TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL,

DIRECT AND GENERAL SUPPORT

MAINTENANCE MANUAL

RADIO TRANSMITTING SET

AN/FRN-41(V)1
(
NSN 5825-01-070-5843)

AND

RADIO TRANSMITTING SET

AN/FRN-41(V)2

(NSN 5825-01-070-5842)

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y
J A N U A R Y 1 9 8 0

TECHNICAL MANUAL

No.11-5875-266-14-3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *28 January 1980*

OPERATOR'S, ORGANIZATIONAL,

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

A reply will be furnished direct to you.

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CHAPTER 1

INTRODUCTION

SECTION I

GENERAL

1-1. SCOPE. This manual includes instructions for performing preshop analysis, overhaul inspection procedures, disassembly, cleaning, reassembly, testing, marking, packaging, quality assurance and quality control requirements. It also lists the types and kinds of materials to be used, procedures and applications, repair parts, special tools and test equipment, time schedules, referenced documentation, and other essential factors which regulate maintenance operations. Refer to TM 11-5825-266-14-1 for operator's and organizational maintenance.

1-2. INDEXES OF PUBLICATIONS.

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are any new editions, changes, or additional publications pertaining to the equipment(s).

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) 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 described by TM 38-750, The Army Maintenance Management System.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DLAR 4145.8.

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

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR). If your Radio Transmitting Set AN/FRN-41(V) needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, New Jersey 07703. We'll send you a reply.

1-5. ADMINISTRATIVE STORAGE. Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

1-6. DESTRUCTION OF ARMY ELECTRONICS MATERIEL. Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-7. DEVIATIONS AND EXCEPTIONS. The following is applicable to contractors using this manual. When any work segment, as set forth in this manual, cannot be accomplished or can only be accomplished in a way other than specified, prior approval of the procuring activity shall be obtained by immediately submitting to the contracting officer/NMP a written notice containing the following information.

a. Serial number (if applicable), part number, and NSN of the affected equip ment.

b. Work elements which will not be completed, or which will not be accomplished exactly as specified herein.

c. Reason for nonaccomplishment or deviation.

d. Action taken to correct condition causing nonaccomplishment or need for deviation.

e. Data relative to availability of parts required, if applicable.

f. Estimated task hours required for completion.

g. Instructions and inspection required to maintain the integrity of the end item because of such omission or deviation.

SECTION II

DATA PLATES AND TABULATED DATA

1-8. DATA PLATES.

a. Equipment Data Plates. The description and detailed information required to fabricate equipment data plates for the AN/FRN-41, are shown in figure 1-1.

b. Overhaul/Modification Data Plates. In the event an overhaul or modification of the equipment is required, an overhaul or modification data plate must be fabricated and attached. The overhaul/modification data plate is fabricated in accordance with MIL-STD-130, Identification Marking of U.S. Military Property and MIL-P-514D, Plate, Identification, Instruction and Marking, Blank. On the overhaul/modification data plate, list the information given in (1) below, use the dimensions stated in (2), and after fabrication, attach the data plate as indicated in (3) below.

NOTE

When sufficient space is not available on the existing data plate to add information, the plate shall be replaced and all pertinent data transferred to the new plate. Data shall not Be stamped directly on any part, assembly, or item of equipment.

(1) The data plate is titled Overhaul/Modification Data and contains the Order No., Data, Part Number and Facility. Use initials for the facility.

(2) The dimensions of the data plate are: width 5/8-inch, length 3 inches; thickness not to exceed 0. 32 inch. The title is lettered in 10-point News Gothic Condensed. All other lettering information is 6-point News Gothic Condensed. Lettering will be etched or stamped.

(3) The overhaul/modification data plate is attached directly above the existing nomenclature data plate. Use an adhesive such as Epoxi-Patch 1C White, MIL-A-8623, NSN 8040-00-777-0361 AF.

1-9. TABULATED DATA. The weight and dimensions for this system are provided in table 2-1 in Technical Manual 11-5825-266-14-1, Volume I. Tabulated reference data for the Radio Transmitting Set AN/FRN-41 are contained in table 1-1 in Volume I of TM 11-5825-266-14-1. The table lists the leading particulars for the AN/F RN-41.

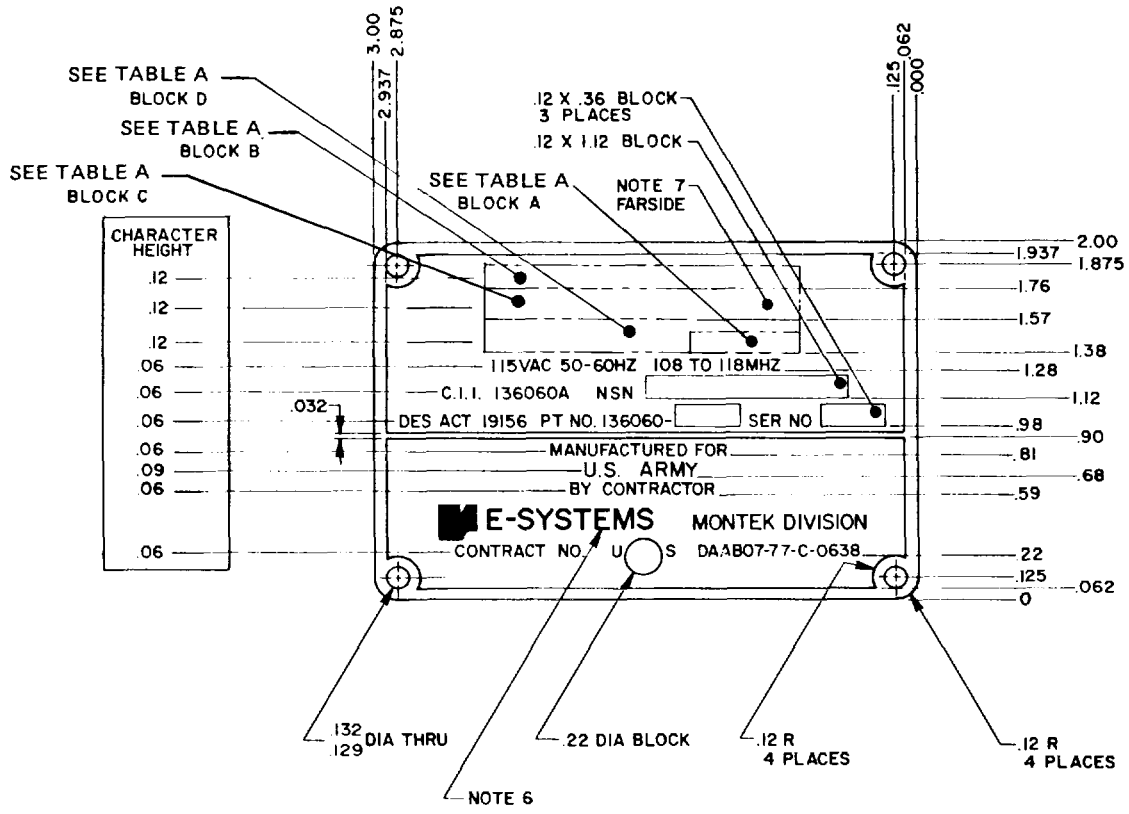


TABLE A

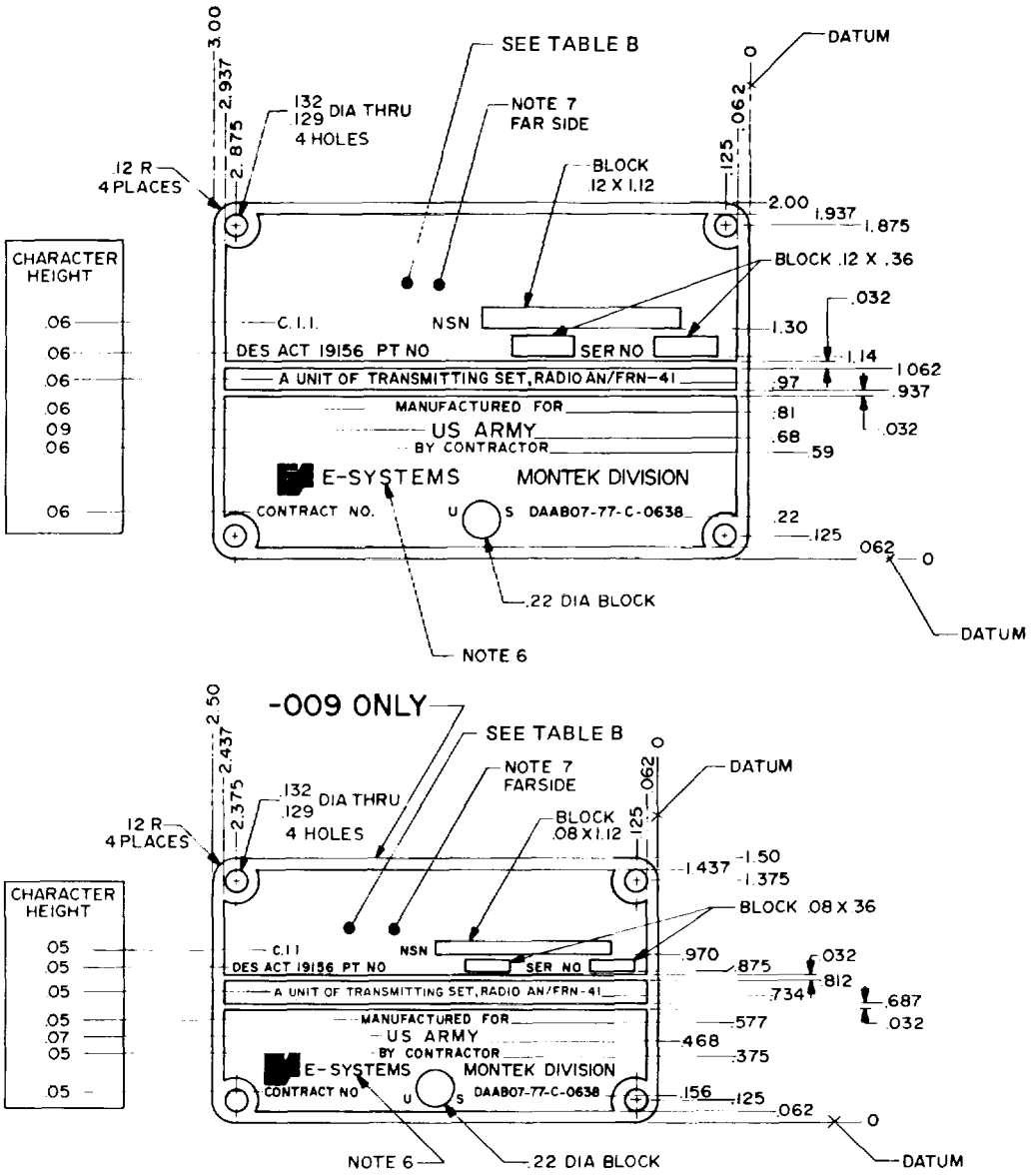
DASH NO.	BLOCK A	BLOCK B	BLOCK C	BLOCK D
-001	V_1	TRANSMITTING SET,	RADIO	AN/FRN-41
-002	V_2	TRANSMITTING SET,	RADIO	AN/FRN-41
-003	—	TRAINING SET,	RADIO TRANSMITTING	AN/FRN-41-T1

NOTES

1. MATERIAL' 032 SHEET ALUMINUM ALLOY 1100-0 PER QO-A-250/I.
2. LETTERING, BLOCKS AND BORDER SHALL BE CLEAR ON BLACK BACKGROUND ANODIZED PER MIL-A-8625, TYPEa, CLASS I AND 2.
3. LETTER STYLE UPPER CASE GOTHIC
4. LINES TO BE CENTRALLY LOCATED
5. MINIMUM DISTANCE FROM LETTERING TO EDGE OF PLATE 25
6. CAMERA READY COPY OF COMPANY LOGO WILL BE FURNISHED TO THE VENDOR.
7. MARK IN 12 CHARACTERS USING BLACK EPOXY INK AS SPECIFIED 19136029-(DASH NO.).

A. SYSTEM DATA PLATE

Figure 1-1. Equipment Data Plates (Sheet 1 of 3)



NOTES:

1. **MATERIAL: .032 SHEET ALLUMINUM ALLOY 1100-0 PER QQ-A-250/1**
2. **LETTERING, BLOCKS AND BORDER SHALL BE CLEAR ON BLACK BACKGROUND, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1 AND 2.**
3. **LETTER STYLE: UPPER CASE GOTHIC.**
4. **LINES TO BE CENTRALLY LOCATED.**
5. **MINIMUM DISTANCE FROM LETTERING TO EDGE OF PLATE .25.**
6. **CAMERA READY COPY OF COMPANY LOGO WILL BE FURNISHED TO THE VENDOR.**
7. **MARK IN .12 CHARACTERS USING BLACK EPOXY INK AS SPECIFIED: 19156-136028-(DASH NO.**

B. UNIT AND DRAWER ASSEMBLY DATA PLATES

Figure 1-1. Equipment Data Plates (Sheet 2 of 3)

TABLE B

DASH NO	CHAR HEIGHT	ADD TO UPPER HALF	LOCATION FROM DATUM
-001	.12	ANTENNA	1.76
	.12	AS-3323/FRN-41	1.58
	.06	108-118MHz	1.47
		C.I.I. NO. 136202A	
		PT. NO. 136202-	
-002	.12	TRANSMITTER GROUP	1.76
	.12	OT-117/FRN-41	1.58
	.06	115VAC 50-60Hz, 108-118MHz	1.47
		C.I.I. NO. 136335A	
		PT NO. 136335-	
-003	.12	CONTROL-INDICATOR	1.76
	.12	C-10526/FRN-41	1.58
	.06	115VAC 50-60Hz	1.47
		C.I.I. NO. 136815A	
		PT. NO. 136815-	
-004	.12	RACK, ELECTRICAL EQUIPMENT	1.76
	.12	MT-6011/FRN-41	1.58
	.06	115VAC 50-60Hz	1.47
		C.I.I. NO. 136320A	
		PT. NO. 136320-	
-005	.12	CONTROL-INDICATOR	1.76
	.12	C-10527/FRN-41	1.58
	.06	115VAC 50-60Hz, 108-118MHz	1.47
		C.I.I. NO. 136740A	
		PT NO. 136740-	
-006	.12	MONITOR, PHASE MODULATION	1.76
	.12	ID-2179/FRN-41	1.58
	.06	115VAC 50-60Hz, 108-118MHz	1.47
		C.I.I. NO. 136500A	
		PT.NO. 136500-	
-007	.12	TRANSMITTER, RADIO	1.76
	.12	T-1394/FRN-41	1.58
	.06	115VAC 50-60Hz, 108-118MHz	1.47
		C.I.I. NO. 136490A	
		PT.NO. 136490-	
-008	.12	TRANSMITTER, SIDEBAND	1.76
	.12	T-1395/FRN-41	1.58
	.06	28VAC 108-118MHz	1.47
		C.I.I. NO. 136645A	
		PT. NO. 136645-	
-009	.09	DETECTOR, RADIO FREQUENCY	1.30
	.09	DT-603/FRN-41	1.17
	.05	108-118MHz	1.08
		C.I.I. NO. 136861A	
		PT. NO. 136861-	
-010	12	SHELTER	1.76
	12	S-597/FRN-41	1.58
	06	230 115VAC 50-60Hz	1.47
		C.I.I. NO. 136130A	
		PT. NO. 136130-	

Figure 1-1. Equipment Data Plates (Sheet 3 of 3)

CHAPTER 2

SPECIAL TOOLS AND TEST EQUIPMENT

2-1. GENERAL. The facilities selected for direct support/general support and depot repairs must provide power requirements of 108 to 118 volts 60 Hz at convenient locations within the facility.

2-2. SUPPORT ITEMS.

a. Special Tools and Equipment. A list of required but not supplied special category hand tools for maintenance of the AN/FRN-41 system is contained in table 2-1.

b. Inspection and Test Equipment. Inspection and test equipment (or equivalent) required for maintenance of the equipment are listed in table 2-2.

c. Repair Parts. All repair parts required for rebuild and overhaul of the AN/FRN-41 are listed in the repair parts and special tools list manual (TM 11-5825-266-24P).

2-3. MODIFICATIONS. Refer to DA PAM 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

Table 2-1. Special Tools and Test Equipment

Nomenclature	Part Number or NSN	Reference Paragraph of USE
Crimp Tool	Amphenol P/N 227-1221-57	Table 3-3
Crimp Tool	Amphenol P/N 227-1221-09	Table 3-3, 6-2
Crimp Tool	Amphenol P/N 227-1221-11	Table 3-3
Crimp Tool	Amphenol P/N 227-1221-25	Table 3-6
Crimp Tool	Bumdy M8ND 8120-00-767-9133	Table 3-3, 4-1, 5-1, 6-2, 7-1, 8-1
Positioner for use with M 8 ND	Burndy N 16 RT-24	Table 3-3, 4-1, 7-1
Positioner for use with M 8 ND	Burndy N 20 RT-29	Table 3-3, 4-1, 5-1, 6-2, 7-1, 8-1
Extraction Tool	RX16D11 5120-01-036-5422 (Montek P/N 910923)	Table 3-3, 4-1, 5-1, 6-2, 7-1, 8-1
Crimp Tool	AMP 59275	Paragraph 3-30 g.
Crimp Tool	AMP 49250	Paragraph 3-30 g.
Crimp Tool	AMP 59239-4	Paragraph 3-30 g.

Table 2-2. AN/FRN-41 Test Equipment List

Nomenclature	Part No/ Model No.	Used At (Note 1)	FMC	National Stock No/ Mfg. Part No.
Multimeter	ME-498/U (HP34702A)	0, F, D	28480	6625-00-538-9794
Display	ID-2101/U (HP 34750A)	O, F, D	28480	6625-00-538-9758
Frequency Converter	CV 2002/U (HP 5253B)	O, F, D	28480	6625-00-226-3483
Digital Counter	CP-772A/U (HP 5245L)	O, F, D	28480	6625-00-9734837
Oscilloscope (Probes included)	OS-261/U (TEK 475)	0	80009	6625-00-127-0079
Oscilloscope (Main Frame)	0S-262/U (TEK 7623A)	0, F, D	80009	6625-01-007-9416
Spectrum Analyzer Plug in	7L13	O, F, D	80009	6625-00-538-9809
Dual Trace Amplifier	AM6785/U 7A26	O, F, D	80009	6625-00-361-5318
Time Base	TD- 1159/U (TEK 7853A)	O, F, D	80009	6625-00-261-5139
Switchable Attenuator Probe, 6 ft (2ea) used with OS-262/U	P6062A	O, F, D	80009	6625-00-368-0475
RF Signal Generator	SG-11.12/U (HP 8640 OPT004)	F, D	28480	6625-00-566-3067
Telephone Test Set (See note 2)	AN/USM-423 (HP 35508-H03)	O, F, D	28480	6625-01-015-6563
Pulse Generator	1108	0, F, D	52542	6625-00-113-6353
Average Power Meter	ME-441/U (HP 432A)	O, F, D	28480	6625-00-436-4883
Thermistor Mount	478A	0, F, D	28480	6625-00-886-1955

Table 2-2. AN/FRN-41 Test Equipment List (Contd)

Nomenclature	Part No/ Model No;	Used At (Note 1)	FMC	National Stock No/ Mfg. Part Number
Radio Frequency Power Test Set	AN/USM-298 (BIRD 43)	O, F, D	70998	6625-00-880-5119
250 Milliwatt	430-24	0, F, D		
2.5-Watt Element (95-150 MHz)	095-2	0, F, D		
5-Watt Element	5C	O, F, D	70998	6625-00-7674215
100-Watt Element	100C	O, F, D	70998	6625-00-804-9671
Attenuator 20 dB	768-20	0, F, D	99899	5985-00-256-8449
Attenuator 30 dB	768-30	F, D	99899	5985-00-233-4626
RF Probe	HP11096B	O, F, D	28480	6625-00-471-0575
VOR Navigational Set Training Configuration		F, D	19156	136138-100
Extender Card 29 Pin		O, F, D	19156	135919-100
Extender Card 100 Pin, 10 inch		O, F, D	19156	136733-101
Extender Card 100 Pin, 14 inch		O, F, D	19156	136733-102
RF Dummy load 150 Watt Bird 8135		O, F, D	70998	6625-00-773-7311
RF Dummy load 5 Watt (2 ea.) Bird 80M		O, F, D	70998	5840-00-669867

The following accessories are also recommended items which should be included in the test equipment list as required but not supplied equipment.

Table 2-2. AN/FRN-41 Test Equipment List (Contd)

Nomenclature	Part No/ Model No.	Used At (Note 1)	FMC	National Stock No/ Mfg. Part Number
Magnifying Glass 3X		O, F, D		
16-Pin Test Clip		O, F, D	Archer	276-1951
Adjustment Tool		O, F, D	JFD	5284

Note 1: The following codes are used to establish compatibility with referenced Logistic Support Analysis record summaries contained in the Appendix.

0 - Organizational F= Intermediate D = Depot

Note 2: The Telephone Test Set is comprised of: an Electronic Voltmeter ME-204B/U (HP403B-001); Signal Generator SG-543B/U (HP 20-2048); and Impedance Matching Attenuator CN-1491/U (HP353A).

CHAPTER 3

MAINTENANCE, OVERHAUL AND REPAIR

SECTION I

GENERAL

3-1. ARRANGEMENT. This chapter and chapters 4 through 9 provide complete maintenance, overhaul and repair requirements for the Radio Transmitting Set AN/FRN-41. This chapter delineates the overall and general requirements for safety, preshop analysis and in-process inspection requirements for all assemblies, and subassemblies of the AN/FRN-41. This chapter contains general disassembly, repair and assembly procedures for the electrical equipment rack, field detector and antenna which are not complex enough to warrant a separate chapter. Detailed maintenance, overhaul and repair instructions for major assemblies such as the local control, monitor, radio transmitter, sideband transmitter, remote control and the shelter are provided in Chapters 4, 5, 6, 7, 8 and 9 respectively.

3-2. REFERENCES. The information to support the maintenance requirements of this system is contained within this manual with reference made to TM 11-5825-266-24P for repair parts and to TM 11-5825266-14-1 and -2 for system type test procedures where applicable.

SECTION II

SAFETY

3-3. PRECAUTIONS. While every practical safety precaution has been incorporated in this equipment, the following rules must be strictly observed.

a. Keep Away From Live Circuits. Operating personnel must at all times observe all safety regulations. Do not make adjustments inside equipment with high-voltage supply on. Under certain conditions, dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors To avoid damage to the equipment always remove power and discharge ground circuits prior to touching them.

b. Do Not Perform Service or Adjustment Alone. Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence or assistance of another person capable of rendering aid.

c. Safety Notes:

(1) Make sure you are not grounded whenever you are adjusting equipment or using measurement equipment

(2) In general, use one hand only when servicing live equipment.

(3) If test meter must be held or adjusted while voltage is applied, ground the case of the meter before starting measurement, and do not touch the live equipment or personnel working on live equipment while you are holding the meter. Some moving-vane-type meters should not be grounded. These should not be held during measurements.

(4) Do not forget that, due to equipment breakdown, high voltages may be present across terminals that are nominally low voltage. Be careful even when measuring low voltages.

(5) Do not use test equipment known to be in poor condition.

(6) High-voltage, high-capacity capacitors should be discharged with a grounding stick with approximately 10 ohms in series with the grounded line. Where neither terminal of a capacitor is grounded, short capacitor terminals to each other.

SECTION III

PRESHOP ANALYSIS

3-4. PURPOSE AND SCOPE. The purpose of preshop analysis is to determine, prior to beginning overhaul activities, the extent of overhaul required to return the Radio Transmitting Set AN/FRN-41, to a serviceable condition as specified herein.

This chapter contains the requirements applicable to preshop analysis. These requirements include unpacking instructions, cleaning, inspection, diagnostic testing, scheduling, and preparing work estimates required for performing depot maintenance. Evaluation of the equipment is made to determine the extent of cleaning, repair, modification, or replacement of parts needed to make the item completely serviceable.

3-5. UNPACKING INSTRUCTIONS.

a. Packing Data. The equipment should be received at the depot or contractor's plant packed in an appropriate way to prevent damage to the equipment. This includes packing the equipment in a polystyrene case wrapped in a vaporproof paper, and sealed securely in a corrugated carton. The corrugated cartons should contain filler material to prevent movement of the equipment within the carton. The interior of each package should contain at least two bags of desiccant to absorb moisture and dampness. Small items, such as printed circuit modules, should be packed in a blisterpak material (or equivalent) with desiccant material and wrapped in vaporproof paper.

NOTE

Instructions given in a. above describe the ideal way for receiving items at a depot or contractor's plant; however, depending on tactical situations and the availability of packing materials at hand, items may be shipped partially packed or, in some cases, without any packing material. In these cases, extra care should be taken when receiving items to prevent further damage to equipment.

b. Unpacking Major Components.

(1) Cut reinforced paper tape along top of corrugated carton and open corrugated carton.

NOTE

If corrugated carton is crated in a wooden box, remove corrugated carton from wooden box and retain box for reuse.

(2) Remove and retain paper work (tags, maintenance forms, etc.) from corrugated carton. Retain corrugated carton for reuse.

(3) Remove major component from vaporproof paper and polystyrene case.

(4) Discard filler material, desiccant, and vaporproof paper. Retain polystyrene case for reuse.

c. Unpacking Printed Circuit Boards.

(1) Cut the vaporproof paper carefully and remove blisterpak containing printed circuit board.

(2) Remove and retain paper work (tags, maintenance forms, etc.).

(3) Open blisterpak and remove module or printed circuit board.

(4) Discard desiccant, vaporproof paper and blisterpak.

3-6. EXAMINATION AND DIAGNOSTIC TESTING. Examination and diagnostic testing is an evaluation of a repairable item to determine the extent of repair, modification, or replacement necessary to make the item completely serviceable. Diagnostic testing includes, but is not limited to, the following; checking maintenance forms and tags attached to the equipment, and performing a preshop analysis checklist. The procedures for diagnostic testing are given in a. and b. below. These procedures should be performed in the sequence given or until a definite evaluation as to the extent of repair, rebuild or overhaul is made.

a. Checking Maintenance Forms and Tags.

(1) Physically check to see that each item received has a maintenance form or tag attached. Check all tags and forms attached to items to determine the reason for removal from service and other discrepancies. Do not remove tags from equipment. If an item received is missing maintenance forms or tags refer to the instructions given in paragraph 1-4.

(2) Record the parts and repairs indicated by the tags and maintenance forms on a work estimate form used by the local activity or applicable work estimate form used by the contractor.

(3) Check DA Pam 310-7 for any MWO pertaining to the equipment.

(4) Visually check the item for compliance with all MWO's.

(5) List outstanding MWO's on work estimate form.

b. Preshop Analysis Checklist. The following instructions are intended as a guide for performing a diagnostic analysis to determine the extent of cleaning, repair, modification or replacement needed to make the defective item completely serviceable. Included in this section are in-process inspection, troubleshooting and diagnostic disassembly procedures.

NOTE

Utilize the test, troubleshooting procedures, voltage measurements, and schematic and wiring diagrams given in TM-11-5825-266-14-1 and -2 as required, in order to determine and evaluate the extent of repair to the equipment.

(1) In-Process Inspection. Prior to performing any tests or operational checks, perform a visual in-process inspection for the defective item as described in Section IV of this chapter.

(2) Troubleshooting Aids. Troubleshooting charts for the most common failures are provided for troubleshooting the system to the drawer level. System troubleshooting charts to fault isolate to the unit and assembly (drawer) level are contained in Chapter 3. Troubleshooting charts to troubleshoot major units and assemblies to the module and circuit level are provided in each of the applicable chapters.

(3) Diagnostic Disassembly. Diagnostic disassembly should only be performed on the equipment to the extent necessary to determine the location of the defective module or part and to evaluate the extent of the repair needed. Basic disassembly requirements for testing will be detailed in the troubleshooting charts. Operational tests are also listed as part of the troubleshooting section. Final checks to check the equipment will be accomplished in accordance with the performance checks outlined in chapter 4.

3-7. ELIGIBILITY OF REPAIR, REBUILD, OR OVERHAUL.

a. General. Upon completion of the diagnostic testing (paragraph 3-6), a determination is made as to the eligibility of repairing, rebuilding or overhauling an item. This determination is based on the cost factors involved in the maintenance process. For an item to be eligible for repair, rebuild or overhaul, the estimated cost of the work, or expenditure limit, shall not exceed the prescribed percentage of the cost of replacement as listed in table 3-1. Table 3-1 lists the expenditure limits for the equipment and accessories; for example, if an item is type-classified STANDARD, is presently being procured, and has an age of three years, the prescribed expenditure limit would be 65 percent of the item cost.

b. Cost Estimates. Cost estimates are based on the results of diagnostic testing (paragraph 3-6) by qualified personnel and making maximum use of available diagnostic equipment. The factors involved in making realistic cost estimates include, but are not limited to, direct labor costs, materials cost, indirect maintenance expenses, and general and administrative costs. For a detailed computation of cost estimates, refer to the instructions given in AR 750-27. The total maintenance cost is weighed against the cost of the item and must meet the criteria listed in table 3-1. Current standard prices on all items can be found in SB 70020, or Management Data List (ML) of DA Supply Catalogs.

Table 3-1. Equipment Expenditure Limits

Type Classification	Age in Years		
	0 to 5	5 to 10	0 and Above
STANDARD (presently being procured)*	65%	55%	30%
STANDARD (no longer procured)	55%	40%	20%
CONTINGENCY	45%	25%	100/

*** LIMITED PROCUREMENT is 65 percent until the item is classified.**

SECTION IV

IN-PROCESS INSPECTION

3-8. GENERAL INSPECTION REQUIREMENTS. The instructions for in-process inspection are given in paragraphs a. through s. below. The equipment shall be subject to these requirements during the maintenance, overhaul or repair functions as applicable. Every portion of the in-process inspection during these maintenance functions must meet the criteria specified in TB SIG 355 Series.

a. Chassis. Inspect the chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors, damaged fastener devices, damaged handles, component corrosion and damage to the finish.

b. Connectors. Inspect connectors for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed or out of alignment Also check for corroded or damaged plating on contacts and for loose, improperly soldered, broken or corroded terminal connections.

c. Capacitors, Fixed. Inspect capacitors for case damage, body damage, and cracked, broken or charred insulation. Check for loose, broken or corroded terminal studs, lugs or leads. Inspect for loose, broken or improperly soldered connections.

d. Capacitors, Variable. Inspect trimmers for chipped and cracked bodies, damaged dielectrics and damaged contacts.

e. Covers and Shields. Inspect covers and shields for punctures, deep dents and badly worn surfaces. Also check for damaged fastener devices, corrosion and damage to finish.

f. Exterior Surfaces and Attaching Hardware. Inspect the exterior surfaces for damage, dirt or corrosion. Check all attaching hardware to be sure that they are complete, assembled, mounted and secured so as to satisfactorily accomplish their intended purpose.

g. Fuse. Inspect for blown-out or missing fuses.

h. Indicators. Inspect fault indicators for cracked or broken face plate or housing.

i. Insulators. Inspect all insulators for evidence of damage, such as broken or chipped edges, burned areas and presence of foreign matter.

j. Jacks. Inspect all jacks for corrosion, rust, loose or broken parts, cracked insulation, bad contacts or other irregularities.

k. Potentiometers. Inspect all potentiometers for evidence of damage such as dents, cracked insulation or other irregularities.

I. Printed Circuit Boards. Inspect printed circuit boards for obvious signs of damage. Where epoxy solution has been used, be sure that the epoxy solution has not covered electrical contacts or moving mechanical parts. Check all mounted parts on the printed circuit board for missing or damaged parts. There shall be no evidence of burns or corona discharge. Check for damaged crystals or I.C.'s.

m. Integrated Circuit Cards. Inspect all integrated circuits for broken leads. The cards should be free of all foreign material.

n. RF Coils. Inspect all RF coils for broken leads, loose mountings and loose, improperly soldered or broken terminal connections. Check for crushed, scratched, cut or charred windings. Inspect the windings, leads, terminals and connections for corrosion or physical damage. Check for physical damage to forms and tuning slug adjustment screws.

o. Resistor, Fixed. Inspect the fixed resistors for cracked, broken, blistered or charred bodies and loose, broken or improperly soldered or corroded terminal connections.

p. Switch, Pushbutton. Examine the switches for a bent, weak or broken pushbutton or broken case.

q. Terminal Connections, Soldered.

(1) Inspect for cold-soldered or resin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using the point of a tool.

(2) Examine the terminals for excess solder, protrusions from the joint, pieces adhering to adjacent insulation and particles lodged between joints, conductors or other components.

(3) Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at the terminal. Check for insulation that is stripped back too far from the terminal.

(4) Inspect for corrosion at the terminal.

r. Transformer.

(1) Inspect for signs of excessive heating, physical damage to case, cracked or broken insulation and other abnormal conditions.

(2) Inspect for corroded, poorly soldered or loose connecting wires.

s. Wiring. Inspect open and laced wiring of chassis, subassembly chassis and parts of equipment for breaks in insulation, conductor breaks, cut or broken lacing and improper dress in relation to adjacent wiring or chassis. Inspect wiring leads to insure that they are tightly crimped to terminals and show no signs of having been moved while being soldered. Solder will show a shiny, smooth surface feathering out at the edges where it joins the outer layer of metal terminal or painted wire.

3-9. DEFECTIVE MATERIAL. The following instructions are applicable to all components when performing maintenance, overhaul and repair.

a. Unserviceable equipment determined to be uneconomically repairable will be reported to the cognizant item manager. Depots shall process the reports in accordance with current established procedures. Contractors shall report unserviceable equipment to the contracting officer. Item managers shall direct the maintenance facility to dispose of the unserviceable item or salvage usable parts for cannibalization purposes. In certain situations, an item may be critically needed regardless of its repair status.

b. Defective material such as piece parts or minor components shall be reported and disposed of in accordance with AR 755-1 and current established procedures for direct support/general support and depot repairs.

c. Used components and refinished parts recovered as products of disassembly will be examined by the contractor to determine serviceability.

3-10. TOLERANCES AND ADJUSTMENTS. Tolerance limits for performance checks or other testing requirements are specified for applicable tasks. These limits are specified in the troubleshooting chart, preventive maintenance performance checks and alignment and adjustment procedures contained in this manual or the operating and maintenance manual TM 11-5825-266-14-1 and -2.

SECTION V

REMOVAL OF MAJOR ASSEMBLIES

3-11. CONTROL INDICATOR C-10527/FRN-41 (1A2). Remove the control indicator assembly from the electrical equipment rack and disassemble per the following procedures. For complete maintenance, overhaul and repair of the control-indicator, refer to Chapter 4.

a. Press the locks on the chassis handles and slide the control indicator chassis out approximately 12 inches.

b. Disconnect connectors 1AlP1 (1A2J1), 1A-1P2 (1A2J2), 1A1P3 (1A2J3) 1ALP12 (1A2J4) and 1A1P13 (1A2J6) from the rear of the control-indicator chassis.

c. Slide the control indicator chassis out until the chassis is free from the electrical panel.

3-12. PHASE MODULATION MONITOR ID-2179/FRN-41 (1A3). Remove the phase modulation monitor from the electrical equipment rack as follows. For complete maintenance, overhaul and repair procedures for the phase modulation monitor, refer to Chapter 5.

a. Press the locks on the chassis handles and slide the phase modulation monitor out approximately 12 inches.

b. Disconnect connector P4 (1A3J1) from the phase modulation monitor chassis.

c. Slide the phase modulation monitor chassis out until the chassis is free from the electrical equipment rack.

3-13. RADIO TRANSMITTER T-1394/FRN-41 (1A4). Remove the radio transmitter chassis from the electrical equipment rack and disassemble per the following procedures. For complete maintenance, overhaul and repair procedures for the radio transmitter, refer to Chapter 6.

a. Press the locks on the chassis handles and slide the radio transmitter chassis out approximately12 inches.

b. Disconnect connectors 1A1W2P1 (1A4J1), 1ALP5 (1A4J2), 1A1P6 (1A4J3) and 1A1W3P1 (1A4F L1J2) from the radio transmitter chassis.

c. Slide the radio transmitter out until the transmitter chassis is free from the electrical equipment rack.

3-14. SIDEBAND TRANSMITTER T-1395/FRN-41 (1A5). Remove the sideband transmitter from the electrical equipment rack and disassemble per the following procedures. For complete maintenance, overhaul and repair procedures for the sideband transmitter, refer to Chapter 7.

a. Press the locks on the chassis handles and slide the transmitter assembly out approximately 12 inches.

b. Disconnect connectors 1A1W2P2 (1A5A5J1), 1A1P7 (1A5J1), 1A1W6P1 (1A5A2J2) and 1A1W6P3 (1A5A3J2) from the rear of the sideband transmitter chassis.

c. Slide the sideband transmitter chassis out until the chassis is free from the electrical equipment rack.

3-15. RADIO FREQUENCY DETECTOR DT-603/FRN-41 (UNIT 2). Remove the radio frequency detector from the shelter per the following procedures. For complete maintenance, overhaul and repair procedures for the radio frequency detector, refer to chapter 3, section VIII.

a. Disconnect cable connector J1 from the coaxial cable.

b. Lift the radio frequency detector from the bracket assembly.

3-16. ANTENNA AS-3323/FRN-41 (UNIT 3). Remove the antenna as follows: for complete maintenance, overhaul and repair procedures for the antenna refer to chapter 3, section VIII.

a. Disconnect the line matching and carrier cables from the left side of the electrical equipment rack.

b. Disconnect the cable connector leading to the obstruction lights.

c. Lift the antenna from the antenna pedestal and remove through the access door.

NOTE

Two men are required to lift the antenna from the antenna pedestal and remove the antenna through the access door.

3-17. CONTROL-INDICATOR C-10526/FRN-41 (Unit 4). Remove all connecting cables P1, 4J1, 4J2, 4J4 and 4J5 from the Control-Indicator C-10526/FRN-41, and remove from cabinet or rack. Complete maintenance, overhaul and repair procedures are outlined in Chapter 8.

3-18. SHELTER S-597/FRN-41 maintenance, overhaul, and repair procedures for the shelter are contained in chapter 9.

SECTION VI

DISASSEMBLY

3-19. CLEANING. Do not perform needless disassembly of the equipment for the purpose of cleaning. Clean the equipment only to the extent required for preshop analysis.

a. Exterior Surfaces.

WARNING

Freon fumes are toxic. Provide thorough ventilation whenever used. DO NOT use near an open flame. Freon is not flammable but exposure of the fumes to an open flame or hot metal surface forms highly toxic phosgene gas.

(1) Remove dust and dirt from exterior surfaces of the equipment with a clean, lint-free cloth and camel's hair brush.

(2) Remove grease, fungus, and ground-in dirt from the equipment using a clean, lint-free cloth dampened (not wet) with freon. If difficulty in removing the dirt occurs, dampen the cloth with water and mild soap and clean as required.

(3) Dry the area with a dry, lint-free cloth.

3-20. RF POWER MONITOR MT-6011/FRN-41 DISASSEMBLY PROCEDURES. Refer to figure 3-1 for the location of equipment contained in the electrical equipment rack and disassemble the RF power monitor per the following procedures.

NOTE

Shut off all power to the Radio Transmitting Set AN/FRN-41, prior to performing disassembly procedures.

a. Front Panel Disassembly,

(1) Remove the four screws from the front panel which holds the power monitor panel to the electrical equipment rack. (Refer to figure 3-2.)

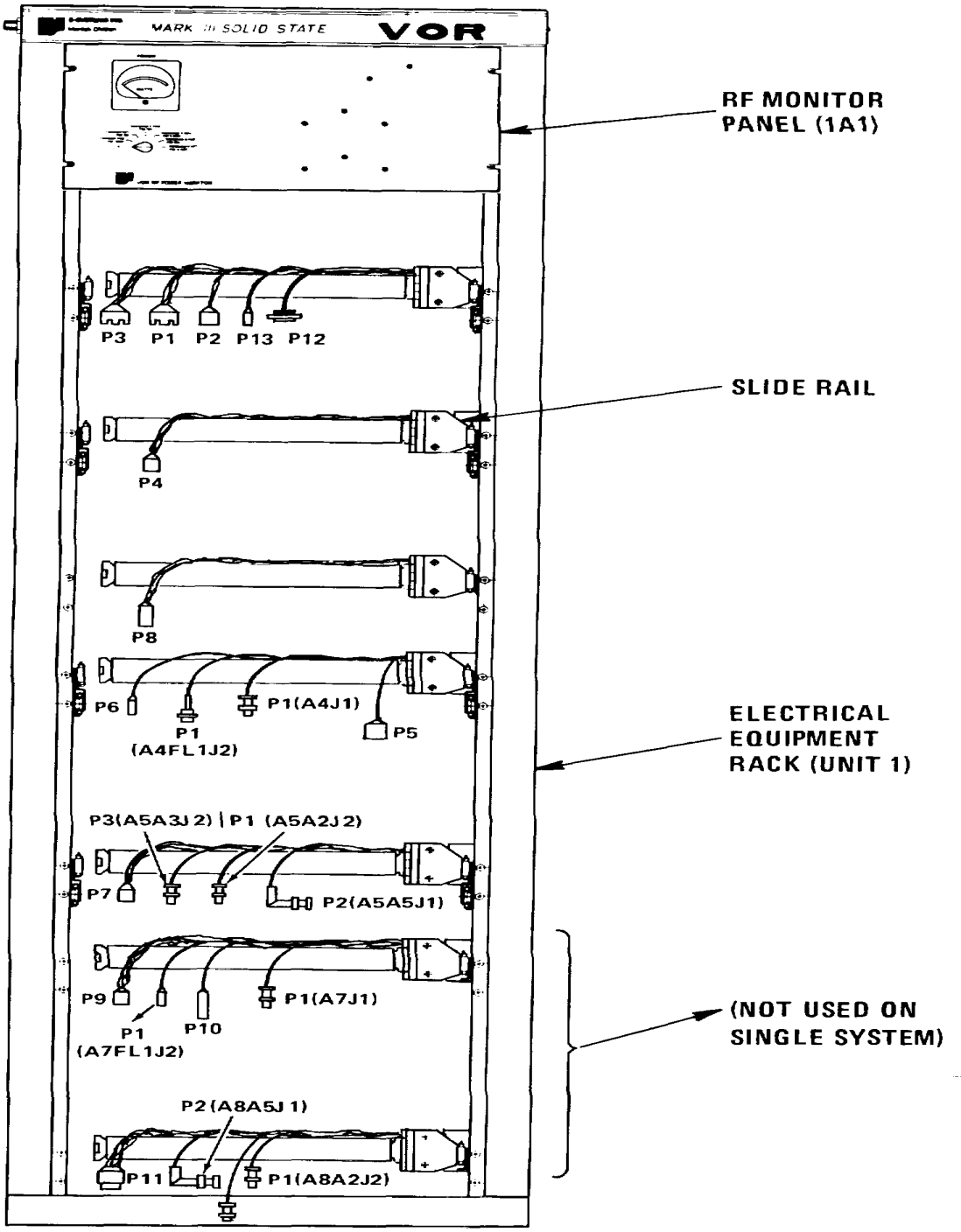


Figure 3-1. VOR Electrical Equipment Rack

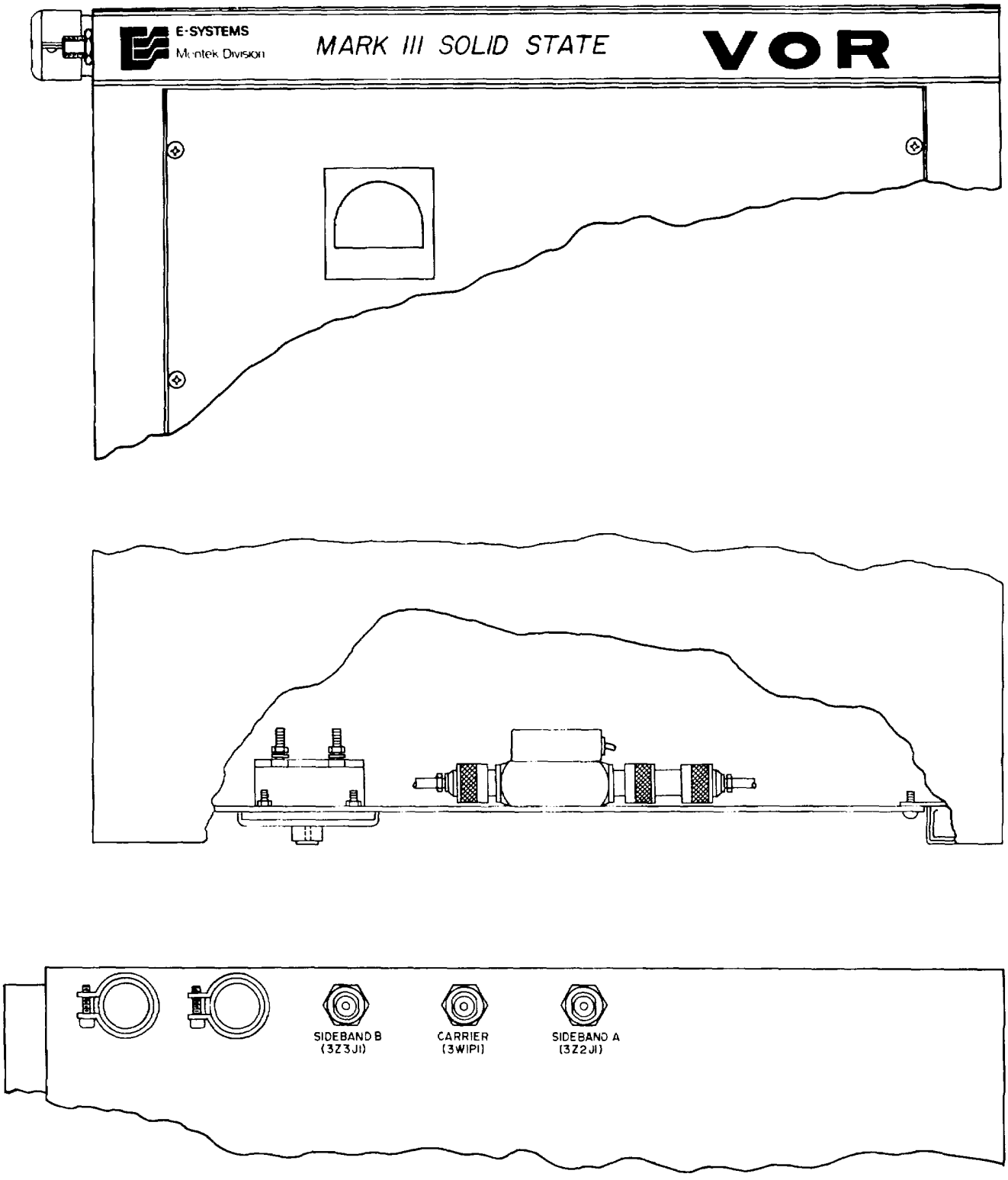
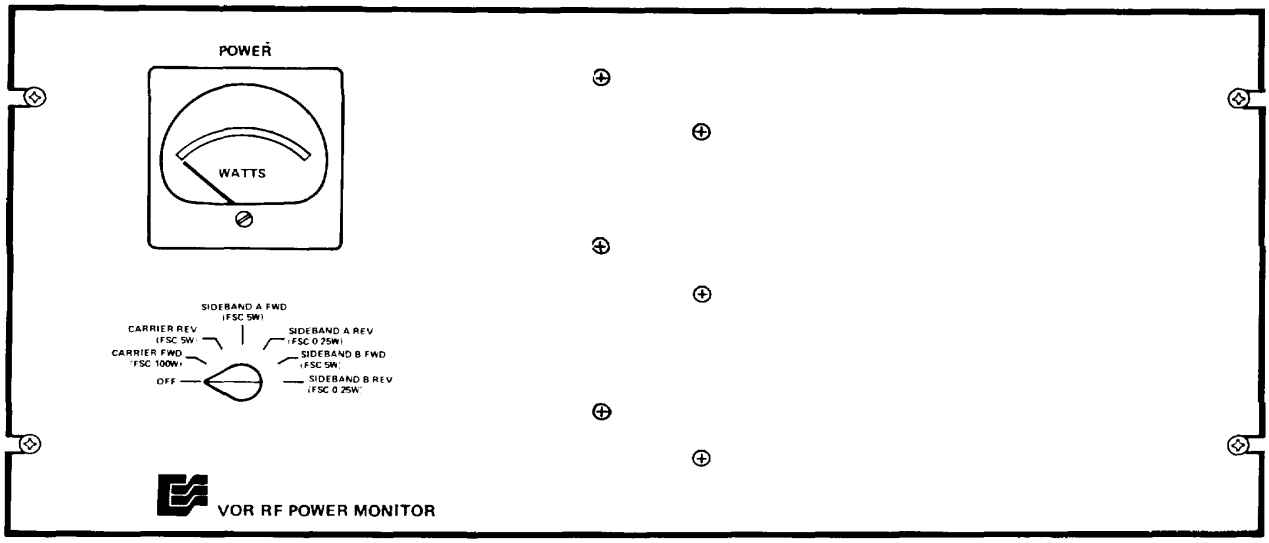
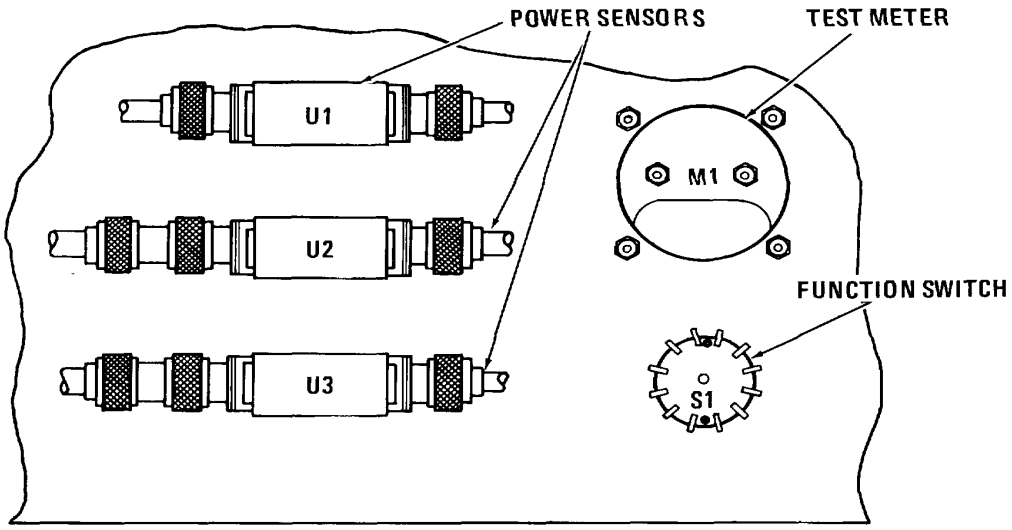


Figure 3-2. Electrical Equipment Rack Disassembly (Sheet 1 of 3)



FRONT PANEL



BACK PANEL

Figure 3-2. Electrical Equipment Rack Disassembly (Sheet 2 of 3)

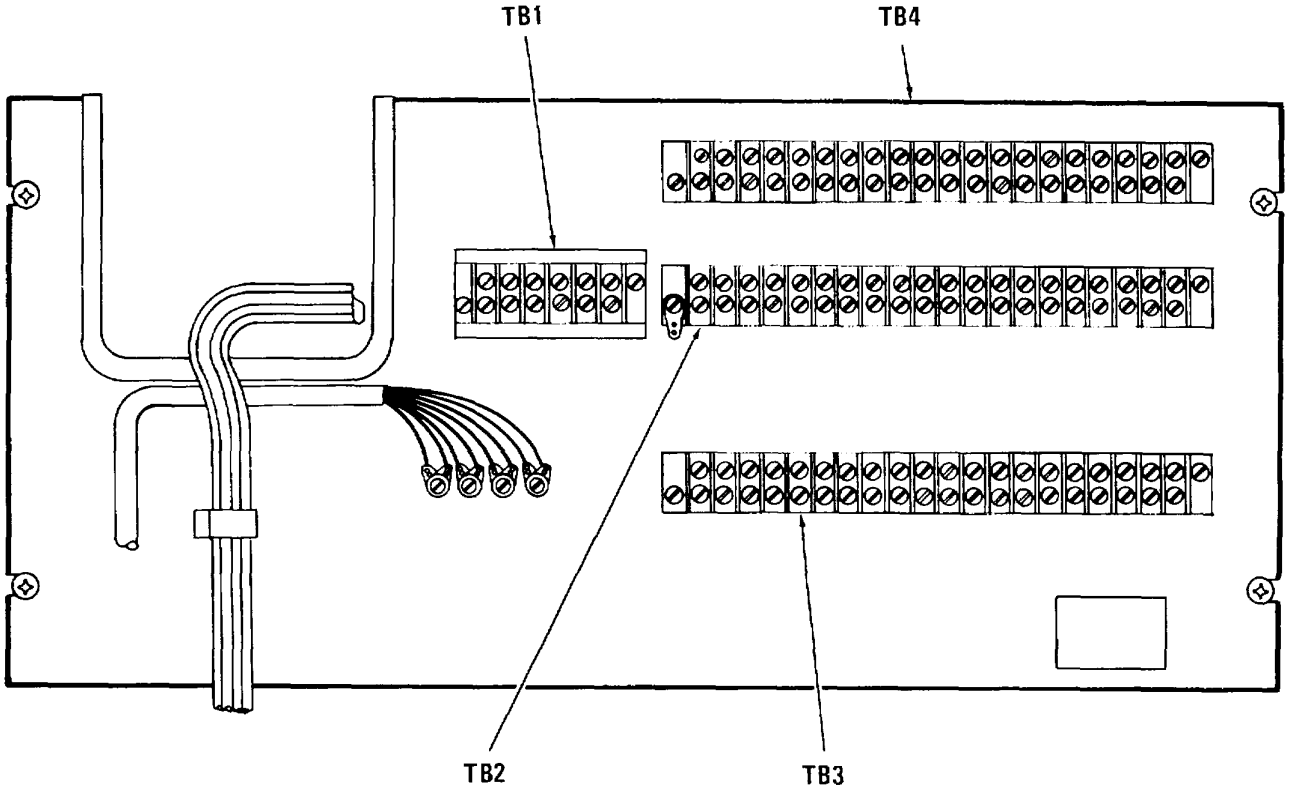


Figure 3-2. Electrical Equipment Rack Disassembly (Sheet 3 of 3)

(2) Disconnect the coaxial cable connectors from the rear of the front panel.

NOTE

To disassemble front panel mounted components, first disassemble front panel by removing the four screws which hold the panel to the electrical equipment rack.

b. Power Meter M1 Disassembly.

(1) Remove four nuts, washers and screws holding power meter M1 to the front panel.

(2) Disconnect the (+) wire and the (-) wire from the rear of the front panel and remove the power meter from the front panel.

c. Power Sensor Disassembly.

(1) Remove the coaxial cables from power sensors U1, U2 and U3.

(2) Remove the six screws which hold the three power sensors,U1, U2, and U3,to the front panel.

d. Function Switch Disassembly.

(1) Disconnect 10 wire leads and remove rotary function switch S1 from the front panel.

e. Terminal Board Disassembly.

(1) Remove wires from the terminal boards and tag.

(2) Remove eight screws, nuts and washers holding terminal boards TB1, TB2, TB3, and TB4 in place.

f. Slide Rail and Retractor Mounting Bracket Disassembly. Disassemble the slide rail per the following procedure (refer to figure 3-3).

(1) Remove the two screws which hold the right slide rail to the front electrical equipment rack support brace.

(2) Remove the screw which holds the right slide rail and retractor bracket to the retractor mounting bracket.

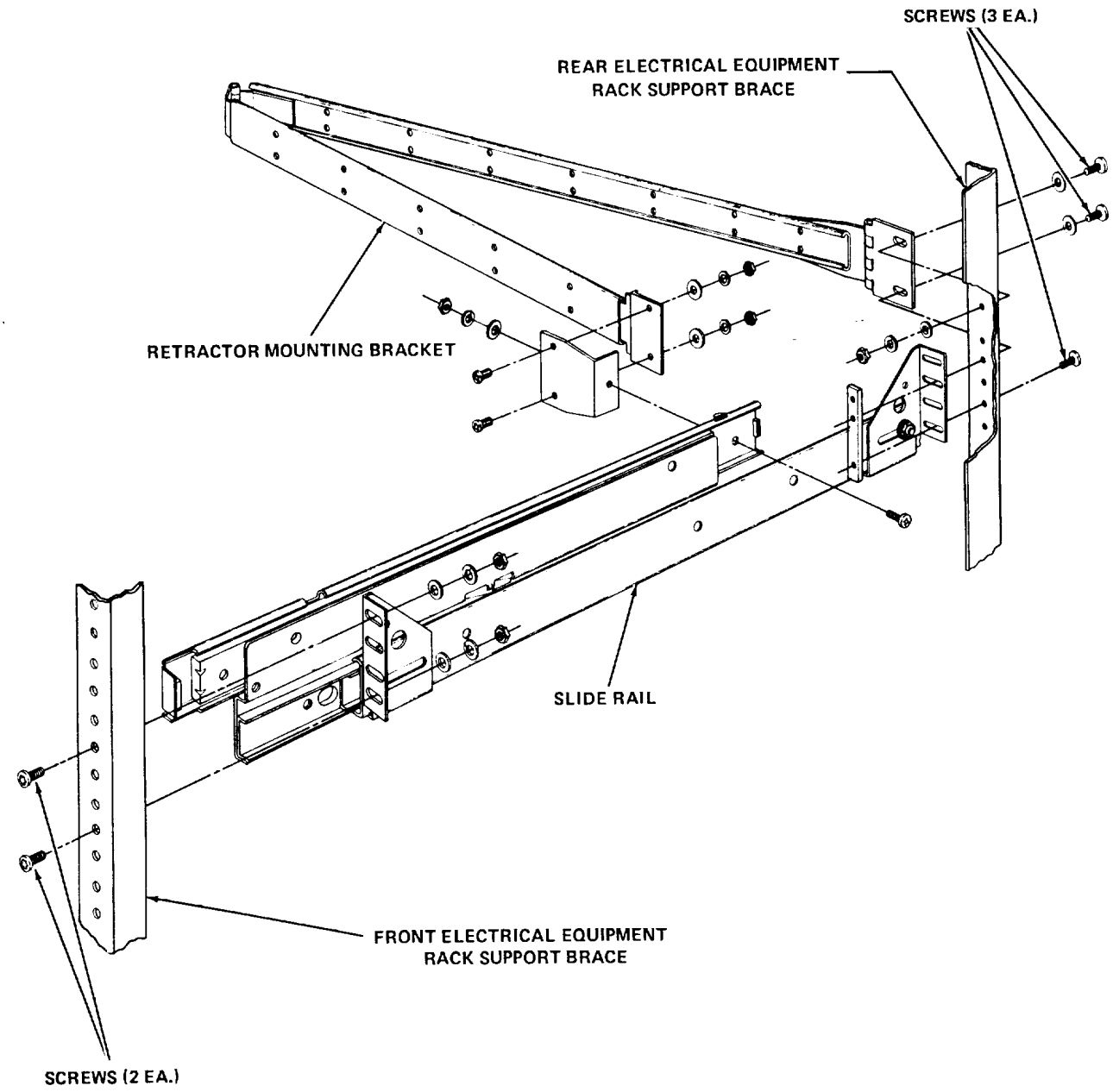


Figure 3-3. Slide Rail Disassembly

(3) Remove the three screws which attach the slide rail to the back electrical equipment rack support brace.

(4) Remove the four screws which attach left slide rail to equipment rack.

3-21. RADIO FREQUENCY DETECTOR DT-603/FRN-41 (UNIT 2). Disassemble the radio frequency detector per the following procedure (refer to figure 3-4).

a. Remove four screws holding the cover to the frequency detector assembly and remove the cover.

b. Remove four panhead screws, washers and nuts holding the radome to the antenna support and remove the radome.

c. Disconnect four wires and remove two screws holding field detector circuit card assembly 2A1 in place.

d. Remove the nut, washer and terminal lug connecting the circuit card assembly to the antenna.

e. Remove the circuit card assembly from the radio frequency detector.

3-22. ANTENNA AS-3323/FRN-41, DISASSEMBLY PROCEDURES. Disassemble the antenna per the following procedures (refer to figure 3-5).

a. Disconnect the line matching and carrier cables from the left side of the electrical equipment rack.

b. Disconnect the cable connector leading to the obstruction lights.

c. Lift the antenna from the antenna pedestal and remove through the access door.

NOTE

Two men are required to lift the antenna from the antenna pedestal and remove the antenna through the access door.

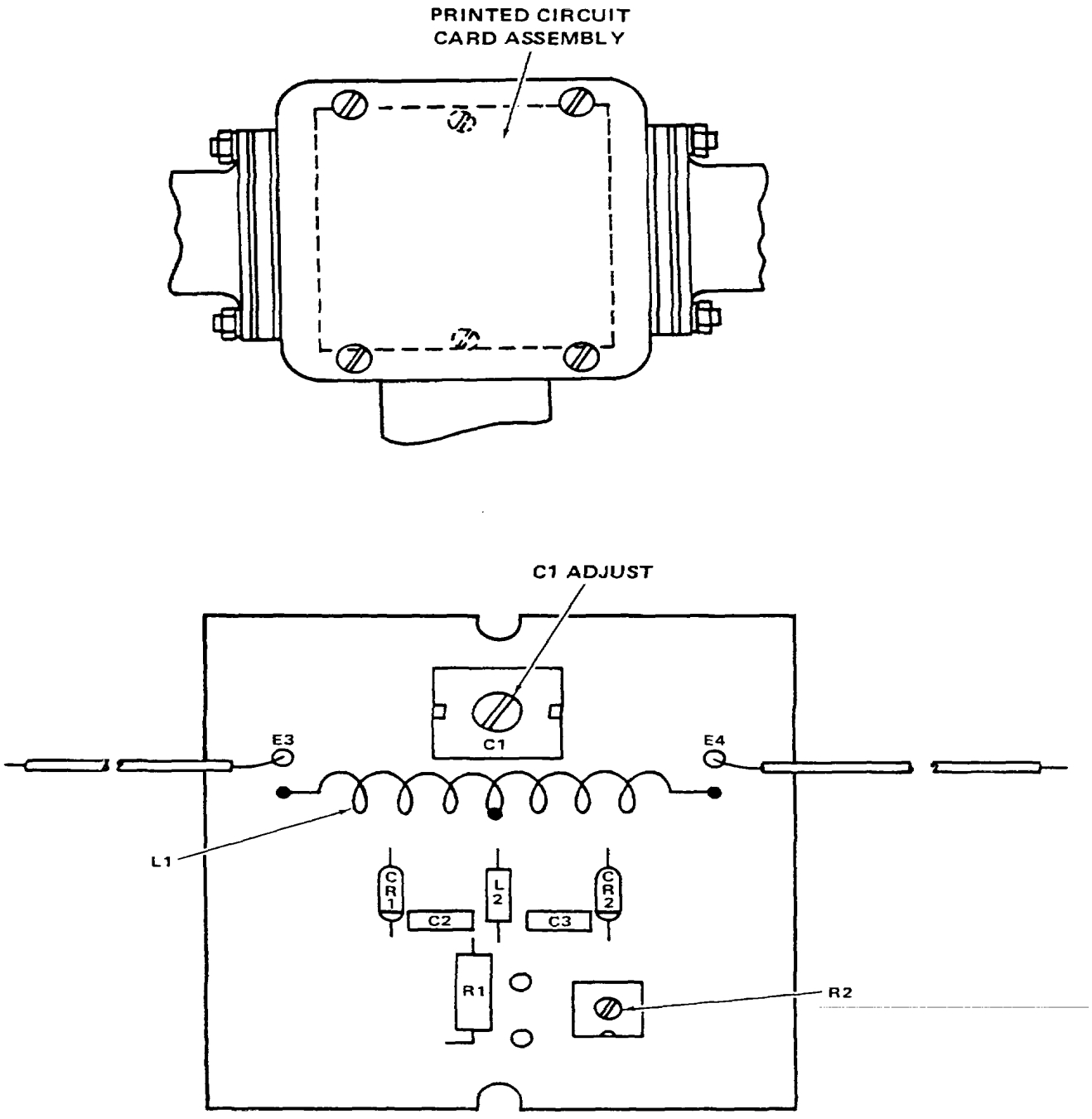


Figure 3-4. Field Detector, 2A1 Circuit Card Assembly Component Location

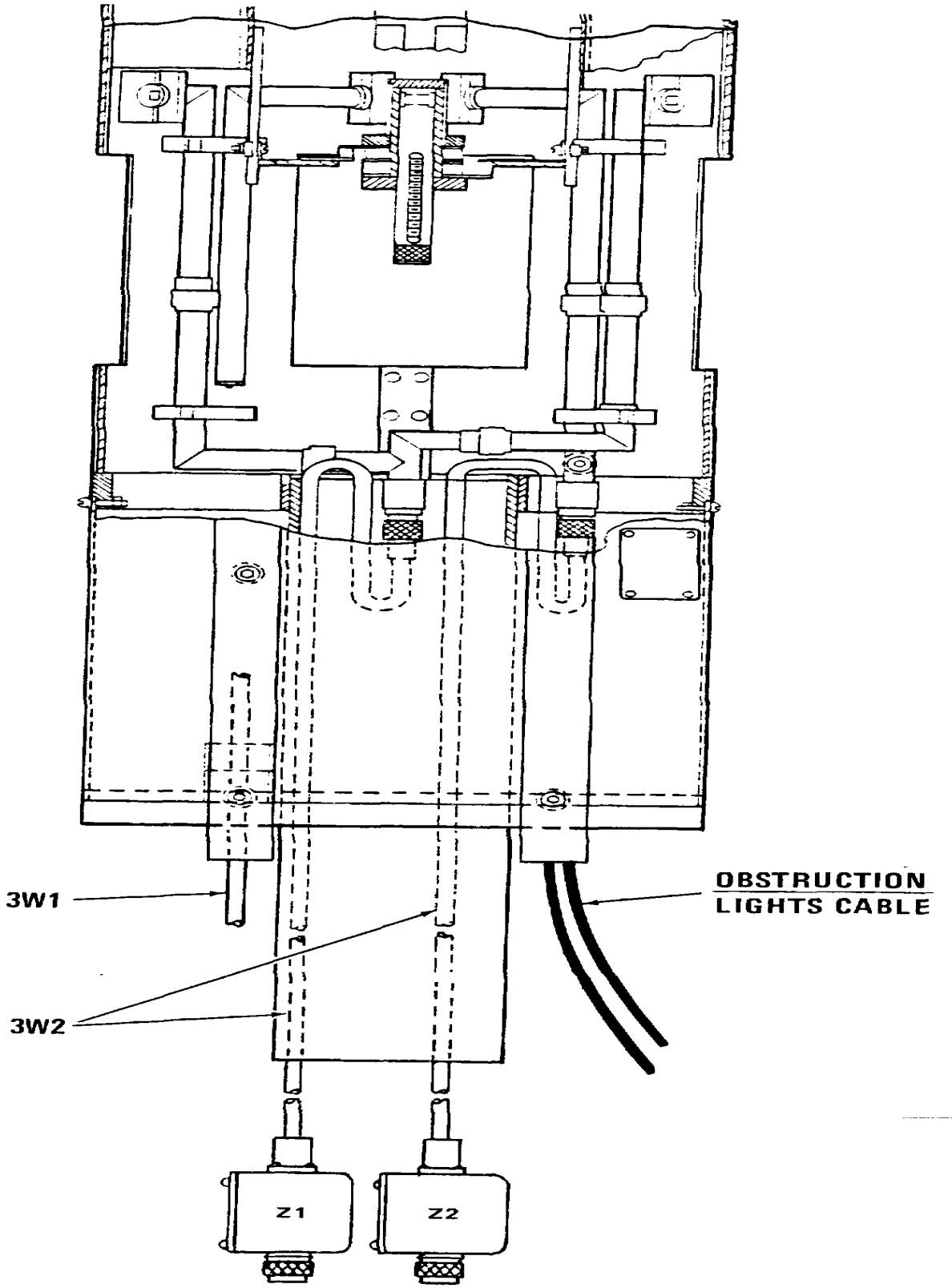


Figure 3-5. Antenna Cable Location

SECTION VII

TROUBLESHOOTING AND FAILURE ANALYSIS

3-23. GENERAL. To facilitate fault isolation to the unit or assembly (drawer) level, a system troubleshooting chart (figure 3-6) is provided in this section. To further fault isolate to the module level for assemblies (drawers) contained in transmitter group OT-117/FRN-41 (unit 1), refer to the troubleshooting charts contained in Chapters 4 through 7.

