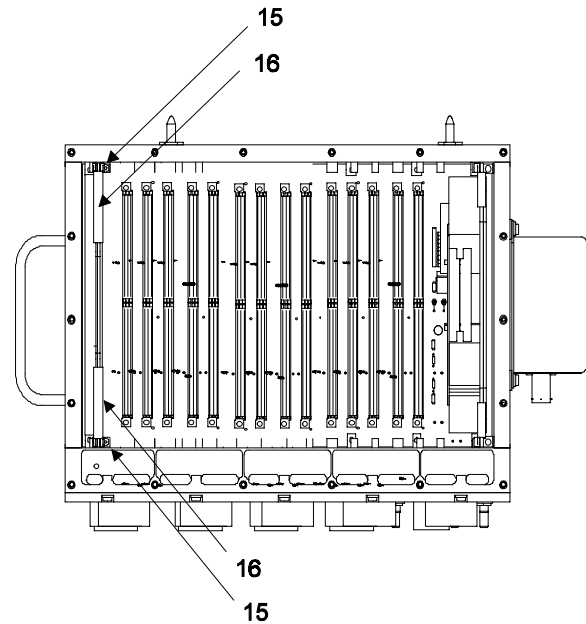


-943

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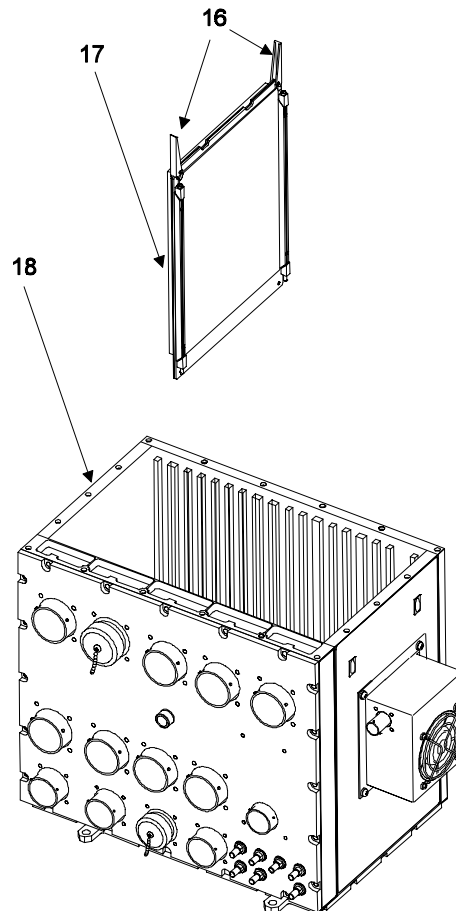
3-43. REMOVE CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

4. Loosen but do not remove two wedge lock screws (15) located to the side of the extractor levers (16) for the desired CCA.



5. Pull out two card extractor levers (16). Slide CCA (17) out from IMCPU (18).

6. Place CCA (17) in static shielding bag (C7) to protect it from ESD.



END OF TASK

3-44. REMOVE POWER SUPPLY (AVIM)

This task covers: Removal of a power supply from the IMCPU.

INITIAL SETUP

Applicable Configurations:

■ CD3, CD4

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

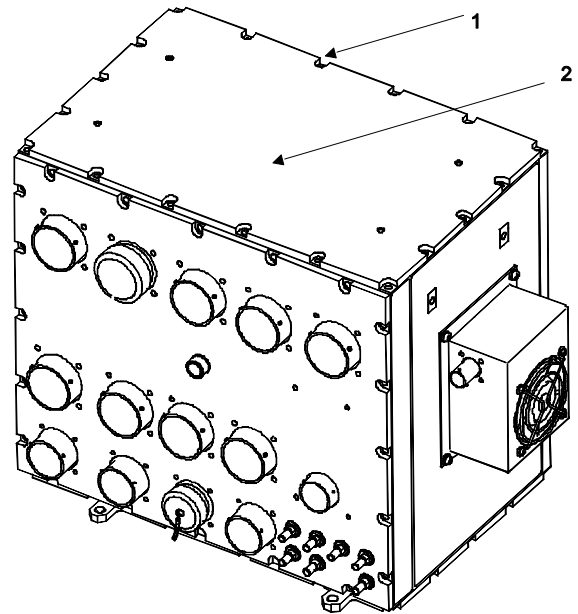
Static control work station
setup (3-42)
IMCPU on bench
No power applied

General Safety Instructions:

CAUTION

The IMCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

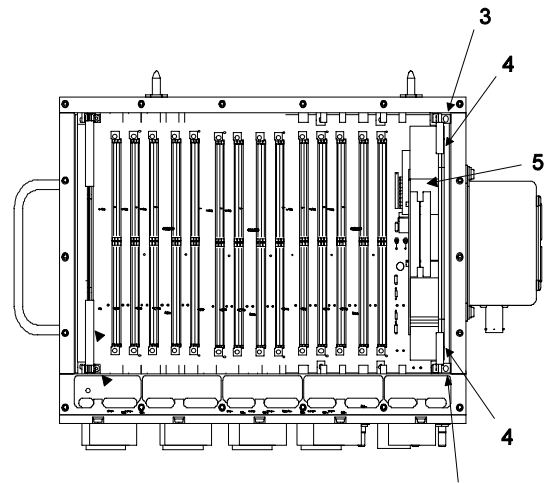
-
1. Loosen 18 captive screws (1) on left or right IMCPU cover assembly (2).



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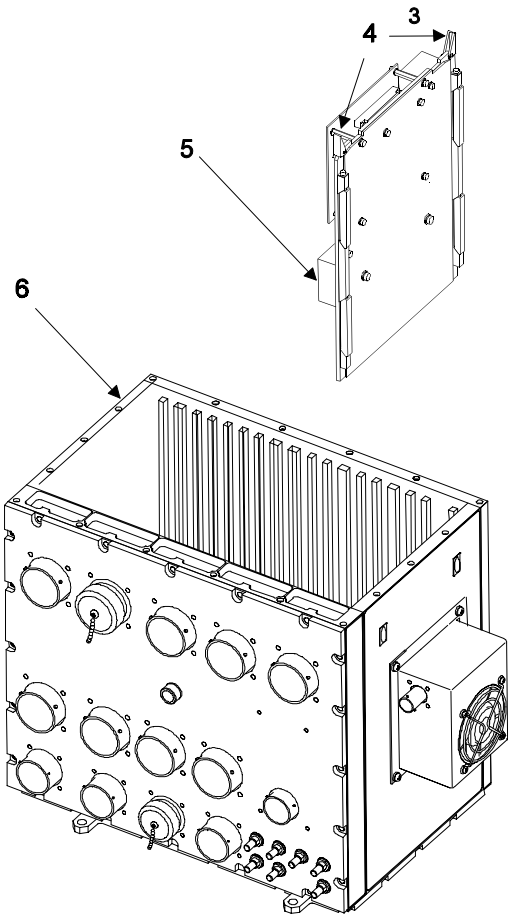
3-44. REMOVE POWER SUPPLY (AVIM) (CONT)

2. Loosen but do not remove two wedge lock screws (3) located to the side of the extractor levers (4) for the power supply CCA (5).



3. Pull out two card extractor levers (4). Slide power supply CCA (5) out from IMCPU (6).

4. Place power supply CCA (5) in static shielding bag (C7) to protect it from ESD.



END OF TASK

3-45. REMOVE BLOWER ASSEMBLY

This task covers: Removal of the blower assembly from the IMCPU.

INITIAL SETUP

Applicable Configurations:

■ CD3, CD4

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

Equipment Condition:

Static control work station
 setup (3-42)
 IMCPU on bench
 No power applied

General Safety Instructions:

CAUTION

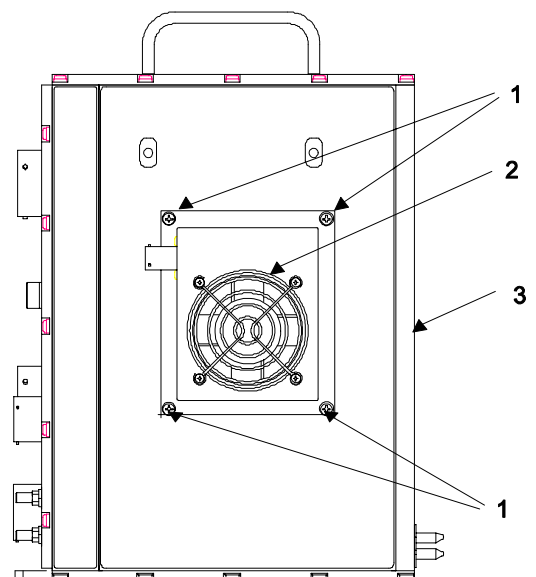
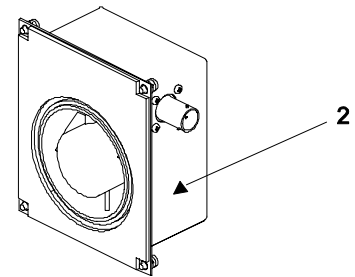
The IMCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen four captive screws (1) on left or right IMCPU blower assembly (2).

2. Remove blower assembly (2) from chassis (3).

3. Inspect gasket. Replace if worn.

4. Deleted.



END OF TASK

3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Installation of a Circuit Card Assembly (CCA) in the IMCPU.

INITIAL SETUP

Applicable Configurations:

CD3, CD4

Tools:

Electronic Equipment Tool Kit
Screwdriver Torque Wrench
Torque Tip 3/32 in.
Torque Tip Screwdriver No. 2

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Reference:

TM 9-4935-780-13-1
TM 11-6625-778-13&P-1

Equipment Condition:

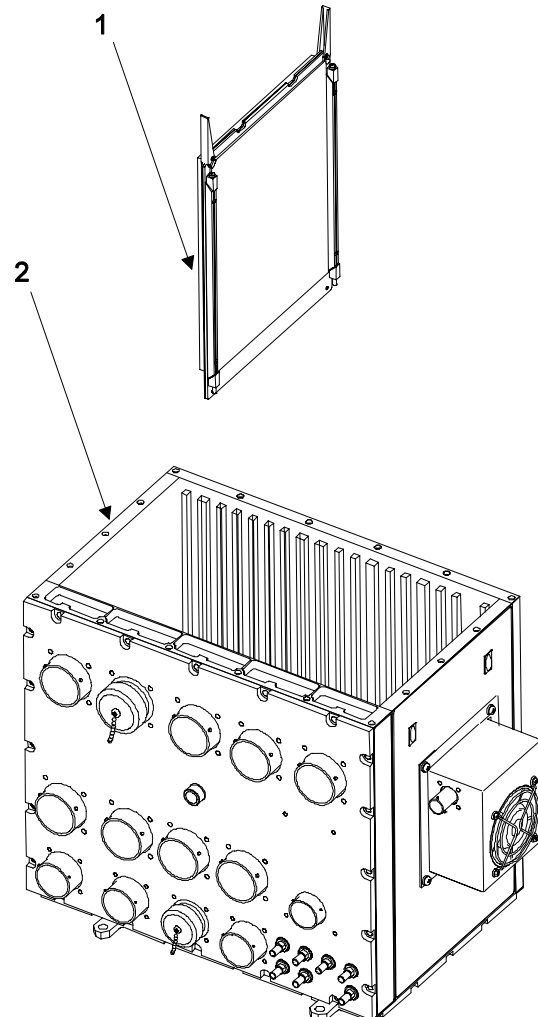
Static control work station
setup (3-42)
IMCPU on bench
No power applied

General Safety Instructions:

CAUTION

The IMCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Verify correct CCA (1) to be installed in left or right IMCPU (2).

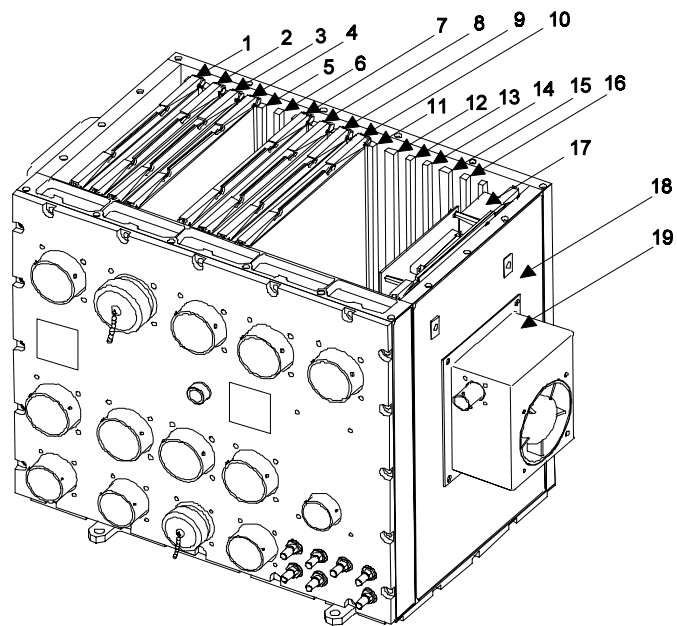


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3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

a. Left IMCPU (PN 8500088-921):

<u>CCA</u>	<u>Part Number</u>	<u>Name</u>	<u>Position</u>
A1	8520662-902	i960 CPU	CCA wedge lock guide 1
A2	8517387-914	VTR I/F	CCA wedge lock guide 2
A2	8517387-915	VTR I/F	CCA wedge lock guide 2
A3	8521307-902	VDU	CCA wedge lock guide 3
A3	8521307-903	VDU	CCA wedge lock guide 3
A3	8521307-904	VDU	CCA wedge lock guide 3
A4	8515287-904	ADSS I/O	CCA wedge lock guide 4
A7	8520656-901	Digital I/O	CCA wedge lock guide 7
A8	8520659-902	Analog I/O	CCA wedge lock guide 8
A9	8520668-902	Symbol Generator	CCA wedge lock guide 9
A10	8513076-908	1553 I/OC	CCA wedge lock guide 10
A17	8521512-902	Power Supply	CCA wedge lock guide 17
A17	8521512-903	Power Supply	CCA wedge lock guide 17
A17	8521512-904	Power Supply	CCA wedge lock guide 17

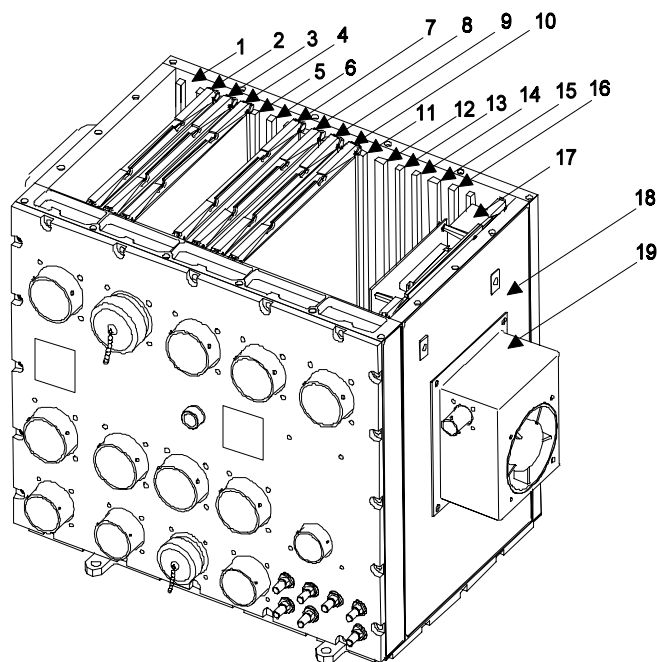


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3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

a.1. Left IMCPU (PN 8500088-923):

<u>CCA</u>	<u>Part Number</u>	<u>Name</u>	<u>Position</u>
A2	8517387-914	VTR I/F	CCA wedge lock guide 2
A2	8517387-915	VTR I/F	CCA wedge lock guide 2
A2	8517387-917	VTR I/F	CCA wedge lock guide 2
A3	8521307-902	VDU	CCA wedge lock guide 3
A3	8521307-903	VDU	CCA wedge lock guide 3
A3	8521307-904	VDU	CCA wedge lock guide 3
A3	8521307-905	VDU	CCA wedge lock guide 3
A4	8515287-904	ADSS I/O	CCA wedge lock guide 4
A4	8515287-905	ADSS I/O	CCA wedge lock guide 4
A7	8520656-901	Digital I/O	CCA wedge lock guide 7
A7	8520656-902	Digital I/O	CCA wedge lock guide 7
A8	8520659-902	Analog I/O	CCA wedge lock guide 8
A8	8520659-903	Analog I/O	CCA wedge lock guide 8
A9	8520668-902	Symbol Generator	CCA wedge lock guide 9
A9	8520668-903	Symbol Generator	CCA wedge lock guide 9
A10	CP8524875-901	GPP CCA	CCA wedge lock guide 10
A17	8521512-902	Power Supply	CCA wedge lock guide 17
A17	8521512-903	Power Supply	CCA wedge lock guide 17
A17	8521512-904	Power Supply	CCA wedge lock guide 17

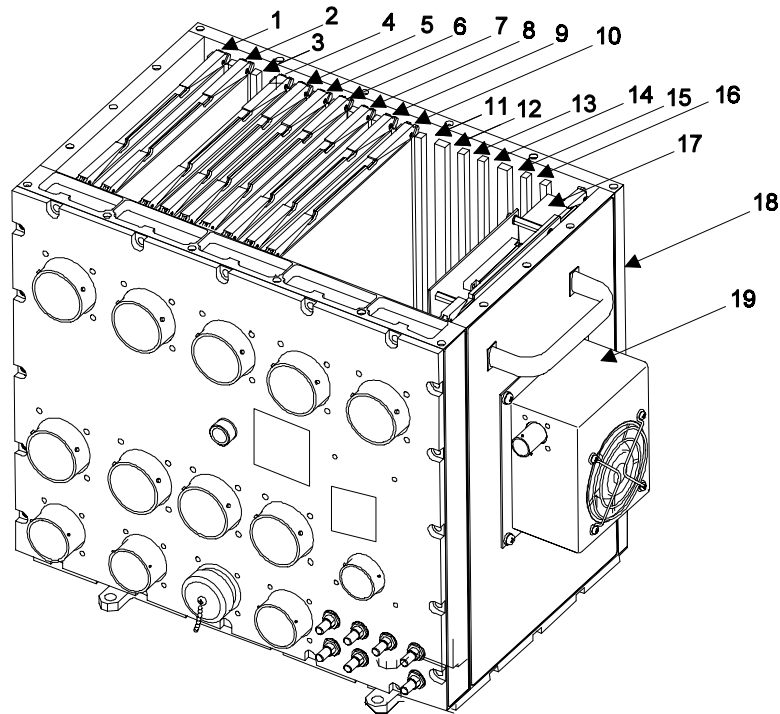


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3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

b. Right IMCPU (PN 8500088-940):

<u>CCA</u>	<u>Part Number</u>	<u>Name</u>	<u>Position</u>
A1	8520662-902	i960 CPU	CCA wedge lock guide 1
A2	8520992-901	RMS	CCA wedge lock guide 2
A2	8520992-902	RMS	CCA wedge lock guide 2
A4	8515287-904	ADSS I/O	CCA wedge lock guide 4
A5	8507082-904	ASE I/O	CCA wedge lock guide 5
A6	8515279-902	Weapons I/O	CCA wedge lock guide 6
A7	8520656-901	Digital I/O	CCA wedge lock guide 7
A8	8520659-902	Analog I/O	CCA wedge lock guide 8
A9	8520668-902	Symbol Generator	CCA wedge lock guide 9
A10	8513076-908	1553 I/O C	CCA wedge lock guide 10
A17	8521512-902	Power Supply	CCA wedge lock guide 17
A17	8521512-903	Power Supply	CCA wedge lock guide 17
A17	8521512-904	Power Supply	CCA wedge lock guide 17

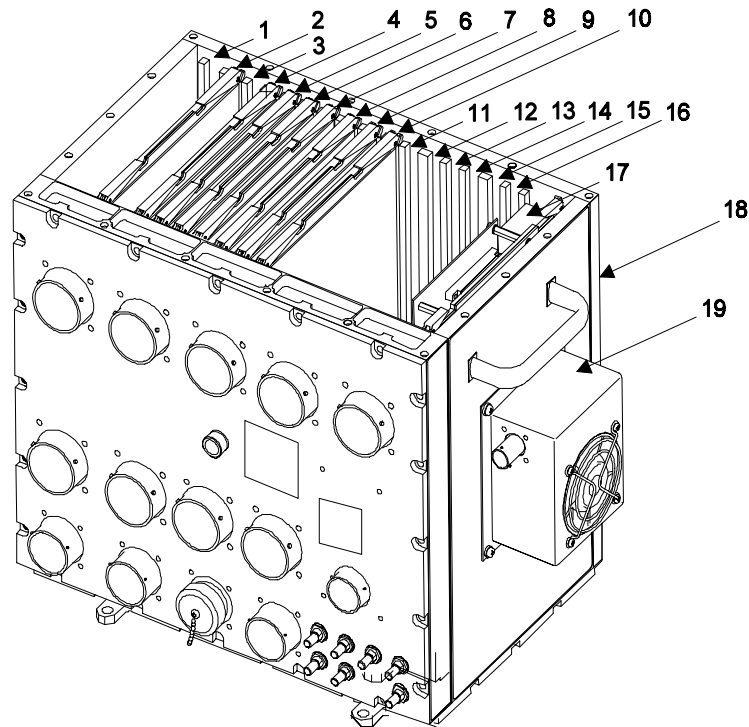


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3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

b.1. Right IMCPU (PN 8500088-943):

<u>CCA</u>	<u>Part Number</u>	<u>Name</u>	<u>Position</u>
A2	8520992-901	RMS	CCA wedge lock guide 2
A2	8520992-902	RMS	CCA wedge lock guide 2
■ A2	8520992-903	RMS	CCA wedge lock guide 2
A4	8515287-904	ADSS I/O	CCA wedge lock guide 4
■ A4	8515287-905	ADSS I/O	CCA wedge lock guide 4
A5	8524327-901	ASE/SCI I/O	CCA wedge lock guide 5
A6	8515279-902	Weapons I/O	CCA wedge lock guide 6
■ A6	8515279-903	Weapons I/O	CCA wedge lock guide 6
A7	8520656-901	Digital I/O	CCA wedge lock guide 7
■ A7	8520656-902	Digital I/O	CCA wedge lock guide 7
A8	8520659-902	Analog I/O	CCA wedge lock guide 8
■ A8	8520656-903	Analog I/O	CCA wedge lock guide 8
■ A9	8520668-902	Symbol Generator	CCA wedge lock guide 9
■ A9	8520668-903	Symbol Generator	CCA wedge lock guide 9
A10	CP8524875-901	GPP CCA	CCA wedge lock guide 10
A17	8521512-902	Power Supply	CCA wedge lock guide 17
A17	8521512-903	Power Supply	CCA wedge lock guide 17
■ A17	8521512-904	Power Supply	CCA wedge lock guide 17



GO TO NEXT PAGE

3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

2. Slide CCA (1) into proper wedge lock guide in IMCPU (2):

3. Push card extractor levers (3) in toward CCA (1).

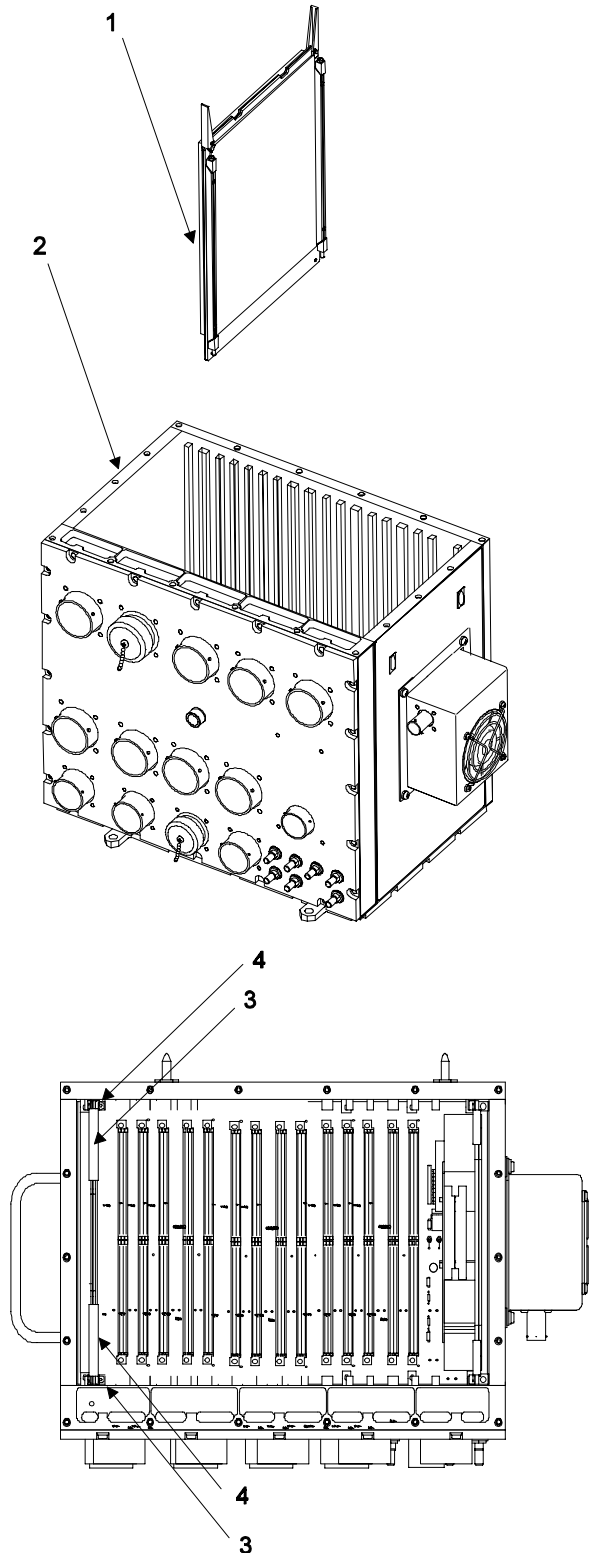
NOTE

When installing CCA, ensure that connectors are properly seated

4. Applying even pressure to both card extractor levers (3) push CCA (1) into IMCPU mate connectors.

5. Apply even pressure to both card extractor levers (3) and push down on CCA to ensure that connectors have mated.

6. Tighten two wedge lock screws (4) to 7 INCH-POUNDS using screwdriver torque wrench and 3/32 Hex torque tip.



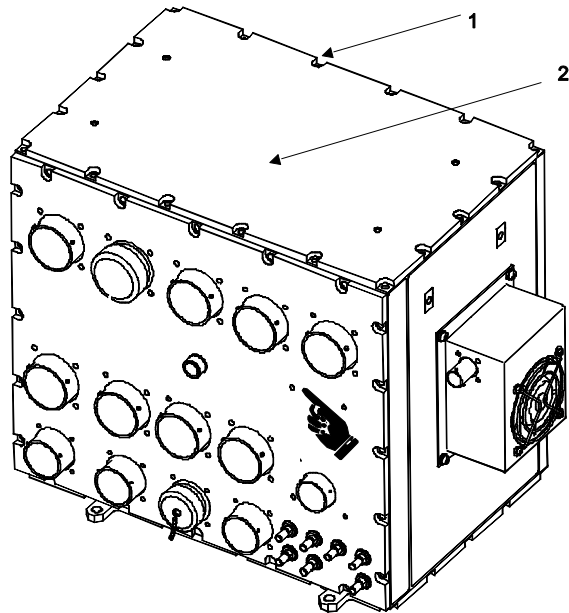
INSPECT

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3-46. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

6. Position cover assembly on IMCPU as shown.

7. Tighten 18 captive screws (1) on cover assembly (2) to 13 INCH-POUNDS using torque screwdriver.



END OF TASK

3-47. INSTALL POWER SUPPLY (AVIM)

This task covers: Installation of the power supply on the IMCPU.

INITIAL SETUP

Applicable Configurations:

- CD3, CD4

Tools:

- Torque Wrench
- Screwdriver Bit
- Electronic Equipment Tool Kit

Personnel Required:

- 68R Avionic Special Equipment Repairer
- 68P Technical Inspector

Equipment Condition:

- Static control work station setup (3-18)
- IMCPU on bench
- No power applied

General Safety Instructions:

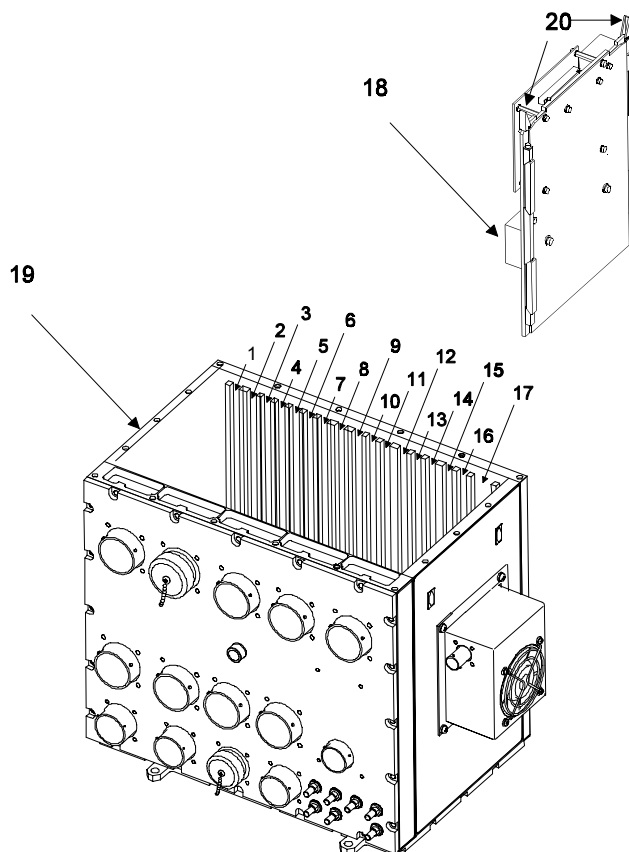
CAUTION

The IMCPU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

NOTE

Procedures for the installation of the left or right IMCPU power supply are identical.

1. Verify correct power supply CCA (18) to be installed in IMCPU (19).
2. Slide power supply CCA (18) into proper wedge lock guide (17) in IMCPU (19). Push card extractor levers (20) in toward CCA (1).



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3-47. INSTALL POWER SUPPLY (AVIM) (CONT)

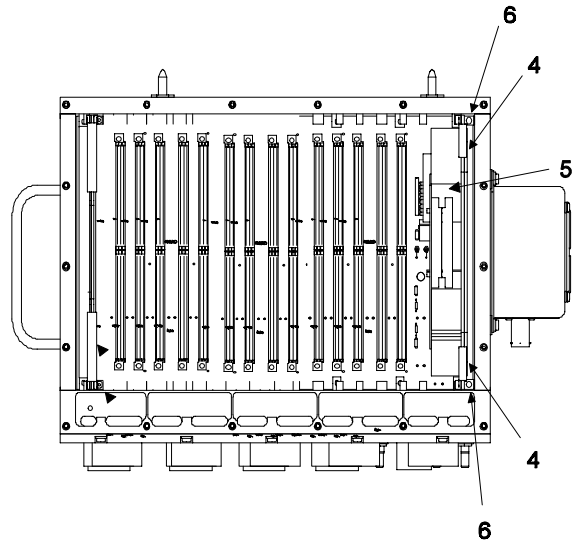
NOTE

When installing CCA ensure that connectors are properly seated.

3. Applying even pressure to both card extractor levers (4) push power supply CCA (5) into IMCPU mate connectors.

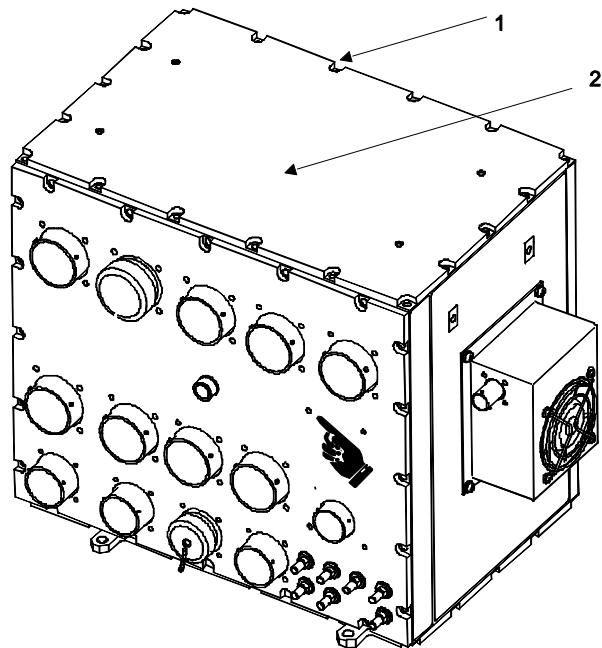
4. Apply even pressure to both card extractor levers (4) and push down on CCA (5) to ensure that connectors have mated.

5. Tighten two wedge lock screws (6) to 7 INCH-POUNDS using screwdriver torque wrench and 3/32 hex torque tip.



INSPECT

6. Tighten eighteen captive screws (1) on top panel (2) of IMCPU to 13 INCH-POUNDS.



END OF TASK

3-48. INSTALL BLOWER ASSEMBLY

This task covers: Installation of the blower assembly on the IMCPU.

INITIAL SETUP

Applicable Configurations:

- CD3, CD4

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
68P Technical Inspector

Materials:

Gasket

Equipment Condition:

Static control work station
setup (3-18)
IMCPU on bench
No power applied

General Safety Instructions:

CAUTION

The IMCPU contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Position gasket (1) on blower assembly (2) by aligning cutout in gasket around fan.

CAUTION

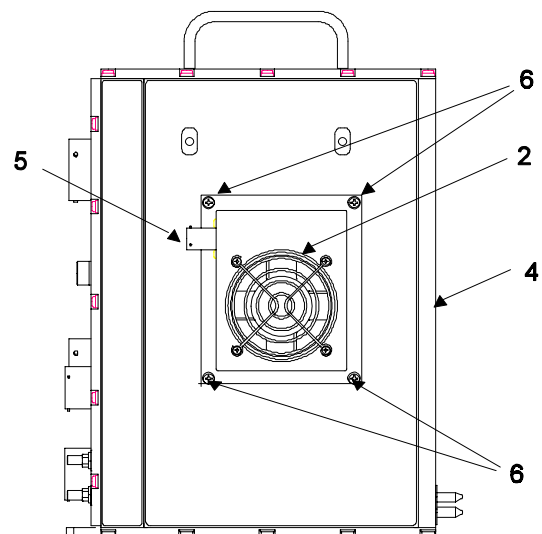
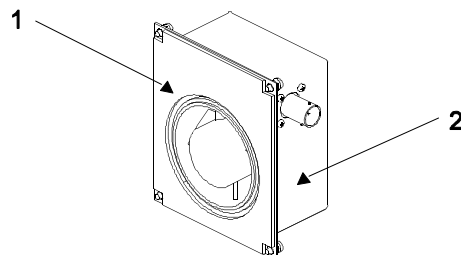
The IMCPU can be damaged if the blower assembly is installed upside down.

2. Position blower assembly (2) on IMCPU chassis so that J12 connector (5) is oriented towards the IMCPU connector panel.

3. Tighten four captive screws (6) on blower assembly (2) to 13 INCH-POUNDS.

INSPECT

END OF TASK



3-49. REMOVE AND INSTALL HANDLES

This task covers: Removal and installation of the handles on the IMCPU.

INITIAL SETUP

Applicable Configurations:

CD3

Tools:

- Torque Wrench
- Screwdriver Bit
- Electronic Equipment Tool Kit

Personnel Required:

- 68N Avionic Mechanic
- 68P Technical Inspector

Equipment Condition:

- Static control work station setup (3-18)
- IMCPU on bench
- No power applied
- Top cover removed (3-43)
- Circuit cards removed (3-43)
- Power supply removed (3-44)

General Safety Instructions:

CAUTION

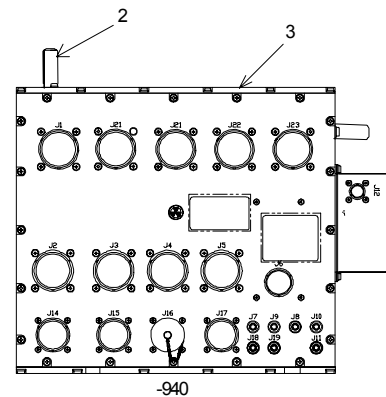
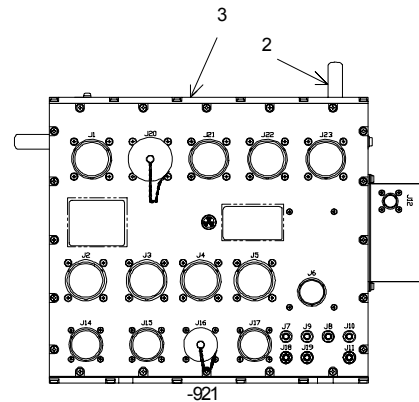
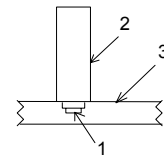
The IMCPU contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Procedure to remove and install handles (2) located on the left or right IMCPU cover assembly (3).

- a. Loosen two screws (1) securing the handle (2) to the cover assembly (3).
- b. Remove handle (2) from cover assembly (3). Carefully position handle (2) to one side to clear work area.
- c. Position replacement handle (2) on cover assembly (3).
- d. Tighten two screws (1) to secure the handle (2) to the cover assembly (3) to 13 INCH-POUNDS.

INSPECT

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3-49. REMOVE AND INSTALL HANDLES (CONT)

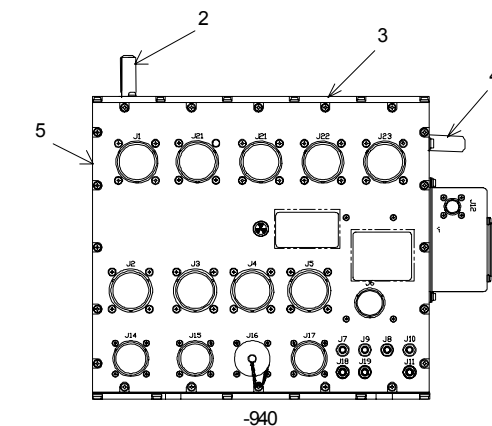
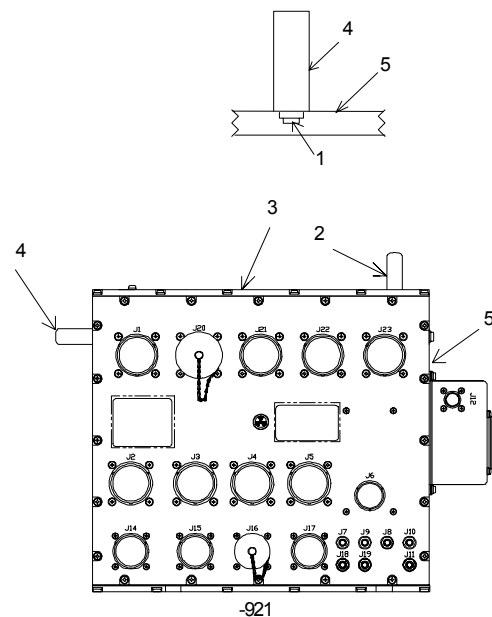
2. Procedure to remove and install handles (4) located on the left or right IMCPU chassis (5).

a. Loosen two screws (1) securing the handle (4) to the IMCPU chassis (5).

b. Remove handle (4) from IMCPU chassis (5). Carefully position handle (4) to one side to clear work area.

c. Position replacement handle (4) on IMCPU chassis (5).

d. Tighten two screws (1) to secure the handle (4) to the IMCPU chassis (5) to 13 INCH-POUNDS.



INSPECT

END OF TASK

CHAPTER 4

MULTIFUNCTION DISPLAY - MAINTENANCE

Section I	Principles/Theory of Operation	4-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	4-6
Section III	Service Upon Receipt	4-6
Section IV	Troubleshooting	4-6
Section V	Maintenance Procedures	4-7

Section I

PRINCIPLES/THEORY OF OPERATION

4-1. PRINCIPLES OF OPERATION

The MFD is a multipurpose, high resolution, Cathode Ray Tube (CRT) video display. It has a 875 line per frame raster scan. The CDS has two MFDs. They mount in the cockpit instrument panel, on the left and right sides, in front of the pilot and observer. Electronically generated flight displays and data displays are produced on the MFD from video signals supplied by the CDS MCPU or IMCPU. Each MFD operates independently of the other MFD. Each MFD receives video signals from both MCPUs or IMCPUs and can be driven by either signal. For each MFD, one MCPU or IMCPU supplies PRIMARY VIDEO and the other MCPU or IMCPU supplies backup (BKUP) VIDEO. Each MFD has a switch for choosing which MCPU or IMCPU will drive the MFD. Normally, PRIMARY VIDEO is supplied to each MFD by the MCPU or IMCPU located on the same side of the helicopter (left or right) the MFD is on, and BKUP VIDEO is supplied from the opposite side MCPU or IMCPU. However, in the OH-58D, the primary video is routed through the VTR CCA in the ISP for video tape recording and playback purposes. If IMCPUs are installed, the VTR CCA is located in the left IMCPU.

The CDS has nine primary display modes, each with multiple submodes and display functions. The desired mode and function for each MFD are selected through 14 push button switches on a bezel on the front of each MFD. In the CDS, displays on the MFD are page type computer displays. Some displays have a graphic format; others have a menu format.

4-2. FUNCTIONAL DESCRIPTION

The MFD has three plug-in circuit cards, three dc power supplies, a bezel framed 20,000-volt CRT, and a box-type metal chassis. A soft, thin contrast filter is bonded to the CRT faceplate over the outside surface of the CRT display screen.

The Horizontal Deflection CCAs (A1) primary function is to provide the proper signal used to drive the electron beam from the CRT electron gun in a horizontal direction. It also provides for automatic and manual contrast control.

The Video Processor CCAs (A2) main function is to strip the incoming composite video signal (video, horizontal sync, and vertical sync pulses) into its three components. The brightness and contrast are mixed with the video and this signal is used to drive the cathode of the electron gun. The horizontal sync signal is directed to the horizontal deflection CCA. The vertical sync signal is directed to the vertical deflection CCA. Other functions include: Video channel selection, internal/external video selection, Contrast and brightness controlling circuitry, brightness overdrive protection, vertical retrace control (blanking), video display control, sync stripping and generation, and BIT circuitry.

The Vertical Deflection CCAs (A3) produces the vertical deflection pulse for control of the electron beam from the top to bottom trace. It directly interfaces to the Y deflection yoke. Other functions include: horizontal and vertical sync detection, horizontal and vertical sync

regeneration, horizontal and vertical sync timing, vertical voltage ramp generator, linearity correction, and BIT circuitry.

The Low Voltage Power Supply (LVPS) (A4) converts +28V dc aircraft bus power to the power used by the MFD circuitry. Primary power passes through an EMI filter first. The Multiple outputs (+6.3V, $\pm 11V$, +5V, ± 15 , +40V, -80V, +90V) are bussed to the motherboard and distributed to the remainder of the system. The LVPS provides all power for the MFD except the 115V ac, 400 Hz used for bezel lighting.

The High Voltage Power Supply (HVPS) (A5) provides the anode voltage (20 kv) for the CRT. It consists of a pulse width regulator CCA and a multiplier module. This module contains the transformer, high voltage multiplier chain, and all other high voltage circuitry. A high-impedance resistor divider within the potted module provides feedback to the regulator.

The Focus Power Supply (FOCPS) (A6) provides the CRT focus electrode with the proper voltage (3,000 - 5,000 volts). It consists of the same two basic functional blocks as HVPS with two additional functions: (1) average brightness and (2) dynamic focus terms are both folded into the FOCPS output. This dynamic focus term provides correction for the nonspherical CRT phosphor plane as viewed from the point of deflection in the CRT neck.

4-3. EQUIPMENT DATA

Weight: 20.1 pounds

Overall Dimensions:

Height: 8.6 inches

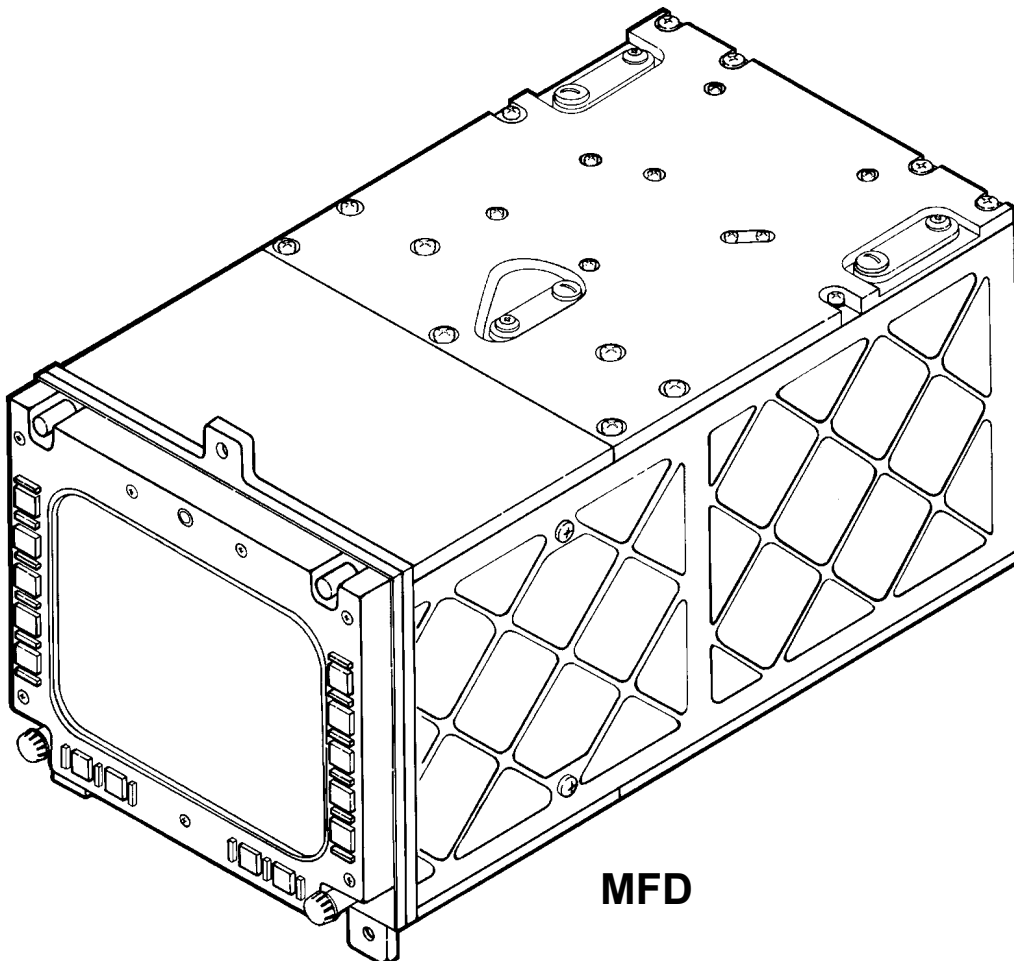
Width: 8.1 inches

Length: 17.0 inches

Electrical Power Requirements:

115 VAC, 400 Hz, .15A, single phase

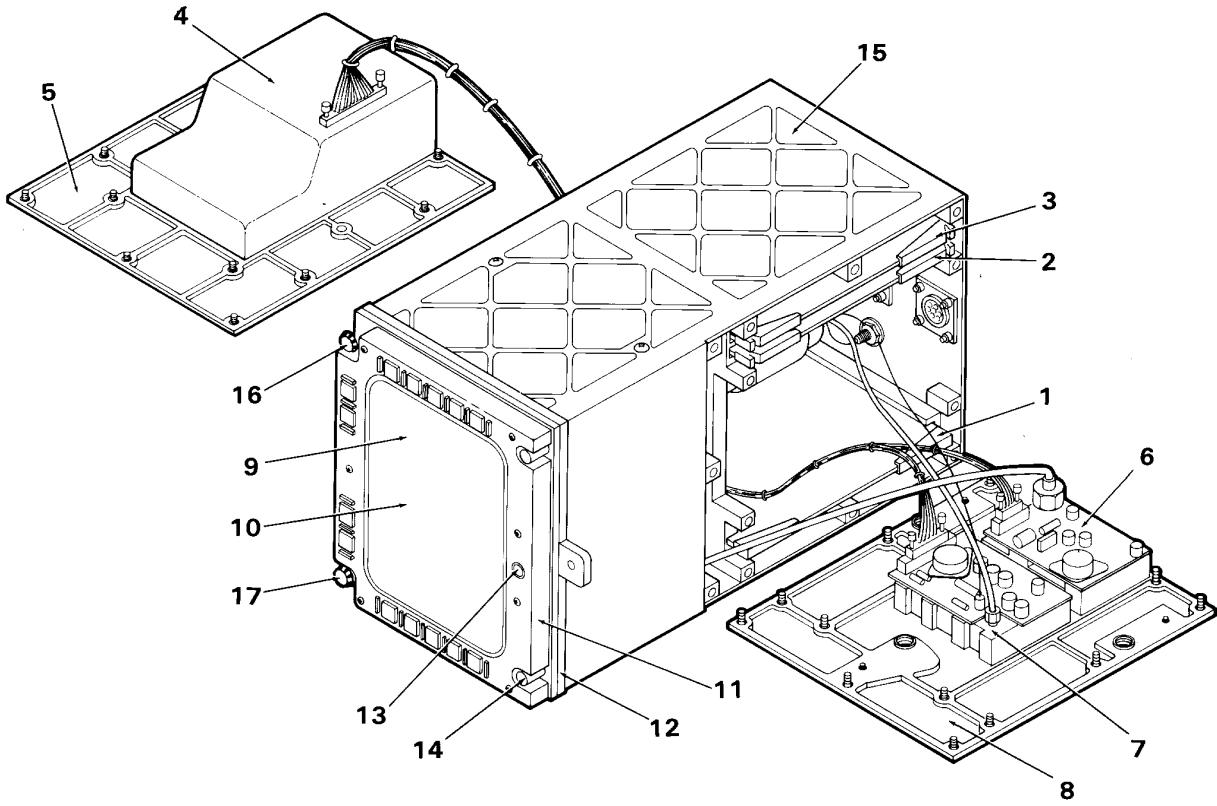
+28 VDC, 3.5A



MFD

4-4. SUBASSEMBLY LIST/NOMENCLATURE CROSS-REFERENCE

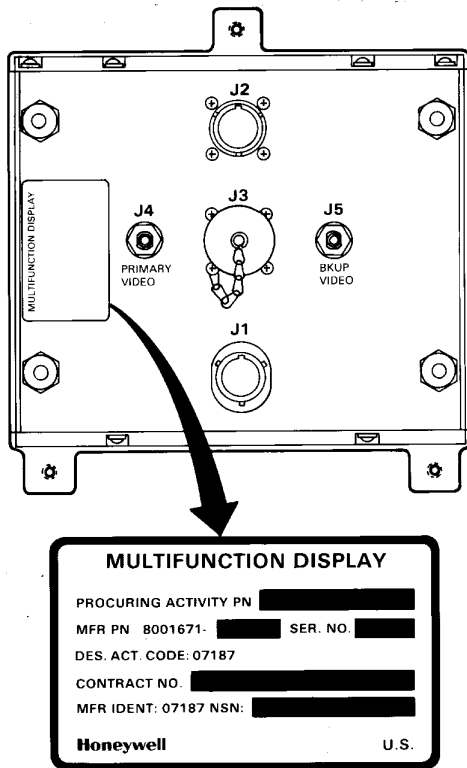
INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NO.
1	Circuit Card A1	A1	Circuit Card Assembly, Horizontal Deflection	8001710-901
2	Circuit Card A2	A2	Circuit Card Assembly, Video Processor	8001735-902
3	Circuit Card A3	A3	Circuit Card Assembly, Vertical Deflection	8001711-901
4	Low Voltage Power Supply	A4	Power Supply, Low Voltage	8001870-902
5	Bottom Cover	None	Cover Assembly, Bottom	8002092
6	High Voltage Supply	A5	Power Supply, High Voltage	8001673-901
7	Focus Power Supply	A6	Power Supply, Focus	8001674-901
8	Top Cover	None	Cover Assembly, Top	8001845
9	CRT	A7	Electron Tube and Yoke Assembly	8001672-901
10	Contrast Filter	A7V1	Electron Tube and Filter Assembly	8001675-901
11	Bezel	A10	Bezel Assembly	8516703
12	Bezel Mounting Plate	A8	Plate Assembly, Bezel Mounting	8001746-901
13	Fault Indicator (To Be Replaced by Nylon Plug)	A8L1	Indicator, Electro Magnet Latching	
14	Light Sensor (2)	A8U1	Microcircuit, Linear	8502059-901
		A8U2	Microcircuit, Linear	8502059-902
15	Chassis	A9	Chassis, Electrical Equipment	8001748-902
16	Brightness Control Knob	None	Knob, Brightness Control	8001858-901
17	Contrast Control Knob	None	Knob, Contrast Control	8001858-902



MFD

4-5. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

The MFD identification plate is located on the rear panel of the MFD.



4-6. SAFETY, CARE, AND HANDLING

Personal Safety:

The two main dangers for personnel to guard against while working on the MFD are accidental electrical shock and CRT implosion.

To avoid accidental electrical shock, never perform maintenance on the MFD while power is applied to the unit. Work carefully so as not to trigger CRT implosion. Pay strict attention to the CRT safety precautions as listed in tasks 4-21 thru 4-27. Always observe General Safety Instructions stated in Initial Setup tables for maintenance tasks.

Never store CRT in areas where expansion/contraction due to excessive temperatures could trigger CRT implosion. Safe temperature range is from +210 degrees F to -140 degrees F.

MFD Care and Handling:

To protect the MFD from Electrostatic Discharge (ESD) during maintenance (Section V), observe these general precautions:

Never perform maintenance of the MFD unless the unit is on a static control grounded work bench.

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks.

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the MFD from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not scratch or mar CRT contrast filter.
- Do not expose to strong electromagnetic fields.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow chemical corrosion to go untreated.
- Do not probe connector pins or receptacles.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-7. COMMON TOOLS AND EQUIPMENT

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

4-8. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

The Test Support System (TSS) and Test Program Sets (TPS) (refer to TM 9-4935-780-13-1) or the Base Shop Test Facility/Base Shop Test Station (BSTF/BSTS) and CDS TPS (refer to TM 11-6625-778-13&P-1) provide the necessary equipment for testing and troubleshooting the MFD. No special tools or other support equipment are required. A foam pad and foam block are needed to protect the CRT when it is out of the MFD. Refer to Appendix C for manufacturing instructions.

Section III

SERVICE UPON RECEIPT

4-9. UNPACKING INSTRUCTIONS

The MFD and each of its Shop Replaceable Units (SRUs) are shipped in reusable containers.

Be careful not to damage the shipping container when unpacking a unit.

Save the shipping container(s) and packaging materials for use when:

- a. Repaired MFD is repacked for shipment to AVUM.
- b. AVIM non-repairable MFD is repacked for shipment to depot repair.

- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

4-10. CHECKING UNPACKED EQUIPMENT

- a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.
- b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies per the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

4-11. SCOPE

This section contains information on testing and troubleshooting a defective MFD.

4-12. TEST AND TROUBLESHOOT

Preparation and setup for testing a MFD is contained in TM 9-4935-780-13-1, or to TM 11-6625-778-13&P-1.

Prior to running a diagnostic test, visually check the MFD for physical damage. Refer to 4-14. If the MFD passes visual check, proceed with the test. If the MFD does not pass visual check, repair the unit.

While a diagnostic test is being run, operator actions will appear on the TSS, or the Base Shop Test Facility/Base Shop Test Station (BSTF/BSTS) display. The operator is to respond to these prompts.

If the MFD passes the test, return the MFD to AVUM. If the MFD fails the test, replace the SRU indicated by the TSS, or BSTF/BSTS printout.

After SRU replacement, retest the MFD. If the MFD fails the test a second time, and the TSS, or BSTF/BSTS printout indicates that the same SRU is faulty, send the MFD to depot repair. If the TSS, or BSTF/BSTS printout indicates that a different SRU is faulty, replace the newly suspected SRU.

Section V

MAINTENANCE PROCEDURES

4-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform the necessary replacement

tasks indicated by List of Tasks to repair the defective MFD. For general aircraft maintenance practices, refer to TM 1-1500-204-23 or TM 55-1500-323-24.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove Multifunction Display	4-15	4-11
Install Multifunction Display	4-16	4-13
Remove and Install Multifunction Display Knobs	4-17	4-15
Clean and Inspect Multifunction Display	4-18	4-17
Remove Top Cover	4-19	4-19
Remove Circuit Cards A1, A2, A3	4-20	4-22
Remove Low Voltage Power Supply	4-21	4-25
Low Voltage Power Supply Inspection	4-22	4-27
Remove Low Voltage Power Supply Circuit Card Assembly A4A2	4-23	4-28
Remove Low Voltage Power Supply Driver Assembly	4-24	4-30
Remove Low Voltage Power Supply Regulator Assembly and CCA A4A1	4-25	4-31
Remove High Voltage Power Supply	4-26	4-33
Remove Focus Power Supply	4-27	4-34
Remove Bezel	4-28	4-35
Remove Bezel Mounting Plate	4-29	4-41
Remove CRT	4-30	4-47
Remove Brightness and Contrast Control Switch Assemblies	4-31	4-53
Install Brightness and Contrast Control Switch Assemblies	4-32	4-56
Connect Bezel to Harness Assembly	4-33	4-59
Connect Bezel Mounting Plate to Motherboard	4-34	4-61
Slide CRT into Chassis	4-35	4-63
Install CRT	4-36	4-67
Install Bezel and Bezel Mounting Plate on Front of Multifunction Display	4-37	4-72
Install Focus Power Supply	4-38	4-74

LIST OF TASKS (CONT)

TASK TITLE	TASK NO.	PAGE NO.
Install High Voltage Power Supply	4-39	4-75
Install Low Voltage Power Supply Regulator Assembly and CCA A4A1	4-40	4-76
Install Low Voltage Power Supply Driver Assembly	4-41	4-79
Install Low Voltage Power Supply Circuit Card Assembly A4A2	4-42	4-81
Install Low Voltage Power Supply	4-43	4-83
Install Circuit Cards A1, A2, A3	4-44	4-85
Install Top Cover	4-45	4-88
Align Multifunction Display	4-46	4-92
Remove and Install Plug Retaining Strap	4-47	4-98

4-14. VISUAL CHECKS

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions listed in the checklist below.

