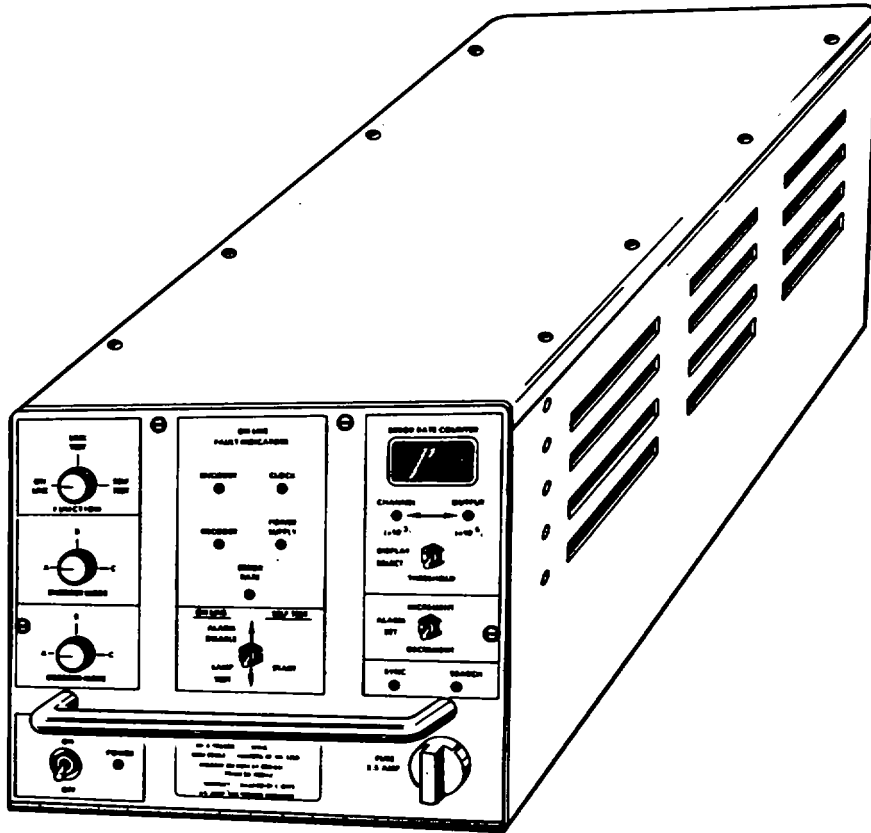


OPERATOR'S, ORGANIZATIONAL, AND
DIRECT SUPPORT MAINTENANCE MANUAL



ENCODER-DECODER KY-883/GSC
(NSN 5895-01-114-1358)

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
20 OCTOBER 1983



5

SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1

DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2

IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3

IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4

SEND FOR HELP AS SOON AS POSSIBLE

5

AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING

Set ON/OFF switch to OFF before opening the front panel assembly. When removing the spare fuse use caution to avoid touching the heat sink on the power supply plug-in-circuit card assembly A4.

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing plug-in-circuit card assemblies.

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing circuit card assemblies. High voltage is present in the power supply even when the ON/OFF switch is OFF. Remove the power plug and discharge capacitors A7C1 and A5AIC1 to ensure safety.

WARNING

High voltage of 115 Vac, dangerous to life, exists in the encoder decoder when the ON/OFF switch is set to ON.

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

SAFETY PRECAUTION

A periodic review of safety precautions in TB 385-4, Safety Precautions for Maintenance of Electrical/Electronic Equipment, is recommended. When the equipment is operated with covers removed, DO NOT TOUCH exposed connections or components. MAKE CERTAIN you are not grounded when making connections or adjusting components inside the test instrument.

A/(B blank)

Technical Manual
No. 11-5895-1179-13
Technical Manual
No. EE132-EA-OMP-010/E106 KY883
Technical Order
No. 31S1-2GSC-161
1983

DEPARTMENTS OF THE ARMY,
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Washington, DC, 20 October 1983

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward direct to prime ALC/MST.

For Navy, mail comments to the Commander, Naval Electronics Systems Command, ATTN: ELEX 8122, Washington, DC 20360.

In either case, a reply will be furnished direct to you.

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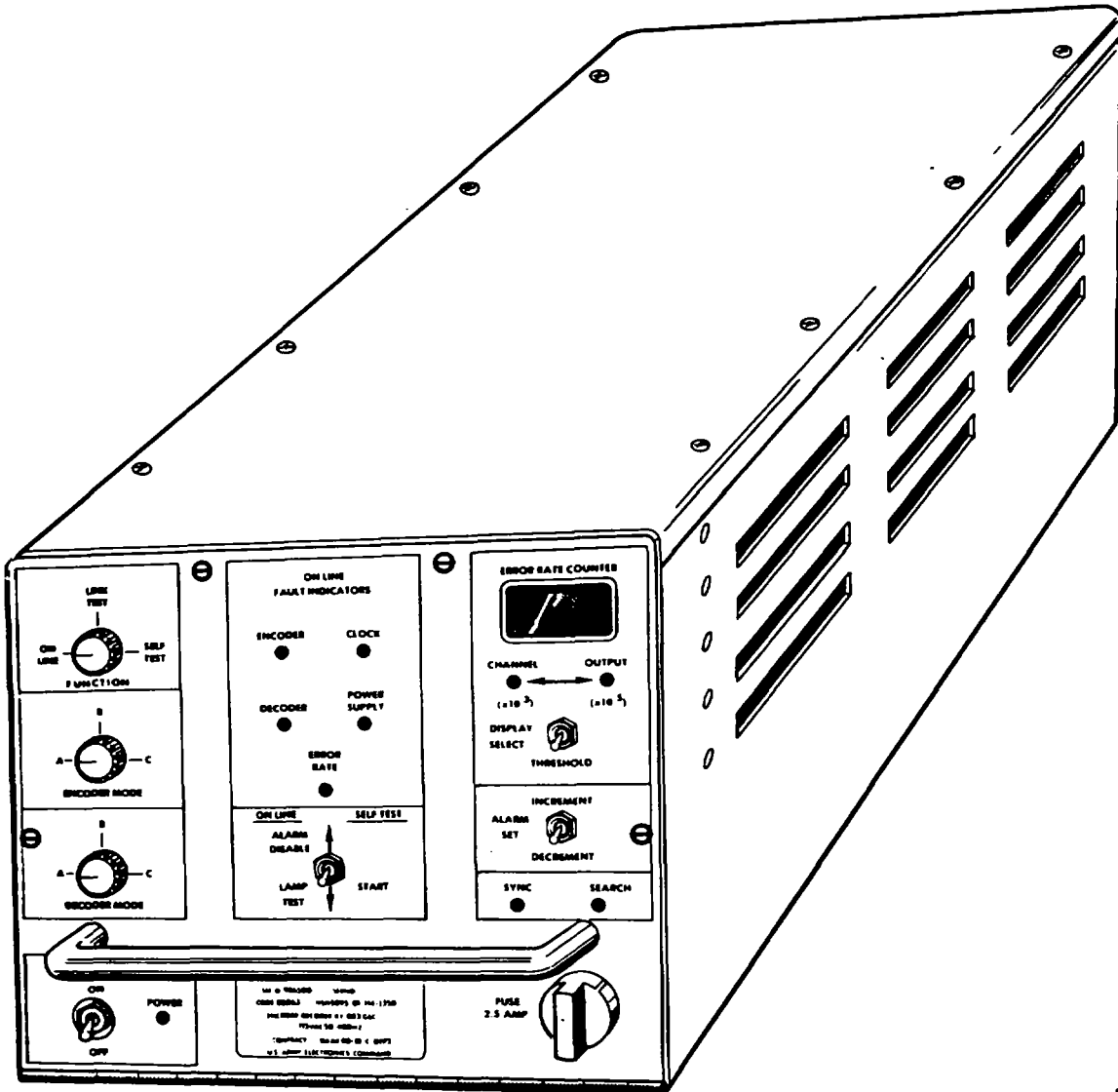
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Figure 1-1. Encoder-Decoder KY-883/GSC

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. Manual Makeup and Contents. This manual tells you how to operate and maintain the Encoder-Decoder KY-883/GSC, hereinafter called the encoder-decoder (figure 1-1). Maintenance instructions for operators, for organizational support personnel, and for direct support personnel are included. Maintenance beyond direct support is covered in DMWR 11-5895-1179.

b. Purpose of equipment. The encoder-decoder provides coding and decoding functions to improve the reliability of digital data transmission in satellite communication links used by the Defense Satellite Communication System.

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

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

1-3. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (Army). Air Force personnel will use AFR 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2, Vol 3 and unsatisfactory material/conditions (UR submissions) IAW OPNAVINST 4790.2, Vol 2, chapter 17.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/ NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-4. Reporting Equipment Improvement Recommendations (EIR)

a. Army. If your encoder-decoder needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it

to Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

- b. Air Force. Air Force personnel are encouraged to submit EIR's in accordance with AFR 900-4.
- c. Navy. Navy personnel are encouraged to submit EIR's through their local Beneficial Suggestion Program.

1-5. Administrative Storage

Administrative Storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraphs 2-4 and 5-35.

1-6. Destruction of Army Electronics Materiel

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

1-7. Abbreviations

Abbreviations not covered in MIL-STD-12C that are used in this manual are listed and explained in table 1-1.

Table 1-1. Non-Standard Abbreviations

Abbreviation	Explanation
AAL	Additional Authorization List
ARC	Accounting Requirements Code
ATP	Acceptance Test Procedure
BII	Basic Issue Items
BITE	Built In Test Equipment
CCA	Circuit Card Assembly
COEI	Components of End Item
DISREP	Discrepancy in Shipment Report
DMWR	Depot Maintenance Work Requirement
EIR	Equipment Improvement Recommendations
HR	Hand Receipt
MAC	Maintenance Allocation Chart
MDCS	Maintenance Data Collection System
NSN	National Stock Number
PMCS	Preventive Maintenance Checks and Service
RPSTL	Repair Parts and Special Tools List
SMR	Source Maintenance Recoverability
SSMA	Spread Spectrum Multiple Access
TAMMS	The Army Maintenance Management System

1-8. Glossary

An explanation of unusual terms and acronyms used in this manual is presented in table 1-2.

Table 1-2. Glossary of Terms

Term or Acronym	Explanation
Burst error protection	The ability to achieve a reasonable error rate in an environment where burst noise is present either in the form of jamming or natural phenomena.
De-interleaving	The reverse process of interleaving. Has the effect of breaking up blocks of errors introduced into the interleaved data stream.
Forward error correcting	The ability to correct errors in a transmission without retransmitting the data
Interleaving	The process of shuffling a serial data stream in time before transmission. This process allows blocks of errors to be scattered in time by de-interleaving on the receive side.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9. Equipment Characteristics, Capabilities and Features

The decoder is a forward-error-correcting decoder which means that the decoder corrects errors without using a return communication link. Encoding and decoding functions are independent so that the encoder decoder provides a full duplex digital communications capability. The encoder-decoder has built-in test equipment for on-line and off-line self-tests which isolate to the circuit card assembly. The encoder-decoder also generates a-test signal which may be used to check the communication channel from end-to-end.

1-10. Location and Description of Major Components

a. Modular Construction Concept. The encoder-decoder is of modular construction (figure 1-2). The chassis assembly (with the

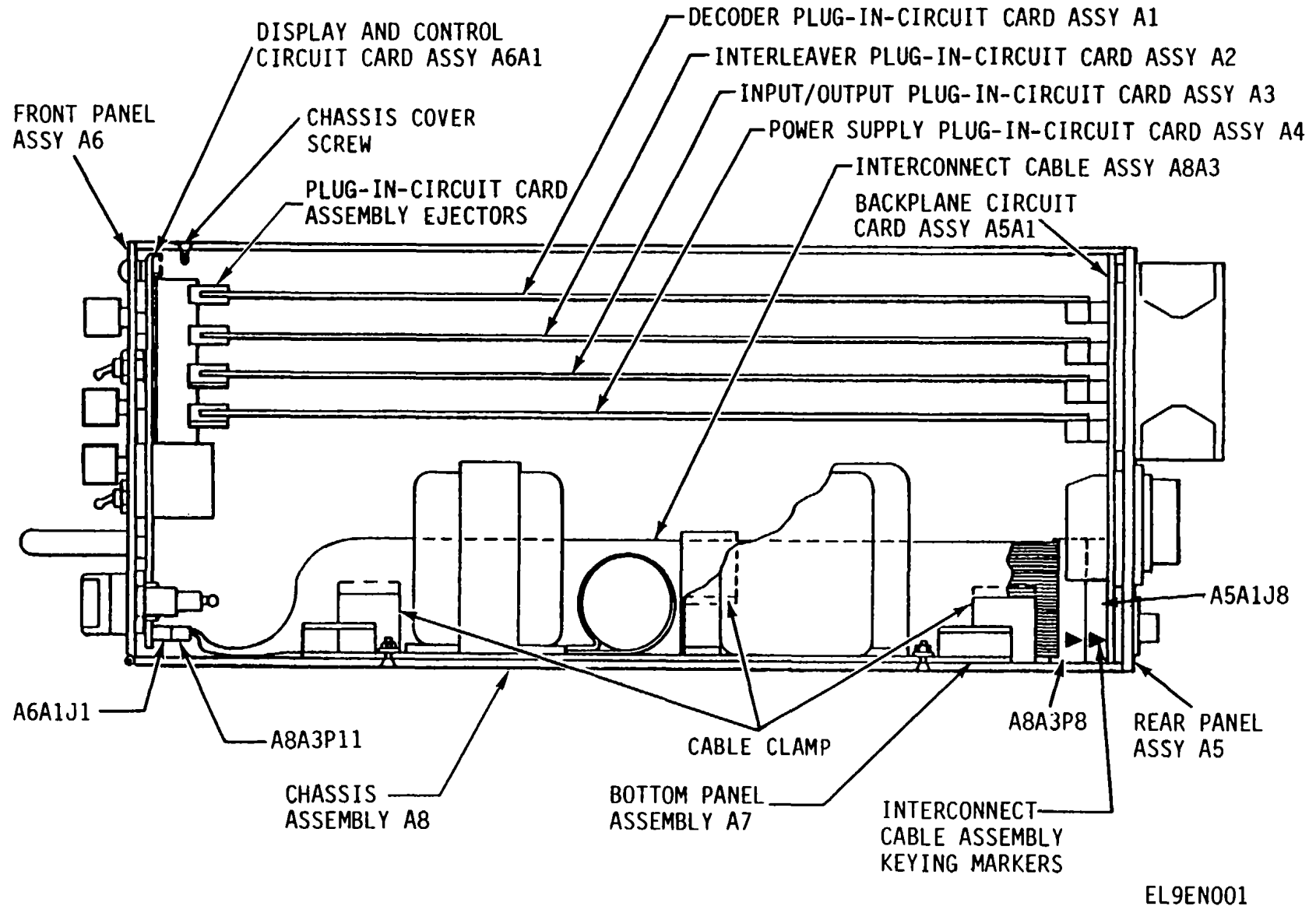
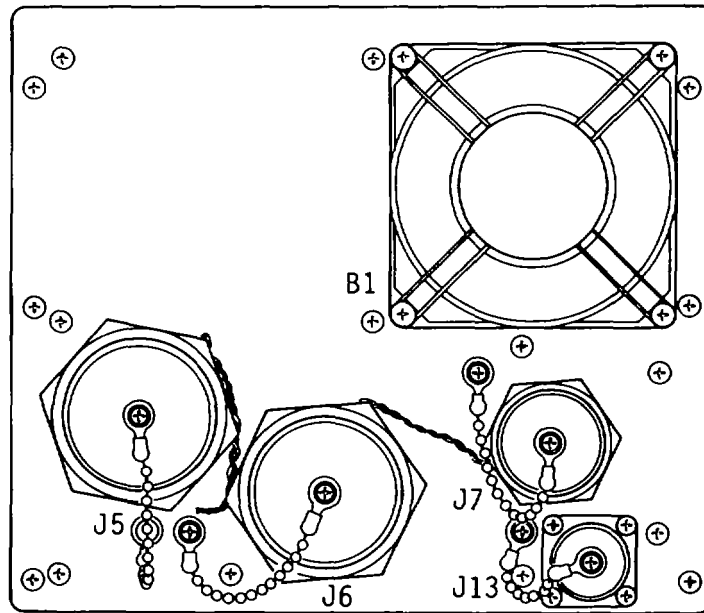


Figure 1-2. Encoder-Decoder with Right Side Panel Removed.

front panel assembly, rear panel assembly, and cover) encloses six circuit card assemblies identified in figure 1-2 and listed in table 1-3. The back plane circuit card assembly is mounted on the rear panel assembly and contains four receptacles for the plug-in-circuit card assemblies. The display and control circuit card assembly is mounted on the front panel assembly. All controls and indicators for operation of the encoder-decoder are located on the front panel assembly. The fan and all external connections are located on the rear panel assembly (figure 1-3).

Table 1-3. Encoder-Decoder Assemblies

Assembly	Reference Designator	Drawing Number
Decoder Plug-In-Circuit Card Assembly	A1	SM-D-986495
Interleaver Plug-In-Circuit Card Assembly	A2	SM-D-986498
Input/Output Plug-In-Circuit Card Assembly	A3	SM-D-986492
Power Supply Plug-In-Circuit Card Assembly	A4	SM-D-882477
Rear Panel Assembly	A5	SM-D-986483
Backplane Circuit Card Assembly	A5A1	SM-D-986486
Front Panel Assembly	A6	SM-D-986481
Display and Control Circuit Card Assembly	A6A1	SM-D-986489
Bottom Panel Assembly	A7	SM-D-882483-1
Chassis Assembly	A8	SM-D-986475



EL9EN003

Figure 1-3. Encoder-Decoder Rear View
1-5

b. Plug-In-Circuit Card Assembly (CCA) Features. Plug-in-circuit card assemblies A1 through A3 perform the encoding and decoding functions. The plug-in power supply circuit card assembly A4 provides the plus and minus five-volt supplies.

g. Front Panel Assembly Features. The front panel assembly contains all controls and indicators for operating and testing the encoder-decoder. The fuseholder with blown fuse indicator is also located on the front panel assembly. Controls and indicators are listed in table 2-1. The display and control circuit card assembly is attached to the back of the front panel assembly. The front panel assembly is hinged at the bottom to allow access to the display and control circuit card assembly, and the four plug-in-circuit card assemblies. The plug-in-circuit card assemblies are removed through the front.

d. Connector Features. The input/output connectors (A5A1J5 and A5A1J6) and the monitor connector (A5A1J7) are mounted on the backplane circuit card assembly which is part of the rear panel assembly (figure 1-3). The two I/O connectors are identical which allow either to be connected to the modem. The backplane circuit card assembly contains the four receptacles (A5A1J1 through A5A1J4) for the plug-in-circuit card assemblies. The power connector A5A1J13 is mounted on the rear panel assembly.

e. Bottom Panel Assembly Features. The electronic signal is located on the bottom panel assembly. Discrete parts associated with the power supply, i.e., the power transformer, power inductor, filter capacitor A7C1, and diodes A7CR1, A7CR2, and A7CR4 are also located on the bottom panel assembly as well as A7CR3 and A7C2 for the 28 Vdc fan circuit. Fuse clips, for a spare fuse, are located on the bottom panel assembly.

1-11. Equipment Data

Equipment data and technical characteristics are listed and defined in table 1-4.

1-12. Encoder-Decoder Interface

Interface signals are differentially driven with balanced current 75107/75109 line receiver/driver characteristics, with the exception of the 2 remote mode control lines, which are TTL compatible, either open-collector, or active pull-up.