3-24. FAULT ISOLATION. Fault isolation procedures and troubleshooting charts for the electrical equipment rack, the radio frequency detector, DT-603/F R N-41 and the antenna, AS-3323/F RN-41 are also contained in this chapter.

Fault isolation procedures for Control-Indicator C-10526/FRN-41 (unit 4) are contained in chapter 8 and the Shelter, S-597/FRN-41, troubleshooting procedures are contained in chapter 9.

To utilize the troubleshooting charts in this section and in chapters 4 through 7, it is first necessary to identify the chart which corresponds to the observed failure reflected by the equipment. The step-by-step procedures contained in the troubleshooting charts provide fault isolation to the defective assembly (drawer) or unit level. Once the defective drawer or unit is identified, it can be repaired or replaced with a serviceable item.

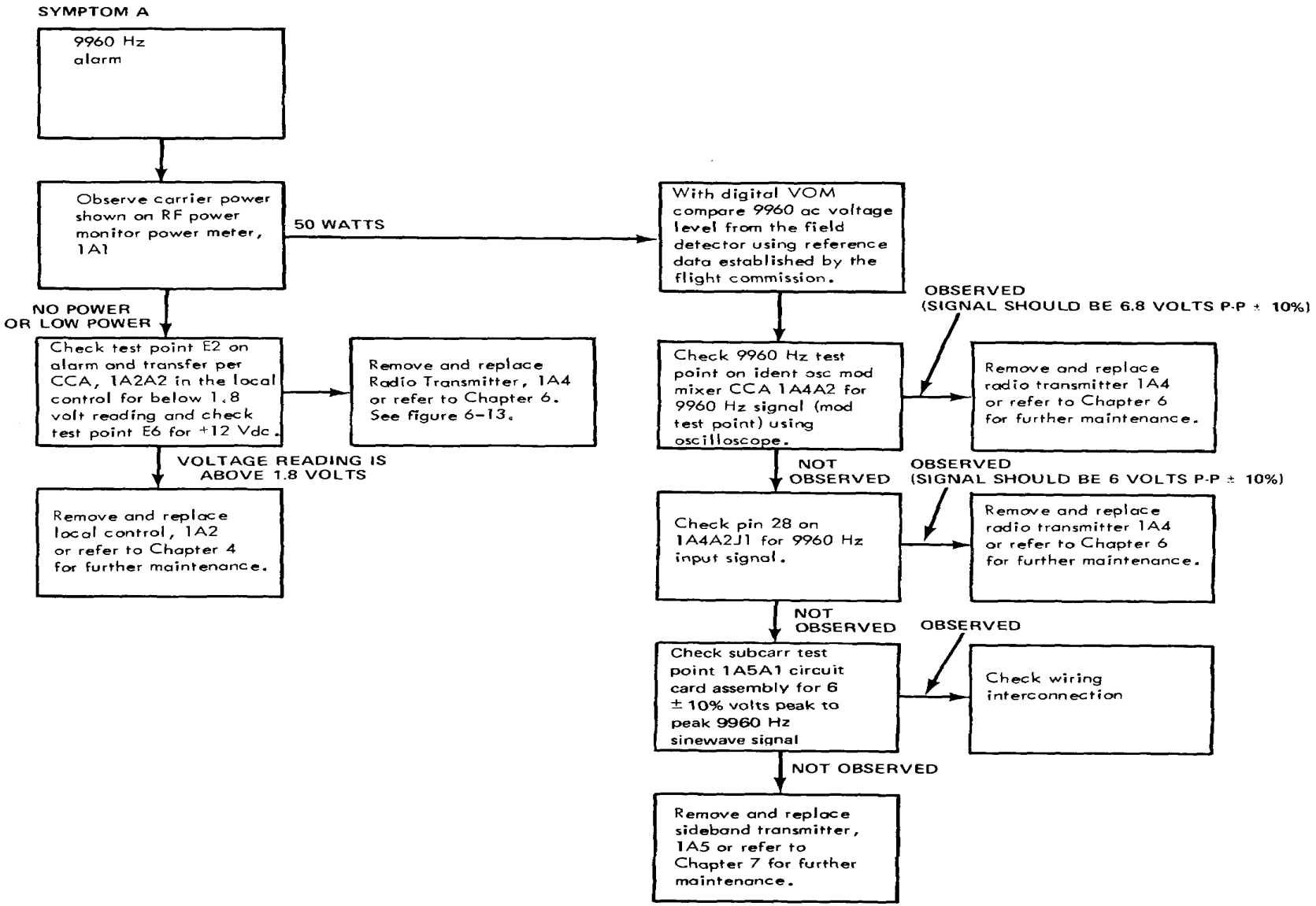


Figure 3-6. System Level Troubleshooting Chart to the Unit or Drawer Assembly Level (Sheet 1 of 6)

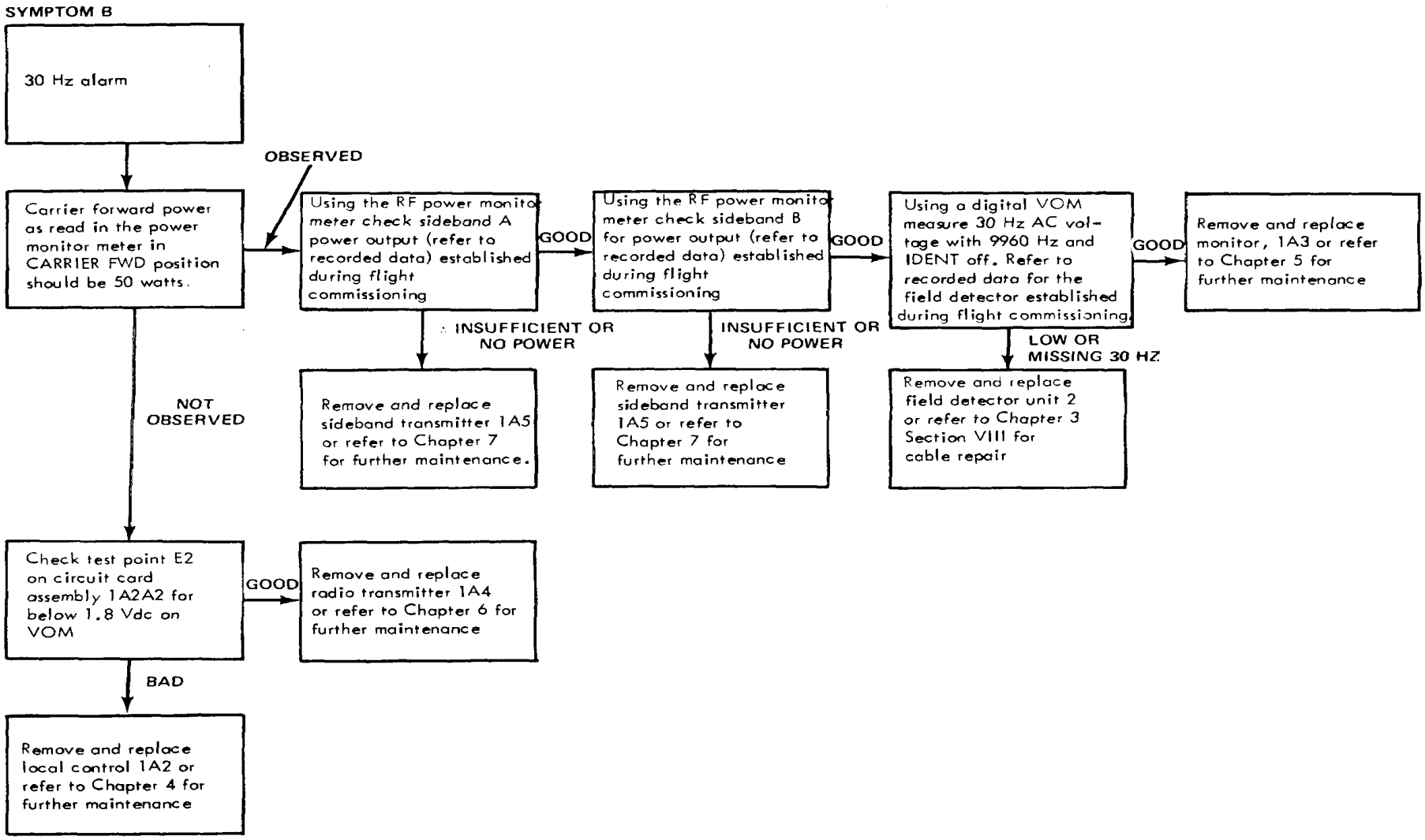


Figure 3-6. System Level Troubleshooting Chart to the Unit or Drawer Assembly Level (Sheet 2 of 6)

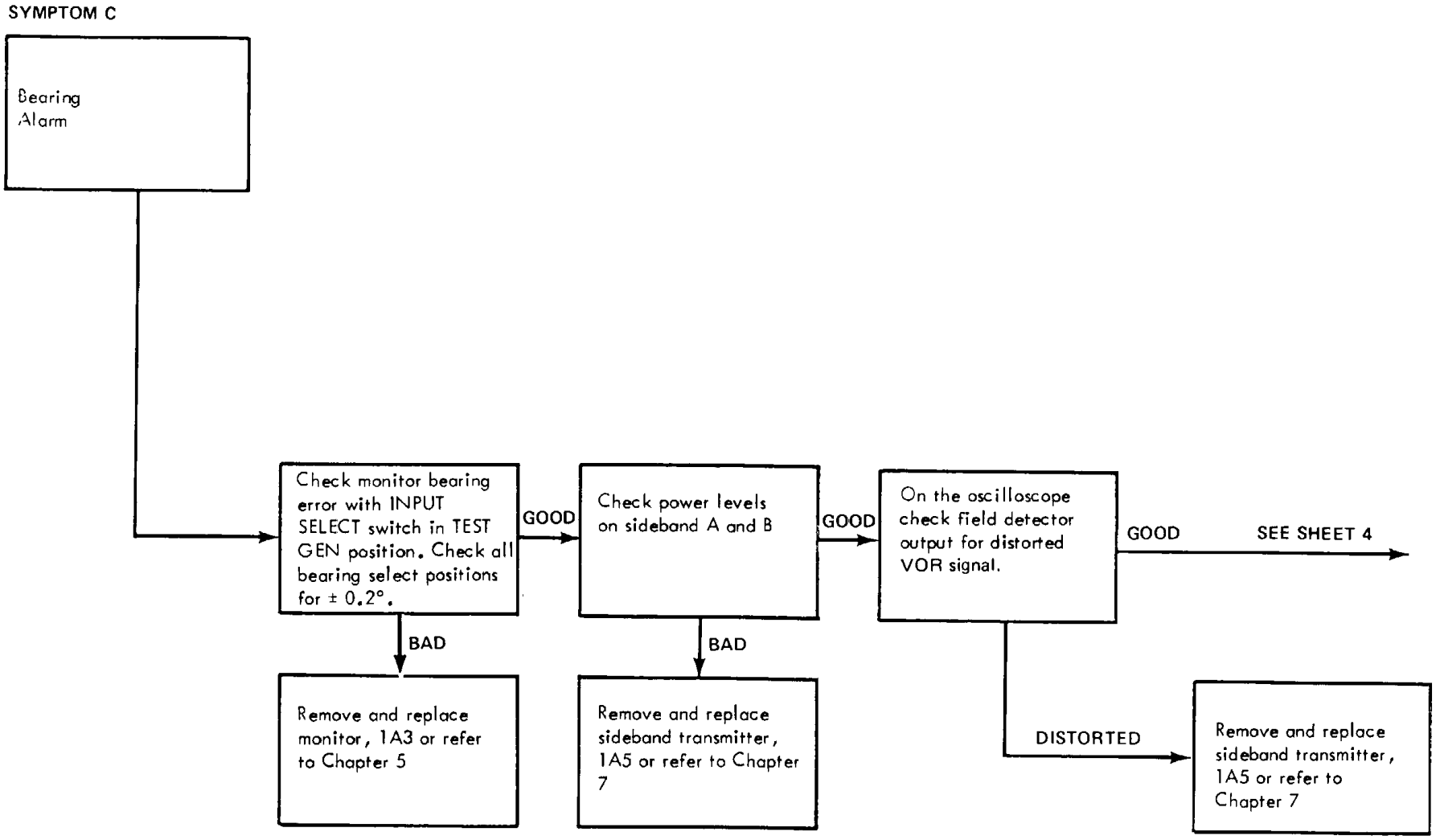


Figure 3-6. System Level Troubleshooting Chart to the Unit or Drawer Assembly Level (Sheet 3 of 6)

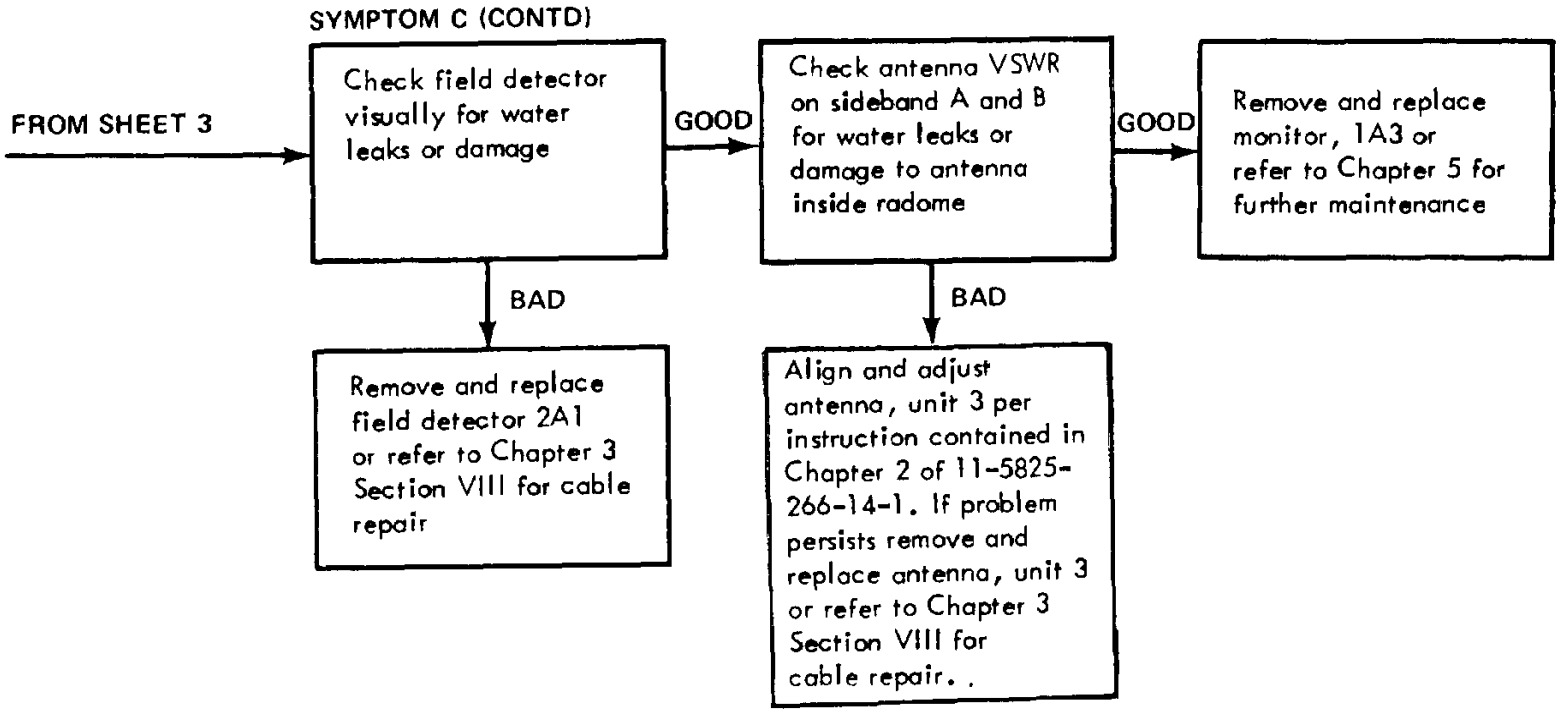


Figure 3-6. System Level Troubleshooting Chart to the Unit or Drawer Assembly Level (Sheet 4 of 6)

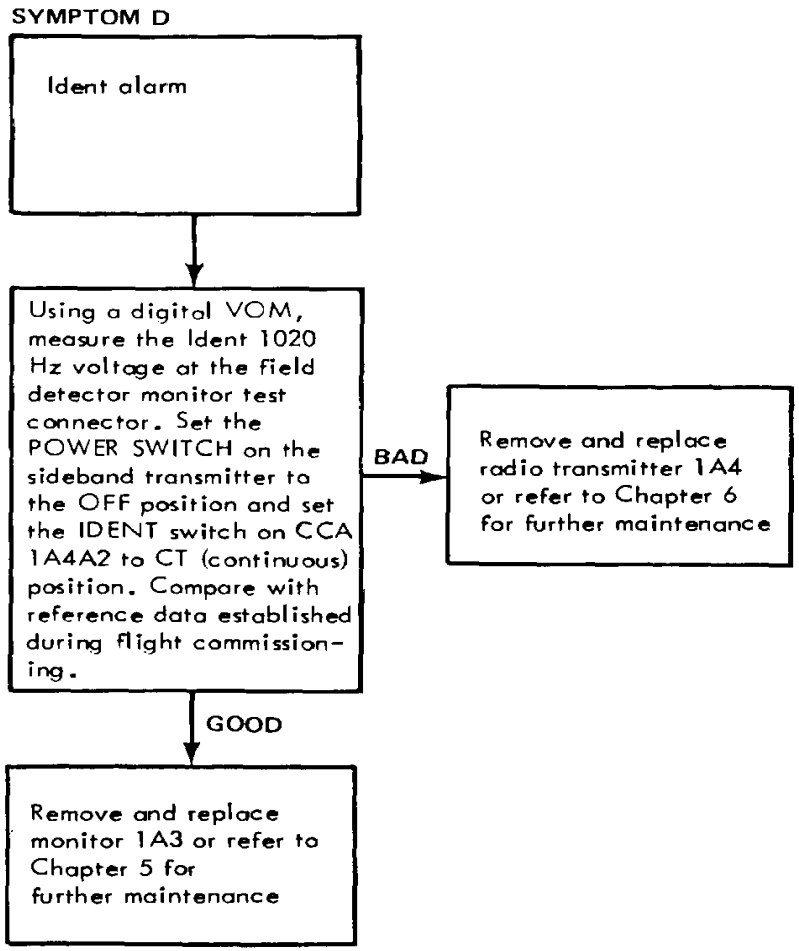
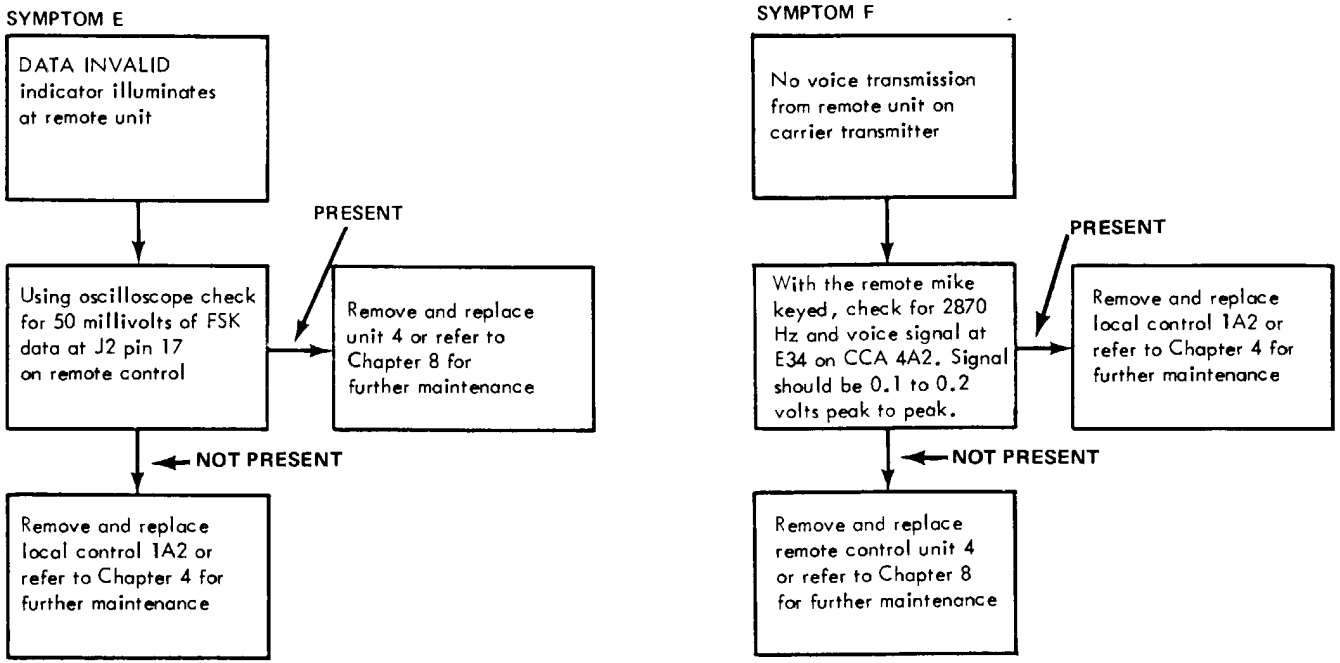


Figure 3-6. System Troubleshooting Chart to the Unit or Drawer Assembly Level (Sheet 5 of 6)



NOTE: To check critical switch operation and proper indicator status, refer to Paragraph 5-26 in TM 11-5825-266-14-1

Figure 3-6. System Level Troubleshooting Chart to the Unit or Drawer Assembly Level (Sheet 6 of 6)

SECTION VIII

REPAIR

3-25. INTRODUCTION. The following paragraphs contain repair procedures for electrical equipment rack MT-601 1/FRN-41 (1Al), radio frequency detector DT-603/FRN-41 (unit 2), antenna AS-3323/FRN-41 and connectors. The repair procedures for the electrical equipment rack, the radio frequency detector and antenna are supported by tables containing cable requirements and lists of material needed to make each completely serviceable as applicable.

3-26. ELECTRICAL EQUIPMENT RACK CONNECTOR AND WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair connector and wiring harness damage. A list of cables is provided in table 3-2. A list of all connectors by reference designation with a cross reference to the hand tools used for repair is provided in table 3-3. A wiring list showing point-to-point connections, wire type and size is provided in table 3-4A. Table 3-4B contains a list of materials.

3-27. RADIO FREQUENCY DETECTOR DT-603/FRN-41. A list of cables required to repair the radio frequency detector is contained in table 3-5.

3-28. ANTENNA AS-3323/FRN-41. A list of cables required to repair the antenna is contained in table 3-6.

3-29. CONNECTOR REPAIR. Electrical connectors containing replaceable contact pins are repaired as follows:

a. Removal of contact pin from connector.

(1) Remove connector from mounted position.

(2) Place extraction tool, selected from the applicable connector maintenance tool list matrix table 3-2, around wire leading to pin to be removed.

(3) Slide tool along wire and insert into contact pin hole using moderate pressure until tool does not advance further.

(4) Hold tool and wire firmly and pull contact pin out of connector.

b. Replacement of contact pin into connector.

(1) Strip 5/32-inch of insulation from wire to be connected to new contact pin.

Table 3-2. Cable Requirements for Electrical Equipment Rack

Ref Desig	Part Number	Function	End 1 (From)	Components	End 2 (To)	Length
1A1W2	136325-102	From 1A4J1 To 1A5A5J1	Connector, BNC P/N 005478	RG-316/U Coaxial Cable	Connector, Straight Plug, Type BNC P/N 910694-001	135" (3.43m
1A1W3	136324-102	From 1A4FL1J2 To 1AlUiJ1	Connector, TNC Plug, P/N 910263-001	RG-223B/U Coaxial Cable	Connector, Straight Plug, Type N P/N 910360-001	125” (3.18m)
1A1W4	136325-103	Installed but Not used	Connector, BNC P/N 005478	RG-316/U Coaxial Cable	Connector, Straight Plug, Type BNC P/N 910694-001	135" (3.43m)
1A1W5	136324-103	Installed but not used	Connector, TNC Plug P/N 910263-001	RG-223B/U Coaxial Cable	Connector, Straight Plug, Type N P/N 910360-001	125" (3.18m)
1A1W6	136306-104 Matched Set	From 1A4A2J2 To 1A1AT4J1 From 1A5A3J3 To 1A1AT5J1	Connector, BNC P/N M39012/ 16-0001	RG-223B/U Coaxial Cable	Connector, Straight Plug Type N P/N 910360-001	150" (3.81m)
1A1W7	136304-105	Installed but not used	Connector, Straight Plug, Type N P/N 910360-001	RG-316/U Coaxial Cable	Connector, Straight Plug Type N P/N 910360-001	40" (101.6 cm)

Table 3-2. Cable Requirements for Electrical Equipment Rack (cntd)

Ref Desig	Part Number	Function	End 1 (From)	Components	End 2 (To)	Length
1A1W8	Matched	Installed but not used	Connector, BNC P/N MS39012/ Set	RG-223B/U Coaxial Cable	Connector, Straight Plug, 16-0001 P/N 910360-001	150” (3.81 m, Type N
1A1W14	136305-102 Matched Set	RG-223B/U Coaxial To Sideband A and From 1A1U3J2 To Sideband B	Connector, Straight Plug Type N P/N 910360-001	RG-223B/U Coaxial Cable	Connector, Coaxial-Bulkhead Jack, Series N P/N 004518	Approx. 46" (116.84 cm)
1A1W16	136305-103	From lAl Ul J2 To Carrier	Connector, Straight Plug, Type N P/N 910360-001	RF-223/U Coaxial Cable	Connector, Coaxial-Bulkhead Jack, Series N P/N 004518	41" (104.14 cm)

Table 3-3. Connector Maintenance Tool List Matrix for the Electrical Equipment Rack

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A1P1	Crimp	910189-004	910195-001 (Male)	22-20	M8ND	N20RT-29	910923
			910195-002 (Male)	18-16	M8ND	N16RT-24	910923
				22-20	M8ND		
			910281-002 (Female)	18-16	M8ND	N16RT-24	910923
1A1P2	Crimp	910189-003	910195-001 (Male)	22-20	M8ND	N2-RT-29	910923
1A1P3	Crimp	910189-004	910195-001 (Male)	22-20	M8ND	N20RT-29	910923
1AlP4	Crimp	910189-003	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
1A1P5	Crimp	910189-002	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
			910281-002 (Female)	18-16	M8ND	N16RT-24	910923
1A1P6	Crimp	910189-001	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
1A1P7	Crimp	910189-003	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
1A1P8	Crimp	910189-003	910281-001 (Female',	22-20	M8ND	N20RT-29	910923
1A1P9	Crimp	910189-002	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
			910281-002 (Female)	18-16	M8ND	N16RT-24	910923
1A1P10	Crimp	910189-001	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
			910281-002 (Female)	18-16	M8ND	N16RT-24	910923
1A1P11	Crimp	910189-003	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
			910281-002	18-16	M8ND	N16RT-24	910923

Table 3-3. Connector Maintenance Tool List Matrix for the Electrical Equipment Rack (Contd)

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A1P12	Solder (used with slide lock 003295-5)	002956-4	N/A	N/A	N/A	N/A	N/A
1A1P13	Crimp	910189-001	910195-001	22-20	M8ND	N20RT-29	910923

Table 3-3. Connector Maintenance Tool List Matrix for the Electrical Equipment Rack (Contd)

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A1W2P1	Solder	005478	N/A	N/A	227-1221-09	N/A	N/A
1A1W2P2	Solder	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A1W3P1	Solder	910263-001	N/A	N/A	227-1221-11	N/A	N/A
1A1W3P2	Clamp	910360-001	N/A	N/A	N/A	N/A	N/A
1A1W6P1	Solder	M39012/16-001	N/A	N/A	N/A	N/A	N/A
1A1W6P2	Solder	910360-001	N/A	N/A	N/A	N/A	N/A
1A1W6P3	Solder	M39012/16-001	N/A	N/A	N/A	N/A ,	N/A
1A1W6P4	Solder	910360-001	N/A	N/A	N/A	N/A	N/A
1A1W14P1	Clamp	910360-001	N/A	N/A	N/A	N/A	N/A
1A1W14P2	Crimp	004518	N/A	N/A	227-1221-57	N/A	N/A
1A1W14P3	Clamp	910360-001	N/A				
1A1W14P4	Crimp	004518	N/A	N/A	227-1221-57	N/A	N/A
1A1W16P1	Clamp	910360-001	N/A	N/A	N/A	N/A	N/A
1A1W16P2	Crimp	004518	N/A	N/A	227-1221-57	N/A	N/A

Table 3-4A. Electrical Equipment Cabinet Wiring List

Note: Point-to-point wire connections are listed in Table 3-4A and a list of materials to be used in conjunction with Table 3-4A is provided in Table 3-4B.

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	4		KI-El		P1-26	22	
2	8		K1-E2		P3-5	22	
3	1		TB2-16 29		El		
4	18		TB2-15 29,41		P4-8	23,41	
4S	1		El		BS3		
5	18		TB2-15 29,41		P8-8	23,41	
5S	1		El		BS4		
6	10		TB2-9 29		P13-6	22	
7	11		TB2-8 29		P13-5	22	
8	12		TB2-7		29 P13-2	22	
9	16		TB2-6 29		P13-1	22	
10	6		TB2-5 29		E2		
11	17		TB204 29		P4-18	23	
12	14		TB2-3 29		P4-17	23	
13B	19		TB2-2 29,42		P8-16	23	
18W	-		TB2-1 29		P8-15	23	
13S	1		El		Float		
14B	19		TB2-2 42		P4-16	23	Installed in lug
14W	-		TB2-1 29		P4-15	23	with 13B
14S	1		E1l		Float		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
15	4		TB3-12 29		P3-32 22		
16	17		TB3-11 29		P3-31 22		
17	16		TB3-10 29		P3-30 22		
18	2		TB3-7 29		P3-27 22		
19	47		TB3-6 29		P3-26 22		
20	12		TB3-4 29		P3-24 22		
21	11		TB3-3 29		P3-23 22		
22	10		TB3-2 29		P3-22 22		
23	16		TB3-1 29		P2-19 22		
24	20		TB1-3 30		E2		
25W	21		TB1-2 30,43		P1-34 24		
25B	-		TBI-1 30		P1-33 24		
25S	1		TB1-3 30		Float		
26W	19		TB4-20 29,42		P1-35 22		
26B	-		TB4-19 29		P1-27 22		
27	11		TB4-19 29		P12-15		
26S	1		TB2-17 29		Float		
28	12		TB4-18 29		P12-24		
29	13		TB4-17 29		P12-25		
30	47		TB4-16 29		P12-18		
31	14		TB4-15 29		P12-17		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM			TO			REMARKS
			CIRCUIT POINT		ACCESS. ITEM NO.	CIRCUIT POINT		ACCESS. ITEM NO.	
32W	19		TB4-14	29,42		P1-21	22		
32B	-		TB4-13	29		P1-20	22		
32S	1		TB2-17	29		Float			
33	16		TB4-13	29		P12-16			
34	17		TB4-12	29		P12-19			
35	9		TB4-11	29		P12-6			
36	10		TB4-10	29		P12-16			
37	11		TB4-9	29		P12-22			
38	12		TB4-8	29		P12-15			
39	13		TB4-7	29		P12-7			
40	47		TB4-6	29		P12-9			
41	14		TB4-5	29		P12-23			
42	15		TB4-4	29		P12-20			
43	16		TB4-3	29		P12-5			
44	17		TB4-2	29		P12-13			
45	9		TB4-1	29		P12-10			
46	1		E2			BS1			
47	6		E2			P4-3	23		
48	6		E2			P6-3	23		
49	6		E2			P7-3	23		
50	6		E2			P8-3	23		
51	6		E2			P10-3	23		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
52	6		E2		P11-3 23		
53W	48		P1-1 22,42		P4-1 23		
53B	-		P1-7 22		P4-2 23		
53S	1		BS1		Float		
54W	49		P1-2 50,43		P6-1 23		
54B	-		P1-8 50		P6-2 23		
54S	1		BS1		Float		
55W	48		P1-4 22,42		P8-1 23		
55B	-		P1-10 22		P8-2 23		
55S	1		BS2		Float		
56W	49		P1-5 43,50		P10-1 24		
56B	-		P1-11 50		P1i-2 24		
56S	1		BS2		Float		
57	4		P1-13 22		P4-4 23		
58	4		P1-14 22		P6-4 23		
59	4		P1 -15 22		P7-4 23		
60	4		P1-16 22		P8-4 23		
61	4		P1-17 22		P10-4 23		
62	4		P1-18 22		P11-4 23		
63	1		P1-27 22		BS2		
64	1		P1-25 22		BS2		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
65	1		P1-29 22		BS2		
66	1		P1-23 23		BS1		
67	1		BS1		BS2		
68	18		P2-2 22,41		P4-9 23,41		
68S	1		P2-1 22		BS3		
69	12		P2-3 22		P4-6 23		
70	13		P2-4 22		P6-6 23		
71	47		P2-5 22		P7-6 23		
72	14		P2-8 22		P5-12 23		
73	4		P2-9 22		P5-3 23		
74	15		P2-11 22		P4-10 23		
75	12		P2-12 22		P4-11 23		
76	10		P2-13 22		P4-12 23		
77	47		P2-14 22		P4-13 23		
78	2		P2-15 22		P4-14 23		
79	14		P3-1 22		P6-5 23		
80	14		P3-2 22		P7-5 23		
81	8		P3-3 22		P10-5 23		
82	8		P3-4 22		P11-5 23		
83	18		P3-7 22,41		P8-9 23,41		
83S	1		P3-6 22		BS-4 -		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
84	10		P3-8	22	P8-6	23	
85	12		P3-9	22	P10-6	23	
86	13		P3-10	22	P11-6	23	
87	15		P3-14	22	P9-12	23	
88	5		P3-15	22	P9-3	23	
89	14		P3-17	22	P8-10	23	
90	9		P3-18	22	P8-11	23	
91	16		Pe-19	22	P8-12	23	
92	17		P3-20	22	P8-13	23	
93	2		P3-21	22	P8-14	23	
94	9		P3-33	22	P4-5	23	
95	9		P3-34	22	P8-5	23	
96	18		P1-28	37	P5-5	23,41	See Wire #97
96S	1		Float		BS5		
97	18		P1-28		P9-5	23,41	See Wire #96
97S	1		Float		BS6		
98							
99	1		P4-7	23	BS3		
100	18		P4-19	23,41	P5-11	24,41	See Wire No. 103
100S	1		BS3		P5-10	24	See Wire No. 103S

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
101	18		P4-20 23,41		P9-11 24,41		See Wire No. 104
101S	1		BS3		P9-10 24		See Wire No. 104S
102	1		P8-7 23		BS4		
103	18		P8-19 23,41		P5-11 41		See Wire No. 100
103S	1		BS4		P5-10		See Wire No. 100S
104	18		P8-20 23,41		P9-11 41		See Wire No. 101
104S	1		BS4		P9-10		See Wire No. 101S
105	18		P5-1 23,41		P7-13 23,41		
105S	1		BS5		P7-14 23		
106	1		P5 2 23		BS5		
107							
108	54		P5-7 24		P7-9 24		
109	55		P5-8 24		P7-16 24		
110	18		P9-1 23,41		P11-13 23,41		
110S	1		BS6		P11-14 23		
111	1		P9-2 23		BS6		
112	9		P9-4 23		P9-6 23		
113	54		P9-7 24		P11-9 24		
114	55		P9-8 24		P11-16 24		
115	10		TB3-13 29		P1-19 22		
116	1		TB2-2 29		TB2-16 29		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
116B	6		P12-1		BS7		
117	6		P12-2		BS7		
118	6		P12-3		BS7		
119	6		P12-4		BS7		
120	6		BS7		E2		
121	1		P1-36	22	BS2		

Table 3-4A. Electrical Equipment Cabinet Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
*1	52		S1 B-2		S1 B-1		
2	52		S1A-1		SIB-1		
3	52		S1 B-2		S1 B-3		
4	52		S1 B-4		S1 B-5		
5	52		S1 B-6	53	S1 B-7		
6	58		U1-RFL		S1A-3		Twist approx.
7	57		U1-El		S1B-3		2 turns/inch
8	59		U1-FWD		S1 A-2		
9	60		U2-RFL		S1A-5		
10	57		U2-E1		S1B-5		Twist approx.
11	61		U2-FWD		S1A-4		2 turns/inch
12	67		U3-RFL		S1A-7		
13	57		U3-E1		S1 B-7		Twist approx.
14	62		U3-FWD		S1A-6		2 turns/inch

NOTE: Table 3-4A ;s comprised of a harness wire list and a cabinet assembly wire list. The cabinet assembly wire list is numbered separately for ease of reference.

Table 3-4B. List of Materials

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	1	Wire #22 BLK	MIL-W-16878/4
AR	2	Wire #22 BRN	MIL-W-16878/4
AR	3	Wire #22 RED	MIL-W-16878/4
AR	4	Wire #22 ORG	MIL-W-16878/4
AR	5	Wire #22 YEL	MIL-W-16878/4
AR	6	Wire #22 GRN	MIL-W-16878/4
AR	7	Wire #22 VIO	MIL-W-16878/4
AR	8	Wire #22 GRY	MIL-W-16878/4
AR	9	Wire #22 WHT	MIL-W-16878/4
AR	10	Wire #22 W/BLK	MIL-W-16878/4
AR	11	Wire #22 W/BRN	MIL-W-16878/4
AR	12	Wire #22 W/RED	MIL-W-16878/4
AR	13	Wire #22 W/ORG	MIL-W-16878/4
AR	14	Wire #22 W/GRN	MIL-W-16878/4
AR	15	Wire #22 W/BLU	MIL-W-16878/4
AR	16	Wire #22 W/VIO	MIL-W-16878/4
AR	17	Wire #22 W/GRN	MIL-W-16878/4
AR	18	Wire 1 Cond. Shid. #22 WHT	MIL-W-16878/4
AR	19	Wire 2 Cond. Shid. #22 WHT/BLK	MIL-W-16878/4
AR	20	Wire #16 GRN	MIL-W-16878/4
AR	21	Wire 2 Cond. Shid. #16 WHT/BLK	MIL-W-16878/4
61	22	Contact #22-20 Male	910195-001
75	23	Contact #22-20 Female	910281-001
16	24	Contact #18-16 Female	910281-002
3	25	Connector6 Pin	910189-001 P10, P6, P13
2	26	Connector 12 Pin	910189-002 P5, P9
5	27	Connector 24 Pin	910189-003 P2, P4, P7, P8, P11
2	28	Connector 36 Pin	910189-004 P3, P1
48	29	Lug Crimp	910283-001
4	30	Lug Crimp	910283-004
3 Pr.	31	Conn. Hood	910190-001
2 Pr.	32	Conn. Hood	910190-002
5 Pr.	33	Conn. Hood	910190-003
2 Pr.	34	Conn. Hood	910190-004
1	35	Conn.	002956-4 P12
1	36	Slidelock	003295-5 37
12	38	Tie Wrap	910126-002
2	39	Splice Blue	MS25274-3
5	40	Splice Yel	MS25274-4
20	41	Solder Sleeve	003700-1
6	42	Solder Sleeve	003700-2
2	43	Solder Sleeve	003700-3

Table 3-4B. List of Materials

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	44	Wire #22 B13	44 ID TagsMS3368-1-9A
AR	45	Lacing Tape	MIL-1-152
AR	46	Solder	QQ-S-571, SN63
AR	47	Wire #22 W/ Yel	MIL-W-16878/1
AR	48	Wire 2 Cond. Shid. 20 WHT/BLK	MIL-W-16878/1
AR	49	Wire 2 Cond. Shid. 18 WHT/BLK	MIL-W-16878/1
5	50	Contact #18-16 Male	910195-002
X	51	Wire List	136329-250
AR	52		
	53		
AR	54	Wire #16 BLUE	MIL-W-16878/4
AR	55	Wire #16 GRN	MIL-W-16878/4
AR	57	Wire AWG 22 BLK	MIL-W-16878/4
AR	58	Wire AWG 22 W/ rIO	MIL-W-16878/4
AR	59	Wire AWG 22 W/YEL	MIL-W-16878/4
AR	60	Wire AWG 22 W/GRY	MIL-W-16878/4
AR	61	Wire AWG 22 W/GRN	MIL-W-16878/4
AR	62	Wire AWG 22 W/BLU	MIL-W-16878/4

Table 3-5. Radio Frequency Detector Cable Requirements

Ref Desig	Part Number	Function	End 1 (From)	Components	End 2 (To)	Length
2W1	136111-102	Field Detector Cable	Spade Lug	RG-223B/U Coaxial Cable	Connector-TNC M39012/27-0011	270 " (6.86m)
2W3	136112-100	Field Detector Cable	Connector, TNC P/N M39012/26 -0011	RG-223B/U Coaxial Cable	Connector, TNC P/N M39012/27 -0011	400” (10.16m)

Table 3-6. Antenna Cable Requirements

Ref Desig	Part Number	Function	End 1 (From)	Components	End 2 (To)	Length
3W1	136244-102	From 1A1W16P2 To 3CP1J2	Connector Straight Plug, Type N P/N/ 910361-001	RG-214/U coaxial Cable	Connector, Straight Plug, Type N P/N 910361-001	288” (7.32m)
3W2	136244-101 Matched Set	From 3Z2J2 To 3J1 and From 3Z3J2 To 3J2	Connector Straight Plug Jack, Type N P/N 910361-001	RG-214/U Coaxial Cable	Connector, Straight Plug, Type N P/N 910498-001	92-3/4” (2.36m)

NOTE: Connector 91C361-001 uses Amphenol crimp tool part number 227-1221-25

(2) Insert stripped wire into crimp chamber of pin.

(3) Place pin into crimp tool locator insert, selected from the connector maintenance tool list matrix table 3-3 and close handles of crimp tool firmly. Remove crimped pin from crimp tool.

(4) Use insertion/removal tool to insert contact pin into position hole in connector using moderate pressure. Withdraw insertion/removal tool, leaving contact pin in connector.

(5) Pull wire slightly to be sure contact pin is locked into place.

(6) Replace connector into chassis assembly.

3-30. CIRCUIT CARD REPAIR INSTRUCTIONS. The following instructions include circuit card repair procedures for: removing circuitry from printed circuitry or printed wiring boards; lifted, broken or damaged circuitry; lifted junction points (terminal pads); conformal coating; epoxy patch kit repairs; and wire splicing.

a. Removal of Circuitry From Wiring Board. To remove circuitry from a printed circuit or printed wiring board, perform the following procedures.

(1) Carefully score or cut circuit path at terminating pads or at a place indicated by other approved repair authorization document, using a sharp razor edge. Exercise extreme caution so as not to damage wiring board, pads or other circuits.

(2) Carefully lift one end of the unwanted path and slowly peel from printed wiring board.

NOTE

Controlled application of heat with a soldering iron may be required to aid in the initial lifting of the path.

CAUTION

If application of heat is required, it must be done with extreme caution to prevent scorching or otherwise damaging wiring board, pads or adjacent circuitry due to overheating.

(3) After removal of path, replate exposed copper pads with minimum solder application.

(4) Clean solder applications as required.

b. Lifted, Broken or Damaged Circuitry. To repair lifted, broken or damaged printed circuitry between eyelets, pads or plated through holes, perform the following procedures. (Refer to figure 3-7.)

NOTE

This procedure applies to repairs less than or equal to 0.500" in length and less than or equal to 0.070" in width.

(1) Remove printed circuitry directly beyond damaged area per a. above. The opened area or removed portion is not to exceed 0.500".

(2) Bridge opened area with solid wire (Buss) having a cross sectional area approximately equal to cross sectional area of circuit path per table 3-7.

(3) Solder jumper wire to each end of remaining circuit path.

(4) Clean and dry repaired area using an approved cleaner (i.e., isopropyl,alcohol or freon solvent.) .

(5) Apply and cure HYSOL No. 0151 to repaired area per procedures contained in paragraph e.

(6) For repairs to lifted, broken or damaged printed circuitry between eyelets, pads or plated through holes less than or equal to 3.000" in length and less than 0.10*(Y'* in width, perform the following steps. (Refer to figure 3-8.)

(a) Remove lifted, broken or damaged circuitry per paragraph a. above.

(b) Jumper damaged circuitry using appropriate Buss wire per table 3-7.

(c) Install jumper wire on underside (dipside) of printed wiring board and up through eyelets and/or plated through holes per figure 3-8.

(d) Solder eyelets and/or plated through holes.

(e) Clean and dry connections using an approved cleaner.

(f) Bond insulated jumper wire to printed wiring board using HYSOL EPOXY No. 0151. Bond in place by running a bead of epoxy underneath the jumper wire throughout its full length. Allow epoxy to flow up over sleeving to securely bond jumper in place over full length.

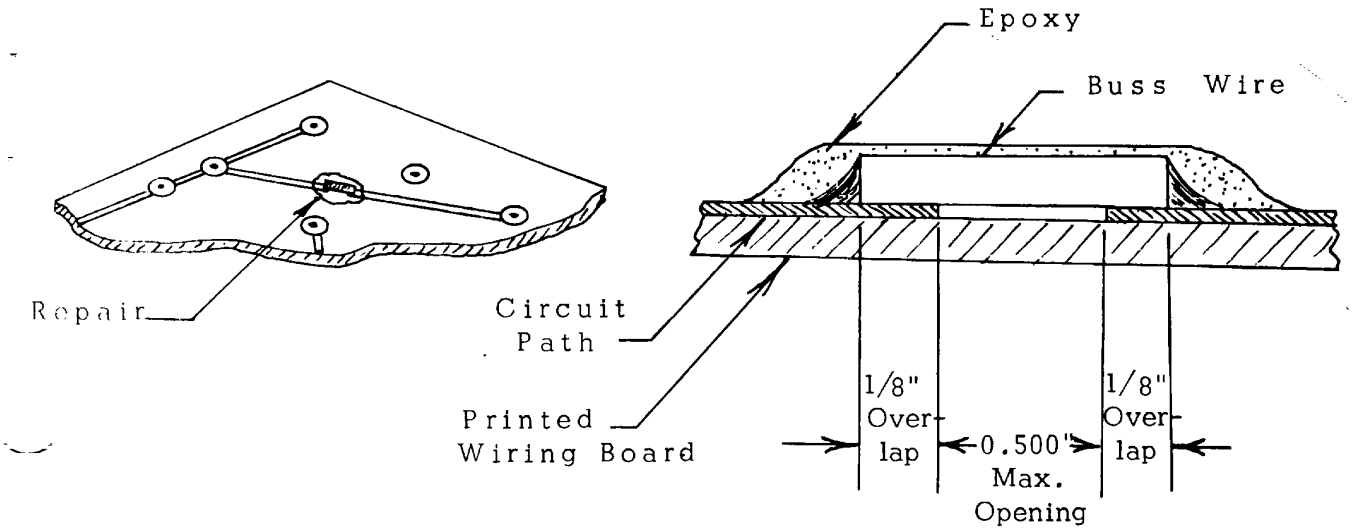


Figure 3-7. Buss Wire Requirements

Table 3-7. Buss Wire Requirements

Printed Circuit Width	* Wire AWG	** Sleeving AWG
0.005"-0.019"	30	30
0.020" -0.029"	28	28
0.030"-0.049"	26	26
0.050"-0.070"	24	24
0.071”-0.100”	22	22

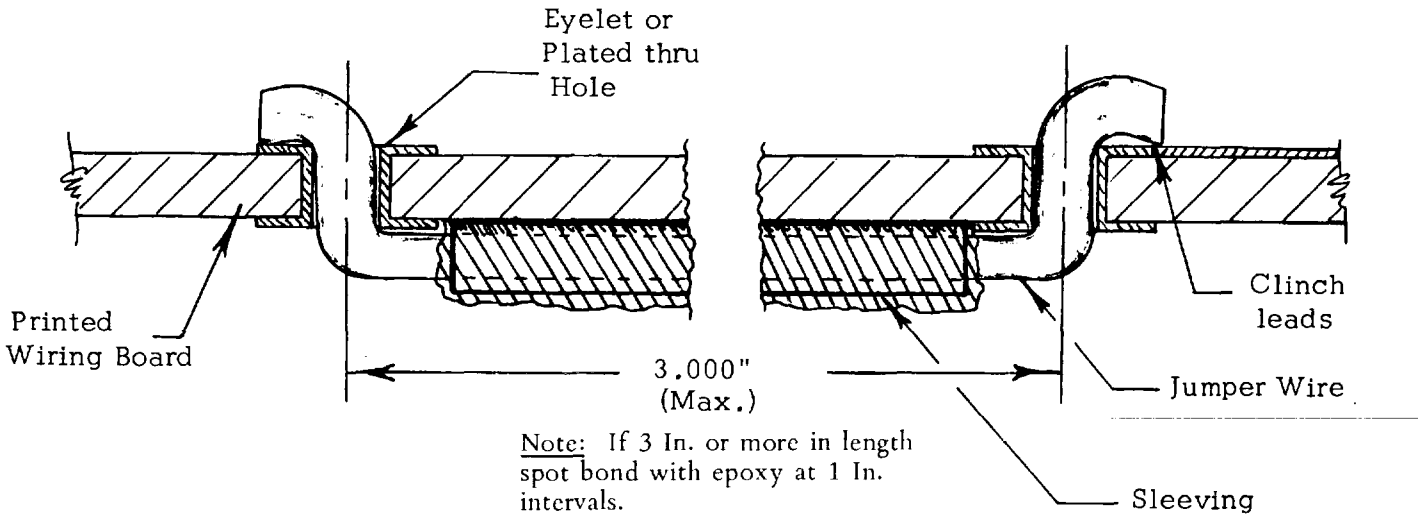


Figure 3-8. Repair of Broken or Damaged Circuitry Where Repaired Area is Greater than 1/2 Inch

(g) In the event that the diameter of the component lead is too large to permit the jumper wire through the eyelet or plated through hole, the following exceptions to (c) above shall be made.

1. Install new component, if necessary, and terminate jumper wire around component lead.
2. Wrap lead with a minimum 1800 wrap. Trim back component lead and excess jumper wire to clear board height requirements. (See figure 3-9.)

c. Lifted Junction Points (Terminal Pads). To repair lifted junction points (terminal pads) at eyelets or plated through holes where the etched circuit path beyond the terminal pad is not lifted in excess of 0.500", perform the following procedure. (Refer to figure 3-10.)

(1) Clean damaged area using an approved cleaner (i.e., isopropyl alcohol or freon solvent).

(2) Carefully remove component lead or wire (as applicable) at damaged terminal area, exercising extreme caution so as not to break or cause further damage to terminal pad.

(3) If necessary, melt solder around the terminal pad with soldering iron.

(4) Prepare and apply epoxy (refer to paragraph e.) on wiring board directly under lifted terminal pad and lifted portion of circuitry (figure 3-10). Press the etched conductor pattern and pad down onto the wiring board. Allow to cure while maintaining pressure on the damaged area.

(5) Install and flare eyelet into the damaged terminal area.

(6) Re-install component or lead (as required) and resolder the lead, wire and/or eyelet at the terminal pad.

(7) In the event that the pad is being used to transfer circuitry from one side of the board to the other and no component is installed, omit step (5) above. Install a length of AWG 22 Buss wire as shown in figure 3-11 prior to soldering.

(8) Prepare, apply and cure HYSOL No. 151 epoxy over repaired area. Apply epoxy so that it extends past the edges and beyond the lifted portion of the circuit path by 0.050" (minimum).

NOTE

In the event the pad is only partially lifted, leaving the plated through portion intact, omit steps (2), (4) and (5) above. Resolder connection after step (3).

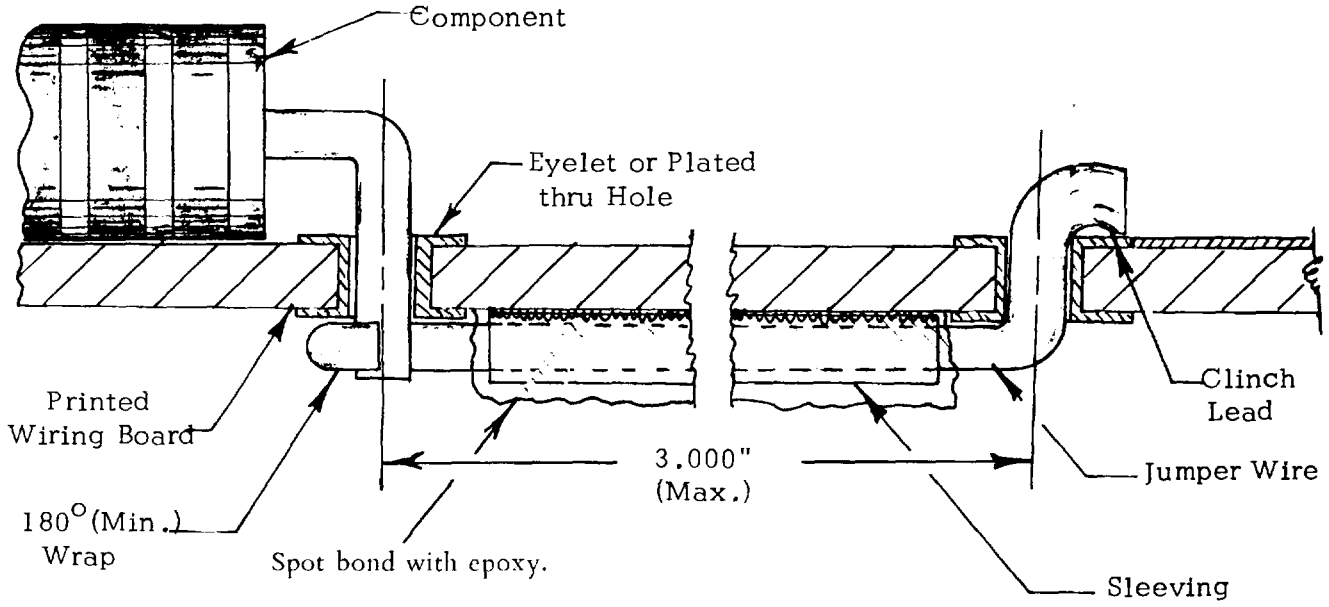
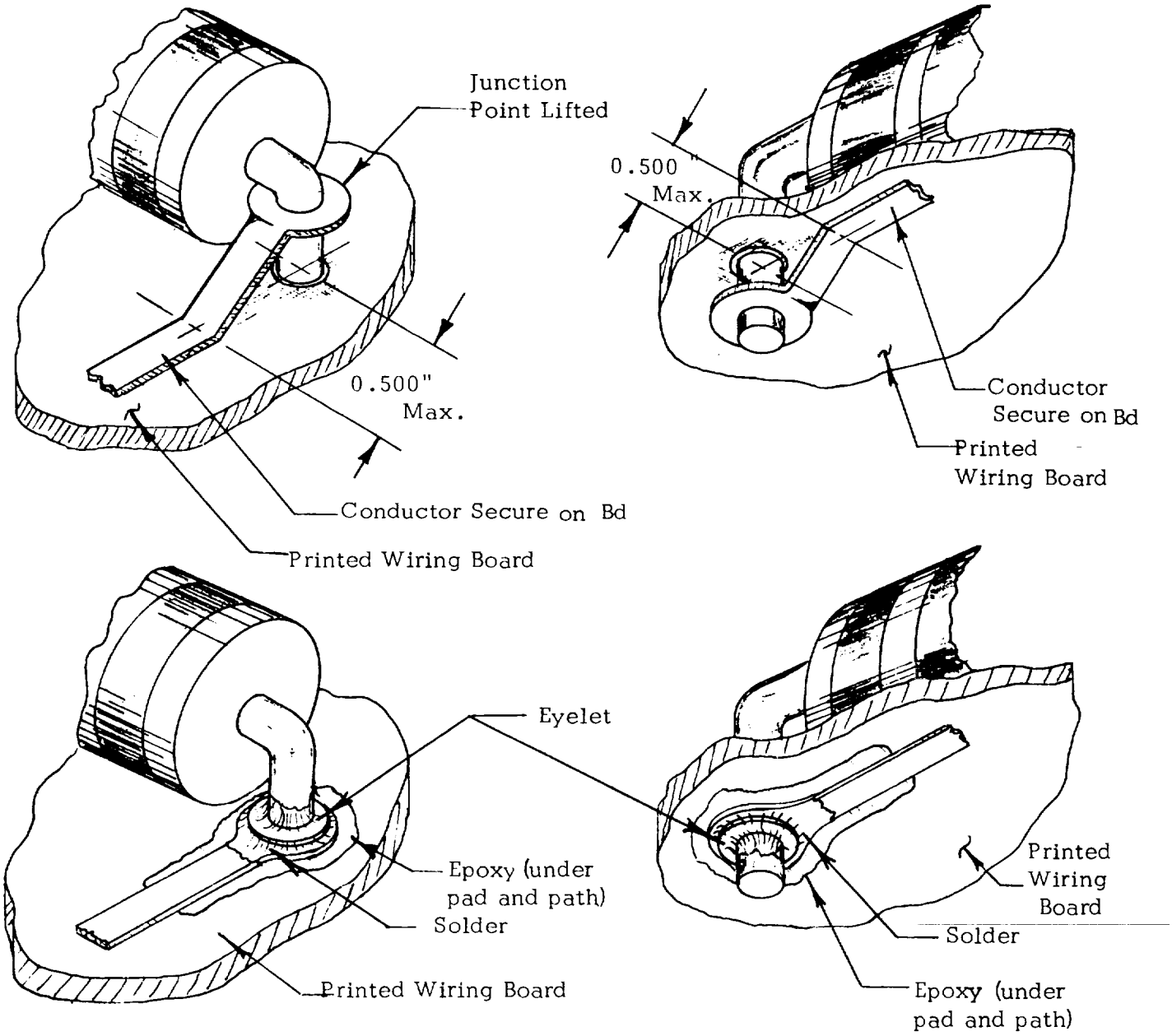


Figure 3-9. Repair of Broken or Damaged Circuitry Where Repaired Area is Greater than 1/2 Inch and Where a Jumper is Attached to Component Lead



REPAIR - COMPONENT SIDEREPAIR - DIPSIDE

Figure 3-10. Repair of Lifted Circuit Pads Where Components are Present and Interfacial Connections are Required

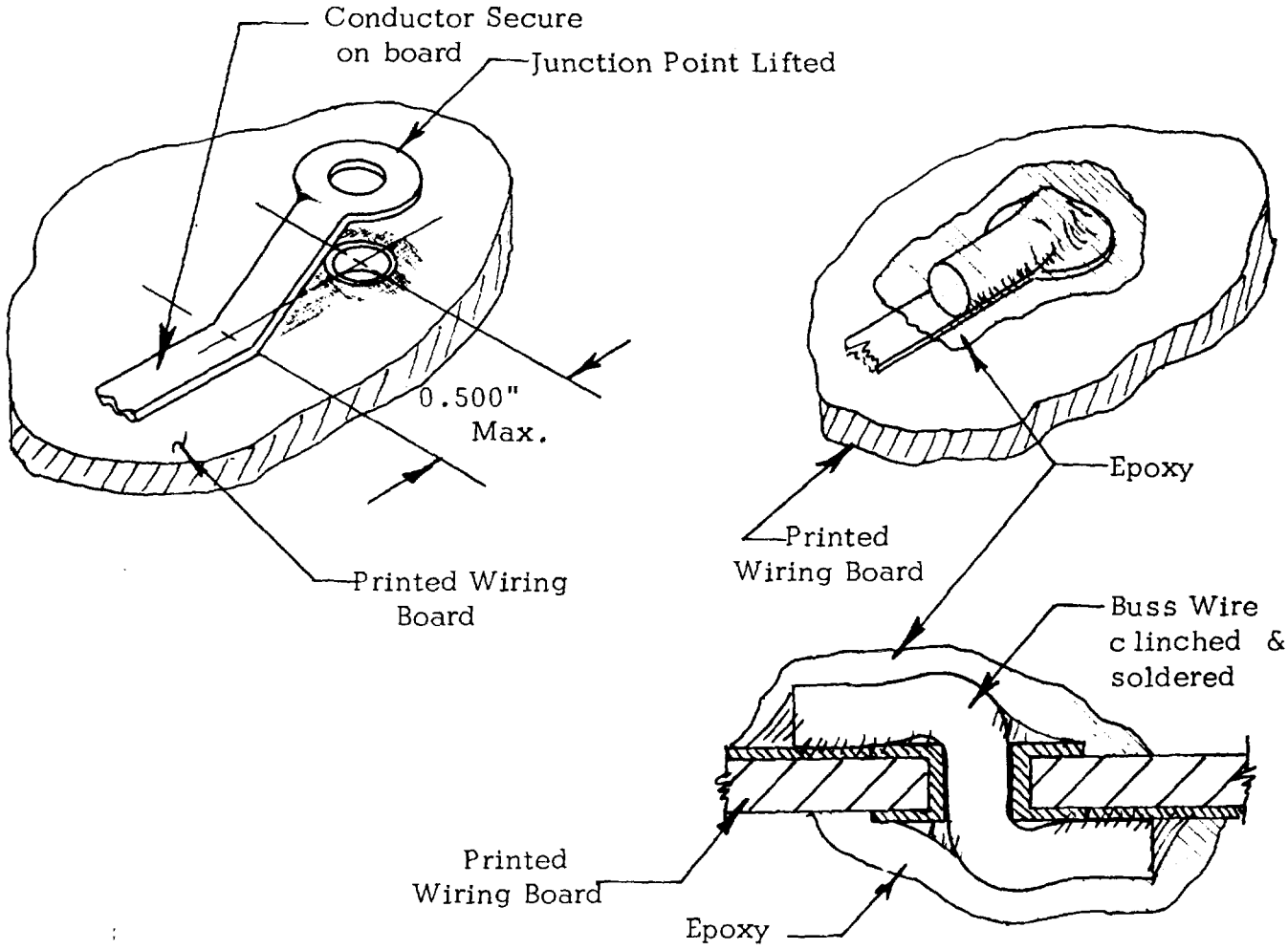


Figure 3-11. Repair of Lifted Circuit Pads Where No Components are Present and Interfacial Connections are Required

(9) Clean and dry repaired area using an approved cleaner.

d. Inspection. Inspect repaired area to ensure the following conditions.

(1) Continuity has been achieved.

(2) No shorts exist.

(3) Printed wiring board, circuitry and/or terminal pads are not damaged.

(4) Solder connections, epoxy application, eyelet installation, etc. are per established specifications.

(5) Circuit function has not been altered in any way.

e. Conformal Coating. After any maintenance has been performed which requires removal of the surface coating on printed circuit board modules, the exposed areas must be recoated for fungus and moisture protection using the following procedure.

NOTE

Prior to mixing conformal coating, verify the material conforms to the shelf life requirements contained in Technical Information Sheet, Conathane CE-1155 System, "Polyurethane Circuit Coating", Conap, Inc.

(1) Prepare coating material by thoroughly mixing 70 parts by weight, Part B to 100 parts by weight Part A. After mixing, let mixture stand for 15 to 30 minutes at 250C (770F) to allow air to escape. The tolerance on the mix ratio should be held to +5%.

(2) Thin mixture as required with thinner to adjust film thickness.

(3) Prior to coating, clean surface with an approved cleaner to remove flux, dirt, oil, corrosion, grease, fingerprints and all other foreign matter.

(4) Mask surfaces which should not be conformally coated. These areas include but are not limited to test points, connectors, variable electrical and mechanical components, switch contacts, electrical contacts and mechanical mounting devices. Mask only the necessary areas.

(5) Apply coating by spray, dip or brush. The thickness of the applied coating shall be .002 ± .001 inch thick as measured on the surface of the board. For spray application, add 10-20% by weight, S-8 solvent.

(6) Place coated assemblies in a horizontal position and cure conformal coating in the following manner.

(a) Air cure for five hours at 25? (77?) to a "tack free" condition.

(b) Alternate curing procedure: Three hours at 60? (140?).

(7) After curing, remove all masking from coated surface.

(8) Pot life under normal conditions is about six hours. This pot life may be extended to eight hours by the addition of 10% S-8 solvent. A shelf life of one year is recommended for Part A and Part B.Store materials in tightly closed containers in a dry area away from fire and extreme heat.

CAUTION

Polyurethane products normally contain traces of free Tolylene Dilsocyanate (TDI) which produce irritating fumes. Preparation and application of mixtrue should be in a well ventilated area. Prevent contact with the eyes, skin and respiratory system; avoid breathing fumes. If contact occurs, wash contacted area with water and/or soap and water.

(9) Inspection.

(a) When inspected with 3-10X magnification, the coated assemblies shall have no visible bubbling, blistering, wrinkling, cracking, pinholes, or peeling of the coating material or corrosion of printed conductors. The cured film shall form a continuous, homogeneous, transparent coating. This coating shall not mask or obliterate the color coding or marking of components. Coating shall not undercut masked areas.

(b) Conformal coating thickness should be checked to assure compliance with (5) above. Film thickness may be checked by measuring the difference in readings on the base laminate, in the finger contact area, and adjacent areas on the conformal coating using a height gauge and dial indicator or a thin-bladed micrometer accurate to ± .0005.

f. Epoxy-Patch Kit Repairs. The following procedures are to be used for preparation and utilization of non-conductive epoxy-patch kits. These kits,which consist of two components (resin and hardener), are purchased from HYSOL Corporation, Olean, New York (FSCM No. 03447) as part number 0151.