Visually check the MFD to determine if it is in good physical condition. Go through the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, bent or broken?	Repair as required.
2. Is any connector loose?	Tighten connector hardware.
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits, similar to dust?	Refer to task 4-18.
5. Do any screws appear reddish-brown?	Refer to task 4-18.
6. Does the external chassis surface of the LRU contain white or gray powdery deposits, similar to dust?	Refer to task 4-18.
7. Does the external chassis surface appear rough or frosted?	Refer to task 4-18.
8. Does the external chassis surface appear dull?	Refer to task 4-18.
9. Does the external chassis surface contain tiny pits or holes?	Refer to task 4-18.
10. Does the external chassis surface appear to be swelling or lifting up?	Refer to task 4-18.
11. Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 4-18.
12. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 4-18.
13. Is paint discolored?	Refer to task 4-18.
14. Is paint cracked or chipped?	Refer to task 4-18.

Visual Checks (CONT)

	CONDITION	IF YES
15.	Does the external chassis surface need cleaning?	Refer to task 4-18.
16.	Are any of the three mounting flanges broken?	Depot repair required.
17.	Is the external surface dented, cracked or, punctured at all?	Repair as required.
18.	Is the external chassis surface scratched or gouged at all?	Refer to task 4-18.
19.	Is bezel frame cracked, chipped or, dented at all?	Replace bezel.
20.	DELETED	
21.	Are any of the bezel switch guards (raised plastic ribs) broken?	Replace bezel.
22.	Is any bezel switch cracked, chipped or broken?	Replace bezel.
23.	DELETED	
24.	Is the stenciling in the lower corners of the bezel worn to a point it cannot be read?	Replace bezel.
25.	Push and release each bezel switch. Check for positive snap action tactile feedback with no sticking or excessive rocking.	
	Has any switch failed mechanical check?	Replace bezel.
26.	Does brightness control knob need replacing (missing, broken, worn lettering)?	Replace knob.
27.	Is brightness control shaft bent or broken?	Replace brightness control switch assembly.
28.	Does contrast control knob need replacing (missing, broken, worn lettering)?	Replace knob.
29.	Is contrast control shaft bent or broken?	Replace contrast control switch assembly.
30.	Is either of the two light sensors on the bezel mounting plate broken, loose, or dented at all?	Replace bezel mounting plate.
31.	Is face of sensor scratched or marred at all?	Replace bezel mounting
32.	Is CRT faceplate chipped, cracked, or broken?	Replace CRT.
33.	Does CRT faceplate need to be cleaned and polished?	Refer to task 4-18.
34.	Look for scratches on contrast filter on CRT faceplate. Is any scratch longer than 1 inch or wider than 0.004 inch?	Replace CRT.
35.	Does contrast filter on CRT faceplate look like it is distorted?	Have TSS, or equivalent, check picture clarity.
36.	Are any of the four guide posts on rear panel loose?	Tighten guide post nut.

Visual Checks (CONT)

CONDITION	IF YES
37. Are any of the guide posts bent, cracked, broken or missing?	Repair as required.
38. Is J3 connector dust cap missing?	Repair as required.
39. Is J3 connector dust cap damaged to the point that it will no longer mate with J3 connector?	Repair as required.
40. Is dust cap chain missing or broken?	Replace chain.

4-15. REMOVE MULTIFUNCTION DISPLAY (MFD)

This task covers: Removal of Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Personnel Required:

68N Avionic Mechanic

References:

- TM 1-1520-248-23

General Safety Instruction:

General Safety Warning

1

WARNING

Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the faceplate.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT faceplate.
3. Do not put fingers on CRT faceplate.

WARNING

There is a danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode.

GO TO NEXT PAGE

4-15. REMOVE MULTIFUNCTION DISPLAY (CONT)

1. Open left or right crew door (refer to TM 1-1520-248-23) to gain access to applicable MFD (1).

2. Remove three screws (2).

CAUTION

To avoid damaging MFD cables, do not pull MFD out from instrument panel more than five inches.

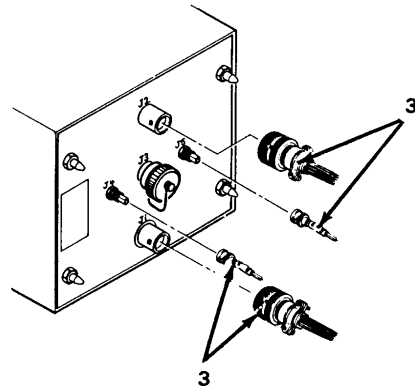
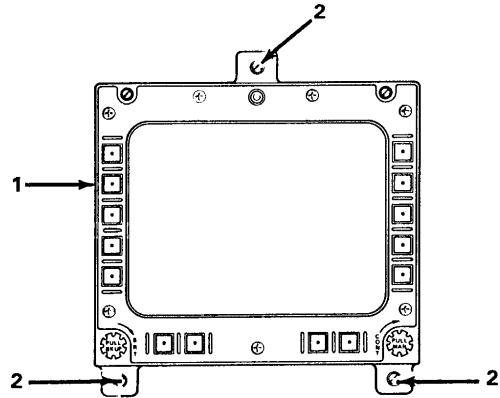
3. Slide MFD (1) partially out of instrument panel to gain access to four rear connectors (3).

4. Reach under instrument panel. Tag and identify four rear connectors (3).

5. Disconnect four rear connectors (3).

6. Remove MFD (1).

7. Close crew door opened in step 1.



END OF TASK

4-16. INSTALL MULTIFUNCTION DISPLAY

This task covers: Installation of Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

- TM 1-1520-248-23

General Safety Instruction:



General Safety Warning

1

WARNING

Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the faceplate.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT faceplate.
3. Do not put fingers on CRT faceplate.

WARNING

There is a danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode.

GO TO NEXT PAGE

4-16. INSTALL MULTIFUNCTION DISPLAY (CONT)

1. Open left or right crew door (refer to TM 1-1520-248-23) to gain access to applicable MFD mounting area.

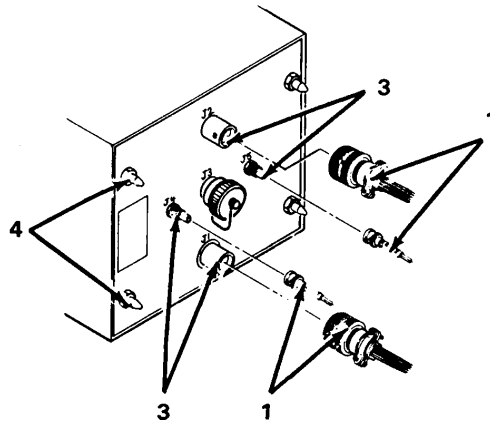
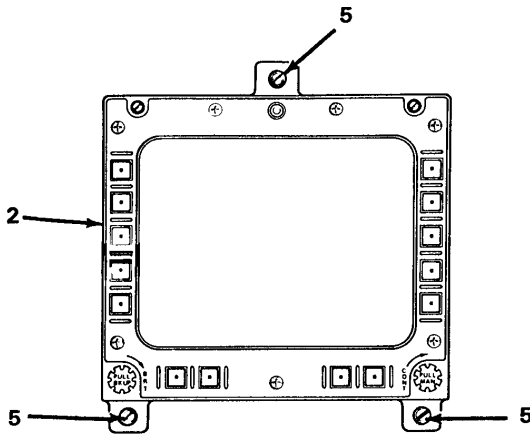
2. Visually inspect four connectors (1) for missing or bent pins, corrosion or cracked housing.

3. Partially slide MFD (2) into mounting area. Reach under instrument panel and mate four tagged connectors (1) to mating connectors (3) from the top down.

4. Continue sliding MFD (2) into instrument panel and align mounting pins (4) with mounting holes.

5. Install three screws (5).

6. Close crew door opened in step 1.



INSPECT

FOLLOW-ON MAINTENANCE

Perform operational checks:

Test and Troubleshoot Procedure, paragraph 2-5.

END OF TASK

4-17. REMOVE AND INSTALL MULTIFUNCTION DISPLAY KNOBS

This task covers: Replacement of the brightness and contrast control knobs on the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

Equipment Condition:

No power applied

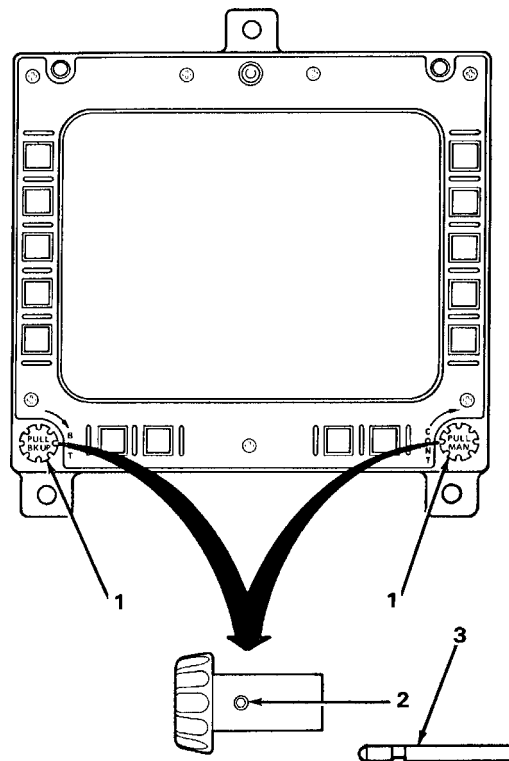
General Safety Instructions:

General Safety Warning

1

REMOVAL

1. Pull knob (1) outward.
2. Loosen two knob setscrews (2).
3. Slide knob (1) off switch shaft (3).



GO TO NEXT PAGE

4-17. REMOVE AND INSTALL MULTIFUNCTION DISPLAY KNOBS (CONT)

INSTALLATION

1. Adjust both knob setscrews (2) so their bottoms are flush with outside surface of shaft hole (4).

CAUTION

Check alignment of bezel and bezel mounting plate before installing knob over switch shaft. Binding of switch shaft may result if alignment is incorrect.

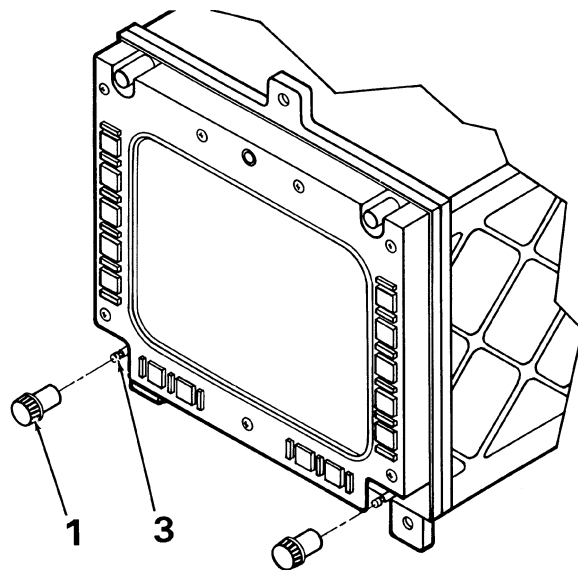
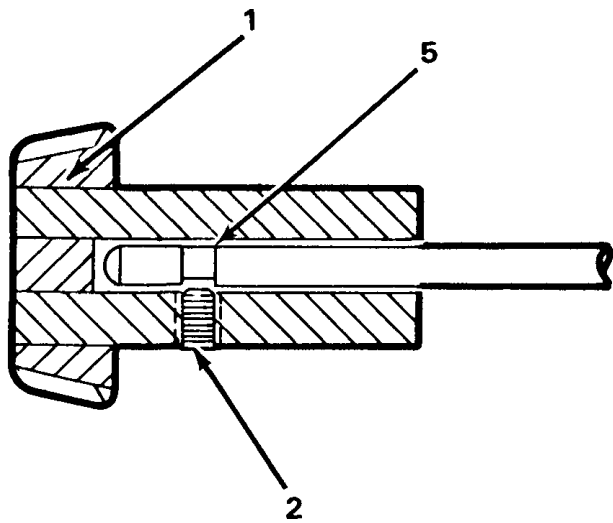
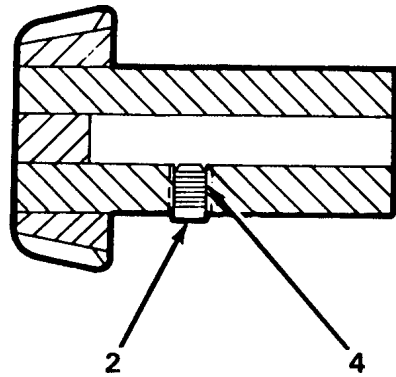
NOTE

The PULL BKUP knob goes on the BRT switch; the PULL MAN knob on the CONT switch.

2. Slide knob (1) onto switch shaft (3).
3. Tighten setscrews (2) slightly and move knob (1) in and out until setscrews (2) are over flat spots (5) on switch shaft (3).
4. Fully tighten the setscrews (2).
5. Check manual operation of switch:
 - a. Turns clockwise and counter clockwise without binding.
 - b. Positive push-pull detents.
6. Reset switch knob (1) if necessary and repeat step 5.

INSPECT

END OF TASK



4-18. CLEAN AND INSPECT MULTIFUNCTION DISPLAY

This task covers: General external cleaning and inspection procedures for the bezel, CRT and chassis.

INITIAL SETUP

Applicable Configurations:

All



Isopropyl Alcohol

3

Tools:

- Safety Goggles
- Chip Guards
- Enco Model 310 (or equivalent)

Materials:

- Clean Soft Cloth (C1) (or equivalent)
- Cotton Swab (C2) (or equivalent)
- Mild Hand Soap (C4) (or equivalent)
- Isopropyl Alcohol (C3) (or equivalent)

WARNING

There is danger of tube implosion if CRT is exposed to abrupt temperature change. Rapid expansion/contraction of CRT glass envelope may cause the tube to crack or burst. Do not spray aerosol cleaners on the CRT and do not use hot air blower to dry cleaned areas.



Compressed Air

2

Equipment Condition:

No power applied

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1500-343-23

CAUTION

Use of cleaning solvents on the bezel is not recommended. Application of cleaning solvents may harm the plastic bezel housing and the rubber seals surrounding the bezel switches.

Do not use compressed air to remove dust from bezel. Compressed air may damage the rubber switch seals.

General Safety Instructions:



General Safety Warning

1

Use of cleaning solvents on electrical parts is not recommended. Application of cleaning solvents, particularly to areas of dense wiring, may cause damage. Prevent the entrance of water or other solvents into electrical components, ducts or other openings to avoid damaging the equipment.

Use of unapproved cleaning material may damage the thin, soft, filter coating on the CRT faceplate.

GO TO NEXT PAGE

4-18. CLEAN AND INSPECT MULTIFUNCTION DISPLAY (CONT)

BEZEL CLEANING

1. Brush loose dust and dirt off the bezel using a soft bristle brush.
2. Wipe off surface grime using water-dampened cotton swabs (C2) that have been brushed across a bar of mild soap (C4).
3. Rinse off soap film using isopropyl alcohol (C3).

CRT CLEANING

1. Moisten wiping cloth (C1) with isopropyl alcohol (C3). Gently, but thoroughly, wipe off CRT faceplate. Use a clean area on cloth (C1) as it picks up dirt and grime. Leave faceplate moistened and let it air dry.
2. When faceplate is completely dry, gently buff faceplate with clean dry wiping cloth (C1). Continue buffing until all streaks and smudges are removed. Avoid touching faceplate after it has been cleaned.

CHASSIS CLEANING

1. Remove dust and foreign matter with a clean soft wiping cloth (C1).
2. Clean painted surfaces with a cloth (C1) moistened with alcohol (C3).
3. Clean areas difficult to reach with a cotton swab (C2) dampened with alcohol (C3).

INSPECT

4. Inspect for evidence of corrosion. If detected, refer to TM 1-1500-343-23.

END OF TASK

4-19. REMOVE TOP COVER (AVIM)

This task covers: Removal of the top cover to obtain access inside the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station setup (3-18)
MFD on bench
No power applied

General Safety Instructions:

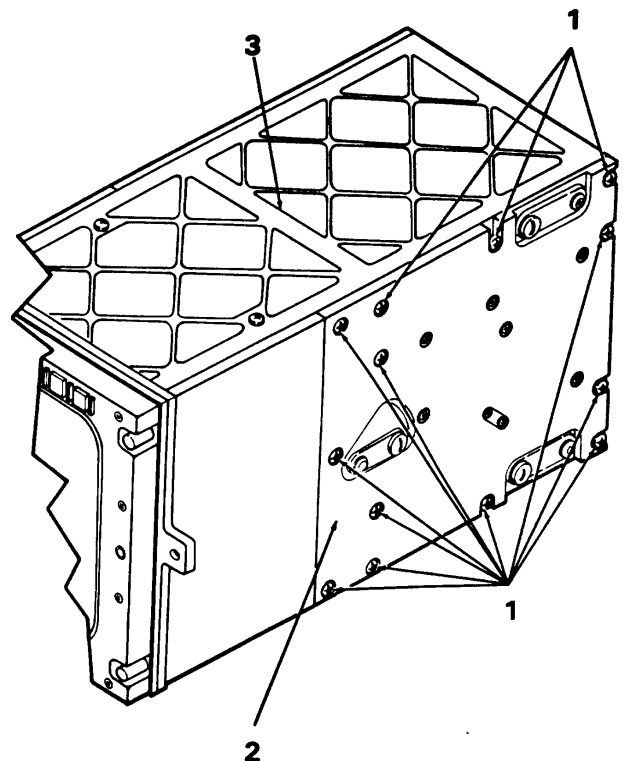
CAUTION

The MFD contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Turn MFD on its right side. Loosen 13 captive screws (1) that fasten top cover (2) to MFD (3).

CAUTION

There is internal wiring connected to the two cover-mounted power supplies. Be careful not to over-stress wire connections when lifting and moving top cover.



GO TO NEXT PAGE

4-19. REMOVE TOP COVER (AVIM) (CONT)

2. Open top cover (2) and set it next to MFD (3).

CAUTION

Anode lead connection on CRT may be damaged if anode lead (4) is pulled or stretched while disconnecting.

3. Unscrew red captive nut (5) and unplug white CRT anode lead (4) from high voltage power supply (6).

CAUTION

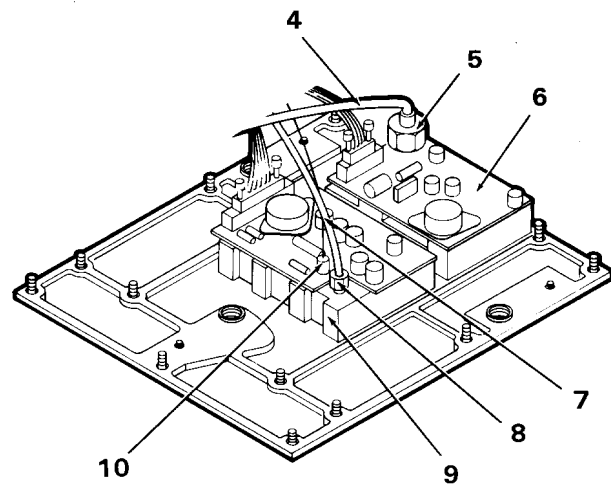
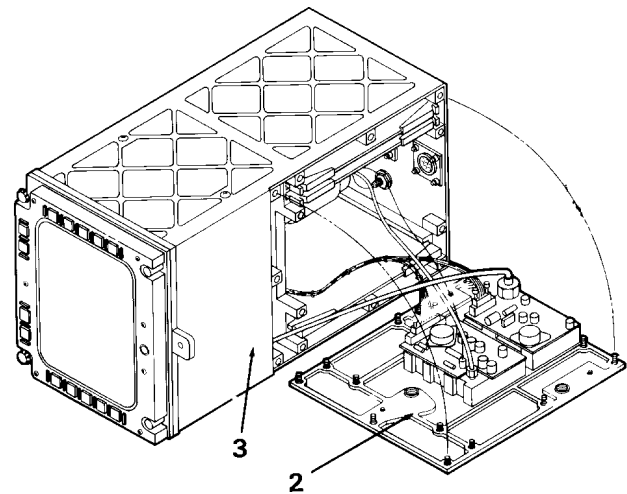
CRT focus lead connection on CRT may be damaged if focus lead (7) is stretched too much while disconnecting.

4. Unscrew green captive nut (8) and unplug CRT focus lead (7) from focus power supply (9).

CAUTION

CRT grid 2 lead (10) may be damaged while being disconnected. To avoid damaging lead, do not pull on lead. Pull on connector only.

5. Unplug connector of orange CRT grid 2 lead (10) from focus power supply (9).



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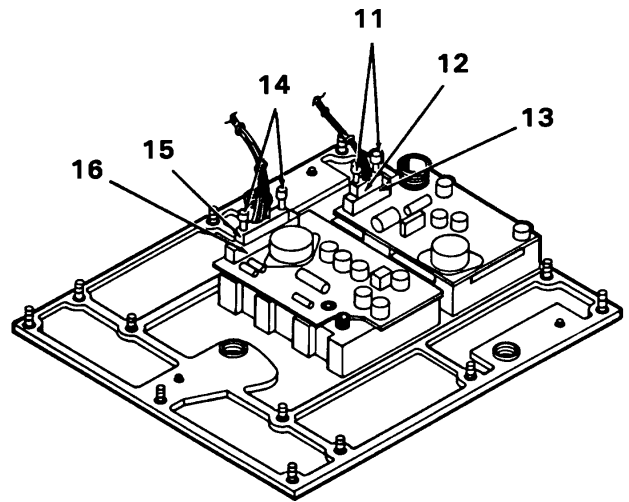
4-19. REMOVE TOP COVER (AVIM) (CONT)

6. Loosen two captive locking screws (11) on high voltage power supply harness connector (12) by unscrewing one side, then the other, a turn at a time.

7. Disconnect harness connector (12) from high voltage supply connector (13).

8. Loosen two captive locking screws (14) on focus power supply harness connector (15) by unscrewing one side, then the other, a turn at a time.

9. Disconnect harness connector (15) from focus power supply connector (16).

**CAUTION**

Power supply components may be physically damaged if weight is set on them. Always set the top cover flat side down so there is no weight on the power supplies. Do not set other objects on top of the power supplies.

10. Place top cover inside a static shielding bag (C7) to protect high voltage and focus power supplies from ESD while top cover is off.

END OF TASK

4-20. REMOVE CIRCUIT CARDS A1, A2, A3 (AVIM)

This task covers: Removal of circuit cards A1, A2 and A3 from the Multifunction Display (MFD). The procedure is basically the same for each circuit card.

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
 MFD on bench
 No power applied
 Top cover removed (4-19)

General Safety Instructions:

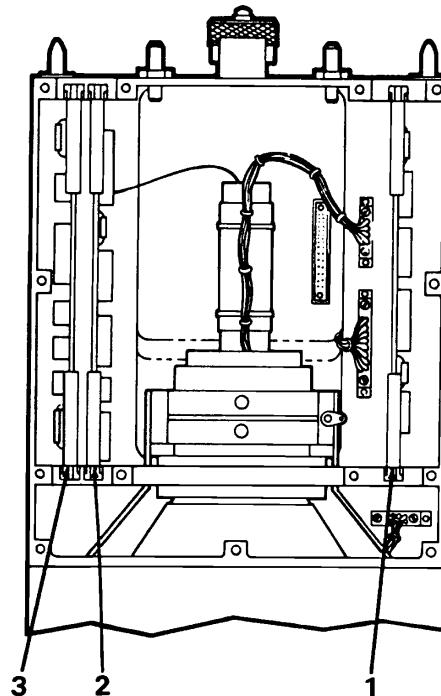
CAUTION

The circuit cards contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Turn MFD so it is sitting top side up on work surface.

2. Determine location of circuit card to be removed:

<u>Index No.</u>	<u>CKT Card</u>	<u>Name and Part No.</u>
1	A1	Horizontal Deflection Card PN 8001710-901
2	A2	Video Processor Card PN 8001735-902
3	A3	Vertical Deflection Card PN 8001711-901



GO TO NEXT PAGE

4-20. REMOVE CIRCUIT CARDS A1, A2, A3 (AVIM) (CONT)

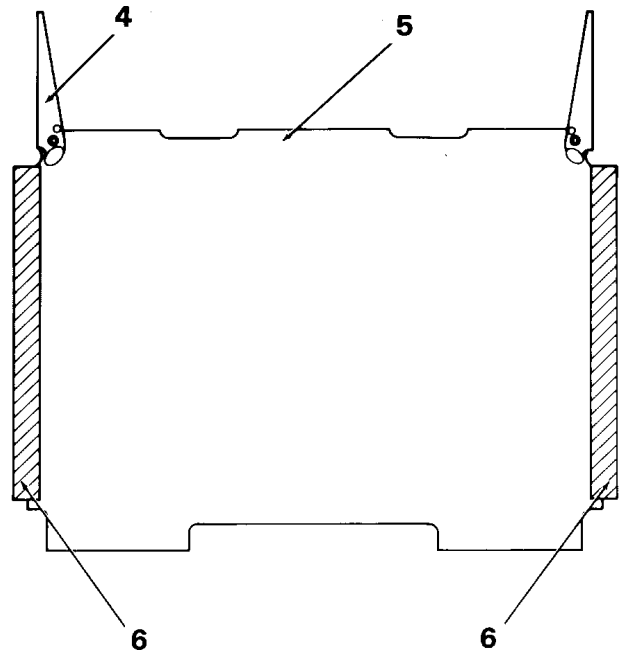
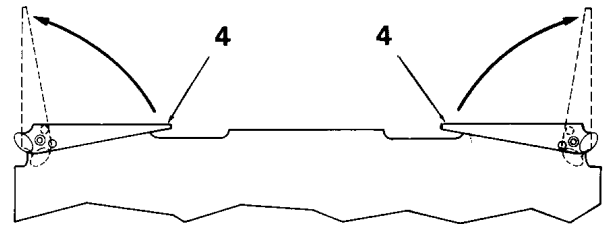
3. Lift up both card extractor levers (4) at the same time and pivot them outward until they are straight up. This will unplug the circuit card from the chassis motherboard connector.

CAUTION

The MFD circuit cards fit tightly in their card slots and may require considerable upward force to be removed. Attempt to pull straight up while removing circuit card. Do not hold any CCA components while pulling CCA out. If circuit card will not pull straight up, it may be necessary to walk it out by pulling slightly on one side, then the other. Take precaution that the circuit card does not crack or break while it is being removed.

4. To remove circuit card A1 or A3:

- a. Grip bottom of each card extractor (4) between thumb and index finger.
- b. Pull upward until circuit card (5) is out of its card slots (6).



GO TO NEXT PAGE

4-20. REMOVE CIRCUIT CARDS A1, A2, A3 (AVIM) (CONT)

5. To remove circuit card A2:

a. Grip bottom of each card extractor (4) between thumb and index finger.

b. Pull upward until circuit card (5) is about halfway out of its card slots (6).

CAUTION

CRT cathode lead can be damaged while being disconnected. To avoid damaging lead, do not pull on lead. Pull on connector only.

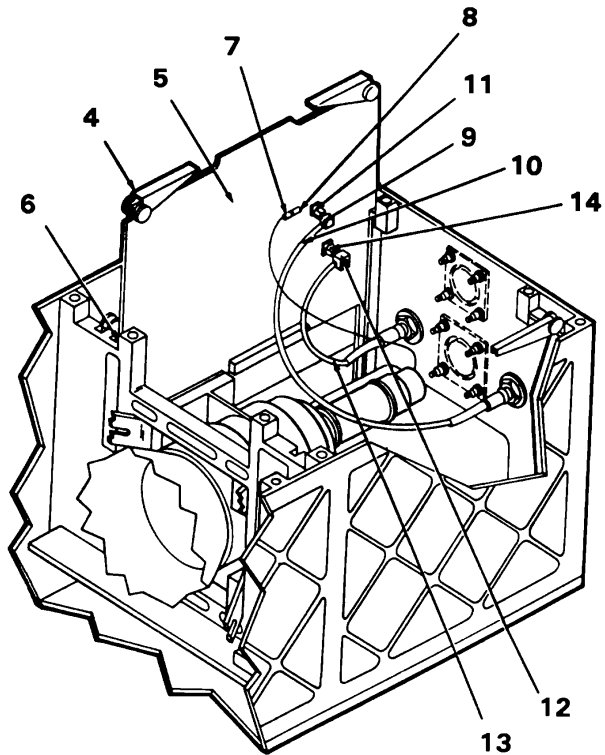
c. Unplug yellow CRT cathode lead connector (7) from connector (8) on circuit card (5).

d. Unscrew coax connector (9) of primary video cable (10) from connector (11) on circuit card (5).

e. Unscrew coax connector (12) of backup video cable (13) from connector (14) on circuit card (5).

f. Pull circuit card (5) the rest of the way out of its card slots (6).

6. Place removed circuit card in a static shielding bag (C7) to protect it from ESD.



END OF TASK

4-21. REMOVE LOW VOLTAGE POWER SUPPLY (AVIM)

This task covers: Removal of low voltage power supply from the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied

General Safety Instructions:

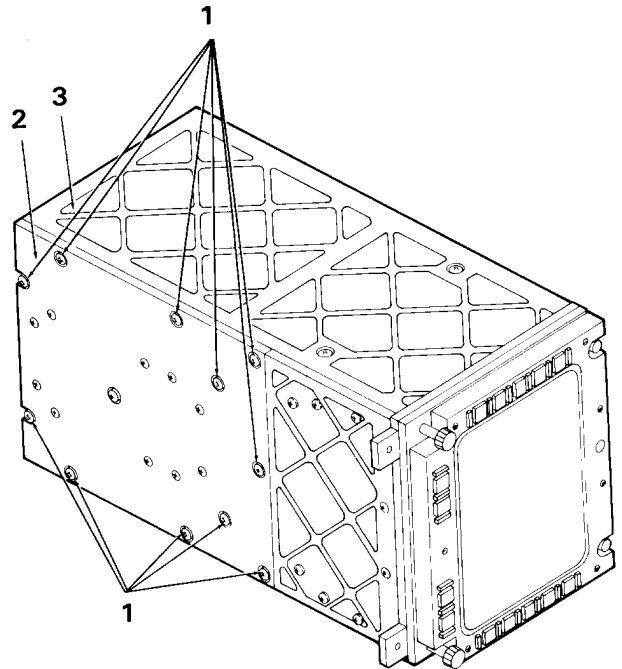
CAUTION

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

NOTE

Bottom cover of low voltage power supply is also bottom cover of MFD.

1. Turn MFD on its right side. Loosen 11 captive screws (1) that fasten bottom cover (2) to chassis (3).



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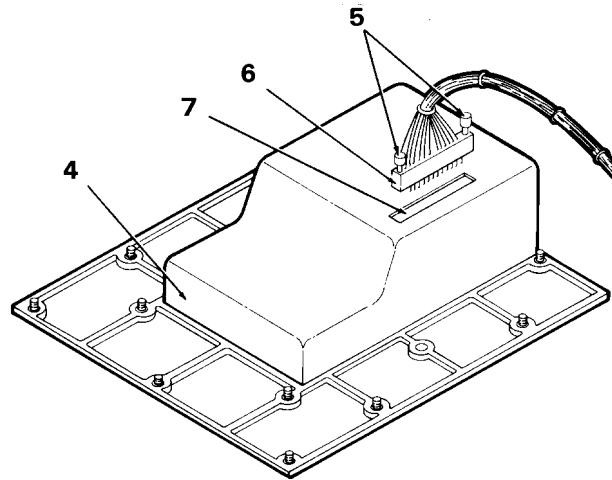
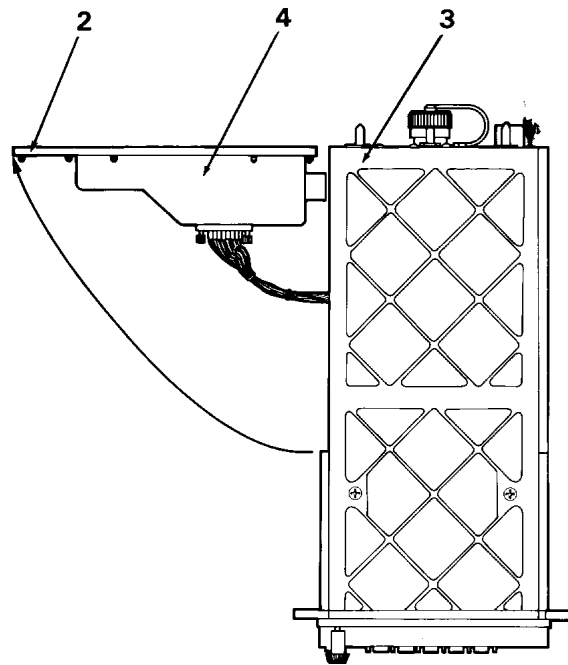
4-21. REMOVE LOW VOLTAGE POWER SUPPLY (AVIM) (CONT)

2. Pull front of cover (2) out from chassis (3). Pivot cover (2) out and back slowly until low voltage power supply (4) is out of MFD. Set cover down on bottom panel so that low voltage power supply is facing up.

3. Loosen two captive locking screws (5) on low voltage power supply harness connector (6) by unscrewing one side, then the other, a turn at a time.

4. Disconnect harness connector (6) from low voltage power supply connector (7).

5. Place low voltage power supply (4) in a static shielding bag (C7).



END OF TASK

4-22. LOW VOLTAGE POWER SUPPLY INSPECTION (AVIM)

This task covers: Inspection of Multifunction Display (MFD) low voltage power supply.

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

References:

■ TM 9-4935-780-13-1

Equipment Condition:

Static control work station set up (3-18)
Low voltage power supply removed (4-21)
No power applied

General Safety Instructions:**CAUTION**

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Test MFD on TSS, or equivalent.

■ a. If low voltage power supply fails either +5V test or +90V test (TM 9-4935-780-13-1), replace low voltage power supply regulator assembly (Task 4-25) and retest MFD.

b. If all tests fail, replace low voltage power supply CCA A4A2 (Task 4-23) and retest MFD.

c. If all tests still fail replace low voltage power supply driver assembly (Task 4-24) and low voltage power supply CCA A4A1 (Task 4-25) together and retest MFD.

END OF TASK

4-23. REMOVE LOW VOLTAGE POWER SUPPLY CIRCUIT CARD ASSEMBLY A4A2 (AVIM)

This task covers: Removal of circuit card assembly A4A2 from low voltage power supply of the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

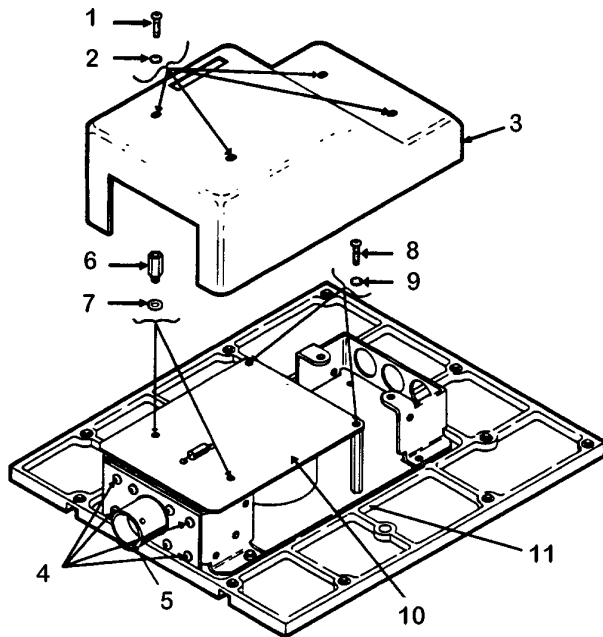
Static control work station set up (3-18)
Low voltage power supply removed (4-21)
No power applied

General Safety Instructions:

CAUTION

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove four screws (1) and four washers (2) from cover (3).
2. Loosen four outside screws (4) on connector plate attached to power supply driver assembly (5).
3. Lift cover (3) from low voltage power supply (11).
4. Remove two electrical-mechanical posts (6), two washers (7), two screws (8), and two washers (9) from circuit card assembly (10).



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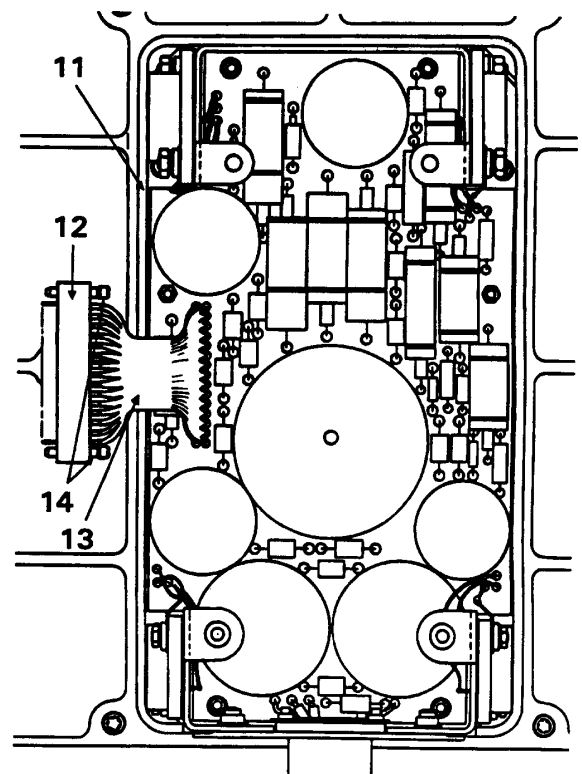
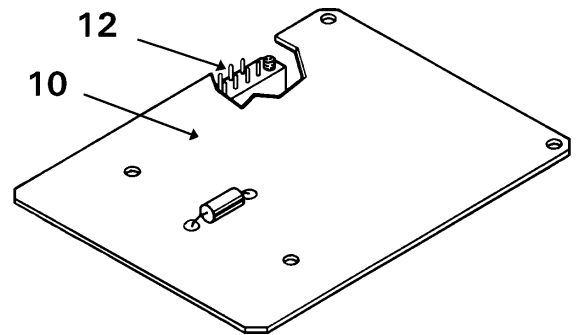
4-23. REMOVE LOW VOLTAGE POWER SUPPLY CIRCUIT CARD ASSEMBLY A4A2 (AVIM) (CONT)**CAUTION**

To prevent damage and stress to lead assembly, do not lift circuit card assembly more than three inches.

5. Carefully lift circuit card assembly (10) off low voltage power supply (11), and turn circuit card assembly over, exposing lead assembly connector (12).

6. Disconnect lead assembly (13) from circuit card assembly (10) by unscrewing two connector screws (14), alternatively turning one screw and then the other. Pull connector (12) away from circuit card assembly (10).

7. Place circuit card assembly (10) in a static shielding bag (C7).



END OF TASK

4-24. REMOVE LOW VOLTAGE POWER SUPPLY DRIVER ASSEMBLY (AVIM)

This task covers: Removal of driver assembly from low voltage power supply of the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
Low voltage power supply removed (4-21)
Low voltage power supply CCA A4A2 removed (4-23)
No power applied

General Safety Instructions:

CAUTION

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

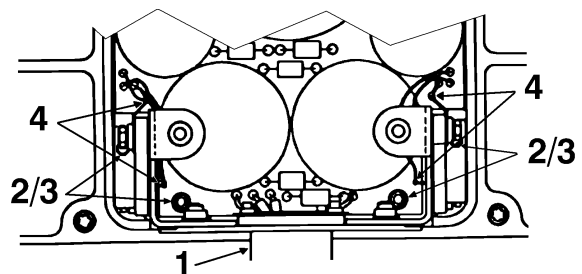
1. Remove low voltage power supply driver assembly (1) by removing four screws (2) and four nuts (3).

CAUTION

Use an approved low wattage soldering iron and heat shunt when unsoldering electronic components.

2. Tag, unsolder, and remove wires (4) connected to low voltage power supply driver assembly (1).

3. Place low voltage power supply driver assembly (1) in a static shielding bag (C7).



END OF TASK

4-25. REMOVE LOW VOLTAGE POWER SUPPLY REGULATOR ASSEMBLY AND CCA A4A1 (AVIM)

This task covers: Removal of regulator assembly and circuit card assembly A4A1 from low voltage power supply of the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
 Low voltage power supply removed (4-21)
 Low voltage power supply CCA A4A2 removed (4-23)
 Low voltage power supply driver assembly removed (4-24)
 No power applied

General Safety Instructions:

CAUTION

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

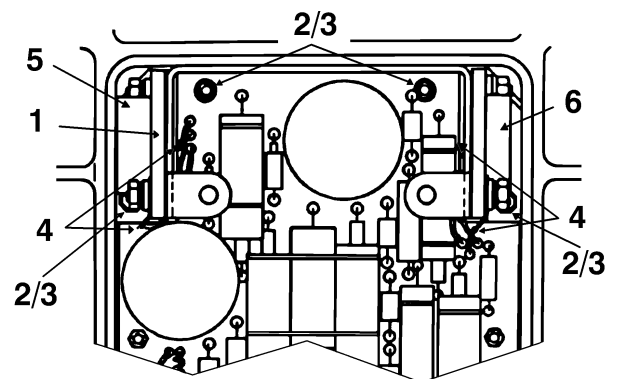
1. Remove low voltage power supply regulator assembly (1) by removing four screws (2), and four nuts (3).

CAUTION

Use an approved low wattage soldering iron and heat shunt when unsoldering electronic components.

2. Tag, unsolder, and remove wires (4) connected to two linear microcircuits (5) and (6) on low voltage power supply regulator assembly (1).

3. Place low voltage power supply regulator assembly (1) in a static shielding bag (C7).



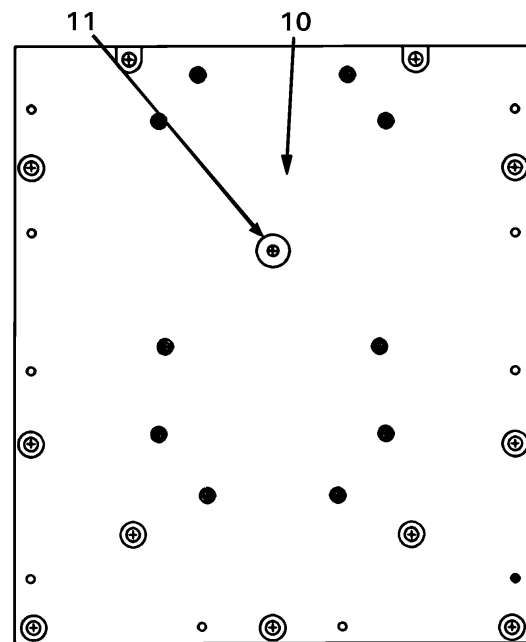
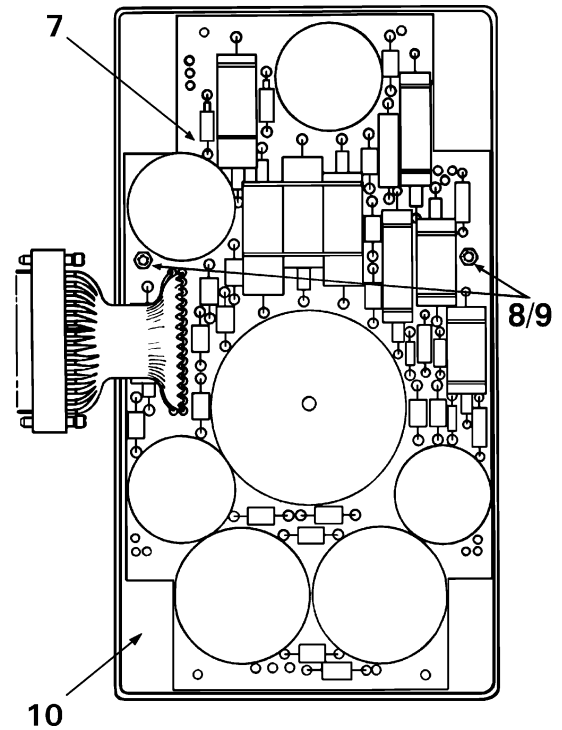
GO TO NEXT PAGE

4-25. REMOVE LOW VOLTAGE POWER SUPPLY REGULATOR ASSY AND CCA A4A1 (AVIM) (CONT)

4. Remove CCA A4A1 (7) from cover base (10) by removing two screws (8) and two posts (9).

5. On bottom of cover base (10), remove one machine screw (11).

6. Place CCA A4A1 (7) in a static shielding bag (C7).



LVPS Cover Base (Bottom)

END OF TASK

4-26. REMOVE HIGH VOLTAGE POWER SUPPLY (AVIM)

This task covers: Removal of high voltage power supply from the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied
Top cover removed (4-19)

General Safety Instructions:**CAUTION**

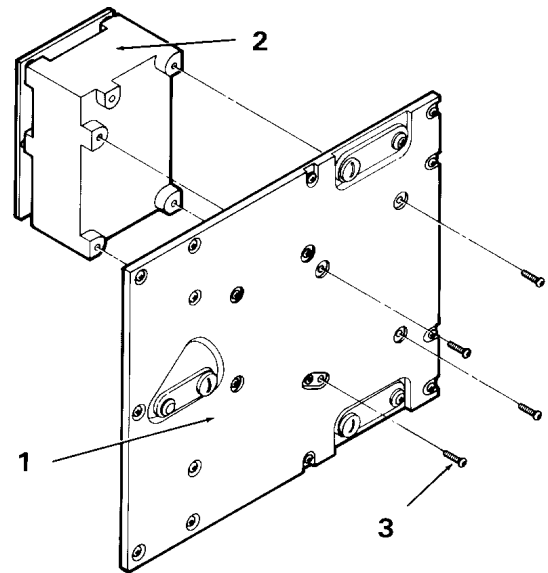
The MFD contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove top cover (1) from static shielding bag (C7).
2. Stand top cover (1) up on edge. Hold onto high voltage power supply (2) and remove its four mounting screws (3) from top side of cover (1).

CAUTION

Power supply components may be physically damaged if weight is set on them. Always set high voltage supply flat side down, and do not set other objects on top of it.

3. Put high voltage power supply in a static shielding bag (C7) to protect it from ESD.
4. Put top cover back in static shielding bag (C7) to protect focus power supply from ESD.

**END OF TASK**

4-27. REMOVE FOCUS POWER SUPPLY (AVIM)

This task covers: Removal of focus power supply from the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied
Top cover removed (4-19)

General Safety Instructions:

CAUTION

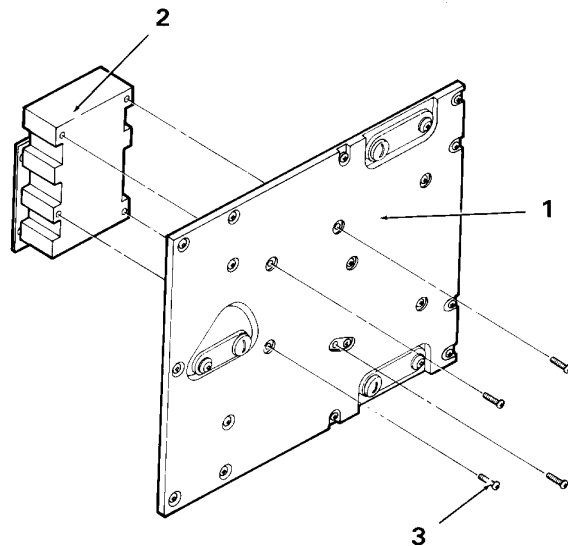
The MFD contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove top cover (1) from static shielding bag (C7).
2. Stand top cover (1) up on edge. Hold onto focus power supply (2) and remove its four mounting screws (3) from top side of cover (1).

CAUTION

Power supply components may be physically damaged if weight is set on them. Always set focus power supply flat side down, and do not set other objects on top of it.

3. Put focus power supply in a static shielding bag (C7) to protect it from ESD.
4. Put top cover back in static shielding bag (C7) to protect focus power supply from ESD.



END OF TASK

4-28. REMOVE BEZEL (AVIM)

This task covers: Removal of the bezel from the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)

MFD on bench, No power applied
Brightness and contrast knobs removed
(4-17)
Top cover removed (4-19)

General Safety Instructions:**WARNING**

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear

safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.

2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.

3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.

4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being slid out.

5. Be sure you have a secure hold on the CRT before you pick it up. Use the yoke mounting block and the area surrounding the outer front portion of the glass envelope as handhold locations. Do not put your hands over the face of the CRT to pick up or carry the CRT.

6. Never use the neck or any of the projecting leads as a means of picking up, holding, or carrying the CRT.

7. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.

8. Be careful not to scratch or mar the contrast filter on the face of the CRT.

9. Do not put fingers on contrast filter.

CAUTION

The two light sensors on the bezel mounting plate can be damaged by ESD. Proper handling and grounding techniques must be observed.

Excessive flexing or strain can break the small-gauge wires in the bundled wiring harnesses on the bezel. Take care to limit harness bending and strain after bezel is unfastened from front of MFD.

GO TO NEXT PAGE

4-28. REMOVE BEZEL (AVIM) (CONT)

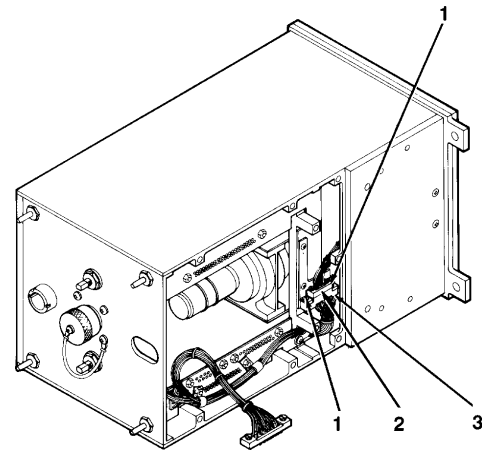
1. Remove Low Voltage Power Supply (Refer to Task 4-21).

2. With MFD still on right side, loosen two captive locking screws (1) on bezel harness connector (2) by unscrewing one side, then the other, one turn at a time.

3. Lift bezel harness connector (2) off harness assembly connector (3).

4. Turn MFD so it is sitting top side up on work surface.

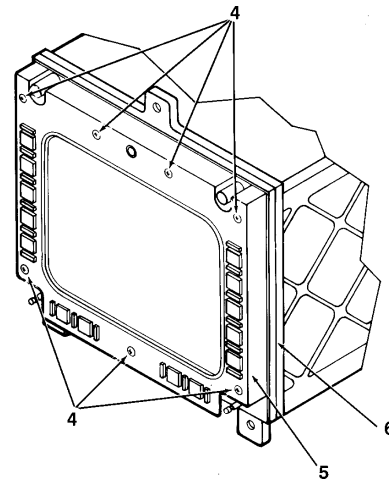
5. Unscrew seven captive screws (4) that hold bezel (5) on bezel mounting plate (6).



CAUTION

The bezel pigtail harness (7) can be damaged if you try to pull the bezel (5) straight out from the bezel mounting plate (6).

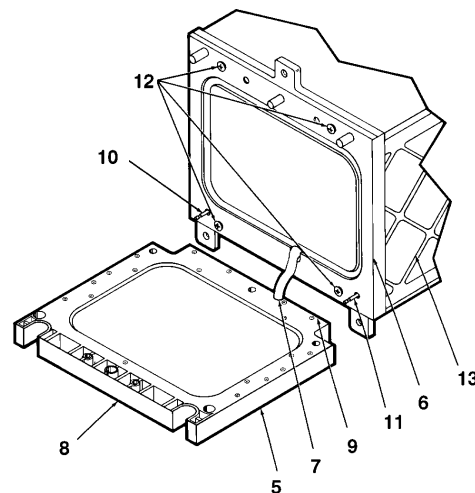
6. Tilt top of bezel (8) outward 2 to 3 inches. Gently pull bottom of bezel (9) outward about one inch. Lift bottom of bezel (9) straight up about 2 inches. Lay bezel (5) facedown in front of MFD.



CAUTION

While removing bezel mounting plate (6) be certain to pull it straight out to avoid bending or breaking switch shafts (10 and 11).

7. Remove four mounting screws (12) that hold bezel mounting plate (6) to chassis (13). Slide bezel mounting plate (6) forward off shafts (10 and 11).



GO TO NEXT PAGE

4-28. REMOVE BEZEL (AVIM) (CONT)

8. Tilt bezel (5) sideways and pass it through opening in bezel mounting plate (6).

9. Set bezel (5) facedown in front of MFD.

10. Set bezel mounting plate (6) off to right side of chassis (13).

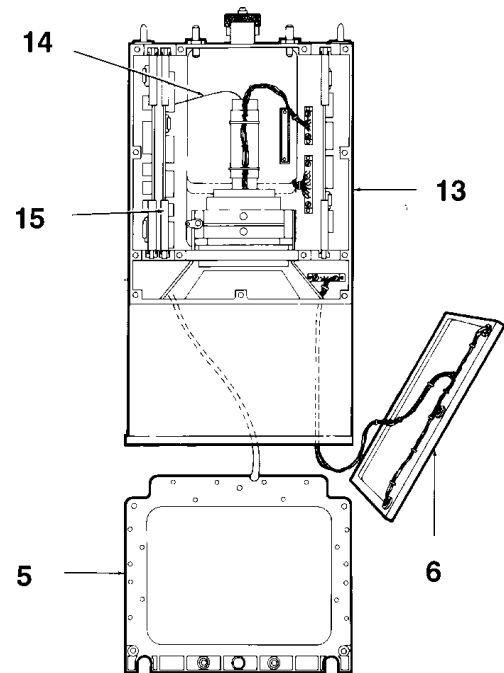
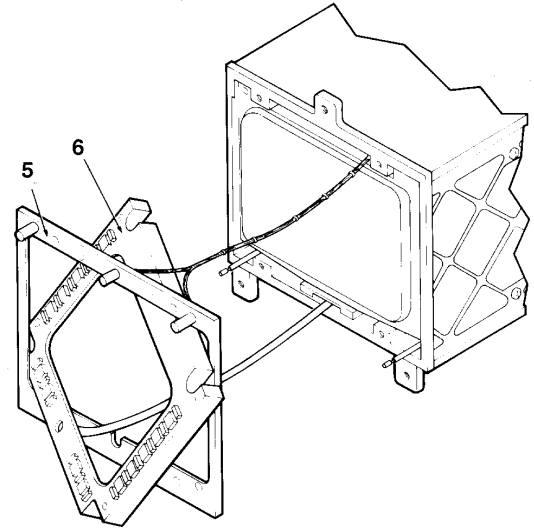
CAUTION

CRT cathode lead (14) can be damaged while being disconnected. To avoid damaging lead, do not pull on lead. Pull on connector only.

11. Disconnect yellow CRT cathode lead (14) from connector on circuit card A2 (15).

CAUTION

Be careful while MFD is being moved around to keep strain off the harnesses of the bezel and bezel mounting plate. Excessive pulling or bending can weaken or break the small-gauge wires in these harnesses. Always lift up the unfastened bezel and bezel mounting plate while lifting or turning the MFD.



GO TO NEXT PAGE

4-28. REMOVE BEZEL (AVIM) (CONT)

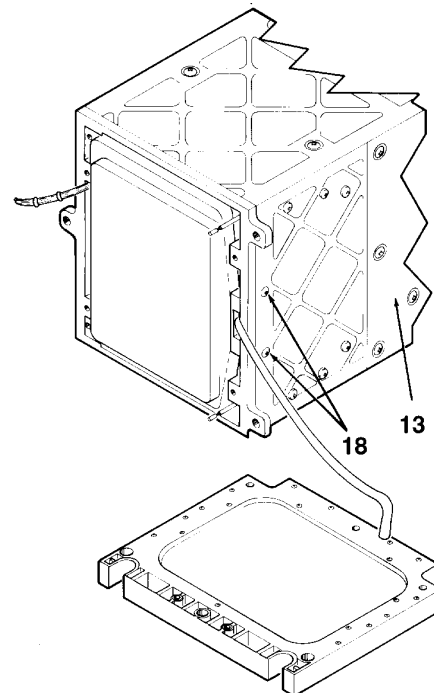
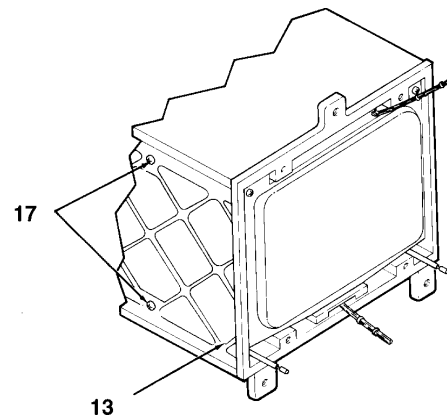
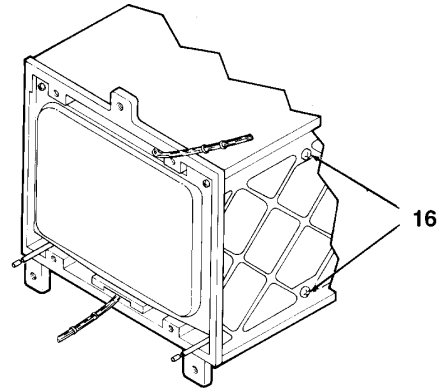
12. Remove four CRT mounting screws (16 and 17) from right and left sides of chassis (13).

CAUTION

Insure electrical leads are not caught under MFD while turning MFD on its side.