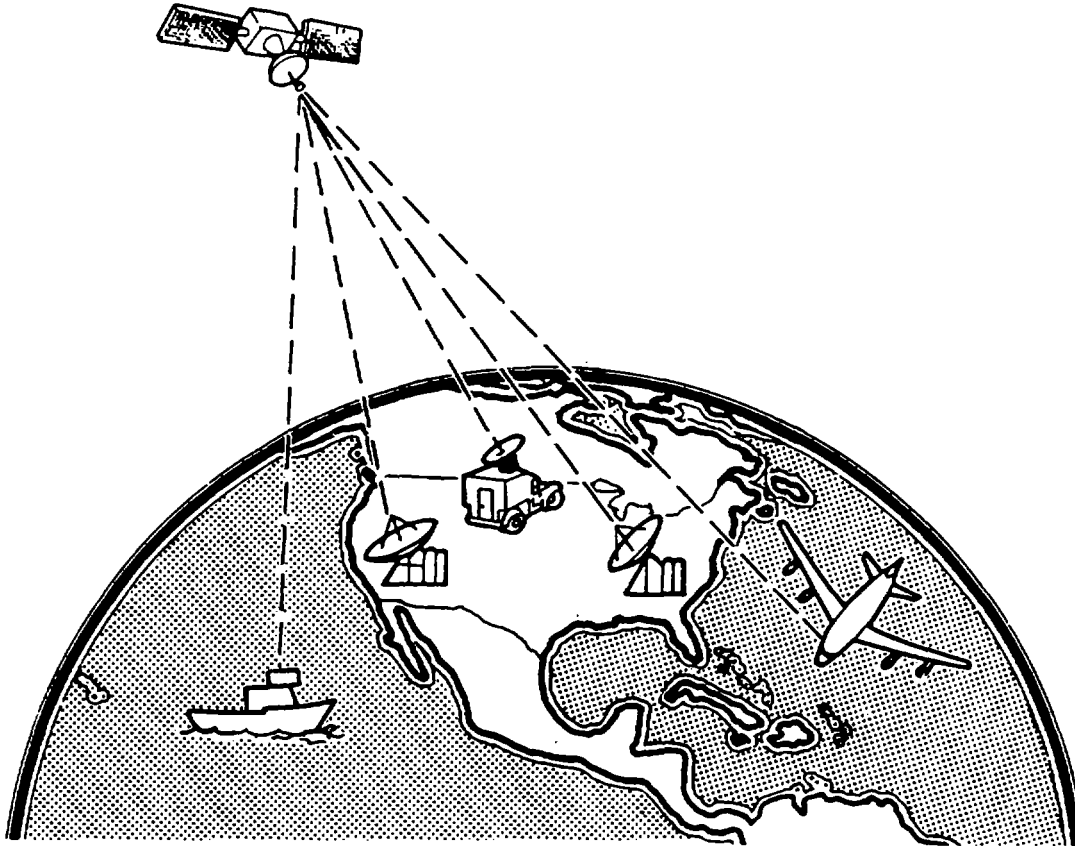
Table 1-4. Equipment Data and Technical Characteristics

Data/Condition	Characteristic/Requirement
PHYSICAL CHARACTERISTICS	
Height	6.859 in.
Width	8.075 in.
Length	20.300 in.
Weight	<30 lb.
POWER REQUIREMENTS	
Prime power voltage	120 Vac +10%
Prime power current	2.5 maximum
Prime power frequency	47 to 420 Hz, single phase
Prime power demand	200W maximum
CONTINUOUS OPERATION	
SERVICE CONDITIONS	
Temperature	320F to 120°F
Relative humidity	5% to 100%
Elevation	Up to 10,000 ft
Tropical conditions	Fungus laden atmosphere
NON-OPERATING CONDITIONS	
Temperature	-65°F to 155°F
Relative humidity	5% to 100%
Elevation	Up to 40,000 ft
Tropical conditions	Fungus laden atmosphere
Vibration, bounce and shock	Military transport methods on rail (hydro-cushion), highways, unimproved roads, and by fixed wing aircraft.
INTERFACE CHARACTERISTICS	
Interface connections between encoder-decoder and modem	782Ω, twisted-pair cables carrying balanced current mode signals. Driver and receiver circuit types and characteristics are: Line driver = SM-A-699713-5 Line-receiver = SM-A-699413-4
Clock signals	Nominally one and zero for equal periods of time
DATA RATE CAPABILITY	
Mode A	Any data rate from 75 bps to 100 kbps
Mode B	Continuous >75-100 kbs
Mode C	75x2 bps (N=0,1,2...7) also 4 kbps and 8 kbps

Section III. PRINCIPLES OF OPERATION

1-13. General Theory

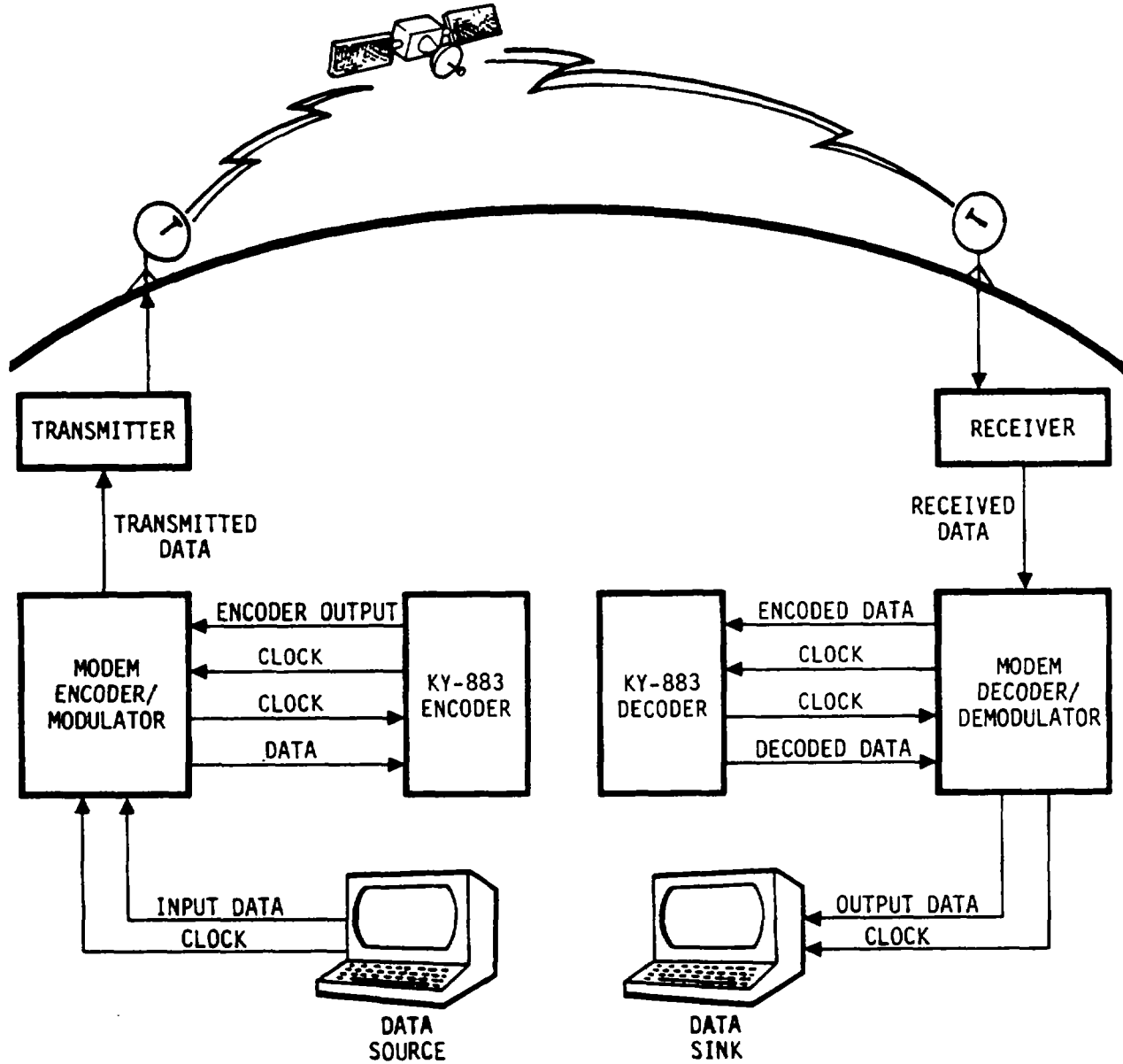
a. Communications Links Overview. Various satellite communications links are shown in figure 1-4. Each surface vehicle, airplane, ship or ground station has a computer, teletype unit, or other similar device that uses and creates binary data in the course of talking to other similar devices that could be anywhere in the world. These devices are linked together by several means, including the satellite links. Normally, the purpose of the encoder-decoder is to provide coding and decoding functions that improve the reliability of digital data transmissions over the communications link (Mode A). The encoder-decoder can also protect a communications channel when an enemy is attempting to jam communications (Mode B) and when signal outages occur while ships in the communications channel switch their antennas (Mode C).



EL9EN007

Figure 1-4. Satellite Communications
1-8

b. Encoder-Decoder Application-Characteristics. As shown in figure 1-5, two encoder-decoders are needed to complete a satellite communications link. The encoder portion of the modem accepts data from the data source, conditions the data, and then sends the data to the KY-883 encoder at the transmit end of the link. The convolutional encoder adds redundancy to the data stream. Additionally, the encoded data is interleaved to provide the necessary burst error protection. At the receive end, the KY-883 decoder uses this redundancy to correct almost all errors that were introduced by the channel.



EL9EN008

Figure 1-5. Satellite Communications Link

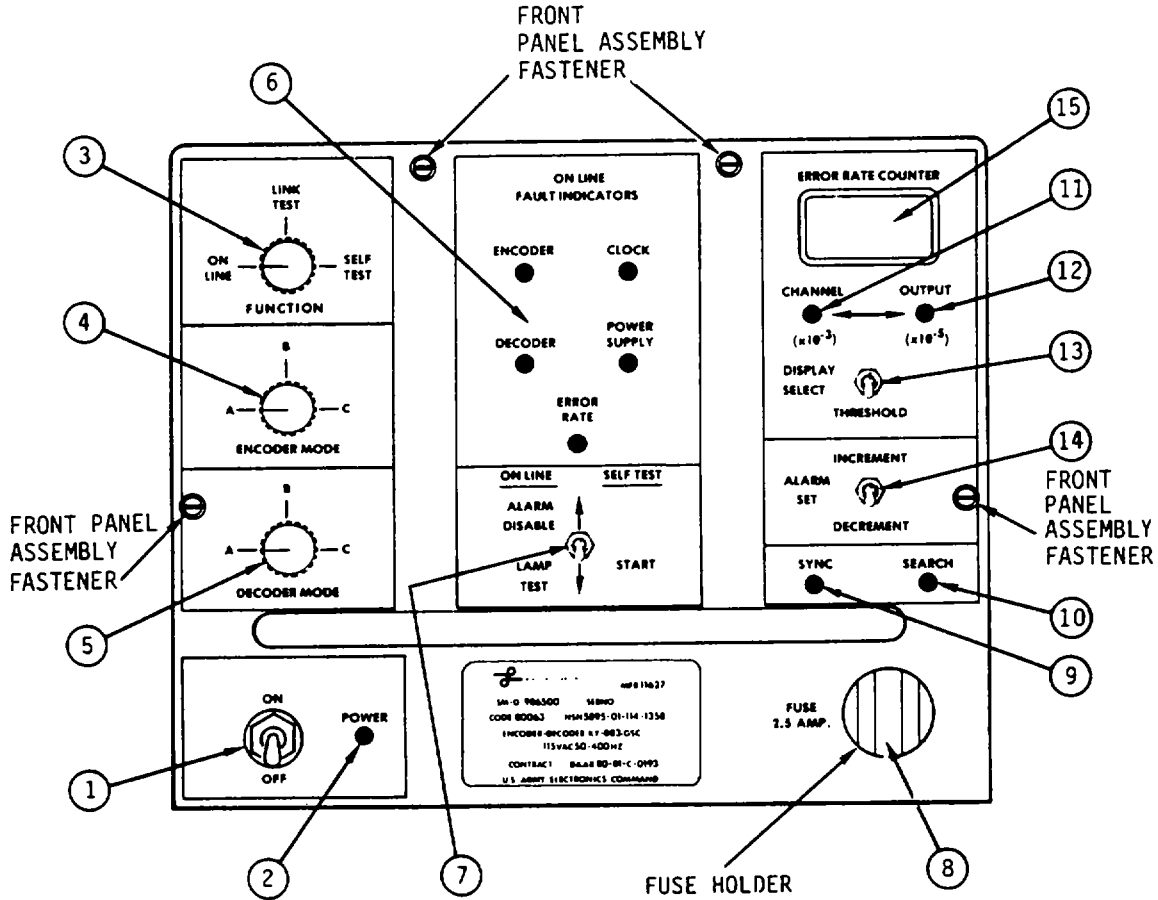
CHAPTER 2

OPERATING INSTRUCTIONS

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

2-1. General

This section tells you the purpose and function of your encoder decoder controls and indicators. How you use these controls and indicators is explained in Operation Under Usual Conditions, section IV of this chapter. Do not try to use the encoder-decoder until you fully understand this section and the Operation Under Usual Conditions section.



EL9EN002

Figure 2-1. Encoder-Decoder Front Panel Assembly
2-1

Table 2-1. Controls and Indicators

Item No.	Control/Indicator	Function
1	ON/OFF switch	Turns the encoder-decoder ON and OFF.
2	POWER indicator	Tells you if the encoder-decoder is on or off. If the POWER indicator is off, the encoder-decoder is off.
3	FUNCTION select switch ON LINE LINK TEST SELF TEST	Selects the function you want the encoder-decoder to perform. Put the FUNCTION select switch in the ON LINE position for normal operation. Put the FUNCTION select switch in the LINK TEST position when you want to run the link test Put the FUNCTION select switch in the SELF TEST position when you want to run the off-line self-test
4	ENCODER MODE select switch A B C	Selects the mode of operation in which you want the encoder to operate. Put the ENCODER MODE select switch in the A position (rate 1/2) when you are operating in a satellite communications link with no with no threat of pulse jamming or antenna outage. This is the normal mode of operation. i Put the ENCODER MODE select switch the B position (rate 1/4) when you are operating in a satellite communications link that is being pulse jammed Put the ENCODER MODE select switch in the C position (rate 1/4) when you are operating in a satellite communications link where antenna possible.
5	DECODER MODE select switch A	Selects the mode of operation in which you want the decoder to operate Put the DECODER MODE select switch in the A position when you are operating in a satellite communications link with no threat of pulse jamming or antenna outage This is the normal mode of operation

Table 2-1. Controls and Indicators-Continued

Item No.	Control/Indicator	Function
6	<p>B</p> <p>C</p> <p>ON LINE FAULT INDICATORS</p> <p>ENCODER DECODER ERROR RATE CLOCK POWER SUPPLY</p>	<p>Put the DECODER MODE select switch in the B position when you are operating in a satellite communications link that is being pulse jammed.</p> <p>Put the DECODER MODE select switch in the C position when you are operating in a satellite communications link where antenna switching is possible.</p> <p>Tells you if a problem was found during the on-line self-test that runs automatically during normal operation. If any of these indicators are on during normal operation, notify the next higher level of maintenance. The electronic signal will also sound if an ON LINE FAULT INDICATOR comes on.</p>
7	<p>ON LINE/SELF TEST switch</p>	<p>When the FUNCTION select switch is in the ON LINE position, this three position, normally, disable the electronic signal if it sounds because the error rate exceeds the alarm threshold you set, or test all the indicators on the encoder-decoder front panel assembly.</p> <p>To operate normally, leave the ON LINE/SELF TEST switch in the center position.</p> <p>To disable the electronic signal (turn it off once it sounds) put the ON LINE/SELF TEST switch in the up position. The ON LINE/SELF TEST switch will return to the center position when you let go. The electronic signal will go off.</p> <p>To test all the indicators on the encoder-decoder, put the ON LINE/SELF TEST switch in the down position. The ON LINE/SELF TEST switch will return to the center position when you release it. All the indicators on the encoder-decoder should come on while the switch is held down.</p>

Table 2-1. Controls and Indicators-Continued

Item No.	Control/Indicator	Function
8	Blown fuse indicator	<p>When the FUNCTION select switch is in the SELF TEST position, the ON LINE/SELF TEST switch lets you start the off-line self-test.</p> <p>To start the off-line self-test, put the ON LINE/SELF TEST switch in the down position. The ON LINE/SELF TEST switch will return to the center position when you release it and the off-line self-test will run.</p> <p>The blown fuse indicator in the fuse holder cap lights up when the fuse is blown.</p>
9	Decoder status indicators	<p>The decoder status indicators tell you the status of the decoder portion of the encoder-decoder.</p>
10	SEARCH indicator	<p>When the SYNC indicator is on, it tells you that the decoder is in sync with the incoming signal.</p> <p>When the SEARCH indicator is on, it tells you that the decoder is not in sync with the incoming signal and is searching for it.</p>
11	Error rate select indicators CHANNEL (x103) indicator	<p>Tells you which error rate is currently shown in the ERROR RATE COUNTER.</p> <p>When the CHANNEL (x10) indicator is on, the ERROR RATE COUNTER is showing you either the channel error rate or the channel error rate alarm threshold, depending on the position of the error rate DISPLAY SELECT switch.</p>
12	OUTPUT (x10 ⁵) indicator	<p>When the OUTPUT (x10⁵) indicator is on, the ERROR RATE COUNTER is showing you the decoder output error rate or the decoder output error rate alarm threshold, depending on the position of the error rate DISPLAY SELECT switch. The decoder output error rate or the decoder output error rate alarm threshold can only be displayed when the FUNCTION select switch is in the LINK TEST position.</p>

Table 2-1. Controls and Indicators-Continued

Item No.	Control/Indicator	Function
13	Error rate DISPLAY SELECT switch	<p>The error rate DISPLAY SELECT switch lets you select the error rate you want displayed on the ERROR RATE COUNTER. You may select either the channel error rate, the channel error rate alarm threshold, the output error rate, or the output error rate alarm threshold depending on the position of the FUNCTION select switch. The output error rate and output error rate alarm threshold can only be selected when the FUNCTION select switch is in the LINK TEST position. The channel error rate and the channel error rate alarm threshold can be selected when the FUNCTION select switch is in either the ON LINE position or the LINK TEST position.</p>
14	ALARM SET switch	<p>The ALARM SET switch lets you set the channel error rate alarm threshold or the output error rate alarm threshold depending on the position of the FUNCTION select switch and the state of the error rate select indicators.</p>
15	ERROR RATE COUNTER	<p>The ERROR RATE COUNTER shows you the channel error rate, the channel error rate alarm threshold, the output error rate, the output self-test and the cause of a failure in the off-line self-test. The information you see on the ERROR RATE COUNTER depends on the position you set on the FUNCTION select switch, the error rate DISPLAY SELECT switch, and the state of the error rate select indicators.</p> <p>If the encoder-decoder is being remotely controlled the ERROR RATE COUNTER will display "REM" every 30 seconds and the front panel controls are disabled except for the ON/OFF switch.</p>

Section II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-2. General

- a. To be sure that the encoder-decoder is always ready for use, you must do scheduled PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).
- b. Before you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your B PMCS.
- c. While you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your D PMCS.
- d. Weekly. Be sure to perform your W PMCS.
- e. If the encoder-decoder fails to operate. Report any deficiencies using the proper forms. See TM 38-750.
- f. Table 2-2 lists and describes the preventive maintenance checks and services you are to do. The ITEM NO. column in your PMCS chart lists the order in which the checks and services are to be done. The INTERVAL column in your PMCS chart tells you when and how often to do the checks and services. The ITEM TO BE INSPECTED column in your PMCS chart lists the part of the equipment on which PMCS is to be performed. The PROCEDURES column in your PMCS chart tells you to "CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY." Carefully follow these instructions, and remember, you are NOT authorized to open up the encoder-decoder to make adjustments or PMCS. The EQUIPMENT IS NOT READY/AVAILABLE IF column in your PMCS chart tells you when the encoder-decoder is not ready/available for use. Notify a higher category of maintenance if you can't fix the problem or if your PMCS chart tells you the encoder-decoder is not ready/available for use.