(1) Prepare epoxy material by squeezing parallel beads of equal length of resin and hardener from tubes onto a clean, dry, disposable surface, Mix the two components together thoroughly to obtain a smooth, even paste. Mix only the amount of material required.

(2) Prepare surface of item requiring bonding, repairing or sealing by light sanding or cleaning with an approved cleaning compound to insure that surfaces are free of oil, wax, dirt or other foreign matter.

NOTE

Epoxy-patch kits are recommended for use with aluminum, copper, steel, glass, ceramics, wood and most plastics; they are not recommended for use with nylon, teflon, mylar, polyethylene, vinyls or precious metals.

(3) Apply epoxy mixture to clean, dry surface using a spatula type applicator. When applying a large patch and a smooth finish is desired, the patch may be covered with a material such as ran Wrap and smoothed out by hand. Remove covering after cure.

(4) Place bonded, sealed or repaired item(s) in a clean, dry area and air cure at room temperature (770F, 250C) for 24-36 hours, or heat cure (1400F, 600C) for two hours.

(5) Pot life under normal conditions (dry, 770F area) is 60-90 minutes for a 100 gram mass. A shelf life limitation of 12 months is recommended for all kits. Keep tubes tightly capped when not in use.

WARNING

Epoxy-patch kits are considered nontoxic only after curing. Epoxy materials should be prepared and used in well ventilated areas. Prevent contact with skin. If contact occurs cleanse contacted area with soap and water.

g. Wire Splice Repair Procedure. Perform the following procedure whenever splicing wires is required as part of a repair procedure.

(1) Use AMP "PIDG" nylon window splice, purchased from American Pamcor, Inc., Paoli, Pennsylvania, FSCM 04618 under the following part numbers:

Splice Part No.	Wire Size AWG	Color Coding	Wire Max.O.D.	Length (Max.)	Mil Equiv.
323994	26-24	Yellow	.082	27/32"	MS25181-4
320559	22-18	Red	.125	1-1/4"	MS25181-1
320562	16-14	Blue	.150	1-1/4"	MS25181-2
320570	12-10	Yellow	.220	1-41/64"	MS25181-3

(2) Use "AMP T-HEAD TOOL," part numbers:

Tool Part No.	Used With Splice No.
59275	323994
49250	320559 and 320562
59239-4	320570

(3) Strip wire insulation to 1/4" as shown in figure 3-12.

(4) Twist wire strands; DO NOT TIN.

(5) Insert splice into crimping tool in side color coded corresponding to splice color code. Insert splice with splice window located under clamping foot of crimping tool.

(6) Insert wire into splice as shown in figure 3-12.

(7) Squeeze crimping tool to crimp splice.

(8) Remove splice from crimping tool.

(9) Inspect to ensure that wire strands are visible through splice window and that splice is properly and adequately crimped.

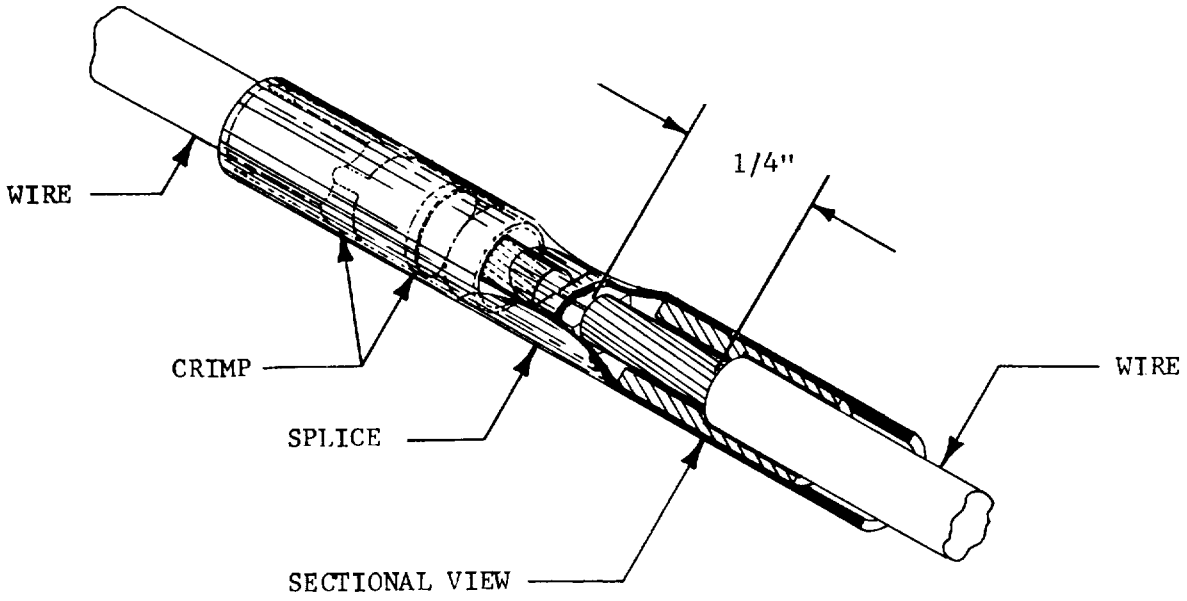


Figure 3-12. Wire Splice Cutaway

3-31. INTEGRATED CIRCUIT REPAIR INSTRUCTIONS. Due to the wide utilization of semiconductors and integrated circuits in this electronic equipment, somewhat different techniques are necessary in maintenance procedures. In solid-state circuits,the impedances and resistances encountered are of much lower values than those encountered in vacuum-tube circuits. Therefore, a few ohms discrepancy can greatly affect the performance of the equipment. Also, coupling and filter capacitors are of larger values and usually are of the tantalum type. Hence, when measuring values of capacitors, an instrument accurate in the high ranges must be employed. Capacitor polarity must be observed when measuring resistance. Usually, more accurate measurements can be obtained if the semiconductors are removed or disconnected from the circuit.

a. Replacing Semiconductors. Never remove or replace a semiconductor with the supply voltage turned on. Transients produced may damage the semiconductor or others remaining in the circuit. If a semiconductor is to be evaluated in an external test circuit, be sure that no more voltage is applied to the semiconductor than normally is used in the circuit from which it came.

NOTE

It is recommended that semiconductors and integrated circuits not be tested or replaced until unsatisfactory performance is observed.

(1) Use only a low-heat soldering iron when installing or removing soldered-in parts.

(2) When installing or removing a soldered-in semiconductor, grasp the lead to which heat is applied between the solder joint and the semiconductor with long-nosed pliers or hemostats. This will dissipate some of the heat that would otherwise conduct into the semiconductor from the soldering iron. Make certain that all wires soldered to semiconductor terminals have first been properly tinned so that the necessary connection can be made quickly. Excessive heat will permanently damage a semiconductor.

(3) In some cases, power transistors are mounted on heat sinks that are designed to dissipate heat away from them. In some power circuits, the transistor must also be insulated from ground. Often, this insulation is accomplished by insulating washers made of mica. When replacing transistors mounted in this manner, be sure that the insulating washers are replaced in the proper order. Before installing the mica washers, treat them with a film of thermal compound. This treatment helps in the transfer of heat.

b. Replacing Integrated Circuits. If an I.C. is known to be defective, the easiest way to remove it is to cut off each of its pins, remove the case, and unsolder the remaining pins from the integrated circuit card one by one. This is preferable over removing the I.C. intact because attempts to remove the I.C. intact may result in damage to the card. However, if it is desired to remove an I.C. intact, a soldering iron with a special tip may be used that will heat all the pins on the backside of the card at the same time. After removal, the holes of the card should be cleaned of solder so that the replacement I.C.may be installed. Note the marking indentation of the I.C. before removal, and replace the new one with the same orientation as the one removed.

SECTION IX

ASSEMBLY

3-32. GENERAL. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

3-33. ASSEMBLY PROCEDURES. Assembly of the electrical equipment rack assembly radio detector and antenna is essentially the reverse of disassembly. No special instructions are required.

3-34. TESTING. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 5 of TM 11-5825-266-14-1.

CHAPTER 4

CONTROL-INDICATOR C- 10527/FR N-41

MAINTENANCE, OVERHAUL AND REPAIR

SECTION I

DISASSEMBLY

4-1. GENERAL. This chapter details disassembly, inspection, troubleshooting repair, and reassembly procedures necessary to restore the Control-Indicator C-10527/FRN-41 and the circuit card assemblies contained therein to satisfactory operating condition after a failure or maintenance action. The text is supplemented with appropriate illustrations necessary to describe the required disassembly, repair, and reassembly procedures. Do not disassemble the local control indicator more than is necessary for repairs.

4-2. CONTROL INDICATOR DISASSEMBLY PROCEDURES. Remove the local control assembly from the electrical equipment cabinet in accordance with the instructions provided in Chapter 3, Section V. Instructions for disassembly of each subassembly and chassis mounted components are provided in the following paragraphs.

a. Front Panel and Chassis-Mounted Components Disassembly. (See figure 4-1.) The following disassembly procedure should be followed for removing components for repair or replacement.

(1) Remove pushbutton tone generator U1 from the front panel by removing the two screws holding the pushbutton tone generator to the tone generator bracket.

(2) Disassemble all other front panel mounted parts in accordance with figure 4-1.

(3) To disassemble any one of the following chassis-mounted components, identify the component on sheet 1 of figure 4-1 and disassemble per the following instructions.

(a) Disassemble chassis-mounted connectors 1A2J1, 1A2J2, 1A2J3 and 1A2J6 by pushing on the side locks on the underside of each connector and lifting out. Use extractor tool to remove wire connections. (See detail L.)

(b) Disassemble chasis-mounted connector 1A2J4 by removing two screws holding connector to chassis. Use extractor tool to remove wire connections.

(c) Disassemble microphone connector 1A2J5 per figure 4-1 (detail K).

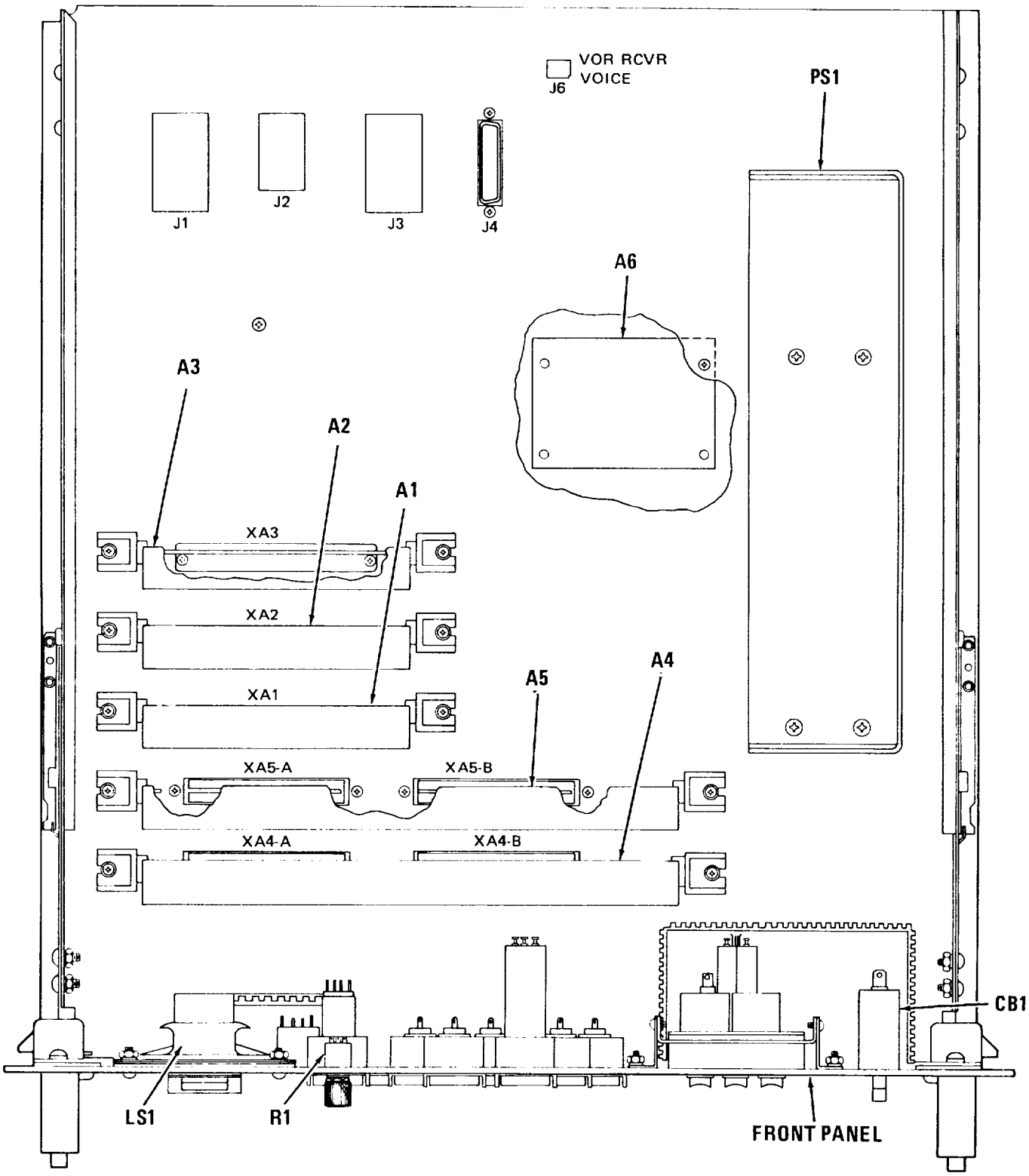


Figure 4-1. VOR Local Control Front Panel andChasis Mounted Parts Location Diagram (Sheet 1 of 4)

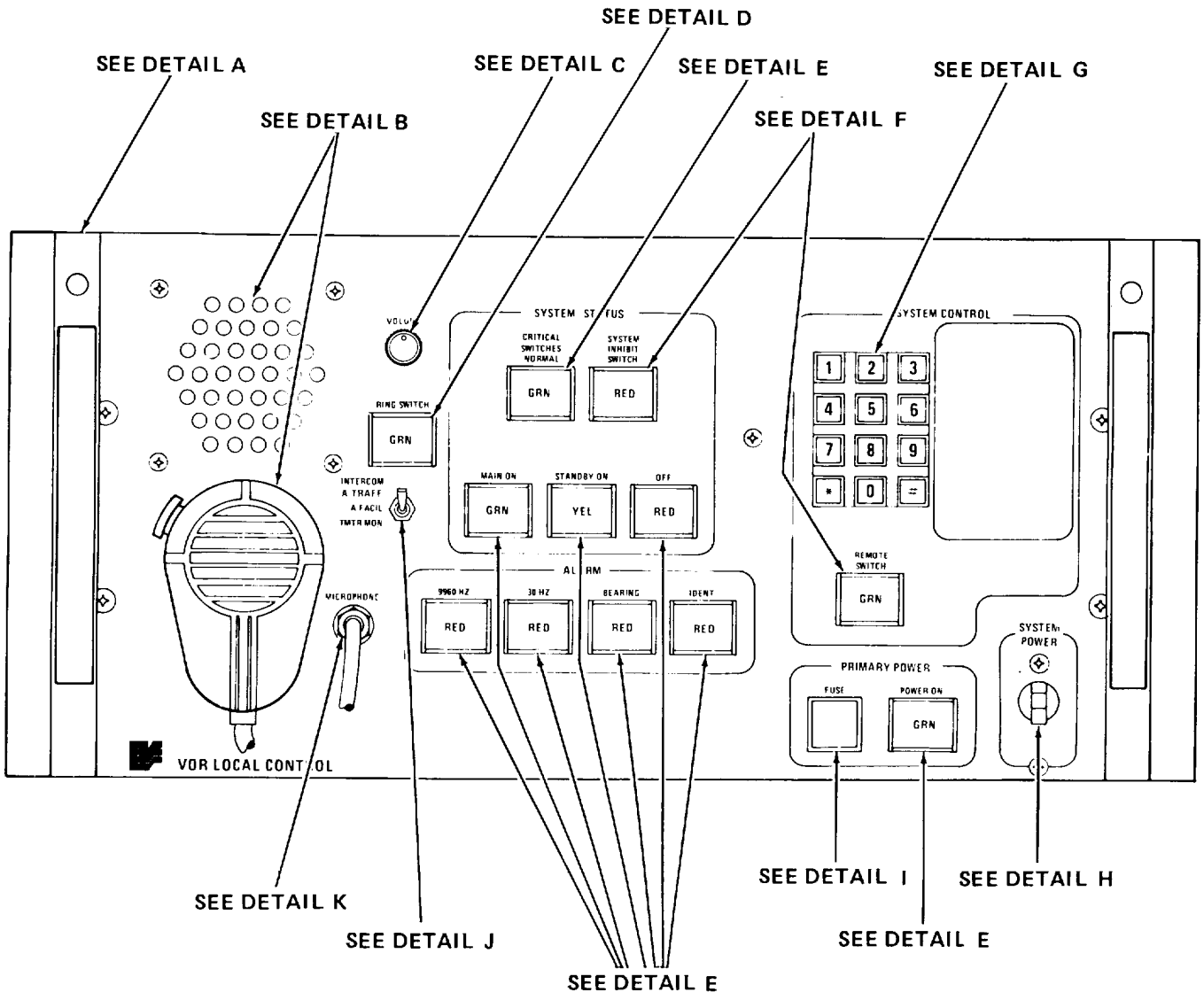
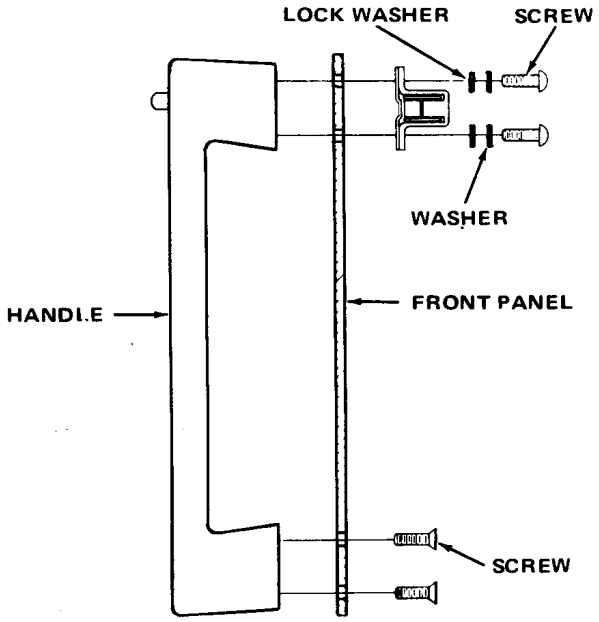
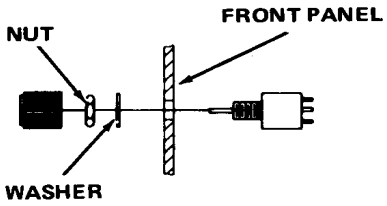


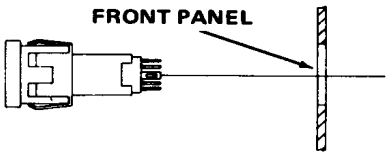
Figure 4-1. VOR Local Control Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 2 of 4)



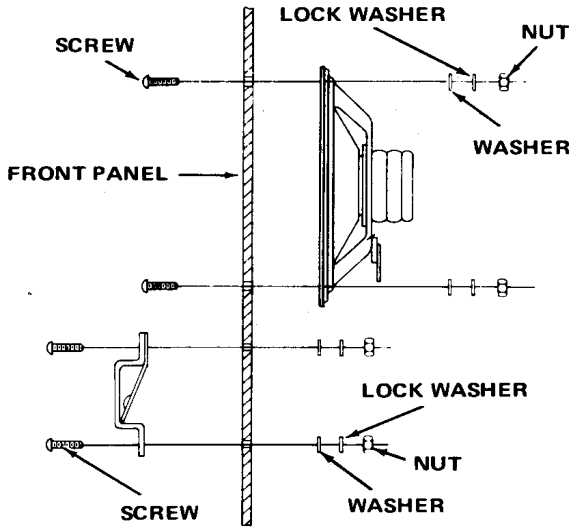
DETAIL A



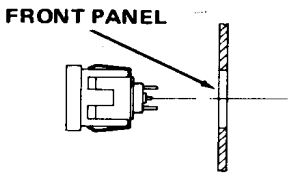
DETAIL C



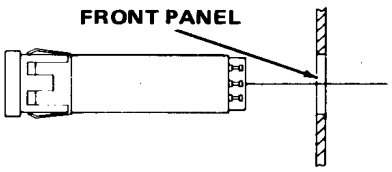
DETAIL D



DETAIL B

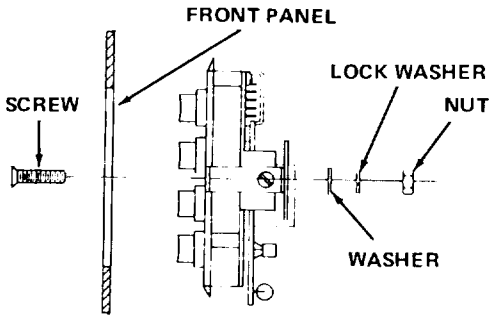


DETAIL E

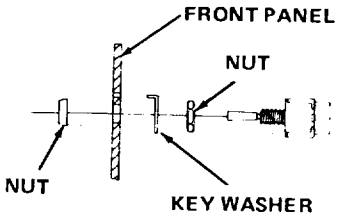


DETAIL F

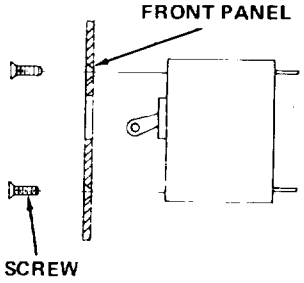
Figure 4-1. VOR Local Control Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 3 of 4)



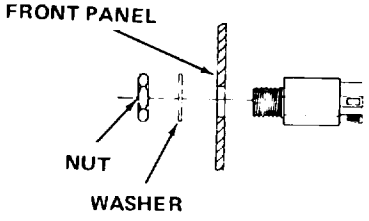
DETAIL G



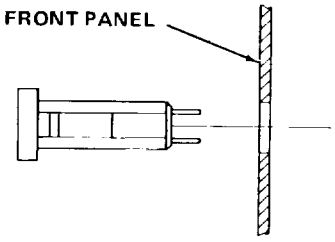
DETAIL J



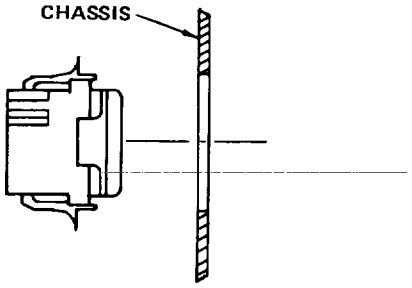
DETAIL H



DETAIL K



DETAIL I



DETAIL L

Figure 4-1. VOR Local Control Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 4 of 4)

b. Tone Decoder Circuit Card Assembly (1A2A1) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-2 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do no remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

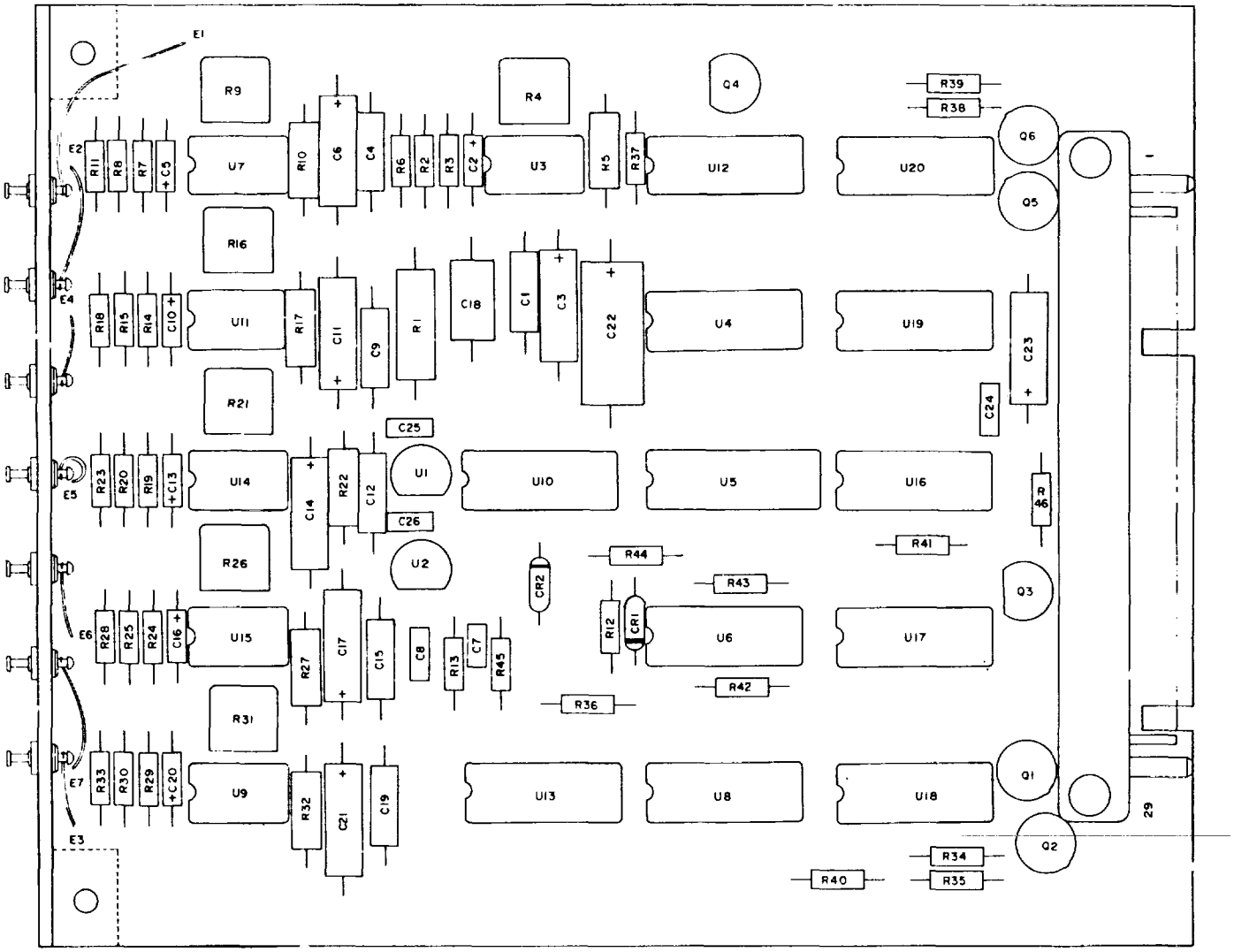


Figure 4-2. Tone Decoder Circuit Card Assembly, 1A2A1

c. Alarm and Transfer Circuit Card Assembly (1A2A2) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-3 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

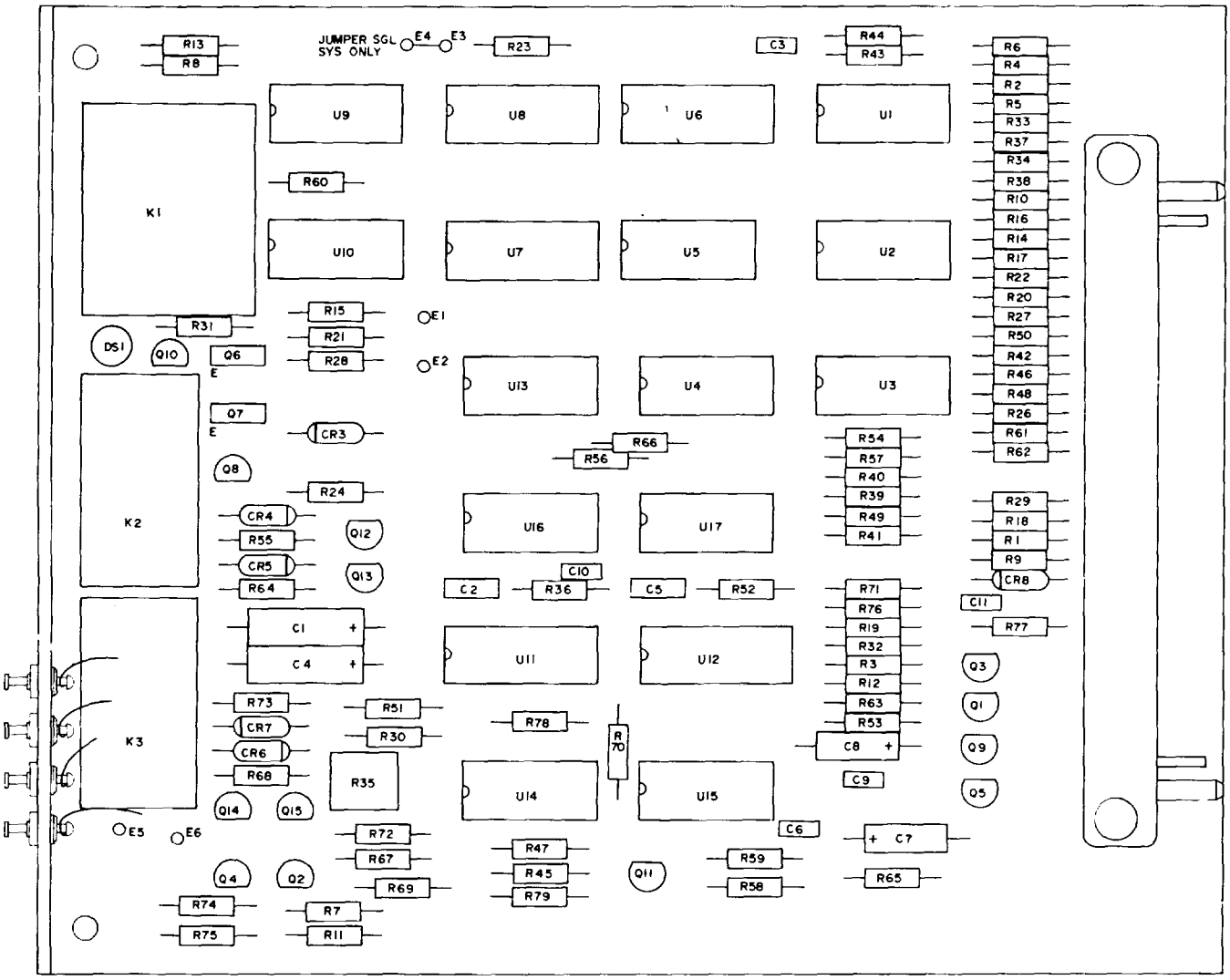


Figure 4-3. Alarm and Transfer Circuit Card Assembly, 1A2A2

d. Ident Control Circuit Card Assembly (1A2A3) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-4 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

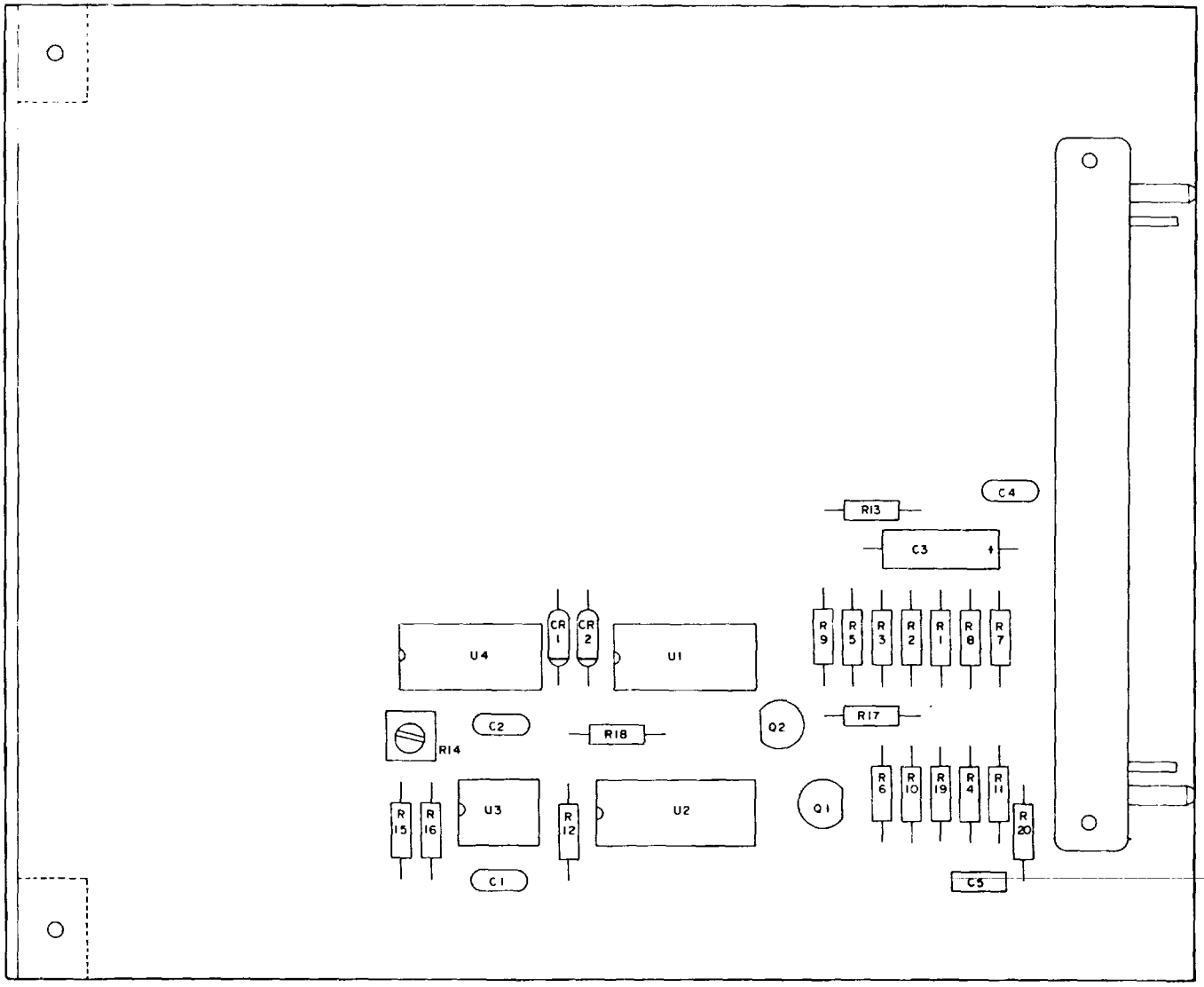


Figure 4-4. Ident Control Circuit Card Assembly, 1A2A3

e. Status XMTR Modem Circuit Card Assembly (1A2A4) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-5 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

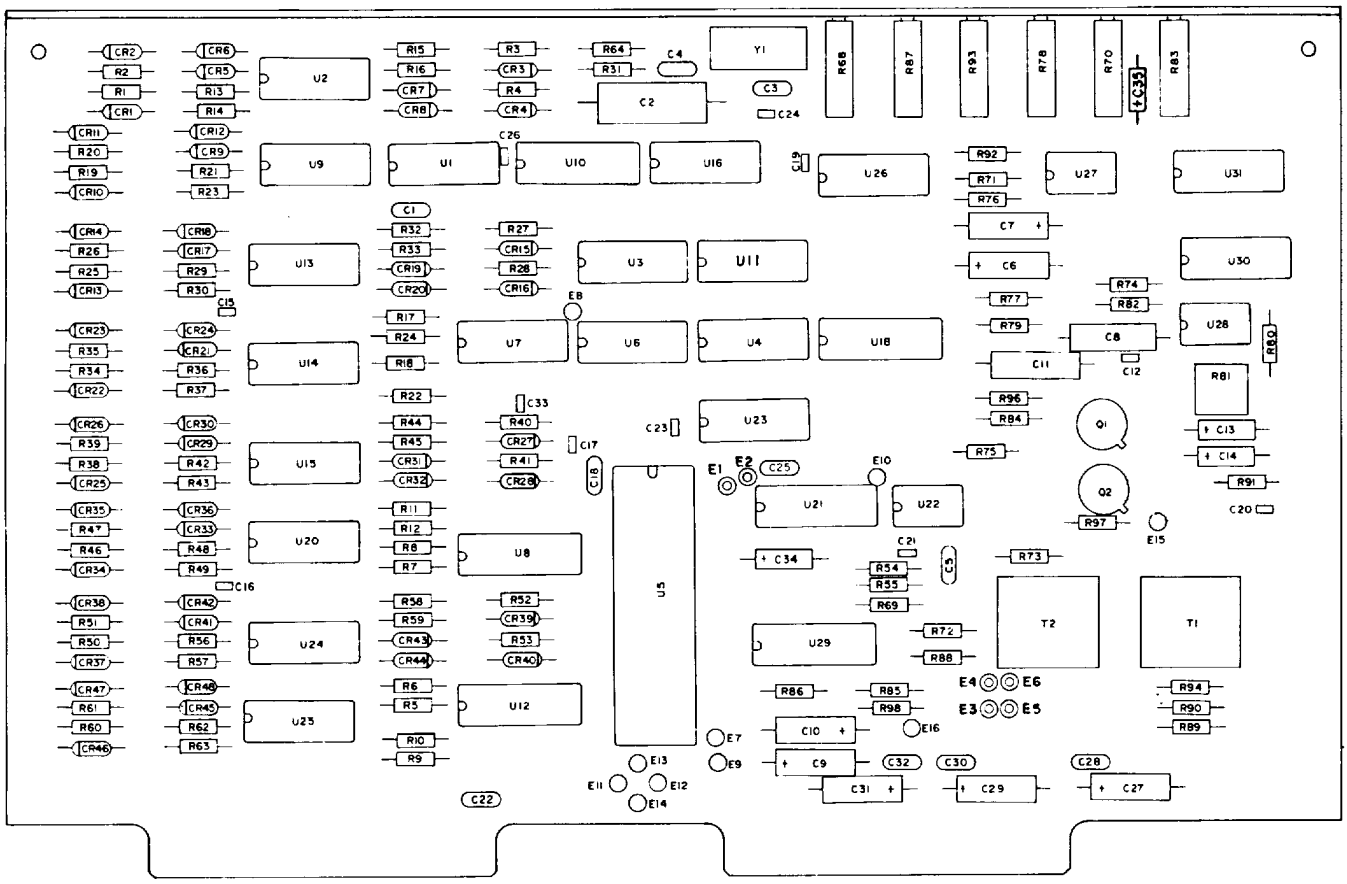


Figure 4-5. Status XMTR Modem Circuit Card Assembly,1A2A4

f. XMTR/RCVR Voice Buffer Circuit Card Assembly (1A2A5) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-6 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

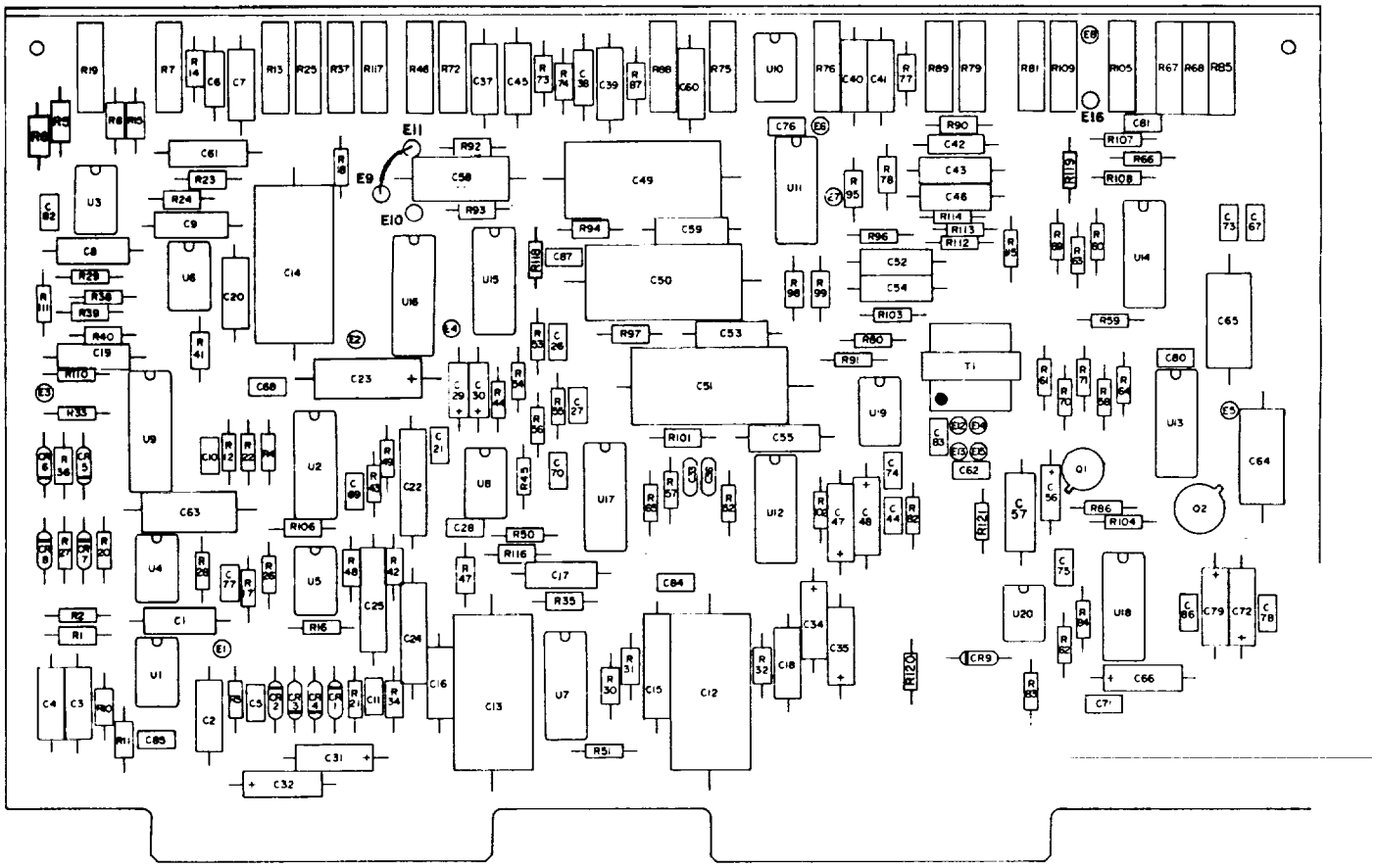


Figure 4-6. XMTR/RCVR Voice Buffer Circuit Card Assembly, 1A2A5

g. Voltage Surge Suppressor Circuit Card Assembly (1A2A6) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, perform the following procedures. Refer to figure 4-7 for location of component be replaced.

(1) Tag and disconnect wiring from solder joints El through E 13.

(2) Remove four screws, washers and electrical spacers holding the voltage surge suppressor circuit card assembly in place.

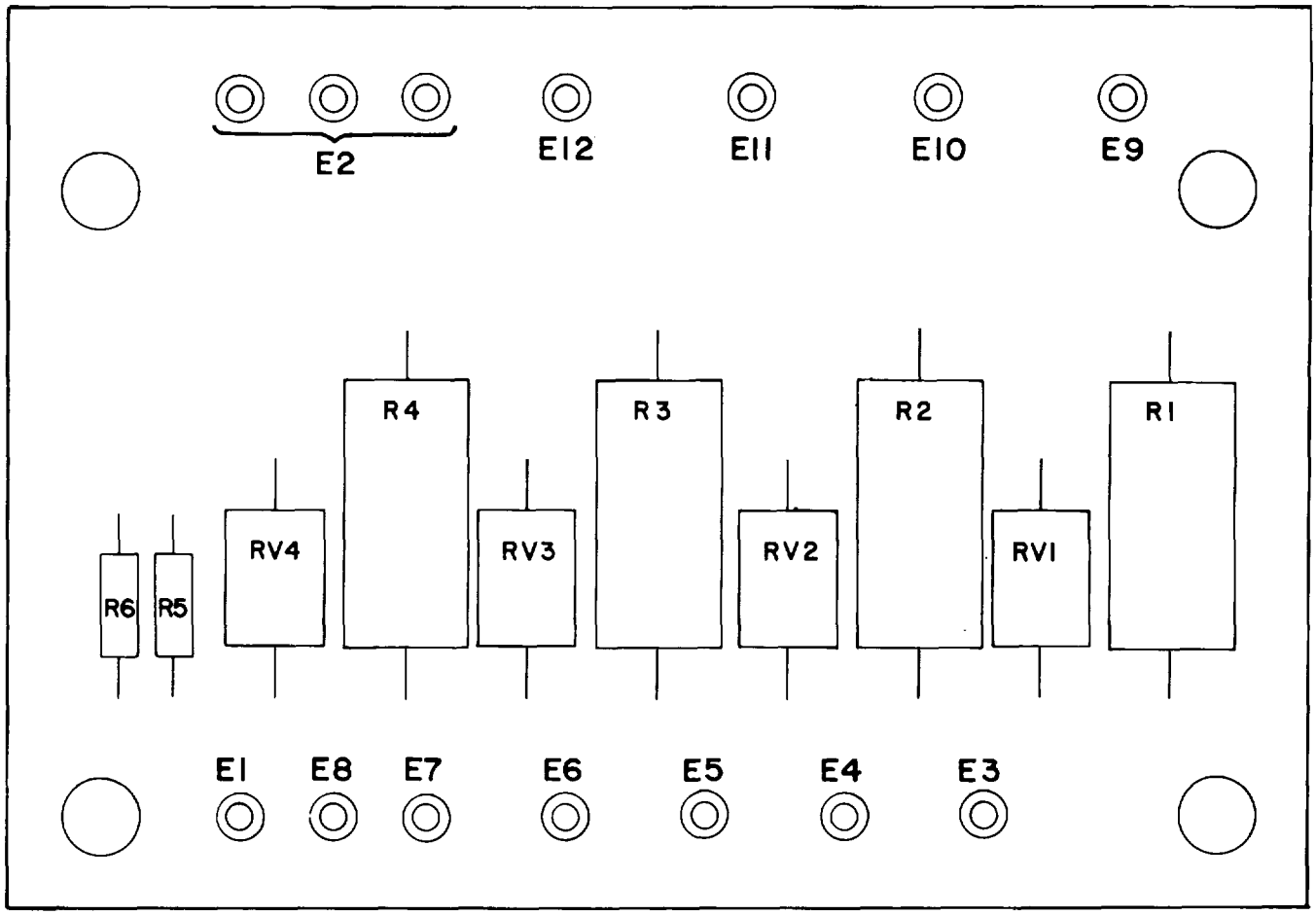


Figure 4-7. Voltage Surge Suppressor Circuit Card Assembly, 1A2A6

h. Power Supply (1A2PS1) Disassembly. (Refer to figure 4-8.) To remove the power supply, perform the following steps:

NOTE

For normal maintenance do not remove the power supply from the drawer.

(1) Remove the four screws, washers and nuts holding power supply 1A2PS1 in place.

(2) Tag and disconnect the wires from the wiring terminals on the transformer and 1A2PS1A1, 1A2PS1A2 and 1A2PS1A3 circuit card assemblies.

(3) Remove the power supply from the chassis.

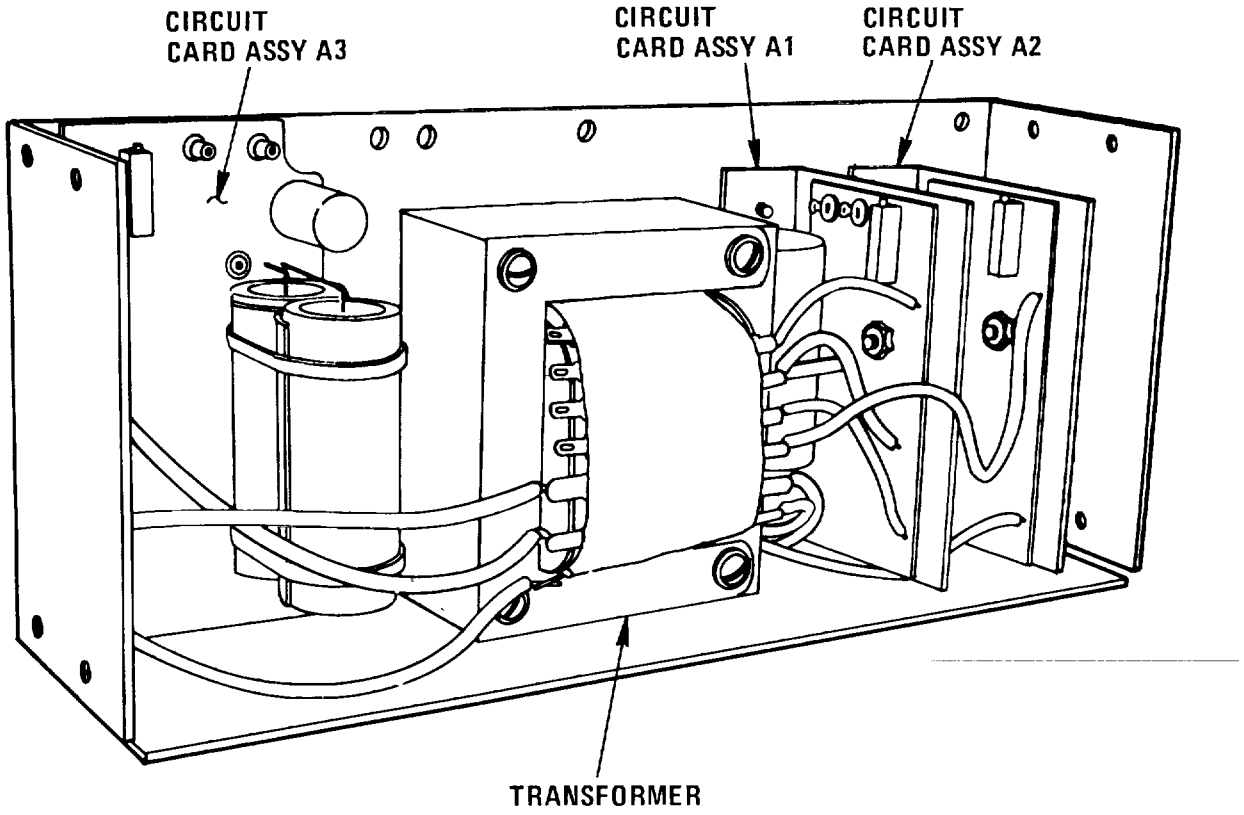


Figure 4-8. Power Supply, 1A2PS1

i. 1A2PS1A1 Circuit Card Assembly Disassembly. To disassemble 1A2PS1A circuit card assembly for servicing or component replacement, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-8 for location of circuit card.

(1) Disconnect the green wire from the top of the card.

(2) Remove the two screws on the back cover of the power supply.

(3) Disconnect the two orange wires from the top of the card.

(4) Remove the bracket with the circuit card still attached.

(5) Remove the two screws holding transistor Q2 to the bracket.

(6) Unsolder the black ground wire from the back of the card and remove card.

j. 1A2PS1A2 Circuit Card Assembly Disassembly. To disassemble 1A2PS1A2 circuit card assembly for servicing or component replacement, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-8 for location of circuit card.

(1) Disconnect the green wire from the top of the card.

(2) Remove the two screws on the back cover of the power supply.

(3) Disconnect the violet wire from the top of the circuit card.

(4) Remove the bracket with the circuit card still attached.

(5) Remove the two screws holding transistor Q2 to the bracket.

(6) Unsolder the black ground wire from the back of the card and remove card.

k. 1A2PS1A3 Circuit Card Assembly Disassembly. To disassemble 1A2PS1A3 circuit card assembly for servicing or component replacement, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 4-8 for location of circuit card.

(1) Disconnect the green wire from the top of the card.

(2) Remove the two screws on the back cover of the power supply.

(3) Disconnect the four yellow wires from the top of the card.

(4) Disconnect the grey and white wires from transformer T1.

(5) Remove the four screws holding transistors Q2 and CR1 to the power supply.

(6) Unsolder the black ground wire from the back of the card and remove card.

SECTION II

CLEANING AND INSPECTION

4-3. CLEANING. Clean the control indicator as required, following the procedures specified below. Do not clean anything which inspection indicates does not need cleaning.

CAUTION

Do not use freon when cleaning circuit cards which contain plastic components, as damage to the cards will result. Use denatured alcohol to clean these circuit cards.

a. Remove dust and loose dirt from outside surfaces with a clean, soft cloth.

WARNING

Freon fumes are toxic. Provide adequate ventilation. Do not use near a flame. Freon is not flammable, but exposure to high heat can convert fumes to a highly toxic gas.

b. Remove grease and ground-in dirt from outside surfaces with a cloth dampened (not wet) with freon.

C Remove dust and dirt from electrical connectors with a soft-bristled brush.

WARNING

Bodily injury or equipment damage can result from cleaning with compressed air at pressures in excess of 15 pounds per square inch.

d. If repair procedures require disassembly, remove dust from exposed inner parts of assembly by loosening with a soft-bristled brush and blowing with a jet of dry air at not more than 15 psi.

4-4. INSPECTION. After disassembly, fabrication action, repair action, or final assembly, subject the items to an in-process inspection. General inspection requirements shall be in accordance with MI L-M-45208. Adequate records of all inspections and tests shall be maintained (refer to Chapter 5, TM 11-5825-266-14-1), as applicable. The in-process inspection should include, but not be limited to, the following criteria:

a. Mounting of Parts. Inspect parts, components, or hardware, etc., to ensure that they are assembled, mounted, and secured so as to satisfactorily accomplish their intended purpose.

b. Fabrication. Inspect finish for a smooth, continuous coating and a reasonable color match where surfaces have been touched up. Where conformal coating has been used, ensure that coating material has not covered areas purposely left unpainted or uncoated for electrical contact purposes. On circuit cards, there shall be no evidence of lifting or separation of plating from the conductor pattern or of conductors from the base laminate. There shall be no slivers or whiskers. There shall be no evidence of burns or corona discharge.

c. Threaded Parts or Devices. Inspect screws, nuts, bolts, etc., for cross-threading, detrimental or hazardous burrs, or mutilation.

d. Tightness. Inspect all screw-type fasteners for tightness. Fasteners shall be firmly secure and there shall be no relative movement possible between them and attached parts.

e. Soldering. Inspect leads to see that they are tightly crimped to terminals and that they show no signs of having been moved while soldering. Solder must show a shiny, smooth surface feathering out at the edges where it joins the surface of terminal or conductor. In addition, solder connections shall show only enough solder to cover the joint, and shall show no indication of burns, acid or acid salts.

NOTE

Acid or acid salts should be used only as permitted for pretinning or soldering mechanical joints. No acid or acid salts may be used near insulation. Where acid or acid salts have been used as permitted, they shall be completely neutralized and removed.

f. Moisture/Fungus-Proofing. Conformal coated parts shall have unbroken coating. The coating material shall not appear on areas purposely left unpainted or uncoated for electrical contact purposes.

g. Wiring. Inspect wiring for neatness and sturdiness. Wires shall be positioned to preclude or be protected from contact with rough or irregular surfaces and sharp edges. Ensure that wiring dress does not result in incorrect electrical operation. Inspect insulation for evidence of burns, abrasion, or pinch marks. There shall be no splices on wiring between terminals. Clearance between wires and parts shall be such that there is no deterioration of wiring due to heat dissipation from the parts. Clearance between bare connections or bare conductors shall be sufficient to prevent contact or arcing during operation.

SECTION III

TROUBLESHOOTING

4-5. GENERAL. System-level fault isolation procedures to the unit or assembly level are provided in Chapter 3. This chapter provides fault isolation procedures to the module and circuit level for the control-indicator.

4-6. FAULT ISOLATION. To utilize the troubleshooting charts in this section, it is first necessary to identify the chart which corresponds to the observed failure reflected by the equipment. The step-by-step procedures contained in the troubleshooting charts (figures 4-9, 4-10, 4-11, 4-12, 4-13 and 4-14) provide fault isolation to the module level and circuit level. These charts provide the means to fault isolate to the suspected circuit group. Isolation down to the part level is accomplished using schematics and circuit theory provided in TM 11-5825-266-14-1 and -2 and standard troubleshooting practices. Once the module or part is identified, it can be repaired or replaced with a serviceable item.

NOTE

Ensure that all internal wiring is good before assuming a circuit card to be defective. Verify that all inputs to the circuit card assembly have been properly checked.

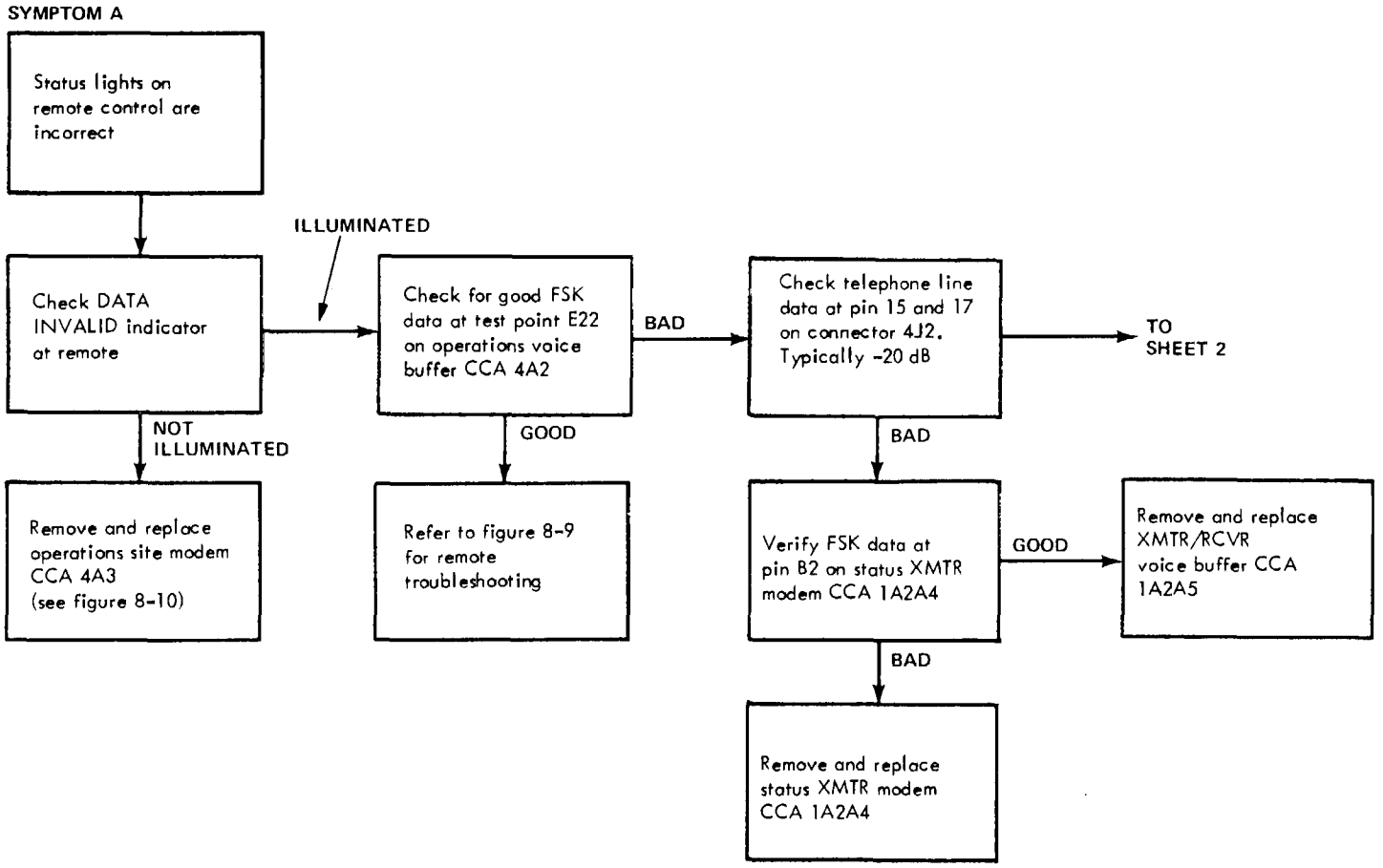


Figure 4-9. Local Control, 1A2, Troubleshooting Chart to the Module Level (Sheet 1 of 3)

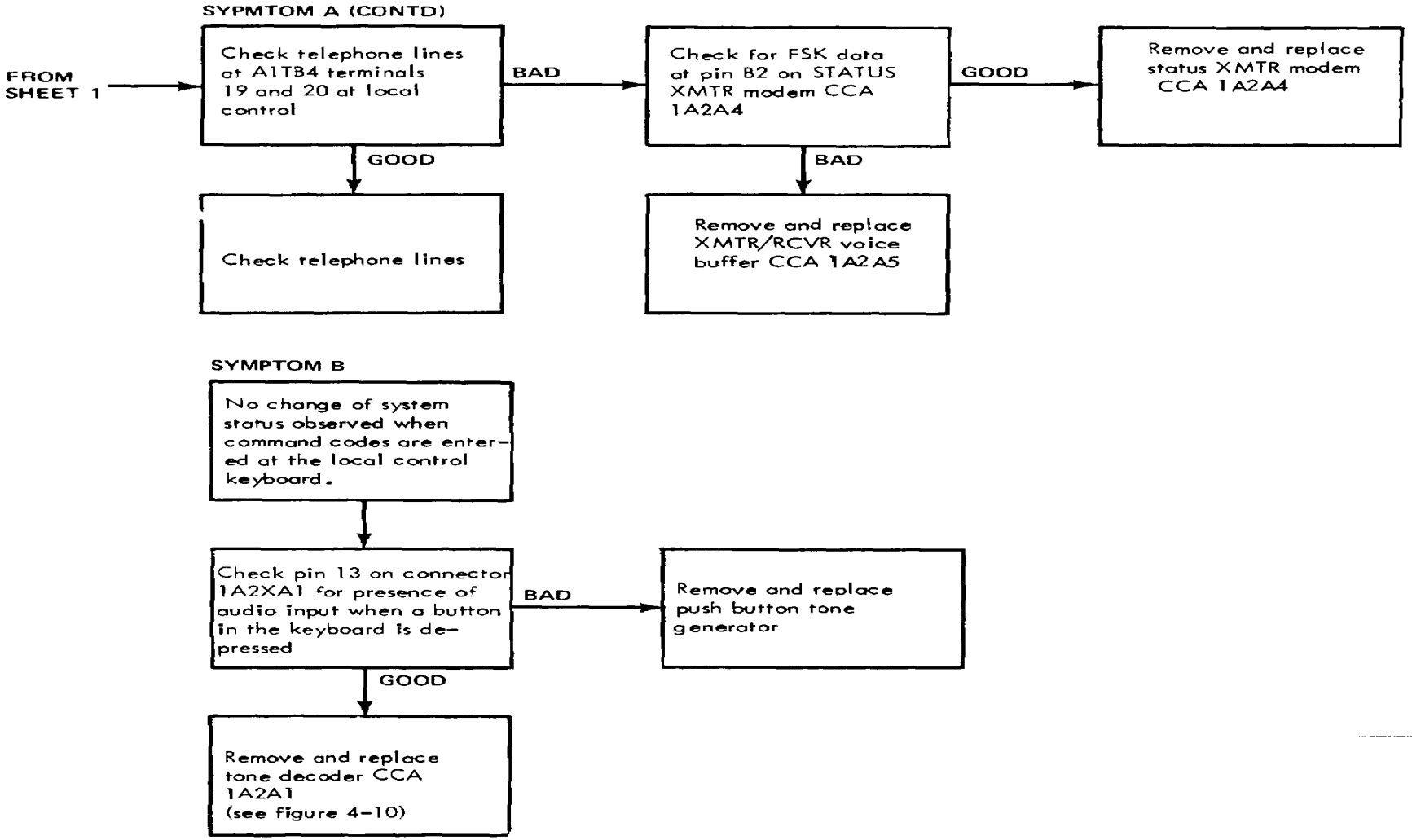


Figure 4-9. Local Control, 1A2, Troubleshooting Chart to the Module Level (Sheet 2 of 3)

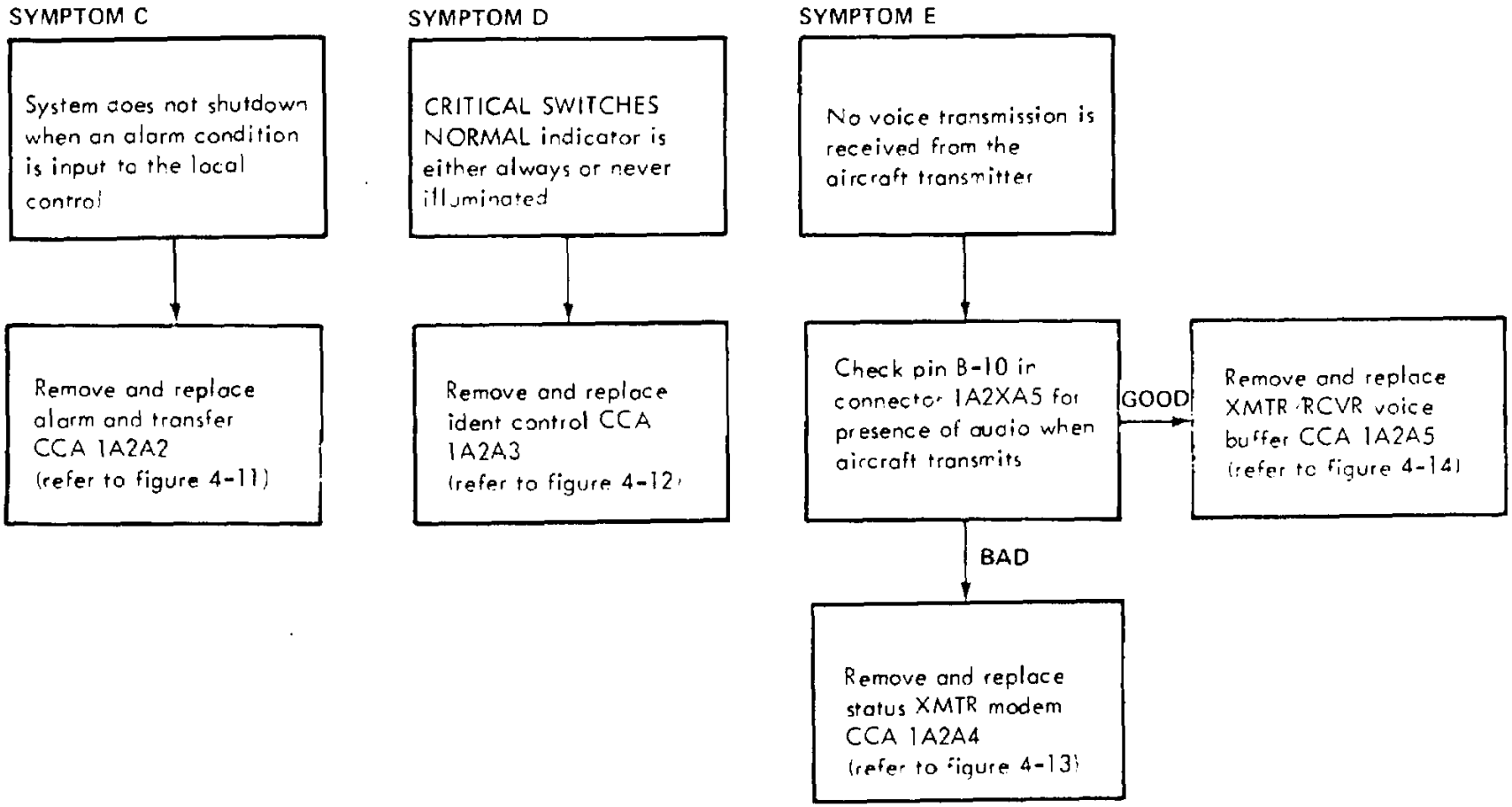


Figure 4-9. Local Control, 1A2, Troubleshooting Chart to the Module Level (Sheet 3 of 3)

