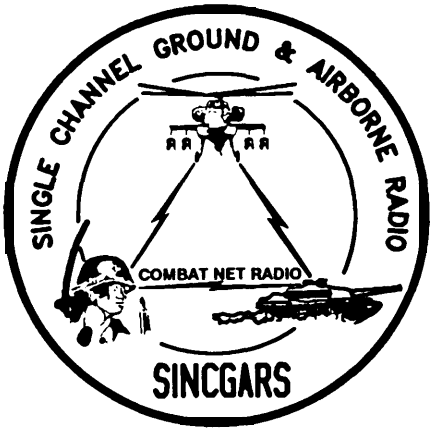
TECHNICAL MANUAL

DIRECT SUPPORT MAINTENANCE MANUAL

(VOLUME 5)



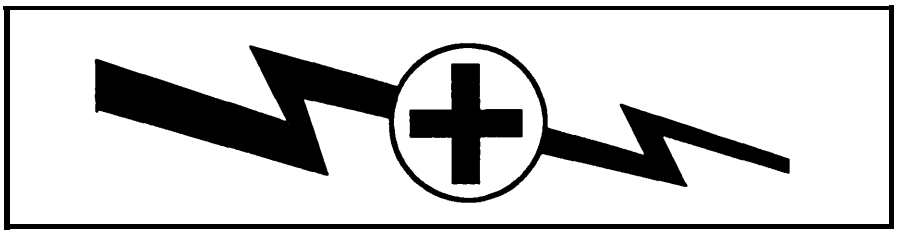
GROUND NON-ICOM RADIO SETS

CONSISTING OF:

RECEIVER-TRANSMITTER, RADIO RT-1439/VRC (NSN 5895-01-195-0827)
MAINTENANCE GROUP, ELECTRICAL EQUIPMENT OA-9263A/GRC (NSN 5820-01-304-2010)
AMPLIFIER-ADAPTER, VEHICULAR
AM-7239/VRC (NSN 5895-01-188-8819)
AM-7239B/VRC (NSN 5895-01-334-3164)
AMPLIFIER, RADIO FREQUENCY AM-7238/VRC (NSN 5895-01-195-4844)
CONTROL-MONITOR C-11291/VRC (NSN 5820-01-151-9914)
MOUNTING BASE, ELECTRICAL EQUIPMENT
MT-6352/VRC (NSN 5975-01-188-8873)
MT-6353/VRC (NSN 5975-01-235-1962)
MT-6429/VRC (NSN 5820-01-220-7901)
MT-6576/VRC (NSN 5975-01-285-2352)
BATTERY BOX CY-8523A/PRC (NSN 6160-01-284-4200)
ANTENNA BASE, ELECTRICAL EQUIPMENT
AS-3684NRC (NSN 5985-01-189-7925)
AS-3900/VRC (NSN 5985-01-297-2971)
CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL
CX-13313/VRC (NSN 5995-01-303-4951)
CX-13293/VRC (NSN 5995-01-295-5360)
POWER SUPPLY ADAPTER, VEHICULAR MX-10862/VRC (NSN 6130-01-284-4195)
TRAY, BATTERY CY-8664/VRC (NSN 6160-01-339-7723)
LOUDSPEAKER-CONTROL UNIT LS-671/VRC (NSN 5965-01-222-1420)
FILL DEVICE, ELECTRONIC COUNTER COUNTERMEASURES
MX-10579/VRC (NSN 5895-01-188-8816)
MX-18290/VRC (NSN 5895-01-270-3935)

HEADQUARTERS, DEPARTMENT OF THE ARMY

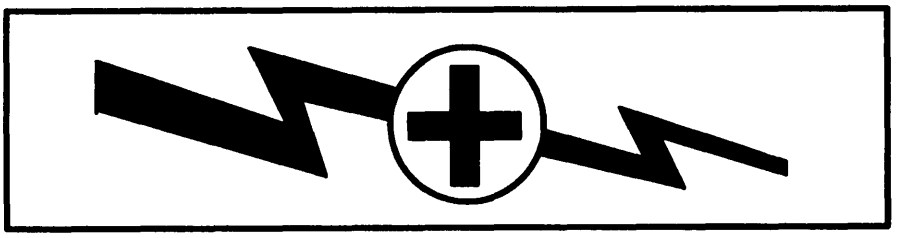
1 SEPTEMBER 1992



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 INSULATION 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



HIGH VOLTAGE is present during testing and troubleshooting of Receiver-Transmitter, Radio RT-1439/VRC; Amplifier, Radio Frequency AM-7238/VRC; and Amplifier-Adapter, Vehicular AM-7239/VRC or AM-7239B/VRC. **DEATH ON CONTACT** can result, so observe the following safety precautions:

If at all possible, work on the equipment only when another person is nearby who is competent in **CARDIOPULMONARY RESUSCITATION (CPR)** and knows the five safety steps on page a.

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technicians are aided by operators, they must be warned about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections or 115 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through the body.

DO NOT BE MISLED by the terms “low voltage” and “low potential”. Voltages/potentials as low as 50 volts can cause **DEATH** under certain conditions.

Remove or tape all personal metal objects (e.g., watches, rings, and medallions) before working on C-E equipment.

For artificial respiration, refer to FM 21-11.

HARDNESS CRITICAL PROCESS

The RT-1439/VRC series of radio sets have been designed to survive the effects of a nuclear explosion. This includes overpressure and burst, thermal radiation, electromagnetic pulse (EMP), and transient radiation effects on electronics (TREE). These maintenance procedures that are critical in maintaining the nuclear hardness of the radio are marked **HCP** .

WARNING

A lithium-sulfur dioxide (Li-SO_2) battery used with the Battery Box, CY-8523A/PRC contains pressurized sulfur dioxide (SO_2) gas. The gas is toxic, and the battery **MUST NOT** be abused in any way which may cause the battery to rupture.

DO NOT heat, short circuit, crush, puncture, mutilate, or disassemble the battery.

DO NOT USE any battery which shows signs of damage, such as bulging, swelling, disfigurement, brown liquid in the plastic wrap, a swollen plastic wrap, etc.

DO NOT test Li-SO_2 batteries for capacity.

DO NOT recharge Li-SO_2 batteries.

DO NOT use water to extinguish Li-SO_2 battery fires if a shock hazard exists due to high voltage equipment in the immediate vicinity (i.e., greater than 30 volts, alternating current (ac) or direct current (dc).

If the battery compartment becomes hot to the touch, if you hear a hissing sound (i. e., battery venting), or smell irritating sulfur dioxide gas, **IMMEDIATELY Turn Off** the equipment. Remove the equipment to a well ventilated area or leave the area.

DO NOT use a Halon type fire extinguisher on a lithium battery fire.

In the event of a fire, near a lithium battery (ies), rapid cooling of the battery (ies) is important. Use a carbon dioxide (CO_2) extinguisher. Control of the equipment fire, and cooling, may prevent the battery from venting and potentially exposing lithium metal. In the event that lithium metal becomes involved in a fire, the use of a graphite based Class D fire extinguisher is recommended, such as Lith-X or MET-L-X.

DO NOT store lithium batteries with other hazardous materials and keep them away from open flame or heat.

WARNING

Isopropyl alcohol is flammable and toxic to skin, eyes, and respiratory tract. Avoid skin and eye contact. Good general ventilation is normally adequate. Keep away from open flames or other sources of ignition.

CAUTION

THIS EQUIPMENT CONTAINS PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD).

USE PRECAUTIONARY PROCEDURES WHEN TOUCHING, REMOVING OR INSERTING PRINTED CIRCUIT BOARDS.

GENERAL HANDLING PROCEDURES FOR ESD ITEMS

USE WRIST GROUND STRAPS OR MANUAL GROUNDING PROCEDURES.
KEEP ESD ITEMS IN PROTECTIVE COVERING WHEN NOT IN USE.
GROUND ALL ELECTRICAL TOOLS AND TEST EQUIPMENT.
PERIODICALLY CHECK CONTINUITY AND RESISTANCE OF GROUNDING SYSTEM.
USE ONLY METALIZED SOLDER SUCKERS.
HANDLE ESD ITEMS ONLY IN PROTECTED AREAS.

MANUAL GROUNDING PROCEDURE

MAKE CERTAIN EQUIPMENT IS POWERED DOWN.
TOUCH GROUND PRIOR TO REMOVING ESD ITEMS.
TOUCH PACKAGE OF REPLACEMENT ESD ITEMS TO GROUND BEFORE OPENING.
TOUCH GROUND PRIOR TO INSERTING REPLACEMENT ESD ITEMS.

ESD PROTECTIVE PACKAGING AND LABELING

INTIMATE COVERING OF ANTISTATIC MATERIAL WITH AN OUTER WRAP OF EITHER TYPE 1 ALUMINIZED MATERIAL OR CONDUCTIVE PLASTIC FILM

OR

HYBRID LAMINATED BAGS HAVING AN INTERIOR OF ANTISTATIC MATERIAL WITH AN OUTER LAYER OF METALIZED MATERIAL.
LABEL WITH SENSITIVE ELECTRONIC SYMBOL AND CAUTION NOTE, AS ABOVE.

CAUTION

Devices such as CMOS, NMOS, MNOS, VMOS, HMOS, thin-film resistors PMOS, and MOSFET used in many equipments can be damaged by static voltages present in most repair facilities. Most of the components contain internal gate protection circuits that are partially effective, but sound maintenance practice and the cost of equipment failure in time and money dictate careful handling of all electrostatic sensitive components.

The following precautions should be observed when handling all electrostatic sensitive components and units containing such components.

CAUTION

Failure to observe all of these precautions can cause permanent damage to the electrostatic sensitive device. This damage can cause the device to fail immediately or at a later date when exposed to an adverse environment.

STEP 1 Turn off and/or disconnect all power and signal sources and loads used with the unit.

STEP 2 Place the unit on grounded conductive work surfaces.

STEP 3 Ground the repair operator using a conductive wrist strap or other device using a 1 M Ω series resistor to protect the operator.

STEP 4 Ground any tools (including soldering equipment) that will contact the unit. Contact with the operator's hand provides a sufficient ground for tools that are otherwise electrically isolated.

STEP 5 All electrostatic sensitive replacement components are shipped in conductive foam or tubes and must be stored in the original shipping container until installed.

STEP 6 When these devices and assemblies are removed from the unit, they should be placed on the conductive work surface or in conductive containers.

STEP 7 When not being worked on, wrap disconnected circuit boards in aluminum foil or in plastic bags that have been coated or impregnated with a conductive material.

STEP 8 Do not handle these devices unnecessarily or remove from their packages until actually used or tested.

STEP 9 Do not mount static pads on conductive surfaces. No test equipment is to be placed on static pads. No equipment resting on a static pad is to be plugged into an electrical outlet.

Technical Manual
No. 11-5820-890-30-5

Headquarters
Department of the Army
Washington, D. C., 1 September 1992

Direct Support Maintenance Manual

Receiver-Transmitter, Radio RT-1439/VRC	(NSN	5895-01-195-0827);
Maintenance Group OA-9263A/GRC	(NSN	5820-01-304-2010);
Amplifier-Adapter, Vehicular AM-7239/VRC	(NSN	5895-01-188-8819);
AM-7239B/VRC	(NSN	5895-01-334-3164);
Amplifier, Radio Frequency AM-7238/VRC	(NSN	5895-01-195-4844);
Control Monitor C-11291/VRC	(NSN	5820-01-151-9914);
Mounting Base, Electrical Equipment MT-6352/VRC	(NSN	5975-01-188-8873);
Battery Box CY-8523A/PRC	(NSN	6140-01-284-4200);
Mounting Base, Electrical Equipment MT-6353/VRC	(NSN	5975-01-235-1962);
Antenna Base AS-3684/VRC	(NSN	5985-01-189-7925);
AS-3900/VRC	(NSN	5985-01-297-2971);
Cable Assy, Special Purpose, Electrical CX-13313/VRC	(NSN	5995-01-303-4951);
Mounting Base, Electrical Equipment MT-6429/VRC	(NSN	5820-01-220-7901);
Cable Assy, Special Purpose, Electrical CX-13293/VRC	(NSN	5995-01-295-5360);
Power Supply Adapter, Vehicular MX-10862/VRC	(NSN	6130-01-284-4195);
Tray, Battery CY-8664/VRC	(NSN	6160-01-339-7723);
Mounting Base, Electrical Equipment MT-6576/VRC	(NSN	5975-01-285-2352);
Loudspeaker-Control Unit LS-671/VRC	(NSN	5965-01-222-1420);
Fill Device, ECCM MX-10579/VRC	(NSN	5895-01-188-8816);
MX-18290/VRC	(NSN	5895-01-270-3935)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know 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 the back of this manual direct to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-ME-PS, Fort Monmouth, New Jersey 07703-5007. A reply will be furnished direct to you.

Page

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Continued)

LIST OF ILLUSTRATIONS (Continued)

LIST OF ILLUSTRATIONS (Continued)

LIST OF TABLES

HOW TO USE THIS MANUAL

This manual is divided into 18 chapters. Chapter 1 is an introduction to the equipment. Chapters 2 thru 18 are on the units maintained by the Direct Support (DS) Maintenance. Each chapter begins with an index to the sections. Most of the sections also begin with indexes.

How to Find Something Fast. Check the index on the front cover. The sections you will use most often are boxed on the front cover. The boxes line up with edge marks on the pages. If you need something that is not listed there, use the alphabetical index in the back of this manual.

Operating Procedures and Unit Maintenance Instructions. Procedures for operating the equipment are not included in this manual. You should read the Operator's Manual TM 11-5820-890-10-3 and be familiar with the procedure in it prior to performing DS maintenance. Also, the information in the Unit Maintenance Manual TM 11-5820-890-20-2 is not repeated in the Direct Support Maintenance Manual.

Read all preliminary information found at the beginning of each procedure. It has important information and safety instructions you must follow before beginning work.

Warning pages are at the beginning of this manual. You should learn the warnings before doing maintenance on the equipment. Always follow appropriate safety procedures and precautions.

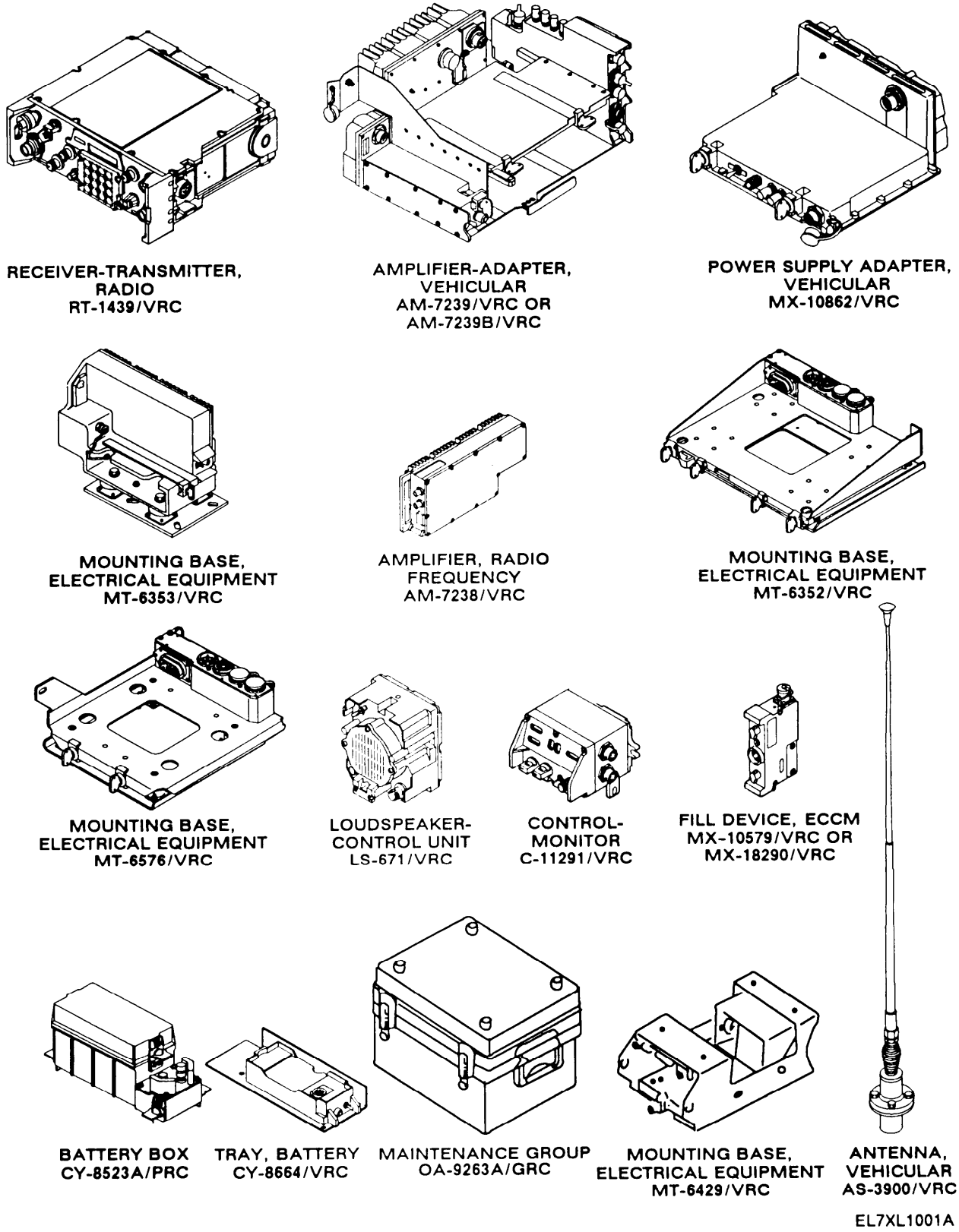


Figure 1-1. RT-1439/VRC Series Radio components

CHAPTER 1

INTRODUCTION

OVERVIEW

This chapter provides general information about the communication-electronics (C-E) items of equipment that make up the RT-1439/VRC series of radio sets.

The principles of operation and specific maintenance instructions for the components are included in the maintenance chapters.

Section I. GENERAL INFORMATION

1-1. SCOPE.

Type of Manual: This manual covers the direct support level of maintenance for the RT-1439 series of radio sets.

Model Numbers and Equipment Names: The following equipment is covered:

Receiver-Transmitter, Radio RT-1439/VRC
Maintenance Group OA-9263A/GRC
Amplifier-Adapter, Vehicular AM-7239/VRC and AM-7239B/VRC
Amplifier, Radio Frequency AM-7238/VRC
Control-Monitor C-11291/VRC
Mounting Base, Electrical Equipment MT-6352/VRC
Battery Box CY-8523A/PRC
Mounting Base, Electrical Equipment MT-6353/VRC
Antenna, Vehicular AS-3684/VRC or AS-3900/VRC
Mounting Base, Electrical Equipment MT-6429/VRC
Power Supply Adapter, Vehicular MX-10862/VRC
Tray, Battery CY-8664/VRC
Mounting Base, Electrical Equipment MT-6576/VRC
Loudspeaker-Control Unit, LS-671/VRC
Fill Device, ECCM MX-10579/VRC and MX-18290/VRC

They are shown in figure 1-1.

Purpose of Radio Sets: The purpose of the RT-1439/VRC series of radio sets is to provide short-range, two-way radio communication in the 30 to 87.975 MHz range, using frequency-modulated (FM) transmission and reception.

1-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

1-3. MAINTENANCE FORMS, RECORDS, AND REPORTS.

a. **Reports of Maintenance and Unsatisfactory Equipment.** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

b. **Reporting of Item and Packaging Deficiencies.** Fill out and forward a Report of Discrepancy (ROD) (SF 364) as prescribed by AR 735-11-2/DLAR 4140.55/SECNAVlNST 4355.18/AFR 400-54/MCO 4430.3J.

c. **Transportation Discrepancy Report (TDR) (SF 361).** Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed by AR 55-38/NAVSUPlNST 461 0.33C/AFR 75-18/MCO P4610.19D/ DLAR 4500.15.

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your RT-1439 radio set component 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 the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-ME-PS, Fort Monmouth, New Jersey, 07703-5023. We'll send you a reply.

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 operational check should be performed to insure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraphs 2-55, 3-41, 4-79, 5-23, 6-25, 7-18, 8-25, 9-19, 10-11, 11-11, 12-10, 13-12, 14-42, 15-37, 16-18, 17-22, and 18-12.

1-6. DESTRUCTION OF ARMY ELECTRONICS MATERIEL TO PREVENT ENEMY USE.

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

1-7. NOMENCLATURE CROSS-REFERENCE LIST.

This list contains common names used throughout this manual in place of official nomenclature.

Common Name	Official Nomenclature
Battery box	Battery Box CY-8523A/PRC
Battery tray	Tray, Battery CY-8664/VRC
Control-monitor	Control-Monitor C-11291/VRC
Frequency counter	Frequency Counter TD-1225(V)1/U
DMM	Digital Multimeter AN/USM-486
ECCM fill device	Fill Device, Electronic Counter-Countermeasures MX-10579/VRC or MX-18290/VRC
Function generator	Function Generator SG-1171/U

1-7. NOMENCLATURE CROSS-REFERENCE LIST. Continued

Common Name	Official Nomenclature
Handset	Handset H-250/U
Holding battery	Battery, Holding BA-5372/U
Interconnecting device	Interconnecting Device J-4501/GRC
Loudspeaker	Loudspeaker-Control Unit, LS-671/VRC
Maintenance group	Maintenance Group OA-9263A/GRC
Mounting adapter	Amplifier-Adapter, Vehicular AM-7239/VRC and AM-7239B/VRC
Mounting base	Mounting Base, Electrical Equipment MT-6352/VRC or MT-6576/VRC
PA mount	Mounting Base, Electrical Equipment MT-6353/VRC
Power amplifier	Amplifier, Radio Frequency AM-7238/VRC
Power supply adapter	Power Supply Adapter, Vehicular MX-10862/VRC
RT	Receiver-Transmitter, Radio RT-1439/VRC
Scope	Oscilloscope AN/USM-488
Signal generator	Signal Generator SG-1112
Test adapter	Adapter, Test (PN A3018710-1)
Test power supply	Power Supply HP 6434B
Reference fixture	Radio Set AN/VRC-87 (part of maintenance group)

Section II. EQUIPMENT DESCRIPTION AND DATA

1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

Refer to Operator's Manual TM 11-5820-890-10-3 and Unit Maintenance Manual TM 11-5820-890-20-2 for general information on the characteristics, capabilities, and features of this equipment.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Refer to sections I and IV of the maintenance chapters for the location and description of major internal components.

1-10. EQUIPMENT DATA.

RECEIVER-TRANSMITTER, RADIO RT-1439/VRC

Audio input impedance	150 ohms
Audio input level	0.7 to 2.1 mV rms
Audio frequency response	300 to 3000 Hz
Audio distortion (max)	7 percent
Audio output power	50 mW
Sidetone level	3 to 9 dB below received audio level
Squelch tone	150 Hz (147 to 153 Hz)
Receive sensitivity	
Audio, SC	-116 dBm
Audio, FH	-115 dBm
16 kb/s, SC	-116 dBm
16 kb/s, FH	-115 dBm
75 b/s to 4.8 kb/s, SC	-116 to -112 dBm
75 b/s to 4.8 kb/s, FH	-115 to -111 dBm
AD1 , SC	-112 dBm
AD1 , FH	-110 dBm
AD2, SC	-117 dBm
AD2, FH	-116 dBm
RF frequency accuracy	±3 PPM
Holding battery current drain (max)	
Clock on	1.2 mA
Clock off	0.5 mA
Warm-up time (max at 20° to 30°C)	
Operational (±50 PPM)	10 seconds
Specification (±3 PPM)	1 minute

1-11. SAFETY, CARE, AND HANDLING.

Safety hazards are present when testing and troubleshooting the equipment. Review the WARNINGS and CAUTIONS in the front of this manual and in each maintenance chapter. WARNINGS provide information on safety hazards that can cause personal injury. The high voltage present during some of the tests can cause death. CAUTIONS provide information of safety hazards that can cause equipment damage. Most of the modules have integrated circuits that can be damaged by static electricity.

CHAPTER 2

RECEIVER-TRANSMITTER, RADIO RT-1439/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

2-1. INTRODUCTION.

The RT can be divided into five parts or functional sections. They are:

Control Section
RF Section
Audio/Data Section
Power Supply
RT Chassis

Figure 2-1 illustrates the basic interconnections of the Resections. Figure 2-2 shows the partitioning of the RT.

2-1. INTRODUCTION. Continued

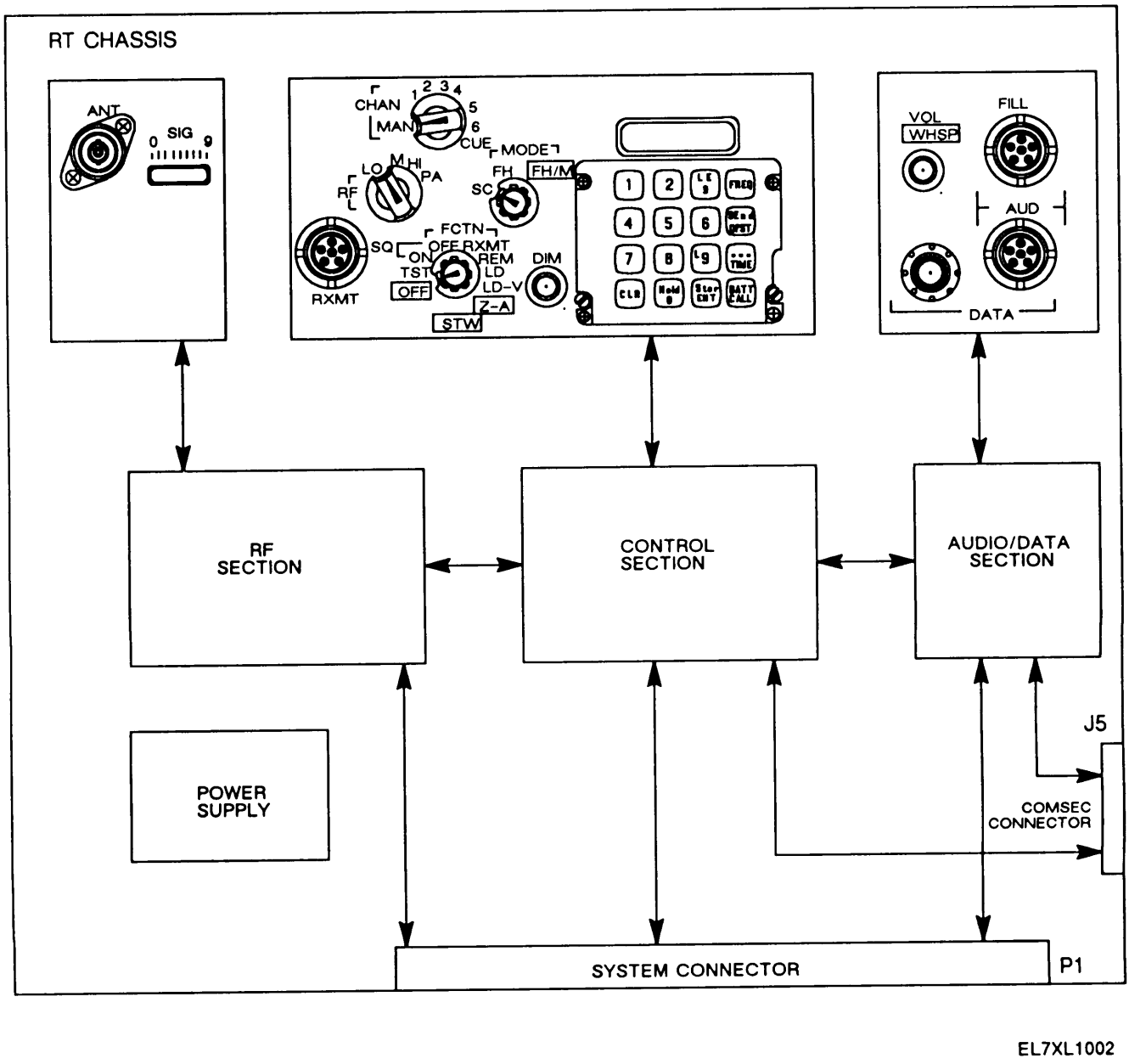


Figure 2-1. RT Functional Sections Block Diagram

2-1. INTRODUCTION. Continued

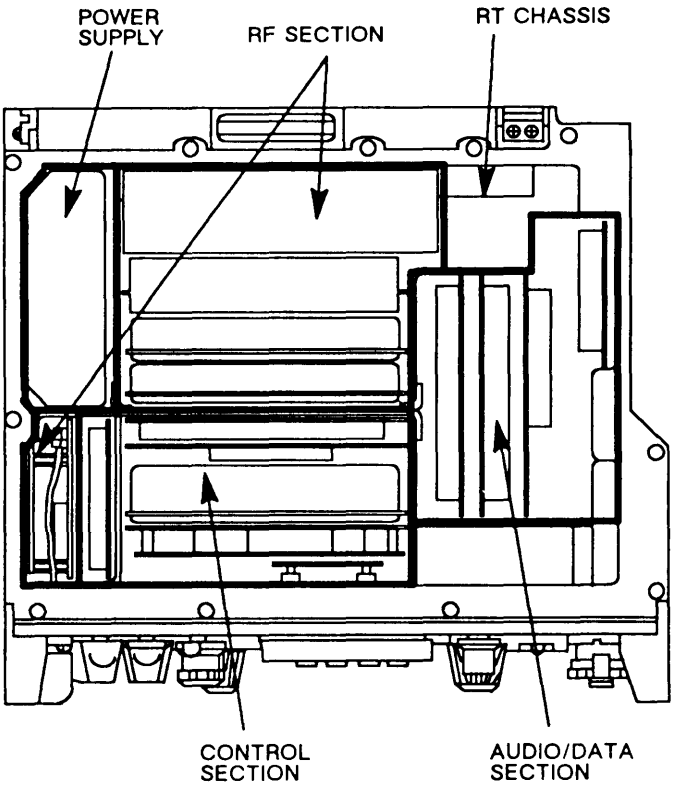


Figure 2-2. RT Partitioning of Functional Sections

The control section contains the microprocessors, programming, and interface circuits that:

Scan the front panel for operator instructions.
Provide feedback to the operator through the keyboard display.
Control frequency selection during FH operation.
Control signal routing between modules.
Provide the remote control interface.

The control section is described in paragraph 2-2.

The RF section is digitally tuned by the control section. When receiving, it demodulates the RF signal. The recovered audio or data signal is routed to its destination through the control section. When transmitting, it modulates the RF carrier with the audio or data signal. The RF section is described in paragraph 2-3.

The audio/data section provides:

The interface circuitry for audio and data input/output (I/O).
Audio/Data signal level control.
Enhanced data handling capability.
COMSEC interface.

The audio/data section is described in paragraph 2-4.

2-1. INTRODUCTION. Continued

The power supply converts the dc input voltage into the voltages required by the other modules in the RT. It is described in paragraph 2-5.

The RT chassis includes:

The front panel with its switches, controls, connectors, and displays.
The module interconnections.
Frame for physical support of the modules.
System, battery, and COMSEC connectors.

It is described in paragraph 2-6.

A description of the types of signals present in the RT is included in paragraph 2-7.

Paragraphs 2-8 through 2-21 provide functional description of the RT in different modes of operation.

2-2. CONTROL SECTION.

The control section consists of five modules. They are:

Electronic Components Assembly - Control 1A4 (control module).
Control, Counter-Countermeasures - Electronic 1A5 (ECCM module).
Circuit Card Assembly - Remote I/O 1A2 (remote l/O module).
Circuit Card Assembly - Two-Wire Interface 1A6 (two-wire interface).
Circuit Card Assembly - Switch 1A7 (switching module).

The module locations are shown in figure 2-3.

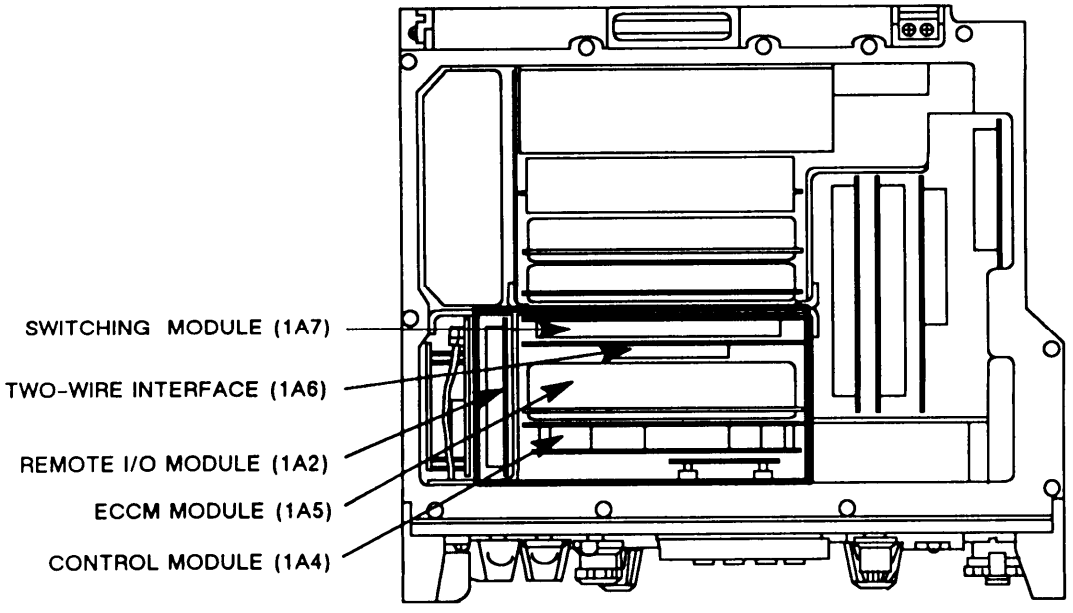


Figure 2-3. Control Section Module Locations

2-2. CONTROL SECTION. Continued

The control module contains a microprocessor and the programming used in single channel operation. Buffers, registers, and interface circuits are included to permit the microprocessor to communicate with the other RT modules. It checks the FCTN, MODE, RF, and CHAN switches and the keyboard for operator action. If the operator's actions are valid, the other modules and the front panel display are informed of any directed changes. Control signals are described in paragraph 2-14.

The ECCM module contains another microprocessor and the programming used in frequency hopping operation. The ECCM module has two connectors. One connects to the control module and the other to the RT chassis. When the MODE switch is set to FH or FH/M, the microprocessor in the control module executes instructions in the ECCM module. It uses the hopset and lockout sets to build a look-up table of frequencies. The TRANSEC variable, FH sync time (TOD), and net ID number are used to select a frequency from that table. When transmitting, the ECCM module converts the analog signal into a digital data signal. The ECCM module microprocessor interleaves the data signal onto the frequency hops. When receiving, the process is reversed. Frequency hopping operation is described in paragraph 2-15.

The remote I/O module and two-wire interface provide the remote operating capability. The two-wire interface sends and receives information to and from the remote control unit over a two-wire link. Control information is encoded using frequency shift keying (FSK). It converts instructions received into a digital data stream for the remote I/O module. A microprocessor in the remote I/O module interprets the instructions and exchanges data with the control module. During remote operation, the control module executes instructions from the remote I/O module instead of the front panel. Remote operation is described in detail in paragraph 2-19. (Also see Chapter 6 on the control-monitor.)

The switching module functions like a railroad switching yard. Many signals are routed between modules through the switching module. The path the signals take is determined by control input signals. It also performs the following functions.

Bit synchronization.
Premodulation filtering.
Tone squelch.
Notch Filtering.
Modulation level control.
Generation of clock frequencies using the 3.2-MHz clock signal from the synthesizer.
Input and output control during retransmit operation.

The switching module is involved in most functions of the RT.

2-3. RF SECTION.

The RF section consists of five modules. They are:

Network, Impedance Matching 1A1
lF/Demodulator 1A8
Tuner/Mixer 1A9
Synthesizer, Electrical Frequency 1A10 (synthesizer)
Exciter/Power Amplifier 1A11

The module locations are shown in figure 2-4.

2-3. RF SECTION. Continued

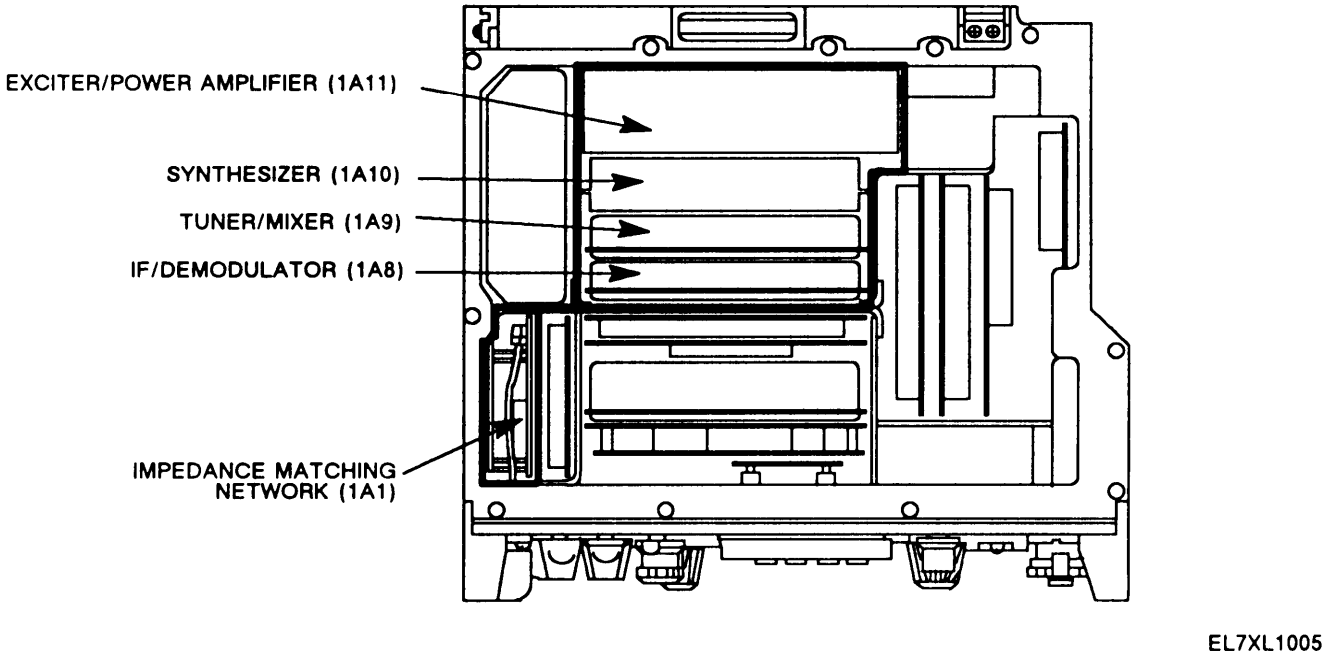


Figure 2-4. RF Section Module Locations

The impedance matching network provides the impedance matching required for the RT to operate with two different antenna types. It provides a 50-ohm impedance when used with a vehicular antenna. To keep the VSWR below 3.5:1 when used with a manpack antenna, one of the module's three matching circuits is used. The module receives frequency data from the control module which is used to select the matching circuit. A detector in the module checks the VSWR when transmitting with a manpack antenna. If it goes above 5:1, sidetone is disabled.

The tuner/mixer and lF/demodulator perform basic receive functions. The tuner/mixer filters and amplifies the received RF signal and mixes it with the local oscillator (LO) signal from the synthesizer. The resulting IF signal is sent to the lF/demodulator. It demodulates the IF signal to recover the transmitted audio or data signal. The lF/demodulator detects cue signals during FH operation. Receive operation is described in paragraph 2-10.

The exciter/power amplifier performs the basic transmit functions. It modulates the RF carrier with the audio or data signal. It then amplifies it to the required output level, Transmit operation is described in paragraph 2-11.

The synthesizer provides the reference frequencies for the tuner/mixer and the exciter/power amplifier.

2-4. AUDIO/DATA SECTION.

The audio/data section consists of four modules. They are:

Circuit Card Assembly - Audio Power Supply 1A12 (audio power supply)
Circuit Card Assembly - Audio Control 1A13 (audio control module)
Circuit Card Assembly - Audio/Data I/O 1A14 (audio/data I/O module)
Circuit Card Assembly - Data Rate Adapter 1A15 (data rate adapter)

The module locations are shown in figure 2-5.

2-4. AUDIO/DATA SECTION. Continued

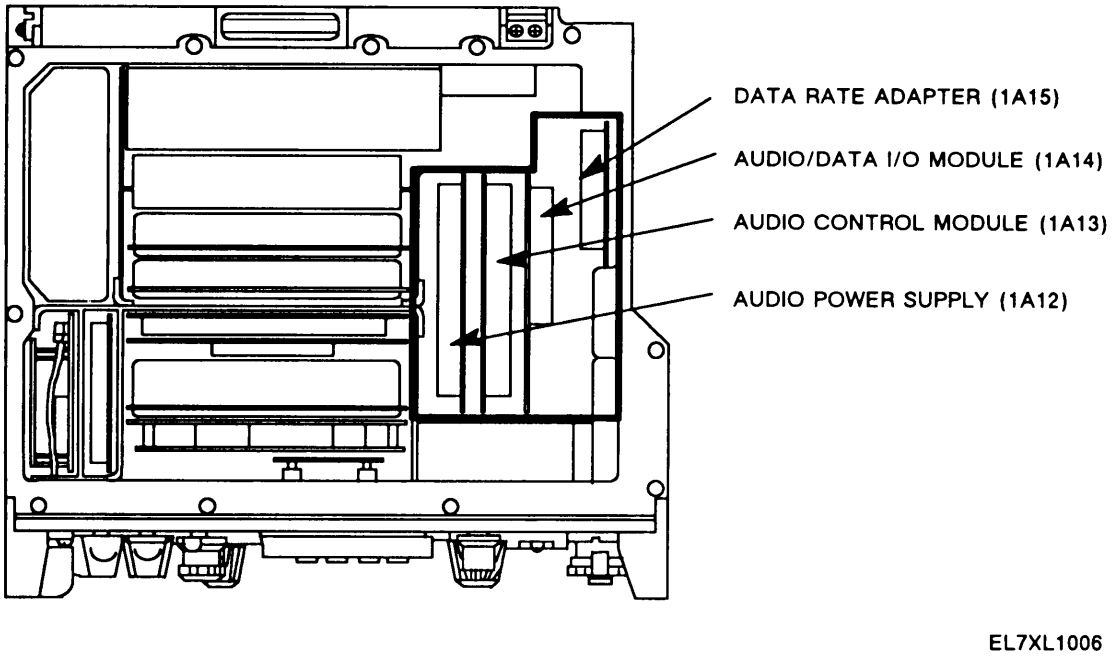


Figure 2-5. Audio/Data Section Module Locations

This section includes the COMSEC interface circuitry. All signals passing between the audio/data section and the rest of the RT are filtered or buffered by the audio power supply. These signals inside the audio/data section are called RED signals to avoid confusion. The audio power supply also adds the 150-Hz squelch tone to the audio or data signal to be transmitted.

The audio control module performs the following functions:

Generation of audio/data section control signals.
Routing of data signals to the data rate adapter.
Plain text/cipher text (PT/CT) signal routing.
Control of the push-to-talk line inside the audio/data section.

The audio/data I/O module controls signal routing within the audio/data section. It also contains the microphone and audio output amplifiers.

The data rate adapter performs the following functions:

Interleaves and deinterleaves low speed data into the 16 kb/s data rate of the RT.
Provides error correction at low speed data rates.
Adds a synchronization preamble to the start of data transmissions to identify the type of data being transmitted.
Inserts and removes transitions in plain text data modes.
Generates low speed data clocks and synchronizes local clocks.

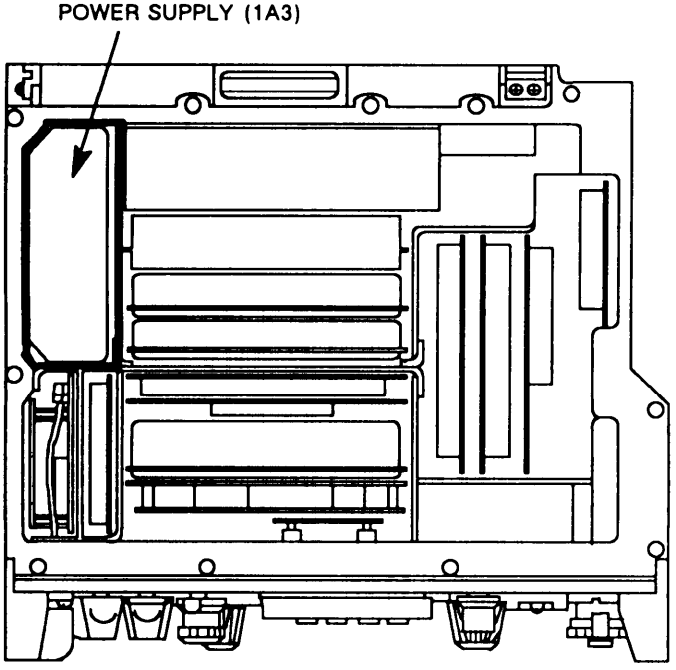
2-5. POWER SUPPLY (1A3).

The power supply is a dc-to-dc solid state power converter. It requires an input voltage of 10.5 to 15 V dc (13 V dc nominal). The maximum current required is 865 mA. Its output voltages are as given in table 2-1.

Table **2-1. Power Supply Output Voltages**

DC Output Voltage (V dc)	Maximum Current (mA)	Maximum Ripple (mV p-p)
6.75 (6.55 to 6.95)	620	10
10.0 (9.7 to 10.3)	180	10
-10.0 (-9.7 to -10.3)	95	10
60.0 (54 to 70)	0.8	25
3.5 (3.33 to 3.68)	880 peak 220 continuous	10

Figure 2-6 shows the location of the power supply. Figure 2-7 is a functional block diagram of the power supply.



EL7XL1007

Figure 2-6. Power Supply Location

2-5. POWER SUPPLY (1A3). Continued

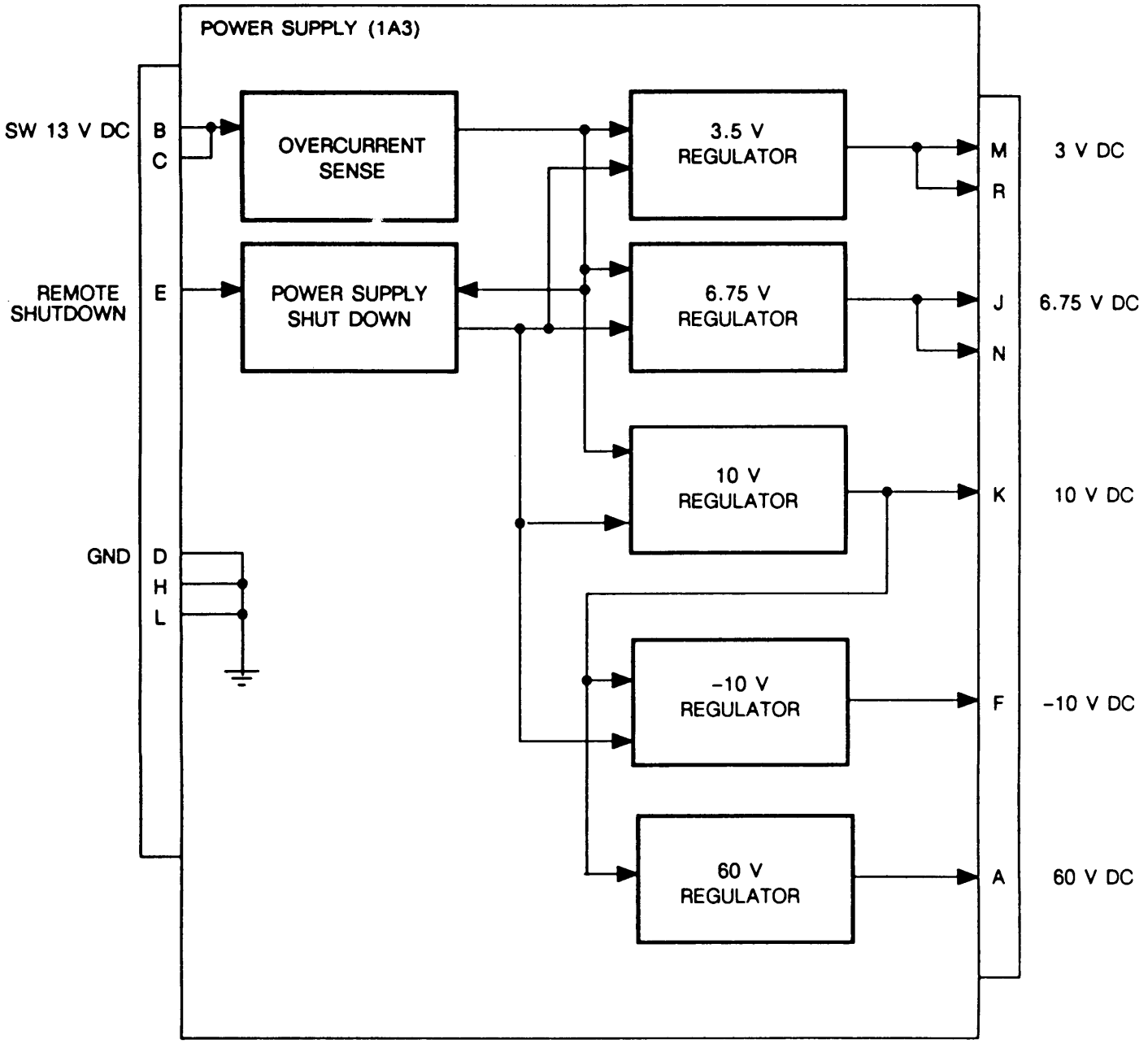


Figure 2-7. Power Supply Functional Block Diagram

2-5. POWER SUPPLY (1A3). Continued

The power supply outputs are over-current protected. If an output is shorted to ground, the power supply will shut down.

CAUTION

The power supply will not be damaged if an output is shorted. However, other modules in the RT may be damaged if this occurs. Exercise caution when troubleshooting the RT.

The power supply will also shut down if 6 V dc is applied to pin E. This is used by the two-wire interface to turn the RT off during remote operation.

The other modules in the RT use the output voltages as listed in table 2-2.

Table 2-2. Power Supply Output Destinations

Voltage (V dc)	Destinations (module-pin)
6.75	1A1-A, 1A2-R, 1A4-8, 1A5-H, 1A6-X, 1A7-77, 1A8-P, 1A9-F, 1A10-J, 1A11-X, 1A12-47, J1-KK, J2-E
10.0	1A5-B, 1A6-T, 1A7-76, 1A8-Q, 1A9-C, 1A10-F, 1A11-F, 1A12-41
3.5	1A1-M, 1A9-B, J2-D
60.0	1A1-Q, 1A11-R
-10.0	1A5-D, 1A6-Z, 1A7-72, 1A8-O, 1A9-A, 1A10-H, 1A11-D, 1A12-57, J2-A

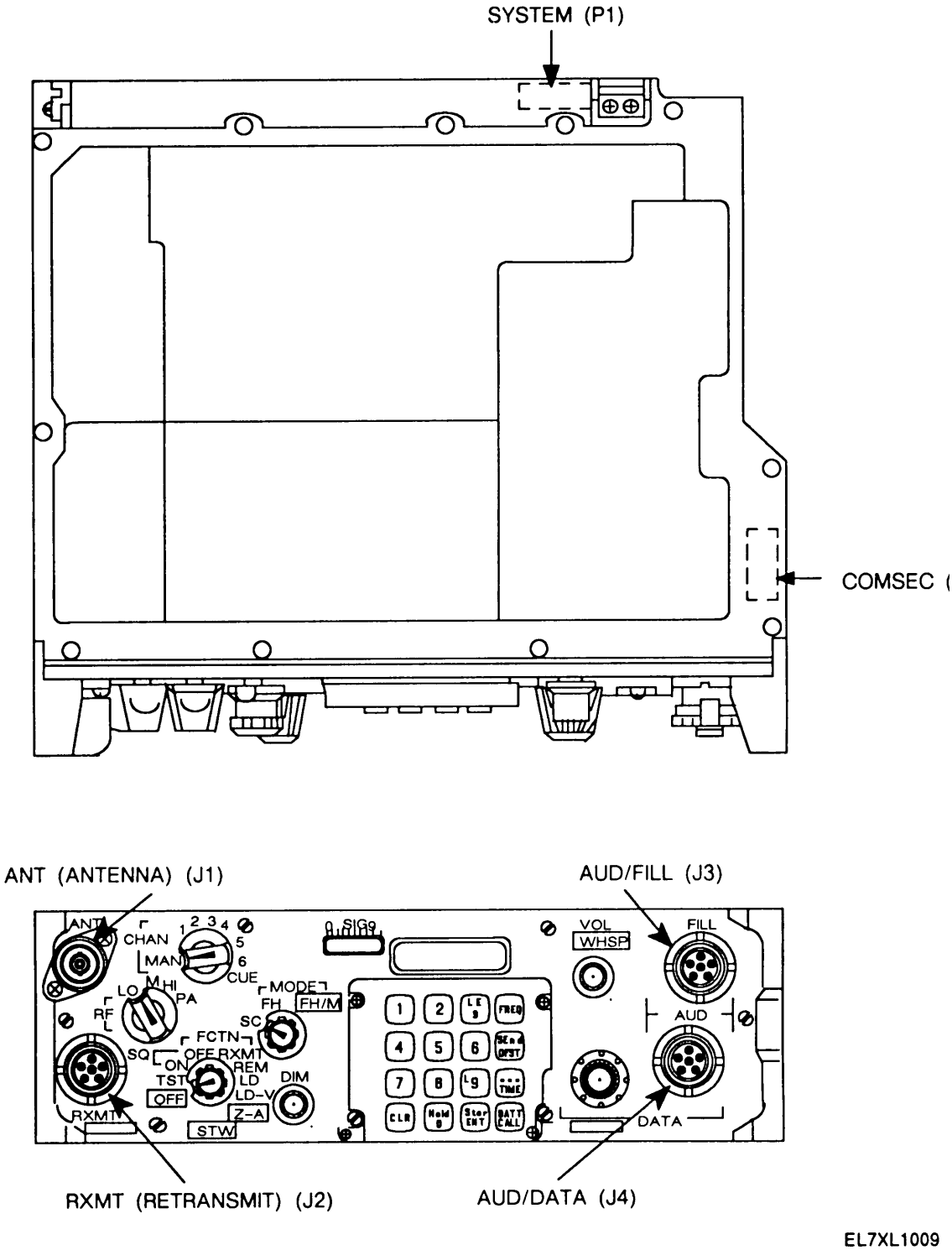
2-6. RT CHASSIS (1A16).

The RT chassis includes the front panel, backplane assembly (parent board), and frame. The controls and connectors on the front panel are used to direct the operation of the RT. The keyboard and SIG displays provide feedback to the operator. The parent board has 15 sockets for the plug-in modules (1A1 through 1A15). It also has three connectors that mate with the front panel connectors. It provides most of the module interconnections. The terminals (E fields) are used as solder points for wires and the flexible circuits that interconnect it to the system and COMSEC connectors. Figure 2-8 identifies the external connectors.

The frame provides physical support for the modules. The covers must be properly installed and the screws torqued to provide the required environmental protection.

Two interlock switches are present on the RT chassis. They protect the TRANSEC variable. They are connected to the ECCM module at pin e through E73. If an RT cover is removed, the switches ground E73. This will cause the ECCM module to zeroize the TRANSEC variable. When troubleshooting an RT with its cover removed, the interlock switch levers must be fully extended to use the FH mode.

2-6. RT CHASSIS (1A16). Continued



2-8. RT Chassis External Connectors

2-7. BASIC RT SIGNAL TYPES.

There are five basic signal types used in the RT:

Analog
Digital
Control
Power
RF

Analog signals include the audio and analog data signals. They can vary greatly in signal level, shape, and frequency.

Digital signals include the timing clocks and digital data signals. Clock frequencies vary. The clocks are used to synchronize the serial digital data streams between modules. Within the RT they are typically at logic 0 and logic 1 levels. RT I/O digital signals use the ±5 V logic levels as required by MIL-STD-188-114. Logic 0 is 5 V dc. Logic 1 is -5 V dc. The ECCM fill device uses 0 V for logic 1 and -6.75 V for logic 0. The logic levels in the RT are as follows:

6.75 V dc Logic: Logic 0 = -0.7 to 2.0 V dc, Logic 1 = 4.7 to 7.5 V dc
Negative Logic: Logic 1 = -5.0 to -7.25 V dc

Control signals include the status and control lines. They will be set to logic 1 to indicate or direct a particular condition. In some cases, a signal name includes a "–N" to indicate that the logic is reversed. For example, a logic 1 on the PTT-N line indicates the absence of a PTT; logic 0 indicates a PTT.

Power signals are at constant V dc levels. Most are provided by the power supply as described in paragraph 2-5. The audio power supply provides the voltages used by the audio/data section.

RF and IF signals are also present in the RT. Coaxial cables are used to pass these signals between modules. Frequencies range from 12.5 (IF) to 100.5 MHz.

2-8. RECEIVE RF SIGNAL PATH.

The RF signal received by the RT is processed by four modules to provide the demodulated audio or data signal. These modules are:

Impedance Matching Network (1A1)
Exciter/Power Amplifier (1A11)
Tuner/Mixer (1A9)
IF/Demodulator (1A8)

See figure FO-1 for the block diagram of this signal path.

The RF signal enters the RT at the ANT connector (J1) and passes through the impedance matching network. The impedance matching network has four bands. One is a 50-ohm network that is used when a BNC is connected to the RT. When a manpack antenna is connected to the RT, one of three impedance matching networks is used depending on the frequency selected.

A logic 1 level is placed on the RF input path by the impedance matching network. If a manpack antenna is connected to the ANT connector, the switch shown in figure 2-9 stays closed. The logic 1 level is pulled to ground by the inductor. The impedance matching network detects the change in logic level and selects the appropriate matching network. If a BNC is connected to the ANT connector, the center part of the connector is pushed in and opens the switch. The RF signal is fed through the capacitor. The dc level stays at logic 1. The impedance matching network selects the 50-ohm matching network.

2-8. RECEIVE SIGNAL PATH. Continued

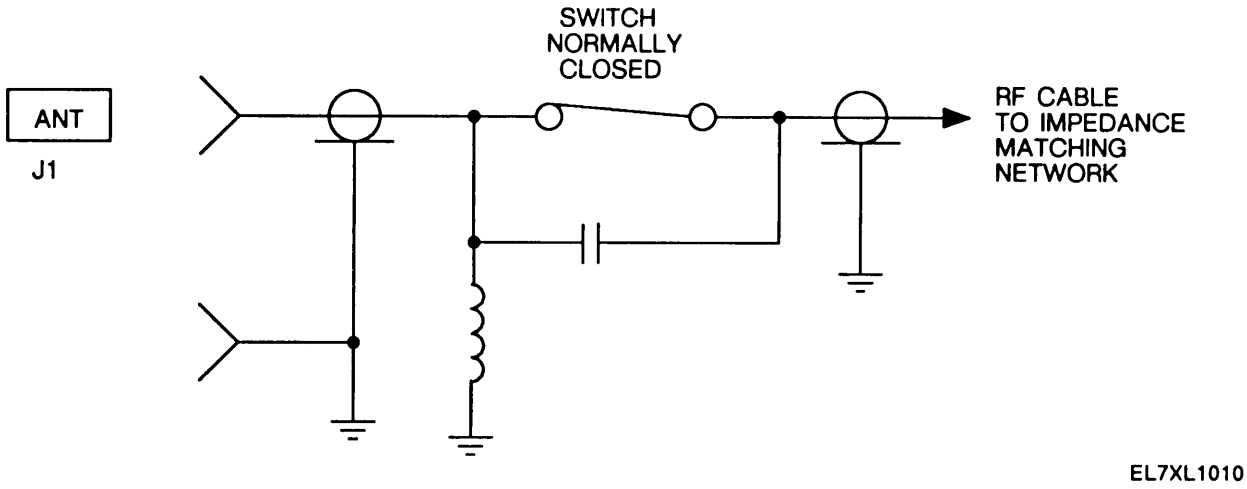


Figure 2-9. Antenna Connector Schematic

Keying and frequency selection are controlled by the control module. During receive, the T/R line is held at logic 0. The operating frequency is distributed using the SERIAL DATA line. TUNE GATE-N and TUNE CLK are used to decode the SERIAL DATA.

The RF signal from the impedance matching network goes to the exciter/power amplifier. After passing through a low-pass filter, it is routed to the tuner/mixer. The tuner/mixer filters and amplifies the RF signal and then mixes it with the local oscillator (LO) signal from the synthesizer. The LO is 12.5 MHz higher than the operating frequency. The tuner/mixer and synthesizer are digitally tuned using the SERIAL DATA line. The 12.5 MHz IF signal is routed to the IF/demodulator. The IF/demodulator demodulates the IF signal to recover the baseband audio or data signal (FM DEMOD).

The SIG display is driven by the SIG STR RCV signal from the IF/demodulator. The SIG display should respond as follows:

RF Level at ANT Connector (dBm)	SIG Display Segments Lit
-116 to -97	1
-108 to -87	2
-98 to -77	3
-88 to -67	4
-67 to -20	4 through 7 in sequence

The signal path is unchanged for FH operation. A SYNC CODE signal is recovered from the received signal and used to synchronize the receiver with the transmitter. DATA SW-N, HOP TIME, and WB SEL are control lines from the ECCM module used during FH operation. DATA SW-N is held at logic 1 during FH operation. HOP TIME goes to logic 1 while the frequency is being changed. WB SEL (wideband select) goes to logic 0 when the RT looks for a CUE signal. If a CUE signal is detected, the IF/demodulator sets the CUE PRESENT line to logic 1.

2-9. TRANSMIT RF SIGNAL PATH.

The transmit mode is initiated by a PTT input from outside the RT. The RADIO PTT-N line is set to logic 0 when the RT is keyed. If the request is valid (frequency loaded and front panel switches set correctly), the control module responds by setting the T/R line to logic 1. See figure FO-2.

The exciter/power amplifier, synthesizer, and the impedance matching network are digitally tuned by the SERIAL DATA signal from the control module. TUNE GATE-N and TUNE CLK are used to decode the SERIAL DATA.

The exciter/power amplifier modulates the carrier with the FM MOD signal from the switching module. The RF REFERENCE signal provided by the synthesizer is 7 MHz higher than the carrier frequency. A 3.2 MHz reference frequency is also provided by the synthesizer.

The exciter/power amplifier generates the FM signal using two phase-locked loops (PLL). In the first, the FM MOD signal controls a 3.9 MHz voltage controlled crystal oscillator (VCXO). This produces an FM 3.9 MHz signal. Mixing it with the 3.2 MHz reference frequency generates a 700 kHz FM output. The phase detector samples the 700 kHz output and the feedback regulates the VCXO frequency. The second PLL operates the same. It phaselocks the 700 kHz output of the first loop with the RF REFERENCE signal to generate the modulated RF signal. The modulated RF signal is amplified and filtered and then sent to the impedance matching network.

The RF output level is selected by the RF switch on the front panel. The control module reads the RF switch position and then sets the RF PWR A and RF PWR B lines as follows:

RF Switch	RF PWR A	RF PWR B
LO	1	1
M	1	0
HI	0	1
PA	0	1

A HI PWR XMT line is set to logic 1 when the RF switch is set to PA. This signal is routed to the system connector (P1) and is used to enable the power amplifier.

The impedance matching network routes the RF signal to the ANT connector. A 50-ohm network is used when a BNC is connected to the RT. When a manpack antenna is connected to the RT, one of three impedance matching networks is used depending on the frequency selected.

A VSWR detector in the impedance matching network checks the output versus reflected power. If the VSWR goes above 5:1, the SIDETONE DISABLE line is set to logic 1. The SIDETONE DISABLE line can also be set to logic 1 by the exciter/power amplifier if the temperature of the module exceeds 105°C. The RF power output level will be reduced 10 to 15 dB if an over-temperature condition occurs.

During FH operation, the control module sets the FH MODE line to logic 1.

2-10. RECEIVE AUDIO SIGNAL PATH.

The received audio signal enters the ICOM I/O section as the FM DEMOD signal output by the IF/demodulator. Its path to the audio connectors is shown in figure FO-3.

2-10. RECEIVE AUDIO SIGNAL PATH. Continued

The switching module detects the presence of the 150-Hz squelch tone. If present, the BIT SYNC/TONE SQUELCH line is set to logic 1. The switching module routes the FM DEMOD signal through the processing circuitry. For single channel (SC), plain text (PT) operation, the signal continues as RCV PT AUDIO. It is routed through the audio power supply and the audio control module. The audio/data I/O module sums the audio signal (RCV AUDIO/SIDETONE) with the 600-Hz alarm tone, if present, and amplifies it. It is routed through a high-pass filter, low-pass filter, and the VOL control. It is amplified using a voltage-to-current converter and routed to the AUD/FILL and AUD/DATA connectors at pin B.

In the FH and PT mode, the FM DEMOD signal is a digital data stream. It is routed to the ECCM module as BIT SYNC DATA to be deinterleaved. (See paragraph 2-11.) The signal is sent through a digital-to-analog converter to recover the original audio signal. The audio signal is returned to the switching module as RCV FH PT AUDIO and continues along the RCV PT AUDIO path.

In the cipher text (CT) mode, the FM DEMOD signal is again a digital data stream. It is routed to the COMSEC connector (J5) as RCV CT. The COMSEC device decrypts the signal and recovers the audio signal. The recovered audio (RCV CT AUDIO DECODED) is routed to the audio control module and back into the audio receive path.

In the FH and CT mode, the ECCM module deinterleaves the data stream. The data stream (FH DATA) is routed to the COMSEC device where the audio signal is recovered.

2-11. TRANSMIT AUDIO SIGNAL PATH.

The transmit audio signal proceeds through the same modules as the receive audio signal only in reverse order. See figure FO-4. The audio transmit (AT) signal is input at J3 or J4 pin D. A PTT is required for the transmit mode.

The AT signals from J3 and J4 are summed by the audio/data I/O module. The audio signal is routed to an automatic gain control (AGC) amplifier. If the WHSP switch is on, the gain of the AGC amplifier is increased. The XMT AUDIO signal is routed through the audio control module to the audio power supply. The audio power supply combines the XMT AUDIO signal with the 150-Hz squelch tone. From there it is routed through the switching module to the exciter/power amplifier.

A PTT at J3 is routed through the audio/data I/O module to the audio control module. A PTT at J4 is routed directly to the audio control module. Both are combined to generate the AUDIO MDL PTT-N. It is buffered by the audio power supply and sent to the control module and the switching module.

When operating in the FH mode, the XMT AUDIO signal is routed from the audio power supply to the ECCM module prior to the addition of the 150-Hz squelch tone. The ECCM module converts the XMT AUDIO signal into a digital data stream (FH DATA). The FH DATA signal goes to the switching module where it is amplified and routed to the exciter/power amplifier module.

When operating in cipher text, the XMT AUDIO signal is routed from the audio control module to the COMSEC connector (J5). The CT XMT signal that is returned is a digital data stream.

2-12. RECEIVE DATA SIGNAL PATH.

The RT can receive audio data and digital data. Audio data can be processed using either AD1 or AD2. When the RT is set to use AD1, the analog data signal follows the audio receive path. When AD2 is used, the analog data is converted into 16 kb/s digital data by the transmitter. The receiver converts it back into analog data. Low speed digital data (75 b/s to 4.8 kb/s) is also transmitted as 16 kb/s digital data. Majority logic error correction is provided for AD2 and low speed digital data. The data rate adapter performs the data rate conversion and error correction.

2-12. RECEIVE DATA SIGNAL PATH. Continued

The RADIO PTT-N line is held at logic 1 during receive mode. The data signal is recovered from the carrier by the RF section, which routes it to the switching module as FM DEMOD. See figure FO-5. A crossover detector senses the presence of the signal. The bit sync/digital squelch network synchronizes the local clocking with the data. When synchronized, the BS/TONE SQUELCH line is set to logic 1. PT DIGITAL CLK provides clocking for the data signals. It is a 16 kHz square wave, at logic 0/1 levels, that is generated by the switch control. RCV PT DATA and PT DIGITAL CLK are routed to the audio section of the RT.

The data and clocking signals are buffered and routed to the audio control module. Audio control processes and switches the signal thru to the audio/data l/O module. The signals are amplified to the correct levels and output to the RT AUD/DATA connector (J4). DIGITAL DATA RCV (DDR) and DIGITAL DATA CLK OUT (DDCO) output signal levels are 5 V for logic 0 and -5 V for logic 1. Analog data signal levels are 0.77 Vrms ±3 dB.

When operating in FH mode, data received signals are routed through the ECCM module. The switching module sends the bit synchronized data (BS DATA) to the ECCM for deinterleaving. FH DATA is returned to the data receive path.

Receive data cipher text (RDCT) is routed to the COMSEC connector from the switching module when the RT operates in cipher text mode. The COMSEC device decodes the signal and returns the data receive signal (AR/DDR) to the audio control module. The COMSEC device generates a clock signal for the data (AT/DDCO) and routes this to the audio control module also.

Each data transmission is preceded by a sync preamble. This preamble is generated by the data rate adapter section of the ICOM control module, It provides a synchronization source, tells the RT a data transmission is being received, and whether the signal is plain or cipher text. During receive mode, the data rate adapter section monitors the RCV DATA output from the audio control module. When the preamble is detected, the NO CODE DETECT line will set to logic 0. CODE X/R ENBL is at logic 1 during preamble detection.

When the DATA switch is set to AD2 or one of the other data rates, the audio control module sends the signals to the data rate adapter (RCV DATA and RCV CLK). The data and clock signals are converted to LO-SPD DATA and LO-SPD CLK. LO-SPD DATA SEL-N at logic 0 switches these LO-SPD signals back into their proper paths.

The AD2 signal is tapped from the LO-SPD DATA line. It is shaped by an RC circuit into the necessary analog signal by the audio/data I/O module.

2-13. TRANSMIT DATA SIGNAL PATH.

The RT can process analog data and digital data. Analog data is input on J4 pin D (AT/DDCO). See figure FO-6. If the data rate is set to AD2, J4 pin F (ADMC/DDT) must be grounded for proper operation. The analog data signal will be converted to 16 kb/s digital data by the RT. If the data rate is set to AD1, the signal follows the audio path. Digital data is input on J4 pin F (ADMC/DDT). Pin E (DDMC) must be grounded. The RT provides a clock on J4 pin D (DDCO) and the digital data signal must be synchronized with the clock.

For AD2, the analog data signal must be FSK modulated at 1200/2400 Hz. It is routed through the audio/data I/O module. An AGC amplifier and limiter adjust the level and the signal is output as LIMITED ANALOG DATA. The audio control module demodulates the FSK signal to convert it into a low speed digital signal. This signal is routed through the data rate adapter section where it is converted into a 16 kb/s digital data stream (XMT DATA). It is routed to the audio power supply where the signal is buffered and then routed through the switching module to the exciter/power amplifier.

The digital data transmit (DDT) signal will be input as a ±5 V square wave, It is converted to logic 0/1 levels by the audio/data I/O module. The logic 0/1 level signal (DIGITAL DATA XMT) is routed to the audio control module. If it is anything other than 16 kb/s, it is routed to the data rate adapter section. It converts the data rate to 16 kb/s and returns the signal. The signal is routed to the audio power supply where it is buffered and sent to the switching module. The switching module routes the signal to the exciter/power amplifier.

2-13. TRANSMIT DATA SIGNAL PATH. Continued

In the FH mode, the BS DATA signal in the switching module is sent to the ECCM module for interleaving. The FH DATA signal is returned to the switching module to continue the data signal path.

In the cipher text mode, the DIGITAL DATA signal in the audio control module is routed to the COMSEC connector. The COMSEC device encrypts the signals and returns the VIN CT XMT signal.

The digital data clock out (DDCO) originates in the switching module (PT DIGITAL CLK-R), the COMSEC device (CT DIGITAL CLK), or the data rate adapter section (LO SPD CLK).

2-14. PRIMARY CONTROL SIGNALS.

The primary control signals originate at the front panel. They direct the operation of the RT. The connectors, switches, controls, and circuitry on the front panel are connected to the parent board through three connectors. They are the front panel switches connector (J1), the display connector (J2), and the audio/data connector (J3). See figure FO-7.

The function of the radio is controlled by the FCTN switch. When it is set to OFF, primary power is removed from the RT. The switch position is checked by the control module. If the switch is set to TST, SQ OFF, RXMT, REM, LD, LD-V, or Z-A, the corresponding line to the control module is set to logic 1 by the switch. If none of these lines are at logic 1, the control module sets the RT for SQ ON operation.

Primary power (PRI 13 V DC) for the RT is also routed through the FCTN switch. Primary power must be provided at either pin L of the system connector (P1). The 13 V DC will be applied to the SWITCHED 13 V DC line when the FCTN switch is at any position other than OFF or STW. The SWITCHED 13 V DC provides the input voltage for the power supply (1A3 pins B and C). If the FCTN switch is set to OFF, the 13 V DC will be applied to the OFF 13 V DC line. Both SWITCHED 13 V DC and OFF 13 V DC lines are routed to the display CCA where they are used to power the PRI BTRY PRES and V HOLD lines.

Two voltages are available to retain the fill information in the control module and the ECCM module. They are V BATT and V HOLD. V BATT is provided by the holding battery and is routed through the FCTN switch. V HOLD is provided by the display CCA. It is derived from the primary input voltage. If both are present, V HOLD will be used instead of V BATT. Both are turned off when the FCTN switch is set to STW.

The control module also checks the MODE, CHAN, and RF switch positions. The control module sets the MODE SW COM line to logic 1 except during remote operation. The control module checks the FH and FH/M lines. If neither is at logic 1, the RT is set for SC operation. The CHAN switch is BCD encoded as follows:

CHAN	PRESET 0	PRESET 1	PRESET 2
MAN	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
CUE	1	1	1

2-14. PRIMARY CONTROL SIGNALS. Continued

When the RT is transmitting, the T/R line is set to logic 1 by the control module. It checks the MED PWR, HI PWR/M, and HI PWR/V lines from the RF switch. If none are at logic 1, the RT RF output is set for low power operation. The SIG display circuit uses the RF DETECT, RF PWR A, RF PWR B, HI PWR XMT, PA PWR LVL, and T/R lines during transmit to drive the display. The SIG STR RCV signal is used during receive.

During retransmit operation, all of the RXMT connector I/O is controlled by the switching module. See paragraph 2-17 for a description of retransmit operations.

The keyboard display is controlled by the control module. The SERIAL DATA, DISPLAY CLK, and DISP EN-N provide the information needed by the display drivers. A DISPLAY INHIBIT line is used by the remote I/O to turn the display off during remote operation.

The keyboard is made up of 16 switches (keys). They are arranged in a four-by-four switch matrix. The control module checks the X and Y lines to see if a key has been pressed. The Y lines (rows) are normally at logic 1. The X line (columns) are normally at logic 0. When a key is pressed, the Y line will be pulled to logic 0. The X line will be pulled high (to about 6 V dc).

2-15. FREQUENCY HOPPING OPERATIONS.

The programming for FH operation is stored in the ECCM module ROM. The control module executes these commands to control the RT while in FH.

Received FH signals are digital signals. The switching module digital processing produces bit synchronized data (BS DATA). See figure 2-10. BS DATA is the RCV FH signal synchronized with the internal RT clocks and converted to RT digital signal levels. BS DATA goes to the ECCM module interleave circuits. The interleaver removes synchronization and frequency hopping information that is embedded in the signal. After deinterleaving, the signal is reclocked at a 16 kb/s rate. It is now the FH DATA signal. In RCV DATA mode, FH DATA is routed to the switching module. When receiving audio, FH DATA is converted back to an analog signal by the continuously variable slope detector (CVSD) in the ECCM module. The RCV FH AUDIO output is also routed to the switching module.

Two signals are required by the ECCM module during FH transmit. They are BS DATA and XMT PT AUDIO. BS DATA goes directly to the interleave. It is interleaved with the synchronization and FH information needed by the receiving RT to coordinate communications. The CVSD converts XMT PT AUDIO to a 16 kb/s digital signal output as CVSD DATA to the interleave. It too is interleaved with data, reclocked to 20 kb/s, and output on the FH DATA line to the switching module.

The interleave supplies the control and data signals needed by the time sync/correlator. The correlator's function is to synchronize the operation of the RT and the ECCM module. It manipulates control signal outputs such as HOP TIME and SYNC. These and others control RT operations in FH mode. They shut down reception/transmission during frequency shifts, provide the next frequency to the control module (via the data and address buses), and supply clocking for the ECCM module.

The ECCM module is also responsible for: storage of the FH operation programming, generation of random numbers for hopping frequency selection, and processing and storage of FILL data. The RT chooses the frequencies in FH by pseudorandom number generation. The TRANSEC variable, FH sync time, and net ID number are used to select the next frequency. The control module uses the hopset and lockout set to create a look-up table in memory of frequencies for the net. The ECCM module picks one of these frequencies from the table. The result is passed to the control module via the data bus. The control module informs the rest of the modules of the frequency selected by the SERIAL DATA line.

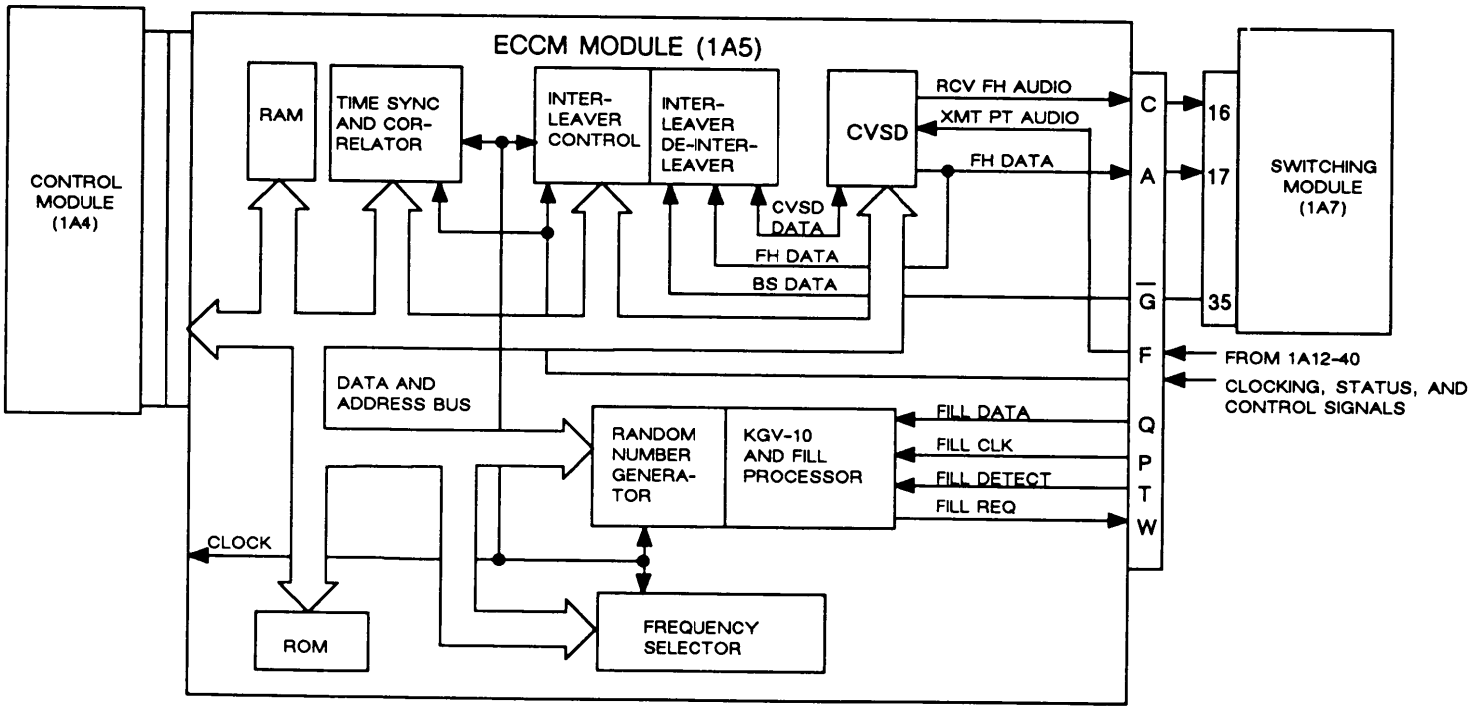


Figure 2-10. FH Block Diagram

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2-16. SELF-TEST.

The RT self-test is performed at several levels. When the FCTN switch is set to TST, the control module begins the self-test routines. The RT receive path, ECCM module, data rate adapter, fill routing module, and audio/data I/O module are checked. A test line to the SYSTEM connector is activated. This allows the RT to report the results of SNAP self-tests. A self-test of the remote control modules can be performed separately.

a. Display Checks. "E d" should be the first display when the FCTN switch is set to TST, the control module checks for the presence of the ECCM module and the data rate adapter. The ECCM module grounds the FH HERE-N line. The data rate adapter grounds the DATA MODULE PRESENT-N line. See figure FO-8.

If either module is absent, its letter in the display is replaced by a dash (-).

The next display is "88888". It permits checking of the display segments. The SIG display can also be checked during self-test. All display segments are lit sequentially with 9 remaining lit.

b. Receive Path Test (FAIL 1). The receive path is tested in four steps. First, the control module performs a memory check (RAM and ROM). Second, the control module checks the TONE SQUELCH line. It should be at logic 0 since there is no received signal. Third, the receive path is checked at eight frequencies in the SC mode. See figure FO-8. The 150-Hz tone is sent from the switching module (FM MOD) to the exciter/power amplifier.

The exciter/power amplifier uses the 150-Hz tone to modulate its 3.9-MHz output. The harmonics from the 3.9 MHz are used as the test frequencies. The tuner/mixer and synthesizer are stepped through eight frequencies. The 150-Hz squelch tone presence is checked at each frequency. Because the tuner/mixer and synthesizer have several bands, it is possible that only one or two frequencies will fail. The last step repeats the receive path checks for two frequencies in the FH mode.

There are secondary displays for each failed test. They will be displayed when any keyboard button is pressed while the FCTN switch is being set to TST. They are:

SECONDARY DISPLAY	FAILED TEST
1--01	Control module RAM
1--02	Control module ROM
1--03	150-Hz detect line stuck at logic 1
1--04	Receive at 78.0 MHz, SC
1--05	Receive at 66.3 MHz, SC
1--06	Receive at 58.5 MHz, SC
1--07	Receive at 50.7 MHz, SC
1--08	Receive at 46.8 MHz, SC
1--09	Receive at 39.0 MHz, SC
1--10	Receive at 35.1 MHz, SC
1--11	Receive at 31.2 MHz, SC
1--12	Receive at 78.0 MHz, FH
1--13	Receive at 35.1 MHz, FH

2-16. SELF-TEST. Continued

The audio present during the “88888” display is a result of the receive tests. There are 10 short bursts of unsquelched rushing noise which can be heard in the handset. However, because they are so quick and close together, they are difficult to count. At the end of a successful self-test a beep can be heard in the handset.

c. Data Rate Adapter Test (FAIL2). The data rate adapter will perform a self-test when the TEST line is set to logic 1. It also requires the RCV CLK and 192-kHz CLK signal to perform self-test. If the data rate adapter passes self-test, then the DATA MODE STATUS line is set to logic 1. If it does not, the line stays at logic 0 and “FAIL2” will be displayed.

d. ECCM Module Test (FAIL3). The ECCM module also performs an independent self-test. It checks the ECCM module’s RAM, ROM, interleave, linear sequence generator, and other circuits. If it does not pass self-test, “FAIL3” will be displayed.

e. Remote Operation Test (FAIL4). The remote operation test checks the remote I/O module and the two-wire interface. It is performed separate from the above tests. The test is initiated when the FCTN switch is set to REM and the BATT/CALL key and PTT switch are pressed. If the test is passed, “CALL” will be displayed. If it is not, “FAIL4” will be displayed.

f. COMSEC and SNAP Tests (FAIL5 and FAIL6). The TEST signal is also routed to the COMSEC connector and the SYSTEM connector. The RT is capable of interpreting a self-test failure response from external equipment connected to either connector. A failure response at the COMSEC connector will be indicated by a "FAIL5" display. (Most COMSEC devices, such as the TSEC/KY-57, cannot use this capability.) A failure response at the SYSTEM connector will be indicated by a “FAIL6” display. See paragraph 2-21.

2-17. RETRANSMIT OPERATION.

The retransmit (RXMT) function allows two RTs to be used as a radio relay. The only additional equipment required is a special cable. (See figure FO-9. It is not pin-to-pin.)

When the FCTN switch is set to RXMT, the RT operates as in SQ ON. The main difference is the use of the RXMT connector for keying and audio input/output. The switching module controls retransmit operation. See figure FO-9. The receiving RT demodulates the RF as described in paragraph 2-8. The signal is routed to pin B of the RXMT connector (RXMT SIG OUT). The switching module sets the RXMT CONTROL OUT line to logic 0 when a signal is received.

The cable that connects the two RTs routes the receiving RT OUT lines to the transmitting RT IN lines. When the RXMT CONT IN line is at logic 0, the RT is keyed. The RXMT SIG IN is routed through the switching module to the audio/data section. The audio/data section processes the signal and routes it to the exciter/power amplifier.

Pin F of the RXMT connector is used to select the analog or digital mode. The analog mode is selected if it is open (about 2.5 V). The digital mode is selected if it is grounded.

During FH operation, the received signal is deinterleaved and the digital data stream is routed to the RXMT connector.

During cipher text operation, the operator of the retransmit station can monitor the traffic if a COMSEC device is properly installed. A COMSEC device is not required for operation of the retransmit station.

2-18. FILL OPERATION.

The ECCM module requires electronic data for FH operation. The data is in the form of TRANSEC variables, hopsets, and lockout sets. The process of providing the data is called the fill operation. It can be performed two ways. All data can be loaded locally using the RT AUD/FILL connector. The second method is the ECCM remote fill (ERF). It can only be used for hopsets and lockout sets. ERF is relatively automatic. The ECCM module adds a preamble to the transmitted data that identifies it as fill data. The ECCM module in the receiving RT detects the preamble and stores the data in holding memory.

Local fill is illustrated in figure 2-11. The fill is initiated by the operator. The ECCM module puts a -6.75 V pulse on the FILL REQ line. The request is routed to the AUD/FILL connector. The FILL INFO signal is input from the fill device. It is the serial data stream that contains the variable to be stored in the ECCM module. The FILL IA is a clock signal from the fill device. It is used to synchronize the RT with the data stream.

The audio power supply buffers the signals for isolation. The signals are processed to produce the inputs for the ECCM module. FILL IA is processed into FILL CLK and FILL DET. FILL CLK follows FILL IA at rates from 1 to 4 kHz. When the fill device is attached, FILL IA is detected and FILL DET drops to logic 0. FILL SEL is created from processing FILL REQ and FILL IA. FILL SEL will drop to logic 0 at the same time as FILL REQ.

The RT has two interlock switches. If either cover is removed, the TRANSEC ZERO-N line is grounded. If that happens, the TRANSEC variable stored in the ECCM module will be zeroized.

2-19. REMOTE CONTROL OPERATION.

When the RT FCTN switch is set to REM, it can be controlled by a remote control unit. There are two remote control modes. One mode provides for complete remote control of all front panel functions. It is called the 2-WIRE mode. It allows remote input/output of audio and data signals. The other mode is called the 6-WIRE mode. Remote control is limited to RT MODE, RF, and CHAN. The audio and data signals are input and output at the RT. The control-monitor uses this mode. When the remote control unit establishes contact with the RT, it identifies which mode the RT is to use.

The two modules that provide the remote control capability are the two-wire interface (1A6) and the remote I/O module (1A2). See figure FO-10. The link between the RT and the remote control unit is the 2 WIRE I/O and 2 WIRE I/O RTN lines. Control signals are FSK modulated onto a 2880-Hz carrier. Audio and data signals are modulated onto a 40-kHz carrier (2-wire mode only).

The two-wire interface sends the received signals on the 2-WIRE I/O lines. When receiving, it separates the two carriers. The control information is routed to the remote I/O module. The audio/data information is routed to the switching module. The remote l/O module decodes the control information and routes it to the control module. During remote operation, the control module executes instructions from the remote l/O module, not the front panel. When sending data to the remote control unit, the above process is reversed.

The remote control unit can turn off the RT. The two-wire interface puts 6 V dc on the PS ON-N line to disable the power supply outputs. The two-wire interface will draw power from the RT dc power input that is routed through the front panel display board.

The remote I/O module has a self-test function. It is initiated when the RT is in remote and the BATT/CALL key and the handset PTT switch are pressed. If self-test is passed, “CALL” will be displayed. If it is not, “ FAIL4” is displayed.

The following signals must be present for proper remote operation. See figure FO-10.

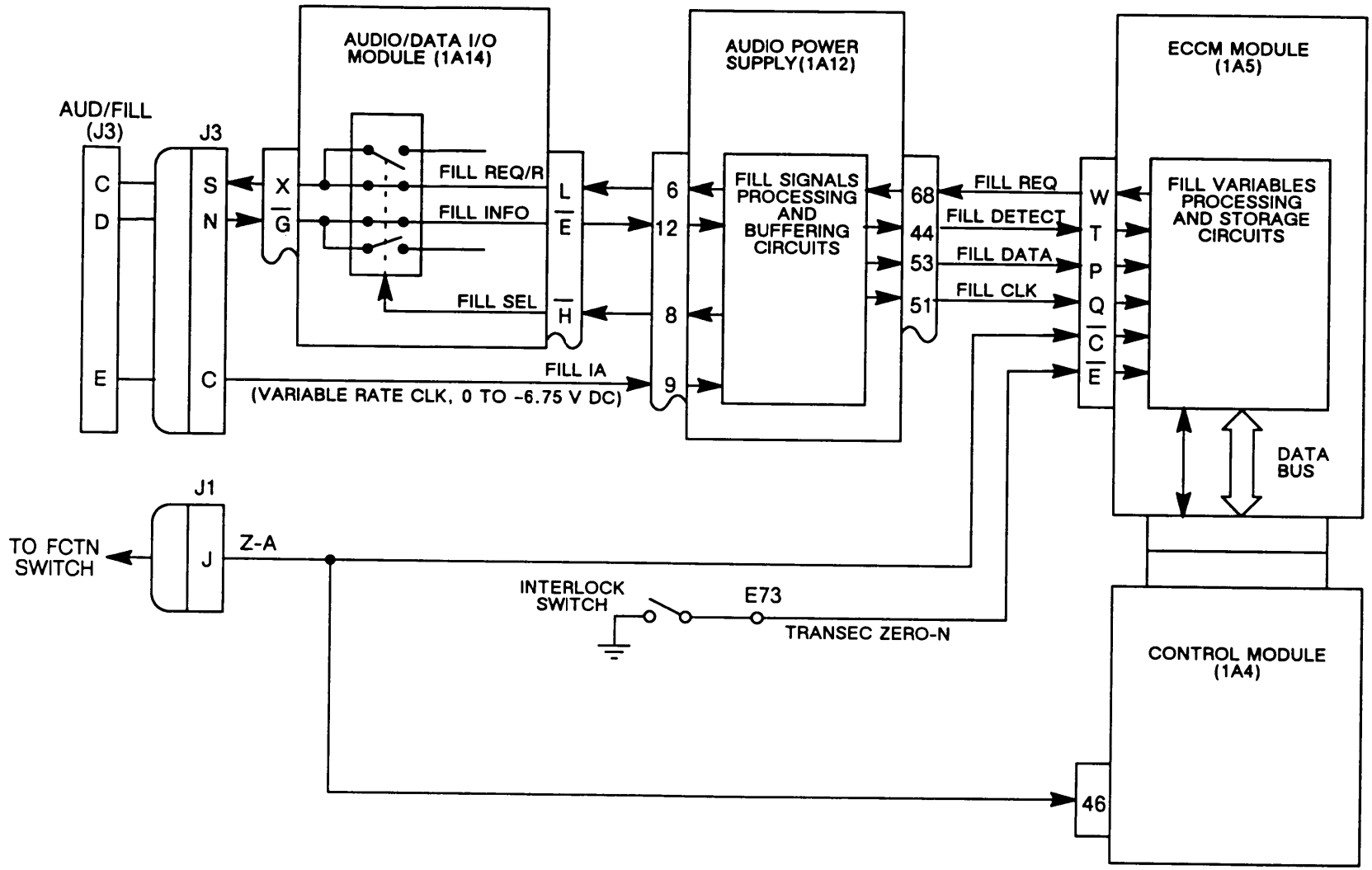

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Figure 2-11. Fill Circuit Block Diagram

2-19. REMOTE CONTROL OPERATION. Continued

SIGNAL NAME	DESCRIPTION
REM PTT	PTT request from remote control unit, logic 1 = PTT.
2/6 WIRE MODE	Logic 1 = 6-wire mode (control-monitor). Logic 0 = 2-wire mode (complete remote control).
REM DDMC	Digital data mode control, logic 0 = digital, logic 1 = analog.
RADIO SQUELCH	Logic 1 indicates a received signal.
AUDIO MODULE PTT-N	PTT generated by RT.
SIDETONE DISABLE	Logic 1 disables sidetone.
40 kHz XMT DATA	Data signal from remote control unit to be transmitted by RT.
XMT REM AUDIO	Audio signal from remote control unit to be transmitted by RT.
REM	Set to logic 1 by FCTN switch.
REM 8 CLK	320-kHz clock in groups of 8. Used with 8-bit data.
REM 8 STROBE	Logic 1 pulse used with 8-bit data.
REM DATA	Remote control data to control module, both 8-bit and 24-bit.
REM 24 CLK	320-kHz clock in groups of 24. Used with 24-bit data.
REM 24 STROBE	Logic 1 pulse used with 24-bit data.
SERIAL DATA	Data from control module to be sent to remote control unit and display.
DISPLAY CLK	320-kHz clock used with SERIAL DATA in groups of 10.
DISPLAY GATE-N	Logic 0 pulse used with SERIAL DATA.
DATA AVAIL	Logic 1 indicates data is available.
DISPLAY INHIBIT	Logic 1 turns off RT display.
REM CLR-N	Logic 0 pulse when FCTN is set to REM.
TRI-STATE EN	Logic 0 pulse when FCTN is set to REM.
40 kHz DET	Logic 1 indicates presence of 40-kHz carrier.
40 kHz A/D SEL	Indicates type of signal to be modulated onto 40-kHz carrier. Logic 1 = analog. Logic 0 = digital.
40 kHz XMT EN	Logic 1 enables 40-kHz carrier.
2880 DET-N	Logic 0 indicates presence of 2880-Hz carrier.
2880 RCV DATA	Serial input of 2880-Hz carrier.
2880 XMT EN	Logic 1 enables 2880-Hz carrier.
CONT FSK DATA	Data to be FSK modulated onto 2880-Hz carrier.
A/D RCV REM SEL	Logic 0 = digital. Logic 1 = analog.
INTERCOM XMT EN	Logic 1 = intercom mode.

2-20. CIPHER TEXT.

The RT can be used with a COMSEC device to receive and transmit cipher text (CT) information. The COMSEC device is cabled to the RT at connector J5. Audio, data, and control signals are routed automatically.

When a cipher text signal is received, it is routed through the COMSEC device. See figure FO-11. The COMSEC device will ground the IRNST(1)-P line to indicate CT operation. The received signal (RDCT) is routed to the COMSEC device. The decrypted signal (AR/DDR) is returned to the RT. If it is an audio signal, it follows the normal audio path. If it is a digital signal, it will follow the normal digital path. The COMSEC device provides the DDCO signal.

When an audio signal is received in the FH and CT modes, the ECCM module deinterleaves the data stream. The COMSEC device recovers the audio signal from the data stream.

When transmitting, the signal sent to the COMSEC device can be either audio (AT) or 16 kb/s digital (DDT). See figure FO-12. The RED DDMC-N line is set to logic 1 for audio. It is set to logic 0 for digital. The COMSEC PTT-N line is grounded for transmit. The audio control module routes the signals to the COMSEC device. The encrypted signal (TDCT) is returned and routed to the switching module.

Audio and data signals are interleaved in the FH mode after encryption.

2-21. SNAP INTERFACE.

The RT provides seven signals for operation with a SNAP. The SNAP is cabled to J10 on the mounting adapter, See figure FO-14. They are as follows:

SIGNAL NAME	DESCRIPTION	SOURCE
FH	Logic 1 = FH, logic 0 = SC.	1A4-30
SERIAL DATA	Digital data stream that provides operating frequency.	1A4-48
TUNE GATE-N	Logic 0 pulse used with SERIAL DATA.	1A4-49
TUNE CLK	Clock used with SERIAL DATA.	1A4-51
TEST	Directs SNAP to perform self-test.	1A4-38
SNAP DISABLE	Logic 0 indicates RT is changing frequency.	1A12-75
SNAP XMT/RCV	Logic 1 = transmit, logic 0 = receive.	1A12-76

The SNAP returns the results of its self-test on the FAULT6 line. If it fails self-test, the RT will display “FAIL6”.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-22. COMMON TOOLS AND EQUIPMENT.

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

2-23. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

2-24. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering DS maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

2-25. GENERAL.

This section provides the troubleshooting procedures used to fault isolate a defective RT. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module.

2-26. TROUBLESHOOTING.

Troubleshooting is done on a faulty RT. The steps to determine if an RT is faulty and how to troubleshoot it are illustrated in the flowchart in figure 2-12. The following is a description of the flowchart. (See paragraph 2-28 for a description of the symbols.)

a. **When an RT is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. **Perform the operational check (paragraph 2-29).** In many cases, it will identify the defective module or the troubleshooting flowchart to use. If the operational check is passed, use the symptom and the MAPS chart to locate the troubleshooting flowchart to use. See paragraph 2-30 for the MAPS chart.

NOTE:

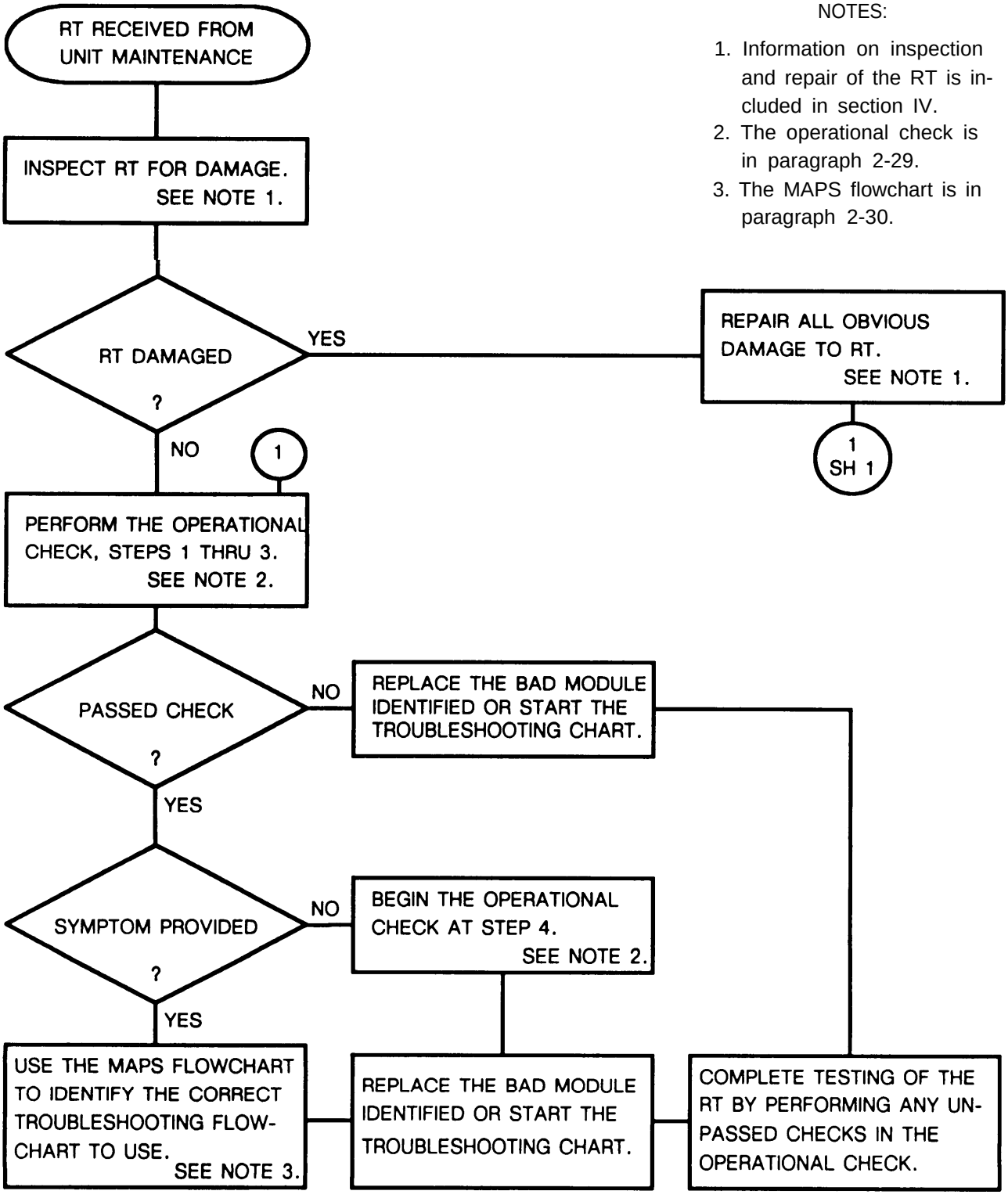
When either the top or bottom cover is removed from the RT, the interlock switch (es) must be bypassed (switch lever pulled out) and the fill data must be reloaded.

c. **Using the troubleshooting flowchart identified, troubleshoot to the defective module.**

d. **Replace the defective module.** Follow the procedures in section IV.

e. **Verify the repair.** Perform the operational check in paragraph 2-29. When the operational check (OP CHECK) is passed, the RT can be returned for use.

2-26. TROUBLESHOOTING. Continued



NOTES:

1. Information on inspection and repair of the RT is included in section IV.
2. The operational check is in paragraph 2-29.
3. The MAPS flowchart is in paragraph 2-30.

Figure 2-12. The Troubleshooting Process for the RT.

2-27. TEST PRECAUTIONS AND NOTES.

WARNING

Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

High voltage is present in the test adapter (200 V dc) and in the RT (60 V dc). Use caution when troubleshooting to avoid personal injury. Set reference fixture CB1 to OFF before connecting or disconnecting a test setup.

STATIC SENSITIVE

CAUTION

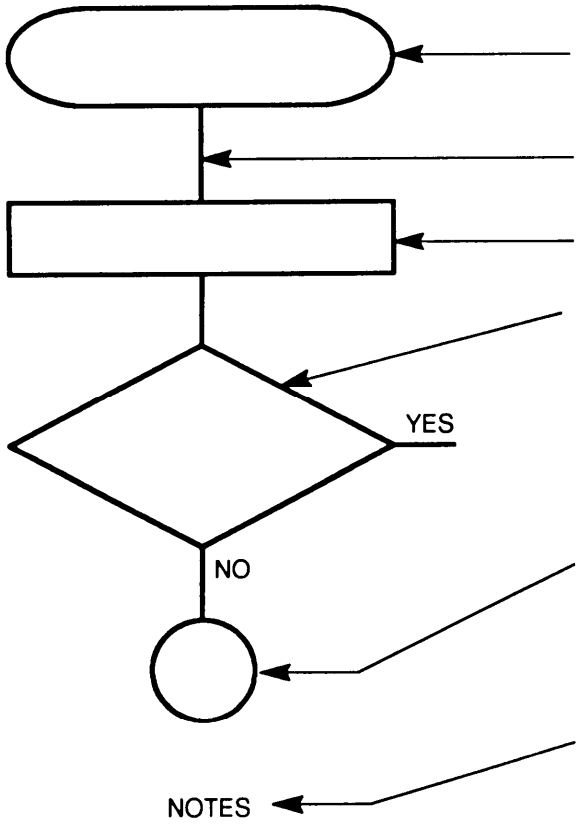
STATIC SENSITIVE

Static electricity and stray voltages can damage the RT modules. Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting or handling the modules.

NOTE:

The Principles of Operation section, functional block diagrams, and figures FO-1 through FO-12 can be used to fault isolate any unusual problems that may not be covered in the troubleshooting procedures.

2-28. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL	EXPLANATION
	Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble. Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow. Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test. Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO). Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages. Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

2-29. OPERATIONAL CHECK.

Before beginning operational check, install new holding battery to replace holding battery removed for shipment and ensure REF RT is loaded with lockset and hopset. Hopset must be loaded in channel 2.

The operational check provides a step-by-step procedure for evaluating an RT. If the operational check is passed, the RT can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 2-31.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the "Action" column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A “No response” in the “Response” column means that any response is not of interest.

The switch settings for the test equipment are given in the “EQUIPMENT PRESETS” section of each test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module.

WARNING

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply ON.

CAUTION

During the operational check the RT top cover is removed and a module may also be removed. Whenever either cover is removed, take all proper electrostatic discharge (ESD) precautions. Static electricity can damage the RT modules.

NOTES:

- The RT may fail self-test if a signal is input to the AUD/FILL or AUD/DATA connector during self-test. These self-test failures may be ignored during testing unless the procedure asks for self-test responses.

- When calibrating either MOD GEN or FCTN GEN, ensure that the maintenance group TEST EQPT SELECTOR is not in the FREQ CNTR position.

- Until piece parts are provisioned, any faulty portion of the front panel assembly will require replacement of the entire front panel assembly.

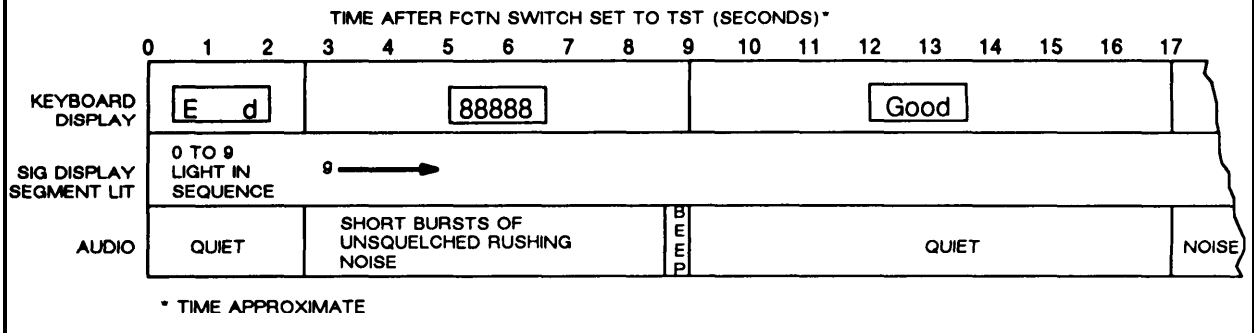
2-29. OPERATIONAL CHECK. Continued

Step 1. CURRENT CHECK.

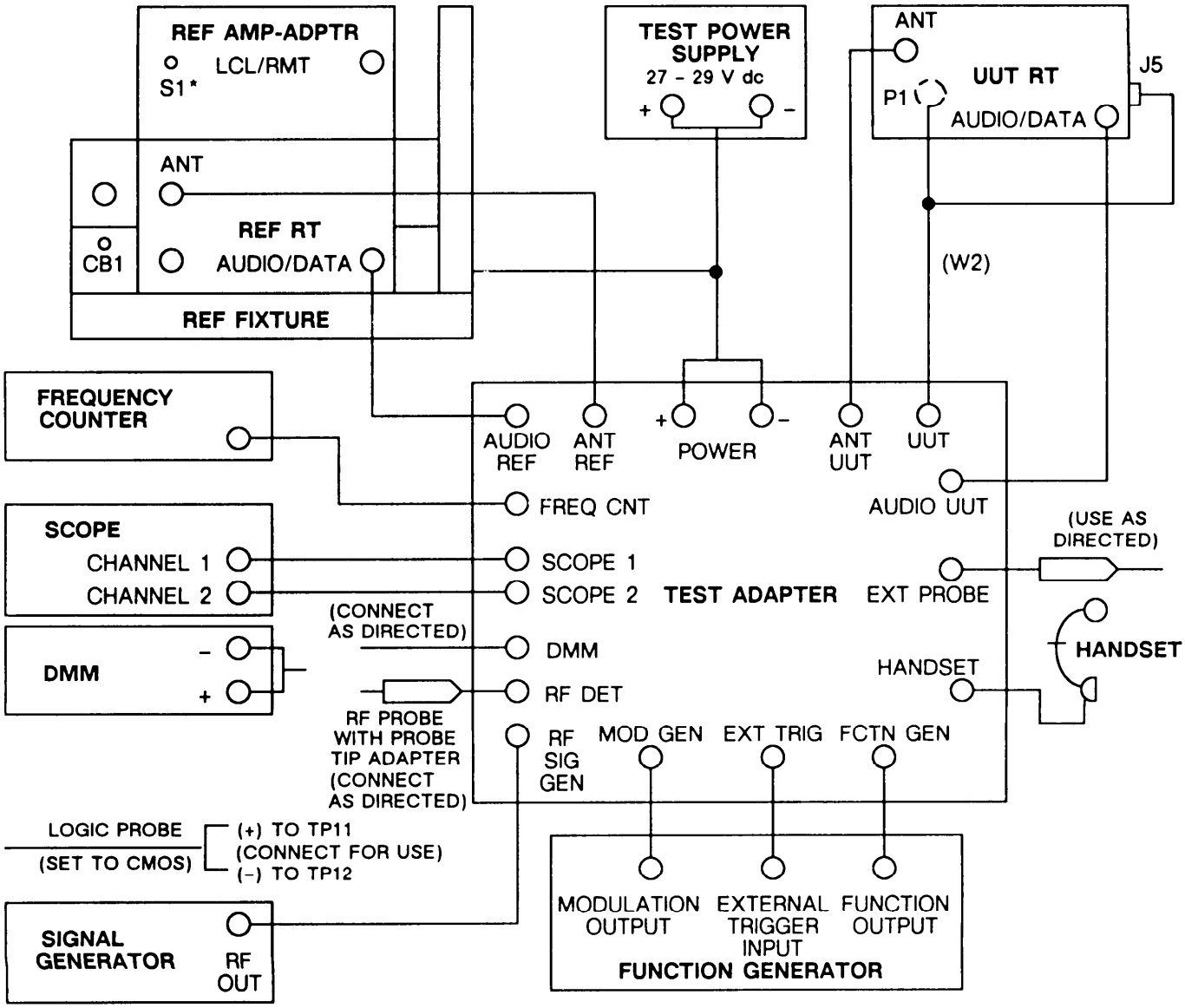
Action	Response
a. Connect equipment as shown in figure 2-13.	a. No response.
b. Set UUT RT FCTN: Z-A.	b. Responses: (1) Multimeter reading is greater than 0 A, but not greater than 800 mA when RT display is on. (2) RT displays "Good" for 7 seconds. (3) Multimeter reading is not greater than 375 mA when RT display is blank.
	IF: / THEN: RT does not turn-on. — Go to chart 1. Current is 0 or high with RT display on. — Go to chart 1. "Good" is not displayed correctly. — Go to chart 2. Current is high with RT display blank. — Go to chart 3.
c. Remove DMM lead from TP8 and TP9. Set 13 V: ON. Set UUT RT FCTN switch to LD-V and then to Z-A. Check operation of DIM control by adjusting it CCW and then CW.	c. CCW dims the display, and cw brightens the display. If not, go to chart 41.

Step 2. SELF-TEST.

Action	Response
a. Set UUT RT FCTN: TST.	a. Responses:



2-29. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

REF RT AND UUT RT:

FCTN:	STW (**UUT ONLY**)
RF:	LO
CHAN:	MAN
DIM:	FULLY CW
VOL:	MID-RANGE
MODE:	SC
DATA:	OFF

REF FIXTURE: CB1: ON
REF RT: FCTN: OFF
REF AMP-ADPTR:
* S1: LCL (If present)

TEST ADAPTER:

28 V:	ON
13 V:	OFF
STIMULUS:	1
RESPONSE:	1
LOAD:	OFF
RF SWITCH:	1
MOD GEN:	OFF
LOGIC:	OFF

DMM: 2000 mA SCALE
TEST LEAD (+): TP8
TEST LEAD (-): TP9

TEST EQUIPMENT SELECTOR:	HNDST
TEST EQUIPMENT INPUT:	INT
BASEBAND:	3
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S1

NOTE: Ensure all SC frequencies are loaded into REF RT. (See Step 3.f, page 2-34.)

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Figure 2-13. Operational Check Test Setup.

2-29. OPERATIONAL CHECK. Continued

Step 2. SELF-TEST. Continued

Action	Response
	IF: / THEN: Any SIG display segment does not light. / Display circuit card assembly (1A16A1A1) is bad. No "E d" display. / Go to chart 4. Any keyboard display segment does not light. / Display circuit card assembly (1A16A1A1) is bad. No "rushing noise". / Go to chart 5. Audio not correct or "Good" not displayed. / Go to chart 6. No "BEEP". / Go to chart 7. Audio is low or distorted. / Go to chart sheet 9 at node (11).
b. Set TEST EQPT SELECTOR: SCOPE. Set RESPONSE: 7. Set UUT RT: FCTN: REM.	b. SIG display lights segments 9 through 0 in sequence, and then goes blank. If not, the display circuit card assembly (1A16A1A1) is bad. Scope than A displays a 1.5 to 2.5 V p-p, 2870 to 2890 Hz sine wave that goes to zero after a few seconds. If not, go to chart 9. If waveform is present, but not sinusoidal, the two-wire interface (1A6) is bad.
c. Press and hold UUT RT BATT/CALL button. Set PTT: UUT. Release UUT RT BATT/CALL button.	c. "CALL" is displayed on RT. If not, go to chart 9. **NOTE:** If RT is being checked for a remote operations fault and has passed step 2, repeat steps 2a through c, 7 or 8 times. If display goes blank when PTT is set to UUT, replace the exciter/power amplifier (1A11) and repeat step 2. If UUT passes step 2, the removed exciter/power amplifier (1A11) is bad. If UUT fails, the power supply (1A3) is bad.
d. Set PTT: OFF.	d. No response.

2-29. OPERATIONAL CHECK. Continued

Step 3. SC LOAD CHECK.

Action	Response
a. Set RESPONSE: 1. Set TEST EQPT SELECTOR: HANDSET. Set UUT RT: FCTN : LD CHAN: 1.	a. No response.
b. Press UUT RT FREQ button.	b. "00000" is displayed on RT. If not, go to chart 10.
c. Press UUT RT CLR button.	c. "_ _ _ _ _" is displayed on RT. If not, go to chart 11.
d. Press UUT RT 3, 7, 8, 7, and 5 buttons.	d. Display responds correctly. If not, go to chart 11.
e. Press UUT RT Sto/ENT button.	e. Display blinks and then displays "37875". If not, go to chart 11.
f. Load the following frequencies into the channels indicated: CHAN — Frequency (kHz) 2 — 42975 3 — 43375 4 — 49075 5 — 56200 6 — 68775 CUE — 87975	f. Frequencies load correctly. If not, go to chart 12. NOTE: Ensure REF RT has single channel frequencies loaded before proceeding with check.

Step 4. OFFSET LOAD CHECK.

Action	Response
a. Set UUT RT: CHAN: 1.	a. No response.
b. Load +5 kHz offset into CHAN 1.	b. "37880" is displayed on RT. If not, go to chart 11.
c. Load -10 kHz offset into CHAN 1.	c. "37865" is displayed on RT. If not, go to chart 11.
d. Clear offset in CHAN 1.	d. "37875" is displayed on RT. If not, go to chart 11.

2-29. OPERATIONAL CHECK. Continued

Step 5. FH LOAD CHECK.

Action	Response
a. Set REF RT and UUT RT: RF: LO MODE: SC FCTN: LD CHAN: MAN DATA: OFF.	a. No response.
b. Load FH sync time (TOD) into REF RT and UUT RT. Use 15 days, 1200 hours. Check after loading. They must be within 4 seconds of each other.	b. FH sync time loads correctly. If not, go to chart 11.
c. Connect ECCM fill device to UUT RT AUD/FILL connector.	c. No response.
d. Set UUT RT: MODE: FH FCTN: LD-V.	d. "FILL†" is displayed on RT. Tone is present in handset. Lockout and hopset positions should be the same as loaded into REF RT.
e. Set ECCM fill device: FUNCTION: ON SELECT: T1.	e. No response.
f. Press UUT RT: H·Ld/0 button.	f. "LOAd" and then "Sto †" is displayed on RT. Disregard additional displays. If displays are not correct, go to chart 13.
g. Set ECCM fill device SELECT switch to hopset lockout set position.	g. No response.
h. Set UUT RT FCTN: LD.	h. No response.
i. Press UUT RT: H·Ld/0 button.	i. "LOAd" and then "HLnnn" is displayed on RT. If not, go to chart 14.
j. Press UUT RT: Sto/ENT button.	j. "Sto└n" is displayed on RT. If not, go to chart 11.
k. Set ECCM fill device SELECT switch to hopset frequency position.	k. No response.
l. Press UUT RT buttons: H·Ld/0 Sto/ENT 2.	l. "LOAd", "HFnnn", "Sto_", and "Sto 2" are displayed on RT. If not, the ECCM module (1A5) is bad.
m. Set ECCM fill device: FUNCTION: OFF. Disconnect from UUT RT.	m. If "CUE" is displayed, the ECCM module (1A5) is bad.

2-29. OPERATIONAL CHECK. Continued

Step 6. RF OUTPUT CHECK.

Action	Response
a. Connect RF probe to DMM and RF DET. Set DMM to 50 Ω reference. Set UUT RT: RF: HI CHAN: MAN FCTN: SQ ON MODE: SC.	a. No response.
b. Set PTT: UUT. Set CHAN switch to each position.	b. DMM reading is 35 to 39 dBm for all channels. If not, go to chart 15. If RT display goes blank when PTT is set to UUT, replace the exciter/power amplifier (1A11) and repeat step 6 b. If UUT passes step 6 b, the removed exciter/power amplifier (1A11) is bad. If UUT fails step 6 b, the power supply (1A3) is bad.
c. Observe SIG display.	c. SIG display reading is 5, 6, or 7. If not, go to chart 16.
d. Set UUT RT: RF: PA.	d. DMM reading is 35 to 39 dBm. If not, go to chart 42.
e. Set UUT RT: RF: M.	e. DMM reading is 20 to 24 dBm. If not, go to chart 17.
f. Observe SIG display.	f. SIG display reading is 2, 3, or 4. If not, the display circuit card assembly (1A16A1A1) is bad.
g. Set UUT RT: RF: LO.	g. DMM reading is -7 to +1 dBm. If not, go to chart 18.
h. Observe SIG display.	h. SIG display reading is 0 or 1. If not, the display circuit card assembly (1A16A1A1) is bad.
i. Set UUT RT: RF: M. Set RF SWITCH: 2.	i. No response.

2-29. OPERATIONAL CHECK. Continued

Step 6. RF OUTPUT CHECK. Continued

Action	Response
j. Set frequency counter to 500 load. Set CHAN switch to each position. Read frequency counter. NOTE: If reading is incorrect, set FCTN GEN LEVEL to minimum and read frequency counter again.	j. Frequency counter reads: CHAN — FREQUENCY (Hz) MAN 29999850 to 30000150 1 37874800 to 37875200 2 42974800 to 42975200 3 43374800 to 43375200 4 49074750 to 49075250 5 56199700 to 56200300 6 68774650 to 68775350 CUE 87974550 to 87975450 If any channel is incorrect, go to chart 15 at node (10) on sheet 4.
k. Set PTT: OFF. Return frequency counter to 1 M Ω load.	k. No response.

Step 7. SIDETONE CHECK.

Action	Response
a. Set UUT RT: RF: HI. Disconnect RF test cable at test adapter UUT ANT connector. Set RF SWITCH: 1.	a. No response.
b. Set PTT: UUT. Press handset PTT switch and check for sidetone.	b. Sidetone should not be present. If it is, go to chart 19.
c. Reconnect RF cable to maintenance group UUT ANT connector.	c. No response.
d. Press handset PTT switch and check for sidetone.	d. Sidetone should be present. If it is not, go to chart 20.
e. Set PTT: OFF.	e. No response.

Step 8. SQUELCH CHECK.

Action	Response
a. Set UUT RT: FCTN: SQ OFF. Listen to handset.	a. Rushing noise is present in handset. If not, go to chart 21.
b. Adjust VOL control.	b. Volume in handset varies. If not, go to chart 8. Also, see figure FO-7.
c. Set UUT RT: FCTN: SQ ON. Listen to handset.	c. Rushing noise is not present in handset. If it is present, go to chart 22.

2-29. OPERATIONAL CHECK. Continued

Step 9. TRANSMIT/RECEIVE SC AND FH AUDIO CHECK.

Action	Response
a. Set REF and UUT RT: RF: LO FCTN: SQ ON CHAN: MAN MODE: SC DATA: OFF VOL: COMFORTABLE LEVEL. Set RF SWITCH: 3. Set RESPONSE: 3.	a. No response.
b. Set PTT: UUT. Press handset PTT switch and speak into handset.	b. Message is heard in handset. If not, go to chart 23.
c. Set REF RT and UUT RT CHAN switches to each position. REF and UUT must be the same. Repeat step 9 b for each channel.	c. Message is heard in handset for each channel. If not, the exciter/power amplifier (1A11) is bad.
d. Set PTT: OFF. Set STIMULUS: 3. Set RESPONSE: 1.	d. No response.
e. Set PTT: REF. Press handset PTT switch and speak into handset.	e. Message is heard in handset. If not, go to chart 39.
f. Set REF RT and UUT RT: MODE: FH CHAN: 2.	f. No response.
g. Set PTT: REF. Press handset PTT switch and speak into handset.	g. Message is heard in handset. If not, go to chart 32.
h. Set STIMULUS: 1. Set RESPONSE: 3.	h. No response.
i. Set PTT: UUT. Press handset PTT switch and speak into handset.	i. Message is heard in handset. If not, go to chart 40.
j. Set PTT: OFF.	j. No response.

2-29. OPERATIONAL CHECK. Continued

Step 10. TRANSMIT CHECK (SC, AUDIO, CIPHER TEXT).

Action	Response
a. Set REF RT and UUT RT: RF: LO FCTN: SQ ON CHAN: MAN MODE: SC DATA : OFF VOL: FULLY CW. Set TEST EQPT SELECTOR: SCOPE CAL: FCTN GEN FREQ: 1000 Hz (900 to 1100 Hz) LEVEL: 120 mV p-p (100 to 140 mV p-p) FUNCTION: SINE CAL: OFF STIM SEL: FCTN GEN RESPONSE: 11.	a. No response.
b. Set PTT: UUT.	b. Scope chan A displays a 1.5 to 2.5 V p-p, 900 to 1100 Hz sine wave. If not, go to chart 24.
c. Set PTT: OFF.	c. No response.
d. Set RESPONSE: 3. Set PTT: UUT.	d. Scope chan A will display audio from the REF RT.
e. Set PTT: OFF.	e. No response.
f. Set LOGIC: 1. Set PTT: UUT.	f. No signal is present on scope than A. If signal is present, go to chart 25.
g. Set PTT: OFF. Disconnect RF probe from DMM. Connect W1 to DMM. Set DMM to 200 k Ω scale. Set TEST EQPT SELECTOR: DMM.	g. No response.
h. Set RESPONSE: 10.	h. DMM reading is 9 to 11 k Ω. If not, the audio control module (1A13) is bad.
i. Set RESPONSE: 9. Set DMM to 20 M Ω scale.	i. DMM reading is 200 to 400 k Ω. If not, the audio control module (1A13) is bad.
j. Set RESPONSE: 8.	j. DMM reading is ∞Ω. If not, the audio control module (1A13) is bad.
k. Set DMM to 200 Ω scale. Set PTT: UUT.	k. DMM reading is less than 200 Ω. If not, the audio control module (1A13) is bad.
l. Set PTT: OFF. Set REF RT and UUT RT: CHAN: 1.	l. No response.
m. Set CAL: FCTN GEN FREQ: 8000 Hz (7990 to 8010 Hz) LEVEL: 10 V p-p (9.5 to 10.5 V p-p) FUNCTION: SQUARE CAL: OFF.	m. No response.
n. Set TEST EQPT SELECTOR: SCOPE LOGIC: 2 STIMULUS: 5 RESPONSE: 3.	n. Scope chan A displays a 200 to 400 mV waveform. Single trace is sine wave. Total waveform is modulated. If not, the switching module (1A7) is bad.

2-29. OPERATIONAL CHECK. Continued

Step 11. RECEIVE CHECK (SC, AUDIO, CT).

Action	Response
a. Set LOGIC: OFF CAL: FCTN GEN FREQ: 1000 Hz (900 to 1100 Hz) LEVEL: 120 mV p-p (100 to 140 mV p-p) FUNCTION: SINE.	a. No response.
b. Set CAL: OFF STIMULUS: 3 RESP SEL: S2 RESPONSE : 1.	b. No response.
c. Set PTT: REF.	c. Scope chan A displays a 4.5 to 6.5 V p-p, 900 to 1100 Hz sine wave + the 150-Hz squelch tone. If not, the switching module (1A7) is bad.
d. Set RESP SEL: S1. Set LOGIC: 1. Jumper TP1 to TP2.	d. No response.
e. Set PTT: REF.	e. Scope chan A displays a 4 to 6 V p-p, 900 to 1100 Hz sine wave. Some of the 150-Hz squelch tone may be present. If not, go to chart 26.

Step 12. TRANSMIT CHECK (SC, 4.8K DATA).

Action	Response
a. Set LOGIC: OFF. Remove jumper between TP1 and TP2.	a. No response.
b. Set CAL: FCTN GEN FREQ: 2400 Hz (2390 to 2410 Hz) LEVEL: 10 V p-p (9.5 to 10.5 V p-p) FUNCTION: SQUARE TRIGGER: EXT TRIG TRIG LEVEL: MID-RANGE. Set CAL: OFF.	b. No response. NOTE Do not change FCTN GEN settings from these settings until required again.
c. Set STIMULUS: 2 RESPONSE: 3 BASEBAND: 1. Set REF RT and UUT RT: DATA: 4.8 K.	c. No response.
d. Set PTT: UUT.	d. Scope chan A displays a 9 to 11 V p-p, 2390 to 2410 Hz square wave. If not, go to chart 27.
e. Set PTT: OFF.	e. No response.

2-29. OPERATIONAL CHECK. Continued

Step 13. TRANSMIT CHECK (SC, 16K DATA, CT).

Action	Response
a. Set FCTN GEN TRIGGER: CONT CAL: MOD GEN FREQ: 16000 Hz (15990 to 16010 Hz) LEVEL: 10 V p-p (9.5 to 10.5 V p-p) FUNCTION: SQUARE TRIGGER: EXT TRIG LEVEL: MID-RANGE CAL: OFF.	a. No response.
b. Set MOD GEN: ON RESPONSE: 10 LOGIC: 2. Set REF RT and UUT RT: DATA: 16K. Set STIM SEL: FCTN GEN.	b. No response.
c. Set PTT: UUT.	c. Scope than A displays a 9 to 11 V p-p, 2390 to 2410 Hz square wave. If not, go to chart 28.
d. Set PTT: OFF.	d. No response.

Step 14. RECEIVE CHECK (SC, 4.8K DATA).

Action	Response
a. Set LOGIC: OFF MOD GEN: OFF.	a. No response.
b. Set CAL: FCTN GEN: TRIGGER: CONT FREQ: 2400 Hz (2390 to 2410 Hz) LEVEL: 10 V p-p (9.5 to 10.5 V p-p) FUNCTION : SQUARE TRIGGER: EXT TRIG LEVEL: MID-RANGE. Set CAL: OFF.	b. No response.
c. Set BASEBAND: 2 STIMULUS: 4 RESPONSE: 1. Set REF RT and UUT RT: DATA: 4.8K.	c. No response.
d. Set PTT: REF.	d. Scope chan A displays a 9 to 11 V p-p, 2390 to 2410 Hz square wave. If not, go to chart 29.
e. Set RESPONSE: 2. Set PTT: REF.	e. Scope chan A displays a 9 to 11 V p-p, 4790 to 4810 Hz square wave. If not, go to chart 30.

2-29. OPERATIONAL CHECK. Continued

Step 15. RECEIVE CHECK (CT, DIGITAL DATA).

Action	Response
a. Remove UUT RT data rate adapter (1A15). Set TRIGGER: CONT CAL: FCTN GEN FREQ: 8000 Hz (7990 to 8010 Hz) LEVEL: 10 V p-p (9.5 to 10.5 V p-p) FUNCTION: SQUARE.	a. No response.
b. Set CAL: MOD GEN FREQ: 16000 Hz (15990 to 16110 Hz) LEVEL: 10 V p-p (9.5 to 10.5 V p-p) FUNCTION: SQUARE TRIGGER: EXT TRIG LEVEL: MID-RANGE Set CAL: OFF. Set REF RT and UUT RT: DATA: 16K.	b. No response.
c. Set MOD GEN: ON LOGIC 1 STIMULUS: 6 RESPONSE: 1. Set PTT: UUT. Set PTT: REF.	c. Scope chan A displays a 9 to 10 V p-p, 7990 to 8010 Hz square wave. If not, go to chart 31.
d. Set RESPONSE: 2. Set PTT: REF.	d. Scope chan A displays a 9 to 10 V p-p, 15990 to 16010 Hz square wave. If not, go to chart 31.
e. Reinstall UUT RT data rate adapter (1A15).	e. No response.

Step 16. TRANSMIT CHECK (SC, AD2).

Action	Response
a. Set LOGIC: OFF MOD GEN: OFF.	a. No response.
b. Set CAL: FCTN GEN TRIGGER: CONT FREQ: 2400 Hz (2390 to 2410 Hz) LEVEL: 120 mV p-p (100 to 140 mV p-p) FUNCTION: SINE. Set CAL: OFF.	b. No response.
c. Set REF RT and UUT RT: DATA: AD2. Set STIMULUS: 1 RESPONSE: 3 BASEBAND: 4.	c. No response.
d. Set PTT: UUT.	d. Scope chan A displays a slightly distorted 1.5 to 2.5 V p-p, 2390 to 2410 Hz sine wave. If not, go to chart 33.
e. Set PTT: OFF.	e. No response.

2-29. OPERATIONAL CHECK. Continued

Step 17. RECEIVE CHECK (SC, AD2).

Action	Response
a. Set BASEBAND: 5 STIMULUS: 3 RESPONSE: 1. Set TEST EQPT INPUT: INT.	a. No response.
b. Set PTT: REF.	b. Scope chan A displays a slightly distorted 1.5 to 2.5 V p-p, 2390 to 2410 Hz sine wave. If not, go to chart 34.

Step 18. RETRANSMIT CHECK.

Action	Response
a. Set RT (UUT and REF) DATA: OFF. Set UUT RT: FCTN : RXMT. Disconnect cable at UUT RT AUDIO/DATA connector and move it to UUT RT RXMT connector.	a. No response.
b. Set CAL: FCTN GEN FREQ: 1000 Hz (990 to 1100 Hz) LEVEL: 120 mV p-p (100 to 140 mV p-p) FUNCTION: SINE. Set CAL: OFF.	b. No response.
c. Set BASEBAND: 3. Set TEST EQPT INPUT: INT.	c. No response.
d. Set PTT: REF.	d. Scope chan A displays a 560 to 700 mV p-p, 900 to 1100 Hz sine wave. If not, go to chart 35.
e. Set TEST EQPT SELECTOR: DMM. Set RESPONSE: 5. Set PTT: REF.	e. DMM reading is -0.5 to 0.5 V dc. If not, go to chart 35.
f. Set RESPONSE: 6.	f. DMM reading is 1.0 to 3.0 V dc. If not, the switching module (1A7) is bad.
g. Set RESPONSE: 4.	g. DMM reading is 1.0 to 3.0 V dc. If not, the switching module (1A7) is bad.

2-29. OPERATIONAL CHECK. Continued

Step 19. RECEIVER SENSITIVITY.

Action	Response
a. Move cable from UUT RT RXMT connector back to UUT RT AUD/DATA connector.	a. No response.
b. Set REF RT: FCTN: OFF. Set UUT RT: FCTN: SQ OFF. Set UUT RT: CHAN: 1. Set SIGNAL GENERATOR: FREQ: 37.8750 MHz (37.8748 to 37.8752 MHz) LEVEL: -96 dBm (-96.5 to -95.5 dBm) FM MOD: INT DEV: 6.5 kHz.	b. No response.
c. Set RF SWITCH: 4. Set TEST EQPT SELECTOR: SCOPE. RESPONSE: 1 LOAD: 1.	c. Scope chan A displays a 14 to 20 V p-p, 1 kHz sine wave with some noise that changes when RF is OFF. If not, go to chart 36.
d. Increase signal generator output to -86 dBm.	d. Scope chan A displays same sine wave as for step 19 c, but without noise. If not, go to chart 37.
e. Repeat steps 19 a thru d for all channels. Set signal generator FREQ to RT display for each channel.	e. Same as for steps 19 c and d.

Step 20. HOLDING BATTERY CHECK.

Action	Response
a. Set UUT RT: FCTN: OFF.	a. RT display turns off. If not, the switch flex assembly (1A16A1W2) is bad.
b. Set 13 V: OFF and wait 30 seconds.	b. No response.
c. Set 13 V: ON.	c. No response.
d. Set UUT RT: FCTN : SQ ON CHAN: 2 MODE: FH.	d. RT displays ID for hopset loaded into channel 2. If not, go to chart 38.
e. Operational Check is complete.	

2-30. MAINTENANCE ACTION PRECISE SYMPTOM (MAPS) CHART.

The MAPS chart is used to find the troubleshooting chart to use when a symptom has been provided by Unit Maintenance. It is a flowchart similar to the troubleshooting flowcharts. Do not start the MAPS chart until after the pre-troubleshooting check has been passed.

The purpose of the MAPS chart is to locate the correct troubleshooting flowchart without performing the entire operational check. Many times, multiple symptoms will be present. The MAPS chart identifies which symptom should be checked first.

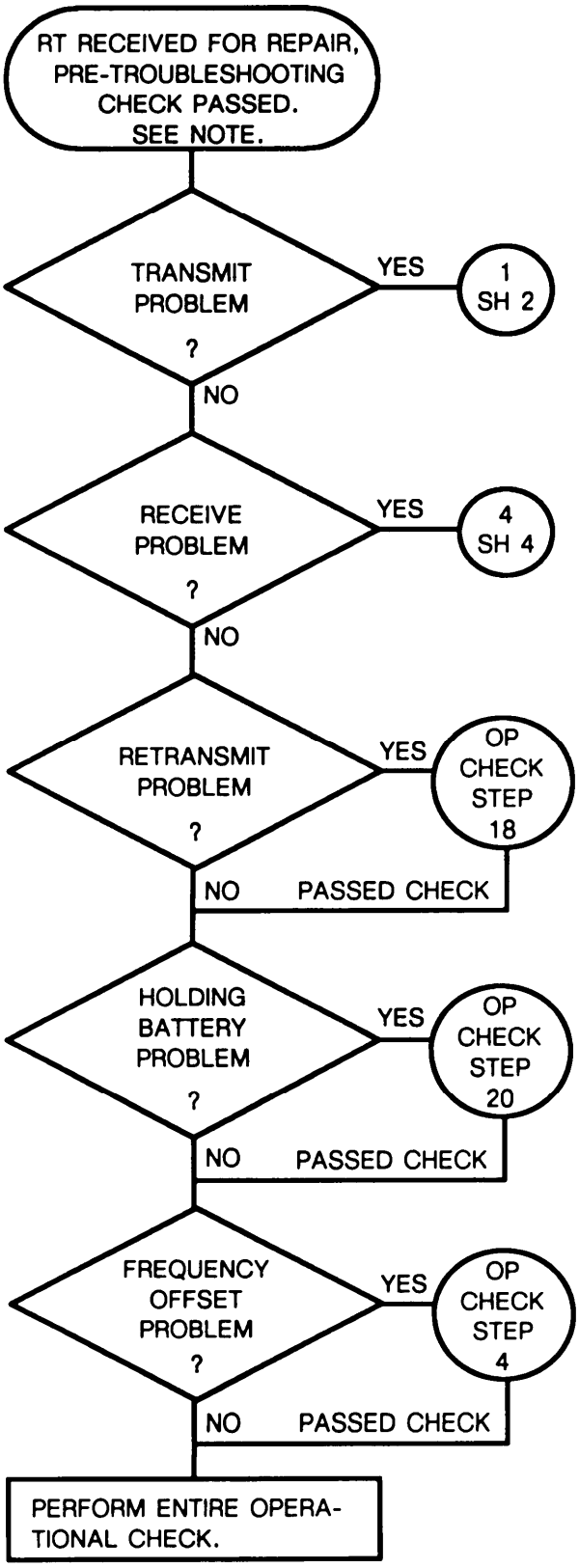
A description of the flowchart symbols is in paragraph 2-28.

To use the MAPS chart, proceed through the flowchart until a circle is reached that directs you to a step (or steps) in the operational check. Perform that step (or steps) in the operational check. If more than one step is indicated, perform them in the order listed. If all of the checks (or steps) are passed, return to the MAPS chart. If the circle has a PASSED CHECK arrow, then return to the MAPS chart where indicated. If the circle does not have a PASSED CHECK arrow, then the symptom was not verified. Perform the operational check.

After a bad module has been replaced, repeat the operational check step that was not passed. The entire operational check should be passed before an RT is returned to Unit Maintenance. It is not necessary to repeat steps that were passed as part of the troubleshooting process.

2-30. MAINTENANCE ACTION PRECISE SYMPTOM (MAPS) CHART. Continued

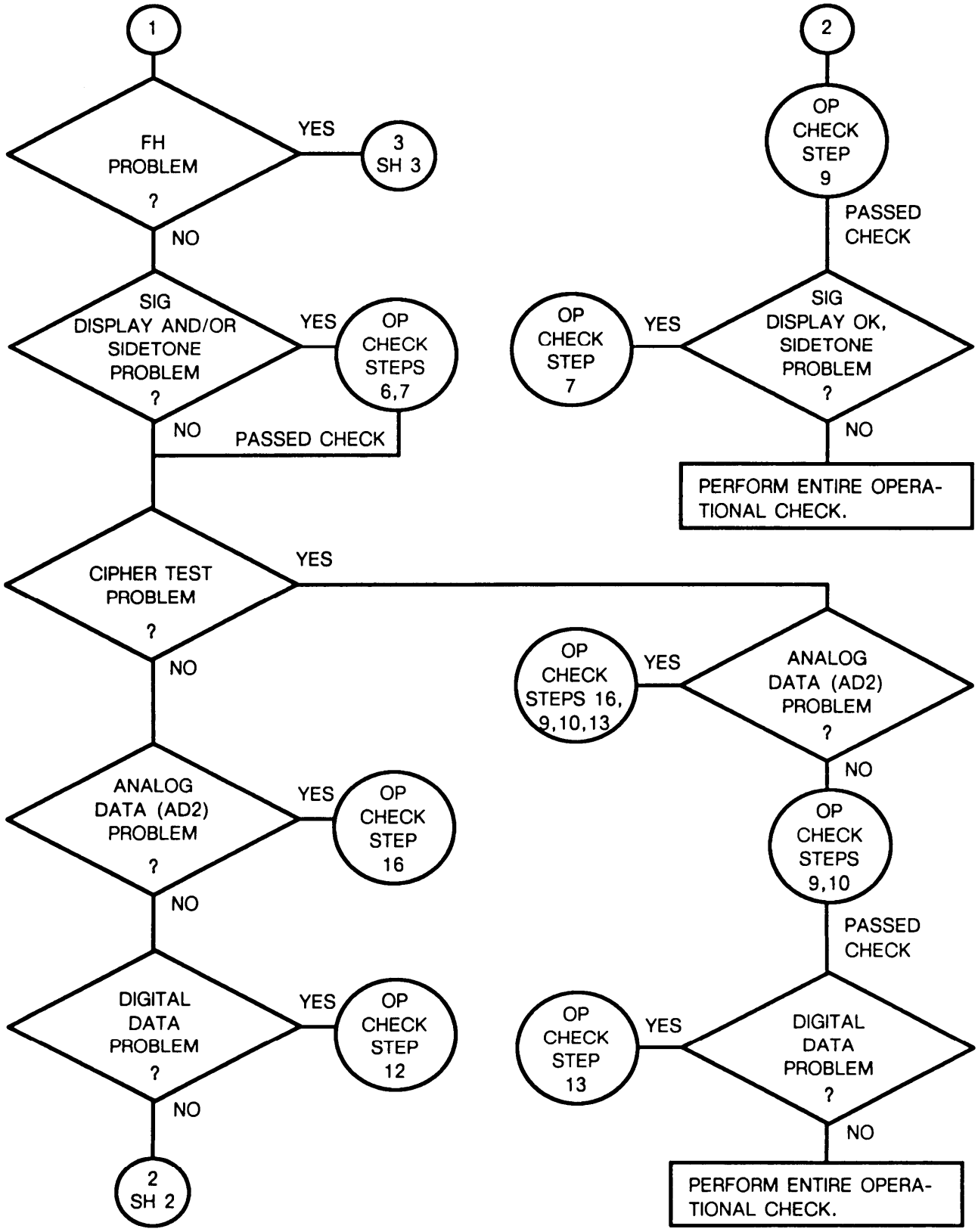
(Sheet 1 of 5)



NOTE
If no symptom is available, perform operational check in paragraph 2-29.

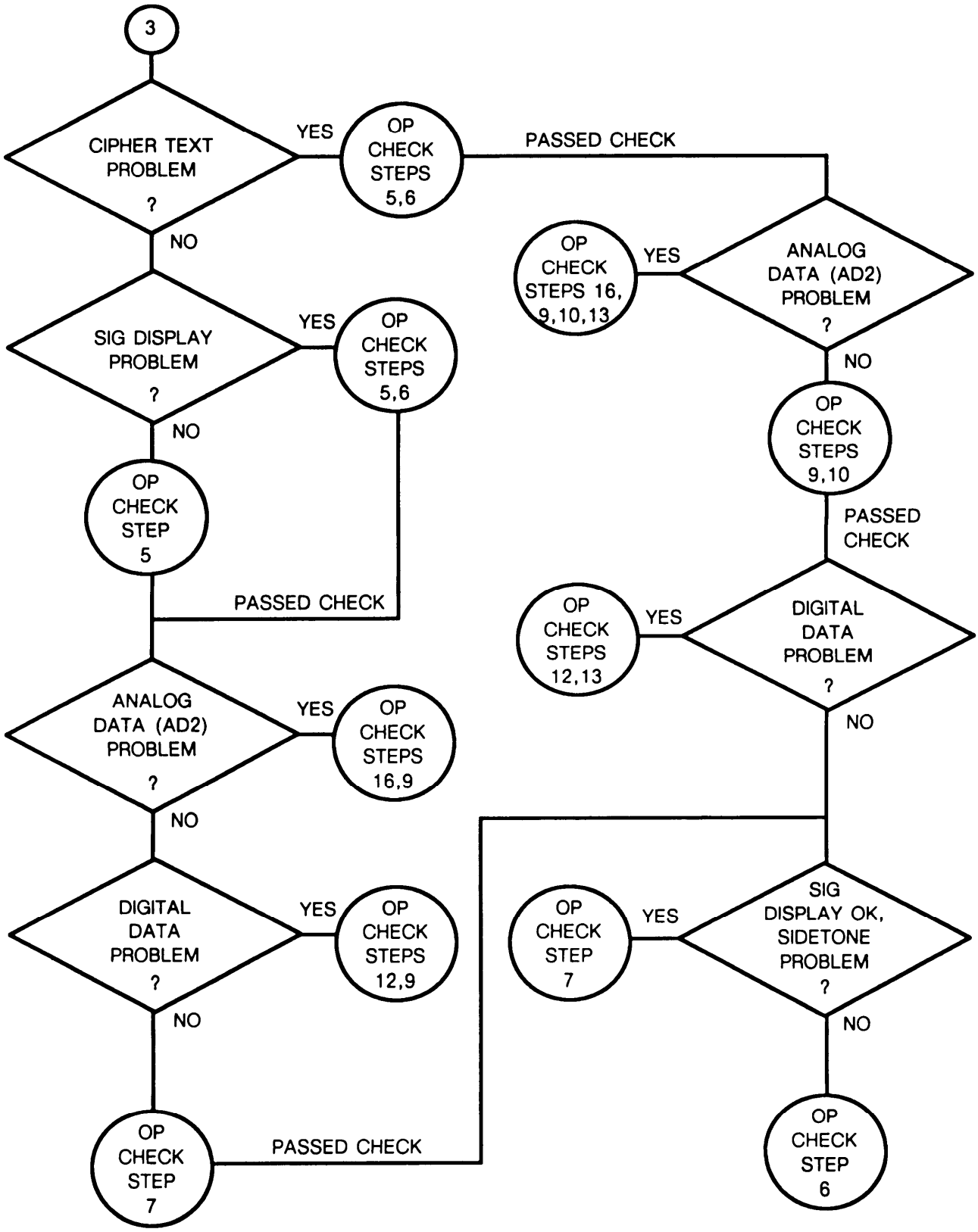
2-30. MAINTENANCE ACTION PRECISE SYMPTOM (MAPS) CHART. Continued

(Sheet 2 of 5)



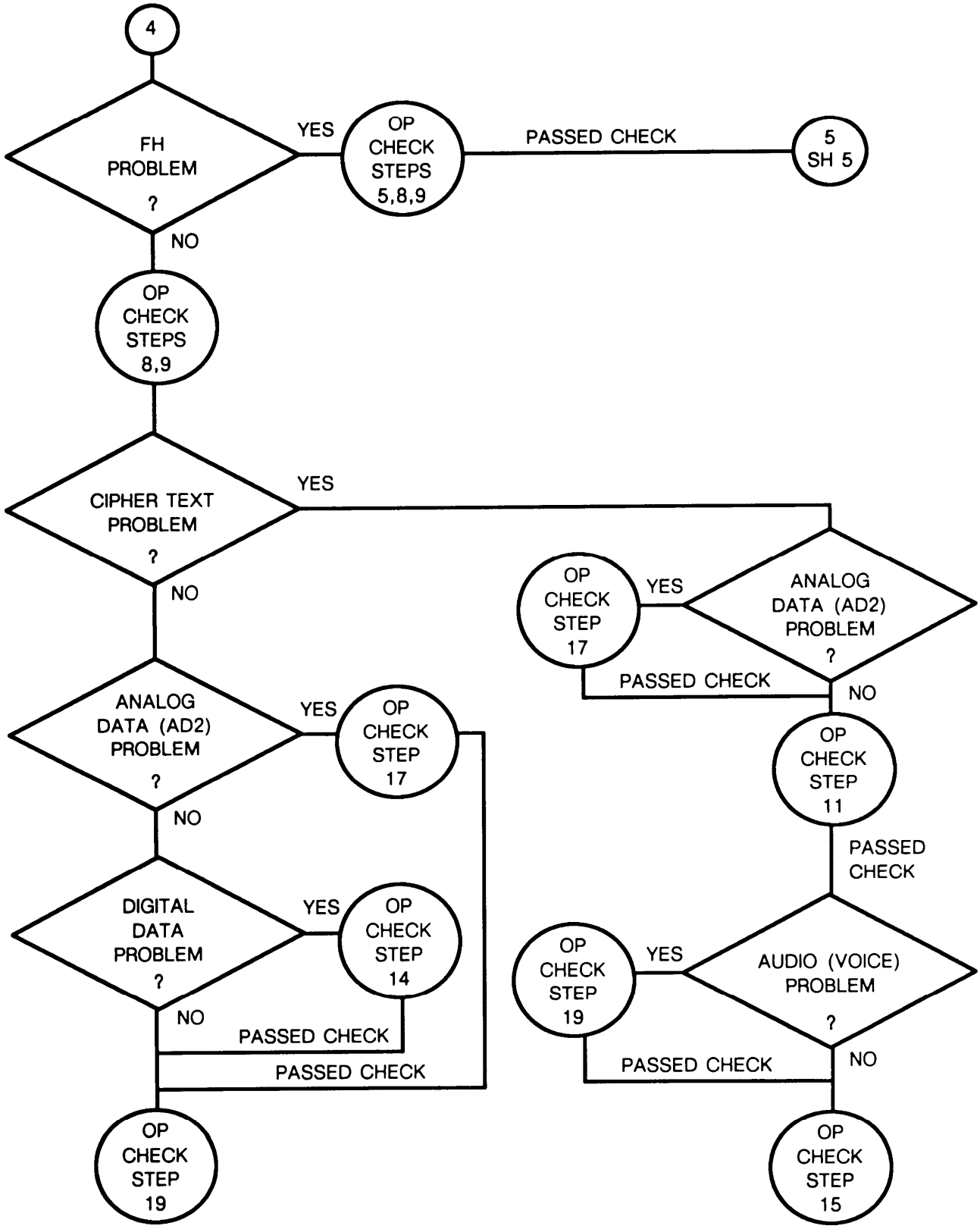
2-30. MAINTENANCE ACTION PRECISE SYMPTOM (MAPS) CHART. Continued

(Sheet 3 of 5)



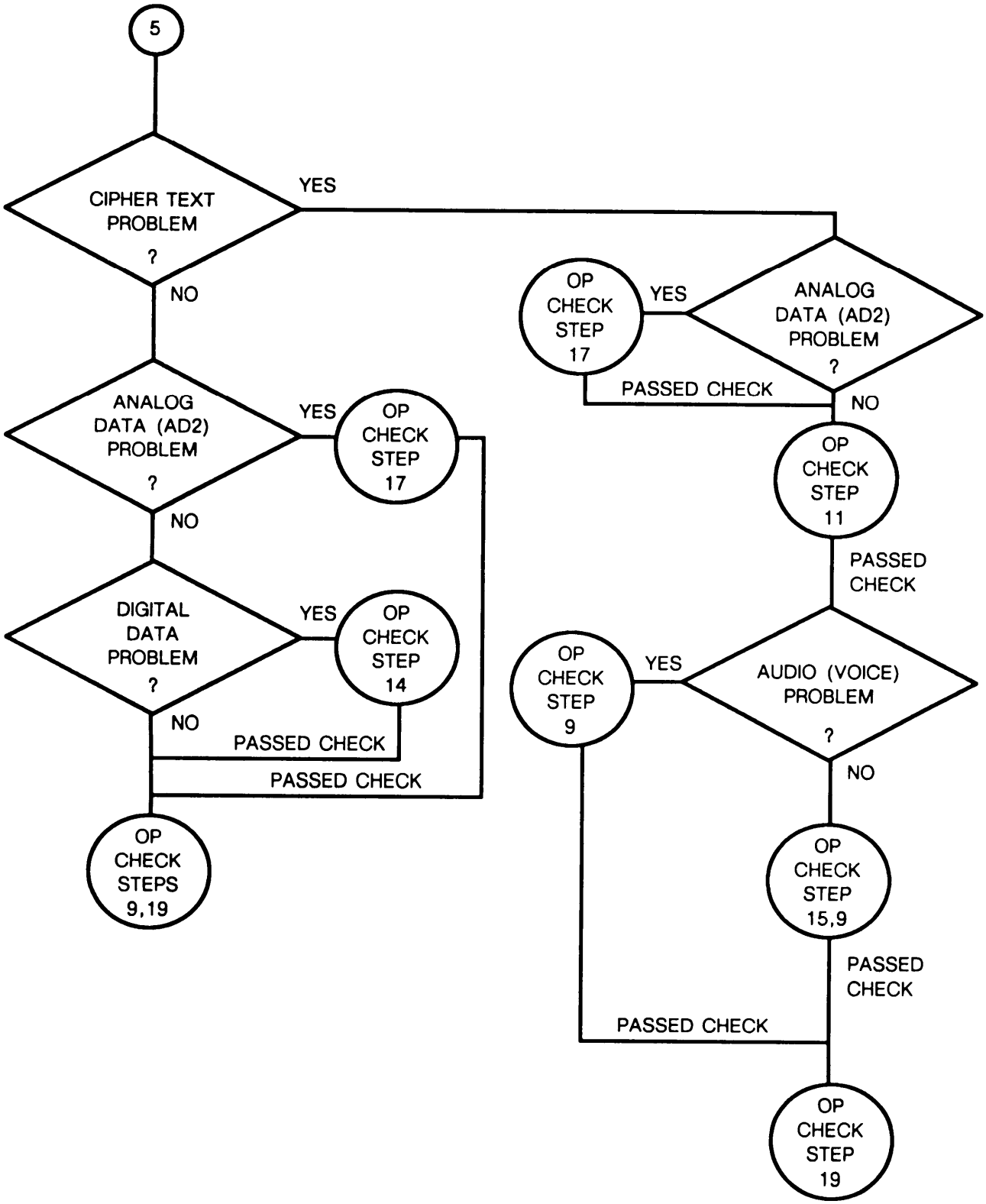
2-30. MAINTENANCE ACTION PRECISE SYMPTOM (MAPS) CHART. Continued

(Sheet 4 of 5)



2-30. MAINTENANCE ACTION PRECISE SYMPTOM (MAPS) CHART. Continued

(Sheet 5 of 5)



2-31. TROUBLESHOOTING FLOWCHARTS.

The following flowcharts contain the troubleshooting procedures used to fault isolate an RT to a bad module. Observe the following when using a flowchart:

a. **Do not start a flowchart** unless directed to it by another troubleshooting flowchart or by the operational check.

b. **Do not change RT or test equipment switch settings** unless directed to do so by the flowchart or the test setup diagram.

c. Refer to Chapter 3 for information on the reference fixture and the test adapter.

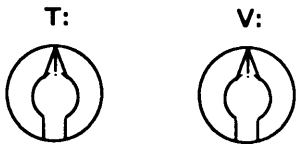
d. The logic levels in the RT are as follows:

	logic 0	=	-0.7	to	2.0 V dc
	logic 1	=	4.7	to	7.5 V dc
negative	logic 1	=	-5.0	to	-7.25 V dc

e. See figure FO-13 for locations on the RT parent board.

f. The test responses at some test points are not seen immediately. Check the probe location and perform the test again to verify a faulty result. Try rekeying the radio that is transmitting. Test responses that are difficult to detect will be supplied with presets for the scope.

These appear as:



They give the time base (T), and voltage base (V) suggested settings for the scope.

g. The reference fixture and REF RT are part of Maintenance Group OA-9263A/GRC.

h. The RT may fail SELF-TEST if a signal is input to the AUD/FILL or AUD/DATA connector during SELF-TEST. These SELF-TEST failures may be ignored during testing unless the procedure asks for SELF-TEST responses.

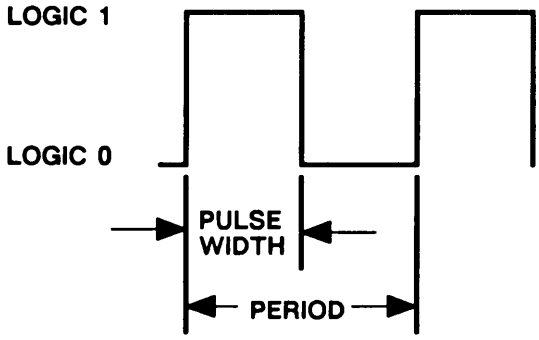
i. Some of the more common frequencies are as follows.

Frequency	Period	Pulse Width
75 Hz	13 ms	6.7 ms
150 Hz	6.7 ms	3.35 ms
640 Hz	1.6 ms	0.78 ms
1 kHz	1.0 ms	0.50 ms
1.2 kHz	0.83 ms	0.42 ms
2.4 kHz	0.42 ms	0.21 ms
2.88 kHz	0.34 ms	0.17 ms
4.8 kHz	0.21 ms	0.10 ms
8 kHz	125 µs	63 µs
16 kHz	62.5 µs	31 µs
32 kHz	31.25 µs	15.6 µs
40 kHz	25 µs	12.5 µs
192 kHz	5.2 µs	2.6 µs
320 kHz	3.1 µs	1.6 µs
640 kHz	1.6 µs	0.78 µs
3.2 MHz	0.31 µs	0.16 µs

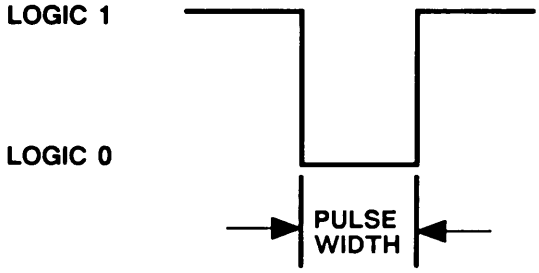
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

j. Some of the more common scope waveforms are as follows:

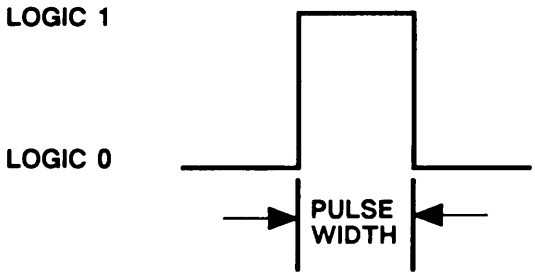
Logic 0/1 Pulse:



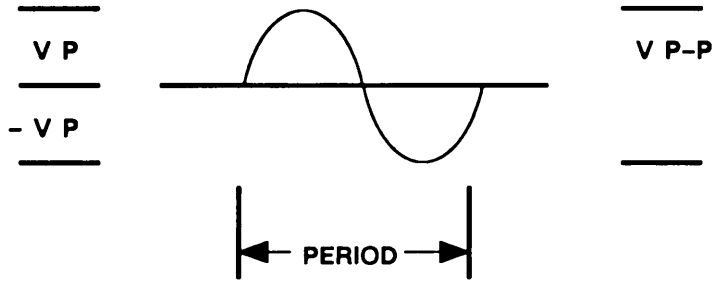
Logic 0 Pulse:



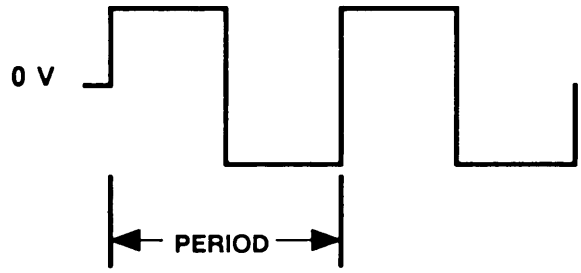
Logic 1 Pulse:



Sine wave:



Square wave:



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2-31. TROUBLESHOOTING FLOWCHARTS. Continued

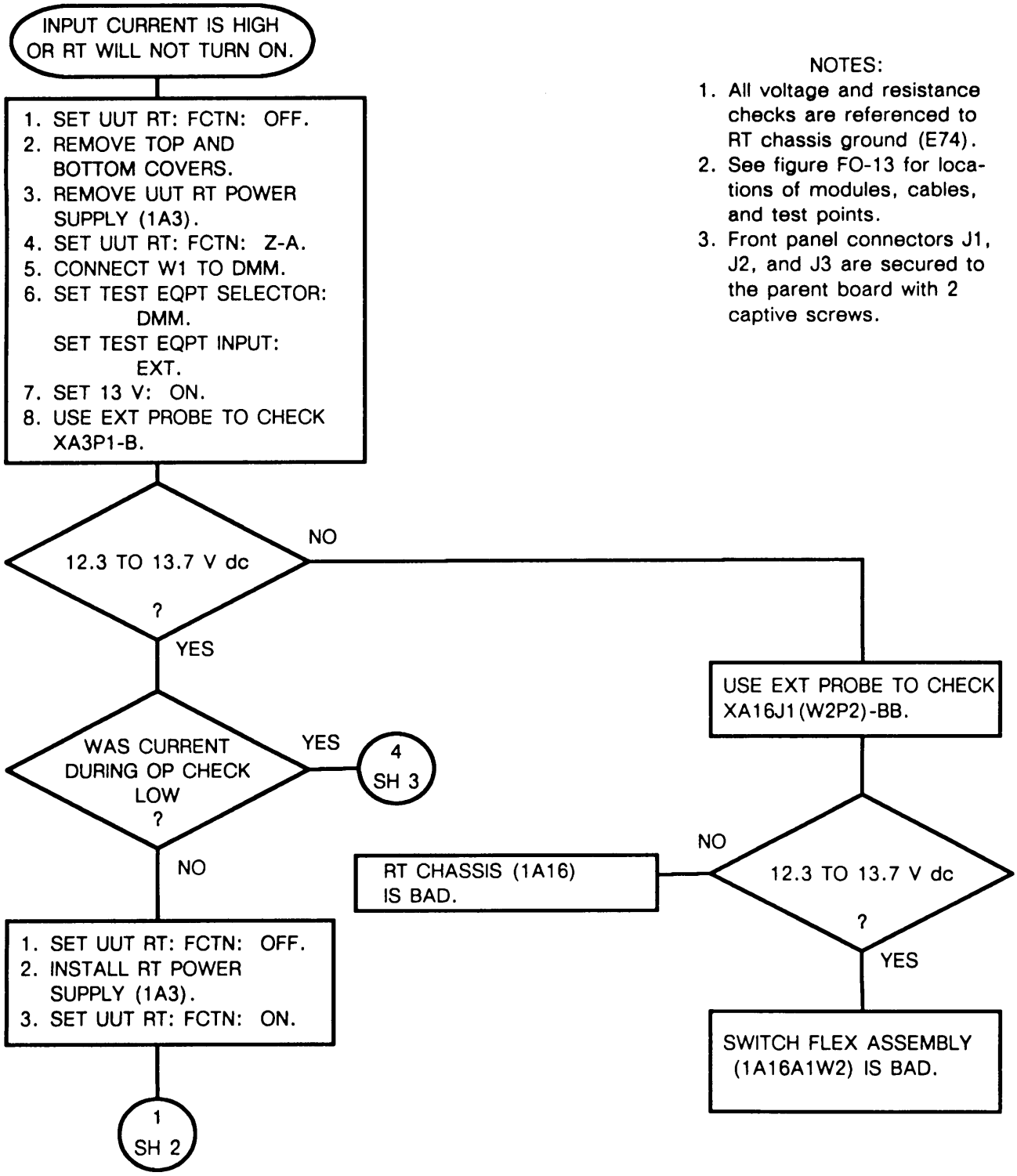
CHART	SYMPTOM
1	Input current is high or RT will not turn on.
2	Fails Z-A test.
3	Current is high in Z-A with display blank.
4	“E d” is not displayed during self-test.
5	No audio output or “FAIL1” is displayed during self-test.
6	Some squelch bursts are not present, “Good” is not displayed.
7	Bad FH self-test (no “ BEEP” during BIT).
8	VOL control does not work.
9	“FAIL4” is displayed or remote test is failed.
10	Frequency display is incorrect.
11	One keyboard button is inoperative.
12	Single channel frequency will not load.
13	TRANSEC will not load.
14	FH fill data will not load into holding memory.
15	RF power output is incorrect in HI.
16	Incorrect SIG display in transmit.
17	RF power output is incorrect in M.
18	RF power output is incorrect in LO.
19	Sidetone is present with high VSWR.
20	Sidetone is absent.
21	Rushing noise is not present in SQ OFF.
22	Rushing noise is present in SQ ON.
23	Will not transmit (SC, audio, PT).
24	Will not transmit (SC, audio, CT).
25	Will not transmit (SC, audio, CT) COMSEC connector fault.
26	Will not receive (SC, audio, CT).
27	Will not transmit (SC, 4.8 K).
28	Will not transmit (SC, digital data, CT).
29	Will not receive (SC, 4.8 K).
30	Will not receive (SC, 4.8K) clocking fault.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

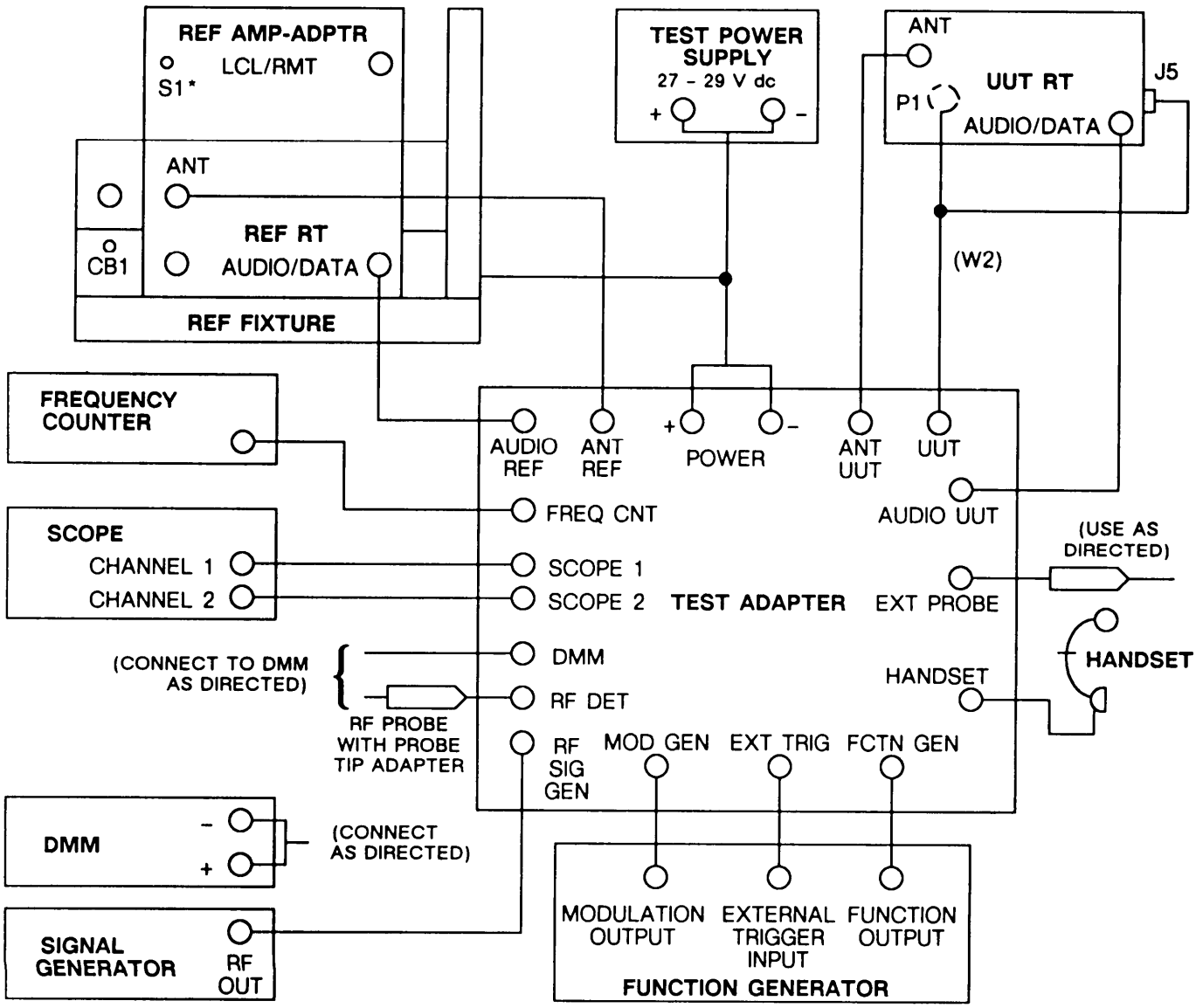
CHART	SYMPTOM
31	Will not receive (SC, 16K, CT).
32	Will not receive FH (SC, O.K.).
33	Will not transmit in AD2.
34	Will not receive in AD2.
35	Will not retransmit.
36	Receive sensitivity is low (-96 dBm).
37	Receive sensitivity is low (-86 dBm).
38	Fill data is lost when power is removed.
39	Will not receive (SC, audio).
40	Will not transmit FH (SC, O.K.).
41	DIM control does not operate.
42	RF power output is incorrect in PA.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 1 of 9)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued



EQUIPMENT PRESETS

REF RT AND UUT RT:

FCTN:	STW **(UUT ONLY)**
RF:	LO
CHAN:	MAN
DIM:	FULLY CW
VOL:	MID-RANGE
MODE:	SC
DATA:	OFF

NOTE: UUT RT: When top or bottom cover is removed, interlock switches must be defeated and fill data must be reloaded.
REF RT: FCTN: OFF

TEST ADAPTER:

28 V:	ON
13 V:	OFF
STIMULUS:	1
RESPONSE:	1
LOAD:	OFF
RF SWITCH:	1
MOD GEN:	OFF
LOGIC:	OFF

REF FIXTURE: CB1: ON

REF AMP-ADPTR:
*S1: LCL (If present)

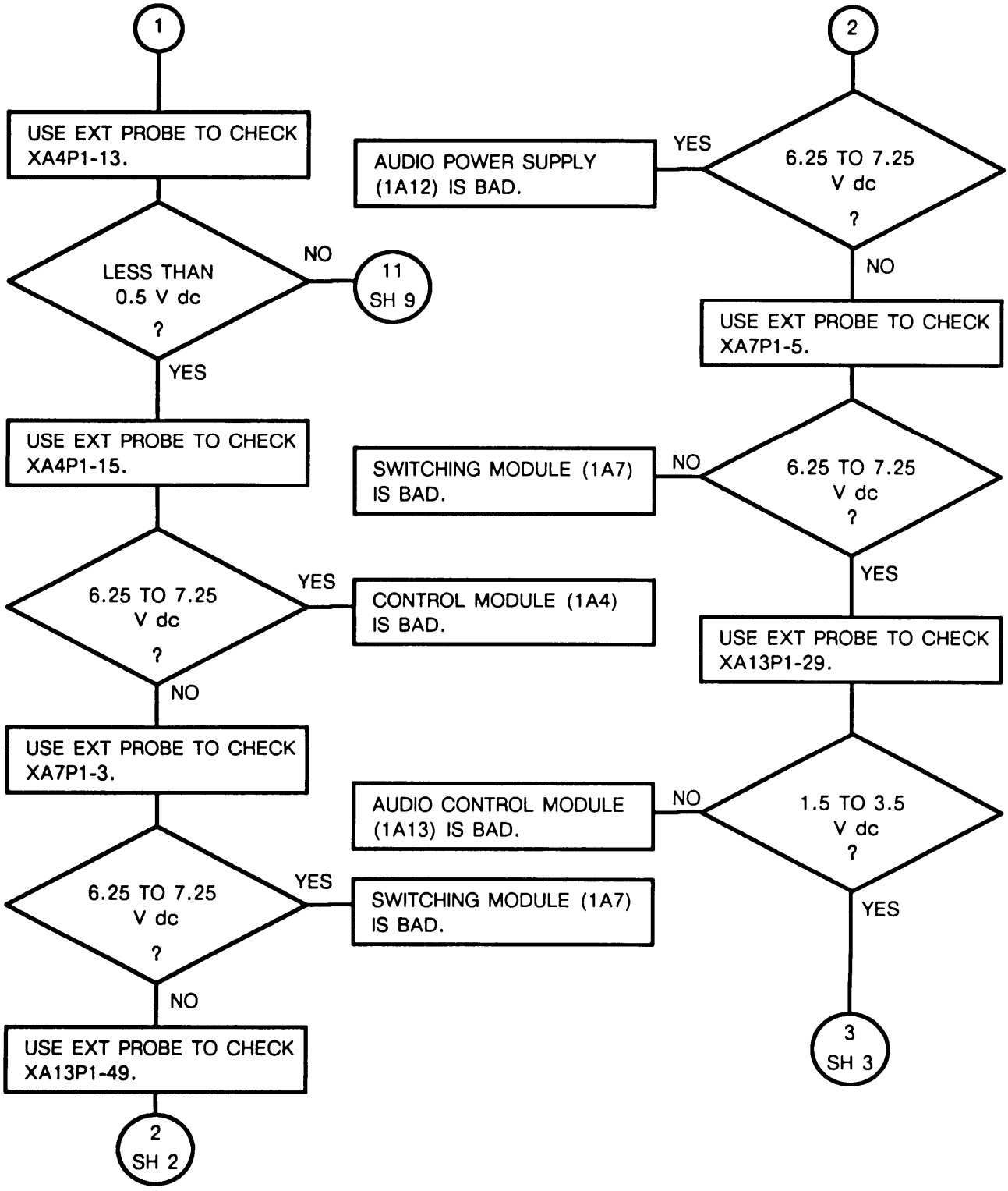
TEST EQUIPMENT SELECTOR:	HNDST
TEST EQUIPMENT INPUT:	INT
BASEBAND:	3
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S1

EL7XL1015A

Figure 2-14. Basic Troubleshooting Test Setup.

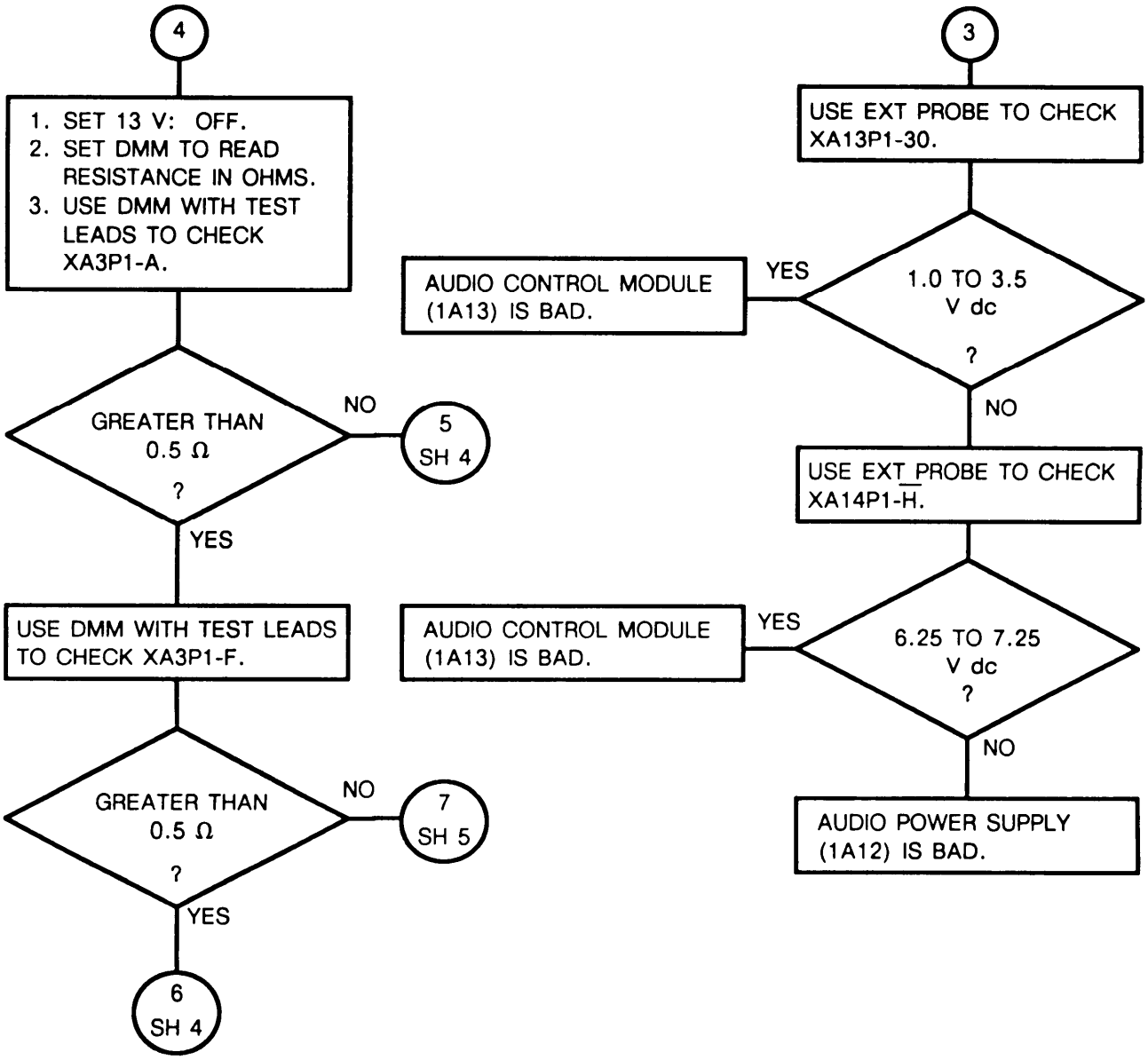
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 2 of 9)



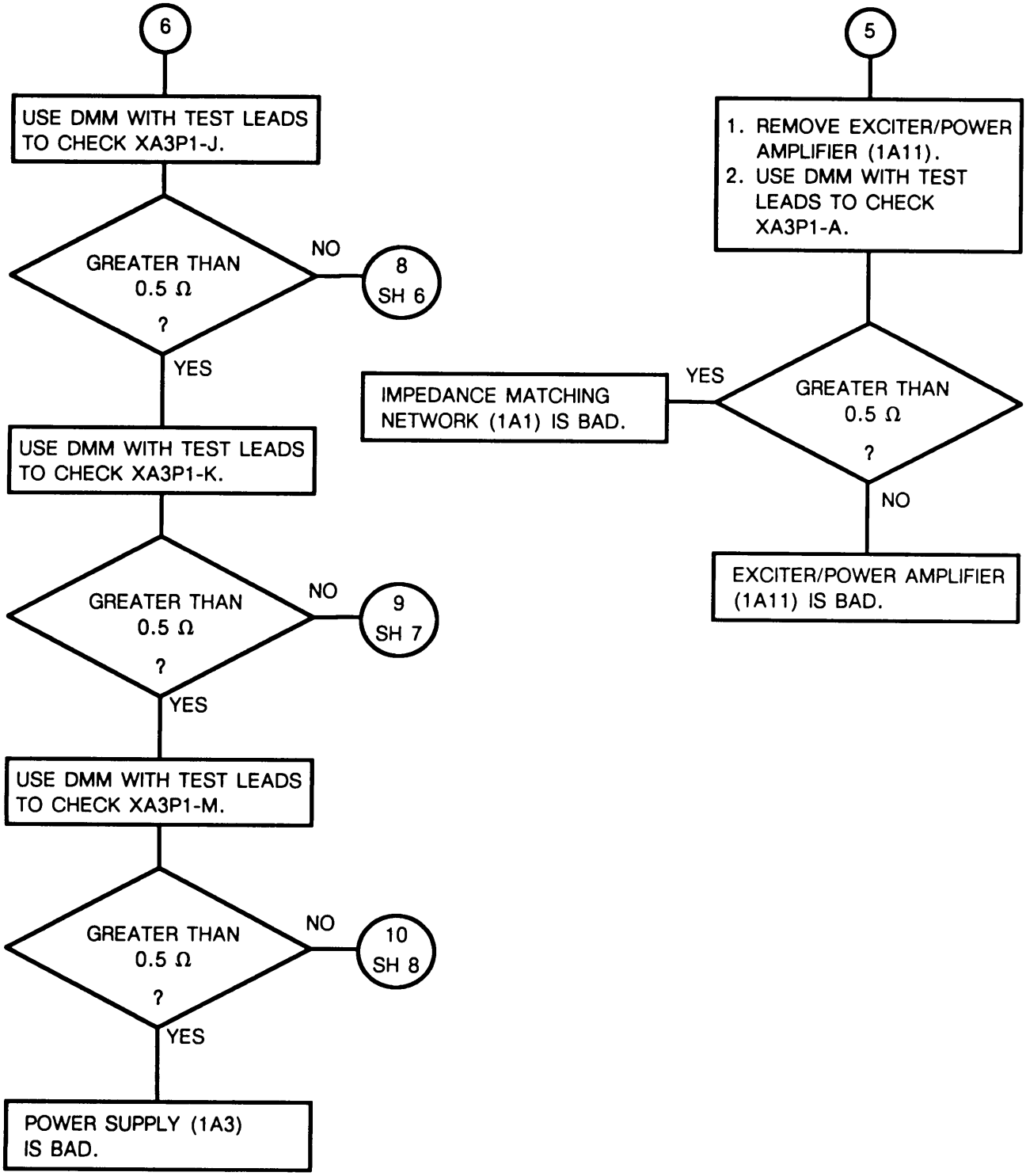
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 3 of 9)



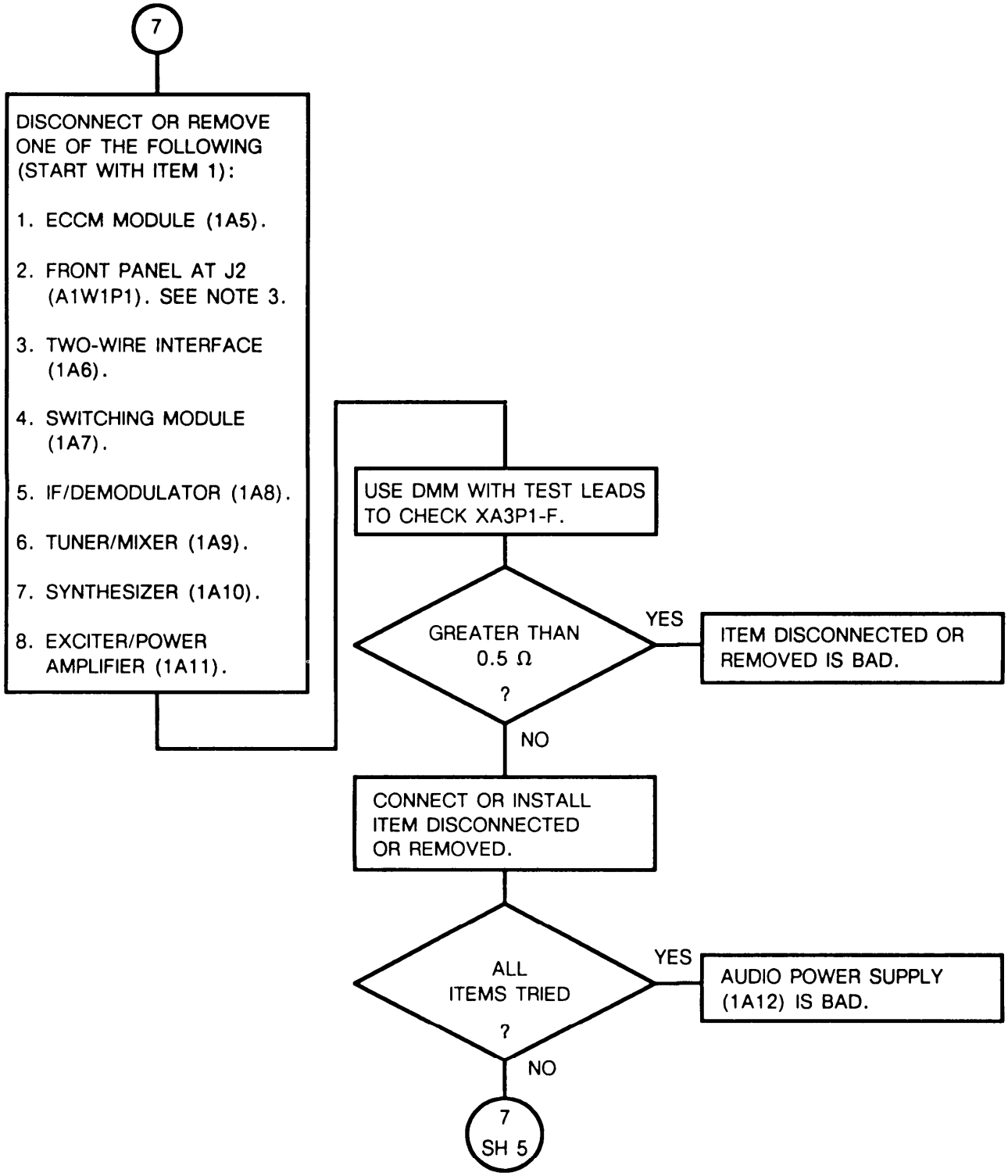
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 4 of 9)



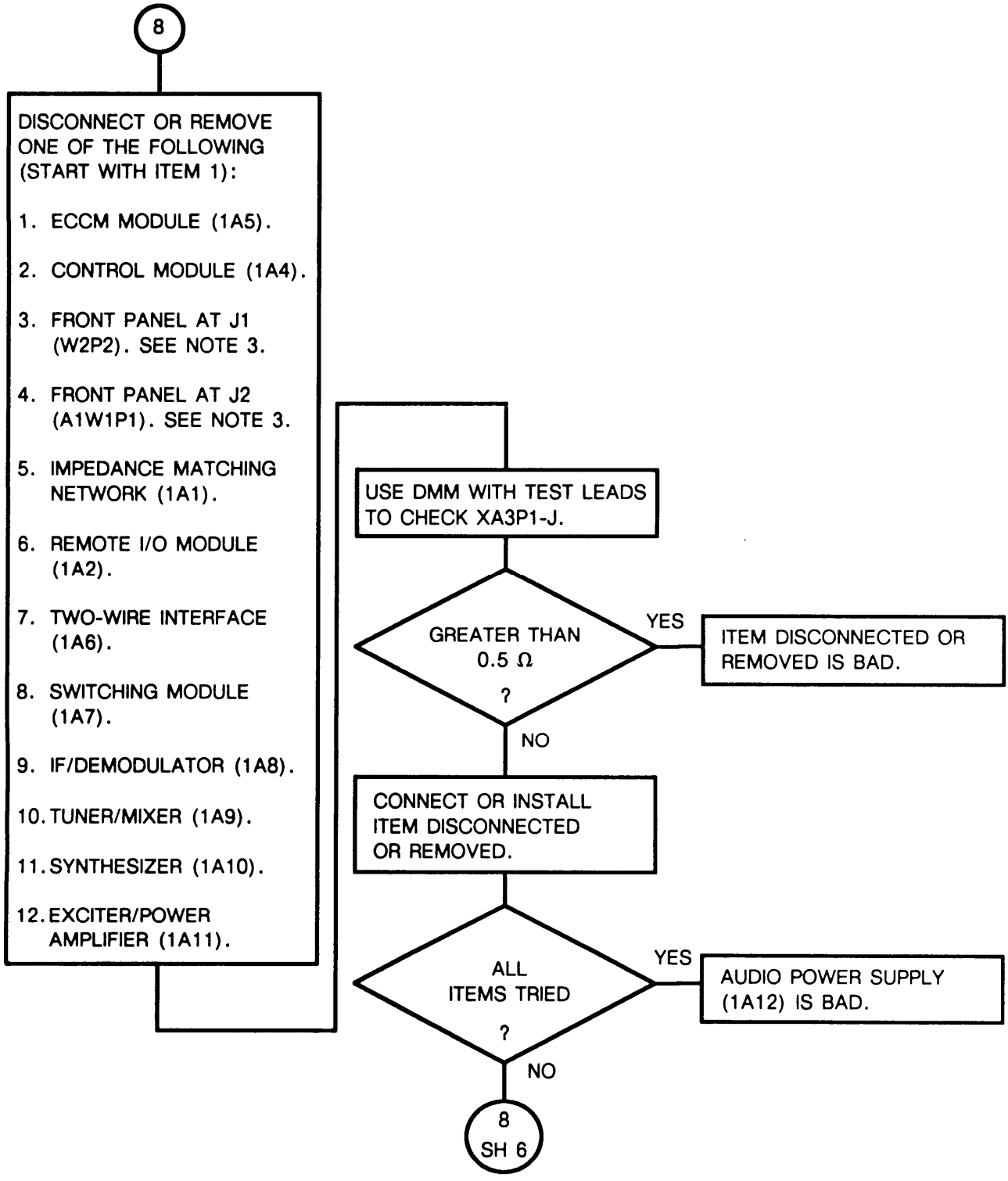
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 5 of 9)



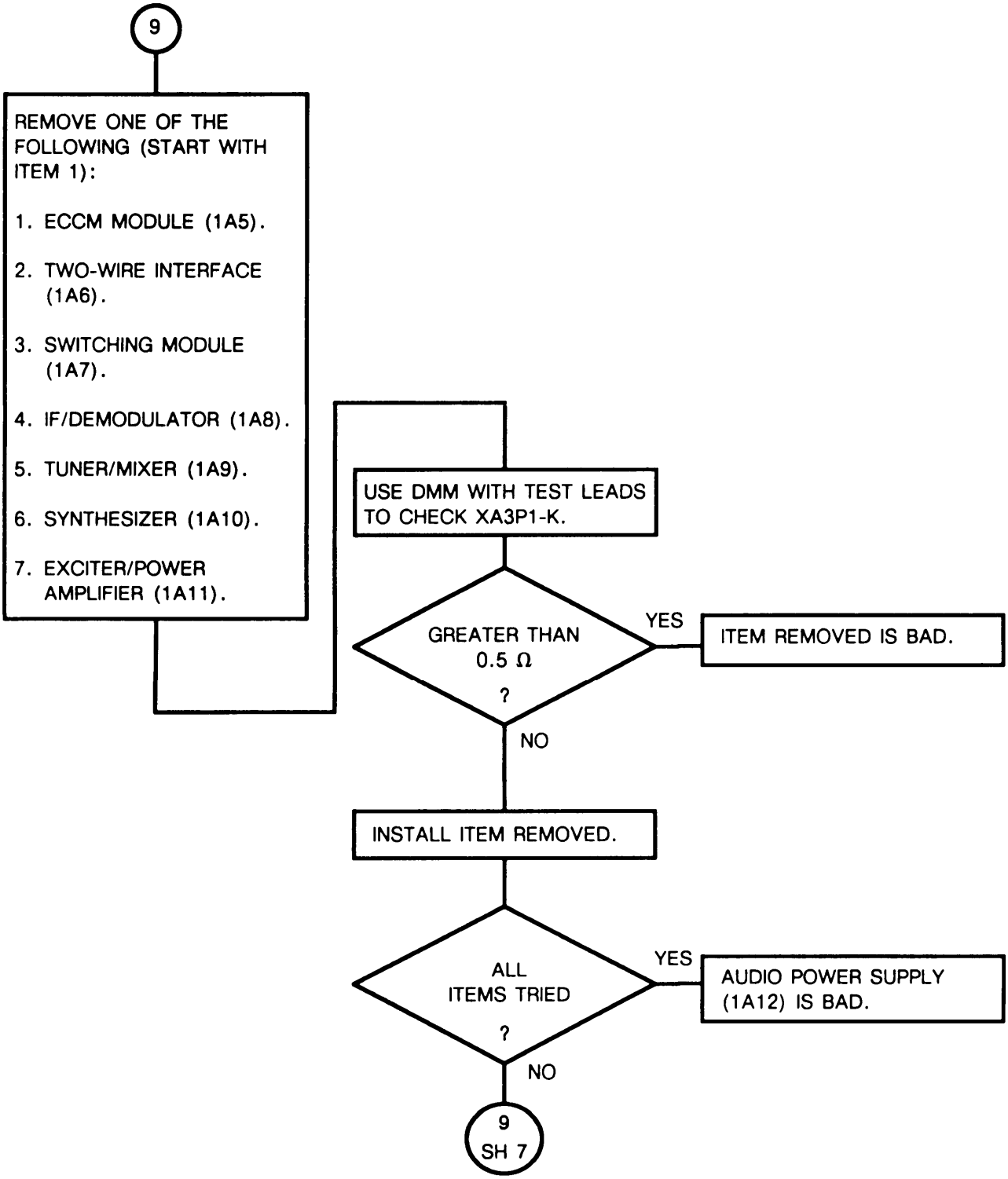
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 6 of 9)



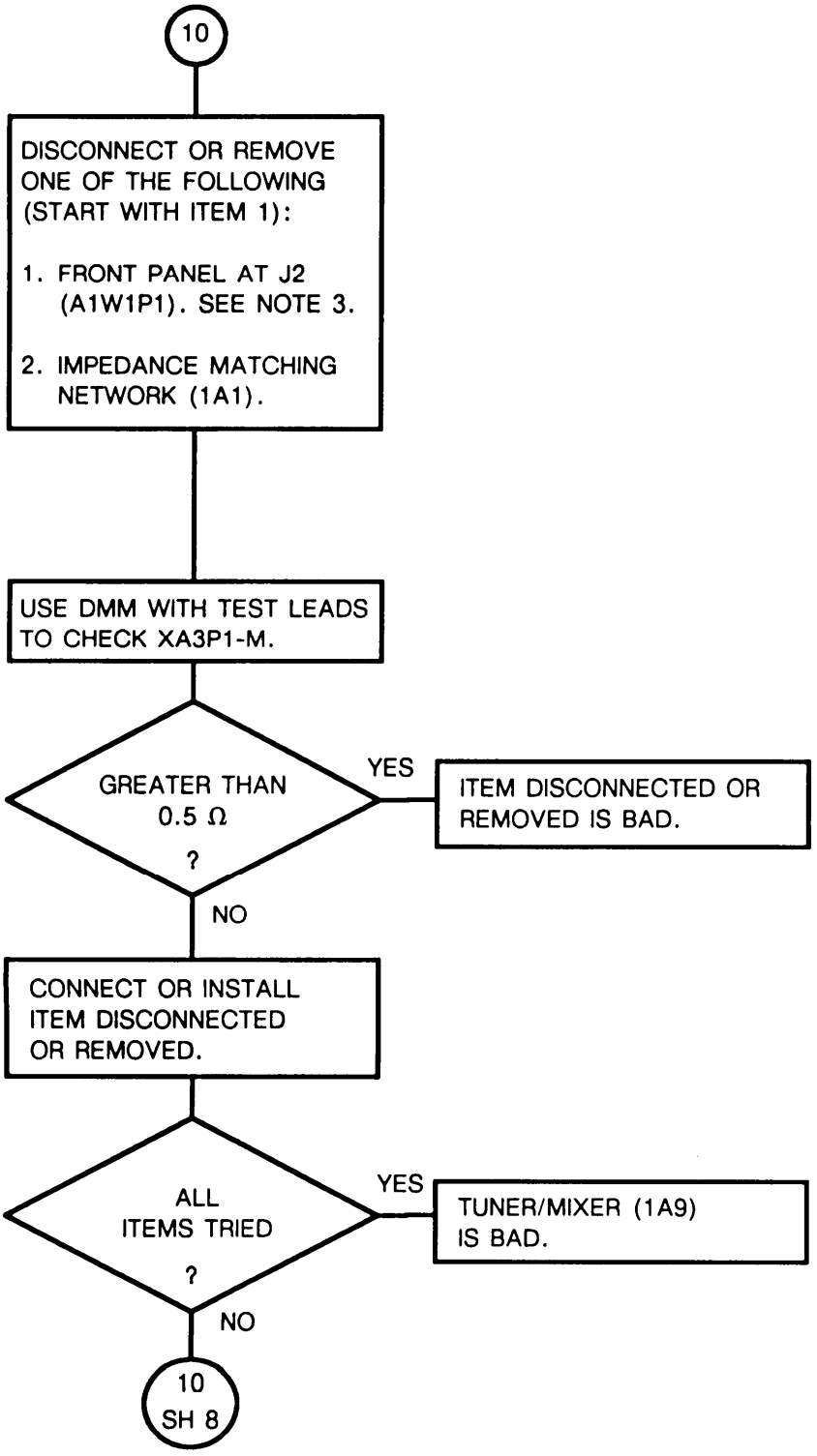
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 7 of 9)



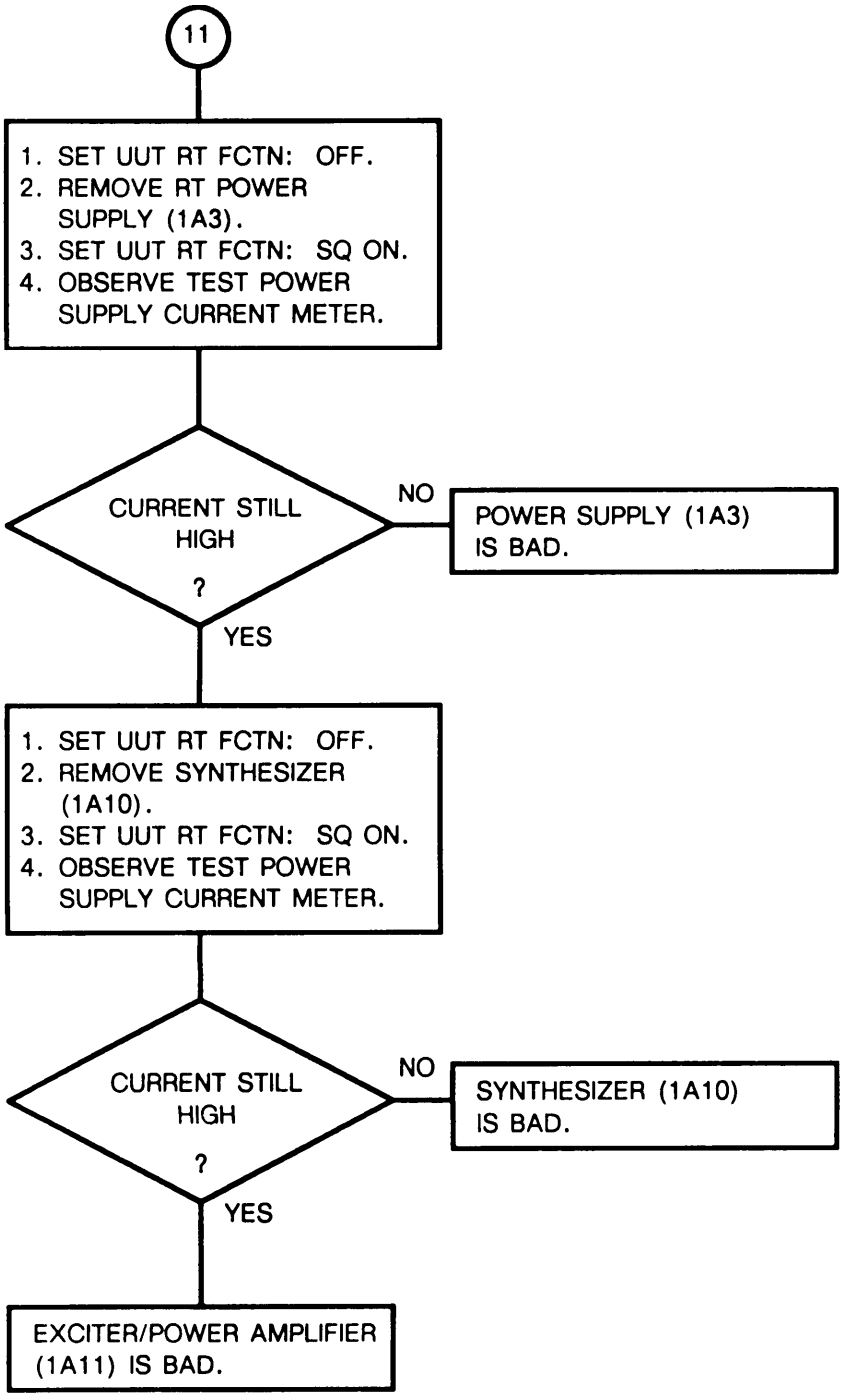
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 8 of 9)



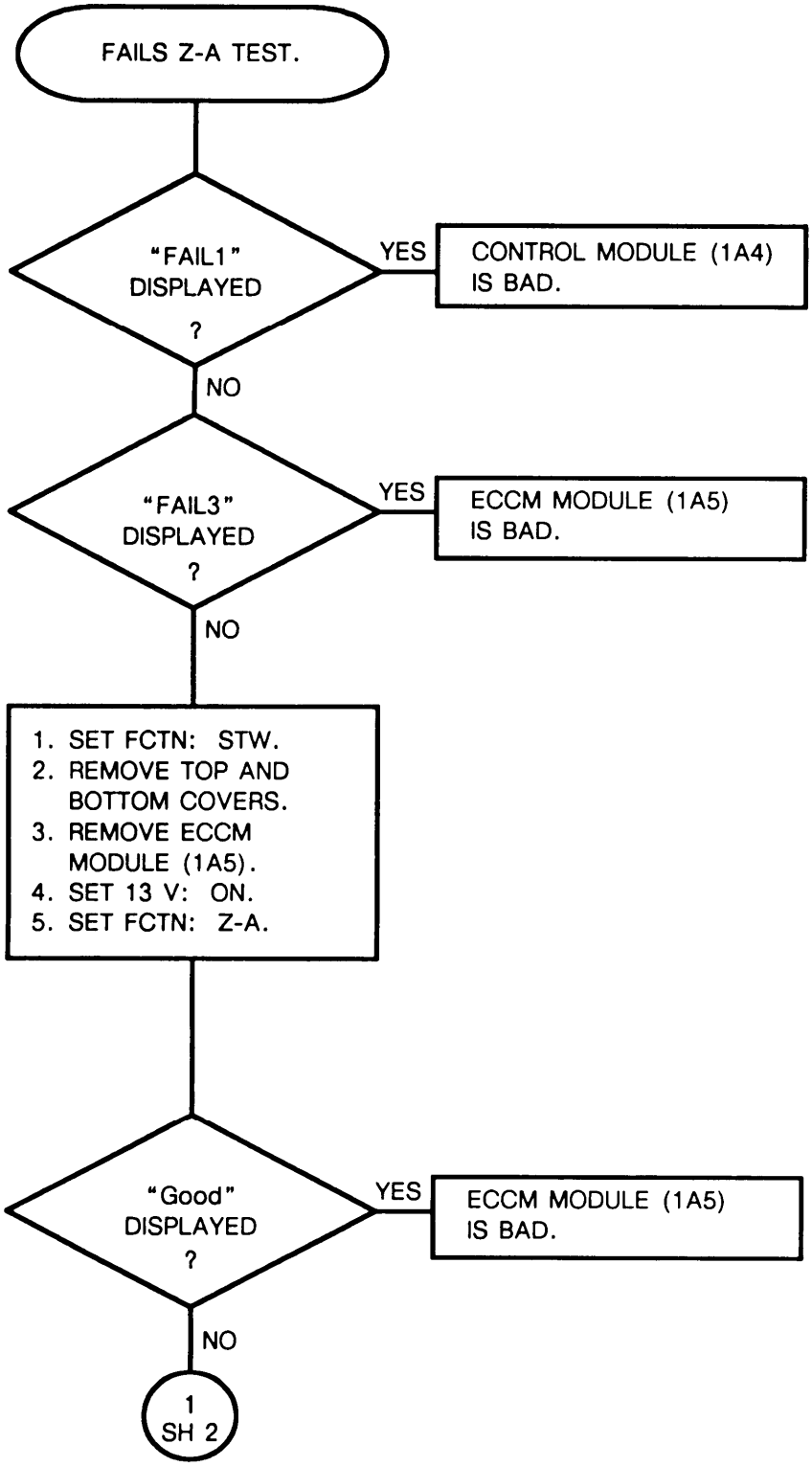
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Power Supply Inputs and Outputs
(Sheet 9 of 9)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

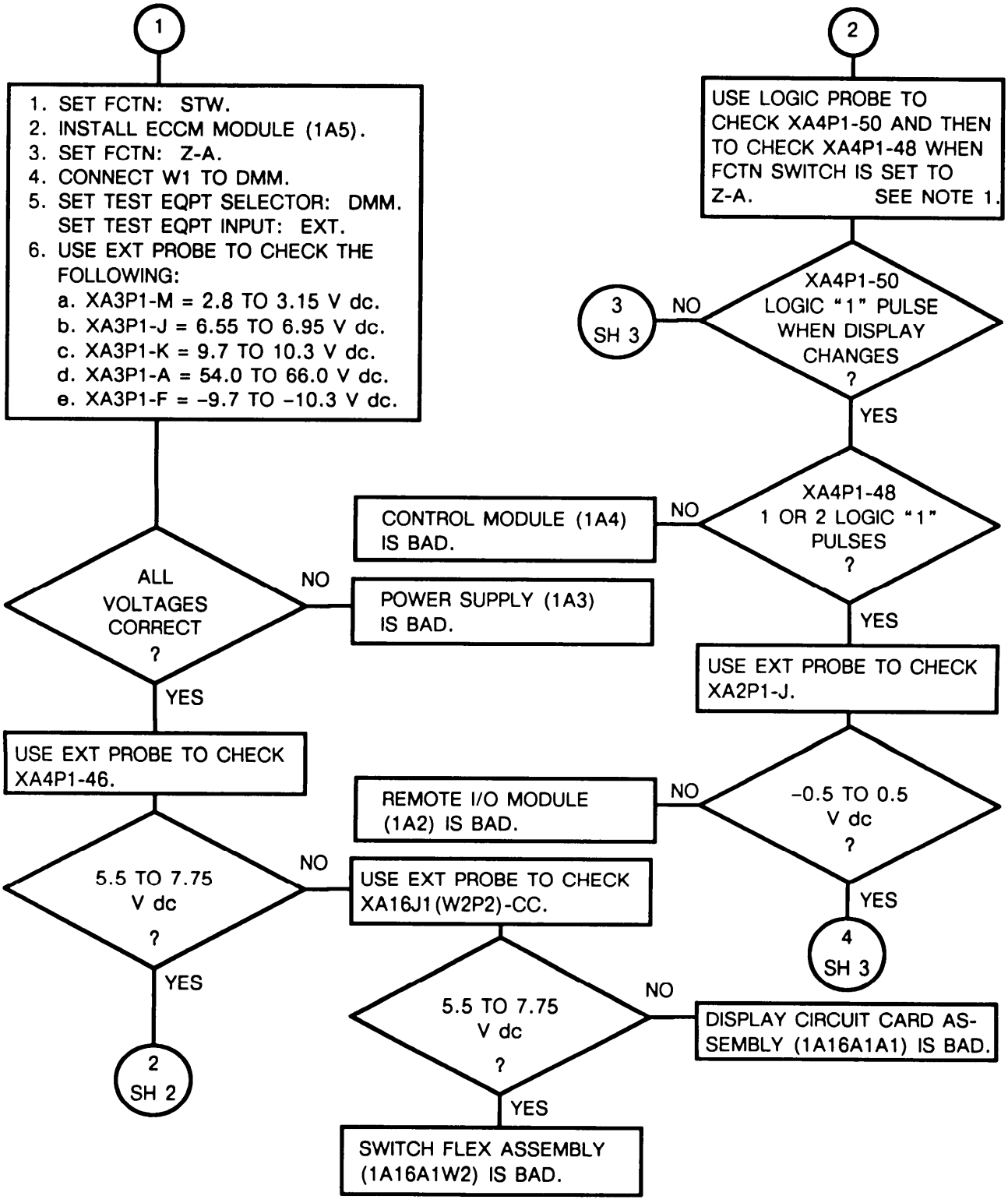
Chart 2
Troubleshooting Z-A Test Failure and Display
(Sheet 1 of 3)



NOTES:
1. Setting the FCTN switch to Z-A initiates a sequence of events. Where a reading is to be taken "WHEN FCTN SWITCH IS SET TO Z-A", move the FCTN switch to STW and then back to Z-A.
2. See figure FO-13 for location of test points.

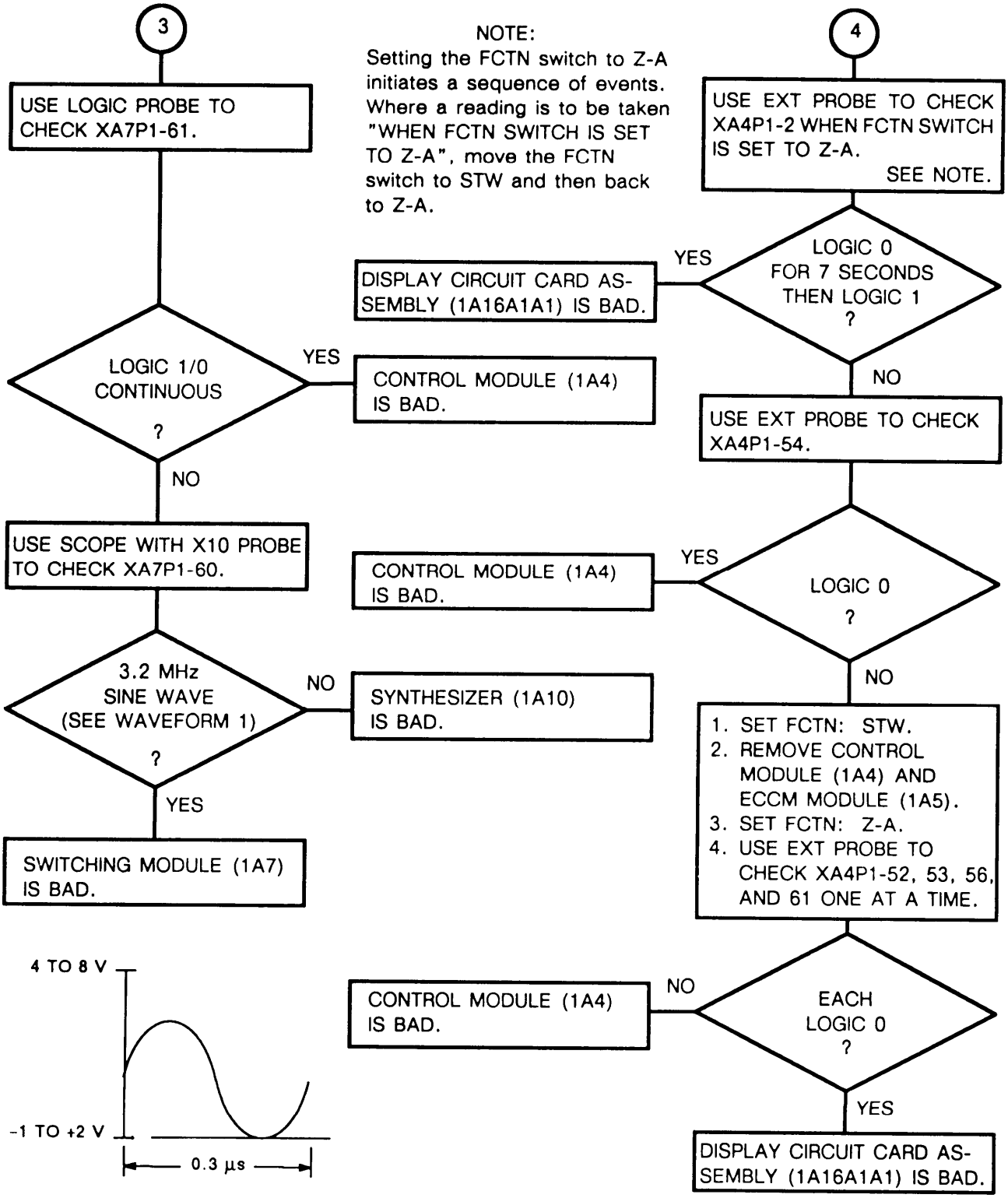
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Z-A Test Failure and Display
(Sheet 2 of 3)



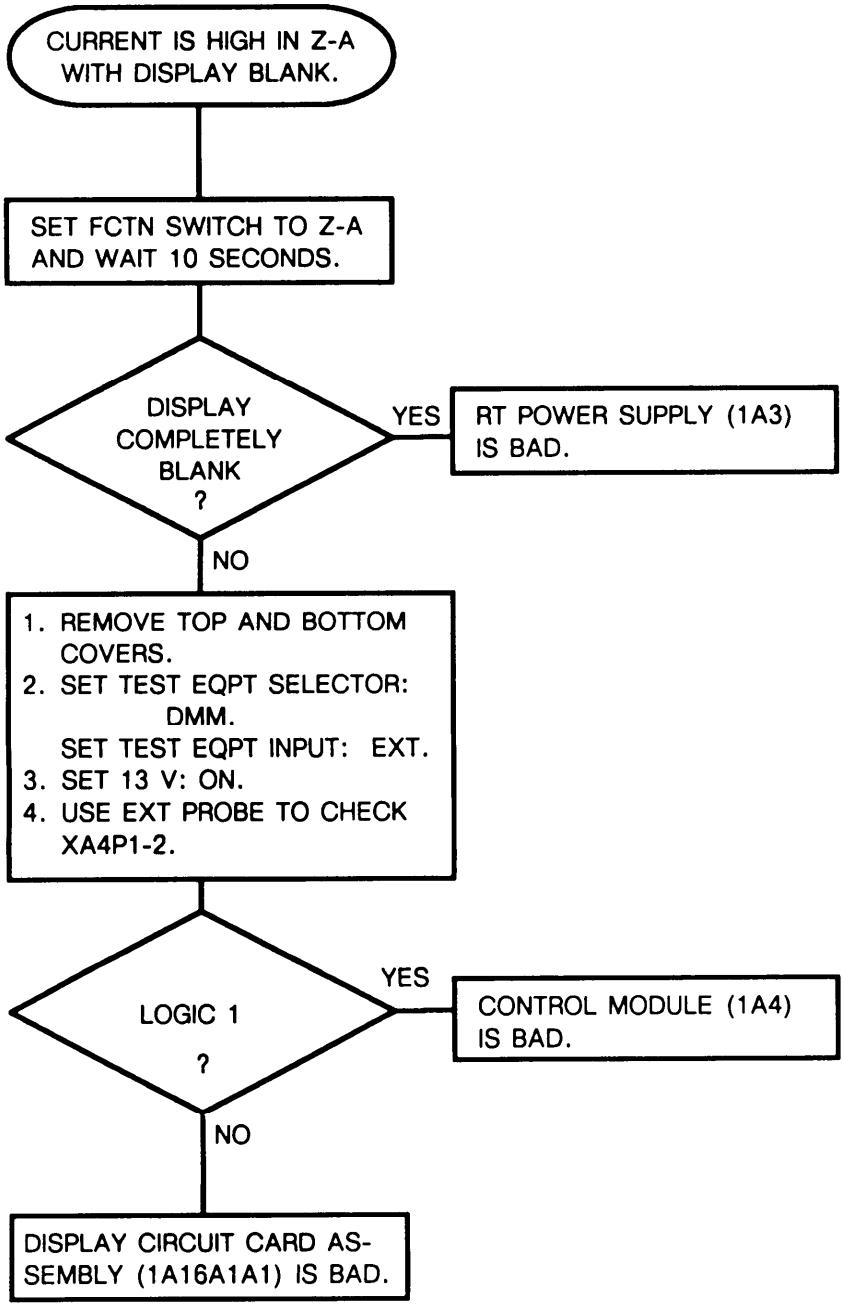
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Z-A Test Failure and Display
(Sheet 3 of 3)



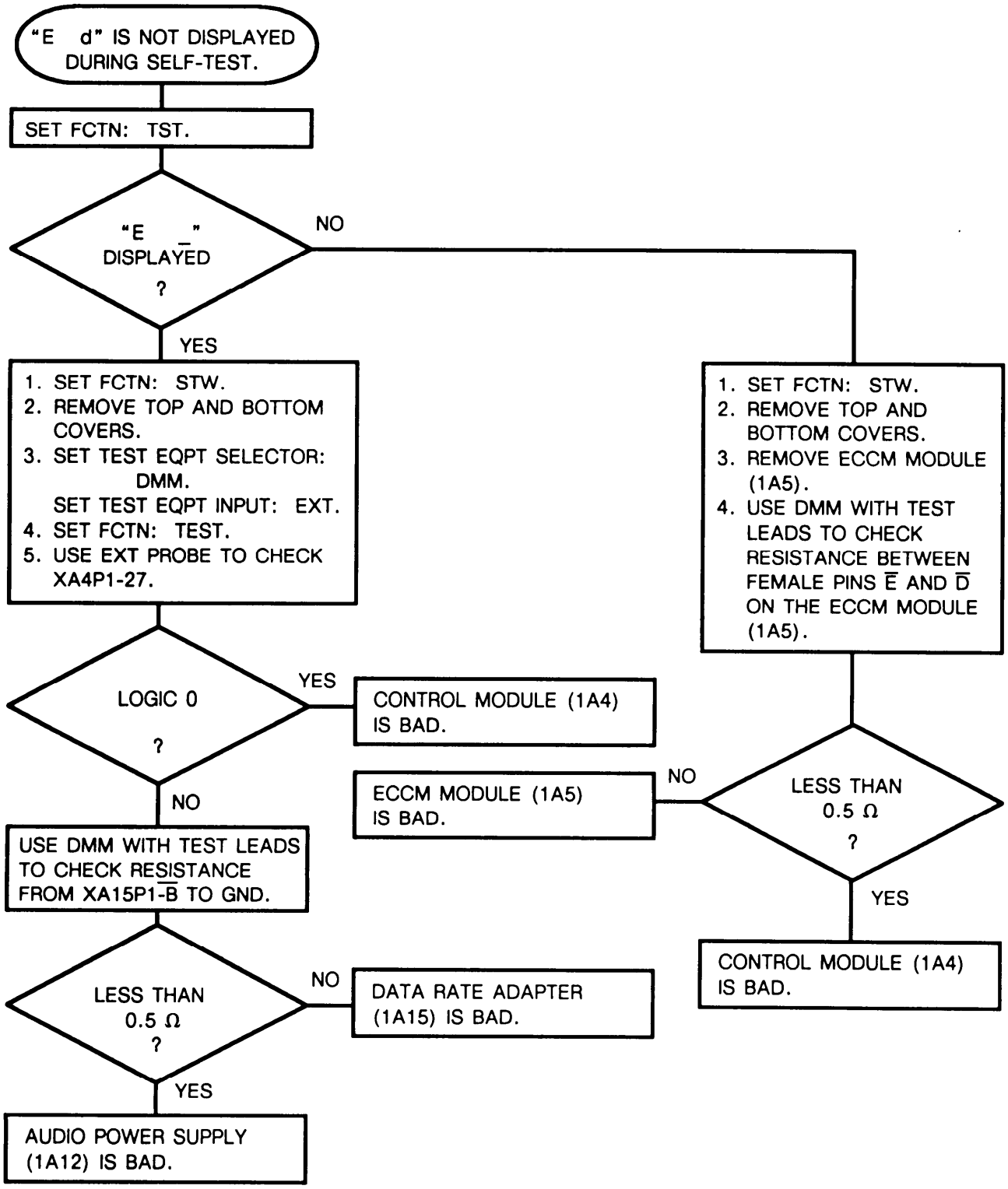
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting Display Enable
(Sheet 1 of 1)



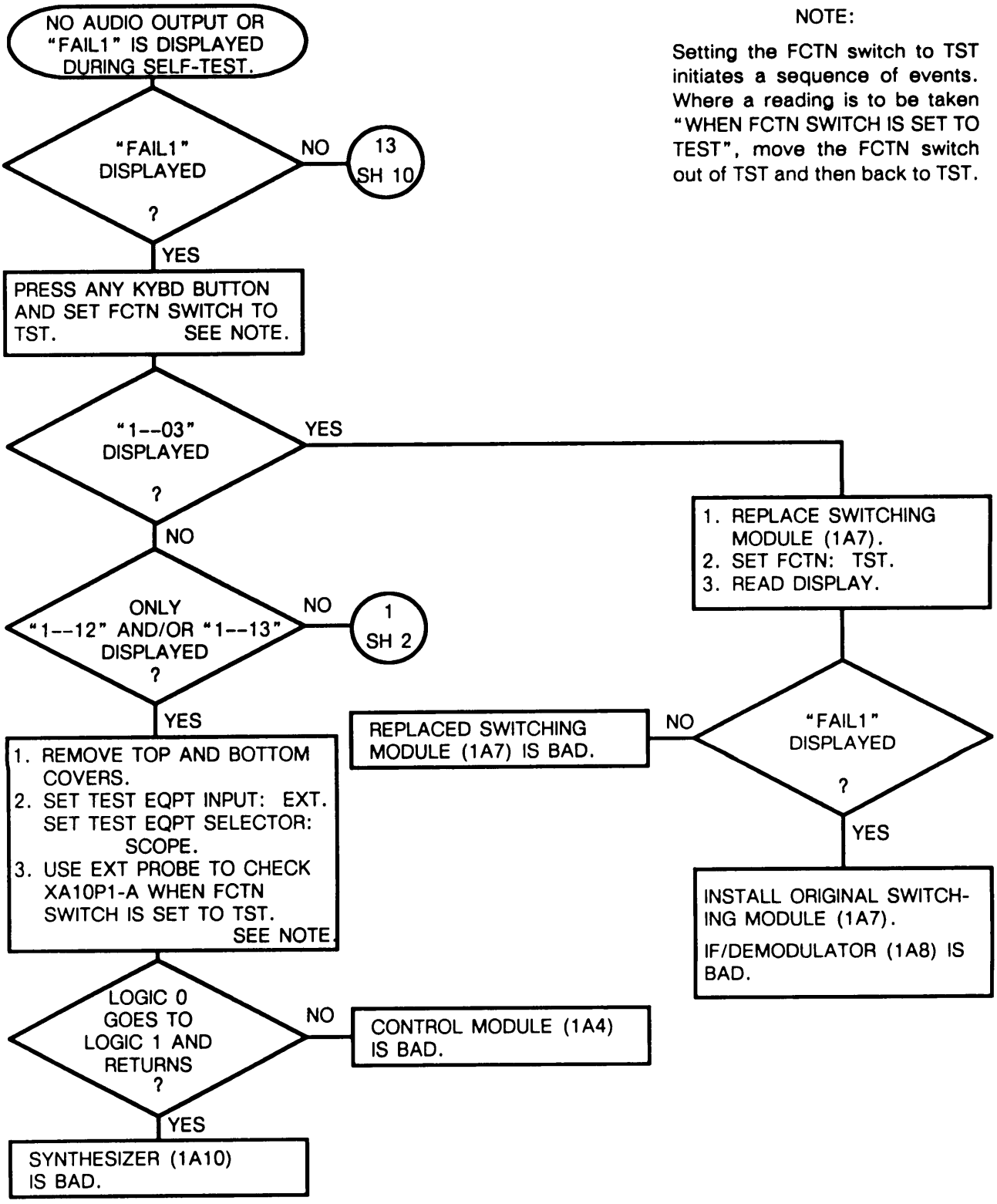
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Incorrect Self-Test " E d" Display
(Sheet 1 of 1)



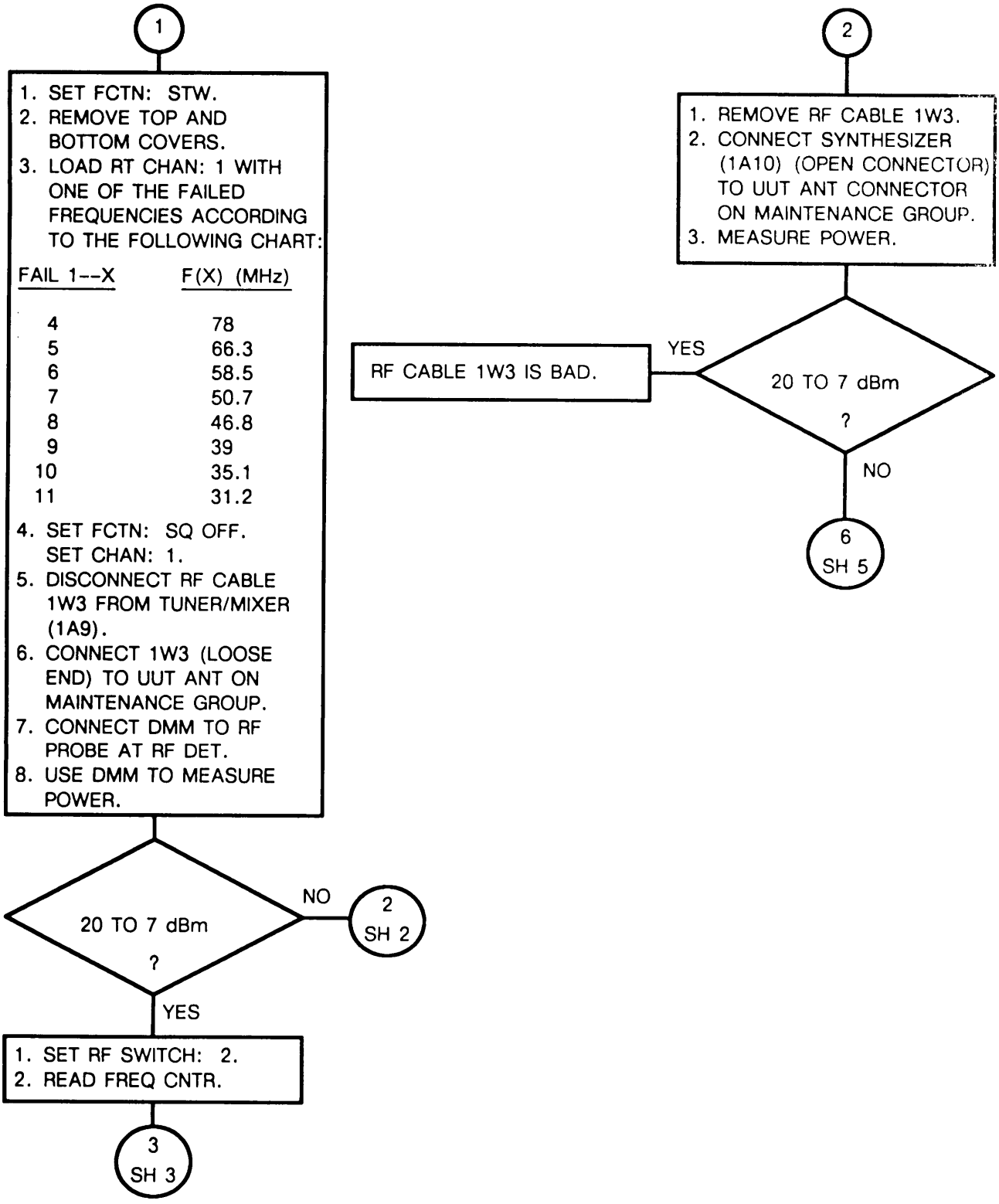
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 1 of 12)



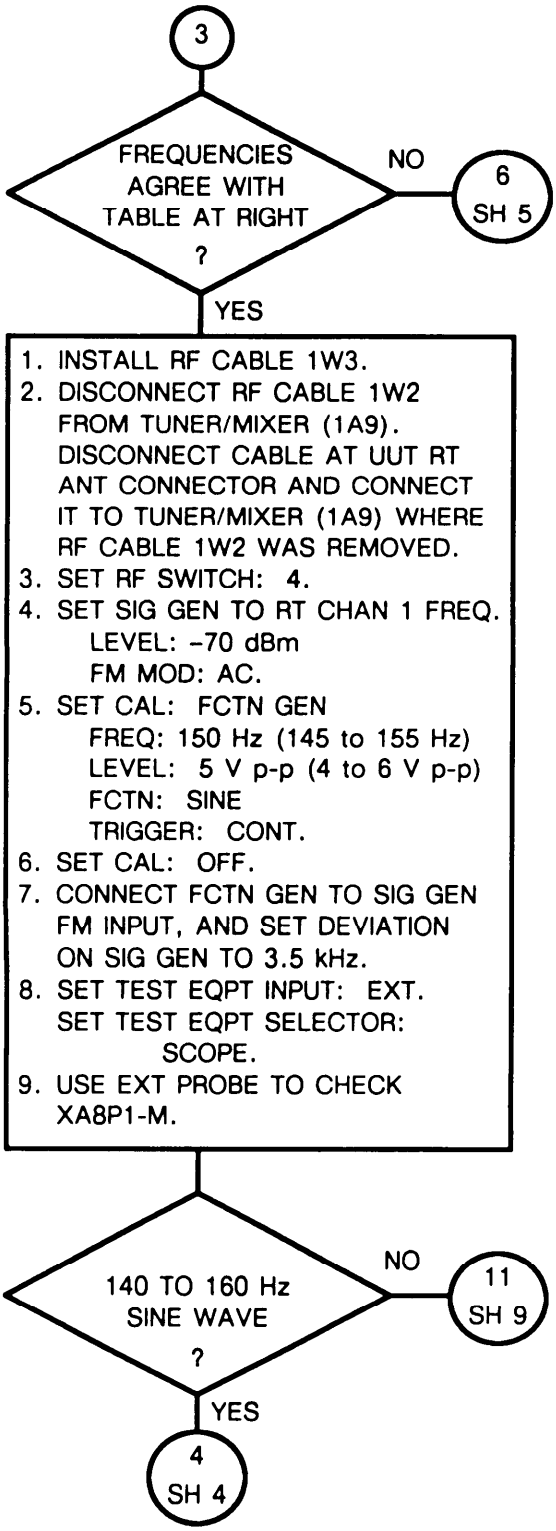
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 2 of 12)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

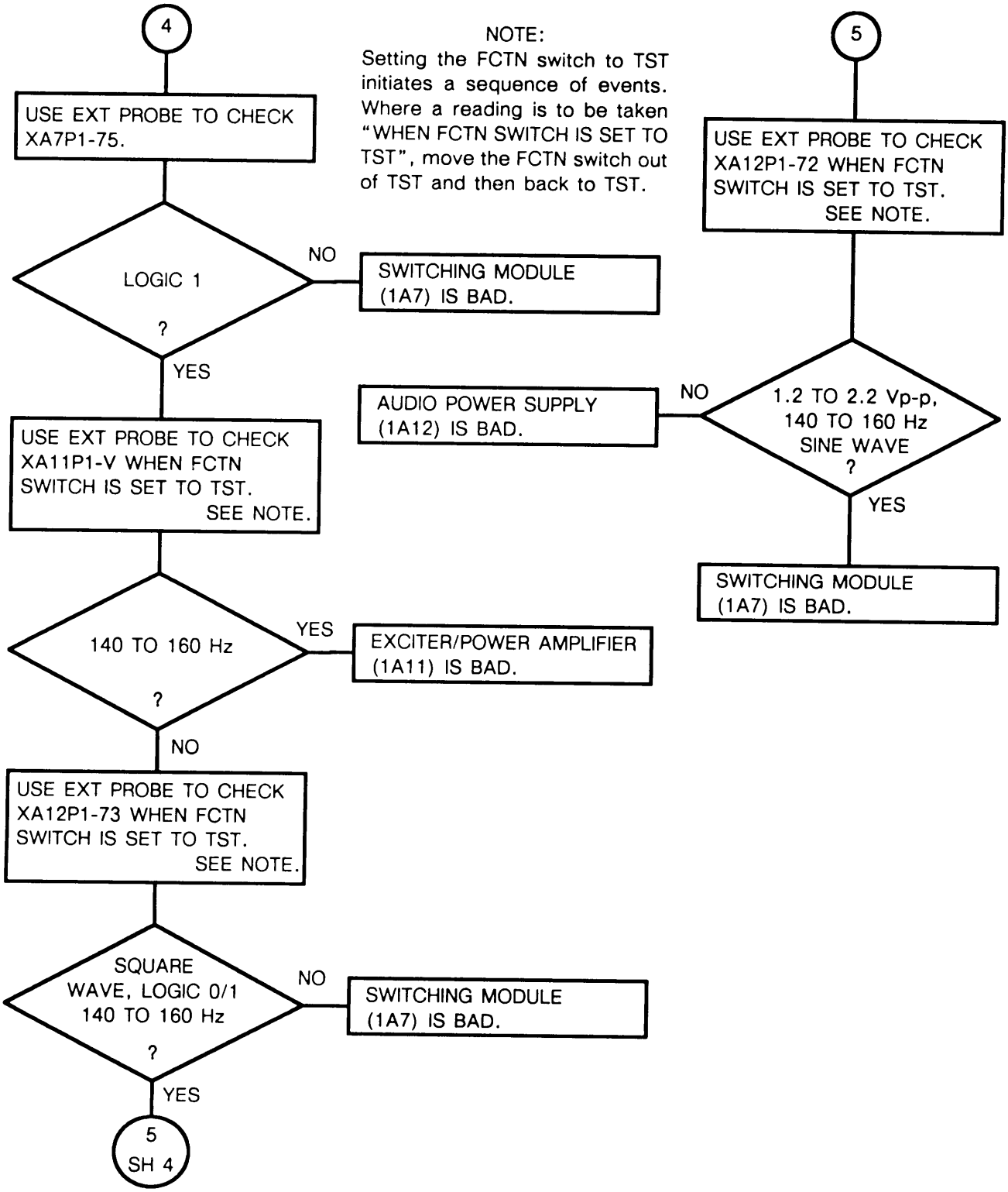
Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 3 of 12)



F(X) (CHAN: 1) (MHz)	FREQUENCY (MHz)
78	90.49955 to 90.50045
66.3	78.7996 to 78.8004
58.5	70.9965 to 71.00035
50.7	63.1997 to 63.2003
46.8	59.2997 to 59.3003
39	51.49975 to 51.50025
35.1	47.59975 to 47.60025
31.2	43.6998 to 43.7002

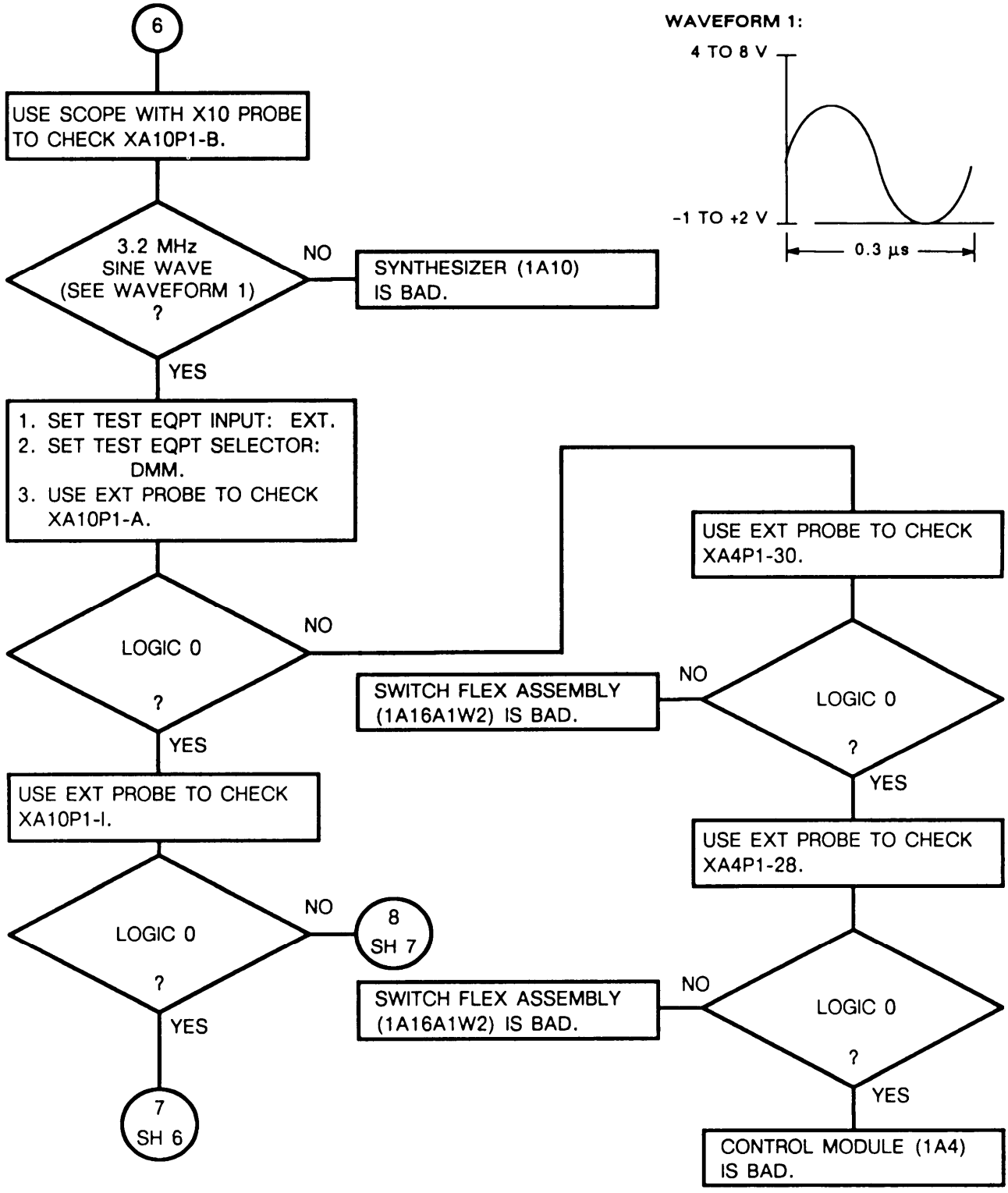
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 4 of 12)



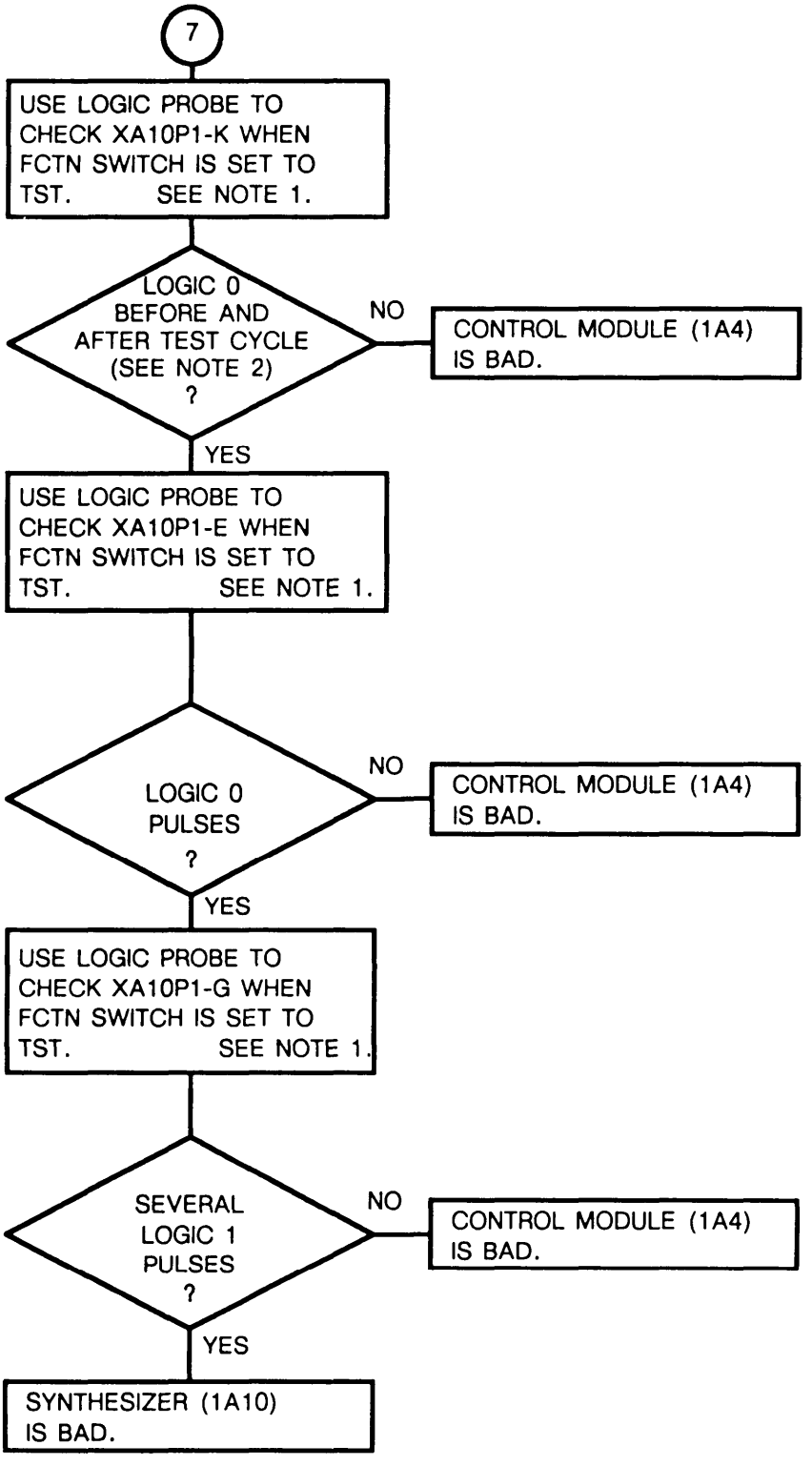
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 5 of 12)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 6 of 12)

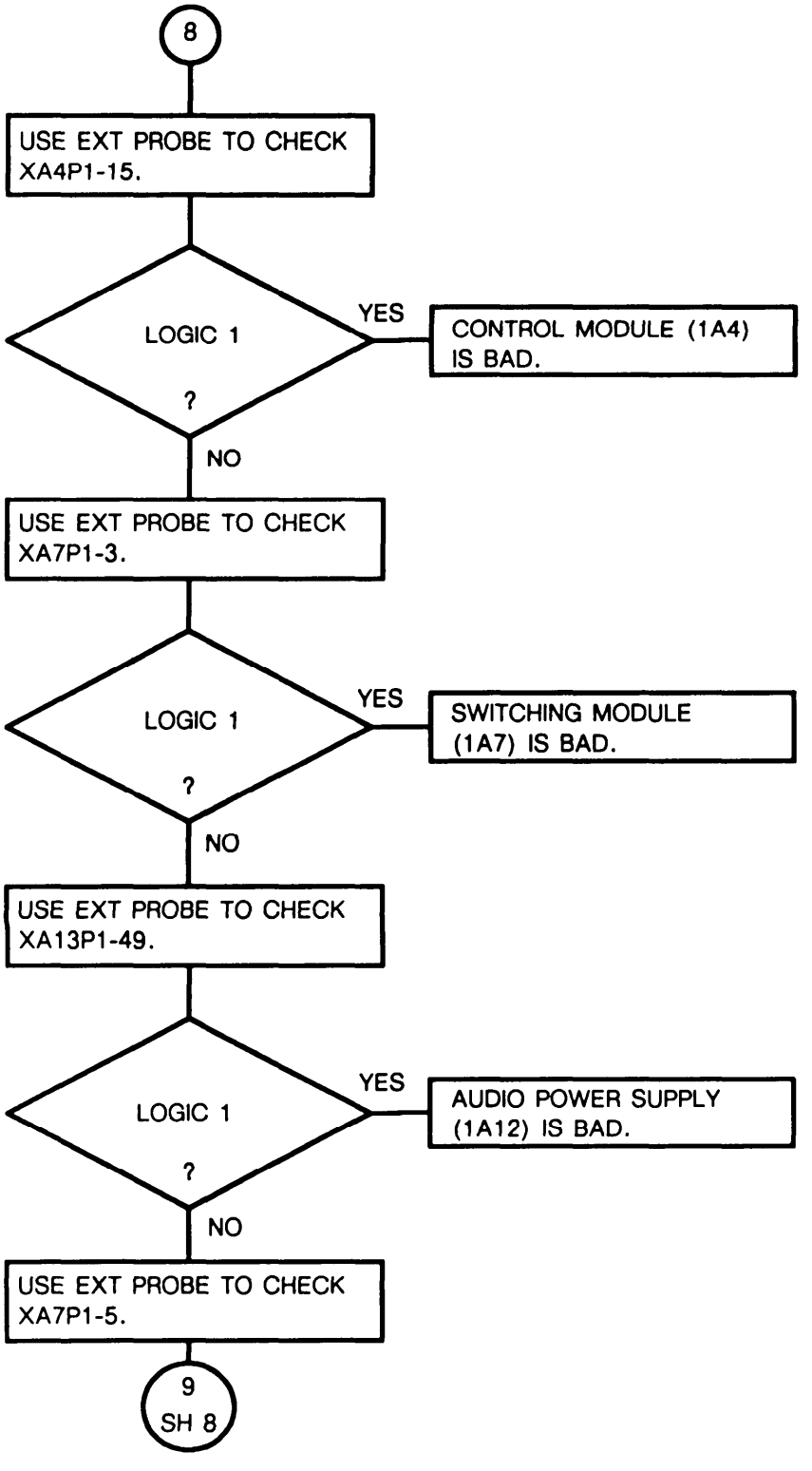


NOTES:

1. Setting the FCTN switch to TST initiates a sequence of events. Where a reading is to be taken "WHEN FCTN SWITCH IS SET TO TST", move the FCTN switch to STW and then back to TST.
2. "FAIL1" is displayed between BIT test cycles. Pin XA10P1-K shows logic "0" when "FAIL1" is displayed.

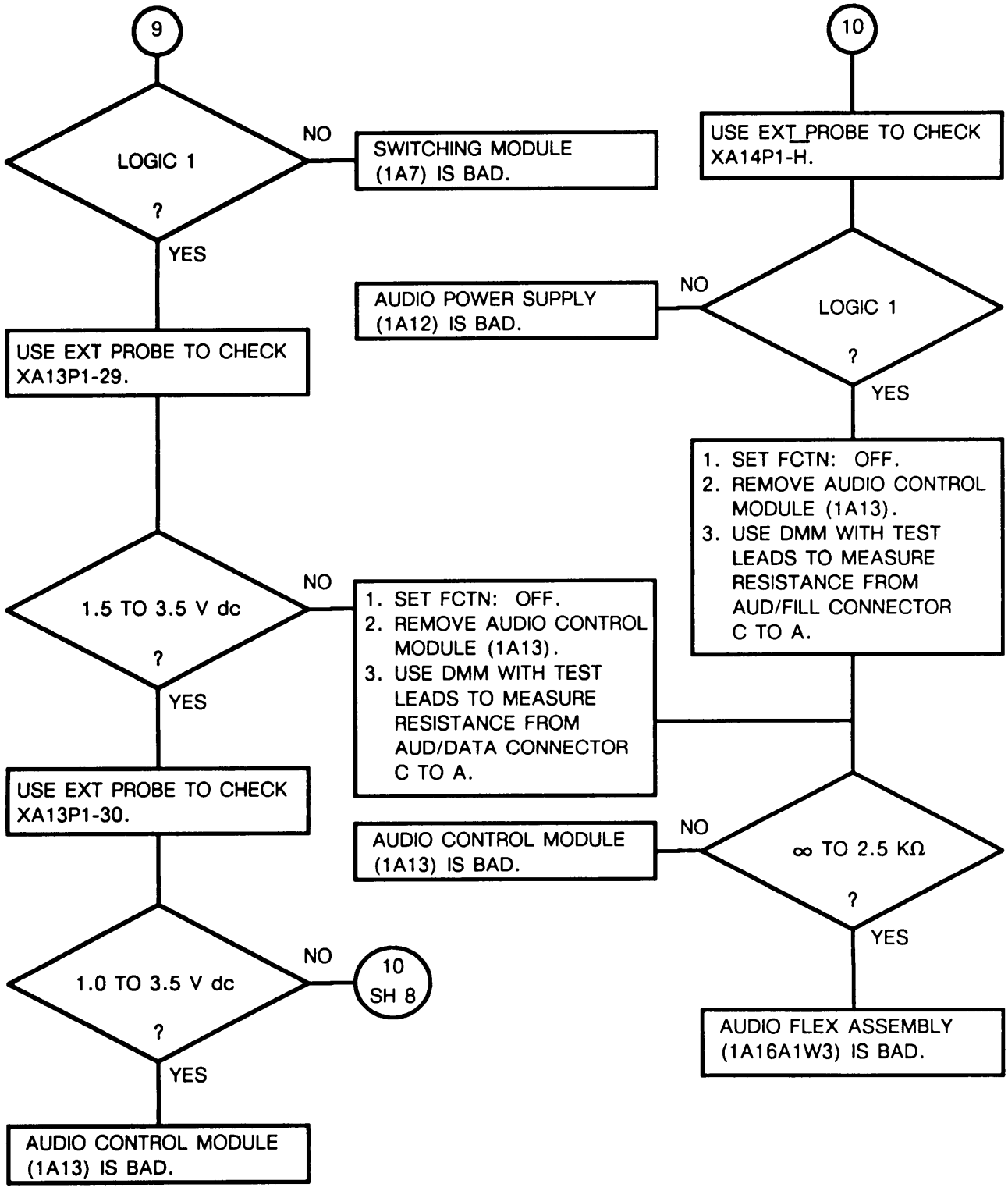
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 7 of 12)



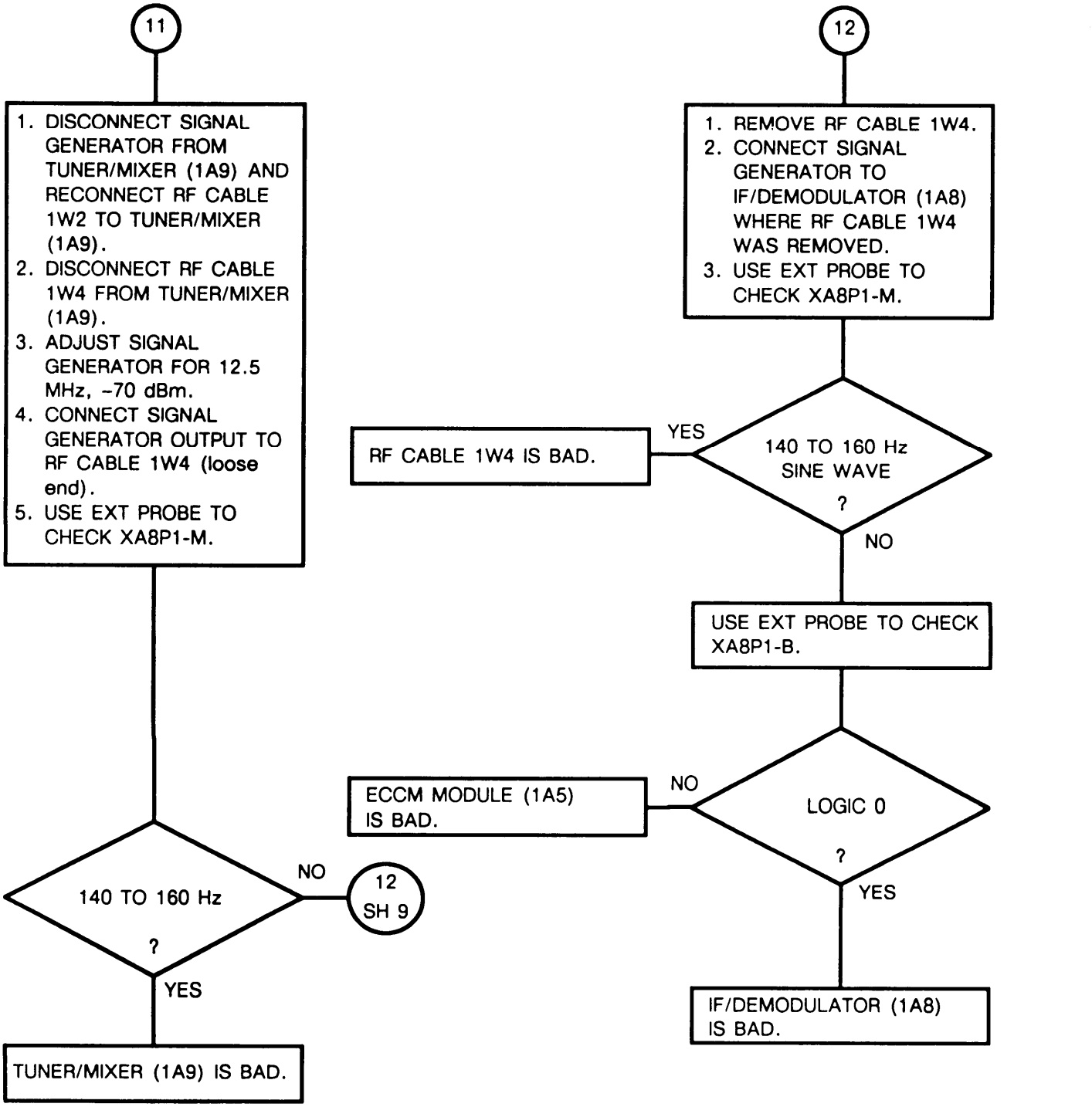
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 8 of 12)



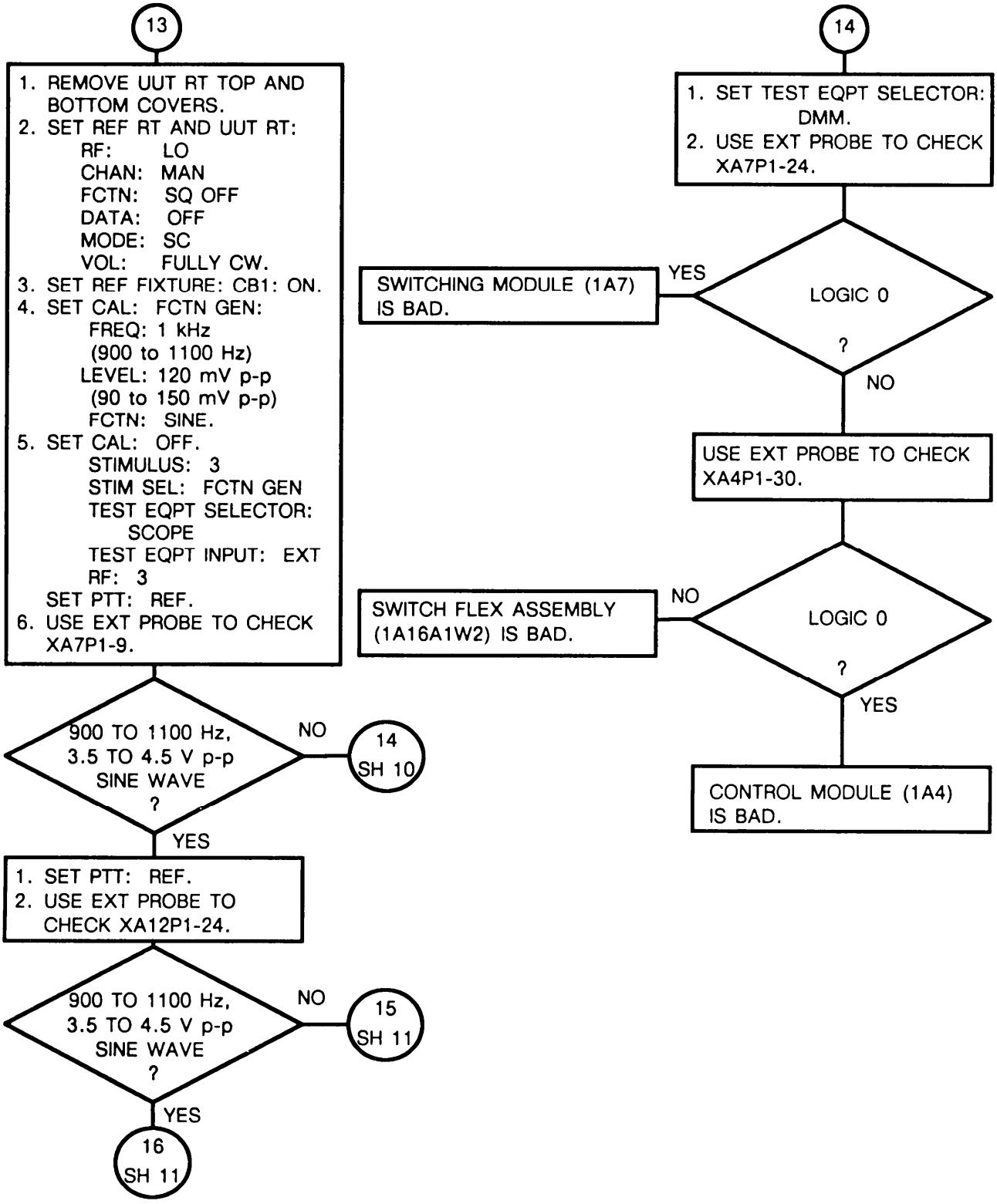
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 9 of 12)



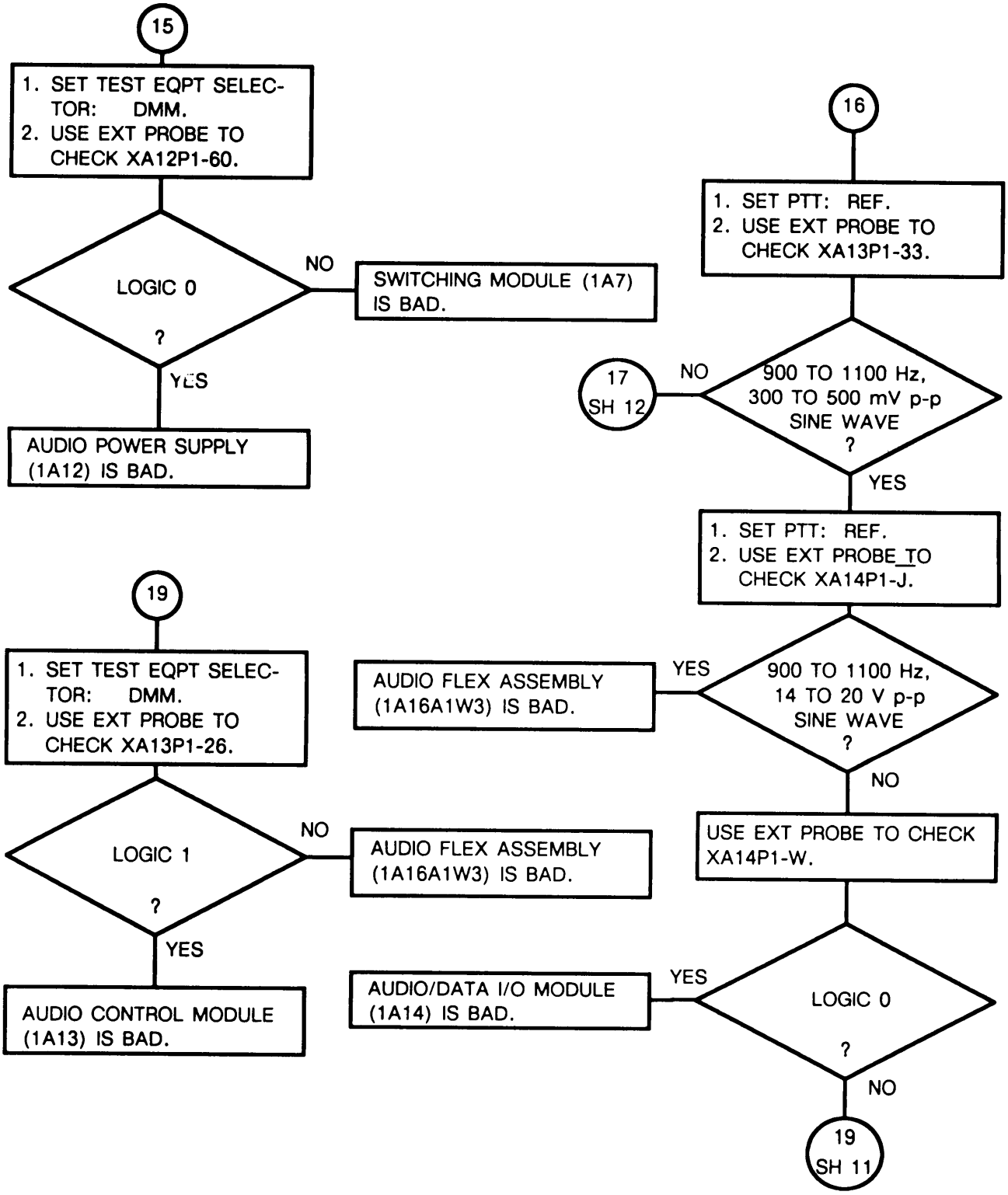
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 10 of 12)



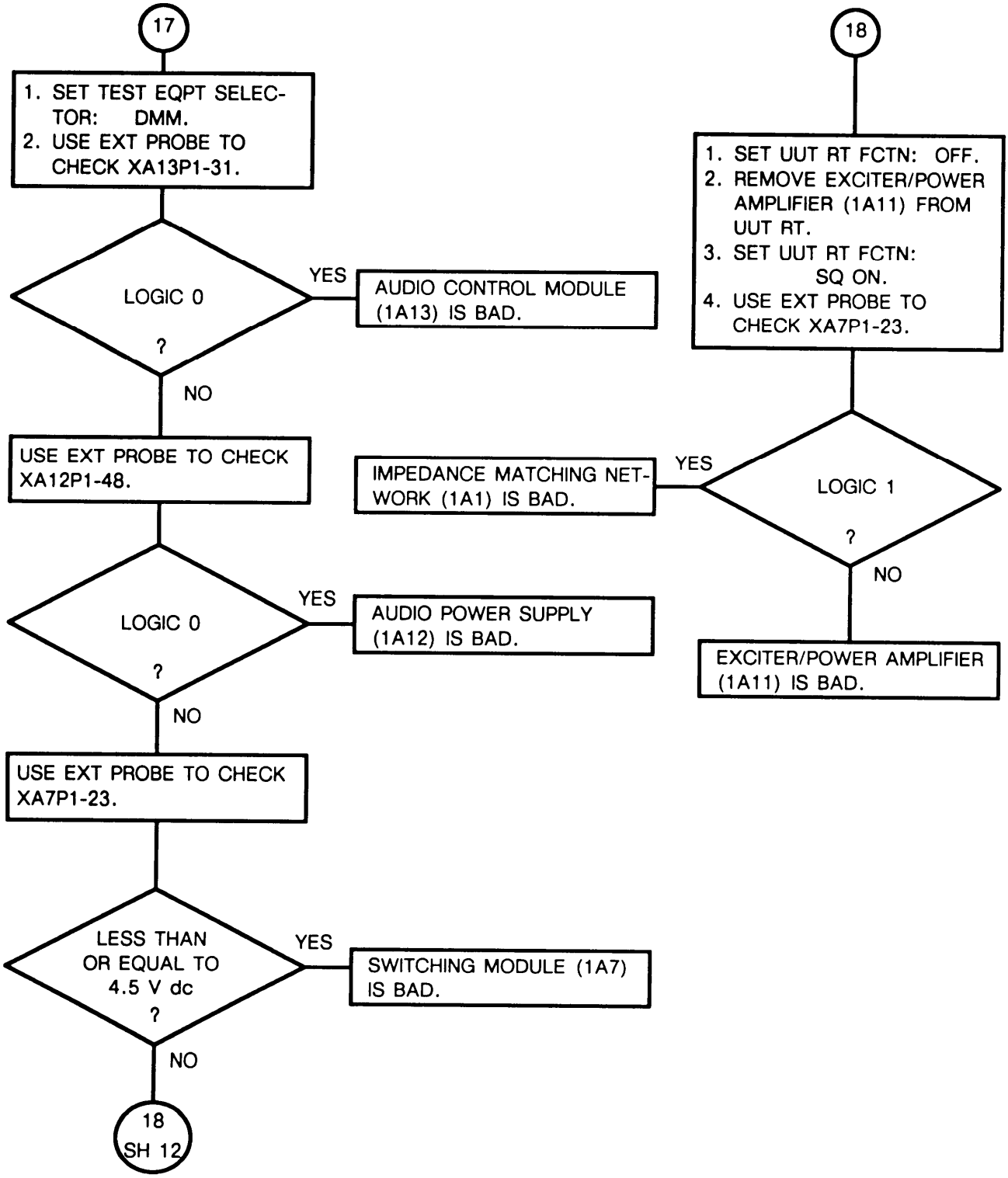
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 11 of 12)



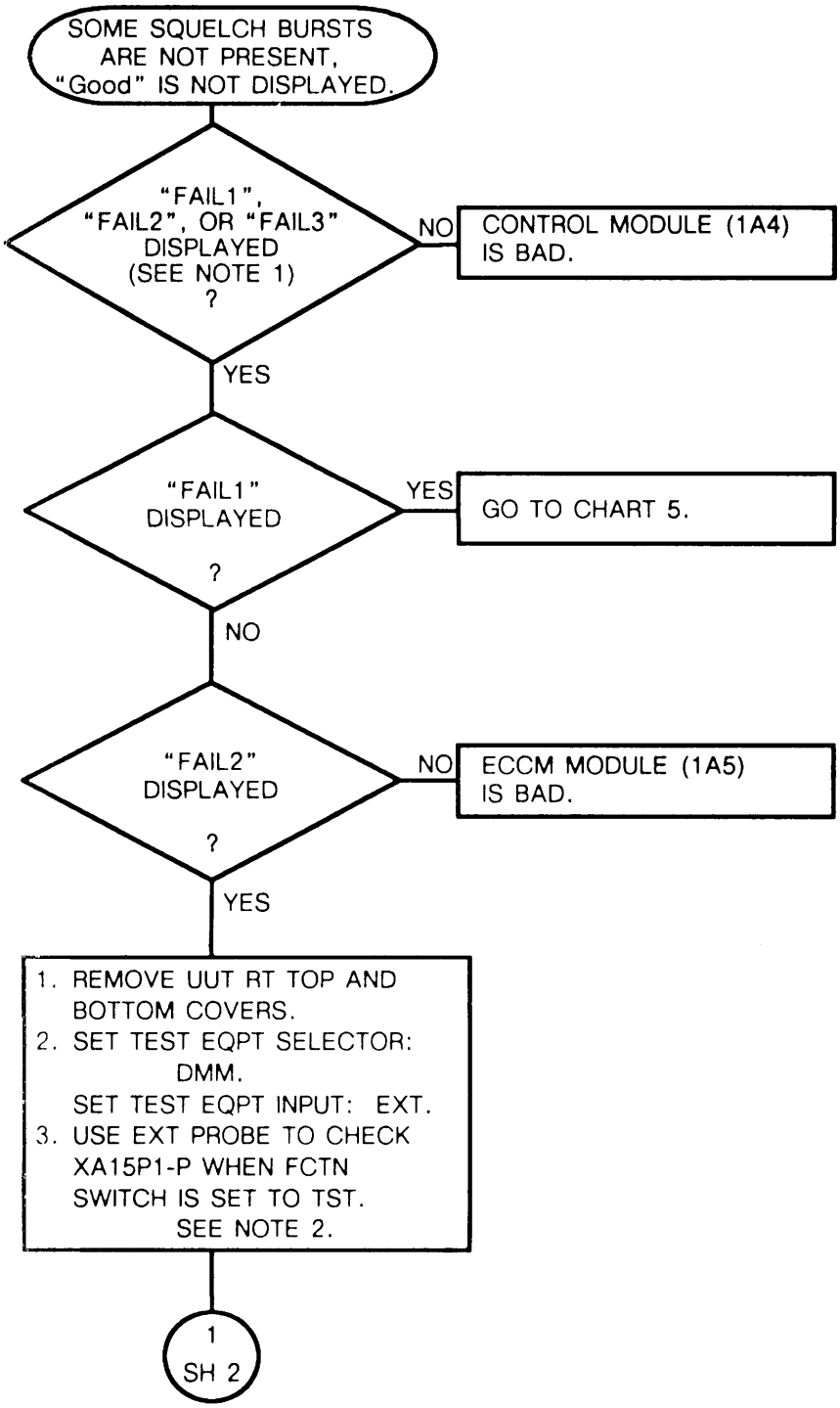
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Self-Test and Audio Paths
(Sheet 12 of 12)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Self-Test Audio, FAIL 2, and FAIL 3
(Sheet 1 of 3)

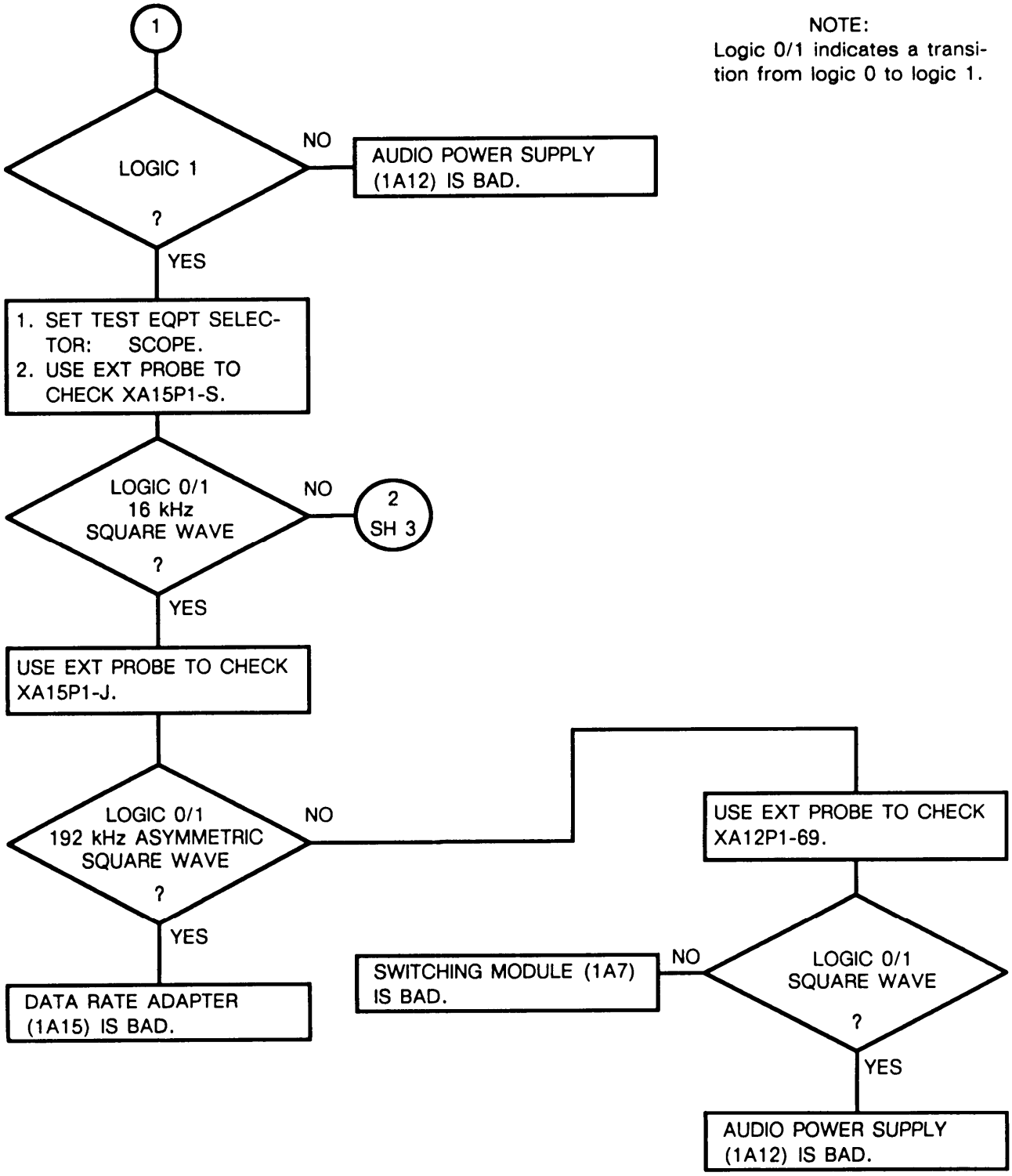


NOTES:

1. Follow the "NO" path if a combination of two or three of the following is displayed: "FAIL1", "FAIL2", "FAIL3".
2. Setting the FCTN switch to TST initiates a sequence of events. Where a reading is to be taken "WHEN FCTN SWITCH IS SET TO TST", move the FCTN switch out of TST and then back to TST.

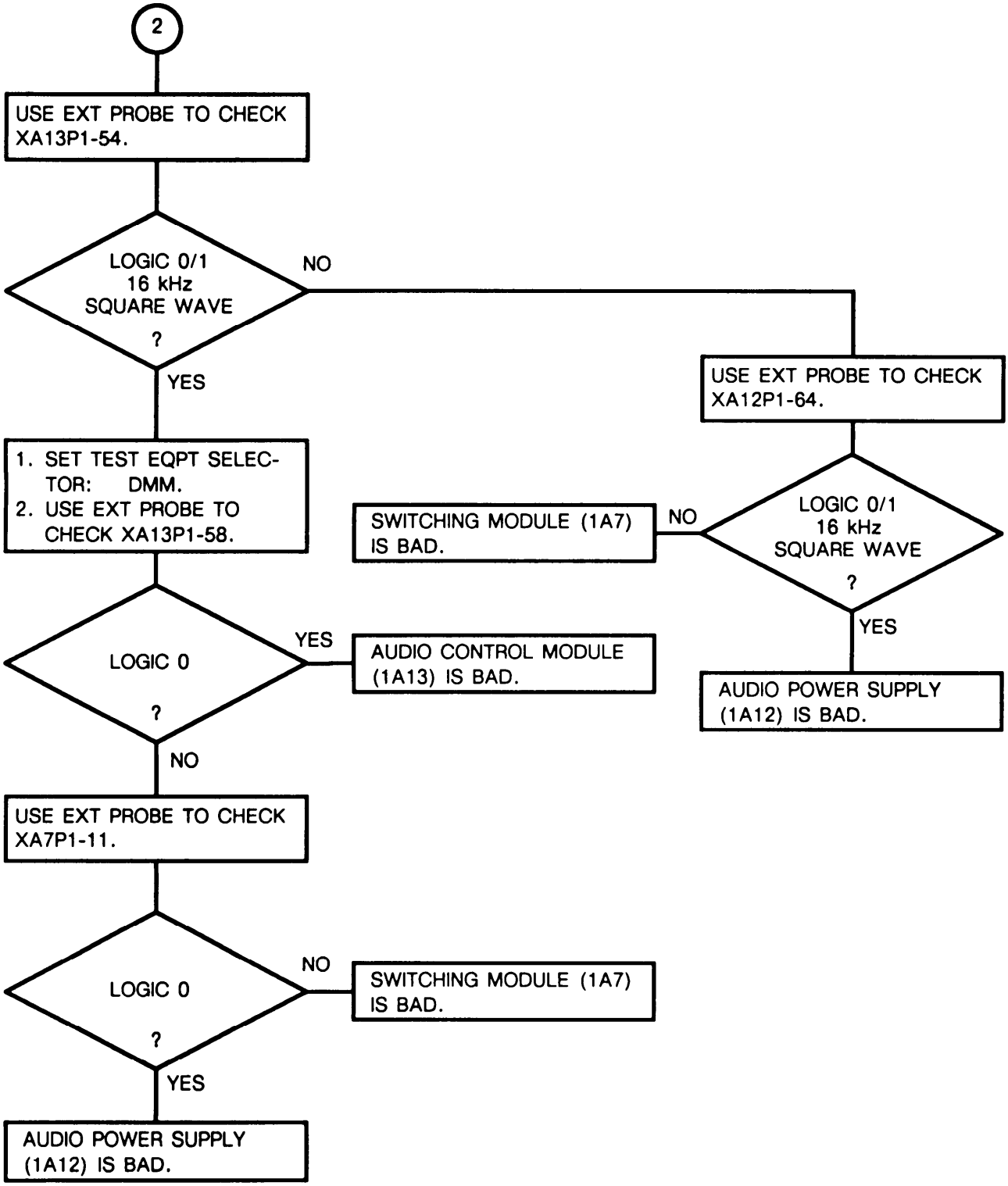
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Self-Test Audio, FAIL 2, and FAIL 3
(Sheet 2 of 3)



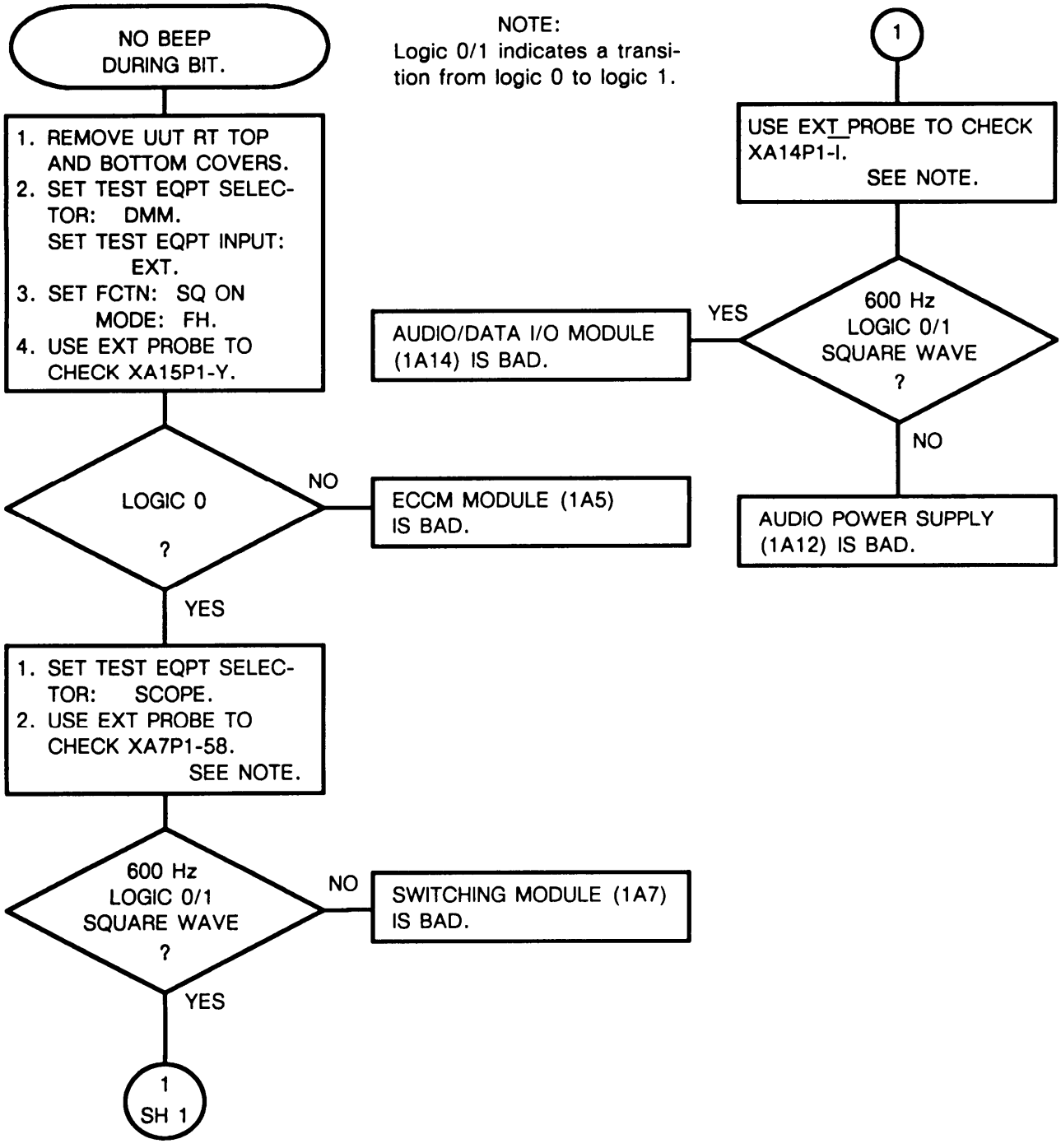
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Self-Test Audio, FAIL 2, and FAIL 3
(Sheet 3 of 3)



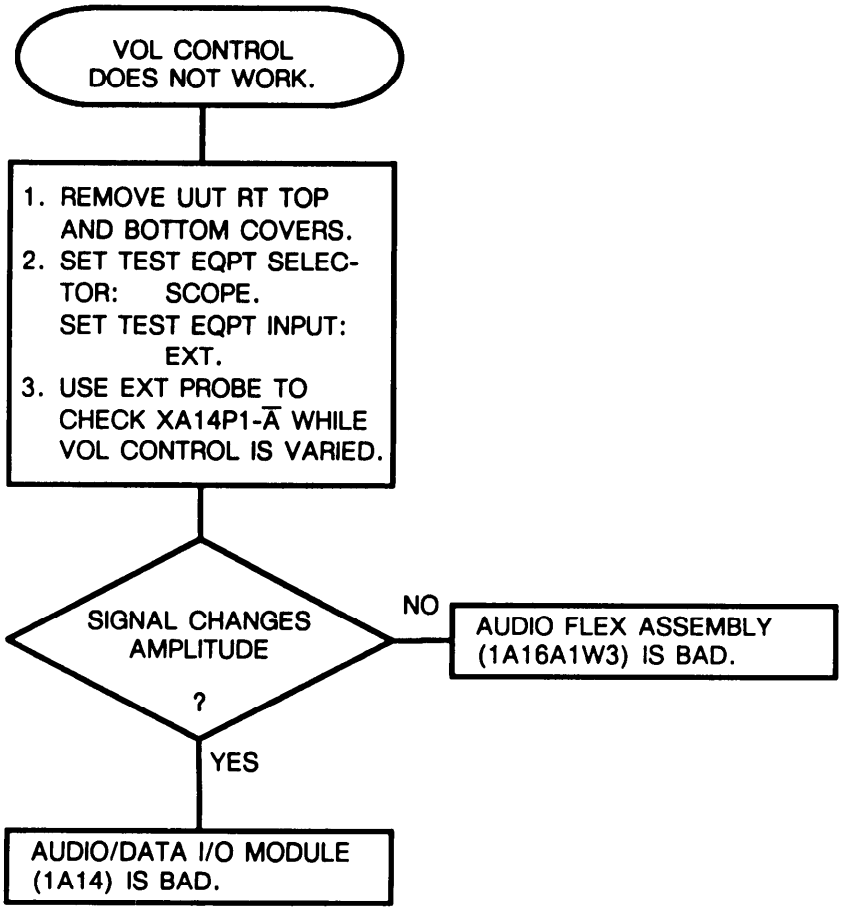
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting FH Self-Test
(Sheet 1 of 1)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

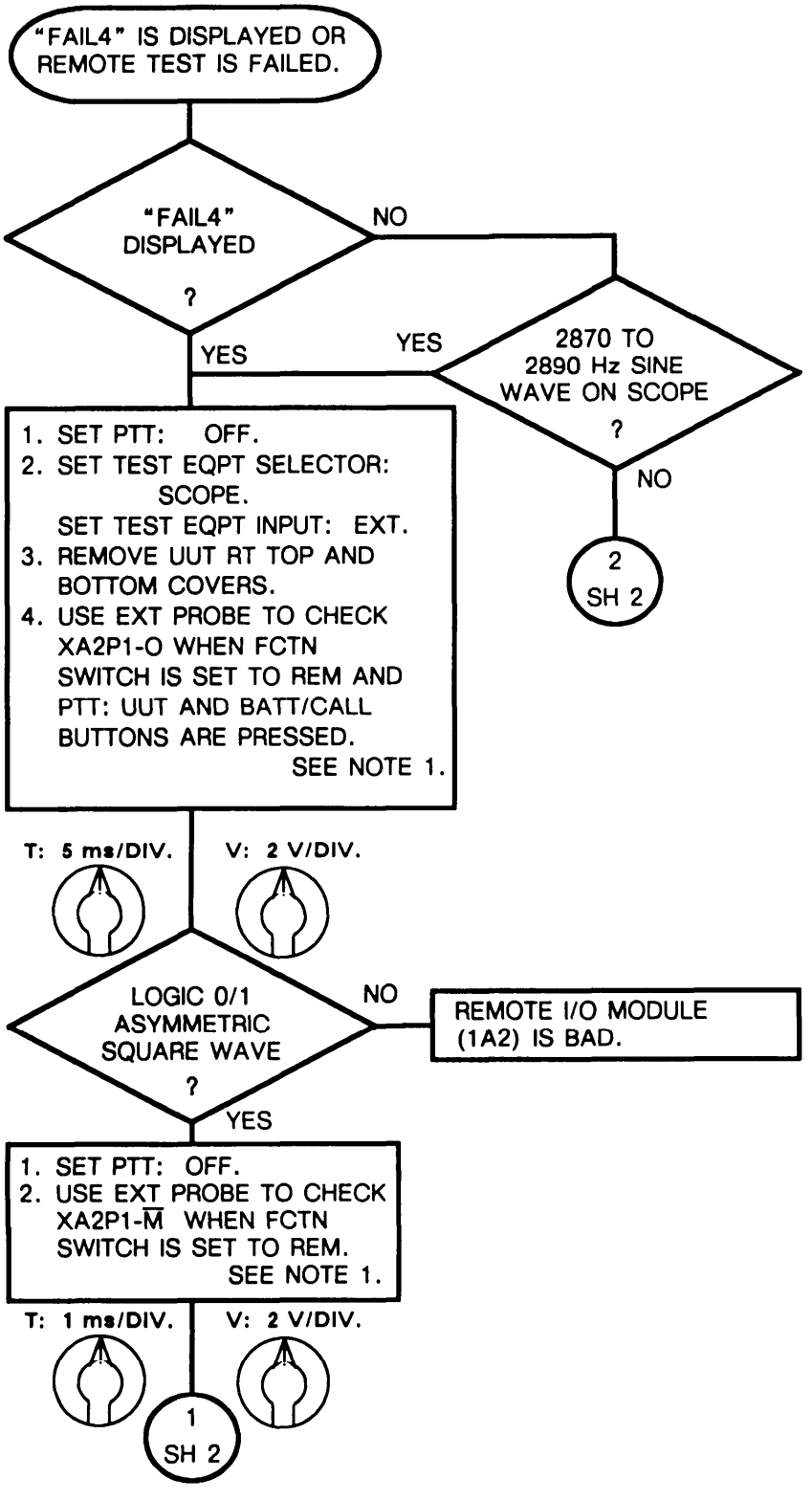
Chart 8
Troubleshooting VOL Control
(Sheet 1 of 1)



NOTE:
See figure FO-7 for diagram of this circuit path.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

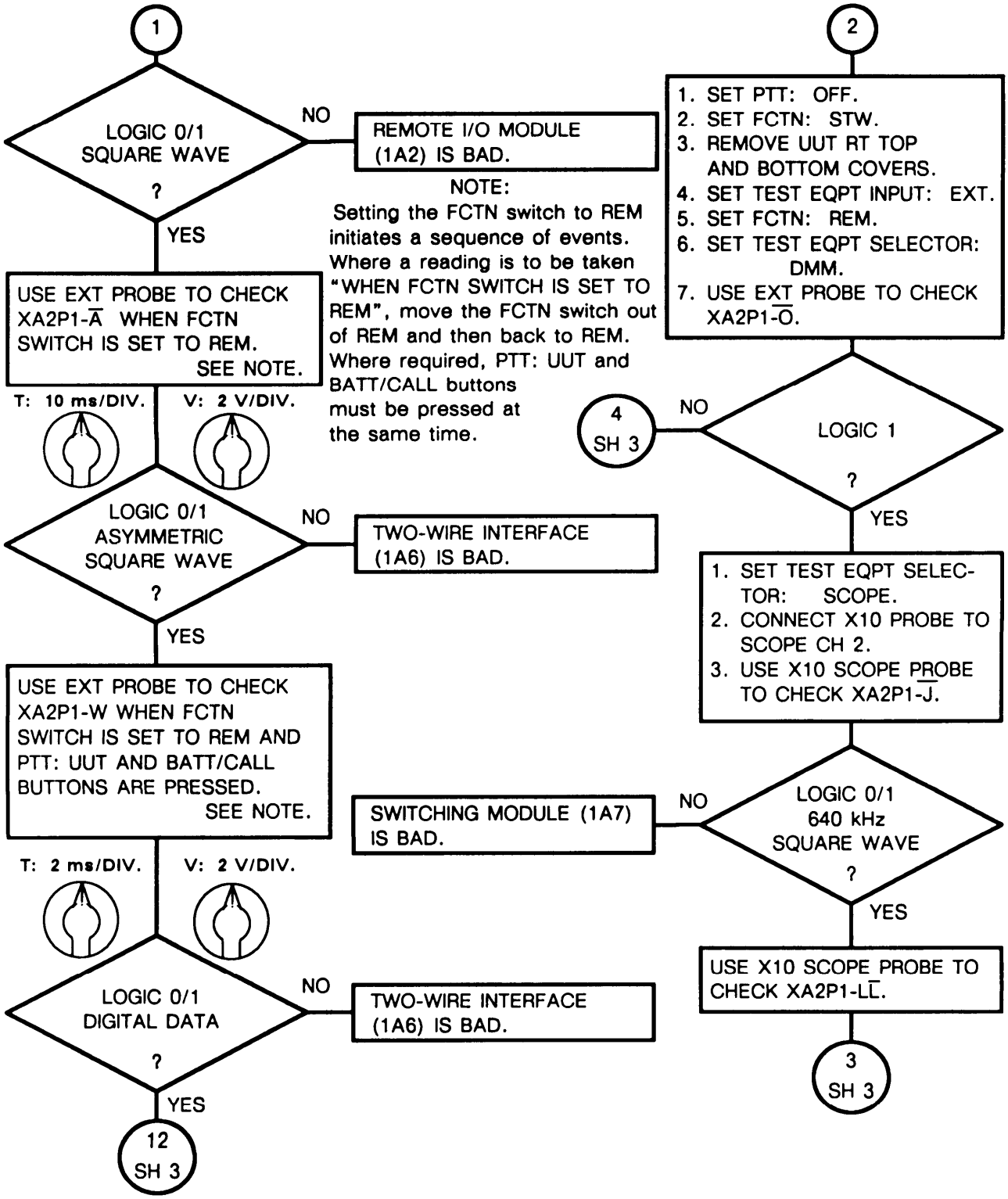
Chart 9
Troubleshooting Remote Control Circuits
(Sheet 1 of 7)



NOTES:
1. Setting the FCTN switch to REM initiates a sequence of events. Where a reading is to be taken "WHEN FCTN SWITCH IS SET TO REM", move the FCTN switch out of REM and then back to REM. Where required, PTT: UUT and BATT/CALL buttons must be pressed at the same time.
2. See figure FO-10 for diagrams of these circuit paths.