2-3. Use of DA FORM 2404 with PMCS

You must fill out an Equipment Inspection and Maintenance Worksheet (DA Form 2404) when a problem is found while you are doing PMCS. Use the number in the ITEM NO. column in your PMCS as the number for the TM ITEM NO. column on DA Form 2404. The heading and other columns on DA Form 2404 should be filled out following the instructions in TM 38-750, The Army Maintenance Management System (TAMMS) and the special instructions from your commander.

Section III. OPERATION UNDER USUAL CONDITIONS

2-4. Assembly and Preparation for Use

A. Unpacking. The encoder-decoder is packed in a fiberboard container surrounded by two preformed plastic foam cushions; one in the bottom of the fiberboard container, and one on the top of the fiberboard container. The upper plastic foam cushion contains a recess for the Operator's, Organizational, and Direct Support Maintenance Manual. To remove the encoder-decoder from the cartons, proceed as follows:

Table 2-2. Operator Preventive Maintenance Checks and Services

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down. Within the designated interval, these checks are to be performed in the order listed.

B-Before		D-During		W-Weekly
Item No.	Interval B D W	Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available if:
1	•	Encoder-Decoder	Perform off-line self-test (paragraph 2-6B.)	Encoder-decoder doesnotpass off-line self-test
2	•	Encoder-Decoder	Clean the outside of the encoder-decoder with a clean, soft, lint-free cloth. Clean the areas around switches and indicators with a soft brush. To remove grease,	

Table 2-2. Operator Preventive Maintenance Checks and Services-Continued

B-Before

D-During

W-Weekly

Item No.	Interval B D W	Item to be Inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available if:
			fungus, or corrosion, use a cloth dampened in Freon Type TF, item 2, App. E. <p style="text-align: center;">CAUTION</p> Do not let the Freon Type TF get into the switches or indicators.	
3	•	Knobs and switches	Check the knobs and switches for smooth operation.	Knobs or switches do not work smoothly.
4	•	Lamps	Put the ON LINE/SELF TEST switch in the LAMP TEST position. Check to see all indicators turn on	One or more indicators will not turn on.
5	•	Fan	Check the fan for operation by feeling for air flow	The fan is not operating
6	• •	Encoder-Decoder and Cables	Check the encoder-decoder and cables to see that they are in good general condition (broken knobs, cabinet dents, twisted or kinked cables).	
7	• •	Cables and Connectors	Check the cables between equipment for cracks Hand-tighten all connectors	
8	• •	Mounting	Check the encoder-decoder mounting. Check the front panel assembly fasteners. Hand-tighten as necessary.	

CAUTION

When cutting the tape on the fiberboard container, do not allow the cutting tool to penetrate the container and damage the encoder-decoder or the manual.

- (1) Observing the caution above, cut or tear the sealing tape from the top of the fiberboard container.
- (2) Open the fiberboard container and remove the upper plastic foam cushion.
- (3) Remove the Operator's, Organizational, and Direct Support Maintenance Manual and the encoder-decoder from the fiber-board container. If the encoder-decoder is not to be inspected immediately, store the encoder-decoder and the Operator's, Organizational, and Direct Support Maintenance Manual in a safe, clean, dry place pending inspection. To repack equipment for shipment or limited storage, reverse the preceding instructions.

b. Checking Unpacked equipment. After unpacking the equipment, the encoder-decoder should be checked according to the following procedures:

- (1) Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report as directed in paragraph 1-3.
- (2) Check the equipment against the packing list shipped with the equipment to see if the shipment is complete. Report all discrepancies in accordance with the instructions in paragraph 1-3.
- (3) Check to see whether the equipment has been modified. Equipment which has been modified will have the MWO number near the nomenclature plate. Check also to see whether all currently applicable MWOs have been applied. MWOs applicable to the equipment are listed in DA Pam 310-1.

c. Tools, Test Equipment, and Materials Required for Installation. Tools required for installation of the encoder-decoder are contained in Tool Kit, Electronic Equipment TK-100/G (NSN 5180-00-605-0079). No test equipment is required for installation of the equipment.

d. Installation Instructions. Mount the encoder-decoder in its assigned position in accordance with the specific installation instructions for the shelter or vehicle in which it is to be used.

2-5. External Connections

The reference designations, titles, and mating connectors for each interface connector are listed in table 2-3.

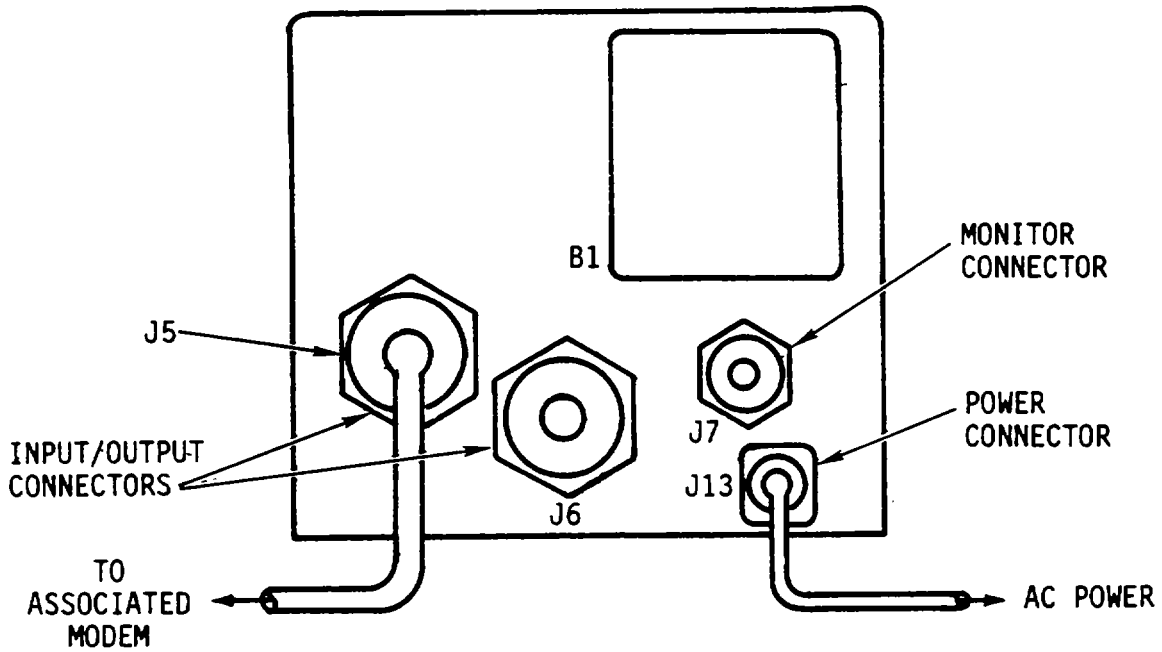
Table 2-3. Encoder-Decoder External Connectors

Reference Designation	Title	Mating Connector
A5AIJ5 (BT07A24-61SWH45)	Input/Output	MS3126F24-61PW
A5A1J6 (BT07A24-61SWH45)	Input/Output	MS3126F24-61PW
A5A1J7 (BT07A16-26SH45)	Monitor	MS3126F16-26P
A5J13 (BT02A12-3P or MS33112E12-3P)	AC Power	BT06EC12-3S or MS3116F12-3S

CAUTION

To avoid damage to the internal circuits in the encoder-decoder, be sure the ON/OFF switch is in the OFF position when connecting the ac power source.

- a. **Power Connections (figure 2-2).** After the encoder-decoder is installed in its assigned position, connect the ac power cord to A5J13 on the rear panel assembly and the ac power source.



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Figure 2-2. Signal Connections for Normal Operation

b. Signal Connections for Normal Operation (figure 2-2). Connect the modem's input/output (I/O) cable assembly to either A5A1J5 or A5A1J6 on the rear panel assembly of the encoder-decoder. (A5A1J5 and A5A1J6 are wired in parallel so that either can be used.) The signals and their pin connections for the input/output connectors are listed in table 2-4.

Table 2-4. Interface Cable Signal List

Pin Letter A5AIJ5,A5AIJ6	Signal	Description
A	+	ENC DATA Transmit data to encoder
B	-	
C	Shield	
D	+	ENC R CLK R clock to encoder
d	Shield	
E	+	ENC 2R CLK 2R clock to encoder
f	-	
e	Shield	ENC I DATA Transmit symbols (Serial or I) from encoder
F	+	
G	-	ENC S CLK 4R clock from encoder in modes B and C or 2R clock from encoder in mode A
g	Shield	
L	+	I SGN Receive symbols (Serial or I Channel) Sign Bit to decoder
M	-	
k	Shield	I MSB Receive symbols (Serial or I Channel) most significant bit (MSB) to decoder
N	+	
P	-	I LSB Receive symbols (Serial or I Channel) least significant bit (LSB) to decoder
m	Shield	
R	+	DEC S CLK 4R clock to decoder in modes B and C or 2R clock to decoder in mode A
p	Shield	
n	+	DEC DATA Decoded receive data from decoder
S	-	
T	Shield	DEC R CLK R clock from decoder
q	+	
v	Shield	CH ER Channel errors from decoder
w	+	
HH	Shield	
JJ	+	
x	-	
Y	Shield	
KK	+	
z	Shield	
AA	+	
BB	-	
CC	Shield	
LL	Shield	

Table 2-4. Interface Cable Signal List-Continued

Pin Letter A5AIJ5,ASAIJ6	Signal	Description
FF	+	Decoder Sync
GG	-	
t	Shield	
H	Spare	
J	Spare	
U	Spare	
V	Spare	
Y	Spare	
u	Spare	
X	Spare	
W	Spare	
h	Ground	
K	Not used	
i	Not used	
i	Ground	
r	Ground	
s	Ground	
Z	Not used	
b	Not used	
a	Ground	
DD	Not used	
EE	Not used	
MM	Ground	
NN	Not used	
PP	Ground	

c. **Monitor Connector A5A1J7 (figure 2-2).** A monitor connector A5A1J7 is provided on the rear panel assembly for remote control operation and for interface with external monitoring systems. The logic levels of the monitor signals are as follows:

Driver Outputs

- Logic zero 0 to +0.4 Vdc
- Logic one +2.4 to +5.5 Vdc

Receiver Inputs

- Logic zero 0 to +0.8 Vdc
- Logic one +2.0 to 5.5 Vdc or open circuit

(1) All signals are provided with transistor-transistor logic (TTL) levels, with the exception of the contact closure which is either an open circuit (no fault condition) or a short circuit (malfunction conditions). (2) The signals and their pin connections for the monitor connector are listed in table 2-5.

Table 2-5. Monitor Connector A5A1J7 Signal List

A5A1J7 Pin Letter	Signal	Description
A	RELAY	Relay closure indicates failure
B	RMD SW1 (E)	MSB of Encoder Remote Mode Control
C	CHAN ERRS	Channel Errors
D	Not used	
E	RMD SW1 (D)	MSB of Decoder Remote Mode Control
F	Not used	
G	GND	Ground
H	BCD 1, 0	Error Counter Most Significant Digit, Bit 0
J	BCD 2, 0	Error Counter Second Digit, Bit 0
K	BCD 1, 3	Error Counter Most Significant Digit, Bit 3
L	BCD 3, 2	Error Counter Least Significant Digit, BIT 2
M	BCD 2, 2	Error Counter Second Digit, Bit 2
N	BCD 3, 1	Error Counter Least Significant Digit, Bit 1
P	DEC SYNC	Decoder Synchronization Status
R	Spare	
S	Not used	
T	RMD SWO (E)	LSB of Encoder Remote Mode
U	RMD SWO (D)	LSB of Decoder Remote Mode Control
V	MAN/REM	Manual/Remote Control
W	GND	Ground
X	BCD 2, 1	Error Counter Second Digit, Bit 1
Y	BCD 1, 1	Error Counter Most Significant Digit, Bit 1
Z	BCD 3, 0	Error Counter Least Significant Digit, Bit 0
<u>a</u>	BCD 3, 3	Error Counter Least Significant Digit, Bit 3
<u>b</u>	BCD 2, 3	Error Counter Second Digit, Bit 3
<u>c</u>	BCD 1, 2	Error Counter Most Significant Digit, Bit 3

2-6. Self Tests

Self-test procedures should be performed daily before operating the encoder-decoder to make sure the encoder-decoder is operating properly. Self-tests should also be performed when a problem is discovered during operation. The self-tests consist of four individual tests: on-line self-test, off-line self-test, lamp test, and link test.

a. On-Line Self-Test. The on-line self-test monitors the performance of the encoder-decoder during normal operation and requires no operator action. The on-line self-test indicates a problem by turning on one or more of the ON LINE FAULT INDICATORS and sounding the electronic signal. If this condition happens during operation, the off-line self-test should be run to find the problem area.

(1) The static on-line self-test monitors the output of the power supply and the presence of an over-voltage, low line voltage, high temperature or excess current condition. Any one of these conditions causes the POWER SUPPLY on-line fault indicator to come on.

(2) The on-line dynamic test circuits consist of the following:

- (a) K=2 and K=8 encoder fault detectors, which turn on the associated ON LINE FAULT INDICATOR, when a transmit fault is found.
- (b) Viterbi and feedback decoder fault detectors, which turn on the associated ON LINE FAULT INDICATOR, when a receive fault is found.
- (c) Interleaver and de-interleaver fault detectors, which turn on the associated ON LINE FAULT INDICATOR, when a fault is found.
- (d) Clock fault detector which turns on the associated fault indicator when the encoder or decoder input clock signal is interrupted.

h. Off-Line Self-Test. The off-line self-test is used to make sure the encoder-decoder is operating properly and to help locate problem areas in the encoder-decoder. The off-line self-test isolates problems to the circuit card assembly level. The off-line self-test should be run daily before operation to make sure the encoder-decoder is operating properly. If the encoder-decoder must be kept in continuous operation, run this test only when the equipment can be shut down without interrupting the communications link. The off-line self-test can be run with the ENCODER or DECODER MODE select switches in any position.

CAUTION

Performing the off-line self-test on the encoder-decoder will interrupt digital user communication on either link, transmit or receive.

- (1) To run the off-line self-test, do the following steps in order:
 - (a) Put the ON/OFF switch in the ON position.
 - (b) Put the FUNCTION select switch in the SELF TEST position.
 - (c) Put the ON LINE/SELF TEST switch in the START position (down). While holding the switch down notice that all indicators come on. When you let the switch go, it will return to the center position and the off-line self-test will start.
- (2) The off-line self-test runs 19 individual tests. The test numbers and their functions are listed in table 2-6.

Table 2-6. Off-Line Self-Test

Test Number	Function
T01	Initialization
T02	Ram Test
T03	Prom Test
T04	Encoder Output Test
T05	Interleaver Output Test
T06	Encoder SEnable/4 Test
T07	Channel Output Test
T08	Deinterleaver Output Test
T09	Decoder Output Test
T10	Feedback Decoder/Deinterleaver Test
T11	Normalize/Threshold/Channel Error Test
T12	Error Rate Counter Test
T13	Data Rate Ranger Test
T14	On-Line Fault Detection Test
T15	Time-Out Counter Test
T16	Power Supply Test
T17	Display and Control Test
T18	Mode C Errors
T19	Operator Interface Test

- (3) As each of the 19 individual tests begin, the ERROR RATE COUNTER shows you the test number that is being run by displaying T01 through T19. The 19 tests run in order, one after the other until T19 is shown on the ERROR RATE COUNTER or until a problem is found.
- (4) If a problem is found, NGO is shown on the ERROR RATE COUNTER for 5 seconds followed by BDn where n represents the number of the bad circuit card assembly as follows:

<u>Display</u>	<u>Circuit Card</u>
BD1	Decoder Plug-In-Circuit Card Assembly
BD2	Interleaver Plug-In-Circuit Card Assembly
BD3	I/O Plug-In-Circuit Card Assembly
BD4	Power Supply Plug-In-Circuit Card Assembly
BD5	Display and Control Circuit Card Assembly

- (5) The electronic signal may sound and an ON LINE FAULT INDICATOR may come on, depending on the cause of the problem. The off-line self-test stops at this point with the bad circuit card assembly number displayed on the ERROR RATE COUNTER.
- (6) If no problem is found the off-line self-test runs until T19 is displayed on the ERROR RATE COUNTER. At this point you can check all the switches on the front panel assembly except the FUNCTION select switch and the ON/OFF switch, or you can let the off-line self-test run indefinitely.
- (7) If you want to check the front panel assembly switches, you have 5 seconds from the time T19 is displayed on the ERROR RATE COUNTER to change the position of a front panel assembly switch. The ERROR RATE COUNTER displays the number of the switch you changed and the position you changed it to. Table 2-7 shows the ERROR RATE COUNTER display for the individual front panel assembly switches and their positions.

Table 2-7. ERROR RATE COUNTER Display

Switch Name	Switch Number	Switch Position	Display
ENCODER MODE select switch	1	A	1L
		B	1U
		C	1R
DECODER MODE select switch	2	A	2L
		B	2U
		C	2R
ALARM SET switch	4	INCREMENT (up)	4U
		center	4C
		DECREMENT (down)	4D
error rate DISPLAY SELECT switch	5	up	5U
		center	5C
		THRESHOLD (down)	5D
ON LINE/SELF TEST switch	3	ALARM DISABLE (up)	3U
		center	3C
		LAMP TEST (down)	3D*

*Changing the ON LINE/SELF TEST switch to the LAMP TEST position (down) during the operator interface test portion of the off-line self-test causes the off-line self-test to start over from the beginning.