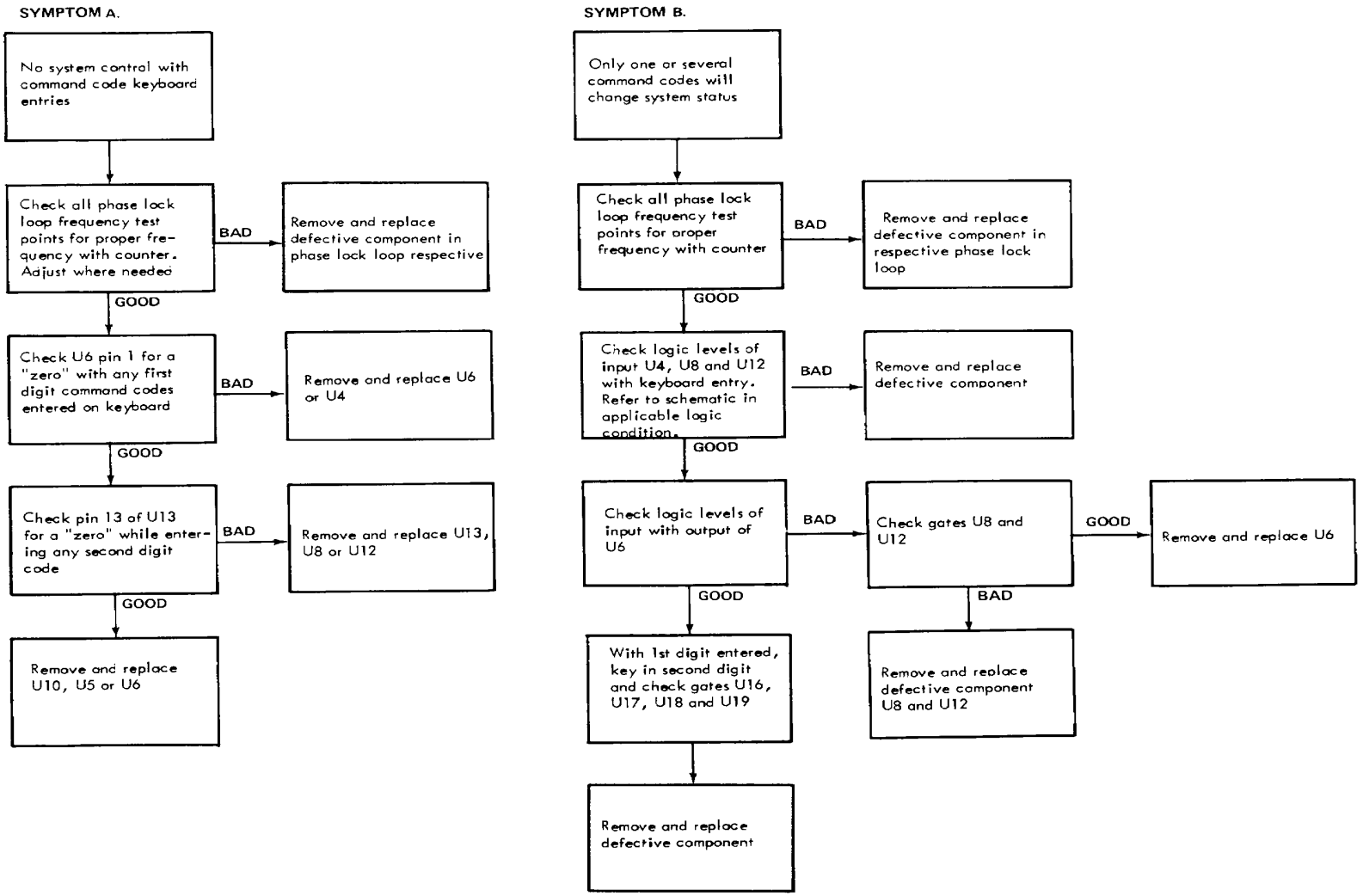


Figure 4-10. Tone Decoder Circuit Card Assembly, 1A2A1, Troubleshooting Chart to the Circuit Level

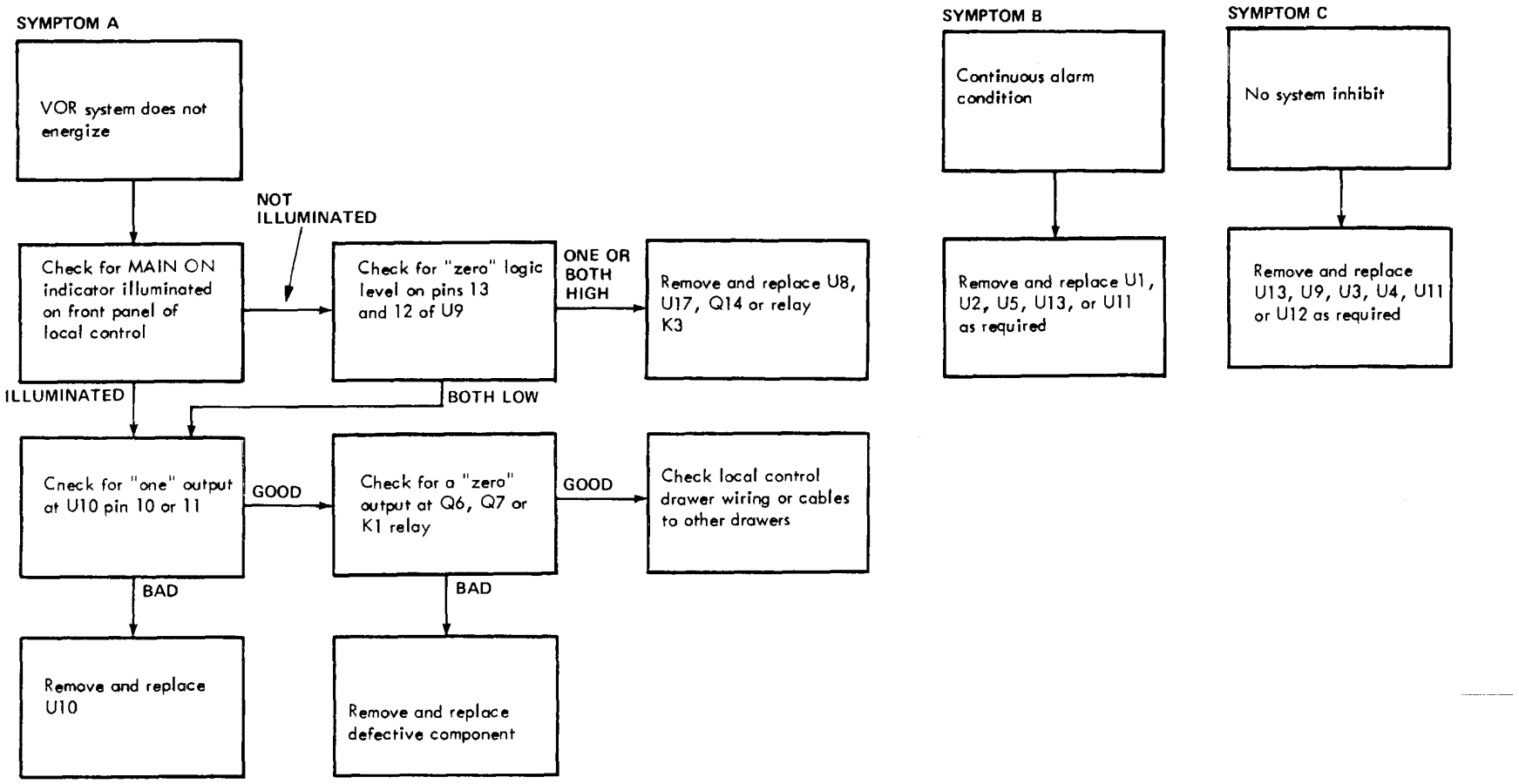


Figure 4-11. Alarm and Transfer Circuit Card Assembly, 1A2A2, Troubleshooting Chart to the Circuit Level

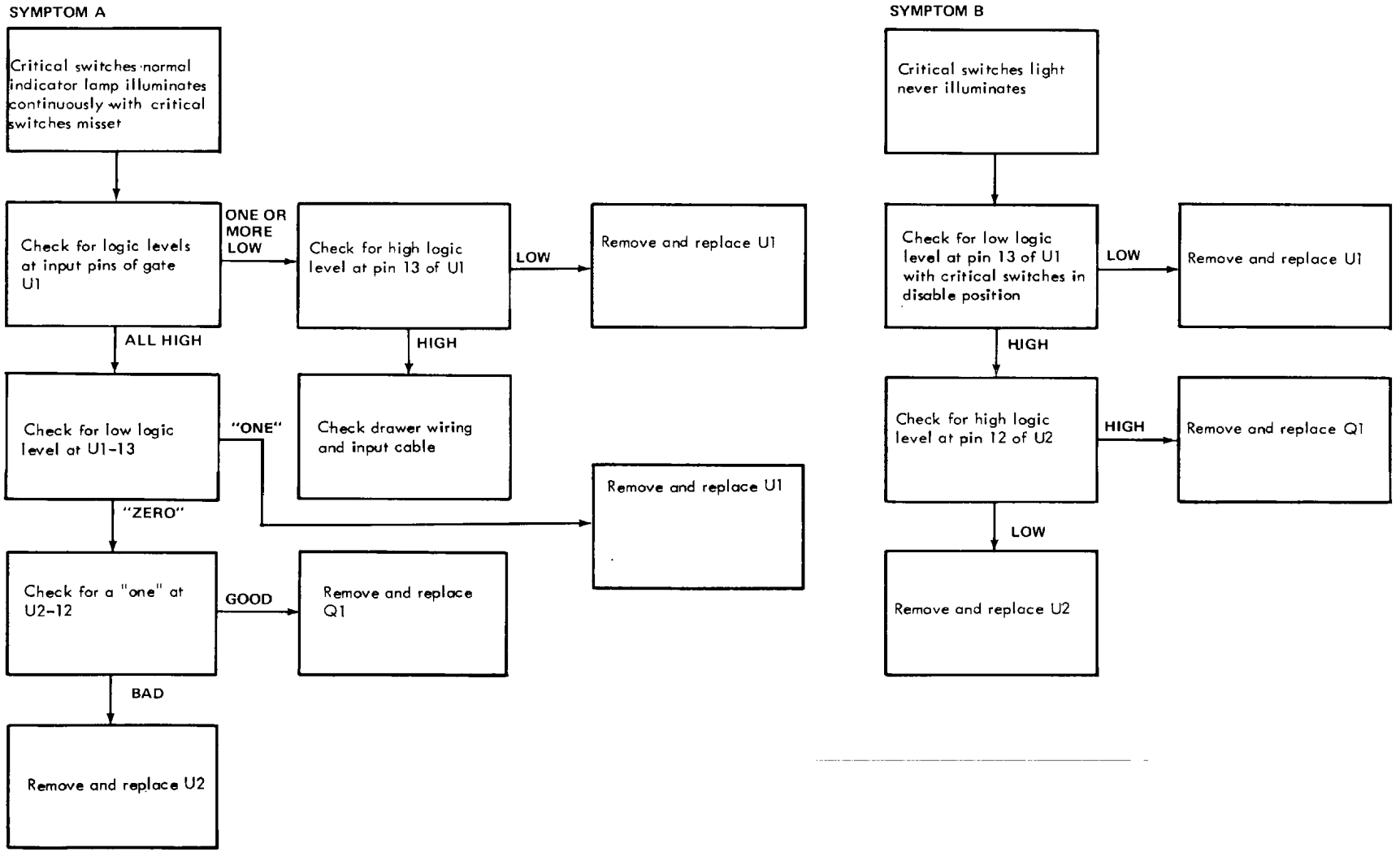


Figure 4-12. Ident Control Circuit Card Assembly, 1A2A3, Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

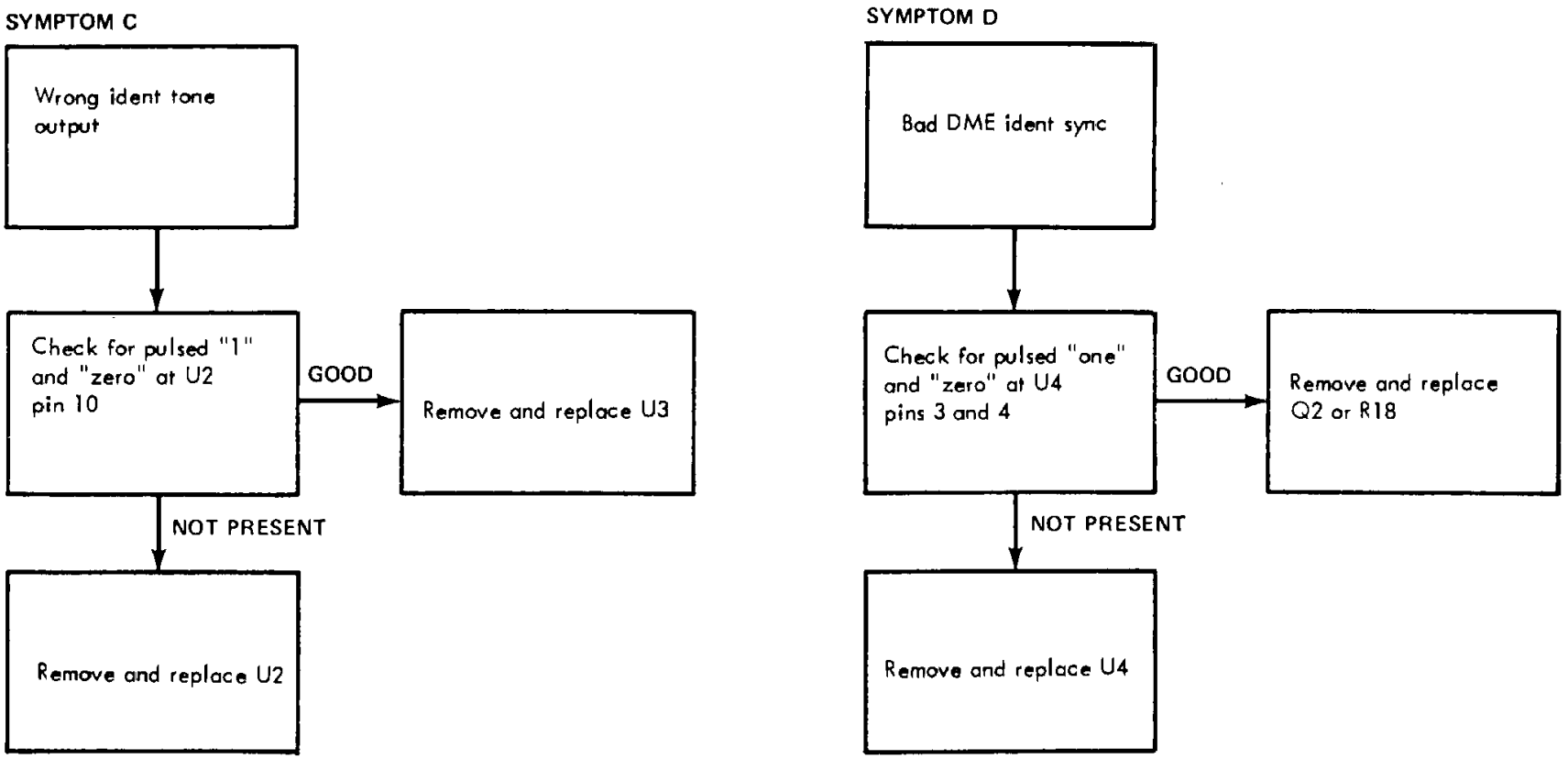


Figure 4-12. Ident Control Circuit Card Assembly, 1A2A3, Troubleshooting Chart*o the Circuit Level (Sheet 2 of 2)*

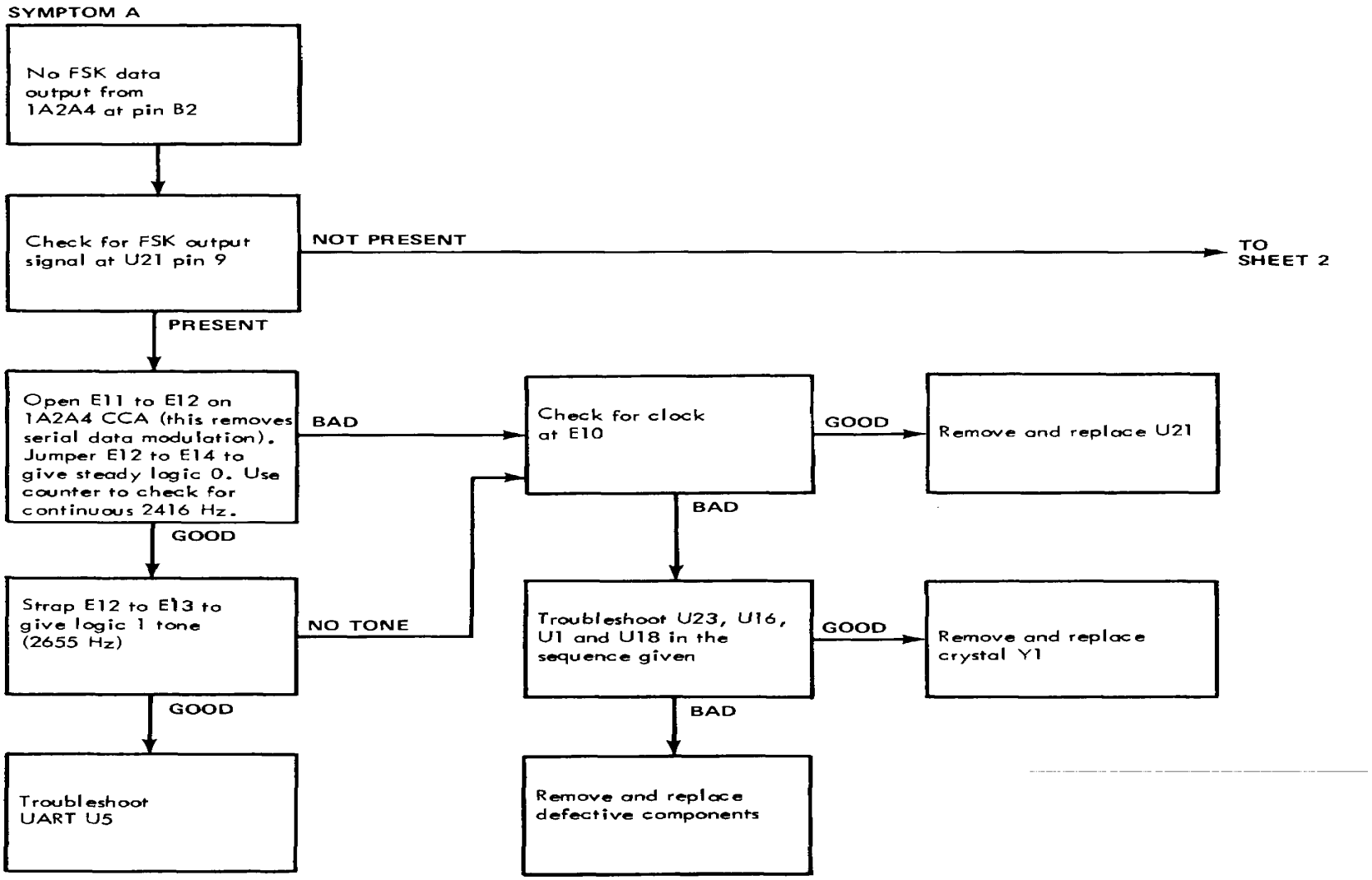


Figure 4-13. Status Transmitter Modem Circuit Card Assembly, 1A2A4 Troubleshooting Chart to the Circuit Level (Sheet 1 of 3)

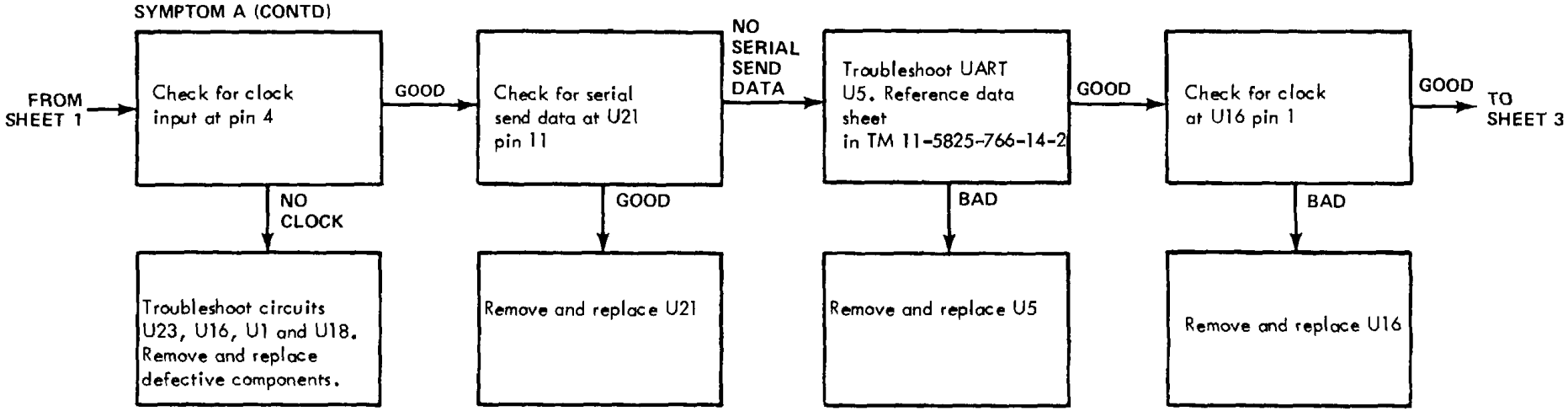


Figure 4-13. Status Transmitter Modem Circuit Card Assembly, 1A2A4 Troubleshooting Chart to the Circuit Level (Sheet 2 of 3)

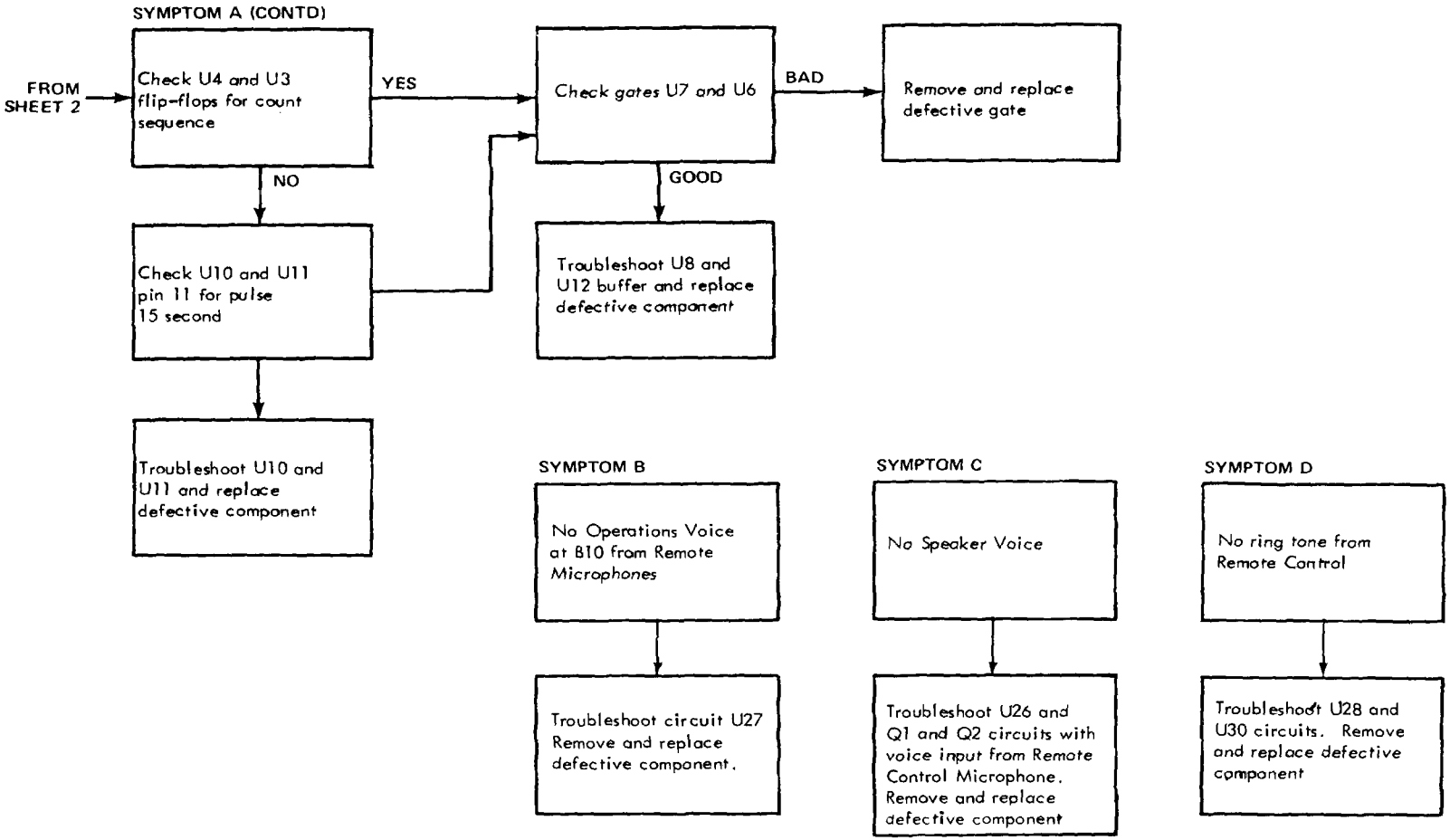


Figure 4-13. Status Transmitter Modem Circuit Card Assembly, 1A2A4 Troubleshooting Chart to the Circuit Level (Sheet 3 of 3)

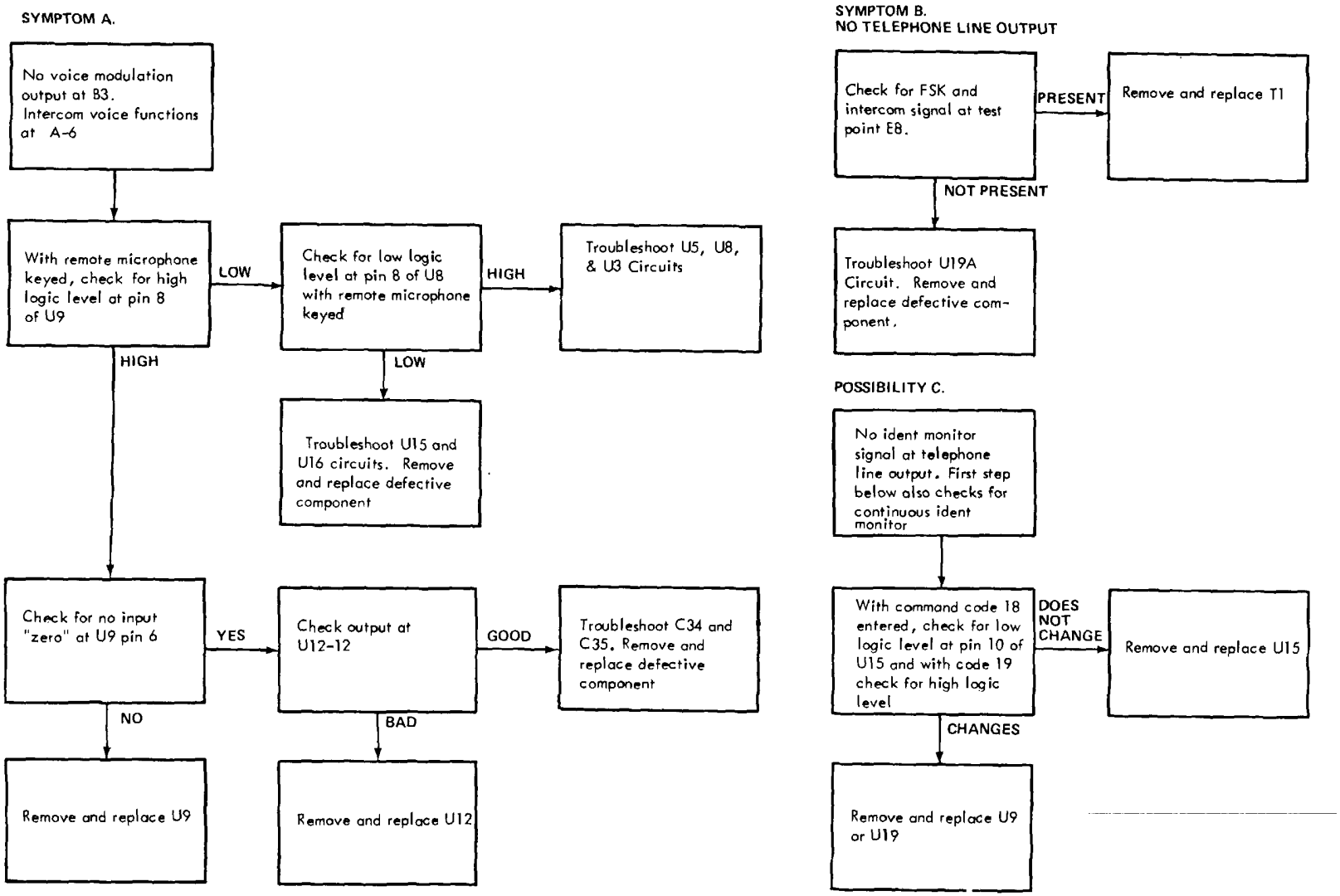


Figure 4-14. XMTR/RCVR Voice Buffer Circuit Card Assembly, 1AZA6 Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

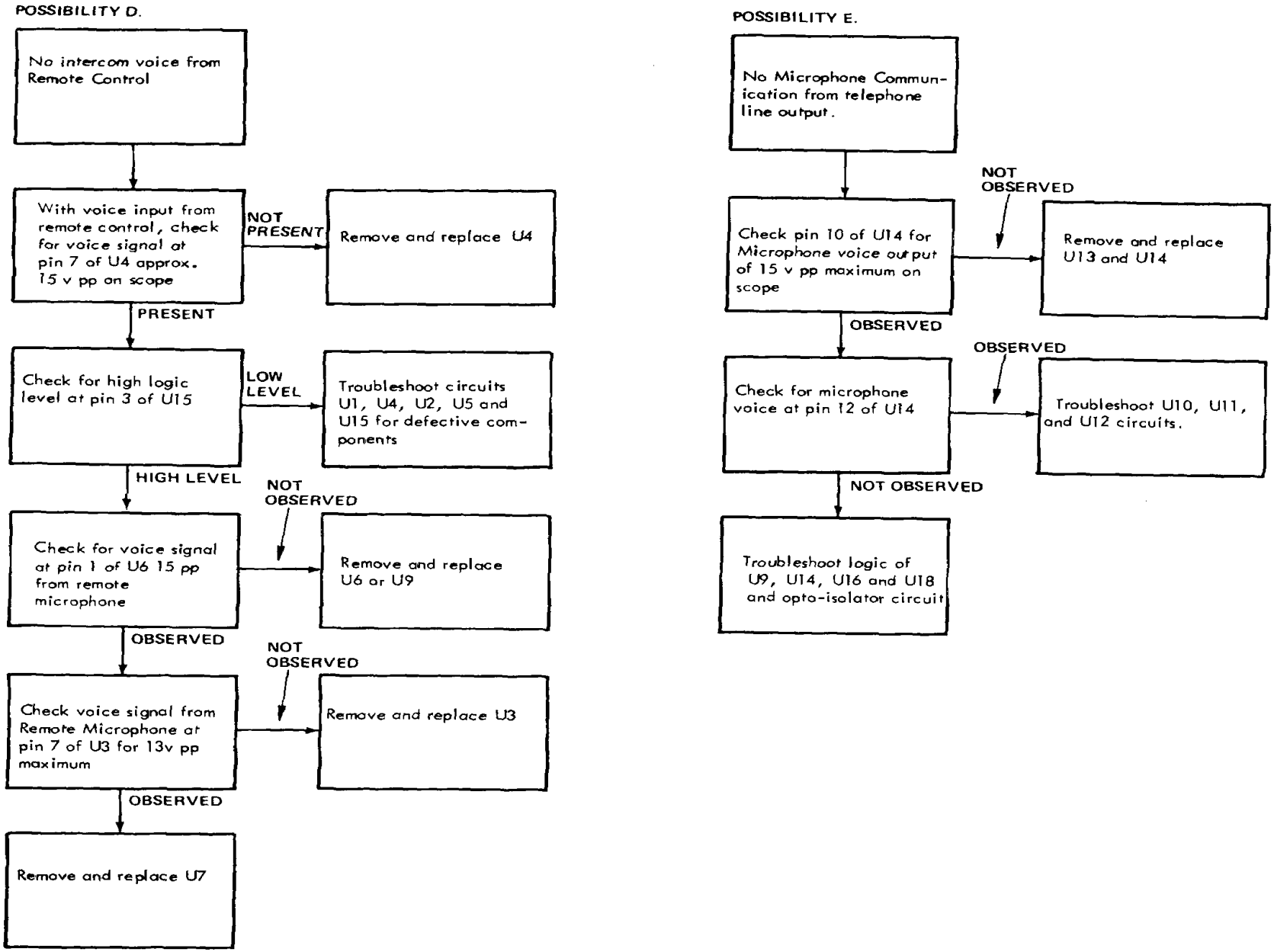


Figure 4-14. XMTR/RCVR Voice Buffer Circuit Card Assembly, 1A2A5 Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

SECTION IV

REPAIR

4-7. INTRODUCTION. The following paragraphs contain repair procedures for the control-indicator and connectors. The repair procedures for the control-indicator are supported by tables containing cable requirements and lists of material needed to make each completely serviceable as applicable.

4-8. CONNECTOR AND WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair connectors and wiring harness damage. A list of all connectors by reference designation with a cross reference to the hand tools used for repair is provided in table 4-1. A wiring list showing point-to-point connections, wire type and size is provided in table 4-2A. Table 4-2B contains a list of materials.

4-9. SPECIAL REPAIR INSTRUCTIONS. See paragraphs 3-30 through 3-31 for circuit card repair procedures.

Table 4-1. Local Control Connector Maintenance Tool List Matrix

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A2J1	Crimp	910163-004	910195-001 (Male) 910195-002 (Male) 910281-001 (Female)	22-20 18-16 22-20	M8ND M8ND M8ND	N20RT-29 N16RT-24 N20RT-29	910923 910923 910923
1A2J2	Crimp	910163-003	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
1A2J3	Crimp	910163-004	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
1A2J4	Solder	003159-4	N/A	N/A	N/A	N/A	N/A
1A2J6	Crimp	910163-001	910281-001 (Female)	22-20	M8ND	N20RT-29	910923
lA2XA1	Solder	910140-003	N/A	22-20	N/A	N/A	N/A
1A2XA2	Solder	910140-003	N/A	22-20	N/A	N/A	N/A
1 A2XA3	Solder	910140-003	N/A	22-20	N/A	N/A	N/A
1A2XA4A	Solder	910932-002	910933-001	22-20	N/A	N/A	Amphenol 91073-1
1A2XA4B	Solder	910932-002	910933-001	22-20	N/A	N/A	Amphenol 91073-1
1A2XA5A	Solder	910932-002	910933-001	22-20	N/A	N/A	Ampheno. 91073-1
1A2XA5B	Solder	910932-002	910933-001	22-20	N/A	N/A	Amphenol 91073-1

Table 4-2A. Local Control Wiring List

Note: Point-to-point wire connections are listed in Table 4-2A and a list of materials to be used in conjunction with Table 4-2A is provided in Table 4-2B.

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	21		J1-1	33	BS1	31	
2	21		J1-2	33	BS1		
3	21		J1-4	33	BS2	32	
4	21		J1-5	33	BS2		
5	20		J1-7	33	BS3	32	
6	20		J1-8	33	BS3		
7	20		J1-10	33	BS3		
8	20		J1-li	33	BS4	32	
9	4		J1-13	33	BS6	31	
10	4		J1-14	33	BS6		
11	4		J1-15	33	BS6		
12	4		J1-16	33	BS7	31	
13	4		J1-17	33	BS7		
14	4		J1-18	33	BS8	32	

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
15	11		J1-19	33	XAI-9		
16W	26		J1-20	33	A6-Ell	37	
16B	-		J1-21	33	A6-E10		
16S	1		FLOAT		A6-E2		
17	6		J1-22	33	BS9	31	
18	6		J1-23	33	BS9		
19	22		J1-24	35	BS4		
20	6		J1-25	33	BS9		
21	4		J1-26	33	BS8		
22B	26		J1-27	33	A6-E9	37	
22W	-		J1 -35	33	A6-E12		
22S	1		FLOAT		A6-E2		
23	15		J1-28	33	XA5B-3		
24	6		J1-29	33	BS10	31	

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
25	9		J1-30	42	P51-(TI-1)		
26	11		J1-31	42	PSI-(T1-3)		
27	19		J1-32	42	PS1-(T1-2)		
28	24		J1-33	35	CBI-1	38, 40	
29	22		J1-34	35	BS5		
30	6		J1-36	33	BS10		
31	25		J2-2	33, 36	XA2-23		
31S	1		J2-1	33	FLOAT		
32	13		J2-3		XA3-22		
33	14		J2-4		XA3-15		
34	15		J2-5		XA3-8		
35	16		J2-8		XA3-23		
36	13		J2-9		XA2-16		
37	17		J2-11		XA2-4		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
38	13		J2-12		XA2-5		
39	11		J2-13		XA2-9		
40	15		J2-14		XA2-8		
41	2		J2-15		XA3-18		
42	18		J2-19		XA1-25		
43	16		J3-1	33	BS1	31	
44	16		J3-2	33	BS11		
45	9		J3-3	33	XA3-6		
46	9		J3-4	33	XA3-6		
47	9		J3-5	33	XA2-28		
48	25		J3-7	33, 36	XA2-23		
48S	1		J3-6	33	FLOAT		
49	11		J3-8	33	XA3-20		
50	13		J3-9	33	XA3-9		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
51	14		J3-10	33	XA3-7		
52	17		J3-14	33	XA3-19		
53	13		J3-15	33	XA2-16		
54	16		J3-17	33	XA2-2		
55	10		J3-18	33	XA2-7		
56	18		J3-19	33	XA2-6		
57	19		J3-20	33	XA2-3		
58	2		J3-21	33	XA3-18		
59	11		J3-22	33	XA1-24		
60	12		J3-23	33	XA1-3		
61	13		J3-24	33	XA1-2		
62	15		J3-26	33	XA3-25		
63	2		J3-27	33	XA3-18		
64	18		J3-30	33	X A1 -20		
65	19		J3-31	33	XA1-6		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
66	4		J3-32	33	BS8		
67	10		J3-33	33	XA2-27		
68	10		J3-34	33	XA2-27		
69	23		BS1		BS2		
70	22		BS3		BS4		
71	22		BS4		BS5		
72	1		BS5		PSl-(T1-4)		
73	4		BS6		BS7		
74	4		BS7		BS8		
75	6		BS9		BS10		
76	6		BS10		El		
77	16		BS11		XA2-23		
78	6		J4-1		BS12		
79	6		J4-2		BS12		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
80	6		J4-3		BS12		
81	6		J4-4		BS12		
82	18		J4-5		XA4A-3		
83	2		J4-6		XA4A-C		
84	14		J4-7		XA4A-23		
85	15		J4-9		XA4A-5		
86	10		J4-10		XA4A-E		
87	12		J4-13		XA4A-7		
88	13		J4-15		XA4A-8		
89	11		J4-16		XA4A-J		
90	16		J4-17		XA4A-9		
91	15		J4-18		XA4A-K		
92	19		J4-19		XA4A-10		
93	17		J4-20		XA4A-L		
94	12		J4-22		XA4A-M		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
95	16		J4-23		XA4A-12		
96	13		J4-24		XA4A-N		
97	11		J4-25		XA4A-13		
98	6		BS12		El		
99W	26		J6-1	33	XA4B-21	37	
99B	-		J6-2	33	XA4B-Y		
99S	1		FLOAT		XA4B-22		
100	14		J6-3	33	*A6-E8*		
101	6		J6-4	33	El		
102W	26		J6-5	33	XASB-11	37	
102B	-		J6-6	33	XA5B-12		
102S	1		FLOAT		XA5B-22		
103	6		El		PS1-(+12V RET)		
104	6		El		PS1-(-12V RET)		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
105	6		E1		PS1-(+5V RET)		
106	6		E1		A6-E2		
107	6		E1		XA3-1		
108	6		E1		XDS1-2		
109	6		E1		S2-1		
110	9		PSI-(TI-1)		XFI-2	38, 40	
111	8		PS1-(-12V)		XDSI-l		
112	8		PSl-(-12V)		XA3-11		
113	4		PS1-(+12V)		XA3-12		
114	4		PSI-(+12V)		BS8		
115	4		PS1-(+12V)		A6-E1		
116	5		PSI-(+5V)		XA4B-b		
117	17		A6-E6		XA5B-8		
118	18		A6-E5		XA4B-V		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
119	16		A6-E4		XA4B-18		
120	11		A6-E3		XA5B-7		
121	14		XA3-4		S2-3		
122	4		XA3-12		S2-5		
123	4		XA3-12		XA5B-14		
124	17		XA3-24		**S1**-6		
125	16		XA3-26		XA5B-2		
126	6		XA3-1		XA3-29		
127	8		XA3-11		XA5B-17		
128	11		XA2-10		S1 -4		
129	4		XA2-11		XDS8-1		
130	16		XA2-18		XDS5-2		
131	19		XA2-20		XDS6-2		
132	12		XA2-22		XDS3-2		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
133	12		XA2-22		XA4A-19		
134	5		PSI-+5 V Bd. **at** C2A & C2Bl fteads		XA2-19		
135	14		XA2-13		XDS8-2		
136	17		XA2-15		XDS7-2-		
137	13		XA2-17		XDS4-2		
138	13		XA2-17		XA4A-H		
139	2		XA2-25		XDS2-2		
140	2		XA2-25		XA4A-T		
141	13		XA1-4		S2-4		
142	4		XA1-12		XA5B-15		
143	19		XA1-10		S2-6		
144	16		XA1-19		U1-TBI-1		
145	17		XA5B-1		XA4B-5		
146	17		XA5B-1		S2-8		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
147	13		XA5B-4		XA4B-2		
148	12		XA5B-5		XA4B-13		
149	2		XA5B-6		XA4B-12		
150	10		XA5B-9		J5-2		
151	18		XASB-10		XA4B-4		
152	13		XA5B-13		J5-1		
153	23		BS2		CB1-2	39, 40	
154	5		XA5B-24		XA5A-22		
155	2		XA5A-24		XA4A- 11		
156	11		XA5A-3		XA4B-10		
157	16		XA5B-B		XA4B-W		
158	16		XASB-B		S4-1		
159	13		XA4B-19		S4-4		
160	18		XA4B-11		R1-3		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
161	11		XA4B-M		R1-1		
162	18		XA4A-S		S3-2		
163	10		XFI-1	38, 40	CB1-2		*See wire # 153.
164	6		S2-1		U1-TBi-2		
165	14		XA4A-14		S2-3		
166	13		S2-7		U1-TB1-3		
167	6		Ul-TB1-2		S3-5		
168	6		Ul-TBi-2		S1-l		
1691	4		XDS8-1		XDS7-1		
170	4		XDS7-1		XDS6-1		
171	4		X DS6-1		XDS5-1		
172	4		XDS5-1		XDS3-1		
173	6		J5-3		S3-5		
174	6		J5-4		S4-2		

Table 4-2A. Local Control Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
175	4		XDS3-1		XDS4-1		
176	4		XDS4-1		XDS2-1		
177	4		XDS2-1		S1-5		
178	6		S1-I		LS1-2		
179	4		S1-5		XDS9-1		
180	14		S1-8		XDS9-2		
181	4		XDS9-1		S3-4		
182	18		Ri-2		LSI-I		
183	12		J2-20	33	A4A19		
184	2		J2-21	33	A4A-T		

Table 4-2B. List of Materials

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	1	Wire #22 BLK	MIL-W-16878/4
AR	2	Wire #22 BRN	MIL-W-16878/4
AR	3	Wire #22 RED	MIL-W-16878/4
AR	4	Wire #22 ORG	MIL-W-16878/4
AR	5	Wire #22 YEL	MIL-W-16878/4
AR	6	Wire #22 GRN	MIL-W-16878/4
AR	7	Wire #22 BLU	MIL-W-16878/4
AR	8	Wire #22 VIO	MIL-W-16878/4
AR	9	Wire #22 GRY	MIL-W-16878/4
AR	10	Wire #22 WHT	MIL-W-16878/4
AR	11	Wire #22 W/BLK	MIL-W-16878/4
AR	12	Wire #22 W/BRN	MIL-W-16878/4
AR	13	Wire #22 W/RED	MIL-W-16878/4
AR	14	Wire #22 W/ORG	MIL-W-16878/4
AR	15	Wire #22 W/YEL	MIL-W-16878/4
AR	16	Wire #22 W/GRN	MIL-W-16878/4
AR	17	Wire #22 W/BLU	MIL-W-16878/4
AR	18	Wire #22 W/VIO	MIL-W-16878/4
AR	19	Wire #22 W/GRY	MIL-W-16878/4
AR	20	Wire #20 BLK	MIL-W-16878/4
AR	21	Wire #20 WHT	MIL-W-16878/4
AR	22	Wire #18 BLK	MIL-W-16878/4
AR	23	Wire #18 WHT	MIL-W-16878/4
AR	24	Wire #18 W/GRY	MIL-W-16878/4
AR	25	Wire #22, 1 Cond., Shld'd.	MIL-W-16878/4
AR	26	Wire #22, 2 Cond., Shld'd, BLK-WH T	MIL-W-16878/4
2	27	Conn. J1 and J3	910163-004
1	28	Conn. J2	910163-003
1	29	Conn. J6	910163-001
1	30	Conn. J4	003159-4
7	31	Splice, BLU	MS25274-3
5	32	Splice, YEL	MS25274-4
75	33	Contact, #22-20 Female	910281-001
1	34	Contact, #18-16 Female	910281-002
2	35	Contact, #18-16 Male	910195-002
2	36	Solder Sleeve	003700-1
4	37	Solder Sleeve	003700-2
3	38	Flag Term. #22-20	910868-001
1	39	Flag Term. #18-16	910868-002
4	40	Term. Housing	910869-001
X	41	Wire List	136729-251
3	42	Contact, #22-20 Male	910195-001
AR	85	Wire Solid No. 22	QQ-W-343 Type S
AR	86	Insulation, Sleeving CLR No. 22	MIL-1-22129

SECTION V

ASSEMBLY

4-10. GENERAL. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

4-11. ASSEMBLY PROCEDURES. Assembly of the control-indicator is essentially the reverse of disassembly. No special instructions are required.

4-12. TESTING. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 5 of TM 11-5825-266-14-1.

4-13. REFINISHING, PAINTING AND MARKING. Refer to applicable cleaning and refinishing practices specified in TB 43-0118 (Field Instructions for Painting and Preserving Electronics Command Equipment). Remove rust or corrosion from metal surfaces by lightly sanding them with No. 000 sandpaper. Apply two thin coats of paint (Finish No. P513E, per MIL-F-14072) on exposed metal areas to prevent further corrosion. Apply paint to only those areas which have been previously painted. Refer to SB 11-573, Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment, and AR 746-5, Color and Marking of Army Material.

CHAPTER 5

PHASE MODULATION MONITOR ID-2179/FRN-41

SECTION 1

DISASSEMBLY

5-1. GENERAL. This chapter details disassembly, inspection, troubleshooting repair and assembly procedures necessary to restore the Phase Modulation Monitor ID-2179/FRN-41 and all subassemblies contained therein to satisfactory operating condition after a failure or maintenance action. The text is supplemented wth appropriate illustrations necessary to describe the required disassembly, repair, and reassembly procedures. Do not disassemble the phase modulation monitor more than is necessary for repairs

5-2. PHASE MODULATION MONITOR DISASSEMBLY PROCEDURES. Remove the phase modulation monitor from the electrical equipment cabinet in accordance with the instructions provided in Chapter 3, Section V. Instructions for disassembly of each subassembly and chassis-mounted components are provided in the following paragraphs.

a. Front Panel, Meter Panel and Chassis-Mounted Components Disassembly. The following disassembly procedure should be followed when removing components for repair or replacement. Refer to figure 5 1 for location of components to be replaced.

(1) To disassemble any one of the front panel or meter panel components, locate the particular item on sheet 2 of figure 51 and disassemble in accordance with the applicable exploded view shown on the following sheets of figure 5-1.

(2) To disassemble any one of the chassis-mounted components, identify the component on sheet 1 of figure 5-1 and disassemble per the following instructions.

(a) U1, U2. Remove the two screws and washers which attach U1 and U2 to the chassis. Unsolder two solder connections.

(b) K1. Move holding wire aside and carefully snap-out relay.

(c) TB1. Remove two screws, washers and spacers from underside of terminal board. Unsolder eight wire connections.

(d) T1. Remove four screws which attach transformer to chassis. Tag and disconnect wires on underside of transformer.

(e) Disassemble chassis-mounted capacitors C1 and C2 by removing the two screws, nuts and washers which attach capacitors to chassis. Unsolder two solder connections and ground wires on underside of each capacitor.

(f) Remove J1 by pressing on side locks on underside of connector and lifting out. Use an extractor tool to remove wire connections.

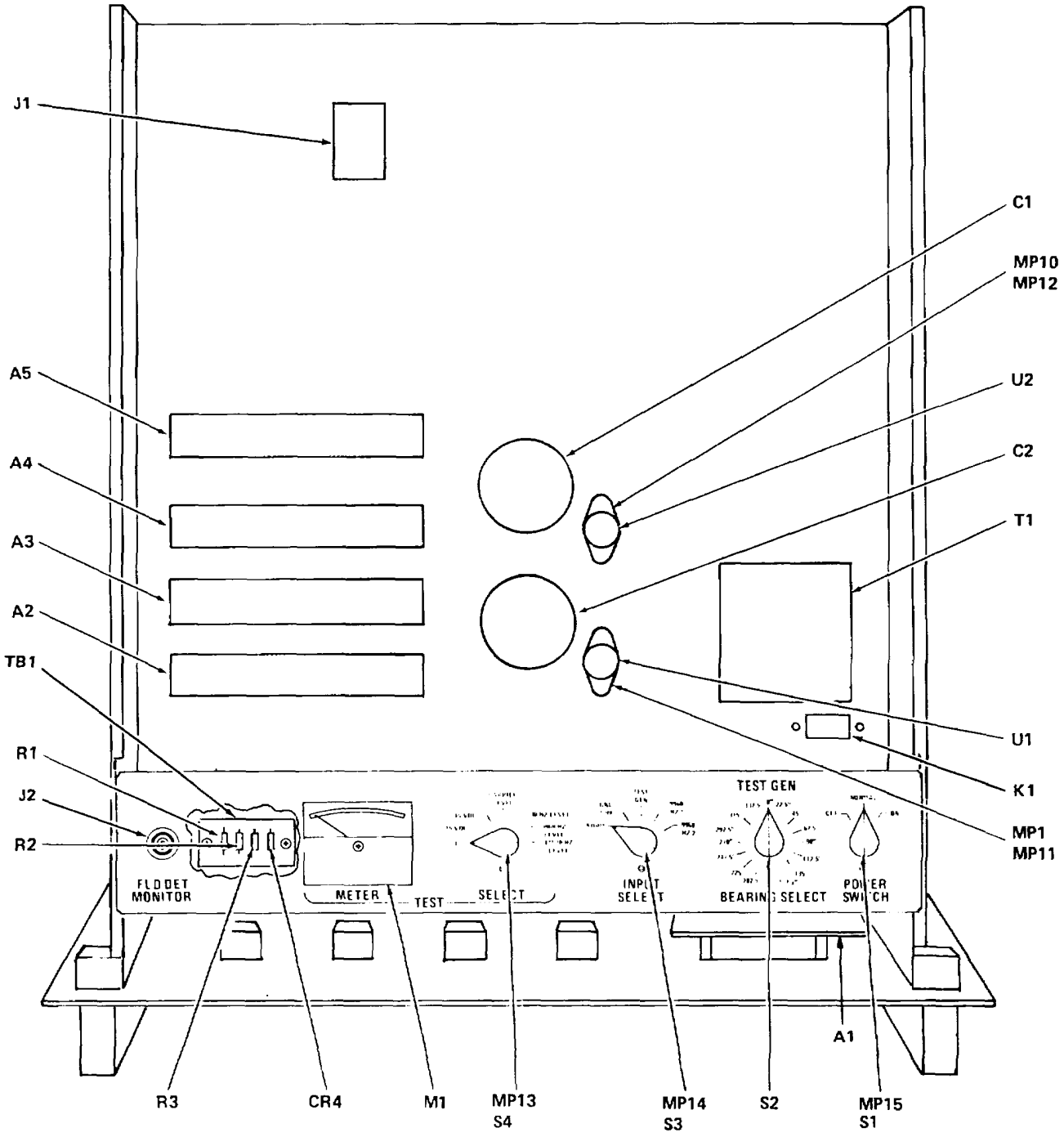


Figure 5-1. Monitor Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 1 of 4)

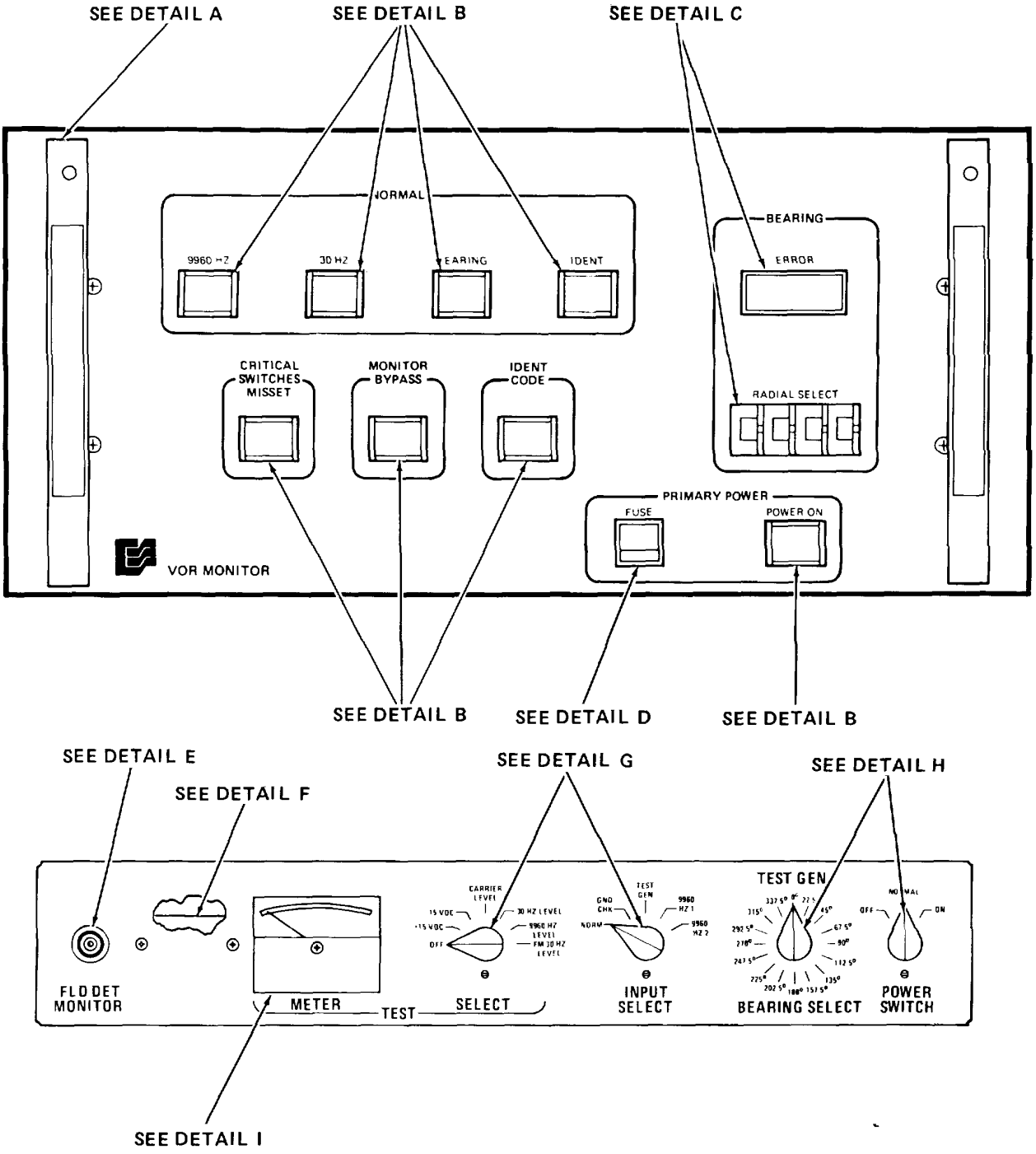


Figure 5-1. Monitor Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 2 of 4)

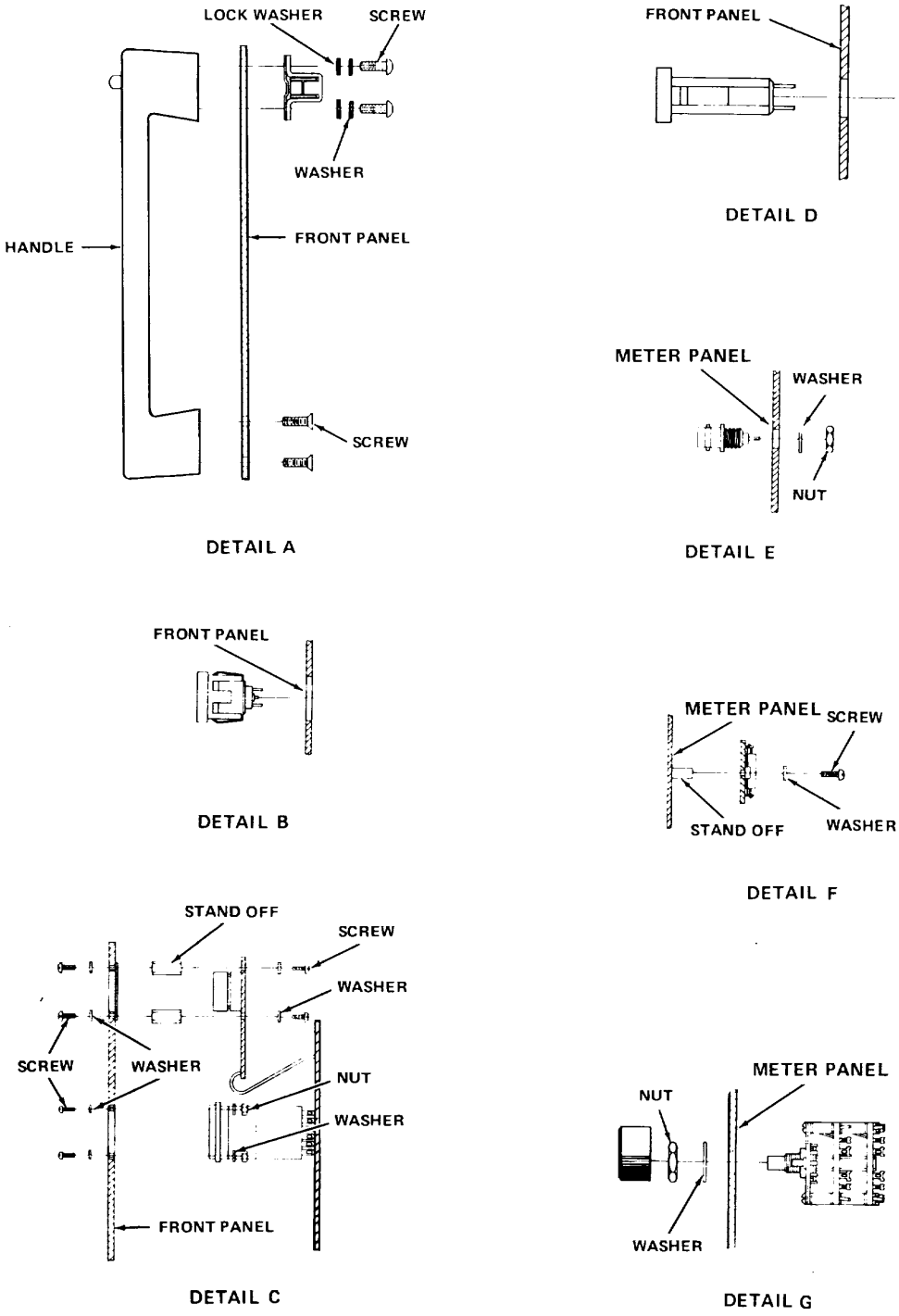
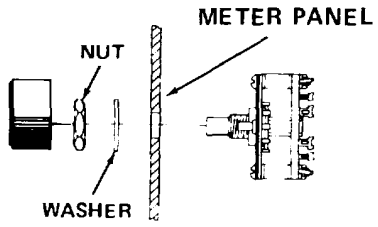
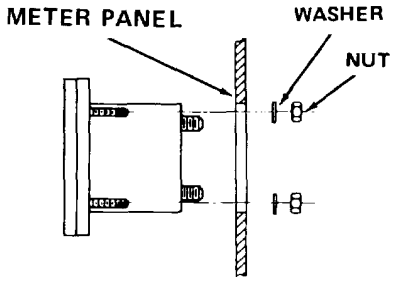


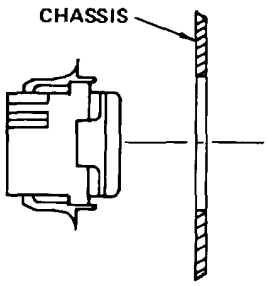
Figure 5-1. Monitor Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 3 of 4)



DETAIL H



DETAIL I



DETAIL J
(CHASSIS-MOUNTED)

Figure 5-1. Monitor Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 4 of 4)

b. Reference Delay/Readout Circuit Card Assembly (1A3A1) Disassembly. This circuit card Assembly should be removed only when servicing or component replacement is required. To remove this circuit card perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement Refer to figure 5-2 for location of component to be replaced.

(1) Loosen inside front panel.

(2) Remove eight screws, washers, electrical spacers and nuts holding the reference delay/readout circuit card assembly to the front panel.

(3) Disconnect the ribbon cable from the circuit card assembly.

NOTE

This is a two-part circuit card assembly. Care should be taken not to break the solder joints attaching the two cards.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to change from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

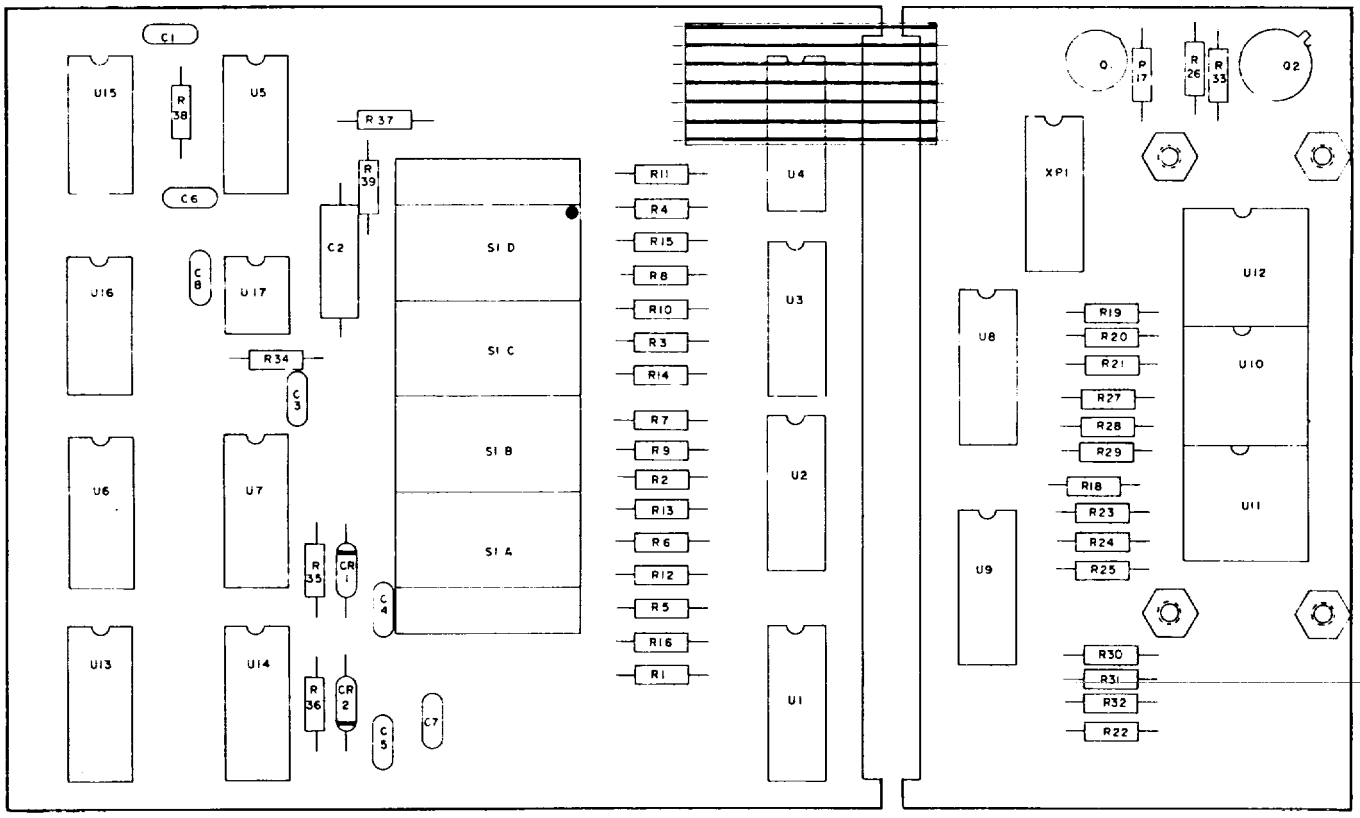


Figure 5-2. Reference Delay/Readout Circuit Card Assembly, 1A3A1 Parts Location Diagram

c. Phase Comparator Circuit Card Assembly. (1A3A2) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 5-3 for location of components to be replaced.