13. Turn MFD on left side.

14. Remove two CRT mounting screws (18) from lower front of chassis (13).



GO TO NEXT PAGE

4-28. REMOVE BEZEL (AVIM) (CONT)

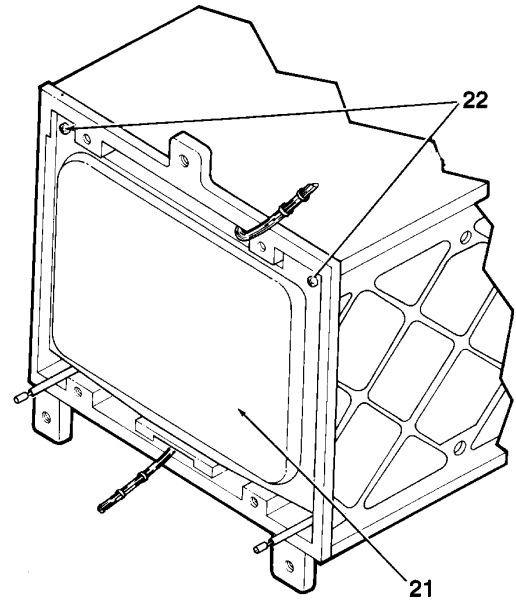
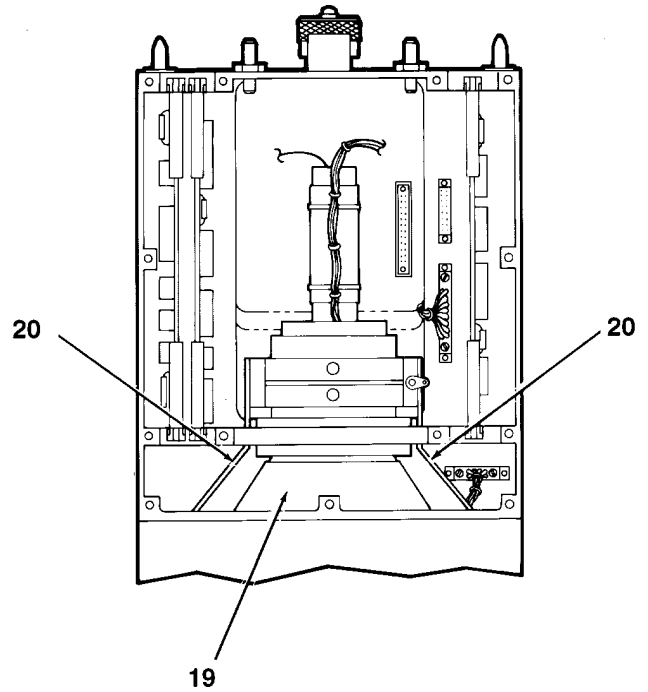
15. Move MFD to a position where it is sitting top side up, is level, and is back far enough to have room in front to pull out the CRT (19).

16. Grasp CRT mounting frame (20) and use it as a holding point to prevent drop-down of CRT neck (19).

CAUTION

Care should be taken to prevent screwdriver from slipping and scratching the contrast filter (21).

17. Remove last two mounting screws (22) from upper front corners of CRT.



GO TO NEXT PAGE

4-28. REMOVE BEZEL (AVIM) (CONT)

18. With one hand still holding the CRT mounting frame (20), turn the other hand palm up and slide all four fingers in under the front of the CRT (19).

WARNING

Do not let the CRT strike any part of the metal chassis. The CRT could implode and seriously injure personnel.

NOTE

Watch to be sure the CRT leads do not get hung up.

19. Using both hands, carefully move the CRT (19) forward until it is about halfway out of chassis (13).

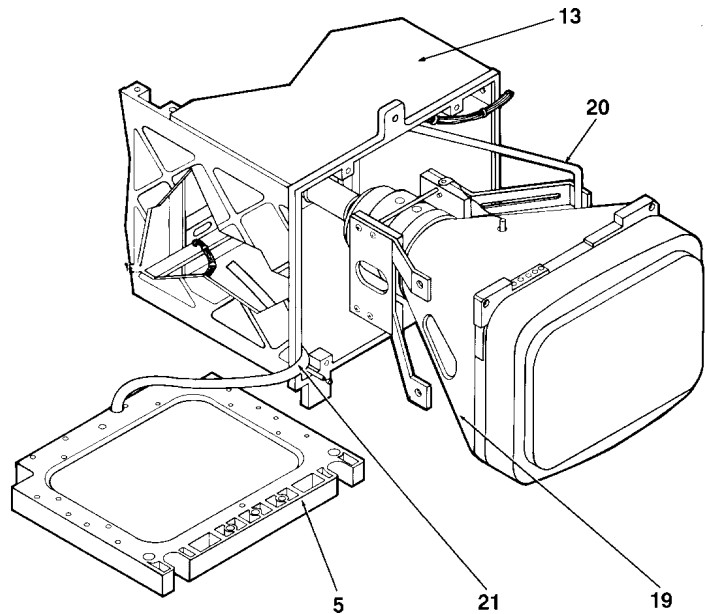
20. Let CRT rest on its feet.

CAUTION

Take care to limit flexing and strain in pigtail harness. Excessive flexing can weaken and break the small-gauge wires in the harness.

Do not coil or bend pigtail harness wires at sharp angles while bezel is disconnected from the MFD.

21. Pull pigtail harness (21) out through front of MFD. Take care that harness connector does not hang up on CRT mounting frame (20).



END OF TASK

4-29. REMOVE BEZEL MOUNTING PLATE (AVIM)

This task covers: Removal of the bezel mounting plate from the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations: All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench, no power applied
Brightness and contrast knobs removed
(4-17)
Top cover removed (4-19)

General Safety Instructions:**WARNING**

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.

2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.

3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.

4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being slid out.

5. Be sure you have a secure hold on the CRT before you pick it up. Use the yoke mounting block and the area surrounding the outer front portion of the glass envelope as handhold locations. Do not put your hands over the face of the CRT to pick up or carry the CRT.

6. Never use the neck or any of the projecting leads as a means of picking up, holding, or carrying the CRT.

7. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.

8. Be careful not to scratch or mar the contrast filter on the face of the CRT.

9. Do not put fingers on contrast filter.

CAUTION

The two light sensors on the bezel mounting plate can be damaged by ESD. Proper handling and grounding techniques must be observed.

Excessive flexing or strain can break the small-gauge wires in the bundled wiring harnesses on the bezel mounting plate. Take care to limit harness bending and strain after bezel mounting plate is unfastened from front of MFD.

GO TO NEXT PAGE

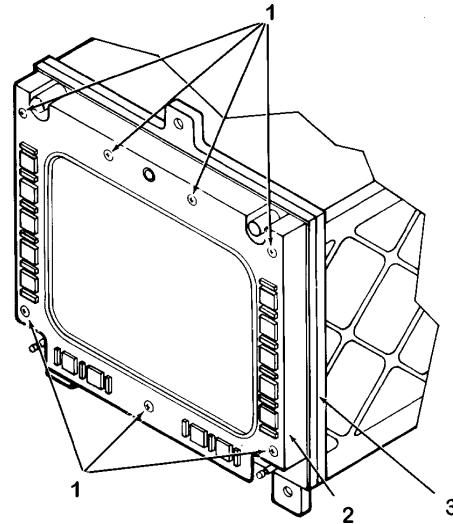
4-29. REMOVE BEZEL MOUNTING PLATE (AVIM) (CONT)

1. Turn MFD so it is sitting top side up on work surface.

2. Unscrew seven captive screws (1) that hold bezel (2) on bezel mounting plate (3).

CAUTION

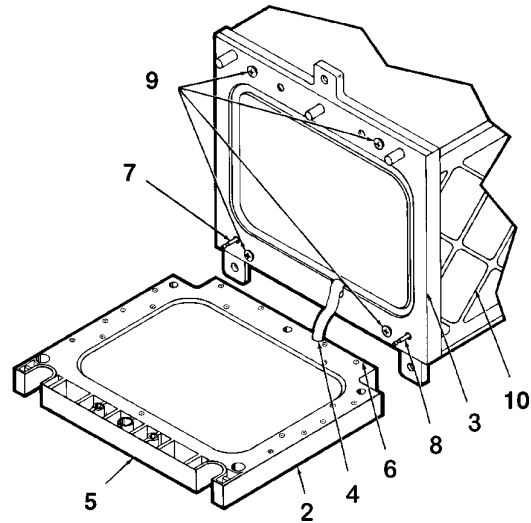
The bezel pigtail harness (4) can be damaged if you try to pull the bezel (2) straight out from the bezel mounting plate (3).



3. Tilt top of bezel (5) outward 2 to 3 inches. Gently pull bottom of bezel (6) outward about one inch. Lift bottom of bezel (6) straight up about 2 inches. Lay bezel (2) facedown in front of MFD.

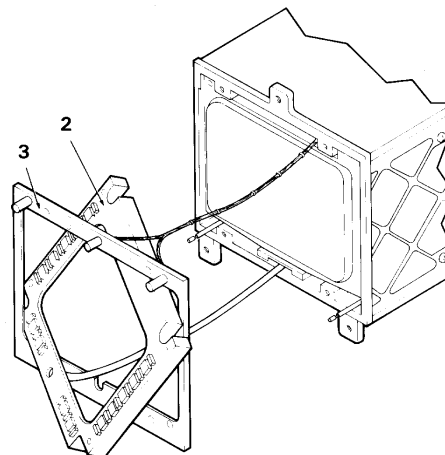
CAUTION

While removing bezel mounting plate (3) be certain to pull it straight out to avoid bending or breaking switch shafts (7 and 8).



4. Remove four mounting screws (9) that hold bezel mounting plate (3) to chassis (10). Slide bezel mounting plate (3) forward off shafts (7 and 8).

5. Tilt bezel (2) sideways and pass it through opening in bezel mounting plate (3).



GO TO NEXT PAGE

4-29. REMOVE BEZEL MOUNTING PLATE (AVIM) (CONT)

6. Set bezel (2) facedown in front of MFD.

7. Set bezel mounting plate (3) off to right side of chassis (10).

CAUTION

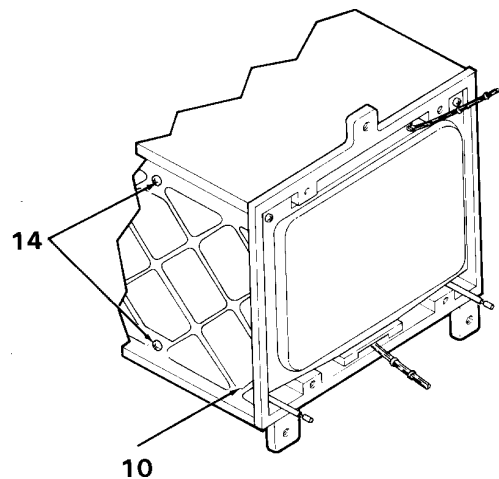
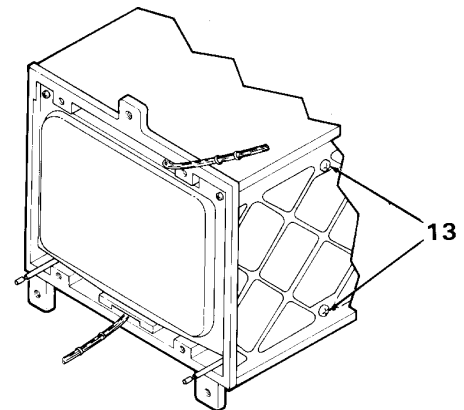
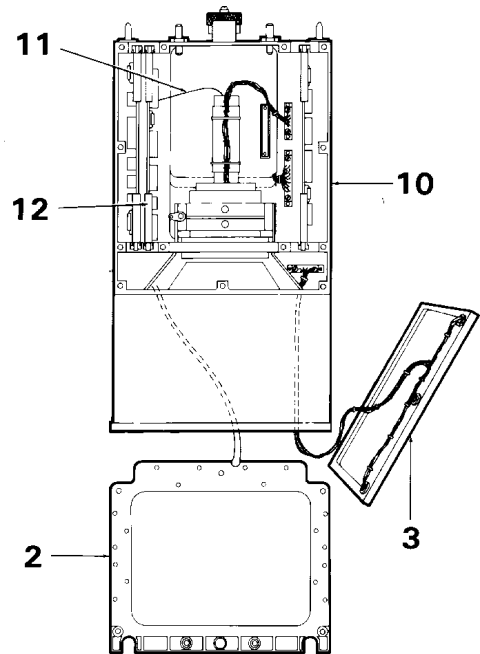
CRT cathode lead (11) can be damaged while being disconnected. To avoid damaging lead, do not pull on lead. Pull on connector only.

8. Disconnect yellow CRT cathode lead (11) from connector on circuit card A2 (12).

CAUTION

Be careful while MFD is being moved around to keep strain off the harnesses of the bezel and bezel mounting plate. Excessive pulling or bending can weaken or break the small-gauge wires in these harnesses. Always lift up the unfastened bezel and bezel mounting plate while lifting or turning the MFD.

9. Remove four CRT mounting screws (13 and 14) from right and left sides of chassis (10).



GO TO NEXT PAGE

4-29. REMOVE BEZEL MOUNTING PLATE (AVIM) (CONT)

CAUTION

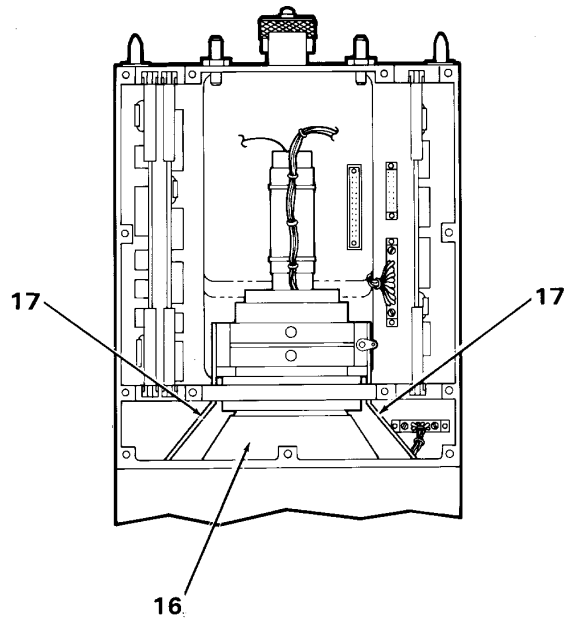
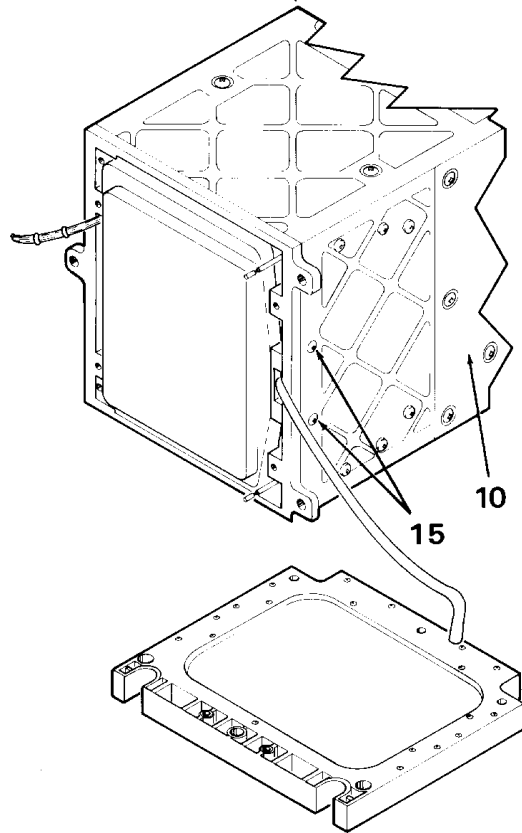
Ensure electrical leads are not caught under MFD while turning MFD on its side.

10. Turn MFD on its left side.

11. Remove two CRT mounting screws (15) from lower front of chassis (10).

12. Move MFD to a position where it is sitting top side up, is level, and is back far enough to have room in front to pull out the CRT (16).

13. Grasp CRT mounting frame (17) and use it as a holding point to prevent drop-down of CRT neck (16).



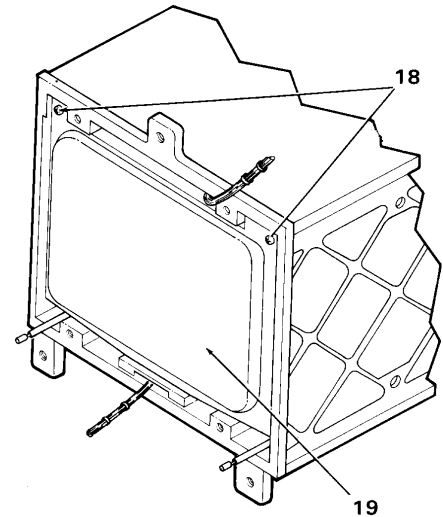
GO TO NEXT PAGE

4-29. REMOVE BEZEL MOUNTING PLATE (AVIM) (CONT)**CAUTION**

Care should be taken to prevent screwdriver from slipping and scratching the contrast filter (19).

14. Remove last two mounting screws (18) from upper front corners of CRT (16).

15. With one hand still holding the CRT mounting frame (17), turn the other hand palm up and slide all four fingers in under the front of the CRT (16).

**WARNING**

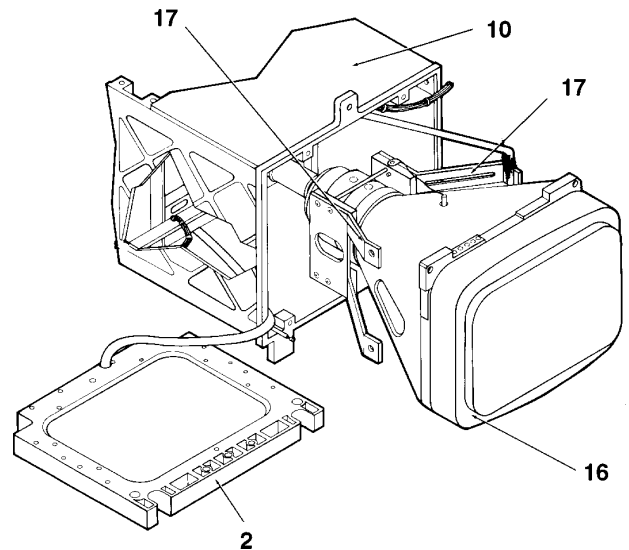
Do not let the CRT strike any part of the metal chassis. The CRT could implode and seriously injure personnel.

NOTE

Watch to be sure the CRT leads do not get hung up.

16. Using both hands, carefully move the CRT (16) forward until it is about halfway out of chassis (10).

17. Move bezel (2) to left side of chassis (10).



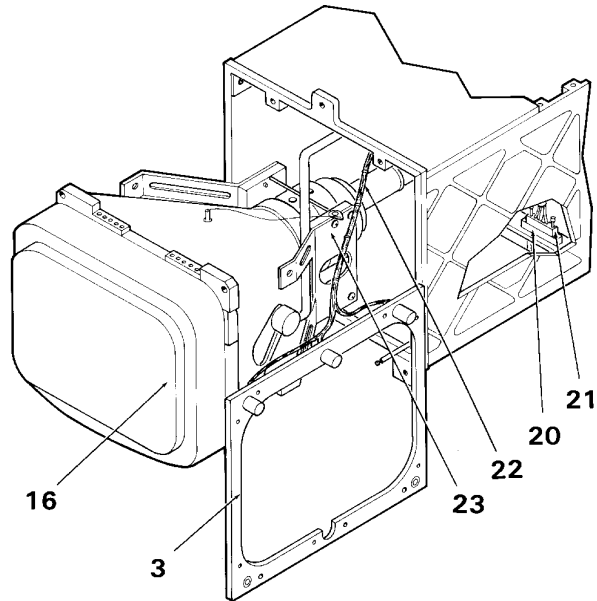
GO TO NEXT PAGE

4-29. REMOVE BEZEL MOUNTING PLATE (AVIM) (CONT)

18. Let the CRT (16) rest on its feet. This will provide room for disconnecting the bezel mounting plate (3) from motherboard connector A7 (20).

19. Loosen two captive locking screws on bezel mounting plate harness connector (21) by unscrewing one side, then the other, a turn at a time.

20. Lift harness connector (21) off motherboard connector A7 (20).



CAUTION

Take care to limit flexing and strain in pigtail harness. Excessive flexing can weaken and break the small-gauge wires in the harness.

21. Pull pigtail harness (22) out through front of MFD. Take care that harness connector (21) does not hang up on CRT mounting frame (23).

CAUTION

Do not coil or bend pigtail harness at sharp angles while placing harness in static shielding bag.

22. Place bezel mounting plate (3) in static shielding bag (C7) to protect the two light sensors from ESD.

END OF TASK

4-30. REMOVE CRT (AVIM)

This task covers: Removal of the CRT from the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles
Gloves (C-17)
Respirator (C-18)
Facemask (C-19)

Materials:

Foam Pad (D1)
Foam Block (D2)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied
Brightness and contrast knobs removed (4-17)
Top cover removed (4-19)

General Safety Instructions:**WARNING**

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.
3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.
4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being removed.
5. Be sure you have a secure hold on the CRT before you pick it up. Use the yoke mounting block and the area surrounding the outer front portion of the glass envelope as handhold locations. Do not put your hands over the face of the CRT to pick up or carry the CRT.
6. Never use the neck or any of the projecting leads as a means of picking up, holding, or carrying the CRT.
7. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.
8. Be careful not to scratch or mar the contrast filter on the face of the CRT.
9. Do not put fingers on contrast filter.
10. Have a safe, preselected place to set the CRT after it is removed from the MFD.
11. Be sure there are no obstacles underfoot while carrying the CRT.

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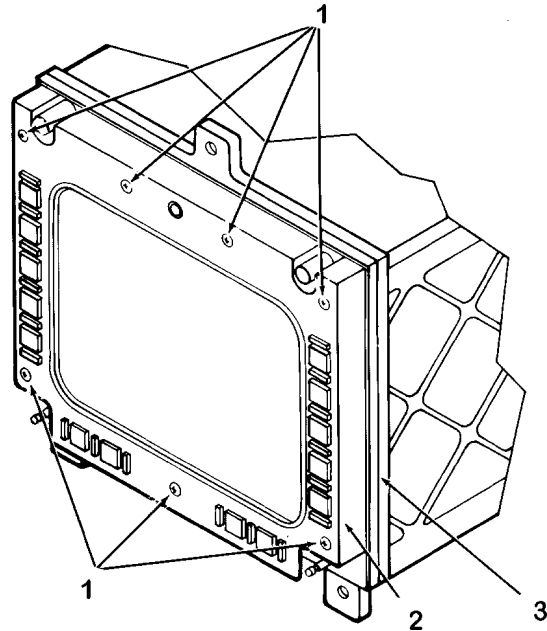
4-30. REMOVE CRT (AVIM) (CONT)

WARNING

Be very careful near the neck of the CRT. The neck is the weakest part of the CRT and is likely to break if pressed on with a hand or if hit by a tool that has slipped. The CRT will implode if the neck glass cracks or breaks.

1. Turn MFD so it is sitting top side up on work surface.

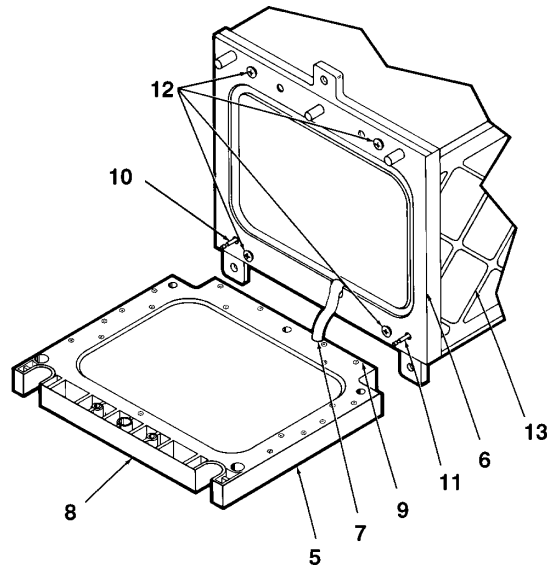
2. Unscrew seven captive screws (1) that hold bezel (2) on bezel mounting plate (3).



CAUTION

The bezel pigtail harness (7) can be damaged if you try to pull the bezel (5) straight out from the bezel mounting plate (6).

3. Tilt top of bezel (8) outward 2 to 3 inches. Gently pull bottom of bezel (9) outward about one inch. Lift bottom of bezel (9) straight up about 2 inches. Lay bezel (5) facedown in front of MFD.



CAUTION

While removing bezel mounting plate (6) be certain to pull it straight out to avoid bending or breaking switch shafts (10 and 11).

4. Remove four mounting screws (12) that hold bezel mounting plate (6) to chassis (13). Slide bezel mounting plate (6) forward off shafts (10 and 11).

GO TO NEXT PAGE

4-30. REMOVE CRT (AVIM) (CONT)

5. Tilt bezel (2) sideways and pass it through opening in bezel mounting plate (3).

6. Set bezel (2) facedown in front of MFD.

7. Set bezel mounting plate (3) off to right side of chassis (10).

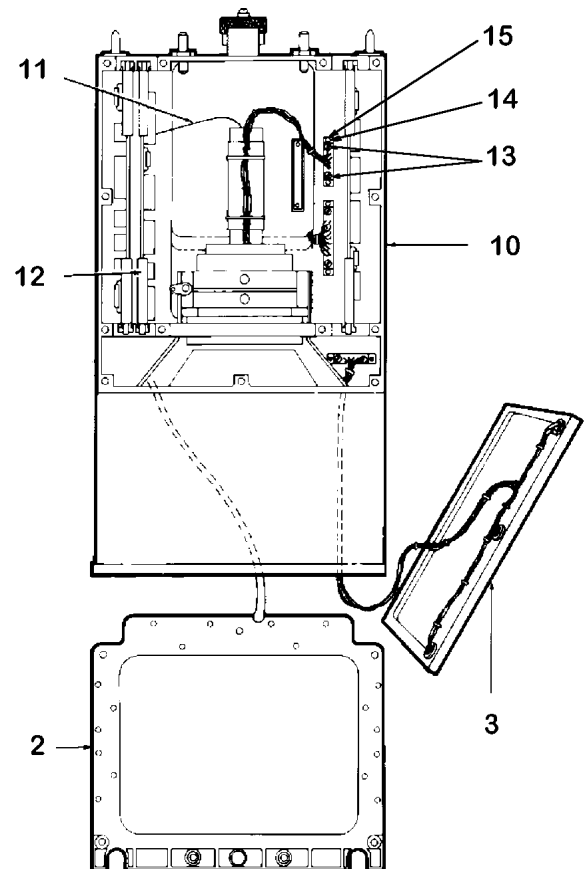
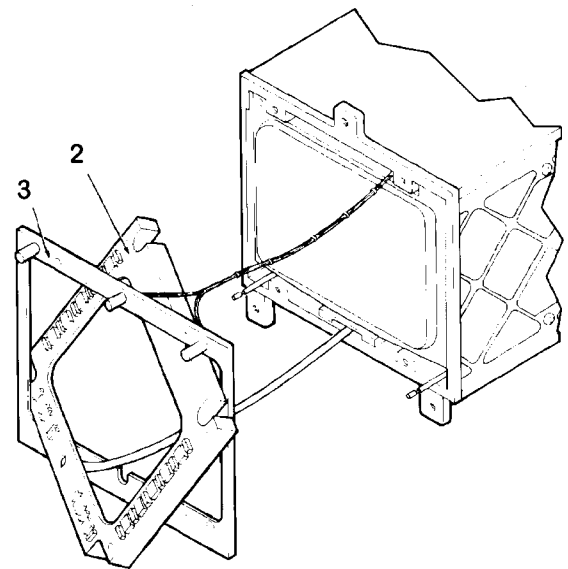
CAUTION

CRT cathode lead (11) can be damaged while being disconnected. To avoid damaging lead, do not pull on lead. Pull on connector only.

8. Disconnect yellow CRT cathode lead (11) from connector on circuit card A2 (12).

9. Loosen two captive locking screws (13) on CRT harness connector (14) by unscrewing one side, then the other, a turn at a time.

10. Disconnect CRT harness connector (14) from motherboard connector A5 (15).



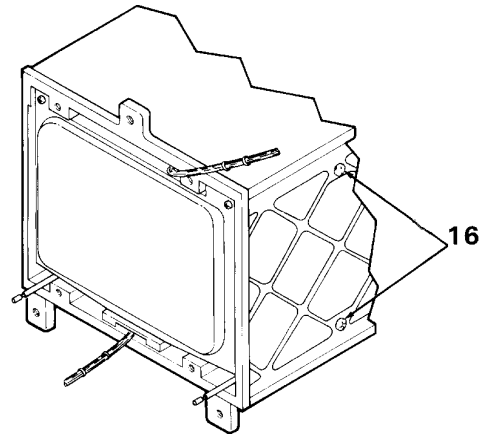
GO TO NEXT PAGE

4-30. REMOVE CRT (AVIM) (CONT)

CAUTION

Be careful while MFD is being moved around to keep strain off the harnesses of the bezel and bezel mounting plate. Excessive pulling or bending can weaken or break the small-gauge wires in these harnesses. Always lift up the unfastened bezel and bezel mounting plate while lifting or turning the MFD.

11. Remove four CRT mounting screws (16 and 17) from right and left sides of chassis (10).

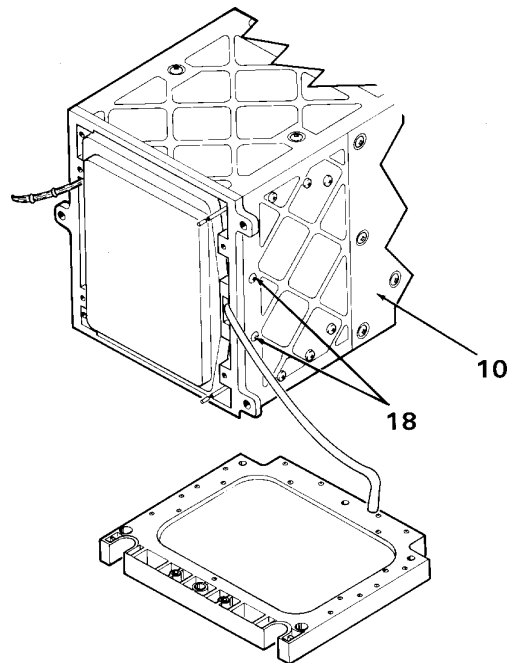
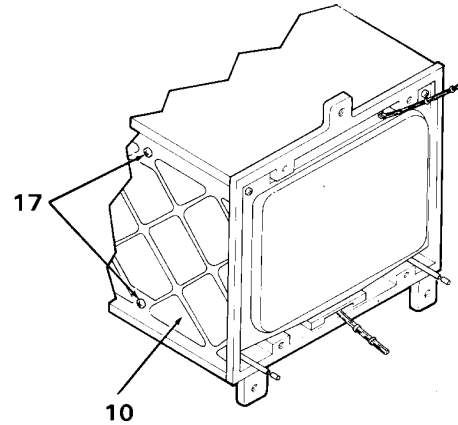


CAUTION

Insure electrical leads are not caught under MFD while turning MFD on its side.

12. Turn MFD on left side.

13. Remove two CRT mounting screws (18) from lower front of chassis (10).



GO TO NEXT PAGE

4-30. REMOVE CRT (AVIM) (CONT)

14. Move MFD to a position where it is sitting upright, is level, and is back far enough to have room in front to pull out the CRT (19).

15. Grasp CRT mounting frame (20) and use it as a holding point to prevent drop-down of CRT neck (19).

CAUTION

Care should be taken to prevent screwdriver from slipping and scratching the contrast filter (22).

16. Remove last two mounting screws (21) from upper front corners of CRT (19).

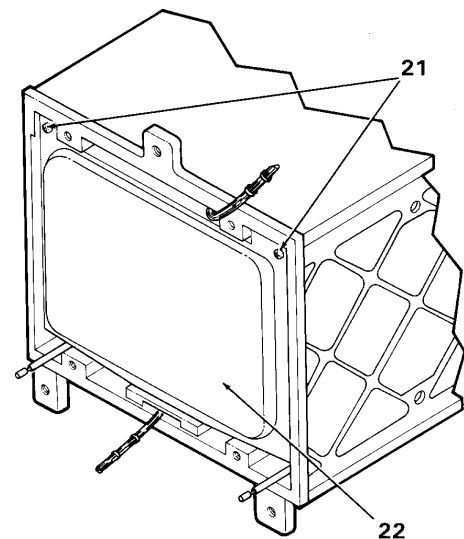
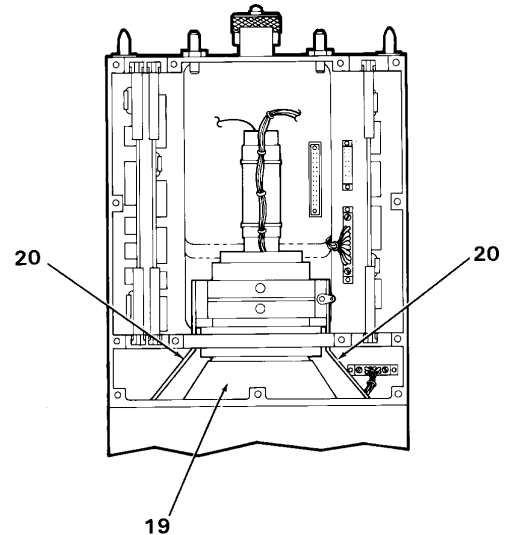
17. With one hand still holding the CRT mounting frame (20), turn the other hand palm up and slide all four fingers in under the front of the CRT (19).

WARNING

Do not let the CRT strike any part of the metal chassis. The CRT could implode and seriously injure personnel.

CAUTION

Avoid damaging bezel harness by ensuring harness wires are not being pulled by CRT while removing the CRT.



GO TO NEXT PAGE

4-30. REMOVE CRT (AVIM) (CONT)

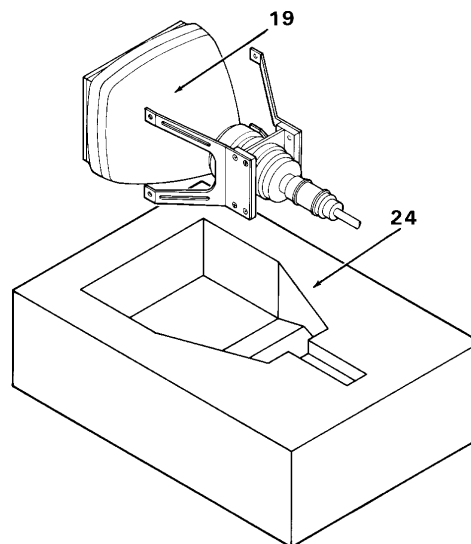
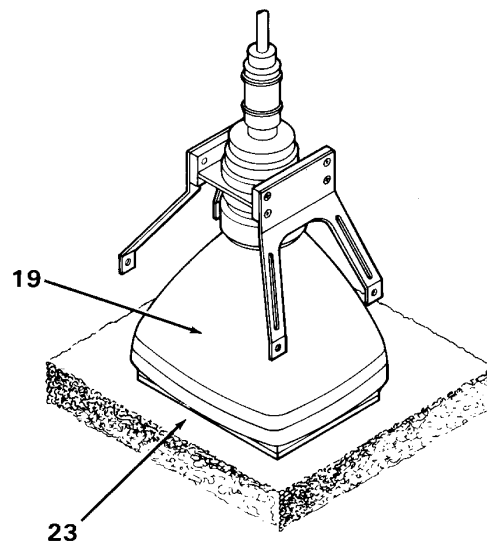
NOTE

Watch to be sure the CRT leads do not get hung up.

18. Using both hands, carefully move the CRT (19) forward until it is completely removed.

19. Set the CRT (19) face down on foam pad (D1) (23).

20. If CRT (19) is going to sit out more than a few minutes after it has been removed from MFD, put it in foam block (D2) (24).



END OF TASK

4-31. REMOVE BRIGHTNESS AND CONTRAST CONTROL SWITCH ASSEMBLIES (AVIM)

This task covers: Removal of brightness and contrast control switch assemblies from the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Electronic Equipment Tool Kit
- Apron
- Safety Goggles

Materials:

- Acetone (C16)
- Cotton Swab (C2)
- Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)

- MFD on bench
- No power applied
- Brightness and contrast knobs removed (4-17)
- Top cover removed (4-19)
- Circuit cards A1, A2, and A3 removed (4-20)
- Low voltage power supply removed (4-21)
- Bezel removed (4-28)
- Bezel mounting plate removed (4-29)
- CRT removed (4-30)

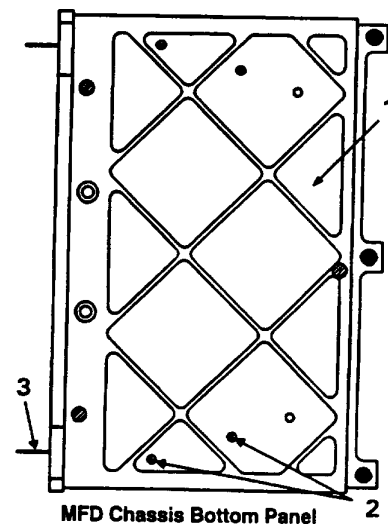
General Safety Instructions:

CAUTION

The MFD contains devices sensitive to ESD. To protect devices from degradation or destruction due to ESD, never perform maintenance on MFD or MFD SRU unless it is positioned on a static control grounded work surface. Never perform maintenance on MFD or MFD SRU unless you are wearing a properly grounded static control wrist strap.

1. Place MFD chassis (1) on a work table with bottom panel forward. Remove two screws (2) on bottom panel of MFD chassis securing brightness control switch assembly (3).

2. On inside of bottom panel (1), gently move brightness control switch assembly (3) away from bottom panel (1), being careful not to stress any wire connections.



GO TO NEXT PAGE

4-31. REMOVE BRIGHTNESS AND CONTRAST CONTROL SWITCH ASSEMBLIES (AVIM) (CONT)

3. Remove two screws (4) from sensitivity switch (5) on brightness control switch assembly (3), and carefully move sensitivity switch (5) away from brightness control switch assembly (3).

WARNING

Cleaning compound is flammable and toxic to skin, eyes, and respiratory system. Skin and eye protection, in form of goggles, is required. Avoid repeated or prolonged contact. Good general ventilation is normally adequate. Keep away from open flames or other sources of ignition.

CAUTION

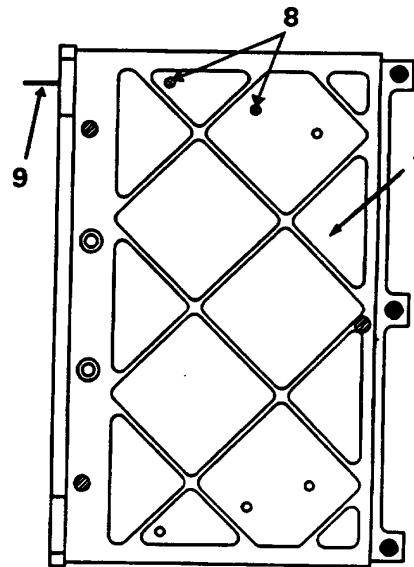
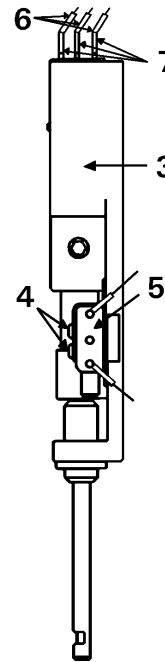
Use an approved low-wattage soldering iron and shunt when unsoldering electronic components and wiring.

4. Move shrinkable sleeving (6) on wires soldered to brightness control switch assembly terminals (7) away from solder connections. Tag wires. Wet or soak solder connections with acetone (C16) to remove conformal coating, and unsolder wires from terminals (7).

5. Place brightness control switch assembly (3) in a static shielding bag.

6. Remove two screws (8) on bottom panel of MFD chassis (1) securing contrast control switch assembly (9).

7. On inside of bottom panel (1), gently move contrast control switch assembly (9) away from bottom panel (1), being careful not to stress any wire connections.



MFD Chassis Bottom Panel

GO TO NEXT PAGE

4-31. REMOVE BRIGHTNESS AND CONTRAST CONTROL SWITCH ASSEMBLIES (AVIM) (CONT)

8. Remove two screws (11) from sensitivity switch (10) on contrast control switch assembly (9), and carefully move sensitivity switch (10) away from contrast control switch assembly (9).

WARNING

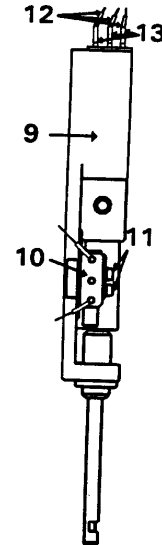
Cleaning compound is flammable and toxic to skin, eyes, and respiratory system. Skin and eye protection, in form of goggles, is required. Avoid repeated or prolonged contact. Good general ventilation is normally adequate. Keep away from open flames or other sources of ignition.

CAUTION

Use an approved low-wattage soldering iron and shunt when unsoldering electronic components and wiring.

9. Move shrinkable sleeving (12) on wires soldered to contrast control switch assembly terminals (13) away from solder connections. Tag wires. Wet or soak solder connections with acetone (C16) to remove conformal coating, and unsolder wires from terminals (7).

10. Place brightness control switch assembly (9) in a static shielding bag (C7).



END OF TASK

4-32. INSTALL BRIGHTNESS AND CONTRAST CONTROL SWITCH ASSEMBLIES (AVIM)

This task covers: Installation of brightness and contrast control switch assemblies into the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Materials:

Conformal Coating (C9)
Cotton Swab (C2)
Shrinkable Sleeving (C12)

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)

MFD on bench

No power applied

Brightness and contrast knobs removed (4-17)

Top cover removed (4-19)

Circuit cards A1, A2, and A3 removed (4-20)

Low voltage power supply removed (4-21)

Bezel removed (4-28)

Bezel mounting plate removed (4-29)

CRT removed (4-30)

Brightness and contrast control switch assemblies removed (4-31)

General Safety Instructions:

CAUTION

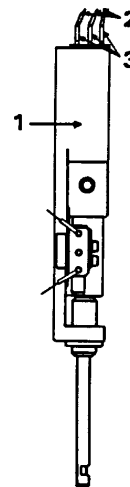
The MFD contains devices sensitive to ESD. To protect devices from degradation or destruction due to ESD, never perform maintenance on MFD or MFD SRU unless it is positioned on a static control grounded work surface. Never perform maintenance on MFD or MFD SRU unless you are wearing a properly grounded static control wrist strap.

CAUTION

Use an approved low-wattage soldering iron and shunt when soldering electronic components and wiring.

1. Remove contrast control switch assembly (1) from static shielding bag and connect tagged lead assembly wires (2) to terminals (3) on contrast control switch assembly (1) as follows:

a. Trim and tin ends of lead assembly wires (2) as required.



GO TO NEXT PAGE.

4-32. INSTALL BRIGHTNESS AND CONTRAST CONTROL SWITCH ASSEMBLIES (AVIM) (CONT)**NOTE**

Do not solder wires until all have been correctly routed to terminals on contrast control switch assembly. Replace shrinkable sleeving on wires, as required, to protect terminals.

b. Solder lead assembly wires (2) to terminals (3) on contrast control switch assembly (1).

c. Using cotton swabs (C2), apply conformal coating (C9) to solder connections and move shrinkable sleeving (C12) (4) in place over wire connections.

d. Remove tags from wires.

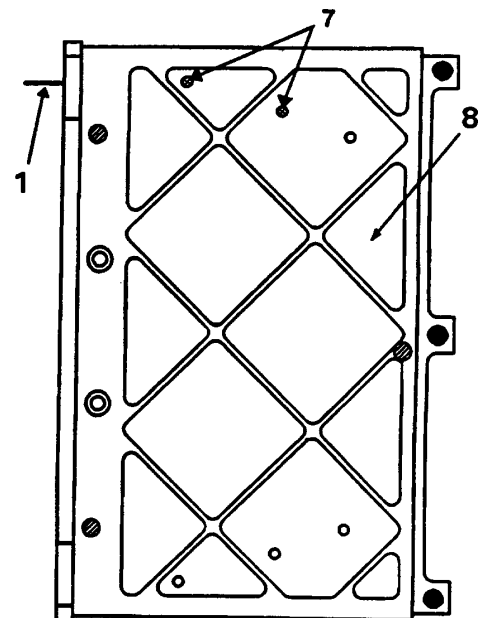
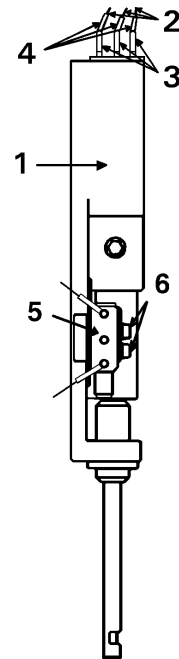
2. Install sensitivity switch (5) on contrast control switch assembly (1) by inserting and tightening two screws (6).

3. Taking care not to damage wiring, loosely install contrast control switch assembly (1) into bottom panel of MFD chassis (8) by inserting two screws (7).

4. Align contrast control switch assembly (1) by pulling its body fully forward. Tighten two screws (7).

CAUTION

Use an approved low-wattage soldering iron and shunt when soldering electronic components and wiring.



MFD Chassis Bottom Panel

GO TO NEXT PAGE

4-32. INSTALL BRIGHTNESS AND CONTRAST CONTROL SWITCH ASSEMBLIES (AVIM) (CONT)

5. Remove brightness control switch assembly (9) from static shielding bag and connect tagged lead assembly wires (10) to terminals (11) on brightness control switch assembly (9) as follows:

- a. Trim and tin ends of lead assembly wires (10) as required.

NOTE

Do not solder wires until all have been correctly routed to terminals on brightness control switch assembly. Replace shrinkable sleeving on wires, as required, to protect terminals.

- b. Solder lead assembly wires (10) to terminals (11) on brightness control switch assembly (9).

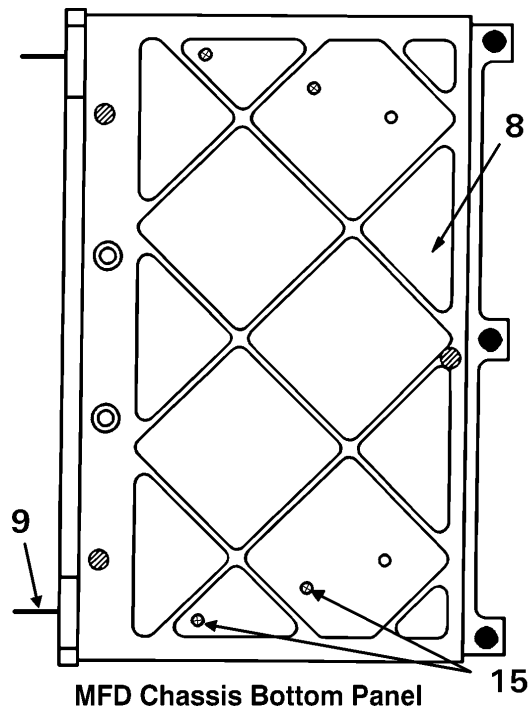
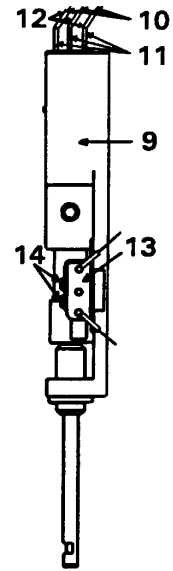
- c. Using cotton swabs (C2), apply conformal coating (C9) to solder connections and move shrinkable sleeving (C12) (12) in place over wire connections.

- d. Remove tags from wires.

6. Install sensitivity switch (13) on brightness control switch assembly (9) by inserting and tightening two screws (14).

7. Taking care not to damage wiring, loosely install brightness control switch assembly (9) into bottom panel of MFD chassis (8) using two screws (15).

8. Align brightness control switch assembly (9) by pulling its body fully forward. Tighten two screws (15).



INSPECT

END OF TASK

4-33. CONNECT BEZEL TO HARNESS ASSEMBLY (AVIM)

This task covers: Connecting the bezel to the harness assembly on the Multifunctional Display.

INITIAL SETUP

Applicable Configurations:
All

Tools:
Electronic Equipment Tool Kit

Apron
Safety Goggles

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied
Brightness and contrast knobs removed (4-17)
Top cover removed (4-19)
CRT removed (4-30)

General Safety Instructions:

WARNING

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.
3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.
4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being installed.
5. Do not put your hands over the face of the CRT.
6. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.
7. Be careful not to scratch or mar the contrast filter on the face of the CRT.

CAUTION

Excessive flexing or strain can break the small-gauge wires in the bundled wiring harnesses on the bezel. Take care to limit harness bending and strain as bezel is installed.

GO TO NEXT PAGE

4-33. CONNECT BEZEL TO HARNESS ASSEMBLY (AVIM) (CONT)

1. With CRT removed from MFD, turn MFD on right side.

2. Visually check that harness assembly connector is not damaged. If damaged, repair as required.

3. Route bezel harness through front of chassis and underneath motherboard to harness assembly connector (1).

4. Position bezel harness connector (2) on harness assembly connector (1) so male/female threads are properly matched.

5. Tighten two captive locking screws (3), a turn or two at a time, until fully threaded into harness assembly connector.

6. Install Low Voltage Power Supply per Task 4-43.

7. Turn MFD top side up.

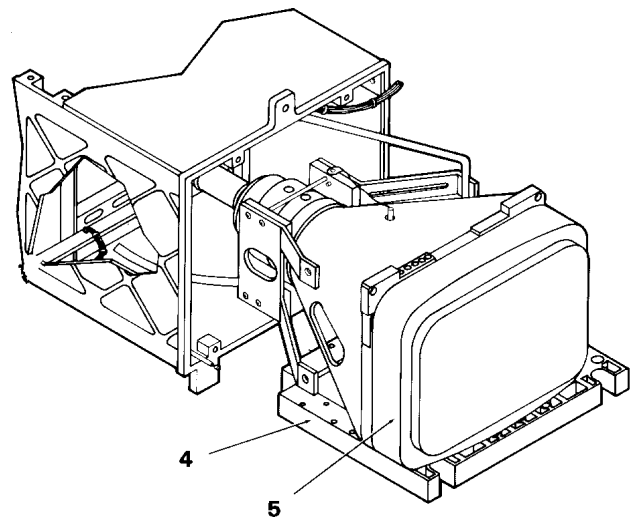
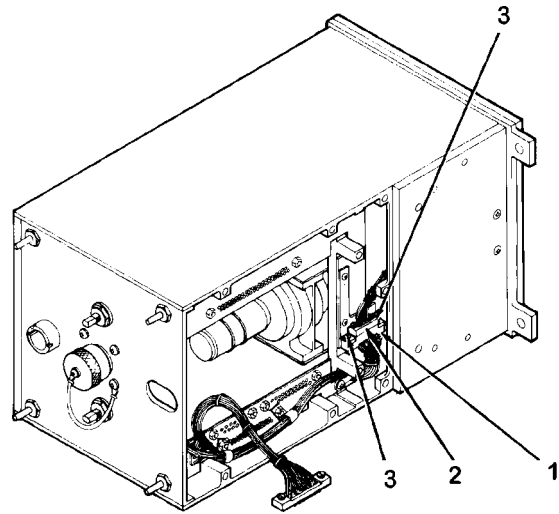
8. Set bezel (4) under feet of CRT (5).

9. Slide CRT back into chassis per Task 4-35 and install CRT per Task 4-36.

10. Install bezel and bezel mounting plate on front of MFD per Task 4-37.

11. Install top cover per Task 4-45.

12. Install brightness and contrast control knobs per Task 4-17.



END OF TASK

4-34. CONNECT BEZEL MOUNTING PLATE TO MOTHERBOARD (AVIM)

This task covers: Connecting the bezel mounting plate to the motherboard on the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied
Brightness and contrast knobs removed (4-17)
Top cover removed (4-19)
CRT removed (4-30)
Bezel connected to motherboard (4-33)

General Safety Instructions:**WARNING**

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance to the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.
3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.
4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being installed.
5. Do not put your hands over the face of the CRT.
6. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.
7. Be careful not to scratch or mar the contrast filter on the face of the CRT.

CAUTION

The two light sensors on the bezel mounting plate can be damaged by ESD. Proper handling and grounding techniques must be observed. Excessive flexing or strain can break the small-gauge wires in the bundled wiring harnesses on the bezel mounting plate. Take care to limit harness bending and strain as bezel mounting plate is installed.

GO TO NEXT PAGE

4-34. CONNECT BEZEL MOUNTING PLATE TO MOTHERBOARD (AVIM) (CONT)

1. Visually check that motherboard connector A7 (1) is not damaged. If damaged, depot repair is required.

2. Remove bezel mounting plate (6) from static shielding bag.

3. Route bezel mounting plate harness (2) through front of chassis (7) to motherboard connector A7 (1).

4. Position bezel mounting plate harness connector (4) on motherboard connector A7 (1) so male/female threads are properly matched.

5. Tighten two captive locking screws (5), a turn or two at a time, until fully threaded into motherboard connector A7 (1).

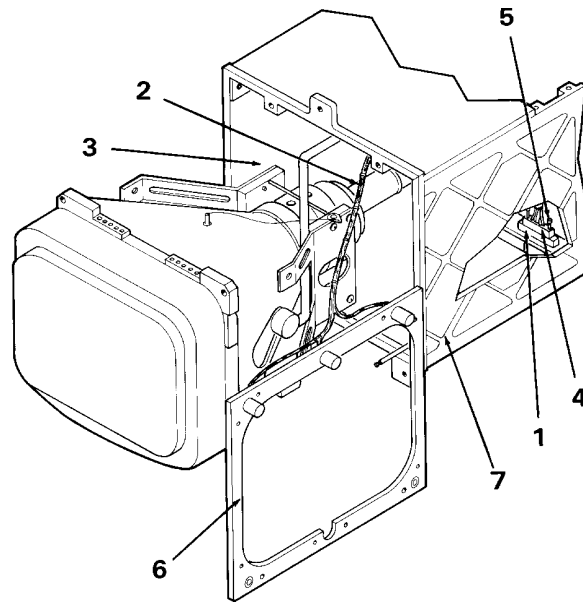
6. Set bezel mounting plate (6) on top of MFD (7).

7. Slide CRT back into chassis per Task 4-35.

8. Install bezel and bezel mounting plate on front of MFD per Task 4-37.

9. Install top cover per Task 4-45.

10. Install brightness and contrast control knobs per Task 4-17.



END OF TASK

4-35. SLIDE CRT INTO CHASSIS (AVIM)

This task covers: Sliding the CRT back into the chassis following partial removal of the CRT from the chassis.

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Personnel Required:

68R Avionic Special Equipment Repairer

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied

General Safety Instructions:

WARNING

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance of the following safety precautions.

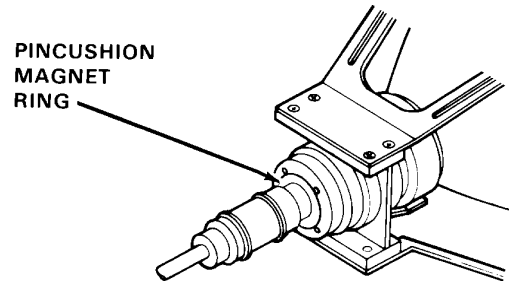
1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.
3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.
4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being installed.
5. Be sure you have a secure hold on the CRT before you pick it up. Use the yoke mounting block and the area surrounding the outer front portion of the glass envelope as handhold locations. Do not put your hands over the face of the CRT to pick up or carry the CRT.
6. Never use the neck or any of the projecting leads as a means of picking up, holding, or carrying the CRT.
7. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.
8. Be careful not to scratch or mar the contrast filter on the face of the CRT.
9. Do not put fingers on contrast filter.

GO TO NEXT PAGE

4-35. SLIDE CRT INTO CHASSIS (AVIM) (CONT)

WARNING

Be careful not to let the CRT neck strike any part of the chassis as CRT is slid in. The neck is the weakest part of the CRT. The CRT will implode if the neck glass is cracked or broken.



CAUTION

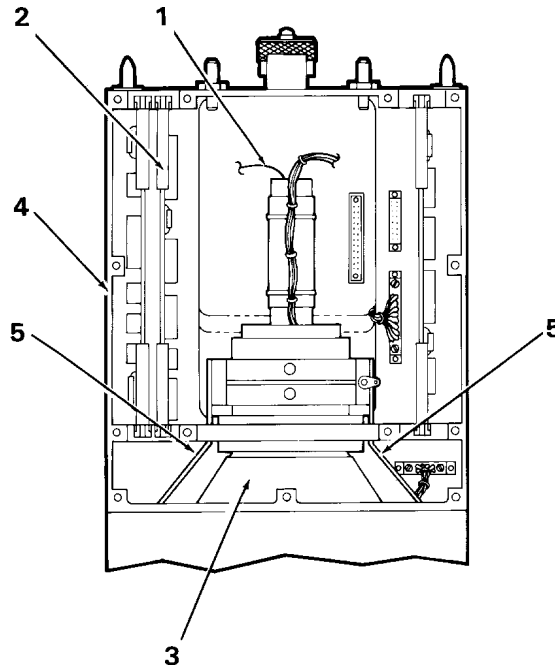
Be careful with the CRT electrical leads. They can be broken or damaged if care is not used.

Do not touch the pincushion magnet ring located at the rear of the yoke around the neck of the CRT. The magnets are preset for correct beam deflection and the ring must not be moved.

NOTE

Insure bezel harness is between feet of CRT.

Insure bezel mounting plate is on top of MFD.

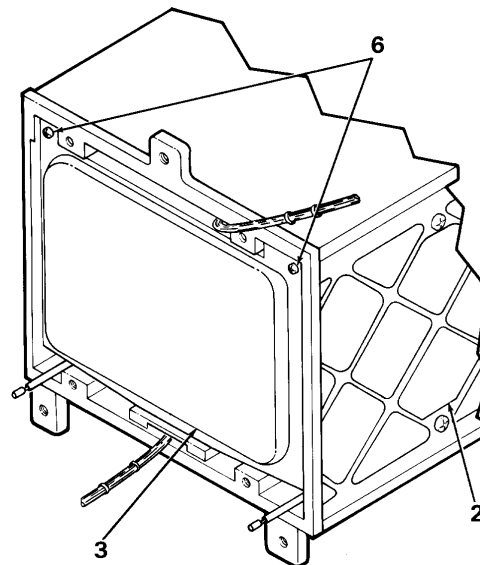


1. Visually check that connector of yellow CRT cathode lead (1) is not damaged. If damaged, replace CRT.

2. Visually check that jack on circuit card A2 (2) is not damaged. If damaged, replace A2.

3. Carefully slide CRT (3) all the way into chassis (4).

4. Grasp CRT mounting frame (5) and use it to hold CRT (3) as CRT mounting screws (6) are installed.



GO TO NEXT PAGE

4-35. SLIDE CRT INTO CHASSIS (AVIM) (CONT)**CAUTION**

Be careful while MFD is being moved around to keep strain off the harnesses of the bezel and bezel mounting plate. Excessive pulling or bending can weaken or break the small-gauge wires in these harnesses. Always lift up the unfastened bezel and bezel mounting plate while lifting or turning the MFD.