- (8) If you see a display on the ERROR RATE COUNTER other than the display shown in table 2-7, notify the next higher level of maintenance.
- (9) You can check as many of the front panel assembly switches as you want during this part of the off-line self-test. However, you must change switch positions at least once every five seconds, or this portion of the test will end. Changing the ON LINE/SELF TEST switch to the LAMP TEST position (down) causes the off-line self-test to start over from the beginning.
- (10) If you do not want to check the front panel assembly switches, do nothing. The off-line self-test will continue indefinitely.
- (11) If the off-line self-test finishes without finding a problem, the ERROR RATE COUNTER will show GO for five seconds and the off-line self-test will start again from the beginning. The off-line self-test will run continuously until a problem is found or until you change the position of the FUNCTION select switch.

c. Lamp Test. The lamp test checks all the indicators on the front panel assembly. To run the lamp test, put the FUNCTION select switch in the ON LINE position and the ON/OFF switch in the ON position. Put the ON LINE/SELF TEST switch in the down position and hold it there. All the indicators on the front panel assembly should come on while the ON LINE/SELF TEST switch is held down. If an indicator does not come on notify the next higher level of maintenance. The ON LINE/SELF TEST switch will return to the center position when you release it. The lamp test can be run without interrupting the communications link.

d. Link Test. The link test checks the quality of the communications link from end to end by sending a known internally generated data sequence from the transmit end of the communications link to the receive end of the communications link. The data sequence received at the receive end of the communications link is compared bit for bit with the known data sequence that was transmitted. Detected channel or output errors are shown on the ERROR RATE COUNTER. To run the link test, do the following steps in order:

- (1) Set the FUNCTION select switch to the LINK TEST position.
- (2) Toggle upward and release the error rate DISPLAY SELECT switch to turn on the error rate select indicator that corresponds to the error rate you want to measure, CHANNEL (X10-) or OUTPUT (X10-). The error rate DISPLAY SELECT switch will return to the center position when you release it.
- (3) The coded error rate is shown on the ERROR RATE COUNTER. When measuring the channel error rate, multiply the value shown on the ERROR RATE COUNTER by 0.001 (10-). When measuring the output error rate, multiply the value shown on the ERROR RATE COUNTER by 0.00001 (10-). The result of this multiplication is the error rate. If the ERROR RATE COUNTER shows 999, when measuring output errors, the equipment is defective and the next higher level of

maintenance should be notified. If the error rate you are measuring exceeds the error rate threshold you set (paragraph 2-7), the electronic signal will sound.

2-7. Setting and Displaying the Error Rate Alarm Threshold

The encoder-decoder has one error rate alarm threshold. The value you set for this alarm threshold is used for monitoring both the channel error rate and the output error rate. When the error rate being measured by the encoder-decoder goes over the threshold you set, the electronic signal will sound. The output error rate alarm threshold can only be set or displayed when the FUNCTION select switch is in the LINK TEST position. The channel error rate alarm threshold can be set or displayed when the FUNCTION select switch is in either the ON LINE or the LINK TEST position. The threshold value you set should be selected according to the communications link you are using. The error rate alarm threshold can be set from 1 to 100 in increments of 1, and from 100 to 990 in increments of 10, as described in paragraph 2-7 b.

NOTE

When you set the error rate alarm threshold, it is done for both channel and output error rates.

- a. Displaying the Error Rate Alarm Threshold. To display the error rate alarm threshold, toggle the error rate DISPLAY SELECT switch down to the THRESHOLD position. The error rate alarm threshold will be shown on the ERROR RATE COUNTER as long as you hold the error rate DISPLAY SELECT switch in the THRESHOLD position. The error rate DISPLAY SELECT switch will return to the center position when you release it.
- b. Setting the Error Rate Alarm Threshold. To set the error rate alarm threshold to the selected value, toggle the ALARM SET switch up to the INCREMENT position to raise the error rate alarm threshold twice per second; or down to the DECREMENT position to lower the error rate alarm threshold 8 times per second. When the ALARM SET switch is toggled either up or down the current error rate alarm threshold is displayed for a second before the threshold is raised or lowered. The ALARM SET switch will return to the center position when you release it.

2-8. Operating Procedures

After completion of the installation procedures, the encoder-decoder is ready for operation. The encoder-decoder can be used for simplex or full duplex link communication in one of three modes: normal (Mode A), stressed (Mode B), or antenna outage (Mode C). The operating procedure for the normal operating mode is described in the following paragraph. The operating procedures for the stressed and antenna outage modes are described in Section IV, Operation Under Unusual Conditions.

a. Mode A (Normal Communications). When you are operating in a satellite communications link where no threat of pulse jamming or antenna outage exists, set the controls on your encoder-decoder as shown in table 2-8. If your encoder-decoder is located at the transmit end of the communications link, the ENCODER MODE select switch should be set to the A position. If your encoder-decoder is located at the receive end of the communication link, the DECODER MODE select switch should be set to the A position. If you are transmitting and receiving information, both the ENCODER MODE select switch and the DECODER MODE SELECT switch should be set to the A position. For proper operation, the encoder-decoder at the transmit end of the communications link must have the ENCODER MODE select switch set to the A position and the encoder-decoder at the receive end of the communications link must have the DECODER MODE select switch set to the A position.

Table 2-8. Mode A Switch Settings

Switch	Setting	Indicator	Required Indication
FUNCTION select	ON LINE	POWER ON LINE FAULT INDICATORS (all) SYNC	On
ENCODER MODE select	A		Off*
DECODER MODE select	A		On
ON/OFF	ON		On
		CHANNEL (x10 ³) OUTPUT (x10 ⁻⁵)	On
		SEARCH	Off
		ERROR RATE COUNTER	Off
			Channel Error Rate

*If any of these indicators is on, inform the next higher level of maintenance.

b. Test Operation. The encoder-decoder can also be used for checking the quality of the communications link from end to end (Link Test) and for checking the operation of the encoder-decoder (Self Test). The operating procedures for these tests are described in paragraph 2-6.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-9. Mode B (Stressed Mode)

When you are operating in a satellite communications link that is being pulse jammed, set the controls on your encoder-decoder as shown in table 2-9. If your encoder-decoder is located at the transmit end 4. of the communications link, the ENCODER MODE select switch should be set to the B position. If your encoder-decoder is located at the receive end of the communications link, the DECODER MODE select switch should be set to the B position. If you are transmitting and receiving information, both the ENCODER MODE select switch and the DECODER MODE select switch should be set to the B position. For proper operation, the encoder-decoder at the transmit end of the communications link must have the ENCODER MODE select switch set to the B position and the encoder-decoder at the receive end of the communications link must have the DECODER MODE select switch set to the B position.

Table 2-9. Mode B Switch Settings

Switch	Setting	Indicator	Required Indication
FUNCTION select	ON LINE	POWER ON LINE FAULT INDICATORS (all) SYNC CHANNEL (x103) OUTPUT (x10- 5) SEARCH ERROR RATE COUNTER	On
ENCODER MODE select	B		Off*
DECODER MODE select	B		On
ON/OFF	ON		On
			Off
			Off
			Off
			Channel Error Rate

*If any of these indicators is on, inform the next higher level of maintenance.

2-10. Mode C (Antenna Outage Mode)

When you are operating in a satellite communications link where antenna switching is possible, set the controls on your encoder- decoder as shown in table 2-10. If your encoder-decoder is located at the transmit end of the communications link, the ENCODER MODE select switch should be set to the C position. If your encoder-decoder is located at the receive end of the communications link, the DECODER MODE select switch should be set to the C position. If you are transmitting and receiving information, both the ENCODER MODE select switch and the DECODER MODE select switch should be set to the C position. For proper operation, the encoder-decoder at the transmit end of the communications link must have the ENCODER MODE Select switch set to the C position and the encoder-decoder at the receive end of the communications link must have the DECODER MODE select switch set to the C position.

Table 2-10. Mode C Switch Settings

Switch	Setting	Indicator	Required Indication
FUNCTION select	ON LINE	POWER ON LINE FAULT INDICATORS (all)	On
ENCODER MODE select	C		Off*
DECODER MODE select	C		On
ON/OFF	ON		On
		CHANNEL (x10 ³)	On
		OUTPUT (x10 ⁻⁵)	Off
		SEARCH	Off
		ERROR RATE	Channel Error
		COUNTER	Rate

*If any of these indicators is on, inform the next higher level of maintenance.

CHAPTER 3

OPERATOR MAINTENANCE

3-1. General

No maintenance other than Preventive Maintenance Checks and Services (PMCS) is authorized for the operator (table 2-2). Perform your PMCS and report any problems to the next higher level of maintenance.

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CHAPTER 4

ORGANIZATIONAL MAINTENANCE

4-1. Tools and Equipment

The tools required for organizational maintenance are contained in the Tool Kit, Electronic Equipment TK-100/G. The repair parts required to accomplish organizational maintenance are listed in the repair parts and special tools list contained in TM 11-5895-1179-23P * EE132-EA-PLO-010/E106 KY883 * TO 31S1-2GSC-164.

4-2. Touchup Painting

Clean all damaged surfaces of the equipment. Touch up the damaged paint on metal surfaces using final film E, semi-gloss, light gray enamel (per FED-STD-595, Color Chip 26307) conforming to MIL-F-14072. For detailed cleaning and refinishing practices, refer to TB 43-0118. For instructions on the care of painted equipment, refer to TM 43-0139.

4-3. Preventive Maintenance Checks and Services (PMCS)

a. To ensure that the encoder-decoder is always ready for operation, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary organizational preventive maintenance checks and services to be performed are listed and described in tables 4-1 and 4-2. The item numbers indicate the sequence of minimum inspection requirements. Record all deficiencies together with the corrective action taken (paragraph 1-3).

b. Organizational maintenance consists of isolation of faults to plug-in-circuit card assemblies A1 through A4, fuse F1, or connectors; and replacement of plug-in-circuit card assemblies A1 through A4, fuse F1, mode select switch knobs, and FUNCTION select switch knob.

4-4. Troubleshooting

Troubleshooting at the organizational level is based on the self-test functions which are designed to detect a faulty indicator or a fault in any one of the four plug-in-circuit card assemblies (refer to paragraph 2-6). Power supply plug-in-circuit card assembly faults are detected by on-line test circuits. When an ON LINE FAULT INDICATOR, (other than POWER SUPPLY) illuminates, the off-line self-test is to be initiated. This test isolates faults to one of the other three plug-in-circuit card assemblies. At the organizational level the four plug-in-circuit card assemblies and the fuse may be replaced. Symptoms are shown in the troubleshooting chart (table 4-3). If the checks and corrective actions do not correct the fault, notify direct support maintenance.

Table 4-1. Monthly Organizational Preventive Maintenance Checks and Services

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation; make the complete checks and services when the equipment can be shut down.

Sequence Number	Items to be Inspected	Procedure	Paragraph Reference
1	Encoder-Decoder	Check interior surfaces for rust, corrosion, or fungus.	Refer to paragraph 4-2 if rust, corrosion, or fungus is found.
2	Encoder-Decoder	Check that equipment is complete.	Refer to paragraph - 1-3.
3	Encoder-Decoder	Check that equipment is properly installed.	Refer to paragraph - 2-4.
4	Encoder-Decoder and cables Fan assembly	Check fan assembly A5B1 for binding and noisy operation.	Refer to direct support maintenance.
5	Off-line self-test	Perform off-line self-test.	Refer to paragraph - 2-6.
6	ERROR RATE COUNTER optical filter	Check for cracks and excessive discoloration.	Refer to higher level maintenance.
7	Front panel assembly	Check that front panel assembly fasteners tighten, the handle is secure, there are no dents and the front panel assembly is not deeply scratched.	Refer to higher level maintenance.
8	Restraint assembly	Check that the restraint assembly is not broken and is securely fastened.	Refer to higher level maintenance.
9	Clamping block	Check that the clamping block is not deformed and is securely mounted.	Refer to higher level maintenance.
10	Plug-in circuit card assemblies A1-A4	Check that plug-in-circuit card assembly ejectors are not missing or broken.	Refer to higher level maintenance.

Table 4-2. Quarterly Organizational Preventive Maintenance Checks and Services

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation; make the complete checks and services when the equipment can be shut down.

Sequence Number	Items to be Inspected	Procedure	Paragraph Reference
1	All external surfaces	Check and spot paint as necessary	Refer to paragraph 4-2.
2	Publication	Check for completeness and serviceability.	Refer to DA Pam 310-1.
3	Spare parts	Check all spare parts for general condition and method of storage. There should be no evidence of overstock and all requisitions must be valid storages.	TM 11-5895-1179-23P * EE132-EA-PLO-010/E106 KY883 . TO 31S1-2GSC-164.

Table 4-3. Organizational Troubleshooting Chart

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing plug-in-circuit card assemblies.

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	<p>When ON/OFF switch is set to ON, fan does not start and POWER indicator does not illuminate.</p> <p>b. Primary power is absent.</p>	<p>a. Blown fuse FI.</p>	<p>a. Check blown fuse indicator. If illuminated, replace fuse FI (paragraph 4-5). If the fuse blows again replace power supply plug-in-circuit card assembly A4 (paragraph 4-7). If the fuse still blows refer to higher level of maintenance.</p> <p>b. Check connector at source input and cable connection at A5J13 for tightness.</p>
2	<p>When ON/OFF switch is set to ON, POWER indicator does not illuminate but fan starts.</p> <p>b. Defective power supply plug-in-circuit card assembly.</p>	<p>a. Power supply plug-in-circuit card assembly A4 not properly seated.</p> <p>b. Replace power supply plug-in-circuit card assembly A4 (paragraph 4-7).</p>	<p>a. Set ON/OFF switch to OFF. Release the four front panel assembly fasteners and lower the front panel assembly. Reseat power supply plug-in-circuit card assembly A4. Close and secure the front panel assembly. Set ON/OFF switch to ON.</p>

Table 4-3. Organizational Troubleshooting Chart-Continued

Item No.	Symptom	Probable Cause	Checks and Corrective Action
3	POWER indicator is illuminated but other indicators do not illuminate during lamp test.	<p>a. Input/Output plug-in-circuit card assembly A3 not properly seated.</p> <p>b. Defective input/output plug-in-circuit card assembly A3.</p>	<p>a. Set ON/OFF switch to OFF. Release the four front panel assembly fasteners and lower the front panel assembly. Reseat Input/Output plug-in-circuit card assembly A3. Close and secure the front panel assembly. Set ON/OFF switch to ON.</p> <p>b. Replace input/output plug-in-circuit card assembly A3 (paragraph 4-7).</p>
4	Equipment is in on-line operation and POWER SUPPLY fault indicator illuminates.	<p>a. Power supply plug-in-circuit card assembly A4 not properly seated.</p> <p>b. Defective power supply plug-in-circuit card assembly A4.</p>	<p>a. Reseat power supply plug-in-circuit card assembly A4 (see step 2a above).</p> <p>b. Replace power supply plug-in-circuit card assembly A4 (paragraph 4-7).</p>
5	While equipment is in on-line operation, one or more FAULT INDICATORS illuminate. (Other than POWER SUPPLY fault indicator.)	<p>a. Defective plug-in circuit card assembly.</p> <p>b. Error rate alarm threshold set too low.</p>	<p>a. Perform off-line self-test (paragraph 2-6) and replace indicated defective plug-in-circuit card assembly (paragraph 4-7).</p> <p>b. Check error rate alarm threshold for proper setting (paragraph 2-7).</p>

4-5. Replacement of Fuse FI

The fuseholder is mounted on the front panel assembly (figure 2-1). The spare fuse is mounted on the mounting plate (figure 5-5). To replace the fuse FI, proceed as follows:

WARNING

Set ON/OFF switch -to OFF before opening the front panel assembly. When removing the spare fuse use caution to avoid touching the heat sink on the power supply plug-in-circuit card assembly (A4).

- a. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly. Remove the spare fuse from its holder. -Close and secure the front panel assembly. . Remove the fuseholder cap (quarter turn CCW) and pull the defective fuse out of the cap.
- b. Remove the fuseholder cap (quarter turn CCW) and pull the defective fuse out of the cap.
- c. Push the replacement fuse into the fuseholder cap until it seats properly.
- d.. Replace the cap in its receptacle and turn a quarter turn CW to lock.

4-6. Replacement of Mode Select Switch and FUNCTION Select Switch Knobs

To replace the ENCODER MODE select switch knob, the DECODER MODE select switch knob and the FUNCTION select switch knob (figure 2-1), proceed as follows:

- a. Turn the knob to a position for easy access to the knob mounting setscrew (figure 5-3).
- b. Loosen the knob mounting setscrew.
- c. Remove the defective knob and install replacement.
- d. Tighten the knob mounting setscrew. Ensure that the knob mounting setscrew is seated on the flat portion of the switch shaft and that the knob indicator properly aligns with the markings on the front panel assembly after replacement.

4-7. Replacement of Plug-in-Circuit Card Assemblies AI, A2, A3, or A4

To replace the four plug-in-circuit card assemblies AI, A2, A3, or A4 proceed as follows:

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing plug-in-circuit card assemblies.

- a. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly.
- b. Identify the plug-in-circuit card assembly (figure 1-2) to be removed.

CAUTION

To avoid damage to plug-in-circuit card assembly ejectors, push plug-in-circuit card assembly ejectors back into place after ejecting the plug-in-circuit card assembly from its receptacle, then pull the plug-in-circuit card assembly from the enclosure.

- c. Unseat the plug-in-circuit card assembly from the receptacle by first pulling outward on the plug-in-circuit card assembly ejectors (figure 1-2). After unseating the plug-in-circuit card assembly, return the plug-in-circuit card assembly ejectors to their original position.

CAUTION

Exercise extreme caution when removing and inserting a plug-in-circuit card assembly. Do not exert any pressure that would bend the plug-in-circuit card assembly even a slight amount. Any bend from straight will cause parts to break away from soldered points.

- d. Carefully pull the plug-in-circuit card assembly straight out of the chassis assembly.
- e. Lay the plug-in-circuit card assembly on a clean workbench with the component side up. Handle the plug-in-circuit card assembly only at the edges.

CAUTION

The plug-in-circuit card assembly keying angle bracket is keyed to prevent installation of circuit card assemblies in the wrong position. If an obstruction is felt when inserting a plug-in-circuit card assembly, remove the plug-in-circuit card assembly and determine the cause. Once the plug-in-circuit card assembly is properly inserted, firmly exert equal force on both plug-in-circuit card assembly ejectors to make certain the plug-in-circuit card assembly is correctly seated.

- f. Insert the replacement plug-in-circuit card assembly component side down in the guide slots in the plug-in-circuit card guide block (figure 5-5) and carefully press straight in along the outer edge until the plug-in-circuit card assembly connector is fully engaged in the receptacle. Close and secure the front panel assembly.

4-8. Fault Correction Verification

Whenever the front panel assembly has been lowered and then refastened, the off-line self-test should be performed (paragraph 2-6).

CHAPTER 5

DIRECT SUPPORT MAINTENANCE

Section I. INTRODUCTION

5-1. General

This chapter covers direct support maintenance for the encoder- decoder. It lists tools and test equipment needed to troubleshoot the encoder-decoder (paragraph 5-2), procedures to trace faults to chassis mounted discrete parts (table 5-1), and procedures to replace defective circuit card assemblies and chassis mounted discrete parts (paragraphs 5-6 thru 5-35). The repair parts required to accomplish direct support maintenance are listed in the repair parts and special tools list contained in TM 11-5895-1179-23P a EE132-EA-PLO-010/E106 KY883 * TO 31S1-2GSC-164.

Section II. TOOLS AND EQUIPMENT

5-2. Tools, Test Equipment, and Material Required

The following tools and test equipment are required for troubleshooting and repairing the encoder-decoder.

- a. Tools.
 Tool Kit, Electronic Equipment TK-100/G NSN 5180-00-605-0079
 Tool Kit, Electronic Equipment TK-105/G NSN 5180-00-610-8177
 Crimp Tool, MS90413-IA NSN 5120-00-832-6420
- b. Test Equipment.
 Multimeter AN/PSM-6() NSN 6625-00-724-8582
- c. Material.

Lockwire	MS20995C-20
Loctite	Grade HV #17
Tiedown strap	MS3367-4-1
Silicon heat sink compound	Type 340
Adhesive	465-11
Freon	Type TF
Silicon adhesive	RTV 3145

5-3. Lubrication Instructions

Encoder-Decoder KY-883/GSC requires no lubrication.

Section III. TROUBLESHOOTING

5-4. General

This section contains the systematic troubleshooting procedure to isolate a fault in the encoder-decoder to a defective circuit card assembly or discrete part. Most encoder-decoder faults will be quickly isolated by use of the off-line self-test (paragraph 2-6). When use of the multimeter is required for fault isolation, the required meter indications are shown in the troubleshooting chart (table 5-1). At the direct support level all subassemblies and discrete parts not located on circuit card assemblies may be replaced.