CAUTION

Prior to removing circuit assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damages from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of circuit card place it on a piece of plastic sheeting.

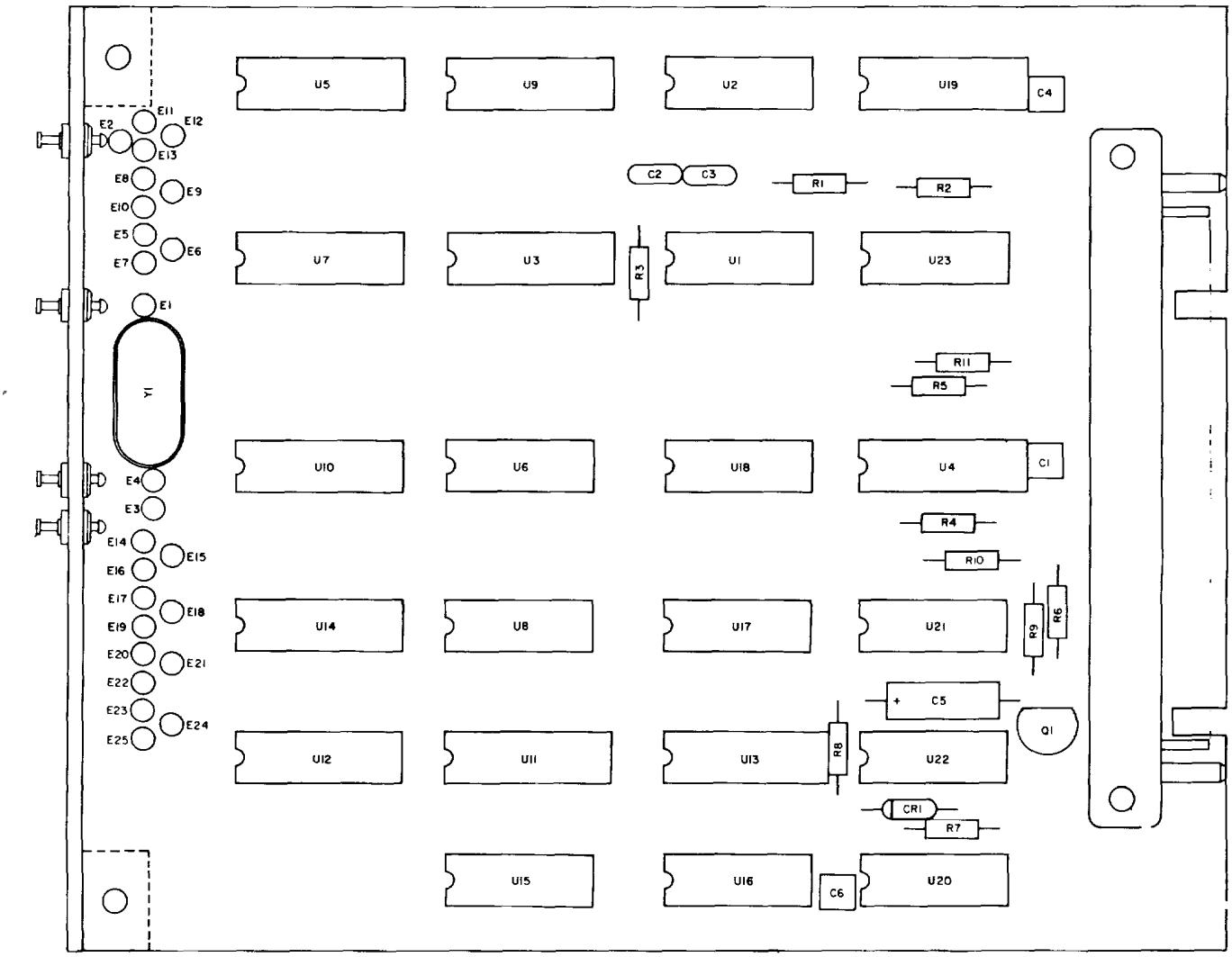


Figure 5-3. PhaseComparator Circuit Card Assembly, 1A3A2 Parts Location Diagram

d. Variable Signal Processing Circuit Card Assembly (1A3A3) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 5-4 for location of components to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

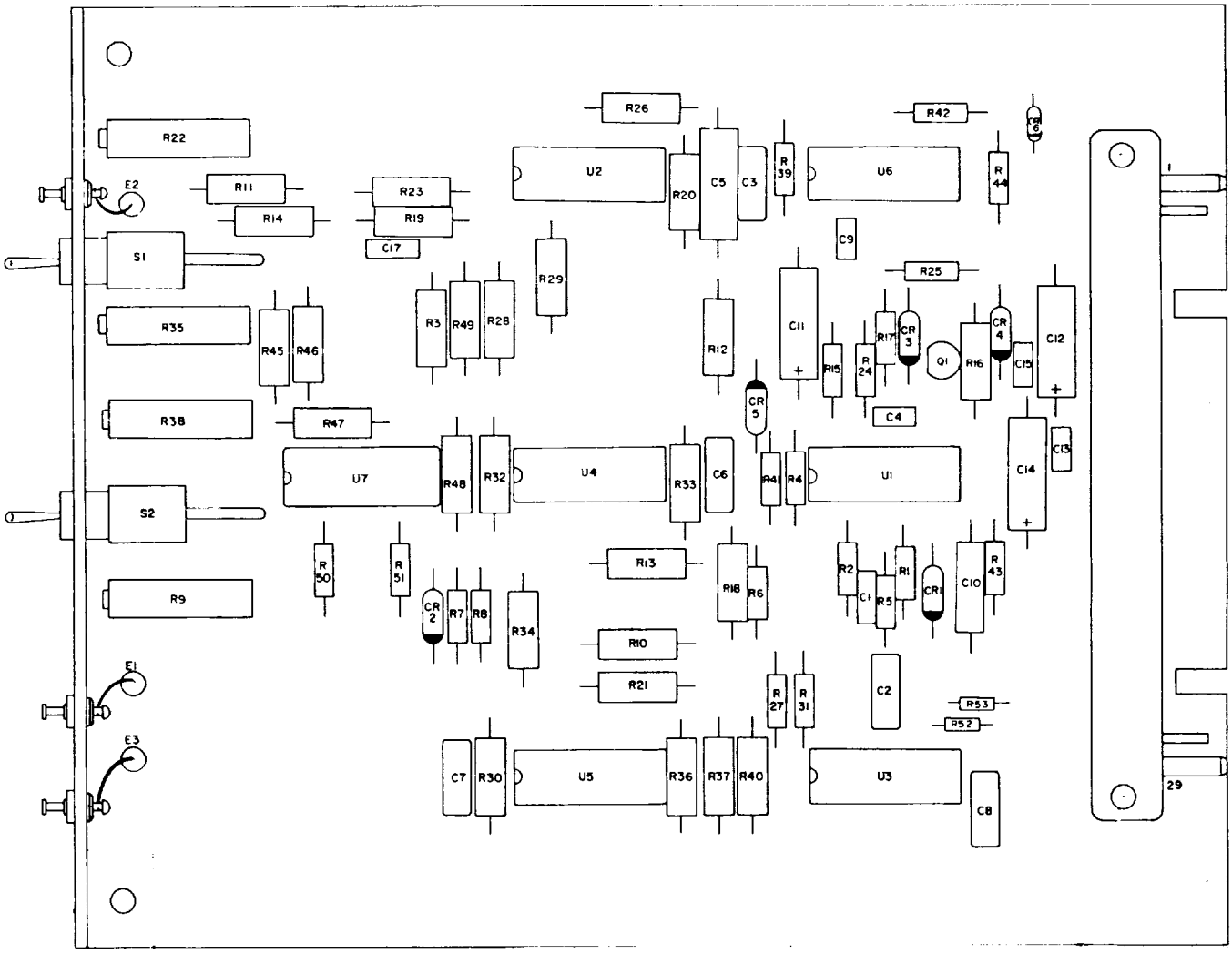


Figure 5-4. Variable Signal Processing Circuit Card Assembly, 1A3A3 Part Location Diagram

e. Reference Ident Circuit Card Assembly (1A3A4) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 5-5 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

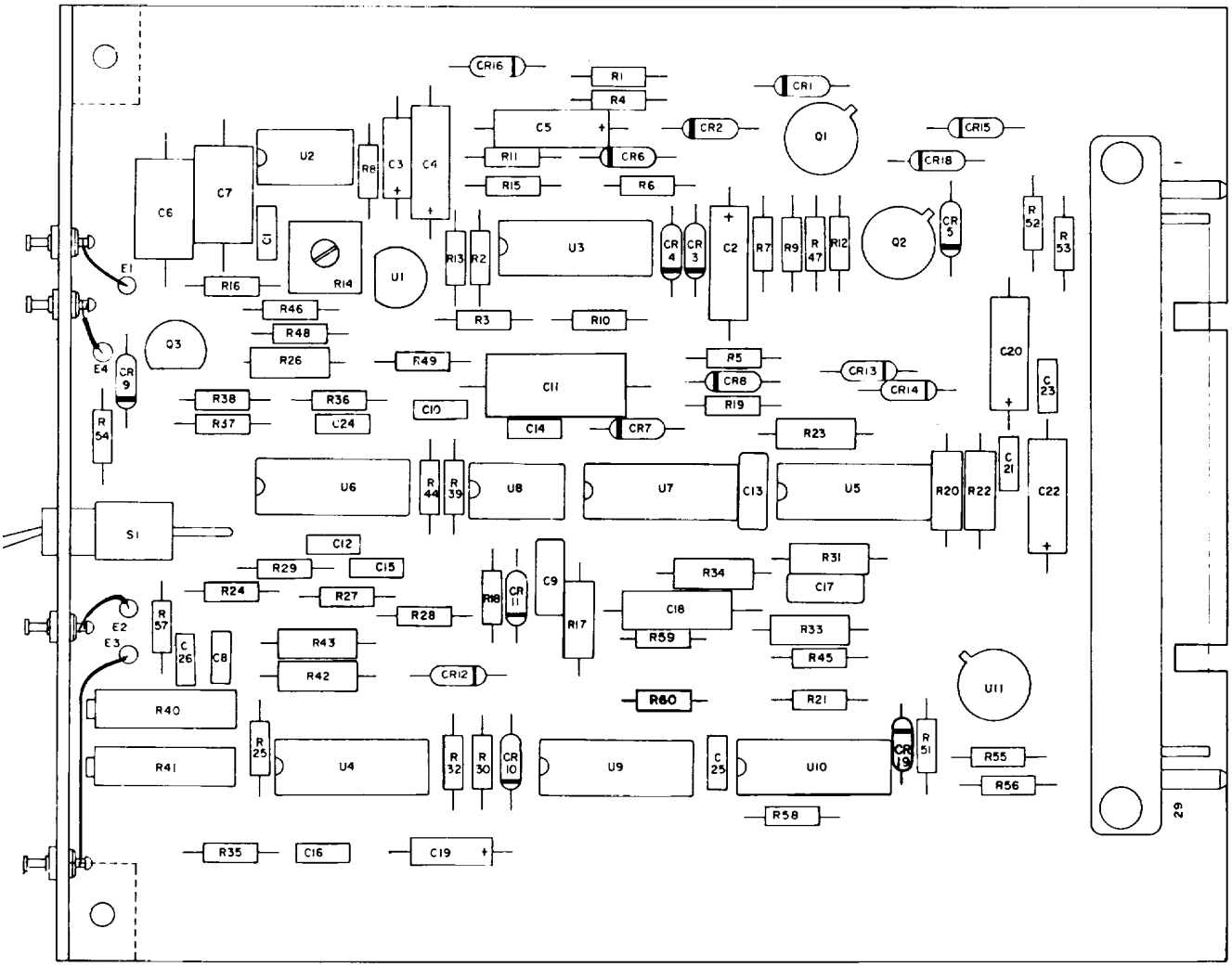


Figure 5-5. ReferenceIdent Circuit Card Assembly, 1A3A4 Parts Location Diagram

f. Test Generator Circuit Card Assembly (1A3A5) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 5-6 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

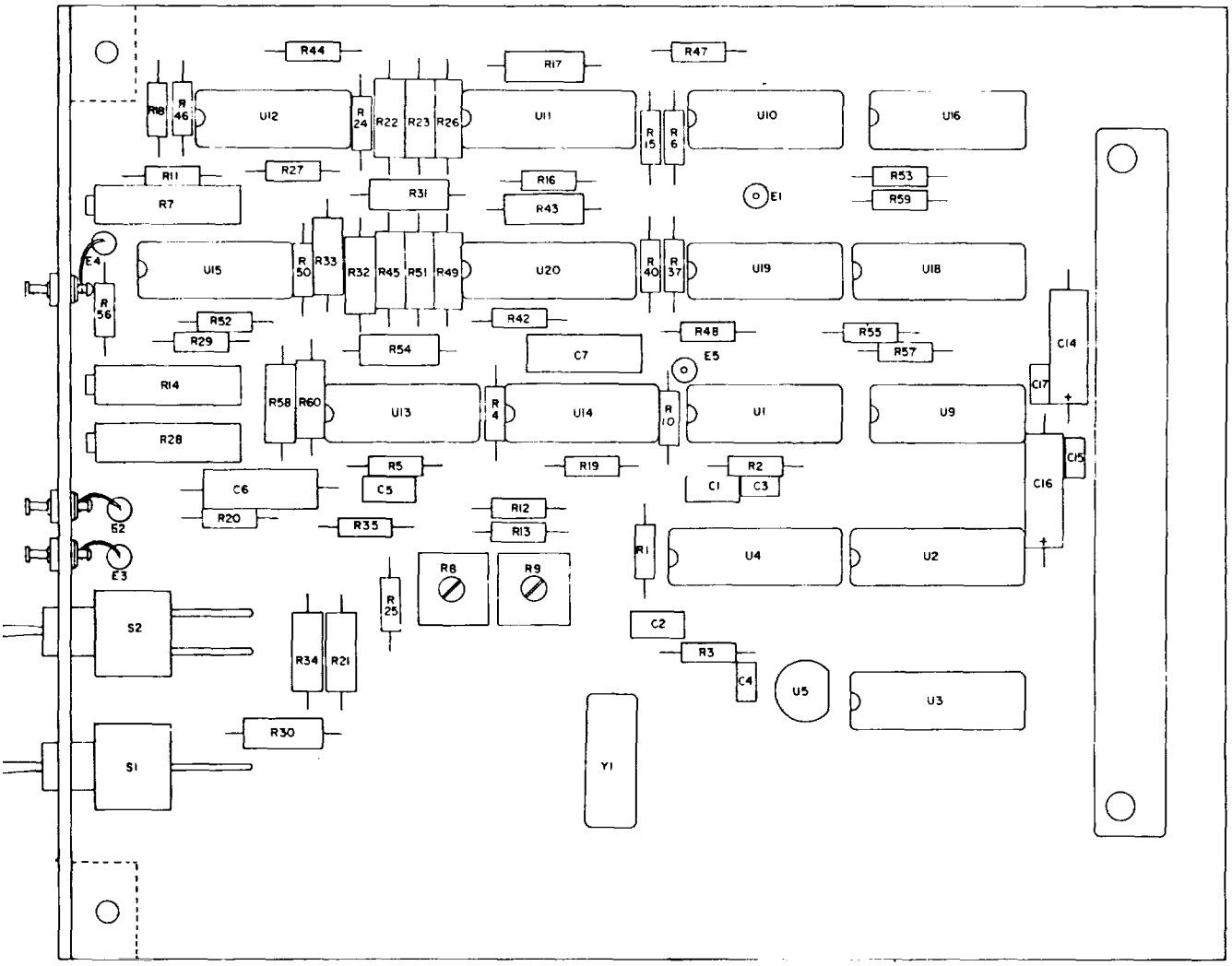


Figure 5-6. Test Generator Circuit Card Assembly, 1A3A5 Parts Location Diagram

SECTION II

CLEANING AND INSPECTION

5-3. CLEANING. Clean the monitor as required following the procedures specified below.

CAUTION

Circuit cards which contain plastic components may be damaged by cleaning with freon. Use denatured alcohol to clean these circuit cards.

a. Remove dust and loose dirt from outside surfaces with a clean soft cloth.

WARNING

Freon fumes are toxic. Provide adequate ventilation. Do not use near a flame. Freon is not flammable, but exposure to high heat can convert fumes to a highly toxic gas.

b. Remove grease and ground in dirt from outside surfaces with a cloth dampened (not wet) with freon.

c. Remove dust and dirt from electrical connectors with a soft-bristled brush.

WARNING

Bodily injury or equipment damage can result from cleaning with compressed air at pressures in excess of 15 pounds per square inch.

d. If repair procedures require disassembly, remove dust from exposed inner parts of assembly by loosening with a soft-bristled brush and blowing with a jet of dry air at not more than 15 pounds per square inch.

5-4. INSPECTION. After disassembly, fabrication action, repair action, or final assembly, subject the items to an in-process inspection. General inspection requirements shall be in accordance with MIL-M-45208B. Adequate records of all inspections and tests shall be maintained (refer to Chapter 5, Volume 1, TM 11-5825-266-14-1), as applicable. The in-process inspection should include, but not be limited to, the following criteria:

a. Mounting of Parts. Inspect parts, components, or hardware, etc., to ensure that they are assembled, mounted, and secured so as to satisfactorily accomplish their intended purpose.

b. Fabrication. Inspect finish for a smooth, continuous coating and a reasonable color match where surfaces have been touched up. Where conformal coating has been used, ensure that coating material has not covered areas purposely left unpainted or uncoated for electrical contact purposes. On circuit cards, there shall be no evidence of lifting or separation of plating from the conductor pattern or of conductors from the base laminate. There shall be no slivers or whiskers, and no evidence of burns or corona discharge.

c. Threaded Parts or Devices. Inspect screws, nuts, bolts, etc., for cross-threading, detrimental or hazardous burrs, or mutilation.

d. Tightness. Inspect all screw-type fasteners for tightness. Fasteners shall be firmly secure and there shall be no relative movement possible between them and attached parts.

e. Soldering. Inspect leads to see that they are tightly crimped to terminals and that they show no signs of having been moved while soldering. Solder must show a shiny, smooth surface feathering out at the edges where it joins the surface of terminal or conductor. In addition, solder connections shall show only enough solder to cover the joint, and shall show no indication of burns, acid or acid salts.

NOTE

Acid or acid salts should be used only as permitted for or soldering mechanical joints. No acid or acid salts may be used near insulation. Where acid or acid salts have been used as permitted, they shall be completely neutralized and removed.

f. Moisture/Fungus-Proofing. Conformally coated parts shall have unbroken coating. The coating material shall not appear on areas purposely left unpainted or uncoated for electrical contact purpose.

g. Wiring. Inspect wiring for neatness and sturdiness. Wires shall be positioned to preclude or be protected from contact with rough or irregular surfaces and sharp edges. Ensure that wiring dress does not result in incorrect electrical operation. Inspect insulation for evidence of burns, abrasions, or pinch marks. There shall be no splices on wiring between terminals. Clearance between wires and parts shall be such that there is no deterioration of wiring due to heat dissipation from the parts. Clearance between bare connections or bare conductors shall be sufficient to prevent contact or arcing during operation.

SECTION III

TROUBLESHOOTING

5-5. GENERAL. System level fault isolation procedures to the unit or assembly level are provided in Chapter 3. This chapter provides fault isolation procedures to the module and circuit level for the monitor.

5-6. FAULT ISOLATION. To utilize the troubleshooting charts in this section, it is first necessary to identify the chart, which corresponds to the observed failure reflected by the equipment. The step-by-step procedures contained in the troubleshooting charts (figures 5-7, 5-8, 5-9, 5-10, 5-11 and 5-12) provide fault isolation to the module level and circuit level. These charts provide the means to fault isolate to the suspected circuit group. Fault isolation down to the part level is accomplished using schematics and circuit theory provided in TM 11-5825-266-14-1 and -2 and standard troubleshooting practices. Once the module or part is identified it can be repaired or replaced with a serviceable item.

NOTE

Ensure that all internal wiring is good before assuming a circuit card to be defective. Verify that all inputs to the circuit card assembly have been properly checked.

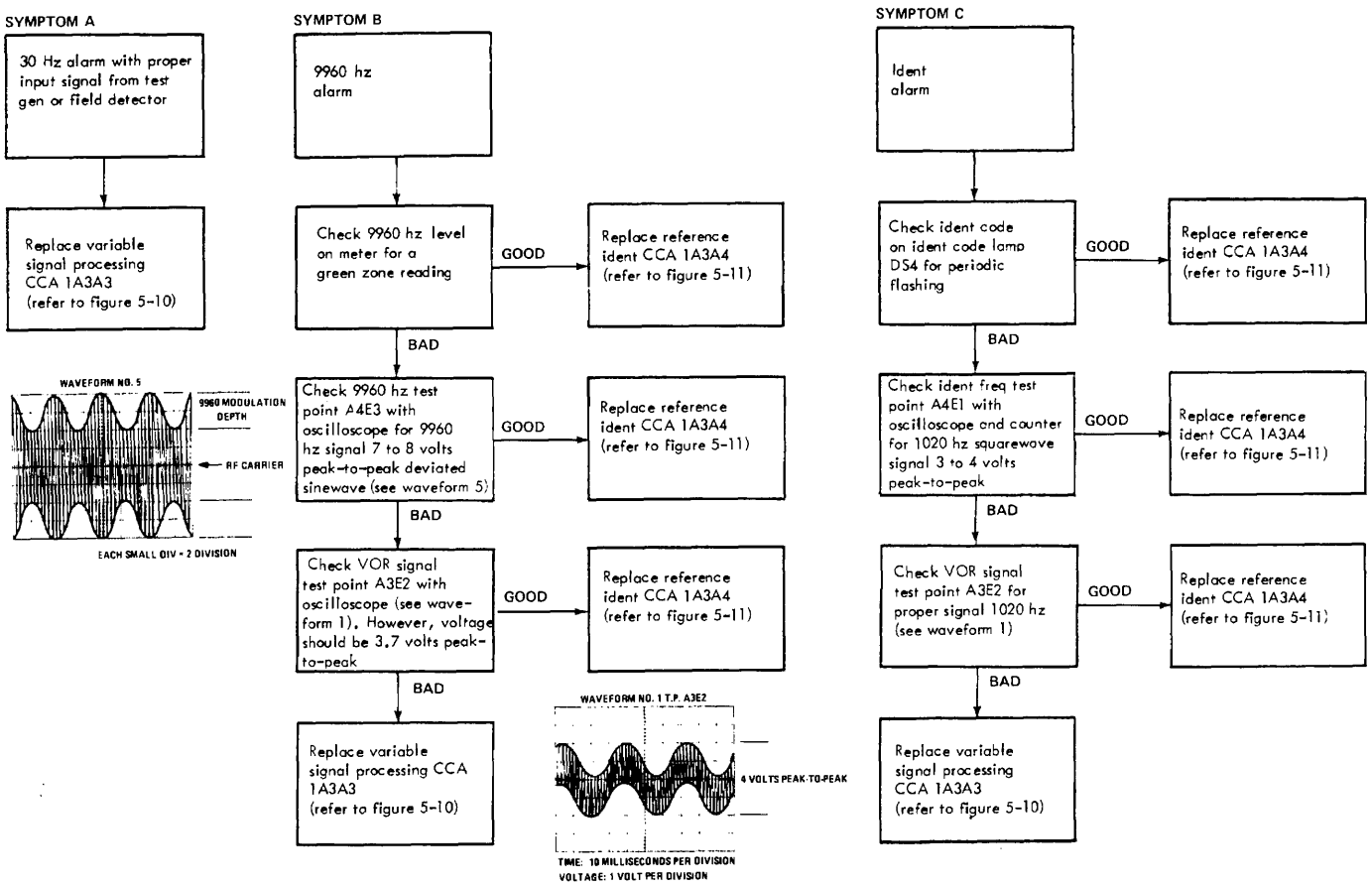


Figure 5-7. Phase Modulation Monitor ID-2179/FRN-41 Troubleshooting Chart to the Module Level (Sheet 1 of 3)

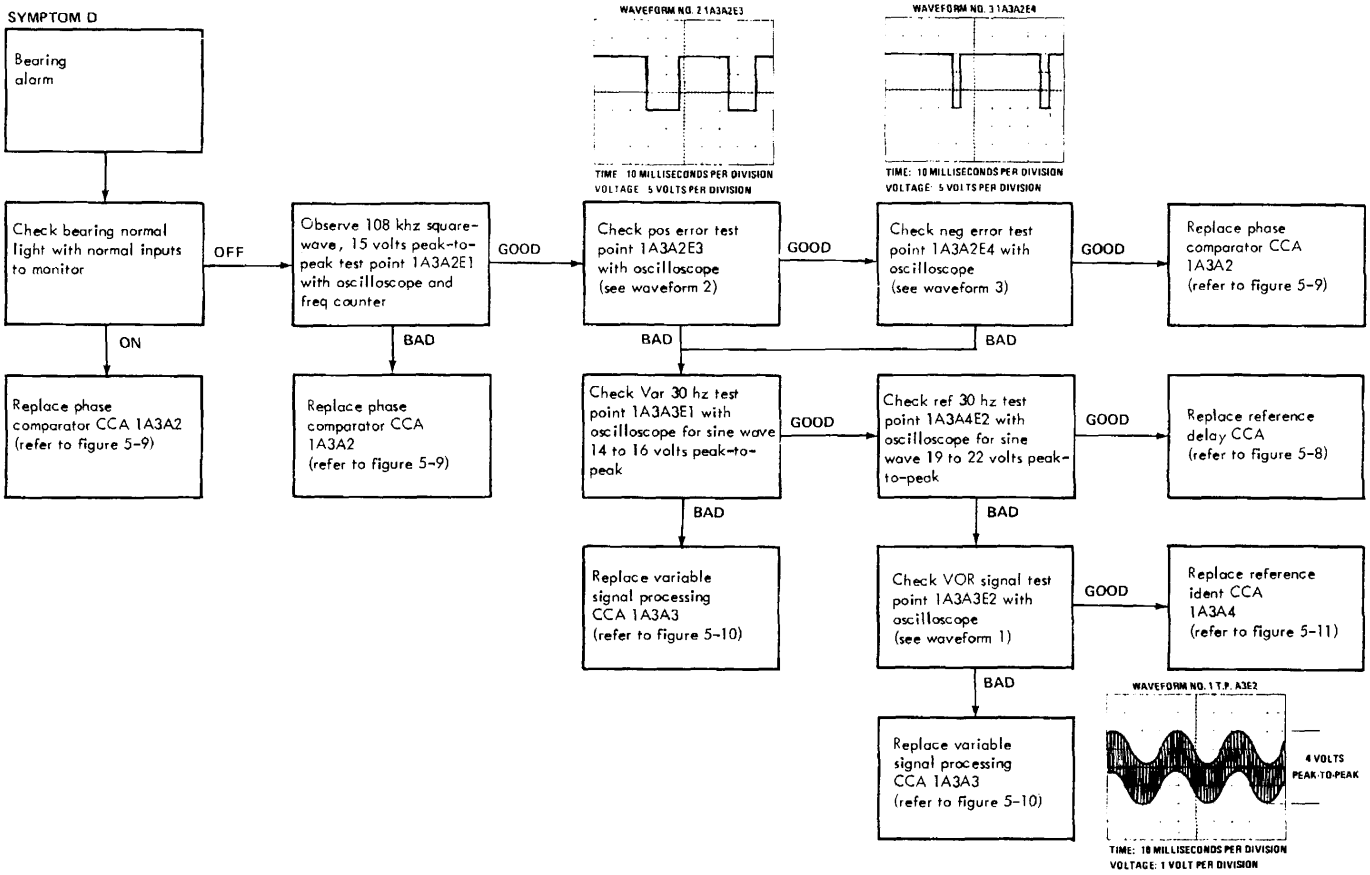


Figure 5-7. Phase Modulation Monitor ID-2179/FRN-41 Troubleshooting Chart to the Module Level (Sheet 2 of 3)

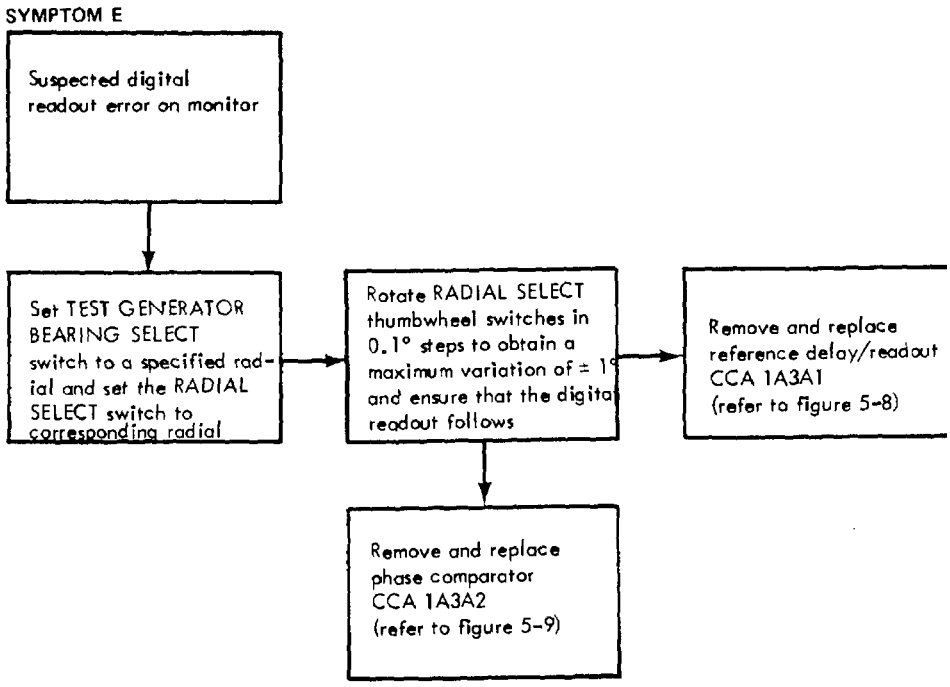


Figure 5-7. Phase Modulation Monitor ID-2179/FRN-41 Troubleshooting Chart to the Module Level (Sheet 3 of 3)

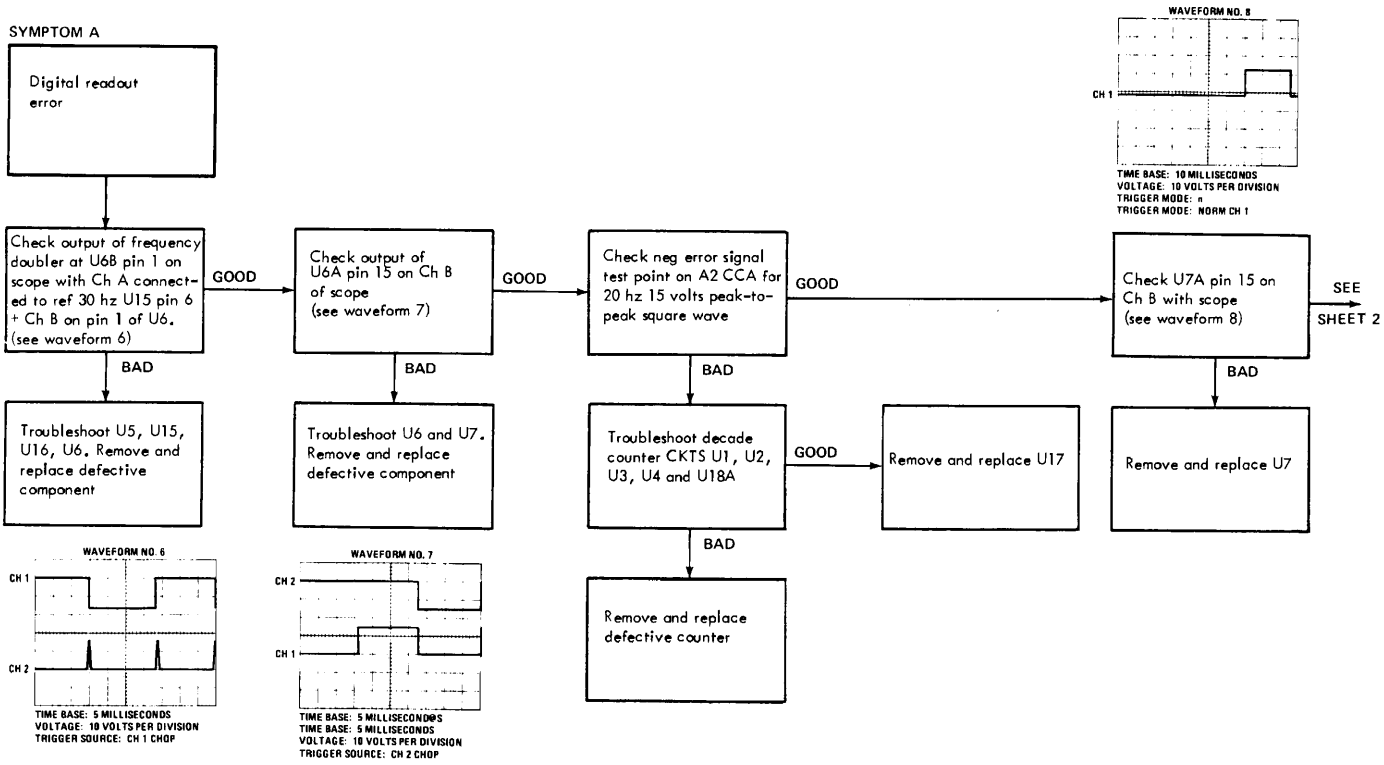


Figure 5-8. Reference Delay/Readout Circuit Card Assembly, 1A3A1, Troubleshooting Chart to the Circuit Level (Sheet 1 of 3)

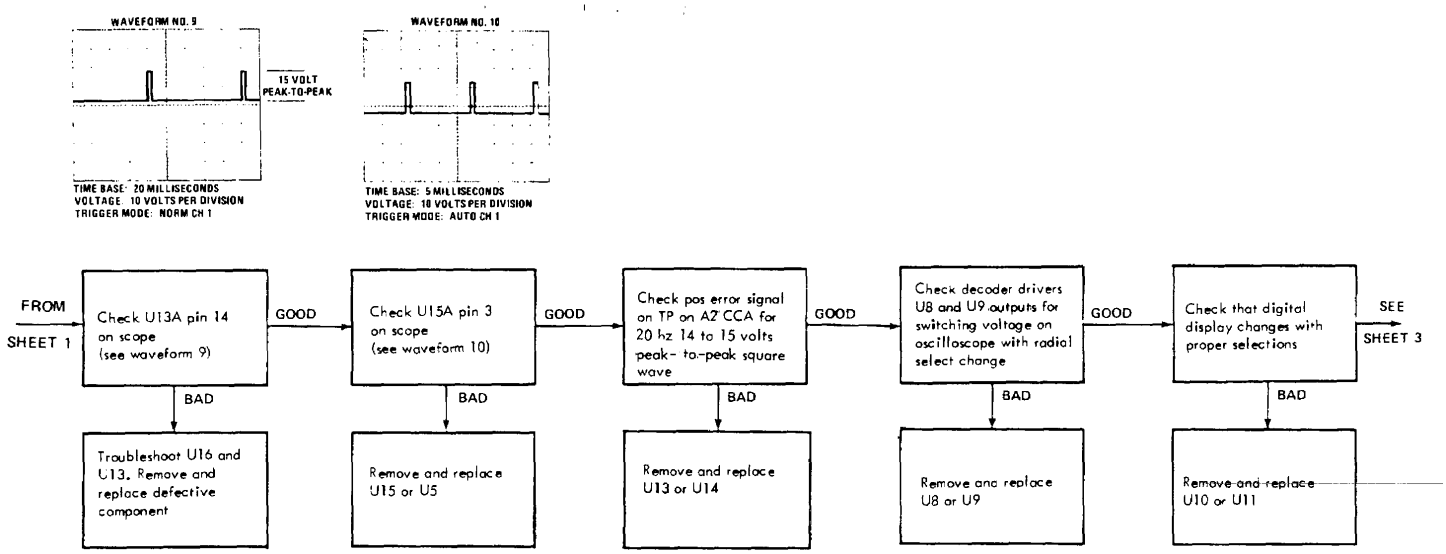


Figure 5-8. Reference Delay/Readout Circuit Card Assembly, 1A3A1, Troubleshooting Chart to the Circuit Level (Sheet 2 of 3)

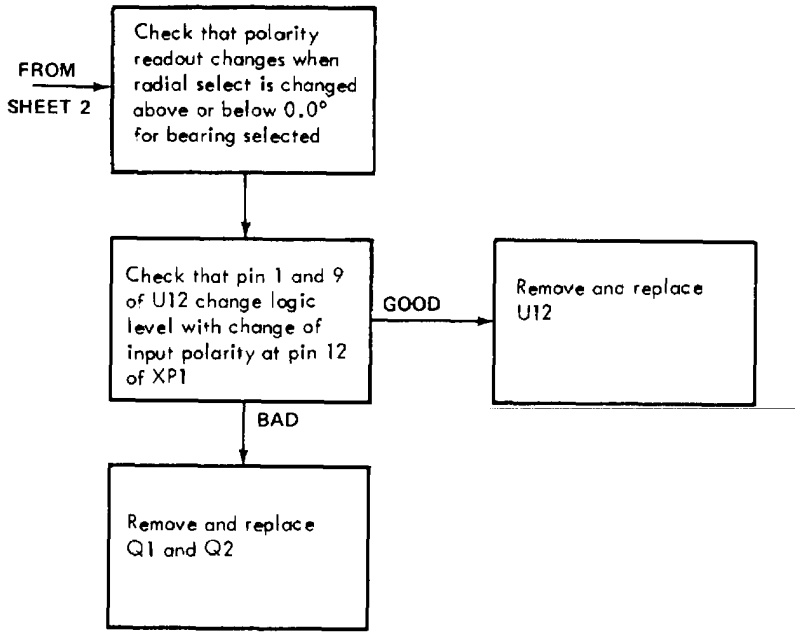


Figure 5-8. Reference Delay/Readout Circuit Card Assembly, 1A3A1, Troubleshooting Chart to the Circuit Level (Sheet 3 of 3)

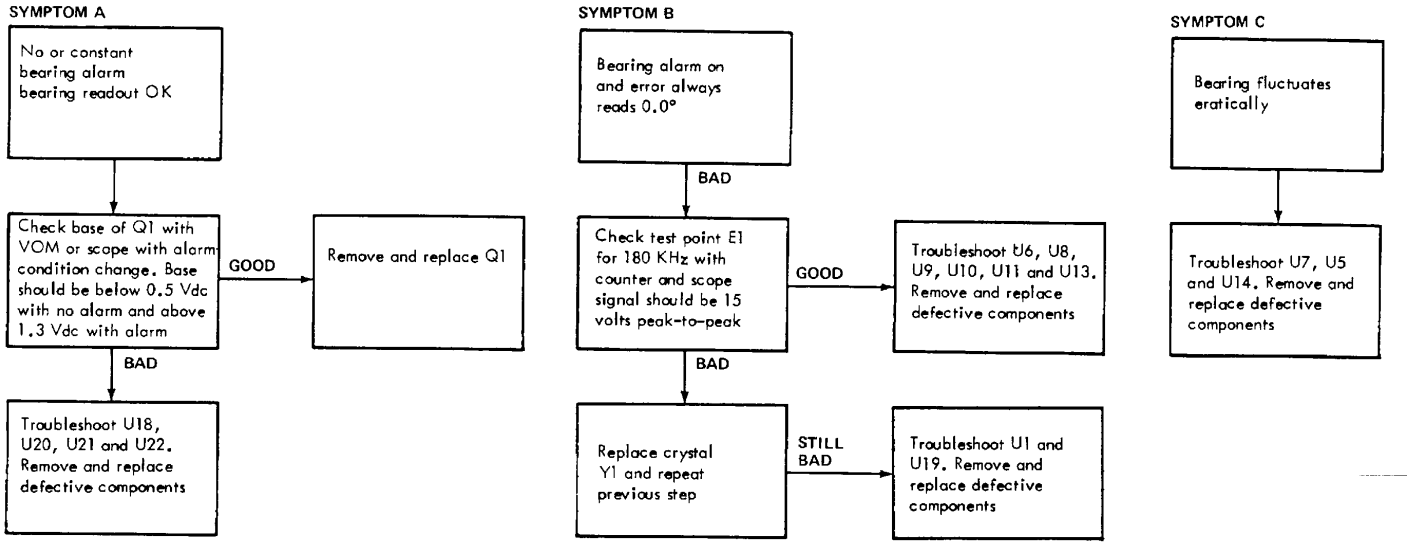
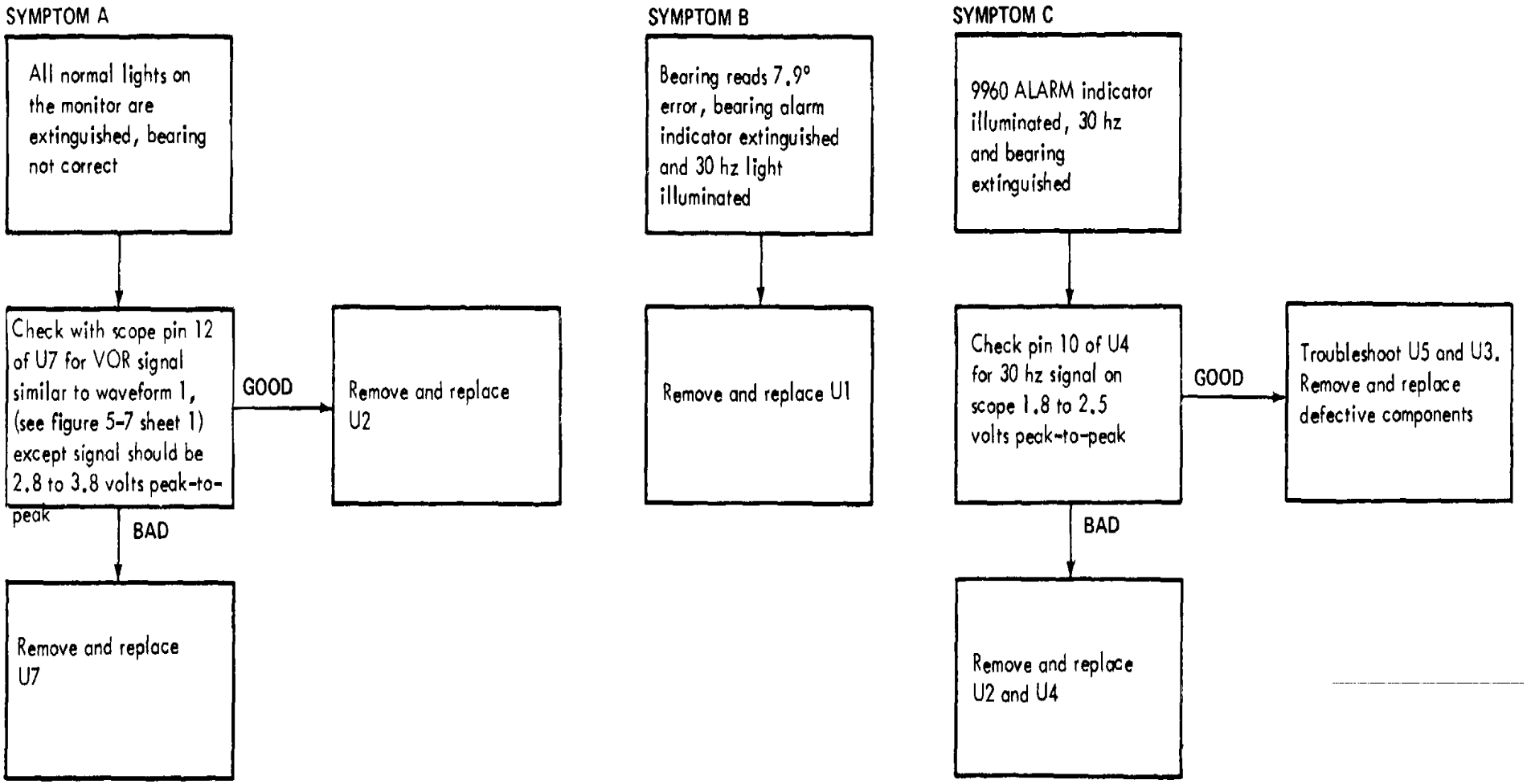


Figure 5-9. PhaseComparator Circuit Card Assembly, 1A3A2, Troubleshooting Chart to the Circuit Level

Figure 5-10. Variable Signal Processing

Circuit



Card Assembly, 1A3A3, Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

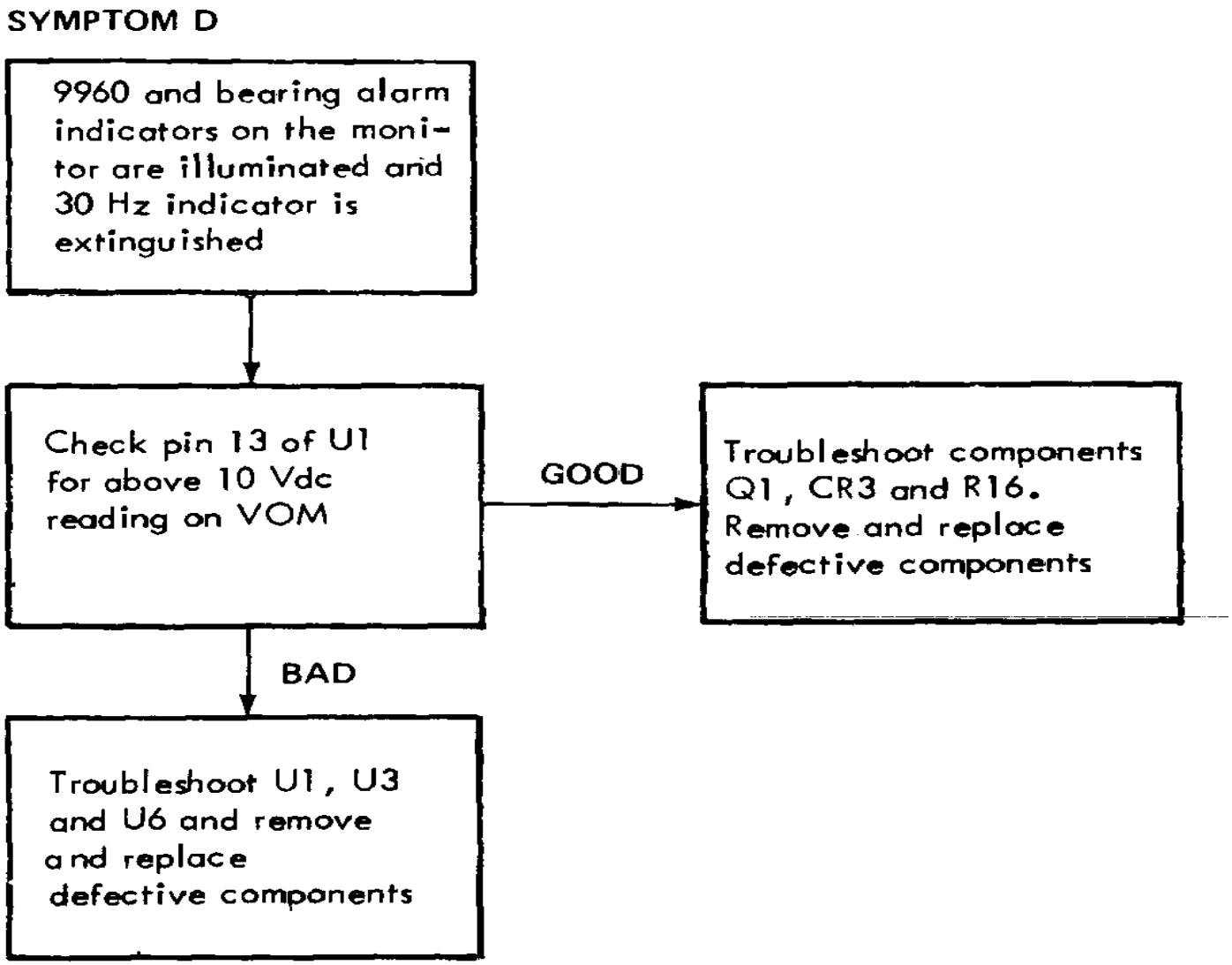


Figure 5-10. Variable Signal Processing Circuit Card Assembly, 1A3A3, Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

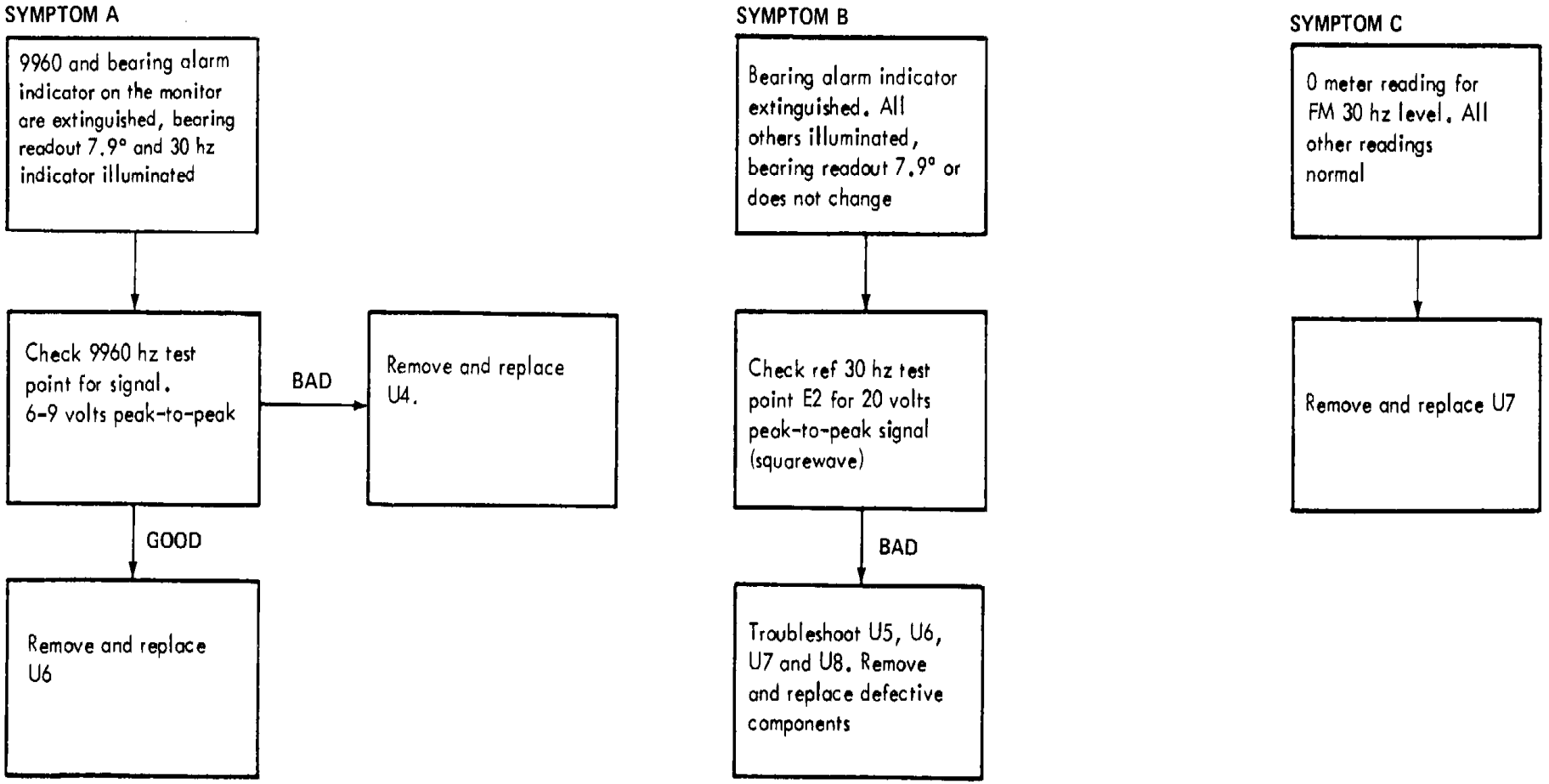


Figure 5-11. ReferenceIdent Circuit Card Assembly, 1A3A4, Troubleshooting Chart to the Circuit Level (Sheet 1 of 3)

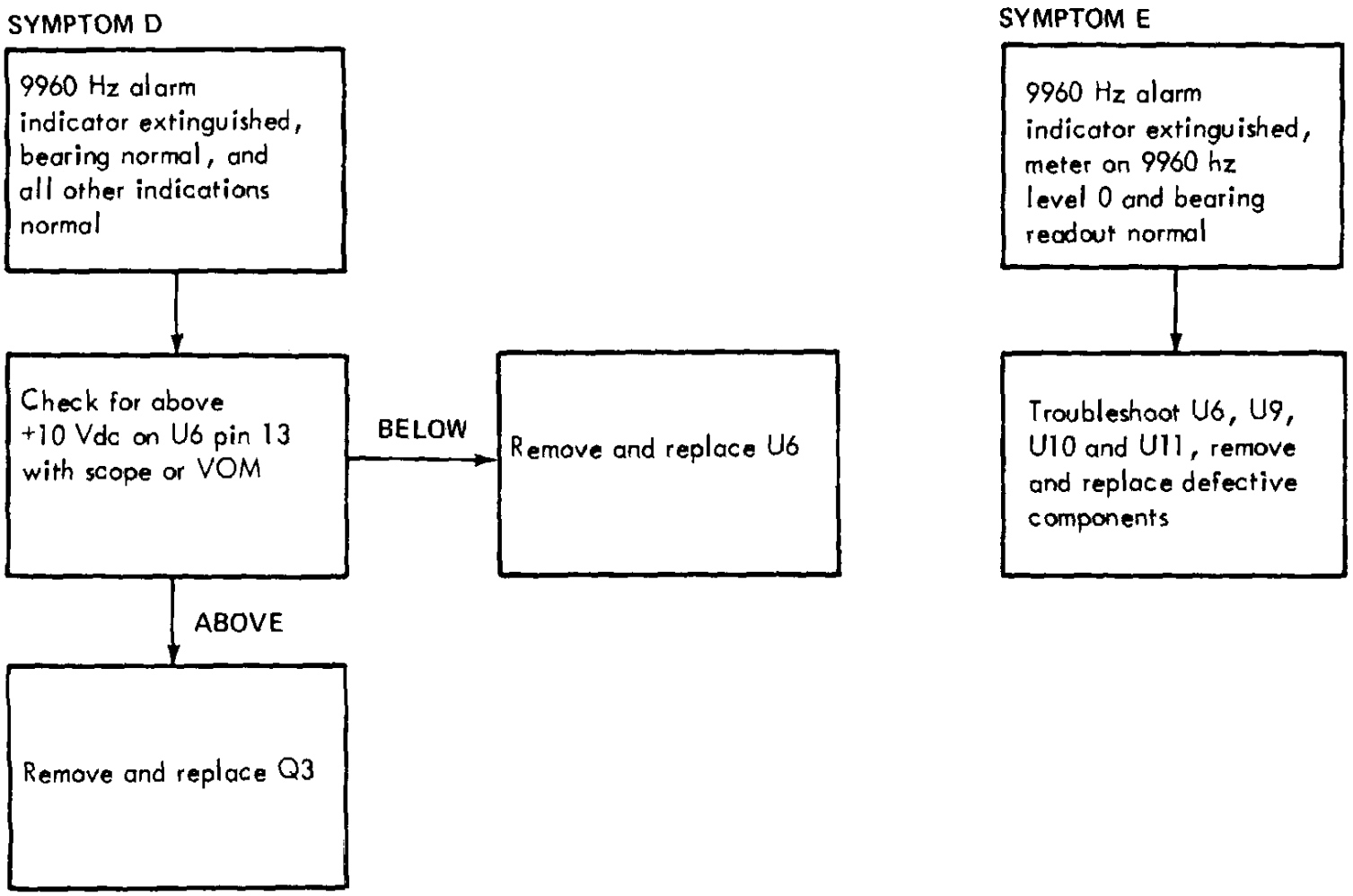


Figure 5-11. Reference Ident Circuit Card Assembly, 1A3A4, Troubleshooting Chart to the Circuit Level (Sheet 2 of 3)

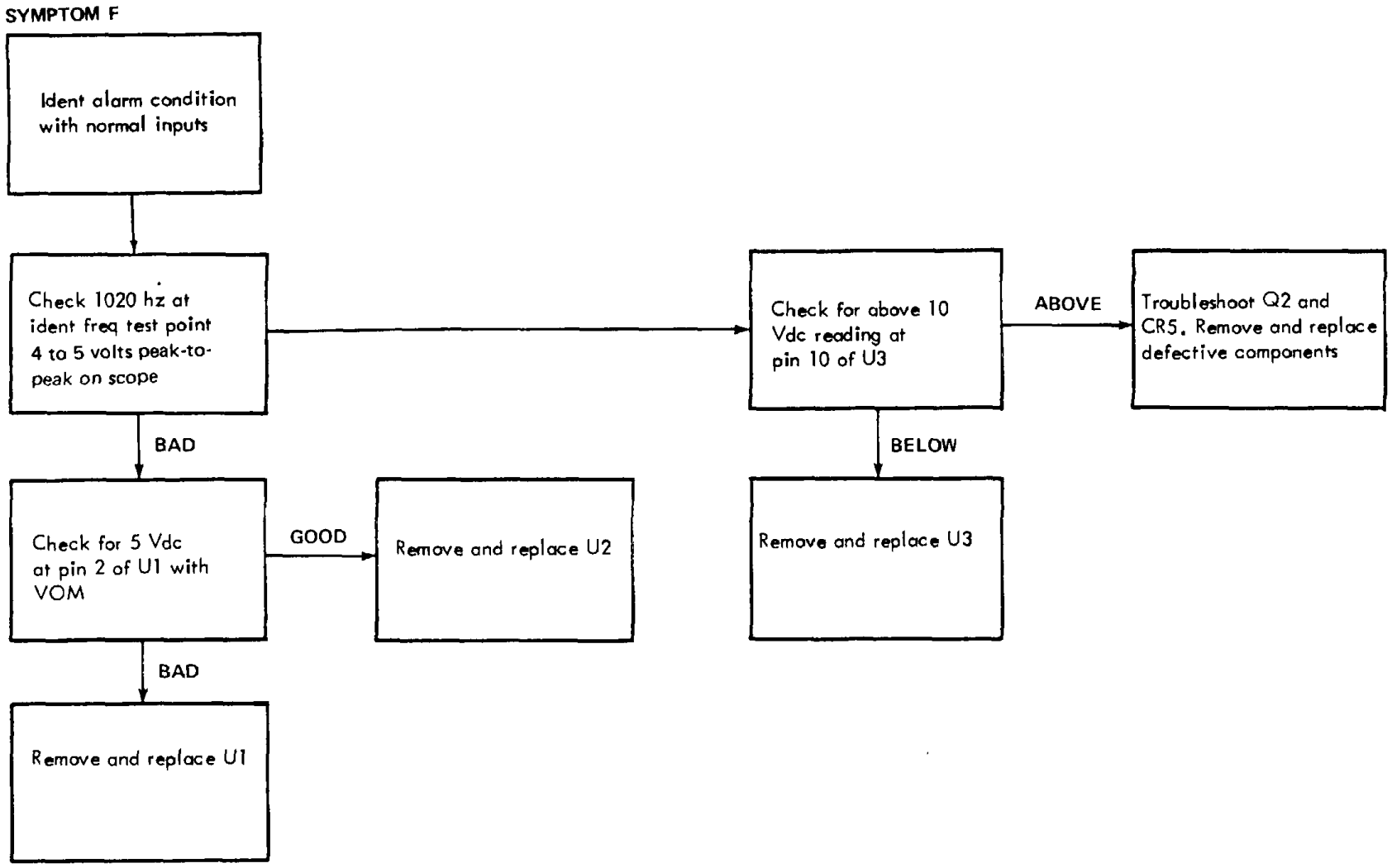


Figure 5-11. ReferenceIdent Circuit Card Assembly, 1A3A4, Troubleshooting Chart to the Circuit Level (Sheet 3 of 3)

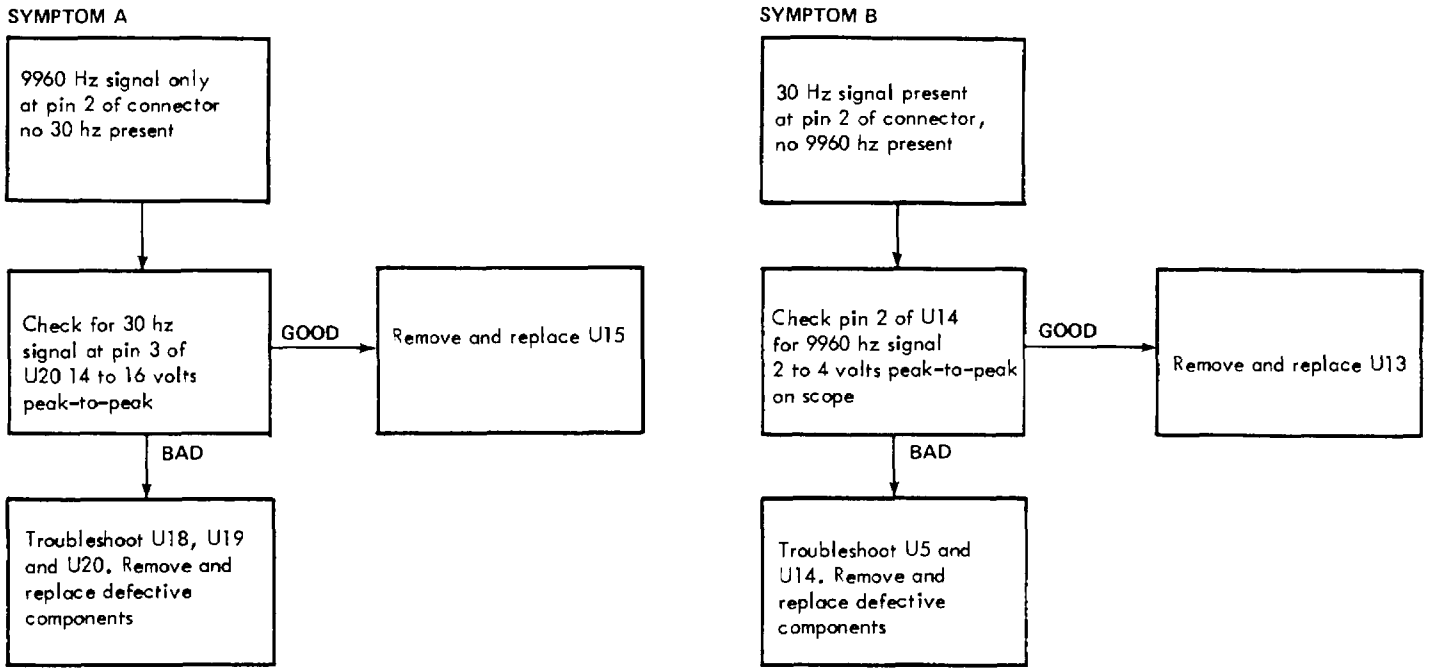


Figure 5-12. Test Generator Circuit Card Assembly, 1A3A5, Troubleshooting Chart to the Circuit Level (Sheet 1 of 3)

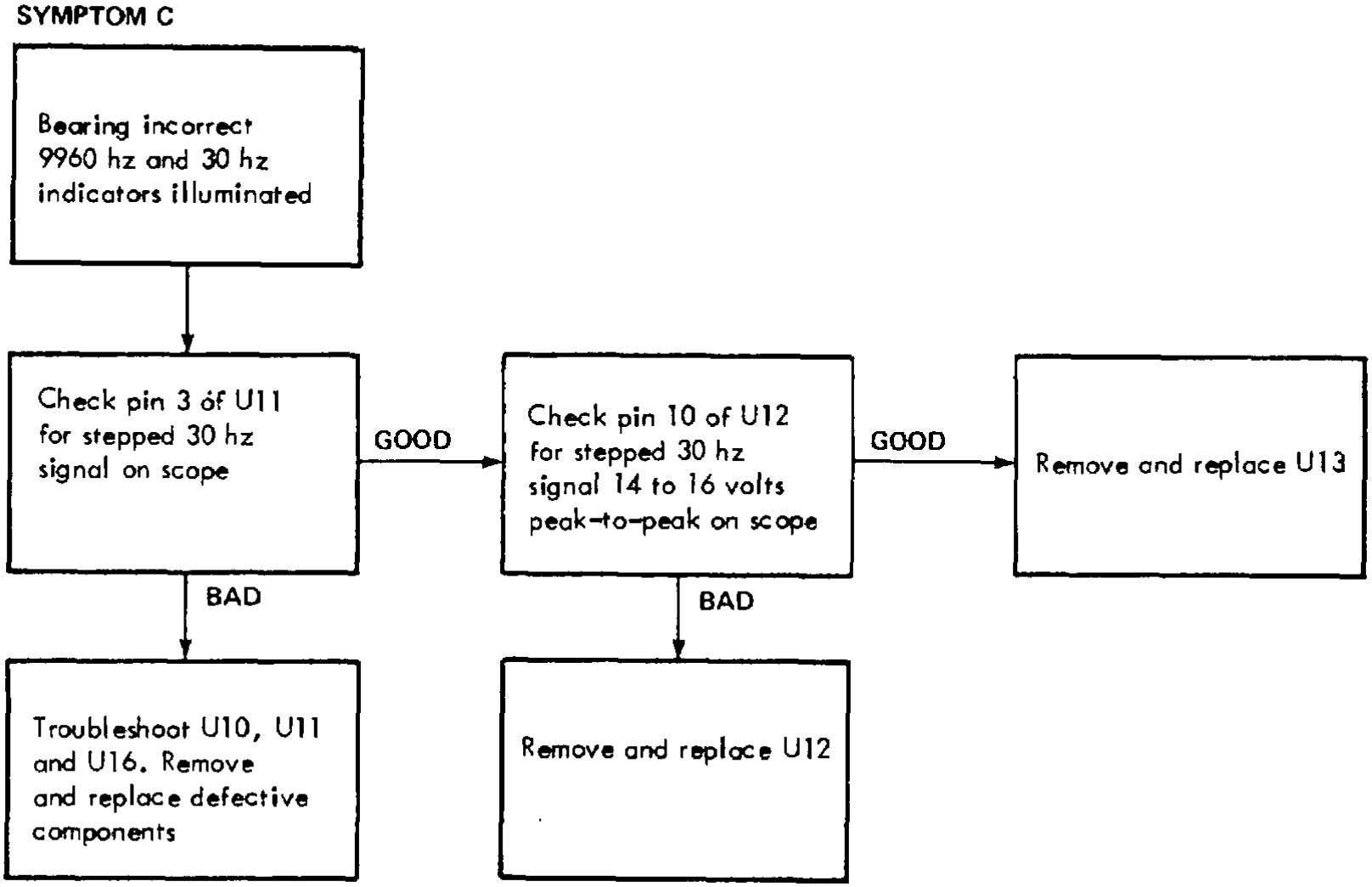


Figure 5-12. Test Generator Circuit Card Assembly, 1A3A5, Troubleshooting Chart to the Circuit Level (Sheet 2 of 3)

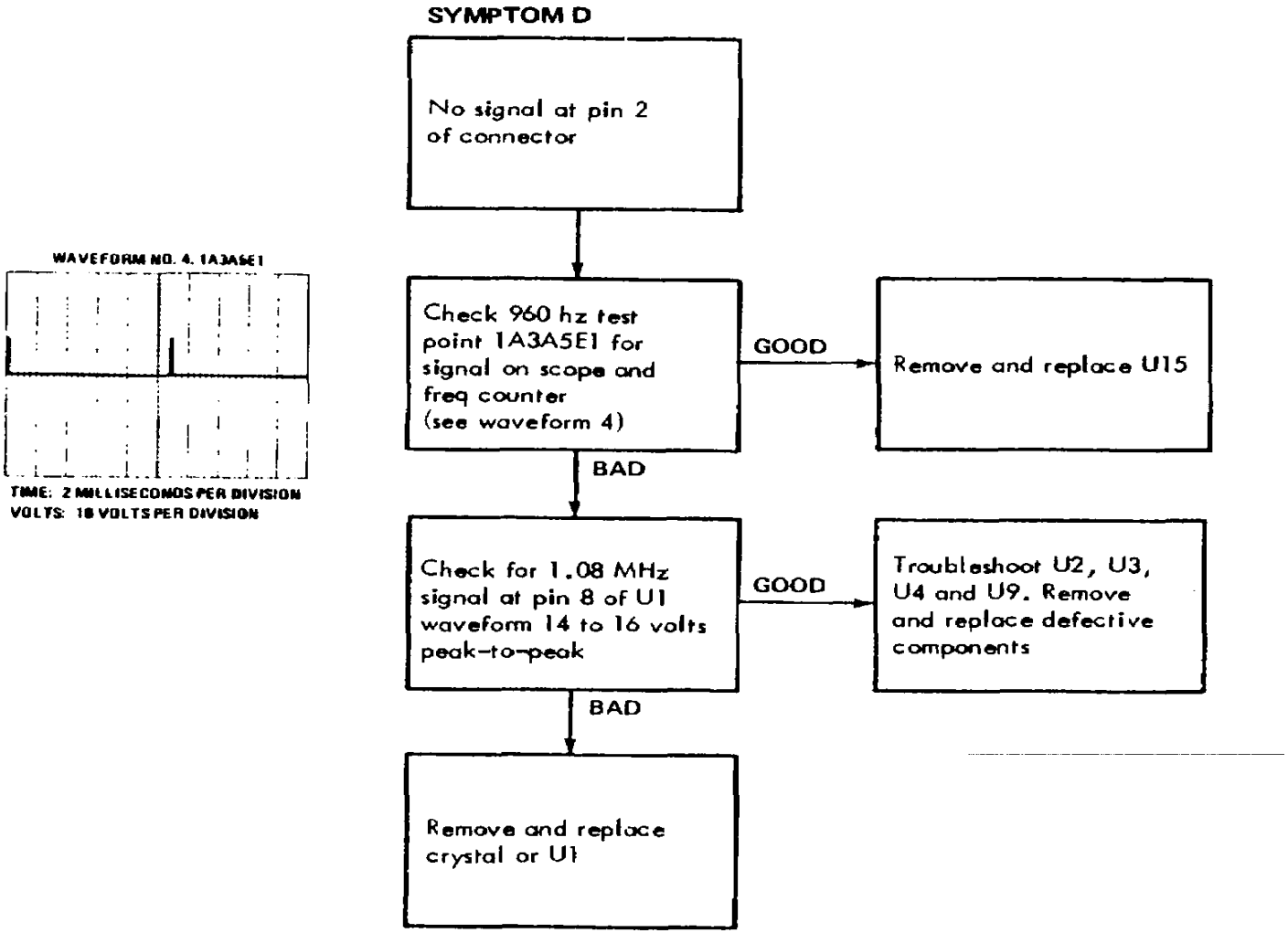


Figure 5-12. Test Generator Circuit Card Assembly, 1A3A5, Troubleshooting Chart to the Circuit Level (Sheet 3 of 3)

SECTION IV

REPAIR

5-7. INTRODUCTION. The following paragraphs contain repair procedures for the monitor and connectors. The repair procedures for the monitor are supported by tables containing cable requirements and lists of material needed to make each completely serviceable as applicable.