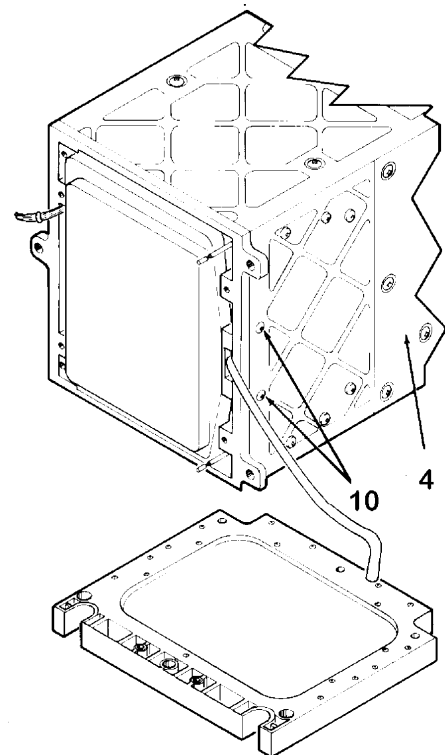
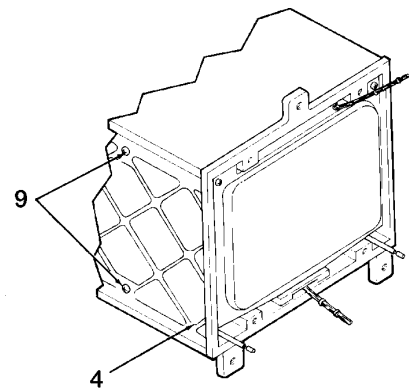
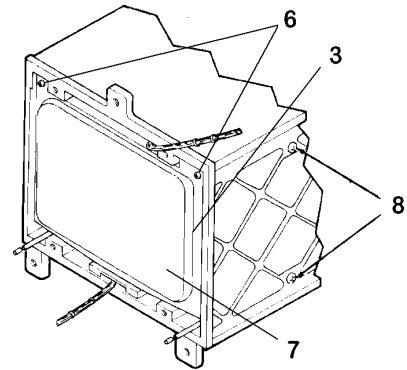
Care should be taken to prevent screwdriver from slipping and scratching the contrast filter (7).

5. Install two CRT mounting screws (6) in upper front corners of CRT (3).

6. Loosely install four CRT mounting screws (8 and 9) through right and left sides of chassis (4).

7. Turn MFD on left side. Tightly install two CRT mounting screws (10) through lower front of chassis (4).

8. Turn MFD top side up. Tighten four mounting screws on right and left sides (8 and 9).



GO TO NEXT PAGE

4-35. SLIDE CRT INTO CHASSIS (AVIM) (CONT)

CAUTION

CRT cathode lead can be damaged while being connected. To avoid damaging lead, do not push on lead. Push on connector only.

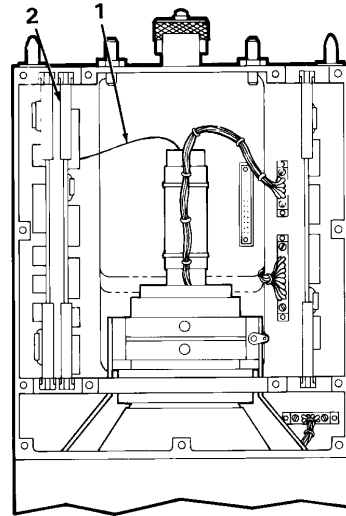
9. Mate connector of yellow CRT cathode lead (1) with connector on circuit card A2 (2).

10. Clean face of CRT per Task 4-18.

11. Install bezel and bezel mounting plate on front of MFD per Task 4-37.

12. Install top cover per Task 4-45.

13. Install brightness and contrast knobs per Task 4-17.



END OF TASK

4-36. INSTALL CRT (AVIM)

This task covers: Installation of the CRT into the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Apron
Safety Goggles

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied

General Safety Instructions:

WARNING

There is danger of CRT implosion if the CRT is handled improperly. You may be seriously injured by flying glass if the CRT implodes. Pay strict attention to all CRT safety precautions listed below. Follow each instruction carefully. Wear safety goggles to guard against eye injury should the CRT implode. Seek medical assistance as soon as possible if you are cut by shattered CRT glass. The P43 phosphor used inside the CRT is toxic and may cause medical problems if it gets into the body through a skin cut or by being inhaled.

General CRT Safety Precautions:

Protect yourself and the CRT by strict observance to the following safety precautions.

1. Remove all jewelry (watches, rings, bracelets, etc.) that could strike or scratch the CRT.
2. Wear an apron to cover and cushion all metal clothing objects (buttons, snaps, belt buckles, etc.) that could contact the CRT.
3. Be careful with hand tools around the CRT; a tool may slip and strike the CRT.
4. Be careful the CRT does not drop onto or slide against the chassis as CRT is being installed.
5. Be sure you have a secure hold on the CRT before you pick it up. Use the yoke mounting block and the area surrounding the outer front portion of the glass envelope as handhold locations. Do not put your hands over the face of the CRT to pick up or carry the CRT.
6. Never use the neck or any of the projecting leads as a means of picking up, holding, or carrying the CRT.
7. Be careful not to damage any of the CRT electrical leads. Do not stretch, twist, or pull on the leads; do not bend them at sharp angles.
8. Be careful not to scratch or mar the contrast filter on the face of the CRT.
9. Do not put fingers on contrast filter.
10. Be sure there are no obstacles underfoot when carrying the CRT.

GO TO NEXT PAGE

4-36. INSTALL CRT (AVIM) (CONT)

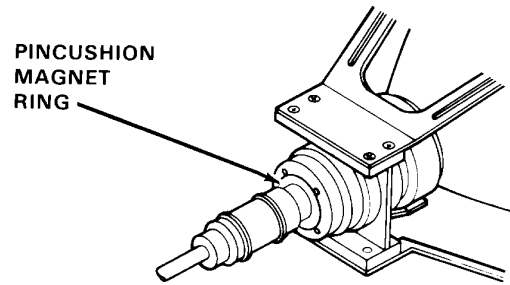
WARNING

Be careful not to let CRT neck strike any part of the chassis as CRT is slid in. The neck is the weakest part of the CRT. The CRT will implode if the neck glass is cracked or broken.

CAUTION

Be careful with the CRT electrical leads. They can be broken or damaged if care is not used.

Do not touch the pincushion magnet ring located at the rear of the yoke around the neck of the CRT. The magnets are preset for correct beam deflection and the ring must not be moved.



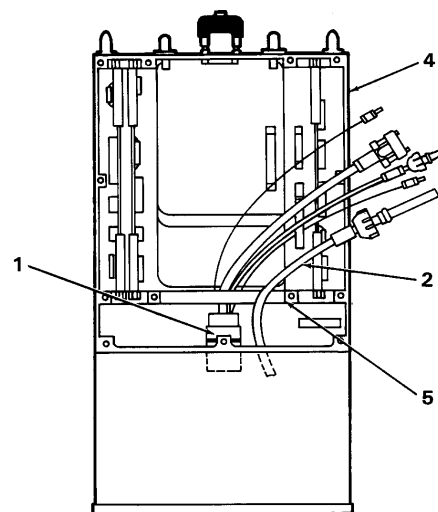
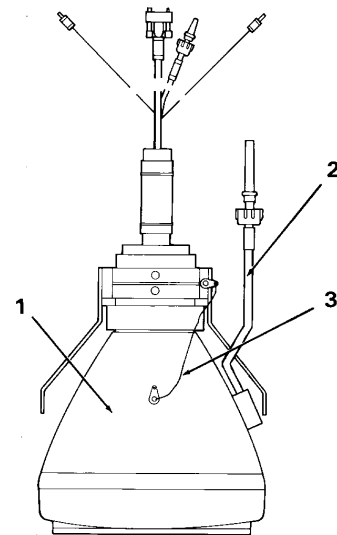
1. Set CRT (1) in front of MFD so anode lead (2) and ground jumper (3) face up as shown.

2. Move CRT (1) part way into chassis (4) and position the leads as follows:

a. Anode lead (2) over top of cross frame (5).

b. All other CRT leads through center of cross frame (5).

3. Set all leads over top right edge of chassis (4).



GO TO NEXT PAGE

4-36. INSTALL CRT (AVIM) (CONT)

4. Visually check that connector on yellow CRT cathode lead (7) is not damaged. If damaged, replace CRT.

5. Visually check that connector on circuit card A2 (8) is not damaged. If damaged, replace A2 (8).

NOTE

Insure bezel harness is between feet of CRT.

Insure bezel mounting plate is on top of MFD.

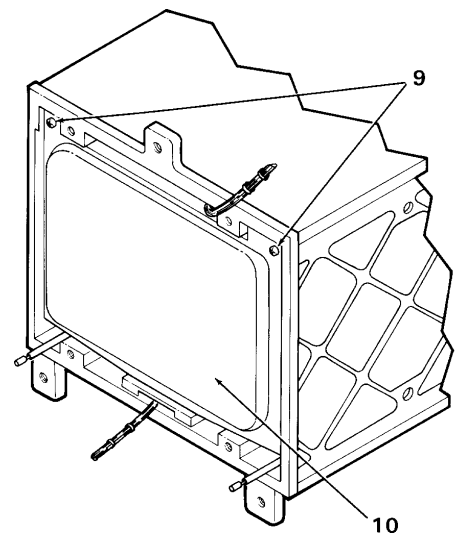
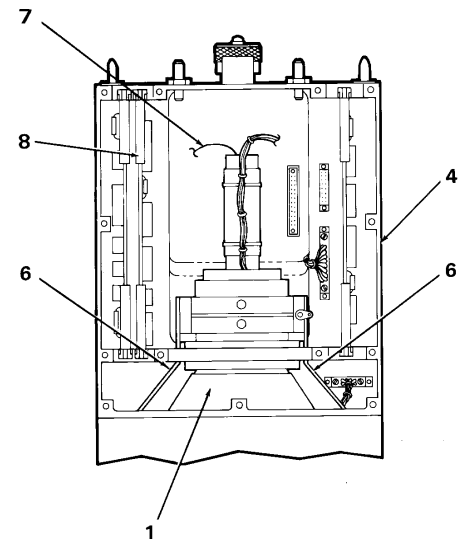
6. Carefully move the CRT (1) the rest of the way into the chassis (4).

7. Grasp CRT mounting frame (6) and use it to hold CRT (1) as CRT mounting screws (9) are installed.

CAUTION

Care should be taken to prevent screwdriver from slipping and scratching the contrast filter (10).

8. Install two CRT mounting screws (9) in upper front corners of CRT (1).



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4-36. INSTALL CRT (AVIM) (CONT)

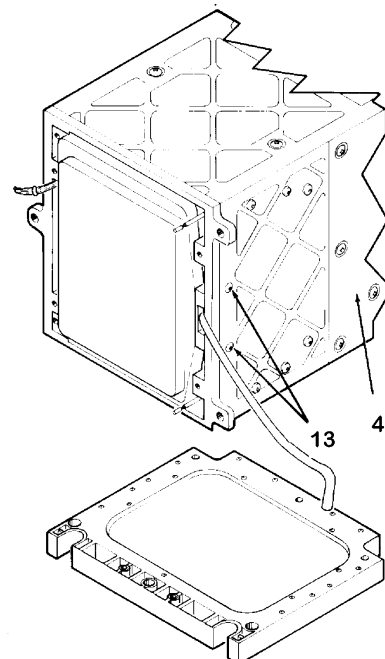
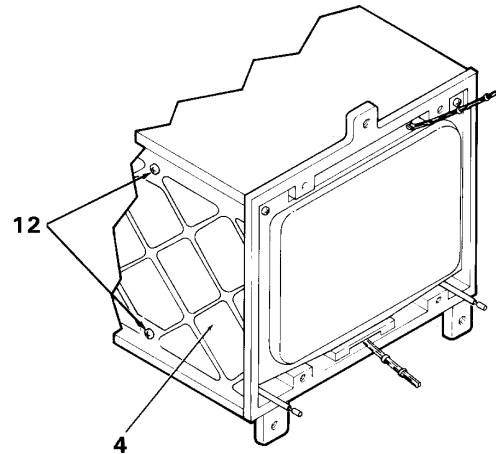
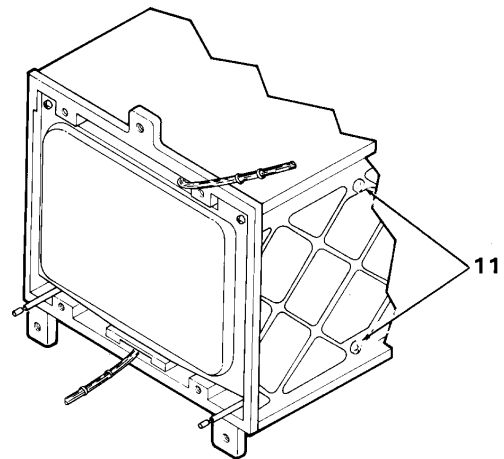
CAUTION

Be careful while MFD is being moved around to keep strain off the harnesses of the bezel and bezel mounting plate. Excessive pulling or bending can weaken or break the small-gauge wires in these harnesses. Always lift up the unfastened bezel and bezel mounting plate while lifting or turning the MFD.

9. Loosely install four CRT mounting screws (11 and 12) through right and left sides of chassis (4).

10. Turn MFD on left side. Tightly install two CRT mounting screws (13) through lower front of chassis (4).

11. Turn MFD top side up. Tighten four mounting screws on right and left sides (11 and 12).



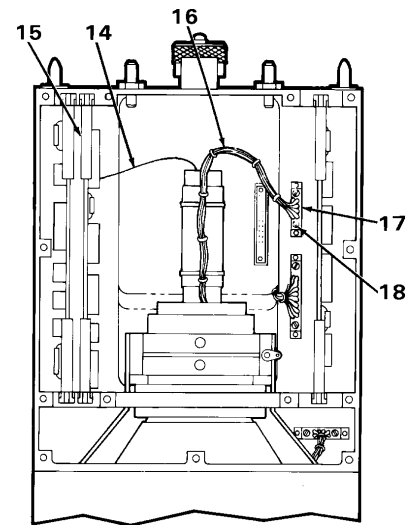
GO TO NEXT PAGE

4-36. INSTALL CRT (AVIM) (CONT)**CAUTION**

CRT cathode lead can be damaged while being connected. To avoid damaging lead, do not push on lead. Push on connector only.

12. Mate connector on yellow CRT cathode lead (14) with connector on circuit card A2 (15).

13. Position connector on CRT harness (16) over motherboard connector A5 (17) so male/female threads are properly matched. Tighten two captive locking screws (18), a turn or two at a time, until fully threaded into motherboard connector A5 (17).

**NOTE**

Connection on CRT focus, anode and orange grid 2 leads is done as part of MFD top cover installation.

14. Clean face of CRT per Task 4-18.

15. Install bezel and bezel mounting plate on front of MFD per Task 4-37.

16. Install top cover per Task 4-45.

17. Install brightness and contrast knobs per Task 4-17.

INSPECT

END OF TASK

4-37. INSTALL BEZEL AND BEZEL MOUNTING PLATE ON FRONT OF MULTIFUNCTION DISPLAY (AVIM)

This task covers: Installation of the bezel and bezel mounting plate.

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied

General Safety Instructions:

CAUTION

The two light sensors on the bezel mounting plate can be damaged by ESD. Take care to prevent ESD while touching the bezel mounting plate.

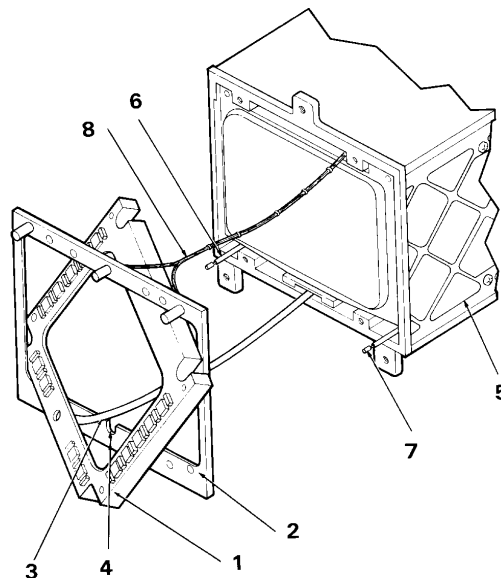
Excessive flexing or strain can break the small-gauge wires in the bundled wiring harnesses on the bezel and bezel mounting plate. Take care to limit harness bending and strain as bezel, bezel mounting plate, and CRT are installed.

1. Tilt bezel (1) sideways and pass bezel through opening in bezel mounting plate (2) so that bezel (1) is on front side of bezel mounting plate (2). Lay bezel (1) facedown in front of MFD.

2. Place bezel harness (3) in U-shaped groove (4) on bottom of bezel mounting plate (2).

3. Slide bezel (1), bezel harness (3), and bezel mounting plate (2) back into chassis (5) so that about one inch of bezel harness (3) extends out in front of bezel mounting plate (2).

4. Slide bezel mounting plate (2) over switch shafts (6 and 7) and the front of the CRT.



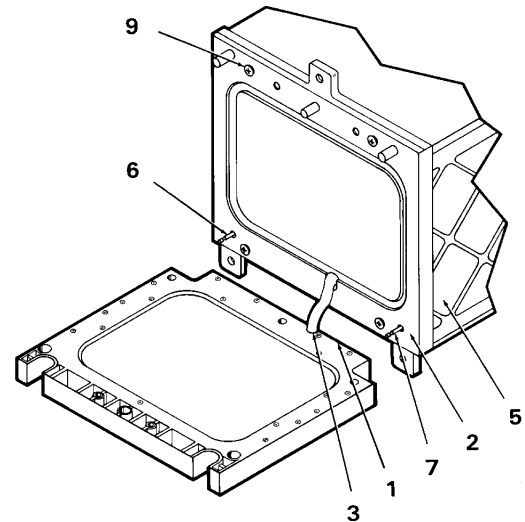
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4-37. INSTALL BEZEL AND MOUNTING PLATE ON FRONT OF MULTIFUNCTION DISPLAY (AVIM) (CONT)**NOTE**

Ensure bezel mounting plate harness (3) is tucked between top of CRT and chassis (5).

5. Position bezel mounting plate (2) on chassis (5) so that switch shafts (6 and 7) rotate without binding.

6. Install four mounting screws (9) through bezel mounting plate holes.

**NOTE**

Ensure no wires are being pinched as you secure bezel mounting plate (2) to chassis (5).

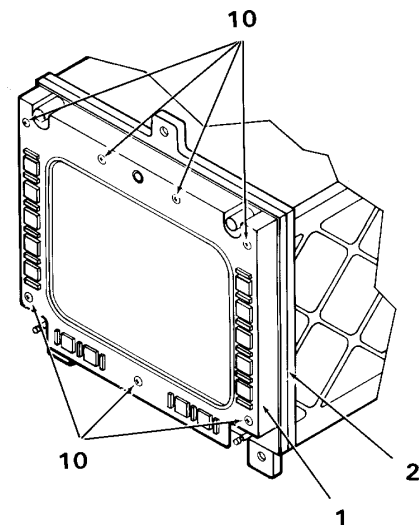
7. Check that bezel mounting plate (2) sits flush against mounting surface around entire front perimeter of chassis (5).

8. Place bottom of bezel (1) next to bottom of bezel mounting plate (2).

NOTE

There should be no slack in bezel harness (3) when bezel (1) is against bezel mounting plate (2).

9. Position bezel (1) on bezel mounting plate (2) and tighten seven captive screws (10) until they are snug. Do not overtighten screws (10).



10. Check that bezel (1) sits flush against surface of bezel mounting plate (2).

11. Install top cover per Task 4-45.

12. Install brightness and contrast control knobs per Task 4-17.

INSPECT**END OF TASK**

4-38. INSTALL FOCUS POWER SUPPLY (AVIM)

This task covers: Installation of focus power supply in the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
MFD on bench
No power applied

General Safety Instructions:

CAUTION

Focus power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove top cover (1) from static shielding bag.

2. Position focus power supply (2) on bottom side of top cover (1).

NOTE

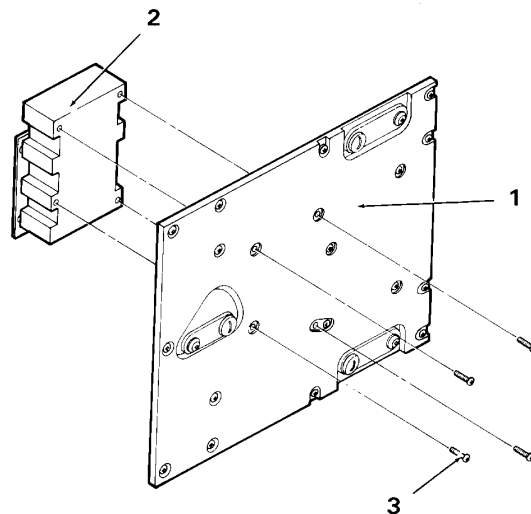
Mounting screws should not be fully tightened until all four have been inserted.

No washers are needed for the mounting screws.

3. Insert four mounting screws (3).
Hand tighten only.

4. Fully tighten four mounting screws (3).

5. Install top cover per Task 4-45.



INSPECT

END OF TASK

4-39. INSTALL HIGH VOLTAGE POWER SUPPLY (AVIM)

This task covers: Installation of high voltage power supply in the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied

General Safety Instructions:**CAUTION**

High voltage supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove top cover (1) from static shielding bag.

2. Position high voltage power supply (2) on bottom side of top cover (1).

NOTE

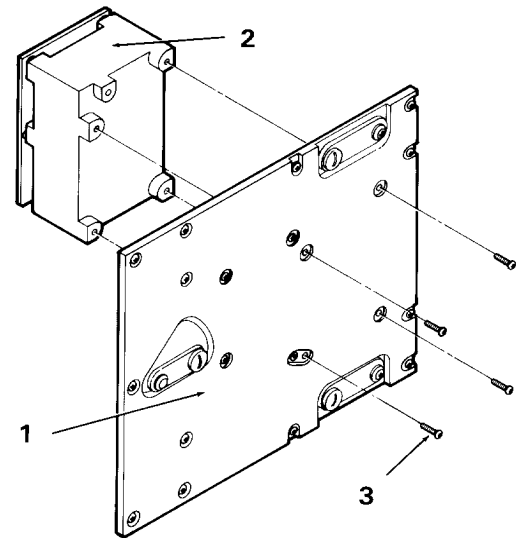
Mounting screws should not be fully tightened until all four have been inserted.

No washers are needed for the mounting screws.

3. Insert four mounting screws (3). Hand tighten only.

4. Fully tighten four mounting screws (3).

5. Install top cover per Task 4-45.

INSPECT**END OF TASK**

4-40. INSTALL LOW VOLTAGE POWER SUPPLY REGULATOR ASSEMBLY AND CCA A4A1 (AVIM)

This task covers: Installation of regulator assembly and circuit card assembly A4A1 into low voltage power supply of the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)

MFD on bench

Low voltage power supply removed (4-21)

Low voltage power supply CCA A4A2 removed (4-23)

Low voltage power supply driver assembly removed (4-24)

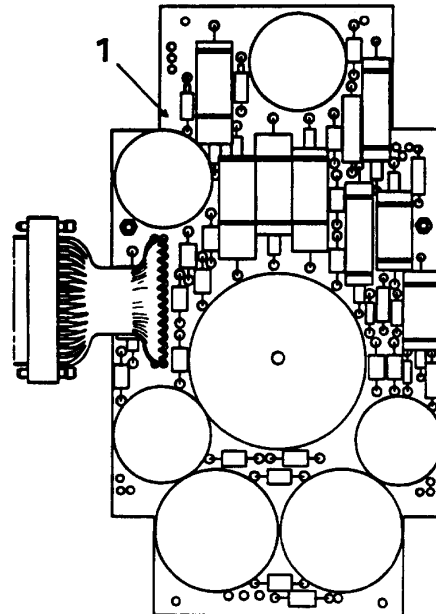
Low voltage power supply regulator assembly and CCA A4A1 removed (4-25)

No power applied

CAUTION

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

-
1. Remove circuit card assembly A4A1 (1) from static shielding bag.



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4-40. INSTALL LOW VOLTAGE POWER SUPPLY REGULATOR ASSEMBLY AND CCA A4A1 (AVIM) (CONT)

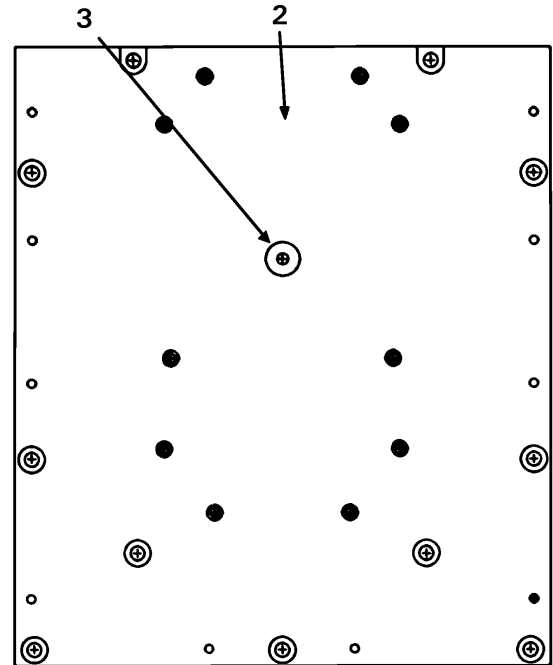
2. Place CCA A4A1 on top of low voltage power supply cover base (2) and secure it to cover base (2) by inserting machine screw (3) into bottom of cover base (2). Do not fully tighten machine screw (3) at this time.

3. Remove low voltage power supply regulator assembly (4) from static shielding bag.

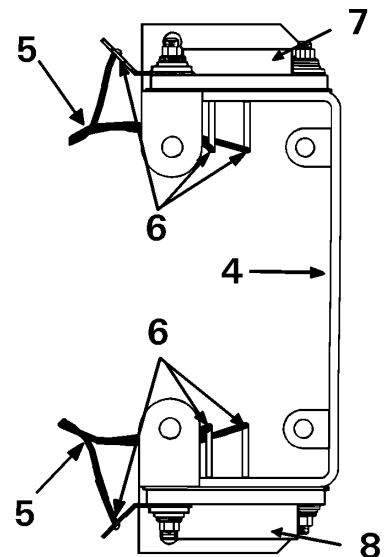
CAUTION

Use an approved low wattage soldering iron and heat shunt when soldering electronic components.

4. Solder tagged wires (5) on CCA A4A1 to terminals (6) on two linear microcircuits (7) and (8) on low voltage power supply regulator assembly (4).



L V P S Cover Base (Bottom)



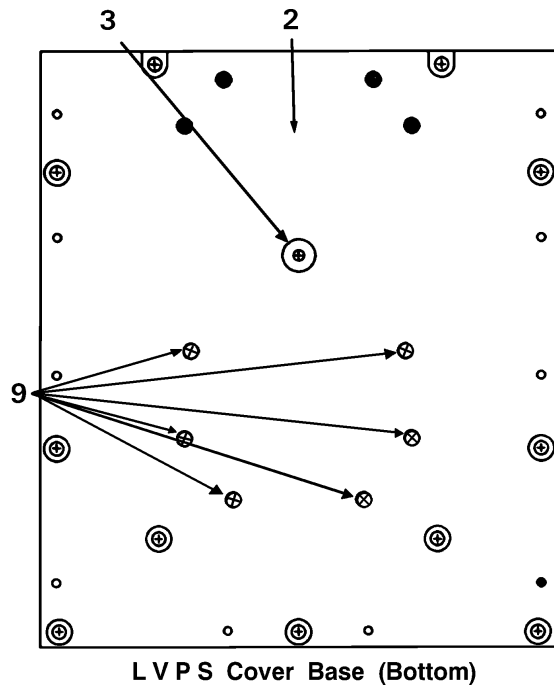
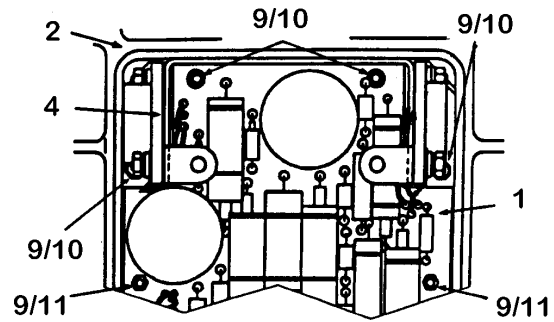
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4-40. INSTALL LOW VOLTAGE POWER SUPPLY REGULATOR ASSEMBLY AND CCA A4A1 (AVIM) (CONT)

5. Secure low voltage power supply regulator assembly (4) and CCA A4A1 to low voltage power supply cover base (2) with six screws (9), four nuts (10), and two posts (11).

6. Torque six screws (9) and one machine screw (3) on bottom of low voltage power supply cover base (2) to 6 INCH-POUNDS.

INSPECT



END OF TASK

4-41. INSTALL LOW VOLTAGE POWER SUPPLY DRIVER ASSEMBLY (AVIM)

This task covers: Installation of driver assembly into low voltage power supply of the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)

MFD on bench

Low voltage power supply removed (4-21)

Low voltage power supply CCA A4A2 removed (4-23)

Low voltage power supply driver assembly removed (4-24)

No power applied

CAUTION

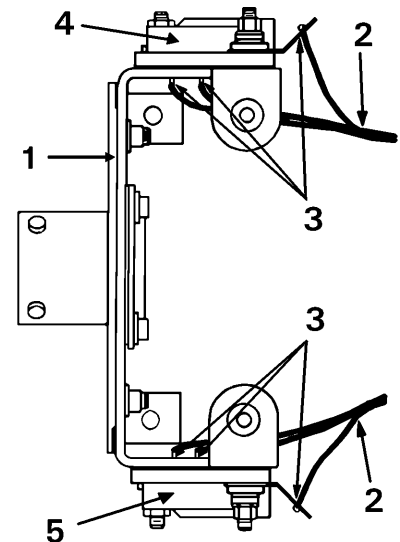
The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove low voltage power supply driver assembly (1) from static shielding bag.

CAUTION

Use an approved low wattage soldering iron and heat shunt when soldering electronic components.

2. Solder tagged wires (2) to terminals (3) on two linear microcircuits (4) and (5) on low voltage power supply driver assembly (1).

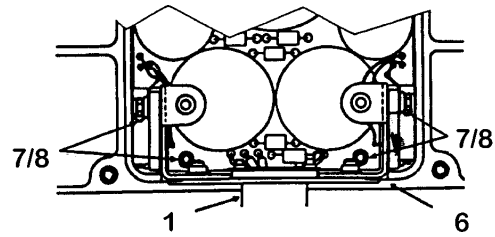


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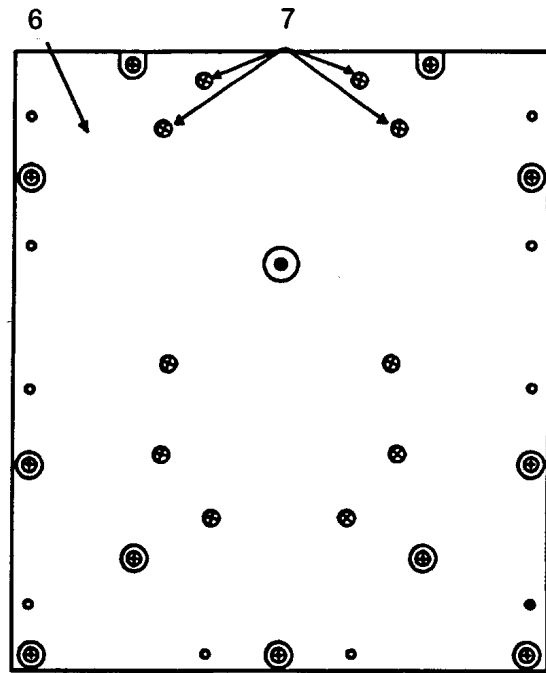
4-41. INSTALL LOW VOLTAGE POWER SUPPLY DRIVER ASSEMBLY (AVIM) (CONT)

3. Secure low voltage power supply driver assembly (1) to low voltage power supply cover base (6) using four screws (7) and four nuts (8).

4. Torque four screws (7) on bottom of low voltage power supply cover base (6) to 6 INCH-POUNDS.



INSPECT



LVPS Cover Base (Bottom)

END OF TASK

4-42. INSTALL LOW VOLTAGE POWER SUPPLY CIRCUIT CARD ASSEMBLY A4A2 (AVIM)

This task covers: Installation of circuit card assembly A4A2 into low voltage power supply of the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

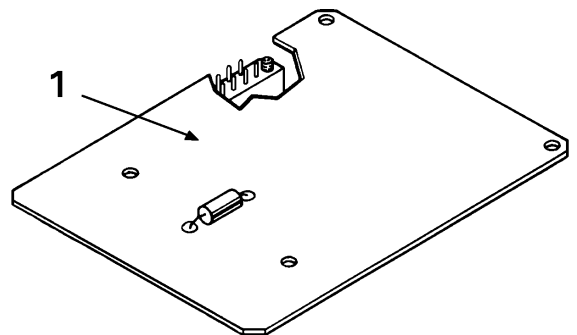
Static control work station set up (3-18)

MFD on bench
Low voltage power supply removed (4-21)
Low voltage power supply CCA A4A2 removed (4-23)
No power applied

CAUTION

The low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Remove low voltage power supply circuit card assembly A4A2 (1) from static shielding bag.



GO TO NEXT PAGE

4-42. INSTALL LOW VOLTAGE POWER SUPPLY CIRCUIT CARD ASSEMBLY A4A2 (AVIM) (CONT)

2. Connect lead assembly (2) to receptacle on CCA A4A2 (1) and secure connection to CCA A4A1 (3) by screwing in two connector screws (4), holding connector straight and alternatively turning both screws.

CAUTION

To prevent damage to lead assembly, do not lift CCA A4A2 more than three inches.

3. Turn CCA A4A2 (1) over, placing it on top of driver assembly (5) and two electrical-mechanical posts (6), and align holes in CCA A4A2 (1) with screw holes in driver assembly (5) and electrical-mechanical posts (6).

4. Secure CCA A4A2 (1) to driver assembly (5) with two electrical-mechanical posts (7) and two washers (8). Secure CCA A4A2 (1) to electrical-mechanical posts (6) with two screws (9) and two washers (10).

5. Torque electrical-mechanical posts (7) and two screws (9) to 6 INCH-POUNDS.

6. Slide low voltage power supply cover top (11) into place over low voltage power supply (12).

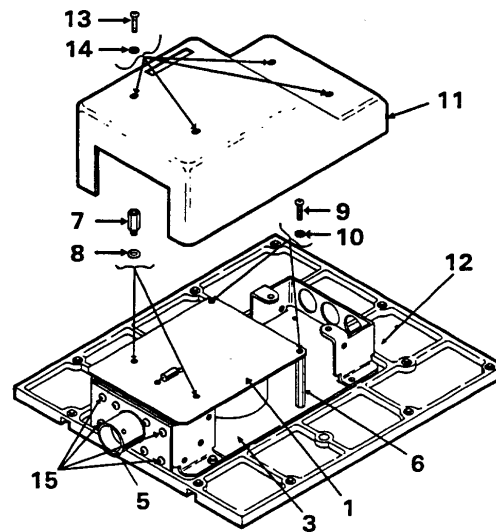
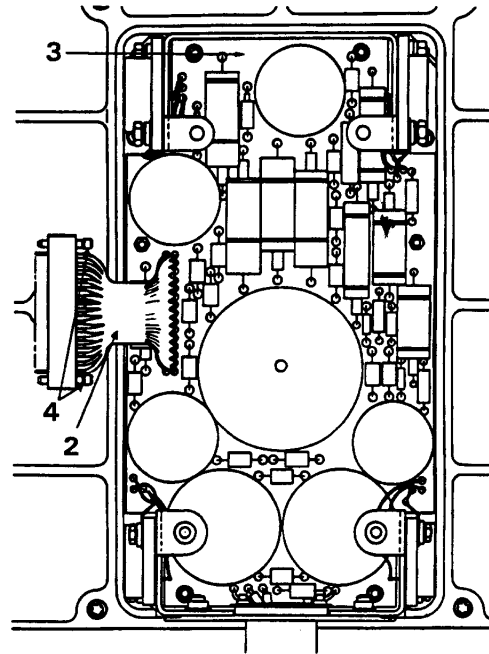
7. Secure low voltage power supply cover top (11) in place by installing four screws (13) and four washers (14) and by tightening four outside screws (15) on connector plate attached to low voltage power supply driver assembly (5).

8. Torque four outside screws (15) on connector plate to 6 INCH-POUNDS.

9. Place low voltage power supply (12) in a static shielding bag (C7).

INSPECT

END OF TASK



4-43. INSTALL LOW VOLTAGE POWER SUPPLY (AVIM)

This task covers: Installation of low voltage power supply into the Multifunction Display (MFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
Low voltage power supply removed (4-21)
No power applied

General Safety Instructions:**CAUTION**

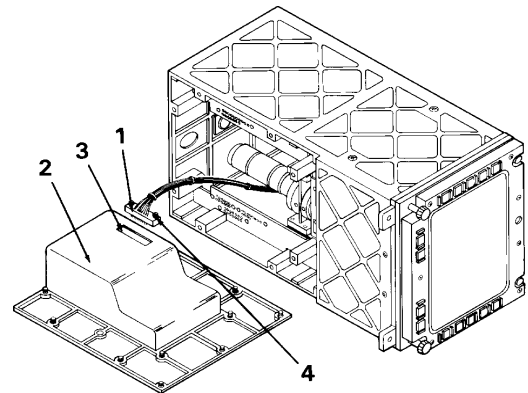
Low voltage power supply and other units in the MFD contain devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Turn MFD on its right side.
2. Visually check that harness connector (1) is not damaged. If damaged, repair as required.
3. Set low voltage power supply (2) next to MFD as shown.

NOTE

Bottom cover of low voltage power supply is also bottom cover of MFD.

4. Position harness connector (1) on low voltage power supply connector (3) so male/female threads are properly matched. Alternatively tighten two captive locking screws (4), a turn or two at a time, until fully threaded into low voltage power supply connector (3).



GO TO NEXT PAGE

4-43. INSTALL LOW VOLTAGE POWER SUPPLY (AVIM) (CONT)

5. Stand low voltage power supply (2) up on bottom edge of cover (5) and position low voltage power supply (2) so it is straight out from MFD.

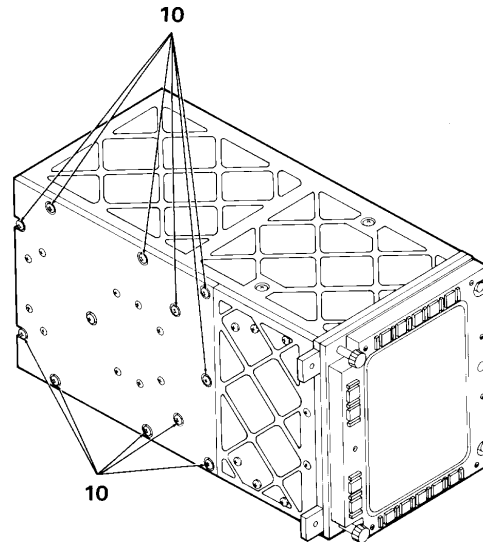
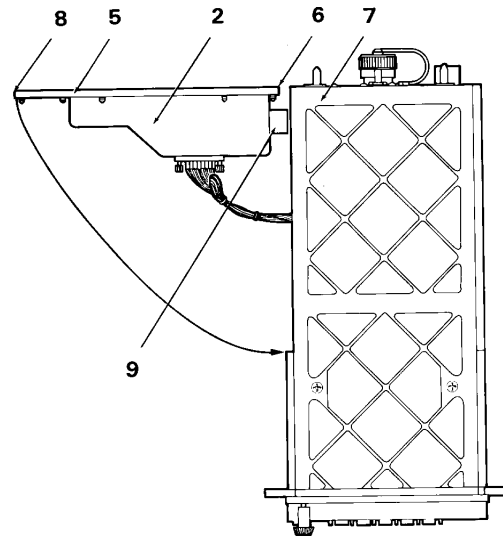
6. Place rear edge (6) of bottom cover (5) next to rear of chassis (7). Pivot front edge (8) of cover (5) in toward front of MFD and guide low voltage power supply (2) and connector (9) into chassis (7).

NOTE

Motherboard harnesses may have to be moved slightly before low voltage power supply can go into chassis.

7. Secure low voltage power supply (2) to MFD by tightening 11 captive screws (10).

INSPECT



END OF TASK

4-44. INSTALL CIRCUIT CARDS A1, A2, A3 (AVIM)

This task covers: Installation of circuit cards A1, A2 and A3 in the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up (3-18)
MFD on bench
No power applied

General Safety Instructions:

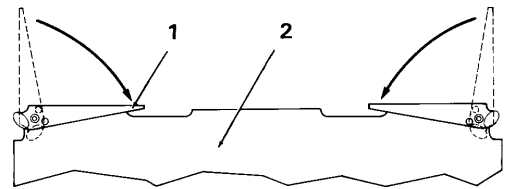
CAUTION

The circuit cards and other units in the MFD contain electronic devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Place both card extractor levers (1) so they are down across top of circuit card (2).

2. Verify that correct part number circuit card is being installed in card slots:

<u>CCA</u>	<u>Part Number</u>	<u>Common Name</u>
A1	8001710-901	Horizontal Deflection Card
A2	8001735-902	Video Processor Card
A3	8001711-901	Vertical Deflection Card



GO TO NEXT PAGE

4-44. INSTALL CIRCUIT CARDS A1, A2, A3 (AVIM) (CONT)

CAUTION

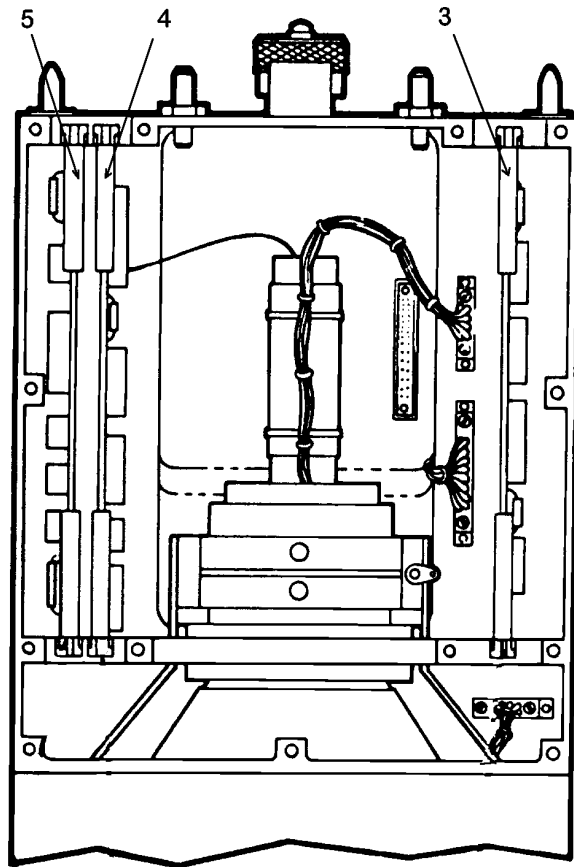
Keep all leads and wire harnesses clear of circuit card path while installing circuit card.

NOTE

The circuit cards fit tightly in the card slots and can require considerable pressure to be installed. The spring tension clips attached along each edge of the circuit cards serve as heat sinks and therefore must have firm contact with the chassis card slots. If a circuit card slides in easily, without a definite feel of snugness, the spring-tension clips are not making proper contact; remove the circuit card and replace with another card with the same part number.

3. To install circuit cards A1 (3) or A3 (5), turn circuit card so component side is positioned as shown. Slide circuit card halfway into its card slots. Using thumb pressure on the two card extractor levers, push circuit card A1 (3) or A3 (5) all the way in so that card extractor levers are flat against card frame.

4. To install circuit card A2 (4), turn circuit card so component side is positioned as shown. Slide circuit card halfway into its card slots.



GO TO NEXT PAGE

4-44. INSTALL CIRCUIT CARDS A1, A2, A3 (AVIM) (CONT)

- a. Visually check that backup video cable (6) is not damaged. Repair if damaged.
- b. Visually check that connector J3 (7) on circuit card A2 (4) is not damaged. If damaged, replace A2 (4).
- c. Visually check that primary video cable (8) is not damaged. If damaged, repair as required.
- d. Visually check that connector J2 (9) on circuit card A2 (4) is not damaged. If damaged, replace A2 (4).
- e. Visually check that connector (10) on yellow CRT cathode lead (11) is not damaged. If damaged, replace CRT (12).
- f. Visually check that connector J1 (13) on circuit card A2 (4) is not damaged. If damaged, replace A2 (4).
- g. Connect backup video cable (6) to connector J3 (7) on circuit card (4).
- h. Connect primary video cable (8) to connector J2 (9) on circuit card (4).

CAUTION

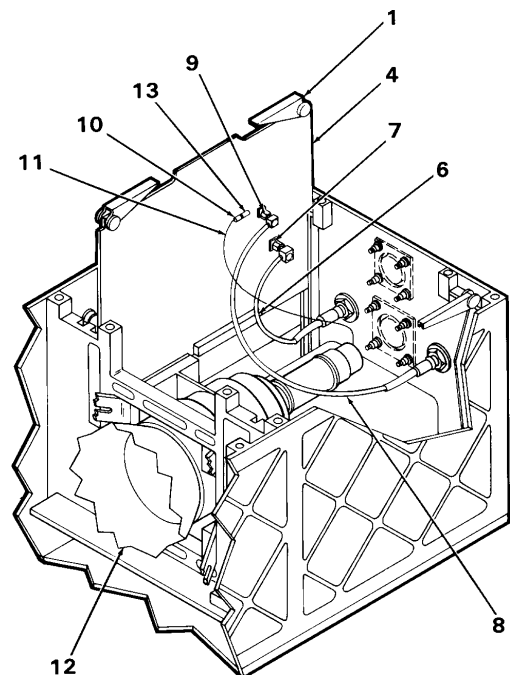
CRT cathode lead can be damaged when being connected. To avoid damaging lead, do not push on lead. Push on connector only.

- i. Plug connector (10) of yellow CRT cathode lead (11) into jack J1 (13) on circuit card A2 (4).

CAUTION

Keep all leads and wire harnesses clear of circuit card path while installing circuit card.

- j. Push circuit card A2 (4) down the rest of the way into the MFD using thumb pressure on the two card extractor levers (1).

INSPECT

5. Install top cover per Task 4-45.

END OF TASK

4-45. INSTALL TOP COVER (AVIM)

This task covers: Installation of the top cover on the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static control work station set up
(3-18)
MFD on bench
No power applied

General Safety Instructions:

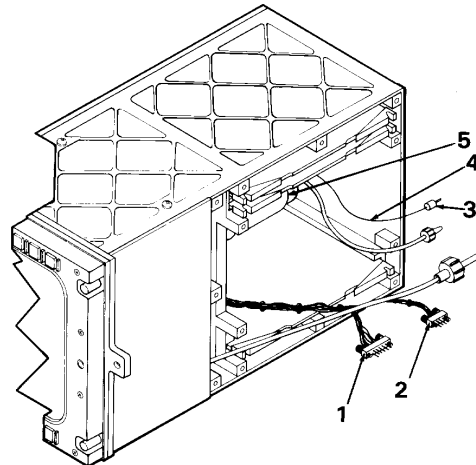
CAUTION

The two cover-mounted power supplies contain electronic devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

CAUTION

To avoid equipment damage, ensure all leads and wire harnesses are out of the way before turning MFD on its side.

1. Turn MFD on its right side.
2. Visually check that two harness connectors (1 and 2) are not damaged. If damaged, repair as required.
3. Visually check that connector (3) on orange CRT grid 2 lead (4) is not damaged. If damaged, repair as required.



GO TO NEXT PAGE

4-45. INSTALL TOP COVER (AVIM) (CONT)

4. Visually check that connector (6) with red captive nut (7) on white CRT anode lead (8) is not damaged. If damaged, repair as required.

5. Visually check that connector (9) with green captive nut (10) on CRT focus lead (11) is not damaged. If damaged, repair as required.

6. Place top cover (12) next to MFD as shown.

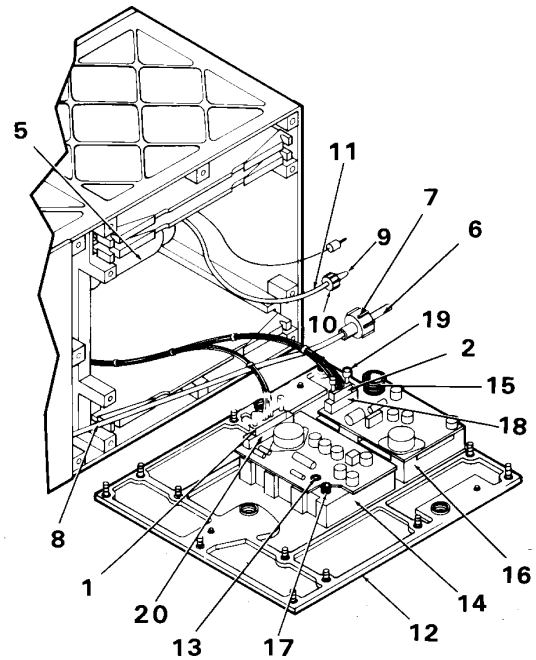
7. Visually check that focus power supply connector (20) is not damaged. If damaged, repair as required.

8. Visually check that high voltage supply connector (15) is not damaged. If damaged, repair as required.

9. Visually check that focus power supply connector (17) is not damaged. If damaged, replace focus power supply (14).

10. Position 10-pin harness connector (2) on high voltage supply connector (18) so male/female threads are properly matched. Tighten two captive locking screws (19) evenly, a turn or two at a time, until fully threaded into high voltage supply connector (18).

11. In same way, connect 14-pin harness connector (1) to focus power supply connector (20).



GO TO NEXT PAGE

4-45. INSTALL TOP COVER (AVIM) (CONT)

CAUTION

CRT grid 2 lead (4) can be damaged when being connected. To avoid damaging lead, do not push on lead. Push on connector only.

12. Plug connector (3) on orange CRT grid 2 lead (4) into focus power supply connector (13).

CAUTION

Anode lead connection on CRT can be damaged if anode lead (8) is pulled and stretched while connecting A7P2.

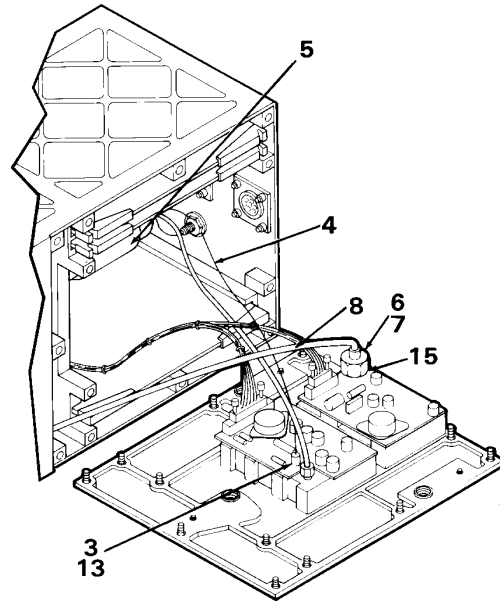
NOTE

Place anode lead (8) over all other leads and wire harnesses.

13. Plug connector (6) with red captive nut (7) on white CRT anode lead (8) into high voltage supply connector (15). Finger-tighten red captive nut (7).

NOTE

CRT anode lead (8) must be inserted into high voltage supply connector (15) as far as it will go for captive nut to hold.



GO TO NEXT PAGE

4-45. INSTALL TOP COVER (AVIM) (CONT)**CAUTION**

CRT focus lead connection on CRT can be damaged if focus lead is over-stretched.

NOTE

Place focus lead (11) under all other leads and wire harnesses.

14. Plug connector (9) with green captive nut (10) on CRT focus lead (11) into focus power supply connector (17). Finger-tighten green captive nut (10).

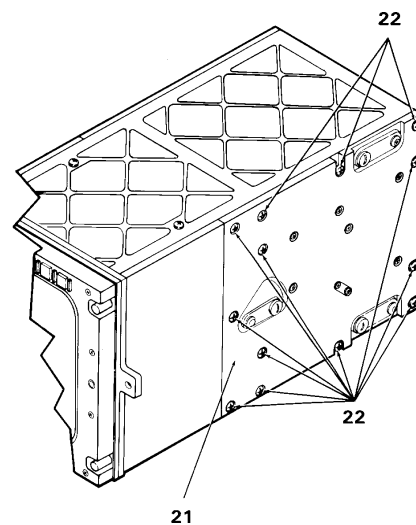
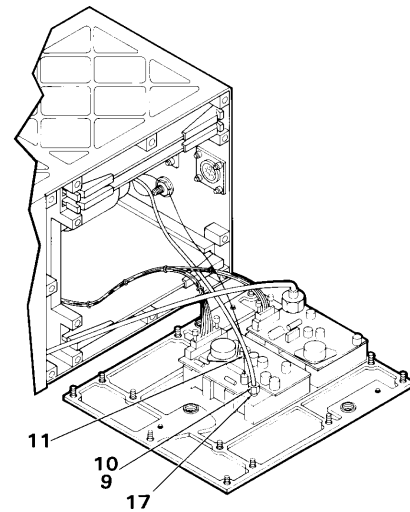
NOTE

CRT focus lead must be inserted into focus power supply connector (17) as far as it will go for captive nut to hold.

Guide wiring into chassis as top cover is placed on MFD.

15. Lift top cover (21) and place it on the MFD.

16. Secure top cover (21) to MFD by tightening 13 captive screws (22).

INSPECT

END OF TASK

4-46. ALIGN MULTIFUNCTION DISPLAY (AVIM)

This task covers: Potentiometer adjustments for the Multifunction Display (MFD).

INITIAL SETUP

Applicable Configurations:

All

Test Equipment:

Test Support System or BSTF/BSTS

Tools:

Electronic Equipment Tool Kit
Insulated Blade Screwdriver

Materials:

Sealing Compound (C10)

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

References:

TM 9-4935-780-13-1
TM 11-6625-778-13&P-1

Equipment Condition:

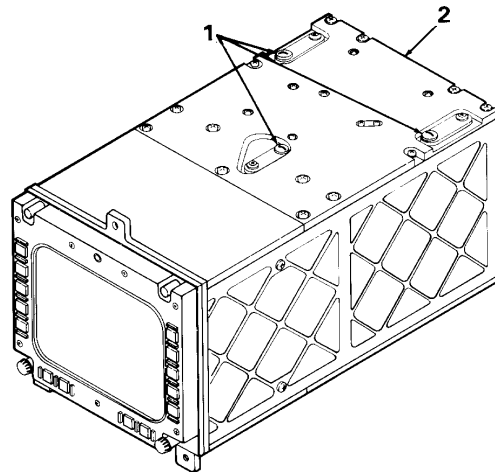
Static Control Work Station Set Up (3-18)
MFD on TSS, or equivalent, bench in front of
Transition Frame.
No power applied

General Safety Instructions:

CAUTION

The MFD contains devices sensitive to
ESD. Proper handling and grounding
techniques must be observed.

1. Position MFD top side up. Loosen three
knurled plugs (1) on top cover (2) and swing out
of the way.



GO TO NEXT PAGE

4-46. ALIGN MULTIFUNCTION DISPLAY (AVIM) (CONT)

2. Carefully scrape sealing compound from the following six potentiometers:

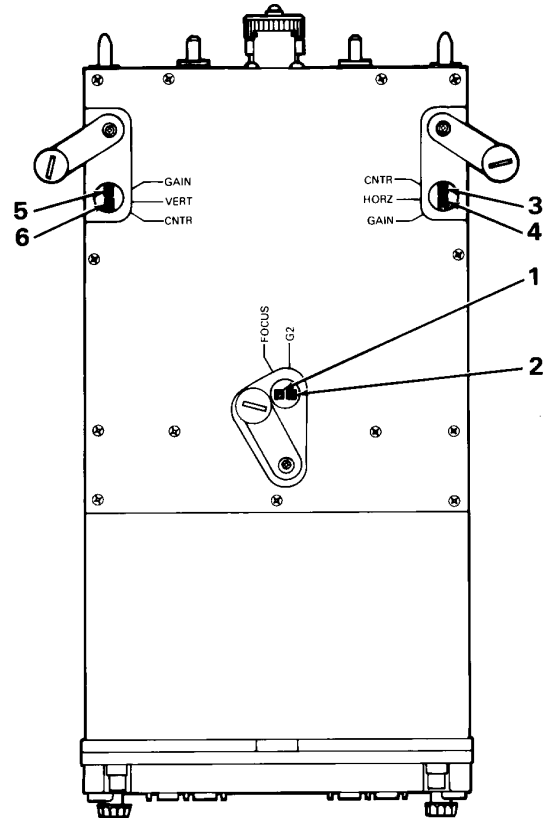
SUBASSEMBLY	POTENTIOMETER	INDEX
Focus Supply	R1	1
Focus Supply	R2	2
Circuit Card A1	R23	3
Circuit Card A1	R24	4
Circuit Card A3	R13	5
Circuit Card A3	R14	6

WARNING

High voltages can kill. Do not allow skin or clothing to come in contact with MFD subassemblies while power is applied. Use only insulated blade screwdriver when adjusting potentiometers. Voltages can cause arcing which may result in severe burns. Remove watches, rings, and other jewelry that may cause a shock or burn hazard.