Table 5-1. Direct Support Troubleshooting Chart

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing circuit card assemblies. High voltage is present in the power supply even when the ON/OFF switch is OFF. Remove the power plug and discharge capacitors A7C1 and A5A1C1 to ensure safety.

Item No.	Symptom	Probable Cause	Checks and Corrective Action
1	When ON/OFF switch is set to ON, fuse blows.	a. Defective power supply plug-in-circuit card assembly A4. b. Defective diode A7CR4. c. Defective transformer A7T1. d. Defective Backplane Harness Assembly A8A5. e. Defective ON/OFF switch assembly A6A4. f. Defective bottom panel assembly A7. g. Defective backplane circuit card assembly A5A1. h. Defective display and control circuit card assembly A6A1.	a. Replace power supply plug-in-circuit card assembly A4 (paragraph 4-7). b. Replace diode A7CR4 (paragraph 5-26). c. Replace transformer A7T1 (paragraph 5-11). d. Replace Backplane Harness Assembly A8A5 (paragraph 5-29). e. Replace ON/OFF switch assembly A6A4 (paragraph 5-9). f. Replace bottom panel assembly A7 (paragraph 5-14). g. Replace backplane circuit card assembly A5A1 (paragraph 5-14). h. Replace display and control circuit card assembly A6A1 (paragraph 5-15).

Table 5-1. Direct Support Troubleshooting Chart-Continued

Item No.	Symptom	Probable Cause	Checks and Corrective Action
2	When ON/OFF switch is set to ON, fan does not start and POWER indicator does not illuminate.	<p>i. Defective plug-in-circuit card assemblies A1, A2, or A3.</p> <p>a. Defective primary power cable assembly. b. Defective power connector assembly A5MP3 (figure 5-4).</p>	<p>i. Replace all plug-in-circuit card assemblies (paragraph 4-7). Apply ac power. If the fuse does not blow, reinstall the original plug-in-circuit card assemblies one at a time. Reapply ac power. If the fuse blows, repeat this step as a process of elimination until the plug-in-circuit card assembly that causes the fuse to blow is found. Refer to paragraph 4-5 for replacement of the fuse.</p> <p>a. Check continuity of cable and replace if defective. b. Set ON/OFF switch to OFF. Remove site power from encoder-decoder. Remove chassis cover (paragraph 5-6), and plug-in-circuit card assemblies (paragraph 4-7).</p> <hr/> <p>WARNING</p> <p>High voltage of 115 Vac, dangerous to life, exists in the encoder-decoder when the ON/OFF switch is set to ON.</p> <p>Apply site power to encoder-decoder and measure voltage at terminals 12 and 13 on A7TB1 (figure 5-2). Voltage should be same as power source (108 to 132 Vac). Replace power connector assembly A5MP3 (paragraph 5-18) if voltage is absent.</p>

Table 5-1. Direct Support Troubleshooting Chart-Continued

Item No.	Symptom	Probable Cause	Checks and Corrective Action
3	When ON/OFF switch is set to ON, fan does not start but POWER indicator illuminates.	<p>c. Defective ON/OFF switch assembly A6A4, fuseholder assembly A6A4, bottom panel harness assembly A7W1, or terminal board(s) A7TB1 and A7TB2.</p> <p>a. Defective fan assembly</p> <p>b. Defective diode A7CR3 or capacitor A7C2.</p>	<p>c. Disconnect POWER cable at A5J13. Set ON/OFF switch to ON. Make continuity checks of ON/OFF switch assembly, fuseholder assembly A6A3, bottom panel harness assembly A7W1 and terminal board(s) A7TB1 and A7TB2 (figure 5-2). Replace bottom panel wiring harness A7WI (paragraph 5-7), fuseholder assembly (paragraph 5-8), ON/OFF switch assembly (paragraph 5-9) or terminal board(s) A7TB1 and A7TB2 (paragraph 5-28).</p> <p>a. Check for +28 Vdc at terminals 9(-) and 11(+) on A7TB1 (figure 5-2). If voltage is present, replace fan assembly (paragraph 5-10).</p> <p>b. Check voltage at E2(+) with A7TBI-9(-) for +28 Vdc +5 Vdc. If voltage is present, replace diode A7CR3 (paragraph 5-25), or capacitor A7C2 (paragraph 5-22).</p>
4	When ON/OFF switch is set to ON, POWER indicator does not illuminate but fan starts.	<p>a. Defective display and control circuit card assembly A6A1.</p> <p>b. Defective capacitor A7C1.</p> <p>c. Defective transformer A7T1.</p> <p>d. Defective backplane circuit card assembly A5A1.</p> <p>e. Defective bottom panel harness assembly A7W1.</p> <p>f. Power supply plug-in-circuit card assembly A4 not properly seated.</p>	<p>a. Replace display and control circuit card assembly A6A1 (paragraph 5-15).</p> <p>b. Replace defective capacitor A7C1 (paragraph 5-13).</p> <p>c. Replace transformer (paragraph 5-11).</p> <p>d. Replace backplane circuit card assembly A5A1 (paragraph 5-14).</p> <p>e. Replace bottom panel harness assembly A7W1 (paragraph 5-7).</p> <p>f. Set ON/OFF switch to OFF. Release the four front panel assembly fasteners and lower the front</p>

Table 5-1. Direct Support Troubleshooting Chart-Continued

Item No.	Symptom	Probable Cause	Checks and Corrective Action
5	POWER SUPPLY fault indicator illuminates.	<p>g. Defective power supply plug-in-circuit card assembly A4.</p> <p>a. Defective power supply plug-in-circuit card assembly A4.</p> <p>b. Defective capacitor A7C1.</p> <p>c. Defective power inductor A7L1.</p> <p>d. Defective transformer A7T1.</p> <p>e. Defective diodes A7CR1 and A7CR2.</p> <p>f. Defective display and control circuit card assembly A6A1.</p> <p>g. Defective backplane circuit card assembly A5A1.</p>	<p>panel assembly. Reseat power supply plug-in-circuit card assembly A4. Close and secure the front panel assembly. Set ON/OFF switch to ON.</p> <p>g. Replace power supply plug-in-circuit card assembly A4 (paragraph 4-7).</p> <p>a. Replace power supply plug-in-circuit card assembly A4 (paragraph 4-7).</p> <p>b. Replace capacitor A7C1 (paragraph 5-13).</p> <p>c. Replace power inductor A7L1 (paragraph 5-21).</p> <p>d. Replace transformer A7T1 (paragraph 5-11).</p> <p>e. Replace defective diodes A7CR1 and A7CR2 (paragraph 5-27).</p> <p>f. Replace display and control circuit card assembly A6A1 (paragraph 5-15).</p> <p>g. Replace backplane circuit card assembly A5A1 (paragraph 5-14).</p>
6	One or more ON LINE FAULT INDICATORS illuminate.	<p>a. Improperly seated or defective plug-in-circuit card assembly.</p>	<p>a. Perform off-line self-test (paragraph 2-6). Reseat or replace indicated defective plug-in-circuit card assembly as necessary (paragraph 4-7).</p>
7	On-line self-test fails after indicated faulty plug-in-circuit card assembly has been replaced.	<p>a. Undetected fault on one of other circuit card assemblies.</p>	<p>a. Reseat all plug-in-circuit card assemblies. If fault remains, replace plug-in-circuit card assemblies A1, A2, and A3 one at a time (paragraph 4-7).</p>

Table 5-1. Direct Support Troubleshooting Chart-Continued

Item No.	Symptom	Probable Cause	Checks and Corrective Action
8	On-line self-test fails after all plug-in-circuit card assemblies have been replaced.	a. Defective display and control circuit card assembly A6A1. b. Defective backplane circuit card assembly A5A1.	a. Replace display and control circuit card assembly A6A1 (paragraph 5-15). b. Replace backplane circuit card assembly A5A1 (paragraph 5-14).
9	One or more indicators or one or more of the ERROR RATE COUNTER display LEDs do not light when the ON LINE/SELF TEST switch is in the LAMP TEST position.	a. Improperly seated or defective plug-in-circuit card assembly. b. Defective display and control circuit card assembly A6A1. c. Defective backplane circuit card assembly A5A1.	a. Reseat plug-in-circuit card assemblies. If fault remains, replace plug-in-circuit card assemblies one at a time (paragraph 4-7). b. Replace display and control circuit card assembly A6A1 (paragraph 5-15). c. Replace backplane circuit card assembly A5A1 (paragraph 5-15).
10	An ON LINE FAULT INDICATOR illuminates but audible alarm does not sound when FUNCTION select switch is in other than the SELF TEST position. assembly A5A1.	a. Defective electronic signal A7DS1. b. Defective I/O plug-in-circuit card assembly A3. c. Defective display and control circuit card d. Defective electronic signal connector assembly A8A2.	a. Open front panel and measure voltage at terminals 5 and 6 on A7TB2 (figure 5-2). Voltage should measure approx. 4.5 volts. If voltage is present, replace electronic signal (paragraph 5-16). b. Replace I/O plug-in-circuit card assembly A3 (paragraph 4-7). c. Replace display and control circuit card assembly (paragraph 5-15). d. Replace electronic signal connector assembly A8A2 (paragraph 5-33).

Section IV. MAINTENANCE PROCEDURES

5-5. General

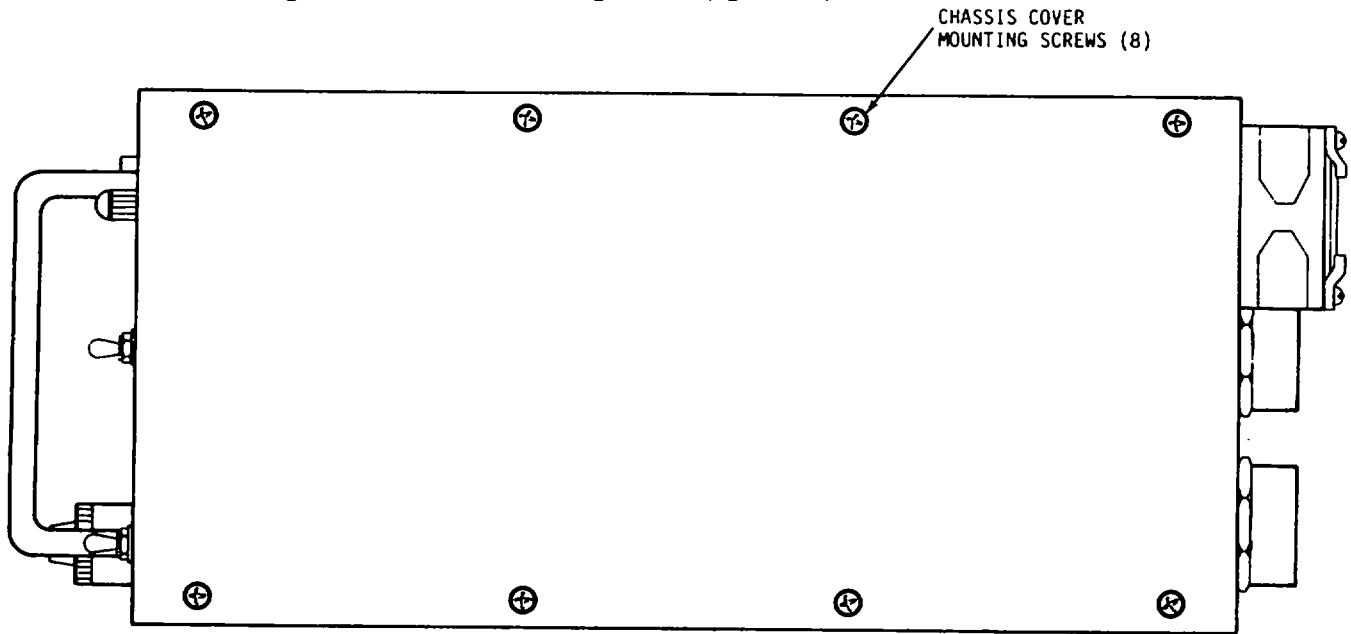
When the trouble has been localized to a circuit card assembly or part, replace the defective circuit card assembly or part as directed in the following paragraphs. Disconnect the primary power, by removing the power plug at A5J13, prior to performing all removal and replacement operations.

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing circuit card assemblies. High voltage is present in the power supply even when the ON/OFF switch is OFF. Remove the power plug and discharge capacitors A7C1 and A5A1C1 to ensure safety.

5-6. Removal and Replacement of Chassis Cover

- a. Remove the eight chassis cover mounting screws (figure 5-1).



EL9EN018

Figure 5-1. Chassis Cover Removal
5-7

- b. Release the four front panel assembly fasteners (figure 2-1), lower the front panel assembly, and remove the chassis cover.
- c. Position the chassis cover in place, install the eight chassis cover screws.
- d. Close and secure the front panel assembly.

5-7. Removal and Replacement of Bottom Panel Harness Assembly A7WI

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Make certain capacitors A7C1 and A5A1C1 (figures 5-5 and 5-6) are discharged. Remove the terminal board covers from A7TB1 and A7TB2 (figure 5-5). Disconnect all leads on the inner sides of A7TB1 and A7TB2 except A7TBI-1, -3, -6, -13 and -15; and A7TB2-15 and -17. Cut the tiedown straps as necessary and remove the bottom panel harness assembly.
- c. Connect the replacement bottom panel harness assembly leads disconnected in step h, using table 5-2 as a guide. Use a heat sink for those connections using solder. Use tiedown straps to replace those removed in step b..

Table 5-2. Bottom Panel Harness Assembly Wiring Chart

From		To		Wire	
Location	Type Connection	Location	Type Connection	Length (Inches)	AWG Size and Color
A7TB1-2	Terminal Lug	A7CR2-AD	;Solder	11.00	16, brown
A7TB1-4	Terminal Lug	A7CR1-AD	Solder	11.00	16, red
A7TB1-5	Terminal Lug	A7TB2-13	Terminal Lug	15.50	14, white/ orange
A7TB1-7	Terminal Lug	A7CI(-)	Terminal Lug	8.50	14, yellow
A7TB1-8	Terminal Lug	Chassis Ground	Terminal Lug	7.30	14, green
A7TBI-10	Terminal Lug	A7E4	Solder	7.80	22, blue
A7TBI-11	Terminal Lug	A7E3	Solder	7.80	22, violet
A7TBI-12	Terminal Lug	A7TB2-11	Terminal Lug	13.00	18, white
A7TBI-14	Terminal Lug	A7CR4-1	Solder	3.00	18, white
A7TBI-16	Terminal Lug	A7TB2-8	Terminal Lug	13.50	18, white/ red
A7TB1-17	Terminal Lug	A7CR4-2	Solder	4.00	18, white/ green
A7CI(+)	Terminal Lug	A7TB2-14	Terminal Lug	9.00	14, white/ orange
A7CR1 (cath)	Solder	A7TB2-16	Terminal Lug	11.50	14, gray
A7DS1(-)	Terminal Lug	A7TB2-6	Terminal Lug	4.00	22, gray
A7DS1(+)	Terminal Lug	A7TB2-5	Terminal Lug	5.50	22, white

- d. Install the terminal board covers on A7TB1 and A7TB2.
- e. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- f. Close and secure the front panel assembly.

5-8. Removal, Replacement, and Repair of Fuseholder Assembly A6A3

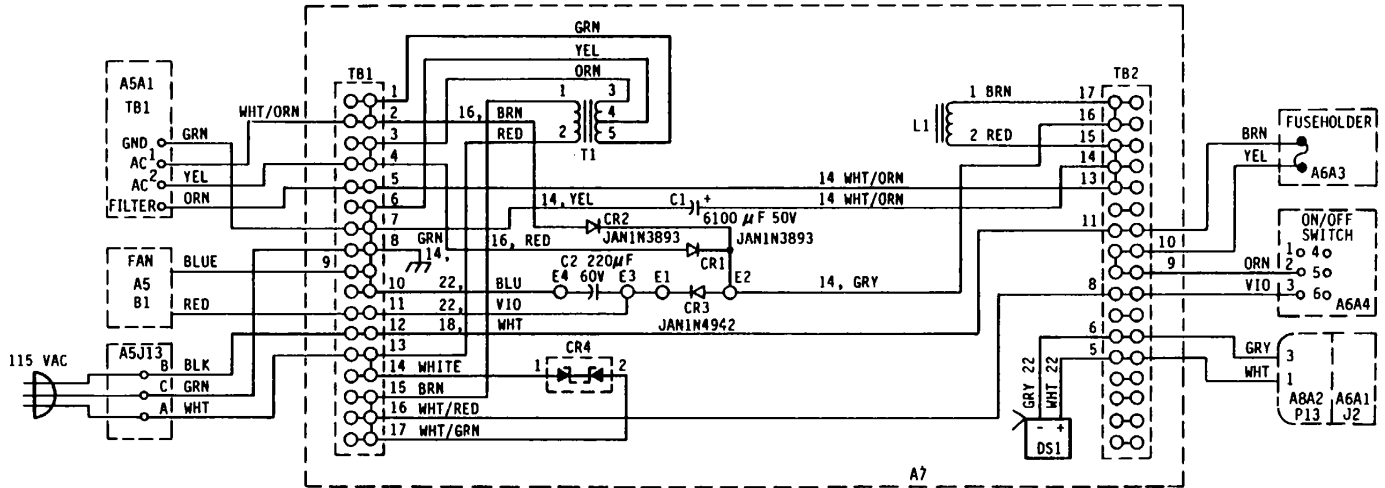
- a. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly.
- b. Remove the terminal board cover from A7TB2 (figure 5-5). Disconnect the fuseholder assembly leads at A7TB2 -10 and -11 (figure 5-2).
- c. Loosen the fuseholder nut and washer at the back of the front panel assembly (figure 5-3). Align the notch of the nut with the fuseholder resistor and remove the nut and washer. Remove the fuseholder assembly.
- d. If the fuseholder assembly is to be repaired, replace the defective component. ie. Position the replacement fuseholder assembly leads in the fuseholder mounting hole, and secure the fuseholder assembly with the washer, and the nut.
- e. Position the replacement fuseholder assembly leads in the fuseholder mounting hole, and secure the fuseholder assembly with the washer, and the nut.
- f. Noting color code of leads, connect the fuseholder assembly leads to A7TB2-10 and -11 (figure 5-2). Install the terminal board cover on A7TB2.
- g. Close and secure the front panel assembly.

5-9. Removal, Replacement, and Repair of ON/OFF Switch Assembly A6A4

- a. Remove the nut and washers which attach the ON/OFF switch assembly A6A4 to the front panel assembly (figure 5-3).
- b. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly.
- c. Remove the terminal board cover from A7TB2 (figure 5-5). Disconnect the ON/OFF switch assembly leads attached to A7TB2-8 and -9 (figure 5-2) and remove the ON/OFF switch assembly.
- d. If the ON/OFF switch assembly is to be repaired, replace the defective component. Apply silicon adhesive RTV3145, item 5, App. E to the terminals of the switch (figure 5-3).
- e. Position replacement ON/OFF switch assembly in the ON/OFF switch mounting hole. Noting color code of leads, reconnect the leads to A7TB2-8 and -9. Install the terminal board cover on A7TB2. Install the washer and finger-tighten the nut.
- f. Close and secure the front panel assembly. Tighten the nut.