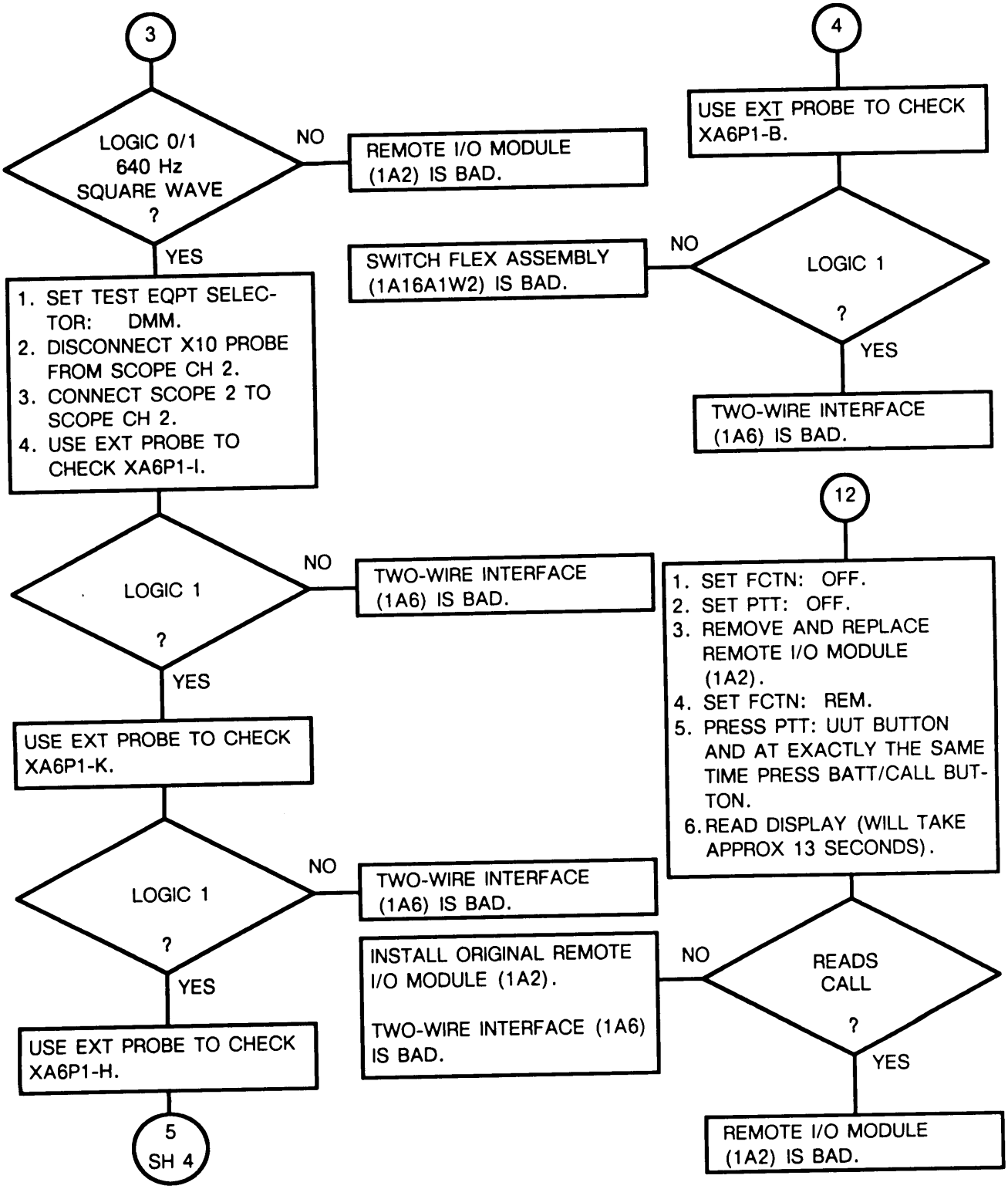
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Remote Control Circuits
(Sheet 2 of 7)



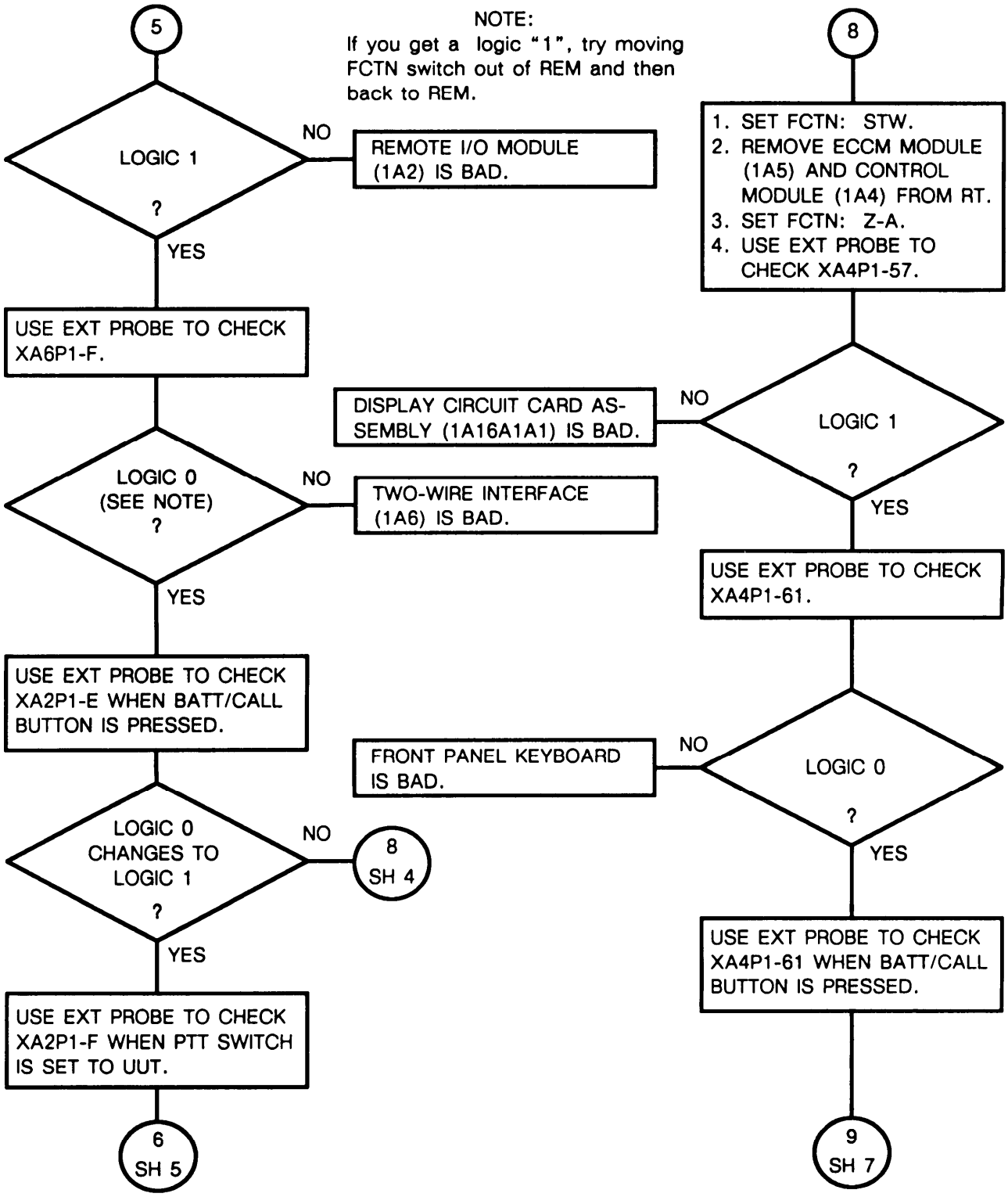
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Remote Control Circuits
(Sheet 3 of 7)



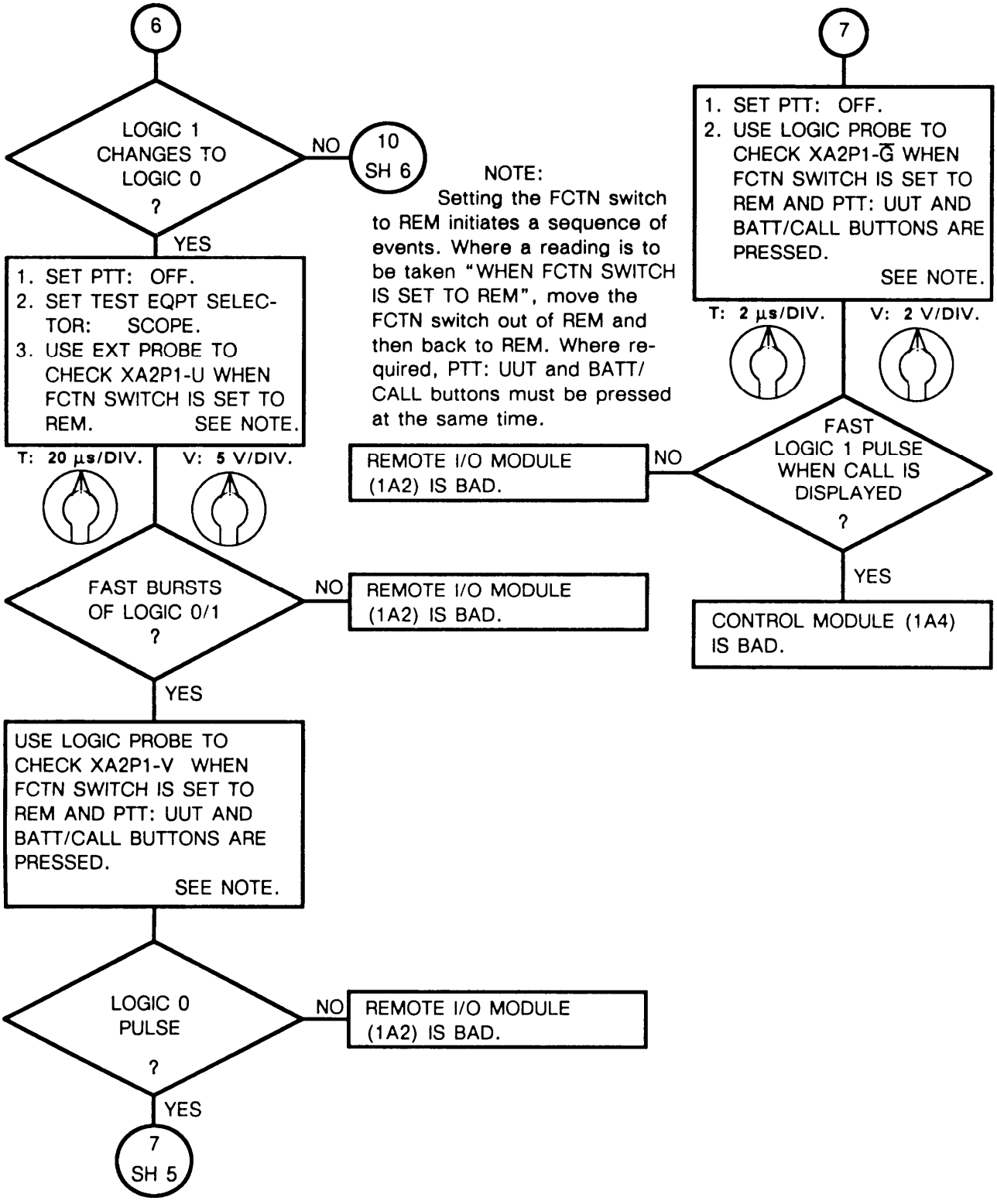
2-31, TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Remote Control Circuits



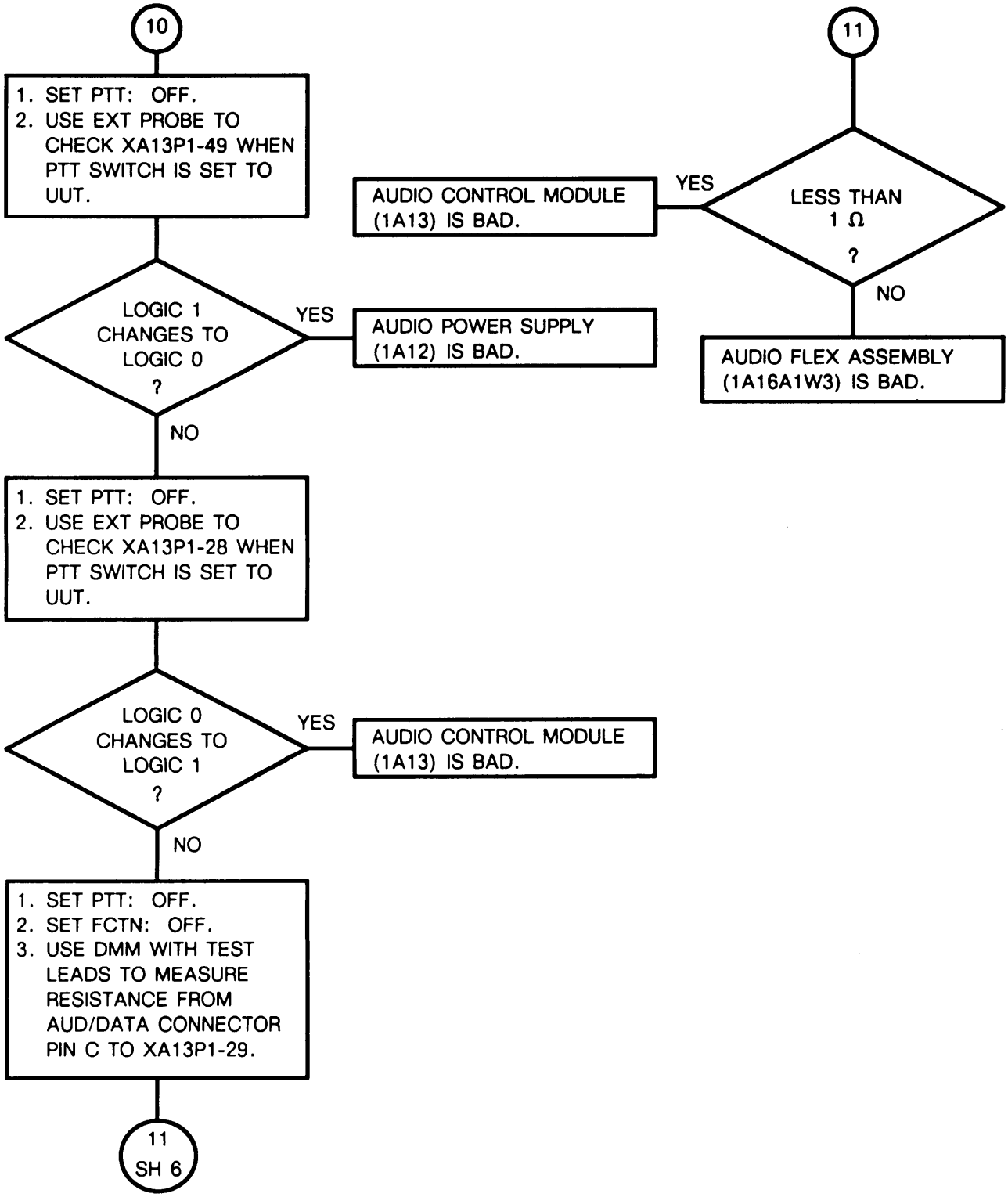
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Remote Control Circuits
(Sheet 5 of 7)



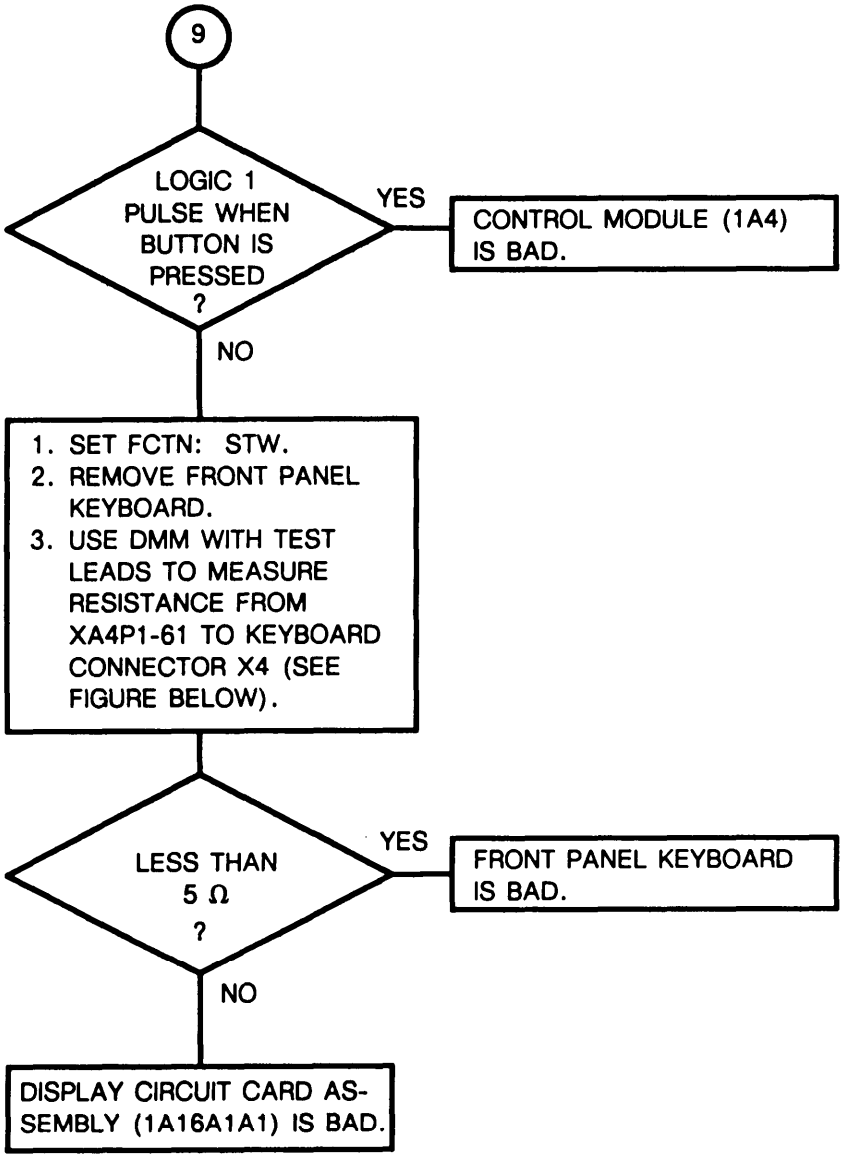
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

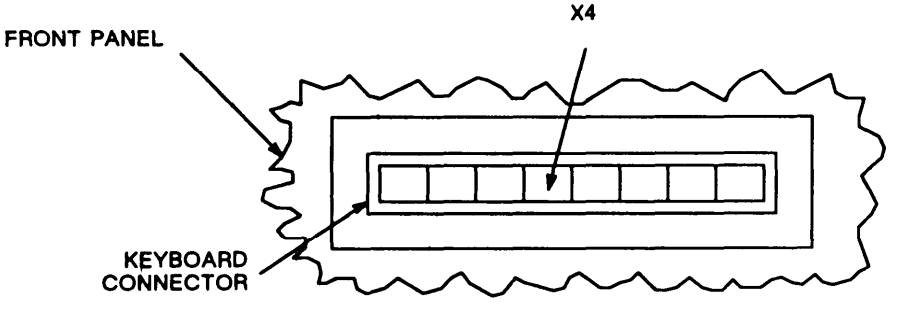
Chart 9
Troubleshooting Remote Control Circuits
(Sheet 6 of 7)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

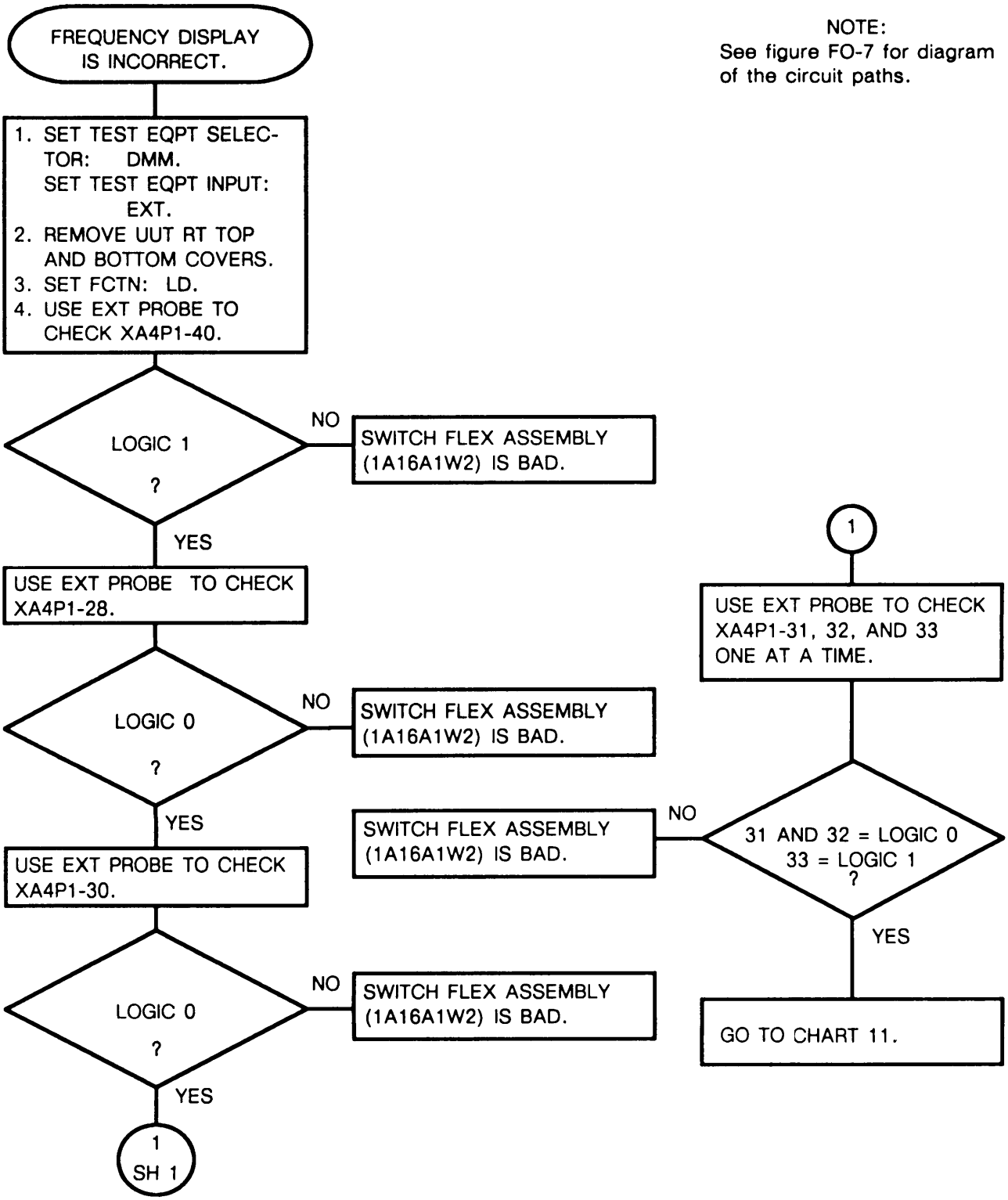
Chart 9
Troubleshooting Remote Control Circuits
(Sheet 7 of 7)





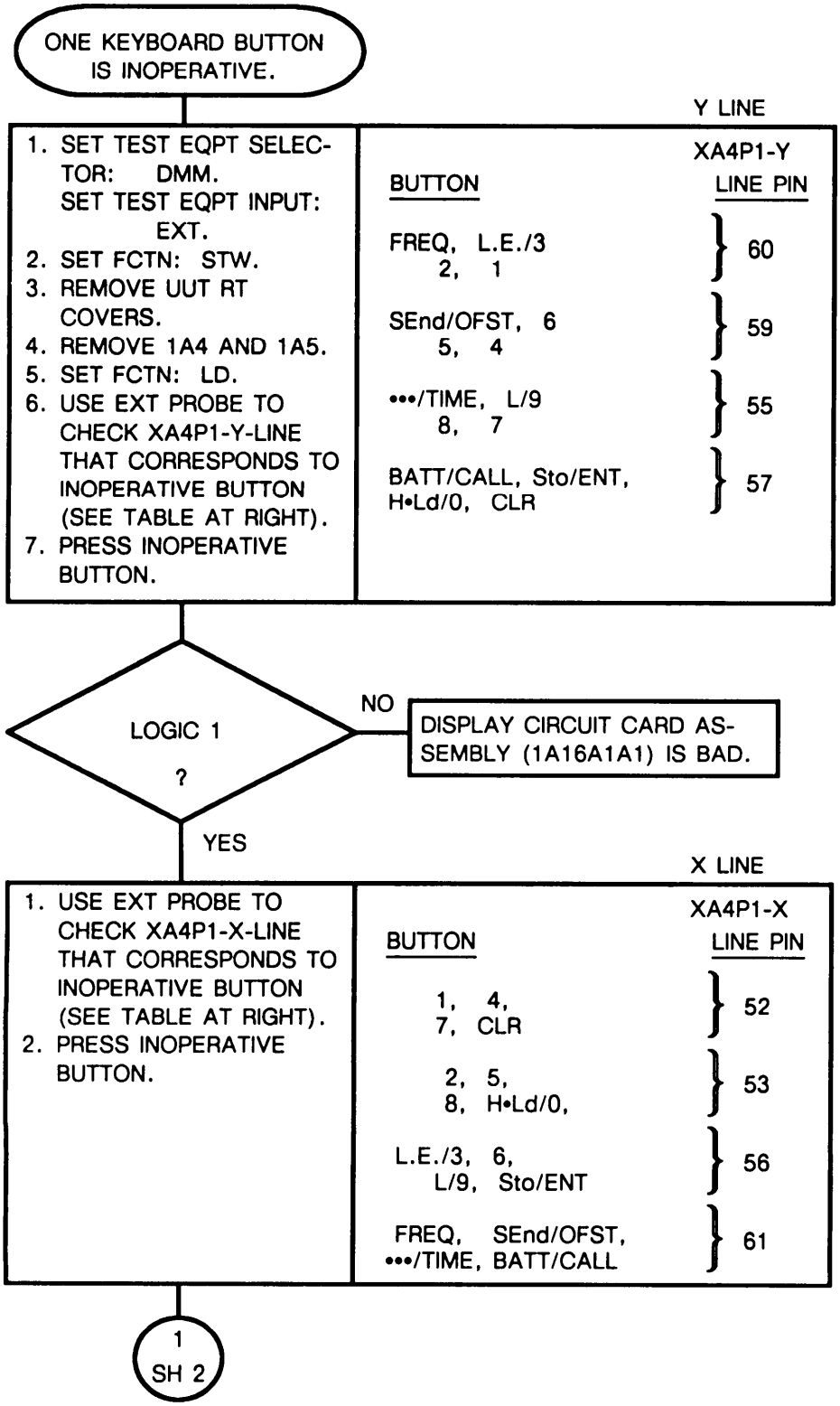
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Display Circuitry
(Sheet 1 of 1)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

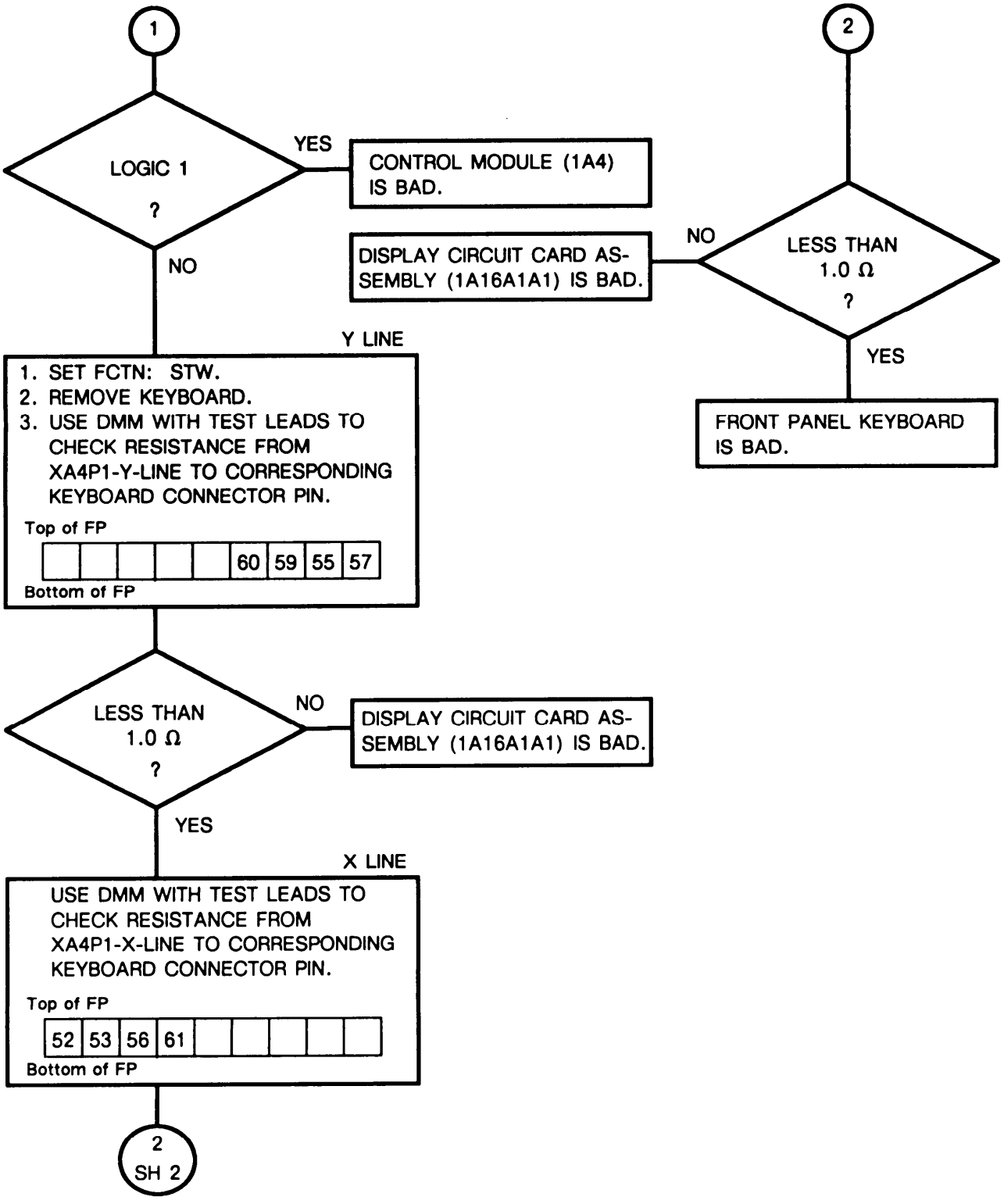
Chart 11
Troubleshooting Display Circuitry
(Sheet 1 of 2)



NOTE:
See figure FO-7 for diagram of the circuit paths.

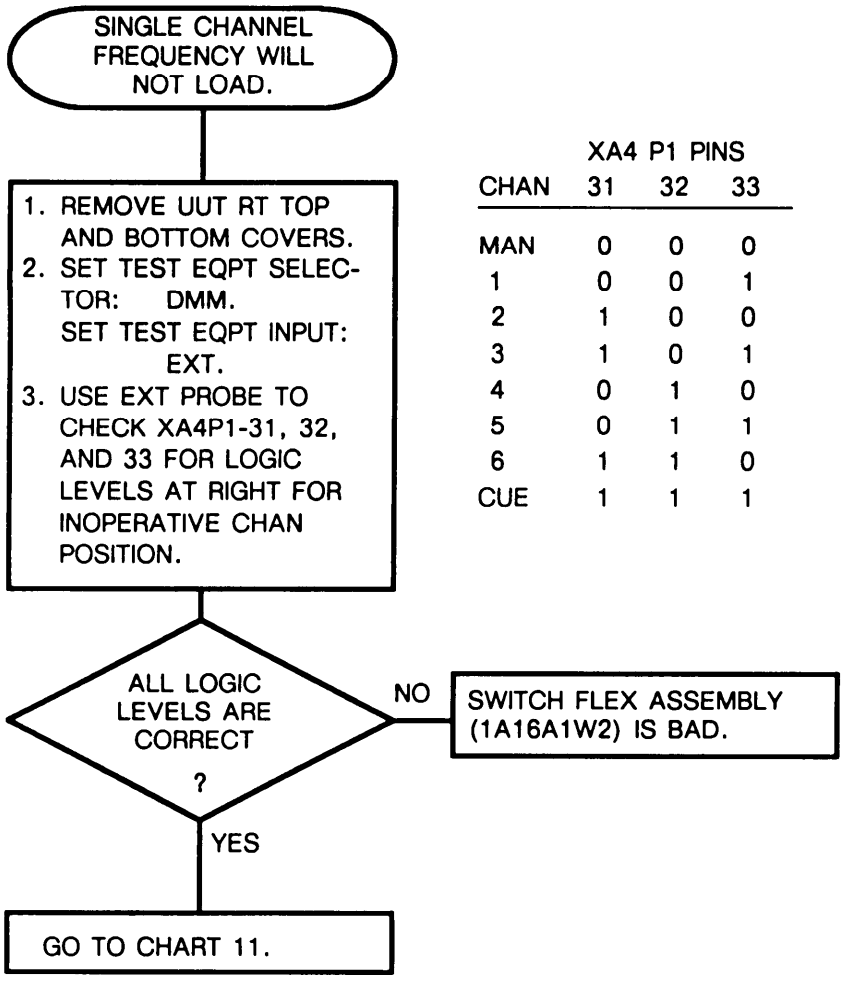
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 11
Troubleshooting Display Circuitry
(Sheet 2 of 2)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 12
Troubleshooting CHAN Switch
(Sheet 1 of 1)

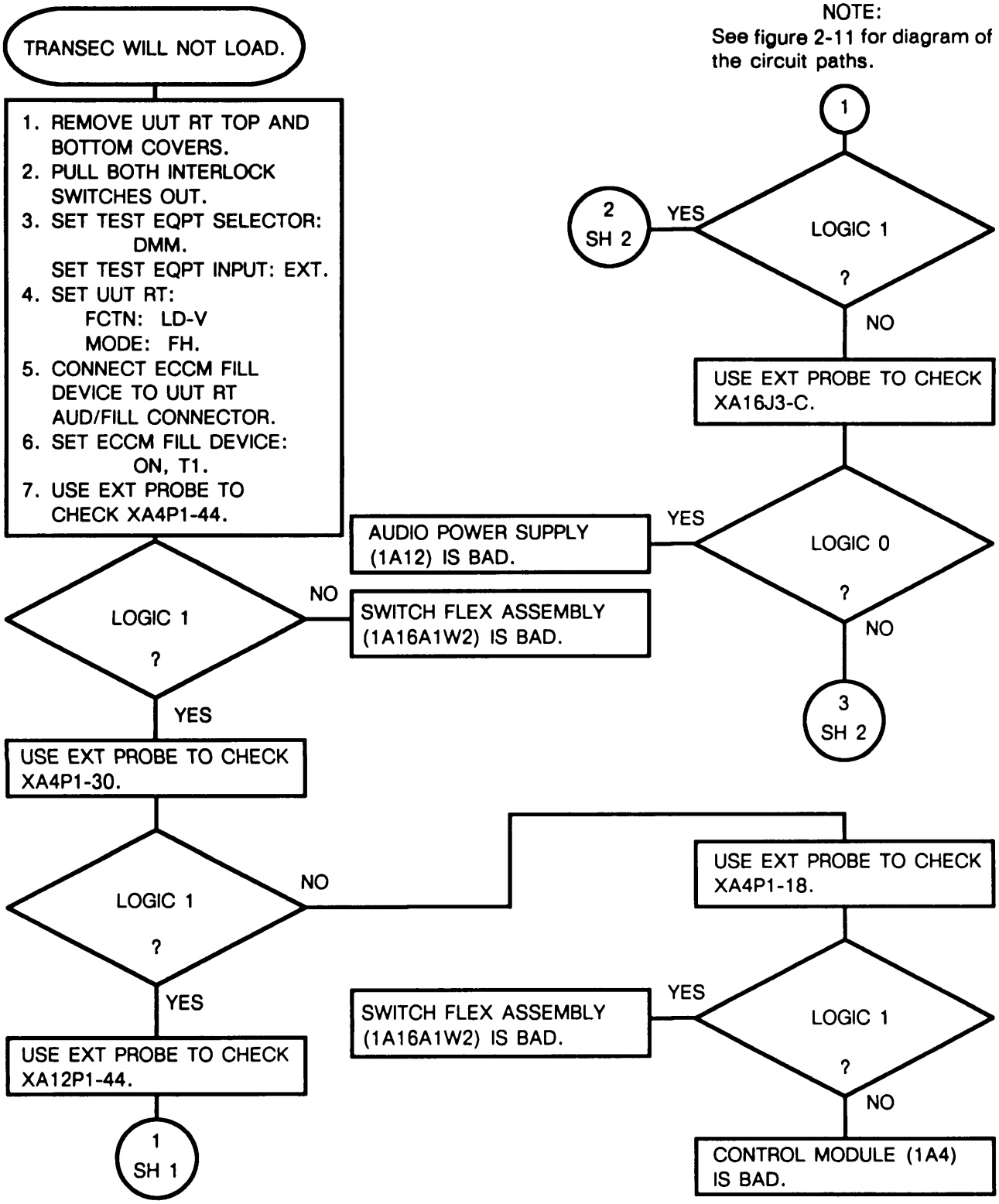


	XA4 P1 PINS		
CHAN	31	32	33
MAN	0	0	0
1	0	0	1
2	1	0	0
3	1	0	1
4	0	1	0
5	0	1	1
6	1	1	0
CUE	1	1	1

NOTE:
See figure FO-7 for diagram of the circuit paths.

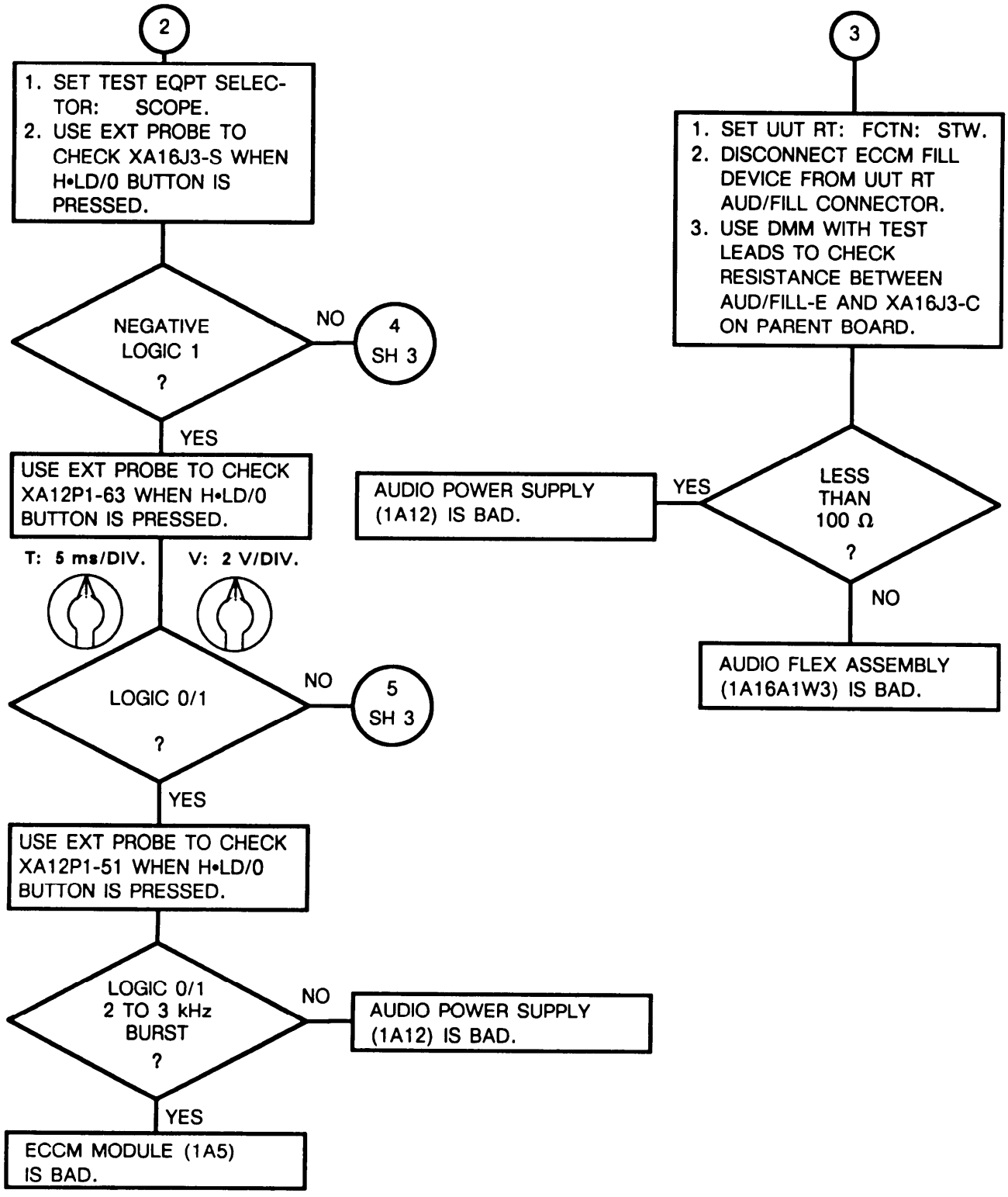
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting Fill Circuitry
(Sheet 1 of 4)



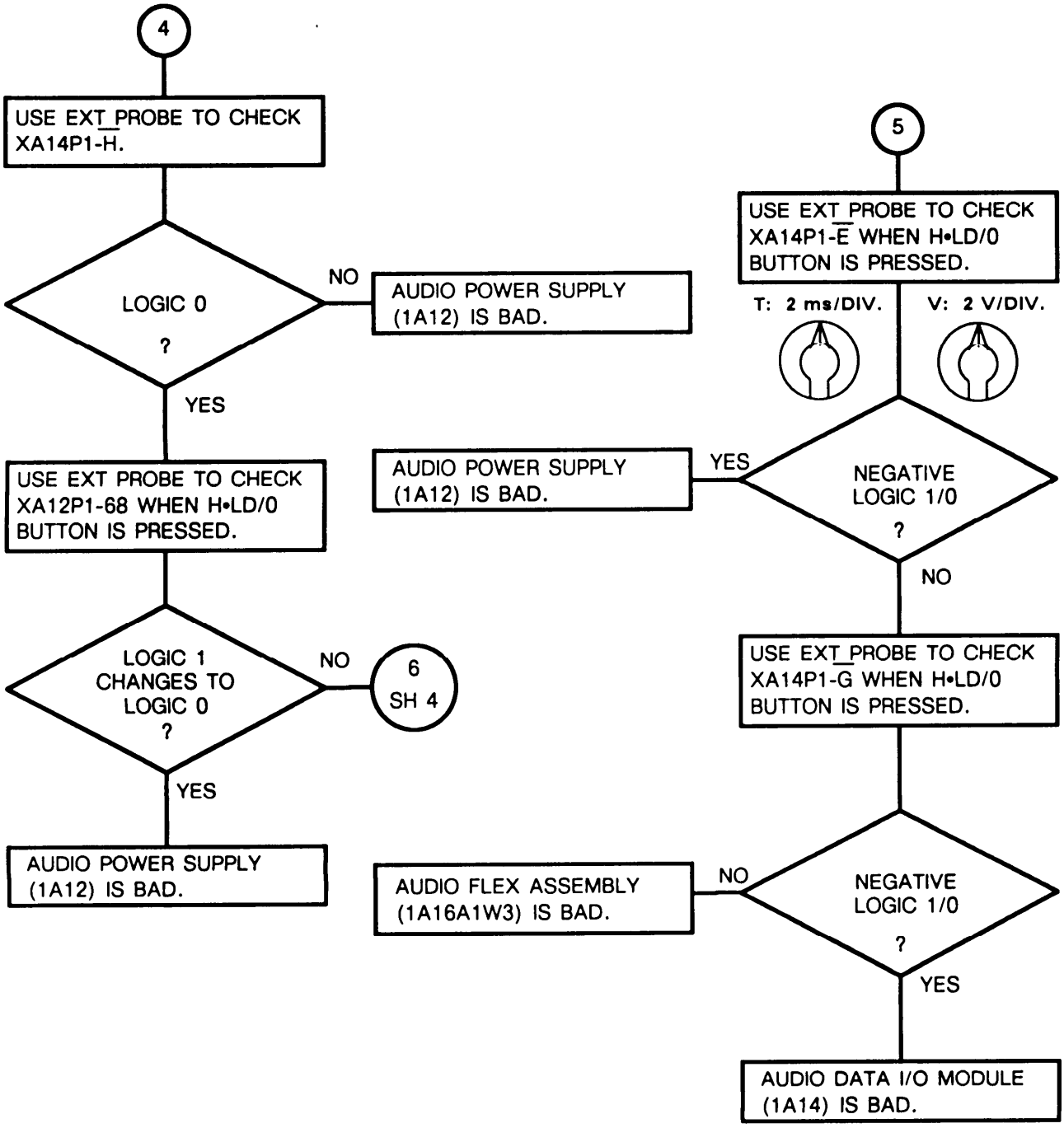
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting Fill Circuitry
(Sheet 2 of 4)



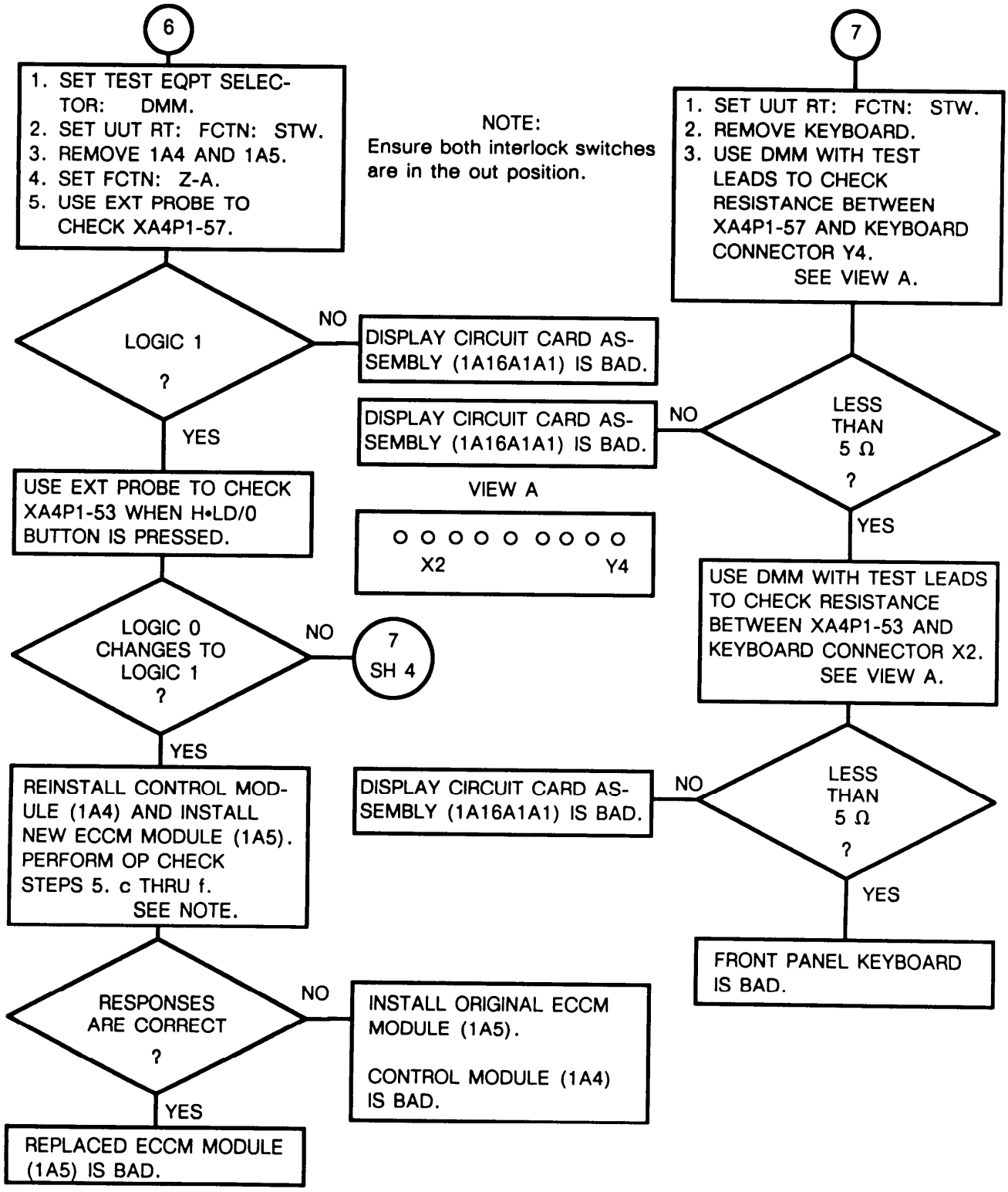
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting Fill Circuitry
(Sheet 3 of 4)



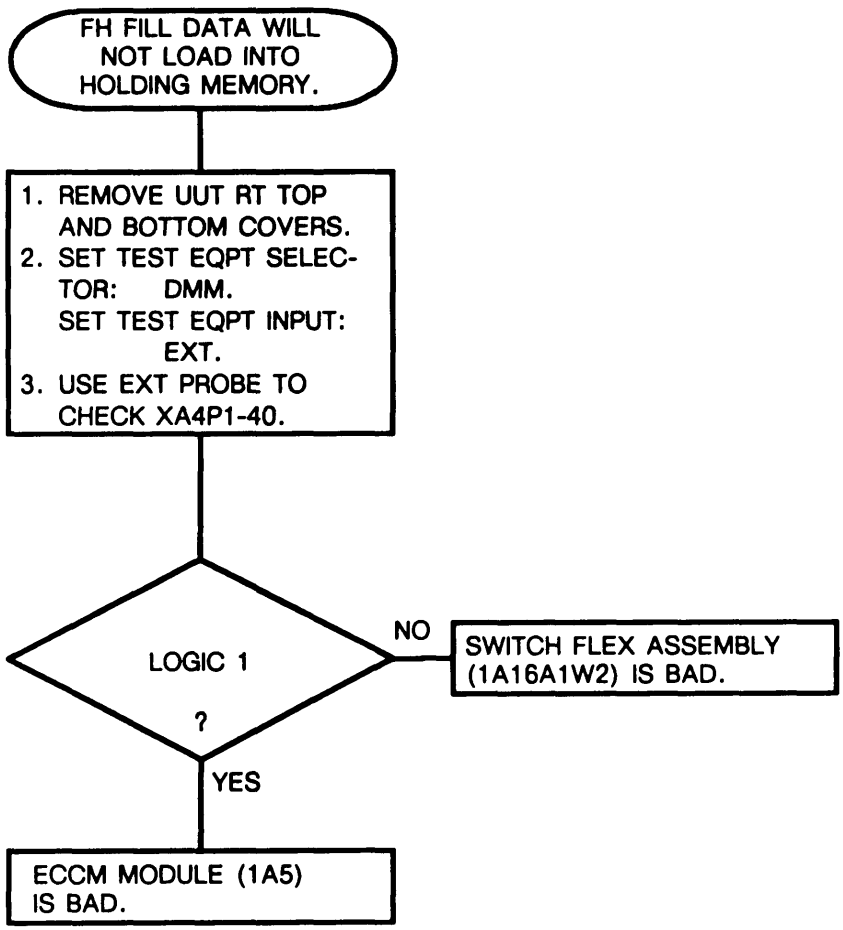
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting Fill Circuitry
(Sheet 4 of 4)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 14
Troubleshooting Fill Circuitry
(Sheet 1 of 1)

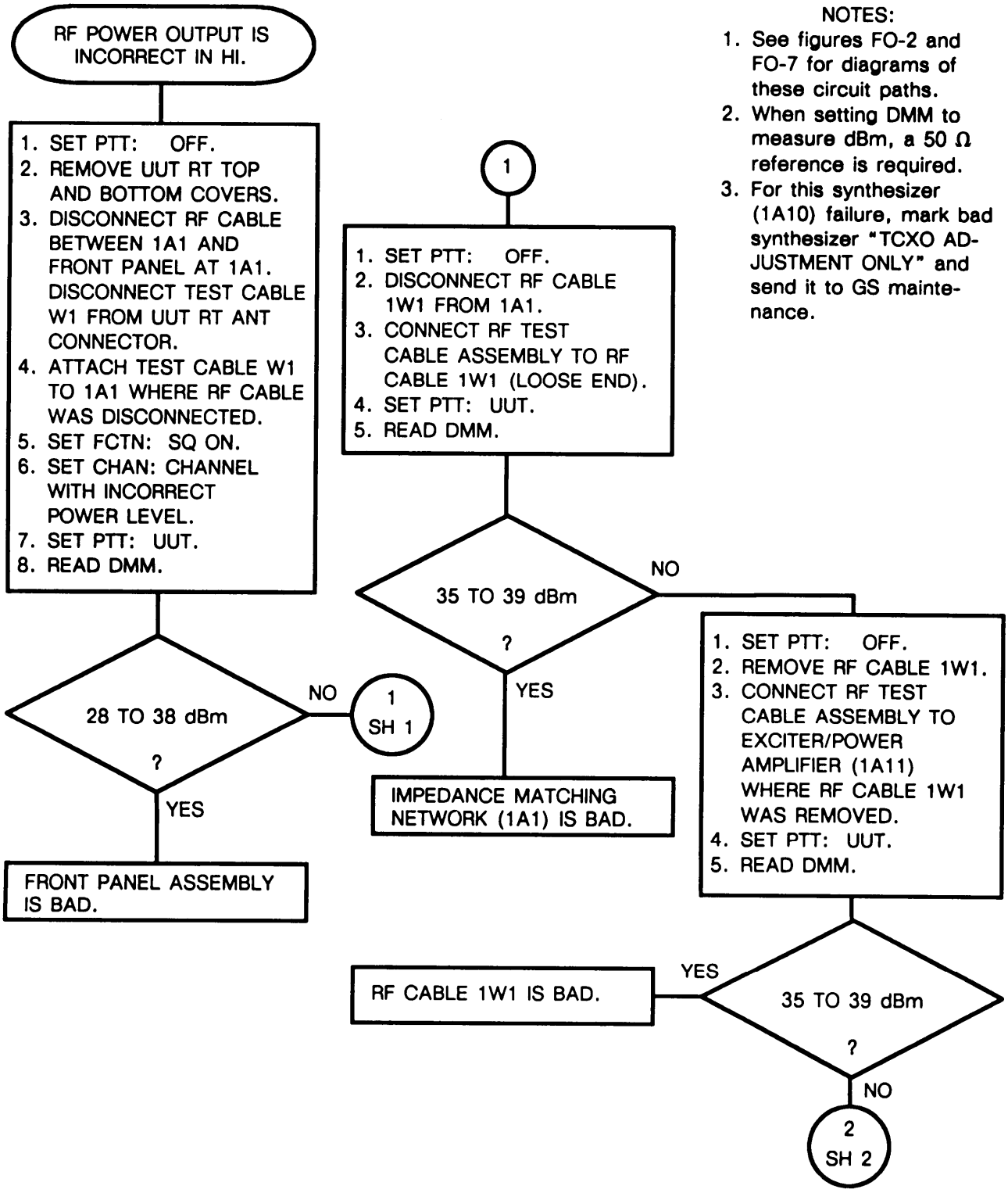


NOTE:

See figure 2-11 for diagram of these circuit paths.

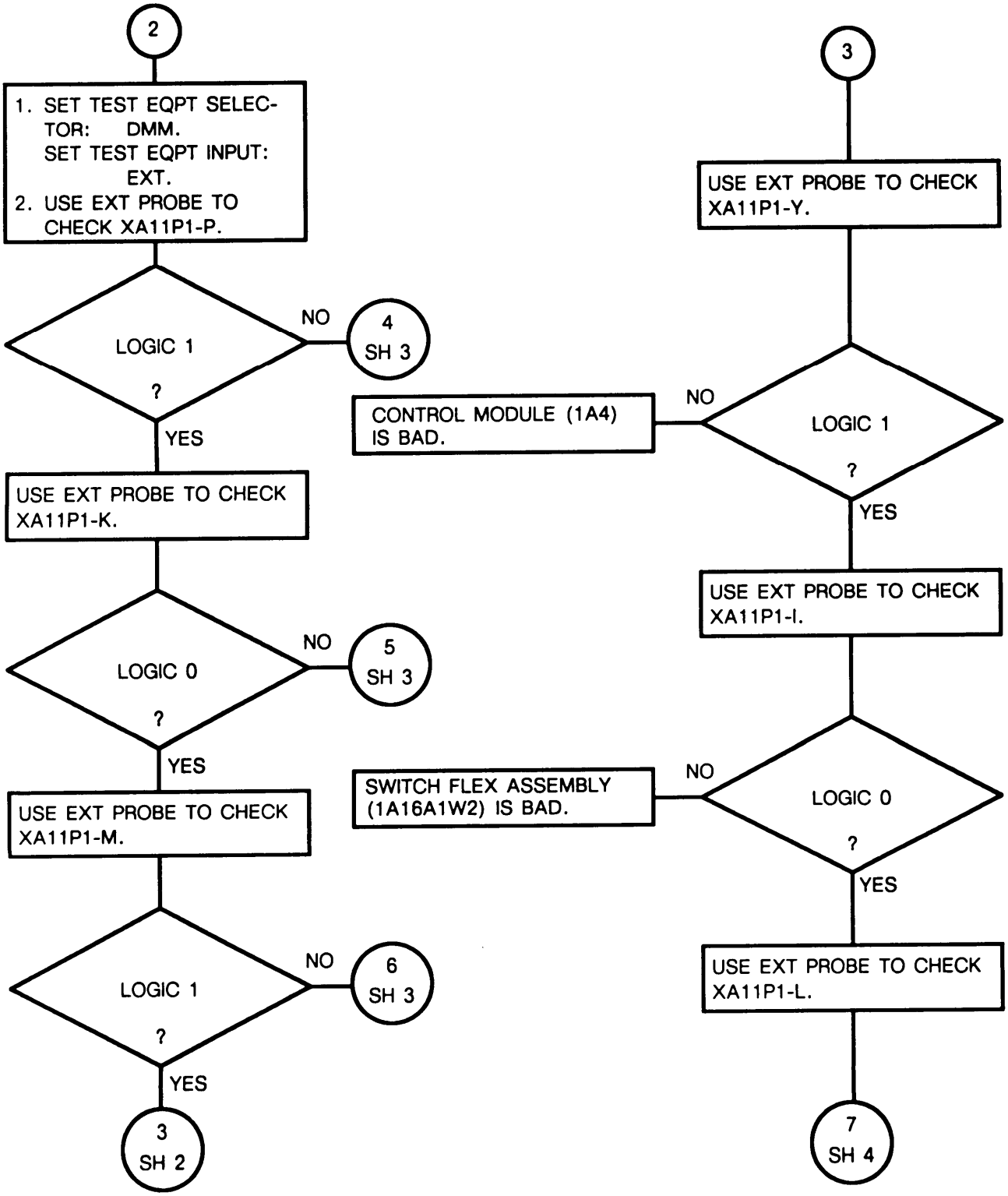
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Transmit Circuitry
(Sheet 1 of 5)



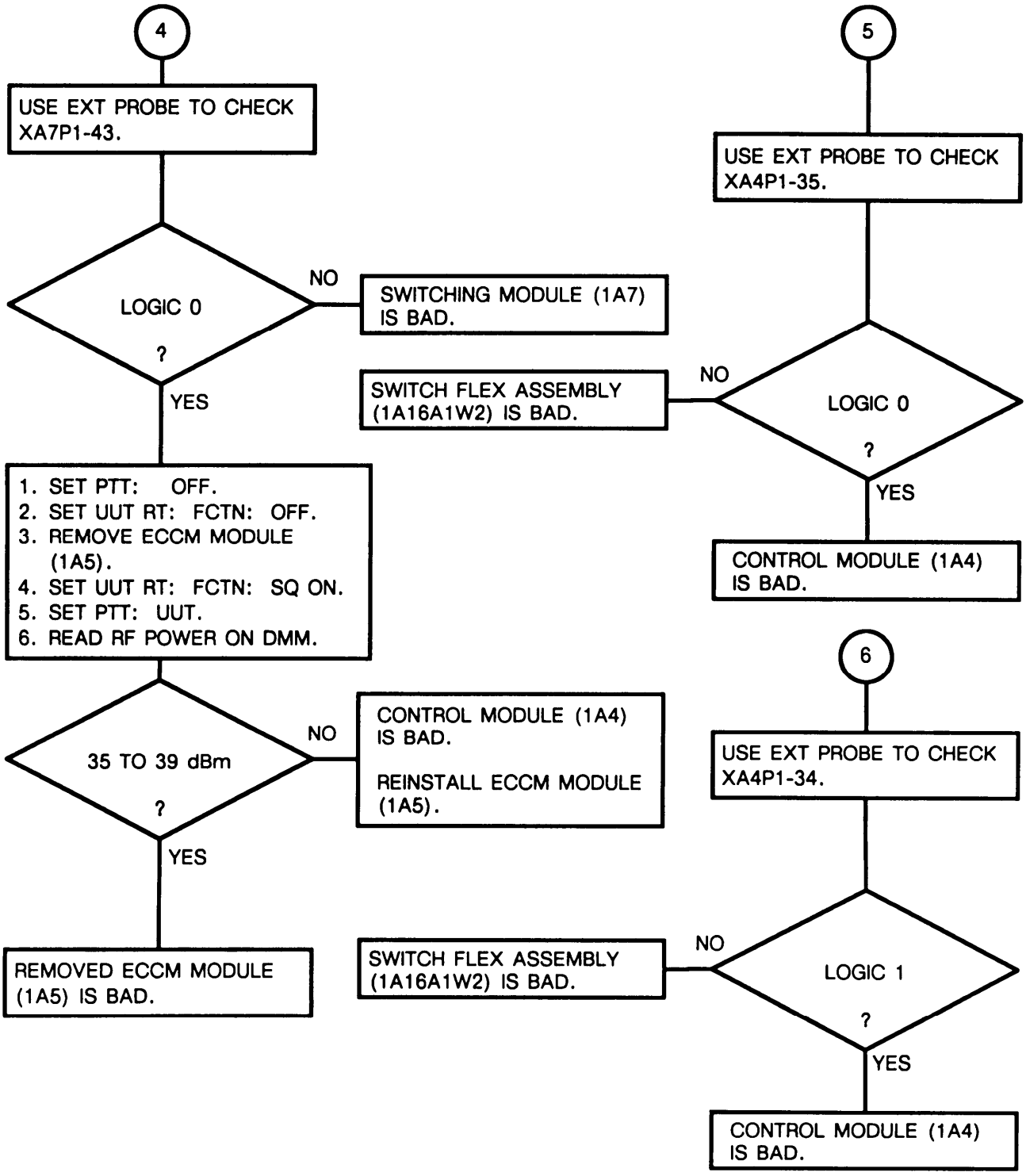
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Transmit Circuitry
(Sheet 2 of 5)



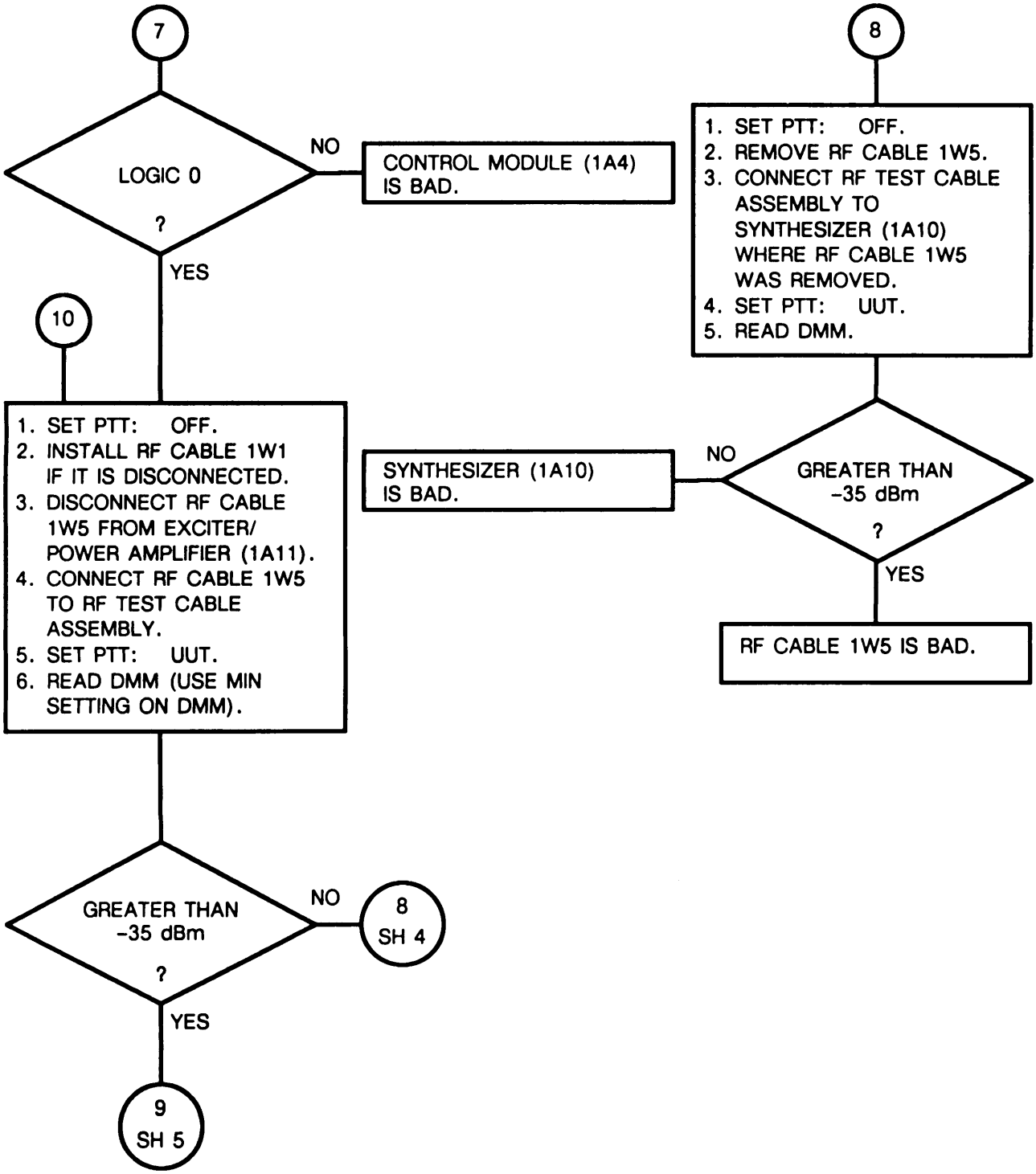
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Transmit Circuitry
(Sheet 3 of 5)



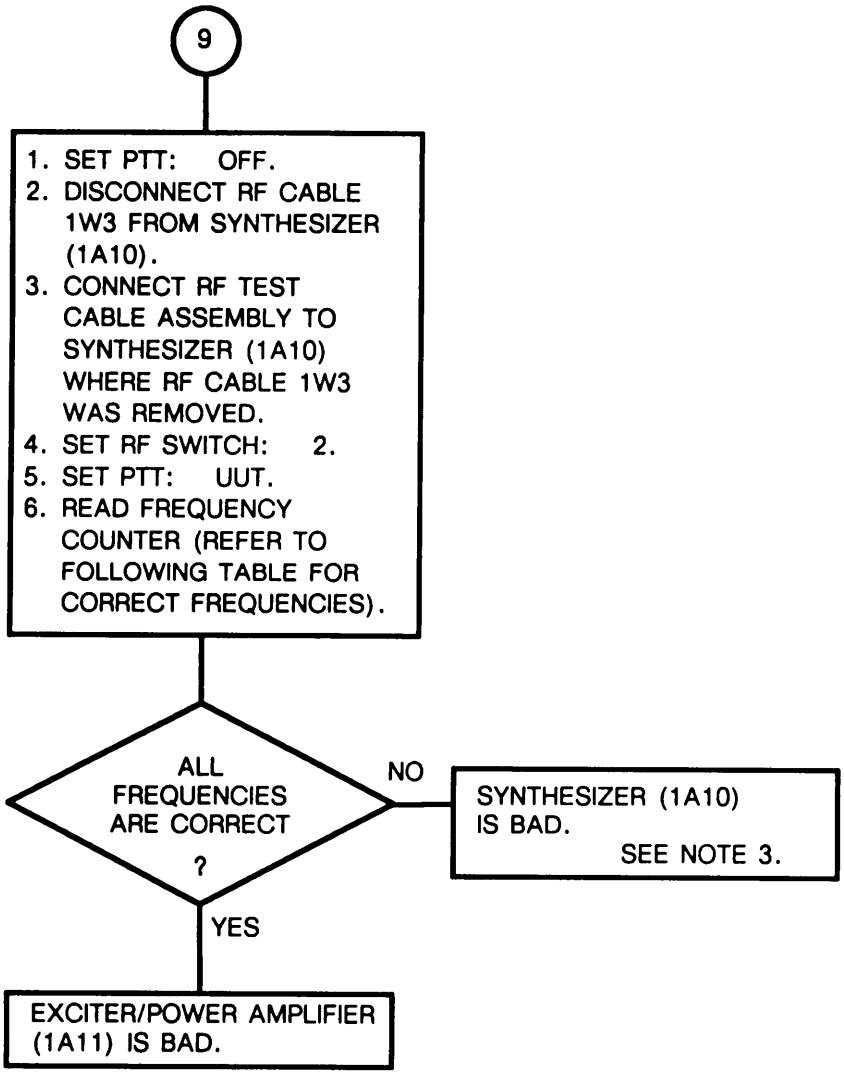
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Transmit Circuitry
(Sheet 4 of 5)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

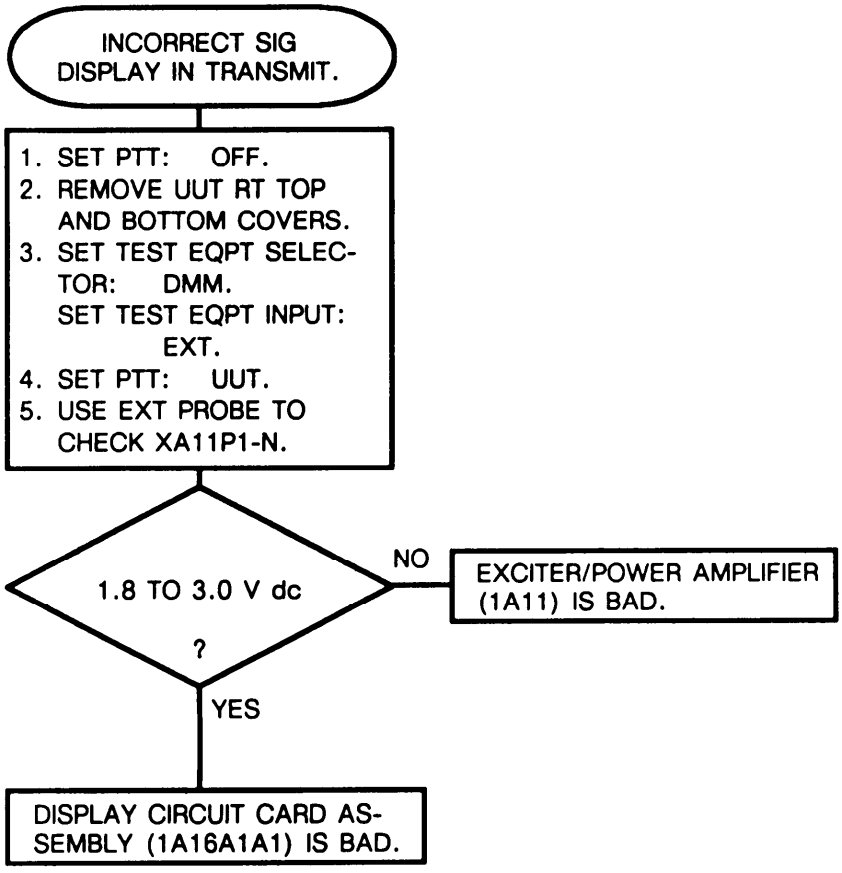
Chart 15
Troubleshooting Transmit Circuitry
(Sheet 5 of 5)



CHAN	FREQUENCY (MHz)
MAN	36.999800 to 37.000200
1	44.874750 to 44.875250
2	49.974750 to 49.975250
3	50.374750 to 50.375250
4	56.074700 to 56.075300
5	63.199700 to 63.200300
6	75.774600 to 75.775400
CUE	94.974500 to 94.975500

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

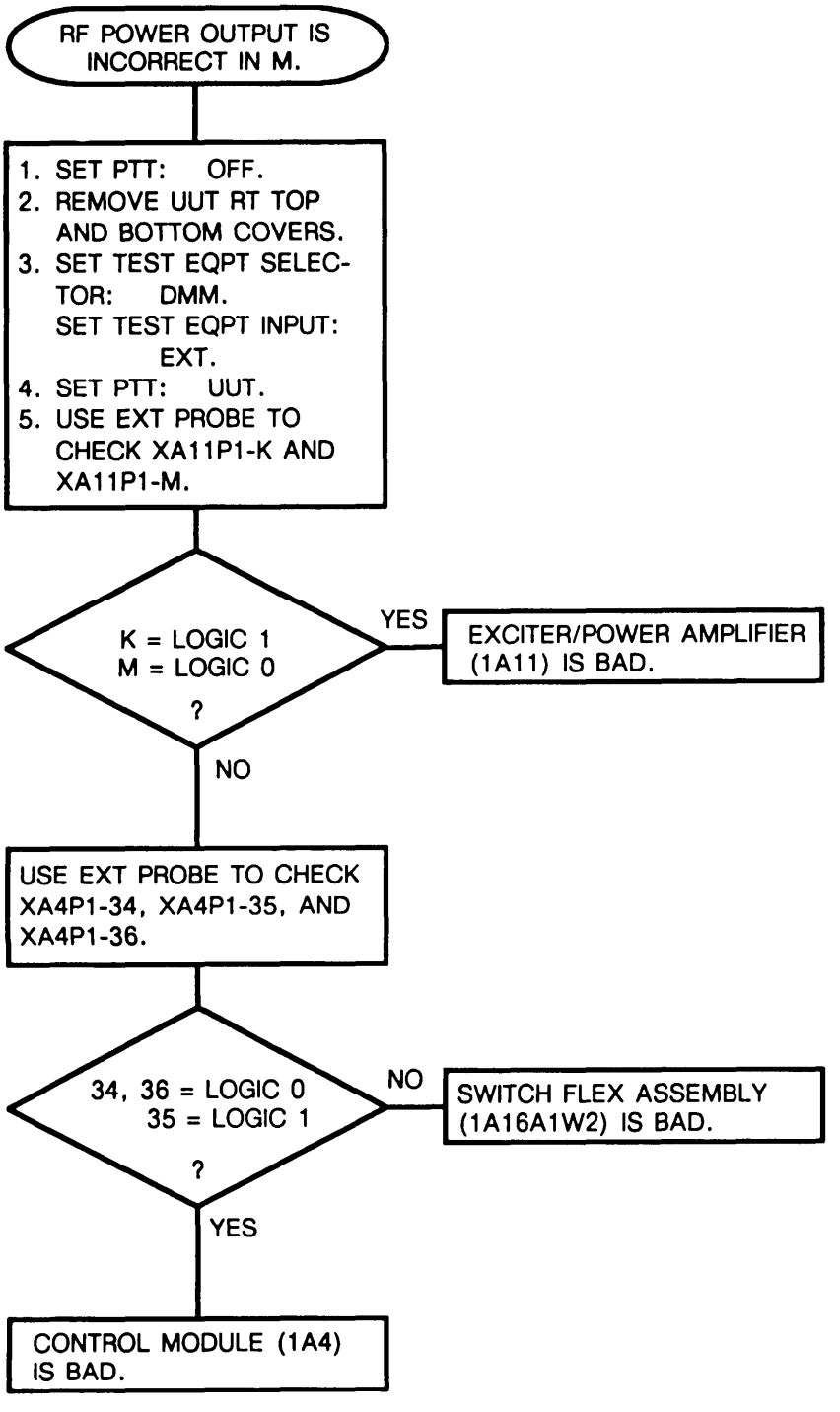
Chart 16
Troubleshooting SIG Display
(Sheet 1 of 1)



NOTE:
See figure FO-2 for diagram of this circuit path.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

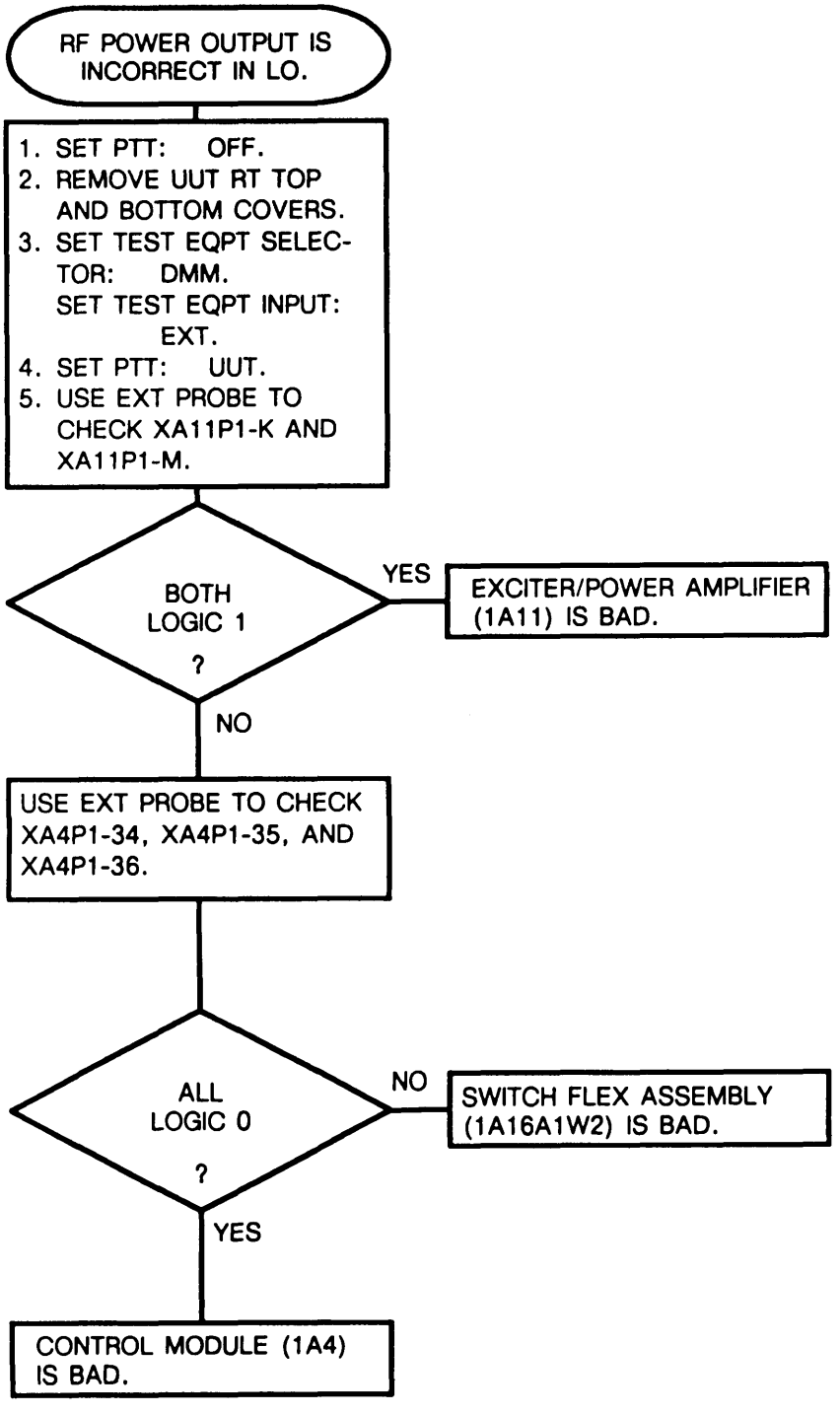
Chart 17
Troubleshooting Medium Power Transmit Path
(Sheet 1 of 1)



NOTE:
See figure FO-7 for diagram of these circuit paths.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

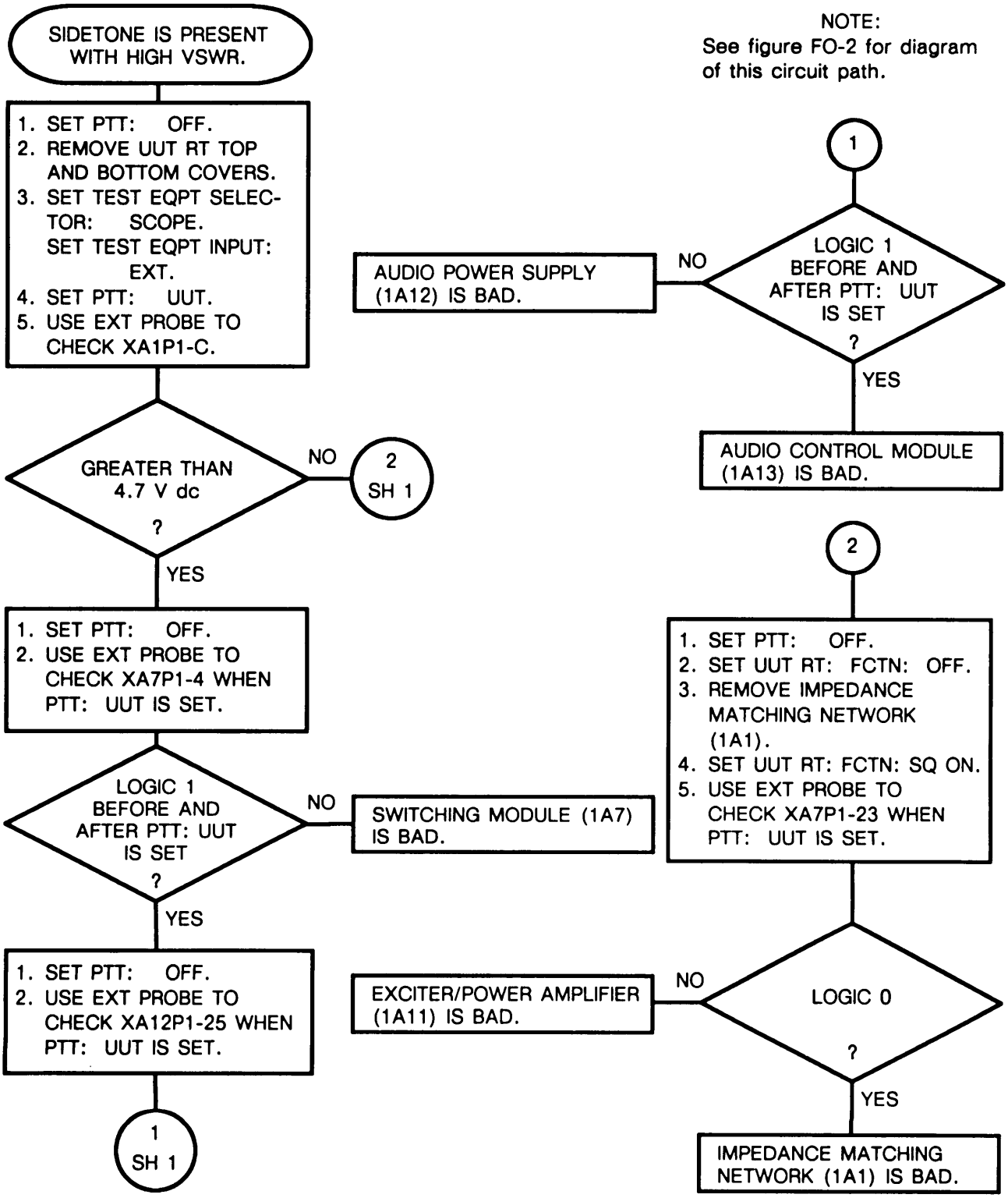
Chart 18
Troubleshooting Low Power Transmit Path
(Sheet 1 of 1)



NOTE:
See figure FO-7 for diagram of these circuit paths.

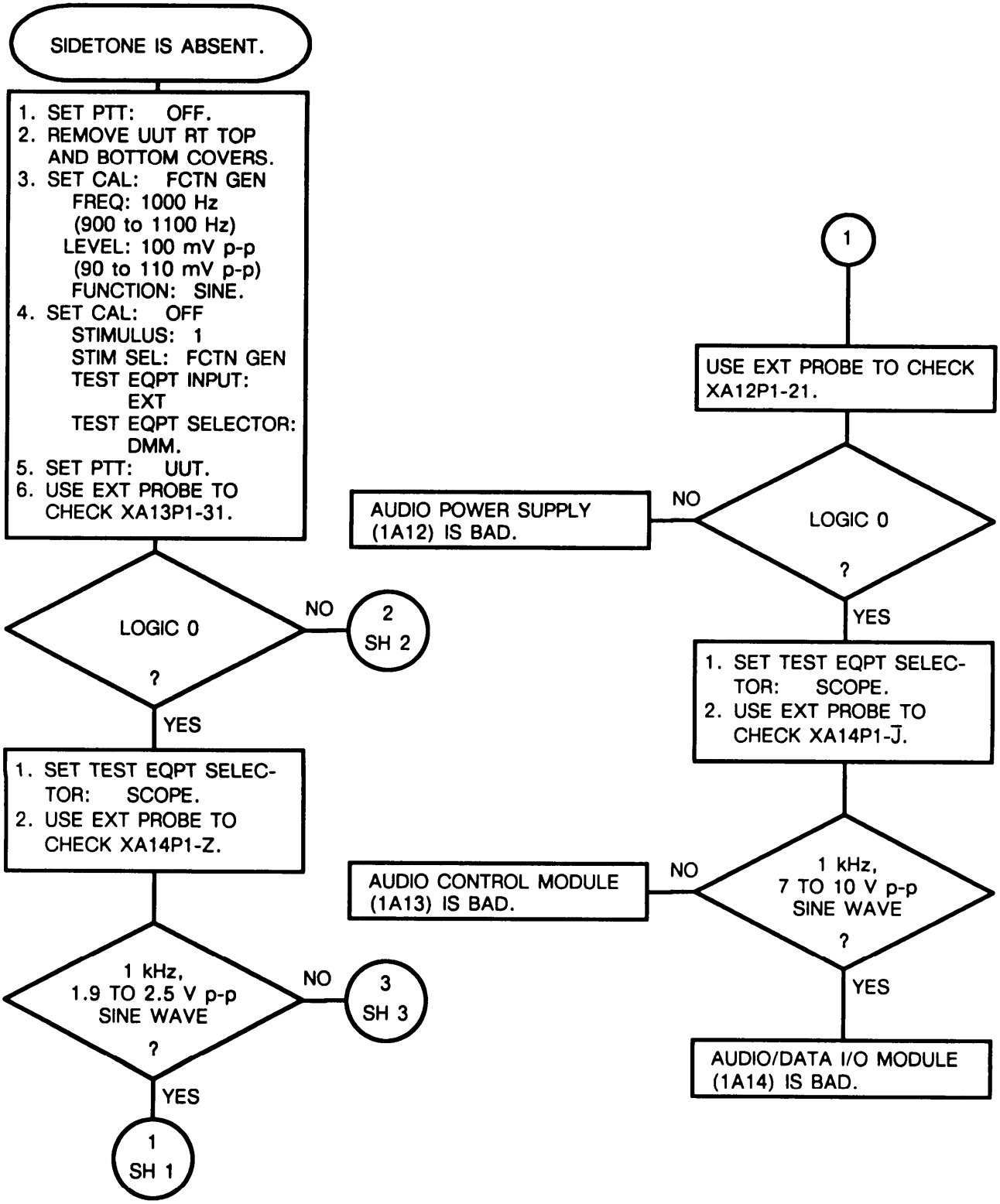
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 19
Troubleshooting Sidetone Circuit
(Sheet 1 of 1)



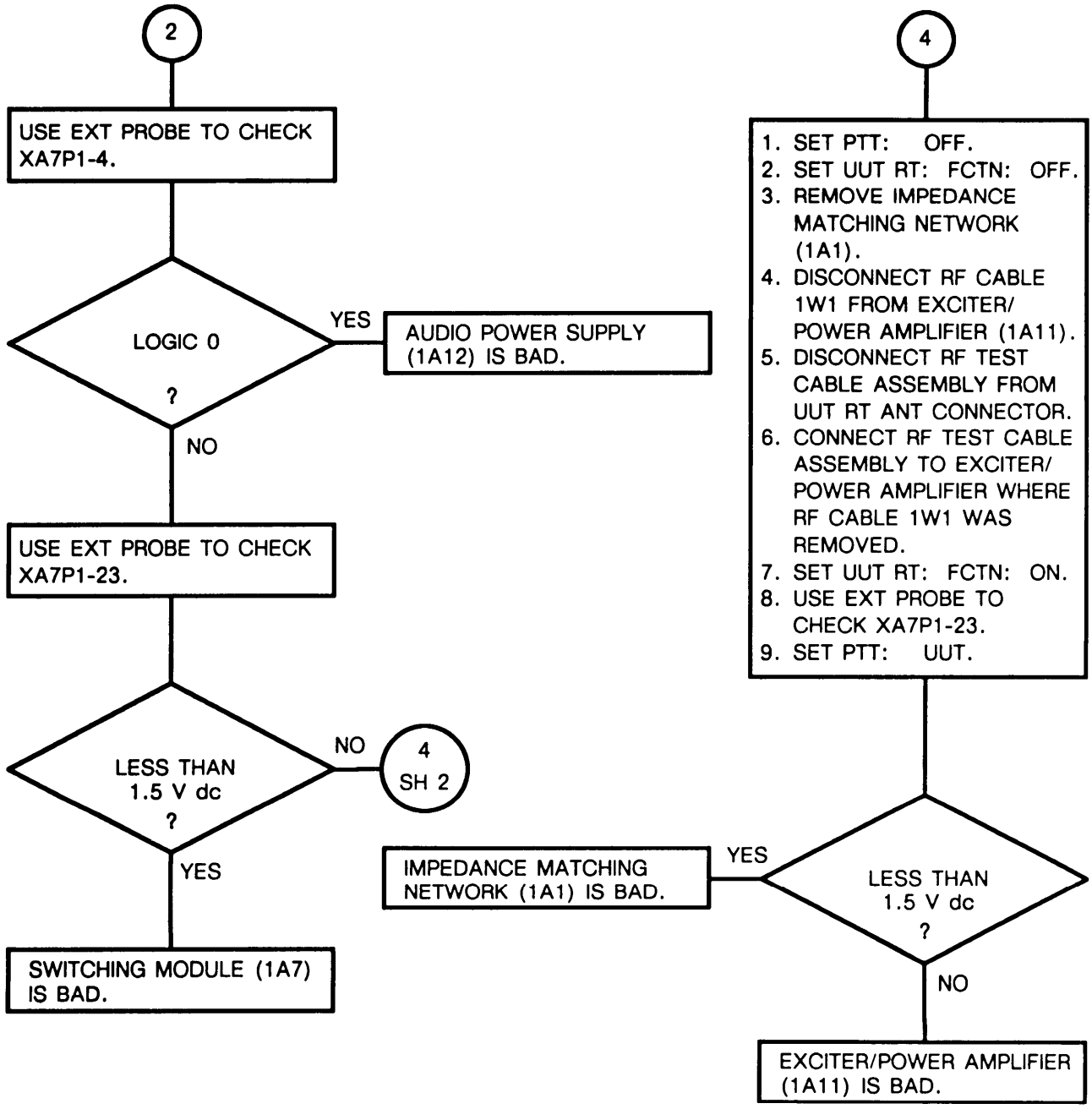
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 20
Troubleshooting Faulty Sidetone
(Sheet 1 of 3)



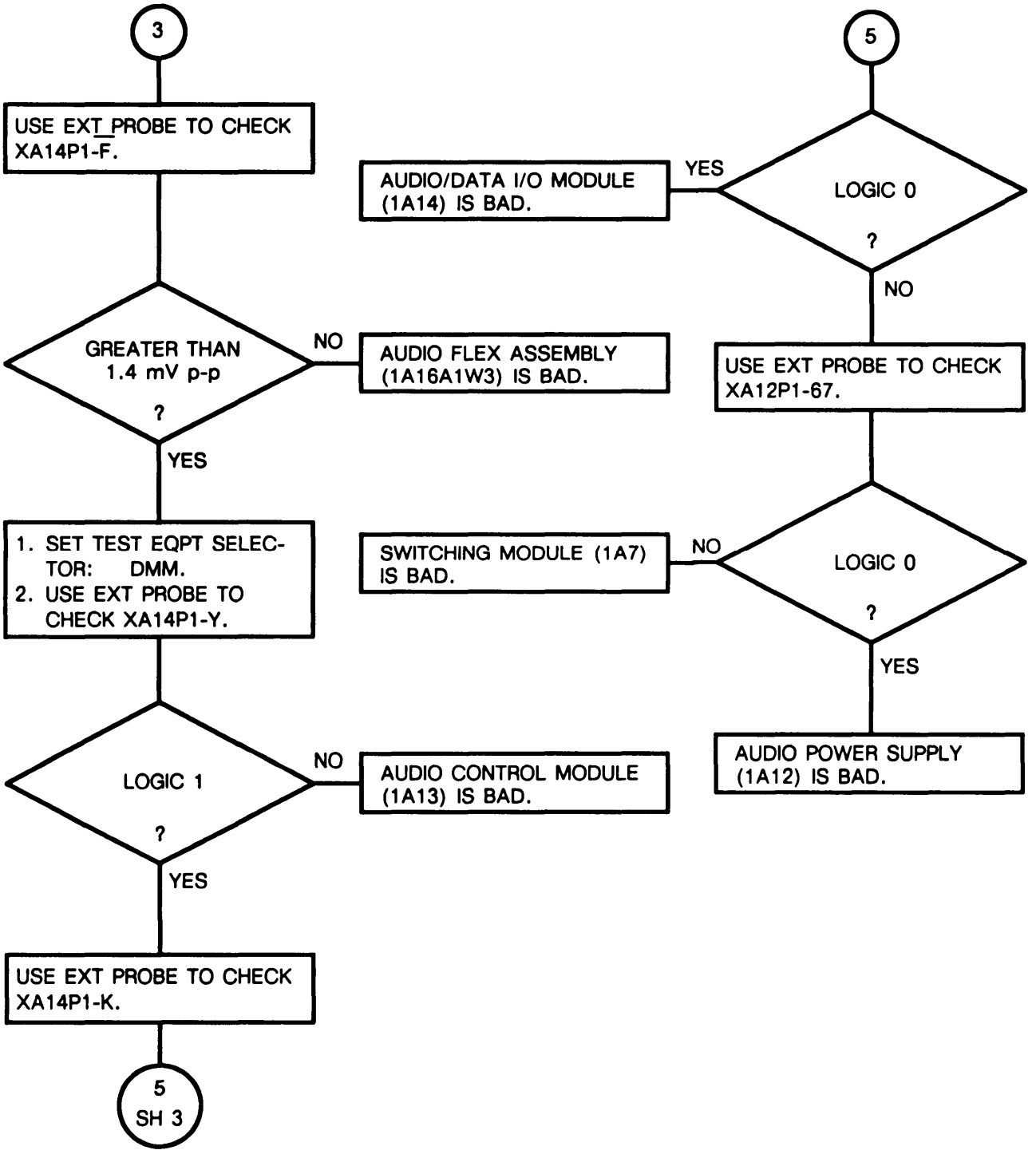
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 20
Troubleshooting Faulty Sidetone
(Sheet 2 of 3)



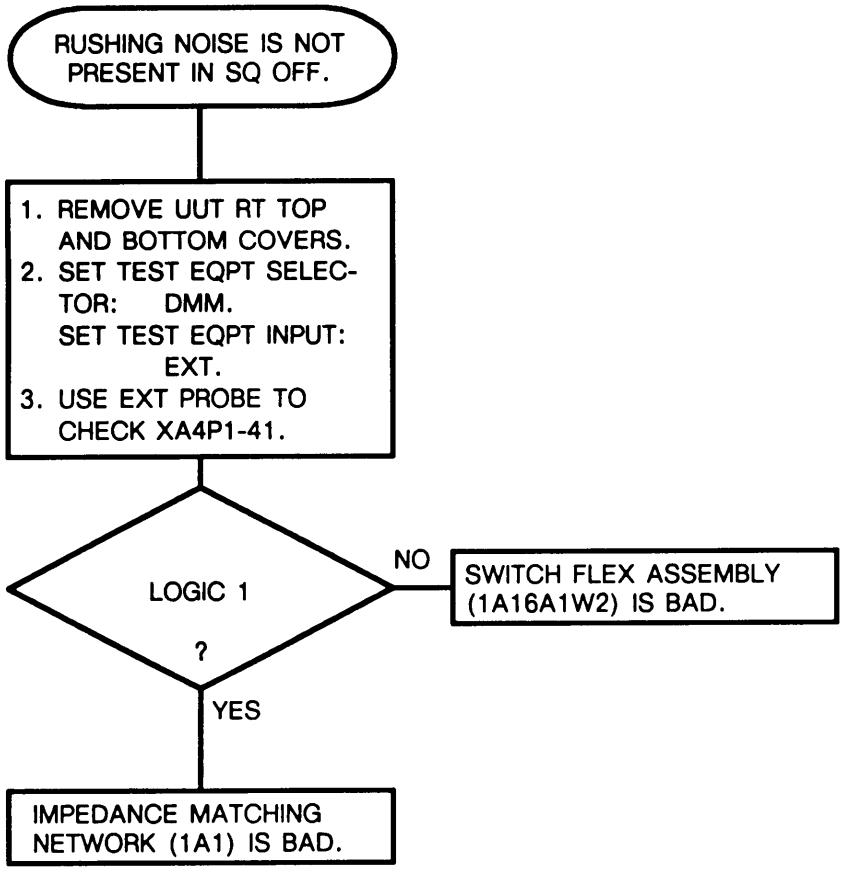
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 20
Troubleshooting Faulty Sidetone
(Sheet 3 of 3)



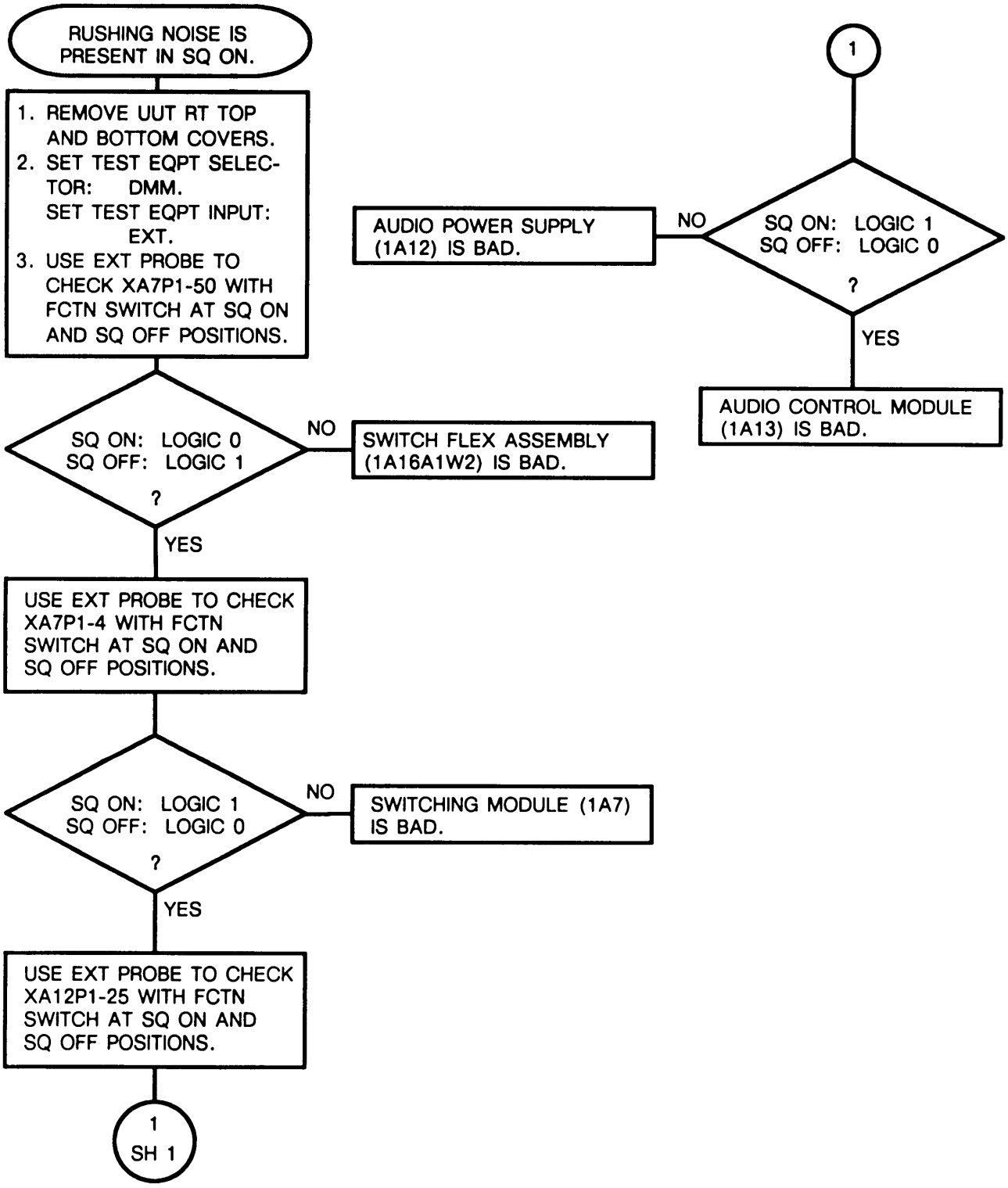
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 21
Troubleshooting Squelch Off Circuit
(Sheet 1 of 1)



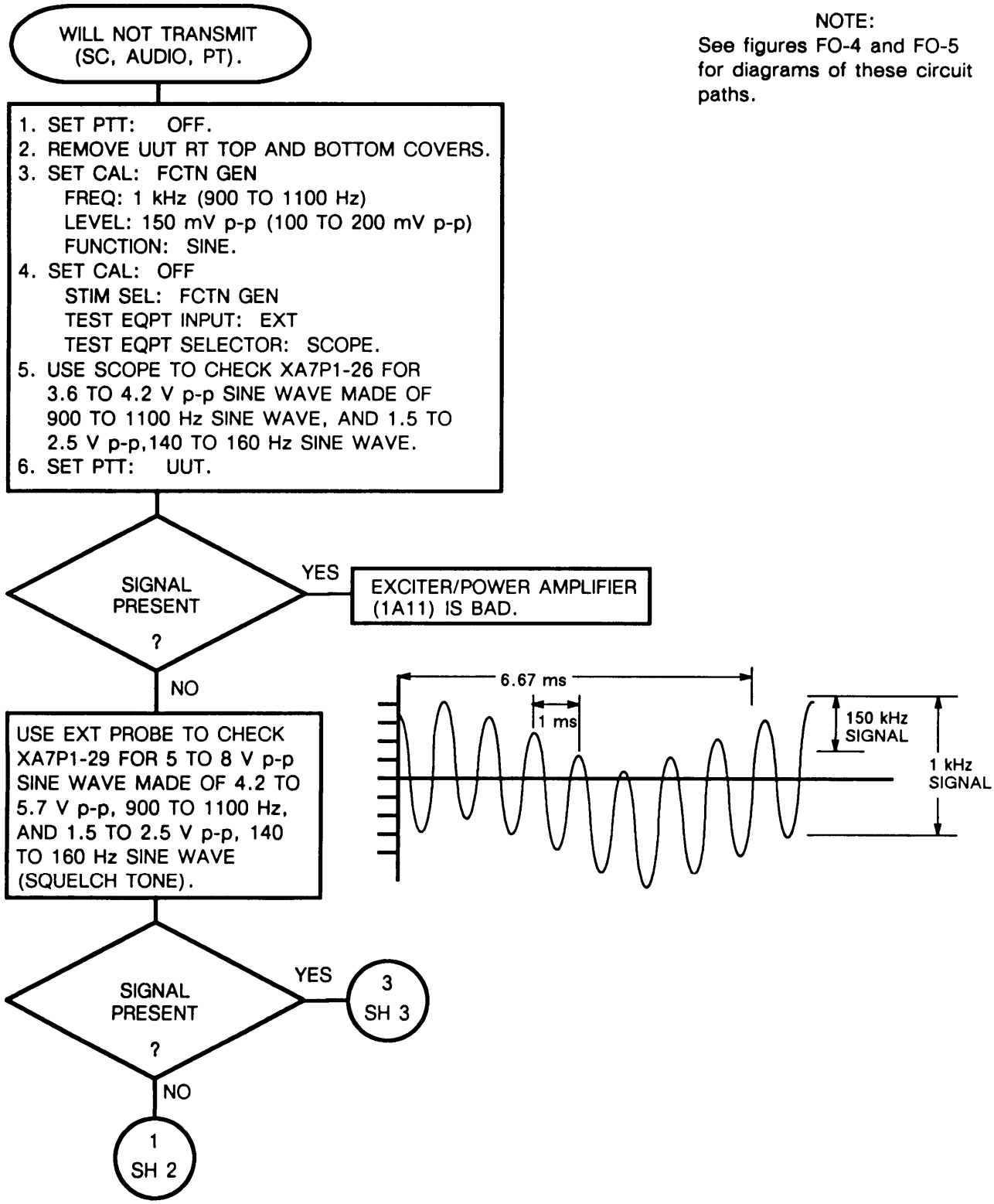
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 22
Troubleshooting Squelch On Circuit
(Sheet 1 of 1)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

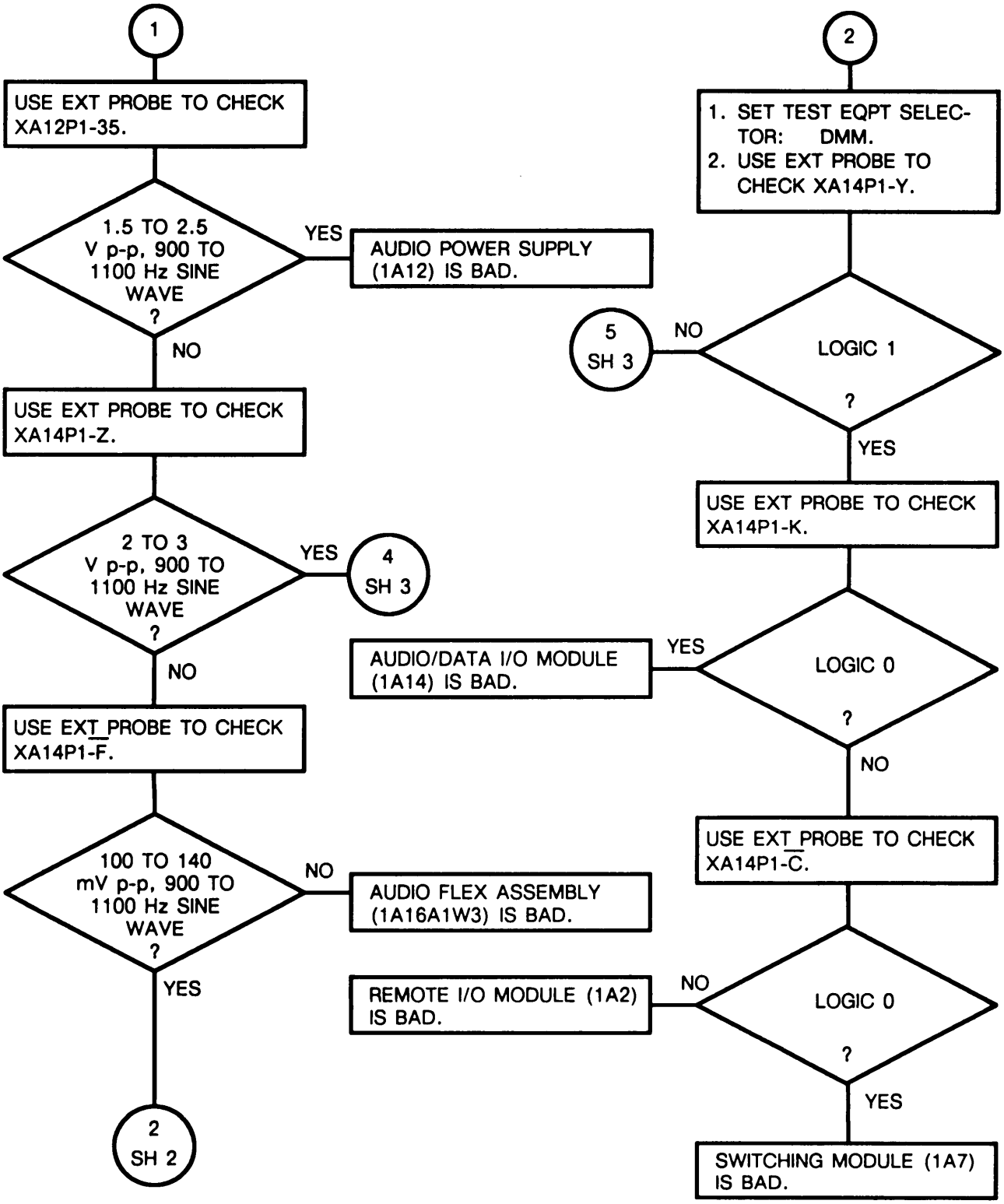
Chart 23
Troubleshooting SC Transmit Path
(Sheet 1 of 3)



NOTE:
See figures FO-4 and FO-5 for diagrams of these circuit paths.

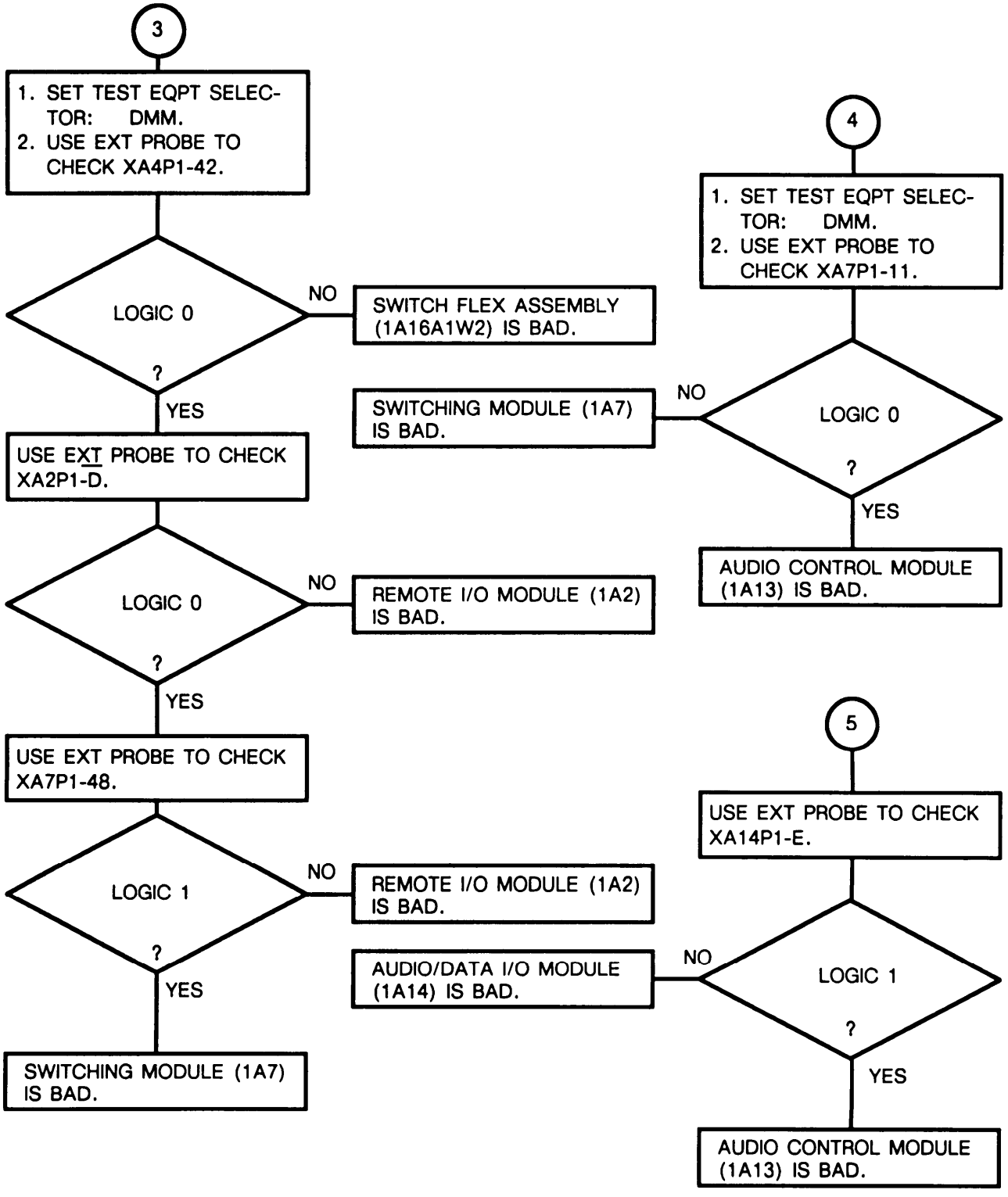
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 23
Troubleshooting SC Transmit Path
(Sheet 2 of 3)



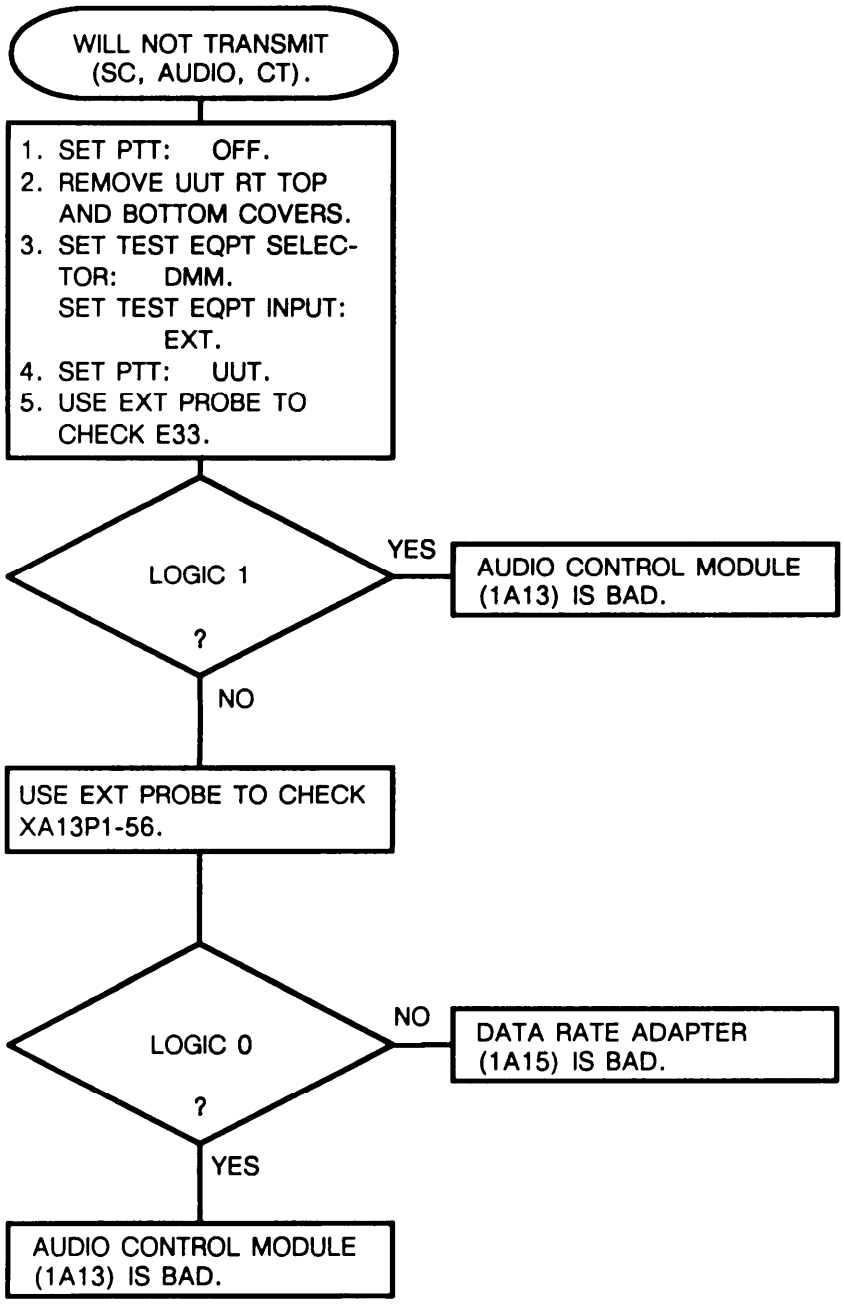
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 23
Troubleshooting SC Transmit Path
(Sheet 3 of 3)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

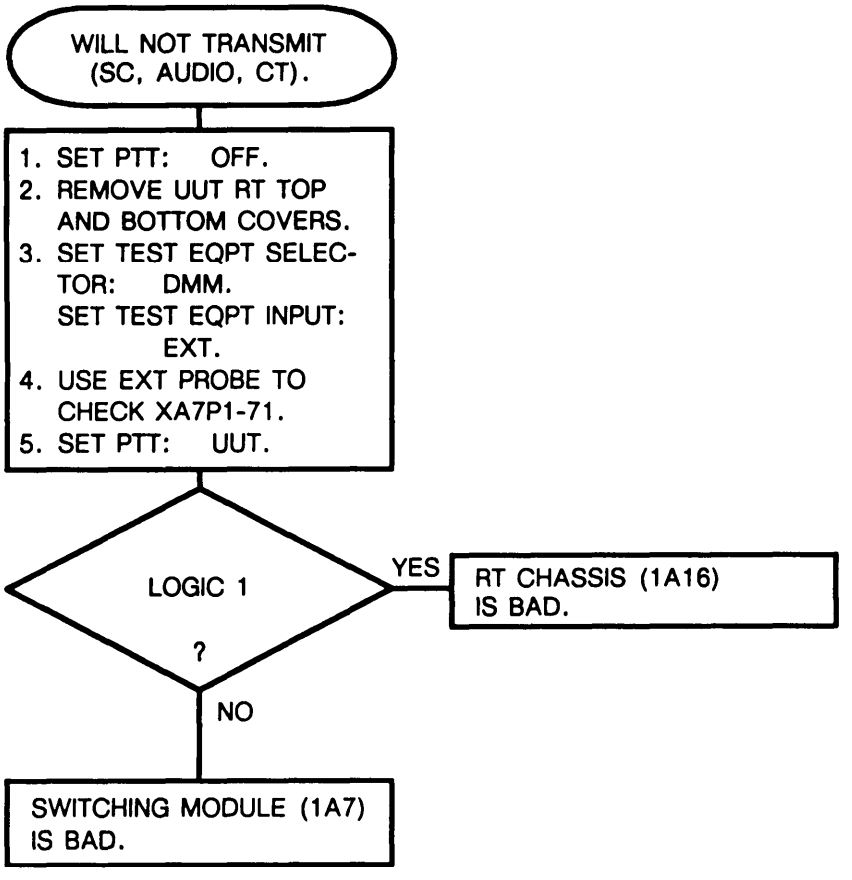
Chart 24
Troubleshooting CT Transmit Path (VIN AT/DDCO)
(Sheet 1 of 1)



NOTE:
See figure FO-11 for diagram of these circuit paths.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

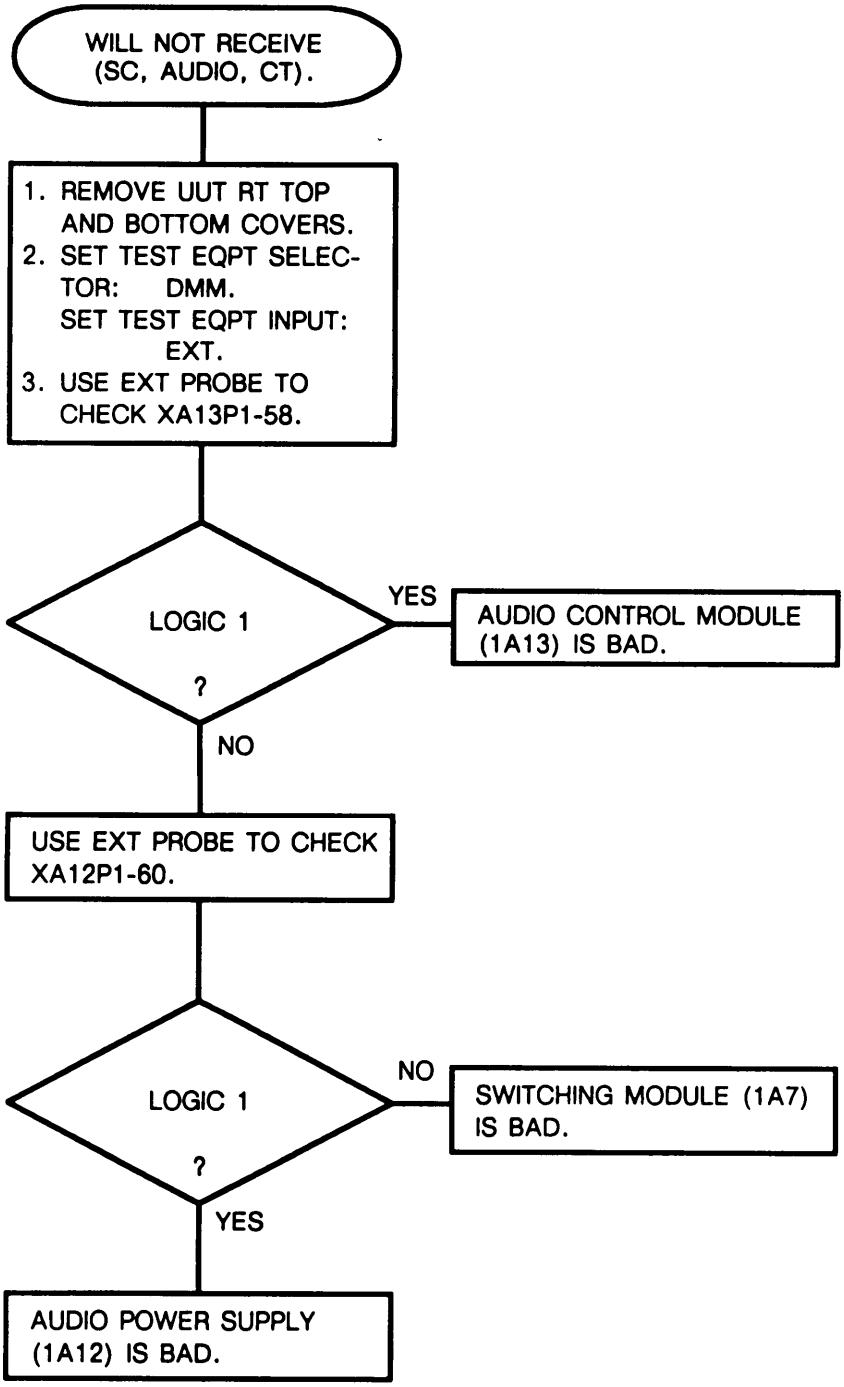
Chart 25
Troubleshooting CT Transmit Path
(Sheet 1 of 1)



NOTE:
See figure FO-11 for diagram of these circuit paths.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

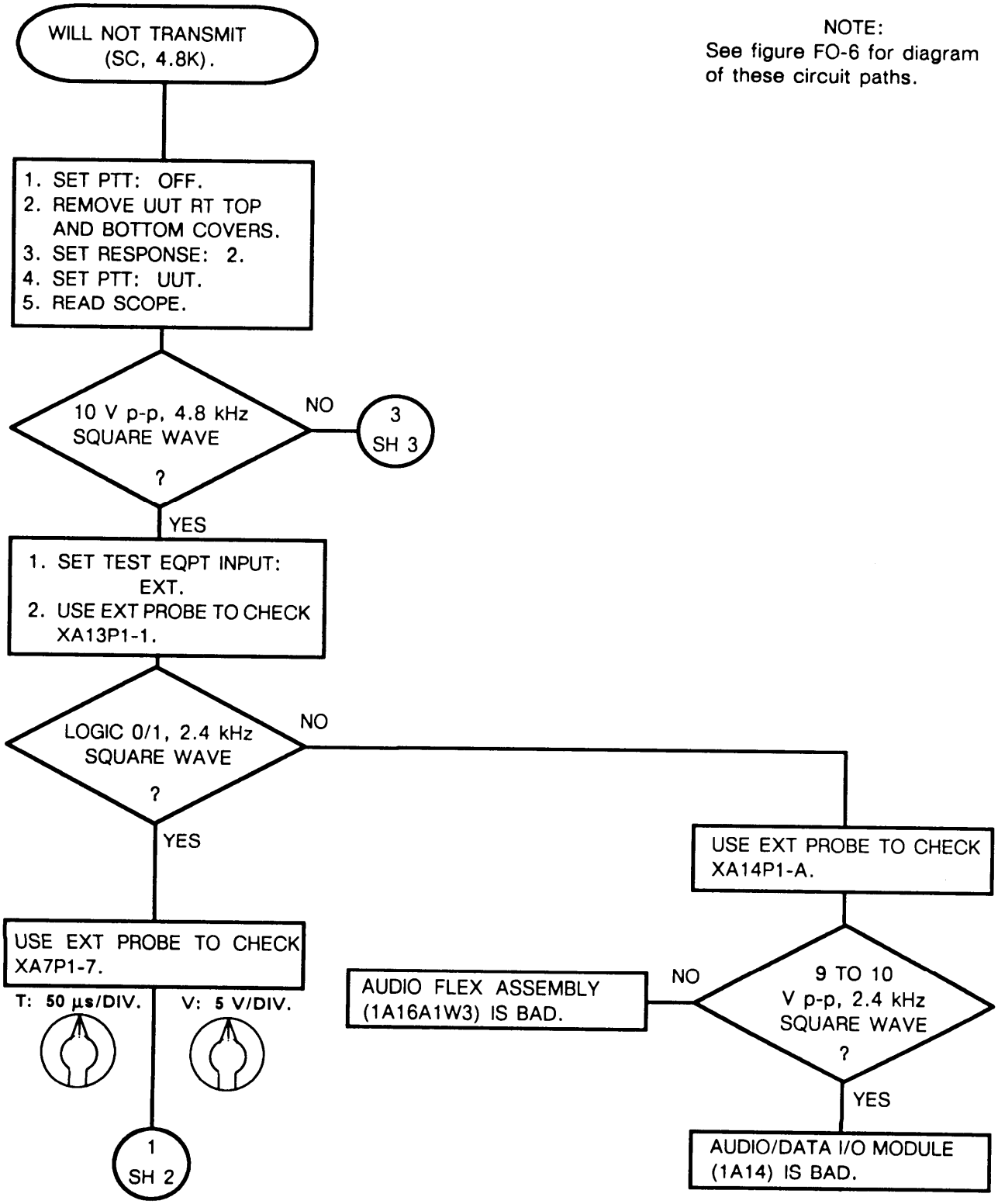
Chart 26
Troubleshooting CT Receive Path
(Sheet 1 of 1)



NOTE:
See figure FO-11 for diagram of these circuit paths.

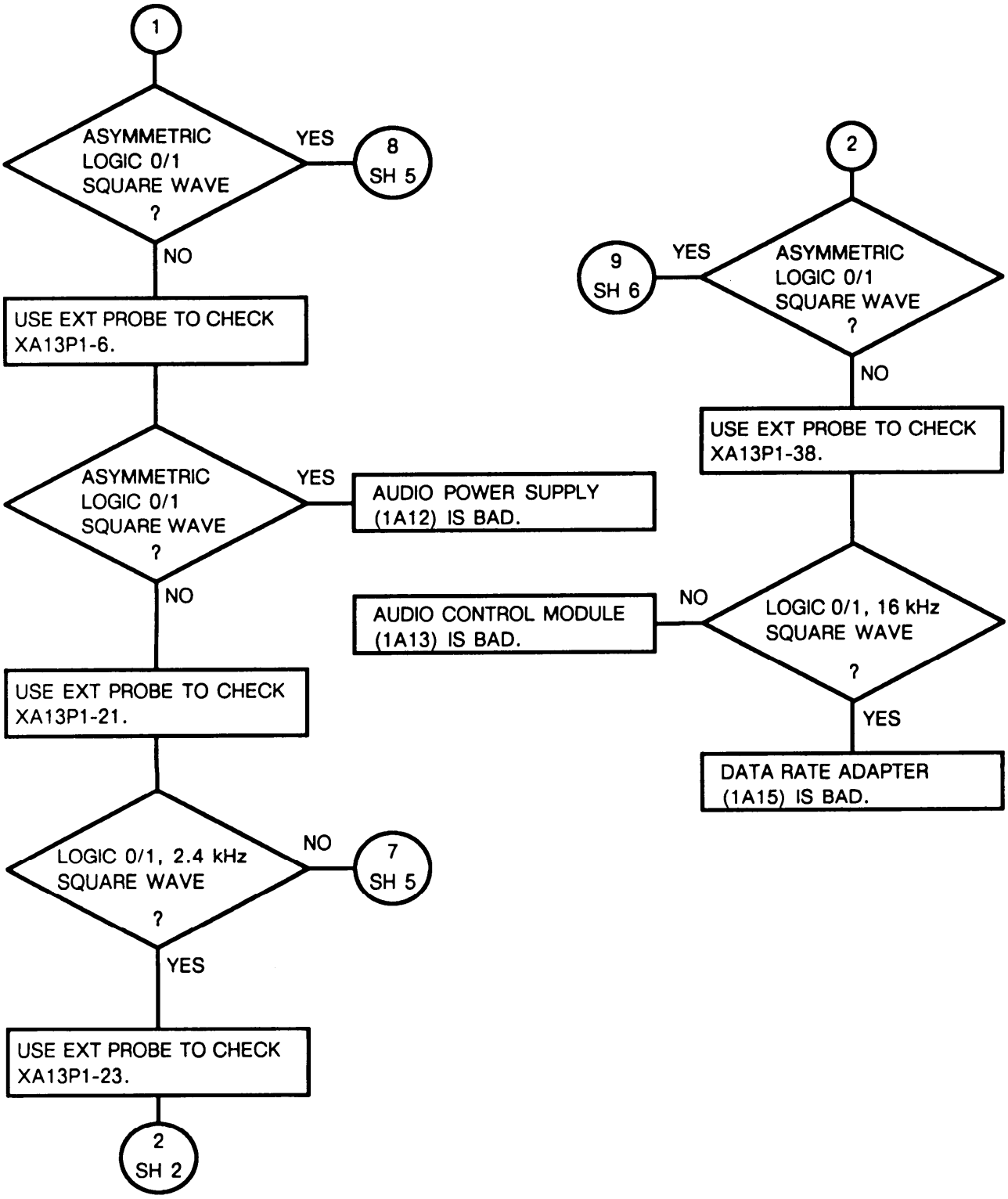
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Low Speed Data Transmit Path
(Sheet 1 of 6)



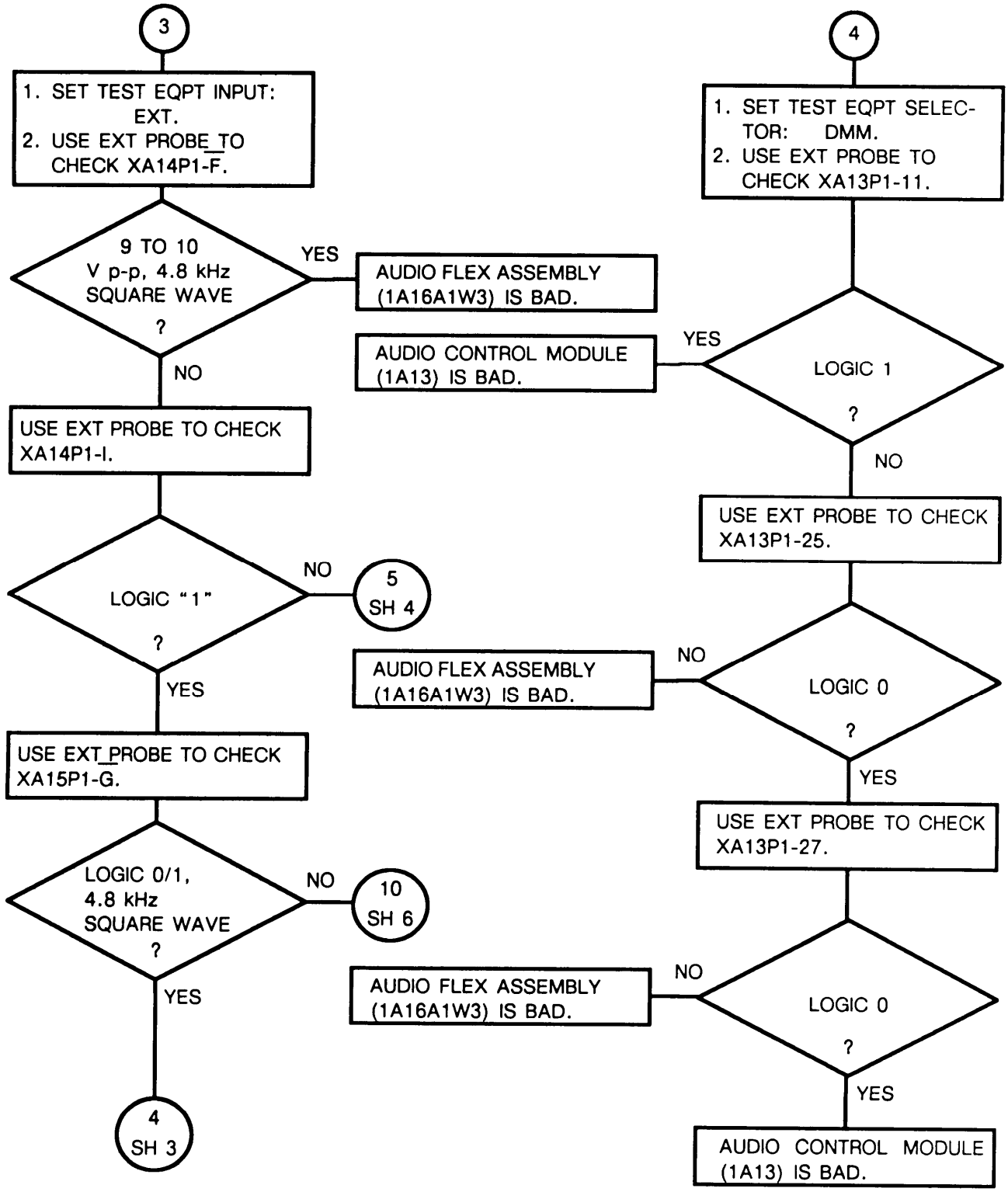
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Low Speed Data Transmit Path
(Sheet 2 of 6)



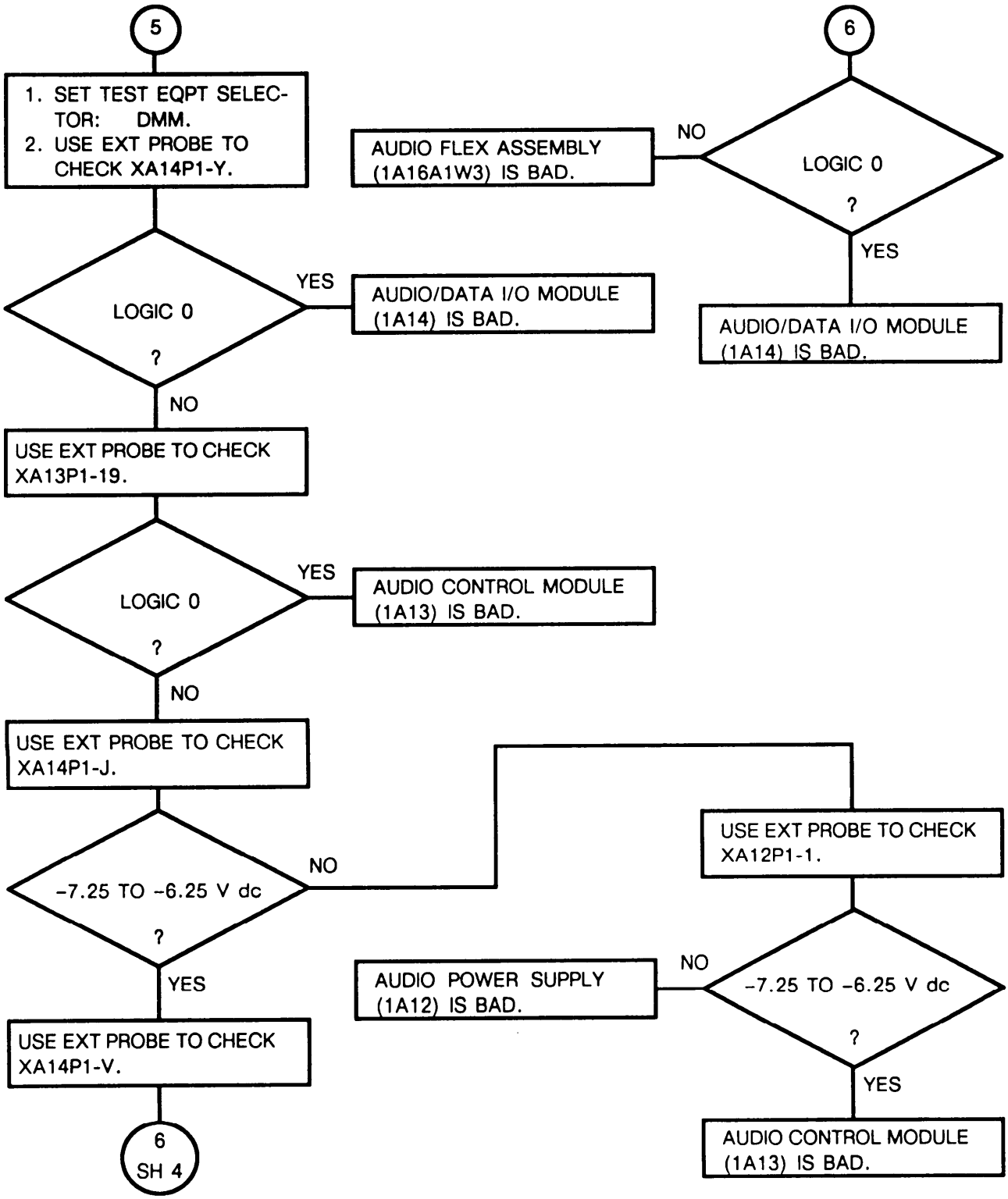
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Low Speed Data Transmit Path
(Sheet 3 of 6)



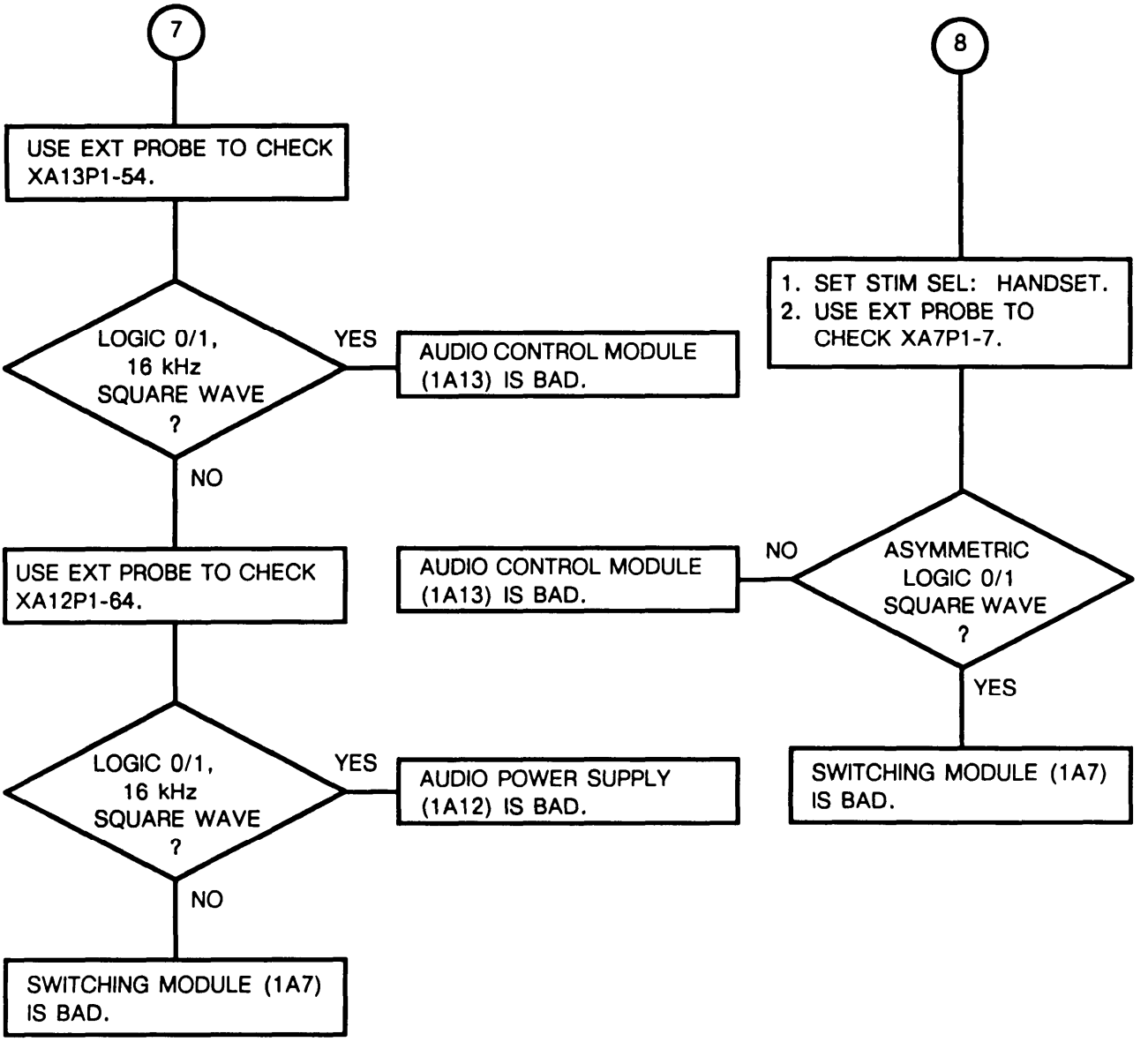
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Low Speed Data Transmit Path
(Sheet 4 of 6)



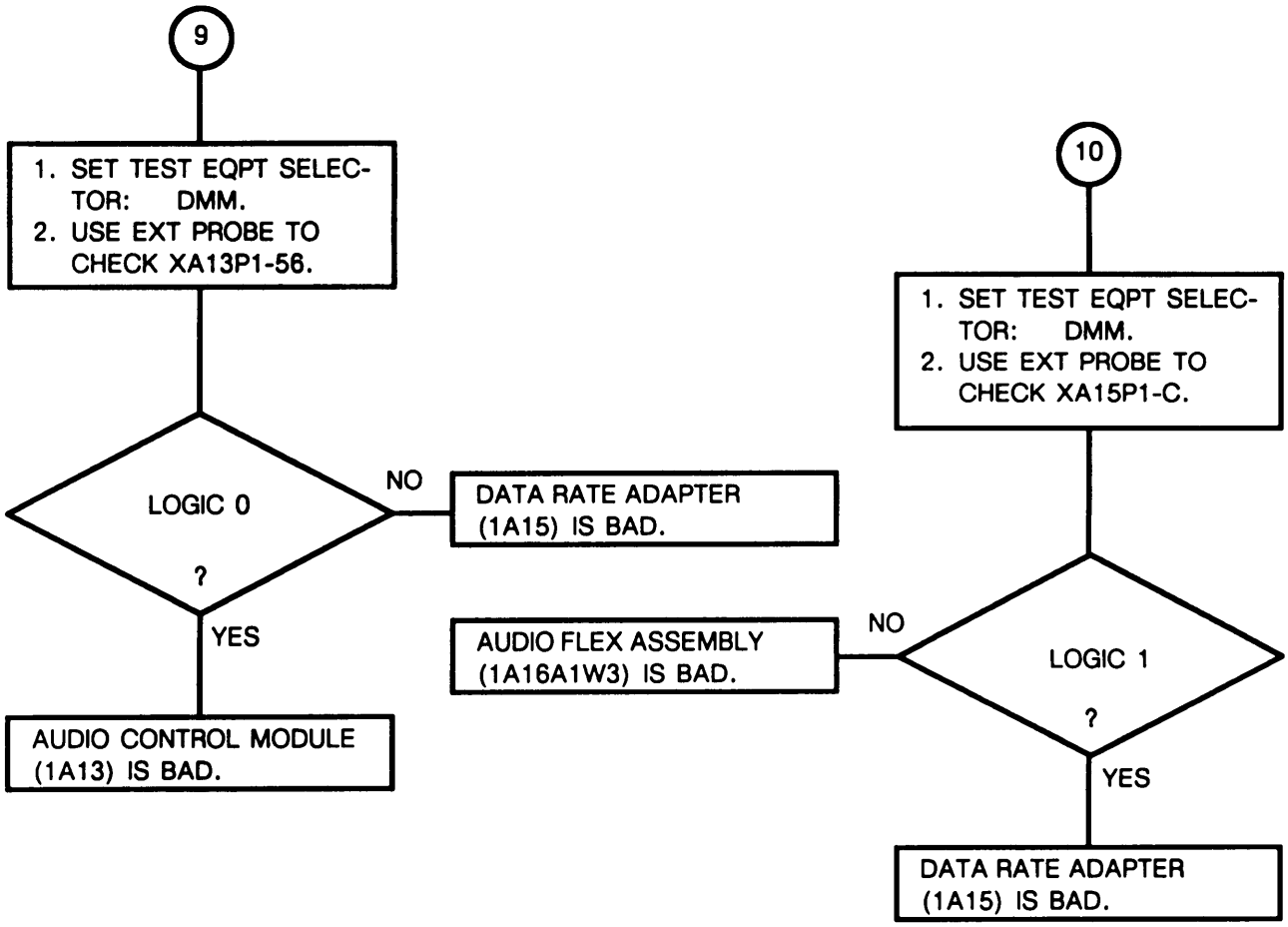
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Low Speed Data Transmit Path
(Sheet 5 of 6)



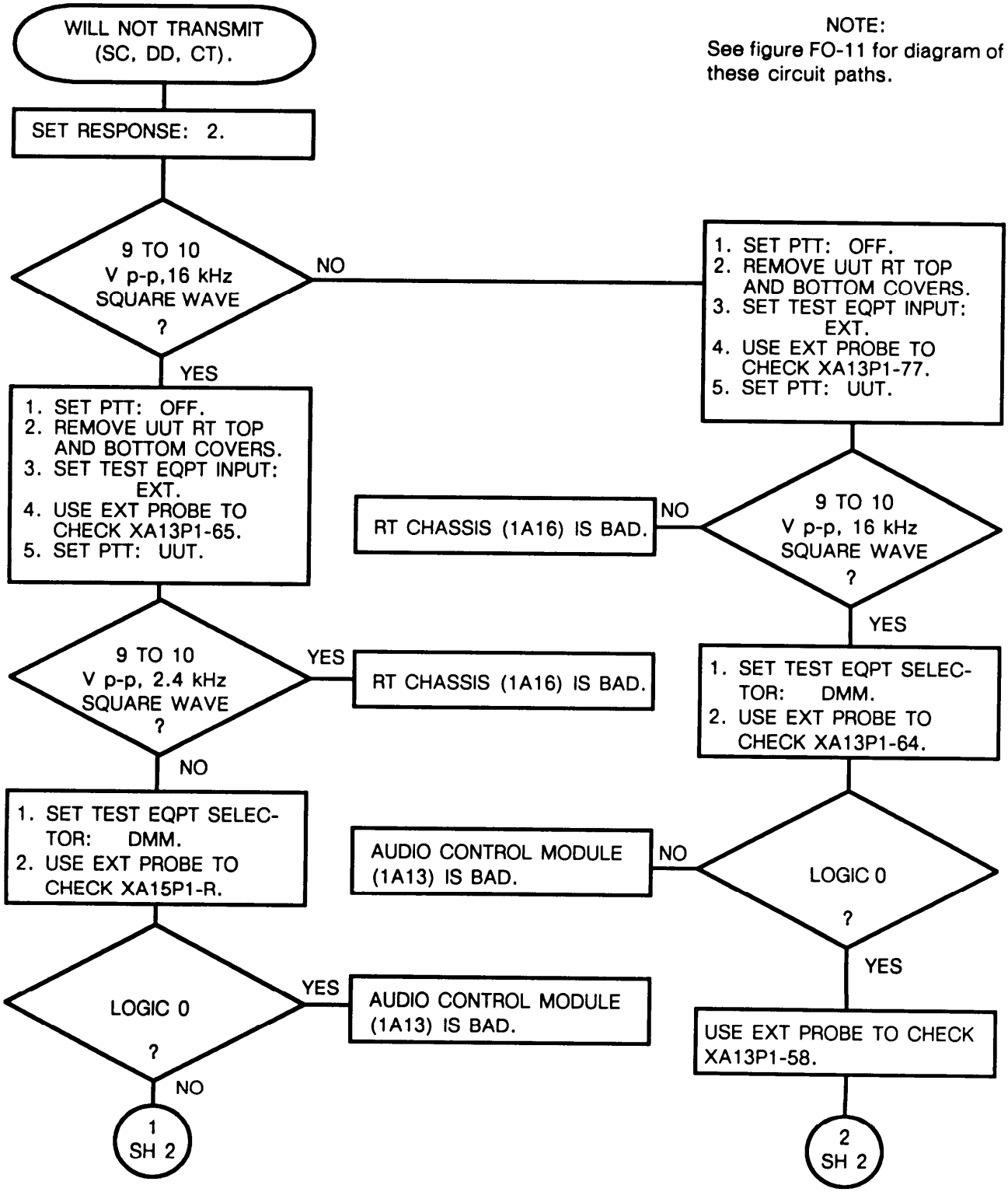
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Low Speed Data Transmit Path
(Sheet 6 of 6)



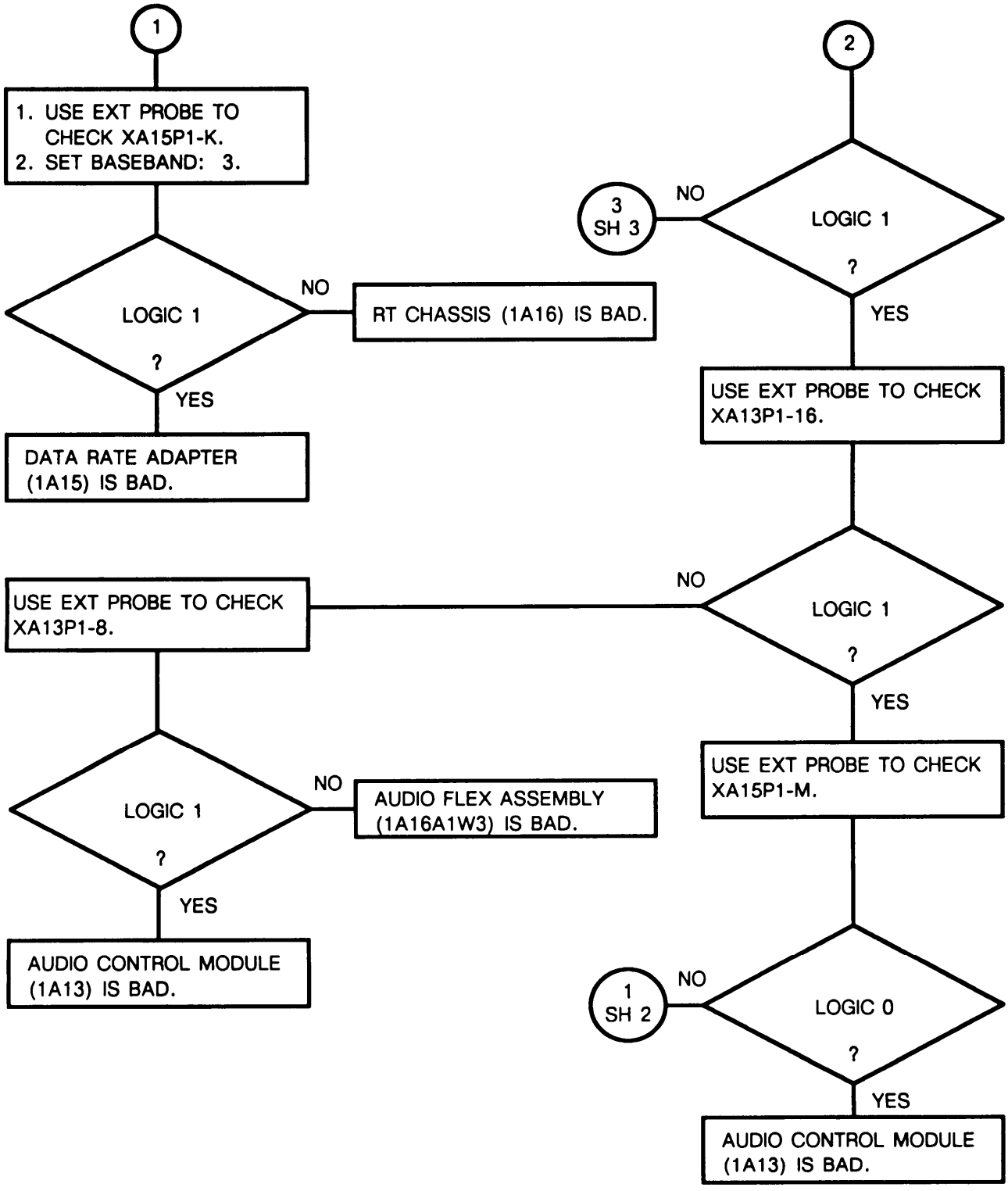
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 28
Troubleshooting COMSEC Digital Data Transmit Path
(Sheet 1 of 3)



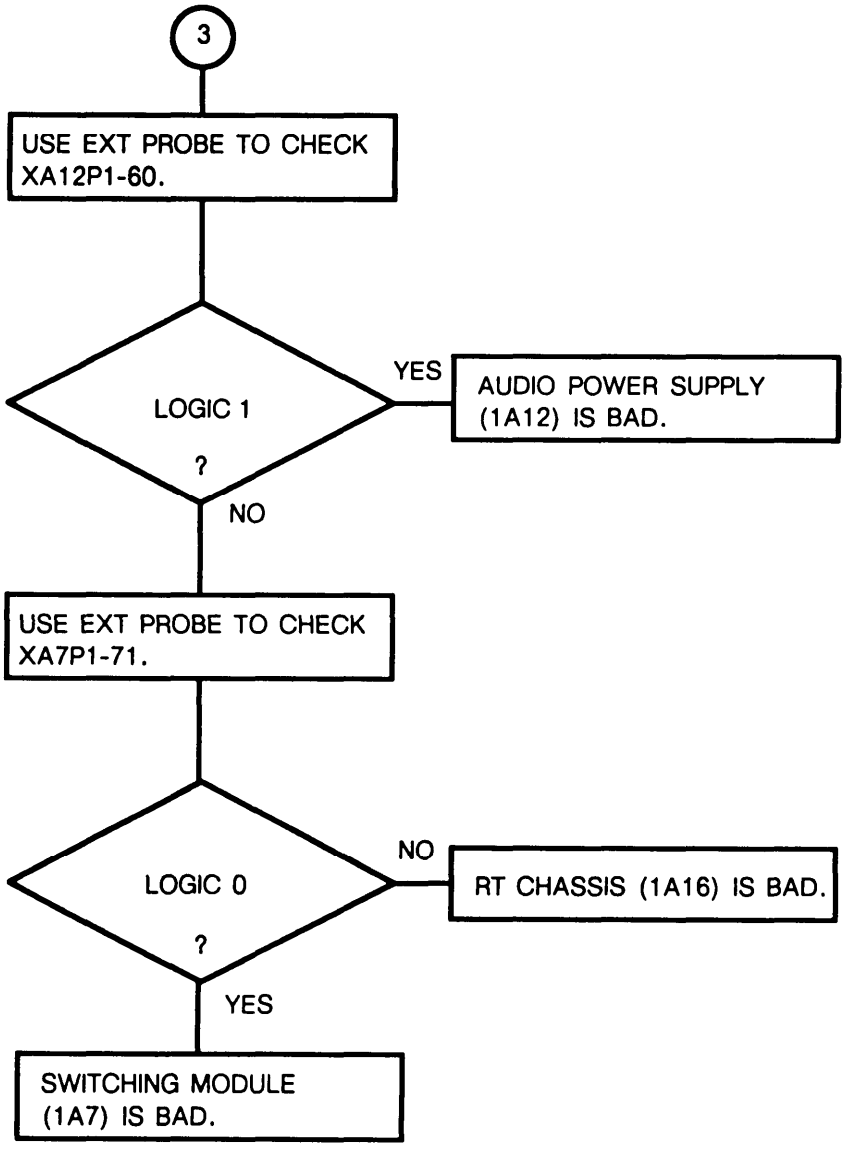
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 28
Troubleshooting COMSEC Digital Data Transmit Path
(Sheet 2 of 3)



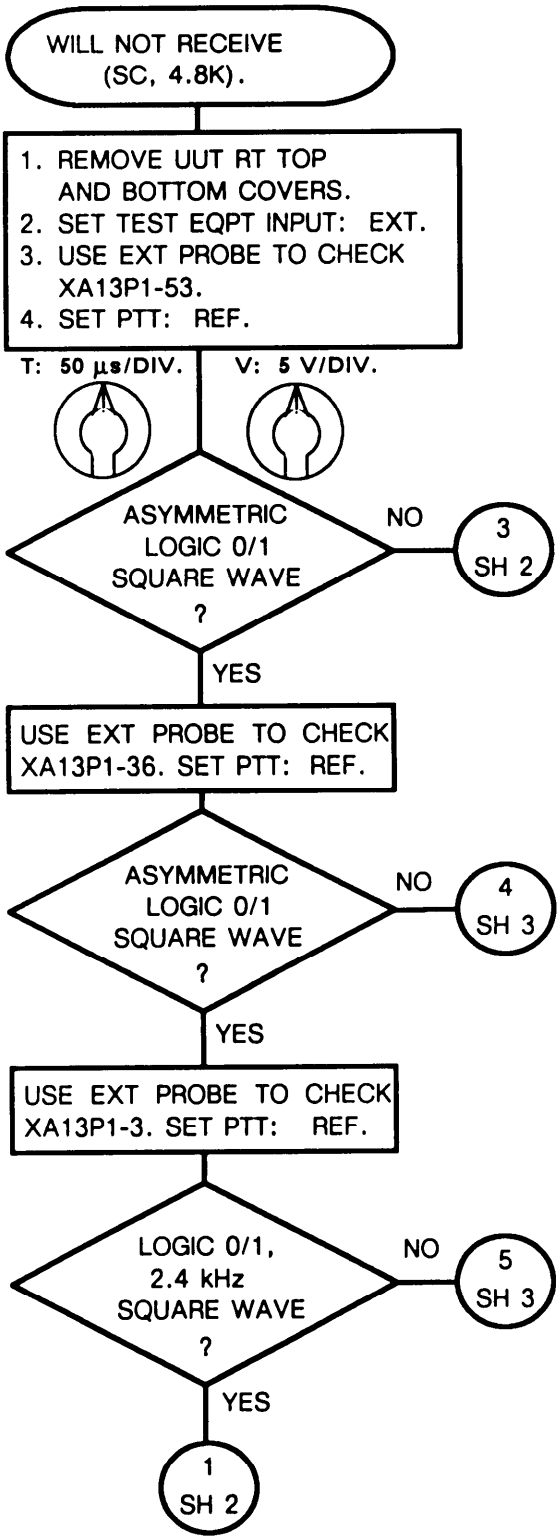
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 28
Troubleshooting COMSEC Digital Data Transmit Path
(Sheet 3 of 3)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

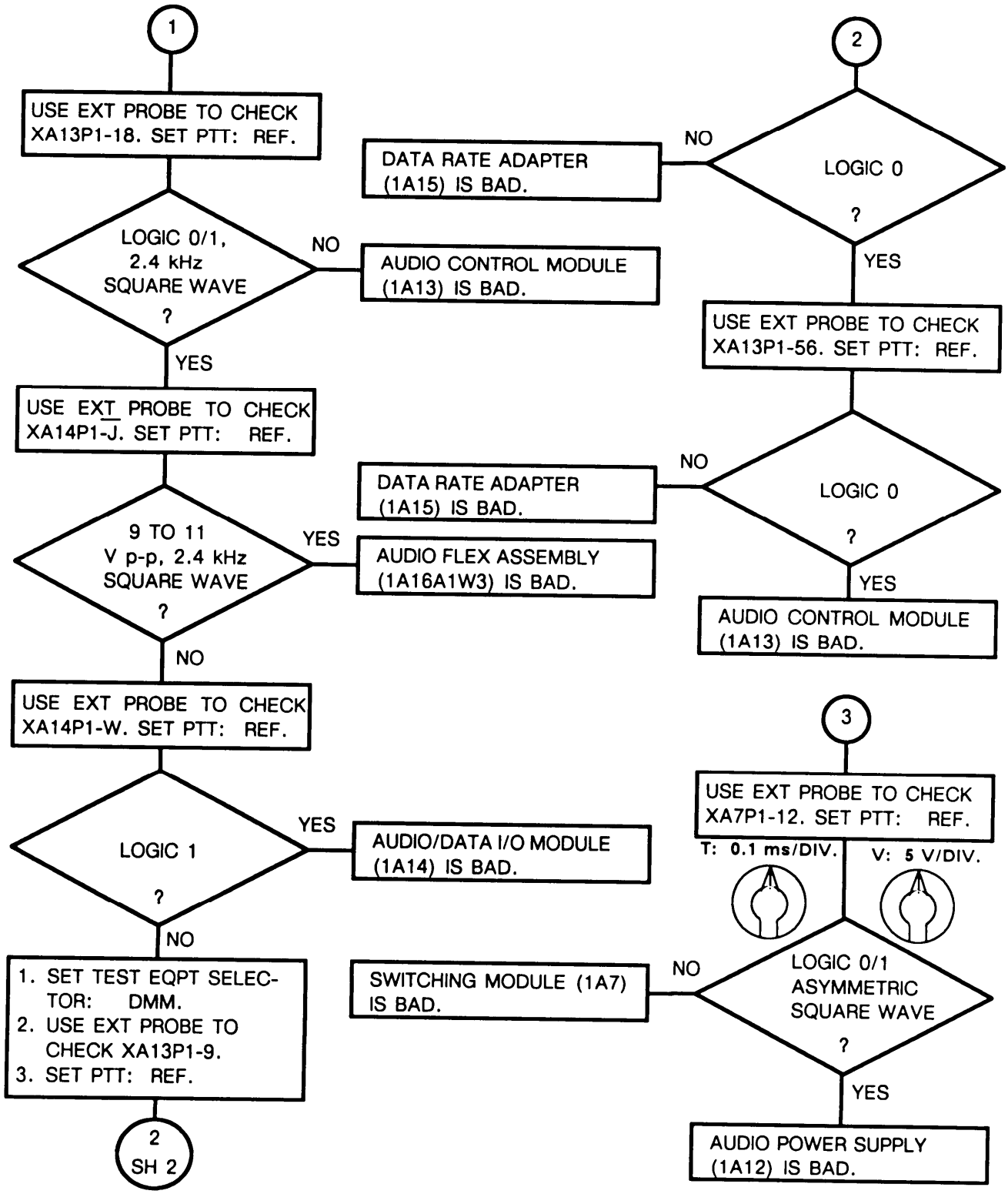
Chart 29
Troubleshooting Low Speed Data Receive Path
(Sheet 1 of 3)



NOTE:
See figure FO-6 for diagram of these circuit paths.

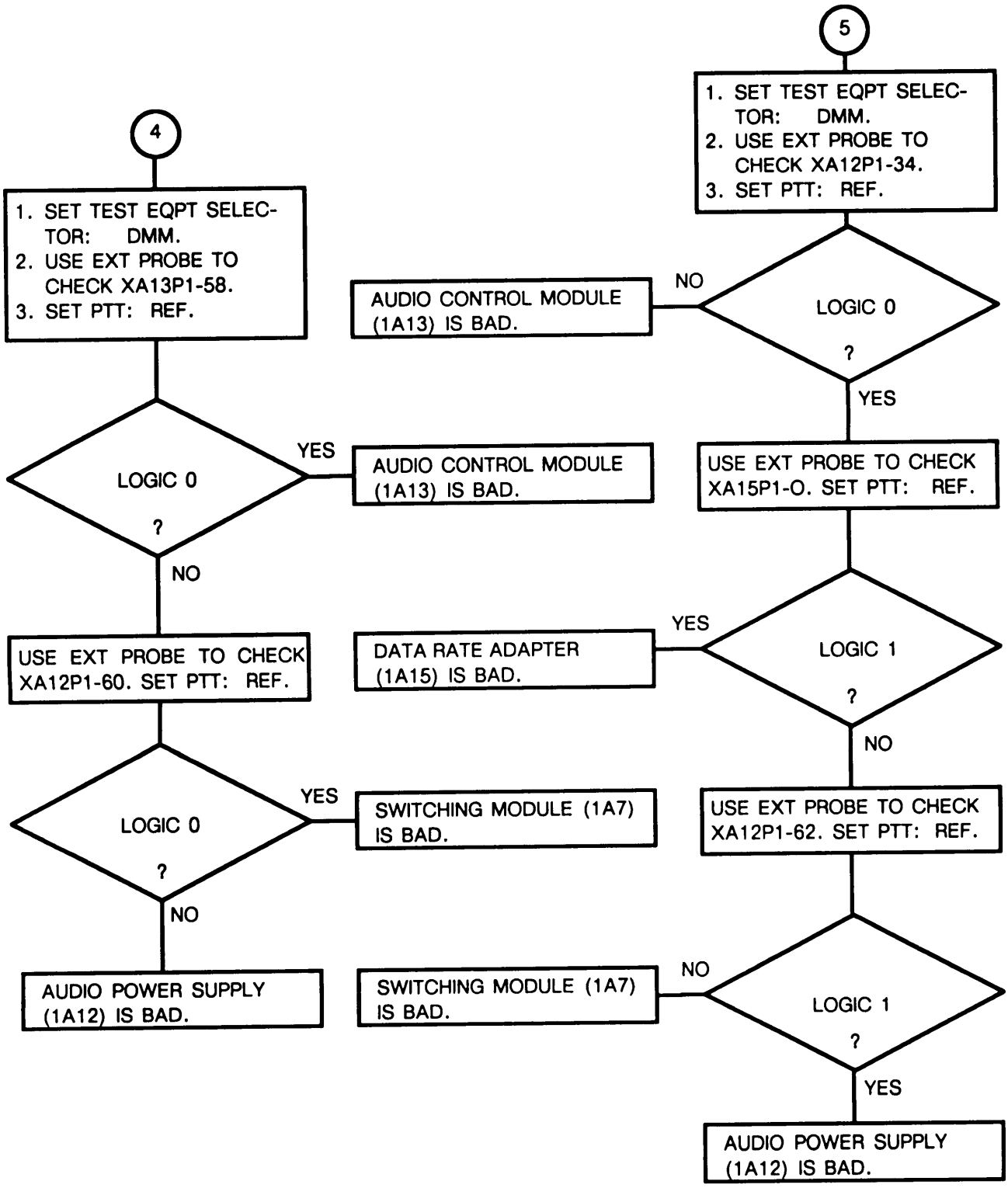
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 29
Troubleshooting Low Speed Data Receive Path
(Sheet 2 of 3)



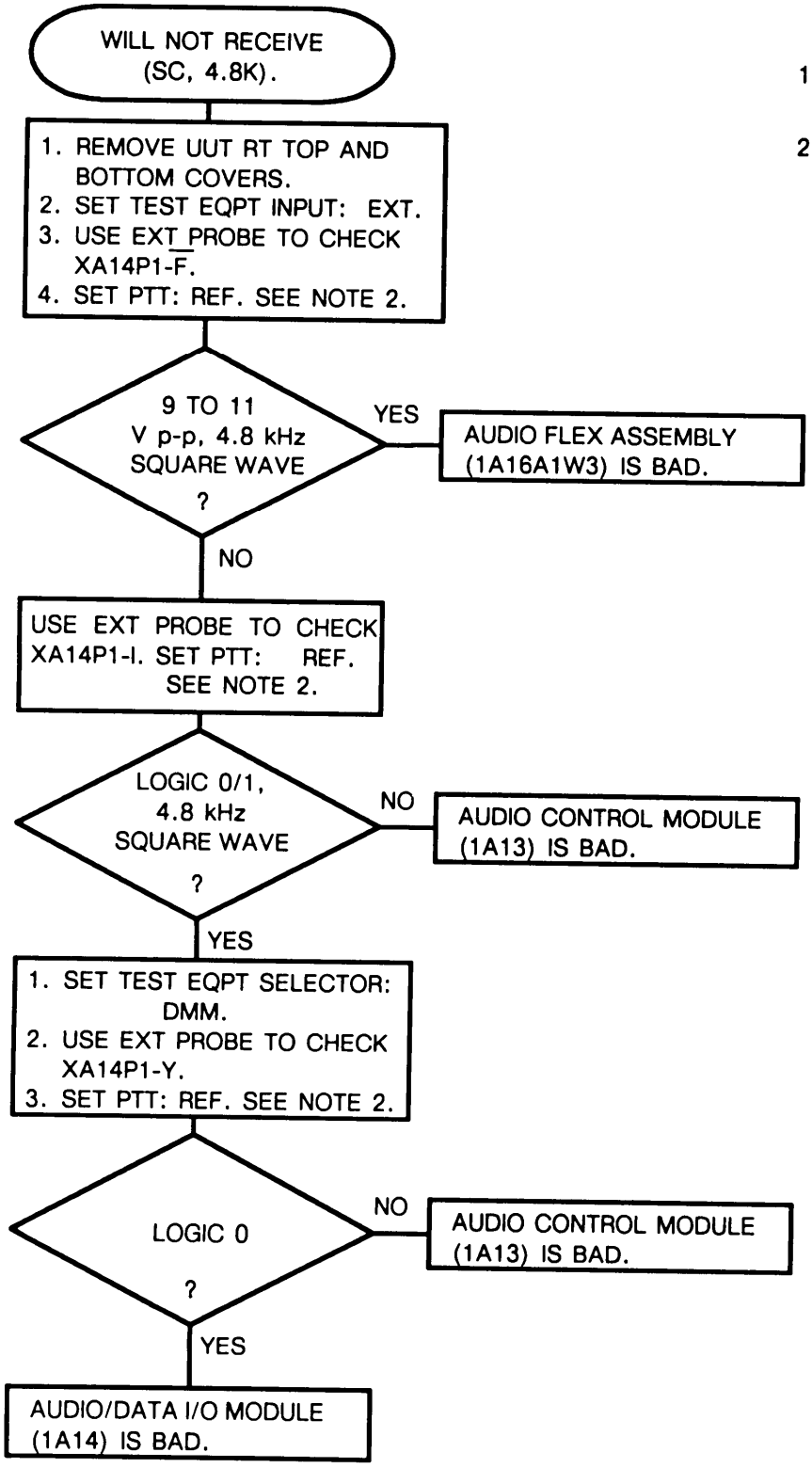
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 29
Troubleshooting Low Speed Data Receive Path
(Sheet 3 of 3)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 30
Troubleshooting Low Speed Data Receive Clock Path
(Sheet 1 of 1)

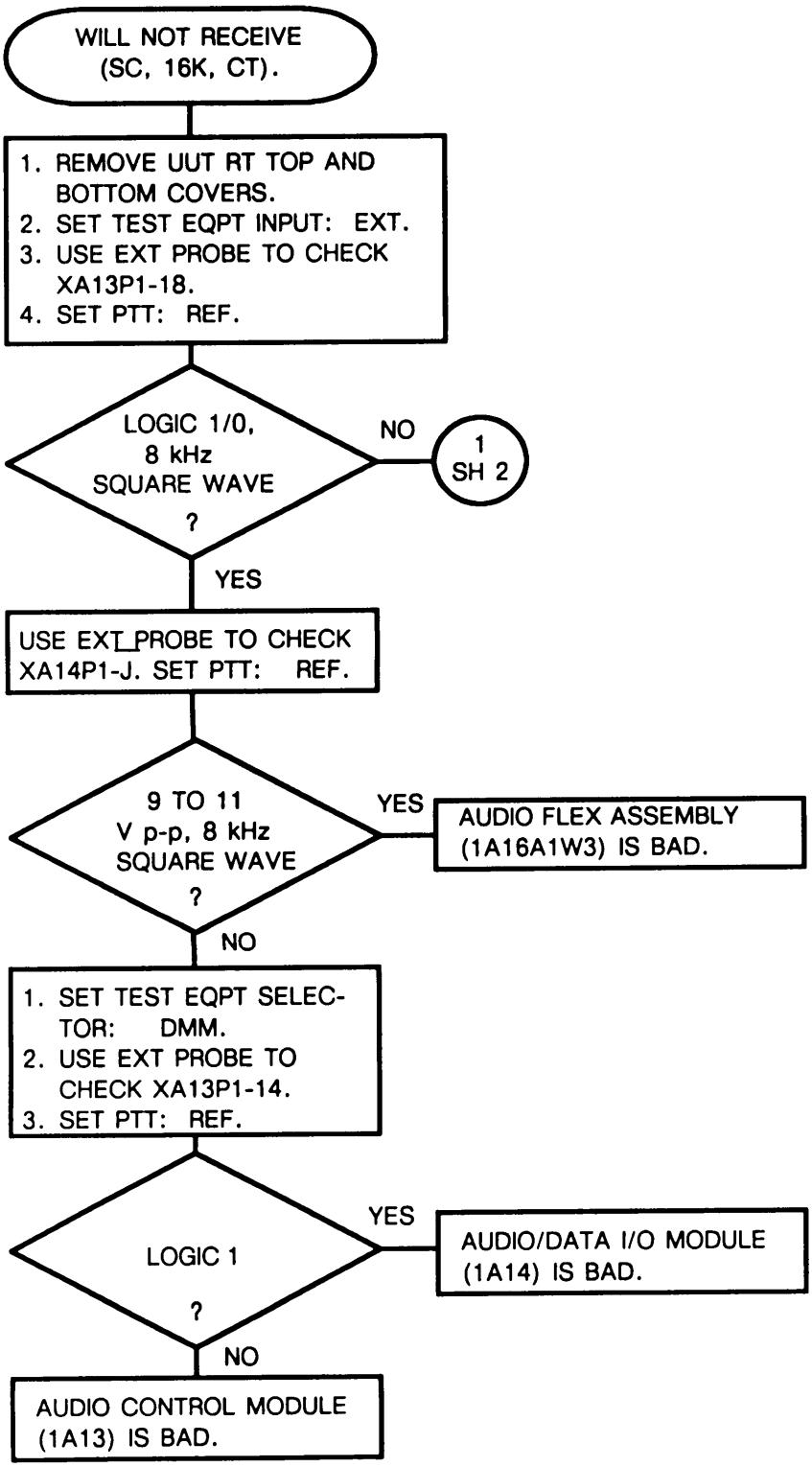


NOTES:

1. See figure FO-6 for diagram of these circuit paths.
2. If any of these tests fail, set PTT switch to OFF and back to REF.

2-31. TROUBLESHOOTING FLOWCHARTS. Continued

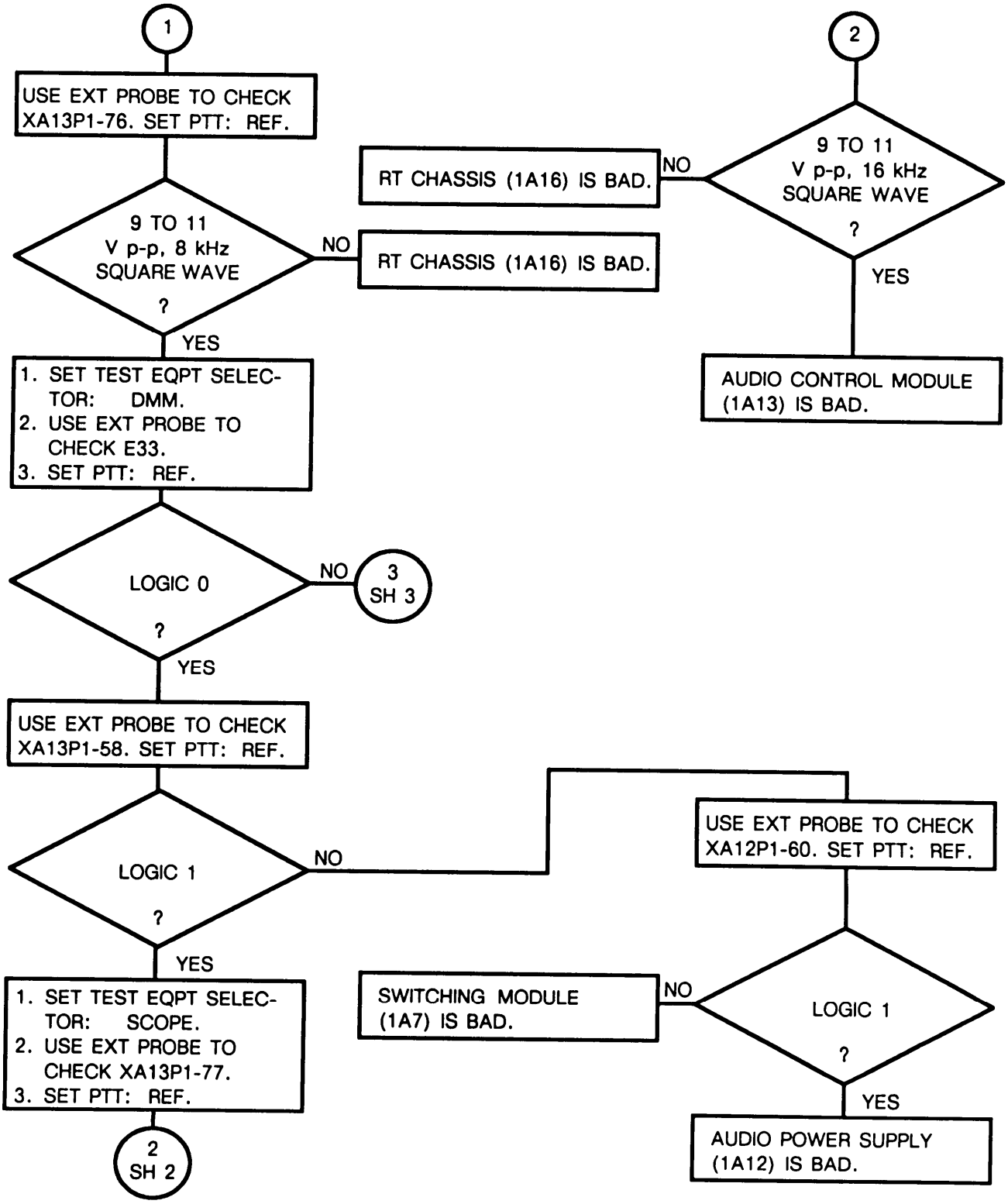
Chart 31
Troubleshooting COMSEC Digital Data Receive Path
(Sheet 1 of 3)



NOTE:
See figures FO-5 and FO-11 for diagrams of these circuit paths.

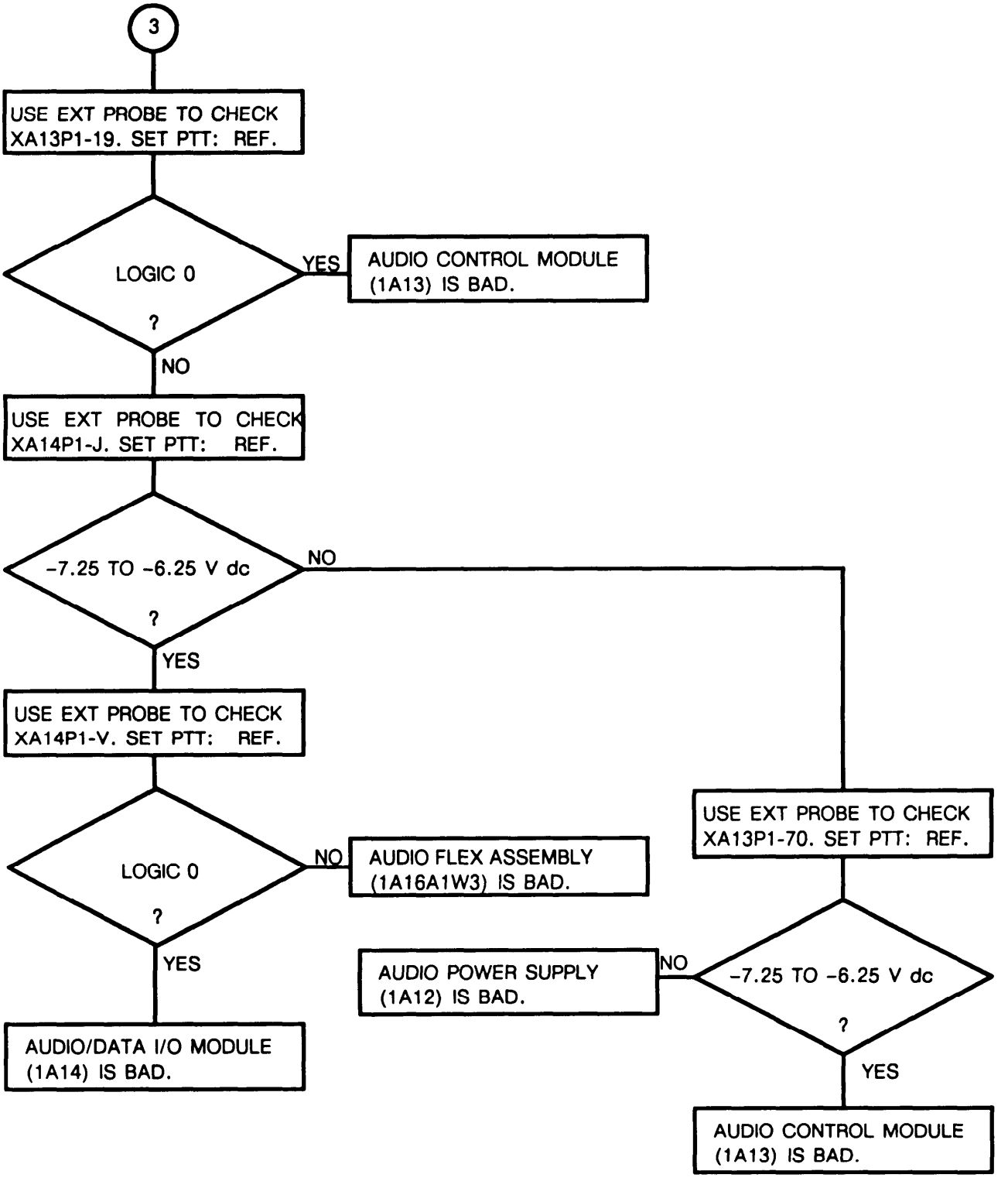
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 31
Troubleshooting COMSEC Digital Data Receive Path
(Sheet 2 of 3)



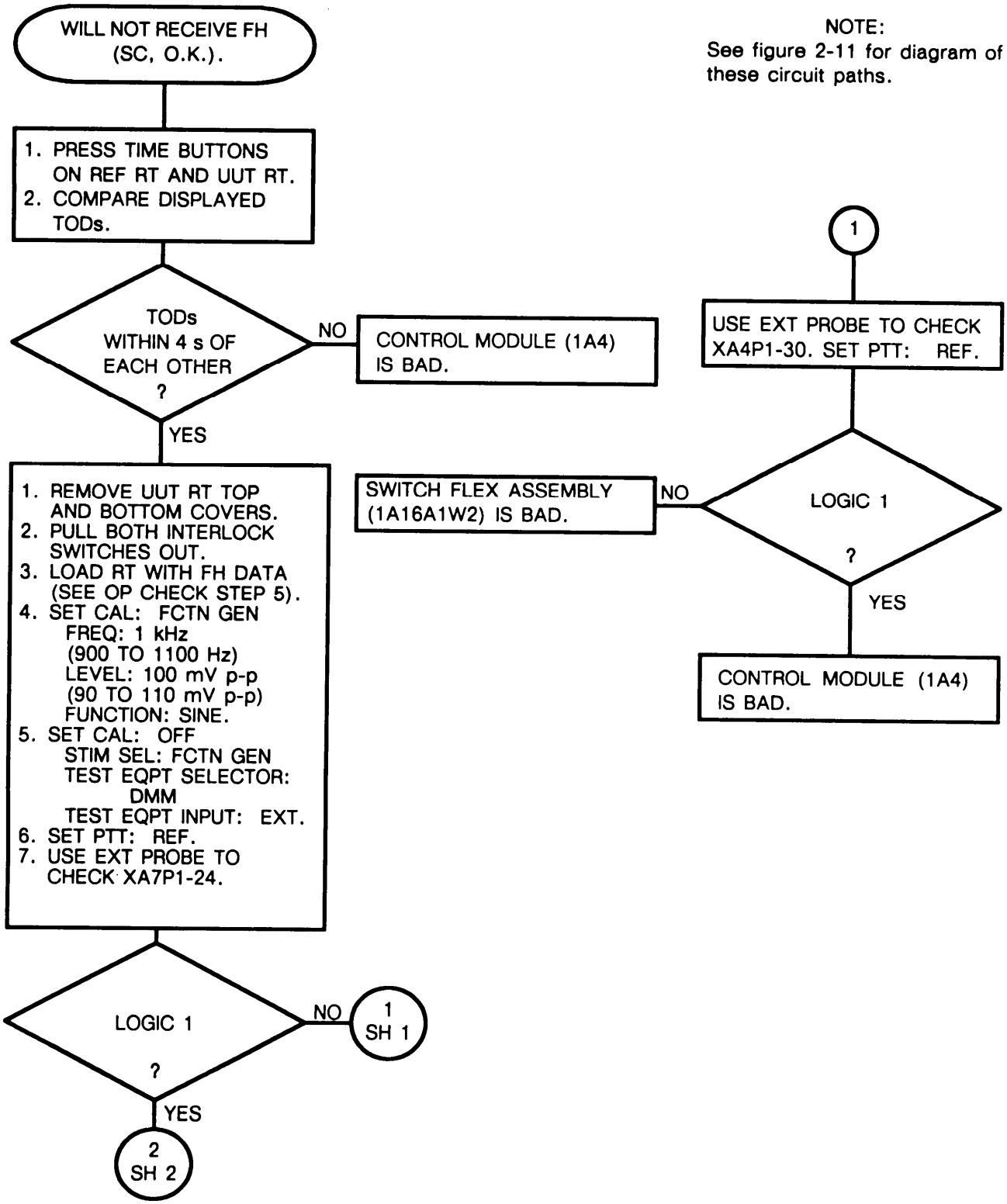
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 31
Troubleshooting COMSEC Digital Data Receive Path
(Sheet 3 of 3)



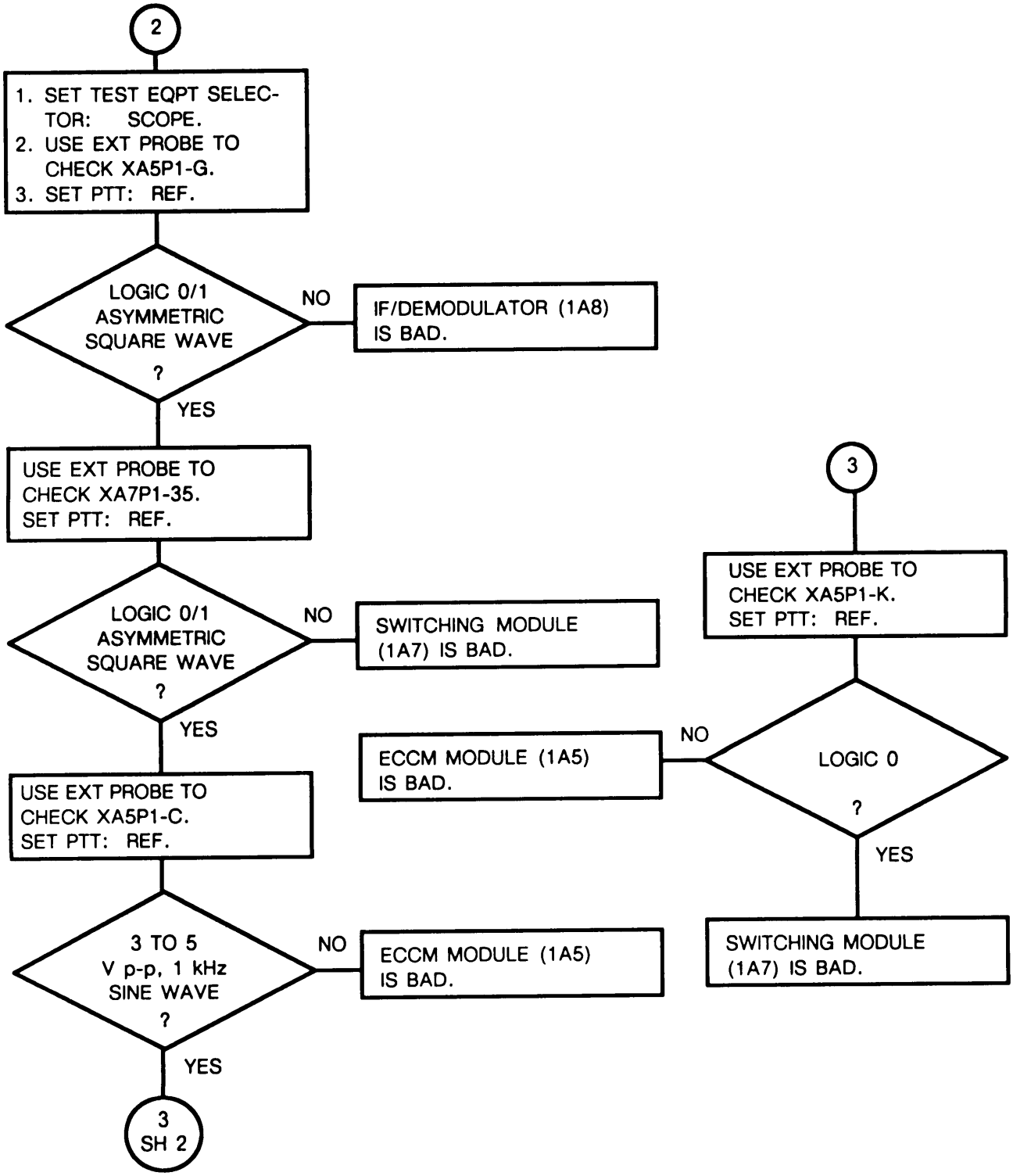
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 32
Troubleshooting FH Receive Path
(Sheet 1 of 2)



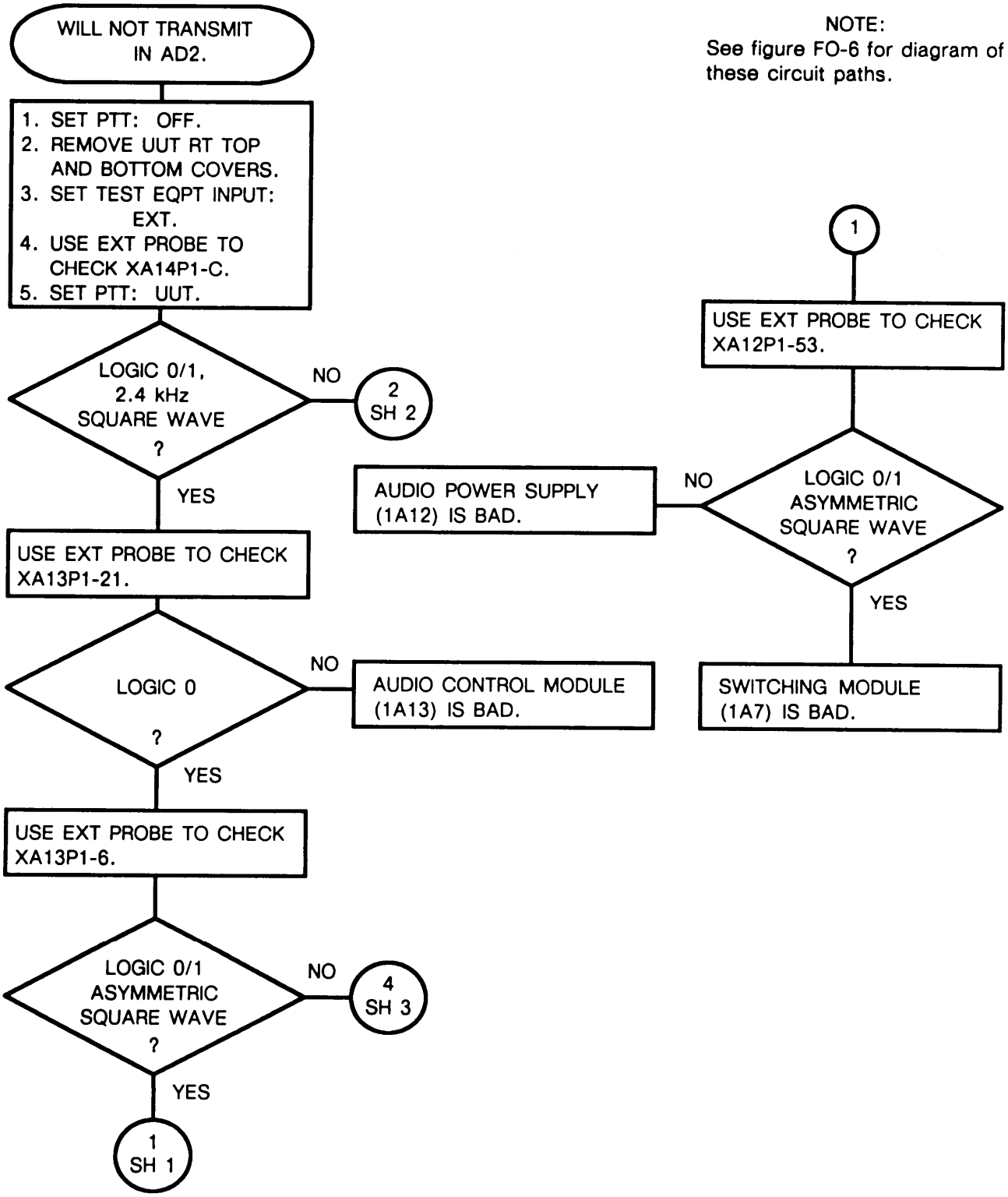
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 32
Troubleshooting FH Receive Path
(Sheet 2 of 2)



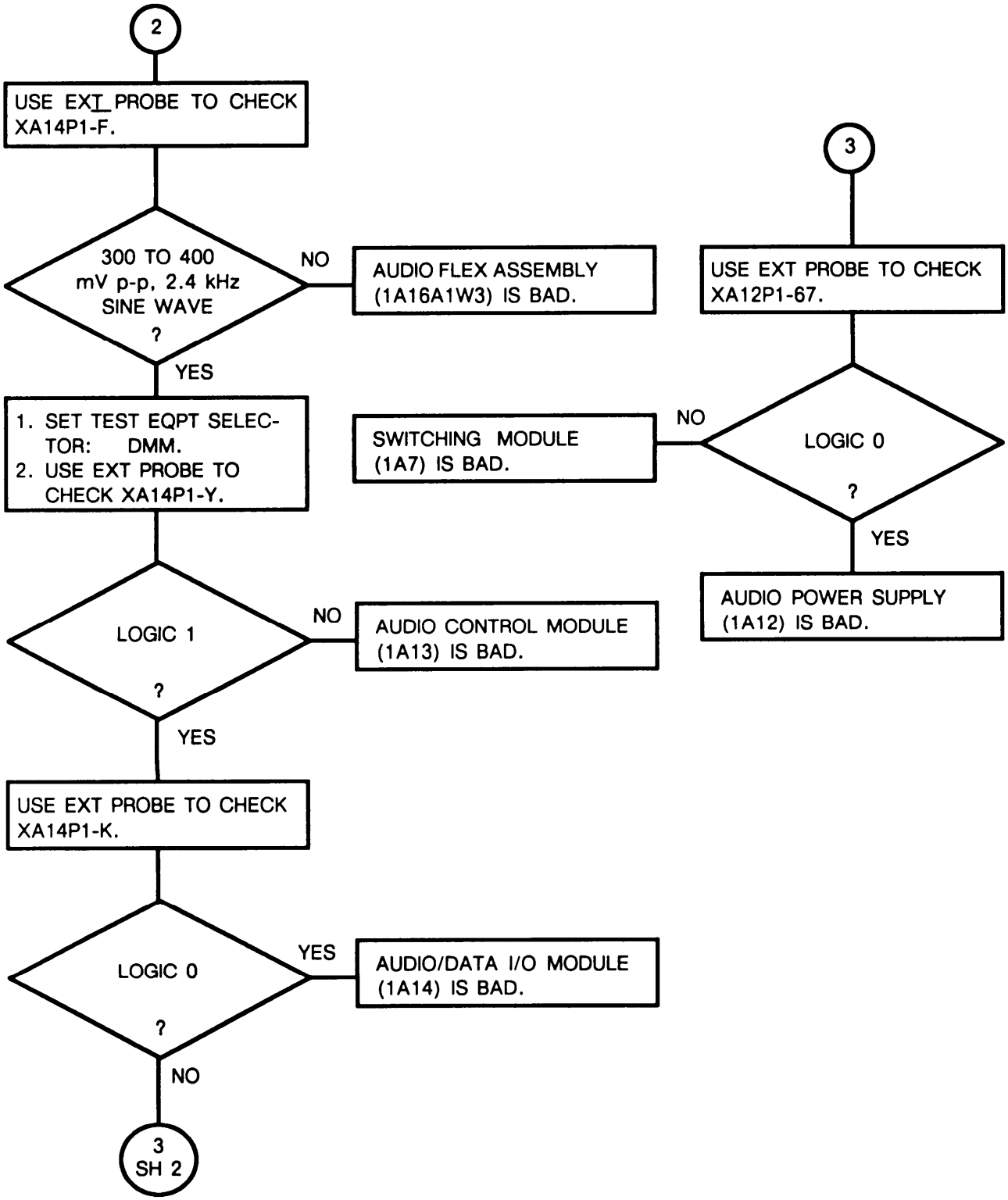
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 33
Troubleshooting AD2 Transmit Circuits
(Sheet 1 of 3)



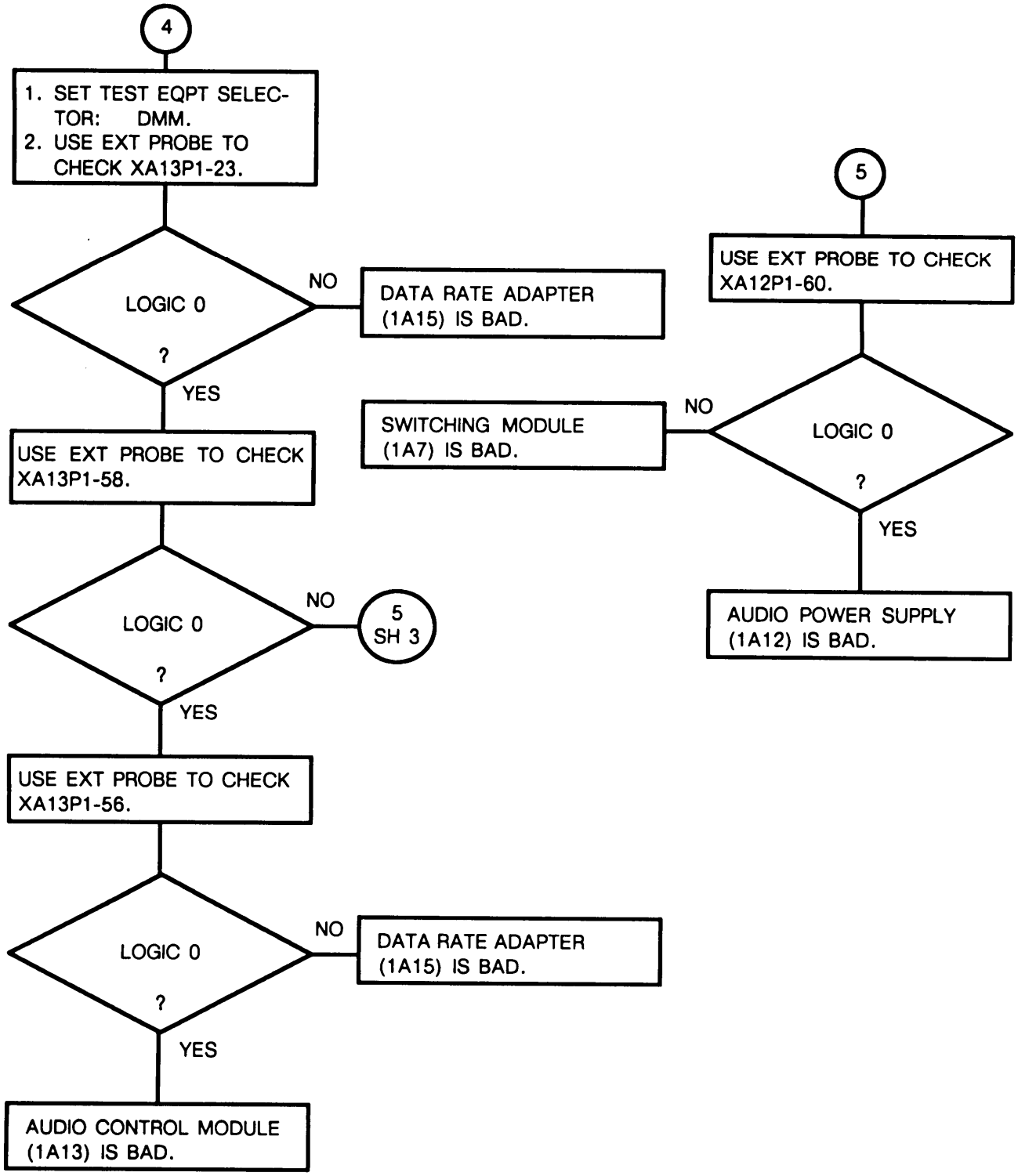
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 33
Troubleshooting AD2 Transmit Circuits
(Sheet 2 of 3)



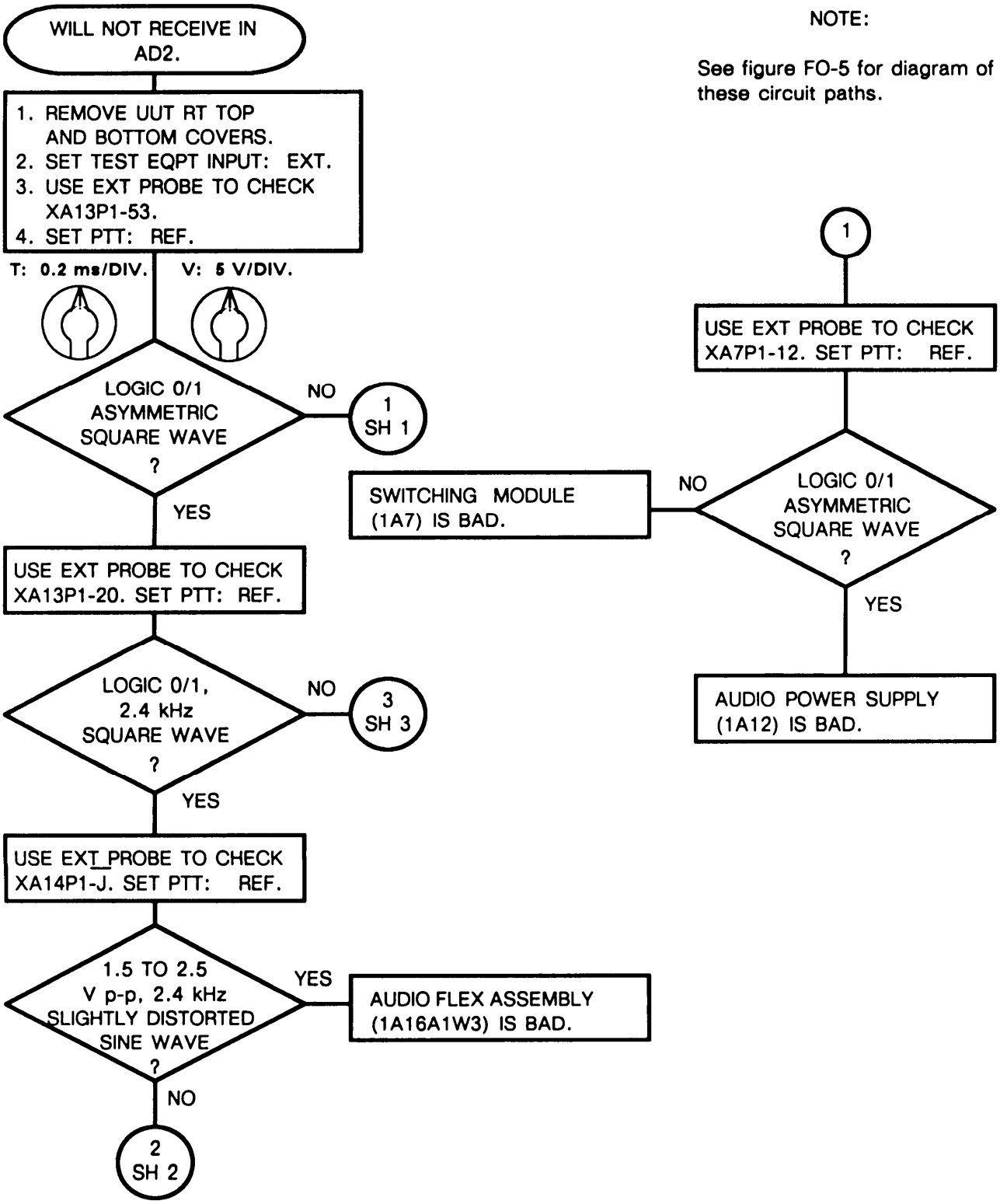
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 33
Troubleshooting AD2 Transmit Circuits
(Sheet 3 of 3)



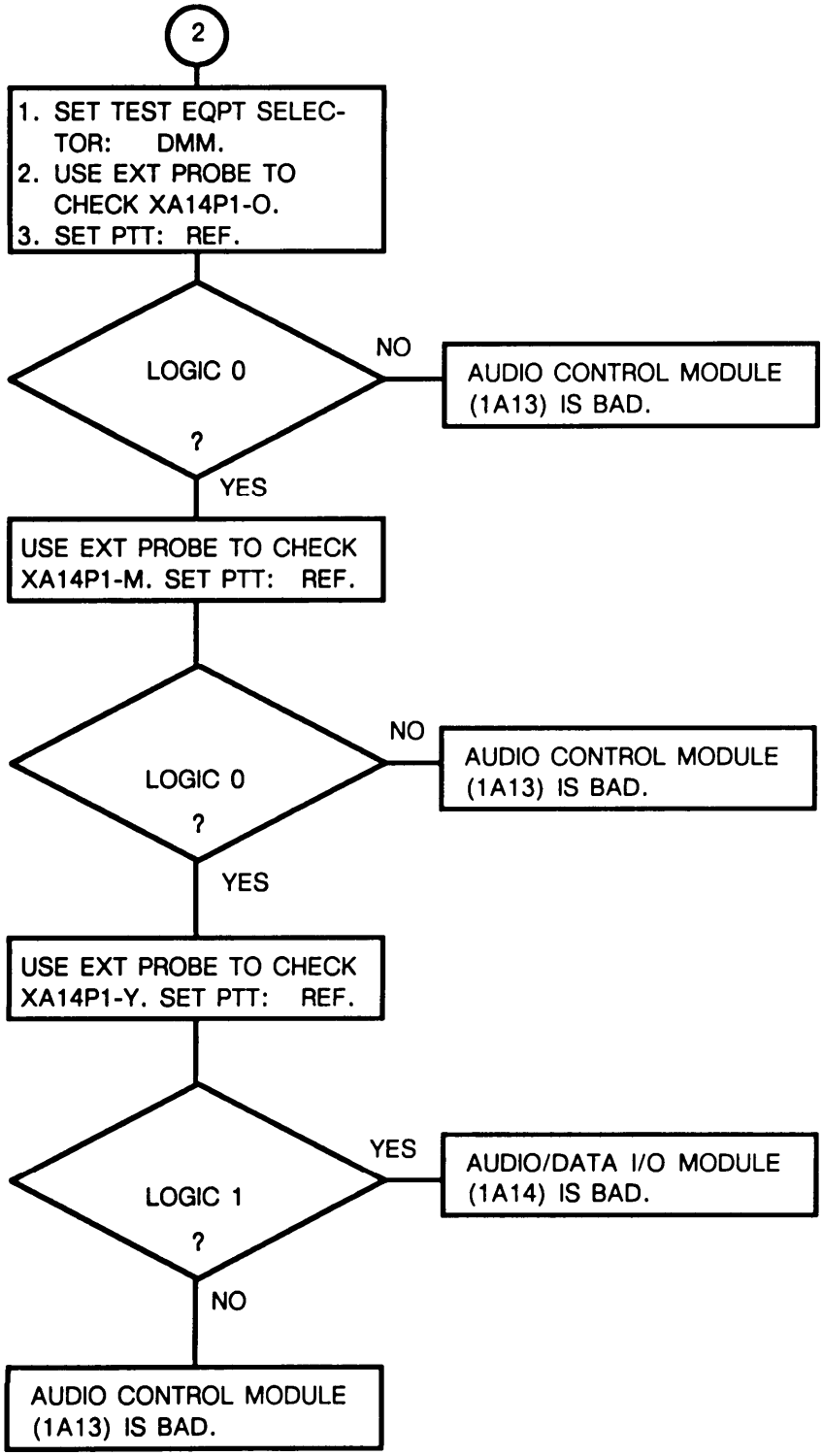
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 34
Troubleshooting AD2 Receive Circuits
(Sheet 1 of 3)



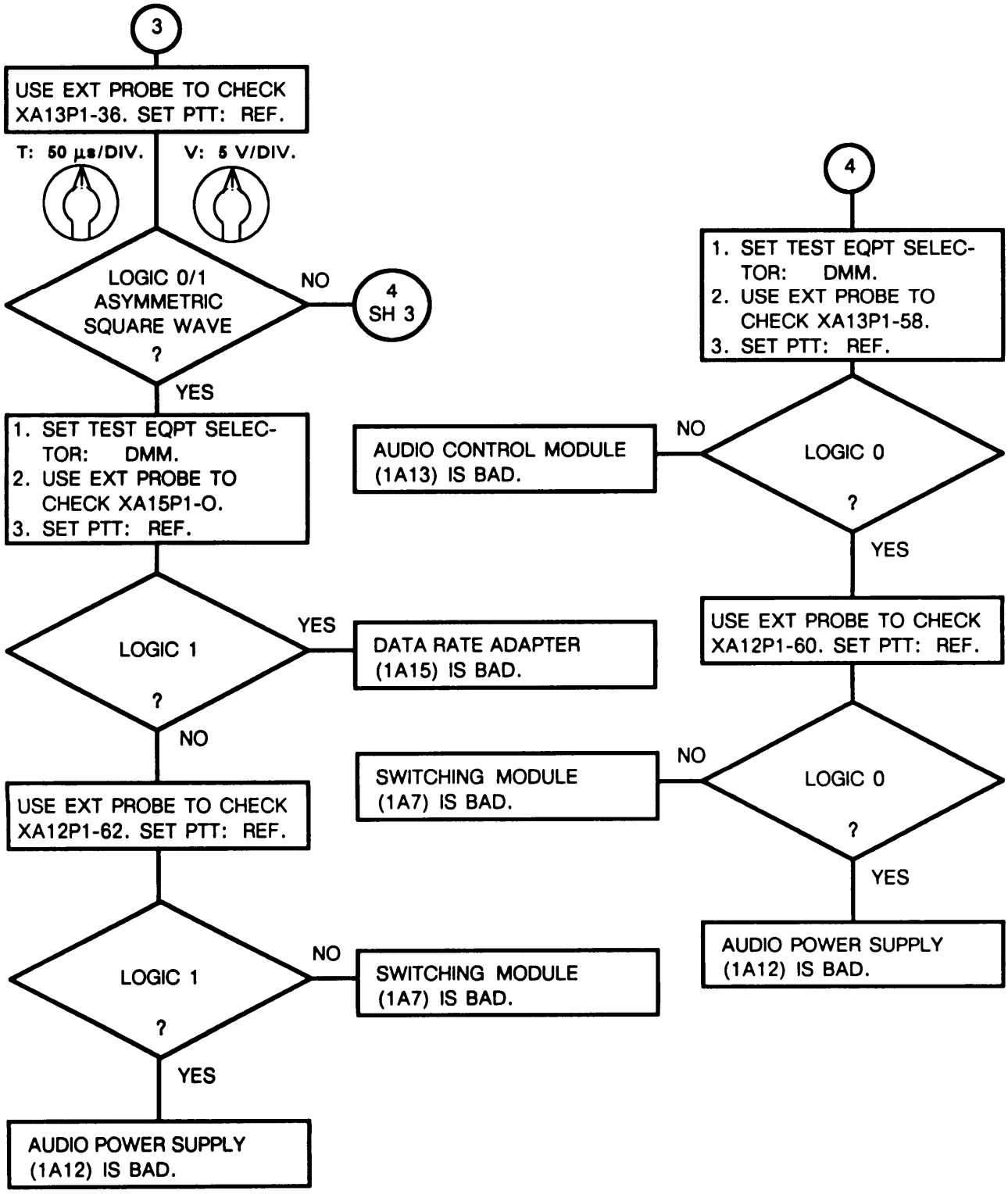
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 34
Troubleshooting AD2 Receive Circuits
(Sheet 2 of 3)



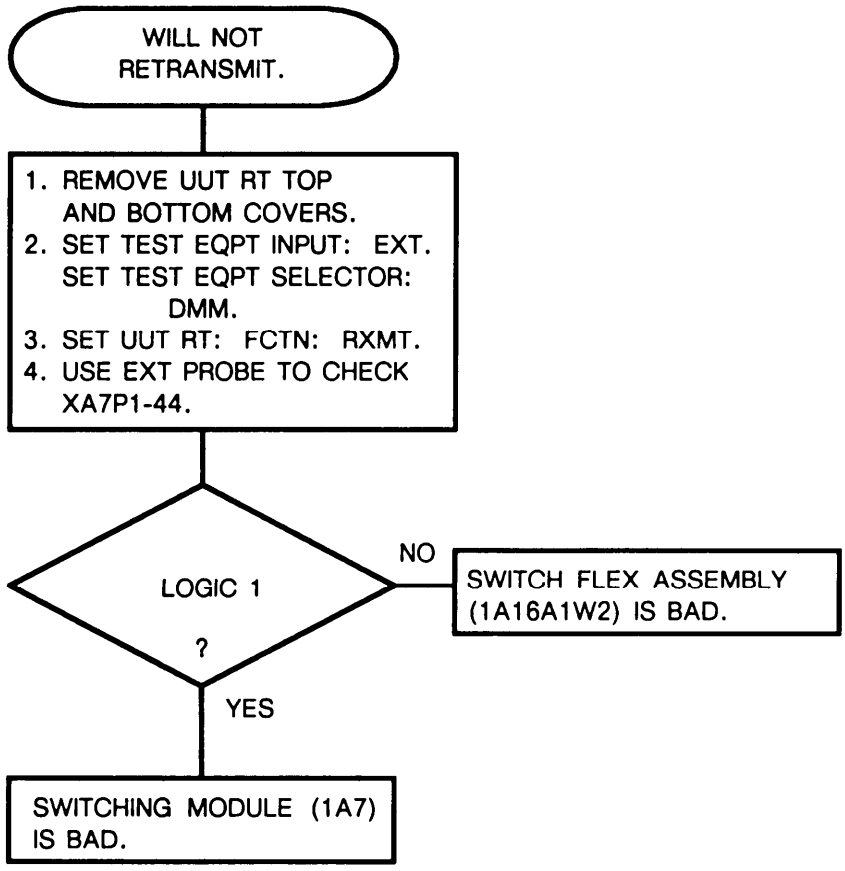
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 34
Troubleshooting AD2 Receive Circuits
(Sheet 3 of 3)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

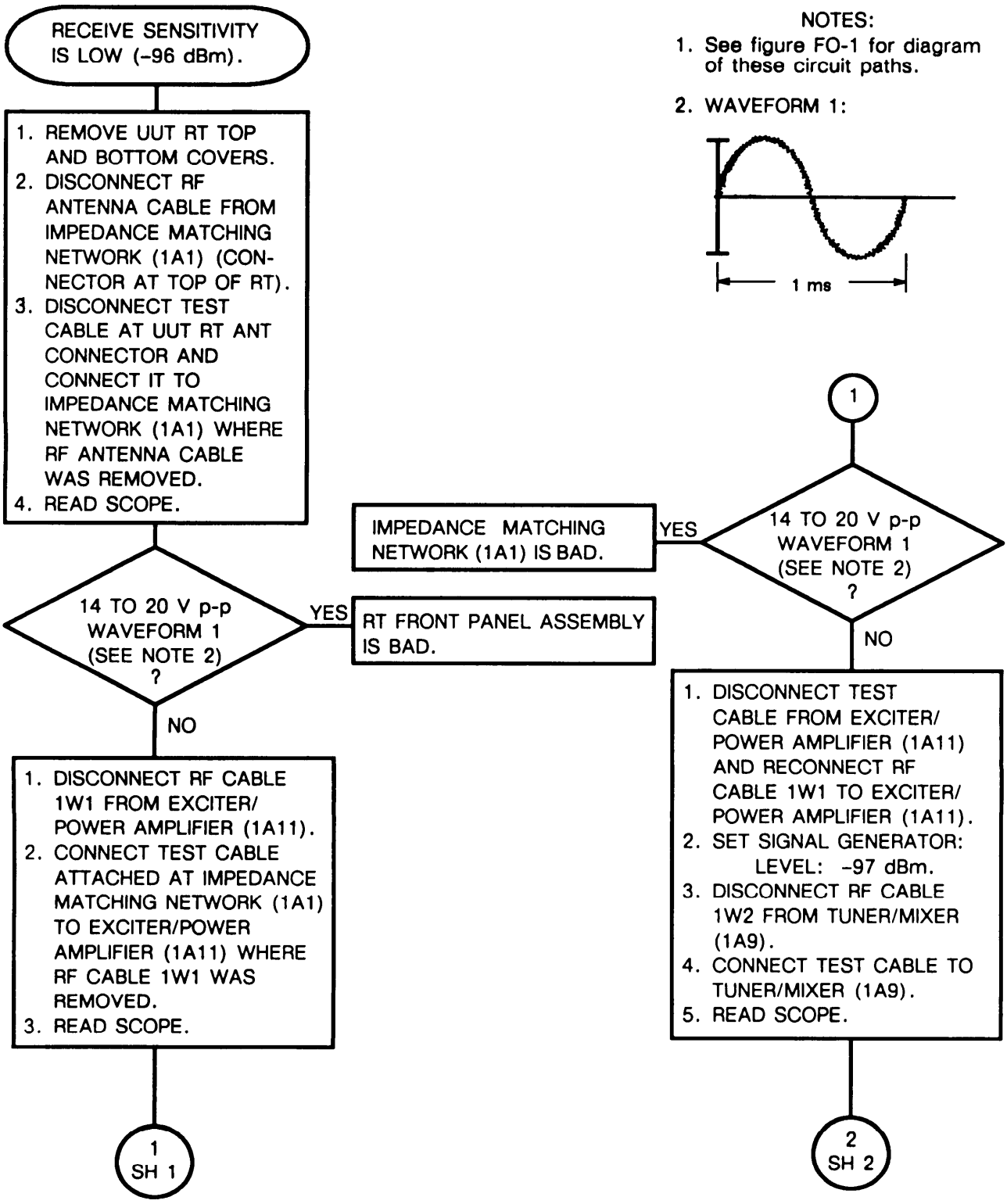
Chart 35
Troubleshooting Retransmit Circuits
(Sheet 1 of 1)



NOTE:
See figure FO-9 for diagram of these circuit paths.

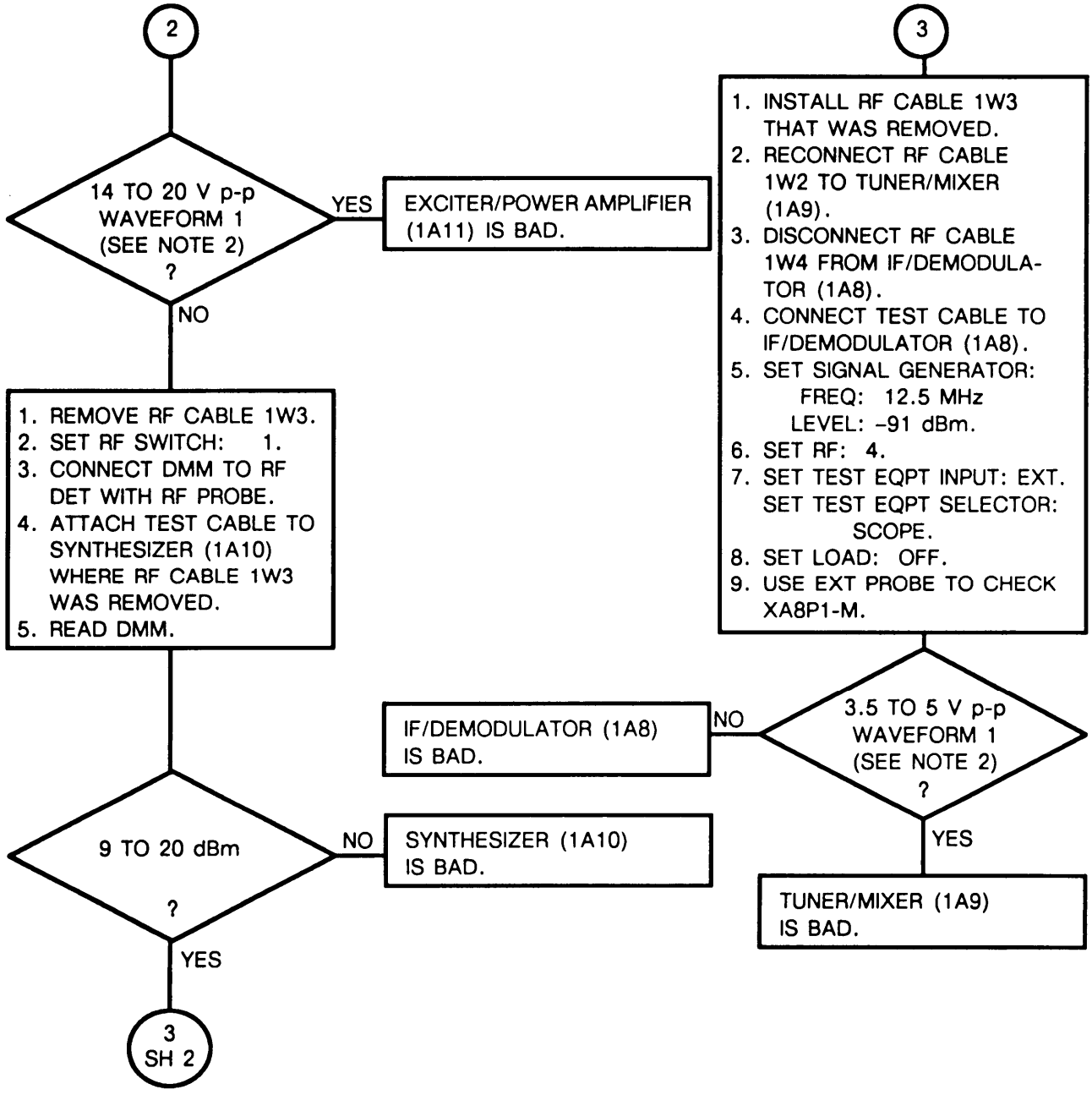
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 36
Troubleshooting Receiver Sensitivity
(Sheet 1 of 2)



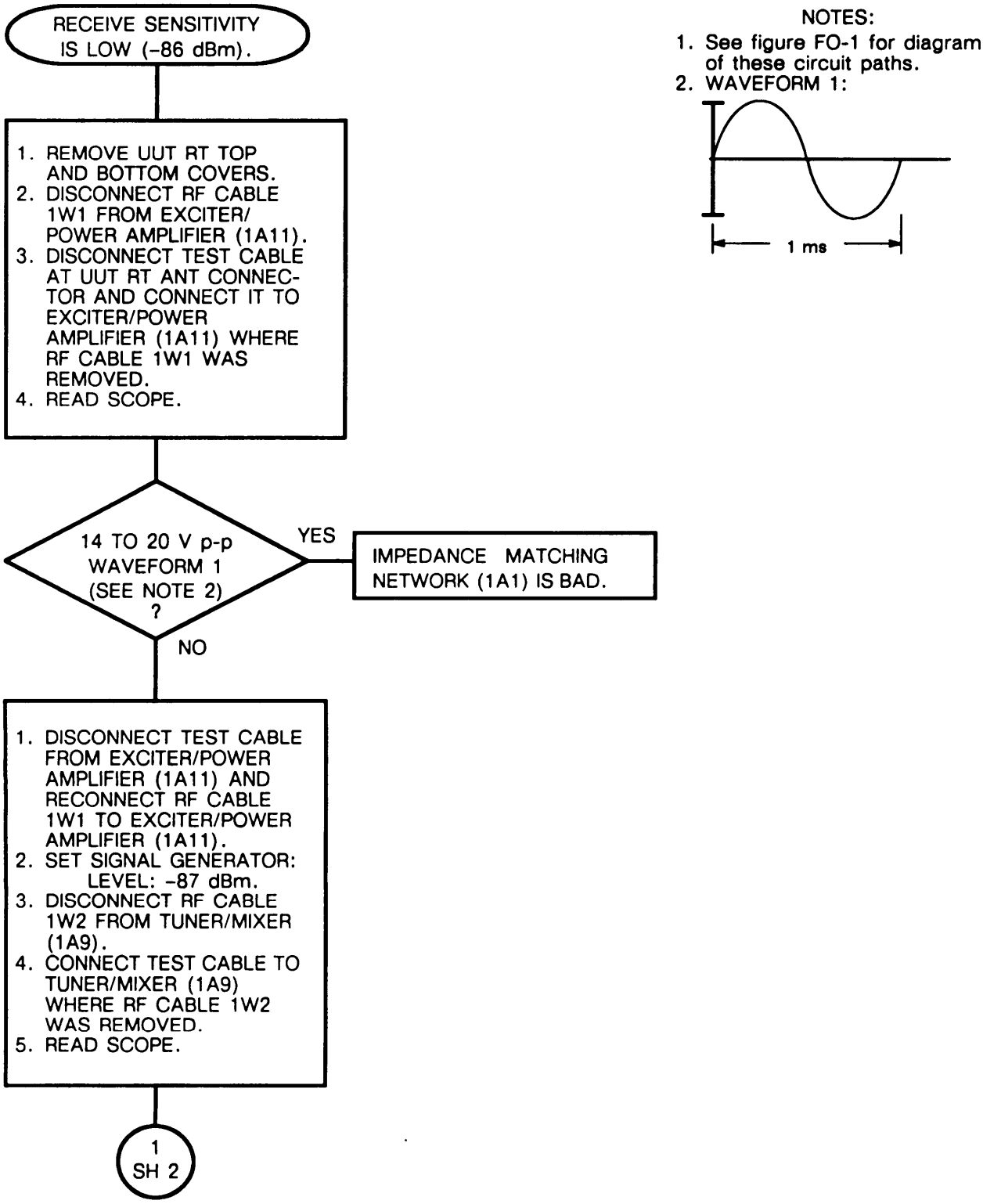
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 36
Troubleshooting Receiver Sensitivity
(Sheet 2 of 2)



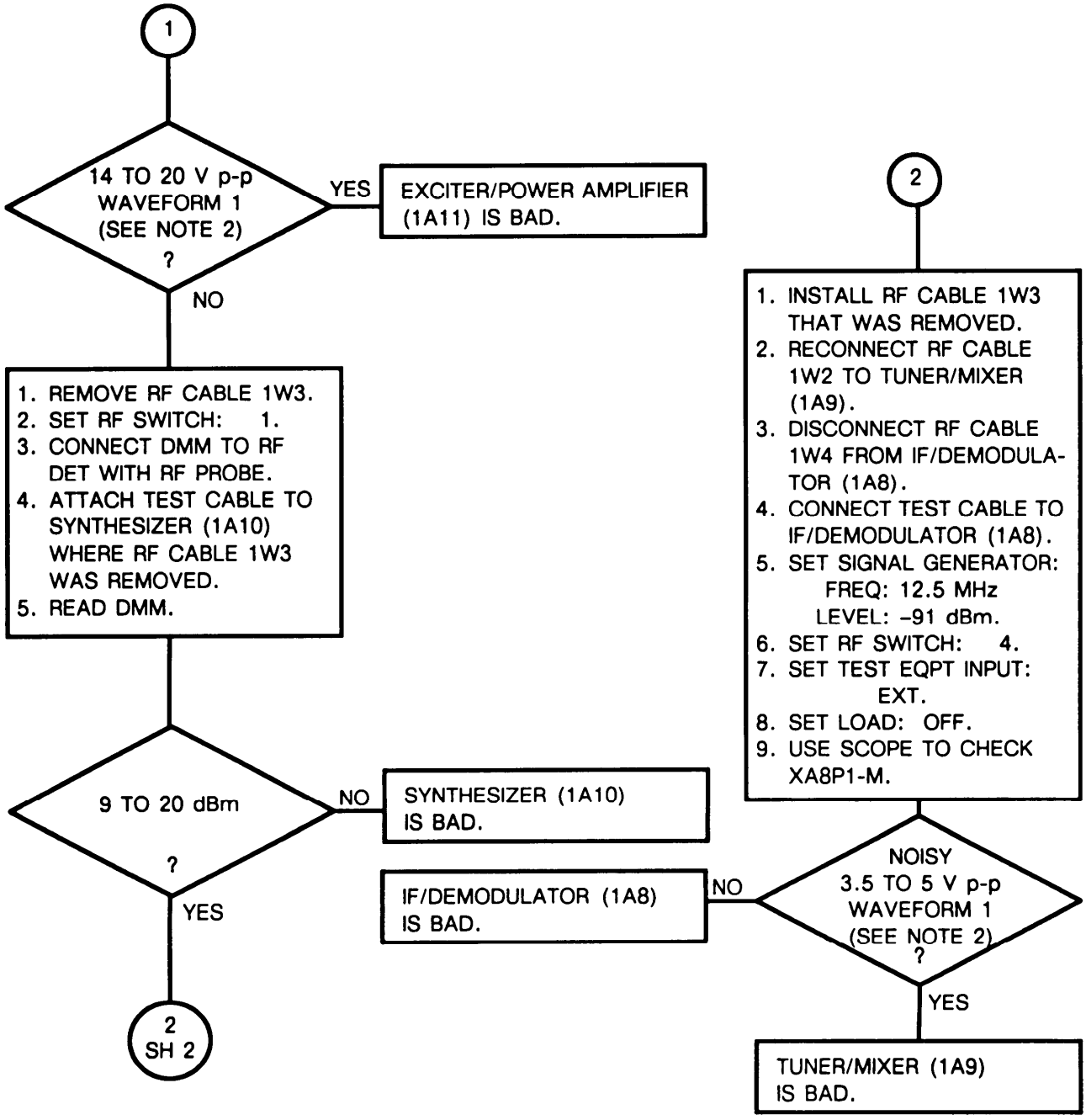
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 37
Troubleshooting Receiver Sensitivity
(Sheet 1 of 2)



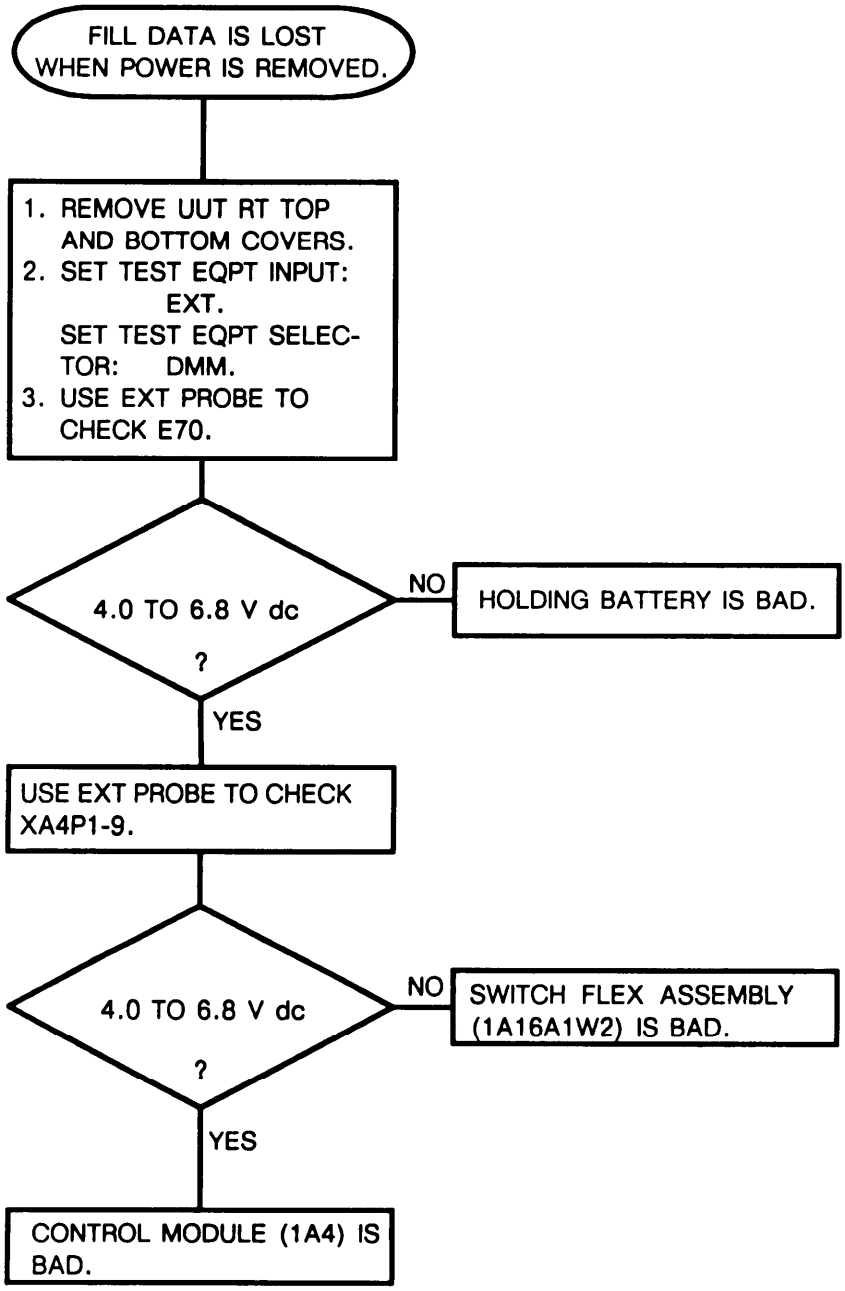
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 37
Troubleshooting Receiver Sensitivity
(Sheet 2 of 2)



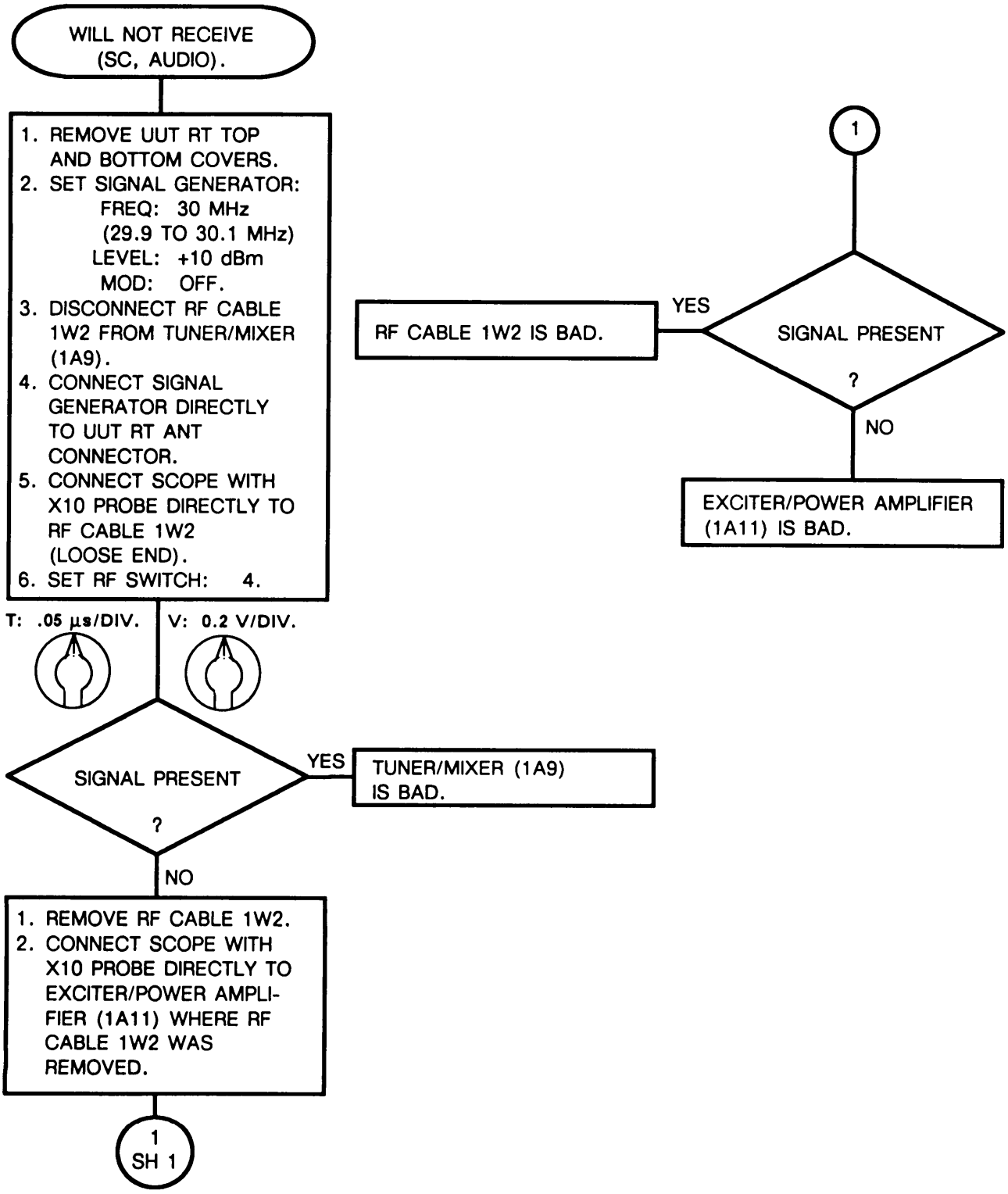
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 38
Troubleshooting Holding Battery Circuitry
(Sheet 1 of 1)



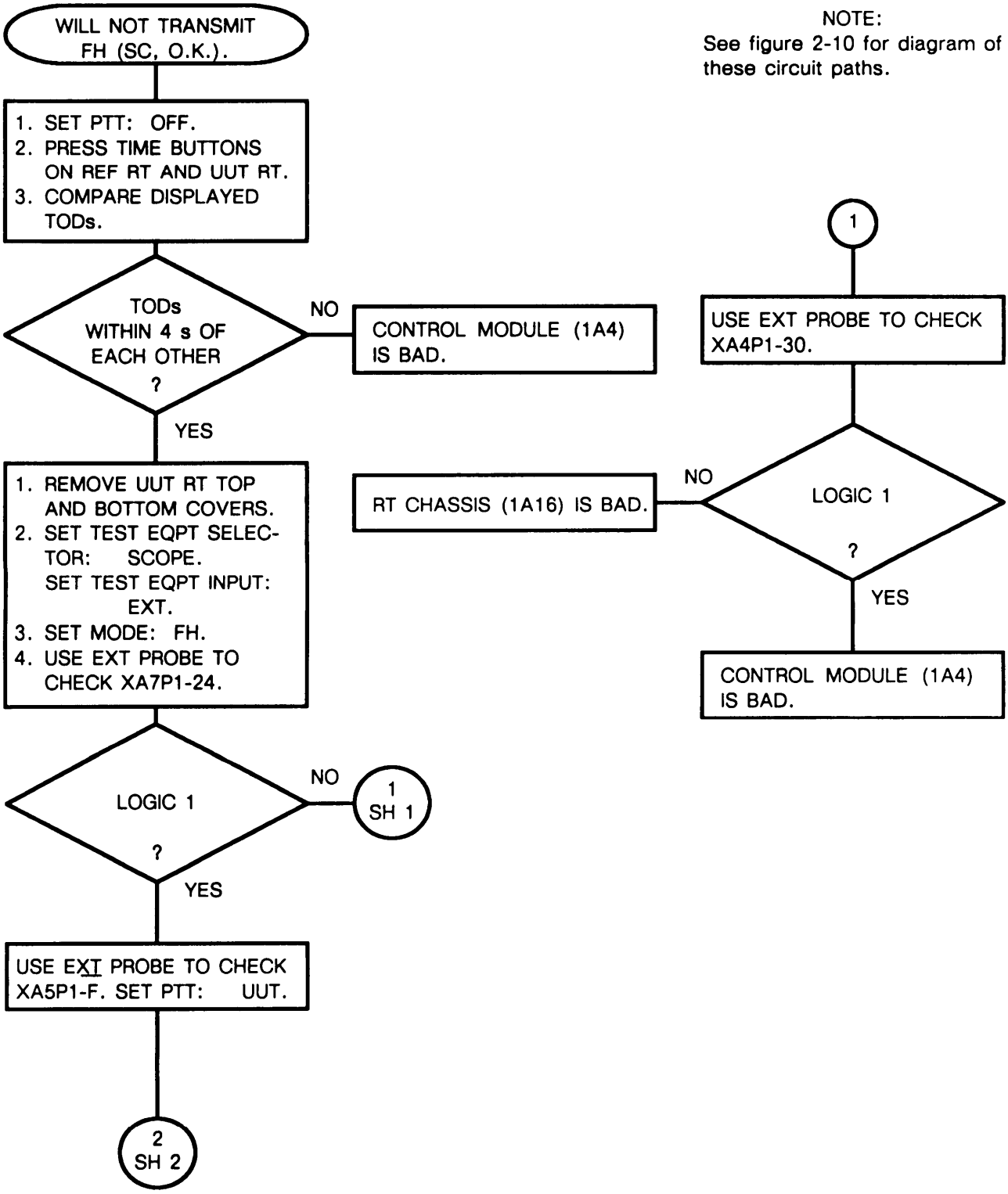
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 39
Troubleshooting Receive SC Path
(Sheet 1 of 1)



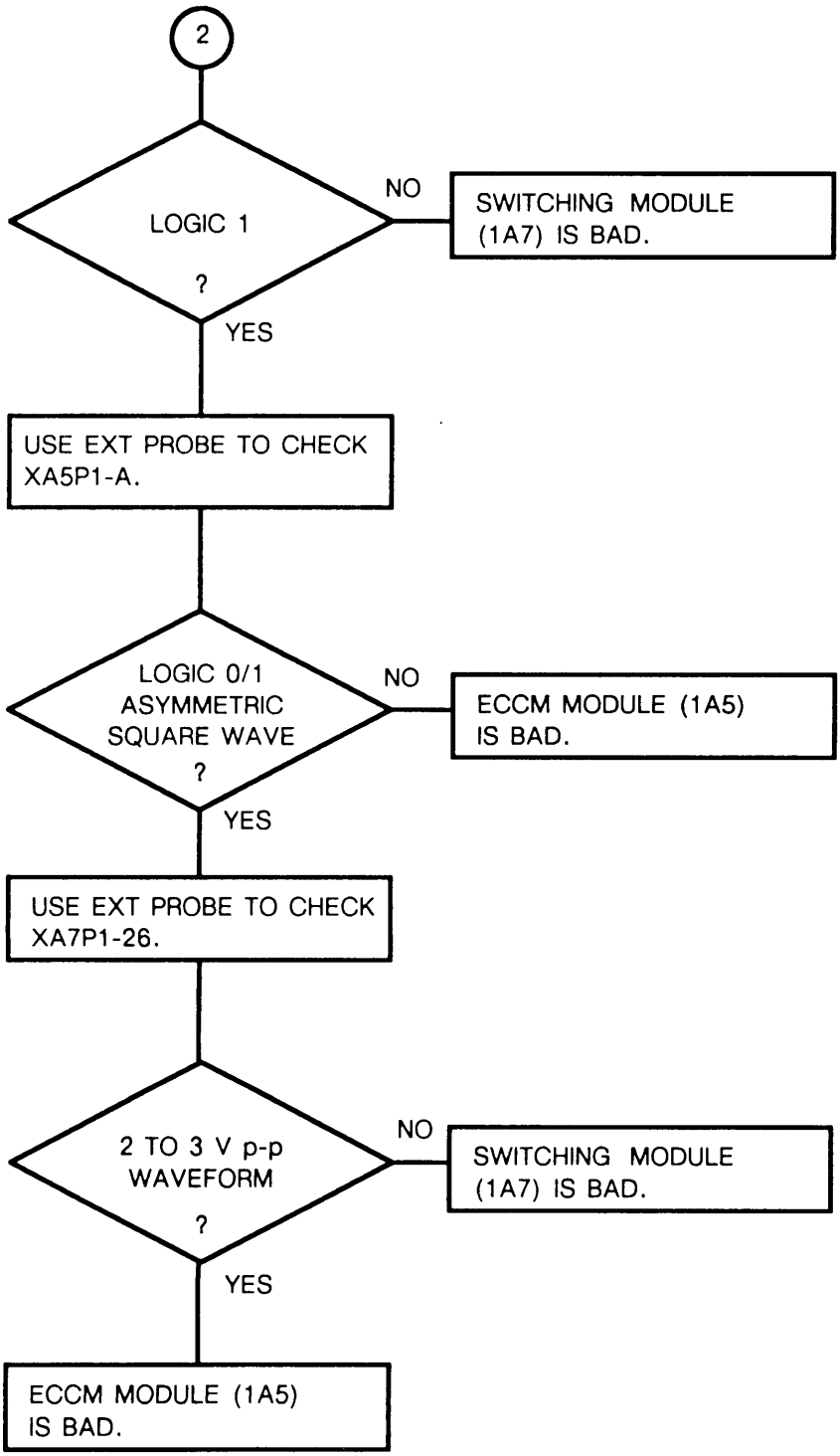
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 40
Troubleshooting FH Circuits
(Sheet 1 of 2)



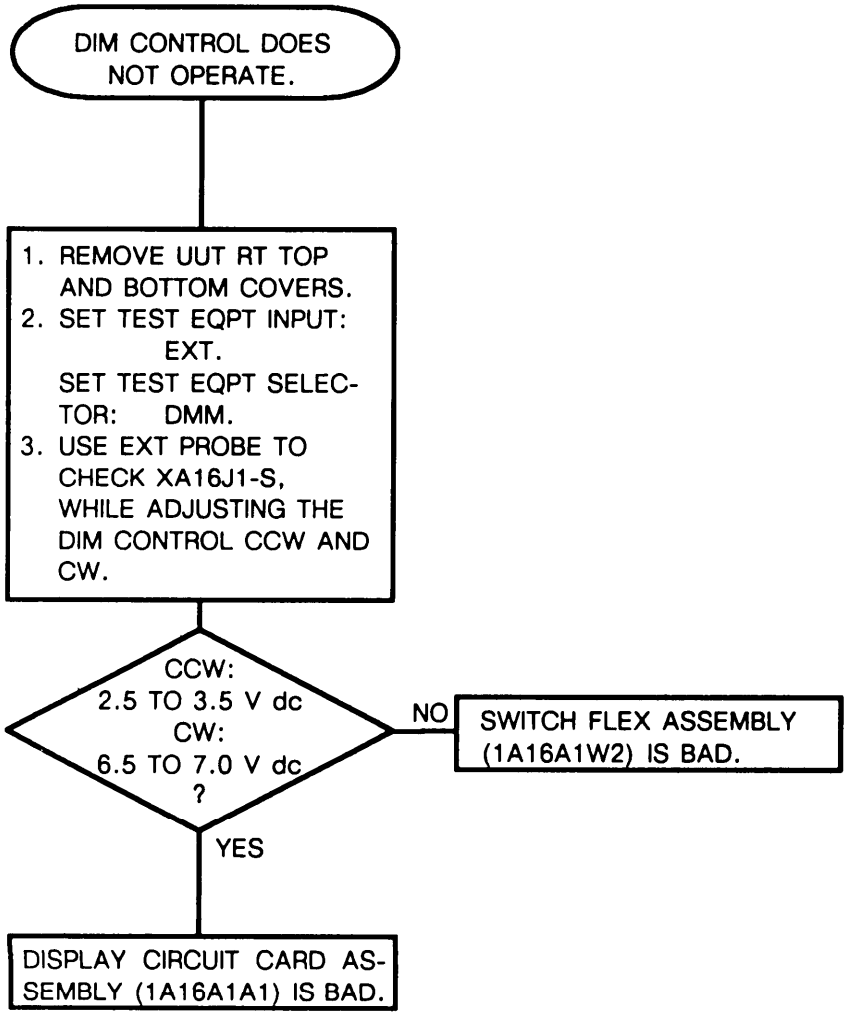
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 40
Troubleshooting FH Circuits
(Sheet 2 of 2)



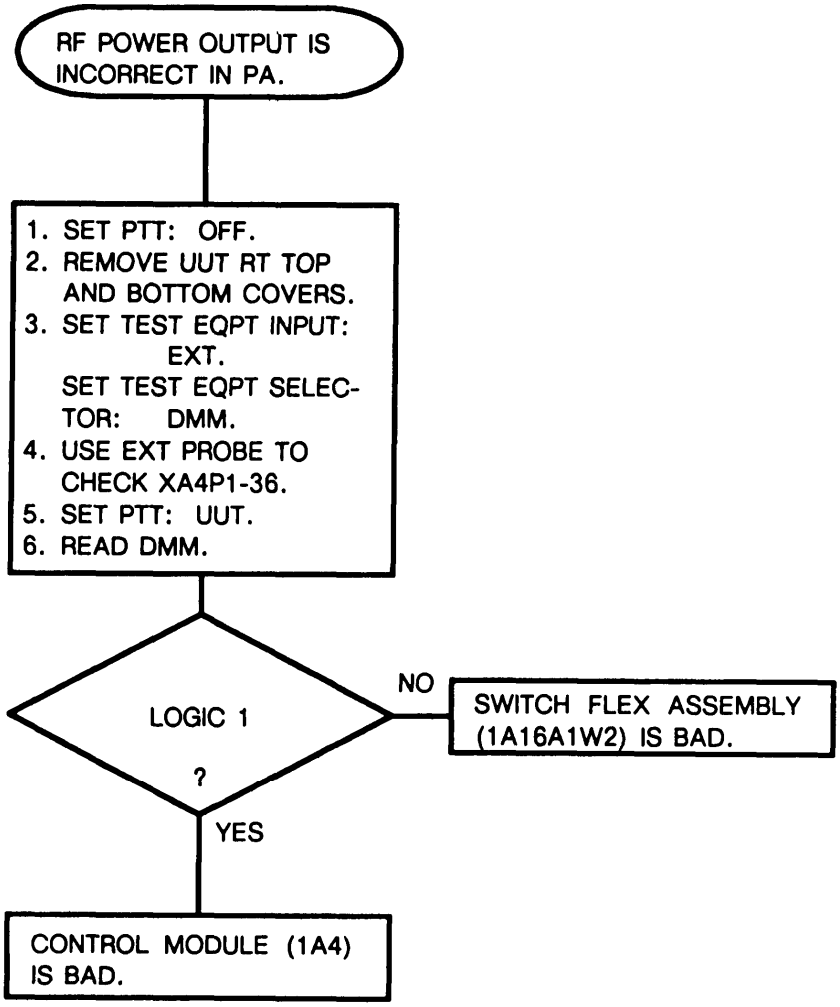
2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 41
Troubleshooting DIM Control
(Sheet 1 of 1)



2-31. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 42
Troubleshooting Transmit Circuit
(Sheet 1 of 1)



Section IV. MAINTENANCE PROCEDURES

2-32. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired RT. It is also used to verify the symptom of a faulty RT. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedures in this section.

2-33. OPERATIONAL CHECK.

Perform the operational check in paragraph 2-29 (page 2-30) to verify correct RT operation.

2-34. REPAIR PROCEDURES.

Repair of the RT consists of replacing a bad module. A module is replaced by removing it and installing a good module. Procedures for doing this follow.

a. General Instructions. The following instructions apply to all repair tasks.

1. Set RT FCTN switch to STW.
2. Remove any cables connected to the RT.
3. inspect the RT for damage. Repair any obvious physical damage.
4. Use the module extractor to remove the circuit card assemblies. It is included in the maintenance tool kit. It is used as follows:

a) Locate the module to be removed.

b) Hook the module extractor through the two holes in the top corners of the module.

c) Hold the module extractor with one hand. Place the other hand on the RT with the fingers of that hand resting on top of the module to be removed.

d) Pull steadily with the module extractor until the module connector is free of the parent board.

e) Remove the module.

f) Unhook the module extractor from the module.

2-34. REPAIR PROCEDURES. Continued

a. General Instructions. Continued

5. Handle all modules carefully.
6. Before installing a module, check the connector for bent or broken pins. Do not install if damaged.
7. Perform the operational check.

b. Repair Precautions.

CAUTION

Static electricity can damage the RT modules. Ground the RT and all tools before removing a module. Use a grounded wrist strap when handling a module.

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the RT. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

2-35. REPLACEMENT OF RT COVERS.

a. **Removal and Installation of Top Cover.**

Tools:

Flat tip screwdriver
Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. RT	Set on work surface with top side up.	
b. 11 captive screws	Use flat tip screwdriver. Fully loosen.	
c. Top cover	Lift free from RT.	
INSTALLATION		
d. Top cover	Set in place on RT.	
e. HCP 11 captive screws	Thread and tighten. Use torque screwdriver. Torque screws to 8 to 10 in-lb.	

2-35. REPLACEMENT OF RT COVERS. Continued

b. Removal and Installation of Bottom Cover.

Tools:

Flat tip screwdriver
Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. RT	Place on work surface with bottom side up.	
b. 13 captive screws	Use flat tip screwdriver. Fully loosen.	
c. Bottom cover	Lift free from RT.	
INSTALLATION		
d. Bottom cover	Set in place on RT.	
e. HCP 13 captive screws	Thread and tighten. Use torque screwdriver. Torque screws to 8 to 10 in-lb.	

2-36. REPLACEMENT OF MODULES 1A2, 1A6, 1A7, 1A12, 1A13, 1A14, and 1A15.

This procedure is for replacement of the following modules.

Remote I/O Module (1A2)
Two-Wire Interface (1A6)
Switching Module (1A7)
Audio Power Supply (1A12)
Audio Control Module (1A13)
Audio Data I/O Module (1A14)
Data Rate Adapter (1A15)

Figure 2-15 shows the locations of these modules.

Tools:

Flat tip screwdriver
Module extractor
Torque screwdriver

References:

Paragraph 2-35a for removal and installation of top cover.
Paragraph 2-34.a for use of module extractor.

ITEM	ACTION	REMARKS
REMOVAL		
a. Top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
b. Module	Hook module extractor to module.	Refer to paragraph 2-34 for use of module extractor.
c. Module	Pull free of RT.	

2-36. REPLACEMENT OF MODULES 1A2, 1A6, 1A7, 1A12, 1A13, 1A14, and 1A15. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
d. Module	Check connector location and place module in card guide. Press down to fully seat module connector.	
e. HCP Top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

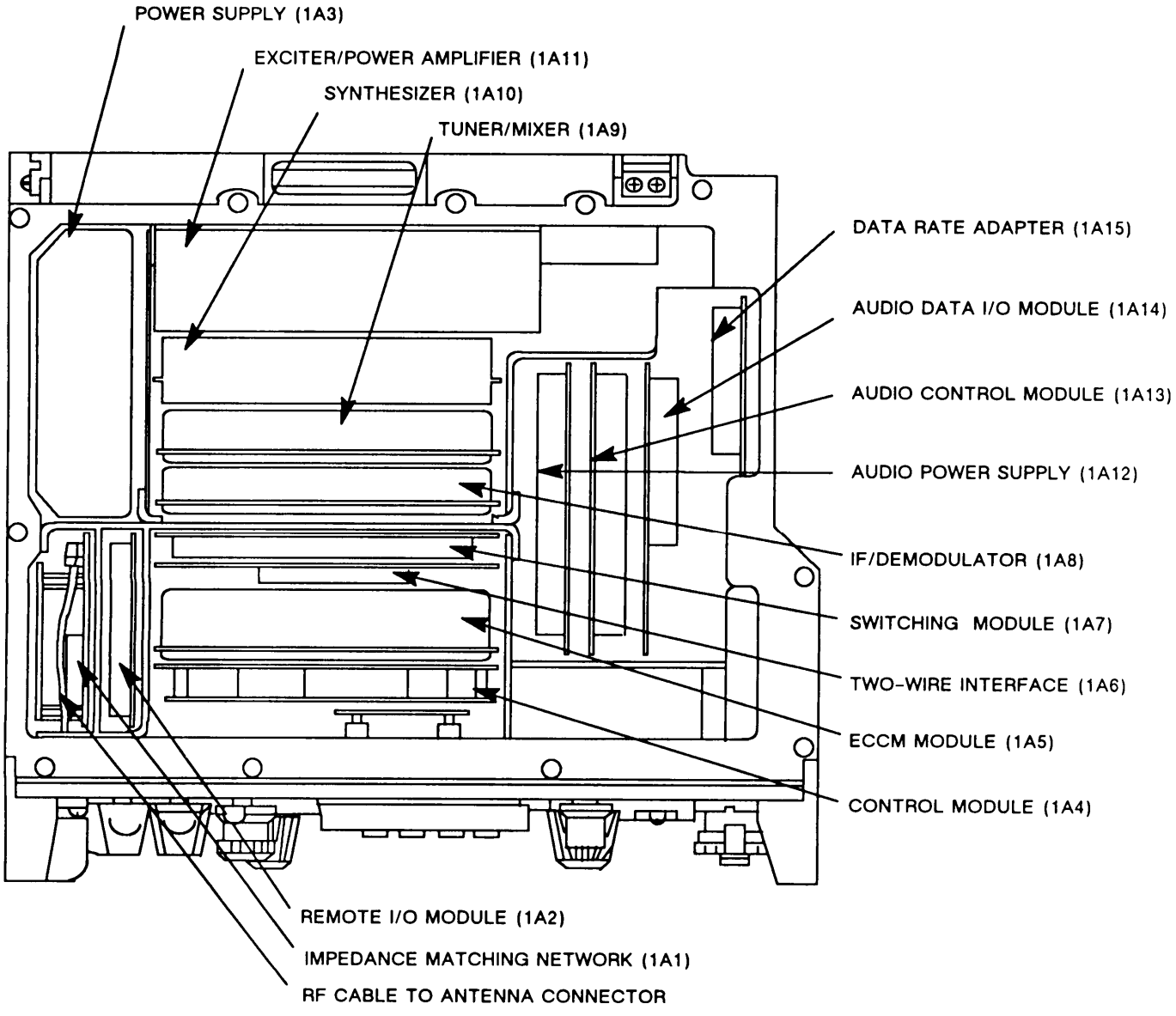


Figure 2-15. RT Module Locations.

2-37. REPLACEMENT OF IMPEDANCE MATCHING NETWORK (1A1).

Tools:

Flat tip screwdriver
Module extractor
Round nose pliers
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT covers.
Figure 2-15 for module and cable locations.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. RF cable (1W1)	Use round nose pliers. Remove from impedance matching network (1A1).	See figure 2-15 for module location.
c. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
d. RF cable	Remove end connected to impedance matching network.	See figure 2-15 for cable location.
e. Impedance matching network	Use module extractor. Pull free from RT.	Refer to paragraph 2-34 for use of module extractor.
INSTALLATION		
f. RF cable	Hold away from module location.	
g. Impedance matching network	Check connector location and place in card guide. Press down to fully seat connector.	
h. RF cable	Attach to connector on impedance matching network.	
i. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.
j. RF cable (1W1)	Attach to impedance matching network.	
k. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.

2-38. REPLACEMENT OF POWER SUPPLY (1A3).

Tools:

Flat tip screwdriver
Module extractor
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT covers.
Figure 2-15 for module locations.
Figure 2-16 for screw locations.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. Two screws	Use flat tip screwdriver. Remove and retain two screws securing power supply.	See figure 2-16 for screw locations.
c. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
d. Power supply	Using module extractor, remove from RT.	Refer to paragraph 2-34 for use of module extractor. See figure 2-15 for module location.
INSTALLATION		
e. Power supply	Check connector location and insert power supply. Press down to seat fully.	
f. Two screws	Use flat tip screwdriver. Install two retained screws.	These were removed in step b.
g. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.
h. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-38. REPLACEMENT OF POWER SUPPLY (1A3). Continued

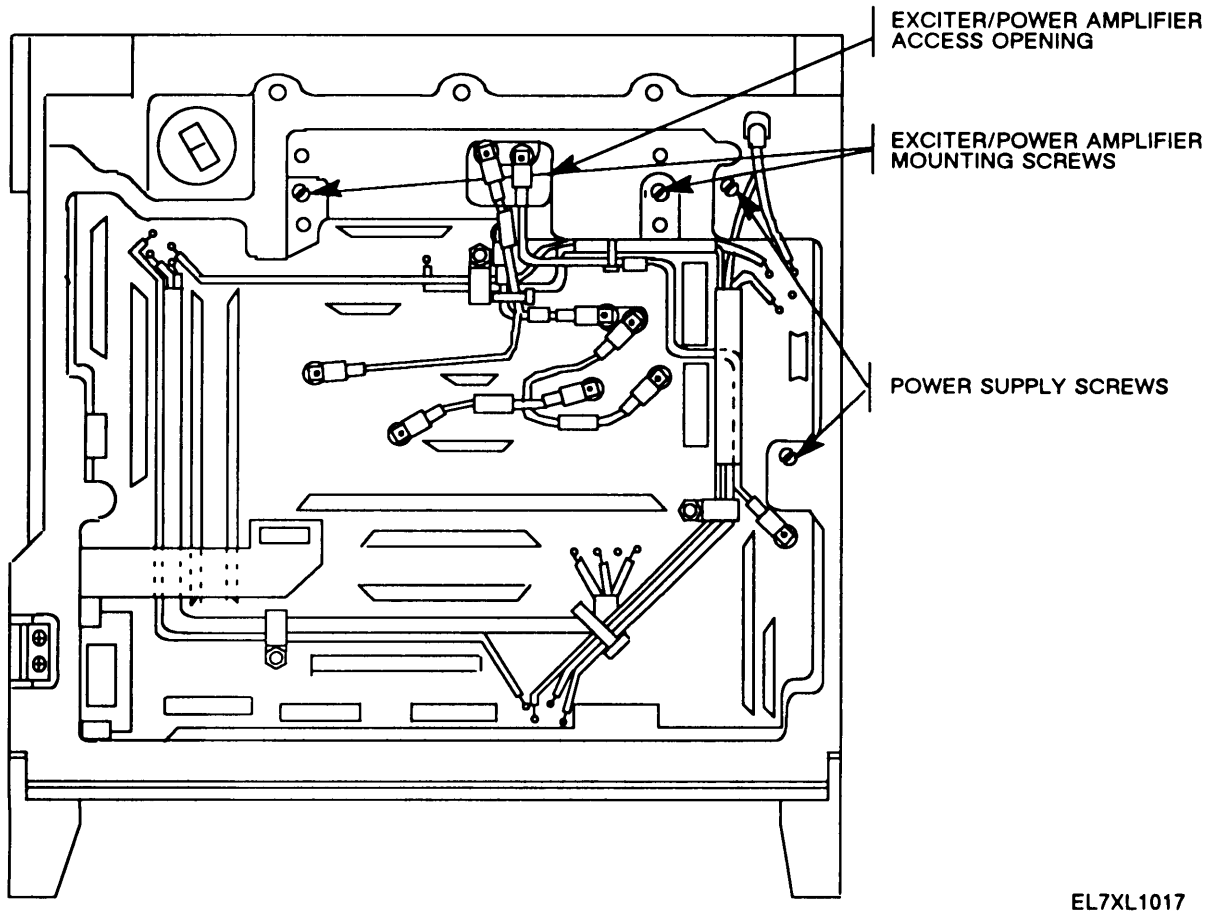


Figure 2-16. Module Screw Locations.

2-39. REPLACEMENT OF ECCM MODULE (1A5).

Tools:

Flat tip screwdriver
Module extractor
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT top cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
b. ECCM module	Use module extractor. Remove from RT.	Refer to paragraph 2-34 for use of module extractor.
c. Control module	Press down to reseat.	

2-39. REPLACEMENT OF ECCM MODULE (1A5). Continued

ITEM	ACTION	REMARKS
INSTALLATION		CAUTION
d. ECCM module	Check connector location and place in card guide. Press down until ECCM module connector touches control module connector. Carefully aline ECCM module with control module. Press down to fully seat both connectors.	Carefully aline ECCM module with control module to avoid connector damage.
e. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-40. REPLACEMENT OF CONTROL MODULE (1A4).

Tools:

Flat tip screwdriver
Module extractor
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT top cover.
Paragraph 2-39 for removal and installation of ECCM module.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
b. ECCM module	Remove.	Refer to paragraph 2-39 for removal of ECCM module.
c. Control module	Use module extractor. Remove from RT.	Refer to paragraph 2-34 for use of module extractor.
INSTALLATION		
d. Control module	Check connector location and place in card guide. Press down to fully seat connector.	
e. ECCM module	Install.	Refer to paragraph 2-39 for installation of ECCM module.
f. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-41. REPLACEMENT OF IF/DEMODULATOR (1A8).

Tools:

Flat tip screwdriver
Module extractor
Round nose pliers
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT covers.
Figure 2-15 for module location.
Figure 2-17 for location of RF cables.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. RF cable (1W4)	Use round nose pliers. Disconnect from IF/demodulator.	See figure 2-17 for cable location.
c. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
d. IF/demodulator	Use module extractor. Remove from RT.	Refer to paragraph 2-34 for use of module extractor. See figure 2-15 for module location.
INSTALLATION		
e. IF/demodulator	Check connector location and place in card guides. Press down to fully seat connector.	
f. RF cable (1W4)	Use round nose pliers. Connect to IF/demodulator.	See figure 2-17 for cable location.
g. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.
h. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-41. REPLACEMENT OF IF/DEMODULATOR (1A8). Continued

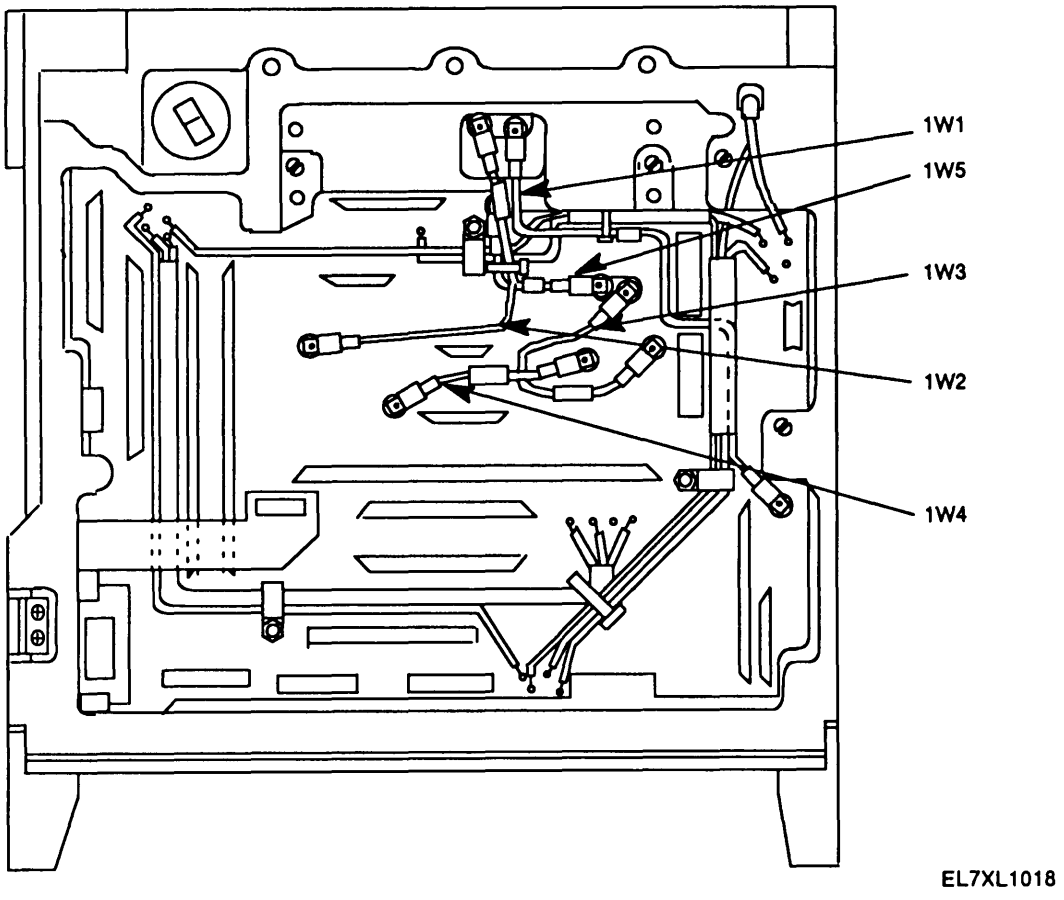


Figure 2-17. RF Cable Locations.

2-42. REPLACEMENT OF TUNER/MIXER (1A9).

Tools:

Flat tip screwdriver
Round nose pliers
Module extractor
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT covers.
Figure 2-15 for module location.
Figure 2-17 for location of RF cables.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. RF cables (1W2, 1W3, and 1W4)	Use round nose pliers. Disconnect from tuner/mixer.	See figure 2-17 for cable locations.

2-42. REPLACEMENT OF TUNER/MIXER (1A9). Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
c. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.
d. Tuner/mixer	Use module extractor. Remove from RT.	Refer to paragraph 2-34 for use of module extractor. See figure 2-15 for module location.
INSTALLATION		
e. Tuner/mixer	Check connector location and place in card guides. Press down to fully seat connector.	
f. RF cables (1W2, 1W3, and 1W4)	Use round nose pliers. Connect to tuner/mixer.	See figure 2-17 for cable locations.
g. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.
h. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-43. REPLACEMENT OF SYNTHESIZER (1A10).

Tools:

Flat tip screwdriver
Round nose pliers
Module extractor
Torque screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT covers.
Figure 2-17 for location of RF cables.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. RF cables (1W3 and 1W5)	Use round nose pliers. Disconnect from synthesizer.	See figure 2-17 for cable locations.
c. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.

2-43. REPLACEMENT OF SYNTHESIZER (1A10). Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
d. Synthesizer	Use module extractor. Remove from RT.	Refer to paragraph 2-34 for use of module extractor. See figure 2-17 for module location.
INSTALLATION		
e. Synthesizer	Check connector location and place in card guides. Press down to fully seat connector.	
f. RF cables (1W3 and 1W5)	Use round nose pliers. Connect to synthesizer.	See figure 2-17 for cable locations.
g. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.
h. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-44. REPLACEMENT OF EXCITER/POWER AMPLIFIER (1A11).

Tools:

Flat tip screwdriver
Round nose pliers
Torque screwdriver

References:

Paragraph 2-35 for removal and installation of RT covers.
Figure 2-17 for location of RF cables.
Figure 2-16 for location of screws and access opening.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. RF cables (1W1, 1W2, and 1W5)	Disconnect from exciter/power amplifier.	See figure 2-17 for cable locations.
c. Four screws	Use flat tip screwdriver. Remove and retain four screws securing exciter/power amplifier.	There may be only two screws securing the exciter/power amplifier. If so, there will only be two screw holes in the RT chassis. See figure 2-16 for screw locations.
d. RT top cover	Remove.	Refer to paragraph 2-35 for removal of top cover.

2-44. REPLACEMENT OF EXCITER/POWER AMPLIFIER (1A11). Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Exciter/power amplifier	Push from bottom and remove exciter/ power amplifier.	See figure 2-16 for location of access opening.
INSTALLATION		
f. Exciter/power amplifier	Check connector location and install. Press down to fully seat connector.	
g. Four screws	Thread and tighten four retained screws. Use torque screwdriver. Torque screws to 8 to 10 in-lb.	See figure 2-16 for screw locations.
h. RF cables (1W1, 1W2, and 1W5)	Attach to exciter/power amplifier.	See figure 2-17 for cable locations.
i. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.
j. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-45. REPLACEMENT OF RF CABLES 1W1 THROUGH 1W5.

Tools:

Diagonal cutting pliers
Flat tip screwdriver
Round nose pliers
Torque screwdriver

References:

Paragraph 2-35 for removal and installation of RT covers.
Figure 2-17 for location of RF cables.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT bottom cover	Remove.	Refer to paragraph 2-35 for removal of bottom cover.
b. Cable ties	Use diagonal cutting pliers. Cut any cable ties securing the RF cable.	
c. RF cable	Use round nose pliers. Locate proper cable and pull to disconnect at each end.	See figure 2-17 for cable location.
INSTALLATION		
d. RF cable	Use round nose pliers. Push each end of new cable onto its connector.	See figure 2-17 for cable location.
e. RF cable	If necessary, secure with new cable tie. Trim excess off the cable tie.	

2-45. REPLACEMENT OF RF CABLES 1W1 THROUGH 1W5. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
f. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.

2-46. REPLACEMENT OF RT CHASSIS (1A16).

Tools:

Flat tip screwdriver
Module extractor
Round nose pliers
Diagonal cutting pliers
Torque screwdriver
Cross tip screwdriver

References:

Paragraph 2-34 for use of module extractor.
Paragraph 2-35 for removal and installation of RT covers.
Paragraphs 2-36 through 2-44 for removal and installation of all RT modules.
Paragraph 2-45 for removal and installation of RF cables.
Paragraph 2-49 for removal and replacement of RT front panel.
Figure 2-15 for location of RT modules.
Figure 2-17 for location of RF cables.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT top cover	Remove and retain.	Refer to paragraph 2-35 for removal of top cover.
b. RT bottom cover	Remove and retain.	Refer to paragraph 2-35 for removal of bottom cover.
c. Two hub cover captive screws	Use flat tip screwdriver. Fully loosen.	
d. Hub cover	Remove and retain.	
e. Cable ties	Use diagonal cutting pliers. Remove any cable ties securing RF cables.	
f. RF cables (1W1 through 1W5)	Use round nose pliers. Remove and retain all RF cables.	Refer to paragraph 2-45 for removal of RF cables. See figure 2-17 for cable locations.
g. Modules (1A1 through 1A15)	Where necessary, use module extractor, round nose pliers, and flat tip screwdriver. Remove and retain all modules.	Refer to paragraph 2-34 for use of module extractor. Refer to paragraphs 2-36 through 2-44 for removal of modules. See figure 2-15 for module locations.

2-46. REPLACEMENT OF RT CHASSIS (1A16). Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
h. RT front panel assembly	Use flat tip screwdriver. Remove and retain.	Refer to paragraph 2-49 for removal of RT front panel.
i. Seal screw	Use flat tip screwdriver. Remove and retain.	
j. COMSEC connector cover	Use cross tip screwdriver. Remove and retain screw, flat washer, lockwasher, and cover.	
k. COMSEC connector alignment plate	Use cross tip screwdriver. Remove and retain screw, flat washer, lockwasher, and alignment plate.	
INSTALLATION		
l. COMSEC connector alignment plate	Use cross tip screwdriver. Install retained screw, flat washer, lockwasher, and alignment plate.	
m. COMSEC connector cover	Use cross tip screwdriver. Install retained screw, flat washer, lockwasher, and cover.	
n. Seal screw	Use flat tip screwdriver. Install retained seal screw.	
o. RT front panel assembly	Use flat tip screwdriver. Install retained RT front panel assembly.	Refer to paragraph 2-49 for installation of RT front panel.
p. Modules (1A1 through 1A15)	Where necessary, use round nose pliers and flat tip screwdriver. Install all modules.	Refer to paragraphs 2-36 through 2-44 for installation of modules. See figure 2-15 for module locations.
q. RF cables (1W1 through 1W5)	Use round nose pliers. Install all retained RF cables.	Refer to paragraph 2-45 for installation of RF cables. See figure 2-17 for cable locations.
r. Cable ties	Install cable ties at locations where removed.	These were removed in step e.
s. Hub cover	Set retained hub cover in place on chassis.	
t. Two hub cover captive screws	Use flat tip screwdriver. Thread and tighten.	
u. HCP RT bottom cover	Install.	Refer to paragraph 2-35 for installation of bottom cover.
v. HCP RT top cover	Install.	Refer to paragraph 2-35 for installation of top cover.

2-47. REPLACEMENT OF DATA ENTRY KEYBOARD.

Tools:

Needle nose pliers
Cross tip screwdriver

Expendable supplies:

Silicone compound

References:

Figure 2-18 for location of screws.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT	Stand on work surface with front panel up.	
b. Four screws and flat washers	Use cross tip screwdriver. Remove and retain four screws and flat washers securing keyboard to front panel.	See figure 2-18 for screw locations.
c. Keyboard	Pull keyboard straight out from front panel.	
d. Sealing gasket	Carefully remove from front panel with needle nose pliers. Clean any remaining silicone compound from front panel.	
INSTALLATION		
e. Sealing gasket	Apply silicone compound to gasket.	
	CAUTION The connector pins on the back of the keyboard are long and easily bent. Carefully aline the keyboard with its mounting screw holes. Insert the keyboard slowly and carefully until the pins are fully seated.	
f. Keyboard	Aline screw holes in keyboard with those in front panel. Carefully insert keyboard.	Feel for when the connector pins meet the connector inside. If there is unusual resistance, do not force. Remove and try again.
g. Four screws and flat washers	Use cross tip screwdriver. Install four retained screws and flat washers securing keyboard to front panel.	

2-47. REPLACEMENT OF DATA ENTRY KEYBOARD. Continued

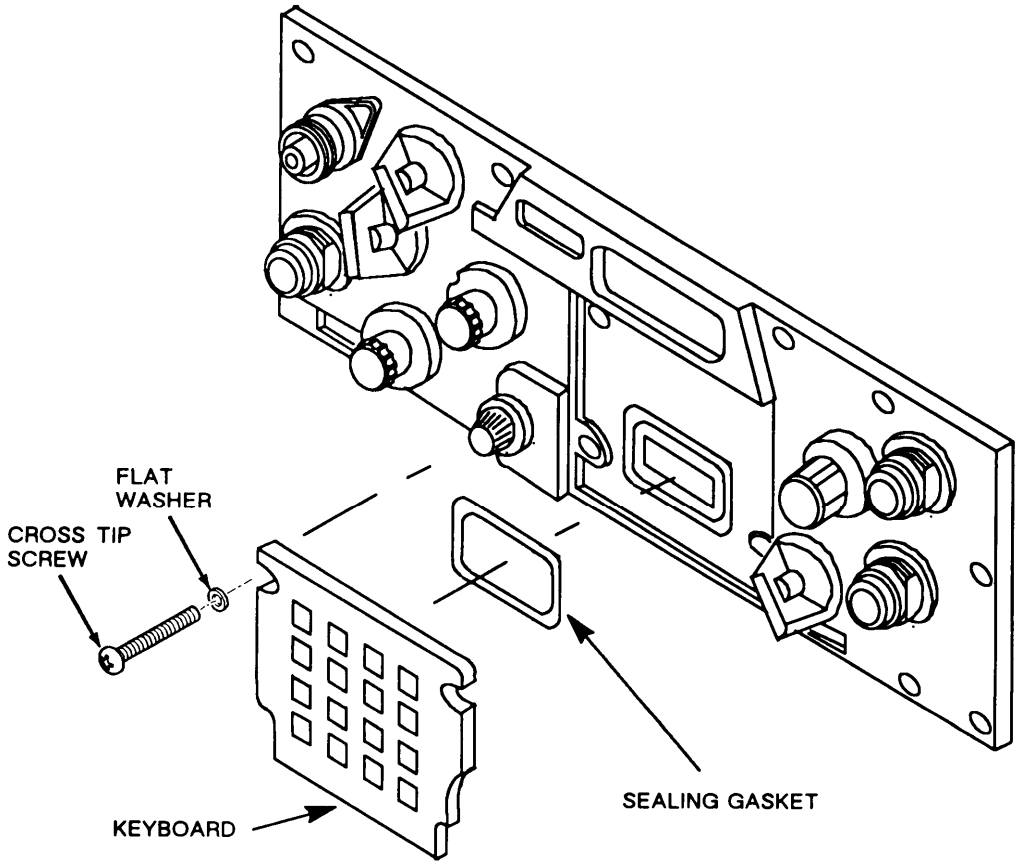


Figure 2-18. RT Front Panel Keyboard.

2-48. REPLACEMENT OF THREADED SCREW INSERTS.

Threaded screw inserts are replaced as described in the following procedure. Table 2-3 lists the threaded screw inserts included in the maintenance group for repair of this equipment. It also identifies where these threaded screw inserts are used in the equipment. Also see TM 11-5820-890-30P-3.

Table 2-3. Threaded Screw Inserts

EQUIPMENT	LOCATION	SCREW INSERT TYPE	SIZE	QTY
RT Chassis	where holding battery cover attaches	MA3330-102	M3 x 1	2
RT Chassis	where top cover attaches	MA3330-102	M3 x 1	11
RT Chassis	where bottom cover attaches	MA3330-102	M3 x 1	13
RT Chassis	where handle assembly attaches	MA3330-152	M3 x 1.5	4
RT Chassis	where guard assembly attaches	MA3330-152	M3 x 1.5	4
RT Chassis	where keypad attaches to front panel	MA3330-100	M2.2 x 1	4

Tools:

Threaded screw insert extractor — Thread cleaning tap — Hex wrench
Prewinder — Tang breakoff tool — Brace

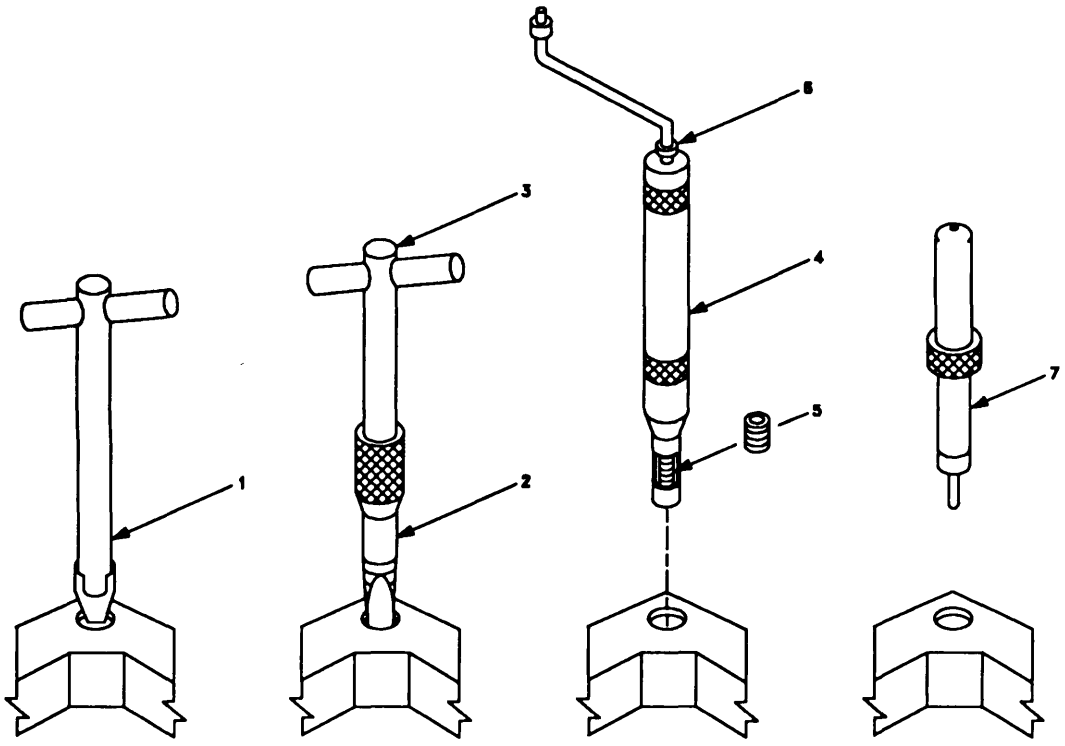
References:

Figure 2-19 for illustration of process.

ITEM	ACTION	REMARKS
REMOVAL		
a. Threaded screw insert extractor (1)	Place in hole. Tap extractor to seat in insert. Maintain steady pressure on extractor and unscrew insert. Remove insert from hole.	For recessed M3 x 1 inserts, use tool 1227-02. For all others, use tool 1227-6 or 1227-02, depending on the insert size. See figure 2-19 for illustration of tool usage.
b. Thread cleaning tap (2)	Select proper size tap. Insert and secure in brace (3). Start carefully in hole. Screw tap to bottom of hole. Unscrew tap.	

2-48. REPLACEMENT OF THREADED SCREW INSERTS. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
c. Prewinder (4) and insert (5)	Loosen stop collar (6) with hex wrench. Extend threaded shaft beyond end of prewinder one thread longer than insert. Move stop collar to top of tool body and tighten. Retract threaded shaft. Place insert in prewinder with tang end toward prewinder tip. Rotate shaft until insert projects beyond the tip one full turn. Place tip in hole. Screw insert into hole until stop collar touches tool body. Retract prewinder.	If insert is used with a captive screw, set prewinder with an extra 2 to 3 mm length.
d. Tang breakoff tool (7)	Place on tang. Break off tang by pressing down on tool. Remove tang breakoff tool. Remove broken tang from hole.	



EL7XL1552

Figure 2-19. Threaded Screw Insert Replacement

2-49. REPLACEMENT OF RT FRONT PANEL ASSEMBLY.

Tools:

Cross tip screwdriver
Torque screwdriver
Round nose pliers
Flat tip screwdriver
Module extractor

Expendable supplies:

Silicone compound

References:

Paragraph 2-35 for removal and installation of RT covers.
Paragraph 2-37 for removal and installation of impedance matching network.
Paragraph 2-47 for removal and installation of data entry keyboard.
Paragraph 2-50 for removal and installation of display circuit card assembly.
Paragraph 2-51 for removal and installation of audio flex assembly.
Paragraph 2-52 for removal and installation of switch flex assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT top cover	Remove and retain.	Refer to paragraph 2-35 for removal of top cover.
b. RT bottom cover	Remove and retain.	Refer to paragraph 2-35 for removal of bottom cover.
c. Impedance matching network	Remove and retain.	Refer to paragraph 2-37 for removal of impedance matching network.
d. Data entry keyboard	Remove and retain.	Refer to paragraph 2-47 for removal of data entry keyboard.
e. Four screws	Use cross tip screwdriver. Remove and retain four screws securing left bow handle to RT chassis.	
f. Left bow handle	Remove and retain.	
g. Four screws	Use cross tip screwdriver. Remove and retain four screws securing guard assembly to RT chassis.	
h. Guard assembly	Remove and retain.	
i. Nine captive screws	Use flat tip screwdriver. Fully loosen nine captive screws securing RT front panel assembly to RT chassis.	
	CAUTION Be careful not to catch RF cable W1 on RT chassis obstructions.	
j. RT front panel assembly	Pull RT front panel assembly free of RT chassis and place RT front panel face down on work surface.	

2-49. REPLACEMENT OF RT FRONT PANEL. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
k. Switch flex	Use flat tip screwdriver. Loosen two jackscrews securing switch flex connector to RT chassis. Disconnect switch flex connector from RT chassis.	Loosen jackscrews by alternately turning each no more than 1-1/2 turns.
l. Display flex	Use flat tip screwdriver. Loosen two jackscrews securing display flex connector to RT chassis. Disconnect display flex connector from RT chassis.	Loosen jackscrews by alternately turning each no more than 1-1/2 turns.
m. Audio flex	Use flat tip screwdriver. Loosen two jackscrews securing audio flex connector to RT chassis. Disconnect audio flex connector from RT chassis.	Loosen jackscrews by alternately turning each no more than 1-1/2 turns.
n. RT front panel assembly	Carefully remove from RT chassis. Repair RT front panel assembly as needed: R/R display CCA R/R audio flex assembly R/R switch flex assembly R/R front panel R/R observation window	
INSTALLATION		
o. RT front panel assembly	Position RT front panel face down near front of RT chassis.	
p. Audio flex	Use flat tip screwdriver. Install audio flex by tightening two jackscrews. Do not place any torque on jackscrews after connectors are mated.	Alternately turn each jackscrew no more than 1-1/2 turns.
q. Display flex	Use flat tip screwdriver. Install display flex by tightening two jackscrews. Do not place any torque on jackscrews after connectors are mated.	Alternately turn each jackscrew no more than 1-1/2 turns.
r. Switch flex	Use flat tip screwdriver. Install switch flex by tightening two jackscrews. Do not place any torque on jackscrews after connectors are mated.	Alternately turn each jackscrew no more than 1-1/2 turns.
s. RT front panel assembly	Position RT front panel on front of RT chassis.	
t. HCP Nine captive screws	Use torque screwdriver. Tighten nine captive screws securing RT front panel assembly to RT chassis. Torque screws to 8 to 10 in-lb.	
u. Guard assembly	Position on front of RT chassis.	

2-49. REPLACEMENT OF RT FRONT PANEL ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
v. Four screws	Use cross tip screwdriver. Install four retained screws securing guard assembly to RT chassis.	
w. Left bow handle	Position to RT chassis.	
x. Four screws	Use cross tip screwdriver. Install four retained screws securing left bow handle to RT chassis.	
y. Impedance matching network	Install retained impedance matching network.	Refer to paragraph 2-37 for installation of impedance matching network.
z. HCP Keyboard	Install retained keyboard.	Refer to paragraph 2-47 for installation of data entry keyboard.
aa. HCP RT bottom cover	Install retained bottom cover.	Refer to paragraph 2-35 for installation of bottom cover.
ab. HCP RT top cover	Install retained top cover.	Refer to paragraph 2-35 for installation of top cover.

2-49. REPLACEMENT OF RT FRONT PANEL ASSEMBLY. Continued

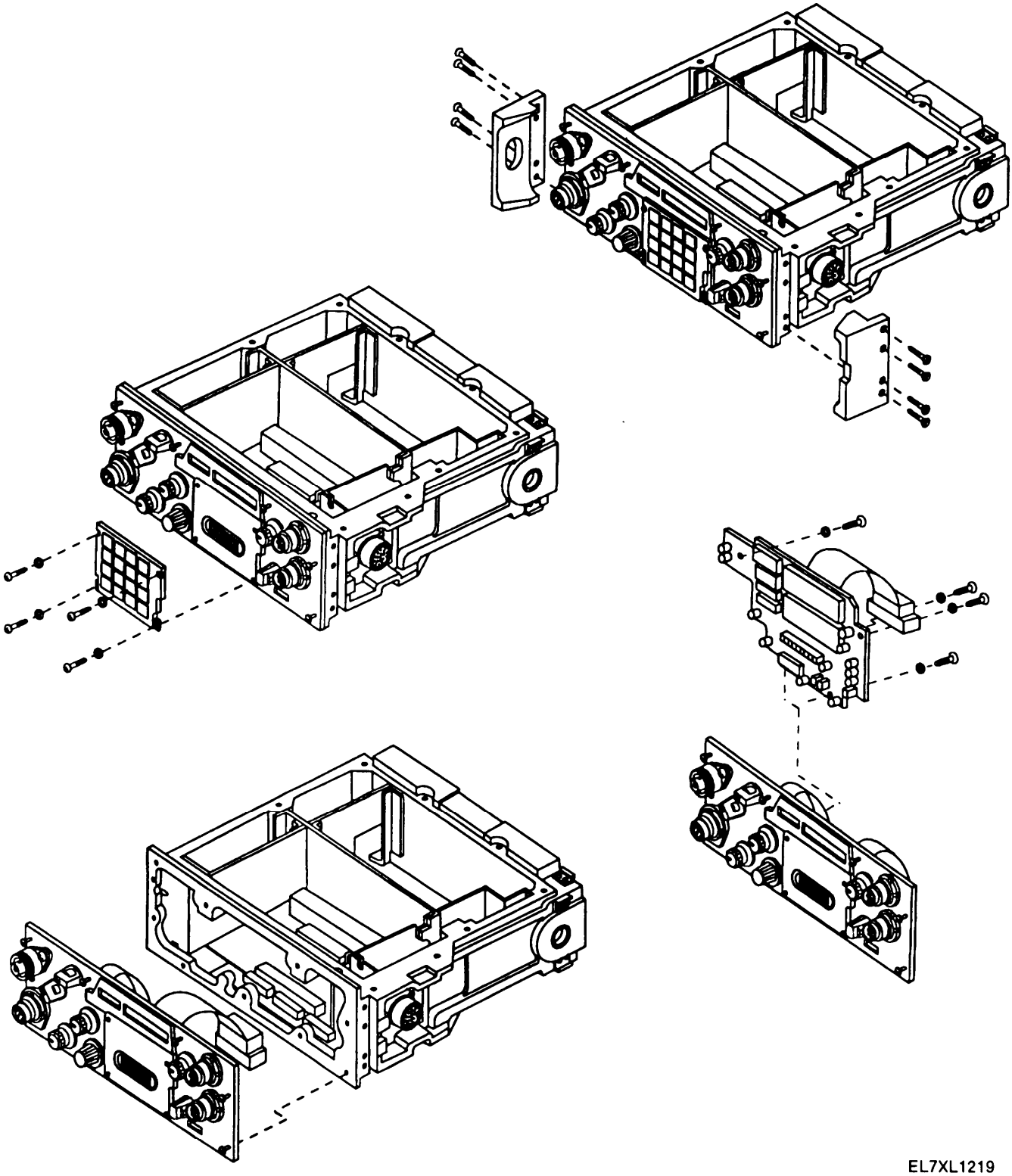


Figure 2-20. RT Front Panel Assembly.