3. Refer to TM 9-4935-780-13-1 to power up the TSS or to TM 11-6625-778-13&P-1 to power up the BSTF/BSTS and perform MFD alignment. Use the following table to locate potentiometers during alignment.

SUBASSEMBLY	POTENTIOMETER	INDEX
Focus Supply	R1	1
Focus Supply	R2	2
Circuit Card A1	R23	3
Circuit Card A1	R24	4
Circuit Card A3	R13	5
Circuit Card A3	R14	6



GO TO NEXT PAGE

4-46. ALIGN MULTIFUNCTION DISPLAY (CONT)

NOTE

For the pilot to have a full view of the MFD display, proper alignment includes the presence of a band (0.2 inch or less) along the top of the screen where no video is displayed.

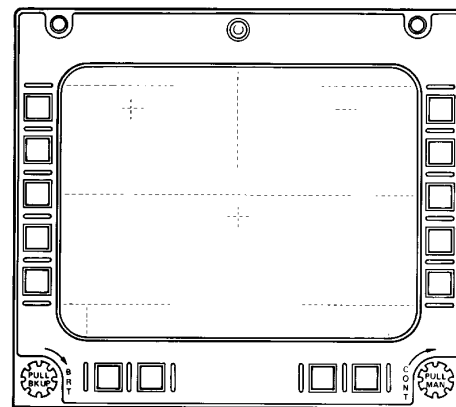
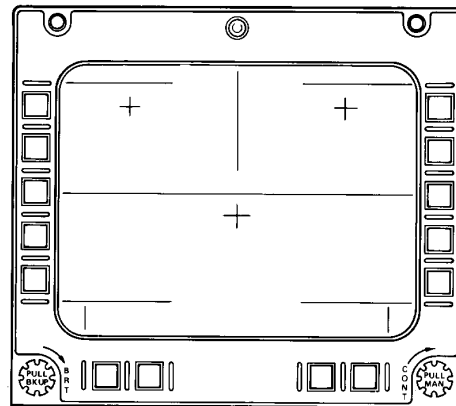
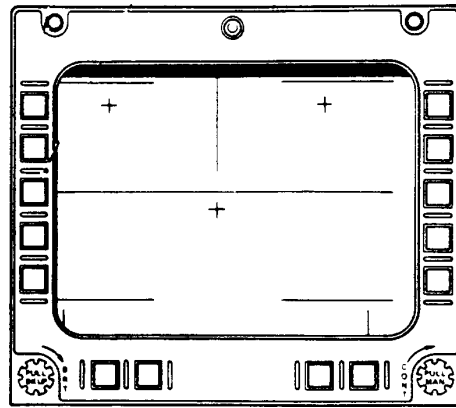
- 4. One or more of the following conditions may be observed while viewing the MFD display.

NOTE

View the display from approximately 16 inches away with eyes aligned to center of screen.

- a. Visible. Either the display is visible as shown or the screen is blank.

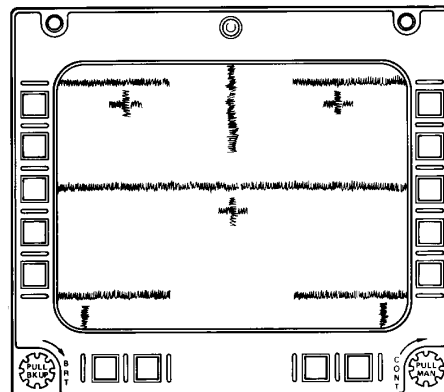
- b. Dim. The display appears faint and hard to see.



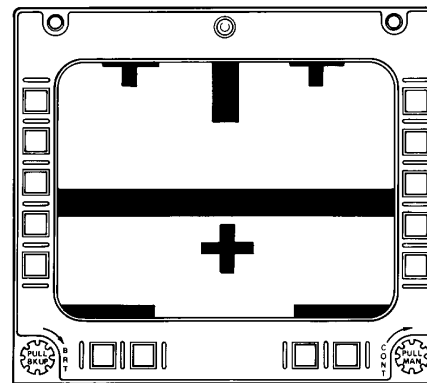
GO TO NEXT PAGE

4-46. ALIGN MULTIFUNCTION DISPLAY (AVIM) (CONT)

c. Out-of-focus. The lines appear fuzzy and thick.



d. Ballooning. The entire display is expanded outward from the center. The lines appear wide.



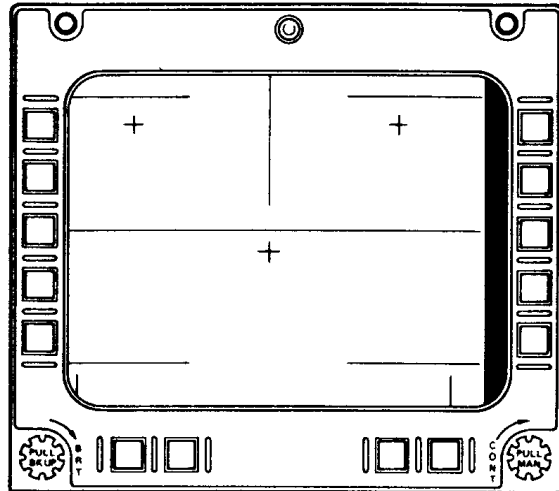
e. Vertical roll. The display moves up or down the screen, disappearing and then reappearing at the opposite side.

GO TO NEXT PAGE

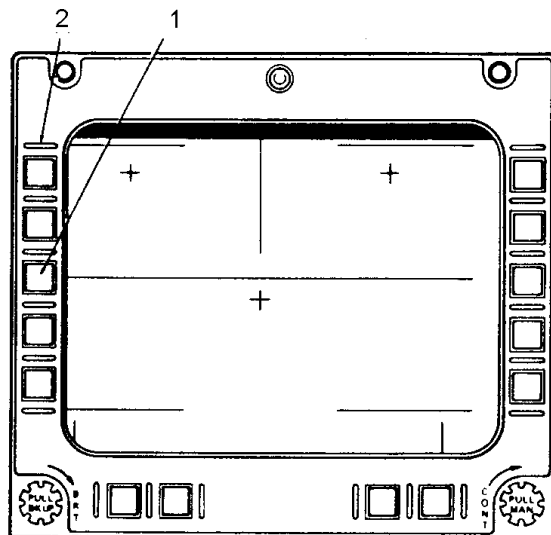
4-46. ALIGN MULTIFUNCTION DISPLAY (AVIM) (CONT)

f. Horizontal roll. The display moves across the screen, disappearing and then reappearing at the opposite side.

g. Out of alignment. The entire display is shifted in one direction. A dark band may appear on any side of the screen.



h. For proper display alignment the horizontal lines should be in line with the center of the central keypads (1) and with the top and bottom keypad guides (2). The vertical line should be centered under the upper center of the bezel.



NOTE

Perfect alignment is not necessary. However, it should be as close as possible to the above guidelines. A properly aligned MFD will exhibit a band (0.2 inches or less) along the top of the screen where no video is displayed.

GO TO NEXT PAGE

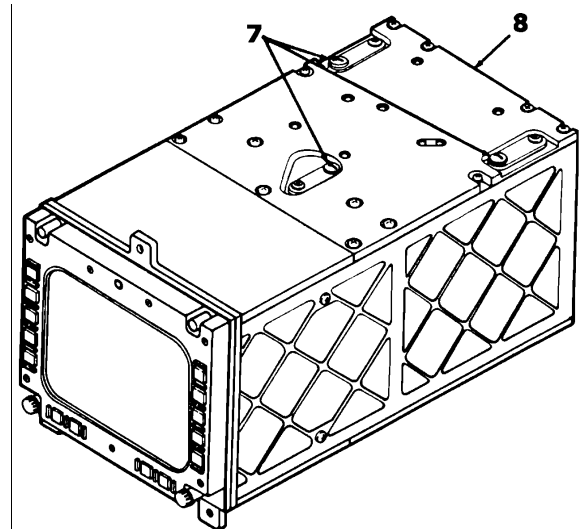
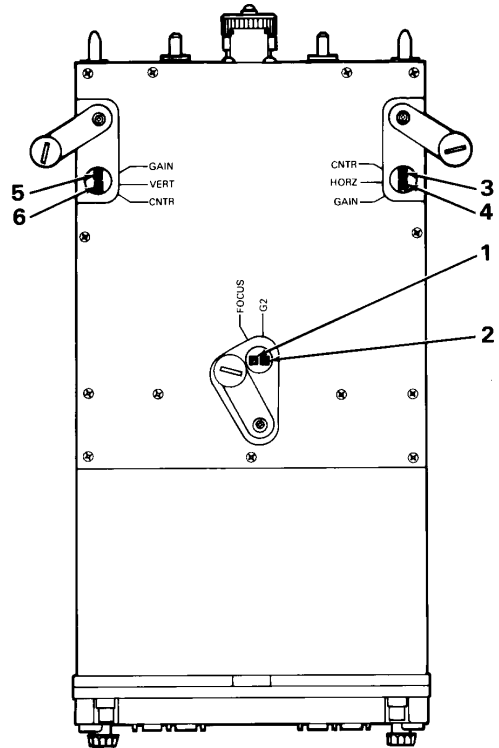
4-46. ALIGN MULTIFUNCTION DISPLAY (AVIM) (CONT)

5. Apply sealing compound (C10) to the following potentiometers. Ensure sealing compound covers screw-head and top of potentiometer.

SUBASSEMBLY	POTENTIOMETER	INDEX
Focus Supply	R1	1
Focus Supply	R2	2
Circuit Card A1	R23	3
Circuit Card A2	R24	4
Circuit Card A3	R13	5
Circuit Card A3	R14	6

6. Reposition knurled plugs (7) into holes on top cover (8) and tighten.

INSPECT



END OF TASK

4-47. REMOVE AND INSTALL PLUG RETAINING STRAP

This task covers: Replacement of the plug retaining strap.

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment Repairer
68P Technical Inspector

Equipment Condition:

Static Control Workstation set up (3-18)
Top cover removed (4-19)
No power applied

Materials:

Plug retaining strap (C11)

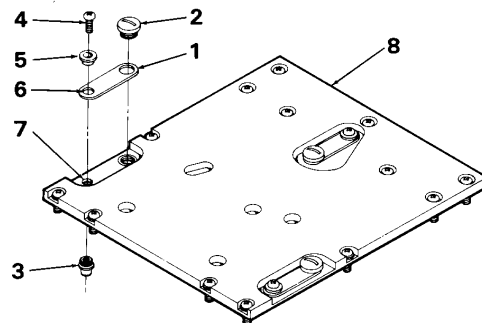
REMOVAL

1. Locate defective strap (1) and unscrew plug (2).

CAUTION

The retaining nut (3) is very small. Be careful not to drop it into the MFD.

2. Hold retaining nut (3) and remove screw (4) and bushing (5).
3. Unscrew plug (2) from strap (1).



INSTALLATION

4. Screw plug (2) into new plug retaining strap (1) (C11).
5. Insert screw (4) and bushing (5) into hole (6) in strap (1) and into hole (7) in cover (8).
6. Replace retaining nut (3) and snug down.
7. Install top cover per Task 4-45.

INSPECT

END OF TASK

CHAPTER 5

KEYBOARD UNIT (KU) - MAINTENANCE

Section I	Principles/Theory of Operation	5-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	5-5
Section III	Service Upon Receipt	5-5
Section IV	Troubleshooting	5-5
Section V	Maintenance Procedures	5-6

Section I

PRINCIPLES/THEORY OF OPERATION

5-1. PRINCIPLES OF OPERATION

The Keyboard Unit (KU) is used for display format call-up, CDS data control, and alphanumeric entry into the CDS. The KU is wired to cockpit switches and both MCPUs or IMCPUs. It monitors and interprets input signals from these sources. It then transmits the information to both MCPUs or IMCPUs.

The KU is the primary interface device for alphanumeric data entry into the CDS. Its main function is to convert discrete switch data and keyboard data into a serial data stream and provide serial data to the MCPU or IMCPU. It also monitors external (cockpit) switch inputs. There are two separately wired channels for redundancy purposes. Each channel interfaces with one MCPU or IMCPU (Channel A with left MCPU and Channel B with right MCPU). If one channel fails, the CDS notes failure and both MCPUs or IMCPUs will use the remaining good channel.

5-2. FUNCTIONAL DESCRIPTION

The major elements of the KU are as follows:

- Enclosure Assembly
- Keyboard Assembly
- Electronic Module

The enclosure assembly is the four sided case for the KU. The front and rear of the enclosure assembly are open. The keyboard assembly mounts to the front panel of the enclosure assembly.

The electronic module mounts to the rear of the enclosure assembly.

The keyboard assembly consists of the following:

- 19 large push buttons
- 28 small push buttons
- 3 toggle switches (two of the three toggle switches contain switch guards)

Of the 19 large push buttons, four are for the APX-100 radio. Of the remaining 15, ten provide numeric data entry capabilities (0-9). There are also push buttons for clear (CLR), message (MSG), ENTER, a dash (-), and a decimal (.). Of the 28 small push buttons, two provide directional cursor control. The remaining 26 provide alpha data entry capabilities.

One toggle switch is labeled REC/ACK. This enables the operator to acknowledge and recall caution, and advisory messages if the condition still exists.

The two toggle switches protected by switch guards are labeled ZERO and EMER. The zeroize/code switch is used to erase memory of the following:

- Preselected Frequencies (except for the Preselected Emergency Radio Frequency)
- Navigation Data
- Weapons Parameters
- IFF Information

NOTE

The zero process takes about 4 minutes to complete.

The emergency/communications switch engages the preselected emergency radio frequency and engages transponders into emergency mode.

The electronic module consists of four Circuit Card Assemblies (CCAs) and one chassis assembly. The CCAs consists of two independent multiplexer channels. The keypad contains dual-switch contacts to enable routing of the signals to both multiplexer channels. The two multiplexer channels enable the KU to be functionally redundant. Each channel has a power supply, timing and encoding circuitry, an RS-422-A differential line receiver and line driver, digital multiplexers and a universal asynchronous receiver transmitter (UART). The channels share a resistor divider network (RDN) that is used for conditioning Type A Receiver (TAR) signals. All TAR and keypad input signals are routed to two digital multiplexers, each of which provides input to one of the two channels. Each channel "talks" to one MCPU or IMCPU.

The MCPU or IMCPU requests transmission of a serial data word by transmitting a Clear-to-Send (CTS) RS-422-A differential control signal. The CTS provides handshaking between MCPU or IMCPU and its KU channel. A CTS pulse of 160 microseconds causes a reset on the KU channel and the first of 24 data words is

transmitted to the MCPU or IMCPU. When the MCPU or IMCPU receives a data word, it generates a CTS pulse of approximately 40 microseconds to command transmission of the next word. As the KU receives each 40-microsecond CTS signal, the next word is transmitted to the MCPU or IMCPU. This process continues until a total of 24 serial data words have been transmitted.

Two test bits (TBIT) are provided in each 24-word set of data. The TBIT will change state after each CTS reset (160-microsecond) pulse. The TBIT are monitored by MCPU or IMCPU software to verify that new data is being received.

The KU provides the MCPU or IMCPU with serial data words in 11-bit serial format (1 start bit, 8 data bits, 1 parity bit (odd) and 1 stop bit).

5-3. EQUIPMENT DATA

Weight: 4.40 pounds

Dimensions:

Height: 6.00 inches

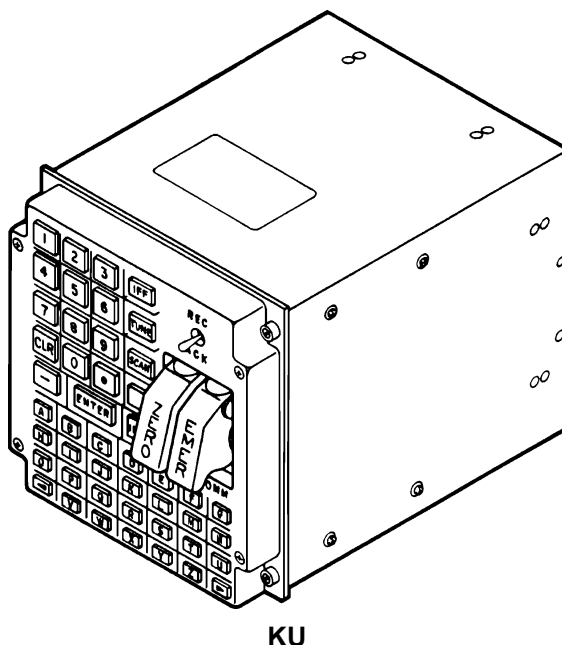
Width: 5.75 inches

Length: 7.40 inches

Electrical Power Requirements:

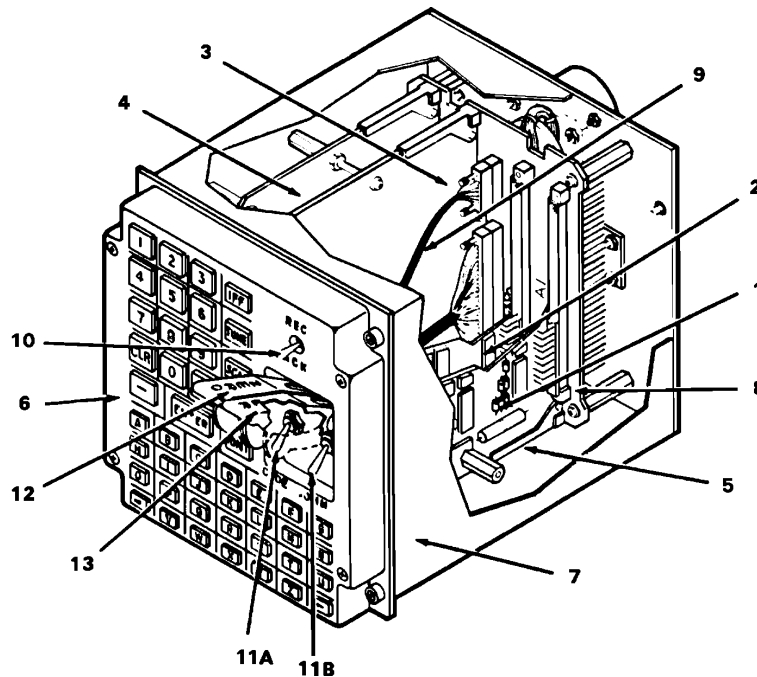
115 VAC, 400 Hz, .15A single phase

+28 VDC, .4A



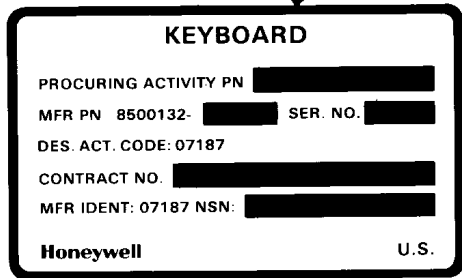
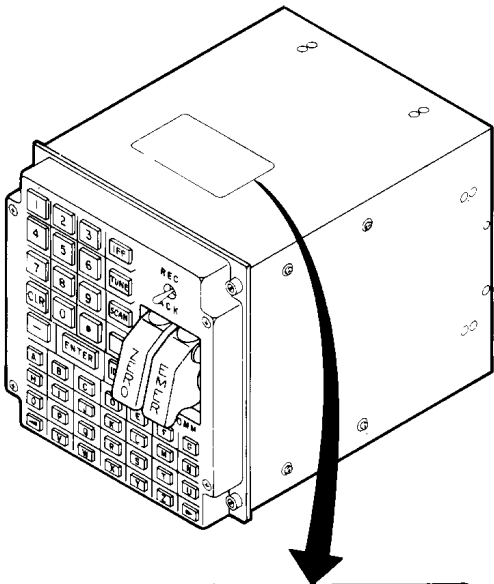
5-4. SUBASSEMBLY LIST/NOMENCLATURE CROSS-REFERENCE

INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NO.	
				-902 MODEL	-903 MODEL
1	A1 CCA	A1	Circuit Card Assembly, Control Card	8500081-901	8500081-901
2	A2 CCA	A2	Circuit Card Assembly, Interface Card	8500082-901	8500082-901
3	A3 CCA	A3	Circuit Card Assembly, Interface Card	8500082-901	8500082-901
4	A4 CCA	A4	Circuit Card Assembly, Control Card	8500081-901	8500081-901
5	Electronic Module	None	Module, Electrical Equipment	8500136-901	8500136-902
6	Keyboard Assembly	None	Keyboard Assembly	8500056-1	8516707
7	Enclosure	None	Enclosure Assembly	8500133	8500133
8	Chassis Assembly	None	Chassis, Electrical Equipment	8500142-901	8500142-902
9	Cable Assembly	None	Cable Assembly	8500213	8500213-901
10	S1	S1	Toggle Switch	2500347-271	2500347-271
11A	S2	S2	Toggle Switch	2500347-231	2503335-231
11B	S3	S3	Toggle Switch	2500347-231	2500347-231
12	Switch Guard	ZERO	Switch Guard	8500712-1	8500712-1
13	Switch Guard	EMER	Switch Guard	8500712-2	8500712-2



5-5. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

The identification plate for the KU is located on the top of the enclosure.



KU Care and Handling:

To protect the KU from Electrostatic Discharge (ESD) during maintenance (Section VII), observe these general precautions:

Never perform maintenance on the KU unless the unit is on a static control grounded workbench.

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks.

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the KU from physical and/or functional damage, observe these general precautions:

Do not handle roughly.

Do not drop.

Do no dent.

Do not scratch surface.

Do not allow contact with acids or solvents unless specified.

Do not allow corrosion to go untreated.

Do not expose to strong electromagnetic fields.

Do not probe connector pins or receptacles.

5-6. SAFETY, CARE, AND HANDLING

Personal Safety:

To avoid accidental electrical shock, never perform maintenance on the KU while power is applied to the unit.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-7. COMMON TOOLS AND EQUIPMENT

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

5-8. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

The Test Support System (TSS) and Test Program Sets (TPS) (refer to TM 9-4935-780-13-1) or the Base Shop Test Facility/Base Shop Test Station (BSTF/BSTS) and CDS TPS (refer to TM 11-6625-778-13&P-1) provide the necessary equipment for testing and troubleshooting the KU. No special tools or other support equipment are required.

Section III

SERVICE UPON RECEIPT

5-9. UNPACKING INSTRUCTIONS

The KU and each of its Shop Replaceable Units (SRUs) are shipped in reusable containers.

Be careful not to damage the shipping container while unpacking a unit.

Save the shipping container(s) and packaging materials for use when:

- a. Repaired KU is repacked for shipment to AVUM.
- b. AVIM non-repairable KU is repacked for shipment to depot repair.

- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

5-10. CHECKING UNPACKED EQUIPMENT

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

5-11. SCOPE

This section contains information on testing and troubleshooting a defective KU.

5-12. TEST AND TROUBLESHOOT

Preparation and setup for testing a KU is contained in TM 9-4935-780-13-1 or TM 11-6625-778-13&P-1.

Prior to running a diagnostic test, visually check the KU for physical damage. Refer to 5-14. If the KU passes visual check, proceed with the test. If the KU does not pass visual check, repair the unit. While a diagnostic test is being run, operator actions will appear on the display. The operator is to respond to these prompts.

If the KU passes the test, return the KU to AVUM. If the KU fails the test, replace the SRU indicated by the printout.

After SRU replacement, retest the KU. If the KU fails the test a second time, and the printout indicates that the same SRU is faulty, replace the cable assembly. Retest the KU. If the KU fails the test a third time, and the printout indicates that the same SRU is faulty, replace the chassis assembly.

If the printout indicates that a different SRU is faulty on the second or third testing, replace the newly suspected SRU.

Section V

MAINTENANCE PROCEDURES

5-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein.

Perform the necessary replacement tasks indicated by List of Tasks to repair the defective KU. For general aircraft maintenance practices, refer to TM 1-1500-204-23 and refer to TM 55-1500-323-24 for Aircraft Electric and Electronic Wiring Practices.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove Keyboard Unit	5-15	5-9
Install Keyboard Unit	5-16	5-10
Remove and Install Keyboard Unit Switch Guards	5-17	5-11
Clean and Inspect Keyboard Unit	5-18	5-12
Remove Electronic Module	5-19	5-13
Remove Keyboard Assembly	5-20	5-15
Remove Cable Assembly	5-21	5-16
Remove Circuit Card Assembly	5-22	5-17
Remove Chassis Assembly	5-23	5-19
Install Circuit Card Assembly	5-24	5-20
Install Chassis Assembly	5-25	5-23
Install Cable Assembly	5-26	5-25
Install Keyboard Assembly	5-27	5-26
Install Electronic Module	5-28	5-27
Repair Cable Assembly	5-29	5-30

5-14. VISUAL CHECKS

Visually check the KU to determine if it is in good physical condition. Go through the checklist below.

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair as required.
2. Is any connector loose?	Tighten connector hardware.

Visual Checks (CONT)

CONDITION	IF YES
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Refer to task 5-18.
5. Do any screws appear reddish-brown?	Refer to task 5-18.
6. Does the external surface of the LRU contain white or gray powdery deposits, similar to dust?	Refer to task 5-18.
7. Does the external surface appear rough or frosted?	Refer to task 5-18.
8. Does the external surface appear dull?	Refer to task 5-18.
9. Does the external surface contain tiny pits or holes?	Refer to task 5-18.
10. Does the external surface appear to be swelling or lifting up?	Refer to task 5-18.
11. Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 5-18.
12. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 5-18.
13. Is paint discolored?	Refer to task 5-18.
14. Is paint cracked or chipped?	Refer to task 5-18.
15. Does the external surface need cleaning?	Refer to task 5-18.
16. Are any of the 4 mounting screws bent or broken?	Repair as required.
17. Is the external surface dented, cracked, or punctured at all?	Repair as required.
18. Is the external surface scratched or gouged at all?	Refer to task 5-18.
19. Is keyboard assembly cracked, chipped, or dented at all?	Replace keyboard assembly.
20. Is any keypad switch cracked, chipped, or broken?	Replace keyboard assembly.
21. Is either ZERO or EMER switch guard cracked, chipped, or broken?	Replace switch guard.
22. Are any of the 3 toggle switches cracked or broken?	Replace cable assembly.
23. If the alphanumeric keypad has rubber seals around the switches, are any of the seals missing, cracked, torn, or deteriorated at all?	Replace keyboard assembly.

Visual Checks (CONT)

CONDITION	IF YES
24. Is the stenciling on any part of the keyboard assembly worn to a point it cannot be read?	Replace keyboard assembly.
25. Push and release each keypad switch. Check for positive snap action tactile feedback with no sticking or excessive rocking. Has any switch failed mechanical check?	Replace keyboard assembly.

5-15. REMOVE KEYBOARD UNIT

This task covers: Removal of Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

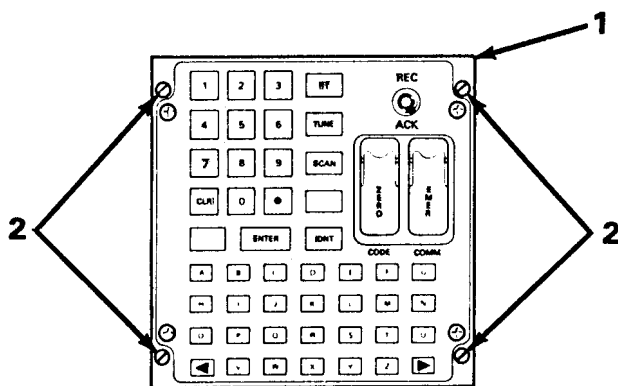
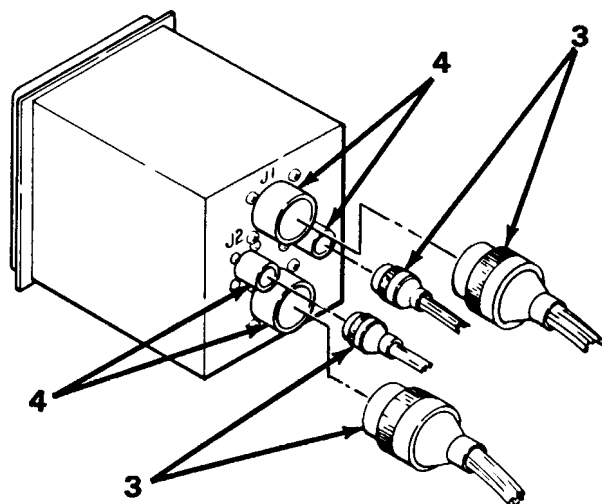
General Safety Instructions:



General Safety Warning

1

1. Open left or right crew door (refer to TM 1-1520-248-23) to gain access to KU (1).
2. Loosen four fasteners (2).
3. Raise collective stick to provide clearance for KU (1).
4. Lift KU out of pedestal to gain access to four connectors (3).
5. Tag and identify four connectors (3).
6. Disconnect four connectors (3) from four mating connectors (4).
7. Remove KU (1).
8. Close crew door opened in step 1.



END OF TASK

5-16. INSTALL KEYBOARD UNIT

This task covers: Installation of Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

TM 1-1520-248-23

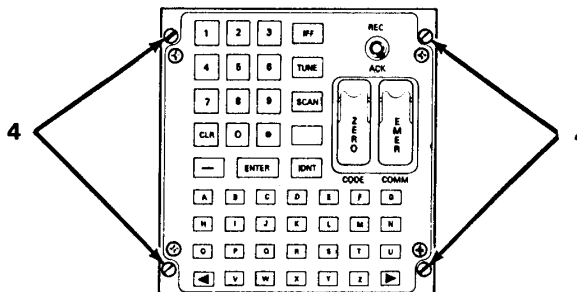
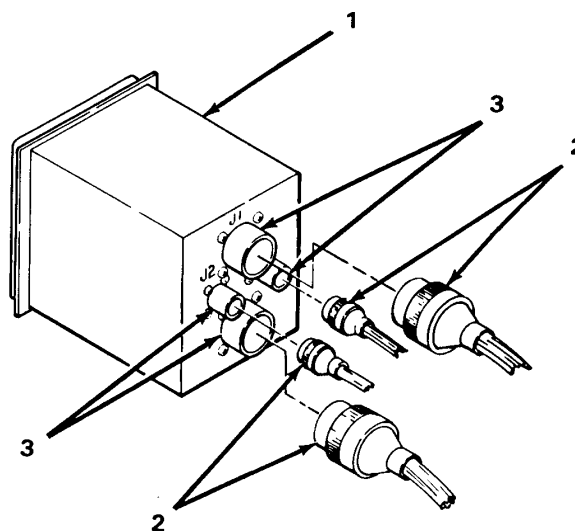
General Safety Instructions:



General Safety Warning

1

1. Open left or right crew door (refer to TM 1-1520-248-23) to gain access to KU mounting area.
2. Raise collective stick to provide clearance for KU (1).
3. Inspect four connectors (2) for bent or missing pins, corrosion or cracked housing.
4. Position rear of KU (1) near mounting area and connect four tagged connectors (2) to mating connectors (3).
5. Lower KU (1) into mounting area and align with mounting holes.
6. Tighten four fasteners (4).
7. Close crew door opened in step 1.



INSPECT

FOLLOW-ON MAINTENANCE

Perform operational check:

Test and Troubleshoot Procedure, paragraph 5-12.

END OF TASK

5-17. REMOVE AND INSTALL KEYBOARD UNIT SWITCH GUARDS

This task covers: Replacing the switch guards on the Keyboard Unit (KU).

INITIAL SETUP**References:****Applicable Configurations:**

TM 1-1520-248-23

All

General Safety Instructions:**Tools:**

Electronic Equipment Tool Kit

**Materials:**

General Safety Warning

1

Staking Compound (C5)

Personnel Required:

68N Avionic Mechanic

REMOVAL

1. Lift two switch guards (1 and 2) covering toggle switches S2 (3) and S3 (4).
2. Remove retaining nuts (5) from toggle switches S2 (3) and S3 (4).
3. Remove two switch guards (1 and 2).

INSTALLATION

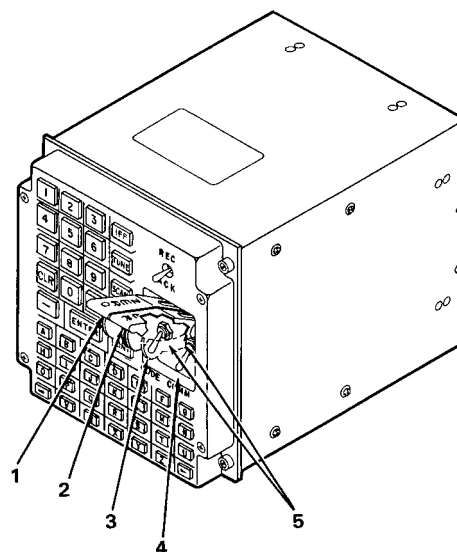
1. To install ZERO switch guard (1):
 - a. Position ZERO switch guard (1) over toggle switch S2 (3).
 - b. Apply staking compound (C5) to threads of S2 (3).
 - c. Install retaining nut (5) to S2 (3).

END OF TASK

2. To install EMER switch guard (2):

- a. Position EMER switch guard (2) over toggle switch S3 (4).
- b. Apply staking compound (C5) to threads of S3 (4).
- c. Install retaining nut (5) to S3 (4).

3. Close switch guards (1 and 2).



5-18. CLEAN AND INSPECT KEYBOARD UNIT

This task covers: General external cleaning and inspection procedures for the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Safety Goggles
- Chip Guards
- Enco Model 310 (or equivalent)

Materials:

- Isopropyl Alcohol (C3)
- Clean Soft Cloth (C1)
(or equivalent)
- Cotton Swab (C2) (or equivalent)

Equipment Condition:

No power applied

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1500-343-23

General Safety Instructions:



Compressed Air

2



Isopropyl Alcohol

3

CAUTION

Use of cleaning solvents on electrical parts is not recommended. Application of cleaning solvents, particularly to areas of dense wiring, may cause damage.

Prevent the entrance of water or other solvents into electrical components, ducts, or other openings to avoid damaging the equipment.

Do not use compressed air to remove dust from bezel. Compressed air may damage the rubber switch seals.

CLEAN

1. Remove dust and foreign matter with a clean soft cloth (C1).
2. Clean painted surfaces with a cloth (C1) moistened with alcohol (C3).
3. Clean areas difficult to reach with a cotton swab (C2) dampened with alcohol (C3).

INSPECT

4. Inspect for evidence of corrosion. If detected, refer to TM 1-1500-343-23.

END OF TASK

5-19. REMOVE ELECTRONIC MODULE (AVIM)

This task covers: Removal of the electronic module from the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied

General Safety Instructions:

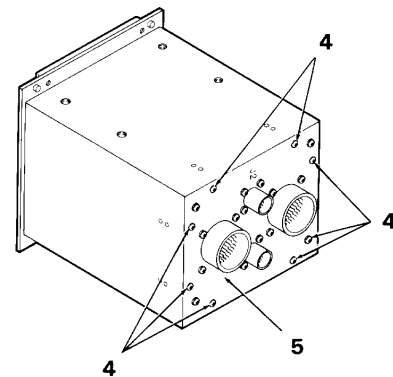
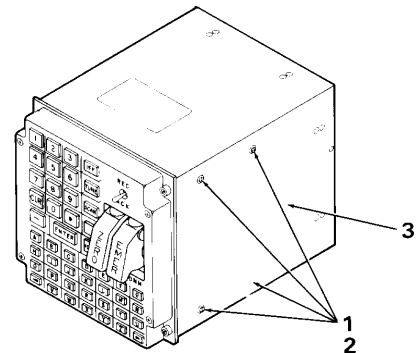
CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Remove eight screws and washers (1 and 2) from sides of enclosure (3).

2. Position KU on left side.

3. Loosen eight captive screws (4) on back panel (5).



GO TO NEXT PAGE

5-19. REMOVE ELECTRONIC MODULE (AVIM) (CONT)

4. Slide out electronic module (6) as far as cables (7) will allow.

5. Remove two-card stack (8) containing A1 and A2 CCA (9 and 10) by pushing out evenly on all four card extractor levers (11).

6. Loosen two locking screws (12) on cable assembly plug (13) by alternately unscrewing one screw (12), then the other, a turn at a time.

7. Disconnect cable assembly plug (13) from connector J5 (14) on chassis assembly (15).

8. Loosen two locking screws (16) on keyboard assembly plug (17) by alternately unscrewing one screw (16), then the other, a turn at a time.

9. Disconnect keyboard assembly plug (17) from connector J6 (18) on chassis assembly (15).

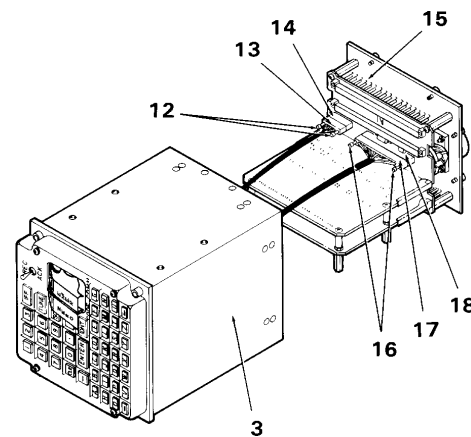
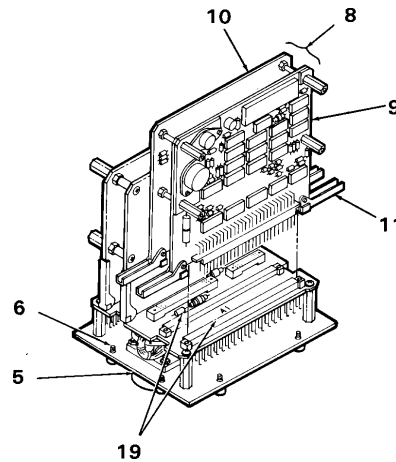
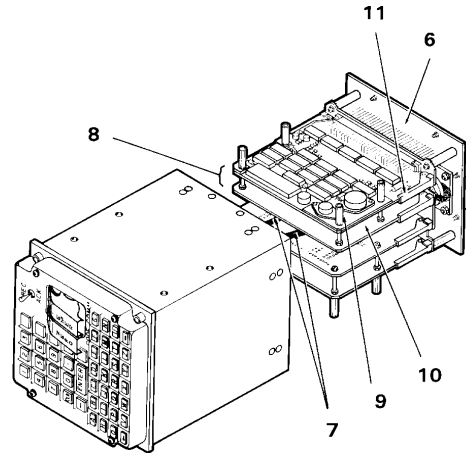
10. Position electronic module (6) on back panel (5).

11. Align two-card stack (8) containing A1 and A2 CCA (9 and 10) with components face out on chassis assembly connectors (19).

12. Push all four card extractor levers (11) against CCA.

13. Apply even downward pressure on both ends of two-card stack (8) to mate connectors. Check to see that connectors are fully mated.

14. Position enclosure (3) top side up.



END OF TASK

5-20. REMOVE KEYBOARD ASSEMBLY (AVIM)

This task covers: Removal of the keyboard assembly from the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied
Switch guards removed (5-17)
Electronic module removed (5-19)

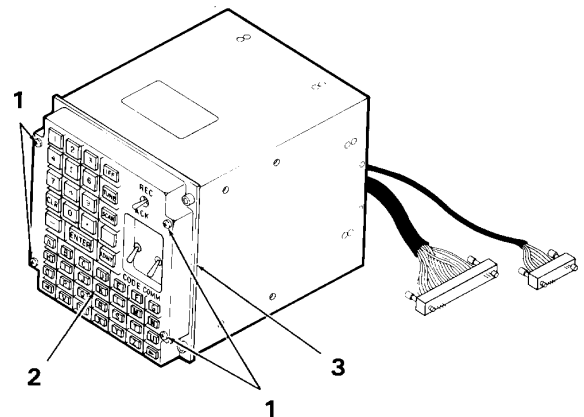
General Safety Instructions:

CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen four captive screws (1) on keyboard assembly (2).

2. Remove keyboard assembly (2) from front panel (3).



END OF TASK

5-21. REMOVE CABLE ASSEMBLY (AVIM)

This task covers: Removal of the cable assembly from the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied
Switch guards removed (5-17)
Electronic module removed (5-19)
Keyboard assembly removed (5-20)

General Safety Instructions:

CAUTION

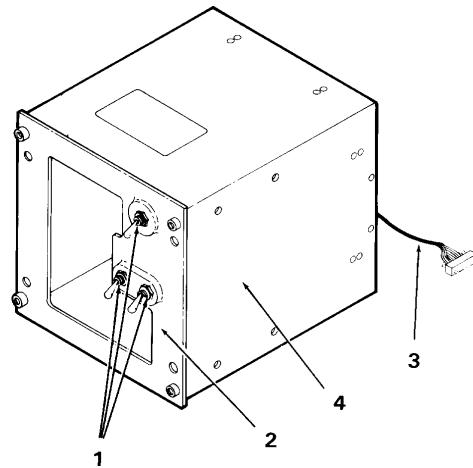
The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Remove three retaining nuts (1) from front panel (2).

NOTE

Locking rings on toggle switches may fall off switch assembly upon removal. Be certain to replace locking rings on toggle switches if they should fall off.

2. Remove cable assembly (3) from enclosure (4).



END OF TASK

5-22. REMOVE CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Removal of a circuit card assembly from the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

References:

None

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied
Electronic module removed (5-19)

General Safety Instructions:

CAUTION

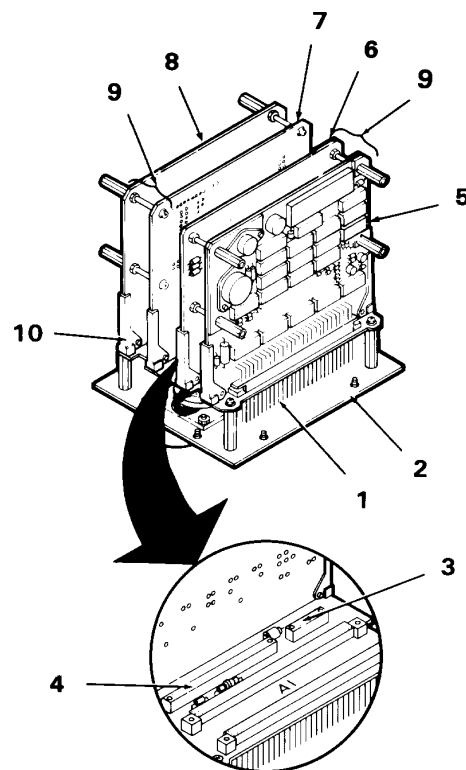
The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Position electronic module (1) on back panel (2) so that J5 connector (3) is to your right and J6 connector (4) is to your left.

2. Identify appropriate CCA to be removed:

CCA	Part Number	Common Name
A1(5)	8500081-901	Control Card
A2(6)	8500082-901	Interface Card
A3(7)	8500082-901	Interface Card
A4(8)	8500081-901	Control Card

3. Remove two-card stack (9) containing appropriate CCA by pushing out evenly on all four card extractor levers (10).

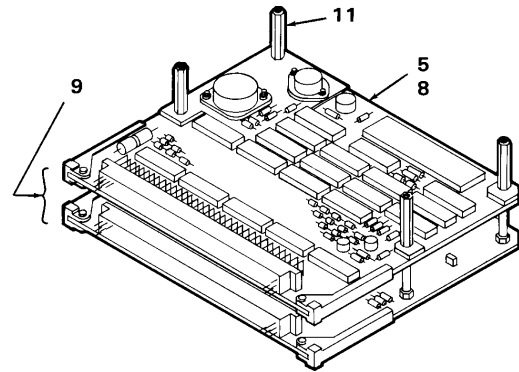


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5-22. REMOVE CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

4. To remove A1 CCA (5) or A4 CCA (8), position two-card stack (9) component side up.

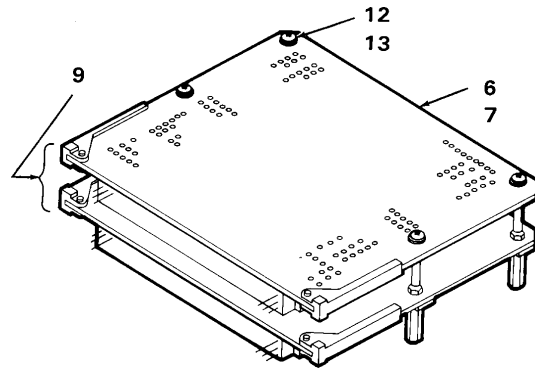
- a. Unscrew four posts (11).
- b. Separate A1 CCA (5) or A4 CCA (8) from two-card stack (9).



5. To remove A2 CCA (6) or A3 CCA (7), position two-card stack (9) component side down.

- a. Remove four screws and washers (12 and 13).
- b. Separate A2 CCA (6) or A3 CCA (7) from two-card stack (9).

6. Place CCA in static shielding bag (C7) to protect it from ESD damage.



END OF TASK

5-23. REMOVE CHASSIS ASSEMBLY (AVIM)

This task covers: Removal of the chassis assembly from the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied
Electronic module removed (5-19)

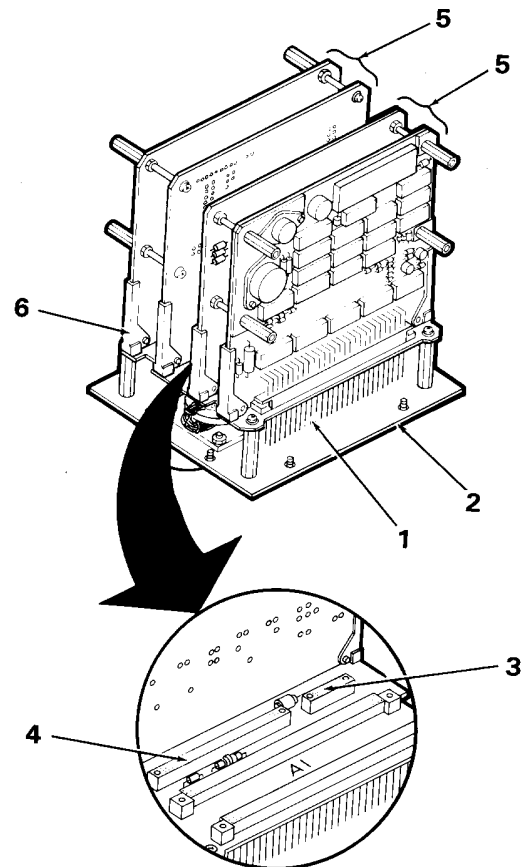
General Safety Instructions:

CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Position electronic module (1) on back panel (2) so that J5 connector (3) is to your right and J6 connector (4) is to your left.

2. Tag and remove two two-card stacks (5) by pushing out evenly on all card extractor levers (6).



END OF TASK

5-24. INSTALL CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Installation of a circuit card assembly into the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied

General Safety Instructions:

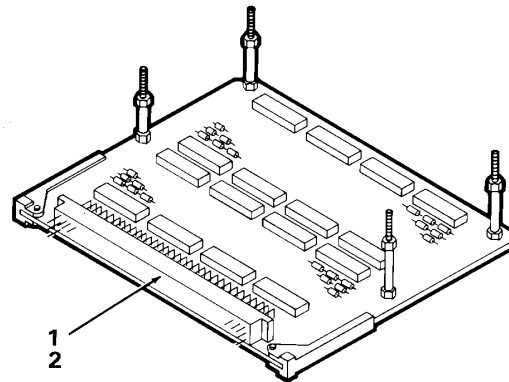
CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Verify correct CCA to be installed in KU:

CCA	Part Number	Common Name
A1	8500081-901	Control Card
A2	8500082-901	Interface Card
A3	8500082-901	Interface Card
A4	8500081-901	Control Card

2. To install A1 CCA or A4 CCA, position A2 CCA (1) or A3 CCA (2), respectively, component side up.



GO TO NEXT PAGE

5-24. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

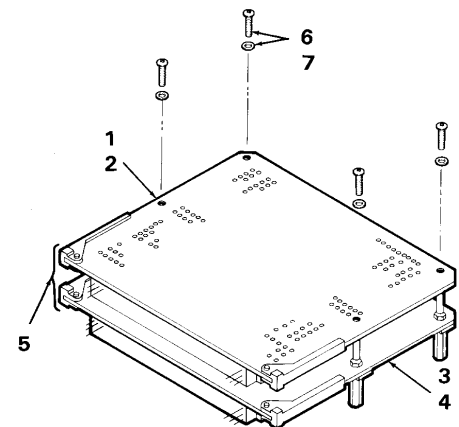
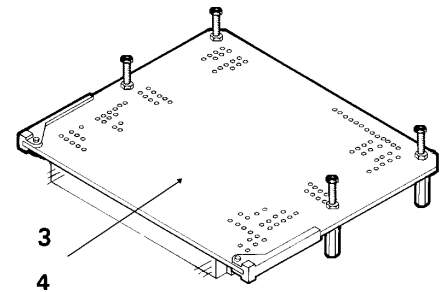
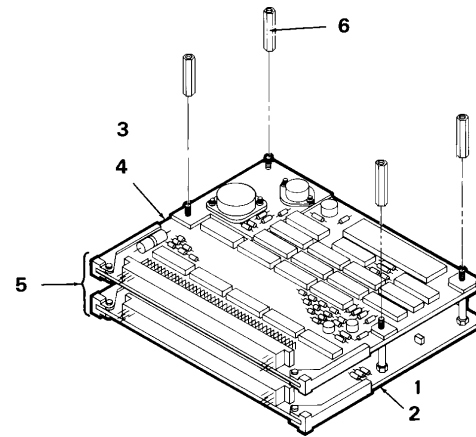
a. Align A1 CCA (3) or A4 CCA (4) on A2 CCA (1) or A3 CCA (2), respectively, to form two-card stack (5).

b. Screw in four posts (6) to secure A1 CCA (3) or A4 CCA (4) to two-card stack (5).

3. To install A2 CCA (1) or A3 CCA (2), position A1 CCA (3) or A4 CCA (4), respectively, component side down.

a. Align A2 CCA (1) or A3 CCA (2) on A1 CCA (3) or A4 CCA (4), respectively, to form two-card stack (5).

b. Install four screws and washers (6 and 7) to secure A2 CCA (1) or A3 CCA (2) to two-card stack (5).



GO TO NEXT PAGE

5-24. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

4. To install two-card stack (5) containing A1 CCA (3) or A2 CCA (1), position electronic module (8) on back panel (9) so that J5 connector (10) is to your right and J6 connector (11) is to your left. To install two-card stack (5) containing A3 CCA (2) or A4 CCA (4), position electronic module (8) so that J5 connector (10) is to your left and J6 connector (11) is to your right.

5. Check chassis assembly connectors (12) for damaged receptacles. If damaged, replace chassis assembly.

6. Align two-card stack (5) with components face out on chassis assembly connectors (12).

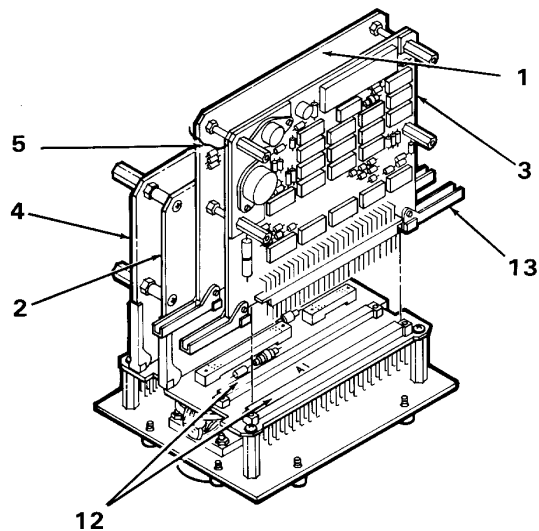
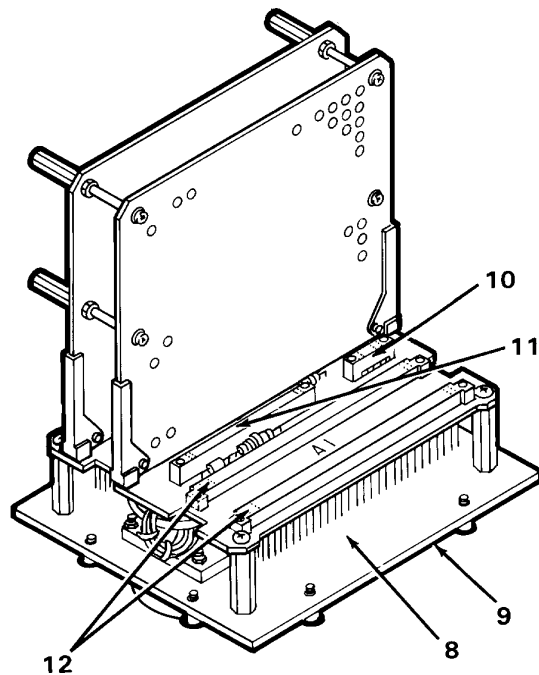
7. Push all four card extractor levers (13) against CCAs (1, 2, 3, and 4).

8. Apply even downward pressure on both ends of two-card stack (5) to mate connectors. Check to see that connectors are fully mated.

9. Install electronic module per Task 5-28.

INSPECT

END OF TASK



5-25. INSTALL CHASSIS ASSEMBLY (AVIM)

This task covers: Installation of the chassis assembly in the electronic module of the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
 Repairer
 68P Technical Inspector

Equipment Condition:

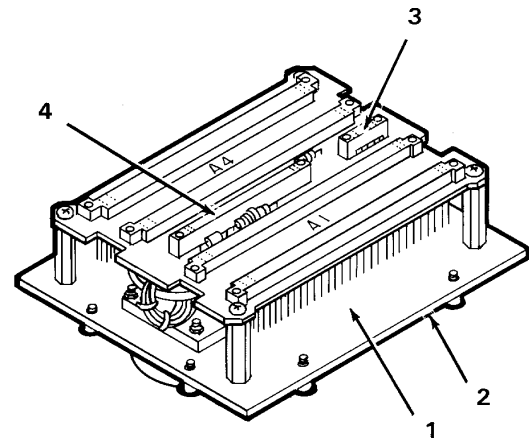
Static control work station
 set up (3-18)
 KU on bench
 No power applied

General Safety Instructions:

CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

-
1. Position electronic module (1) on back panel (2) so that J5 connector (3) is to your right and J6 connector (4) is to your left.



GO TO NEXT PAGE

5-25. INSTALL CHASSIS ASSEMBLY (AVIM) (CONT)

2. Align two-card stack (5) containing A3 CCA (6) and A4 CCA (7) on chassis assembly connectors A3 (8) and A4 (9). Ensure CCA components are face out.

3. Push all four card extractor levers (10) against CCAs (6 and 7).

4. Apply even downward pressure on both ends of two-card stack (5) to mate connectors.

5. Align two-card stack (11) containing A1 CCA (12) and A2 CCA (13) on chassis assembly connectors A1 (14) and A2 (15). Ensure CCA components are face out.

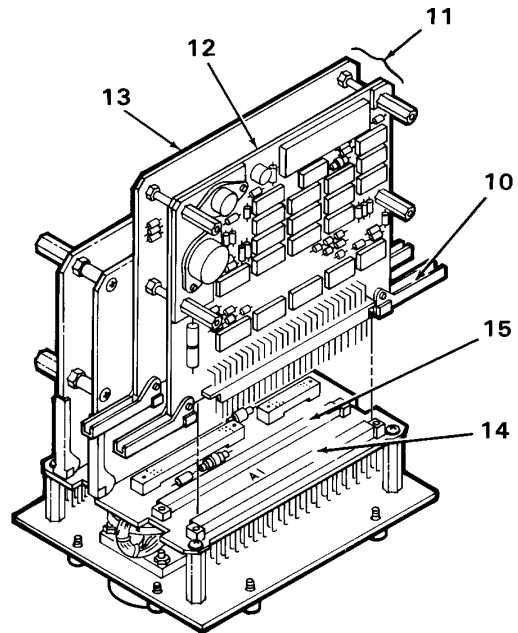
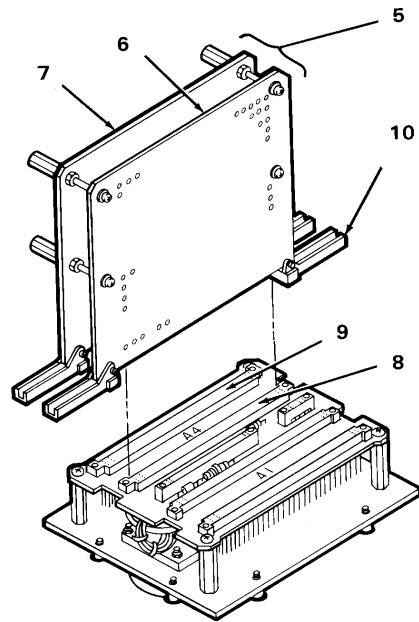
6. Push all four card extractor levers (10) against CCAs (12 and 13).

7. Apply even downward pressure on both ends of two-card stack (11) to mate connectors.

8. Install electronic module per Task 5-28.

INSPECT

END OF TASK



5-26. INSTALL CABLE ASSEMBLY (AVIM)

This task covers: Installation of the cable assembly in the Keyboard Unit (KU).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied

General Safety Instructions:**CAUTION**

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

NOTE

Toggle switches S1, S2 and S3 are not marked. Note the following wiring scheme in order to distinguish between the three switches:

S1: three wires-black/brown/green
S2: two wires-yellow/orange
S3: two wires-red/green

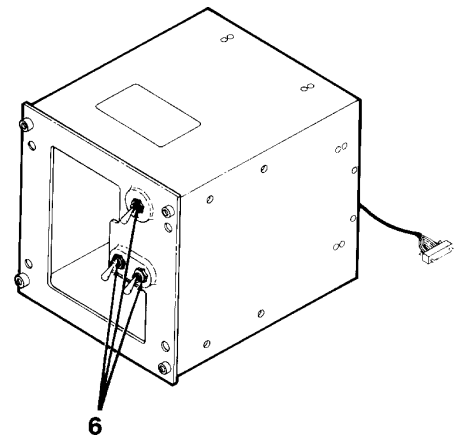
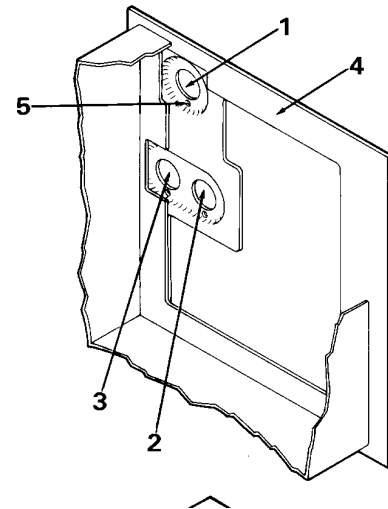
1. Insert S1 in hole (1), S2 in hole (2), and S3 in hole (3) in front panel (4). Align nub of locking ring with hole (5) directly beneath each opening.