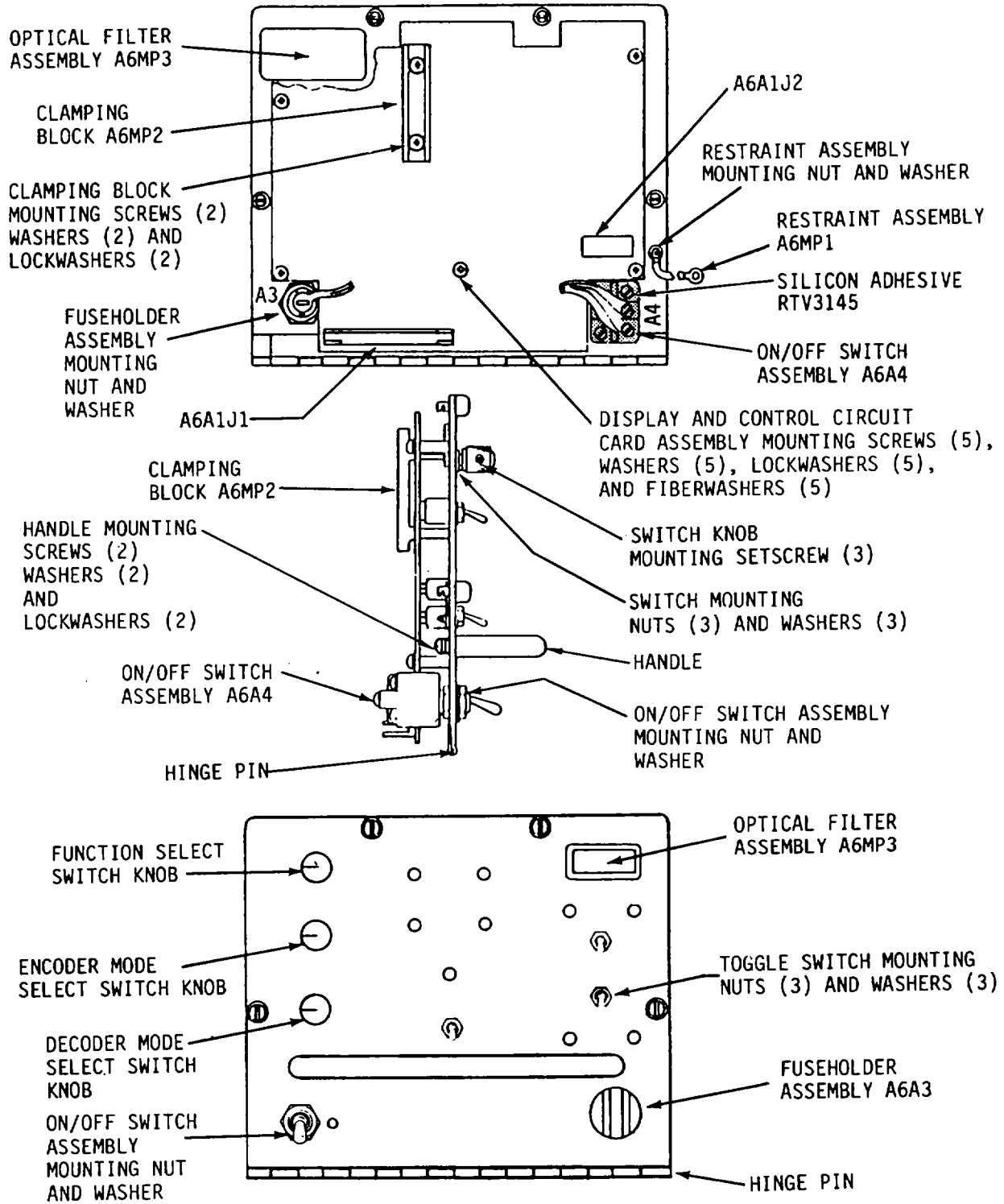
5-10. Removal, Replacement, and Repair of Fan Assembly A5B1

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Make certain capacitors A7C1 and A5AIC1 (figures 5-5 and 5-6; are discharged. Remove the terminal board cover from A7TB1.



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Figure 5-2. Chassis Wiring Diagram
5-10



EL9EN014

Figure 5-3. Front Panel Assembly, A6.

Note dressing of leads with respect to keying bracket. Disconnect fan leads at A7TBI-9 and -11 (figure 5-2).

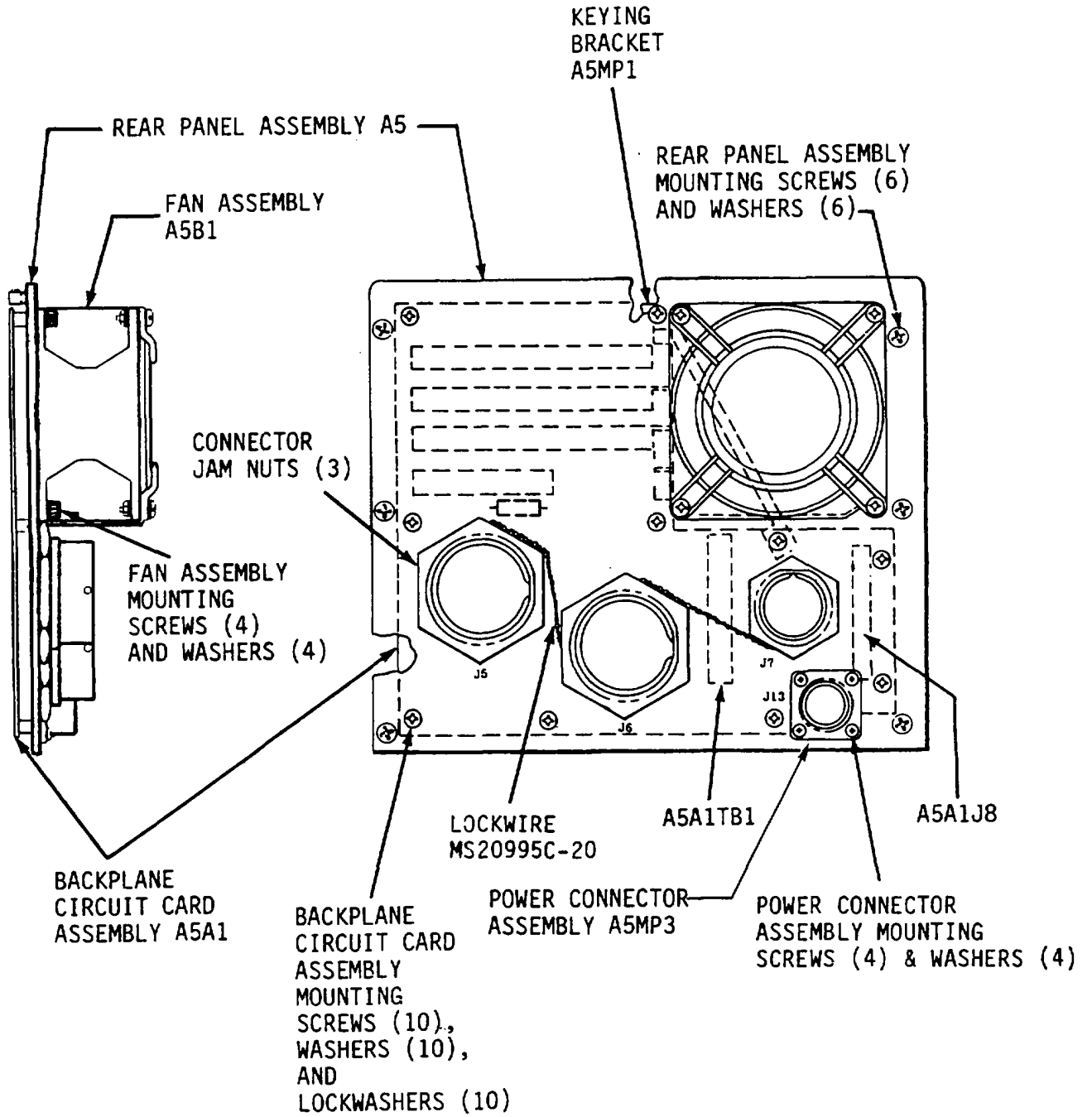
- c. Remove the four hex screws and washers which attach the fan assembly A5B1 to the rear panel assembly A5 (figure 5-4). Cut the tiedown straps as necessary and remove the fan assembly.
- d. If the fan assembly is to be repaired, replace the defective component.
- e. Position the replacement fan assembly against the rear panel so that the leads are at the bottom of the mounting hole and secure the fan assembly with the four screws and washers removed in step c.
- f. Dress the fan leads as noted in step b and connect the fan assembly leads to A7TBI-9 and -11 (figure 5-2). Use tiedown straps to replace those removed in step S.
- g. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6). Install the terminal board cover on A7TB1.
- h. Close and secure the front panel assembly.
- i. Ensure that the fan is drawing air through the chassis.

5-11. Removal and Replacement of Power Transformer A7T1

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Make certain capacitors A7CI and A5C1 (figures 5-5 and 5-6) are discharged. Remove the terminal board cover from A7TB1 and disconnect transformer leads at A7TBI-1, -3, -6, -13, and -15 (figure 5-2).
- c. Remove the four nuts and washers which attach the transformer to the bottom panel assembly (figure 5-5). Remove the ground lead on the forward inboard mounting stud. Cut the tiedown straps that are associated with the A7T1 leads. Remove A7T1 by lifting it directly upward from the mounting studs.
- d. Set the replacement transformer in place on the mounting studs with the leads correctly oriented and reconnect the ground lead to the inboard mounting stud. Install the four nuts and washers removed in step c.
- e. Connect the replacement transformer leads at the A7TB1 terminals as indicated in figure 5-2. Install the terminal board cover on A7TB1. Dress leads into A7W1 harness assembly and replace tiedown straps removed in step g.
- f. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- g. Close and secure the front panel assembly.

5-12. Removal and Replacement of Clamping Block A6MP2

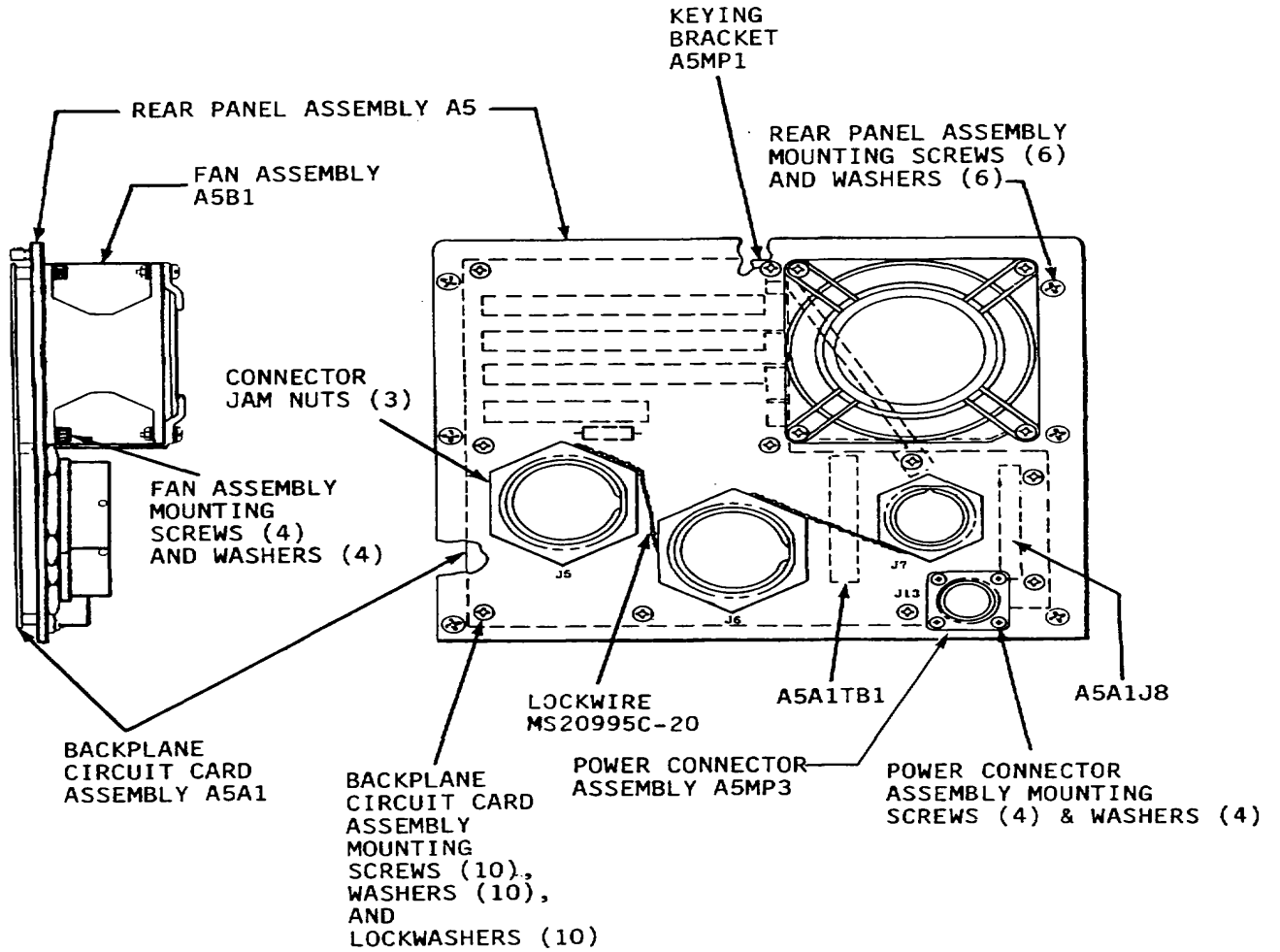
- a. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly. Remove the two screws, flat washers and lock washers holding the clamping block to the front panel assembly (figure 5-3). Remove the clamping block.



3285A

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Figure 5-4. Rear Panel Assembly, A5



3285A

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Figure 5-5. Encoder-Decoder, Top View, with Cover Removed (Sheet 1 of 2)

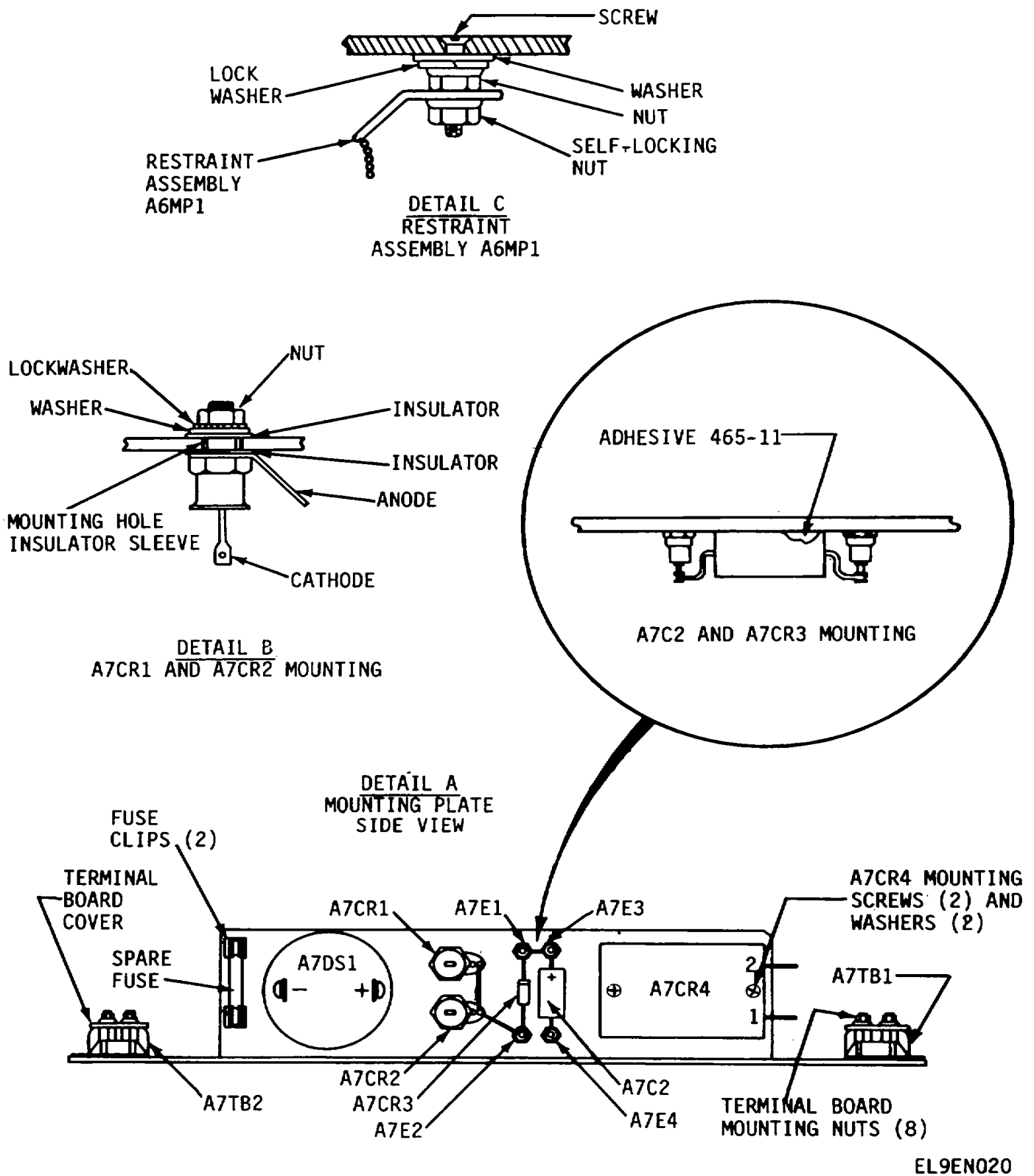


Figure 5-5. Encoder-Decoder, Top View, with Cover Removed (Sheet 2 of 2)

- b. Mount the new clamping block in position using the two screws, flat washers and lock washers removed in step a.
- c. Close and secure the front panel assembly.

5-13. Removal and Replacement of Capacitor A7C1

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing circuit card assemblies. High voltage is present in the power supply even when the ON/OFF switch is OFF. Remove the power plug and discharge capacitors A7C1 and A5A1C1 to ensure safety.

- b. Make certain capacitors A7C1 and A5A1C1 (figures 5-5 and 5-6) are discharged. Remove the two screws and washers which attach the leads to the capacitor. Disconnect the leads.
- c. Remove the two nuts, flat washers and shoulder washers which attach the capacitor support clamps to the bottom panel assembly (figure 5-5) and remove the capacitor. Remove the support clamps from the capacitor.
- d. Place the support clamps on the replacement capacitor so that the capacitor can be oriented with the plus terminal toward the front of the chassis assembly. Install the capacitor leads removed in step h. Position and secure the capacitor to the bottom panel assembly with the two nuts, washers and shoulder washers removed in step c.
- e. Install the four circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- f. Close and secure the front panel assembly.