2-50. REPLACEMENT OF DISPLAY CIRCUIT CARD ASSEMBLY.

CAUTION

Static electricity can damage the display CCA (1A16A1A1). Ground the RT and all tools before removing the display CCA. Use a grounded wrist strap when handling the display CCA.

Tools:

Torque screwdriver
Cross tip screwdriver

Expendable supplies:

Sealing compound, grade H

References:

Paragraph 2-35 for removal and installation of RT covers.
Paragraph 2-47 for removal and installation of data entry keyboard.
Paragraph 2-49 for removal and installation of RT front panel assembly.
Paragraph 2-51 for removal and installation of audio flex assembly.
Paragraph 2-52 for removal and installation of switch flex assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT front panel assembly	Remove and retain.	Refer to paragraph 2-49 for removal of RT front panel assembly.
b. Audio flex assembly	Remove and retain.	Refer to paragraph 2-51 for removal of audio flex assembly.
c. Switch flex assembly	Remove and retain.	Refer to paragraph 2-52 for removal of switch flex assembly.
d. Four screws and flat washers	Use cross tip screwdriver. Remove and retain four screws and flat washers securing insulator plate and display CCA to electrical posts.	
e. Insulator plate	Remove and retain.	
f. Display CCA	Remove.	
INSTALLATION		
g. Display CCA	Position display CCA on electrical posts.	
h. Insulator plate	Position retained insulator plate on display CCA.	

2-50. REPLACEMENT OF DISPLAY CIRCUIT CARD ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
i. Four screws	Apply one drop of sealing compound to threads of each of four retained screws used to secure insulator plate and display CCA to electrical posts.	
j. Four screws and flat washers	Use cross tip screwdriver. Install four retained screws and flat washers securing insulator plate and display CCA to electrical posts.	
k. Audio flex assembly	Install retained audio flex assembly.	Refer to paragraph 2-51 for installation of audio flex assembly.
l. switch flex assembly	Install retained switch flex assembly.	Refer to paragraph 2-52 for installation of switch flex assembly.
m. RT front panel assembly	Install retained RT front panel assembly.	Refer to paragraph 2-49 for installation of RT front panel assembly.

2-51. REPLACEMENT OF AUDIO FLEX ASSEMBLY.

Tools:

1/16-inch hex wrench	3/4-inch spanner socket
3/8-inch socket	Socket wrench
1/2-inch socket	Torque wrench
Torque screwdriver	Flat tip screwdriver

Expendable supplies:

Silicone compound

References:

Paragraph 2-35 for removal and installation of RT covers.
Paragraph 2-49 for removal and installation of RT front panel assembly,

ITEM	ACTION	REMARKS
REMOVAL		
a. RT front panel assembly	Remove and retain.	Refer to paragraph 2-49 for removal of RT front panel assembly.
b. Set screws	Use 1/16-inch hex wrench. Loosen set screws securing knobs to VOL variable resistor and DATA rotary switch.	
c. Control knobs	Remove and retain control knobs.	
d. Spring lockwasher	Remove and discard spring lockwasher from shaft of DATA rotary switch.	

2-51. REPLACEMENT OF AUDIO FLEX ASSEMBLY. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Spring tension washer	Remove and retain spring tension washer from shaft of VOL variable resistor.	
f. Retaining nut	Use 3/8-inch socket and socket wrench. Remove and retain retaining nut securing DATA rotary switch to RT front panel assembly.	
g. Retaining nut	Use 1/2-inch socket and socket wrench. Remove and retain retaining nut securing VOL variable resistor to RT front panel assembly.	
h. Retaining nuts	Use 3/4-inch spanner socket and socket wrench. Remove and retain retaining nuts securing AUD/FILL and AUD/DATA connectors to RT front panel assembly.	
i. Internal tooth lockwashers	Remove and discard internal tooth lockwashers from AUD/FILL and AUD/DATA connectors.	
j. Audio flex assembly	Remove and discard.	
INSTALLATION		
k. Audio flex assembly	Position audio flex assembly in RT front panel assembly.	
l. HCP Retaining nut	Use 1/2-inch socket and torque wrench. Install and tighten retaining nut securing VOL variable resistor. Torque nut to 19 to 21 in-lb.	
m. HCP Retaining nut	Use 3/8-inch socket and torque wrench. Install and tighten retaining nut securing DATA rotary switch. Torque nut to 11 to 13 in-lb.	
n. Internal tooth lockwashers	Obtain replacement internal tooth lockwashers and place on AUD/FILL and AUD/DATA connectors.	
o. HCP Retaining nuts	Use 3/4-inch spanner socket and torque wrench. Install and tighten retaining nuts securing AUD/FILL and AUD/DATA connectors. Torque nuts to 88 to 92 in-lb.	
p. Spring tension washer	Place retained spring tension washer on shaft of VOL variable resistor.	
q. Spring lockwasher	Place replacement spring lockwasher on shaft of DATA rotary switch.	**NOTE**
r. Knobs	Position retained control knobs on shafts aligning knob set screws with flat surface.	VOL control knob shaft must be pressed in before installing knob.

2-51. REPLACEMENT OF AUDIO FLEX ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
s. Set screws	Use 1/16-inch hex wrench. Tighten set screws securing knobs to VOL variable resistor and DATA rotary switch.	
t. RT front panel assembly	Install retained RT front panel assembly.	Refer to paragraph 2-49 for installation of RT front panel assembly.

2-52. REPLACEMENT OF SWITCH FLEX ASSEMBLY.

Tools:

1/16-inch hex wrench	5/16-in socket
3/8-inch socket	1/2-inch socket
9/16-inch socket	3/4-inch spanner socket
Torque screwdriver	Torque wrench
Flat tip screwdriver	Socket wrench

Expendable supplies:

Silicone compound

References:

Paragraph 2-35 for removal and installation of RT covers.
Paragraph 2-49 for removal and installation of RT front panel assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. RT front panel assembly	Remove and retain.	Refer to paragraph 2-49 for removal of RT front panel assembly.
b. Set screws	Use 1/16-inch hex wrench. Loosen set screws securing knobs to DIM variable resister, CHAN rotary switch, MODE rotary switch, RF PWR rotary switch, and FCTN rotary switch.	
c. Knobs	Remove and retain knobs.	
d. Spring lockwashers	Remove and retain spring lockwashers from shafts of DIM variable resistor, CHAN rotary switch, MODE rotary switch, RF PWR rotary switch, and FCTN rotary switch.	
e. Retaining nuts	Use 3/8-inch socket and socket wrench. Remove and retain retaining nuts securing RF PWR rotary switch, CHAN rotary switch, and MODE rotary switch to RT front panel assembly.	

2-52. REPLACEMENT OF SWITCH FLEX ASSEMBLY. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
f. Retaining nut	Use 5/16-inch socket and socket wrench. Remove and retain retaining nut securing DIM variable resistor to RT front panel assembly.	
g. Retaining nut	Use 9/16-inch socket and socket wrench. Remove and retain retaining nut securing FCTN rotary switch to RT front panel assembly.	
h. Retaining nut	Use 3/4-inch spanner socket and socket wrench. Remove and retain retaining nut securing RXMT connector to RT front panel assembly.	
i. Internal tooth lockwasher	Remove and retain internal tooth lockwasher from RXMT connector.	
j. Switch flex assembly	Remove and discard.	
INSTALLATION		
k. Switch flex assembly	Position switch flex assembly on RT front panel assembly.	
l. HCP Retaining nut	Use 9/16-inch socket and torque wrench. Install and tighten retaining nut securing FCTN rotary switch. Torque nut to 29 to 31 in-lb.	
m. HCP Retaining nut	Use 5/16-inch socket and torque wrench. Install and tighten retaining nut securing DIM variable resistor. Torque nut to 11 to 13 in-lb.	
n. HCP Retaining nuts	Use 3/8-inch socket and torque wrench. Install and tighten retaining nuts as follows: CHAN rotary switch: 11 to 13 in-lb. MODE rotary switch: 11 to 13 in-lb. RF PWR rotary switch: 19 to 21 in-lb.	
o. Internal tooth lockwasher	Obtain new internal tooth lockwasher and place on RXMT connector.	
p. HCP Retaining nut	Use 3/4-inch spanner socket and torque wrench. Install and tighten retaining nut and internal tooth lockwasher securing RXMT connector. Torque nut to 88 to 92 in-lb.	
q. Knobs	Position retained knobs on shafts aligning knob set screws with flat surface.	**NOTE** VOL control knob shaft must be pressed in before installing knob.

2-52. REPLACEMENT OF SWITCH FLEX ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
r. Set screws	Use 1/16-inch hex wrench. Tighten set screws securing knobs to DIM variable resistor, CHAN rotary switch, MODE rotary switch, RF PWR rotary switch, and FCTN rotary switch.	
s. RT front panel assembly	Install retained RT front panel assembly.	Refer to paragraph 2-49 for installation of RT front panel assembly.

2-53. REPLACEMENT OF FRONT PANEL.

Tools:

Cross tip screwdriver	Flat tip screwdriver	Torque screwdriver
Module extractor	1/16-inch socket head wrench	Round nose pliers
3/8-inch socket	3/4-inch spanner socket	Soldering kit
1/2-inch socket	3/16-inch nutdriver	Socket wrench
5/16-inch socket	9/16-inch socket	Torque wrench

Expendable supplies:

Silicone compound

References:

Paragraph 2-47 for removal and installation of data entry keypad.
Paragraph 2-49 for removal and installation of front panel assembly.
Paragraph 2-51 for removal and installation of audio flex.
Paragraph 2-52 for removal and installation of switch flex.
Paragraph 2-50 for removal and installation of display CCA.
Figures 2-18 and 2-20 for location of components of front panel assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Front panel assembly	Remove.	Refer to paragraph 2-49 for removal of front panel assembly.
b. Audio flex	Remove.	Refer to paragraph 2-51 for removal of audio flex.
c. Switch flex	Remove.	Refer to paragraph 2-52 for removal of switch flex.
d. Keypad	Remove.	Refer to paragraph 2-47 for removal of data entry keypad.
e. Display CCA and insulator plate	Remove.	Refer to paragraph 2-50 for removal of display CCA.
f. Six standoff posts	Use flat tip screwdriver. Remove and retain six standoff posts.	

2-53. REPLACEMENT OF FRONT PANEL. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
g. Window frame	Use cross tip screwdriver. Remove six screws securing window frame to front panel. remove and retain window frame.	
h. Shielding gasket	Remove and discard.	
i. Observation window	Remove and retain.	
j. Window gasket	Remove and discard.	
k. Identification plate and two screws	Use cross tip screwdriver. Remove and retain.	
l. Front panel	Discard.	
INSTALLATION		
m. Identification plate and front panel	Position retained identification plate on replacement front panel.	This was removed in step k.
n. Identification plate	Use cross tip screwdriver. Install two retained screws securing identification plate to front panel.	These were removed in step k.
o. Window gasket	Position replacement window gasket on front panel.	
p. Observation window	Position retained observation window on window gasket.	This was removed in step i.
q. Shielding gasket	Position replacement shielding gasket on observation window.	
r. Window frame	Install retained window frame.	This was removed in step g.
s. Window frame	Use cross tip screwdriver. Install six retained screws securing window frame.	These were removed in step g.
t. Six standoff posts	Use flat tip screwdriver. Install six retained standoff posts.	These were removed in step f.
u. Display CCA and insulator plate	Install.	Refer to paragraph 2-50 for installation of display CCA.
v. Keypad	Install.	Refer to paragraph 2-47 for installation of data entry keypad.
w. Audio flex	Install.	Refer to paragraph 2-51 for installation of audio flex.
x. Switch flex	Install.	Refer to paragraph 2-52 for installation of switch flex.
y. HCP Front panel assembly	Install.	Refer to paragraph 2-49 for installation of front panel assembly.

2-54. REPLACEMENT OF OBSERVATION WINDOW.

In order to replace the observation window, perform the procedure in paragraph 2-53 for replacement of the front panel; but, instead of replacing the front panel, replace the observation window.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

2-55. GENERAL INFORMATION.

a. Pack the RT and modules in approved shipping containers.

b. All modules must be shipped enclosed in material that provides protection from static electricity. See the following paragraph.

2-56. PACKING STATIC SENSITIVE MODULES.

The following steps should be followed when packing a static sensitive module for storage or shipment.

CAUTION

To avoid damaging static sensitive modules, use an antistatic pad on the work surface and wear a grounded wrist strap when handling the module.

ITEM	ACTION	REMARKS
a. Module (1)	Place inside antistatic bag (2) or inside antistatic wrapping material (3). See figure 2-21.	
b. Antistatic package (4)	Seal with adhesive tape. Attach “static sensitive contents” unit pack label (5).	
c. Antistatic package (4)	Place inside approved shipping container (6). Attach “static sensitive contents” intermediate pack label (7).	

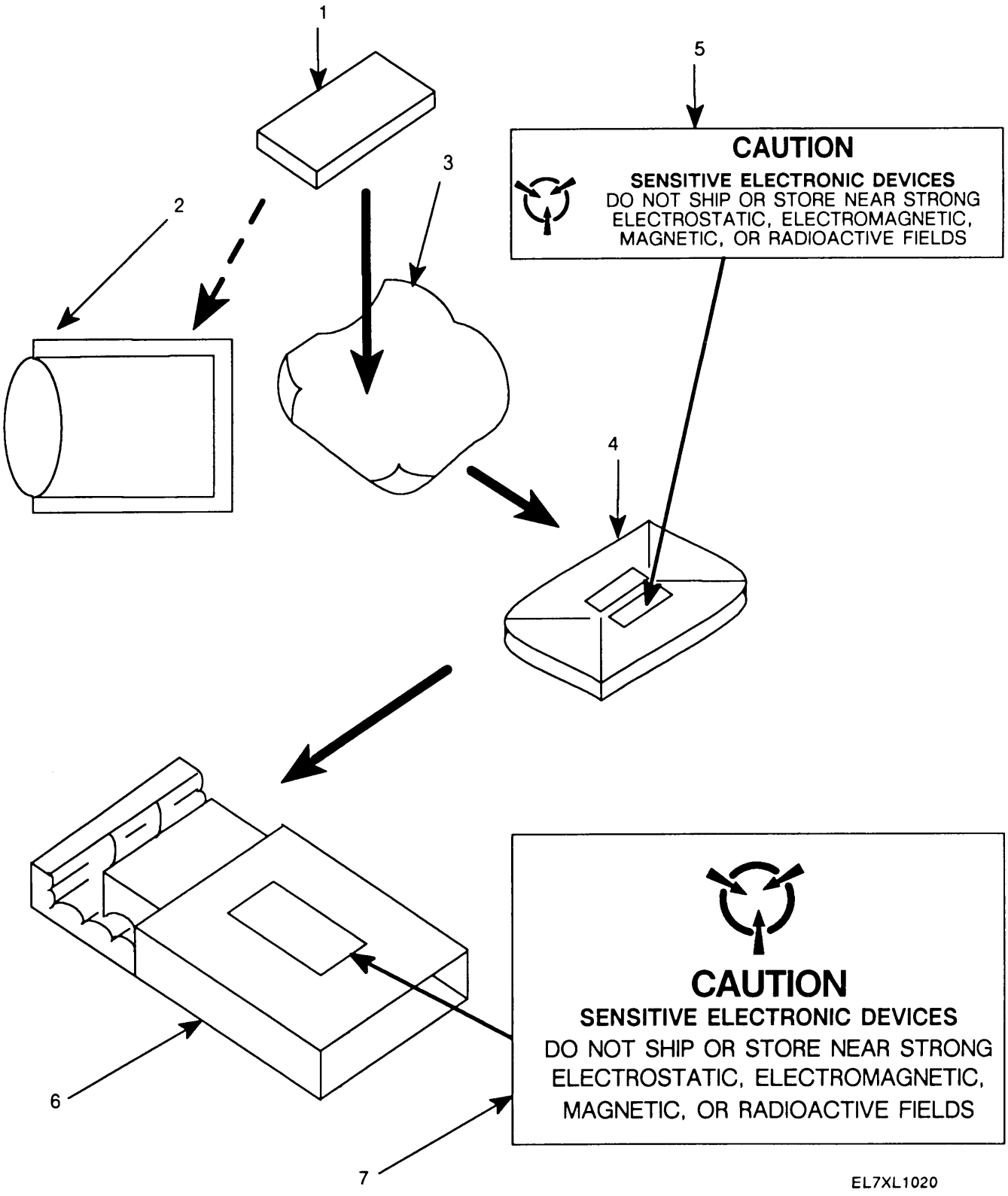


Figure 2-21. Packing Static Sensitive Modules.

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CHAPTER 3

MAINTENANCE GROUP OA-9263A/GRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

3-1. INTRODUCTION.

Maintenance Group OA-9263A/GRC is used to test and troubleshoot the radio set components. It is made up of the following:

Receiver-Transmitter, Radio RT-1439/VRC
Amplifier-Adapter, Vehicular AM-7239/VRC or AM-7239B/VRC
Mounting Base, Electrical Equipment MT-6352/VRC
Fill Device, Electronic Counter-Countermeasures MX-10579/VRC or MX-18290/VRC
Interconnecting Device J-4501/GRC

The COEI list in Appendix C shows the items found in the maintenance group.

3-2. RECEIVER-TRANSMITTER, RADIO RT-1439/VRC.

One RT-1439/VRC is included with the maintenance group. The RT serves as a reference radio (REF RT) for troubleshooting and operational check procedures. It functions as a receiver or transmitter when used to troubleshoot other RTs. It helps test the operation of all RT modes: SC, FH, PT, CT, audio, and data. It is mounted in the lower slot of the mounting adapter included in the maintenance group.

Operating instructions are in TM 11-5820-890-10-3. Unit maintenance instructions are in TM 11-5820-890-20-2. If an RT is determined to be faulty, see chapter 2.

3-3. AMPLIFIER-ADAPTER, VEHICULAR AM-7239/VRC OR AM-7239B/VRC.

One mounting adapter is included in the maintenance group. The mounting adapter provides physical support and electrical power for the reference RT.

Operating instructions are in TM 11-5820-890-10-3. Unit maintenance instructions are in TM 11-5820-890-20-2. Direct Support maintenance instructions are in this manual.

3-4. MOUNTING BASE, ELECTRICAL EQUIPMENT MT-6352/VRC.

The mounting base is used with the radio. A power cable connects the mounting base to a 28 V dc supply. The power is routed to the radio. The mounting base can be secured to the work surface. This may be desirable in some maintenance shops. The mounting base is covered in TM 11-5820-890-20-2 and this manual.

3-5. FILL DEVICE, ELECTRONIC COUNTER-COUNTERMEASURES MX-10579/VRC OR MX-18290/VRC.

This fill device is used to hold and transfer ECCM fill data. It can hold hopsets, lockout sets, and TRANSEC variables. Operating instructions are in TM 11-5820-890-10-3. Unit maintenance instructions are in TM 11-5820-890-20-2. Direct Support maintenance instructions are in this manual.

3-6. INTERCONNECTING DEVICE J-4501/GRC.

The interconnecting device is used to interconnect a unit under test and the test equipment. It includes a test adapter, cables, and tools used for unit repair. The COEI list in Appendix C lists the items found in the interconnecting device. All of the items that come with the interconnecting device are stored in the chest. It functions as a shipping and storage container.

a. Test Adapter. The test adapter provides connections for the test equipment, reference fixture, and units under test. It performs several signal switching functions. The capabilities of the test adapter are covered in paragraph 3-7. The test adapter is secured inside the lid of the interconnecting device chest. It is shown in figure 3-1.

b. Tool Kit. The tool kit includes the following tools:

Module extractor
Threaded screw insert replacement tools
Torque wrench and adapters
Open end wrenches
Deep well socket set
Spanner adapters

The module extractor is used to remove modules from the RT. Instructions for using it are included in Chapter 2. The torque wrench, adapters, and sockets are used to torque the cover screws and other items.

c. Electronic Equipment Parts Kit. The items included in the parts kit are used to connect the test setups. It contains 13 adapters, 3 cables, a test lead, and a logic probe.

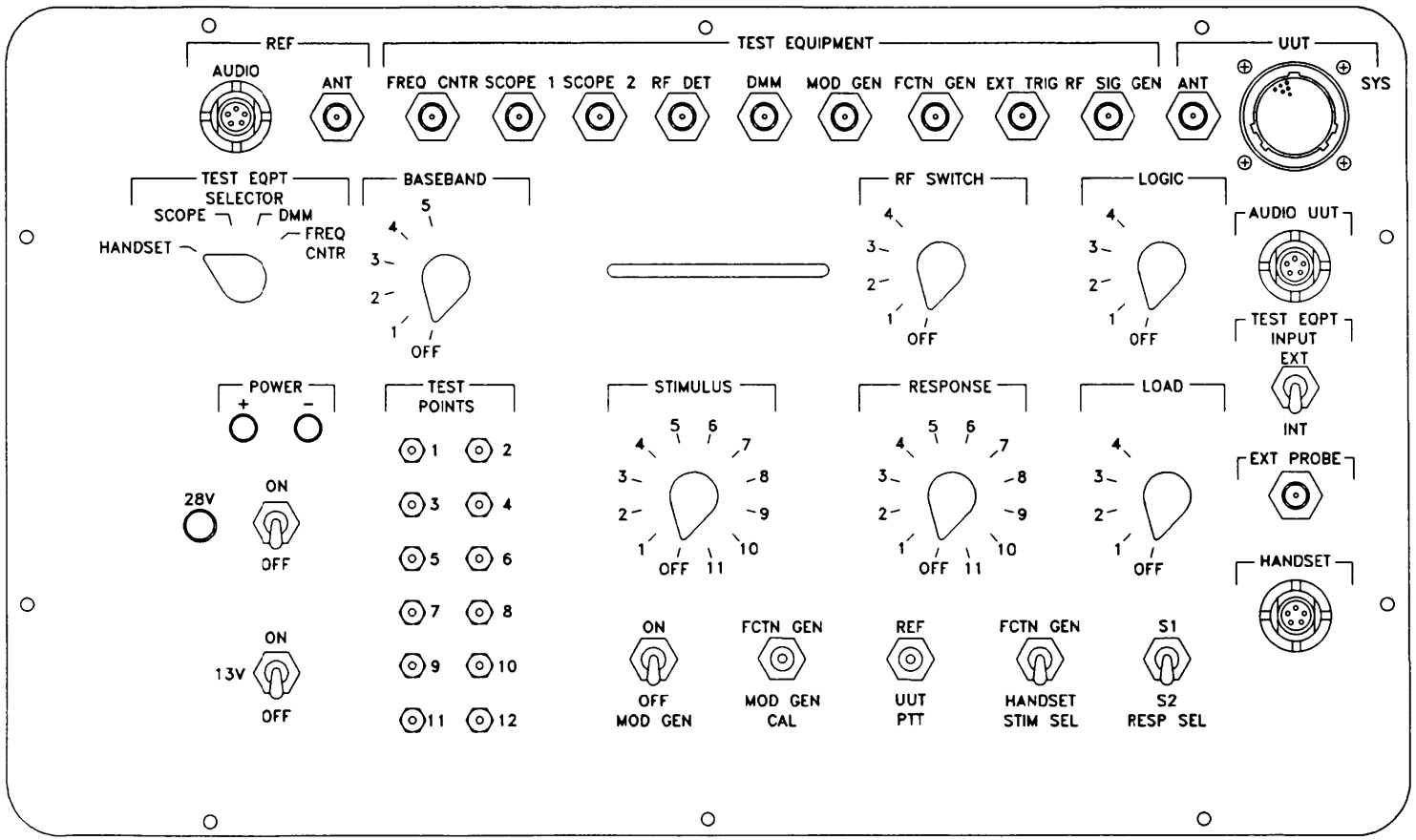

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Figure 3-1. Test Adapter Front Panel.

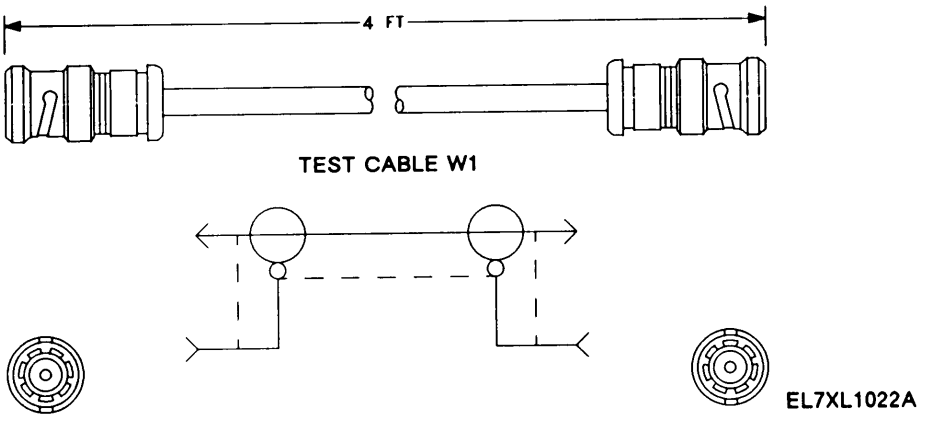
3-6. INTERCONNECTING DEVICE J-4501/GRC. Continued

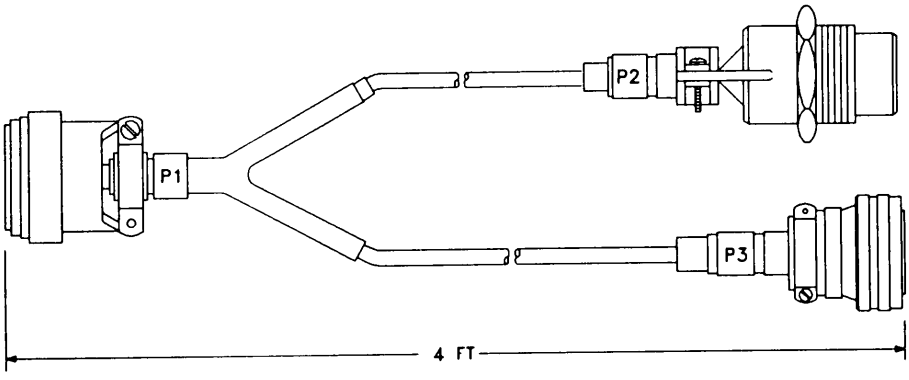
d. Cables. There are cables included in the interconnecting device. A drawing and schematic of each repairable cable is included in figure 3-2 as an aid in repairing a defective cable. The cables are used as follows:

REF DES OR PIN	PURPOSE
W1	Connects test adapter to test equipment.
W2	Connects test adapter to RT UUT.
W3	Connects mounting adapter to RFPA.
W4	Connects mounting adapter J9 to control-monitor J1, J2, or J3.
W5	Connects test adapter to mounting adapter.
W6	Connects test adapter to control-monitor.
W7	Connects test adapter to RFPA.
W8	Standard 6-pin audio/data cable.
W9	Connects test adapter to auxiliary RFPA mount.
W10	Connects test adapter to maintenance group LRUs.
W11	Connects test adapter to battery box.
W12	Connects test power supply to test adapter (2-wire nonrepairable cable).
W13	Connects fill device to RT (6-pin audio/data cable).
W14	Connects test adapter to power supply adapter.
W15	Connects test adapter to battery tray.
W16	Connects test adapter to loudspeaker-control unit.
CX-4720 /VRC-12FT	Connects mounting base to 28 V dc power supply (power cable).

e. Handset H-250/U. A standard handset that is included in the interconnecting device.

f. Static Control. included with the interconnecting device are a static control mat for the workbench and two grounding wrist straps. These are used whenever handling the radio equipment. They must be used when handling or testing electrostatic sensitive parts.





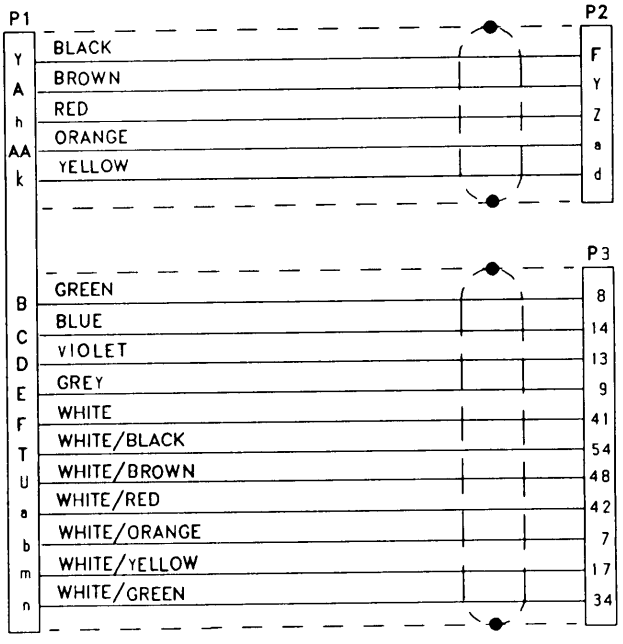
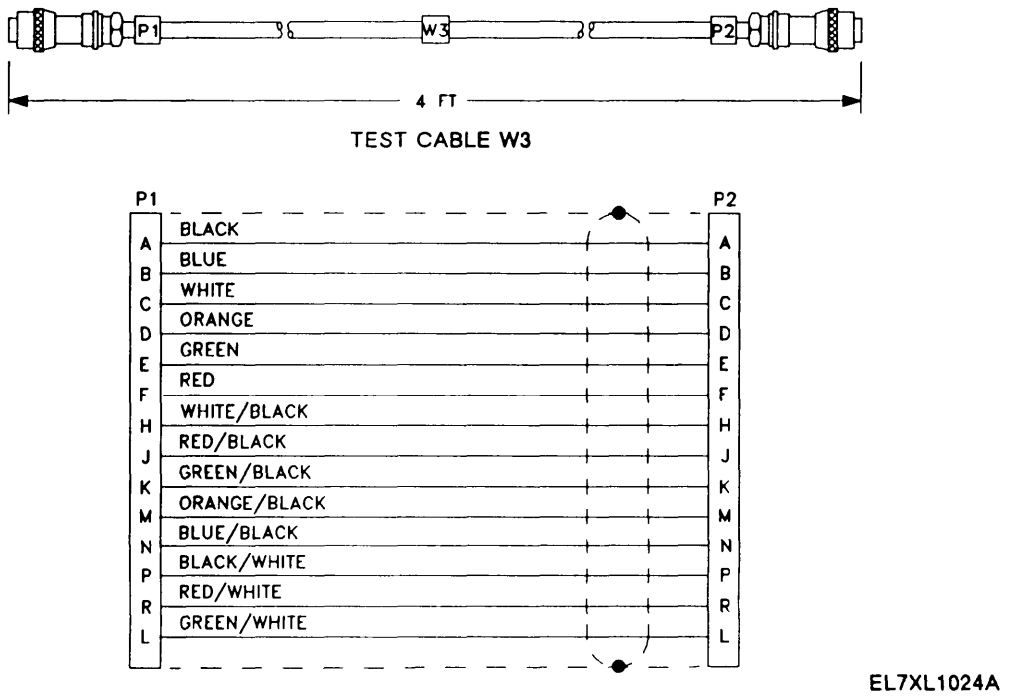


Figure 3-2. Test Cables (Sheet 1 of 10)



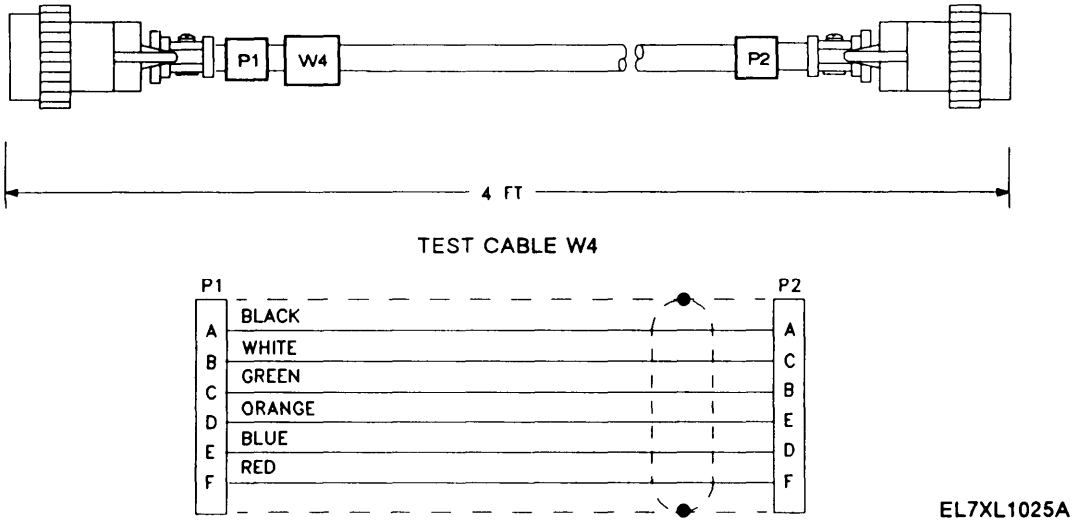


Figure 3-2. Test Cables (Sheet 2 of 10)

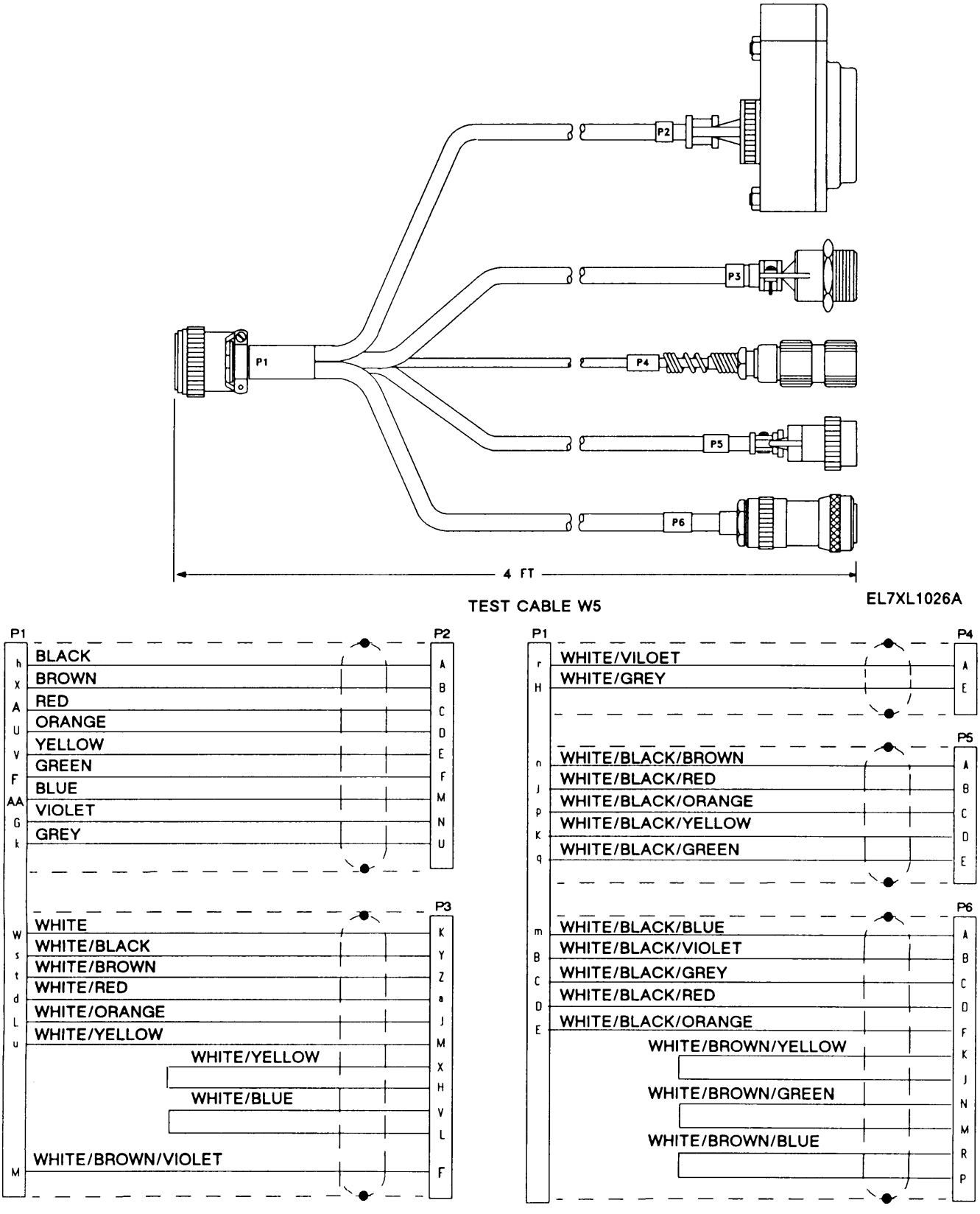
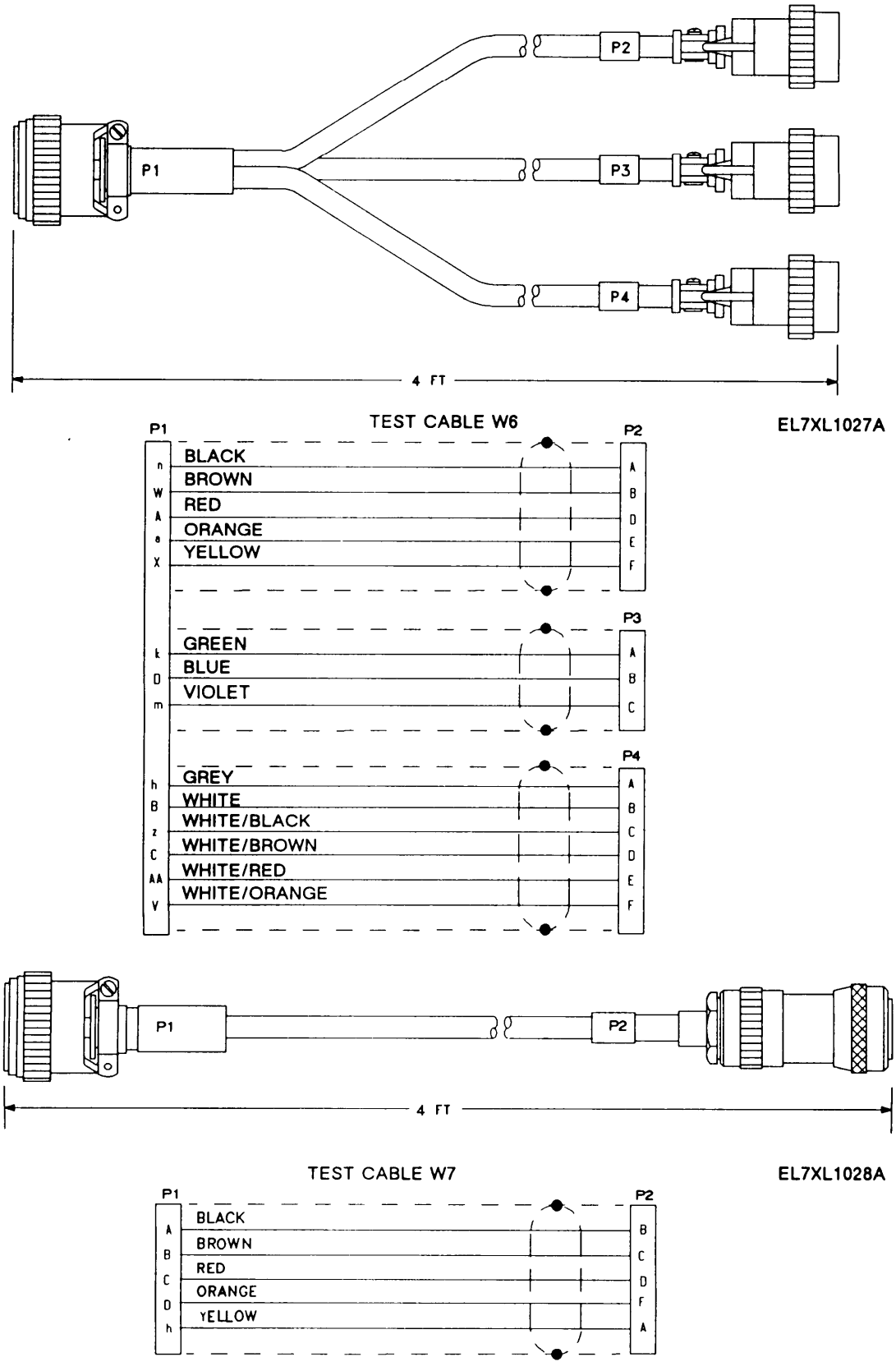


Figure 3-2. Test Cables (Sheet 3 of 10)



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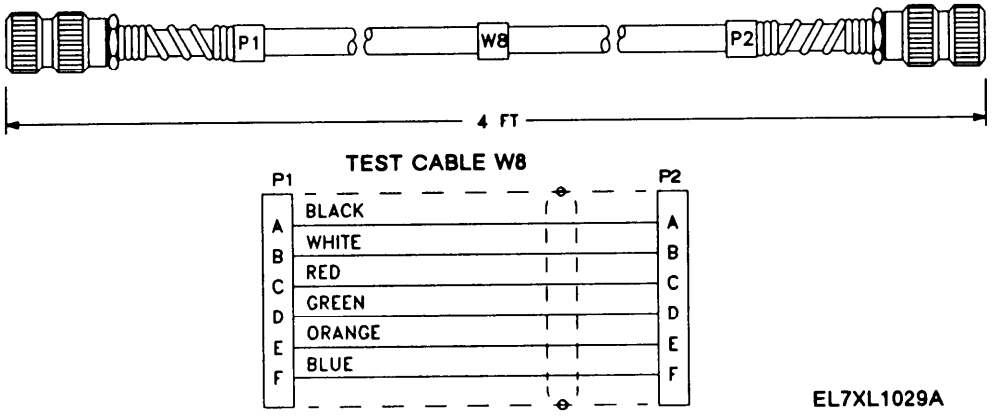


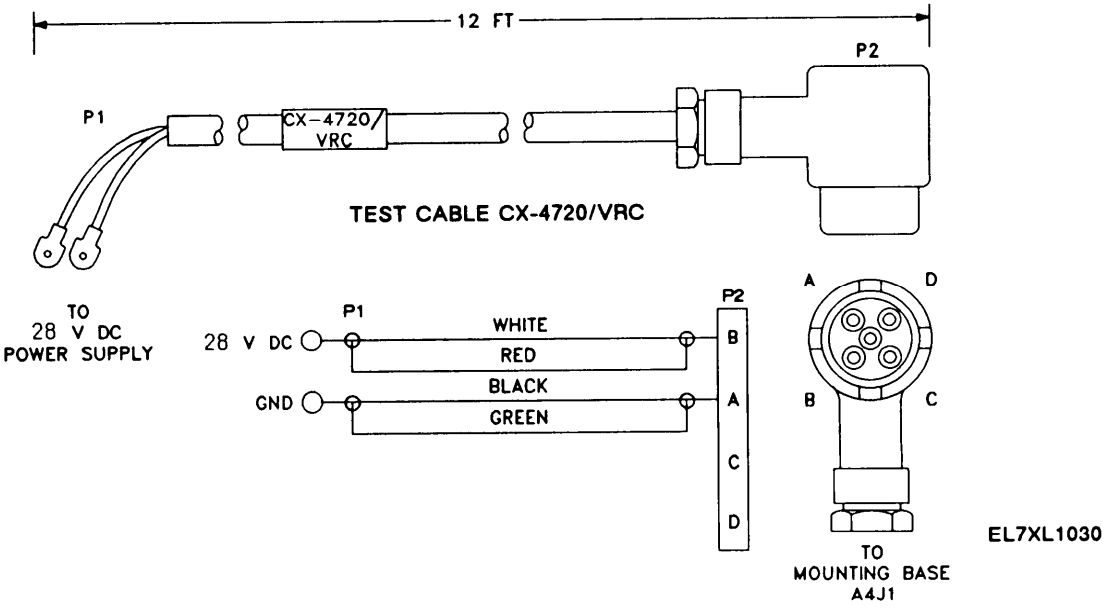
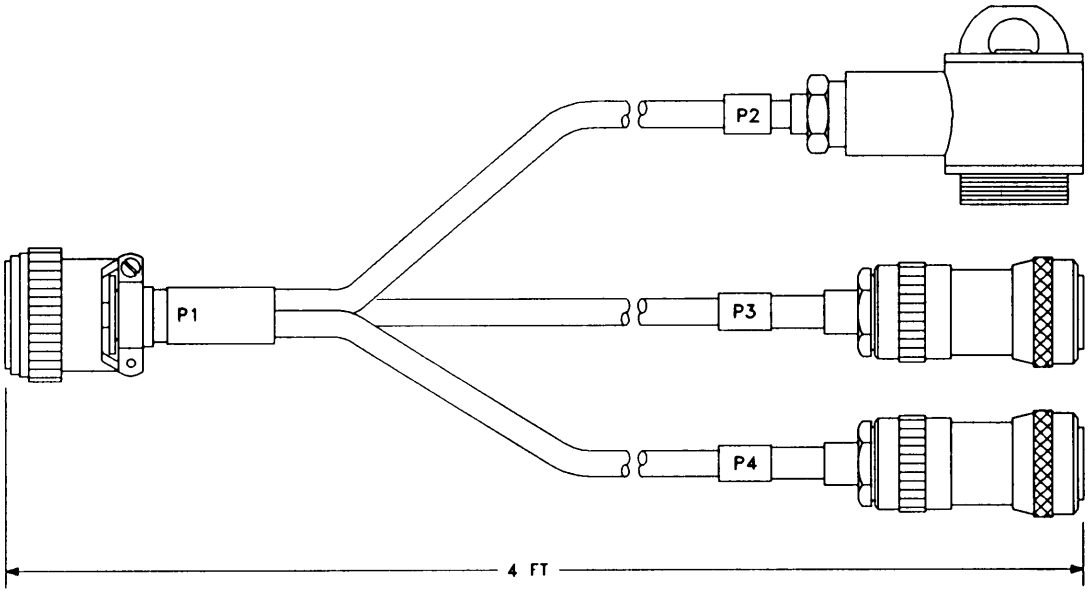


Figure 3-2. Test Cables (Sheet 5 of 10)



TEST CABLE W9

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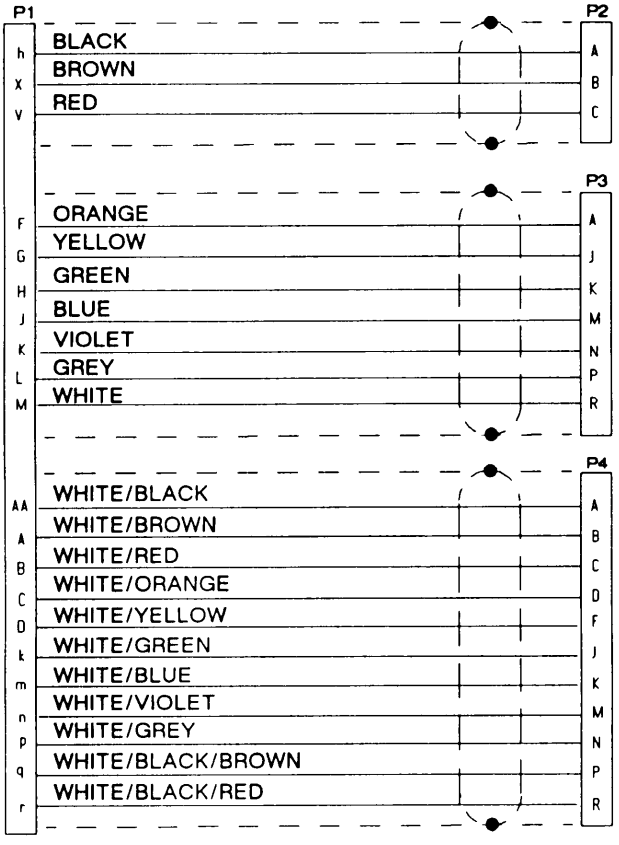

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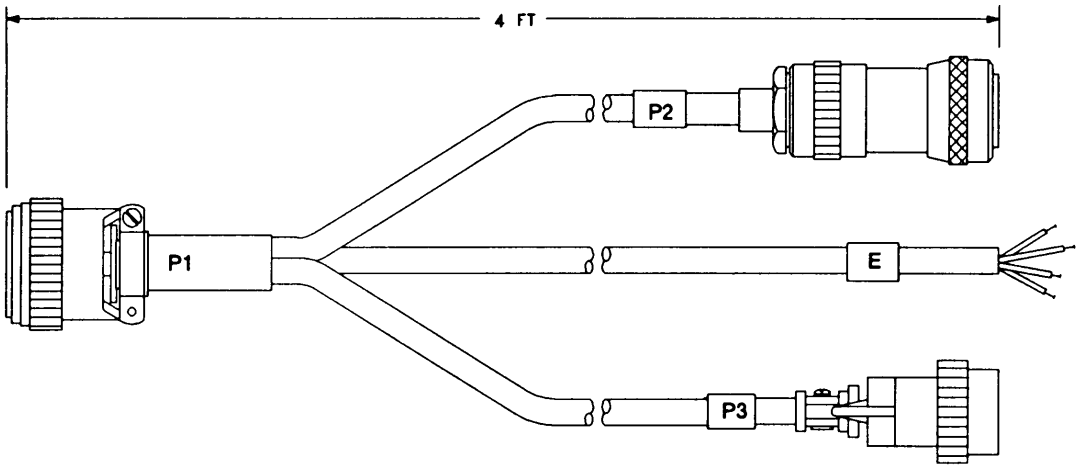


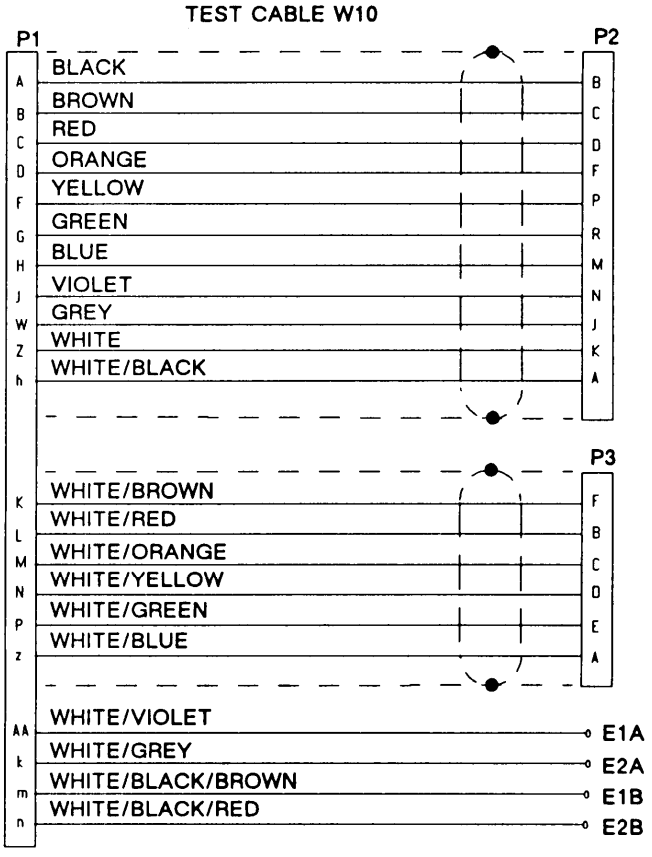
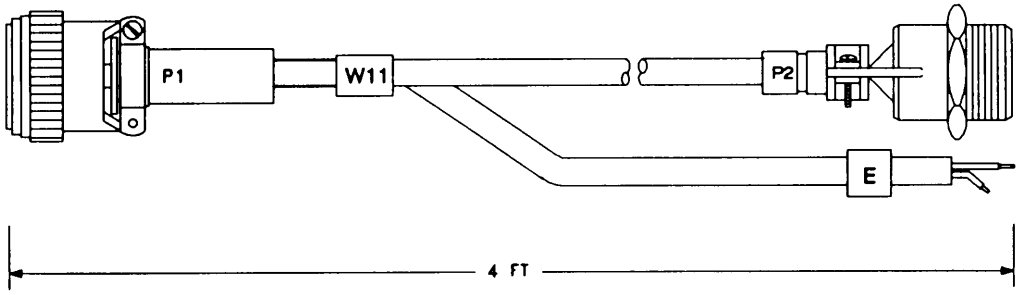
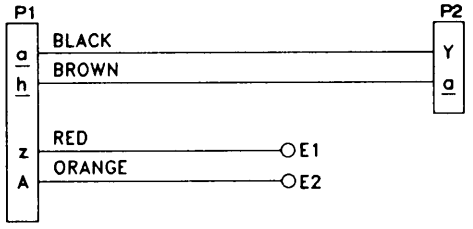


Figure 3-2. Test Cables (Sheet 7 of 10)



TEST CABLE W11



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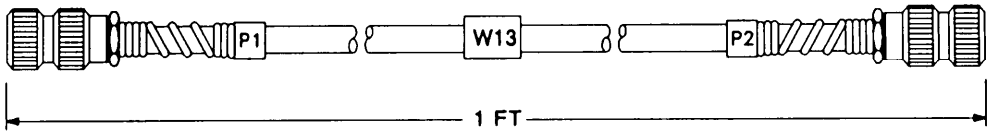

TEST CABLE W13

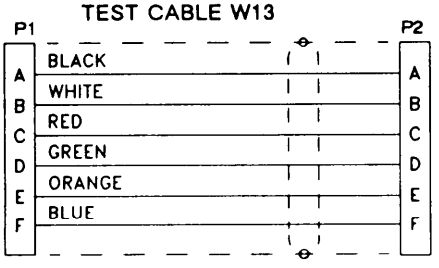

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Figure 3-2. Test Cables (Sheet 8 of 10)

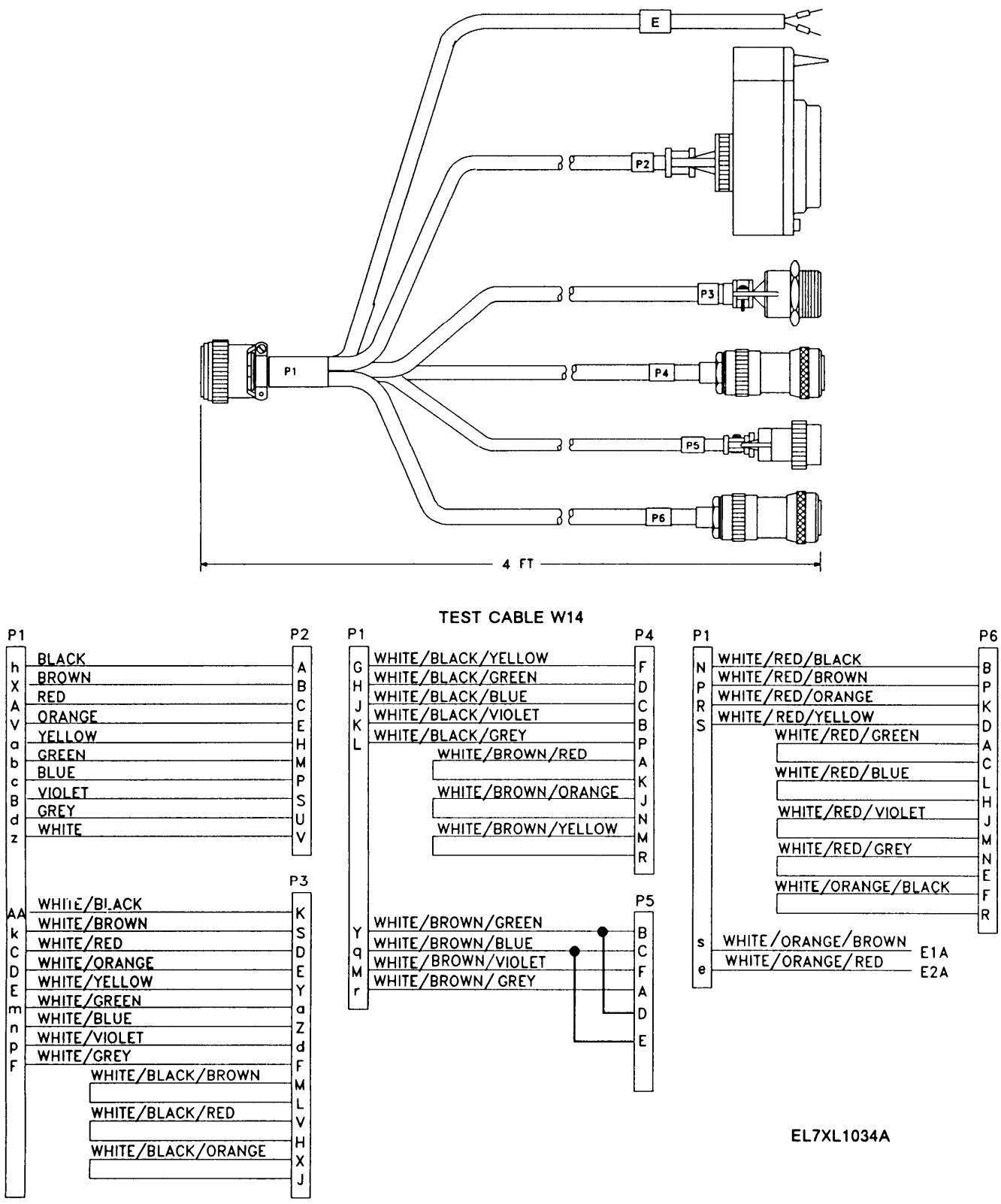
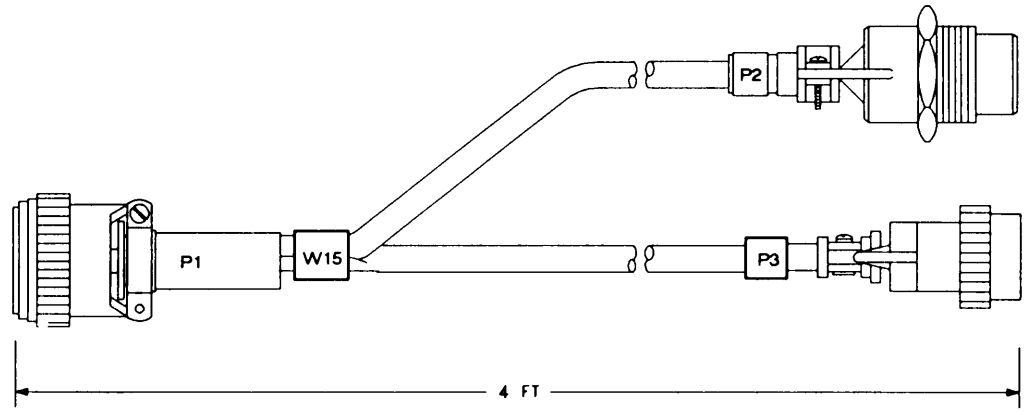
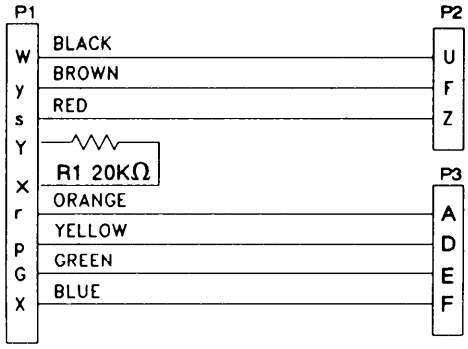


Figure 3-2. Test Cables (Sheet 9 of 10)



TEST CABLE W15



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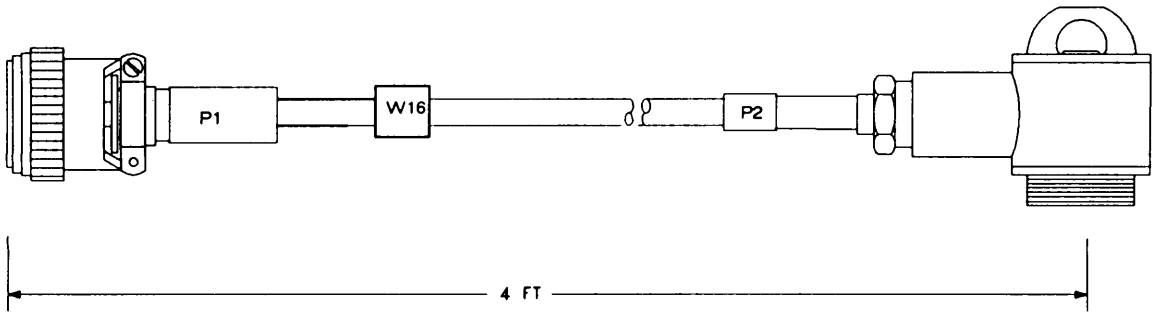

TEST CABLE W16

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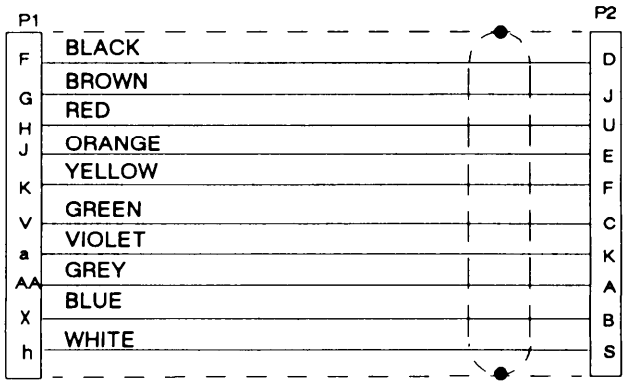


Figure 3-2. Test Cables (Sheet 10 of 10)

3-7. TEST ADAPTER.

The test adapter provides a means of routing signals to, from, and between the reference fixture and a unit under test (UUT). Signals may be routed, sampled, and changed for different test procedures.

The different functions of the test adapter can be divided into seven major areas. They are:

Test Equipment I/O
Reference Fixture I/O
UUT I/O
Power Supply
RF Signal Routing
Switching
Test Points

The interaction of these areas is shown in the block diagram of figure 3-3. A complete schematic of the test adapter is shown in figure FO-19. The following paragraphs discuss the major functions of the test adapter.

a. Test Equipment I/O. The test equipment used with the maintenance group connects to BNC connectors mounted on the test adapter front panel. The following list provides details about the connections.

CONNECTOR	TEST EQUIPMENT
FREQ CNT	Frequency counter input
SCOPE 1	Scope Channel 1 input
SCOPE 2	Scope Channel 2 input
RF DET	RF Probe used with DMM.
DMM	DMM
MOD GEN	Output from modulation generator section of function generator.
FCTN GEN	Output from function generator.
EXT TRIG	External trigger input of function generator.
RF SIG GEN	RF output of signal generator.
EXT PROBE	Test probe supplied with scope.
HANDSET (six-pin audio connector)	H-250/U handset included with maintenance group.

b. Reference Fixture I/O. AUDIO REF and ANT REF connectors are connected to the AUD/DATA and ANT connectors of the reference RT which is part of the reference fixture included in the maintenance group. Audio signals, data signals, and control signals are exchanged with the reference RT through the AUDIO REF connector. Transmitted and received FM radio signals are exchanged with the reference RT through the ANT REF connector.

c. UUT I/O. The ANT and AUDIO UUT connectors are connected to the ANT and AUDIO/DATA connectors of an RT UUT. As with the reference RT, audio, data, and control signals are exchanged through the AUDIO UUT connector and FM radio signals are exchanged through the ANT connector.

The UUT connector is used to interface with the system connector of an RT UUT. It may be connected to several other types of equipment with the use of different test cables. Power, control, and communication signals are supplied to a UUT through this connector.

d. Power Supply. 27.5 V dc is input to the test adapter power supply through the POWER + and - inputs of the front panel (J15 and J16). See figure 3-4 for a partial schematic diagram of this section.

3-7. TEST ADAPTER. Continued

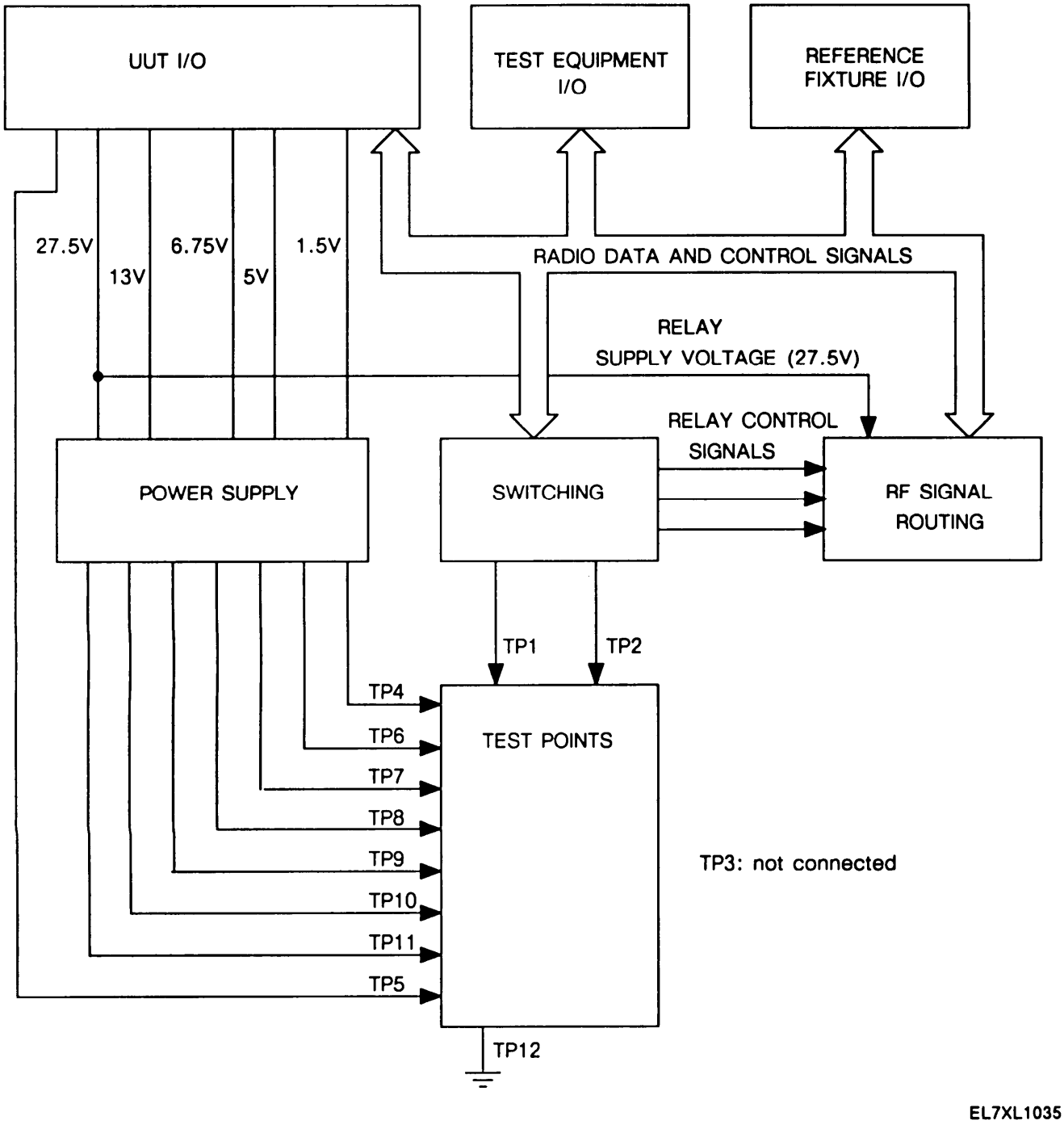


Figure 3-3. Test Adapter Interaction Block Diagram

3-7. TEST ADAPTER. Continued

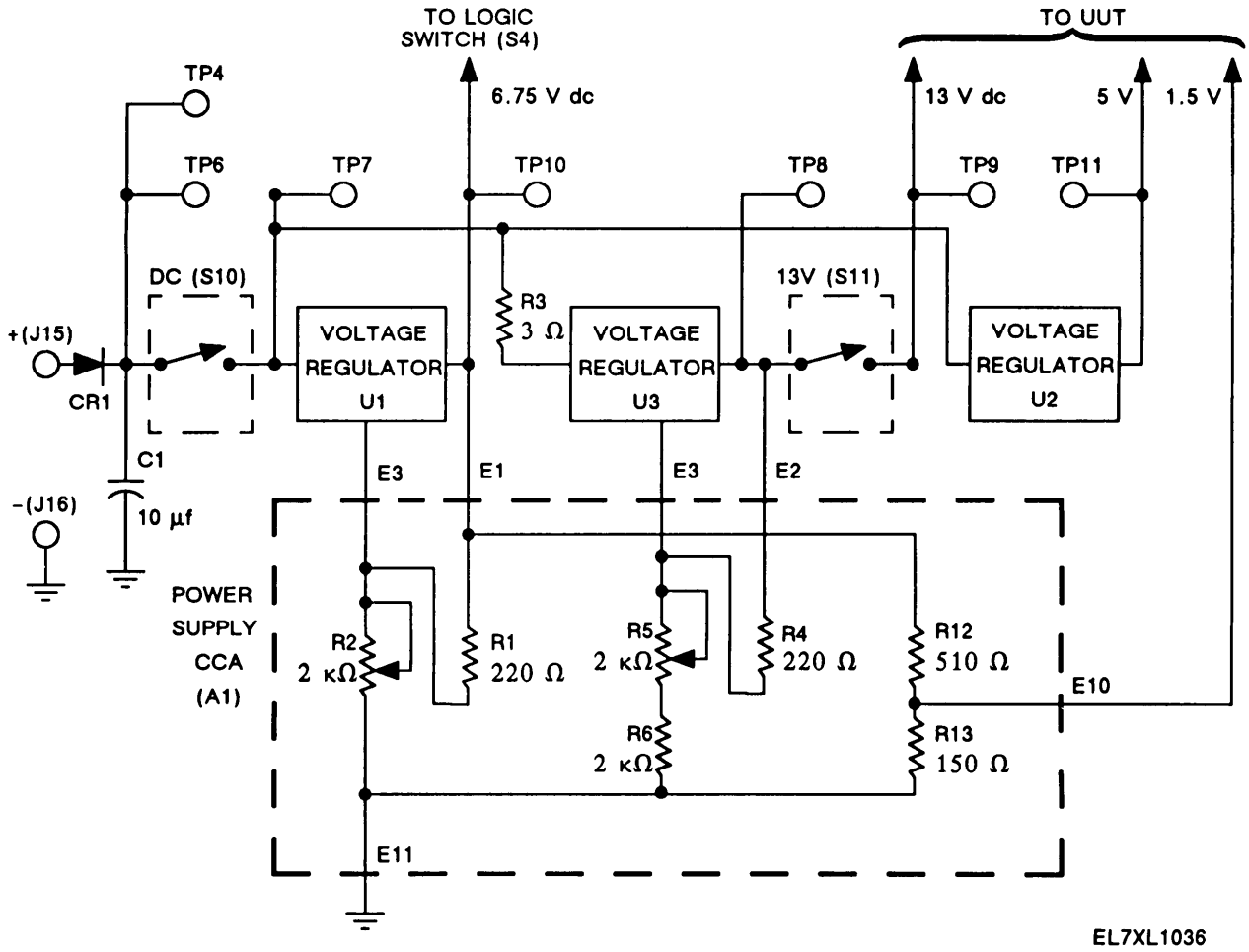


Figure 3-4. Test Adapter Power Supply

3-7. TEST ADAPTER. Continued

Diode CR1 prevents test adapter damage from accidental reversal of the power supply inputs.

Voltage regulators U1, U2, and U3 convert the input voltage to the voltages used by the UUT. The 1.5 V supply is provided by a voltage divider composed of R12 and R13 tapped into the 6.75 V supply line.

All resistors used by the power supply, except for R3, are mounted on the test adapter power supply CCA (18A1).

e. RF Signal Routing. This section routes RF signals to and from the reference radio and UUT antenna connectors and the test equipment.

Relays K1, K2, and K3 control the flow of the RF signals. Each is controlled by the RF switch (S3). 27.5 V dc is supplied to the positive control lead (+) of each relay. Each relay's negative control lead (-) may be connected to GND through the RF switch. When the negative control lead is grounded, current flows through the relay coil, shifting the relay output from the NC output to the NO output.

Attenuators AT1 and AT2 decrease the signal strength of RF signals input from either the reference or UUT RTs. This prevents damage to an RT from a high power input signal. AT3 provides a 50-ohm matching impedance to the RF DET output.

f. Switching. The switching section is composed of a variety of switches which perform signal routing functions. Table 3-1 describes them and their uses. The switches are shown in detail in the schematic of FO-19.

Table 3-1. Test Adapter Switches

NAME (NUMBER)	FUNCTION
TEST EQPT SELECTOR (S1)	Routes signals for testing to test equipment (to frequency counter, DMM, scope channel 1, or handset).
BASEBAND (S2)	Sets conditions on the AUDIO REF and AUDIO UUT connectors for several audio and data operation modes: SETTING — MODE 1 — UUT RT transmits digital data 2 — UUT RT receives digital data 3 — Either RT transmits or receives audio 4 — UUT RT transmits analog data 5 — UUT RT receives analog data
RF SWITCH (S3)	Selects different RF paths for signals from either UUT or REF RT.
LOGIC (S4)	Selects different combinations of voltage and GND to be sent to UUT.
STIMULUS (S5)	Selects paths for input of function generator or handset signals into UUT or REF RT.
RESPONSE (S6)	Two-deck switch which selects signal from UUT or REF RT for testing by the test equipment.

3-7. TEST ADAPTER. Continued

Table 3-1. Test Adapter Switches Continued

NAME (NUMBER)	FUNCTION
MOD GEN (S7)	When ON, this switch routes the function generator's modulation generator output to the UUT.
LOAD (S8)	Sets resistance loads on the test equipment measurement inputs. The loads are: 1 620 ohms 2 510 ohms 3 220 ohms 4 150 ohms The load resistors are mounted on the test adapter power supply CCA.
TEST EQPT INPUT (S9)	Selects between testing signals from external probe or from RESPONSE switch.
CAL (S12)	Selects to send either the function generator or the modulation generator signal to the frequency counter and scope 2 for calibration.
PTT (S13)	Provides Push-To-Talk signal (GND) to UUT or REF RT.
STIM SEL (S14)	Selects either function generator or handset signals to be sent to STIMULUS switch.
RESP SEL (S15)	Selects deck 1 or deck 2 of RESPONSE switch for source of test signals.

g. Test Points. There are twelve plugs mounted on the front panel. They provide access to test adapter signals. The test point signals are:

TEST POINT	SIGNAL FROM
TP1	Pin F of UUT connector.
TP2	Pin b of UUT connector.
TP3	Not connected.
TP4	Test power supply input: 27.5 V dc.
TP5	Pin V of UUT connector.
TP6	Test power supply input: 27.5 V dc.
TP7	DC switch output: 27.5 V dc when ON.
TP8	Voltage regulator U3 output: 13 V dc.
TP9	13V switch output: 13 V dc when ON.
TP10	Voltage regulator U1 output: 6.75 V dc.
TP11	Voltage regulator U2 output: 5 V dc.
TP12	Chassis ground.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-8. COMMON TOOLS AND EQUIPMENT.

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

3-9. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

3-10. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering Direct Support maintenance for this equipment.

Section III. SERVICE UPON RECEIPT

3-11. CHECKING UNPACKED EQUIPMENT.

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

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-750.

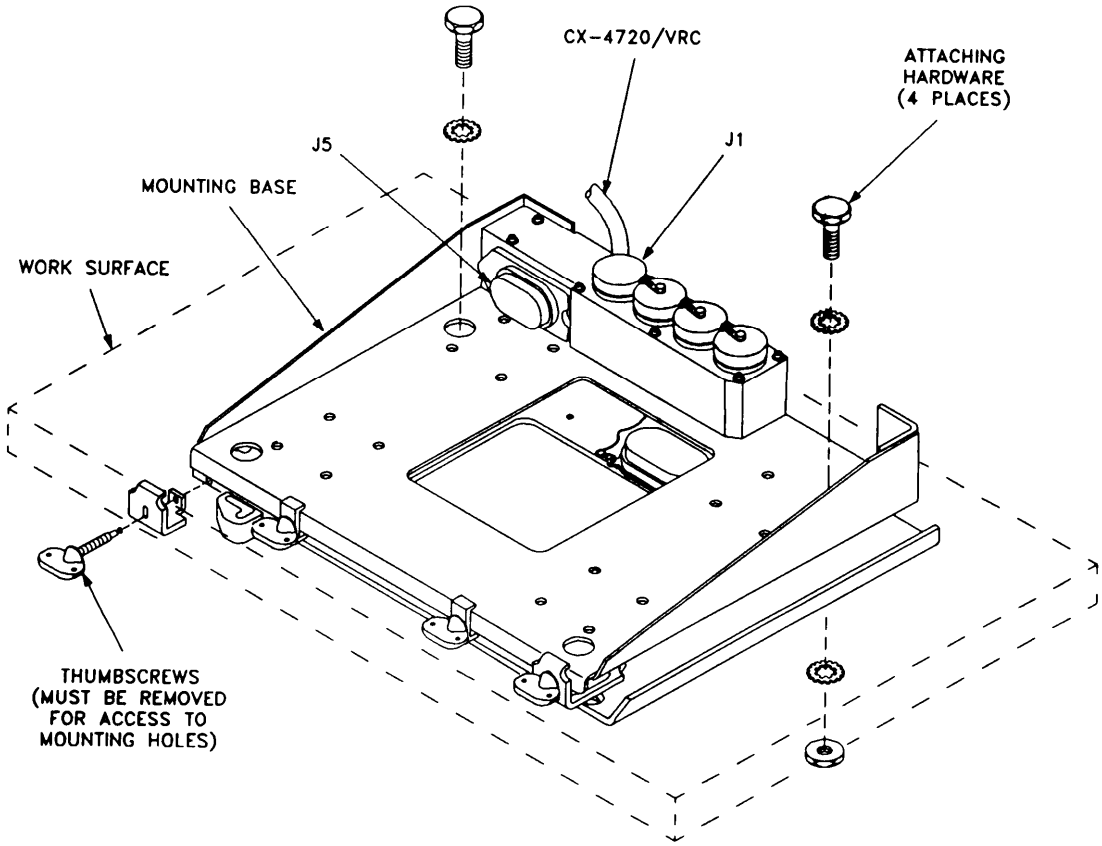
c. Check to see whether the equipment has been modified.

3-12. ASSEMBLY AND INSTALLATION OF STANDARD TEST SETUP.

The reference fixture and mounting base can be secured to a work bench. This may be desirable for some installations. A 12 ft power cable is provided. A 28 V dc power source must be provided by the user. The following procedure describes a typical installation. Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the mounting adapter and RT. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedure.

ITEM	ACTION	REMARKS
a. Mounting base	Set on work surface. Secure to work surface if desired. See figure 3-5. Remove connector caps from J1 and J5.	Attaching hardware is provided with the mount. Position must be within 12 feet of power source (22 to 32 V dc).
b. Cable CX-4720/VRC	Connect to mounting base J1 and power source.	
c. HCP Mounting adapter	For AM-7239/VRC, remove cover and check position of shorting bar. It should connect TB2-1 to TB2-2. Torque cover screws to 12 in-lb.	
	For AM-7239B/VRC, set LCL/RMT switch to LCL.	See figure 3-5.
	Remove cap from P1. Set CB1 to OFF. Install mounting adapter in mounting base. Tighten outer thumbscrews.	
d. HCP RT	Install holding battery. Remove caps from J6 and P1. Install in lower slot in the mounting adapter. Tighten thumbscrews.	See figure 3-5.
e. Audio cable	Connect to RT AUD/DATA connector and mounting adapter DATA J5 connector.	
f. Reference fixture	Insure all thumbscrews are tight. Perform operational check in paragraph 3-17.	

3-12. ASSEMBLY AND INSTALLATION OF STANDARD TEST SETUP. Continued



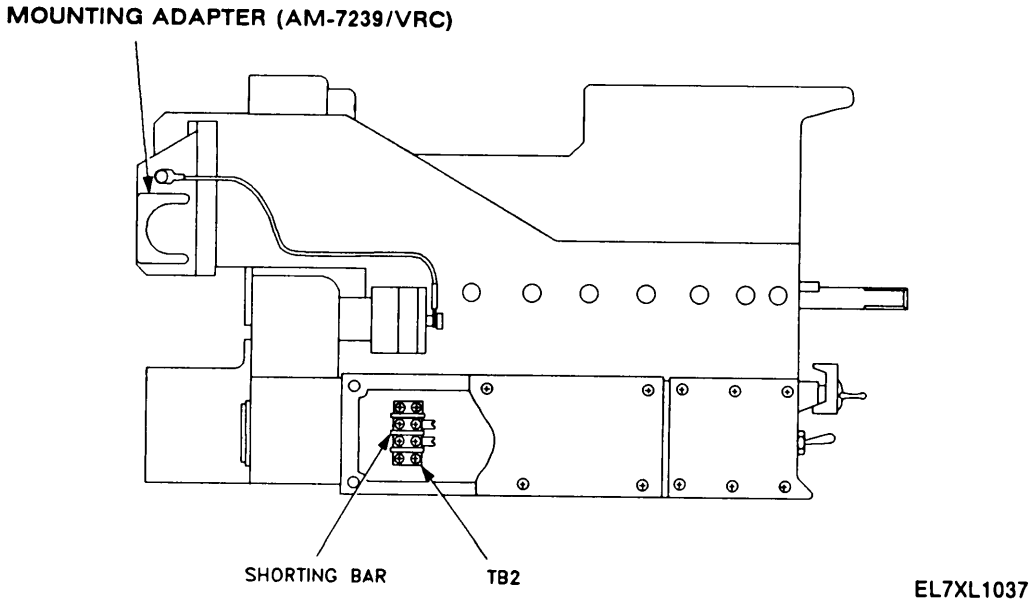


Figure 3-5. Assembly and Installation of Reference Fixture (Sheet 1 of 2)

3-12. ASSEMBLY AND INSTALLATION OF STANDARD TEST SETUP. Continued

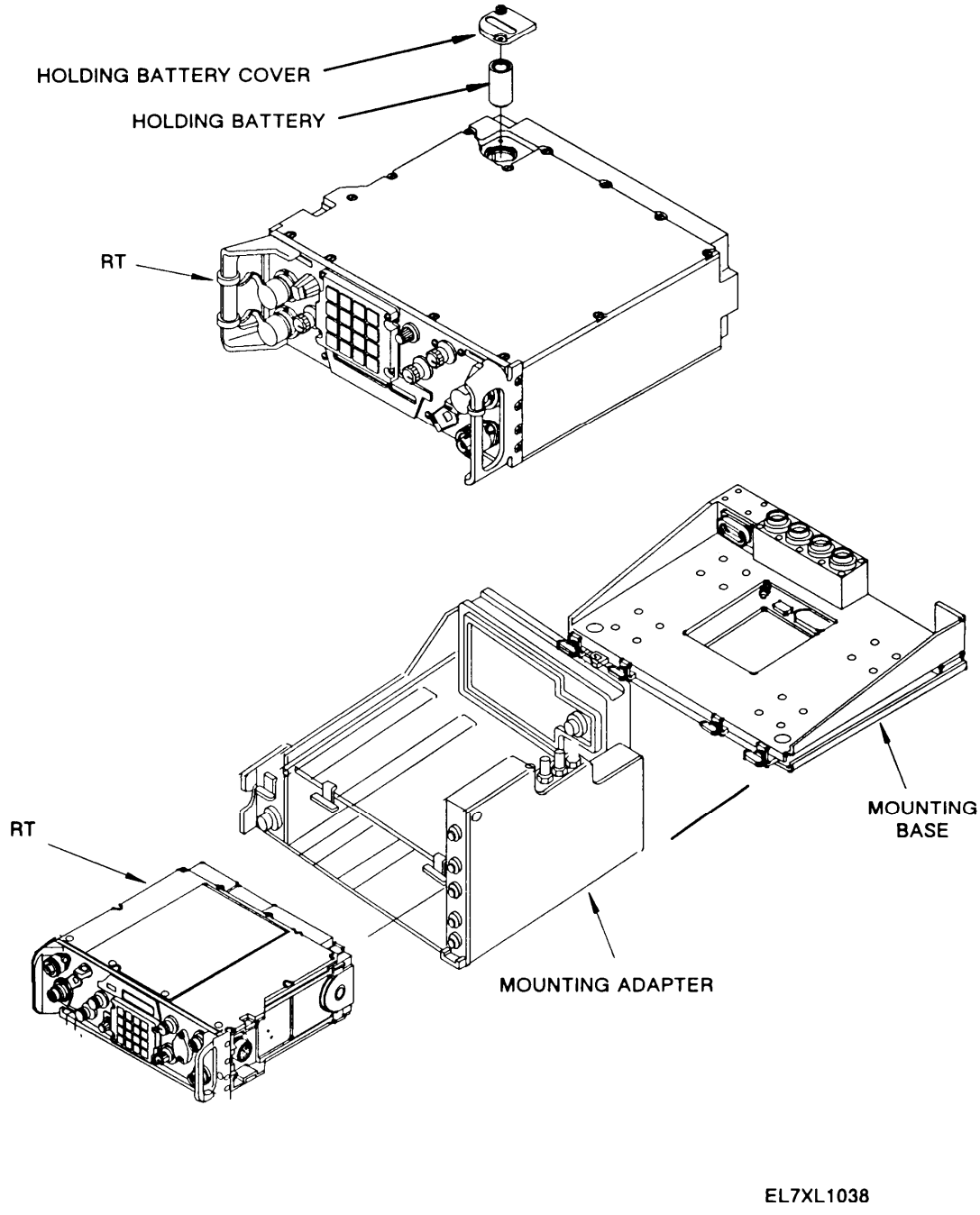


Figure 3-5. Assembly and Installation of Reference Fixture (Sheet 2 of 2)

3-12. ASSEMBLY AND INSTALLATION OF STANDARD TEST SETUP. Continued

ITEM	ACTION	REMARKS
g. Reference fixture	Normal presets are: CHAN — FREQUENCY (MHz) MAN — 30.000 1 — 37.875 2 — 42.975 3 — 43.375 4 — 49.075 5 — 56.200 6 — 68.775 CUE — 87.975 Also load FH sync time (TOD), TRANSEC, and hopset. Preset switch settings: CB1: ON MODE: SC RF: LO CHAN: MAN FCTN: OFF DATA: OFF VOL: As required DIM: As required	NOTE: When the reference fixture is not going to be used for long periods (overnight), set FCTN switch to STW position to extend holding battery life. Presets will have to be reloaded afterward.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

3-13. GENERAL.

PMCS are required for the reference fixture. They are needed to keep it in good working order. Do the checks in the PMCS table at the intervals listed. Some checks and services must be done whenever you see they need to be. These routine tasks are not listed in the table. They include cleaning, checking cables for damage, stowing items not used, and checking for loose nuts, bolts, and screws.

3-14. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

ITEM	ACTION	REMARKS
a. Holding battery in RT.	Set FCTN: OFF. Set CB1: OFF. If RT loses fill information, replace holding battery.	Perform this check every six months.
b. Holding battery in ECCM fill device.	Replace every six months.	
c. ECCM fill devices.	Test daily for presence of fill information.	Refer to paragraph 3-21 for loss of fill information.

Section V. TROUBLESHOOTING PROCEDURES

3-15. GENERAL.

Troubleshooting is performed on a unit that is not operating properly. Use the operational checks in paragraph 3-17 to determine if a unit is operating properly. If it is not, follow the troubleshooting instructions in this section.

3-16. TROUBLESHOOTING.

Troubleshoot the maintenance group using the troubleshooting flowcharts as follows:

a. **When a maintenance group is faulty, inspect it for damage.** Repair any damage before proceeding with testing.

b. **Verify the symptom.** Perform the operational check in paragraph 3-17. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. **Troubleshoot the maintenance group using the flowchart.** It will identify the fault. Disassemble the test adapter as necessary to gain access.

d. **Repair the defective unit.** Follow the procedures in section VI or indicated chapters.

e. **Verify the repair.** Repeat the operational check in paragraph 3-17 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the maintenance group can be returned to service.

If you suspect a short circuit is the problem, follow these steps:

1. Using schematic, visually check suspect path for wires pinched against chassis by bolting action of components or brackets.

2. Use supplied schematic (figure FO-19) and a digital multimeter to check for incorrectly grounded paths. As an example, the seventh test of the Test Adapter Continuity Checks (table 3-2) should not give a digital multimeter resistance reading of less than 1 ohm between either J1-CC and TP 12 (ground) or J17-CC and ground. If it does, then a short to ground is located on the J17-CC to J1-CC path.

3-17. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating the reference fixture and the test adapter. If the operational check is passed, the reference fixture may be returned to service. If it does not pass the test, the bad unit or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 3-20.

Continuity checks of the test adapter can be performed using the schematic (figure FO-19) and an ohmmeter, if necessary. Use the operational check in this manual for the ECCM fill device.

The operational check requires the use of a second RT, which is known to be good, to serve as the reference RT. Obtain this RT from another maintenance group.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the "Action" column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A "No response" in the "Response" column means that any response is not of interest.

When instructed, set up the test equipment as indicated in the figures. Each figure shows the proper switch settings for the test equipment.

WARNING

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply on.

High voltage (200 V dc) is present at mounting adapter connector J1 and inside the test adapter. Use caution when connecting the test setup and taking measurements to avoid personal injury.

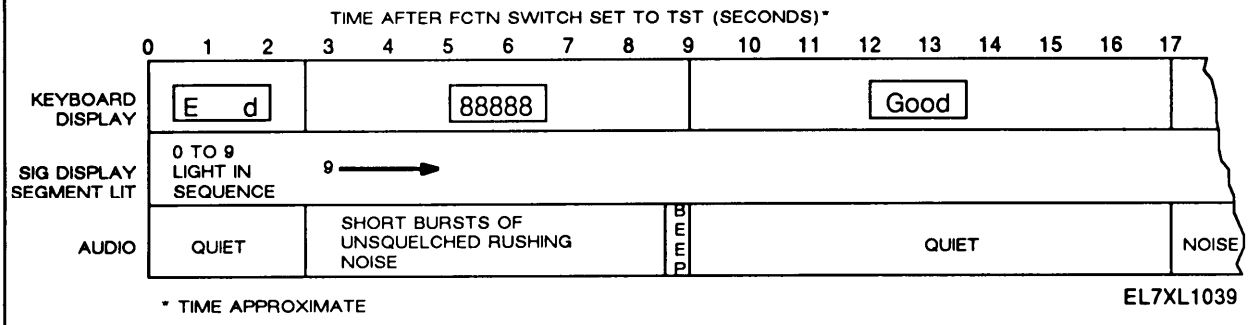
NOTE

Two mounting adapters, the AM-7239/VRC and the AM-7239B/VRC, are tested with the following procedures. Before starting to troubleshoot the mounting adapter AN-7239/VRC insure that the shorting bar is in the local position. Before troubleshooting the mounting adapter AN-7239B/VRC insure that the LOCAL/REMOTE switch is set to the local (LCL) position. Failure to properly install the shorting bar or set the LOCAL/REMOTE to the LCL switch to the LCL position will cause the mounting adapter to fail the operational check.

3-17. OPERATIONAL CHECK. Continued

Step 1. SELF-TEST, RECEIVE, AND TRANSMIT CHECK.

Action	Response
a. Connect equipment as shown in figure 3-6.	a. No response.
b. Set UUT RT: FCTN: Z-A.	b. Display lights. If not, go to chart 1. If the display does not read “Good”, the RT is bad. See chapter 2.
c. Adjust DIM control while display reads "Good".	c. Display brightness varies in intensity. If not, the RT is bad. See chapter 2.
d. Set UUT RT: FCTN: TST.	d. Responses:

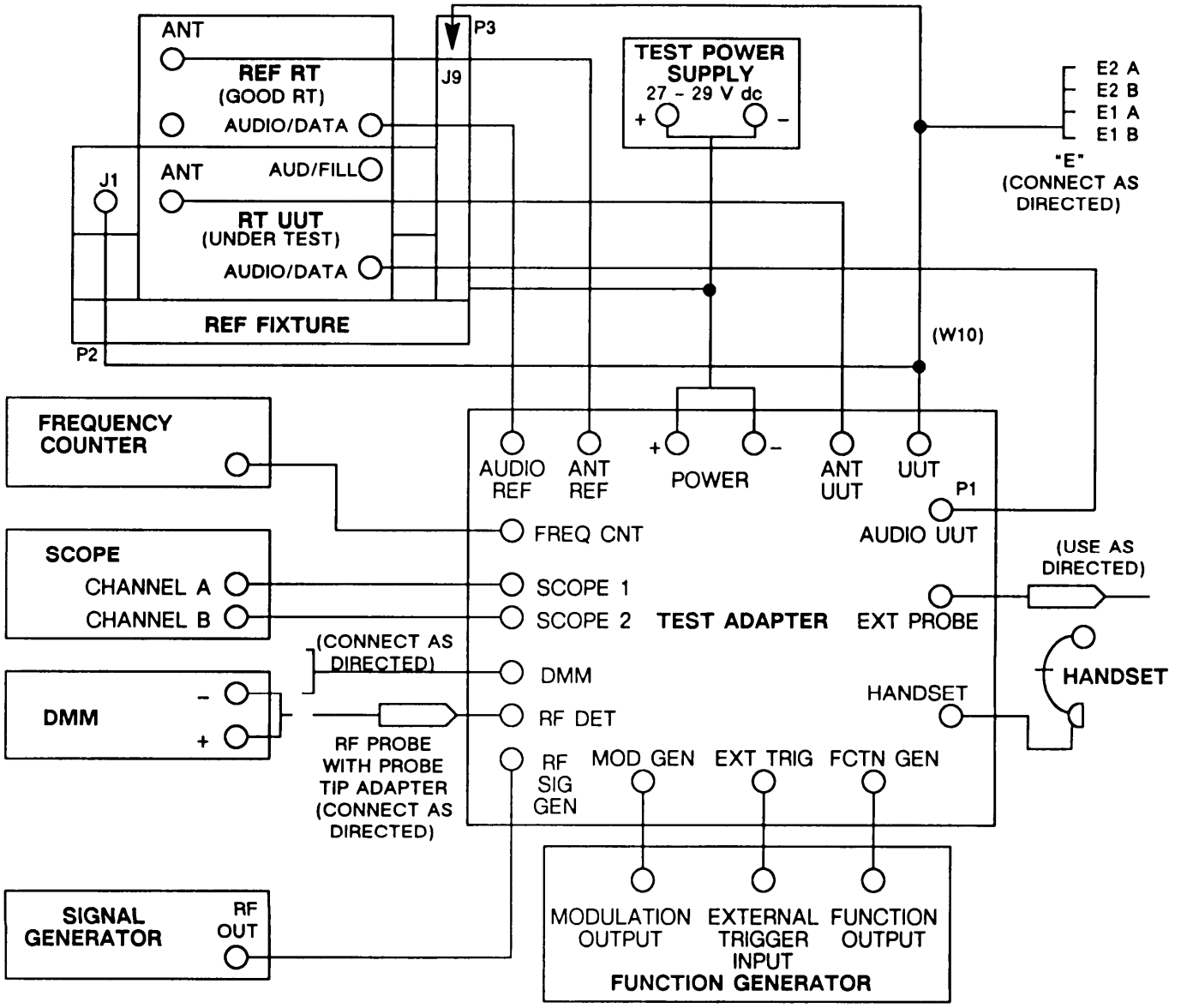


If any of these do not occur, the RT is bad. See chapter 2.

e. Set UUT RT: FCTN: REM.	e. SIG display segments light 9 through 0 in sequence and then go blank. Keyboard display reads 30000. If not, the RT is bad. See chapter 2.
f. Press and hold RT BATT/CALL button. Set PTT: UUT.	f. “CALL” is displayed on RT. If not, the RT is bad. See chapter 2.
g. Set PTT: OFF. Set UUT RT: FCTN: LD. Load the following frequencies:	g. Frequencies load correctly. If not, the RT is bad. See chapter 2.

CHAN	Frequency (MHz)
MAN	49.000
1	87.975
2	55.000
3	33.000
4	40.000
5	61.000
6	72.000
CUE	80.000

3-17. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

REF RT AND RT UUT:

FCTN:	OFF
RF:	HI
CHAN:	MAN
DIM:	FULLY CW
VOL:	MID-RANGE
MODE:	SC
DATA:	OFF

REF FIXTURE: CB1: ON

REF AMP-ADPTR:
* S1: LCL (If present)

TEST ADAPTER:

28 V:	ON
13 V:	OFF
STIMULUS:	1
RESPONSE:	1
LOAD:	OFF
RF SWITCH:	1
MOD GEN:	OFF
LOGIC:	OFF

DMM:
dB 50 Ω reference

TEST EQUIPMENT SELECTOR:	HNDST
TEST EQUIPMENT INPUT:	INT
BASEBAND:	3
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S1

NOTE: Ensure REF RT is loaded with SC frequencies (see Step 1.g, page 3-27).

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Figure 3-6. Operational Check Test Setup

3-17. OPERATIONAL CHECK. Continued

Step 1. SELF-TEST, RECEIVE, AND TRANSMIT CHECK. Continued

Action	Response
h. Connect DMM to RF PROBE. Set UUT RT: FCTN: SQ ON. Set PTT: UUT. Read DMM. Repeat for each channel.	h. DMM reads 35 to 39 dBm for all channels. If not, go to chart 2.
i. Set PTT: OFF. Set power supply to 22 V dc.	i. No response.
j. Set PTT: UUT. Read DMM.	j. DMM reads 35 to 39 dBm for all channels. If not, go to chart 2.
k. Set PTT: OFF. Set power supply to 31 V dc. Set PTT: UUT. Read DMM.	k. DMM reads 35 to 39 dBm for all channels. If not, go to chart 2.
l. Set PTT: OFF. Set power supply to 27.5 V dc.	l. No response.
m. Set RF SWITCH: 2. Set UUT RT: RF: M.	m. No response.
n. Set PTT: UUT. Read frequency counter.	n. Frequencies should read: CHAN — Frequency (MHz) MAN — 48.999750 to 49.000250 1 — 87.974550 to 87.975450 2 — 54.999770 to 55.000230 3 — 32.999825 to 33.000175 4 — 39.999800 to 40.000200 5 — 60.999700 to 61.000300 6 — 71.999650 to 72.000350 CUE — 79.999600 to 80.000400 If not, the RT is bad. See chapter 2.
o. Set RF SWITCH: 1. Set UUT RT: RF: HI. Read SIG display.	o. SIG display reading is 5, 6, or 7. If not, the RT is bad. See chapter 2.
p. Press handset PTT switch and talk into handset.	p. Sidetone is present. If not, the RT is bad. See chapter 2.
q. Set PTT: OFF.	q. No response.

3-17. OPERATIONAL CHECK. Continued

Step 1. SELF-TEST, RECEIVE, AND TRANSMIT CHECK. Continued

Action	Response
r. Disconnect RF probe from DMM. Connect DMM to DMM connector. Set TEST EQPT SELECTOR: DMM. Set RESPONSE to 7, 8, 9, and 10, one position at a time, and read DMM for each position.	r. DMM readings are: RESPONSE — Reading (V dc) 7 — 6.55 to 6.95 8 — 12.6 to 13.4 9 — 25.0 to 29.0 10 — 180 to 220 If any voltage is incorrect, the mounting adapter is bad. See chapter 4.
s. Set UUT RT: CHAN: 1. Set RESP SEL: S2. Set PTT: UUT. Set RESPONSE to 1, 2, and 3, one at a time, and read DMM for each position.	s. DMM readings are: RESPONSE — Reading (V dc) 1 Logic 0 — -0.5 to 0.5 2 Logic 0 — -0.5 to 0.5 3 Logic 1 — 6.25 to 7.25 If any voltage is incorrect, go to chart 3.
t. Set UUT RT: CHAN: 2. Set RESPONSE to 1, 2, and 3, one at a time, and read DMM for each position.	t. DMM readings are: RESPONSE — Reading (V dc) 1 Logic 0 — -0.5 to 0.5 2 Logic 1 — 6.25 to 7.25 3 Logic 0 — -0.5 to 0.5 If any voltage is incorrect, go to chart 3.
u. Set UUT RT: CHAN: 3. Set RESPONSE to 1, 2, and 3, one at a time, and read DMM for each position.	u. DMM readings are: RESPONSE — Reading (V dc) 1 Logic 1 — 6.25 to 7.25 2 Logic 0 — -0.5 to 0.5 3 Logic 0 — -0.5 to 0.5 If any voltage is incorrect, go to chart 3.
v. Set RESPONSE: 4. Read DMM.	v. DMM reads -0.5 to 0.5 V dc. If not, go to chart 3.

3-17. OPERATIONAL CHECK. Continued

Step 1. SELF-TEST, RECEIVE, AND TRANSMIT CHECK. Continued

Action	Response
w. Set UUT RT: RF: PA. Read DMM.	w. DMM reads 6.25 to 7.25 V dc. If not, go to chart 3.
x. Set RESP SEL: S1. Set RESPONSE: 1. Set TEST EQPT SELECTOR: HANDSET. Press handset PTT switch and check for sidetone.	x. Sidetone is present. If not, check switch positions on test adapter.
y. Set LOGIC: 1. Press handset PTT switch and check for sidetone.	y. Sidetone is not present. If sidetone present, go to chart 3.
z. Set LOGIC: OFF. Read SIG display.	z. SIG display segments 8 or 9 are lit. If not, go to chart 3.
aa. Set PTT: OFF.	aa. No response.

Step 2. TRANSMIT/RECEIVE SC AUDIO CHECK.

Action	Response
a. Set CAL: FCTN GEN LEVEL: 140 mV p-p (130 to 150 mV p-p) FREQ: 1000 Hz (900 to 1100 Hz) FUNCTION: SINE, Set CAL: OFF. RESPONSE : 3 LOAD: 1 RF SWITCH: 3. Set TEST EQPT SELECTOR: SCOPE STIM SEL: FCTN GEN. Set REF RT and UUT RT: (All test frequencies loaded) FCTN: SQ ON RF: LO CHAN: 1 VOL: FULLY CW MODE : SC DATA : OFF.	a. Scope CHAN B and frequency counter will display function generator calibration.

3-17. OPERATIONAL CHECK. Continued

Step 2. TRANSMIT/RECEIVE SC AUDIO CHECK. Continued

Action	Response
b. Set PTT: UUT.	b. Scope CHAN A displays a 15 to 20 V p-p, 900 to 1100 Hz sine wave. If not, go to chart 4.
c. Set STIMULUS: 3. Set RESPONSE: 1. Set PTT: REF.	c. Scope CHAN A displays a 15 to 20 V p-p, 900 to 1100 Hz sine wave. If not, the RT is bad. See chapter 2.
d. Set CHAN switch on REF RT and UUT RT to each position (at the same time). Set PTT: REF (for each channel),	d. Scope CHAN A displays a 15 to 20 V p-p, 900 to 1100 Hz sine wave. If not, the RT is bad. See chapter 2.

Step 3. XMT DIGITAL DATA CHECK.

Action	Response
a. Set CAL: FCTN GEN LEVEL: 10 V p-p (9 to 11 v p-p) FREQ: 2400 Hz (2390 to 2410 Hz) FUNCTION: SINE. Set CAL: OFF. Set FCTN GEN TRIGGER: EXT TRIG TRIG LEVEL: MID-RANGE.	a. Scope CHAN B and frequency counter will display function generator calibration.
b. Set STIMULUS: 2 LOAD: OFF BASEBAND: 1. Set REF RT and UUT RT: DATA: 4.8 K RESPONSE: 3.	b. No response.
c. Set PTT: UUT.	c. Scope CHAN A displays a 9.5 to 10.5 V p-p, 2390 to 2410 Hz square wave. If not, the RT is bad. See chapter 2.

3-17. OPERATIONAL CHECK. Continued

Step 4. RCV SC 4.8K CHECK.

Action	Response
a. Set PTT: OFF STIMULUS: 4 RESPONSE: 1 BASEBAND: 2.	a. No response.
b. Set PTT: REF.	b. Scope CHAN A displays a 9.5 to 10.5 V p-p, 2390 to 2410 Hz square wave. If not, the RT is bad. See chapter 2.
c. Set RESPONSE: 2. Set PTT: REF.	c. Scope CHAN A displays a 9.5 to 10.5 V p-p, 4790 to 4810 Hz square wave. If not, the RT is bad. See chapter 2.

Step 5. TRANSMIT AD2 CHECK.

Action	Response
a. Set FCTN GEN TRIGGER: CONT CAL: FCTN GEN LEVEL: 350 mV p-p (340 to 360 mV p-p) FREQ: 2400 Hz (2390 to 2410 Hz) FUNCTION: SINE CAL: OFF.	a. Scope CHAN B and frequency counter will display function generator calibration.
b. Set REF RT and UUT RT: DATA: AD2 STIMULUS: 1 RESPONSE: 3 BASEBAND: 4.	b. No response.
c. Set PTT: UUT.	c. Scope CHAN A displays a 1.5 to 2,5 V p-p, 2390 to 2410 Hz sine wave (slightly distorted). If not, the RT is bad. See chapter 2.

Step 6. RECEIVE AD2 CHECK.

Action	Response
a. Set PTT: OFF STIMULUS: 3 RESPONSE: 1 BASEBAND: 5.	a. No response.
b. Set PTT: REF.	b. Scope CHAN A displays a 1.5 to 2.5 V p-p, 2390 to 2410 Hz sine wave (slightly distorted). If not, the RT is bad. See chapter 2.

3-17. OPERATIONAL CHECK. Continued

Step 7. RECEIVE FH AUDIO CHECK.

Action	Response
a. Connect ECCM fill device to RT AUD/FILL connector. Load RT with fill data.	a. UUT RT responds correctly, If not, the RT is bad. See chapter 2.
b. Load both RTs with the same FH sync time.	b. UUT RT responds correctly. If not, the RT is bad. See chapter 2.
c. Set REF RT and UUT RT: RF: LO MODE: FH FCTN: SQ, ON DATA: OFF CHAN: Channel with hopsets loaded.	c. No response.
d. Set CAL: FCTN GEN LEVEL: 140 mV p-p (130 to 150 mV p-p) FREQ: 1000 Hz (900 to 1100 Hz) FUNCTION: SINE Set CAL: OFF.	d. Scope CHAN B and frequency counter will display function generator calibration.
e. Set LOAD: 1 BASEBAND: 3.	e. No response.
f. Set PTT: REF.	f. Scope CHAN A displays a sine wave greater than a 15 V p-p, 900 to 1100 Hz sine wave with some distortion. If not, the RT is bad. See chapter 2.

Step 8. TRANSMIT FH AUDIO CHECK.

Action	Response
a. Set STIMULUS: 1 Set RESPONSE: 3.	a. No response.
b. Set PTT: UUT.	b. Scope CHAN A displays a distorted sine wave greater than a 15 V p-p, 900 to 1100 Hz sine wave. If not, the RT is bad. See chapter 2.
c. Set PTT: OFF.	c. No response.

3-17. OPERATIONAL CHECK. Continued

Step 9. REMOTE OPERATION CHECK.

Action	Response
a. Connect wires E1A, E1B, E2A, and E2B to binding posts E1A, E1B, E2A, and E2B.	a. No response.
b. Set RESPONSE: 6 RESP SEL: S2 LOAD: OFF. Set TEST EQPT SELECTOR: DMM.	b. DMM reading is less than 50. If not, the mounting adapter is bad. See chapter 4.
c. Set RESPONSE: 7.	c. DMM reading is less than 5 Ω. If not, the mounting adapter is bad. See chapter 4.
d. Set RESPONSE: 8.	d. DMM reading is less than 5 Ω. If not, the mounting adapter is bad. See chapter 4.
e. Set RESPONSE: 9.	e. DMM reading is less than 5 Ω. If not, the mounting adapter is bad. See chapter 4.
NOTE Steps f through i require a good control-monitor. If one is not available, these steps are optional and may be skipped.	
f. Disconnect UUT test cable. Connect cable W4 to UUT connector J9 and to control-monitor connector J1. Set control-monitor: RADIO: 1 FCTN: CHAN DIM: FULLY CW. Set REF RT: RF: LO MODE: SC FCTN: REM DATA: OFF CHAN: MAN. Set UUT RT: FCTN: OFF.	f. Control-monitor display M is lit.
g. Move INIT to UP and release.	g. RT display reads “87975”. If not, go to chart 5.
h. Set CB1: OFF. Move UUT RT to the upper slot of the mounting adapter. Set control-monitor: RADIO: 2. Set CB1: ON.	h. No response.
i. Move INIT to UP and release.	i. RT display reads “87975”. If not, the mounting adapter is bad. See chapter 4.
j. “Hot mock-up” Operational Check is complete.	

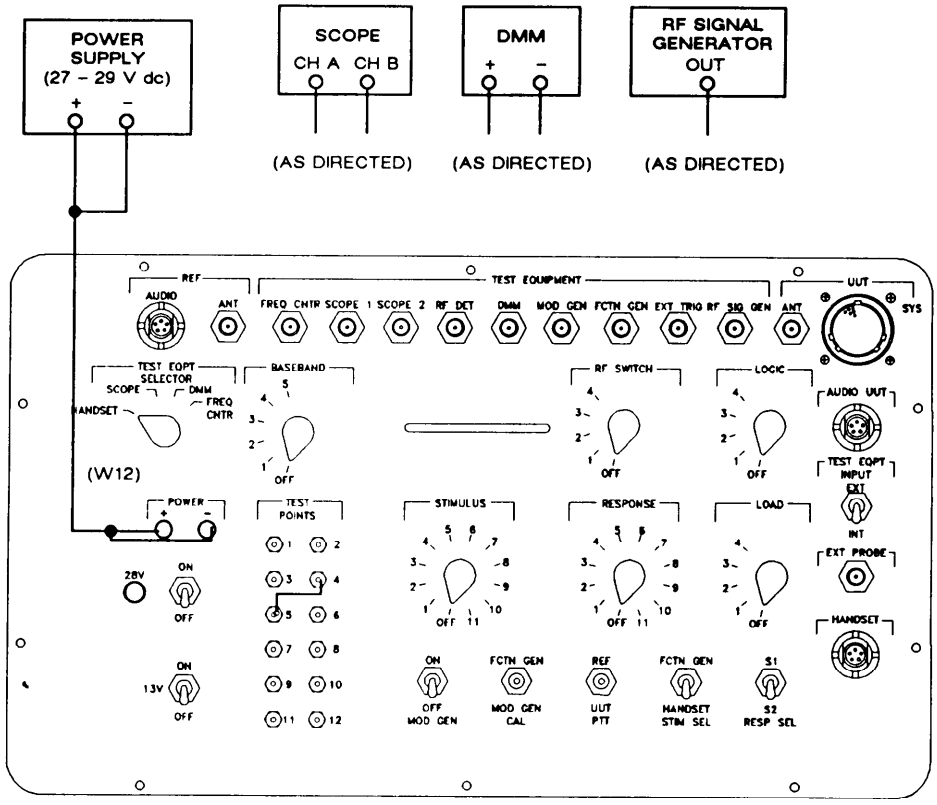
3-17. OPERATIONAL CHECK. Continued

Step 10. POWER SUPPLIES TEST.

CONNECT EQUIPMENT AS SHOWN IN FIGURE 3-7.

Action	Response
a. Connect DMM (+) probe to UUT SYS connector pin V and DMM (-) probe to TP12.	a. DMM reads 26.5 to 28.5 V dc. If not, go to chart 6.
b. Set test adapter: 28 V: ON.	b. DS1 lights. If not, go to chart 7.
c. Connect DMM (+) probe to UUT SYS connector pins X and x.	c. DMM reads 26.5 to 28.5 V dc. If not, there is an open in the wiring between connector J15 and pins J11-X and x.
d. Connect DMM (+) probe to UUT SYS connector pin W.	d. DMM reads 6.25 to 7.25 V dc. If not, go to chart 8.
e. Set test adapter: 13 V: ON.	e. No response.
f. Connect DMM (+) probe to UUT SYS connector pin Y and y.	f. DMM reads 12.25 to 13.75 V dc. If not, go to chart 9.
g. Connect DMM (+) probe to UUT SYS connector pin w.	g. DMM reads 4.75 to 5.25 V dc. If not, go to chart 10.
h. Connect DMM (+) probe to UUT SYS connector pin Z.	h. DMM reads 1.35 to 1.65 V dc. If not, go to chart 11.
i. Set test adapter: LOGIC: 2 28 V: OFF.	i. No response.
j. Set DMM to measure resistance. Connect DMM (+) probe to UUT SYS connector pin U.	j. DMM reads less than 1 ohm. If not, go to chart 12.
k. Connect DMM (+) probe to UUT SYS connector pin T.	k. DMM reads less than 1 ohm. If not, go to chart 13.

3-17. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

TEST ADAPTER:

TEST EQPT SELECTOR:	FREQ CNTR
BASEBAND:	OFF
RF SWITCH:	OFF
LOGIC:	1
TEST EQPT INPUT:	EXT
28 V:	OFF
13 V:	OFF
STIMULUS:	7
RESPONSE:	OFF
LOAD:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S1

JUMPER BETWEEN TEST POINTS TP4 AND TP5.

EL7XL1041A

Figure 3-7. Maintenance Group Pretroubleshooting Test Setup.

3-17. OPERATIONAL CHECK. Continued

Step 11. RF SECTION TEST.

CONNECT: Signal generator output to UUT ANT connector, and scope channel 1 input to RF DET connector using mini probe tip adapter and X10 probe.

DISCONNECT: DMM.

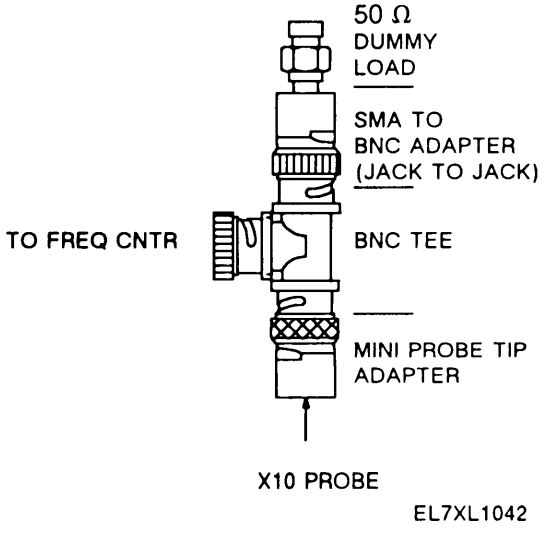
NOTE:

If any RF SECTION TEST fails, check all internal RF cable, attenuator, and relay connections for tightness prior to entering the appropriate chart. If any connections are loose, tighten them and retest.

SET: Signal generator:
FREQ: 30 MHz
LEVEL: 0 dBm
MODULATION: OFF.

Test adapter:
28 V: ON.

Action	Response
a. Measure output of RF DET connector on scope.	a. Scope channel 1 displays a signal which is 0 mV p-p (-10 to 10 mV p-p). If not, go to chart 14.
b. Set test adapter: RF SWITCH: 1.	b. Scope channel 1 displays a 560 to 700 mV p-p signal. If not, go to chart 15.
c. Connect scope channel 1 input to FREQ CNTR connector using impedance matching setup, shown below.	c. No response.



3-17. OPERATIONAL CHECK. Continued

Step 11. RF SECTION TEST. Continued

Action	Response
d. Set test adapter: RF SWITCH: 2.	d. Scope channel 1 displays a 50 to 75 mV p-p signal. If not, go to chart 16.
e. Set test adapter: RF SWITCH: 4.	e. Scope channel 1 displays a 0 mV p-p (-10 to 10 mV p-p) signal. If not, go to chart 17.
f. Connect scope channel 1 input to RF SIG GEN connector using impedance matching setup.	f. Scope channel 1 displays a 50 to 75 mV p-p signal. If not, go to chart 18.
g. Connect scope channel 1 input to ANT REF connector using impedance matching setup. Set signal generator: LEVEL: +15 dBm.	g. No response.
h. Set test adapter: RF SWITCH: 3.	h. Scope channel 1 displays a 30 to 50 mV p-p signal. If not, go to chart 19.

3-17. OPERATIONAL CHECK. Continued

Step 12. WIRING AND SWITCH TESTS.

Action	Response
a. Turn test power supply OFF and disconnect it from test adapter. Disconnect scope and signal generator.	a. No response.
b. Perform continuity checks in table 3-2 using the following procedure:	b. Responses to the continuity check actions are:
(1) Set test adapter switches as listed in column 1 “SWITCH POSITIONS”.	(1) No response.
NOTE Do not change switch settings until instructed to do so.	
(2) Connect DMM test leads to the points listed in columns 2 and 3 “DMM (+)” and “DMM (-)”.	(2) DMM reading is as listed in column 4 “RESULTS”. If not, part listed in column 5 “FAULT” is bad. If no part is listed in column 5, then use figure FO-19 and the DMM to check the path between the points listed in columns 2 and 3.
NOTE CC indicates the center conductor of a BNC connector such as ANT REF.	
c. Operational Check is complete.	

Table 3-2. Test Adapter Continuity Checks

1. SWITCH POSITIONS	2. DMM (+)	3. DMM (-)	4. RESULTS	5. FAULT
TEST EQPT INPUT: INT LOAD: 1	FREQ CNTR - CC	TP12	560 to 680 ohms	R7
LOAD: 2	FREQ CNTR - CC	TP12	460 to 560 ohms	R8
LOAD: 3	FREQ CNTR - CC	TP12	200 to 240 ohms	R9
LOAD: 4	FREQ CNTR - CC	TP12	135 to 165 ohms	R10
	HANDSET A	TP12	90 to 110 ohms	R11
TEST EQPT INPUT: EXT	FREQ CNTR - CC	EXT PROBE - CC	Less than 1 ohm	
BASEBAND: 1	AUDIO UUT - E	TP12	Less than 1 ohm	S2
	AUDIO UUT - D	EXT TRIG - CC	Less than 1 ohm	
RESPONSE: 5 TEST EQPT INPUT: INT	FREQ CNTR - CC	AUDIO UUT - E	Less than 1 ohm	
BASEBAND: 2	AUDIO REF - E	TP12	Less than 1 ohm	
STIMULUS: 3 STIM SEL: HANDSET	EXT TRIG - CC	HANDSET - D	Less than 1 ohm	
BASEBAND: 3	MOD GEN - CC	EXT TRIG - CC	Less than 1 ohm	
CAL: MOD GEN	SCOPE 2 - CC	MOD GEN - CC	Less than 1 ohm	
CAL: OFF	SCOPE 2 - CC	MOD GEN - CC	Greater than 100 k ohms	
CAL: FCTN GEN	SCOPE 2 - CC	FCTN GEN - CC	Less than 1 ohm	
BASEBAND: 4	AUDIO UUT - F	TP12	Less than 1 ohm	
RESPONSE: 6	FREQ CNTR - CC	AUDIO UUT - F	Less than 1 ohm	
CAL: MOD GEN STIM SEL: FCTN GEN STIMULUS: 2	FCTN GEN - CC	AUDIO UUT - F	Less than 1 ohm	
BASEBAND: 5	AUDIO REF - F	TP12	Less than 1 ohm	

Table 3-2. Test Adapter Continuity Checks Continued

1. SWITCH POSITIONS	2. DMM (+)	3. DMM (-)	4. RESULTS	5. FAULT
STIMULUS: 4	FCTN GEN - CC	TP12	Less than 1 ohm	
LOGIC: 1	UUT - T	TP12	Less than 1 ohm	
LOGIC: 4	UUT - W	TP12	Less than 1 ohm	
STIMULUS: 5	FCTN GEN - CC	UUT - a	Less than 1 ohm	
STIMULUS: 6	FCTN GEN - CC	UUT - b	Less than 1 ohm	
STIMULUS: 7	FCTN GEN - CC	UUT - c	Less than 1 ohm	
STIMULUS: 8	FCTN GEN - CC	UUT - d	Less than 1 ohm	
STIMULUS: 9	FCTN GEN - CC	UUT - e	Less than 1 ohm	
STIMULUS: 10	FCTN GEN - CC	UUT - f	Less than 1 ohm	
STIMULUS: 11	FCTN GEN - CC	UUT - g	Less than 1 ohm	
STIMULUS: 1	FCTN GEN - CC	AUDIO UUT - D	Less than 1 ohm	
RESPONSE: 1	FREQ CNTR - CC	AUDIO UUT - B	Less than 1 ohm	
RESPONSE: 2	FREQ CNTR - CC	AUDIO UUT - D	Less than 1 ohm	
RESPONSE: 3	FREQ CNTR - CC	AUDIO REF - B	Less than 1 ohm	
RESPONSE: 4	FREQ CNTR - CC	AUDIO UUT - C	Less than 1 ohm	
RESPONSE: 7	FREQ CNTR - CC	UUT - A	Less than 1 ohm	
RESPONSE: 8	FREQ CNTR - CC	UUT - B	Less than 1 ohm	
RESPONSE: 9	FREQ CNTR - CC	UUT - C	Less than 1 ohm	
RESPONSE : 10	FREQ CNTR - CC	UUT - D	Less than 1 ohm	
RESPONSE : 11	FREQ CNTR - CC	UUT - E	Less than 1 ohm	
MOD GEN: ON	MOD GEN - CC	UUT - E	Less than 1 ohm	
RESPONSE: 1 RESP SEL: S2	FREQ CNTR - CC	UUT - F	Less than 1 ohm	

Table 3-2. Test Adapter Continuity Checks Continued

1. SWITCH POSITIONS	2. DMM (+)	3. DMM (-)	4. RESULTS	5. FAULT
RESPONSE: 2	FREQ CNTR - CC	UUT - G	Less than 1 ohm	
RESPONSE: 3	FREQ CNTR - CC	UUT - H	Less than 1 ohm	
RESPONSE: 4	FREQ CNTR - CC	UUT - J	Less than 1 ohm	
RESPONSE: 5	FREQ CNTR - CC	UUT - K	Less than 1 ohm	
RESPONSE: 6	FREQ CNTR - CC	UUT - L	Less than 1 ohm	
RESPONSE: 7	FREQ CNTR - CC	UUT - M	Less than 1 ohm	
RESPONSE: 8	FREQ CNTR - CC	UUT - N	Less than 1 ohm	
RESPONSE: 9	FREQ CNTR - CC	UUT - P	Less than 1 ohm	
RESPONSE: 10	FREQ CNTR - CC	UUT - R	Less than 1 ohm	
RESPONSE: 11	FREQ CNTR - CC	UUT - S	Less than 1 ohm	
28V: OFF	TP6	TP7	Greater than 100 k ohms	
PTT: REF	AUDIO REF - A	HANDSET - A	Less than 1 ohm	
PTT: UUT	AUDIO UUT - A	HANDSET - A	Less than 1 ohm	
PTT: REF	AUDIO REF - C	TP12	Less than 1 ohm	
PTT: UUT	AUDIO UUT - C	TP12	Less than 1 ohm	
STIMULUS: 3	FCTN GEN - CC	AUDIO REF - D	Less than 1 ohm	
TEST EQPT SELECTOR: FREQ CNTR	FREQ CNTR - CC	SCOPE 2 - CC	Greater than 100 k ohms	
TEST EQPT SELECTOR: DMM	FREQ CNTR - CC	SCOPE 2 - CC	Less than 1 ohm	
TEST EQPT SELECTOR: SCOPE	FREQ CNTR - CC	SCOPE 2 - CC	Less than 1 ohm	
TEST EQPT SELECTOR: HANDSET	FREQ CNTR - CC	SCOPE 2 - CC	Less than 1 ohm	

Table 3-2. Test Adapter Continuity Checks Continued

1. SWITCH POSITIONS	2. DMM (+)	3. DMM (-)	4. RESULTS	5. FAULT
TEST EQPT SELECTOR: DMM TEST EQPT INPUT: EXT	DMM - CC	EXT PROBE - CC	Less than 1 ohm	
TEST EQPT SELECTOR: SCOPE	SCOPE 1 - CC	EXT PROBE - CC	Less than 1 ohm	
TEST EQPT SELECTOR: HANDSET	Chassis	TP12	Less than 1 ohm	
	EXT PROBE - CC	HANDSET B	Less than 1 ohm	
	TP2	UUT - b	Less than 1 ohm	
	UUT - c	AUDIO UUT - B	Less than 1 ohm	
	UUT - E	UUT - v	Less than 1 ohm	
	TP1	UUT - F	Less than 1 ohm	
	UUT - h	TP12	Less than 1 ohm	
	UUT - z	TP12	Less than 1 ohm	
	UUT - AA	TP12	Less than 1 ohm	
	UUT - k	TP12	Less than 1 ohm	
	UUT - m	TP12	Less than 1 ohm	
	UUT - n	TP12	Less than 1 ohm	
	UUT - p	TP12	Less than 1 ohm	
	UUT - q	TP12	Less than 1 ohm	
	UUT - r	TP12	Less than 1 ohm	
	UUT - s	TP12	Less than 1 ohm	
	UUT - t	TP12	Less than 1 ohm	
	UUT - u	TP12	Less than 1 ohm	
BASEBAND: OFF	AUDIO UUT - E	AUDIO REF - E	Less than 1 ohm	

Table 3-2, Test Adapter Continuity Checks Continued

1. SWITCH POSITIONS	2. DMM (+)	3. DMM (-)	4. RESULTS	5. FAULT
STIMULUS: 6 CAL: FCTN GEN STIM SEL: FCTN GEN	TP2	FCTN GEN - CC	Greater than 100 k ohms	
STIMULUS: 6 CAL: MOD GEN STIM SEL: FCTN GEN	TP2	FCTN GEN - CC	Less than 1 ohm	
STIMULUS: 6 CAL: OFF STIM SEL: FCTN GEN	TP2	FCTN GEN - CC	Less than 1 ohm	

3-18. TEST PRECAUTIONS AND NOTES.

WARNING

High voltage (200 V dc) is present at mounting adapter connector J1. Use caution when connecting the test setup and taking measurements to avoid personal injury.

WARNING

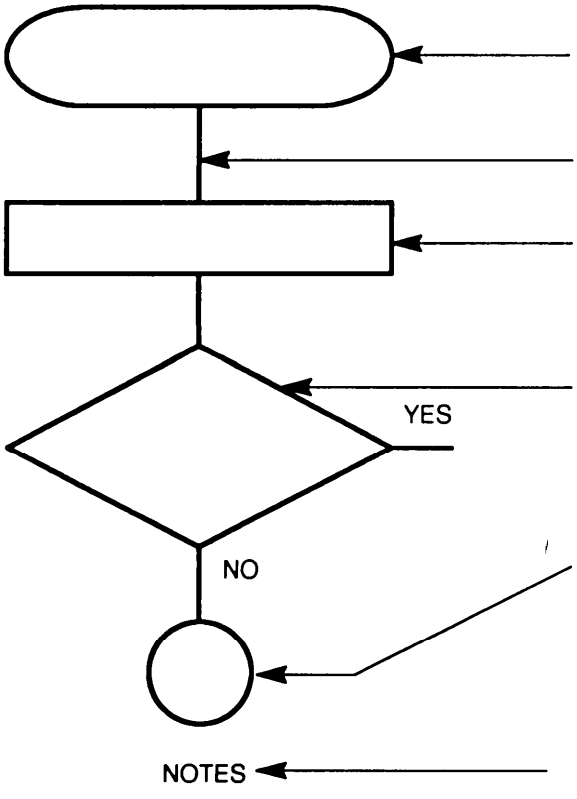
Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

NOTE

Chapter 2 can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.

3-19. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages.

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

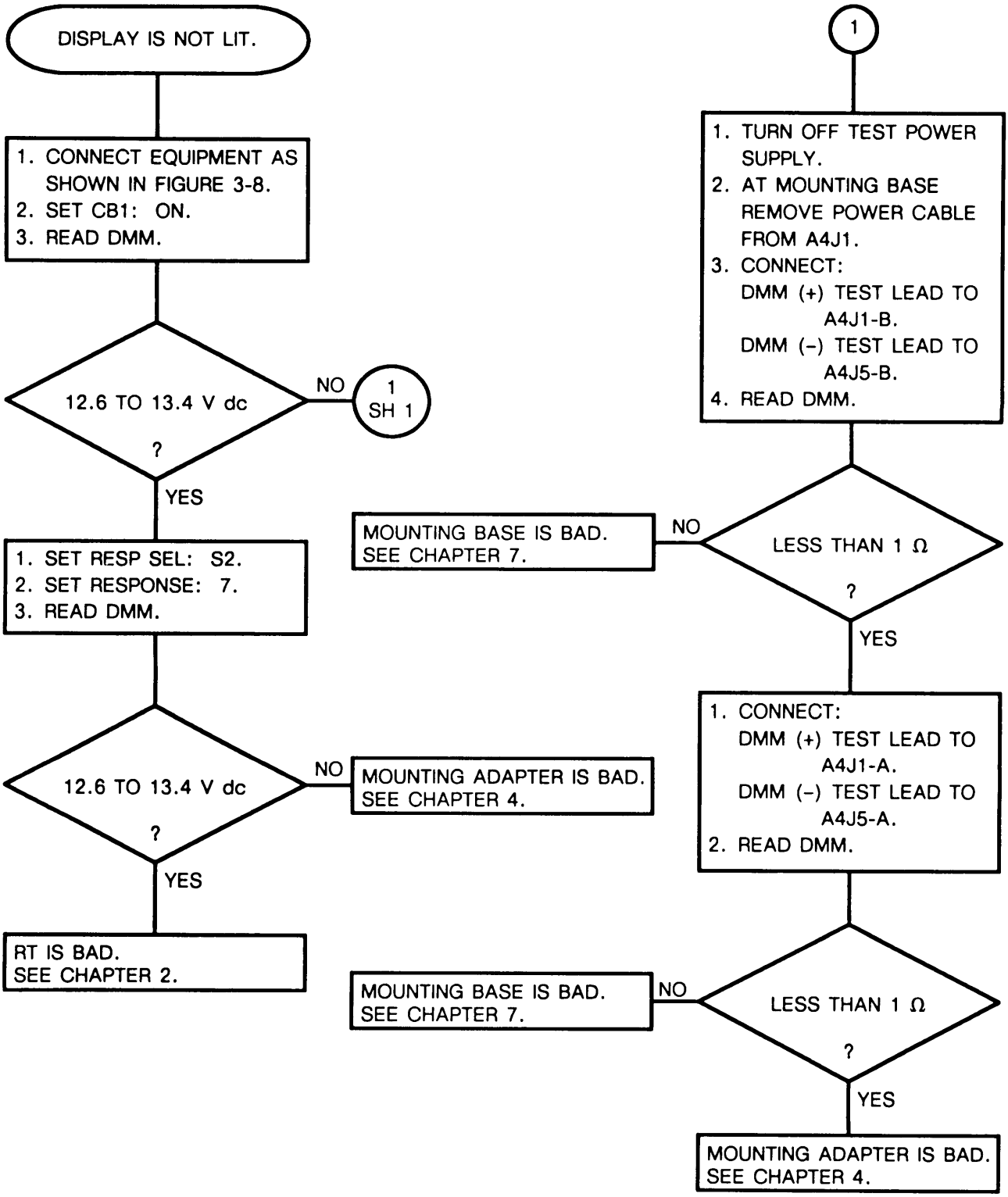
3-20. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

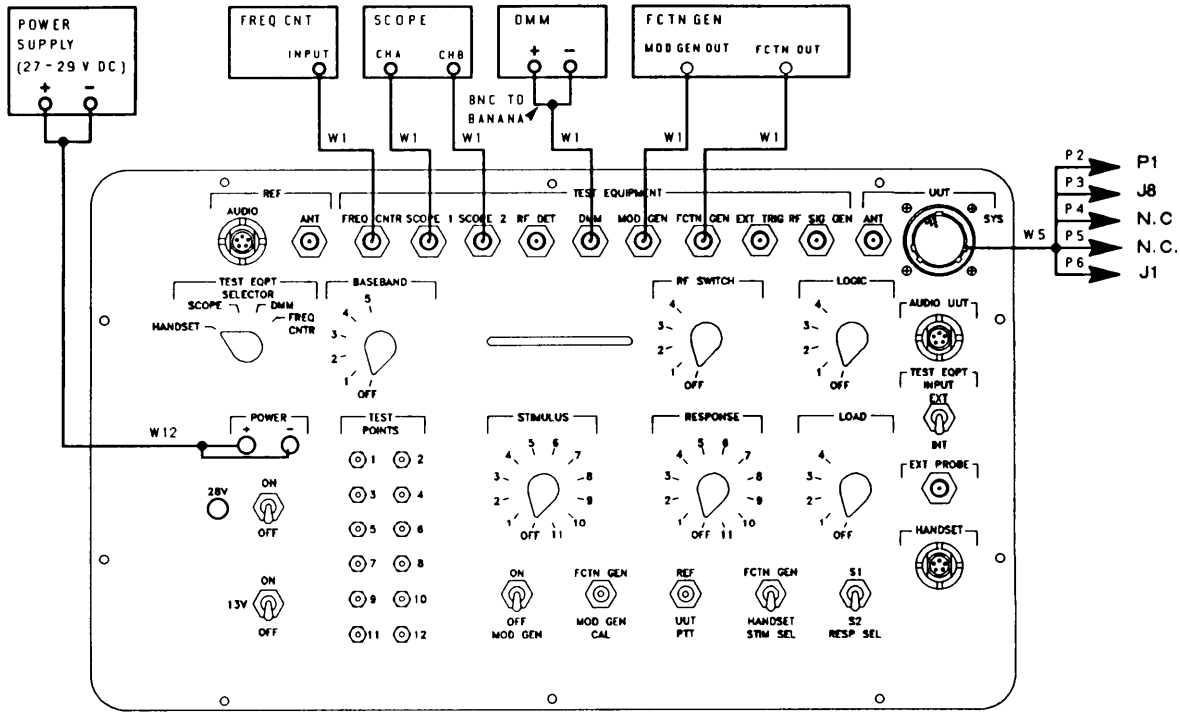
Chart	Symptom
1	Display is not lit.
2	Incorrect RF output.
3	Incorrect power voltages.
4	Fails to transmit.
5	Control-monitor failure.
6	No 27.5 V dc to UUT.
7	No 27.5 V dc to UUT when DC switch is ON.
8	No 6.75 V dc to UUT.
9	No 13 V dc supply to UUT.
10	No 5 V dc supply to UUT.
11	No 1.5 V dc supply to UUT.
12	No GND connection to UUT.
13	No GND connection to UUT.
14	Relay K1 is stuck ON.
15	Relay K1 is inactive.
16	No signal output to frequency counter.
17	Relay K2 is faulty.
18	Relay K2 is faulty.
19	No signal output at REF ANT.

3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Faulty Display
(Sheet 1 of 1)



3-20. TROUBLESHOOTING FLOWCHARTS. Continued



EL7XL1043

EQUIPMENT PRESETS

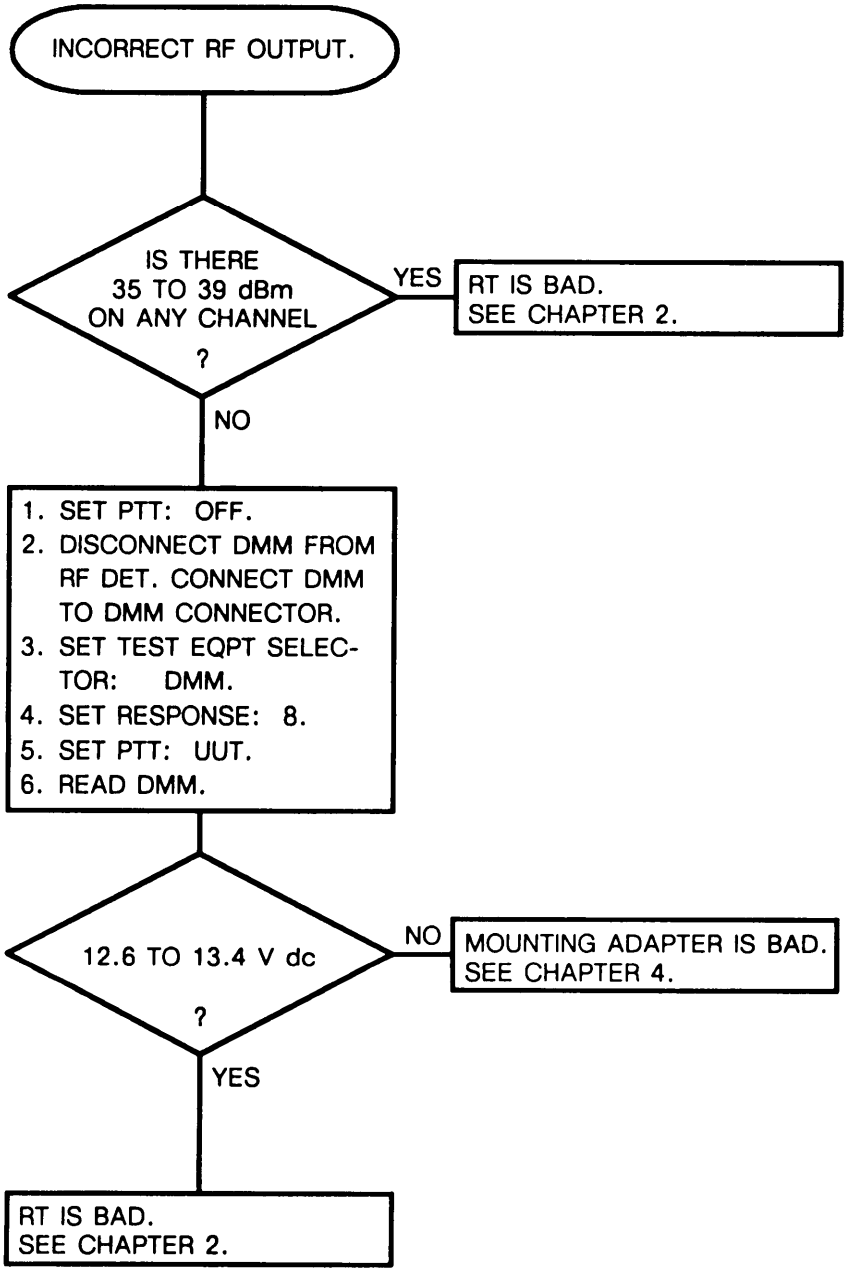
TEST ADAPTER:

TEST EQPT SELECTOR:	DMM
BASEBAND:	OFF
RF SWITCH:	OFF
LOGIC:	OFF
STIMULUS:	OFF
RESPONSE:	9
LOAD:	OFF
28 V:	ON
13 V:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S1
TEST EQPT INPUT:	INT

Figure 3-8. REF RT Troubleshooting Test Setup

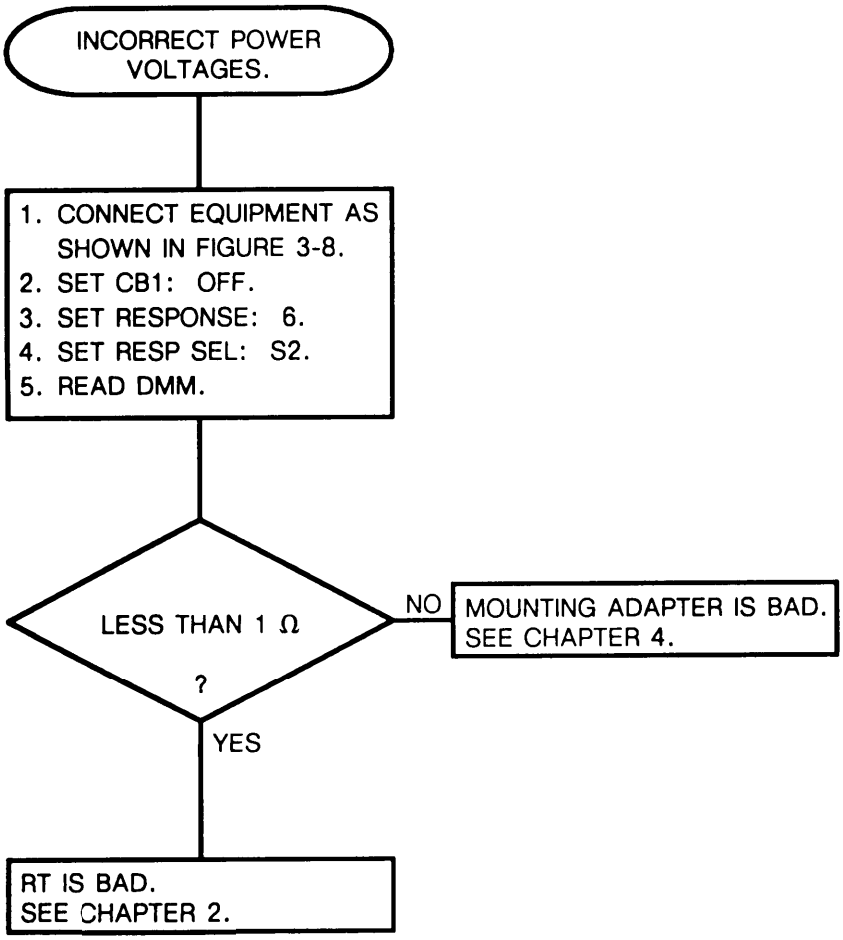
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting RF Output
(Sheet 1 of 1)



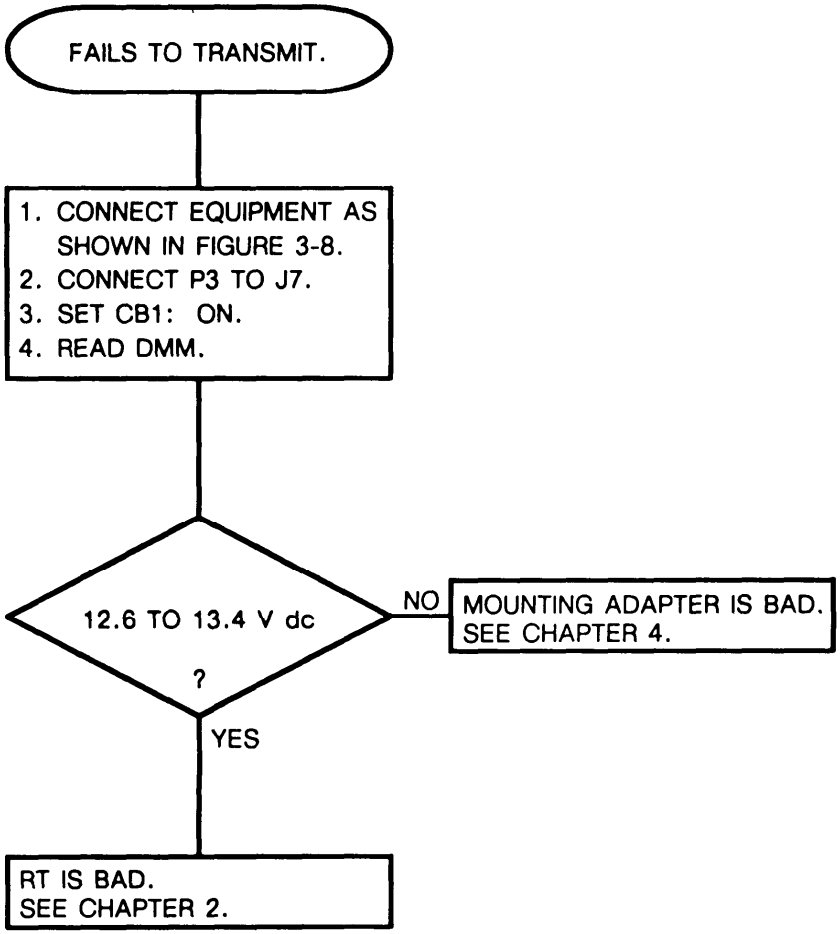
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting Power Output
(Sheet 1 of 1)



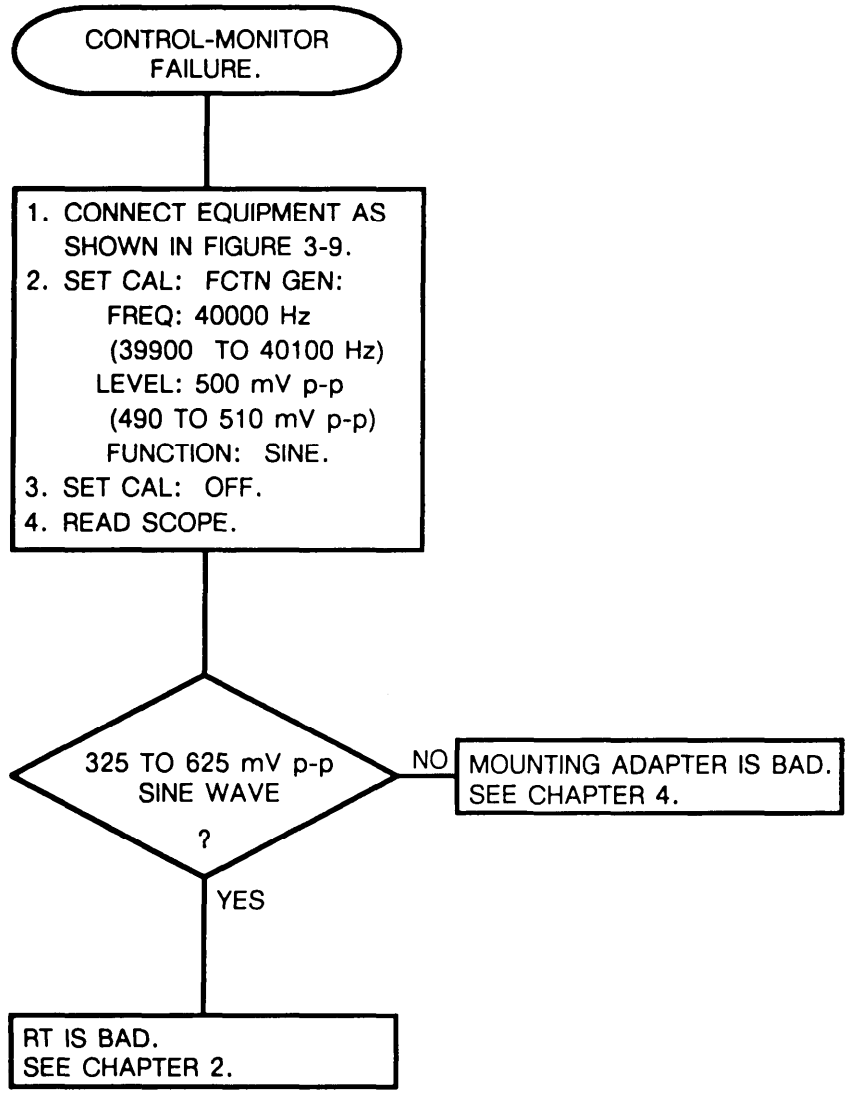
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Transmit Failure
(Sheet 1 of 1)

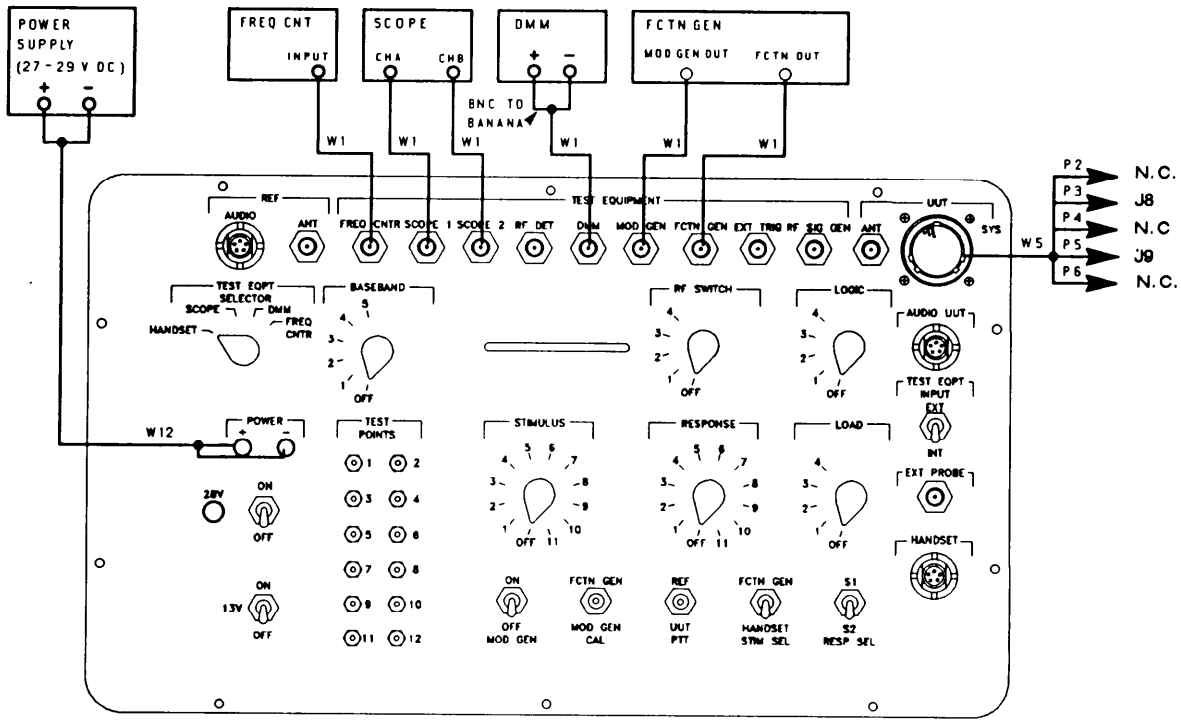


3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Remote Operation Failure
(Sheet 1 of 1)



3-20. TROUBLESHOOTING FLOWCHARTS. Continued



EL7XL1044

EQUIPMENT PRESETS

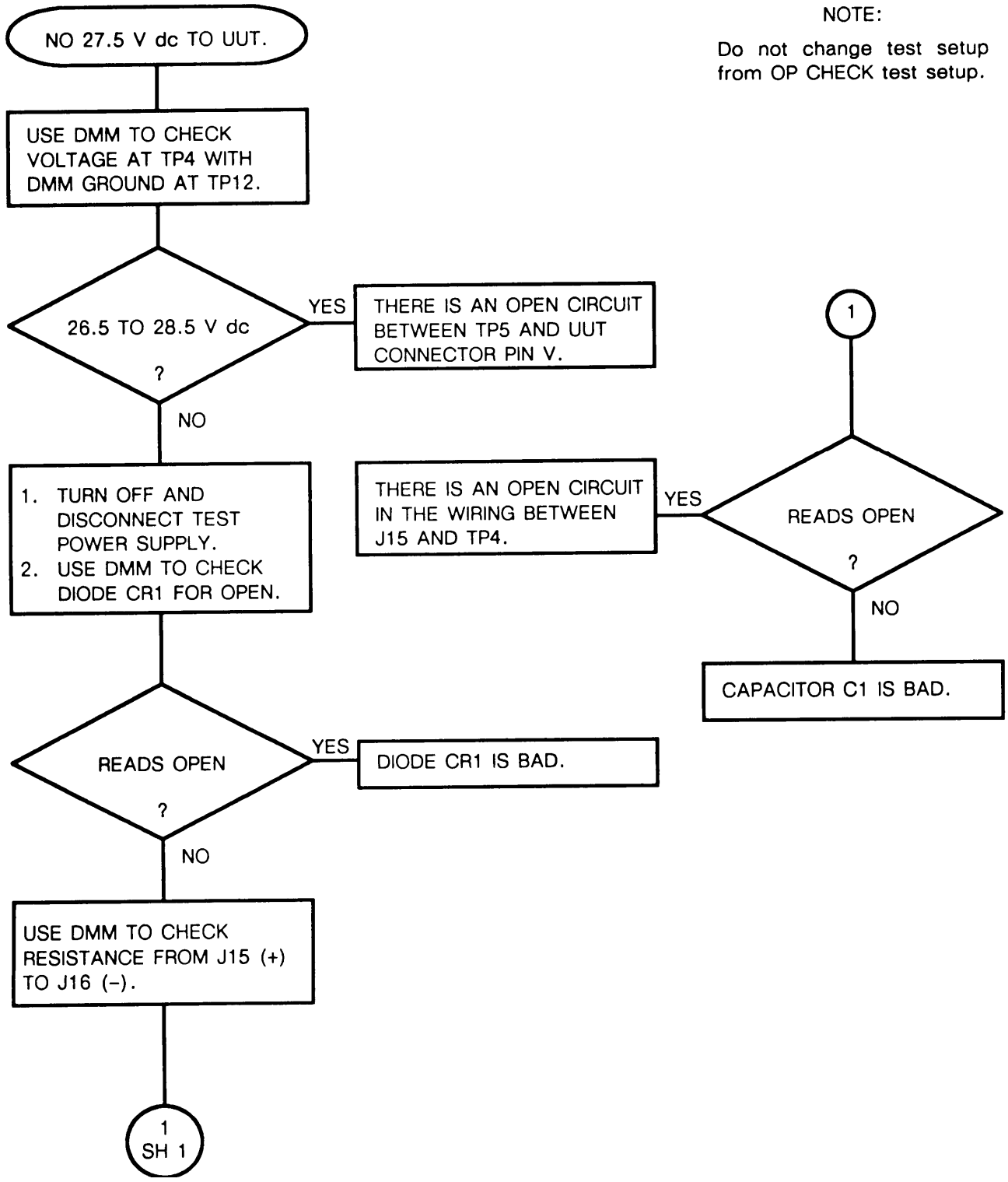
TEST ADAPTER:

TEST EQPT SELECTOR:	SCOPE
BASEBAND:	OFF
RF SWITCH:	OFF
LOGIC:	OFF
STIMULUS:	8
RESPONSE:	4
LOAD:	3
28 V:	OFF
13 V:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S2
TEST EQPT INPUT:	INT

Figure 3-9. Control-Monitor Troubleshooting Test Setup

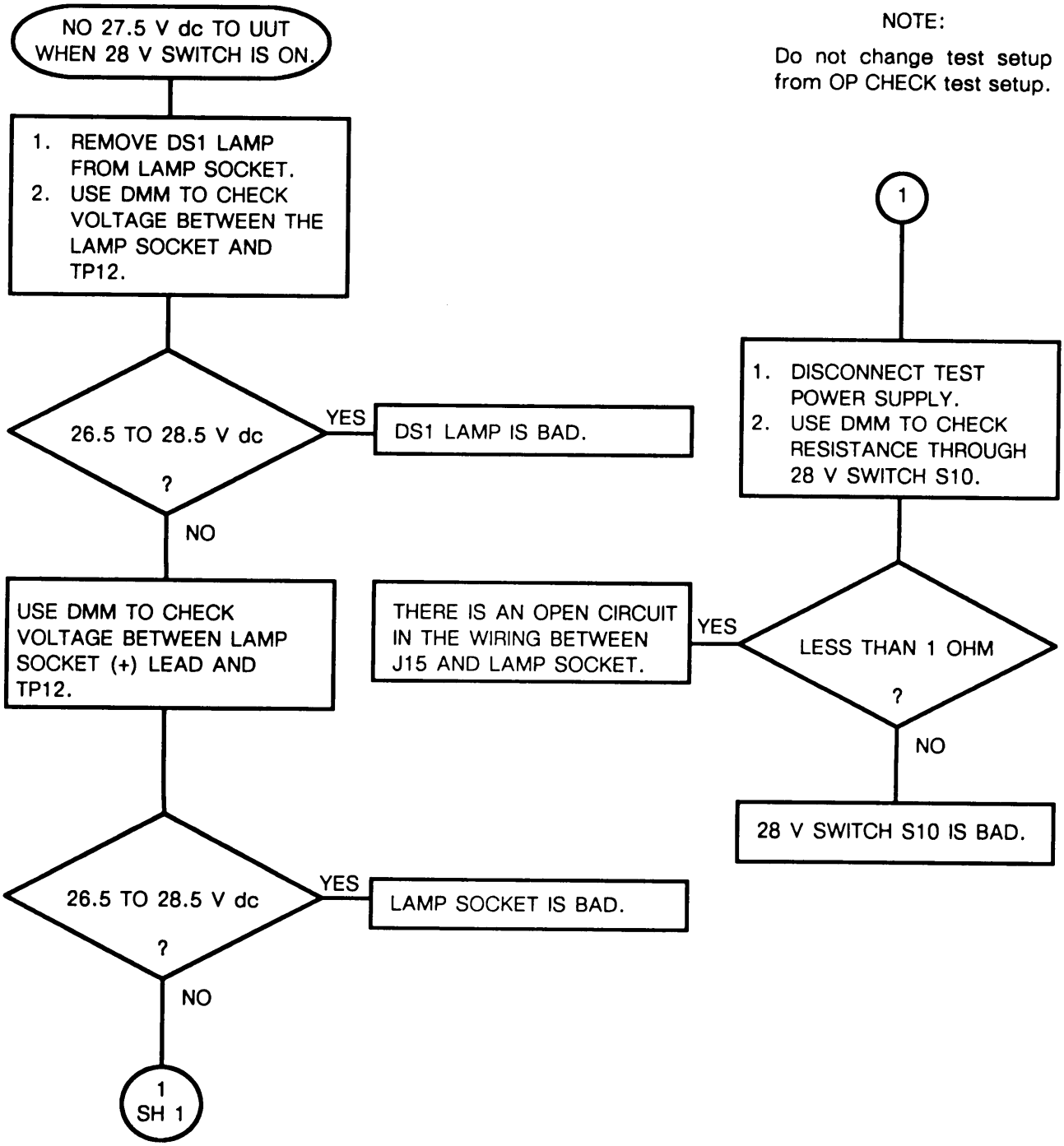
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting 27.5 V Power Supply
(Sheet 1 of 1)



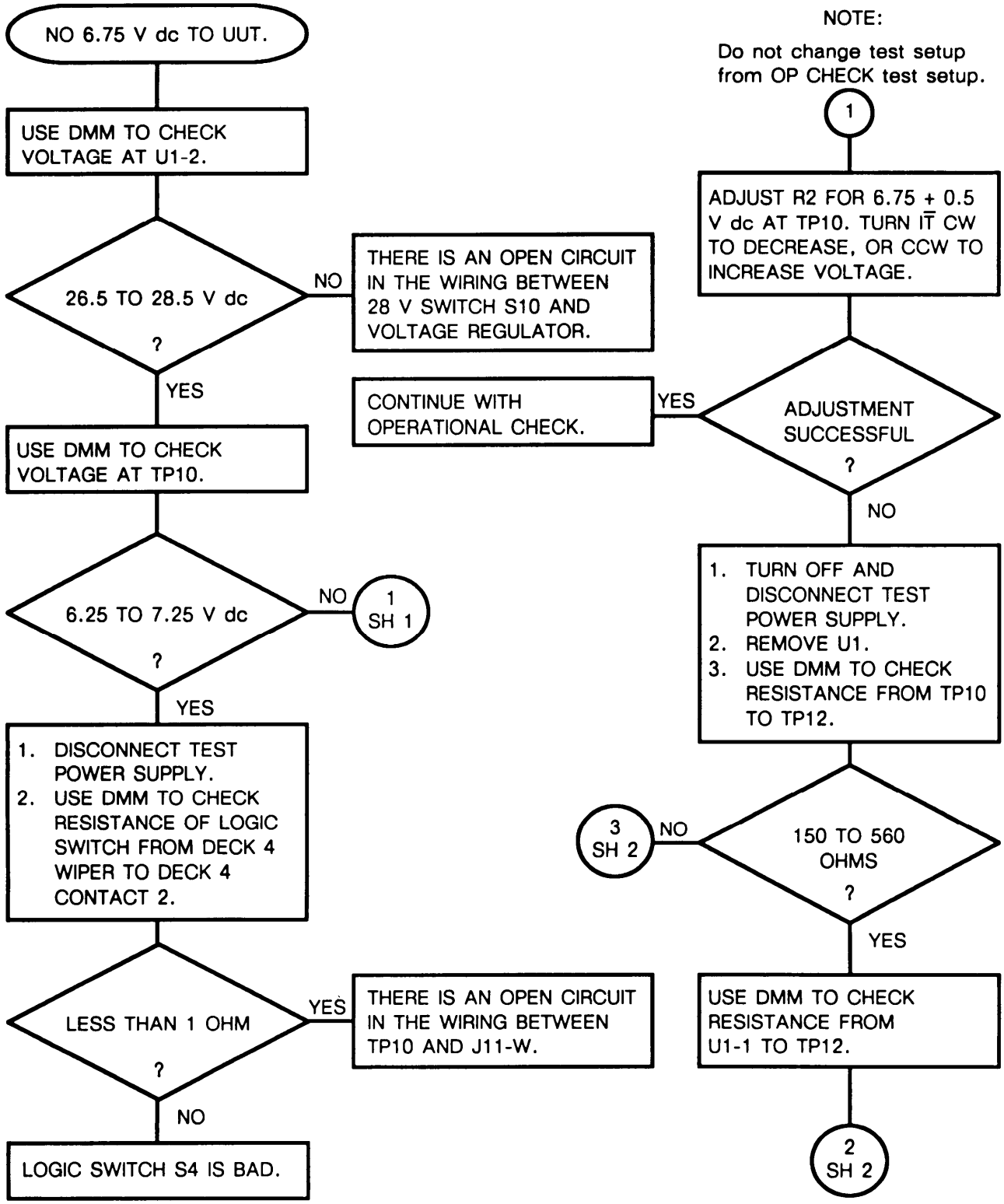
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting 27.5 V Power Supply
(Sheet 1 of 1)



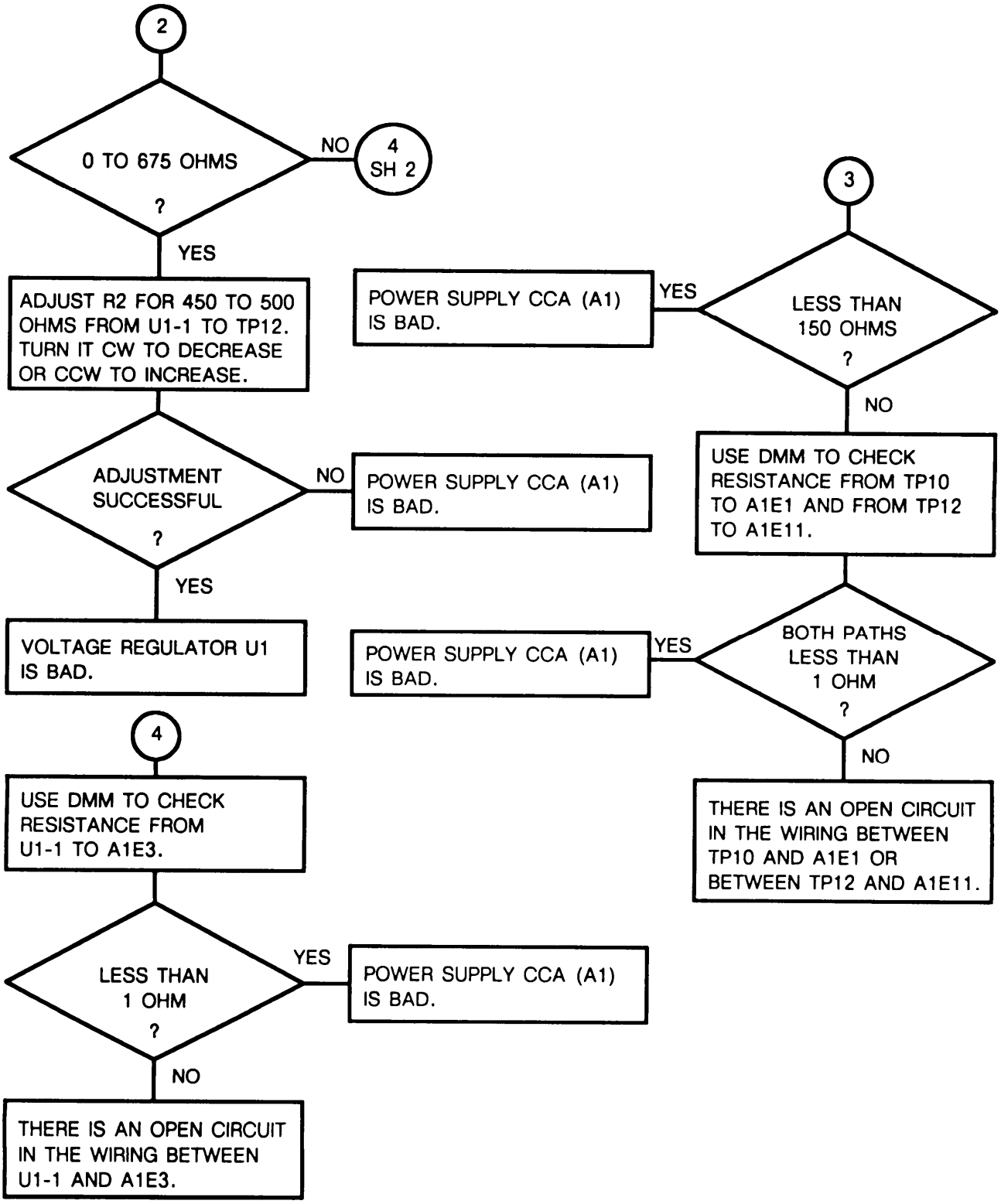
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting 6.75 V Power Supply
(Sheet 1 of 2)



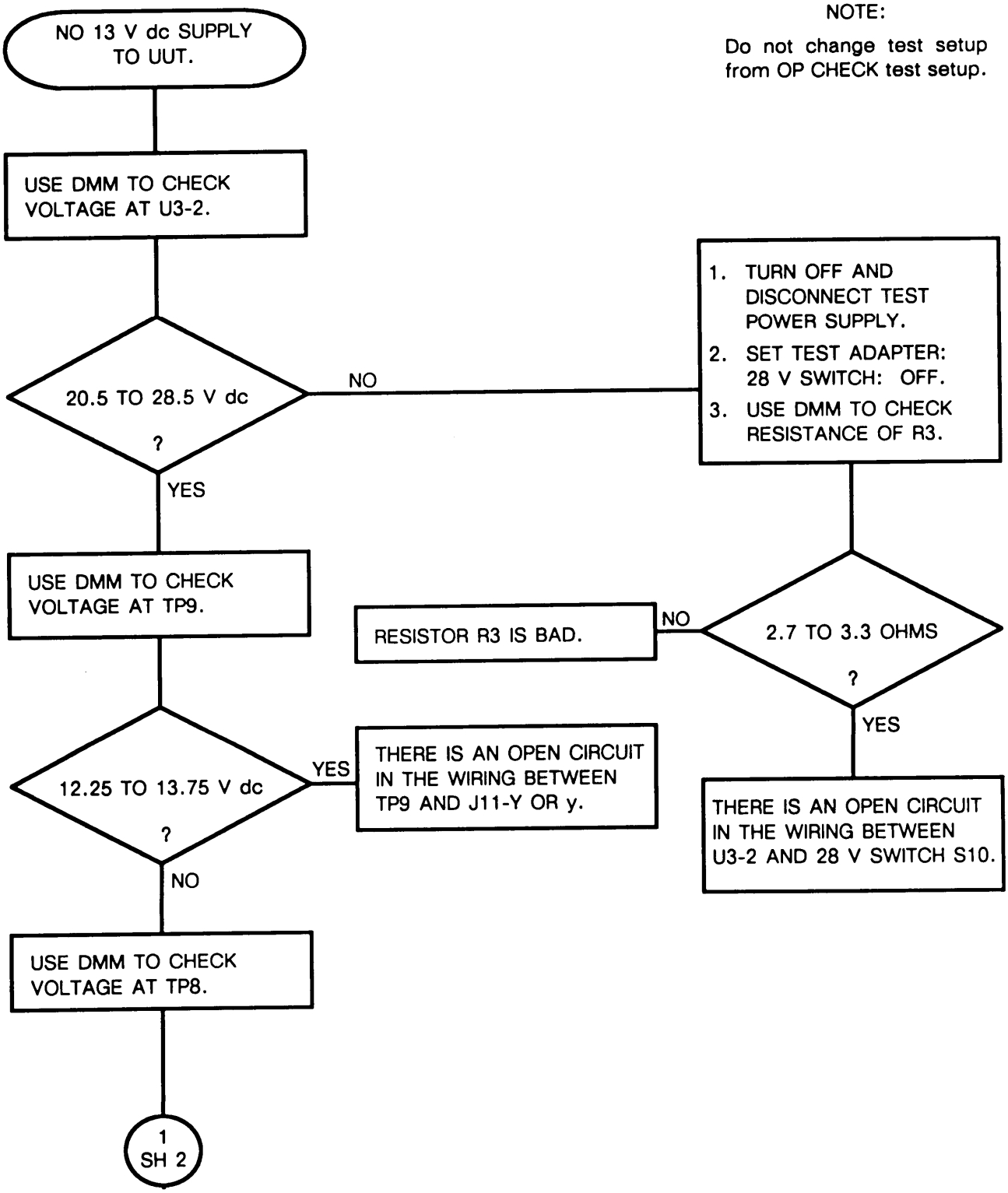
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting 6.75 V Power Supply
(Sheet 2 of 2)



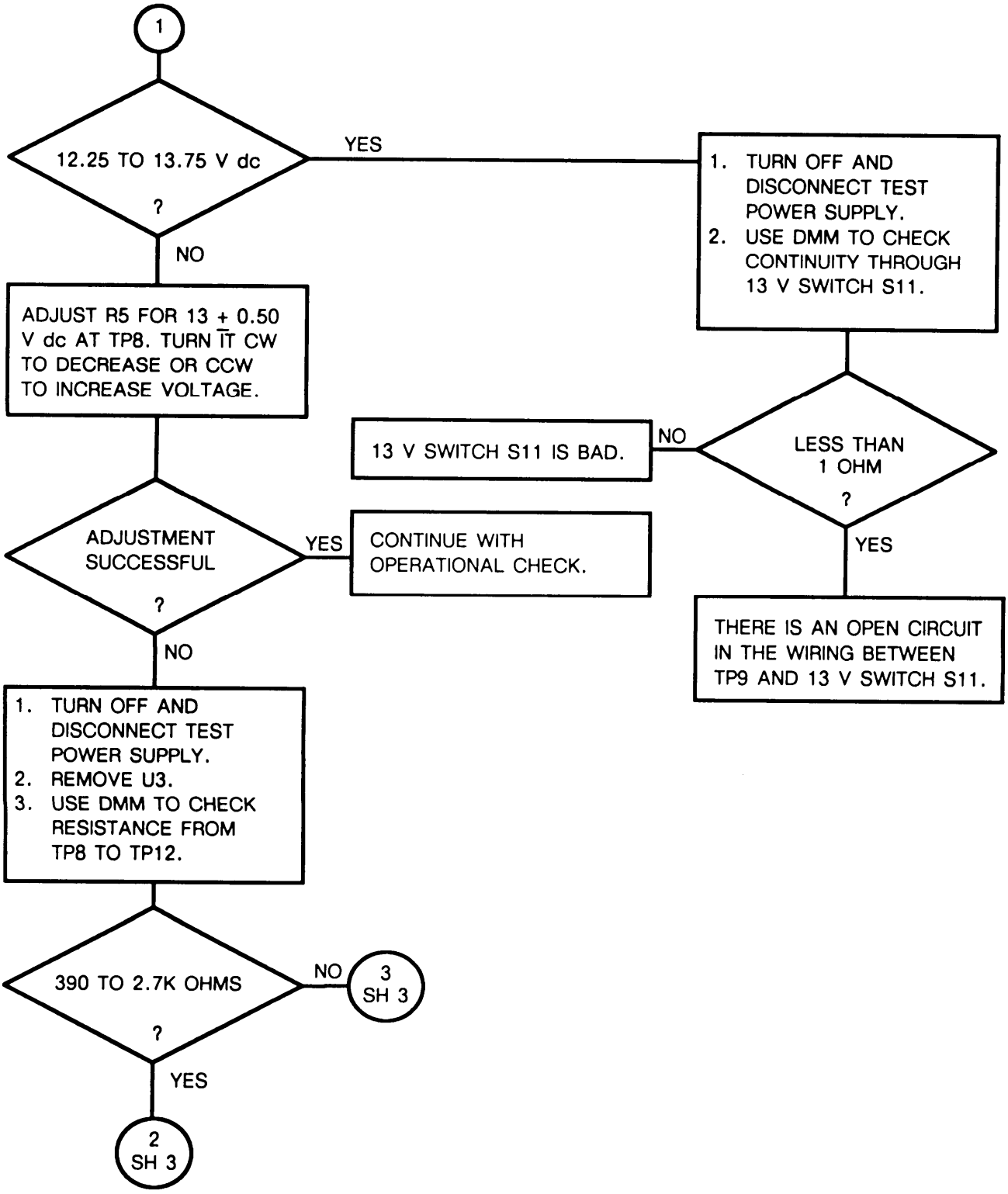
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting 13 V Power Supply
(Sheet 1 of 3)



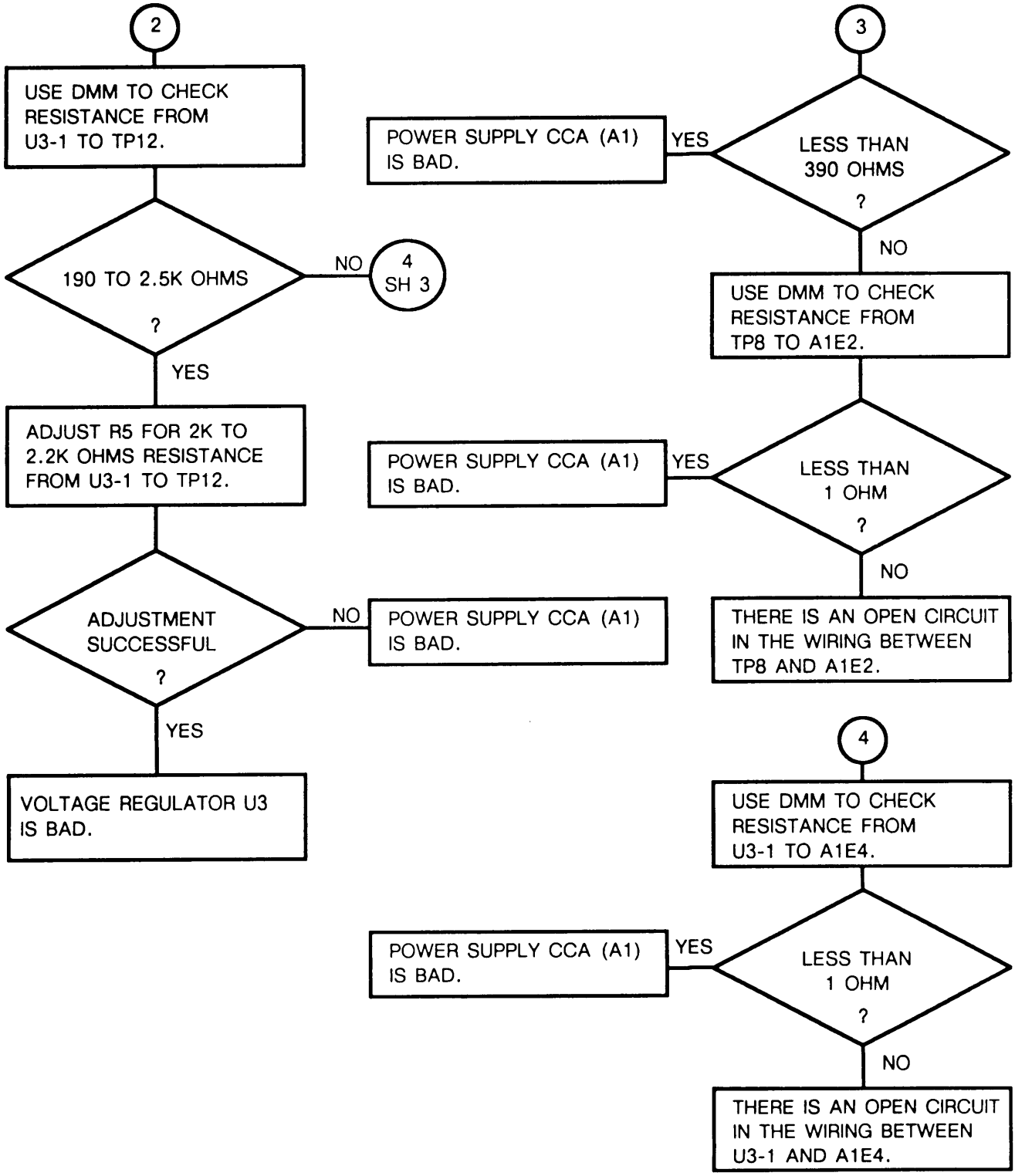
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting 13 V Power Supply
(Sheet 2 of 3)



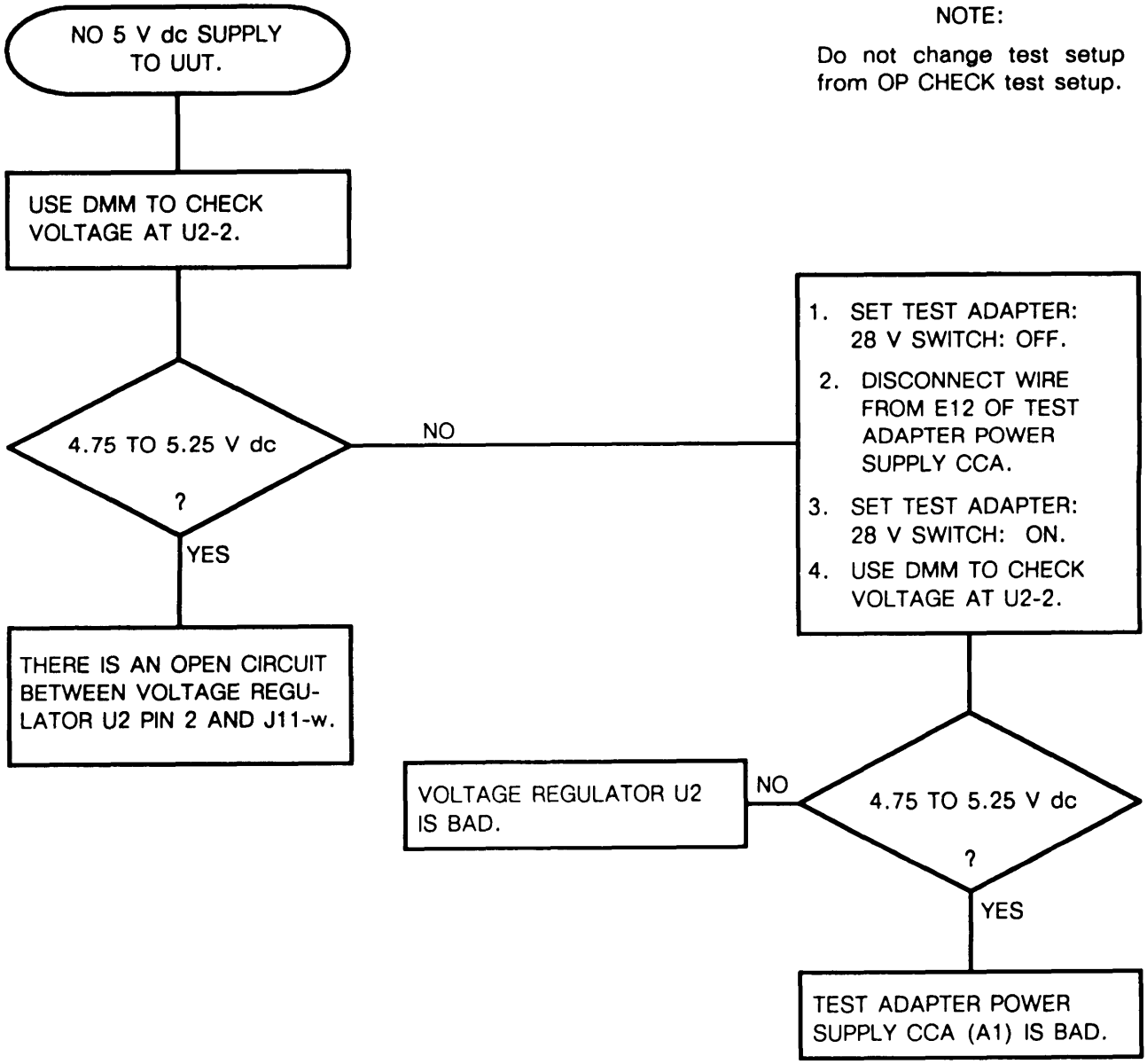
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting 13 V Power Supply
(Sheet 3 of 3)



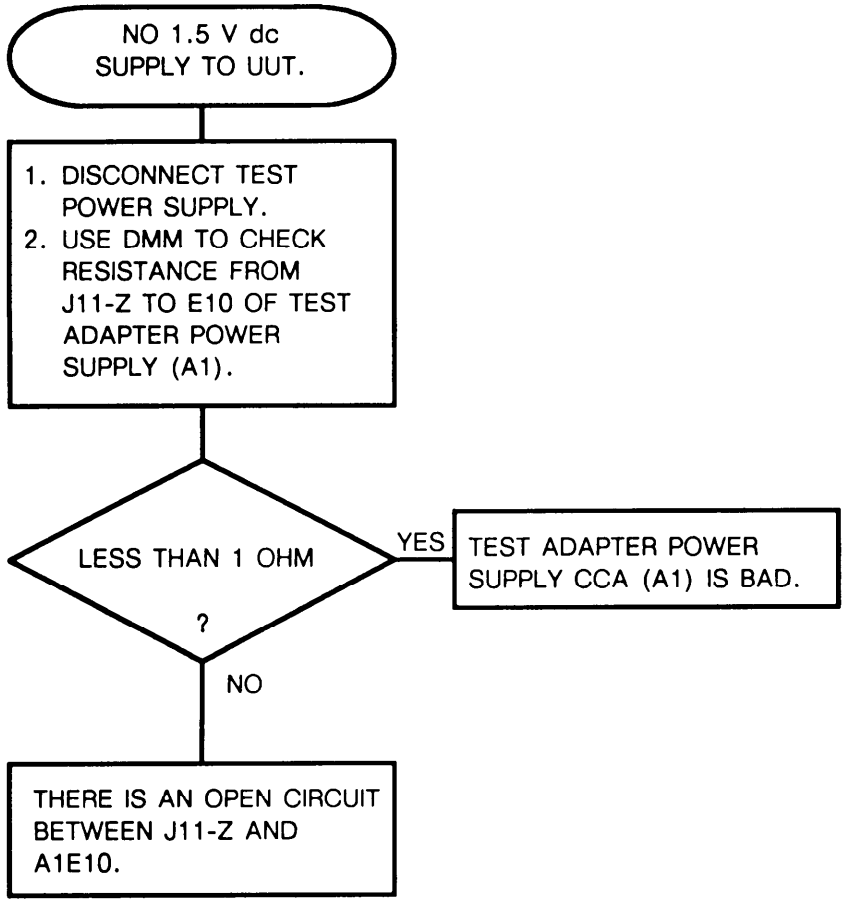
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting 5 V Power Supply
(Sheet 1 of 1)



3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 11
Troubleshooting 1.5 V Power Supply
(Sheet 1 of 1)

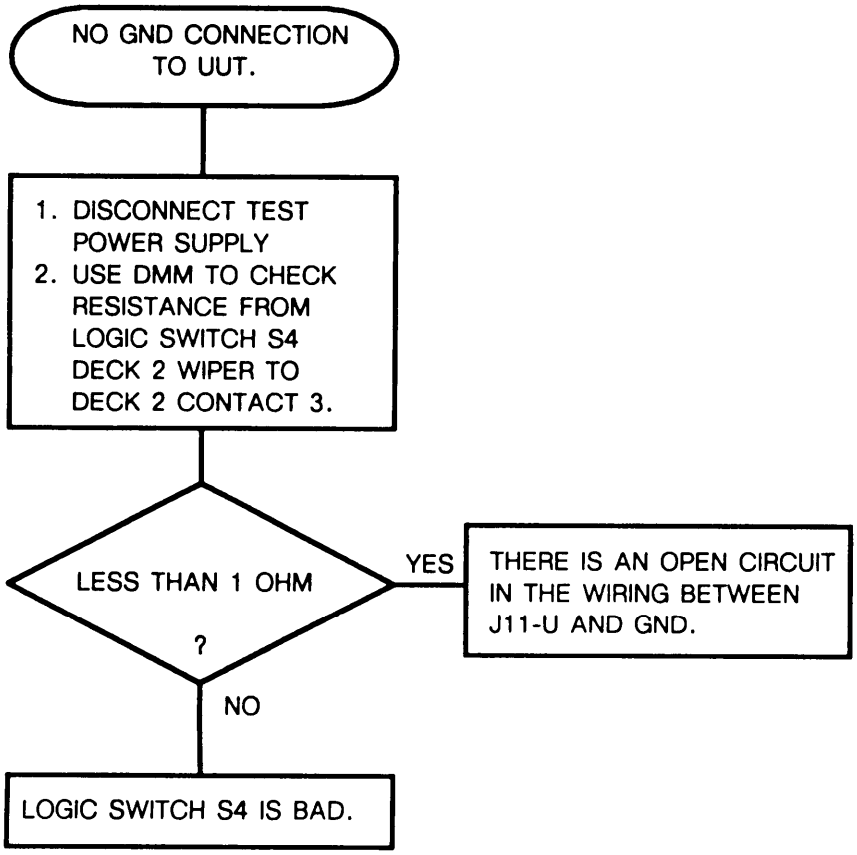


NOTE:

Do not change test setup from OP CHECK test setup.

3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 12
Troubleshooting UUT GND Connection
(Sheet 1 of 1)

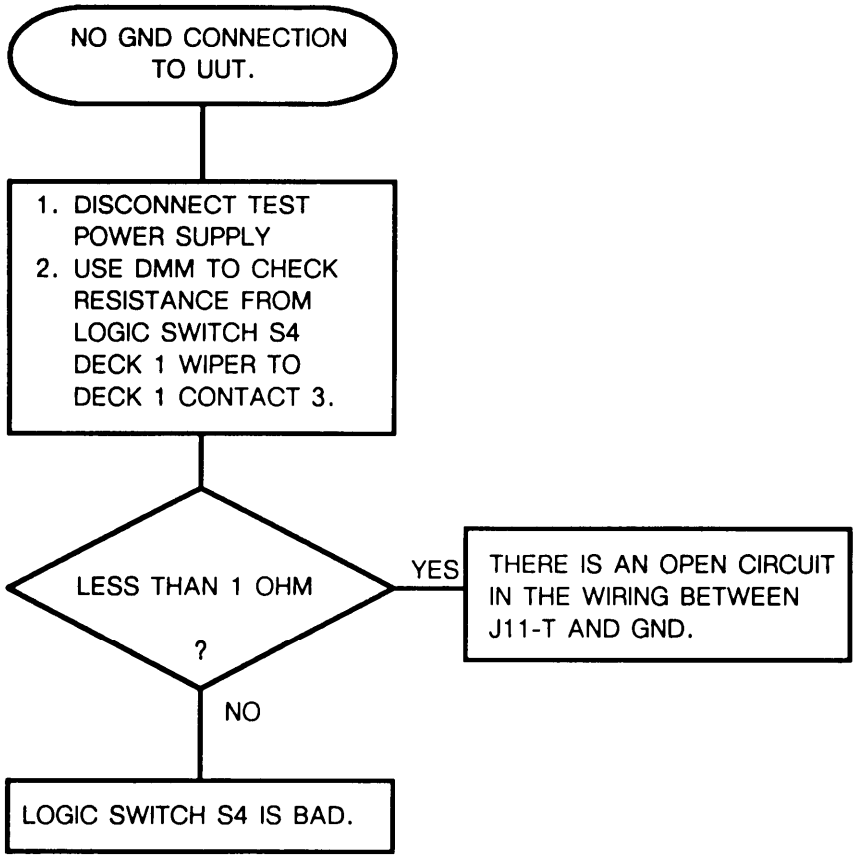


NOTE:

Do not change test setup from OP CHECK test setup.

3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting UUT GND Connection
(Sheet 1 of 1)

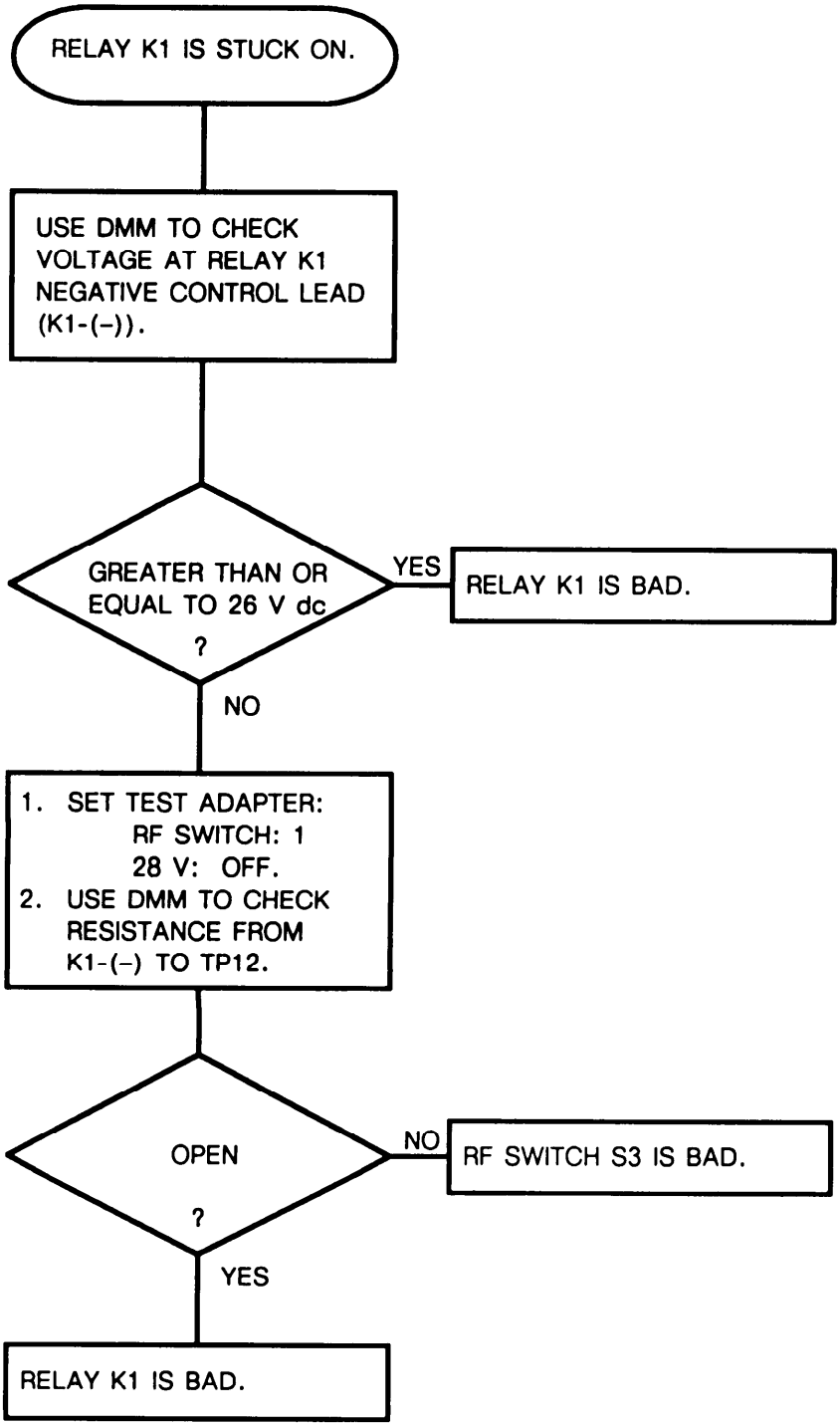


NOTE:

Do not change test setup from OP CHECK test setup.

3-20. TROUBLESHOOTING FLOWCHARTS. Continued

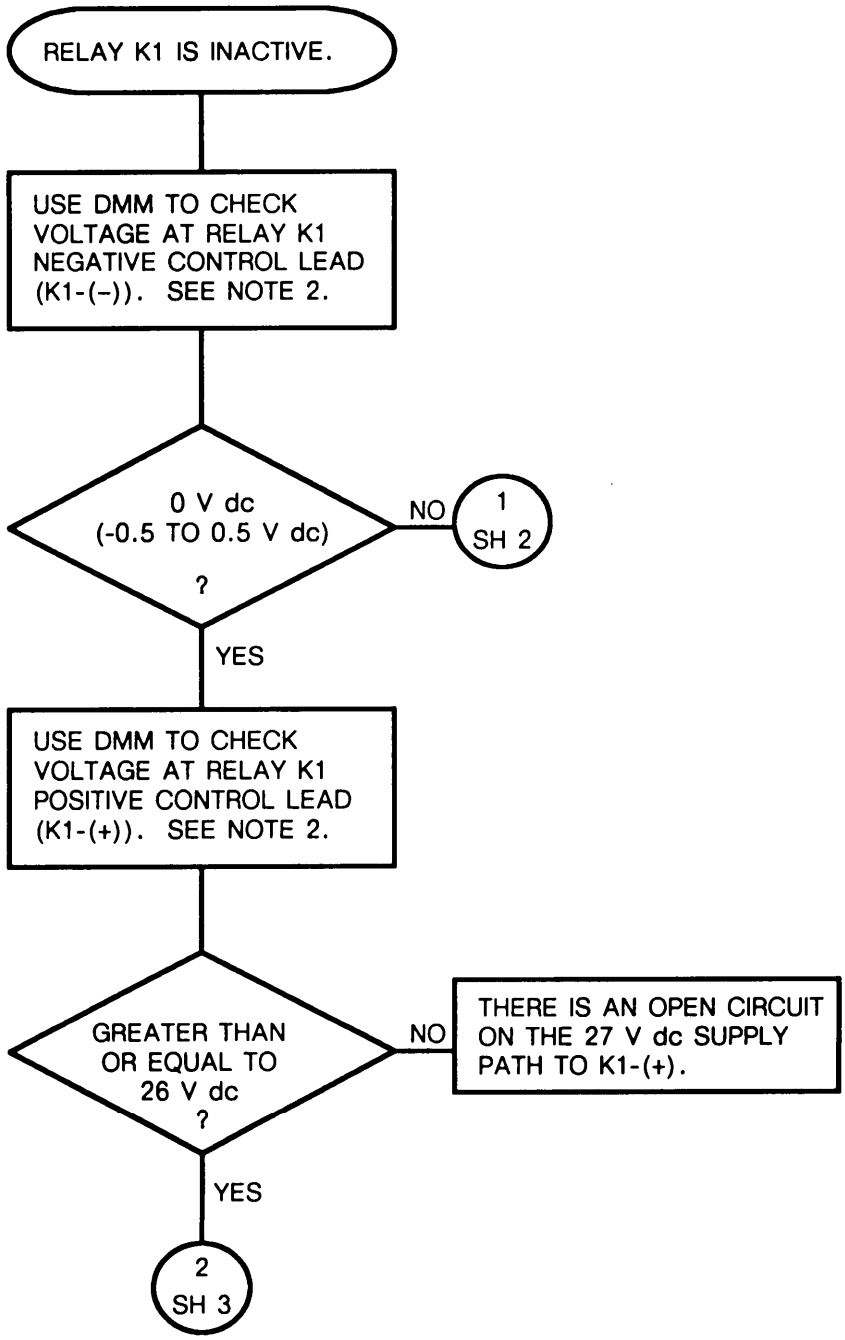
Chart 14
Troubleshooting Relay K1
(Sheet 1 of 1)



NOTE:
Do not change test setup from OP CHECK test setup.

3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Relay K1
(Sheet 1 of 6)

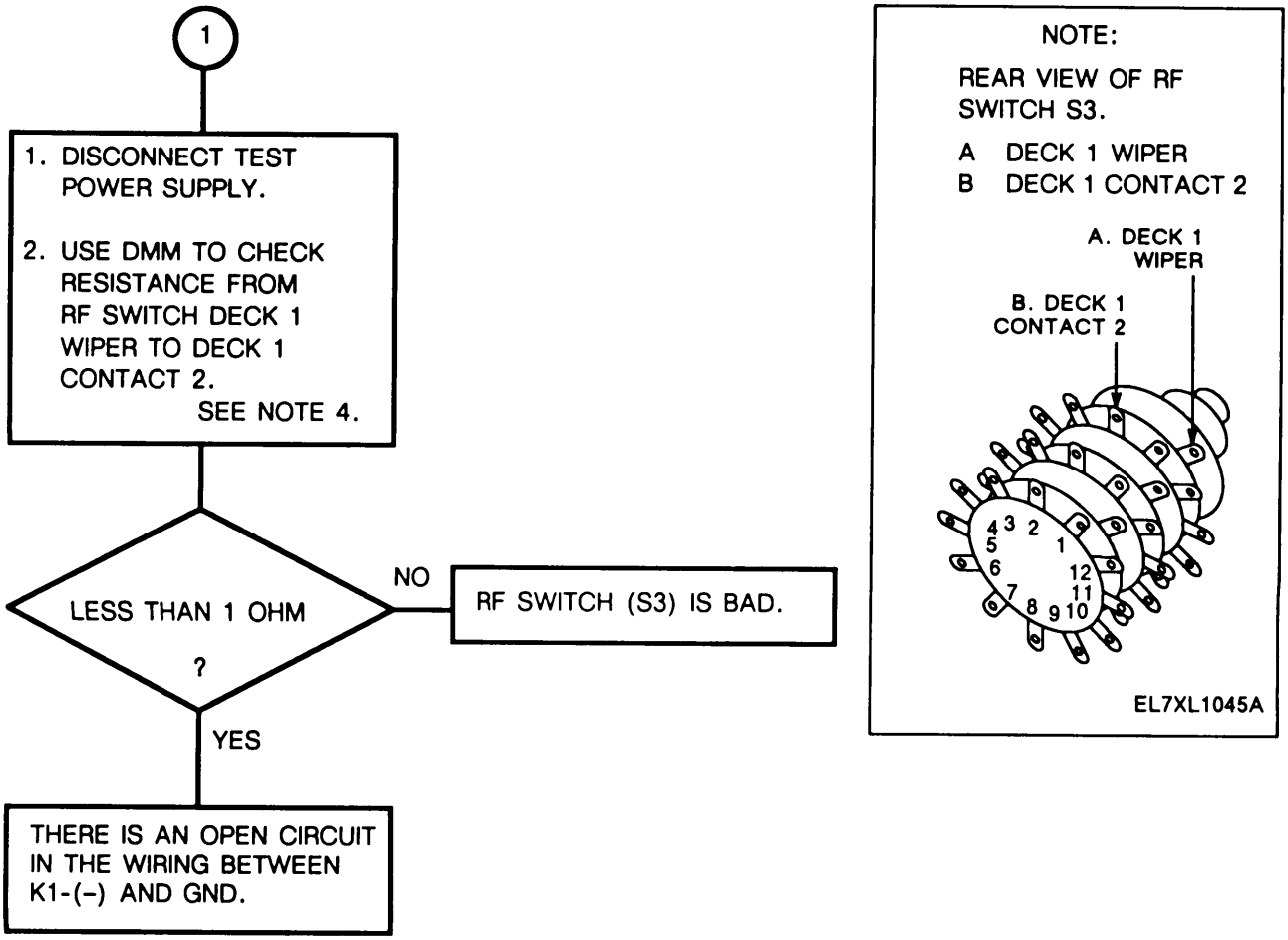


NOTES:

1. Do not change test setup from OP CHECK test setup.
2. K1-(+) is the positive control lead of relay K1.
3. K1-(-) is the negative control lead of relay K1.

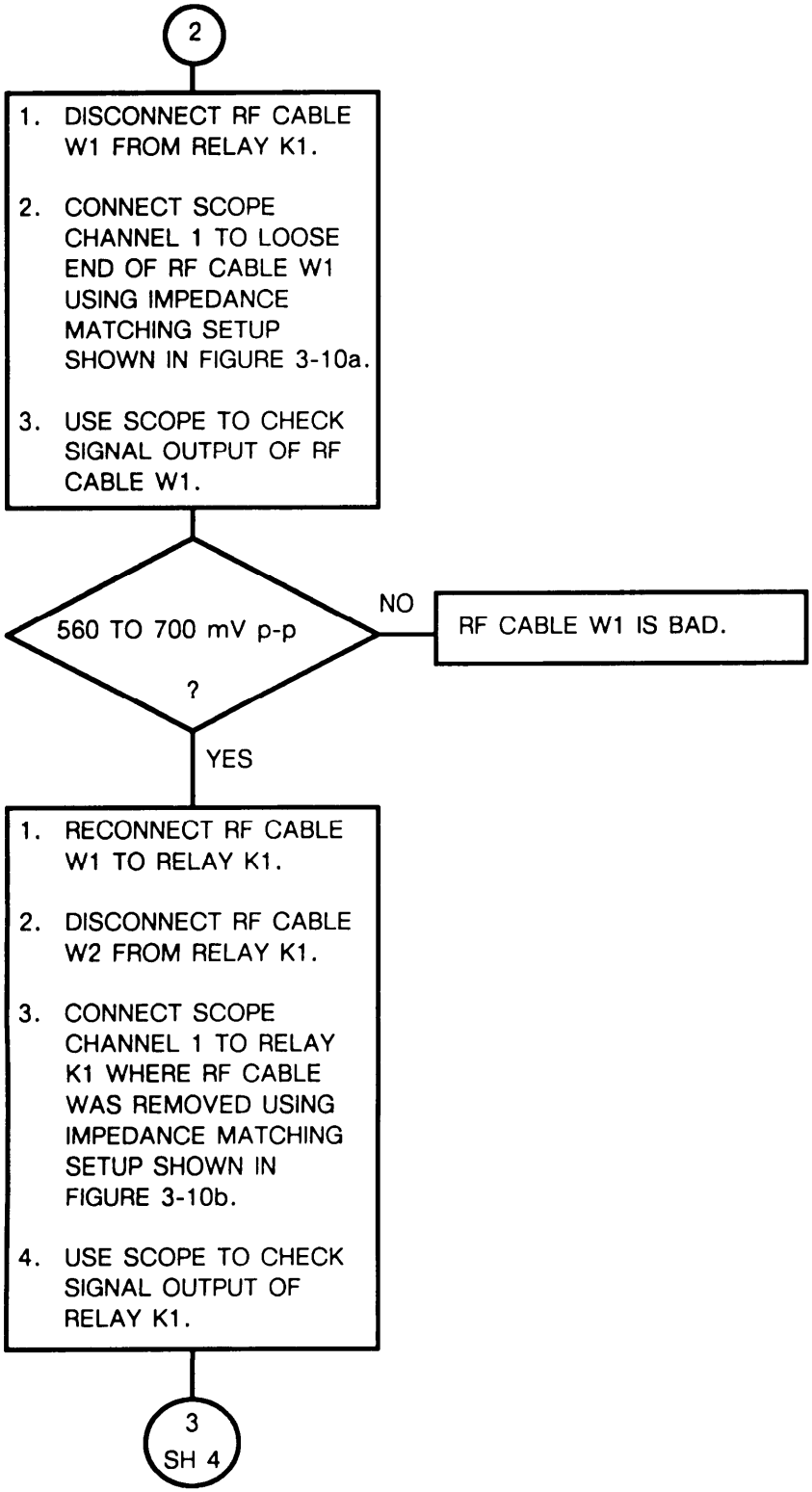
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Relay K1
(Sheet 2 of 6)

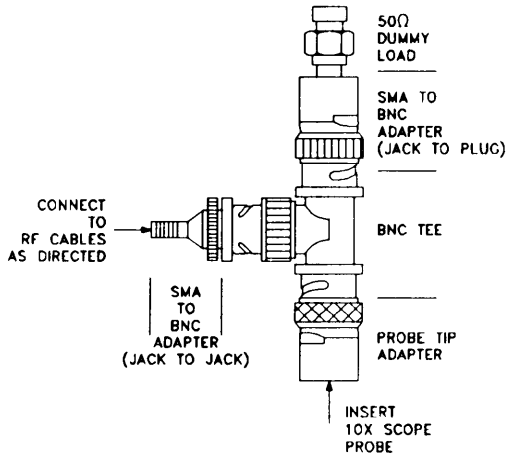


3-20. TROUBLESHOOTING FLOWCHARTS. Continued

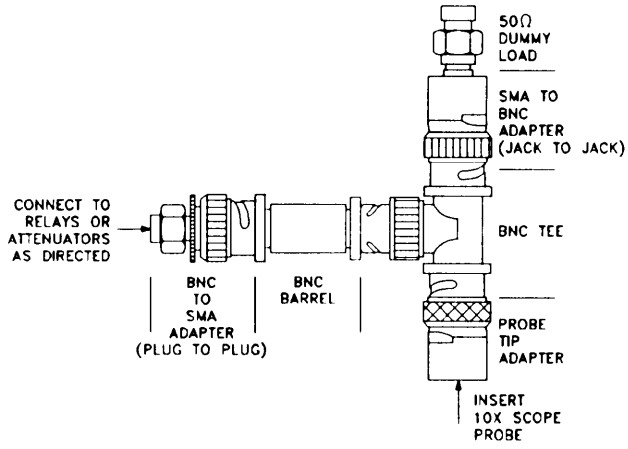
Chart 15
Troubleshooting Relay K1
(Sheet 3 of 6)



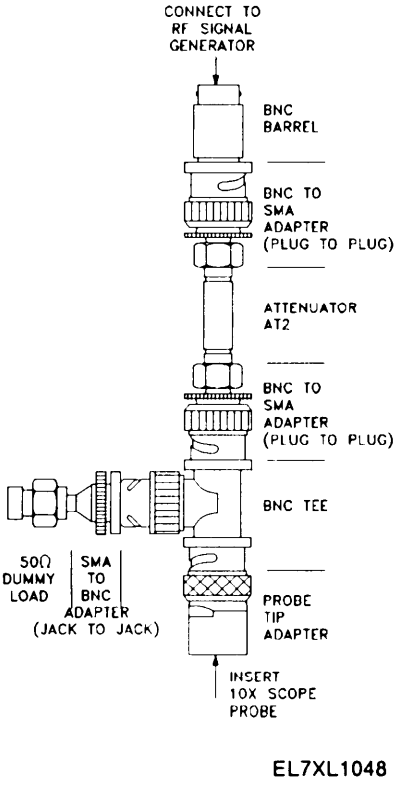
3-20. TROUBLESHOOTING FLOWCHARTS. Continued



a)



b)

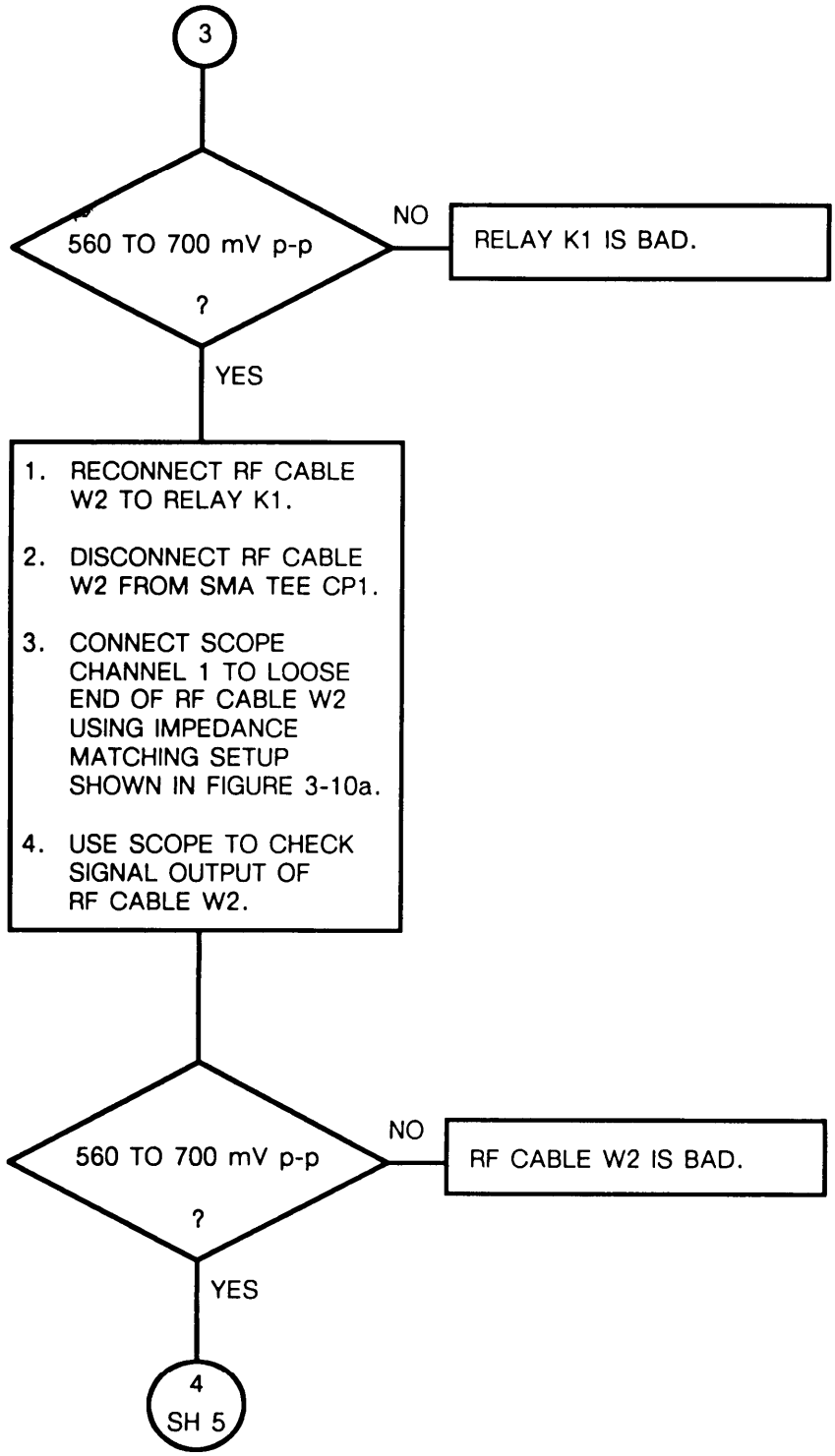


c)

Figure 3-10. Impedance Matching Test Setups

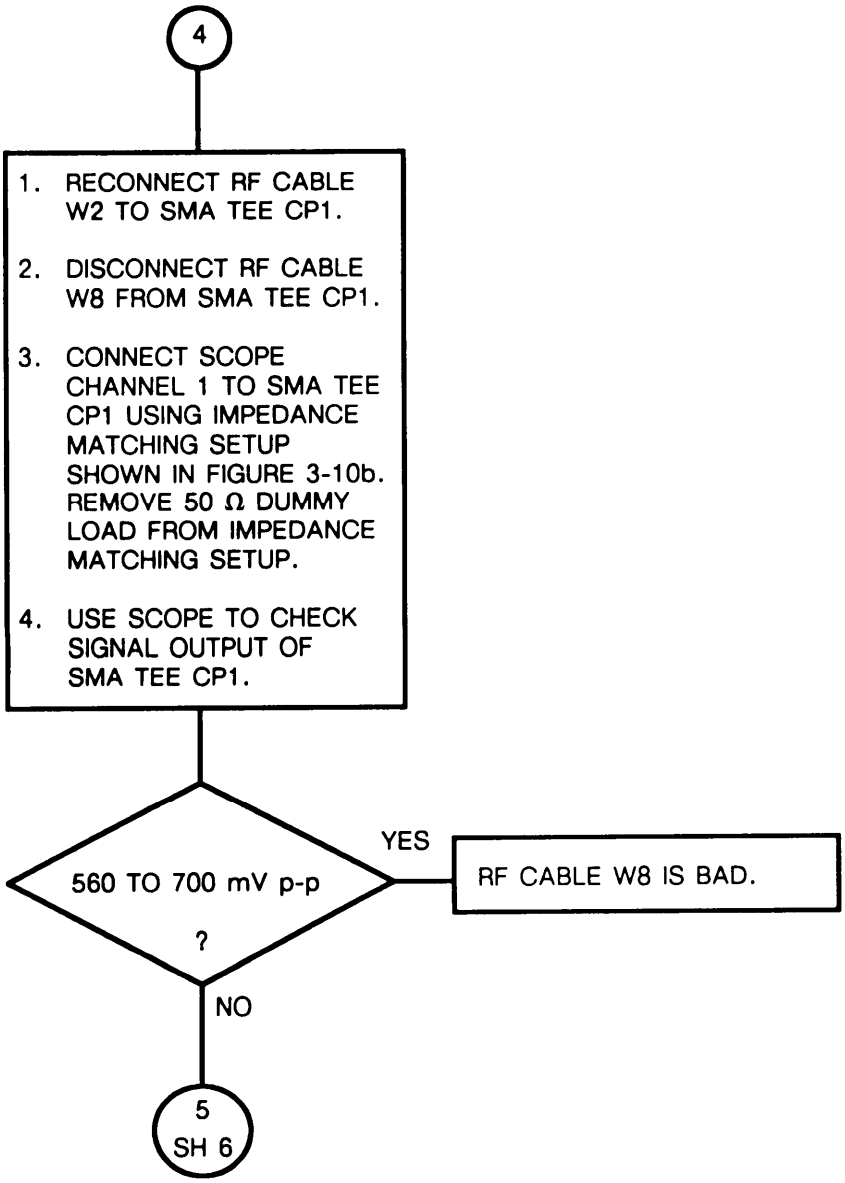
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Relay K1
(Sheet 4 of 6)



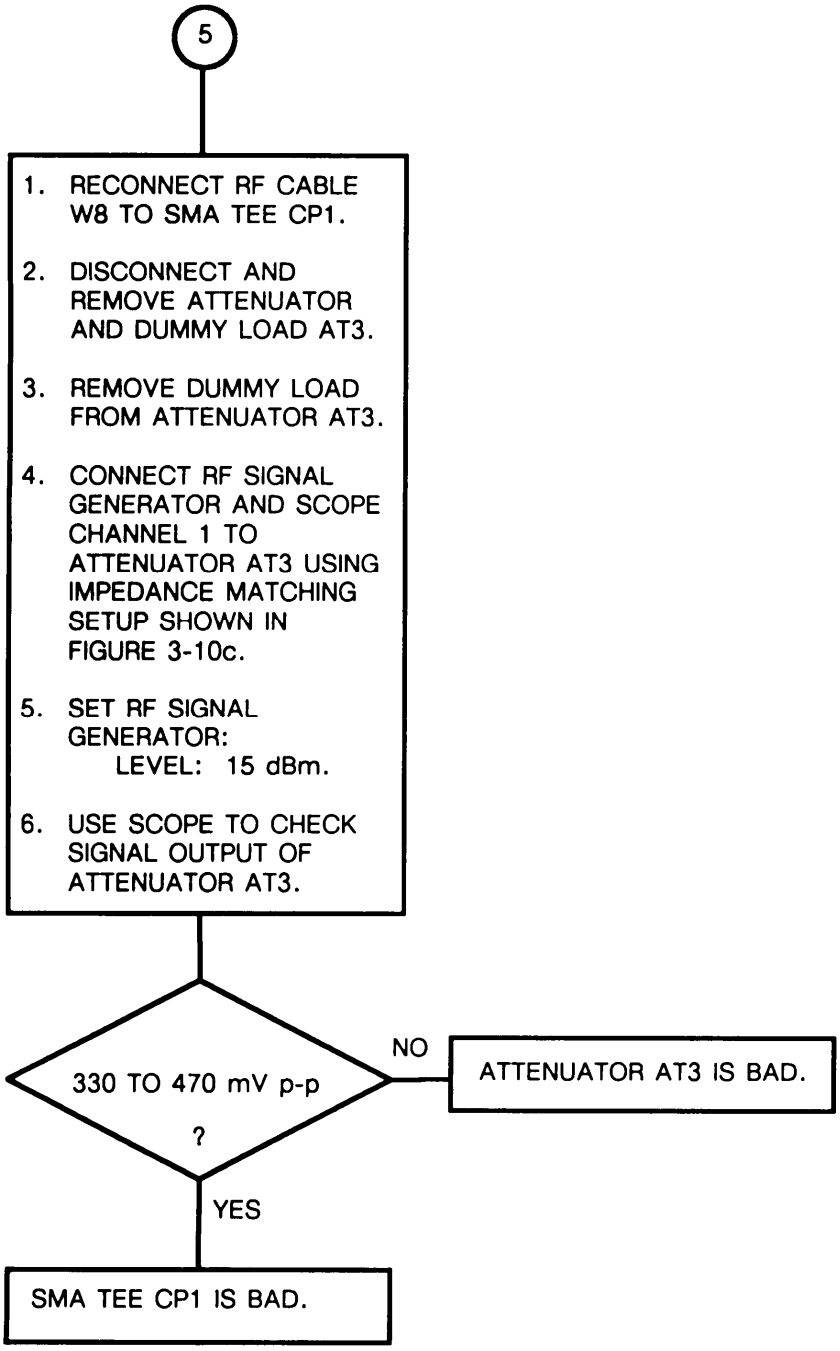
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Relay K1
(Sheet 5 of 6)



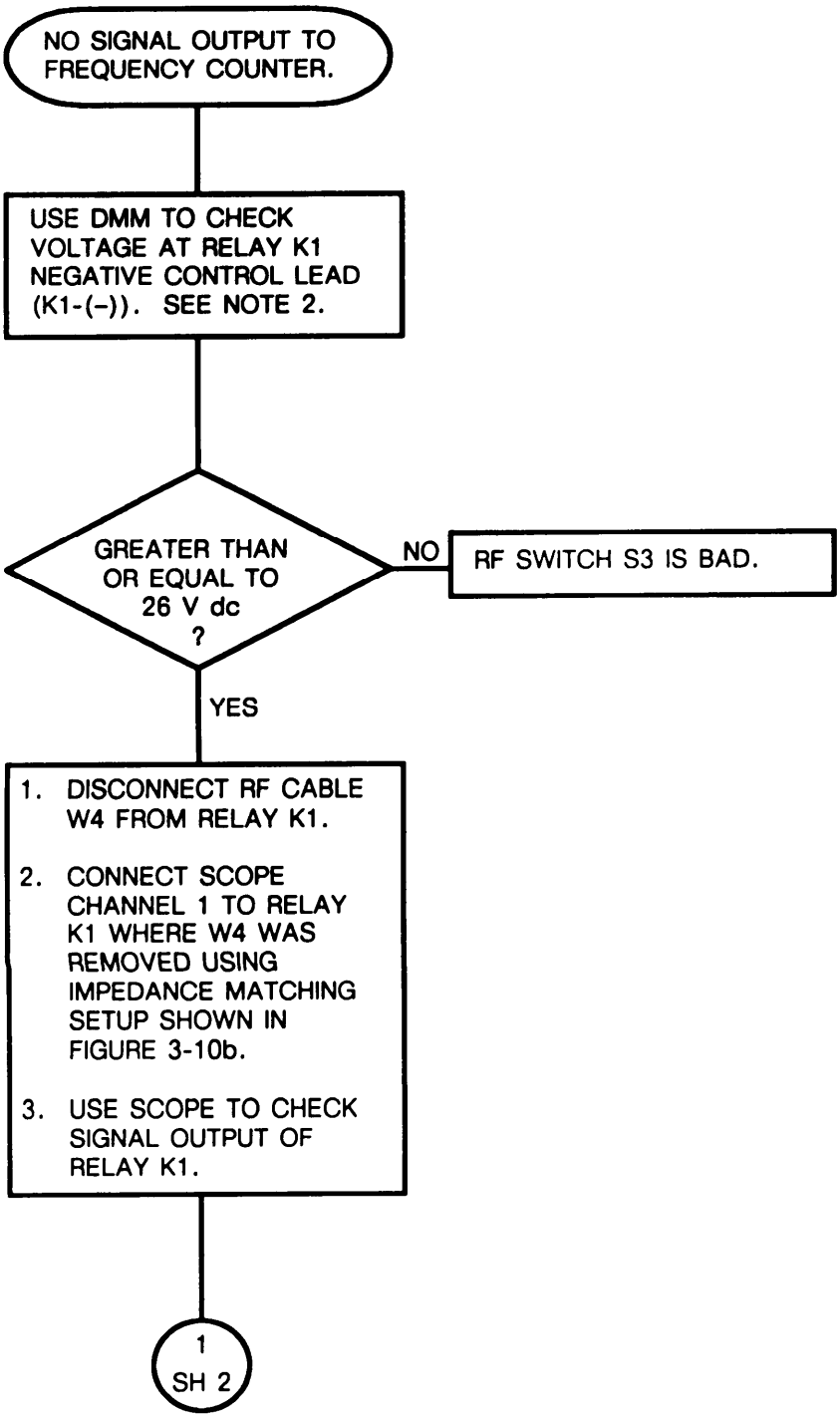
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Relay K1
(Sheet 6 of 6)



3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 1 of 7)

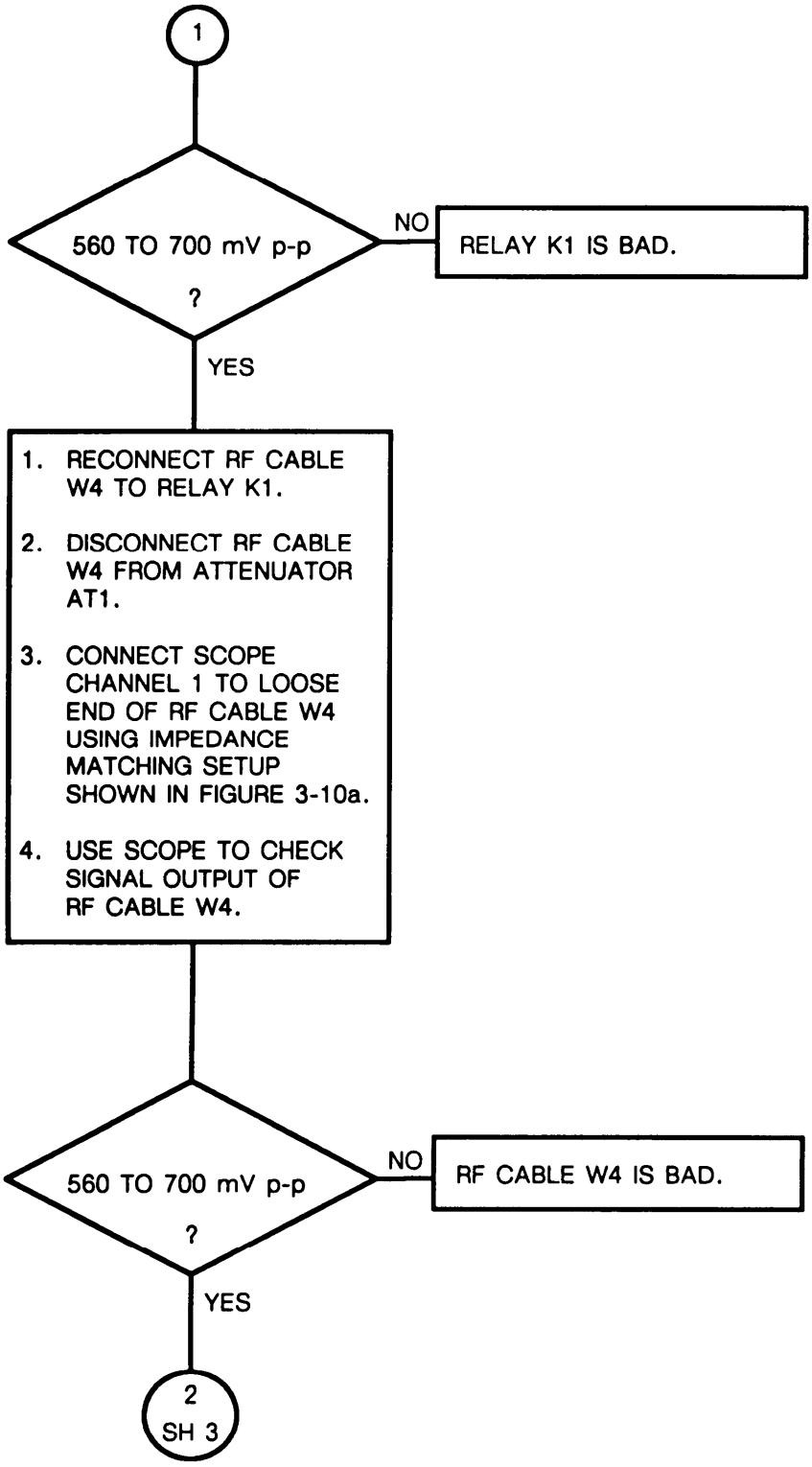


NOTES:

1. Do not change test setup from OP CHECK test setup.
2. K1-(+) is the positiv control lead of relay K1.
3. K1-(–) is the negative control lead of relay K1.

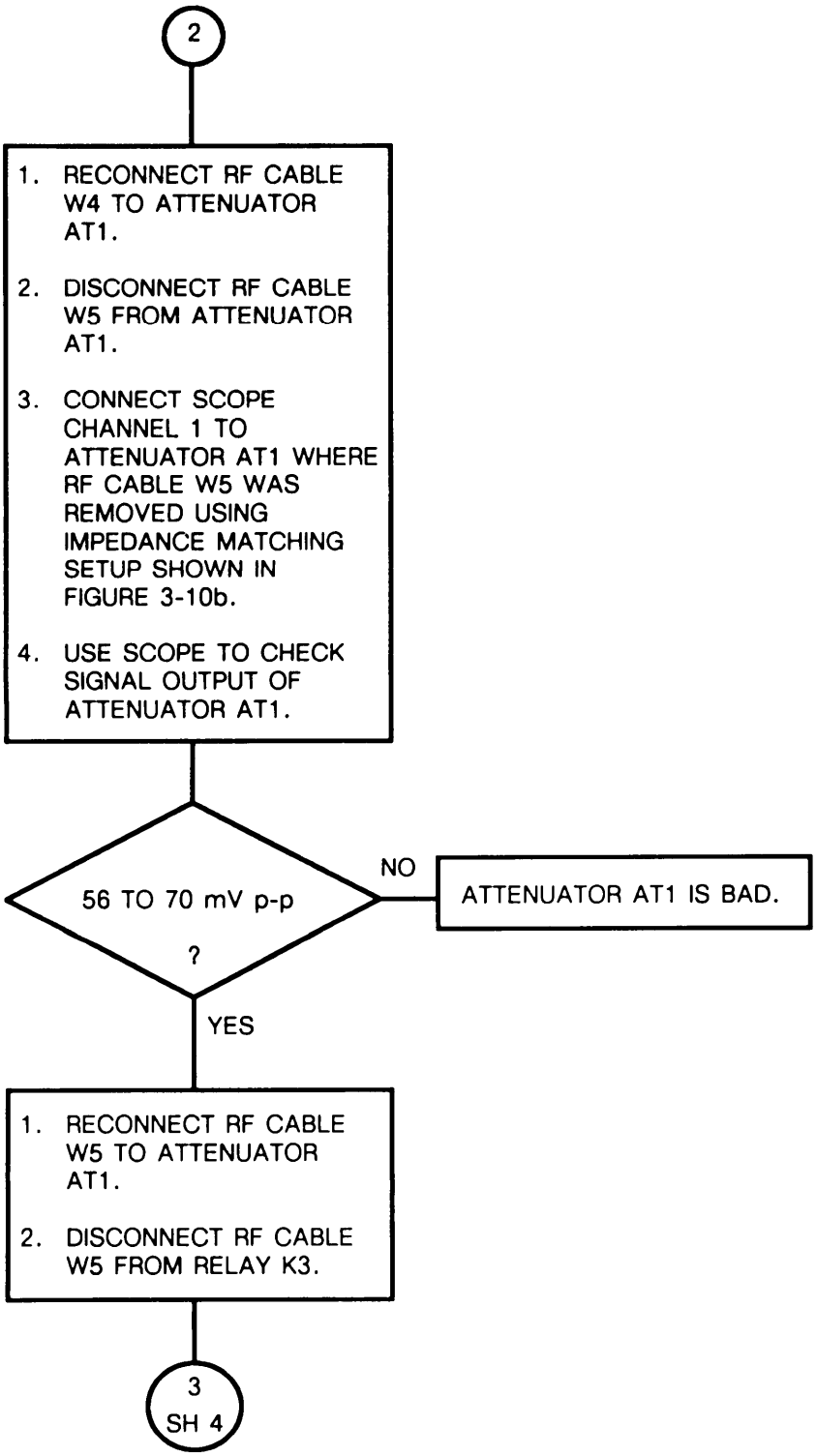
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 2 of 7)



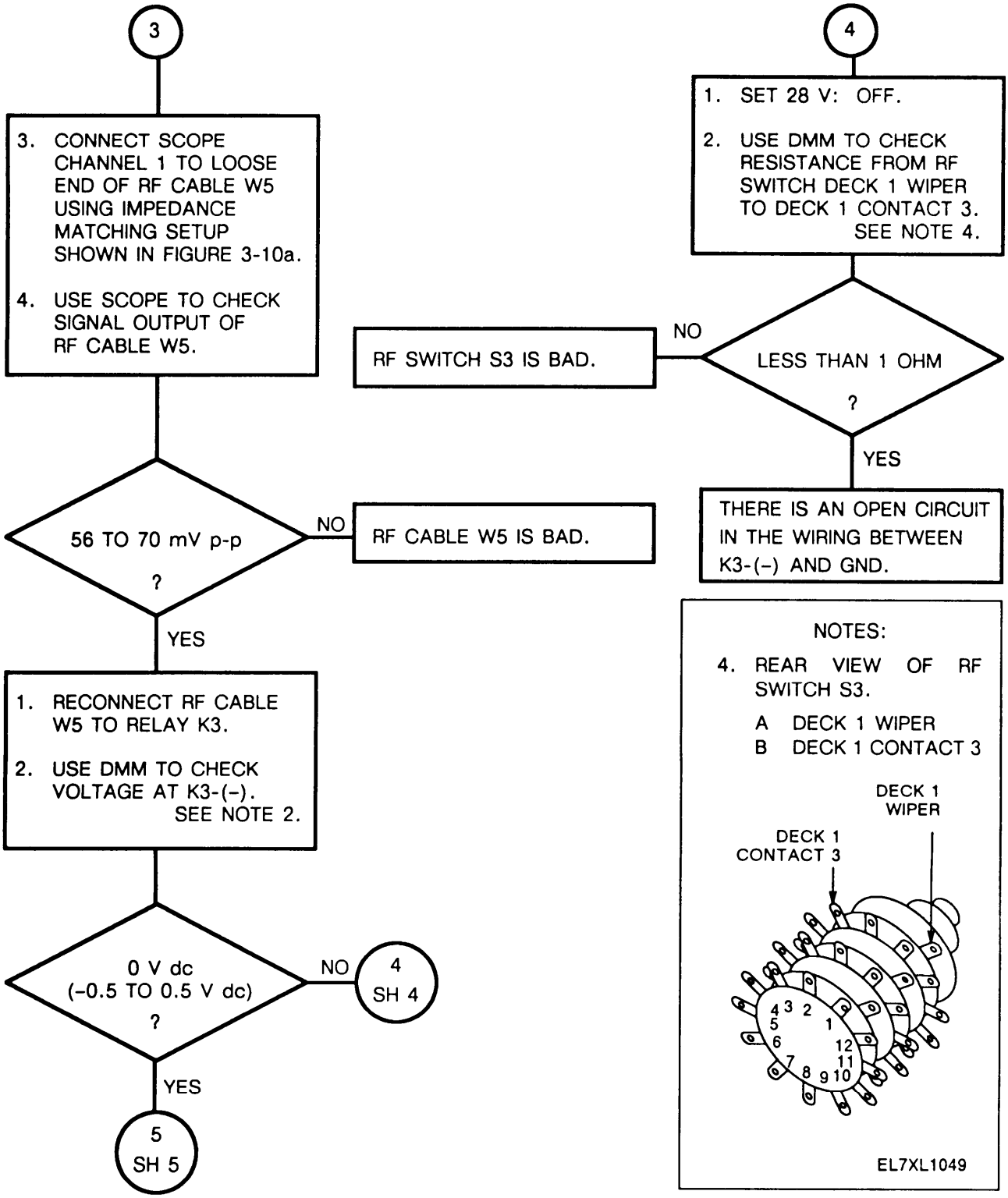
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 3 of 7)



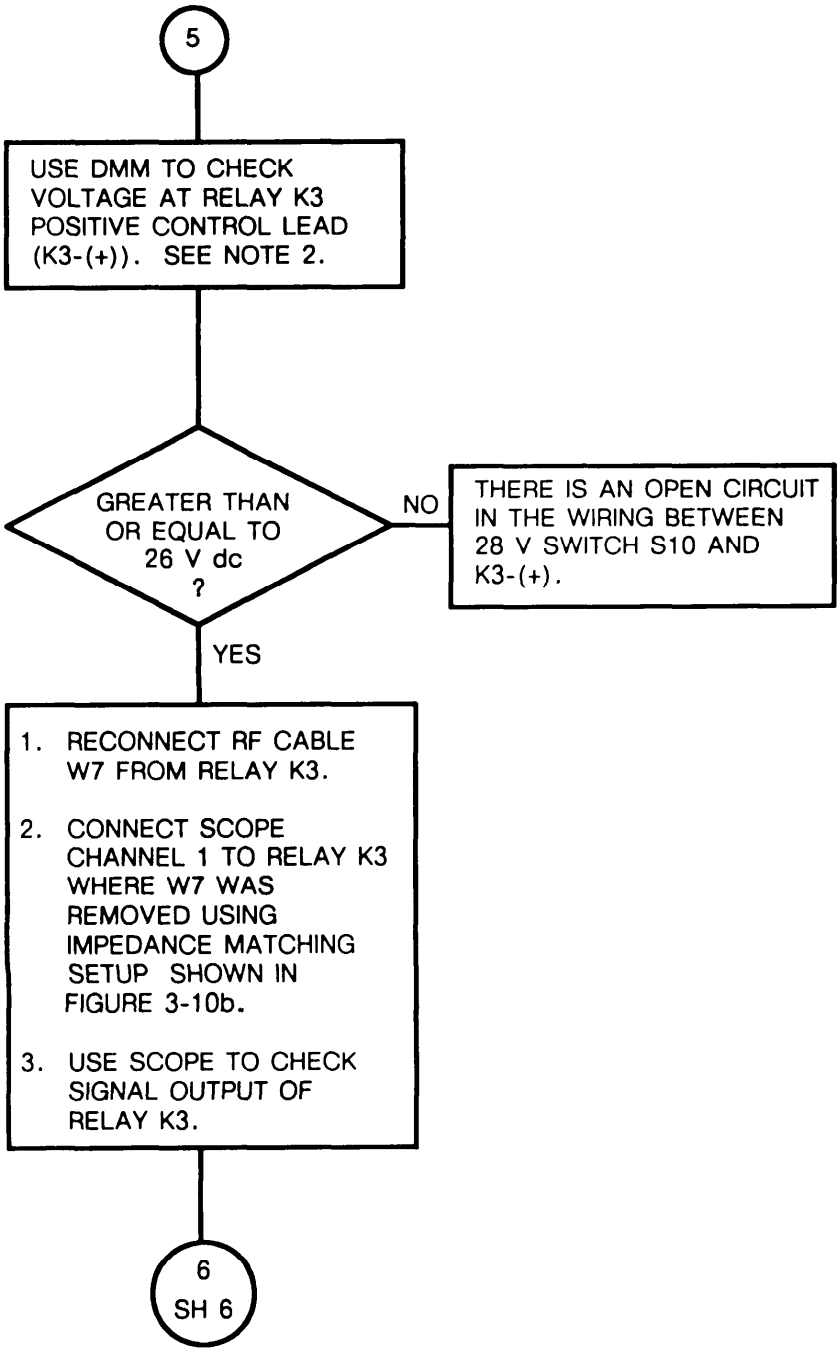
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 4 of 7)



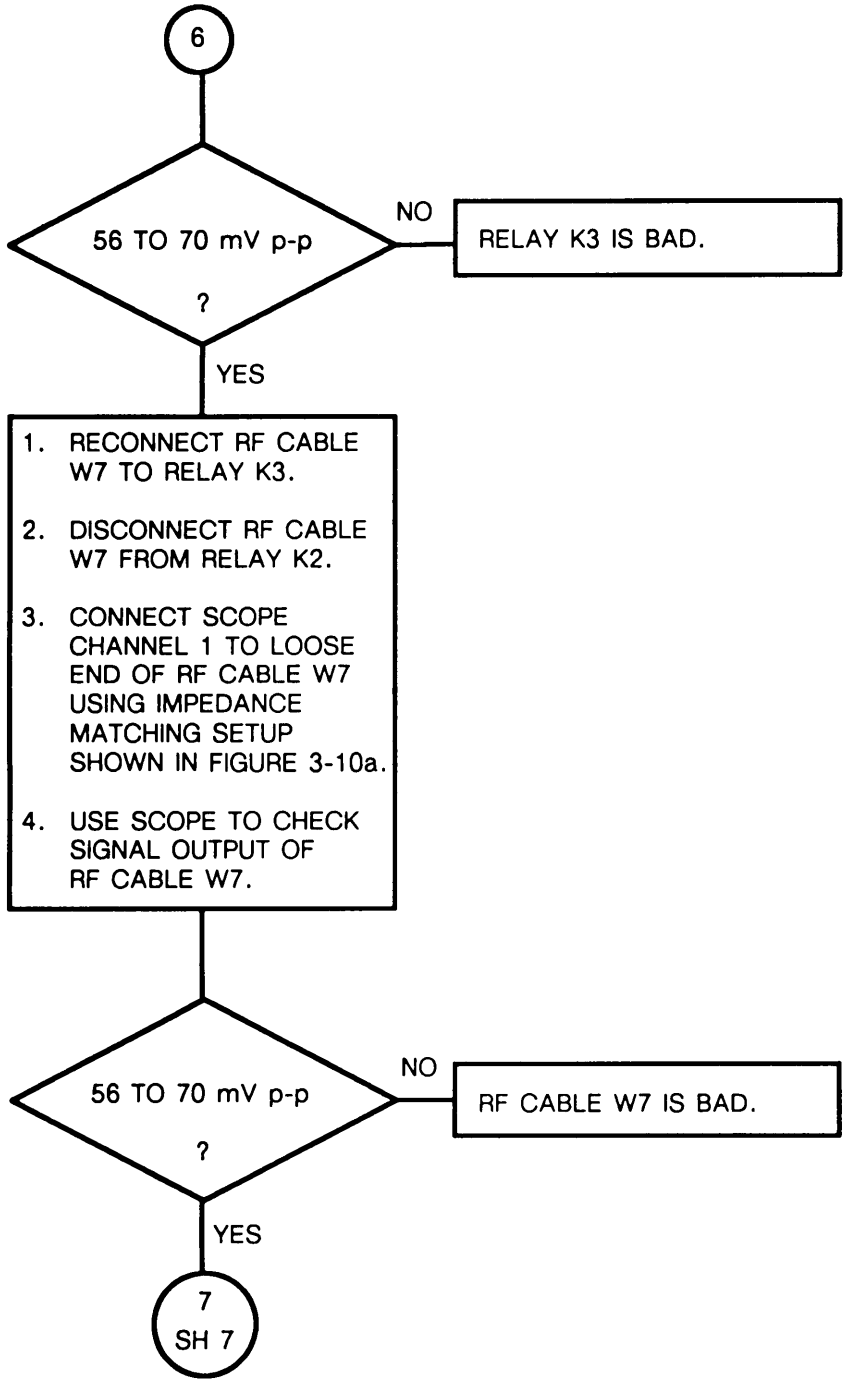
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 5 of 7)



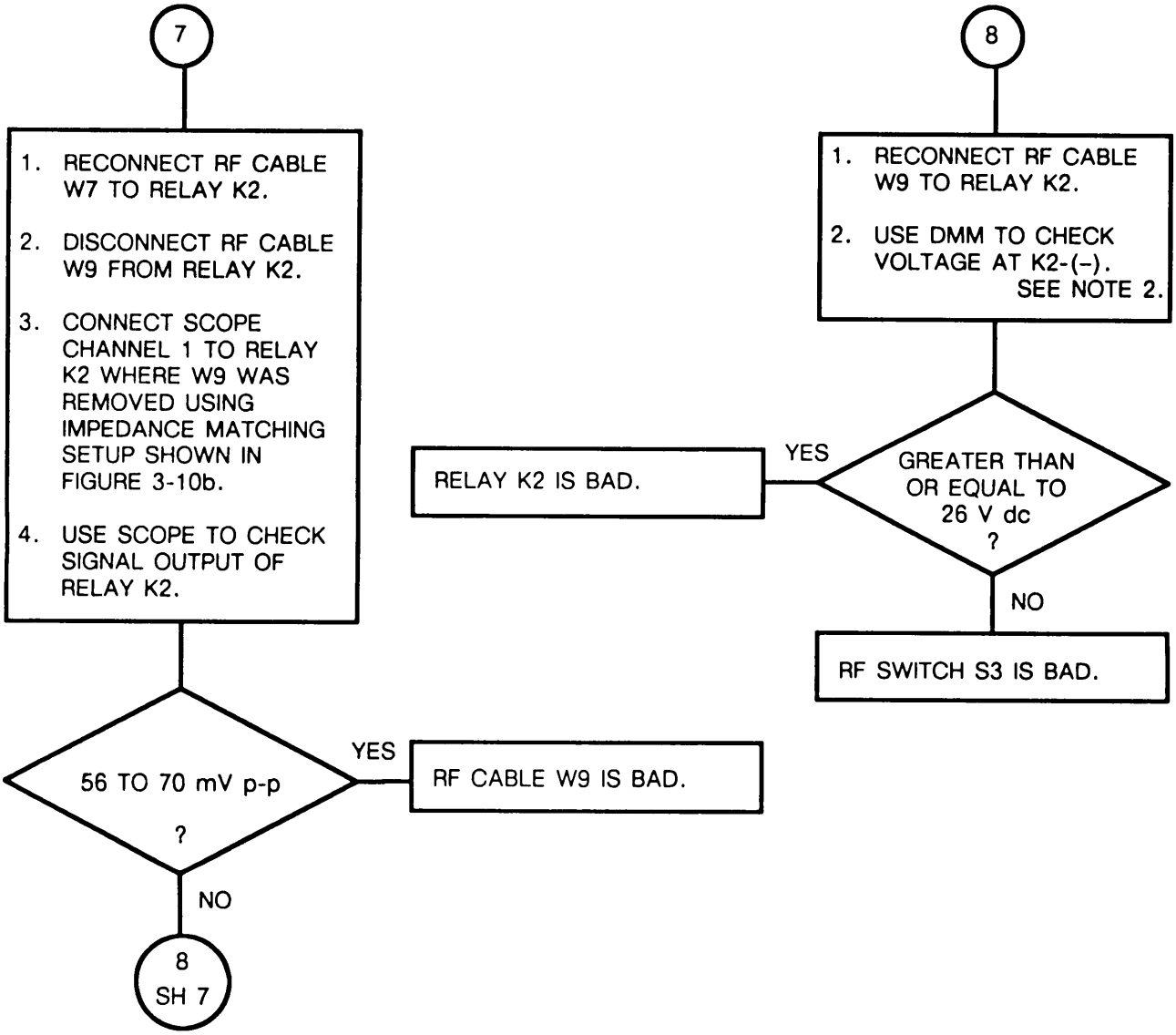
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 6 of 7)



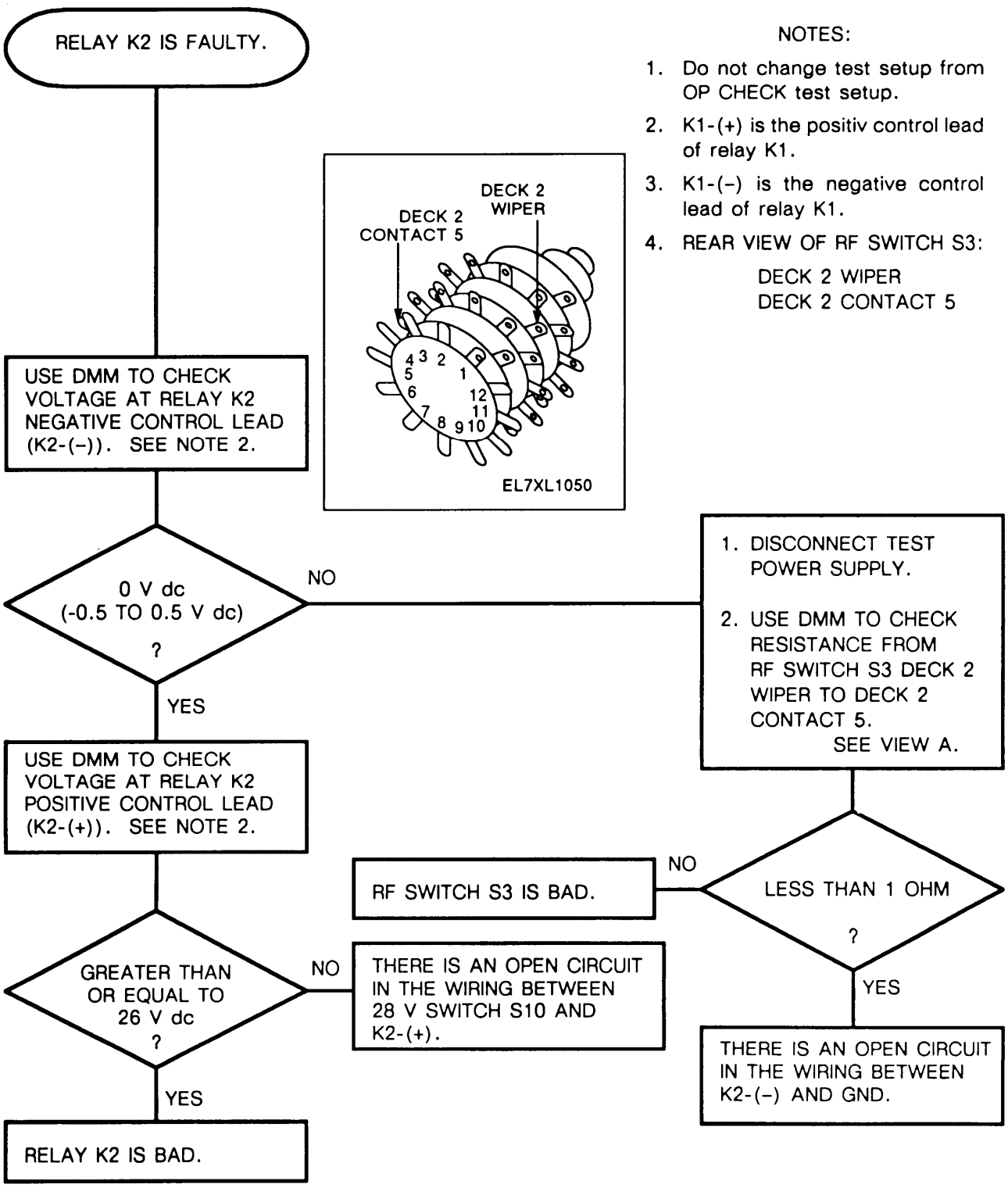
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting RF to Frequency Counter Path
(Sheet 7 of 7)



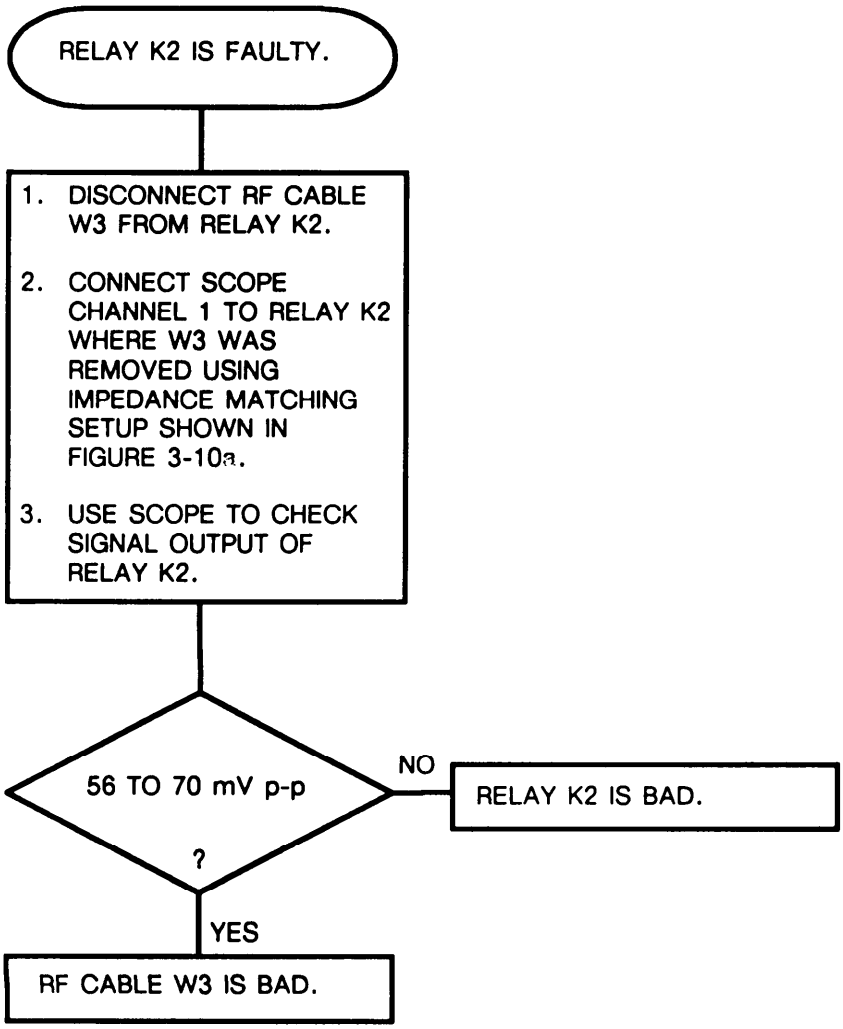
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 17
Troubleshooting Relay K2
(Sheet 1 of 1)



3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 18
Troubleshooting Relay K2
(Sheet 1 of 1)

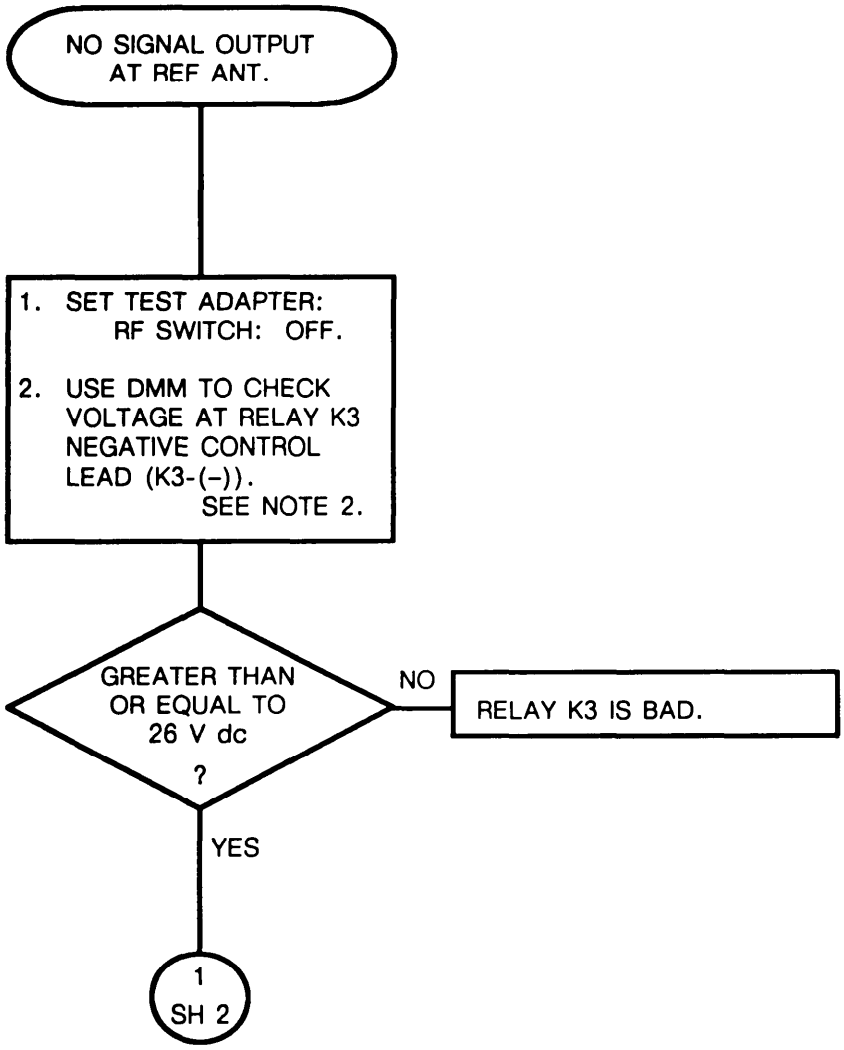


NOTE:

Do not change test setup from OP CHECK test setup.

3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 19
Troubleshooting UUT ANT to REF ANT RF path
(Sheet 1 of 3)

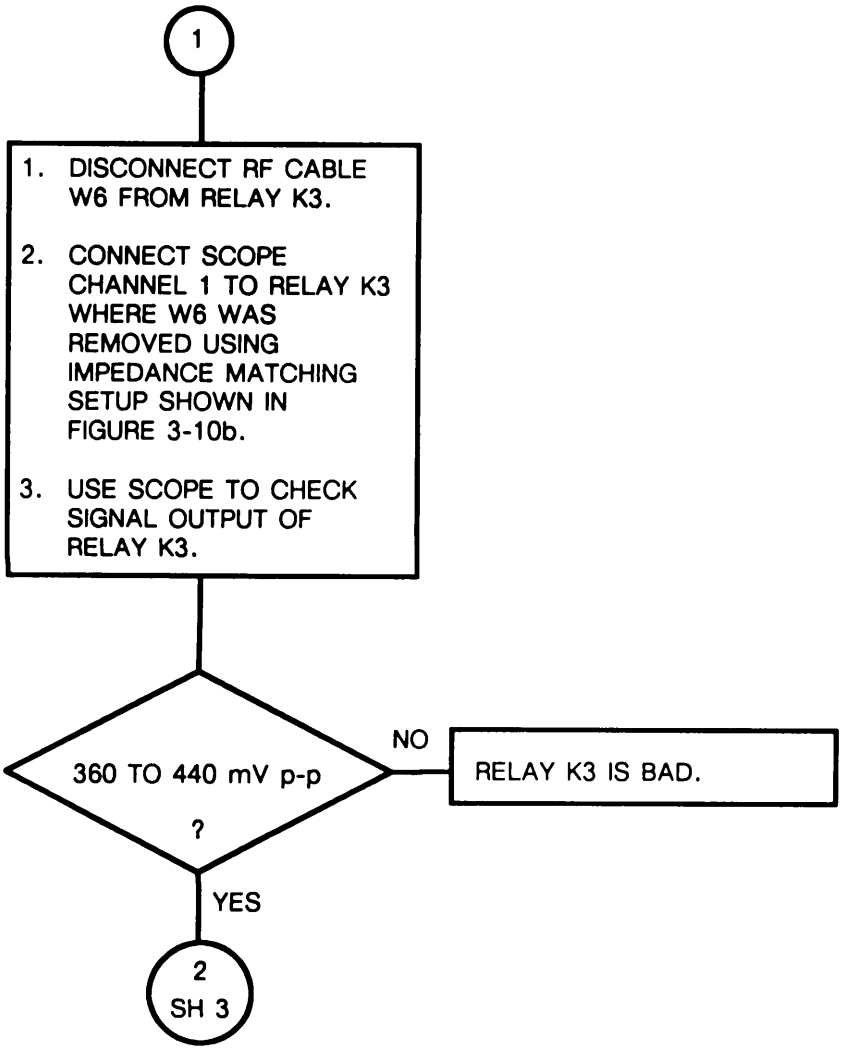


NOTES:

1. Do not change test setup from OP CHECK test setup.
2. K3-(+) is the positive control lead of relay K3.
3. K3-(–) is the negative control lead of relay K3.

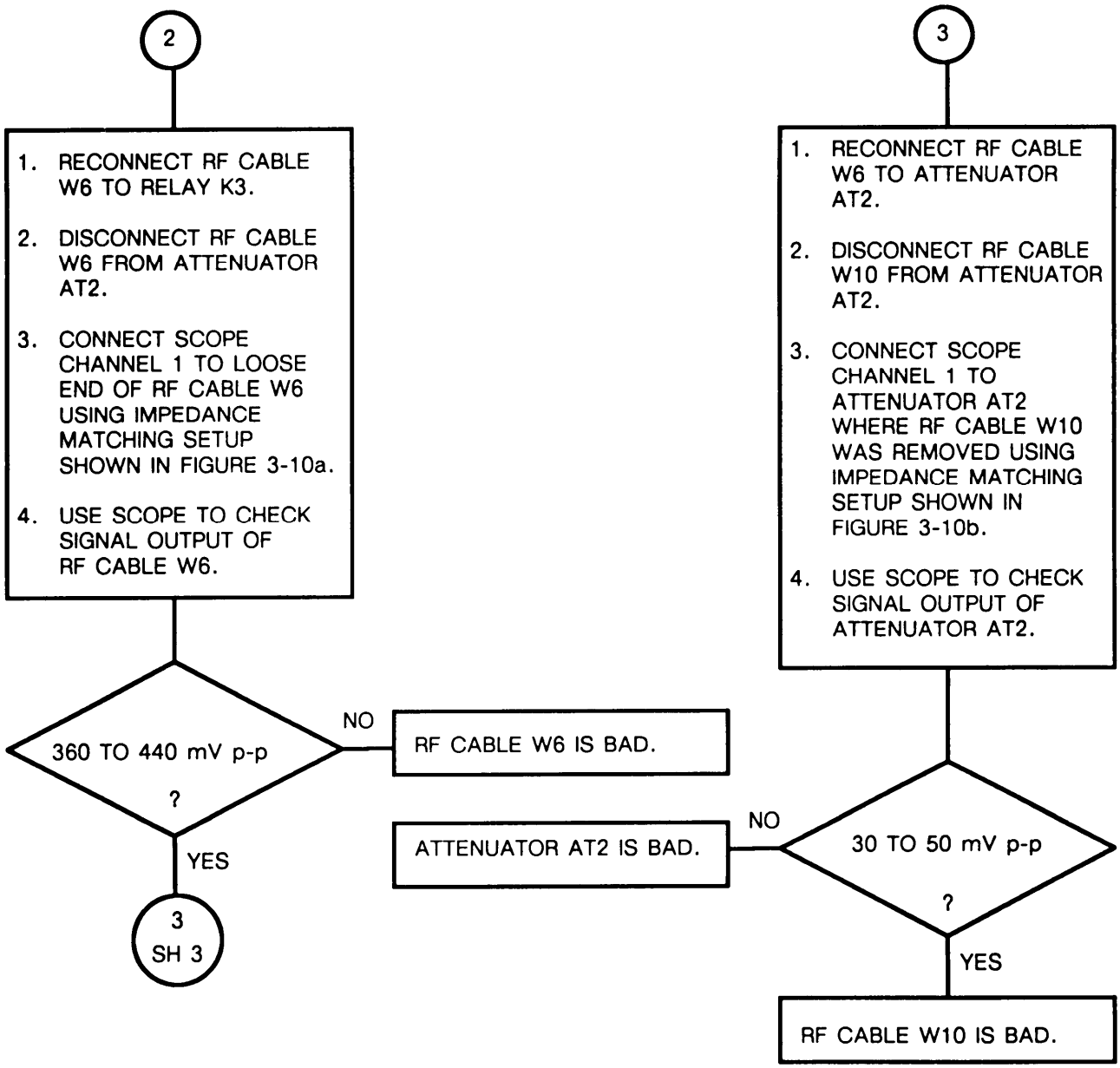
3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 19
Troubleshooting UUT ANT to REF ANT RF path
(Sheet 2 of 3)



3-20. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 19
Troubleshooting UUT ANT to REF ANT RF path
(Sheet 3 of 3)



3-21. ECCM FILL DEVICE, MX-10579/VRC AND MX-18290/VRC.

If the ECCM fill device will not hold or transfer a fill with a good battery, refer to chapter 18 for repair instructions.

Section VI. MAINTENANCE PROCEDURES

3-22. OPERATIONAL CHECK.

Perform the operational check found in paragraph 3-17 to verify proper operation of the reference applique and test adapter.

3-23. REPAIR INSTRUCTIONS.

The following paragraphs are the replacement instructions for the interconnecting device components. Refer to chapter 2 for the RT instructions. Refer to chapter 4 for mounting adapter and chapter 7 for mounting base instructions. Threaded screw inserts are replaced as described in the next paragraph. Table 3-3 lists the threaded screw inserts included in the maintenance group. It also identifies where they are used in the equipment. Also see TM 11-5820-890-30P-3.

Table 3-3. Threaded Screw Inserts.

EQUIPMENT	LOCATION	SCREW INSERT TYPE	SIZE	QTY
RT Chassis	where holding battery cover attaches	MA3330-102	M3 x 1	2
RT Chassis	where top cover attaches	MA3330-102	M3 x 1	11
RT Chassis	where bottom cover attaches	MA3330-102	M3 x 1	12
RT Chassis	where the handle assembly attaches	MA3330-152	M3 x 1.5	4
RT Chassis	where the guard assembly attaches	MA3330-152	M3 x 1.5	4
RT Chassis	where keypad attaches to front panel	MA3330-100	M2.2 x 1	4
RT Chassis	where front panel attaches	MA3330-102	M3 x 1	9

3-23. REPAIR INSTRUCTIONS. Continued

Table 3-3. Threaded Screw Inserts. Continued

EQUIPMENT	LOCATION	SCREW INSERT TYPE	SIZE	QTY
Amplifier-Adapter	where the power supply mounts	MA3330-152	M3 x 1.5	17
Amplifier-Adapter	where the access covers mount	MA3330-152	M3 x 1.5	12
Amplifier-Adapter	where the bottom access cover mounts	MA3330-152	M3 x 1.5	2
Amplifier-Adapter	where the power amplifier securing thumbscrew mounts	MA3330-209	M8 x 2	1
Amplifier-Adapter	on the bottom of the audio amplifier case where 3 screws of the bottom plate are secured	MA3330-152	M3 x 1.5	3
Amplifier-Adapter	on the bottom of the CB1 case where 2 screws of the bottom plate are attached	MA3330-152	M3 x 1.5	2
Amplifier-Adapter	where the audio amplifier access cover mounts	MA3330-152	M3 x 1.5	15
Mounting Base Connector Assembly	where cover mounts	MA3330-152	M3 x 1.5	8
Mounting Base Connector Assembly	where connector J5 mounts	MA3330-104	M4 x 1	2
Mounting Base Connector Assembly	where guide pin mounts	MA3330-105	M5 x 1	1
Control-Monitor	where rear cover mounts	MA3330-154	M4 x 1.5	6
Control-Monitor	where front panel mounts	MA3330-154	M4 x 1.5	6

3-24. THREADED SCREW INSERT REPLACEMENT PROCEDURE.

ITEM	ACTION	REMARKS
REMOVAL		
a. Threaded screw insert extractor (1)	Refer to figure 3-11. Place in hole. Tap extractor to seat in insert. Maintain steady pressure on extractor and unscrew insert. Remove insert from hole.	For recessed M3 x 1 inserts, use tool 1227-02. For all others, use tool 1227-6 or 1227-02, depending on the insert size.
b. Thread cleaning tap (2)	Select proper size tap. Insert and secure in brace (3). Start carefully in hole. Screw tap to bottom of hole. Unscrew tap.	

3-24. THREADED SCREW INSERT REPLACEMENT PROCEDURE. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
c. Prewinder (4) and insert (5)	Loosen stop collar (6) with hex wrench. Extend threaded shaft beyond end of prewinder 1 thread longer than insert. Move stop collar to top of tool body and tighten. Retract threaded shaft. Place insert in prewinder with tang end toward prewinder tip. Rotate shaft until insert projects beyond the tip one full turn. Place tip in hole. Screw insert into hole until stop collar touches tool body. Retract prewinder.	If insert is used with a captive screw, set prewinder with an extra 2 to 3 mm length,
d. Tang breakoff tool (7)	Place on tang. Break off tang by pressing down on tool. Remove tang breakoff tool. Remove broken tang from hole.	

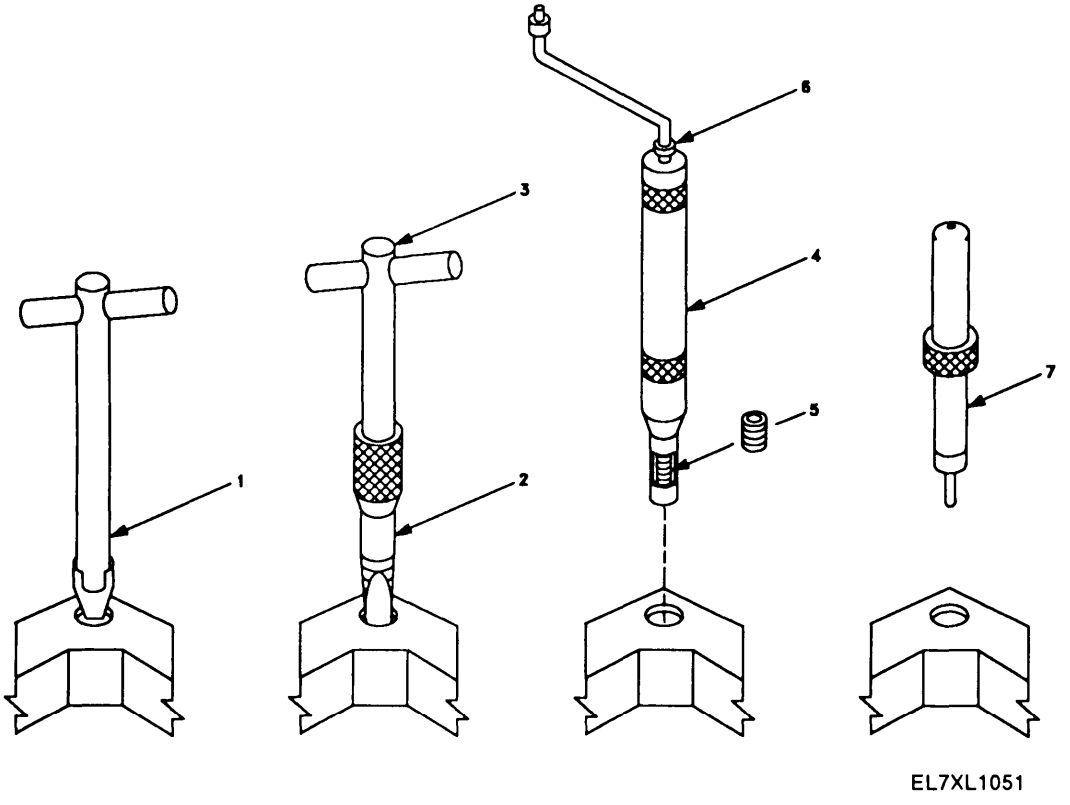


Figure 3-11. Threaded Screw Insert Replacement

3-25. REMOVAL AND INSTALLATION OF TEST ADAPTER.

This paragraph details the procedures for the removal and installation of the test adapter from the maintenance group lid.

Tools:

Cross tip screwdriver, #2 point

ITEM	ACTION	REMARKS
REMOVAL		
a. Maintenance group lid	Use cross tip screwdriver. Fully loosen and remove 10 screws securing test adapter to lid.	
b. Test adapter	Pull test adapter out of lid.	
INSTALLATION		
c. Test adapter	Insert test adapter into lid.	
d. 10 screws	Use cross tip screwdriver. Thread 10 screws through test adapter into lid. Tighten screws.	

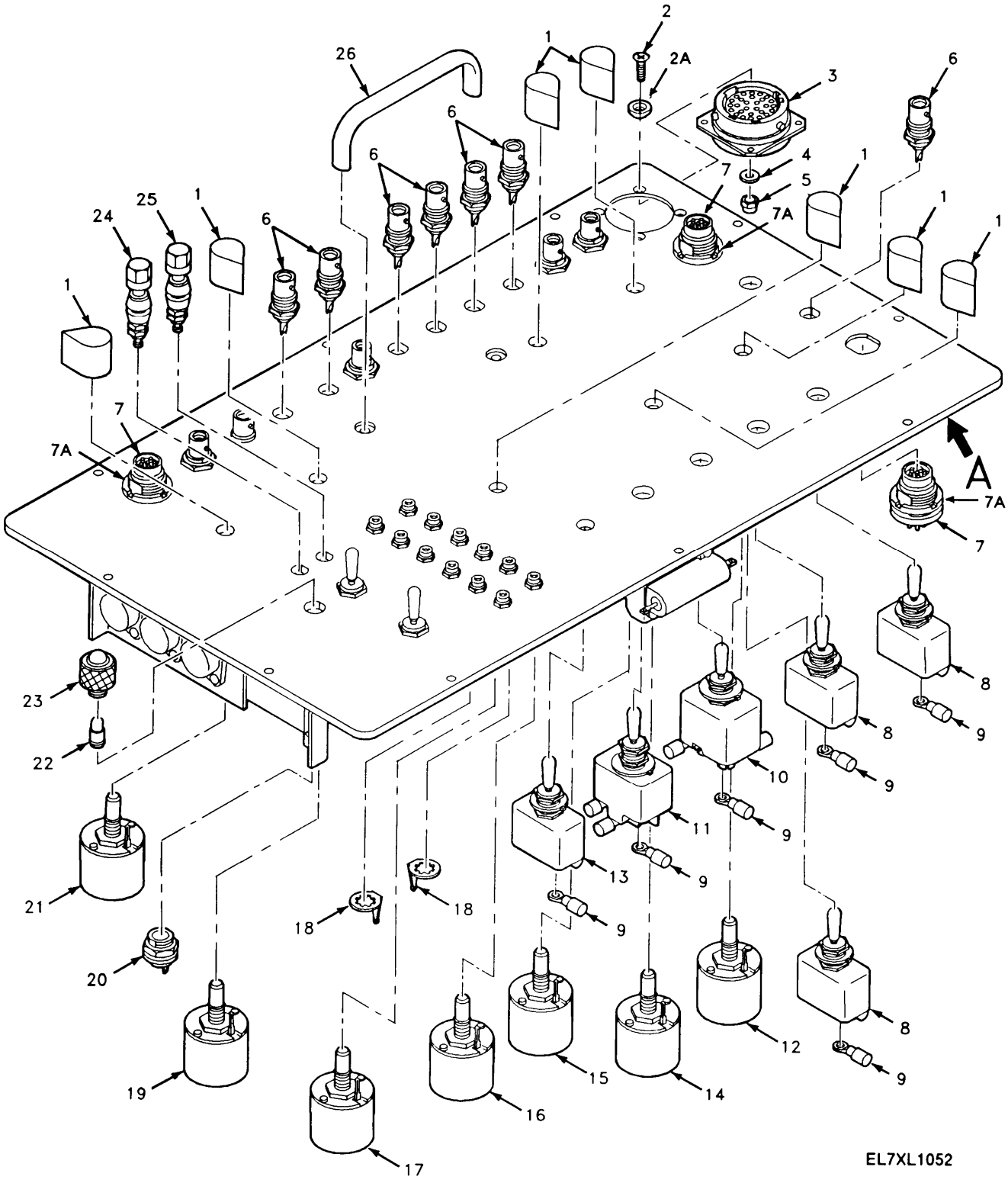


Figure 3-12. Test Adapter Front Panel Repair. (Sheet 1 of 3)

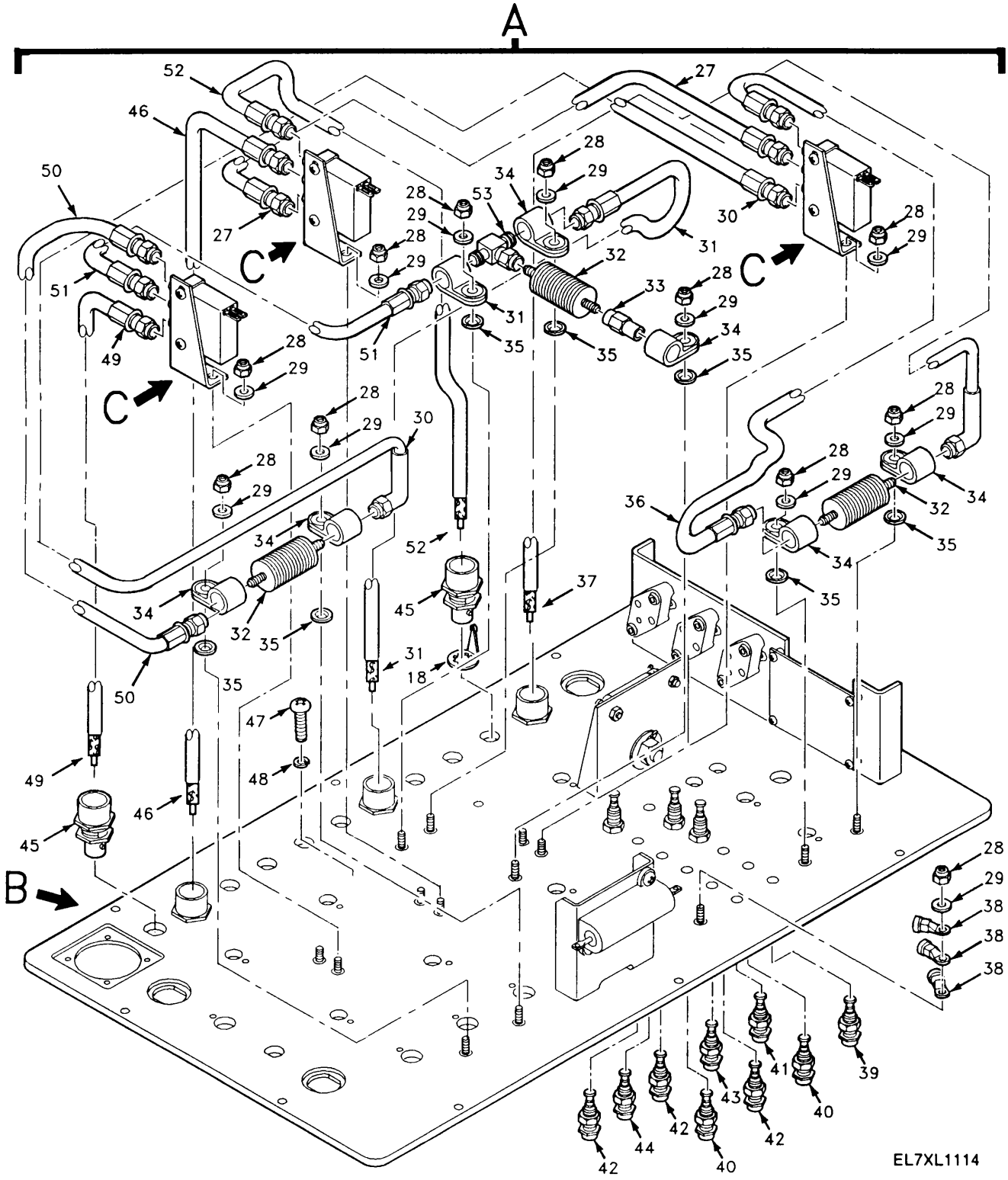


Figure 3-12. Test Adapter Front Panel Repair. (Sheet 2 of 3)

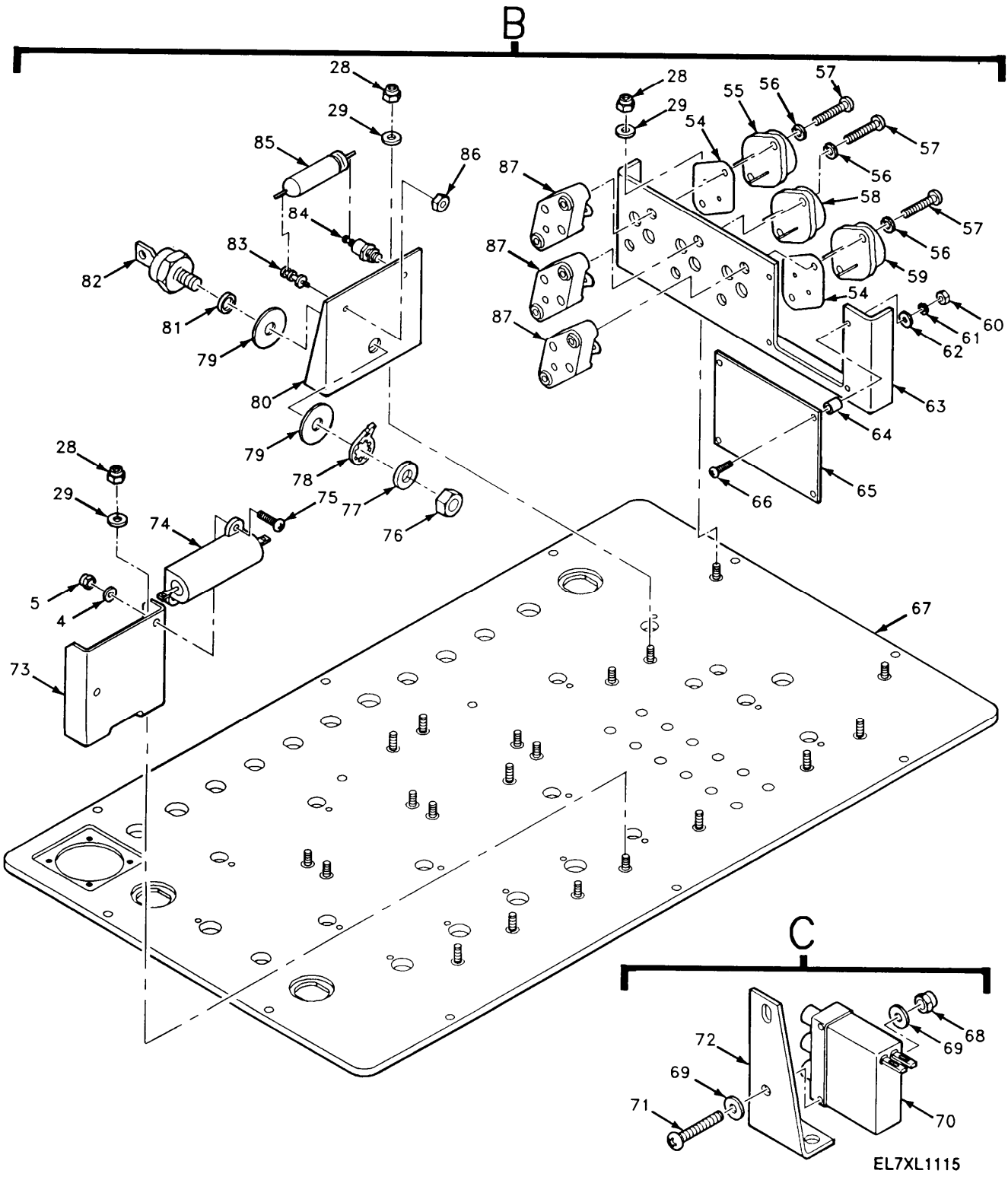


Figure 3-12. Test Adapter Front Panel Repair. (Sheet 3 of 3)

3-26. REPLACEMENT OF CONNECTORS.

Tools:

Socket wrench	Cross tip screwdriver, #1 point	Soldering kit
7/32-inch nutdriver	3/4-inch spanner wrench	1/2-inch socket
Pin insertion/removal tool		

Expendable supplies:

Alcohol	Cotton swabs	Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid. Figure 3-12 for location of connectors.

a. Replacement of Front Panel Mounted BNC Connectors (J1, J2, J3, J5, J6, J7, J8, and J17).

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Using soldering kit, desolder wires from connector (6) and ground tab (18).	See figure 3-12 (sheets 1 and 2).
b. Connector (6)	Using socket wrench and 1/2-inch socket, remove and retain hex nut (45) and ground tab (18) securing connector to test adapter. Remove and discard connector from test adapter.	
INSTALLATION		
c. Connector (6)	Insert replacement connector in test adapter. Install retained ground tab (18) and hex nut (45) on connector. Using socket wrench and 1/2-inch socket, tighten nut.	These were removed in step b.
d. Wires	Using soldering kit, solder wires to correct positions on connector and ground tab.	Before and after soldering, clean solder joints with cotton swabs and alcohol.

3-26. REPLACEMENT OF CONNECTORS. Continued

b. Replacement of Circular Multipin Connector J11.

ITEM	ACTION	REMARKS
REMOVAL		
a. Four screws (2), nuts (5), flat washers (4), and spacers (2A)	Using cross tip screwdriver and 7/32-inch nutdriver, remove and retain four screws, nuts, flat washers, and spacers securing connector J11 (3) to test adapter. Remove connector J11 from test adapter,	See figure 3-12 (sheet 1).
b. Wires and pins	Use soldering kit, and pin insertion/removal tool included in connector package. Remove any damaged pins from connector (3). Desolder pins from wires and solder new pins on wires.	Before and after soldering, clean solder joints with cotton swabs and alcohol.
INSTALLATION		
c. Pins	Use pin insertion/removal tool. Remove remaining pins one at a time from bad connector and install all pins in correct positions in replacement connector.	
d. Connector (3)	Insert connector in test adapter with correct orientation.	
e. Four screws (2), nuts (5), flat washers (4), and spacers (2A)	Use cross tip screwdriver and 7/32-inch nutdriver. Insert four retained screws through connector and test adapter. Install and tighten screws with four retained flat washers, spacers, and nuts.	These were removed in step a.

3-26. REPLACEMENT OF CONNECTORS. Continued

c. Replacement of Six-pin Audio Connectors (J13, J14, and J18).

ITEM	ACTION	REMARKS
REMOVAL		
a. Spanner nut (7A)	Using 3/4-inch spanner wrench, remove and retain spanner nut from audio connector (7), Remove connector from test adapter.	See figure 3-12 (sheet 1).
b. Wires and pins	Using soldering kit, desolder wires from pins on connector. Note positions of wires connected to audio connector.	
c. Connector (7)	Discard.	
INSTALLATION		
d. Wires and pins	Using soldering kit, solder wires to correct pins on connector.	Before and after soldering, clean solder joints with cotton swabs and alcohol.
e. Connector (7)	Insert replacement connector in test adapter with correct orientation.	
f. Spanner nut (7A)	Using 3/4-inch spanner wrench, install and tighten spanner nut on connector.	This was removed in step a.

3-27. REPLACEMENT OF SWITCHES.

Tools:

Flat tip screwdriver
Adjustable wrench
Soldering kit
Hex key set

Expendable supplies:

Alcohol
Cotton swabs
Solder
Masking tape

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for location of switches.

a. Replacement of Toggle Switches (S7 and S9 through S15).

ITEM	ACTION	REMARKS
REMOVAL		
a. Terminal lugs (9)	Using flat tip screwdriver, remove and retain screws and lockwashers securing terminal lugs (9) to switch. Note positions of all terminal lugs removed from switch.	See figure 3-12 (sheet 1). Use masking tape on terminal lug wires during removal to keep track of positions on switch.
b. Switch (8, 10, 11, or 13)	Note position of switch. Using adjustable wrench, remove and retain hex nut and lockwasher securing switch to test adapter. Remove and discard switch.	
INSTALLATION		
c. Alignment washer	Make sure there is an alignment washer on replacement switch. Check that tab of washer is pointing toward the switch.	
d. Switch (8, 10, 11, or 13)	Insert switch into test adapter so that tab of washer fits into hole in back of test adapter front panel.	
e. Hex nut and lockwasher	Using adjustable wrench, install and tighten retained lockwasher and hex nut on switch securing it to front panel.	These were removed in step b.
f. Terminal lugs (9)	Using flat tip screwdriver, install retained screws with lockwashers through terminal lugs (9) and into switch connections. Tighten screws. Make sure each terminal lug is secured to correct position.	These were removed in step a.

3-27. REPLACEMENT OF SWITCHES. Continued

b. Replacement of Rotary Switches (S1 through S6 and S8).

ITEM	ACTION	REMARKS
REMOVAL		
a. Knob (1)	Note position of switch. Using hex key set, loosen two setscrews securing knob (1) to switch. Remove and retain knob from switch.	See figure 3-12 (sheet 1).
b. Wires	Note position of all wires soldered to switch. Using soldering kit, desolder each wire from switch.	
c. Hex nut and lockwasher	Note orientation of switch. Using adjustable wrench, remove and retain hex nut and lockwasher securing switch to test adapter.	
d. Switch (12, 14, 15, 16, 17, 19, or 21)	Remove and discard defective switch.	
INSTALLATION		
e. Wires	Using soldering kit, solder wires to correct positions of switch.	Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. Switch (12, 14, 15, 16, 17, 19, or 21)	Insert replacement switch in test adapter with correct orientation.	
g. Hex nut and lockwasher	Using adjustable wrench, install and tighten retained lockwasher and hex nut on switch securing it to front panel.	These were removed in step c.
h. Knob (1)	Place retained knob (1) on switch with correct orientation. Using hex key set, tighten both setscrews.	This was removed in step a.

3-28. REPLACEMENT OF TEST POINTS AND POWER PLUGS.

Tools:

Soldering kit 1-1/32-inch nutdriver

Expendable supplies:

Alcohol Cotton swabs Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of test points and power plugs.

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Using soldering kit, desolder wires from test point TP1 thru TP12 (39 thru 44) or power plug J15 or J16 (24 or 25).	See figure 3-12 (sheets 1 and 2).
b. Hex nut and washer	Using 1-1/32-inch nutdriver, remove and retain hex nut and washer securing test point or power plug to test adapter.	
c. Test point or power plug (39 thru 44, or 24 or 25)	Remove and discard defective test point or power plug.	
INSTALLATION		
d. Test point or power plug (39 thru 44, or 24 or 25)	Insert replacement test point or power plug into test adapter.	
e. Hex nut and washer	Using 1-1/32-inch nutdriver, install and tighten retained washer and hex nut on test point (39 thru 44) or power plug (24 or 25) securing it to front panel.	These were removed in step b.
f. Wires	Using soldering kit, solder wires on test point or power plug.	Before and after soldering, clean solder joints with cotton swabs and alcohol.

3-29. REPLACEMENT OF POWER SUPPLY CCA.

Tools:

Soldering kit	3/16-inch nutdriver	Cross tip screwdriver, #0 point

Expendable supplies:

Alcohol	Cotton swabs	Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of power supply circuit card assembly (CCA).

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Note positions of all wires soldered to power supply CCA (65). Using soldering kit, desolder all wires from CCA.	See figure 3-12 (sheet 3).
b. Four hex nuts (60), lockwashers (61), flat washers (62), and screws (66)	Using cross tip screwdriver and 3/16-inch nutdriver, remove and retain four hex nuts, lockwashers, flat washers, and screws securing CCA to power supply mounting bracket (63). Note orientation of CCA's component side with respect to mounting bracket.	
c. Four spacer sleeves (64)	Remove and retain.	
d. Power supply CCA (65)	Remove and discard.	
INSTALLATION		
e. Wires	Using soldering kit, solder all wires to correct positions on CCA.	Before and after soldering, clean solder joints with cotton swabs and alcohol.
f. Power supply CCA (65)	Install four retained screws (66) through replacement CCA and four retained spacer sleeves (64). Place CCA with its component side in correct orientation on power supply mounting bracket (63) with screws inserted through holes in bracket.	These were removed in steps b and c.
g. Four hex nuts (60), lockwashers (61), flat washers (62), and screws (66)	Using cross tip screwdriver and 3/16-inch nutdriver, install and tighten four retained hex nuts, lockwashers, and flat washers on four screws securing CCA to mounting bracket.	These were removed in step b.

3-30. REPLACEMENT OF VOLTAGE REGULATORS.

Tools:

Soldering kit | Cross tip screwdriver, #1 point

Expendable supplies:

Alcohol | Cotton swabs | Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of voltage regulators.

ITEM	ACTION	REMARKS
REMOVAL		
a. Two screws (57) and lockwashers (56)	Using cross tip screwdriver, remove and retain two screws and lockwashers securing voltage regulator (55, 58, or 59) to power supply mounting bracket (63).	See figure 3-12 (sheet 3).
b. Wires	Note positions of all wires soldered to power supply CCA (65). Using soldering kit, desolder all wires from CCA.	See figure 3-12 (sheet 3).
c, Voltage regulator (55, 58, or 59)	Pull loose from mounting socket (87) and mounting bracket (63). Discard defective voltage regulator.	NOTE: When replacing voltage regulator U1 or U3 (55 or 59), remove and retain insulating film (54) from between regulator and mounting bracket.
INSTALLATION		
d. Wires	Using soldering kit, solder all wires to correct positions on CCA.	Before and after soldering, clean solder joints with cotton swabs and alcohol.
e. Voltage regulator (55, 58, or 59)	Insert leads of replacement voltage regulator through mounting bracket (63) and into mounting socket (87). If insulating film (54) is required with voltage regulator, make sure film is on regulator before installing it on mounting bracket (63).	
f. Two screws (57) and lockwashers (56)	Using cross tip screwdriver, install and tighten two retained screws with lockwashers through voltage regulator (55, 58, or 59) and into mounting socket (87) securing them to mounting bracket (63).	These were removed in step a.

3-31. REPLACEMENT OF POWER SUPPLY MOUNTING BRACKET.