2. Install retaining nuts (6).

3. Install keyboard assembly per Task 5-27.

4. Install electronic module per Task 5-28.

5. Install switch guards per Task 5-17.

INSPECT**END OF TASK**

5-27. INSTALL KEYBOARD ASSEMBLY (AVIM)

This task covers: Installation of the keyboard assembly in the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied

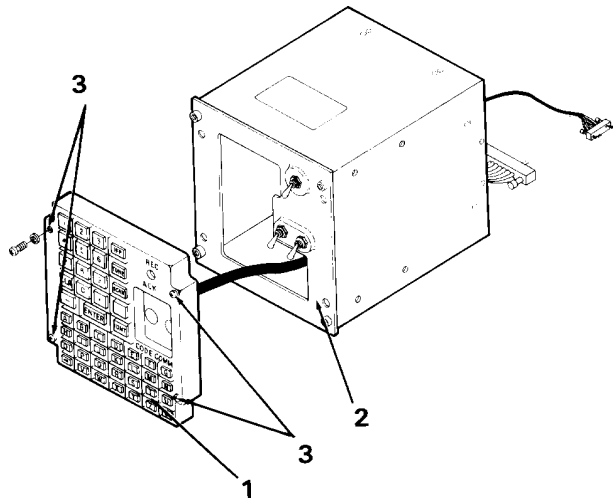
General Safety Instructions:

CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Install keyboard assembly (1) over front panel (2).
2. Tighten four captive screws (3) on keyboard assembly (1).
3. Install electronic module per Task 5-28.
4. Install switch guards per Task 5-17.

INSPECT



END OF TASK

5-28. INSTALL ELECTRONIC MODULE (AVIM)

This task covers: Installation of the electronic module in the Keyboard Unit (KU).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit
Torque Wrench 0-60 in/lbs

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
KU on bench
No power applied

General Safety Instructions:**CAUTION**

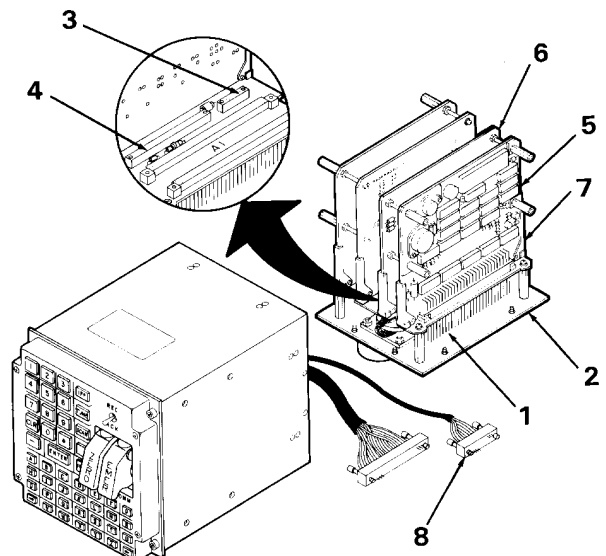
The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Position electronic module (1) on back panel (2) so that J5 connector (3) is to your right and J6 connector (4) is to your left.

2. Remove two-card stack containing A1 and A2 CCAs (5 and 6) by pushing out evenly on all four card extractor levers (7).

3. Check cable assembly plug (8) for damaged pins. If cable assembly plug (8) contains damaged pins, replace cable assembly.

4. Check J5 connector (3) for damaged receptacles. If J5 connector (3) contains damaged receptacles, replace chassis assembly.



GO TO NEXT PAGE

5-28. INSTALL ELECTRONIC MODULE (AVIM) (CONT)

5. Check keyboard assembly plug (9) for damaged pins. If keyboard assembly plug (9) contains damaged pins, replace keyboard assembly.

6. Check J6 connector (4) for damaged receptacles. If J6 connector (4) contains damaged receptacles, replace chassis assembly.

7. Turn electronic module (1) so that it rests on posts (10) of A4 CCA (11). Ensure that J5 connector (3) is to your left and J6 connector (4) is to your right.

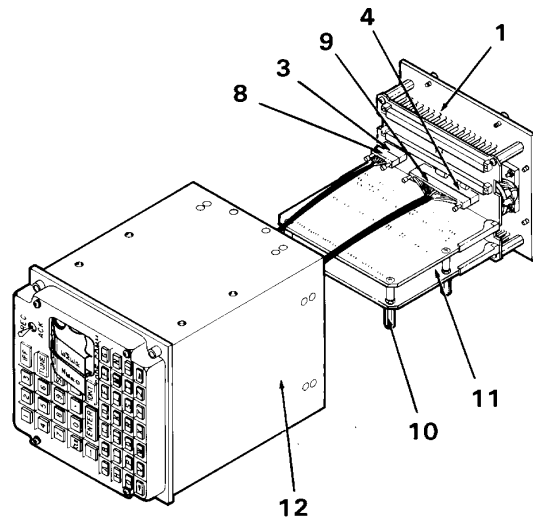
8. Position enclosure (12) on left side.

9. Align locking screw guides of cable assembly plug (8) with locking screw guides of J5 connector (3).

10. Mate cable assembly plug (8) to J5 connector (3) by alternately screwing one locking screw, then the other, a turn at a time.

11. Align locking screw guides of keyboard assembly plug (9) with locking screw guides of J6 connector (4).

12. Mate keyboard assembly plug (9) to J6 connector (4) by alternately screwing one locking screw, then the other, a turn at a time.



CAUTION

Do not damage cables when installing two-card stack. The cables could be stretched or broken if the two-card stack is not properly installed.

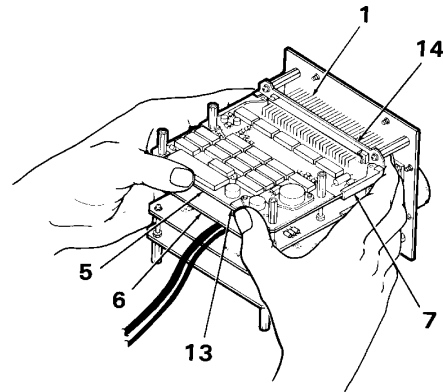
GO TO NEXT PAGE

5-28. INSTALL ELECTRONIC MODULE (AVIM) (CONT)

13. Align two-card stack containing A1 and A2 CCAs (5 and 6) with components faceup on chassis assembly connectors.

14. Push all four card extractor levers (7) against CCAs (5 and 6).

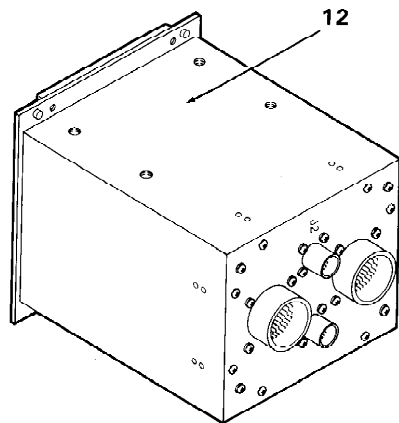
15. With thumbs positioned on front edge of stack (13) and fingers wrapped around contact assembly (14) of electronic module (1), push backward on two-card stack towards connectors with even pressure to mate connectors.



16. Holding card extractor levers (7) in toward CCAs (5 and 6), slide electronic module (1) into enclosure (12).

17. Turn KU right side up.

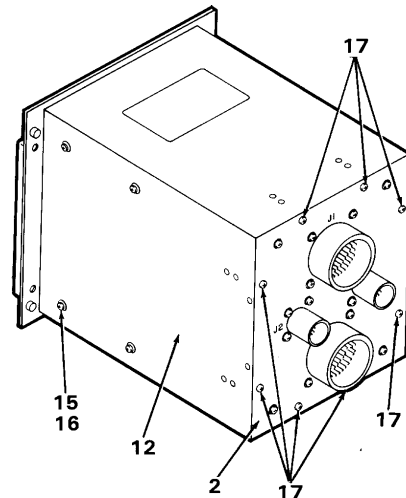
18. Insert 8 screws and washers (15 and 16) in sides of enclosure (12). Hand-tighten screws (15).



19. Tighten 8 captive screws (17) on back panel (2) to 6 INCH-POUNDS.

20. Tighten 8 screws (15) in sides of enclosure (12) to 6 INCH-POUNDS.

INSPECT



END OF TASK

5-29. REPAIR CABLE ASSEMBLY (AVIM)

This task covers: Repair of the cable assembly in the Keyboard Unit (KU).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer

References:

TM 55-1500-323-24

Equipment Condition:

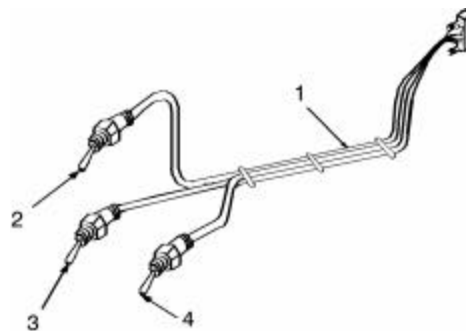
Static control work station
set up (3-18)
KU on bench
No power applied
Switch guards removed (5-17)
Electronic module removed (5-19)
Keyboard assembly removed (5-20)
Cable assembly removed (5-21)

General Safety Instructions:

CAUTION

The KU contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Tag wires on cable assembly (1).
2. Replace cable assembly switches S1(2), S2(3), or S3(4) as required (TM 55-1500-323-24).
3. Repair connector (TM 55-1500-323-24).
4. Repair cable wiring (TM 55-1500-323-24).



END OF TASK

**CHAPTER 6
REMOTE FREQUENCY DISPLAY (RFD) - MAINTENANCE**

Section I	Principles/Theory of Operation	6-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	6-5
Section III	Service Upon Receipt	6-5
Section IV	Troubleshooting	6-5
Section V	Maintenance Procedures	6-6

Section I

PRINCIPLES/THEORY OF OPERATION

6-1. PRINCIPLES OF OPERATION

The RFD provides display of radio frequency information on a Liquid Crystal Display (LCD). The LCD consists of five lines with 85 segments per line. These segments comprise the following information:

- Radio number (1 thru 5)
- Control designator arrow
(indicates pilot or observer control of a radio)
- Two alphanumeric characters
(indicates channel)
- Preselected frequency
- Cipher mode (indicates if the transmission is encoded)

The data to be displayed on the LCD is received in a serial data stream from the MCPU or IMCPU. The displayed data is then stored in the RFD.

The RFD has three basic modes of operation:

- Normal mode
- Failure mode
- Test mode

In normal mode, the RFD periodically receives messages from the MCPU or IMCPU and updates the LCD. The data to be displayed is provided by one of the MCPUs or IMCPUs in the form of a serial stream (DATA). DATA is a 12-word message. Each word of the 12-word serial stream (DATA) is represented in an 11-bit serial asynchronous data format (1 start bit, 8 data bits, 1 parity bit (odd), and a stop bit). The

first word of each 12-word set indicates which of the five windows is to be addressed. The remaining 11 words specify the state (on or off) for the 82 controllable LCD segments in the display window.

The MCPU or IMCPU transmits the 12-word data set to the RFD in about 5.5 milliseconds. A 14.32 millisecond intermessage gap follows each data set. As the RFD senses the intermessage gap, the data word just received is sent to the selected LCD display window. The next word is considered to be the start of a new data set.

If no new data is received for more than 2 seconds, the RFD enters the failure mode. In the failure mode, the LCD is blanked except for the radio number digits (1 through 5). The LCD remains in this state until a message is again received. In the test mode, all 415 LCD segments are lit for the purpose of operational check.

The LCD uses segmented characters on a contrasting background for easy daylight viewing.

It uses electroluminescent backlighting for easy night viewing. The LCD has an antireflective coating on the front surface to minimize reflections. The LCD also has a heater to keep the RFD at a minimum temperature of approximately 0 (C (32 (F).

6-2. FUNCTIONAL DESCRIPTION

Located on the RFD bezel are three pushbutton switches and one control knob. The control knob is labeled BRT. It is used for adjusting the electroluminescent backlighting of the LCD for low light viewing conditions.

Turning the control knob in a clockwise direction increases the backlighting intensity, while turning it counterclockwise decreases the intensity.

Of the three pushbutton switches, two are labeled CIPH. These switches are used to select the cipher mode on a radio. When pressed, the transmission becomes encoded, and the LCD displays CIPH next to the preselected frequency. When pressed again, the transmission is no longer encoded, and the LCD no longer displays CIPH next to the preselected frequency.

On initial power-up of the CDS, the left MCPU is in control of the serial data displayed on the RFD.

The third pushbutton is labeled TEST. This switch is used to select the source of the serial data message (left MCPU or right MCPU). When pressed, the source is switched to the opposite MCPU. A test pattern appears on the LCD at this time to indicate that the source switching took place.

All three pushbutton switches are illuminated for ease of viewing under low light conditions.

6-3. EQUIPMENT DATA

Weight: 1.90 pounds

Dimensions:

Height: 3.94 inches

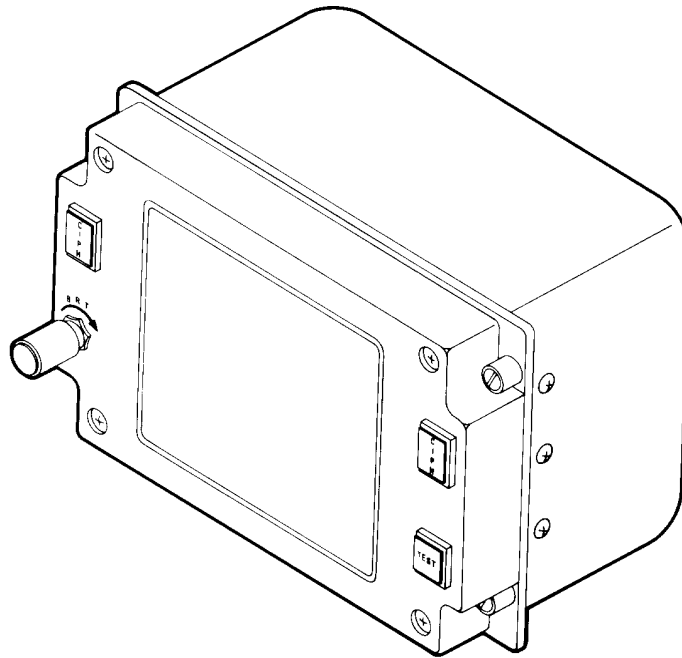
Width: 5.77 inches

Length: 4.70 inches

Electrical Power Requirements:

115 VAC, 400 Hz, .15A, single phase

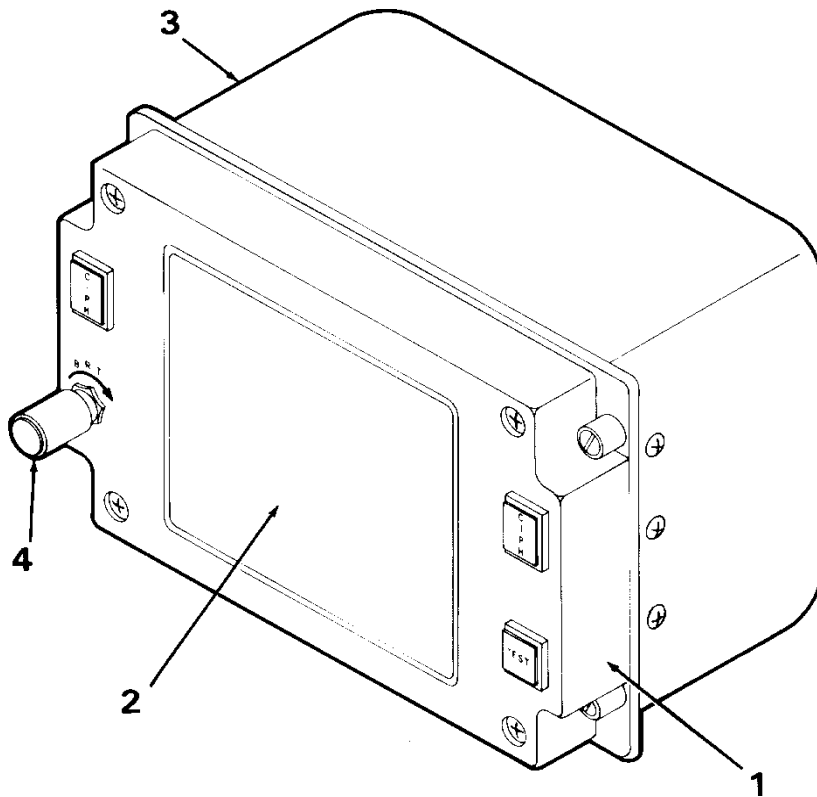
+28 VDC, 2.5A



RFD

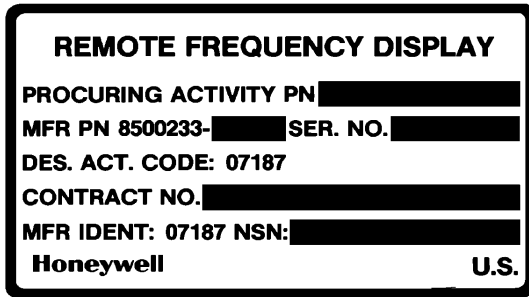
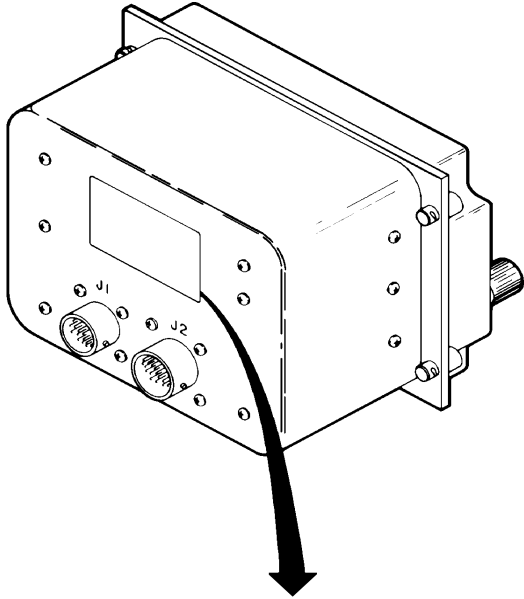
6-4. SUBASSEMBLY LIST/NOMENCLATURE CROSS-REFERENCE

INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NO.
1	Bezel Assembly	None	Bezel Assembly	8500254-901 8500254-902
2	LCD	None	Liquid Crystal Display	8501526-901 8501526-902
3	Chassis	None	Chassis, Electrical Equipment	8500255-901
4	Knob	None	Knob, Brightness Control	MS91528-0C3B



6-5. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

The identification plate for the RFD is located on the rear panel of the chassis.



RFD Care and Handling:

To protect the RFD from Electrostatic Discharge (ESD) during maintenance (Section V), observe these general precautions:

Never perform maintenance on the RFD unless the unit is on a static control grounded workbench;

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks;

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the RFD from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch chassis surface.
- Do not scratch LCD display surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not expose to strong electromagnetic fields.
- Do not probe connector pins or receptacles.

6-6. SAFETY, CARE, AND HANDLING

Personal Safety:

To avoid accidental electrical shock, never perform maintenance on the RFD while power is applied to the unit.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

6-7. COMMON TOOLS AND EQUIPMENT

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

6-8. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

The Test Support System (TSS) and Test Program Sets (TPS) (refer to TM 9-4935-780-13-1) or the Base Shop Test Facility/Base Shop Test Station (BSTF/BSTS) and CDS TPS (refer to TM 11-6625-778-13&P-1) provide the necessary equipment for testing and troubleshooting the RFD. No special tools or other support equipment are required.

Section III

SERVICE UPON RECEIPT

6-9. UNPACKING INSTRUCTIONS

The RFD and its Shop Replaceable Units (SRUs) are shipped in reusable containers.

Be careful not to damage the shipping container when unpacking a unit.

Save the shipping container(s) and packaging materials for use when:

- a. Repaired RFD is repacked for shipment to AVUM.
- b. AVIM non-repairable RFD is repacked for shipment to depot repair.

- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

6-10. CHECKING UNPACKED EQUIPMENT

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies per the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

6-11. SCOPE

This section contains information on testing and troubleshooting a defective RFD.

6-12. TEST AND TROUBLESHOOT

Preparation and setup for testing a RFD is contained in TM 9-4935-780-13-1 or TM 11-6625-778-13&P-1.

Prior to running a diagnostic test, visually check the RFD for physical damage. Refer to 6-14. If the RFD passes visual check, proceed with the test. If the RFD does not pass visual check, repair the unit.

While a diagnostic test is being run, operator actions will appear on the display. The operator is to respond to these prompts.

If the RFD passes the test, return the RFD to AVUM. If the RFD does not pass the test, replace the SRU indicated by the printout.

RFD fails the test a second time, and the printout indicates that the same SRU is faulty, send the RFD to depot repair. If the printout indicates that a different SRU is faulty, replace the newly suspected SRU.

After SRU replacement, retest the RFD. If the

Section V

MAINTENANCE PROCEDURES

6-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform the

necessary replacement tasks indicated by List of Tasks to repair the defective RFD. For general aircraft maintenance practices, refer to TM 1-1500-204-23 and refer to TM 55-1500-323-24 for Aircraft Electric and Electronic Wiring Practices.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove Remote Frequency Display	6-15	6-8
Install Remote Frequency Display	6-16	6-9
Clean Bezel and Faceplate on Remote Frequency Display	6-17	6-10
Remove and Install Remote Frequency Display Knob	6-18	6-11
Clean and Inspect Remote Frequency Display	6-19	6-12
Remove and Install Bezel Assembly	6-20	6-14
Remove Circuit Cards A1, A2	6-20	6-15
Install Circuit Cards A1, A2	6-21	6-17

6-14. VISUAL CHECKS

Visually check the RFD to determine if it is in good physical condition. Go through the checklist below.

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair as required.
2. Is any connector loose?	Tighten connector hardware.
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Refer to task 6-19.

Visual Checks (CONT)

	CONDITION	IF YES
5.	Do any screws appear reddish-brown?	Refer to task 6-19.
6.	Does the external chassis surface contain white or gray powdery deposits, similar to dust?	Refer to task 6-19.
7.	Does the external chassis surface appear rough or frosted?	Refer to task 6-19.
8.	Does the external chassis surface appear dull?	Refer to task 6-19.
9.	Does the external chassis surface contain tiny pits or holes?	Refer to task 6-19.
10.	Does the external chassis surface appear to be swelling or lifting up?	Refer to task 6-19.
11.	Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 6-19.
12.	Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 6-19.
13.	Is paint discolored?	Refer to task 6-19.
14.	Is paint cracked or chipped?	Refer to task 6-19.
15.	Does the external chassis surface need cleaning?	Refer to task 6-19.
16.	Are any of the mounting screws bent or broken?	Replace screws.
17.	Is the external surface dented, cracked or punctured at all?	Repair as required.
18.	Is the external surface scratched or gouged at all?	Refer to task 6-19.
19.	Is bezel assembly cracked, chipped, or dented at all?	Replace bezel assembly.
20.	Are any of the bezel switch guards (raised plastic ribs) broken?	Replace bezel assembly.
21.	Is any bezel switch cracked, chipped, or broken?	Replace bezel assembly.
22.	Are any of the rubber seals around the bezel switches missing, cracked, torn, or deteriorated at all?	Replace bezel assembly.
23.	Is the stenciling on the bezel, bezel knob, or bezel switches worn to a point it cannot be read?	Replace bezel assembly.
24.	Push and release each bezel switch. Check for positive snap action tactile feedback with no sticking or excessive rocking. Has any switch failed mechanical check?	Replace bezel assembly.
25.	Does brightness control knob need replacing (missing or broken)?	Replace knob.
26.	Is brightness control shaft bent or broken?	Replace bezel assembly.
27.	Is LCD chipped, cracked, or broken?	Replace bezel assembly.
28.	Does LCD need to be cleaned?	Refer to task 6-19.
29.	Does LCD contain any scratches longer than 1 inch or wider than 0.004 inch?	Replace bezel assembly.

6-15. REMOVE REMOTE FREQUENCY DISPLAY

This task covers: Removal of Remote Frequency Display (RFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

General Safety Instructions:



General Safety Warning

1

1. Open left or right crew door (refer to TM 1-1520-248-23) to gain access to RFD (1).

2. Loosen four fasteners (2).

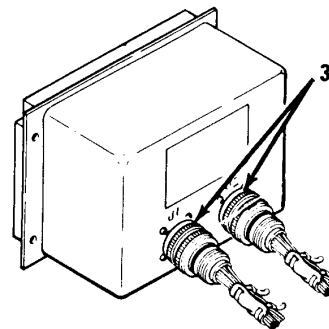
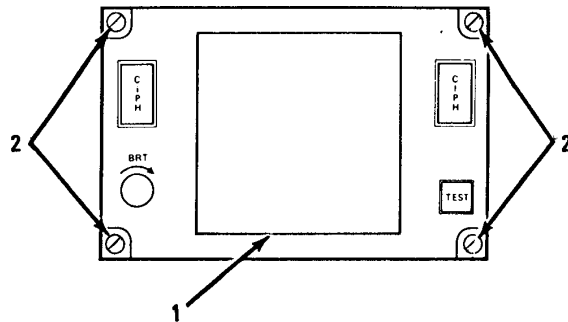
3. Slide RFD (1) out of instrument panel to gain access to two connectors (3).

4. Tag and identify two connectors (3).

5. Disconnect two connectors (3).

6. Remove RFD (1).

7. Close crew door opened in step 1.



END OF TASK

6-16. INSTALL REMOTE FREQUENCY DISPLAY

This task covers: Installation of Remote Frequency Display (RFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

TM 1-1520-248-23

General Safety Instructions:



General Safety Warning

1

1. Open left or right crew door (refer to TM 1-1520-248-23) to gain access to RFD mounting area.

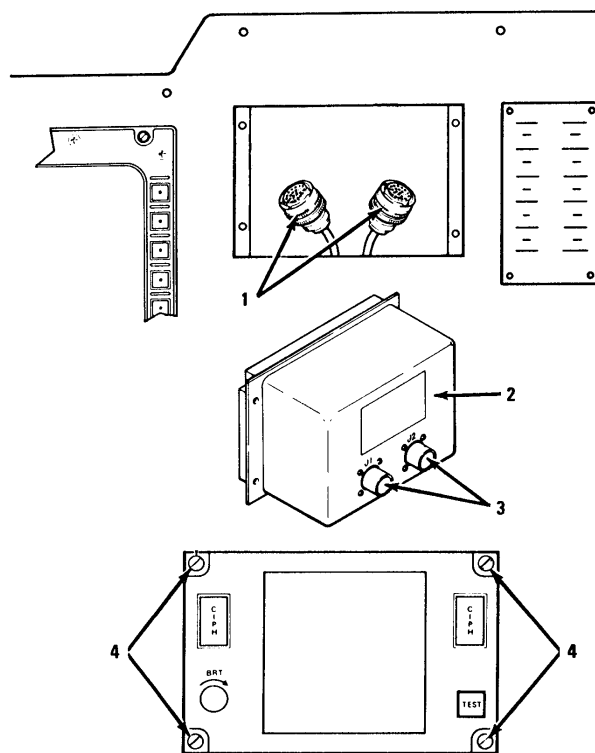
2. Inspect both connectors (1) for missing or bent pins, corrosion or cracked housing.

3. Position rear of RFD (2) near mounting area and connect both tagged connectors (1) to mating connectors (3).

4. Slide RFD (2) into instrument panel and align with mounting holes.

5. Tighten four fasteners (4).

6. Close crew door opened in step 1.



INSPECT

FOLLOW-ON MAINTENANCE

Perform operational checks:

Test and Troubleshoot Procedure, paragraph 2-5.

END OF TASK

6-17. CLEAN BEZEL AND FACEPLATE ON REMOTE FREQUENCY DISPLAY

This task covers: Cleaning procedures for the bezel and faceplate on the Remote Frequency Display (RFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Safety Goggles
Chip Guards
Enco Model 310 (or equivalent)

Materials:

Cotton Swab (C2)
Mild Hand Soap (C4)
Isopropyl Alcohol (C3)
Clean Soft Cloth (C1)

Personnel Required:

68N Avionic Mechanic

General Safety Instructions:



General Safety Warning 1



Compressed Air 2



Isopropyl Alcohol 3

WARNING

There is danger of tube implosion if CRT is exposed to abrupt temperature change. Rapid expansion/contraction of CRT glass envelope may cause the tube to crack or burst. Do not spray aerosol cleaners on the CRT and do not use hot air blower to dry cleaned areas.

BEZEL CLEANING

1. Remove dust and foreign matter with compressed air or a clean soft cloth (C1).
2. Wipe off surface grime using water-dampened cotton swabs (C2) that have been brushed across a bar of mild soap (C4).
3. Rinse off soap film using isopropyl alcohol (C3).

FACEPLATE CLEANING

1. Moisten wiping cloth (C1) with isopropyl alcohol (C3). Gently, but thoroughly, wipe off faceplate. Use a clean area on cloth (C1) as it picks up dirt and grime. Leave faceplate moistened and let it air dry.
2. When faceplate is completely dry, gently buff faceplate with clean dry wiping cloth (C1). Continue buffing until all streaks and smudges are removed. Avoid touching faceplate after it has been cleaned.

END OF TASK

6-18. REMOVE AND INSTALL REMOTE FREQUENCY DISPLAY KNOB

This task covers: Replacing the brightness control knob on the Remote Frequency Display (RFD).

INITIAL SETUP**Applicable Configurations:**

All

General Safety Instructions:**Tools:**

Electronic Equipment Tool Kit



General Safety Warning

1

Personnel Required:

68N Avionic Mechanic

REMOVAL

1. Loosen two setscrews (1) on knob (2) one-half to three-quarters of a turn.
2. Pull knob off knob shaft (3).

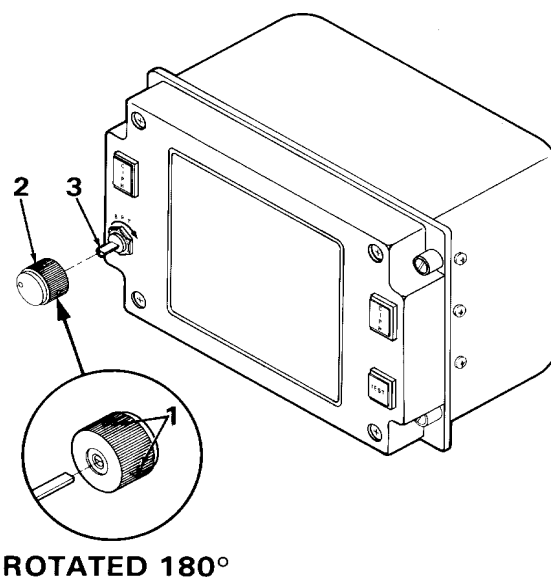
INSTALLATION

1. Turn knob shaft (3) fully counterclockwise.
2. Position knob (2) on knob shaft (3).

NOTE

Knob will fit on shaft one way only.

3. Tighten two setscrews (1).

**ROTATED 180°****END OF TASK**

6-19. CLEAN AND INSPECT REMOTE FREQUENCY DISPLAY

This task covers: General external cleaning and inspection procedures for the LCD, and chassis.

INITIAL SETUP

Applicable Configurations:

All

Tools:

- Safety Goggles
- Chip Guards
- Enco Model 310 (or equivalent)
- 1 in. Soft Bristle Brush
- Grumbacher Series 55 (or equivalent)

Materials:

- Clean Soft Cloth (C1)
(or equivalent)
- Cotton Swab (C2) (or equivalent)
- Mild Hand Soap (C4) (or equivalent)
- Isopropyl Alcohol (C3)
(or equivalent)

Equipment Condition:

No power applied

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1500-343-23

General Safety Instructions:



Compressed Air

2



Isopropyl Alcohol

3

CAUTION

Use of cleaning solvents on the bezel is not recommended. Application of cleaning solvents may harm the plastic bezel housing and the rubber seals surrounding the bezel switches.

Do not use compressed air to remove dust from bezel. Compressed air may damage the rubber switch seals.

Use of cleaning solvents on electrical parts is not recommended. Application of cleaning solvents, particularly to areas of dense wiring, may harm part.

Prevent the entrance of water or other solvents into electrical components, ducts, or other openings to avoid damaging the equipment.

GO TO NEXT PAGE

6-19. CLEAN AND INSPECT REMOTE FREQUENCY DISPLAY (CONT)

LCD CLEANING

1. Moisten wiping cloth (C1) with isopropyl alcohol (C3). Gently, but thoroughly, wipe off LCD. Use a clean area on cloth (C1) as it picks up dirt and grime. Leave display moistened and let it air dry.

2. When display is completely dry, gently buff display with clean dry wiping cloth (C1). Continue buffing until all streaks and smudges are removed. Avoid touching display after it has been cleaned.

CHASSIS CLEANING

1. Remove dust and foreign matter with a clean soft wiping cloth (C1).

2. Clean painted surfaces with a cloth (C1) moistened with alcohol (C3).

3. Clean areas difficult to reach with a cotton swab (C2) dampened with alcohol (C3).

INSPECT

4. Inspect for evidence of corrosion. If detected, refer to TM 1-1500-343-23.

END OF TASK

6-20. REMOVE AND INSTALL BEZEL ASSEMBLY (AVIM)

This task covers: Replacement of the bezel assembly on the Remote Frequency Display (RFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
RFD on bench
No power applied

General Safety Instructions:

CAUTION

Proper handling and grounding techniques must be observed.

Avoid scratching LCD. Do not set bezel assembly facedown on any foreign objects other than table mat.

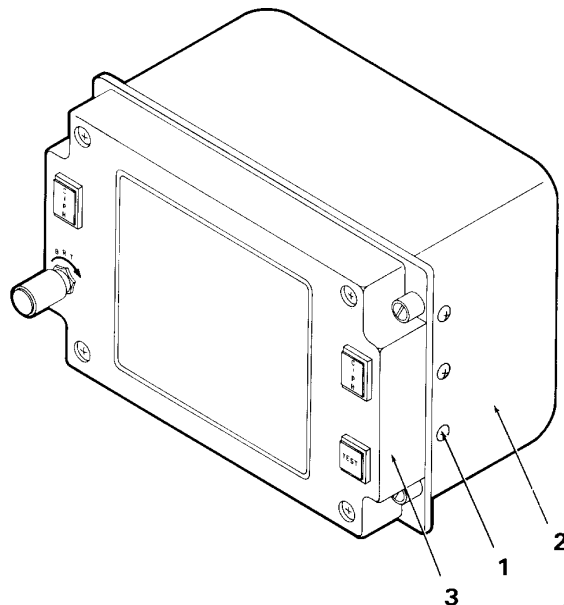
REMOVAL

1. Remove six screws (1) from chassis (2) (three on each side).

CAUTION

Avoid damaging wire harness by pulling bezel assembly away from chassis no more than 6 inches.

2. Pull bezel assembly (3) away from chassis (2).



GO TO NEXT PAGE

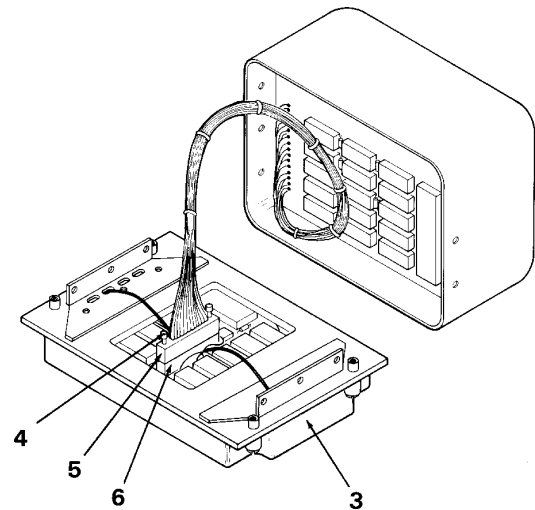
6-20. REMOVE AND INSTALL BEZEL ASSEMBLY (AVIM) (CONT)

3. Set bezel assembly (3) facedown on table mat.

4. Loosen two locking screws (4) on plug (5) by alternately unscrewing one screw (4), then the other, a turn at a time.

5. Disconnect plug (5) from connector (6) on bezel assembly (3).

6. Place bezel assembly (3) in static shielding bag (C7) to protect it from ESD damage.

**INSTALLATION**

7. Set bezel assembly (3) facedown on table mat. Be certain lettering on bezel assembly (3) will be facing in same direction as lettering on rear of chassis when mounted.

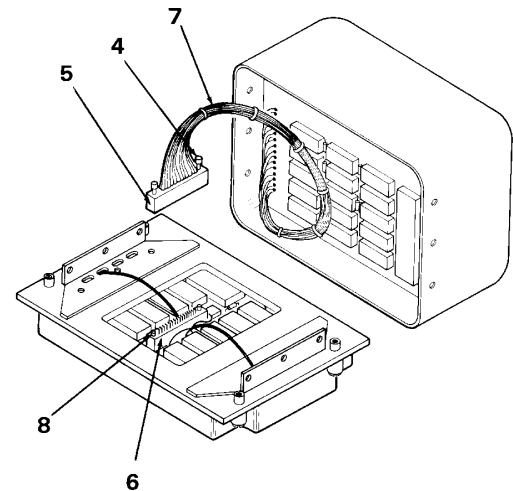
8. Check connector (5) for damaged receptacles. If damaged, repair as required.

9. Check wire harness (7) for frayed insulation or broken wires. If damaged, repair as required.

10. Check connector (6) for damaged pins. If damaged, depot repair is required.

11. Align locking screw guides (4) of connector (5) with locking screw guides (8) of connector (6).

12. Mate plug (5) to connector (6) by alternately screwing one locking screw (4), then the other, a turn at a time.



GO TO NEXT PAGE

6-20. REMOVE AND INSTALL BEZEL ASSEMBLY (AVIM) (CONT)

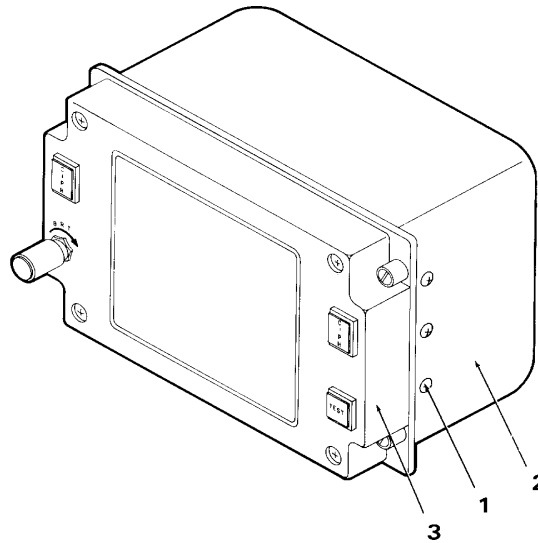
NOTE

Coil wire harness back into RFD when positioning bezel assembly on chassis. This will prevent the wire harness from being pinched and possibly damaged.

13. Position bezel assembly (3) on chassis (2).

14. Install six screws (1) in chassis (2) (three on each side).

INSPECT



END OF TASK

6-21. REMOVE CIRCUIT CARDS A1, A2 (AVIM)

This task covers: Removal of circuit cards A1 and A2 from the Remote Frequency Display (RFD).

INITIAL SETUP**Applicable Configurations:**

All

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
RFD on bench
No power applied
Bezel assembly removed (6-20)

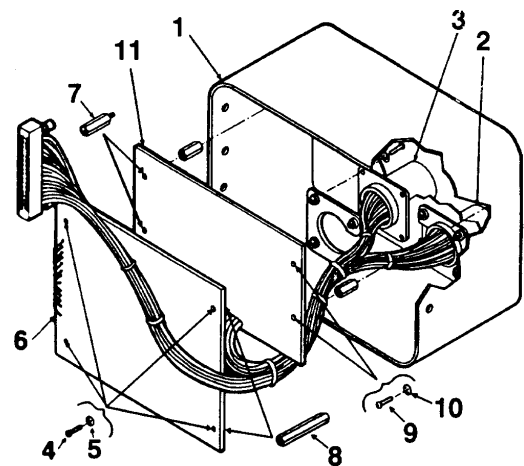
General Safety Instructions:**CAUTION**

The RFD contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Position RFD electrical chassis (1) on work surface so that J1 (2) and J2 (3) receptacles are to rear.

2. Remove four screws (4) and washers (5) securing circuit card assembly A2 (6) to electrical-mechanical posts (7 and 8). Carefully position circuit card assembly A2 (6) to one side to clear work area.

3. Remove two electrical-mechanical posts (7), and two screws (9) and washers (10) securing circuit card assembly A1 (11) in RFD electrical chassis (1). Carefully position circuit card assembly A1 (11) to one side to clear work area.



GO TO NEXT PAGE

6-21. REMOVE CIRCUIT CARDS A1, A2 (AVIM) (CONT)

4. On rear face of RFD electrical chassis (5), remove eight screws (1) and washers (2) securing chassis wiring harness receptacles J1 (3) and J2 (4). Remove two nut plates (6 and 7).

5. Remove circuit card assembly A1 (8), circuit card assembly A2 (9), receptacles J1 (3) and J2 (4), and attached wiring harness (10) from RFD electrical chassis (5).

6. On rear face of RFD electrical chassis (5), remove six screws (11) and washers (12) securing remaining posts (13 and 14) in RFD electrical chassis (5), and remove posts.

7. Remove circuit card assembly A1 (8) from chassis wiring harness (10) as follows:

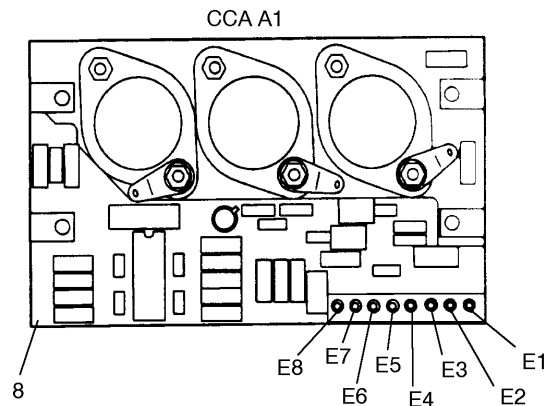
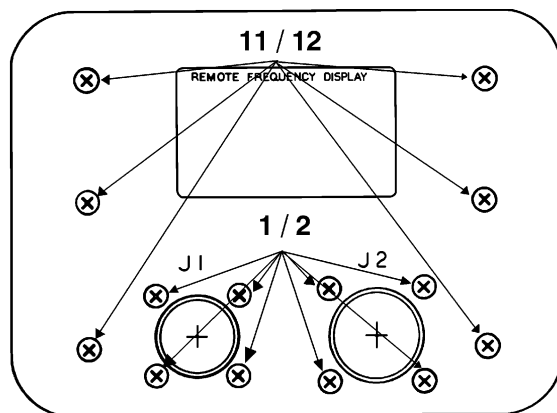
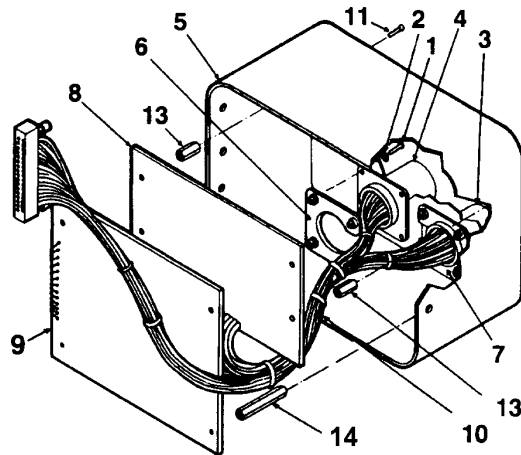
a. Position circuit card assembly A1 (8) on work surface with component side up.

CAUTION

Use approved low wattage soldering iron when desoldering electrical components.

b. Tag wires adjacent to terminals E1 through E8 on circuit card assembly A1 and desolder wires from terminals.

c. Place circuit card assembly A1 (8) in a static shielding bag (C7).



GO TO NEXT PAGE

6-21. REMOVE CIRCUIT CARDS A1, A2 (AVIM) (CONT)

8. Remove circuit card assembly A2 (9) from chassis wiring harness as follows:

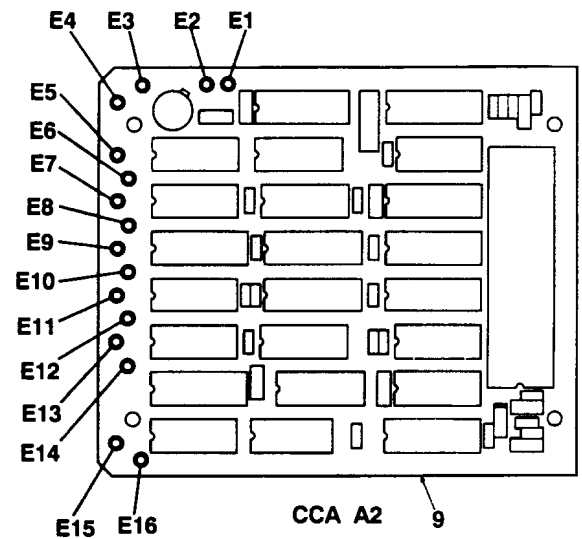
a. Position circuit card assembly A2 (9) on work surface with component side up.

CAUTION

Use approved low wattage soldering iron when desoldering electrical components.

b. Tag wires adjacent to terminals E1 through E16 and desolder wires from terminals.

c. Place circuit card assembly A2 (9) in a static shielding bag (C7).



END OF TASK

6-22. INSTALL CIRCUIT CARDS A1, A2 (AVIM)

This task covers: Installation of circuit cards A1 and A2 into the Remote Frequency Display (RFD).

INITIAL SETUP

Applicable Configurations:

All

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Equipment Condition:

Static control work station
set up (3-18)
RFD on bench
No power applied
Bezel assembly removed (6-20)
CCA A1 and A2 removed (6-21)

General Safety Instructions:

CAUTION

The RFD contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

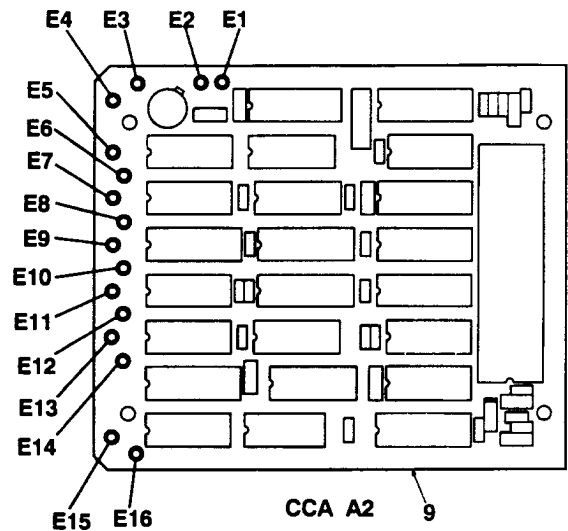
1. Connect RFD wiring harness to circuit card assembly A2 as follows:

a. Remove circuit card assembly A2 (9) from static shielding bag and place on work surface with component side up.

CAUTION

Use approved low wattage soldering iron when soldering electrical components.

b. Using tags and accompanying CCA A2 figure as reference, connect and solder tagged wires on RFD wiring harness to circuit card assembly A2 (9) terminals E1 through E16. (Refer to Circuit Card Assembly A2 Wiring List.)



GO TO NEXT PAGE

6-22. INSTALL CIRCUIT CARDS A1, A2 (AVIM) (CONT)

c. Perform continuity check, using Circuit Card Assembly A2 Wiring List as reference.

Circuit Card Assembly A2 Wiring List

WIRE COLOR (ABBREVIATED)	FROM CONN/PWG	TO TERMINAL
WHT	P3-8	E1
WHT	J2-21	E1
WHT/RED	J2-19	E2
WHT/RED	P3-10	E2
ORN	A1-E3	E3
BLK	P3-22	E4
BLK	J2-20	E4
BLK	A1-E2	E4
WHT	J2-22	E5
YEL	P3-25	E6
YEL	J2-13	E6
BRN	P3-15	E7
BRN	J2-10	E7
ORN	J2-12	E8
ORN	P3-21	E8
RED	P3-17	E9
RED	J2-11	E9
GRN	P3-23	E10
GRN	J2-14	E10
RED	J2-6	E11
BLK	J2-7	E12
BLK	J2-3	E13
RED	J2-2	E14
WHT	J2-15	E15
WHT	P3-6	E15
BLU	P3-7	E16
BLU	J2-4	E16

CAUTION

Use approved low wattage soldering iron when soldering electrical components.

b. Using tags and accompanying Circuit Card Assembly A1 Wiring List as reference, connect and solder tagged wires on RFD wiring harness to circuit card assembly A1 (8) terminals E1 through E8. (Refer to Circuit Card Assembly A1 Wiring List.)

c. Perform continuity check, using Circuit Card Assembly A1 Wiring List as reference.

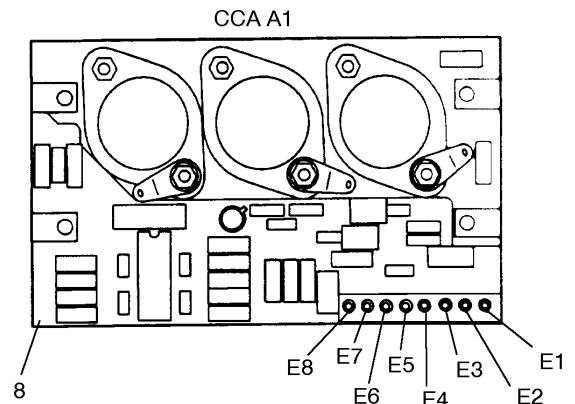
Circuit Card Assembly A1 Wiring List

WIRE COLOR (ABBREVIATED)	FROM CONN/PWG	TO TERMINAL
RED	J1-4	E1
BLK	J1-5	E2
BLK	A2-E4	E2
ORN	J1-12	E3
ORN	A2-E3	E3
YEL	P3-20	E4
YEL	J1-13	E4
RED	P3-14	E5
BLK	P3-13	E6
GRN	J1-6	E7
GRN	P3-9	E7
ORN	J1-7	E8
ORN	P3-5	E8
ORN	A2-E3	E3
BLK	A2-E4	E2

2. Connect RFD wiring harness to circuit card assembly A1 (8) as follows:

a. Remove circuit card assembly A1 (8) from static shielding bag and place on work surface with component side up.

GO TO NEXT PAGE



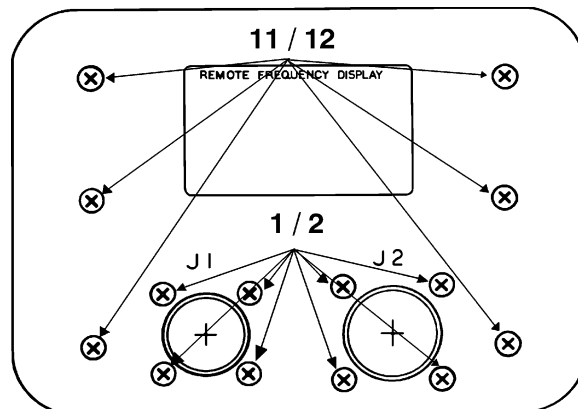
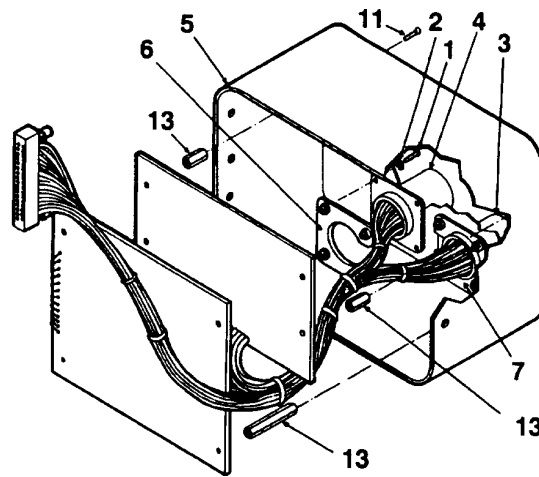
6-22. INSTALL CIRCUIT CARDS A1, A2 (AVIM) (CONT)

3. Install six posts (13) to inside rear of RFD electrical chassis (5) and secure with six screws (11) and washers (12).

4. Install connectors J1 (3) and J2 (4) into RFD electrical chassis (5) as follows:

a. Insert receptacle J2 (4) through opening in rear of RFD electrical chassis (5) with pin 1 oriented to top. Position retaining plate (6) at rear of receptacle J2 (4), and install and tighten four screws (1) and washers (2).

b. Insert receptacle J1 (3) through opening in rear of RFD electrical chassis (5) with pin 1 oriented to top. Position retaining plate (7) at rear of receptacle J1 (3), and install and tighten four screws (1) and washers (2).



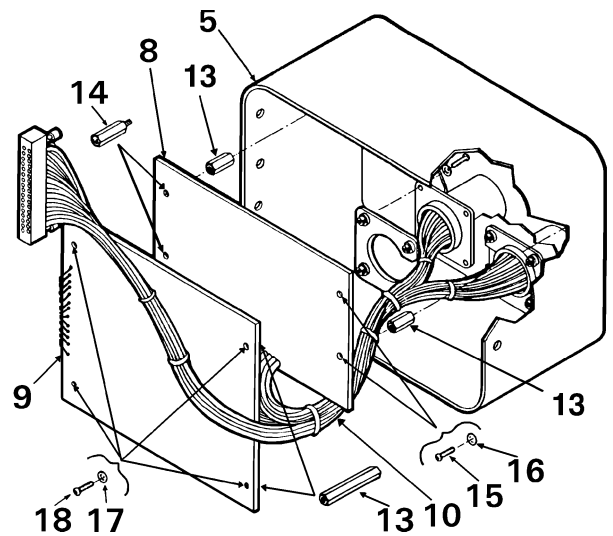
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6-22. INSTALL CIRCUIT CARDS A1, A2 (AVIM) (CONT)

5. Install circuit card assembly A1 (8) into RFD electrical chassis (5) as follows:

a. Position circuit card assembly A1 (8) so that mounting holes align with four short posts (13) previously installed in RFD electrical chassis (5). Ensure that wiring harness (10) is routed so that no wires remain behind circuit card assembly A1 (8).

b. Secure left side of circuit card assembly A1 (8) to short posts (13) with posts (14). Secure right side of circuit card assembly A1 (8) to short posts (13) with two screws (15) and washers (16).



6. Install circuit card assembly A2 (9) into RFD electrical chassis (5) as follows:

a. Position circuit card assembly A2 (9) so that mounting holes align with four posts (13 and 14).

b. Install four washers (17) and screws (18) to secure circuit card assembly A2 (9) to RFD electrical chassis (5).

INSPECT

END OF TASK

CHAPTER 7

OPTICAL DISPLAY ASSEMBLY (ODA) - MAINTENANCE

Section I	Principles/Theory of Operation	7-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	7-4
Section III	Service Upon Receipt	7-4
Section IV	Troubleshooting	7-4
Section V	Maintenance Procedures	7-5

Section I

PRINCIPLES/THEORY OF OPERATION

7-1. PRINCIPLES OF OPERATION

The Optical Display Assembly (ODA) provides the pilot and copilot wearing Night Vision Goggles (NVG) with MCPU or IMCPU generated flight data superimposed on the real world imagery. The images are duplications from the Multifunction Displays (MFD) Vertical Situation Display (VSD) mode. The images are generated by the ANVIS Display Symbology System (ADSS) located in the Integrated Systems Processor (ISP) or the Improved Master Controller Processor Unit (IMCPU).

focusing or "collimating" the display to the focal length of the observer's background scene.