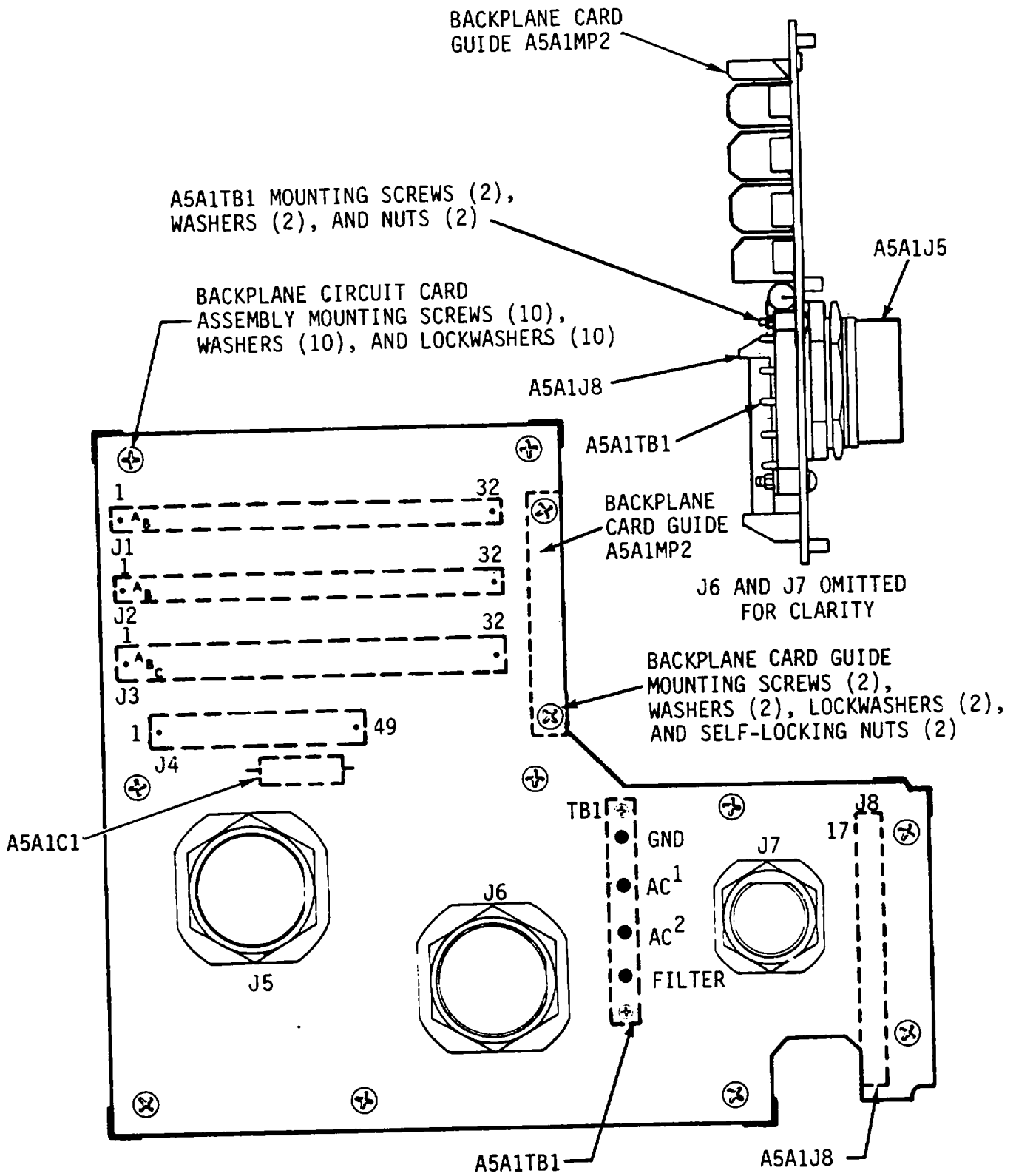
5-14. Removal and Replacement of Rear Panel Assembly A5 and Backplane Circuit Card Assembly A5A1

- a. Remove the power plug at A5J13 (figure 2-2). Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b.. Make certain that capacitors A7C1 and ASA1C1 (figures 5-5 and 5-6) are discharged. Disconnect cables connected at A5A1J5, A5A1J6, and A5A1J7 (figure 2-2). Cut the lockwire MS20995C-20 between the jam nuts on the connectors ASA1J5, A5A1J6, and A5A1J7 (figure 5-4) and remove the jam nuts.
- c. Remove the terminal board cover from A7TB1 (figure 5-5) and disconnect the three power connector assembly leads at A7TB1-8,

- 12, and -13 (figure 5-2). Disconnect the fan assembly leads at A7TBI-9 and -11.
- d. Disconnect the four backplane harness assembly leads connected to A5AITBI on the backplane circuit card assembly (figures 5-4 and 5-6). Disconnect the interconnect cable assembly A8A3 from A5A1J8 on the backplane circuit card assembly.
- e. Remove the six screws and washers (figure 5-4) which attach the rear panel assembly to the chassis assembly and remove the rear panel assembly A5 with the backplane circuit card assembly A5A1 mounted to it.
- f. Remove the ten backplane circuit card assembly mounting screws, flat washers and lock washers (figures 5-4 and 5-6). Separate the backplane circuit card assembly from the rear panel assembly. The keying bracket A5MP1 will fall from the assembly.
- g. Loosen the card guide on the replacement backplane circuit card assembly by loosening the two mounting screws (figure 5-6).
- h. Insert the four plug-in-circuit card assemblies into the chassis assembly.
- i. Fit the backplane circuit card assembly over the four plug-in circuit card assemblies and tighten the two screws holding the card guide to the backplane circuit card assembly (figure 5-6).
- j. Position the backplane circuit card assembly A5A1 on the rear panel assembly A5; position the keying bracket A5MP1 removed in step I on A5A1 and initially insert the two longer screws with flat washers and lock washers, loosely, to hold the rear panel assembly, backplane circuit card assembly, and keying bracket together. Insert the remaining 8 screws with flat and lock washers to secure A5A1 to the rear panel assembly. Tighten the ten screws.
- l. Position the rear panel assembly on the chassis and secure it in place with the six screws removed in step e. Remove the four plug-in-circuit card assemblies.
- m. Connect the four backplane harness assembly leads removed in step I to A5AITB1 on the backplane assembly and the three power connector assembly and two fan assembly leads removed in step to A7TB1 on the bottom panel assembly. Reconnect the interconnect cable assembly A8A3 removed in step A to A5A1J8 on the backplane circuit card assembly.
- n. Install the jam nuts removed in step h. Install lockwireMS20995C-20, item 4, App. E, as shown in figure 5-4.
- o. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- p. Close and secure the front panel assembly.
- q. Reconnect cables to A5A1J5, A5A1J6, A5A1J7, and A5J13 (figure 2-2).

5-15. Removal and Replacement of the Display and Control Circuit Card Assembly A6A1

- a. Remove the nuts and washers from all the front panel assembly toggle switches except the ON/OFF switch (figure 5-3). Loosen the set screws on the FUNCTION select switch knob, the ENCODER



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Figure 5-6. Backplane Circuit Card Assembly, A5A1

MODE select switch knob and the DECODER MODE select switch knob. Remove the knobs, nuts and washers.

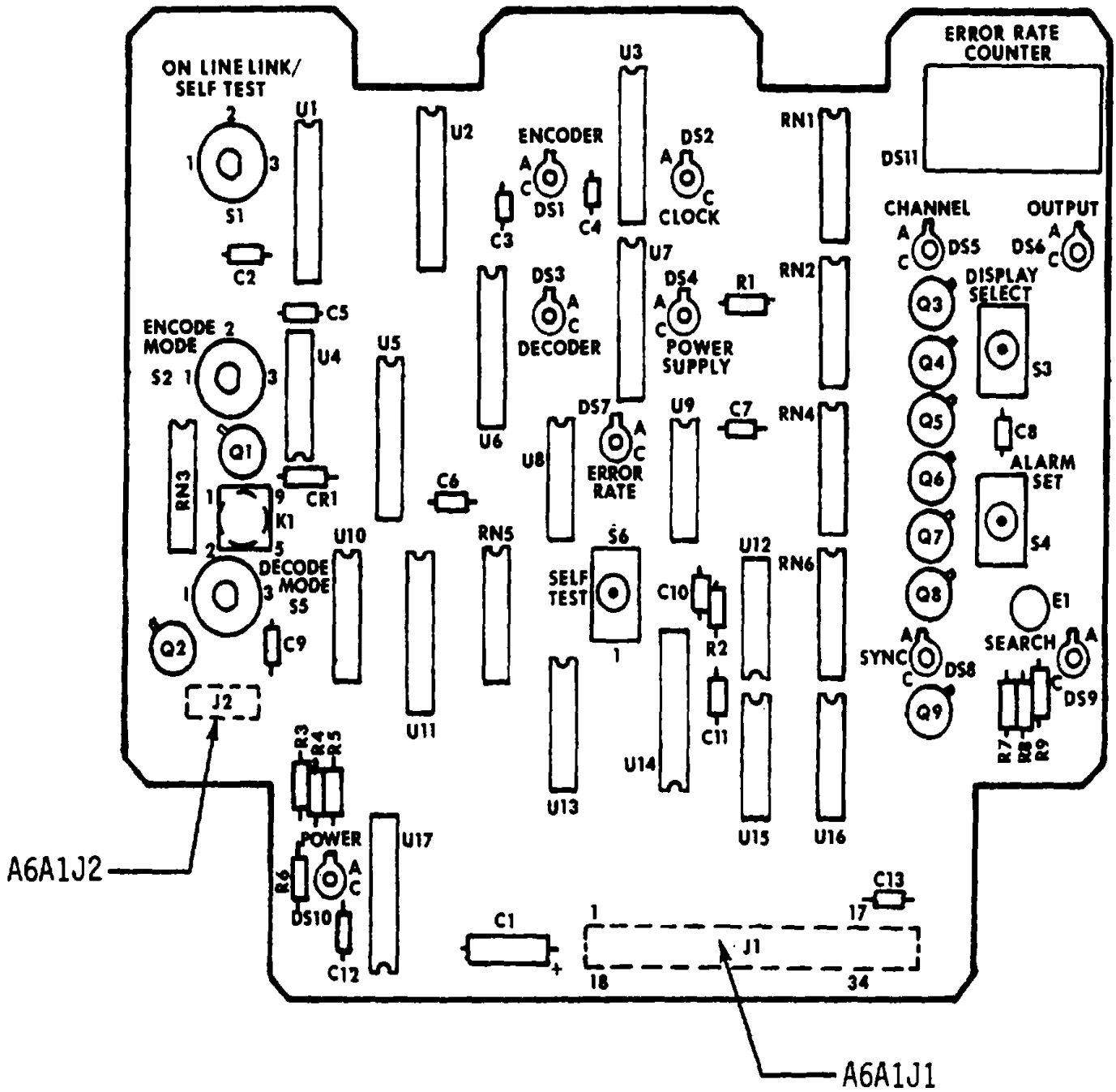
- b. Release the four front panel assembly fasteners (figure 2-1), lower the front panel assembly and disconnect the interconnect cable assembly A8A3 from connector A6A1J1 (figures 5-5, 5-3, and 5-7). Disconnect the electronic signal connector assembly A8A2 from A6A1J2 (figures 5-5, 5-3, and 5-7).
- c. Remove the five display and control circuit card assembly mounting screws, flat washers, lockwashers and fiber washers (figure 5-3). Remove the two clamping block mounting screws, flat washers, and lockwashers (figure 5-3). Remove the display and control circuit card assembly A6A1 from the front panel assembly A6.
- d. Install the replacement display and control circuit card assembly and secure with the five screws, washers, lock washers and fiberwashers removed in-step c. Install the clamping block with the two screws and washers removed in step c. Connect the interconnect cable assembly A8A3 to connector A6A1J1 and the electronic signal connector assembly A8A2 to A6A1J2.
- e. Close and secure the front panel assembly.
- f. Replace the toggle switch washers and nuts removed in step A. Install the nuts and washers removed from the FUNCTION select switch, the ENCODER MODE select switch, and the DECODER MODE select switch in step a. Install the switch knobs and tighten the set screws (paragraph 4-6).

5-16. Removal and Replacement of Electronic Signal A7DS1

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Disconnect the two leads from the terminals on the electronic signal A7DS1 (figure 5-5).
- c. Unscrew the knurled mounting ring which secures the electronic signal to the mounting plate (figure 5-5) and remove the electronic signal.
- d. Position the replacement electronic signal on the mounting plate and install the knurled mounting ring. Reconnect the two leads to the electronic signal removed in step h, making sure that the lead from A7TB2-5 (figure 5-2) is connected to the positive terminal on the electronic signal.
- e. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- f. Close and secure the front panel assembly.

5-17. Removal and Replacement of Plug-In-Circuit Card Assembly Ejectors

- a. Remove the appropriate plug-in-circuit card assembly (paragraph 4-7) and place the assembly component side up, on a firm, flat surface that contains a hole or notch for the ejector pin to fall into when it is pushed out.



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Figure 5-7. Display and Control Circuit Card Assembly, A6A1
5-20

.....
CAUTION

The plug-in-circuit card assembly ejector as well as the plug-in- circuit card assembly should be firmly supported to prevent cracking the plug-in-circuit card assembly during step b.

- b. Using a drill pin punch, push the ejector roll pin with just enough force to drive out the pin.
- c. Position the replacement plug-in-circuit card assembly ejector so that the ejector roll-pin hole is aligned with the hole in the plug-in-circuit card assembly. Insert the new roll pin and press it with a screwdriver blade until it is properly seated.
- d. Install the plug-in-circuit card assembly (paragraph 4-7).
- e. Close and secure the front panel assembly.

5-18. Removal, Replacement and Repair of Power Connector Assembly A5MP3

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.

WARNING

Set ON/OFF switch to OFF before opening front panel assembly and removing circuit card assemblies. High voltage is present in the power supply even when the ON/OFF switch is OFF. Remove the power plug and discharge capacitors A7C1 and A5A1C1 to ensure safety.

- b. Make certain that capacitors A7C1 and A5A1C1 (figures 5-5 and 5-6) are discharged. Remove the terminal board cover from A7TB1 (figure 5-5) and disconnect the leads from A7TBI-8, -12 and -13 (figure 5-2).
- c. Remove the four power connector assembly mounting screws and washers (figure 5-4). Remove the power connector assembly.
- d. If the power connector assembly is to be repaired, replace the defective component. a. Position the replacement power connector assembly in the mounting hole with pin B at the bottom. Install the four screws and washers removed in step c.
- f. Connect the leads to A7TB1-8, -12 and -13 (figure 5-2). Install the terminal board cover removed in step s.

- g. Replace the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
Close and secure the front panel assembly.

5-19. Removal and Replacement of Interconnect Cable Assembly A8A3

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Disconnect A8A3P8 from A5A1J8 on the backplane circuit card assembly (figures 1-4 and 5-6) and A8A3PII from A6AIJ1 on the display and control circuit card assembly (figures 1-4 and 5-7). Note the dressing of A8A3 and the keying of the interconnect cable (figures 1-4 and 5-5) for replacement purposes.
- c. Remove the interconnect cable assembly A8A3, held in place by three cable clamps (figure 1-4).
- d. To install the replacement interconnect cable assembly, connect A8A3P8 to A5A1J8 and A8A3PII to A6AIJ1 making certain the dressing and keying noted in step h are followed.
- e. Install the four plug-in-circuit card assemblies (paragraph 4-7) and chassis cover (paragraph 5-6).
- f. Close and secure the front panel assembly.

5-20. Removal and Replacement of Restraint Assembly A6MP1

- a. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly.
- b. Noting the various positions of hardware, remove the flat washer and nut that hold the restraint assembly A6MP1 to the front panel assembly (figure 5-3). Remove the screw, washer, lock washer, nut, and selflocking nut (figure 5-5) holding the restraint assembly to the chassis assembly. Remove the restraint assembly.
- c. Install the new restraint assembly by mounting the hardware removed in step h. The chassis assembly connection must permit free rotation of the restraint chain connector. The front panel assembly connection should be tight.
- d. Close and secure the front panel assembly.

5-21. Removal and Replacement of Power Inductor A7L1

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Make certain that capacitors A7L1 and A5A1CI (figures 5-5 and 5-6) are discharged. Remove the terminal board cover from A7TB2 (figure 5-5) and disconnect the inductor leads (figure 5-2) at A7TB2-15 and -17. Cut the tiedown straps as necessary.

- c. Remove the four nuts and washers which attach the inductor to the bottom panel assembly mounting studs (figure 5-5). Remove the power inductor A7L1.
- d. Set the new power inductor in place on the mounting studs and install the four nuts and washers removed in step c.
- e. Connect the replacement inductor leads to A7TB2-15 and -17 (figure 5-2). Install the terminal board cover removed in step h. Use tiedown straps to replace those removed in step B.
- f. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- e. Close and secure the front panel assembly.

5-22. Removal and Replacement of Capacitor A7C2

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Unsolder and remove A7C2 from A7E3 and A7E4 (figure 5-5) using standard heat sinking techniques.
- c. Remove the capacitor by breaking the adhesive bond between the capacitor and the mounting plate.
- d. Apply adhesive 465-11, item 1, App. E to the replacement capacitor and install with the positive lead to A7E3.
- e. Solder in the replacement capacitor using standard heat sinking techniques.
- f. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6). 9.
- g. Close and secure the front panel assembly.

5-23. Removal and Replacement of Front Panel Assembly A6 and Hinge Pin

- a. Release the four front panel assembly fasteners (figure 2-1) and lower the front panel assembly. B.
- b. Disconnect the interconnect cable assembly A8A3 from the connector A6AIJ1 on the display and control circuit card assembly (figure 5-3). Note the dressing of A8A3 and the keying of the interconnect cable (figure 5-5) for replacement purposes. Disconnect the electronic signal connector assembly A8A2 (figures 5-3 and 5-5) from A6A1J2. Remove the fuseholder assembly A6A3 (paragraph 5-8) and ON/OFF switch assembly A6A4 (paragraph 5-9) from the front panel assembly.
- c. Remove the restraint assembly (paragraph 5-20). v.
- d. Remove the hinge pin (figure 5-3) from right to left with a drive pin punch. Remove the front panel assembly.
- e. Place the replacement front panel assembly in proper position against the chassis and install the hinge pin.
- f. Install the restraint assembly (paragraph 5-20), the fuseholder assembly (paragraph 5-8) and the ON/OFF switch assembly (paragraph 5-9).

- g. Reconnect the electronic signal connector assembly A8A2 to A6A1J2, and the interconnect cable assembly A8A3 to A6AIJ1 (paragraph 5-19).
- h. Close and secure the front panel assembly.

5-24. Removal and Replacement of Bottom Panel Assembly A7

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively. Remove the interconnect cable assembly A8A3 (paragraph 5-19).
- b. Make certain that capacitors A7C1 and A5A1C1 (figures 5-5 and 5-6) are discharged. Remove the terminal board covers from A7TB1 and A7TB2 and disconnect the leads at A7TB1-5, -6, -8 through -11 and A7TB2-2, -4, -5, -8, -9, -11, -12, and -13.
- c. Remove the five nuts and washers that hold the bottom panel assembly A7 to the chassis assembly A8 (figure 5-5) and remove the bottom panel assembly.
- d. Lower the replacement bottom panel assembly onto the threaded studs of the chassis assembly and secure with the five nuts and washers removed in step c.
- e. Reconnect all 6 leads to A7TB2 and 8 leads to A7TB1 that were removed in step b (figure 5-2). Install the terminal board covers removed from A7TB1 and A7TB2 in step b.
- f. Install and reconnect the interconnect cable assembly A8A3 removed in step I (paragraph 5-19).
- g. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (figure 5-6).
- h. Close and secure the front panel assembly.

5-25. Removal and Replacement of Diode A7CR3

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Unsolder the diode A7CR3 to be replaced from A7E1 and A7E2 (figure 5-5) using standard heat sinking techniques. Note the diode polarity before removing.
- c. Remove the diode by breaking the adhesive bond between the diode and the mounting plate.
- d. Apply adhesive 465-11, item 1, App. E to the replacement diode and install keeping the polarity noted in step b. Solder in the replacement diode using standard heat sinking techniques.
- f. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- g. Close and secure the front panel assembly.