5-8. CONNECTOR AND WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair connectors and wiring harness damage. A list of all connectors by reference designation with a cross reference to the hand tools used for repair is provided in table 5-1. A wiring list showing point-to-point connections, wire type and size is provided in table 5-2A. Table 5-2B contains a list of materials.

5-9. SPECIAL REPAIR INSTRUCTIONS. See paragraph 3-30 for repair procedures for semiconductors and microcircuits.

Tables 5-1. Phase Modulation Monitor Connector Maintenance Tool List Matrix

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A3J1	Crimp	910163-003	910195-001 (Male)	22-20	M8ND	N20rt-29	910923
1A3P1	Ribbon Cable	910212-001	N/A	N/A	N/A	N/A	N/A
1A3xA2	Solder	910140-003	N/A	N/A	N/A	N/A	N/A
1A3XA3	Solder	910140-003	N/A	N/A	N/A	N/A	N/A
1A3XA4	Solder	910140-003	N/A	N/A	N/A	N/A	N/A
1A3XA5	Solder	910140-003	N/A	N/A	N/A	N/A	N/A

Table 5-2A. Phase Modulation Monitor Wiring List

Note: Point–to-Point wire connections are listed in Table 5-2A and a list for materials to be used in conjunction with Table 5-2A is provided in Table 5-2B

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	7		J1-1	24	XF1-1	27, 30	
2	1		J1-1	24	BS2	25	
3	4		J1-3	24	E1		
4	3		J1-4	24	XDS2-1		
5	7		J1-5	24	S1-2		
6	10		J1-6	24	S1-9		
7	1		J1-7	24	E1		
8	17		J1-8	19, 24	S3B-9		
8S	1		E1		FLOAT		
9	15		J1-9	24	XA4-2		
10	14		J1-10	24	XA4-8		
11	10		J1-11	24	XA3-7		
12	7		J1-12	24	XA2-15		
13	12		J1-13	24	XA4-3		
14	2		J1-14	24	XA4-15		
15	17		J1-15	19, 24	S3B-7		
15S	1		E1		FLOAT		
16	16		J1-16	24	S3B-5		
17	3		J1-17	24	XA5-12		
18	5		J1-18	24	XA5-11		
19W	18		J1-19	19, 24	S3A-10		
19B	-		J1-20	24	S3A-11		
19S	1		E1		FLOAT		
20	6		J1-21	24	BS1	25	
21	1		J1-24	24	BS2		See Wiring #2
22	4		E1		C1-NEG.		
23	16		XK1-1		BS1		See Wiring #20
24	4		XA5-1		XA5-29		
25	17		XA5-2	19	S3B-9		
25S	1		E2		FLOAT		

Table 5-2A. Phase Modulation Monitor Wiring List (Continued)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
26	13		XA5-5		S2-D		See Note 5, 136500
27	14		XA5-6		S2-A		See Note 5, 136500
28	15		XA5-7		S2-C		See Note 5, 136500
29	16		XA5-8		S2-B		
30	11		XA4-4		XDS4-2		
31	9		XA4-5		X DS5-2		
32	17		XA4-6	19	S3A-COM #2		
32S	1		E2		FLOAT		
33	10		XA4-7		S4B-6		
34	8		XA4-9		X DS7-2		
35	13		XA4-10		S3A-COM #1		
36	5		XA4-11		C2-NEG.		
37	3		XA4-12		U1-2		
38	3		XA4-12		XDSI-1		
39	9		XA4-18		XA2-18		
40	16		XA4-23		S4B-7		
41	13		XA4-29		X DS1-2		
42	8		XA3-3		J2		
43	15		XA3-3		S3B-COM #2		
44	15		XA3-4		53B-COM #1		
45	17		XA3-6		S3A-7		
45S	1		E2	19	FLOAT		
46	11		XA3-9		X DS3-2		
47	16		XA3-10		TB1-3		
48	5		XA3-11		T81-6		
49	3		XA3-12		S3A-1		
50	14		XA3-18		S4B-5		
51	12		XA3-25		S4B-4		
52	4		XA3-29		S 1-3		
53	11		XA2-16		X DS6-2		

Table 5-2A. Phase Modulation Monitor Wiring List (Continued)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
54	12		XA2-19		XDS8-2		
55	4		XA2-29		C1-NEG.		
56	5		TB1-6		C2-NEG.		
57	3		XK1-1		XDS2-1		
58	11		XK1-4		SI-COM #1		
59	16		XK 1-7		X F 1-2	27, 30	
60	3		XDS I - 1		X DS8-1		
61	3		XDS4-1		XDS8-1		
62	3		XDS4-1		X DS5-1		
63	10		XDS2-2		TB 1-4		
64	3		XDS6-1		X DS5-1		
65	3		XDS6-1		X DS3-1		
66	3		XDS7-1		X DS3-1		
67	10		51-7	TB1-4			
68	4		SI-COM #2		S2-C OM. #1		See Note 5, 136500
69	4		S1-COM #2		S3A-2		
70	3		S3A-1		TB 1-7		
71	4		S3A-2		S4B- 1		
72	7		S4A-COM #1		MI-NEG.		
73	15		S4A-3		TB1-5		
74	2		S4B-COM #1		MI-POS.		
75	11		S4B-2		TB1-8		
76	26		PI-I BRN		XA2-2		
77	26		P1-2 ORG		XA2-4		
78	26		P1-3 GRN		XA2-6		
79	26		P1-4 VIO		XA2-8		
80	26		P1-5 WIIT		XA2-10		
81	26		P1-6 BRN		XA2-12		
82	26		P1-7 ORG		XA2-14		
83	26		P1-8 GRN		XA3-21		

Table 5-2A. Phase Modulation Monitor Wiring List (Continued)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	ROM CIRCUIT POINT	ROM ACCESS. ITEM NO.	TO CIRCUIT POINT	TO ACCESS. ITEM NO.	REMARKS
84	26		P1-9 BLU		XA2-17		
85	26		P1-10 YEL		XA2-13		
86	26		P1-11 RED		XA2-11		
87	26		P1-12 BLK		XA2-9		
88	26		P1-13 GRY		XA2-7		
89	26		P1-14 BLU		XA2-5		
90	26		P1-15 YEL		XA2-3		
91	26		P1-16 RED		XA2-1		

Table 5-2A. Phase Modulation Monitor Wiring List (Continued)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	86		XA2-1	85	XA3-1		
2	86		XA4-1	85	XA3-1		
3	86		XA4-1	85	XA5-1		
4	86		XA2-29	85	XA3-29		
5	86		XA4-29	85	XA3-29		
6	86		XA4-29	85	XA5-29		
7	86		XA2-12	85	XA3-12		
8	86		XA4-12	85	XA3-12		
9	86		XA4-12	85	XA5-12		
10	86		XA4-19	85	XA3-10		
11	86		XA4-10	85	XA3-10		
12	86		XA3-2	85	XA4-2		
13	86		XA3-11	85	XA4-11		
14	86		XA5-11	85	XA4-11		
15	86		C2-NEG.	85	U2-3		
16	86		CR1-NEG.	85	U2-2		
17	86		C2-POS.	85	U2-1		
18	86		CR2-POS.	85	U2-1		
19	86		CR2-NEG.	85	U2-3		
20	86		CR1-NEG.	85	U1-3		
21	86		C1-NEG.	85	U1-3		
22	86		C1-POS.	85	U1-1		
23	86		CR1-POS.	85	U1-1		
24	86		S1-COM.#2	85	S1-3		
25	86		S1-7	85	S1-9		
26	86		S3A-2		S3A-3		
27	86		S3A-4		S3A-3		
28	86		S3A-4		S3A-3		
29	86		S3B-3	85	S3A-5		

NOTE: Table 5-2A is comprised of the monitor assembly wire list and a monitor harness wire list. The monitor assembly wire list is numbered separately for ease of reference.

Table 5-2A. Phase Modulation Monitor Wiring List (Continued)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
28	86		S3B-5		S3B-4		
29	86		S3B-2	85	S3B-4		
30	86		S3B-2		S3B-1		
31	86		S3B-7		S3B-8		
32	86		S3B-10	85	S3B-8		
33	86		S3B-10		S3B-11		
34	86		S3A-7		S3A-8		
35	86		S3A-9		S3A-8		
36	86		S4A-1		S4B-1		
37	86		S4A-1		S4A-2		
38	86		S4A-4	85	S4A-2		
39	86		S4A-4		S4A-5		
40	86		S4A-6		S4A-5		
41	86		S4A-6		S4A-7		
42	86		S4B-1	85	S4B-3		
43	86		S2-COM #1	85	S2-COM #2		136500-102 ONLY
44	86		S2-C #1	85	S2-C #2		136500-102 ONLY
45	86		T1-GRAY		BSI*		See 136517-251
46	86		T1-WHT		J1-22	94	
			T1-PURPLE		J1-23	94	
			T1-BLK		BS2*		
			T1-YEL		J1-22		
			T1-YEL		F1-23		
			T1-BLUE		BS2*		
			TI-BLUE		SPARE		
			TI-RED		SPARE		
			TI-RED		SPARE		
			TI-BRN		CR2-1		
			TI-BRN		CR2-2		

Table 5-2B. Materials List

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	1	WIRE, Awg 22, BLK	MIL-W-168878/4
AR	2	WIRE, Awg 22, BRN	MIL-W-168878/4
AR	3	WIRE, Awg 22, ORG	MIL-W-168878/4
AR	4	WIRE, Awg 22, GRN	MIL-W-168878/4
AR	5	WIRE, Awg 22, VIO	MIL-W-168878/4
AR	6	WIRE, Awg 22, GRY	MIL-W-168878/4
AR	7	WIRE, Awg 22, WHT	MIL-W-168878/4
AR	8	WIRE, Awg 22, W/BLK	MIL-W-168878/4
AR	9	WIRE, Awg 22, W/BRN	MIL-W-168878/4
AR	10	WIRE, Awg 22, W/RED	MIL-W-168878/4
AR	11	WIRE, Awg 22, W/ORG	MIL-W-168878/4
AR	12	WIRE, Awg 22, W/YEL	MIL-W-168878/4
AR	13	WIRE, Awg 22, W/GRN	MIL-W-168878/4
AR	14	WIRE, Awg 22, W/BLU	MIL-W-168878/4
AR	15	WIRE, Awg 22, WVIO	MIL-W-168878/4
AR	16	WIRE, Awg 22, WGRY	MIL-W-168878/4
AR	17	WIRE, 1 Cond. Shld. Awg. 22	MIL-W-168878/4
AR	18	WIRE, 2 Cond, Shld. Awg. 22	MIL-W-168878/4
4	19	Solder Sleeve	003700-3
1	20	Solder Sleeve	003700-3
AR	21	Sleeving, Wht, 1/8OD	MIL-1-23053/5
AR	22	Sleeving, Wht, 1/4OD	MIL-1-23053/5
1	23	Conn. 24 Pin	910163-003
21	24	Contact, Male #22-20	910195-001
2	25	Wire Cap	MS25274-3
1	26	Ribbon Cable	910212-001
2	27	Flange Lug	910868-001
1	28	Contact, Male 18-16	910195-002
X	29	Wire List	136517-251
2	30	Lug, Housing	910869-001
	85		
	86		
	94		

SECTION V

ASSEMBLY

5-11. GENERAL. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

5-12. ASSEMBLY PROCEDURES. Assembly of the monitor is essentially the reverse of disassembly. No special instructions are required.

5-13. TESTING. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 5 of TM 11-5825-266-14-1.

5-14. REFINISHING, PAINTING AND MARKING. Refer to applicable cleaning and refinishing practices specified in TB 43-0118, Field Instructions for Painting and Preserving Electronics Command Equipment. Remove rust or corrosion from metal surfaces by lightly sanding then with No. 000 sandpaper. Apply two thin coasts of paint to only those areas which have been previously painted. Refer to SB 1-573, Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment, and AR 746-5, Color and Marking of Army Material.

CHAPTER 6

RADIO TRANSMITTER T-1394/FRN-41

MAINTENANCE, OVERHAUL AND REPAIR

SECTION I

DISASSEMBLY

6-1. GENERAL. This chapter details disassembly, inspection, troubleshooting, repair, and reassembly procedures necessary to restore the Radio Transmitter T-1394/FRN-41 and all subassemblies contained therein to satisfactory operating condition after a failure or maintenance action. The text is supplemental with appropriate illustrations necessary to describe the required disassembly, repair and reassembly procedures. Do not disassemble the radio transmitter assembly more than is necessary for repairs.

6-2. RADIO TRANSMITTER DISASSEMBLY PROCEDURES. If the radio transmitter assembly has not been removed from the electrical equipment cabinet, remove in accordance with the instructions provided in Chapter 3, Section V. Individual instructions for each subassembly and chassis-mounted components are provided in the following paragraphs.

a. Front Panel and Chassis-Mounted Components Disassembly. (See figure 6-1.) The following disassembly procedure should be followed for removing components for repair or replacement.

(1) To disassemble any one of the front panel components, locate the particular item on sheet 2 of figure 6-1 and disassemble in accordance with the applicable exploded view shown on the following sheets of figure 6-1.

(2) To disassemble any one of the following chassis-mounted components, refer to figure 6-1 for proper identification and location and proceed as follows:

(a) Switch S2. Remove two screws, one nut and unsolder five wires from underside of drawer.

(b) Relay K1. Move holding wire and snap relay out of socket. To remove socket, remove two screws, disconnect terminal E5 and unsolder seven wires.

(c) Unscrew connectors 1A4J1, 1A4J2 and 1A4J3.

(d) 1A4FL1-J2. Remove two screws holding FL1 to chassis on bottom of drawer. Remove two screws on inside of FL1. Unsolder connection to J2. Remove four screws holding board in place. Unsolder connection to J1 and loosen nut. Connector may now be removed.

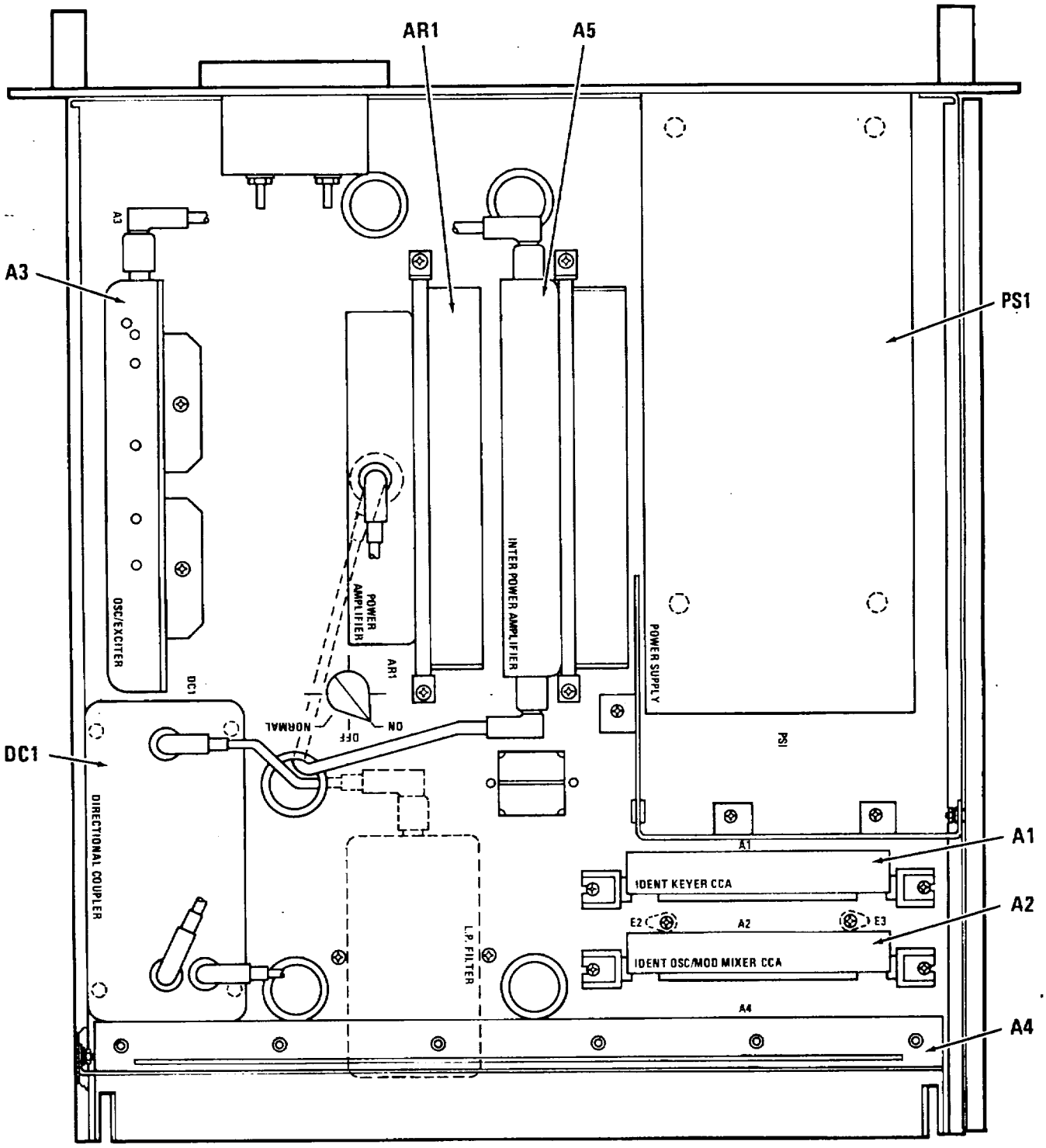


Figure 6-1. Radio Transmitter Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 1 of 3)

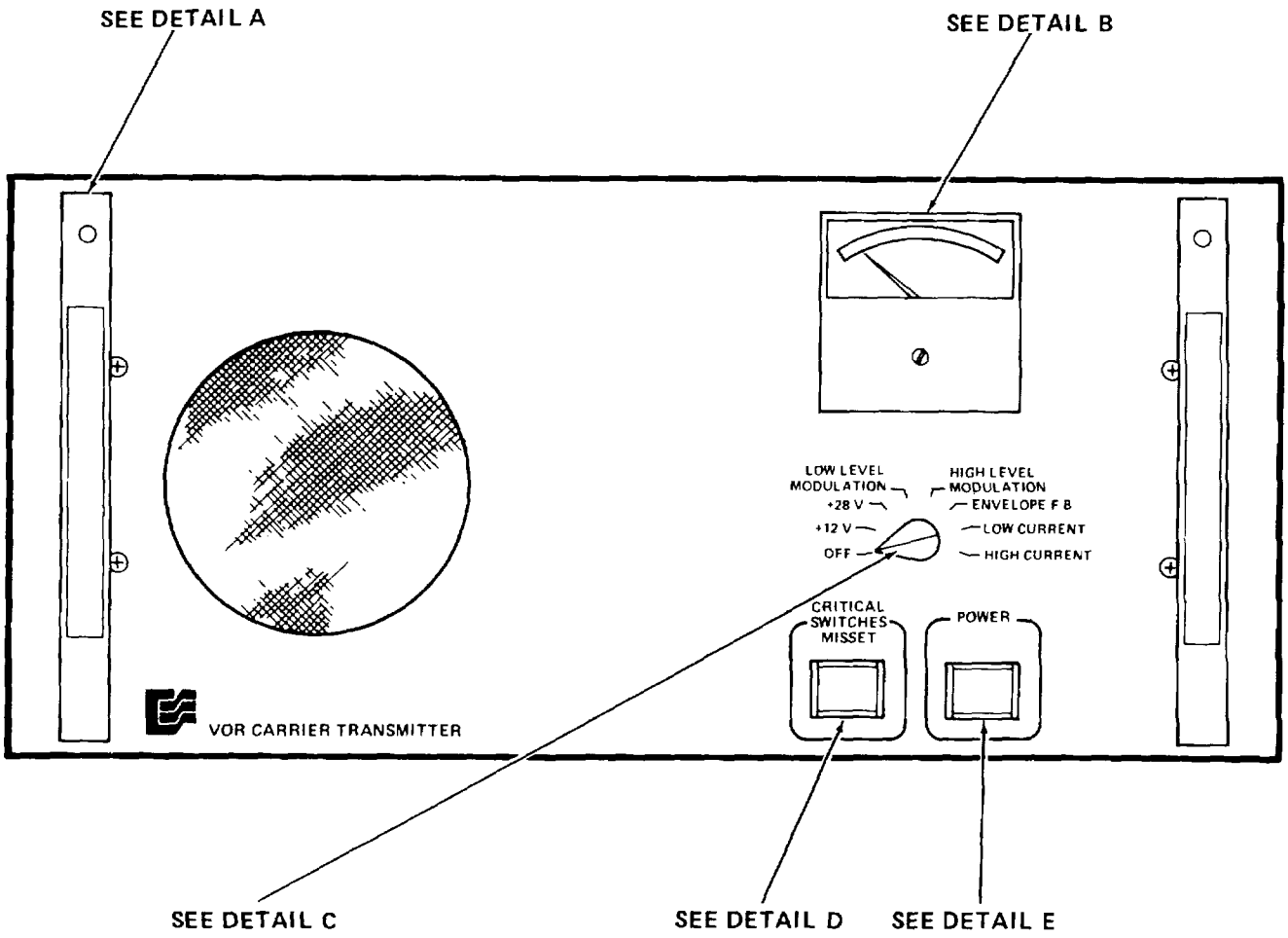
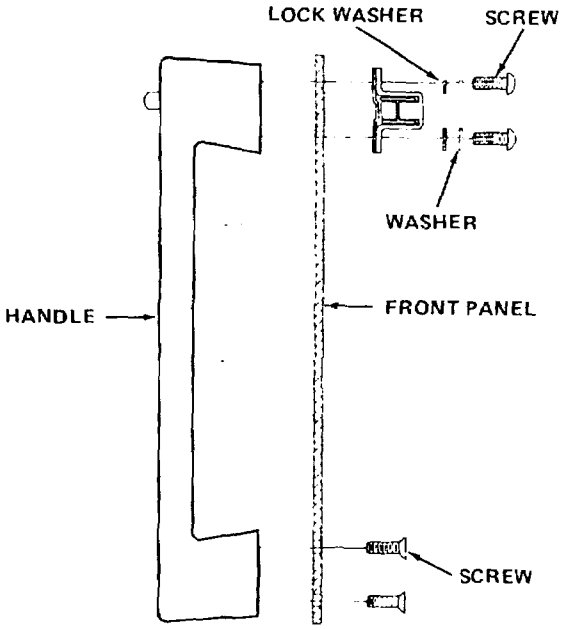
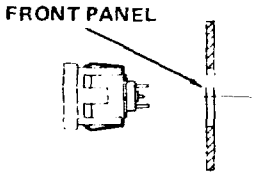


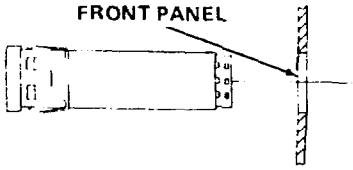
Figure 6-1. Radio Transmitter Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 2 of 3)



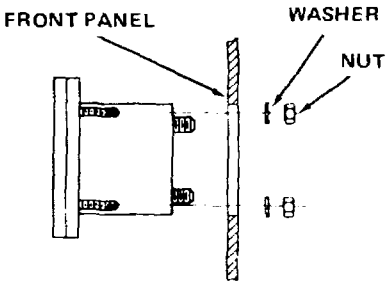
DETAIL A



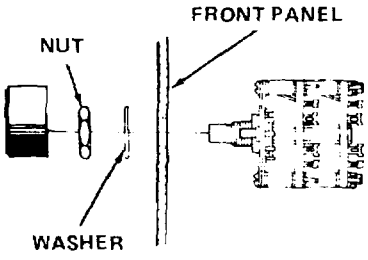
DETAIL D



DETAIL E



DETAIL B



DETAIL C

Figure 6-1. Radio Transmitter Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 3 of 3)

b. Ident Keyer Circuit Card Assembly (1A4A1) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. Refer to figure 6-2 for location of component to be replaced. To remove this circuit card assembly, grasp both edges of the card and pull up.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

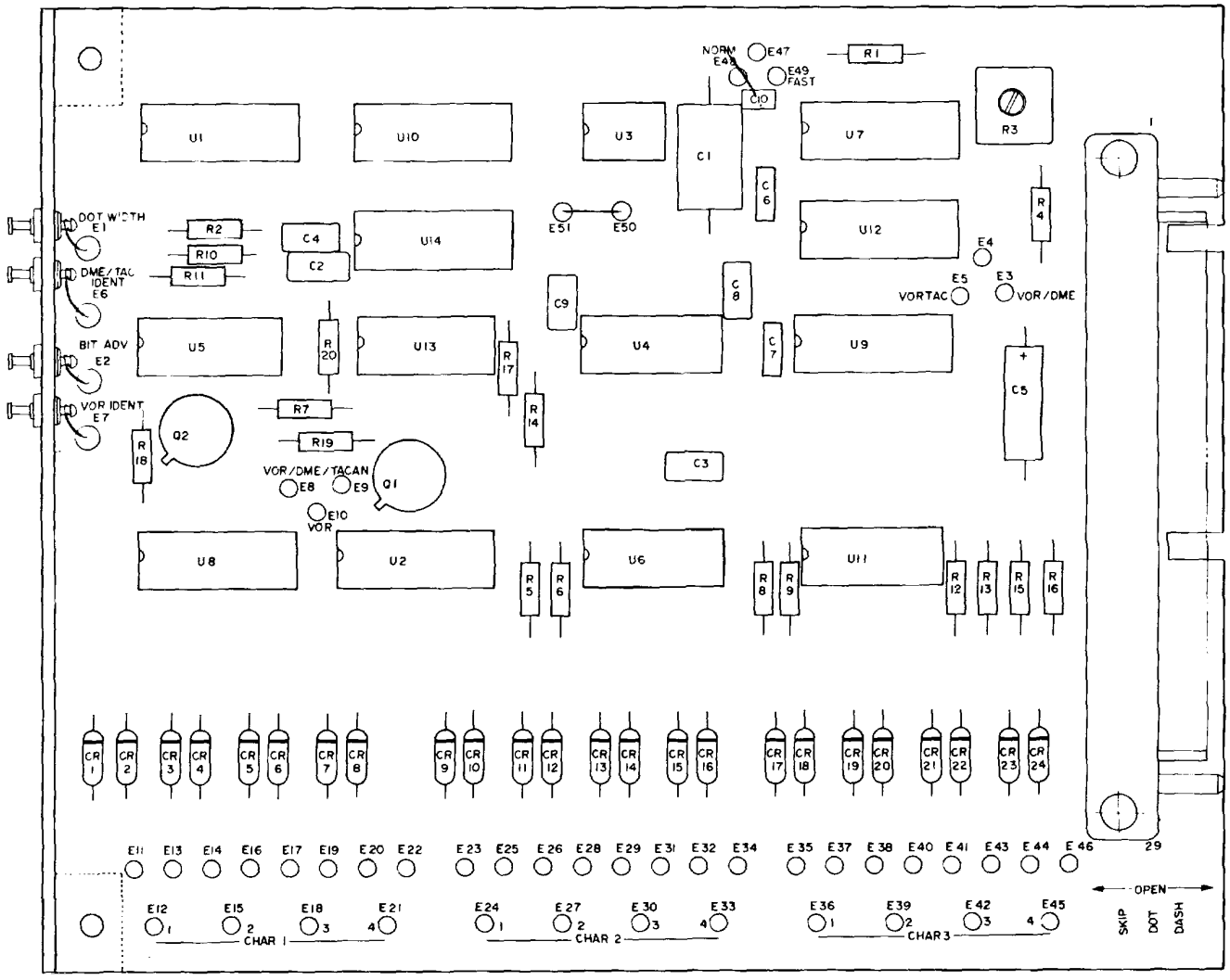


Figure 6-2. Ident Keyer Circuit Card Assembly, 1A4A1 Parts Location Diagram

c. Ident Osc/Mod Mixer Circuit Card Assembly {1A4A2) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. Refer to figure 6-3 for location of component to be replaced. To remove this circuit card assembly, grasp both edges of the card and pull up.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

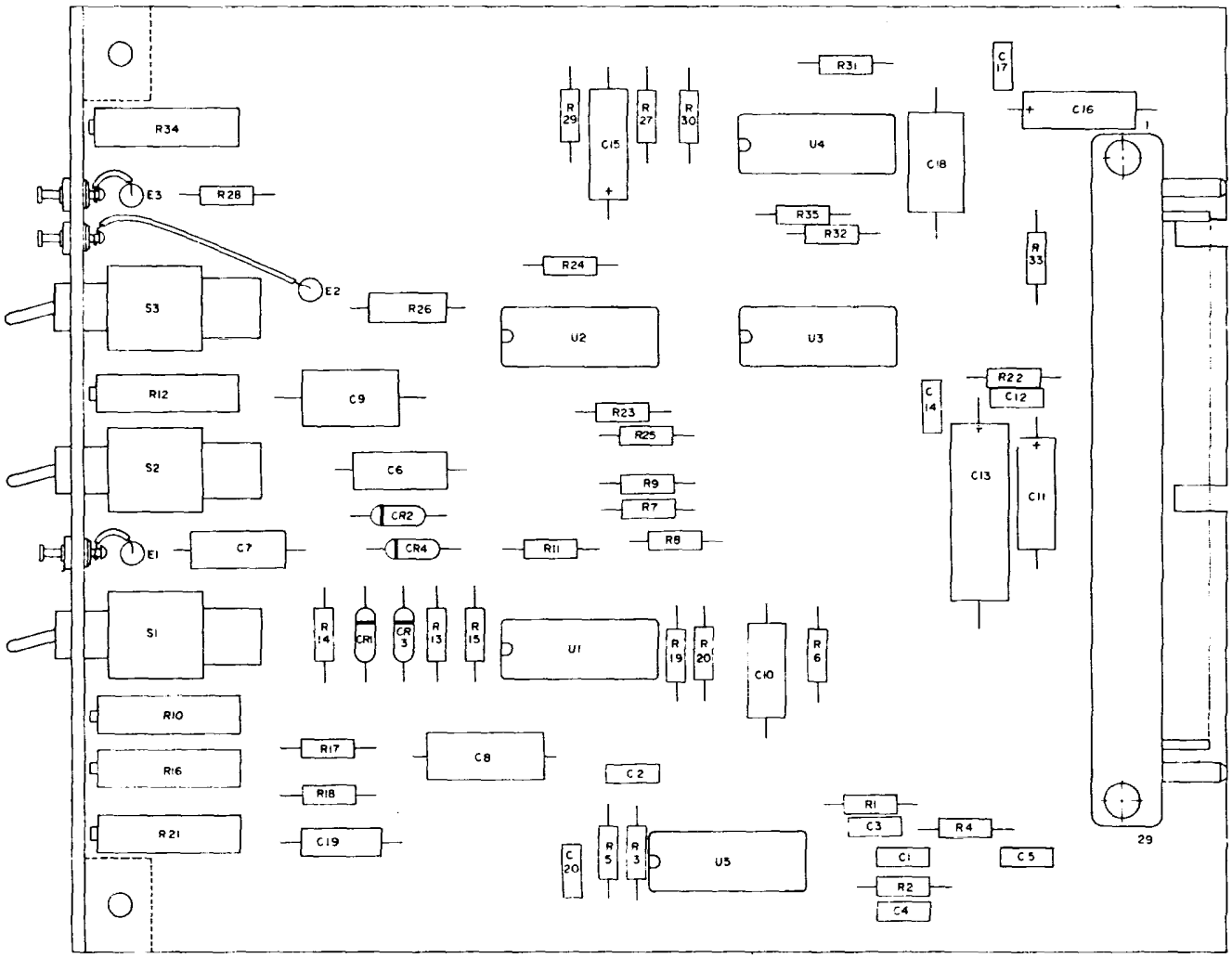


Figure 6-3. Ident OSC/MOD Mixer Circuit Card Assembly, 1A4A2 Parts Location Diagram

d. Oscillator/Exciter Assembly (1A4A3) Disassembly. This assembly should be removed only when servicing or component replacement is required. To remove this assembly perform the following procedures. Refer to figure 6-4 for location of component to be replaced.

(1) Remove two screws and washers holding the oscillator/exciter assembly (1A4A3) in place.

(2) Disconnect the coaxial cable from the oscillator/exciter assembly.

(3) Disconnect the wiring from wiring terminals El, E2, E3 and E4 by removing the terminals.

(4) Remove the oscillator/exciter assembly from the chassis.

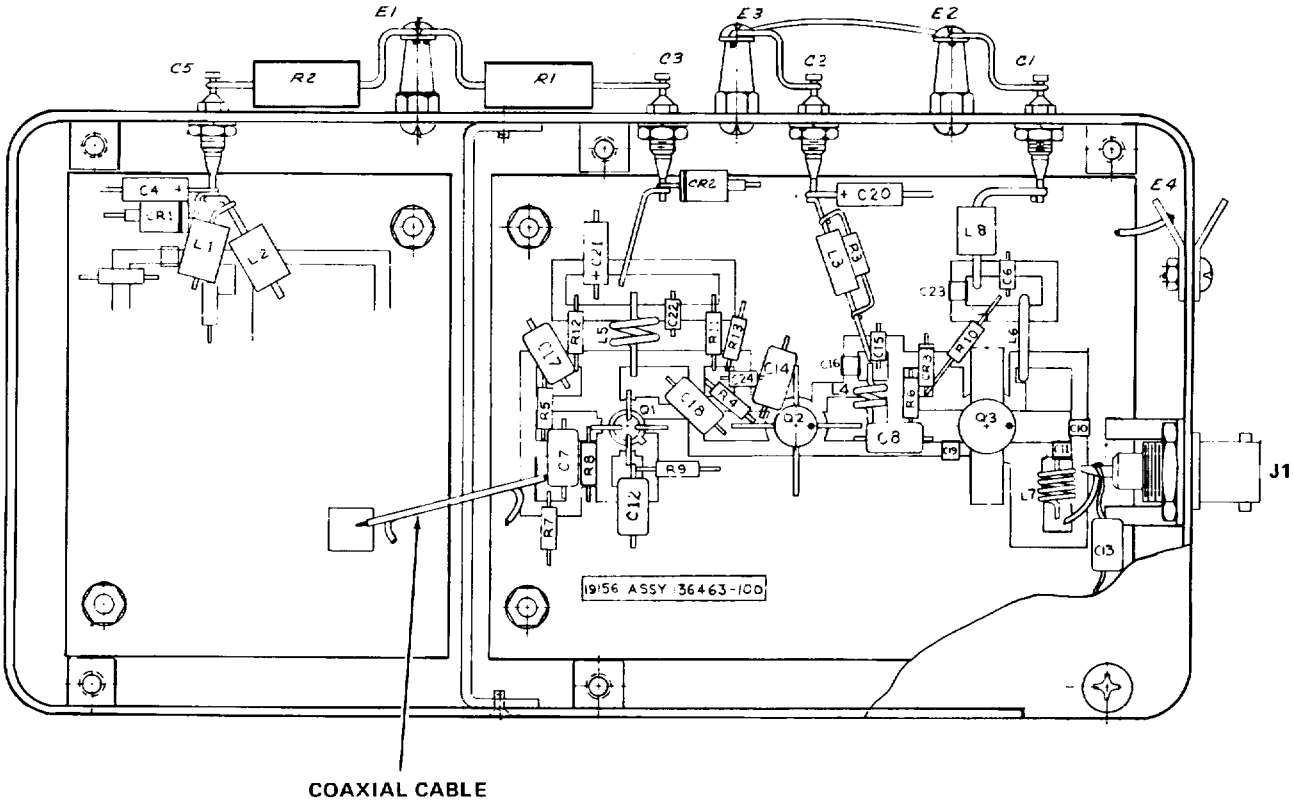


Figure 6-4. OSC/Exciter Assembly, 1A4A3 Parts Location Diagram

e. Oscillator Circuit Card Assembly (1A4A3A1) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card, perform the following procedures. Refer to figure 6-5 for location of component to be replaced.

(1) Remove the two screws attaching the oscillator assembly to the chassis.

(2) Remove the six screws from the cover of the oscillator assembly.

(3) Unsolder the buss wire from feed-through capacitor C5.

(4) Remove the two nuts from the mounting screws.

(5) Remove the two mounting screws.

Further disassembly should be limited to removal of parts of repair or replacement.

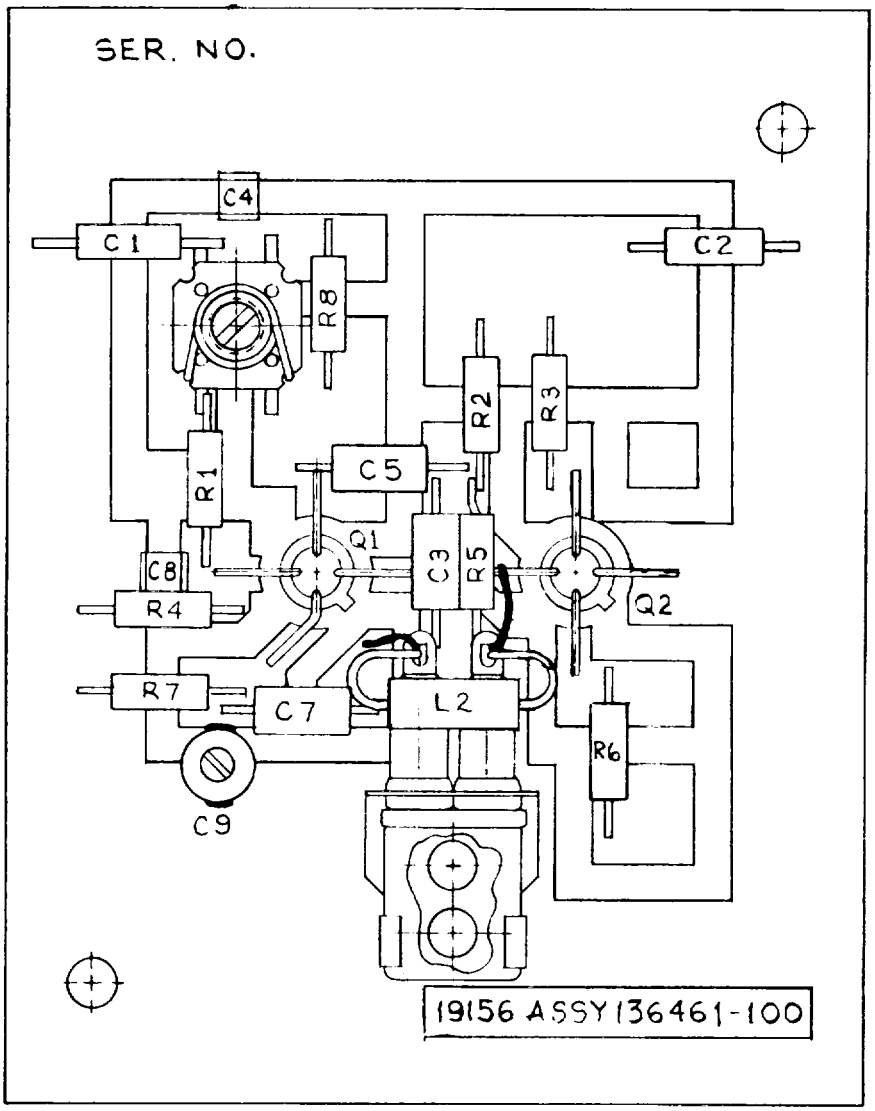


Figure 6-5. Oscillator Circuit Card Assembly, 1A4A3A1 Parts Location Diagram

f. Exciter Circuit Card Assembly (1A4A3A1) Disassembly. To remove the exciter circuit card contained in the Oscillator/Exciter assembly, perform the following steps. Refer to figure 6-4 for location of component to be replaced.

(1) Remove the two screws attaching the oscillator/exciter assembly to the chassis.

(2) Remove the six screws on the cover of the assembly.

(3) Unsolder leads from C3, C2, C1, E4 and J1.

(4) Unsolder two leads from center conductor and shield.

(5) Unsolder two leads from ground lug.

(6) Remove hardware.

g. Modulator Assembly (1A4A4) Disassembly. This assembly should be removed only when servicing or component replacement is required. To remove this assembly from the radio transmitter (1A4) drawer, first remove the two screws from the end brackets. On the bottom of the drawer, remove the low pass filter and then remove the six screws across the bottom of the drawer. Disconnect and tag the wires from the terminal strip located on the modulator circuit card assembly. The wires are separated by ties to facilitate reconnection. Refer to figure 6-6 for location of component to be replaced. Further disassembly should be limited to removal of parts for repair or replacement.

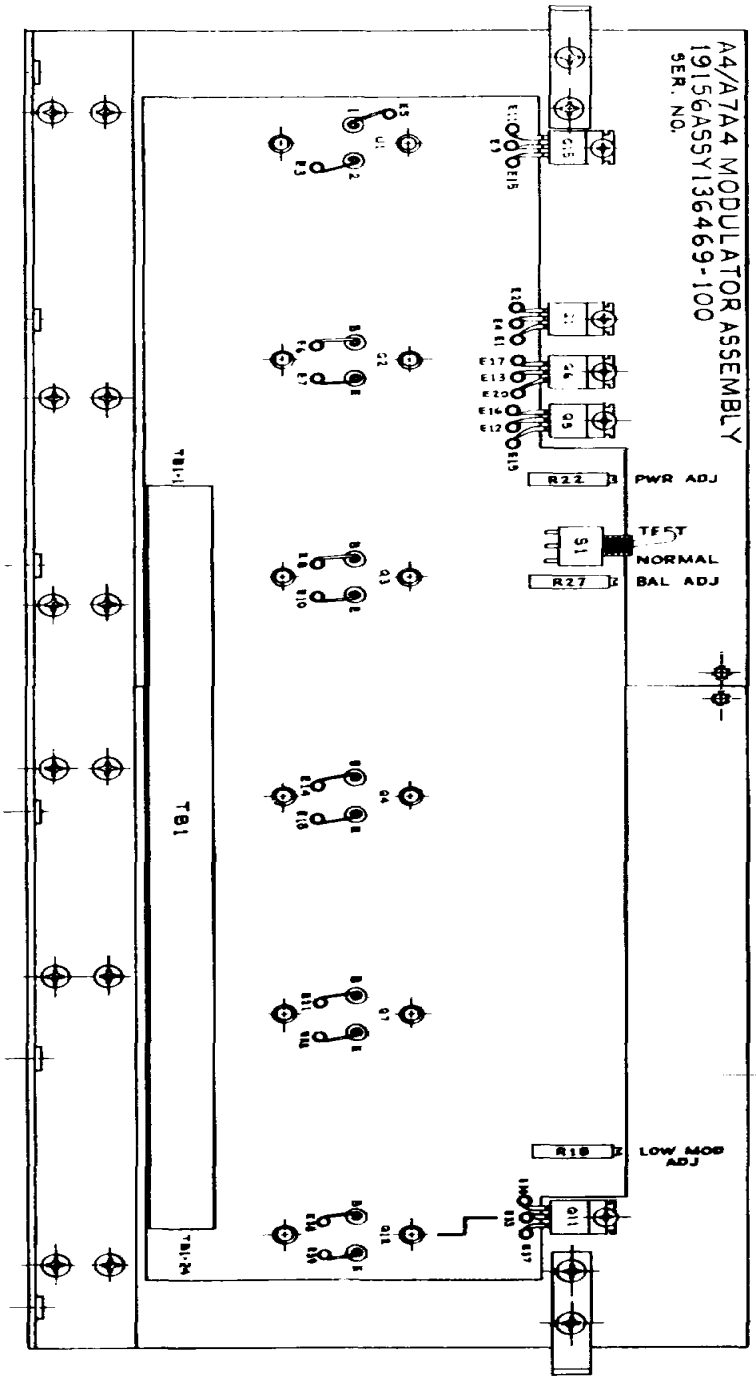


Figure 6-6. Modulator Assembly Circuit Card Assembly, 1A4A4 Parts Location Diagram

h. Modulator Circuit Card Assembly (1A4A4A1) Disassembly.

NOTE

This circuit card assembly should be removed only when it is necessary to have access to the back of the card in order to repair or replace potentiometers R22, R27, R18 or switch S1.

To remove this circuit card from modulator assembly 1A4A4, unsolder all transistor leads. There are 27 leads for the 11 transistors. On the back of the heat sync, remove the 12 screws holding transistors Q2, Q3, Q4, Q7 and 012 and regulator U1 to the heat sync. The circuit card assembly may now be removed from the modulator assembly.

To assemble the modulator circuit card assembly, feed transistor leads for 02, Q3, Q4, 07 and Q12 and regulator U1 through the heat sync. The nylon shoulder washers on the back of the heat sync may have to come off during disassembly. If so, use Eastman 9-10 glue to replace these. Feed these transistor and regulator leads up through the circuit card and resolder all connections. If necessary to remove transistors 015, 01, Q6 or Q5 for repair or replacement, use heat sync compound when replacing. Replace hardware on back of heat sync and use Loctite to ensure screws are tightly locked. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 6-7 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card place it on a piece of plastic sheeting.

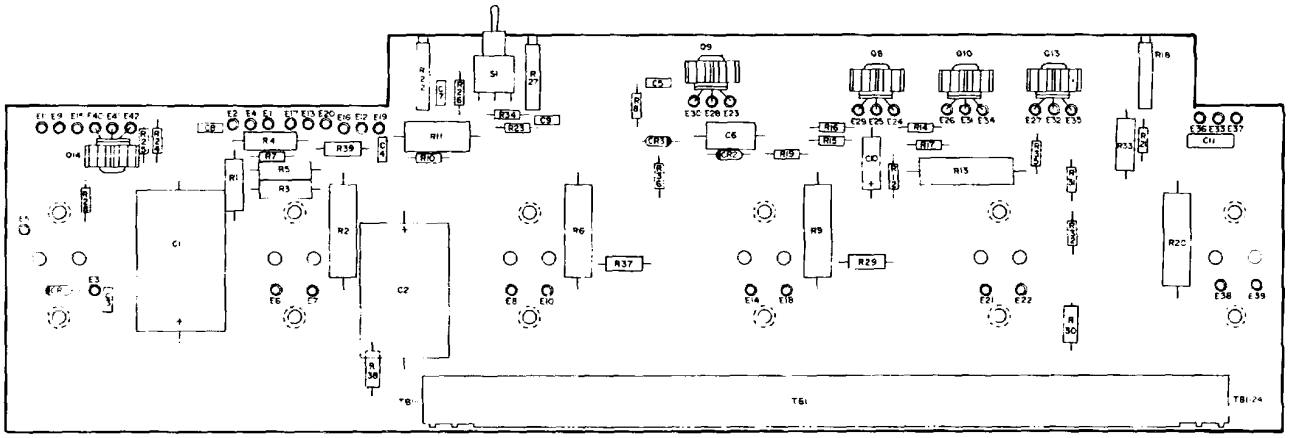


Figure 6-7. Modulator Circuit Card Assembly, 1A4A4A1 Parts Location Diagram

i. Intermediate Power Amplifier Assembly (1A4A5) Disassembly. To remove the intermediate power amplifier, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 6-8 for location of component to be replaced.

(1) Disconnect the coaxial cables from the intermediate power amplifier.

(2) Disconnect wires from El, E2 and E4.

(3) Remove two screws and washers holding the intermediate power amplifier in place.

(4) Remove the intermediate power amplifier from the radio transmitter chassis.

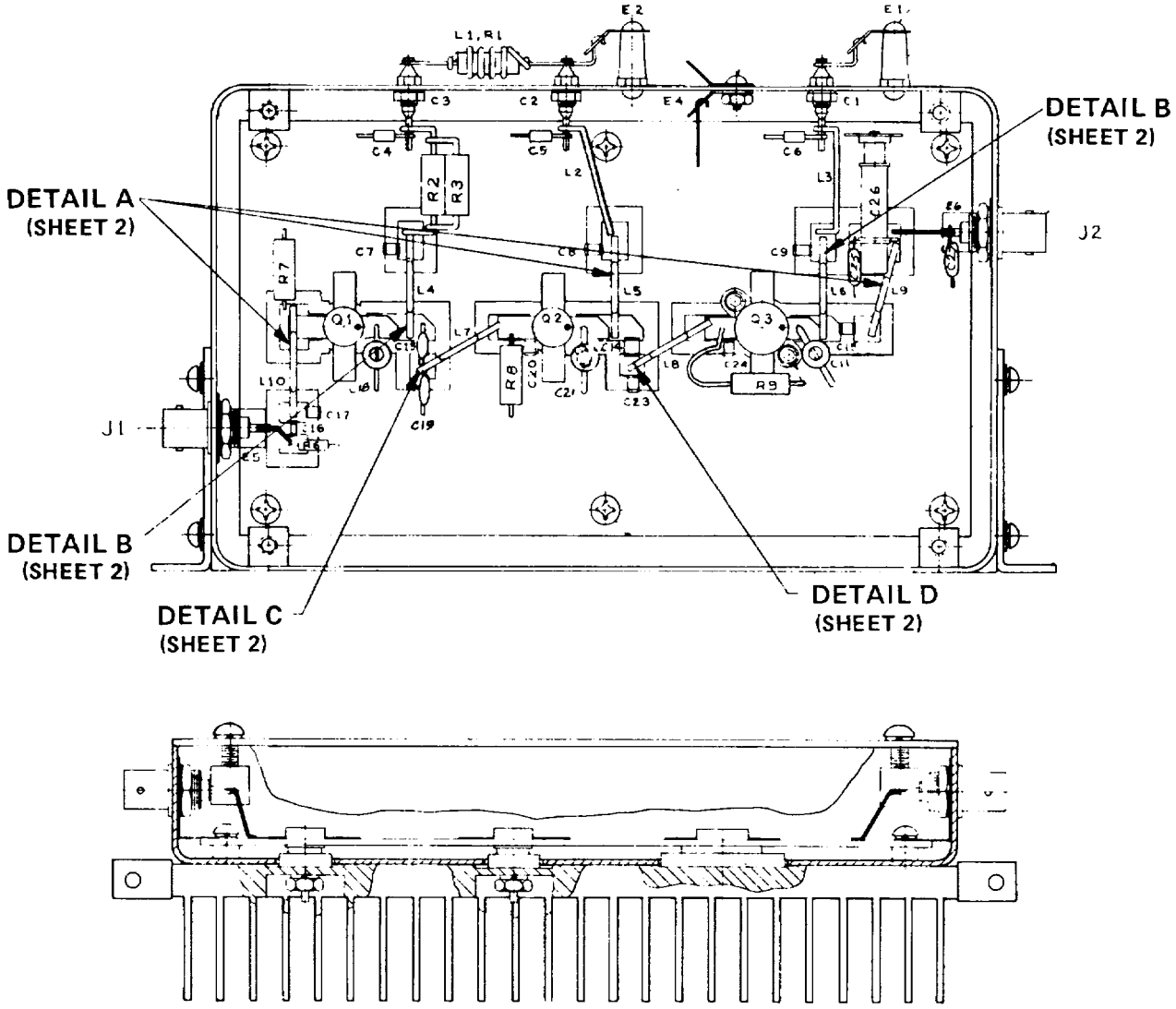


Figure 6-8. Intermediate Power Amplifier, 1A4A5 Parts Location Diagram (Sheet 1 of 2)

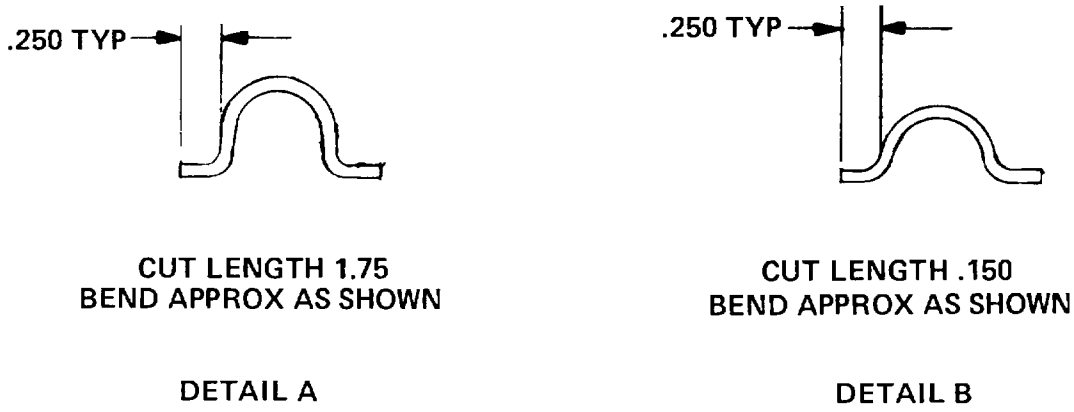


Figure 6-8. Intermediate Power Amplifier, 1A4A5 Parts Location Diagram (Sheet 2 of 2)

j. Power Amplifier Assembly (1A4ARl) Disassembly. To remove the power amplifier assembly from the radio transmitter (refer to figure 6-9), perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 6-9 for location of components to be replaced.

(1) Disconnect the coaxial cables from the top and bottom of the power amplifier (1A4AR1).

(2) Disconnect the wiring connectors (El, E2, E3, C1 and C2) from the power amplifiers.

(3) Remove two screws and washers holding the power amplifier in place.

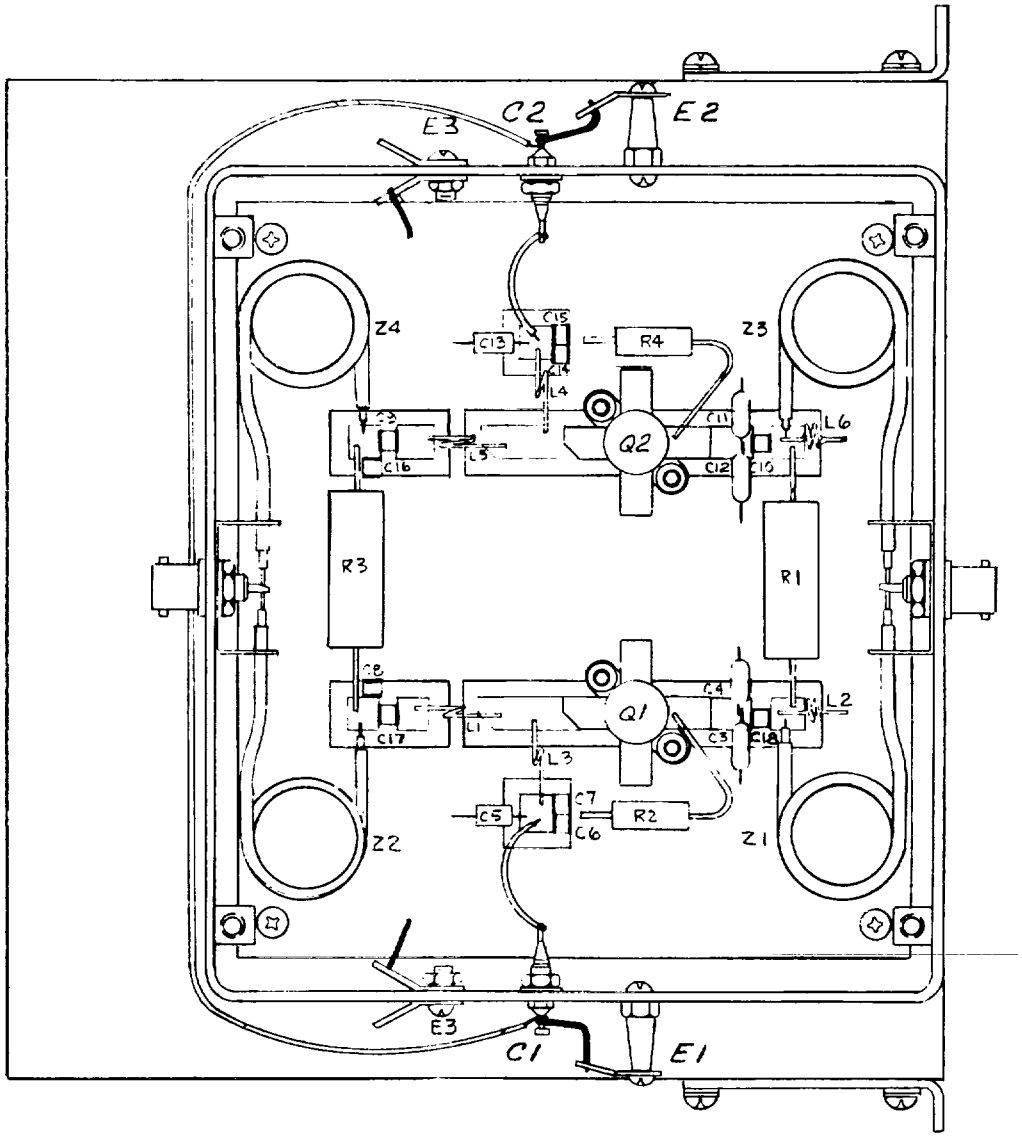


Figure 6-9. Power Amplifier Assembly, 1A4AR1 Parts Location Diagram

k. Directional Coupler (1A4DC1) Disassembly. To remove the directional coupler from the radio transmitter chassis, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 6-10 for location of components to be replaced.

(1) Remove four screws and washers holding the directional coupler (1A4DC1) in place.

(2) Disconnect coaxial cables (J 1, J2 and J3) from the directional coupler.

(3) Disconnect wiring from terminal lug (E1) and remove the directional coupler from the radio chassis.

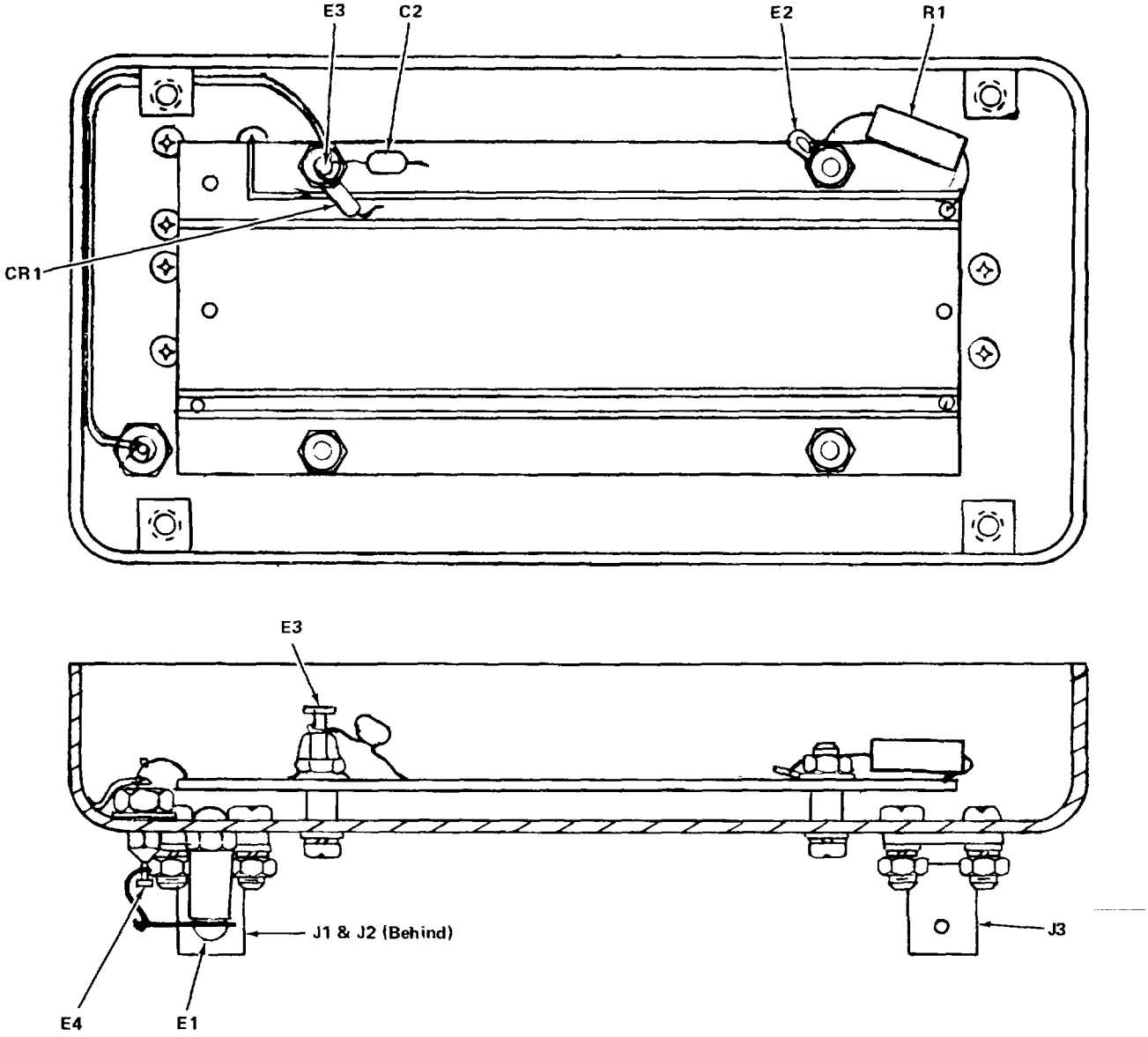


Figure 6-10. Directional Coupler, 1A4DC1 Parts Location Diagram

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1. Low Pass Filter Assembly (1A4FL1) Disassembly. To remove the low pass filter assembly from the radio transmitter chassis, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement.

(1) Disconnect the coaxial cable from the low pass filter assembly.

(2) Remove two screws and washers holding the low pass filter in place.

(3) Remove the low pass filter assembly from the radio transmitter chassis.