7-3. EQUIPMENT DATA

Weight: 0.53 pounds

Dimensions:

Height: 1.90 inches

Width: 1.49 inches

Length: 3.56 inches

Electrical Power Requirements:

None

7-2. FUNCTIONAL DESCRIPTION

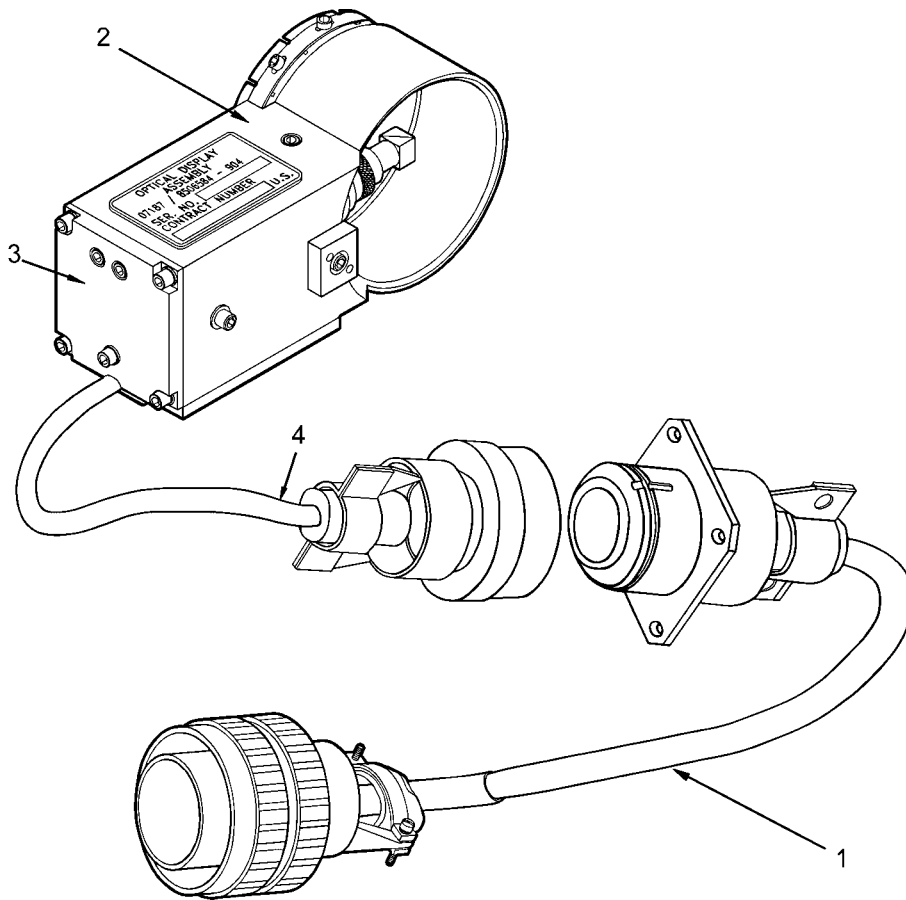
The ODA is mounted to the pilot's and copilot's NVG with a quick-release clamp assembly. Components of the ODA include the image generator assembly, optic assembly, cable/electrical assembly, a quick disconnect cable/electrical assembly and the housing and access cover.

a. The image generator assembly is composed of a fiber optic ribbon coupled to a linear array of 128 Light Emitting Diodes (LED) which are aligned along the vertical axis. The ribbon is vibrated from side to side at approximately 80 Hz creating a 128 by 170 grid of 21,760 pixels. Time multiplexing of the pulses to the LED array creates the actual display.

b. The optic assembly contains the collimating lens, folding mirror, and optical combiner. The image created by the image generator is redirected by these components and reflected off the optical combiner element into the observer's eye. An adjustment screw is provided on the side of the ODA housing for

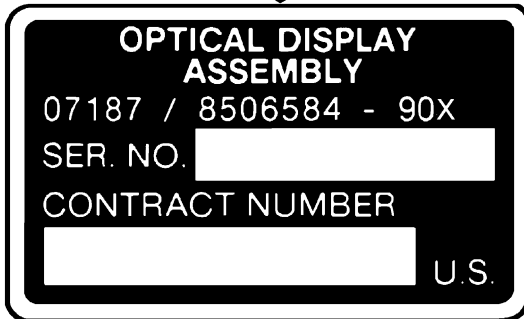
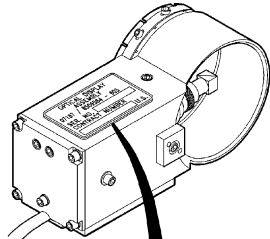
7-4. SUBASSEMBLY LIST/NOMENCLATURE CROSS-REFERENCE

INDEX NO.	COMMON NAME	OFFICIAL NOMENCLATURE	MANUFACTURER PART NO.
1	Cable	Cable/Electrical Assembly	8519074-903
2	Housing	Housing, Optical Display	8519066
3	Image Generator	Image Generator Assembly	8519059-902
3	Image Generator	Image Generator Assembly	8519059-903
4	Cable	Cable/Electrical Assembly	8523949-901



7-5. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

The identification plate for the ODA is located on the top panel of the housing.



7-6. SAFETY, CARE, AND HANDLING

To protect the ODA from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not probe connector pins or receptacles.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

7-7. COMMON TOOLS AND EQUIPMENT

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

7-8. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

None.

Section III

SERVICE UPON RECEIPT

7-9. UNPACKING INSTRUCTIONS

The ODA is shipped in reusable containers.

Be careful not to damage shipping container when unpacking a unit.

Save the shipping container(s) and packaging materials for use when an AVUM non-repairable ODA is repacked for shipment to depot repair.

7-10. CHECKING UNPACKED EQUIPMENT

Inspect equipment for damage incurred during shipment. If equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

Check equipment against packing slip to see if shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

7-11. SCOPE

This section contains information on testing and troubleshooting a defective ODA.

7-12. TEST AND TROUBLESHOOT

No test or troubleshooting procedures exist for the AVUM or AVIM levels of maintenance.

Section V

MAINTENANCE PROCEDURES

7-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform the

necessary replacement tasks indicated by List of Tasks to repair the defective ODA. For general aircraft maintenance practices, refer to TM 1-1500-204-23 or TM 55-1500-323-24.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Clean the Optical Display Assembly Eyepiece	7-15	7-7

7-14. VISUAL CHECKS

Visually check the ODA to determine if it is in good physical condition. Go through the checklist below. If the answer to each question

is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair as required.
2. Is the connector loose?	Tighten connector hardware.
3. Is the connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Repair as required.
5. Do any screws appear reddish-brown?	Repair as required.
6. Does the external housing surface contain white or gray powdery deposits, similar to dust?	Repair as required.
7. Does the external housing surface appear rough or frosted?	Repair as required.
8. Does the external housing surface appear dull?	Repair as required.
9. Does the external housing surface contain tiny pits or holes?	Repair as required.
10. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Repair as required.

Visual Checks (CONT)

CONDITION	IF YES
11. Is paint discolored?	Repair as required.
12. Is paint cracked or chipped?	Repair as required.
13. Is the external surface dented, cracked or punctured?	Repair as required.
14. Is the external surface scratched or gouged at all?	Repair as required.

7-15. CLEAN OPTICAL DISPLAY ASSEMBLY EYEPIECE

This task covers: Cleaning the Optical Display Assembly (ODA) eyepiece.

INITIAL SETUP

Applicable Configurations:

All

Materials:

Cotton Swab (C2)
Isopropyl Alcohol (C3)

Personnel Required:

68N Avionic Mechanic

References:

- TM 1-1520-248-23

General Safety Instructions:



General Safety Warning

1

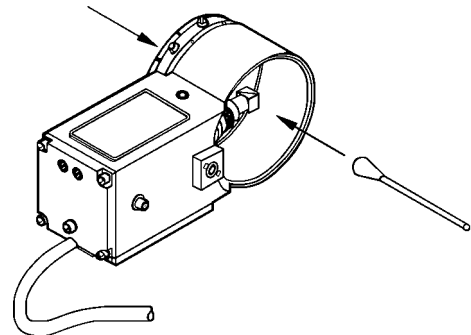


Isopropyl Alcohol

3

1. Wipe surface grime from both sides of ODA eyepiece using isopropyl alcohol (C3) dampened cotton swab (C2). Allow surfaces to air dry.

2. When eyepiece is completely dry, gently buff surfaces cleaned in step 1 above with clean, dry cotton swab (C2).



END OF TASK

CHAPTER 8

INTEGRATED SYSTEMS PROCESSOR (ISP) - MAINTENANCE

Section I	Principles/Theory of Operation	8-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	8-6
Section III	Service Upon Receipt	8-6
Section IV	Troubleshooting	8-6
Section V	Maintenance Procedures	8-7

Section I

PRINCIPLES/THEORY OF OPERATION

8-1. PRINCIPLES OF OPERATION

The ISP provides a powerful Central Processing Unit (CPU) for avionics applications. The ISP performs processing functions on data received through interfaces to external systems via two dual-redundant MIL-STD-1553B data buses and other memory-mapped analog, serial digital, and discrete input/output (I/O) lines. On the primary data bus, the ISP acts as a Remote Terminal providing information and performing tasks as requested by the MCPU. On the secondary data bus, the ISP serves as the Bus Controller, controlling the Hellfire Missiles.

The major elements of the ISP are:

- 1750 CPU
- 1553 Input/Output Controller (I/OC)
- Subsystem Interface

8-2. FUNCTIONAL DESCRIPTION

The 1750 Central Processing Unit CCA (A1) controls the activities within the ISP and associated equipment. It is the "brains" of the ISP. The 1750 CPU is based on the Performance PACE 1750A processor running at 30MHz. It utilizes a discretely implemented Memory Management Unit (MMU) to generate a 20 bit address bus to provide one megaword of memory address space. In addition to the local (on-card) bus, the processor has two interfaces which allow access to off-card memory or I/O devices. The first of these off-card buses is the Dedicated Bus. The dedicated bus is merely an extension of the processor's local buses and control signals. It is implemented, but not

utilized, in the ISP. The second off-card bus is the Global Bus. The global bus is also an extension of the processor's local bus (including control signals), but it is shared among multiple users in the ISP. As a result, the processor must request and be granted control of the global bus. Arbitration is handled by the Global Bus Arbiter which resides on the 1553 card. Both memory and I/O accesses (reads and writes) can be performed over the global bus. Global bus requests and bus control are handled by the Global Bus Sequencer.

The 1750 CPU card contains two Application Specific Integrated Circuits (ASICs). The first of these is the Superglue, which provides eight discrete inputs and eight discrete outputs. The Superglue performs a wide variety of functions including wait state generation, I/O decode and illegal I/O detection, input and output discretes, expansion interrupts, DMA arbitration, watchdog timers, bus timeout monitor, task scheduling (via a Real Time Clock), and miscellaneous glue logic (hence the name). Many of these functions use parameters which are configured during the Superglue's power-up initialization. A Programmable Read Only Memory (PROM) and a Programmable Logic Device (PLD) state machine provide these parameters. The second ASIC is the Serial Test and Maintenance Port (STAMP). The STAMP provides a serial data path between the processor and an external host utilizing RS-232 protocol. The STAMP receives console commands (memory, I/O, and register read/write) and passes them to the processor through dedicated I/O registers.

The 1553 Input/Output Controller (IOC) CCA (A2) serves as the direct interface between the ISP and two MIL-STD-1553B data buses. The CCA is a dual configuration, comprised of two identical circuits. One circuit allows the ISP to respond as a Remote Terminal (RT) on the primary data bus, while the other half of the card allows the ISP to act as the Bus Controller (BC) on the secondary data bus. This "BC half" of the card performs all I/O controller tasks for the entire card. After performing its bus controller tasks, the BC BIOC gets data from the ISP's various slave devices and stores information it will need in RAM. It also sends this information to the RT half's RAM via the global bus. The RT BIOC can then access this information directly and send it out on the primary data bus per requests from the primary data bus BC. This process is repeated during each major frame (40 ms) of the global bus cycle.

The ANVIS Display Symbology System (ADSS) CCA (A3,A6) provides the interface between the 1750 processor and the Optical Display Assembly (ODA) and is designed to work as a pilot ADSS (A3) or a copilot ADSS (A6). The processor controls what data is displayed, how often data is updated, and the intensity (brightness) of the display. All of this information is passed through the ADSS. The ADSS uses a 'Ping-Pong' memory configuration designed to allow the processor to update one page of memory with new display information while the other page of memory is providing the information that is being displayed on the ODA. This configuration is implemented using two pages of display RAM designated as page '0' and page '1'. Each page consists of 2048 x 16 words. Each address in the display RAM correlates to a given location on the ODA screen. The data contained in a given display RAM address will determine which LEDs may be illuminated at the corresponding ODA location. During normal operation, the display RAM on both the pilot and copilot ADSS will be updated with a single write since both are displaying the same data. This was done to save processor throughput. If desired, each ADSS also has the ability to display different information on its corresponding ODA.

Once the display and intensity data has been processed by the ADSS, it is sent to the LED anode and cathode drivers for display on the

ODA. The Analog Adjusting Circuitry uses a photo diode and a photo transistor to monitor the frequency of the ODA (60-80 Hz). If the ODA frequency is too high or too low, this circuitry will detect the error and adjust the coil drive voltage accordingly.

The Aircraft Survivability Equipment (ASE) I/O CCA (A4) provides the interface between all of the aircraft survivability equipment subsystems and the ISP global data bus. The main routing of data on the ASE I/O CCA is done via an on-card 16 bit data bus. Data is passed between the on-card data bus and the global data bus using tri-stated bidirectional data buffers controlled by global address control signals. An externally applied 12 MHz clock from the 1553 CCA is used to create a 1.5 MHz clock which in turn provides a four microsecond delay for circuit stability. The Global Bus Decode and Timing/Logic Control circuitry determines the appropriate signals to be passed to and from the data bus. All signals tied to the data bus are set to a high impedance state when inactive.

The Weapons I/O CCA (A5) provides the interface between the ISP global data bus and the following weapons systems on the Improved OH-58D helicopter: Hellfire Missiles, Air-to-Air Stinger Missiles, 2.75" Rockets, and .50 Caliber Machine Gun. These interfaces are comprised of analog, discrete, and serial digital circuits. The Weapons I/O CCA utilizes a state machine acting as an on-card I/O Controller (IOC) and a two-port RAM to transfer data between the global bus and the I/O circuitry. Output data to the weapons subsystems is stored into the RAM over the global bus and then transferred to the I/O circuitry by the IOC. Input data from the weapons subsystems is collected by the IOC and stored into the RAM where it can be read over the global bus.

The primary function of the Video Tape Recorder (VTR) CCA (A7) is to convert 875 line video it receives from the Master Controller Processor Unit (MCP) to 525 line video used by the on-aircraft video tape recording unit. The card must also convert 525 line video from the VTR into 875 line video for use on the Multifunction Display (MFD) during playback. The card operates in three basic modes: "do-nothing", record, and playback. Data is passed between the VTR CCA and the global data bus

using tri-stated bidirectional data buffers controlled by global address control signals (handshaking).

In "do-nothing" mode, 875 line video from the MCPU is received through VIDEO INPUT #1, routed through a relay, and sent through VIDEO OUTPUT #1 directly to the MFD for display. As the name implies, nothing is actually done to the video signal.

In record mode, 875 line video from the MCPU which is received through VIDEO INPUT #1 is processed and adds symbology, if desired. The video signal is then sent to the MFD for viewing. The video signal is also digitized during processing. The digitized video signal is converted to 525 line video for compatibility with the VTR. This is accomplished by cropping the necessary lines from the top and bottom of the field, leaving the middle 525 lines of video.

In playback mode, 525 line video from the VTR is received through VIDEO INPUT #2. After the signal has been digitized, it is converted to 875 line video. This signal is then converted back to analog by the D/A CONVERTER AND VIDEO SWITCHES and sent to the copilot's MFD to be displayed.

■ Paragraph e. deleted.

The CPU CCA (A1) communicates with the VTR CCA via the global data bus. The VTR CCA communicates with the video tape recorder via an RS-422 serial digital interface. Thus, the CPU writes commands (i.e. PLAY, RECORD, PAUSE) to the VTR CCA memory locations over the global data bus, and the VTR CCA sends these commands to the video tape recording unit via the RS-422 interface.

The primary function of the power supply (PS) ECA (A10) is to provide the ISP with the voltages and currents required by the hardware in order to function properly. The PS takes the aircraft +28 volts and utilizes a push-pull topology for better use of the transformer. The PS is a two CCA component: the PS is on one card, and the monitoring circuitry is on the second card. The two cards are mounted together in one housing. The input filter has several purposes. It filters out EMI in both directions, blocks out negative voltages, and provides holdup energy in the case of a power transient. A 10-capacitor bank is used to provide a holdup voltage for 200 mseconds when the input voltage drops.

8-3. EQUIPMENT DATA

Weight: 24.50 pounds

Dimensions:

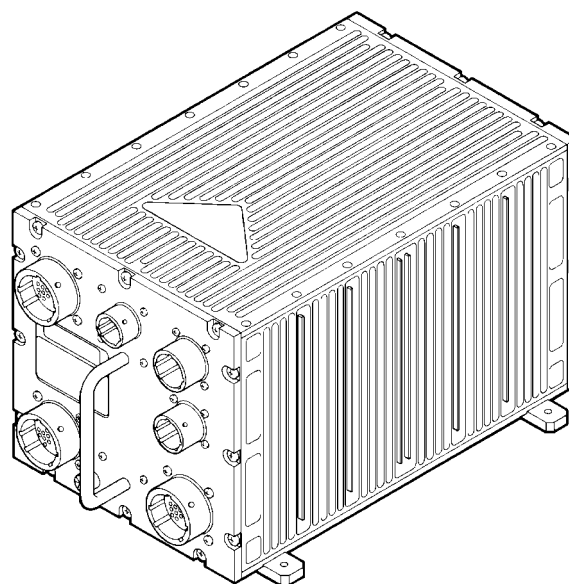
Height: 7.98 inches

Width: 8.04 inches

Length: 12.61 inches

Electrical Power Requirements:

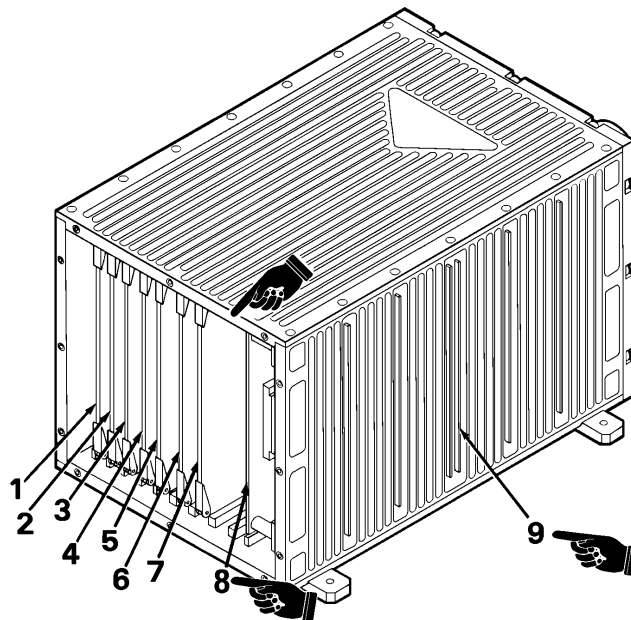
+28 VDC, 4A



ISP

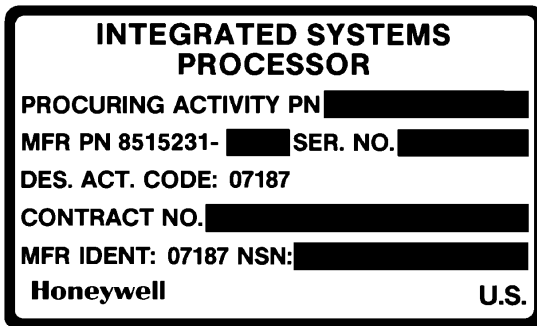
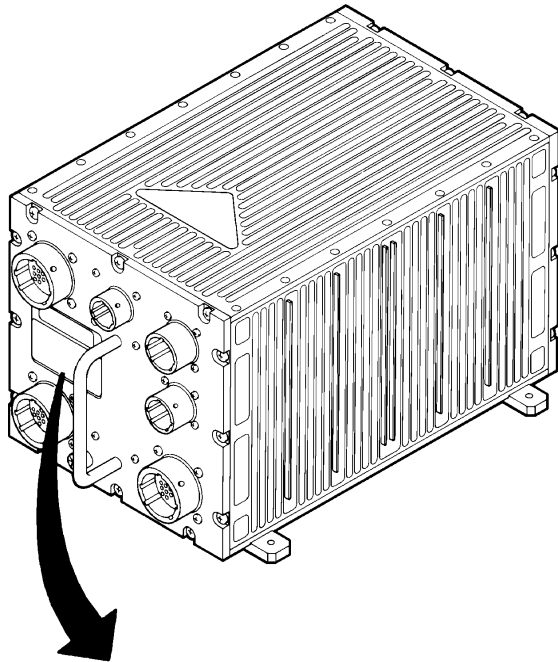
INDEX NO.	COMMON NAME	OFFICIAL NOMENCLATURE	MANUFACTURER PART NO.
1	A1 CCA	Circuit Card Assembly 1750 CPU	8513072-902
2	A2 CCA	Circuit Card Assembly 1553 I/OC	8513076-904
3	A3 CCA	Circuit Card Assembly ADSS I/OC	8515287-903 8515287-904
4	A4 CCA	Circuit Card Assembly ASE I/OC	8507082-903 8507082-904
5	A5 CCA	Circuit Card Assembly Weapons I/OC	8515279-902
6	A6 CCA	Circuit Card Assembly ADSS I/OC	8515287-903 8515287-904
7	A7 CCA	Circuit Card Assembly Video Tape Recorder Interface	8517387-902 8517387-903 8517387-904 8517387-905 8517387-914 8517387-915
8	Power Supply	Electronics Components Assembly, Power Supply	8513069-901
9	Chassis	Chassis Assembly	8515257-902

Note: CCA A3 (pilot's ADSS) and CCA A6 (copilot's ADSS) are identical circuit cards.



8-5. LOCATION AND CONTENTS OF IDENTIFICATION PLATE

The identification plate for the ISP is located on the front panel.



8-6. SAFETY, CARE, AND HANDLING

Personal Safety:

To avoid accidental electrical shock, never perform maintenance on ISP while power is applied to unit.

ISP Care and Handling:

To protect the ISP from Electrostatic Discharge (ESD) during maintenance (Section V), observe these general precautions:

Never perform maintenance on the ISP unless the unit is on a static control grounded work bench.

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks.

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the ISP from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not expose to strong electromagnetic fields.
- Do not probe connector pins or receptacles.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

8-7. COMMON TOOLS AND EQUIPMENT

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

8-8. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

The Test Support System (TSS) and Test Program Sets (TPS) (refer to TM 9-4935-780-13-1) or the Base Shop Test Facility/Base Shop Test Station (BSTF/BSTS) and CDS TPS (refer to TM 11-6625-778-13&P-1) provide the necessary equipment for testing and troubleshooting the ISP. No special tools or other support equipment are required.

Section III

SERVICE UPON RECEIPT

8-9. UNPACKING INSTRUCTIONS

The ISP and each of its Shop Replaceable Units (SRUs) are shipped in reusable containers.

Be careful not to damage shipping container when unpacking a unit.

Save shipping container(s) and packaging materials for use when the following conditions exist:

- a. Repaired ISP is repacked for shipment to AVUM.
- b. AVIM non-repairable ISP is repacked for shipment to depot repair.

- c. AVIM non-repairable SRU is repacked for shipment to depot repair.

8-10. CHECKING UNPACKED EQUIPMENT

Inspect equipment for damage incurred during shipment. If equipment has been damaged, report damage on DD Form 6, Packaging Improvement Report.

Check equipment against packing slip to see if shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

8-11. SCOPE

This section contains information on testing and troubleshooting a defective ISP.

8-12. TEST AND TROUBLESHOOT

Preparation and setup for testing an ISP is contained in TM 9-4935-780-13-1 or TM 11-6625-778-13&P-1.

Prior to running a diagnostic test, visually check ISP for physical damage. Refer to paragraph 8-14. If ISP passes visual check, proceed with test. If ISP does not pass visual check, repair the unit. While diagnostic test is being run, operator actions will appear on the display. The operator is to respond to these prompts.

■ If ISP passes test, return ISP to AVUM. If ISP fails test, replace SRU indicated by the printout.

that the same SRU is faulty, send ISP to depot repair. If printout indicates that a different SRU is faulty, replace the newly suspected SRU. ■

■ After SRU replacement, retest ISP. If ISP fails test a second time, and the printout indicates

Section V

MAINTENANCE PROCEDURES

8-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform

necessary replacement tasks indicated by List of Tasks to repair defective ISP. For general aircraft maintenance practices, refer to TM 1-1500-204-23 or TM 55-1500-323-24.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove Integrated Systems Processor	8-15	8-9
Install Integrated Systems Processor	8-16	8-10
Clean and Inspect Integrated Systems Processor	8-17	8-11
Remove Circuit Card Assembly	8-18	8-12
Remove Power Supply Electronic Components Assembly	8-19	8-14
Install Circuit Card Assembly	8-20	8-16
Install Power Supply Electronic Components Assembly	8-21	8-19

8-14. VISUAL CHECKS

Visually check the ISP to determine if it is in good physical condition. Go through the checklist below.

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair in accordance with TM 55-1500-323-24.
2. Is any connector loose?	Repair in accordance with TM 55-1500-323-24.
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.

Visual Checks (CONT)

CONDITION	IF YES
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Refer to task 8-17.
5. Do any screws appear reddish-brown?	Refer to task 8-17.
6. Does external surface of LRU contain white or gray powdery deposits, similar to dust?	Refer to task 8-17.
7. Does external surface appear rough or frosted?	Refer to task 8-17.
8. Does external surface appear dull?	Refer to task 8-17.
9. Does external surface contain tiny pits or holes?	Refer to task 8-17.
10. Does external surface appear to be swelling or lifting up?	Refer to task 8-17.
11. Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 8-17.
12. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 8-17.
13. Is paint discolored?	Refer to task 8-17.
14. Is paint cracked or chipped?	Refer to task 8-17.
15. Does external surface need cleaning?	Refer to task 8-17.
16. Are any of four mounting flanges bent or broken?	Repair as required.
17. Is external surface dented, cracked, or punctured at all?	Repair as required.
18. Is external surface scratched or gouged at all?	Refer to task 8-17.

8-15. REMOVE INTEGRATED SYSTEMS PROCESSOR

This task covers: Removal of Integrated Systems Processor (ISP).

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

General Safety Instructions:



General Safety Warning

1

1. Open left access door (refer to TM 1-1520-248-23) to gain access to ISP (1).

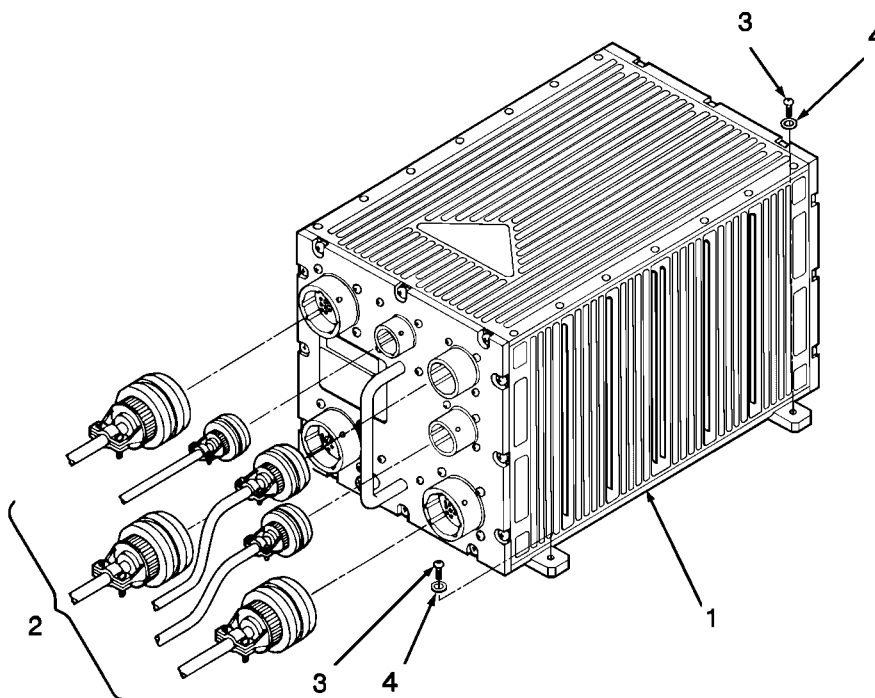
2. Tag and identify six connectors (2).

3. Disconnect six connectors (2).

4. Remove four screws and washers (3 and 4).

5. Remove ISP (1).

6. Close left access door.



END OF TASK

8-16. INSTALL INTEGRATED SYSTEMS PROCESSOR

This task covers: Installation of Integrated Systems Processor (ISP).

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

TM 1-1520-248-23
TM 55-1500-323-24

General Safety Instructions:



General Safety Warning

1

1. Open or remove left access door (refer to TM 1-1520-248-23) to gain access to ISP mounting area.

2. Position ISP (1) in place. Align four mounting holes and install four washers and screws (2 and 3).

3. Visually inspect 6 connectors (4) (refer to TM 55-1500-323-24) for missing or bent pins, corrosion, or cracked housing.

4. Connect 6 tagged connectors (4) to mating connectors.

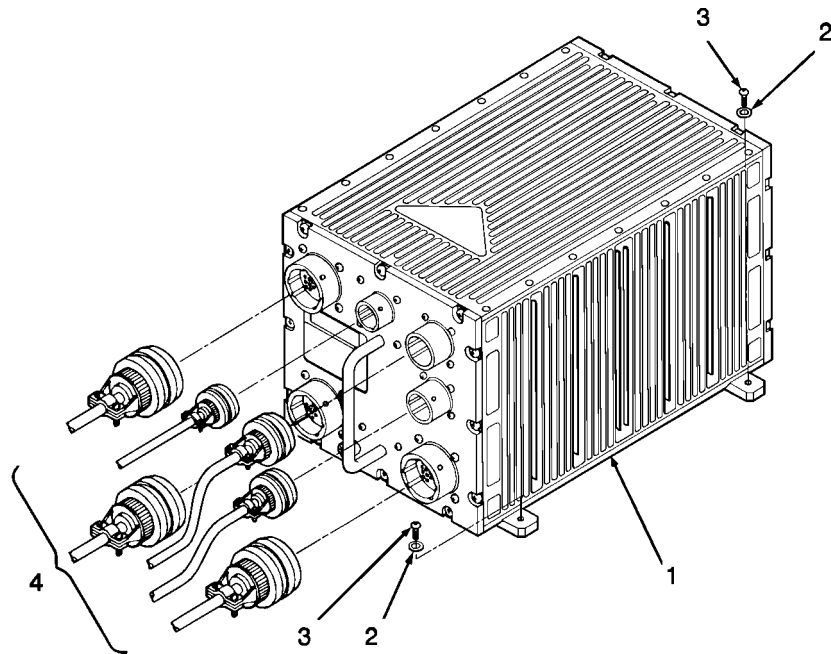
5. Close or install left access door.

INSPECT

FOLLOW-ON MAINTENANCE

Perform operational checks:

Test and Troubleshoot procedure, paragraph 2-5.



END OF TASK

8-17. CLEAN AND INSPECT INTEGRATED SYSTEMS PROCESSOR

This task covers: General external cleaning and inspection procedures for the Integrated Systems Processor (ISP).

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Safety Goggles
 Chip Guards
 Enco Model 310 (or equivalent)

Materials:

Isopropyl Alcohol (C3)
 Clean Soft Cloth (C1)
 Cotton Swab (C2)

Equipment Condition:

No power applied

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1500-344-23

General Safety Instructions:



Compressed Air

2



Isopropyl Alcohol

3

CAUTION

Use of cleaning solvents on electrical parts is not recommended. Application of cleaning solvents, particularly to areas of dense wiring, may cause damage.

Prevent the entrance of water or other solvents into electrical components, ducts, or other openings to avoid damaging the equipment.

CLEAN

1. Remove dust and foreign matter with a clean soft cloth (C1).

2. Clean painted surfaces with a cloth (C1) moistened with alcohol (C3).

3. Clean areas difficult to reach with a cotton swab (C2) dampened with alcohol (C3).

END OF TASK

INSPECT

4. Inspect for evidence of corrosion. If detected, refer to TM 1-1500-344-23.

8-18. REMOVE CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Removal of a Circuit Card Assembly (CCA) from the Integrated Systems Processor (ISP). All seven CCAs are removed in the same manner.

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
ISP on bench
No power applied

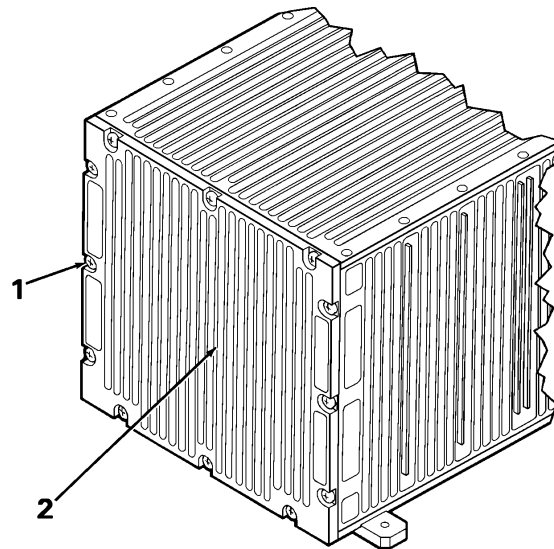
General Safety Instructions:

CAUTION

The ISP contains devices sensitive to
ESD. Proper handling and grounding
techniques must be observed.

1. Loosen twelve captive screws (1) on rear
panel (2).

2. Remove rear panel (2).



GO TO NEXT PAGE

8-18. REMOVE CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

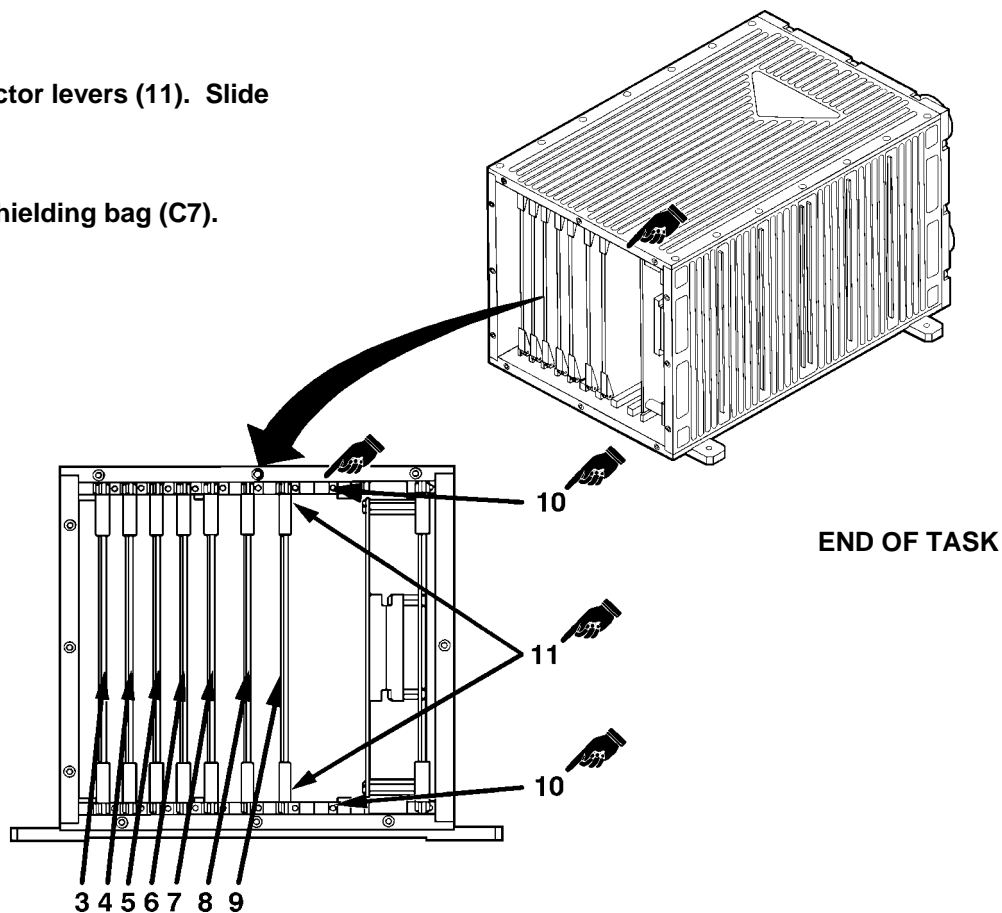
3. Identify CCA to be removed:

<u>CCA</u>	<u>Manufacturer Part No.</u>	<u>Common Name</u>	<u>Index No.</u>
A1	8513072-902	1750 CPU	(3)
A2	8513076-904	1553 I/O	(4)
A3	8515287-903	ADSS I/O	(5)
A3	8515287-904	ADSS I/O	(5)
A4	8507082-903	ASE I/O	(6)
A4	8507082-904	ASE I/O	(6)
A5	8515279-902	Weapons I/O	(7)
A6	8515287-903	ADSS I/O	(8)
A6	8515287-904	ADSS I/O	(8)
A7	8517387-902	Video Tape Recorder Interface	(9)
A7	8517387-903	Video Tape Recorder Interface	(9)
A7	8517387-904	Video Tape Recorder Interface	(9)
A7	8517387-905	Video Tape Recorder Interface	(9)
A7	8517387-914	Video Tape Recorder Interface	(9)
A7	8517387-915	Video Tape Recorder Interface	(9)

4. Loosen but do not remove two wedge lock screws (10) located to the right of the desired CCA.

5. Pull out two card extractor levers (11). Slide CCA out from ISP.

6. Place CCA in a static shielding bag (C7).



8-19. REMOVE POWER SUPPLY ELECTRONIC COMPONENTS ASSEMBLY (AVIM)

This task covers: Removal of the Power Supply Electronic Components Assembly (ECA) from the Integrated Systems Processor (ISP).

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit

Materials:

Static Shielding Bag (C7)

Personnel Required:

68R Avionic Special Equipment
Repairer

Equipment Condition:

Static control work station
set up (3-18)
ISP on bench
No power applied

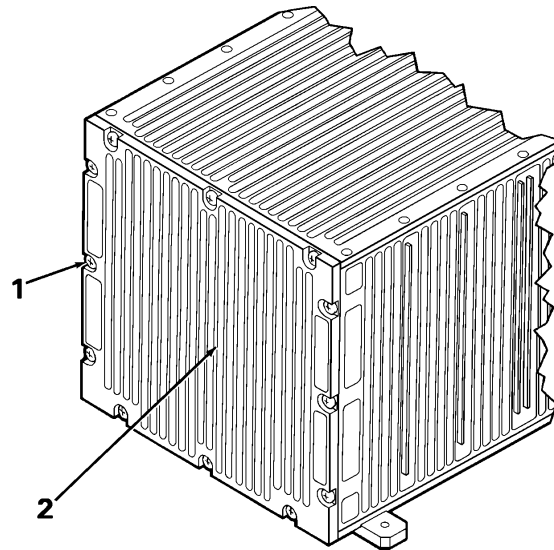
General Safety Instructions:

CAUTION

The ISP contains devices sensitive to ESD. Proper handling and grounding techniques must be observed.

1. Loosen twelve captive screws (1) on rear panel (2).

2. Remove rear panel (2).



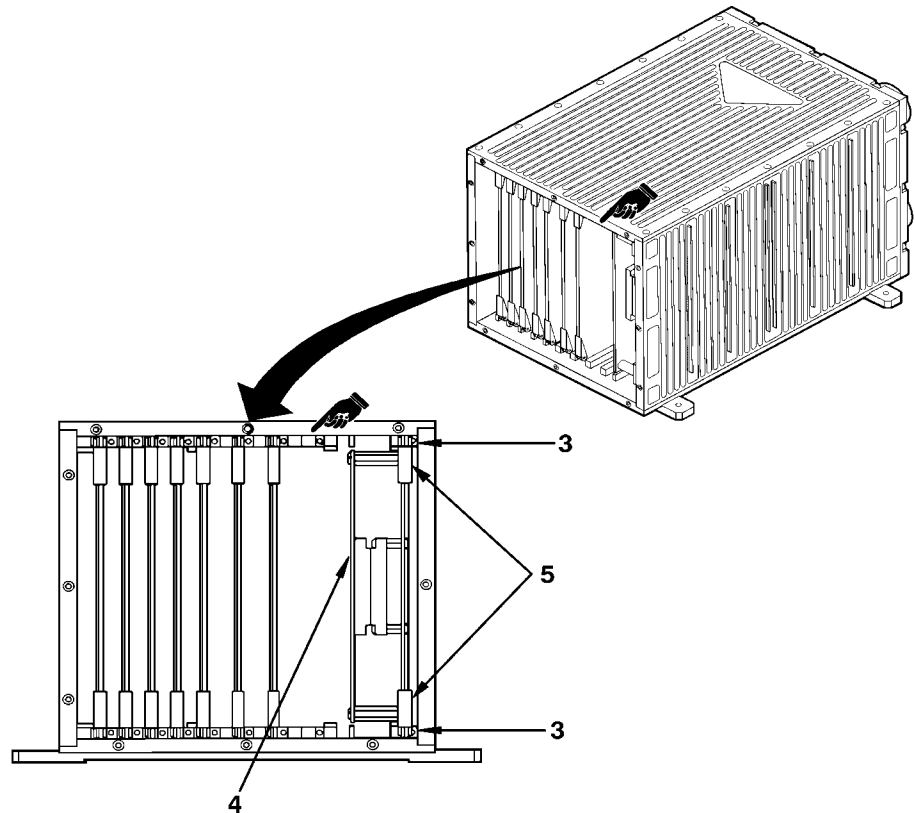
GO TO NEXT PAGE

8-19. REMOVE POWER SUPPLY ELECTRONIC COMPONENTS ASSEMBLY (AVIM) (CONT)

3. Loosen but do not remove two wedge lock screws (3) located to the right of the Power Supply ECA (4).

4. Pull out two card extractor levers (5). Slide Power Supply ECA out from ISP.

5. Place Power Supply ECA in static shielding bag (C7) to protect it from ESD.



END OF TASK

8-20. INSTALL CIRCUIT CARD ASSEMBLY (AVIM)

This task covers: Installation of a Circuit Card Assembly (CCA) in the Integrated Systems Processor (ISP).

INITIAL SETUP

Applicable Configurations:

CD2

Tools:

Electronic Equipment Tool Kit
Screwdriver Torque Wrench
Torque Tip, 3/32 Hex
Torque Tip, Screwdriver No. 2

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Reference:

TM 9-4935-780-13-1
TM 11-6625-778-13&P-1

Equipment Condition:

Static control work station
setup (3-18)
ISP on bench
No power applied

General Safety Instructions:

CAUTION

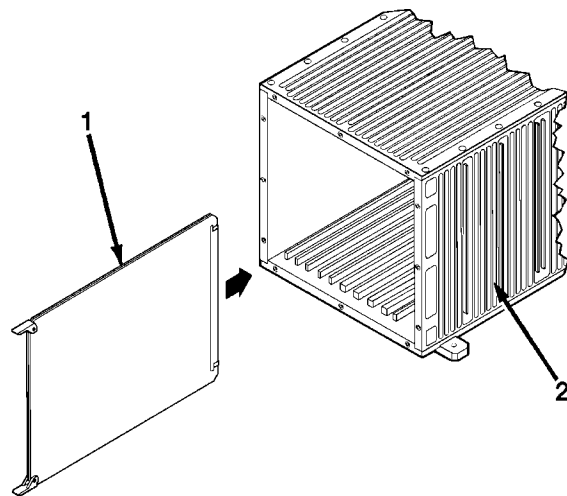
The ISP contains devices that can be damaged by ESD. Proper handling and grounding techniques must be observed.

1. Verify correct CCA (1) to be installed in ISP
- (2).

<u>CCA</u>	<u>Manufacturer Part No.</u>
A1	8513072-902
A2	8513076-904
A3	8515287-903
A3	8515287-904
A4	8507082-903
A4	8507082-904
A5	8515279-902
A6	8515287-903
A6	8515287-904
A7	8517387-902
A7	8517387-903
A7	8517387-904
A7	8517387-905
A7	8517387-914
A7	8517387-915

Common Name for CCAs

A1	1750 CPU
A2	1553 I/OC
A3	ADSS I/O
A4	ASE I/O
A5	Weapons I/O
A6	ADSS I/O
A7	Video Tape Recorder Interface



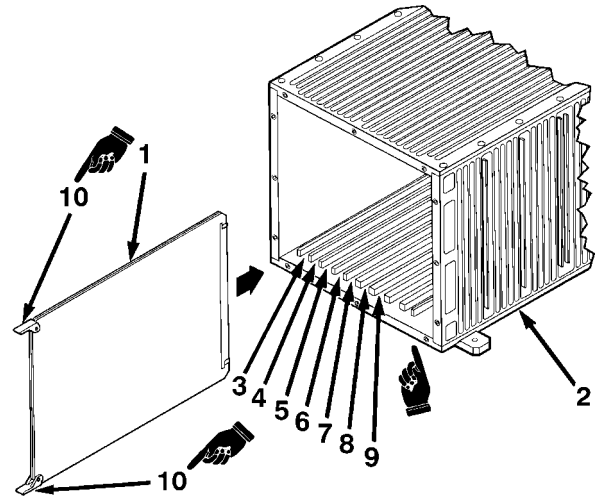
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8-20. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

2. Slide CCA (1) into proper wedge lock guide in ISP:

- A1 CCA wedge lock guide (3)
- A2 CCA wedge lock guide (4)
- A3 CCA wedge lock guide (5)
- A4 CCA wedge lock guide (6)
- A5 CCA wedge lock guide (7)
- A6 CCA wedge lock guide (8)
- A7 CCA wedge lock guide (9)

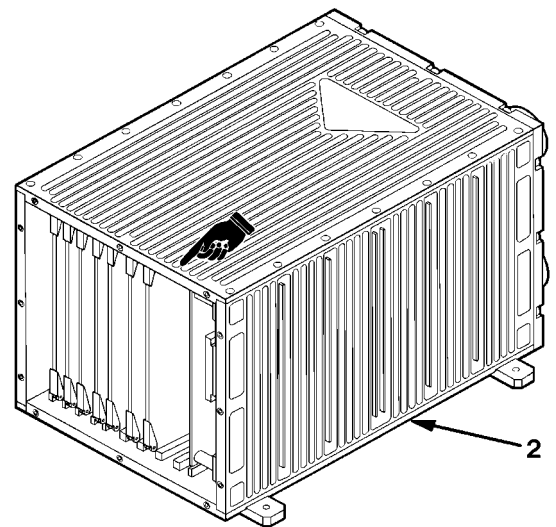
- Push card extractor levers (10) in toward CCA (1).



NOTE

When installing CCA, ensure that connectors are properly seated.

- 3. Applying even pressure to both card extractor levers (10), push CCA (1) back into ISP (2) to mate connectors.

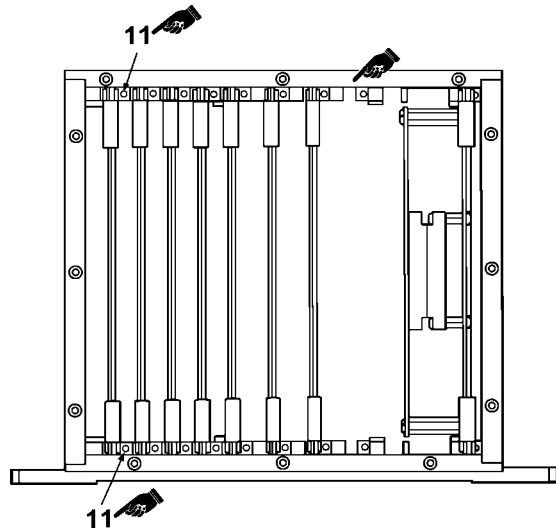


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8-20. INSTALL CIRCUIT CARD ASSEMBLY (AVIM) (CONT)

- 4. Tighten two wedge lock screws (11) to 6-8 INCH-POUNDS using screwdriver torque wrench and 3/32 Hex torque tip.

INSPECT



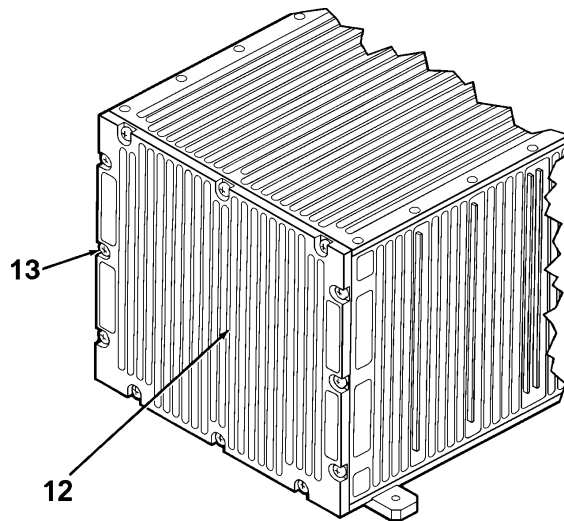
- 5. Position rear panel (12) on ISP, positioned as shown.

- 6. Tighten 12 captive screws (13) on rear panel (12) to 16-20 INCH-POUNDS using screwdriver torque wrench.

INSPECT

FOLLOW-ON MAINTENANCE

Perform operational check per TM 9-4935-780-13-1 or TM 11-6625-778-13&P-1.



END OF TASK

8-21. INSTALL POWER SUPPLY ELECTRONIC COMPONENTS ASSEMBLY (AVIM)

This task covers: Installation of the Power Supply Electronic Components Assembly (ECA) in the Integrated Systems Processor (ISP).

INITIAL SETUP**Applicable Configurations:**

CD2

Tools:

Electronic Equipment Tool Kits
Screwdriver Torque Wrench
Torque Tip, 3/32 Hex
Torque Tip, Screwdriver No. 2

Personnel Required:

68R Avionic Special Equipment
Repairer
68P Technical Inspector

Reference:

TM 9-4935-780-13-1
TM 11-6625-778-13&P-1

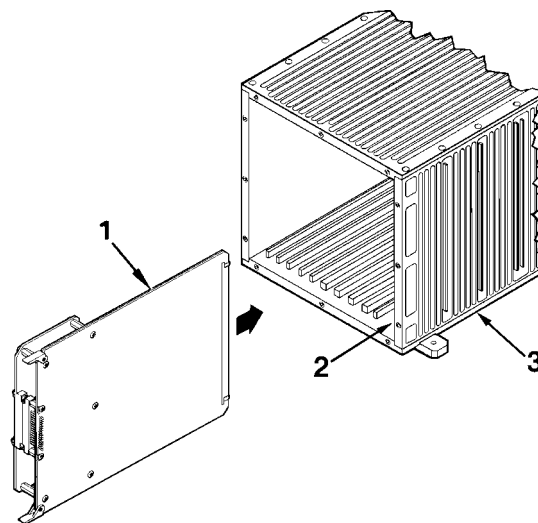
Equipment Condition:

Static control work station
setup (3-18)
ISP on bench
No power applied

General Safety Instructions:**CAUTION**

The ISP contains devices sensitive to ESD.
Proper handling and grounding techniques
must be observed.

1. Slide ECA (1) into wedge lock guide (2) in
ISP (3).



GO TO NEXT PAGE

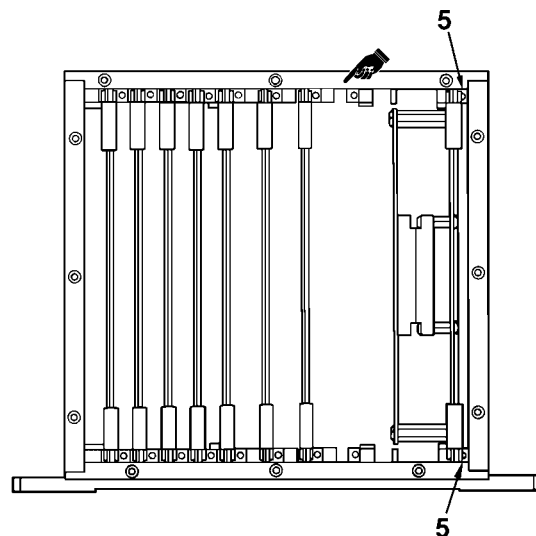
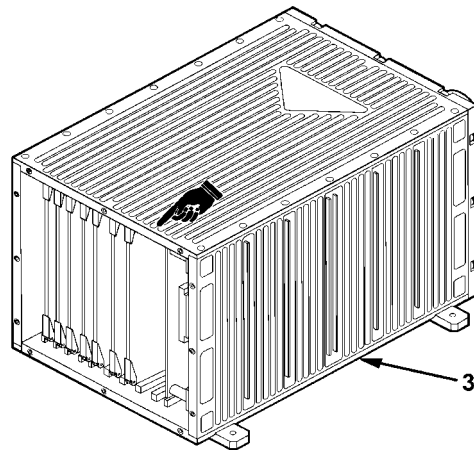
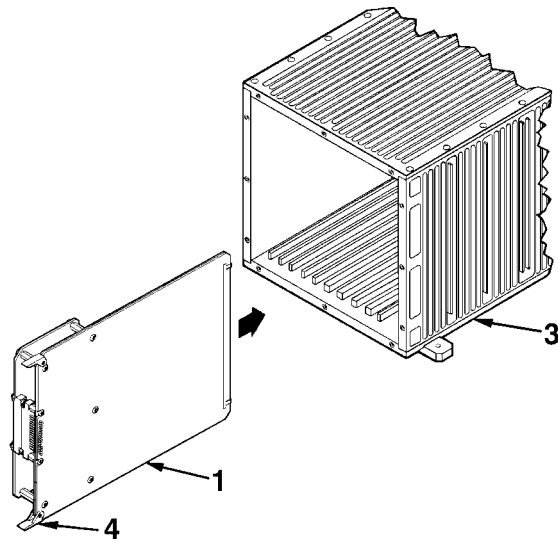
8-21. INSTALL POWER SUPPLY ELECTRONIC COMPONENTS ASSEMBLY (AVIM) (CONT)

NOTE

When installing ECA, ensure connector is properly seated.

2. Push card extractor levers (4) in toward ECA (1). Applying even pressure to both card extractor levers (4), push ECA (1) back into ISP (3) to mate connectors.

3. Tighten two wedge lock screws (5) to 6-8 INCH-POUNDS using screwdriver torque wrench and 3/32 Hex torque tip.



INSPECT

GO TO NEXT PAGE

8-21. INSTALL POWER SUPPLY ELECTRONIC COMPONENTS ASSEMBLY (AVIM) (CONT)

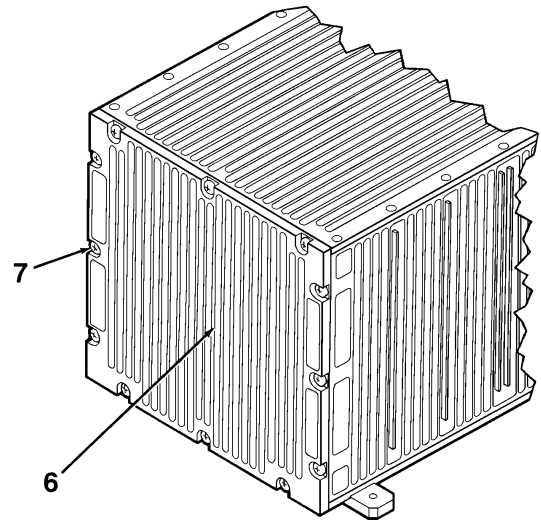
4. Position rear panel (6) on ISP, positioned as shown.

5. Tighten 12 captive screws (7) on rear panel (6) to 16-20 INCH-POUNDS using screwdriver torque wrench.

INSPECT

FOLLOW-ON MAINTENANCE

Perform operational check per TM 9-4935-780-13-1 or TM 11-6625-778-13&P-1.



END OF TASK

CHAPTER 9

DATA RECEPTACLE UNIT (DRU) AND DATA TRANSFER MODULE (DTM) - MAINTENANCE

Section I	Principles/Theory of Operation	9-1
Section II	Repair Parts, Special Tools, TMDE, and Support Equipment	9-5
Section III	Service Upon Receipt	9-5
Section IV	Troubleshooting	9-5
Section V	Maintenance Procedures	9-6

NOTE

The CD3 incorporates the capability of the Data Receptacle Unit (DRU) and the Data Transfer Module (DTM). The CD2 utilizes a different DTM/DRU configuration. For maintenance operations refer to TM 1-1520-248-23.

Section I

PRINCIPLES/THEORY OF OPERATION

9-1. PRINCIPLES OF OPERATION

The Data Transfer Module (DTM) and the Data Receptacle Unit (DRU) provide the memory storage for the Rotorcraft Mapping System (RMS). The Data Receptacle Unit (DRU) is an aircraft mounted unit, and the Data Transfer Module (DTM) is a physically small, removable memory unit. The DRU supports an 8-bit, single ended SCSI-II interface and the MIL-STD-1553B interface operating as a Remote Terminal (RT). The DRU provides 256 Kbyte of SRAM storage backed up by battery, and a minimum of 40 Mbyte of Flash EEPROM storage.

The DTM is shirt pocket size portable data transfer memory storage and recording device with memory capacity of 40-80 Mbyte. It uses non-hermetic packaged FLASH EEPROM memories.

9-2. FUNCTIONAL DESCRIPTION

The primary interface of the DRU, which permits access to the DTM memory, is the SCSI interface. The DRU SCSI port is configured as a peripheral controller receiving commands from the RMS configured as a host adapter. All data transfers are initiated by the RMS in the airborne configuration or by the host ground computer in the ground configuration. Data

transfer occurs in 128 Kbyte data blocks.

Logical addressing is utilized, permitting the host adapter to see DTM memory as a continuous block of fully functional memory. The DRU handles all physical addressing chores and data/write processing actions unique to FLASH EEPROM memory devices.

The DRU utilizes dedicated hardware with tightly coupled firmware. It meets the required SCSI data transfer rate of 2 Mbyte/sec over a period of writing, or reading one 128 Kbyte of data to or from the DTM.

The DRU contains the following functions:

- DTM I/O interface
- DTM Memory Error Detection and Correction (EDAC) logic
- MC68302 System Processor
- 256 Kbyte of FLASH EEPROM program memory
- 512 Kbyte of SRAM
- 8-bit SCSI interface
- 2 UART with RS-422 interfaces
- Power Supply

DTM I/O Interface - DRU interfaces with DTM via serial interface. The DTM interface supports up to 32 bits of address space (4 Gigabytes).

EDAC - The EDAC will correct any single bit error within a 64 Kbyte block of data. It will also detect and report any multi-bit errors. The overhead for this data protection requires only 3 bytes out of each 64 Kbyte block.

MC68302 DRU System Processor - All functions within the DRU are controlled by the MC68302 integrated system processor.

FLASH Memory - Program memory for the MC68302 is contained in 256 Kbyte of FLASH EEPROM. The program memory can be reloaded by several means: RS-422 UART, SCSI port, or by using the DTM.

SRAM - The DRU also contains 512 Kbyte of SRAM used to buffer data as it flows from the SCSI port to the DTM, as well as the scratch pad RAM for the MC68302.

SCSI Port - The DRU SCSI port will support the 8-bit, differential mode, physical layer of the SCSI bus. The interface supports arbitration, selection/reselection, initiator, and target roles. The DRU is optimized for target operation.

Power Supply - The power supply features 28 VDC input power per MIL-STD-704A, category B. It has input transient voltage protection up to 700 volts peak to peak with duration of 1 microsecond. The circuitry also protects for reverse polarity of input power. In addition it provides energy storage for operation throughout power interruptions.

DRU Firmware - The primary purpose of the DRU firmware is to handle all SCSI protocol and message transfer actions. It also handles transfer actions with the host adapter for reading and writing blocks of data to the DTM memory. Upon power up, the DRU firmware automatically performs a power up BIT function.

It checks the functionality of the microprocessor, scratchpad RAM, SCSI interface, DTM interface, and verifies the check sum of the DRU program memory.