5-26. Removal and Replacement of Diode A7CR4

- a. Remove the chassis cover and the four plug-in-circuit card

- assemblies as described in paragraphs 5-6 and 4-71 respectively. .
- b. Tag and unsolder the two wires at the diode terminals (figure 5-5). Remove the two screws and flat washers holding the diode to the bottom panel assembly mounting plate (figure 5-5). Remove the diode.
 - c. Install the replacement diode using the two screws and washers removed in step h. Solder the wires removed in step h to the new diode terminals.
 - d. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
 - e. Close and secure the front panel assembly.

5-27. Removal and Replacement of Diodes A7CR1 and A7CR2

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Tag and unsolder the wire at the cathode of the diode to be replaced (figure 5-5). Remove the nut, lockwasher, flat washer and flat insulator. Remove the diode, insulator sleeve, flat insulator and anode from the mounting plate.
- c. Apply silicon heat sink compound type 340, item 6, App. E. Place anode, flat insulator and mounting hole insulator sleeve onto the replacement diode. Insert diode through mounting plate hole and attach using the other insulator, the flat washer, the lockwasher and the nut.
- d. Solder the wire removed in step B to the cathode of the replacement diode.
- e. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- f. Close and secure the front panel assembly.

5-28. Removal and Replacement of Bottom Panel Terminal Boards A7TB1 or A7TB2

- a. Remove the chassis cover and the four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Make certain that capacitors A7C1 and A5AIC1 (figures 5-5 and 5-6) are discharged. Remove the terminal board cover (figure 5-5) from the terminal board to be replaced and tag and disconnect all leads to it (figure 5-2). Unscrew the four nuts that secure the terminal board A7TB1 or A7TB2 (figure 5-5) and remove the terminal board by lifting it off the four threaded studs.
- c. Install the new terminal board and secure with the 4 nuts removed in step k (figure 5-2). Reconnect all leads removed in step h and install the terminal board cover.
- d. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- e. Close and secure the front panel assembly.

5-29. Removal, Replacement and Repair of Backplane Harness Assembly A8A5

- a. Remove the chassis cover and four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-7, respectively.
- b. Make certain capacitors A7C1 and A5AIC1 are discharged. Remove the terminal board cover from A7TB1 (figure 5-5) and tag and remove the wires from A7TB1-2, -4, -5, and -7 (figure 5-2). Tag and remove all the wires from ASAITBI (figures 5-5 and 5-6) and remove the backplane harness assembly. If an individual wire is to be replaced, cut the tiedown straps as necessary and remove the desired wire using table 5-3 as a guide.
- c. When repairing the backplane harness assembly, construct a new wire per table 5-3. A MS90413-IA crimping tool will be required.
- d. Install the new backplane harness assembly (figure 5-2).
- e. Install the terminal board cover on A7TB1.
- f. Install the four plug-in-circuit card assemblies (paragraph 4-7) and the chassis cover (paragraph 5-6).
- g. Close and secure the front panel assembly.

Table 5-3. Backplane Harness Assembly Wiring Chart

From		To		Length (Inches)	Wire AWG Size and Color
Location	Type Connection	Location	Type Connection		
A5AITBI-GND	Terminal Solderless 4916	A7TB1-7	Terminal Lug MS02536-106	7.00	14,green
A5AITB1-AC1	Terminal Solderless 4916	A7TB1-2	Terminal Lug MS02536-106	8.50	14,white/ orange
ASAITBI-AC2	Terminal Solderless 4916	A7TB1-4	Terminal Lug MS02536-106	7.75	14,yellow
A5AITBI-FILTER	Terminal Solderless 4916	A7TB1-5	Terminal Lug MS02536-106	6.75	14,orange

5-30. Removal and Replacement of Optical Filter Assembly A6MP3

- a. Remove the display and control circuit card assembly A6A1 (paragraph 5-15).

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

- b. Remove the optical filter assembly (figure 5-3) from the rear of the front panel assembly A6 and clean the area where the new filter is to be installed with Freon Type TF, item 2, App. E.
- c. Attach the new optical filter assembly A6MP3 with adhesive (supplied with new filter) being careful to center the assembly over the rear of the front panel assembly rectangular cutout.
- d. Install the display and control circuit card assembly A6A1 (paragraph 5-15).
- e. Close and secure the front panel assembly.

5-31. Removal and Replacement of Handle

- a. Remove the display and control circuit card assembly A6A1 (paragraph 5-15).
- b. Remove the two screws, lock washers, and flat washers holding the handle to the front panel assembly (figure 5-3).
- c. Install the replacement handle using the two screws, flat washers and lock washers removed in step h.
- d. Install the display and control circuit card assembly A6A1 (paragraph 5-15).
- e. Close and secure the front panel assembly.

5-32. Removal and Replacement of Plug-In-Circuit Card Assembly Guide Blacks

- a. Remove the chassis cover and four plug-in-circuit card assemblies as described in paragraphs 5-6 and 4-8, respectively.
- b. Remove the five screws, washers and nuts holding the defective plug-in-circuit card assembly guide block to the chassis

- assembly (figure 5-5). Remove the plug-in-circuit card assembly guide block.
- c. Install the new plug-in-circuit card assembly guide block by remounting the hardware removed in step h.
 - d. Install the four plug-in-circuit card assemblies (paragraph 4-8) and the chassis cover (paragraph 5-6).
 - e. Close and secure the front panel assembly.

5-33. Removal and Replacement of Electronic Signal Connector Assembly A8A2

- a. Release the front panel assembly fasteners (figure 2-1) and lower the front panel assembly.
- b. Disconnect the electronic signal connector assembly A8A2 from A6A1J2 (figures 5-5, 5-3, and 5-7). Remove the terminal board cover from A7TB2 (figure 5-5). Disconnect the electronic signal connector assembly leads at A7TB2-5 and -6 (figure 5-2). Remove the electronic signal connector assembly.
- c. Connect the replacement electronic signal connector assembly to A6A1J2 on the display and control circuit card assembly.
- d. Noting color code of leads, connect the electronic signal connector assembly leads to A7TB2-5 and -6 (figure 5-2).
- e. Install the terminal board cover on A7TB2.
- f. Close and secure the front panel assembly.

5-34. Fault Correction Verification

Whenever the front panel assembly has been lowered and then refastened the off-line self-test should be performed (paragraph 2-6).

5-35. Removal and Replacement of KY-883/GSC from Rack

- a. Disconnect all cables from rear of unit.
- b. Remove four mounting screws from bottom of unit (if necessary).
- c. Lift unit from rack.
- d. Install unit in rack.
- e. Install the four mounting screws removed in step c.
- f. Reconnect all cables removed in step a.

APPENDIX A

REFERENCES

DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TB 385-4	Safety Precaution for Maintenance of Electrical/Electronic Equipment.
TM 11-5895-1179-23P	Organizational and Direct Support Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Encoder-Decoder KY-883/GSC.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 43-0139	Painting Instructions for Field Use.
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).
TO-00-35054	US Air Force Material Efficiency Reporting and Investigating System.

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APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for KY-883/GSC. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

- a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards through examination.
- b. Test. -To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing these characteristics with prescribed standards. Precise identification of the specific incipient failure is accomplished by troubleshooting/fault location of the repairable item to identify the failed component.
- c. Service. Operations required periodically to keep an item in proper operating condition such as to clean, to preserve, to paint, or to lubricate.
- d. Adjust. Maintain within prescribed limits by bringing-into proper or exact position, or by setting the operating characteristics to the specified parameters.
- e. Aliqn. To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. Calibrate. To determine and cause corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison 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 with the certified standard.
- g. Install. To set up for use in an operational environment such as a site or vehicle.
- h. Replace. To replace unserviceable items with serviceable like items.
- i. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of running spare type items such as fuses and indicators.

i. Overhaul. Normally, the highest degree of maintenance performed by the Army in order to minimize time and assure that work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable/operational condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

k. Rebuild. Consists of restoring equipment as nearly as possible to like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. Rebuild reduces to zero the hours the equipment, or component thereof, has been in use.

B-3. Column Entries

a. Column 1 lists-Group-Numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

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

c. Column 3. -Maintenance- Functions. Column 3 lists the functions to be performed on the item listed in column 2.

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

- C - Operator/Crew
- O - Organizational
- F - Direct Support
- L - General Support
- D - Depot i

e. Column 5. Tools and Test Equipment Column 5 specifies, by code, those tool sets and test equipment required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in Section III.

B-4. Tool and Test Equipment Requirements (Section III)

a. Tools and Equipment Reference Code. The numbers in this column coincide with the numbers used in the Tools and Equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name of the tools, test, and maintenance equipment required to perform the maintenance functions.

d. National/NATO stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. The Joint Electronics Type Designation System number is given when available. Otherwise, the part number of the manufacturer is listed.

B-5. Remarks (Section IV).

a. Reference Code. This code refers to the appropriate item in Section II, Column 6..

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in Section II.

Section II MAINTENANCE ALLOCATION CHART
FOR
ENCODER-DECODER KY-883/GSC

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS	(6) REMARKS
			C	O	F	H	D	EQPT	
00	ENCODER-DECODER	Inspect	0.1	0.1	0.1		0.1		
		Test		0.1	0.1				A
		Repair		0.1	0.6		2.0	4,5	B,D
		Test					0.8	1,3,7,12,13	C
		Replace				0.1			
		Overhaul					40.0	1 thru 14	
01	DECODER CIRCUIT CARD ASSEMBLY (A1)	Inspect			0.1		0.1		A
		Test		0.1					
		Replace		0.1				4	
		Test					0.3	1,3,9,12,13	
		Repair			0.3		3.3	1,3,5,9,12,13	E,H
02	INTERLEAVER CIRCUIT CARD ASSEMBLY (A2)	Inspect			0.1		0.1		
		Test		0.1					A
		Replace		0.1				4	
		Test					0.4	1,3,11	
		Repair			0.3		3.3	1,3,5,11	E,H
03	INPUT/OUTPUT CIRCUIT CARD ASSEMBLY (A3)	Inspect	Inspect		0.1		0.1		A
		Test				0.1			
		Replace		0.1				4	
		Test					0.5	1,3,6,14	
		Repair			0.3		3.3	1,3,5,10	E,H
04	POWER SUPPLY CIRCUIT CARD ASSEMBLY	Inspect		0.1			0.1		A
		Test		0.1					
		Replace		0.1				4	
		Test					0.5	1,3,6,14	
		Repair			0.3		3.3	1,3,5,6,14	E,H
0401	HEATSINK ASSEMBLY (A4A1)	Replace					0.5	5	
05	CHASSIS ASSEMBLY (AB)	Repair			1.0		5.0	5	
		Inspect			0.1		0.1		
		Replace			0.1			5	
0501	FRONT PANEL ASSEMBLY (A6)	Inspect			0.1		0.1		A
		Test		0.1					
		Replace			1.6			5	
		Repair			0.3		0.5	5	F,G
050101	DISPLAY AND CONTROL CIRCUIT CARD ASSEMBLY (A6A1)	Inspect					0.1		
		Test					0.5	1,3,8	
		Replace			0.4		0.4	5	
		Repair					1.5	1,3,5,8	E
050102	FRONT PANEL SUBASSEMBLY	Replace			1.5		1.5	5	
		Repair					3.0	5	
050103	POWER SWITCH ASSEMBLY	Replace			1.2		1.2	5	
		Repair			3.3		3.3	2,5	
050104	FUSEHOLDER ASSEMBLY	Replace			1.2		1.2	5	
		Repair			3.3		3.3	2,5	
0502	BOTTOM PANEL ASSEMBLY (A7)	Inspect			0.2		0.2		
		Replace			0.7		0.7	5	
		Test			1.0		0.5	1,3,6,14	
		Repair			0.7		2.5	1,3,5,6,14	
0503	REAR PANEL ASSEMBLY (A5)	Inspect			0.1		0.1		
		Replace			0.7		0.7	5	
		Repair			0.9		0.9	5	
050301	BACKPLANE CIRCUIT CARD ASSEMBLY (ASA1)	Inspect	Inspect				0.1	0.1	
		Replace			0.6		0.6	5	
		Test			0.5		1		
		Repair					2.0	5	
050302	REAR PANEL SUBASSEMBLY	Repair			4.0		4.0	5	
		Replace			0.7		0.7		
050303	POWER CONNECTOR ASSEMBLY	Replace			0.5		0.5	5	
		Repair			1.0		1.0	2,5	

SECTION II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
050304	FAN ASSEMBLY	Replace			6.0		6.0	5	
		Repair			2.5		3.5	2,5	
0504	HARNESS ASSEMBLY (A7W1)	Repair			1.0		1.0	1,2,5	
		Replace			0.2	0.2	5		
0505	CHASSIS SUBASSEMBLY (ABA1)	Inspect		0.1					
		Service		0.2					
		Repair					6.0	5	
		Replace			0.7		0.7		
		B-5							

**Section III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
ENCODER-DECODER KY-883/GSC**

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	D,F	MULTIMETER, AN/PSM-6()	6625-00-724-8582	
2	D,F	CRIMPING TOOL, MS 90413-1A	5120-00-832-6420	
3	D	OSCILLOSCOPE, OS-261/U	6645-00-127-0079	
4	D,F,O	TOOL KIT, ELECTRONIC EQUIPMENT, TK-100/G		5180-00-605-
0079				
5	D,F	TOOL KIT, ELECTRONIC EQUIPMENT, TK-105/G		5180-00-610-
8177				
6	D	TRANSFORMER, P/N WSMT3AW (NFG. CODE 13850)		5950-00-137-
7789				
7	0	TEST SET, ATP, (MFG. CODE 11627)		P/N 22640
8	D	TEST SET, DISPLAY/CONTROL, (MFG. CODE 11627)		P/N 22650
9	0	TEST SET, DECODER (MFG. CODE 11627)		P/N 22660
10	D	TEST SET, INPUT/OUTPUT, (MFG. CODE 11627)		P/N 22670
11	D	TEST SET, INTERLEAVER, (MFG. CODE 11627)		P/N 22680
12	D	FREQUENCY METER, HP (MFG. CODE 50438)	6625-01-018-6361	P/N 53008
13	D	PLUG-IN, ELECTRONIC, HP (MFG. CODE 28480)		6625-01-022-
6231P/N 5308A				
14	D	TEST SET, POWER SUPPLY, (MFG. CODE 11627)		P/N 9976-1
		B-6		

REFERENCE CODE	Section IV REMARKS
<p>A B C D E F G H</p>	<p>OFF-LINE SELF-TEST REPLACE PLUG-IN CIRCUIT CARD ASSEMBLIES, MODE SWITCH KNOB, OR FUSE. ACCEPTANCE TEST PROCEDURE. REPLACE BACKPLANE HARNESS. REPLACE CIRCUIT CARD ASSEMBLY SOLDERED COMPONENTS. REPLACE DISPLAY AND CONTROL OR BACKPLANE CIRCUIT CARD ASSEMBLY. REPLACE FUSEHOLDER, POWER SWITCH, OR RESTRAINT ASSEMBLY. REPLACE CIRCUIT CARD EJECTORS AT DIRECT SUPPORT</p> <p style="text-align: center;">B-7/(B-B blank)</p>

APPENDIX C

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

Section I. INTRODUCTION

C-1. Scope

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

C-2. General

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

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

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

C-3. Explanation of Columns

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

a. Column (1) -Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

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

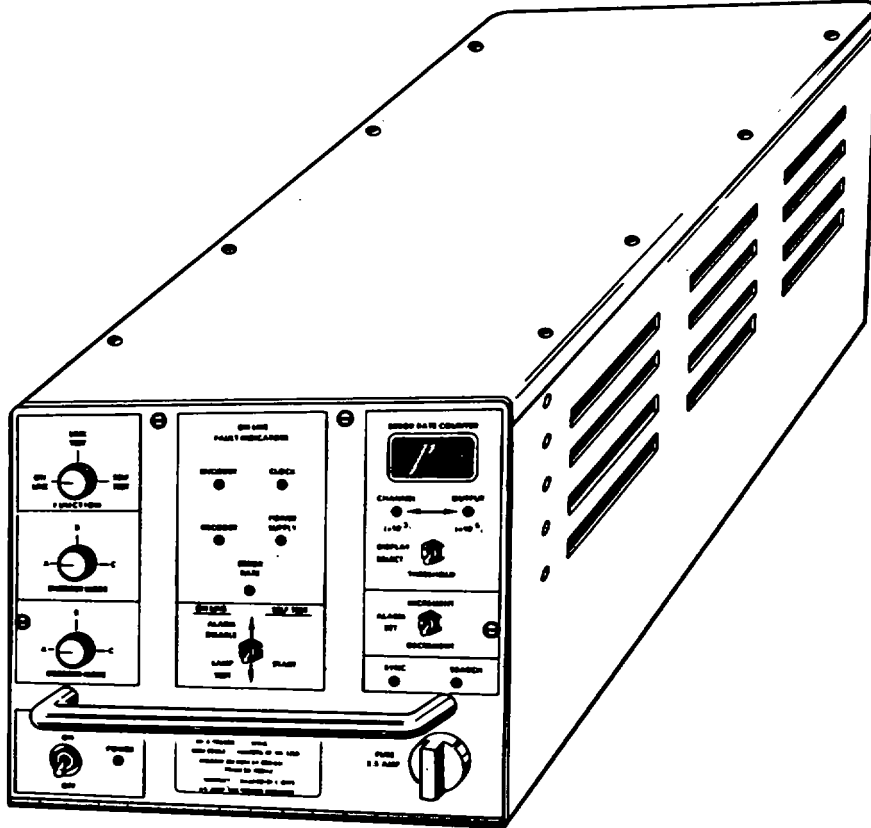
c. Column (3) - Description. Indicates the Federal-item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4) - Unit of Measure (U/M). indicates the measure used in performing the actual operational/maintenance function. This

measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

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

Section II. COMPONENTS OF END ITEM



(1) ILLUS NUMBER	(2) NATO STOCK NUMBER	(3) DESCRIPTION (FSCM) and Part Number	Usable On Code	(4) U/M	(5) QTY Rqr
	5895-01-114-1358	Encoder-Decoder KY-883/GSC (80063) SM-D-986500 C-2		EA	1

Section III. BASIC ISSUE ITEMS

(1) ILLUS NUMBER	(2) NATO STOCK NUMBER	(3) DESCRIPTION (FSCM) and Part Number	Usable On Code	(4) U/M	(5) QTY Rqr
		TM 11-5895-1179-13 Operator's, Organizational, & Direct Support Maintenance Manual C-3/(C-4 blank)		EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION
LIST

Not Applicable

D-1/(D-2blank)

APPENDIX E

EXPENDABLE SUPPLIES
AND
MATERIALS LIST

Section I. INTRODUCTION

E-1. Scope

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

E-2.Explanation of Columns

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

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

C - Operator/Crew

O - Organizational Maintenance

F - Direct Support Maintenance

H - General Support Maintenance

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

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the 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.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	F	5970-01-022-3949	Adhesive (21109) 465-11	EA
2	C	6850-00-105-3084	Freon (73925) Type TF	EA
3	F	8030-01-070-9851	Locktite Grade HV #17 (05972) 79-21	EA
4	F	9525-00-807-5505	Lockwire (96906) MS 20995C-20	IN
5	F	8040-01-136-1116	Silicon Adhesive (71984) RTV3145	EA
6	F	6850-00-927-9461	Silicon Heat Sink Compound (71983) Type 340	EA
7	F	5975-00-767-0524	Tiedown Strap (96906) MS 3367-4-1	EA
			E-2	

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