Tools:

3/16-inch nutdriver	Cross tip screwdriver, #0 point	Soldering kit
Adjustable wrench	Cross tip screwdriver, #1 point	

Expendable supplies:

Alcohol	Cotton swabs	Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Paragraph 3-29 for removal and installation of power supply CCA.
Paragraph 3-30 for removal and installation of voltage regulators.
Figure 3-12 for illustration of power supply mounting bracket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply CCA (65)	Remove and retain.	Refer to paragraph 3-29 for removal procedures.
b. Voltage regulators (55, 58, and 59)	Remove and retain.	Refer to paragraph 3-30 for removal procedures.
c. Two nuts (28) and flat washers (29)	Using adjustable wrench, remove and retain two nuts and flat washers securing mounting bracket (63) to chassis (67).	See figure 3-12 (sheet 3).
d. Power supply mounting bracket (63)	Remove and discard defective mounting bracket (63).	
INSTALLATION		
e. Power supply mounting bracket (63)	Place replacement mounting bracket (63) on chassis (67) and aline mounting holes.	
f. Two nuts (28) and flat washers (29)	Using adjustable wrench, install and tighten two retained nuts and flat washers securing mounting bracket (63) to chassis (67).	These were removed in step c.
g. Voltage regulators (55, 58, and 59)	Install.	Refer to paragraph 3-30 for installation procedures.
h. Power supply CCA (65)	Install.	Refer to paragraph 3-29 for installation procedures.

3-32. REPLACEMENT OF RF CABLES.

Tools:

3/16-inch nutdriver
Adjustable wrench
Soldering kit
Wire cutters

Expendable supplies:

Alcohol
Cotton swabs
Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of RF cables.

ITEM	ACTION	REMARKS
REMOVAL		
a. Cable tiedown straps	Locate RF cable to be removed, and remove and discard cable tiedown straps.	See figure 3-12 (sheet 2).
b. Plastic clamps (34), hex nuts (28), flat washers (29), and spacers (35)	Use 3/16-inch nutdriver. On the attenuator (32) or the dummy load (33), remove and retain the affected plastic clamps (34) and mounting hardware.	Applies to RF cables W2, W4, W5, and W6.
c. SMA connector end of RF cable	Using adjustable wrench, unscrew and disconnect SMA connector of RF cable from attenuator (32) or T-connector (53), taking care to note the position of the RF cable to be removed.	
d. Soldered end of RF cable	Note position of RF cable. Using soldering kit, desolder RF cable and cable shield from connector on chassis (67).	Applies to RF cables W1, W3, W8, W9, and W10.
e. RF cable	Remove and discard RF cable from chassis (67), and note position and routing.	
INSTALLATION		
f. RF cable	Insert replacement RF cable in chassis (67), and route in previously noted position.	
g. Soldered end of RF cable	Using soldering kit, solder RF cable and cable shield to correct position and connector.	Before and after soldering, clean solder joints with cotton swabs and alcohol.
h. SMA connector end of RF cable	Using adjustable wrench, position RF cable and connect SMA connector of RF cable to attenuator (32) or T-connector (53).	
i. Plastic clamps (34), hex nuts (28), flat washers (29), and spacers (35)	Use 3/16-inch nutdriver. On the attenuator (32) or dummy load (33), reinstall the affected plastic clamps (34) and mounting hardware.	These were removed in step b.
j. Cable tiedown straps	Locate RF cable tiedown areas, and install new tiedown straps.	

3-33. REPLACEMENT OF RELAYS.

Tools:

Soldering kit | Cross tip screwdriver, #0 point | 3/16-inch nutdriver
Adjustable wrench

Expendable supplies:

Alcohol | Cotton swabs | Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of relays.

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Note positions of all wires soldered to relay (70). Using soldering kit, desolder all wires. Using adjustable wrench, disconnect RF cables from relay.	See figure 3-12 (sheet 2, detail C).
b. Two screws (71), flat washers (69), and hex nuts (68)	Using cross tip screwdriver and 3/16-inch nutdriver, remove and retain two screws, flat washers, and hex nuts securing relay (70) to mounting bracket (72).	See figure 3-12 (sheet 3, detail C).
c. Relay (70)	Remove and discard defective relay from mounting bracket.	
INSTALLATION		
d. Relay (70)	Install replacement relay in correct position on mounting bracket (72) with two retained screws (71) inserted through holes in mounting bracket and relay case.	
e. Two screws (71), flat washers (69), and hex nuts (68)	Using cross tip screwdriver and 3/16-inch nutdriver, install and tighten two retained hex nuts and flat washers on two screws securing relay (70) to mounting bracket (72).	These were removed in step b.
f. Wires	Using soldering kit, solder all wires to correct positions on relay (70). Using adjustable wrench, connect RF cables to correct connectors on relay.	Before and after soldering, clean solder joints with cotton swabs and alcohol.

3-34. REPLACEMENT OF RELAY MOUNTING BRACKETS.

Tools:

Soldering kit | Cross tip screwdriver, #1 point | 3/16-inch nutdriver
Adjustable wrench

Expendable supplies:

Alcohol | Cotton swabs | Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of relay mounting brackets.

ITEM	ACTION	REMARKS
REMOVAL		
a. Two screws (71), flat washers (69), and, hex nuts (68)	Using cross tip screwdriver, remove and retain two screws (71), flat washers (69), and hex nuts (68) securing relay (70) to mounting bracket (72).	See figure 3-12 (sheet 2, detail C).
b. Relay (70)	Remove and retain.	Refer to paragraph 3-33 for removal procedures.
c. Two nuts (28) and flat washers (29)	Using adjustable wrench, remove and retain two nuts and flat washers securing mounting bracket (72) to chassis studs.	See figure 3-12 (sheet 2, detail C).
d. Relay mounting bracket (72)	Remove and discard from chassis.	
INSTALLATION		
e. Relay mounting bracket (72)	Place replacement mounting bracket into chassis (67) and aline mounting holes with chassis studs.	
f. Two nuts (28) and flat washers (29)	Using adjustable wrench, install and tighten two retained nuts and flat washers securing mounting bracket (72) to chassis studs.	These were removed in step c.
g. Two screws (71), flat washers (69), and, hex nuts (68)	Using cross tip screwdriver, install two retained screws (71), flat washers (69), and hex nuts (68) securing relay (70) to mounting bracket (72).	These were removed in step a.

3-35. REPLACEMENT OF RESISTOR R3.

Tools:

Soldering kit | Cross tip screwdriver, #0 point | 3/16-inch nutdriver
Adjustable wrench

Expendable supplies:

Alcohol | Cotton swabs | Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of resistor R3 and mounting bracket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Note positions of wires soldered to resistor R3 (74). Using soldering kit, desolder wires from resistor.	
b. Two screws (75), flat washers (4), and hex nuts (5)	Using cross tip screwdriver and 3/16-inch nutdriver, remove and retain two screws, flat washers, and hex nuts securing resistor R3 (74) to mounting bracket (73).	See figure 3-12 (sheet 3).
c. Resistor R3 (74)	Remove and discard from mounting bracket.	
INSTALLATION		
d. Resistor R3 (74)	Insert two retained screws (75) through replacement resistor R3. Place resistor in correct position on mounting bracket (73) with screws inserted through holes in mounting bracket.	These were removed in step b.
e. Two screws (75), flat washers (4), and hex nuts (5)	Using cross tip screwdriver and 3/16-inch nutdriver, install and tighten two retained hex nuts and flat washers on two screws securing resistor to mounting bracket.	These were removed in step b.
f. Wires	Using soldering kit, solder all wires to correct positions on resistor R3.	Before and after soldering, clean solder joints with cotton swabs and alcohol.

3-36. REPLACEMENT OF RESISTOR MOUNTING BRACKET.

Tools:

3/16-inch nutdriver Cross tip screwdriver, #0 point Adjustable wrench

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of resistor R3 and mounting bracket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Two screws (75), flat washers (4), and hex nuts (5)	Using cross tip screwdriver and 3/16-inch nutdriver. Remove and retain two screws, flat washers, and hex nuts securing resistor R3 (74) to mounting bracket (73).	See figure 3-12 (sheet 3).
b. Resistor R3 (74)	Remove and retain from mounting bracket.	
c. Switch S12 (11)	Note position of switch. Using adjustable wrench, remove and retain hex nut and lockwasher securing switch to test adapter. Remove and retain switch.	
d. Two nuts (28) and flat washers (29)	Using adjustable wrench, remove and retain two nuts and flat washers securing mounting bracket (73) to chassis studs.	
e. Resistor R3 mounting bracket (73)	Remove and discard defective mounting bracket (73) from chassis (67).	
INSTALLATION		
f. Resistor R3 mounting bracket (73)	Place replacement mounting bracket on chassis (67) and aline mounting holes with chassis studs.	
g. Two nuts (28) and flat washers (29)	Using adjustable wrench, install and tighten two retained nuts and flat washers securing mounting bracket to chassis studs.	These were removed in step d.
h. Switch S12 (11)	Insert retained switch into test adapter so that tab of washer fits into hole in back of test adapter front panel.	
i. Hex nut and lockwasher	Using adjustable wrench, install retained hex nut and lockwasher securing switch to test adapter.	These were removed in step c.
j. Resistor R3 (74)	Install on mounting bracket.	This was removed in step b.
k. Two screws (75), flat washers (4), and hex nuts (5)	Using cross tip screwdriver and 3/16-inch nutdriver, install and tighten two retained hex nuts (5) and flat washers (4) on two screws (75) securing resistor (73) to mounting bracket (73).	These were removed in step a.

3-37. REPLACEMENT OF DUMMY LOAD AND ATTENUATORS.

Tools:

Adjustable wrench 3/16-inch nutdriver

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of dummy load and attenuators.

ITEM	ACTION	REMARKS
REMOVAL		
a. Hex nut (28), flat washer (29), and spacer (35)	Using 3/16-inch nutdriver, remove and retain hex nut, flat washer, and spacer securing each plastic clamp (34) to chassis (67).	See figure 3-12 (sheet 2).
b. Plastic clamps (34)	Remove and retain plastic clamps from ends of attenuator (32) (two each) or ends of T-connector (53) and dummy load (33) (three each).	
c. RF cables (30, 31, 36, 50, and 51)	Using adjustable wrench, unscrew SMA connectors and disconnect RF cables from attenuator (32) or T-connector (53) taking care to note the position of the RF cables.	
d. Attenuator (32) or dummy load (33)	Remove and discard.	
INSTALLATION		
e. Attenuator (32) or dummy load (33)	Place replacement attenuator or dummy load in proper position on chassis (67).	
f. RF cables (30, 31, 36, 50, and 51)	Using adjustable wrench, connect RF cables to correct positions on attenuator (32) or T-connector (53).	
g. Plastic clamps (34)	Install retained plastic clamps to ends of attenuator (32) (two each) or ends of T-connector (53) and dummy load (33) (three each).	These were removed in step b.
h. Hex nut (28), flat washer (29), and spacer (35)	Using 3/16-inch nutdriver, install and tighten retained hex nut, flat washer, and spacer securing each plastic clamp (34) to chassis (67).	These were removed in step a.

3-38. REPLACEMENT OF DIODE CR1.

Tools:

Soldering kit | Adjustable wrench

Expendable supplies:

Alcohol | Cotton swabs | Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Figure 3-12 for illustration of diode CR1, capacitor C1, and mounting bracket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Note positions of wires soldered to diode CR1 (82). Using soldering kit, desolder wires from diode.	See figure 3-12 (sheet 3).
b. Hex nut (76) and flat washer (77)	Using adjustable wrench, remove and retain hex nut (76) and flat washer (77) securing diode CR1 (82) to mounting bracket (80).	
c. Diode CR1 (82)	Remove and discard defective diode CR1 from mounting bracket (80).	
INSTALLATION		
d. Diode CR1 (82)	Place replacement diode CR1 in correct position on mounting bracket (80).	
e. Hex nut (76) and flat washer (77)	Using adjustable wrench, install and tighten retained hex nut (76) and flat washer (77) securing diode CR1 (82) to mounting bracket (80).	These were removed in step b.
f. Wires	Using soldering kit, solder all wires to correct positions on diode CR1 (82).	Before and after soldering, clean solder joints with cotton swabs and alcohol.

3-39. REPLACEMENT OF CAPACITOR C1.

Tools:

Soldering kit | Long nose pliers

Expendable supplies:

Alcohol | Cotton swabs | Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid. Figure 3-12 for illustration of diode CR1, capacitor C1, and mounting bracket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Wires	Note positions of wires soldered to capacitor C1 (85). Using soldering kit, desolder wires from capacitor C1 (85).	See figure 3-12 (sheet 3).
b. Capacitor C1 (85)	Using Long nose pliers, remove and discard defective capacitor C1 from mounting hardware items 83 and 84 on mounting bracket (80).	
INSTALLATION		
c. Capacitor C1 (85)	Using Long nose pliers, attach replacement capacitor C1 in correct position on retained mounting hardware items 83 and 84 on mounting bracket (80).	This was removed in step b.
d. Wires	Using soldering kit, solder all wires to correct positions capacitor C1 (85).	Before and after soldering, clean solder joints with cotton swabs and alcohol.

3-40. REPLACEMENT OF MOUNTING BRACKET.

Tools:

Soldering kit	3/16-inch nutdriver	Adjustable wrench
Long nose pliers		

Expendable supplies:

Alcohol	Cotton swabs	Solder

References:

Paragraph 3-25 for removal and installation of test adapter from maintenance group lid.
Paragraph 3-38 for removal and installation of diode CR1.
Paragraph 3-39 for removal and installation of capacitor C1.
Figure 3-12 for illustration of diode CR1, capacitor C1, and mounting bracket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Diode CR1 (82)	Remove and retain,	Refer to paragraph 3-38 for removal procedures.
b. Capacitor C1 (85)	Remove and retain.	Refer to paragraph 3-39 for removal procedures.
c. Mounting hardware (83), (84), and (86)	Using adjustable wrench, remove and retain nut (86) securing mounting post (83) to mounting bracket (80). Remove and retain mounting post. Using soldering kit, desolder remove, and retain insulated standoff (84).	
d. Two hex nuts (28) and flat washers (29)	Using 3/16-inch nutdriver, remove and retain two hex nuts (28) and flat washers (29) securing mounting bracket (80) to chassis studs.	
e. Mounting bracket (80)	Remove and discard defective mounting bracket (80).	
INSTALLATION		
f. Mounting bracket (80)	Place replacement mounting bracket on chassis (67) and aline mounting holes with chassis studs.	
g. Two hex nuts (28) and flat washers (29)	Using 3/16-inch nutdriver, install and tighten two retained hex nuts and flat washers securing mounting bracket (80) to chassis studs.	These were removed in step d.
h. Mounting hardware (83), (84), and (86)	Using adjustable wrench, install and tighten retained nut (86) securing mounting post (83) to mounting bracket (80). Using soldering kit, desolder remove, and retain insulated standoff (84).	These were removed in step c.
i. Capacitor C1 (85)	Install retained capacitor C1.	Refer to paragraph 3-39 for installation procedures.
j. Diode CR1 (82)	Install retained diode CR1.	Refer to paragraph 3-38 for installation procedures.

Section VII. PREPARATION FOR STORAGE OR SHIPMENT

3-41. GENERAL INFORMATION.

a. Place all cables and adapters that are part of electronic equipment parts kit inside parts kit box. Secure lid to box. Place box inside chest.

b. Place all tools that are part of tool kit inside tool kit box. Close tool kit. Place tool kit inside chest.

c. Place all test cables inside chest.

d. Close and secure chest inner lid.

e. Attach and secure test adapter to chest.

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CHAPTER 4

AMPLIFIER-ADAPTER, VEHICULAR AM-7239/VRC AND AM-7239B/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

4-1. INTRODUCTION.

The mounting adapter's three main sections are:

Power Supply, Amplifier-Adapter 5A1 (power supply).

Circuit Card Assembly, One-Watt Audio Amplifier 5A2 (audio amplifier).

Chassis, Electrical Equipment, Amplifier-Adapter 5A3 (mounting adapter chassis).

They are described in the following paragraphs:

4-2. POWER SUPPLY.

The power supply is mounted on the back of the mounting adapter. It provides two basic functions:

It suppresses transients on the input power line.

It converts the dc input power into the dc voltages required by the radio components.

The input power must be 22 to 32 V dc. The current required depends on the output loads. Normally, 2 to 12 A of input current is required. A block diagram of the power supply is included in figures FO-14 and FO-15.

a. Transient Suppressor. The transient suppressor protects the radio from transients that may be on the input power line. The transients, surges, and ripple on the input power line must be within the requirements of MIL-STD-1275. The output of the transient suppressor is not short-circuit protected. If shorted to ground, CB1 will trip. Its output is typically 0.5 V below the input voltage.

b. DC-to-DC Converter. The output of the transient suppressor is fed into the dc-to-dc converter. It provides the following regulated output voltage:

4-2. POWER SUPPLY. Continued

DC Output Voltage (V dc)	Maximum Current (A)	Maximum Ripple (mV p-p)
6.75 (6.55 to 6.95)	1.5	75
13.0 (12.6 to 13.4)	4.3	75
200 (180 to 220)	0.008	3000

These outputs are short-circuit protected. The power supply will not be damaged if an output is shorted to ground.

4-3. AUDIO AMPLIFIER.

The audio amplifier performs the following functions:

Amplifies the audio input to 1 W to drive a loudspeaker.

Amplifies the audio input to 200 mW for the intercom set.

Detects FSK (TACFIRE) tones to generate the required control signal.

Additional filtering of 13 V dc line.

A functional block diagram of the audio amplifier is included in figure 4-1.

a. One-Watt Audio Amplifier. The analog receive (AR-A or AR-B) signals from the RT are amplified by the 1 W audio amplifier. The output level is determined by the RT VOL control setting. An input signal of 5.5 V rms will be amplified to 1 W into 600 ohms. The frequency response is from 300 to 3000 Hz. An analog switch is used to attenuate the output when either PTT line or the MUTE line is grounded.

b. Intercom Audio Amplifiers. The analog receive signals from the RT are also amplified by the intercom amplifiers. AR-A and AR-B are amplified separately to 200 mW. The output level is determined by the RT VOL control setting. The frequency response is also 300 to 3000 Hz.

c. FSK (TACFIRE) Detector. The FSK permits using one radio for audio and analog data. The analog data mode control (ADMC) line at the transmitting RT must be grounded when the analog transmit (AT) signal is analog data and AD2 is used. The FSK detector does this for the user.

It is a four-stage process. The AT signal is amplified to the required level. A notch filter attenuates all frequencies outside the 300 to 3000 Hz range. This prevents harmonics from triggering the tone detector. The tone detector checks for the 1200 and 2400 Hz FSK tones. If both are present and the FSK PRESENT signal passes to the output processing circuit, the output processing circuit begins when a PTT is received. The ADMC line is held open for 120 ms after a PTT. After 120 ms, the output of the tone detector is checked. If FSK tones were detected, the ADMC line is grounded until PTT is released. If the tones were not detected in the 120 ms period, the line is held open until the PTT is released. A separate FSK detector is provided for AT-A and AT-B.

4-4. MOUNTING ADAPTER CHASSIS.

The mounting adapter chassis provides the basic radio interconnections as shown in figures FO-14 and FO-15. Several other functions are also performed. The power input is switched on and off by CB1. EMP protection is provided by CR1 through CR6, VR1, VR2, and E9 through E15. The remote control transformers couple the RT and control-monitor. The SNAP line driver passes signals between RT A and the SNAP. Q1 and R1 are electronically part of the voltage regulator on the audio amplifier.

4-4. MOUNTING ADAPTER CHASSIS. Continued

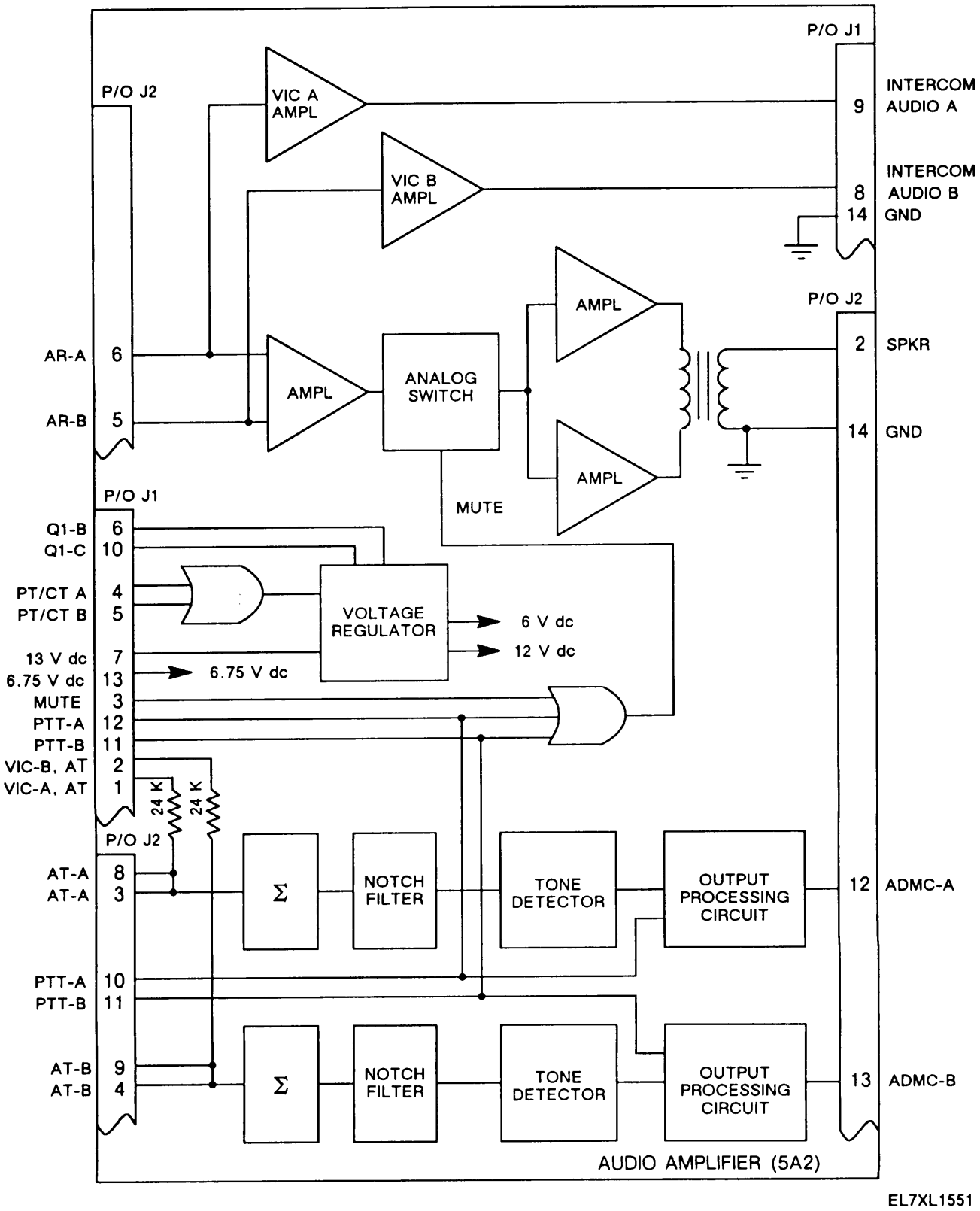


Figure 4-1. Audio Amplifier Block Diagram.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-5. COMMON TOOLS AND EQUIPMENT.

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

4-6. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, seethe maintenance allocation chart. It is Appendix Bin TM 11-5820-890-20-2.

4-7. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering Direct Support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

4-8. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective mounting adapter. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module.

4-9. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating amounting adapter. If the operational check is passed, the mounting adapter can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 4-10.

4-9. OPERATIONAL CHECK. Continued

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A "No response" in the "Response" column means that any response is not of interest.

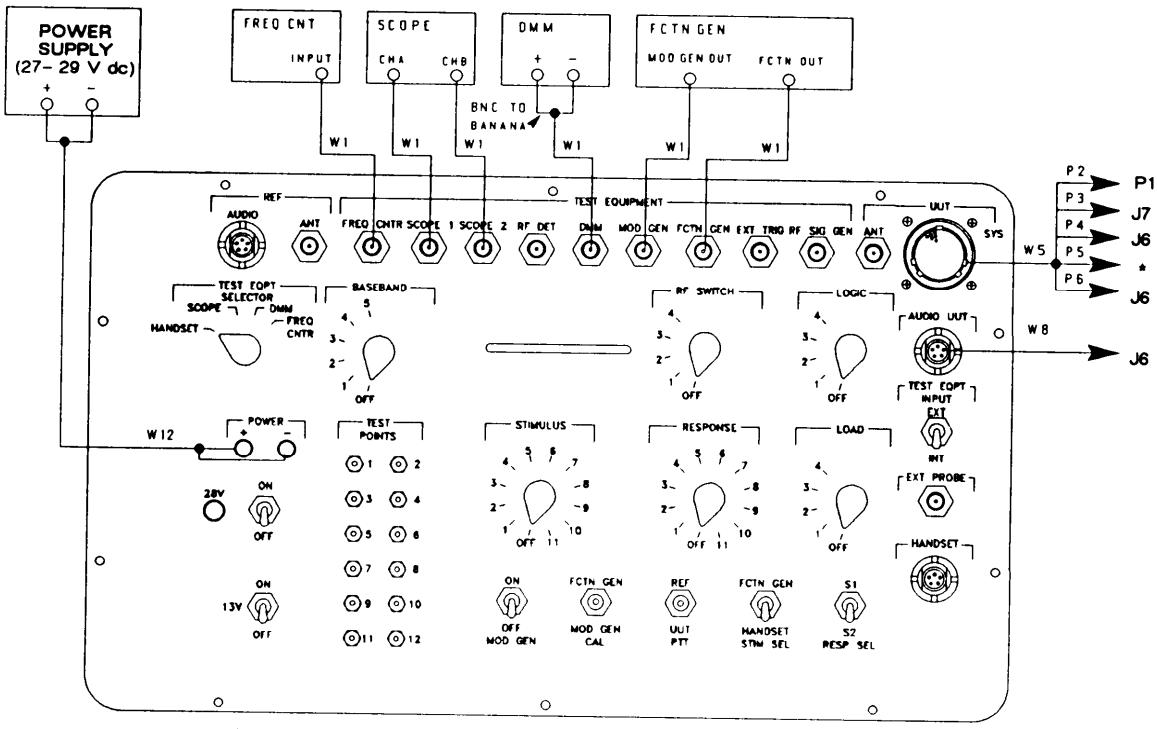
The switch settings for the test equipment are given in the “EQUIPMENT PRESETS” section of the test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module.

WARNING

High voltage (200 V dc) is present at mounting adapter connector J1. The large current capacity of the test power supply can cause personal injury. Use caution when connecting the test setup and taking measurements to avoid personal injury.

Connect equipment as shown in figure 4-2 to perform the operational check of the mounting adapter.

4-9. OPERATIONAL CHECK. Continued



* CONNECTION WILL BE GIVEN IN OPERATIONAL CHECK.

EQUIPMENT PRESETS

TEST ADAPTER:

TEST EQPT SELECTOR:	DMM
BASEBAND:	3
RF SWITCH:	OFF
LOGIC:	4
TEST EQPT INPUT:	INT
28 V:	OFF
13 V:	OFF
STIMULUS:	OFF
RESPONSE:	7
LOAD:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S1

AM-7239/VRC OR AM-7239B/VRC:

CB1: OFF (see CAUTION)
DS1: FULLY CCW

CAUTION

CB1 should be set to OFF before operating LCL/RMT switch S1. Switch S1 could be damaged if power is not removed first.

NOTES:

1. If testing an AM-7239/VRC, remove the remote operation shorting bar (see paragraph 4-17, figure 4-3).
2. If testing an AM-7239B/VRC, set S1 switch to LCL (see CAUTION).

Figure 4-2. Amplifier-Adapter Test Setup

4-9. OPERATIONAL CHECK. Continued

Step 1a. INPUT POWER CHECK FOR AM-7239/VRC.

Action	Response
a. Set DMM on 2 k Ω range. Disconnect W5P2 from 5A3P1. Use DMM with test leads to check for short from 5A3P1-E to 5A3P1-A (GND).	a. If a short is present, diode 5A3CR6 is bad. This diode is connected between 5A3K1-X2 and 5A3K1-X1.
b. Connect equipment as shown in figure 4-2.	b. No response.
c. Set DMM to read 25 to 29 V dc.	c. No response.
d. Set 28 V: ON. Set CB1: ON. Read DMM.	d. Lamp DS1 lights. If not, go to chart 1. If CB1 trips to OFF, go to chart 2. The DMM reading is 0 V dc. If a voltage is present, relay 5A3K1 is bad, **CAUTION** See removal and replacement procedures for two versions of relay K1.
e. Use a jumper cable to connect TEST POINT 5 to TEST POINT 4. Read DMM.	e. CB1 stays ON. If CB1 trips to OFF, go to chart 3. The DMM reading is 25 to 29 V dc. If not, go to chart 4.

Step 1 b. INPUT POWER CHECK FOR AM-7239B/VRC.

Action	Response
a. Set S1: RMT.	a. No response.
b. Set DMM on 2 k Ω range. Disconnect W5P2 from 5A3P1. Use DMM with test leads to check for short from 5A3P1-E to 5A3P1-A (GND).	b. If a short is present, diode 5A3CR6 is bad. This diode is connected between 5A3K1-X2 and 5A3K1-X1.
c. Connect equipment as shown in figure 4-2.	c. No response.
d. Set DMM to read 25 to 29 V dc.	d. No response.
e. Set 28 V: ON. Set CB1: ON.	e. CB1 stays ON. If CB1 trips to OFF, go to chart 5. Lamp DS1 lights. If not, go to chart 6.
f. Read DMM.	f. DMM reading is 25 to 29 V dc. If not, connector 5A3P1 is bad.
g. Set CB1: OFF. Set S1: RMT. Set CB1: ON.	g. Lamp DS1 turns off. If not, go to chart 7.
h. Use a jumper cable to connect TEST POINT 5 to TEST POINT 4. Read DMM.	h. DMM reading is 25 to 29 V dc. If not, the wire from 5A3P1-E to 5A3S1-2, or connector 5A3P1, is bad.

4-9. OPERATIONAL CHECK. Continued

Step 2. POWER SUPPLY OUTPUT CHECK FOR AM-7239/VRC AND AM-7239B/VRC.

Action	Response
a. Set TEST EQPT INPUT: INT. Set RESPONSE: 8. Read DMM.	a. DMM reading is 6.55 to 6.95 V dc. If not, go to chart 8.
b. Set RESPONSE: 9. Read DMM.	b. DMM reading is 12.6 to 13.4 V dc. If not, go to chart 9.
c. Set RESPONSE: 10. Read DMM.	c. DMM reading is 25 to 29 V dc. If not, go to chart 9.
d. Set RESPONSE: 11. Read DMM.	d. DMM reading is 180 to 220 V dc. If not, go to chart 9.
e. Set RESP SEL: S2. Set RESPONSE: 7. Read DMM.	e. DMM reading is 12.6 to 13.4 V dc. If not, go to chart 10.
f. Disconnect cable at J7 and move it to J8. Read DMM.	f. DMM reading is 12.6 to 13.4 V dc. If not, go to chart 10.
g. Set TEST EQPT INPUT: EXT.	g. No response.
h. Use EXT probe to check voltage from J9-F to GND. Read DMM.	h. DMM reading is 25 to 29 V dc. If not, go to chart 10.
i. Connect W5P5 to UUT J9 connector.	i. No response.
j. Set TEST EQPT INPUT: INT. Set RESP SEL: S1. Set RESPONSE: 8. Set TEST EQPT SELECTOR: SCOPE (AC). Read scope. Set RESPONSE: 9. Read scope. Set RESPONSE: 10. Read scope. Set RESPONSE: 11. Read scope.	j. Each should have an ac ripple less than 100 mV p-p. If the ripple voltage is greater than 100 mV p-p, the power supply (5A1) is bad.

4-9. OPERATIONAL CHECK. Continued

Step 3. AUDIO AMPLIFIER CHECK FOR AM-7239/VRC AND AM-7239B/VRC.

Action	Response
a. Set RESPONSE: OFF. Set CAL: FCTN GEN: FREQ: 1 kHz (900 to 1100 Hz) LEVEL: 15 V p-p (14 to 16 V p-p) FCTN: SINE. Set CAL: OFF. Set LOAD: 4. Set STIMULUS: 7. Set RESPONSE: 1. Set RESP SEL: S2. Read scope.	a. Scope reading is 13 to 19 V p-p. If no signal is present, go to chart 11. If a signal is present but not correct, the audio amplifier (5A2) is bad.
b. Disconnect cable at J5 and move it to J3. Read scope.	b. Same response as for step 3 a. If not, connector 5A3J3 is bad.
c. Set RESPONSE: 2. Read scope.	c. Scope reading is less than 1.4 V p-p. If not, the audio amplifier (5A2) is bad.
d. Disconnect cable at SCOPE CH A and test adapter SCOPE 1. Connect X10 probe to SCOPE CH A. Attach mini probe tip adapter to SCOPE 1 on test adapter. Insert X10 probe tip into mini probe tip adapter. Set LOAD: 1. Set RESPONSE: 3. Read scope.	d. Scope reading is 60 to 78 V p-p. If no signal is present, go to chart 12. If a signal is present but not correct, the audio amplifier (5A2) is bad.
e. Set PTT: UUT. Read scope.	e. Scope reading is less than 0.5 V p-p. If response is same as step 3 d, go to chart 13. If not, the audio amplifier (5A2) is bad.
f. Set PTT: OFF.	f. No response.
g. Disconnect cable at J3 and move it to J5.	g. No response.
h. Set PTT: UUT. Read scope.	h. Same response as for step 3 e. If not, the wire from 5A3J3-C to 5A3J5-C, or connector 5A3J5, is bad.
i. Set PTT: OFF.	i. No response.
j. Disconnect cable at J5 and move it to J4. Set LOAD: 4. Set RESPONSE: 2. Read scope.	j. Scope reading is 13 to 19 V p-p. If no signal is present, go to chart 14. If not, the audio amplifier (5A2) is bad.
k. Disconnect cable at J4 and move it to J2. Read scope.	k. Same response as for step 3 j. If not, connector 5A3J2 is bad.
l. Set RESPONSE: 1. Read scope.	l. Scope reading is less than 1.4 V p-p. If not, the audio amplifier (5A2) is bad.
m. Set RESPONSE: 3. Set LOAD: 1. Read scope.	m. Scope reading is 60 to 75 V p-p. If not, the audio amplifier (5A2) is bad.

4-9. OPERATIONAL CHECK. Continued

Step 3. AUDIO AMPLIFIER CHECK FOR AM-7239/VRC AND AM-7239B/VRC. Continued

Action	Response
n. Set PTT: UUT. Read scope.	n. Scope reading is less than 0.5 V p-p. If not, go to chart 15.
o. Set PTT: OFF.	o. No response.
p. Disconnect cable at J2 and move it to J4.	p. No response.
q. Set PTT: UUT. Read scope.	q. Same response as for step 3 n. If not, the wire from 5A3J2-C to 5A3J4-C, or connector 5A3J4, is bad.
r. Set PTT: OFF.	r. No response.
s. Set LOGIC: 2. Read scope.	s. Scope reading is less than 0.5 V p-p. If not, go to chart 16.
t. Remove X10 probe and mini probe tip adapter from test adapter SCOPE 1. Remove X10 probe from SCOPE CH A. Connect cable from test adapter SCOPE 1 to SCOPE CH A. Disconnect cable at J4 and move it to J5. Set CAL: FCTN GEN: FREQ: 1800 Hz (1750 to 1850 Hz) LEVEL: 300 mV p-p (250 to 350 mV p-p) FCTN: SINE. Set CAL: MOD GEN: FREQ: 600 Hz (550 to 650 Hz) MOD AMPLITUDE: MID-RANGE MOD FCTN : SINE MODULATION: FM: INT. Set CAL: OFF. Set STIMULUS: 1. Set LOAD: 2. Set LOGIC: 4. Set TEST EQPT SELECTOR: SCOPE. Set RESPONSE: 6 Set RESP SEL: S1. Set STIM SEL: HANDSET. Read scope.	t. Scope reading is -0.2 to 0.2 V dc. If not, the audio amplifier (5A2) is bad.
u. Set PTT: UUT. Read scope.	u. Scope reading is 0.8 to 1.3 V dc when PTT: UUT, then -0.2 to 0.2 V dc within 1 second. If no signal is present, go to chart 17. If a signal is present but not correct, the audio amplifier (5A2) is bad.
v. Set PTT: OFF.	v. No response.
w. Set STIM SEL: FCTN GEN. Set PIT: UUT. Read scope.	w. Scope reading is 0.8 to 1.3 V dc. If signal is same as in step 3 u, go to chart 18. If not, the audio amplifier (5A2) is bad.
x. Set PTT: OFF.	x. No response.

4-9. OPERATIONAL CHECK. Continued

Step 3. AUDIO AMPLIFIER CHECK FOR AM-7239/VRC AND AM-7239B/VRC. Continued

Action	Response
y. Connect cable at J5 to J4. Set STIM SEL: HANDSET. Set PTT: UUT. Read scope.	y. Scope reading is 0.8 to 1.3 V dc when PTT: UUT, then -0.2 to 0.2 V dc within 1 second. If no signal is present, go to chart 19. If a signal is present but not correct, the audio amplifier (5A2) is bad.
z. Set PTT: OFF.	z. No response.
aa. Set STIM SEL: FCTN GEN. Set PTT: UUT. Read scope.	aa. Scope reading is 0.8 to 1.3 V dc. If signal is same as in step 3 y, go to chart 20. If not, the audio amplifier (5A2) is bad.
ab. Set PTT: OFF.	ab. No response.
ac. Set LOAD: OFF. Set CB1: OFF. Set 28 V: OFF. Disconnect BNC-to-banana adapter from DMM. Connect test leads to DMM, and set DMM to 2000 mA scale. Insert (+) test lead into TEST POINT 6. Insert (-) test lead into TEST POINT 7. Set CB1: ON. Read DMM.	ac. Record current measured by DMM.
ad. Set LOGIC: 1. Read DMM.	ad. DMM reading is 200 to 800 mA greater than that recorded in step 3 ac. If not, go to chart 21.
ae. Set LOGIC: 4.	ae. No response.
af. Disconnect cable at J8 and move it to J7. Set LOGIC: 1. Read DMM.	af. DMM reading is 200 to 800 mA greater than that recorded in step 3 ac. If not, go to chart 22.

Step 4. POWER AMPLIFIER INTERFACE FOR AM-7239/VRC AND AM-7239B/VRC.

Action	Response
a. Set CB1: OFF. Disconnect cable at J7 and move it to J8. Remove test leads from TEST POINTS 6 and 7 and DMM. Connect BNC-to-banana adapter to DMM. Set TEST EQPT SELECTOR: DMM. Set RESPONSE: 6. Set RESP SEL: S2. Read DMM.	a. DMM reading is less than 5 Ω. If not, go to chart 23.
b. Disconnect cable at J1 and move it to J11. Disconnect cable at J8 and move it to J7. Read DMM.	b. DMM reading is less than 5 Ω. If not, go to chart 24.

4-9. OPERATIONAL CHECK. Continued

Step 5. REMOTE CONTROL TRANSFORMERS CHECK FOR AM-7239/VRC AND AM-7239/VRC.

Action	Response
a. Set CAL: FCTN GEN: MODULATION: OFF FREQ: 40 kHz (38 to 42 kHz) LEVEL: 500 mV p-p (450 to 550 mV p-p) FCTN: SINE. Set CAL: OFF. Set STIMULUS: 8. Set TEST EQPT SELECTOR: SCOPE. Set LOAD: 3. Set RESPONSE: 5. Read scope.	a. Scope reading is 300 to 625 mV p-p. If not, go to chart 25.
b. Disconnect cable at J7 and move it to J8. Set RESPONSE: 4. Read scope.	b. Scope reading is 300 to 625 mV p-p. If not, go to chart 26.
c. Set TEST EQPT INPUT: EXT.	c. No response.
d. Use EXT probe to check voltage from E1A to E2A (GND). Read scope.	d. Scope reading is 100 to 200 mV p-p, If not, go to chart 27.
e. Disconnect cable at J8 and move it to J7.	e. No response.
f. Use EXT probe to check voltage from E2B to E1B (GND). Read scope.	f. Scope reading is 100 to 200 mV p-p. If not, go to chart 28.

Step 6. INTERCOM AUDIO PATH CHECK FOR AM-7239/VRC AND AM-7239B/VRC.

Action	Response
a. Set STIMULUS: OFF. Set TEST EQPT INPUT: INT. Disconnect cable at J4 and move it to J3. Set LOAD: OFF. Set RESPONSE: 2. Set TEST EQPT SELECTOR: DMM. Set RESP SEL: S1. Read DMM.	a. DMM reading is 21.6 k to 26.4 k ohms. If DMM reading indicates an open circuit, go to chart 29. If not, the audio amplifier (5A2) is bad.
b. Disconnect cable at J3 and move it to J2. Read DMM.	b. DMM reading is 21.6 k to 26.4 k ohms. If DMM reading indicates an open circuit, go to chart 30. If not, the audio amplifier (5A2) is bad.

4-9. OPERATIONAL CHECK. Continued

Step 6. INTERCOM AUDIO PATH CHECK FOR AM-7239/VRC AND AM-7239B/VRC. Continued

Action	Response
c. Place RT in lower slot. Set 28 V: ON. Set CB1: ON. Set RT FCTN: TST. Read RT display.	c. RT display reads "Good". If not, the snap line driver (5A3A2 or 5A3A1W3A2) is bad.
d. Set RT FCTN: OFF. Set CB1: OFF. Remove RT.	d. No response.
e. Install shorting bar, if testing an AM-7239/VRC.	e. Operational Check is complete.

4-10. TROUBLESHOOTING.

Troubleshooting is done on a faulty mounting adapter. The steps to determine if a mounting adapter is faulty and how to troubleshoot it are as follows:

a. **When a mounting adapter is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV or V if repairs are necessary.

b. **Verify the symptom.** Perform the operational check found in paragraph 4-9. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. **Troubleshoot the mounting adapter using the flowchart.** It will identify the defective module or component.

d. **Replace the defective module or component.** Follow the procedures in section IV or V.

e. **Verify the repair.** Repeat the operational check in paragraph 4-9 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the mounting adapter can be returned for use.

4-11. TEST PRECAUTIONS AND NOTES.

CAUTION

Static electricity and stray voltages can damage the mounting adapter. Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting.

All circuit card assemblies in the mounting adapter contain static sensitive devices susceptible to electrostatic damage. **DO NOT** attempt to replace components without using protective devices.

4-11. TEST PRECAUTIONS AND NOTES. Continued

WARNING

High voltage (200 V dc) is present at mounting adapter connector J1. Use caution when connecting the test setup and taking measurements to avoid personal injury.

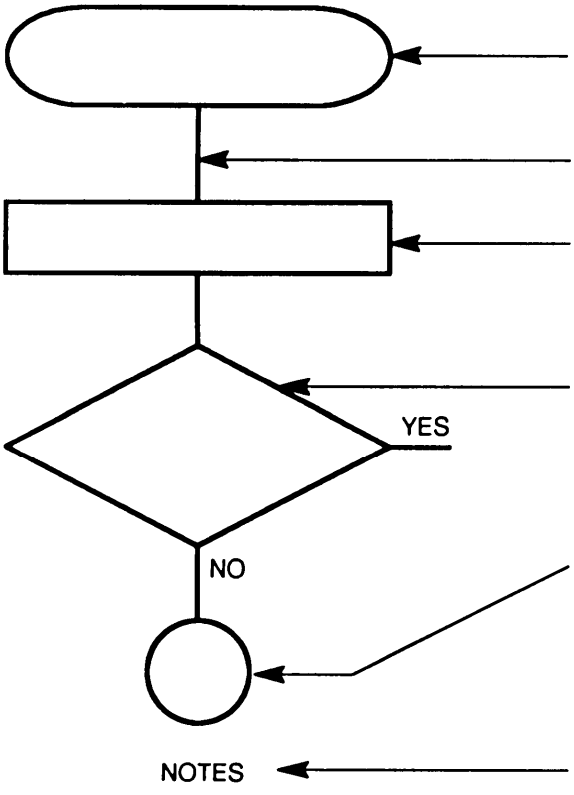
Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

NOTE

The Principles of Operation section, functional block diagrams, and figure FO-14 or FO-15 can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.

4-12. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages.

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

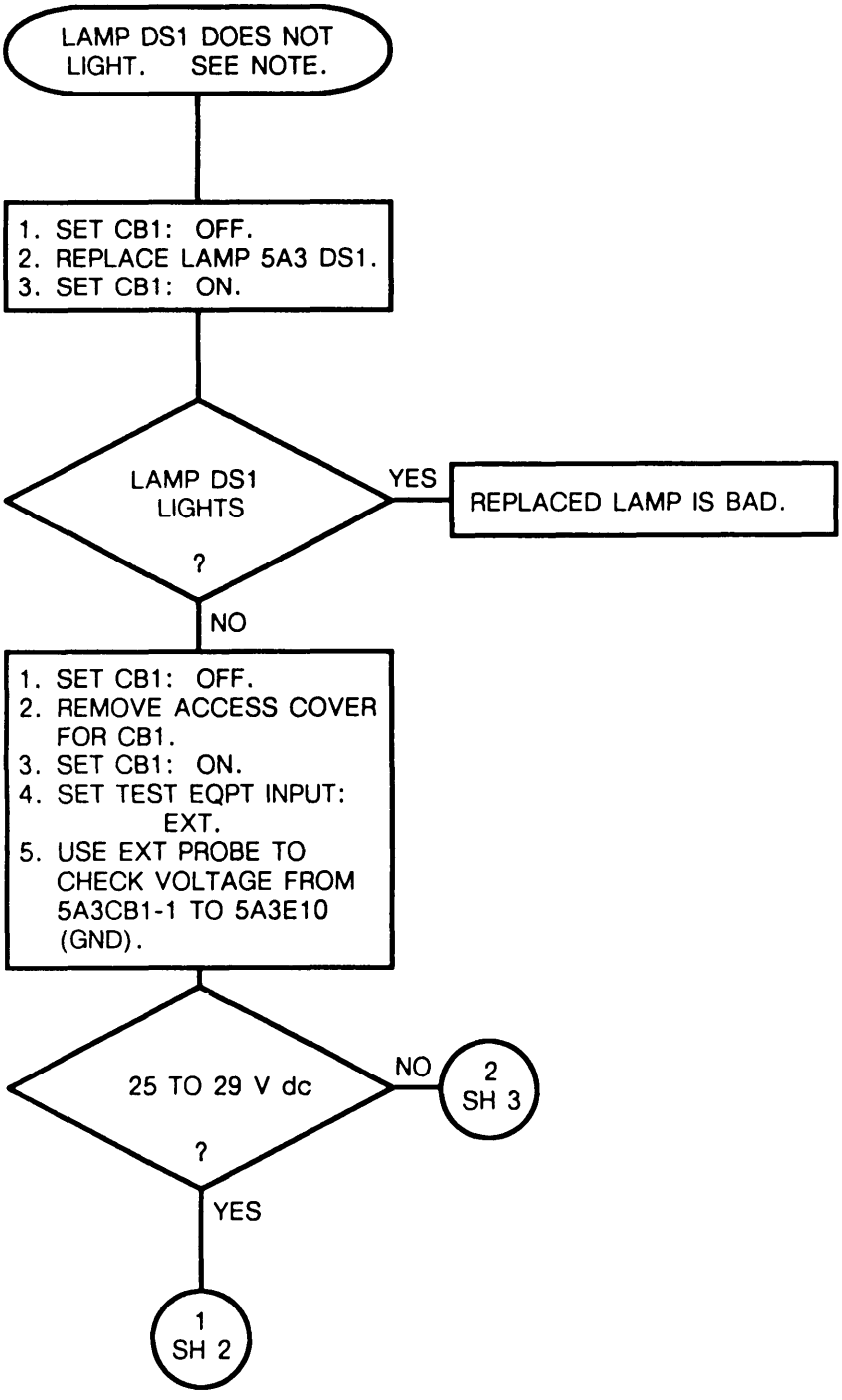
4-13. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	Lamp DS1 does not light.
2	CB1 trips.
3	CB1 trips when RLY CONTROL power is applied.
4	SW 27.5 VDC is not present.
5	CB1 trips with S1 set to LCL.
6	Lamp DS1 does not light.
7	Lamp DS1 does not turn off when S1 is set to RMT.
8	6.75 V dc power is absent.
9	13, 28, or 200 V dc power is absent.
10	13 or 27 V dc power is absent.
11	No intercom Audio-A.
12	No speaker output.
13	Speaker output does not mute.
14	No intercom Audio-B.
15	Speaker output does not mute.
16	Speaker output does not mute from 5A3P1.
17	No ADMC-A signal is present.
18	ADMC-A output is incorrect.
19	No ADMC-B signal is present.
20	ADMC-B output is incorrect.
21	COMSEC 13 V line filter is inoperative.
22	Current reading is incorrect.
23	Open exists for PA control.
24	Open exists for PA control.
25	No two-wire signal is present at J7.
26	No two-wire signal is present at J8.
27	No signal is present at E1A and E2A.
28	No signal is present at E1B and E2B.
29	VIC-A audio transmit line is open.
30	VIC-B audio transmit line is open.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Primary Power Circuit for AM-7239/VRC
(Sheet 1 of 3)

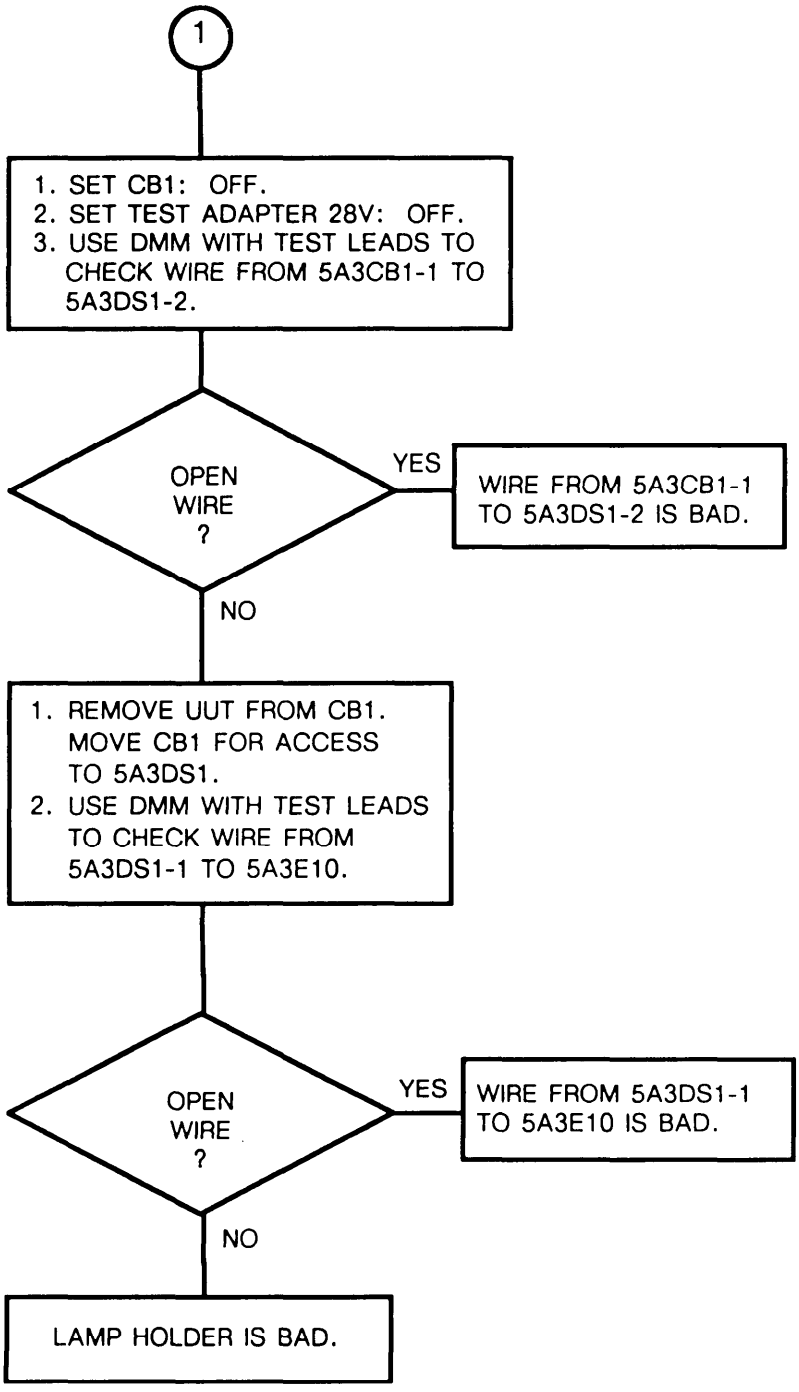


NOTE:

Refer to figure FO-14 for diagram of these circuits.

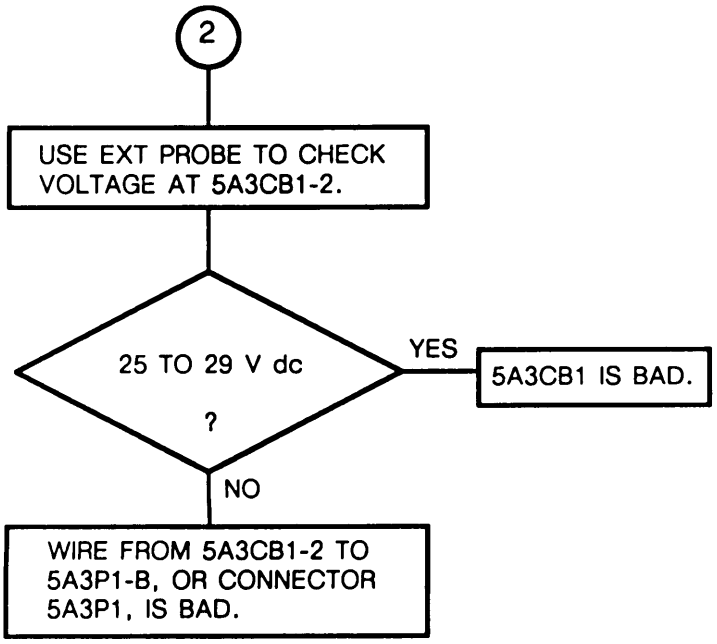
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Primary Power Circuit for AM-7239/VRC
(Sheet 2 of 3)



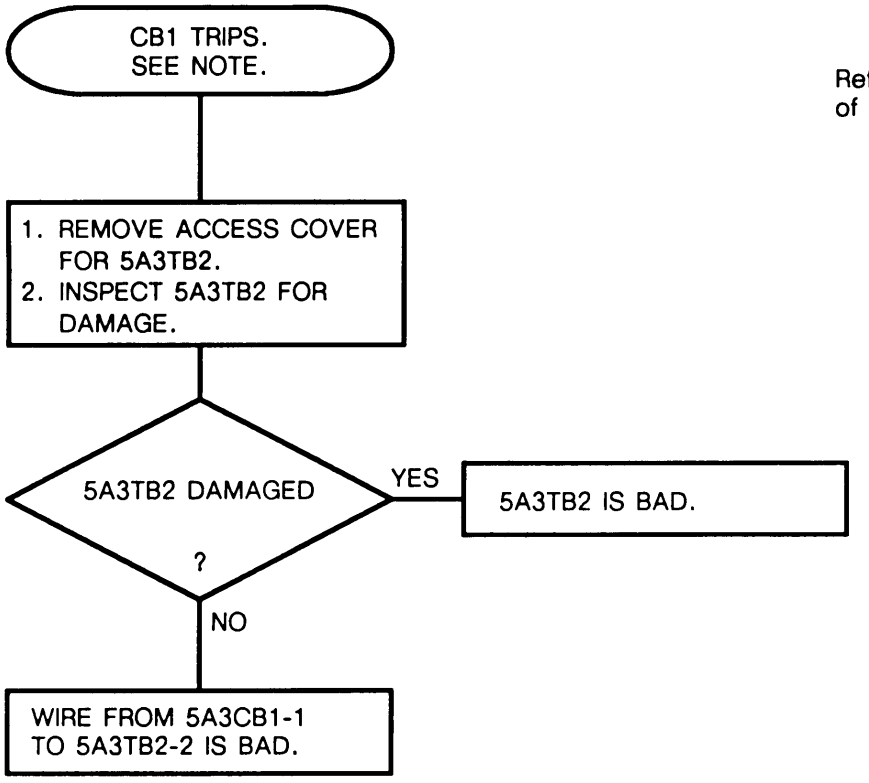
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Primary Power Circuit for AM-7239/VRC
(Sheet 3 of 3)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Primary Power Circuit for AM-7239/VRC
(Sheet 1 of 1)

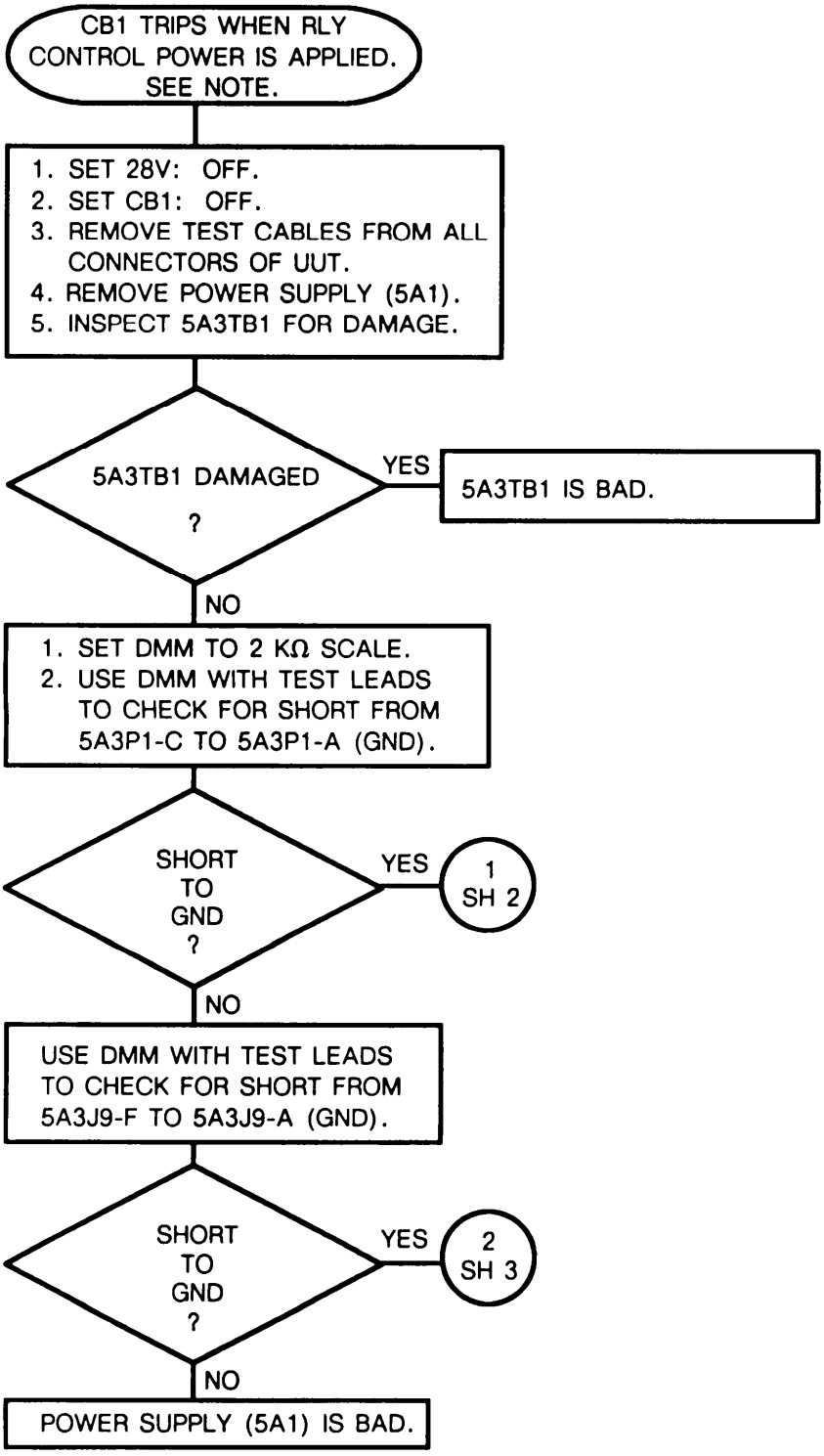


NOTE:

Refer to figure FO-14 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting Relay Control Circuit for AM-7239/VRC
(Sheet 1 of 3)

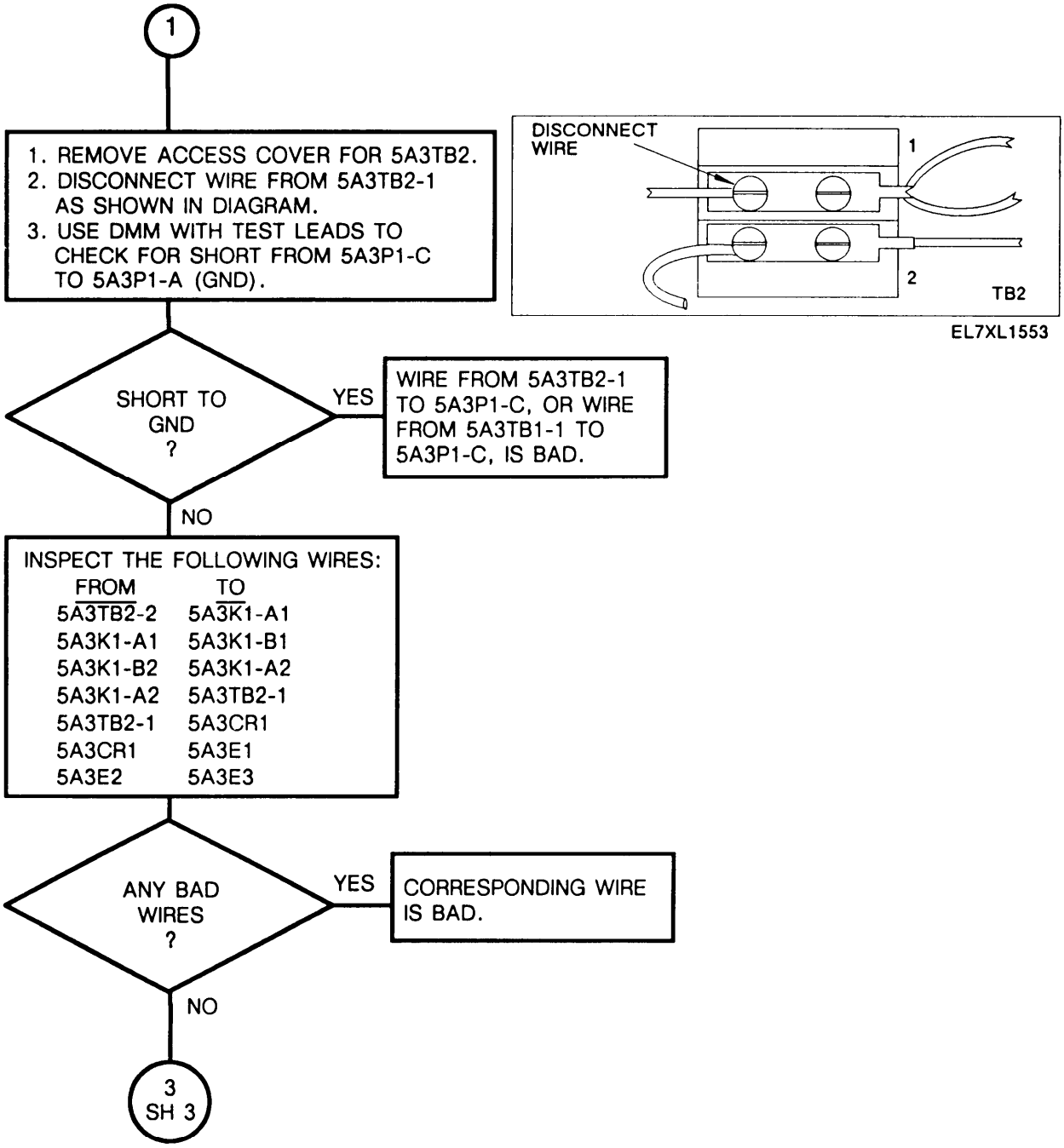


NOTE:

Refer to figure FO-14 for diagram of these circuits.

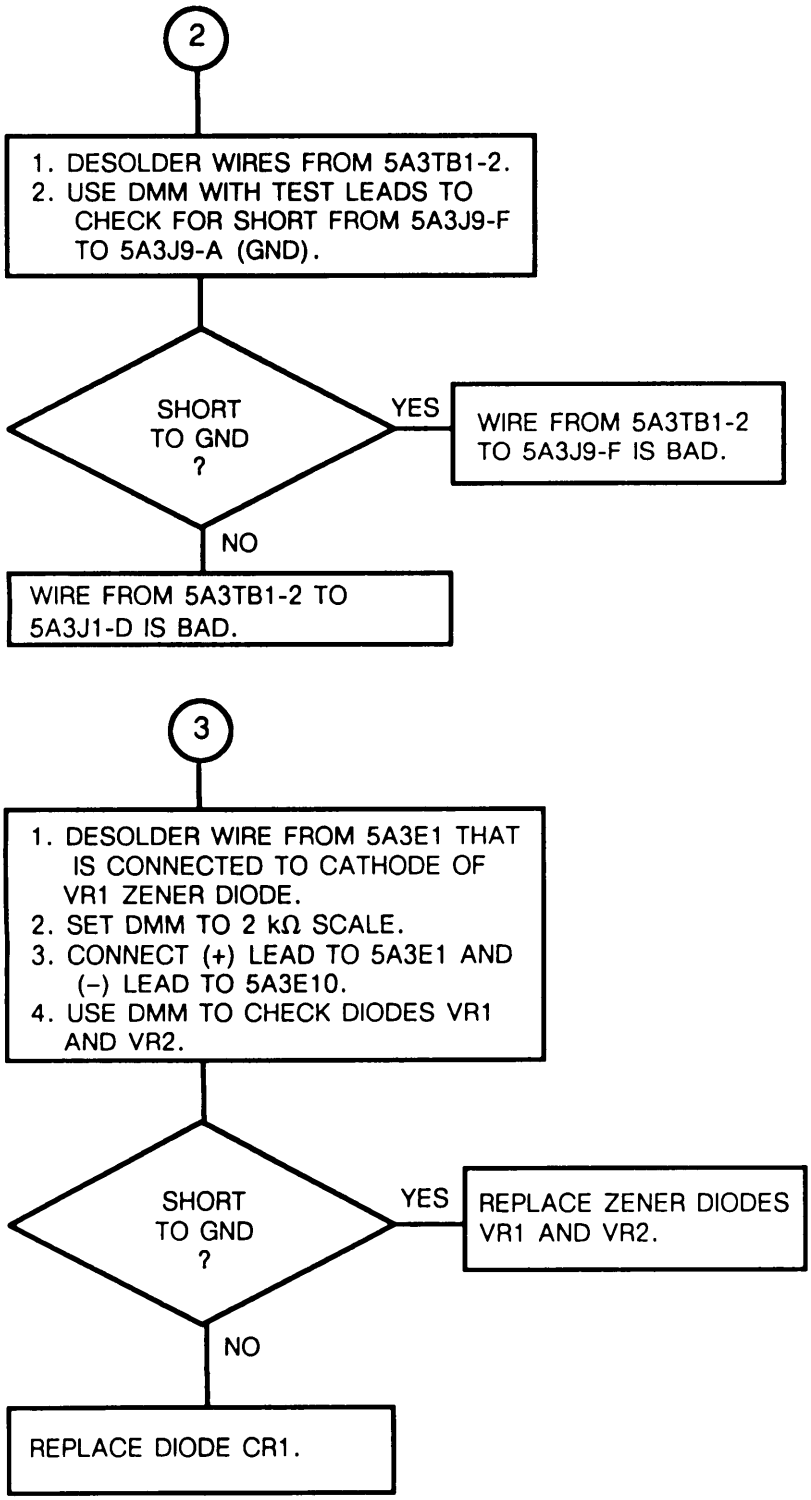
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting Relay Control Circuit for AM-7239/VRC
(Sheet 2 of 3)



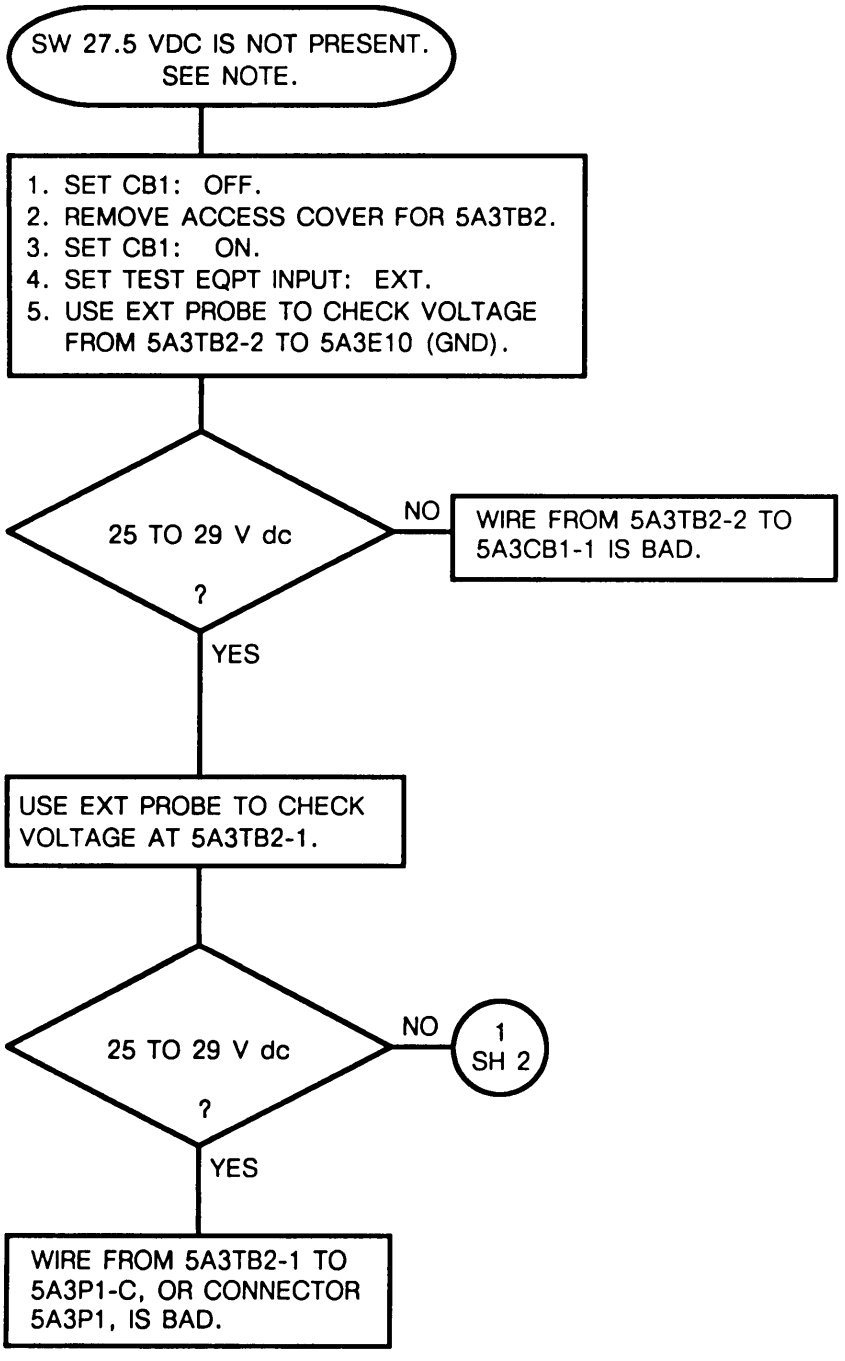
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting Relay Control Circuit for AM-7239/VRC
(Sheet 3 of 3)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Primary Power Path for AM-7239/VRC
(Sheet 1 of 2)

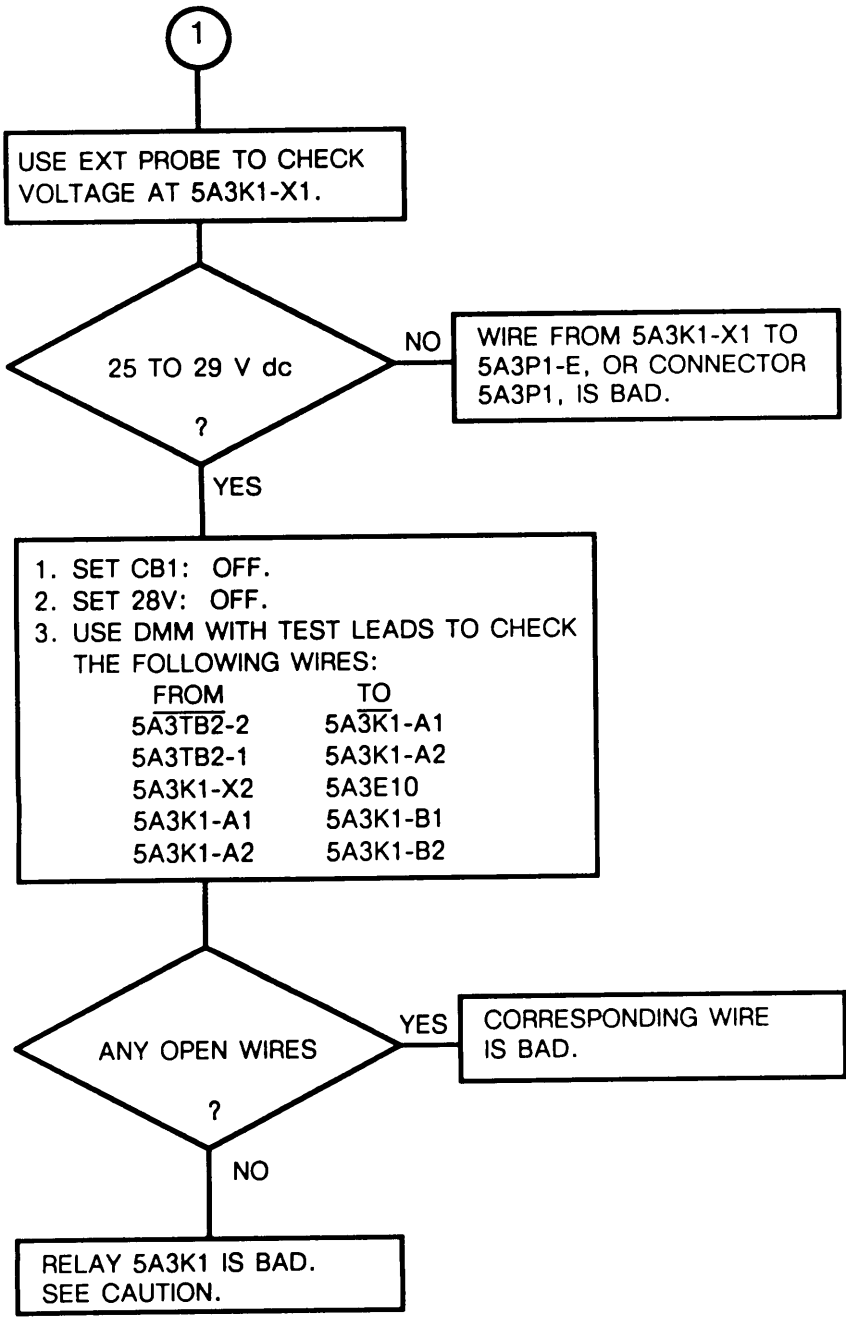


NOTE:

Refer to figure FO-14 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Primary Power Path for AM-7239/VRC
(Sheet 2 of 2)

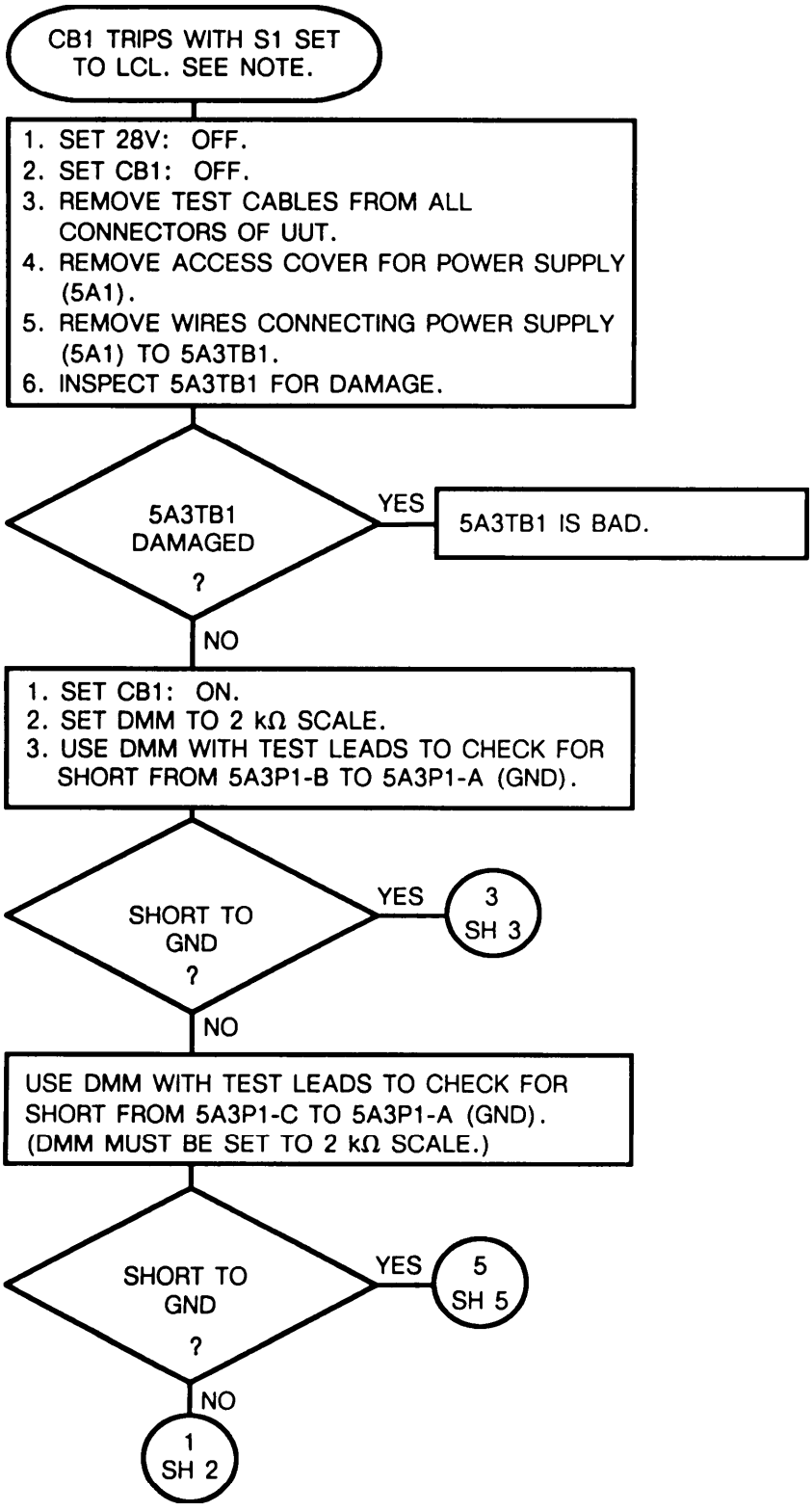


CAUTION

See removal and replacement procedures for two versions of relay K1.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 1 of 6)

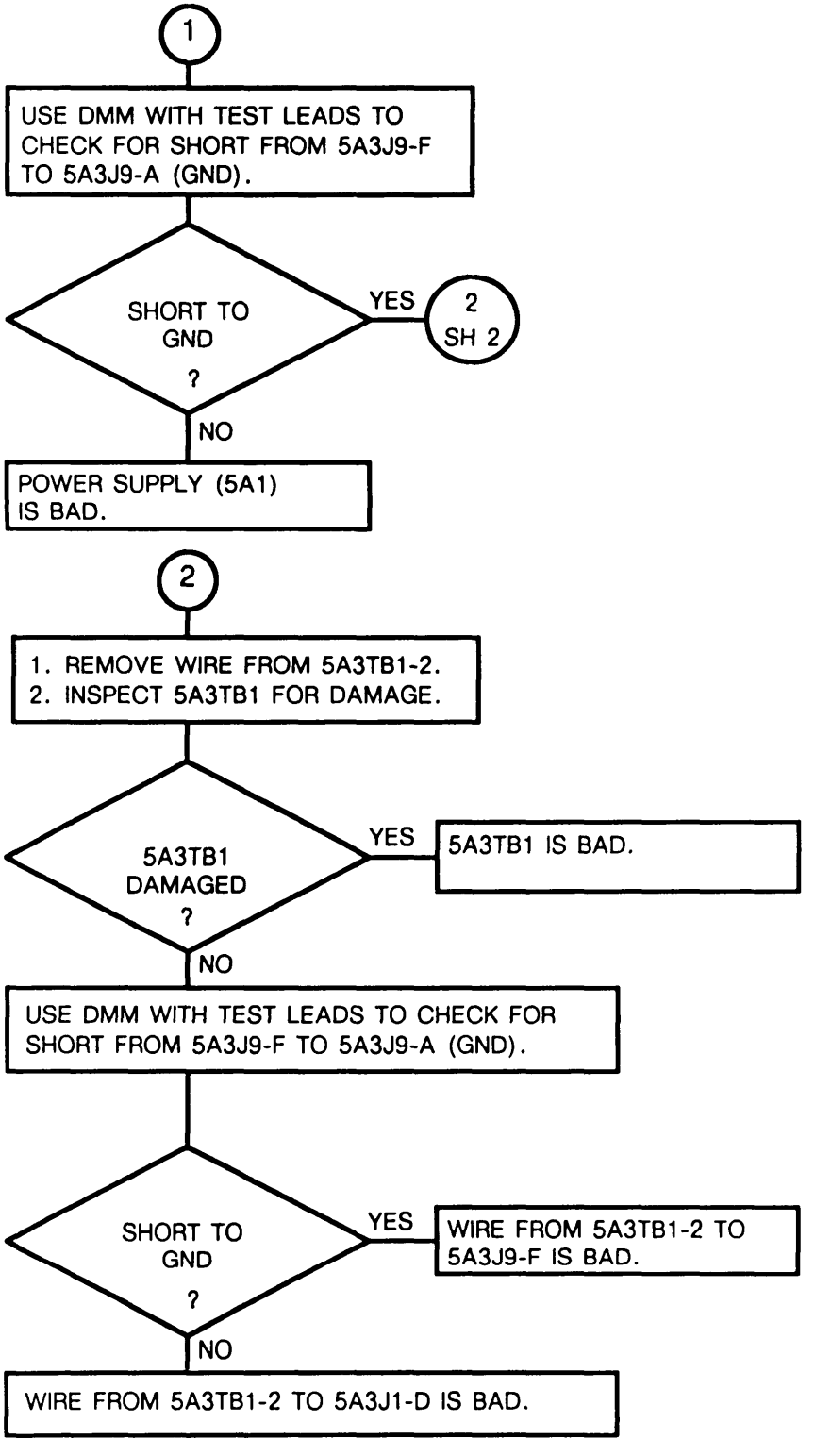


NOTE:

Refer to figure FO-15 for diagram of these circuits.

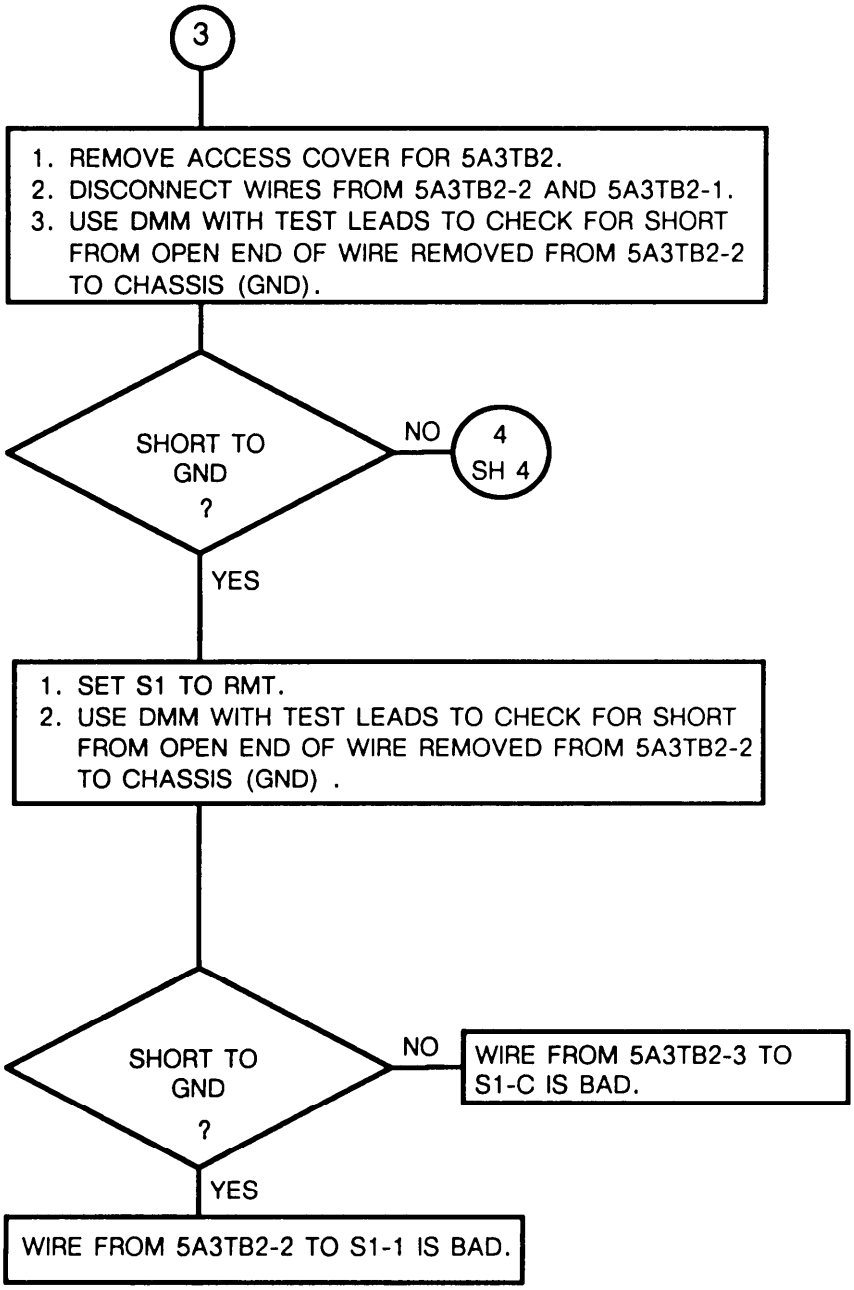
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 2 of 6)



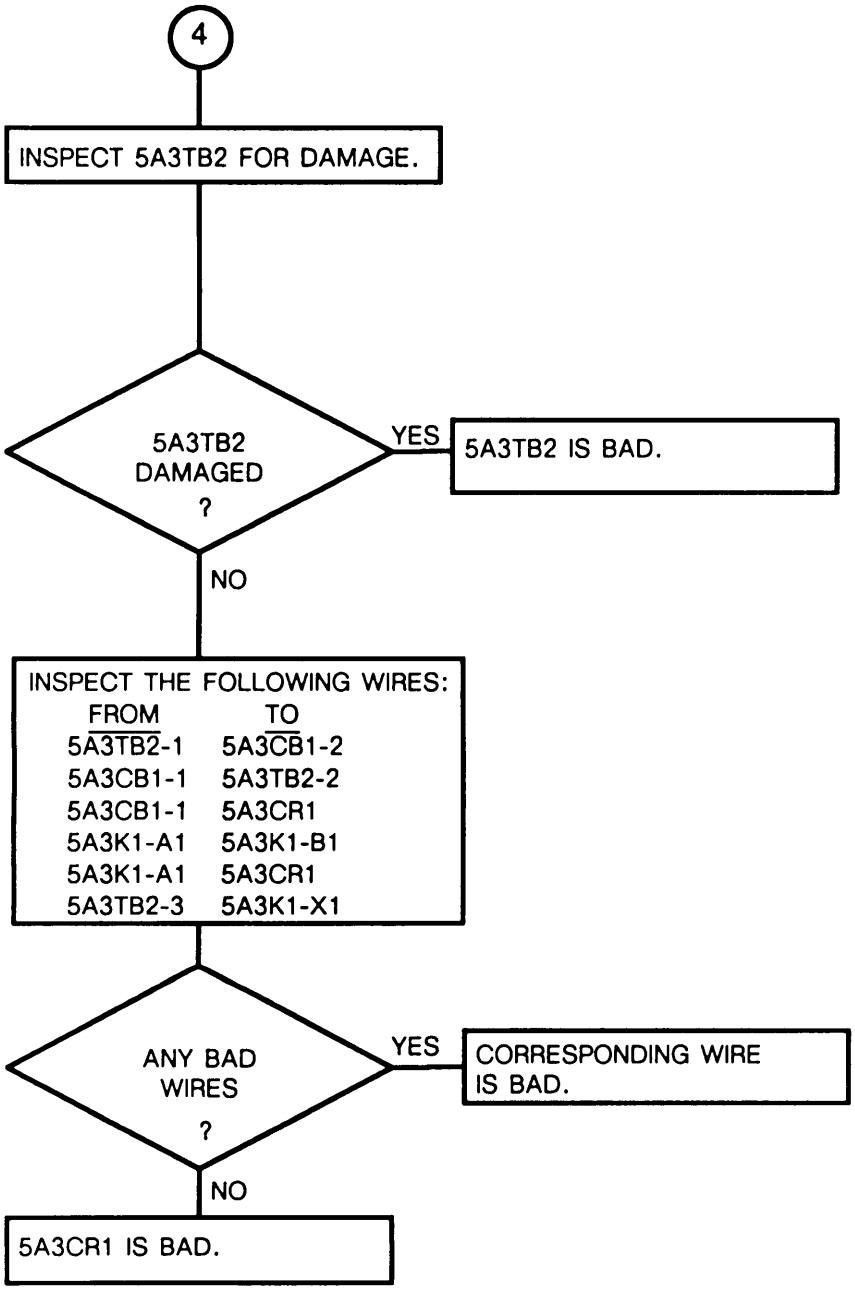
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 3 of 6)



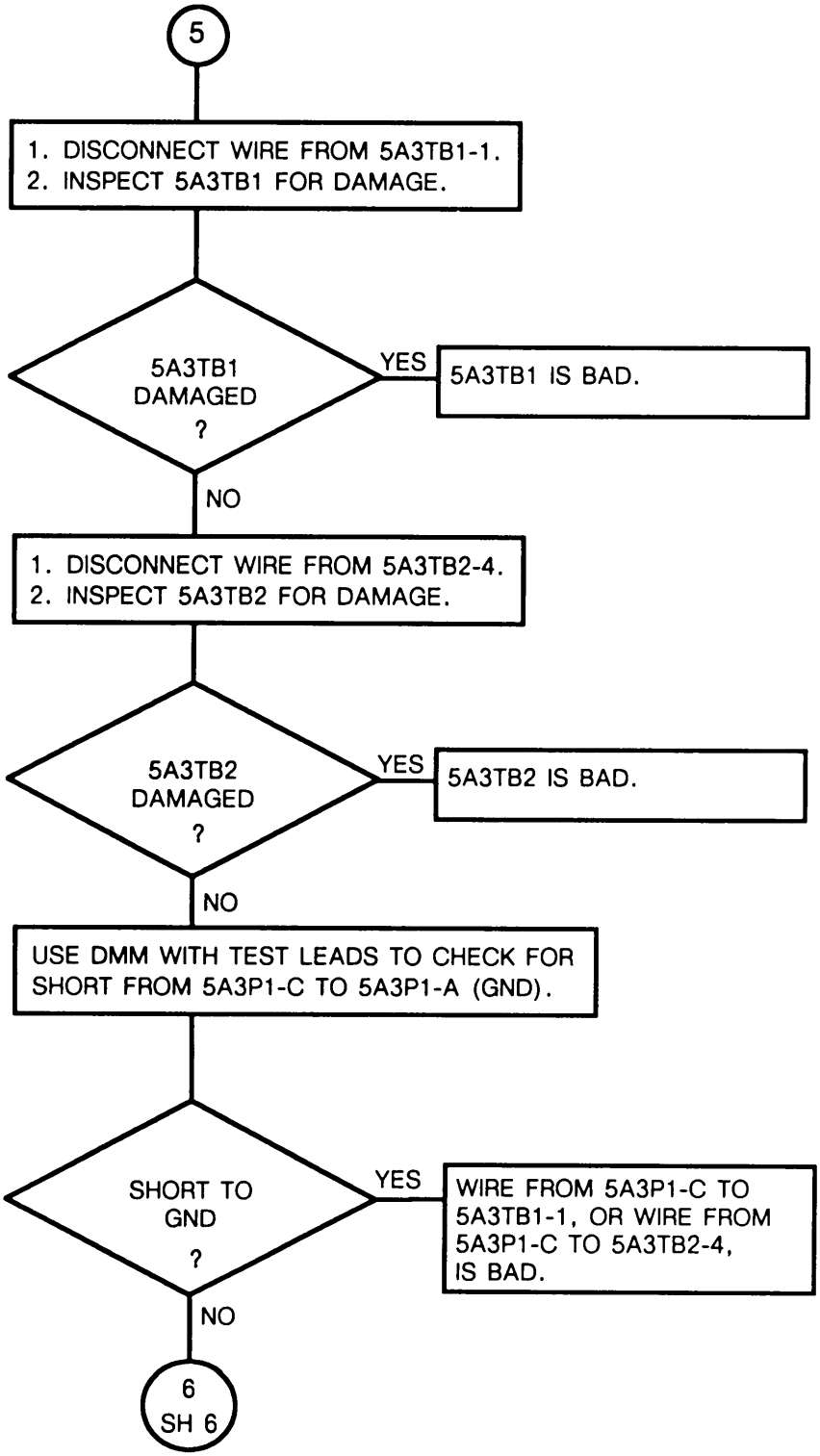
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 4 of 6)



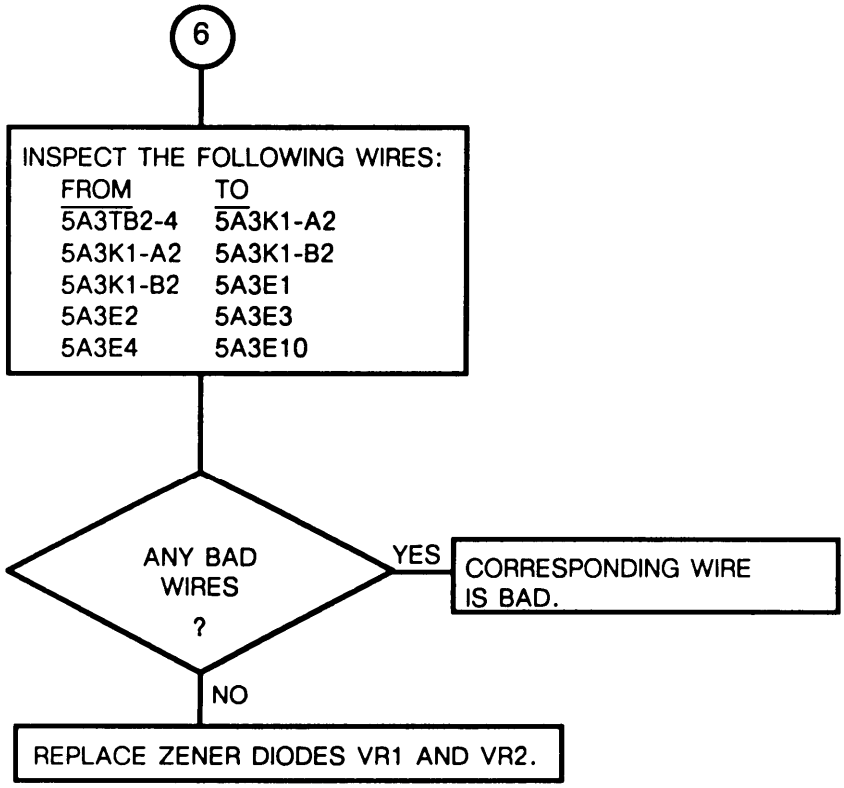
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 5 of 6)



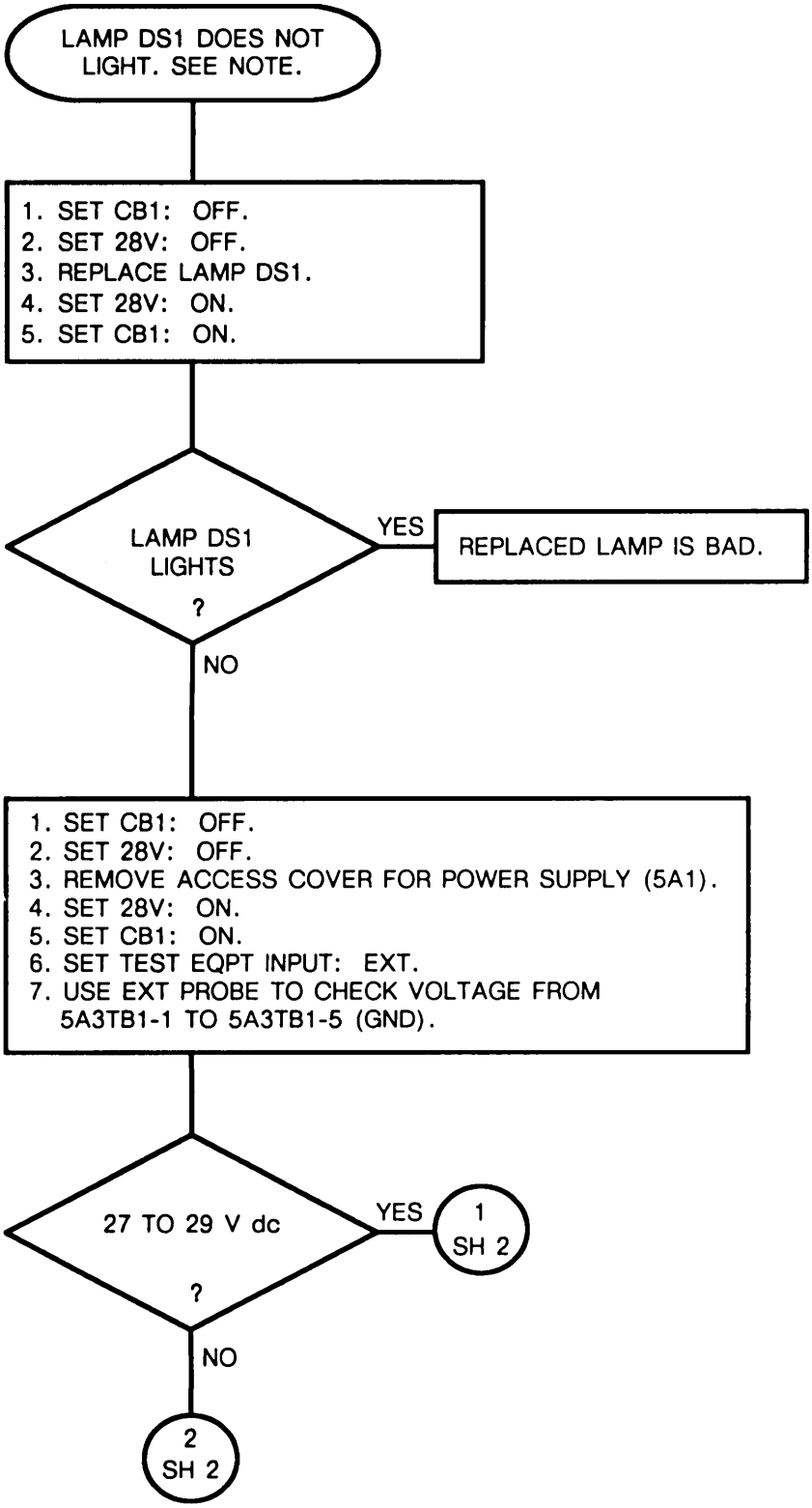
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 6 of 6)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 1 of 12)

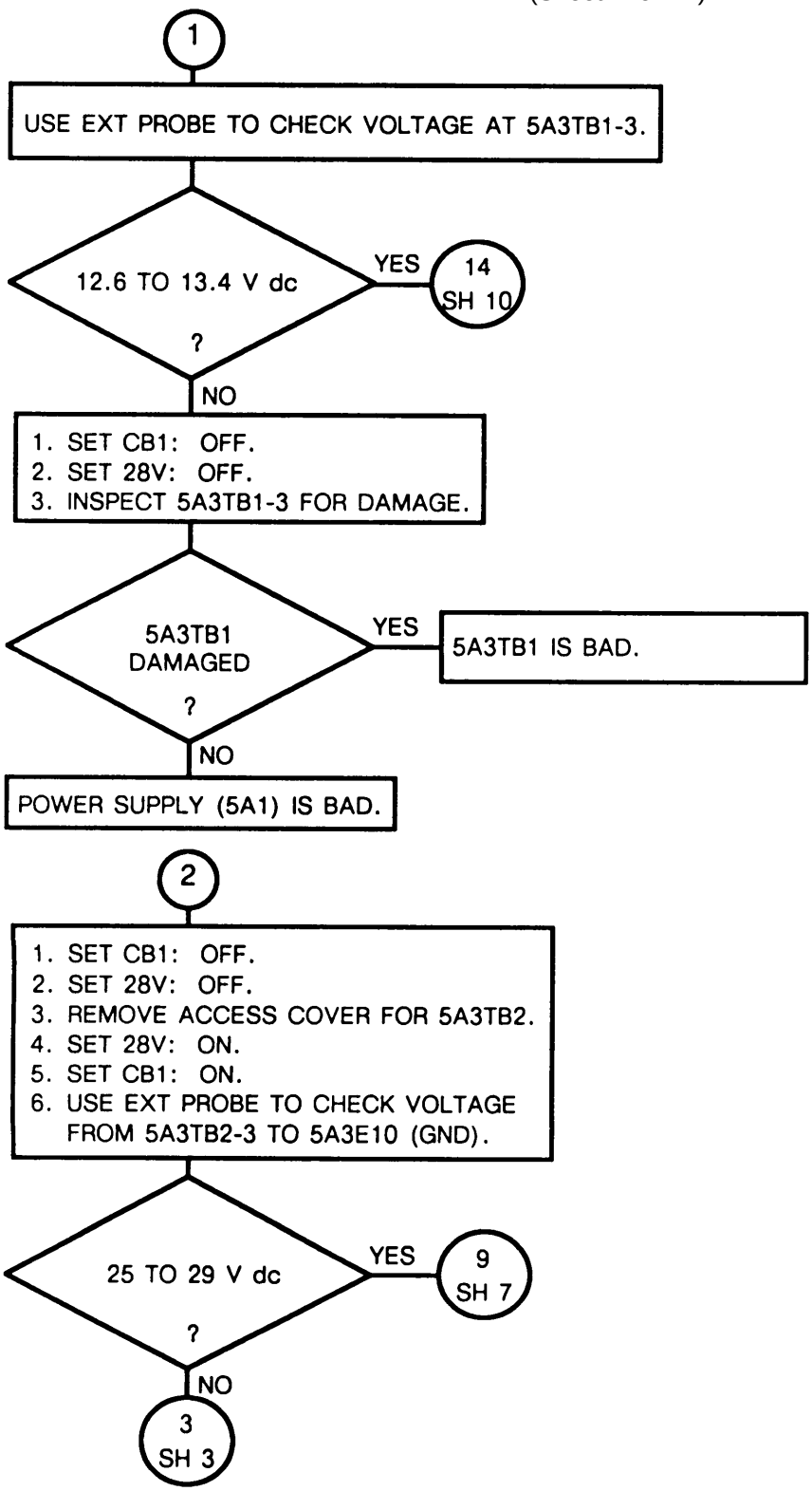


NOTE:

Refer to figure FO-15 for diagram of these circuits.

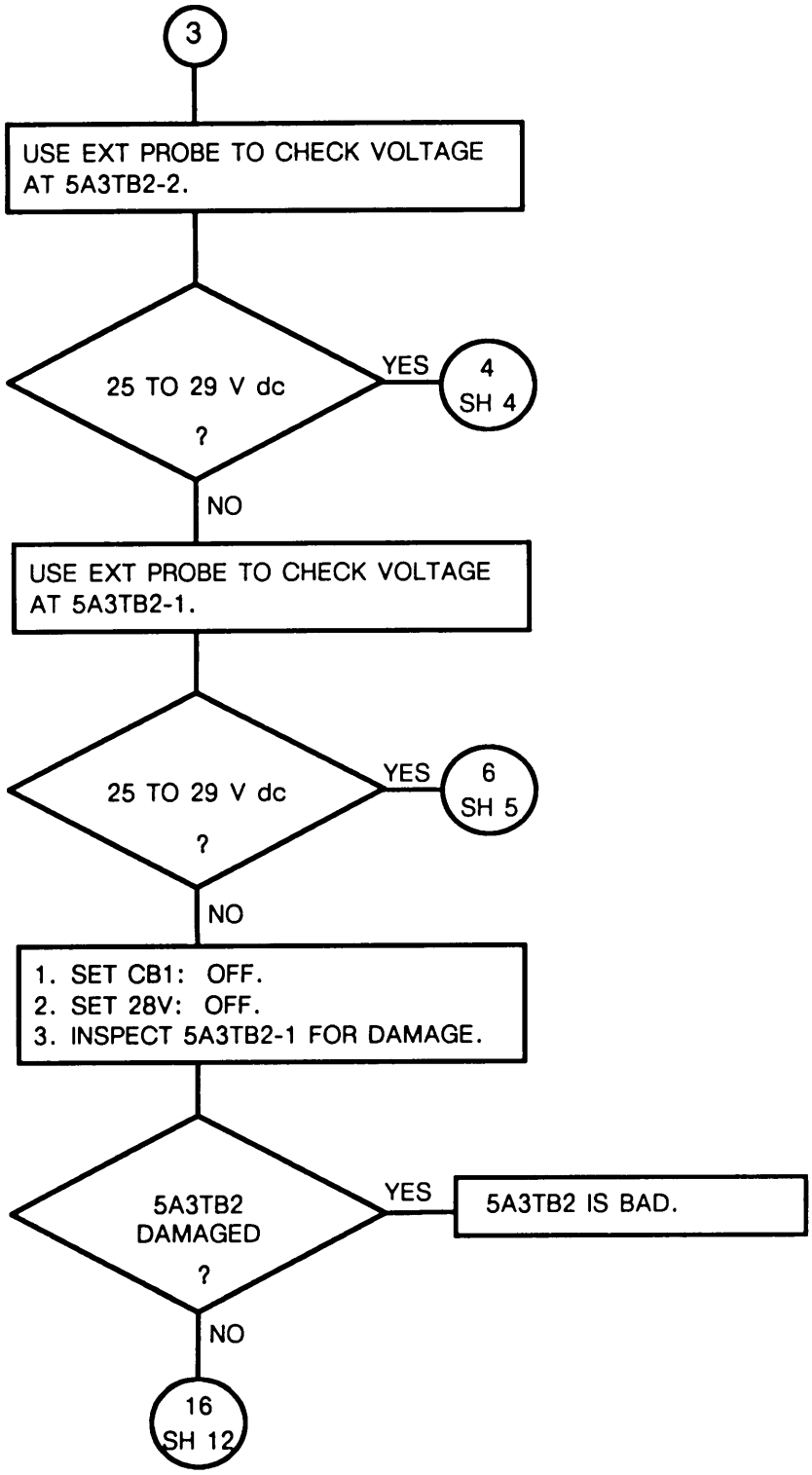
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 2 of 12)



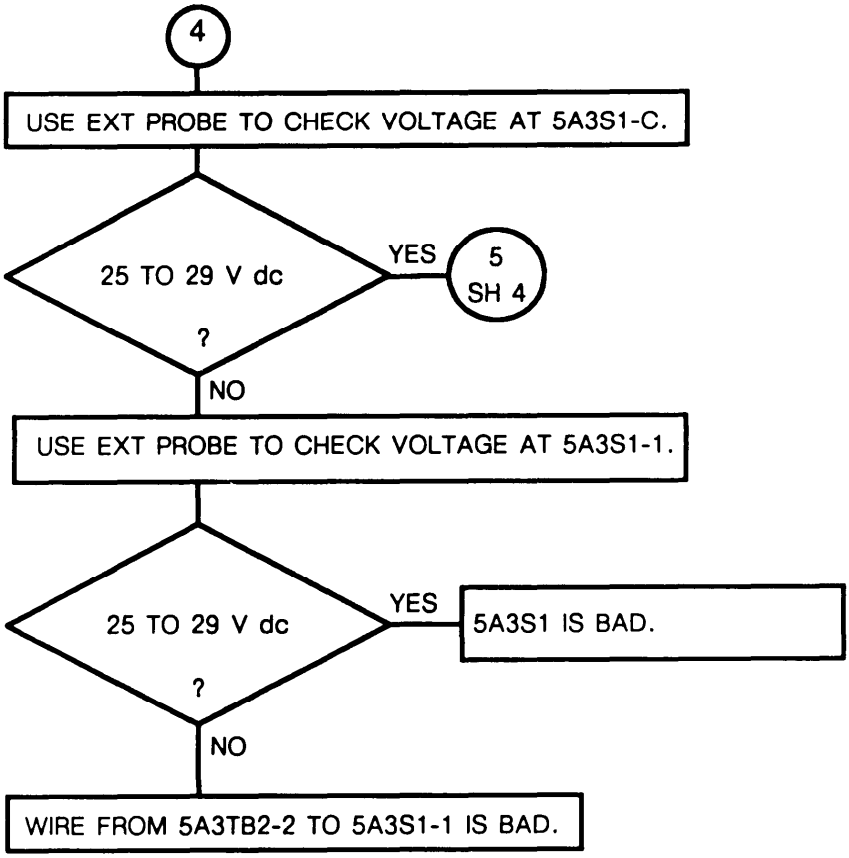
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

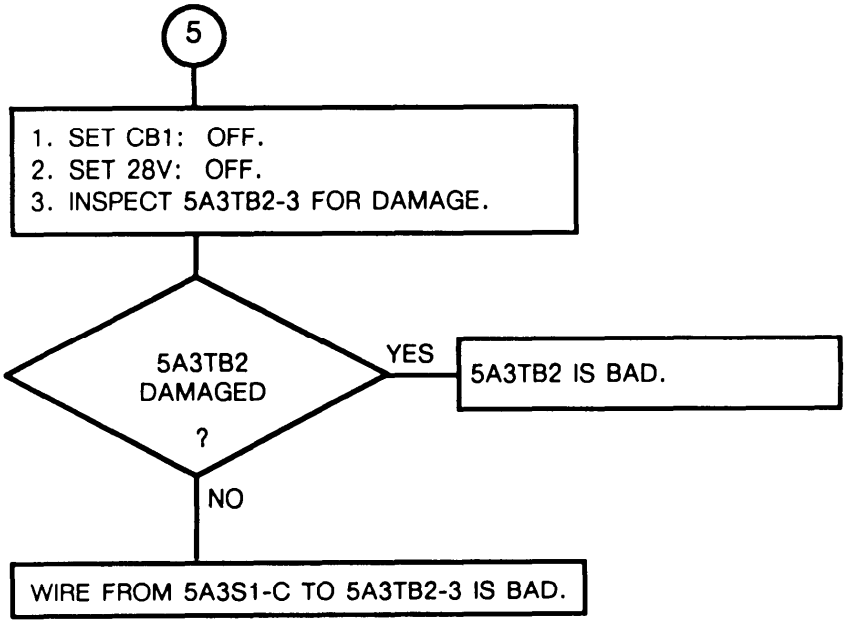
Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 3 of 12)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

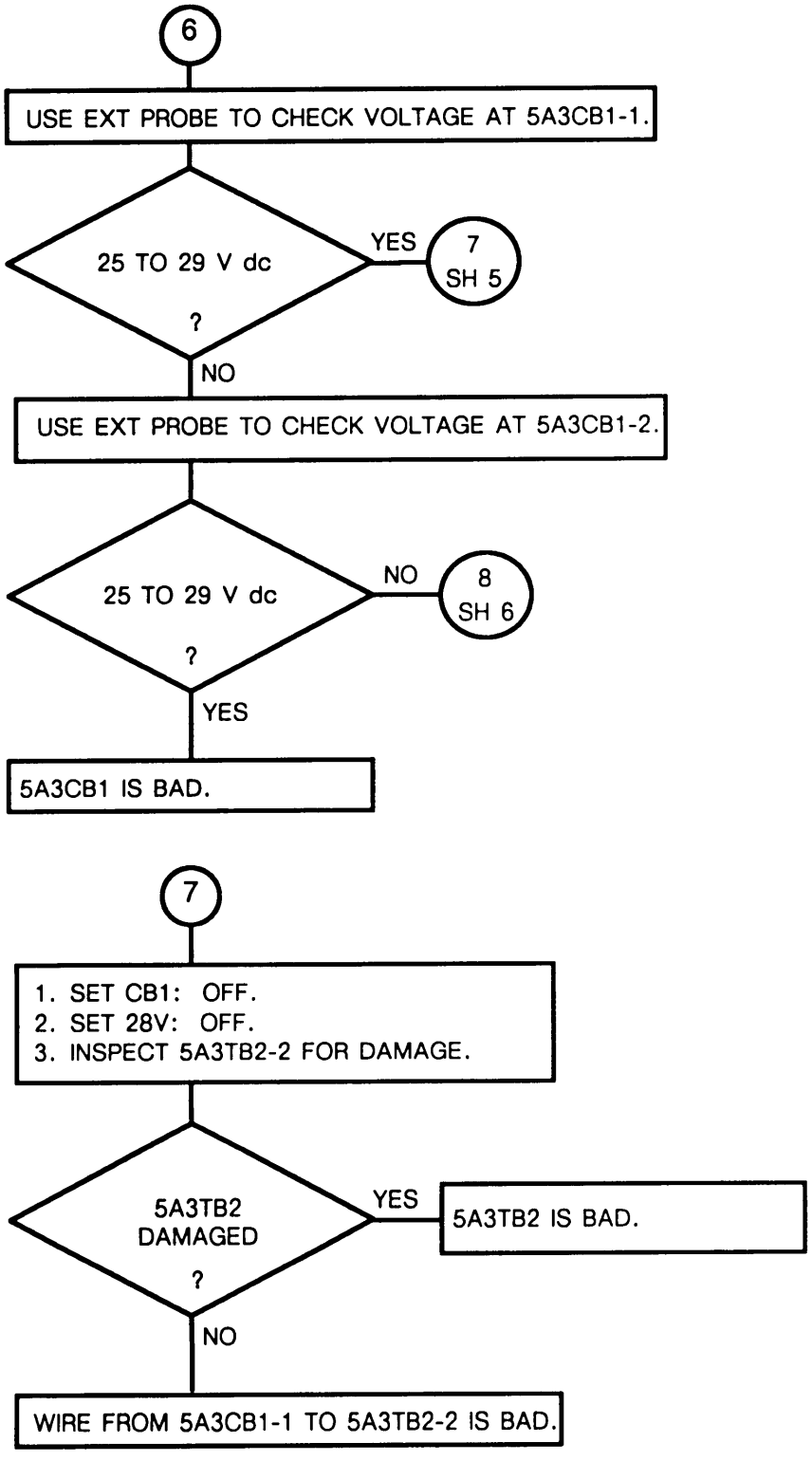
Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 4 of 12)





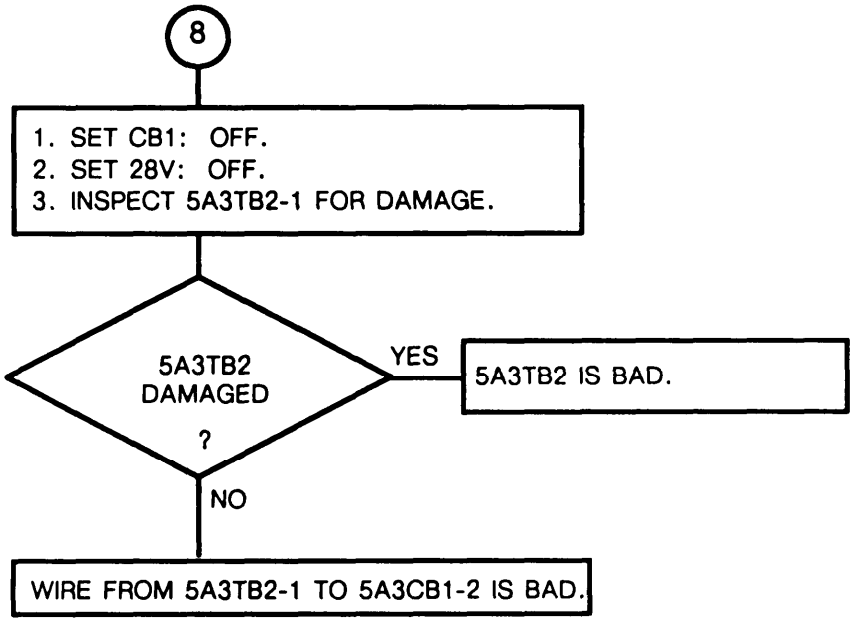
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 5 of 12)



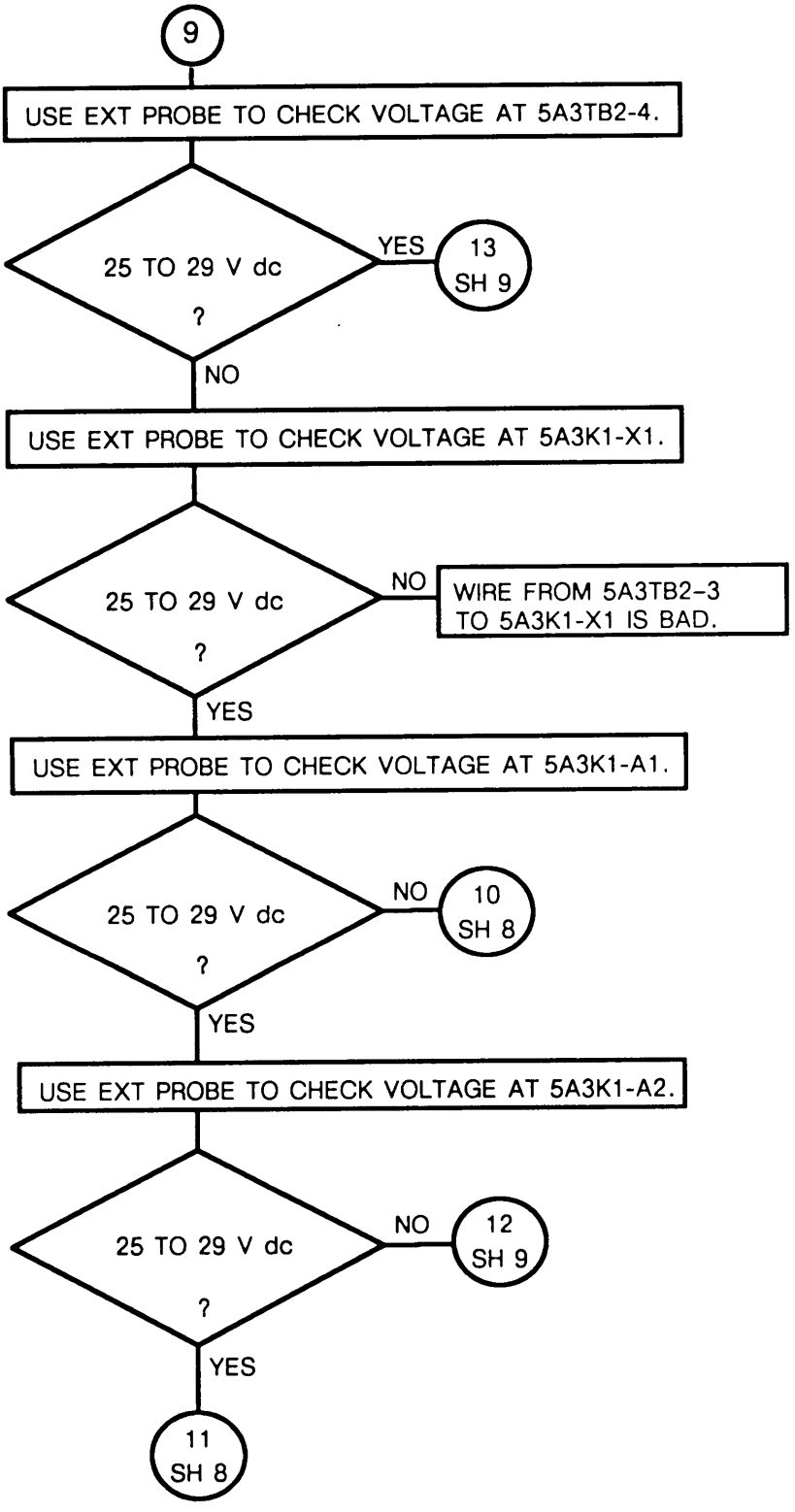
4-13.TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 6 of 12)



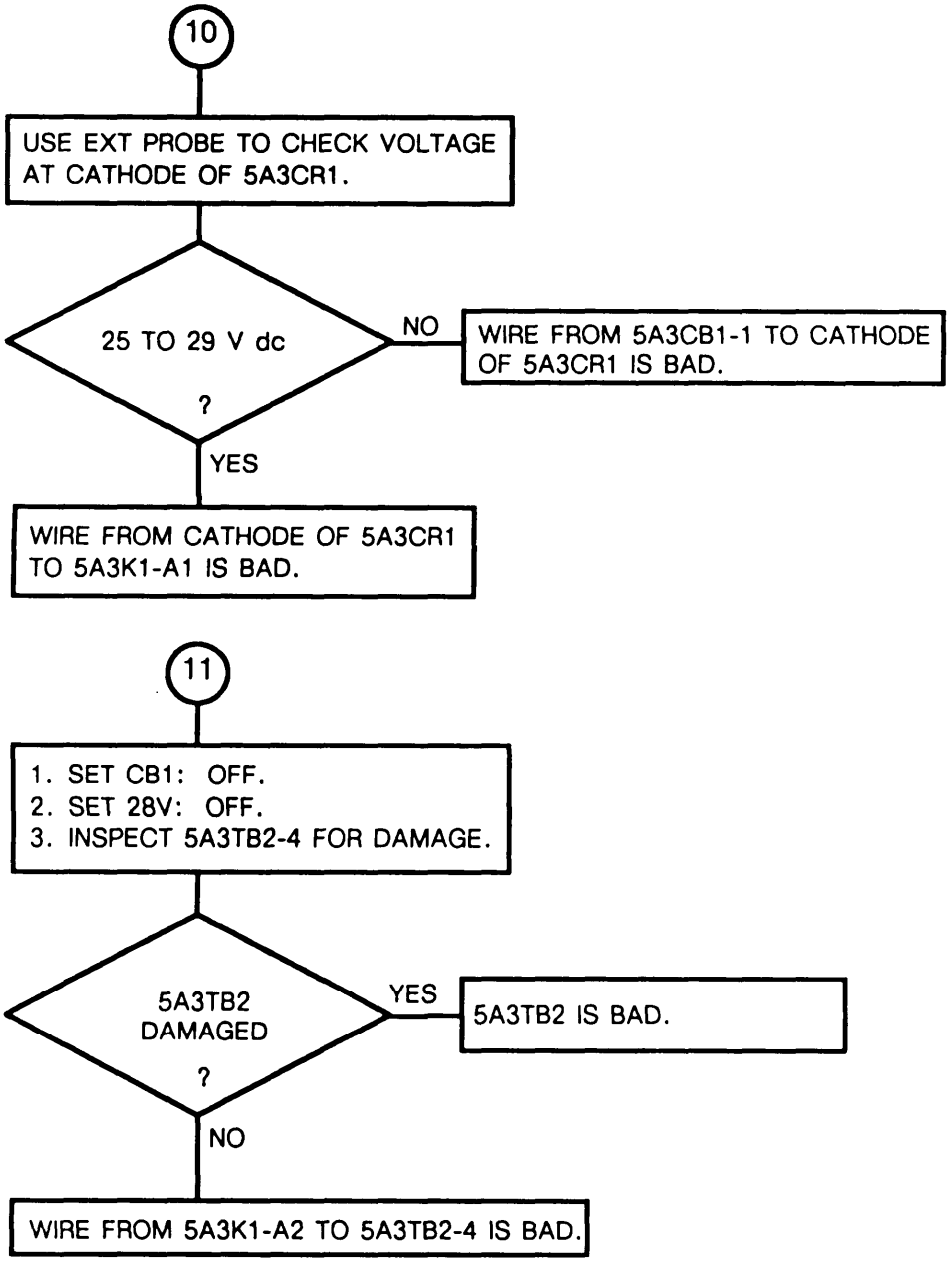
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 7 of 12)



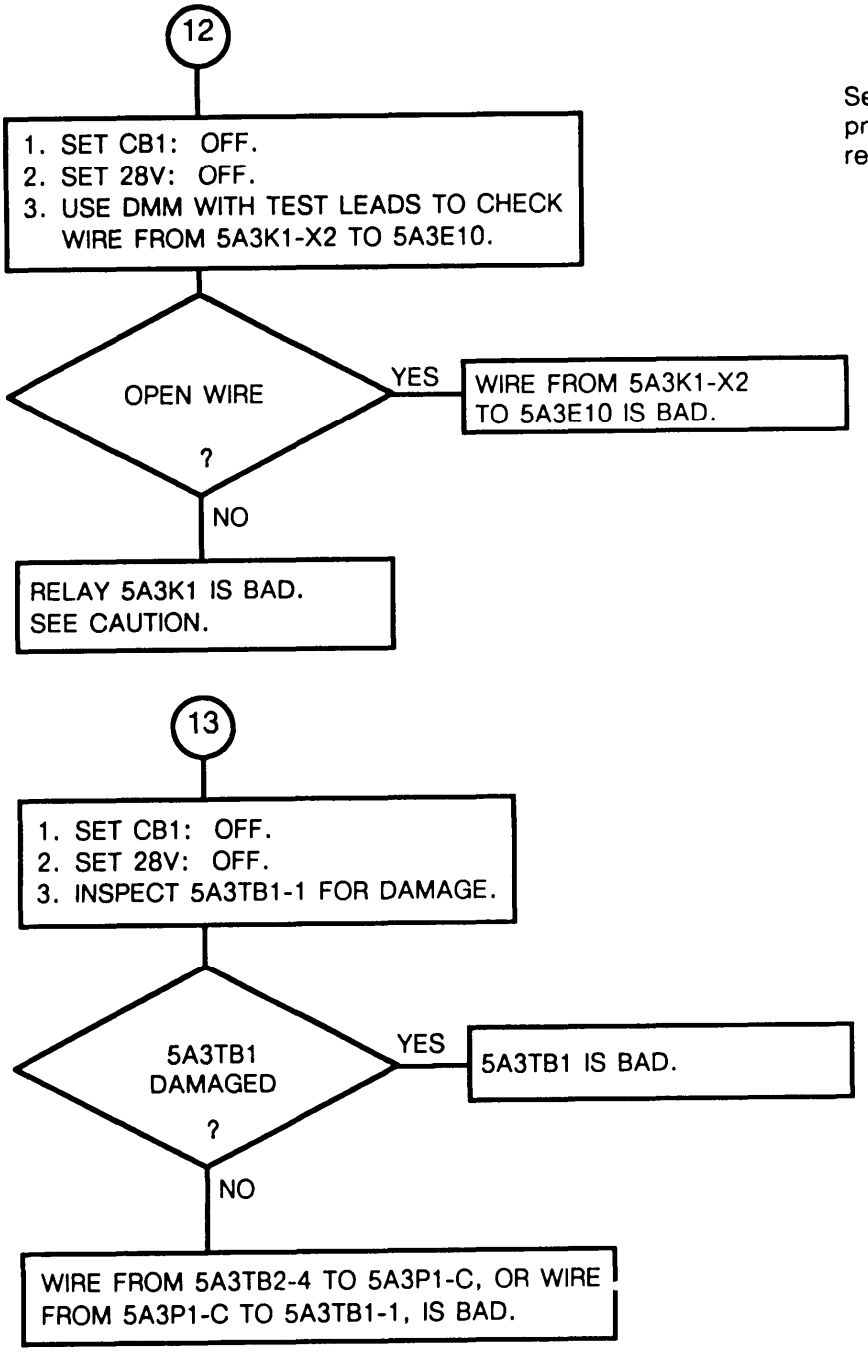
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 8 of 12)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 9 of 12)

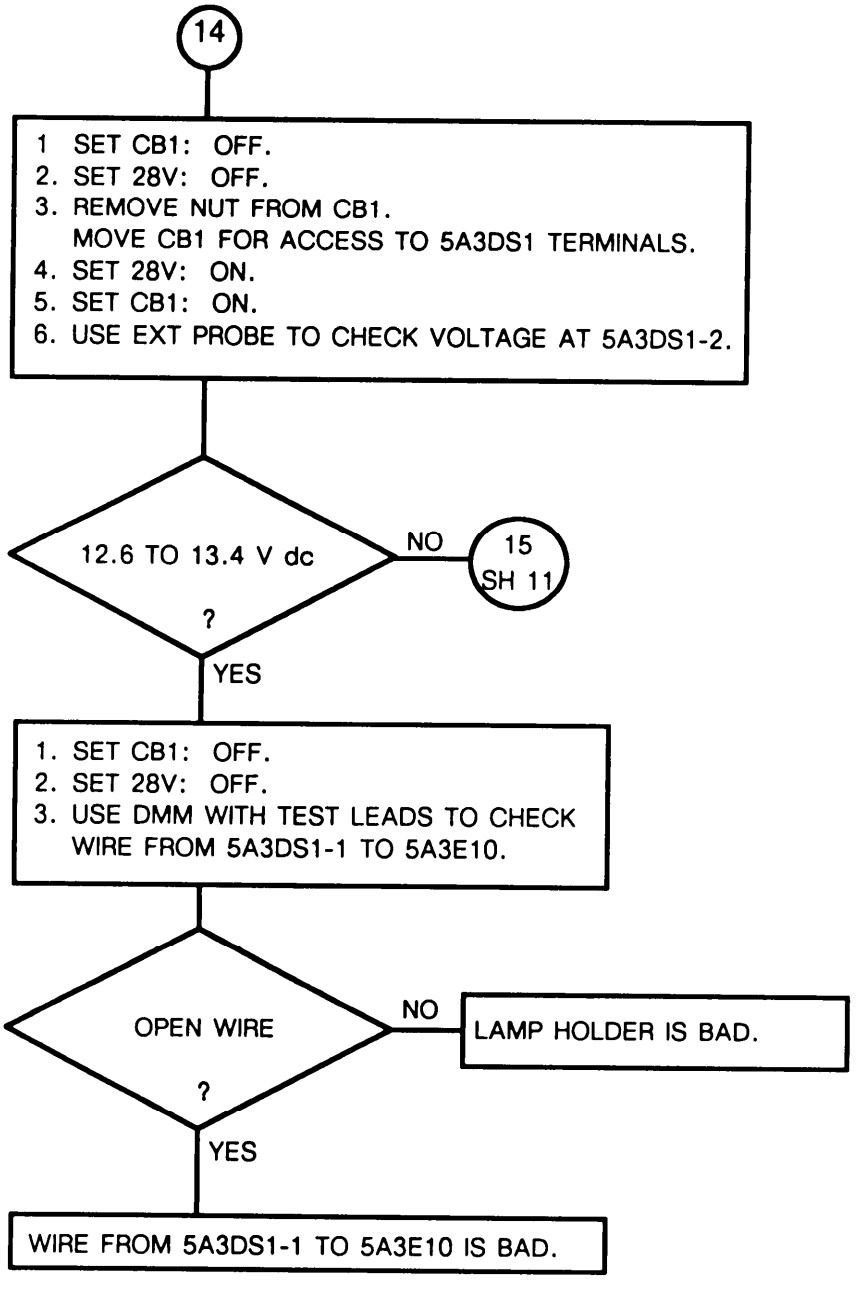


CAUTION

See removal and replacement procedures for two versions of relay K1.

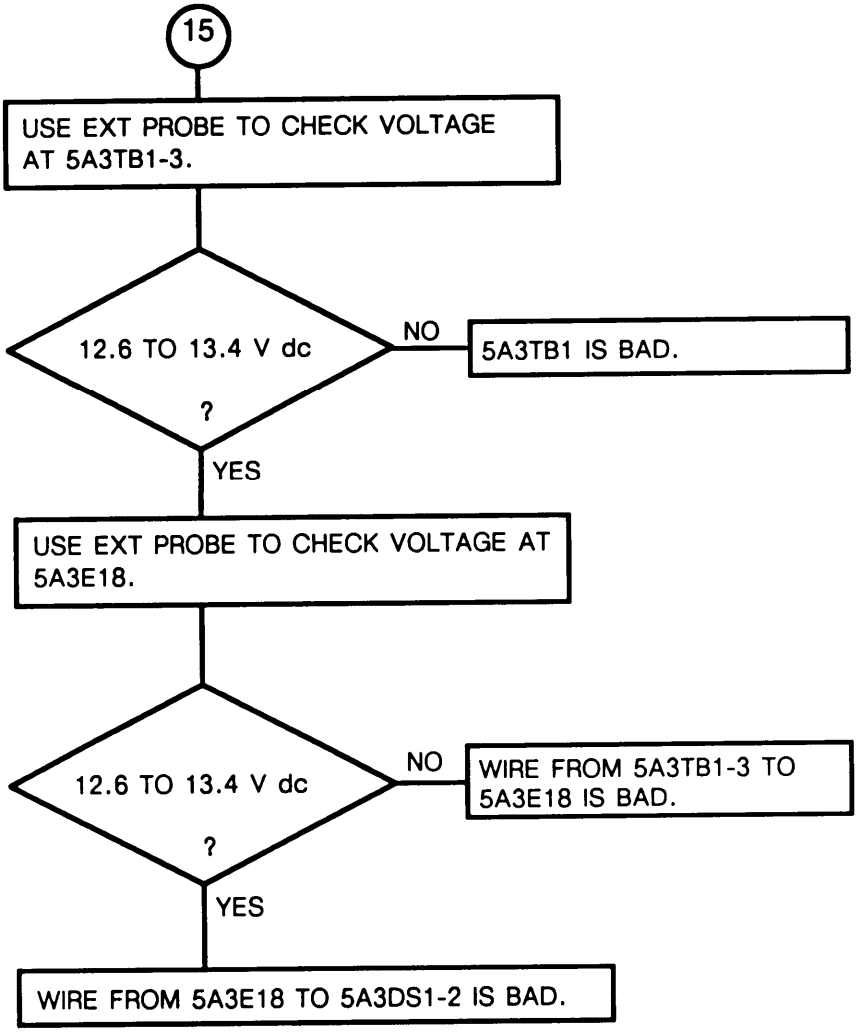
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 10 of 12)



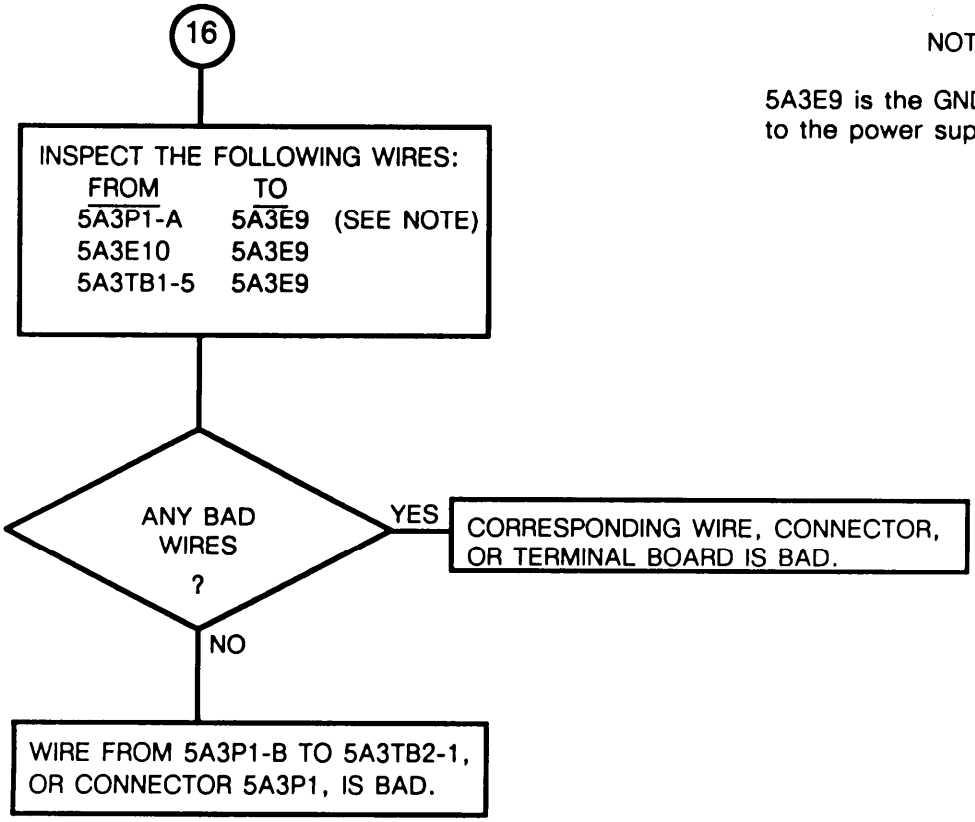
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 11 of 12)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 12 of 12)

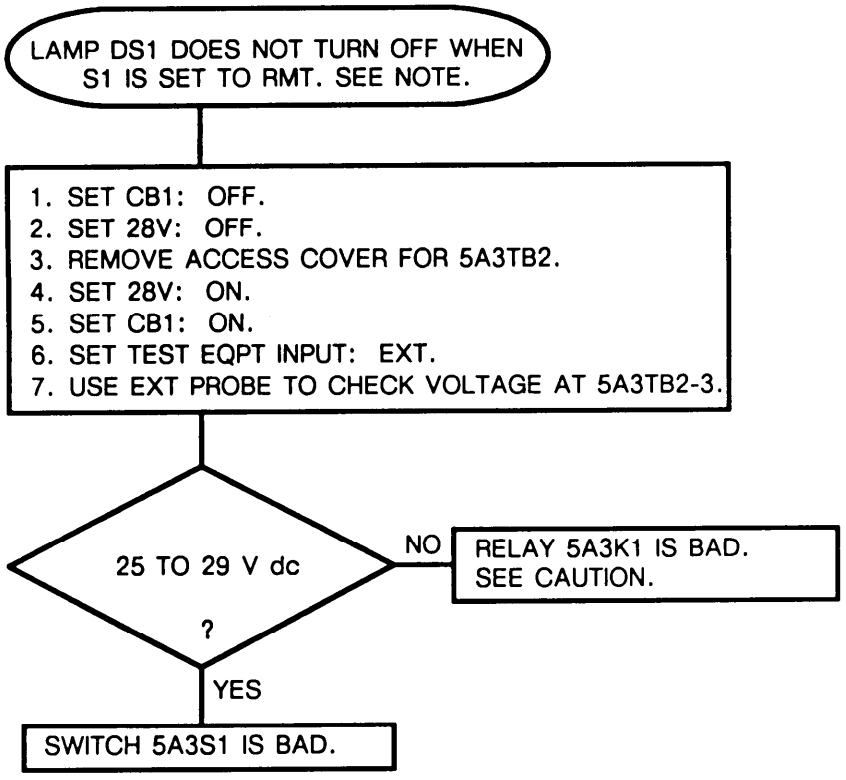


NOTE:

5A3E9 is the GND lug screwed to the power supply heatsink.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting Primary Power Path for AM-7239B/VRC
(Sheet 1 of 1)



NOTE:

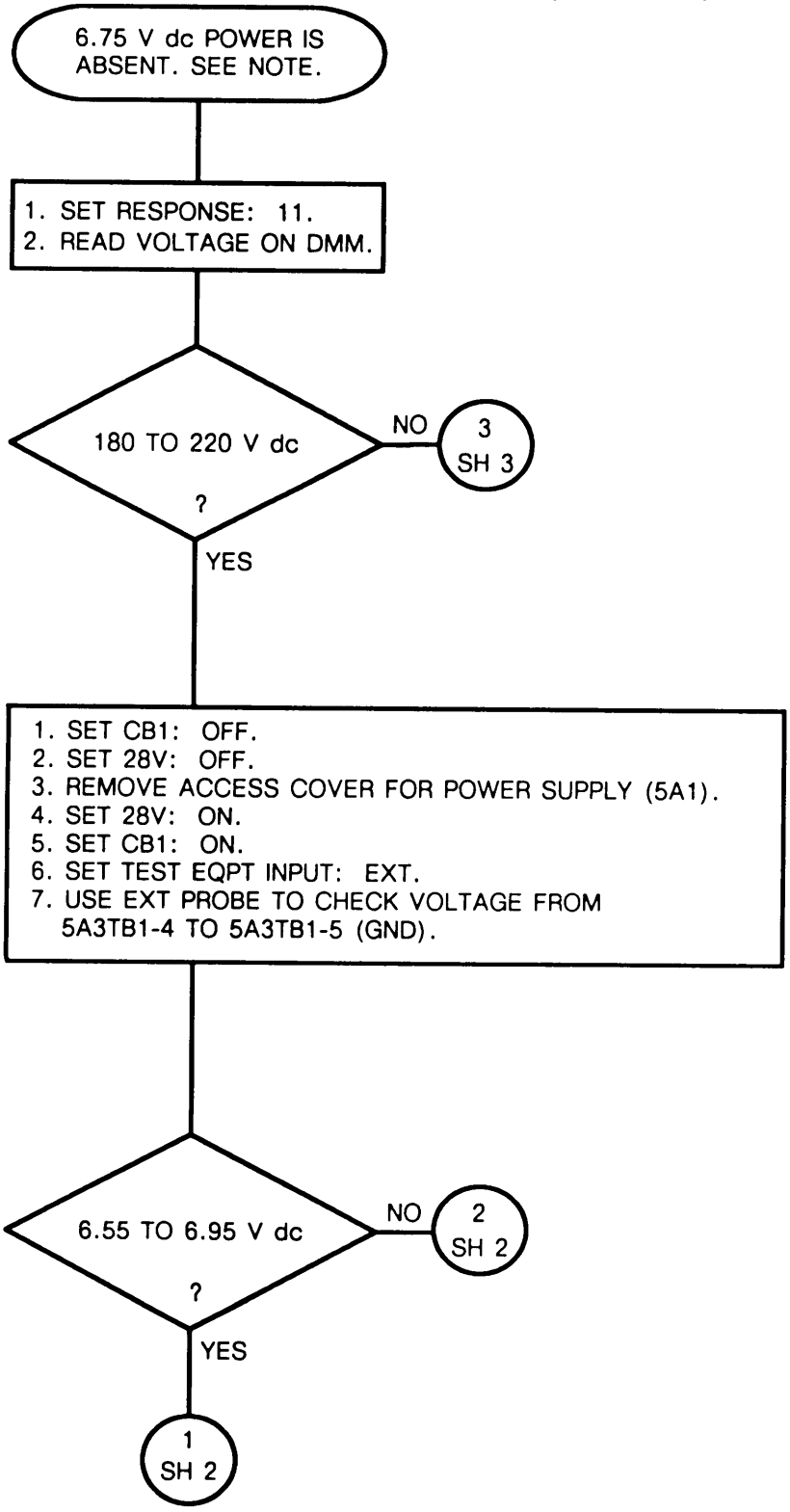
Refer to figure FO-15 for diagram of these circuits.

CAUTION

See removal and replacement procedures for two versions of relay 5A3K1.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 1 of 7)

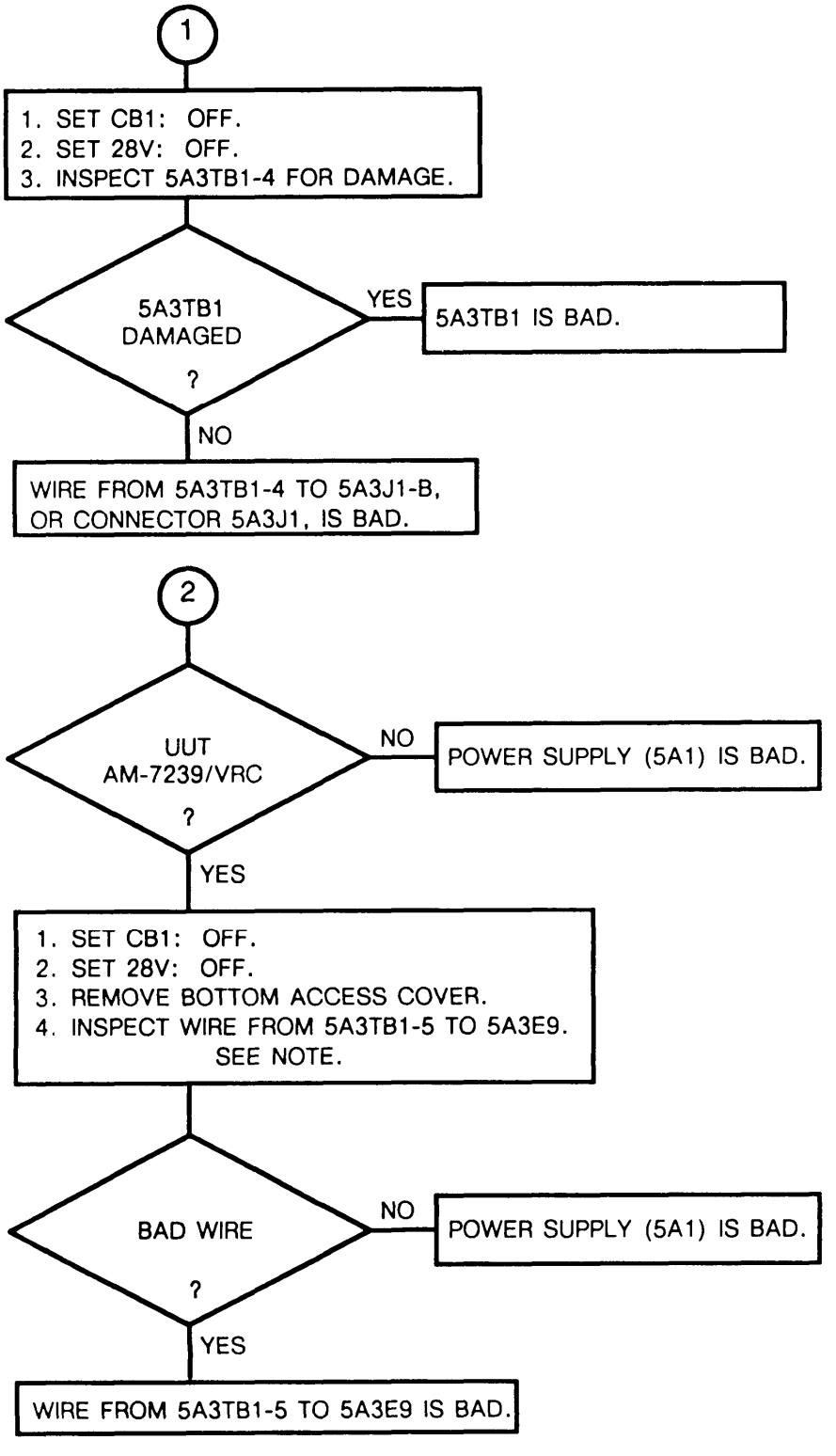


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 2 of 7)

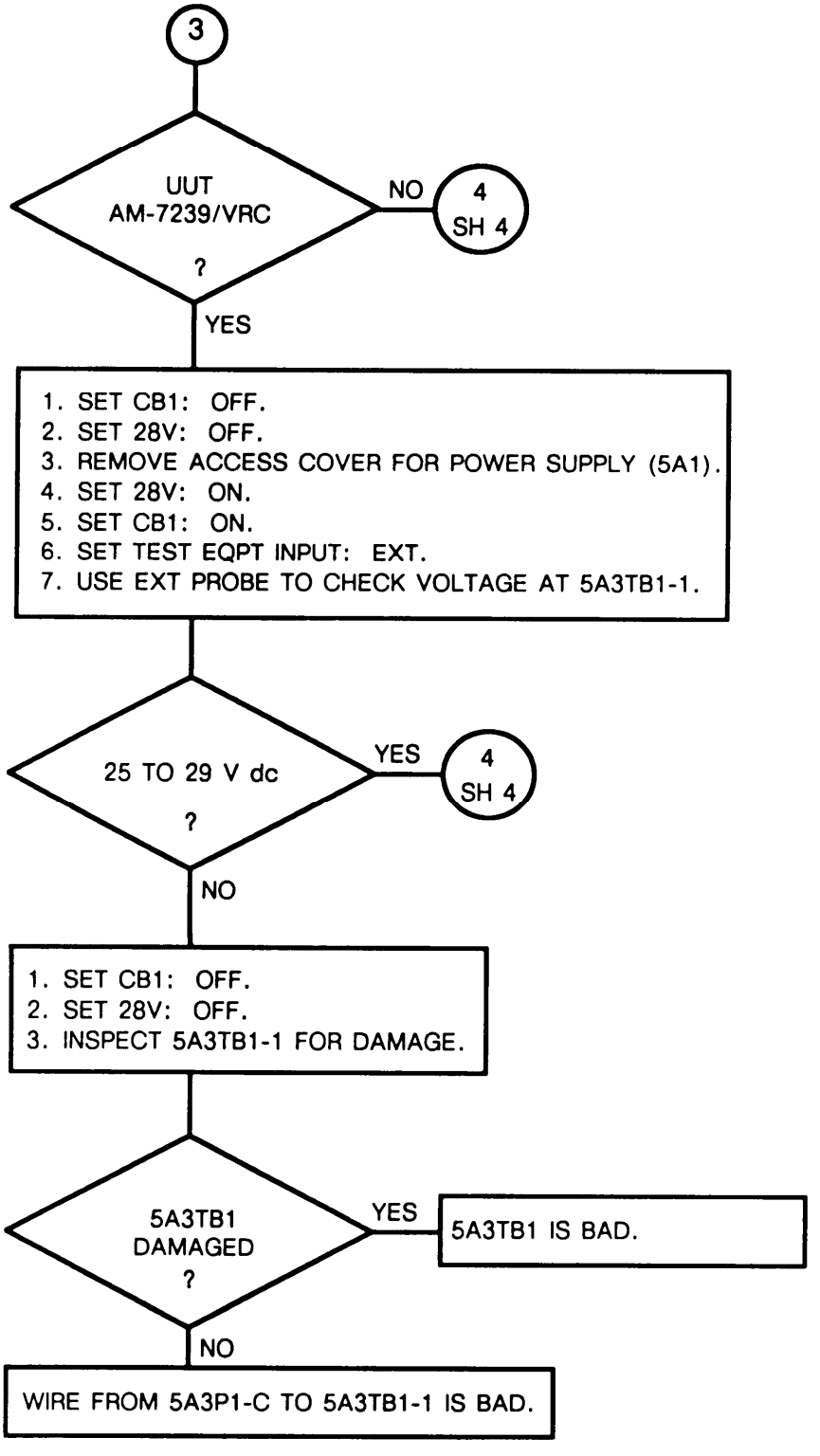


NOTE:

5A3E9 is the GND lug screwed to the chassis.

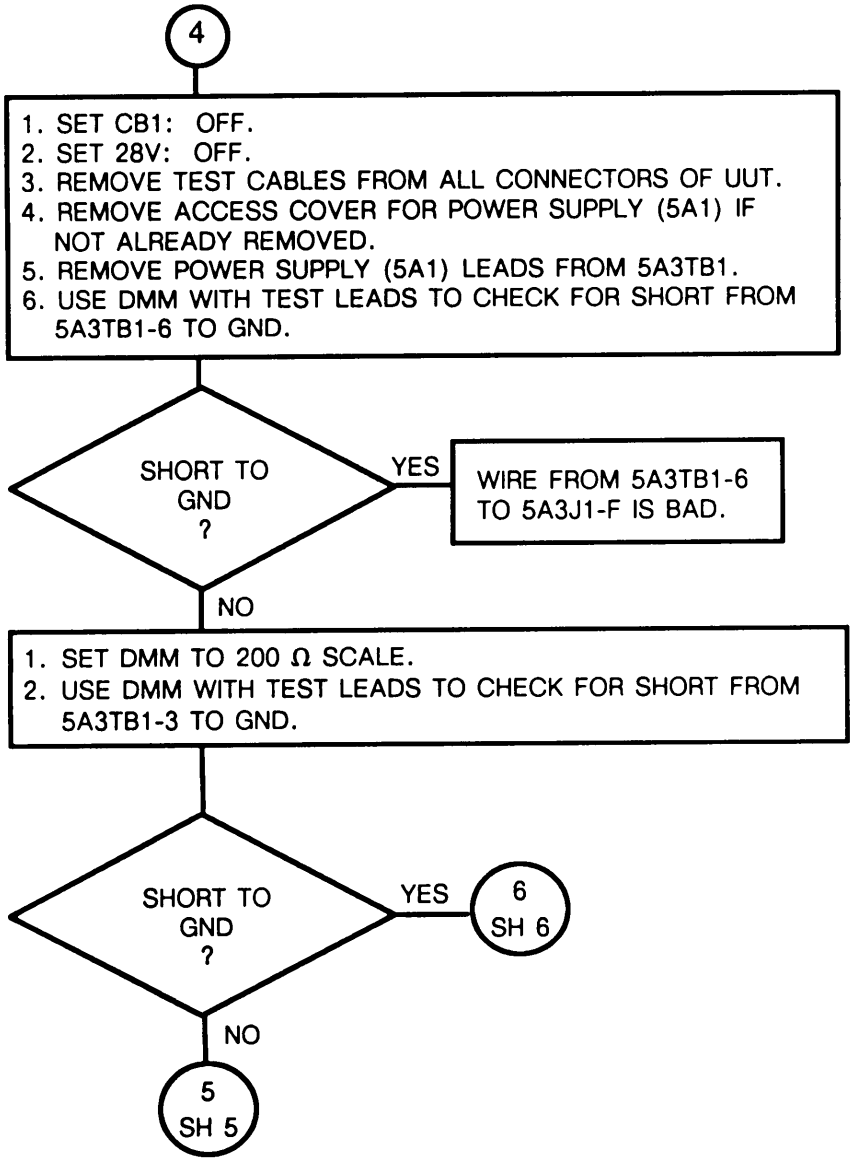
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 3 of 7)



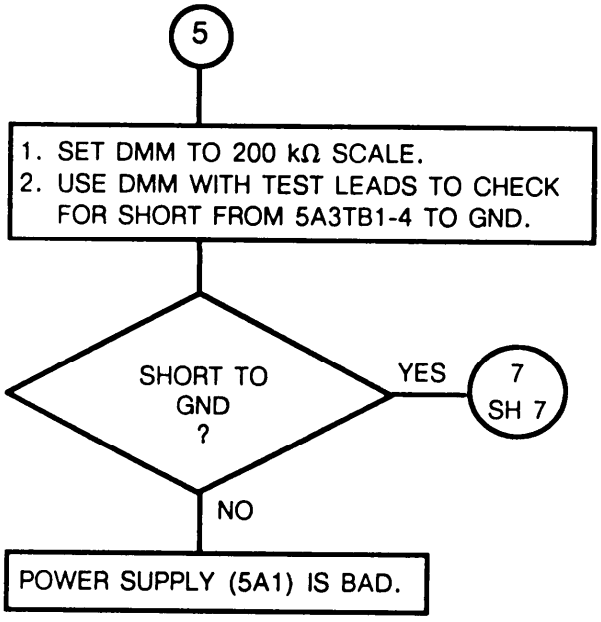
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 4 of 7)



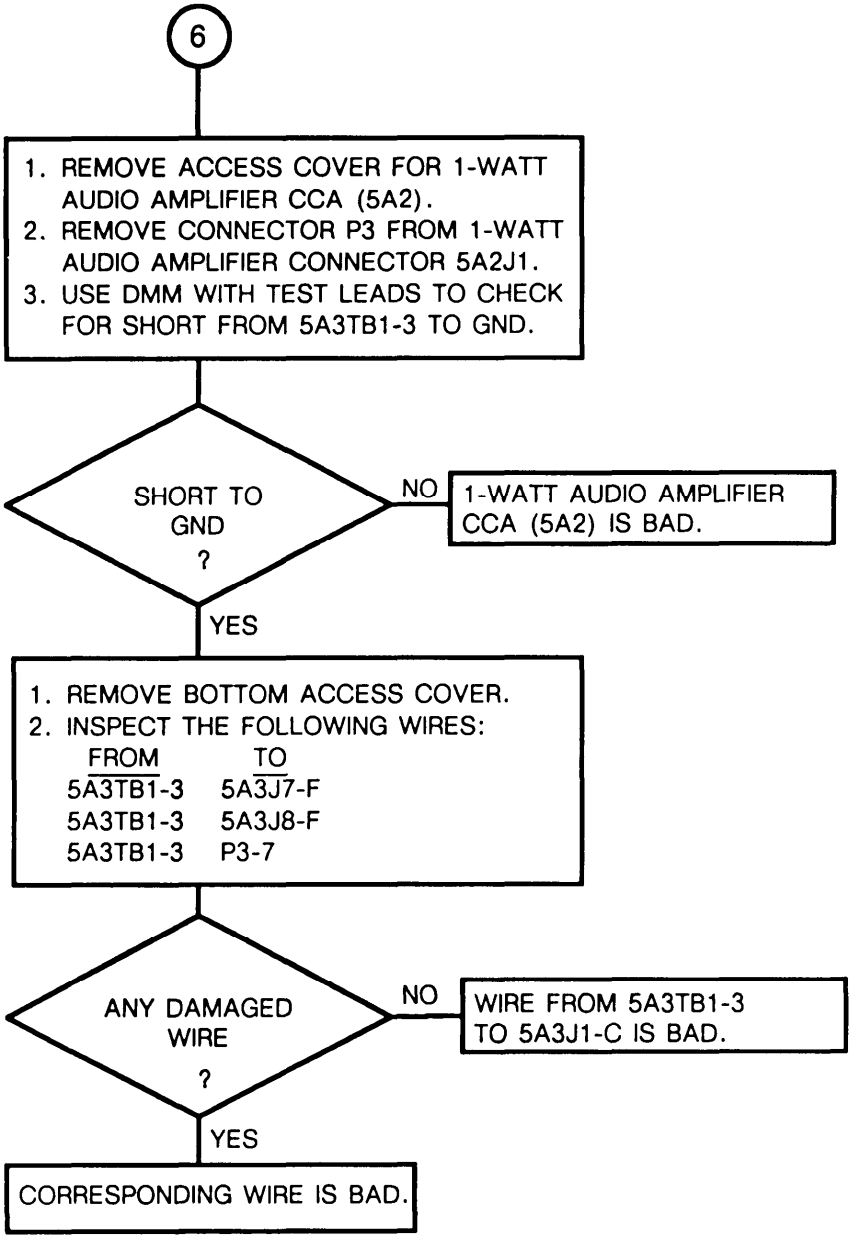
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 5 of 7)



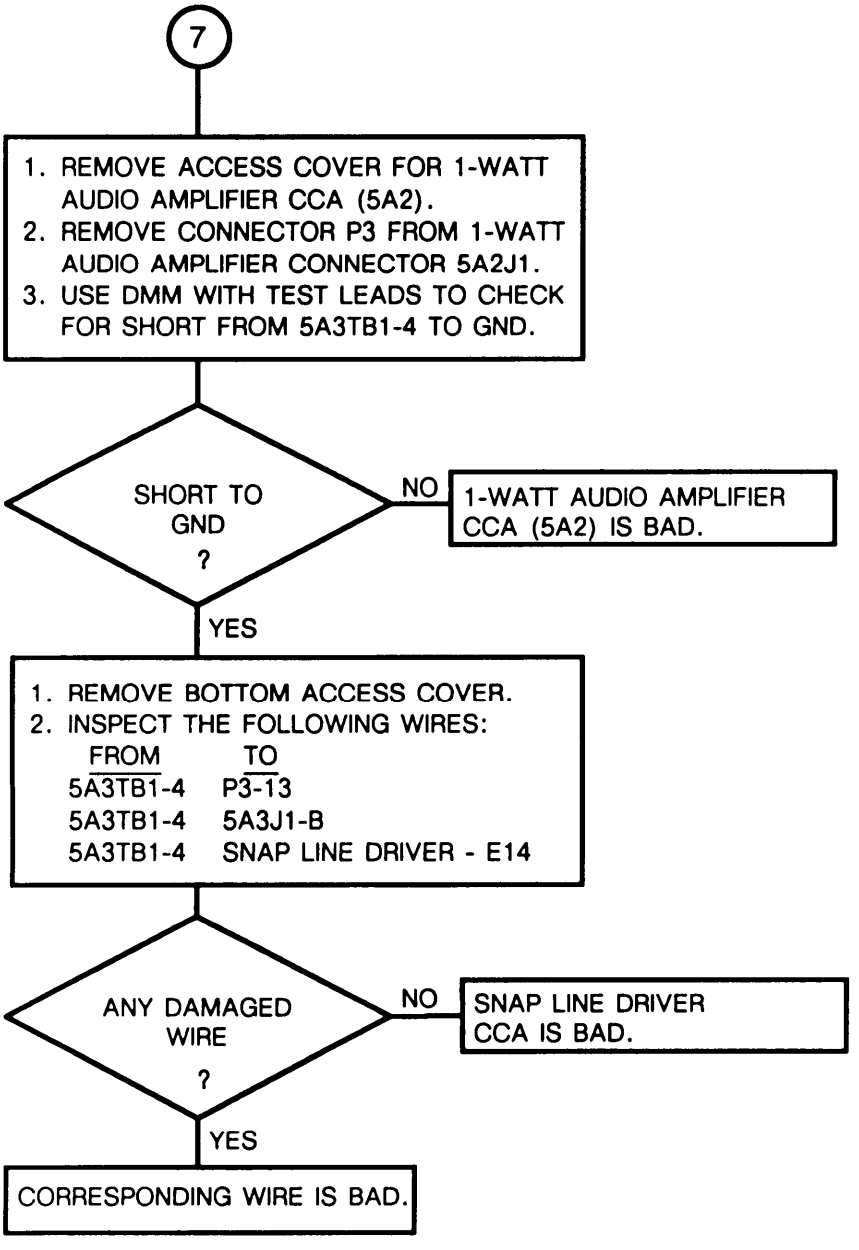
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 6 of 7)



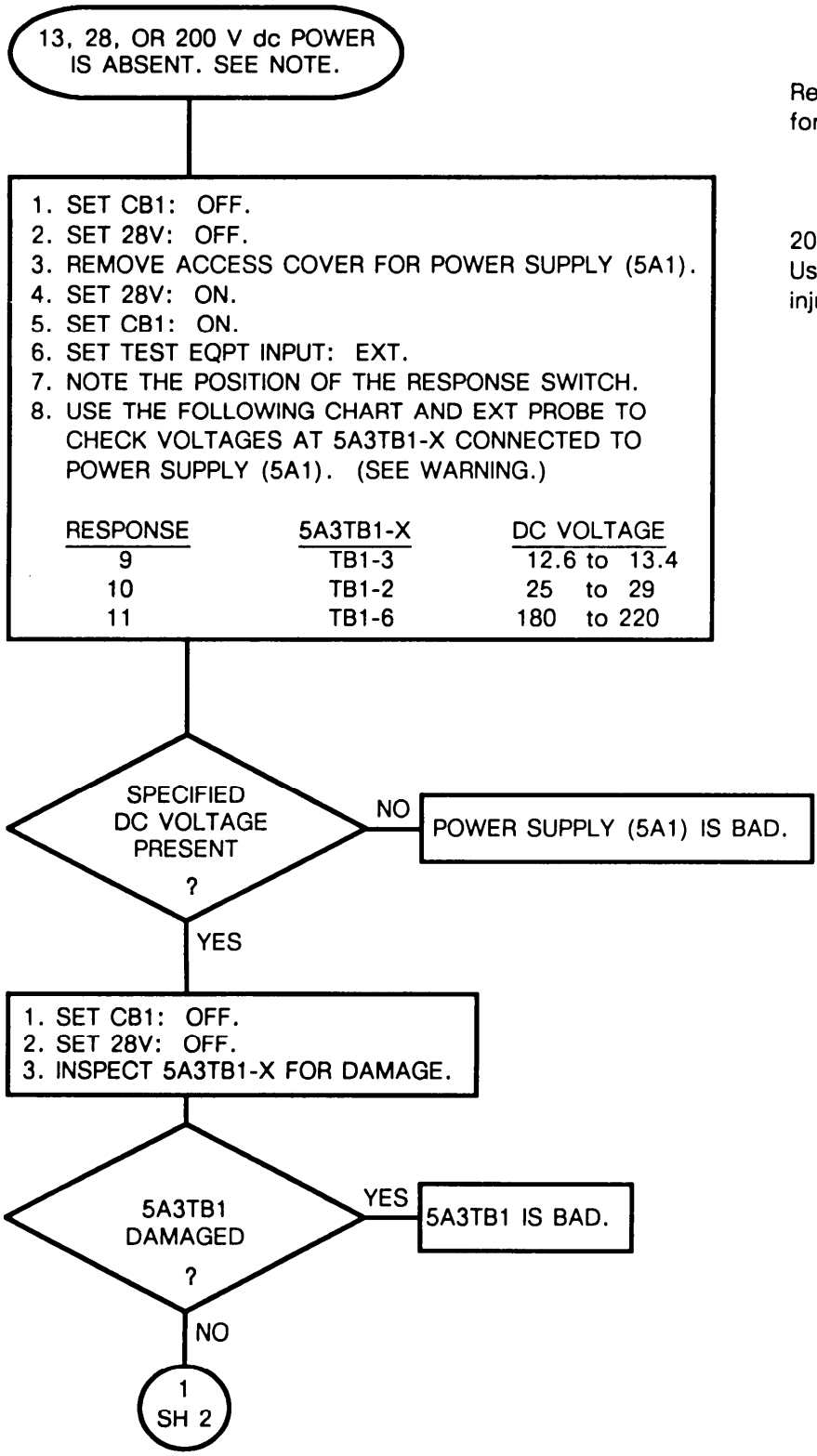
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 7 of 7)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Power Supply 13, 28, or 200 V dc Output
(Sheet 1 of 2)



NOTE:

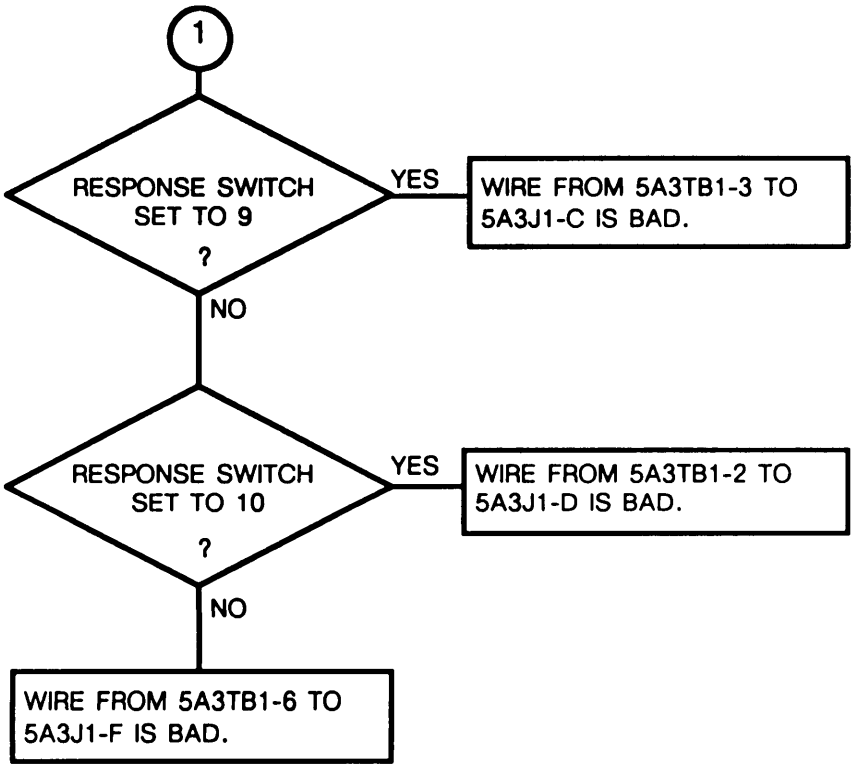
Refer to figure FO-14 or FO-15 for diagram of these circuits.

WARNING

200 V dc is present at 5A3TB1-6. Use caution to avoid personal injury.

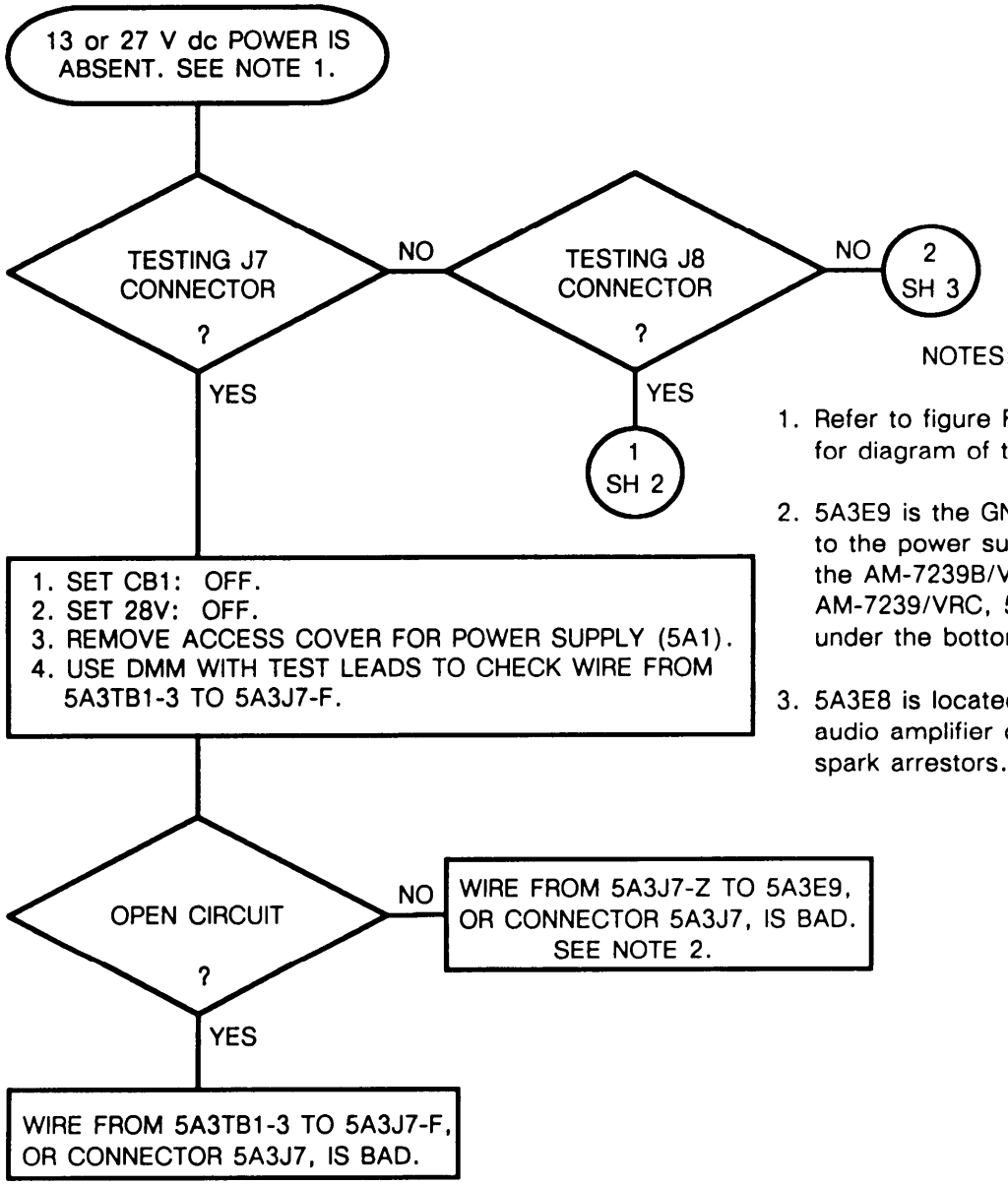
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Power Supply 13, 28, or 200 V dc Output
(Sheet 2 of 2)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Voltages at J7, J8, or J9 Connector
(Sheet 1 of 3)

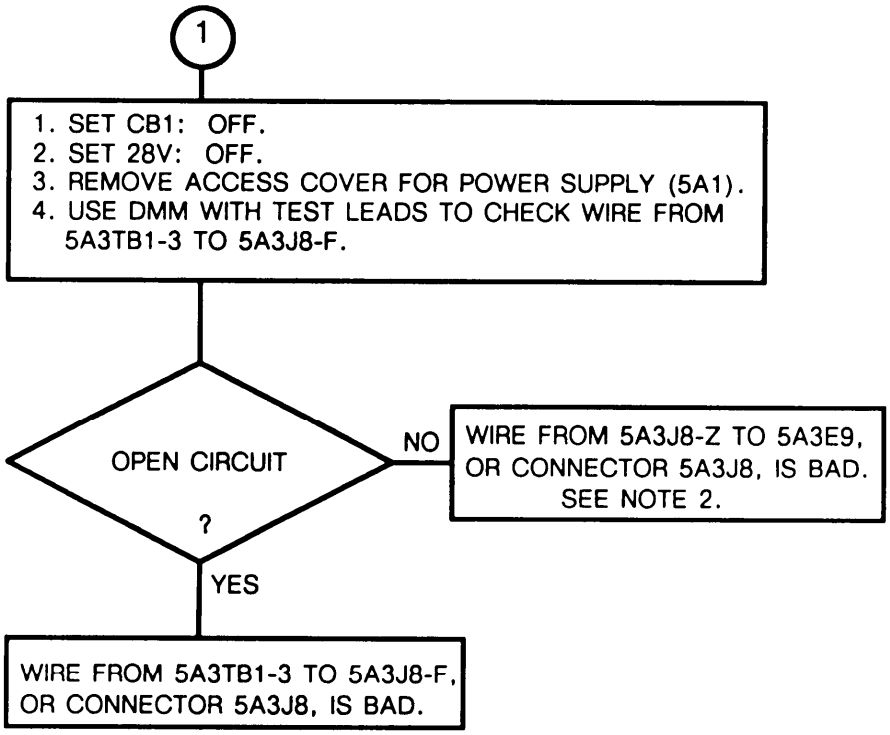


NOTES:

1. Refer to figure FO-14 or FO-15 for diagram of these circuits.
2. 5A3E9 is the GND lug screwed to the power supply heatsink for the AM-7239B/VRC. For the AM-7239/VRC, 5A3E9 is located under the bottom access cover(s).
3. 5A3E8 is located under the 1-watt audio amplifier cover near the spark arrestors.

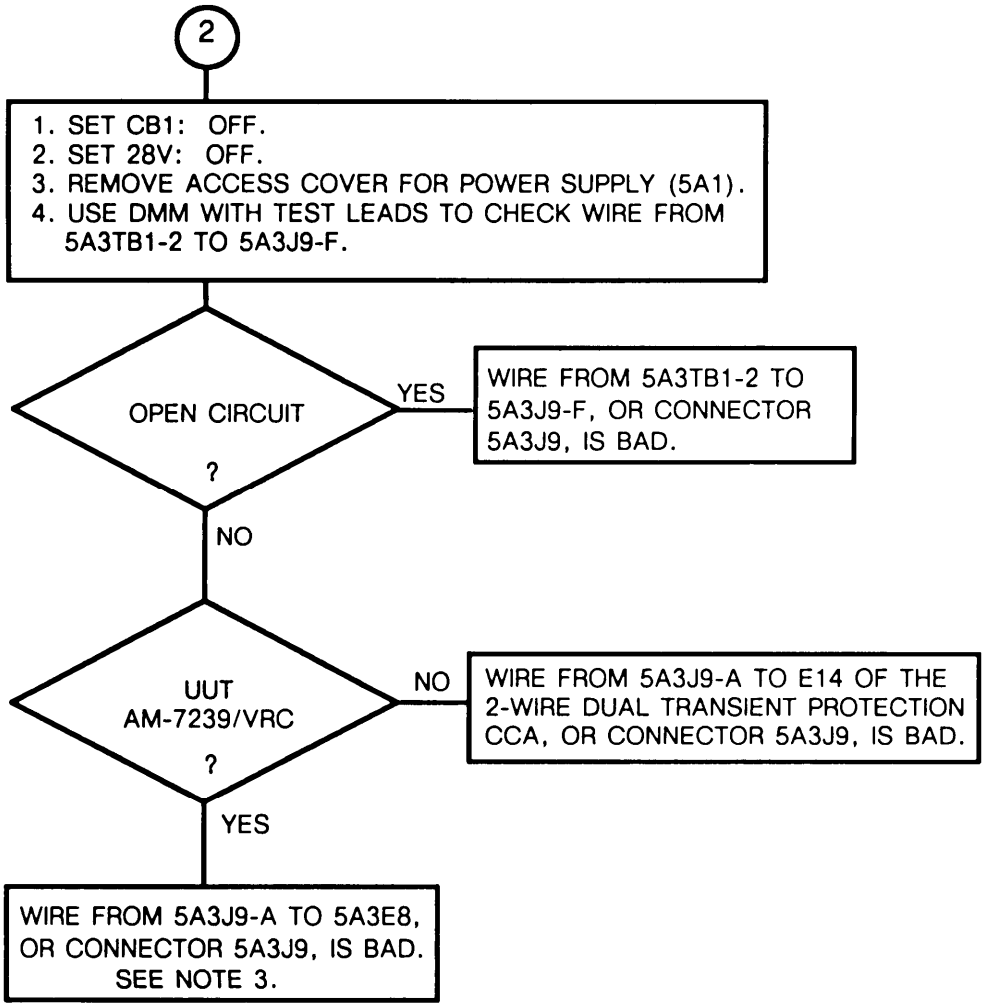
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Voltages at J7, J8, or J9 Connector
(Sheet 2 of 3)



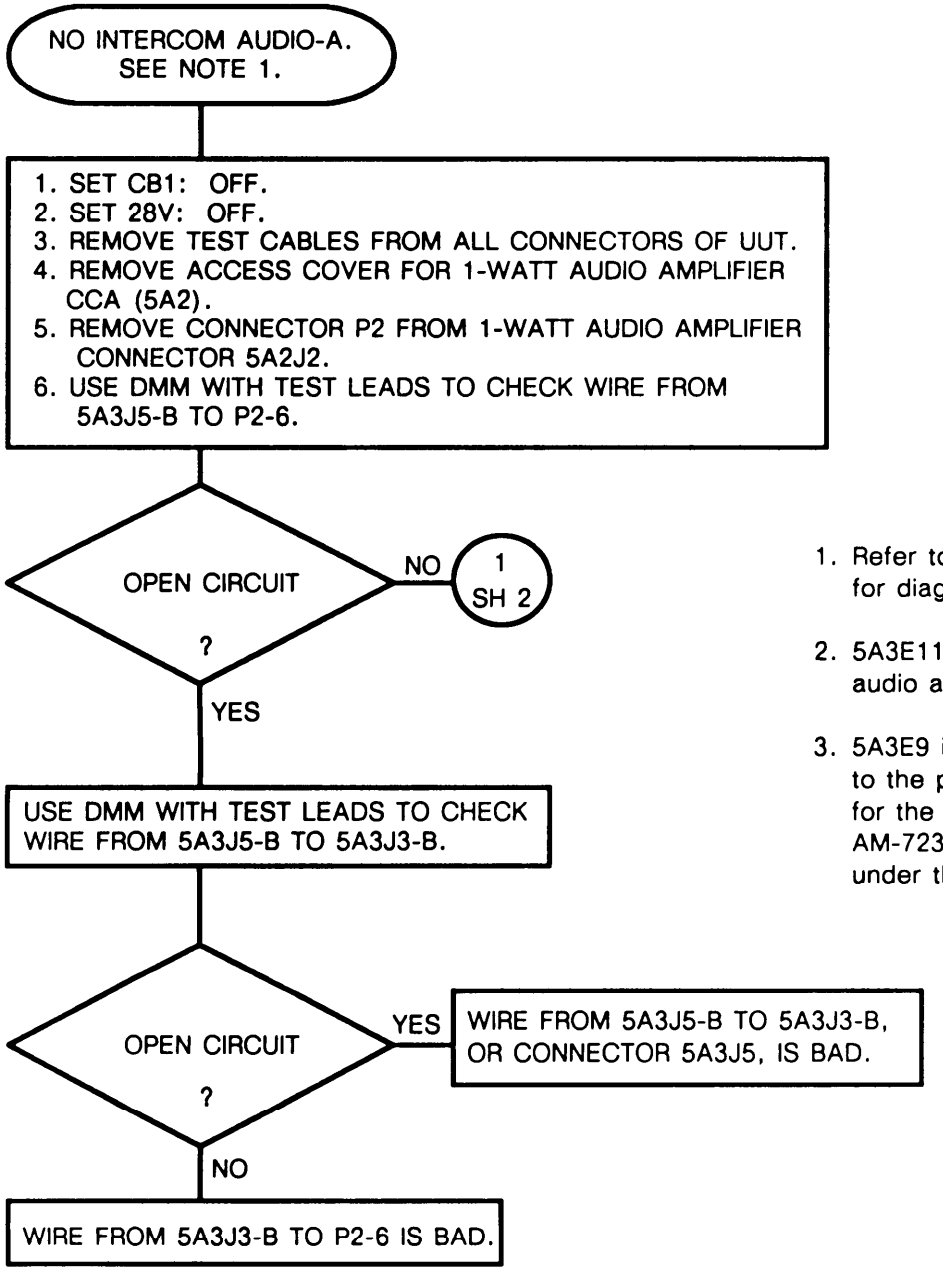
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Voltages at J7, J8, or J9 Connector
(Sheet 3 of 3)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 11
Troubleshooting Intercom Audio-A Line
(Sheet 1 of 2)

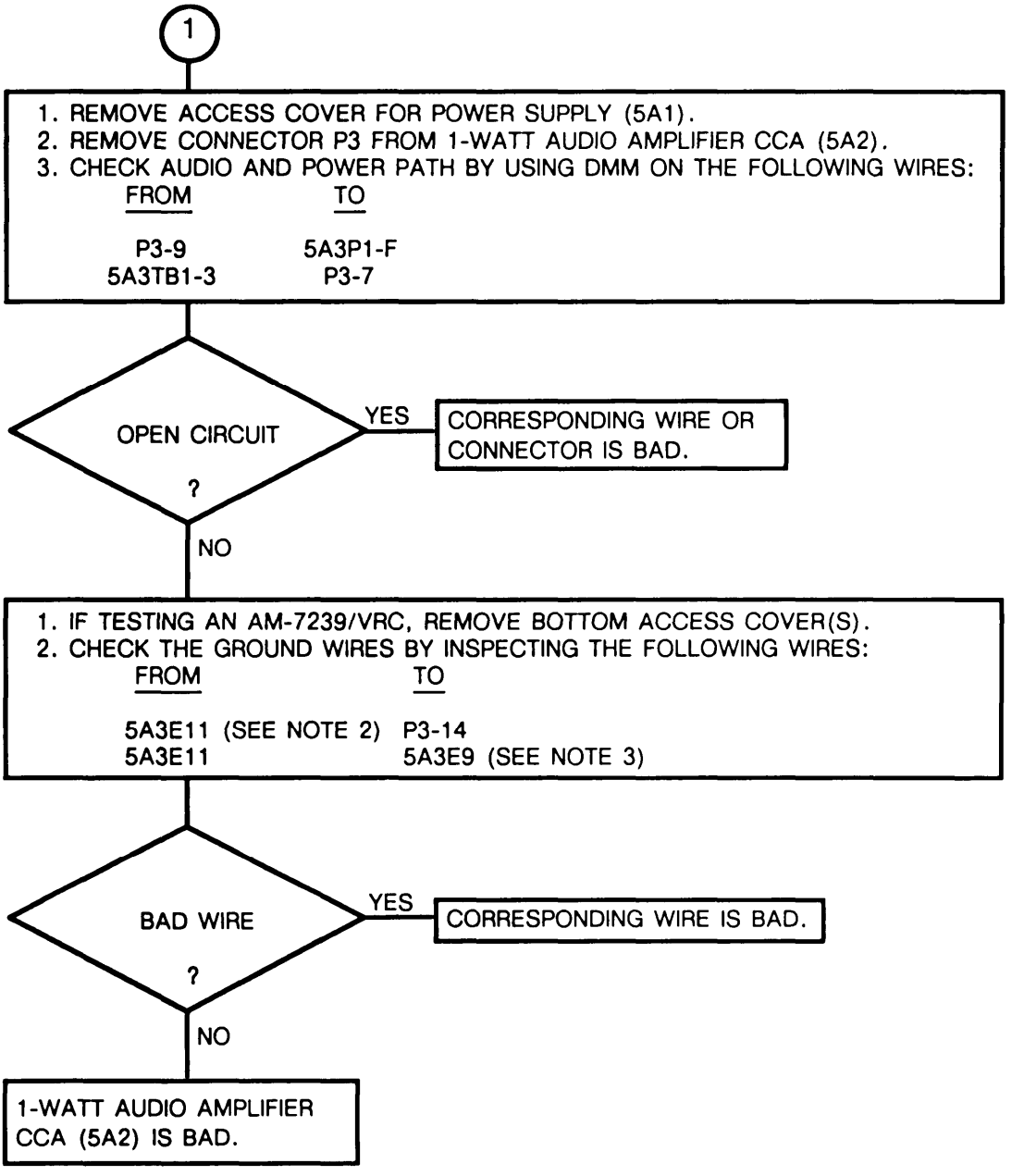


NOTES:

1. Refer to figure FO-14 or FO-15 for diagram of these circuits.
2. 5A3E11 is located on the 1-watt audio amplifier case.
3. 5A3E9 is the GND lug screwed to the power supply heatsink for the AM-7239B/VRC. For the AM-7239/VRC, 5A3E9 is located under the bottom access covers.

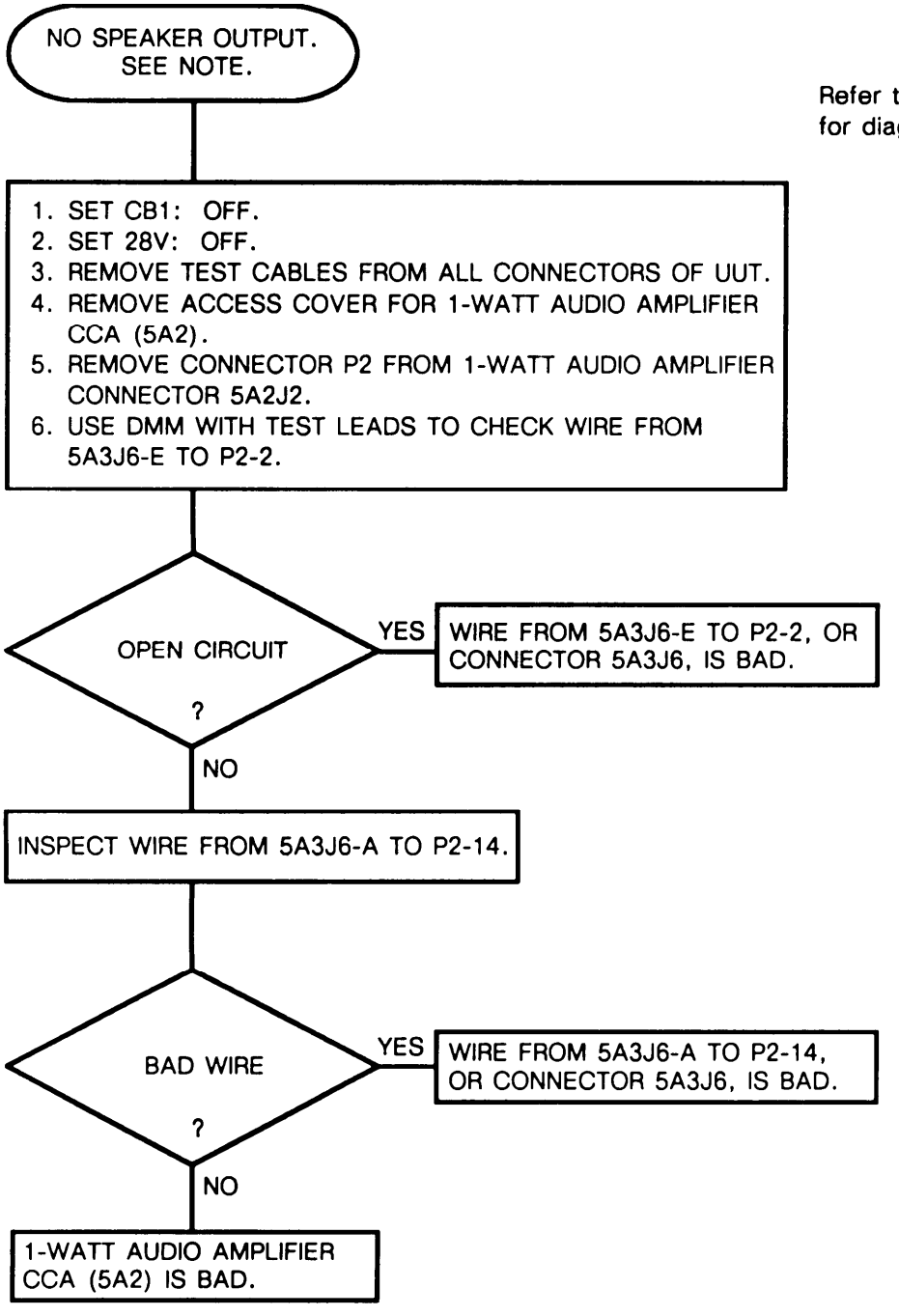
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 11
Troubleshooting Intercom Audio-A Line
(Sheet 2 of 2)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 12
Troubleshooting Speaker Output
(Sheet 1 of 1)

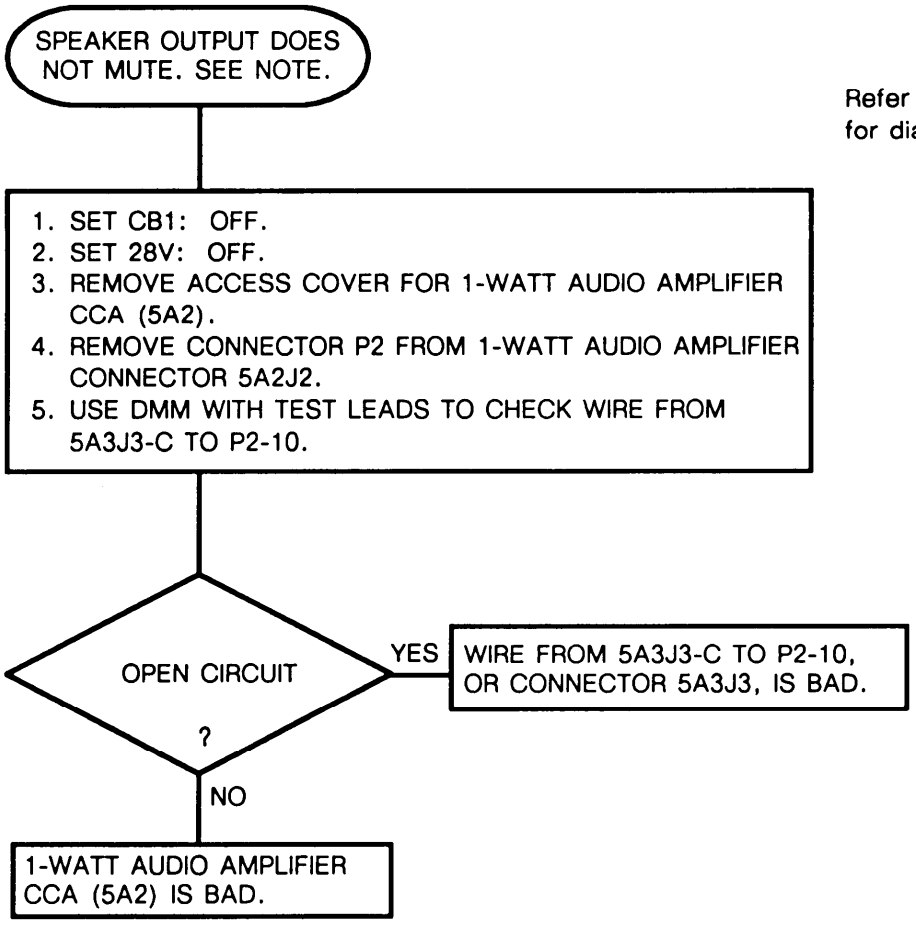


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting Speaker Output
(Sheet 1 of 1)

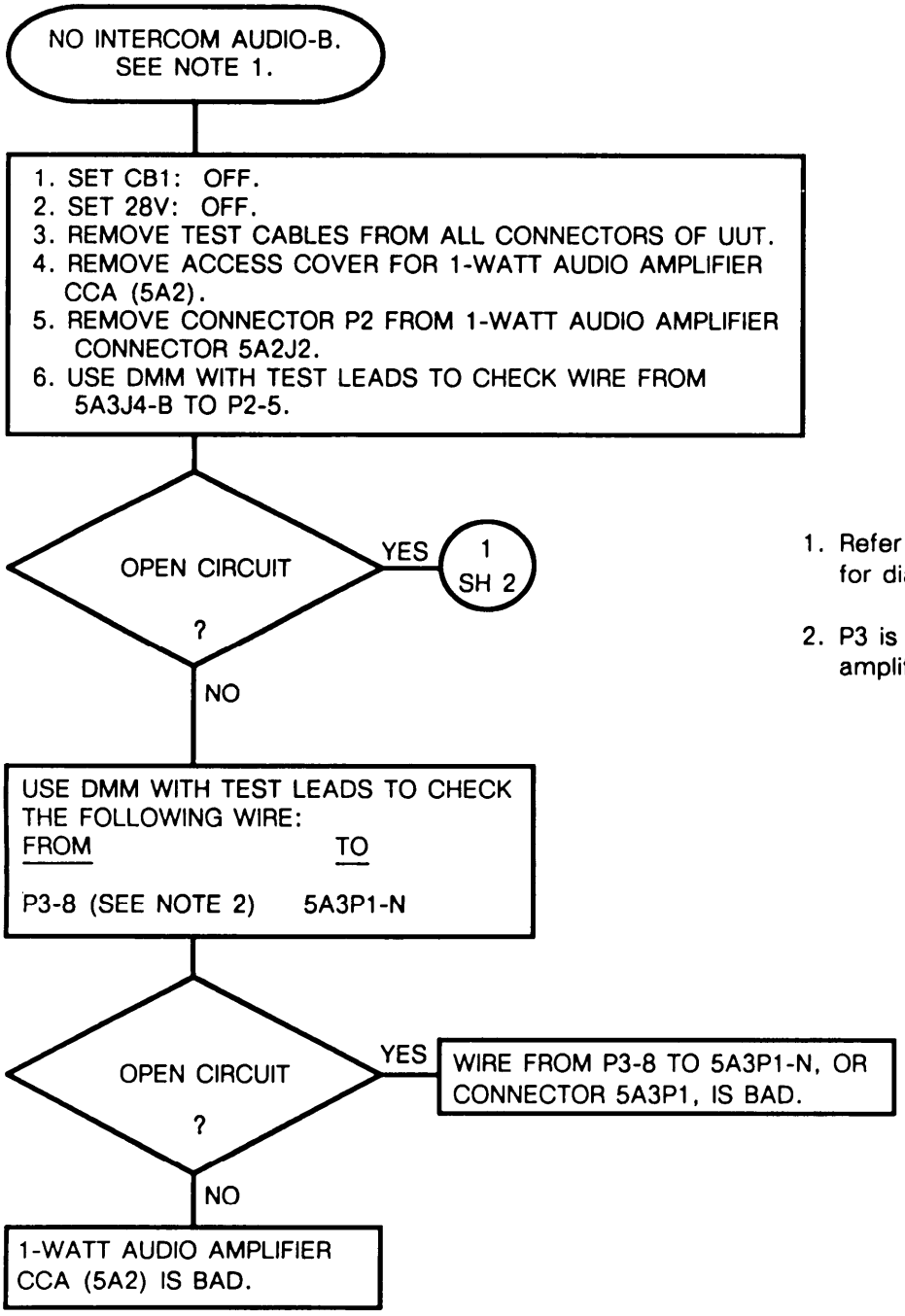


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 14
Troubleshooting Intercom Audio-B Line
(Sheet 1 of 2)

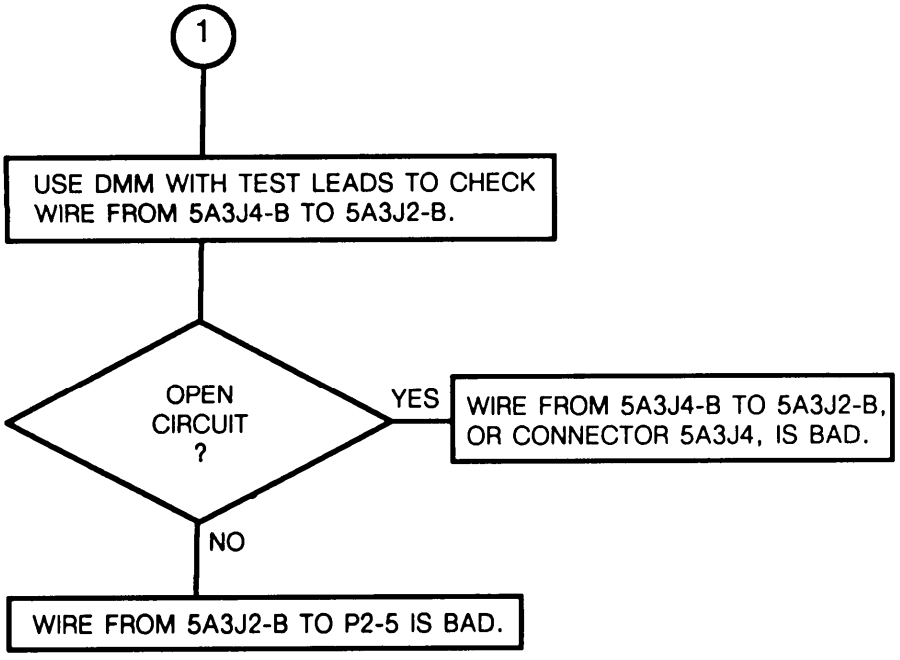


NOTES:

1. Refer to figure FO-14 or FO-15 for diagram of these circuits.
2. P3 is connected to 1-watt audio amplifier connector 5A2J1.

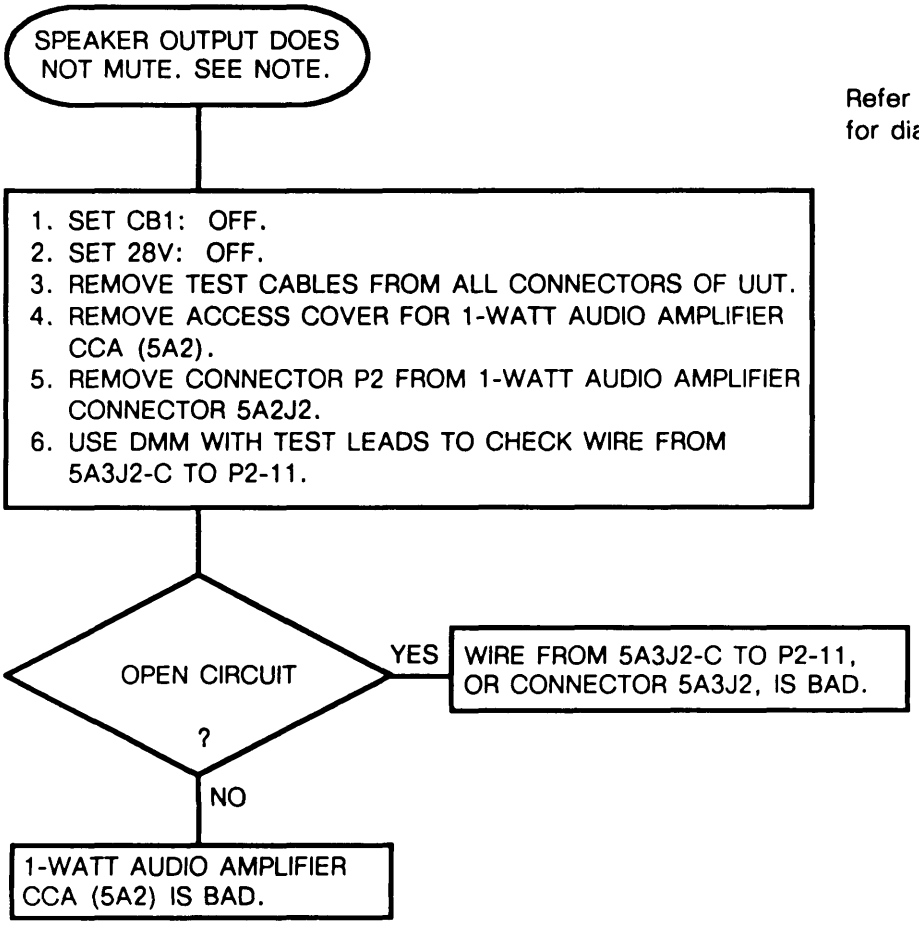
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 14
Troubleshooting Intercom Audio-B Line
(Sheet 2 of 2)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Speaker Output
(Sheet 1 of 1)

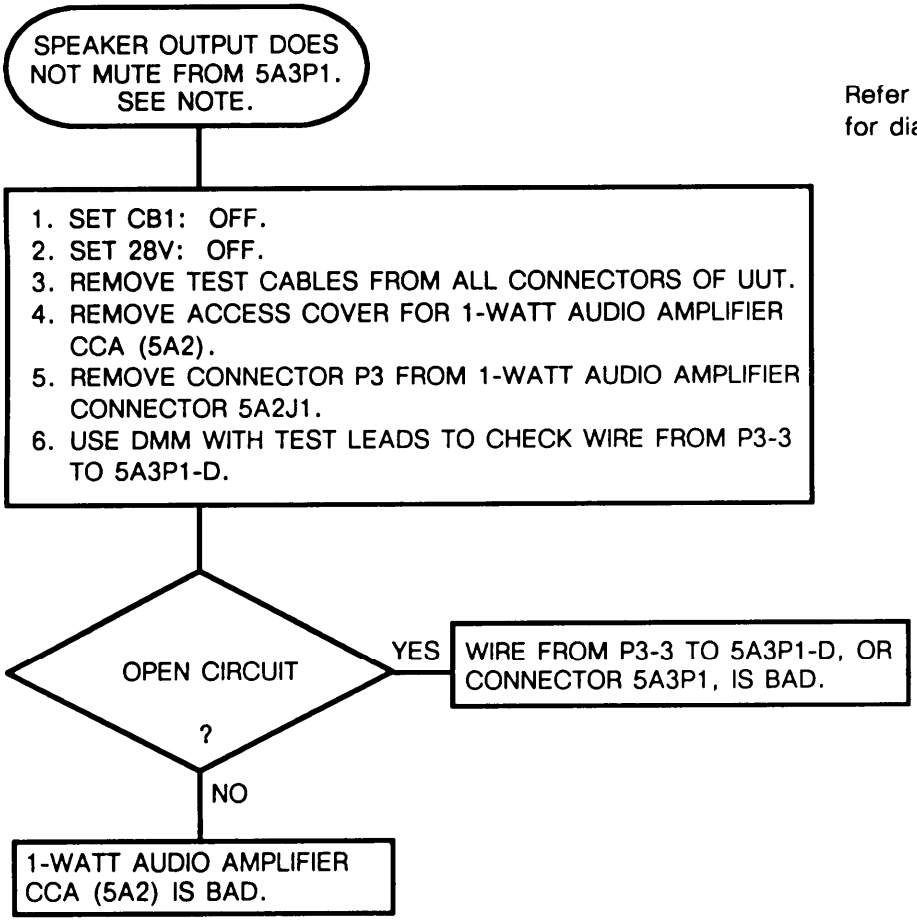


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 16
Troubleshooting Speaker Output
(Sheet 1 of 1)

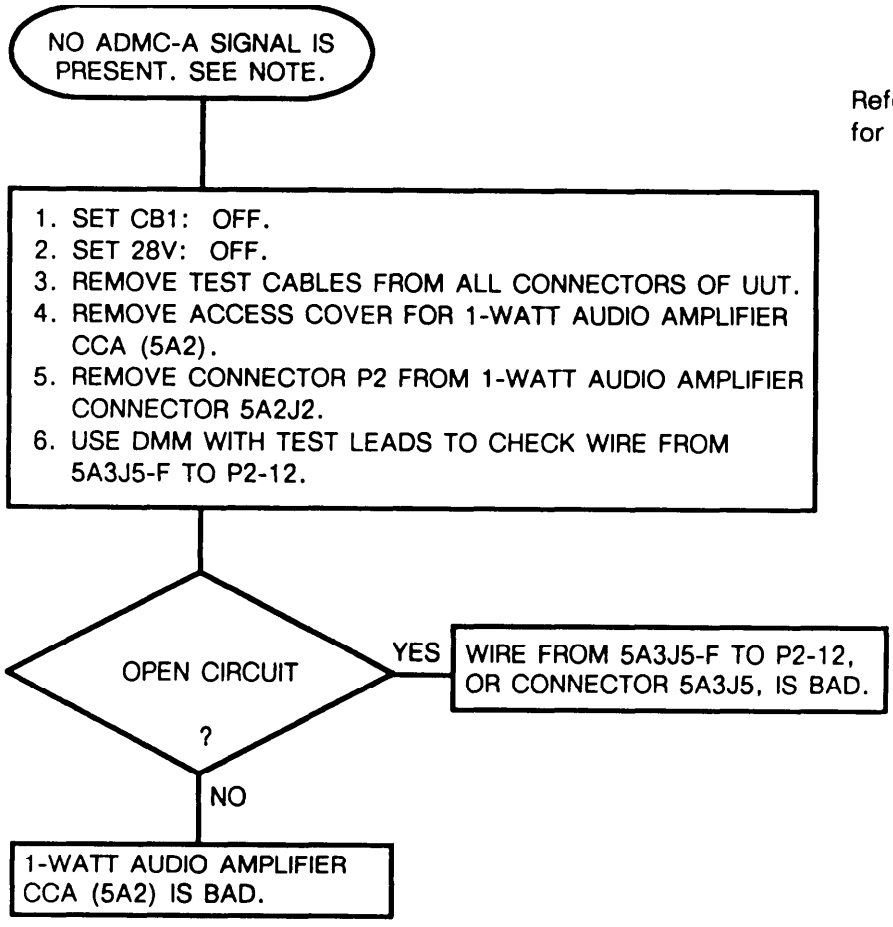


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 17
Troubleshooting ADMC-A Line
(Sheet 1 of 1)

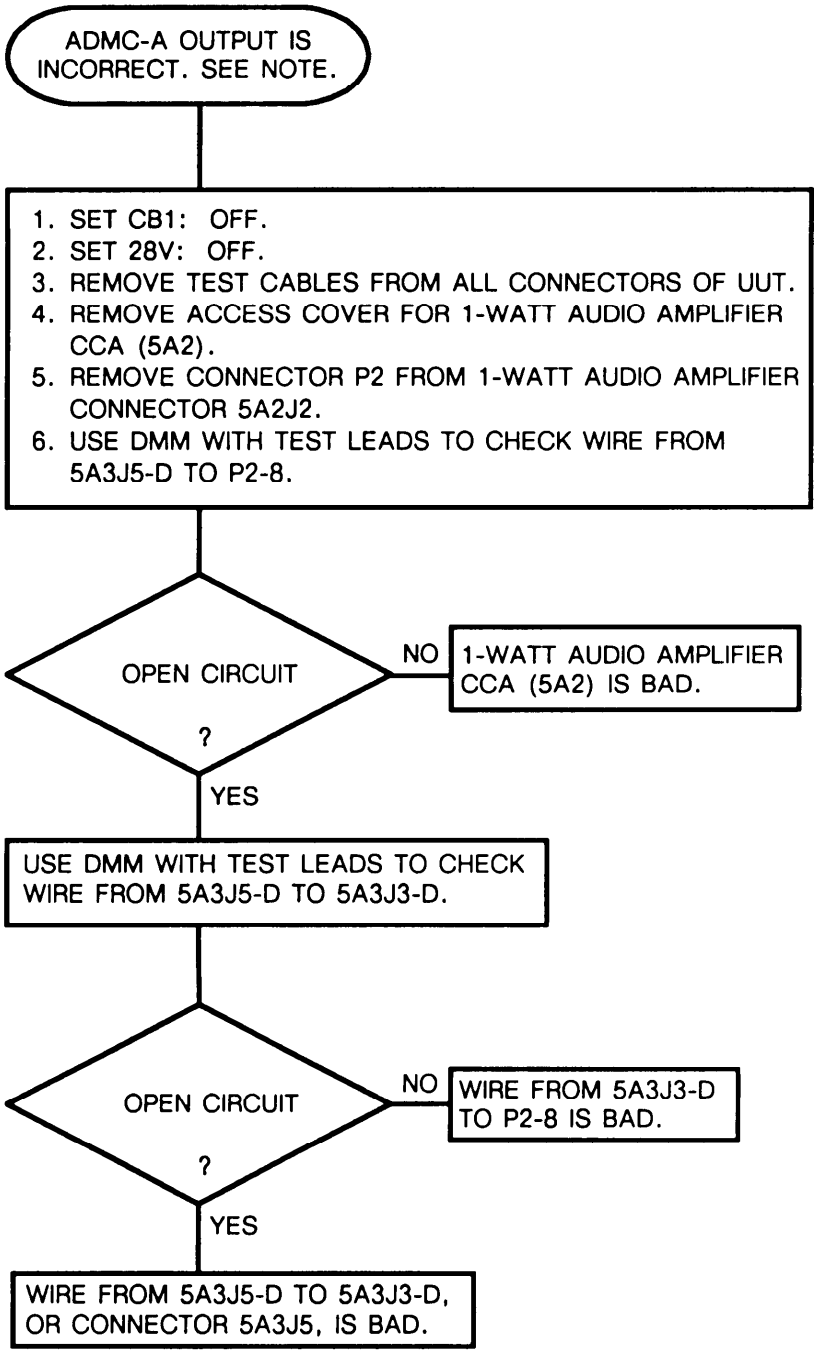


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 18
Troubleshooting ADMC-A Line
(Sheet 1 of 1)

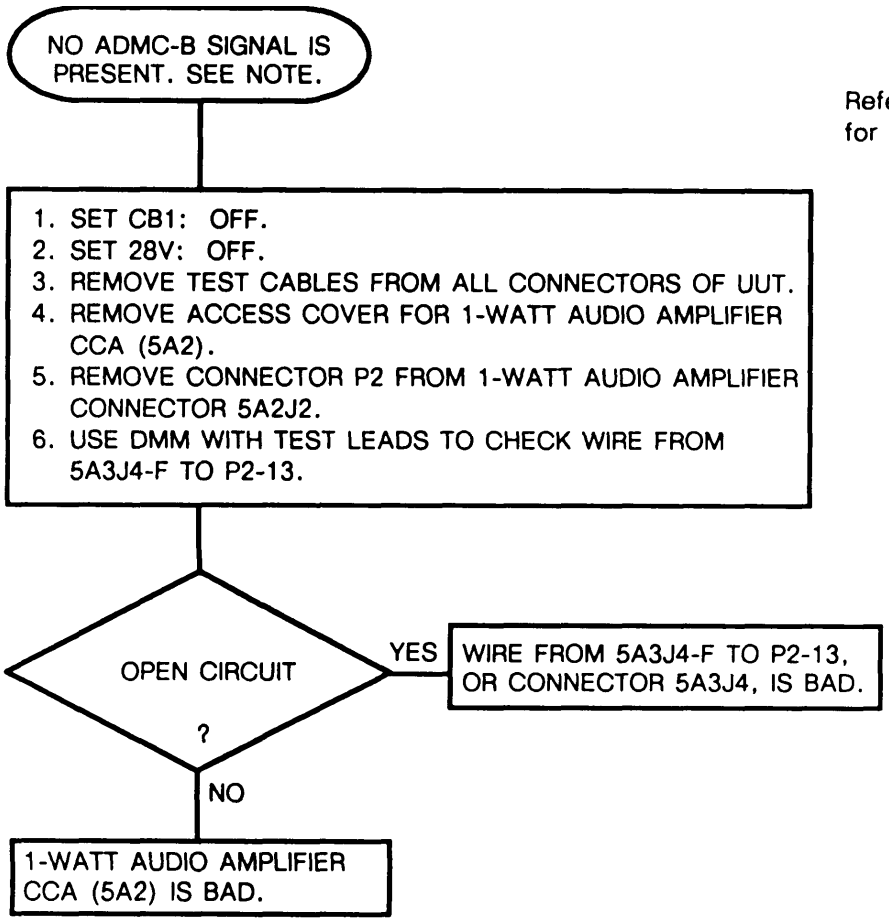


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 19
Troubleshooting ADMC-B Line
(Sheet 1 of 1)

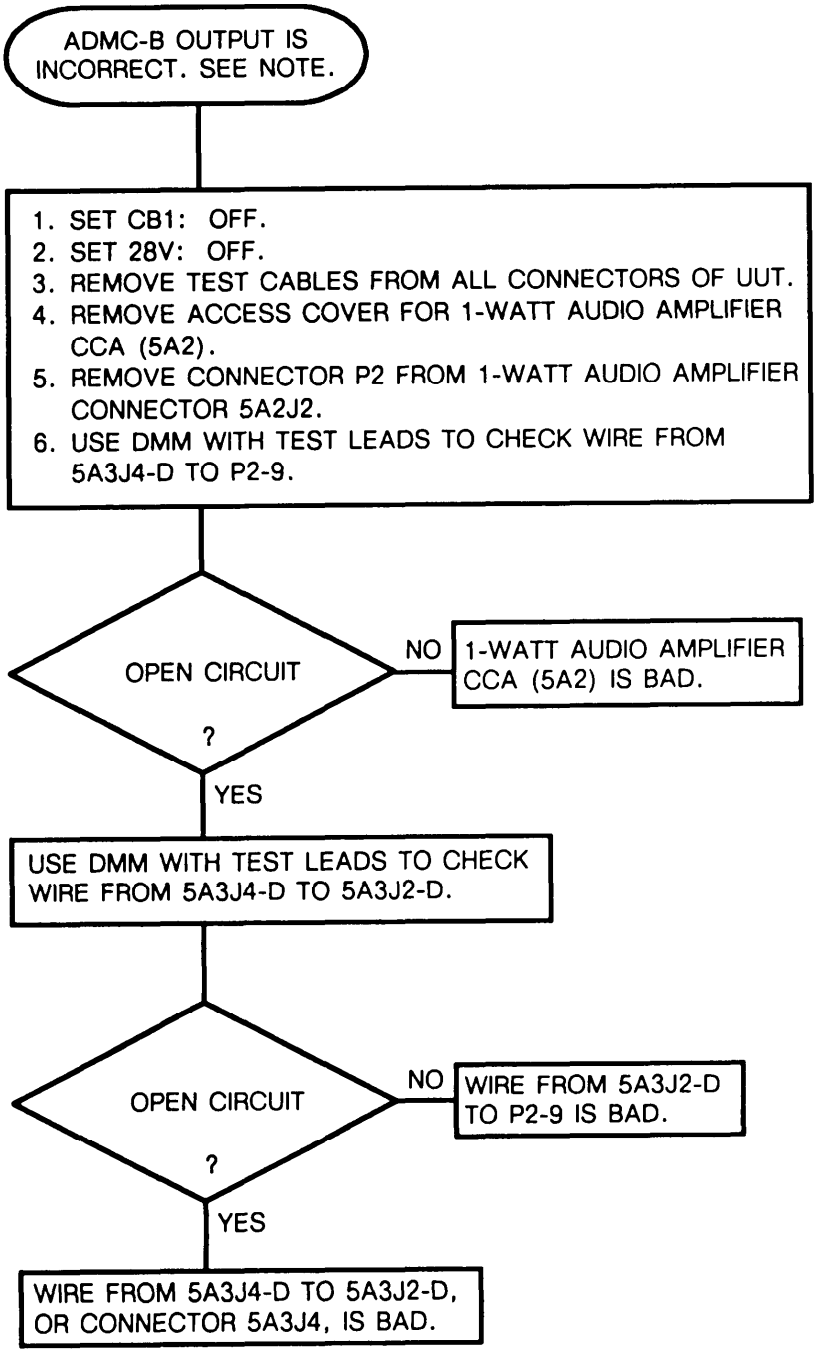


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 20
Troubleshooting ADMC-B Line
(Sheet 1 of 1)

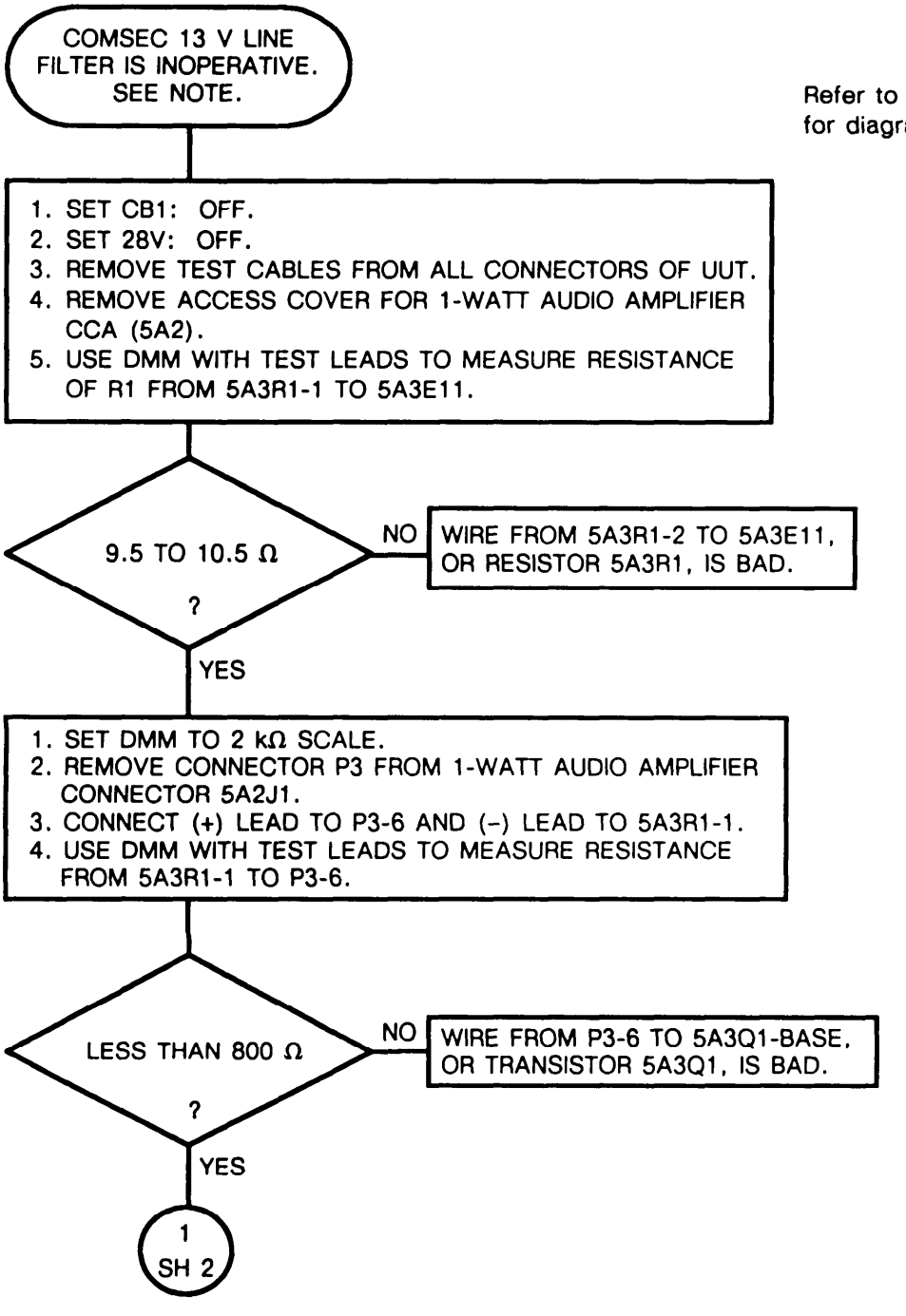


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 21
Troubleshooting COMSEC 13 V Line Filtering
(Sheet 1 of 3)

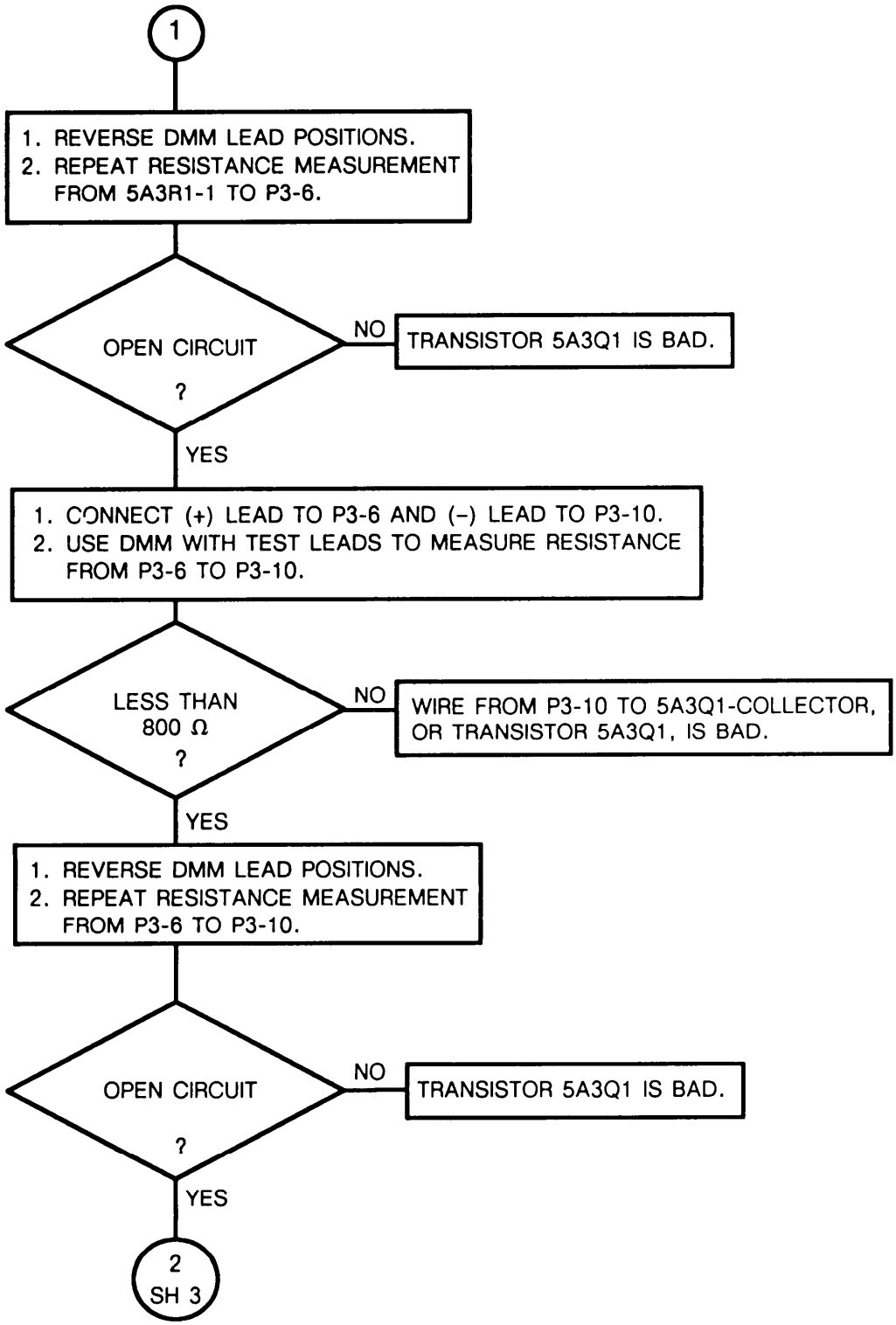


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

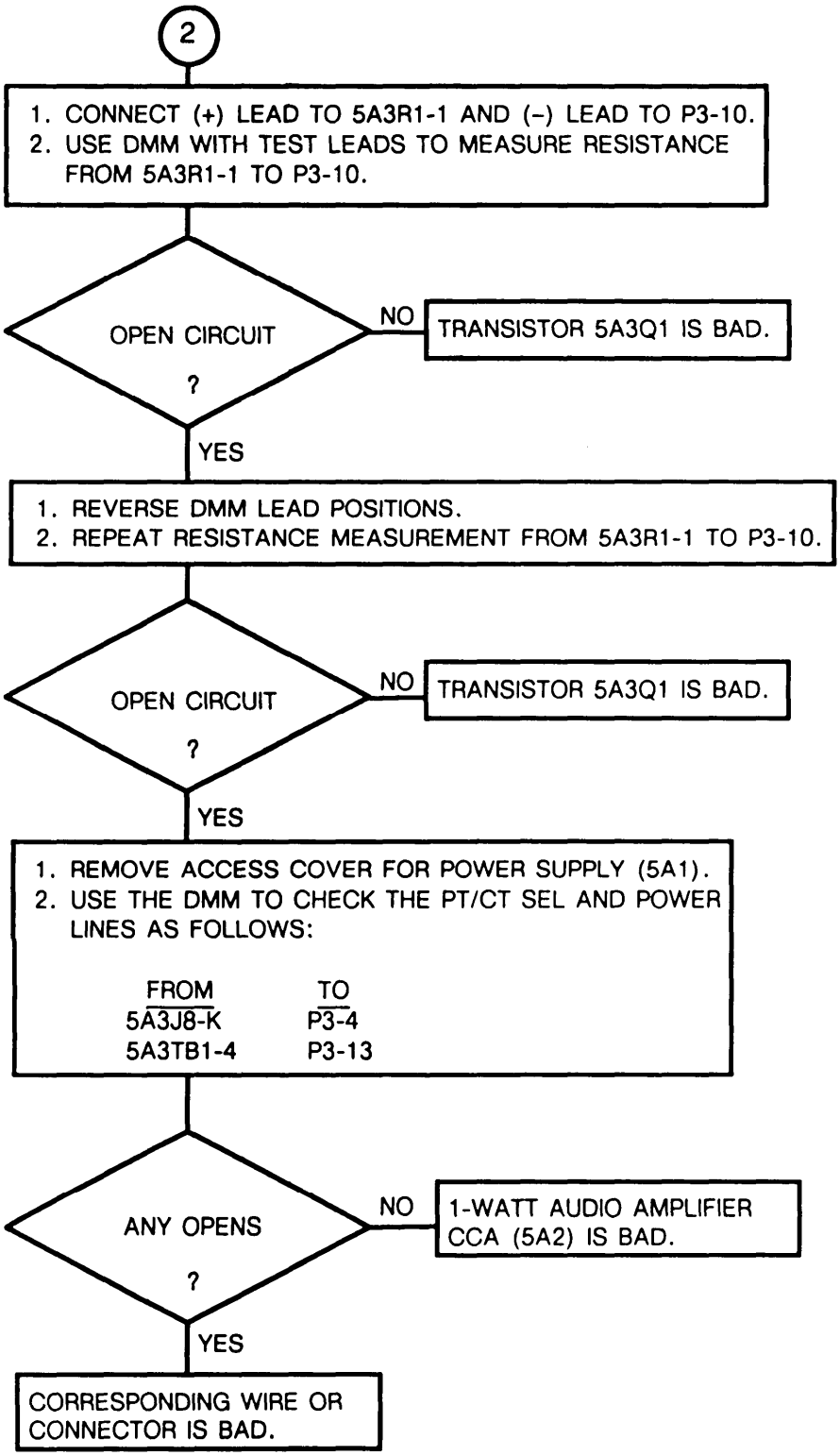
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 21
Troubleshooting COMSEC 13 V Line Filtering
(Sheet 2 of 3)



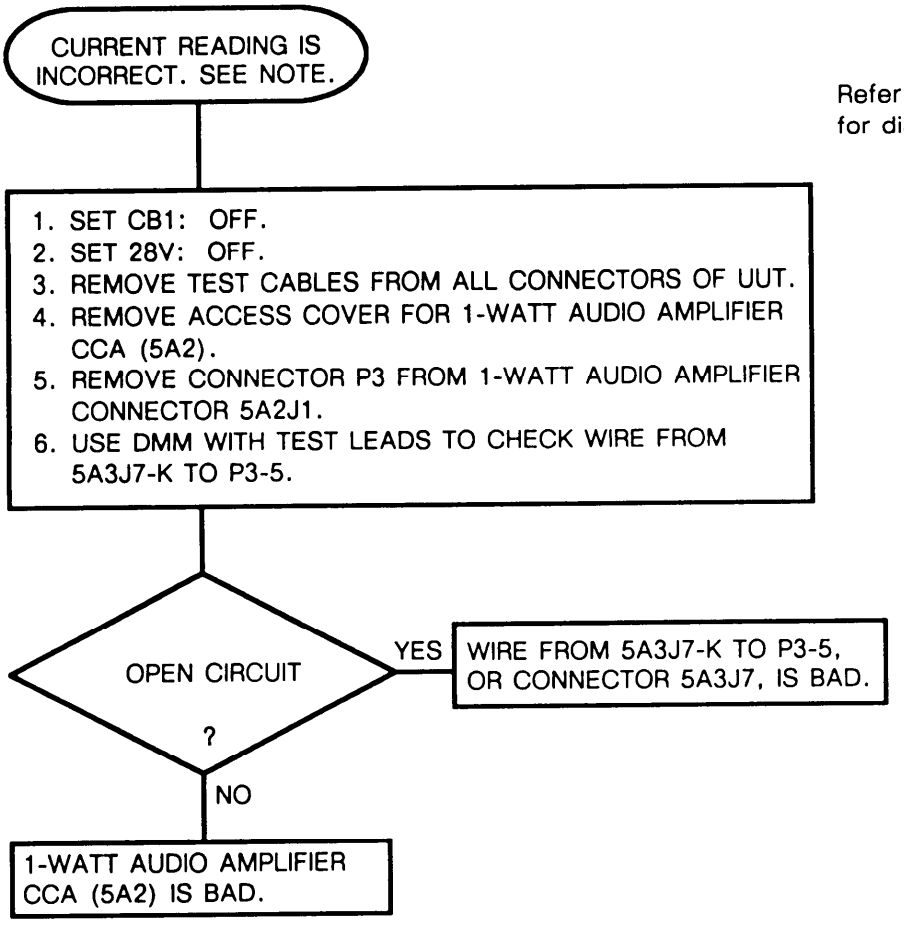
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 21
Troubleshooting COMSEC 13 V Line Filtering
(Sheet 3 of 3)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 22
Troubleshooting Shunt Regulator
(Sheet 1 of 1)

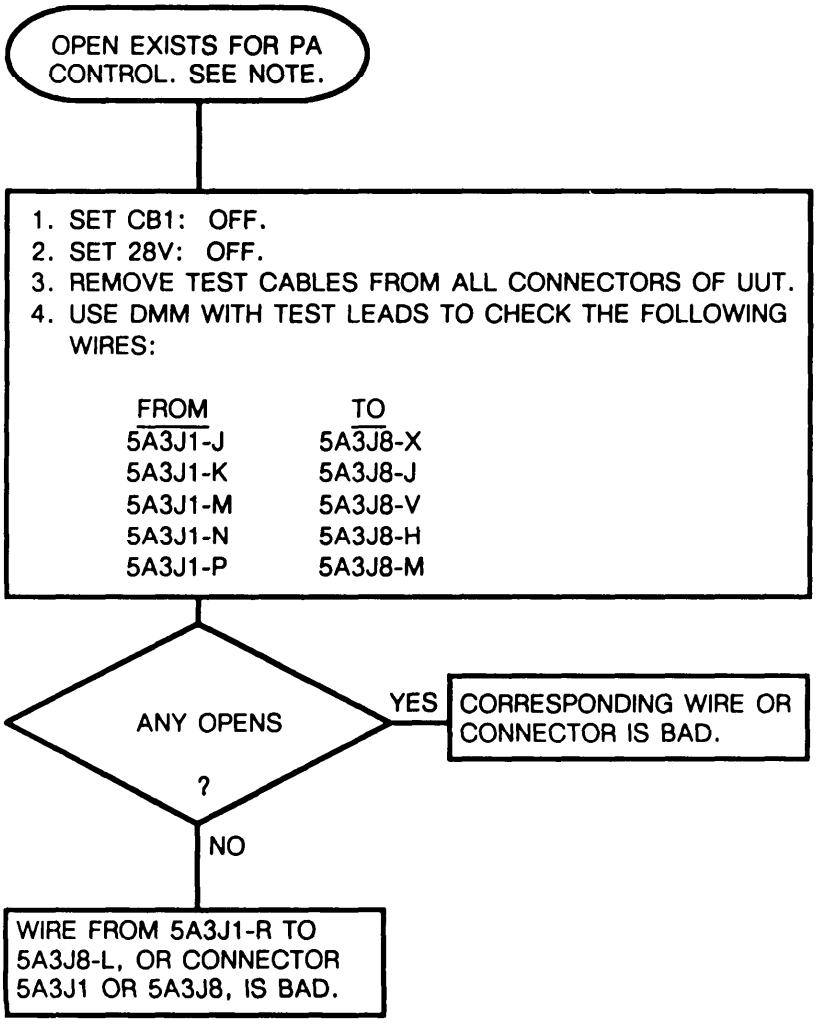


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 23
Troubleshooting J8 Power Amplifier Interface
(Sheet 1 of 1)

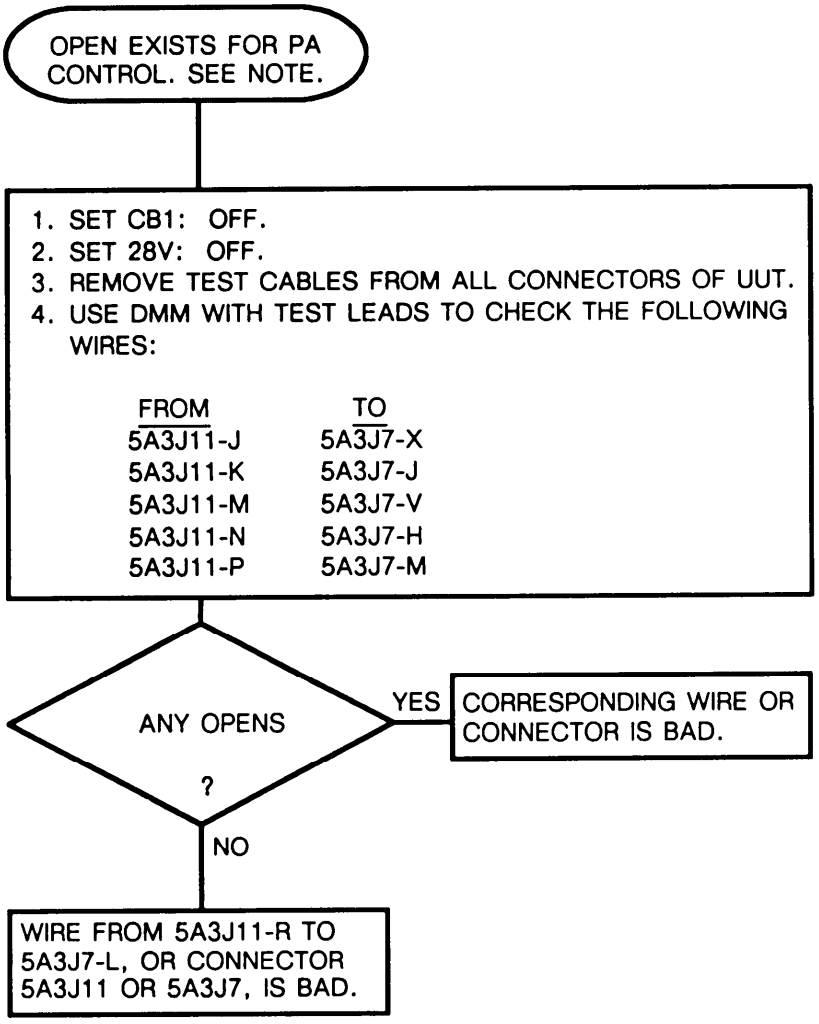


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 24
Troubleshooting J7 Power Amplifier Interface
(Sheet 1 of 1)

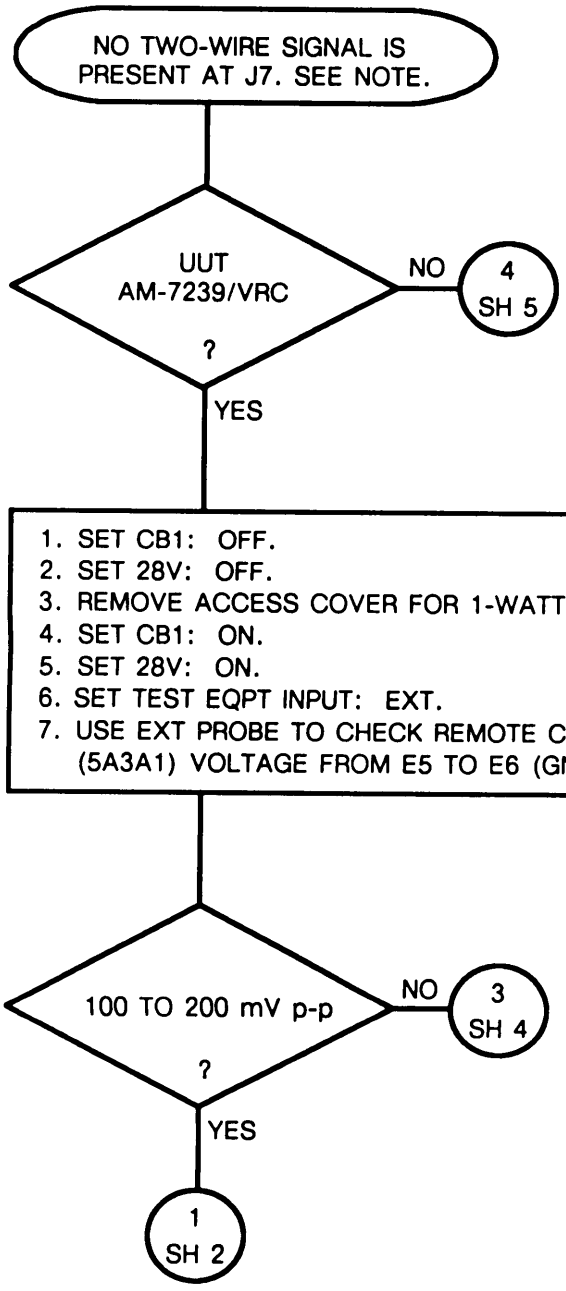


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

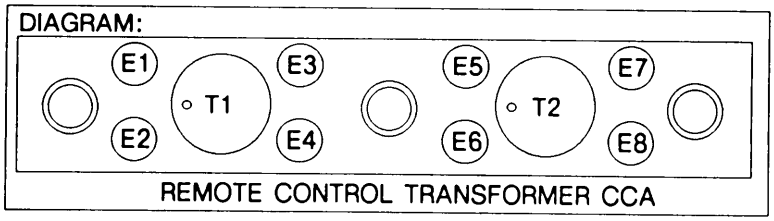
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 1 of 8)



NOTES:

1. Refer to figure FO-14 or FO-15 for diagram of these circuits.
2. 5A3A1W3A1 is the remote control transformer CCA. 5A3A2A1 is the 2-wire dual transient protection CCA.



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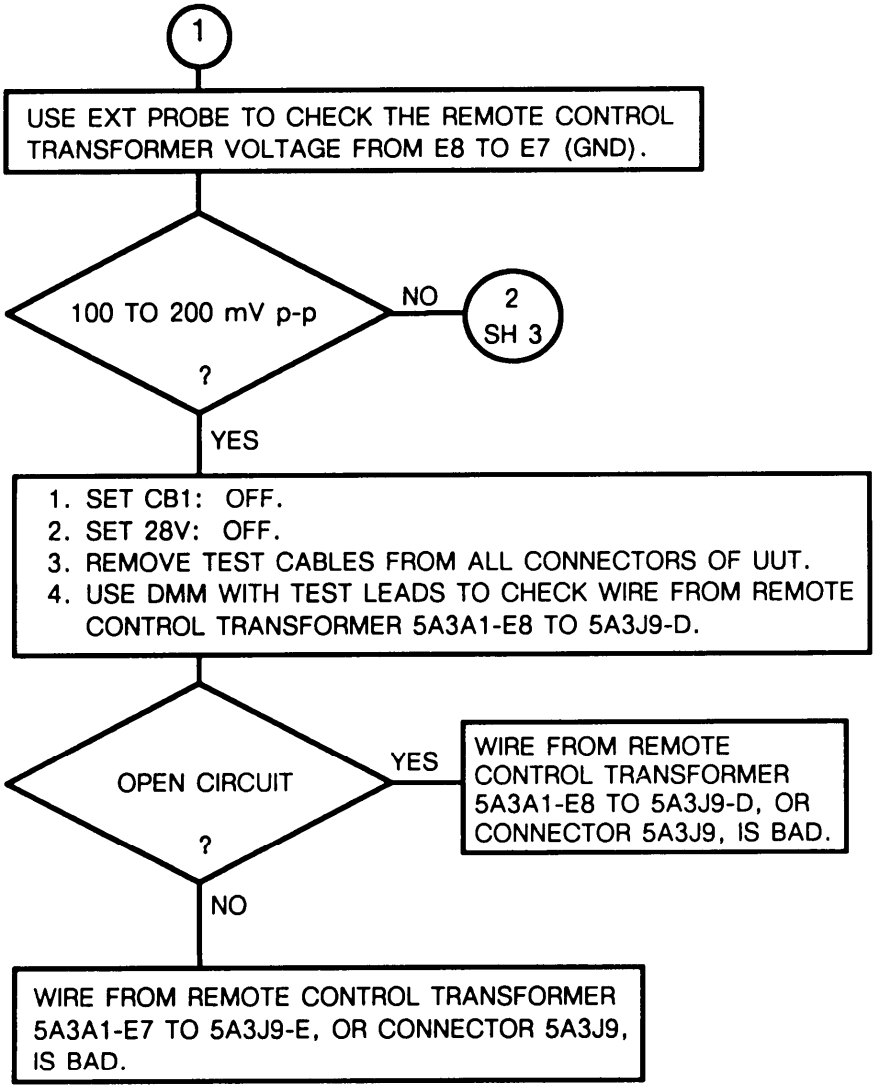
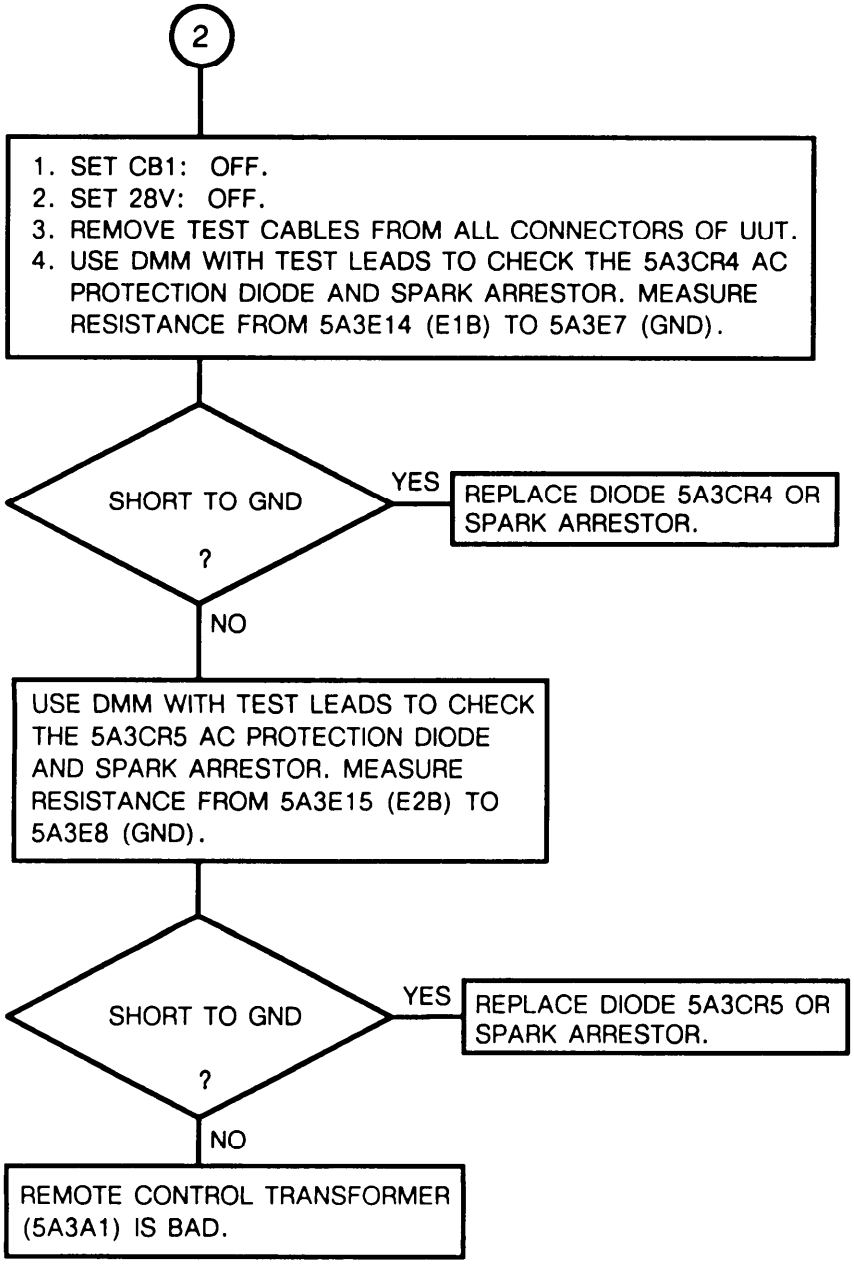
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 2 of 8)



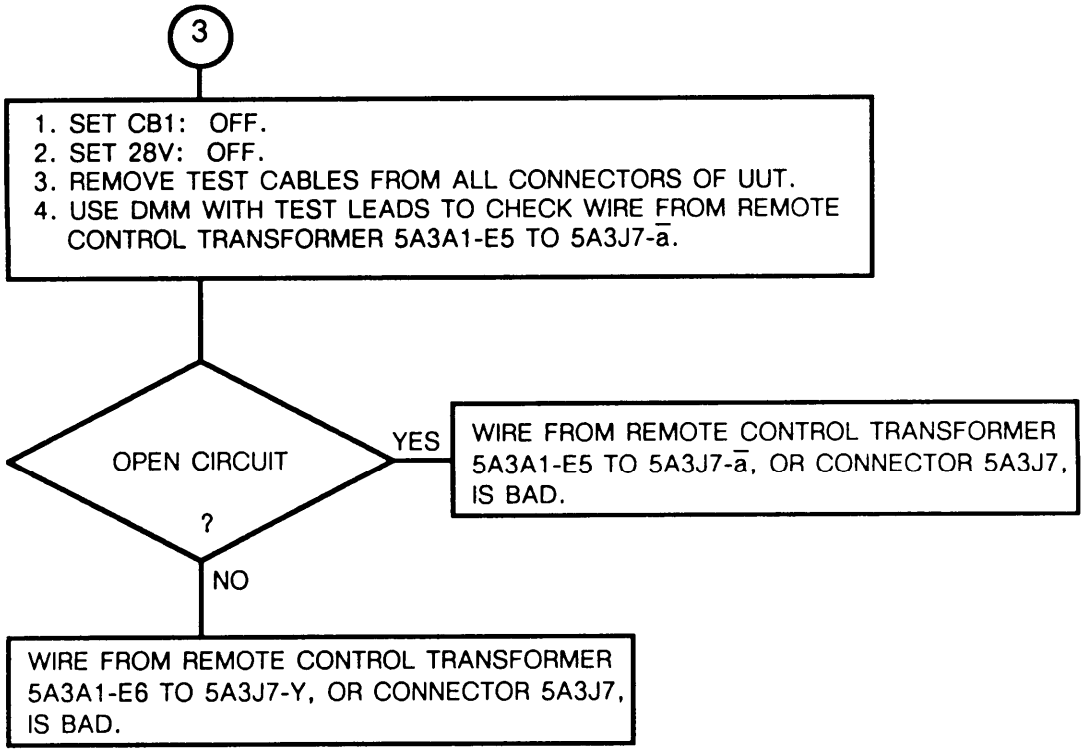
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 3 of 8)



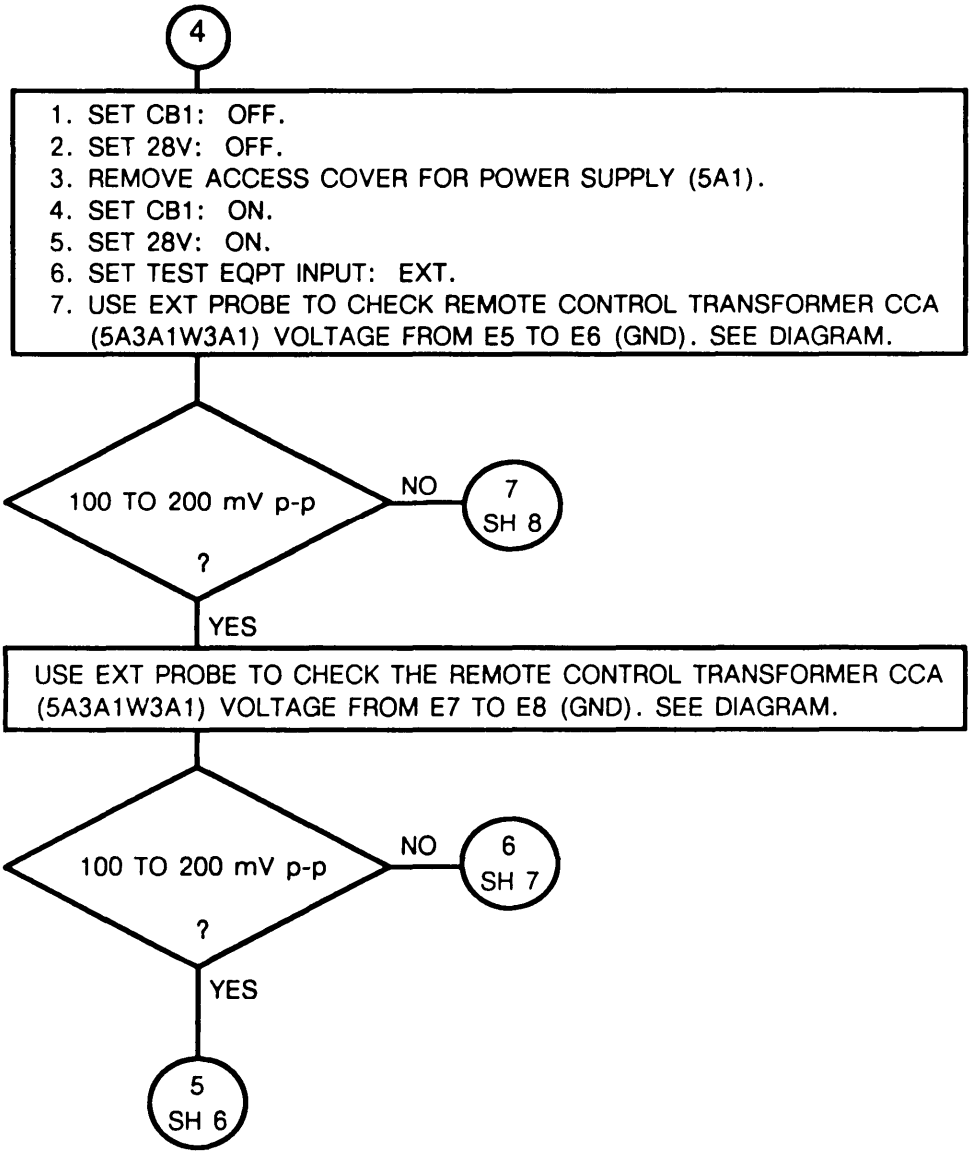
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

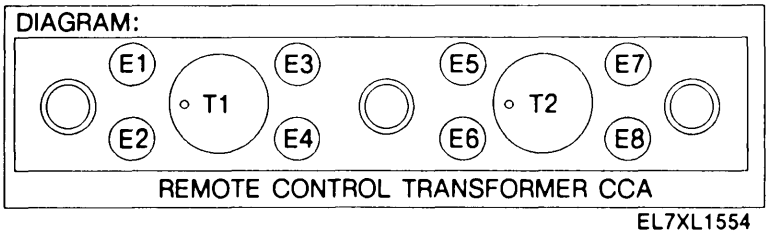
Chart 25
Troubleshooting Remote Control Transformers
(Sheet 4 of 8)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 5 of 8)

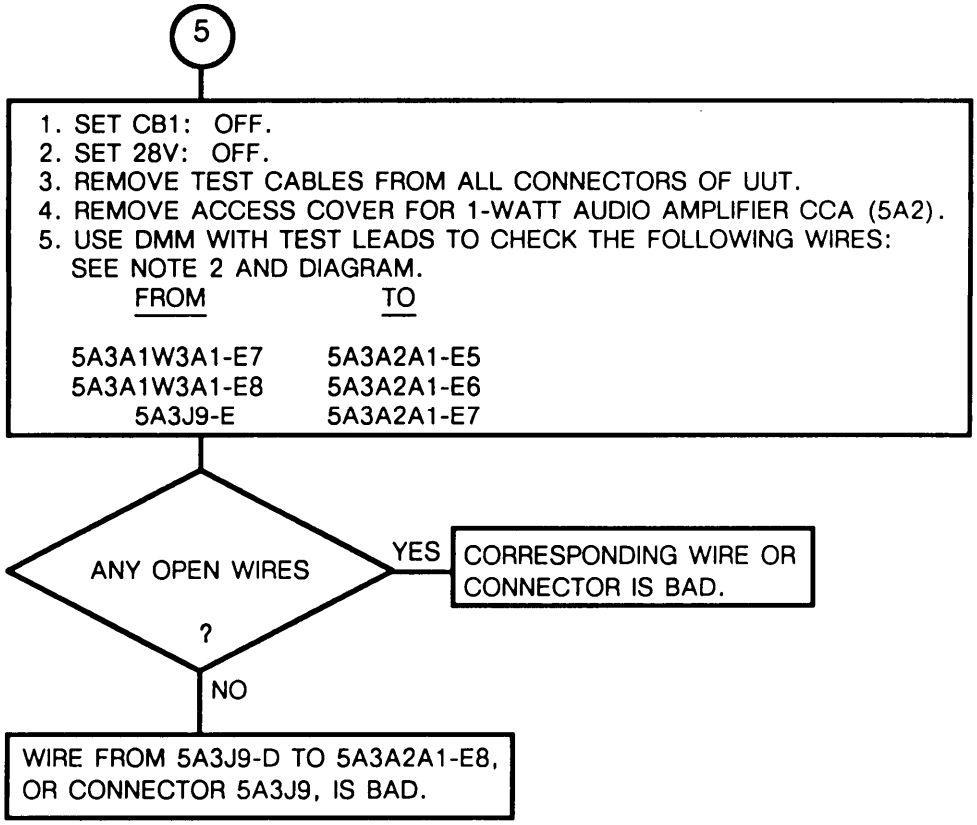




EL7XL1554

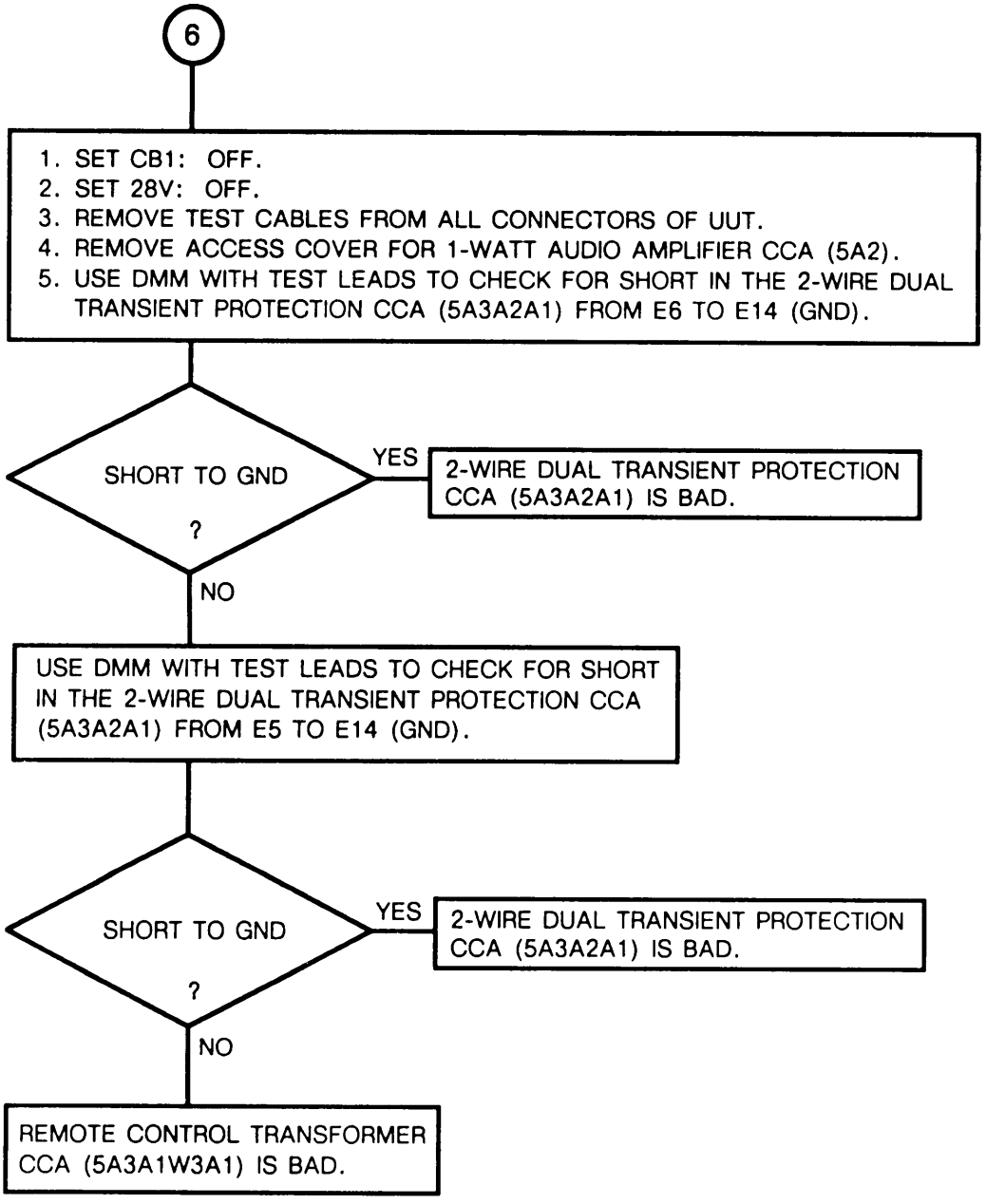
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 6 of 8)



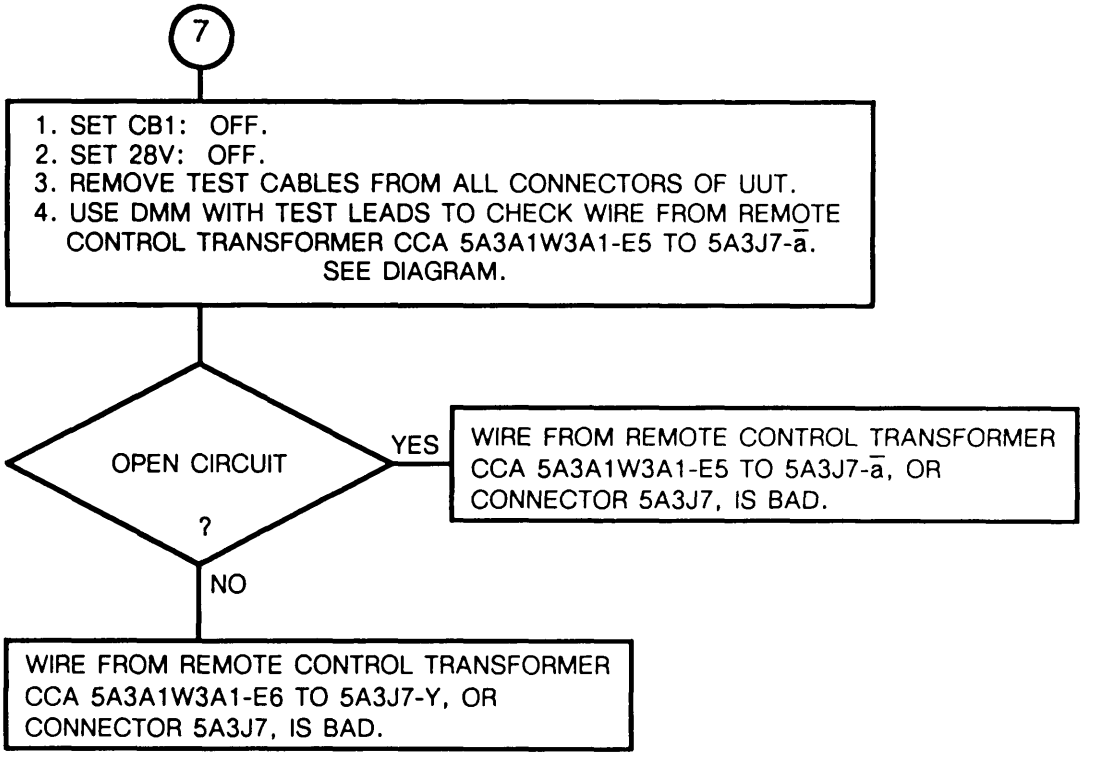
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 7 of 8)



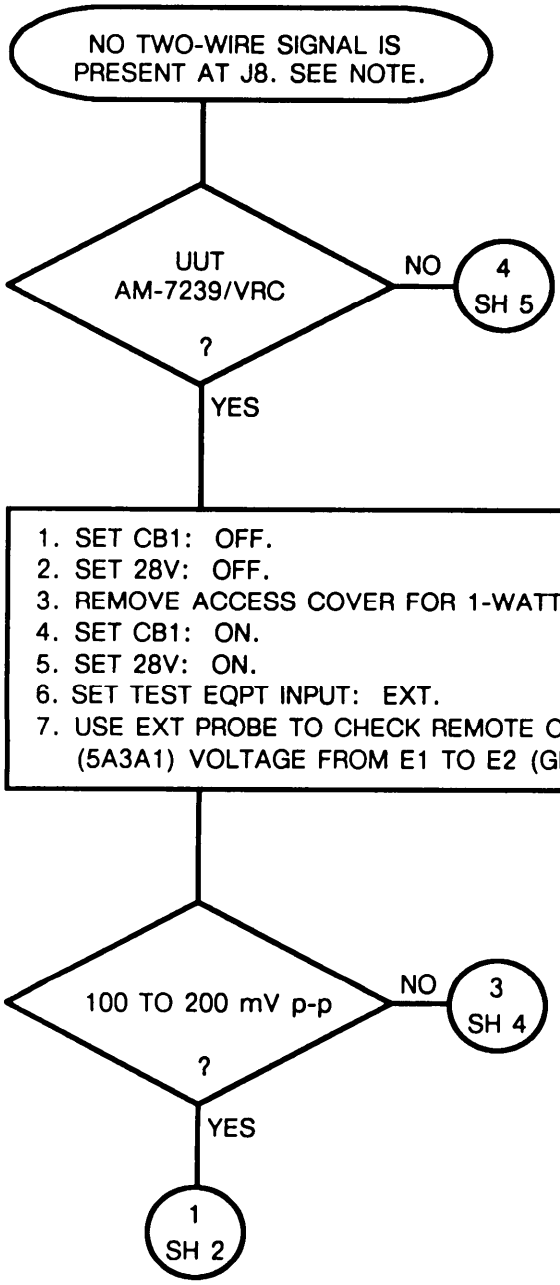
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 25
Troubleshooting Remote Control Transformers
(Sheet 8 of 8)



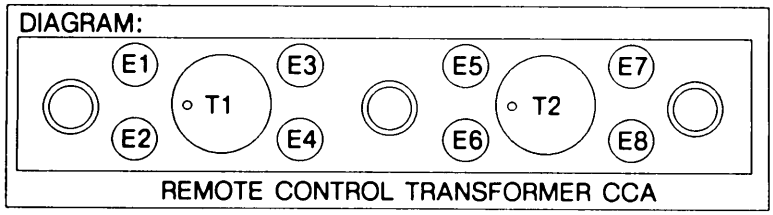
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 1 of 9)



NOTES:

1. Refer to figure FO-14 or FO-15 for diagram of these circuits.
2. 5A3A1W3A1 is the remote control transformer CCA. 5A3A2A1 is the 2-wire dual transient protection CCA.



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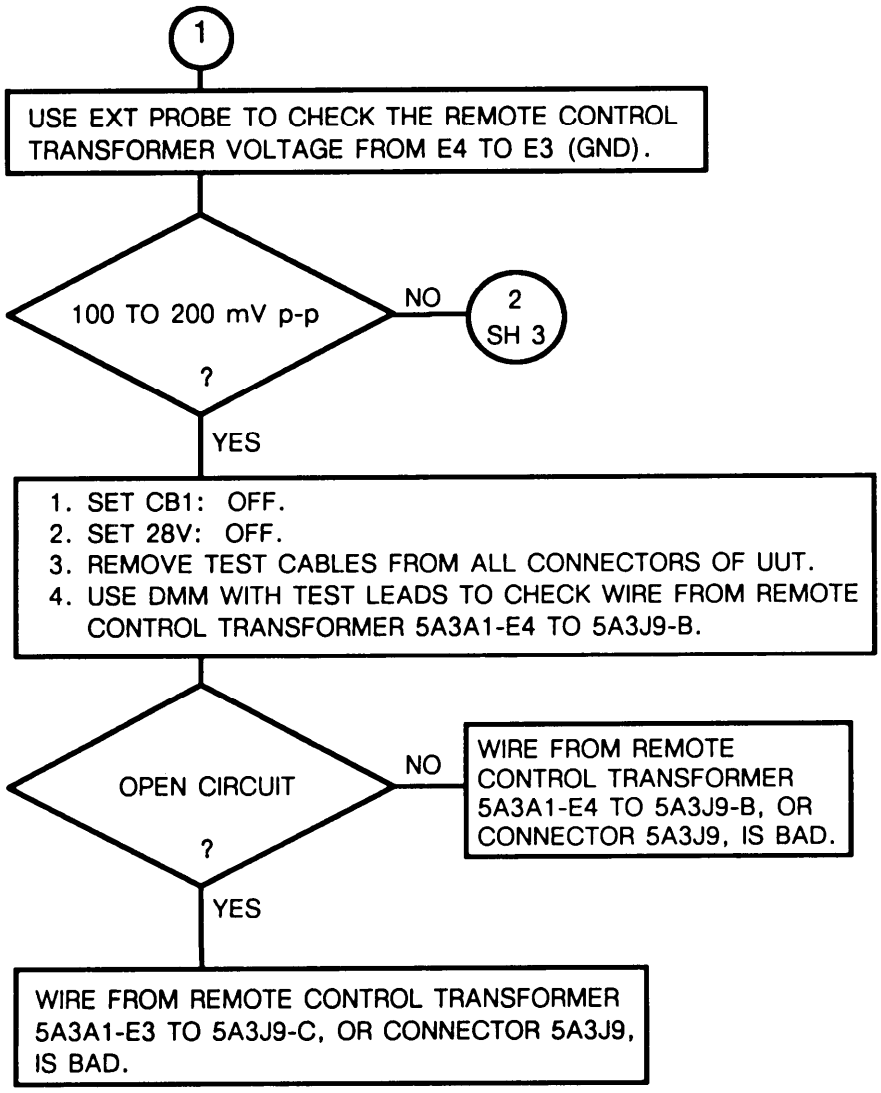
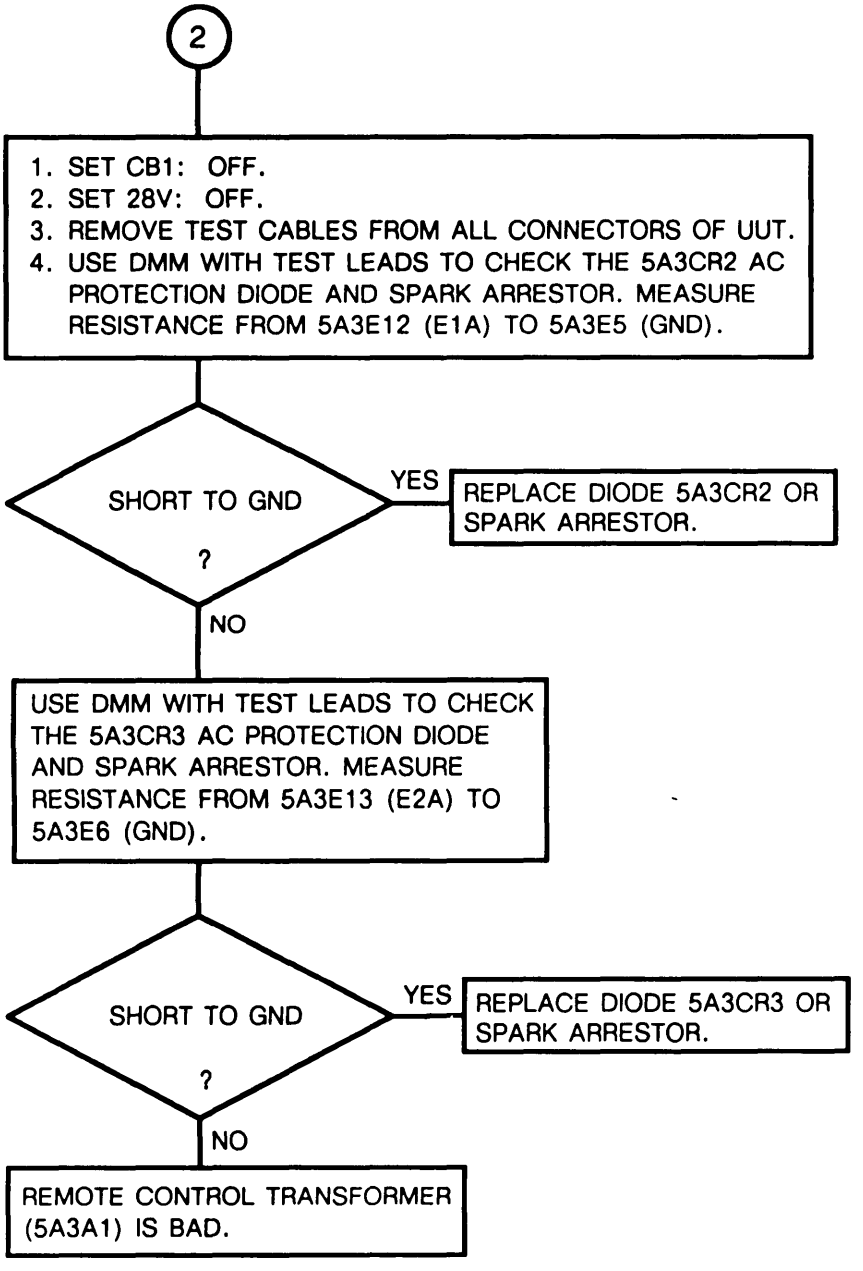
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 2 of 9)



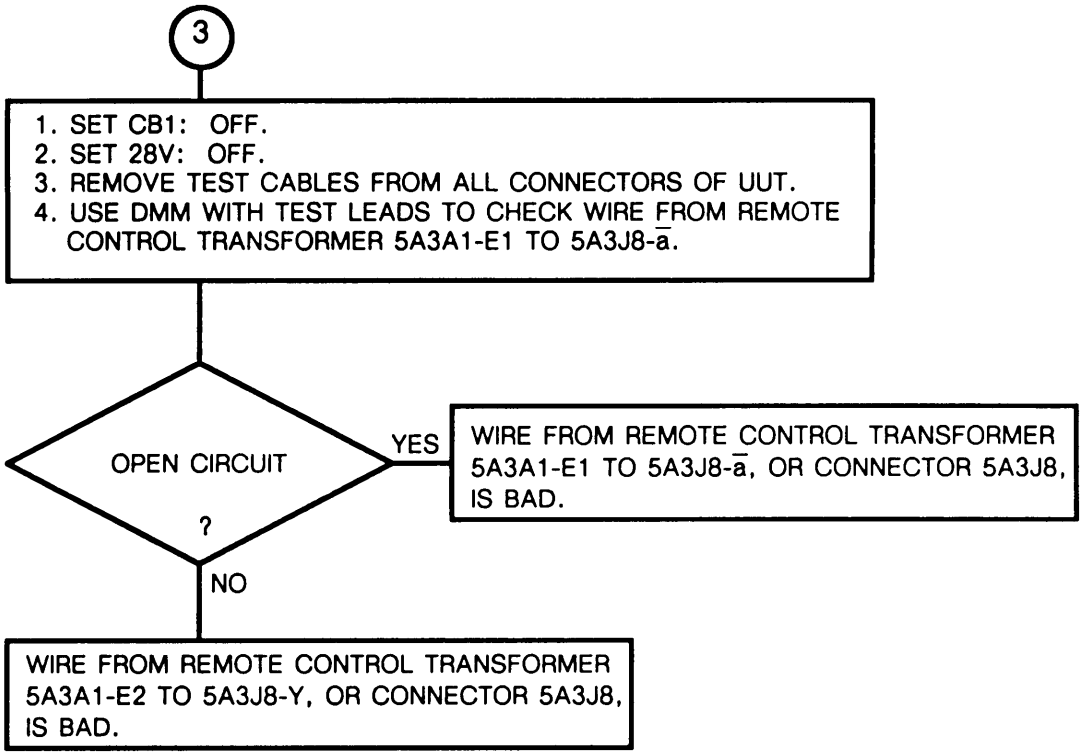
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 3 of 9)



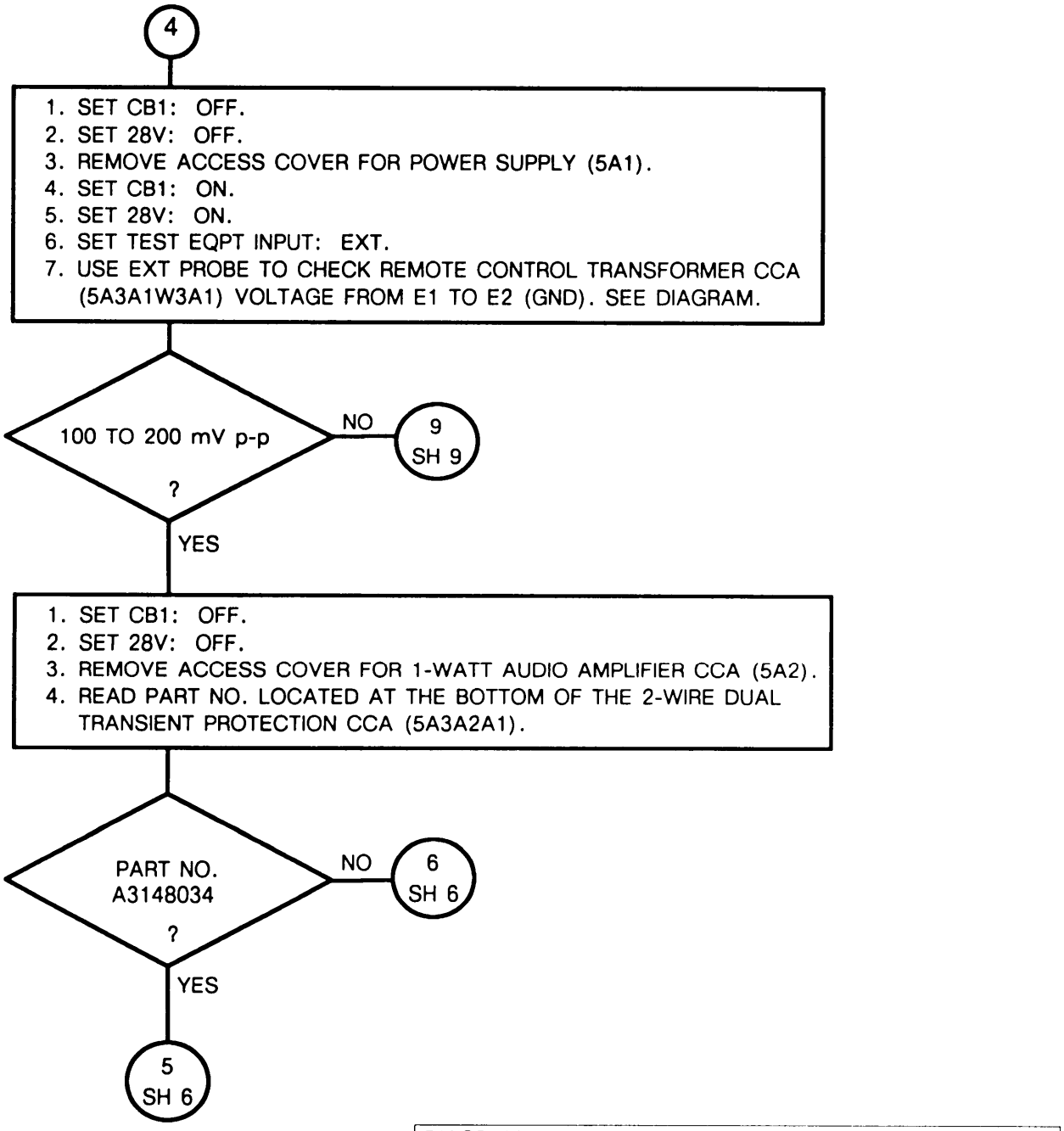
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

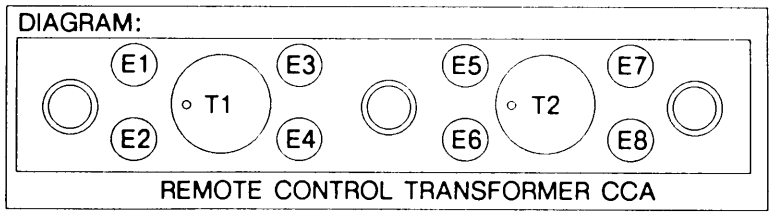
Chart 26
Troubleshooting Remote Control Transformers
(Sheet 4 of 9)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 5 of 9)





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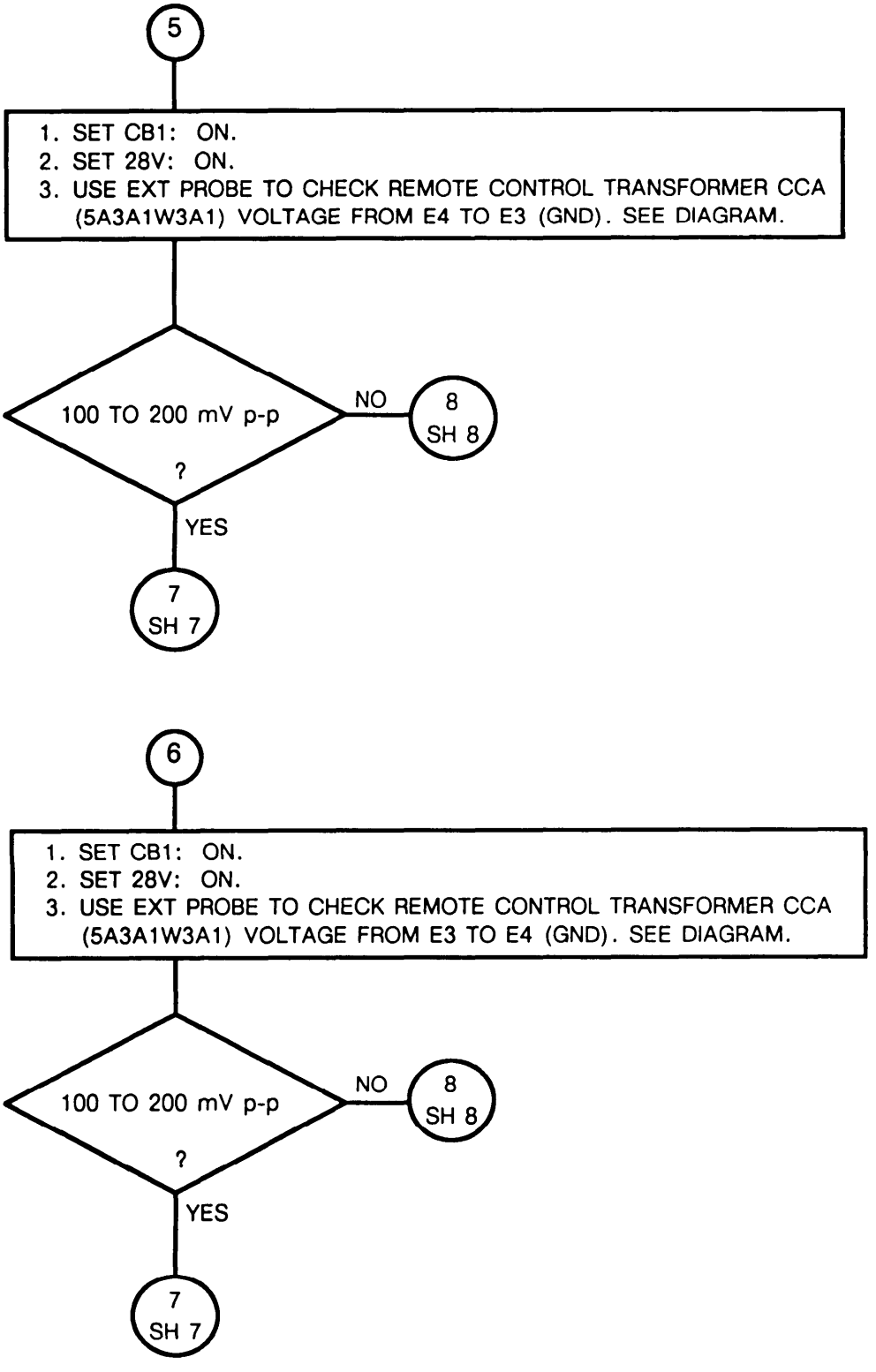
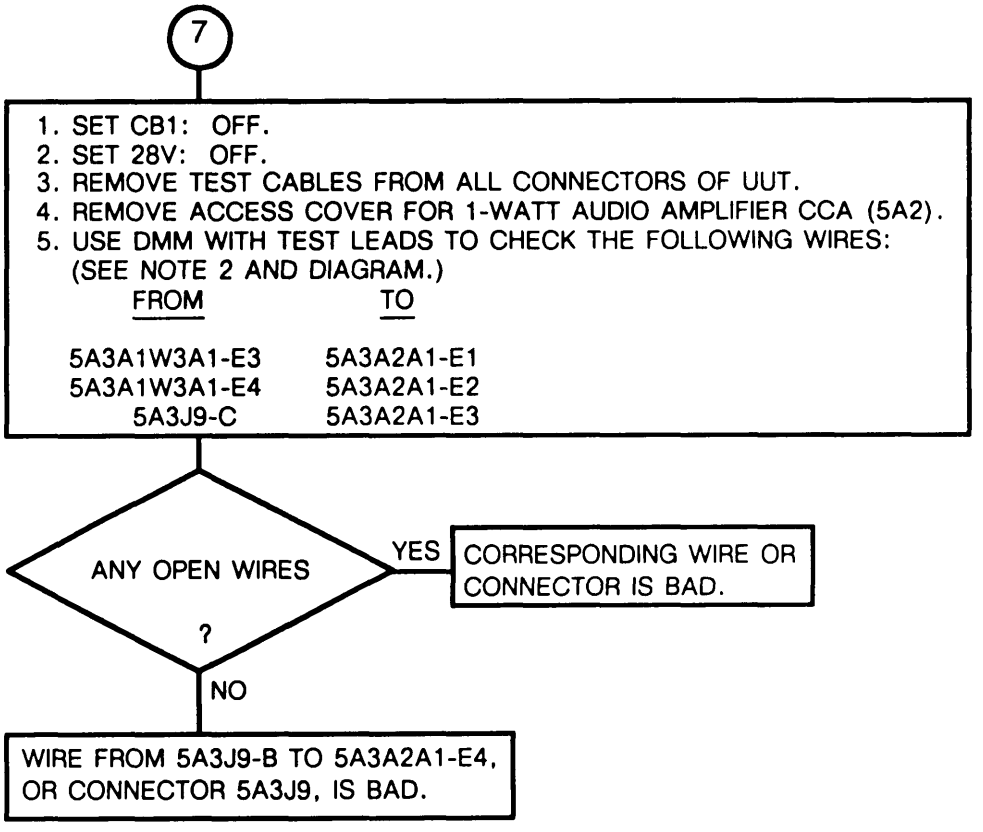
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 6 of 9)



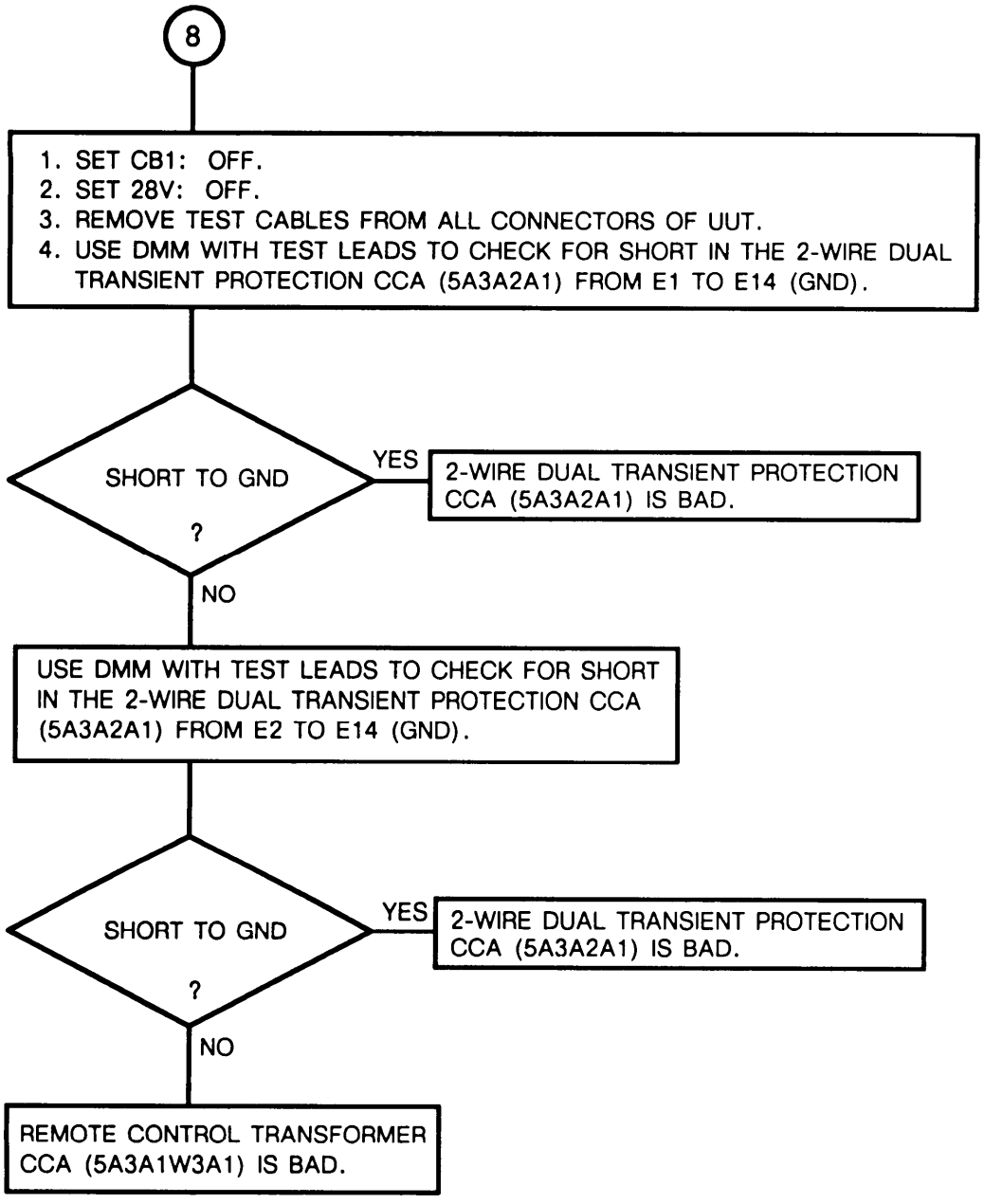
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 7 of 9)



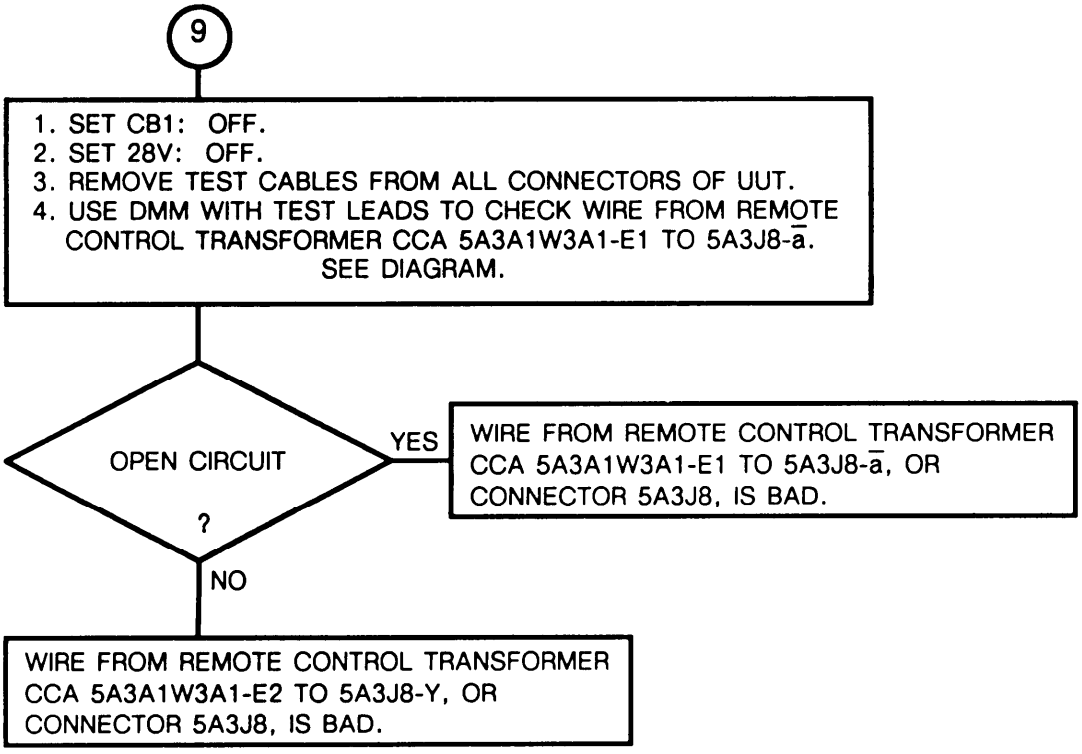
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 8 of 9)



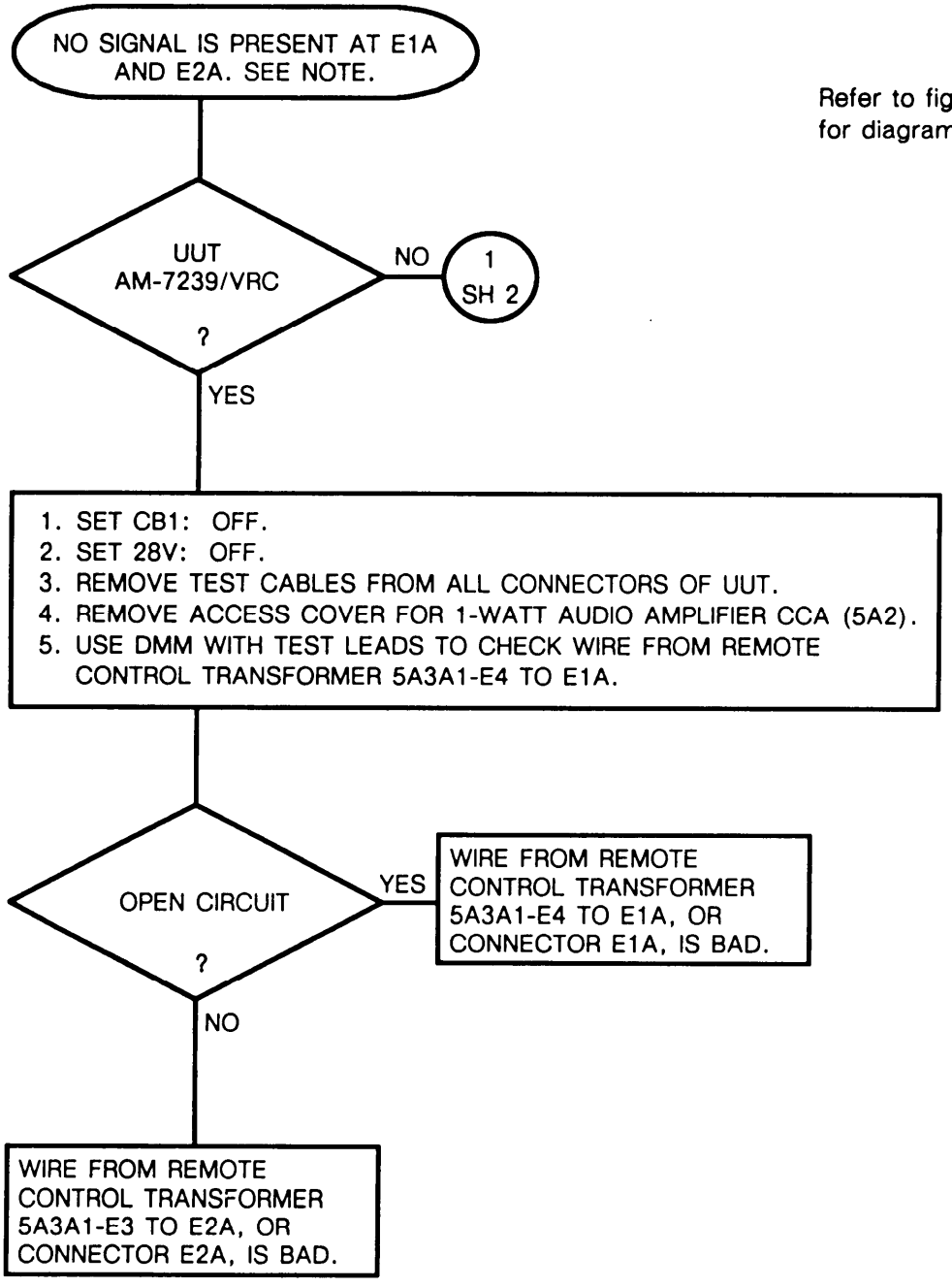
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 26
Troubleshooting Remote Control Transformers
(Sheet 9 of 9)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Two-Wire Terminals
(Sheet 1 of 2)

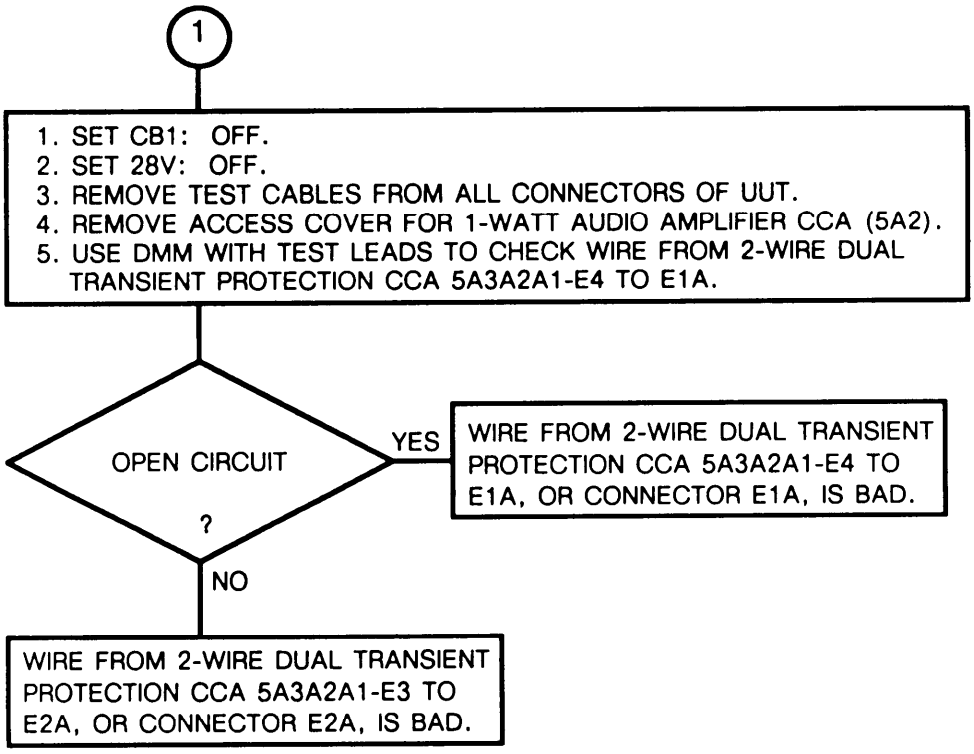


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

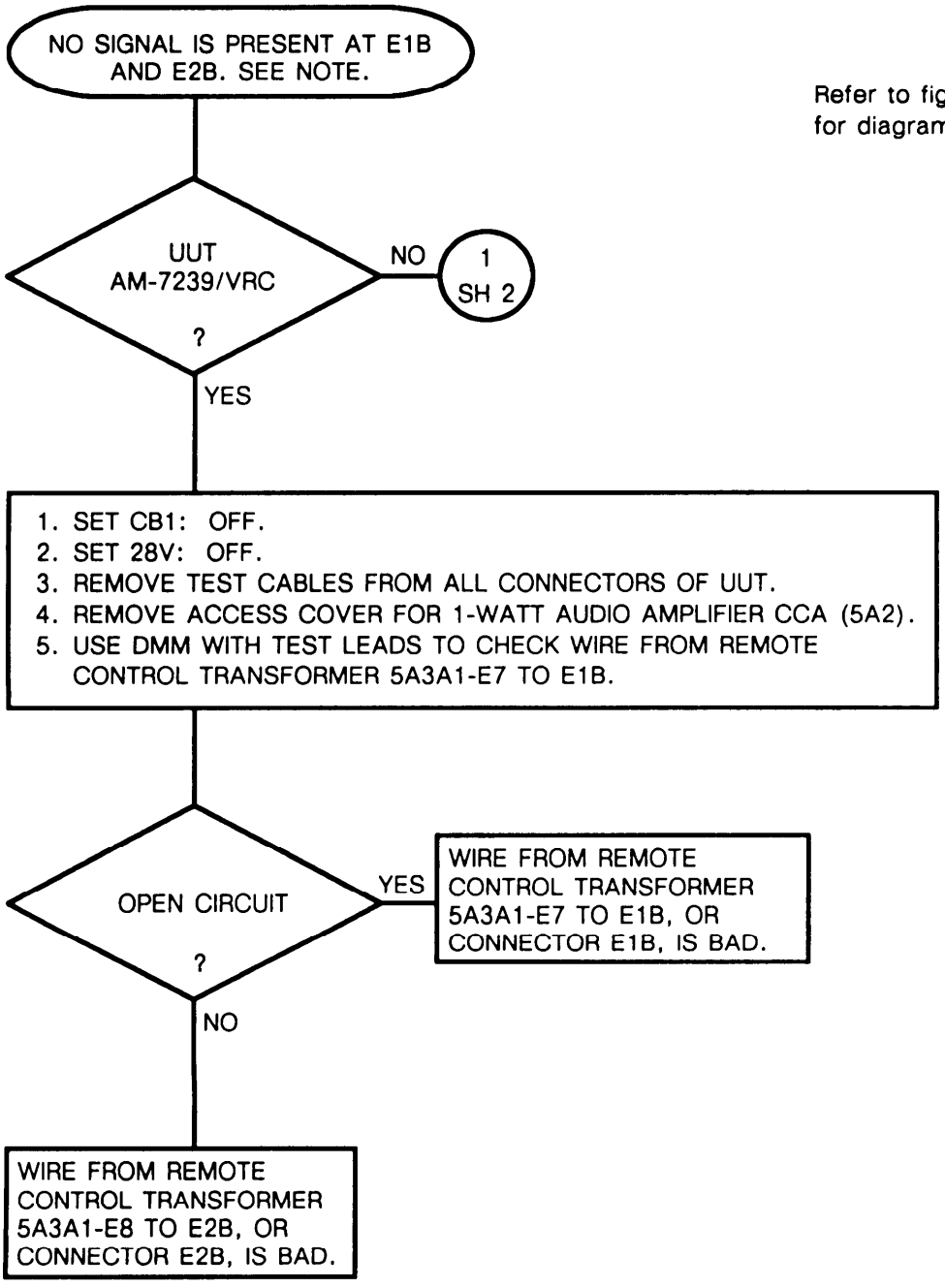
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 27
Troubleshooting Two-Wire Terminals
(Sheet 2 of 2)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 28
Troubleshooting Two-Wire Terminals
(Sheet 1 of 2)

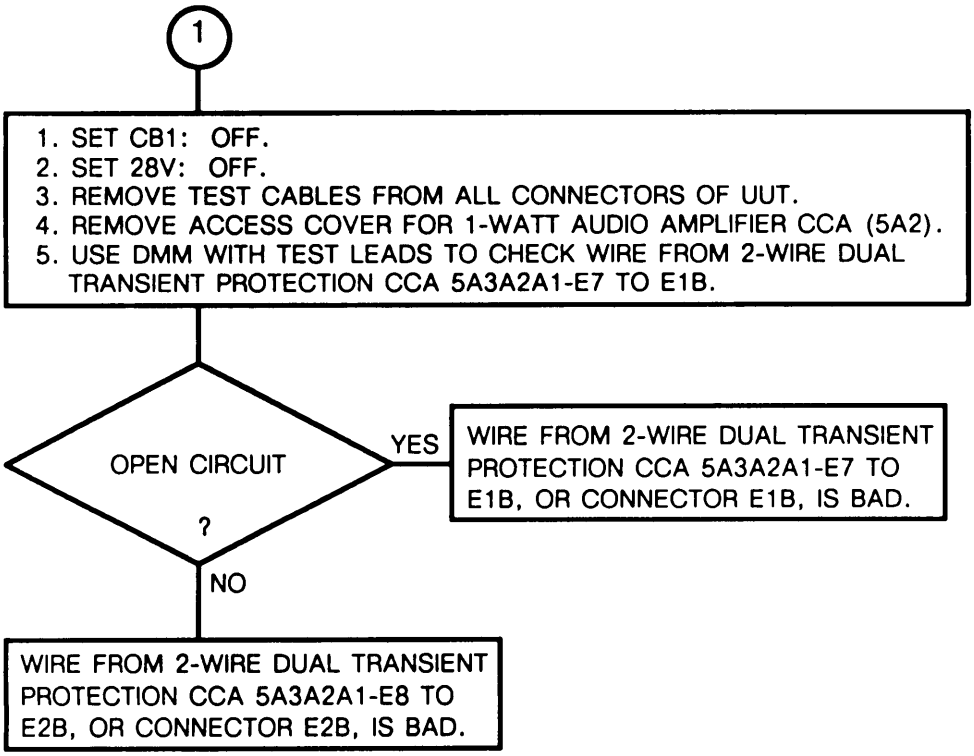


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

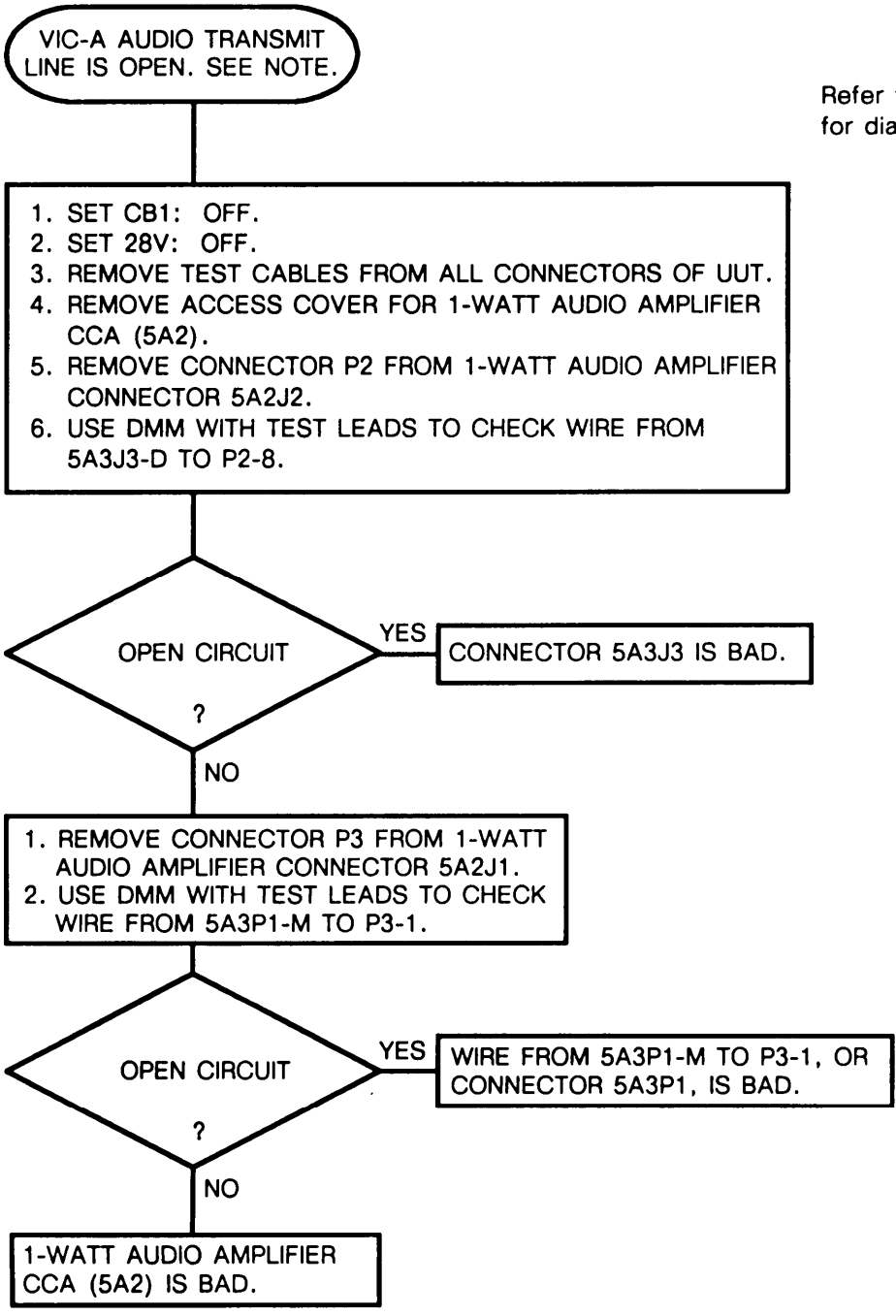
4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 28
Troubleshooting Two-Wire Terminals
(Sheet 2 of 2)



4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 29
Troubleshooting VIC-A Audio Transmit Line
(Sheet 1 of 1)

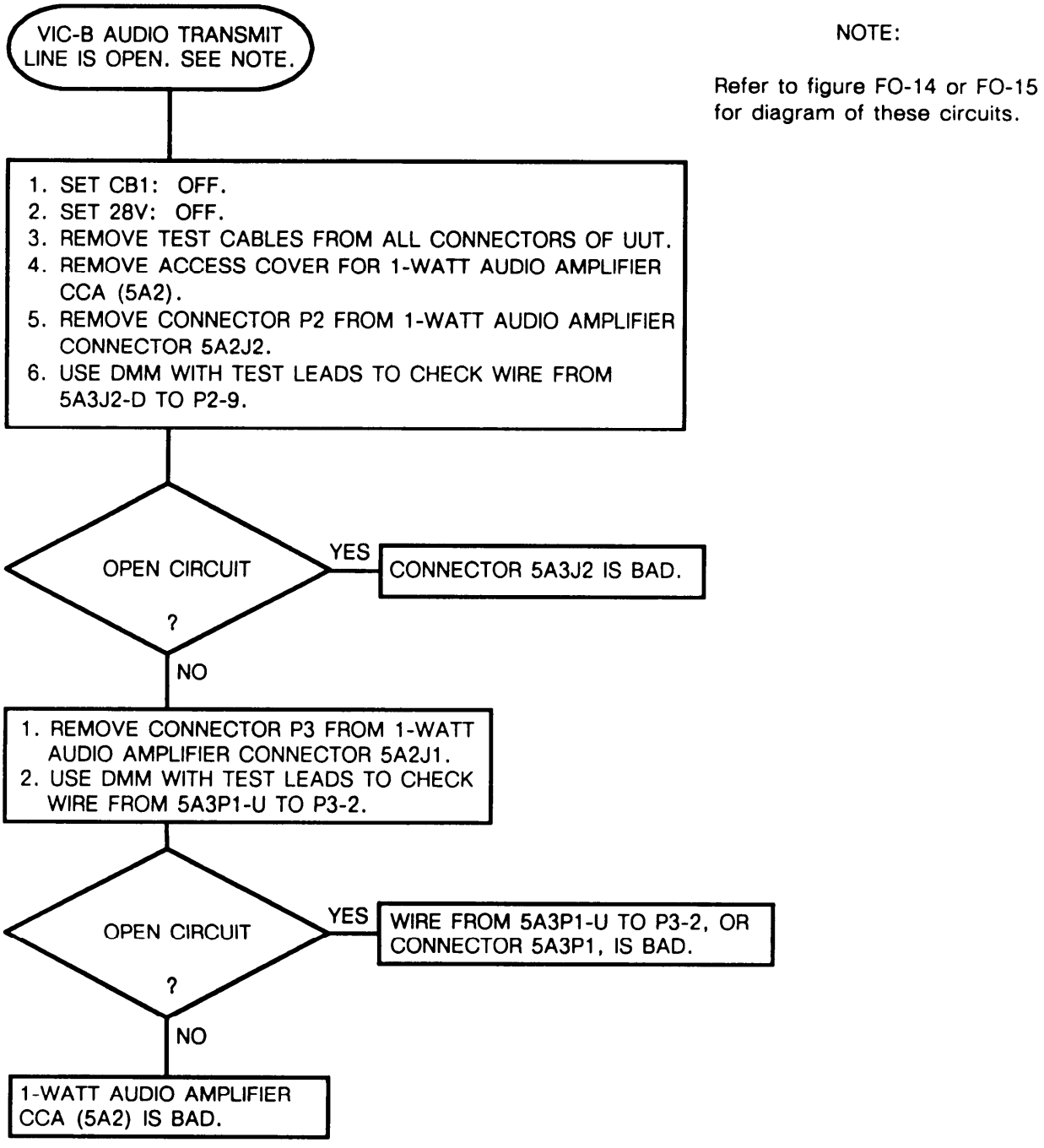


NOTE:

Refer to figure FO-14 or FO-15 for diagram of these circuits.