The DRU also checks the status of the inserted DTM cartridge to insure that it is properly initialized for subsequent data write and read actions. The status of all power up BIT checks are maintained in scratchpad RAM and are reported to the SCSI host adapter upon request. The firmware also supports the ability of the DRU system to zeroize all DTM memory upon command from the SCSI host adapter.

9-3. EQUIPMENT DATA

Data Receptacle Unit (DRU)

Weight: 4.50 pounds

Dimensions:

Height: 3.00 inches

Width: 5.75 inches

Length: 7.00 inches

Data Transfer Module (DTM)

Weight: 0.50 pounds

Dimensions:

Height: 0.81 inches

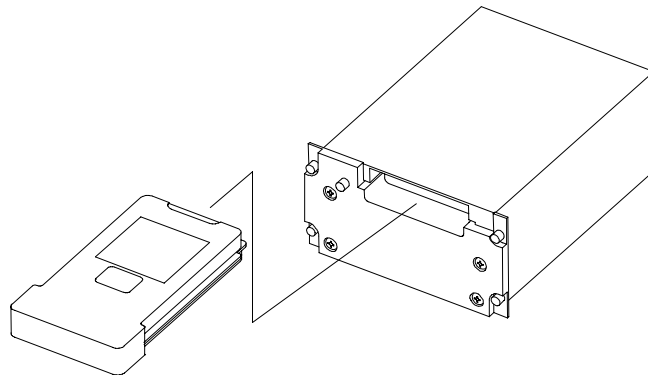
Width: 3.26 inches

Length: 5.91 inches

Electrical Power Requirements:

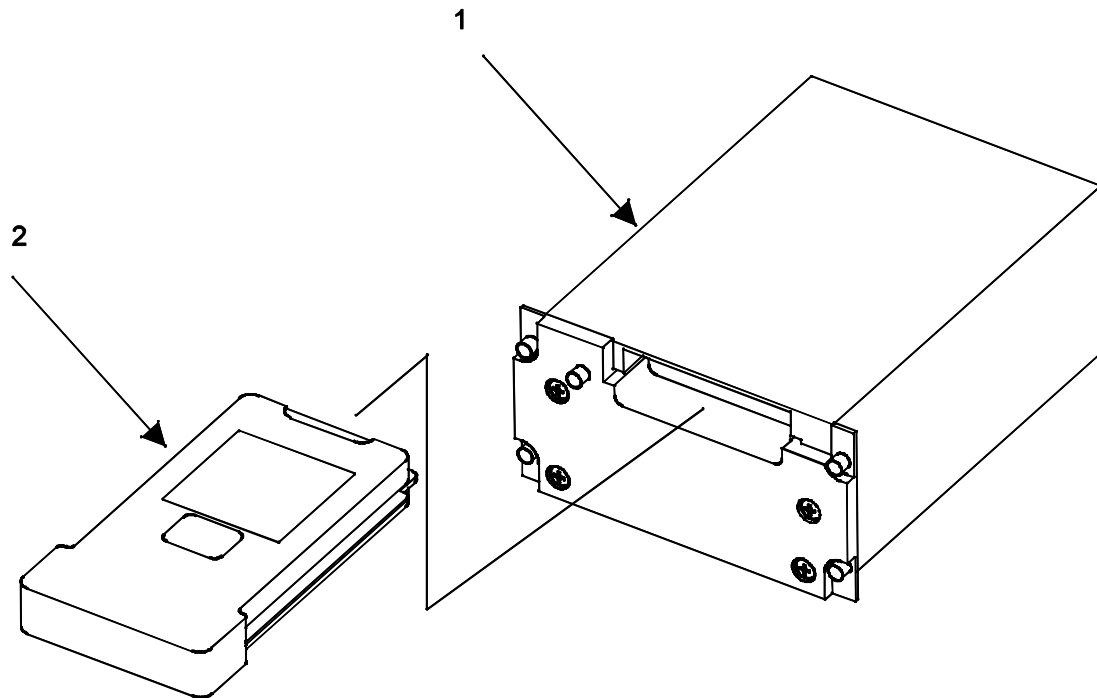
+28 VDC, 12 Vmax

+5 VDC



9-4. SUBASSEMBLY LIST/NOMENCLATURE CROSS-REFERENCE

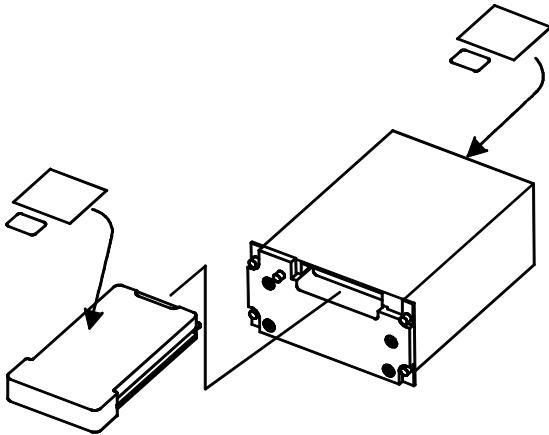
INDEX NO.	COMMON NAME	REF. DES.	OFFICIAL NOMENCLATURE	MANUFACTURER PART NO.
1	Data Receptacle Unit (DRU)	None	Data Receptacle Unit (DRU)	(HONEYWELL P/N 8521852-5)
2	Data Transfer Module (DTM)	None	Data Transfer Module (DTM)	(HONEYWELL P/N 8521852-4)



9-5. LOCATION OF IDENTIFICATION PLATE

The identification plate for the DRU is located on the rear panel of the chassis.

The identification plate for the DTM is located on the top panel of the chassis.



ID Plate Location

9-6. SAFETY, CARE, AND HANDLING

Personal Safety:

To avoid accidental electrical shock, never perform maintenance on the DRU while power is applied.

DRU/DTM Care and Handling:

To protect the DRU from Electrostatic Discharge (ESD) during maintenance (Section V), observe these general precautions:

Never perform maintenance on the DRU unless the unit is on a static control grounded workbench;

Always observe Equipment Condition as stated in the initial setup table for maintenance tasks;

Always observe General Safety Instructions as stated in the initial setup table for maintenance tasks.

To protect the DRU from physical and/or functional damage, observe these general precautions:

- Do not handle roughly.
- Do not drop.
- Do not dent.
- Do not scratch chassis surface.
- Do not allow contact with acids or solvents unless specified for cleaning.
- Do not allow corrosion to go untreated.
- Do not expose to strong electromagnetic fields.
- Do not probe connector pins or receptacles.

Section II

REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

9-7. COMMON TOOLS AND EQUIPMENT

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

9-8. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

None.

Section III

SERVICE UPON RECEIPT

9-9. UNPACKING INSTRUCTIONS

The DTM/DRU is shipped in reusable containers.

Be careful not to damage the shipping container when unpacking a unit.

Save the shipping container(s) and packaging materials for use when a non-repairable DTM/DRU is repacked for shipment to depot repair.

9-10. CHECKING UNPACKED EQUIPMENT

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies per the instructions of DA PAM 738-751.

Section IV

TROUBLESHOOTING

9-11. SCOPE

This section contains information on testing and troubleshooting a defective DRU/DTM.

9-12. TEST AND TROUBLESHOOT

After the DRU/DTM is determine to be defective, component maintenance of the non-repairable DRU/DTM is performed at depot repair.

Prior to shipping the faulty DTM/DRU to depot repair, visually check the DTM/DRU for physical damage. Refer to 9-14. If the DTM/DRU passes visual check, depot repair is required. If the DTM/DRU does not pass visual check, repair the unit.

After visual check repair, retest the DTM/DRU. If the DTM/DRU fails the test a second time, send the DTM/DRU to depot repair.

Section V

MAINTENANCE PROCEDURES

9-13. INTRODUCTION

Complete maintenance procedures for organizational and intermediate level maintenance are contained herein. Perform the necessary

replacement tasks indicated by List of Tasks to repair the defective DTM/DRU. For general aircraft maintenance practices, refer to TM 1-1500-204-23 or TM 55-1500-323-24.

LIST OF TASKS

TASK TITLE	TASK NO.	PAGE NO.
Remove DTM/DRU	9-15	9-8
Install DTM/DRU	9-16	9-9
Clean and Inspect DTM/DRU	9-17	9-10

9-14. VISUAL CHECKS

Visually check the DTM/DRU to determine if it is in good physical condition. Go through the checklist below.

If the answer to each question is NO, proceed with required maintenance procedures. If the answer to any question is YES, follow the instructions in the checklist below.

Visual Checks

CONDITION	IF YES
1. Are connector pins and/or receptacles recessed, or broken?	Repair as required.
2. Is any connector loose?	Tighten connector hardware.
3. Is any connector bent to the point that it will no longer mate with its mating connector?	Repair as required.
4. Do any connector pins and/or receptacles contain blue or blue-green powdery deposits similar to dust?	Refer to task 9-17.
5. Do any screws appear reddish-brown?	Refer to task 9-17.
6. Does the external chassis surface contain white or gray powdery deposits, similar to dust?	Refer to task 9-17.
7. Does the external chassis surface appear rough or frosted?	Refer to task 9-17.
8. Does the external chassis surface appear dull?	Refer to task 9-17.
9. Does the external chassis surface contain tiny pits or holes?	Refer to task 9-17.

Visual Checks (CONT)

CONDITION	IF YES
10. Does the external chassis surface appear to be swelling or lifting up?	Refer to task 9-17.
11. Is there evidence of deposits or spots on any unpainted metal surface?	Refer to task 9-17
12. Is there evidence of a scaly or blistered appearance on any painted metal surface?	Refer to task 9-17.
13. Is paint discolored?	Refer to task 9-17.
14. Is paint cracked or chipped?	Refer to task 9-17.
15. Does the external chassis surface need cleaning?	Refer to task 9-17.
16. Are any of the mounting screws bent or broken?	Replace screws.
17. Is the external surface dented, cracked or punctured at all?	Repair as required.
18. Is the external surface scratched or gouged at all?	Refer to task 9-17.

9-15. REMOVE DATA RECEPTACLE UNIT (DRU)

This task covers: Removal of Data Receptacle Unit (DRU)

INITIAL SETUP

Applicable Configurations:

CD3

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1520-248-23

General Safety Instructions:



General Safety Warning

1

1. Open right crew door (refer to TM 1-1520-248-23) to gain access to DRU (1). Gain access to the DRU (1) suspended from RH roof in FWD area.

2. Tag and identify four connectors (2), (3), (5), and (6).

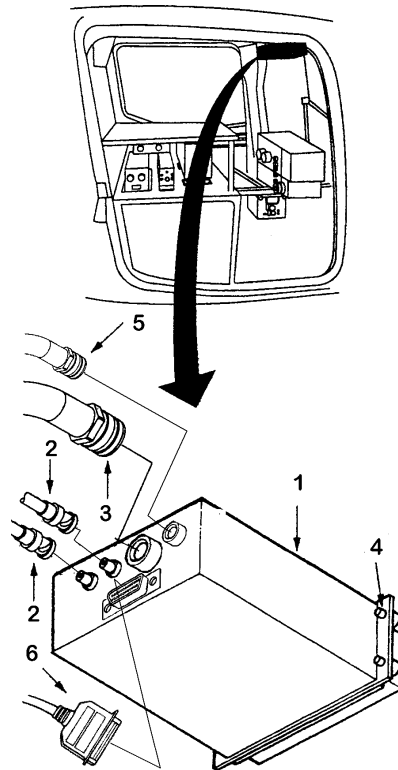
3. Disconnect four connectors (2), (3), (5), and (6) on AFT end of DRU (1).

4. Release four quick-release fasteners (4) at the forward end of DRU (1).

5. Slide DRU (1) forward from its mounting surface.

6. Remove DRU (1).

7. Close crew door opened in step 1.



END OF TASK

9-16. INSTALL DATA RECEPTACLE UNIT (DRU)

This task covers: Installation of Data Receptacle Unit (DRU).

INITIAL SETUP**Applicable Configurations:**

CD3

Tools:

Electronic Equipment Tool Kit

Personnel Required:

68N Avionic Mechanic
67S Technical Inspector

References:

TM 1-1520-248-23

General Safety Instructions:

General Safety Warning

1

1. Open right crew door (refer to TM 1-1520-248-23) to gain access to DRU mounting area.

2. Insert AFT end of DRU (1) into mount and slide the DRU (1) AFT.

3. Rotate four quick-release fasteners (4) to the right to secure DRU (1) to structure.

4. Inspect four tagged connectors (2), (3), (5), and (6) for missing or bent pins, corrosion or cracked housing.

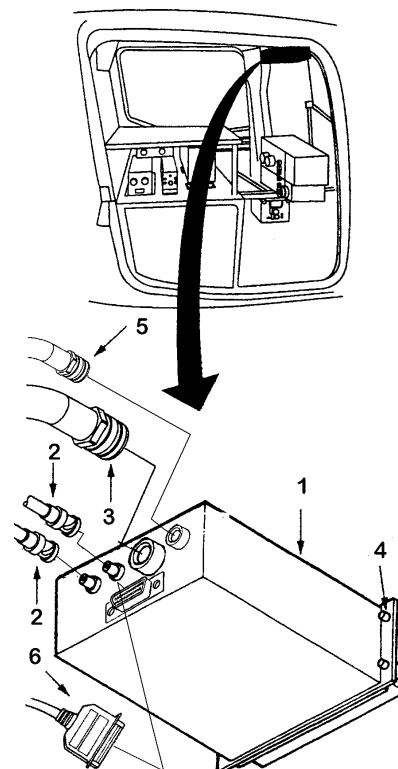
5. Connect four connectors (2), (3), (5), and (6) to DRU (1).

6. Close crew door opened in step 1.

INSPECT**FOLLOW-ON MAINTENANCE**

Close crew door opened in step 1.

Perform operational checks.

**END OF TASK**

9-17. CLEAN AND INSPECT DATA RECEPTACLE UNIT

This task covers: General external cleaning and inspection procedures for the chassis.

INITIAL SETUP

Applicable Configurations:

CD3

Tools:

Safety Goggles
Chip Guards
Enco Model 310 (or equivalent)
1 in. Soft Bristle Brush
Grumbacher Series 55 (or equivalent)

Materials:

Clean Soft Cloth (C1)
(or equivalent)
Cotton Swab (C2) (or equivalent)
Mild Hand Soap (C4) (or equivalent)
Isopropyl Alcohol (C3)
(or equivalent)

Equipment Condition:

No power applied

Personnel Required:

68N Avionic Mechanic

References:

TM 1-1500-344-23

General Safety Instructions:



Isopropyl Alcohol

3



Compressed Air

2

CAUTION

Use of cleaning solvents on electrical parts is not recommended. Application of cleaning solvents, particularly to areas of dense wiring, may harm part.

Prevent the entrance of water or other solvents into electrical components, ducts, or other openings to avoid damaging the equipment.

CHASSIS CLEANING

1. Remove dust and foreign matter with a clean soft wiping cloth (C1).

2. Clean painted surfaces with a cloth (C1) moistened with alcohol (C3).

3. Clean areas difficult to reach with a cotton swab (C2) dampened with alcohol (C3).

INSPECT

END OF TASK

APPENDIX A

REFERENCES

AR 385-40	Accident Reporting and Records
AR 702-11	Army Quality Program
PAM 738-751	Functional Users Manual for the Army Maintenance Management System - Aviation (TAMMS - A)
TM 38-230-1	Packaging of Materiel: Preservation
TM 38-230-2	Packaging of Materiel: Packing
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use
TM 1-1500-204-23	Aviation Unit Maintenance (AVUM) and Aviation Intermediate Maintenance (AVIM) Manual for General Aircraft Maintenance
TM 1-1500-343-23	Organizational Unit and Intermediate Maintenance for Avionic Cleaning and Corrosion Prevention/Control
TM 1-1500-344-23	Aircraft Weapons Systems Cleaning and Corrosion Control
TM 11-1520-248-23	Avionic Unit and Intermediate Maintenance Manual for Electronic Equipment Configuration Army Model OH-58D Helicopter
TM 9-1240-778-20	Aviation Unit Maintenance Manual (AVUM) for Mast Mounted Sight Subsystem (MMSS)
TM 9-1240-778-23	Aviation Unit and Aviation Intermediate Maintenance Manual for Mast Mounted Sight Subsystem (MMSS)
TM 9-4935-780-13-1	Operator and Aviation Intermediate Maintenance Manual for Test Support System AN/TSM-173 (TSS)
TM 55-1500-323-24	Installation Practices for Aircraft Electric and Electronic Wiring
TM 1-1520-248-23	Aviation Unit and Intermediate Maintenance Manual for Army Model OH-58D Helicopter
TM 11-6625-778-13&P-1	Operator and Aviation Intermediate Maintenance Manual, Including Repair Parts and Special Tools List, for Control/Display Subsystem Test Program Set

APPENDIX B
MAINTENANCE ALLOCATION CHART
SECTION I
INTRODUCTION

B.1 Aviation Maintenance Allocation Chart.

B.1.1. This Maintenance Allocation Chart (MAC) assigns maintenance functions in accordance with the Aviation Maintenance concept for Army aviation. These maintenance levels - Aviation Unit Maintenance (AVUM), Aviation Intermediate Maintenance (AVIM), and Depot Maintenance - are depicted on the MAC as follows:

AVUM - corresponds to an O Code in the Repair Parts and Special Tools List (RPSTL).

AVIM - corresponds to an F Code in the RPSTL.

DEPOT - corresponds to a D Code in the RPSTL.

B.1.2. The maintenance to be performed below depot and in the field is described as follows:

B.1.2.1 AVUM activities will be staffed and equipped to perform high frequency "on-aircraft" maintenance tasks required to retain or return aircraft systems to a serviceable condition. The maintenance capability of the AVUM will be governed by the Maintenance Allocation Chart (MAC) and limited by the amount and complexity of ground support equipment (GSE), facilities required, authorized manning strength, and critical skills available. The range and quantity of authorized spare modules/components will be consistent with the mobility requirements dictated by the air mobility concept. (Assignments of maintenance tasks to divisional company size aviation units will consider the overall maintenance capability of the division, the requirement to conserve personnel and equipment resources, and air mobility requirements.)

B.1.2.1.1 Company Size Aviation Units: Perform those tasks which consist primarily of preventive maintenance and maintenance repair and replacement functions associated with sustaining a high level of aircraft operational readiness. Perform maintenance inspections and servicing to include preflight, daily, intermediate, periodic (or phased), and special inspections as authorized by the MAC or higher headquarters. Identify the cause of equipment/system malfunctions using applicable technical manual troubleshooting instructions, built-in test equipment (BITE), installed aircraft instruments, or test, measurement, and diagnostic equipment (TMDE). Replace worn or damaged modules/components that do not require complex adjustments or system alignment and which can be removed/installed with available skills, tools, and ground support equipment. Perform operational and continuity checks and make minor repairs to the electrical system. Inspect, service, and make operational, capacity, and pressure checks to hydraulic systems. Perform servicing, functional adjustments, and minor repair/replacement to the flight control, propulsion, power train, and fuel systems. Accomplish air frame repair that does not require extensive disassembly, jiggling, or alignment. The manufacture of airframe parts will be limited to those items which can be fabricated with tools and equipment found in current air mobile tool and shop sets. Evacuate unserviceable modules/components and end items beyond the repair capability of AVUM to the support AVIM.

B.1.2.1.2 Less than Company Size Aviation Units: Aviation elements organic to brigade, group, battalion headquarters, and detachment size units are normally small and have less than 10 aircraft assigned. Maintenance tasks performed by these units will be those which can be accomplished by the aircraft

crew chief or assigned aircraft repairman and will normally be limited to preventive maintenance, inspections, servicing, spot painting, module/component fault diagnosis, and replacement of selected modules/components. Repair functions will normally be accomplished by the support AVIM unit.

B.1.2.2 Aviation Intermediate Maintenance (AVIM).

B.1.2.2.1 Provides mobile, responsive "One-Stop" maintenance support. (Maintenance functions which are not conducive to sustaining air mobility will be assigned to depot maintenance).

B.1.2.2.2 May perform all maintenance functions authorized to be done at AVUM. Repair of equipment for return to user will emphasize support or operational readiness requirements. Authorized maintenance includes replacement and repair of modules/components and end items which can be accomplished efficiently with available skills, tools, and equipment.

B.1.2.2.3 Establishes the Direct Exchange (DX) program for AVUM units by repairing selected items for return to stock when such repairs cannot be accomplished at the AVUM level.

B.1.2.2.4 Inspects, troubleshoots, performs diagnostic tests, repairs, adjusts, calibrates, and aligns aircraft system modules/components. AVIM units will have capability to determine the serviceability of specified modules/components removed prior to the expiration of the Time Between Overhaul (TBO) or finite life. Module/component disassembly and repair will support the DX program and will normally be limited to tasks requiring cleaning and the replacement of seals, fittings, and items of common hardware. Airframe repair and fabrication of parts will be limited to those maintenance tasks which can be performed with available tools and test equipment. Unserviceable reparable modules/components and end items which are beyond the capability of AVIM to repair will be evacuated to Depot Maintenance.

B.1.2.2.5 Performs aircraft weight and balance inspections and other special inspections which exceed AVUM capability.

B.1.2.2.6 Provides quick response maintenance support, including aircraft recovery and air evacuation, on-the-job training, and technical assistance through the use of mobile maintenance contact teams.

B.1.2.2.7 Maintains authorized operational readiness float aircraft.

B.1.2.2.8 Provides collection and classification services for serviceable/unserviceable material.

B.1.2.2.9 Operates a cannibalization activity in accordance with AR 710-2 and DA Pam 710-2-2. (The aircraft maintenance company within the maintenance battalion of a division will perform AVIM functions consistent with air mobility requirements and conservation of personnel and equipment resources. Additional intermediate maintenance support will be provided by the supporting nondivisional AVIM unit.)

B.2. Use of the Maintenance Allocation Chart (Section II).

NOTE

Approved item names are used throughout this MAC. Generic terms/nomenclatures (if any) are expressed in parentheses and are not to be considered as official terminology.

B.2.1. This Maintenance Allocation Chart assigns maintenance functions to the lowest level of maintenance based on past experience and the following considerations:

Skills available.

Work time required.

Tools and test equipment required and/or available.

B.2.2. Only the lowest level of maintenance authorized to perform a maintenance function is indicated. If the lowest maintenance level cannot perform all tasks of any single maintenance function (e.g., test, repair), then the higher maintenance level(s) that can accomplish additional tasks will also be indicated.

B.2.3. A maintenance function assigned to a maintenance level will automatically be authorized to be performed at any higher maintenance level.

B.2.4. A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be evacuated to the next higher maintenance level. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required by the commander who has the authority to direct such tasking.

B.2.5. The assignment of a maintenance function will not be construed as authorization to carry the related repair parts or spares in stock. Information to requisition or otherwise secure the necessary repair parts will be as specified in the associated RPSTL.

B.2.6. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, at the request of a lower maintenance level and on a one-time basis, transfer of maintenance functions to the lower level may be accomplished by specific authorization of the maintenance officer of the higher level of maintenance to which the function is assigned. The special tools, equipment, etc. required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility for the function. The higher level of maintenance will provide technical supervision and inspection of the function being performed at the lower level.

B.3. Maintenance functions. Maintenance functions will be limited to and defined as follows:

B.3.1. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

B.3.2. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

B.3.3. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

B.3.4. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

B.3.5. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

B.3.6. Calibrate. To determine and cause corrections or adjustments on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

B.3.7. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repaired part, or module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

B.3.8. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the 3d position code of the SMR code.

B.3.9. Repair. The application of maintenance services¹, including fault location/troubleshooting², removal/installation, and disassembly/assembly procedures³, and maintenance actions⁴ to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

B.3.10. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

B.3.11. 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 any age measurements (e.g., hours/miles) considered in classifying Army equipment/components.

B.4 Explanation of Columns in the MAC, Section II.

B.4.1. Functional Groups (Columns 1 and 2). The functional grouping shown on the MAC identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

B.4.2. Maintenance Function (Column 3). Column 3 lists the functions to be performed on the items listed in column 2.

B.4.3. Maintenance Levels (Column 4). The maintenance levels AVUM, AVIM, and DEPOT are listed on the Maintenance Allocation Chart with individual columns that include the work times for maintenance functions at each maintenance level. Work time presentations such as "0.1" indicate the average time (expressed in man-hours in whole hours or decimals) it requires a maintenance level to perform a specified maintenance function. If a work time has not been established, the columnar presentation will indicate "--". Maintenance levels higher than the level of maintenance indicated are authorized to perform the indicated function.

B.4.4. Tools and Equipment Reference Code (Column 5). Column 5 specifies, by code, those common tool sets (not individual tools), common TMDE, and special tools, special TMDE, and special support equipment required to perform the designated function.

B.4.5. Remarks Code (Column 6). When applicable, this column contains a letter code, in alphabetical order, which is keyed to the remarks contained in Section IV.

¹Services - Inspect, test, service, adjust, align, calibrate, and/or replace.

²Fault locate/troubleshoot - The process of investigating and detecting the cause of equipment malfunctioning; the act is isolating a fault within a system or unit under test (UUT).

³Disassemble/assemble - Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the level of maintenance under consideration.

⁴Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

B.5 Explanation of Columns in Tools and Test Equipment Requirements, Section III.

B.5.1. Column 1, Tools and Test Equipment Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

B.5.2. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

B.5.3. Column 3, Nomenclature. Name or identification of the tool or test equipment.

B.5.4. Column 4, National Stock Number. The National Stock Number of the tool or test equipment.

B.5.5. Column 5, Tool Number. The manufacturer's part number.

B.6 Explanation of Columns in Remarks, Section IV.

B.6.1. Column 1, Remarks Code. The code recorded in Column 6, Section II.

B.6.2. Column 2, Remark. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

SECTION II
**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
0020	Master Controller Processor Unit (MCPU)	Test	0.2			41	A
				0.4		26,88,90,92	B
		Service		0.5		43,44	
		Replace	0.5			28,41	
0040	Chassis Assembly	Repair		1.7		26,28,88,90,92	
		Inspect			0.1		
		Test			1.0	26	
		Replace			2.0	26,28,32,33	
0120	Circuit Card Assembly, Vector Generator (A1)	Repair			2.0	3,4,26,28,29,40	
		Inspect			0.1		
		Test			1.0	2,10,11,26	
		Replace		1.3		26,28,32,33,88,90,92	
0140 0150 0160	Circuit Card Assembly, CPU/Memory (A2 and A3)	Repair			2.5	2,10,11,27,28	
		Inspect			0.1		
		Test			1.0	2,12,13,26	
		Replace		1.3		26,28,32,33,88,90,92	
		Repair			2.6	2,12,13,27,28	

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 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
0180 0190	Circuit Card Assembly, Remote Terminal Interface (A4)	Inspect			0.03		
		Test			1.0	2,14,26, 46	
		Replace		1.3		26,28,32, 33,88,90,92	
		Repair			2.6	2,14,27, 28,46	
0200	Circuit Card Assembly, Digital I/O (A5)	Inspect			0.1		
		Test			1.0	2,15,26, 47	
		Replace		1.3		26,28,32, 33,88,90,92	
		Repair			2.4	2,15,27, 28,47	
0220	Circuit Card Assembly, Analog I/O (A6)	Inspect			0.1		
		Test			1.0	2,17,26, 48	
		Replace		1.3		26,28,32, 33,88,90,92	
		Repair			2.5	2,17,27, 28,48	
0240	Circuit Card Assembly, Video/Discrete (A7)	Inspect			0.1		
		Test			1.0	2,18,26, 49	
		Replace		1.3		26,28,32, 33,88,90,92	
		Repair			2.4	2,18,27, 28,49	
0260	Housing, Blower Assembly	Inspect			0.1		

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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
0260	Housing, Blower Assembly	Test		1.0		26	
		Replace		1.1		26,28	
		Repair		1.4		2,26,28	
0280	Power Supply	Inspect			0.1		
		Test			1.0		
		Replace		1.2		26,28,88,90, 92	
0300	Power Supply Module	Repair			1.7	2,3,4,6, 8,27,28, 29	
0320	Circuit Card Assembly, Power Supply Regulator	Replace			2.7	2,28,29	
		Repair			2.0	2,27,28	
0340	Circuit Card Assembly, Power Supply Control	Replace			2.7	2,28,29	
		Repair			1.4	2,27,28	
0400	Chassis Assembly	Repair			2.7	2,28,29	

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 FOR
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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE	
			AVUM (O)	AVIM (I)	DEPOT (D)			
0460	Multifunction Display (MFD)	Test	0.3			41	A	
				0.4			26,88,89,92	B
		Service	0.1			43		
				0.1			43	
		Inspect		0.1				
		Replace	0.6				28,41	
0480	Chassis Subassembly	Repair	0.3			28		
				1.4			26,28,30,88, 89,92	
		Inspect			0.1			
		Test			1.0		26	
		Repair			2.2		26,27,28	
0600	Switch Assembly, Contrast Control	Remove/ Install			2.3	26,28,30		
		Replace		0.4		26,28,88,89, 92		
		Repair			0.3	26,28		
0620	Switch Assembly, Brightness Control	Replace		0.4		26,28,88,89, 92		
		Repair			0.3	26,28		
0640	Plate Assembly, Bezel Mounting (A8)	Inspect			0.1			
		Test			1.0	26		
		Replace		1.5		26,28,30,88, 89,92		

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**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
0640	Plate Assembly, Bezel Mounting (A8)	Repair			0.3	28	
0660	Power Supply, Low Voltage (A4)	Inspect		0.1			
		Test			1.0	26	
		Replace		1.2		26,28,88,89,92	
0680	Circuit Card Assembly A4A2, Low Voltage Power Supply	Replace		2.5		28,29	
		Repair			1.4	2,27,28	
0720	Circuit Card Assembly A4A1, Low Voltage Power Supply	Replace		2.5		28,29	
		Repair			1.4	2,27,28	
0725	Driver Assembly, Low Voltage Power Supply	Replace		2.5		28,32,33	
		Repair			1.4	2,27,28	
0730	Regulator Assembly, Low Voltage Power Supply	Replace		2.5		28,32,33	
		Repair			1.4	2,27,28	
0740	Circuit Card Assembly, Horizontal Deflection (A1)	Inspect			0.1		
		Test			1.0	2,23,26,45	
		Replace		1.2		26,28,88,89,92	
		Repair			2.5	2,23,27,28,45	
0760	Circuit Card Assembly, Video Processor (A2)	Inspect			0.1		

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 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
0760	Circuit Card Assembly, Video Processor (A2)	Test			1.0	2,19,26, 51	
		Replace		1.3		26,28,88,89, 92	
		Repair			2.0	2,19,27, 28,51	
0780	Circuit Card Assembly, Vertical Deflection (A3)	Inspect			0.1		
		Test			1.0	2,21,26, 50	
		Replace		1.2		26,28,88,89, 92	
		Repair			2.5	1,2,21, 27,28,50	
0800	Power Supply, High Voltage (HVPS)	Inspect			0.1		
		Test			1.0	26	
		Replace		1.3		26,28,88,89, 92	
0840	Power Supply, Focus (FPS)	Inspect			0.1		
		Test			1.0	26	
		Replace		1.3		26,28,88,89, 92	
		Repair			2.0	2,27,28	

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 FOR
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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE	
			AVUM (O)	AVIM (I)	DEPOT (D)			
0980	Remote Frequency Display (RFD)	Test	0.3			41	A	
				0.4			26,88,89,92	B
		Service	0.1			43		
				0.1			43	
		Replace	0.4				41	
1000	Chassis, Electrical Equipment	Repair	0.3			28		
				1.5			26,88,89,92	
		Inspect			0.1			
		Test			2.0		26	
		Replace			1.2		26,28	
1020	Circuit Card Assembly, Power Supply (A1)	Repair			7.1	2,3,4,5,7,22,27,28		
		Inspect			0.1			
		Test			1.0		2,22,26,53	
		Replace		4.9			26,28,88,89,92	
		Repair			2.3		2,22,27,28,53	
1060	Circuit Card Assembly, RFD UART (A2)	Inspect			0.1			
		Test			1.0		2,26,54,55	
		Replace		5.2			26,28,88,89,92	
		Repair			2.5		2,27,28,54,55	

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**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
1120	Bezel Assembly, RFD	Inspect			0.1		
		Test			2.0	26	
		Replace		1.1		26,28,88,89, 92	
		Repair			2.9	2,26,27, 28,30	

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 FOR
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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
1160	Keyboard Unit (KU)	Test	0.3			41	A
				0.5		26,88,89,92	B
		Service		0.1		43	
		Replace	0.4			41	
1180	Module, Electrical	Repair	0.3			28	
				1.3		26,28,88,89, 92	
		Inspect		0.1			
		Replace		1.5		26,28,88,89, 92	
1200	Circuit Card Assembly, Control Card (A1 CCA, A4 CCA)	Repair		0.3		28	
		Inspect			0.1		
		Test			2.0	2,16,26, 52	
		Replace		0.3		28	
1220	Circuit Card Assembly, Interface Card (A2 CCA, A3 CCA)	Repair			3.3	2,16,27, 28,52	
		Inspect			0.1		
		Test			1.0	2,20,26, 52	
		Replace		0.3		28	
		Repair			2.1	2,20,27, 28,52	

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 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
1240	Chassis, Electrical Equipment	Inspect			0.1	26	
		Test			1.0		
		Replace		0.2			
		Repair			1.6	2,21,26, 28,38,39, 40	

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 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
1900	Integrated Systems Processor (ISP)	Test	0.2			41	A
				0.4		26,88,91,92	B
		Service		0.5		43,44	
		Replace	0.4			28,41	
1920	Rack, Electrical Equipment	Repair		1.8		26,88,91,92	
		Inspect			0.1		
		Test			1.0	26	
		Replace			2.0	26,28,32,33	
		Repair			1.6	26,28,40	
1960	Filter Assembly	Replace			0.9	28	
		Repair			0.6	28,40	
1980	Circuit Card Assembly, Motherboard	Replace			0.5	28	
		Repair			1.4	27,28	
2000	Circuit Card Assembly, 1750 CPU (A1)	Inspect			0.1		
		Test			1.0	2,26,56,57	
		Replace		1.4		26,28,32,33,88,91,92	
		Repair			2.4	2,27,28,31,56,57	

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**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
2020	Circuit Card Assembly, 1553 IOC (A2)	Inspect			0.1		
		Test			1.0	2,26,58, 59	
		Replace		1.4		26,28,32, 33,88,91,92	
		Repair			2.4	2,27,28, 31,58,59	
2040 2045 2050	Circuit Card Assembly, ADSS (A3 and A6)	Inspect			0.1		
		Test			1.0	2,26,60, 61	
		Replace		1.4		26,28,32, 33,88,91,92	
		Repair			2.4	2,27,28, 31,60,61	
2060 2065	Circuit Card Assembly, ASE I/O (A4)	Inspect			0.1		
		Test			1.0	2,26,62, 63	
		Replace		1.4		26,28,32, 33,88,91,92	
		Repair			2.4	2,27,28, 31,62,63	
2080	Circuit Card Assembly, Weapons I/O (A5)	Inspect			0.1		
		Test			1.0	2,26,64, 65	
		Replace		1.4		26,28,32, 33,88,91,92	
		Repair			2.4	2,26,27, 28,31,64, 65	

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**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
2100 2105 2110 2115 2117 2118	Circuit Card Assembly, Video Tape Recorder Interface (A7)	Inspect			0.1		
		Test			1.0	2,26,66, 67	
		Replace		1.4		26,28,32, 33,88,91,92	
		Repair			2.4	2,26,27, 28,31,66, 67	
2120	Electronic Components Assembly, Power Supply (A10)	Inspect			0.1		
		Replace		1.4		26,28,32, 33,88,91,92	
2140	Circuit Card Assembly, Power Supply (A10A1)	Test			1.0	2,26,68, 69	
		Replace			0.3	28	
		Repair			2.4	2,27,28, 31,68,69	
2160	Circuit Card Assembly, Power Supply (A10A2)	Test			1.0	2,26,70, 71	
		Replace			0.3	28	
		Repair			2.4	2,27,28, 31,70,71	

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 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
2500	Optical Display Assembly (ODA)	Test	0.3			41	A
		Service	0.2				
		Repair			5.3	28,41	
2520	Cable/Electrical Assembly	Inspect			0.1		
		Test			0.4	28,41	
		Replace			1.3	28,41	
		Repair			0.4	28,41	
2540	Image Generator Assembly	Inspect			0.4		
		Test			1.0	28,41,93,94, 95,96,97,98	
		Replace			1.3	28,41	
		Repair			4.0	28,41,93,94, 95,96,97,98	
2560	Optical Display Housing	Inspect			0.1		
		Replace			1.3	28,41	
		Repair			0.4	28,30	

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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
3000	Left/Right IMCPU (8500088-921/923/940/943)	Test	0.2			41	A
		Service		0.5		43,44	
		Replace	0.5			28,41	
		Repair		1.8		28	
3100	Chassis, Electrical Assembly (8521751-903/905)	Inspect			0.1		
		Test			1.0		
		Replace			2.0	28,32,33	
		Repair			2.0	3,4,28 29,40	
3120	Chassis Assembly, IMCPU	Inspect			0.1		
		Replace			1.0	26,28,32, 33	
		Repair			2.0	3,4,26,28, 29,32,33	
3150	Housing, Blower Assembly	Inspect		0.1			
		Test		1.0		28	
		Replace		1.1		28	
		Repair		1.4		2,26,28	
3200	Circuit Card Assy, Backplane (8521470-901/905)	Inspect			0.1		
		Test			1.0	28	
		Replace			0.5	28	

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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
3200	Circuit Card Assembly, Backplane	Repair			1.4	27,28	
3300	Circuit Card Assembly, i960 CPU (A1)	Inspect			0.1		
		Test			1.0	2,24,25, 27,28	
		Replace		1.4		28,32,33	
		Repair			2.4	2,24,25, 27,28,31	
3350	Circuit Card Assembly, Memory Module	Inspect			0.1		
		Test			1.0	28	
		Replace			1.2	27,28,31	
		Repair			2.4	27,28,31	
3400 3410 3420	Circuit Card Assembly, RMS (A2)	Inspect			0.1		
		Test			1.0	2,27,28, 72,73	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28, 31,72,73	
3500 3510 3520 3530	Circuit Card Assembly, Video Downlink/Uplink (A3)	Inspect			0.1		
		Test			1.0	2,27,28, 74,75	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28, 31,74,75	

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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
3600 3610	Circuit Card Assembly, Digital I/O (A7)	Inspect			0.1		
		Test			1.0	2,27,28,76,77	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28,31,76,77	
3700 3710	Circuit Card Assembly, Analog I/O (A8)	Inspect			0.1		
		Test			1.0	2,27,28,78,79	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28,31,78,79	
3800 3810	Circuit Card Assembly, Symbol Generator (A9)	Inspect			0.1		
		Test			1.0	2,27,28,80,81	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28,31,80,81	
3900	Circuit Card Assembly, 1553 I/OC (A10)	Inspect			0.1		
		Test			1.0	2,27,28,82,83	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28,31,82,83	
4000	Power Supply Assembly (A17)	Inspect			0.1		
		Test			0.1	28	

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(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
4000	Power Supply Assembly (A17)	Replace		1.4		28,32,33	
		Repair			2.0	28,32,33	
4030 4035	Circuit Card Assembly, A17A1, Power Supply	Inspect			0.1		
		Test			0.1	2,27,28, 84,85	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28, 31,84,85	
		Inspect			0.1		
4060 4065 4070	Circuit Card Assembly, A17A2, Power Supply	Test			1.0	2,27,28, 86,87	
		Replace		1.4		28,32,33	
		Repair			2.4	2,27,28, 31,84,85	
		Inspect			0.1		
4100	Circuit Card Assembly, ASE/SCI (A5 U/O IMCPU 8500088-943)	Inspect			0.1		
		Test			1.0	2,26,62,63	
		Replace		1.4		26,28,32,33, 88,99,92	
	Circuit Card Assembly, GPP (A15 U/O IMCPU 8500088-923/943)	Repair			2.4	2,26,27,28, 31,62,63	
		Inspect			0.1		
		Test			1.0	2,26,62,63	
		Replace		1.4	26,28,32,33, 88,99,92		

SECTION II
**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTIONS	(4) MAINTENANCE LEVEL			(5) TOOLS & EQUIP REF CODE	(6) REMARKS CODE
			AVUM (O)	AVIM (I)	DEPOT (D)		
5000	Data Receptacle Unit	Test	0.2			41	A
		Service	0.1			43	
		Replace	0.4			41	

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
OH-58D CONTROL DISPLAY SUBSYSTEM**

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	Depot	Automatic Test Equipment		AN/USM-410
2	Depot	Automatic Test Equipment (GenRad)		2271
3	Depot	Extraction Tool		MS27495A
4	Depot	Extraction Tool		MS27495R
5	Depot	Crimper		MS3198-1
6	Depot	Positioner		MS3198-6P
7	Depot	Positioner		MS3198-8P
8	Depot	Crimp Tool		MS3198-1
9	Depot	Lamp, Mercury, 100W	6240-00-051-8454	
10	Depot	GenRad Software		4492-20210-103
11	Depot	Interface Adapter		T338205-053
12	Depot	GenRad Software		4492-20336-103
13	Depot	Interface Adapter		T3995001-167
14	Depot	GenRad Software		GI3411194-42
15	Depot	GenRad Software		4492-20217-100
16	Depot	GenRad Software		4492-20197-101
17	Depot	GenRad Software		4492-20215-100
18	Depot	GenRad Software		4492-20219-101
19	Depot	GenRad Software		4492-20151-102
20	Depot	GenRad Software		4492-20276-100
21	Depot	GenRad Software		4492-20270-102
22	Depot	GenRad Software		4492-20152-100
23	Depot	GenRad Software		4492-20048-102
24	Depot	GenRad Software		4492-20513-101
25	Depot	Interface Adapter		T3995006-157
26	AVIM	Test Support System	5999-01-323-3165	1D50963-505
27	Depot	Oven, Thermal Drying	4430-01-050-6339	
28	AVUM	Tool Kit, Electric	5180-00-610-8177	
29	AVIM	Socket, 3/16 in.	5120-00-087-0700	
30	AVIM	Allen Wrench, 0.05 in.	5120-00-198-5401	
31	Depot	Clamp	5120-00-180-0905	
32	AVIM	Screwdriver, Torque	5120-00-421-5128	
33	AVIM	Torque Tip, 3/32 in.	5120-00-640-6725	
34				
35				
36				
37				

SECTION II
**MAINTENANCE ALLOCATION CHART
 FOR
 OH-58D CONTROL DISPLAY SUBSYSTEM**

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
38	Depot	Extraction Tool	5120-01-108-5115	
39	Depot	Insertion Tool	5120-01-108-5117	
40	Depot	Wrapping Tool, Wire	5130-00-133-3525	
41	AVUM	Generator Set	6115-00-127-8544	
42				
43	AVUM	Goggles, Safety	4240-00-203-3810	
44	AVUM	Guard, Chip	5120-00-179-0133	4019039
45	Depot	Interface Adapter		T338205-044
46	Depot	Interface Adapter		T3995001-168
47	Depot	Interface Adapter		T338205-046
48	Depot	Interface Adapter		T338205-051
49	Depot	Interface Adapter		T338205-054
50	Depot	Interface Adapter		T338205-048
51	Depot	Interface Adapter		T338205-050
52	Depot	Interface Adapter		T338205-042
53	Depot	Interface Adapter		T3995001-204
54	Depot	GenRad Software		GI3411194-14
55	Depot	Interface Adapter		T338205-048
56	Depot	GenRad Software		4492-20180-101
57	Depot	Interface Adapter		T3995001-232
58	Depot	GenRad Software		4492-20018-100
59	Depot	Interface Adapter		T3995001-229
60	Depot	GenRad Software		4492-20251-101
61	Depot	Interface Adapter		T3995001-231
62	Depot	GenRad Software		4492-20013-100
63	Depot	Interface Adapter		T3995001-218
64	Depot	GenRad Software		4492-20120-103
65	Depot	Interface Adapter		T3995001-230
66	Depot	GenRad Software		4492-20542-104
67	Depot	Interface Adapter		T3935006-083
68	Depot	GenRad Software		4492-20164-101
69	Depot	Interface Adapter		T3995001-249
70	Depot	GenRad Software		4492-20015-104
71	Depot	Interface Adapter		T3995001-233
72	Depot	GenRad Software		GI3411194-42
73	Depot	Interface Adapter		T3995001-168
74	Depot	GenRad Software		4492-20558
75	Depot	Interface Adapter		T3995006-143
76	Depot	GenRad Software		4492-20511-104

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
OH-58D CONTROL DISPLAY SUBSYSTEM**

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
77	Depot	Interface Adapter		T3995006-156
78	Depot	GenRad Software		4492-20512-102
79	Depot	Interface Adapter		T3995006-139
80	Depot	GenRad Software		4492-20278-X00
81	Depot	Interface Adapter		T3995006-147
82	Depot	GenRad Software		4492-20509-100
83	Depot	Interface Adapter		T3995001-277
84	Depot	GenRad Software		4492-20518-103
85	Depot	Interface Adapter		T3995006-138
86	Depot	GenRad Software		4492-20519-102
87	Depot	Interface Adapter		T3995006-148
88	AVIM	AN/GSM-340(V)4 CEE/ AN/TSM-191(V)3 BSTF		
89	AVIM	MRK Test Set	6625-01-453-1657	8522273-901
90	AVIM	MCPU Test Set	6625-01-453-7059	8522271-901
91	AVIM	ISP Test Set	6625-01-453-1658	8522272-901
92	AVIM	Universal Interconnect Device (UICD) Adapter Set	6625-01-458-1766	8522275-901
93	Depot	Patch Template	T-3910545	
94	Depot	Color Video CCD Camera, and Color Monitor (or equivalent)	Javelin Electronics Model JE-3662HR	
95	Depot	IGA Ribbon Alignment Fixture (Base)	T-3912690	
96	Depot	IGA Ribbon Alignment Fixture (Subassembly Attachment)	T-3912690-3	
97	Depot	IGA Ribbon Alignment Fixture (Subassembly Attachment)	T-3912690-17	
98	Depot	Torque Watch	T-3912746	
99	AVIM	IMCPU Test Set	6625-01-462-5325	8522274- 901/902

SECTION IV. REMARKS
FOR
OH-58D CONTROL DISPLAY SUBSYSTEM

Remarks Code	Remark
A	Functional Test at AVUM - LRU in helicopter
B	Functional Test at AVIM - LRU on Test Support System

APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS LIST

SECTION I

INTRODUCTION

C-1. SCOPE

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

C-2. EXPLANATION OF COLUMNS

a. **Column(1)-Item number.** This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use staking compound (C1).")

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

O - Aviation Unit Maintenance
F - Aviation Intermediate Maintenance
D - Depot Maintenance

c. **Column(3)-National Stock Number/Manufacturer Model Number.** This is either the National Stock Number or the manufacturer's model number assigned to the item; use it to request or requisition the item.

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

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

SECTION II
EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER/MANUFACTURER MODEL NUMBER	(4) DESCRIPTION	(5) U/M
C1	F/O	TX 512	Soft Cloth Texwipe Co. (21994)	EA
C2	F/O	6515-00-303-8250	Cotton Swab (81348) GG-A-616	PG
C3	F	6810-00-286-5435	Isopropyl Alcohol (81348) TT-I-735	GL
C4	F/O	8520-00-551-0376	Soap, Mild Hand (58536) A-A-49	BX
C5	F/O	8030-00-781-6534	Staking Compound (05972) 08821	BX
C6	F	6850-00-274-5421	Solvent (81348) P-D-680	CN
C7	F	RCAS 1200	Static Shielding Bag Richmond Corp. (81705)	RO
C9	F	5970-01-029-7961	Conformal Coating (88818)	QT
C10	F/O	8030-00-781-6534	Staking Compound (05972)	BX
C11	F	5340-01-2656-992	Plug Retaining Strap (07187) 8502287	EA
C12	F	AMS3654	Shrinkable Sleeving Dixico Inc. (85670)	FT
C13	F	4020-00-159-6924	Lacing Tape (81349)	FT

SECTION II

EXPENDABLE SUPPLIES AND MATERIALS LIST (CONT.)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER/MANUFACTURER MODEL NUMBER	(4) DESCRIPTION	(5) U/M
C14	F	SY95P-2278-714	Torque Seal Anti-Sabotage Inspectors Lacquer Organic Products Co. (01195)	EA
C15	F	8415-00-266-8677	Gloves, Rubber (81348)	EA
C16	F	6810-01-015-8437	Acetone MIL-SPEC-0-A-51	EA ■

APPENDIX D

ILLUSTRATED LIST OF MANUFACTURED ITEMS

INTRODUCTION

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at AVIM.

The bulk materials needed for manufacture of an item are listed on the item fabrication illustration.

MANUFACTURED ITEMS INDEX

NAME	
CRT Foam Pad	D-1
CRT Foam Block	D-2

MATERIALS REQUIRED

INDEX

<u>NO.</u>	<u>NAME</u>	<u>MATERIAL SPECIFICATION</u>	<u>LENGTH/WIDTH HEIGHT (INCHES)</u>	<u>qty</u>
(1)	BASE	POLYURETHANE FOAM PREFORMED, FLEXIBLE MIL-P-26514D, TYPE 1, CLASS II	9 x 9 x 1	1
(2)	END BLOCK	SAME AS (1)	9 x 1-1/4 x 2	2
(3)	FILLER BLOCK	SAME AS (1)	6-1/2 x 1 x 2	2
(4)	CUSHION SHEET	UNICELLULAR POLYETHYLENE MIL-C-46842	9 x 9; 1/16 OR 1/8 THICK	1
(NONE)	GLUE	ANY GOOD GRADE WHITE LIQUID GLUE OR HOT MELT GLUE OR SPRAY ADHESIVE	NA	AR

ALTERNATE METHOD

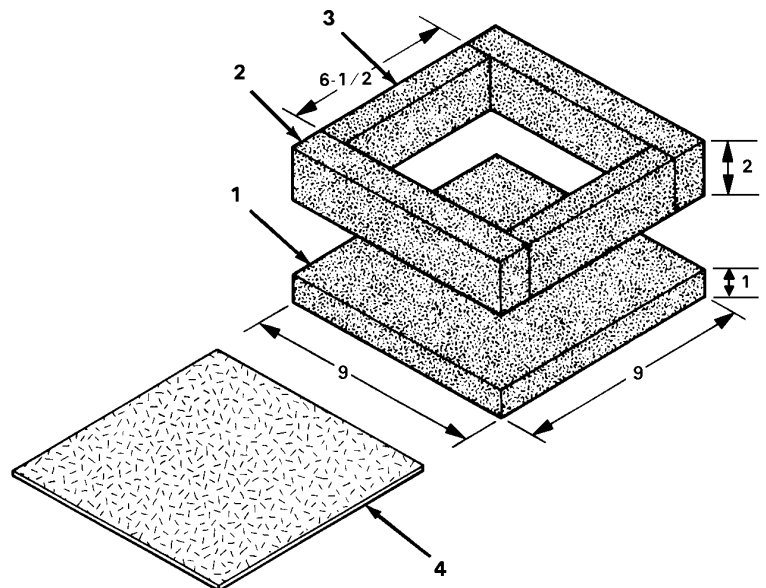
Hollow out 6.5 by 7.0 opening, 2 inches deep, in center of a 9 x 9 x 3 piece of polyurethane foam.

ASSEMBLY INSTRUCTIONS

1. Glue two end blocks (2) to base (1).
2. Glue two filler blocks (3) to Base (1) and end blocks (2).
3. Fold cushion sheet (4) and store it inside the cutout until needed.

USING CRT FOAM PAD

1. Remove cushion sheet (4) and spread out to full size.
2. Wrap cushion sheet (4) over CRT faceplate and insert CRT face down into center cut out of pad assembly.



NOTE: ALL DIMENSION IN INCHES

APPENDIX D

ILLUSTRATED LIST OF MANUFACTURED ITEMS (cont)

MATERIALS REQUIRED

INDEX NO.	NAME	MATERIAL SPECIFICATION	LENGTH/WIDTH HEIGHT (INCHES)	qty
(1)	TOP PIECE	POLYURETHANE FOAM PREFORMED, FLEXIBLE MIL-P-26514D, TYPE 1, CLASS II	18 x 12 x 5	1
(2)	BOTTOM PIECE	SAME AS (1)	18 x 12 x 5	1
(3)	CUSHION SHEET	UNICELLULAR POLYETHYLENE MIL-C-46842	9 x 9; 1/16 OR 1/8 THICK	1
(NONE)	TIE STRING	STRONG MULTISTRAND TWINE OR CORD	36	36

CUTTING INSTRUCTIONS

1. Mark cut lines A thru L on top of each 18 x 12 x 5 foam block per dimensions shown in top view.
2. Using sharp knife blade (or other suitable cutter), slice out foam for cavities ABCD, EFGH, and IJKL as follows:

- a. Cut downward into foam block along specified lines to form the perpendicular side walls for the cavity.

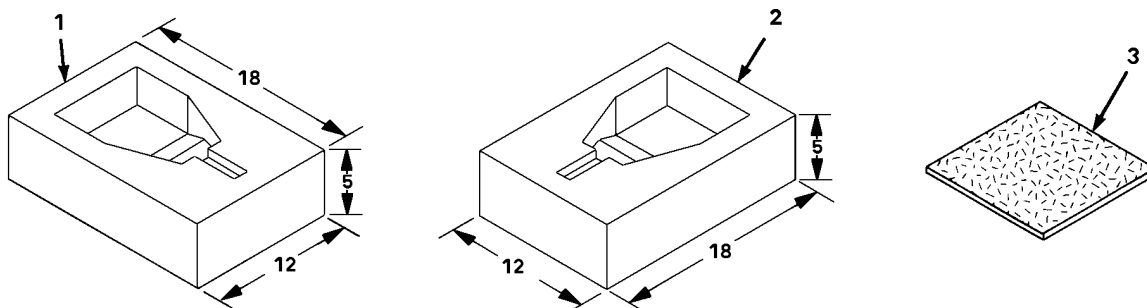
- b. Remove foam from area between cut lines until cavity is hollowed out to specified depth.

CAVITY	CUT LINES	DEPTH
ABCD	A-B, B-C, C-D, D-A	3.25 INCHES
EFGH	E-F, F-G, G-H, H-E	1.80 INCHES
IJKL	I-L, L-K, K-J	0.60 INCH

3. For cavity ADEF, taper EF to DA so slope angle of surface MN is about 30 degrees.

USING CRT FOAM BLOCK

1. Spread cushion sheet (3) over CRT faceplate and fold excess material back over the outer surfaces of the CRT.
2. Lay CRT down into cutout of bottom piece (2), so that mounting frame brackets are against sides of block.
3. Fit top piece (1) down over CRT and tie pieces (1) and (2) together using three pieces of 36-inch tie string. Place tie string near front, rear, and center of block assembly. (Do not use adhesive tape to tie adhesive tape to tie the two foam blocks together.)



NOTE: ALL DIMENSIONS IN INCHES

GLOSSARY

ADSS	ANVIS Display Symbology System
AHRS	Attitude and Heading Reference System
ANVIS	Aviator's Night Vision Imaging System
ASE	Aircraft Survivability Equipment
ATHS	Airborne Target Handover System
AVIM	Aviation Intermediate Maintenance
AVUM	Aviation Unit Maintenance
BITE	Built-In Test Equipment
BKUP	Backup
BRT	Bright
CKT	Circuit
CCA	Circuit Card Assembly
CDS	Control/Display Subsystem
Cont	Continued
CPU	Central Processing Unit
CRT	Cathode Ray Tube
DMA	Direct Memory Access
DMWR	Depot Maintenance Work Requirement
DTM	Data Transfer Module
DRU	Data Receptacle Unit
DX	Direct Exchange
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIR	Equipment Improvement Recommendations
ESD	Electrostatic Discharge
FADEC	Full Authority Digital Engine Control
FDL	Fault Detection and Location
FSCM	Federal Supply Code for Manufacturer
GSE	Ground Support Equipment
IFF	Identification Friend or Foe
IFM	Improved FM Amplifier
I/O	Input/Output
I/OC	Input/Output Controller
IMCPU	Improved Master Controller Processing Unit
IOC	Input/Output Controller
ISP	Integrated Systems Processor
KU	Keyboard Unit
LCD	Liquid Crystal Display
LRU	Line Replaceable Unit
MAC	Maintenance Allocation Chart
MCPU	Master Controller Processor Unit
MFD	Multifunction Display
MMS	Mast Mounted Sight
MTOE	Modified Table of Organization and Equipment
NSN	National Stock Number
NVG	Night Vision Goggles
ODA	Optical Display Assembly
PSIG	Pounds-Force per Square Inch Gauge
QA/QC	Quality Assurance/Quality Control
RAM	Random Access Memory
RFD	Remote Frequency Display
RPSTL	Repair Parts and Special Tools List
SCAS	Stability and Control Augmentation System
SMR	Source, Maintenance and Recoverability

GLOSSARY

SRU	Shop Replaceable Unit
TAMMS-A	The Army Maintenance Management System-Aviation
TBO	Time Between Overhaul
TMDE	Test, Measurement, and Diagnostic Equipment
TPS	Test Program Set
TSS	Test Support System
U/M	Unit of Measure
UUT	Unit Under Test
VAC	Volts, Alternating Current
VDC	Volts, Direct Current
VTR	Video Tape Recorder

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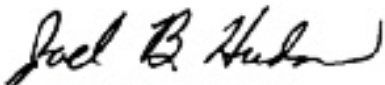
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W

Warning Summary i

TM 1-1427-779-23

By Order of the Secretary OF the Army:

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PUBLICATION DATE

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PUBLICATION TITLE

AVUM/AVIM Manual for OH-58 Helicopter

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

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 in figure 4-3 is pointed at a bolt. In key to figure 4-3, item 16 is called a shim. Please correct one or the other

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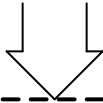
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TABLE NO

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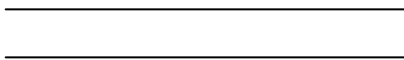
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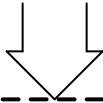
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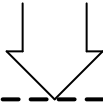
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TEAR ALONG PERFORATED LINE

The Metric System and Equivalents

Linear Measure

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

Weights

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

Liquid Measure

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

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

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

Temperature (Exact)

F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	C
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