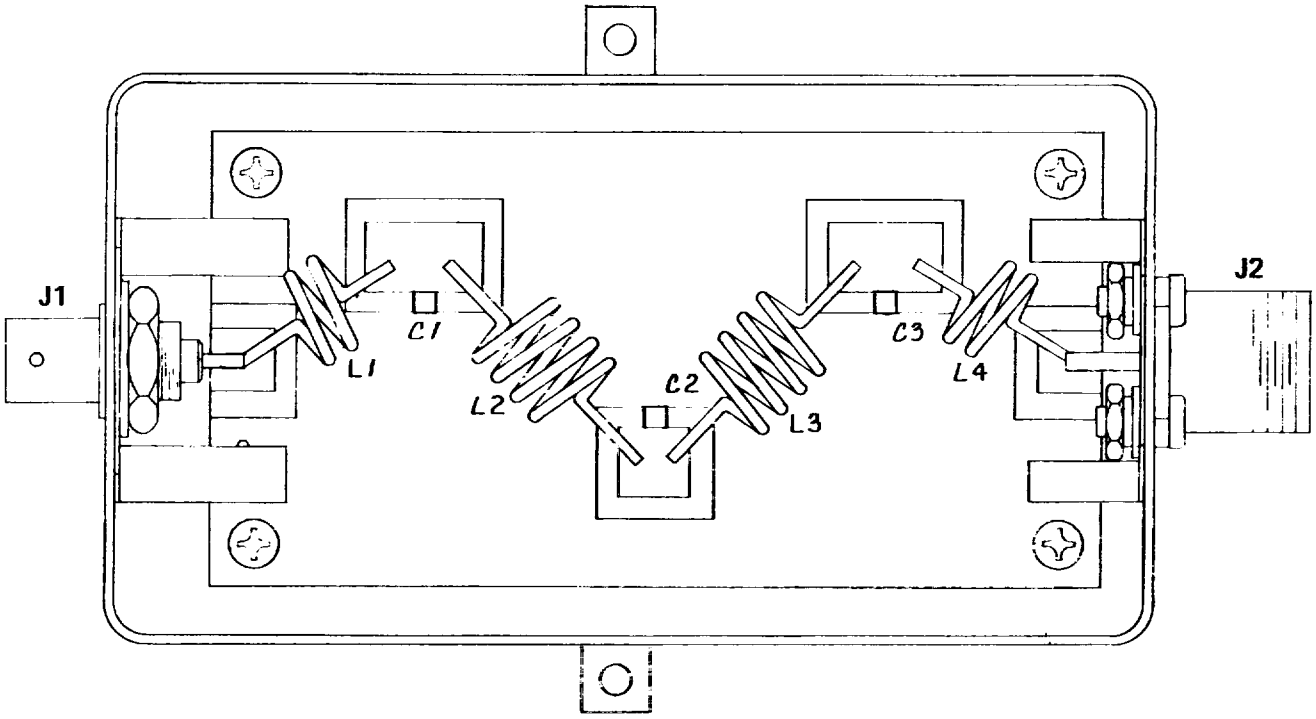


Figure 6-11. Low Pass Filter, 1A4FL1 Parts Location Diagram

m. Power Supply Assembly (1A4PS1) Disassembly. To remove the power supply from the radio transmitter, perform the following steps. Refer to figure 6-12 for location of components to be replaced.

(1) Remove the four screws and washers holding the power supply in place.

(2) Disconnect the wiring from the power supply terminals (TB1-1, TB1-2, TB1-8 and TB 1-9).

(3) Disconnect the 28-volt wiring terminals and remove the power supply f rom the radio transmitter chassis.

(4) Remove the eight top cover screws and remove cover.

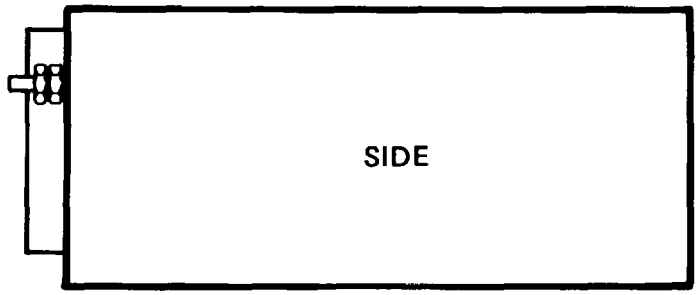
(5) Remove the two bottom cover screws holding the fan to the power supply. Remove fan and housing from chassis.

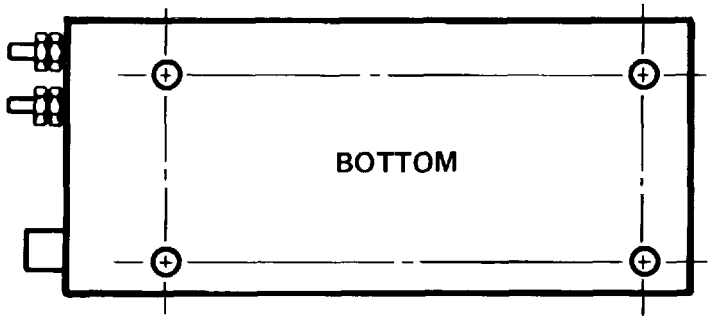
(6) Remove the five screws from the bottom cover which hold the control and power output boards to the bottom cover. Remove board spacers.

(7) To remove the control board from the power supply, unsolder wires connecting the board to the power supply. Unscrew the two brown wires from top of the power output board.

(8) To remove the power output board after unit disassembly, remove the two screws holding the two brown wires at the top end of the board as shown in figure 6-12. Remove the screws holding the transformer wires to the output filter capacitor and remove board.

(9) To remove the input filter board after top cover removal, remove the two brace nuts and the four hex screws on the circuit board. Unsolder the five wires connected to the board and remove board.


SIDE


BOTTOM

SECTION II

CLEANING AND INSPECTION

6-3. CLEANING. Clean the radio transmitter as required, following the procedures specified below. Do not clean anything which inspection does not indicate needs cleaning.

CAUTION

Do not use freon when cleaning circuit cards which contain plastic components as damage to the cards will result. Use denatured alcohol to clean these circuit cards.

a. Remove dust and loose dirt from outside surfaces with a clean, soft cloth.

WARNING

Freon fumes are toxic. Provide adequate ventilation. Do not use near a flame. Freon is not flammable, but exposure to high heat can convert fumes to a highly toxic gas.

b. Remove grease and ground-in dirt from outside surfaces with a cloth dampened (not wet) with freon.

c. Remove dust and dirt from electrical connectors with a soft-bristled brush.

WARNING

Bodily injury or equipment damage can result from cleaning with compressed air at pressures in excess of 15 pounds per square inch.

d. If repair procedures require disassembly, remove dust from exposed inner parts of assembly by loosening with a soft-bristled brush and blowing with a jet of dry air at not more than 15 pounds per square inch.

6-4. INSPECTION. After disassembly, fabrication action, repair action, or final assembly, subject the items to an in-process inspection. General inspection requirements shall be in accordance with MIL-M-45208. Adequate records of all inspections and tests shall be maintained (TM 11-5825-266-14-1, Chapter 5), as applicable. The in-process inspection should include, but not be limited to, the following criteria:

a. Mounting of Parts. Inspect parts, components, or hardware, etc., to ensure that they are assembled, mounted, and secured so as to satisfactorily accomplish their intended purpose.

b. Fabrication. Inspect finish for a smooth, continuous coating and a reasonable color match where surfaces have been touched up. Where conformal coating has been used, ensure that coating material has not covered areas purposely left unpainted or uncoated for electrical contact purposes. On circuit cards, there shall be no evidence of lifting or separation of plating from the conductor pattern or of conductors from the base laminate. There shall be no slivers or whiskers. There shall be no evidence of burns or corona discharge.

c. Threaded Parts or Devices. Inspect screws, nuts, bolts, etc., for cross-threading, detrimental or hazardous burrs, or mutilation.

d. Tightness. Inspect all screw-type fasteners for tightness. Fasteners shall be firmly secure and there shall be no relative movement possible between them and attached parts.

e. Soldering. Inspect leads to see that they are tightly crimped to terminals and that they show no signs of having been moved while soldering. Solder must show a shiny, smooth surface feathering out at the edges where it joins the surface of a terminal or conductor. In addition, solder connections shall show only enough solder to cover the joint, and shall show no indication of burns, acid, or acid salts.

NOTE

Acid or acid salts should be used only as permitted for pretinning or soldering mechanical joints. No acid or acid salts may be used near insulation. Where acid or acid salts have been used, as permitted, they shall be completely neutralized and removed.

f. Moisture/Fungus-Proofing. Conformally coated parts shall have no unbroken coating. The coating material shall not appear on areas purposely left unpainted or uncoated for electrical contact purposes.

g. Wiring. Inspect wiring for neatness and sturdiness. Wires shall be positioned to preclude or be protected from contact with rough or irregular surfaces and sharp edges. Ensure that wiring dress does not result in incorrect electrical operation. Inspect insulation for evidence of burns, abrasion, or pinch marks. There shall be no splices on wiring between terminals. Clearance between wires and parts shall be such that there is no deterioration of wiring due to heat dissipation from the parts. Clearance between bare connections and bare conductors shall be sufficient to prevent contact or arcing during operation.

SECTION III

TROUBLESHOOTING

6-5. GENERAL. System level fault isolation procedures to the unit or assembly level are provided in Chapter 3. This chapter provides fault isolation procedures to the module and circuit level for the radio transmitter.

6-6. FAULT ISOLATION. To utilize the troubleshooting charts in this section, it is first necessary to identify the chart which corresponds to the observed failure reflected by the equipment. The step-by-step procedures contained in the troubleshooting charts (figures 6-13, 6-14, 6-15, 6-16, 6-17 and 6-18) provide fault isolation to the module level and circuit level. These charts provide the means to fault isolate to the suspected circuit group. Isolation down to the part level is accomplished using schematics and circuit theory provided in TM 11 5825-266-14-1 and -2 and standard troubleshooting practices.

NOTE

Ensure that all internal wiring is good before assuming a circuit card to be defective. Verify that all inputs to the circuit card assembly have been properly checked.

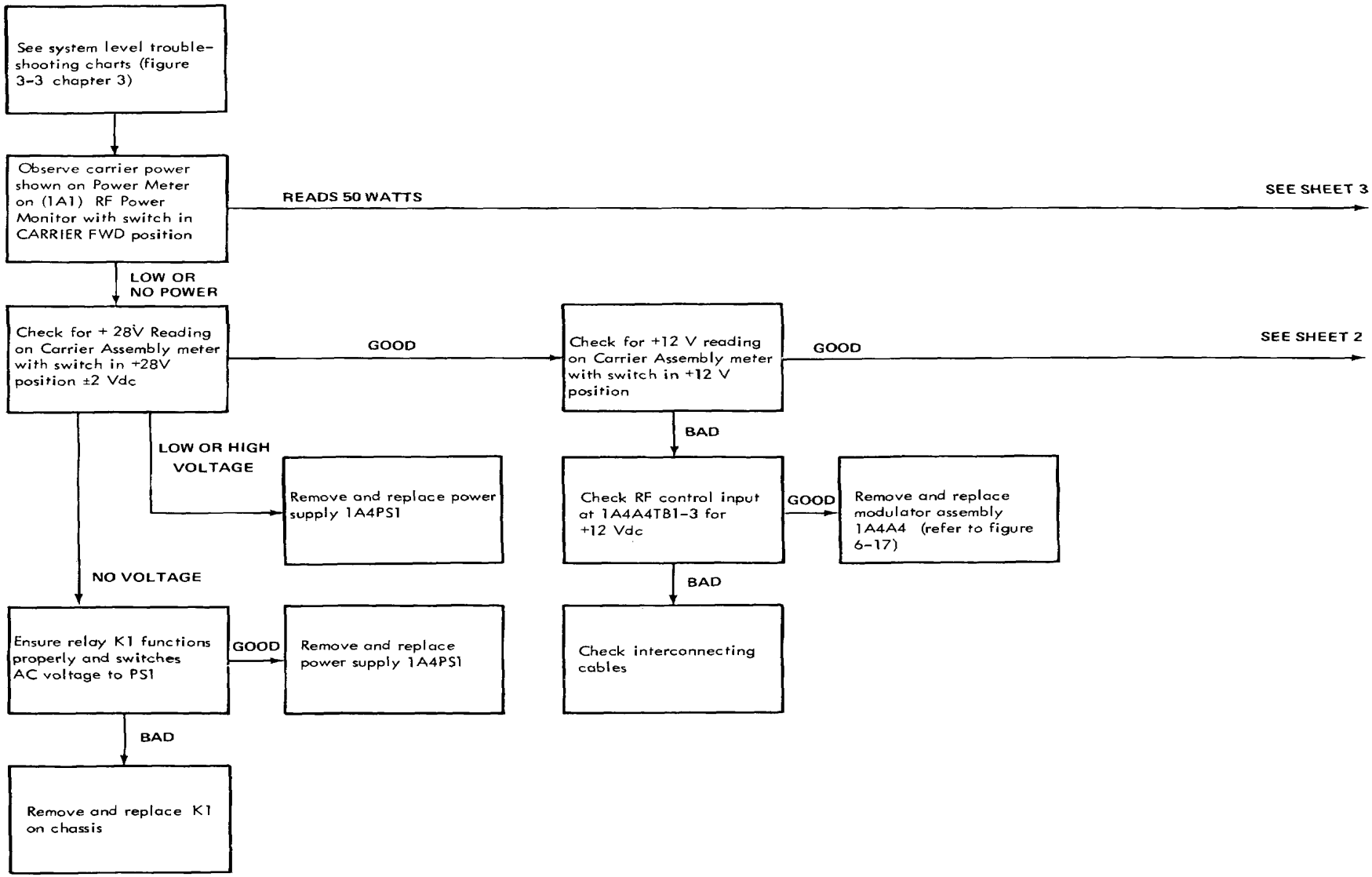


Figure 6-13. Radio Transmitter Troubleshooting Chart to Modules Level (Sheet 1 of 3)

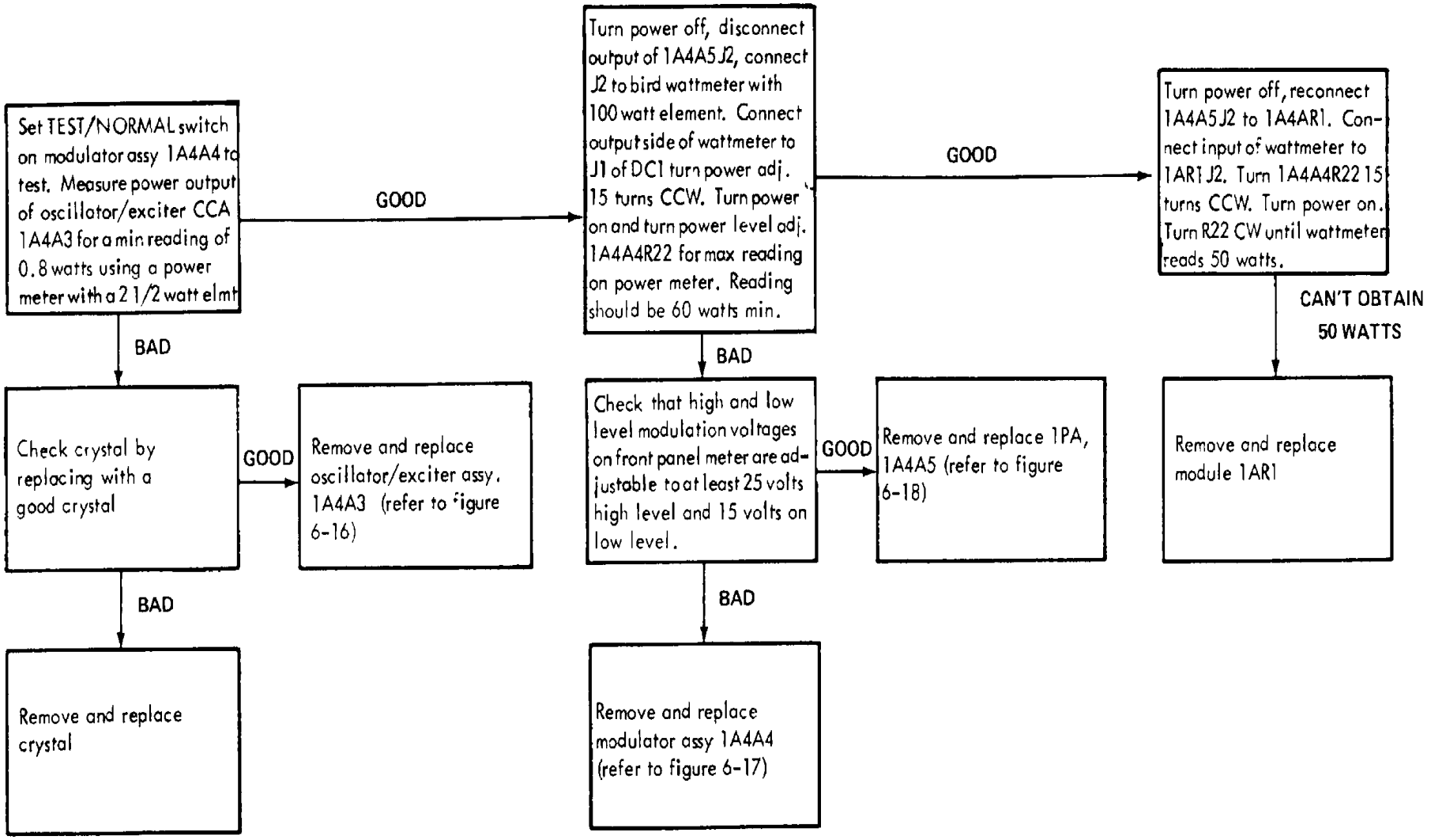


Figure 6-13. Radio Transmitter Troubleshooting Chart to Module Level (Sheet 2 of 3)

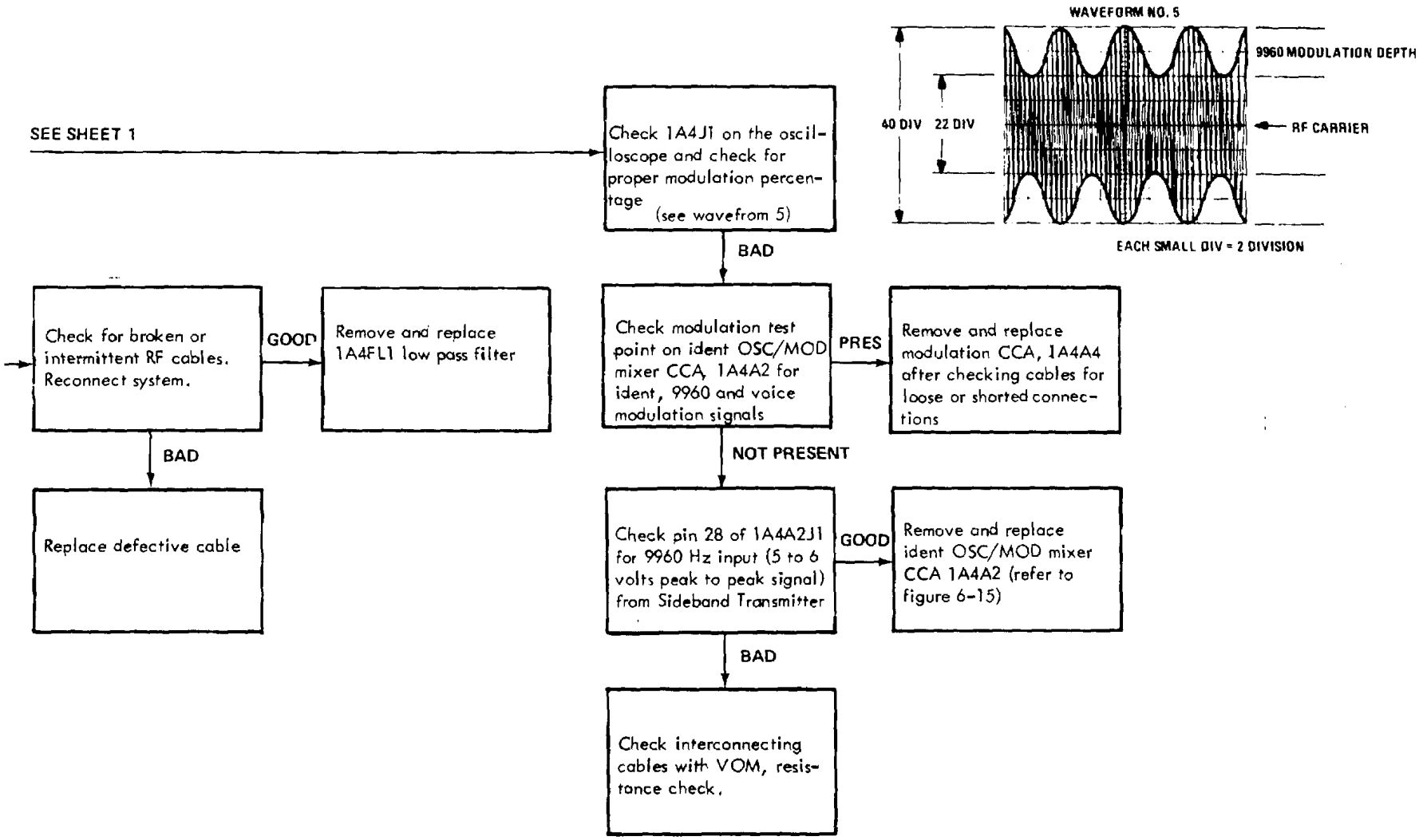


Figure 6-13. Radio Transmitter Troubleshooting Chart to Module Level (sheet 3 of 3)

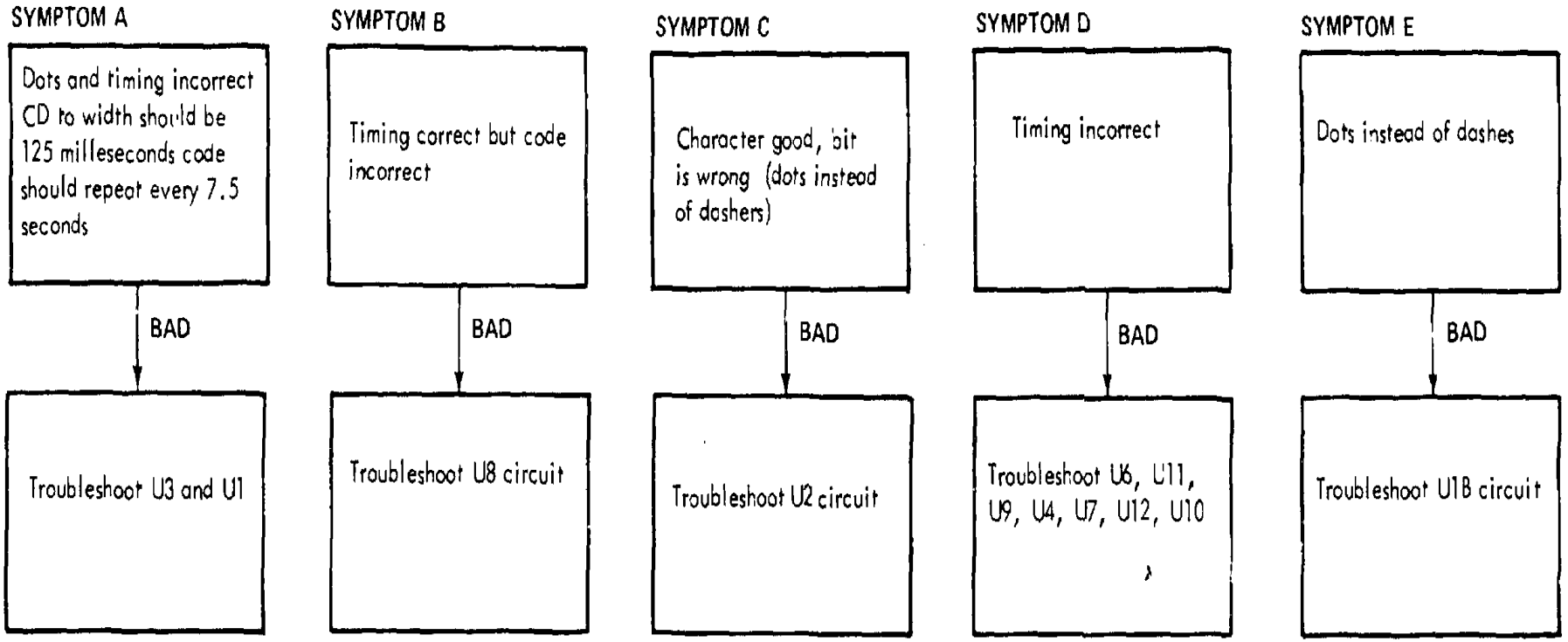


Figure 6-14. Ident Circuit Card Assembly, 1A4A1, Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

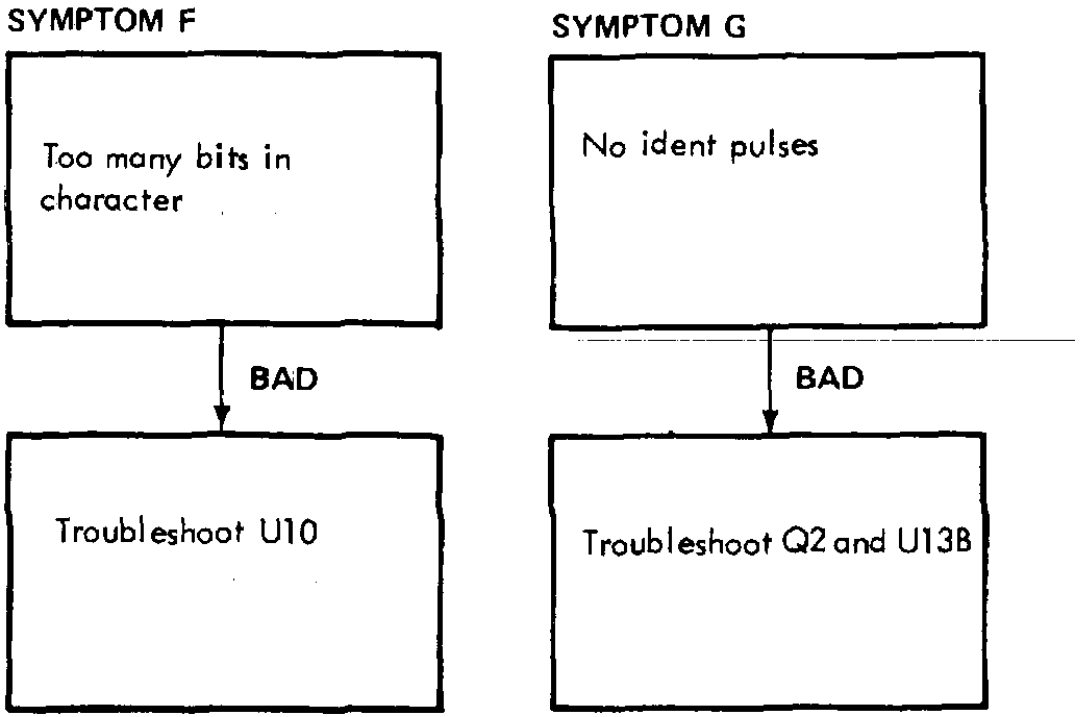


Figure 6-14. Ident Circuit Card Assembly, 1A4A1, Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

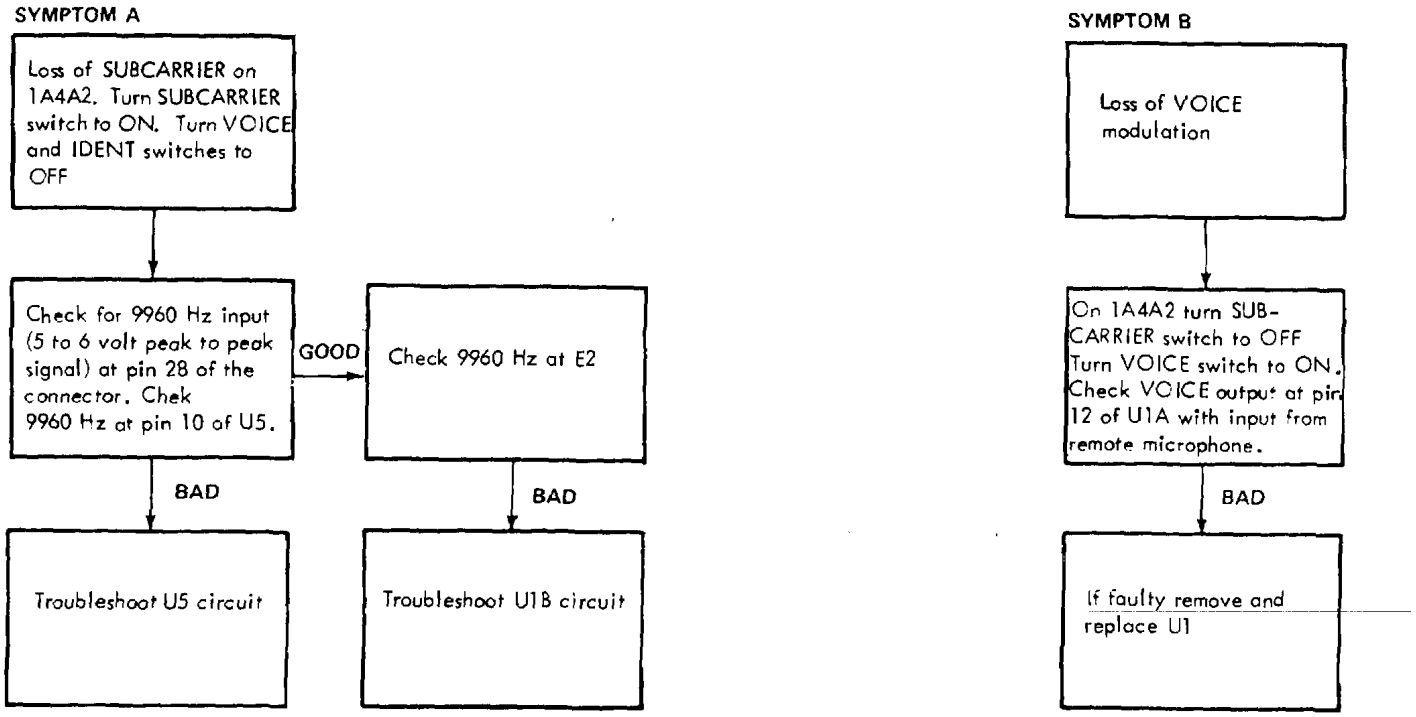


Figure 6-15. Ident Osc./Mod. Mixer Circuit Card Assembly, 1A4A2, Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

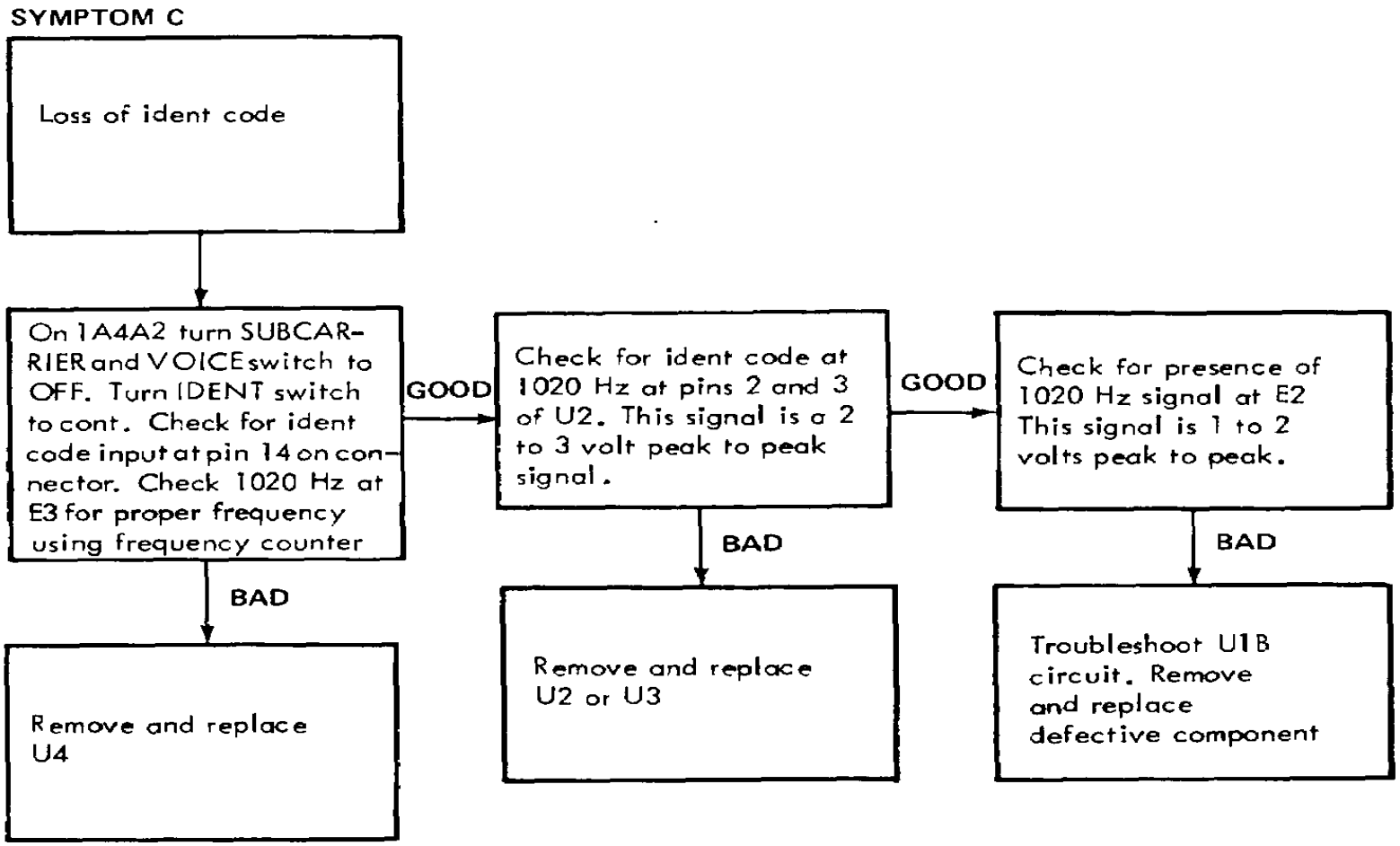


Figure 6-15. Ident Osc./Mod. Mixer Circuit Card Assembly, 1A4A2, Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

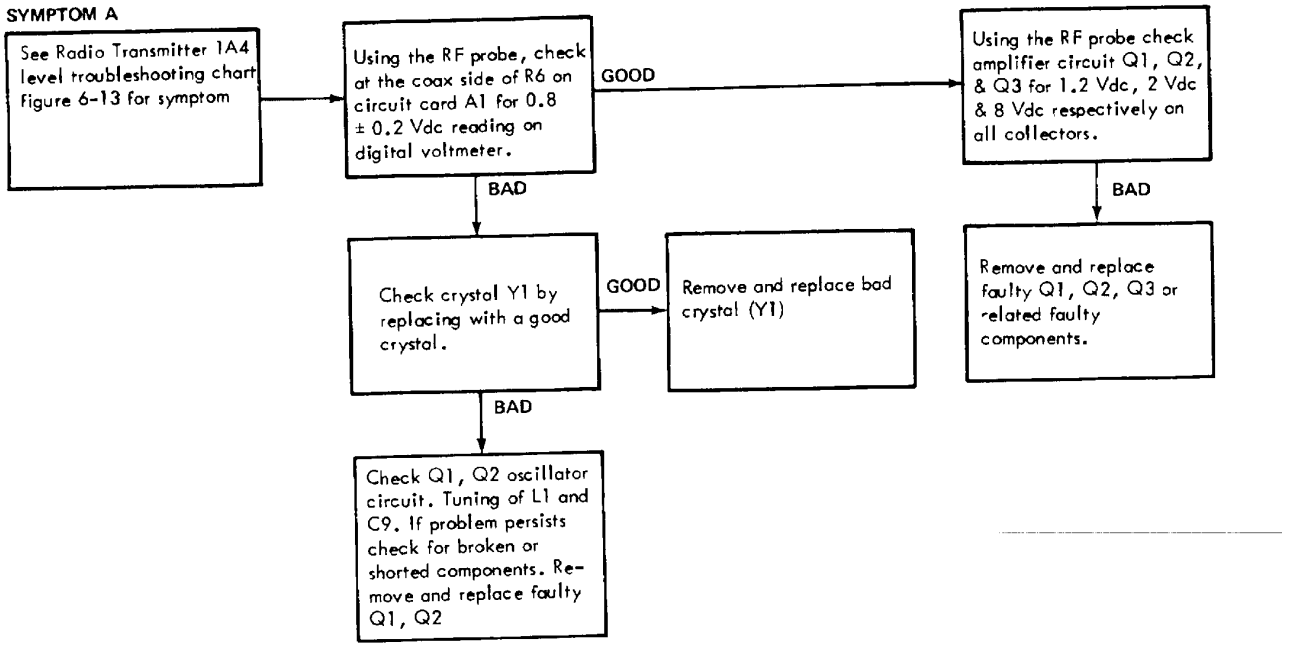


Figure 6-16. Oscillator/Exciter Circuit Card Assembly, 1A4A3, Troubleshooting Chart to the Circuit Level

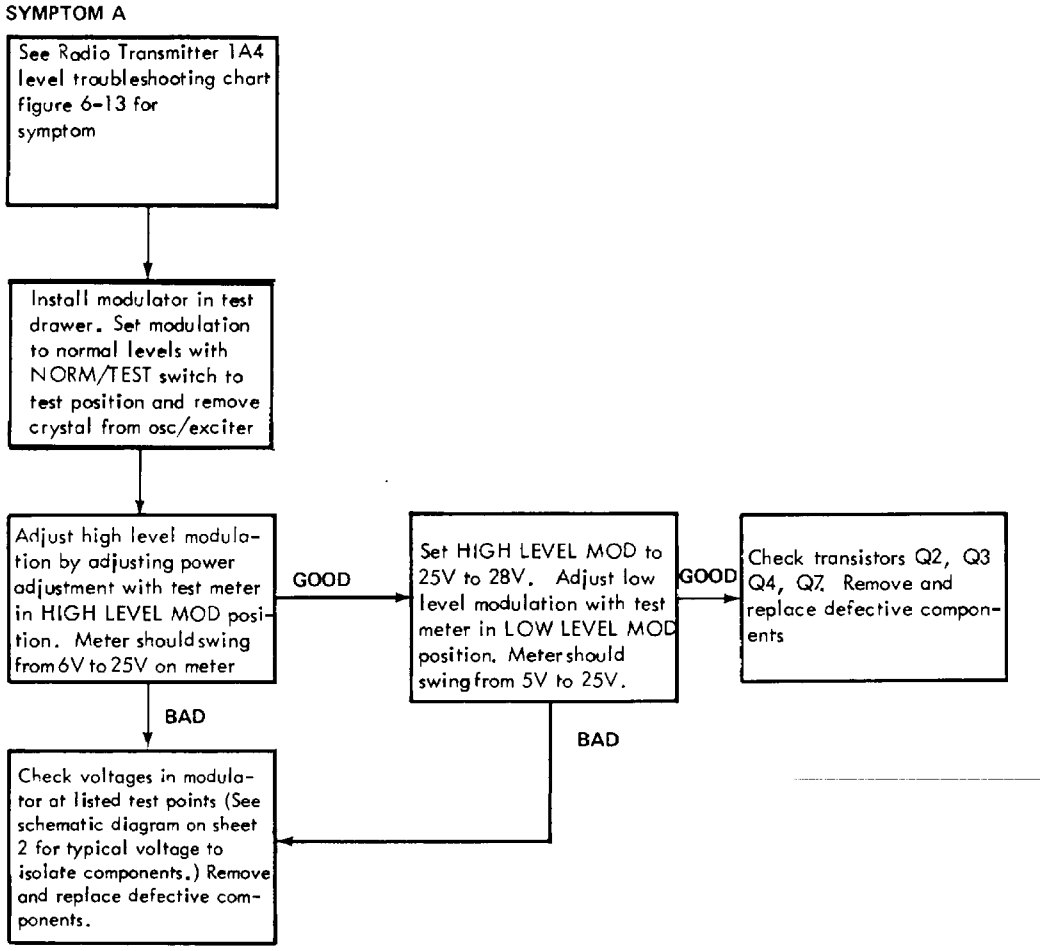
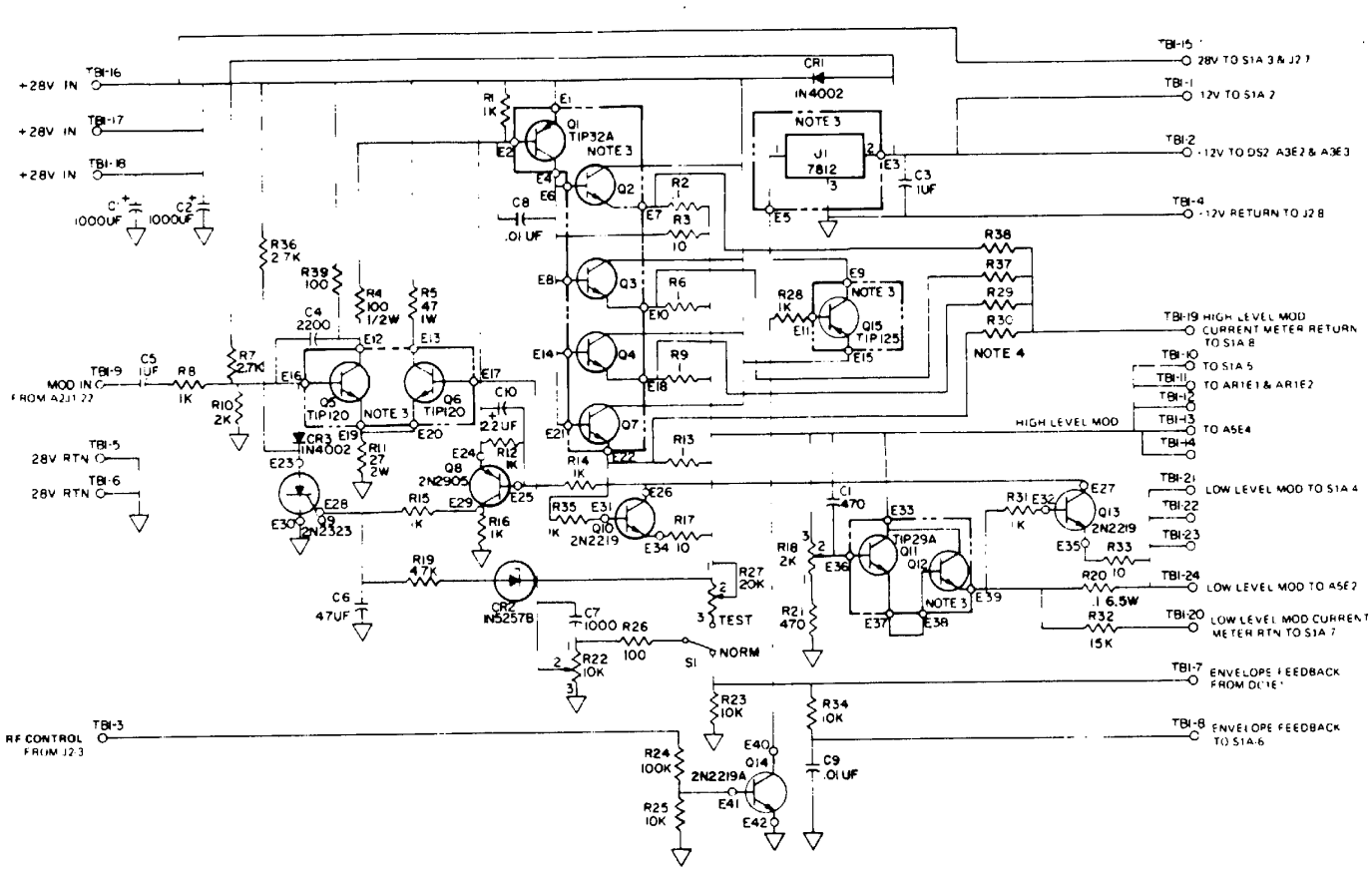


Figure 6-17. Modulator Assembly, 1A4A4, Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)



TEST POINT	VOLTAGE	TEST POINT	VOLTAGE	TEST POINT	VOLTAGE
E1	26.9	E16	5.5	E31	17.9
E2	29.0	E17	5.6	E32	24.6
E4	18.6	E18	17.5	E33	17.5
E7	17.5	E19	4.6	E34	17.5
E9	29.2	E20	4.6	E35	24.4
E10	17.5	E22	17.5	E36	14.4
E11	28.5	E24	29.7	E38	13.8
E12	28.8	E25	99.7	E39	13.1
E13	22.1	E26	20.7	E40	0.5
E15	29.9	E27	29.9	E41	19.3

Figure 6-17. Modulator Assembly, 1A4A4, Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

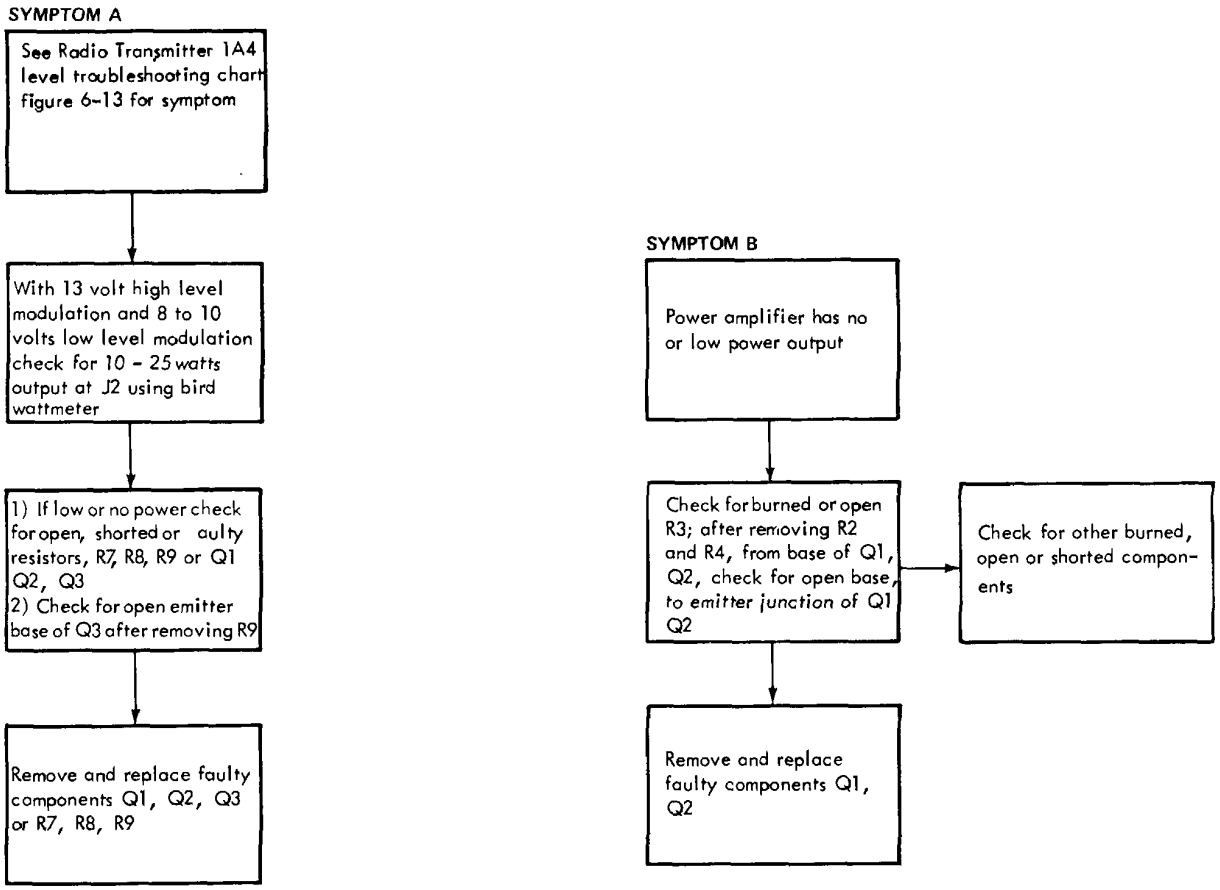


Figure 6-18. Intermediate Power Amplifier Assembly, 1A4A5 and Power Amplifier Assembly 1A4AR1 Troubleshooting Chart to the Circuit Level

SECTION IV

REPAIR

6-7. INTRODUCTION. The following paragraphs contain repair procedures for the radio transmitter and connectors. The repair procedures for the radio transmitter are supported by tables containing cable requirements and lists of material needed to make each completely serviceable as applicable.

6-8. CONNECTOR AND WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair connectors and wiring harness damage. A list of all connectors by reference designation with a cross reference to the hand tools used for repair is provided in table 6-1. A wiring list showing point-to-point connections, wire type and size is provided in table 6-2A. Table 6-2B contains a list of materials.

6-9. SPECIAL REPAIR INSTRUCTIONS. See paragraph 3-30 for repair procedures for semiconductors and microcircuits.

Table 6-1. Cable Requirements for Radio Transmitter

Ref Desig	Part Number	Function	End 1 (From)	Components	End 2 (To)	Length
1A4W1	136498-103	From 1A4A3J1 To 1A4A5J1	Connector, BNC P/N 910694-001	Connector, BNC Cable	Connector, BNC P/N 910694-001	11" 2.36cm
1A4W2	136497-103	Not Used				
1A4W3	136498-104	Not Used				
1A4W4	136499-100	Not Used				
1A4W5	136497-101	Not Used				
1A4W6	136497-102	Not Used				
1A4W7	136498-101	Not Used				
1A4W8	136499-101	From 1A4A7J1 To Carrier Phase Reference	Connector, BNC Right Angle Crimp P/N 910694-001	RG-188/U Coaxial Cable	Connector, Female Jack, BNC P/N 006107	8" (20.32cm)
1A4W9	136498-102	From 1A4DC1J3 To 1A4FL1J1	Connector, BNC Right Angle Crimp P/N 910694-001	RG-188/U Coaxial Cable	Connector, BNC Right Angle Crimp P/N 910694-001	8" (20.32cm)

Table 6-1. Cable Requirements for Radio Transmitter (Contd)

Ref Desig	Part Number	Function	End 1 (From)	Components	End 2 (To)	Length
1A4W10	136498-105	From 1A4A5J2 To 1A4AR1 J1	Connector, BNC Right Angle Crimp P/N 910694-001	RG-188/U Coaxial Cable	Connector, BNC Right Angle Crimp P/N 910694-001	12" (30.48cm)
1A4W11	136498-106	From 1A4AR1J2 To 1A4DC1 J1	Connector, BNC Right Angle Crimp P/N 910694-001	RG-188/U Coaxial Cable	Connector, BNC Right Angle Crimp P/N 910694-001	15" (38cm)

Table 6-2. Radio Transmitter Connector Maintenance Tool List Matrix

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A4J2	Crimp	910163-002	910195-001 910195-002	22-20	M8ND	N20RT-29	910923
1A4J3	Crimp	910163-001	910195-001	22-20	M8ND	N20RT-29	910923
1A4W1P1	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4W1P2	Solder	910694-001	N/A	N/A	N/A	N/A	N/A
1A4W8P1	Solder	910694-001	N/A	N/A	N/A	N/A	N/A
1A4W8P2	Solder	006107	N/A	N/A	N/A	N/A	N/A
1A4W9P1	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4W9P2	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4WlOP1	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4W1OP2	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4W11P1	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4W1P2	Crimp	910694-001	N/A	N/A	227-1221-09	N/A	N/A
1A4XA1	Solder	910140-003	N/A	N/A	N/A	N/A	N/A
1A4XA2	IA4XA2	910140-003	N/A	N/A	N/A	N/A	N/A

Table 6-3A. Radio Transmitter Wiring List

Note: Point-to point wire connections are listed in Table 6-3A in a list 0f material tom be used in conjunction with Table 6-3A is provide in Table 6-3B

WIRE No.	MAKE FROM ITEM NO.	APPROX LEGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCEESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	1		J2-1	19,22	XA2-28		
1S	2		J2-2	19	FLOAT		
2	3		J2-3	19	A4TB1-3	21	
3	4		J2-4	19	XA1-2		
4	1		J2-5	19,22	XA2-15		
4S	2		J2-2		FLOAT		INSTAL WITH WIRE #1S IN ITEM #19
5	5		J2-6	19	BS-4		
6	1		J2-11	19,22	XA2-24		
6S	2		J2-10	19	FLOAT		
7	6		J2-12	19	XA1-16		
8							
9							
10	2		J3-3	19	E1		
11	6		19	19	K1-7		
12	9		J3-5	19	S2-3		
13	10		J3-6	19	S2 WIPER (2)		

Table 6-3A. Radio Transmitter Wiring List (Contd)

WIRE No.	MAKE FROM ITEM NO.	APPROX LEGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCEESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
14	10		S2 WIPER (2)		DS1-2		
15	10		XA2-1		DS1-2		
16	6		K1-1		DS-1		
17	11		BS-1		S1A-1		
18	5		BS-4		S1A-2		
19	12		A4TBI-15	21	S1A-3		
20	13		A4TBI-21	21	S1A-4		
21	9		A4TBI-10	21	S1A-5		
22	3		A4TBI-8	21	S1A-6		
23	10		A4TBI-20	21	S1A-7		
24	9		A4TBI-19	21	S1A-8		
25	11		SIA-C		M1 (+)		
26	2		SIB-C		M1 (-)		
27	11		XA2-1		BS1		
29	5		XA1-12		BS4		

Table 6-3A. Radio Transmitter Wiring List (Contd)

WIRE No.	MAKE FROM ITEM NO.	APPROX LEGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCEESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
30	5		XA2-12		BS5		
31	12		XA2-11		A4TBI-15	21	
32	1		XA2-22		A4TBI-9	22,21	
32S	2		XA2-29		FLOAT		
33	1		A4TBI-7	22,21	DCI-E1		
33S	2		BSI		FLOAT		
34	11		BSI		AR2-E3		
35	1		A4TBI-12	22,21	AR2-E1	20	
35S	2		BSI		FLOAT		
36	11		BS2		AR1-E3		
37	1		A4TBI-11	22,21	ARI-E2	20	
37S	2		BS2		FLOAT		
38	11		BS-2		A3-E4		
39	12		A4TBI-16	21	A3-E1	20	
40	5		BS-5		A3-E3	20	
41	11		BS-2		A5-E1		

Table 6-3A. Radio Transmitter Wiring List (Contd)

WIRE No.	MAKE FROM ITEM NO.	APPROX LEGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCEESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
42	1		A4TBI-24	21,22	A5-E2	20	
42S	2		BS3		FLOAT		
43	1		A4TBI-13	22, 21	A5-E4		
43S	2		BS3		FLOAT		
44	11		DS2-1		BS3		
45	5		DS2-2		BS5		
46	14		A4TBI-16	21	PSI-POS		
47	14		A4TBI-17	21	PSI-POS	} 27	Combine 3 Wires on lug
48	14		A4TBI-18	21	PSI-POS		
49	15		A4TBI-4	21	PSI-NEG		
50	15		A4TBI-5	23	PSI-NEG	} 27	Combine 3 Wires on lug
51	15		A4TBI-6	21	PSI-NEG		
52			BS-2		A3-E4		
53			A4TBI-16	21	A3-E1	20	
54	3		S2 WIPER (1)		K1-2	20	
55	11		S2-7		BS3		

Table 6-3A. Radio Transmitter Wiring List (Contd)

WIRE No.	MAKE FROM ITEM NO.	APPROX LEGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCEESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
56	11		A4TB1-6	21	BS3	17	
57	5		A4TB1-1	21	BS5	18	
58	11		A4TB1-4	21	BS1	17	
59	11		A4TB1-5		BS2	17	Installed in same
60	5		A4TB1-1	21	BS4	18	Lug as wire #50
61	25		A4TB1-17	23	J2-7	24	
62	26		A4TB1-5	23	J2-8	24	

NOTE: Table 6-3A is comprised of the radio transmitter wire list and the radio transmitter harness wire list. For ease of reference, the radio transmitter wire list is numbered separately.

Table 6-3A. Radio Transmitter Wiring List (Contd)

WIRE No.	MAKE FROM ITEM NO.	APPROX LEGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCEESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	67		S1A-5	68	S1B-8		
2	67		S1A-6	68	S1B-7		
3	67		S1B-1	68	S1A-1		
4	67		S1B-2		S1B-3		
5	67		S1B-3		S1B-4		
6	67		S1B-4		S1B-5		
7	67		S1B-5		S1B-6		
8	67		XA1-14	68	XA2-14		
9	67		XA1-29	68	XA2-29		
10	67		XA2-29	68	XA2-29		
11	67		S2-1	68	XA2-1		
12	67		S2-6	68	S2-7		
13	67		XA1-1		E2		
14	67		XA1-29		E3		
15	67		XA2-1		E2		
16	67		XA2-29		E3		
17	67		XA2-29		E4		

Table 6-2A. Radio Transmitter Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
18W	90		J3-1	89	K1-6		
18R	90		J3-2	89	K1-3		
18S	90				E5	91,92	
19W	90		K1-1		PS1-9	88	
19R	90		K1-8		PS1-8	88	
19S	90		E5	91,92			

Table 6-3B. Materials List

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	1	Wire, 1 Condition Shield AWG, 22	MIL-W-16878/4
AR	2	Wire, AWG 22 Black	MIL-W-16878/4
AR	3	Wire, AWG 22 W/Brown	MIL-W-16878/4
AR	4	Wire, AWG 22 W/Violet	MIL-W-16878/4
AR	5	Wire, AWG 22 Brown	MIL-W-16878/4
AR	6	Wire, AWG 22 W/Black	MIL-W-16878/4
AR	7	Wire, AWG 22 Red	MIL-W-16878/4
AR	8	Wire, AWG 22 W/Red	MIL-W-16878/4
AR	9	Wire, AWG 22 W/Blue	MIL-W-16878/4
AR	10	Wire, AWG 22 W/Orange	MIL-W-16878/4
AR	11	Wire, AWG 22 Green	MIL-W-16878/4
AR	12	Wire, AWG 22 Blue	MIL-W-16878/4
AR	13	Wire, AWG 22 W/Green	MIL-W-16878/4
AR	14	Wire, AWG 18 Blue	MIL-W-16878/4
AR	15	Wire, AWG 18 Green	MIL-W-16878/4
X	16	Wire List	136380-250
3	17	Wire Cap	MS25274-4
2	18	Wire Cap	MS25274-3
14	19	Connector Pin	910195-001
7	20	Terminal Lug	910283-010
24	21	Terminal Lug	910283-001
8	22	Solder Sleeve	003700-2
3	23	Terminal Lug	910283-4
2	24	Connector Pin	910195-002
AR	25	Wire AWG 16 Blue	MIL-W-16878/14
AR	26	Wire AWG 16 Green .	MIL-W-16878/14
2	27	Solder Lug	005363-01
AR	67	Wire AWG 20 Solid	QQ-W-343 Type S
AR	84	Wire AWG 12 Black	MIL-W-16878/4
	90	Wire AWG 18 9-2-9 Shld. Pair	MIL-W-16878/4
	92	Wire AWG 22 Black	MIL-W-16878/4

SECTION V

ASSEMBLY

6-11. GENERAL. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

6-12. ASSEMBLY PROCEDURES. Assembly of the radio transmitter is essentially the reverse of disassembly. Except for the thermal compound required for transistors on circuit cards within the radio transmitter, no special assembly instructions are required.

6-13. TESTING. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 5 of TM 11-5825-266-14-1.

6-14. REFINISHING, PAINTING AND MARKING. Refer to applicable cleaning and refinishing practices specified in TB 43-0118, Field Instructions for Painting and Preserving Electronics Command Equipment. Remove rust or corrosion from metal surfaces by lightly sanding them with No. 000 sandpaper. Apply two thin coats of paint (Finish No. P513E, per MIL-F-14072) on exposed metal areas to prevent further corrosion. Apply paint to only those areas which have been previously painted. Refer to SB 11-573, Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment, and AR 746-5, Color and Marking of Army Material.

CHAPTER 7

SIDEBAND TRANSMITTER T-1395/FRN-41

MAINTENANCE, OVERHAUL AND REPAIR

SECTION I

DISASSEMBLY

7-1. GENERAL. This chapter details disassembly, inspection, troubleshooting repair and assembly procedures necessary to restore the Sideband Transmitter T-1395/FRN-41 assembly and subassemblies contained therein to satisfactory operating condition after a failure or maintenance action. The text is supplemental with appropriate illustrations necessary to describe the required disassembly, repair and reassembly procedures. Do not disassemble the sideband transmitter assembly more than is necessary for repairs.

7-2. SIDEBAND TRANSMITTER DISASSEMBLY PROCEDURES. If the sideband transmitter has not been removed from the electrical equipment cabinet, remove in accordance with the instructions provided in Chapter 3, Section V. Individual instructions for each subassembly and chassis-mounted components are provided in the following paragraphs.

a. Front Panel, Meter Panel and Chassis-Mounted Components Disassembly. (See figure 7-1.) The following disassembly procedure should be followed when removing components for repair or replacement.

(1) To disassemble any one of the front panel or meter panel components locate the particular item on sheet 2 of figure 7-1 and disassemble in accordance with the applicable exploded view shown on the following sheets of figure 7-1.

(2) To disassemble any one of the chassis-mounted components identify the component on sheet 1 of figure 5-1 and disassemble per the following instructions.

(a) Connectors 1A5J1, 1A5J2, 1A5J3, 1A5J4 and 1A5J5. Disassemble by pushing on the side locks on the underside of each connector and lift out. Use proper extractor tool to remove wire connections. (See detail H.)

(b) Relay K 1. Move holding wire, carefully snap-out relay.

(c) Transistor U1. Remove the two screws, nuts and washers on the underside of the chassis.