4-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 30
Troubleshooting VIC-B Audio Transmit Line
(Sheet 1 of 1)



Section IV. MAINTENANCE PROCEDURES FOR AM-7239/VRC

4-14. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired mounting adapter. It is also used to verify the symptom of a faulty mounting adapter. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

4-15. OPERATIONAL CHECK.

Perform the operational check found in paragraph 4-9 to verify proper operation of the mounting adapter.

4-16. REPAIR INSTRUCTIONS.

The following instructions apply to all repair tasks unless otherwise noted in the procedure.

a. Begin procedure with mounting adapter switch CB1 set to OFF.

b. Disconnect any external cables connected to mounting adapter.

c. Inspect mounting adapter. Replace mounting adapter chassis if the mounting adapter is physically damaged, such as with a broken connector.

d. Mounting adapter must be tested after replacement of a module.

CAUTION

Static electricity and stray voltages can damage the mounting adapter. Use an antistatic pad on the work surface and wear a grounded wrist strap when repairing the mounting adapter.

All circuit card assemblies in the mounting adapter contain static sensitive devices susceptible to electrostatic damage. **DO NOT** attempt to replace components without using protective devices.

Steps marked with **HCP** must be performed exactly as written. They are critical in maintaining the nuclear hardness of the mounting adapter. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

4-17. REMOVAL AND INSTALLATION OF 5A3TB2 SHORTING BAR.

The 5A3TB2 shorting bar, which is only present on the AM-7239/VRC, must be removed prior to testing the mounting adapter. It must be installed on the AM-7239/VRC prior to returning the mounting adapter to service.

Tools:

Cross tip screwdriver Flat tip screwdriver Torque screwdriver

ITEM	ACTION	REMARKS
a. Mounting adapter	Set on its right side with bottom toward you.	
b. Six captive screws (1) on rear access cover (2)	Using flat tip screwdriver, fully loosen six captive screws (1) securing rear access cover (2) on power control chassis.	See figure 4-3.
c. Rear access cover (2) and seal	Lift off of power control chassis.	
d. Shorting bar (3)	Check its position. If it is properly installed, skip to step e. Otherwise, using cross tip screwdriver, remove and retain two screws securing shorting bar (3) to terminal block TB2. Remove and retain shorting bar for use after testing is completed.	For local operation, it should connect 5A3TB2-1 to 5A3TB2-2. For remote operation or testing, it must not connect 5A3TB2-1 to 5A3TB2-2.
e. HCP Rear access cover (2), seal, and six captive screws (1)	Check seal. If damaged, replace rear access cover (2). Otherwise, set it in place and tighten six captive screws (1) securing it to power control chassis. Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step c.

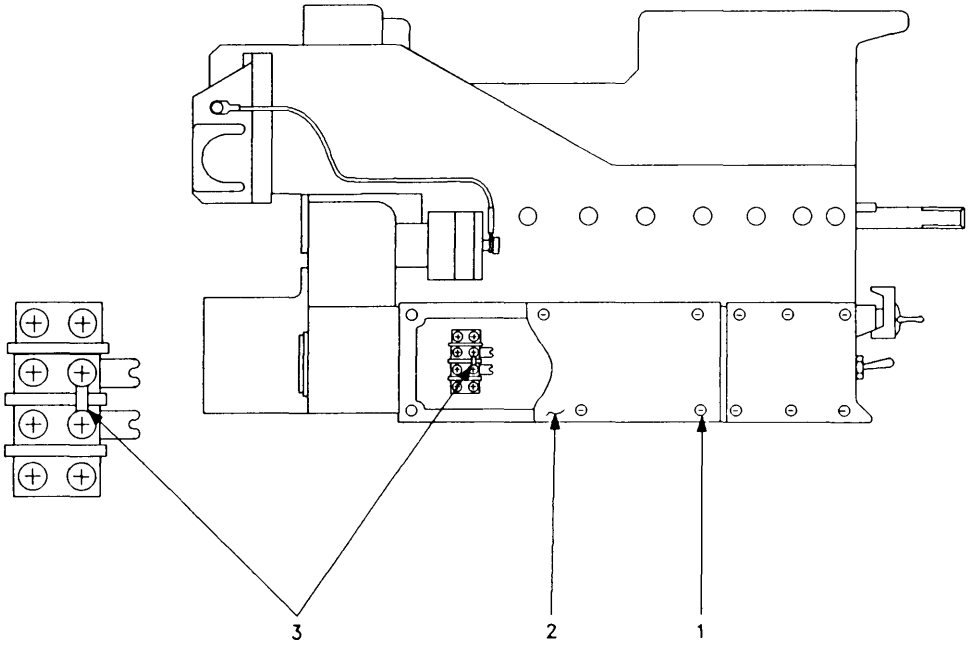


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Figure 4-3. Shorting Bar Installation.

4-18. REPLACEMENT OF POWER SUPPLY (5A1).

Tools:
Cross tip screwdriver Flat tip screwdriver Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 17 captive screws	Using flat tip screwdriver, fully loosen 17 captive screws securing power supply (1) to mounting adapter chassis (3).	See figure 4-4.
c. Power supply (1)	Set power supply (1) with heatsink assembly face down on work surface.	
d. Power supply wires	Tag wires as to location on terminal block TB1. The wire connected to TB1 position 1 is labeled "1". Repeat for all six wires.	
e. Six screws on terminal block TB1 (2)	Using flat tip screwdriver, remove and retain six screws securing power supply wires to terminal block TB1 (2).	
f. Power supply (1)	Remove defective power supply and send to General Support for repair.	
INSTALLATION		
g. Power supply (1)	Set replacement power supply (1) on work surface so wires can be connected to terminal block TB1 (2).	
h. Power supply wires	Position tagged wires to terminal block TB1 (2). The wire labeled "1" connects to TB1 position 1. Repeat for all six wires.	
i. Six screws on terminal block TB1 (2)	Using flat tip screwdriver, install and tighten six retained screws securing power supply wires to terminal block TB1. Remove wire tags.	These were removed in step e.
j. HCP Power supply (1) and 17 captive screws	Hold power supply (1) in place and tighten 17 captive screws securing it to mounting adapter chassis. Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b.

4-18. REPLACEMENT OF POWER SUPPLY (5A1). Continued

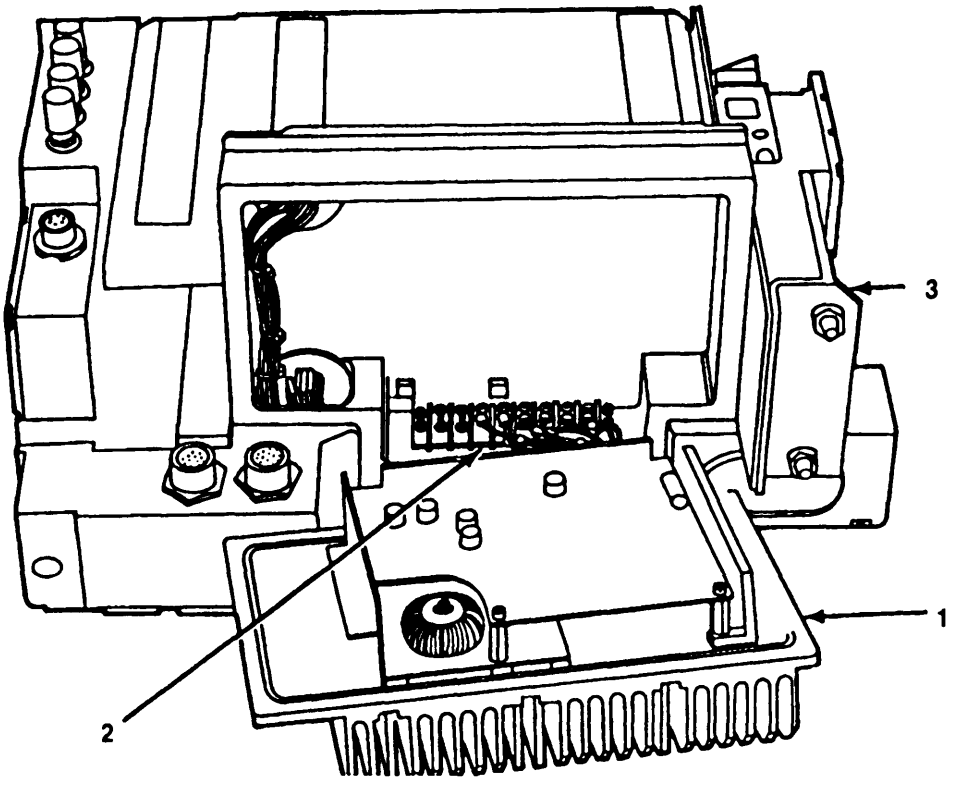

Figure 4-4. Power Supply Replacement.

4-19. REPLACEMENT OF AUDIO AMPLIFIER CCA (5A2).

Tools:

Flat tip screwdriver | Cross tip screwdriver | Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Using flat tip screwdriver, fully loosen 15 captive screws (1) securing access cover (2) to audio amplifier chassis (3). Remove access cover (2). Inspect access cover and gasket, replace if necessary.	See figure 4-5.
c. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, remove and retain eight screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	
d. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, remove and retain three screws (7), flat washers (5), and cable clamps (8) securing audio amplifier CCA (6) to audio amplifier chassis (3).	

4-19. REPLACEMENT OF AUDIO AMPLIFIER CCA (5A2). Continued

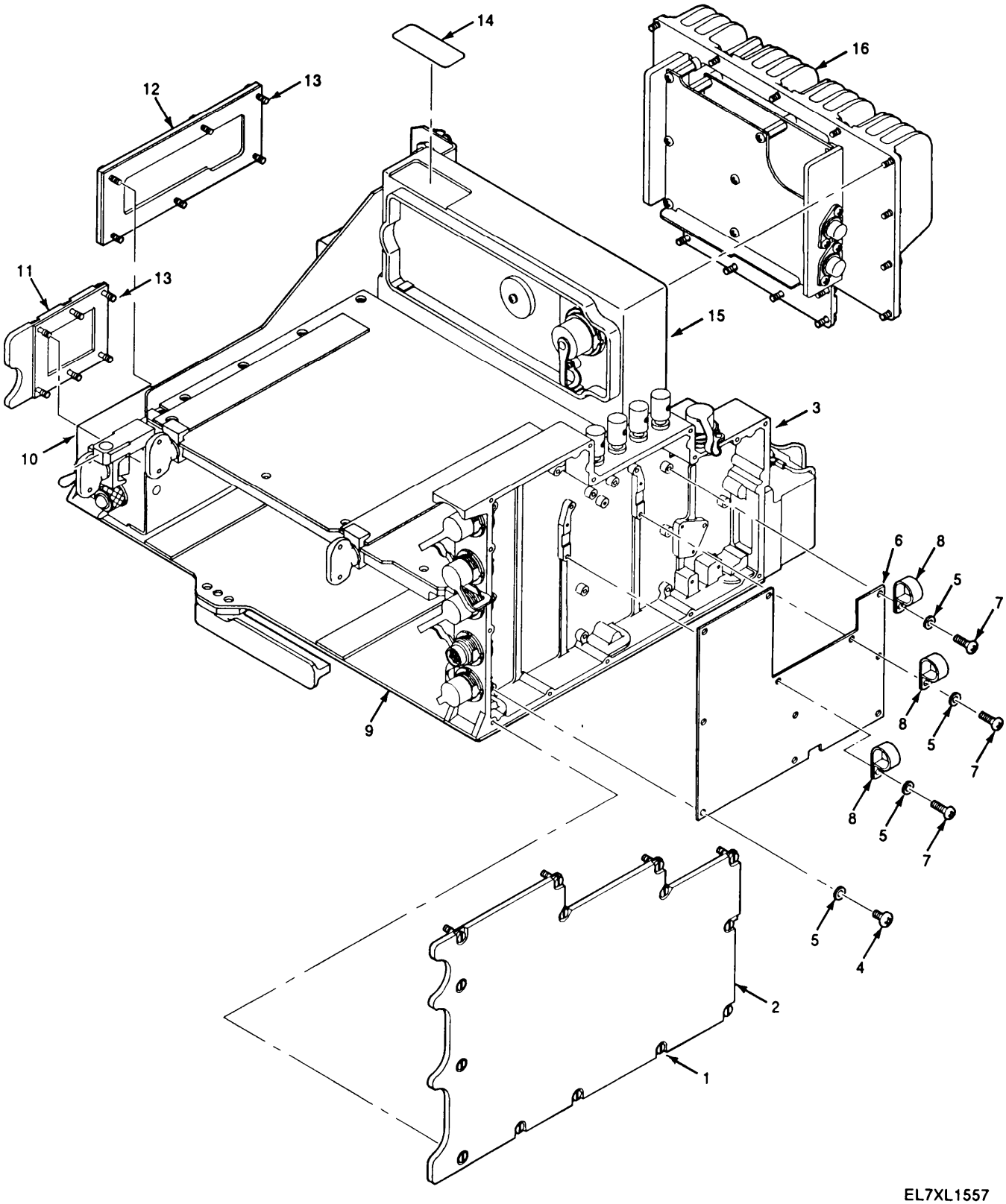

Figure 4-5. Vehicular Amplifier-Adapter AM-7239/VRC (Exploded View).

4-19. REPLACEMENT OF AUDIO AMPLIFIER CCA (5A2). Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Audio amplifier CCA (8)	Pull from audio amplifier chassis just enough to gain access to connectors P2 (1) and P3 (2).	See figure 4-6.
f. Connector P2 (1)	Loosen two jackscrews and disconnect from connector J2 on audio amplifier CCA (8).	
g. Connector P3 (2)	Loosen two jackscrews and disconnect from connector J1 on audio amplifier CCA (8).	
h. Audio amplifier CCA (8)	Remove defective audio amplifier CCA (8) and send to General Support for repair.	
INSTALLATION		
i. Audio amplifier CCA (8)	Position replacement audio amplifier CCA (8) on chassis.	
j. Connector P3 (2)	Connect to connector J1 on audio amplifier CCA (8) and tighten two jackscrews.	See figure 4-6.
k. Connector P2 (1)	Connect to connector J2 on audio amplifier CCA (8) and tighten two jackscrews.	
l. Audio amplifier CCA (8)	Hold in place in audio amplifier chassis.	
m. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, install three retained screws (7), flat washers (5), and cable clamps (8) securing audio amplifier CCA (6) to audio amplifier chassis (3).	See figure 4-5. These were removed in step d.
n. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, install and tighten eight retained screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	These were removed in step c.
o. HCP Access cover (2)	Hold in place and tighten 15 captive screws (1) securing access cover (2) to audio amplifier chassis (3). Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b.

4-19. REPLACEMENT OF AUDIO AMPLIFIER CCA (5A2). Continued

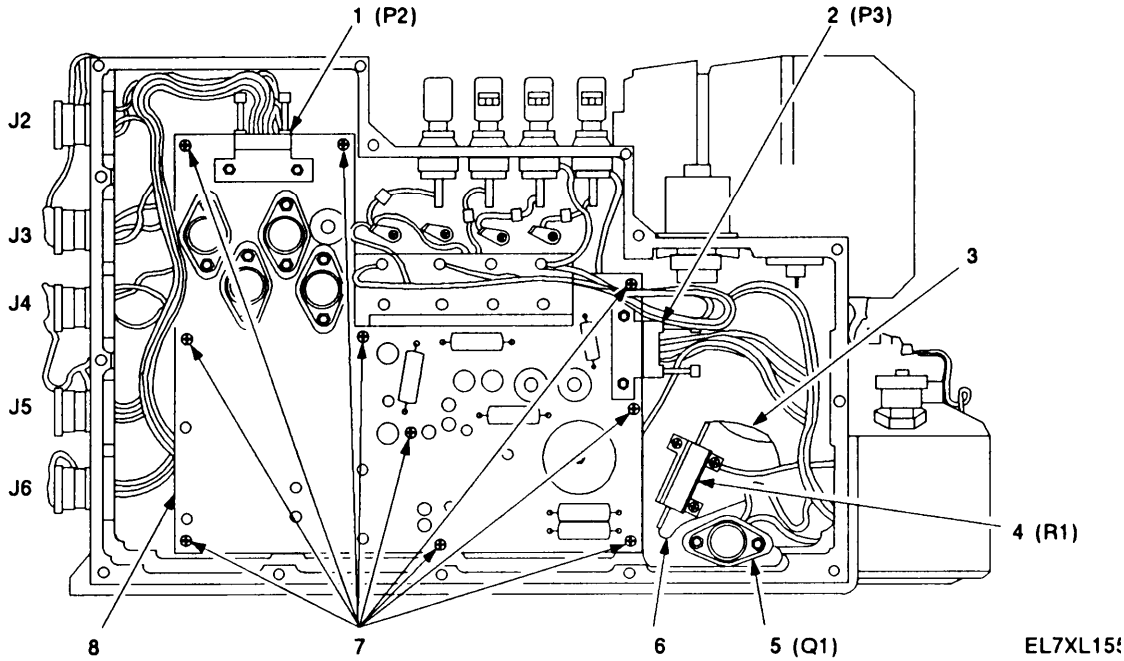

Figure 4-6. Audio Amplifier CCA Replacement.

4-20. REPLACEMENT OF TRANSISTOR Q1.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-19 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Transistor Q1 (5)	Using cross tip screwdriver, remove and retain two screws (1), lockwashers (2), flat washers (3), terminal lug (4), and two insulating washers (6) securing transistor Q1 (5) to audio amplifier chassis (8). Tag and desolder wires from transistor leads. Inspect and replace insulation sleeving as required. Remove and discard defective transistor.	See figure 4-7.
d. Mounting pad (7)	Inspect and replace as required.	

4-20. REPLACEMENT OF TRANSISTOR Q1. Continued

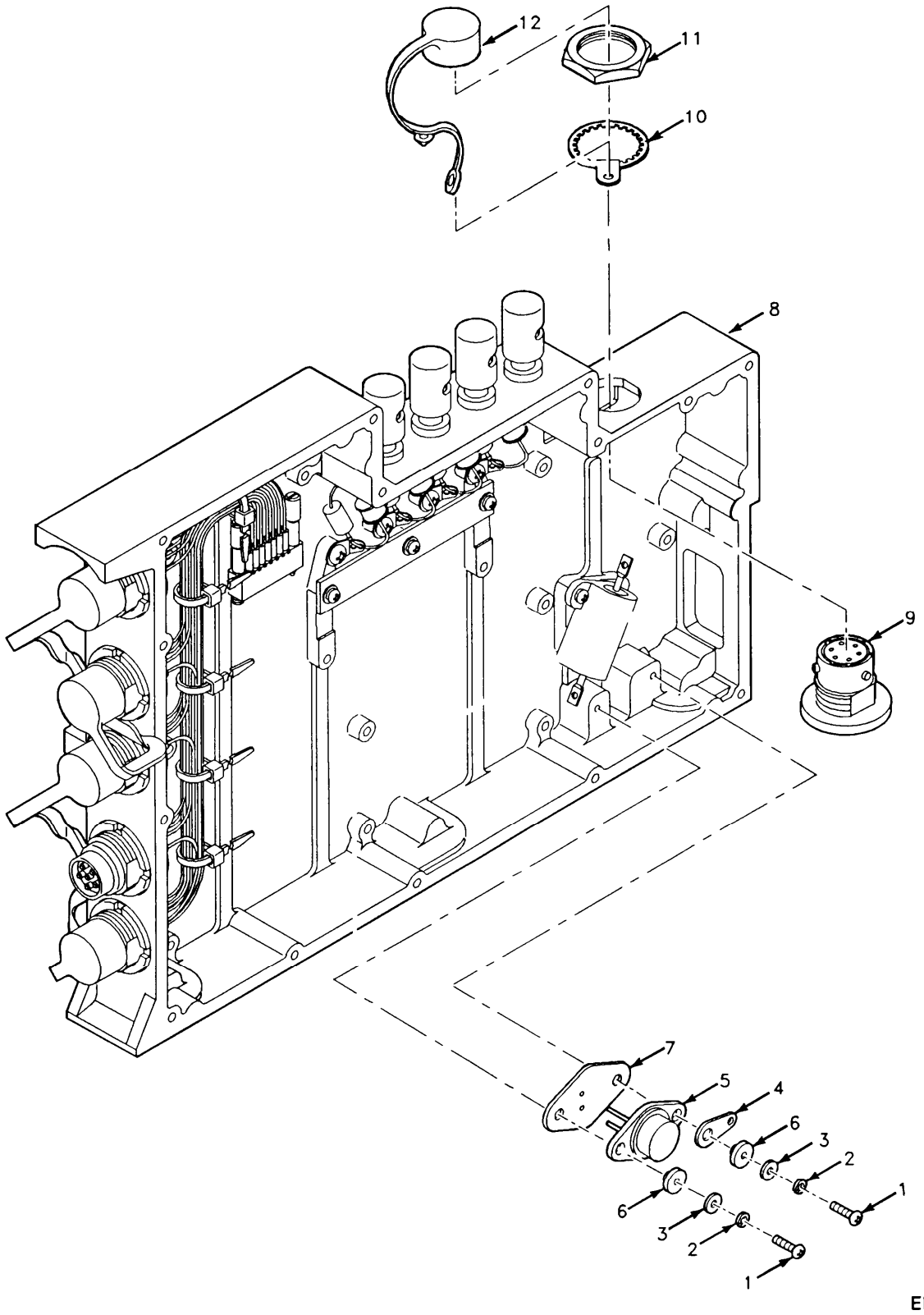

Figure 4-7. Transistor Q1 Replacement.

4-20. REPLACEMENT OF TRANSISTOR Q1. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
e. Mounting pad (7)	Install mounting pad (7) on audio amplifier chassis (8).	See figure 4-7.
f. Transistor Q1 (5)	Replace insulation sleeving. Using soldering kit, solder tagged wires to correct leads of replacement transistor. Remove wire tags. Using cross tip screwdriver, install two retained screws (1), Iockwashers (2), flat washers (3), terminal lug (4), and two insulating washers (6) securing transistor to audio amplifier chassis (8).	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
g. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-21. REPLACEMENT OF CONNECTOR J9.

Tools:

Flat tip screwdriver	7/8-inch socket	Socket wrench
Torque screwdriver	Soldering kit	Torque wrench
Pliers		

Expendable Supplies:

Silicone compound	Solder	Alcohol
Cotton swabs		

References:

Paragraph 4-19 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Protective cap (12)	Remove protective cap (12) from defective connector J9 (9).	See figure 4-7.
d. Connector J9 (9)	Using 7/8-inch socket and socket wrench, remove and discard nut (11) securing protective cap retainer (10) and connector J9 (9) to audio amplifier chassis (8). Disassemble connector. Slide insulator back on wires to expose solder connections. Using soldering kit, tag and desolder wires from connector J9. Remove and discard defective connector J9.	A replacement nut is supplied with replacement connector.

4-21. REPLACEMENT OF CONNECTOR J9. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
e. HCP Connector J9 (9)	Using solder kit, solder tagged wires to correct pins of replacement connector J9. Remove wire tags. Slide insulator over solder connections. Assemble connector. Apply silicone compound to connector threads and o-ring before installation. Install o-ring and connector in chassis. Position retained protective cap retainer (10) and replacement nut (11) to connector. Using torque wrench and 7/8-inch socket, torque nut to 58 to 62 in-lb.	Before and after soldering, clean wires and pins with alcohol and cotton swabs.
f. Protective cap (12)	Install retained protective cap (12) on connector J9 (9).	This was removed in step c.
g. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-22. REPLACEMENT OF CONNECTORS J2 - J6.

Tools:

3/4-inch spanner wrench	Flat tip screwdriver	Soldering kit
Spanner attachment	Torque screwdriver	Torque wrench
Socket wrench		

Expendable Supplies:

Silicone compound	Solder	Alcohol
Cotton swabs		

References:

Paragraph 4-19 for removal and installation of audio amplifier CCA.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Audio amplifier CCA (6)	Remove.	Refer to paragraph 4-19 for removal procedures.
d. Protective cap (3)	Remove from defective connector J2, J3, J4, J5, or J6 (1).	See figure 4-8.

4-22. REPLACEMENT OF CONNECTORS J2 - J6. Continued

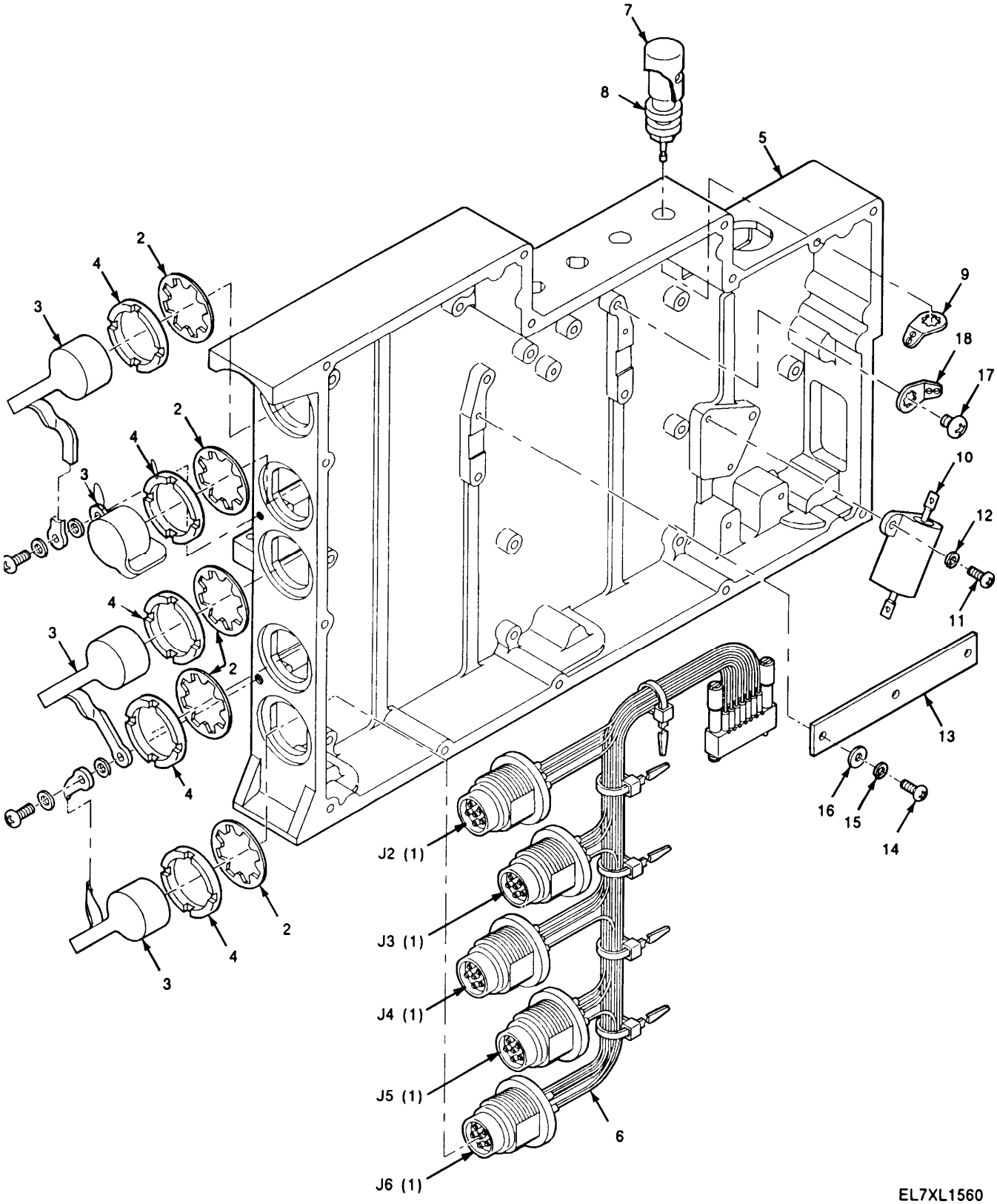

Figure 4-8. Replacement of Components in Audio Amplifier Chassis.

4-22. REPLACEMENT OF CONNECTORS J2 - J6. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Connectors J2 - J6 (1)	Using 3/4-inch spanner wrench and spanner attachment, remove and retain spanner nut (4) and internal-tooth lockwasher (2) from defective connector. Remove defective connector from audio amplifier chassis (5).	
f. Wires (6)	Remove insulation sleeving. Using soldering kit, tag and desolder wires from connector. Remove and discard defective connector.	
INSTALLATION		
g. Wires (6)	Using soldering kit, solder tagged wires to correct pins on replacement connector. Remove wire tags. Replace insulation sleeving.	Before and after soldering, clean wires and pins with alcohol and cotton swabs.
h. Audio amplifier CCA (6)	Install.	Refer to paragraph 4-19 for installation procedures.
i. HCP Connectors J2 - J6 (1)	Apply silicone compound to replacement connector o-ring. Position connector to audio amplifier chassis (5). Install retained internal-tooth lockwasher (2), and secure connector with spanner nut (4). Using torque wrench and spanner attachment, torque nut to 87 to 93 in-lb.	These were removed in step e.
j. Protective cap (3)	Install on replacement connector.	
k. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-23. REPLACEMENT OF ELECTRICAL BINDING POSTS E1A, E2A, E1B, AND E2B.

Tools:

Flat tip screwdriver	Torque wrench	5/16-inch open-end wrench
Torque screwdriver	Soldering kit	

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-19 for removal and installation of access cover.

4-23. REPLACEMENT OF ELECTRICAL BINDING POSTS E1A, E2A, E1B, AND E2B. Continued

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Wires	Using soldering kit, tag and desolder wires from defective binding post (7).	See figure 4-8.
d. Binding post (7)	Using 5/16-inch open-end wrench, remove and discard nut and lockwasher (8) securing terminal lug (9) to defective binding post. Remove and discard defective binding post from audio amplifier chassis (5).	A replacement nut and lockwasher comes with replacement binding post.
INSTALLATION		
e. Binding post (7)	Position replacement binding post to audio amplifier chassis (5). Install terminal lug (9) to binding post. Position replacement nut and lockwasher (8) on binding post. Using 5/16-inch open wrench tighten nut.	
f. Wires	Using soldering kit, solder tagged wires to replacement binding post. Remove wire tags.	Before and after soldering, clean wires and binding post with alcohol and cotton swabs.
g. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-24. REPLACEMENT OF RESISTOR R1.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-19 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Wires	Using soldering kit, tag and desolder wires from defective resistor R1 (10).	See figure 4-8.
d. Resistor R1 (10)	Using cross tip screwdriver, remove and retain two screws (11) and Iockwashers (12) securing defective resistor to audio amplifier chassis (5). Remove and discard defective resistor R1.	
INSTALLATION		
e. Resistor R1 (10)	Position replacement resistor to audio amplifier chassis (5). Using cross tip screwdriver, install two retained screws (11) and Iockwashers (12) securing replacement resistor R1 to audio amplifier chassis (5).	These were removed in step d.
f. Wires	Using soldering kit, solder tagged wires to correct leads of resistor R1. Remove wire tags.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
g. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-25. REPLACEMENT OF REMOTE CONTROL TRANSFORMER CCA.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-19 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Wires	Using soldering kit, tag and desolder wires from defective remote control transformer CCA (13).	See figure 4-8.
d. Remote control transformer CCA (13)	Using cross tip screwdriver, remove and retain three screws (14), lockwashers (15), and flat washers (16) securing defective remote control transformer CCA (13) to audio amplifier chassis (5). Remove and discard defective remote control transformer CCA (13).	
INSTALLATION		
e. Remote control transformer CCA (13)	Position replacement remote control transformer CCA (13) to audio amplifier chassis (5). Using cross tip screwdriver, install three retained screws (14), lockwashers (15), and flat washers (16) securing replacement remote control transformer CCA (13) to audio amplifier chassis (5).	These were removed in step d.
f. Wires	Using soldering kit, solder tagged wires to leads of replacement remote control transformer CCA. Remove wire tags.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
g. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-26. REPLACEMENT OF CONNECTORS P2 AND P3.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-19 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, remove and retain eight screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	
d. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, remove and retain three screws (7), flat washers, and cable clamps (8) securing audio amplifier CCA (6) to audio amplifier chassis (3).	
e. Audio amplifier CCA (8)	Pull from audio amplifier chassis just enough to gain access to connectors P2 and P3 (1 and 2).	See figure 4-6.
f. Connectors P2 and P3 (1 and 2)	Loosen two jackscrews and disconnect connector P2 (1) or P3 (2) from audio amplifier CCA connector J2 or J1.	
g. Wires	Slide insulation sleeving away from solder joints. Using soldering kit, tag and desolder wires from pins on defective connector P2 or P3 (1 or 2).	
h. Connectors P2 and P3 (1 and 2)	Remove and discard defective connector.	

4-26. REPLACEMENT OF CONNECTORS P2 AND P3. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
i. Connectors P2 and P3 (1 and 2)	Position replacement connector P2 or P3 to tagged wires.	See figure 4-6.
j. Wires	Using soldering kit, solder tagged wires to pins of replacement connector P2 or P3. Remove wire tags. Replace insulation sleeving.	Before and after soldering, clean wires and pins with alcohol and cotton swabs.
k. Connectors P2 and P3 (1 and 2)	Connect connector P2 or P3 to audio amplifier CCA connector J2 or J1 and tighten two jackscrews.	
l. Audio amplifier CCA (6)	Hold in place in audio amplifier chassis.	See figure 4-5.
m. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, install and tighten eight retained screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	These were removed in step c.
n. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, install and tighten three retained screws (7), flat washers, and cable clamps (8) securing audio amplifier CCA (6) to audio amplifier chassis (3).	These were removed in step d.
o. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-27. REPLACEMENT OF WIRING ON AUDIO AMPLIFIER CHASSIS CONNECTORS.

Tools:

Cross tip screwdriver	Pliers	Knife
Flat tip screwdriver	7/8-inch socket	Socket wrench
Torque screwdriver	Soldering kit	Torque wrench

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-19 for removal and installation of access cover.
Paragraph 4-21 for removal and installation of connector J9.
Paragraph 4-22 for removal and installation of connectors J2 - J6.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, remove and retain eight screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	
d. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, remove and retain three screws (7), flat washers, and cable clamps (8) securing audio amplifier CCA (6) to audio amplifier chassis (3).	
e. Audio amplifier CCA (6)	Pull from audio amplifier chassis just enough to gain access to connectors P2 and P3 (1 and 2).	
f. Connectors P2 and P3 (1 and 2)	Unscrew and disconnect connectors P2 and P3 from audio amplifier CCA connectors J2 and J1.	
g. Audio amplifier CCA (6)	Remove and retain.	
h. Wires	Remove insulation sleeving and tiedown straps as required. Using soldering kit, tag, desolder, and remove defective wire(s) from audio amplifier chassis connectors J2 through J6 and J9.	
i. Connector J9 wires	For replacement of wires on connector J9, remove connector J9 from audio amplifier chassis.	Refer to paragraph 4-21 for removal procedures.

4-27. REPLACEMENT OF WIRING ON AUDIO AMPLIFIER CHASSIS CONNECTORS. Continued

ITEM	ACTION	REMARKS

INSTALLATION

j. Wires

Using soldering kit, install and solder replacement wire (s) on audio amplifier chassis connectors J2 through J6 and J9, as required, per the following wire list. Replace insulation sleeving and tiedown straps as required.

Before and after soldering, clean wires and pins with alcohol and cotton swabs.

FROM	TO	COLOR/TRACER
J2-B	P2-5	White/Blue
J2-C	P2-11	White/Violet
J2-D	P2-9	White/Gray
J3-B	P2-6	White/Brown
J3-C	P2-10	White/Red
J3-D	P2-8	White/Orange
J4-A	J2-A	Black
J4-B	J2-B	White/Blue
J4-C	J2-C	White/Violet
J4-D	J2-D	White/Gray
J4-F	P2-13	White
J5-A	J3-A	Black
J5-B	J3-B	White/Brown
J5-C	J3-C	White/Red
J5-D	J3-D	White/Orange
J5-F	P2-12	White/Green
J6-A	P2-14	Black
J6-B	J5-B	White/Brown
J6-C	J5-C	White/Red
J6-D	J5-D	White/Orange
J6-E	P2-2	White/Yellow
J6-F	J5-A	Black
J9-A	A1-E14	Black
J9-B	A1-E4	White/Red
J9-C	A1-E3	White/Black
J9-D	A1-E8	White
J9-E	A1-E7	White/Orange
J9-F	TB1-2	Red

k. Connectors J2 through J6 and J9

Install replacement connector in audio amplifier chassis.

Refer to paragraphs 4-21 and 4-22 for installation procedures.

l. Audio amplifier CCA (6)

Position retained audio amplifier CCA in audio amplifier chassis.

This was removed in step g.

m. Connectors P2 and P3 (1 and 2)

Connect connectors P2 and P3 to audio amplifier CCA connectors J2 and J1 and tighten screws.

n. Audio amplifier CCA (6)

Hold in place in audio amplifier chassis.

4-27. REPLACEMENT OF WIRING ON AUDIO AMPLIFIER CHASSIS CONNECTORS. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
o. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, install and tighten eight retained screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	See figure 4-5. These were removed in step c.
p. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, install and tighten three retained screws (7), flat washers, and cable clamps (8) securing audio amplifier CCA (6) to audio amplifier chassis (3).	These were removed in step d.
q. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-28. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET.

Tools:

Cross tip screwdriver	Pliers	5/16-inch open end wrench
Flat tip screwdriver	Socket wrench	7/8-inch socket
Torque screwdriver	Torque wrench	Soldering kit

Expendable Supplies:

Silicone compound	Adhesive, cyanoacrylate	Solder
Cotton swabs	Alcohol	

References:

Paragraph 4-19 for removal and installation of audio amplifier CCA.
Paragraph 4-20 for removal and installation of transistor Q1.
Paragraph 4-21 for removal and installation of connector J9.
Paragraph 4-24 for removal and installation of resistor R1.
Paragraph 4-40 for removal and installation of bottom cover.
Figures 4-5, 4-6, 4-7, 4-8, 4-10, and 4-11 for location of amplifier adapter parts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Three screws (1) and flat washers (2)	Use cross tip screwdriver. Remove and retain three screws (1) and flat washers (2) securing bottom shelf (3) to audio amplifier chassis (16).	See figure 4-11.
d. Five screws (7)	Use cross tip screwdriver. Remove and retain five screws (7) securing top shelf (9) to audio amplifier chassis (16).	

4-28. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Bottom cover (13)	Remove.	Refer to paragraph 4-40 for removal procedures.
f. Connectors P3 (2)	Disconnect from audio amplifier CCA (8).	See figure 4-6.
g. Three screws (7), flat washers (5), and cable clamps (8)	Use cross tip screwdriver. Remove and retain three screws (7), flat washers (2), and cable clamps (8) securing audio amplifier CCA (6) and cables to audio amplifier chassis (3).	See figure 4-5.
h. Cable harness connections	Label cable harness connections at A3A1E1, A3A1E2, A3A1E5, A3A1E6, A3E5, and A3E7. Using soldering kit, desolder cable harness connections at the above points.	
i. Connector J9 (9)	Remove and retain. See figure 4-7.	Refer to paragraph 4-21 for removal procedures.
j. Transistor Q1 (5)	Remove and retain. See figure 4-7.	Refer to paragraph 4-20 for removal procedures.
k. Resistor R1 (10)	Remove and retain. See figure 4-8.	Refer to paragraph 4-24 for removal procedures.
l. Ground lug	Use cross tip screwdriver. Remove ground lug located next to resistor R1.	
m. Cable harness	Remove cable harness from audio amplifier chassis by pushing it out through access hole in back of audio amplifier chassis.	See figure 4-11.
n. Two screws (17 and 18) and flat washers (19)	Use cross tip screwdriver and 5/16-inch open end wrench. Remove and retain two screws (17 and 18) and flat washers (19) securing power supply chassis (15) to audio amplifier chassis (16).	
o. Audio amplifier chassis (16)	Remove from amplifier adapter chassis (15).	
p. O-ring gasket	Remove and discard. Clean audio amplifier case channel of all debris.	
INSTALLATION		
q. O-ring gasket (2)	Apply silicone compound to o-ring gasket. Install in channel on audio amplifier chassis case and secure with cyanoacrylate adhesive.	
r. Two screws (17 and 18) and flat washers (19)	Use cross tip screwdriver and 5/16-inch open end wrench. Align audio amplifier chassis (16) to power supply chassis (15) Install and tighten two retained screws (17 and 18) and flat washers (19).	These were removed in step n.

4-28. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
s. Cable harness	Install in audio amplifier chassis by routing through access hole in back of audio amplifier chassis (16).	See figure 4-11.
t. Ground lug	Use cross tip screwdriver. Install ground lug on audio amplifier chassis (16).	This was removed in step l.
u. Resistor R1 (10)	Install retained resistor R1 (10) on chassis (8).	Refer to paragraph 4-24 for installation procedures.
v. Transistor Q1 (5)	Install retained transistor Q1 (5) on chassis (8).	Refer to paragraph 4-20 for installation procedures.
w. HCP Connector J9 (9)	Install retained connector J9 (9) on chassis (8). See figure 4-7.	Refer to paragraph 4-21 for installation procedures.
x. Cable harness connections	Using soldering kit, solder tagged wires to correct terminals. Remove wire tags.	These were removed in step h. Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
y. Three screws (7), flat washers (5), and cable clamps (8)	Use cross tip screwdriver. Install three retained screws (7), flat washers (2), and cable clamps (8) securing cable harness and audio amplifier CCA (6) to audio amplifier chassis (3).	See figure 4-5. These were removed in step g.
z. Connectors P3 (2)	Connect to audio amplifier CCA (8).	See figure 4-6. This was removed in step f.
aa. Bottom cover (13)	Remove.	Refer to paragraph 4-40 for installation procedures. This was removed in step e.
ab. Five screws (7)	Install five retained screws (7) securing top shelf (9) to audio amplifier chassis (16).	See figure 4-11. These were removed in step d.
ac. Three screws (1) and flat washers (2)	Install three retained screws (1) and flat washers (2) securing bottom shelf (3) to audio amplifier chassis (16).	These were removed in step c.
ad. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-28. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET. Continued

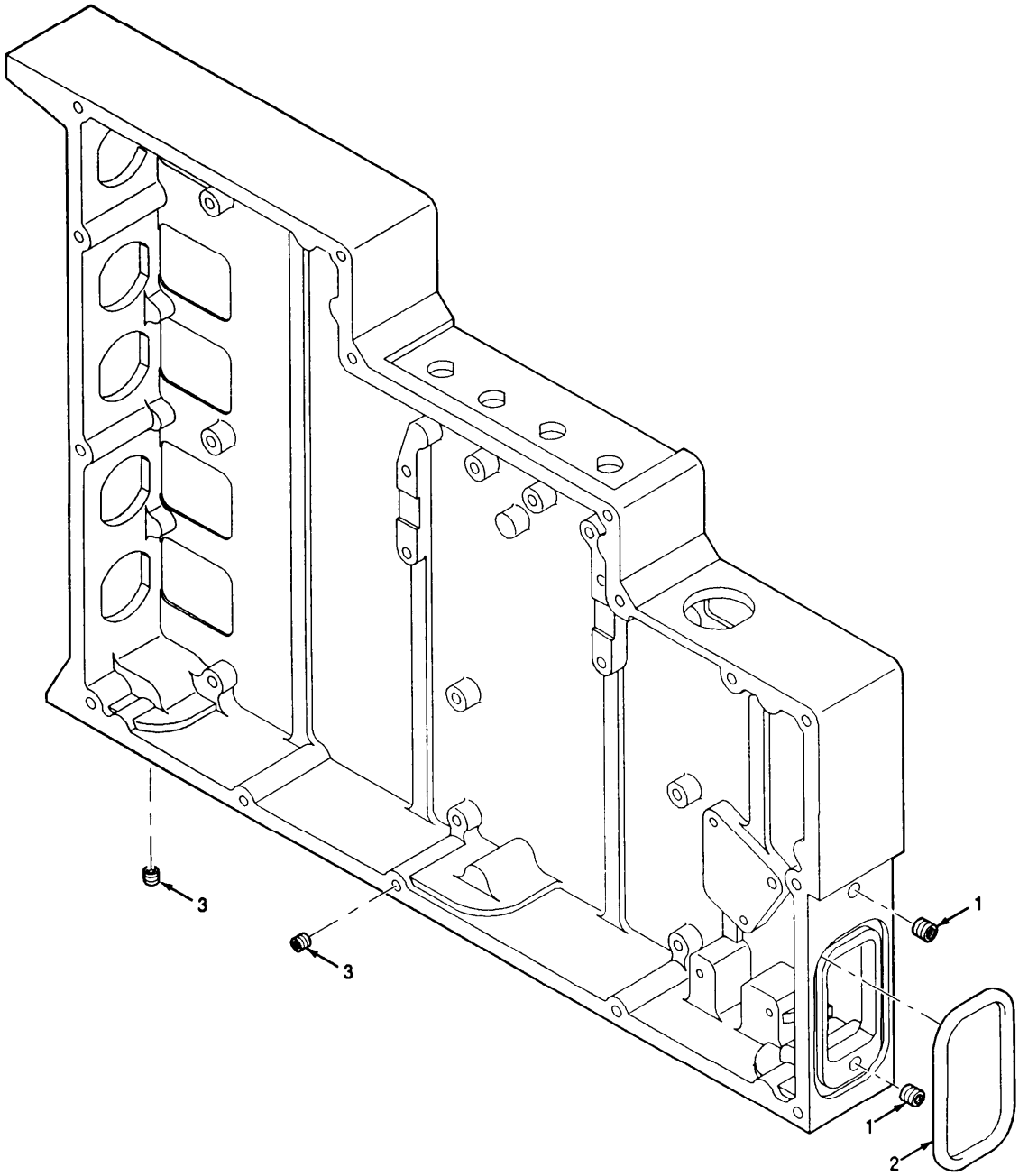

Figure 4-9. Maintenance of Audio Amplifier Chassis Case.

4-29. REPLACEMENT OF SURGE ARRESTORS OR DIODES.

Tools:

Flat tip screwdriver	Torque screwdriver	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-19 for removal and installation of audio amplifier CCA.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Surge arrestor or diode	Using soldering kit, desolder and discard defective diode or surge arrestor.	
INSTALLATION		
d. Surge arrestor or diode	Position replacement surge arrestor or diode to terminal and binding post. Using solder kit, solder replacement surge arrestor or diode in place.	These were removed in step c. Before and after soldering, clean wires and leads with alcohol and cotton swabs.
e. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-30. REPLACEMENT OF AUDIO AMPLIFIER CASE.

Tools:

Cross tip screwdriver	Pliers	Adjustable wrench
Flat tip screwdriver	Socket wrench	7/8-inch socket
Torque screwdriver	Torque wrench	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-19 for removal and installation of audio amplifier CCA.
Paragraph 4-20 for removal and installation of transistor Q1.
Paragraph 4-21 for removal and installation of connector J9.
Paragraph 4-22 for removal and installation of connectors J2 - J6.
Paragraph 4-23 for removal and installation of binding posts.
Paragraph 4-24 for removal and installation of resistor R1.
Paragraph 4-25 for removal and installation of remote control transformer CCA.
Figures 4-5, 4-6, 4-7, 4-8, 4-10, and 4-11 for location of amplifier adapter parts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (2)	Remove.	See figure 4-5. Refer to paragraph 4-19 for access cover removal procedures.
c. Audio amplifier CCA (6)	Remove and retain.	Refer to paragraph 4-19 for removal procedures.
d. Connectors J2 - J6	Remove and retain.	Refer to paragraph 4-21 for removal procedures.
e. Connector covers	Using cross tip screwdriver, remove and retain two screws and flat washers securing four protective covers to audio amplifier case.	
f. Transistor Q1 (5)	Remove and retain. See figure 4-7.	Refer to paragraph 4-20 for removal procedures.
g. Resistor R1 (10)	Remove and retain. See figure 4-8.	Refer to paragraph 4-24 for removal procedures.
h. Binding posts	Remove and retain. See figure 4-7.	Refer to paragraph 4-23 for removal procedures.
i. Surge Arrestors and diodes	Using cross tip screwdriver, remove and retain four screws securing terminal lugs, surge arrestors and diodes to audio amplifier case.	
j. Remote control transformer CCA	Remove and retain.	Refer to paragraph 4-25 for removal procedures.

4-30. REPLACEMENT OF AUDIO AMPLIFIER CASE. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
k. Connector J9 (9)	Remove and retain. See figure 4-7.	Refer to paragraph 4-21 for removal procedures.
l. Bottom cover	Using cross tip screwdriver, remove and retain 18 screws and IET Iockwashers securing bottom cover to power supply chassis. Remove and retain bottom cover.	
m. Audio amplifier case	Using adjustable wrench and cross tip screwdriver, remove and retain two screws and flat washers securing defective audio amplifier case to power supply chassis.	
n. Bottom shelf (9)	Using cross tip screwdriver, remove and retain three screws and flat washers securing audio amplifier case to bottom shelf (9). Remove and discard audio amplifier case (3).	See figure 4-5.
INSTALLATION		
o. Audio amplifier case	Position to power supply chassis. Using adjustable wrench and cross tip screwdriver, install two retained screws and flat washers securing audio amplifier case to power supply chassis.	These were removed in step m.
p. Bottom shelf (9)	Using cross tip screwdriver, install three retained screws and flat washers securing bottom shelf (9) to audio amplifier case.	See figure 4-5. These were removed in step n.
q. Bottom cover	Using cross tip screwdriver, install 18 retained screws and IET Iockwashers securing bottom cover to power supply chassis.	These were removed in step l.
r. HCP Connector J9 (9)	Install. See figure 4-7.	Refer to paragraph 4-21 for installation procedures.
s. Remote control transformer CCA	Install.	Refer to paragraph 4-25 for installation procedures.
t. Surge Arrestors and diodes	Using cross tip screwdriver, install four retained screws securing terminal lugs, surge arrestors and diodes to audio amplifier case.	These were removed in step i.
u. HCP Binding posts	Install. See figure 4-7.	Refer to paragraph 4-23 for installation procedures.

4-30. REPLACEMENT OF AUDIO AMPLIFIER CASE. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
v. Resistor R1 (10)	Install. See figure 4-8.	Refer to paragraph 4-24 for installation procedures.
w. Transistor Q1 (5)	Install. See figure 4-7.	Refer to paragraph 4-20 for installation procedures.
x. Connector covers	Using cross tip screwdriver, install two retained screws and flat washers securing four protective covers to audio amplifier case.	These were removed in step e.
y. HCP Connectors J2 - J6	Install.	Refer to paragraph 4-21 for installation procedures.
z. Audio amplifier CCA (6)	Install.	Refer to paragraph 4-19 for installation procedures.
aa. HCP Access cover (2)	Install.	See figure 4-5. This was removed in step b. Refer to paragraph 4-19 for access cover installation procedures.

4-31. REPLACEMENT OF CIRCUIT BREAKER CB1.

Tools:

1/2-inch open-end wrench	Flat tip screwdriver	Torque wrench
1/2-inch socket	Torque screwdriver	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Figures 4-5 and 4-10 for location of amplifier adapter parts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Six captive screws (13) and front access cover (11)	Using flat tip screwdriver, fully loosen six captive screws (13) securing front access cover (11) to power control chassis (10). Remove front access cover. Inspect front access cover, replace if required.	See figure 4-5.
c. Circuit breaker CB1 (10)	Using 1/2-inch open-end wrench, remove and retain nut, IET lockwasher, ON/OFF plate, and locking ring securing defective circuit breaker CB1 (10) to power control chassis (17). Remove circuit breaker from power control chassis.	See figure 4-10.
d. Wires	Using soldering kit, tag and desolder wires from leads of circuit breaker. Remove and discard circuit breaker.	
INSTALLATION		
e. Wires	Using soldering kit, solder tagged wires to leads of replacement circuit breaker. Remove wire tags.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
f. HCP Circuit breaker CB1 (10)	Position circuit breaker CB1 (10) into power control chassis (17) and install retained locking ring, ON/OFF plate, lockwasher, and nut. Using 1/2-inch socket and torque wrench, secure circuit breaker to power control chassis (17). Torque nut to 19 to 21 in-lb.	These were removed in step c.
g. HCP Front access cover (11) and six captive screws (13)	Hold in place and tighten six captive screws (13) securing front access cover (11) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. This was removed in step b.

4-31. REPLACEMENT OF CIRCUIT BREAKER CB1. Continued

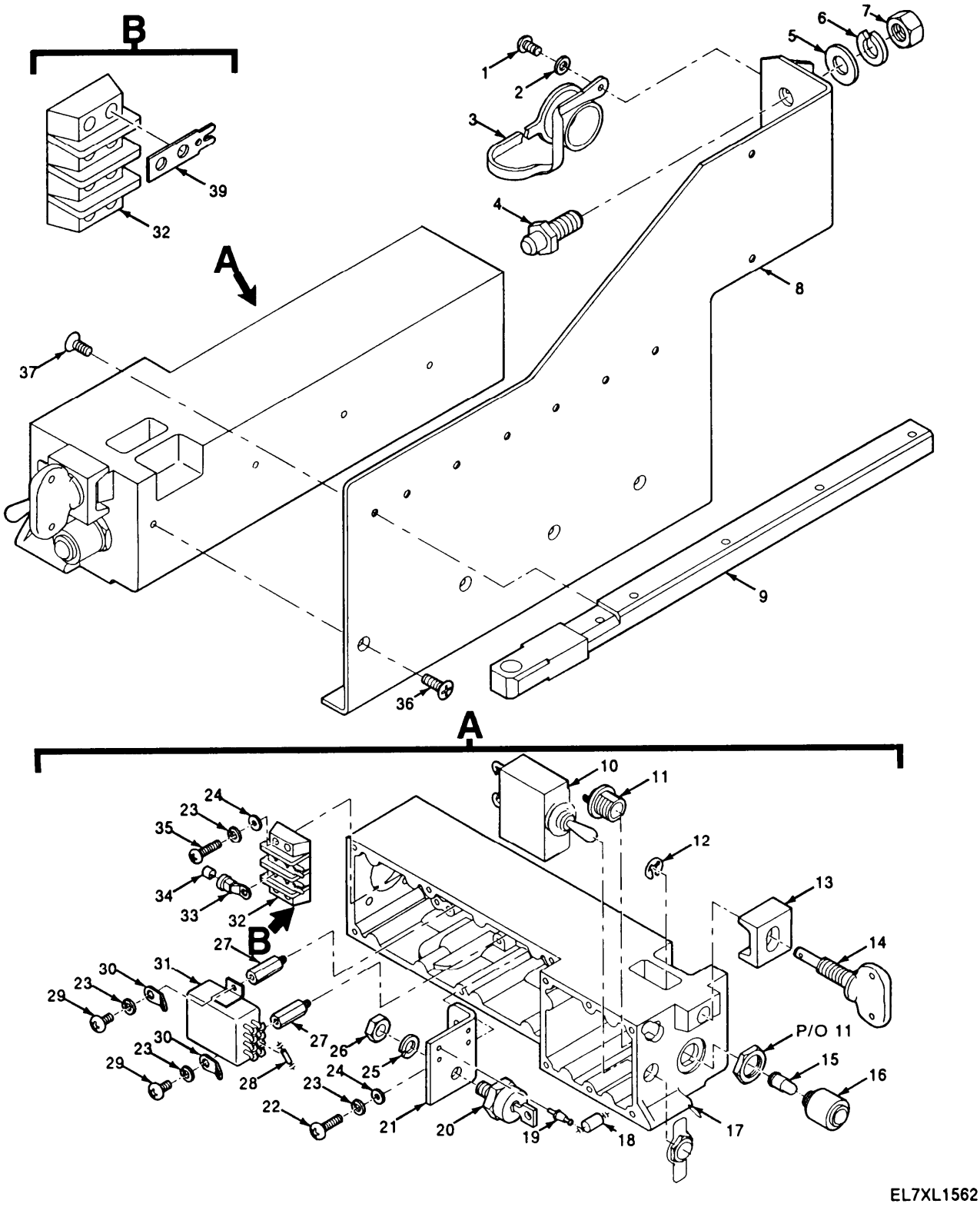

Figure 4-10. Replacement of Components in Power Control Chassis.

4-32. REPLACEMENT OF LAMP HOLDER DS1.

Tools:

1/2-inch open-end wrench	1/2-inch socket	Flat tip screwdriver
9/16-inch open-end wrench	9/16-inch socket	Torque screwdriver
Torque wrench	Soldering kit	

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-31 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Six captive screws (13) and front access cover (11)	Using flat tip screwdriver, fully loosen six captive screws (13) securing front access cover (11) to power control chassis (10). Remove front access cover. Inspect front access cover, replace if required.	See figure 4-5.
c. Circuit breaker CB1 (10)	Remove and retain.	Refer to paragraph 4-31 for removal procedures.
d. Lens (16) and lamp (15)	Remove and retain lens (16) and lamp (15) from defective lamp holder DS1 (11).	See figure 4-10.
e. Wires	Using soldering kit, tag and desolder wires from defective lamp holder DS1 (11).	
f. Lamp holder DS1 (11)	Using 9/16-inch open-end wrench, remove and retain nut and lockwasher securing defective lamp holder DS1 (11) to power control chassis (17). Remove lamp holder through front of chassis. Discard defective lamp holder	
INSTALLATION		
g. HCP Lamp holder DS1 (11)	Position lamp holder DS1 to power control chassis (17) and install retained lockwasher and nut. Using torque wrench and 9/16-inch socket, torque nut to 29 to 31 in-lb.	These were removed in step f.
h. Wires	Using soldering kit, solder tagged wires to leads of replacement lamp holder DS1 (11). Remove wire tags. Replace insulation sleeving as required.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
i. Lens (16) and lamp (15)	Install retained lens (16) and lamp (15) to lamp holder DS1 (11).	These were removed in step d.
j. HCP Circuit breaker CB1 (10)	Install retained circuit breaker CB1 (10) in power control chassis (17).	Refer to paragraph 4-31 for installation procedures.
k. HCP Front access cover (11) and six captive screws (13)	Hold in place and tighten six captive screws (13) securing front access cover (11) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. This was removed in step b.

4-33. REPLACEMENT OF RELAY K1.

Tools:

Cross tip screwdriver	Torque screwdriver	Soldering kit
Flat tip screwdriver		

Expendable Supplies:

Sealing compound, grade H	Solder	Cotton swabs
Alcohol		

References:

Figures 4-5 and 4-10 for location of amplifier adapter parts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Rear access cover (12)	Using flat tip screwdriver, fully loosen six captive screws (13) securing rear access cover (12) to power control chassis (11). Remove and inspect rear access cover replace if required.	See figure 4-5.
c. Relay K1 (31)	Using cross tip screwdriver, remove and retain two screws (29), lockwashers (23), and terminal lugs (30) securing defective relay K1 (31) to two electrical posts (27) on power control chassis (17).	See figure 4-10.
d. Diode CR6 (28)	Note polarity. Using soldering kit, desolder, remove, and retain diode CR6 (28) from defective relay K1 (31).	
e. Wires	Remove insulation sleeving as required. Using soldering kit, tag and desolder wires from leads of relay K1 (31). Remove and discard relay K1.	
INSTALLATION		
f. Wires	Using soldering kit, solder tagged wires to leads of replacement relay K1 (31). Remove wire tags. Replace insulation sleeving as required.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
g. Diode CR6 (28)	Note polarity. Using soldering kit, solder retained diode CR6 (28) to leads X1 and X2 of relay K1 (31).	Before and after soldering, clean solder joints with alcohol and cotton swabs.
h. Relay K1 (31)	Position replacement relay K1 (31) on two electrical posts (27) on power control chassis (17). Using cross tip screwdriver, install two retained screws (29), lockwashers (23), and terminal lugs (30) securing relay K1 to power control chassis (17).	Apply one drop of grade H sealing compound to threads of two retained screws before installation.

4-33. REPLACEMENT OF RELAY K1. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
i. HCP Rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b. See figure 4-5.

4-34. REPLACEMENT OF DIODE CR1.

Tools:

Flat tip screwdriver, Cross tip screwdriver, 7/16-inch open-end wrench, Torque screwdriver, Soldering kit

Expendable Supplies:

Cotton swabs, Solder, Alcohol

References:

Figures 4-5 and 4-10 for location of amplifier adapter parts.
Paragraph 4-33 for removal and installation of rear access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Rear access cover (12)	Remove and retain.	See figure 4-5. Refer to paragraph 4-33 for removal procedures.
c. Wires	Remove insulation sleeving as required. Using soldering kit, tag and desolder wires from defective diode CR1 (20).	See figure 4-10.
d. Two screws (22), flat washers (24), and Iockwashers (23)	Using cross tip screwdriver, remove and retain two screws (22), flat washers (24), and Iockwashers (23) securing mounting bracket (21) to power control chassis (17).	
e. Diode CR1 (20)	Using 7/16-inch open-end wrench, remove and retain hex nut (26) and Iockwasher (25) securing defective diode CR1 (20) to mounting bracket (21). Remove and discard defective diode CR1.	

4-34. REPLACEMENT OF DIODE CR1. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
f. Diode CR1 (20)	Position replacement diode CR1 (20) to mounting bracket (21). Using 7/16-inch open-end wrench, install retained hex nut (26) and lockwasher (25) securing diode CR1 (20) to mounting bracket.	This was removed in step e.
g. Two screws (22), flat washers (24), and lockwashers (23)	Using cross tip screwdriver, install mounting bracket (21) to power control chassis (17) using two retained screws (22), flat washers (24), and lockwashers (23).	These were removed in step d.
h. Wires	Using soldering kit, solder tagged wires to terminal on diode CR1 (20). Remove wire tags. Replace insulation sleeving as required.	Before and after soldering, clean wires and terminal with alcohol and cotton swabs.
i. HCP Rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. This was removed in step b.

4-35. REPLACEMENT OF ZENER DIODE VR1/VR2.

Tools:

Flat tip screwdriver | Torque screwdriver | Soldering kit
Cross tip screwdriver

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Figures 4-5 and 4-10 for location of amplifier adapter parts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Rear access cover (12)	Remove and retain.	See figure 4-5. Refer to paragraph 4-33 for removal procedures.
c. Two screws (22), flat washers (24), and lockwashers (23)	Using cross tip screwdriver, remove and retain two screws (22), flat washers (24), and lockwashers (23) securing mounting bracket (21) to power control chassis (17).	
d. Zener diode VR1/VR2 (18)	Note polarity. Using soldering kit, desolder defective Zener diode VR1/VR2 (18) from terminal studs (19) on mounting bracket (21). Remove and retain insulation sleeving. Remove and discard defective Zener diode VR1/VR2 (18).	See figure 4-10.
INSTALLATION		
e. Zener diode VR1/VR2 (18)	Install retained insulation sleeving on replacement Zener diode VR1/VR2 (18). Note polarity. Using soldering kit, solder replacement diode to terminal studs (19) on mounting bracket (21).	Before and after soldering, clean leads with alcohol and cotton swabs.
f. Two screws (22), flat washers (24), and lockwashers (23)	Using cross tip screwdriver, install mounting bracket (21) to power control chassis (17) using two retained screws (22), flat washers (24), and lockwashers (23).	These were removed in step c.
g. HCP Rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (10), Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. This was removed in step b.

4-36. REPLACEMENT OF SIDE PANEL.

Tools:

Cross tip screwdriver	Torque screwdriver	1/2-inch open-end wrench
Flat tip screwdriver	Adjustable wrench	

References:

Figures 4-5, 4-10, and 4-11 for location of amplifier adapter parts.
Paragraph 4-40 for removal and installation of bottom cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Six captive screws (13) and rear access cover (12)	Using flat tip screwdriver, fully loosen six captive screws (13) securing rear access cover (12) to power control chassis (10). Remove and retain rear access cover.	See figure 4-5.
c. Two screws (1) and flat washers (2)	Using cross tip screwdriver, remove and retain two screws (1) and flat washers (2) securing bottom shelf (3) to power control chassis (4).	See figure 4-11. NOTE There are two different types of bottom shelf.
d. Bottom cover (13)	Remove and retain.	Refer to paragraph 4-40 for removal procedures.
e. Connector P1 (13)	Using flat tip screwdriver, remove and retain four screws securing connector P1 to power supply chassis (15).	
f. Four screws (40)	Using cross tip screwdriver, remove and retain four screws (40) securing rear of power control chassis (4) to power supply chassis (15).	
g. Two screws (5)	Using cross tip screwdriver, remove and retain two screws (5) securing side panel (6) of power control chassis (4) to power supply chassis (15).	
h. Five screws (7 and 8)	Using cross tip screwdriver, remove and retain five screws (7 and 8) securing top shelf (9) to mounting rail (10) on side panel (6) of power control chassis (4).	
i. Mounting rail (9)	Using cross tip screwdriver, remove and retain seven screws (37) securing mounting rail (9) to defective side panel (8). Remove and retain mounting rail (9).	See figure 4-10.
j. Side panel (8)	Using cross tip screwdriver, remove and retain four screws (36) securing defective side panel to power control chassis (17). Remove defective side panel.	See figure 4-10.

4-36. REPLACEMENT OF SIDE PANEL. Continued

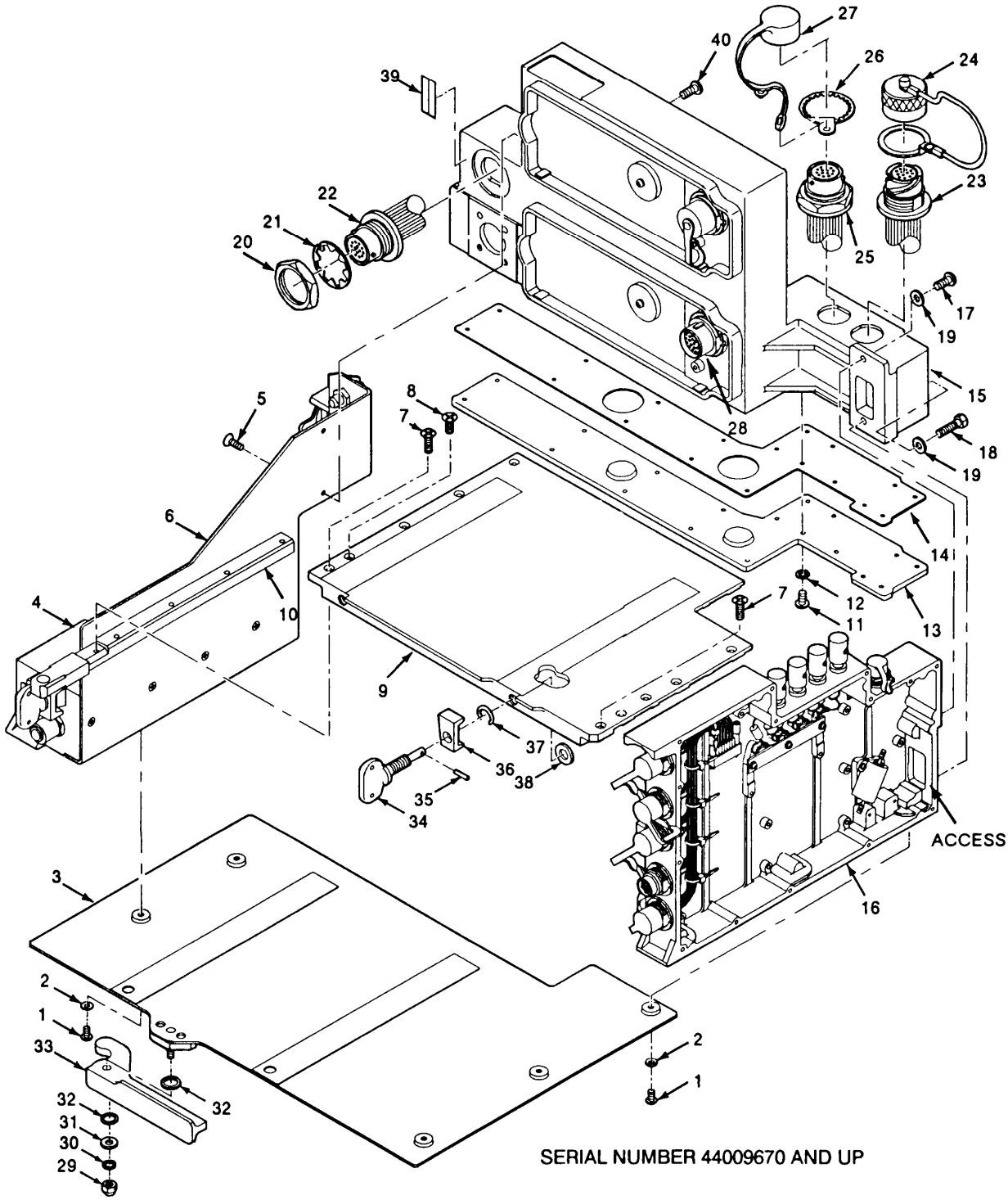

Figure 4-11. Disassembled View of Mounting Adapter AM-7239/VRC.

4-36. REPLACEMENT OF SIDE PANEL. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
k. J1 protective cap (3)	Using cross tip screwdriver, remove and retain screw (1) and flat washer (2) securing J1 protective cap (3) to defective side panel (8). Remove and retain J1 protective cap.	
l. Shoulder pin (4)	Using adjustable wrench and 1/2-inch open-end wrench, remove and retain hex nut (7), lockwasher (6), and flat washer (5) securing shoulder pin (4) to side panel (8). Remove and retain shoulder pin.	
m. Side panel (8)	Discard defective side panel.	
INSTALLATION		
n. Shoulder pin (4)	Obtain replacement side panel (8). Position retained shoulder pin (4), hex nut (11), lockwasher (10), and flat washer (9) to side panel (12). Using adjustable wrench and 1/2-inch open-end wrench, tighten nut.	These were removed in step l.
o. J1 protective cap (3)	Using cross tip screwdriver, install retained screw (1) and flat washer (2) securing retained J1 protective cap (3) to side panel (8).	These were removed in step k.
p. Side panel (8)	Position replacement side panel (8) to power control chassis (17). Using cross tip screwdriver, install four retained screws (36) securing replacement side panel to power control chassis (17).	These were removed in step j.
q. Mounting rail (9)	Using cross tip screwdriver, install seven retained screws (37) securing retained mounting rail (9) to side panel (8).	These were removed in step i.
r. Five screws (7 and 8)	Using cross tip screwdriver, install five retained screws (7 and 8) securing top shelf (9) to mounting rail (10) on side panel (6) of power control chassis (4).	These were removed in step h. See figure 4-11.
s. Two screws (1) and flat washers (2)	Using cross tip screwdriver, install two retained screws (1) and flat washers (2) securing bottom shelf (3) to power control chassis (4).	These were removed in step c.
t. Two screws (5)	Using cross tip screwdriver, install two retained screws (5) securing side panel (6) of power control chassis (4) to power supply chassis (15).	These were removed in step g.

4-36. REPLACEMENT OF SIDE PANEL. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
u. Four screws (40)	Using cross tip screwdriver, install four retained screws (40) securing rear of power control chassis (4) to power supply chassis (15).	These were removed in step f.
v. Connector P1 (13)	Using flat tip screwdriver, install four retained screws securing connector P1 to power supply chassis (15).	
w. Bottom cover (13)	Install.	Refer to paragraph 4-40 for installation procedures.
x. HCP Rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b. See figure 4-5.

4-37. REPLACEMENT OF DIODE CR6.

Tools:

Cross tip screwdriver	Torque screwdriver
Flat tip screwdriver	Soldering kit

Expendable Supplies:

Sealing compound, grade H	Cotton swabs
Solder	Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Rear access cover (12)	Using flat tip screwdriver, fully loosen six captive screws (13) securing rear access cover (12) to power control chassis (10). Remove and retain rear access cover.	See figure 4-5.
c. Relay K1 (31)	Using cross tip screwdriver, remove and retain two screws (29), lockwashers (23), and terminal lugs (30) securing relay K1 (31) to two electrical posts (27) on power control chassis (17). Remove and retain relay K1.	See figure 4-10.
d. Diode CR6 (28)	Noting polarity, desolder defective diode CR6 (28) from leads X1 and X2 of relay K1 (31). Remove and discard defective diode CR6.	

4-37. REPLACEMENT OF DIODE CR6. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
e. Diode CR6 (28)	Noting polarity, solder replacement diode CR6 (28) to leads X1 and X2 of retained relay K1 (31).	Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. Relay K1 (31)	Position retained relay K1 (31) on two electrical posts (27) on power control chassis (17). Using cross tip screwdriver, install two retained screws (29), lock-washers (23), and terminal lugs (30) securing relay K1 (31) to power control chassis (17).	Apply one drop of grade H sealing compound to threads of two retained screws before installation.
g. HCP Rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b. See figure 4-5.

4-38. REPLACEMENT OF TERMINAL BLOCK TB2.

Tools:

Cross tip screwdriver | Flat tip screwdriver | Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Six captive screws (13) and rear access cover (12)	Using flat tip screwdriver, fully loosen six captive screws (13) securing rear access cover (12) to power control chassis (10). Remove and retain rear access cover.	See figure 4-5.
c. Wires	Tag wires of terminal block TB2 (32). Using flat tip screwdriver, remove and retain four screws securing shorting bar (39) and terminal lugs (33) with tagged wires to terminal block TB2 (32).	See figure 4-10.
d. Terminal block TB2 (32)	Using cross tip screwdriver, remove and retain four screws (35), lockwashers (23), and flat washers (24) securing defective terminal block TB2 (32) to power control chassis (17). Remove and discard defective terminal block TB2.	

4-38. REPLACEMENT OF TERMINAL BLOCK TB2. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
e. Terminal block TB2 (32)	Using cross tip screwdriver, install four retained screws (35), lockwashers (23), and flat washers (24) securing replacement terminal block TB2 (32) to power control chassis (17).	These were removed in step d.
f. Wires	Using flat tip screwdriver, install four retained screws securing shorting bar (39) and terminal lugs (37) with tagged wires to terminal block TB2 (32). Remove wire tags.	These were removed in step c.
g. HCP Rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b. See figure 4-5.

4-39. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET.

Tools:

Cross tip screwdriver
Flat tip screwdriver
Torque screwdriver
Soldering kit

Expendable Supplies:

Sealing compound, grade H
Adhesive, cyanoacrylate
Solder
Silicone compound
Cotton swabs
Alcohol

References:

Figures 4-5, 4-10, 4-11, 4-12, and 4-13 for component locations,
Paragraph 4-40 for removal and installation of bottom cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side	
b. Six captive screws (13) and rear access cover (12)	Using flat tip screwdriver, fully loosen six captive screws (13) securing rear access cover (12) to power control chassis (11). Remove and retain rear access cover.	See figure 4-5.
c. Terminal lugs (30)	Using cross tip screwdriver, remove and retain screw (29) and lockwasher (23) securing terminal lugs (30) to electrical post (27) .	See figure 4-10.
d. Two screws (1) and flat washers (2)	Using cross tip screwdriver, remove and retain two screws (1) and flat washers (2) securing bottom shelf (3) to power control chassis (4).	See figure 4-11.

4-39. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Five screws (7 and 8)	Using cross tip screwdriver, remove and retain five screws (7 and 8) securing top shelf (9) to mounting rail (10) on side panel (6) of power control chassis (4).	See figure 4-11.
f. Two screws (5)	Using cross tip screwdriver, remove and retain two screws (5) securing side panel (6) of power control chassis (4) to power supply chassis (15).	See figure 4-11.
g. Bottom cover (13)	Remove and retain.	See figure 4-10. Refer to paragraph 4-40 for removal procedures.
h. Connector P1 (12)	Using flat tip screwdriver, remove and retain four screws (14) securing connector P1 to power supply chassis (6). Move connector P1 aside.	See figure 4-13.
i. Four screws (40)	Using cross tip screwdriver, remove and retain four screws (40) securing rear of power control chassis (4) to power supply chassis (15).	See figure 4-11.
j. Wire connections on connector P1 (12)	Using soldering kit, tag and desolder the following wires from connector P1 (12) leading into power control chassis.	See figure 4-13.
k. Side panel (6) and power control chassis (4)	Remove from mounting adapter power supply chassis (15).	See figure 4-11.
l. O-ring gasket (4)	Inspect, remove, and replace as required. Clean case channel of all debris.	See figure 4-12.
INSTALLATION		
m. O-ring gasket (4)	Install in channel on power control chassis case and secure with cyanoacrylate adhesive.	Apply silicone compound to o-ring gasket before installation.
n. Side panel (6) and power control chassis (4)	Position side panel (6) and power control chassis (4) to power supply chassis (15). Using cross tip screwdriver install four retained screws (4) securing rear of power control chassis (4) to the power supply chassis (15).	These were removed in step k. See figure 4-11.
o. Wire connections on connector P1 (12)	Using soldering kit, solder tagged wires to correct pins of connector P1 (12).	These were removed in step j. See figure 4-13.

P1 CONNECTOR PIN	COLOR
B	YELLOW
c	WHITE
E	BROWN

4-39. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET. Continued

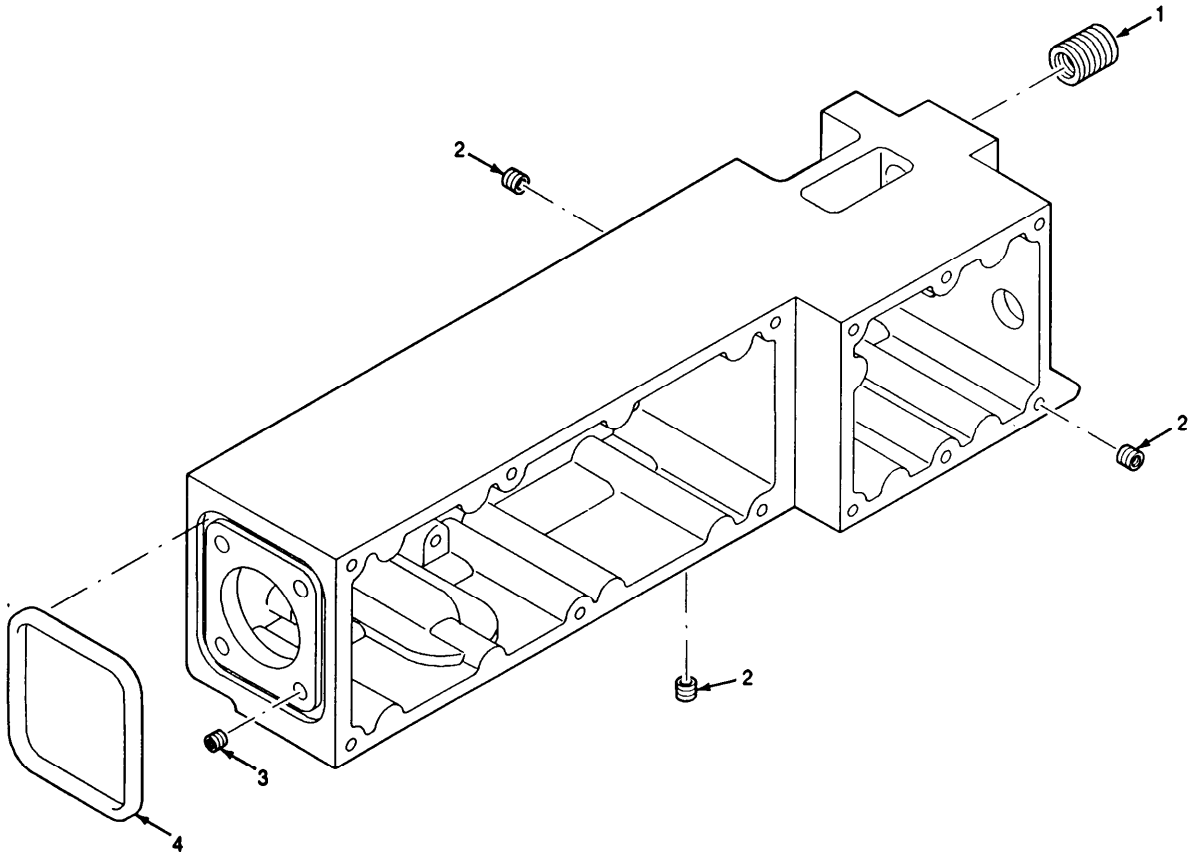

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Figure 4-12. Maintenance of Power Control Chassis Case.

4-39. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
p. Connector P1 (12)	Using flat tip screwdriver, install four retained screws (14) securing connector P1 to power supply chassis (6). Move connector P1 aside.	These were removed in step h. See figure 4-13.
q. Bottom cover (13)	Install.	See figure 4-10. Refer to paragraph 4-40 for removal procedures.
r. Two screws (5)	Using cross tip screwdriver, install two retained screws (5) securing side panel (6) of power control chassis (4) to power supply chassis (15).	See figure 4-11. These were removed in step f.
s. Five screws (7 and 8)	Using cross tip screwdriver, install five retained screws (7 and 8) securing top shelf (9) to mounting rail (10) on side panel (6) of power control chassis (4).	See figure 4-11. These were removed in step e.
t. Two screws (1) and flat washers (2)	Using cross tip screwdriver, install two retained screws (1) and flat washers (2) securing bottom shelf (3) to power control chassis (4).	See figure 4-11. These were removed in step d.
u. Terminal lugs (30)	Using cross tip screwdriver, install retained screw (29) and lockwasher (23) securing terminal lugs (30) to electrical post (27).	See figure 4-10. These were removed in step c.
v. HCP Six captive screws (13) and rear access cover (12)	Hold in place and tighten six captive screws (13) securing rear access cover (12) to power control chassis (11). Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. This was removed in step b.

4-40. REPLACEMENT OF BOTTOM COVER.

Tools:

Cross tip screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set upside down on work surface with power supply chassis toward you.	
b. Bottom cover (13)	Using cross tip screwdriver, remove and retain 18 screws (11) and flat washers (12) securing defective bottom cover (13) to power supply chassis (15). Remove bottom cover.	See figure 4-11.
c. Gasket (14)	Remove and inspect gasket (14), replace gasket if required. Discard bottom cover (13).	
INSTALLATION		
d. Gasket (14)	Position retained gasket (14) to replacement bottom cover (13).	This was removed in step c.
e. Bottom cover (13)	Using cross tip screwdriver, install 18 retained screws (11) and flat washers (12) securing bottom cover (13) to power supply chassis (15).	These were removed in step b.

4-41. REPLACEMENT OF TERMINAL BLOCK TB1.

Tools:

Cross tip screwdriver	Torque screwdriver	Socket wrench
Flat tip screwdriver	Soldering kit	5.5-mm socket

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-18 for removal and installation of power supply.
Paragraph 4-40 for removal and installation of bottom cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Bottom cover (13)	Remove and retain.	See figure 4-10. Refer to paragraph 4-40 for removal procedures.
b. Wires	Using soldering kit, tag and desolder wires from bottom of terminal block TB1 (1).	See figure 4-13.
c. Power supply (1)	Remove and retain.	See figure 4-4. Refer to paragraph 4-18 for removal procedures.
d. Wires	Tag wires on top of terminal block TB1 (1). Using flat tip screwdriver, remove and retain six screws securing tagged wires to terminal block TB1 (1).	See figure 4-13.
e. Terminal block TB1 (1)	Using cross tip screwdriver, 5.5-mm socket, and socket wrench, remove and retain four screws (2), eight flat washers (3), four lockwashers (4), and four nuts (5) securing defective terminal block TB1 to power supply chassis (6). Remove and discard terminal block TB1.	
INSTALLATION		
f. Terminal block TB1 (1)	Using cross tip screwdriver, 5.5-mm socket, and socket wrench, install four retained screws (2), eight flat washers (3), four lockwashers (4), and four nuts (5) securing replacement terminal block TB1 to power supply chassis (6).	These were removed in step e.
g. Wires	Using flat tip screwdriver, install six retained screws securing tagged wires to top of terminal block TB1 (1). Remove wire tags.	These were removed in step d.
h. HCP Power supply (1)	Install retained power supply (1) on mounting adapter.	Refer to paragraph 4-18 for installation procedures.

4-41. REPLACEMENT OF TERMINAL BLOCK TB1. Continued

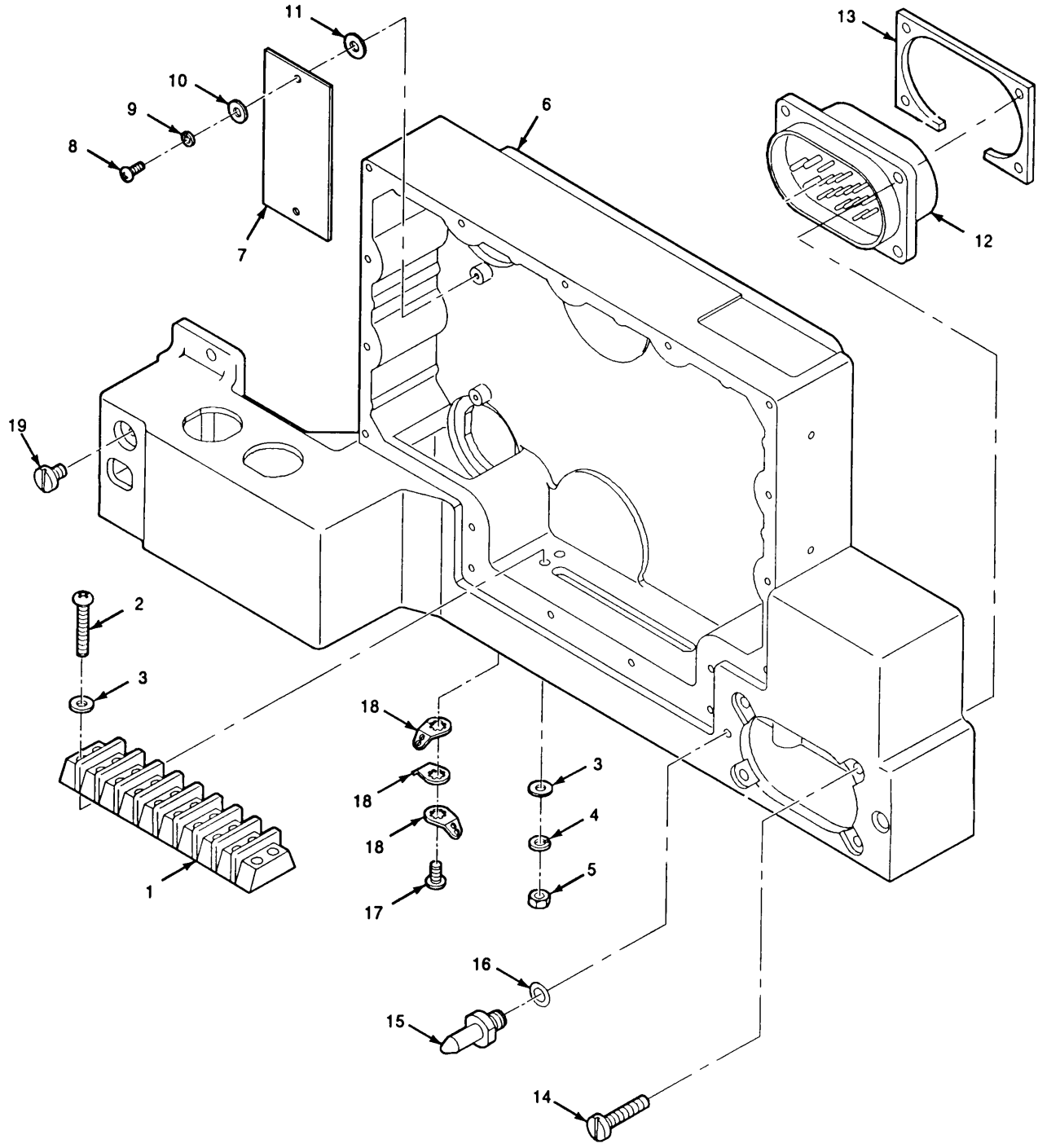

Figure 4-13. Disassembled View of Power Supply Chassis.

4-41. REPLACEMENT OF TERMINAL BLOCK TB1. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
i. Wires	Using soldering kit, solder tagged wires to bottom of replacement terminal block TB1 (1). Remove wire tags.	These were removed in step b. Before and after soldering, clean solder joints with alcohol and cotton swabs.
j. HCP Bottom cover (13)	Install retained bottom cover (13) on power supply chassis (16).	Refer to paragraph 4-40 for installation procedures.

4-42. REPLACEMENT OF SNAP LINE DRIVER CCA.

Tools:

Cross tip screwdriver Flat tip screwdriver	Torque screwdriver	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 17 captive screws	Using flat tip screwdriver, fully loosen 17 captive screws securing power supply (1) to mounting adapter chassis.	
c. Power supply (1)	Set power supply (1) with heatsink assembly face down on work surface.	See figure 4-4.
d. SNAP line driver CCA (7)	Using cross tip screwdriver, remove and retain two screws (8), Iockwashers (9), flat washers (10), and non-metallic washers (11) securing defective SNAP line driver CCA (7) to power supply chassis (6).	See figure 4-13.
e. Wires	Using soldering kit, tag and desolder wires from terminals on defective SNAP line driver CCA. Remove and discard SNAP line driver CCA.	

4-42. REPLACEMENT OF SNAP LINE DRIVER CCA. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
f. Wires	Using soldering kit, solder tagged wires to terminals on replacement SNAP line driver CCA (7). Remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
g. SNAP line driver CCA (7)	Using cross tip screwdriver, install two retained screws (8), Iockwashers (9), washers (10), and non-metallic washers flat (11) securing replacement SNAP line driver CCA (7) to power supply chassis (6).	These were removed in step d.
h. HCP Power supply (1)	Hold power supply (1) in place and tighten 17 captive screws securing it to mounting adapter chassis. Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-4. This was removed in step c.

4-43. REPLACEMENT OF WIRING.

Tools:

Cross tip screwdriver Flat tip screwdriver	Torque screwdriver	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 17 captive screws	Using flat tip screwdriver, fully loosen 17 captive screws securing power supply (1) to mounting adapter chassis.	
c. Power supply (1)	Set power supply (1) with heatsink assembly face down on work surface.	See figure 4-4.
d. Wires	Remove insulation sleeving and tiewraps as required. Using soldering kit, tag and desolder wire(s). Replace wire(s) as to following wire lists:	

4-43. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

e. Cable assembly W3 wire lists

Use the following wire lists in replacing wires.

FROM	TO	COLOR/TRACER
A1-E1	A3-E3	Black
A1-E2	A3-E4	White
A1-E3	J9-C	White/Black
A1-E4	J9-B	White/Red
A1-E5	A3-E7	Black
A1-E6	A3-E8	White
A1-E7	J9-E	White/Orange
A1-E8	J9-D	White
A1-E13	A1-E1/E2	Black (shield)
A1-E13	A3-E3/E4	Black (shield)
A1-E14	A3-E7/E8	Black (shield)
A1-E14	J9-A	White/Black
A1-E14	A1-E5/E6	Black (shield)
A1-E19	A3-E1/E2	Black (shield)
A1-E19	A3-E5/E6	Black (shield)
A2-E7	J10-C	White/Violet
A2-E8	J10-B	White/Gray
A2-E9	J10-A	White/Yellow
A2-E10	J10-F	Green
A2-E11	J10-H	Violet
A2-E12	J10-K	Gray
A2-E13	E9	Black
A2-E13	E11	Black
A2-E13	J10-D	Black
A2-E13	J11-A	Black
A2-E13	P3-14	Black
A2-E14	TB1-4	Yellow
A2-E14	P3-13	Yellow
A2-E17	J10-J	White/Brown
A2-E18	J10-E	White/Red
A3-E3	A1-E1	Black
A3-E4	A1-E2	White
A3-E7	A1-E5	Black
A3-E8	A1-E6	White

4-43. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

e. Cable assembly W3 wire lists Continued

Connector P1.

FROM	TO	COLOR/TRACER
P1-A	E9	Black
P1-B	CB1-2	Yellow
P1-C	TB1-1	White
P1-C	TB2-4	White
P1-D	P3-3	White/Blue
P1-E	K1-B12	Brown
P1-F	P3-9	Brown
P1-K	P3-12	White/Yellow
P1-M	P3-1	Yellow
P1-N	P3-8	Green
P1-S	P3-11	White/Violet
P1-U	P3-2	White
P1-V	E9	Black
P1-M (Shield)	P1-H (Shield)	Black
P1-P (Shield)	P1-M (Shield)	Black
P1-U (Shield)	P1-P (Shield)	Black
P1-U (Shield)	P1-V	Black

Connector P3.

FROM	TO	COLOR/TRACER
P3-1	P1-M	Yellow
P3-2	P1-U	White
P3-3	P1-D	White/Blue
P3-6	Q1-base	Green
P3-7	TB1-3	Orange
P3-8	P1-N	Green
P3-9	P1-F	Brown
P3-10	Q1-collector	Blue
P3-11	P1-S	White/Violet
P3-12	P1-K	White/Yellow
P3-13	TB1-4	Yellow
P3-14	E11	Black
P3-8 (Shield)	P3-9 (Shield)	Black
P3-9 (Shield)	E11 (Shield)	Black

Connector J9.

FROM	TO	COLOR/TRACER
J9-F	TB1-2	Red

4-43. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

e. Cable assembly W3 wire lists Continued

Connector J10.

FROM	TO	COLOR/TRACER
J10-A	A2-E9	White/Yellow
J10-B	A2-E8	White/Gray
J10-C	A2-E7	White/Violet
J10-D	A2-E13	Black
J10-E	A2-E18	White/Red
J10-F	A2-E10	Green
J10-H	A2-E11	Violet
J10-J	A2-E17	White/Brown
J10-K	A2-E12	Gray

Connector J11.

FROM	TO	COLOR/TRACER
J11-A	E9	Black

Miscellaneous wiring.

FROM	TO	COLOR/TRACER
TB1-1	P1-C	White
TB1-2	J9-F	Red
TB1-3	P3-7	Orange
TB1-3	E18	Orange
TB1-4	P3-13	Yellow
TB1-4	A2-E14	Yellow
TB1-5	E9	Black
TB2-1	CB1-2	Yellow
TB2-1	P1-B	Black
TB2-2	CB1-1	Red
TB2-3	K1-X1	Brown
TB2-4	K1-A2	White
TB2-4	P1-C	White
E9	A2-E13	Black
E9	E10	Black
E9	E11	Black
E9	J11-A	Black
E9	P1-A	Black
E9	P1-V	Black
E9	P3-14	Black
E9	R1-2	Black
E9	TB1-5	Black

4-43. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

e. Cable assembly W3 wire lists Continued

Miscellaneous wiring. Continued

FROM	TO	COLOR/TRACER
E10	E4	Red
E10	DS1-1	Black
E10	K1-X2	Black
E11	P3-9	Black
E11	P3-14	Black
E11	R1-2	Black
E18	DS1-2	Orange
E18	TB1-3	Black
E11 (Shield)	P3-9	Black
A1-E1 (Shield)	A1-E13	Black
A1-E2 (Shield)	A1-E13	Black
A1-E5 (Shield)	A1-E14	Black
A1-E6 (Shield)	A1-E14	Black
A3-E1 (Shield)	A1-E19	Black
A3-E2 (Shield)	A1-E19	Black
A3-E5 (Shield)	A1-E19	Black
A3-E6 (Shield)	A1-E19	Black
CR1-cathode	CB1-1	Red
CR1-cathode	K1-A1	Red
CR1-cathode	TB2-2	Red
DS1-1	E10	Black
DS1-2	E18	Orange
Q1-base	P3-6	Green
Q1-collector	P3-10	Blue
R1-1	Q1-emitter	Yellow
R1-2	E11	Black

INSTALLATION

f. Wires	Using soldering kit, solder tagged wires to correct terminals or connector pins. Remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
g. HCP Power supply (1)	Hold power supply (1) in place and tighten 17 captive screws securing it to mounting adapter chassis. Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-4. This was removed in step c.

4-44. REPLACEMENT OF POWER SUPPLY CHASSIS.

Tools:

Flat tip screwdriver Cross tip screwdriver

NOTE:

This procedure is done only if wiring to or connectors J7, J8 or J1 are damaged.

References:

Paragraph 3-24 for repair instructions.
Paragraph 3-25 for replacement of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. 15 captive screws (1)	Using flat tip screwdriver, fully loosen 15 captive screws (1) securing access cover (2) to audio amplifier chassis (3).	See figure 4-5.
b. Access cover (2)	Remove and retain.	
c. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, remove and retain eight screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	See figure 4-5.
d. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, remove and retain three screws (7), flat washers (5), and cable clamps (8) securing audio amplifier CCA (6) and cables to audio amplifier chassis (3).	
e. Connector P3 (2)	Loosen two jackscrews and disconnect connector P3 (2) from CCA connector J1.	See figure 4-6.
f. Connector P2 (1)	Loosen two jackscrews and disconnect connector P2 (1) from CCA connector J2.	
g. 12 captive screws (13)	Using flat tip screwdriver, fully loosen 12 captive screws (13) securing access covers (11 and 12) to power control chassis (10).	See figure 4-5.
h. Access covers (11 and 12)	Remove and retain.	
i. 17 captive screws	Using flat tip screwdriver, fully loosen 17 captive screws securing power supply (1) to power supply chassis.	See figure 4-4.
j. Power supply (1)	Place power supply on its fins. Using soldering kit, tag six wires on TB1. Using flat tip screwdriver, remove and retain six screws securing wires to TB1. Remove and retain power supply.	

4-44. REPLACEMENT OF POWER SUPPLY CHASSIS. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
k. Wires	Position six tagged wires to TB1. Using flat tip screwdriver, install six retained screws securing power supply wires to TB1.	These were removed in step j.
l. HCP Power supply (1)	Align retained power supply (1) with power supply chassis. Using torque screwdriver, tighten 17 captive screws securing power supply (1) to power supply chassis. Torque screws to 8 to 10 in-lb.	See figure 4-4. This was removed in step j.
m. HCP Access covers (11 and 12)	Position retained access covers (11 and 12) on power control chassis (10). Tighten 12 captive screws (13) securing access covers to power control chassis (10). Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. These were removed in step h.
n. Connector P2 (1)	Connect connector P2 (1) to audio amplifier CCA connector J2 and tighten two jackscrews.	See figure 4-6.
o. Connector P3 (2)	Connect connector P3 (2) to audio amplifier CCA connector J1 and tighten two jackscrews.	
p. Three screws (7), flat washers (5), and cable clamps (8)	Using cross tip screwdriver, install three retained screws (7), flat washers (5), and cable clamps (8) securing audio amplifier CCA (6) and cables to audio amplifier chassis (3).	See figure 4-5. These were removed in step d.
q. Eight screws (4) and flat washers (5)	Using cross tip screwdriver, install eight retained screws (4) and flat washers (5) securing audio amplifier CCA (6) to audio amplifier chassis (3).	These were removed in step c.
r. HCP Access cover (2)	Position retained access cover (2) on audio amplifier chassis (3). Tighten 15 captive screws (1) securing access cover (2) to audio amplifier chassis (3). Using torque screwdriver, torque screws to 8 to 10 in-lb.	See figure 4-5. These were removed in step a.

4-45. REPLACEMENT OF P1 CONNECTOR.

Tools:
Cross tip screwdriver
Flat tip screwdriver
Torque screwdriver
Soldering kit

Expendable Supplies:
Cotton swabs
Solder
Alcohol

References:
Paragraph 4-40 for removal and installation of bottom access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Bottom access cover (13)	Remove and retain.	See figure 4-10. Refer to paragraph 4-40 for removal procedures.
b. Four screws (14)	Using flat tip screw driver, remove and retain four screws securing P1 connector (12) to power supply chassis (6).	See figure 4-13.
c. P1 connector (12)	Remove from power supply chassis.	
d. Wires	Using soldering kit, tag and desolder wires from defective P1 connector.	See figure 4-13.
e. Retaining plate (13)	Remove and retain retaining plate and discard defective P1 connector.	
INSTALLATION		
f. Retaining plate (13)	Position retained retaining plate to replacement P1 connector.	
g. Wires	Using soldering kit, solder tagged wires to replacement P1 connector. Remove wire tags.	These were removed in step d. Before and after soldering, clean solder joints with alcohol and cotton swabs.
h. HCP P1 connector (12)	Install P1 connector (12) into power supply chassis (6). Using torque screwdriver, torque four retained screws (14) to 8 to 10 in-lb.	See figure 4-13. These were removed in step b.
i. HCP Bottom access cover (13)	Install retained bottom cover (13) on power supply chassis (16).	Refer to paragraph 4-40 for installation procedures.

4-46. REPLACEMENT OF J10 CONNECTOR.

Tools:

Cross tip screwdriver	Flat tip screwdriver	Torque screwdriver
Soldering kit	1-1/16-inch socket	Socket wrench
Torque wrench		

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-40 for removal and installation of bottom access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Bottom access cover (13)	Remove and retain.	See figure 4-10. Refer to paragraph 4-40 for removal procedures.
b. Protective cap (24)	Remove from defective J10 connector.	See figure 4-11.
c. J10 connector (23)	Using 1-1/16-inch socket and socket wrench, remove nut and protective cap retainer from defective J10 connector. Discard nut and retain protective cap retainer. Push J10 connector through bottom of power supply chassis.	A replacement nut is supplied with replacement connector.
d. Wires	Remove insulation sleeving. Using soldering kit, tag and desolder wires from defective J10 connector. Discard J10 connector.	
INSTALLATION		
e. Wires	Position tagged wires to replacement J10 connector. Using soldering kit, solder tagged wires to replacement J10 connector. Remove wire tags and slide insulation sleeving over solder joints.	These were removed in step d. Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. HCP J10 connector (23)	Position J10 connector (23) to power supply chassis (15). Using 1-1/16-inch socket and torque wrench, torque nut securing protective cap retainer and nut to 68 to 72 in-lb.	These were removed in step c.
g. Protective cap (24)	Install on replacement J10 connector.	
h. HCP Bottom access cover (13)	Install retained bottom cover (13) on power supply chassis (16).	Refer to paragraph 4-40 for installation procedures.

4-47. REPLACEMENT OF J11 CONNECTOR.

Tools:

Cross tip screwdriver	Flat tip screwdriver	Torque screwdriver
Soldering kit	1-1/16-inch socket	Socket wrench
Torque wrench		

Expendable Supplies:

Cotton swabs	Solder	Alcohol
Silicone compound		

References:

Paragraph 4-40 for removal and installation of bottom access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Bottom access cover (13)	Remove and retain.	See figure 4-10. Refer to paragraph 4-40 for removal procedures.
b. Protective cap (27)	Remove from defective J11 connector.	See figure 4-11.
c. J11 connector (25)	Using 1-1/16-inch socket and socket wrench, remove nut and protective cap retainer from defective J11 connector. Discard nut and retain protective cap retainer. Push J11 connector through bottom of power supply chassis.	A replacement nut is supplied with replacement connector.
d. Wires	Remove insulation sleeving. Using soldering kit, tag and desolder wires from defective J11 connector. Discard J11 connector.	
INSTALLATION		
e. Wires	Position tagged wires to replacement J11 connector. Using soldering kit, solder tagged wires to replacement J11 connector. Remove wire tags and slide insulation sleeving over solder joints.	These were removed in step d. Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. HCP J11 connector (23)	Position J11 connector (25) to power supply chassis (15). Using 1-1/16-inch socket and torque wrench, torque nut securing protective cap retainer and nut to 68 to 72 in-lb.	These were removed in step c. Apply silicone compound to O ring before installing in power supply chassis
g. Protective cap (27)	Install on replacement J11 connector.	
h. HCP bottom access cover (13)	Install retained bottom cover (13) on power supply chassis (16).	Refer to paragraph 4-40 for installation procedures.

Section V. MAINTENANCE PROCEDURES FOR AM-7239B/VRC

4-48. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired mounting adapter. It is also used to verify the symptom of a faulty mounting adapter. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

4-49. OPERATIONAL CHECK.

Perform the operational check found in paragraph 4-9 to verify proper operation of the mounting adapter.

4-50. REPAIR INSTRUCTIONS.

The following instructions apply to all repair tasks unless otherwise noted in the procedure.

a. Begin procedure with mounting adapter switch CB1 set to OFF.

b. Disconnect any external cables connected to mounting adapter.

4-50. REPAIR INSTRUCTIONS. Continued

c. Inspect mounting adapter. Replace mounting adapter chassis if the mounting adapter is physically damaged, such as with a broken connector.

d. Mounting adapter must be tested after replacement of a module.

CAUTION

Static electricity and stray voltages can damage the mounting adapter. Use an antistatic pad on the work surface and wear a grounded wrist strap when repairing the mounting adapter.

All circuit card assemblies in the mounting adapter contain static sensitive devices susceptible to electrostatic damage. **DO NOT** attempt to replace components without using protective devices.

Steps marked with **HCP** must be performed exactly as written. They are critical in maintaining the nuclear hardness of the mounting adapter. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

4-51. REPLACEMENT OF POWER SUPPLY (5A1).

Tools:

Cross tip screwdriver Flat tip screwdriver Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 20 captive screws (8)	Using flat tip screwdriver, fully loosen 20 captive screws securing heatsink assembly (11) to power supply cover (17).	See figure 4-14.
c. Screw (9) and flat washer	Using cross tip screwdriver, remove and retain screw (9) and flat washer securing heatsink assembly (11) to audio amplifier chassis (3).	
d. Screw (10)	Using flat tip screwdriver, remove and retain screw (10) securing heatsink assembly (11) to audio amplifier chassis (3).	
e. Heatsink assembly (11)	Lay heatsink assembly on its fins.	CAUTION Carefully lay on fins to ensure casting does not rest on components inside power supply cover.
f. Terminal block TB1 screws and wires (12)	Using flat tip screwdriver, tag, remove and retain six screws securing six wires (12) to terminal block TB1 on heatsink assembly.	
g. Eight captive screws (14)	Using flat tip screwdriver, fully loosen eight captive screws (14) securing power supply (13) to heatsink assembly.	
h. Power supply (13)	Remove and send to general support for repair.	

4-47. REPLACEMENT OF POWER SUPPLY (5A1). Continued

ITEM	ACTION	REMARKS
INSTALLATION		
i. Power supply (13)	Obtain replacement power supply (13) and position it on heatsink assembly (11).	
j. Eight captive screws (14)	Using flat tip screwdriver, tighten eight captive screws (14) securing power supply to heatsink assembly.	
k. Terminal block TB1 screws and wires (12)	Using cross tip screwdriver, install six retained screws securing six tagged wires (12) to correct terminals on terminal block TB1, per the following wire list.	These were removed in step f.

FROM	TO	COLOR/TRACER
A1A1-E17/A1E1	TB1-1	Red
A1A2-E2/A1FL1-1	TB1-2	Gray, Brown
A1A1-E6/A1FL2-1	TB1-3	White/Orange
A1A2-E19/A1FL3-1	TB1-4	White/Yellow
A1E2	TB1-5	Black
A1A2-E17/A1E3	TB1-6	White

l. Heatsink assembly (11)	Align heatsink assembly (11) to power supply cover (17).	
m. Screw (10)	Using flat tip screwdriver, install retained screw (10) securing heatsink assembly to audio amplifier chassis (3).	This was removed in step d.
n. Screw (9) and flat washer	Using cross tip screwdriver, install retained screw (9) and flat washer securing heatsink assembly to audio amplifier chassis (3).	These were removed in step c.
o. HCP 20 captive screws (8)	Using torque screwdriver, torque 20 captive screws (8) securing heatsink assembly (11) to power supply cover (17) to 8 to 10 in-lb.	

4-47. REPLACEMENT OF POWER SUPPLY (5A1). Continued

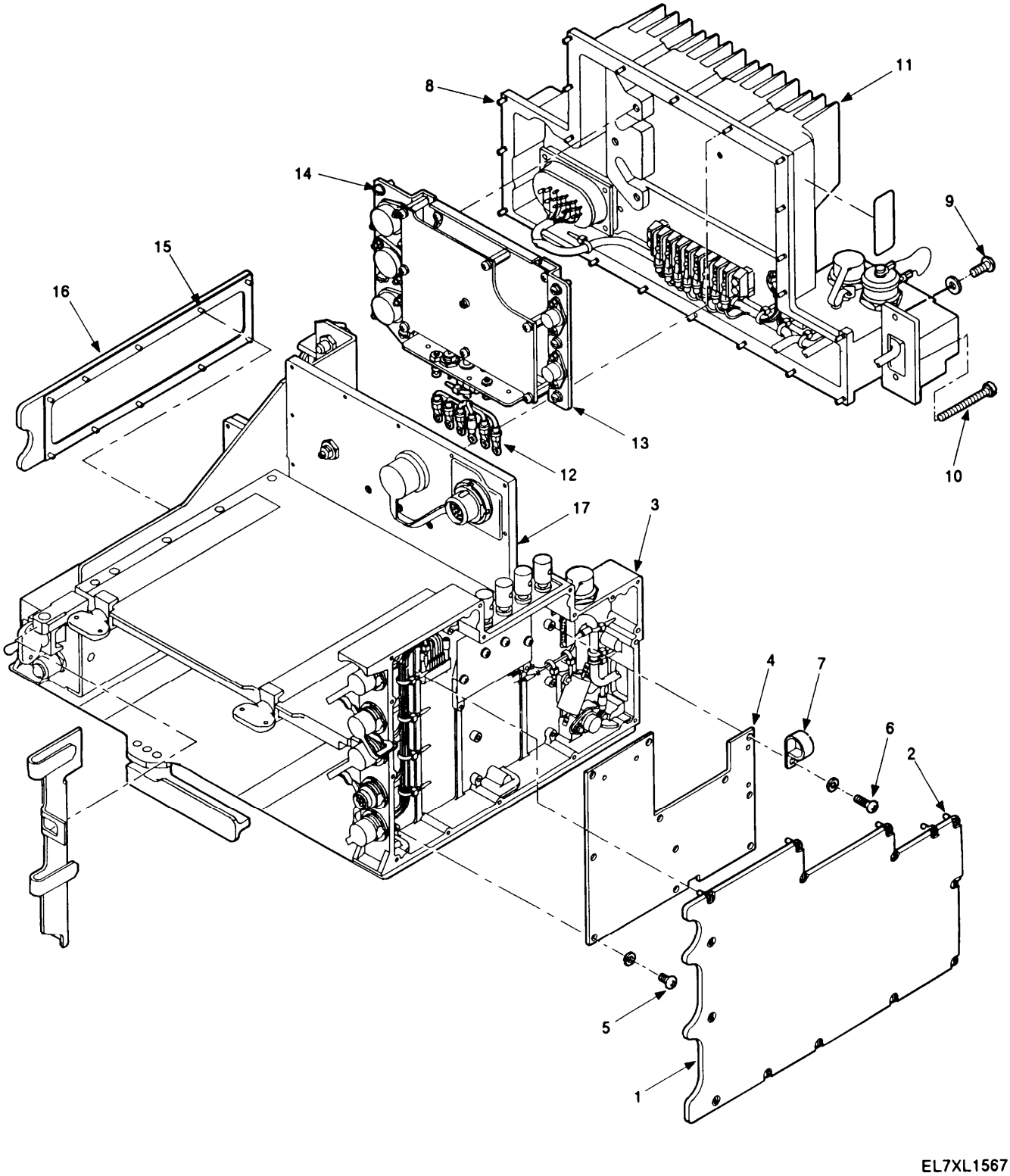

Figure 4-14. Disassembled View of Mounting Adapter AM-7239B/VRC.

4-52. REPLACEMENT OF 1-WATT AUDIO AMPLIFIER CCA (5A2).

Tools:

Cross tip screwdriver Flat tip screwdriver Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Access cover (1)	Using flat tip screwdriver, fully loosen 15 captive screws (2) securing access cover (1) to audio amplifier chassis (3). Remove and retain access cover (1).	See figure 4-14.
b. Eight screws (5) and flat washers	Using cross tip screwdriver, remove and retain eight screws and flat washers securing 1-watt audio amplifier CCA (4) to chassis.	
c. Three screws (6), flat washers, and cable clamps (7)	Using cross tip screwdriver, remove and retain three screws, flat washers, and cable clamps securing CCA and cables to chassis.	
d. Connectors W3P3 and W1P2	Disconnect connectors W3P3 and W1P2 from CCA connectors J1 and J2.	
e. 1-Watt audio amplifier CCA (4)	Remove and send to general support for repair.	
INSTALLATION		
f. 1-Watt audio amplifier CCA (4)	Obtain replacement CCA and position it on chassis.	
g. Connectors W3P3 and W1P2	Connect connectors W3P3 and W1P2 to CCA connectors J1 and J2.	
h. Three screws (6), flat washers, and cable clamps (7)	Position three retained cable clamps on CCA. Using cross tip screwdriver, install three retained screws and flat washers securing cable clamps and CCA to chassis.	These were removed in step c.
i. Eight screws (5) and flat washers	Using cross tip screwdriver, install eight retained screws and flat washers securing CCA to chassis.	These were removed in step b.
j. HCP Access cover (1)	Position retained access cover (1) on chassis. Using torque screwdriver tighten 15 captive screws (2) securing access cover (1) to chassis. Torque screws to 8 to 10 in-lb.	This was removed in step a.

4-53. REPLACEMENT OF TRANSISTOR Q1.

Tools:

Flat tip screwdriver	Cross tip screwdriver	Torque screwdriver
Soldering kit		

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 4-52 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. Two screws (1), lock-washers, flat washers, and insulating washers	Using cross tip screwdriver, remove and retain two screws (1), lockwashers, flat washers, insulating washers, and terminal lug securing transistor Q1 (3) to audio amplifier chassis (2).	See figure 4-15.
d. Transistor Q1 (3)	Remove and discard insulation sleeving on transistor leads. Using soldering kit, tag and desolder wires from transistor leads. Remove and discard defective transistor Q1 (3).	
e. Mounting pad (4)	Inspect and replace as required.	
INSTALLATION		
f. Mounting pad (4)	Install replacement mounting pad (4) on bottom of transistor Q1 (3).	This was removed in step e.
g. Transistor Q1 (3)	Install replacement insulation sleeving on transistor leads. Using soldering kit, solder tagged wires to correct leads of transistor Q1 (3). Remove wire tags.	These were removed in step d. Before and after soldering, clean wires and leads with alcohol and cotton swabs.
h. Two screws (1), lock-washers, flat washers, and insulating washers	Using cross tip screwdriver, install two retained screws (1), lockwashers, flat washers, insulating washers, and terminal lug securing transistor Q1 (3) to audio amplifier chassis (2).	These were removed in step c.
i. HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-53. REPLACEMENT OF TRANSISTOR Q1. Continued

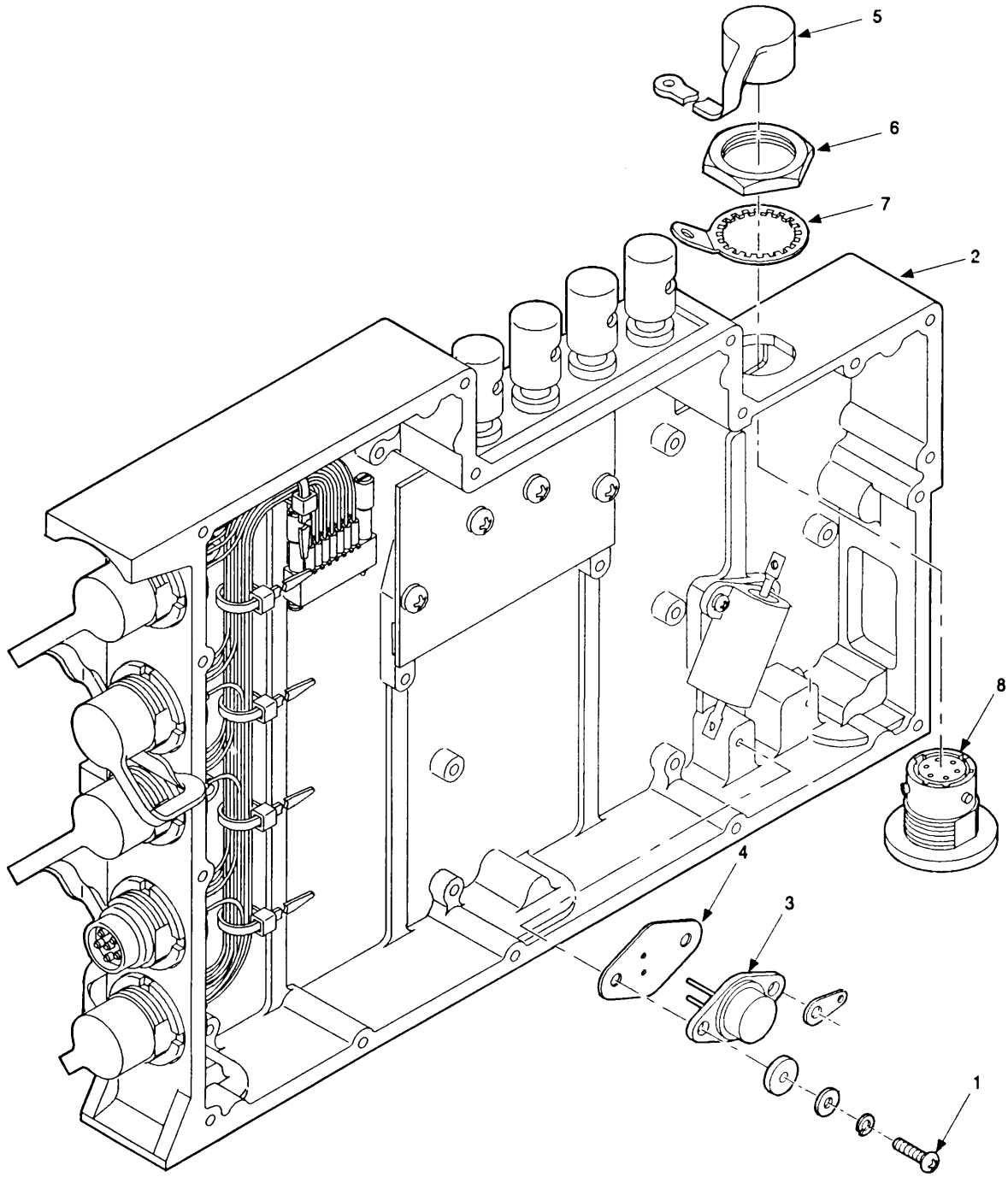

Figure 4-15. Removal and Installation of Audio Amplifier Chassis Components.

4-54. REPLACEMENT OF CONNECTOR J9.

Tools:

Flat tip screwdriver	7/8-inch socket	Socket wrench
Torque screwdriver	Soldering kit	Torque wrench
Pliers		

Expendable Supplies:

Solder	Alcohol	Cotton swabs
Silicone compound		

References:

Paragraph 4-52 for removal and installation of access cover.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. Protective cap (12)	Remove protective cap (5) from defective connector J9 (8).	See figure 4-15.
d. Connector J9 (8)	Using socket wrench and 7/8-inch socket, remove and discard nut (6) securing protective cap retainer (7) and connector J9 (8) to audio amplifier chassis (2). Disassemble connector. Slide insulator back on wires to expose solder connections. Using soldering kit tag and desolder wires from J9 connector. Remove and discard defective connector J9.	A replacement nut is supplied with replacement connector
INSTALLATION		
e. HCP Connector J9 (8)	Using solder kit, solder tagged wires to correct pins of replacement connector J9. Remove wire tags. Slide insulator over solder connections. Assemble connector. Apply silicone compound to connector threads and o-ring before installation. Install connector and o-ring in chassis. Install retained protective cap retainer (7) and locknut (6). Using torque wrench and 7/8-inch socket, torque locknut to 58 to 62 in-lb.	See figure 4-15. These were removed in step d. Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
f. Protective cap (5)	Install retained protective cap (5).	This was removed in step c.
g. HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-55. REPLACEMENT OF CONNECTOR J2 - J6.

Tools:

Flat tip screwdriver	3/4-inch spanner wrench	Torque wrench
Torque screwdriver	Spanner attachment	Soldering kit

Expendable Supplies:

Solder	Silicone compound	Alcohol
Cotton swabs		

References:

Paragraph 4-52 for removal and installation of 1-Watt Audio Amplifier CCA (5A2).

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. 1-watt audio amplifier CCA (4)	Remove and retain 1-watt audio amplifier CCA (4).	Refer to paragraph 4-52 for removal instructions.
d. Protective caps (3)	Remove protective cap (3) from defective connector.	See figure 4-16.
e. Connectors J2, J3, J4, J5, and J6 (1)	Using 3/4-inch spanner wrench and spanner attachment, remove and retain spanner nut (4) and internal-tooth lockwasher from defective connector. Remove defective connector from audio amplifier chassis.	
f. Wires (11)	Remove insulation sleeving. Using soldering kit, tag and desolder wires from connector. Remove and discard defective connector.	
INSTALLATION		
g. Wires (11)	Using soldering kit, solder tagged wires to correct pins on replacement connector. Remove wire tags. Replace insulation sleeving.	These were removed in step f. Before and after soldering, clean wires and pins with alcohol and cotton swabs.
h. 1-watt audio amplifier CCA (4)	Install retained 1-watt audio amplifier CCA (4).	Refer to paragraph 4-52 for installation instructions.
i. HCP Connectors J2, J3, J4, J5, and J6 (1)	Apply silicone compound to o-ring and install connector in chassis. Install retained internal-tooth lockwasher and secure connector with spanner nut (4). Using torque wrench and spanner attachment, torque locknuts to 87 to 93 in-lb.	These were removed in step e.
j. Protective cap (3)	Install protective cap (3) on replacement connector.	See figure 4-16. This was removed in step d.
k. HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-55. REPLACEMENT OF CONNECTOR J2 - J6. Continued

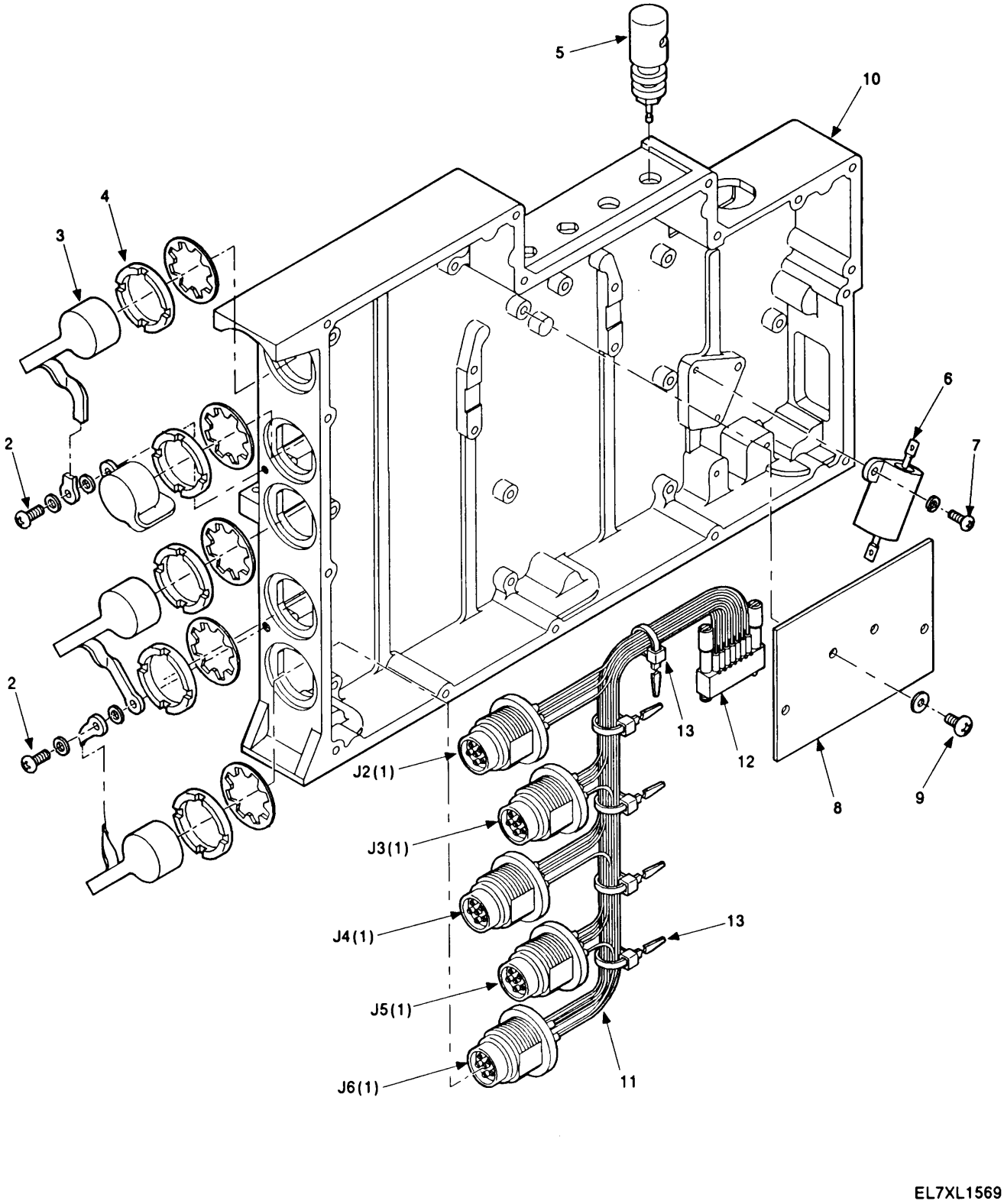

Figure 4-16. Replacement of Components in Audio Amplifier Chassis.

4-56. REPLACEMENT OF ELECTRICAL BINDING POSTS E1A, E2A, E1B, AND E2B.

Tools:

Flat tip screwdriver | Soldering kit | 5/16-inch open-end wrench
Torque screwdriver

Expendable Supplies:

Solder | Alcohol | Cotton swabs

References:

Paragraph 4-52 for removal and installation of 1-Watt Audio Amplifier CCA (5A2).

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. Wire	Using soldering kit, tag and desolder wire from defective binding post (5).	See figure 4-16.
d. Electrical binding post E1A, E2A, E1B, or E2B (5)	Using 5/16-inch open-end wrench, remove and retain locknut and lockwasher securing defective binding post to chassis (10). Remove and discard defective binding post.	
INSTALLATION		
e. Electrical binding posts E1A, E2A, E1B, and E2B (5)	Position replacement binding post on chassis. Install retained lockwasher and locknut securing post to chassis. Using 5/16-inch open-end wrench tighten locknut.	These were removed in step d.
f. Wire	Using soldering kit, solder tagged wire to replacement binding post. Remove wire tags.	These were removed in step c. Before and after soldering, clean wires and posts with alcohol and cotton swabs.
g. HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-57. REPLACEMENT OF RESISTOR R1.

Tools:

Flat tip screwdriver | Cross tip screwdriver | Torque screwdriver
Soldering kit

Expendable Supplies:

Solder | Alcohol | Cotton swabs

References:

Paragraph 4-52 for removal and installation of 1-Watt Audio Amplifier CCA (5A2).

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. Wires	Using soldering kit, tag and desolder wires from defective resistor R1 (6).	See figure 4-16
d. Resistor R1 (6)	Using cross tip screwdriver, remove and retain two screws (7) and lock-washers securing resistor to audio amplifier chassis (10). Remove and discard defective resistor R1.	
INSTALLATION		
e. Resistor R1 (6)	Position replacement resistor R1 on chassis. Using cross tip screwdriver, install two retained screws (7) and lockwashers securing resistor R1 (6) to chassis (10).	These were removed in step d.
f. Wires	Using soldering kit, solder tagged wires to correct terminals on replacement resistor R1 (6). Remove wire tags.	These were removed in step c. Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
g. HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-58. REPLACEMENT OF 2-WIRE DUAL TRANSIENT PROTECTION CCA.

Tools:

Flat tip screwdriver | Cross tip screwdriver | Torque screwdriver
Soldering kit

Expendable Supplies:

Solder | Alcohol | Cotton swabs

References:

Paragraph 4-52 for removal and installation of 1-Watt Audio Amplifier CCA (5A2).

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. Wires	Using soldering kit, tag and desolder wires from defective 2-Wire dual transient protection CCA (8).	See figure 4-16
d. 2-Wire dual transient protection CCA (8)	Using cross tip screwdriver, remove and retain four screws (9) and flat washers securing 2-Wire dual transient protection CCA (8) to audio amplifier chassis (10). Remove and discard CCA.	
INSTALLATION		
e. 2-Wire dual transient protection CCA (8)	Position CCA on chassis. Using cross tip screwdriver, install four retained screws (9) and flat washers securing 2-Wire dual transient protection CCA (8) to audio amplifier chassis (10).	These were removed in step d.
f. Wires	Using soldering kit, solder tagged wires to correct terminals on replacement 2-Wire dual transient protection CCA (8) per the following wire list. Remove wire tags.	These were removed in step c. Before and after soldering, clean wires and terminals with alcohol and cotton swabs.

FROM	TO	COLOR/TRACER
A1-E3	E2A	White/Black
A1-E4	E1A	White/Red
A1-E7	E1B	White/Orange
A1-E8	E2B	White

g.	HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-59. REPLACEMENT OF CONNECTORS P2 AND P3.

Tools:

Flat tip screwdriver | Cross tip screwdriver | Torque screwdriver
Soldering kit

Expendable Supplies:

Solder | Alcohol | Cotton swabs

References:

Paragraph 4-52 for removal and installation of 1-Watt Audio Amplifier CCA (5A2).

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. 1-Watt audio amplifier CCA (4)	Remove and retain.	Refer to paragraph 4-52 for removal procedures.
d. Connectors P2 and P3	Loosen two jackscrews and disconnect connector P2 or P3 from 1-Watt audio amplifier CCA connector J2 or J1.	
e. Wires	Slide insulation sleeving away from solder joints. Using soldering kit, tag and desolder wires from pins on defective connector P2 or P3 (1 or 2).	
f. Connectors P2 and P3	Remove and discard defective connector.	
INSTALLATION		
g. Connectors P2 and P3	Position replacement connector P2 or P3 to tagged wires.	
h. Wires	Using soldering kit, solder tagged wires to pins of replacement connector P2 or P3. Remove wire tags. Replace insulation sleeving.	Before and after soldering, clean wires and pins with alcohol and cotton swabs.
i. Connectors P2 and P3	Connect connector P2 or P3 to 1-Watt audio amplifier CCA connector J2 or J1 and tighten two jackscrews.	
j. 1-Watt audio amplifier CCA (4)	Install.	Refer to paragraph 4-52 for installation procedures.
k. HCP Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-60. REPLACEMENT OF WIRING ON AUDIO AMPLIFIER CHASSIS CONNECTORS.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-52 for removal and installation of 1-Watt Audio Amplifier CCA (5A2).

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with right side toward you.	
b. Access cover (1)	Remove and retain access cover (1).	See figure 4-14. Refer to paragraph 4-52 for access cover removal procedures.
c. Wires	Remove insulation sleeving and tiedown straps as required. Using soldering kit, tag, desolder, and remove defective wire(s) from audio amplifier chassis connectors J2 through J6 and J9.	

4-60. REPLACEMENT OF WIRING ON AUDIO AMPLIFIER CHASSIS CONNECTORS. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
d. Wires	Using soldering kit, install and solder replacement wire(s) on audio amplifier chassis connectors J2 through J6 and J9, as required, per the following wire list. Replace insulation sleeving and tiedown straps as required.	Before and after soldering, clean wires and pins with alcohol and cotton swabs.

FROM	TO	COLOR/TRACER
J2-B	P2-5	White/Blue
J2-C	P2-11	White/Violet
J2-D	P2-9	White/Gray
J3-B	P2-6	White/Brown
J3-C	P2-10	White/Red
J3-D	P2-8	White/Orange
J4-A	J2-A	Black
J4-B	J2-B	White/Blue
J4-C	J2-C	White/Violet
J4-D	J2-D	White/Gray
J4-F	P2-13	White
J5-A	J3-A	Black
J5-B	J3-B	White/Brown
J5-C	J3-C	White/Red
J5-D	J3-D	White/Orange
J5-F	P2-12	White/Green
J6-A	P2-14	Black
J6-B	J5-B	White/Brown
J6-C	J5-C	White/Red
J6-D	J5-D	White/Orange
J6-E	P2-2	White/Yellow
J6-F	J5-A	Black
J9-A	A1-E14	Black
J9-B	A1-E4	White/Red
J9-C	A1-E3	White/Black
J9-D	A1-E8	White
J9-E	A1-E7	White/Orange
J9-F	TB1-2	Red

e.	HCP	Access cover (1)	Install.	See figure 4-14. These were removed in step b. Refer to paragraph 4-52 for access cover installation procedures.

4-61. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET.

Tools:

Cross tip screwdriver	5/16-inch open-end wrench	Socket wrench
Flat tip screwdriver	3/4-inch spanner wrench	Torque wrench
Torque screwdriver	Spanner attachment	Soldering kit
Adjustable wrench	7/8-inch socket	

Expendable Supplies:

Silicone compound	Adhesive, cyanoacrylate	Solder
Cotton swabs	Alcohol	

References:

Paragraph 3-24 and 3-25 for repair instructions and removal and installation of threaded screw inserts.
Paragraph 4-52 for removal and installation of 1-Watt audio amplifier CCA.
Paragraph 4-53 for removal and installation of transistor Q1.
Paragraph 4-54 for removal and installation of connector J9.

ITEM	ACTION	REMARKS
REMOVAL		
a. 1-Watt audio amplifier CCA (4)	Remove and retain. See figure 4-14.	Refer to paragraph 4-52 for removal procedures.
b. Screw (1) and flat washer	Using cross tip screwdriver, remove and retain screw (1) and flat washer securing power supply chassis (7) to audio amplifier chassis (8).	See figure 4-17.
c. Screw (2)	Using a flat tip screwdriver remove and retain screw (2) securing power supply chassis (7) to audio amplifier chassis (8).	
d. Three screws (3) and flat washers	Using cross tip screwdriver, remove and retain three screws (3) and flat washers securing bottom shelf (9) to audio amplifier chassis (8).	
e. Four screws (4 and 5)	Remove and retain four screws (4 and 5) securing top shelf (10) to audio amplifier chassis (8).	
f. Transistor Q1 (3)	Remove and retain, See figure 4-15.	Refer to paragraph 4-53 for removal procedures.
g. Connector J9 (8)	Remove and retain.	Refer to paragraph 4-54 for removal procedures.
h. Wires	Using soldering kit, tag and desolder wires to allow removal of case.	
i. O-ring gasket	Inspect, remove, and replace as required. Clean case channel of all debris.	

4-61. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET. Continued

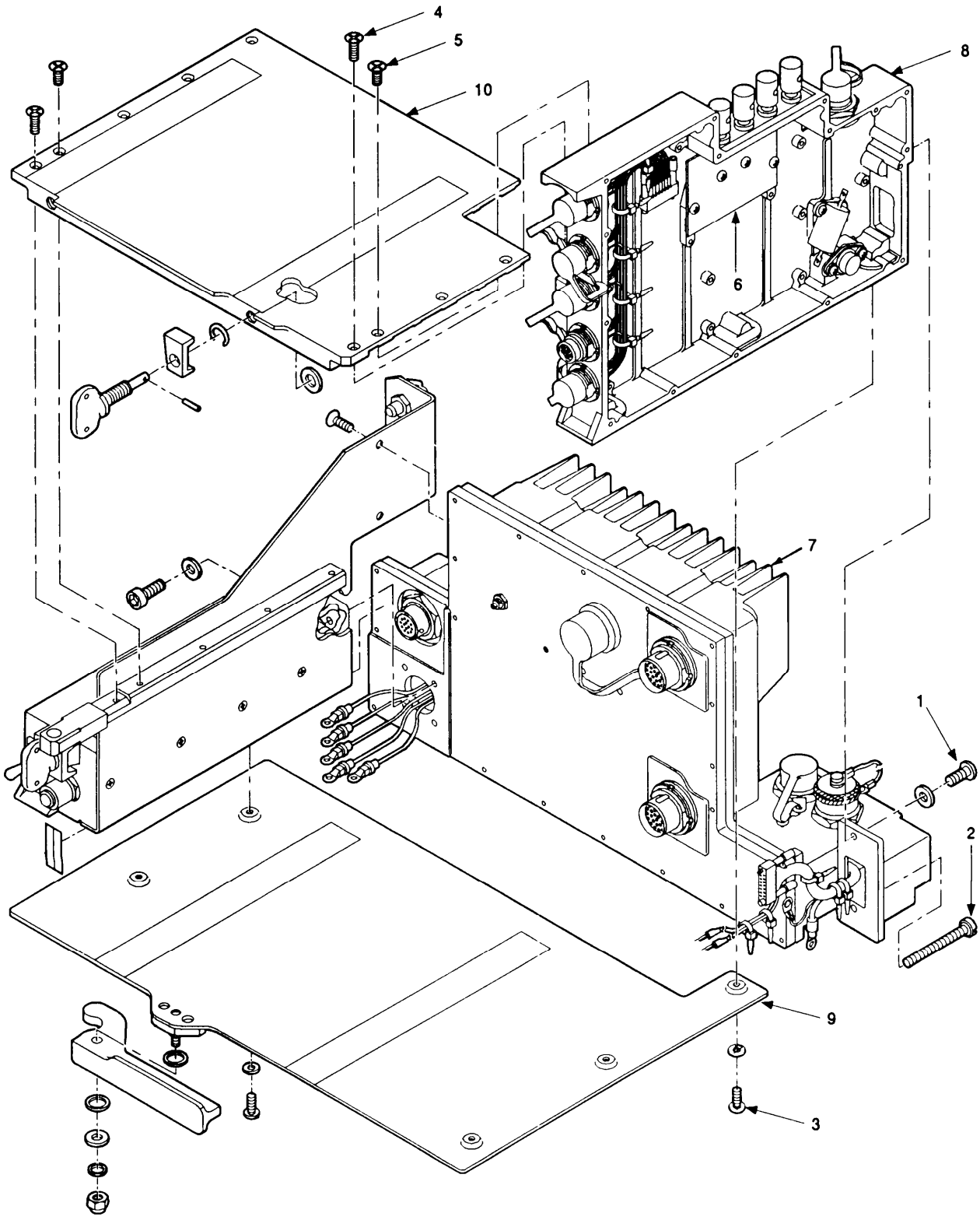

Figure 4-17. Removal and Installation of Audio Amplifier Chassis.

4-61. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET. Continued

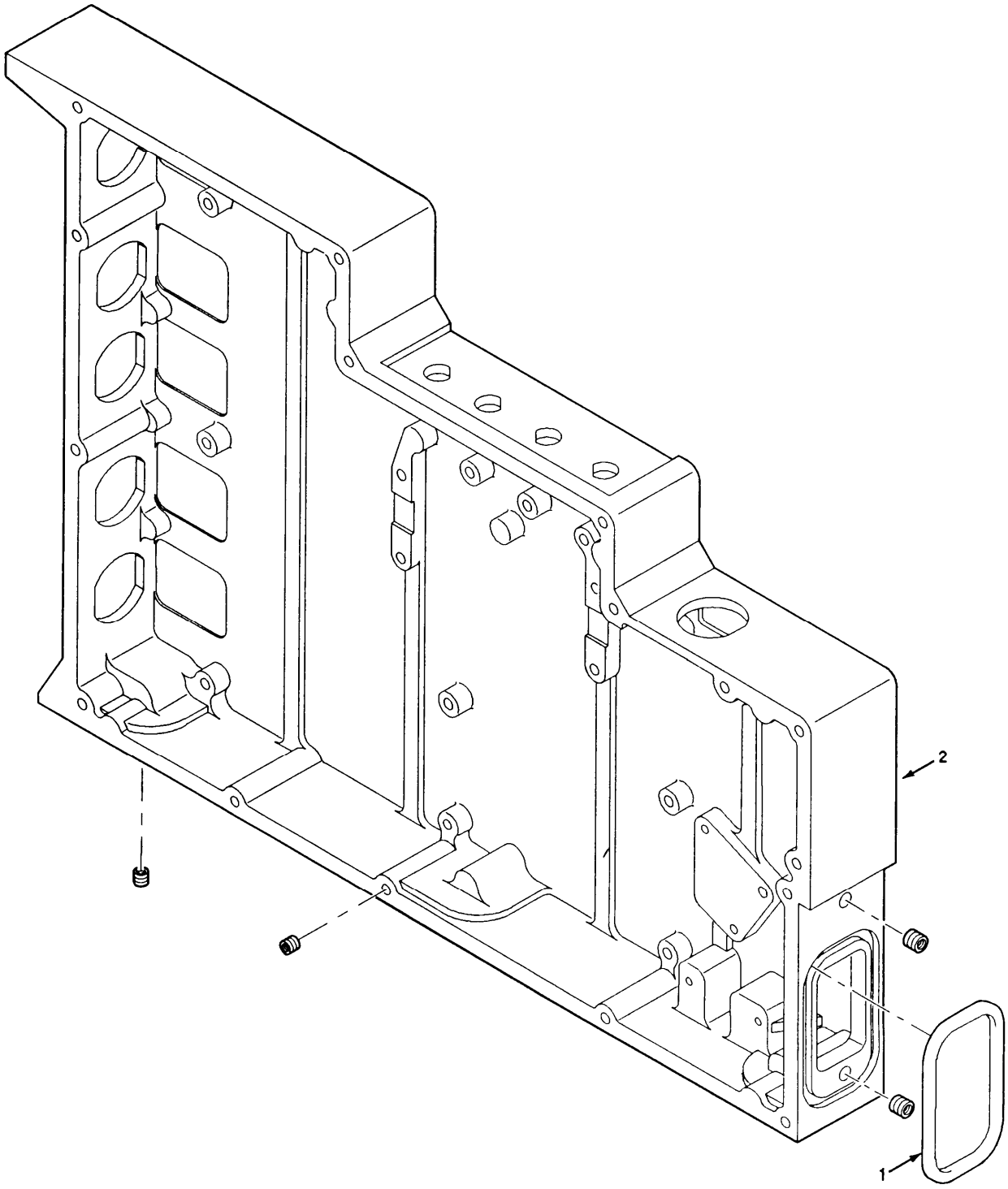

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Figure 4-18. Maintenance of Audio Amplifier Chassis Case.

4-61. REPLACEMENT OF AUDIO AMPLIFIER CHASSIS O-RING GASKET. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
j. O-ring gasket (2)	Install in channel on audio amplifier chassis case and secure with cyanoacrylate adhesive.	Apply silicone compound to o-ring gasket before installation.
k. Wires	Using soldering kit, solder tagged wires into appropriate position. Remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
l. HCP Connector J9 (8)	Install retained connector J9 (8) on audio amplifier chassis (2).	See figure 4-150 Refer to paragraph 4-54 for installation procedures.
m. Transistor Q1 (3)	Install retained transistor Q1 (3) on audio amplifier chassis (2).	Refer to paragraph 4-53 for installation procedures.
n. Bottom shelf (9)	Position audio amplifier chassis (8) on bottom shelf so screw holes are aligned. Using cross tip screwdriver, install three retained screws (3) and flat washers securing bottom shelf (9) to audio amplifier chassis (8).	See figure 4-17. These were removed in step d.
o. Four screws (4 and 5)	Using cross tip screwdriver, install four retained screws (4 and 5) securing top shelf (10) to audio amplifier chassis (8).	These were removed in step e.
p. Screws (2)	Using flat tip screwdriver, install retained screw (2) securing power supply chassis (7) to audio amplifier chassis (8).	This was removed in step c.
q. Screws (1) and flat washer	Using cross tip screwdriver, install retained screw (1) and flat washer securing power supply chassis (7) to audio amplifier chassis (8).	These were removed in step b.
r. 1 - Watt audio amplifier CCA (4)	Install retained 1 - Watt audio amplifier CCA (4). See figure 4-14.	Refer to paragraph 4-52 for installation procedures.

4-62. REPLACEMENT OF CIRCUIT BREAKER CB1.

Tools:

1/2-inch open-end wrench	Flat tip screwdriver	Torque wrench
1/2-inch socket	Torque screwdriver	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Using flat tip screwdriver, fully loosen ten captive screws (15) securing side access cover (16) to power control chassis. Remove and retain side access cover.	See figure 4-14.
c. Circuit breaker CB1 (12)	Using 1/2-inch open-end wrench, remove and retain hex nut (13), lockwasher, ON/OFF plate (14), and locking ring. Remove CB1 to allow access to wires.	See figure 4-19.
d. Wires	Using soldering kit, tag and desolder wires from leads of circuit breaker CB1 (12). Discard circuit breaker.	
INSTALLATION		
e. Wires	Using soldering kit, solder tagged wires to leads of replacement circuit breaker CB1 (12). Remove wire tags.	These were removed in step d. Before and after soldering, clean wires and leads with alcohol and cotton swabs.
f. HCP Circuit breaker CB1 (12)	Position circuit breaker in case (8) and install retained locking ring. Using torque wrench and 1/2-inch socket, secure circuit breaker to case with retained ON/OFF plate (14), lockwasher, and hex nut (13), torque nut to 19 to 21 in-lb.	These were removed in step c.
g. HCP Side access cover (16)	Hold in place and tighten ten captive screws (15) securing side access cover (16) to power control chassis. Using torque screwdriver, torque screws to 8 to 10 in-lb.	This was removed in step b. See figure 4-14.

4-62. REPLACEMENT OF CIRCUIT BREAKER CB1. Continued

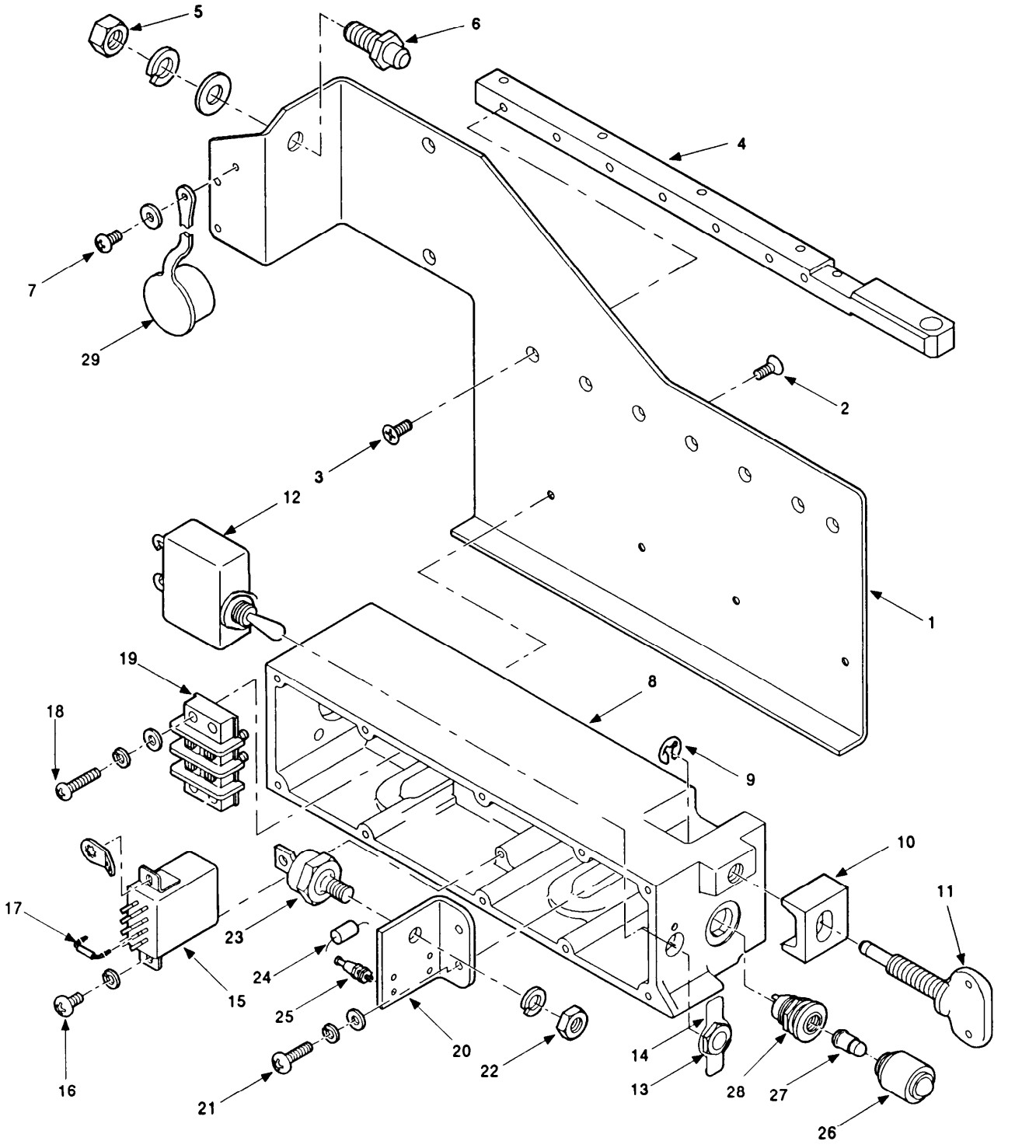

Figure 4-19. Replacement of Components in Power Control Chassis.

4-63, REPLACEMENT OF LAMP HOLDER DS1.

Tools:

1/2-inch open-end wrench	1/2-inch socket	Flat tip screwdriver
9/16-inch open-end wrench	Torque wrench	Torque screwdriver
Soldering kit		

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Circuit breaker CB1 (12)	Remove and retain.	See figure 4-19. Refer to paragraph 4-62 for removal procedures.
d. Lens (26) and lamp (27)	Remove and retain lens (26) and lamp (27) from defective lamp holder DS1 (28).	
e. Lamp holder DS1 (28)	Using 9/16-inch open-end wrench, remove and retain nut and lockwasher securing defective lamp holder DS1 (28) to power control chassis (8). Remove lamp holder from power control chassis.	
f. Wires	Using soldering kit, tag and desolder wires from defective lamp holder DS1 (28). Discard lamp holder,	
INSTALLATION		
g. Wires	Using soldering kit, solder tagged wires to leads of replacement lamp holder DS1 (28). Remove wire tags.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
h. Lamp holder DS1 (28)	Position lamp holder DS1 (28) to power control chassis (8) and install retained lockwasher and nut. Using 9/16-inch open-end wrench tighten nut securing lamp holder to power control chassis.	These were removed in step e.
i. Lens (26) and lamp (27)	Install retained lens (26) and lamp (27) to lamp holder DS1 (28).	These were removed in step d.
j. HCP Circuit breaker CB1 (12)	Install.	Refer to paragraph 4-62 for installation procedures.
k. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-64. REPLACEMENT OF RELAY K1.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver
Soldering kit

Expendable Supplies:

Sealing compound, grade H | Solder | Cotton swabs
Alcohol

References:

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Relay K1 (15)	Using cross tip screwdriver, remove and retain two screws (16), lockwasher, and terminal lugs securing relay K1 (15) to power control chassis (8). Remove relay K1 to allow access to wires and diode CR6.	See figure 4-19.
d. Diode CR6 (17)	Note polarity. Using soldering kit, desolder, remove, and retain diode CR6 (17) from defective relay K1 (15) terminals X1 and X2.	
e. Wires	Remove insulation sleeving as required. Using soldering kit, tag and desolder wires from leads of relay K1 (15). Discard relay K1.	
INSTALLATION		
f. Wires	Using soldering kit, solder tagged wires to leads of replacement relay K1 (15). Remove wire tags. Replace insulation sleeving as required.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
g. Diode CR6 (17)	Note polarity. Using soldering kit, solder retained diode CR6 (17) to leads X1 and X2 of relay K1 (15).	Before and after soldering, clean solder joints with alcohol and cotton swabs.
h. Relay K1 (15)	Position replacement relay K1 (15) on power control chassis (8). Using cross tip screwdriver, install two retained screws (16), lockwasher, and terminal lugs securing relay K1 to power control chassis (8).	Apply one drop of grade H sealing compound to threads of two retained screws before installation.
i. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-65. REPLACEMENT OF DIODE CR1.

Tools:

Flat tip screwdriver | 7/16-inch open-end wrench | Torque screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Wires	Using soldering kit, tag and desolder wires from defective diode CR1 (23).	See figure 4-19.
d. Diode CR1 (23)	Using 7/16-inch open-end wrench, remove and retain hex nut (22) and lockwasher securing defective diode CR1 (23) to mounting bracket (20). Remove and discard defective diode CR1.	
INSTALLATION		
e. Diode CR1 (23)	Position replacement diode CR1 (23) to mounting bracket (20). Using 7/16-inch open-end wrench, install retained hex nut (22) and lockwasher securing diode CR1 (23) to mounting bracket (20).	These were removed in step d.
f. Wires	Using soldering kit, solder tagged wires to terminal on diode CR1 (23). Remove wire tags.	Before and after soldering, clean wires and terminal with alcohol and cotton swabs.
g. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-66. REPLACEMENT OF ZENER DIODE VR1/VR2.

Tools:

Flat tip screwdriver
Cross tip screwdriver
Torque screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs
Solder
Alcohol

References:

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Mounting bracket (20)	Using cross tip screwdriver, remove and retain two screws (21), lockwashers, and flat washers securing mounting bracket (20) to power control chassis. Remove mounting bracket to allow for resoldering.	
d. Zener diode VR1/VR2 (24)	Note polarity. Using soldering kit, desolder defective Zener diode VR1/VR2 (24) from terminal studs (25) on mounting bracket (20). Remove and discard defective Zener diode VR1/VR2 (24).	See figure 4-19.
INSTALLATION		
e. Zener diode VR1/VR2 (24)	Note polarity. Using soldering kit, solder replacement diode to terminal studs (25) on mounting bracket (20).	Before and after soldering, clean leads with alcohol and cotton swabs.
f. Mounting bracket (20)	Position mounting bracket to power control chassis. Using cross tip screwdriver, install two retained screws (21), lockwashers, and flat washers securing mounting bracket (20) to power control chassis.	These were removed in step c.
g. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-67. REPLACEMENT OF SIDE PANEL.

Tools:

Cross tip screwdriver	Torque screwdriver	1/2-inch open-end wrench
Flat tip screwdriver	Adjustable wrench	Hex wrench

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Two screws (5)	Using cross tip screwdriver, remove and retain two screws (5) securing side panel (6) to power supply chassis (15).	See figure 4-20.
c. Nine screws (7 and 8)	Using cross tip screwdriver, remove and retain nine screws (7 and 8) securing top shelf (9) to mounting adapter.	
d. Mounting rail (4)	Using cross tip screwdriver, remove and retain seven screws (3) securing mounting rail (4) to defective side panel (1). Remove and retain mounting rail (4).	See figure 4-19.
e. J1 protective cap (29)	Using cross tip screwdriver, remove and retain screw (7) and flat washer securing J1 protective cap (29) to defective side panel (1). Remove and retain J1 protective cap.	
f. Shoulder pin (6)	Using adjustable wrench and 1/2-inch open-end wrench, remove and retain hex nut (5), lockwasher, and flat washer securing shoulder pin (6) to side panel (1). Remove and retain shoulder pin.	
g. Side panel (1)	Using cross tip screwdriver, remove and retain four screws (2) securing defective side panel to power control chassis (8). Remove and discard defective side panel.	

4-67. REPLACEMENT OF SIDE PANEL. Continued

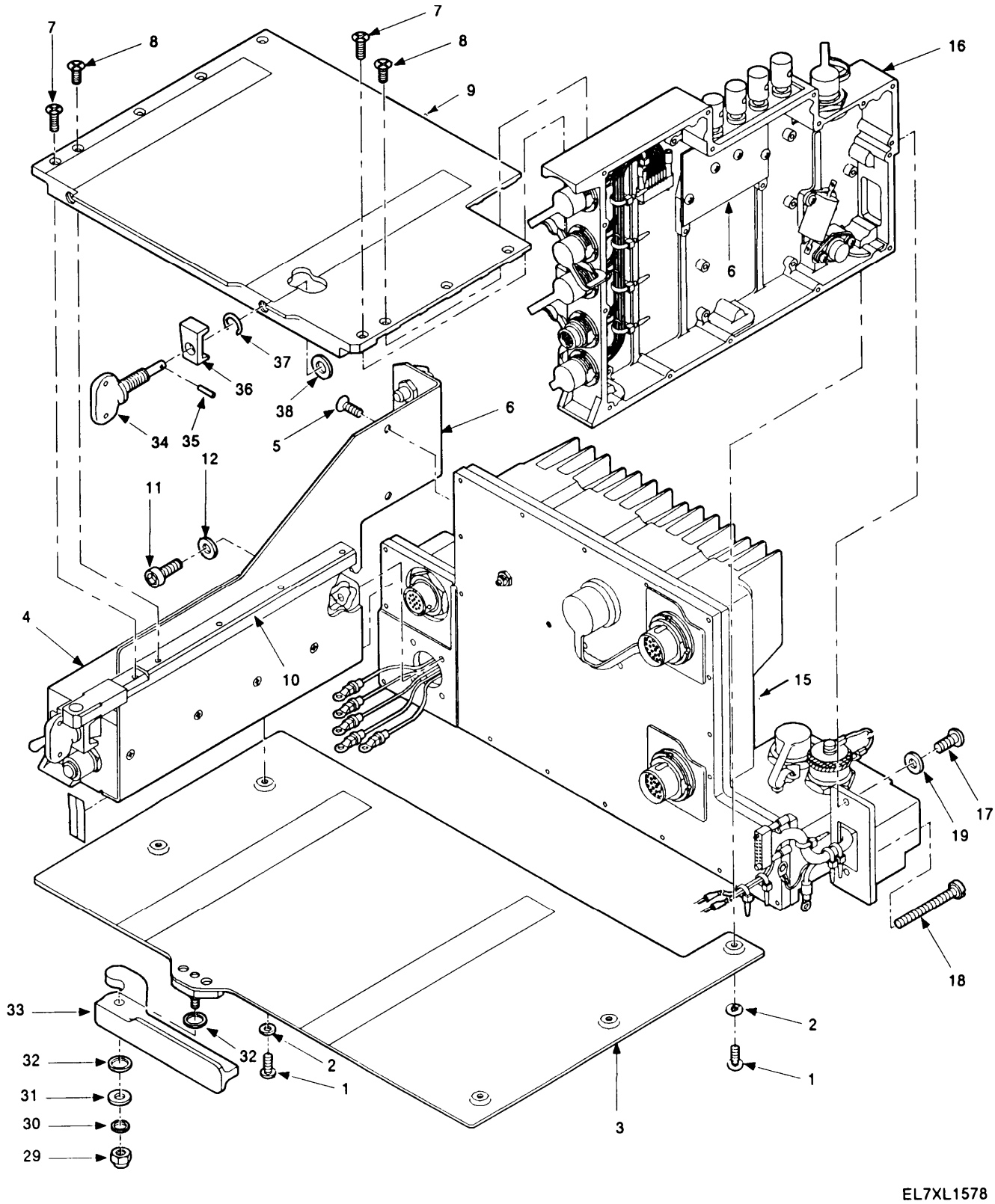

Figure 4-20. Disassembled View of Mounting Adapter AM-7239B/VRC.

4-67. REPLACEMENT OF SIDE PANEL. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
h. Side panel (1)	Position replacement side panel (1) to power control chassis (8). Using cross tip screwdriver, install four retained screws (2) securing replacement side panel (1) to power control chassis (8).	See figure 4-19. These were removed in step g.
i. Shoulder pin (6)	Position retained shoulder pin (6), hex nut (5), lockwasher, and flat washer to side panel (1). Using adjustable wrench and 1/2-inch open-end wrench, tighten nut.	These were removed in step f.
j. J1 protective cap (29)	Using cross tip screwdriver, install retained screw (7) and flat washer securing retained J1 protective cap (29) to side panel (1).	These were removed in step e.
k. Mounting rail (4)	Using cross tip screwdriver, install seven retained screws (3) securing retained mounting rail (4) to side panel (1).	These were removed in step d.
l. Nine screws (7 and 8)	Using cross tip screwdriver, install nine retained screws (7 and 8) securing top shelf (9) to mounting adapter.	See figure 4-20. These were removed in step c.
m. Two screws (5)	Using cross tip screwdriver, install two retained screws (5) securing side panel (6) to power supply chassis (15).	These were removed in step b.

4-68. REPLACEMENT OF DIODE CR6.

Tools:

Cross tip screwdriver | Flat tip screwdriver | Torque screwdriver
Soldering kit

Expendable Supplies:

Sealing compound, grade H | Cotton swabs | Alcohol
Solder

References:

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Relay K1 (15)	Using cross tip screwdriver, remove and retain two screws (16), lockwasher, and terminal lugs securing relay K1 (15) to power control chassis (8). Remove and retain relay K1.	See figure 4-19.
d. Diode CR6 (17)	Note polarity. Using soldering kit, desolder defective diode CR6 (17) from leads X1 and X2 of relay K1 (15). Remove and discard defective diode CR6.	
INSTALLATION		
e. Diode CR6 (17)	Note polarity. Using soldering kit, solder replacement diode CR6 (17) to leads X1 and X2 of retained relay K1 (15).	Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. Relay K1 (15)	Position retained relay K1 (15) on power control chassis (8). Using cross tip screwdriver, install two retained screws (29), lockwasher, and terminal lugs securing relay K1 (15) to power control chassis (8).	Apply one drop of grade H sealing compound to threads of two retained screws before installation.
g. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-69. REPLACEMENT OF TERMINAL BLOCK TB2.

Tools:

Cross tip screwdriver | Flat tip screwdriver | Torque screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Alcohol | Solder

References:

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you .	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Terminal block TB2 (19)	Using cross tip screwdriver, remove and retain two screws (18), lockwashers, flat washers, and insulating washers securing defective terminal block TB2 (19) to power control chassis (8). Remove terminal block TB2 to allow for resoldering.	
d. Wires	Tag wires of terminal block TB2. Using flat tip screwdriver, remove and retain four screws securing terminal lugs with tagged wires to terminal block TB2 (19). Using soldering kit, tag and desolder wires from defective terminal block TB2 (19). Discard defective terminal block TB2.	See figure 4-20. See figure 4-19.
INSTALLATION		
e. Wires	Using soldering kit, solder tagged wires to correct terminals of terminal block TB2 (19). Using flat tip screwdriver, install four retained screws securing terminal lugs with tagged wires to terminal block TB2 (19). Remove wire tags.	See figure 4-20. These were removed in step d. Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
f. Terminal block TB2 (19)	Using cross tip screwdriver, install two retained screws (18), lockwashers, flat washers, and insulating washers securing replacement terminal block TB2 (19) to power control chassis (8).	These were removed in step c.
g. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-70. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET.

Tools:

Cross tip screwdriver Flat tip screwdriver

Expendable Supplies:

Sealing compound, grade H Adhesive, cyanoacrylate Silicone compound

References:

Paragraph 3-24 and 3-25 for repair instructions and removal and installation of threaded screw inserts.

Paragraph 4-62 for removal and installation of circuit breaker CB1.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with left side toward you.	
b. Side access cover (16)	Remove and retain.	Refer to paragraph 4-62 for removal procedures.
c. Terminal block TB2 (19)	Tag wires on terminal block TB2 (19). Using flat tip screwdriver, remove and retain four screws securing wires to terminal block TB2 (19).	See figure 4-19.
d. Screw (18)	Tag terminal lugs. Using cross tip screwdriver, remove and retain screw (18), flat washer, lockwasher, and insulating washer securing two terminal lugs to terminal block TB2 (19).	
e. Relay K1 (15)	Tag terminal lugs. Using cross tip screwdriver, remove and retain screw (16) securing two terminal lugs to relay K1.	
f. Four hex screws (11) and flat washers (12)	Using hex wrench, remove and retain four screws (11) and flat washers (12) securing power control chassis to power supply chassis.	See figure 4-20.
g. Four screws (2)	Using cross tip screwdriver, remove and retain four screws (2) securing side panel (6) to power control chassis.	See figure 4-19.
h. Two screws (1) and flat washers (2)	Using cross tip screwdriver, remove and retain two screws (1) and flat washers (2) securing bottom shelf to power control chassis. Remove and retain power control chassis.	See figure 4-20.
i. O-ring gasket (4)	Inspect, remove, and replace as required. Clean case channel of all debris.	See figure 4-21.

4-70. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
j. O-ring gasket (4)	Install in channel on power control chassis case and secure with cyanoacrylate adhesive.	Apply silicone compound to o–ring gasket before installation.
k. Two screws (1) and flat washers (2)	Position power control chassis to mounting adapter. Using cross tip screwdriver, install two retained screws (1) and flat washers (2) securing power control chassis to bottom shelf.	See figure 4-20. These were removed in step h.
l. Four screws (2)	Using cross tip screwdriver, install four retained screws (2) securing side panel (6) to power control chassis.	See figure 4-19. These were removed in step g.
m. Four hex screws (11) and flat washers (12)	Using hex wrench, install four retained screws (11) and flat washers (12) securing power control chassis to power supply chassis.	See figure 4-20. These were removed in step f.
n. Relay K1 (15)	Using cross tip screwdriver, install retained screw (16) securing two terminal lugs to relay K1 (15). Remove wire tags.	These were removed in step e.
o. Screw (18)	Using cross tip screwdriver, install retained screw (18), flat washer, lockwasher, and insulating washer securing two terminal lugs to terminal block TB2 (19). Remove wire tags.	These were removed in step d.
p. Terminal block TB2 (19)	Using flat tip screwdriver, install four retained screws securing wires to terminal block TB2 (19). Remove wire tags.	See figure 4-19. These were removed in step c.
q. HCP Side access cover (16)	Install.	See figure 4-14. This was removed in step b. Refer to paragraph 4-62 for installation procedures.

4-70. REPLACEMENT OF POWER CONTROL CHASSIS O-RING GASKET. Continued

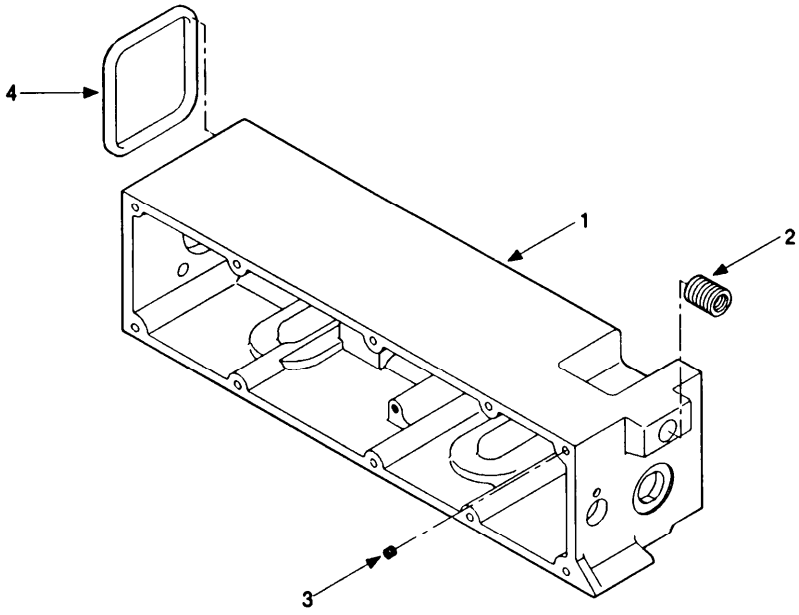

Figure 4-21. Maintenance of Power Control Chassis Case.

4-71. REPLACEMENT OF TERMINAL BLOCK TB1.

Tools:

Cross tip screwdriver | Torque screwdriver | Flat tip screwdriver

References:

Paragraph 4-51 for removal and installation of power supply.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 20 captive screws (8)	Using flat tip screwdriver, fully loosen 20 captive screws securing heatsink assembly (11) to power supply cover (17).	See figure 4-14.
c. Screw (9) and flat washer	Using cross tip screwdriver, remove and retain screw (9) and flat washer securing heatsink assembly (11) to audio amplifier chassis (3).	
d. Screw (10)	Using flat tip screwdriver, remove and retain screw (10) securing heatsink assembly (11) to audio amplifier chassis (3),	
e. Heatsink assembly (11)	Lay heatsink assembly (11) on its fins.	CAUTION Carefully lay on fins to ensure casting does not rest on components inside power supply cover.
f. Power supply (13)	Remove and retain	Refer to paragraph 4-51 for removal procedures.
g, Wires	Tag wires on bottom, of terminal block TB1 (17). Using flat tip screwdriver, remove and retain eight screws securing tagged wires to terminal block TB1 (17).	See figure 4-22.
h, Terminal block TB1 (17)	Using cross tip screwdriver, remove and retain four screws (18) and flat washers securing defective terminal block TB1 (17) to heatsink assembly (1). Remove and discard terminal block TB1.	
INSTALLATION		
i. Terminal block TB1 (17)	Using cross tip screwdriver, install four retained screws (18) and flat washers securing replacement terminal block TB1 to heatsink assembly (1).	See figure 4-22. These were removed in step h.
j. Wires	Using flat tip screwdriver, install eight retained screws securing tagged wires to bottom of terminal block TB1 (17). Remove wire tags.	These were removed in step g.
k. Power supply (13)	Install retained power supply (13).	See figure 4-14. Refer to paragraph 4-51 for installation procedures.

4-71. REPLACEMENT OF TERMINAL BLOCK TB1. Continued

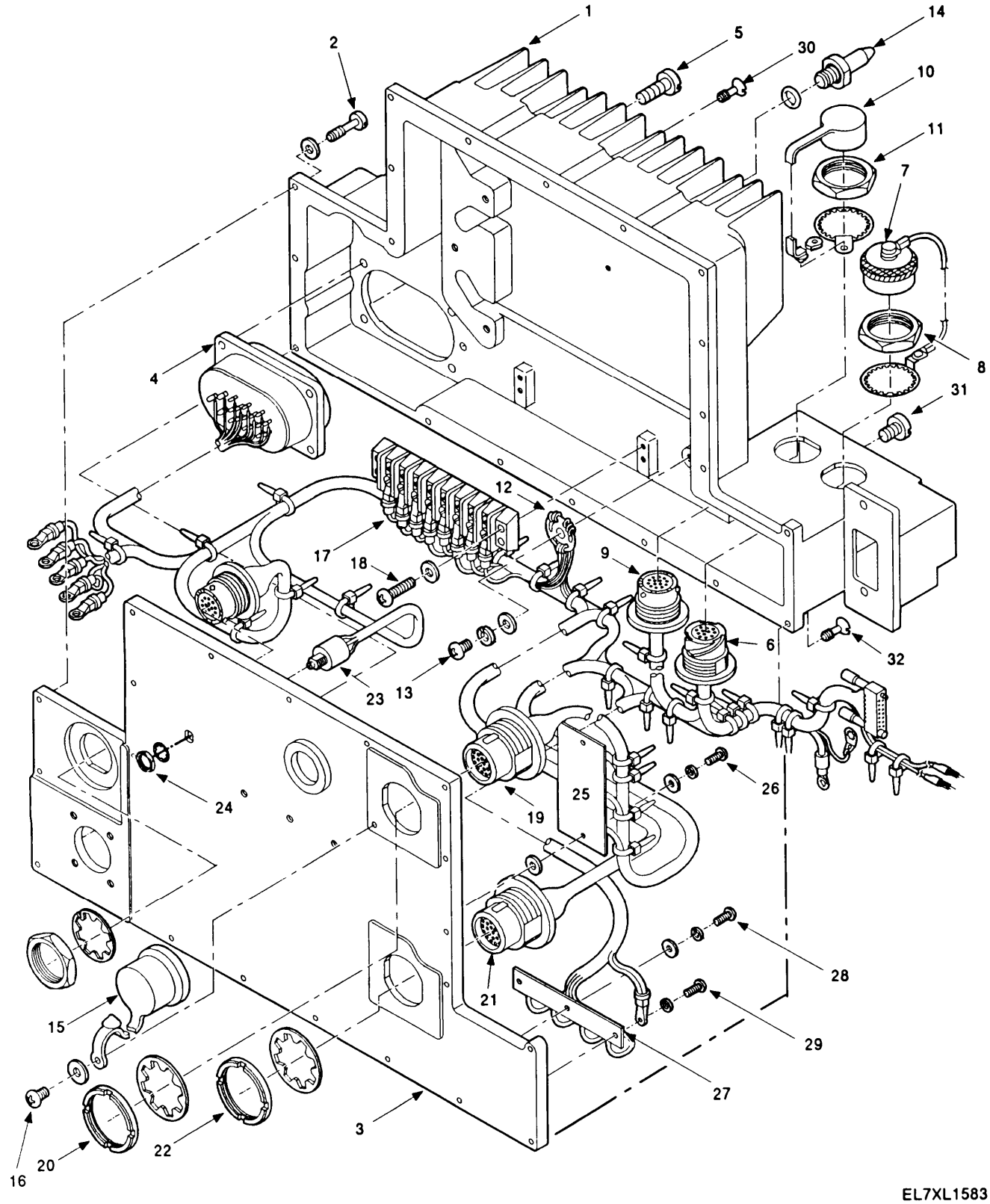

Figure 4-22. Disassembled View of Power Supply Chassis.

4-71. REPLACEMENT OF TERMINAL BLOCK TB1. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
l. Heatsink assembly (11)	Align heatsink assembly (11) to power supply cover (17).	See figure 4-14.
m. Screw (9) and flat washer	Using cross tip screwdriver, install retained screw (9) and flat washer securing heatsink assembly to audio amplifier chassis (3).	These were removed in step c.
n. Screw (10)	Using flat tip screwdriver, install and retained screw (10) securing heatsink assembly (11) to audio amplifier chassis (3).	These were removed in step d.
o. HCP 20 captive screws (8)	Using torque screwdriver, tighten 20 captive screws (8) securing heatsink assembly (11) to power supply cover (17). Torque screws to 8 to 10 in-lb.	These were removed in step b.

4-72. REPLACEMENT OF SNAP LINE DRIVER CCA.

Tools:

Cross tip screwdriver	Torque screwdriver	Soldering kit
Flat tip screwdriver		

Expendable Supplies:

Cotton swabs	Solder	Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 20 captive screws (8)	Using flat tip screwdriver, fully loosen 20 captive screws securing heatsink assembly (11) to power supply cover (17).	See figure 4-14.
c. Screw (9) and flat washer	Using cross tip screwdriver, remove and retain screw (9) and flat washer securing heatsink assembly (11) to audio amplifier chassis (3).	
d. Screw (10)	Using flat tip screwdriver, remove and retain screw (10) securing heatsink assembly (11) to audio amplifier chassis (3).	
e. Heatsink assembly (11)	Lay heatsink assembly (11) on its fins.	CAUTION Carefully lay on fins to ensure casting does not rest on components inside power supply cover.

4-72. REPLACEMENT OF SNAP LINE DRIVER CCA. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
f. SNAP line driver CCA (25)	Using cross tip screwdriver, remove and retain two screws (26), Iockwashers, flat washers, and non-metallic washers securing SNAP line driver CCA (25) to power supply cover (3).	See figure 4-22.
g, Wires	Remove tiedown straps as required. Using soldering kit, tag and desolder wires from terminals E1 through E18 on defective SNAP line driver CCA (25). Remove and discard defective SNAP line driver CCA.	
INSTALLATION		
h. Wires	Solder tagged wires to terminals El through E18 on replacement SNAP line driver CCA (25). Remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
i. SNAP line driver CCA (25)	Using cross tip screwdriver, install two retained screws (26), Iockwashers, flat washers, and non-metallic washers securing replacement SNAP line driver CCA (25) to power supply cover (3).	These were removed in step f.
j. Heatsink assembly (11)	Align heatsink assembly (11) to power supply cover (17).	
k. Screw (9) and flat washer	Using cross tip screwdriver, install retained screw (9) and flat washer securing heatsink assembly to audio amplifier chassis (3).	These were removed in step c.
l. Screw (10)	Using flat tip screwdriver, install and retained screw (10) securing heatsink assembly (11) to audio amplifier chassis (3).	These were removed in step d.
m. HCP 20 captive screws (8)	Using torque screwdriver, tighten 20 captive screws (8) securing heatsink assembly (11) to power supply cover (17). Torque screws to 8 to 10 in-lb.	These were removed in step b.

4-73. REPLACEMENT OF REMOTE CONTROL TRANSFORMER CCA.

Tools :

Cross tip screwdriver Flat tip screwdriver	Torque screwdriver	Soldering kit

Expendable Supplies:

Cotton swabs	Solder	Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting adapter	Set on work surface with back toward you.	
b. 20 captive screws (8)	Using flat tip screwdriver, fully loosen 20 captive screws securing heatsink assembly (11) to power supply cover (17).	See figure 4-14.
c. Screw (9) and flat washer	Using cross tip screwdriver, remove and retain screw (9) and flat washer securing heatsink assembly (11) to audio amplifier chassis (3).	
d. Screw (10)	Using flat tip screwdriver, remove and retain screw (10) securing heatsink assembly (11) to audio amplifier chassis (3).	
e. Heatsink assembly (11)	Lay heatsink assembly (11) on its fins.	CAUTION Carefully lay on fins to ensure casting does not rest on components inside power supply cover.
f. Remote control transformer CCA (27)	Using cross tip screwdriver, remove and retain screw (28), lockwasher, and flat washer securing center of remote control transformer CCA to power supply cover. Using cross tip screwdriver, remove and retain two screws (29) and lockwashers securing W3 cable and ends of remote control transformer CCA to power supply cover.	See figure 4-22.
g. Wires	Using soldering kit, tag and desolder wires from terminals on defective remote control transformer CCA (27). Remove and discard defective remote control transformer CCA.	

4-73. REPLACEMENT OF REMOTE CONTROL TRANSFORMER CCA. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
INSTALLATION		
h. Wires	Using soldering kit, solder tagged wires to terminals on replacement remote control transformer CCA (27). Remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
i. Remote control transformer CCA (27)	Using cross tip screwdriver, install retained screw (28), lockwasher, and flat washer securing center of remote control transformer CCA (27) to power supply cover. Using cross tip screwdriver, install two retained screws (29) and lockwashers securing ends of remote control transformer CCA (27) to power supply cover (3).	These were removed in step f.
j. Heatsink assembly (11)	Align heatsink assembly (11) to power supply cover (17).	
k. Screw (9) and flat washer	Using cross tip screwdriver, install retained screw (9) and flat washer securing heatsink assembly to audio amplifier chassis (3).	These were removed in step c.
l. Screw (10)	Using flat tip screwdriver, install and retained screw (10) securing heatsink assembly (11) to audio amplifier chassis (3).	These were removed in step d.
m. HCP 20 captive screws (8)	Using torque screwdriver, tighten 20 captive screws (8) securing heatsink assembly (11) to power supply cover (17). Torque screws to 8 to 10 in-lb.	These were removed in step b.

4-74. REPLACEMENT OF POWER SUPPLY HEATSINK.

Tools:

Flat tip screwdriver	Spanner wrench	Adjustable wrench
Cross tip screwdriver	Spanner adapter	Socket wrench
Torque screwdriver	1-1/16-inch socket	Hex socket
Soldering kit		

Expendable Supplies:

Sealing compound, grade H	Cotton swabs	Alcohol
Silicone compound	Solder	

References:

Paragraph 4-51 for removal and installation of Power Supply (5A1).
Paragraph 4-53 for removal and installation of Transistor Q1.
Paragraph 4-54 for removal and installation of Connector J9.

ITEM	ACTION	REMARKS
REMOVAL		
a. Access cover (1)	Using flat tip screwdriver, fully loosen 15 captive screws (2) securing access cover (1) to audio amplifier chassis (3). Remove and retain.	See figure 4-14.
b. Eight screws (5) and flat washers	Using cross tip screwdriver, remove and retain eight screws (5) and flat washers securing 1-Watt audio amplifier CCA (4) to audio amplifier chassis (3).	See figure 4-14.
c. Three screws (6), flat washers, and cable clamps (7)	Using cross tip screwdriver, remove and retain three screws (6), flat washers, and cable clamps (7) securing 1-Watt audio amplifier CCA (4) and cables to audio amplifier chassis (3).	
d. Connector W3P3	Loosen two jackscrews and disconnect connector W3P3 (2) from 1-Watt audio amplifier CCA connector J1.	
e. Connector W1P2 (1)	Loosen two jackscrews and disconnect connector W1P2 (1) from 1-Watt audio amplifier CCA connector J2.	
f. 20 captive screws	Using flat tip screwdriver, fully loosen 20 captive screws securing heatsink assembly (11) to power supply cover.	See figure 4-14.
g. Heatsink assembly (11)	Lay heatsink assembly on its fins.	CAUTION Carefully lay on fins to ensure casting does not rest on components inside power supply cover.

4-74. REPLACEMENT OF POWER SUPPLY HEATSINK. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
h. Resistor R1 (6)	Using soldering kit, tag and desolder wire from R1-2.	See figure 4-16.
i. Transistor Q1 (3)	Remove and retain.	See figure 4-15. Refer to paragraph 4-53 for removal procedures.
j. Connector J9 (8)	Remove and retain.	See figure 4-15. Refer to paragraph 4-54 for removal procedures.
k. 2-Wire dual transient protection CCA (8)	Using soldering kit, tag and desolder wires from E1, E2, E5, E6, E13, and E14.	See figure 4-16.
l. Remote control transformer CCA (27)	Using cross tip screwdriver, remove and retain three screws, lockwashers, and flat washers securing remote control transformer to power supply cover.	See figure 4-22.
m. Connector J11 (9)	Remove protective cap (10) from connector J11 (9). Using socket wrench and 1-1/16-inch socket, remove and retain hex nut (11) and protective cap retainer securing connector J11 to heatsink assembly (1).	
n. Connector J10 (6)	Remove protective cap (7) from connector J10 (6). Using socket wrench and 1-1/16-inch socket, remove and retain hex nut (8) and protective cap retainer securing connector J10 to heatsink assembly (1).	
o. Solder lug terminal (12)	Using cross tip screwdriver, remove and retain screw (13), flat washer, and lockwasher securing solder lug terminal (12) with ground wires to heatsink assembly (1).	
p. Power supply	Remove and retain.	Refer to paragraph 4-51 for removal procedures.
q. Terminal block TB1 (17)	Using cross tip screwdriver, remove and retain four screws (18) and flat washers securing terminal block TB1 (17) to heatsink assembly (1).	See figure 4-22.
r. Connector P1 (4)	Using flat tip screwdriver, remove and retain four screws (5) securing connector P1 to power supply chassis. Remove and discard defective power supply chassis.	
s. Gasket	Inspect gasket on power supply cover and replace as required.	

4-74. REPLACEMENT OF POWER SUPPLY HEATSINK. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
t. Power supply cover (3)	Install retained gasket on power supply cover (3).	See figure 4-22.
u. HCP Connector P1 (4)	Position retained retaining plate on connector P1. Position connector P1 in heatsink assembly. Using torque screwdriver, install four retained screws (5) securing connector P1 to heatsink assembly, torque screws to 8 to 10 in-lb.	These were removed in step r. Apply silicone compound to o-ring on connector P1 before installation.
v. Terminal block TB1 (17)	Using cross tip screwdriver, install four retained screws (18) and flat washers securing terminal block TB1 to heatsink assembly.	These were removed in step q. Apply one drop of grade H sealing compound to threads of four retained screws before installation.
w. Power supply	Install,	Refer to paragraph 4-51 for installation procedures.
x. Solder lug terminal (12)	Using cross tip screwdriver, install retained screw (13) and flat washer securing solder lug (12) terminal with ground wires to heatsink assembly (1).	These were removed in step o.
y. HCP Connector J10 (6)	Using torque wrench and 1-1/16-inch socket, install retained hex nut (8) and protective cap retainer securing connector J10 to heatsink assembly (1), torque hex nut to 70 in-lb.	These were removed in steps n. Apply silicone compound to o-ring on J10 connector before installation.
z. HCP Connector J11 (9)	Using torque wrench and 1-1/16-inch socket, install retained hex nut (11) and protective cap retainer securing connector J11 (9) to heatsink assembly (1).	These were removed in steps m. Apply silicone compound to o-ring on J11 connector before installation.
aa. Remote control transformer CCA (27)	Using cross tip screwdriver, install three retained screws, Iockwashers, and flat washers securing remote control transformer to power supply cover.	See figure 4-22. These were removed in step 1.
ab. 2-Wire dual transient protection CCA (8)	Using soldering kit, solder wires to terminals E1, E2, E5, E6, E13, and E14.	See figure 4-16. These were removed in step k.
ac. Connector J9 (8)	Install.	See figure 4-15. Refer to paragraph 4-54 for installation procedures.

4-74. REPLACEMENT OF POWER SUPPLY HEATSINK. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
ad. transistor Q1 (3)	Install.	See figure 4-15. Refer to paragraph 4-53 for installation procedures.
ae. Resistor R1 (6)	Using soldering kit, solder wire to R1-2. Remove wire tags.	See figure 4-16. This was removed in step h.
af. HCP Heatsink assembly (11)	Position heatsink assembly to power supply cover. Using torque screwdriver, tighten 20 captive screws securing heat-sink assembly (11) to power supply cover, torque screws to 8 to 10 in-lb.	See figure 4-14. These were removed in step f.
ag. Connector W1P2 (1)	Install connector W1P2 (1) to 1-Watt audio amplifier CCA connector J2 by tightening two jackscrews.	
ah. Connector W3P3	Install connector W3P3 (2) to 1-Watt audio amplifier CCA connector J1 by tightening two jackscrews.	
ai. 1-Watt audio amplifier CCA (4)	Using cross tip screwdriver, Install eight retained screws (5) and flat washers securing 1-Watt audio amplifier CCA (4) to audio amplifier chassis (3).	See figure 4-14. These were removed in step b.
aj. Three screws (6), flat washers, and cable clamps (7)	Using cross tip screwdriver, install three retained screws (6), flat washers, and cable clamps (7) securing 1-Watt audio amplifier CCA (4) and cables to audio amplifier chassis (3).	These were removed in step c.
ak. Access cover (1)	Position retained access cover on audio amplifier chassis (3).	See figure 4-14. This was removed in step a.
al. HCP Access cover (1)	Tighten 15 captive screws securing access cover to audio amplifier chassis. Using torque screwdriver and flat tip adapter, torque screws to 9 in-lb.	

4-75. REPLACEMENT OF POWER SUPPLY COVER GASKET.

Tools:

Flat tip screwdriver	Spanner wrench	Adjustable wrench
Cross tip screwdriver	Spanner adapter	Socket wrench
Torque screwdriver	1-1/16-inch socket	Hex socket
Soldering kit		

Expendable Supplies:

Sealing compound, grade H	Cotton swabs	Alcohol
Silicone compound	Solder	

References:

Paragraph 4-74 for replacement of power supply heatsink

ITEM	ACTION	REMARKS
REMOVAL Continued		
a. Power supply cover (3)	Remove and retain cable W3 major components to gain access to gasket power supply cover (3)	Refer to paragraph 4-74 for repair instructions See figure 4-22.
b. Power supply cover gasket (1)	Remove gasket and clean the gasket groove in power supply cover (2), inspect and replace gasket as required.	See figure 4-23.
INSTALLATION		
c. Power supply cover gasket (1)	Install gasket in power supply cover (2).	See figure 4-23. This was removed in step b.
d. Power supply cover (3)	Install retained cable assembly W3 and all associated hardware on power supply cover.	See figure 4-22. This was removed in step a.

4-75. REPLACEMENT OF POWER SUPPLY COVER GASKET. Continued

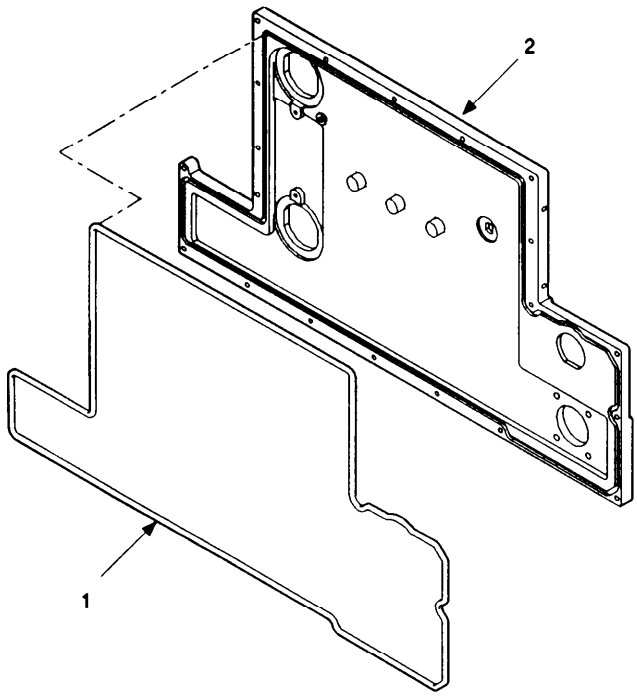

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Figure 4-23. Replacement of Power Supply Cover Gasket.

4-76. REPLACEMENT OF P1 CONNECTOR.

Tools:

Cross tip screwdriver | Flat tip screwdriver | Torque screwdriver
Soldering kit

Expendable Supplies:

Cotton swabs | Solder | Alcohol

References:

Paragraph 4-74 for replacement of power supply heatsink

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply heatsink (1)	Separate to gain access to connectors.	See figure 4-22. Refer to paragraph 4-74 for removal procedures.
b. Four screws	Using flat tip screw driver, remove and retain four screws securing P1 connector (4) to power supply heatsink (1).	
c. P1 connector (4)	Remove from power supply chassis.	
d. Wires	Using soldering kit, tag and desolder wires from defective P1 connector.	
e. Retaining plate	Remove and retain retaining plate and discard defective PI connector.	
INSTALLATION		
f. Retaining plate	Position retained retaining plate to replacement P1 connector.	
g. Wires	Using soldering kit, solder tagged wires to replacement P1 connector. Remove wire tags.	These were removed in step d. Before and after soldering, clean solder joints with alcohol and cotton swabs.
h. HCP P1 connector (12)	Install P1 connector (12) into power supply heatsink (1). Using torque screwdriver, torque four retained screws (14) to 8 to 10 in-lb.	See figure 4-22. These were removed in step b.
i. HCP Power supply heatsink (1)	Install power supply heatsink (3) on power supply cover (3).	Refer to paragraph 4-74 for installation procedures.

4-77. REPLACEMENT OF J1O CONNECTOR.

Tools :

Cross tip screwdriver	Flat tip screwdriver	Torque screwdriver
Soldering kit	1-1/16-inch socket	Socket wrench
Torque wrench		

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:

Paragraph 4-74 for replacement of power supply heatsink

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply heatsink (1)	Separate to gain access to connectors.	See figure 4-22. Refer to paragraph 4-74 for removal procedures.
b. Protective cap (7)	Remove from defective J10 connector.	
c. J10 connector (6)	Using 1-1/16-inch socket and socket wrench, remove nut and protective cap retainer from defective J10 connector. Discard nut and retain protective cap retainer. Push J10 connector through power supply heatsink (1).	A replacement nut is supplied with replacement connector.
d. Wires	Remove insulation sleeving. Using soldering kit, tag and desolder wires from defective J10 connector. Discard defective J10 connector.	
INSTALLATION		
e. Wires	Position tagged wires to replacement J10 connector. Using soldering kit, solder tagged wires to replacement J10 connector. Remove wire tags and slide insulation sleeving over solder joints.	These were removed in step d. Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. HCP J10 connector (6)	Position J10 connector (6) to power supply heatsink (1). Using 1-1/16-inch socket and torque wrench, torque nut securing protective cap retainer and nut to 68 to 72 in-lb.	These were removed in step c.
g. Protective cap (7)	Install on replacement J10 connector.	
h. HCP Power supply heatsink (1)	Install power supply heatsink (1) on power supply cover (3).	Refer to paragraph 4-74 for installation procedures.

4-78. REPLACEMENT OF J11 CONNECTOR.

Tools:

Cross tip screwdriver	Flat tip screwdriver	Torque screwdriver
Soldering kit	1-1/16-inch socket	Socket wrench
Torque wrench		

Expendable Supplies:

Cotton swabs	Solder	Alcohol
Silicone compound		

References:

Paragraph 4-74 for replacement of power supply heatsink

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply heatsink (1)	Separate to gain access to connectors.	See figure 4-22. Refer to paragraph 4-74 for removal procedures.
b. Protective cap (10)	Remove from defective J11 connector.	
c. J11 connector (9)	Using 1-1/16-inch socket and socket wrench, remove nut and protective cap retainer from defective J11 connector. Discard nut and retain protective cap retainer. Push J11 connector through power supply heatsink (1).	A replacement nut is supplied with replacement connector.
d. Wires	Remove insulation sleeving, Using soldering kit, tag and desolder wires from defective J11 connector. Discard defective J11 connector.	
INSTALLATION		
e. Wires	Position tagged wires to replacement J11 connector. Using soldering kit, solder tagged wires to replacement J11 connector. Remove wire tags and slide insulation sleeving over solder joints.	These were removed in step d. Before and after soldering, clean solder joints with alcohol and cotton swabs.
f. HCP J11 connector (9)	Position J11 connector (9) to power supply heatsink (1). Using 1-1/16-inch socket and torque wrench, torque nut securing protective cap retainer and nut to 68 to 72 in-lb.	These were removed in step c. Apply silicone compound to O ring before installing in power supply chassis
g. Protective cap (10)	Install on replacement J11 connector.	
h. HCP Power supply heatsink (1)	Install power supply heatsink (1) on power supply cover (3).	Refer to paragraph 4-74 for installation procedures.

Section VI. PREPARATION FOR STORAGE OR SHIPMENT

4-79. GENERAL INFORMATION.

a. Pack the mounting adapter and modules in approved shipping containers.

b. All modules must be shipped enclosed in material that provides protection from static electricity. See the following paragraph.

4-80. PACKING STATIC SENSITIVE MODULES.

The following steps should be followed when packing a static sensitive module for storage or shipment.

CAUTION

To avoid damaging static sensitive modules, use an antistatic pad on the work surface and wear a grounded wrist strap when handling the module.

ITEM	ACTION	REMARKS
a. Module (1)	Place inside antistatic bag (2) or inside antistatic wrapping material (3). See figure 4-24.	
b. Antistatic package (4)	Seal with adhesive tape. Attach “sensitive electronic devices” unit pack label (5).	
c. Antistatic package (4)	Place inside approved shipping container (6). Attach “sensitive electronic devices” intermediate pack label (7).	

4-80. PACKING STATIC SENSITIVE MODULES. Continued

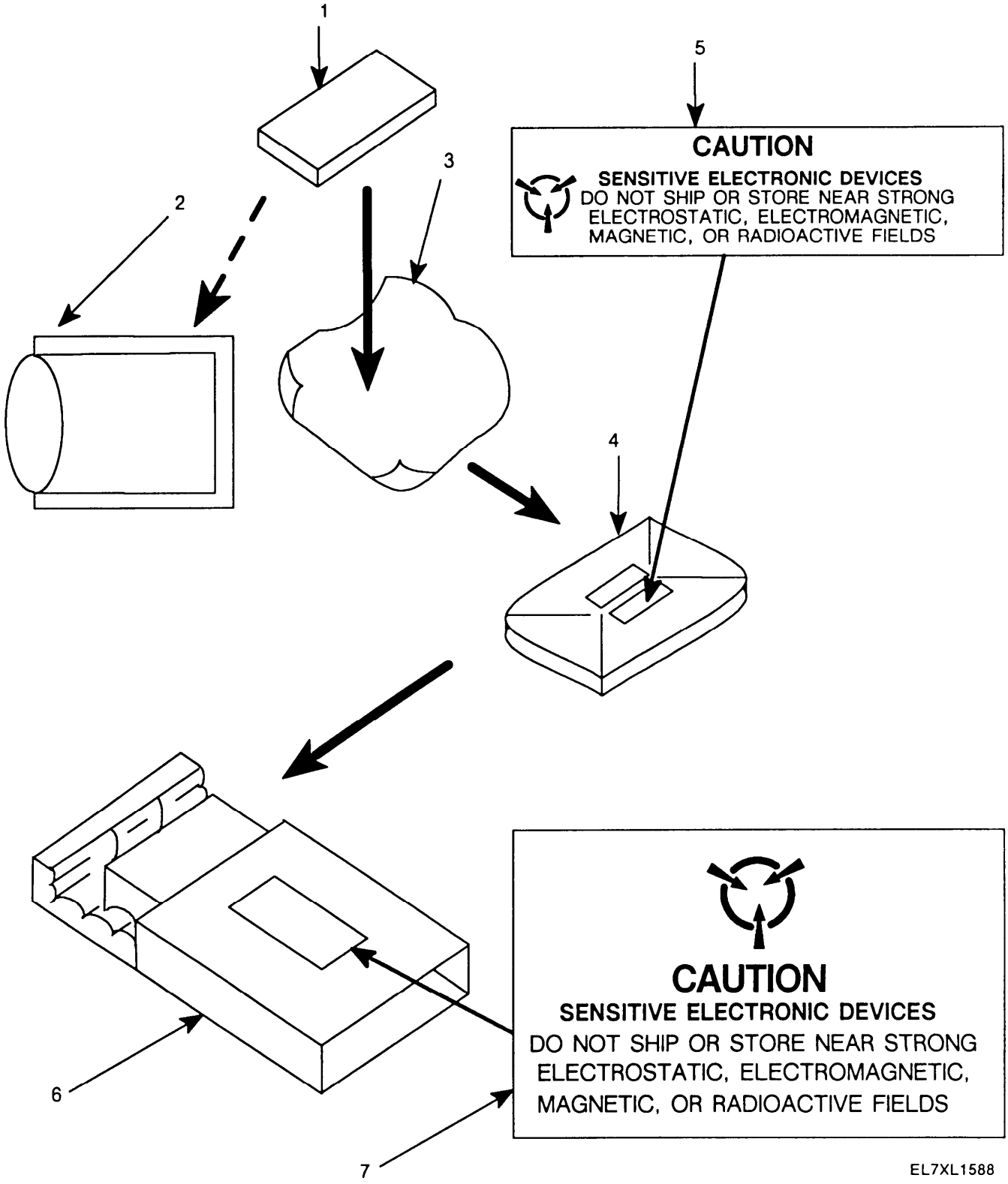

Figure 4-24. Packing Static Sensitive Modules.

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CHAPTER 5

AMPLIFIER, RADIO FREQUENCY AM-7238/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

5-1. INTRODUCTION.

The power amplifier increases the 4-W output of the RT to 50 W for long range communication. It has no controls or indicators. When properly installed in a vehicular radio, operation is automatic.

The power amplifier separates into three parts:

Case, Amplifier, RF 6A1 (power amplifier case).

Circuit Card Assembly, Decoder Control 6A2 (decoder control).

Electronic Component Assembly - Amplifier, Radio Frequency 6A3 (power amplifier heat sink).

The power amplifier case contains filters, electronic switches, and the three external connectors. The decoder control provides the signal interface to the RT. The power amplifier heat sink contains the RF amplifier that provides the RF gain.

5-2. OVERALL FUNCTIONAL DESCRIPTION.

Figure 5-1 is a block diagram of the power amplifier. During high power transmit, the RF signal from the RT is input at connector J2. It is routed through an RF switch to the amplifier. The amplifier increases the power level to 50 W. The amplified signal is routed through one of three filters to reduce harmonic and spurious signals. From there, it goes through a second RF switch and out the ANT connector (J1).

During low power transmit, the RF signal is routed from J2 through the two RF switches to J1. During receive, the same path is followed in reverse.

Control signals from the RT identify the frequency band and the RF path required. The decoder control activates the high voltage switch drivers based on the control signals from the RT. The switch drivers select the switch positions that determine the RF path.

Feedback signals are provided during high power transmit. Internally, an automatic level control (ALC) signal is used to control the RF gain. If the VSWR is too high, the RF gain is reduced and the sidetone disable line to the RT is activated. The decoder control also drives the RT SIG display.

5-2. OVERALL FUNCTIONAL DESCRIPTION. Continued

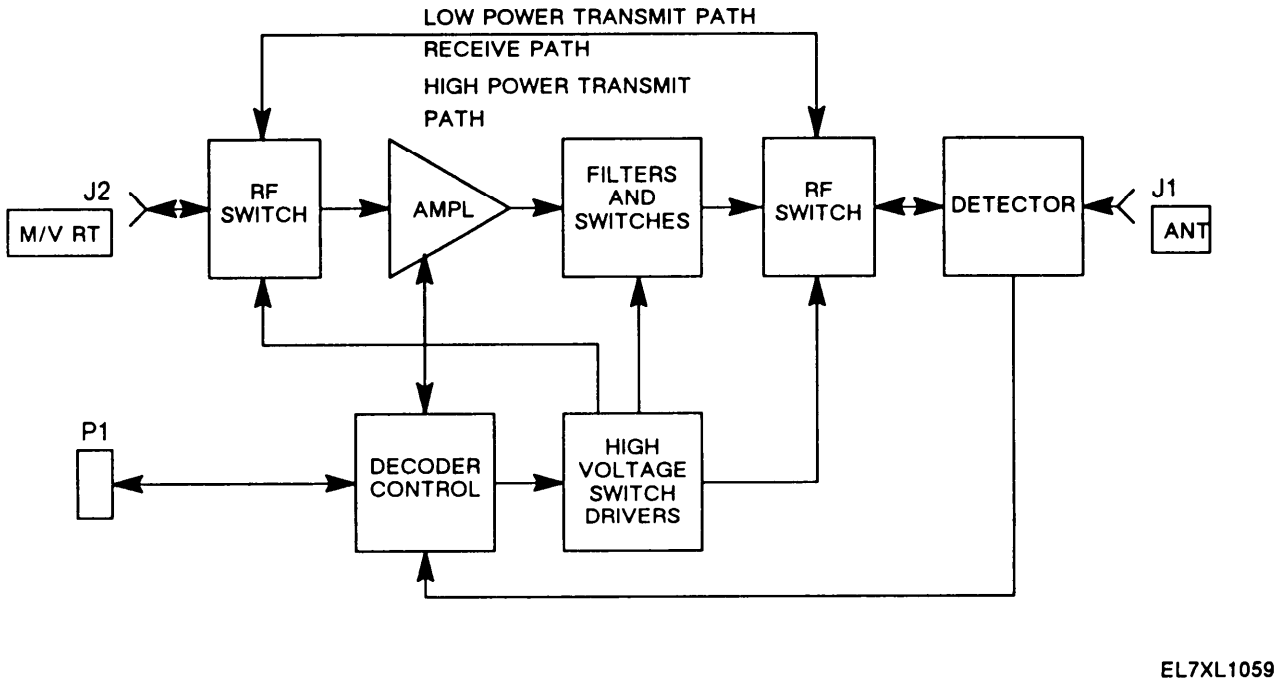


Figure 5-1. Power Amplifier Block Diagram.

5-3. INPUT CONTROL SIGNAL PATHS.

The power amplifier requires four control signals from the RT. See figure FO-16. When the RT RF switch is set to PA, the HIGH POWER XMT line is set to logic 1. One of three filter lines will also be set to logic 1 depending on the frequency. The power amplifier frequency bands are as follows:

Frequency Band (MHz)	Filter
30 to 43	A
43 to 61.5	B
61.5 to 88	C

The decoder control (6A2) drives the switching FET. When the HIGH POWER XMT line is set to logic 1, the TRANSMIT output line is set to 13 V dc (12.5 to 13.5 V dc). The RECEIVE line is the opposite. When the HIGH POWER XMT line is at 0 V dc, the RECEIVE line is set to 13 V dc. When the gate (G) of a switching FET is held at 13 V dc, current flows from the source (S) to the drain (D). In the power amplifier case (6A1), the drain of the FET is held at 200 V dc when the FET is not conducting. When the FET conducts, the voltage drops to near 0 V. The 0 V level sets the electronic switches in the input and output filter switches (6A1A2 and 6A1A1). The filters (all except FL14) are used to isolate the RF energy.

The FILTER A, FILTER B, and FILTER C paths operate in the same way. The logic level from the RT is converted to 0 or 13 V dc by the decoder control. The output of the decoder control drives the switching FET. The output from the FET sets the input and output filter switch.

5-4. RF SIGNAL PATHS.

a. High Power Transmit Path. When the HIGH POWER XMT control line is at logic 1, the control circuits set the RF switches in the output filter switch (6A1A1) to the XMT position. See figure FO-16. The RF signal is input at connector J2. It passes through E1 to the first RF switch. With the switch as shown in figure FO-16, the signal is output at E3. It travels through cables W1 and W3 to the power amplifier heat sink (6A3) at E1. The power amplifier heat sink provides 12 dB of RF gain. (1 dB is lost in the filters and switches.) It is a push-pull amplifier with input and output impedance matching. The output at E5 goes through cables W4 and W2 into the input filter switch at E1. It switches the signal through one of three low-pass filters in filter FL14. The low-pass filter attenuates any harmonics or spurious signals outside the filter's frequency range. The output of the low-pass filter is routed to the second RF switch and out to connector J1 through the power detector. The power detector measures the output power level to provide an ALC feedback signal. It also measures the reflected power to provide a VSWR feedback signal.

b. Low Power Transmit Path and Receive Path. When the RT RF switch is set to LO, M, or Hl, the HIGH POWER XMT input line is held at logic 0. The HIGH POWER XMT line will also be at logic 0 any time the radio is not transmitting. This causes the two electronic RF switches in the output filter switch (6A1A1) to be set to the RCV position. This basically connects connector J1 to connector J2 so that signals can pass between the RT and the antenna.

5-5. FEEDBACK AND OUTPUT SIGNAL PATHS.

The two main feedback signals originate at the power detector in the output filter switch (6A1A1). See figure FO-16. The forward power is checked and is used for the automatic level control (ALC) signal. The reverse or reflected power is checked and is used for the VSWR signal. Both of these are 0 to 4 V dc signals and are fed back to the decoder control (6A2). The ALC signal is used to provide the POWER LEVEL signal that goes back to the RT to drive the SIG display. The VSWR and the ALC signals are compared. If the VSWR is greater than 5:1, the SIDETONE DISABLE line is set to 6.5 V dc. Adjustments are provided on the decoder control to adjust the sidetone disable limits.

The power amplifier heat sink (6A3) uses the 27 V dc power from the constant current source circuit of 6A1Q1 and 6A1Q2. Most of the current is supplied from Q1 through filter FL1. It is used to regulate the RF gain of the power amplifier heat sink. The gain is reduced if any of the following occurs:

The RF power output exceeds its maximum limit.

The VSWR exceeds 5:1.

The temperature of the power amplifier exceeds 70° C (160° F).

The temperature of the power amplifier is sensed by two thermistors in the power amplifier heat sink. They are connected in series between E4 and ground. The decoder control monitors the resistance at pin 24 of J1.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-6. COMMON TOOLS AND EQUIPMENT.

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

5-7. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

5-8. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering Direct Support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

5-9. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective power amplifier. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module.

5-10. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating a power amplifier. If the operational check is passed, the power amplifier can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 5-11.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response incorrect, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A “No response” in the “Response” column means that any response is not of interest.

5-10. OPERATIONAL CHECK. Continued

The switch settings for the test equipment are given in the "EQUIPMENT PRESETS" section of each test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module.

WARNING

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply ON.

CAUTION

Static electricity and stray voltages can damage the decoder control (6A2). Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting.

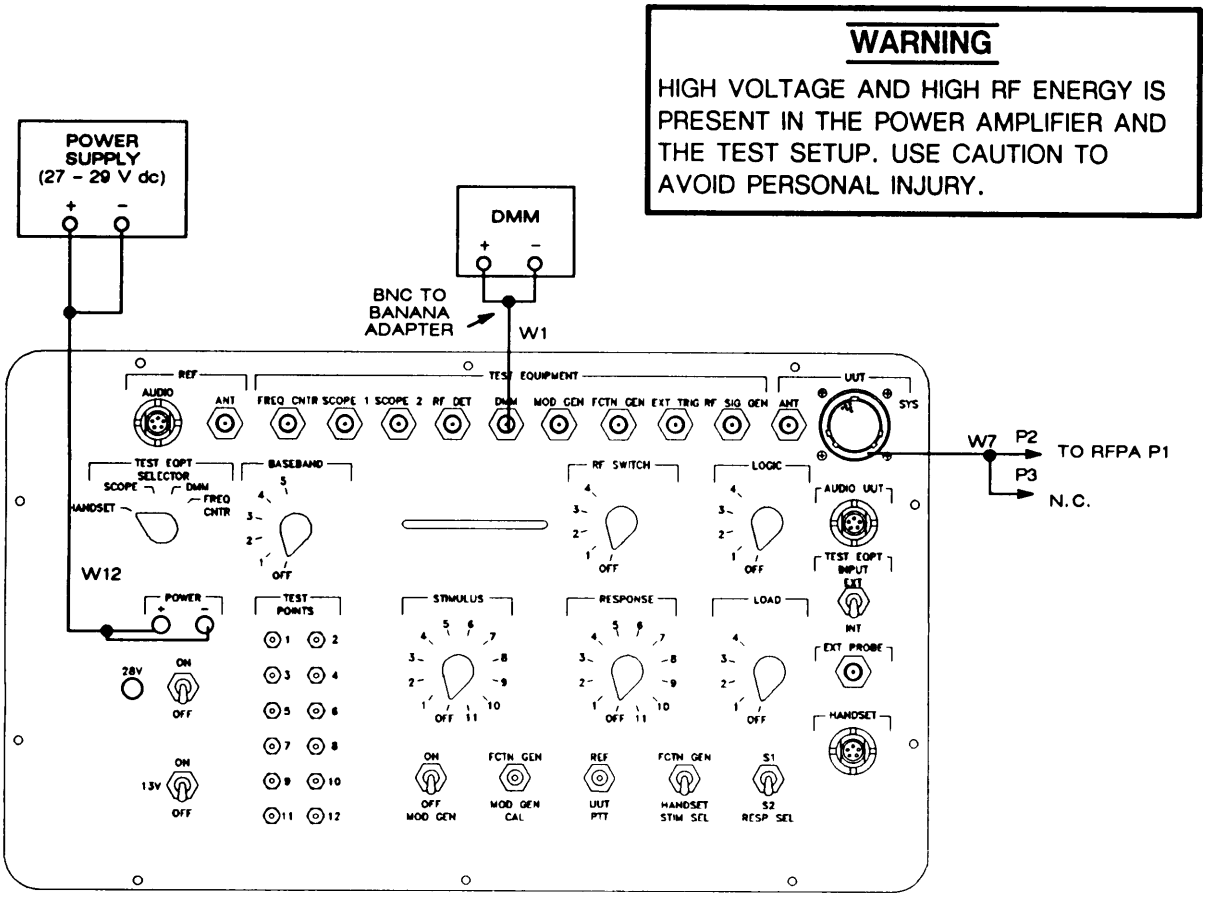
High voltage (200 V) and high RF energy (50 watts) is present in the power amplifier during testing. Do not disassemble with power applied to the power amplifier.

NOTE

If the decoder control (6A2) is replaced, be sure to perform the entire operational check.

Connect equipment as shown in figure 5-2 to perform the operational check of the RF power amplifier.

5-10. OPERATIONAL CHECK. Continued



EL7XL1060

EQUIPMENT PRESETS

TEST ADAPTER:

TEST EQPT SELECTOR:	DMM
BASEBAND:	OFF
RF SWITCH:	OFF
LOGIC:	OFF
TEST EQPT INPUT:	INT
28 V:	OFF
13 V:	OFF
STIMULUS:	OFF
RESPONSE:	7
LOAD:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S1

Figure 5-2. RF Power Amplifier Test Setup.

5-10. OPERATIONAL CHECK. Continued

Step 1. SAFE TO TURN ON CHECK.

Action	Response
a. Read DMM.	a. DMM reading is greater than 2 k Ω. If not, the power amplifier case (6A1) is bad.
b. Set RESPONSE: 8. Read DMM.	b. DMM reading is greater than 2 k Ω. If not, the decoder control (6A2) is bad.
c. Set RESPONSE: 9. Read DMM.	c. DMM reading is greater than 5 k Ω. If not, go to chart 1.
d. Set RESPONSE: 10. Read DMM.	d. DMM reading is greater than 50 k Ω. If not, the decoder control (6A2) is bad.

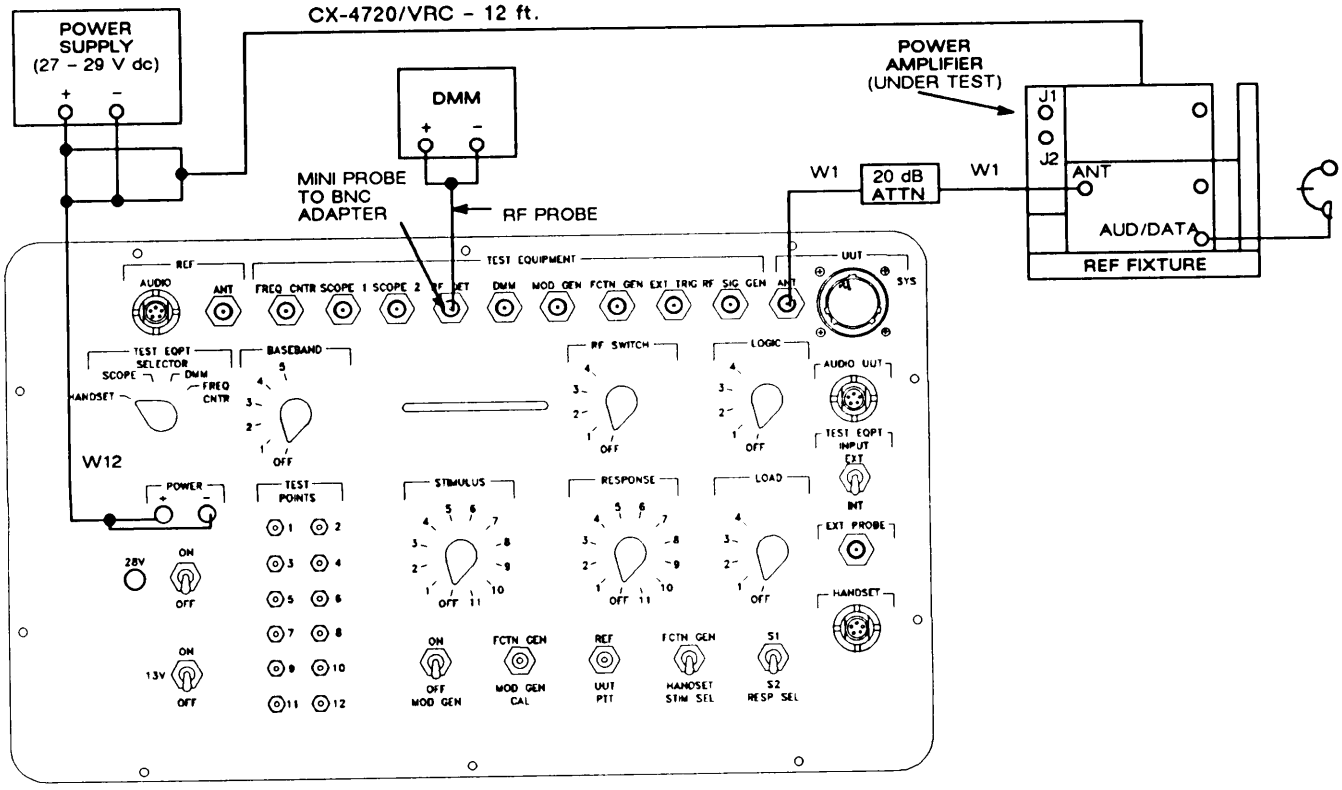
Step 2. RF OUTPUT CHECK.

Action	Response
a. Connect equipment as shown in figure 5-3. Set 28 V: ON. Set RF SWITCH: 1.	a. No response.
b. Load the following frequencies into the RT: CHAN / FREQUENCY (kHz) 1 / 87975 2 / 55000 3 / 33000	b. No response.
c. Set RT CHAN: 1.	c. No response.
d. Press handset PTT switch. Read and record level shown on DMM.	d. Recorded DMM reading is RT channel 1 RF power (RT 1).
e. Set RT CHAN: 2.	e. No response.
f. Press handset PTT switch. Read and record level shown on DMM.	f. Recorded DMM reading is RT channel 2 RF power (RT 2).
g. Set RT CHAN: 3.	g. No response.
h. Press handset PTT switch. Read and record level shown on DMM.	h. Recorded DMM reading is RT channel 3 RF power (RT 3).

5-10. OPERATIONAL CHECK. Continued

WARNING

HIGH VOLTAGE AND HIGH RF ENERGY IS PRESENT IN THE POWER AMPLIFIER AND THE TEST SETUP. USE CAUTION TO AVOID PERSONAL INJURY.



EL7XL1061A

EQUIPMENT PRESETS

REF FIXTURE:

CB1:	ON
FCTN:	SQ ON
MODE:	SC
RF:	HI
DATA:	OFF

DMM:

SET FOR dBm, 50 Ω REF

Figure 5-3. Reference RF Output Test Setup.

5-10. OPERATIONAL CHECK. Continued

Step 2. RF OUTPUT CHECK. Continued

Action	Response
i. Connect equipment as shown in figure 5-4.	i. No response.
j. Set RT CHAN: 1.	j. No response.
k. Press handset PTT switch and read DMM.	k. DMM reading is 10 to 14 dB greater than measurement RT 1. If not, go to chart 2.
l. Set RT CHAN: 2.	l. No response.
m. Press handset PTT switch and read DMM.	m. DMM reading is 10 to 14 dB greater than measurement RT 2. If not, go to chart 3.
n. Set RT CHAN: 3.	n. No response.
o. Press handset PTT switch and read DMM.	o. DMM reading is 10 to 14 dB greater than measurement RT 3. If not, go to chart 4.
p. Decrease test power supply output voltage to 22.0 V dc.	p. No response.
q. Press handset PTT switch and read DMM.	q. DMM reading is 8 to 12 dB greater than measurement RT 3. If not, the power amplifier heat sink (6A3) is bad.
r. Increase test power supply output voltage to 31.0 V dc.	r. No response.
s. Press handset PTT switch and read DMM.	s. DMM reading is 10 to 14 dB greater than measurement RT 3. If not, the power amplifier heat sink (6A3) is bad.
t. Decrease test power supply output voltage to 27.5 V dc.	t. No response.

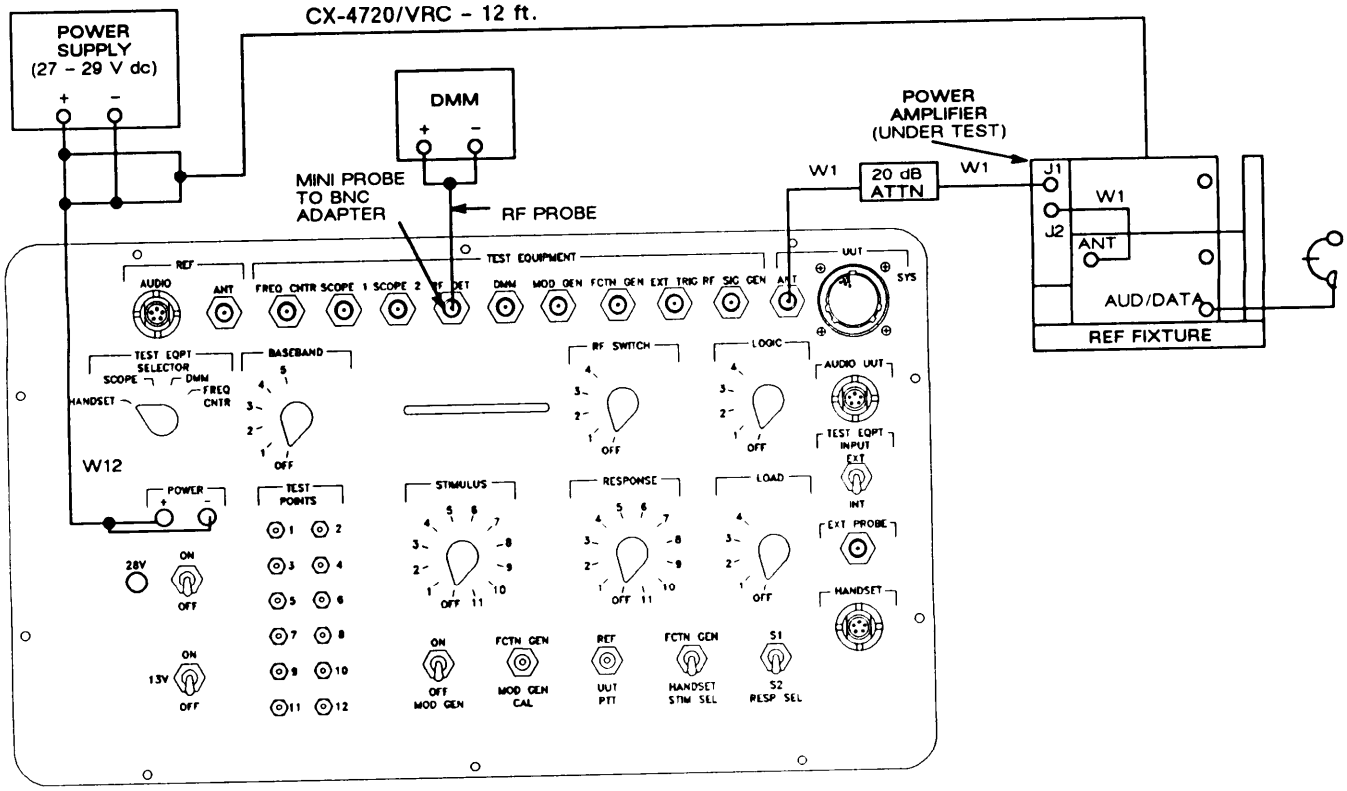
Step 3. RECEIVE PATH LOSS CHECK.

Action	Response
a. Set RT RF: HI.	a. No response.
b. Press handset PTT switch and read DMM.	b. DMM reading is not more than 1.5 dB below measurement RT 3. If it is, go to chart 5.

5-10. OPERATIONAL CHECK. Continued

WARNING

HIGH VOLTAGE AND HIGH RF ENERGY IS PRESENT IN THE POWER AMPLIFIER AND THE TEST SETUP. USE CAUTION TO AVOID PERSONAL INJURY.



EL7XL1062A

EQUIPMENT PRESETS

REF FIXTURE:

CB1:	ON
FCTN:	SQ ON
MODE:	SC
RF:	PA
DATA:	OFF

DMM:

SET FOR dBm, 50 Ω REF

Figure 5-4. RF Output Test Setup.

5-10. OPERATIONAL CHECK. Continued

Step 4. SIGNAL STRENGTH CHECK.

Action	Response
a. Set RT RF: PA.	a. No response.
b. Press handset PTT switch and read RT SIG display.	b. SIG display reading is 8 or 9. If not, the decoder control (6A2) is bad.

Step 5. VSWR PROTECTION AND SIDETONE CHECKS.

Action	Response
a. Press the handset PTT switch and check for sidetone.	a. Sidetone is present. If not, the decoder control (6A2) is bad.
b. Disconnect W1 at 20 dB attenuator input and connect it to 3 dB attenuator. Do not terminate 3 dB attenuator output.	b. No response.
c. Press the handset PTT switch and check for sidetone.	c. Sidetone is present. If not, go to chart 6.
d. Disconnect W1 at 3 dB attenuator input.	d. No response.
e. Press the handset PTT switch and check for sidetone.	e. Sidetone is not present. If it is present, go to chart 7.
f. Operational check is complete.	

5-11. TROUBLESHOOTING.

Troubleshooting is done on a faulty power amplifier. The steps to determine if a power amplifier is faulty and how to troubleshoot it are as follows:

a. When a power amplifier is received from unit maintenance, inspect it for damage. Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. Verify the symptom. Perform the operational check in paragraph 5-10. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. Troubleshoot the power amplifier using the flowchart. It will identify the defective module or component.

d. Replace the defective module or component. Follow the procedures in section IV.

e. Verify the repair. Repeat the operational check in paragraph 5-10 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the power amplifier can be returned for use.

5-12. TEST PRECAUTIONS AND NOTES.

WARNING

Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

High voltage (200 V dc) is present at several places within the power amplifier. Use caution when connecting the test setup and taking measurements to avoid personal injury.

High RF energy (50 watts) is present at J1 and several places within the power amplifier when the handset PTT switch is pressed. Use caution to avoid personal injury.

STATIC SENSITIVE

CAUTION

STATIC SENSITIVE

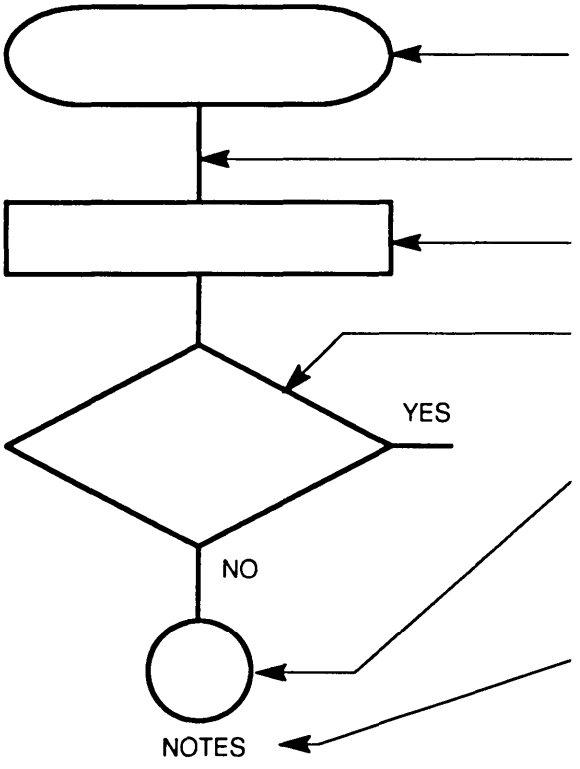
Static electricity and stray voltages can damage the decoder control (6A2). Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting.

High voltage (200 V) and high RF energy (50 watts) is present in the power amplifier during testing. Do not disassemble with power applied to the power amplifier.

NOTE

The Principles of Operation section, functional block diagrams, and figure FO-16 can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.

5-13. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL	EXPLANATION
	Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble. Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow. Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test. Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO). Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages. Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

5-14. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	27 V dc overcurrent or low resistance at P1 pin D.
2	RF power output is too high or too low (88 MHz).
3	RF power output is too high or too low (55 MHz).
4	RF power output is too high or too low (33 MHz).
5	Receive output is too low.
6	Sidetone disable is faulty, sidetone is absent.
7	Sidetone disable is faulty, sidetone is present.

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Figures 5-5, 5-6, and 5-7 illustrate the test points used inside the power amplifier. The detailed procedures for disassembling the power amplifier for troubleshooting or repair are provided in section IV.

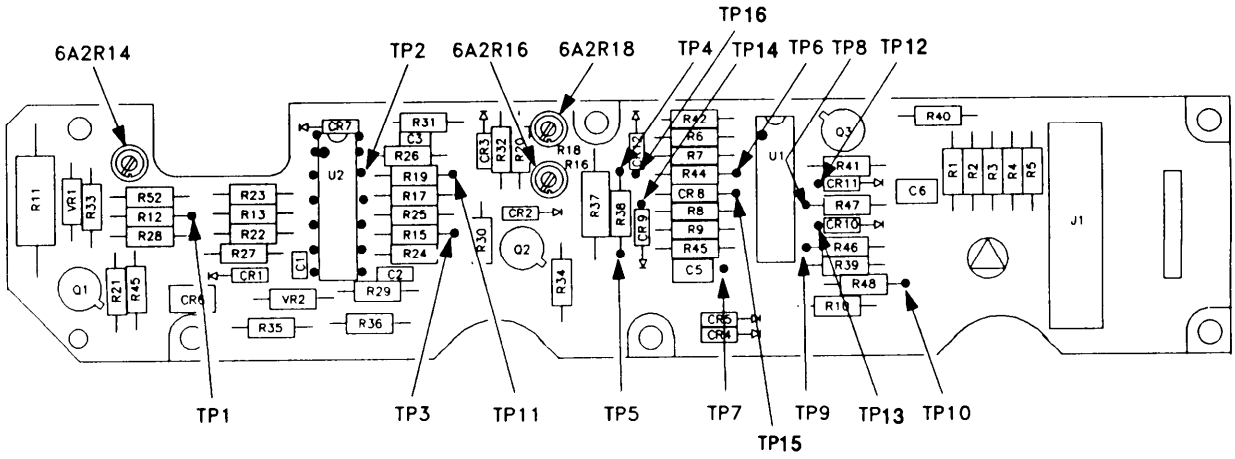


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Figure 5-5. Test Point Locations for Decoder Control (6A2).

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

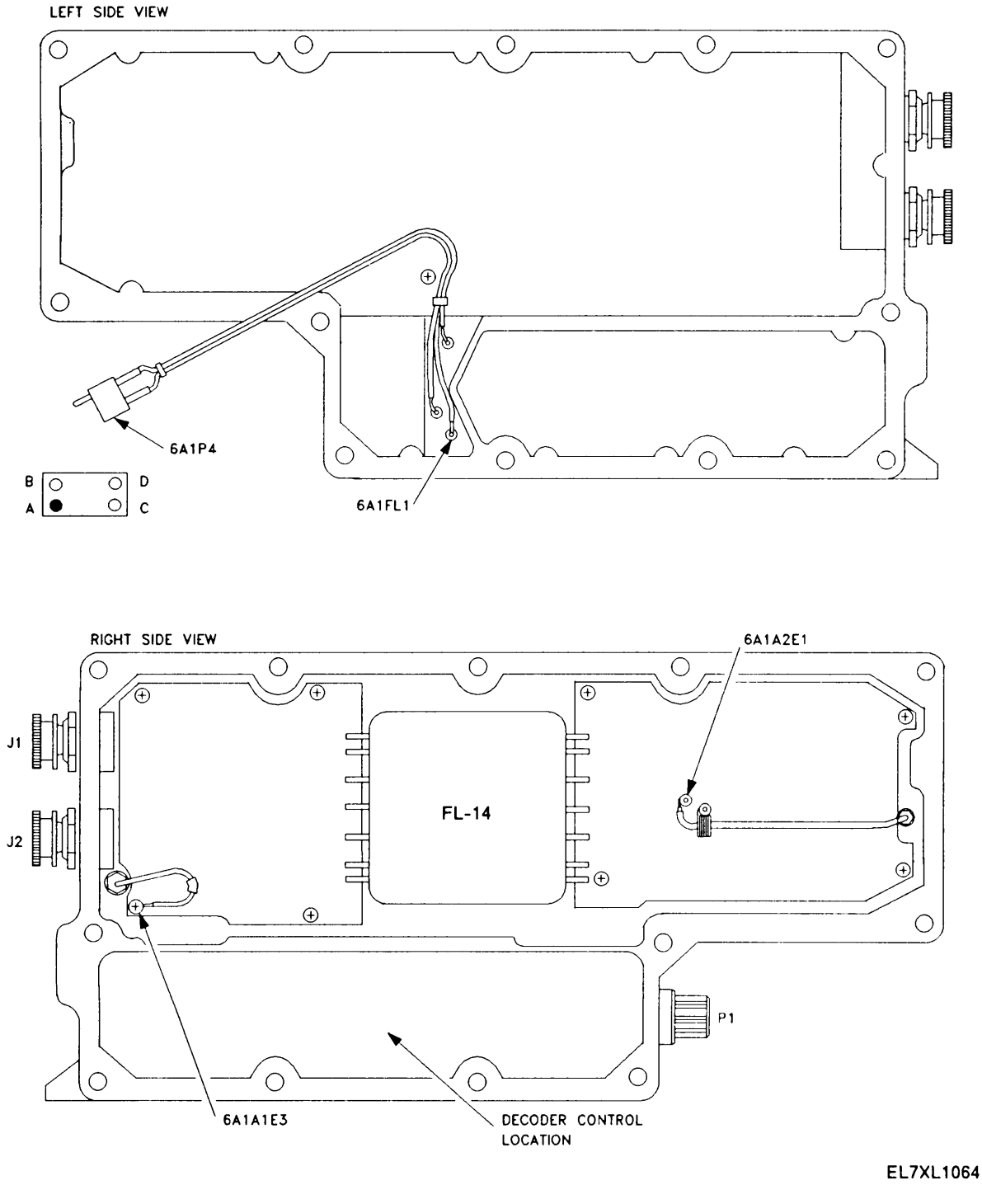


Figure 5-6. Test Point Locations in Power Amplifier Case (6A1).

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

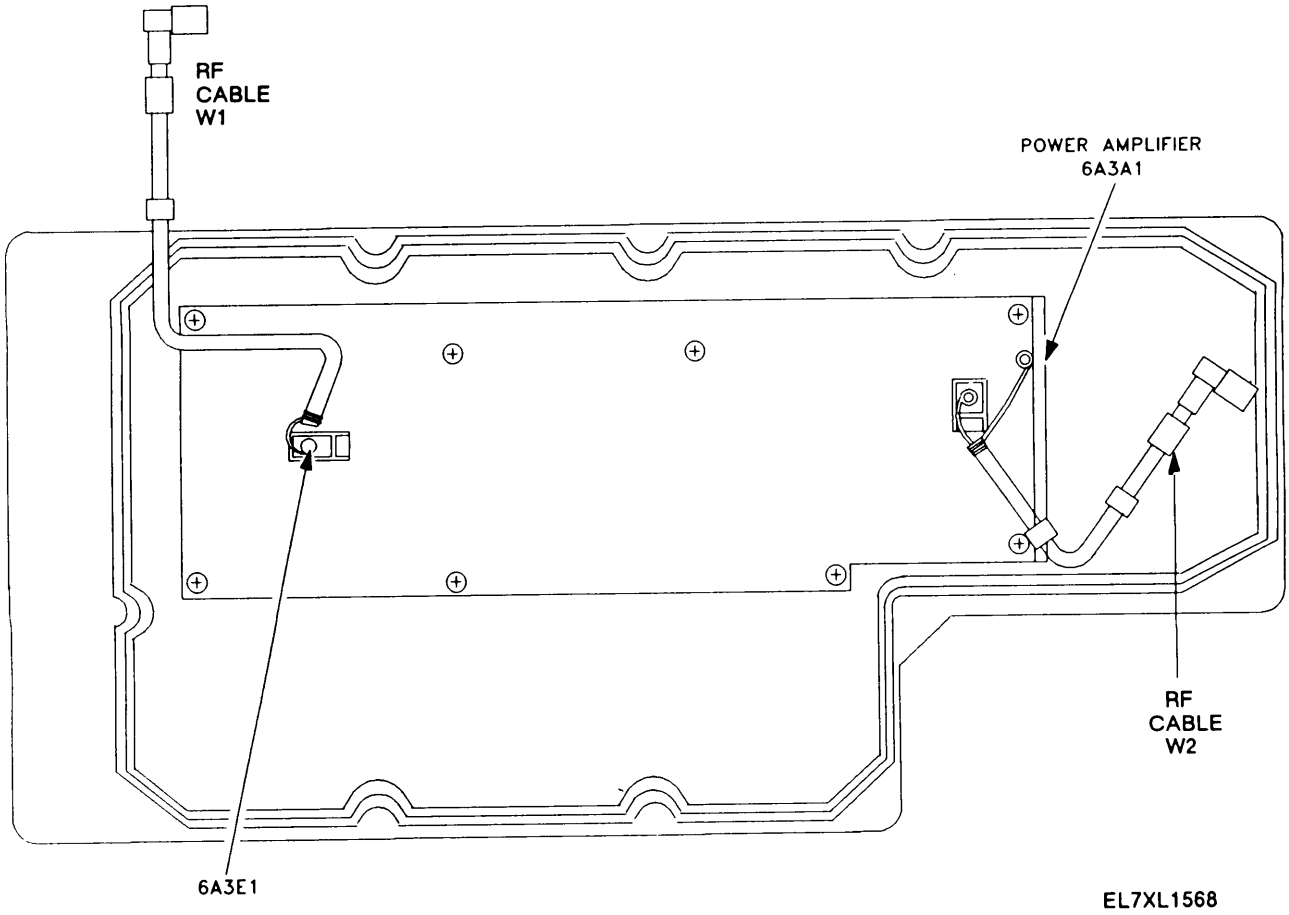
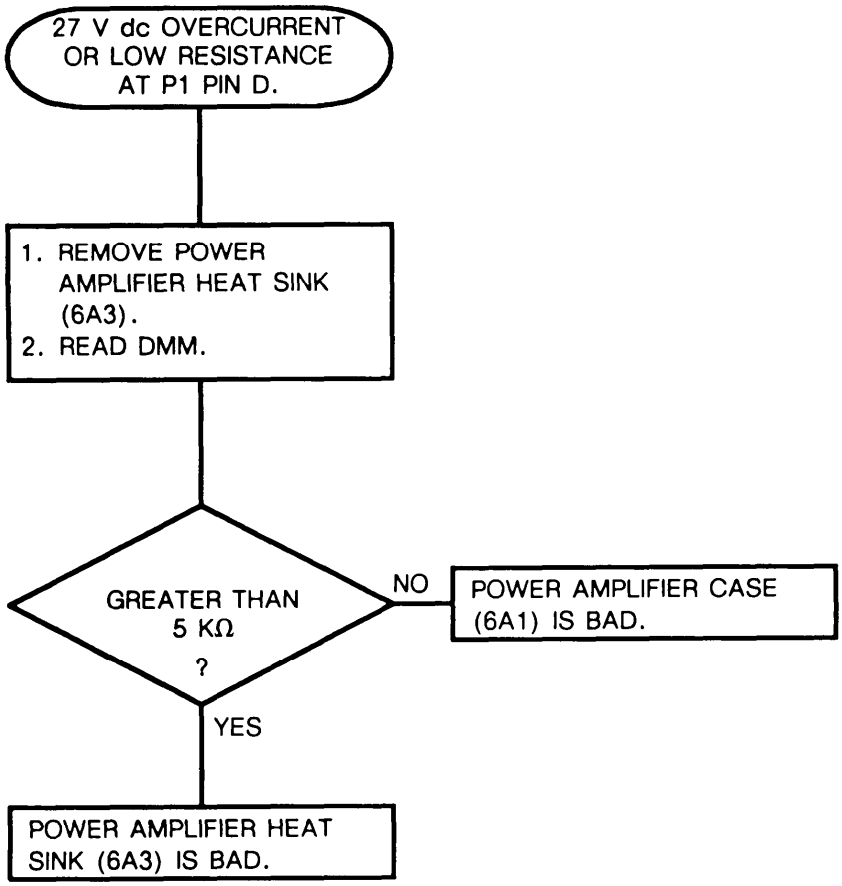


Figure 5-7. Test Point Locations for Power Amplifier Heat Sink (6A3).

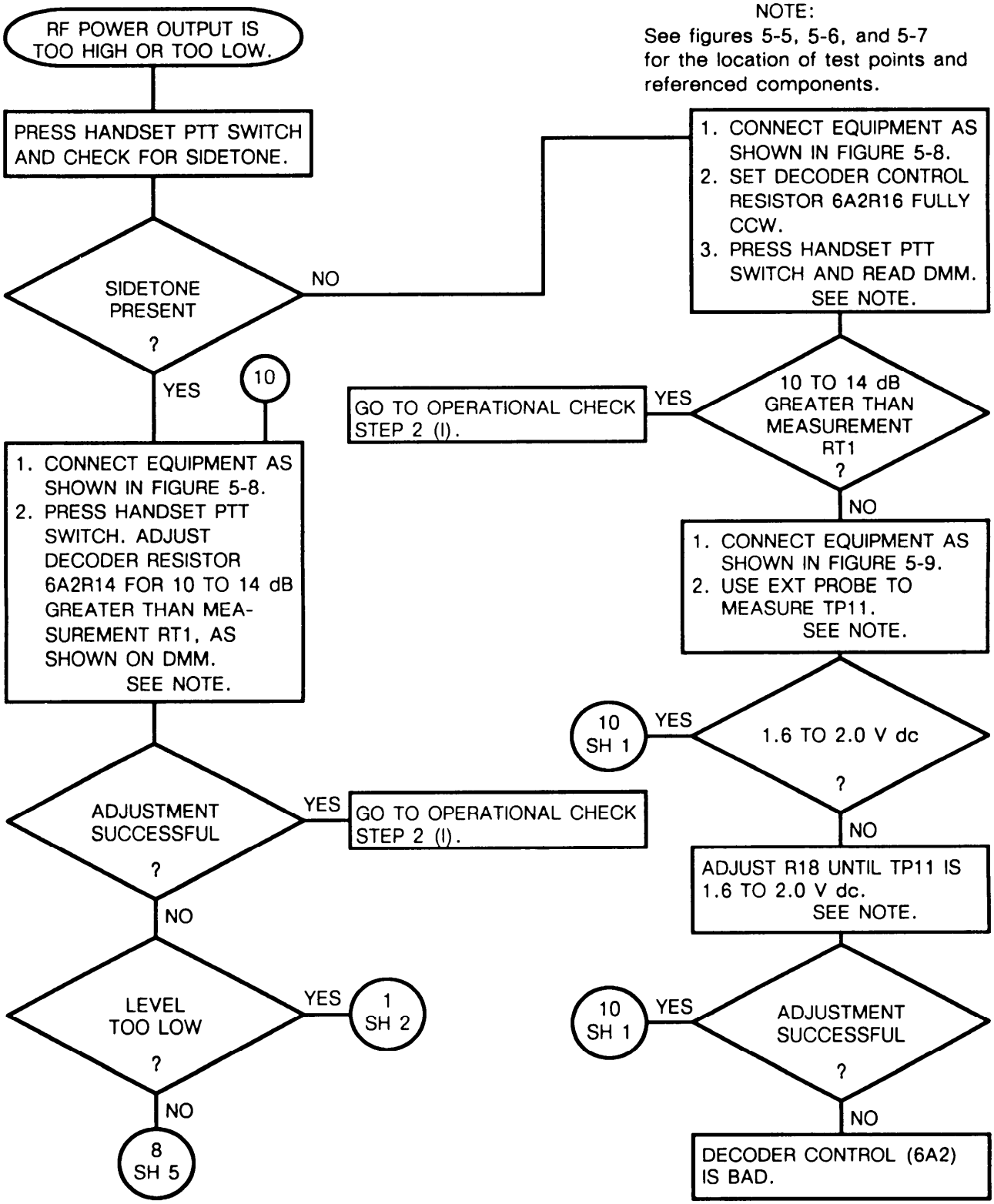
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Primary Power Overcurrent
(Sheet 1 of 1)



5-14. TROUBLESHOOTING FLOWCHARTS. Continued

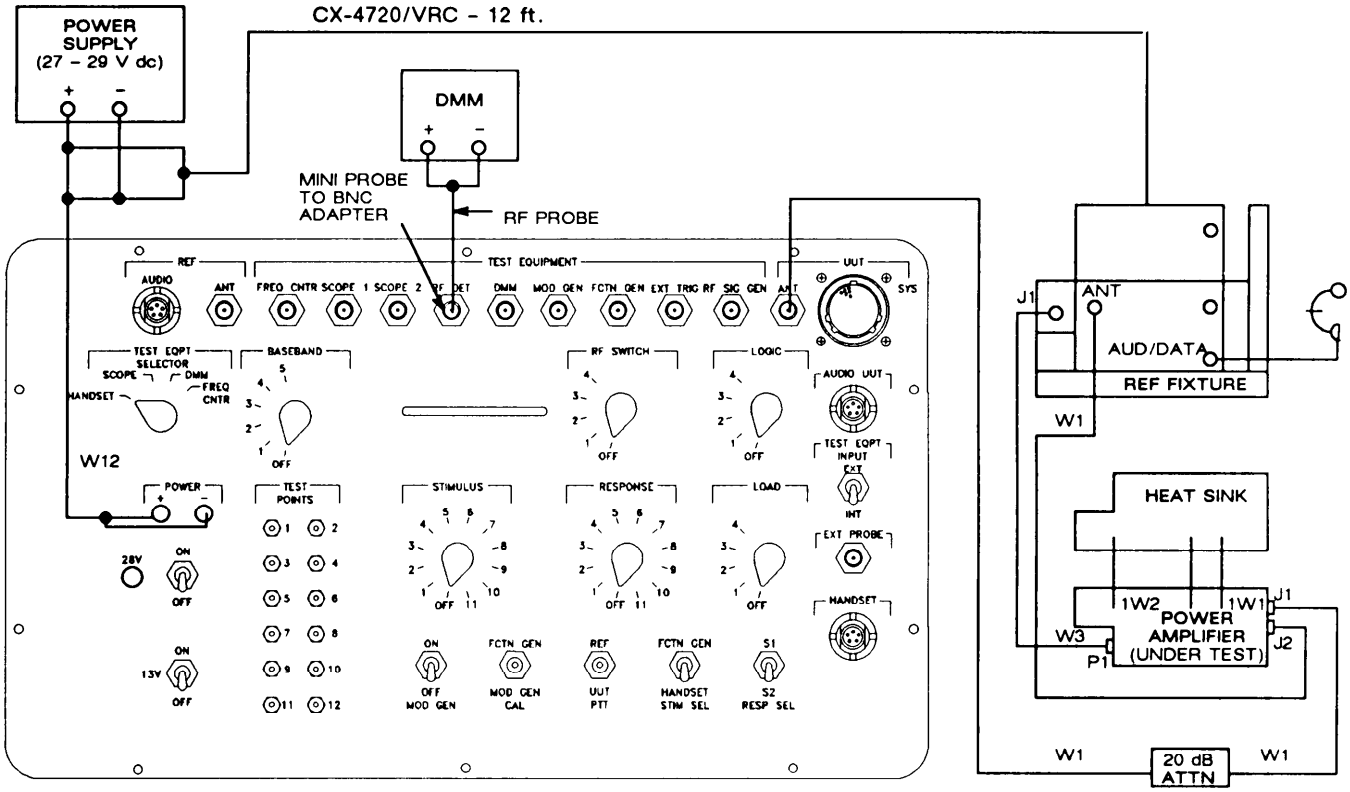
Chart 2
Troubleshooting RF Output at 88 MHz
(Sheet 1 of 6)



5-14. TROUBLESHOOTING FLOWCHARTS. Continued

WARNING

HIGH VOLTAGE AND HIGH RF ENERGY IS PRESENT IN THE POWER AMPLIFIER AND THE TEST SETUP. USE CAUTION TO AVOID PERSONAL INJURY.



EL7XL1066A

EQUIPMENT PRESETS

REF FIXTURE:

CB1:	ON
FCTN:	SQ ON
MODE:	SC
DATA:	OFF
CHAN:	DO NOT CHANGE FROM OPERATIONAL CHECK.

DMM:

SET FOR dBm, 50 Ω REF

POWER AMPLIFIER:

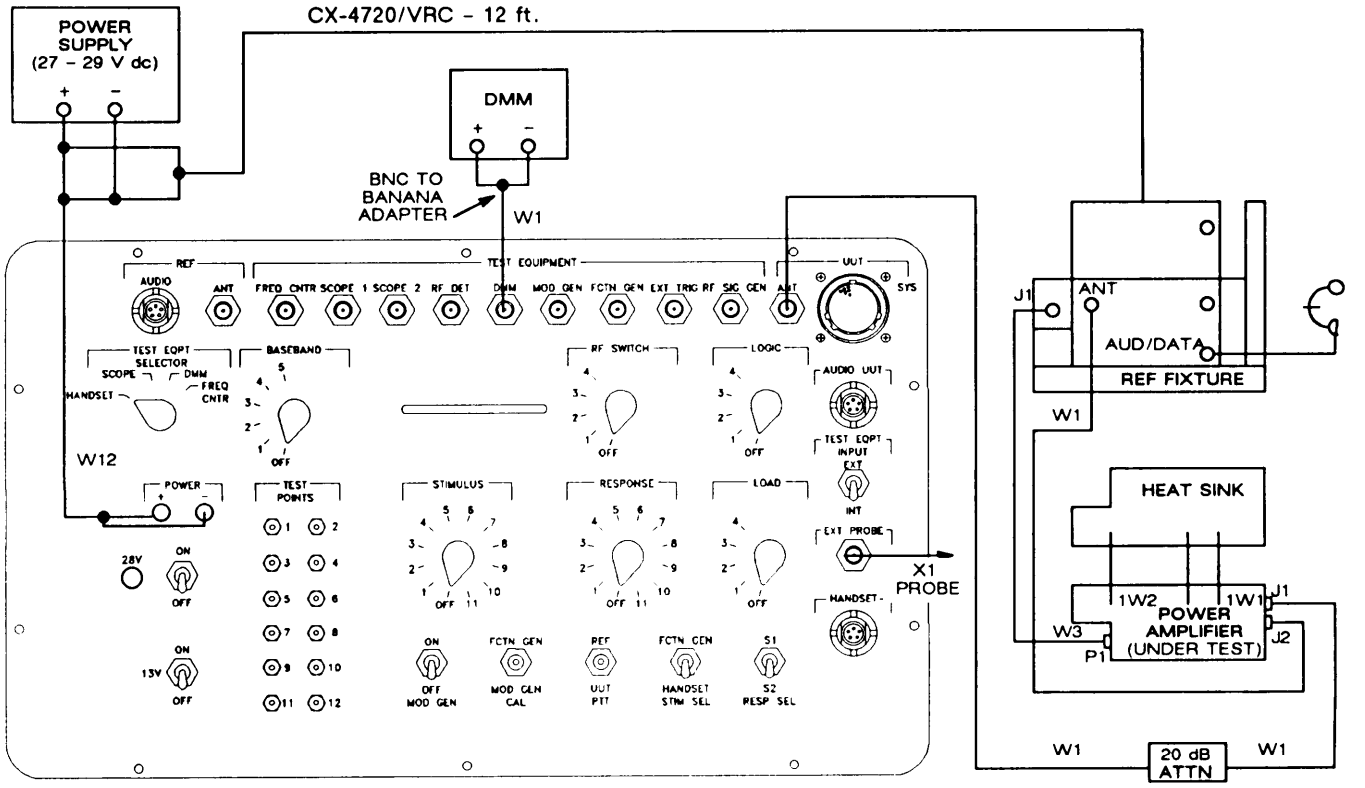
DISASSEMBLE TO GAIN ACCESS TO TEST POINTS. DO NOT DISCONNECT CABLES.

Figure 5-8. RF Output (dBm) Troubleshooting Test Setup.

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

WARNING

HIGH VOLTAGE AND HIGH RF ENERGY IS PRESENT IN THE POWER AMPLIFIER AND THE TEST SETUP. USE CAUTION TO AVOID PERSONAL INJURY.



EL7XL1067A

EQUIPMENT PRESETS

REF FIXTURE:

CB1:	ON
FCTN:	SQ ON
MODE:	SC
DATA:	OFF
CHAN:	DO NOT CHANGE FROM OPERATIONAL CHECK.

TEST ADAPTER:

TEST EQPT INPUT:	EXT
TEST EQPT SELECTOR:	DMM

DMM:

SET FOR V dc

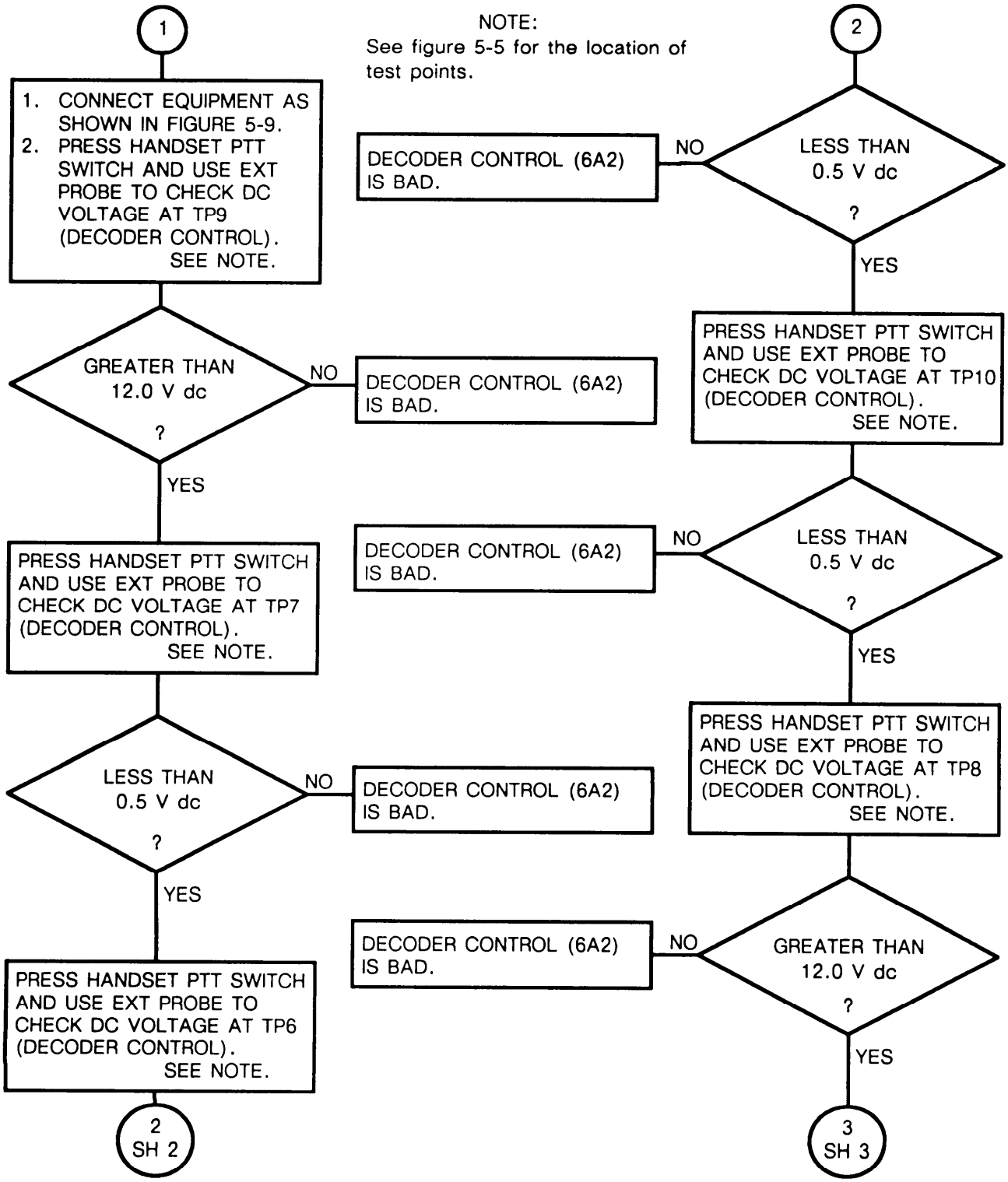
POWER AMPLIFIER:

DISASSEMBLE TO GAIN ACCESS TO TEST POINTS. DO NOT DISCONNECT CABLES.

Figure 5-9. RF Output (V dc) Troubleshooting Test Setup.

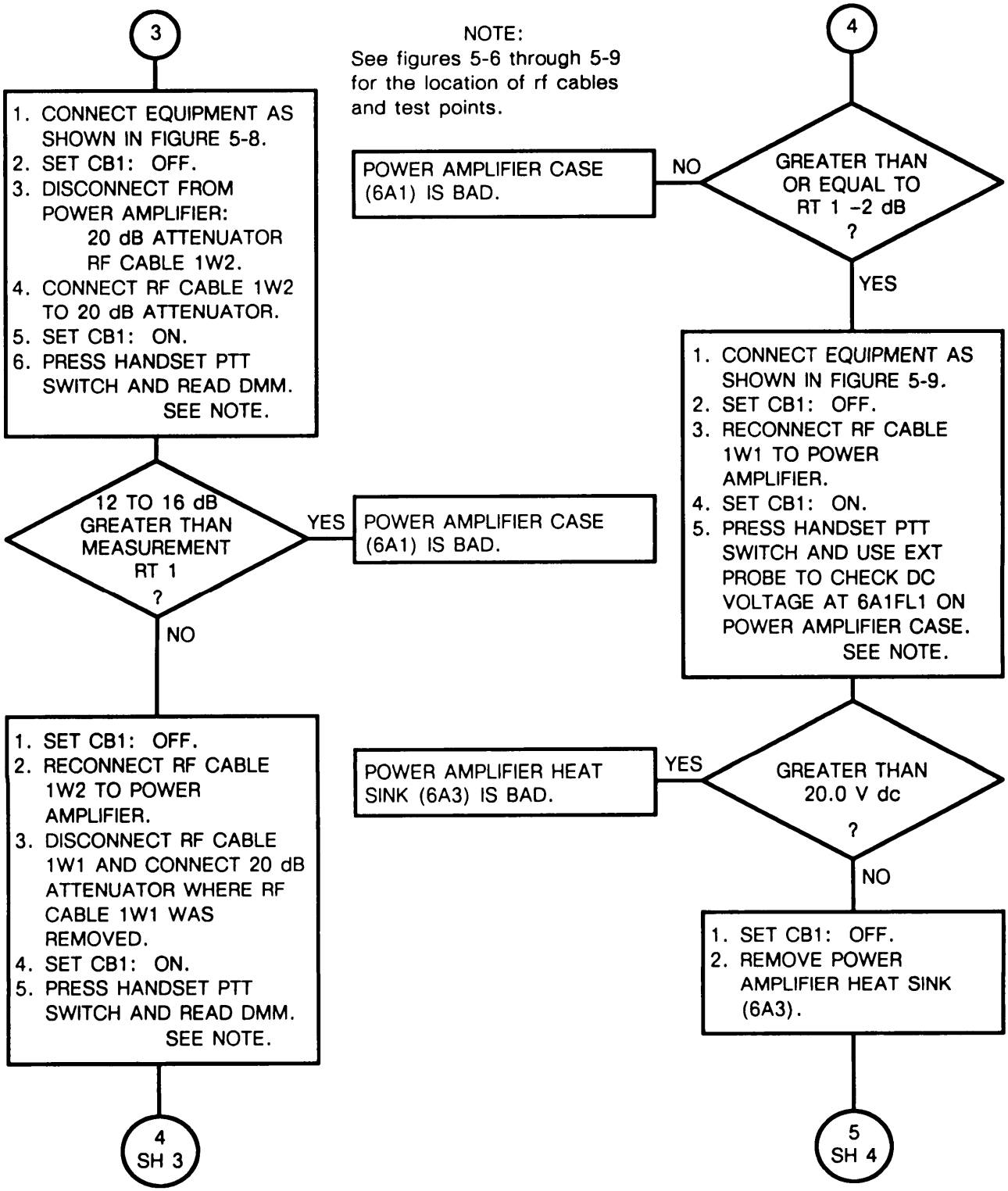
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting RF Output at 88 MHz
(Sheet 2 of 6)



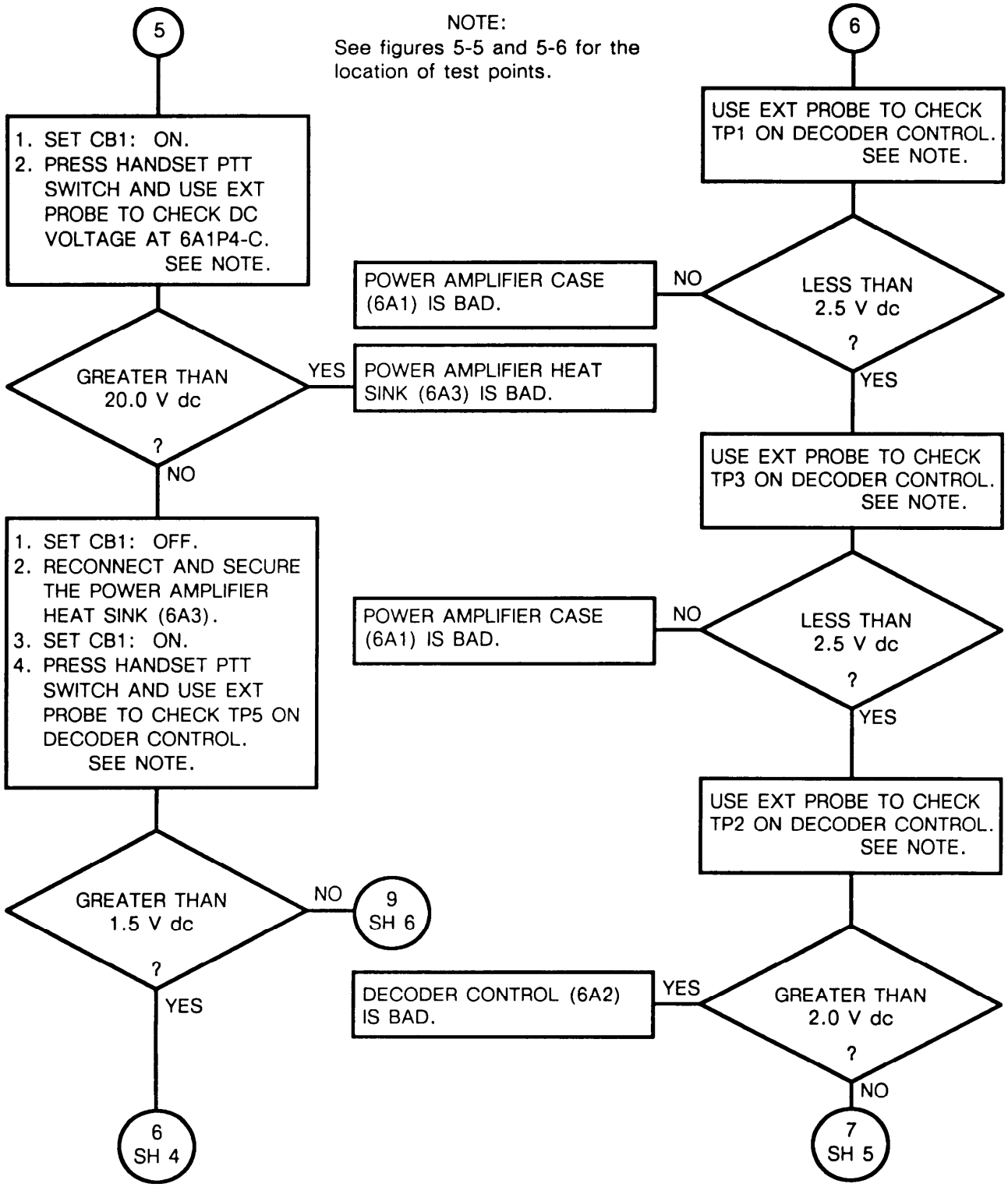
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting RF Output at 88 MHz
(Sheet 3 of 6)



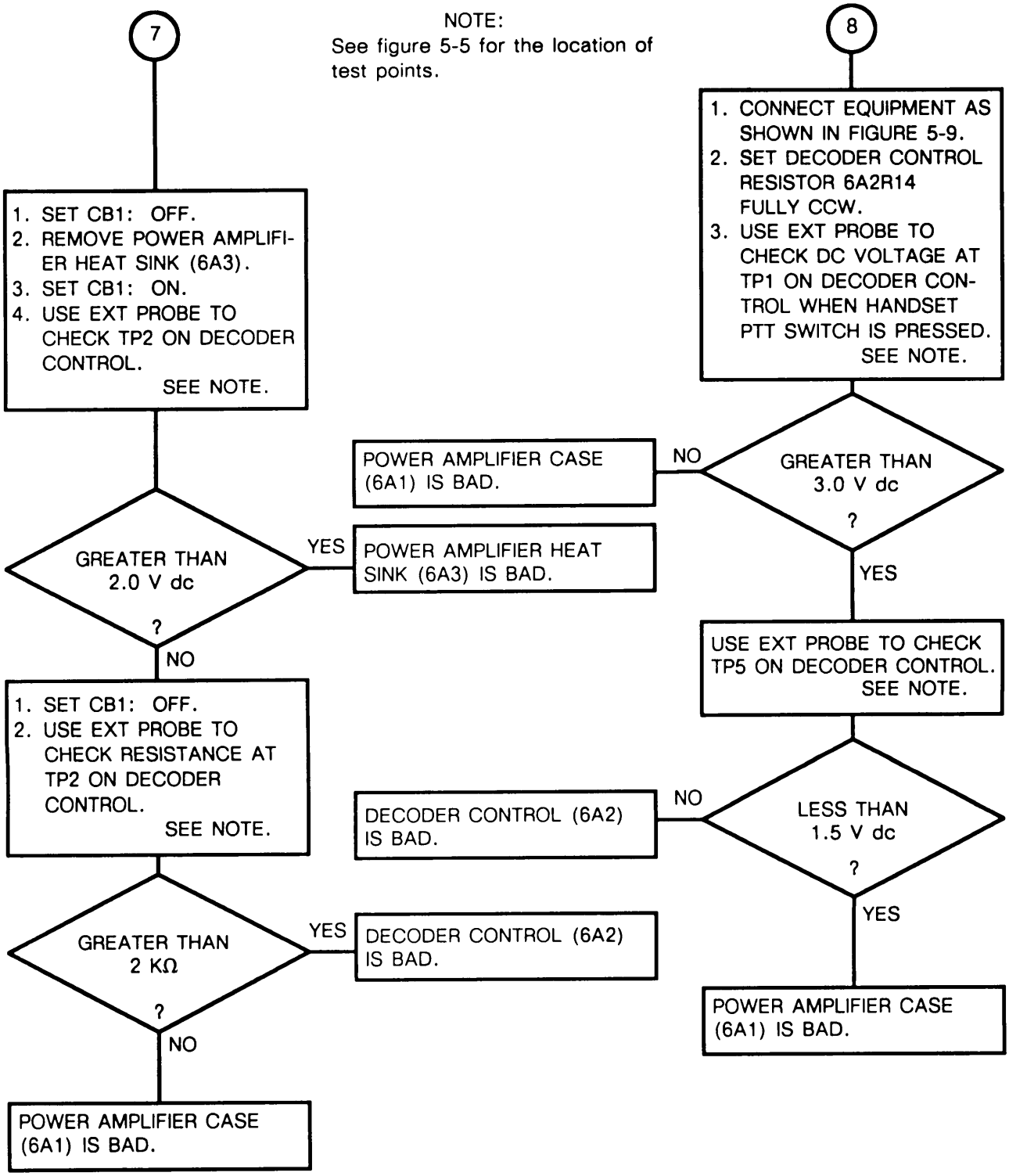
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting RF Output at 88 MHz
(Sheet 4 of 6)



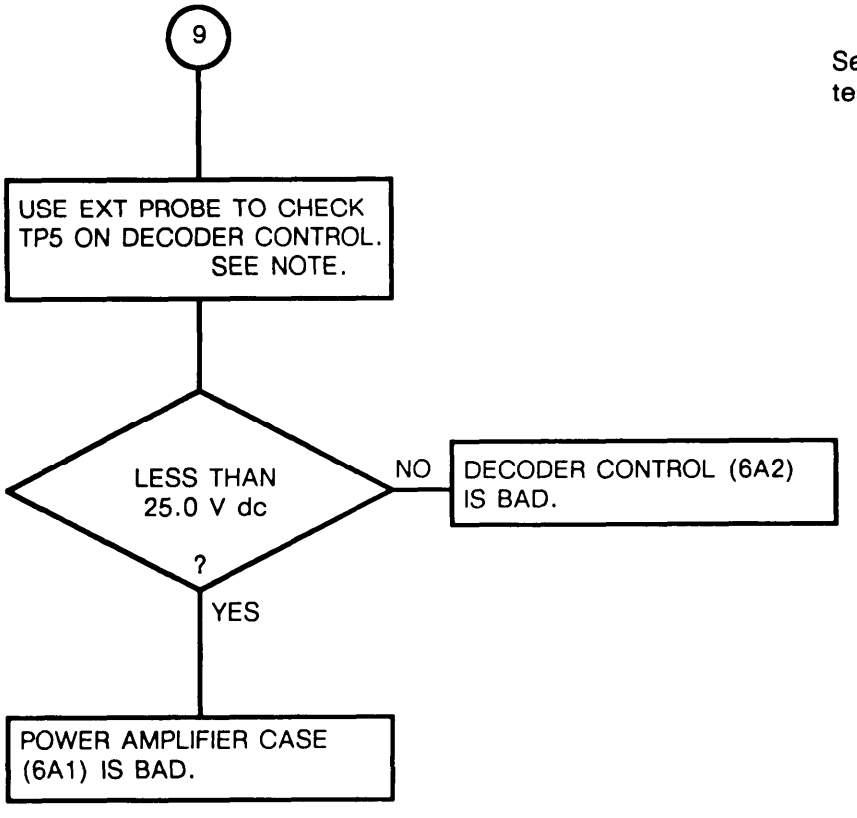
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting RF Output at 88 MHz
(Sheet 5 of 6)



5-14. TROUBLESHOOTING FLOWCHARTS. Continued

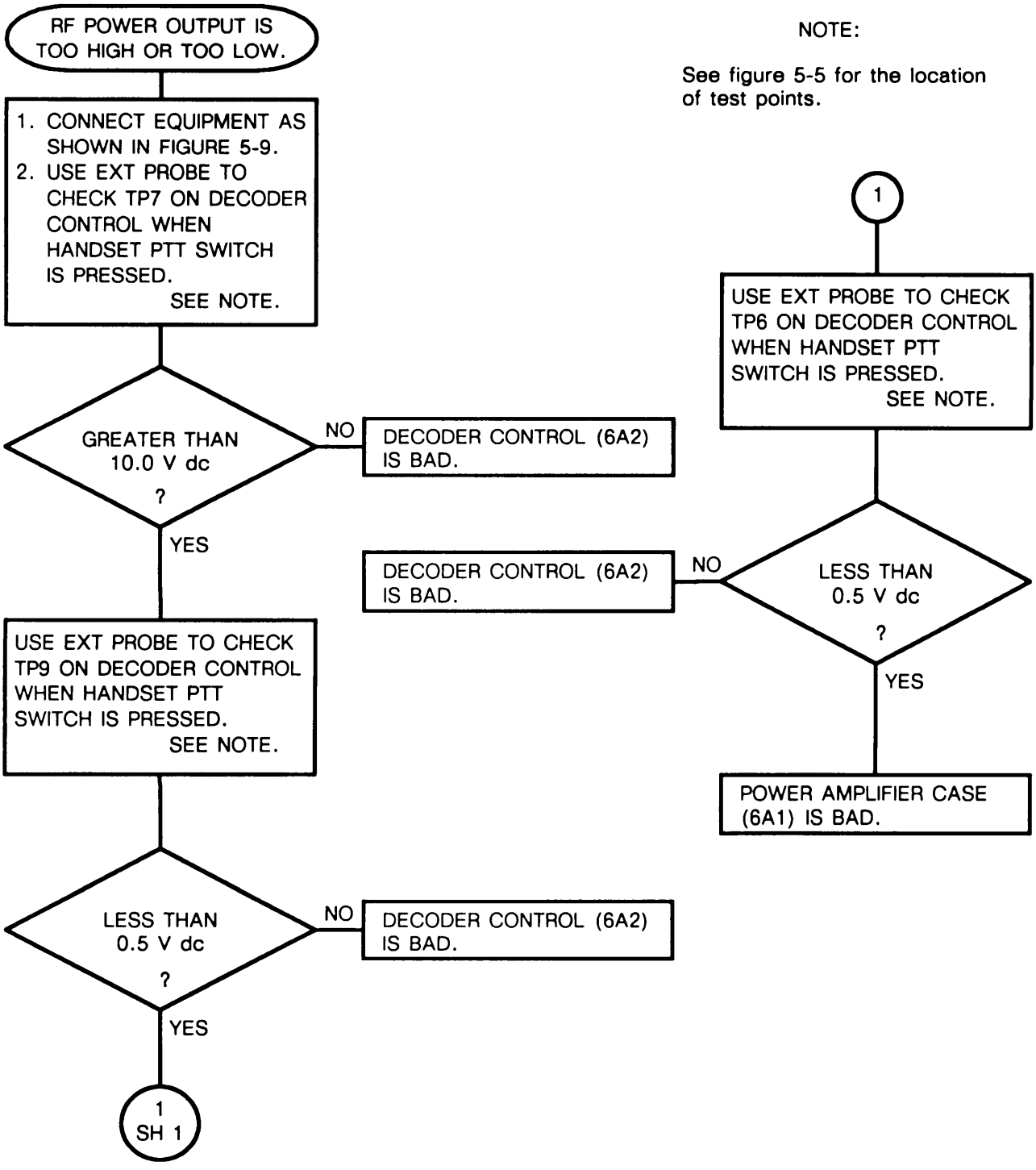
Chart 2
Troubleshooting RF Output at 88 MHz
(Sheet 6 of 6)



NOTE:
See figure 5-5 for the location of test points.

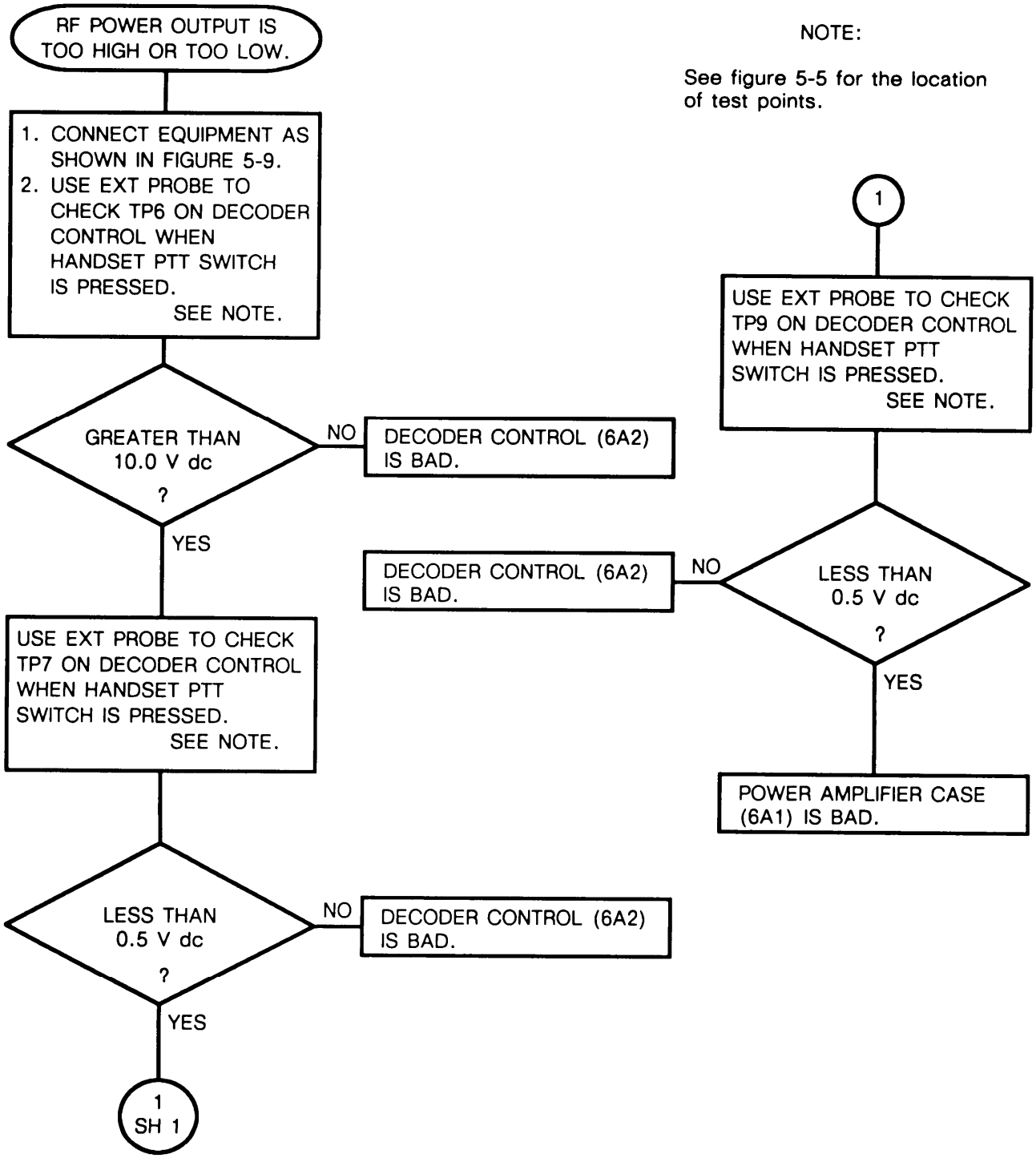
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting RF Power Output at 55 MHz
(Sheet 1 of 1)



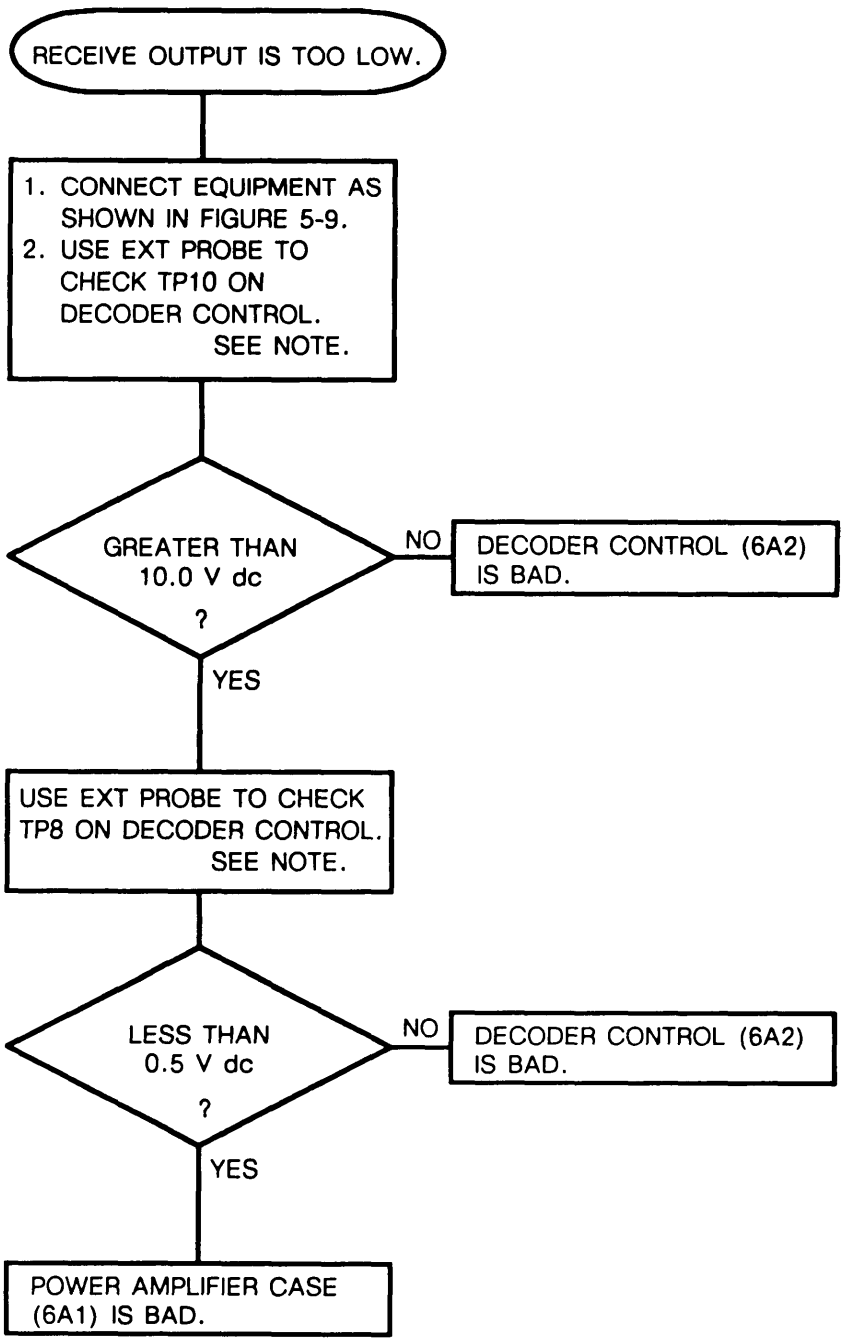
5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting RF Power Output at 33 MHz
(Sheet 1 of 1)



5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Receive Path
(Sheet 1 of 1)

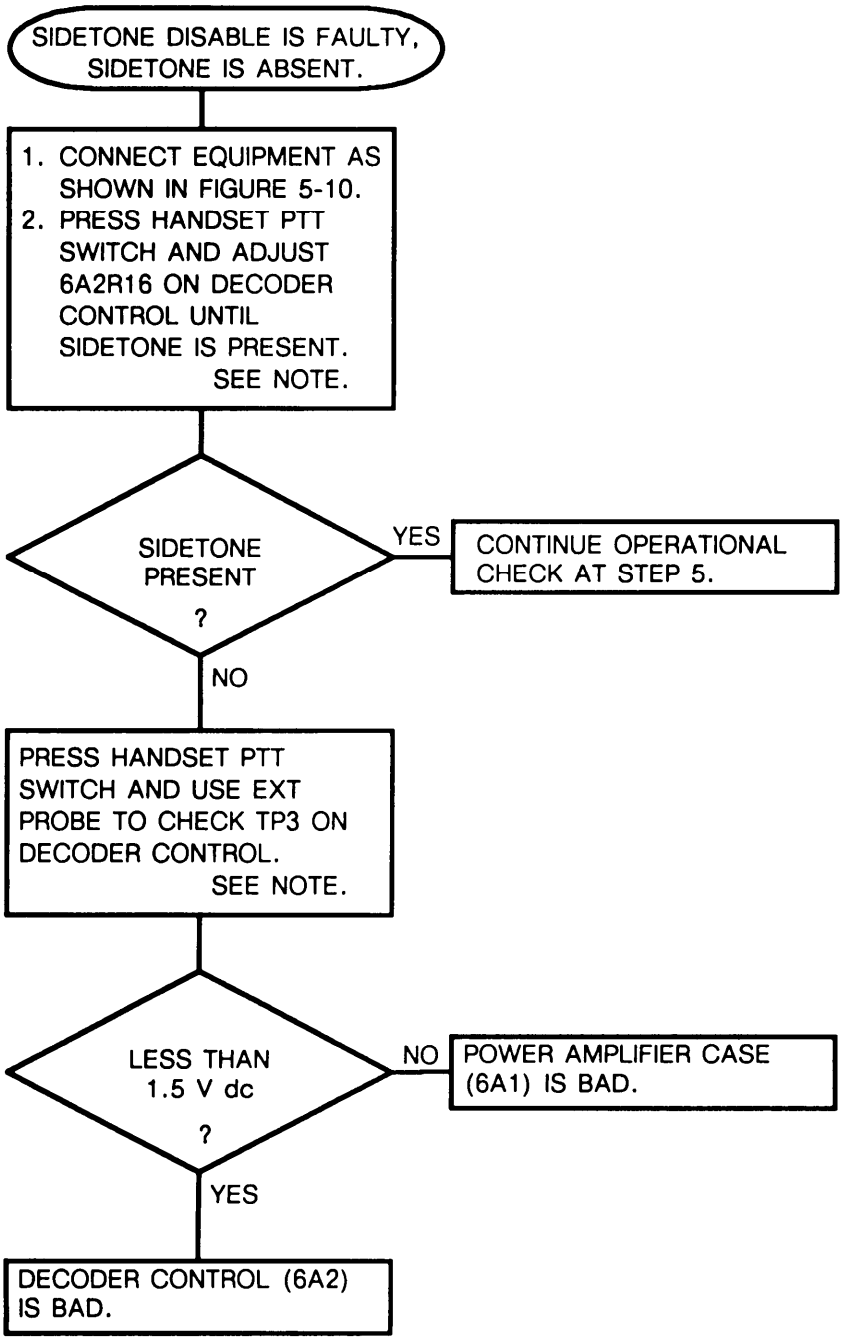


NOTE:

See figure 5-5 for the location of test points.

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting 5:1 VSWR Adjustment Circuit
(Sheet 1 of 1)



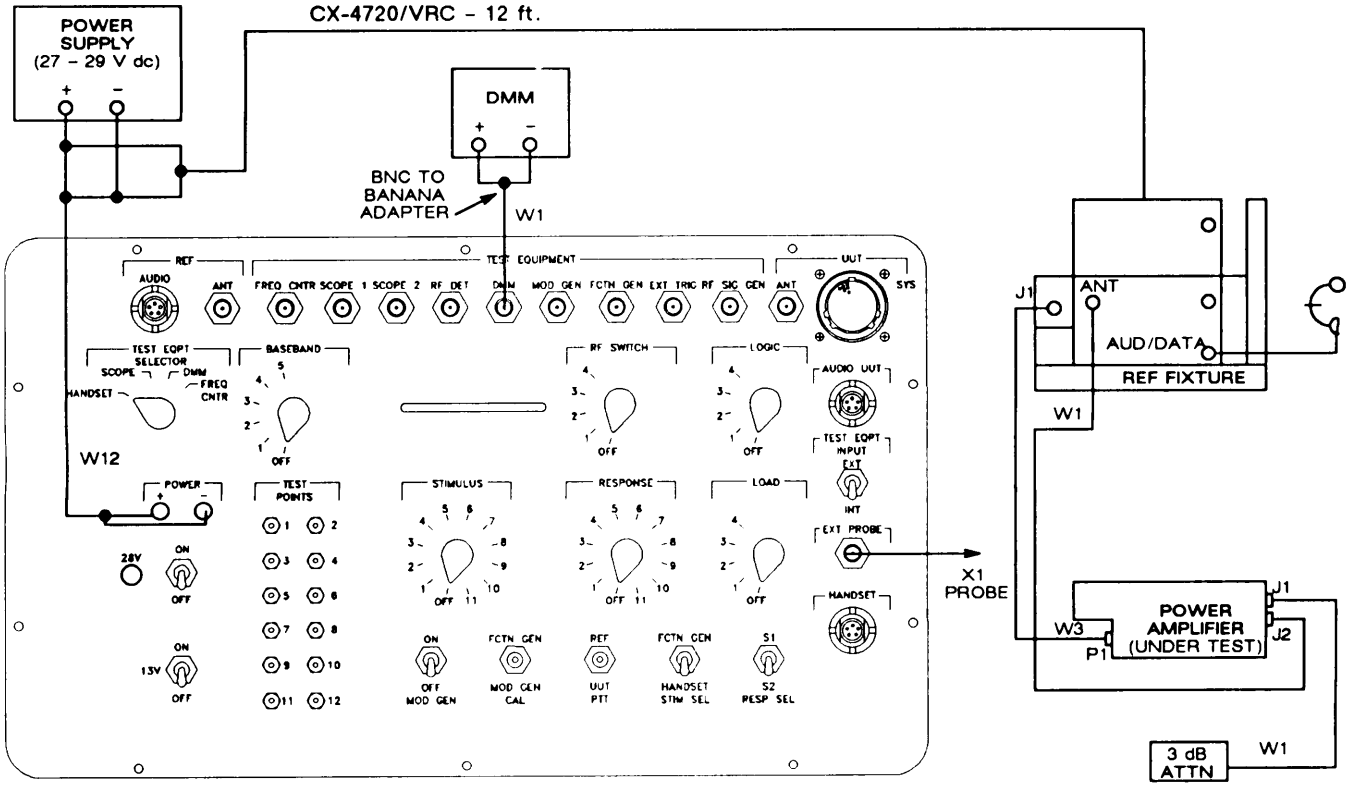
NOTE:

See figure 5-5 for the location of test points.

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

WARNING

HIGH VOLTAGE AND HIGH RF ENERGY IS PRESENT IN THE POWER AMPLIFIER AND THE TEST SETUP. USE CAUTION TO AVOID PERSONAL INJURY.



EL7XL1068A

EQUIPMENT PRESETS

REF FIXTURE:

CB1:	ON
FCTN:	SQ ON
MODE:	SC
RF:	PA
DATA:	OFF
CHAN:	DO NOT CHANGE FROM OPERATIONAL CHECK.

TEST ADAPTER:

TEST EQPT INPUT:	EXT
TEST EQPT SELECTOR:	DMM

DMM:

SET FOR V dc

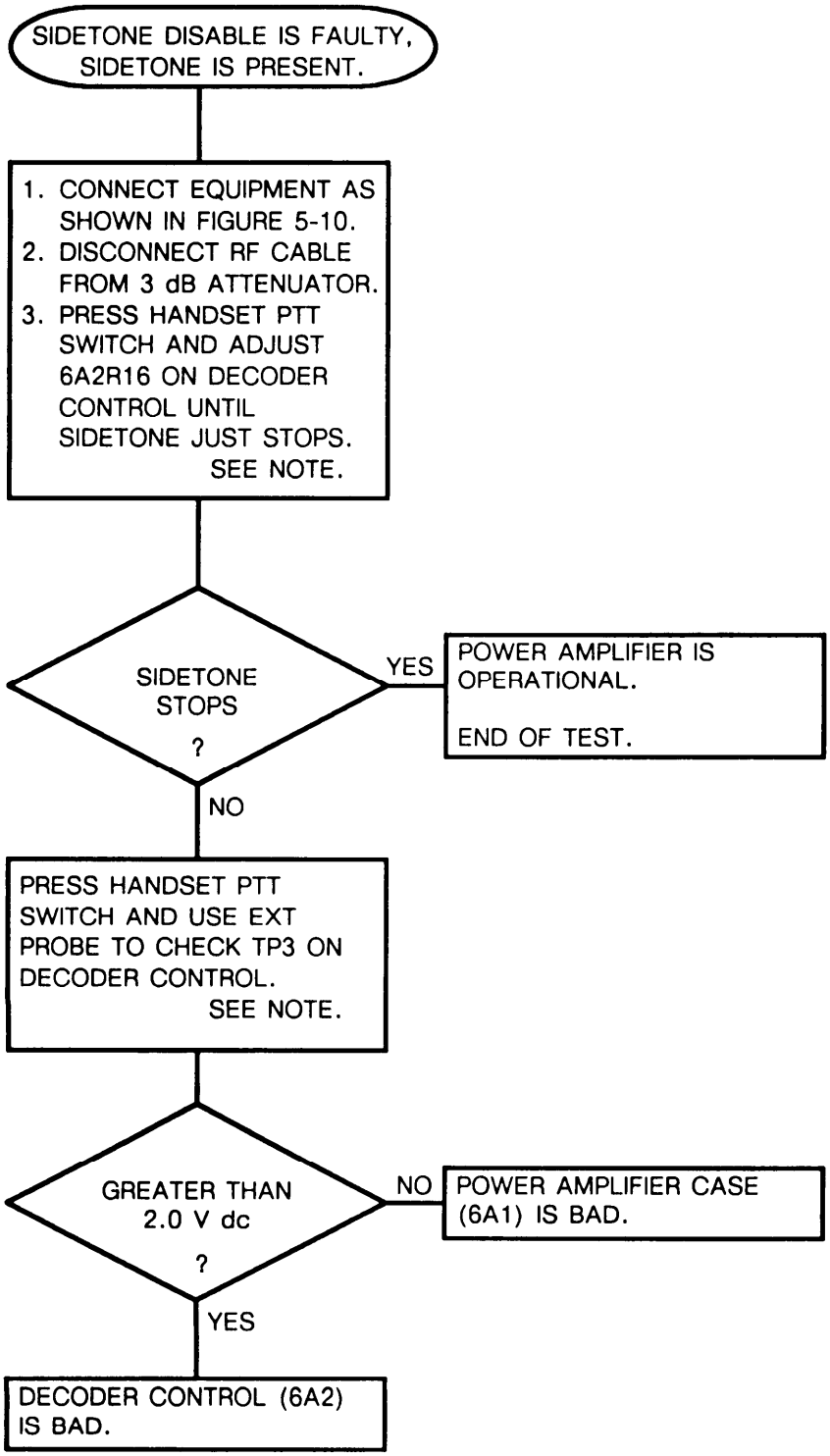
POWER AMPLIFIER:

DISASSEMBLE TO GAIN ACCESS TO TEST POINTS. DO NOT DISCONNECT CABLES.

Figure 5-10. VSWR Adjustment Troubleshooting Test Setup.

5-14. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting 5:1 VSWR Adjustment Circuit
(Sheet 1 of 1)



NOTE:

See figure 5-5 for the location of test points and referenced components.

Section IV. MAINTENANCE PROCEDURES

5-15. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired power amplifier. It is also used to verify the symptom of a faulty power amplifier. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

5-16. OPERATIONAL CHECK.

Perform the operational check found in paragraph 5-10 to verify the proper operation of the power amplifier.

5-17. REPAIR INSTRUCTIONS.

Repair of the power amplifier consists of replacing a bad module. A module is replaced by removing it and installing a good one. Procedures for doing this follow:

a. General Instructions. The following instructions apply to all repair tasks.

1. Remove all cables connected to the power amplifier.
2. Inspect the power amplifier for damage, Repair any obvious physical damage.
3. Handle all modules carefully.
4. Before installing a module, check the connectors or terminals for bent or broken pins. Do not install if damaged.
5. After the repair, perform the operational check.

b. Repair Precautions.

CAUTION

Static electricity and stray voltages can damage the decoder control (6A2). Ground the power amplifier and all tools before removing the decoder control. Use a grounded wrist strap when handling the decoder control.

CAUTION

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the power amplifier. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

5-18. DISASSEMBLY FOR TROUBLESHOOTING.

The power amplifier must be disassembled to gain access to the test points. Figures 5-5, 5-6, and 5-7 identify the test points inside the power amplifier.

Tools:

Flat tip screwdriver

ITEM	ACTION	REMARKS

WARNING

High voltage (200 V) and high RF energy (50 watts) are present in the power amplifier during testing. Do not disassemble with power applied to the power amplifier.

a. Power amplifier	Set on work surface with heat sink side down. See figure 5-11.
b. Cover (10)	Using flat tip screwdriver, fully loosen 12 captive screws and remove cover.
c. Power amplifier	Set on work surface with heat sink side up.
d. Power amplifier	Using flat tip screwdriver, fully loosen 12 captive screws that secure power amplifier heat sink (1) to power amplifier case (4).
e. Power amplifier	Separate power amplifier heat sink from power amplifier case but do not disconnect any cables. Set on work surface with access to desired test points.
f. Seal screw (5)	Using flat tip screwdriver, remove and inspect. If seal screw is bad, replace it. Thread and tighten.

5-18. DISASSEMBLY FOR TROUBLESHOOTING. Continued

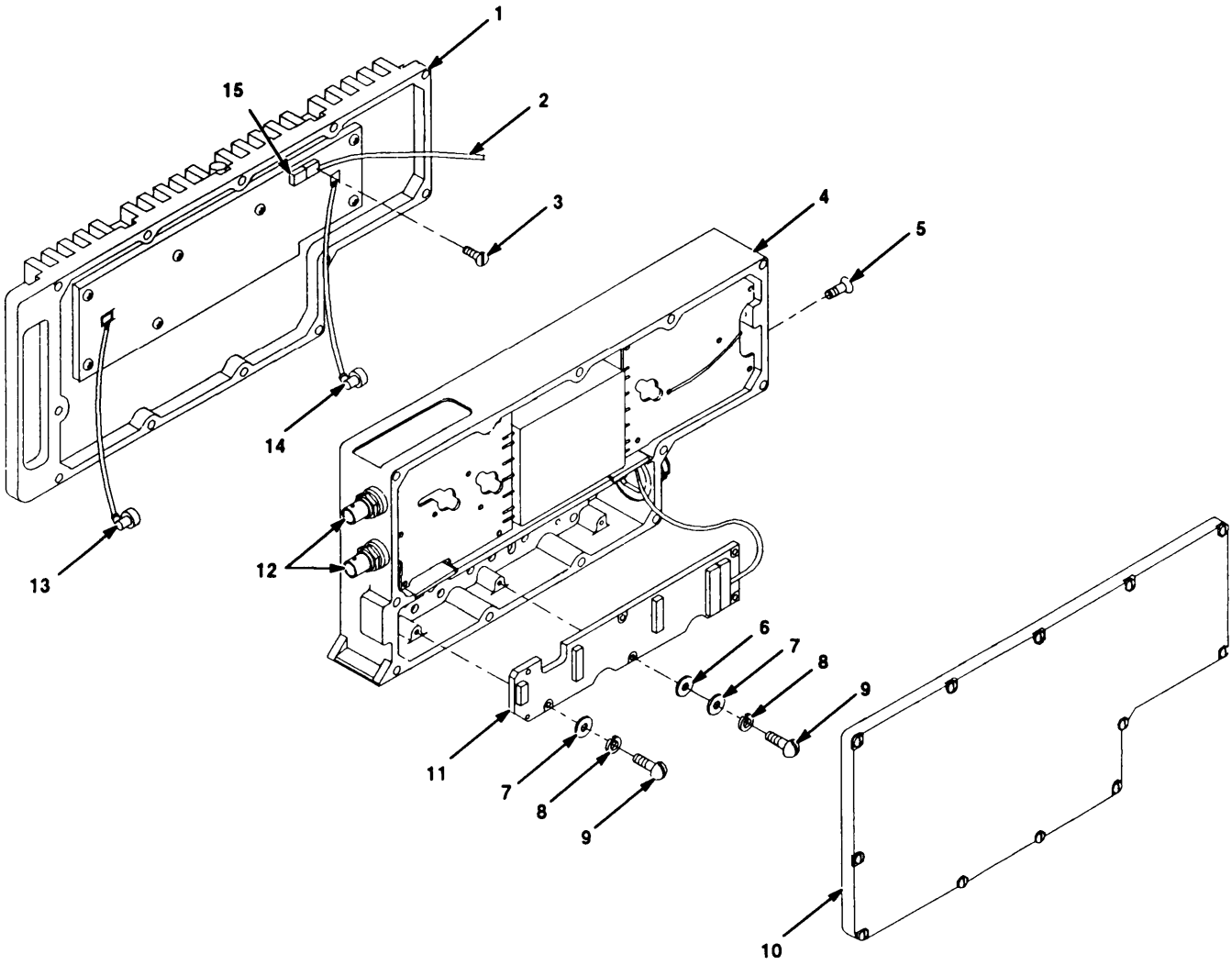


Figure 5-11. Power Amplifier Exploded View.

5-19. REPLACEMENT OF POWER AMPLIFIER COVER.

Tools:

Flat tip screwdriver
Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Power amplifier	Set on work surface with heat sink side down. See figure 5-11.	
b. Cover (10)	Using flat tip screwdriver, fully loosen 12 captive screws and remove cover.	
INSTALLATION		
c. Cover (10)	Inspect for damage to gasket. Replace cover if damaged.	
d. HCP Cover (10)	Set in place on power amplifier case (4), Start screws. Using torque screwdriver, Torque screws to 8 to 10 in-lb.	

5-20. REPLACEMENT OF DECODER CONTROL (6A2).

Tools:

Flat tip screwdriver
Cross tip screwdriver
Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Power amplifier	Set on work surface with heat sink side down. See figure 5-11.	
b. Cover (10)	Using flat tip screwdriver, fully loosen 12 captive screws and remove cover.	
c. Two middle screws (9), lockwashers (8), flat washers (7), and insulating washers (6)	Using flat tip screwdriver, loosen and remove.	
d. Four corner screws (9), lockwashers (8), and flat washers (7)	Using flat tip screwdriver, loosen and remove.	
e. Decoder control (11)	Pull free from power amplifier case (4) and disconnect wiring harness from decoder control connector J1.	

5-20. REPLACEMENT OF DECODER CONTROL (6A2). Continued

ITEM	ACTION	REMARKS
INSTALLATION		
f. Decoder control (11)	Connect wiring harness to decoder control connector J1. Set decoder control in place in power amplifier case (4).	
g. Four corner screws (9), lockwashers (8), and flat washers (7)	Using flat tip screwdriver, set in place and tighten.	
h. Two middle screws (9), lockwashers (8), flat washers (7), and insulating washers (6)	Using flat tip screwdriver, set in place and tighten.	
	NOTE Three variable resistors on the decoder control may need to be adjusted. Perform operational check prior to installing cover.	
i. Cover (10)	Inspect for damage to gasket. Replace cover if damaged.	
j. HCP Cover (10)	Set in place on power amplifier. Start screws. Using torque screwdriver, torque screws to 8 to 10 in-lb.	

5-21. REPLACEMENT OF POWER AMPLIFIER HEAT SINK (6A3).

Tools:

Flat tip screwdriver	Cross tip screwdriver
Torque screwdriver	Round nose pliers

Expendable Supplies:

Sealing compound, grade H

ITEM	ACTION	REMARKS
REMOVAL		
a. Power amplifier	Set on work surface with cover side down. See figure 5-11.	
b. Power amplifier heat sink (1)	Using flat tip screwdriver, fully loosen 12 captive screws securing power amplifier heat sink to power amplifier case (4).	
c. Power amplifier heat sink (1)	Lift from power amplifier case (4). Do not strain cables connecting power amplifier heat sink to power amplifier case. Set on work surface.	

5-21. REPLACEMENT OF POWER AMPLIFIER HEAT SINK (6A3). Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
d. Cable W3 (13)	Using round nose pliers, disconnect from connector 6A1A2W1J4 on power amplifier case (4).	
e. Cable W4 (14)	Using round nose pliers, disconnect from connector 6A1A2W2J3 on power amplifier case (4).	
f. Screw (3)	Using flat tip screwdriver, loosen, remove, and retain screw (3) from connector 6A1W1P4 (15).	
g. Cable W1 (2)	Loosen and remove from power amplifier heat sink (1) connector 6A3A1J1.	
INSTALLATION		
h. Power amplifier heat sink (1)	Set on work surface close to power amplifier case (4).	
i. Cable W1 (2)	Connect to power amplifier heat sink (1) connector 6A3A1J1.	
j. Screw (3)	Use sealing compound on threads of retained screw (3). Using flat tip screwdriver, install in connector 6A1W1P4.	This was removed in step f.
k. Cable W4 (14)	Connect to power amplifier case (4) connector 6A1A2W2J3.	
l. Cable W3 (13)	Connect to power amplifier case (4) connector 6A1A2W1J4.	
m. HCP power amplifier heat sink (1)	Set in place on power amplifier case (4). Start screws. Using torque screwdriver, torque screws to 8 to 10 in-lb.	

5-22. REPLACEMENT OF POWER AMPLIFIER CASE (6A1).

Tools:

Flat tip screwdriver	Cross tip screwdriver
Torque screwdriver	Round nose pliers

Expendable Supplies:

Sealing compound, grade H

References:

Paragraph 5-19 for removal and installation of power amplifier cover.
Paragraph 5-20 for removal and installation of decoder control (6A2).
Paragraph 5-21 for removal and installation of power amplifier heat sink (6A3).

ITEM	ACTION	REMARKS
REMOVAL		
a. Cover (10)	Remove and retain.	See paragraph 5-19 for removal procedures.
b. Decoder control (6A2)	Remove and retain.	See paragraph 5-20 for removal procedures.
c. Power amplifier heat sink (6A3)	Remove and retain.	See paragraph 5-21 for removal procedures.
INSTALLATION		
d. Power amplifier heat sink (6A3)	Install on power amplifier case.	See paragraph 5-21 for installation procedures.
e. Decoder control (6A2)	Install on power amplifier case.	See paragraph 5-20. for installation procedures.
f. Cover (10)	Install on power amplifier case.	See paragraph 5-19. for installation procedures.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

5-23. GENERAL INFORMATION.

a. Pack the power amplifier and modules in approved shipping containers.

b. All modules must be shipped enclosed in material that provides protection from static electricity. See the following paragraph.

5-24. PACKING STATIC SENSITIVE MODULES.

The following steps should be followed when packing a static sensitive module for storage or shipment.

CAUTION

To avoid damaging static sensitive modules, use an antistatic pad on the work surface and wear a grounded wrist strap when handling the module.

ITEM	ACTION	REMARKS
a. Module (1)	Place inside antistatic bag (2) or inside antistatic wrapping material (3). See figure 5-12.	
b. Antistatic package (4)	Seal with adhesive tape. Attach “static sensitive contents” unit pack label (5).	
c. Antistatic package (4)	Place inside approved shipping container (6). Attach “static sensitive contents” intermediate pack label (7).	

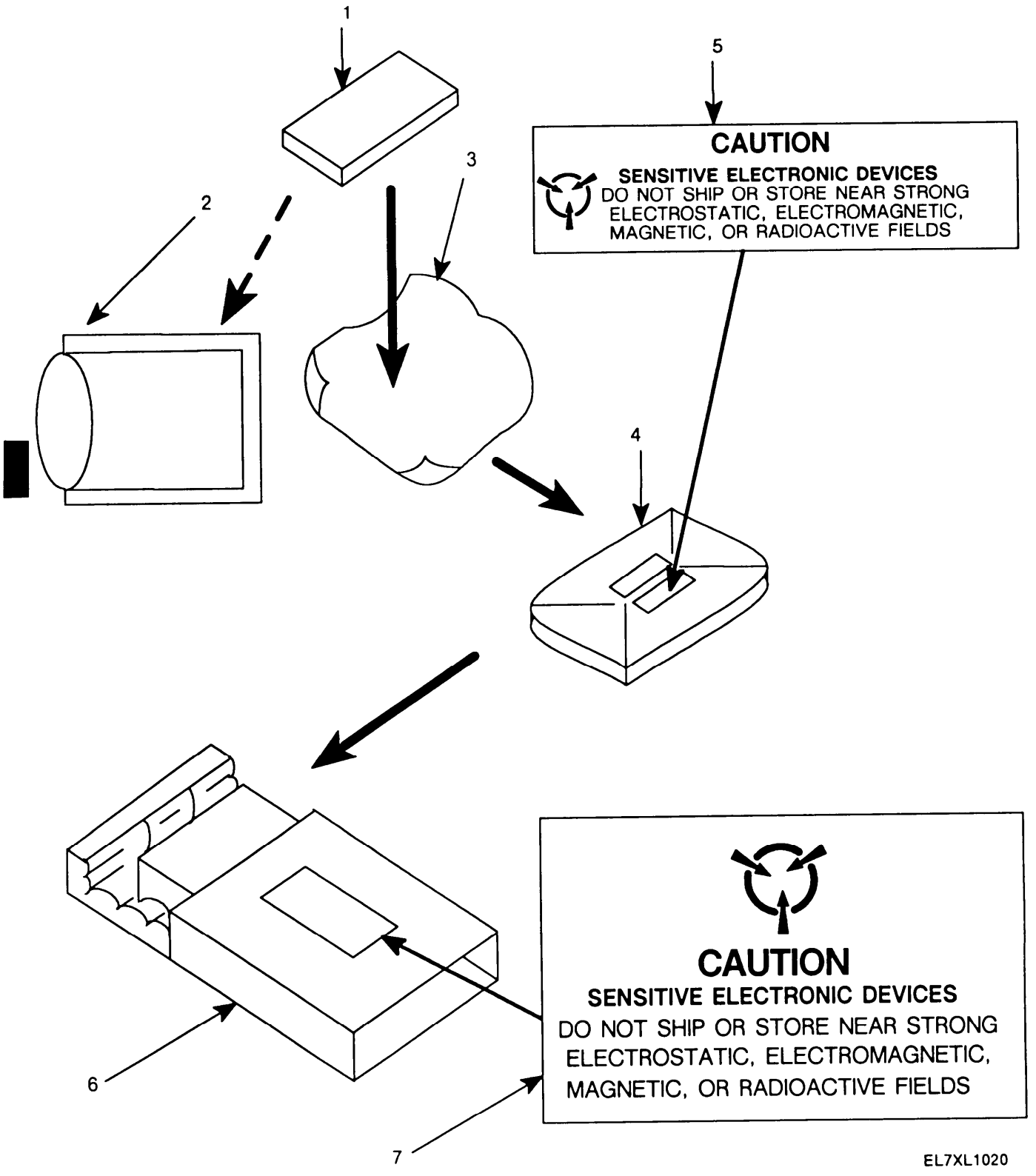


Figure 5-12. Packing Static Sensitive Modules.

CHAPTER 6

CONTROL-MONITOR C-11291/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

6-1. INTRODUCTION.

The control-monitor receives status signals and transmits control signals to one, two, or three RTs. It can also operate in tandem with another control-monitor. ln the MAIN mode, it can monitor and change the RF, RT mode, and CHAN of the Reselected. ln the STANDBY mode, it can monitor the RF, RT mode, and CHAN of the RT selected. A control-monitor in STANDBY can request a change to MAIN,

Figure 6-1 is a block diagram of the control-monitor. It is made up of four modules and the chassis. They are:

Control-Monitor Panel - Case 7A1 (control-monitor chassis).

Circuit Card Assembly, Microcontroller 7A2 (microcontroller).

Circuit Card Assembly, Decoder/Timer 7A3 (decoder/timer).

Circuit Card Assembly, Analog 7A4 (analog module).

Circuit Card Assembly, Power Supply 7A5 (power supply).

The control-monitor has three connectors. Two are for the RT status and control signals. A 2880-Hz FSK carrier is used with ones and zeros at 2560 and 3200 Hz. Normal output level is 600 mV p-p. Primary power is also supplied from the radio to connector J1.

The third connector is for the tandem control-monitor. A 640-Hz serial digital data format is used between control-monitors. The tandem control-monitor receives primary power at connector J3.

6-1. INTRODUCTION. Continued

The decoder/timer reads the front panel switch settings. This information is provided to the microcontroller. The microcontroller responds to received data, generates data to be transmitted, and writes to the front panel displays. The analog module detects received FSK signals. It routes received FSK and digital data to the microcontroller. Transmitted data starts with the microcontroller and goes through the decoder/timer and analog module.

Control-monitor logic levels are as follows:

logic 1 = 3.9 to 6.3 V dc.

logic 0 = -0.7 to 1.7 V dc.

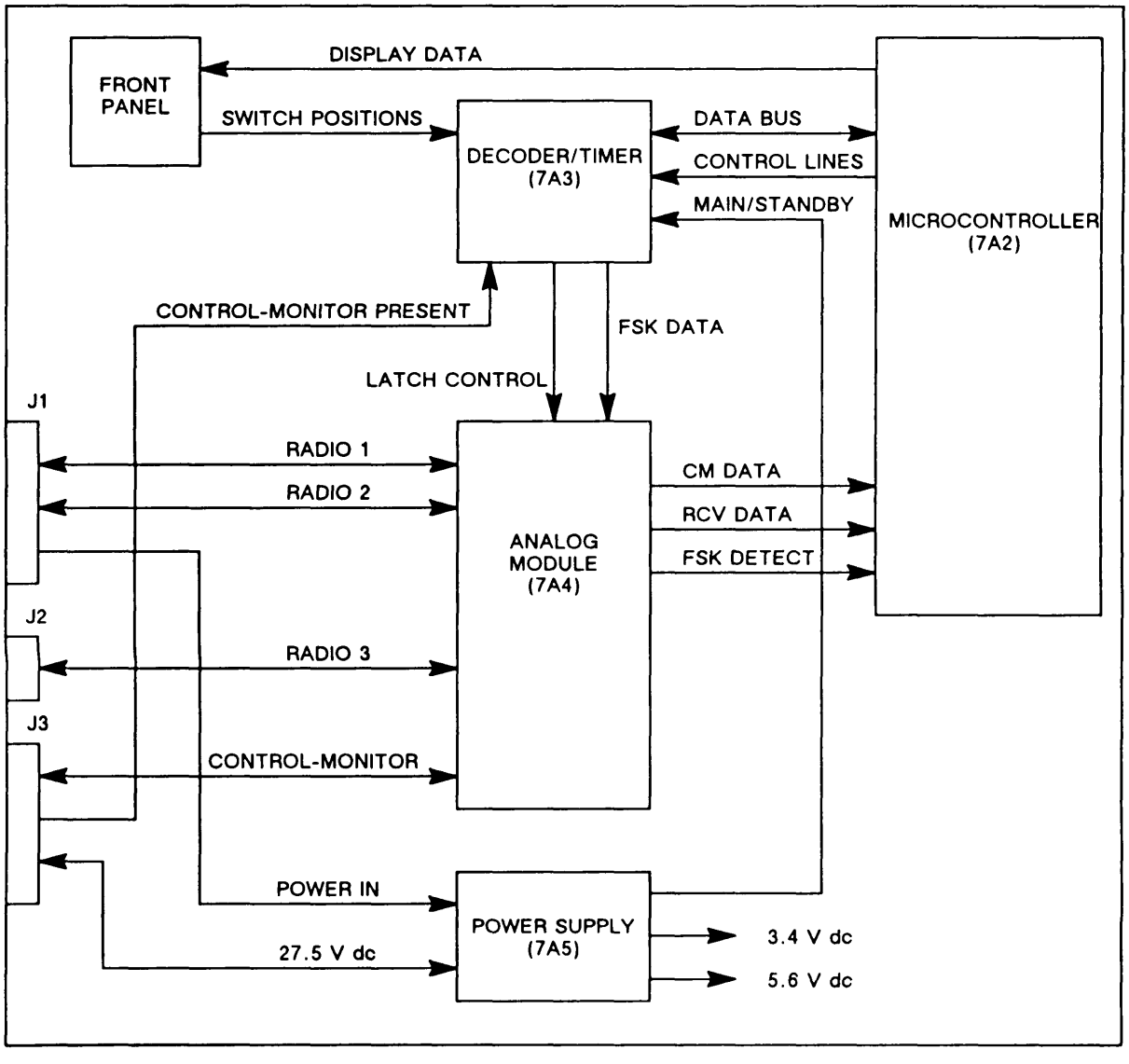


Figure 6-1. Control-Monitor Functional Block Diagram.

6-1. INTRODUCTION. Continued

All clocking signals are square waves with logic 0 and logic 1 levels. FSK frequencies are:

logic 1 = 2560 Hz.

logic 0 = 3200 Hz.

A description of each of the modules follows.

6-2. CONTROL-MONITOR CHASSIS (7A1).

The control-monitor chassis includes the front panel, case, and backplane assembly (parent board). The front panel has the operator controls and displays. The case has the connectors used to interconnect the control-monitor to the other units in the system. The parent board provides the module interconnections. See figure FO-17. Most of the test points used for troubleshooting are located on the parent board. See figure FO-18.

The display board requires two inputs from the microcontroller. DISPLAY DATA is a serial data stream that controls the display. DISPLAY CLK is a 320-kHz clock signal that provides timing for the data. The front panel switches are read by the decoder/timer.

6-3. MICROCONTROLLER (7A2).

The microcontroller contains a microprocessor, memory, and interface circuits. It controls the operation of the control-monitor by:

Generating control signals that operate I/O latches.

Monitoring and translating received data.

Generating data for transmission.

Monitoring the front panel switches.

Writing to front panel displays.

Figure 6-2 is a block diagram of the microcontroller.

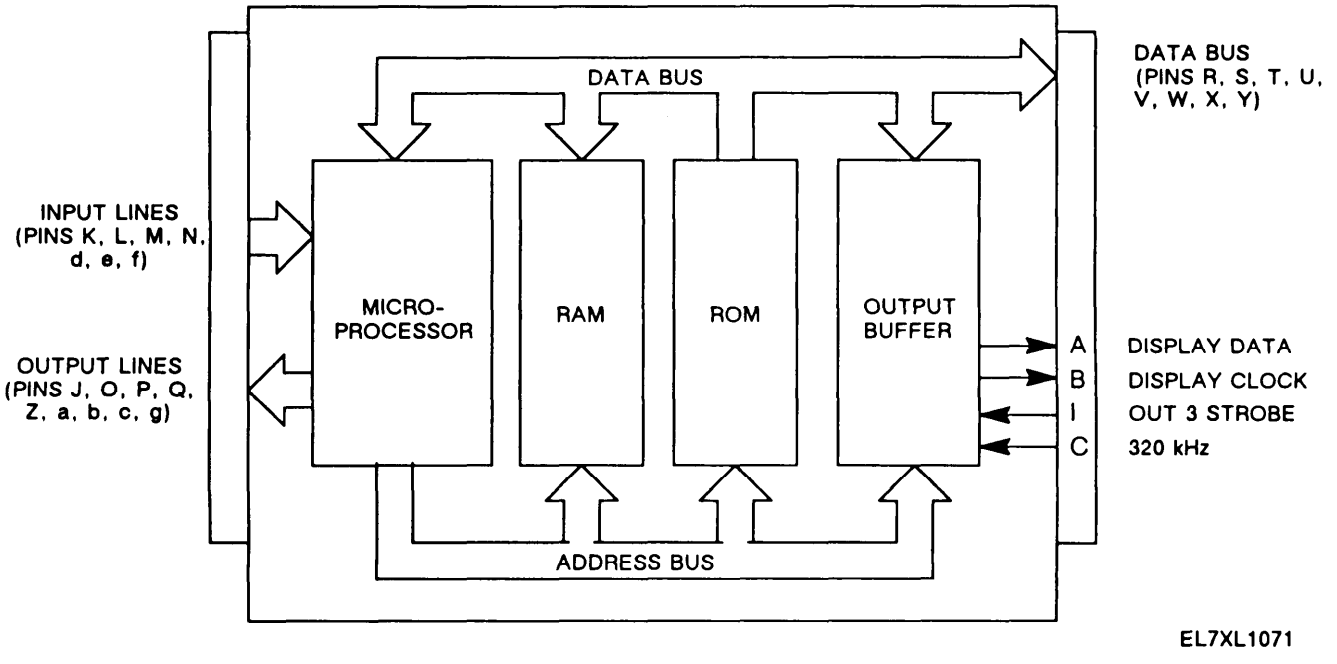


Figure 6-2. Microcontroller Functional Block Diagram.

6-3. MICROCONTROLLER (7A2). Continued

The inputs required by the microcontroller are as follows:

SIGNAL	PIN	DESCRIPTION
CM DATA	K	Data received from other control-monitor. Serial data format, 6740 Hz. From analog module.
RCV DATA	L	Data received from RT. Serial data format, 640-Hz. From analog module.
2880 DET-N	M	Control line from analog module. Goes to logic 0 when data is received from RT.
640 Hz	N	Digital clock signal from decoder/timer.
320 kHz	C	Digital clock signal from decoder/timer.
1.92 MHz	e	Digital clock signal from decoder/timer.
CLR-N	d	Normally logic 1. Goes to logic 0 for 1 second at turn-on. From decoder/timer.
DMA-OUT-N	f	1.5 µs logic 0 pulse every 1.56 ms from decoder/timer.
OUT 3 STROBE	l	1.5 µs logic 1 pulse from decoder/timer.

The outputs provided by the microcontroller are as follows:

SIGNAL	PIN	DESCRIPTION
DATA DISPLAY	A	320-kHz digital data stream. Directs displays.
DISPLAY CLK	B	320-kHz clock. Provides display data timing.
PROCESSOR Q	c	Goes to logic 1 when FSK data is to be transmitted.
MEM REQ DATA-N	Z	Logic 0 pulse train for 3.4 µs when active.
TIMING PULSE A and B	g J	Timing pulse train, logic 1 for 0.5 µs.
N0, N1, and N2	O P Q	Logic 1 for 1.5 µs.
STATE CODE 0	a	Logic 1 or 0 for 8.3 µs.
STATE CODE 1	b	Logic 1 for 8.3 µs every 1.56 ms.

Information is passed between the microcontroller and the decoder/timer on the data bus. This is the microprocessor DATA BUS B0 through DATA BUS 67 lines (microcontroller pins R, S, T, U, V, W, X, and Y). Data transfers both ways on the bus.

Data from the RT is input on the RCV DATA line. Data to be sent to the RT is sent to the decoder/timer on the data bus.

Data from the other control-monitor is input on the CM DATA line. Data to be sent to the other control-monitor is sent on the PROCESSOR Q line.

6-4. DECODER/TIMER (7A3).

The decoder/timer performs several functions:

It generates all required clock signals.

It decodes microcontroller outputs.

It provides an I/O interface between the microcontroller and the other modules.

Figure 6-3 is a block diagram of the decoder/timer.

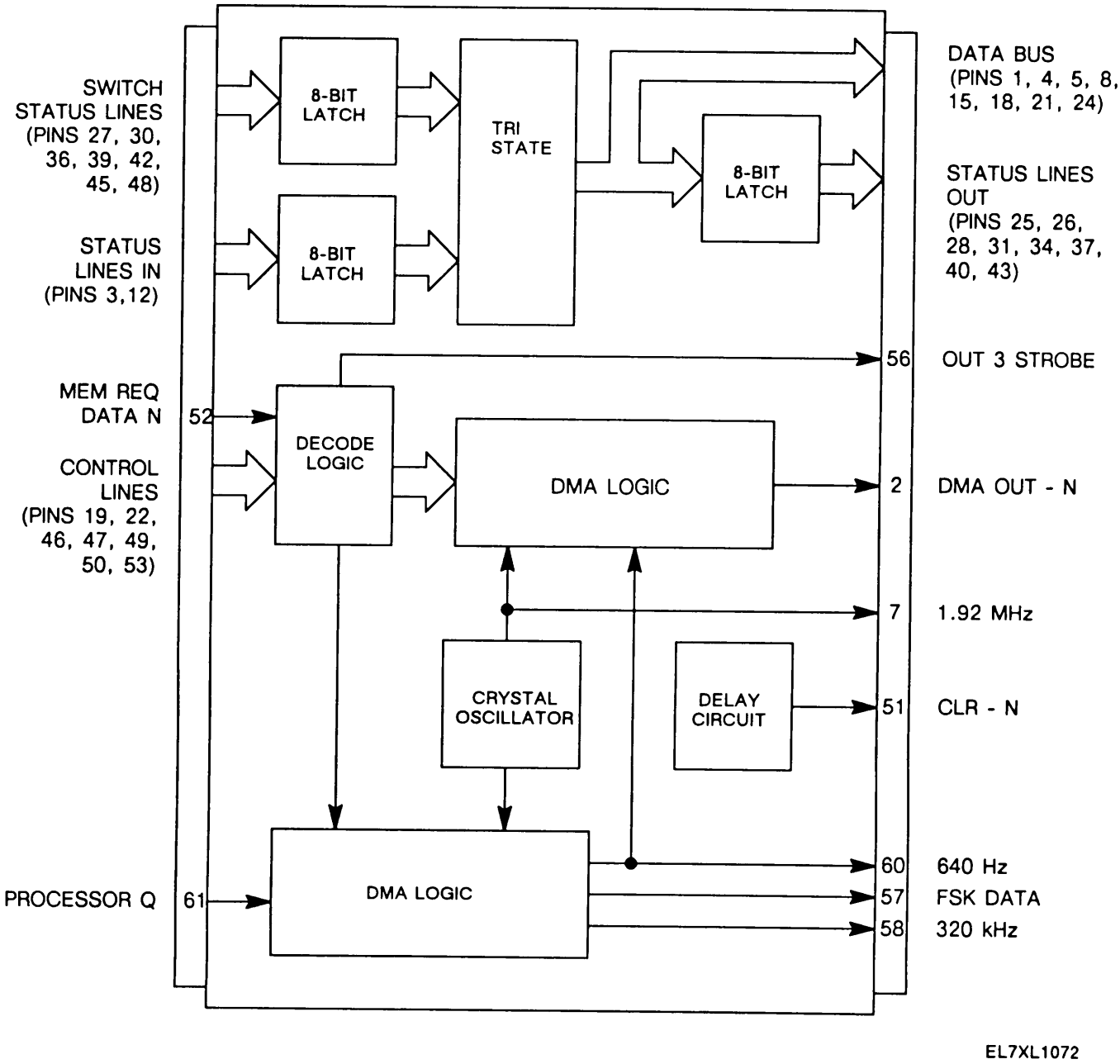


Figure 6-3. Decoder/Timer Functional Block Diagram.

6-4. DECODER/TIMER (7A3). Continued

The SWITCH STATUS, MAIN/STANDBY, and CM PRES lines are checked and the information is provided to the microcontroller on the DATA BUS. The STATUS LINES OUT are latched as directed by the microcontroller.

A crystal oscillator on the decoder/timer provides several clock frequencies. A 3.84-MHz crystal output is divided by two to obtain 1.92 MHz. It is used by the microcontroller and logic circuits on the decoder/timer. It is divided further to produce 640 Hz and 320 kHz. These are also used by the microcontroller.

A delay circuit holds the CLR-N line at logic 0 for about 1 second when the control-monitor is turned-on. After that, it is held at logic 1. It is used to reset the microcontroller and start the initialization routine.

Logic circuits convert the PROCESSOR Q signal into FSK DATA. Several control lines from the microcontroller are required to accomplish this. See figure 6-3 and figure FO-17. The FSK DATA signal is a 2560/3200 Hz square wave. 2560 Hz is a logic 1. 3200 Hz is a logic 0.

OUT 3 STROBE and DMA OUT-N are also generated for use by the microcontroller.

6-5. ANALOG MODULE (7A4).

The analog module performs receive and transmit functions. See figure 6-4. Three radio channels are available for receive and transmit. A channel is selected by the radio switch. The transmit circuit shapes and buffers the FSK square wave signal from the decoder/timer. The receive circuit converts the analog FSK signal into a digital data stream.

The three transmit channels are identical except for the input control signal. For radio 1, the RADIO 1 XMT line goes to logic 1. This closes the appropriate transmit switch. The FSK DATA signal is from the decoder/timer. It is a 2560/3200 Hz square wave. The shaper/filter circuit converts it into a sine wave. This FSK analog signal is routed through the transmit switch to a buffer amplifier. It isolates the outgoing signals from the incoming signals. The signal is transformer coupled to the radio. Radio 2 and radio 3 paths operate the same as radio 1.

The receive path is selected that corresponds to the transmit path. For radio 1, the RADIO 1 RCV line goes to logic 1. This closes the appropriate receive switch. The received signal is transformer coupled to the receive switch. It is routed to a buffer amplifier. The buffered FSK signal is demodulated. The analog data signal is converted into a digital data signal (RCV DATA). The RCV DATA signal is sent to the microcontroller. Radio 2 and radio 3 paths operate the same as radio 1.

When the FSK demodulator circuit detects a carrier, the 2880 DET-N line is pulled to logic 0. The RCV DATA signal is fed back into the analog module. It is used to maintain the frequency accuracy of the VCO and tracking of the received analog signal.

The receive and transmit signals to a second control-monitor are also routed through the analog module. During transmit, the CM XMT line goes to logic 1. This closes the control-monitor transmit switch. The signal transmitted is the PROCESSOR Q signal. It is a 640-Hz digital data stream. It is routed through the transmit switch to a current driver. The current driver increases the current to the level required to drive the CM OUT line. A signal from the second control-monitor is input on the CM IN line. It is also routed through a current driver. The CM DATA signal is output to the microcontroller.

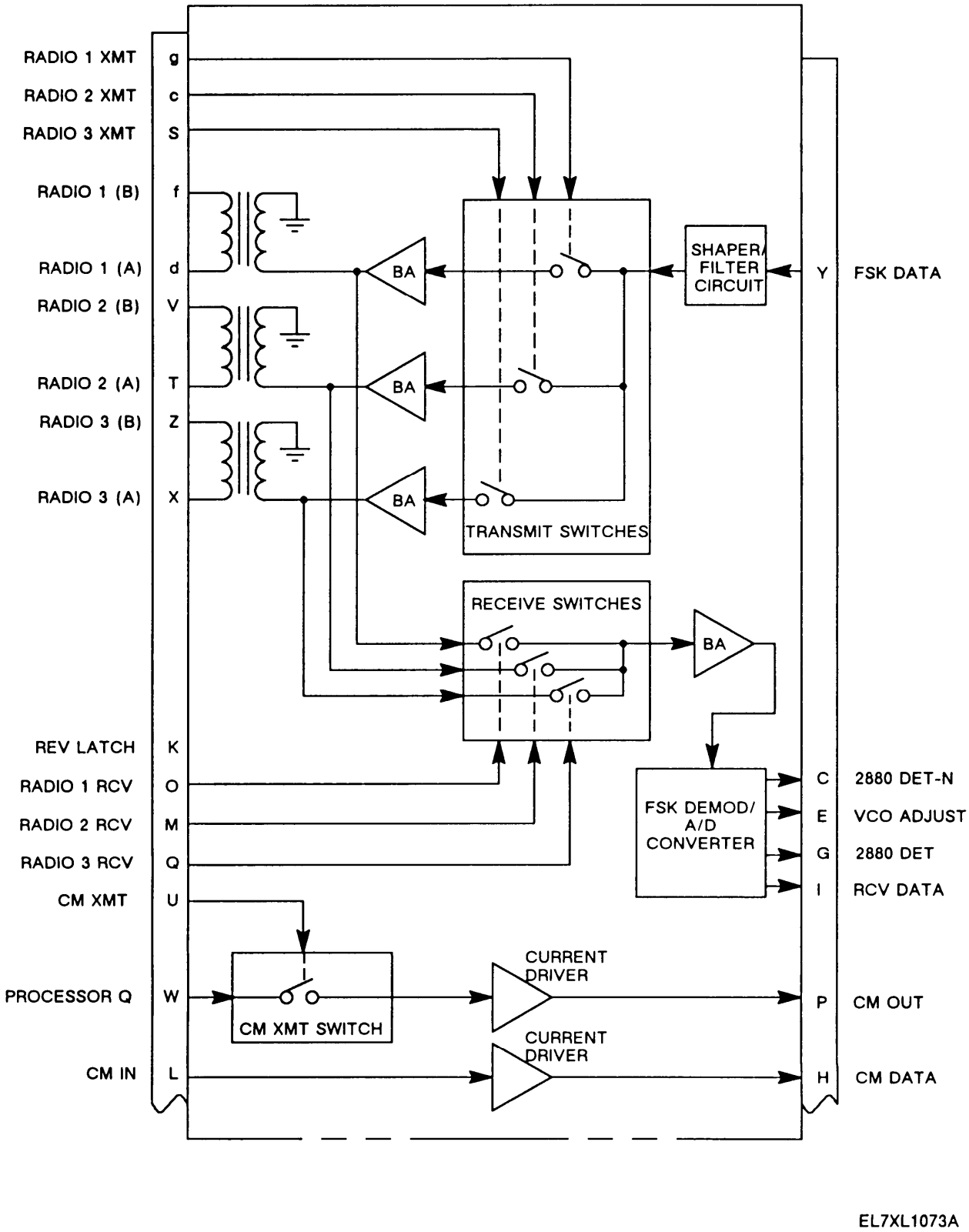


Figure 6-4. Analog Module Functional Block Diagram.

6-6. POWER SUPPLY (7A5).

The power supply operates using the switched 27.5 V dc from the mounting adapter. It will operate with an input voltage between 18.5 and 32 V dc. It requires no more than 1 A. Its outputs are 5.43 to 5.77 V dc (5.6 V dc nominal) and 2.9 to 3.9 V dc (3.4 V dc nominal). Both outputs are overcurrent protected.

The power supply can receive its input power from either pin I or pin H. See figure 6-5. When the control-monitor is connected to the radio, 27.5 V dc is present at connector J1 pin F. See figure FO-17. It is routed to pin I of the power supply. The voltage source detection circuit pulls the MAIN/STANDBY line to logic 1. The 27.5 V dc is output through pin H to connector J3 pin F. When the control-monitor is the second one in the system, it receives power at connector J3 pin F. It is input to the power supply at pin H. This causes the voltage source detection circuit to pull the MAIN/STANDBY line to logic 0.

The power supply operates as a switching voltage regulator. The output of the switching circuit is compared to a reference voltage. The output voltage regulator circuit uses the difference in the two voltages to set the switching rate. This rate is adjusted until there is no difference between the reference voltage and the sampled output voltage.

Overcurrent protection is also provided. If 100 mA on the 5.6 V line or 400 mA on the 3.4 V line is exceeded, the power supply reduces both outputs to 0 V.

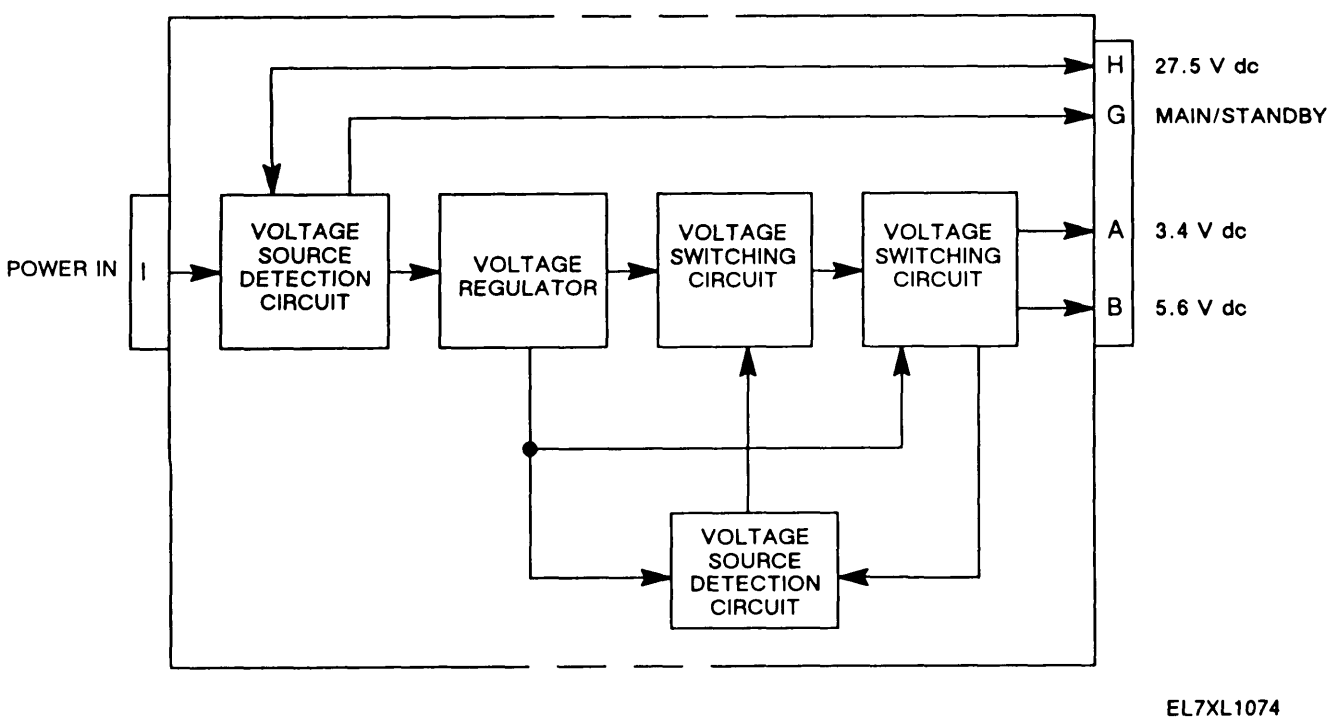


Figure 6-5. Power Supply Functional Block Diagram.

6-7. SELF-TEST.

The self-test function checks the following:

Front panel displays.

Microcontroller RAM and ROM.

Analog channel operation.

6-7. SELF-TEST. Continued

Several displays are generated to indicate the results of the test. They are:

All display segments are lit to check display operation.

“Gd” display indicates self-test was passed.

“F1” display indicates a microcontroller failure.

“F2” display indicates an analog channel failure.

Self-test is always executed on turn-on. It will repeat the self-test as long as the FCTN switch is set to TEST.

The front panel displays are lit first. A series of “ones” are sent on the DISPLAY DATA line to light all the display segments. This pattern is sent twice. The display segments are lit for about 3 seconds.

Next, the microcontroller ROM is checked. It is checked by summing all of the bytes in ROM except the last two and comparing the sum to the last two bytes in ROM. If they are the same, the ROM code, address bus, data bus, and access lines are verified. Self-test continues with the next check. If not, “F1” is displayed.

If the ROM check passes, the RAM is checked. All RAM addresses are checked by writing and reading a value at each address. When checked at turn-on, all RAM values are set to zero. When the FCTN switch is set to TEST, the values in RAM are retained and restored. If the RAM check passes, the RAM, address bus, data bus, and access lines are verified. If any RAM address fails, "F1" is displayed.

The analog channel operation is checked next. All three radio transmit/receive paths are checked. Radio channel 3 is checked first, followed by radio channel 2, and then radio channel 1. The channels are tested by sending a carrier signal on the FSK DATA line and changing its frequency from 3200 Hz to 2560 Hz. The 2880 DET-N line should stay at logic 0. The RCV DATA line should change logic states with each frequency change.

A channel test is started by setting the PROCESSOR Q line to logic 1. See figure 6-6. The test is delayed until there is no activity on the selected channel and a negative 640-Hz clock edge is detected (1). This ensures that the PROCESSOR Q line is set to logic 1 (3200 Hz). The carrier is turned on (2). After two clock periods (3), about 3 ms, the first check is made (4). The 2880 DET-N line should be at logic 0. The RCV DATA line should be at logic 0. If both pass, the PROCESSOR Q line is set to logic 0 (2560 Hz). After a second delay (5), and two clock periods (6), the checks are repeated (7). The 2880 DET-N line should beat logic 0. The RCV DATA line should be at logic 1. If both pass, the carrier is turned off and the next channel is checked. If any failures are detected, "F2" is displayed.

If all self-test checks are passed, “Gd” is displayed.

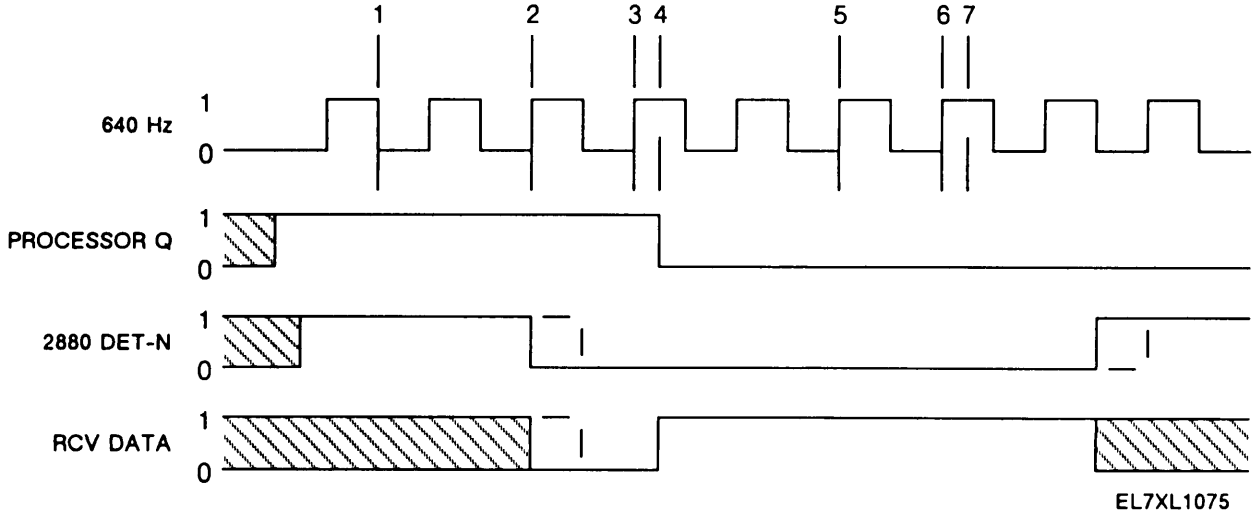


Figure 6-6. Analog Check Timing.

6-8. INTERFACE FAULTS AND ERRORS.

When the control-monitor requests a status update, the other unit responds. The RT echoes the control signals. If the RT does not respond, the control-monitor will display “F7”. If a second control-monitor is involved and it does not respond, “Fr” for failed response is displayed.

If the operator makes an error, “Er” will be displayed. This can happen several ways. If no radio is connected to the radio 3 channel and an update request is made with the RADIO switch set to 3, “Er” will be displayed.

A blinking CHAN display indicates a problem at the RT. This could be caused by selecting an unloaded channel.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

6-9. COMMON TOOLS AND EQUIPMENT.

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

6-10. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

6-11. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering Direct Support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

6-12. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective control-monitor. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module.

6-13. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating a control-monitor. If the operational check is passed, the control-monitor can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 6-14.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the "Action" column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A "No response " in the "Response" column means that any response is not of interest.

The switch settings for the test equipment are given in the "EQUIPMENT PRESETS" section of each test setup figure.

WARNING

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply ON.

CAUTION

Static electricity and stray voltages can damage the control-monitor. Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting.

NOTE

CB1 should be turned OFF whenever the control-monitor is being connected to the test radio. If the control-monitor does not turn-on properly when power is applied, try turning CB1 OFF and back ON a few times until it does.

6-13. OPERATIONAL CHECK. Continued

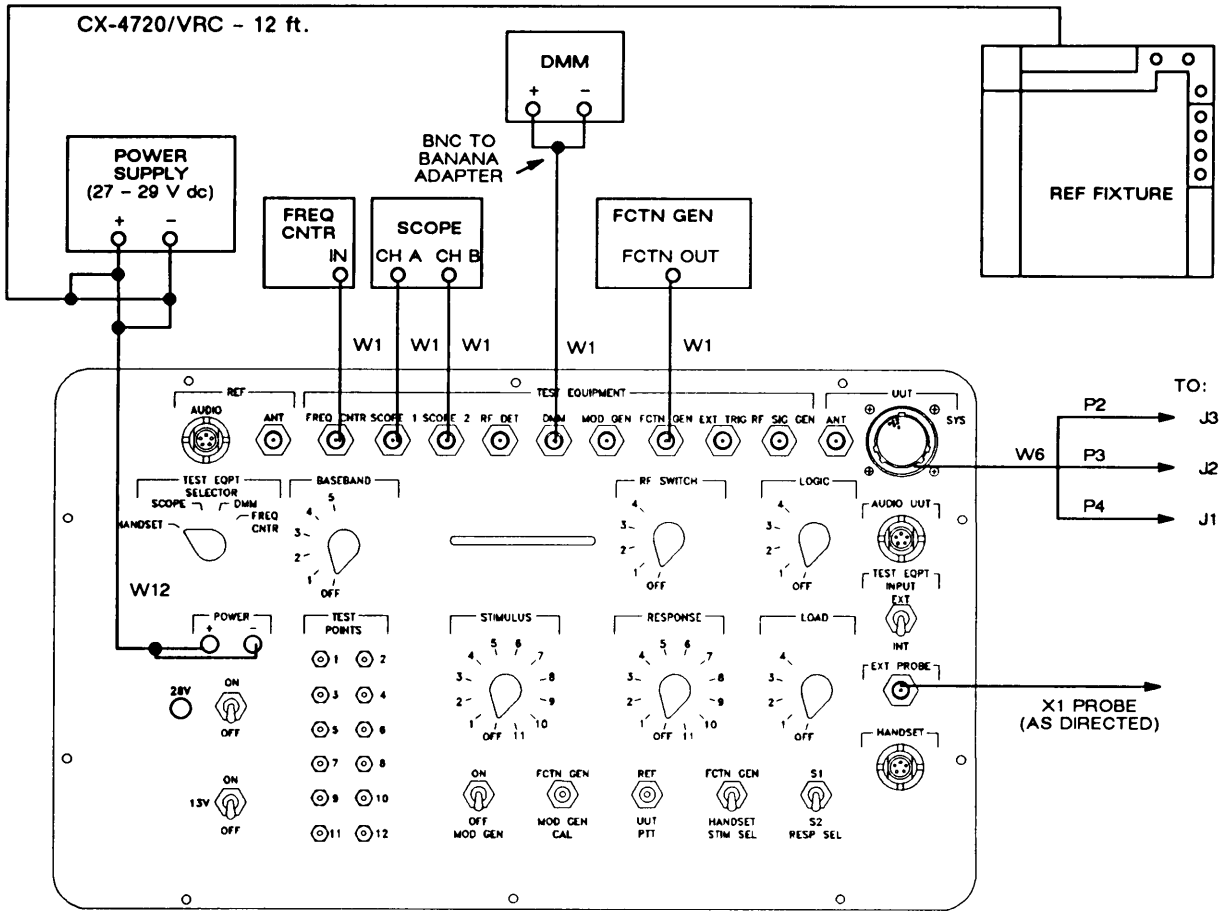
Step 1. SELF-TEST.

Action	Response
a. Connect equipment as shown in figure 6-7.	a. No response.
b. Set 28 V: ON.	b. Control-monitor repeats self-test every 5 seconds. All display segments light for 3 seconds and then "Gd" is displayed for 2 seconds. IF — THEN All display segments do not light. — Go to chart 1. Any display segment does not light. — Control-monitor front panel (7A1) is bad. Display is stuck with all segments lit. — Go to chart 2. "F1" is displayed. — Microcontroller (7A2) is bad. "F2" is displayed. — Go to chart 3.
c. Check DIM control operation by adjusting it ccw and then cw.	c. Ccw dims the display, and cw brightens the display. If not, the control-monitor front panel (7A1) is bad.

Step 2. OUTPUT CHECK.

Action	Response
a. Read scope CHAN: A. T: 0.2 ms/DIV V: 0.2 V/DIV	a. Burst of 0.8 to 1.8 V p-p, 0 V dc, referenced sine wave every 5 seconds. If not, go to chart 4.
b. Set RESPONSE: 9. Read scope CHAN: A.	b. Same as in step 2 a. If not, go to chart 4.
c. Set RESPONSE: 10. Read scope CHAN: A.	c. Same as in step 2 a. If not, go to chart 4.

6-13. OPERATIONAL CHECK. Continued



EL7XL1076

EQUIPMENT PRESETS

TEST ADAPTER:		CONTROL-MONITOR:	
TEST EQPT SELECTOR:	SCOPE	RADIO:	1
BASEBAND:	OFF	FCTN:	TEST
RF SWITCH:	OFF	DIM:	FULLY CW
LOGIC:	4		
TEST EQPT INPUT:	INT		
28 V:	OFF		
13 V:	OFF		
STIMULUS:	OFF		
RESPONSE:	8		
LOAD:	OFF		
MOD GEN:	OFF		
PTT:	OFF		
STIM SEL:	FCTN GEN		
RESP SEL:	S1		
CAL:	OFF		

Figure 6-7. Control-Monitor Test Setup.

6-13. OPERATIONAL CHECK. Continued

Step 3. CONTROL FUNCTION CHECK.

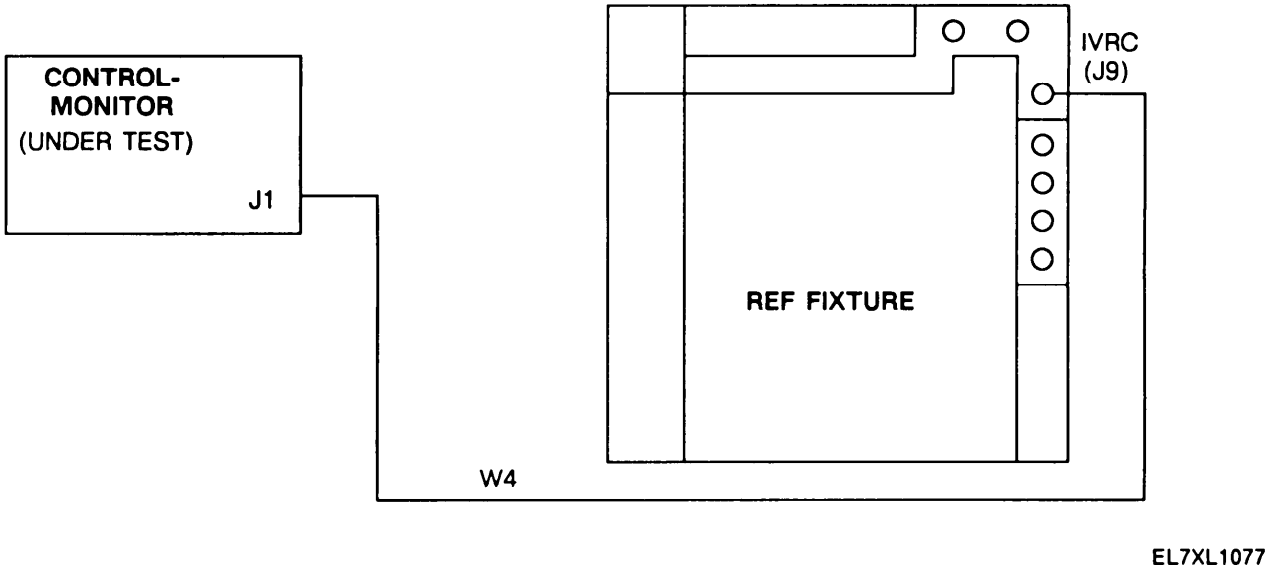
Action	Response
a. Set FCTN: RF.	a. CONTROL S is lit, all others blank. IF — THEN CONTROL M is lit with all others blank. — Go to chart 5. Any other display is seen. — Go to chart 6.
b. Set FCTN: MODE.	b. CONTROL S is lit, all others blank. If not, go to chart 7.
c. Set FCTN: VAR.	c. CONTROL S is lit, all others blank. If not, go to chart 7.
d. Set FCTN: CONTROL.	d. CONTROL S is lit, all others blank. If not, go to chart 8.
e. Set INIT to UP and then release it.	e. "Er" is displayed while INIT is UP. If not, go to chart 9.
f. Set INIT to DN and then release it.	f. CONTROL M is lit briefly, "Fr" is displayed for 2.5 seconds, and then CONTROL S is lit. If not, go to chart 10. If "Er" is displayed, go to chart 8.
g. Set RESPONSE: 7. Read scope CHAN: A when INIT is set to DN and then released. T: 10 ms/DIV V: 5 V/DIV	g. Scope CHAN: A displays digital data pattern for about 0.9 seconds and then logic "1". If not, go to chart 11.
h. Set 28 V: OFF. Set LOGIC: 3. Set 28 V: ON.	h. Control-monitor runs 1 test cycle and then CONTROL M is lit, all others blank. If not, go to chart 12 node (2).
i. Set 28 V: OFF. Set LOGIC: 4. Jumper TP4 to TP5.	i. Control-monitor runs 1 test cycle and then CONTROL M is lit, all others blank. If not, go to chart 12.

6-13. OPERATIONAL CHECK. Continued

Step 4. INPUT AND RADIO SELECT CHECK.

Action	Response
a. Connect equipment as shown in figure 6-8.	a. No response.
b. Set CB1: ON.	b. Control-monitor runs 1 test cycle, "Ud" is displayed, and then SC, CHAN 0, RF LO, and CONTROL M are lit with all others blank. If not, go to chart 13.
c. Set FCTN: CHAN. Set INIT to UP and then release it.	c. CHAN 1 lights. If not, go to chart 15. If CHAN 1 is blinking, go to next action.
d. Set FCTN: COMSEC. Set INIT to UP and then release it.	d. "Er" is displayed briefly and then SC, CHAN 1, RF LO, and CONTROL M are lit with all others blank. If not, go to chart 15. If CHAN 1 is blinking, go to next action.
e. Set CB1: OFF. Set RAD: 2. Set CB1: ON.	e. Control-monitor runs 1 test cycle, and then CONTROL M is lit with all others blank. If not, go to chart 13.
f. Set CB1: OFF. Set RAD: 3. Set CB1: ON.	f. Control-monitor runs 1 test cycle, and then CONTROL M is lit with all others blank. If not, go to chart 13.
g. Operational Check is complete.	

6-13. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

CONTROL-MONITOR:
- RADIO: 1
- FCTN: CONTROL

REF FIXTURE:
- CB1: OFF
- RT FCTN: REM
- RT IN LOWER SLOT.

Figure 6-8. Operation with Radio Test Setup.

6-14. TROUBLESHOOTING.

Troubleshooting is done on a faulty control-monitor. The steps to determine if a control-monitor is faulty and how to troubleshoot it are as follows:

a. **When a control-monitor is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. **Verify the symptom.** Perform the operational check found in paragraph 6-13. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. **Troubleshoot the control-monitor using the flowchart.** It will identify the defective module or component.

d. **Replace the defective module or component.** Follow the procedures in section IV.

e. **Verify the repair.** Repeat the operational check in paragraph 6-13 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the control-monitor can be returned for use.

6-15. TEST PRECAUTIONS AND NOTES.

WARNING

Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

CAUTION

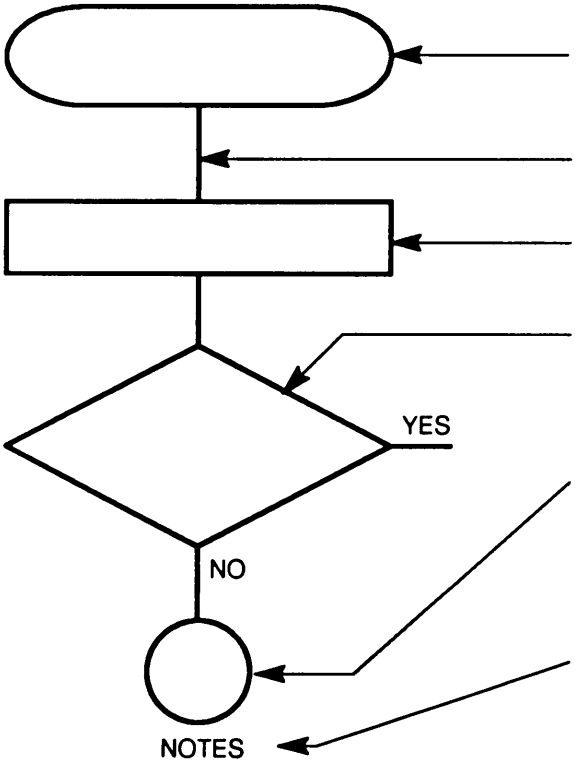
Static electricity and stray voltages can damage the control-monitor modules. Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting.

NOTE

The Principles of Operation section, functional block diagrams, and figure FO-17 can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.

6-16. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages.

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

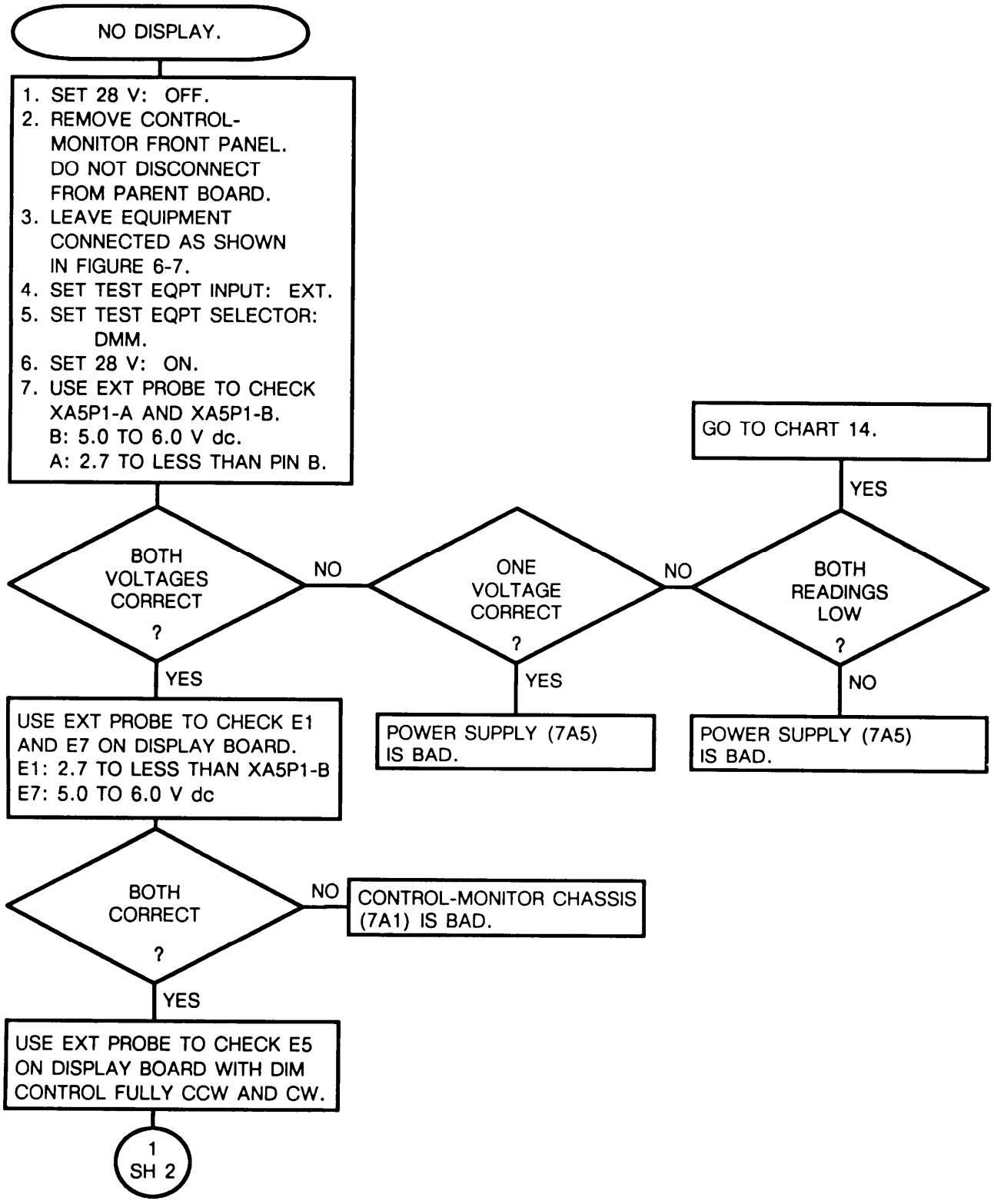
6-17. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	No display.
2	All display segments stay lit.
3	Self-test “F2” display.
4	Incorrect radio XMT output.
5	CONTROL M lit, all others blank.
6	Incorrect display in RF.
7	Incorrect display in FCTN: MODE or VAR.
8	Incorrect display in CONTROL.
9	“Er” is not displayed.
10	“Fr” is not displayed and/or CONTROL M is not lit.
11	CM OUT is incorrect.
12	Incorrect display after test cycle.
13	“Ud” is not displayed or incorrect indicators.
14	Power supply output is low.
15	Incorrect display in FCTN: CHAN or COMSEC.

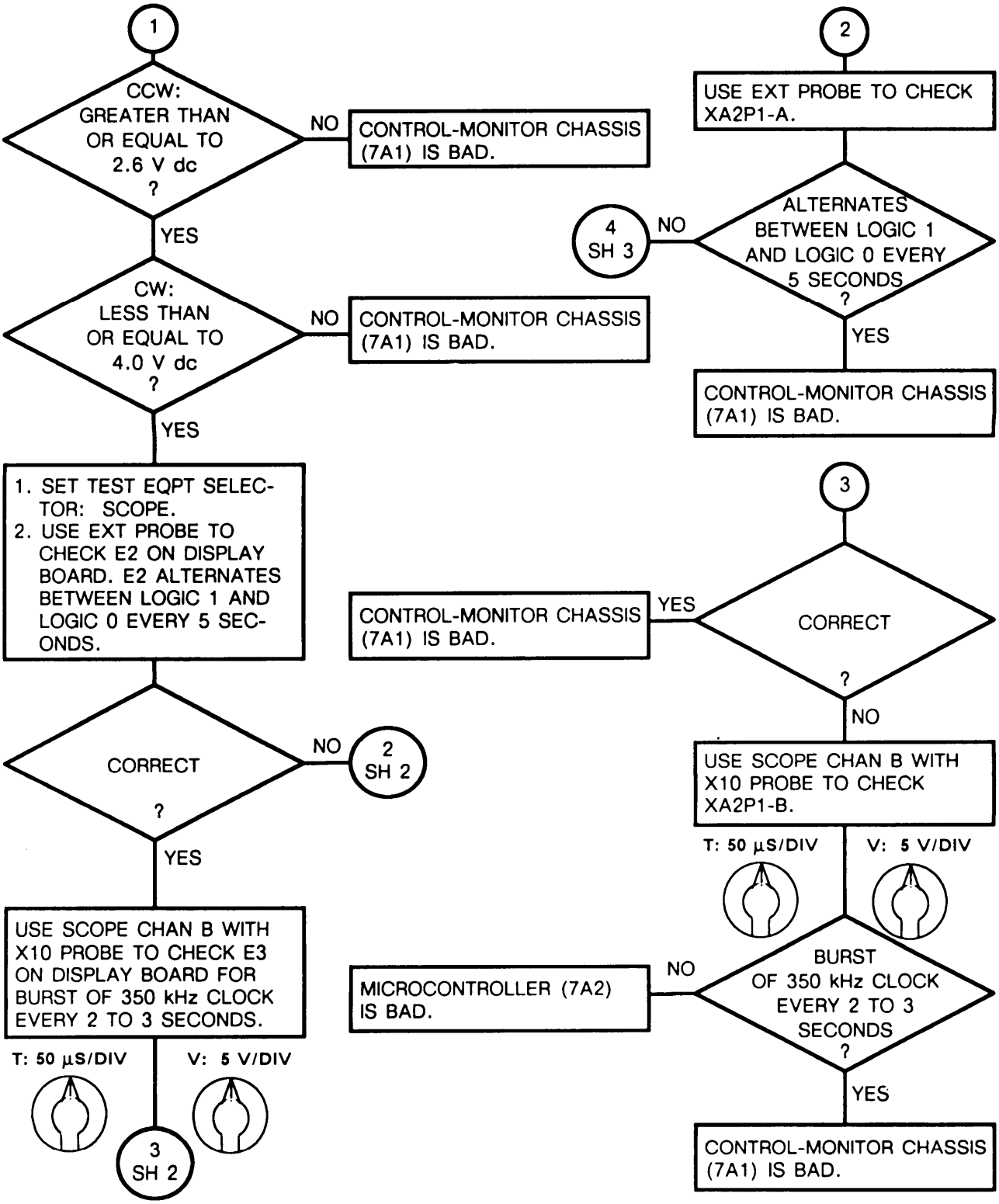
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Display Circuit
(Sheet 1 of 5)



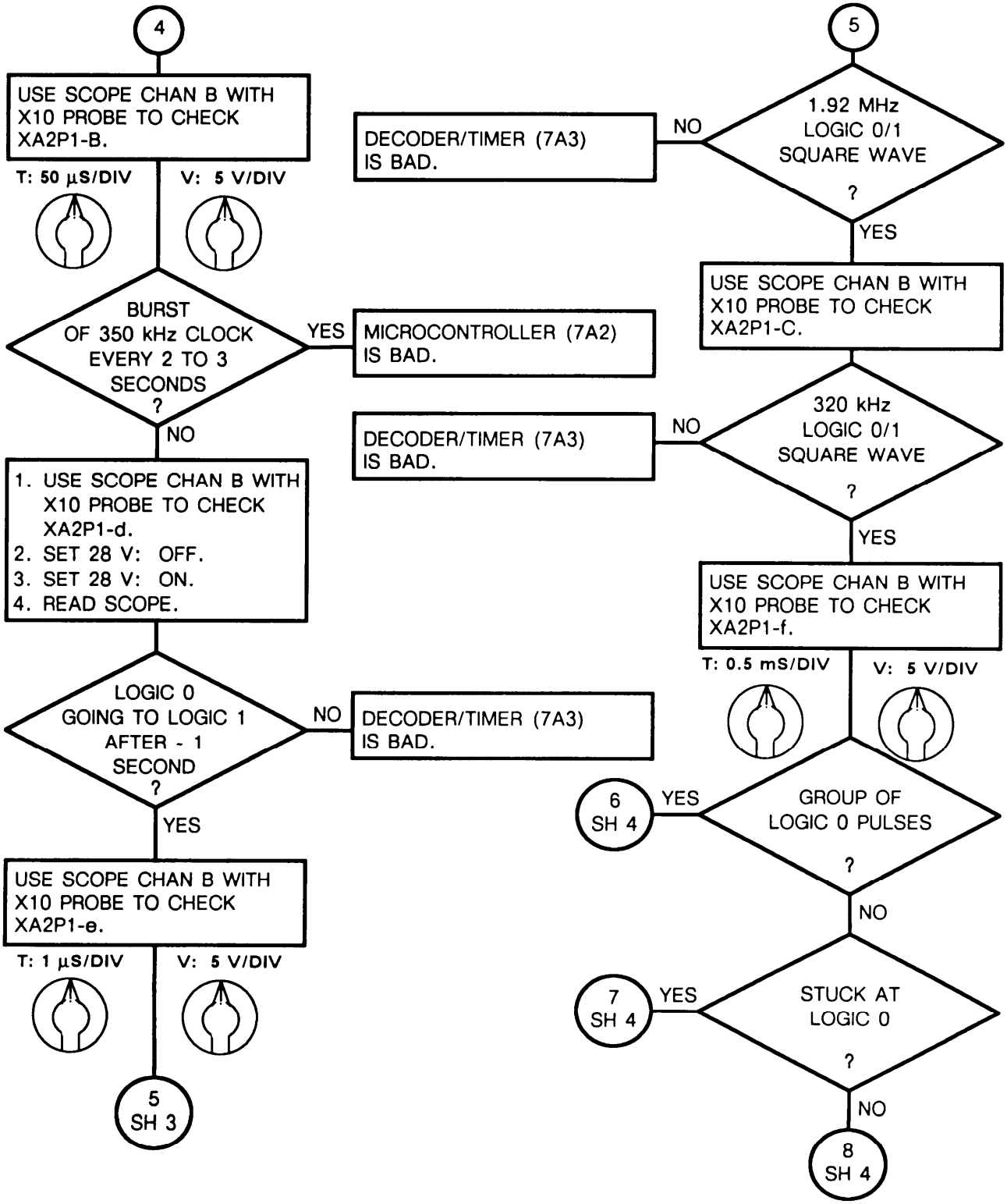
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Display Circuit
(Sheet 2 of 5)



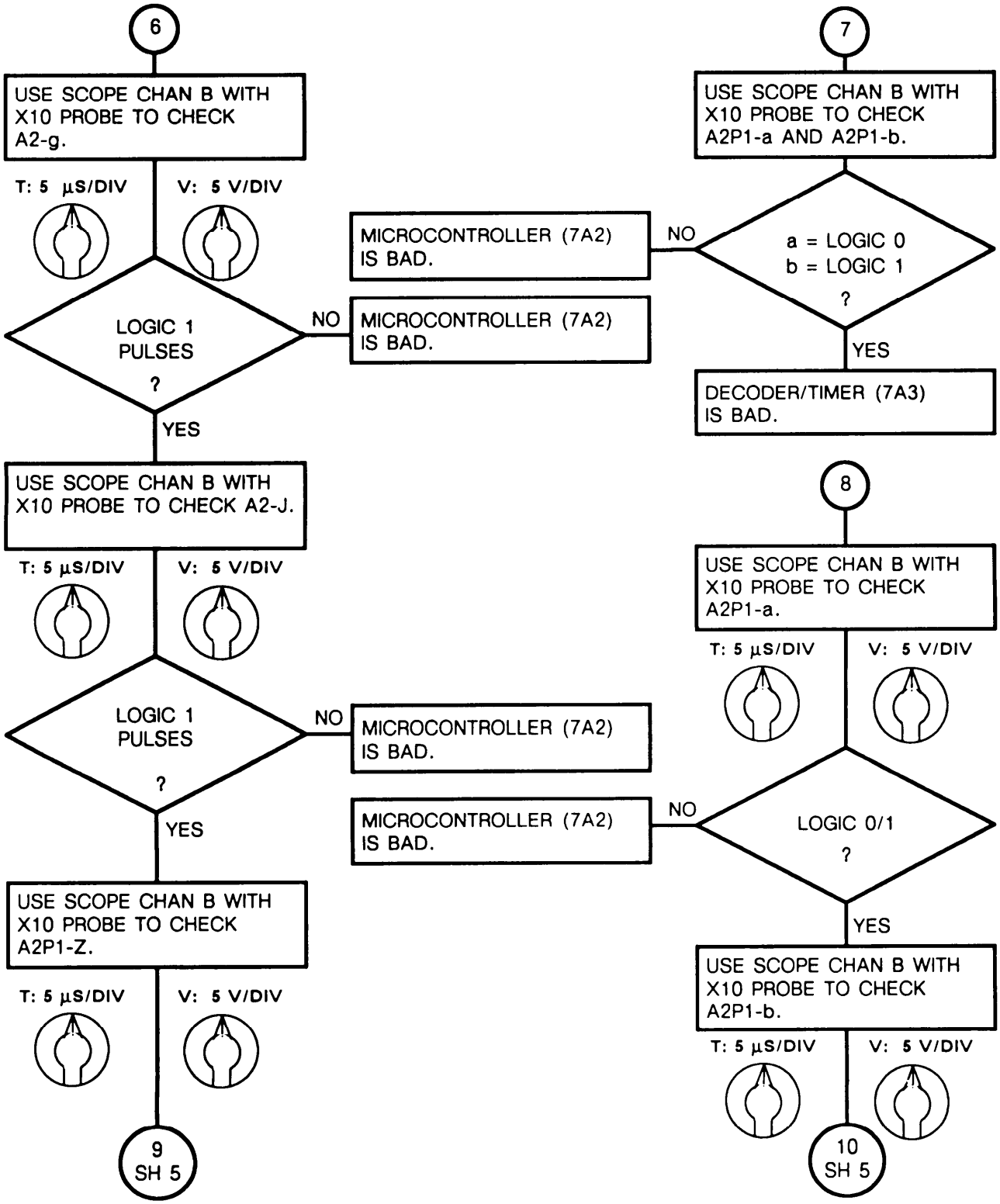
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Display Circuit
(Sheet 3 of 5)



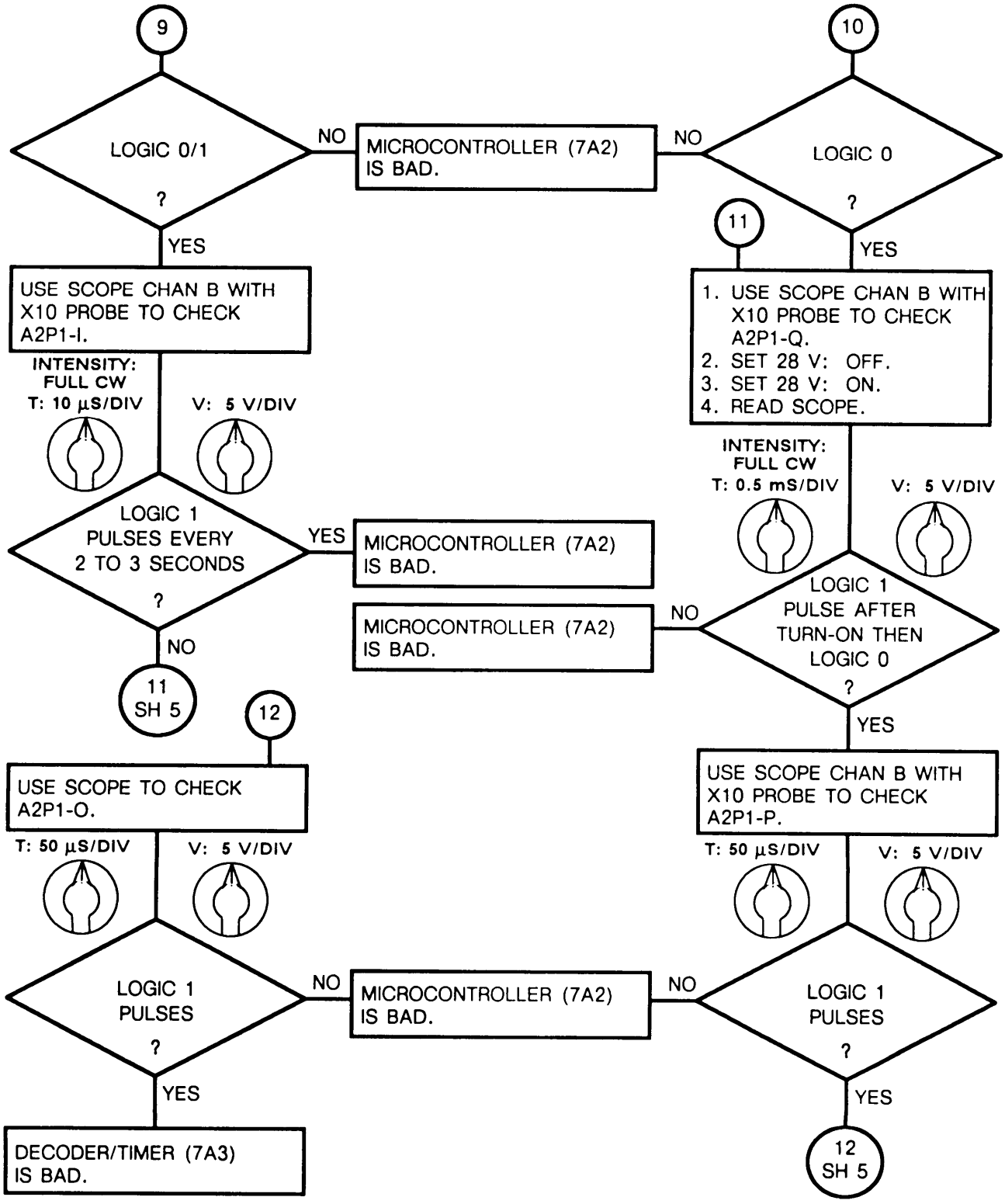
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Display Circuit
(Sheet 4 of 5)



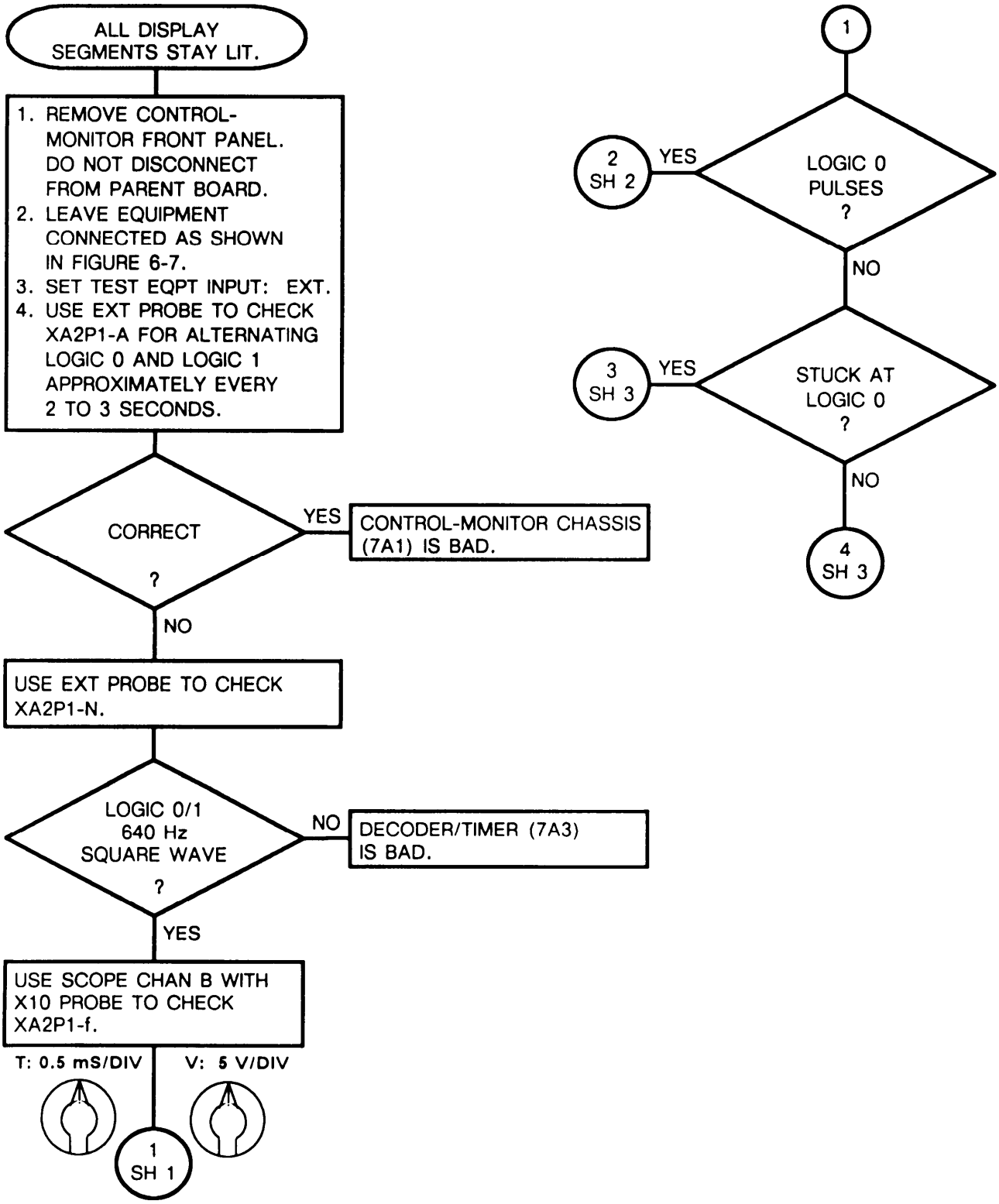
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Display Circuit
(Sheet 5 of 5)



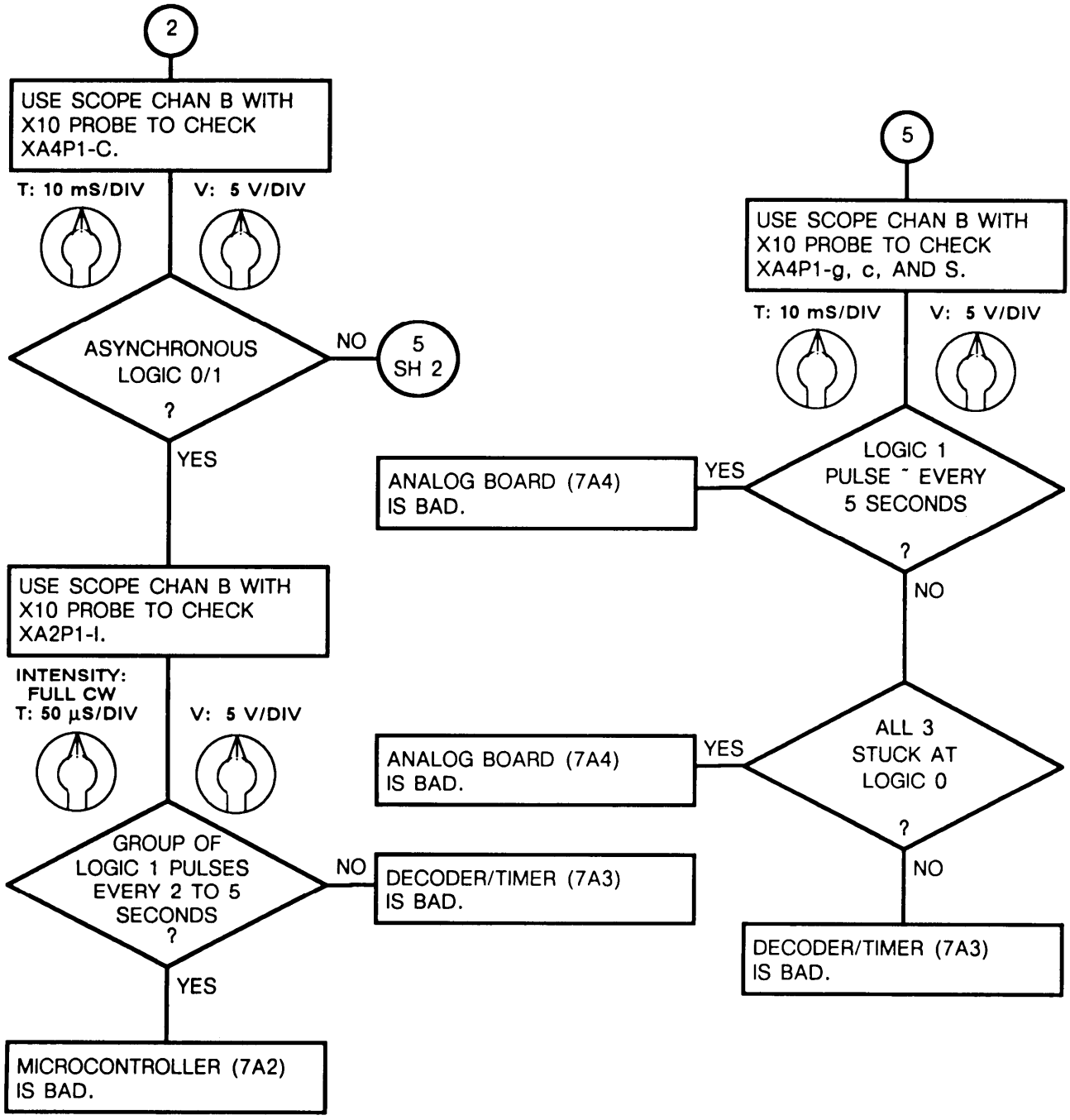
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Display Circuit
(Sheet 1 of 4)



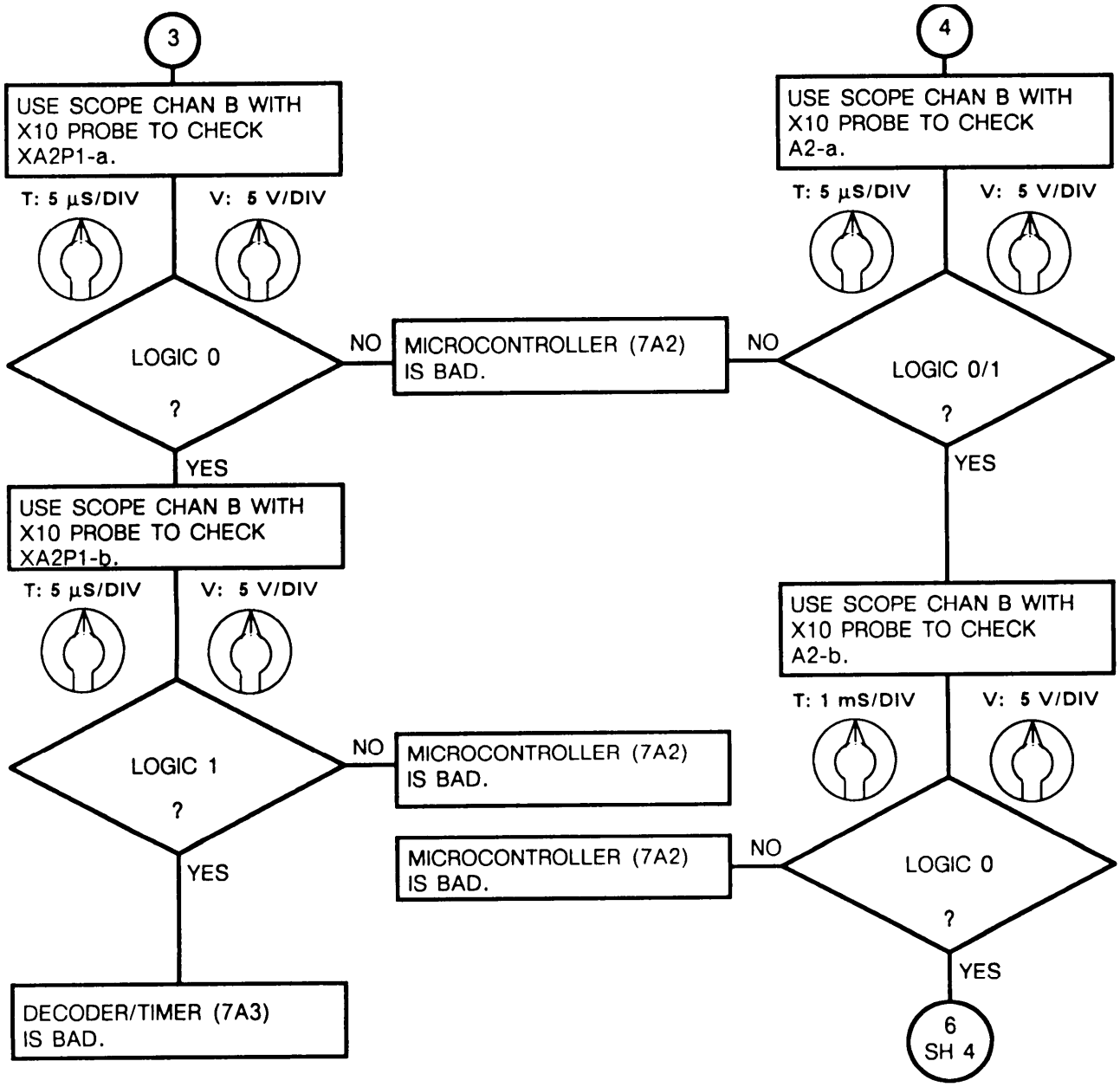
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Display Circuit
(Sheet 2 of 4)



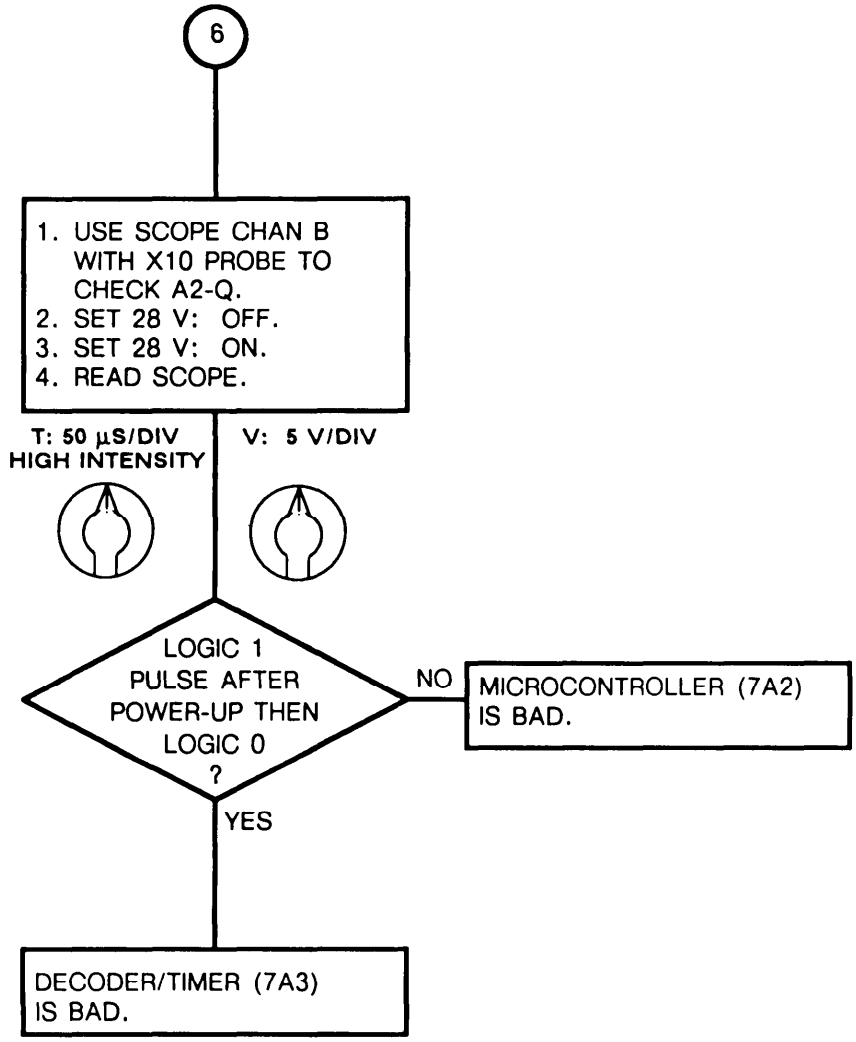
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Display Circuit
(Sheet 3 of 4)



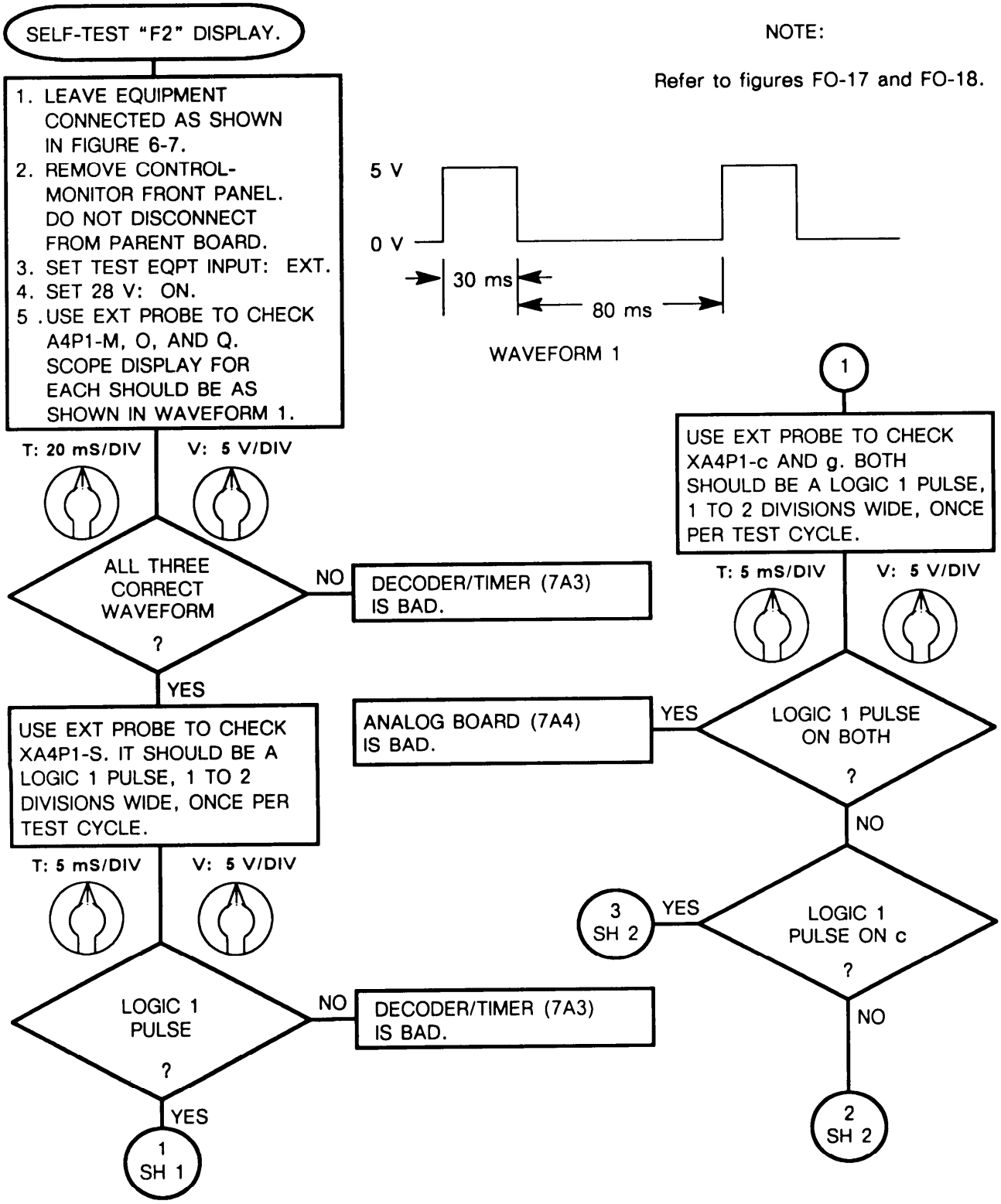
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Display Circuit
(Sheet 4 of 4)



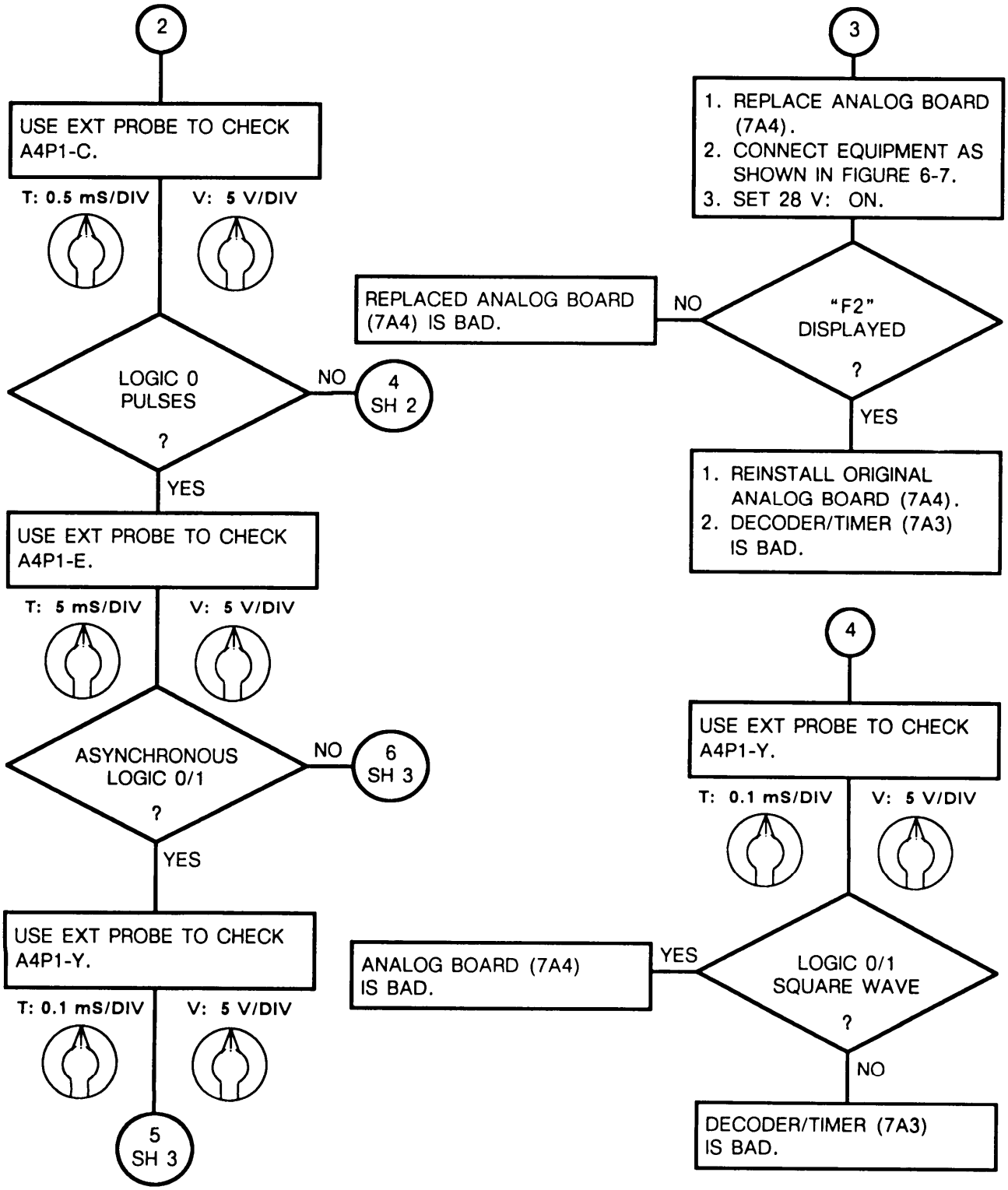
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting "F2" Display
(Sheet 1 of 3)



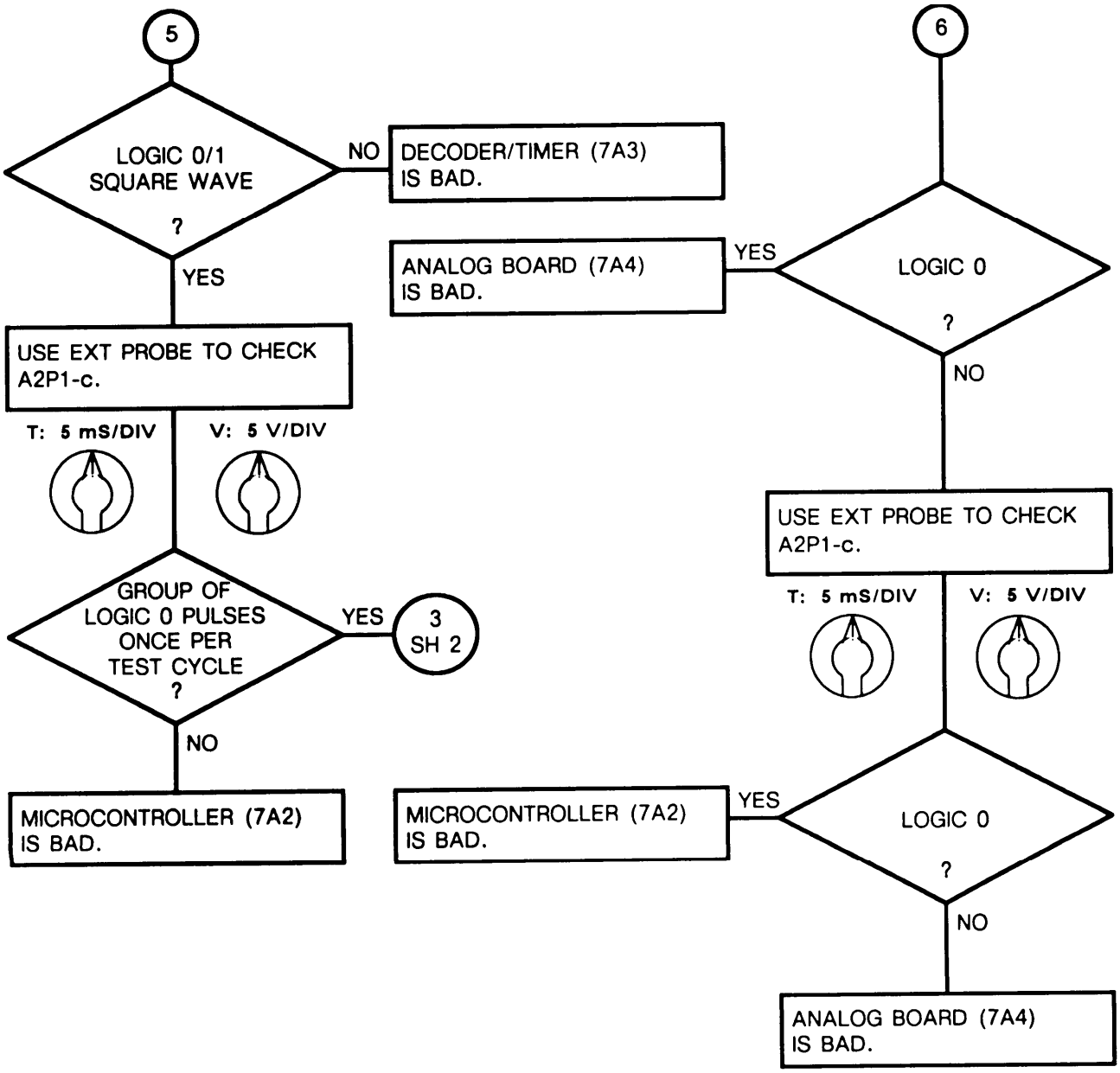
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting "F2" Display
(Sheet 2 of 3)



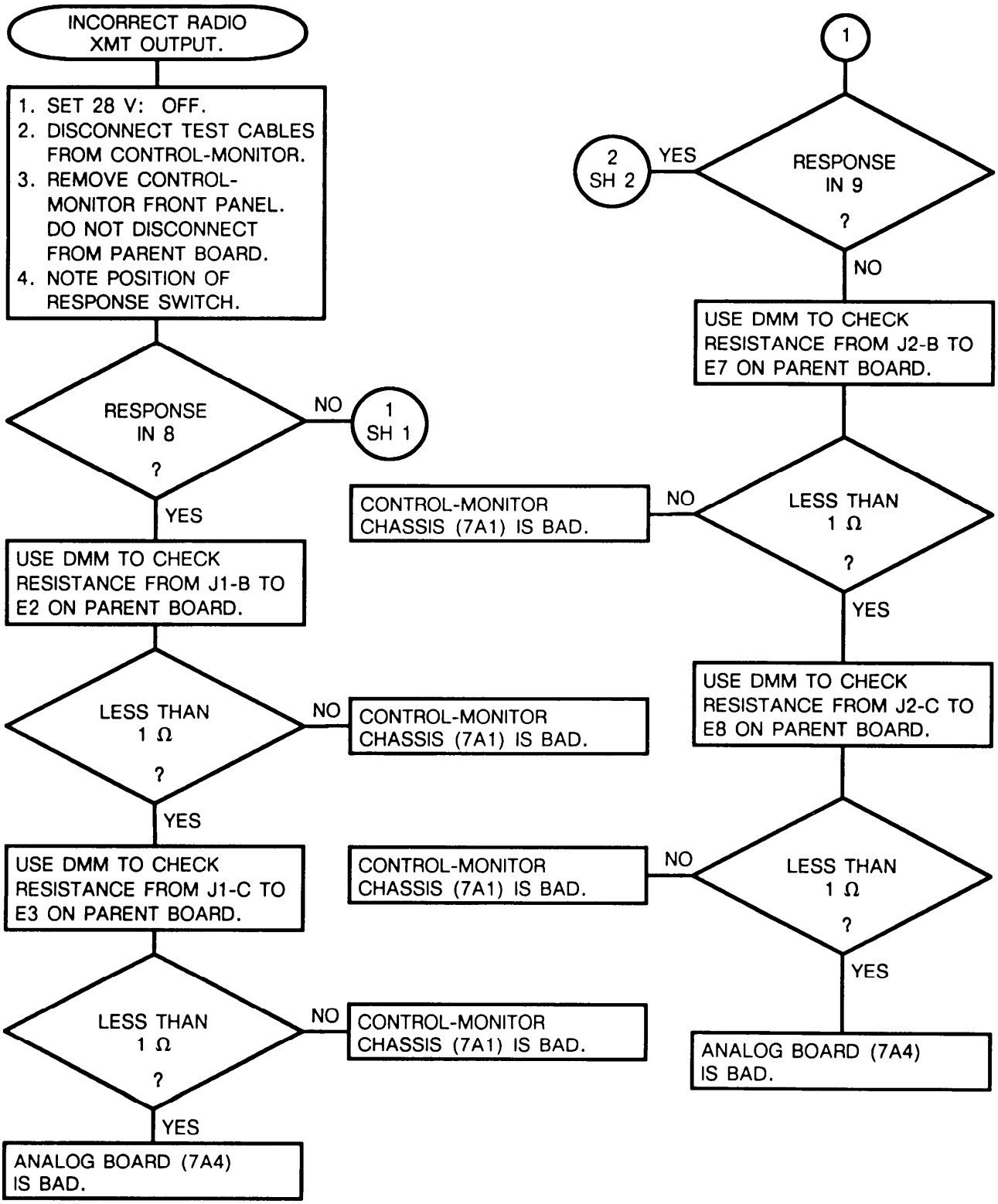
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting "F2" Display
(Sheet 3 of 3)



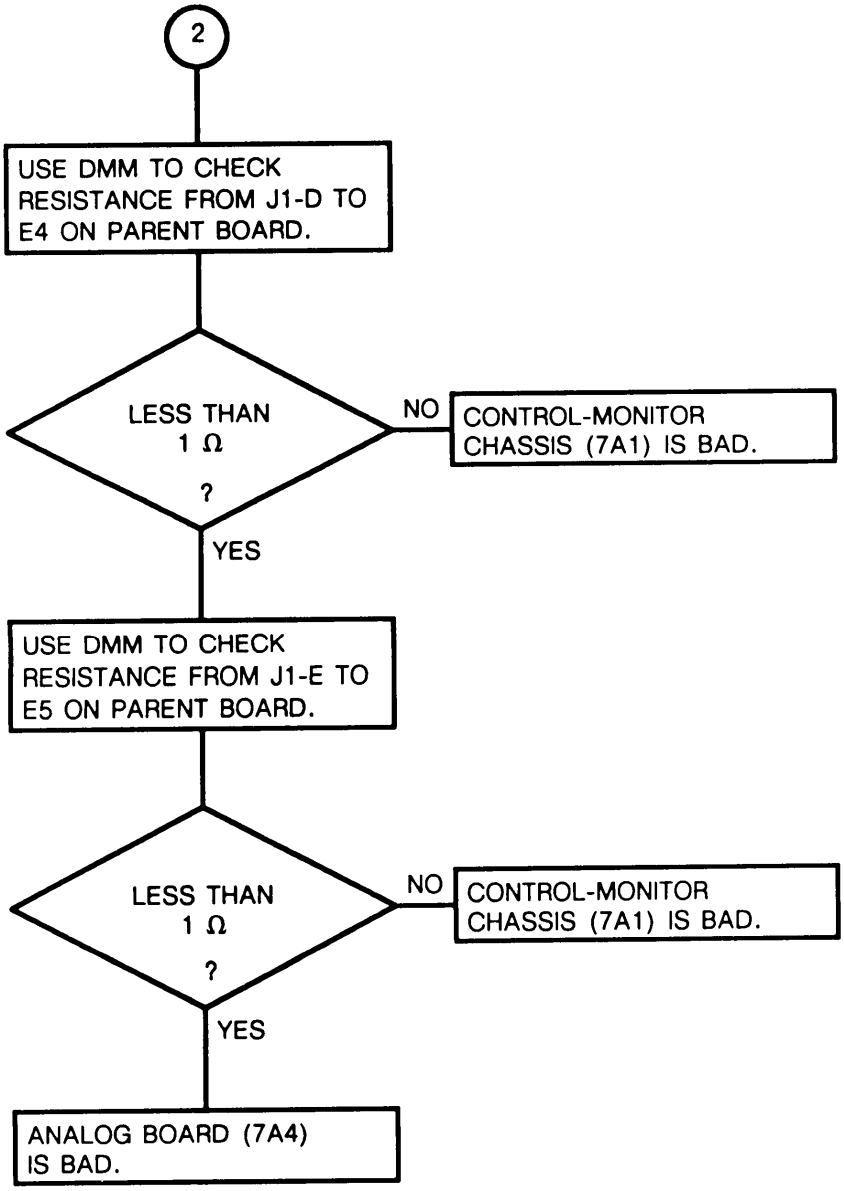
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Radio Transmit
(Sheet 1 of 2)



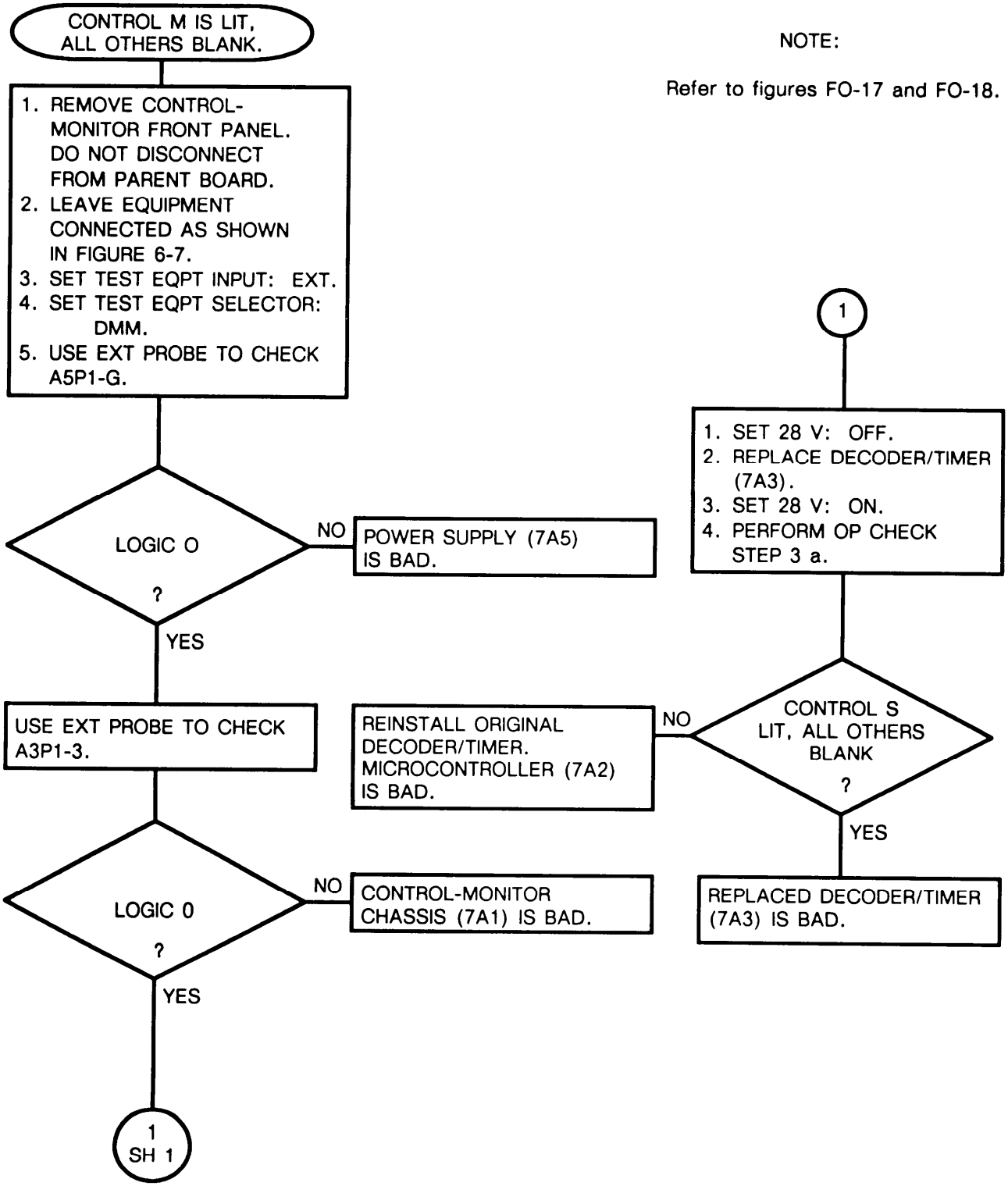
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Radio Transmit
(Sheet 2 of 2)



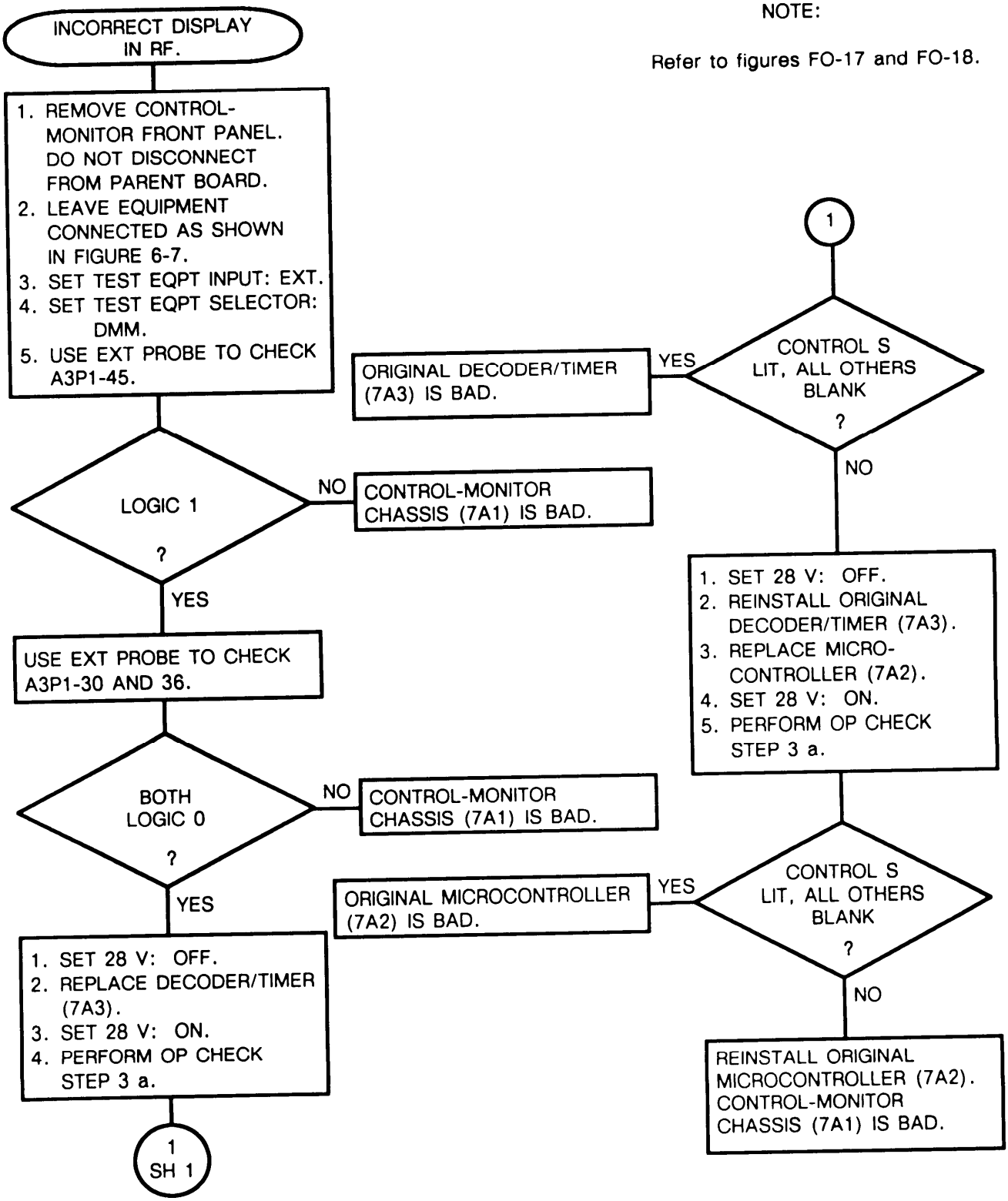
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Incorrect Display in RF (CONTROL M)
(Sheet 1 of 1)



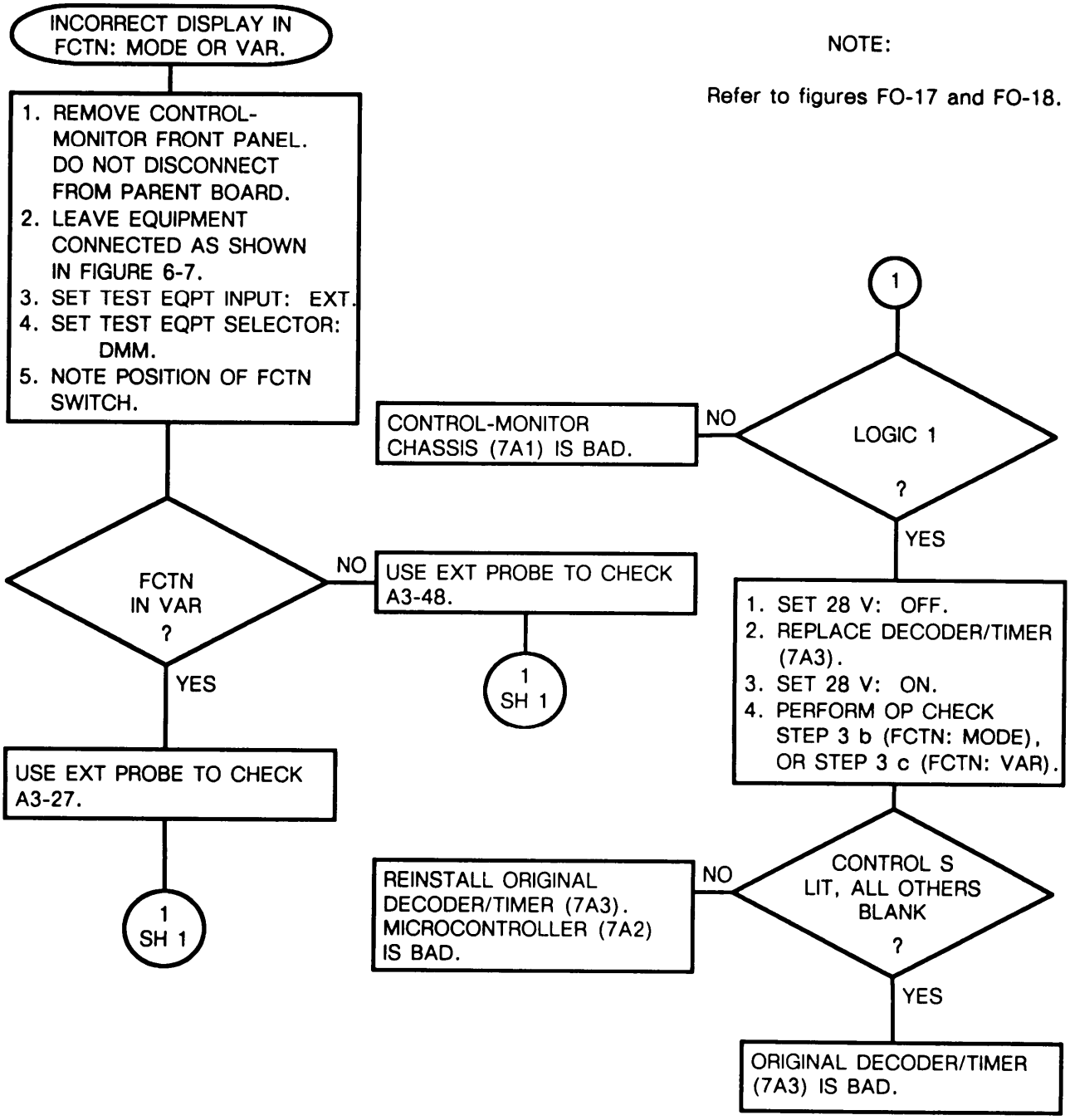
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Incorrect Display in RF (any other display)
(Sheet 1 of 1)



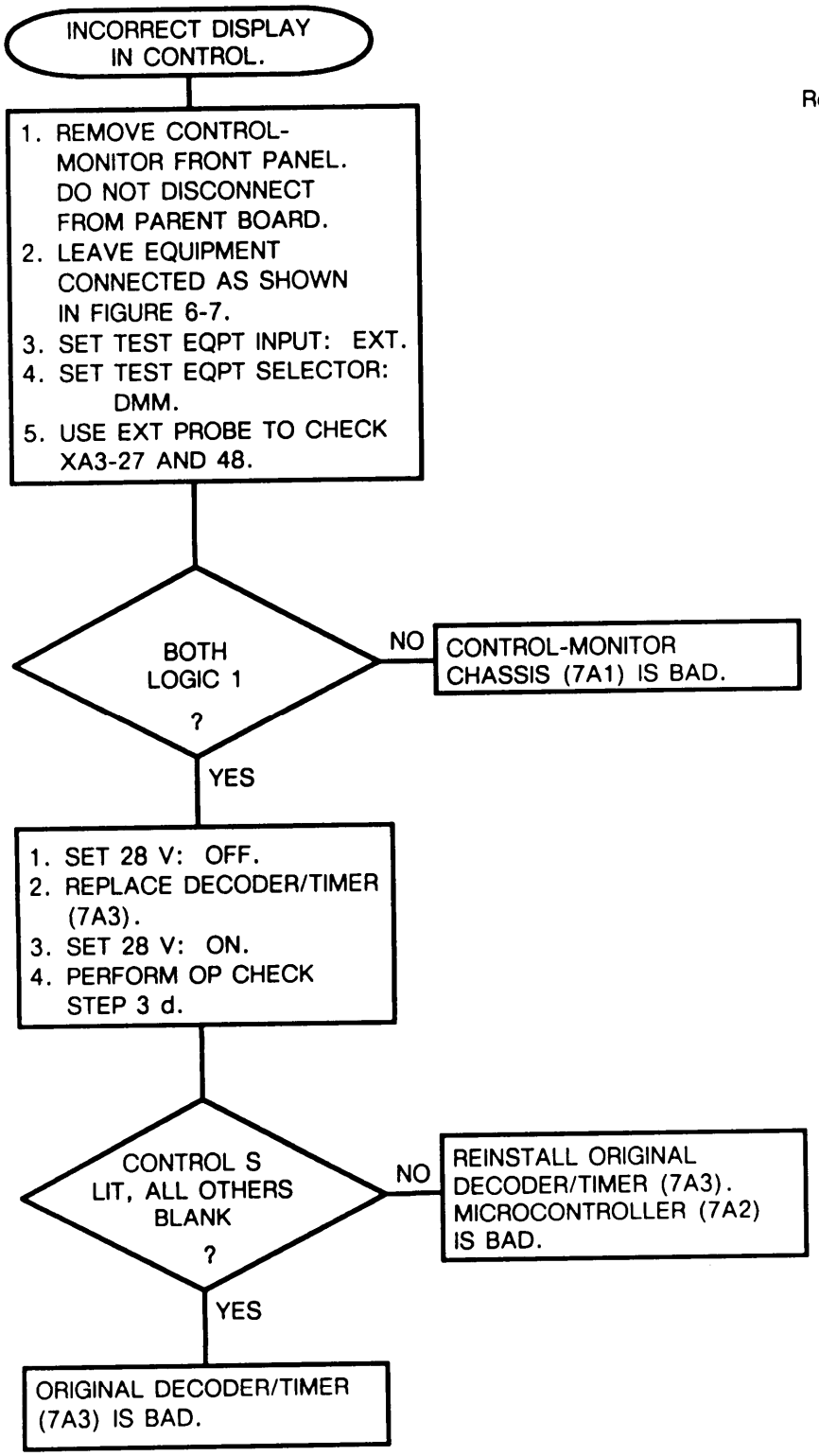
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting Incorrect Display in MODE or VAR
(Sheet 1 of 1)



6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting Incorrect Display in CONTROL
(Sheet 1 of 1)

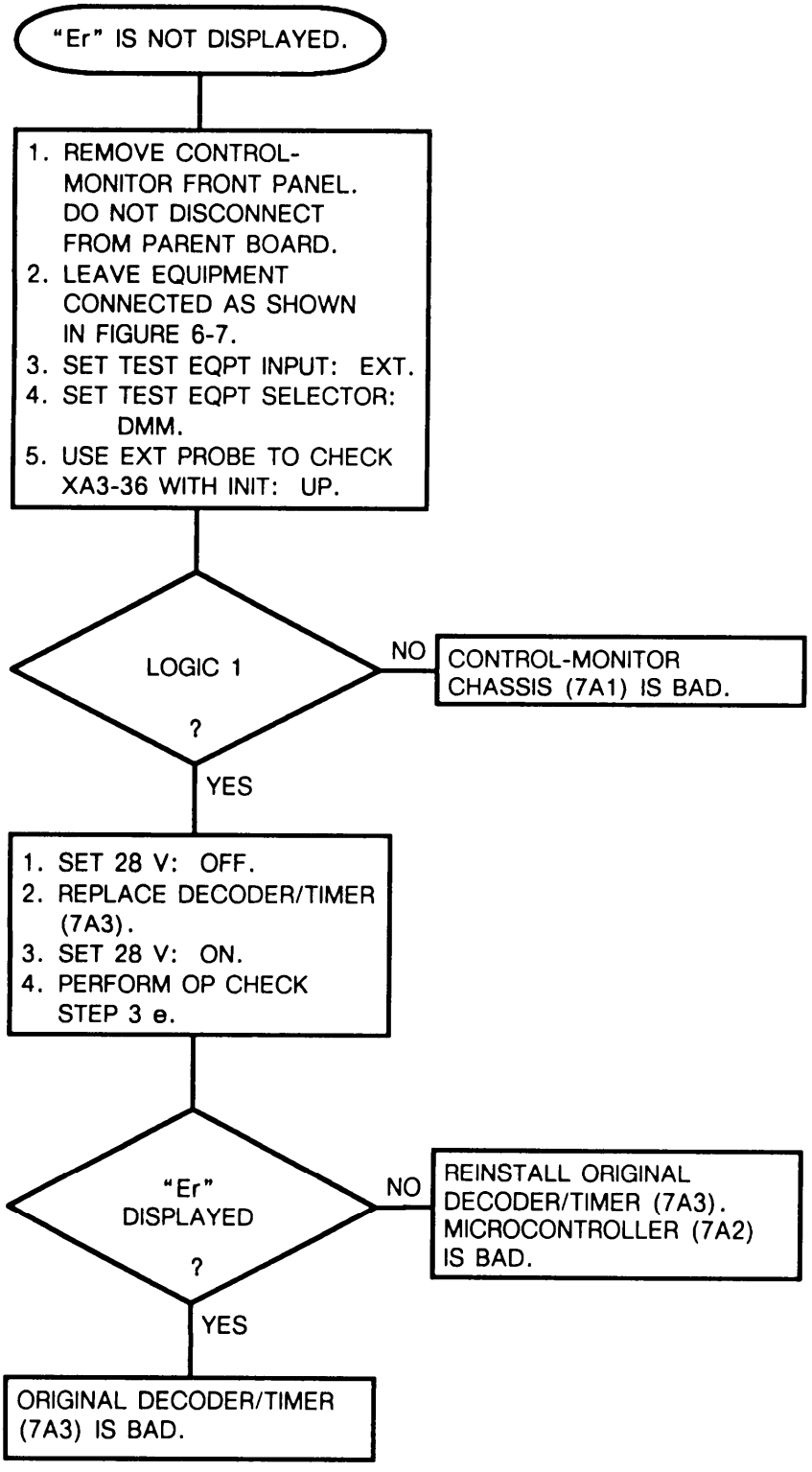


NOTE:

Refer to figures FO-17 and FO-18.

6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Incorrect Display After INIT Set to UP
(Sheet 1 of 1)

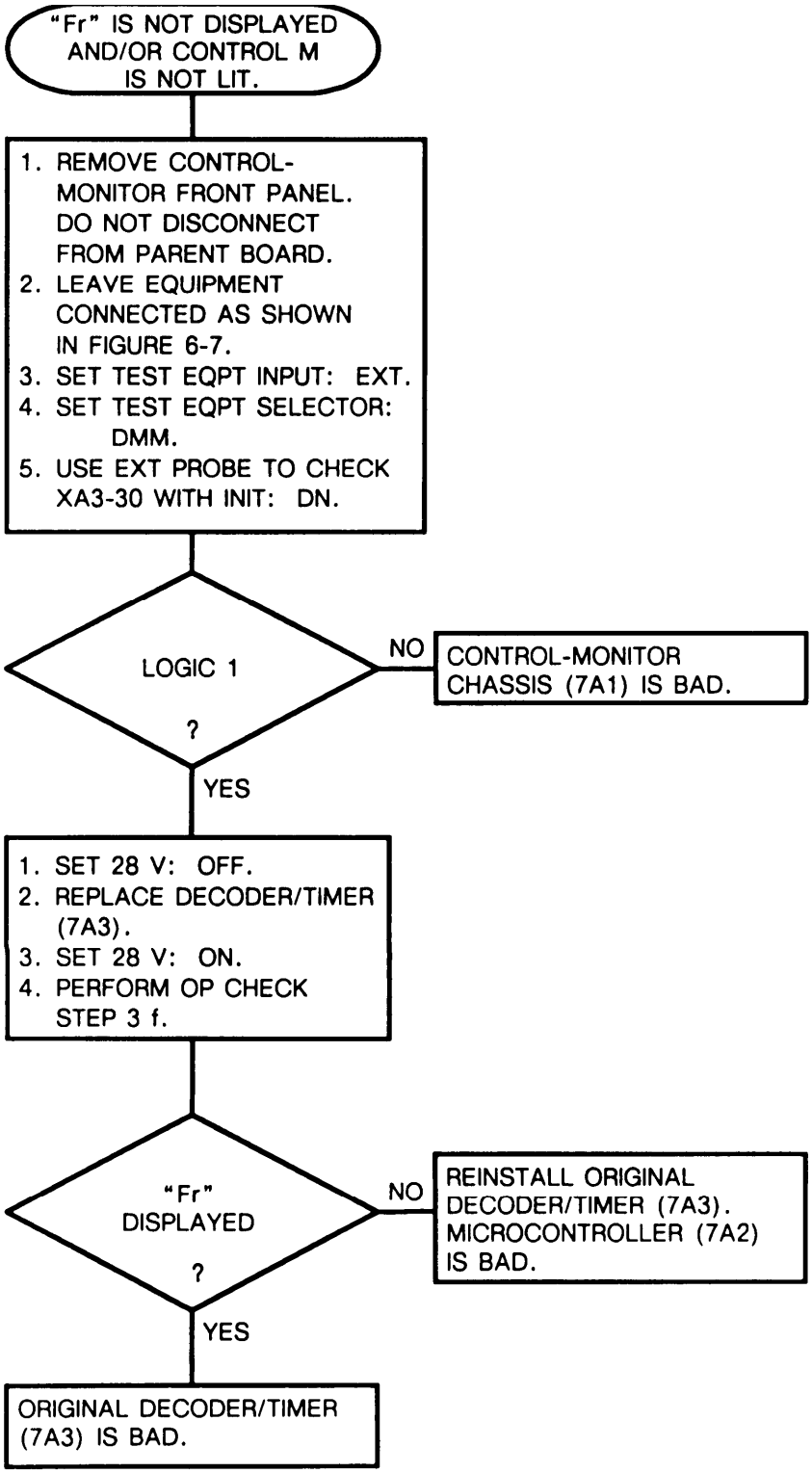


NOTE:

Refer to figures FO-17 and FO-18.

6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Incorrect Display After INIT Set to DN
(Sheet 1 of 1)

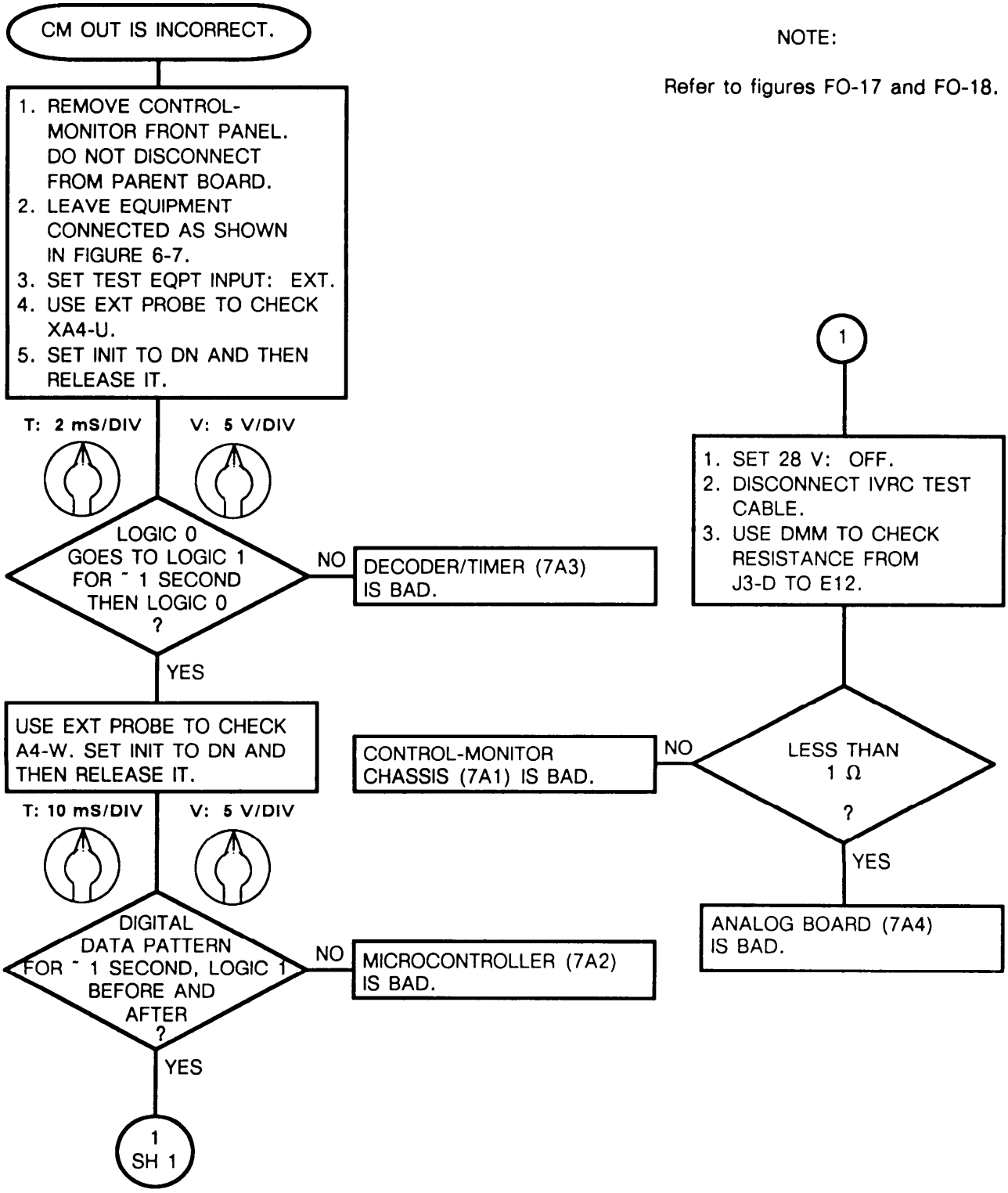


NOTE:

Refer to figures FO-17 and FO-18.

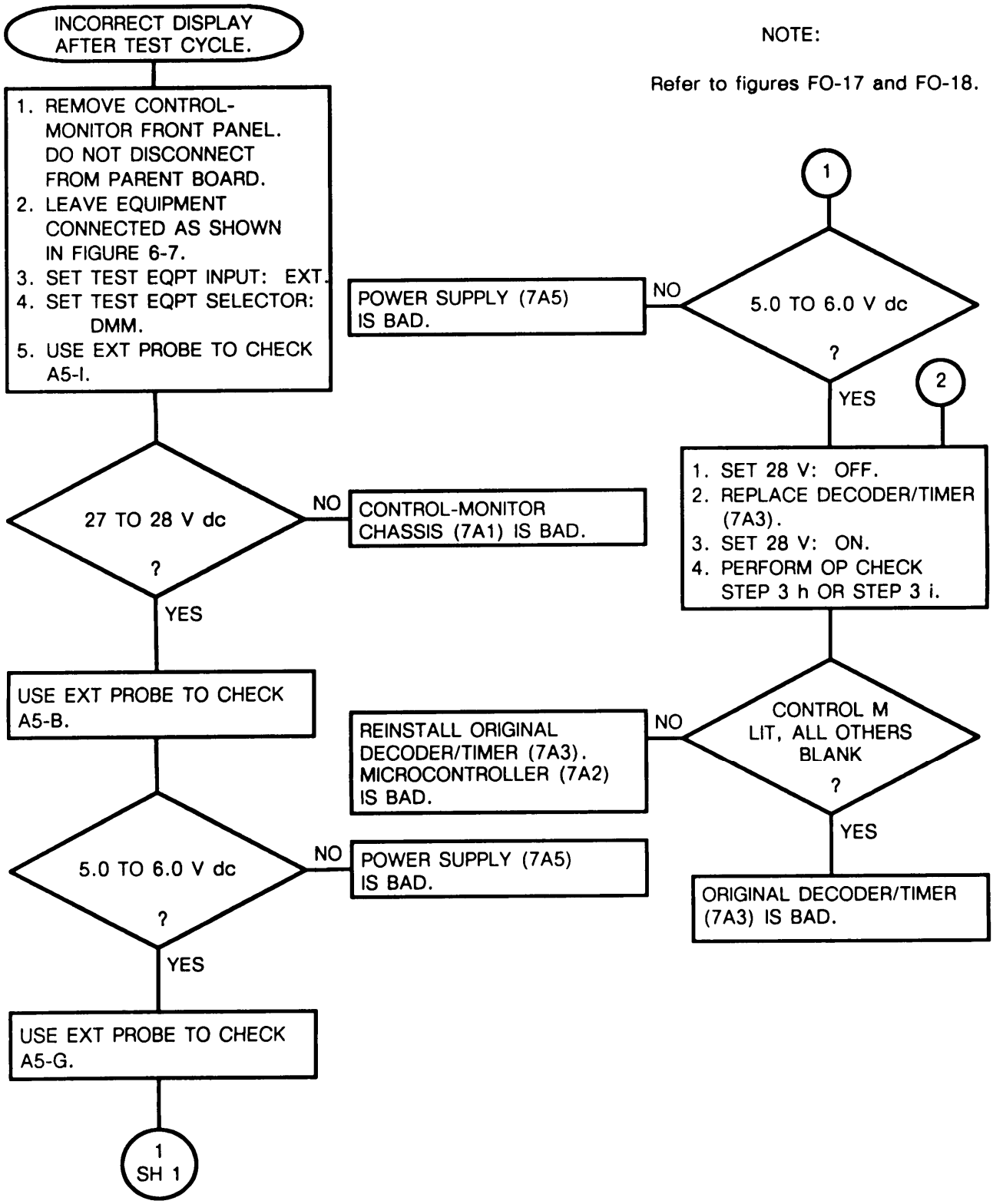
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 11
Troubleshooting Incorrect Control-Monitor Output
(Sheet 1 of 1)



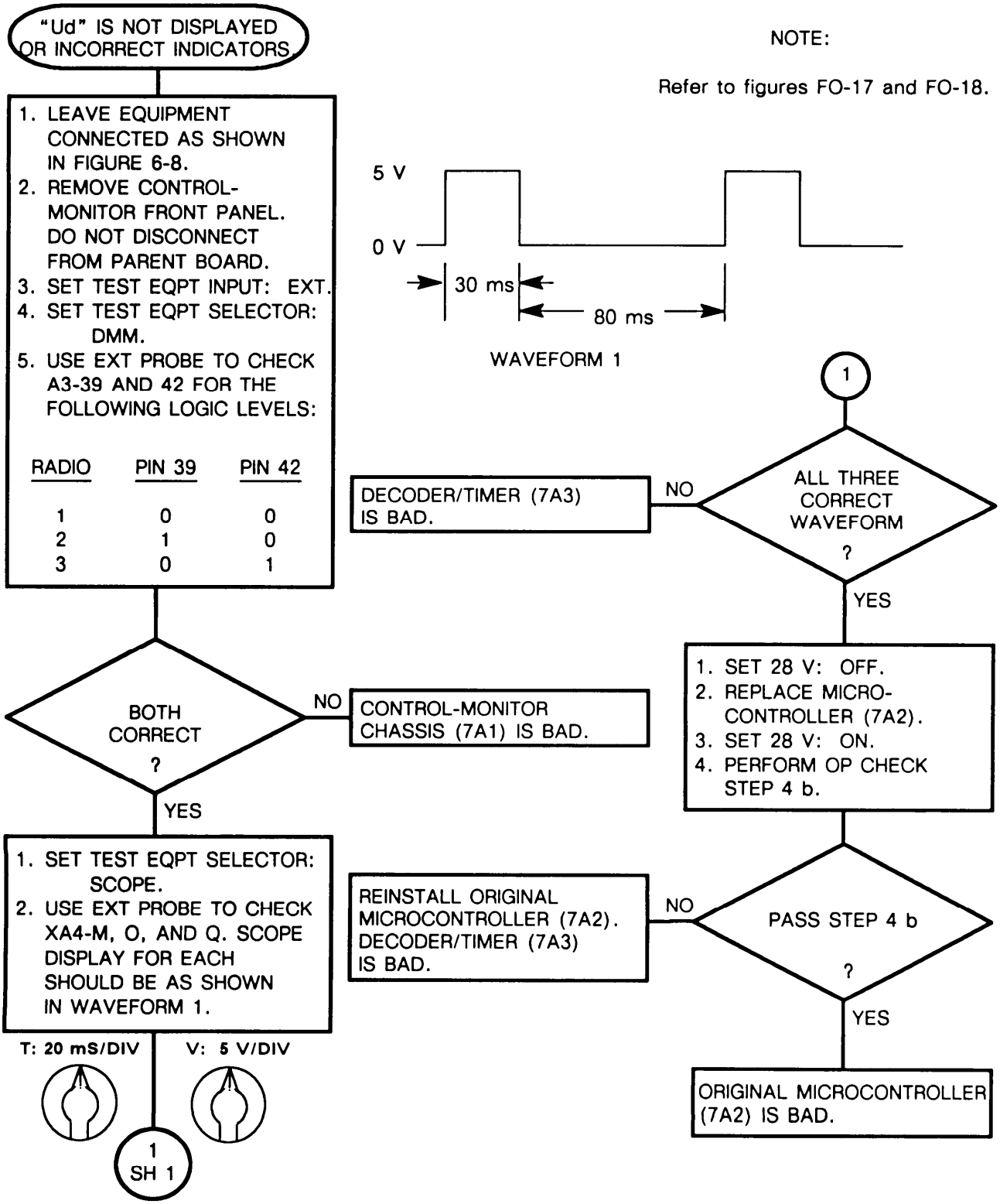
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 12
Troubleshooting Incorrect Test Cycle Display
(Sheet 1 of 1)



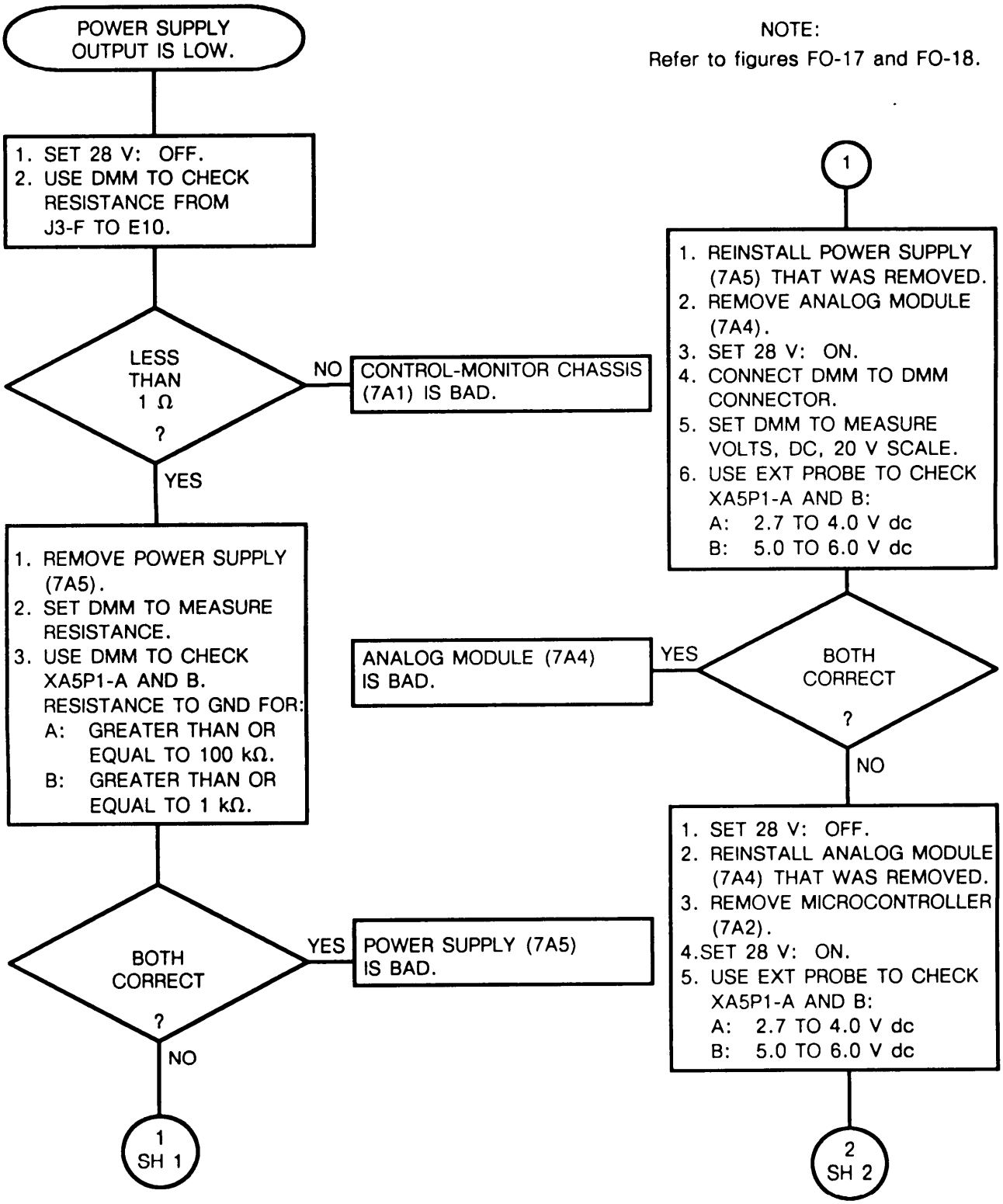
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting "Ud" Display
(Sheet 1 of 1)



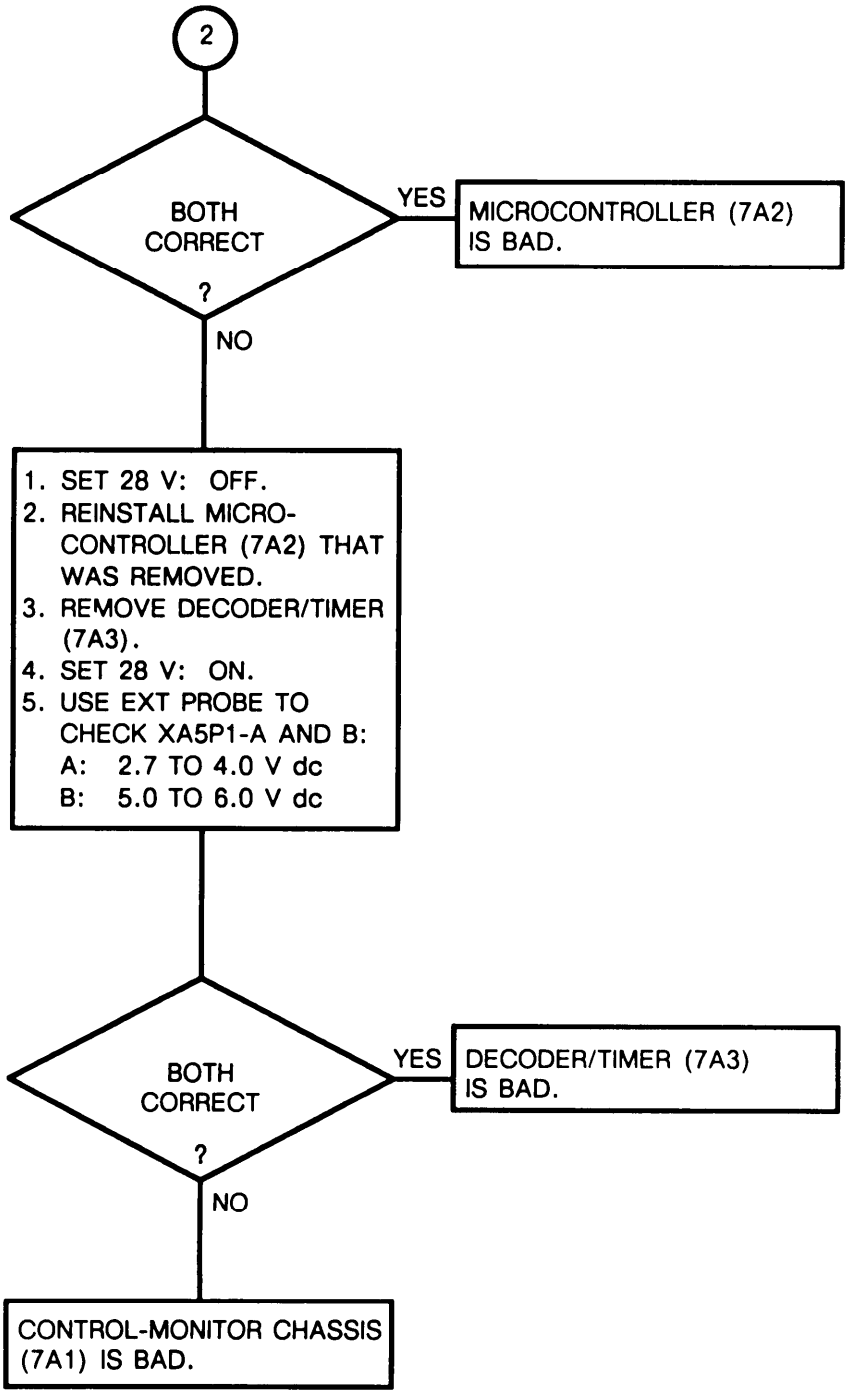
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 14
Troubleshooting Power Supply
(Sheet 1 of 2)



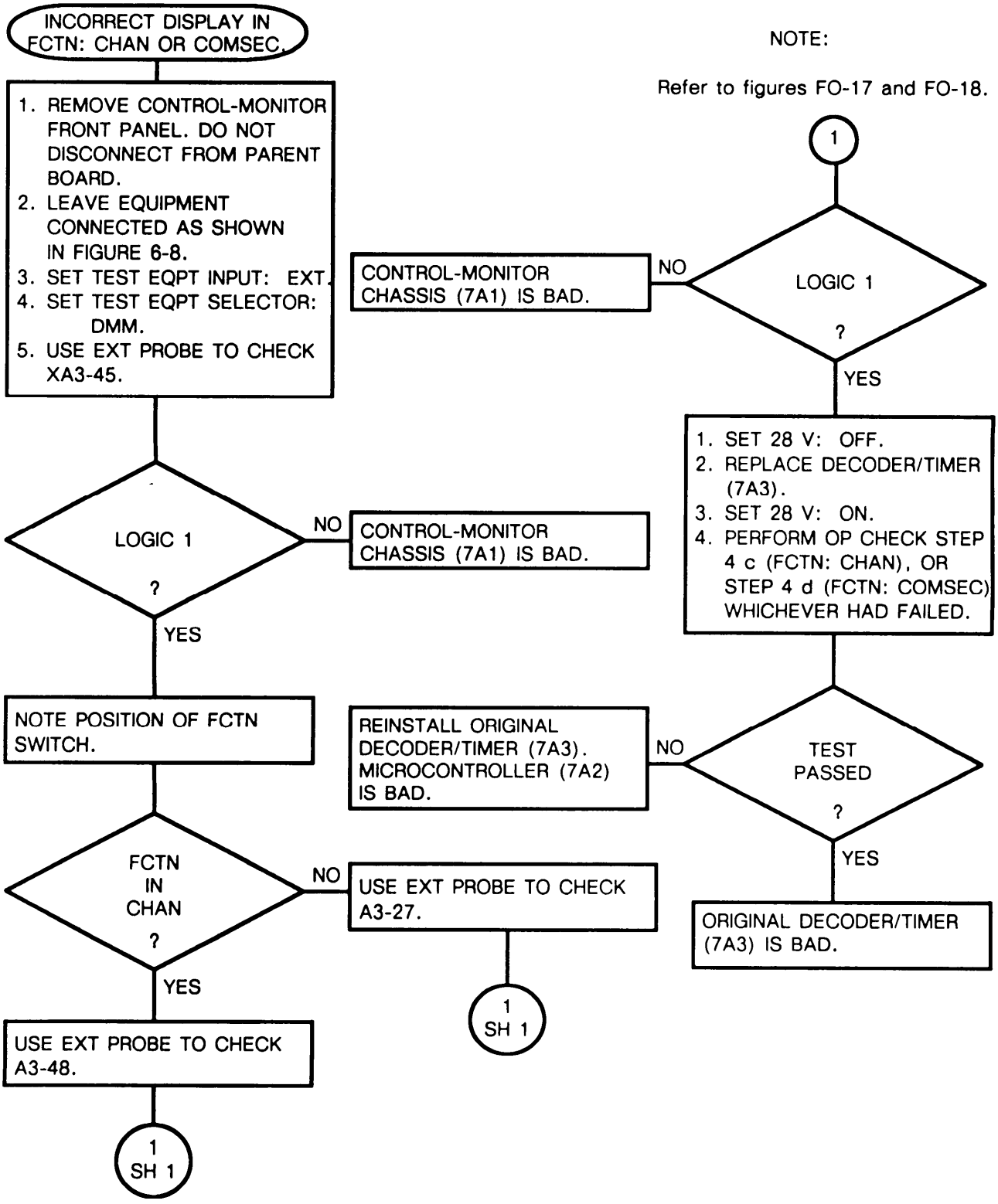
6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 14
Troubleshooting Power Supply
(Sheet 2 of 2)



6-17. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 15
Troubleshooting Incorrect Display in CHAN or
(Sheet 1 of 1)



Section IV. MAINTENANCE PROCEDURES

6-18. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired control-monitor. It is also used to verify the symptom of a faulty control-monitor. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

6-19. OPERATIONAL CHECK.

Perform the operational check found in paragraph 6-13 to verify the proper operation of the control-monitor.

6-20. REPAIR PROCEDURES.

Repair of the control-monitor consists of replacing a bad module. A module is replaced by removing it and installing a good one. Procedures for doing this follow:

a. General Instructions. The following instructions apply to all repair tasks.

1. Remove all cables connected to the control-monitor.
2. Inspect the control-monitor for damage. Repair any obvious physical damage.
3. Use the module extractor to remove the circuit card assemblies. It is included in the maintenance tool kit. It is used as follows:
   (a) Locate the module to be removed.
   (b) Hook the module extractor through the two holes in the top corners of the module.
   (c) Hold the module extractor with one hand. Rest the other hand on the control-monitor with the fingers of the hand on top of the module to be removed.
   (d) Pull steadily with the module extractor until the module connector is free of the parent board.
   (e) Remove the module.
   (f) Unhook the module extractor.
4. Handle all modules carefully.
5. Before installing a module, check the connectors or terminals for bent or broken pins. Do not install if damaged.
6. Complete the operational check.

6-20. REPAIR PROCEDURES. Continued

b. Repair Precautions.

CAUTION

Static electricity can damage the control-monitor modules. Ground the control-monitor before removing a module. Use a grounded wrist strap when handling a module.

CAUTION

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the control-monitor. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

6-21. DISASSEMBLY FOR TROUBLESHOOTING.

The control-monitor front panel is not replaced by Direct Support maintenance. However, to gain access to the parent board for testing, it is necessary to partially remove the front panel.

Tools:

Flat tip screwdriver

Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Control-monitor	Set on back cover.	
b. Six captive screws	Using flat tip screwdriver, fully loosen six captive screws.	
c. Front panel	Lift free from chassis. Do not disconnect front panel from parent board.	The control-monitor is ready for troubleshooting.
INSTALLATION		
d. Front panel	Set front panel in place on chassis.	
e. HCP Six captive screws	Tighten screws. Using torque screwdriver, torque to 14 to 16 in-lb.	

6-22. REPLACEMENT OF BACK COVER.

Tools:

Flat tip screwdriver
Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Control-monitor	Set on work surface with back cover toward you.	
b. Six captive screws	Using flat tip screwdriver, fully loosen six captive screws.	
c. Back cover	Lift free from control-monitor. If damaged, replace.	
INSTALLATION		
d. Back cover	Aline with screw holes in chassis. Set cover in place on control-monitor.	
e. HCP Six captive crews	Tighten screws. Using torque screwdriver, torque screws to 14 to 16 in-lb.	

6-23. REPLACEMENT OF CONTROL-MONITOR CHASSIS (7A1).

The control-monitor chassis (7A1) is replaced by removing each module from the faulty control-monitor and then installing the modules into a good chassis.

Tools:

Flat tip screwdriver
Module extractor
Torque screwdriver

References:

Paragraph 6-22 for removal and installation of back cover.
Paragraph 6-24 for removal and installation of modules.

ITEM	ACTION	REMARKS
REMOVAL		
a. Back cover	Remove and retain.	Refer to paragraph 6-22 for removal procedures.
b. Modules	Remove and retain each module from faulty control-monitor chassis.	Refer to paragraph 6-24 for removal procedures.
INSTALLATION		
c. Modules	Install in replacement control-monitor chassis.	Refer to paragraph 6-24 for installation procedures.
d. HCP Back cover	Install in replacement control-monitor chassis. Using torque screwdriver, torque screws to 14 to 16 in-lb.	Refer to paragraph 6-22 for installation procedures.

6-24. REPLACEMENT OF CONTROL-MONITOR

Tools:

Flat tip screwdriver
Module extractor
Torque screwdriver

References:

Paragraph 6-20 for use of module extractor.
Paragraph 6-22 for removal and installation of back cover.
Figure 6-9 for location of modules.

ITEM	ACTION	REMARKS
REMOVAL		
a. Back cover	Remove and retain.	Refer to paragraph 6-22 for removal procedures.
b. Module	Hook module extractor to module using two holes in top corners of circuit card.	Refer to paragraph 6-20 for use of module extractor and figure 6-9 for location of modules
c. Module	Pull free of control-monitor chassis.	
INSTALLATION		
d. Module	Place module in card guides.	
e. Module	Press down to fully seat circuit card.	
f. HCP Back cover	Install on control-monitor chassis.	Refer to paragraph 6-22 for installation procedures.

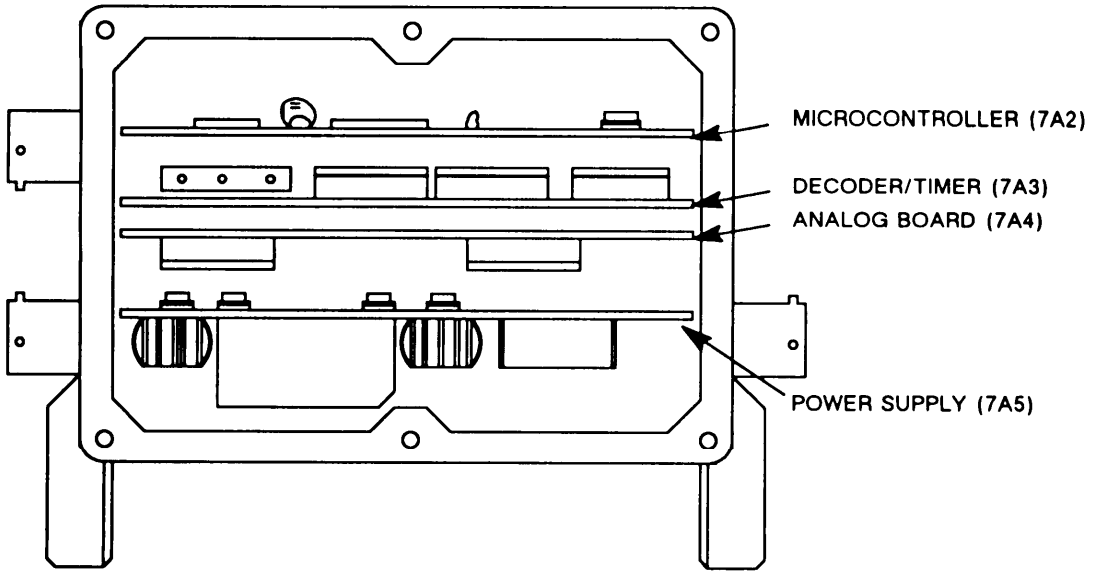


Figure 6-9. Control-Monitor Module Locations.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

6-25. GENERAL INFORMATION.

a. Pack the control-monitor and modules in approved shipping containers.

b. All modules must be shipped enclosed in material that provides protection from static electricity. See the following paragraph.

6-26. PACKING STATIC SENSITIVE MODULES.

The following steps should be followed when packing a static sensitive module for storage or shipment.

CAUTION

To avoid damaging static sensitive modules, use an antistatic pad on the work surface and wear a grounded wrist strap when handling the module.

ITEM	ACTION	REMARKS
a. Module (1)	Place inside antistatic bag (2) or inside antistatic wrapping material (3). See figure 6-10.	
b. Antistatic package (4)	Seal with adhesive tape. Attach “static sensitive contents” unit pack label (5).	
c. Antistatic package (4)	Place inside approved shipping container (6). Attach “static sensitive contents” intermediate pack label (7).	

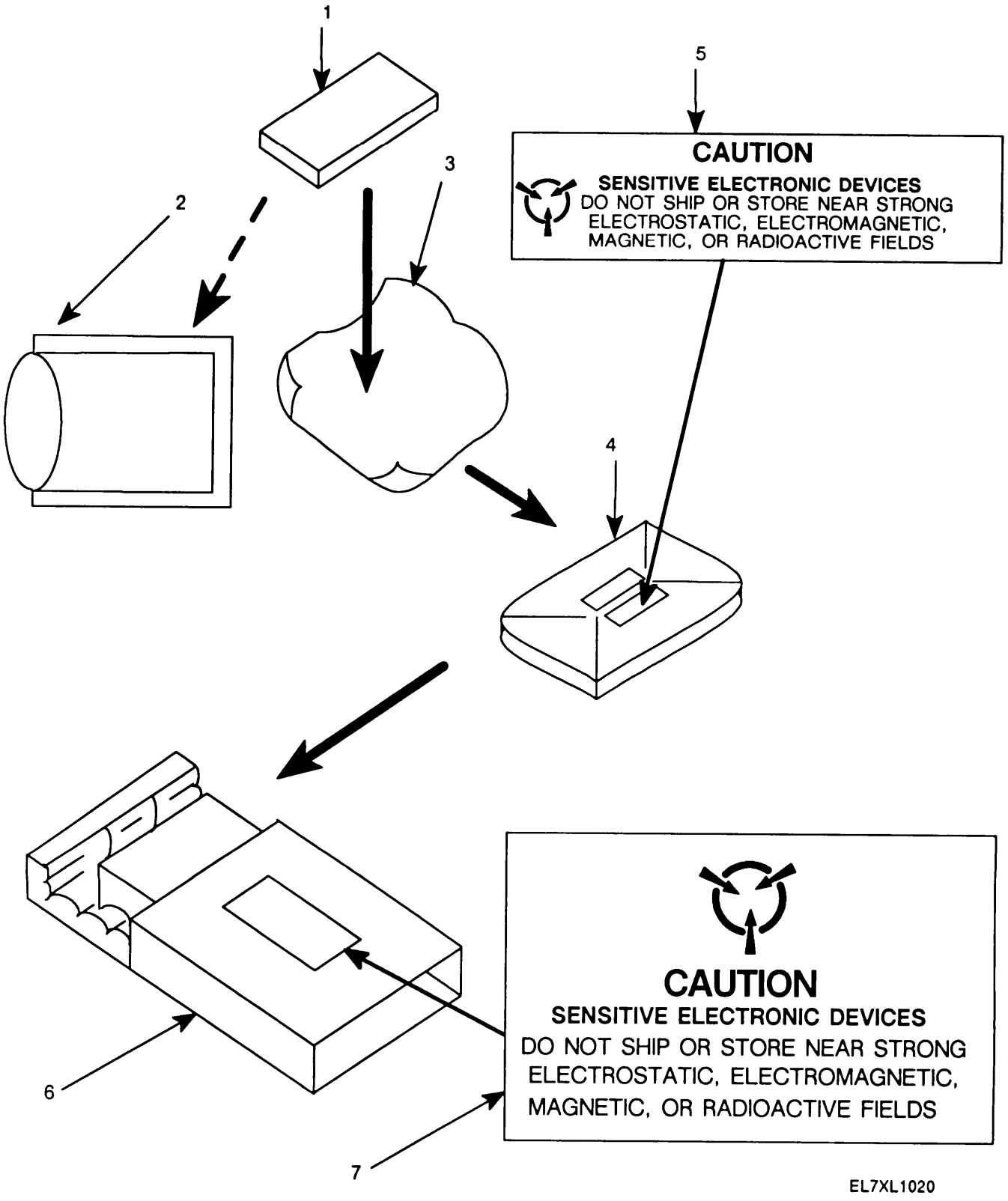


Figure 6-10. Packing Static Sensitive Modules.

CHAPTER 7

MOUNTING BASE, ELECTRICAL EQUIPMENT MT-6352/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

7-1. INTRODUCTION.

The mounting base performs the following functions:

Physically supports the mounting adapter.

Electrically connects mounting adapter to vehicular power and intercom.

Distribution of vehicular dc power.

7-2. ELECTRICAL CONNECTOR ASSEMBLY (13A1).

The electrical connector assembly has five connectors as shown in figure 7-1. The operating voltage (22 to 32V dc) from the vehicle's electrical system is connected to the power-in connector (J1). A second mounting base or other equipment is connected to the power-out connector (J2). The vehicle intercom or LS-671/VRC loudspeaker is connected to connector J3 or J4. The system connector (J5) mates with the system connector (PI) on the amplifier adapter. See chapter 4.

The electrical connector assembly has no active circuitry. The dc input power is filtered by either filters FL1 and FL2, or for newer versions the FILTER EMI-CCA. All connections are as shown in figure 7-1.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

7-3. COMMON TOOLS AND EQUIPMENT.

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

7-4. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

7-5. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

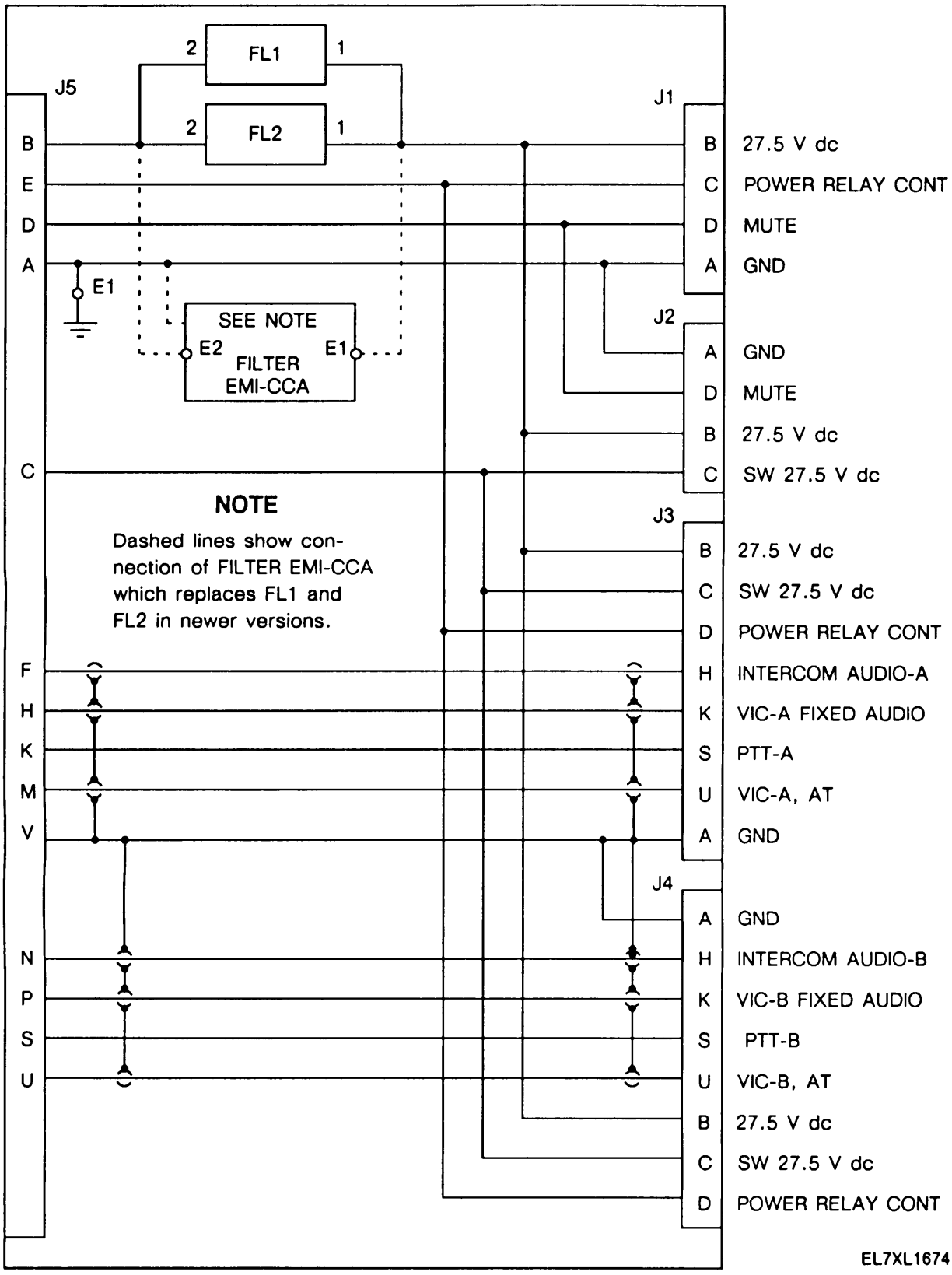


Figure 7-1. Electrical Connector Assembly Schematic Diagram.

Section III. TROUBLESHOOTING PROCEDURES

7-6. TROUBLESHOOTING.

When an electrical connector assembly is received from unit maintenance, inspect it for damage. The visual inspection procedures are in paragraph 7-7. Repair any damage following the instructions in section IV. If the electrical connector assembly has an electrical problem, use the DMM and figure 7-1 to verify the fault. If there is a short or open circuit in the electrical connector assembly, repair it. Follow the instructions in section IV. Use the DMM and figure 7-1 to verify the repair of the electrical connector assembly.

7-7. VISUAL INSPECTION PROCEDURES.

Before beginning any maintenance procedure, inspect the electrical connector assembly for physical damage. Use the following table as a guide to inspect the electrical connector assembly. Look for damaged or missing parts, and replace them as required. Figure 7-2 shows the piece parts that are removable and replaceable at direct support maintenance.

ITEM	ACTION	REMARKS
a. Access cover (1)	Inspect for chips, cracks, or scratches in paint. Check for damage. See figure 7-2.	If defective, refer to TB-43-0118. For repair procedure, refer to paragraph 7-9.
b. Connector case (12)	Inspect for chips, cracks, or scratches in paint. Check for damage. See figure 7-2.	If defective, refer to TB-43-0118. For repair procedure, refer to paragraph 7-10.
c. J1 (7), J2 (10), J3 (8), or J4 (9) connector	Check for damaged or missing piece parts. See figure 7-2.	For repair procedure, refer to paragraph 7-11.
d. J5 connector (16)	Check for damaged or missing piece parts. See figure 7-2.	For repair procedure, refer to paragraph 7-12.

7-7. VISUAL INSPECTION PROCEDURES. Continued

NOTE 1

Older versions may have metal protective caps on connectors J1, J2, J3, and J4.

NOTE 2

The filter mounting plate (22), filter FL1 (20), and filter FL2 (21) are replaced with a FILTER EMI-CCA for newer versions of the connector assembly.

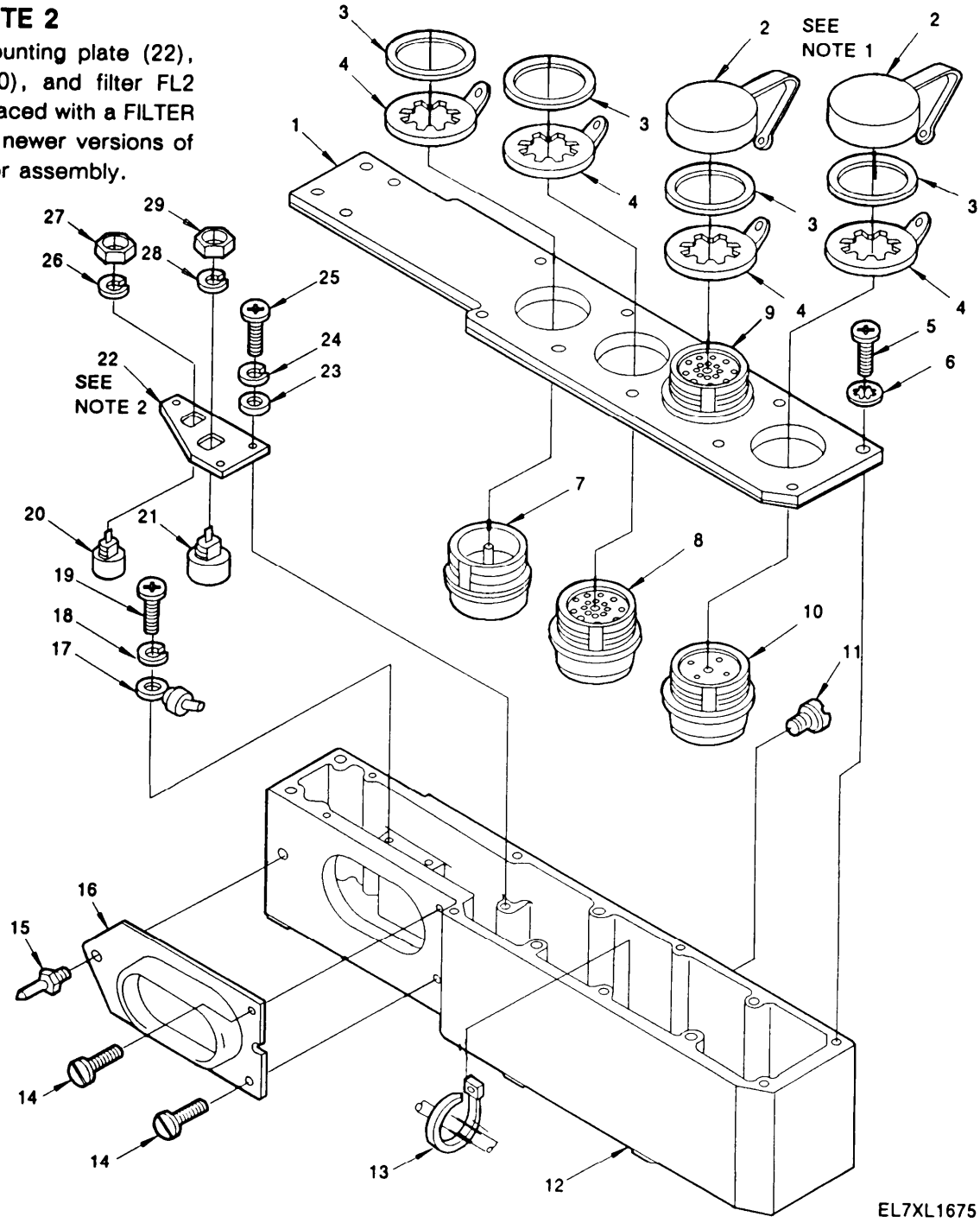


Figure 7-2. Electrical Connector Assembly (Exploded View).

Section IV. MAINTENANCE PROCEDURES

7-8. INTRODUCTION.

Maintenance of the electrical connector assembly consists of replacing defective parts using the procedures in this section. The electrical connector assemblyman be removed by unit maintenance. Check it as described in section Ill. Inspect all of the parts and replace any that are defective. The repair procedures are in paragraphs 7-9 through 7-17.

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the mounting base. Seals must not be damaged. All screws must be torqued to the limits specified in the procedures.

7-9. REPLACEMENT OF ACCESS COVER.

Tools:

Cross tip screwdriver
Torque screwdriver
Torque wrench
1-1/4-inch spanner wrench attachment
Spanner wrench

Expendable supplies:

Silicone compound

References:

Paragraph 7-10 for removal and installation of connector case.
Paragraph 7-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. See figure 7-2.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective, If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.

7-9. REPLACEMENT OF ACCESS COVER. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. Two protective caps (2)	Remove and inspect two protective caps (2) from J4 and J2 connectors (9) and (10). If damaged, obtain replacement.	**NOTE** If you are working on a version with metal caps, then skip this step.
c. Four spanner nuts (3)	Use spanner wrench with 1-1/4-inch spanner wrench attachment. Remove and inspect four spanner nuts (3) from J1 through J4 connectors (7) through (10). If damaged, obtain replacement.	
d. Four electrical connector retainers (4)	Remove and inspect four electrical connector retainers from four connectors. If damaged, obtain replacement.	**NOTE** If you are working on a version with metal caps, then replace all four connector retainers.
e. Access cover (1)	Remove and discard defective access cover (1).	
INSTALLATION		
f. Access cover (1)	Obtain replacement access cover (1).	
g. Four o-rings	Coat o-rings of four connectors (7) through (10) with silicone compound.	
h. J1 through J4 connectors (7) through (10)	Install four connectors in four connector holes in access cover (1).	
i. Four electrical connector retainers (4)	Install four electrical connector retainers (4) on four connectors.	
j. HCP Four spanner nuts (3)	Use spanner wrench, Install and hand tighten four spanner nuts (3) securing four connectors to access cover (1). Use torque wrench and 1-1/4-inch spanner wrench attachment. Torque nuts to 100 in-lb.	
k. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover(1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 7-10 for replacement of the connector case (12).
l. Two protective caps (2)	Install two protective caps (2) on J4 and J2 connectors (9) and (10).	

7-10. REPLACEMENT OF CONNECTOR CASE.

Tools:

Cross tip screwdriver	Adjustable wrench
Flat tip screwdriver	Soldering kit

Expendable supplies:

Silicone compound	Cotton swabs
Sealing compound, grade H	Alcohol
	Solder

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 7-2.	
b. Two screws (14) (four screws for older versions)	Use flat tip (or cross tip) screwdriver. Remove and inspect two (or four) screws (14) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	
c. Guide pin (15)	Use adjustable wrench. Remove and inspect guide pin (15) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	
d. J5 connector (16)	Gently pull out top of J5 connector (16).	If necessary, remove tiedown strap (13).
e. J5 connector (16) wires	Record location of wires soldered to terminals of J5 connector (16).	
	Use soldering kit. Desolder each wire connected to J5 connector (16).	**NOTE** Place heat sink on bare part of wire just above area to be resoldered.
f. J5 connector (16)	Remove J5 connector (16) from connector case (12), and inspect it for damage. If damaged, obtain replacement.	

7-10. REPLACEMENT OF CONNECTOR CASE. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
g. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Remove and inspect screw (19) and lockwasher (18) securing E1 terminal lug (17) next to filter mounting plate (22). If damaged, obtain replacement. See note.	**NOTE** For versions with a FILTER EMI-CCA this terminal lug is screwed to the CCA and connector case.
h. Three (or two) screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Remove and inspect three (or two) screws (25), flat washers (24), and lockwashers (23) securing filter mounting plate (22) or FILTER EMI-CCA to connector case (12). If damaged, obtain replacement.	**NOTE** For versions with a FILTER EMI-CCA there will be hardware for only two holes after removal of ground lug in step g.
i. Filter mounting plate (22) or FILTER EMI-CCA, and wiring harness	Remove filter mounting plate (22) or FILTER EMI-CCA, and wiring harness from connector case (12). If damaged, obtain replacement.	
j. Seal screw (11)	Use flat tip screwdriver. Remove seal screw (11) from connector case (12), and inspect it. If damaged, obtain replacement.	
k. Connector case (12)	Discard defective connector case (12).	
INSTALLATION		
l. Connector case (12)	Obtain replacement connector case (12).	
m. Seal screw (11)	Use flat tip screwdriver. Install and hand tighten seal screw (11) in connector case (12).	
n. Filter mounting plate (22) or FILTER EMI-CCA, and wiring harness	Place filter mounting plate (22) or FILTER EMI-CCA, and wiring harness in connector case (12).	
o. Three (or two) screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Install and hand tighten three or two screws (25), flat washers (24), and lockwashers (23).	**NOTE** For versions with a FILTER EMI-CCA two sets of hardware are installed on the side of the CCA that contains two holes.

7-10. REPLACEMENT OF CONNECTOR CASE. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
p. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Install and hand tighten screw (19) and lockwasher (18) securing E1 terminal lug (17) next to filter mounting plate (22) or on remaining hole of FILTER EMI-CCA.	
q. J5 connector (16)	Position J5 connector (16) next to mounting hole in connector case (12).	
r. J5 connector (16) wires	Use soldering kit. Solder wires to correct terminals of connector.	**NOTE** Ensure each wire is placed through mounting hole in connector case (12). Before and after soldering clean wires and terminals with cotton swabs and alcohol.
s. Tiedown strap (13)	Replace tiedown strap (13) if removed.	
t. Neoprene gasket	Coat the neoprene gasket of J5 connector (16) with silicone compound, and place the connector in mounting hole of connector case (12).	
u. Two screws (14) (four screws for older versions) and guide pin (15)	Use flat tip (or cross tip) screwdriver and adjustable wrench. Install and hand tighten two (or four) screws (14) and guide pin (15) securing J5 connector (16) to connector case (12).	
v. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	

7-11. REPLACEMENT OF J1 , J2, J3, OR J4 CONNECTOR.

Tools:

Cross tip screwdriver
Torque screwdriver
Cross tip bit
Spanner wrench
1-1/4-inch spanner wrench attachment
Soldering kit
Torque wrench

Expendable supplies:

Silicone compound
Cotton swabs
Alcohol
Solder

References:

Paragraph 7-10 for removal and installation of connector case.
Paragraph 7-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 7-2.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. Tiedown straps (13)	Remove any tiedown straps that are in the way.	
c. J1 (7), J2 (10), J3 (8), or J4 (9) connector wires	Record location of wires soldered to terminals of connector.	
	Use soldering kit. Desolder each wire connected to connector. Inspect insulation sleeving as required. If damaged, obtain replacement.	**NOTE** Place heat sink on bare part of wire just above area to be resoldered.
d. Connector	Remove and discard defective connector.	
INSTALLATION		
e. J1 (7), J2 (10), J3 (8), or J4 (9) connector	Obtain replacement connector.	

7-11. REPLACEMENT OF J1, J2, J3, OR J4 CONNECTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
f. Connector terminals	Use soldering kit and soldering aid. Solder wires to correct terminals of connector. If necessary, slide insulation sleeving down over connection, and apply heat to it until it shrinks tight around the connection.	**NOTE** Ensure each wire has insulation sleeving on it if necessary, and each wire is placed through mounting hole in connector case (12). While soldering wires, attach heat sink to bare wire between insulation sleeving and terminal. Before and after soldering, clean wires and terminals with cotton swabs and alcohol.
g. Tiedown straps (13)	Replace any tiedown straps (13) that were removed.	
h. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 7-10 for replacement of the connector case. (12).

7-12. REPLACEMENT OF J5 CONNECTOR.

Tools:

Flat tip screwdriver
Adjustable wrench
Soldering kit

Expendable supplies:

Silicone compound
Alcohol
Cotton swabs
Solder

References:

Paragraph 7-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Electrical connector assembly (13A1)	Set on work surface with J5 connector (16) toward you. See figure 7-2.	

7-12. REPLACEMENT OF J5 CONNECTOR. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. Two screws (14) (four screws for older versions)	Use flat tip (or cross tip) screwdriver. Remove and inspect two (or four) screws (14) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	Inspect each screw and its threaded screw insert to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert.
c. Guide pin (15)	Use adjustable wrench. Remove and inspect guide pin (15) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	Inspect guide pin and its threaded screw insert to determine if either is defective. If guide pin is stripped, do not replace its threaded screw inserts.
d. J5 connector (16)	Gently pull out top of J5 connector (16).	If necessary, remove tiedown strap (13).
e. J5 connector (16) wires	Record location of wires soldered to terminals of J5 connector (16).	
	Use soldering kit. Desolder each wire connected to J5 connector (16).	**NOTE** Place heat sink on bare part of wire just above area to be resoldered.
f. J5 connector (16)	Remove and discard defective J5 connector (16).	
INSTALLATION		
g. J5 connector (16)	Obtain replacement J5 connector (16).	
h. Connector case (12)	Position J5 connector (16) next to mounting hole in connector case (12).	
i. J5 connector (16) terminals	Use soldering kit. Solder wires to correct terminals of connector.	**NOTE** Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
j. Tiedown strap (13)	Replace tiedown strap (13) if removed.	
k. Neoprene gasket	Coat the neoprene gasket of J5 connector (16) with silicone compound, and place the connector in mounting hole of connector case (12).	
l. Two screws (14) (four screws for older versions) and guide pin (15)	Use flat tip (or cross tip) screwdriver and adjustable wrench. Install and hand tighten two (or four) screws (14) and guide pin (15) securing J5 connector (16) to connector case (12).	If a screw or the guide pin is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert.

7-13. REPLACEMENT OF FL1 FILTER.

Tools:

Cross tip screwdriver
5/16-inch wrench
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

References:

Paragraph 7-10 for removal and installation of connector case.
Paragraph 7-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 7-2.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. FL1 filter (20) top terminal	Use soldering kit. Desolder wire from top terminal of FL1 filter (20).	
c. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Remove and inspect three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12). If damaged, obtain replacement.	
d. Filter mounting plate (22)	Lift filter mounting plate (22) to allow access to bottom terminal of FL1 filter (20).	
e. FL1 filter (20) bottom terminal	Use soldering kit. Desolder wire from bottom terminal of FL1 filter (20).	
f. Hex nut (27) and lockwasher (26)	Use 5/16-inch wrench. Remove and inspect hex nut (27) and lockwasher (26) securing FL1 filter (20) to filter mounting plate (22). If damaged, obtain replacement.	
g. FL1 filter (20)	Remove and discard defective FL1 filter (20).	
INSTALLATION		
h. FL1 filter (20)	Obtain replacement FL1 filter (20).	

7-13. REPLACEMENT OF FL1 FILTER. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
i. Filter mounting plate (22)	Install FL1 filter (20) in mounting hole of filter mounting plate (22).	
j. Hex nut (27) and lockwasher (26)	Use 5/16-inch wrench. Install and hand tighten hex nut (27) and lockwasher (26) securing FL1 filter (20) to filter mounting plate (22).	
k. FL1 filter (20) terminals	Using cotton swabs and alcohol, clean both terminals on FL1 filter (20).	
l. FL1 filter (20) wires	Use soldering kit. Solder wires to correct terminals of FL1 filter (20).	
m. Filter mounting plate (22)	Position filter mounting plate (22) in connector case (12).	
n. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Install and tighten three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12).	If a screw is not stripped but will not tighten, inspect its tapped hole. If the tapped hole is defective, refer to paragraph 7-10 for replacement of connector case (12).
o. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 7-10 for replacement of the connector case. (12).

7-14. REPLACEMENT OF FL2 FILTER.

Tools:

Cross tip screwdriver
3/8-inch wrench
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

References:

Paragraph 7-10 for removal and installation of connector case.
Paragraph 7-16 for removal and installation of threaded screw inserts.

7-14. REPLACEMENT OF FL2 FILTER. Continued

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 7-2.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. FL1 filter (20) and FL2 filter (21) top terminal	Use soldering kit. Desolder wire from top terminal of FL1 filter (20) and FL2 filter (21).	
c. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Remove and inspect three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12). If damaged, obtain replacement.	
d. Filter mounting plate (22)	Lift filter mounting plate (22) to allow access to bottom terminal of FL2 filter (21).	
e. FL2 filter (21) bottom terminal	Use soldering kit. Desolder wire from bottom terminal of FL2 filter (21).	
f. Hex nut (29) and lockwasher (28)	Use 3/8-inch wrench. Remove and inspect hex nut (29) and lockwasher (28) securing FL2 filter (21) to filter mounting plate (22). If damaged, obtain replacement.	
g. FL2 filter (21)	Remove and discard defective FL2 filter (21).	
INSTALLATION		
h. FL2 filter (21)	Obtain replacement FL2 filter (21).	
i. Filter mounting plate (22)	Install FL2 filter (21) in mounting hole of filter mounting plate (22).	
l. Hex nut (29) and lockwasher (28)	Use 3/8-inch wrench. Install and hand tighten hex nut (29) and lockwasher (28) securing FL2 filter (21) to filter mounting plate (22).	
k. FL1 filter (20) and FL2 filter (21) terminals	Using cotton swabs and alcohol, clean both terminals on FL2 filter (21) and top terminal on FL1 filter (20).	
l. FL1 filter (20) and FL2 filter (21) wires	Use soldering kit. Solder wires to correct terminals of FL2 filter (21) and top terminal on FL1 filter (20).	

7-14. REPLACEMENT OF FL2 FILTER. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
m. Filter mounting plate (22)	Position filter mounting plate (22) in connector case (12).	
n. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Install and tighten three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12).	If a screw is not stripped but will not tighten, inspect its tapped hole, If the tapped hole is defective, refer to paragraph 7-10 for replacement of connector case (12).
o. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 7-10 for replacement of the connector case. (12).

7-15. REPLACEMENT OF WIRING.

Tools:

Diagonal cutting pliers
Wire stripper
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

References:

Paragraph 7-12 for removal and installation of J5 connector.
Paragraph 7-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 7-2.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. J5 connector (16)	Check wiring list and if applicable remove connector J5 from connector case (12).	Refer to paragraph 7-12 for removal instructions.

7-15. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

c. Wiring — Use soldering kit. Desolder, remove, and discard defective wiring from connectors.

INSTALLATION

d. Wiring — Use diagonal cutting pliers. Cut replacement wiring to lengths as specified in the following wire list:

WIRE#	FROM	TO	COLOR	GAUGE	LG/MM
001	J5 A	E1	BLK	16	64.0
002	J5 A	J1 A	BLK	16	107.0
004	J5 V	J3 A	BLK	20	132.0
005	J5 V	J4 A	BLK	20	210.0
006	J5 B	(SEE NOTE 1)	RED	16	76.0
OR					
006	J5 B	EMI-CCA E2	RED	16	76.0
007	J1 B	J2 B	RED	16	200.0
010	J1 A	J2 A	BLK	16	175.0
011	J5 C	J2 C	YEL	16	257.0
012	J2 C	J3 C	YEL	20	120.0
013	J1 B	J3 B	RED	20	110.0
014	J5 D	J1 D	WHT	22	115.0
015	J1 D	J2 D	WHT	22	160.0
016	J5 E	J1 C	BRN	22	197.0
017	J1 C	J3 D	BRN	22	95.0
*018	J5 F	J3 H	BRN	22	132.0
*019	J5 H	J3 K	ORG	22	141.0
021	J5 K	J3 S	WHT/RED	22	132.0
023	J5 M	J3 U	YEL	22	132.0
*024	J5 N	J4 H	GRN	22	170.0
025	J5 P	J4 K	BLU	22	200.0
027	J5 S	J4 S	WHT/VIO	24	202.0
029	J5 U	J4 U	WHT	22	170.0
031	J1 B	(SEE NOTE 2)	RED	16	89.0
OR					
031	J1 B	EMI-CCA El	RED	16	89.0
032	J5 V	(SEE NOTE 3)	BLK	24	AR
033	J2 B	J4 B	RED	20	95.0
034	J2 C	J4 C	YEL	20	64.0
035	J1 C	J4 D	BRN	22	135.0

*NOTE: Wires #018, 019, and 024 may be shielded electrical cables.

7-15. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

INSTALLATION Continued

NOTES:

1. Using the wire stripper, strip 3.5 mm of insulation from one end of wire #006. Using the wire stripper, strip 20.0 mm of insulation from other end of wire #006. Using the soldering kit, tin both ends of wire #006. Insert the 20.0 mm end of wire #006 through top terminals of filters FL1 and FL2 (20) and (21). Place a 12.0 mm length of 16 gauge insulation sleeving on wire #006 between terminals of filters FL1 and FL2 (20) and (21).

2. Using the wire stripper, strip 3.5 mm of insulation from one end of wire #031. Using the wire stripper, strip 20.0 mm of insulation from other end of wire #031. Using the soldering kit, tin both ends of wire #031. Insert the 20.0 mm end of wire #031 through bottom terminals of filters FL1 and FL2 (20) and (21). Place a 12.0 mm length of 16 gauge insulation sleeving on wire #031 between terminals of filters FL1 and FL2 (20) and (21).

3. Connect wire #032 to shields of wires #018, 019, and 024 going directly from shield to shield. Cover all J5 pigtail connections with heat shrinkable insulation sleeving. Cover exposed braid on end opposite pigtail connection of wires #018, 019, and 024 with heat shrinkable insulation sleeving. Cover all J3 and J4 connections with 14 gauge insulation sleeving.

d. Wiring Continued	Using wire stripper, strip wires. Using cotton swabs and alcohol, clean wires. Using soldering kit, tin wires.	
e. Shielded electrical cables	Prepare wires #018, 019, and 024 as follows: Unbraid shielding from around center conductor. Using cotton swabs and alcohol, clean the shielding. Using soldering kit, tin the shielding. Using wire stripper, strip sleeving from center conductor. Using cotton swabs and alcohol, clean the center conductor. Using soldering kit, solder wires as specified in the wire list.	
f. J5 connector (16)	If applicable, install J5 connector.	Refer to paragraph 7-12 for installation instructions.

7-15. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
g. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 7-10 for replacement of the connector case. (12).

7-16. REPLACEMENT OF THREADED SCREW INSERTS.

Tools:

Extractor tool 1227-06	Thread cleaning tap	Tang breakoff tool
Extractor tool 1227-6	5/64-inch hex wrench	Prewinder
Insertion tool 7751-3	3/32-inch hex wrench	

ITEM	ACTION	REMARKS
REMOVAL		
a. Insert	If a screw for any of the following items will not tighten, inspect it to ensure it is not stripped. If the screw is stripped, do not replace its insert.	If the screw is not stripped, replace its insert. The following is a list of the threaded screw inserts and their locations.

Location	Type	Size	Quantity
(1) Access cover (as required)	MA 3330-152	M3 X 0.5 X 1.5 dia	8
(2) J5 connector	MA 3330-104	M4 X 0.7 X 1.0 dia	2
(3) Guide pin	MA 3330-105	M5 X 0.8 X 1.0 dia	1

b. Extractor tool (1)	Refer to figure 7-3. Place tool in hole. Tap extractor to seat in insert. Maintain steady pressure on extractor and unscrew insert. Remove insert from hole.	The following is a list of the appropriate extractor tools for the respective inserts. Select the extractor tool to be used.
	(1) Extractor tool 1227-06	M2.5 thru M4.5
	(2) Extractor tool 1227-6	M5 thru M10
INSTALLATION		
c. Insert	Obtain replacement threaded screw insert.	
d. Thread cleaning tap (2)	Select proper size tap. Insert and secure in brace (3). Start carefully in hole. Screw tap to bottom of hole. Unscrew tap.	Be careful not to get metal shavings on the electrical parts.

7-16. REPLACEMENT OF THREADED SCREW INSERTS. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
e. Prewinder (4)	Loosen stop collar (6) with hex wrench. Extend threaded shaft beyond end of prewinder one thread longer than insert. Move stop collar to top of tool body and tighten. Retract threaded shaft.	If insert is used with a captive screw, set prewinder with an extra 2 to 3 mm length.
f. Insert (5)	Place insert in prewinder (4) with tang end toward prewinder tip. Rotate shaft until insert projects beyond the tip one full turn. Place tip in hole. Screw insert into hole until stop collar touches the tool body. Retract prewinder.	
g. Tang breakoff tool (7)	Place on tang. Break off tang by pressing down on tool. Remove tang breakoff tool. Remove broken tang from hole.	

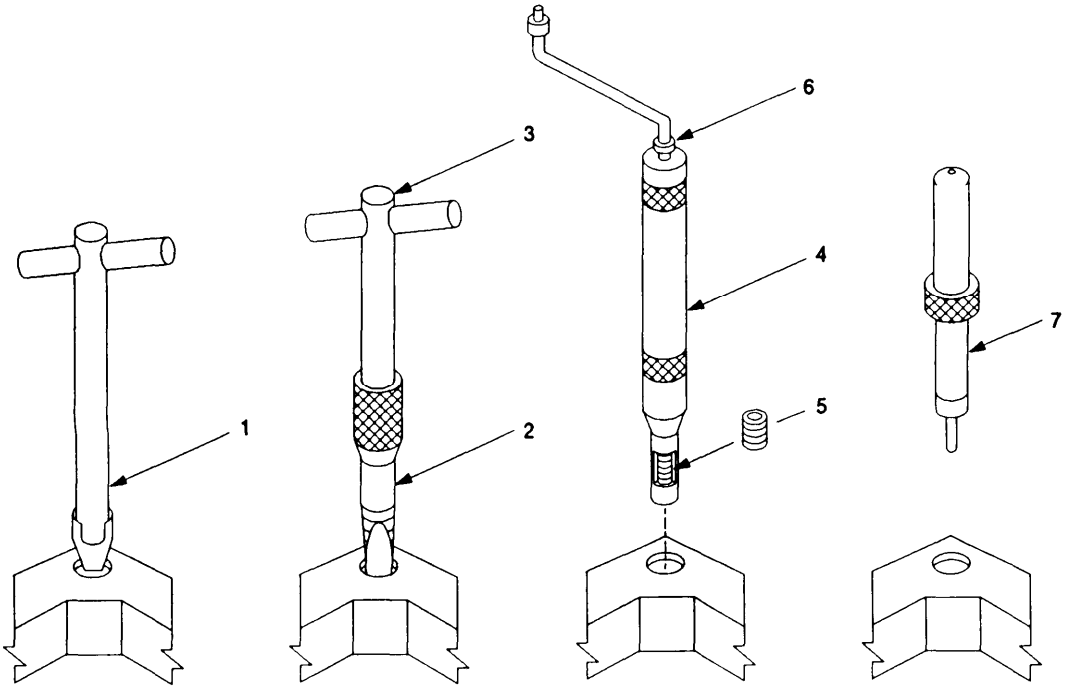


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Figure 7-3. Threaded Screw Insert Replacement

7-17. REPLACEMENT OF FILTER EMI-CCA.

Tools:

Cross tip screwdriver
Soldering kit

Expendable supplies:

Solder
Cotton swabs
Alcohol

References:

Paragraph 7-10 for removal and installation of connector case.
Paragraph 7-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 7-2.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Remove and inspect screw (19) and lockwasher (18) securing terminal lug (17) to FILTER EMI-CCA. If damaged, obtain replacement.	
c. FILTER EMI-CCA wires	Record location of wires soldered to E1 and E2 of FILTER EMI-CCA. Use soldering kit. Desolder each wire.	
d. Two screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Remove and inspect two screws (25), flat washers (24), and lockwashers (23) securing FILTER EMI-CCA to connector case (12). If damaged, obtain replacement.	
e. FILTER EMI-CCA	Remove and discard.	
INSTALLATION		
f. FILTER EMI-CCA	Obtain replacement FILTER EMI-CCA and place in connector case (12).	
g. Two screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Install and hand tighten two screws (25), flat washers (24), and lockwashers (23) securing FILTER EMI-CCA to connector case (12).	

7-17. REPLACEMENT OF FILTER EMI-CCA. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
h. FILTER EMI-CCA wire	Use soldering kit. Solder wires to correct terminals of FILTER EMI-CCA.	**NOTE** Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
i. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Install and hand tighten screw (19) and lockwasher (18) securing terminal lug (17) to FILTER EMI-CCA.	
j. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 7-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 7-10 for replacement of the connector case (12).

Section V. PREPARATION FOR STORAGE OR SHIPMENT

7-18. GENERAL INFORMATION.

Pack the electrical connector assembly (13A1) in an approved shipping container.

CHAPTER 8

BATTERY BOX CY-8523A/PRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

8-1. INTRODUCTION.

The battery box has two basic functions. First, it holds the battery in place on the RT. Four latches secure the battery box to the RT. The battery is held in a water-tight enclosure. Second, it is an interface for two-wire remote control of the RT. This interface is described in paragraph 8-2.

8-2. TWO-WIRE TRANSIENT PROTECTION CCA.

The RT with the CY-8523A/PRC battery box can be remotely controlled through the two-wire interface. Control units, such as Control, Receiver-Transmitter C-11561(C)/U, can send control signals to the RT through a two-wire field wire. The field wire connects to binding posts E1 and E2 on the battery box for the AN/PRC-119. The two-wire transient protection CCA filters the remote control signals. See figure 8-1. J1 mates with RT connector P1. The signals are transformer coupled to the RT. Inductors L1 and L2 are not separate components. They are a part of the printed wiring board.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

8-3. COMMON TOOLS AND EQUIPMENT.

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

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

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-1.

8-5. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-1) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

8-6. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective battery box. The troubleshooting information is presented in the form of a flowchart. This chart will systematically check for faults in the battery box.

8-7. TROUBLESHOOTING.

Troubleshooting is done on a faulty battery box. The steps to determine if a battery box is faulty and how to troubleshoot it are as follows:

a. **When a battery box is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. **Troubleshoot the battery box using the flowchart.** It will identify the defective electrical components.

c. **Replace the defective components using the procedures in section IV.**

d. **Verify the repair.** Perform the troubleshooting flowchart again. When the flowchart is passed, the battery box can be returned for use.

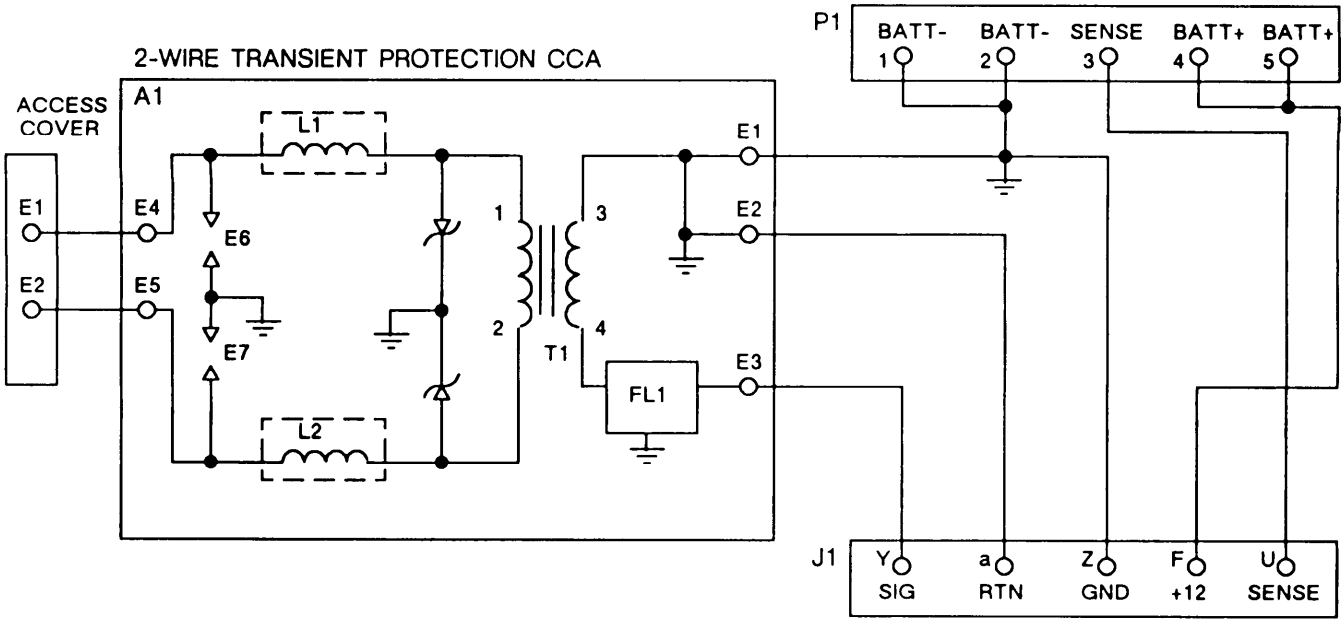
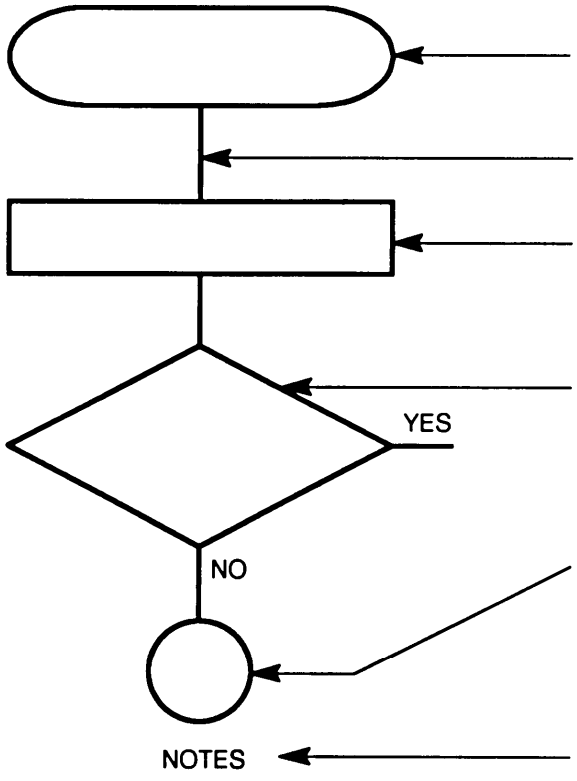


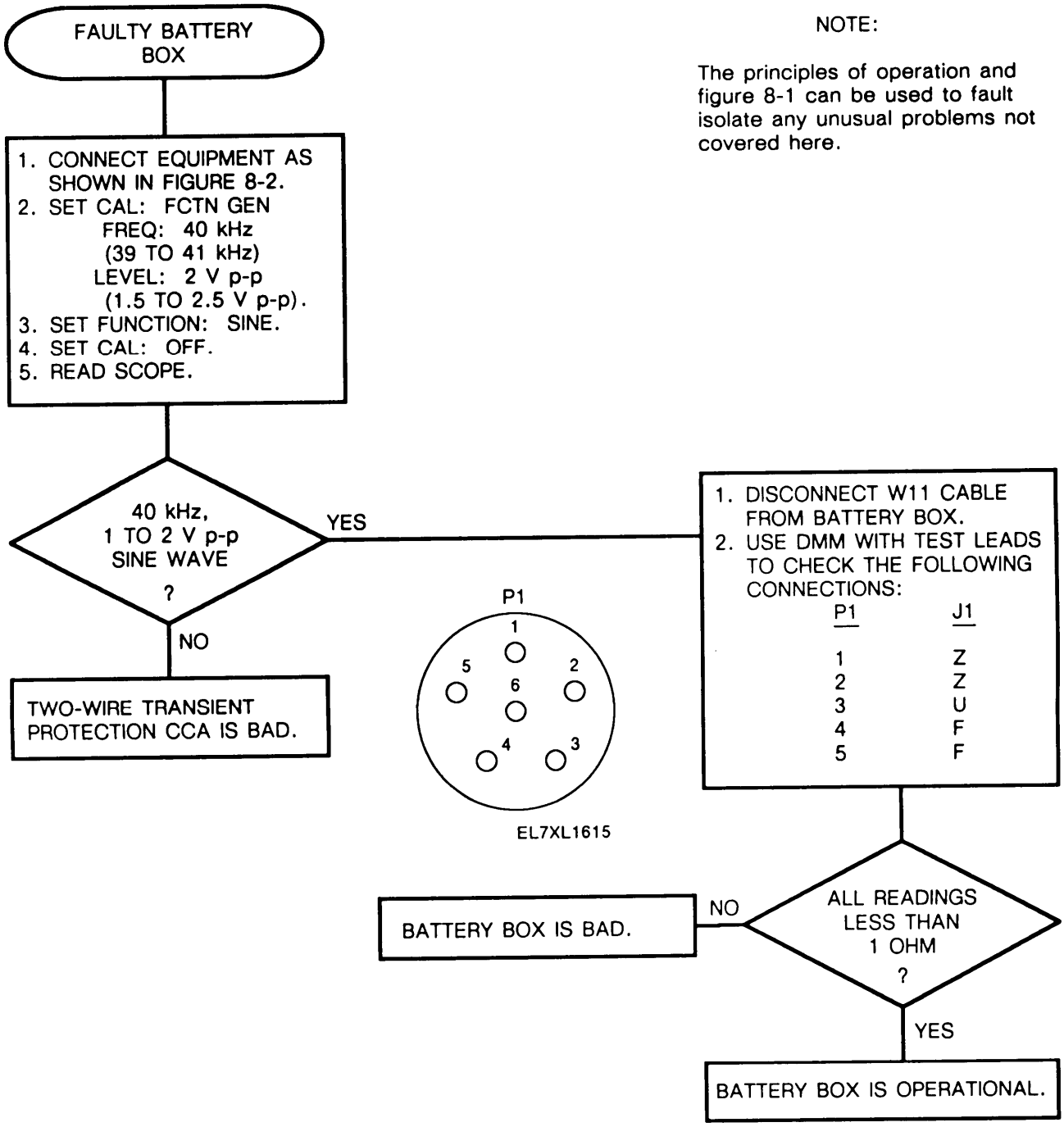
Figure 8-1. Battery Box Schematic Diagram.

8-8. EXPLANATION OF SYMBOLS AND NOTES.

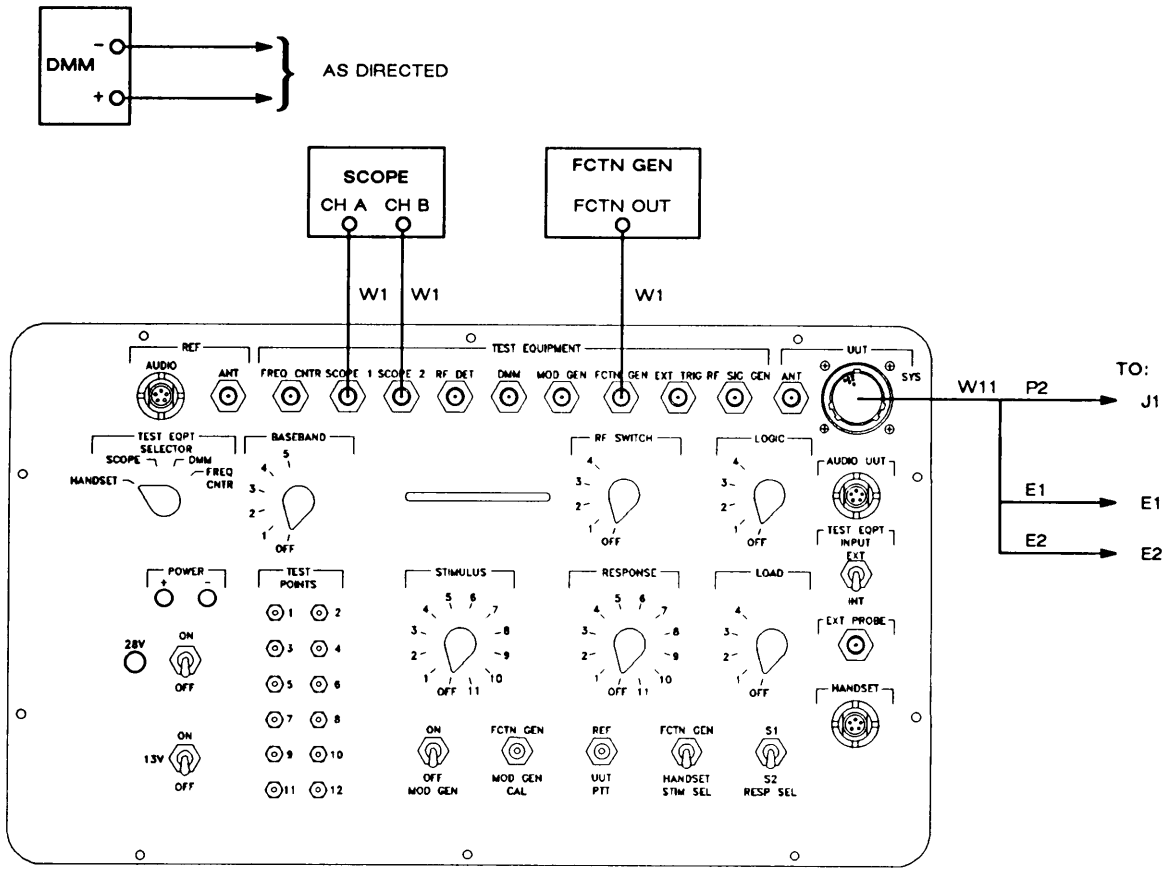
SYMBOL	EXPLANATION
	Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble. Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow. Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test. Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO). Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages. Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

8-9. TROUBLESHOOTING FLOWCHARTS.

Chart 1
Troubleshooting Battery Box
(Sheet 1 of 1)



8-9. TROUBLESHOOTING FLOWCHARTS. Continued



EQUIPMENT PRESETS

TEST ADAPTER:

TEST EQPT SELECTOR:	SCOPE
BASEBAND:	OFF
RF SWITCH:	OFF
LOGIC:	OFF
TEST EQPT INPUT:	INT
28 V:	OFF
13 V:	OFF
STIMULUS:	5
RESPONSE:	7
LOAD:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S1

BATTERY BOX:

TWO-WIRE TRANSIENT PROTECTION CCA IS PRESENT.

EL7XL1616

Figure 8-2. Battery Box Troubleshooting

Section IV. MAINTENANCE PROCEDURES

8-10. INTRODUCTION.

Maintenance of the battery box consists of replacing defective components. The battery box can be checked as described in section III. All other components are checked by performing the visual inspection procedures found in paragraph 8-11. When a bad component is identified, replace it using the procedure in this section.

WARNING

A lithium-sulfur dioxide ($Li-SO_2$) battery used with your manpack radio contains pressurized sulfur dioxide (SO_2) gas. The gas is toxic, and the battery **MUST NOT** be abused in anyway which may cause the battery to rupture. If the battery compartment becomes hot to the touch, if you hear a hissing sound (i.e., battery venting) or smell irritating gas (sulfur dioxide), **IMMEDIATELY TURN OFF** the equipment and leave the area.

1. Allow equipment to cool at least one hour.
2. Remove and replace battery after equipment has cooled to the touch.
3. lf there is a safety incident or if you believe a safety hazard exists, notify your local Safety Office/Officer; file a Quality Deficiency Report, SF Form 368; and notify CECOM Safety Office, Ft. Monmouth, NJ at AV 995-3112.
4. There is a discharge device built into all new batteries. instructions on its use will resupplied with the battery.

- **DO NOT** heat, short circuit, crush, puncture, mutilate, or disassemble a $Li-SO_2$ battery.
- **DO NOT** use any $Li-SO_2$ battery which shows signs of damage, such as bulging, swelling, disfigurement, a brown liquid in the plastic wrap, swollen plastic wrap, etc.
- **DO NOT** test $Li-SO_2$ batteries for capacity.
- **DO NOT** recharge $Li-SO_2$ batteries.
- **DO NOT** dispose of $Li-SO_2$ batteries with ordinary trash/refuse. Turn in $Li-SO_2$ batteries to your local servicing Defense Reutilization and Marketing Office,
- **DO NOT** store batteries in unused equipment for more than 30 days.
- **DO NOT** store $Li-SO_2$ batteries with other hazardous materials. Keep them away from open flame or heat.
- **DO NOT** use a HaIon type fire extinguisher on a $Li-SO_2$ battery fire.

In the event of fire near $Li-SO_2$ battery (ies), rapid cooling of $Li-SO_2$ battery (ies) is important. Use carbon dioxide (CO_2) extinguisher. Control of equipment fire, and cooling, may prevent battery from venting and potentially exposing lithium metal. In the event that lithium metal becomes involved in fire, use of a graphite based Class D fire extinguisher, such as Lith-X or Met-L-X, is recommended.

8-11. VISUAL INSPECTION OF BATTERY BOX.

Before beginning any maintenance procedure, inspect the battery box for physical damage. Use the following table as a guide to inspect the components. Look for damaged or missing parts, and replace them as required. An exploded view of the Battery Box CY-8523A/PRC components is provided in figure 8-3.

ITEM	ACTION	REMARKS
a. Battery box case (15)	Check for obvious damage.	If defective, proceed to paragraph 8-24.
b. Battery box cover (1)	Check for obvious damage.	If defective, proceed to paragraph 8-12.
c. Six latch/strike assemblies (14, 18, 23, 24, and 32)	Check for obvious damage.	If defective, proceed to paragraph 8-13.
d. J1 connector (34)	Check for bent/broken pins and tight connection to battery box case.	If defective, proceed to paragraph 8-18.
e. P1 connector (6)	Check for bent/broken pins and tight connection to battery box case.	If defective, proceed to paragraph 8-19.
f. E1 and E2 binding posts (28)	Check for obvious damage.	If defective, proceed to paragraph 8-17.
g. Two seal screws (16)	Check for a tight seal to battery box case.	If defective, proceed to paragraph 8-20.
h. Dampening tape gasket (3)	Check for obvious damage.	If defective, proceed to paragraph 8-21.
i. Wires	Check for frays, faulty connections, and other obvious damage.	If defective, proceed to paragraph 8-22.
j. Plastic strip (10)	Check for obvious damage.	If defective, proceed to paragraph 8-23.
k. Two-wire transient protection CCA (26)	Check for burnt components, missing traces, and other obvious damage.	If defective, proceed to paragraph 8-15.
l. Access cover (27)	Check for obvious damage.	If defective, proceed to paragraph 8-16.

8-11. VISUAL INSPECTION OF BATTERY BOX. Continued

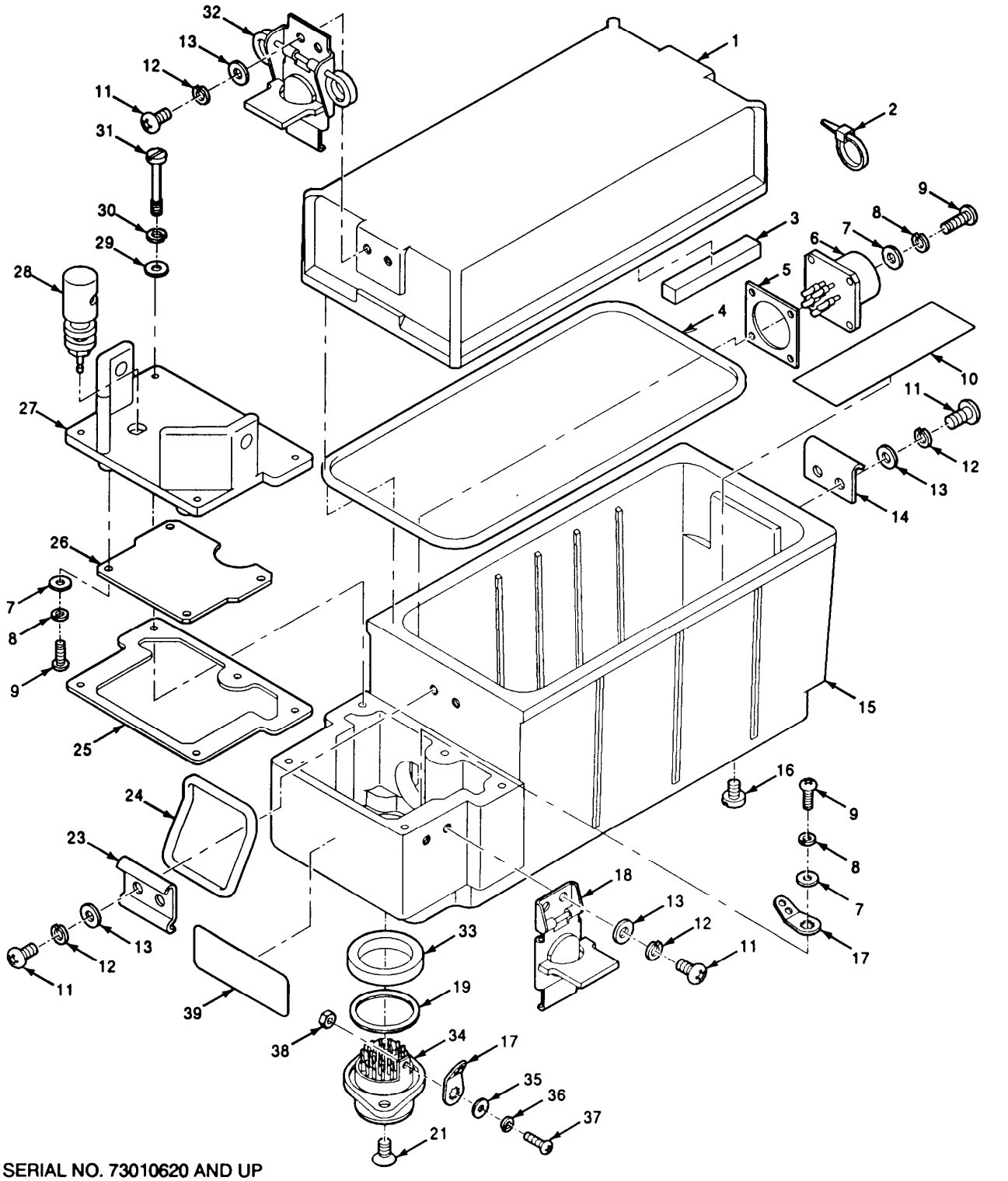


Figure 8-3. Battery Box CY-8523A/PRC (Exploded View).

8-12. REPLACEMENT OF BATTERY BOX COVER.

Tools:

Cross tip screwdriver Pocket knife

References:

Paragraph 8-21 for removal and installation of dampening tape gasket.

ITEM	ACTION	REMARKS
REMOVAL		
a. Two battery box cover latches (32)	Release two twist lock latches securing battery box cover (1) to battery box case (15). See figure 8-3.	
b. Four screws (11), flat washers (13), and lock-washers (12)	Use cross tip screwdriver. Remove and retain two screws (11), flat washers (13), and lockwashers (12) securing each latch (32) to battery box cover (1). Remove and retain two latches (32).	
c. Dampening tape gaskets (3)	Remove and retain.	Refer to paragraph 8-21 for removal procedures.
d. Battery box cover (1)	Discard.	
INSTALLATION		
e. Battery box cover (1)	Obtain replacement.	
f. Dampening tape gaskets (3)	Install.	Refer to paragraph 8-21 for installation procedures.
		NOTE
g. Battery box cover (1)	Place on battery box case (15).	If replacing latch/strike assembly equipped with battery box cover retaining ring (24), insure retaining ring is properly positioned under latch/strike assembly before proceeding to step h.
		NOTE
h. Two battery box cover latches (32)	Position two retained latches on cover (1), Use cross tip screwdriver. Install two retained screws (11), flat washers (13), and lockwashers (12) securing latches to battery box cover (1).	Do not over tighten screws securing latches to cover.
i. Two battery box cover latches (32)	Fasten two twist lock latches securing battery box cover (1) to battery box case (15).	

8-13. REPLACEMENT OF LATCH/STRIKE ASSEMBLY.

Tools:

Cross tip screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Two screws (11), flat washers (13), and lock-washers (12)	Use cross tip screwdriver. Remove and retain two screws, flat washers, and lock-washers securing latch (32) to battery box cover (1).	
b. Latch assembly (32)	Remove and discard.	
c. Two screws (11), flat washers (13), and lock-washers (12)	Use cross tip screwdriver. Remove and retain two screws, flat washers, and lock-washers securing strike (14) or (23) to battery box case (15).	
d. Strike (14) or (23)	Remove and discard.	
INSTALLATION		
e. Strike (14) or (23)	Position replacement strike to battery box case (15).	
		NOTE
f. Two screws (11), flat washers (13), and lock-washers (12)	Use cross tip screwdriver. Install two retained screws, flat washers, and lock-washers securing strike (14) or (23) to battery box case (15)	Do not over tighten screws.
g. Latch assembly (32)	Position replacement latch to battery box cover (1).	
		NOTE
h. Two screws (11), flat washers (13), and lock-washers (12)	Use cross tip screwdriver. Install two retained screws, flat washers, and lock-washers securing latch (32) to battery box cover.	Do not over tighten screws.

8-14. REPLACEMENT OF CATCH ASSEMBLY.

Tools:

Cross tip screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Two screws (11), flat washers (13), and lock-washers (12)	Use cross tip screwdriver. Remove and retain two screws, flat washers, and lock-washers securing defective catch assembly (18) to battery box case (15).	
b. Catch assembly (18)	Remove and discard.	

8-14. REPLACEMENT OF CATCH ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
c. Catch assembly (18)	Position replacement catch to battery box case (15).	
		NOTE
d. Two screws (11), flat washers (13), and lockwashers (12)	Use cross tip screwdriver. Install two retained screws, flat washers, and lockwashers securing catch (18) to battery box case (15).	Do not over tighten screws.

8-15. REPLACEMENT OF TWO-WIRE TRANSIENT PROTECTION CCA.

Tools:

Soldering kit	Cross tip screwdriver	
Soldering aid	Flat tip screwdriver	
Heat sink	Torque screwdriver	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Five captive screws (31)	Use flat tip screwdriver. Fully loosen five captive screws securing access cover (27) to battery box case (15).	
b. Access cover (27)	Pull access cover away from battery box case (15) to allow resoldering of wires.	
c. Wires	Use soldering kit. Tag and desolder wires from defective two-wire transient protection CCA terminals E1 thru E3.	
d. Bus wires	Use soldering kit. Desolder two bus wires from two-wire transient protection CCA (26) and binding posts (28). Remove and retain.	
e. Four screws (9), flat washers (7), and lockwashers (8)	Use cross tip screwdriver. Remove and retain four screws, flat washers, and lockwashers securing two-wire transient protection CCA (26) to battery box access cover (27).	
f. Access cover (27)	Retain.	
g. Two-wire transient protection CCA (26)	Remove and discard.	

8-15. REPLACEMENT OF TWO-WIRE TRANSIENT PROTECTION CCA. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
h. Two-wire transient protection CCA (26)	Position replacement two-wire transient protection CCA to retained access cover (27).	
i. Four screws (9), flat washers (7), and lockwashers (8)	Use cross tip screwdriver. Install four retained screws, flat washers, and lockwashers securing replacement two-wire transient protection CCA (26) to access cover (27).	These were removed in step e.
		NOTE
j. Bus wires	Position retained bus wires from E4 to binding post (28) and E5 to binding post (28). Use soldering kit. Solder bus wires to binding posts (28).	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
		NOTE
k. Wires	Use soldering kit. Solder three tagged wires to E1 thru E3 of replacement two-wire transient protection CCA (26).	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
l. Access cover (27)	Position access cover to battery box case (15). Use torque screwdriver. Tighten five captive screws (31) securing access cover to battery box case (15). Torque screws to 5 in-lb.	

8-16. REPLACEMENT OF ACCESS COVER.

Tools:

Soldering kit	5/16-inch open end wrench	Cross tip screwdriver
Soldering aid	5/16-inch socket	Flat tip screwdriver
Heat sink	Torque wrench	Torque screwdriver

Expendable Supplies:

Solder	Alcohol	Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Access cover (27)	Use flat tip screwdriver. Fully loosen five captive screws (31) securing access cover to battery box case (15). Remove to allow resoldering.	
b. Two-wire transient protection CCA (26)	Use soldering kit. Tag and desolder three wires from terminals of two-wire transient protection CCA.	

8-16. REPLACEMENT OF ACCESS COVER. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
c. Bus wires	Use soldering kit. Desolder bus wires from binding posts (28).	
d. Two-wire transient protection CCA (26)	Use cross tip screwdriver. Remove and retain four screws (9), lockwashers (8), and flat washers (7) securing two-wire transient protection CCA (26) to access cover (27). Remove and retain.	
e. Access cover gasket (25)	Remove and retain.	
f. Two binding posts (28)	Use 5/16-inch open end wrench. Remove and retain two nuts, lockwashers, and flat washers securing binding posts to access cover. Remove and retain.	
g. Access cover (27)	Remove and discard.	
INSTALLATION		
h. Access cover (27)	Obtain replacement.	
i. HCP Two binding posts (28)	Position two retained binding posts to replacement access cover (27). Use torque wrench and 5/16-inch socket. Install two retained nuts, lockwashers, and flat washers securing binding posts to access cover. Torque screws to 5 to 7 in-lb.	These were removed in step f.
j. Access cover gasket (25)	Install retained gasket to access cover.	This was removed in step e.
k. Two-wire transient protection CCA (26)	Position retained CCA to access cover. Use cross tip screwdriver. Install four retained screws (9), lockwashers (8), and flat washers (7) securing CCA to access cover.	These were removed in step d.
		NOTE
l. Bus wires	Use soldering kit. Position and solder two retained bus wires to E4 and binding post and to E5 and binding post.	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
m. Two-wire transient protection CCA (26)	Use soldering kit. Position and solder three tagged wires to terminals E1 thru E3.	
n. Access cover (27)	Position access cover to battery box case (15). Using torque screwdriver tighten five captive screws (31) securing access cover (27) to battery box case (15). Torque screws to 5 in-lb.	These were removed in step a.

8-17. REPLACEMENT OF BINDING POSTS.

Tools:

Flat tip screwdriver	5/16-inch open end wrench	5/16-inch socket
Soldering kit	Soldering aid	Heat sink
Torque wrench	Torque screwdriver	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Access cover (27)	Use flat tip screwdriver. Fully loosen five captive screws (31). Remove cover to allow resoldering.	
b. Wires	Use soldering kit. Tag and desolder three wires from terminals of two-wire transient protection CCA (26).	
c. Bus wires	Use soldering kit. Desolder bus wires from defective binding post (28).	
d. Two-wire transient protection CCA (26)	Use cross tip screwdriver. Remove and retain four screws (9), lockwashers (8), and flat washers (7) securing CCA to access cover.	
e. Binding post (28)	Use 5/16-inch open end wrench. Remove and retain nut, lockwasher, and flat washer securing defective binding post to access cover. Remove and discard defective binding post.	
INSTALLATION		
f. Binding post (28)	Obtain replacement.	
g. HCP Binding post (28)	Position replacement binding post to access cover. Use torque wrench and 5/16-inch socket. Install retained nut, lockwasher, and flat washer securing binding post to access cover. Torque nut to 5 to 7 in-lb.	This was removed in step e.
h. Two-wire transient protection CCA (26)	Position retained CCA to access cover. Use cross tip screwdriver. Install four retained screws (9), lockwashers (8), and flat washers (7) securing CCA to access cover.	These was removed in step d.
		NOTE
i. Bus wires	Use soldering kit. Position and solder bus wires to binding post (28).	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
j. Wires	Use soldering kit. Position and solder three tagged wires to terminals E1 thru E3 of two-wire transient protection CCA.	

8-17. REPLACEMENT OF BINDING POSTS. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
k. Access cover (27)	Use torque screwdriver. Position and tighten five captive screws (31) securing access cover to battery box case (15). Torque screws to 5 in-lb.	

8-18. REPLACEMENT OF J1 CONNECTOR.

Tools:

Cross tip screwdriver	Torque screwdriver	Heat sink
Soldering kit	Soldering aid	

Expendable Supplies:

Sealing compound	Alcohol	Solder
Cotton swabs		

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery box case (15)	Use cross tip screwdriver. Remove and retain two screws (21) securing J1 connector to case. Pull J1 connector from case.	
b. Wires	Slide insulation sleeving away from solder joints. Use soldering kit. Tag and desolder wires from J1 connector.	
c. O-ring (33) and shielding gasket (19)	Remove and retain. Inspect for damage. Replace as required.	
d. J1 connector (34)	Discard.	
INSTALLATION		
e. J1 connector (34)	Obtain replacement.	
f. O-ring (33) and shielding gasket (19)	Coat O-ring with sealing compound. Install shielding gasket and O-ring to replacement J1 connector.	These were removed in step c.
		NOTE
g. Wires	Use soldering kit. Position and solder tagged wires to J1 connector. Remove wire tags.	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
		NOTE
h. J1 connector (34)	Position connector into battery box case (15).	Ensure keyway is toward seal screw.
i. Battery box case (15)	Use torque screwdriver. Install two retained screws (21) securing connector to case. Torque screws to 8 to 10 in-lb.	These were removed in step a.

8-19. REPLACEMENT OF P1 CONNECTOR.

Tools:

Cross tip screwdriver | Soldering kit | Soldering aid
Heat sink

Expendable Supplies:

Cotton swabs | Solder | Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery box case (15)	Use cross tip screwdriver. Remove and retain four screws (9), lockwashers (8), and flat washers (7) securing P1 connector (6) to case. Pull P1 from case.	
b. Wires	Slide insulation sleeving away from solder joints. Use soldering kit. Tag and desolder wires from P1 connector.	
c. P1 connector (6) and gasket (5)	Remove P1 connector and gasket from case. Inspect gasket and obtain replacement if required. Discard P1 connector.	
INSTALLATION		
d. P1 connector (6) and gasket (5)	Obtain replacement and position to gasket.	
		NOTE
e. Wires	Use soldering kit. Position and solder tagged wires to P1 connector. Replace insulation sleeving over solder joints.	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
		NOTE
f. Battery box case (15)	Position P1 connector to case. Use cross tip screwdriver. Install four retained screws (9), lockwashers (8), and flat washers (7) securing P1 connector to battery box case (15).	Ensure single keyway is to right of raised letters.

8-20. REPLACEMENT OF SEAL SCREW.

Tools:

Flat tip screwdriver | Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery box case (15)	Use flat tip screwdriver. Remove defective seal screw (16) from battery box case (15). See figure 8-3.	
b. Seal screw (16)	Discard.	

8-20. REPLACEMENT OF SEAL SCREW. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
c. Seal screw (16)	Obtain replacement seal screw.	
d. Battery box case (15)	Use torque screwdriver. Install seal screw in case and torque to 9 in-lb.	

8-21. REPLACEMENT OF DAMPENING TAPE GASKET.

Tools:
Pocket knife

Expendable Supplies:
Adhesive

ITEM	ACTION	REMARKS
REMOVAL		
a. Two battery box cover latches (32)	Release two twist lock latches securing battery box cover (1) to battery box case (15). See figure 8-3.	
b. Battery box cover (1)	Position cover to allow access to dampening tape gasket (3).	
c. Dampening tape gasket (3)	Use pocket knife. Remove and discard defective dampening tape gasket.	
INSTALLATION		
d. Dampening tape gasket (3)	Obtain replacement. Apply adhesive to back of dampening tape gasket.	
e. Battery box cover (1)	Install dampening tape gasket in cover. Position cover to battery box case (15).	
f. Two battery box cover latches (32)	Fasten two twist lock latches securing battery box cover to case.	

8-22. REPLACEMENT OF WIRES.

Tools:

Flat tip screwdriver	Torque screwdriver	Heat sink
Soldering kit	Soldering aid	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Access cover (27)	Use flat tip screwdriver. Fully loosen five captive screws (31) securing access cover (27) to battery box case (15).	See figure 8-3.
b. Access cover (27)	Pull access cover away from battery box case to allow resoldering of wires.	
c. Wires	Use soldering kit. Desolder and discard defective wire (s).	
INSTALLATION		
d. Wires	Obtain replacement wire (s).	**NOTE**
e. Wire list	Use soldering kit. Solder wire (s) in place per following wire list: FROM — TO P1 PIN 1 — P1 PIN 2 P1 PIN 1 — LUG J1 PIN Z — LUG A1 E1 — LUG A1 E2 — J1 PIN a A1 E3 — J1 PIN Y J1 PIN F — P1 PIN 4 P1 PIN 4 — P1 PIN 5 J1 PIN U — P1 PIN 3 A1 E5 — E2 A1 E4 — E1	Before and after soldering, clean wires and solder joints with alcohol and cotton swabs.
f. Access cover (27)	Position access cover on battery box case (15).	
g. Access cover (27)	Use torque screwdriver. Tighten five captive screws (31) securing access cover (27) on battery box case (15). Torque screws to 5 in-lb.	These were removed in step a.

8-23. REPLACEMENT OF PLASTIC STRIP.

Tools:
Pocket knife

Expendable Supplies:
Adhesive

ITEM	ACTION	REMARKS
REMOVAL		
a. Two battery box cover latches (32)	Release two twist lock latches securing battery box cover (1) to battery box case (15). See figure 8-3.	
b. Battery box cover (1)	Position cover to allow access to plastic strip (10).	
c. Battery box case (15)	Use pocket knife. Remove plastic strip from case.	
d. Plastic strip (10)	Discard.	
INSTALLATION		
e. Plastic strip (10)	Obtain replacement and apply adhesive to back of plastic strip.	
f. Battery box case (15)	Install plastic strip in case.	
g. Battery box cover (1)	Position battery box cover on case,	
h. Two battery box cover latches (32)	Fasten two twist lock latches securing battery box cover to case.	

8-24. REPLACEMENT OF BATTERY BOX CASE.

Tools:

Cross tip screwdriver	Flat tip screwdriver	Heat sink
Soldering kit	Soldering aid	Torque screwdriver

Expendable Supplies:

Cotton swabs	Solder	Alcohol

References:
Paragraph 8-14 for removal and installation of catch assemblies.
Paragraph 8-18 for removal and installation of J1 connector.
Paragraph 8-20 for removal and installation of seal screws.
Paragraph 8-23 for removal and installation of plastic strip.

ITEM	ACTION	REMARKS
REMOVAL		
a. Two battery box cover latches (32)	Release two twist lock latches securing battery box cover (1) to battery box case (15).	

8-24. REPLACEMENT OF BATTERY BOX CASE. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. Strikes (23) and (14)	Use cross tip screwdriver. Remove and retain two screws (11), flat washers (13), and lockwashers (12) securing each strike to battery box case (15).	
c. Battery box cover (1)	Remove and retain.	
d. Catch assemblies (18)	Remove and retain.	Refer to paragraph 8-14 for removal instructions.
e. Access cover (27)	Use flat tip screwdriver. Fully loosen five captive screws (31). Remove cover to allow for resoldering.	
f. Two-wire transient protection CCA (26)	Use soldering kit. Tag and desolder three wires from terminals E1 thru E3.	
g. Access cover (27)	Remove and retain.	
h. J1 connector (34)	Remove and retain.	Refer to paragraph 8-18 for removal instructions.
i. Terminal lug (17)	Use cross tip screwdriver. Remove and retain screw (9), lockwasher (8), and flat washer (7) securing terminal lug to battery box case (15).	
j. P1 connector (6)	Use cross tip screwdriver. Remove and retain four screws (9), lockwashers (8), and flat washers (7) securing P1 connector to case. Remove and retain P1 connector with all wires attached.	
k. Two seal screws (16)	Remove and retain.	Refer to paragraph 8-20 for removal instructions.
l. Plastic strip (10)	Remove and retain.	Refer to paragraph 8-23 for removal instructions.
m. Battery box case (15)	Discard.	
INSTALLATION		
n. Battery box case (15)	Obtain replacement.	
o. Plastic strip (10)	Install.	Refer to paragraph 8-23 for installation instructions.
p. Two seal screws (16)	Install.	Refer to paragraph 8-20 for installation instructions.

8-24. REPLACEMENT OF BATTERY BOX CASE. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		**NOTE**
q. P1 connector (6)	Use cross tip screwdriver. Position connector to case. Install four retained screws (9), lockwashers (8), and flat washers (7) securing connector to case.	Ensure single keyway is located to right of raised letters.
r. Terminal lug (17)	Use cross tip screwdriver. Position terminal lug to case. Install retained screw (9), lockwasher (8), and flat washer (7) securing terminal lug to case.	These were removed in step i.
s. J1 connector (34)	Install.	Refer to paragraph 8-18 for installation instructions.
		NOTE
t. Two-wire transient protection CCA (26)	Use soldering kit. Position and solder three tagged wires to terminals E1 thru E3.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
u. Access cover (27)	Use torque screwdriver. Install and tighten five captive screws (31) securing access cover to case. Torque screws to 5 in-lb.	This was removed in step g.
v. Catch assemblies (18)	Install.	Refer to paragraph 8-14 for installation instructions.
w. Strikes (23) and (14)	Use cross tip screwdriver. Position retained strikes to case. Install four retained screws (11), lockwashers (12), and flat washers (13) securing Strikes to case.	These were removed in step b.
x. Battery box cover (1)	Position on case.	This was removed in step c.
y. Two battery box cover latches (32)	Fasten two twist lock latches securing battery box cover (1) to battery box case (15).	

Section V. PREPARATION FOR STORAGE OR SHIPMENT

8-25. GENERAL INFORMATION.

Pack the battery box in an approved shipping container.

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CHAPTER 9

MOUNTING BASE, ELECTRICAL EQUIPMENT MT-6353/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

9-1. INTRODUCTION.

The PA mount's main sections are:

Power Supply (power supply).

Case, Power Supply (PA mount chassis).

They are described in the following paragraphs:

9-2. POWER SUPPLY.

The power supply is mounted on the right side of the PA mount. It provides two basic functions:

It suppresses transients on the input power line.

It converts the dc input power into the dc voltages required by the power amplifier.

The input power must be 22 to 32 V dc. The current required depends on the output loads. Normally, 2 to 12 A of input current is required. A block diagram of the power supply is included in figure 9-1.

a. Transient Suppressor. The transient suppressor protects the radio from transients that may be on the input power line. The transients, surges, and ripple on the input power line must be within the requirements of MIL-STD-1275. The output of the transient suppressor is not short-circuit protected. If shorted to ground, CB1 will trip. Its output is typically 0.5 V below the input voltage.

b. DC-to-DC Converter. The output of the transient suppressor is fed into the dc-to-dc converter. It provides the following regulated output voltage:

DC Output Voltage (V dc)	Maximum Current (A)	Maximum Ripple (mV p-p)
6.75 (6.55 to 6.95)	1.5	75
13.0 (12.6 to 13.4)	4.3	75
200 (180 to 220)	0.008	3000

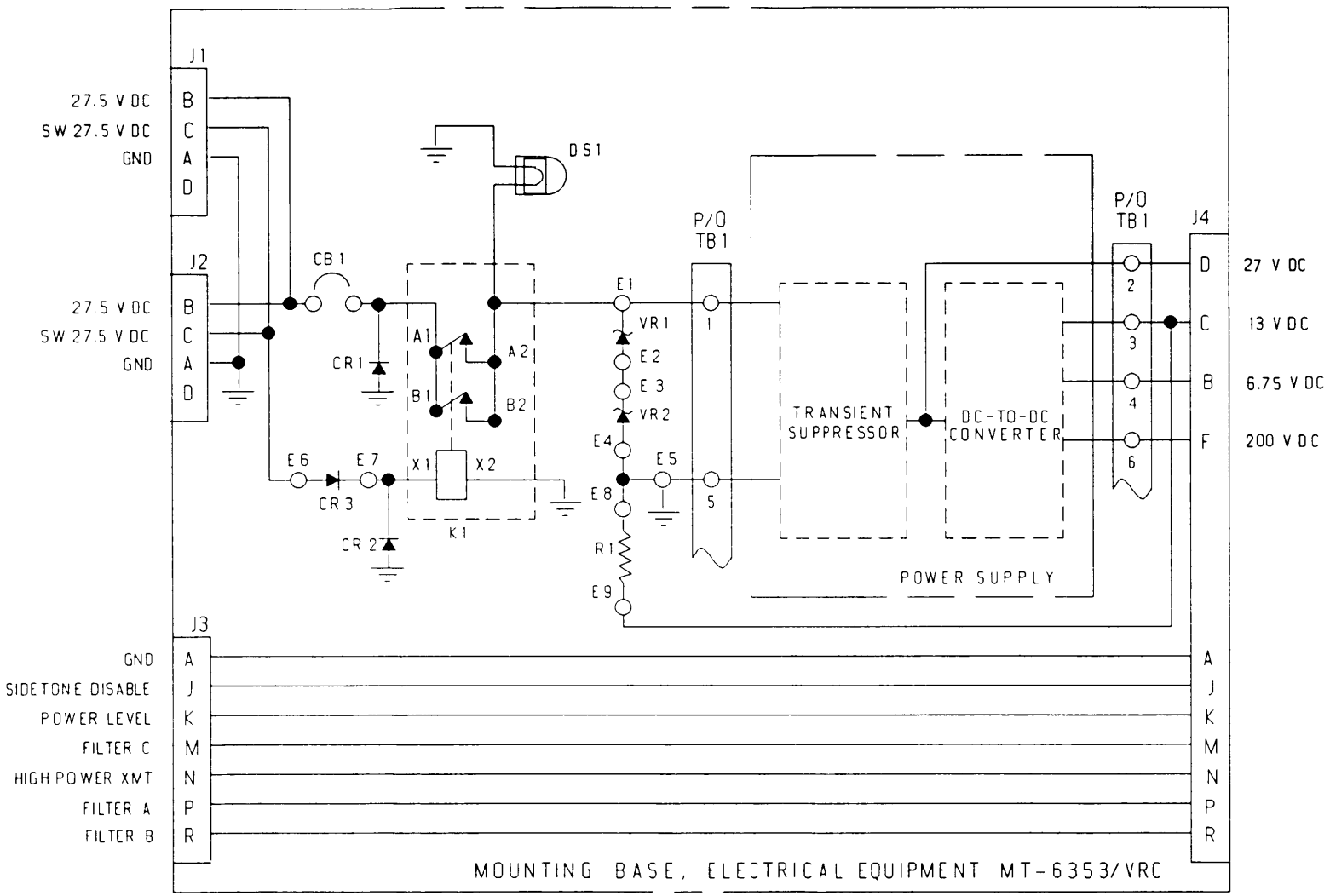

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Figure 9-1. PA Mount Schematic Diagram

9-2. POWER SUPPLY. Continued

These outputs are short-circuit protected. The power supply will not be damaged if an output is shorted to ground.

9-3. PA MOUNT CHASSIS.

The PA mount chassis provides the interconnections as shown in figure 9-1. Several other functions are also performed. The power input is switched on and off by CB1. EMP protection is provided by CR1, VR1, and VR2. Lamp DS1 indicates when power is applied to the power amplifier.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

9-4. COMMON TOOLS AND EQUIPMENT.

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

9-5. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

9-6. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

9-7. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective PA mount. The troubleshooting information is presented in the form of flow charts. They systematically get from a symptom to the bad module.

9-8. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating a PA mount. If the operational check is passed, the PA mount can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 9-9.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the "Action" column. Check the response. If the response is correct, proceed with the next lettered step. When a STEP has been completed, proceed with the next STEP. A "No response" in the "Response" column means that any response is not of interest.

The switch settings for the test equipment are given in the "EQUIPMENT PRESETS" section of each test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module.

WARNING

High voltage (200 V dc) is present at PA mount connector J4. Use caution when connecting the test setup and taking measurements to avoid personal injury.

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply ON.

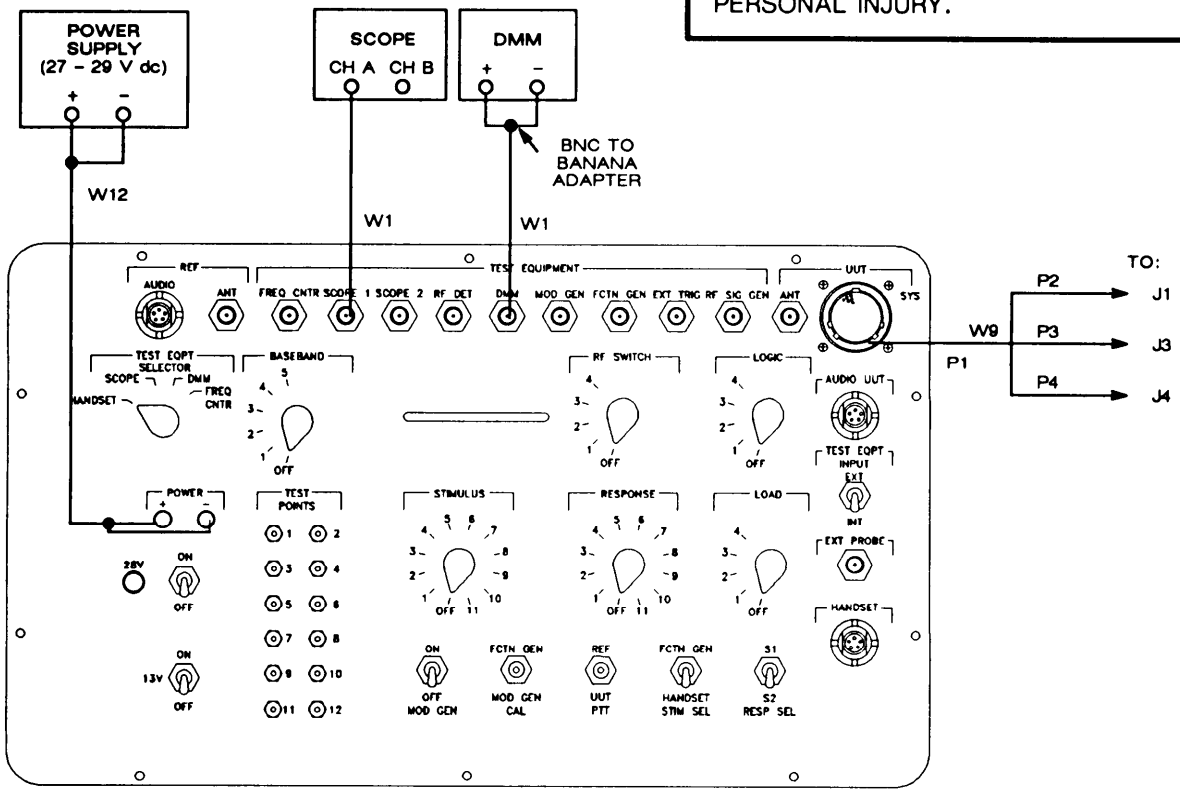
Step 1. TURN-ON CHECK.

Action	Response
a. Remove connector caps from connectors J1, J3, and J4.	a. No response.
b. Adjust test power supply for 27 V dc.	b. No response.
c. Connect test setup as shown in figure 9-2.	c. No response.
d. Turn-on test power supply. 28 V: ON	d. Test power supply circuit breaker does not trip. If the circuit breaker trips, the chassis is bad.
e. PA mount CB1: ON.	e. DS1 does not light. If it does, relay K1 is bad. CB1 does not trip. If it does, the chassis is bad.
f. Connect TP4 to TP5 with jumper cable. Listen for relay contacts to close.	f. Responses: 1. Relay contacts close. If they do not, the chassis is bad. 2. CB1 remains at ON. If it trips to OFF, go to chart 1. 3. DS1 lights. If it does not, go to chart 2.

9-8. OPERATIONAL CHECK. Continued

WARNING

HIGH VOLTAGE IS PRESENT INSIDE THE PA MOUNT. USE CAUTION TO AVOID PERSONAL INJURY.



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EQUIPMENT PRESETS

TEST ADAPTER:

28 V:	OFF
13 V:	OFF
STIMULUS:	OFF
RESPONSE:	7
LOAD:	OFF
RF SWITCH:	OFF
MOD GEN:	OFF
LOGIC:	OFF
TEST EQPT SELECTOR:	DMM
TEST EQPT INPUT:	INT
BASEBAND:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S1

PA MOUNT:

DS1:	FULL CCW
CB1:	OFF

Figure 9-2. PA Mount Test Setup.

9-8. OPERATIONAL CHECK. Continued

Step 2. POWER SUPPLY OUTPUT CHECK.

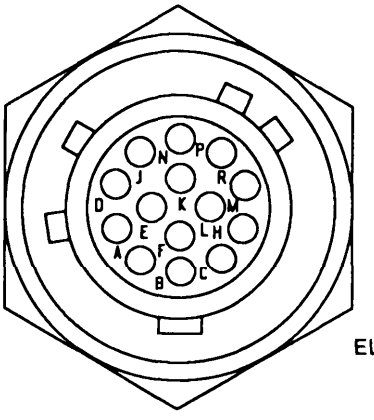
Action	Response
a. Read DMM.	a. DMM reading is 6.55 to 6.95 V dc. If not, go to chart 3.
b. RESPONSE: 8 Read DMM.	b. DMM reading is 12.6 to 13.6 V dc. If not, go to chart 4.
c. RESPONSE: 9 Read DMM.	c. DMM reading is 26.5 to 27.5 V dc. If not, go to chart 5.
d. RESPONSE: 10 Read DMM.	d. DMM reading is 180 to 220 V dc. If not, go to chart 6.
e. TEST EQPT SELECTOR: SCOPE Read scope CH A.	e. Ripple is less than 100 mV p-p. If not, power supply is bad.
f. Set RESPONSE to positions 9, 8, and 7. Read scope CH A at each position.	f. Ripple is less than 100 mV p-p at each position. If not, power supply is bad.

Step 3. INTERCONNECTION CHECK.

Action	Response
a. Remove jumper cable from TP4 and TP5. 28 V: OFF Turn off test power supply. TEST EQPT SELECTOR: DMM RESPONSE: RESP SEL: S2	a. DMM reading is less than 1 ohm (continuity). If not, the chassis is bad.
b. Set RESPONSE to positions 2 through 7. Read DMM at each position.	b. DMM reading is less than 1 ohm (continuity) at each position. If not, the chassis is bad. RESPONSE position — J3/J4 pin 2 — J 3 — K 4 — M 5 — N 6 — P 7 — R
c. Disconnect cable at mounting base connector J3. Set RESPONSE to positions 7 through 1. Read DMM at each position.	c. DMM reading is infinite ohms (open circuit) at each position. If any indicate continuity J4-pin (α) is shorted to ground, chassis is bad.

9-8. OPERATIONAL CHECK. Continued

Step 3. INTERCONNECTION CHECK. Continued

Action	Response
	J3, J4  EL7XL1088
c. Continued	c. RESPONSE position — J4 pin (α) 1 — A 2 — J 3 — K 4 — M 5 — N 6 — P 7 — R
d. RESPONSE: 8 RESP SEL: S1 Read DMM.	d. DMM reads less than 160 Ω. If not, chassis is bad.
e. Operational check is complete.	

9-9. TROUBLESHOOTING.

Troubleshooting is done on a faulty PA mount. The steps to determine if a PA mount is faulty and how to troubleshoot it are as follows:

a. **When a PA mount is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. **Verify the symptom.** Perform the operational check in paragraph 9-8. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. **Troubleshoot the PA mount using the flowchart.** It will identify the defective module or component.

d. **Replace the defective module or component.** Follow the procedures in section IV.

e. **Verify the repair.** Repeat the operational check in paragraph 9-8 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the PA mount can be returned for use.

9-10. TEST PRECAUTIONS AND NOTES.

WARNING

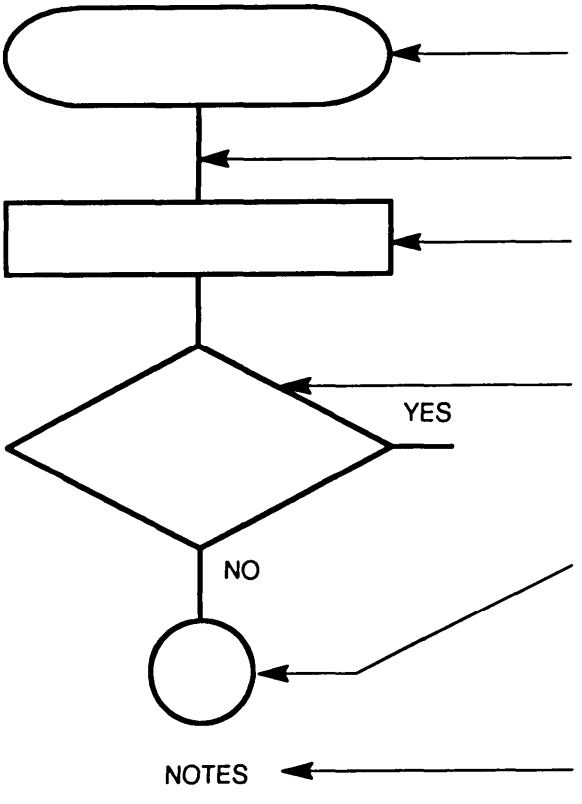
High voltage (200 V dc) is present at PA mount connector J4. Use caution when connecting the test setup and taking measurements to avoid personal injury.

Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

NOTE

The Principles of Operation section and schematic diagram can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.

9-11. EXPLANATION OF SYMBOLS AND NOTES.



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages.

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

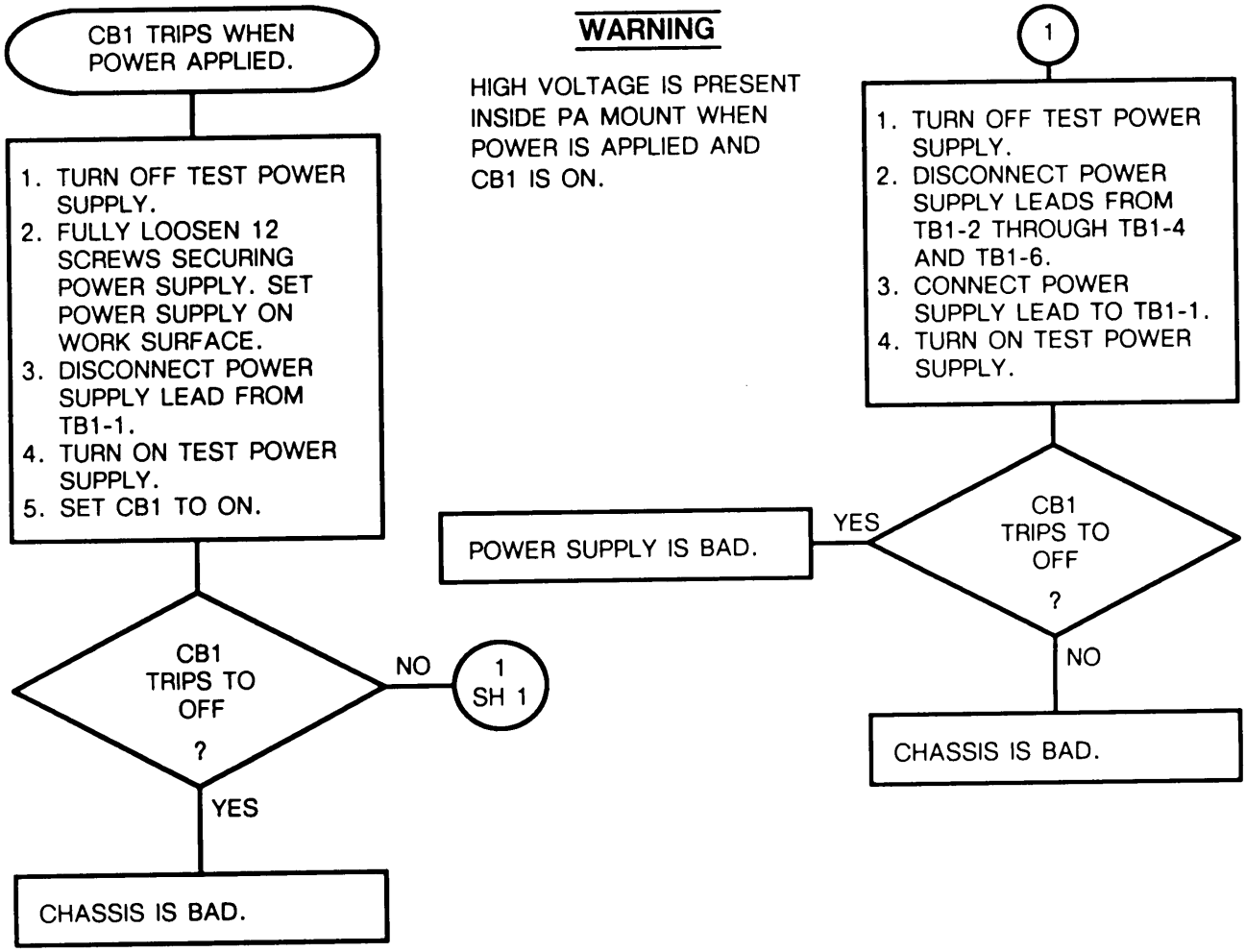
9-12. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	CB1 trips when power applied
2	Lamp DS1 does not light
3	No 6.75 Vdc output
4	No 13 V dc output
5	No 27 V dc output
6	No 200 V dc output

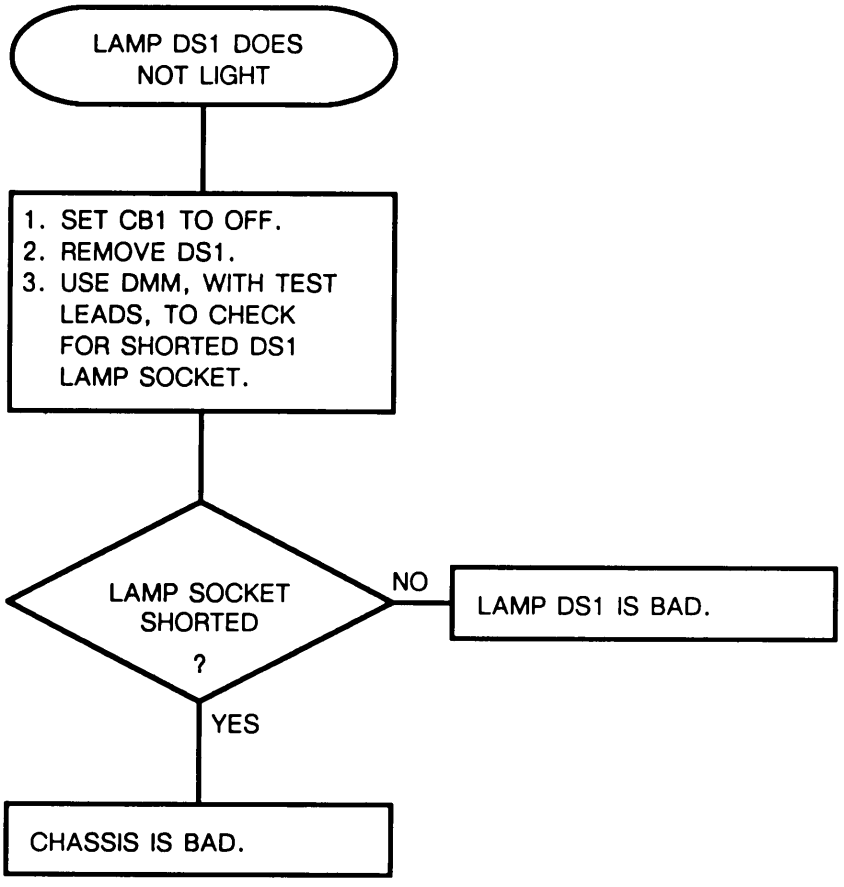
9-12. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Short on Input to Power Supply
(Sheet 1 of 1)



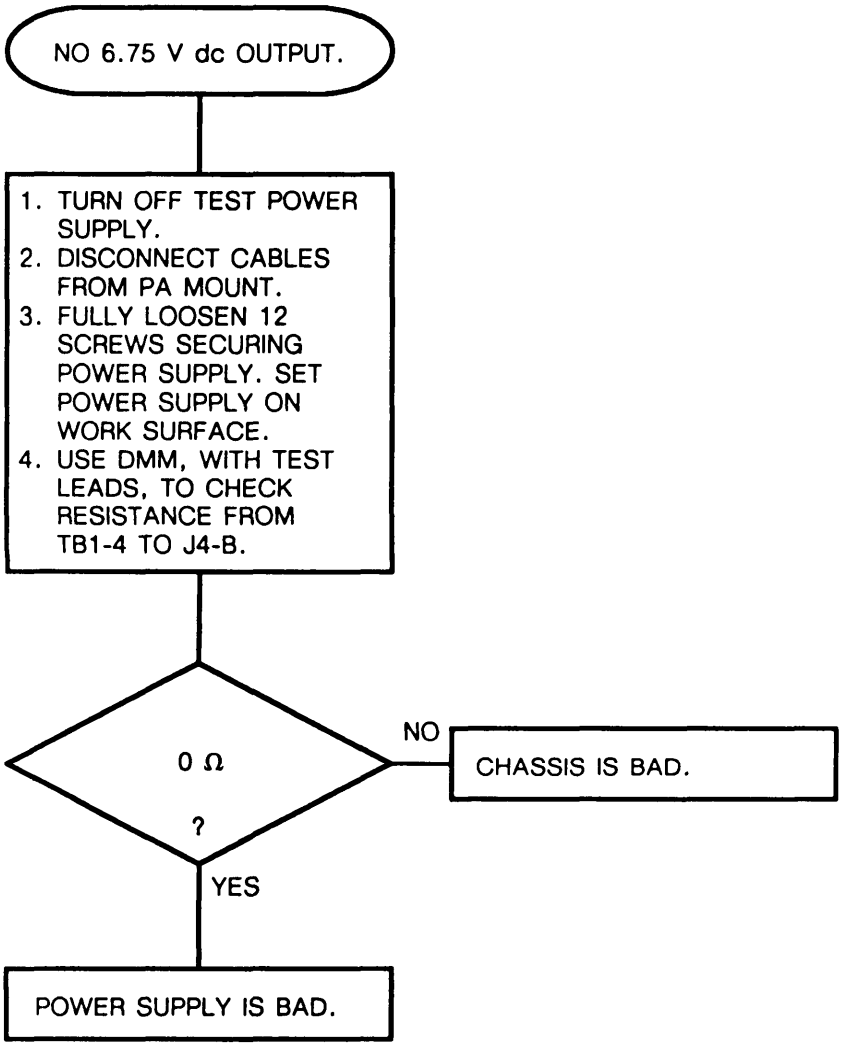
9-12. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting Lamp DS1 Circuit
(Sheet 1 of 1)



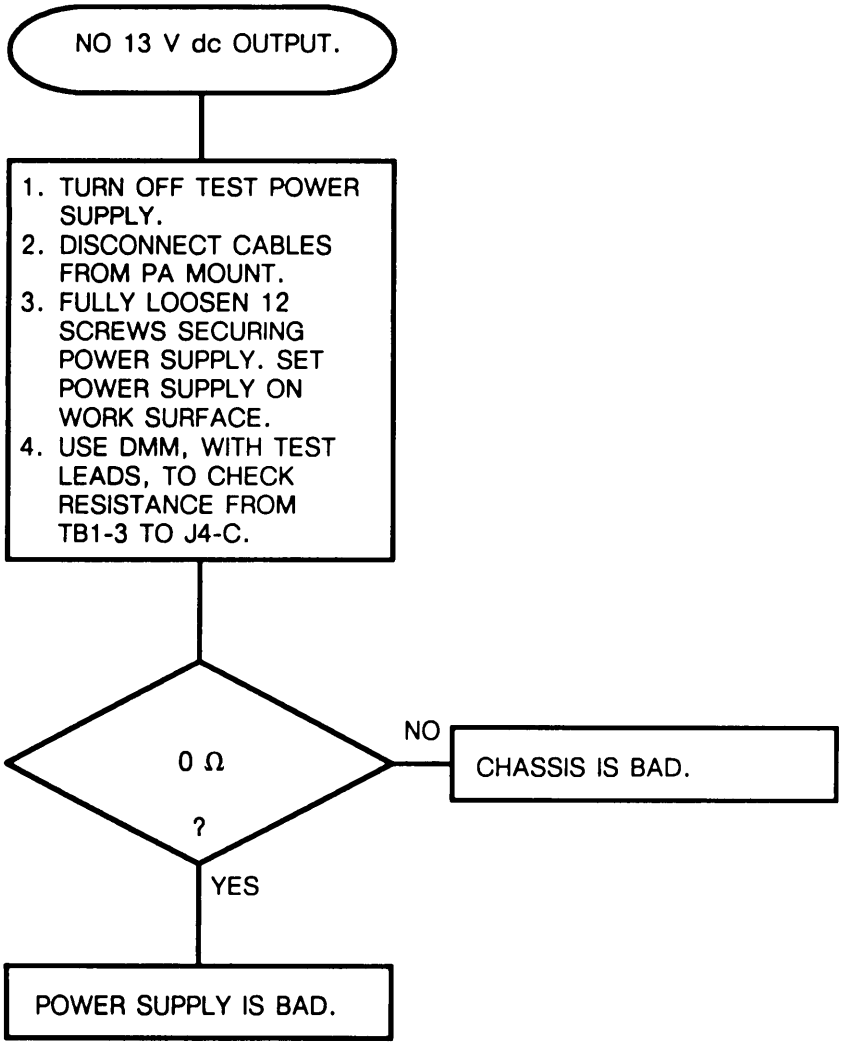
9-12. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting Power Supply 6.75 V dc Output
(Sheet 1 of 1)



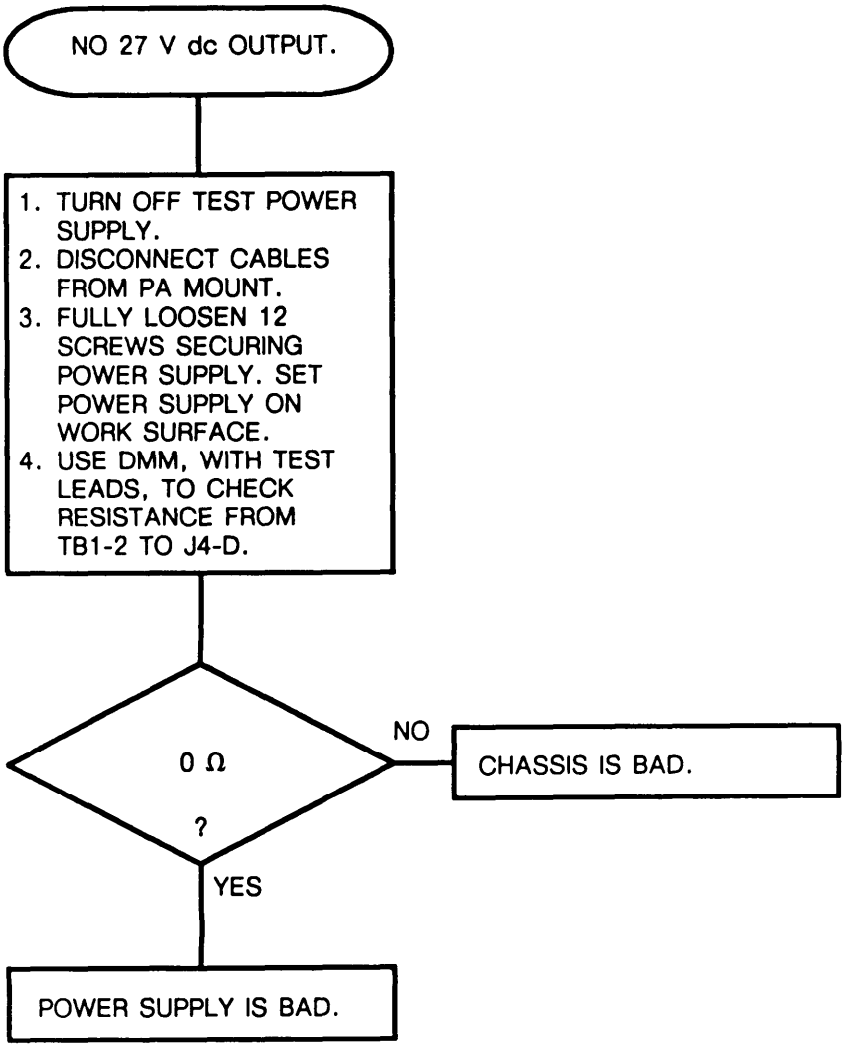
9-12. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Power Supply 13 V dc Output
(Sheet 1 of 1)



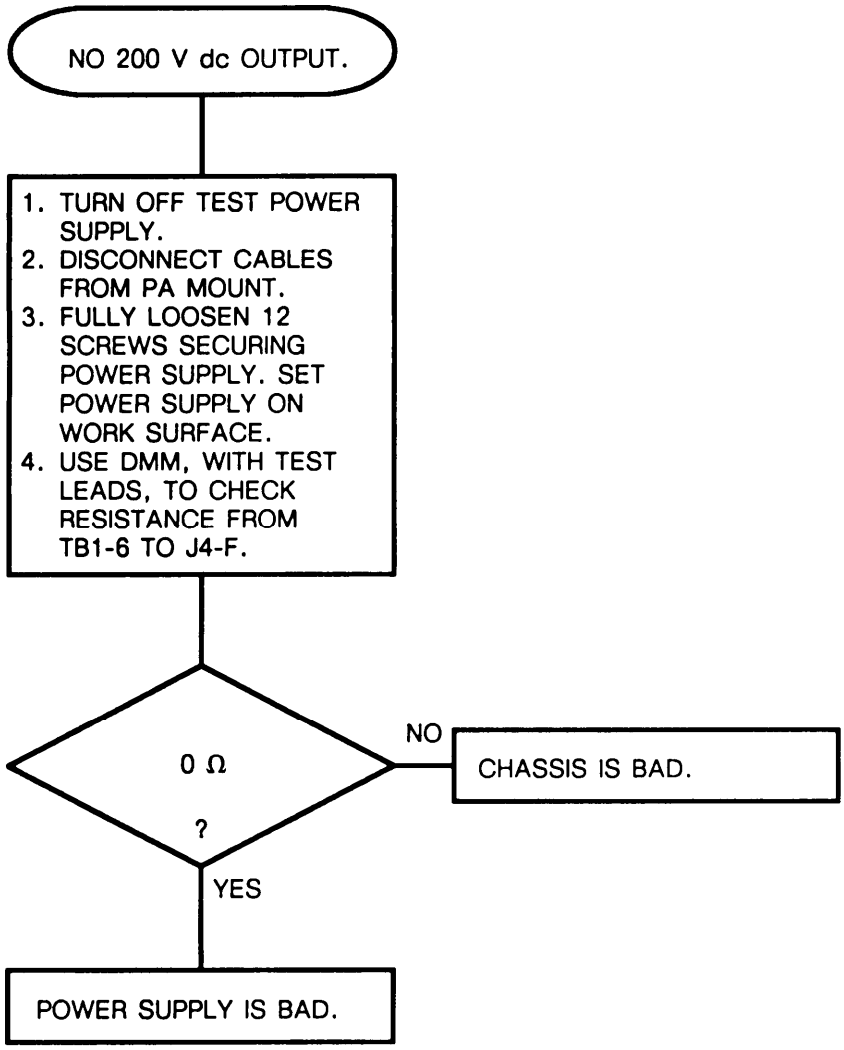
9-12. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Power Supply 27 V dc Output
(Sheet 1 of 1)



9-12. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Power Supply 200 V dc Output
(Sheet 1 of 1)



Section IV. MAINTENANCE PROCEDURES

9-13. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired PA mount. It is also used to verify the symptom of a faulty PA mount. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

9-14. OPERATIONAL CHECK.

Perform the operational check found in paragraph 9-8 to verify the proper operation of the PA mount.

9-15. REPAIR PROCEDURES.

The following instructions apply to all repair tasks unless otherwise noted in the procedure, See figure 9-4 for parts location.

a. Begin procedure with PA mount switch CB1 set to OFF.

b. Disconnect any external cables connected to PA mount.

c. Inspect PA mount. Replace PA mount chassis if it is physically damaged, such as with a broken connector.

d. PA mount must be tested after replacement of a module. See paragraph 9-8 for operational check.

CAUTION

Steps marked with **HCP** must be performed exactly as written. They are critical in maintaining the nuclear hardness of the PA mount. Seals must not be damaged. All screws must be torqued to the limits specified in Appendix B.

9-15. REPAIR PROCEDURES. Continued

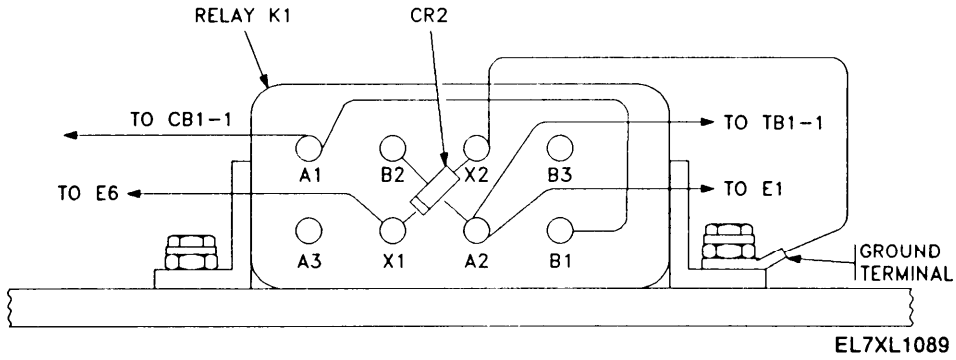


Figure 9-3. Diode CR2 Position on Relay K1.

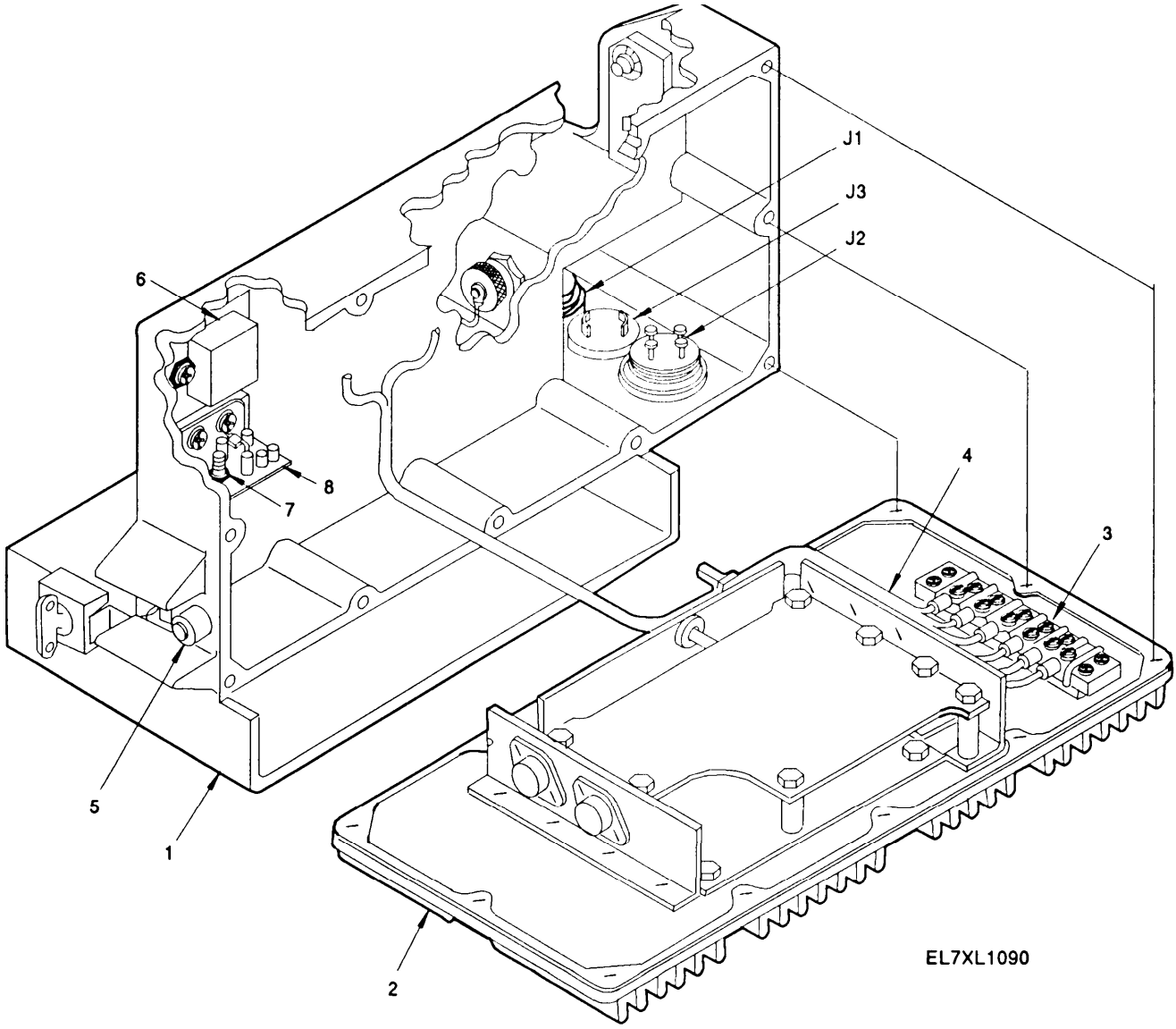


Figure 9-4. PA Mount.

9-15. REPAIR PROCEDURES. Continued

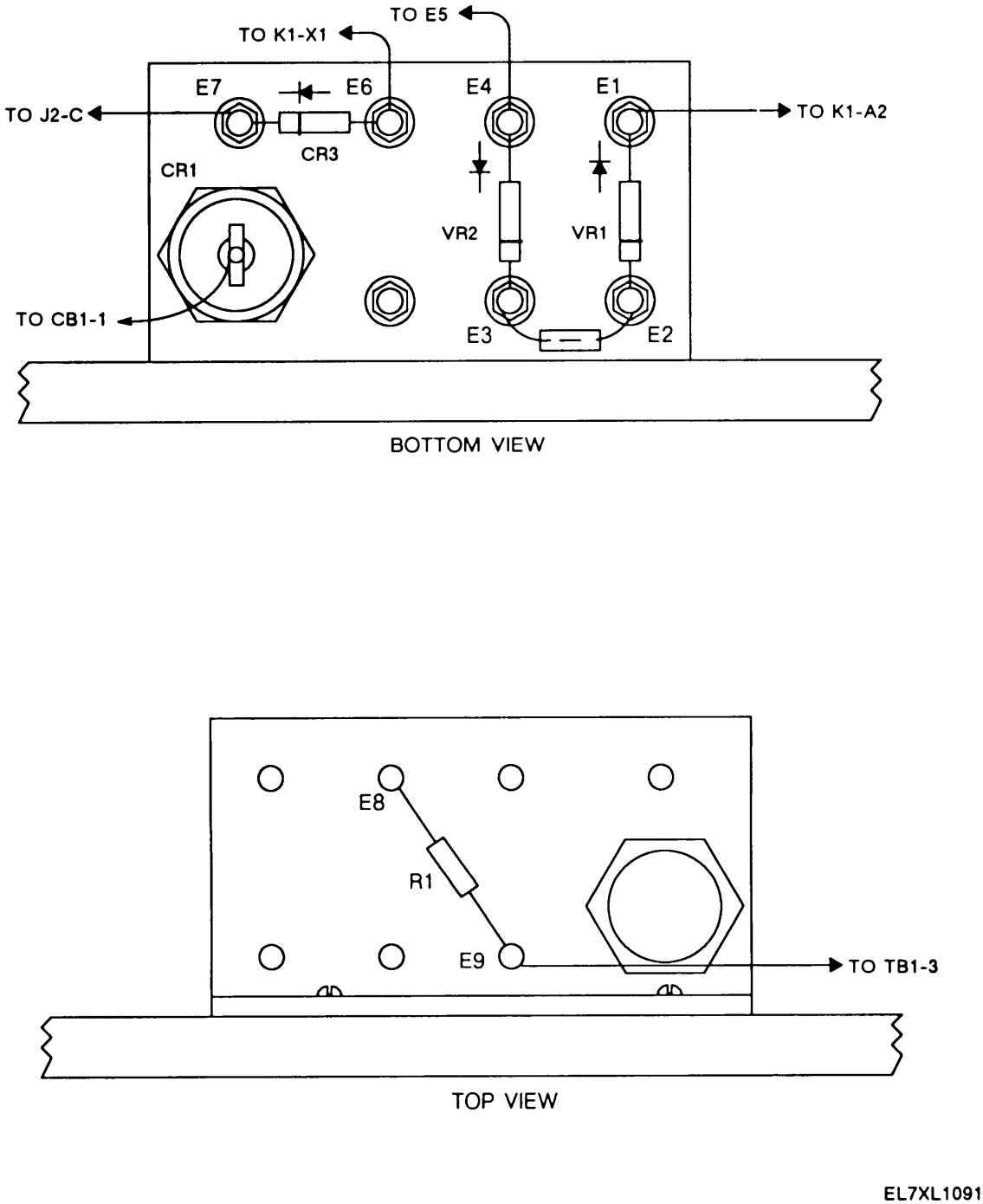


Figure 9-5. Mounting Bracket with CR1, VR1, VR2, CR3, and R1.

9-16. REPLACEMENT OF POWER SUPPLY.

Tools:

Flat tip screwdriver
Torque adapter
Torque wrench

ITEM	ACTION	REMARKS
REMOVAL		
a. PA mount (1)	Set on work surface with right side toward you. See figure 9-4.	
b. 12 captive screws	Fully loosen.	
c. Power supply (2)	Set power supply on work surface.	
d. Six screws on TB1 (2)	Loosen and remove power supply wires.	
e. Power supply wires	Tag wires as to location on TB1, Wire connected to TB1 position 1 is labeled "1". Repeat for all six wires.	
f. Power supply (2)	Remove.	
g. Seal gasket	Check for damage.	
INSTALLATION		
h. Seal gasket	Place on power supply (2).	
i. Power supply (2)	Set on work surface so that wires can be connected to TB1 (3).	
j. PA mount chassis wires	Connect to TB1 (3). Wire labeled "1" connects to TB1 position 1. Repeat for all six wires.	
k. Six screws on TB1 (3)	Tighten.	
l. HCP Power supply and 12 captive screws	Hold power supply in place on PA mount and tighten screws. Torque to 9 in-lb.	

9-17. REPLACEMENT OF PA MOUNT CHASSIS.

Tools:

Flat tip screwdriver
Cross tip screwdriver
Torque adapter
Torque wrench

References:

Paragraph 9-16 for removal and installation of the power supply.

ITEM		ACTION	REMARKS
a.	Power supply (2)	Remove from faulty PA mount chassis. Install in good PA mount chassis.	

9-18. LAMP DS1 REPLACEMENT.

ITEM	ACTION	REMARKS
REMOVAL		
a. Lens assembly (5)	Loosen and remove. See figure 9-4.	
b. Lamp DS1	Pull free from lens assembly.	
INSTALLATION		
c. Lamp DS1	Install in lens assembly.	
d. Lens assembly (5)	Install and tighten.	

Section V. PREPARATION FOR STORAGE OR SHIPMENT

9-19. GENERAL INFORMATION.

Pack the PA mount, chassis, or power supply in approved shipping containers.

CHAPTER 10

ANTENNA BASE, AS-3684/VRC AND AS-3900/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

10-1. INTRODUCTION.

The antenna base has two basic functions. First, it provides an interface between the RT and the antenna. Second, it is a secure mounting surface for the antenna.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

10-20 COMMON TOOLS AND EQUIPMENT.

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

10-3. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

10-4. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

10-5. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective antenna base.

10-6. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating an antenna base. If the operational check is passed, the antenna base can be returned to service. If it does not pass the test, dispose of the defective antenna base. The troubleshooting procedures are in paragraph 10-7.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a STEP has been completed, proceed with the next STEP. A "No response" in the “Response’’ column means that any response is not of interest.

The switch settings for the test equipment are given in the ’’EQUIPMENT PRESETS” section of each test setup figure.

WARNING

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply ON.

10-6. OPERATIONAL CHECK. Continued

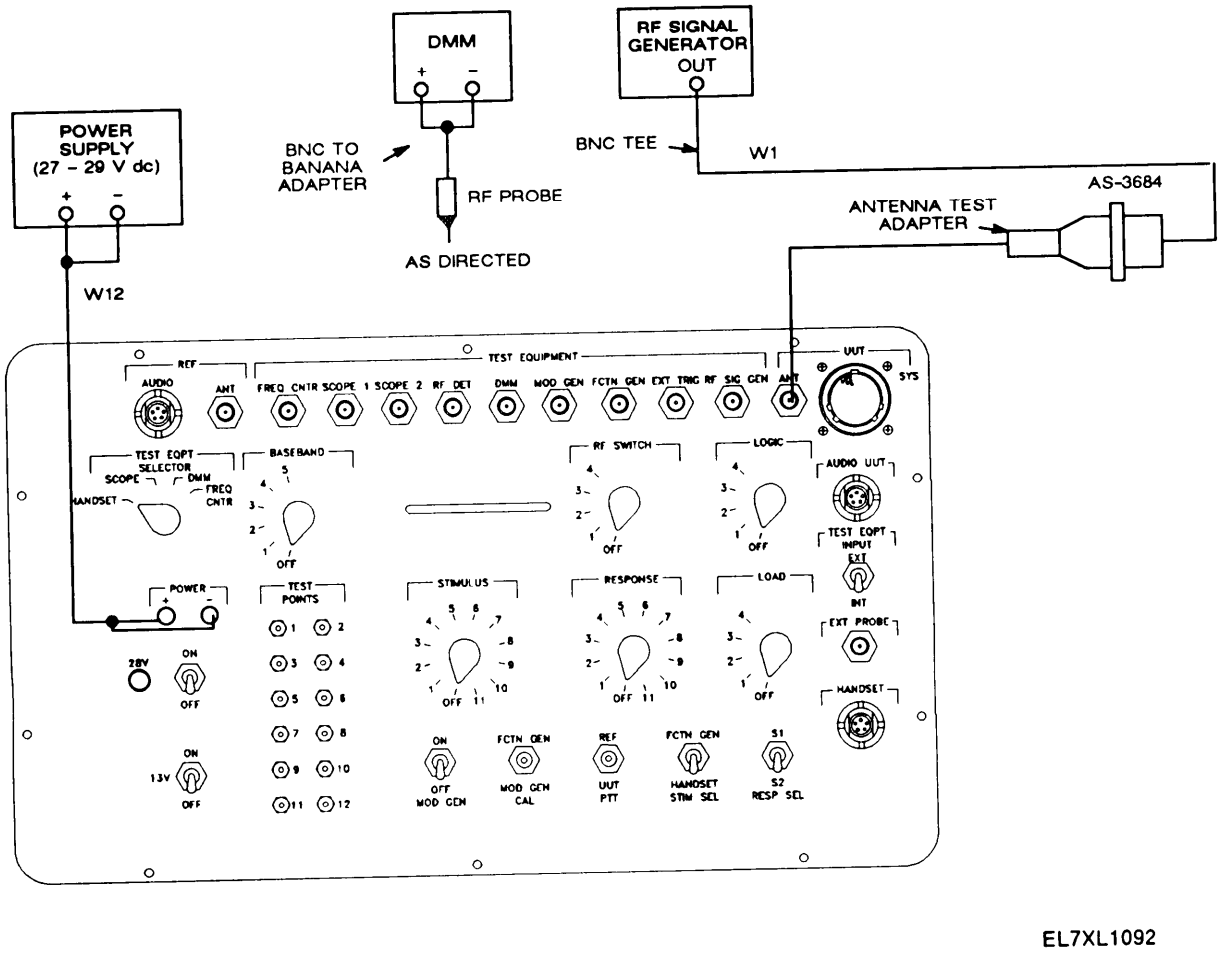
Step 1. AS-3684 ANTENNA BASE CHECK.

Action	Response
a. Connect equipment as shown in figure 10-1.	a. No response.
b. Connect RF probe to RF signal generator.	b. No response.
c. Set RF signal generator to frequency listed in table 1. Set RF signal generator level to +10 +0.1 dBm on DMM.	c. No response.
d. Connect RF probe to RF DET. Read DMM.	d. DMM reading shall be as indicated in second column of table 1. If not, AS-3684 antenna base is bad.
e. Repeat steps b thru d for all remaining frequencies.	e. DMM reading shall be as indicated in second column of table 1 If not, AS-3684 antenna base is bad.
f. Operational Check of AS-3684 antenna base is complete.	

Table 1

F (MHz +10 kHz)	DMM reading (dBm)
36	2,5 to 600
46	11.4 to 13.4
56	5.7 to 7.7
60	6.1 to 8.1
70	11.2 to 13.2
78	7.2 to 9.2
82	7.4 to 9.4

10-6. OPERATIONAL CHECK. Continued



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EQUIPMENT PRESETS

TEST ADAPTER:

28 V:	ON
13 V:	OFF
STIMULUS:	OFF
RESPONSE:	OFF
LOAD:	OFF
RF SWITCH:	1
MOD GEN:	OFF
LOGIC:	OFF
TEST EQPT SELECTOR:	HANDSET
TEST EQPT INPUT:	INT
BASEBAND:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S1

Figure 10-1. AS-3684/VRC Antenna Base Test Setup.

10-6. OPERATIONAL CHECK. Continued

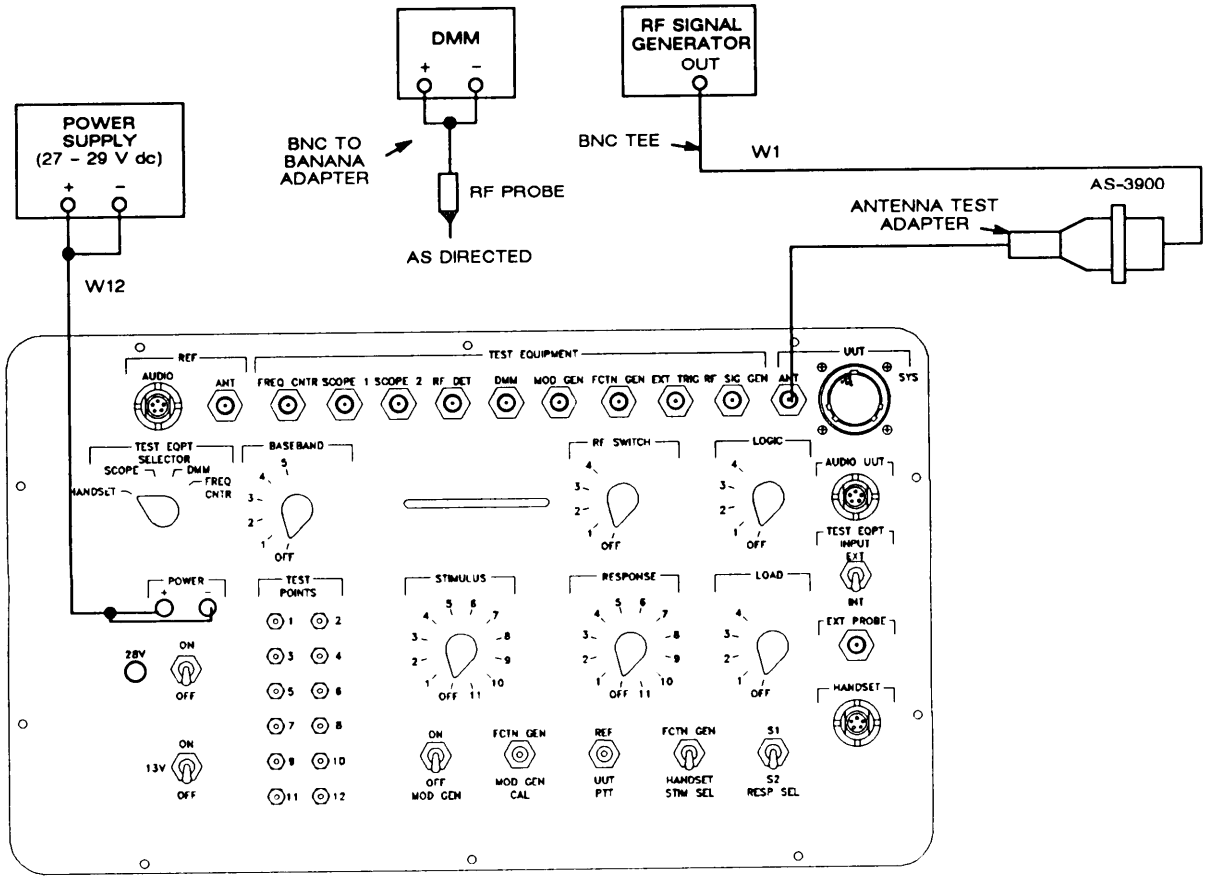
Step 2. AS-3900 ANTENNA BASE CHECK.

Action	Response
a. Connect equipment as shown in figure 10-2.	a. No response.
b. Connect RF probe to RF signal generator.	b. No response.
c. Set RF signal generator to frequency listed in table 2. Set RF signal generator level to +10 +0.1 dBm on DMM.	c. No response.
d. Connect RF probe to RF DET. Read DMM.	d. DMM reading shall be as indicated in second column of table 2. If not, AS-3900 antenna base is bad.
e. Repeat steps b thru d for all remaining frequencies.	e. DMM reading shall be as indicated in second column of table 2. If not, AS-3900 antenna base is bad.
f. Operational Check of AS-3900 antenna base is complete.	

Table 2

F(MHz +10 kHz)	DMM reading (dBm)
36	4.1 to 6.1
46	9.5 to 11.5
56	5.4 to 7.4
60	5.5 to 7.5
70	10.7 to 12.7
78	8.8 to 10.8
82	8.6 to 10.6

10-6. OPERATIONAL CHECK. Continued



EL7XL1093

EQUIPMENT PRESETS

TEST ADAPTER:

28 V:	ON
13 V:	OFF
STIMULUS:	OFF
RESPONSE:	OFF
LOAD:	OFF
RF SWITCH:	1
MOD GEN:	OFF
LOGIC:	OFF
TEST EQPT SELECTOR:	HANDSET
TEST EQPT INPUT:	INT
BASEBAND:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S1

Figure 10-2. AS-3900/VRC Antenna Base Test Setup.

10-7. TROUBLESHOOTING.

The AS-3684 antenna base and the AS-3900 antenna base are non-repairable items. Troubleshooting consists of performing the operational check found in paragraph 10-6. If the antenna base is found to be bad, replace with a new one.

Section IV. MAINTENANCE PROCEDURES

10-8. INTRODUCTION.

Maintenance of the AS-3684 antenna base or AS-3900 antenna base consists of replacing defective components.

10-9. OPERATIONAL CHECK.

Perform the operational check found in paragraph 10-6 to verify the proper operation of the AS-3684 antenna base or AS-3900 antenna base.

10-10. REPAIR PROCEDURE.

The AS-3684 antenna base and AS-3900 antenna base are non-repairable items and when found to be defective should be disposed of in an appropriate manner.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

10-11. GENERAL INFORMATION.

Pack the AS-3684 antenna base or AS-3900 antenna base in an approved shipping container.

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CHAPTER 11

CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-13313/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

11-1. INTRODUCTION.

The CX-13313/VRC cable has one basic function. It filters out modulation and fluctuations in supplied power to the VIC AM-1780/VRC.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

11-2. COMMON TOOLS AND EQUIPMENT.

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

11-3. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

11-4. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

11-5. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective CX-13313/VRC cable. There is no troubleshooting information as the CX-13313/VRC cable is a non repairable item.

11-6. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating a CX-13313/VRC cable. If the operational check is passed, the CX-13313/VRC cable can be returned to service. If it does not, the CX-13313/VRC cable shall be considered bad.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a STEP has been completed, proceed with the next STEP. A “No response” in the “Response” column means that any response is not of interest.

The switch settings for the test equipment are given in the “EQUIPMENT PRESETS” section of each test setup figure.

WARNING

Connect the test setups only when directed, and with the power supply set to OFF. The large current capacity of the test power supply can cause personal injury. Verify the test setup before turning the power supply ON.

11-6. OPERATIONAL CHECK. Continued

Step 1. CX-13313/VRC CABLE CHECK.

Action	Response
a. Set DMM to 200 Ω scale and check the resistance between the following connector pins: P1 -A and P2-A P1 -B and P2-B P1-C and P2-C P1-D and P2-D P1-H and P2-H P1-K and P2-K P1-S and P2-S P1-U and P2-U P1-SHELL and P2-SHELL P1-A and P1-SHELL P2-A and P2-SHELL	a. All DMM readings are less than 1 Ω. If not, cable is bad.
b. Set DMM to 20 k Ω scale and check the resistance between the following connector pins: NOTE: Observe polarity. (+) lead — P2-C (-) lead — P1-A	b. DMM reading changes from greater than 0.5 k Ω to open within 20 seconds. If not, cable is bad. **NOTE:** If DMM reading does not change and is open, apply a short from P1-A to P2-C and repeat step b.
c. Operational check is complete.	

11-6. OPERATIONAL CHECK. Continued

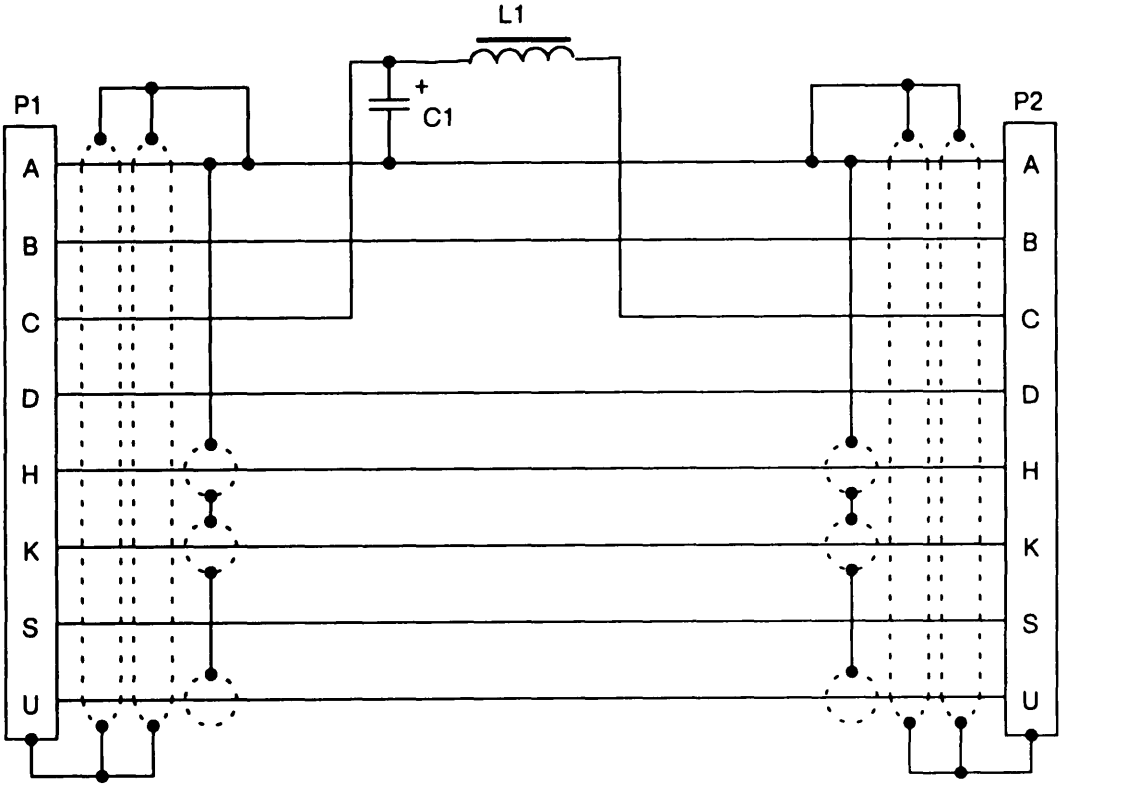

Figure 11-1. CX-13313/VRC Cable Schematic Diagram.

11-7. TROUBLESHOOTING.

The CX-13313/VRC cable is a non-repairable item. Troubleshooting consists of performing the operational check found in paragraph 11-6. If the cable is bad, replace with a new one. The CX-13313/VRC cable schematic shown in figure 11-1 is provided for informational purposes and to aid in performing the operational check.

Section IV. MAINTENANCE PROCEDURES

11-8. INTRODUCTION.

Maintenance of the CX-13313/VRC cable consists of identifying defective components.

11-9. OPERATIONAL CHECK.

Perform the operational check found in paragraph 11-6 to verify the proper operation of the CX-13313/VRC cable.

11-10. REPAIR PROCEDURE.

The CX-13313/VRC cable is a non-repairable item and when found to be defective should redisposed of in an appropriate manner.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

11-11. GENERAL INFORMATION.

Pack the CX-13313/VRC cable in an approved shipping container.

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CHAPTER 12

MOUNTING BASE, ELECTRICAL EQUIPMENT MT-6429/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

12-1. INTRODUCTION.

The COMSEC mount performs the following functions:

Physically supports the KY-57 COMSEC unit.

Electrically connects the KY-57 COMSEC unit to vehicular power.

12-2. ELECTRICAL FILTER ASSEMBLY.

The electrical filter has three connectors as shown in figure 12-1. The power cable connects to J1. Power for a second device is available at J2.

The electrical filter assembly has no active circuitry. Filter FL1 filters the dc input power. The KY-57 plugs into J3. All connections are as shown in figure 12-1.

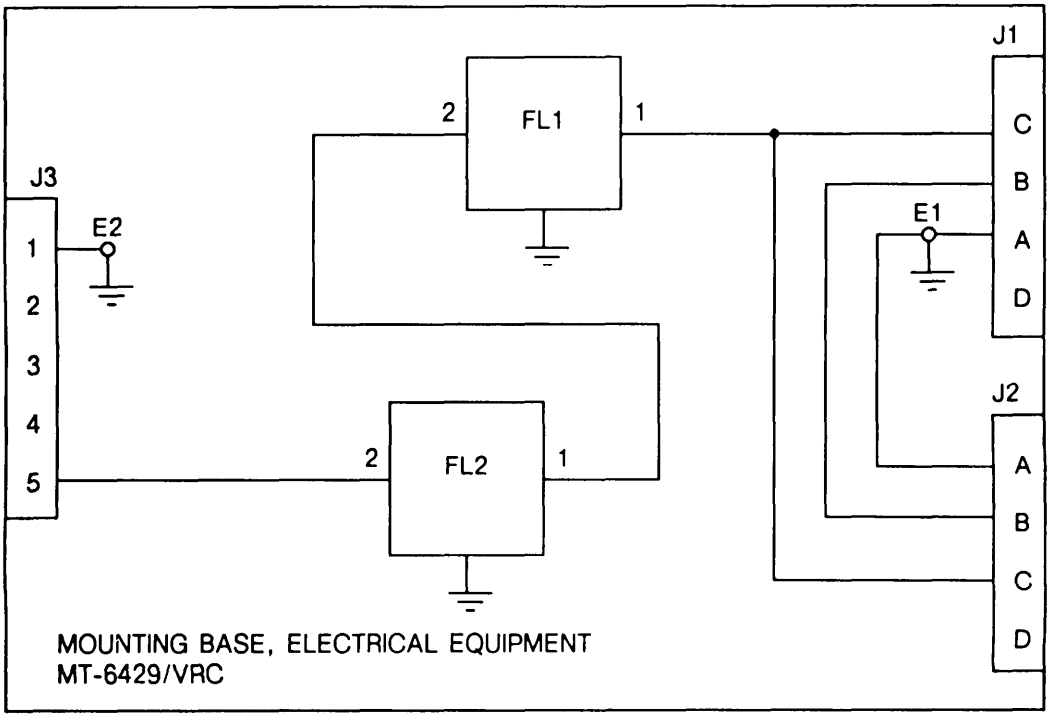


Figure 12-1. COMSEC Mount Schematic Diagram.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

12-3. COMMON TOOLS AND EQUIPMENT.

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

12-4. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

12-5. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering DS maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

12-6. TROUBLESHOOTING.

When a COMSEC mount is received from unit maintenance, inspect it for damage. Repair any damage following the instructions in section IV. If the COMSEC mount has an electrical problem, use the DMM and figure 12-1 to verify the fault. If there is a short or open circuit in the electrical filter assembly, repair it. Follow the instructions in section IV.

Section IV. MAINTENANCE PROCEDURES

12-7. INTRODUCTION.

Maintenance of the COMSEC mount consists of replacing defective parts. The electrical filter assembly can be removed by unit maintenance. Check it as described in section III. The repair procedure is in paragraph 12-9. Repair of the COMSEC mount is covered in paragraph 12-8. Inspect all of the parts and replace any that are defective.

CAUTION

Steps marked with **HCP** must be performed exactly as written. They are critical in maintaining the nuclear hardness of the mounting adapter. Seals must not be damaged. All screws must be torqued to the limits specified in Appendix B.

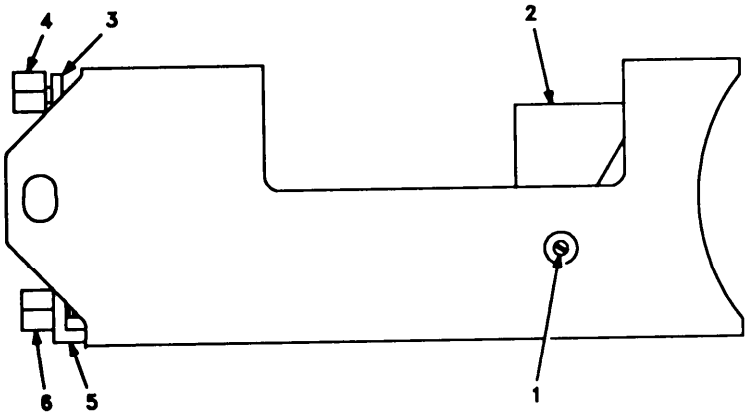
12-8. COMSEC MOUNT REPAIR PROCEDURE.

Tools:

Tool Kit, Electronic Equipment, TK-105/G

ITEM	ACTION	REMARKS
DISASSEMBLY		
a. Two screws and washers (1)	Loosen and remove two screws and two washers.	See figure 12-2 for parts identification.
b. Electrical filter assembly (2)	Pull assembly free from COMSEC mount.	
c. Clamp plate (3)	Fully loosen and remove two thumbscrews (4).	
d. Rim clenching clamp (5)	Fully loosen and remove thumbscrew (6).	
ASSEMBLY		
e. Rim clenching clamp (5)	Install and tighten thumbscrew (6).	
f. Clamp plate (3)	Install and tighten two thumbscrews (4).	
g. Electrical filter assembly (2)	Place in position in COMSEC mount.	
h. Two screws and washers (1)	Install and tighten two screws and two washers.	

12-8. COMSEC MOUNT REPAIR PROCEDURE. Continued



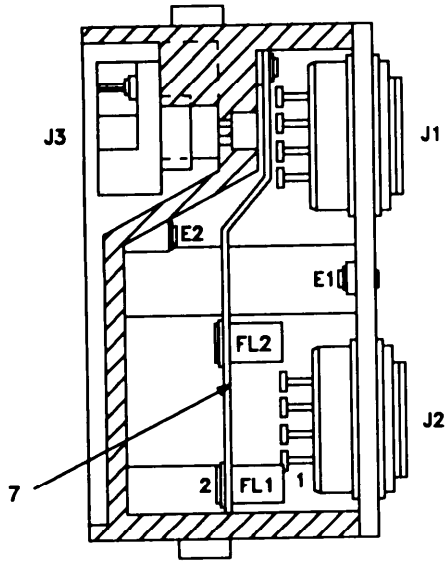


Figure 12-2. COMSEC Mount Component Locations.

12-9. ELECTRICAL FILTER ASSEMBLY REPAIR PROCEDURE.

Tools:

Tool Kit, Electronic Equipment, TK-105/G
Torque wrench
Torque adapter

ITEM	ACTION	REMARKS
DISASSEMBLY		
a. Six captive screws	Fully loosen. Lift cover off at case.	See figure 12-2 for parts identification.
b. Electrical connectors J1 and J2	Unsolder wires. Loosen and remove locking rings on connectors. Remove from cover.	
c. Filter support plate (7)	Remove four screws and lift free of the case.	
d. Electrical connector J3	Remove two screws and lift J3 free of case. Unsolder the wire attached to post 5.	
ASSEMBLY		
e. Electrical connector J3	Solder the wire attached to post 5. Place connector J3 in position in the case. Install and tighten two screws. Torque to 9 in-lb.	Before and after soldering, clean wires and leads with cotton swabs and alcohol.
f. Filter support plate (7)	Position on case. Install and tighten four screws. Torque to 9 in-lb.	
g. Electrical connectors J1 and J2	Position on cover. Install and tighten locking rings on connectors. Solder wires in place.	
h. Six captive screws	Place cover on case. Tighten captive screws. Torque to 9 in-lb.	

Section V. PREPARATION FOR STORAGE OR SHIPMENT

12-10. GENERAL INFORMATION.

Pack the COMSEC mount in an approved shipping container.

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CHAPTER 13

CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL CX-13293/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

13-1. INTRODUCTION.

The CX-13293/VRC cable has two basic functions. First, it provides an interface between the RT and the COMSEC device. Second, it provides a means of assuring that if the battery of the COMSEC device becomes too weak to operate the COMSEC device the RT will not transmit.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

13-2. COMMON TOOLS AND EQUIPMENT.

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

13-3. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

13-4. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

13-5. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective CX-13293/VRC cable.

13-6. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating an CX-13293/VRC cable. If the operational check is passed, the CX-13293/VRC cable can be returned to service. If it does not, the CX-13293/VRC cable shall be considered bad.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response incorrect, proceed with the next lettered step. When a STEP has been completed, proceed with the next STEP. A "No response" in the “Response” column means that any response is not of interest.

13-6. OPERATIONAL CHECK. Continued

Step 1. CX-13293/VRC CABLE CHECK.

Action	Response
a. Set DMM to 200 Ω scale and check the resistance between the following connector pins: P1-1 and P3-K P1-7 and P2-B P1-8 and P2-C P1-9 and P2-D P1-13 and P2-F P1-14 and P2-E P1-17 and P2-A P1-34 and P3-N P1-41 and P3-A P1-42 and P3-U P1-48 and P3-S P1-50 and P3-B P1-51 and P3-E P1-54 and P3-T	a. All DMM readings are less than 1 Ω. If not, cable is bad.
b. Set DMM to 20 Ω scale and check the resistance between the following connector pins: P1-8 and P1-54 P1-8 and P3-T P1-54 and P2-C P2-C and P3-T	b. All DMM readings are 4.7 to 5.5 Ω. If not, cable is bad.
c. Set DMM to 2 Ω scale and check the resistance between the following connector pins: P1-34 and P1-42 P1-34 and P3-U P3-N and P3-U P3-N and P1-42	c. All DMM readings are 470 to 550 Ω. If not, cable is bad.
d. Set DMM to 2 Ω scale and check the resistance between the following connector pins: NOTE: Observe polarity. (+) lead — (-) lead P3-D — P1-54 P3-D — P3-T	d. All DMM readings are 0.83 to 1.63 Ω. If not, cable is bad.

13-6. OPERATIONAL CHECK. Continued

Step 1. CX-13293/VRC CABLE CHECK. Continued

Action	Response
e. Set DMM to 20 M Ω scale and check the resistance between the following connector pins: NOTE: Observe polarity. (+) lead P3-T (-) lead P3-D	e. DMM reads open. If not, cable is bad.
f. Set DMM to 20 M Ω scale and check the resistance between the following connector pins: P3-T P3-K	f. DMM reads greater than 1 M Ω. If not, cable is bad.
g. Set DMM to 20 M Ω scale and check the resistance between the following connector pins: NOTE: Observe polarity. (+) lead P3-K (-) lead P3-N	g. DMM reading changes from greater than 1 M Ω to open within 30 seconds. If not, cable is bad. **NOTE:** If DMM reading does not change and is open, apply a short from P3-K to P3-N and repeat step g.
h. Operational check is complete.	

13-6. OPERATIONAL CHECK. Continued

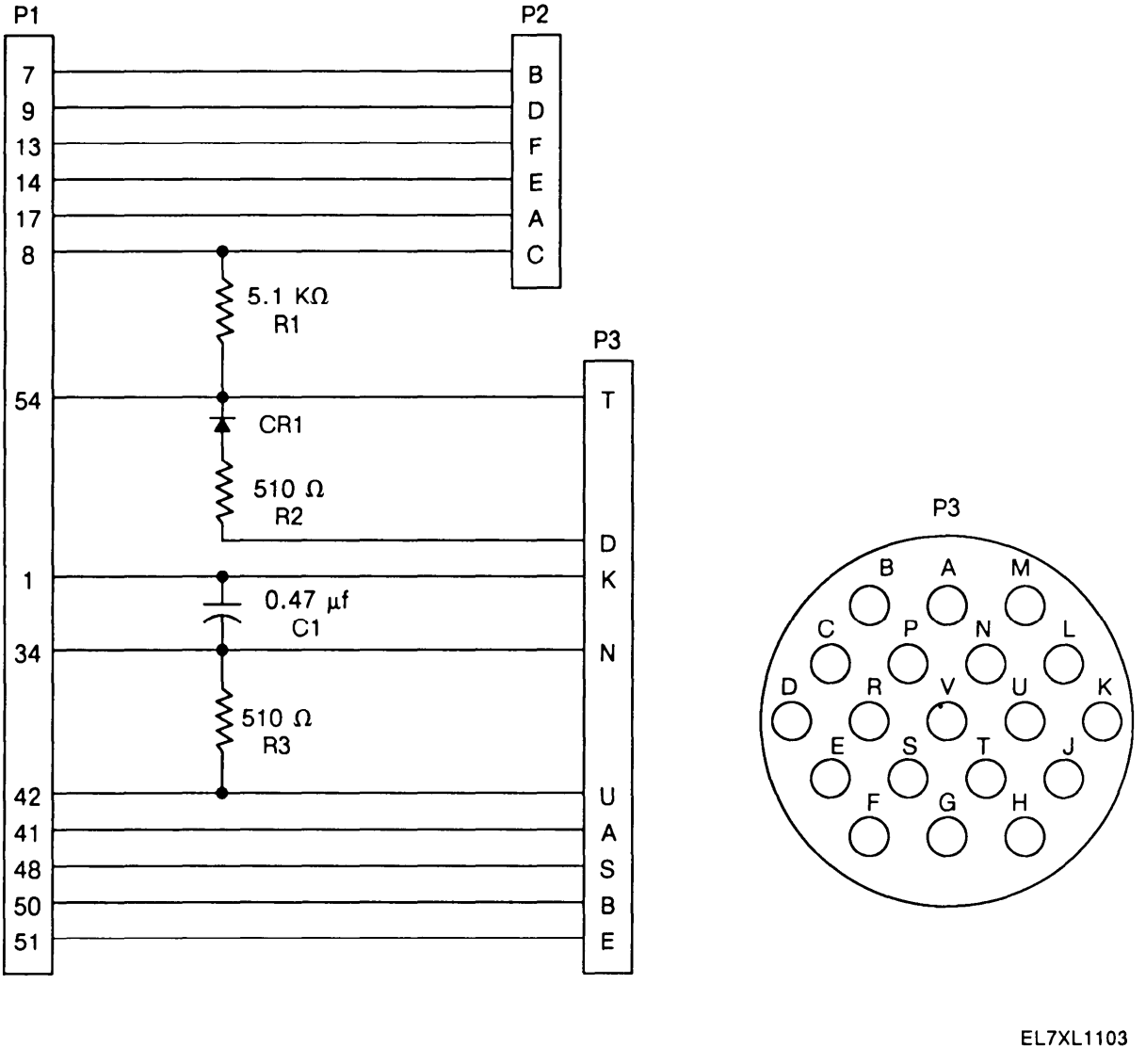

Figure 13-1. CX-13293/VRC Cable Schematic Diagram.

13-7. TROUBLESHOOTING.

The CX-13293/VRC cable is a non-repairable item. Troubleshooting consists of performing the operational check found in paragraph 13-6. If the cable is bad, replace with a new one. The CX-13293/VRC Cable schematic shown in figure 13-1 is provided for informational purposes and the aid in performing the operational check.

Section IV. MAINTENANCE PROCEDURES

13-8. INTRODUCTION.

Maintenance of the CX-13293/VRC cable consists of checking by inspection and repair of the audio connector. All other components are to be sent to general support for repair.

13-9. OPERATIONAL CHECK.

Perform the operational check found in paragraph 13-6 to verify the proper operation of the CX-13293/VRC cable.

13-10. REPAIR PROCEDURE.

With the exception of the audio connector, the CX-13293/VRC cable is a non-repairable item and when found to be defective should be disposed-of in an appropriate manner. The procedure for replacement of the audio connector is found in the following paragraph.

13-11. REPLACEMENT OF AUDIO CONNECTOR.

Tools:

Hex Head Key | Slip-Joint Pliers | Soldering kit

Expendable supplies:

Alcohol | Cotton swabs | Soldering kit

NOTE:

If connector shell is damaged and shell insert is undamaged, replace only shell. Do not replace insert unless damaged.

ITEM	ACTION	REMARKS
REMOVAL		
a. Two set screws	Using hex head key, loosen and remove two set screws in connector adapter nut.	
b. Connector shell	Hold connector shell and cable “in-place” and use slip-joint pliers to turn connector adapter nut until connector shell is free of cable assembly.	
c. Connector insert	Carefully remove connector insert from connector shell and discard defective connector shell.	

13-11. REPLACEMENT OF AUDIO CONNECTOR. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
d. Wires	Note each wire position. Using soldering kit, desolder wires from connector insert.	
INSTALLATION		
e. Wires	Using soldering kit, solder wires to correct positions on connector insert.	Before and after soldering, clean solder joints with cotton swabs and alcohol.
f. Connector insert	Aline and install connector insert into connector shell.	
g. Connector shell	Hold connector shell and cable “in-place” and use slip-joint pliers to turn connector adapter nut until connector shell is tight against connector adapter nut.	
h. Two set screws	Using a hex head key install and tighten two set screws in connector adapter nut. Ensure connector adapter nut has only 90 degree turning radius in either direction	

Section V. PREPARATION FOR STORAGE OR SHIPMENT

13-12. GENERAL INFORMATION.

Pack the CX-13293/VRC cable in an approved shipping container.

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CHAPTER 14

POWER SUPPLY ADAPTER, VEHICULAR MX-10862/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

14-1. INTRODUCTION.

The Power Supply Adapter, Vehicular MX-10862/VRC (power supply adapter) has three main sections:

a. Heat Sink Assembly, Power Supply Adapter (heat sink assembly) (8A1)

b. Circuit Card Assembly, Two-Wire Transient Protection (8A2A1)

c. Chassis, Electrical Equipment, Power Supply Adapter (power supply adapter chassis) (8A2)

They are described in the following paragraphs:

14-2. HEAT SINK ASSEMBLY.

The heat sink assembly is mounted on the bottom of the power supply adapter. It provides two basic functions:

It suppresses transients on the input power line.

It converts the dc input power into the dc voltages required by the radio components.

The input power must be 22 to 32 V dc. The current required depends on the output loads. Normally, 2 to 12 A of input current is required. A schematic diagram of the heat sink assembly is included in figure FO-19.

a. Transient Suppressor. The transient suppressor protects the radio from transients that may be on the input power line. The transients, surges, and ripple on the input power line must be within the requirements of MIL-STD-1275. The output of the transient suppressor is not short-circuit protected. If shorted to ground, CB1 will trip. Its output is typically 0.5 V below the input voltage.

14-2. HEAT SINK ASSEMBLY. Continued

b. DC-to-DC Converter. The output of the transient suppressor is fed into the dc-to-dc converter. It provides the following regulated output voltage:

DC Output Voltage (V dc)	Maximum Current (A)	Maximum Ripple (mV p-p)
6.75 (6.55 to 6.95)	1.5	75
13.0 (12.6 to 13.4)	4.3	75
200 (180 to 220)	0.008	3000

These outputs are short-circuit protected. The power supply will not be damaged if an output is shorted to ground.

14-3. TWO-WIRE TRANSIENT PROTECTION CIRCUIT.

The two-wire transient protection circuit provides for transient protection of the remote control signals between either the control-monitor or the remote control unit.

14-4. POWER SUPPLY ADAPTER CHASSIS.

The power supply adapter chassis provides the basic radio interconnections as shown in figure FO-19. Several other functions are also performed. The power input is switched on and off by CB1. EMP protection is provided by CR1 through CR3 and the CCA-diode. The two-wire transient protection circuit couples the RT and control-monitor or remote control unit.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

14-5. COMMON TOOLS AND EQUIPMENT.

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

14-6. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

14-7. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-2) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

14-8. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective power supply adapter. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module.

14-9. OPERATIONAL CHECK.

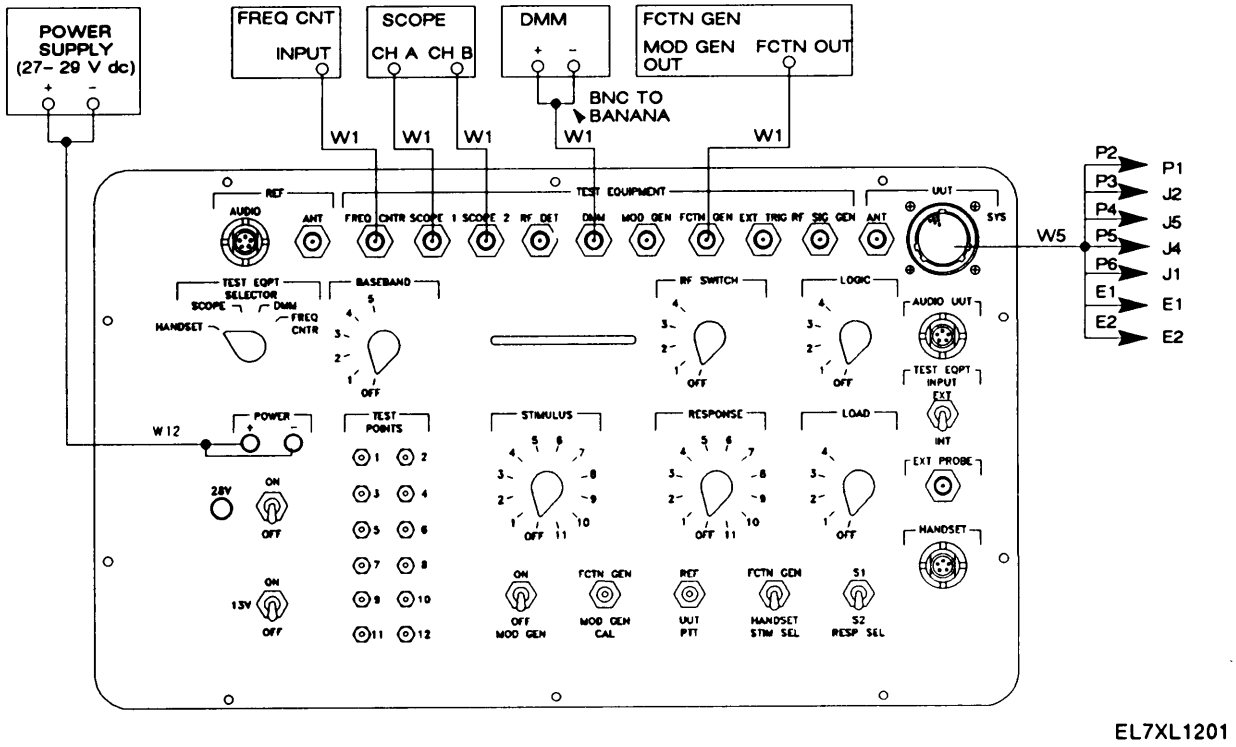
The operational check provides a step-by-step procedure for evaluating a power supply adapter. If the operational check is passed, the power supply adapter can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 14-10.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a STEP has been completed, proceed with the next STEP. A "No response" in the "Response" column means that any response is not of interest.

The switch settings for the test equipment are given in the “EQUIPMENT PRESETS” section of the test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module.

Connect equipment as shown in figure 13-1 to perform the operational check of the power supply adapter.

14-9. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

TEST ADAPTER:

TEST EQPT SELECTOR:	DMM
BASEBAND:	OFF
RF SWITCH:	OFF
LOGIC:	OFF
TEST EQPT INPUT:	INT
28 V:	OFF
13 V:	OFF
STIMULUS:	9
RESPONSE:	7
LOAD:	OFF
MOD GEN:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S1

POWER SUPPLY ADAPTER:

S1:	LCL
CB1:	OFF

Figure 14-1. Power Supply Adapter Test Setup

14-9. OPERATIONAL CHECK. Continued

Step 8. INPUT POWER CHECK.

Action	Response
a. Connect equipment as shown in figure 14-1.	a. No response.
b. 28 V: ON CB1: ON Adjust lamp DS1 for maximum brightness.	b. CB1 does not trip. If it does, go to chart 1. DS1 lights. If not, go to chart 2.
c. Read DMM.	c. DMM reads 25 to 29 V dc. If not, go to chart 3.

Step 9. POWER SUPPLY OUTPUT CHECK.

Action	Response
a. Set S1: RMT	a. DS1 turns OFF. If not, go to chart 4.
b. Connect jumper between TP5 and TP4.	b. DS1 lights. If not, go to chart 5.
c. RESPONSE: 10 RESP SEL: S2	c. DMM reads 25 to 29 V dc. If not, go to chart 6.
d. RESPONSE: 11	d. DMM reads 12.3 to 13.7 V dc. If not, go to chart 7.
e. RESPONSE: 8	e. DMM reads 25 to 29 V dc. If not, wire from 8A2TB1-1 to 8A2J1-B, or 8A2J1, is bad.
f. RESPONSE: 7	f. DMM reads 25 to 29 V dc. If not, wire from 8A2A2-E11 to 8A2J4-F, or 8A2J4, is bad.
g. RESPONSE: 5	g. DMM reads 6.5 to 7.0 V dc. If not, go to chart 8.
h. RESPONSE: 4	h. DMM reads 12.3 to 13.7 V dc. If not, wire from 8A2TB1-3 to 8A2J5-C, or 8A2J5, is bad.
i. RESPONSE: 3	i. DMM reads 25 to 29 V dc. If not, wire from 8A2TB1-2 to 8A2J5-D, or 8A2J5, is bad.
j. RESPONSE: 2	j. DMM reads 180 to 220 V dc. If not, go to chart 8.

14-9. OPERATIONAL CHECK. Continued

Step 9. POWER SUPPLY OUTPUT CHECK. Continued

Action	Response
k. Set Scope CH 1 to AC. TEST EQPT SELECTOR: SCOPE Read Scope. RESPONSE: 4 Read Scope. RESPONSE: 5 Read Scope.	k. Each response position should have less than 200 mV p-p. If the ripple voltage is greater than 200 mV p-p, heat sink assembly (8A1) is bad.
l. TEST EQPT SELECTOR: DMM. RESPONSE: 1	l. DMM reads 12.3 to 13.7 V dc. If not, wire from 8A2CR3-C to 8A2J2-F, or 8A2J2, is bad.
m. Set LOAD: 1 TEST EQPT INPUT: EXT. Use ext probe to check TP9.	m. DMM reads -1 to +3 V dc. If not, 8A2CR3 is bad.
n. Set LOAD: OFF CB1: OFF 13 V: ON TEST EQPT INPUT: INT	n. DMM reads 12.3 to 13.7 V dc. If not, go to chart 9.
o. RESPONSE: 4	o. DMM reads -1 to +3 V dc. If not, 8A2CR4 is bad.

Step 10. REMOTE CONTROL CIRCUIT CHECK.

Action	Response
a. Set 13 V: OFF CAL: FCTN GEN FREQ: 40 kHz (38 to 42 kHz) LEVEL: 500 mV p-p (450 to 550 mV p-p) FCTN : SINE CAL: OFF RESPONSE: 11 RESP SEL: S1 TEST EQPT SELECTOR: SCOPE Read Scope.	a. Scope CH 1 reads 300 to 625 mV p-p. If not, go to chart 10.

14-9. OPERATIONAL CHECK. Continued

Step 11. CONTINUITY CHECKS.

Action	Response
a. Disconnect W5 test cable P6 at J1. Set DMM to 200 ohms scale. RESPONSE: 6 RESP SEL: S2 TEST EQPT SELECTOR: DMM	a. DMM reads less than 5 ohms. If not, go to chart 11.
b. Disconnect W5 test cable P4 at J5. Connect P6 to J1. RESPONSE: 10 RESP SEL: S1	b. DMM reads less than 5 ohms. If not, go to chart 12.
c. RESPONSE: 9	c. DMM reads less than 5 ohms. If not, go to chart 13.
d. RESP SEL: S2	d. DMM reads less than 5 ohms. If not, go to chart 14.
e. RESPONSE: 8 RESP SEL: S1	e. DMM reads less than 5 ohms. If not, 8A2P1 is bad.
f. Disconnect W5 test cable P6 at J1. STIMULUS: 8 RESPONSE: 10 TEST EQPT SELECTOR: SCOPE	f. Scope CH1 reads 400 to 600 mV p-p. If not, 8A2P1 is bad.
g. STIMULUS: 6	g. Scope CH1 reads 400 to 600 mV p-p. If not, 8A2P1 is bad.
h. STIMULUS: 7 RESPONSE: 9	h. Scope CH1 reads 400 to 600 mV p-p. If not, 8A2P1 is bad.
i. STIMULUS: 5	i. Scope CH1 reads 400 to 600 mV p-p. If not, 8A2P1 is bad.
j. Disconnect W1 from DMM. Connect test leads to DMM. Disconnect W5 test cable P5 at J4. Connect P5 to J3. Connect DMM (-) to 8A2E1. Connect DMM (+) to TP9.	j. DMM reads less than 5 ohms. If not, wire from 8A2J3-B to 8A2A1-E5, or 8A2J3, is bad.
k. Connect DMM (+) to TP12. Connect DMM (-) to 8A2E2.	k. DMM reads less than 5 ohms. If not, wire from 8A2J3-C to 8A2A1-E4, or 8A2J3, is bad.
l. Disconnect DMM test leads. Connect W1 to DMM. Set DMM to 200 V scale. TEST EQPT SELECTOR: DMM RESPONSE: 7 RESP SEL: S2 CB1: ON	l. DMM reads 25 to 29 V dc. If not, wire from 8A2J3-F to 8A2TB1-2, or 8A2J3, is bad.
m. Operational Check Is Complete.	

14-10. TROUBLESHOOTING.

Troubleshooting is done on a faulty power supply adapter. The steps to determine if a power supply adapter is faulty and how to troubleshoot it are as follows:

a. When a power supply adapter is received from unit maintenance, inspect it for damage. Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. Verify the symptom. Perform the operational check found in paragraph 14-9. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. Troubleshoot the power supply adapter using the flowchart. It will identify the defective module or component.

d. Replace the defective module or component. Follow the procedures in section IV.

e. Verify the repair. Repeat the operational check in paragraph 14-9 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the power supply adapter can be returned for use.

14-11. TEST PRECAUTIONS AND NOTES.

WARNING

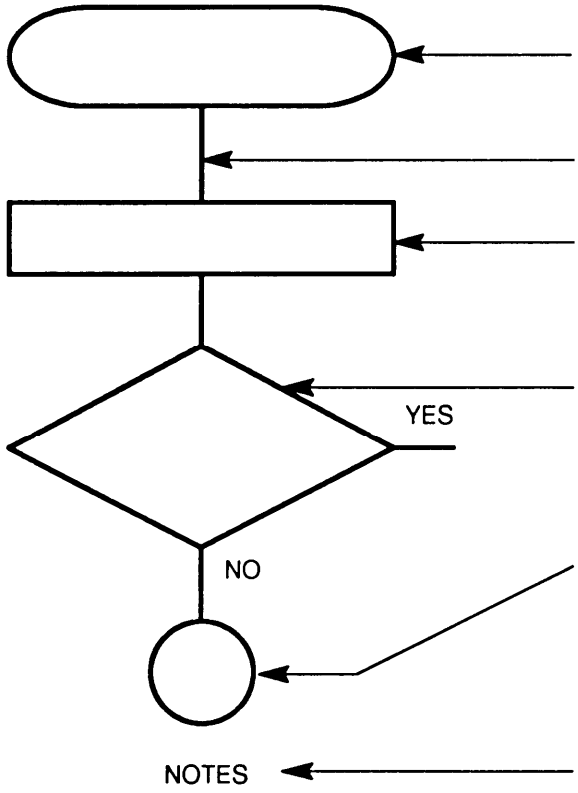
Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

NOTE

The Principles of Operation section, functional block diagrams, and figure FO-19 can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.

14-12. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages.

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

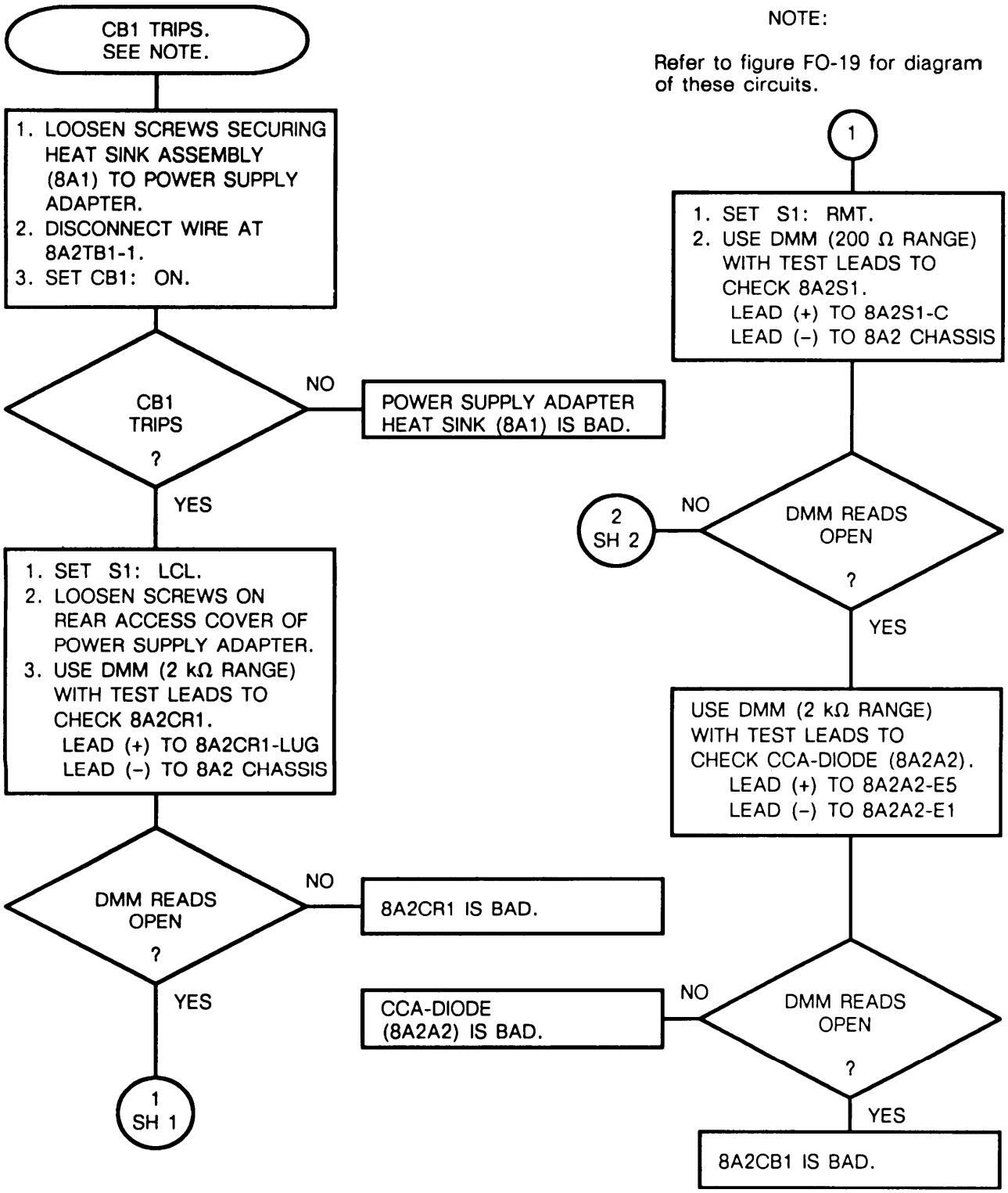
14-13. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	CB1 trips
2	DS1 lamp does not light
3	SW 27.5 V dc absent
4	DS1 is lit in RMT
5	DS1 does not light in RMT
6	No 27 V dc at J1
7	No 13 V dc at J1
8	Heat sink outputs (6.75 or 200 V dc) absent
9	13 V dc from battery tray absent
10	Troubleshooting remote control circuit
11	Troubleshooting continuity between J2 and J5
12	Troubleshooting continuity between J1 and J2
13	Troubleshooting continuity between J1 and J2
14	Troubleshooting continuity between J1 and J2

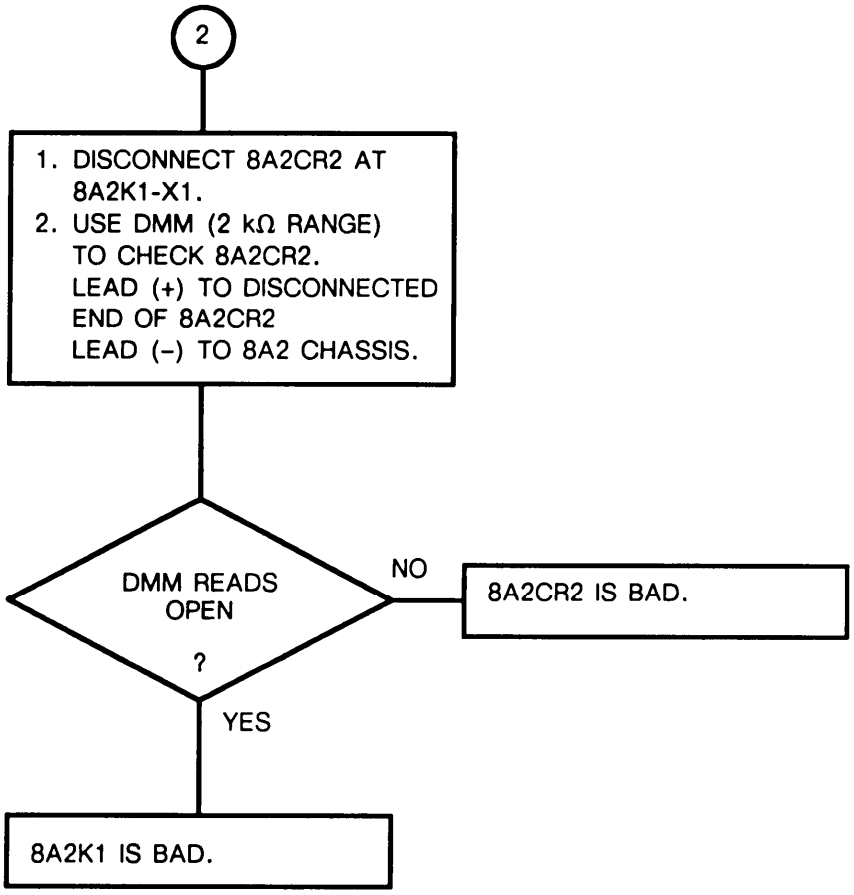
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Primary Power Circuit
(Sheet 1 of 2)



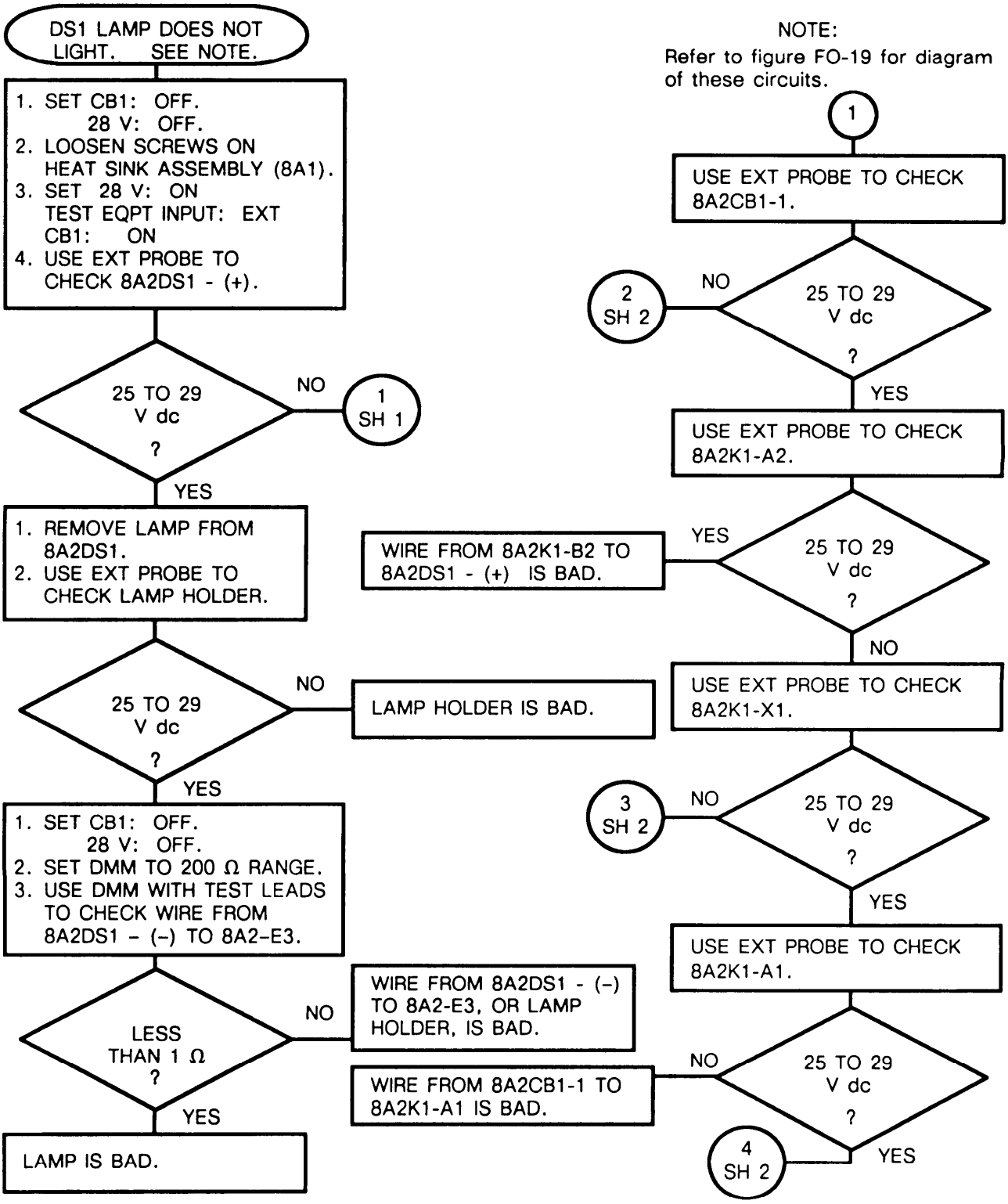
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting Primary Power Circuit
(Sheet 2 of 2)



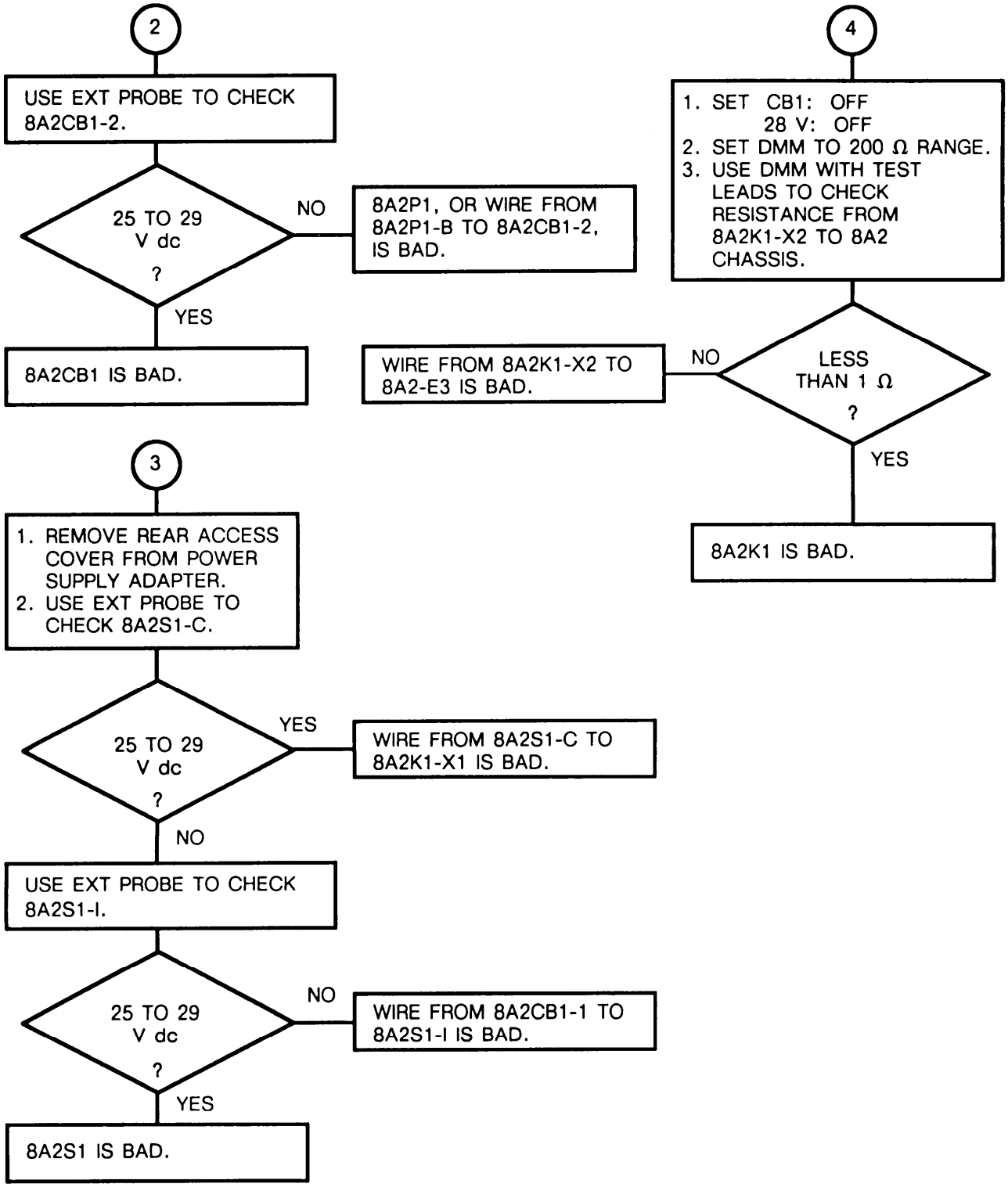
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting DS1 Indicator lamp Circuit
(Sheet 1 of 2)



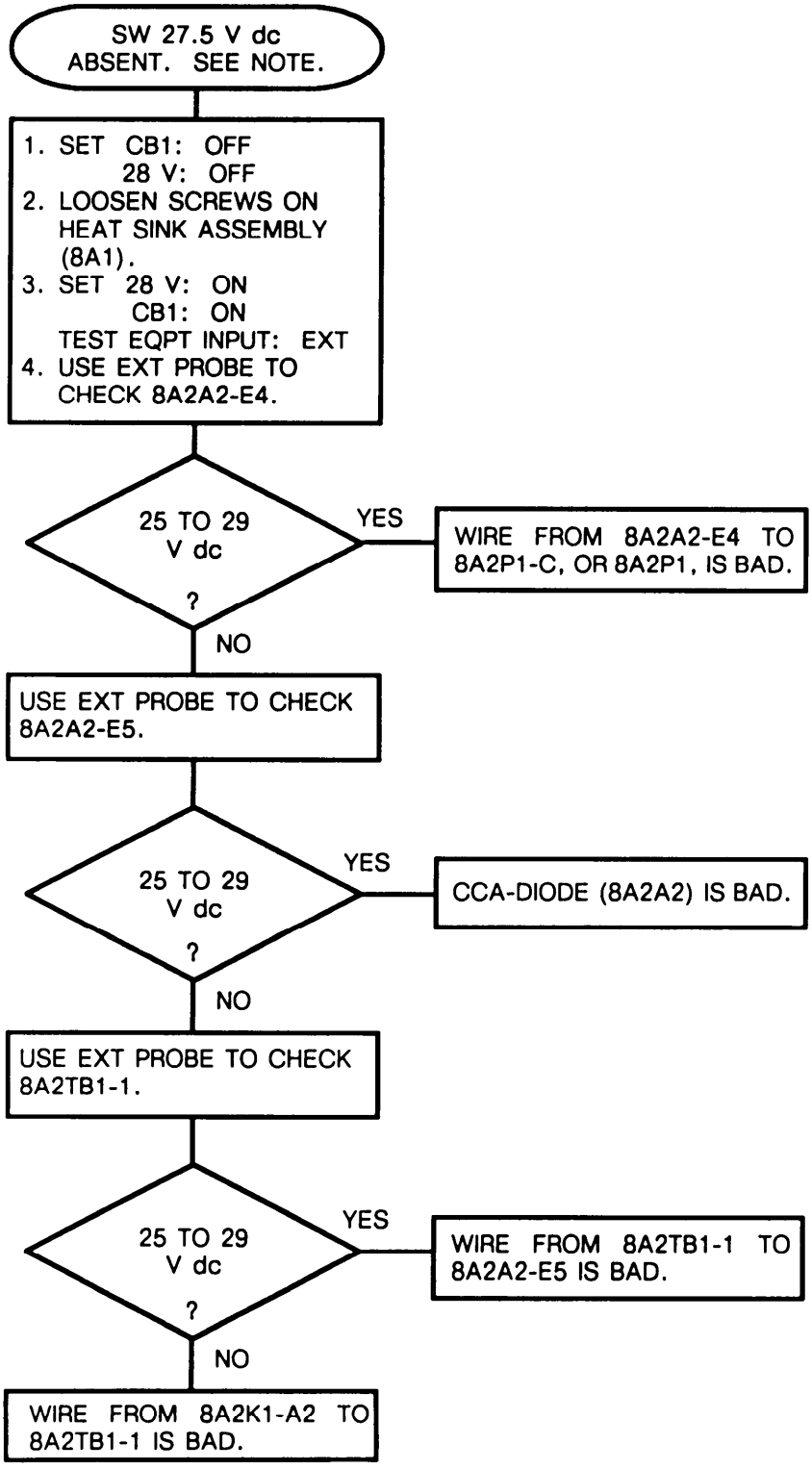
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting DS1 Indicator lamp Circuit
(Sheet 2 of 2)



14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting 27.5 V dc Power Circuit
(Sheet 1 of 1)

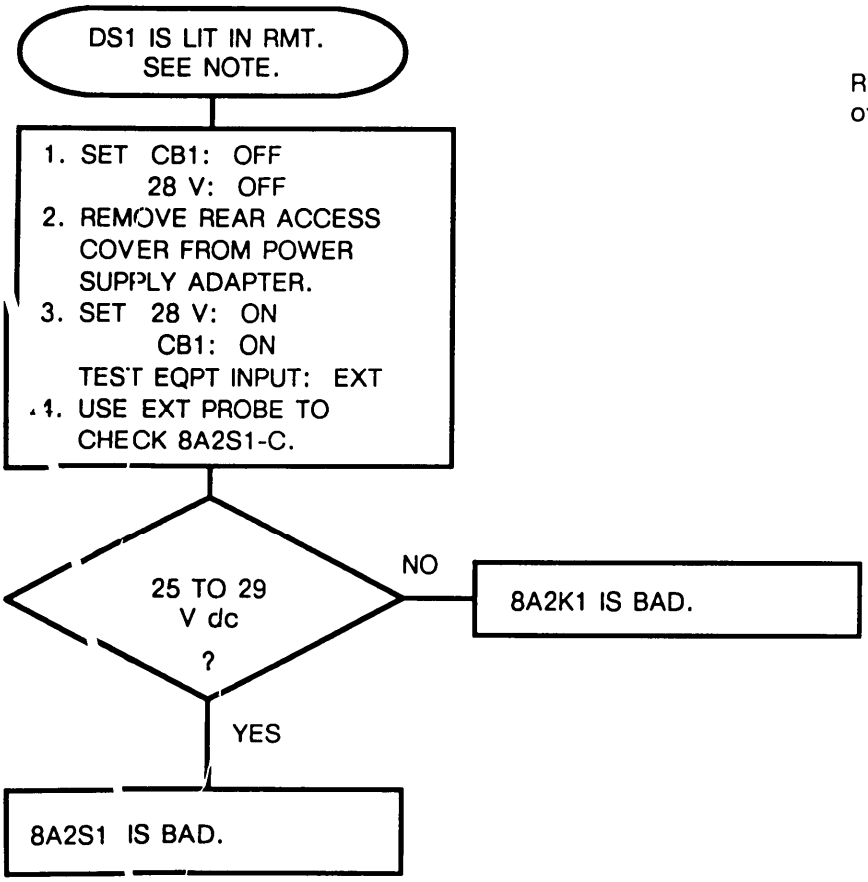


NOTE:

Refer to figure FO-19 for diagram of these circuits.

14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Remote Control Switch Circuit
(Sheet 1 of 1)

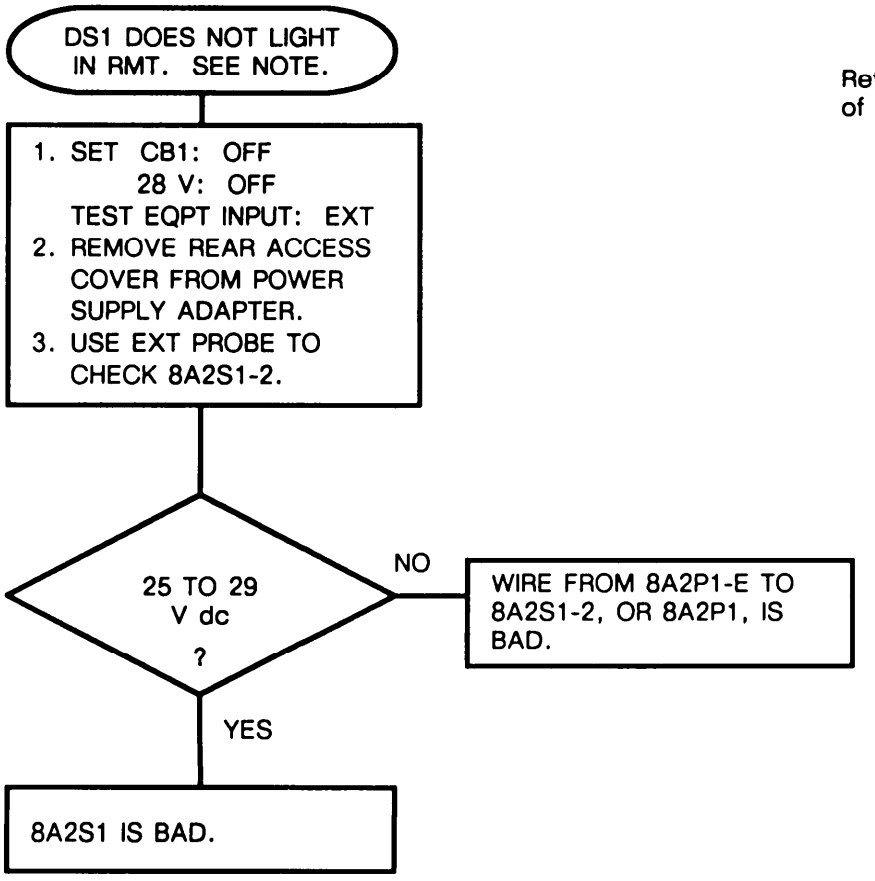


NOTE:

Refer to figure FO-19 for diagram of these circuits.

14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Remote Control Switch Circuit
(Sheet 1 of 1)

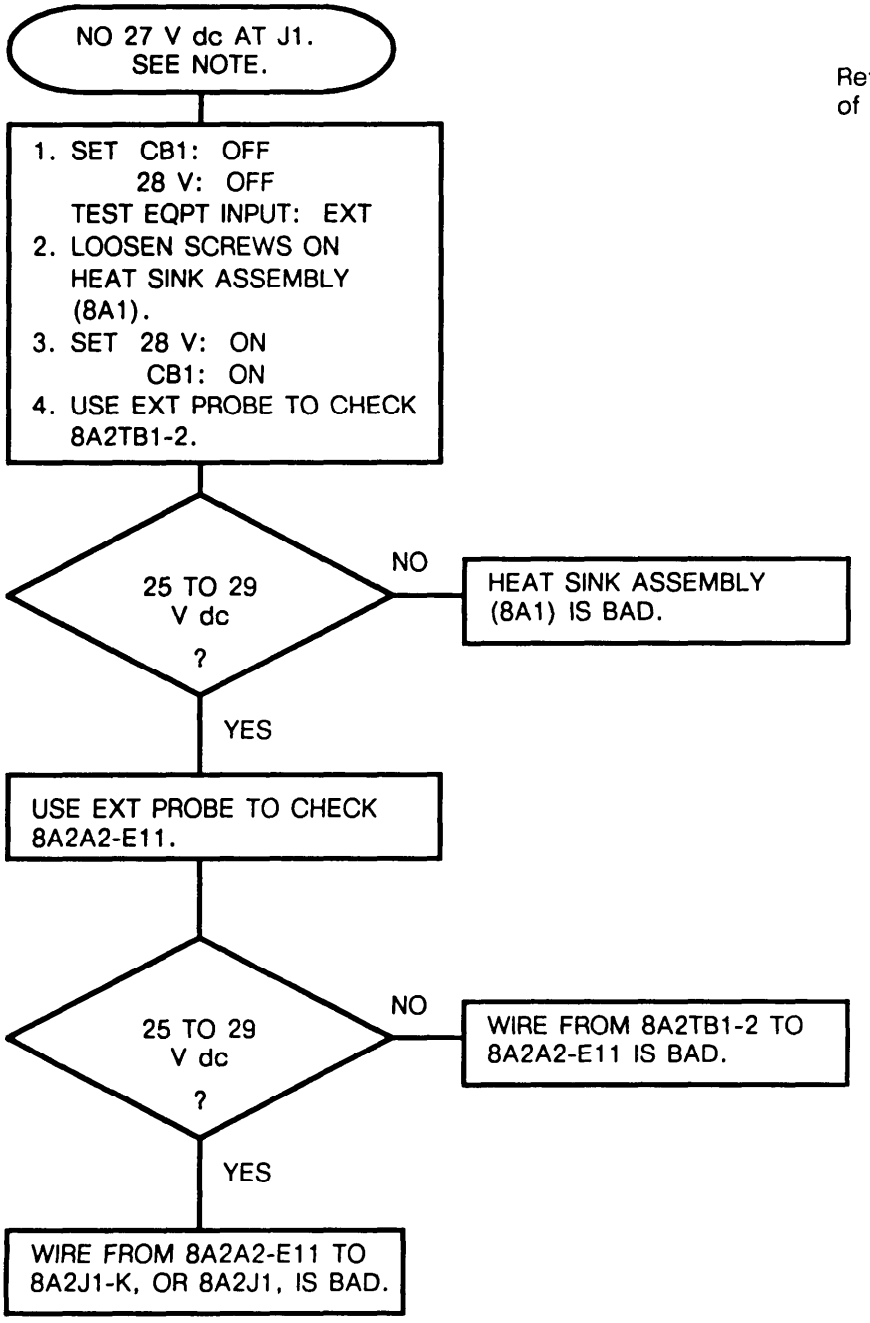


NOTE:

Refer to figure FO-19 for diagram of these circuits.

14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting 27 V dc Output Circuit
(Sheet 1 of 1)

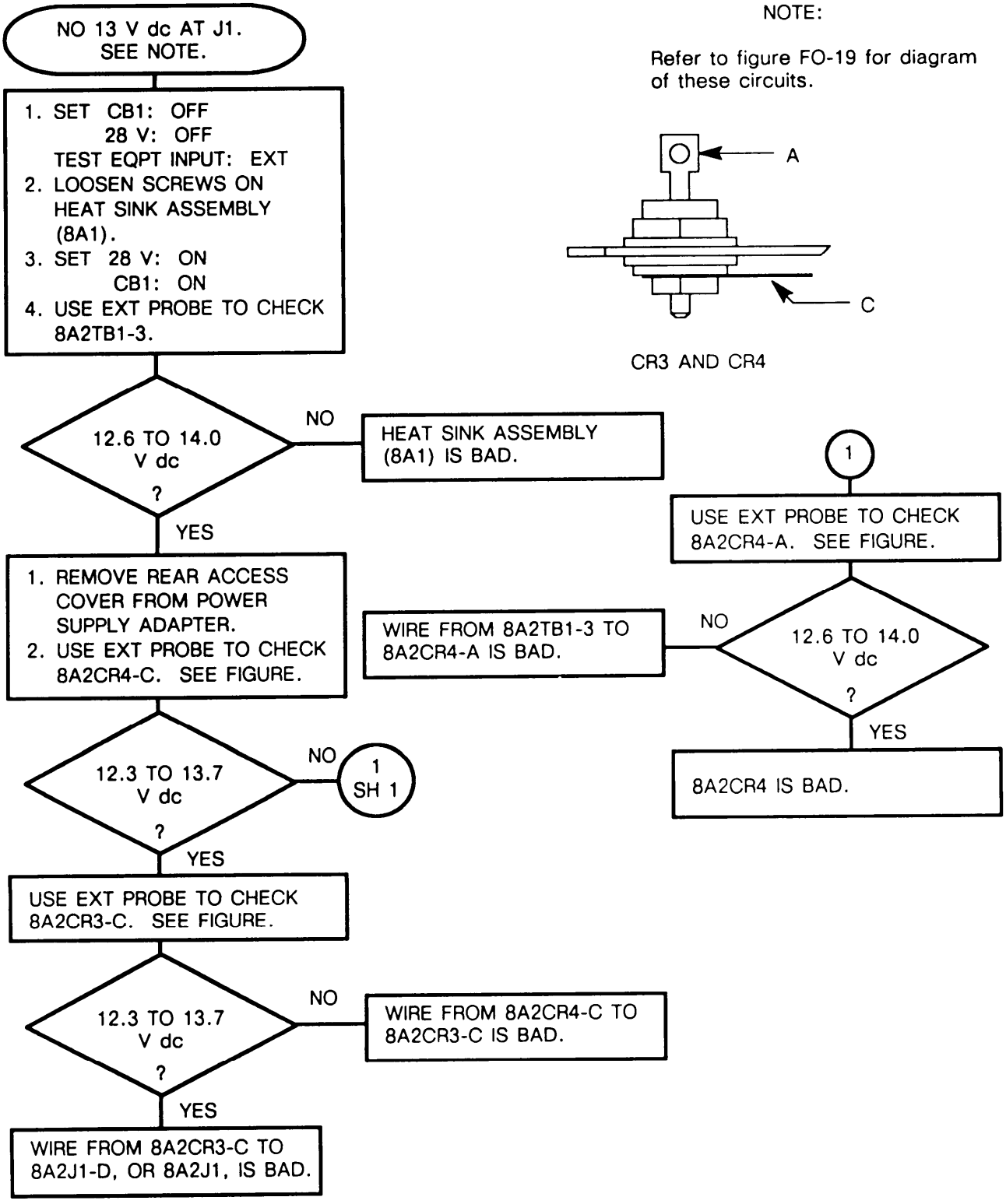


NOTE:

Refer to figure FO-19 for diagram of these circuits.

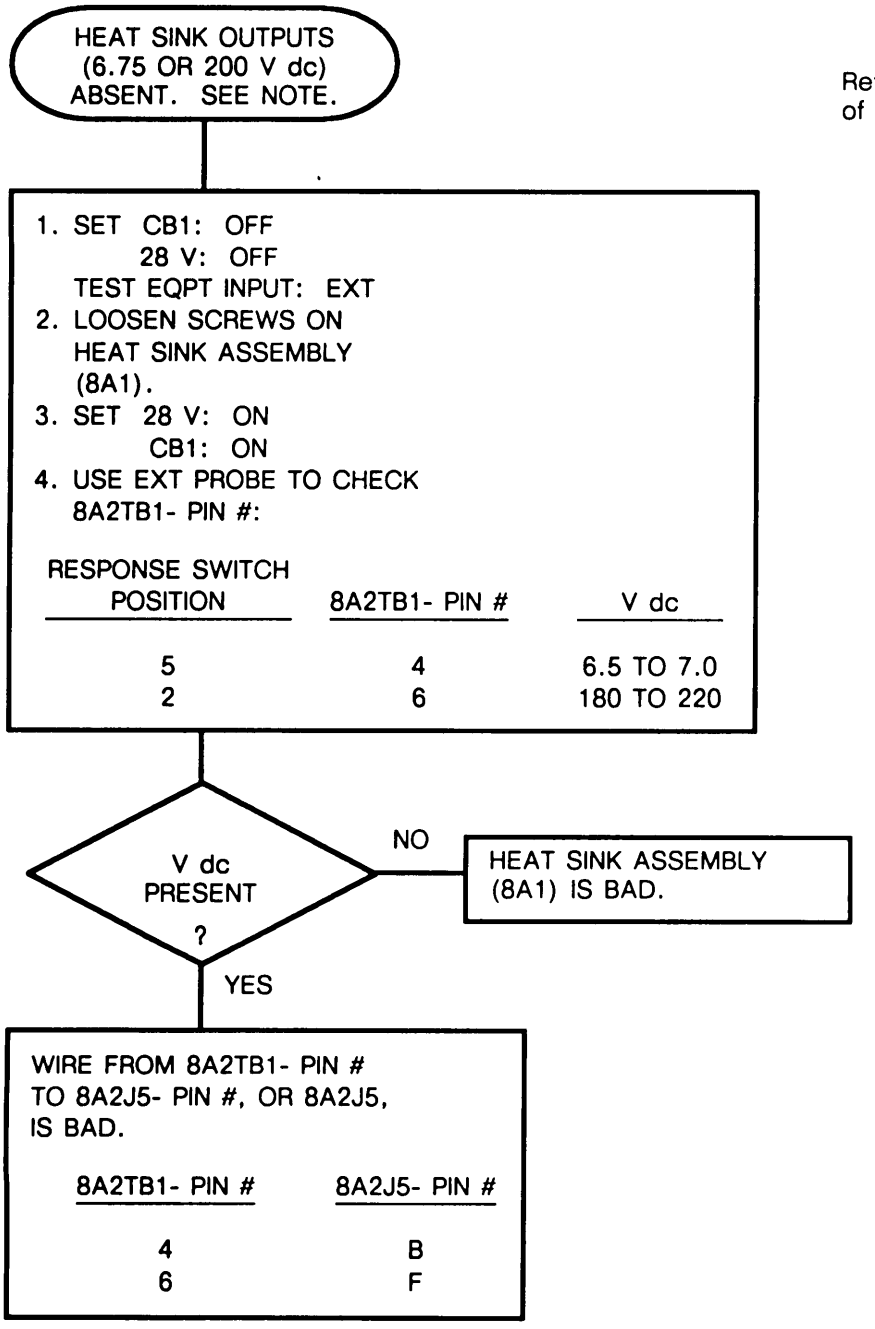
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting 13 V dc Output Circuit
(Sheet 1 of 1)



14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting 6.75 and 200 V dc Output Circuits
(Sheet 1 of 1)

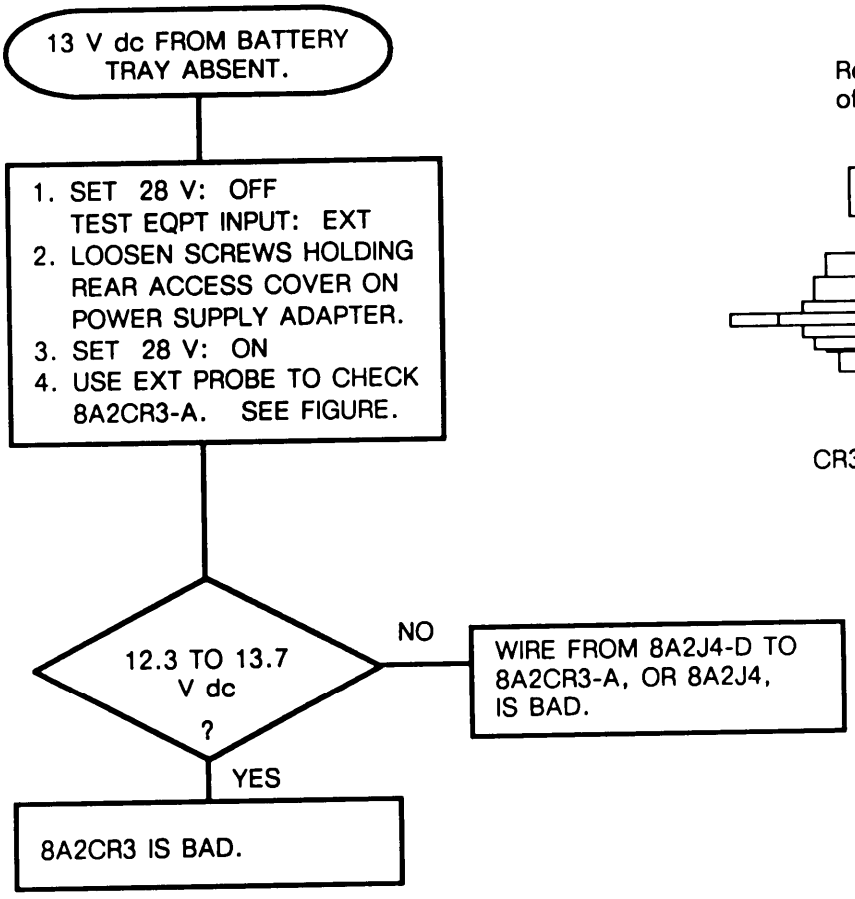


NOTE:

Refer to figure FO-19 for diagram of these circuits.

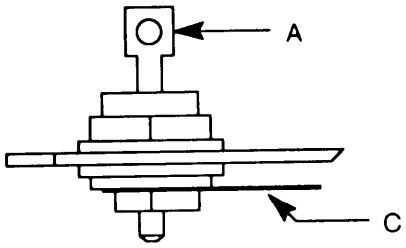
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting 13 V dc Battery Tray Input Circuit
(Sheet 1 of 1)



NOTE:

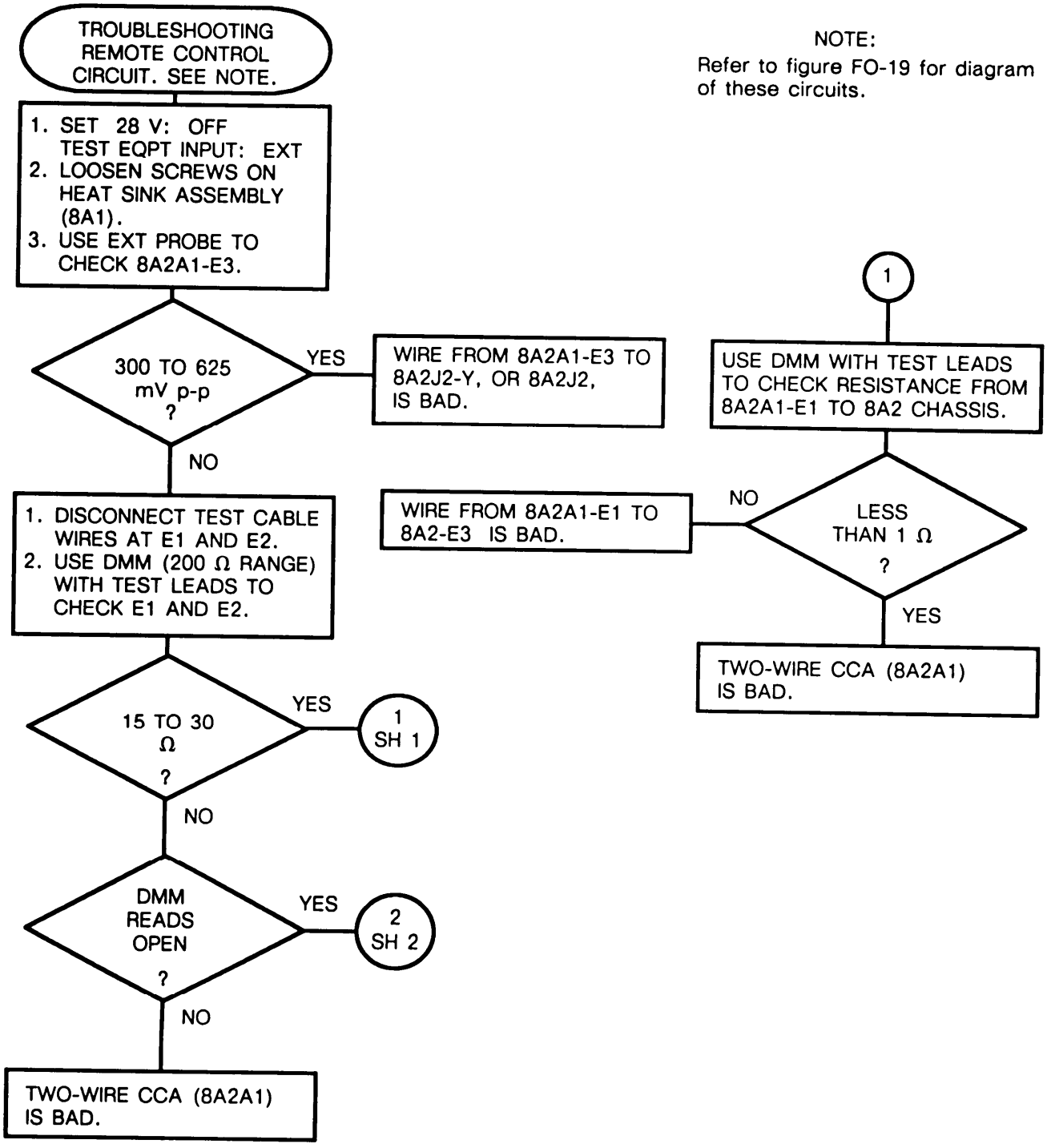
Refer to figure FO-19 for diagram of these circuits.



CR3 AND CR4

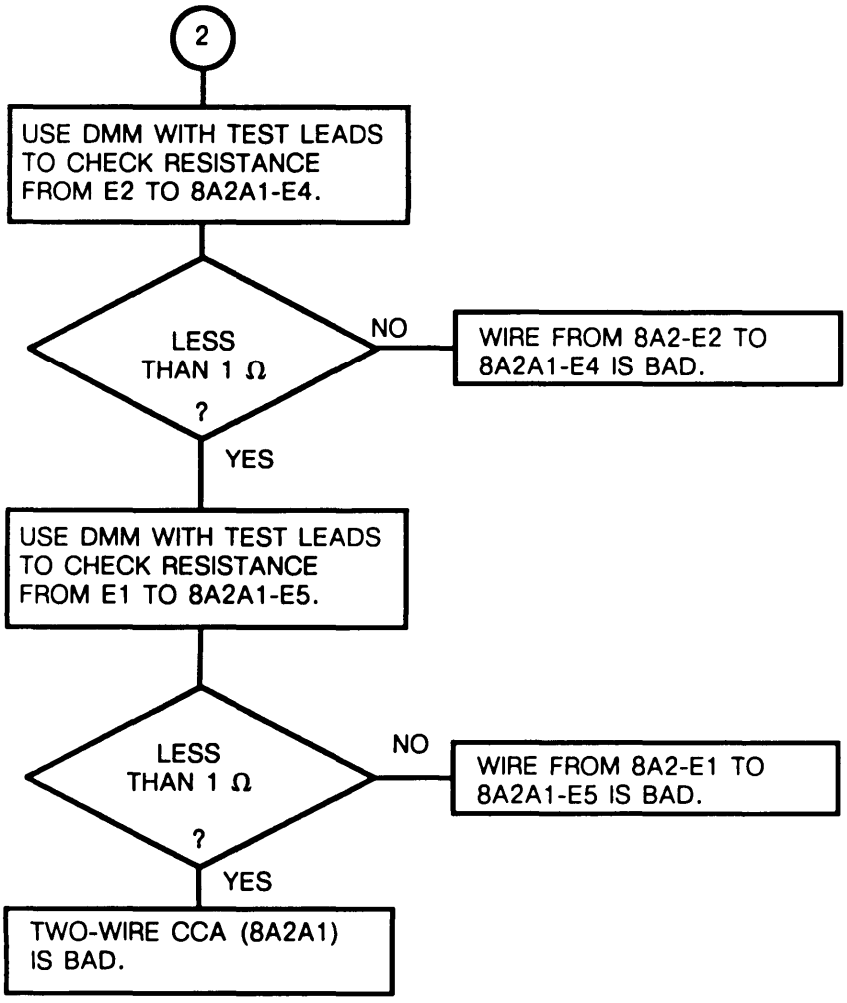
14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Remote Control Circuit
(Sheet 1 of 2)



14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting Remote Control Circuit
(Sheet 2 of 2)



14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 11
Troubleshooting Continuity
(Sheet 1 of 1)

TROUBLESHOOTING CONTINUITY BETWEEN J2 AND J5. SEE NOTE.

1. SET 28 V: OFF
2. LOOSEN SCREWS HOLDING HEAT SINK ASSEMBLY (8A1) AND REAR ACCESS COVER ON POWER SUPPLY ADAPTER.
3. USE DMM WITH TEST LEADS TO FIND THE OPEN WIRE OR BAD CONNECTOR ACCORDING TO THE FOLLOWING:

8A2J5- PIN #	8A2A2- PIN #	8A2J2- PIN #
K	E2	J
J	E6	X
P	E10	M
R	E9	L
N	E7	H
M	E8	V
A	8A2 - E3 (CHASSIS)	

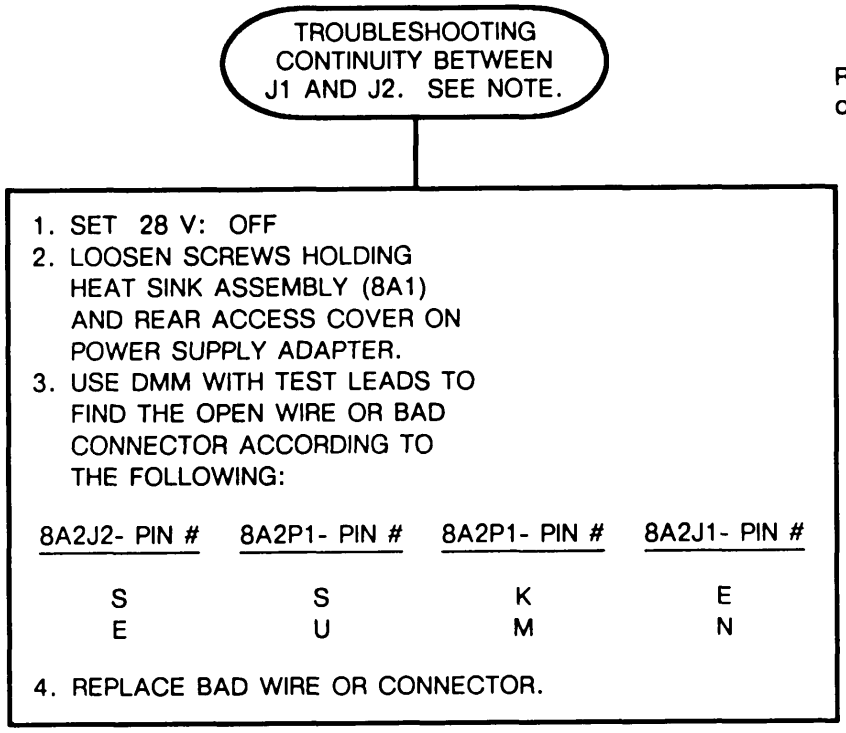
4. REPLACE BAD WIRE OR CONNECTOR.

NOTE:

Refer to figure FO-19 for diagram of these circuits.

14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 12
Troubleshooting Continuity
(Sheet 1 of 1)

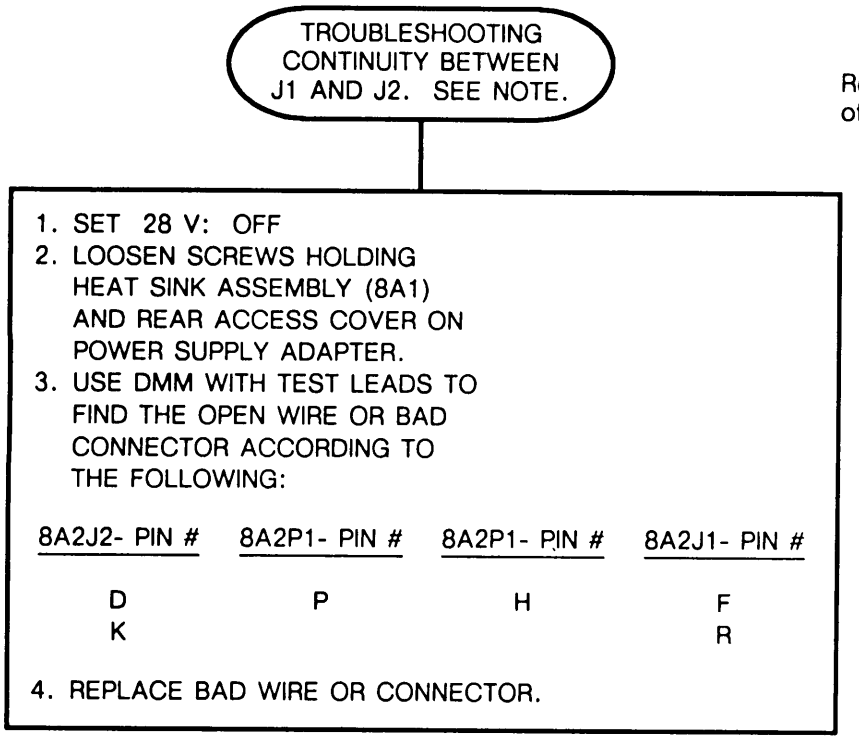


NOTE:

Refer to figure FO-19 for diagram of these circuits.

14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 13
Troubleshooting Continuity
(Sheet 1 of 1)

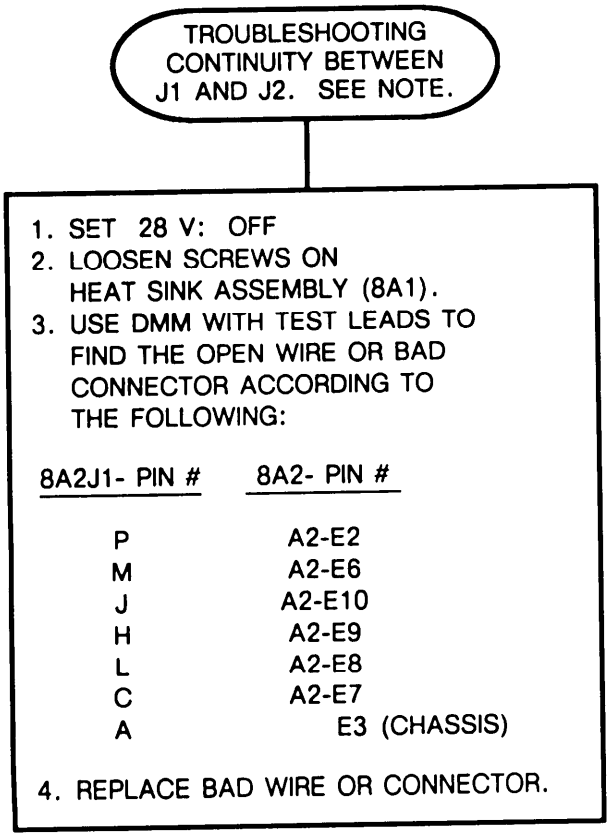


NOTE:

Refer to figure FO-19 for diagram of these circuits.

14-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 14
Troubleshooting Continuity
(Sheet 1 of 1)



NOTE:

Refer to figure FO-19 for diagram of these circuits.

Section IV. MAINTENANCE PROCEDURES

14-14. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired power supply adapter. It is also used to verify the symptom of a faulty power supply adapter. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

14-15. OPERATIONAL CHECK.

Perform the operational check found in paragraph 14-9 to verify proper operation of the power supply adapter.

14-16. REPAIR INSTRUCTIONS.

The following instructions apply to all repair tasks unless otherwise noted in the procedure.

a. Begin procedure with power supply adapter switch CB1 set to OFF.

b. Disconnect any external cables connected to power supply adapter.

c. Inspect power supply adapter. Replace power supply adapter chassis if the power supply adapter is physically damaged, such as with a broken connector.

d. Power supply adapter must be tested after replacement of a module.

CAUTION

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the power supply adapter. Seals must not be damaged. All screws must be torqued to the limits specified in Appendix B.

14-17. REPLACEMENT OF HEAT SINK ASSEMBLY (8A1).

Tools:

Flat tip screwdriver
Flat tip bit
Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter (1)	Set upside down on work surface with rear toward you. See figure 14-2.	
b. 18 captive screws (3)	Use flat tip screwdriver. Fully loosen, and inspect for damage. If damaged, obtain replacement.	
c. Heat sink assembly (2)	Remove heat sink assembly from power supply adapter and set on work surface.	
d. Six screws on terminal board TB1 (4)	Use flat tip screwdriver. Loosen, remove, and inspect six screws securing wires to TB1. If damaged, obtain replacement.	
e. Heat sink assembly wires	Disconnect and label six wires from TB1.	
f. Sealing gasket	Remove and check for damage. If damaged, obtain replacement.	
g. Heat sink assembly (2)	Turn in defective heat sink assembly to supply for disposition.	
INSTALLATION		
h. Heat sink assembly (2)	Obtain replacement heat sink assembly.	
i. Sealing gasket	Place on replacement heat sink assembly.	
j. Heat sink assembly (2)	Set on work surface so that wires can be connected to TB1 (4).	
k. Heat sink assembly wires	Connect to TB1 (4). Wire labeled "1" connects to TB1 terminal 1. Repeat for all six wires.	
l. Six screws on terminal board TB1 (4)	Use flat tip screwdriver. Install and tighten six retained screws securing wires to TB1.	
m. HCP Heat sink assembly and 18 captive screws (3)	Use flat tip screwdriver. Hold heat sink assembly (2) in place on power supply adapter (1). Install and hand tighten 18 captive screws. Use torque screwdriver. Torque to 9 in-lb.	

14-17. REPLACEMENT OF HEAT SINK ASSEMBLY (8A1). Continued

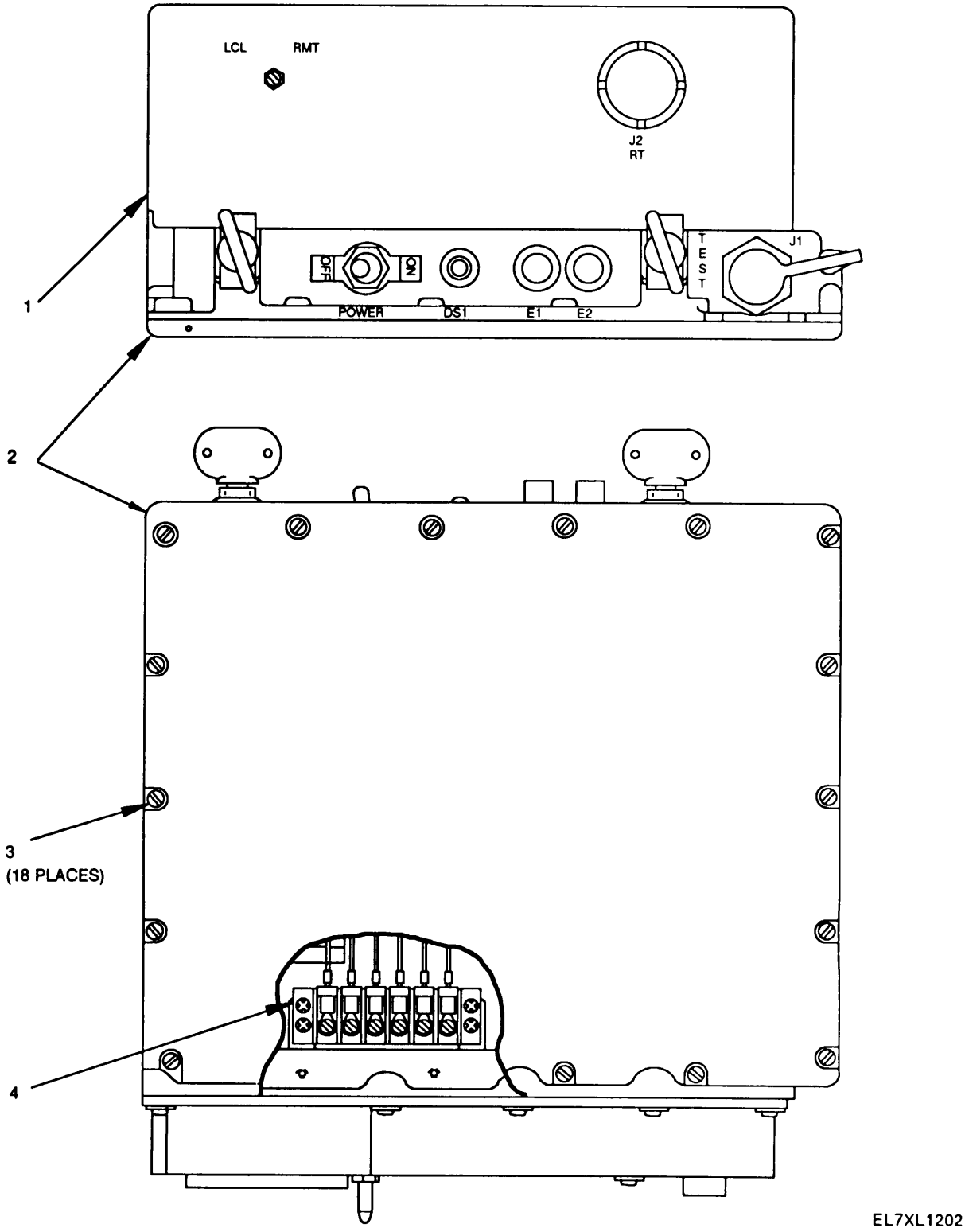


Figure 14-2. Power Supply Adapter (Front and Bottom Views).

14-18. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS (8A2).

Tools:

Flat tip screwdriver
Torque screwdriver
Flat tip bit

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Use flat tip screwdriver. Remove and retain heat sink assembly (2) from defective power supply adapter chassis (1). See figure 14-3.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Turn in defective chassis to supply for disposition.	
INSTALLATION		
c. Power supply adapter chassis (1)	Obtain replacement power supply adapter chassis.	
d. HCP Heat sink assembly (2)	Use flat tip screwdriver. Install retained heat sink assembly (2) on replacement power supply adapter chassis (1). Use torque screwdriver. Torque to 9 in-lb.	Refer to paragraph 14-17 for heat sink installation.

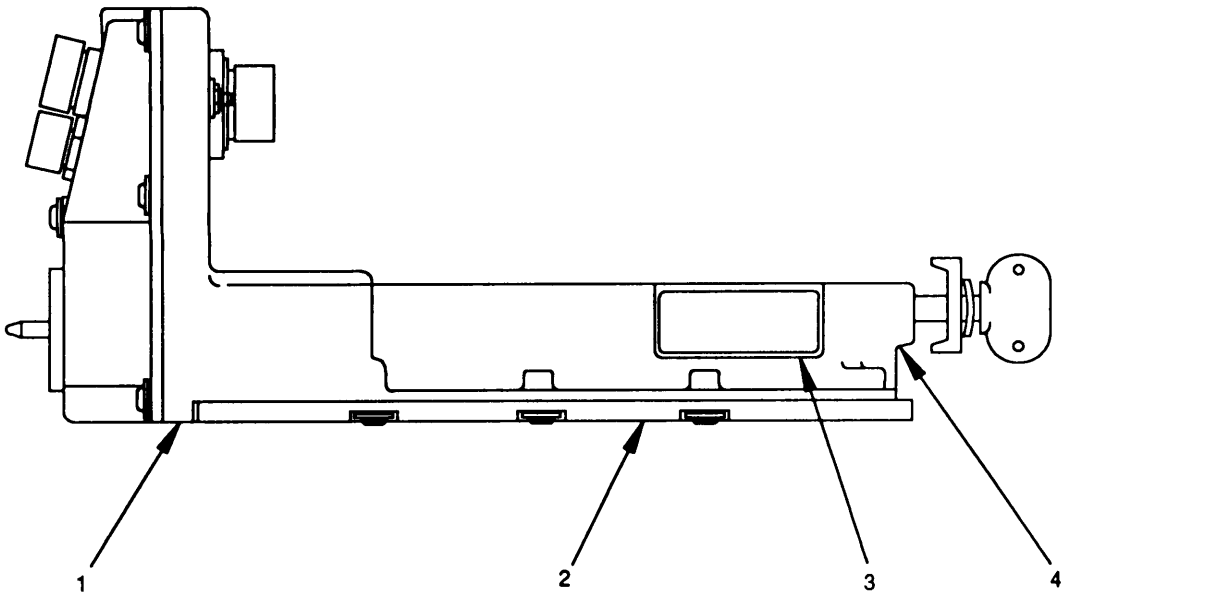


Figure 14-3. Power Supply Adapter (Left Side View) With Heat Sink Assembly.

14-19. REPLACEMENT OF IDENTIFICATION PLATE.

Tools:

Pocket knife

Expendable Supplies:

Alcohol
Cheesecloth
Trichloroethane 1,1,1
Skin/eye protection items

ITEM	ACTION	REMARKS

REMOVAL

a. Power supply adapter — Set on work surface with left side toward you. See figure 14-3.

b. Identification plate (3) — Using a pocket knife, remove damaged identification plate (3) from power supply adapter case assembly (4), and discard.

WARNING

Isopropyl alcohol is flammable and toxic to skin, eyes, and respiratory tract. Avoid skin and eye contact. Good general ventilation is normally adequate. Keep away from open flames or other sources of ignition.

c. Power supply adapter case assembly (4) — Using alcohol and cheesecloth, remove all adhesive residue left from damaged identification plate on power supply adapter case assembly (4).

INSTALLATION

d. Identification plate (3) — Obtain replacement identification plate (3).

WARNING

Trichloroethane 1,1,1 is flammable and toxic to skin, eyes, and respiratory tract. Skin/eye protection is required. Avoid repeated prolonged contact. Good general ventilation is normally adequate. Keep away from open flames or other sources of ignition.

e. Trichloroethane 1,1,1 — Apply trichloroethane to back of identification plate to activate adhesive.

f. Power supply adapter case assembly (4) — Install identification plate (3) on power supply adapter case assembly (4).

14-20. REPLACEMENT OF SEAL SCREW.

Tools:

Flat tip screwdriver
Torque screwdriver
Flat tip bit

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. Seal screw (1)	Use flat tip screwdriver. Remove damaged seal screw (1) from middle left side of rear access cover (2) and discard.	
INSTALLATION		
c. Seal screw (1)	Obtain replacement seal screw (1).	
d. HCP Rear access cover (2) and seal screw (1)	Use flat tip screwdriver. Install and hand tighten replacement seal screw on rear access cover (2). Use torque screwdriver. Torque to 15 in-lb.	

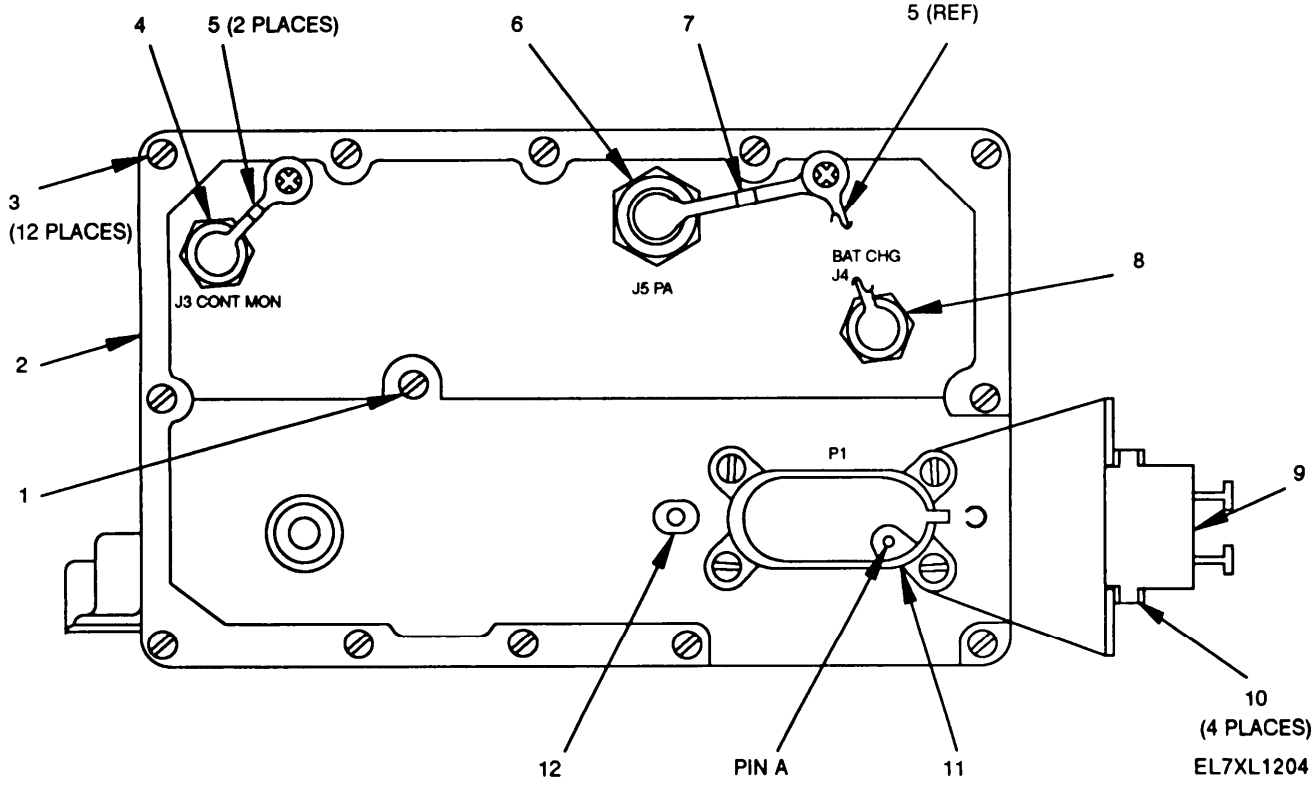


Figure 14-4. Power Supply Adapter (Rear View) With Rear Access Cover.

14-21. REPLACEMENT OF J3 OR J4 CONNECTOR.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- 7/8 Inch socket wrench
- 7/8 Inch socket
- Soldering kit
- Soldering aid
- Heat sink
- Torque wrench

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs
- Silicone compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover (2)	Remove from chassis to allow access to J3 or J4 connector, and retain.	
d. Protective cap (5)	Remove from defective connector (4) or (8), and retain.	
e. Connector (4) or (8) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective connector. Unsolder each wire from the connector.	
f. Hex nut	Use 7/8 inch socket wrench. Remove and retain hex nut securing connector to rear access cover.	
g. Connector (4) or (8) and lockwasher	Remove and discard defective connector and lockwasher.	

14-21. REPLACEMENT OF J3 OR J4 CONNECTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
h. Connector (4) or (8) and Iockwasher	Obtain replacement connector and Iockwasher.	
i. O-ring	Apply silicone compound to o-ring on replacement connector.	
j. HCP Hex nut and Iockwasher	Use 7/8 inch socket wrench. Install and hand tighten retained hex nut and replacement Iockwasher securing the connector to the access cover. Use torque wrench and 7/8 inch socket. Torque to 60 in-lb.	
k. Connector (4) or (8) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct connector pins, and remove wire tags.	Before and after soldering, clean wires and connector pins with alcohol and cotton swabs.
l. Rear access cover (2)	Position retained rear access cover on the power supply adapter chassis.	
m. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	
n. Protective cap (5)	Install the protective cap on the connector.	

14-22. REPLACEMENT OF J5 CONNECTOR.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- 1 1/16 Inch socket wrench
- 1 1/16 Inch socket
- Soldering kit
- Soldering aid
- Heat sink
- Torque wrench

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs
- Silicone compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover (2)	Remove from chassis to allow access to J5 connector, and retain.	
d. Protective cap (7)	Remove from defective connector (6), and retain.	
e. Connector (6) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective connector. Unsolder each wire from the connector.	
f. Hex nut	Use 1 1/16 inch socket wrench. Remove and retain hex nut securing connector to rear access cover.	
g. Connector (6) and Iockwasher	Remove and discard defective connector and Iockwasher.	

14-22. REPLACEMENT OF J5 CONNECTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
h. Connector (6) and lockwasher	Obtain replacement connector and lockwasher.	
i. O-ring	Apply silicone compound to o-ring on replacement connector.	
j. HCP Hex nut and lockwasher	Use 1 1/16 inch socket wrench. Install and hand tighten retained hex nut and replacement lockwasher securing the connector to the access cover. Use torque wrench and 1 1/16 inch socket. Torque to 70 in-lb.	
k. Connector (6) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct connector pins, and remove wire tags.	Before and after soldering, clean wires and connector pins with alcohol and cotton swabs.
l. Rear access cover (2)	Position retained rear access cover on the power supply adapter chassis.	
m. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	
n. Protective cap (7)	Install the protective cap on the connector.	

14-23. REPLACEMENT OF P1 CONNECTOR.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- Soldering kit
- Soldering aid
- Heat sink

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs
- Sealing compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover (2)	Remove from chassis to allow access to P1 connector, and retain.	
d. Connector (9) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective connector. Unsolder each wire from the connector.	
e. Four screws (10)	Use flat tip screwdriver. Remove and inspect four screws securing connector to rear access cover. If damaged, obtain replacement.	
f. Connector retaining plate (11)	Remove from rear access cover and inspect for damage. If damaged, obtain replacement.	
g. Connector (9)	Remove and discard defective connector.	

14-23. REPLACEMENT OF P1 CONNECTOR. Continued

ITEM		ACTION	REMARKS
INSTALLATION			
h.	Connector (9)	Obtain replacement connector.	
i.	Connector (9) and connector retaining plate (11)	Position replacement connector and retained connector retaining plate in rear access cover.	
j.	HCP Four screws (10)	Apply sealing compound to threads of four retained screws. Use flat tip screwdriver. Install and hand tighten four screws securing the connector to the rear access cover. Use torque screwdriver. Torque to 90 in-lb.	
k.	Connector (9) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct connector pins, and remove wire tags.	Before and after soldering, clean wires and connector pins with alcohol and cotton swabs.
l.	Rear access cover (2)	Position retained rear access cover on the power supply adapter chassis.	
o.	HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	

14-24. REPLACEMENT OF SEALING GUIDE PIN.

Tools:

Adjustable wrench
Torque wrench

Expendable Supplies:

Sealing compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. Sealing guide pin (12) and o-ring	Use adjustable wrench. Remove damaged sealing guide pin and o-ring from rear access cover, and discard.	
INSTALLATION		
c. Sealing guide pin (12) and o-ring	Obtain replacement sealing guide pin and o-ring.	
d. O-ring	Install replacement o-ring on sealing guide pin, and apply sealing compound to o-ring.	
e. HCP Rear access cover (2)	Use adjustable wrench. Install and hand tighten sealing guide pin on rear access cover. Use torque wrench. Torque to 20 in-lb.	

14-25. REPLACEMENT OF J2 CONNECTOR.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- 1 5/16 Inch spanner wrench
- Socket wrench spanner attachment
- Soldering kit
- Soldering aid
- Heat sink
- Torque wrench

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs
- Silicone compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover (2)	Remove from chassis to allow access to J2 connector (1), and retain. See figure 14-5.	
d. Connector (1) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective connector. Unsolder each wire from the connector.	
e. Spanner nut	Use 1 5/16 inch spanner wrench. Remove and inspect spanner nut securing connector to power supply adapter chassis. If damaged, obtain replacement.	
f. Connector (1) and lockwasher	Remove and discard defective connector and lockwasher.	

14-25. REPLACEMENT OF J2 CONNECTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
g. Connector (1) and lockwasher	Obtain replacement connector and lockwasher.	
h. O-ring	Apply silicone compound to o-ring on replacement connector.	
i. HCP Spanner nut and lockwasher	Use 1 5/16 inch spanner wrench. Install and hand tighten retained spanner nut and replacement lockwasher securing the connector to power supply adapter chassis. Use torque wrench and socket wrench spanner attachment. Torque to 90 in-lb.	
j. Connector (1) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct connector pins, and remove wire tags.	Before and after soldering, clean wires and connector pins with alcohol and cotton swabs.
k. Rear access cover (2)	Position retained rear access cover on the power supply adapter chassis.	
l. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	

14-26. REPLACEMENT OF LCL/RMT ROTARY SWITCH (8A2S1).

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- Torque wrench
- Adjustable wrench
- Soldering kit
- Soldering aid
- Heat sink

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs
- Silicone compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover	Remove from chassis to allow access to S1 switch (2), and retain. See figure 14-5.	
d. Switch (2) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective switch. Unsolder each wire from the switch.	
e. Hex nut and lockwasher	Use adjustable wrench. Remove hex nut and lockwasher securing the switch to the chassis, and discard them.	
f. Switch (2)	Remove and discard defective switch.	
INSTALLATION		
g. Switch (2)	Obtain replacement switch, hex nut, and lockwasher.	
h. Rubber washer	Apply silicone compound to rubber washer on replacement switch.	
i. HCP Hex nut and lockwasher	Use adjustable wrench. Install and hand tighten replacement hex nut and lockwasher securing the switch to power supply adapter chassis. Use torque wrench. Torque to 13 in-lb.	

14-26. REPLACEMENT OF LCL/RMT ROTARY SWITCH (8A2S1). Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
j. Switch (2) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct connections on the switch, and remove wire tags.	Before and after soldering, clean wires and switch connections with alcohol and cotton swabs.
k. Rear access cover	Position retained rear access cover on the power supply adapter chassis.	
l. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	

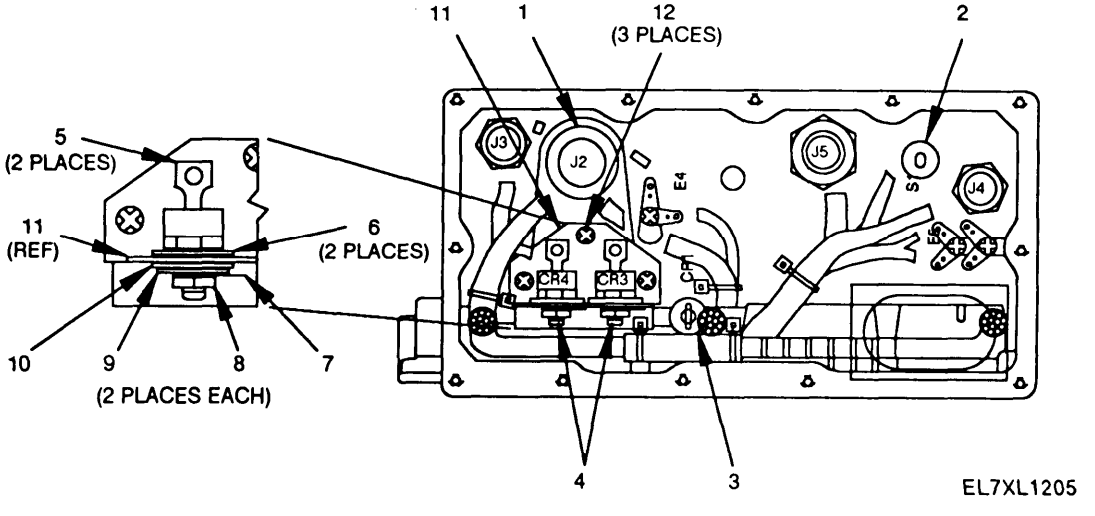


Figure 14-5. Power Supply Adapter (Rear View) Without Rear Access Cover.

14-27. REPLACEMENT OF CR1 DIODE.

Tools:

Flat tip screwdriver	Soldering kit
Torque screwdriver	Soldering aid
Flat tip bit	Heat sink
Adjustable wrench	

Expendable Supplies:

Solder	Alcohol
Cotton swabs	

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover	Remove from chassis to allow access to CR1 diode (3), and retain. See figure 14-5.	
d. Diode (3) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective diode. Unsolder each wire from the diode.	
e. Diode (3), flat washer, and Iockwasher	Use adjustable wrench. Remove the diode, flat washer, and Iockwasher from the power supply adapter chassis. Retain the flat washer and discard the defective diode and Iockwasher.	
INSTALLATION		
f. Diode (3) and Iockwasher	Obtain replacement diode and Iockwasher.	
g. Diode (3), flat washer, and Iockwasher	Use adjustable wrench. Install and hand tighten replacement diode, Iockwasher, and retained flat washer on power supply adapter chassis.	
h. Diode (3) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct terminals on diode, and remove wire tags.	Before and after soldering, clean wires and diode terminals with alcohol and cotton swabs.
i. Rear access cover	Position retained rear access cover on the power supply adapter chassis.	
j. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	

14-28. REPLACEMENT OF CR3 OR CR4 DIODE.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- 1/4 inch wrench
- Soldering kit
- Soldering aid
- Heat sink

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover	Remove from chassis to allow access to CR3 or CR4 diode (4), and retain. See figure 14-5.	
d. Diode (4) wires	Use soldering kit, soldering aid, and heat sink. Tag the location of all wires on defective diode. Unsolder the wires from the terminal post of the diode.	
e. Hex nut (8), terminal lug (7), flat washer (9), insulated washer (1 O), and mounting pad (6)	Use 1/4 inch wrench. Remove and retain hex nut, terminal lug, flat washer, insulated washer, and mounting pad securing the diode to the angle bracket (11) on the power supply adapter chassis.	
f. Diode (4)	Remove and discard the defective diode.	

14-28. REPLACEMENT OF CR3 OR CR4 DIODE. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
g. Diode (4)	Obtain replacement diode.	
h. Hex nut (8), terminal lug (7), flat washer (9), insulated washer (10), and mounting pad (6)	Use 1/4 inch wrench. Install and tighten retained hex nut, terminal lug, flat washer, insulated washer, and mounting pad securing the diode to the angle bracket (11) on the power supply adapter chassis.	
i. Diode (4) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to terminal post (5) on diode, and remove wire tags.	Before and after soldering, clean wires and diode terminal post with alcohol and cotton swabs.
j. Rear access cover	Position retained rear access cover on the power supply adapter chassis.	
k. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	

14-29. REPLACEMENT OF CR3 AND CR4 DIODE ANGLE BRACKET.

Tools:

Flat tip screwdriver	Cross tip screwdriver
Torque screwdriver	1/4 inch wrench
Flat tip bit	

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-4.	
b. 12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover	Remove from chassis to allow access to CR3 and CR4 diodes (4) on angle bracket (11), and retain. See figure 14-5.	
d. CR3 diode (4)	Use 1/4 inch wrench. Remove and inspect hex nut (8), terminal lug (7), flat washer (9), insulated washer (10), and mounting pad (6) securing the diode to the angle bracket (11) on the power supply adapter chassis. If damaged, obtain replacement. Remove and retain the diode.	
e. CR4 diode (4)	Use 1/4 inch wrench. Remove and inspect hex nut (8), terminal lug (7), flat washer (9), insulated washer (10), and mounting pad (6) securing the diode to the angle bracket (11) on the power supply adapter chassis. If damaged, obtain replacement. Remove and retain the diode.	
f. Three screws and flat washers (12)	Use cross tip screwdriver. Remove and inspect three screws and flat washers securing the angle bracket (11) on the power supply adapter chassis. If damaged, obtain replacement.	
g. Angle bracket (11) and Iockwashers	Remove and discard the damaged angle bracket and Iockwashers.	

14-29. REPLACEMENT OF CR3 AND CR4 DIODE ANGLE BRACKET. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
h. Angle bracket (11) and lockwashers	Obtain replacement angle bracket and lockwashers.	
i. Three screws, flat washers, and lockwashers (12)	Use cross tip screwdriver. Install and tighten three retained screws, flat washers, and replacement lockwashers securing the angle bracket (11) to the power supply adapter chassis.	
j. CR3 diode (4)	Install CR3 on angle bracket. Use 1/4 inch wrench. Install and tighten retained hex nut (8), terminal lug (7), flat washer (9), insulated washer (10), and mounting pad (6) securing the diode to the angle bracket (11) on the power supply adapter chassis.	
k. CR4 diode (4)	Install CR4 on angle bracket. Use 1/4 inch wrench. Install and tighten retained hex nut (8), terminal lug (7), flat washer (9), insulated washer (10), and mounting pad (6) securing the diode to the angle bracket (11) on the power supply adapter chassis.	
l. Rear access cover	Position retained rear access cover on the power supply adapter chassis.	
m. HCP 12 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	

14-30. REPLACEMENT OF TWO-WIRE TRANSIENT PROTECTION CIRCUIT CARD ASSEMBLY (8A2A1).

Tools:

Flat tip screwdriver
Torque screwdriver
Flat tip bit
Cross tip screwdriver
Soldering kit
Soldering aid
Heat sink

Expendable Supplies:

Solder
Cotton swabs
Alcohol

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Two-wire transient protection circuit (2) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to A1 circuit near terminals E1 and E2. Unsolder each wire from the circuit.	
d. Four screws, flat washers, and lockwashers (3)	Use cross tip screwdriver. Remove and inspect four screws and flat washers securing the circuit to the chassis. If damaged, obtain replacement. Discard lockwashers.	
e. Two-wire transient protection circuit (2)	Remove defective circuit and send it to supply for disposition.	
INSTALLATION		
f. Two-wire transient protection circuit (2)	Obtain replacement circuit and four lockwashers.	
g. Four screws, flat washers, and lockwashers (3)	Use cross tip screwdriver. Install and tighten four screws, flat washers, and replacement lockwashers securing the circuit to the chassis.	
h. Two-wire transient protection circuit (2) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to terminals on the circuit, and remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
i. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-30. REPLACEMENT OF TWO-WIRE TRANSIENT PROTECTION CIRCUIT CARD ASSEMBLY (8A2A1). Continued

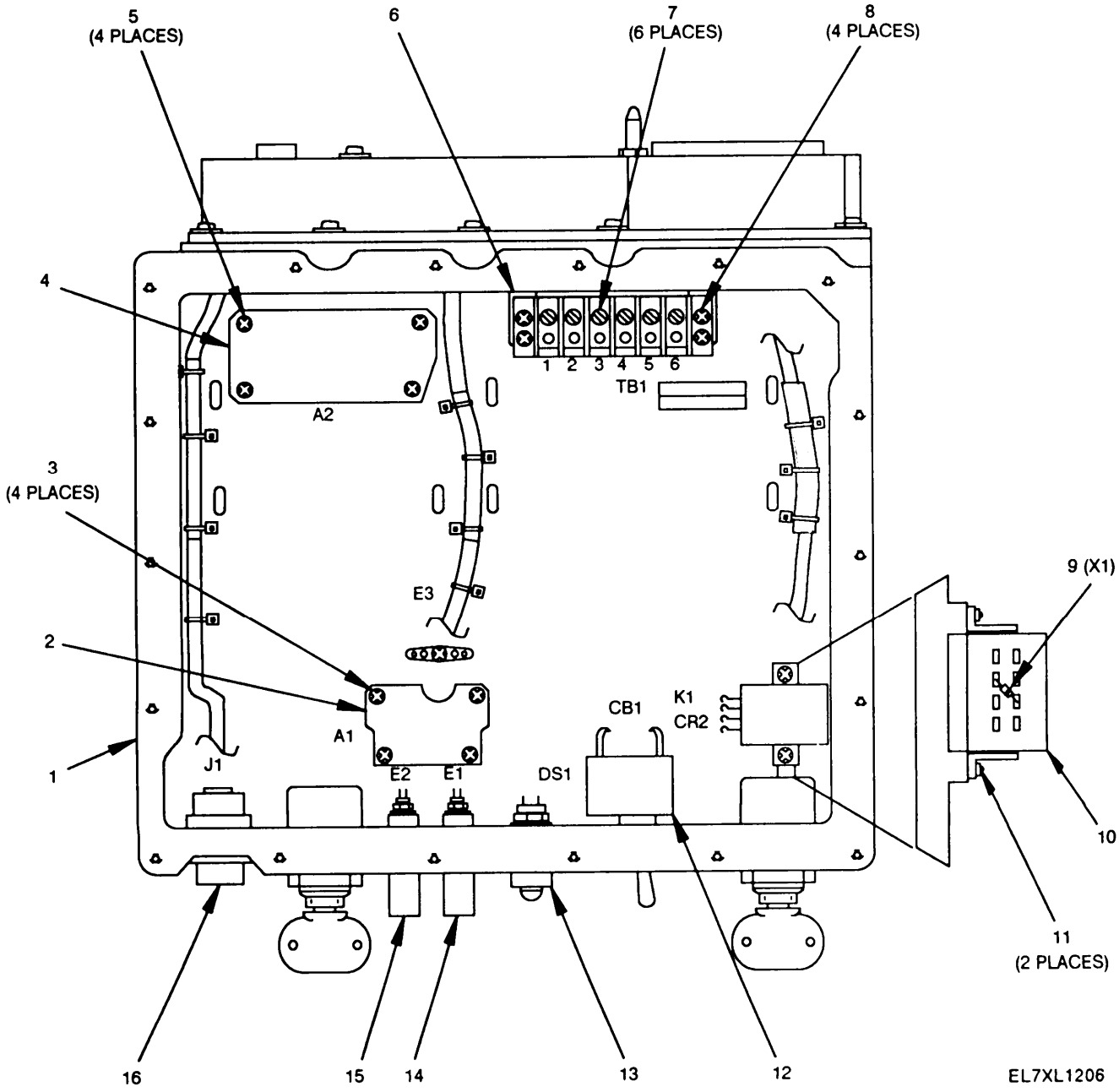


Figure 14-6. Power Supply Adapter (Bottom View) Without Heat Sink Assembly.

14-31. REPLACEMENT OF DIODE CIRCUIT CARD ASSEMBLY (8A2A2).

Tools:

Flat tip screwdriver	Soldering kit
Torque screwdriver	Soldering aid
Flat tip bit	Heat sink
Cross tip screwdriver	

Expendable Supplies:

Solder	Alcohol
Cotton swabs	

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Diode circuit (4) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to A2 circuit near TB1 terminal board (6). Unsolder each wire from the circuit.	
d. Four screws, flat washers, and Iockwashers (5)	Use cross tip screwdriver. Remove and inspect four screws and flat washers securing the circuit to the chassis. If damaged, obtain replacement. Discard Iockwashers.	
e. Diode circuit (4)	Remove defective circuit and send it to supply for disposition.	
INSTALLATION		
f. Diode circuit (4)	Obtain replacement circuit and four Iockwashers.	
g. Four screws, flat washers, and Iockwashers (5)	Use cross tip screwdriver. Install and tighten four screws, flat washers, and replacement lockwashers securing the circuit to the chassis.	
h. Diode circuit (4) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to terminals on the circuit, and remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
i. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-32. REPLACEMENT OF TB1 TERMINAL BOARD.

Tools:

Flat tip screwdriver
Torque screwdriver
Flat tip bit
Cross tip screwdriver

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Terminal board (6) wires	Tag location of all wires connected to TB1 terminal board (6) near connector P1.	
d. Six screws (7)	Use flat tip screwdriver. Remove and inspect six screws securing the wires to the terminal board. If damaged, obtain replacement.	
e. Four screws, flat washers, and lockwashers (8)	Use cross tip screwdriver. Remove and inspect four screws and flat washers securing the terminal board to the chassis. If damaged, obtain replacement. Discard lockwashers.	
f. Terminal board (6)	Remove and discard defective terminal board.	
INSTALLATION		
g. Terminal board (6)	Obtain replacement terminal board and four lockwashers.	
h. Four screws, flat washers, and lockwashers (8)	Use cross tip screwdriver. Install and tighten four screws, flat washers, and replacement lockwashers securing the terminal board to the chassis.	Position terminal board TB1 with terminals for wires closest to connector P1.
i. Terminal board (6) wires and screws (7)	Use flat tip screwdriver. Install and tighten six retained screws securing tagged wires to terminals on the terminal board. Remove wire tags.	
j. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-33. REPLACEMENT OF CR2 DIODE ON K1 RELAY.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- Needle nose pliers
- Flush cutting pliers
- Soldering kit
- Soldering aid
- Heat sink
- Lead measuring and forming tool

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Diode (9) leads	Use soldering kit, soldering aid, and heat sink. Tag location of the diode leads soldered to pins on the K1 relay (10). Unsolder each lead from the relay.	
d. Diode (9)	Remove and discard defective diode.	
INSTALLATION		
e. Diode (9)	Obtain replacement diode.	
f. Diode (9) leads	Use lead measuring and forming tool. Measure the center-to-center dimension between mounting leads of component at replacement site and form the leads to this dimension.	
g. Relay (10)	Use soldering kit, soldering aid, heat sink, needle nose pliers, and flush cutting pliers. Install diode, solder leads to tagged pins on relay (10), trim the leads, and remove the tags.	Before and after soldering, clean diode leads and relay pins with alcohol and cotton swabs. Ensure that cathode lead is connected to pin X1 on the relay.
h. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-34. REPLACEMENT OF K1 RELAY.

Tools:

Flat tip screwdriver	Soldering kit
Torque screwdriver	Soldering aid
Flat tip bit	Heat sink
Needle nose pliers	Cross tip screwdriver

Expendable Supplies:

Solder	Alcohol
Cotton swabs	

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Diode (9) leads	Use soldering kit, soldering aid, and heat sink. Tag location of the diode leads soldered to pins on the K1 relay (10). Unsolder each lead from the relay.	
d. Diode (9)	Remove and retain the diode.	
e. Two screws, flat washers, and lockwashers (11)	Use cross tip screwdriver. Remove and inspect two screws and flat washers securing the K1 relay (10) to the chassis. If damaged, obtain replacement. Discard lockwashers.	
f. Relay (10)	Remove and discard defective relay.	
INSTALLATION		
g. Relay (10)	Obtain replacement relay and two lockwashers.	
h. Two screws, flat washers, and lockwashers (11)	Use cross tip screwdriver. Install and tighten two retained screws, flat washers, and replacement lockwashers securing the K1 relay (10) to the chassis.	Position K1 relay with pins for wires closest to CB1 circuit breaker.
i. Diode (9) leads	Use soldering kit, soldering aid, heat sink, and needle nose pliers. Install the retained diode, solder leads to tagged pins on relay (10), and remove the tags.	Before and after soldering, clean diode leads and relay pins with alcohol and cotton swabs. Ensure that cathode lead is connected to pin X1 on the relay.
j. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-35. REPLACEMENT OF CB1 CIRCUIT BREAKER.

Tools:

Flat tip screwdriver	Soldering kit
Torque screwdriver	Soldering aid
Flat tip bit	Heat sink
Needle nose pliers	Torque wrench
Adjustable wrench	

Expendable Supplies:

Solder	Alcohol
Silicone compound	Cotton swabs

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Circuit breaker (12) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to CB1 circuit breaker terminals near the DS1 lamp. Unsolder each wire from the circuit breaker.	
d. Hex nut, switch plate, and lock ring	Use adjustable wrench. Note orientation of circuit breaker. Remove and discard hex nut, switch plate, and lock ring securing circuit breaker to chassis.	
e. Circuit breaker (12)	Remove and discard defective circuit breaker.	
INSTALLATION		
f. Circuit breaker (12)	Obtain replacement circuit breaker, hex nut, switch plate, and lock ring.	
g. O-ring	Apply silicone compound to o-ring on replacement circuit breaker.	
h. HCP Hex nut, switch plate, and lock ring	Use adjustable wrench. Insert replacement circuit breaker in chassis with proper orientation. Install and hand tighten replacement hex nut, switch plate, and lock ring securing circuit breaker to chassis. Use torque wrench. Torque to 20 in-lb.	

14-35. REPLACEMENT OF CB1 CIRCUIT BREAKER. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
i. Circuit breaker (12) wires	Use soldering kit, soldering aid, heat sink, and needle nose pliers. Solder wires to tagged terminals on the circuit breaker, and remove the tags.	Before and after soldering, clean wires and circuit breaker terminals with alcohol and cotton swabs.
j. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-36. REPLACEMENT OF LAMP HOLDER FOR DS1 LAMP.

Tools:

Flat tip screwdriver	Soldering kit
Torque screwdriver	Soldering aid
Flat tip bit	Heat sink
Torque wrench	9/16 inch wrench

Expendable Supplies:

Solder	Alcohol
Silicone compound	Cotton swabs

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Light lens and DS1 lamp	Remove light lens and lamp from lamp holder (13) and inspect for damage. If damaged, obtain replacement.	
d. Lamp holder (13) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to terminals on rear of lamp holder. Unsolder each wire from the lamp holder.	
e. Hex nut and lockwasher	Use 9/16 inch wrench. Remove and discard hex nut and lockwasher securing lamp holder to chassis.	
f. Lamp holder (13)	Remove and discard defective lamp holder.	

14-36. REPLACEMENT OF LAMP HOLDER FOR DS1 LAMP. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
g. Lamp holder (13)	Obtain replacement lamp holder, hex nut, and lockwasher.	
h. O-ring	Apply silicone compound to o-ring on replacement lamp holder.	
i. HCP Hex nut and lockwasher	Use 9/16 inch wrench. Install and hand tighten replacement hex nut and lockwasher securing lamp holder to chassis. Use torque wrench. Torque to 30 in-lb.	
j. Lamp holder (13) wires	Use soldering kit, soldering aid, and heat sink. Solder wires to tagged terminals on the lamp holder, and remove the tags.	Before and after soldering, clean wires and lamp holder terminals with alcohol and cotton swabs.
k. Light lens and DS1 lamp	Install and tighten retained light lens on the lamp holder.	
l. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-37. REPLACEMENT OF E1 OR E2 BINDING POST.

Tools:

Flat tip screwdriver	Soldering kit
Torque screwdriver	Soldering aid
Flat tip bit	Heat sink
Torque wrench	5/16 inch wrench

Expendable Supplies:

Solder	Alcohol
Silicone compound	Cotton swabs

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1), See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	

14-37. REPLACEMENT OF E1 OR E2 BINDING POST. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
c. Binding post (14) or (15) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to terminals on rear of binding post. Unsolder each wire from the binding post.	
d. Hex nut, lockwasher, flat washer, and nylon washer	Use 5/16 inch wrench. Remove and discard hex nut, lockwasher, flat washer, and nylon washer securing binding post to chassis.	
e. Binding post (14) or (15)	Remove and discard defective binding post.	
INSTALLATION		
f. Binding post (14) or (15)	Obtain replacement binding post, hex nut, lockwasher, flat washer, and nylon washer.	
g. O-ring	Apply silicone compound to o-ring on replacement binding post.	
h. HCP Hex nut, flat washer, lockwasher, and nylon washer	Use 5/16 inch wrench. Install and hand tighten replacement hex nut, lockwasher, flat washer, and nylon washer securing binding post to chassis. Use torque wrench. Torque to 6 in-lb.	
i. Binding post (14) or (15) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to terminals on rear of the binding post, and remove wire tags.	Before and after soldering, clean wires and binding post terminals with alcohol and cotton swabs.
j. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-38. REPLACEMENT OF J1 CONDUCTOR.

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- Socket wrench
- 1 1/16 inch socket
- Soldering kit
- Soldering aid
- Heat sink
- Torque wrench

Expendable Supplies:

- Solder
- Silicone compound
- Alcohol
- Cotton swabs

14-38. REPLACEMENT OF J1 CONNECTOR. Continued

References:
Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis (1)	Set upside down on work surface with front toward you. See figure 13-6.	
c. Connector J1 (16) wires	Use soldering kit, soldering aid, and heat sink. Tag the pin location of all wires soldered to rear of connector. Unsolder each wire from the connector.	
d. Hex nut	Use socket wrench and 1 1/16 inch socket. Remove and inspect hex nut securing connector to chassis. If damaged, obtain replacement.	
e. Connector J1 (16) and lockwasher	Remove and discard defective connector and lockwasher.	
INSTALLATION		
f. Connector J1 (16) and lockwasher	Obtain replacement connector and lockwasher.	
g. O-ring	Apply silicone compound to o-ring on replacement connector.	
h. HCP Hex nut and lockwasher	Use socket wrench and 1 1/16 inch socket. Install and hand tighten retained hex nut and replacement lockwasher securing connector to chassis. Use torque wrench. Torque to 70 in-lb.	
i. Connector J1 (16) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to pins on rear of the connector, and remove wire tags.	Before and after soldering, clean wires and connector pins with alcohol and cotton swabs.
j. HCP Heat sink assembly	Install retained heat sink assembly on power supply adapter chassis (1).	Refer to paragraph 14-17 for heat sink installation.

14-39. REPLACEMENT OF REAR ACCESS COVER ASSEMBLY.

Tools:

Flat tip screwdriver	7/8 Inch socket wrench
Cross tip screwdriver	1 1/16 Inch socket wrench
Torque screwdriver	7/8 Inch socket
Flat tip bit	1 1/16 Inch socket
Adjustable wrench	Torque wrench

Expendable Supplies:

Sealing compound
Silicone compound

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-7.	
b. Seal screw (1)	Use flat tip screwdriver. Remove seal screw from middle left side of rear access cover (2), and retain.	
c. Sealing guide pin (15)	Use adjustable wrench. Remove the sealing guide pin and o-ring, and retain.	
d. Screw, flat washer, and lockwasher (5)	Use cross tip screwdriver. Remove and inspect screw and flat washer securing protective rubber cap (4) for J3 connector (3) to rear access cover. If damaged, obtain replacement. Discard lockwasher.	
e. Protective rubber cap (4)	Remove and retain.	
f. Screw, flat washer, and lockwasher (8)	Use cross tip screwdriver. Remove and inspect screw and flat washer securing protective rubber caps (9) and (7) for J4 and J5 connectors (10) and (6) to rear access cover. If damaged, obtain replacement. Discard lockwasher.	
g. Protective rubber caps (7) and (9)	Remove and retain.	
h. 12 captive screws (11)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
i. Rear access cover (2)	Remove from chassis to allow access to P1, J3, J4 and J5 connectors, and retain.	
j. Four screws (12)	Use flat tip screwdriver. Remove and inspect four screws securing P1 connector (13) to rear access cover. If damaged, obtain replacement.	

14-39. REPLACEMENT OF REAR ACCESS COVER ASSEMBLY. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

k.	Connector (13) and connector retaining plate (11)	Remove from rear access cover and inspect for damage. If damaged, obtain replacement.
l.	Connector (3), hex nut, and lockwasher	Use 7/8 inch socket wrench. Remove and inspect hex nut securing J3 connector (3) to rear access cover. If damaged, obtain replacement. Discard lockwasher.
m.	Connector (3)	Remove and retain.
n.	Connector (10), hex nut, and lockwasher	Use 7/8 inch socket wrench. Remove and inspect hex nut securing J4 connector (10) to rear access cover. If damaged, obtain replacement. Discard lockwasher.
o.	Connector (10)	Remove and retain.
p.	Connector (6), hex nut, and lockwasher	Use 1 1/16 inch socket wrench. Remove and inspect hex nut securing J5 connector (6) to rear access cover. If damaged, obtain replacement. Discard lockwasher.
q.	Connector (6)	Remove and retain.
r.	Rear access cover (2)	Remove damaged rear access cover from power supply adapter chassis and send it to supply for disposition.

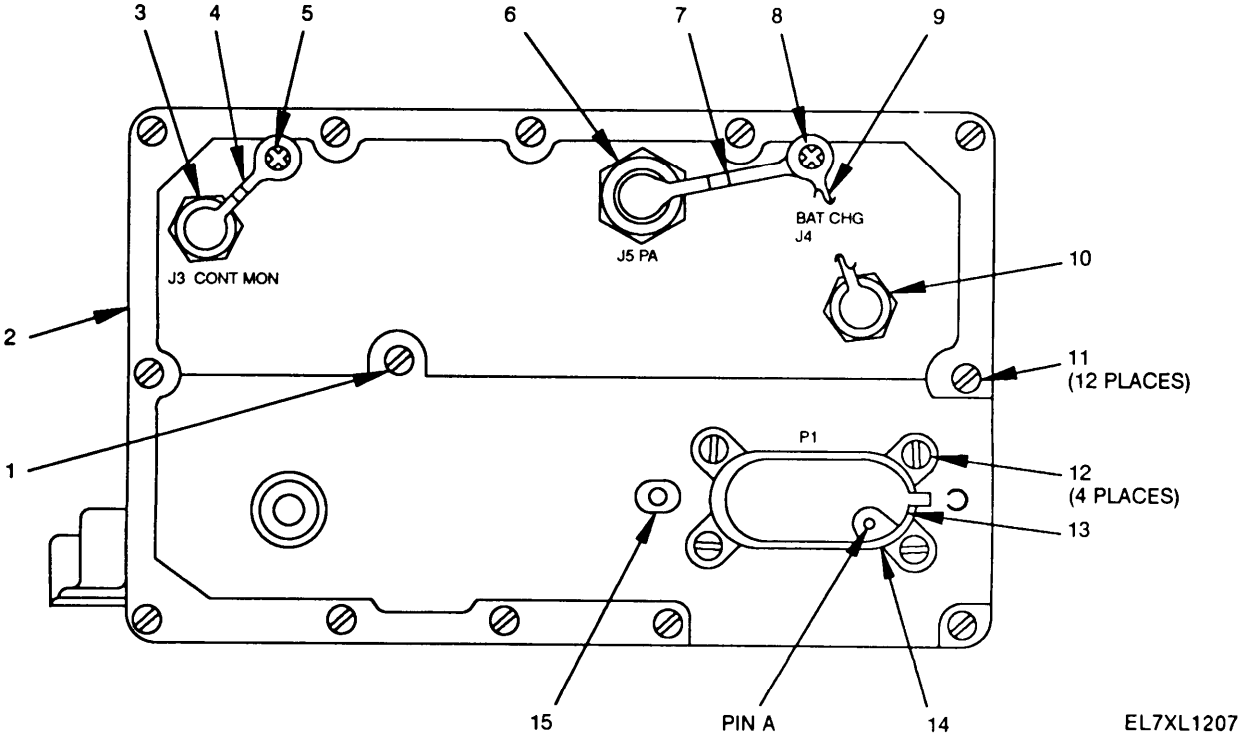


Figure 14-7. Rear Access Cover Assembly on Power Supply Adapter.

14-39. REPLACEMENT OF REAR ACCESS COVER ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
s. Rear access cover (2) and five lockwashers	Obtain replacement rear access cover and lockwashers.	
t. Connector (6) o-ring	Apply silicone compound to o-ring on retained J5 connector.	
u. HCP connector (6), hex nut, and lockwasher	Use 1 1/16 inch socket wrench. Install and hand tighten retained hex nut and replacement lockwasher securing the J5 connector (6) to the rear access cover. Use torque wrench and 1 1/16 inch socket. Torque to 70 in-lb.	
v. Connector (3) o-ring	Apply silicone compound to o-ring on retained J3 connector.	
w. HCP Connector (3), hex nut, and lockwasher	Use 7/8 inch socket wrench. Install and hand tighten retained hex nut and replacement lockwasher securing the J3 connector (3) to the rear access cover. Use torque wrench and 7/8 inch socket. Torque to 60 in-lb.	
x. Connector (10) o-ring	Apply silicone compound to o-ring on retained J4 connector.	
y. HCP Connector (10), hex nut, and lockwasher	Use 7/8 inch socket wrench. Install and hand tighten retained hex nut and replacement lockwasher securing the J4 connector (10) to the rear access cover. Use torque wrench and 7/8 inch socket. Torque to 60 in-lb.	
z. Connector (13) and connector retaining plate (14)	Position retained connector and connector retaining plate in rear access cover.	
aa. HCP Four screws (12)	Apply sealing compound to threads of four retained screws. Use flat tip screwdriver. Install and hand tighten four screws securing the connector and connector retaining plate to the rear access cover. Use torque screwdriver. Torque to 90 in-lb.	

14-39. REPLACEMENT OF REAR ACCESS COVER ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
ab. Rear access cover (2)	Position replacement rear access cover on the power supply adapter chassis.	
ac. HCP 12 captive screws (11)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the power supply adapter chassis. Use torque screwdriver. Torque to 9 in-lb.	
ad. Screw, flat washer, and lockwasher (5)	Use cross tip screwdriver. Install and hand tighten retained screw, flat washer, and replacement lockwasher securing the protective rubber cap (4) for the J3 connector (3) on the rear access cover. Place the protective rubber cap on the J3 connector (3).	
ae. Screw, flat washer, and lockwasher (8)	Use cross tip screwdriver. Install and hand tighten retained screw, flat washer, and replacement lockwasher securing the protective rubber caps (9) and (7) for the J4 and J5 connectors (10) and (6) on the rear access cover. Place the protective rubber caps on the J4 and J5 connectors (10) and (6).	
af. Sealing guide pin (15) o-ring	Install o-ring on retained sealing guide pin, and apply sealing compound to o-ring.	
ag. HCP Sealing guide pin (15)	Use adjustable wrench. Install and hand tighten sealing guide pin on rear access cover. Use torque wrench. Torque to 20 in-lb.	
ah. HCP Seal screw (1)	Use flat tip screwdriver. Install and hand tighten seal screw on rear access cover. Use torque screwdriver. Torque to 15 in-lb.	

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY.

Tools:

Flat tip screwdriver	5/16 Inch wrench	Soldering kit
Cross tip screwdriver	9/16 Inch wrench	Soldering aid
Torque screwdriver	1 5/16 Inch spanner wrench	Heat sink
Flat tip bit	1 1/16 Inch socket	Torque wrench
Adjustable wrench	Socket wrench	
Long nose pliers	Socket wrench spanner attachment	

Expendable Supplies:

Solder	Cotton swabs
Alcohol	Silicone compound

References:

Paragraph 14-17 for removal and installation of the heat sink assembly (8A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Heat sink assembly (2)	Use flat tip screwdriver. Remove and retain heat sink assembly from power supply adapter chassis (1). See figure 13-2.	Refer to paragraph 14-17 for heat sink removal.
b. Power supply adapter chassis assembly (1)	Set on work surface with left side toward you. See figure 14-8.	
c. Two spring pins (2)	Use long nose pliers. Remove and discard two spring pins (located in cutout on chassis) securing two thumbscrews (3) on the chassis.	
d. Two flat washers (2)	Remove two flat washers from the end of two thumbscrews and inspect them for damage. If damaged, obtain replacement.	
e. Two thumbscrews (3), bevel washers (4), and rim clenching clamps (5)	Remove and inspect two thumbscrews, bevel washers, and rim clenching clamps for damage. If damaged, obtain replacement.	

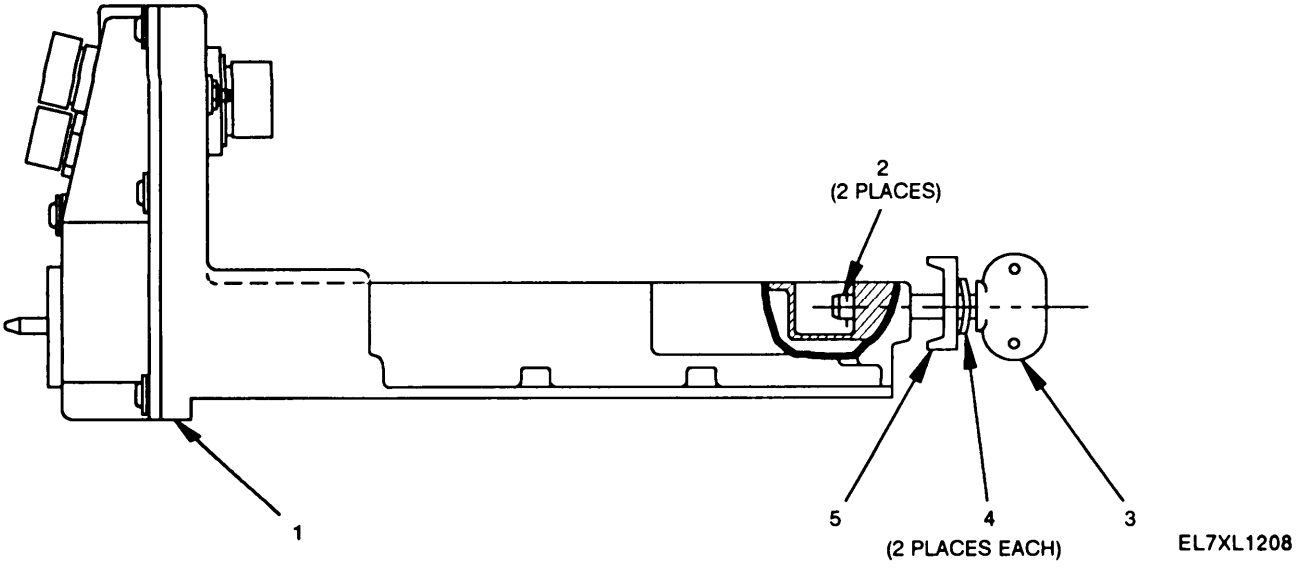


Figure 14-8. Power Supply Adapter Chassis Assembly (Left Side Cutout View) Without Heat Sink Assembly.

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

f.	Power supply adapter chassis assembly (1)	Set on work surface with front toward you. See figure 14-9.
g.	Screw, flat washer, and lockwasher (2)	Use cross tip screwdriver. Remove and inspect screw and flat washer securing protective rubber cap (3) for J1 connector (4) on the chassis. If damaged, obtain replacement. Discard lockwasher.
h.	Protective rubber cap (3)	Remove and retain.
i.	Connector J1 (4) wires	Use soldering kit, soldering aid, and heat sink, Tag the pin location of all wires soldered to rear of connector. Unsolder each wire from the connector.
j.	Hex nut and lockwasher	Use socket wrench and 1 1/16 inch socket. Remove and inspect hex nut securing J1 connector to chassis. If damaged, obtain replacement. Discard lockwasher.
k.	Connector J1 (4)	Remove and retain.

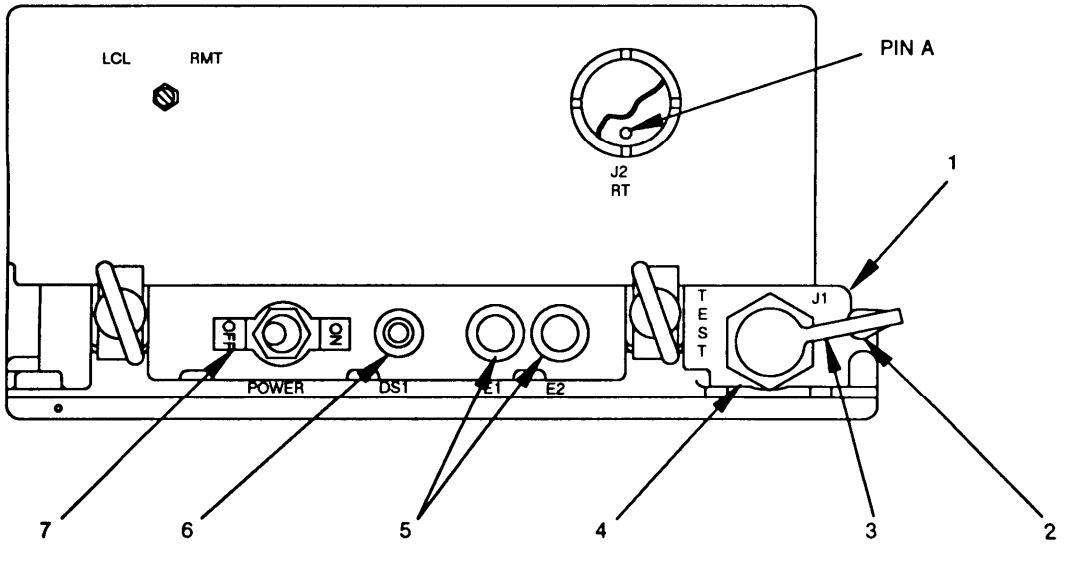


Figure 14-9. Power Supply Adapter Chassis Assembly (Front View).

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
l. Binding post (5) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to terminals of the E1 and E2 binding posts. Unsolder each wire from the terminals.	
m. Two hex nuts, lockwashers, flat washers, and nylon washers	Use 5/16 inch wrench. Remove and inspect two hex nuts, flat washers, and nylon washers securing binding posts on the chassis. If damaged, obtain replacement. Discard lockwashers.	
n. Binding posts (5)	Remove and retain.	
o. Light lens	Remove light lens from DS1 lamp holder (6) and inspect for damage. If damaged, obtain replacement.	
p. Lamp	Remove lamp from DS1 lamp holder (6) and inspect for damage. If damaged, obtain replacement.	
q. Lamp holder (6) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to terminals of the lamp holder. Unsolder each wire from the terminals.	
r. Hex nut and lockwasher	Use 9/16 inch wrench. Remove and inspect hex nut securing lamp holder on the chassis. If damaged, obtain replacement. Discard lockwasher.	
s. Lamp holder (6)	Remove and retain.	
t. Circuit breaker (7) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered to CB1 circuit breaker terminals. Unsolder each wire from the circuit breaker.	
u. Hex nut, switch plate, and lock ring	Use adjustable wrench. Note orientation of circuit breaker. Remove and inspect hex nut, switch plate, and lock ring securing circuit breaker on the chassis. If damaged, obtain replacement.	
v. Circuit breaker (7)	Remove and retain.	

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

w.	Power supply adapter chassis assembly (1)	Set upside down on work surface with front toward you. See figure 14-10.

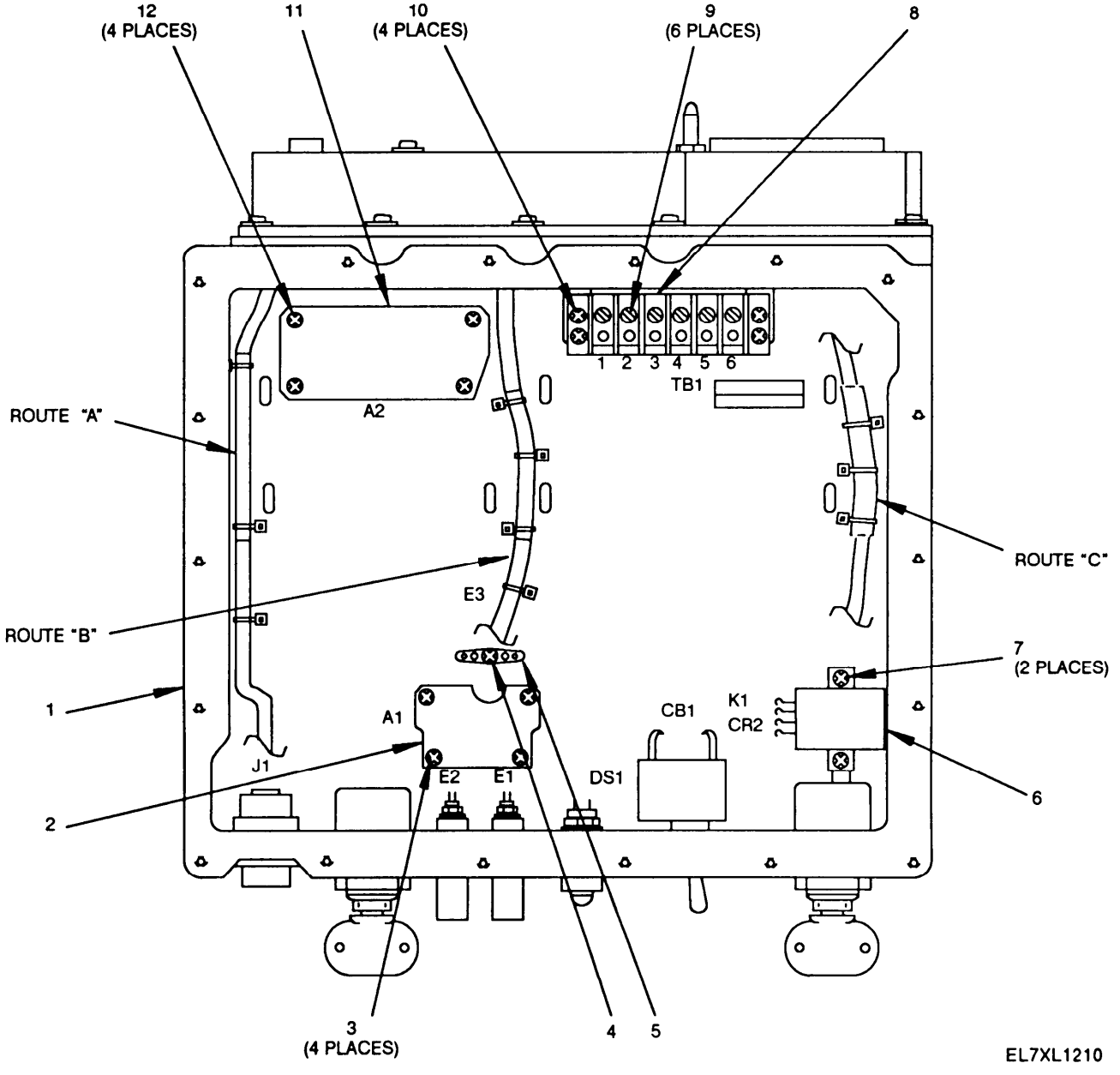


Figure 14-10. Power Supply Adapter Chassis Assembly (Bottom View) Without Heat Sink Assembly.

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
x. Two-wire transient protection circuit (2) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered on two-wire transient protection CCA (8A2A1). Unsolder each wire from terminal posts on the A1 CCA.	
y. Four screws, flat washers, and lockwashers (3)	Use cross tip screwdriver. Remove and inspect four screws and flat washers securing the circuit to the chassis. If damaged, obtain replacement. Discard lockwashers.	
z. Two-wire transient protection CCA (2)	Remove and retain.	
aa. Screw and flat washer (4) and two terminal lugs (5)	Use cross tip screwdriver. Remove and inspect screw, flat washer, and two terminal lugs securing the wiring harness to E3 on the chassis. If damaged, obtain replacement.	
ab. K1 relay (6) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires soldered on the relay. Unsolder each wire from the relay.	
ac. Two screws, flat washers, and lockwashers (7)	Use cross tip screwdriver. Remove and inspect two screws and flat washers securing the K1 relay to the chassis. If damaged, obtain replacement. Discard lockwashers.	
ad. K1 relay (6)	Remove and retain.	
ae. TB1 terminal board (8) wires	Tag location of all wires connected to TB1 terminal board (8).	
af. Six screws (9)	Use flat tip screwdriver. Remove and inspect six screws securing the wires to the terminal board. If damaged, obtain replacement.	
ag. Four screws, flat washers, and lockwashers (10)	Use cross tip screwdriver. Remove and inspect four screws and flat washers securing the terminal board to the chassis. If damaged, obtain replacement. Discard lockwashers.	
ah. Terminal board (8)	Remove and retain.	

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS

REMOVAL Continued

ai.	Diode CCA (11) wires	Use soldering kit, soldering aid, and heat sink. Tag location of all wires on the diode CCA (8A2A2). Unsolder each wire from terminal posts on the A2 CCA.
aj.	Four screws, flat washers, and lockwashers (12)	Use cross tip screwdriver. Remove and inspect four screws and flat washers securing the A2 CCA to the chassis. If damaged, obtain replacement. Discard lockwashers.
ak.	Diode CCA (11)	Remove and retain.
al.	Power supply adapter	Set on work surface with rear toward you. See figure 14-4.
am.	12 captive screws (3)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.
an.	Rear access cover (2)	Remove from chassis to allow access to CR1, CR3 and CR4 diodes, J2 connector, and the S1 rotary switch, and retain. See figure 14-11.

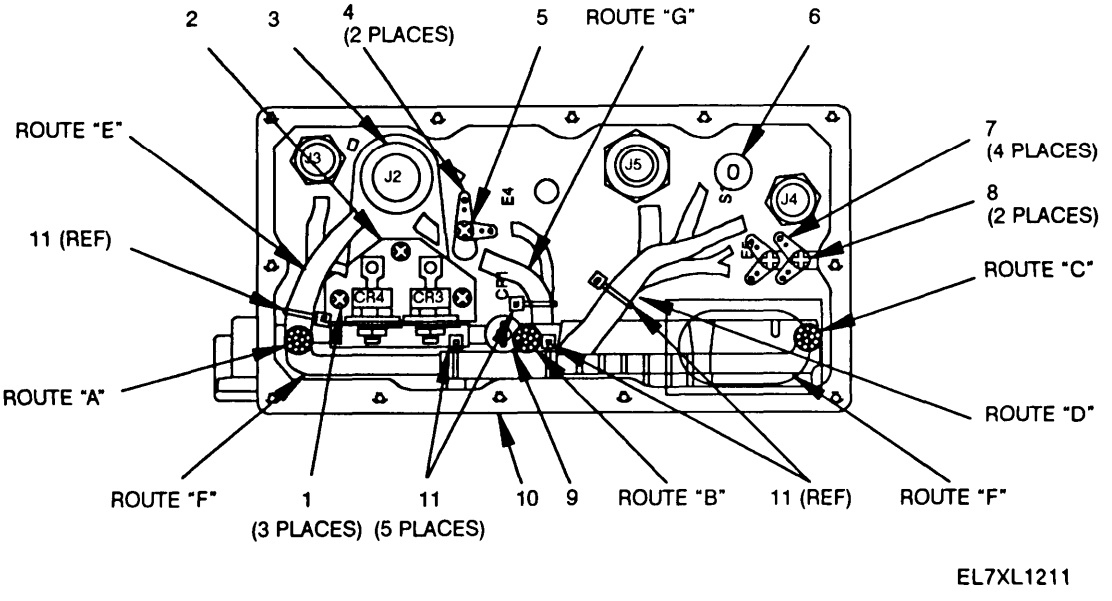


Figure 14-11. Power Supply Adapter Chassis Assembly (Rear View) Without Rear Access Cover.

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
ao. Three screws, flat washers, and lockwashers (1)	Use cross tip screwdriver. Remove and inspect three screws and flat washers securing angle bracket (2) with diodes CR3 and CR4 on the chassis. If damaged, obtain replacement. Discard lockwashers.	
ap. Angle bracket (2) with CR3 and CR4 diodes	Remove and retain the angle bracket with the CR3 and CR4 diodes.	
aq. CR1 diode (9), flat washer, and lockwasher	Use adjustable wrench. Remove the CR1 diode, flat washer, and lockwasher from the chassis. Inspect the flat washer for damage. If damaged, obtain replacement. Discard lockwasher.	
ar. CR1 diode (9)	Remove and retain.	
as. Spanner nut and lockwasher	Use 1 5/16 inch spanner wrench. Remove and inspect spanner nut securing J2 connector (3) on the chassis. If damaged, obtain replacement. Discard lockwasher.	
at. J2 connector (3)	Remove and retain.	
au. Screw, flat washer (5), and two terminal lugs (4)	Use cross tip screwdriver. Remove and inspect screw, flat washer, and two terminal lugs securing the wiring harness to E4 on the chassis. If damaged, obtain replacement.	
av. Hex nut and lockwasher	Use adjustable wrench. Remove and inspect hex nut securing the S1 rotary switch (6) on the chassis. If damaged, obtain replacement. Discard lockwasher.	
aw. S1 rotary switch (6)	Remove and retain.	
ax. Two screws, flat washers (8), and four terminal lugs (7)	Use cross tip screwdriver. Remove and inspect two screws, flat washers, and four terminal lugs securing the wiring harness to E5 on the chassis. If damaged, obtain replacement.	
ay. Wiring harness with rear access cover, J2 connector, S1 rotary switch, and CR1, CR3, and CR4 diodes	Remove and retain.	
az. Power supply adapter chassis assembly (10)	Send damaged power supply adapter chassis assembly to supply for disposition.	

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
ba. Power supply adapter chassis assembly (10), 25 lockwashers, and two spring pins	Obtain replacement power supply adapter chassis assembly, 25 lockwashers, and two spring pins.	
bb. Wiring harness with rear access cover, J2 connector, S1 rotary switch, and CR1, CR3, and CR4 diodes	Carefully position retained wiring harness with rear access cover, J2 connector, S1 rotary switch, and CR1, CR3, and CR4 diodes on replacement power supply adapter chassis assembly. Route the wiring harness as shown in figure 14-11.	
bc. Screw, flat washer (5), and two terminal lugs (4)	Use cross tip screwdriver. Install and tighten screw, flat washer, and two terminal lugs securing the wiring harness to E4 on the chassis.	
bd. Two screws, flat washers (8), and four terminal lugs (7)	Use cross tip screwdriver. Install and tighten two screws, flat washers, and four terminal lugs securing the wiring harness to E5 on the chassis.	
be. Rubber washer	Apply silicone compound to rubber washer on retained S1 rotary switch.	
bf. HCP Hex nut and lockwasher	Use adjustable wrench. Install and hand tighten hex nut and replacement lockwasher securing the S1 rotary switch on the chassis. Use torque wrench. Torque to 13 in-lb.	
bg. O-ring	Apply silicone compound to o-ring on retained J2 connector (3).	
bh. HCP Spanner nut and lockwasher	Use 1 5/16 inch spanner wrench. Install and tighten spanner nut and replacement lockwasher securing J2 connector (3) on the chassis. Use torque wrench and socket wrench spanner attachment. Torque to 90 in-lb.	
bi. CR1 diode (9), flat washer, and lockwasher	Use adjustable wrench. Install and tighten retained CR1 diode, flat washer, and replacement lockwasher on the chassis.	
bj. Three screws, flat washers, and lockwashers (1)	Use cross tip screwdriver. Install and tighten three retained screws, flat washers, and replacement lockwashers securing retained angle bracket (2) with the CR3 and CR4 diodes on the chassis.	

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
bk. Power supply adapter chassis assembly (1)	Set upside down on work surface with front toward you. Route the wiring harness as shown in figure 14-10.	
bl. Screw and flat washer (4) and two terminal lugs (5)	Use cross tip screwdriver. Install and tighten retained screw, flat washer, and two terminal lugs securing the wiring harness to E3 on the chassis.	
bm. Four screws, flat washers, and Iockwashers (12)	Use cross tip screwdriver. Install and tighten four retained screws, flat washers, and replacement Iockwashers securing the retained A2 diode CCA on the chassis.	
bn. Diode CCA (11) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct terminal posts on the A2 diode CCA, and remove wire tags.	Before and after soldering, clean wires and terminal posts with alcohol and cotton swabs.
bo. Four screws, flat washers, and Iockwashers (10)	Use cross tip screwdriver. Install and tighten four retained screws, flat washers, and replacement Iockwashers securing the retained TB1 terminal board (8) on the chassis.	Position terminal board TB1 with terminals for wires closest to connector P1.
bp. Terminal board (8) wires and six screws (9)	Use flat tip screwdriver. Install and tighten six retained screws securing tagged wires to terminals on the terminal board. Remove wire tags.	
bq. Two screws, flat washers, and Iockwashers (7)	Use cross tip screwdriver. Install and tighten two retained screws, flat washers, and replacement Iockwashers securing the retained K1 relay (6) on the chassis.	Position K1 relay with pins for wires closest to CB1 circuit breaker.
br. Relay (6) wires	Use soldering kit, soldering aid, heat sink, and needle nose pliers. Install and solder tagged wires on correct terminals of the relay, and remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
bs. Four screws, flat washers, and Iockwashers (3)	Use cross tip screwdriver. Install and tighten four retained screws, flat washers, and replacement Iockwashers securing the retained two-wire transient CCA on the chassis.	
bt. Two-wire transient protection CCA (2) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct terminal posts on the two-wire transient CCA, and remove wire tags.	Before and after soldering, clean wires and terminal posts with alcohol and cotton swabs.

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
bu. O-ring	Apply silicone compound to o-ring on retained CB1 circuit breaker (7) See figure 14-9.	
bv. HCP Hex nut, switch plate, and lock ring	Use adjustable wrench. Insert retained circuit breaker in chassis with proper orientation. Install and hand tighten retained hex nut, switch plate, and lock ring securing circuit breaker on chassis. Use torque wrench. Torque to 20 in-lb.	
bw. Circuit breaker (7) wires	Use soldering kit, soldering aid, heat sink, and needle nose pliers. Install and solder tagged wires to correct terminals on the circuit breaker, and remove the wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
bx. O-ring	Apply silicone compound to o-ring on retained DS1 lamp holder (6).	
by. HCP Hex nut and lockwasher	Use 9/16 inch wrench. Install and hand tighten retained hex nut and replacement lockwasher securing lamp holder on chassis. Use torque wrench. Torque to 30 in-lb.	
bz. Lamp holder (6) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct terminals on the lamp holder, and remove the wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
ca. Lamp	Install retained lamp in lamp holder.	
cb. Light lens	Install and tighten retained light lens on lamp holder.	
cc. O-rings	Apply silicone compound to o-rings on retained E1 and E2 binding posts (5).	
cd. HCP two hex nuts, flat washers, lockwashers, and nylon washers	Use 5/16 inch wrench. Install and hand tighten two retained hex nuts, flat washers, nylon washers, and replacement lockwashers securing binding posts on chassis. Use torque wrench. Torque to 6 in-lb.	
ce. Binding post (5) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct terminals on rear of the binding posts, and remove the wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.

14-40. REPLACEMENT OF POWER SUPPLY ADAPTER CHASSIS ASSEMBLY. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
cf. O-ring	Apply silicone compound to o-ring on retained J1 connector (4).	
cg. HCP hex nut and lockwasher	Use socket wrench and 1 1/16 inch socket. Install and hand tighten retained hex nut and replacement lockwasher securing the J1 connector (4) on the chassis. Use torque wrench and 1 1/16 inch socket. Torque to 70 in-lb.	
ch. Connector (4) wires	Use soldering kit, soldering aid, and heat sink. Solder tagged wires to correct pins on the J1 connector, and remove wire tags.	Before and after soldering, clean wires and connector pins with alcohol and cotton swabs.
ci. Screw, flat washer, and lockwasher (2)	Use cross tip screwdriver. Install and hand tighten retained screw, flat washer, and replacement lockwasher securing the protective rubber cap (3) for the J1 connector on the chassis.	
cj. Two bevel washers (4)	Install two retained bevel washers on two retained thumbscrews (3). See figure 14-8.	Ensure that serrated side of each bevel washer is facing toward the thumbscrew.
ck. Two rim clenching clamps (5)	Install two retained rim clenching clamps on two retained thumbscrews (3).	Ensure that flat side of each rim clenching clamp is facing toward the bevel washer.
cl. Two flat washers (2)	Use long nose pliers. Install two retained flat washers on the two thumbscrews.	
cm. Two spring pins (2)	Use long nose pliers. Install two replacement spring pins in the end of two thumbscrews securing them to the chassis.	
cn. Rear access cover (2)	Position retained rear access cover on the chassis. See figure 14-7.	
co. HCP 12 captive screws (11)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover to the chassis. Use torque screwdriver. Torque to 9 in-lb.	
cp. Heat sink assembly (2)	Position retained heat sink assembly on the chassis. See figure 14-2.	
cq. HCP 18 captive screws (3)	Use flat tip screwdriver. Install and hand tighten the 18 captive screws securing the heat sink assembly on the chassis. Use torque screwdriver. Torque to 9 in-lb.	

14-41. REPLACEMENT OF WIRING IN POWER SUPPLY ADAPTER CHASSIS (8A2).

Tools:

- Flat tip screwdriver
- Torque screwdriver
- Flat tip bit
- Long nose pliers
- Flush cutting pliers
- Soldering kit
- Soldering aid
- Heat sink
- Wire strippers

Expendable Supplies:

- Solder
- Alcohol
- Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Power supply adapter	Set on work surface with rear toward you. See figure 14-7.	
b. 12 captive screws (11)	Use flat tip screwdriver. Fully loosen and inspect for damage. If damaged, obtain replacement.	
c. Rear access cover (2)	Remove from chassis to allow access to wiring, and retain.	
d. Tiedown straps (11)	Use flush cutting pliers. Remove tiedown straps from wiring harness with damaged wire. See figure 14-11. Tag wire locations at each end of damaged wire.	
e. Solder cup	Use soldering kit, soldering aid, heat sink, and long nose pliers. Unsolder end of damaged wire from solder cup.	
f. Terminal post	Use soldering kit, soldering aid, heat sink, and long nose pliers. Unsolder and unwrap end of damaged wire from terminal post.	
INSTALLATION		
g. Replacement wire	Use flush cutting pliers. Cut replacement wire of same length, gauge, and color as damaged wire. Use wire strippers. Strip both ends of replacement wire.	Refer to wiring list A3018935 for wire length and connectivity.
h. Wiring harness	Attach replacement wire to damaged wire. Pull replacement wire into wiring harness. Remove damaged wire from wiring harness.	
i. Solder cup	Use soldering kit, soldering aid, heat sink, and long nose pliers. Solder end of replacement wire in solder cup.	Before and after soldering, clean wires and solder cup with alcohol and cotton swabs.

14-41. REPLACEMENT OF WIRING IN POWER SUPPLY ADAPTER CHASSIS (8A2). Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
j. Terminal post	Use soldering kit, soldering aid, heat sink, and long nose pliers. Wrap and solder end of replacement wire on terminal post.	Before and after soldering, clean wires and terminal post with alcohol and cotton swabs.
k. Tiedown straps (11)	Install replacement tiedown straps on wiring harness, and remove wire tags.	
l. Rear access cover (2)	Position replacement rear access cover on the power supply adapter chassis. See figure 14-7.	
m. HCP 12 captive screws (11)	Use flat tip screwdriver. Install and hand tighten the 12 captive screws securing the rear access cover on the chassis. Use torque screwdriver. Torque to 9 in-lb.	

Section V. PREPARATION FOR STORAGE OR SHIPMENT

14-42. GENERAL INFORMATION.

a. Pack the power supply adapter and any removed modules in approved shipping containers.

b. All modules must be shipped enclosed in material that provides protection from static electricity. See the following paragraph.

14-43. PACKING STATIC SENSITIVE MODULES.

The following steps should be followed when packing a static sensitive module for storage or shipment.

CAUTION

To avoid damaging static sensitive modules, use an antistatic pad on the work surface and wear a grounded wrist strap when handling the module.

ITEM	ACTION	REMARKS
a. Module (1)	Place inside antistatic bag (2) or inside antistatic wrapping material (3). See figure 14-12.	
b. Antistatic package (4)	Seal with adhesive tape. Attach “sensitive electronic devices” unit pack label (5).	
c. Antistatic package (4)	Place inside approved shipping container (6). Attach “sensitive electronic devices” intermediate pack label (7).	

14-43. PACKING STATIC SENSITIVE MODULES. Continued

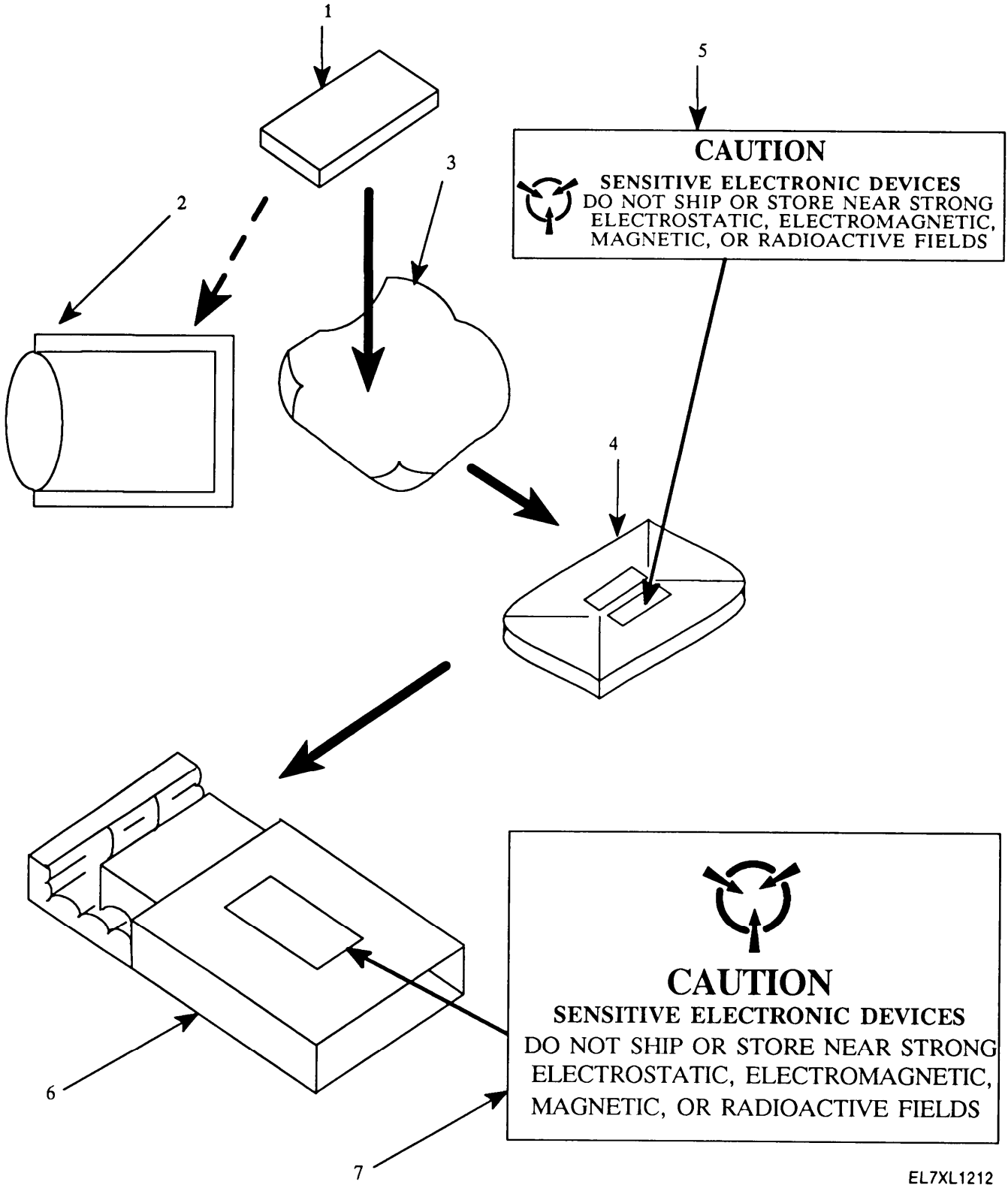


Figure 14-12. Packing Static Sensitive Modules

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CHAPTER 15

TRAY, BATTERY CY-8664/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

NOTE:

The charging function of this device is disabled when a Lithium battery is installed. There is presently no acceptable Nicad battery for this device, so the Nicad SENSE line has been factory disconnected effectively disabling the charging function.

15-1. INTRODUCTION.

The Tray, Battery CY-8664/VRC (battery tray), which operates in conjunction with the Battery Box CY-8523A/PRC and the Power Supply Adapter MX-10862/VRC, provides a battery backup capability, using a lithium battery, for certain single radio mount applications. This battery backup capability is the primary function and is intended to supply +13 V dc to the RT when the +27.5 V dc primary power drops to +7 V dc for longer than 300 milliseconds. This occurs in certain vehicles when hydraulic systems are operated. The battery tray also has test circuitry to indicate battery operability. The battery tray has four main sections:

a. Plate, Mounting, Battery Tray (mounting plate assembly)

b. Battery Tray Subassembly (12A1)

c. Circuit Card Assembly, Battery Tray (12A1A1)

d. Circuit Card Assembly, Connector Board (12A1A2)

They are described in the following paragraphs:

15-2. MOUNTING PLATE ASSEMBLY.

The mounting plate assembly is mounted on the bottom of the battery tray subassembly (12A1). It provides two basic functions:

a. It provides an environmental seal for the battery tray.

b. It supports the battery tray subassembly (12A1) that controls the operation of the battery tray.

15-3. BATTERY TRAY SUBASSEMBLY (12A1).

The battery tray subassembly consists of the battery tray case (chassis) and the following components that are mounted on it: resistor R1, zener diode VR1, connector J1, voltage regulator U1, lamp holder DS1, pushbutton switch S1, connector P1, terminal lugs, interconnection wiring, seal screw, battery tray circuit card assembly (12A1A1), and connector board circuit card assembly (12A1A2). A schematic diagram of the battery tray subassembly is included in figure FO-29. The battery tray subassembly has two circuit card assemblies. They are described in the following paragraphs:

15-4. BATTERY TRAY CIRCUIT CARD ASSEMBLY (12A1A1).

The battery tray circuit card assembly provides the switching and power sense functions that enable the +13 V dc from the battery box to power the RT during heavy vehicular power drain conditions, such as activating certain hydraulic systems. The circuit card assembly contains two relays, several diodes, and a voltage comparator.

15-5. CONNECTOR BOARD CIRCUIT CARD ASSEMBLY (12A1A2).

The connector board circuit card assembly provides the connection between the battery box and the battery tray circuit card assembly.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

15-6. COMMON TOOLS AND EQUIPMENT.

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

15-7. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

15-8. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

15-9. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective module within the battery tray. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module.

15-10. TEST PRECAUTIONS AND NOTES.

WARNING

Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

CAUTION

Static electricity and stray voltages can damage the battery tray. Use an antistatic pad on the work surface and wear a grounded wrist strap when troubleshooting or handling the modules.

NOTE

The Principles of Operation section, functional block diagrams, and schematic diagram, figure FO-29, can be used to help fault isolate any unusual problems that might not recovered in the troubleshooting procedures.

15-11. OPERATIONAL CHECK.

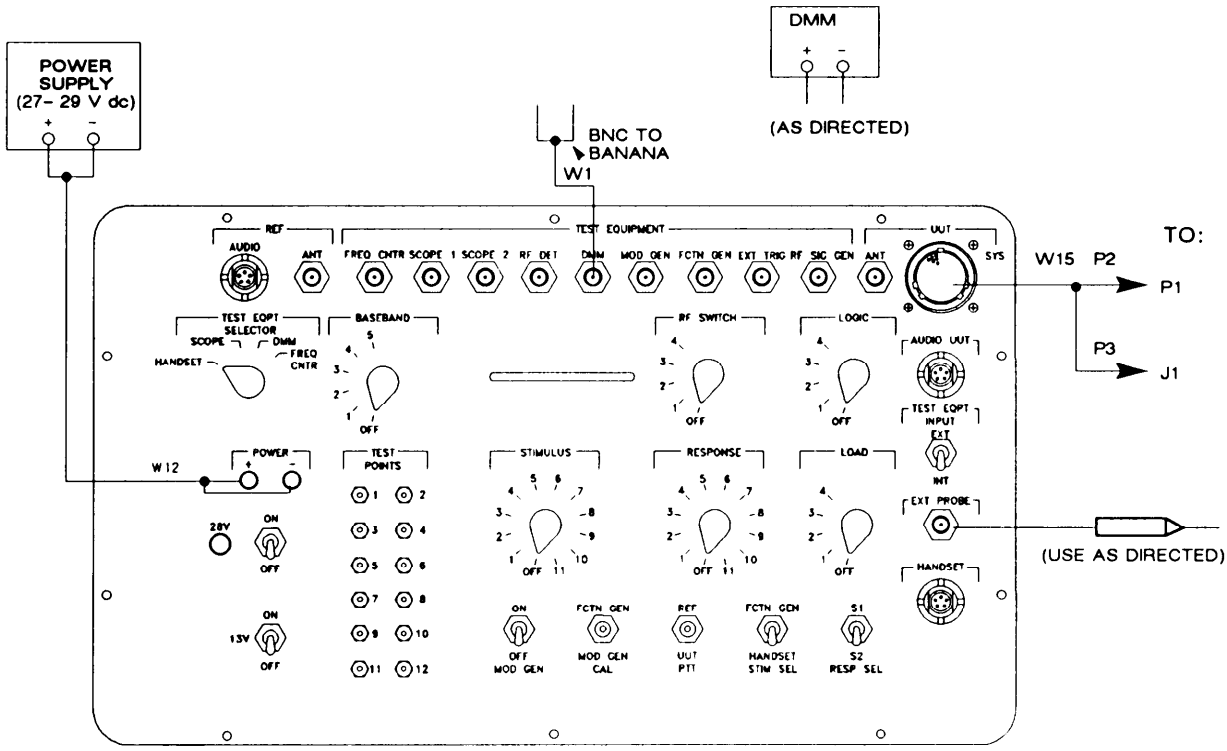
The operational check provides a step-by-step procedure for evaluating a battery tray. If the operational check is passed, the battery tray can be returned to service. If it does not, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 15-12.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A “No response” in the “Response” column means that any response is not of interest.

The switch settings for the test equipment are given in the “EQUIPMENT PRESETS” section of the test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module.

Connect equipment as shown in figure 15-1 to perform the operational check of the battery tray.

15-11. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

TEST ADAPTER:

28 V:	OFF
13 V:	OFF
STIMULUS:	OFF
RESPONSE:	2
LOAD:	OFF
RF SWITCH:	OFF
MOD GEN:	OFF
LOGIC:	OFF
TEST EQPT SELECTOR:	DMM
TEST EQPT INPUT:	INT
BASEBAND:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	FCTN GEN
RESP SEL:	S2

BATTERY TRAY:

DS1: FULLY CCW

DMM: 2 kΩ SCALE

EL7XL1655

Figure 15-1. Battery Tray Test Setup

15-11. OPERATIONAL CHECK. Continued

Step 1. BATTERY TRAY CHECK.

Action	Response
a. Connect equipment as shown in figure 14-1.	a. No response.
b. Remove 28 V lamp from test adapter.	b. No response.
c. Connect DMM test lead (+) to test adapter TEST POINT 7. Connect DMM test lead (-) to test adapter TEST POINT 12. Read DMM.	c. DMM reading is greater than 200 Ω. If not, the battery tray CCA (12A1A1) is bad.
d. Install 28 V lamp into test adapter.	d. No response.
e. Disconnect DMM test lead (+) from test adapter TEST POINT 7. Set test adapter 28 V: ON.	e. Battery tray lamp (DS1) does **not** light. If it does, go to chart 1.
f. Wait for 30 seconds.	f. DS1 lamp is still **not** lit. If it is, the battery tray CCA (12A1A1) is bad.
g. Set DMM to 20 V dc scale. Connect DMM test lead (+) to test adapter TEST POINT 9.	g. DMM reading is 14 to 16 V dc. If not, go to chart 2.
h. Press battery tray switch (S1).	h. DS1 lamp lights. If not, go to chart 3.
i. Disconnect DMM test leads from DMM and test adapter. Connect Jumper from test adapter TEST POINT 10 to TEST POINT 9. Press battery tray switch (S1).	i. DS1 lamp does **not** light. If it does, the battery tray CCA (12A1A1) is bad.
j. Disconnect jumper from test adapter TEST POINT 10 to TEST POINT 9. Connect W1 cable to DMM.	j. DMM reading is 14 to 16 V dc. If not, the wire from battery tray CCA-E16 to J1-E, or connector J1, is bad.
k. Disconnect W1 cable from DMM. Connect test leads to DMM. Connect (+) test lead to test adapter POWER +. Connect (-) test lead to test adapter POWER -.	k. No response.
l. Adjust power supply for output voltage of 2.0 V dc (1.5 to 2.5 V dc. Read DMM.	l. DMM reading is 1.5 to 2.5 V dc.
m. Disconnect test leads from DMM and test adapter. Connect W1 cable to DMM. Set DMM to 20 V dc scale. Read DMM.	m. DMM reading is -0.1 to +0.1 V dc. If not, the battery tray CCA (12A1A1) is bad.
n. Operational Check is complete.	

15-12. TROUBLESHOOTING.

Troubleshooting is done on a faulty battery tray. The steps to determine if a battery tray is faulty and how to troubleshoot it are as follows:

a. **When a battery tray is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. **Verify the symptom.** Perform the operational check found in paragraph 15-11. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. **Troubleshoot the battery tray using the flowchart.** It will identify the defective module or component.

d. **Replace the defective module or component.** Follow the procedures in section IV.

e. **Verify the repair.** Repeat the operational check in paragraph 15-11 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the battery tray can be returned for use.

The flowcharts provide views of the battery tray test points. These test points are used to fault isolate to a defective component. See figure 15-2 for the overall layout.

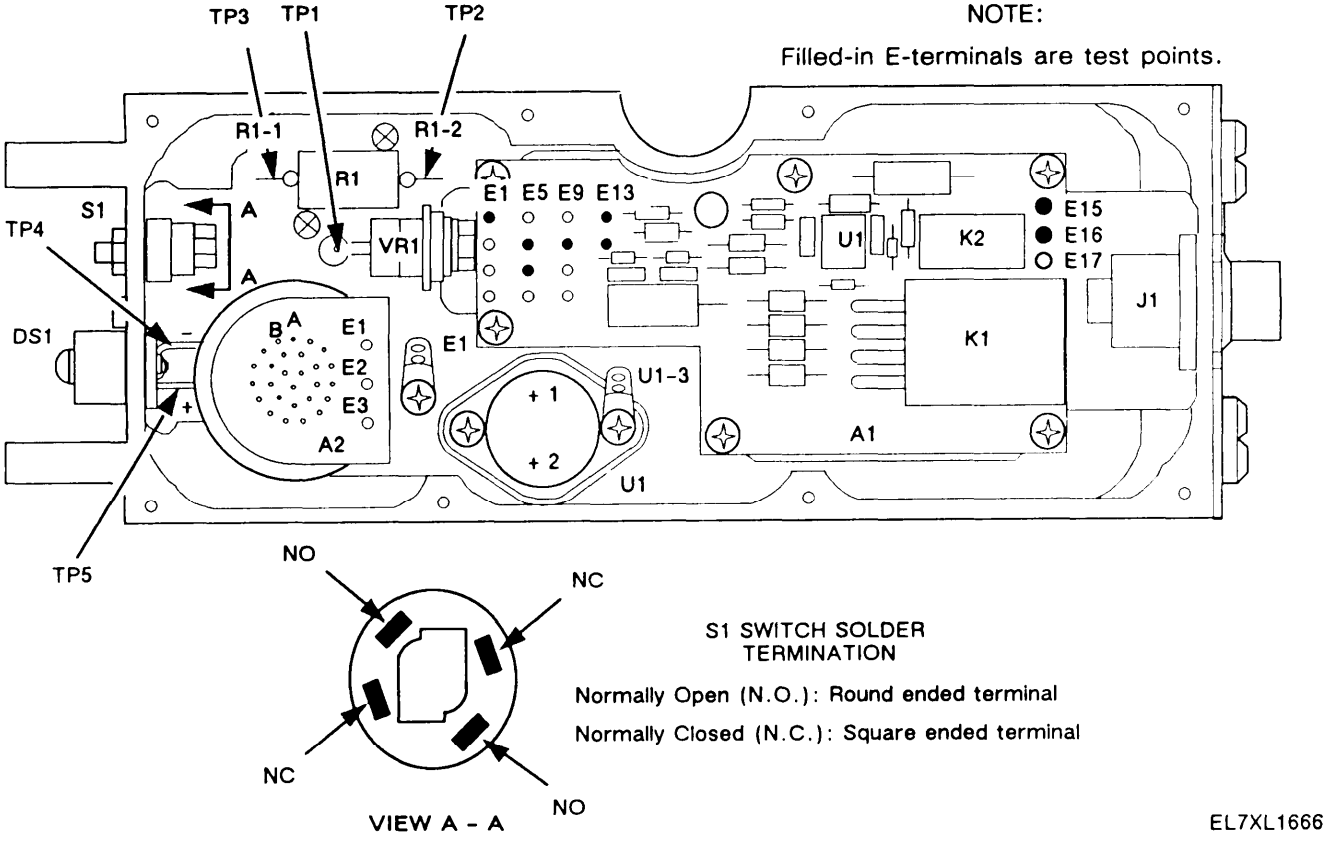
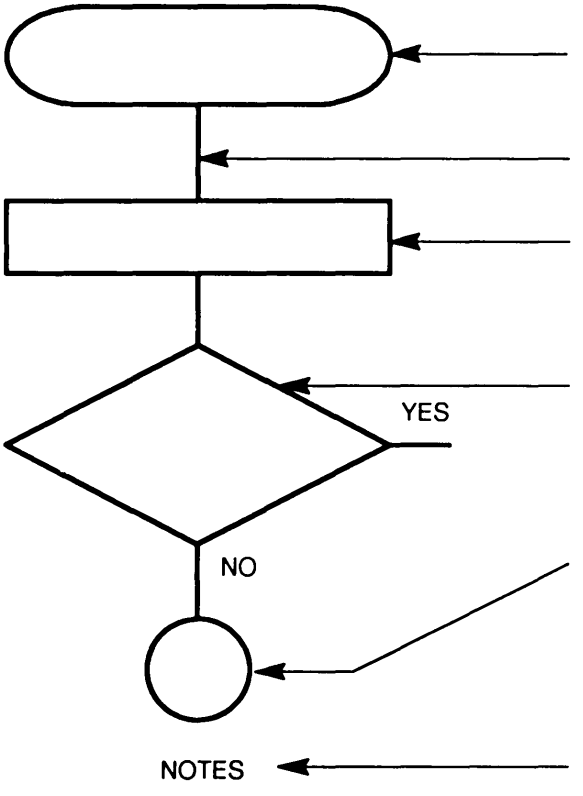


Figure 15-2. Battery Tray Test Points.

15-13. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages.

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

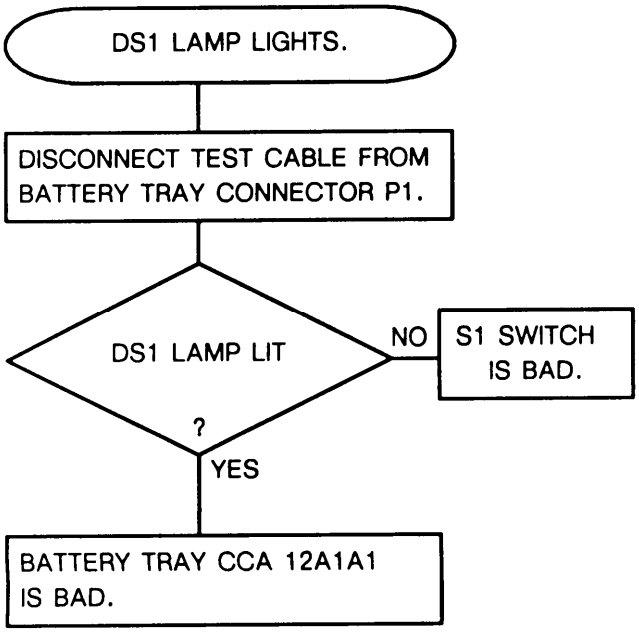
15-14. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	Troubleshooting DS1 Lamp
2	Troubleshooting Battery Tray
3	Troubleshooting DS1 Lamp

15-14. TROUBLESHOOTING FLOWCHARTS. Continued

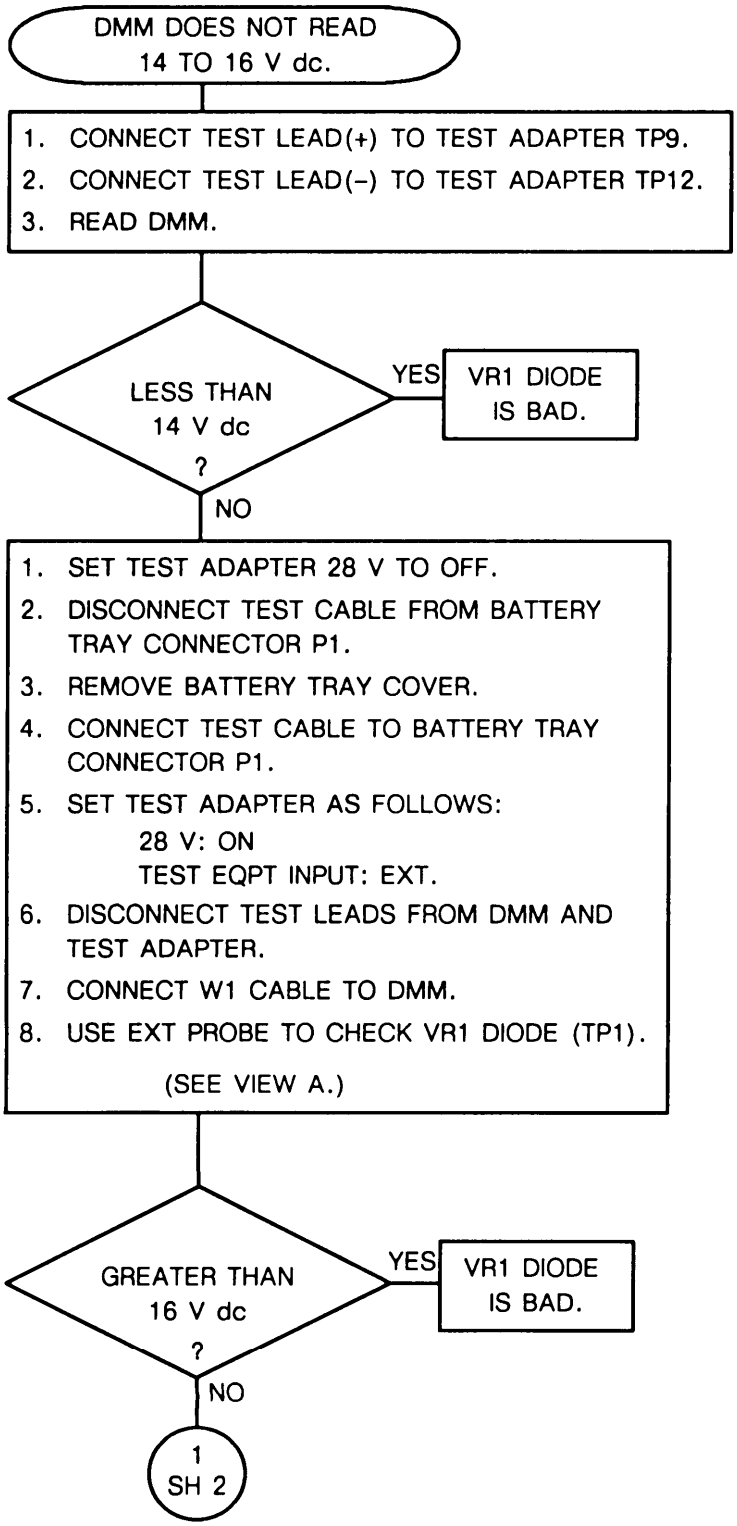
CHART 1
Troubleshooting DS1 Lamp
(Sheet 1 of 1)

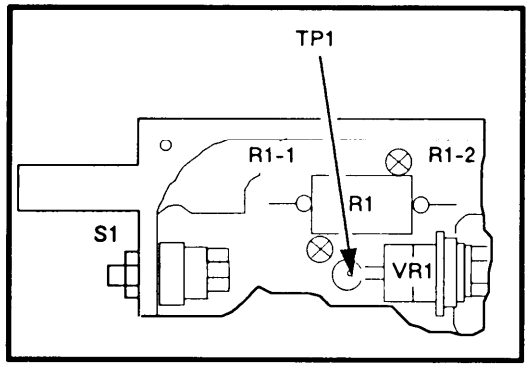


15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 2

Troubleshooting Battery Tray
(Sheet 1 of 3)



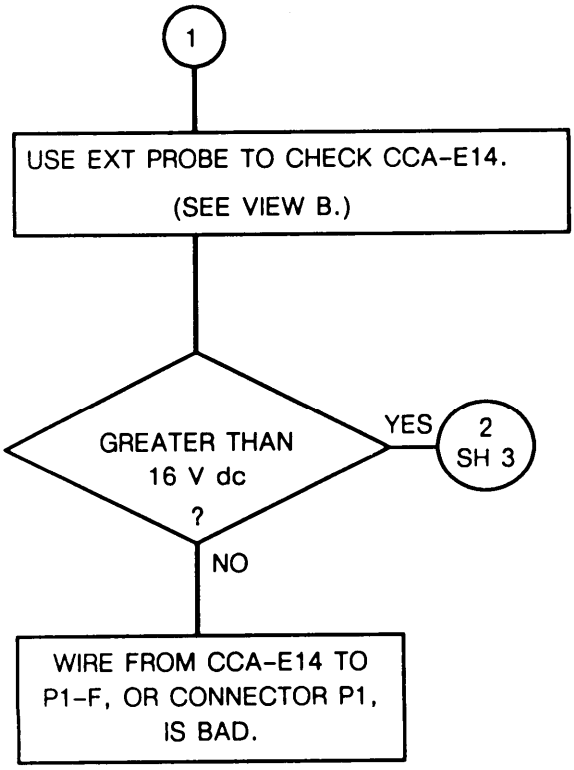


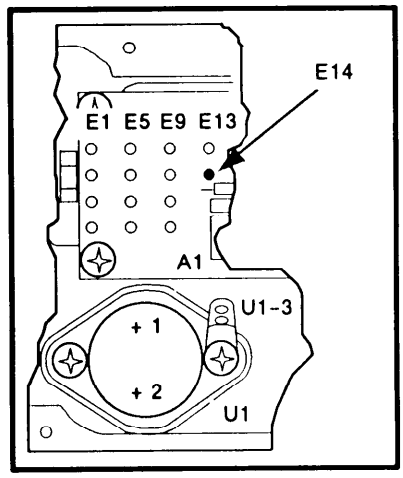
VIEW A.

15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 2

Troubleshooting Battery Tray
(Sheet 2 of 3)

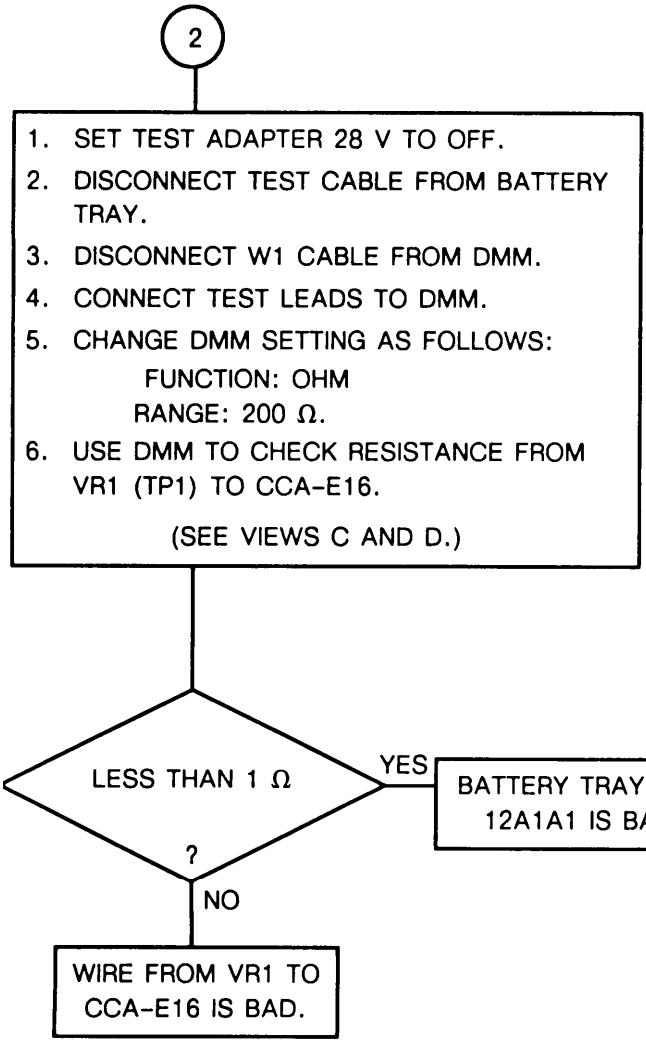


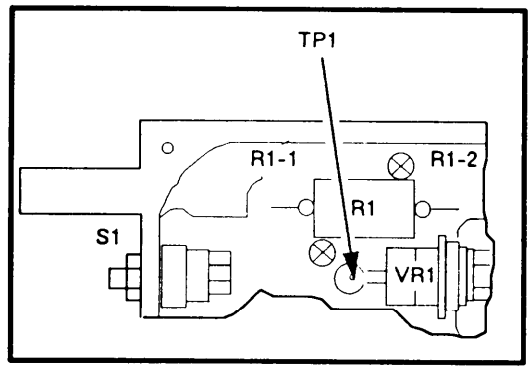


VIEW B.

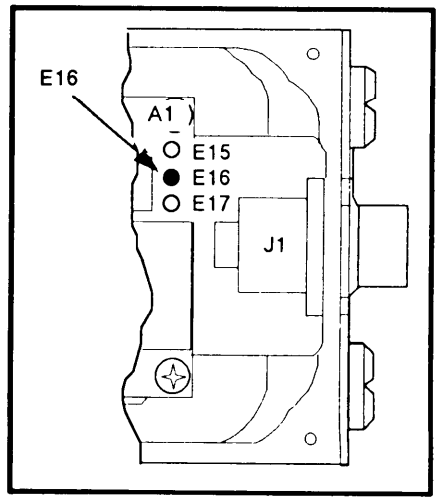
15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 2
Troubleshooting Battery Tray
(Sheet 3 of 3)





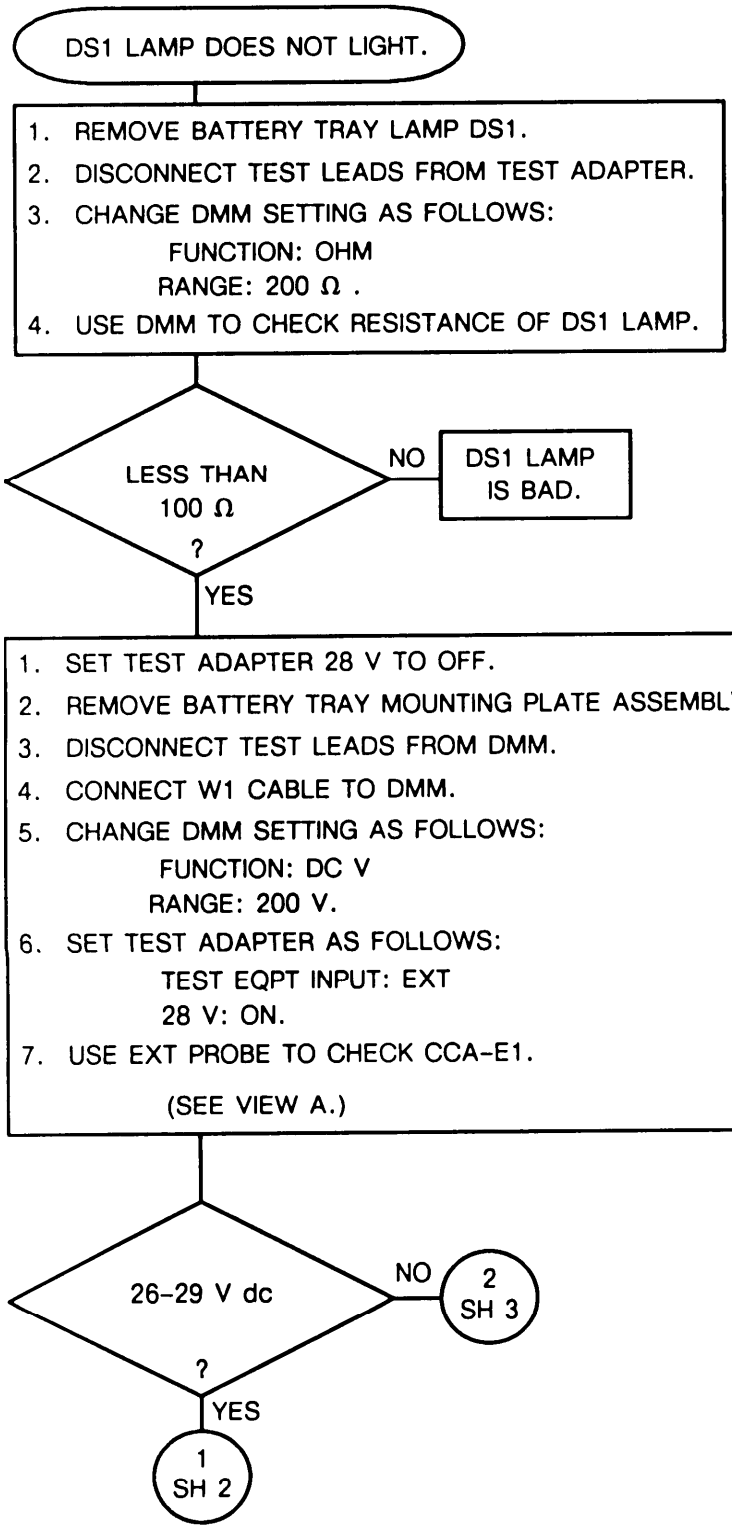
VIEW C.

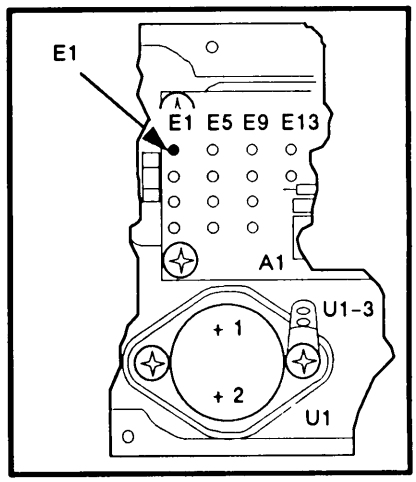


VIEW D.

15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 3
Troubleshooting DS1 Lamp
(Sheet 1 of 6)





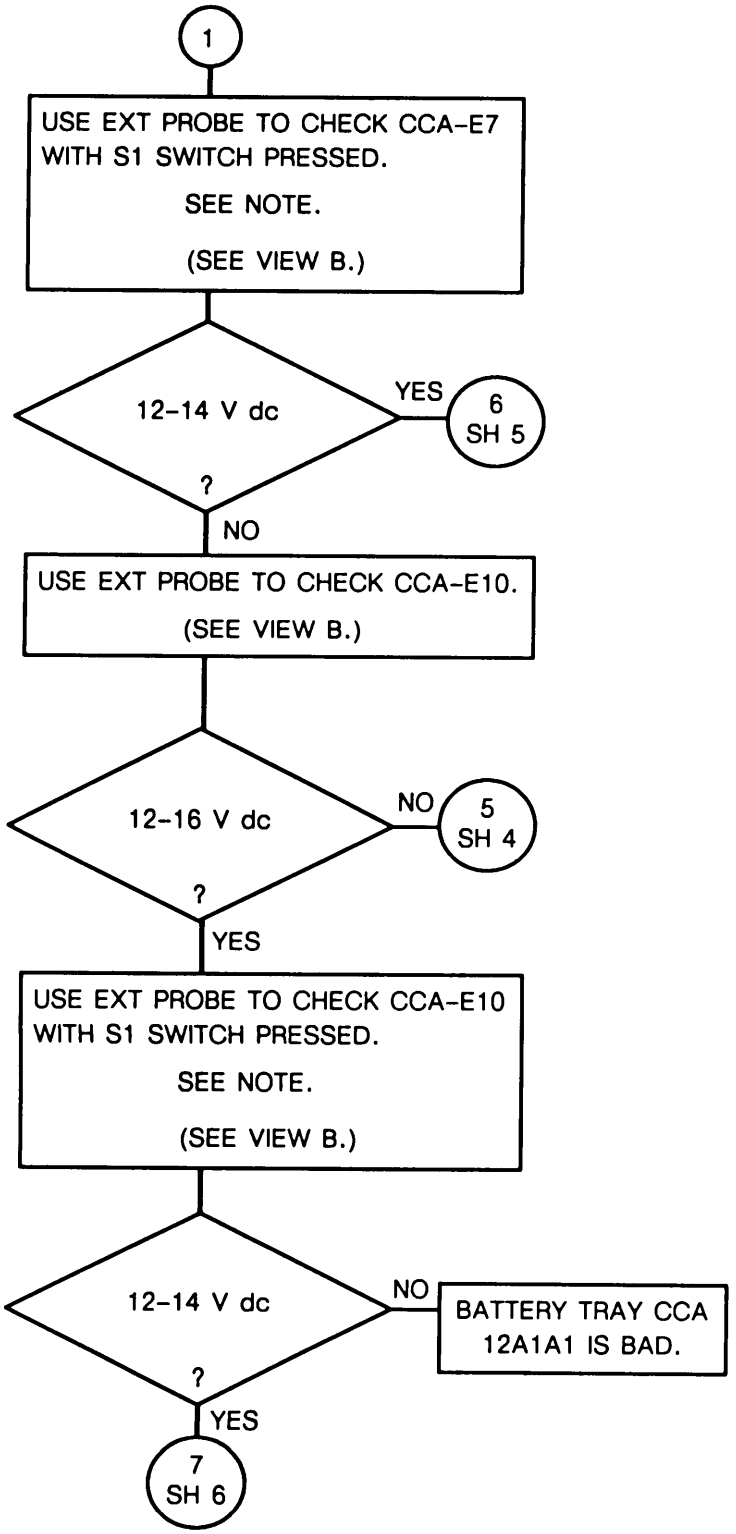
VIEW A.

15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 3

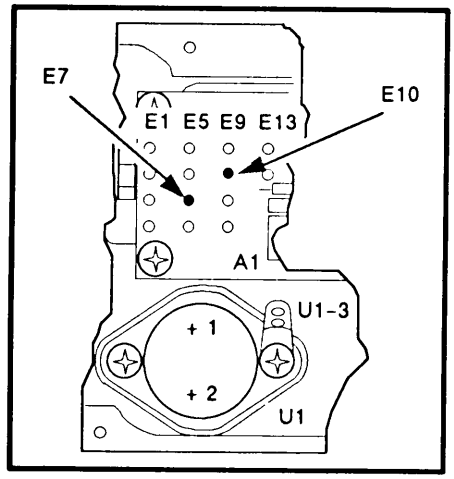
Troubleshooting DS1 Lamp

(Sheet 2 of 6)



NOTE:

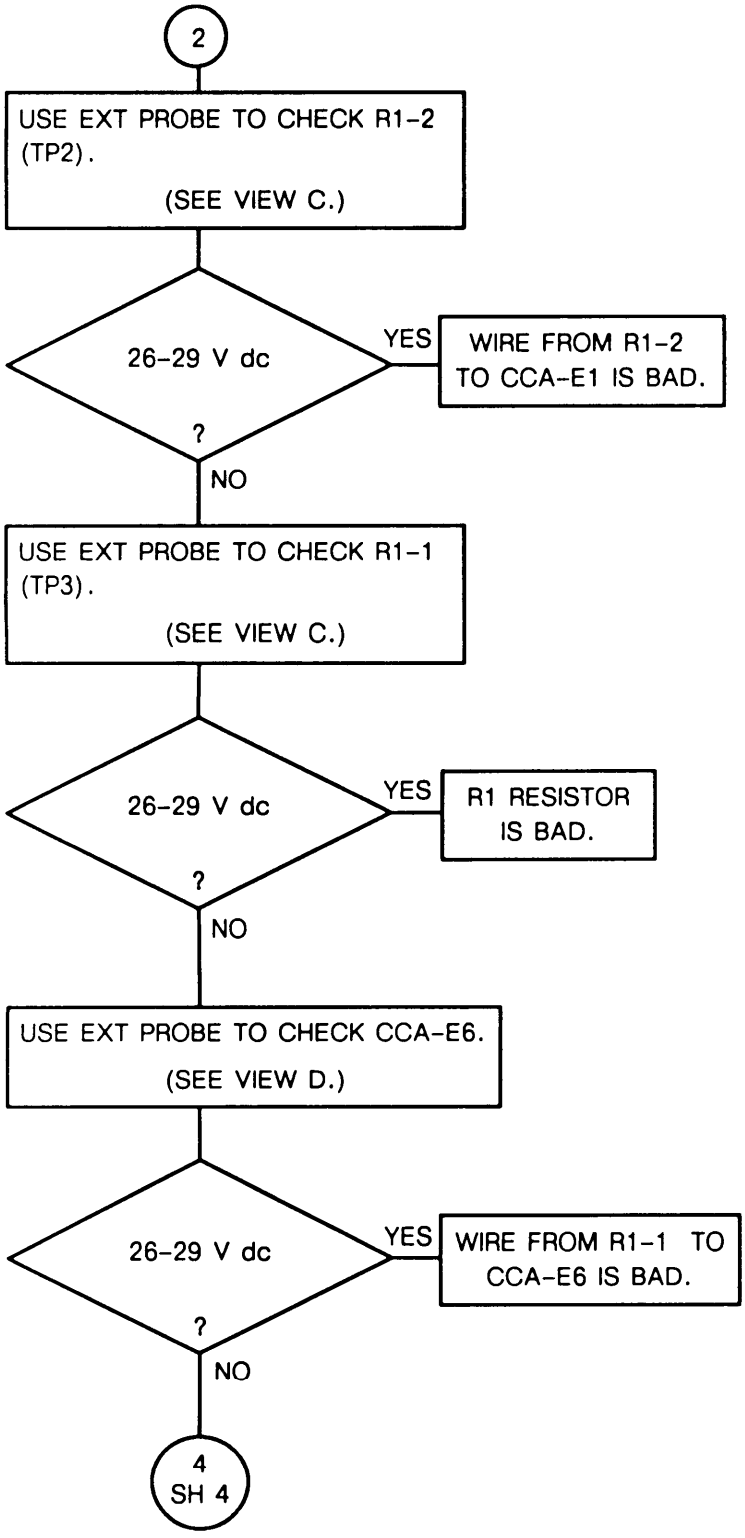
Release S1 switch after check has been made.

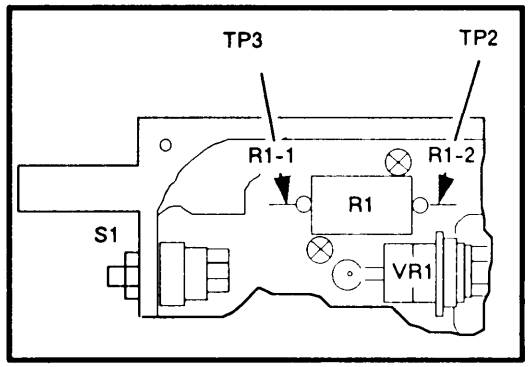


VIEW B.

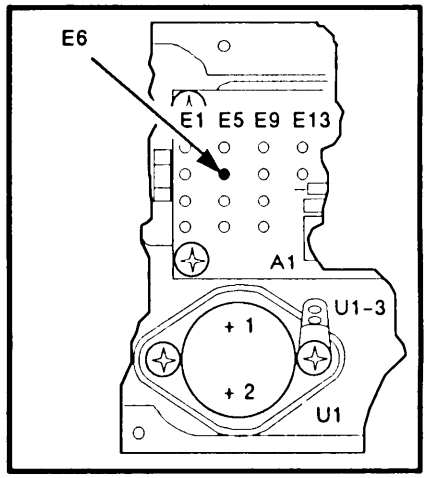
15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 3
Troubleshooting DS1 Lamp
(Sheet 3 of 6)





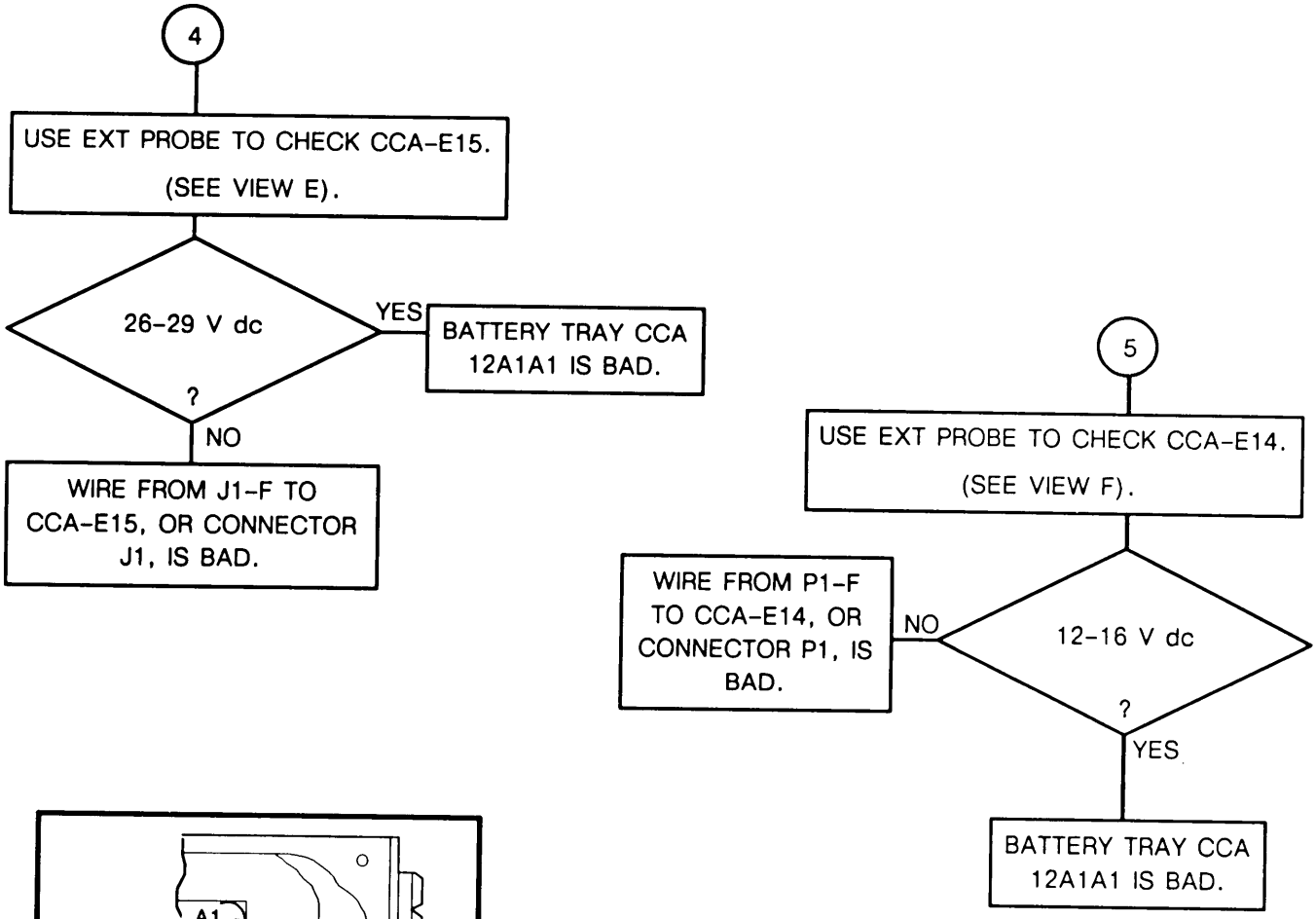
VIEW C.

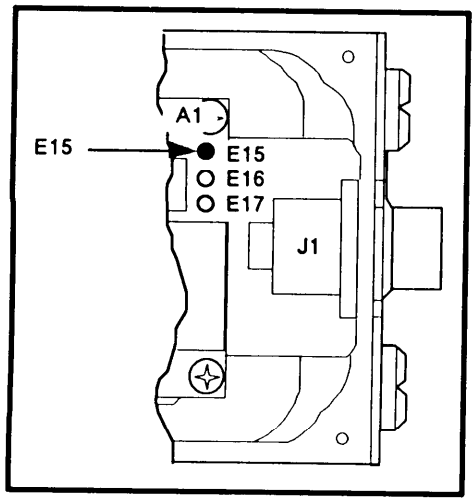


VIEW D.

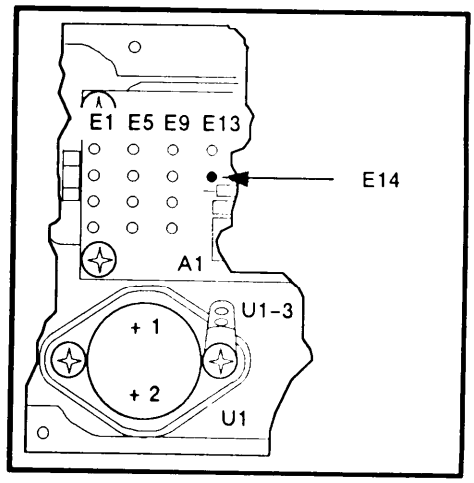
15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 3
Troubleshooting DS1 Lamp
(Sheet 4 of 6)





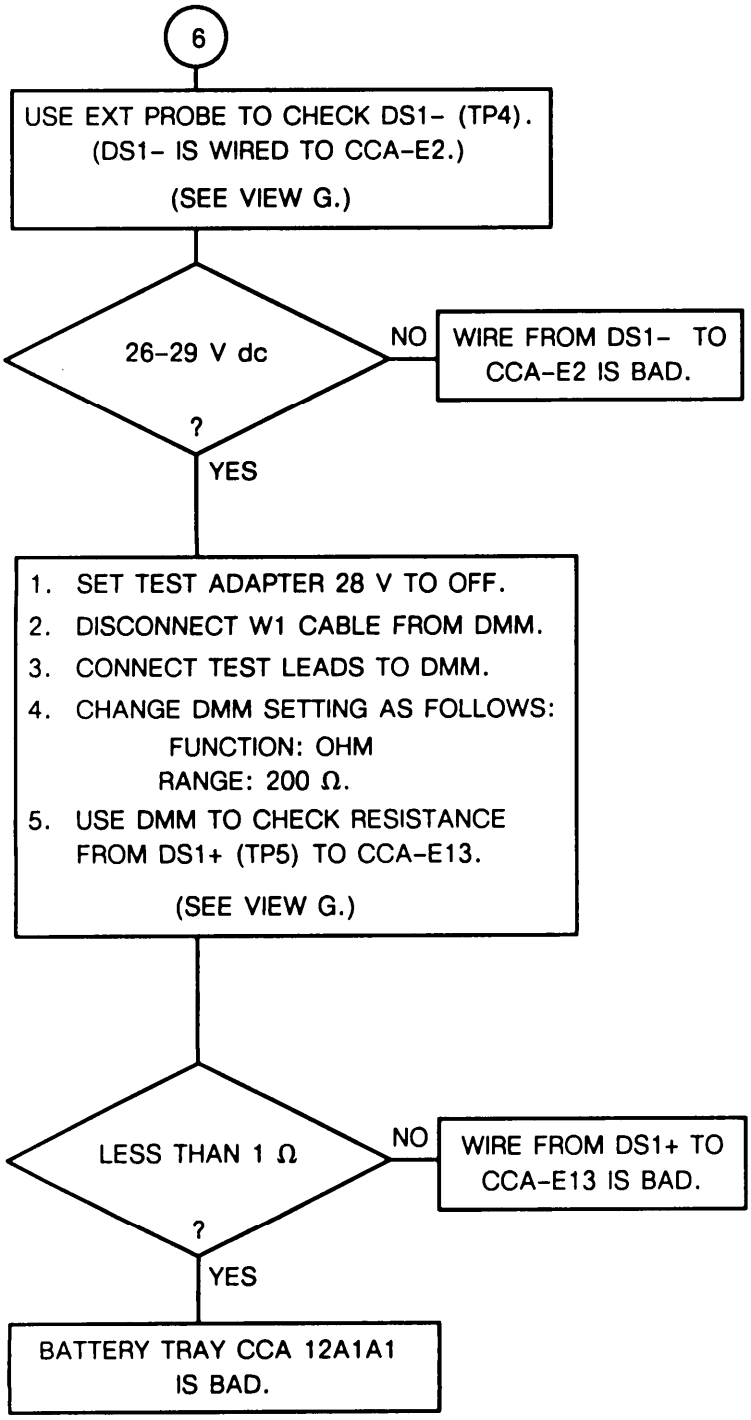
VIEW E.

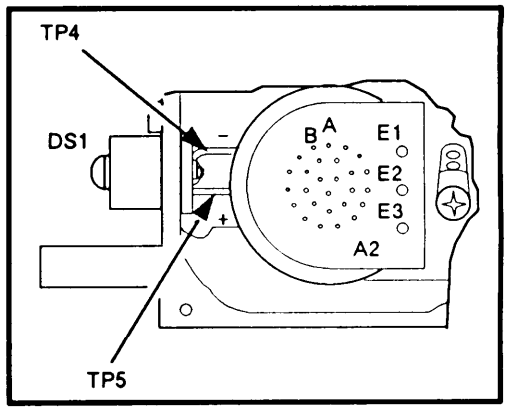


VIEW F.

15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 3
Troubleshooting DS1 Lamp
(Sheet 5 of 6)

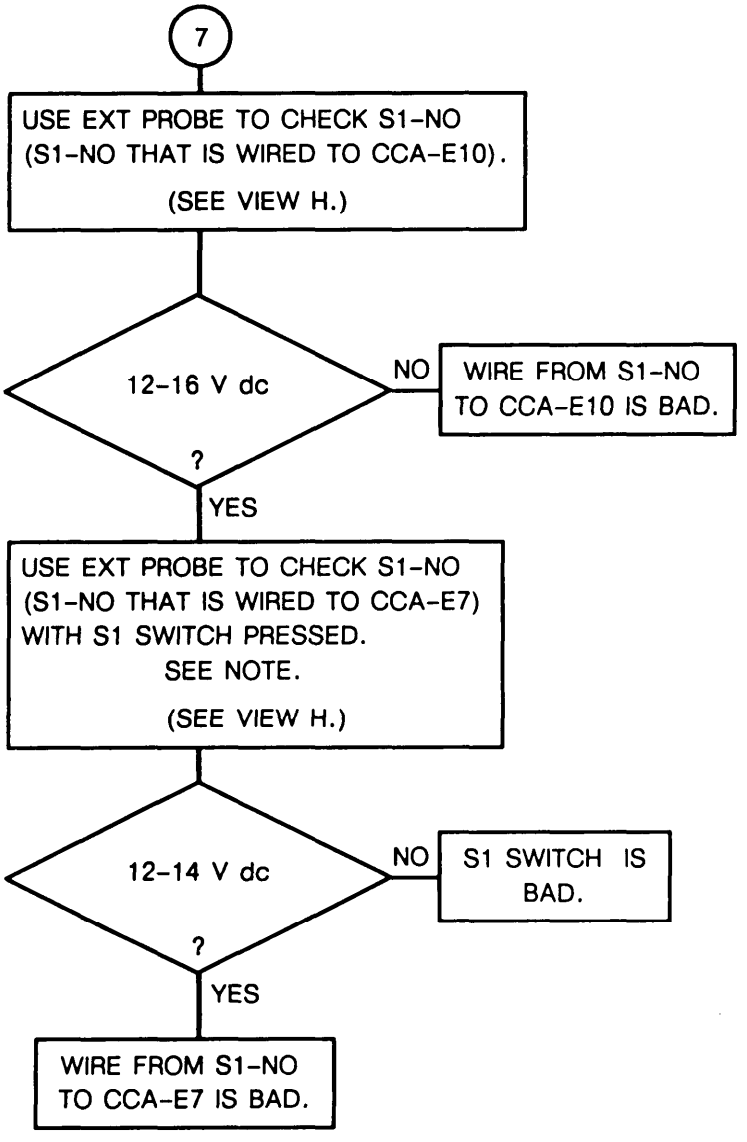




VIEW G.

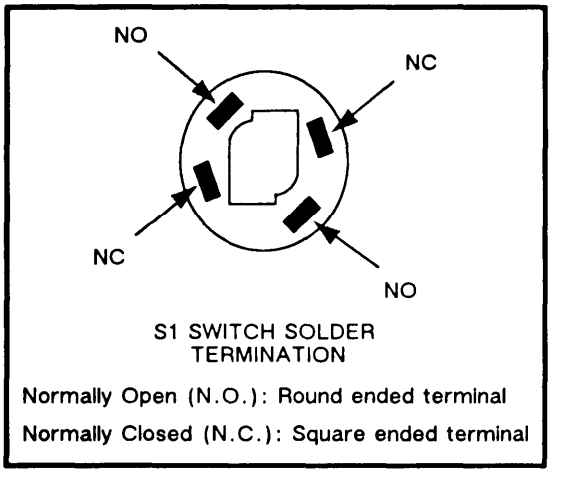
15-14. TROUBLESHOOTING FLOWCHARTS. Continued

CHART 3
Troubleshooting DS1 Lamp
(Sheet 6 of 6)



NOTE:

Release S1 switch after check has been made.



VIEW H.

Section IV. MAINTENANCE PROCEDURES

15-15. GENERAL.

This section includes the operational check, repair instructions, and visual inspection procedures. The operational check is used to verify the operation of a repaired battery tray. lt is also used to verify the symptom of a faulty battery tray. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

15-16. OPERATIONAL CHECK.

Perform the operational check found in paragraph 15-11 to verify proper operation of the battery tray.

15-17. REPAIR INSTRUCTIONS.

The following instructions apply to all repair tasks unless otherwise noted in the procedure.

a. Begin procedure with the battery tray pushbutton switch S1 out (not pushed). Do not press the S1 pushbutton unless directed to in order to check its operation.

b. Disconnect any external cables connected to the battery tray.

c. Inspect the battery tray. Replace the battery tray case if the battery tray is physically damaged, such as with a broken connector. The visual inspection procedures are in paragraphs 15-18 and 15-19.

CAUTION

Steps marked with **HCP** must be performed exactly as written. They are critical in maintaining the nuclear hardness of the battery tray. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

d. The battery tray must be tested after replacement of a module.

15-18. VISUAL INSPECTION OF BATTERY TRAY ASSEMBLY.

Before beginning any maintenance procedure, inspect the battery tray assembly for physical damage. Use the following table as a guide to inspect the assembly. Look for damaged or missing parts, and replace them as required. The external parts are shown in figure 15-3.

ITEM	ACTION	REMARKS
a. 12A1 battery tray subassembly (1)	Check for damage and tight connection to mounting plate assembly.	If defective, proceed to paragraph 15-19.
b. Mounting plate assembly (2) and attaching hardware	Check for damage.	If defective, proceed to paragraph 15-20.
c. Battery tray gasket	Check for cuts, tears, and improper seating.	If defective, proceed to paragraph 15-21.
d. J1 connector (4) and attaching hardware	Check for bent/broken pins and tight connection to battery tray case.	If defective, proceed to paragraph 15-26.
e. P1 connector (5) and attaching hardware	Check for bent/broken pins and tight connection to battery tray case.	If defective, proceed to paragraph 15-23.
f. S1 pushbutton switch (6) and attaching hardware	Check for damage and tight connection to battery tray case.	If defective, proceed to paragraph 15-32.
g. Seal screw (7)	Check for a tight seal to battery tray case.	If defective, proceed to paragraph 15-31.
h. DS1 lamp holder (8) and attaching hardware	Check for damage and tight connection to battery tray case.	If defective, proceed to paragraph 15-30.
i. Battery tray case (9)	Check for damage such as a broken connector.	If defective, proceed to paragraph 15-33.
j. Battery box gasket (10)	Check for cuts, tears, and improper seating.	If defective, proceed to paragraph 15-34.

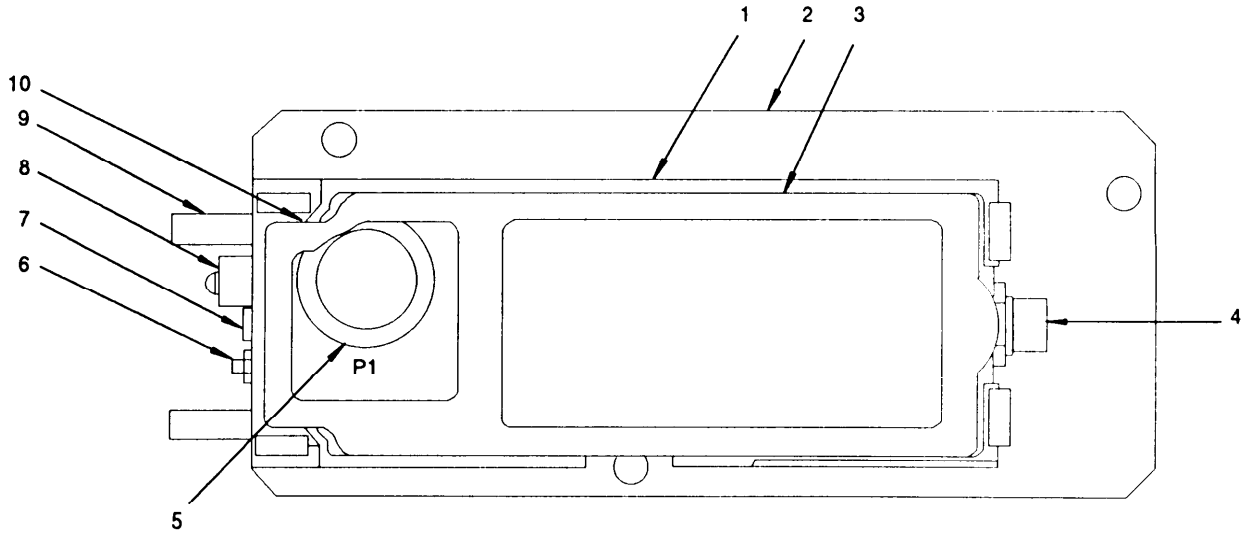


Figure 15-3. Battery Tray Assembly (Top View) With Mounting Plate Assembly.

15-19. VISUAL INSPECTION OF BATTERY TRAY SUBASSEMBLY (12A1).

Tools:

Flat tip screwdriver

ITEM	ACTION	REMARKS
a. Battery tray assembly	Set upside down on work surface with left side toward you. See figure 15-4.	
b. Eight captive screws (4) and flat washers (5)	Use flat tip screwdriver. Fully loosen and inspect eight captive screws and flat washers securing mounting plate assembly (2) to battery tray subassembly (1). If damaged, obtain replacement.	Steps f through r refer to replacement procedures for items on battery tray subassembly (see figure 15-5). Perform only procedures for defective items.
c. Mounting plate assembly (2)	Remove and inspect for damage. If damaged, obtain replacement.	
d. Battery tray gasket (3)	Inspect for cuts, tears, and improper seating. If defective, obtain replacement.	
e. Battery tray subassembly (1)	Set upside down on work surface with left side toward you. See figures 15-4 and 15-5.	
f. Wires	Inspect for frays, faulty connections, and other obvious defects. See figure 15-6.	If defective, proceed to paragraph 15-29.

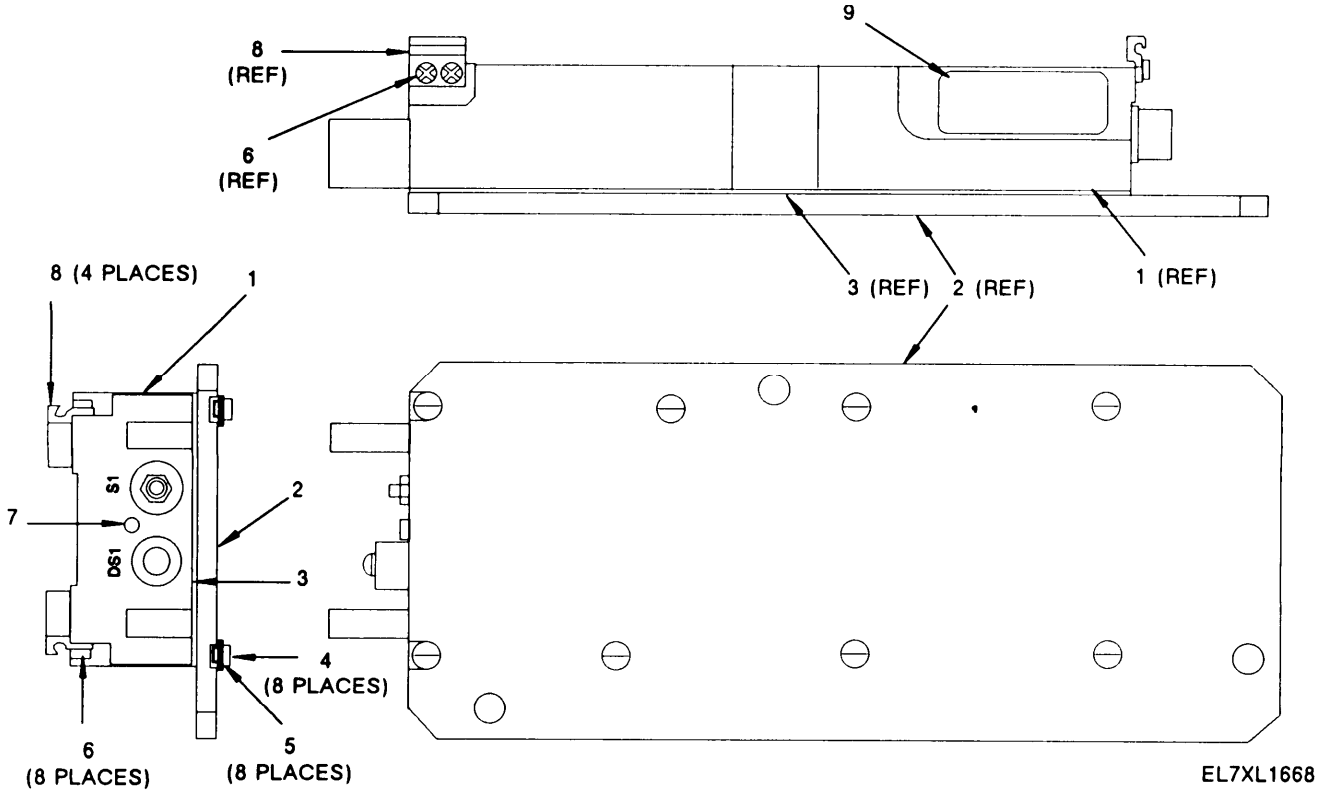


Figure 15-4. Battery Tray Subassembly (Front, Bottom, and Right Side Views) With Mounting Plate Assembly.

15-19. VISUAL INSPECTION OF BATTERY TRAY SUBASSEMBLY (12A1). Continued

ITEM	ACTION	REMARKS
g. R1 resistor (1)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-24.
h. VR1 zener diode (3)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-25.
i. J1 connector (5)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-26.
j. A1 battery tray circuit card assembly (8)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-22.
k. U1 voltage regulator (10)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-27.
l. Terminal lug (9) or (12)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-28.
m. A2 connector board circuit card assembly (13)	Check for damage and tight connection to wires and P1 connector (17).	If defective, proceed to paragraph 15-23.
n. DS1 lamp holder (14)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-30.
o. Seal screw (15)	Check for tight seal to chassis.	If defective, proceed to paragraph 15-31.
p. S1 pushbutton switch (16)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-32.
q. P1 connector (17)	Check for damage and tight connection to wires and chassis.	If defective, proceed to paragraph 15-23.
r. Battery tray case (18)	Check for damage.	If defective, proceed to paragraph 15-33.

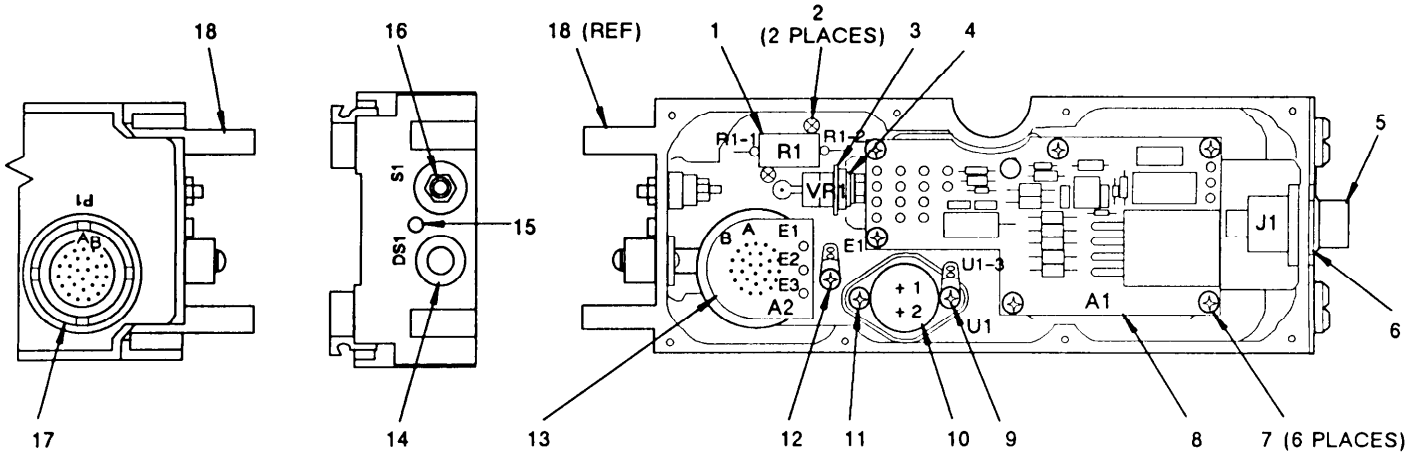


Figure 15-5. Battery Tray Subassembly (Top, Front, and Bottom Views) Without Mounting Plate Assembly and Battery Tray Gasket.

15-20. REPLACEMENT OF MOUNTING PLATE ASSEMBLY.

Tools:

Flat tip screwdriver
Torque screwdriver
Flat tip adapter

References:

Paragraph 15-35 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery tray assembly	Set upside down on work surface with left side toward you. See figure 15-4.	
b. Eight captive screws (4) and flat washers (5)	Use flat tip screwdriver. Fully loosen and inspect eight captive screws and flat washers securing mounting plate assembly (2) to battery tray subassembly (1). If damaged, obtain replacement.	
c. Battery tray subassembly (1)	Remove and retain.	
d. Battery tray gasket (3)	Check for damage.	
e. Mounting plate assembly (2)	Remove and discard.	
INSTALLATION		
f. Mounting plate assembly (2)	Obtain replacement mounting plate assembly.	
g. Battery tray gasket (3)	Position to replacement mounting plate assembly.	
h. Mounting plate assembly (2) and battery tray subassembly (1)	Position replacement mounting plate assembly (2) to retained battery tray subassembly (1).	
i. HCP Eight captive screws (4) and flat washers (5)	Use torque screwdriver and flat tip adapter. Install eight captive screws and flat washers securing replacement mounting plate assembly (2) to retained battery tray subassembly (1). Torque screws to 9 in-lb.	Inspect each screw and its threaded screw insert to determine if any is defective. If a screw is not stripped but will not tighten, refer to paragraph 15-35 for removal and replacement of threaded screw inserts.

15-21. REPLACEMENT OF BATTERY TRAY GASKET.

Tools:

Flat tip screwdriver
Torque screwdriver
Flat tip adapter

References:

Paragraph 15-35 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery tray assembly	Set upside down on work surface with left side toward you. See figure 15-4.	
b. Eight captive screws (4) and flat washers (5)	Use flat tip screwdriver. Fully loosen and inspect eight captive screws and flat washers securing mounting plate assembly (2) to battery tray subassembly (1).	
c. Mounting plate assembly (2)	Remove and retain.	
d. Battery tray subassembly (1)	Remove and retain.	
e. Battery tray gasket (3)	Remove and discard.	
INSTALLATION		
f. Battery tray gasket (3)	Obtain and install replacement battery tray gasket on mounting plate assembly.	
g. Mounting plate assembly (2)	Position on battery tray subassembly (1).	
h. HCP Eight captive screws (4) and flat washers (5)	Use torque screwdriver and flat tip adapter. Install eight captive screws and flat washers securing retained mounting plate assembly (2) to retained battery tray subassembly (1). Torque screws to 9 in-lb.	Inspect each screw and its threaded screw insert to determine if any is defective. If a screw is not stripped but will not tighten, refer to paragraph 15-35 for removal and replacement of threaded screw inserts.

15-22. REPLACEMENT OF BATTERY TRAY CIRCUIT CARD ASSEMBLY (12A1A1).

Tools:

Cross tip screwdriver	Soldering kit	Heat sink
Long nose pliers	Soldering aid	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.
Paragraph 15-35 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. A1 battery tray CCA wires (2)	Tag the location of each wire soldered to 17 E-terminals on A1 battery tray CCA. See figure 15-6.	
d. 17 E-terminals	Use long nose pliers and soldering equipment. Desolder and remove 20 tagged wires from 17 E-terminals.	
e. Six screws, flat washers, and Iockwashers (7)	See figure 15-5. Use cross tip screwdriver. Remove and inspect six screws, flat washers, and Iockwashers securing A1 battery tray CCA (8) to chassis. If damaged, obtain replacement,	
f. A1 battery tray CCA (8)	Remove and discard.	
INSTALLATION		
g. A1 battery tray CCA (8)	Obtain replacement A1 battery tray CCA and place it on the chassis.	
h. Six screws, flat washers, and Iockwashers (7)	Use cross tip screwdriver. Install six retained screws, flat washers, and Iockwashers securing A1 battery tray CCA (8) to chassis.	These were removed in step e.
i. A1 battery tray CCA (8)	Use long nose pliers and soldering equipment. Attach and solder 20 tagged wires to 17 E-terminals on A1 battery tray CCA, and remove wire tags. See figure 15-6.	Before and after soldering, clean wires and E-terminals with alcohol and cotton swabs.
j. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-23. REPLACEMENT OF CONNECTOR BOARD CIRCUIT CARD ASSEMBLY (12A1A2) AND P1 CONNECTOR.

Tools:

Cross tip screwdriver	Soldering kit	Heat sink
Long nose pliers	Soldering aid	1-1/4 inch spanner wrench attachment
1-1/4 inch spanner wrench	Torque wrench	

Expendable Supplies:

Solder	Silicone compound
Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly,

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. A2 connector board CCA wires (2)	Tag the location of each wire soldered to three E-terminals on A2 connector board CCA. See figure 15-6.	
d. Three E-terminals	Use long nose pliers and soldering equipment. Desolder and remove tagged wires from three E-terminals.	
e. Battery tray case (18)	Turn upside down on work surface. See figure 15-5.	
f. P1 connector (17)	Use 1-1/4 inch spanner wrench. Remove and retain spanner nut and IET lockwasher securing P1 connector and attached A2 connector board CCA (13) to chassis.	
g. A2 connector board CCA (13) and P1 connector (17)	Remove and discard.	
INSTALLATION		
h. A2 connector board CCA (13) and P1 connector (17)	Obtain replacement A2 connector board CCA and P1 connector.	
i. P1 connector (17) and o-ring	Apply small amount of silicone compound to o-ring prior to installing.	
j. A2 connector board CCA	Install on chassis.	

15-23. REPLACEMENT OF CONNECTOR BOARD CIRCUIT CARD ASSEMBLY (12A1A2) AND P1 CONNECTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
k. HCP P1 connector (17)	Use torque wrench and 1-1/4 inch spanner wrench attachment. Install retained spanner nut and IET lockwasher. Torque nut to 90 in-lb.	These were removed in step f.
l. Three E-terminals	Use long nose pliers and soldering equipment. Attach and solder tagged wires to three E-terminals on A2 connector board CCA, and remove wire tags. See figure 15-6.	Before and after soldering, clean wires and E-terminals with alcohol and cotton swabs.
m. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-24. REPLACEMENT OF R1 RESISTOR.

Tools:

Cross tip screwdriver	Soldering kit	Soldering aid
Long nose pliers	Heat sink	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. R1 resistor (1) wires	Tag the location of each wire on R1 resistor. Use long nose pliers and soldering equipment. Desolder tagged wires from resistor leads. See figures 15-5 and 15-6.	
d. Two screws, flat washers, and lockwashers (2)	Use cross tip screwdriver. Remove and inspect two screws, flat washers, and lockwashers securing resistor to chassis. If damaged, obtain replacement.	
e. R1 resistor (1)	Remove and discard.	

15-24. REPLACEMENT OF R1 RESISTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
f. R1 resistor (1)	Obtain replacement R1 resistor.	
g. Two screws, flat washers, and lockwashers (2)	Use cross tip screwdriver. Install two retained screws, flat washers, and lockwashers securing R1 resistor (1) to chassis.	These were removed in step d.
h. R1 resistor (1) wires	Use long nose pliers and soldering equipment. Attach and solder each tagged wire to correct lead of resistor, and remove wire tags.	Before and after soldering, clean wires and leads with alcohol and cotton swabs,
i. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-25. REPLACEMENT OF VR1 ZENER DIODE.

Tools:

Cross tip screwdriver	Soldering kit	7/16 inch open-end wrench
Long nose pliers	Soldering aid	Heat sink

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. VR1 zener diode (3) wire	Use long nose pliers and soldering equipment. Desolder wire from terminal on zener diode. See figures 15-5 and 15-6.	
d. Hex nut, flat washer, and lockwasher (4)	Use 7/1 6 inch open-end wrench. Remove and inspect hex nut, flat washer, and lockwasher securing VR1 zener diode to chassis. If damaged, obtain replacement.	
e. VR1 zener diode (3)	Remove and discard.	

15-25. REPLACEMENT OF VR1 ZENER DIODE. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
f. VR1 zener diode (3)	Obtain replacement VR1 zener diode and position it on chassis.	
g. Hex nut, flat washer, and lockwasher (4)	Use 7/16 inch open-end wrench. Install retained hex nut, flat washer, and lockwasher securing VR1 zener diode (3) to chassis.	These were removed in step d.
h. VR1 zener diode wire	Use long nose pliers and soldering equipment. Attach and solder wire to terminal of VR1 zener diode.	Before and after soldering, clean wire and terminal with alcohol and cotton swabs.
i. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-26. REPLACEMENT OF J1 CONNECTOR.

Tools:

Cross tip screwdriver	Soldering kit	Socket wrench	Torque wrench
Long nose pliers	Soldering aid	7/8 inch socket	Heat sink

Expendable Supplies:

Silicone compound	Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. Hex nut and IET lockwasher (6)	Use socket wrench and 7/8 inch socket. Remove and inspect hex nut and IET lockwasher securing J1 connector (5) to chassis. If damaged, obtain replacement. See figures 15-5 and 15-6.	
d. J1 connector (5)	Maneuver connector and rubber contact cover so wires and contacts are accessible, and tag location of each wire on connector.	

15-26. REPLACEMENT OF J1 CONNECTOR. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Four connector wires	Use long nose pliers and soldering equip- Desolder wires from J1 connector.	
f. J1 connector (5)	Remove and discard defective J1 connector and rubber contact cover.	
INSTALLATION		
g. J1 connector (5)	Obtain replacement J1 connector and rubber contact cover.	
h. Rubber contact cover	Slide onto wires.	
i. Four connector wires	Use long nose pliers and soldering equipment. Attach and solder each wire to correct pin on J1 connector, and remove wire tags.	Before and after soldering, clean wires and pins with alcohol and cotton swabs.
j. O-ring	Apply a small amount of silicone compound to o-ring on J1 connector and, while wet, install connector in chassis.	
k. HCP Hex nut and IET lockwasher (6)	Install and hand tighten retained hex nut and IET lockwasher securing J1 connector to chassis. Use torque wrench and 7/8 inch socket. Torque nut to 60 in-lb.	These were removed in step c.
l. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-27. REPLACEMENT OF U1 VOLTAGE REGULATOR.

Tools:

Cross tip screwdriver	Soldering kit	Heat sink
Long nose pliers	Soldering aid	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.
Paragraph 15-35 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.

15-27. REPLACEMENT OF U1 VOLTAGE REGULATOR. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. Two screws, flat washers, lockwashers, and shouldered washers (9) and (11)	Use cross tip screwdriver. Remove and inspect two screws, flat washers, lockwashers, and shouldered washers securing U1 voltage regulator (10) with mounting pad and U1-3 terminal lug to the chassis. If damaged, obtain replacement. Remove and retain terminal lug with wire soldered to it. See figures 15-5 and 15-6.	Inspect each screw and its threaded screw insert to determine if any are defective. If a screw is stripped, do not replace its threaded screw insert.
d. U1 voltage regulator (10) leads	Maneuver U1 voltage regulator so U1-1 and U1-2 leads on underside are accessible, and tag location of each wire soldered to leads.	
e. U1 voltage regulator (10) wires	Use long nose pliers and soldering equipment. Desolder tagged wires from U1 voltage regulator leads.	
f. Mounting pad	Remove and inspect for damage. If damaged, obtain replacement.	
g. U1 voltage regulator (10)	Remove and discard.	
INSTALLATION		
h. U1 voltage regulator (10)	Obtain replacement U1 voltage regulator.	
i. Mounting pad	Place retained mounting pad on underside of voltage regulator.	This was removed in step f.
j. U1 voltage regulator (10) leads	Use long nose pliers and soldering equipment. Attach and solder tagged wires to U1-1 and U1-2 leads on voltage regulator, and remove wire tags.	Before and after soldering, clean wires and leads with alcohol and cotton swabs.
k. Two screws, flat washers, lockwashers, and shouldered washers (9) and (11)	Use cross tip screwdriver. Install two retained screws, flat washers, lockwashers, and shouldered washers securing U1 voltage regulator (10) with retained mounting pad and U1-3 terminal lug, with wire soldered to it, to the chassis.	Inspect each screw and its threaded screw insert to determine if any are defective. If a screw is not stripped but will not tighten, refer to paragraph 15-35 for removal and replacement of threaded screw inserts.
l. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-28. REPLACEMENT OF TERMINAL LUGS.

Tools:

Cross tip screwdriver	Soldering kit	Heat sink
Long nose pliers	Soldering aid	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. Terminal lug (3) wire(s)	Tag the wire (s). Use long nose pliers and soldering equipment. Desolder tagged wire(s) from terminal lug. See figure 15-6.	
d. Screw, flat washer, and lockwasher	Use cross tip screwdriver. Remove and inspect screw, flat washer, and lock-washer securing terminal lug (3) to chassis. If damaged, obtain replacement.	
e. Terminal lug (3)	Remove and discard.	
INSTALLATION		
f. Terminal lug (3)	Obtain replacement terminal lug.	
g. Screw, flat washer, and lockwasher	Use cross tip screwdriver. Install retained screw, flat washer, and lockwasher securing terminal lug (3) to chassis.	These were removed in step d.
h. Terminal lug (3) wire (s)	Use long nose pliers and soldering equip-ment. Attach and solder tagged wire (s) to terminal lug, and remove wire tags.	Before and after soldering, clean wires and terminal lugs with alcohol and cotton swabs.
i. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-29. REPLACEMENT OF WIRES.

Tools:

Cross tip screwdriver	Soldering kit	Diagonal cutting pliers
Long nose pliers	Soldering aid	Heat sink
Wire strippers		

Expendable Supplies:

Solder	Cotton swabs	Tiedown straps
Alcohol	Connectors	Wire

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. Wire(s) (2) and tiedown straps (1)	Use long nose pliers and soldering equipment. Desolder both ends of defective wire (s) to be replaced. Cut, remove, and discard tiedown strap(s) along wire(s). See figure 15-6.	
d. Wire(s) (2)	Remove and discard defective wire (s).	

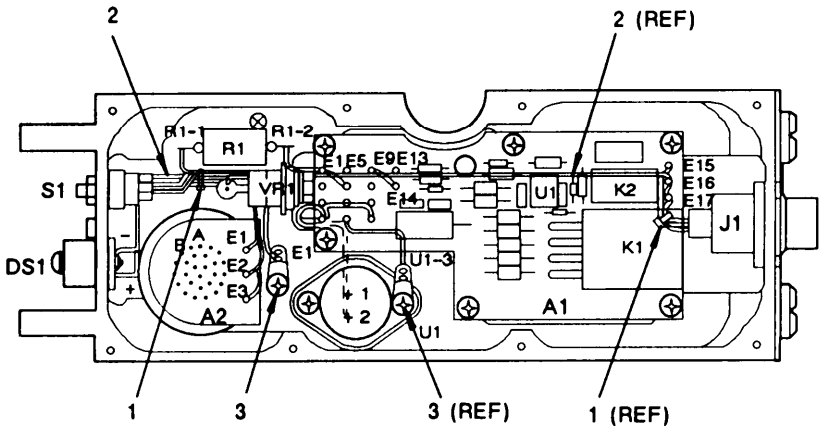


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Figure 15-6. Battery Tray Subassembly (Bottom View) With Internal Wiring Harness.

15-29. REPLACEMENT OF WIRES. Continued

ITEM	ACTION	REMARKS
INSTALLATION		
e. Wires(s) (2) and tiedown strap (s) (1)	Obtain replacement wire (s) and tiedown strap(s). Using wire strippers, remove insulation from ends of replacement wire(s).	
f. Replacement wire(s)	Tin ends of replacement wire(s).	
g. Connector(s) and terminal lug (s) (3)	Use long nose pliers and soldering equipment. Attach and solder replacement wire(s) to existing wire(s), connector(s), and/or terminal lug (s).	Before and after soldering, clean wire(s), connector(s), and terminal lug(s) with alcohol and cotton swabs.
h. Tiedown strap(s) (1)	Install replacement tiedown strap(s) on wiring.	
i. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-30. REPLACEMENT OF DS1 LAMP HOLDER.

Tools:

Cross tip screwdriver	Soldering kit	Long nose pliers
Socket wrench	Soldering aid	Torque wrench
9/16 inch socket	Heat sink	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. Light lens and lamp	Unscrew and remove light lens and lamp from DS1 lamp holder (14). Inspect them for damage. If damaged, obtain replacement.	
d. DS1 lamp holder (14) wires	Tag the destination of each wire on DS1 lamp holder. Use long nose pliers and soldering equipment. Desolder tagged wires from terminals on lamp holder. See figures 15-5 and 15-6.	

15-30. REPLACEMENT OF DS1 LAMP HOLDER. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
e. Hex nut and IET lockwasher	Use socket wrench and 9/16 inch socket. Remove and inspect hex nut and IET lockwasher securing DS1 lamp holder to chassis. If damaged, obtain replacement.	
f. DS1 lamp holder (14)	Remove and discard.	
INSTALLATION		
g. DS1 lamp holder (14)	Obtain replacement DS1 lamp holder.	
h. HCP Hex nut and IET lockwasher	Install and hand tighten retained hex nut and IET lockwasher securing lamp holder to chassis. Use torque wrench and 9/16 inch socket. Torque nut to 30 in-lb.	These were removed in step e.
i. DS1 lamp holder (14) wires	Use long nose pliers and soldering equipment. Attach and solder tagged wires to correct terminals on lamp holder, and remove wire tags.	Before and after soldering, clean wires and terminals with alcohol and cotton swabs.
j. Light lens and lamp	Install retained light lens and lamp into DS1 lamp holder (14).	These were removed in step c.
k. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-31. REPLACEMENT OF SEAL SCREW.

Tools:
Flat tip screwdriver | Torque screwdriver | Flat tip adapter

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery tray assembly	Set on work surface with front toward you. See figure 15-4.	
b. Seal screw (7)	Use flat tip screwdriver. Remove and inspect seal screw. If defective, discard it.	
INSTALLATION		
c. HCP Seal screw (7)	Obtain replacement seal screw. Use flat tip screwdriver. Install and hand tighten seal screw, securing it to chassis. Use torque screwdriver and flat tip adapter. Torque screw to 20 in-lb.	

15-32. REPLACEMENT OF S1 PUSHBUTTON SWITCH.

Tools:

Cross tip screwdriver	Soldering kit	Long nose pliers
Socket wrench	Soldering aid	Torque wrench
9/16 inch socket	Heat sink	

Expendable Supplies:

Solder	Alcohol	Cotton swabs

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. S1 pushbutton switch (16) wires (2)	Tag the destination of each wire on S1 pushbutton switch. Use long nose pliers and soldering equipment. Desolder four wires from switch contacts. See figures 15-5 and 15-6.	
d. Hex nut and IET lockwasher	Use socket wrench and 9/16 inch socket. Remove and inspect hex nut and IET lockwasher securing S1 pushbutton switch (16) to chassis. If damaged, obtain replacement.	
e. S1 pushbutton switch (16)	Remove and discard.	
INSTALLATION		
f. S1 pushbutton switch (16)	Obtain replacement S1 pushbutton switch.	
g. HCP Hex nut and IET lockwasher	Install and hand tighten retained hex nut and IET lockwasher securing S1 pushbutton switch to chassis. Use torque wrench and 9/16 inch socket. Torque nut to 20 in-lb.	These were removed in step d.
h. S1 pushbutton switch (16) wires (2)	Use long nose pliers and soldering equipment. Attach and solder tagged wires to correct contacts on pushbutton switch, and remove wire tags.	Before and after soldering, clean wires and contacts with alcohol and cotton swabs.
i. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.

15-33. REPLACEMENT OF BATTERY TRAY CASE.

Tools:

Flat tip screwdriver	Torque screwdriver	7/16 inch open-end wrench
Cross tip screwdriver	Socket wrench	9/16 inch open-end wrench
Spanner wrench	Torque wrench	9/16 inch socket
Spanner wrench adapter	Pocket knife	7/8 inch socket
Flat tip adapter		

Expendable Supplies:

Silicone compound

References:

Paragraph 15-20 for removal and installation of mounting plate assembly.
Paragraph 15-21 for removal and installation of battery tray gasket.
Paragraph 15-22 for removal and installation of A1 battery tray CCA.
Paragraph 15-23 for removal and installation of A2 connector board CCA and P1 connector.
Paragraph 15-24 for removal and installation of R1 resistor.
Paragraph 15-25 for removal and installation of VR1 zener diode.
Paragraph 15-26 for removal and installation of J1 connector.
Paragraph 15-27 for removal and installation of U1 voltage regulator.
Paragraph 15-28 for removal and installation of E1 terminal lug.
Paragraph 15-30 for removal and installation of DS1 lamp holder.
Paragraph 15-31 for removal and installation of seal screw.
Paragraph 15-32 for removal and installation of S1 pushbutton switch.
Paragraph 15-33 for removal and installation of A2 connector board CCA.
Paragraph 15-34 for removal and installation of battery box gasket.
Paragraph 15-35 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Mounting plate assembly (2)	Remove and retain.	Refer to paragraph 15-20 for removal of mounting plate assembly.
b. Battery tray subassembly (1)	Set upside down on work surface with left side toward you.	
c. J1 connector (5)	Remove and retain.	Refer to paragraph 15-26 for removal of J1 connector.
d. U1 voltage regulator (10)	Remove and retain.	Refer to paragraph 15-27 for removal of U1 voltage regulator.
e. A2 connector board CCA (13) and P1 connector (17)	Remove and retain.	Refer to paragraph 15-33 for removal of A2 connector board CCA and P1 connector.
f. Light lens	Remove light lens from DS1 lamp holder (14). Inspect it for damage. If damaged, obtain replacement.	
g. DS1 lamp holder (14)	Remove and retain.	Refer to paragraph 15-30 for removal of DS1 lamp holder.

15-33. REPLACEMENT OF BATTERY TRAY CASE. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
h. S1 pushbutton switch (16)	Remove and retain.	Refer to paragraph 15-32 for removal of S1 pushbutton switch.
i. R1 resistor (1)	Remove and retain.	Refer to paragraph 15-24 for removal of R1 resistor.
j. VR1 zener diode (3)	Remove and retain.	Refer to paragraph 15-25 for removal of VR1 zener diode.
k. A1 battery tray CCA (8)	Remove and retain.	Refer to paragraph 15-22 for removal of A1 battery tray CCA.
l. E1 terminal lug (12)	Remove and retain.	Refer to paragraph 15-28 for removal of E1 terminal lug.
m. Battery tray gasket (3)	Remove and inspect for cuts and tears. If defective, obtain replacement. See figure 15-4.	Refer to paragraph 15-21 for removal of battery tray gasket.
n. Battery tray subassembly (1)	Remove and retain all components, circuit card assemblies, and connectors that were disconnected from chassis.	
o. Four catch strikes (8)	Use cross tip screwdriver. Remove and inspect eight screws, flat washers, and lockwashers (6) securing four catch strikes (8) to chassis. Remove and inspect four catch strikes. If damaged, obtain replacement.	Inspect each screw and its threaded screw insert to determine if any are defective. If a screw is not stripped but will not tighten, refer to paragraph 15-35 for removal and replacement of threaded screw inserts.
p. Seal screw (7)	Use flat tip screwdriver. Remove and inspect seal screw. If damaged, obtain replacement.	Refer to paragraph 15-31 for removal of seal screw.
q. Battery tray case (18)	Remove and discard. See figure 15-5.	
INSTALLATION		
r. Battery tray case (18)	Obtain replacement battery tray case.	
s. Battery tray subassembly (1)	Place all retained components, circuit card assemblies, and connectors into replacement battery tray case (18) chassis.	These were removed in step n.
t. A1 battery tray CCA (8)	Install to chassis.	Refer to paragraph 15-22 for installation of A1 battery tray CCA.

15-33. REPLACEMENT OF BATTERY TRAY CASE. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
u. O-ring	Apply small amount of silicone compound to o-ring on retained J1 connector and, while wet, install connector in chassis.	
v. HCP J1 connector (5)	Install to chassis.	Refer to paragraph 15-26 for installation of J1 connector.
w. U1 voltage regulator (10)	Install to chassis.	Refer to paragraph 15-27 for installation of U1 voltage regulator.
x. O-ring	Apply small amount of silicone compound to o-ring on retained P1 connector and, while wet, install connector in chassis.	
y. HCP AZ connector board CCA (13) and P1 connector (17)	Install to chassis.	Refer to paragraph 15-23 for installation of A2 connector board CCA and P1 connector. Ensure that 27 pins of P1 connector (17) are securely connected to AZ connector board CCA (13).
z. HCP DS1 lamp holder (14)	Install to chassis.	Refer to paragraph 15-30 for installation of DS1 lamp holder.
aa. Light lens	Install.	
ab. HCP S1 pushbutton switch (16)	Install to chassis.	Refer to paragraph 15-32 for installation of S1 pushbutton switch.
ac. R1 resistor (1)	Install to chassis.	Refer to paragraph 15-24 for installation of R1 resistor.
ad. VR1 zener diode (3)	Install to chassis.	Refer to paragraph 15-25 for installation of VR1 zener diode.
ae. Four catch strikes (8)	Use cross tip screwdriver. Install eight retained screws, flat washers, and lockwashers (6) securing four catch strikes (8) to chassis. See figure 15-4.	Inspect each screw and its threaded screw insert to determine if any is defective. If a screw is not stripped but will not tighten, refer to paragraph 15-35 for removal and replacement of threaded screw inserts.

15-33. REPLACEMENT OF BATTERY TRAY CASE. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
af. Identification plate (9)	Obtain replacement identification plate. Peel backing from plate. Place plate on chassis. Apply downward pressure on plate to form a seal between it and chassis. See figure 15-4.	
ag. Battery box gasket (10)	Obtain replacement battery box gasket. Peel backing from gasket. Place gasket on chassis. Apply downward pressure on gasket to form a seal between it and chassis. See figure 15-3.	Refer to paragraph 15-34 for installation of battery box gasket.
ah. Battery tray gasket (3)	Place retained battery tray gasket on chassis. See figure 15-4.	Refer to paragraph 15-21 for installation of battery tray gasket.
ai. Mounting plate assembly (2)	Install retained mounting plate assembly on battery tray subassembly (1).	Refer to paragraph 15-20 for installation of mounting plate assembly.
aj. HCP Seal screw (7)	Obtain replacement seal screw. Install and hand tighten seal screw, securing it to chassis. Use torque screwdriver and flat tip adapter. Torque screw to 20 in-lb.	

15-34. REPLACEMENT OF BATTERY BOX GASKET.

ITEM	ACTION	REMARKS
REMOVAL		
a. Battery tray assembly	Set on work surface with right side toward you. See figure 15-3.	
b. Battery box gasket (10)	Remove and discard defective battery box gasket.	
INSTALLATION		
c. Battery box gasket (10)	Obtain replacement battery box gasket. Remove backing material from self adhesive on gasket. Place gasket on chassis. Apply downward pressure on gasket to form a seal between it and chassis. See figure 15-3.	

15-35. REPLACEMENT OF THREADED SCREW INSERTS.

Tools:

Extractor tool 1227-02	Thread cleaning tap	Tang breakoff tool
Extractor tool 1227-06	5/64 inch hex wrench	Magnifying glass
Insertion tool	Depth gauge	Brace

ITEM	ACTION	REMARKS

REMOVAL

a. Threaded screw insert

If a screw for any of following items will not tighten, inspect it to ensure it is not stripped. If screw is stripped, do not replace its insert.

If screw is not stripped, replace its insert. The following is a list of the threaded screw inserts and their locations.

Insert Location	Size	Type	Qty
(1) Mounting plate assembly	M3 X 1.5 dia	MA 3330-152	8
(2) Catch strikes	M3 X 1.0 dia	MA 3330-102	8
(3) Voltage regulator (U1)	M2.2 X 1.5 dia	MA 3330-150	2

b. Extractor tool (1)

Position appropriate extractor tool on threaded screw insert in hole as shown in figure 15-7, so blade edge is centered on first coil (this may require using the magnifying glass).

(1) Extractor tool 1227-02
(2) Extractor tool 1227-06

The following is a list of appropriate extractor tools for respective inserts. Select extractor tool to be used for removal of insert.

M2.2
M2.5 thru M4.5

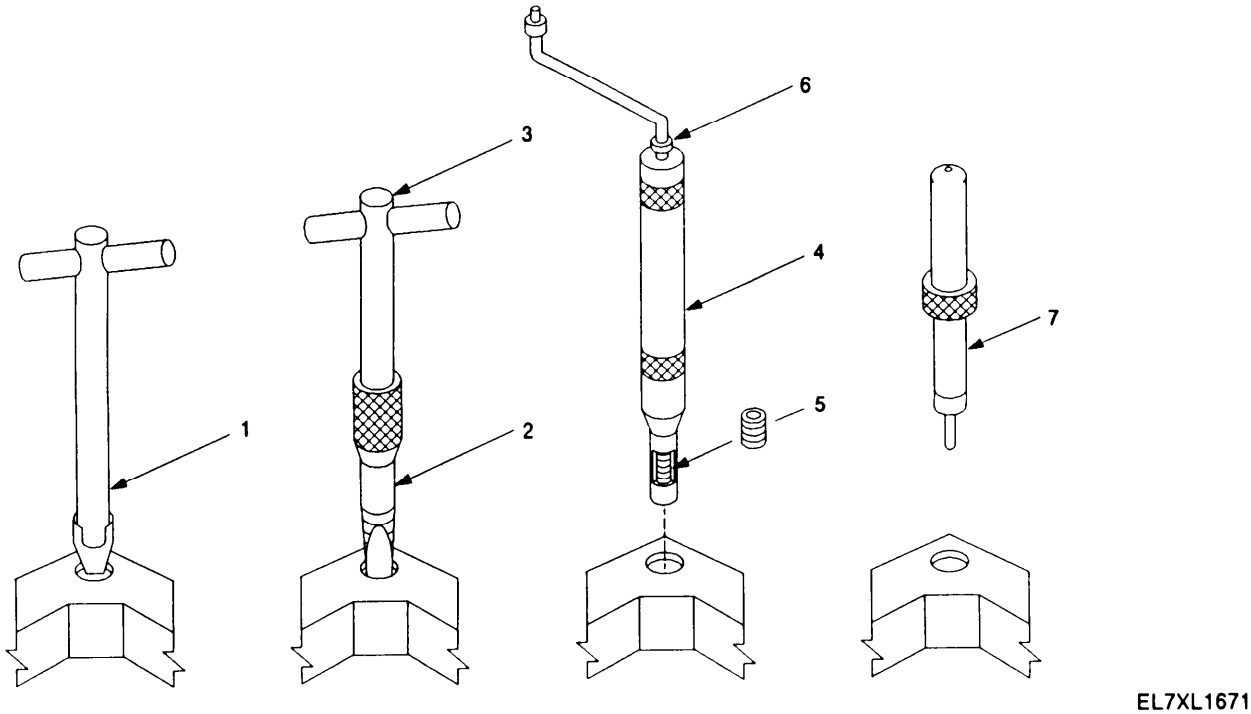

Figure 15-7. Threaded Screw Insert Replacement

15-35. REPLACEMENT OF THREADED SCREW INSERTS. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
c. Threaded screw insert	Strike extractor tool to seat blade into threaded screw insert in hole. Keep steady downward pressure on extractor tool while turning it counterclockwise until threaded screw insert is out of hole. Discard defective threaded screw insert.	
INSTALLATION		
d. Threaded screw insert	Obtain replacement threaded screw insert.	
e. Thread cleaning tap (2)	Select proper size tap. Insert and secure in brace (3). Start carefully in hole. Use thread cleaning tap (2) to remove all debris from hole. Screw tap to bottom of hole. Unscrew tap.	Be careful not to get metal shavings on electronic parts.
f. Insertion tool	Using 5/64 inch hex wrench, loosen stop collar (6) on prewinder (4) of insertion tool. Turn handle clockwise until threaded shaft of prewinder protrudes from end of insertion tool to proper depth. Move stop collar to top of tool body. While holding it in place, position, secure, and tighten stop collar by using 5/64 inch hex wrench. Turn handle so threaded shaft is past opening of tool body. Insert location (1) Mounting plate assembly (2) Catch strikes (3) Voltage regulator (U1)	If insert is used with a captive screw, set prewinder threaded shaft with an extra 2 to 3 mm length longer than insert. Using depth gauge, set stop collar against insertion tool for proper depth setting as follows: Depth setting 2 mm below surface Flush with surface Flush with surface
g. Threaded screw insert (5)	Place insert in opening of tool body so tang end is toward prewinder tip. Turn handle until insert protrudes one full turn beyond the tip. Position insertion tool in tapped hole where defective threaded screw insert was removed. Turn handle clockwise until insert is positioned into hole and stop collar touches tool body. Turn handle counterclockwise until insertion tool is retracted. Remove tool from hole.	
h. Tang breakoff tool (7)	Position tang breakoff tool in hole with threaded screw insert. Place on tang. Break off tang by pressing down on tool until it clicks. Remove tang breakoff tool and check for broken tang on tool end. If tang is not there, turn connector box over and remove broken tang from hole.	

Section V. PREPARATION FOR STORAGE OR SHIPMENT

15-36. GENERAL INFORMATION.

a. Pack the battery tray and any removed modules in approved shipping containers.

b. All modules must be shipped enclosed in material that provides protection from static electricity. See the following paragraph.

15-37. PACKING STATIC SENSITIVE MODULES.

The following steps should be followed when packing a static sensitive module for storage or shipment.

CAUTION

To avoid damaging static sensitive modules, use an antistatic pad on the work surface and wear a grounded wrist strap when handling the module.

ITEM	ACTION	REMARKS
a. Module (1)	Place inside antistatic bag (2) or inside antistatic wrapping material (3). See figure 15-8.	
b. Antistatic package (4)	Seal with adhesive tape. Attach “sensitive electronic devices” unit pack label (5).	
c. Antistatic package (4)	Place inside approved shipping container (6). Attach “sensitive electronic devices” intermediate pack label (7).	

15-37. **STATIC SENSITIVE MODULES.** Continued

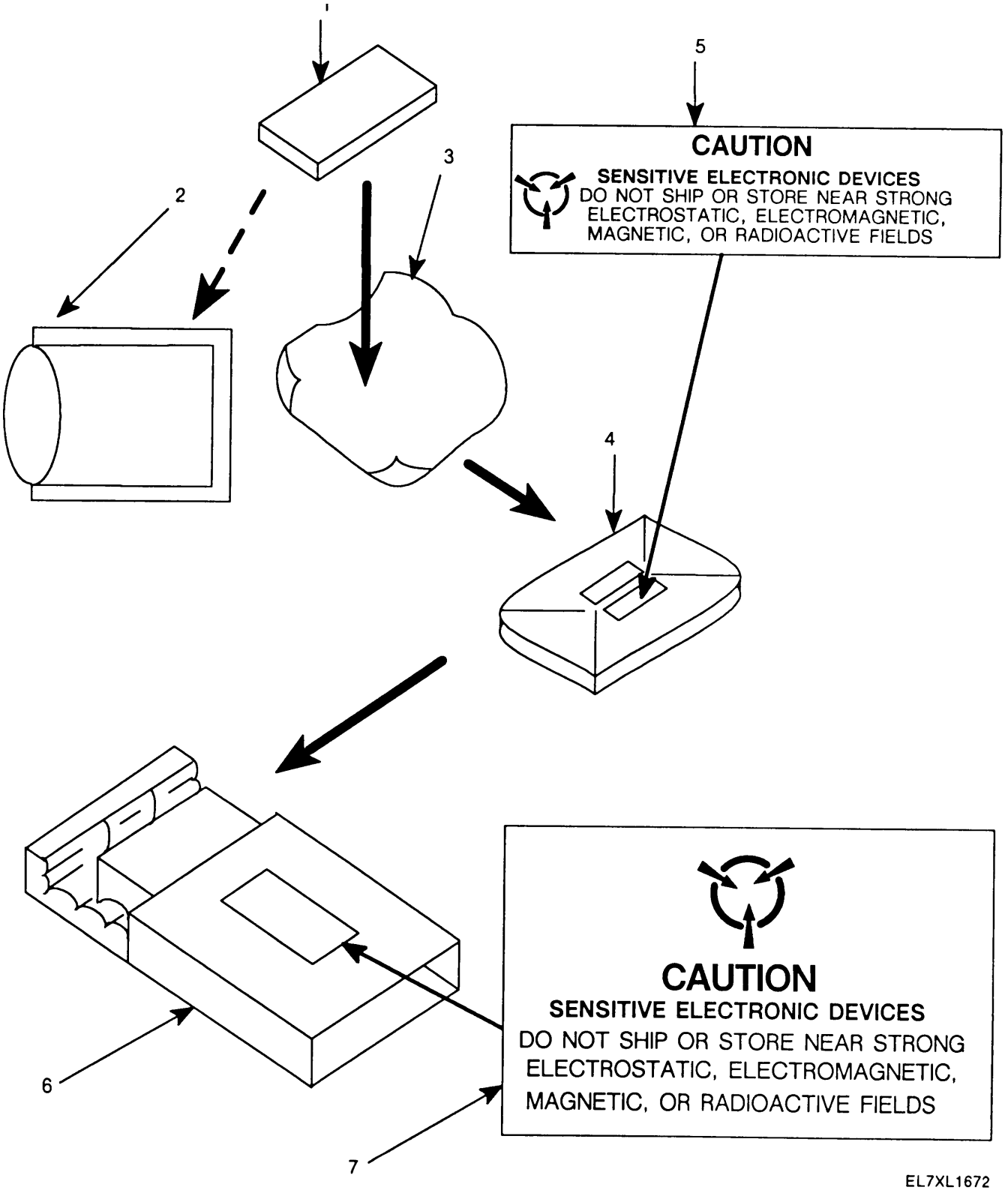

Figure 15-8. Packing Static Sensitive Modules

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CHAPTER 16

MOUNTING BASE, ELECTRICAL EQUIPMENT MT-6576/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

16-1. INTRODUCTION.

The Mounting Base MT-6576/VRC (SRM mounting base) holds the Power Supply Adapter MX-10862/VRC. It also provides the electrical interface to the vehicle power. The mounting tray and base are connected by four mechanical isolator shock mounts. Six internal electrical leads are used for grounding. The mounting base has two thumbscrews and rim clenching clamps that hold the power supply adapter in place. There are five connectors on the electrical connector assembly at the back of the mounting base as shown in figure 16-1 and described in the following paragraph.

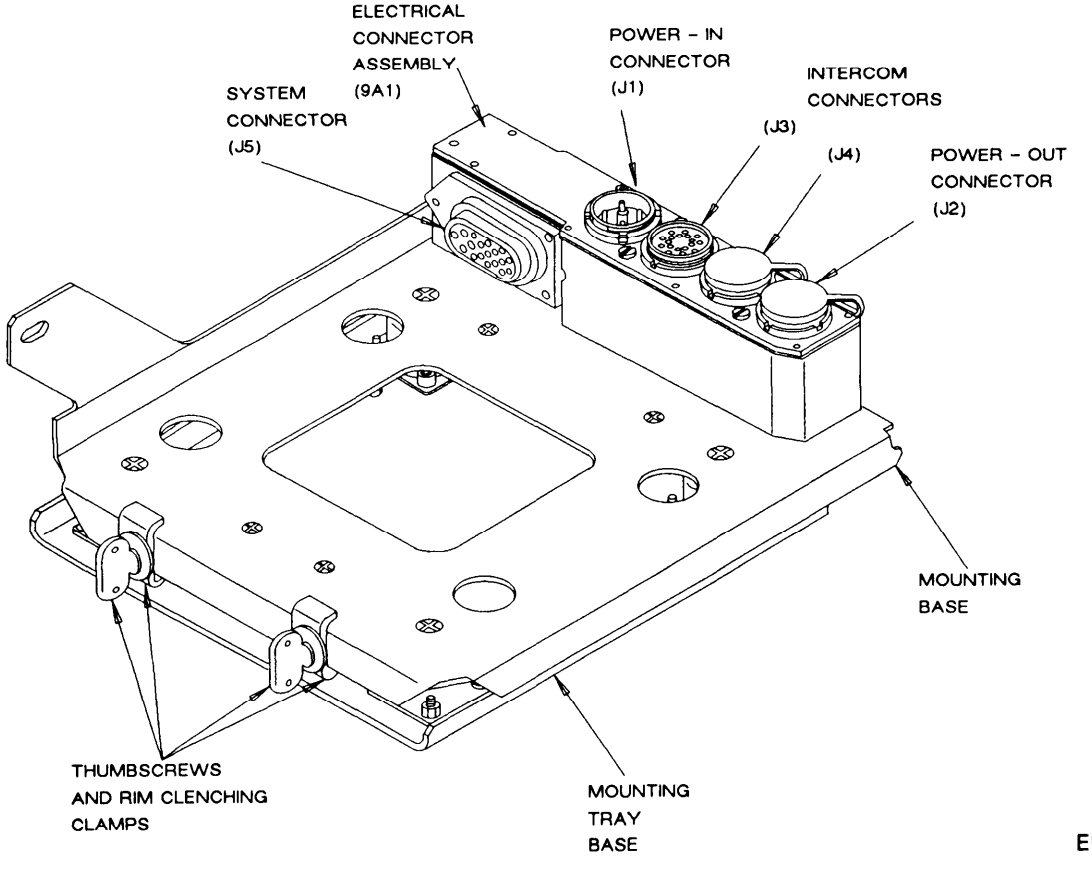


Figure 16-1. SRM Mounting Base.

16-2. ELECTRICAL CONNECTOR ASSEMBLY (9A1).

The electrical connector assembly has five connectors as shown in figure 16-1. The operating voltage (22 to 32 V dc) from the vehicle's electrical system is connected to the power-in connector (J1). A second mounting base or other equipment is connected to the power-out connector (J2). The vehicle intercom or LS-671/VRC loudspeaker is connected to connector J3 or J4. The system connector (J5) mates with the system connector (P1) on the power supply adapter. See chapter 14.

The electrical connector assembly has no active circuitry. The dc input power is filtered by either filters FL1 and FL2, or for newer versions the FILTER EMI-CCA. All connections are as shown in figure 16-2.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

16-3. COMMON TOOLS AND EQUIPMENT.

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

16-4. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

16-5. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

16-6. TROUBLESHOOTING.

When an electrical connector assembly is received from unit maintenance, inspect it for damage. The visual inspection procedures are in paragraph 16-7. Repair any damage following the instructions in section IV. If the electrical connector assembly has an electrical problem, use the DMM and figure 16-2 to verify the fault. If there is a short or open circuit in the electrical connector assembly, repair it. Follow the instructions in section IV. Use the DMM and figure 16-2 to verify the repair of the electrical connector assembly.

16-7. VISUAL INSPECTION PROCEDURES.

Before beginning any maintenance procedure, inspect the electrical connector assembly for physical damage. Use the following table as a guide to inspect the electrical connector assembly. Look for damaged or missing parts, and replace them as required. Figure 16-3 shows the piece parts that are removable and replaceable at direct support maintenance.

ITEM	ACTION	REMARKS
a. Access cover (1)	Inspect for chips, cracks, or scratches in paint. Check for damage. See figure 16-3.	If defective, refer to TB-43-0118. For repair procedure, refer to paragraph 16-9.
b. Connector case (12)	Inspect for chips, cracks, or scratches in paint. Check for damage. See figure 16-3.	If defective, refer to TB-43-0118. For repair procedure, refer to paragraph 16-10.
c. J1 (7), J2 (10), J3 (8), or J4 (9) connector	Check for damaged or missing piece parts. See figure 16-3.	For repair procedure, refer to paragraph 16-11.
d. J5 connector (16)	Check for damaged or missing piece parts. See figure 16-3.	For repair procedure, refer to paragraph 16-12.

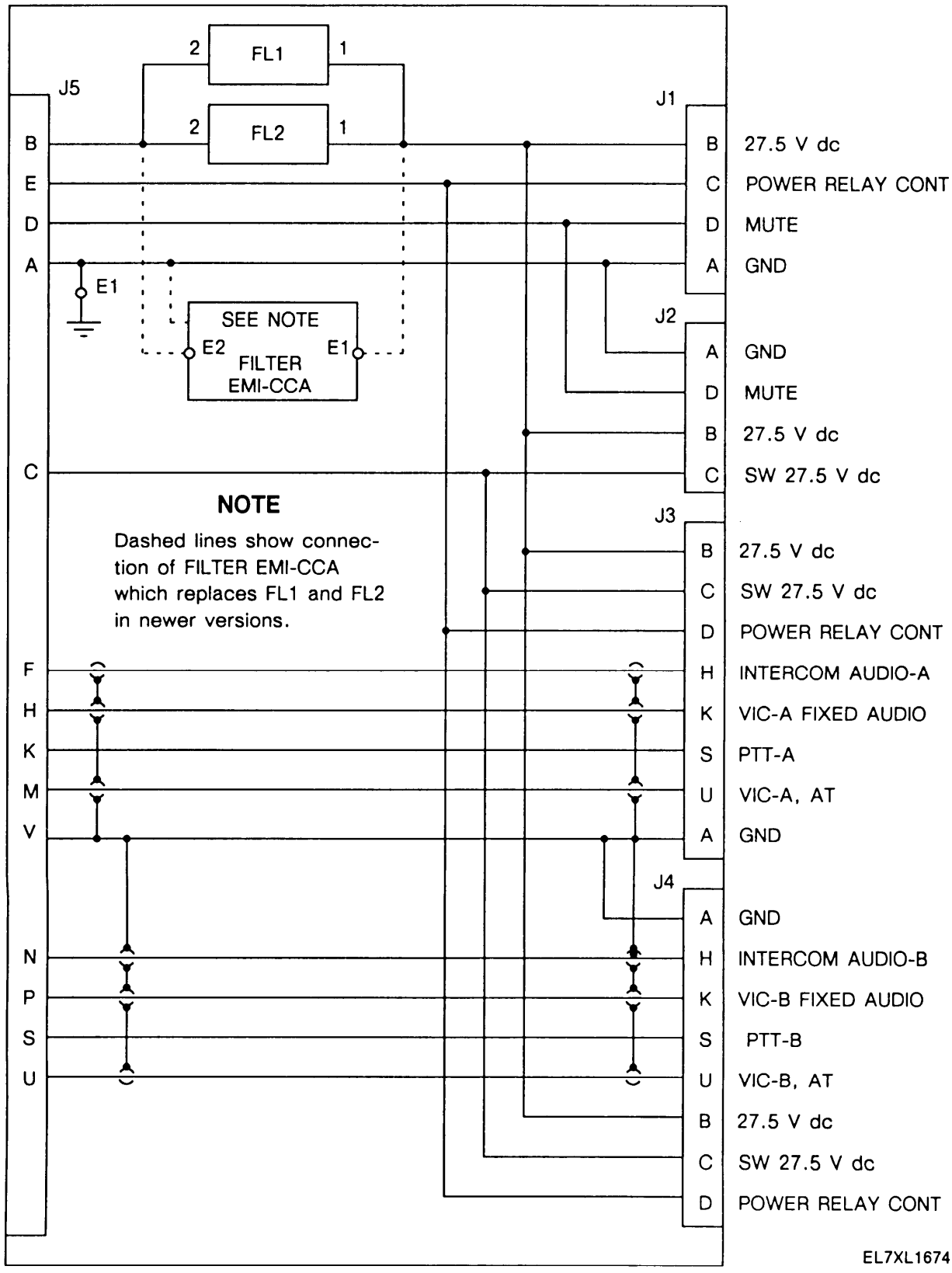


Figure 16-2. Electrical Connector Assembly Schematic Diagram.

NOTE

The filter mounting plate (22), filter FL1 (20), and filter FL2 (21) are replaced with a FILTER EMI-CCA for newer versions of the connector assembly.

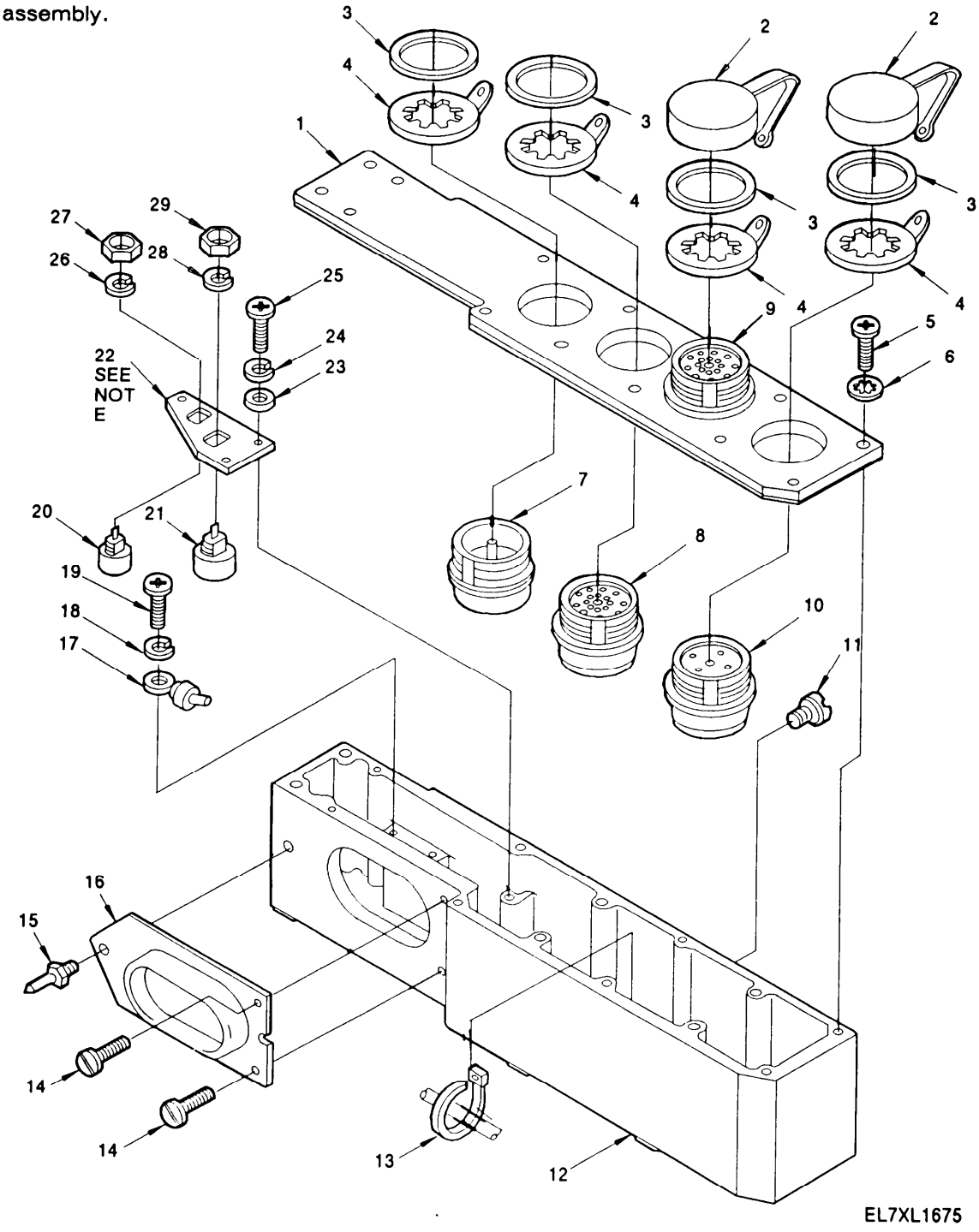


Figure 16-3. Electrical Connector Assembly (Exploded View).

Section IV. MAINTENANCE PROCEDURES

16-8. INTRODUCTION.

Maintenance of the electrical connector assembly consists of replacing defective parts using the procedures in this section. The electrical connector assembly can be removed by unit maintenance. Check it as described in section Ill. Inspect all of the parts and replace any that are defective. The repair procedures are in paragraphs 16-9 through 16-17.

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the mounting base. Seals must not be damaged. All screws must be torqued to the limits specified in the procedures.

16-9. REPLACEMENT OF ACCESS COVER.

Tools:

Cross tip screwdriver
Torque screwdriver
Torque wrench
1-1/4-inch spanner wrench attachment
Spanner wrench

Expendable supplies:

Silicone compound

References:

Paragraph 16-10 for removal and installation of connector case.
Paragraph 16-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. See figure 16-3.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.

16-9. REPLACEMENT OF ACCESS COVER. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. Two protective caps (2)	Remove and inspect two protective caps (2) from J4 and J2 connectors (9) and (10). If damaged, obtain replacement.	
c. Four spanner nuts (3)	Use spanner wrench with 1-1/4-inch spanner wrench attachment. Remove and inspect four spanner nuts (3) from J1 through J4 connectors (7) through (10). If damaged, obtain replacement.	
d. Four electrical connector retainers (4)	Remove and inspect four electrical connector retainers from four connectors. If damaged, obtain replacement.	
e. Access cover (1)	Remove and discard defective access cover (1).	
INSTALLATION		
f. Access cover (1)	Obtain replacement access cover (1).	
g. Four o-rings	Coat o-rings of four connectors (7) through (10) with silicone compound.	
h. J1 through J4 connectors (7) through (10)	Install four connectors in four connector holes in access cover (1).	
i. Four electrical connector retainers (4)	Install four electrical connector retainers (4) on four connectors.	
j. HCP Four spanner nuts (3)	Use spanner wrench. Install and hand tighten four spanner nuts (3) securing four connectors to access cover (1). Use torque wrench and 1-1/4-inch spanner wrench attachment. Torque nuts to 100 in-lb.	
k. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 16-10 for replacement of the connector case. (12).
l. Two protective caps (2)	Install two protective caps (2) on J4 and J2 connectors (9) and (10).	

16-10. REPLACEMENT OF CONNECTOR CASE.

Tools:

Cross tip screwdriver	Adjustable wrench	Soldering kit
Flat tip screwdriver	Heat sink	

Expendable supplies:

Silicone compound	Cotton swabs
Sealing compound, grade H	Alcohol
	Solder

References:

Paragraph 16-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 16-3.	
b. Two screws (14)	Use flat tip screwdriver. Remove and inspect two screws (14) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	
c. Guide pin (15)	Use adjustable wrench. Remove and inspect guide pin (15) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	
d. J5 connector (16)	Gently pull out top of J5 connector (16).	If necessary, remove tiedown strap (13).
e. J5 connector (16) wires	Record location of wires soldered to terminals of J5 connector (16).	
	Use soldering kit. Desolder each wire connected to J5 connector (16).	**NOTE** Place heat sink on bare part of wire just above area to be resoldered.
f. J5 connector (16)	Remove J5 connector (16) from connector case (12), and inspect it for damage. If damaged, obtain replacement.	
g. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Remove and inspect screw (19) and lockwasher (18) securing E1 terminal lug (17) next to filter mounting plate (22). If damaged, obtain replacement. See note.	**NOTE** For versions with a FILTER EMI-CCA this terminal lug is screwed to the CCA and connector case.

16-10. REPLACEMENT OF CONNECTOR CASE. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
h. Three (or two) screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Remove and inspect three (or two) screws (25), flat washers (24), and lockwashers (23) securing filter mounting plate (22) or FILTER EMI-CCA to connector case (12). If damaged, obtain replacement.	**NOTE** For versions with a FILTER EMI-CCA there will be hardware for only two holes after removal of ground lug in step g.
i. Filter mounting plate (22) or FILTER EMI-CCA, and wiring harness	Remove filter mounting plate (22) or FILTER EMI-CCA, and wiring harness from connector case (12). If damaged, obtain replacement.	
j. Seal screw (11)	Use flat tip screwdriver. Remove seal screw (11) from connector case (12), and inspect it. If damaged, obtain replacement.	
k. Connector case (12)	Discard defective connector case (12).	
INSTALLATION		
l. Connector case (12)	Obtain replacement connector case (12).	
m. Seal screw (11)	Use flat tip screwdriver. Install and hand tighten seal screw (11) in connector case (12).	
n. Filter mounting plate (22) or FILTER EMI-CCA, and wiring harness	Place filter mounting plate (22) or FILTER EMI-CCA, and wiring harness in connector case (12).	
o. Three (or two) screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Install and hand tighten three (or two) screws (25), flat washers (24), and lockwashers (23).	**NOTE** For versions with a FILTER EMI-CCA two sets of hardware are installed on the side of the CCA that contains two holes.

16-10. REPLACEMENT OF CONNECTOR CASE. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
p. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Install and hand tighten screw (19) and lockwasher (18) securing E1 terminal lug (17) next to filter mounting plate (22) or on remaining hole of FILTER EMI-CCA.	
q. J5 connector (16)	Position J5 connector (16) next to mounting hole in connector case (12).	
r. J5 connector (16) wires	Use soldering kit and soldering aid. Solder wires to correct terminals of connector.	**NOTE** Ensure each wire is placed through mounting hole in connector case (12). Before and after soldering clean wires and terminals with cotton swabs and alcohol.
s. Tiedown strap (13)	Replace tiedown strap (13) if removed.	
t. Neoprene gasket	Coat the neoprene gasket of J5 connector (16) with silicone compound, and place the connector in mounting hole of connector case (12).	
u. Two screws (14) and guide pin (15)	Use flat tip screwdriver and adjustable wrench. Install and hand tighten two screws (14) and guide pin (15) securing J5 connector (16) to connector case (12).	
v. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	

16-11. REPLACEMENT OF J1, J2, J3, OR J4 CONNECTOR.

Tools:

Cross tip screwdriver
Torque screwdriver
Torque wrench
1-1/4-inch spanner wrench attachment
Soldering kit
Spanner wrench

Expendable supplies:

Silicone compound
Cotton swabs
Alcohol
Solder

References:

Paragraph 16-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 16-3.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. Tiedown straps (13)	Remove any tiedown straps that are in the way.	
c. J1 (7), J2 (10), J3 (8), or J4 (9) connector wires	Record location of wires soldered to terminals of connector.	
	Use soldering kit. Desolder each wire connetted to connector. Inspect insulation sleeving as required. If damaged, obtain replacement.	**NOTE** Place heat sink on bare part of wire just above area to be resoldered.
d. Connector	Remove and discard defective connector.	
INSTALLATION		
e. J1 (7), J2 (10), J3 (8), or J4 (9) connector	Obtain replacement connector.	

16-11. REPLACEMENT OF J1, J2, J3, OR J4 CONNECTOR. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
f. Connector terminals	Use soldering kit. Solder wires to correct terminals of connector. If necessary, slide insulation sleeving down over connection, and apply heat to it until it shrinks tight around the connection.	**NOTE** Ensure each wire has insulation sleeving on it if necessary, and each wire is placed through mounting hole in connector case (12). While soldering wires, attach heat sink to bare wire between insulation sleeving and terminal. Before and after soldering, clean wires and terminals with cotton swabs and alcohol.
g. Tiedown straps (13)	Replace any tiedown straps (13) that were removed.	
h. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 16-10 for replacement of the connector case (12).

16-12. REPLACEMENT OF J5 CONNECTOR.

Tools:

Flat tip screwdriver	Soldering kit
Adjustable wrench	

Expendable supplies:

Silicone compound	Cotton swabs
Alcohol	Solder

References:

Paragraph 16-16 for removal and installation of threaded screw inserts.

ITEM	ACTION	REMARKS
REMOVAL		
a. Electrical connector assembly (9A1)	Set on work surface with J5 connector (16) toward you. See figure 16-3.	

16-12. REPLACEMENT OF J5 CONNECTOR. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. Two screws (14)	Use flat tip screwdriver. Remove and inspect two screws (14) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	Inspect each screw and its threaded screw insert to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert.
c. Guide pin (15)	Use adjustable wrench. Remove and inspect guide pin (15) securing J5 connector (16) to connector case (12). If damaged, obtain replacement.	Inspect guide pin and its threaded screw insert to determine if either is defective. If guide pin is stripped, do not replace its threaded screw inserts.
d. J5 connector (16)	Gently pull out top of J5 connector (16).	If necessary, remove tiedown strap (13).
e. J5 connector (16) wires	Record location of wires soldered to terminals of J5 connector (16).	
	Use soldering kit. Desolder each wire connected to J5 connector (16).	**NOTE** Place heat sink on bare part of wire just above area to be resoldered.
f. J5 connector (16)	Remove and discard defective J5 connector (16).	
INSTALLATION		
g. J5 connector (16)	Obtain replacement J5 connector (16).	
h. Connector case (12)	Position J5 connector (16) next to mounting hole in connector case (12).	
i. J5 connector (16) terminals	Use soldering kit. Solder wires to correct terminals of connector.	**NOTE** Before and after soldering, clean wires and terminals with cotton swabs and alcohol.
j. Tiedown strap (13)	Replace tiedown strap (13) if removed.	
k. Neoprene gasket	Coat the neoprene gasket of J5 connector (16) with silicone compound, and place the connector in mounting hole of connector case (12).	
l. Two screws (14) and guide pin (15)	Use flat tip screwdriver and adjustable wrench. Install and hand tighten two screws (14) and guide pin (15) securing J5 connector (16) to connector case (12).	If a screw or the guide pin is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert.

16-13. REPLACEMENT OF FL1 FILTER.

Tools:

Cross tip screwdriver
5/16-inch wrench
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

References:

Paragraph 16-10 for removal and installation of connector case.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 16-3.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. FL1 filter (20) top terminal	Use soldering kit. Desolder wire from top terminal of FL1 filter (20).	
c. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Remove and inspect three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12). If damaged, obtain replacement.	
d. Filter mounting plate (22)	Lift filter mounting plate (22) to allow access to bottom terminal of FL1 filter (20).	
e. FL1 filter (20) bottom terminal	Use soldering kit. Desolder wire from bottom terminal of FL1 filter (20).	
f. Hex nut (27) and lockwasher (26)	Use 5/16-inch wrench. Remove and inspect hex nut (27) and lockwasher (26) securing FL1 filter (20) to filter mounting plate (22). If damaged, obtain replacement.	
g. FL1 filter (20)	Remove and discard defective FL1 filter (20).	
INSTALLATION		
h. FL1 filter (20)	Obtain replacement FL1 filter (20).	

16-13. REPLACEMENT OF FL1 FILTER. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
i. Filter mounting plate (22)	Install FL1 filter (20) in mounting hole of filter mounting plate (22).	
j. Hex nut (27) and lockwasher (26)	Use 5/16-inch wrench. Install and hand tighten hex nut (27) and lockwasher (26) securing FL1 filter (20) to filter mounting plate (22).	
k. FL1 filter (20) terminals	Using cotton swabs and alcohol, clean both terminals on FL1 filter (20).	
l. FL1 filter (20) wires	Use soldering kit. Solder wires to correct terminals of FL1 filter (20).	
m. Filter mounting plate (22)	Position filter mounting plate (22) in connector case (12).	
n. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Install and tighten three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12).	If a screw is not stripped but will not tighten, inspect its tapped hole. If the tapped hole is defective, refer to paragraph 16-10 for replacement of connector case (12).
o. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 16-10 for replacement of the connector case. (12).

16-14. REPLACEMENT OF FL2 FILTER.

Tools:

Cross tip screwdriver
3/8-inch wrench
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

References:

Paragraph 16-10 for removal and installation of connector case.

16-14. REPLACEMENT OF FL2 FILTER. Continued

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 16-3.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.
b. FL1 filter (20) and FL2 filter (21) top terminal	Use soldering kit. Desolder wire from top terminal of FL1 filter (20) and FL2 filter (21).	
c. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Remove and inspect three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12). If damaged, obtain replacement.	
d. Filter mounting plate (22)	Lift filter mounting plate (22) to allow access to bottom terminal of FL2 filter (21).	
e. FL2 filter (21) bottom terminal	Use soldering kit. Desolder wire from bottom terminal of FL2 filter (21).	
f. Hex nut (29) and lockwasher (28)	Use 3/8-inch wrench. Remove and inspect hex nut (29) and lockwasher (28) securing FL2 filter (21) to filter mounting plate (22). If damaged, obtain replacement.	
g. FL2 filter (21)	Remove and discard defective FL2 filter (21).	
INSTALLATION		
h. FL2 filter (21)	Obtain replacement FL2 filter (21).	
i. Filter mounting plate (22)	Install FL2 filter (21) in mounting hole of filter mounting plate (22).	
j. Hex nut (29) and lockwasher (28)	Use 3/8-inch wrench. Install and hand tighten hex nut (29) and lockwasher (28) securing FL2 filter (21) to filter mounting plate (22),	
k. FL1 filter (20) and FL2 filter (21) terminals	Using cotton swabs and alcohol, clean both terminals on FL2 filter (21) and top terminal on FL1 filter (20).	

16-14. REPLACEMENT OF FL2 FILTER. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
l. FL1 filter (20) and FL2 filter (21) wires	Use soldering kit. Solder wires to correct terminals of FL2 filter (21) and top terminal on FL1 filter (20).	
m. Filter mounting plate (22)	Position filter mounting plate (22) in connector case (12).	
n. Three screws (25), lockwashers (24), and flat washers (23)	Use cross tip screwdriver. Install and tighten three screws (25), lockwashers (24), and flat washers (23) securing filter mounting plate (22) to connector case (12).	If a screw is not stripped but will not tighten, inspect its tapped hole. If the tapped hole is defective, refer to paragraph 16-10 for replacement of connector case (12).
o. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 16-10 for replacement of the connector case. (12).

16-15. REPLACEMENT OF WIRING.

Tools:

Diagonal cutting pliers
Wire stripper
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

References:

Paragraph 16-12 for removal and installation of J5 connector.

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 16-3.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert. If the holes are tapped, there will be no threaded screw insert.

16-15. REPLACEMENT OF WIRING.

ITEM	ACTION	REMARKS
REMOVAL Continued		
b. J5 connector (16)	Check wiring list and if applicable remove J5 from connector case (12).	Refer to paragraph 16-12 for removal instructions.
c. Wiring	Use soldering kit. Desolder, remove, and discard defective wiring from connectors.	
INSTALLATION		
d. Wiring	Use diagonal cutting pliers. Cut replacement wiring to lengths as specified in the following wire list:	

WIRE#	FROM	TO	COLOR	GAUGE	LG/MM
001	J5 A	E1	BLK	16	64.0
002	J5 A	J1 A	BLK	16	107.0
004	J5 V	J3 A	BLK	20	132.0
005	J5 V	J4 A	BLK	20	210.0
006	J5 B	(SEE NOTE 1)	RED	16	76,0
OR					
006	J5 B	EMI-CCA E2	RED	16	76.0
007	J1 B	J2 B	RED	16	200.0
010	J1 A	J2 A	BLK	16	175.0
011	J5 C	J2 C	YEL	16	257.0
012	J2 C	J3 C	YEL	20	120.0
013	J1 B	J3 B	RED	20	110.0
014	J5 D	J1 D	WHT	22	115.0
015	J1 D	J2 D	WHT	22	160.0
016	J5 E	J1 C	BRN	22	197.0
017	J1 C	J3 D	BRN	22	95.0
*018	J5 F	J3 H	BRN	22	132.0
*019	J5 H	J3 K	ORG	22	141.0
021	J5 K	J3 S	WHT/RED	22	132.0
023	J5 M	J3 U	YEL	22	132.0
*024	J5 N	J4 H	GRN	22	170.0
025	J5 P	J4 K	BLU	22	200,0
027	J5 S	J4 S	WHT/VIO	24	202.0
029	J5 U	J4 U	WHT	22	170,0
031	J1 B	(SEE NOTE 2)	RED	16	89.0
OR					
031	J1 B	EMI-CCA E1	RED	16	89.0
032	J5 V	(SEE NOTE 3)	BLK	24	AR
033	J2 B	J4 B	RED	20	95.0
034	J2 C	J4 C	YEL	20	64.0
035	J1 C	J4 D	BRN	22	135.0

*NOTE: Wires #018, 019, and 024 may be shielded electrical cables.

16-15. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS

INSTALLATION Continued

NOTES:

1. Using the wire stripper, strip 3.5 mm of insulation from one end of wire #006. Using the wire stripper, strip 20.0 mm of insulation from other end of wire #006. Using the soldering kit, tin both ends of wire #006. Insert the 20.0 mm end of wire #006 through top terminals of filters FL1 and FL2 (20) and (21). Place a 12.0 mm length of 16 gauge insulation sleeving on wire #006 between terminals of filters FL1 and FL2 (20) and (21).

2. Using the wire stripper, strip 3.5 mm of insulation from one end of wire #031. Using the wire stripper, strip 20.0 mm of insulation from other end of wire #031. Using the soldering kit, tin both ends of wire #031. Insert the 20.0 mm end of wire #031 through bottom terminals of filters FL1 and FL2 (20) and (21). Place a 12.0 mm length of 16 gauge insulation sleeving on wire #031 between terminals of filters FL1 and FL2 (20) and (21).

3. Connect wire #032 to shields of wires #018, 019, and, 024 going directly from shield to shield. Cover all J5 pigtail connections with heat shrinkable insulation sleeving. Cover exposed braid on end opposite pigtail connection of wires #018, 019, and 024 with heat shrinkable insulation sleeving. Cover all J3 and J4 connections with 14 gauge insulation sleeving.

d. Wiring Continued	Using wire stripper, strip wires. Using cotton swabs and alcohol, clean wires. Using soldering kit, tin wires.	
e. Shielded electrical cables	Prepare wires #018, 019, and 024 as follows: Unbraid shielding from around center conductor. Using cotton swabs and alcohol, clean the shielding. Using soldering kit, tin the shielding. Using wire stripper, strip sleeving from center conductor. Using cotton swabs and alcohol, clean the center conductor. Using soldering kit, solder wires as specified in the wire list.	
f. J5 connector (16)	If applicable install J5 connector.	Refer to paragraph 16-12 for installation instructions.

16-15. REPLACEMENT OF WIRING. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
g. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 - 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 16-10 for replacement of the connector case (12).

16-16. REPLACEMENT OF THREADED SCREW INSERTS.

Tools:

Extractor tool 1227-06	Thread cleaning tap	Tang breakoff tool
Extractor tool 1227-6	5/64-inch hex wrench	Prewinder
Insertion tool 7751-3	3/32-inch hex wrench	

ITEM	ACTION	REMARKS
REMOVAL		
a. Insert	If a screw for any of the following items will not tighten, inspect it to ensure it is not stripped. If the screw is stripped, do not replace its insert.	If the screw is not stripped, replace its insert. The following is a list of the threaded screw inserts and their locations.

Location	Type	Size	Quantity
(1) Access cover (as required)	MA 3330-152	M3 X 0.5 X 1.5 dia	8
(2) J5 connector	MA 3330-104	M4 X 0.7 X 1.0 dia	2
(3) Guide pin	MA 3330-105	M5 X 0.8 X 1.0 dia	1

b. Extractor tool (1)	Refer to figure 16-4, Place tool in hole, Tap extractor to seat in insert. Maintain steady pressure on extractor and unscrew insert. Remove insert from hole.	The following is a list of the appropriate extractor tools for the respective inserts. Select the extractor tool to be used.
	(1) Extractor tool 1227-06	M2.5 thru M4.5
	(2) Extractor tool 1227-6	M5 thru M10
INSTALLATION		
c. Insert	Obtain replacement threaded screw insert.	
d. Thread cleaning tap (2)	Select proper size tap. Insert and secure in brace (3). Start carefully in hole. Screw tap to bottom of hole. Unscrew tap.	Be careful not to get metal shavings on the electrical parts.

16-16. REPLACEMENT OF THREADED SCREW INSERTS. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
e. Prewinder (4)	Loosen stop collar (6) with hex wrench. Extend threaded shaft beyond end of prewinder one thread longer than insert. Move stop collar to top of tool body and tighten. Retract threaded shaft.	If insert is used with a captive screw, set prewinder with an extra 2 to 3 mm length.
f. Insert (5)	Place insert in prewinder (4) with tang end toward prewinder tip. Rotate shaft until insert projects beyond the tip one full turn. Place tip in hole. Screw insert into hole until stop collar touches the tool body. Retract prewinder.	
g. Tang breakoff tool (7)	Place on tang. Break off tang by pressing down on tool. Remove tang breakoff tool. Remove broken tang from hole.	

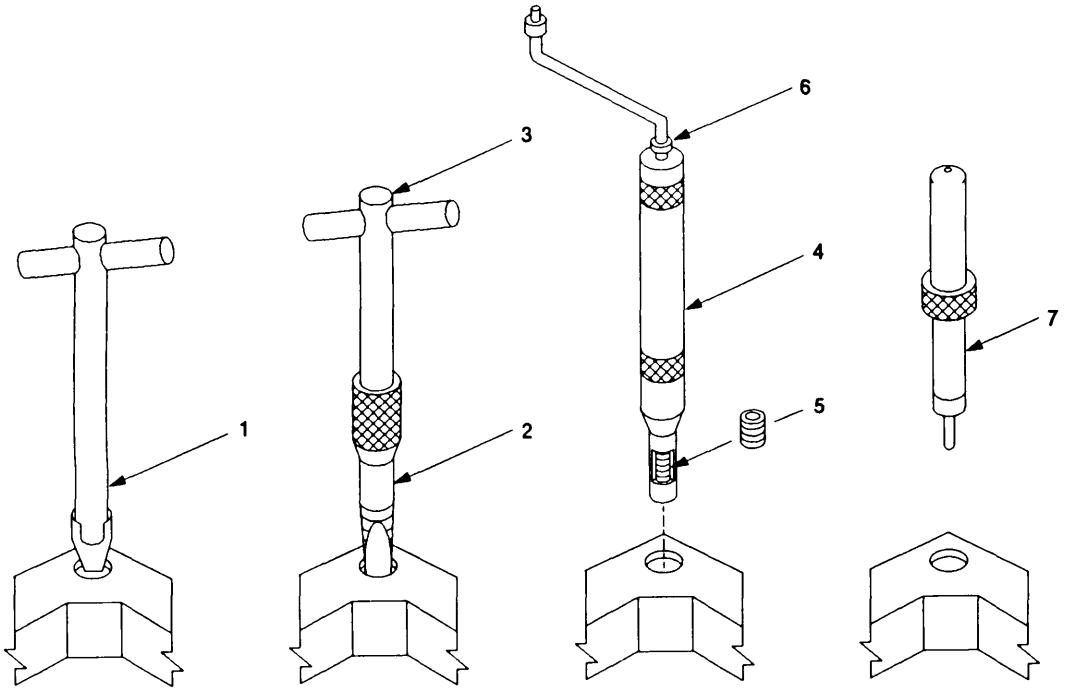


Figure 16-4. Threaded Screw Insert Replacement

16-17. REPLACEMENT OF FILTER EMI-CCA.

Tools:

Cross tip screwdriver
Soldering kit

Expendable supplies:

Solder
Alcohol
Cotton swabs

ITEM	ACTION	REMARKS
REMOVAL		
a. Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Remove and inspect eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). If damaged, obtain replacement. Lay access cover to one side. See figure 16-3.	Inspect each screw and its threaded screw insert (if present) to determine if any is defective. If a screw is stripped, do not replace its threaded screw insert, If the holes are tapped, there will be no threaded screw insert.
b. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Remove and inspect screw (19) and lockwasher (18) securing terminal lug (17) to FILTER EMI-CCA. If damaged, obtain replacement.	
c. FILTER EMI-CCA wires	Record location of wires soldered to E1 and E2 of FILTER EMI-CCA. Use soldering kit and soldering aid. Desolder each wire.	
d. Two screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Remove and inspect two screws (25), flat washers (24), and lockwashers (23) securing FILTER EMI-CCA to connector case (12). If damaged, obtain replacement.	
e. FILTER EMI-CCA	Remove and discard.	
INSTALLATION		
f. FILTER EMI-CCA	Obtain replacement FILTER EMI-CCA and place in connector case (12).	
g. Two screws (25), flat washers (24), and lockwashers (23)	Use cross tip screwdriver. Install and hand tighten two screws (25), flat washers (24), and lockwashers (23) securing FILTER EMI-CCA to connector case (12).	

16-17. REPLACEMENT OF FILTER EMI-CCA. Continued

ITEM	ACTION	REMARKS
INSTALLATION Continued		
h. FILTER EMI-CCA wire	Use soldering kit. Solder wires to correct terminals of FILTER EMI-CCA.	**NOTE** Before and after soldering, clean wires and terminals with cotton swabs and alcohol.
i. Screw (19) and lockwasher (18)	Use cross tip screwdriver. Install and hand tighten screw (19) and lockwasher (18) securing terminal lug (17) to FILTER EMI-CCA.	
j. HCP Eight screws (5) and lockwashers (6)	Use cross tip screwdriver. Install and hand tighten eight screws (5) and lockwashers (6) securing access cover (1) to connector case (12). Use torque screwdriver. Torque screws to 8 to 10 in-lb.	If a screw is not stripped but will not tighten, refer to paragraph 16-16 for replacement of its threaded screw insert (if present). If a tapped hole is defective, refer to paragraph 16-10 for replacement of the connector case (12).

Section V. PREPARATION FOR STORAGE OR SHIPMENT

16-18. GENERAL INFORMATION.

Pack the electrical connector assembly (9A1) in an approved shipping container.

CHAPTER 17

LOUDSPEAKER-CONTROL UNIT, LS-671/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

17-1. INTRODUCTION.

The Loudspeaker-Control Unit, LS-671/VRC (loudspeaker) is used in conjunction with vehicular mounted radio systems. Its basic function is to permit remote transmit and receive operation of the RT thru the loudspeaker. Other functions included are remote power ON/OFF control of the mounting adapter or power supply adapter, volume control of the loudspeaker, and a provision for connecting a handset.

The loudspeaker-control unit, LS-671/VRC has three main sections which are:

a. Rear Cover Assembly (15A1)

b. Speaker Case/Flexible Cable Assembly (15A2 and 15A3)

c. Loudspeaker

They are described in the following paragraphs:

17-2. REAR COVER ASSEMBLY (15A1).

The rear cover assembly is mounted on the rear of the LS-671/VRC. It provides three basic functions:

a. It provides an environmental seal for the LS-671/VRC.

b. It contains the LS-671/VRC CCA (15A1A1) that controls the operation of the LS-671/VRC.

c. It contains the amplifier module assembly (15A1A2) that comprises a voltage regulator, loudspeaker amplifier, handset amplifier, and buffering amplifier.

The input power must be 22 to 32 V dc. The current required depends on the output loads. Normally, 150 to 500 mA of input current is required. A schematic diagram of the LS-671/VRC is included in figure FO-30.

17-3. SPEAKER CASE/FLEXIBLE CABLE ASSEMBLY (15A2 and 15A3).

The speaker case/flexible cable assembly provides the physical structure which holds the loudspeaker, VOL control R1, power indicator lamp DS1, ON/OFF switch CB1, and connectors J1 and J2. The speaker case/flexible cable assembly also contains the interconnection wiring for these external components. The loudspeaker and external components are described in the following paragraphs and illustrated in figure 17-1.

17-4. LOUDSPEAKER.

The loudspeaker provides the function of converting the amplified RT audio signals into sound for monitoring voice communications in vehicular installations.

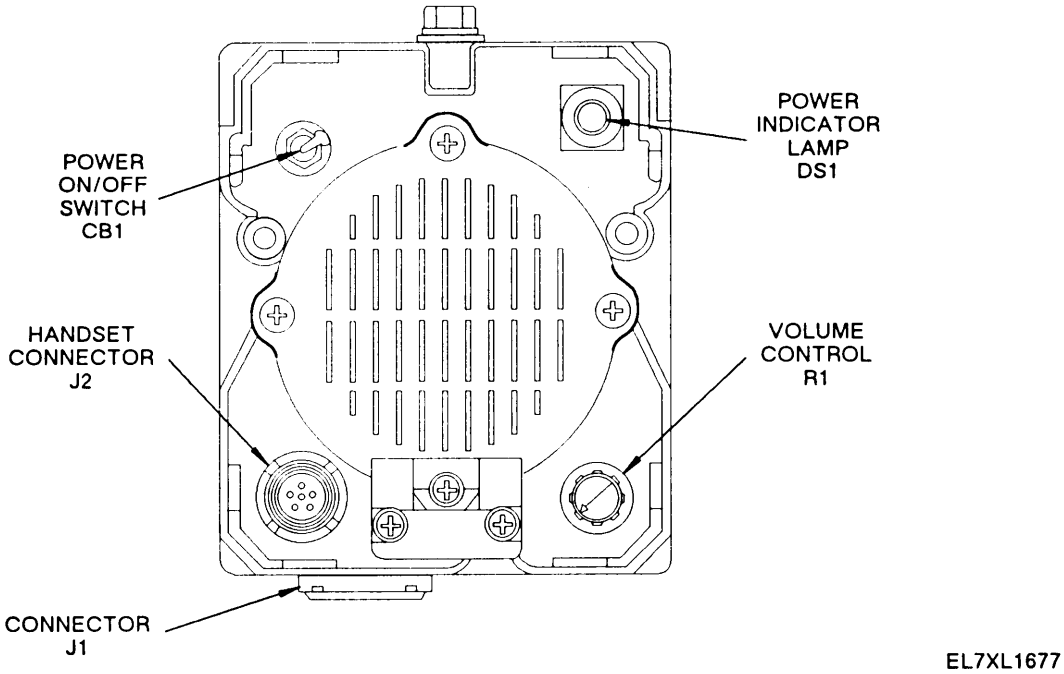


Figure 17-1. Loudspeaker and External Components.

a. Power ON/OFF switch CB1. Used to turn the loudspeaker on and off. May also be used to turn power on and off to the mounting adapter or power supply adapter, if the mounting adapter or power supply adapter power switch CB1 is set to ON.

b. Power indicator lamp DS1. Lights when power ON/OFF switch CB1 is set to ON.

c. Volume control R1. Adjusts volume level for loudspeaker or handset (if connected). To adjust volume level for handset, turn VOL control clockwise to increase volume; turn it counterclockwise to decrease volume. To adjust volume level for loudspeaker, pull and turn VOL control clockwise to increase volume; pull and turn it counterclockwise to decrease volume.

d. Handset connector J2. Used to connect handset.

e. Connector J1. Connects to mounting base or single radio mount connector J3 or J4 using loudspeaker cable CX-13292/VRC.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

17-5. COMMON TOOLS AND EQUIPMENT.

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

17-6. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

17-7. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

17-8. GENERAL.

This section provides the troubleshooting procedures used to isolate a defective module within the LS-671/VRC. The troubleshooting information is presented in the form of flowcharts. They systematically get from a symptom to the bad module or component.

17-9. OPERATIONAL CHECK.

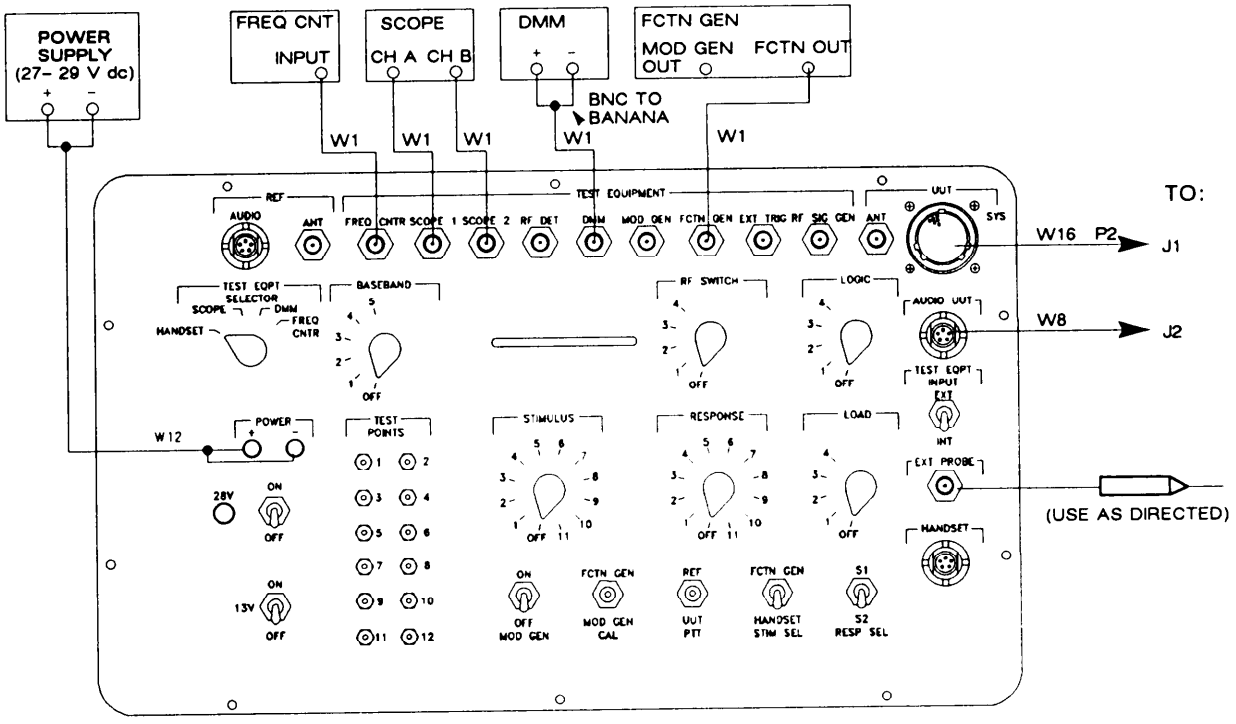
The operational check provides a step-by-step procedure for evaluating an LS-671/VRC. If the operational check is passed, the LS-671/VRC can be returned to service. If it does not pass the test, the bad module or the troubleshooting chart to be used will be identified. The troubleshooting procedures are in paragraph 17-10.

The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A “No response” in the “Response” column means that any response is not of interest.

The switch settings for the test equipment are given in the “EQUIPMENT PRESETS” section of the test setup figure. Set the test equipment switches to the indicated presets and then verify the settings. If a test response is incorrect, check the equipment settings and the test adapter cabling before going to a troubleshooting chart or replacing a bad module or component.

Connect equipment as shown in figure 17-2 to perform the operational check of the LS-671/VRC.

17-9. OPERATIONAL CHECK. Continued



EQUIPMENT PRESETS

TEST ADAPTER:

28 V:	OFF
13 V:	OFF
STIMULUS:	5
RESPONSE:	1
LOAD:	OFF
RF SWITCH:	OFF
MOD GEN:	OFF
LOGIC:	OFF
TEST EQPT SELECTOR:	DMM
TEST EQPT INPUT:	INT
BASEBAND:	OFF
CAL:	OFF
PTT:	OFF
STIM SEL:	HANDSET
RESP SEL:	S2

LS-671/VRC:

POWER (DS1):	FULLY CCW
ON/OFF (CB1):	OFF
SPKR-PULL (VOL):	MID-RANGE AND PULL OUT

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Figure 17-2. LS-671/VRC Test Setup.

17-9. OPERATIONAL CHECK. Continued

Step 1. INPUT POWER CHECK.

Action	Response
a. Connect equipment as shown in figure 17-2.	a. No response.
b. Set 28 V: ON. Read DMM.	b. DMM reads -1 to 1 V dc. If not, the ON/OFF switch (CB1) is bad.
c. Jumper test adapter TEST POINT 4 and TEST POINT 5. Set LS-671/VRC ON/OFF switch CB1: ON. Read DMM.	c. DS1 lamp lights. If not, go to chart 1. CB1 switch does not trip. If it does, go to chart 2. DMM reads 26 to 29 V dc. If not, go to chart 3.

Step 2. VOLUME CONTROL CHECK.

Action	Response
a. Set CAL: FCTN GEN. FREQ: 1000 Hz (900 to 1100 Hz) LEVEL: 3.4 V p-p (3.2 to 3.6 V p-p). Set FCTN: SINE. Set CAL: OFF. Set STIM SEL: FCTN GEN.	a. A 1-kHz tone is heard over speaker. If not, go to chart 4.
b. Adjust speaker VOL control setting.	b. Volume varies. If not, the speaker case/flexible cable assembly is bad.
c. Set RESP SEL: S1. Set LOAD: 1. Set TEST EQPT SELECTOR: SCOPE. Read scope.	c. Scope CH1 displays a 1-kHz sine wave. If not, go to chart 5. Adjust speaker VOL control setting until scope displays an 800 mV p-p, 1 kHz sine wave. **NOTE** Do not change VOL control setting again until after step 2 l.
d. Set CAL: FCTN GEN. FREQ: 400 Hz (360 to 440 Hz) LEVEL: 3.4 V p-p (3.2 to 3.6 V p-p). Set FCTN: SINE. Set CAL: OFF. Read scope.	d. A 400-Hz tone is heard over speaker. If not, go to chart 6. Scope CH1 displays a 400-Hz sine wave at same amplitude as in step c. If not, the rear cover assembly is bad.

17-9. OPERATIONAL CHECK. Continued

Step 2. VOLUME CONTROL CHECK. Continued

Action	Response
e. Set CAL: FCTN GEN. FREQ: 3 kHz (2700 to 3300 Hz) LEVEL: 3.4 V p-p (3.2 to 3.6 V p-p). Set FCTN: SINE. Set CAL: OFF. Read scope.	e. A 3-kHz tone is heard over speaker. If not, go to chart 7. Scope CH1 displays a 3-kHz sine wave at same amplitude as in step c. If not, the rear cover assembly is bad.
f. Set PTT: UUT.	f. A 3-kHz tone is NOT heard over speaker. If it is, go to chart 8.
g. Set PTT: OFF.	g. No response.
h. Push speaker VOL control in.	h. A 3-kHz tone is NOT heard over speaker. If it is, go to chart 9.
i. Set CAL: FCTN GEN. FREQ: 1000 Hz (900 to 1100 Hz) LEVEL: 4 mV p-p (3 to 5 mV p-p). Set FCTN: SINE. Set CAL: OFF. Set LOAD: OFF. Set STIMULUS: 1. Set RESPONSE: 3. Set RESP SEL: S2. Read scope.	i. Scope CH1 displays a 200 to 800 mV p-p, 1-kHz sine wave. If not, go to chart 10.
j. Set CAL: FCTN GEN. FREQ: 400 Hz (360 to 440 Hz) LEVEL: 4 mV p-p (3 to 5 mV p-p). Set FCTN: SINE. Set CAL: OFF. Read scope.	j. Scope CH1 displays a 200 to 800 mV p-p, 400-Hz sine wave. If not, the rear cover assembly is bad.
k. Set CAL: FCTN GEN. FREQ: 3 kHz (2700 to 3300 Hz) LEVEL: 4 mV p-p (3 to 5 mV p-p). Set FCTN: SINE. Set CAL: OFF. Read scope.	k. Scope CH1 displays a 200 to 800 mV p-p, 3-kHz sine wave. If not, the rear cover assembly is bad.
l. Operational Check is complete.	

17-10. TROUBLESHOOTING.

Troubleshooting is done on a faulty LS-671/VRC. The steps to determine if a LS-671/VRC is faulty and how to troubleshoot it are as follows:

a. **When an LS-671/VRC is received from unit maintenance, inspect it for damage.** Repair any damage before proceeding with testing. See section IV if repairs are necessary.

b. **Verify the symptom.** Perform the operational check found in paragraph 17-9. This will direct you to the correct troubleshooting flowchart or identify the fault.

c. **Troubleshoot the LS-671/VRC using the flowchart.** It will identify the defective module or component.

d. **Replace the defective module or component.** Follow the procedures in section IV.

e. **Verify the repair.** Repeat the operational check in paragraph 17-9 that failed. If it passes, then continue with the rest of the operational check. When the operational check is passed, the LS-671/VRC can be returned for use.

The flowcharts provide views of speaker CCA test points. These test points are used to fault isolate to a defective component. See figure 16-3 for the overall layout of the speaker CCA and test points.

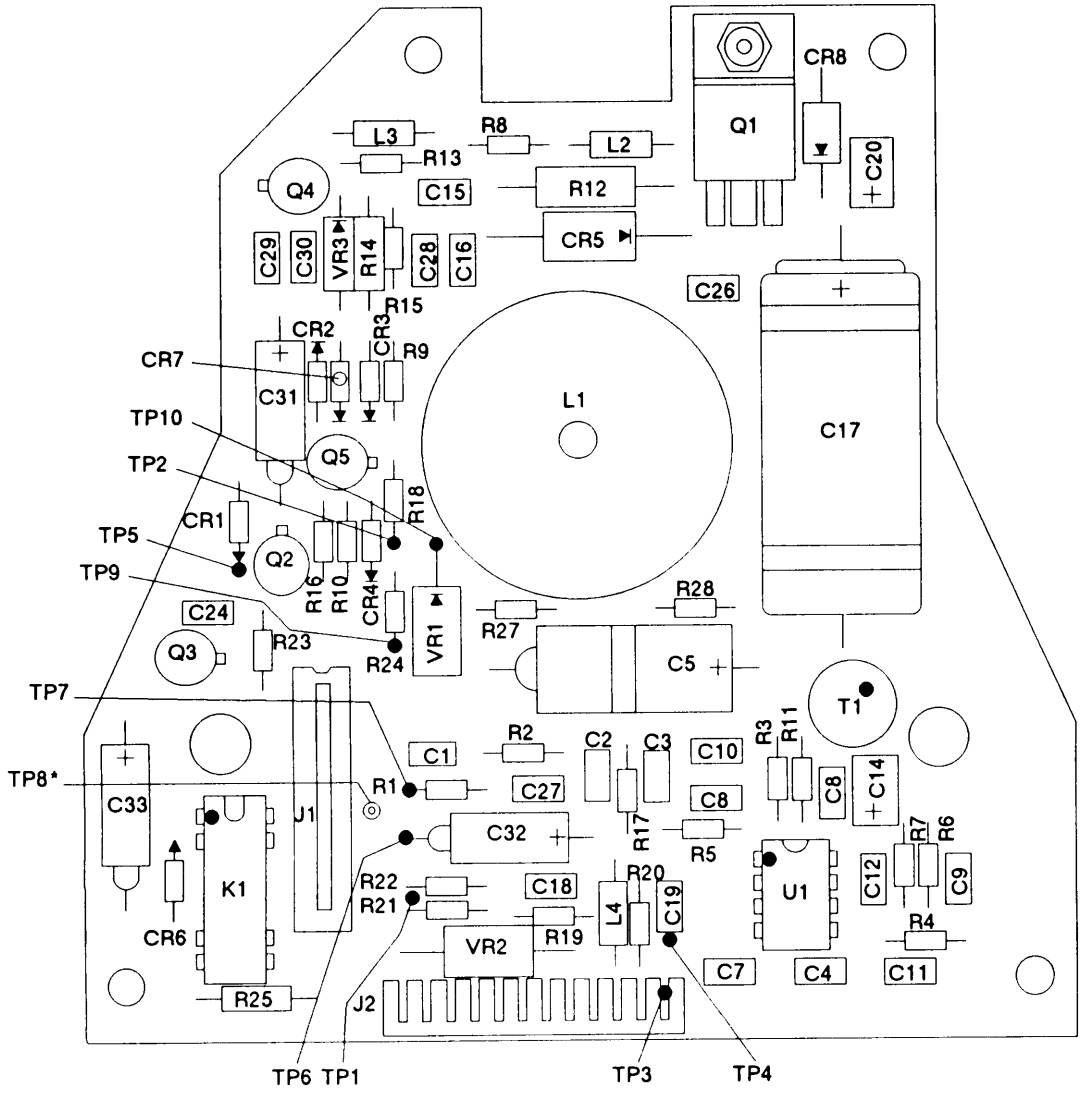
17-11. TEST PRECAUTIONS AND NOTES.

WARNING

Set the test power supply to OFF before connecting or disconnecting a test setup. Current capacities are large enough to cause personal injury. Equipment can also be damaged if care is not taken.

NOTE

The Principles of Operation section, functional block diagrams, and schematic diagram figure FO-30 can be used to help fault isolate any unusual problems that might not be covered in the troubleshooting procedures.



*TP8 IS A THRU HOLE OF THE PC BOARD, NOT A COMPONENT.

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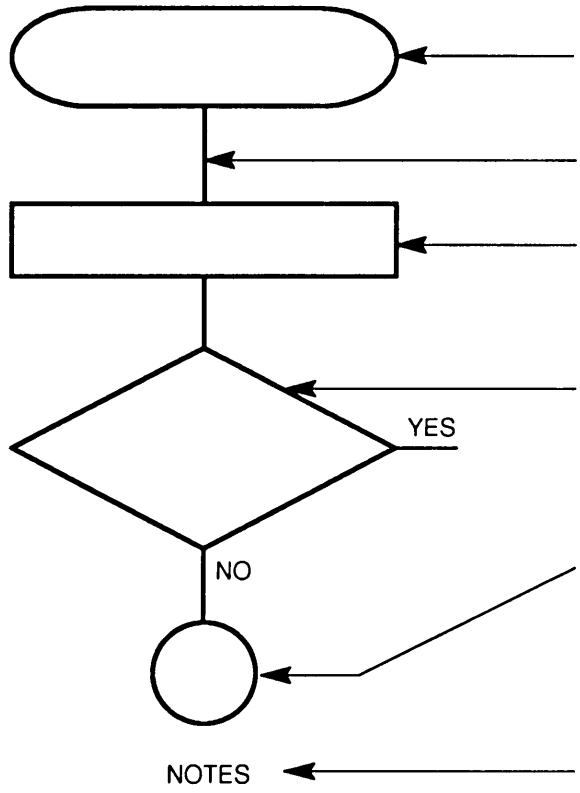
Figure 17-3. Speaker CCA Test Points

17-12. EXPLANATION OF SYMBOLS AND NOTES.

SYMBOL



EXPLANATION

Test Procedure Start: (Rectangle with rounded sides) Indicates start of the test procedure and contains a brief description of the symptom of trouble.

Test Procedure Flow Line: (Heavy line) Indicates direction of the procedure flow.

Test Procedure Instruction: (Rectangle) Provides test setup or instructions for doing a specific test.

Decision: (Diamond) Indicates that a decision must be made (YES or NO) in answer to question about the previous test. Path taken depends on the answer (YES or NO).

Connector: (Circle) Directs user to an entry point of another chart. Contains an entry number that is the same as entry number of other chart and a sheet number (Sh. No.) that indicates the number of follow-on pages,

Notes Column: Presents additional information, such as: more specific instructions about how to do a test, cautions and warnings that must be observed when doing a test, and additional information about what to do after doing a test. Also provides reference to appropriate circuit diagrams.

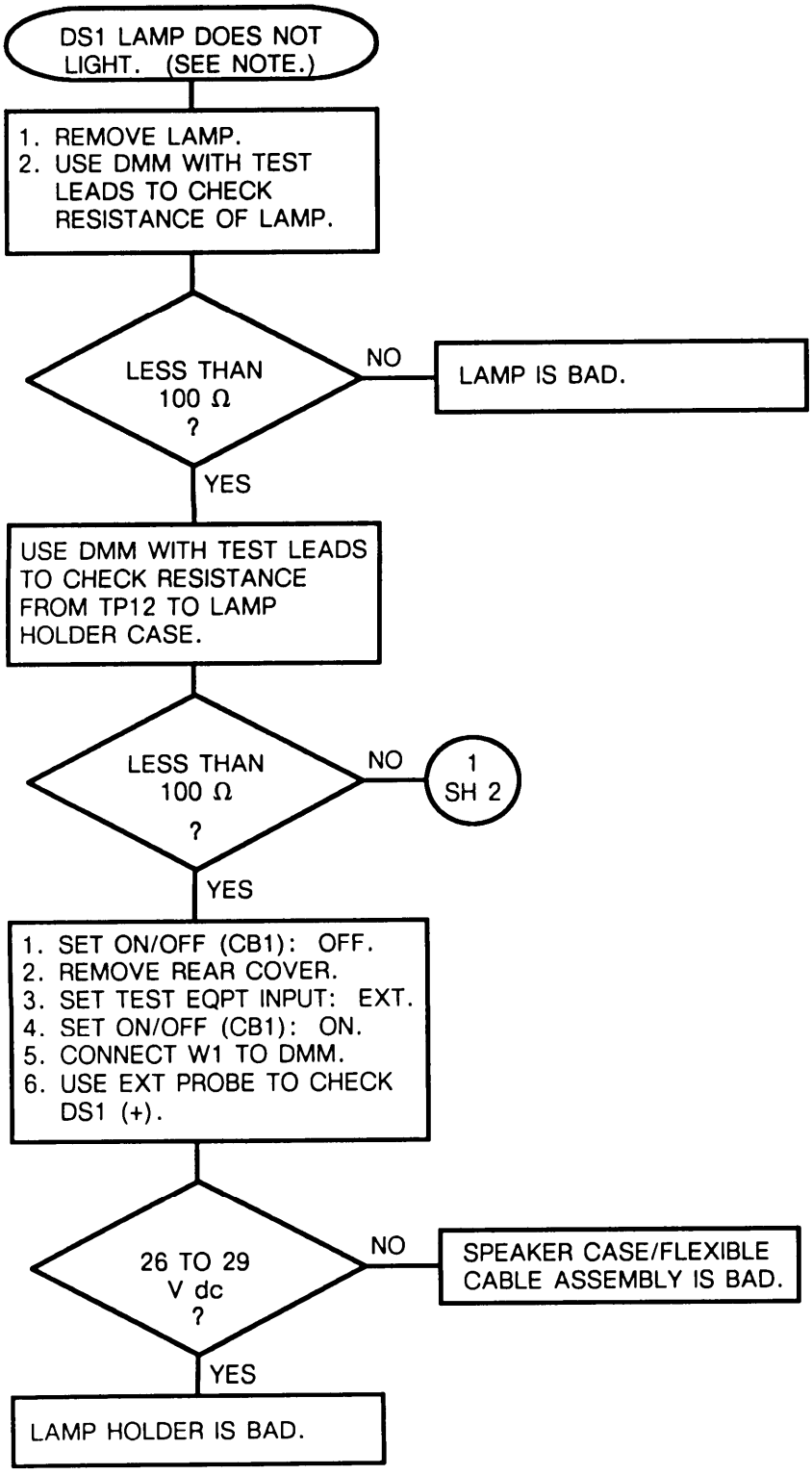
17-13. TROUBLESHOOTING FLOWCHARTS.

The following charts are included:

Chart	Symptom
1	DS1 lamp does not light.
2	ON/OFF switch (CB1) trips.
3	DMM does not read 26 to 29 V dc.
4	No tone is heard over speaker.
5	No RCV audio is at handset connector.
6	400-Hz tone is not heard.
7	3-kHz tone is not heard.
8	Tone is heard over speaker with PTT applied.
9	Tone is heard over speaker with VOL control pushed in.
10	No MIC audio.

17-13. TROUBLESHOOTING FLOWCHARTS. Continued

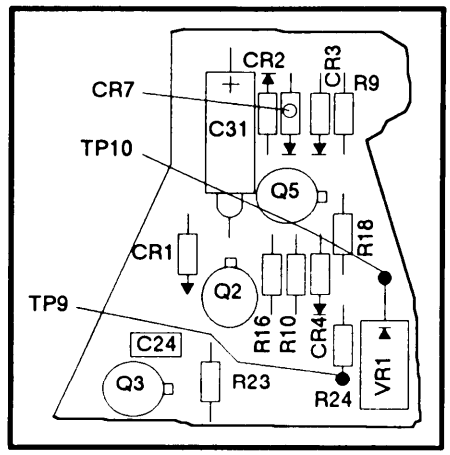
Chart 1
Troubleshooting DS1 POWER Indicator Lamp Circuit
(Sheet 1 of 3)



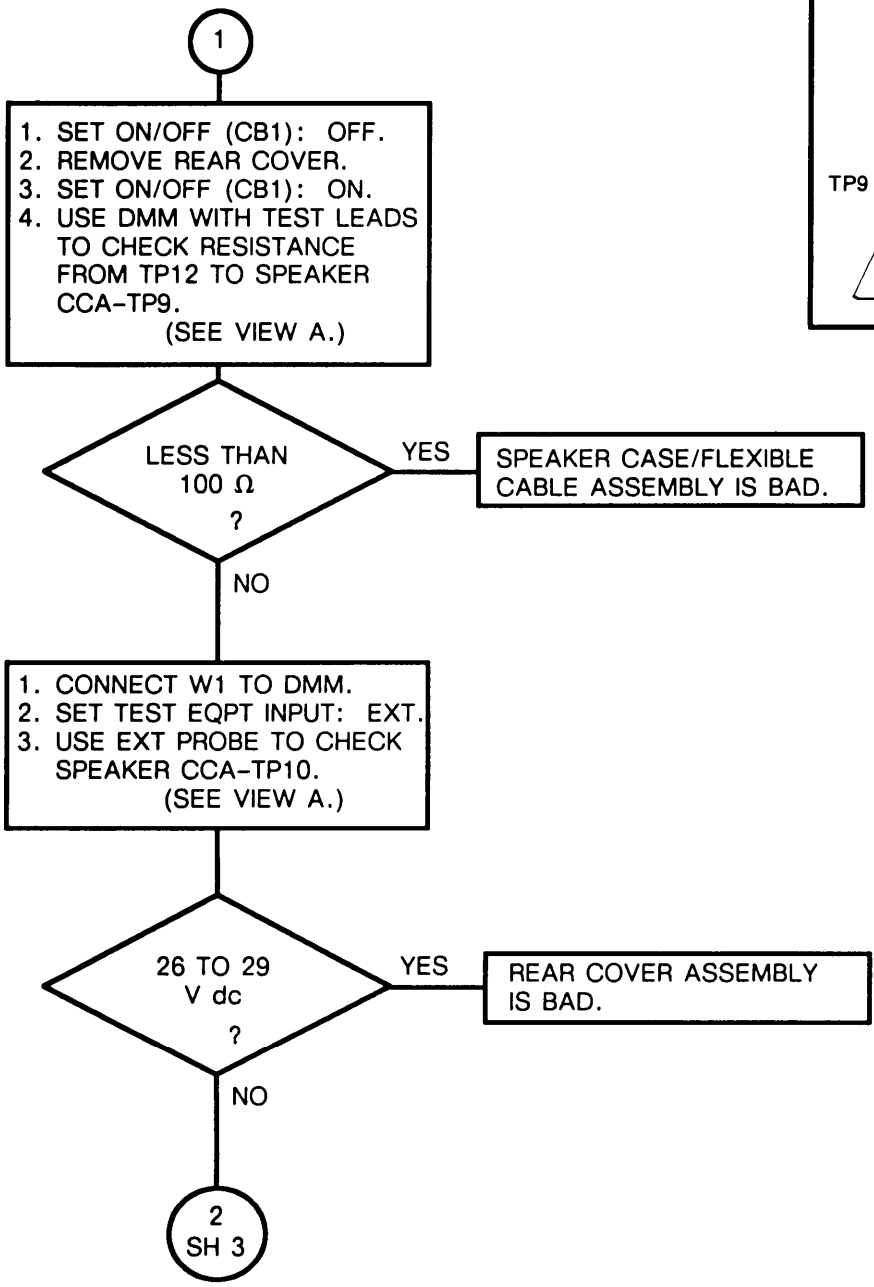
NOTE:
Refer to figure FO-30 for diagram of these circuits.

17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting DS1 POWER Indicator Lamp Circuit
(Sheet 2 of 3)

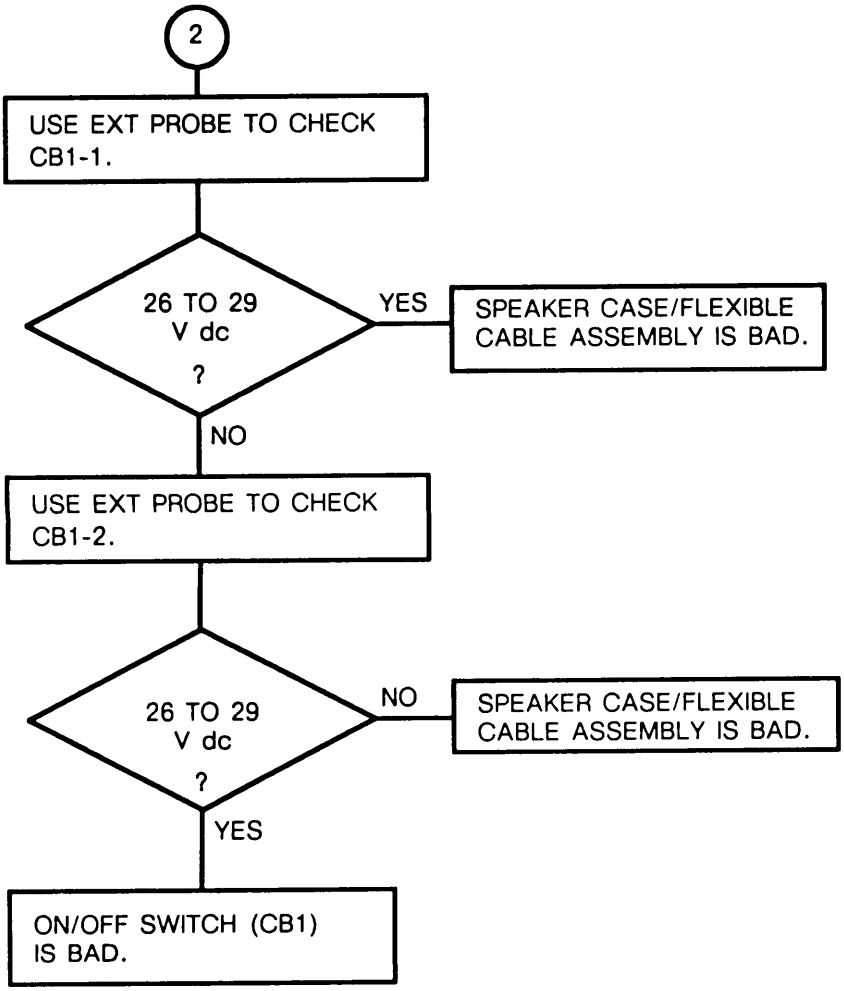


VIEW A



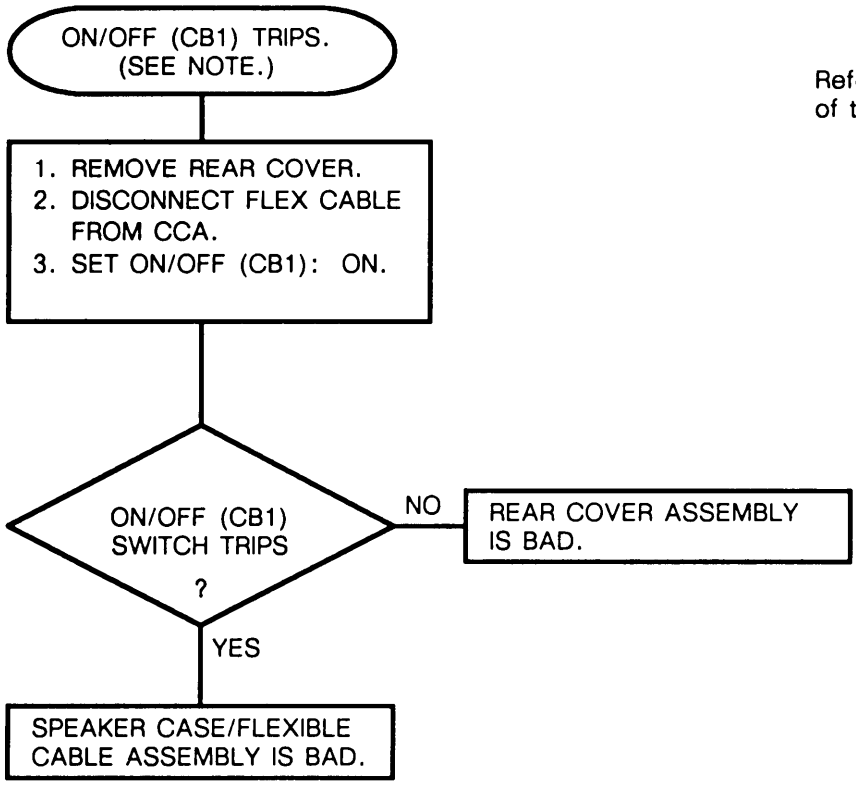
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 1
Troubleshooting DS1 POWER Indicator Lamp Circuit
(Sheet 3 of 3)



17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 2
Troubleshooting ON/OFF Switch (CB1)
(Sheet 1 of 1)

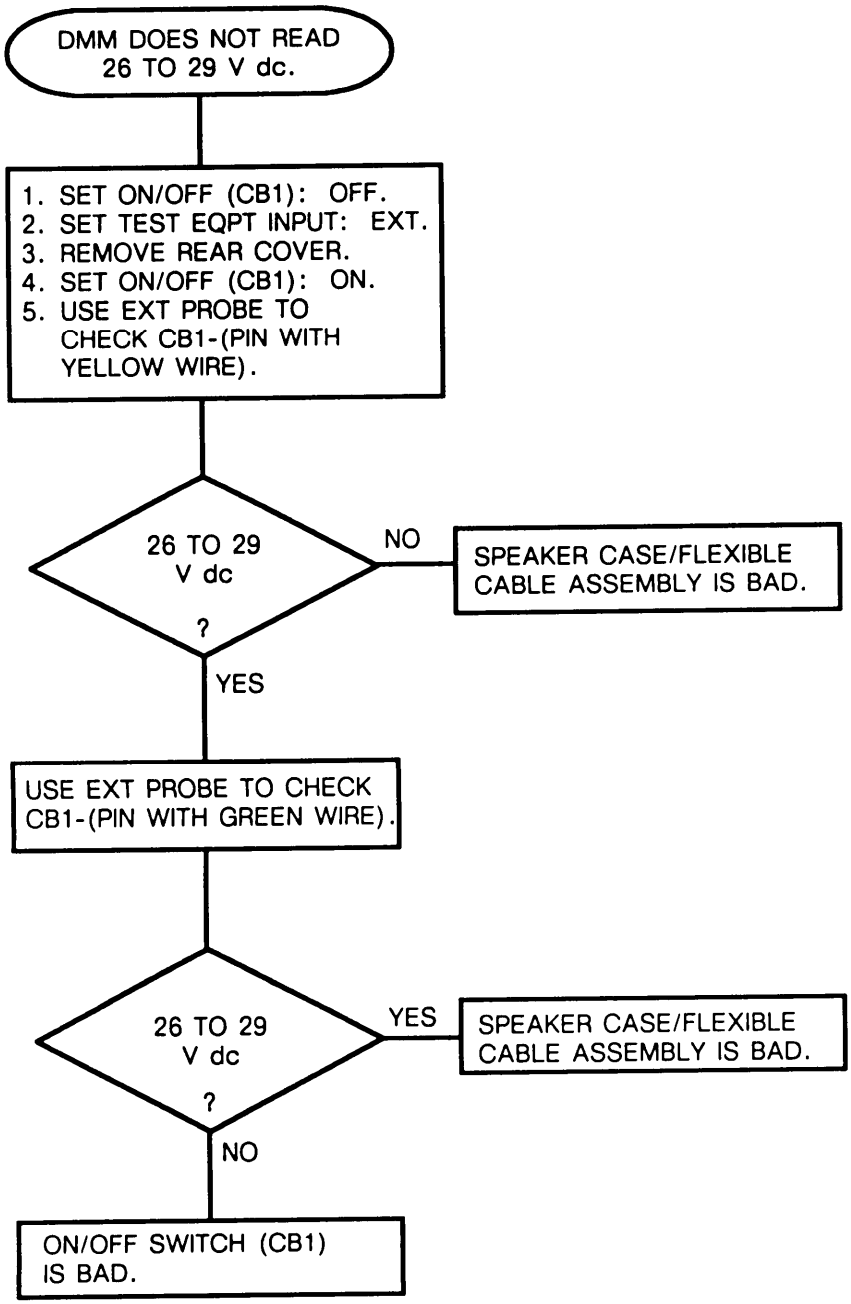


NOTE:

Refer to figure FO-30 for diagram of these circuits.

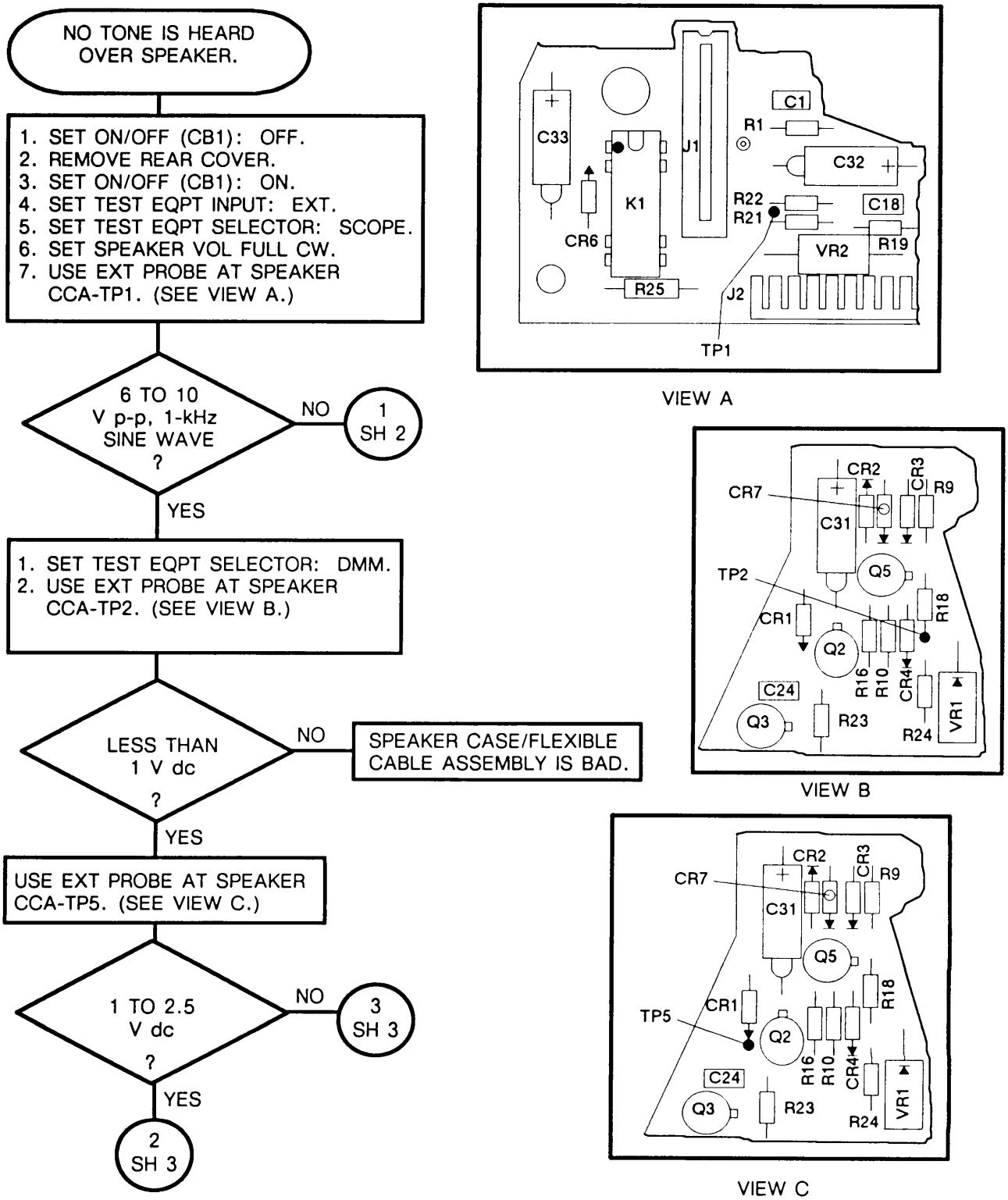
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 3
Troubleshooting SW +27.5 V dc Power Circuit
(Sheet 1 of 1)



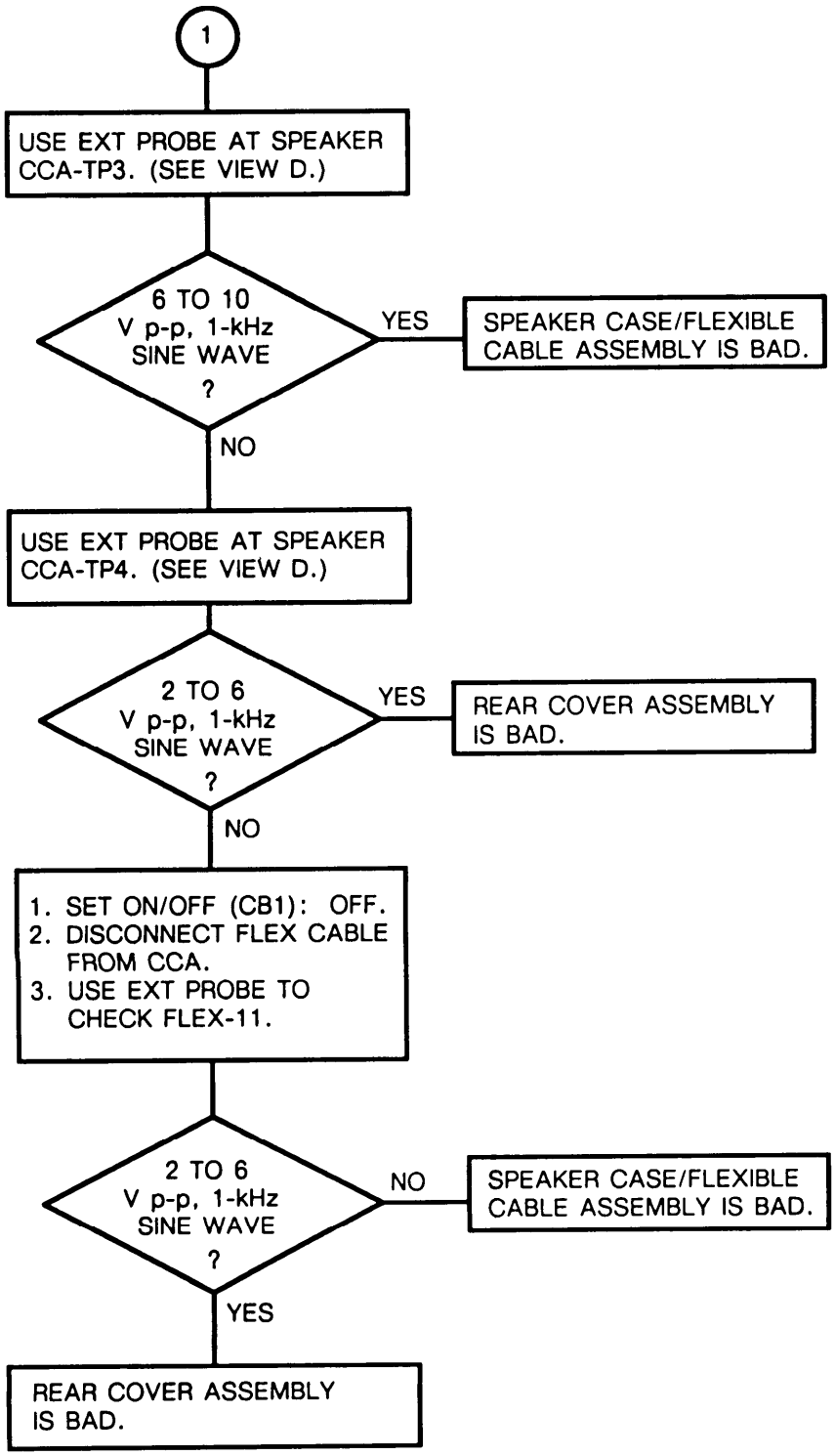
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

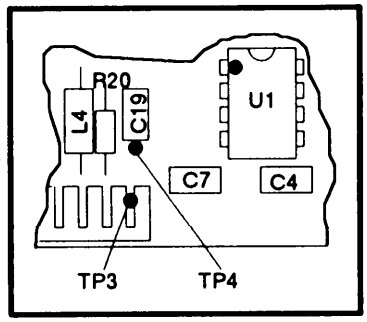
Chart 4
Troubleshooting Speaker Circuit
(Sheet 1 of 3)



17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Speaker Circuit
(Sheet 2 of 3)

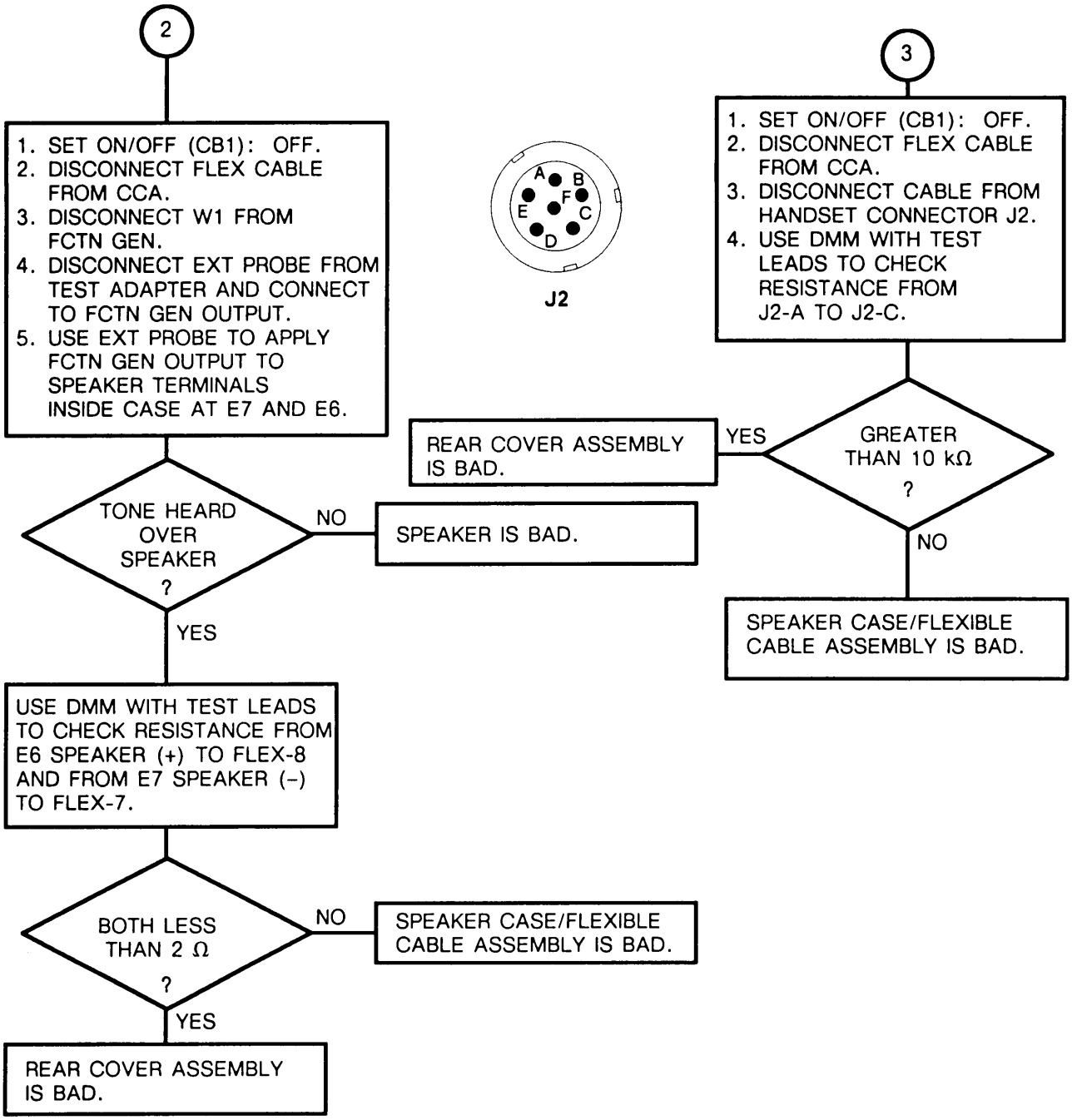




VIEW D

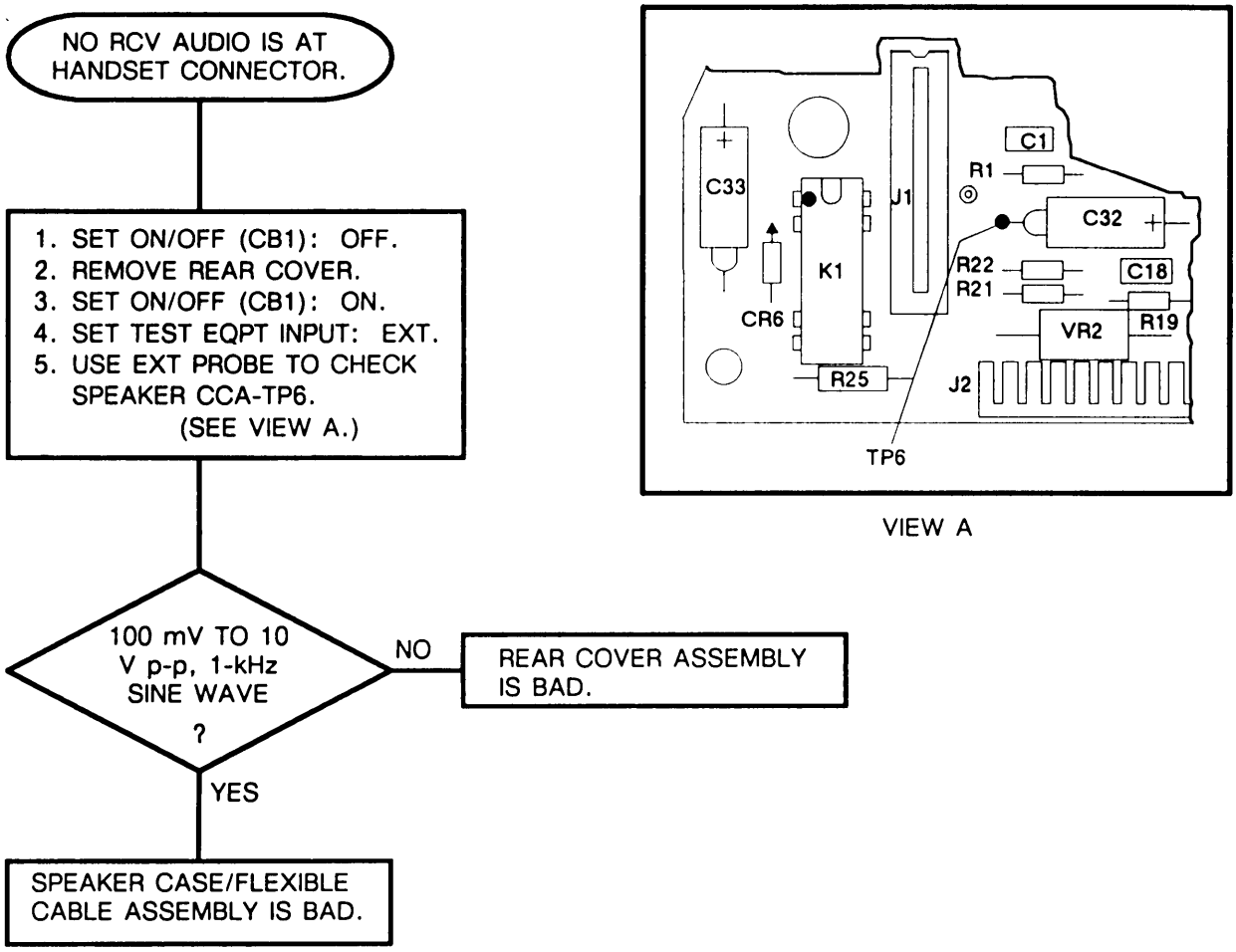
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 4
Troubleshooting Speaker Circuit
(Sheet 3 of 3)



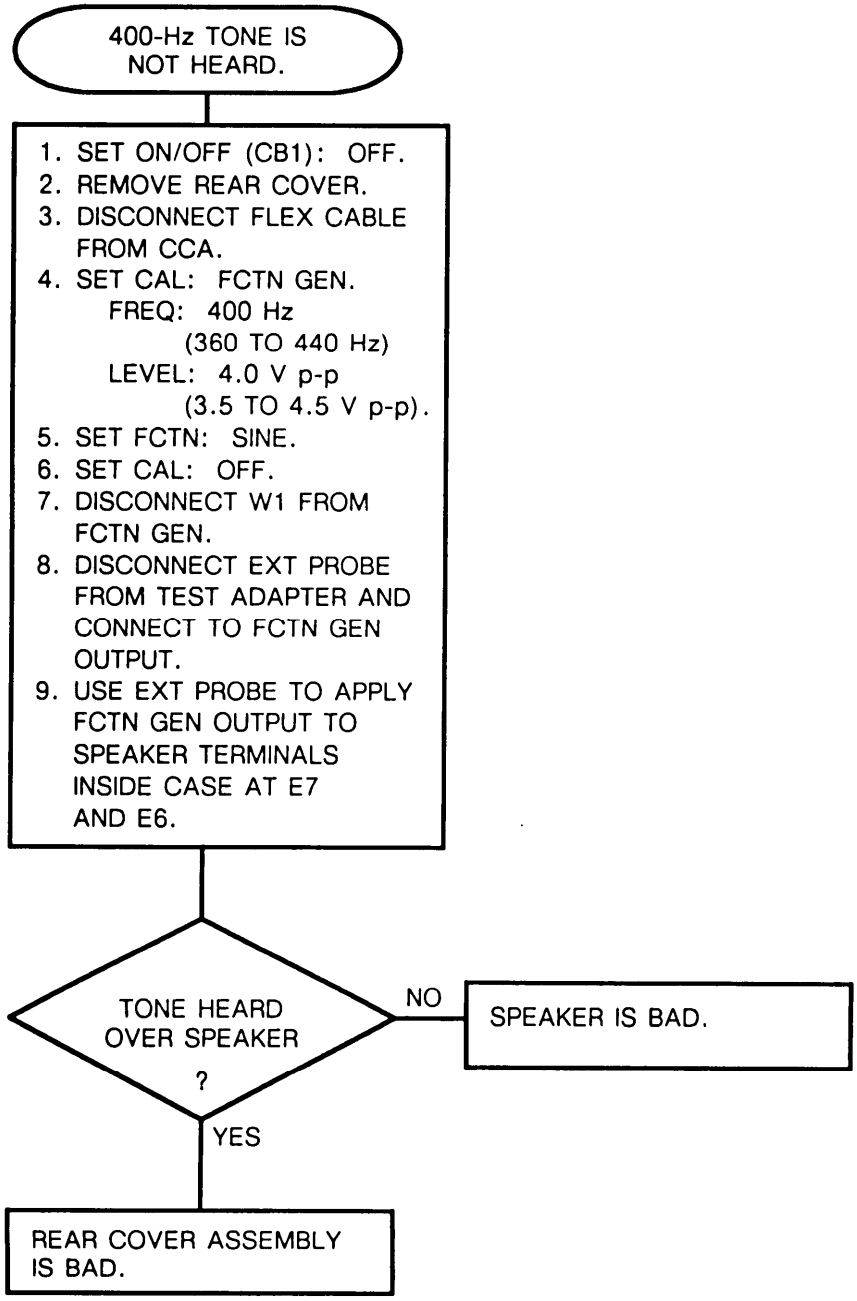
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 5
Troubleshooting Handset Circuitry
(Sheet 1 of 1)



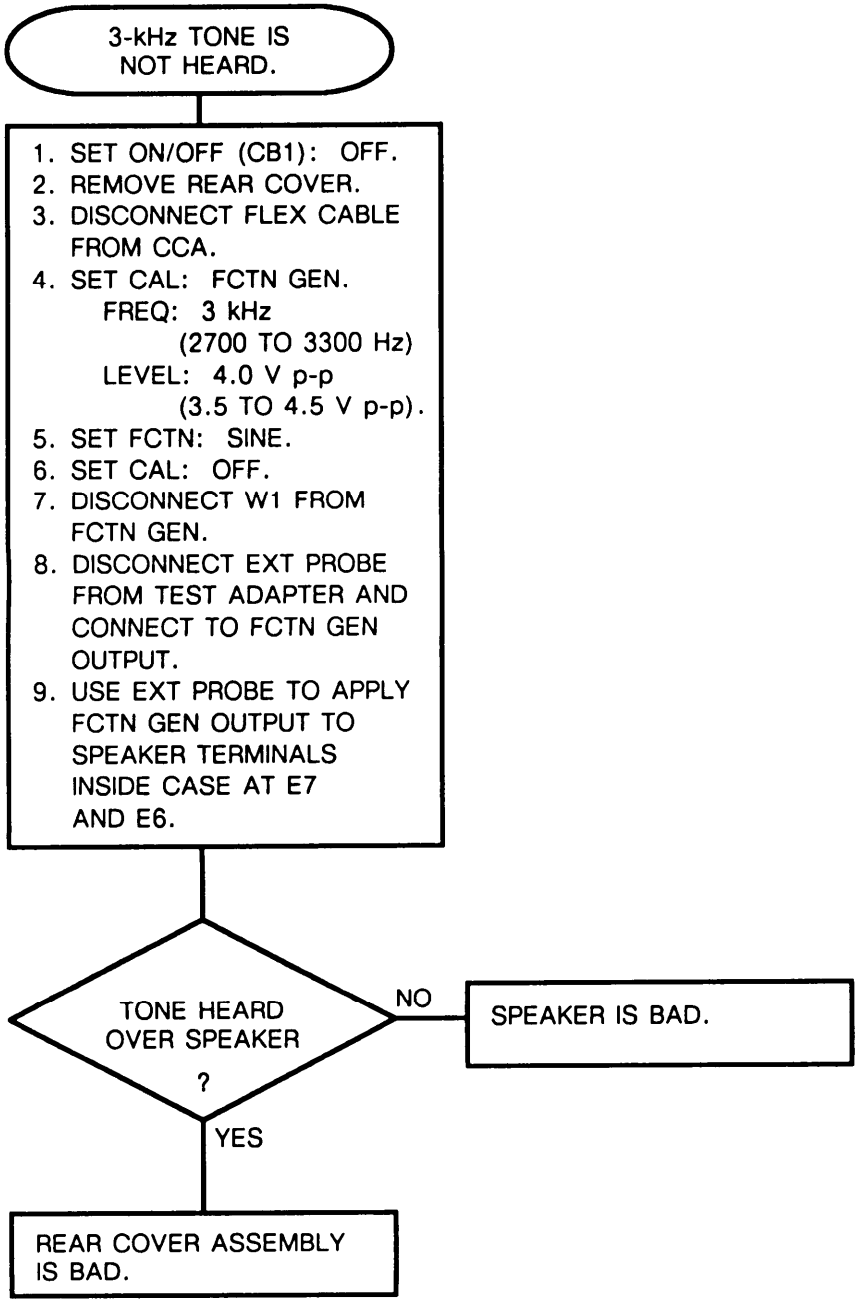
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 6
Troubleshooting Speaker
(Sheet 1 of 1)



17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 7
Troubleshooting Speaker
(Sheet 1 of 1)

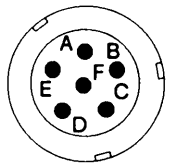


17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 8
Troubleshooting PTT Circuit
(Sheet 1 of 1)

TONE IS HEARD OVER SPEAKER WITH PTT APPLIED.

1. DISCONNECT W8 FROM J2.
2. SET TEST EQPT INPUT: EXT.
3. SET TEST EQPT SELECTOR: DMM.
4. SET LOAD: OFF.
5. USE EXT PROBE TO CHECK J2-C.



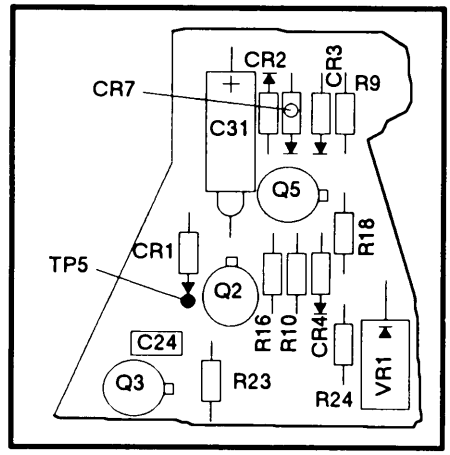
J2

GREATER THAN 1 V dc ?

YES → REAR COVER ASSEMBLY IS BAD.

NO

1. SET ON/OFF (CB1): OFF.
2. REMOVE REAR COVER.
3. SET ON/OFF (CB1): ON.
4. USE EXT PROBE TO CHECK SPEAKER CCA-TP5. (SEE VIEW A.)



VIEW A

GREATER THAN 1 V dc ?

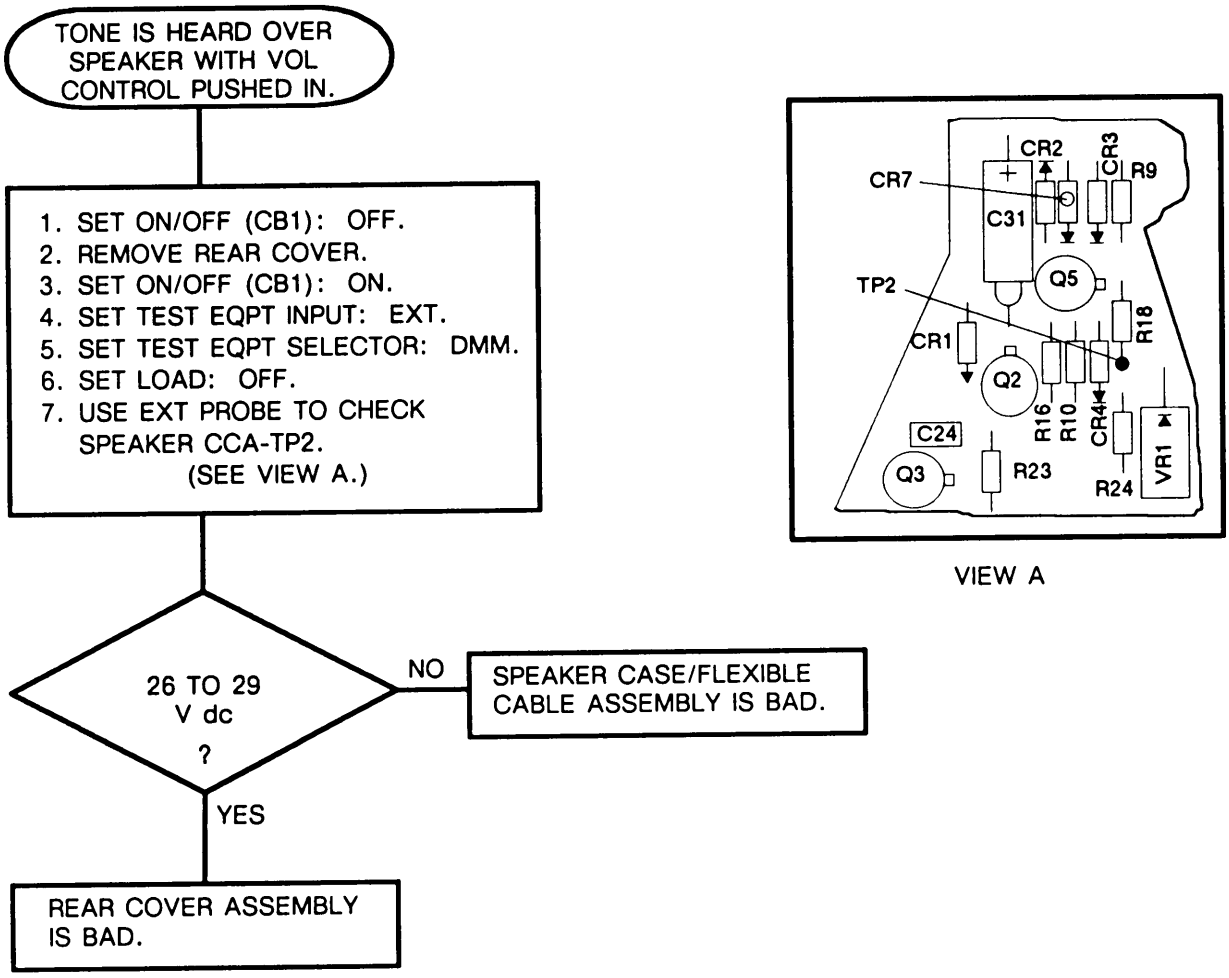
NO → REAR COVER ASSEMBLY IS BAD.

YES

SPEAKER CASE/FLEXIBLE CABLE ASSEMBLY IS BAD.

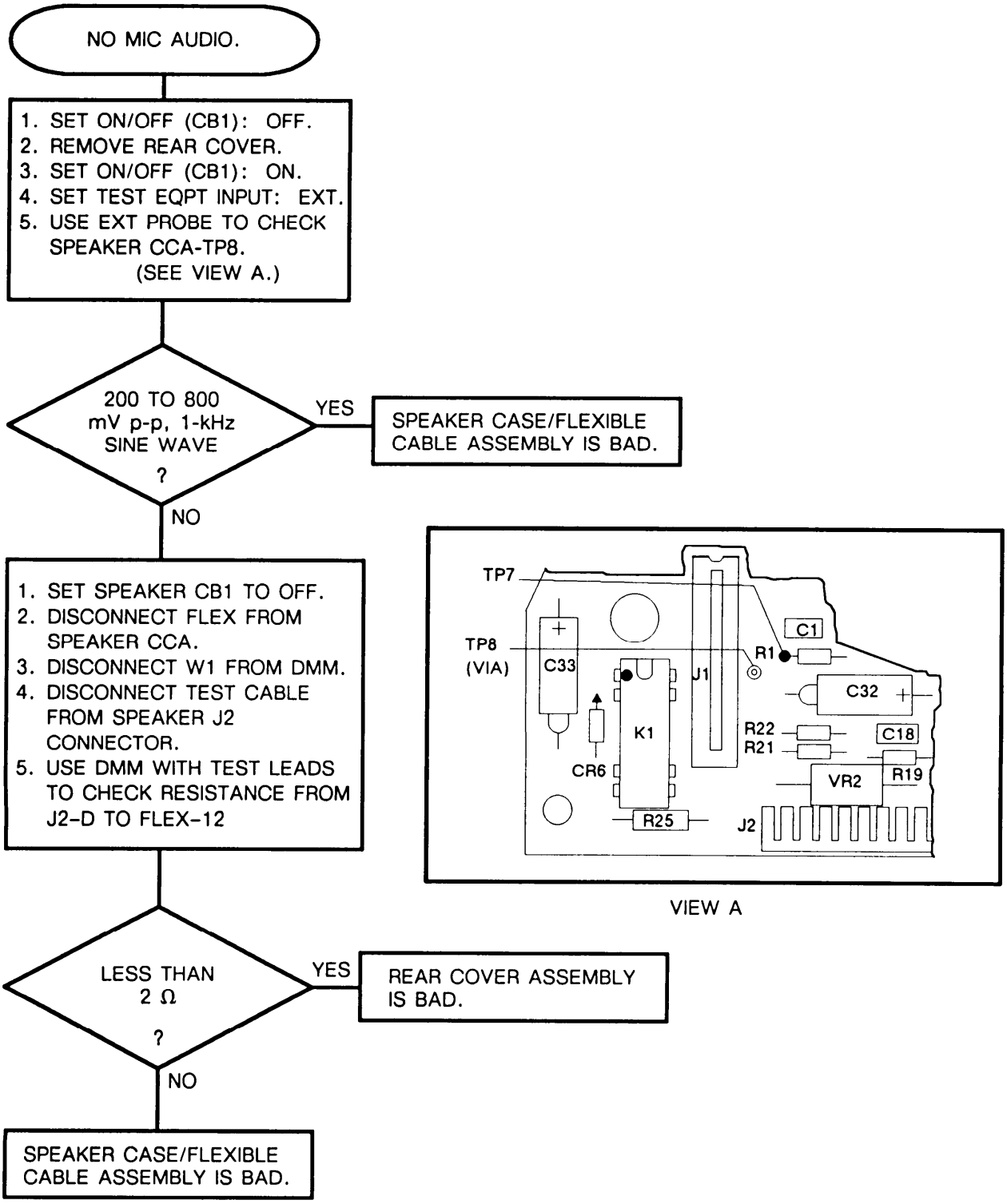
17-13. TROUBLESHOOTING FLOWCHARTS. Continued

Chart 9
Troubleshooting Mute Circuit
(Sheet 1 of 1)



17-13, TROUBLESHOOTING FLOWCHARTS. Continued

Chart 10
Troubleshooting MIC Audio Circuit
(Sheet 1 of 1)



Section IV. MAINTENANCE PROCEDURES

17-14. GENERAL.

This section includes the operational check and the repair procedures. The operational check is used to verify the operation of a repaired LS-671/VRC. It is also used to verify the symptom of a faulty LS-671/VRC. It will identify the troubleshooting chart to be used. When a bad module is identified, replace it using the procedure in this section.

17-15. OPERATIONAL CHECK.

Perform the operational check found in paragraph 17-9 to verify proper operation of the LS-671/VRC.

17-16. REPAIR INSTRUCTIONS.

The following instructions apply to all repair tasks unless otherwise noted in the procedure.

a. Begin procedure with the LS-671/VRC ON/OFF switch (CB1) set to OFF.

b. Disconnect any external cables connected to the LS-671/VRC.

c. lnspect the LS-671/VRC. Replace the LS-671/VRC case/flexible cable assembly, if the LS-671/VRC is physically damaged, such as with a broken connector.

CAUTION

Steps marked with HCP must be performed exactly as written. They are critical in maintaining the nuclear hardness of the LS-671/VRC. Seals must not be damaged. All screws must be torqued to the limits specified in the replacement procedures.

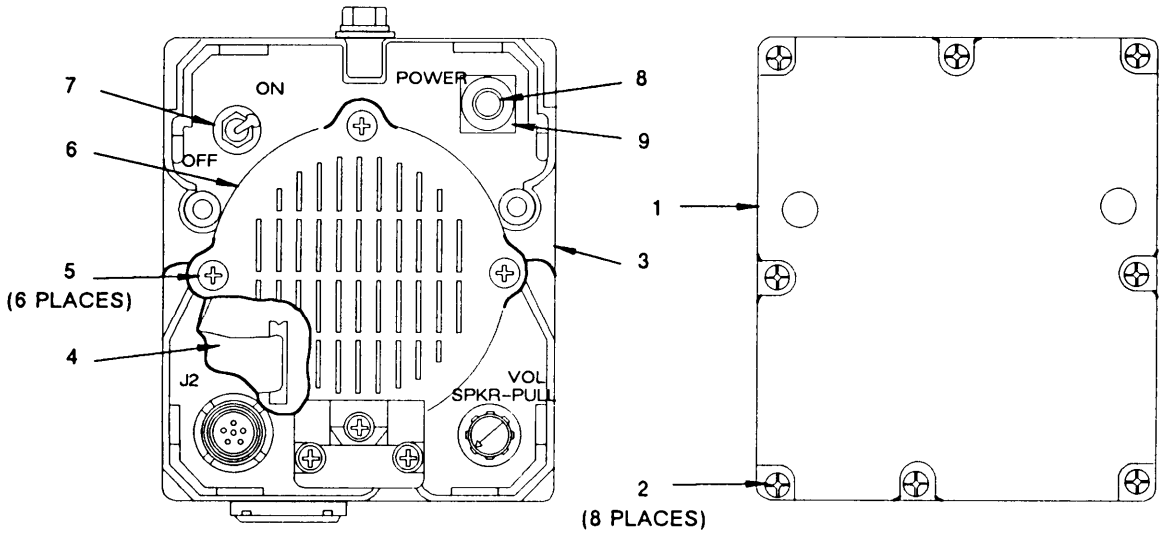
d. The LS-671/VRC must be tested after replacement of a module or component.

17-17. REPLACEMENT OF REAR COVER ASSEMBLY (15A1).

Tools:

Cross tip screwdriver Torque screwdriver

ITEM	ACTION	REMARKS
REMOVAL		
a. LS-671/VRC	Set upside down on work surface with bottom connector (J1) toward you.	See figure 17-4.
b. Eight screws and flat washers (2)	Using cross tip screwdriver, remove and retain eight screws and flat washers securing rear cover assembly (1) to case (3).	
c. Flexible cable (4)	Turn rear cover assembly over. Lift up on outside of flexible cable connector mounted on LS-671/VRC CCA and remove flexible cable (4) (shown in the cutout area of front view) from LS-671/VRC CCA connector.	
d. Rear cover assembly (1)	Remove and discard defective rear cover assembly.	



EL7XL1680

Figure 17-4. Loudspeaker-Control Unit LS-671/VRC (Front and Rear Views).

17-17. REPLACEMENT OF REAR COVER ASSEMBLY (15A1). Continued

ITEM	ACTION	REMARKS
INSTALLATION		
e. Rear cover assembly (1)	Obtain replacement rear cover assembly.	
f. Flexible cable (4)	Align and install flexible cable in LS-671/VRC CCA connector and push down on outside of connector to secure flexible cable. Turn rear cover assembly over and aline on case (3).	
g. HCP Eight screws and flat washers (2)	Using cross tip screwdriver, install and hand tighten eight retained screws and flat washers securing rear cover assembly (1) to case (3). Using torque screwdriver, torque screws to 15 in-lb.	

17-18. REPLACEMENT OF CASE/FLEXIBLE CABLE ASSEMBLY.

Tools:

Cross tip screwdriver | Soldering kit | 1/16-inch alien wrench
Torque screwdriver

Expendable Supplies:

Solder | Cotton swabs | Alcohol

References:

Paragraph 17-17 for removal and installation of the rear cover assembly (15A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Rear cover assembly (1)	Remove and retain rear cover assembly.	Refer to paragraph 17-17 for rear cover assembly removal instructions.
b. Six screws, flat washers (5), and speaker cover (6)	Using cross tip screwdriver, remove and retain six screws and flat washers securing speaker cover (6) to case (3). Remove and retain speaker cover.	See figure 17-4.

17-18. REPLACEMENT OF CASE/FLEXIBLE CABLE ASSEMBLY. Continued

ITEM	ACTION	REMARKS
REMOVAL Continued		
c. Two speaker terminals	Tag wire locations on speaker terminals. Using soldering kit, desolder tagged wires from speaker terminals.	See figure 17-4
d. Case/flexible cable assembly (3 and 4)	Remove and discard defective case/flexible cable assembly.	
e. Set screw	Using 1/16 allen wrench, loosen set screw securing knob to VOL switch.	
f. VOL knob	Remove and retain VOL knob.	
g. Lens and lamp	Remove and retain lens and lamp from lampholder.	
INSTALLATION		
h. Case/flexible cable assembly (3 and 4)	Obtain replacement case/flexible cable assembly.	
i. VOL knob	Position VOL knob on VOL switch, aligning knob set screw with flat surface.	**NOTE** VOL control knob shaft must be pressed in before installing knob.
j. Set screw	Using 1/16 allen wrench, tighten set screw securing knob to VOL switch.	
k. Lens and lamp	Install retained lens and lamp in lampholder.	
l. Two speaker terminals	Using soldering kit, attach and solder tagged wires to correct speaker terminal, and remove tags.	Before and after soldering, clean wires and speaker terminals with alcohol and cotton swabs.
m. Loudspeaker and speaker cover (6)	Install retained loudspeaker and speaker cover (6) in replacement case.	
n. Six screws and flat washers (5)	Using cross tip screwdriver, install and tighten six retained screws and flat washers securing loudspeaker and speaker cover (6) in replacement case (3).	
o. HCP Rear cover assembly (1)	Install retained rear cover assembly.	Refer to paragraph 17-17 for rear cover assembly installation instructions.

17-19. REPLACEMENT OF LOUDSPEAKER.

Tools:

Cross tip screwdriver
Soldering kit

Expendable Supplies:

Solder
Cotton swabs
Alcohol

ITEM	ACTION	REMARKS
REMOVAL		
a. LS-671/VRC	Set on work surface with bottom connector (J1) toward you.	See figure 17-4.
b. Six screws, flat washers (5), and speaker cover (6)	Using cross tip screwdriver, remove and retain six screws and flat washers securing speaker cover (6) to case (3).	
c. Speaker cover (6)	Remove and retain speaker cover.	
d. Loudspeaker	Lift the loudspeaker (6) out of case, and turn over.	
e. Two speaker terminals	Tag wire locations on speaker terminals. Using soldering kit, desolder tagged wires from speaker terminals.	
f. Loudspeaker	Remove and discard defective loudspeaker.	
INSTALLATION		
g. Loudspeaker	Obtain replacement loudspeaker.	
h. Two speaker terminals	Using soldering kit, attach and solder tagged wires to correct speaker terminals, and remove tags.	Before and after soldering, clean wires and speaker terminals with alcohol and cotton swabs.
i. Loudspeaker	Install the replacement loudspeaker in retained case (3).	
j. Speaker cover (6)	Install retained speaker cover on retained case (3).	
k. Six screws and flat washers (5)	Using cross tip screwdriver, install and tighten six retained screws and flat washers securing loudspeaker and speaker cover (6) to case (3).	

17-20. REPLACEMENT OF ON/OFF SWITCH (CB1).

Tools:

Cross tip screwdriver	1/2-inch combination wrench	Torque wrench
Torque screwdriver	Soldering kit	1/2-inch socket
Needle nose pliers		

Expendable Supplies:

Solder	Cotton swabs	Alcohol

References:

Paragraph 17-17 for removal and installation of the rear cover assembly (15A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Rear cover assembly (1)	Remove and retain rear cover assembly.	Refer to paragraph 17-17 for rear cover assembly removal instructions. See figure 17-4.
b. ON/OFF switch (CB1) (7) terminals	Tag the wire locations on CB1 terminals. Using soldering kit, desolder tagged wires from CB1 terminals.	
c. ON/OFF switch (CB1) (7), hex nut, switch plate, and lock ring	Using 1/2-inch combination wrench, remove and discard hex nut, switch plate, and lock ring securing CB1 to case (3).	Replacement nut, plate and locking ring is supplied with replacement CB1.
d. ON/OFF switch (CB1) (7)	Remove and discard defective ON/OFF switch (CB1) (7).	
INSTALLATION		
e. ON/OFF switch (CB1) (7)	Obtain replacement ON/OFF switch (CB1).	
f. HCP ON/OFF switch (CB1) (7), hex nut, switch plate, and lock ring	Using 1/2-inch combination wrench, install and hand tighten replacement hex nut, switch plate, and lock ring securing CB1 to case (3). Using torque wrench and 1/2-inch socket, torque nut to 10 in-lb.	
g. ON/OFF switch (CB1) (7) terminals	Using soldering equipment and needle nose pliers, attach and solder tagged wires to correct CB1 terminals, and remove wire tags.	Before and after soldering, clean wires and switch terminals with alcohol and cotton swabs.
h. HCP Rear cover assembly (1)	Install retained rear cover assembly.	Refer to paragraph 17-17 for rear cover assembly installation instructions.

17-21. REPLACEMENT OF POWER LAMP HOLDER (DS1).

Tools:

Cross tip screwdriver	9/16-inch wrench	Torque wrench
Torque screwdriver	Soldering kit	9/16-inch socket

Expendable Supplies:

Solder	Cotton swabs	Alcohol

References:

Paragraph 17-17 for removal and installation of the rear cover assembly (15A1).

ITEM	ACTION	REMARKS
REMOVAL		
a. Rear cover assembly (1)	Remove and retain rear cover assembly.	Refer to paragraph 17-17 for rear cover assembly removal instructions. See figure 17-4.
b. Light lens and lamp (8)	Remove and inspect light lens and lamp for damage. If damaged, obtain replacement.	
c. POWER lamp holder (DS1) (9) leads	Tag wire locations on lamp holder leads. Using soldering kit, desolder tagged wires from lamp holder leads.	
d. POWER lamp holder (9), hex nut, and lockwasher	Using 9/16-inch wrench, remove and discard hex nut and lockwasher securing lamp holder to case (3).	Replacement nut and lockwasher is supplied with replacement lamp holder.
e. POWER lamp holder (9)	Remove and discard defective lamp holder.	
INSTALLATION		
f. POWER lamp holder (9)	Obtain replacement lamp holder.	
g. HCP POWER lamp holder (9), hex nut, and lockwasher	Using 9/16-inch wrench, install and hand tighten hex nut and lockwasher securing lamp holder to case (3). Using torque wrench and 9/16-inch socket, torque nut to 15 in-lb.	
h. POWER lamp holder (9) leads	Using soldering kit, attach and solder tagged wires to correct lamp holder leads, and remove wire tags.	Before and after soldering, clean wires and lamp holder leads with alcohol and cotton swabs.
i. Light lens and lamp (8)	Install and tighten retained light lens and lamp in lamp holder.	
j. HCP Rear cover assembly (1)	Install retained rear cover assembly.	Refer to paragraph 17-17 for rear cover assembly installation instructions.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

17-22. GENERAL INFORMATION.

Pack the LS-671/VRC and any removed modules in approved shipping containers.

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CHAPTER 18

FILL DEVICE, ECCM MX-10579/VRC AND MX-18290/VRC MAINTENANCE INSTRUCTIONS

Section I. PRINCIPLES OF OPERATION

18-1. INTRODUCTION.

The Electronic Counter-Countermeasures (ECCM) Fill Device, MX-10579/VRC and MX-18290/VRC, are used to hold and transfer ECCM fill data. It can hold hopsets, lockout sets, and transec variables.

18-2. OPERATING AND UNIT MAINTENANCE INSTRUCTIONS.

The operating instructions for the fill device are found in TM 11-5820-890-10-3. Unit maintenance instructions are found in TM 11-5820-890-20-2.

Section II. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

18-3. COMMON TOOLS AND EQUIPMENT.

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

18-4. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

For the TMDE and support equipment required for DS, see the maintenance allocation chart. It is Appendix B in TM 11-5820-890-20-2.

18-5. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list (TM 11-5820-890-30P-3) covering direct support maintenance for this equipment.

Section III. TROUBLESHOOTING PROCEDURES

18-6. GENERAL.

This section provides an operational check to verify if an MX-18290/VRC is defective. Defective fill devices are sent to general support for repair.

18-7. OPERATIONAL CHECK.

The operational check provides a step-by-step procedure for evaluating an MX-10579/VRC or MX-18290/VRC. If the operational check is passed, the MX-10579/VRC or MX-18290/VRC can be returned to service. If it does not pass the check, the MX-10579/VRC or MX-18290/VRC shall be considered bad.

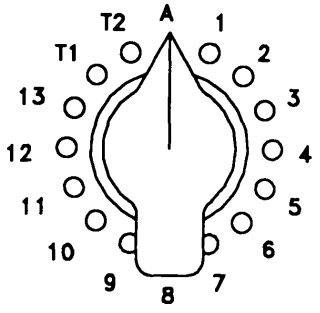
The operational check is divided into steps. Each step verifies a particular function. Follow the instruction in the “Action” column. Check the response. If the response is correct, proceed with the next lettered step. When a Step has been completed, proceed with the next Step. A "No response" in the "Response" column means that any response is not of interest. If a test response is incorrect, check the equipment settings and the test setup cabling.

Connect equipment as shown in figure 18-1 to perform the operational check of the MX-10579/VRC or MX-18290/VRC.

18-7. OPERATIONAL CHECK. Continued

Step 1. LOADING FILL DEVICE FROM ANOTHER FILL DEVICE.

Action	Response
a. Set both fill device FUNCTION switches to OFF.	a. No response.
b. Connect both fill devices together. Two methods are shown in figure 18-1. A fill cable does not have to be used but is preferred. The fill devices may be directly connected from connector J1 to connector P1. (See illustrations.)	b. No response.
c. Set both fill device FUNCTION switches to ON.	c. No response.
d. On fill device having data, set the SELECT switch to the position of the desired fill data. If all positions are to be transferred, set to A.	d. No response.
e. On fill device to be filled, set the SELECT switch to position to be filled. If all positions are to be filled, set to A.	e. No response.
f. Watch CHECK lights on fill devices. On the fill device to be filled, press the INITIATE switch.	f. The CHECK lights blink when data is transferred.
g. Record data identification number on side panel of fill device that has been filled.	g. No response.
h. Repeat steps d thru g for each position to be filled.	h. See responses for steps d thru g.
i. Set fill device FUNCTION switch to OFF and disconnect fill devices.	i. No response.

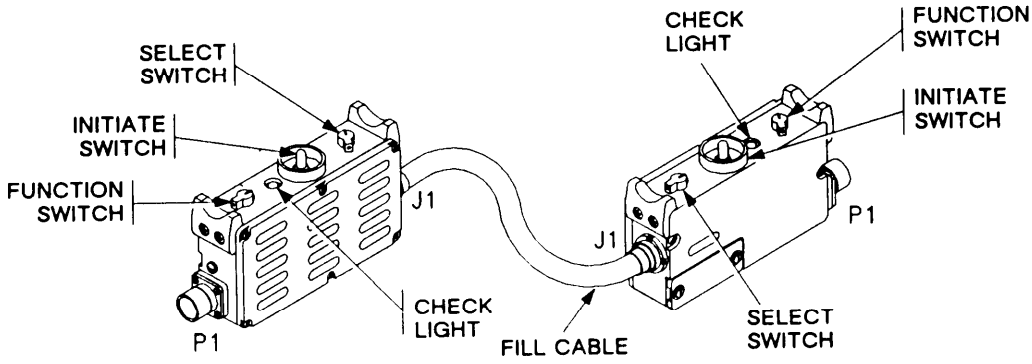


SELECT SWITCH

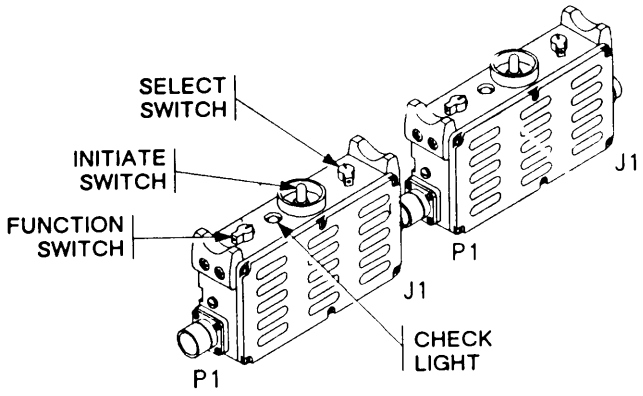
18-7. OPERATIONAL CHECK. Continued

NOTE

An ECCM fill device is used to load FH data into the RT. There are 15 labels on the side of the fill device that list information about the data that is stored in the fill device memory. Each label represents a position where the data is stored. Specific data is selected by setting the fill device SELECT switch to the label position of the desired data.



Fill Device Connected to Fill Device (Using Fill Cable)

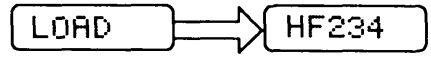
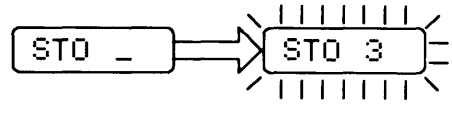


Fill Device Connected Directly to Fill Device (Without Using Fill Cable)

Figure 18-1. MX-10579/VRC or MX-18290/VRC Test Setup.

18-7. OPERATIONAL CHECK. Continued

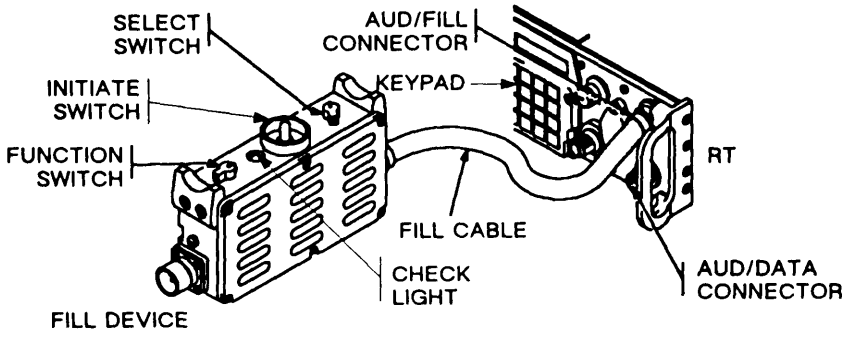
Step 2. LOADING FH DATA (LOCAL FILL) INTO RT (RECEIVER-TRANSMITTER).

Action	Response
a. Prepare RT for operation.	a. Make sure that the fill device is loaded. If the fill device needs to be filled, see Step 1 on page 17-3.
b. Set fill device FUNCTION switch to OFF position.	b. No response.
c. Connect fill device connector J1 to RT AUD/FILL connector using fill cable, as shown in figure 18-2.	c. No response.
d. Set RT FCTN switch to LD, set MODE switch to FH, and set CHAN switch to position where FH data is to be loaded.	d. No response.
e. Set fill device FUNCTION switch to ON, and set SELECT switch to position containing FH data.	e. No response.
f. Press LOAD key and then STO key on RT keypad.	f. RT display will cycle as shown, and a beep is heard. 
g. Press number button of channel in which data is to be stored.	g. RT display blinks and “STO” is shown, followed by the channel number in which the data was stored. 
h. Set fill device FUNCTION switch to OFF, and disconnect fill device and fill cable from RT.	h. No response.
i. Operational Check is complete.	

18-7. OPERATIONAL CHECK. Continued

CAUTION

Always use a fill cable to connect fill device to the RT. Equipment damage may result if a fill cable is not used.



Fill Device Connected to RT (Using Fill Cable)

Figure 18-2. RT Test Setup.

18-8. TROUBLESHOOTING.

Troubleshooting consists of performing the operational check found in paragraph 18-7. If the MX-10579/VRC or MX-18290/VRC is bad, then ship it to general support for repair.

Section IV. MAINTENANCE PROCEDURES

18-9. GENERAL.

Maintenance consists of identifying a defective MX-18290/VRC.

18-10. OPERATIONAL CHECK.

Perform the operational check found in paragraph 18-7 to verify proper operation of the fill device.

18-11. REPAIR INSTRUCTIONS.

All repairs are performed at general support.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

18-12. GENERAL INFORMATION.

Pack the fill device in approved shipping containers.

APPENDIX A
REFERENCES

SCOPE

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publication references in this manual.

FORMS

DA Form 2028	Recommended Changes to Publications and Blank Forms.
DA Form 2028-2	Recommended Changes to Equipment Technical Publications.
SF 361	Discrepancy in Shipment Report (DISREP).
SF 368	Product Quality Deficiency Report (ROD).

FIELD MANUAL

FM 21-11	Artificial Respiration.
TM 750-244-2	Map Reading.

TECHNICAL MANUAL

TM 11-5820-890 -10-4	Department of the Army Technical Manual (Pocket Size): Radio Sets AN/PRC-119, AN/VRC-87, AN/VRC-88, AN/ VRC-89, AN/VRC-90, AN/VRC-91, and AN/VRC-92.
TM 11-5820-890-10-3	Department of the Army Technical Manual: Radio Sets AN/PRC-119, AN/VRC-87, AN/VRC-88, AN/ VRC-89, AN/VRC-90, AN/VRC-91, and AN/VRC-92.
TM 11-5820-890 -20-2	Department of the Army Unit Maintenance Technical Manual: Radio Sets AN/PRC-119, AN/VRC-87, AN/VRC-88, AN/ VRC-89, AN/VRC-90, AN/VRC-91, and AN/VRC-92.
TM 11-5820-890-20P	Department of the Army Unit Maintenance Repair Parts and Special Tools Lists: Radio Sets AN/PRC-119, AN/VRC-87, AN/VRC-88, AN/ VRC-89, AN/VRC-90, AN/VRC-91, and AN/VRC-92.
TM 11-5820-890-30P-3	Department of the Army Unit and Direct Support Maintenance Repair Parts and Special Tools Lists: Radio Sets AN/PRC-119, AN/VRC-87, AN/VRC-88, AN/ VRC-89, AN/VRC-90, AN/VRC-91, and AN/VRC-92.
TM 750-244-2	Procedure for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

REFERENCES Continued

MISCELLANEOUS PUBLICATIONS

AMDF	(AR 708-1) IAW Packaging Segment of AMDF by NSN.
AR 735-244-2	Reporting of Item and Packaging Discrepancies.
DA Pam 25-30	Consolidated Index of Army Publications and Blank Forms.
DA Pam 738-750	The Army Maintenance Management System (TAMMS).
SB 11-624	Warning Notice for Vehicles in Which Radios are Mounted.

APPENDIX B
TORQUE REQUIREMENTS

B-1. GENERAL INFORMATION.

Proper tightening of all threaded fasteners is an essential part of equipment maintenance. Not tightening enough can allow:

Components to come loose.
Water, dirt, or other substances to enter unit.
Unwanted RF energy to enter and possibly damage unit.
RF energy to escape unit and possibly compromise security.

Trying to tighten a screw or nut too much can strip threads. Do not return equipments for use that have stripped or missing screws or nuts.

B-2. TORQUE REQUIREMENTS.

Unless stated otherwise in an assembly procedure, all screws and nuts should be torqued as follows:

Metric Screw (Thread) Size	Torque (in-lb)
M2.2 X 0.45	6
M3.0 X 0.50	12
M4.0 X 0.70	20

Metric Nut Size	Torque (in-lb)
M8.0 X 1.25	30

English (Thread Diameter)	Torque (in-lb)
1/4	12
3/8	20
1/2	30
5/8	50
3/4	60
7/8	70
1-1/16	80
1-1/8	90
1-1/4	100

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS FOR MAINTENANCE GROUP OA-9263A/GRC

Section I. INTRODUCTION

C-1 . SCOPE.

This appendix lists components of end item and basic issue items for Maintenance Group OA-9263A/GRC 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 List for maintenance Group OA-9263A/GRC.** 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. The list is divided into sublistings for each maintenance group. Illustrations are furnished to assist you in identifying the items.

b. Section III. Components of End Item List for Interconnecting Device J-4501/GRC. Same as **a** for Interconnecting Device J-4501/GRC.

c. **Section IV. Components of End Item List for Tool Kit, Electronic Equipment A3018715-1.** Same as **a** for Parts Kit, Electronic Equipment A3018715-1.

d. **Section V. Components of End Item List for Parts Kit, Electronic Equipment A3018712-1.** Same as **a** for Parts Kit, Electronic Equipment A3018712-1.

e. **Section VI. Basic Issue Items.** These are the minimum essential items required to place the maintenance group in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, B11 must be with the maintenance group during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items, This manual is your authority to request/requisition replacement B11, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS.

The following explains the columns found in the tabular listings.

a. **Column (1), Illustration Number (Illus No).** This column indicates the number of the illustration showing the item.

b. **Column (2), National Stock Number.** This column indicates the national stock number assigned to the item and will be used for requisitioning purposes.

c. **Column (3), Description.** This column 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).** This column 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 Reqd).** This column indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM LIST FOR MAINTENANCE GROUP OA-9263A/GRC

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
see figure C-1				
1	5895-01-188-8819	Amplifier-Adapter, Vehicular AM-7239/VRC (80063) A3013365-1	ea	1
2	5975-01-188-8873	Mounting Base, Electrical Equipment MT-6352/VRC (80063) A3013367-1	ea	1
3	5820-01-200-9688	Interconnecting Device J-4501/GRC (80063) A3018713-1	ea	1
4	5895-01-188-8816	Fill Device, Electronic Counter-Countermeasures MX-10579/VRC (80063) A3013375-1	ea	1
5		Manual, Technical TM 11-5820-890-30-3	ea	1
6		Adapter, Test - Antenna Base A3142124-1	ea	1
7		Receiver-Transmitter, Radio RT-1439/VRC (60063) A3013354-1	ea	1
8		Wiring Harness, Branched-Adapter, Power Supply - W14 A3142119-1	ea	1
9		Wiring harness, Branched-Battery Charger - W15 A3142121-1	ea	1
10		Wiring Harness - Loudspeaker Control Unit - W16 A3142123-1	ea	1

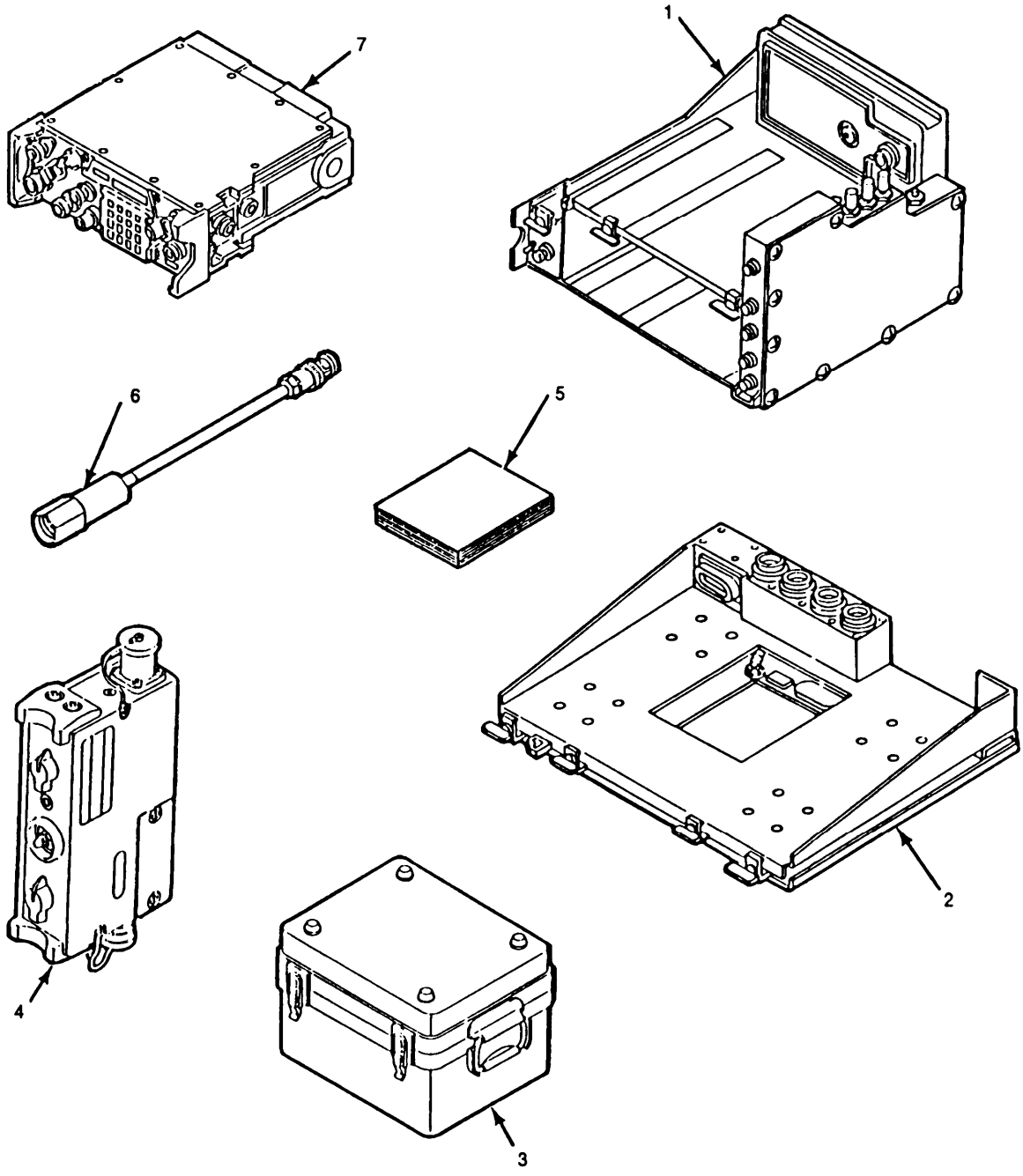


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Figure C-1. Maintenance Group OA-9263A/GRC (Sheet 1 of 2)

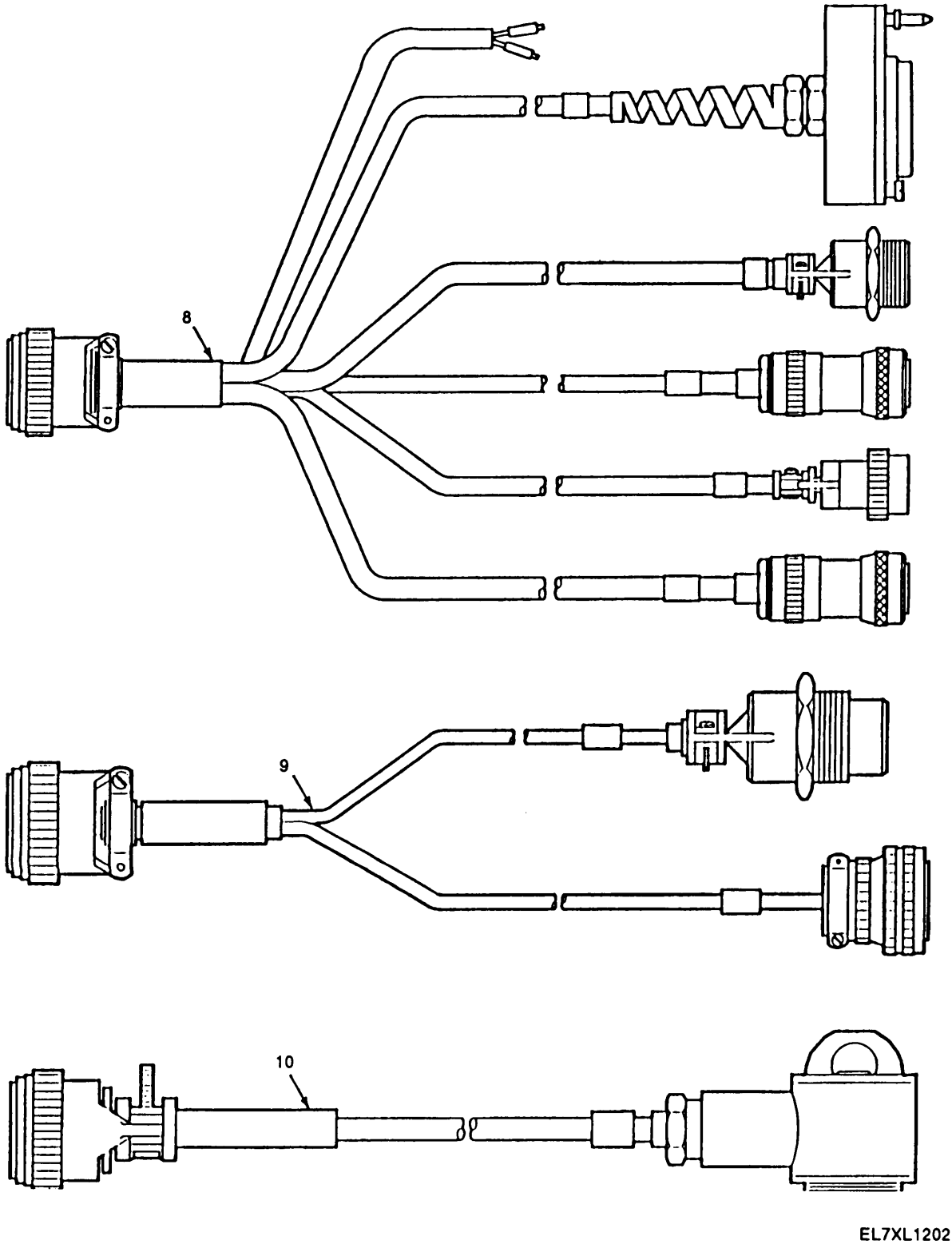


Figure C-1. Maintenance Group OA-9263A/GRC (Sheet 2 of 2)

Section III. COMPONENTS OF END ITEM LIST FOR INTERCONNECTING DEVICE J-4501/GRC

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
See figure C-2				
1		Manual, Technical, 11-5820-890-30-3	ea	1
2		Manual, Technical, 11-5820-890-30P	ea	1
3	5965-00-043-3463	Handset H-250 A/U (80058) H-250 A/U	ea	1
4		Strap, Wrist, Grounding, Small (80063) A3013062-1	ea	1
5		Strap, Wrist, Grounding, Large (80063) A3013062-2	ea	1
6	5985-01-202-0280	Attenuator 20 dB 100 watts A3018693-1	ea	1
7		Attenuator 3 dB 100 watts A301 8693-2	ea	1
8	5895-01-261-2913	Tablerunner, Static Control (80063) A3014484-1	ea	1
9		Chest, Tool and Equipment Kit (80063) A3013163-4	ea	1
10		Tool Kit, Electronbic Equipment (80063) A3018715-1	ea	1
11		Parts Kit, Electronic Equipment (80063) A3018712-1	ea	1
12		Adapter, Test (80063) A3018710-1	ea	1
13		Wiring Harness, Branched - Battery Box (80063) A3018659-1, (W11)	ea	1
14		Wiring Harness, Branched - Amplifier-Adapter with RT (80063) A3018654-1, (W10)	ea	1
15		Wiring Harness, Branched - Auxilary RFPA (80063) A3018660-1, (W9)	ea	1
16		Cable Assy, Special Purpose, Electrical (80063) A3132893-1, Audio (W8)	ea	1
17		Cable Assy, Special Purpose, Electrical (80063) A3019154-1, Control-Monitor (W4)	ea	1
18		Wiring Harness, Branched - Amplifier-Adapter (80063) A3018656-1, (W5)	ea	2

Section III. COMPONENTS OF END ITEM LIST FOR INTERCONNECTING DEVICE J-4501/GRC (Continued)

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
See figure C-2				
19		Wiring Harness, RFPA (80083) A3018855-1, (W7)	ea	1
20		Cable Assy, Special Purpose, Electrical (80063) A3019153-1, RFPA Adapter (W3)	ea	1
21		Wiring Harness, Branched - Control-Monitor (80063) A3018657-1, (WS)	ea	1
22		Wiring Harness, Branched - Receiver-Transmitter (80063) A3018658-1, (W2)	ea	1
23	5995-00-889-1253	Cable Assy, Power, Electrical CX-4720/VRC (12 FT) (80058) CX-4720/VRC-12 FT	ea	1
24		Cable Assy, Radio Frequency (80063) A3013902-4, (W1)	ea	11
25		Cable Assy, Power, Electrical (80063) A3016774-1, (W12)	ea	1
26		Cable Assy, Special Purpose, Electrical (80063) A3132893-2, (W13)	ea	1

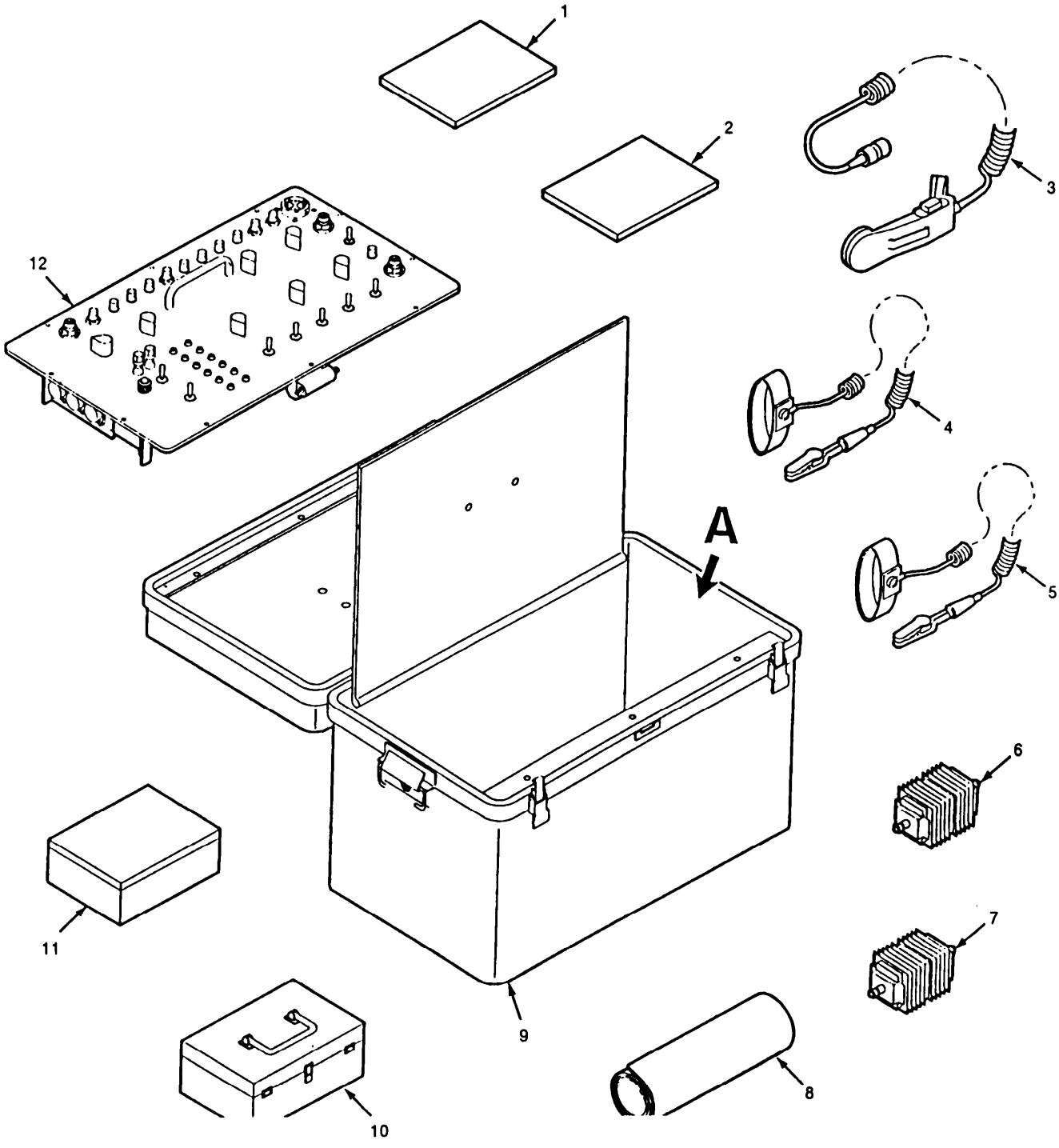


Figure C-2. Interconnecting Device J-4501/GRC (Sheet 1 of 5)

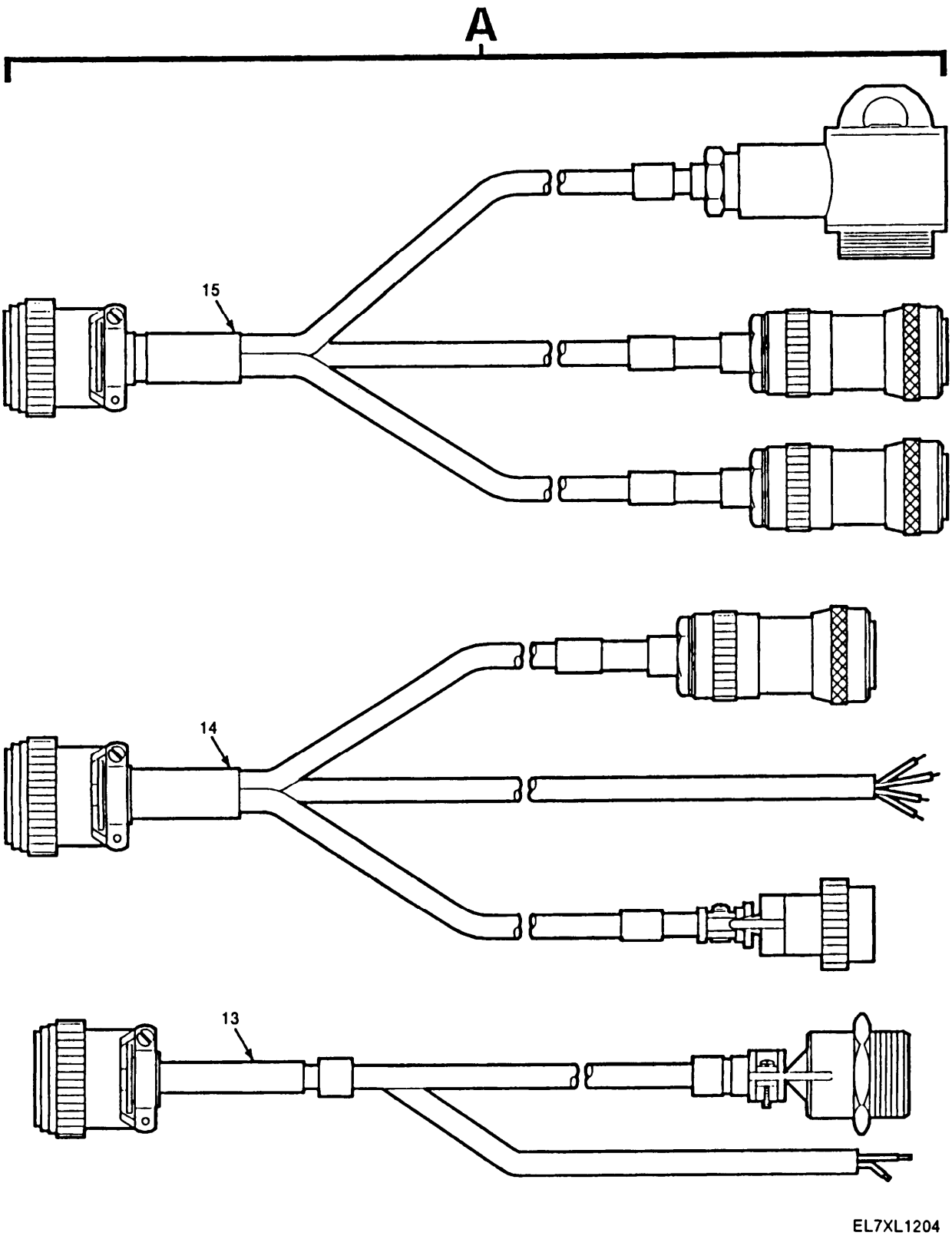


Figure C-2. Interconnecting Device J-4501/GRC (Sheet 2 of 5)

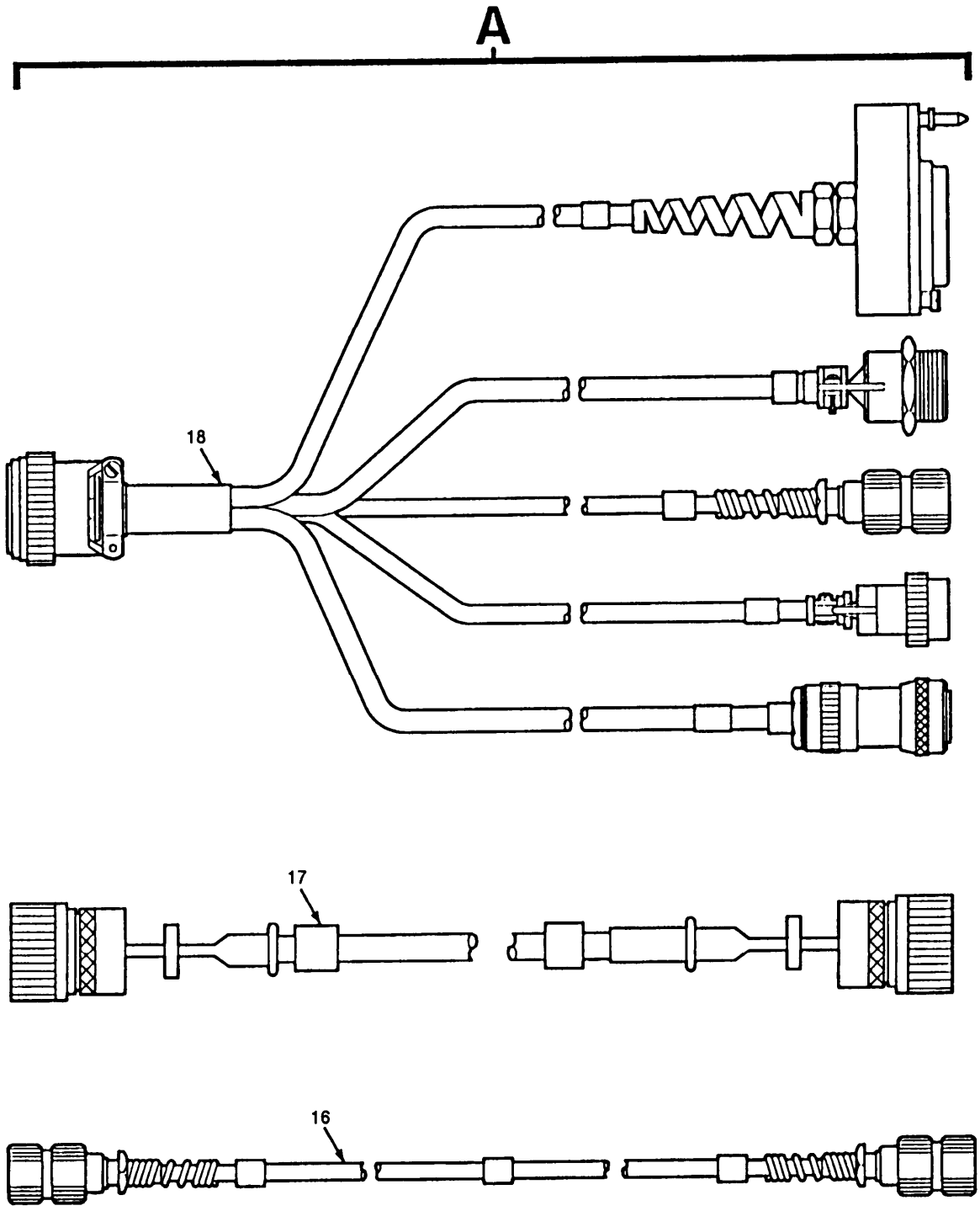


Figure C-2. Interconnecting Device J-4501/GRC (Sheet 3 of 5)

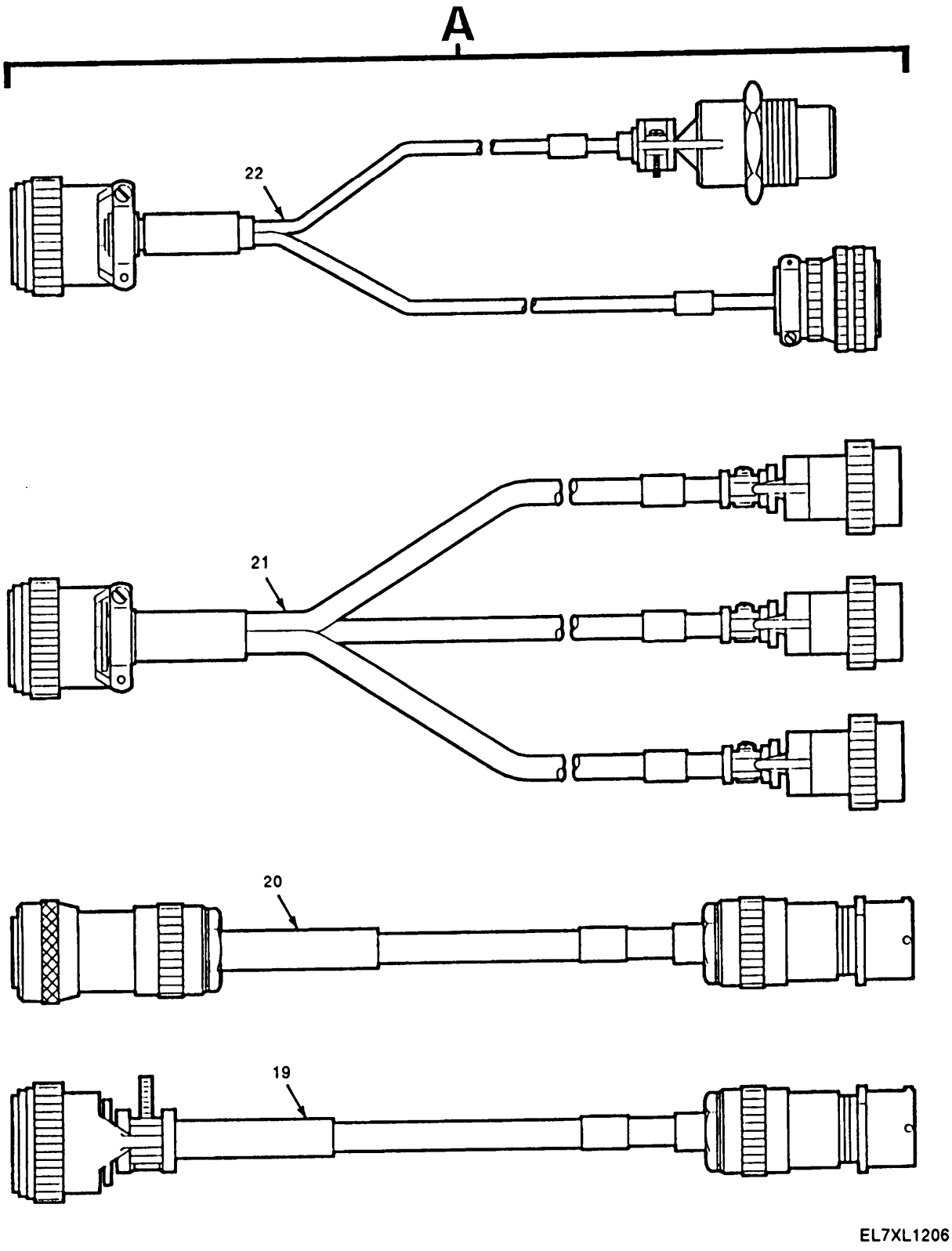


Figure C-2. Interconnecting Device J-4501/GRC (Sheet 4 of 5)

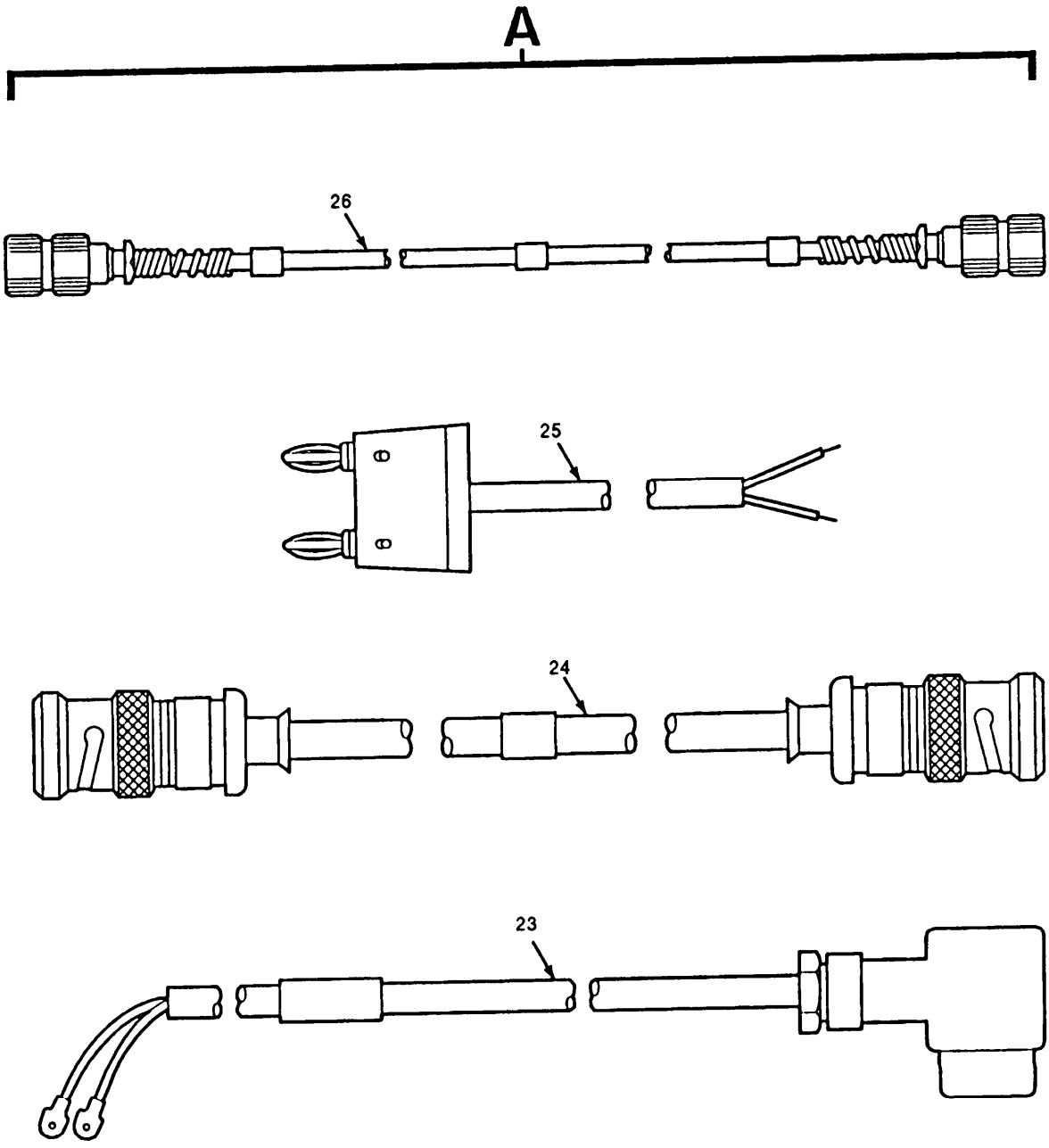


Figure C-2. Interconnecting Device J-4501/GRC (Sheet 5 of 5)

Section IV. COMPONENTS OF END ITEM LIST FOR TOOL KIT, ELECTRONIC EQUIPMENT

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
See Figure C-3				
1	5140-00-315-2747	Tool Box, Portable, Type 1 Class 2 (81348) GGG-T-558/1	ea	1
2		Inserter, Screw Thread - M2.2 (80063) A3018037-1	ea	1
3	5120-01-118-6280	Inserter, Screw Thread Insert - M3.0 (80063) A3018037-2	ea	1
4	5120-01-118-6281	Inserter, Screw Thread Insert - M4.0 (80063) A3018037-3	ea	1
5	5120-01-119-2593	Inserter, Screw Thread Insert - M5.0 (80083) A3018037-4	ea	1
6	5120-01-114-0942	Inserter, Screw Thread Insert - M8.0 (80063) A3018037-5	ea	1
7	5120-01-114-0944	Tang Breakoff Tool, Screw Thread Insert - M2.2 (80063) A3018039-1	ea	1
8	5120-01-118-6267	Tang Breakoff Tool, Screw Thread Insert - M3.0 (80063) A3018039-2	ea	1
9	5120-01-119-2586	Tang Breakoff Tool, Screw Thread Insert - M4.0 (80063) A3018039-3	ea	1
10	5120-01-118-6258	Tang Breakoff Tool, Screw Thread Insert - M5.0 (80063) A3018039-4	ea	1
11	5120-01-114-0946	Tang Breakoff Tool, Screw Thread Insert - M8.0 (80063) A3018039-5	ea	1
12	5340-01-199-6350	Insert. Screw Thread - M2.2 x 1.0 Dia. (81343) MA3330-100	ea	25
13	5340-01-199-6349	Insert, Screw Thread - M3.0 x 1.0 Dia. (81343) MA3330-102	ea	50
14	5340-01-180-6844	Insert, Screw Thread - M3.0 x 1.50 Dia. (81343) MA3330-152	ea	50
15	5340-01-201-0429	Insert, Screw Thread - M4.0 x 1.0 Dia. (81343) MA3330-104	ea	25
16	5340-01-173-5655	Insert, Screw Thread - M4.0 x 1.5 Dia. (81343) MA3330-154	ea	25
17	5340-01-216-7444	Insert, Screw Thread - M5.0 x 1.0 Dia. (81343) MA3330-105	ea	25
18	5340-01-201-0831	Insert, Screw Thread - M8.0 x 2.0 Dia. (81343) MA3330-209	ea	25

Section IV. COMPONENTS OF END ITEM LIST FOR TOOL KIT, ELECTRONIC EQUIPMENT (Continued)

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
See figure C-3				
19	5120-00-723-6833	Extractor, Screw Thread Insert - M5.0 - M10.0 (80063) A3018038-3	ea	1
20	5120-00-245-9539	Extractor, Screw Thread Insert - M2.5 - M4.5 (80063) A3018038-2	ea	1
21	5120-00-138-6803	Extractor, Screw Thread Insert - M2.2 (80063) A3018036-1	ea	1
22		Helicoil Depth Gage (80083) A3018767-1	ea	1
23	5120-01-258-7503	Socket, Socket Wrench - 1-1/18 in. (80063) A3018045-6	ea	1
24	5120-01-262-5962	Socket, Socket Wrench - 1-1/18 in. (80063) A3018045-7	ea	1
25	5120-01-262-9960	Socket, Socket Wrench - 5.5 mm (80083) A3018047-2	ea	1
26	5120-01-032-4925	Socket, Socket Wrench - 13 mm (80063) A3018047-1	ea	1
27	5120-00-935-7440	Socket, Socket Wrench - 1/2 in. (80063) A3018045-1	ea	1
26	5120-00-235-5809	Socket, Socket Wrench - 7/8 in. (80063) A3018045-4	ea	1
29	5120-00-720-1975	Wrench, Torque - Type 1, Style B, 0-100 in-lb (90947) CCC-W-686 T1, SB, S100-1	ea	1
30	5120-00-568-4742	Torque, Screwdriver - Type II, Style B, 0-25 in-lb (03683) CCC-W-686, B25 RIGHT	ea	1
31		Tap, Thread Cutting - M2.2 (80063) A3018040-1	ea	1
32		Tap, Thread Cutting - M3.0 (80063) A3018040-2	ea	1
33		Spanner Attachment, Socket Wrench - 3/4, in. (80063) A3018049-2	ea	1
34		Spanner Attachment, Socket Wrench - 1-1/4 in. (80063) A3018049-4	ea	1

Section IV. COMPONENTS OF END ITEM LIST FOR TOOL KIT, ELECTRONIC EQUIPMENT (Continued)

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
See figure C-3				
35	5120-01-109-4788	Handle - Tap and Reamer - M2.2-M6.0 (80083) A3018048-1	ea	1
38	5120-01-028-7078	Handle - Tap and Reamer - M8.0 (80083) A3018048-2	ea	1
37		Tap, Thread Cutting - M8.0 (80083) A3018040-5	ea	1
38		Tap, Thread Cutting - M5.0 (80083) A3018040-4	ea	1
39		Tap, Thread Cutting - M4.0 (80083) A3018040-3	ea	1
40		Extractor, Electrical Card - Assy of (80083) A3013669-1	ea	1
41	5120-01-051-3506	Wrench, Box and Open-End, Combination - 5.5 mm (80063) A3018043-1	ea	1
42	5120-00-240-8703	Adapter, Socket Wrench - 3/8 to 1/2 in. (80063) A3018042-1	ea	1
43	5120-00-227-8095	Adapter, Socket Wrench - 3/8 to 1/4, in. (80083) A3018042-2	ea	1

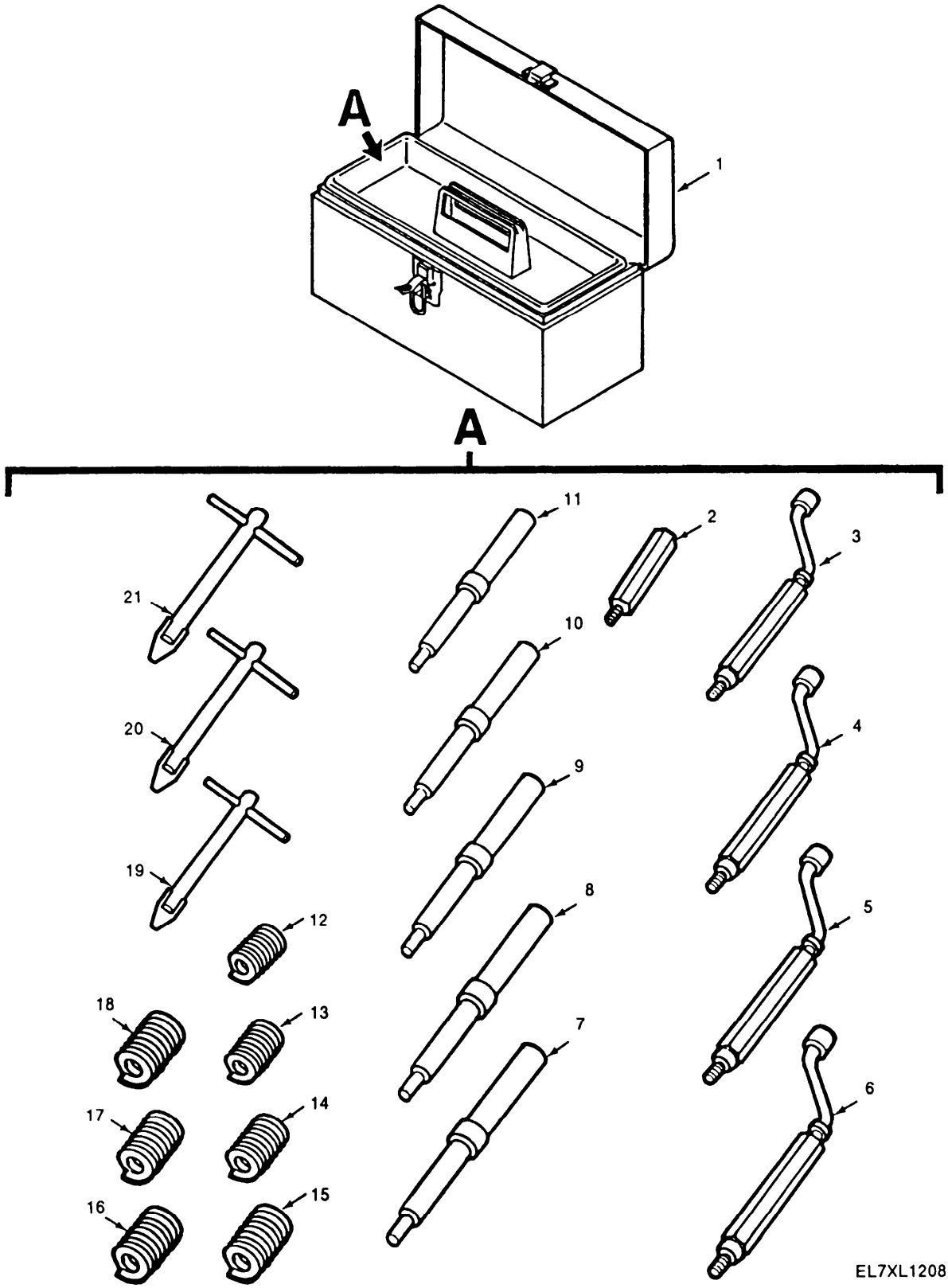


Figure C-3. Electronic System Tool Kit (Sheet 1 of 3)

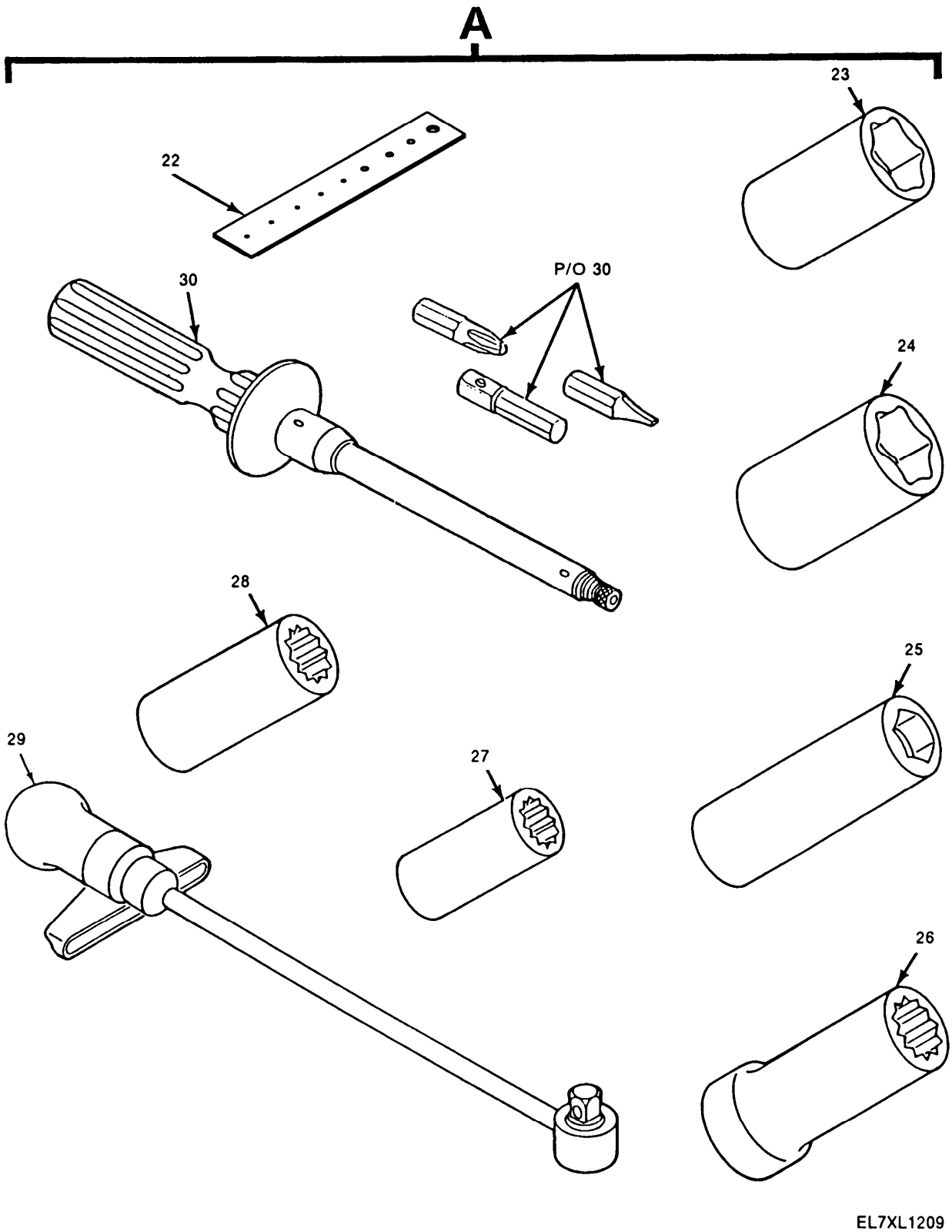


Figure C-3. Electronic System Tool Kit (Sheet 2 of 3)

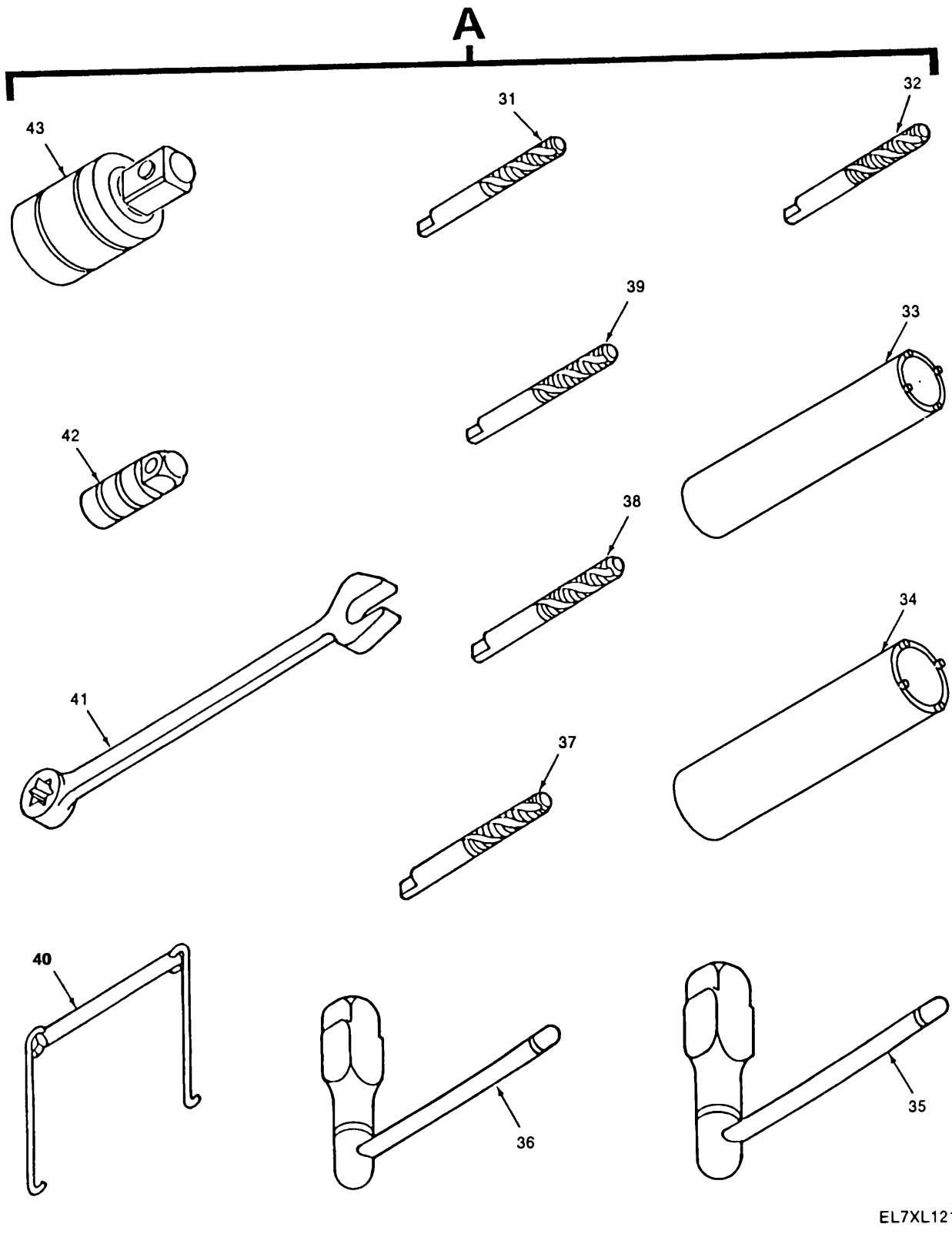


Figure C-3. Electronic System Tool Kit (Sheet 3 of 3)

Section V. COMPONENTS OF END ITEM LIST FOR PARTS KIT, ELECTRONIC EQUIPMENT

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
See figure C-4				
1		Container, Shipping and Storage (60063) A3013071-1	ea	1
2		Indicator. Pulse Analyzer - Logic Probe (80063) B4042205-1	ea	1
3		Cable Adapter Test Point to Test Point (80063) A3132859-1	ea	1
4	5985-01-047-6462	Dummy Load, Electrical (81349) M39030/3-01N	ea	1
5		Cable Assy, RF (W19) (80063) A3018583-1	ea	1
6	6625-01-081-2949	Adapter, Test - Mini Probe (Tip to BNC) (80063) A3018697-1	ea	1
7	5935-00-926-7523	Adapter, Connector (Tee BNC) (81349) M55339/17-00274	ea	1
6	5935-00-259-0205	Adapter, Connector (BNC Jack to N Plug) (81349) M55339/20-00201	ea	4
9	5935-01 -037-3476	Adapter, Connector (Barrel BNC) (81349) M55339/16-00914	ea	2
10		Adapter, Connector (BNC to Double Banana) (80063) A3013034-1	ea	1
11	5995-01-203-4653	Cable Assy, RF (80063) A3013903-1	ea	2
12		Connector, Plug - Modified, Blk (80063) B4041506-2	ea	1
13		Connector, Plug - Modified, Red (80063) B4041506-1	ea	1
14	5935-01-193-5557	Adapter, Connector (SMA Jack to BNC Plug) (81349) M55339/44-30001	ea	1
15	5935-01-201-9178	Adapter, Connector (SMA Plug to BNC Plug) (81349) M55339/45-30101	ea	2
16	5935-01-165-9946	Adapter, Connector (SMA Jack to BNC Jack) (81349), M55339/46-30001	ea	1

Section VI. BASIC ISSUE ITEMS

(1) Illustration Number	(2) National Stock Number	(3) Description (FSCM) and Part Number	(4) (U/M)	(5) Quantity Required
NONE				

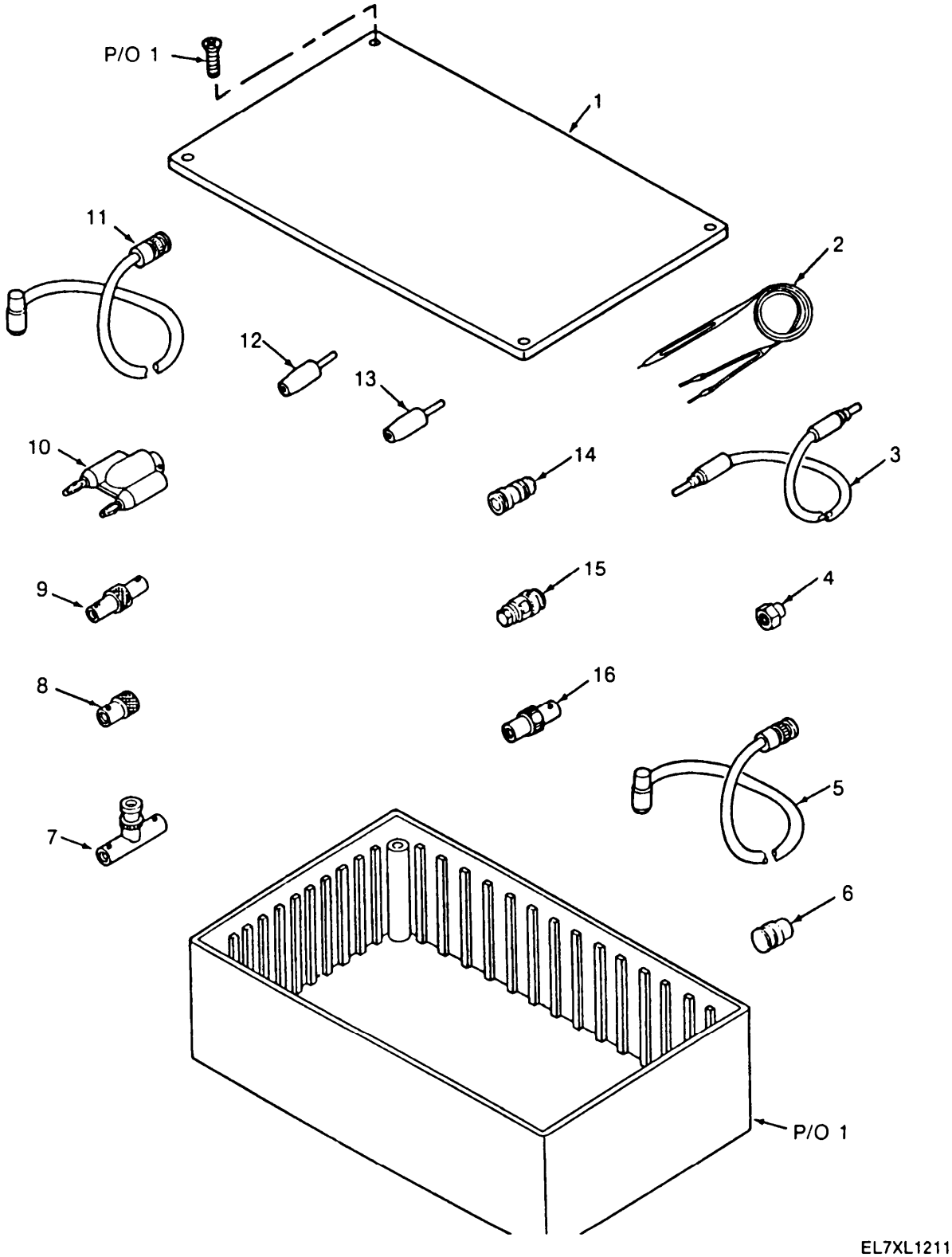


Figure C-4. Electronic Equipment Parts Kit (Sheet 1 of 1)

APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE

This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2. EXPLANATION OF COLUMNS

The following explains the columns found in the tabular listing.

a. Column (1), Item Number.

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

c. Column (3), Description. Indicate 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.

d. Column (4), Unit of Measure. Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two character alphabetical abbreviation (e.g., an, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES LIST.

(1) Item Number	(2) National Stock Number	(3) Description (CAGE) and Part Number	(4) (U/M)
1	8040-00-117-8510	Adhesive, RTV (81 349), Type 3 Clear	AR
2	6810-00-753-4993	Alcohol, Isopropyl, Grade A MIL-A-2048	AR
3	6515-00-303-8250	Swabs, Cotton	AR
4	8030-00-753-4599	Sealing Compound, Proseal 890 (8327) MIL-S-8802	AR
5	6850-00-927-9461	Silicone Compound (81 349), MIL-S-8660 Clear	AR
6		Adhesive-cyanocrylate (80063) A3018437-1	AR

APPENDIX E. GLOSSARY

Section I. ABBREVIATIONS

Abbreviation	Description
A	ampere
AC	Alternating current
AD	Analog data
A/D	Analog to digital
ADMC	Analog/digital mode control
AGC	Automatic gain control
ALC	Automatic level control
ANLG	Analog
ANT	Antenna
AR	Analog receive
AR	Audio receive
AT	Analog transmit
AT	Audio transmit
AUD	Audio
AUX	Auxiliary
AVAIL	Available
BCD	Binary-coded decimal
BS	Bit sync
BTRY	Battery
CAL	Calibrate
CB	Circuit breaker
CB1	Circuit breaker 1
CCA	Circuit card assembly
CCTS	Circuits
CCW	Counter-clockwise
CHAN	Channel
CLK	Clock
CLOS	Closure
CLR	Clear
cm	Centimeter
CM	Control-monitor
CNTL	Control
COM	Common
CPR	Cardiopulmonary resuscitation
CT	Cipher text
CVSD	Continuously variable slope delta
CW	Clockwise
DC	Direct current
dBm	Decibels at one milliwatt (power)
DDCO	Digital data clock out
DDI	Digital data input
DDMC	Digital data mode control
DDR	Digital data receive
DDT	Digital data transmit
DEMOD	Demodulated
DET	Detector
DGT	Digital
DMM	Digital multi-meter
DRA	Data rate adapter
DSPL	Display
DSQ	Digital squelch
ECCM	Electronic Counter-Countermeasures
EIR	Equipment Improvement Recommendations
EMP	Electro-magnetic pulse
ENBL	Enable
ERF	ECCM remote fill
ETM	Elapsed time meter
EXT	External
FCTN	Function
FH	Frequency hopping
FH/M	Frequency hopping/master
FREQ	Frequency
FREQ CNTR	Frequency counter
FSK	Frequency shift keying
FCTN	Function
FCTN GEN	Function generator
GND	Ground
HI	High
HLDG	Holding
HPF	High pass filter
Hz	Hertz
ICS	Intercommunications System
I/D	Integrate and dump
I/O	Input/output
IF	Intermediate frequency
INFO	Information
INHB	Inhibit
INP	input
INT	internal
KB/S	Kilobit per second
kg	Kilogram

Section I. ABBREVIATIONS Continued

Abbreviation	Description
L	Low
LD	Load
LD-V	Load-variable
LE	Late entry
LO	Local oscillator
LPF	Low pass filter
LVL	Level
M	Medium
MAPS	Maintenance action precise symptom
MGROUP	Maintenance Group
M/V RT	Manpack/vehicular receiver-transmitter
MDL	Module
MEM	Memory
MOD	Modulated
MTOE	Modified table of organization and equipment
mV	Mini-volt
N	Not
N/C	No contact
OFST	Offset
OP CHECK	Operational Check
OUT	output
P-P	Peak-to-peak
PA	Power amplifier
PLL	Phase locked loop
PMCS	Preventive Maintenance Checks and Services
PN	Part number
POT	Potentiometer
PR	Preset
PRE	Present
PRI	Primary
PT	Plain text
PTT	Push-to-talk
PTTR	Push-to-talk receive
PWR	Power
PWR SPLY	Power supply
RAM	Random access memory
RCA	Remote control adapter
RCU	Remote control unit
RCV	Receive
RED	Red
REF	Reference
REM	Remote
REQ	Request
RF	Radio Frequency
RM	Remote mode
RMS	Remote mode select
ROD	Report of Discrepancy
ROM	Read only memory
RT	Receiver-transmitter
RTN	Return
RXMT	Retransmit
SC	Single channel
SEL	select
SEQ	Sequential
SIG	Signal
SIG STR RCV	Signal strength receive
SNAP	Steerable null antenna processor
SP	Speed
SQ	Squelch
ST	Sidetone
STR	Strobe
STW	STOW
SW	Switch
SYNC	Synchronize
TD	Time delay
TDR	Transportation Discrepancy Report
TM	Technical Manual
TOD	FH sync time
TP	Test Point
TR	Transmit/receive
TST	Test
UUT	Unit Under Test
V	volt
VAR	Variable
VCO	Voltage controlled oscillator
VCXO	Voltage controlled crystal oscillator
VOL	Volume
VSO	Variable select zero
VSWR	Voltage standing wave ratio
W	Wire
WB	Waveband
WHSP	Whisper
XMT	Transmit
Z-A	Zero all

Section II. UNUSUAL TERMS

Term	Definition
Bit synchronized	Alinement of incoming data bits with internal clocks.
Black signals	Signals that are buffered by the audio power supply to isolate the COMSEC signals in the audio/data section.
Carrier	The RF frequency to which the RT is tuned and onto which the information signal is modulated.
Deinterleave	To strip a signal of data speed or frequency hopping control information, leaving only the information signal, and collapse it down to its original signal speed.
Interleave	Insert data speed or frequency hopping control information into a signal by creating gaps in the information flow and inserting the control data into the gaps. The process will increase a signal's data speed.
Receiver Sensitivity	The lowest power signal the RT can receive.
Red signals	Signals in the audio/data section of the RT that may contain COMSEC coding.
Sidetone	Feedback of the operator's voice into the handset receiver when transmitting.
Squelch tone	150 Hz tone accompanying received signals, necessary to break squelch.

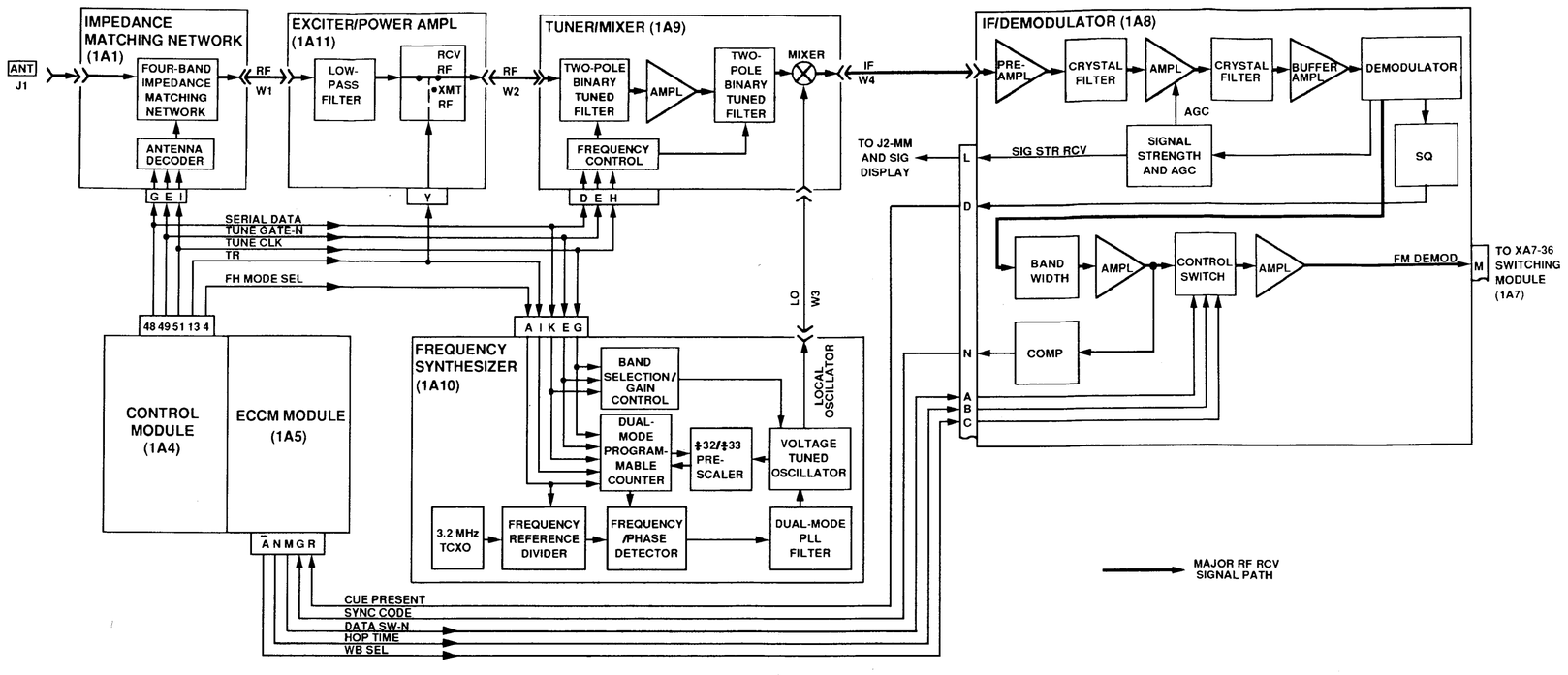


Figure FO-1. RT RF Receive Signal Path Functional Block Diagram
FP-1/(FP-2 Blank)

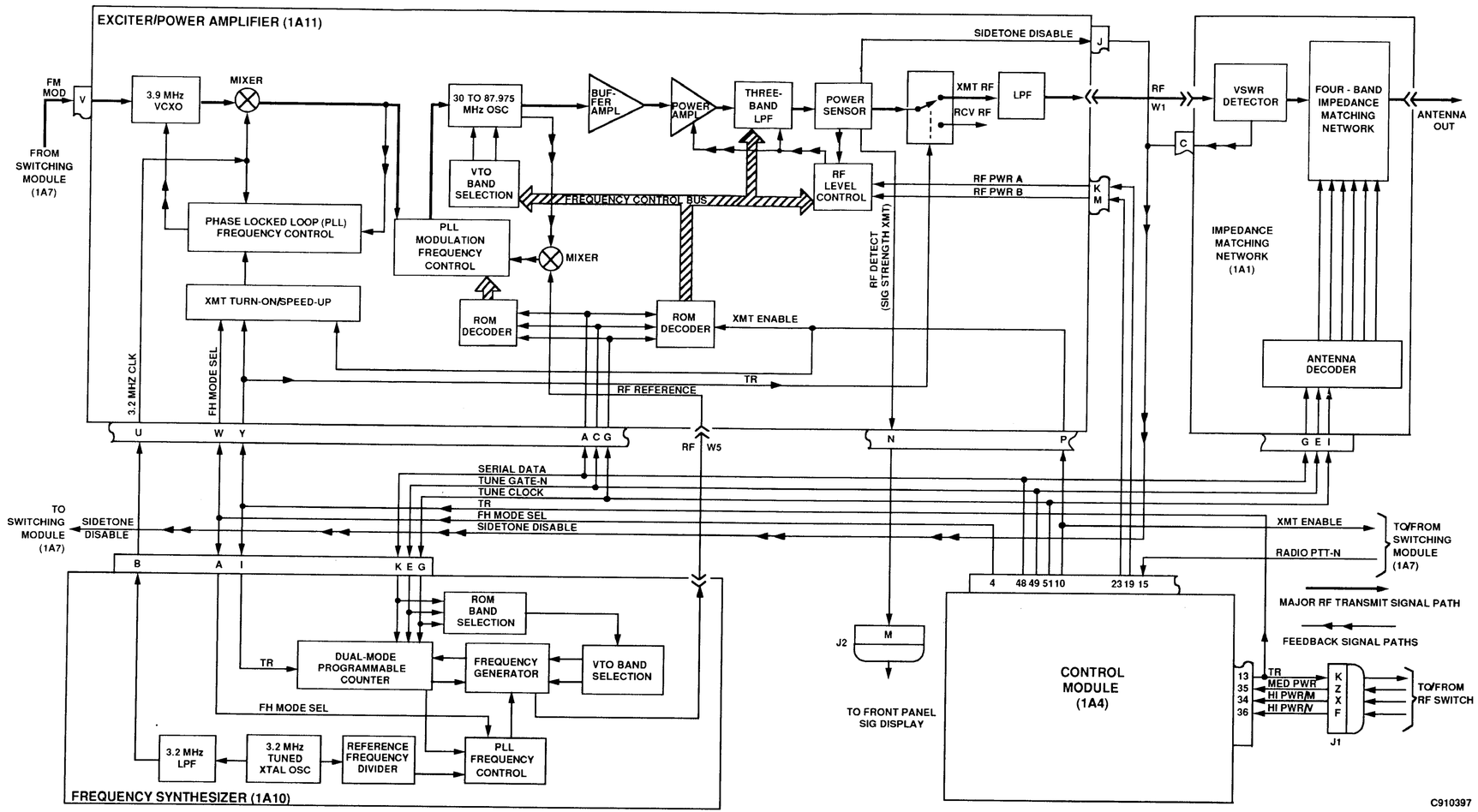


Figure FO-2. RT RF Transmit Signal Path Functional Block Diagram
FP-3/(FP-4 Blank)

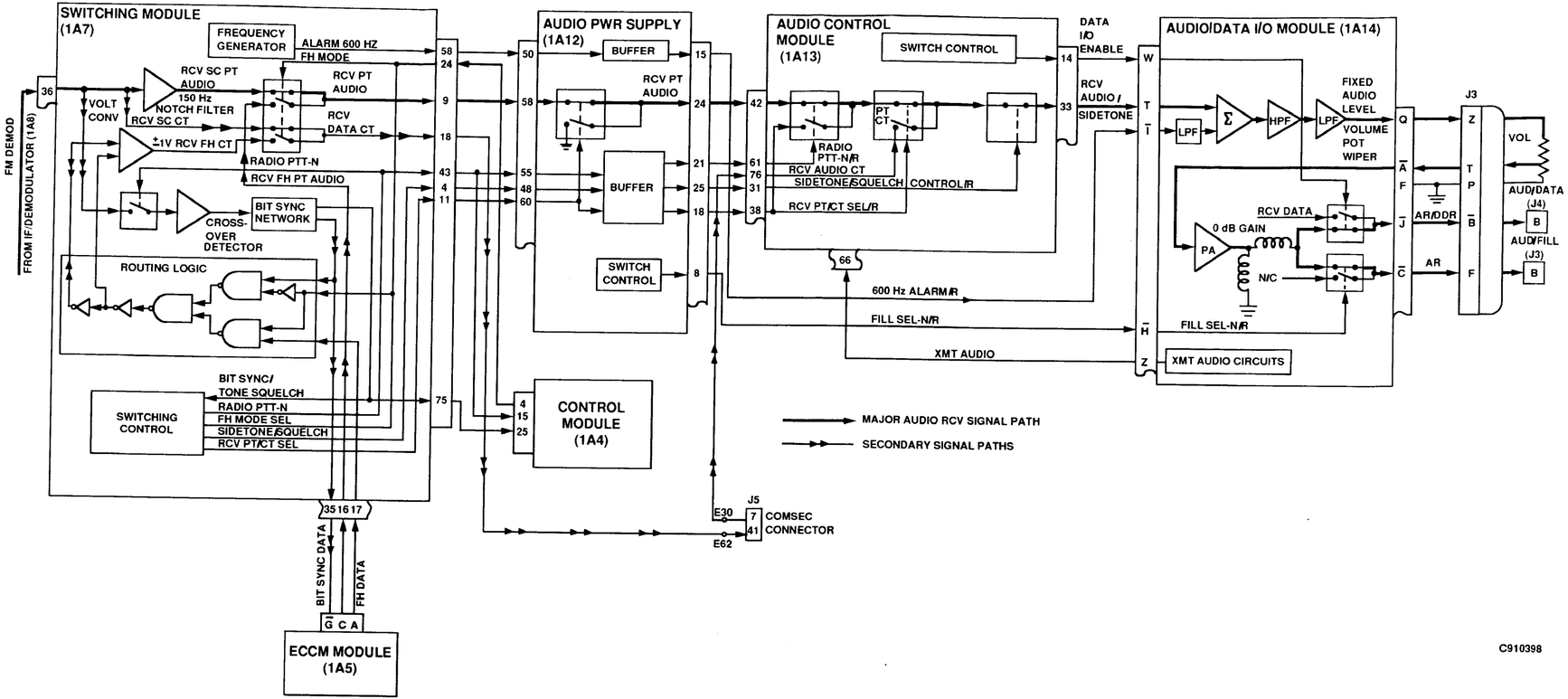


Figure FO-3. RT Audio Receive Signal Path Functional Block Diagram FP-5/(FP-6 Blank)

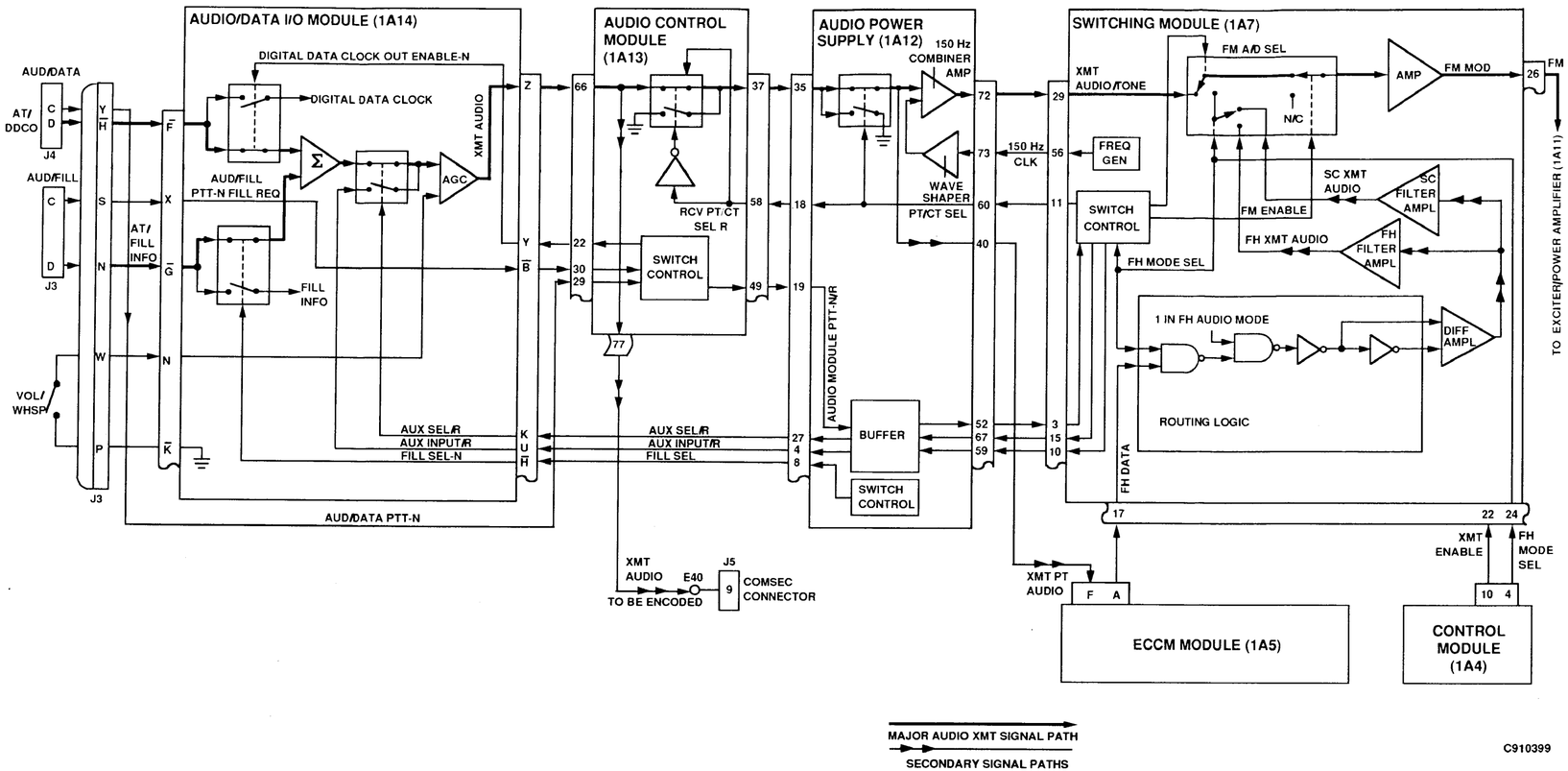


Figure FO-4. RT Audio Transmit Signal Path Functional Block Diagram
FP-7/(FP-8 Blank)

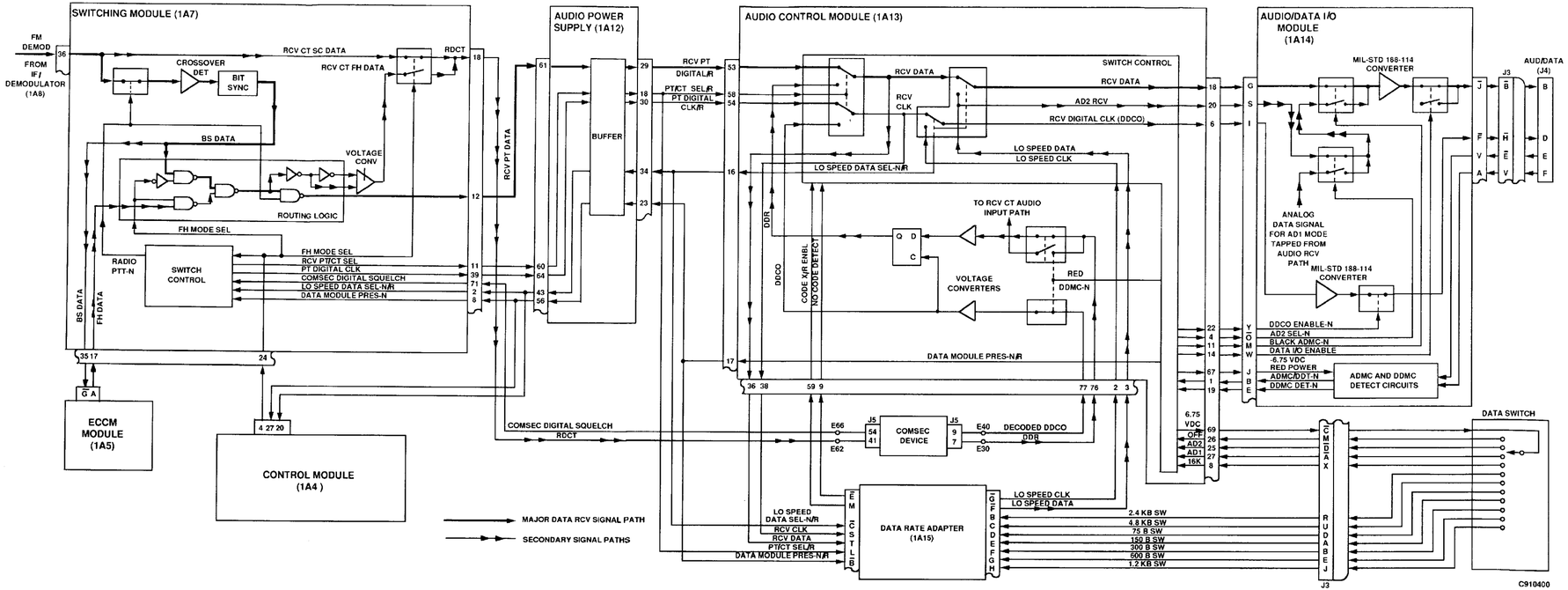


Figure FO-5. RT Data Receive Signal Path Functional Block Diagram FP-9/(FP-10 Blank)

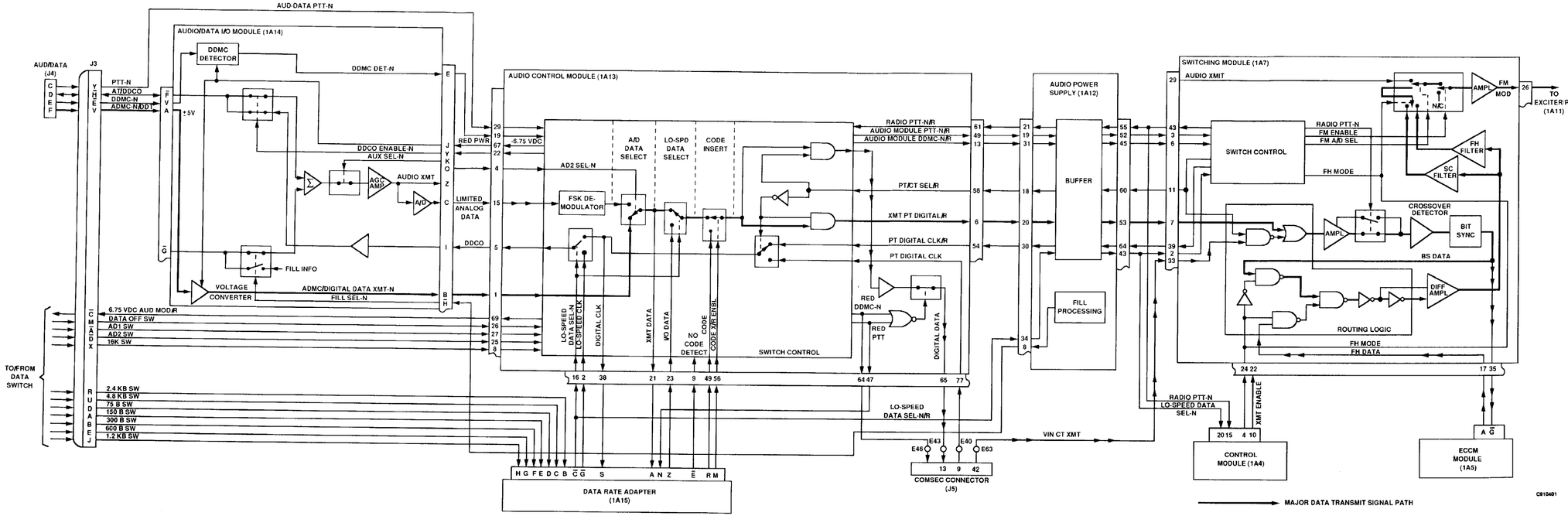


Figure FO-6. RT Data Transmit Signal Path Functional Block Diagram FP-11/(FP-12 Blank)

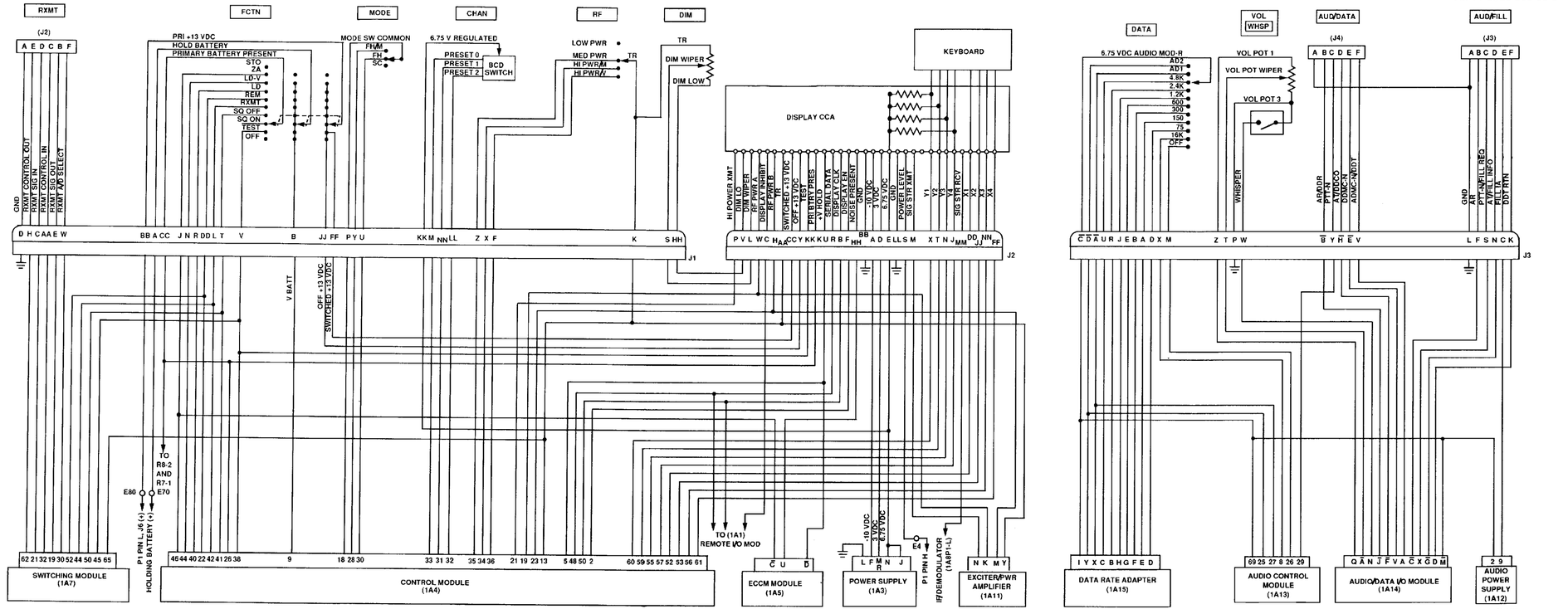


Figure FO-7. RT Primary Control Signals FP-13/(FP-14 Blank)

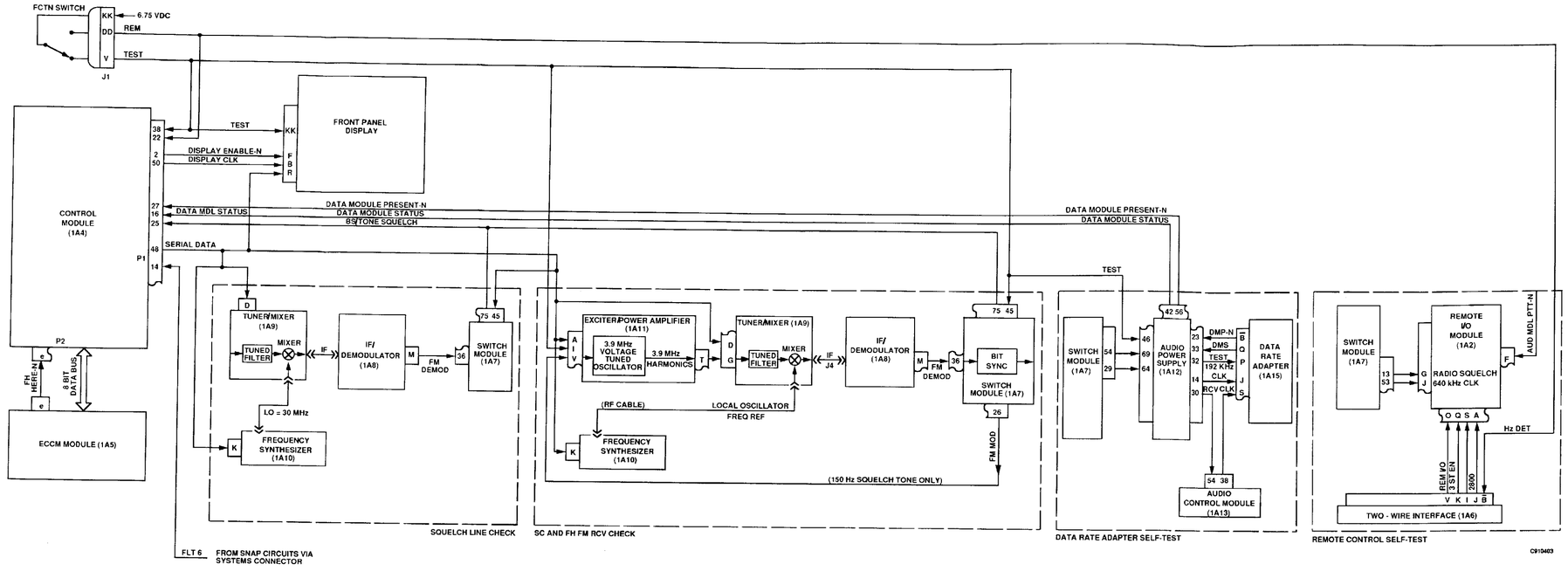


Figure FO-8. RT Self-Test Signal Path Functional Block Diagram
FP-15/(FP-16 Blank)

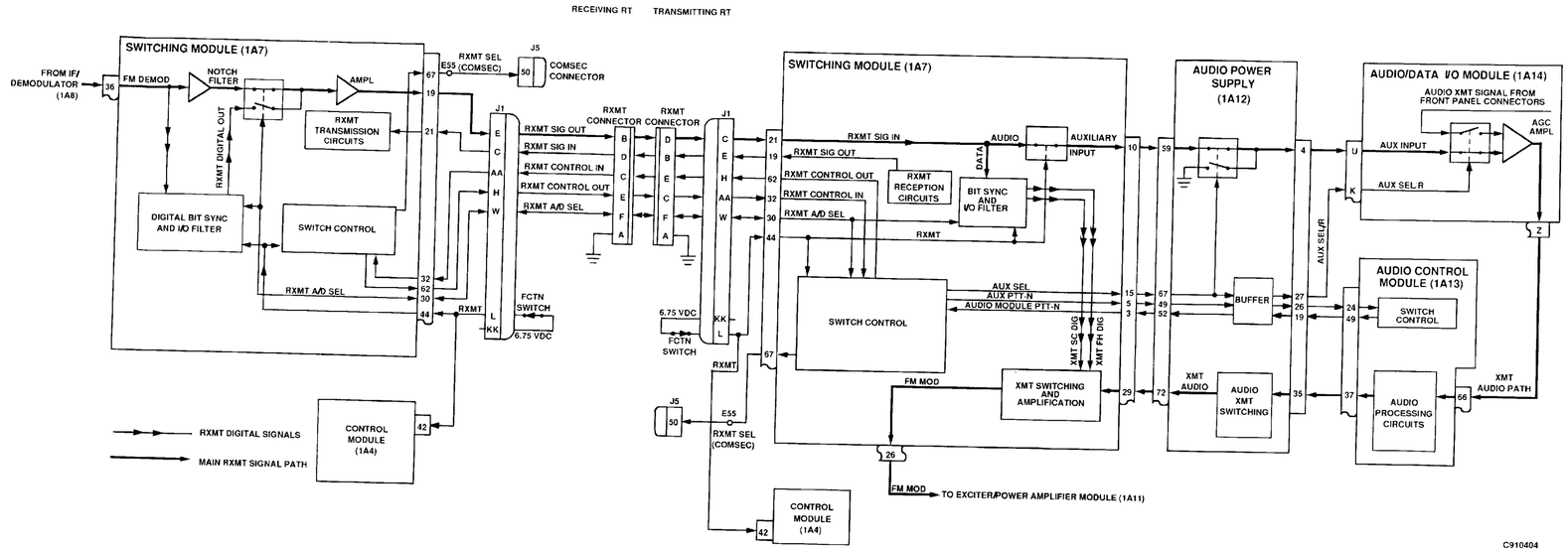


Figure FO-9. RT Retransmit Signal Path Functional Block Diagram
FP-17/(FP-18 Blank)

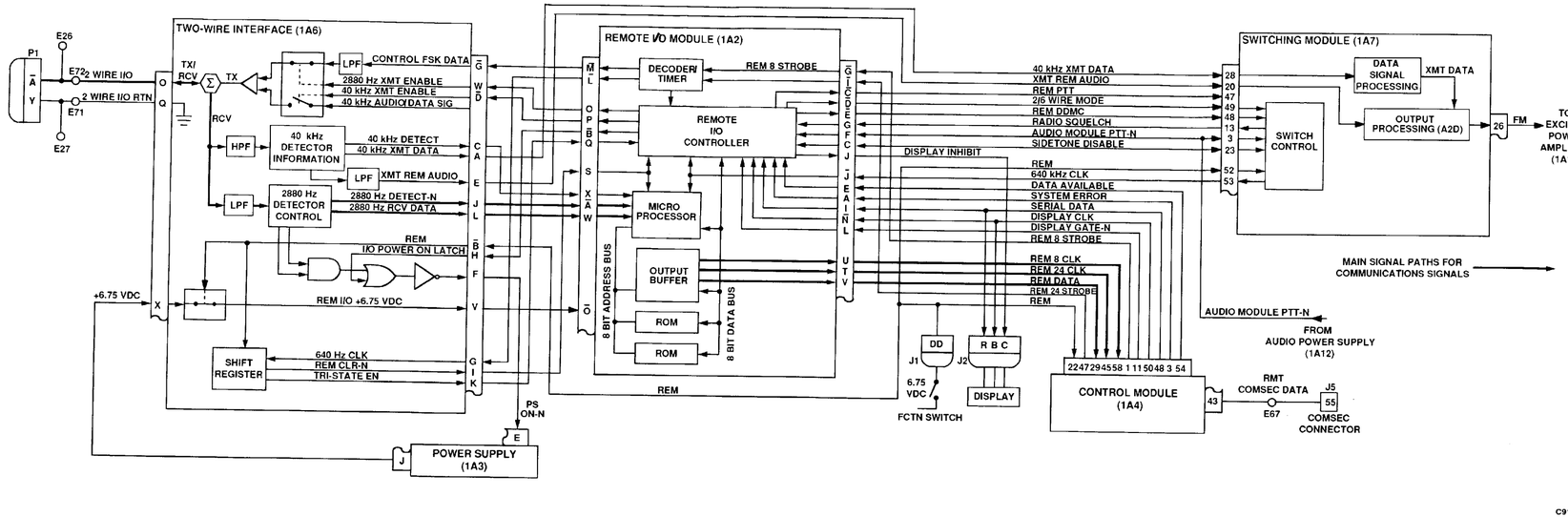


Figure FO-10. RT Remote Control Receive Signal Path Functional Block Diagram (Sheet 1 of 2)
FP-19/(FP-20 Blank)

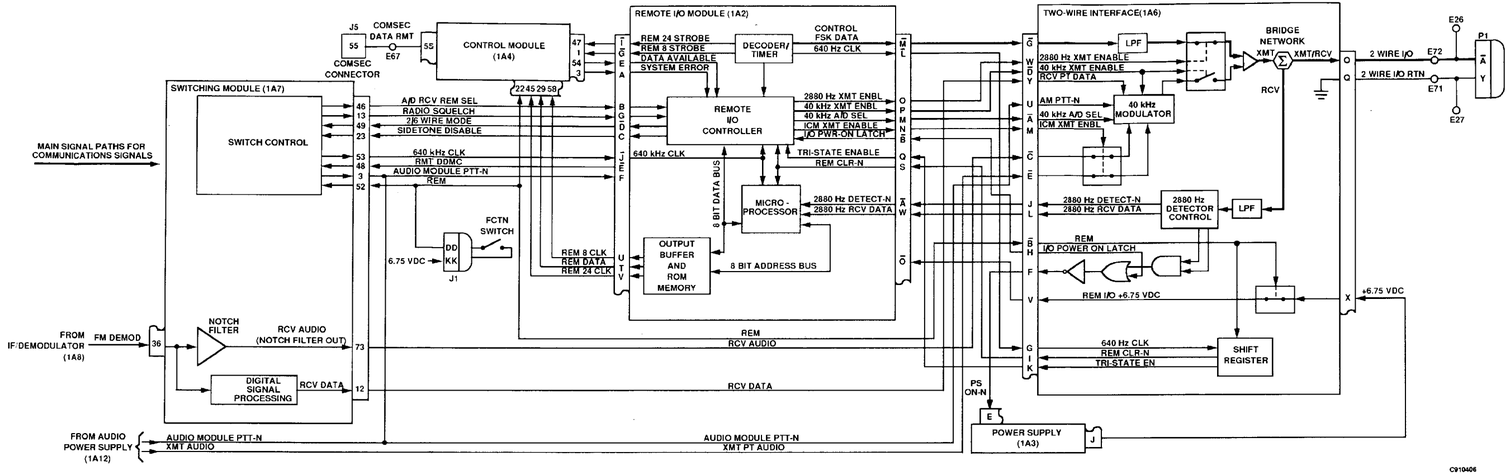


Figure FO-10. RT Remote Control Receive Signal Path Functional Block Diagram (Sheet 2 of 2)

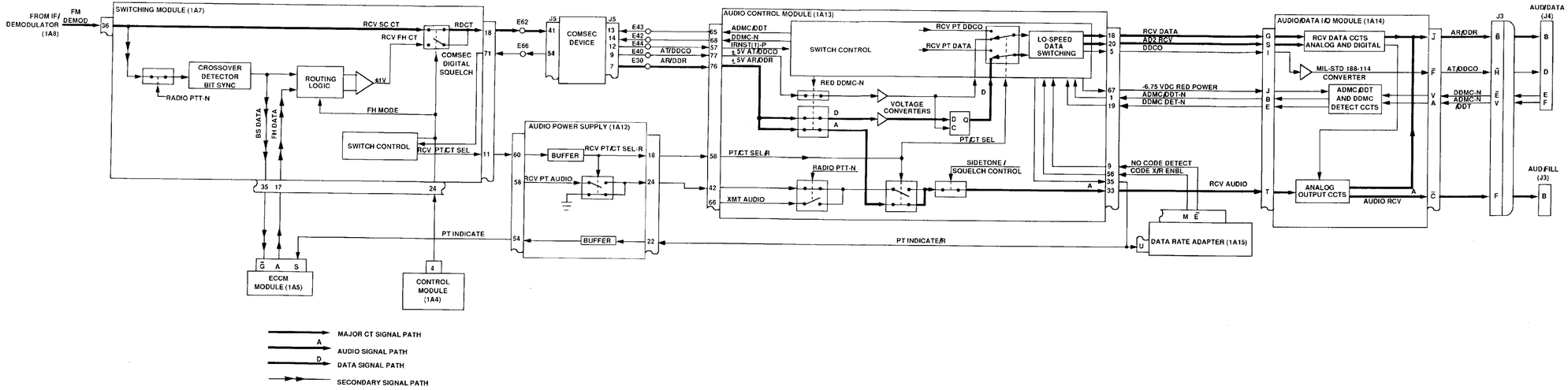


Figure FO-11. RT Cipher Text Receive Signal Path Functional Block Diagram
FP-23/(FP-24 Blank)

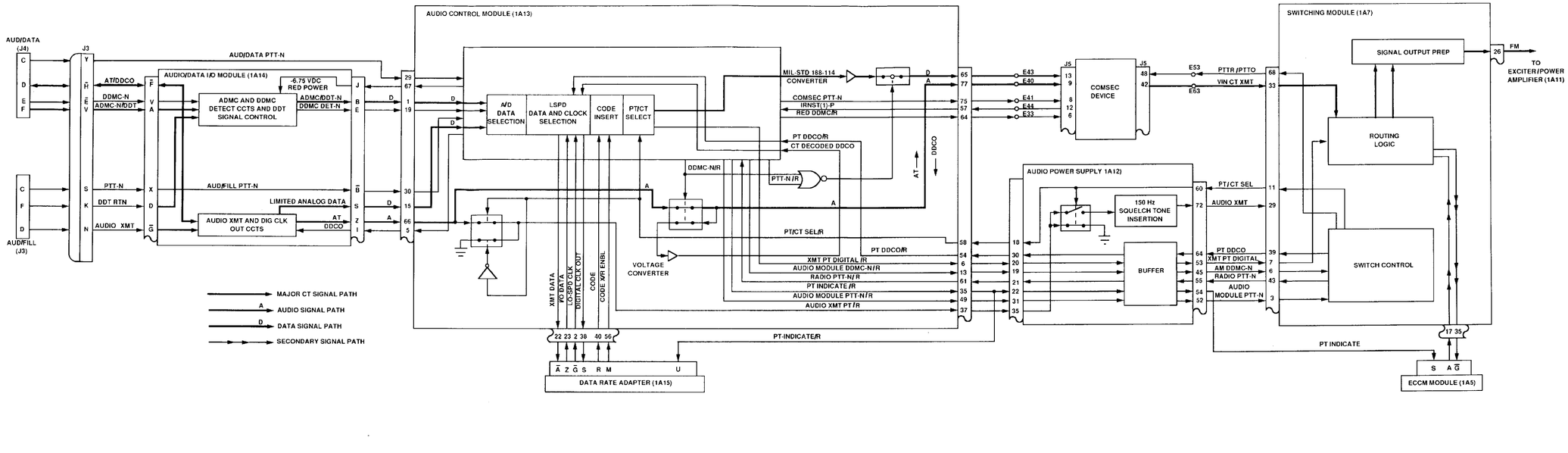


Figure FO-12. RT Cipher Transmit Signal Path Functional Block Diagram FP-25/(FP-26 Blank)

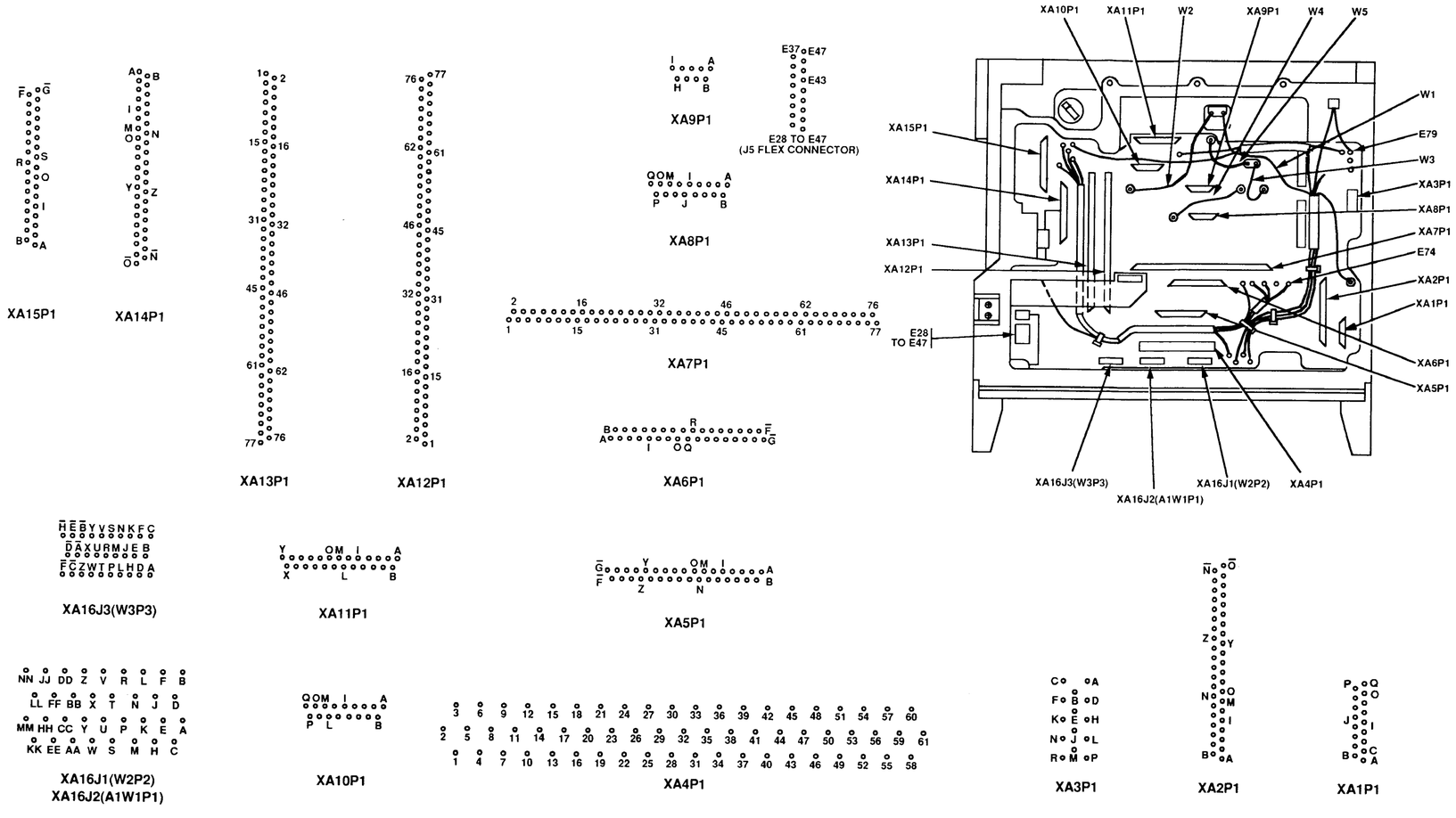
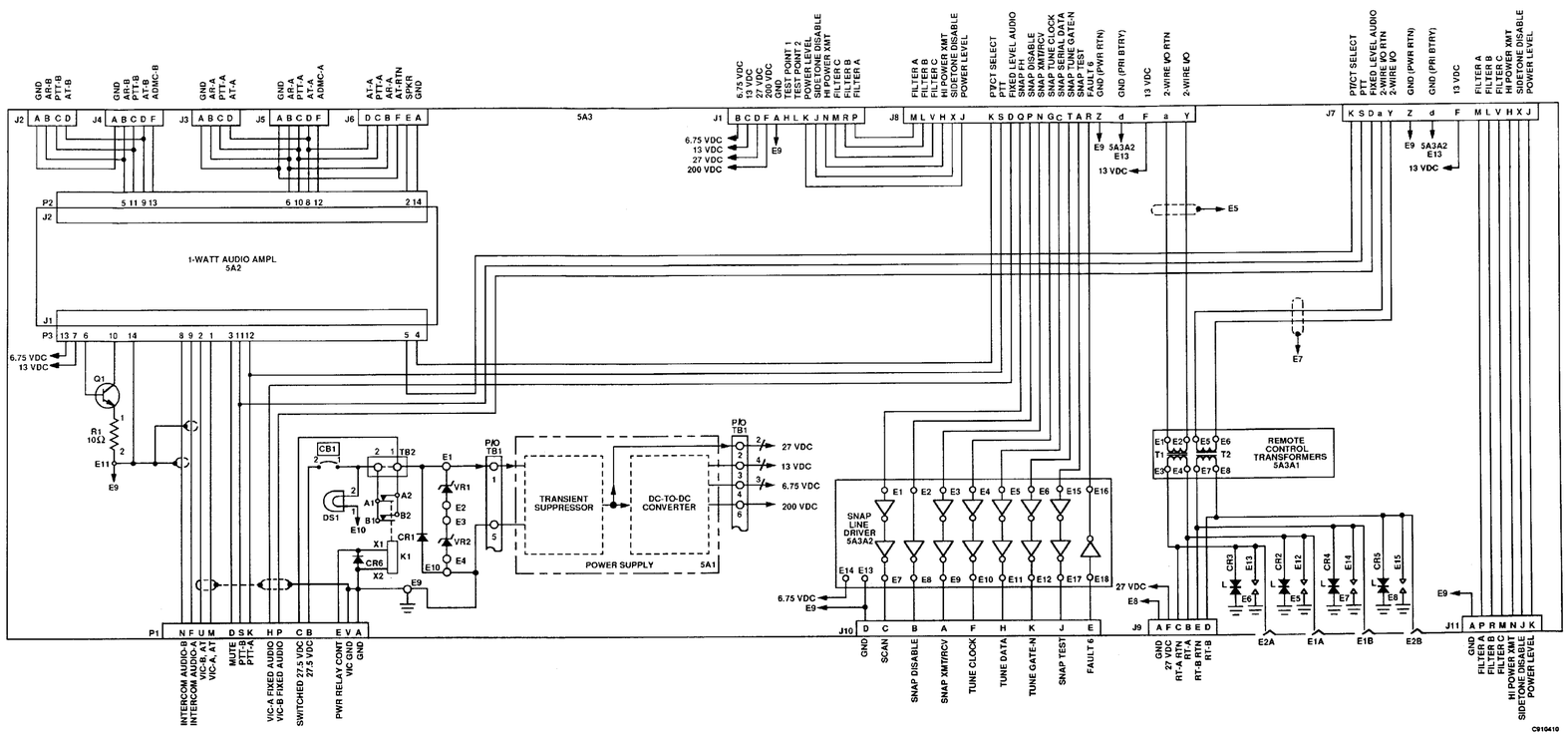
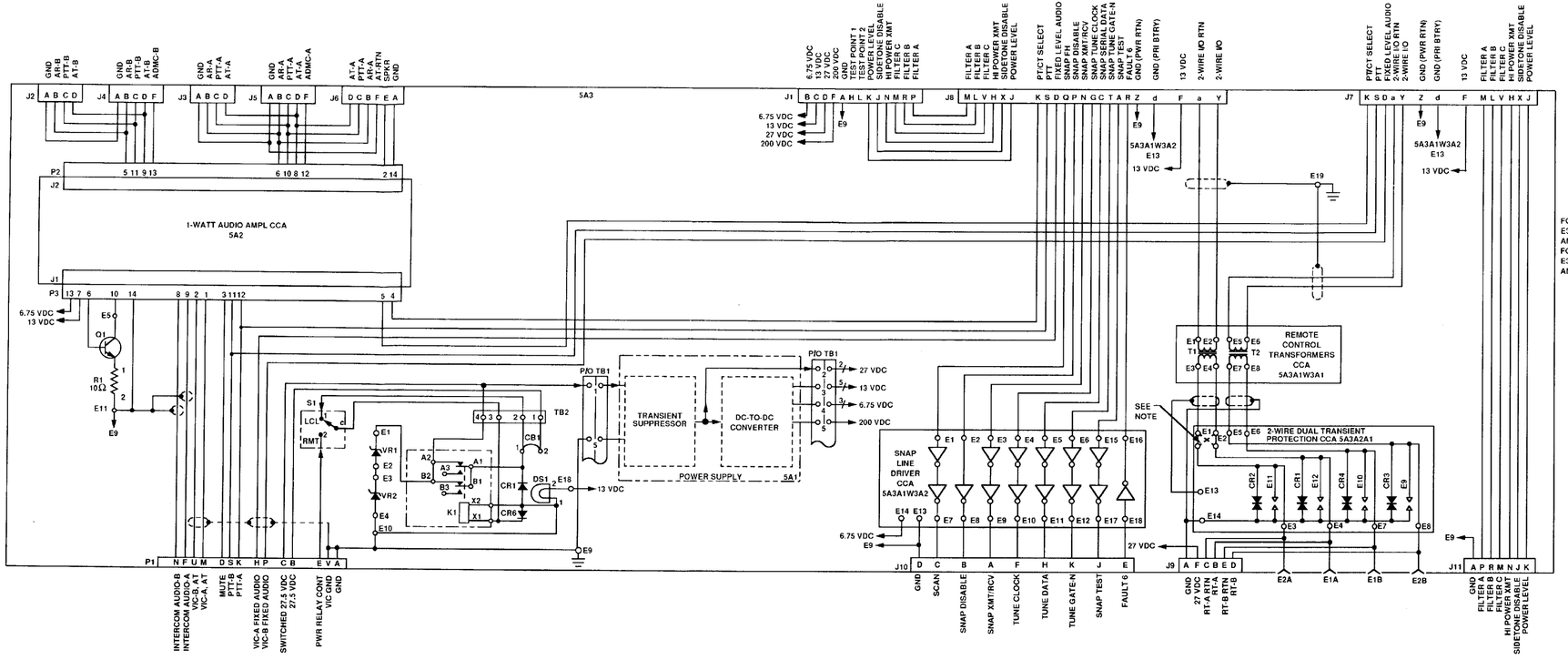


Figure FO-13. RT Parent Board Connectors
FP-27/(FP-28 Blank)



C910410

Figure FO-14. Amplifier-Adapter, Vehicular AM-7239/VRC Schematic Diagram



NOTE:
FOR PART NO. A3148034,
E3 CONNECTS TO E1
AND E4 CONNECTS TO E2.
FOR PART NO. A3167792,
E3 CONNECTS TO E2
AND E4 CONNECTS TO E1.

C910426

Figure FO-15. Amplifier-Adapter, Vehicular AM-7239B/VRC Schematic Diagram FP-31/(FP-32 Blank)

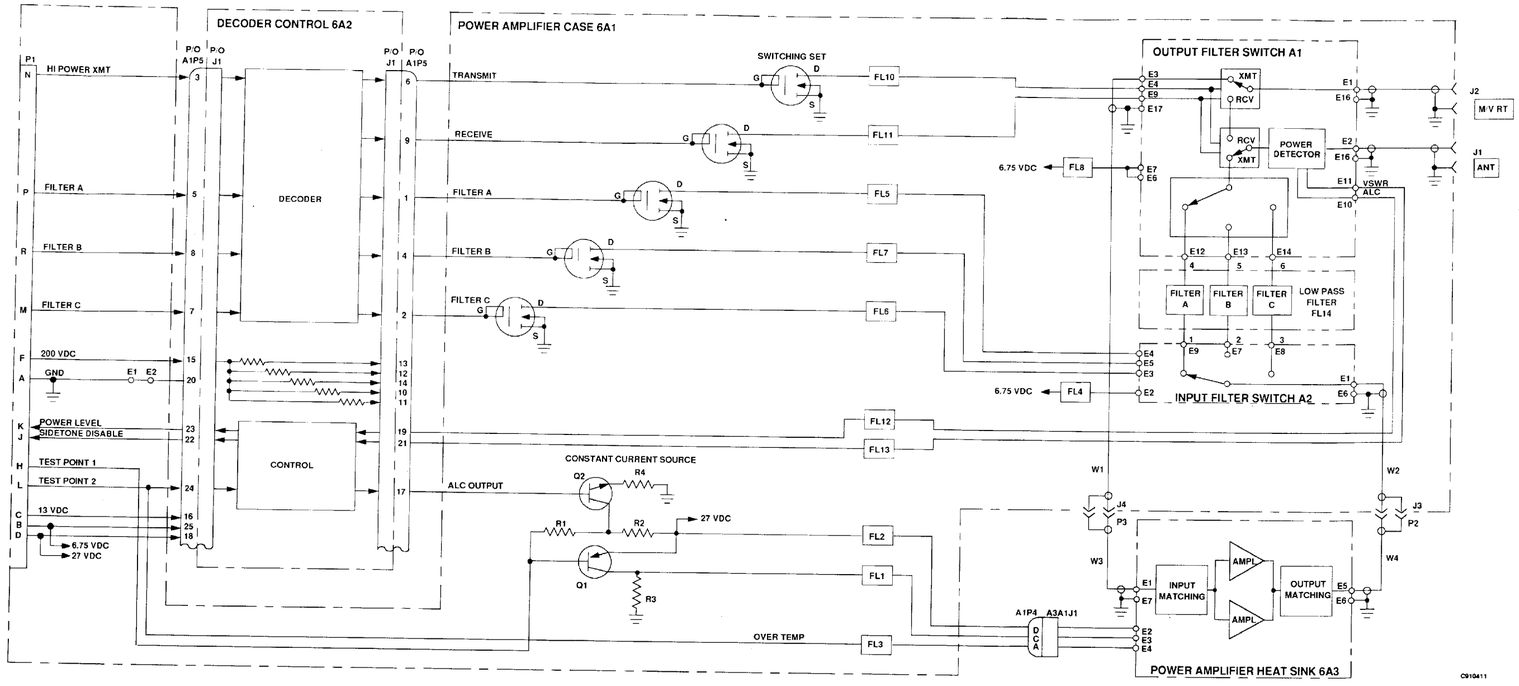


Figure FO-16. Power Amplifier Block Diagram
FP-33/(FP-34 Blank)

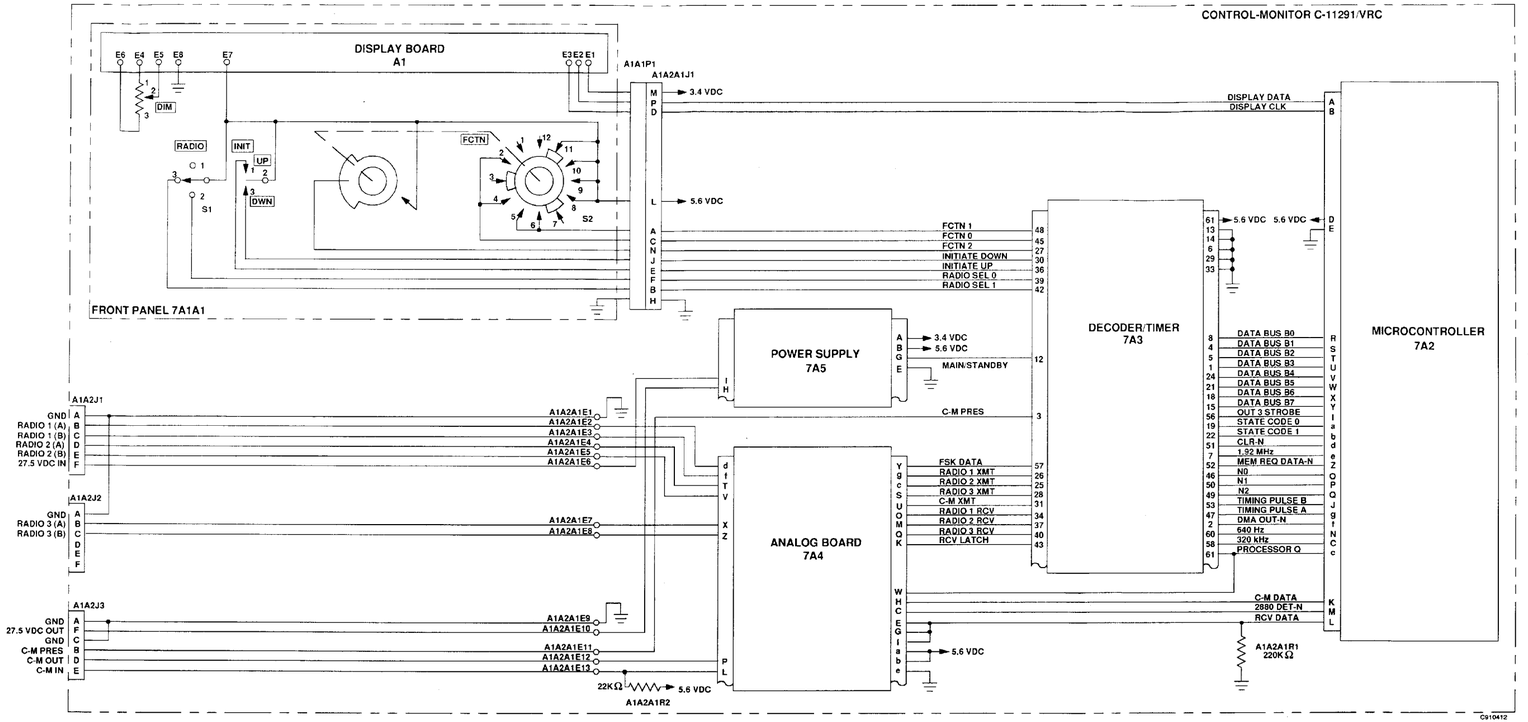
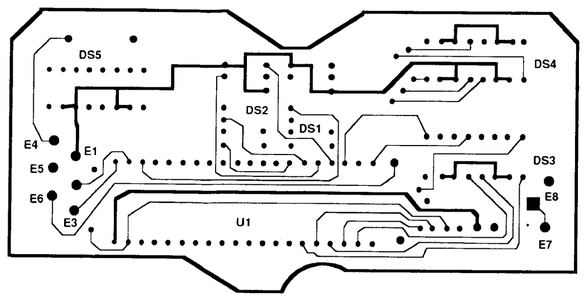
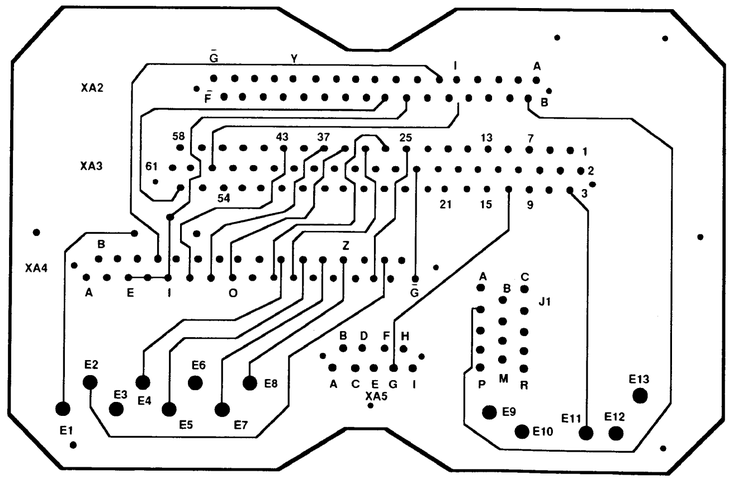


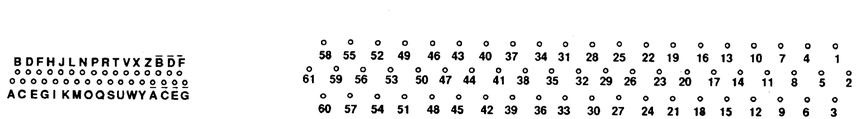
Figure FO-17. Control-Monitor C-11291/VRC Schematic Diagram



DISPLAY BOARD



PARENT BOARD



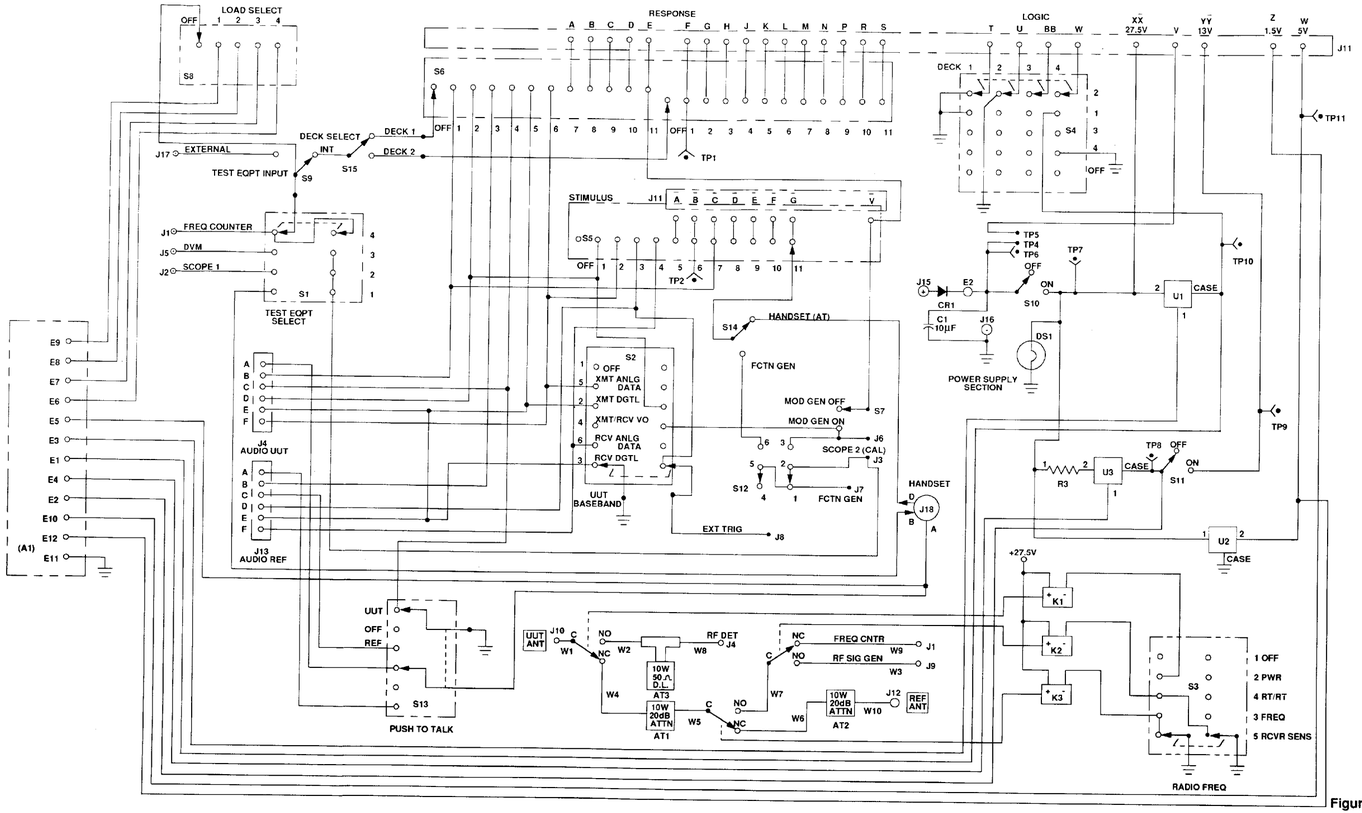
XA3

J1

XA2

C910413

Figure FO-18. Control-Monitor Parent Board and Display Board FP-37/(FP-38 Blank)



NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER AND SUBASSEMBLY DESIGNATION.
2. UNLESS OTHERWISE SPECIFIED; RESISTANCE VALUES ARE IN OHMS.

C910414

Figure FO-19. Test Adapter Schematic Diagram

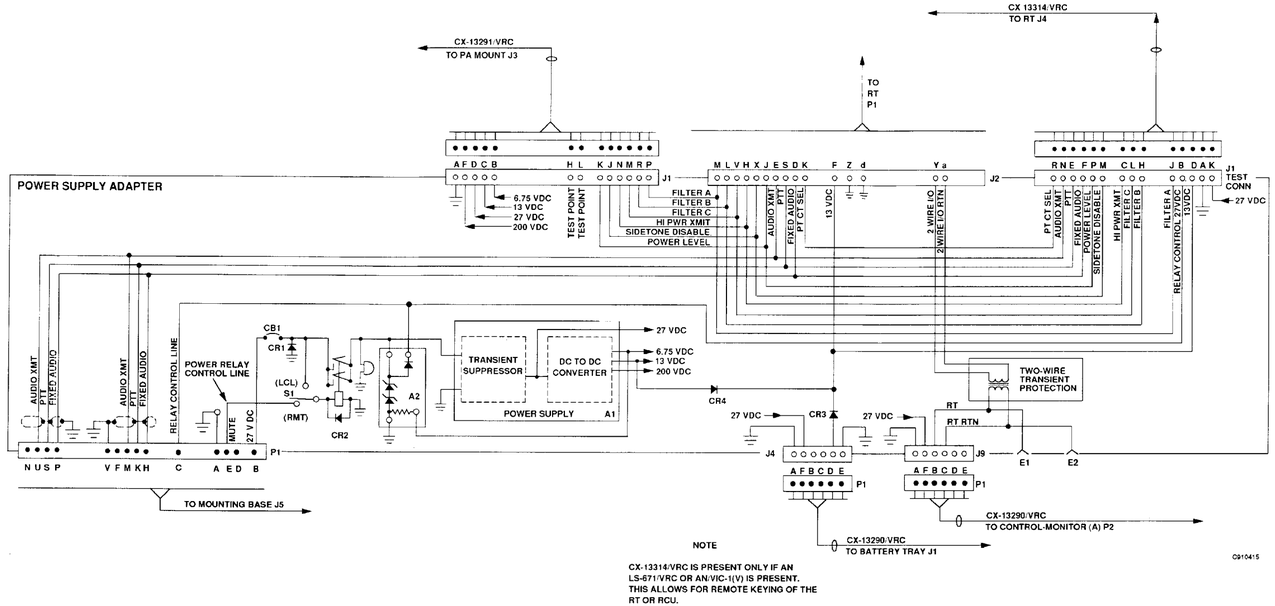
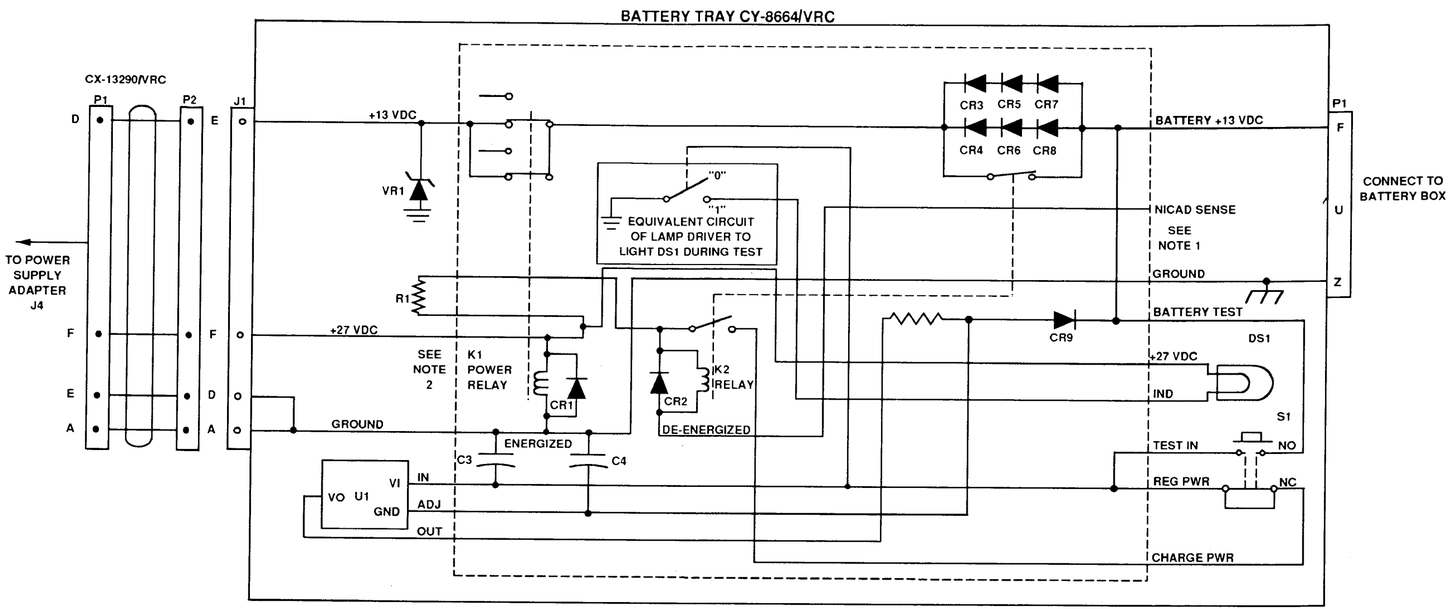


Figure FO-20. Power Supply Adapter MX-10862/VRC
Schematic Diagram
FP-41/(FP-42Blank)



NOTES:

1. THE NICAD SENSE LINE IS DISCONNECTED. THIS DISABLES THE CHARGE FUNCTION.

2. THE K1 RELAY IS SHOWN IN THE ENERGIZED STATE. K1 IS ENERGIZED BY 2.0 TO 32 VDC AT J1-F. IF THE 13 VDC LINE DROPS LOW, THEN THE POWER SUPPLY ADAPTER DIODES ALLOW THE BATTERY TO SUPPLY RT VOLTAGE.

C910416A

Figure FO-21. Battery Tray CY-8664/VRC Schematic Diagram

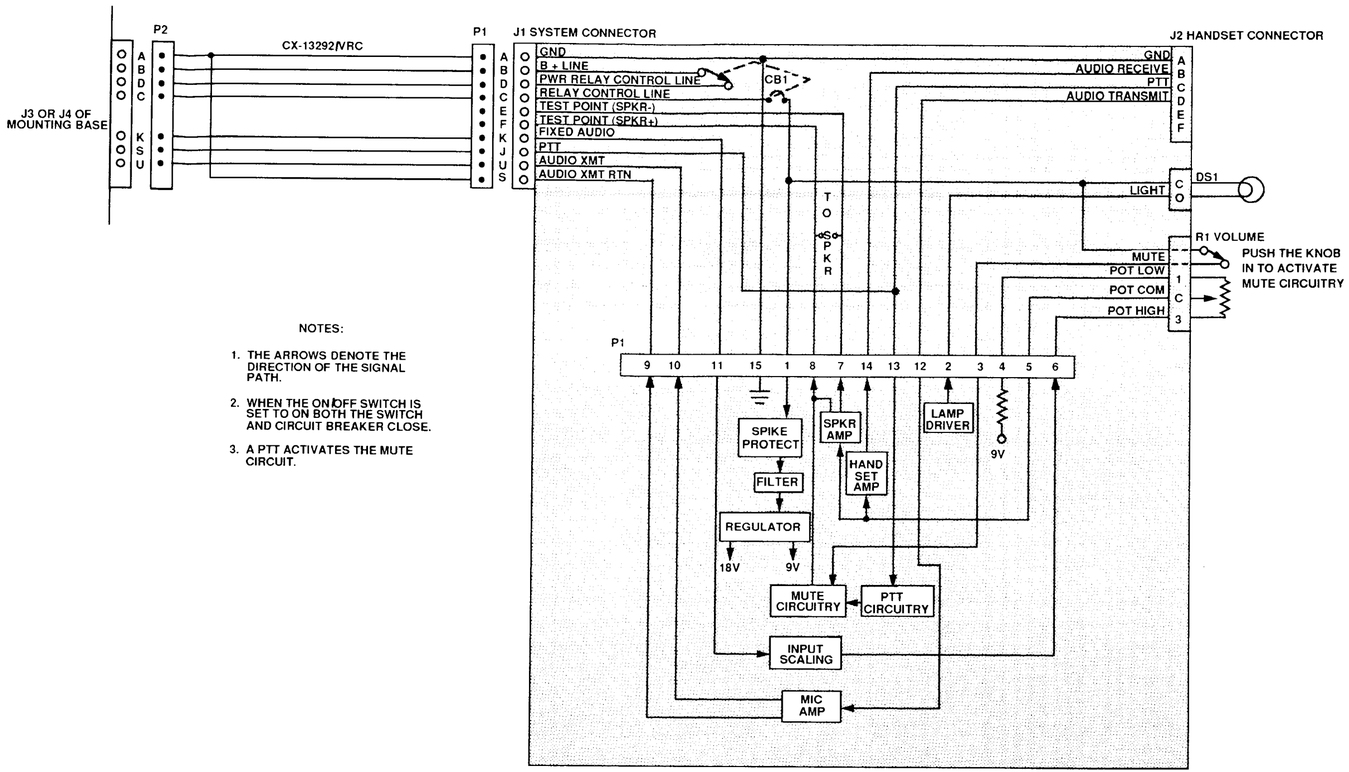


Figure FO-22. Loudspeaker-Control Unit LS-671/VRC Schematic Diagram

ALPHABETICAL INDEX

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function, column. Change "2 dB" to "3 dB". REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 dB (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step f.1 above." REASON: To replace the cover plate.
		FO-3		Zone C 3. On J1-2, change "+24 VDC" to "+5 VDC". REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE
SSG I. M. DeSpiritof 999-1776	

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