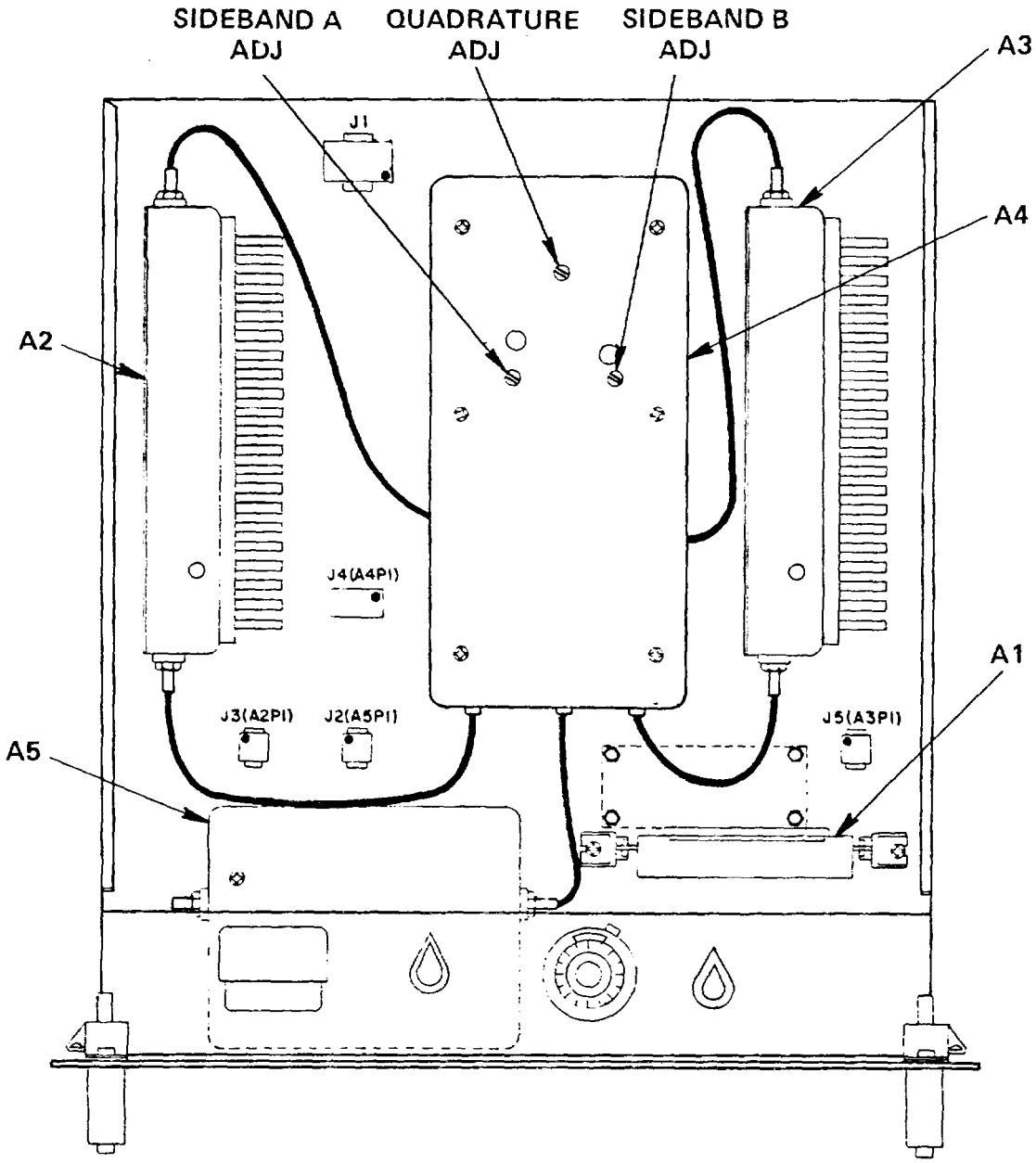


Figure 7-1. Sideband Transmitter Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 1 of 3)

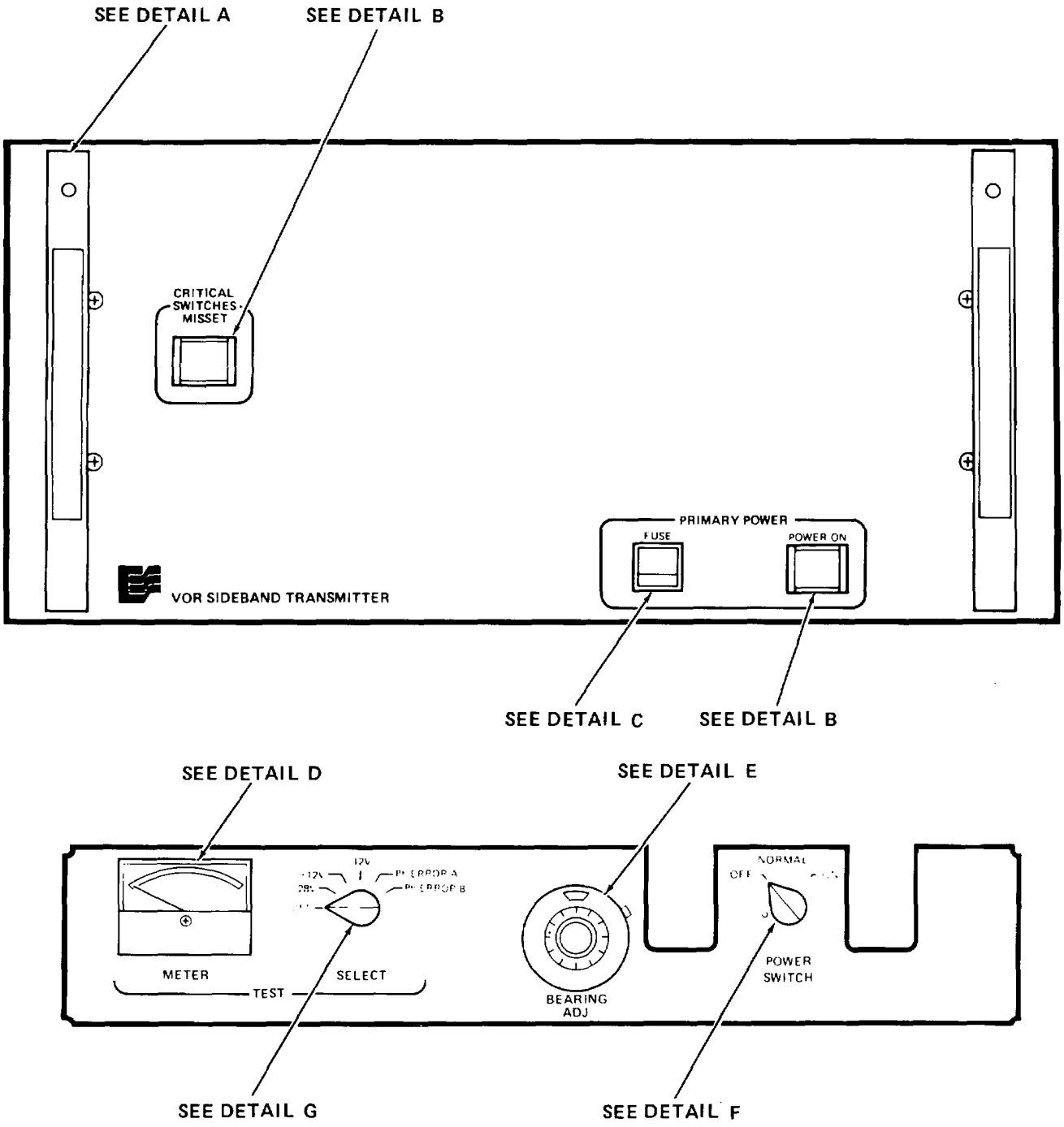
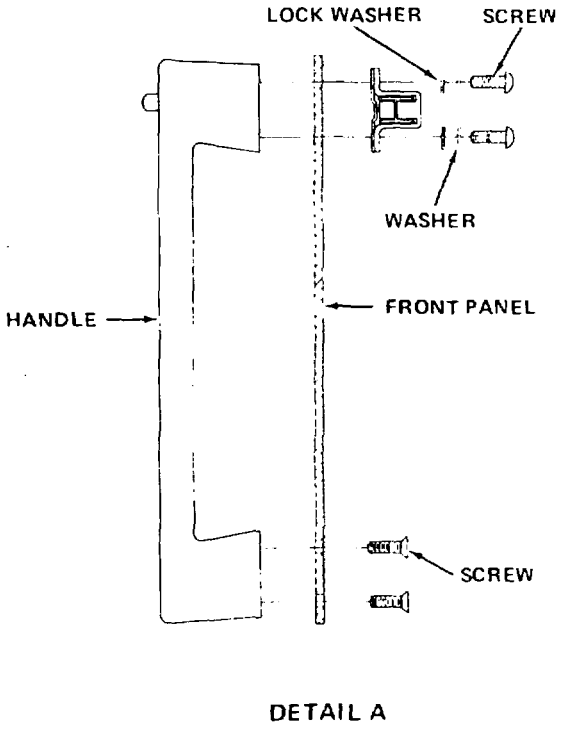
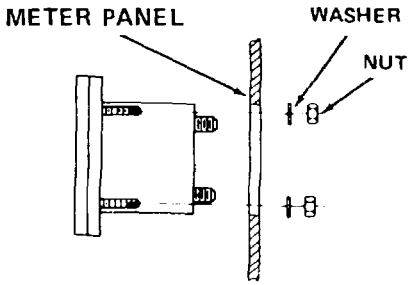


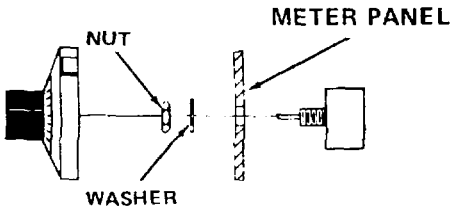
Figure 7-1. Sideband Transmitter Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 2 of 3)



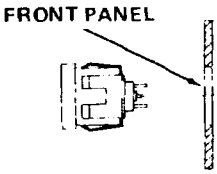
DETAIL A



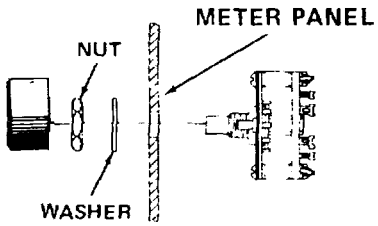
DETAIL D



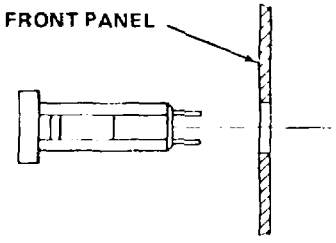
DETAIL E



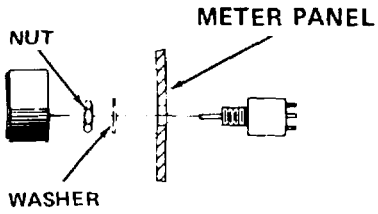
DETAIL B



DETAIL F

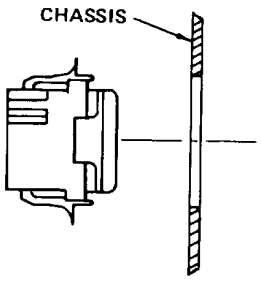


DETAIL C



DETAIL G

Figure 7-1. Sideband Transmitter Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 3 of 3)



DETAIL H

b. Reference and Subcarrier Generator Circuit Card Assembly (1A5A1) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-2 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area whil carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

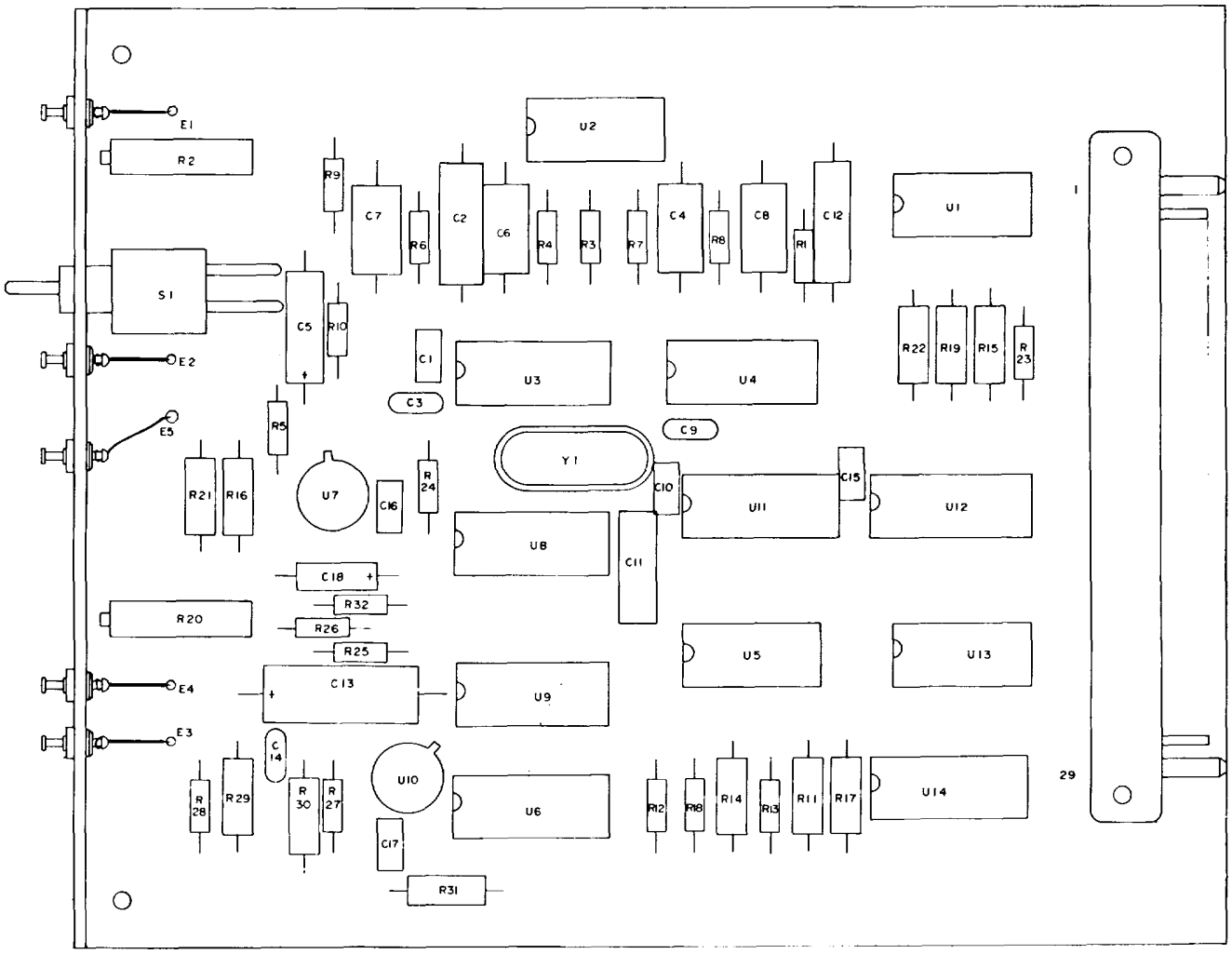


Figure 7-2. Reference andSubcarrier Circuit Card Assembly, 1A5A1 Parts Location Diagram

c. RF Amplifier Assembly (1A5A2 and 1A5A3) Disassembly. To remove the RF amplifier assemblies, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-3 for location of parts to be replaced.

(1) Disconnect the coaxial cables from the RF amplifiers.

(2) Disconnect multi-connector plug from chassis jack.

(3) Remove the RF amplifiers from the chassis.

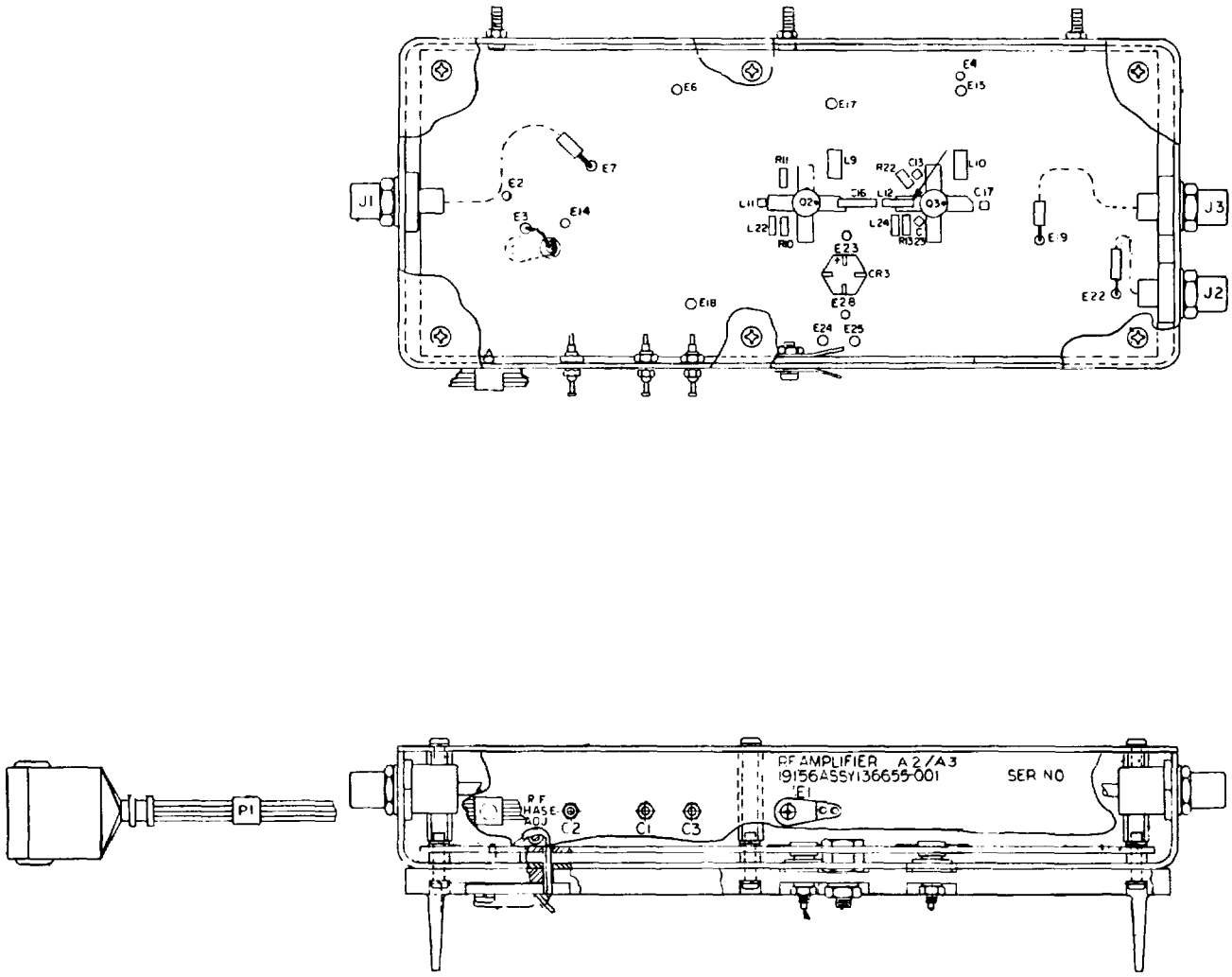


Figure 7-3. RF Amplifier, 1A5A2 and 1A5A3 Parts Location Diagram

d. RF Amplifier Circuit Card Assembly (1A5A2A1 and 1A5A3A1) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly from the RF amplifier assembly, remove the six cover screws, remove cover, and perform the following steps.

(1) Unscrew connectors J 1, J2 and J3.

(2) Disconnect buss wires from C2, C1, C3 and El.

(3) While holding the screws on the back of the heat sink, use a spin tight to remove the six spacers from the circuit card.

(4) Unsolder jumper buss wires E3, E23, E24 and E25.

(5) Remove the two screws on the back of the heat sink which hold transistors Q2 and Q3 to the heat sink.

The circuit card assembly may now be easily removed from the cover. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-4 for location of components to be replaced.

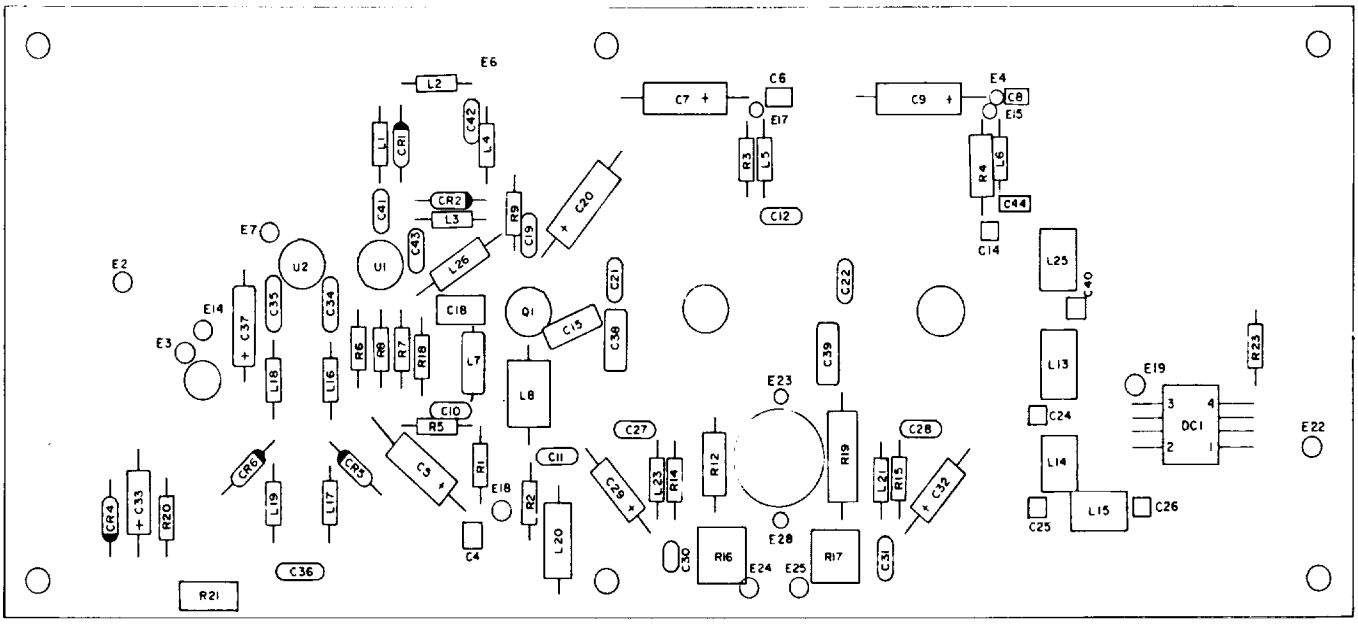


Figure 7-4. RF Amplifier Circuit Card Assembly, 1A5A2A1 and 1A5A3A1 Parts Location Diagram

e. Modulation Control Assembly (1A5A4) Disassembly. To remove the modulation control assembly perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement Refer to figure 7-5 for location of components to be replaced.

(1) Disconnect the five coaxial cables from the modulation control assembly.

(2) Disconnect multi-conductor plug from chassis jack.

(3) Remove four nuts and washers holding the modulation control assembly in place.

(4) Unsolder the solder connections holding capacitors C1, C2 and C3 in place.

(5) Remove the modulation control assembly from the chassis.

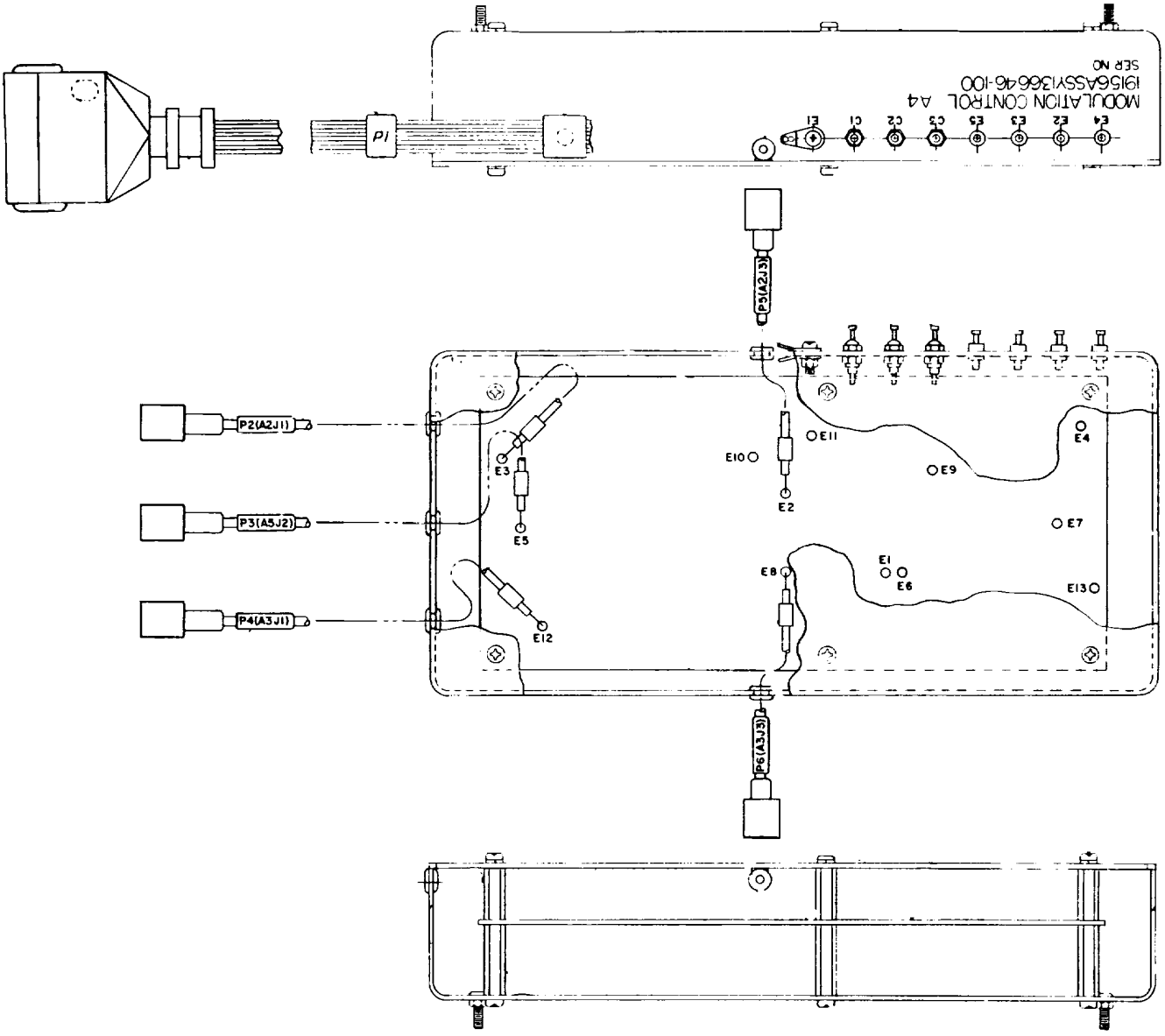


Figure 7-5. Modulation Control, 1A5A4 Parts Location Diagram

f. Modulation Control Circuit Card Assembly (1A5A4A1) Disassembly. To remove the modulation control circuit card assembly, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-6 for location of components to be replaced.

(1) Remove six screws, washers and electrical spacers holding modulation control circuit card assembly (1A5A2A1) in place.

(2) Remove the circuit card assembly from modulation control assembly 1A5A4.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

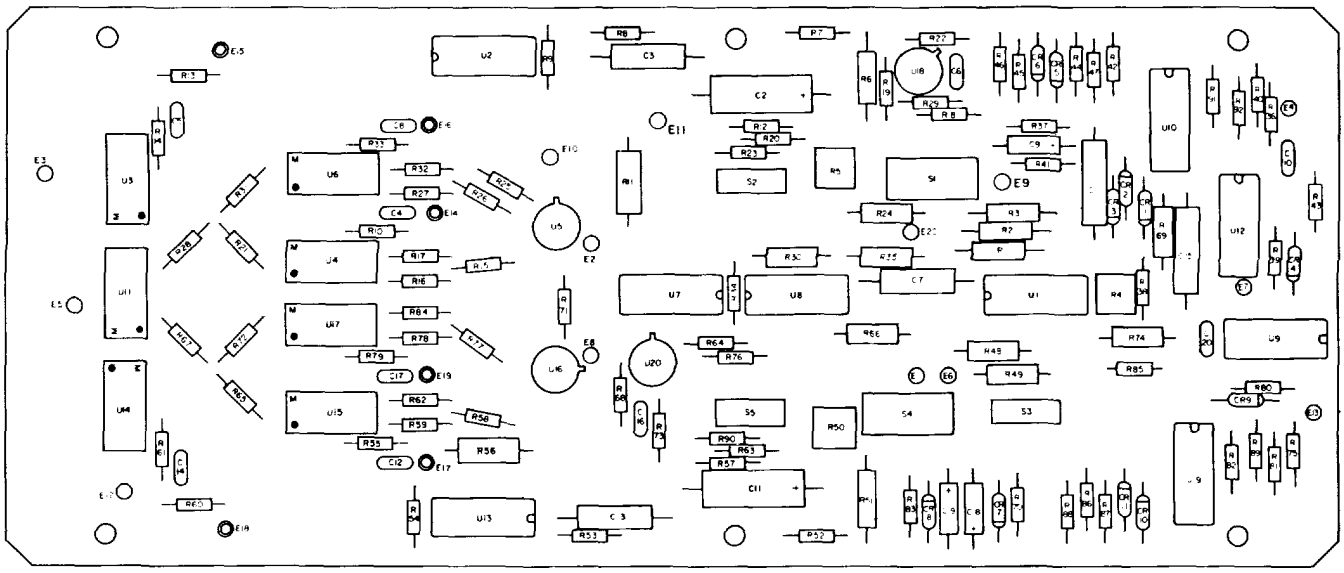


Figure 7-6. Modulation Control Circuit Card Assembly, 1A5A4A1 Parts Location Diagram

9. Modulation Eliminator Assembly (1A5A5) Disassembly. To remove the modulation eliminator Assembly, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-7 for location of components to be replaced.

(1) Disconnect the coaxial cables from modulation eliminator assembly 1A5A5.

(2) Disconnect plug D1 from the modulation eliminator assembly.

(3) Remove four washers and nuts holding the assembly in place.

(4) Remove the modulation eliminator assembly from the chassis.

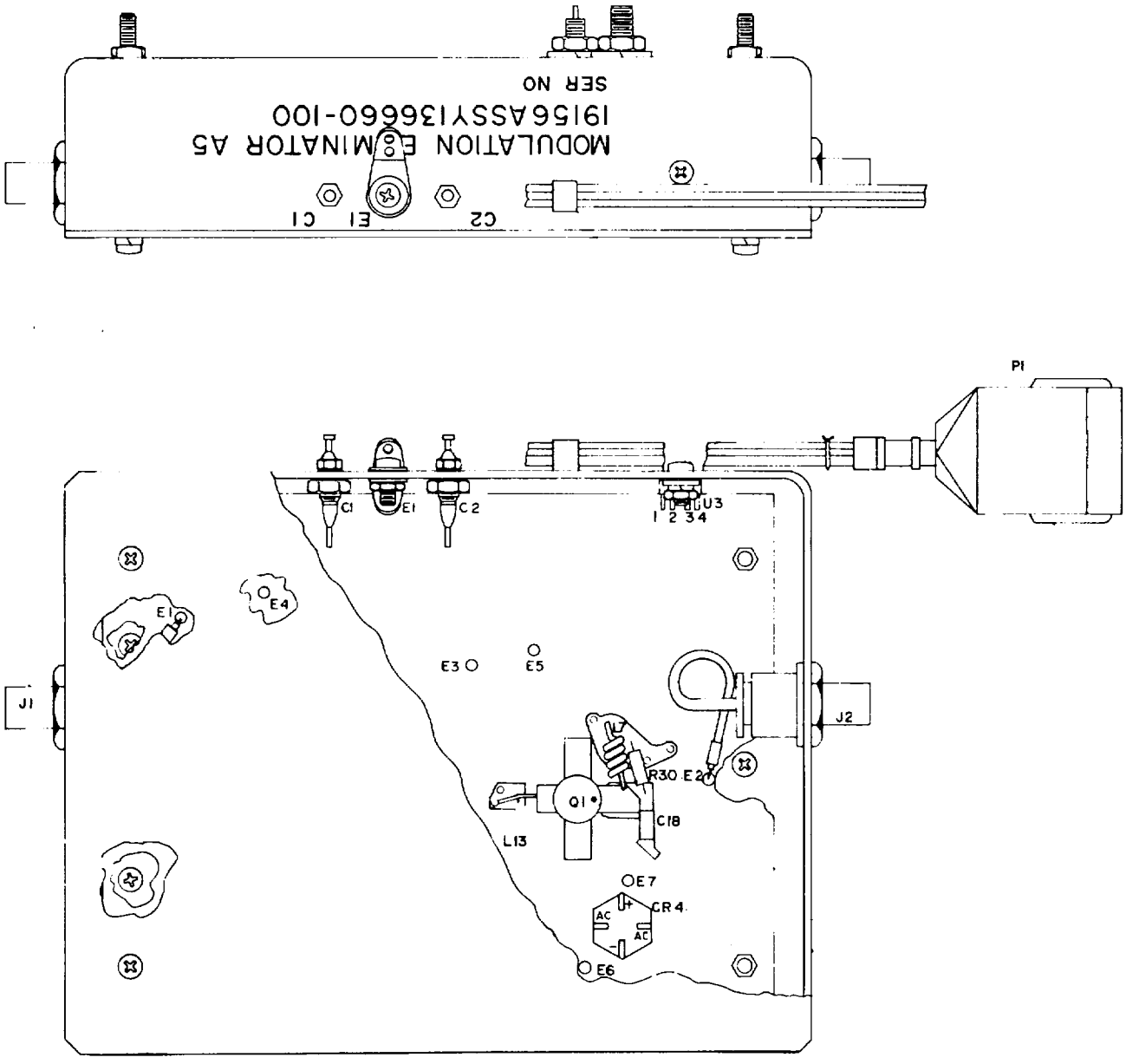


Figure 7-7. Modulation Eliminator, 1A5A5 Parts Location Diagram

h. Modulation Eliminator Circuit Card Assembly (1A5A5A1) Disassembly. To remove the modulation eliminator circuit card assembly, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-8 for location of components to be replaced.

(1) Remove four screws and nuts holding modulation eliminator circui t card assembly 1A5A5A1 in place.

(2) Unsolder the connections (C1, C2, E1 and E2).

(3) Remove the circuit card assembly (1A5A5A1) from the chassis.

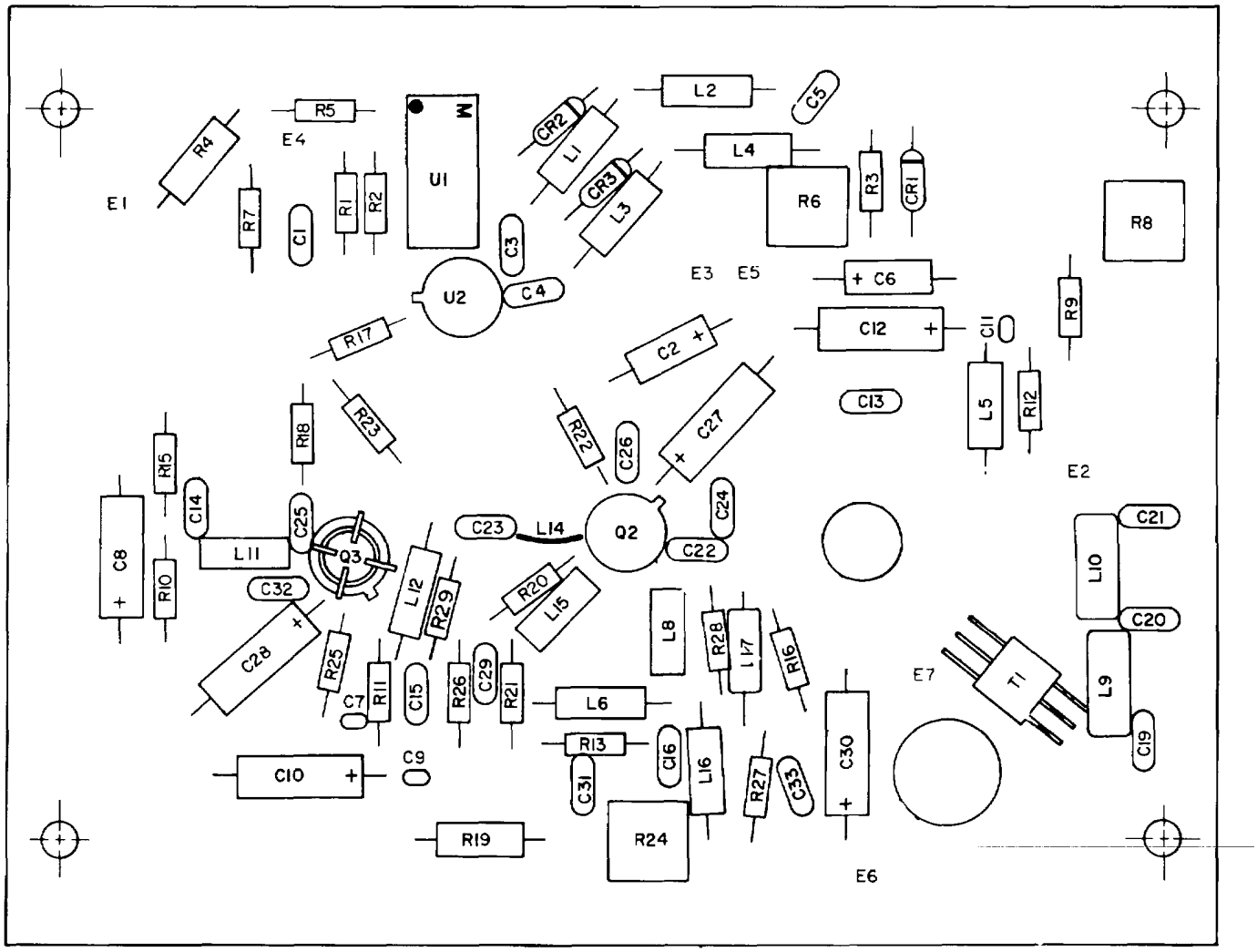


Figure 7-8. Modulation Eliminator Circuit Card Assembly, 1A5A5A1 Parts Location Diagram

i. Meter Card Circuit Card Assembly (1A5A6) Disassembly. To remove the modulation control circuit card assembly, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 7-9 for location of components to be replaced.

(1) Disconnect the solder connections holding meter circuit card 1A5A6 in place.

(2) Remove four screws and washers holding the meter circuit card assembly in place.

(3) Remove the meter circuit card assembly from the chassis.

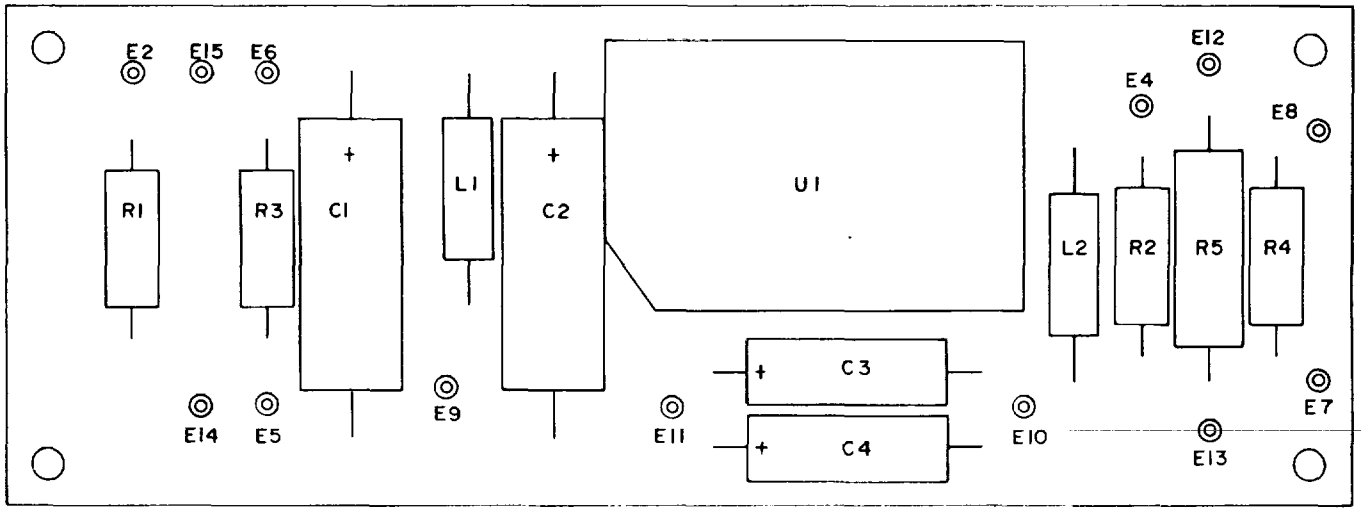


Figure 7-9. Meter Card Circuit Card Assembly, 1A5A6 Parts Location Diagram

SECTION II

CLEANING AND INSPECTION

7-3. CLEANING. Clean the sideband transmitter as required, following the procedures specified below. Do not clean anything which inspection does not show needs cleaning.

CAUTION

Circuit card assemblies which contain plastic components may be damaged by cleaning with freon. Use denatured alcohol to clean these circuit cards.

a. Remove dust and loose dirt from outside surfaces with a clean, soft cloth.

WARNING

Freon fumes are toxic. Provide adequate ventilation. DO NOT use near a flame. Freon is not flammable, but exposure to high heat can convert fumes to a highly toxic gas.

b. Remove grease and ground-in dirt from outside surfaces with a cloth dampened (not wet) with freon.

c. Remove dust and dirt from electrical connectors with a soft-bristled brush.

WARNING

Bodily injury or equipment damage can result from cleaning with compressed air at pressures in excess of 15 pounds per square inch.

d. If repair procedures require disassembly, remove dust from exposed inner parts of assembly by loosening with a soft-bristled brush and blowing with a jet of dry air at not more than 15 pounds per square inch.

7-4. INSPECTION. After disassembly, fabrication action, repair action, or final assembly, subject the items to an in-process inspection. General inspection requirements shall be in accordance with M IL-M-45208. Adequate records of all inspections and tests shall be maintained (Chapter 5, TM 11-5825-266-14-1), as applicable. The in-process inspection should include, but not be limited to, the following criteria:

a. Mounting of Parts. Inspect parts, components, or hardware, etc., to ensure that they are assembled, mounted and secured so as to satisfactorily accomplish their intended purpose.

b. Fabrication. Inspect all boards, chassis, covers, etc., for breaks, cracks, bends, dents, etc. Inspect finish for a smooth, continuous coating and a reasonable color match where surfaces have been touched up. Where conformal coating has been used, ensure that coating material has not covered areas purposely left unpainted or uncoated for electrical contact purposes. On circuit cards, there shall be no evidence of lifting or separation of plating from the conductor pattern or of conductors from the base laminate. There shall be no slivers or whiskers. There shall be no evidence of burns or corona discharge.

c. Threaded Parts or Devices. Inspect screws, nuts, bolts, etc., for absence of cross-threading, detrimental or hazardous burrs, or mutilation.

d. Tightness. Inspect all screw-type fasteners for tightness. Fasteners shall be firmly secure and there shall be no relative movement possible between them and attached parts.

e. Soldering. Inspect leads to see that they are tightly crimped to terminals and that they show no signs of having been moved while soldering. Solder must show a shiny, smooth surface feathering out at the edges where it joins the surface of a terminal or conductor. In addition, solder connections should show only enough solder to cover the joint, and shall show no indication of burns, acid or acid salts.

NOTE

Acid or acid salts should be used only as permitted for pretinning or soldering mechanical joints. No acid or acid salts may be used near insulation. Where acid or acid salts have been used as permitted, they shall be completely neutralized and removed.

f. Moisture/Fungus-Proofing. Conformally coated parts shall have unbroken coating. The coating material shall not appear on areas purposely left unpainted or uncoated for electrical contact purposes.

SECTION III

TROUBLESHOOTING

7-5. GENERAL. System-level fault isolation procedures to the unit or assembly level are provided in chapter 3. This chapter provides fault isolation procedures to the module and circuit level for the sideband transmitter.

7-6. FAULT ISOLATION. To utilize the troubleshooting charts in this section, it is first necessary to identify the chart which corresponds to the observed failure reflected by the equipment. The step-by-step procedures contained in the troubleshooting charts (figures 7-10, 7-11, 7-12, 7-13 and 7-14) provide fault isolation to the module and circuit level. These charts provide the means to fault isolate to the suspected circuit group. Fault isolation down to the part level is accomplished using schematics and circuit theory provided in TM 11-5825-266-14-2, and standard troubleshooting practices.

NOTE

Ensure that all internal wiring is good before assuming a circuit card to be defective.
Verify that all inputs to the circuit card assembly have been properly checked.

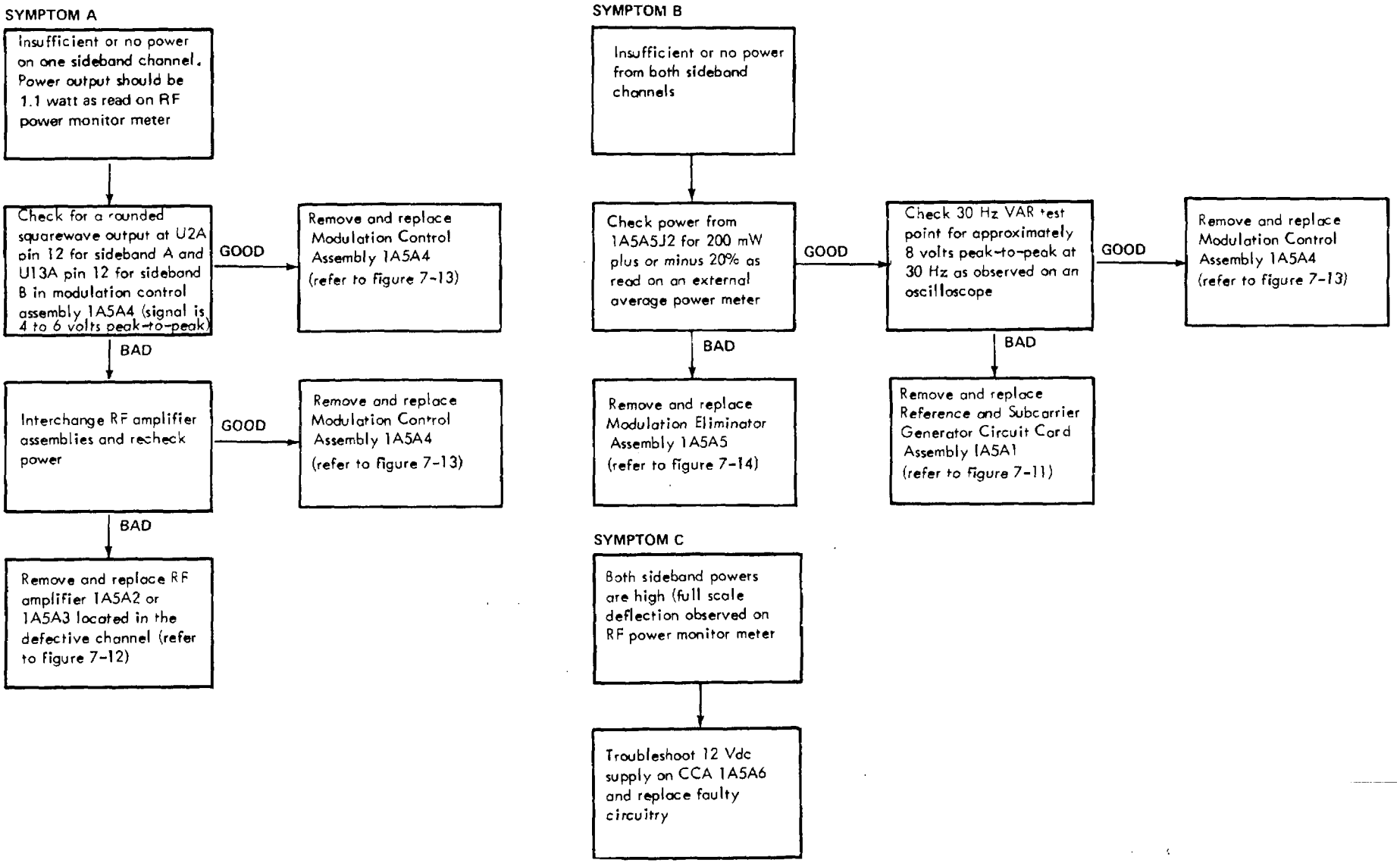


Figure 7-10. Sideband Transmitter Troubleshooting Chart to the Module Level (Sheet 1 of 2)

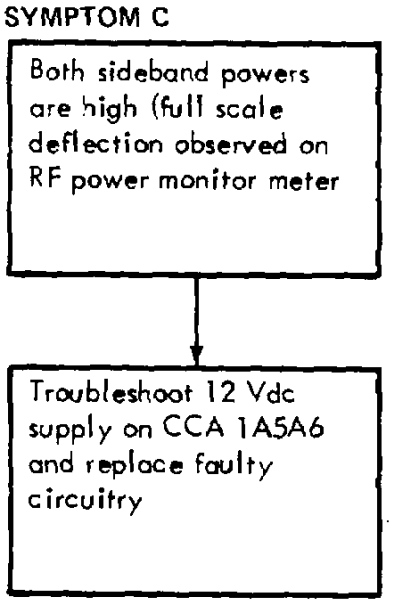


Figure 7-10. Sideband Transmitter Troubleshooting Chart to the Module Level (Sheet 2 of 2)

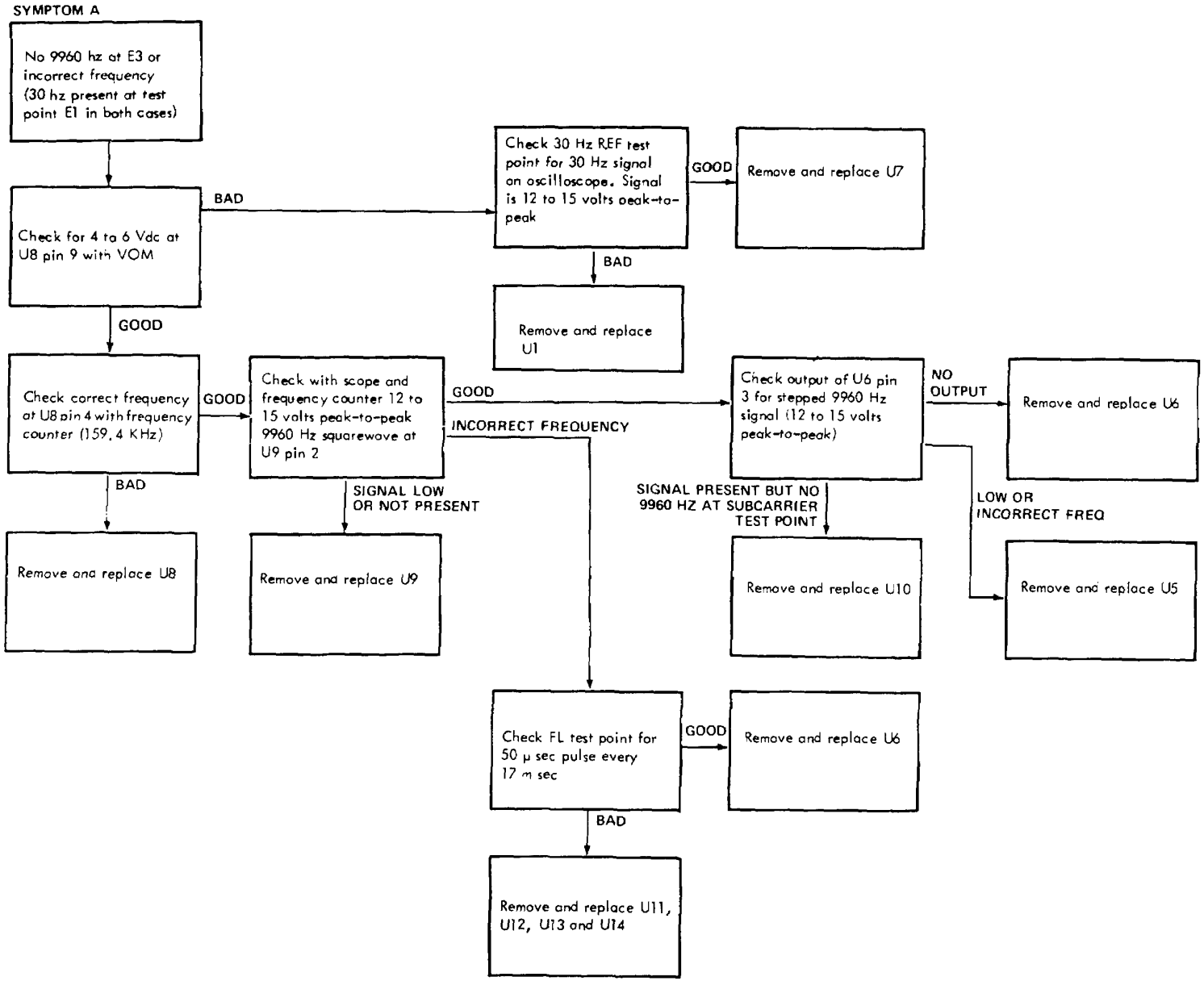


Figure 7-11. Reference andSubcarrier Generator Circuit Card Assembly, 1A5A1 Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

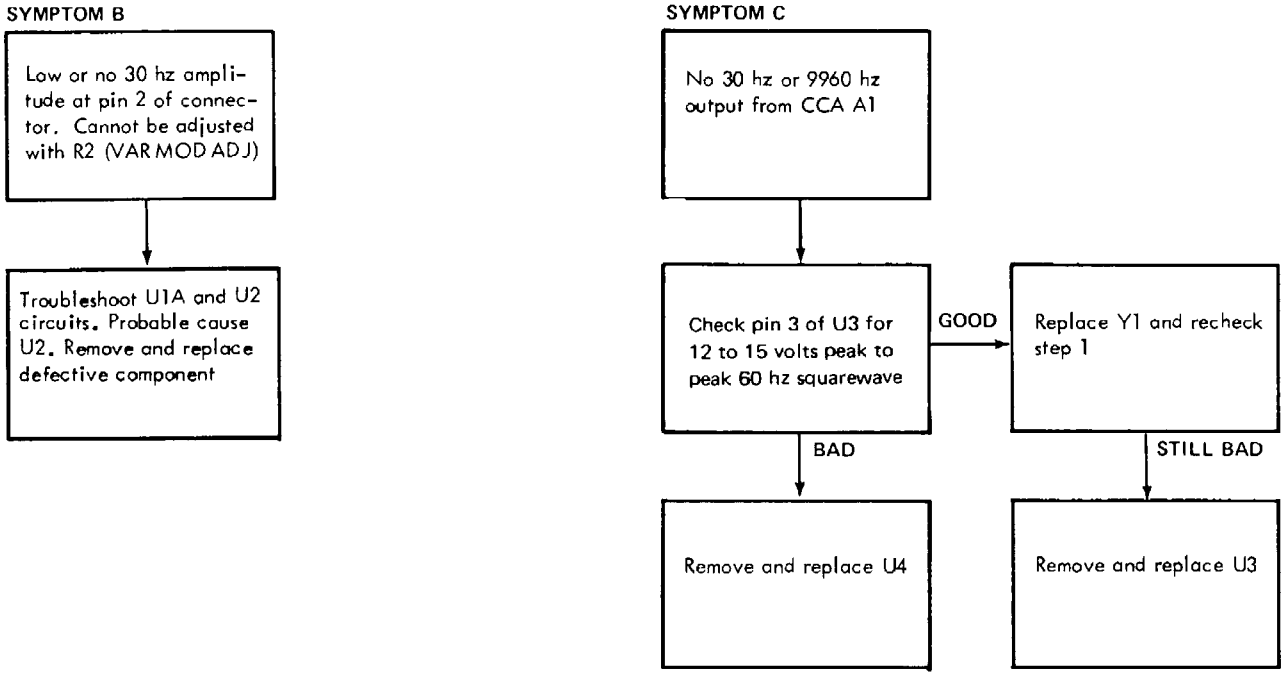


Figure 7-11. Reference andSubcarrier Generator Circuit Card Assembly, 1A5A1 Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

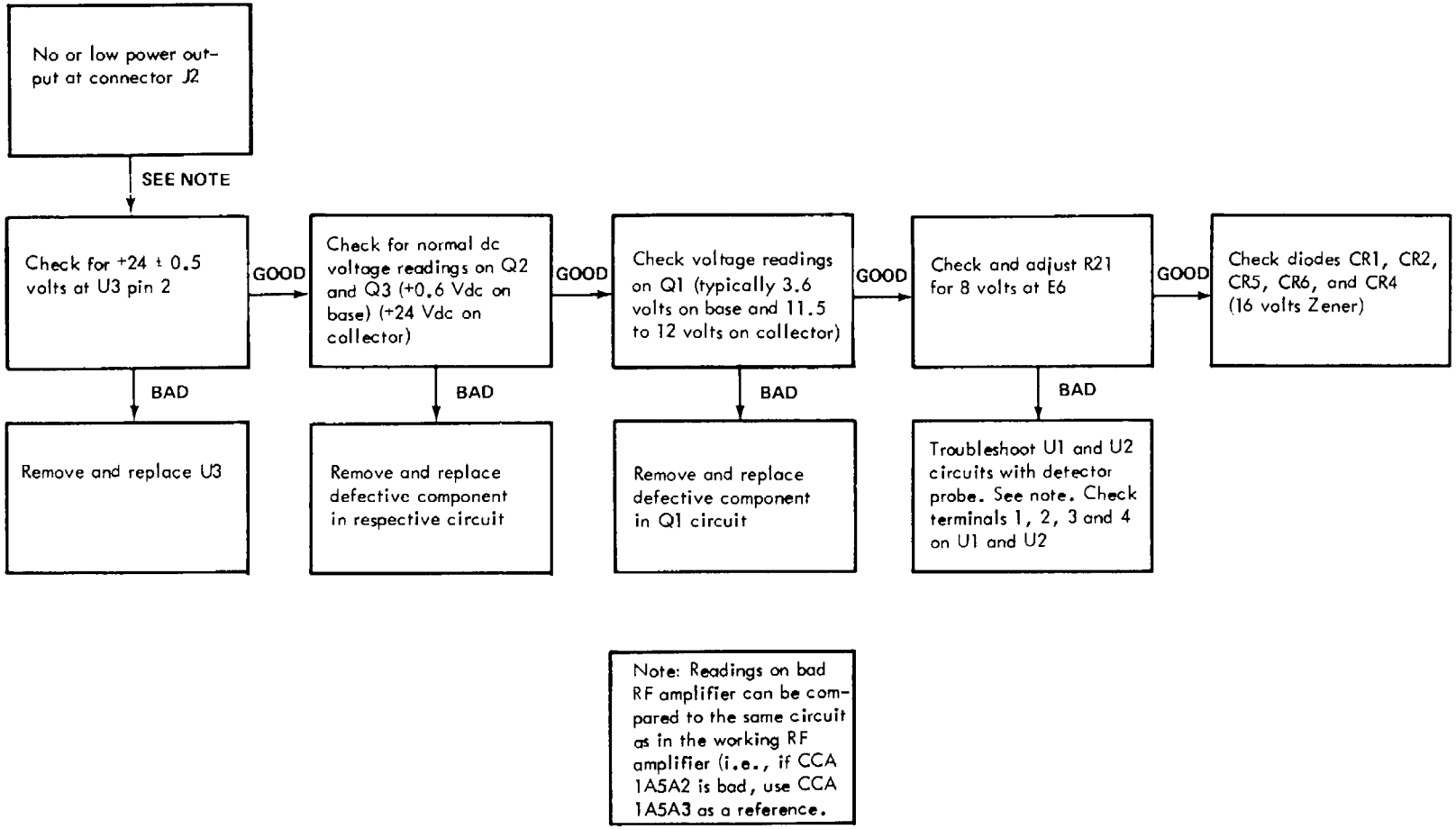


Figure 7-12. RF Amplifier Assembly, 1A5A2 and 1A5A3 Troubleshooting Chart to the Circuit Level

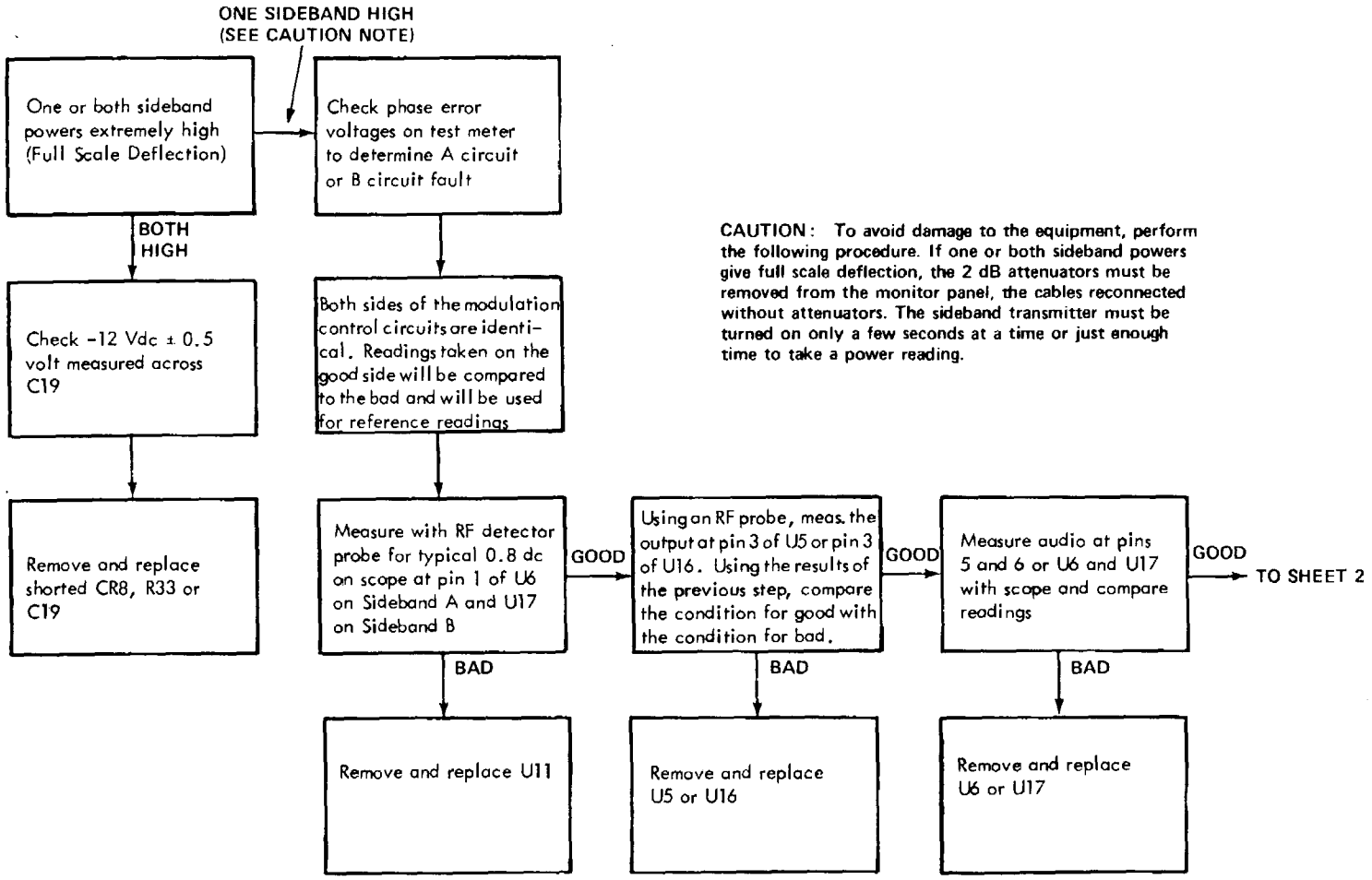


Figure 7-13. Modulation Control, 1A5A4, Troubleshooting Chart to the Circuit Level (Sheet 1 of 4)

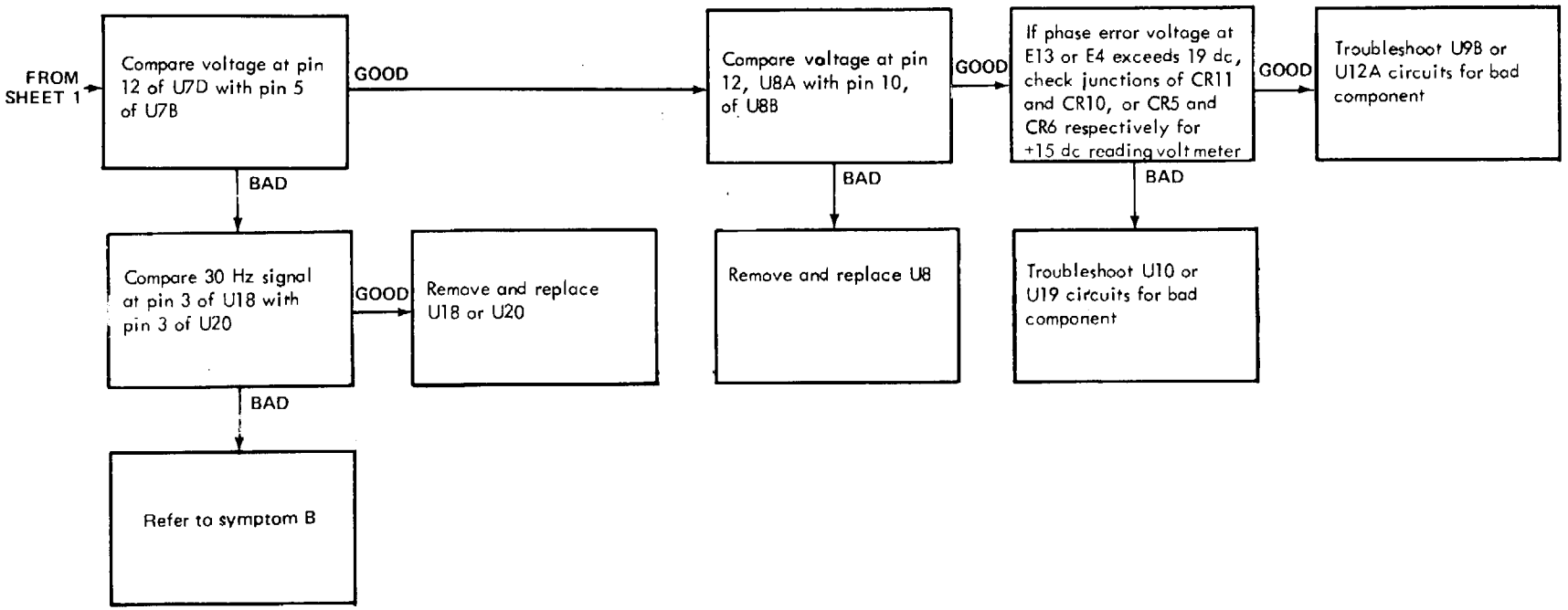


Figure 7-13. Modulation Control, 1A5A4, Troubleshooting Chart to the Circuit Level (Sheet 2 of 4)

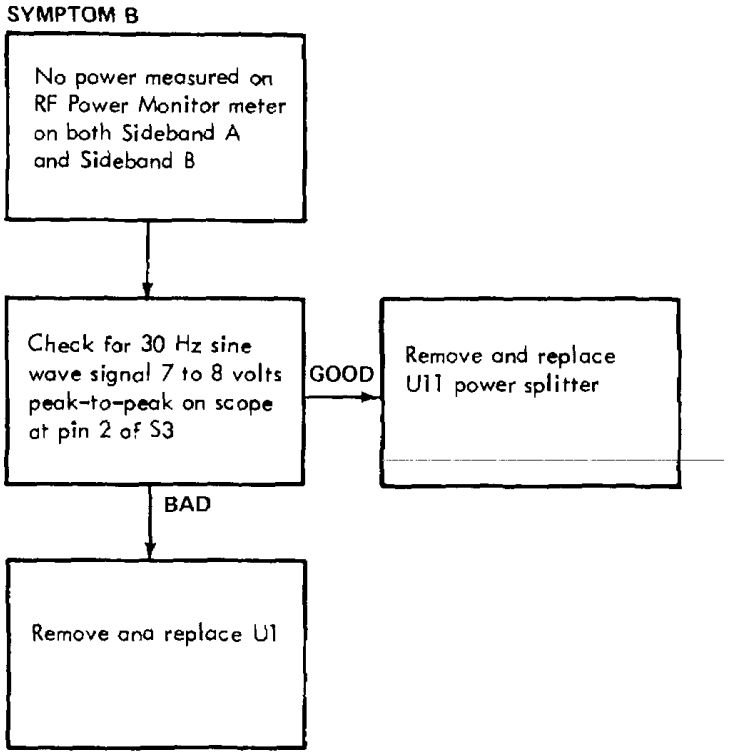


Figure 7-13. Modulation Control, 1A5A4, Troubleshooting Chart to the Circuit Level (Sheet 3 of 4)

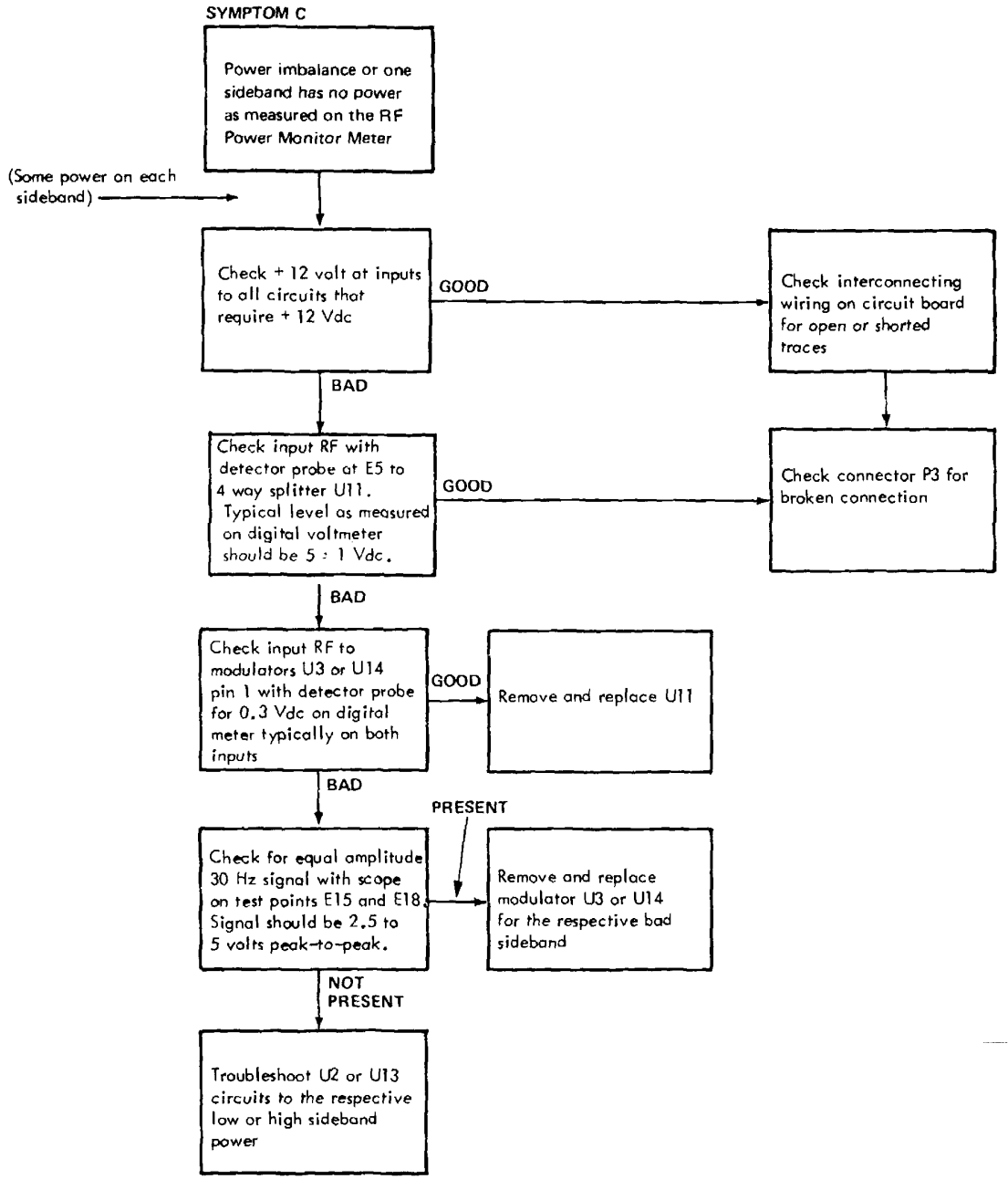


Figure 7-13. Modulation Control, 1A5A4, Troubleshooting Chart to the Circuit Level (Sheet 4 of 4)

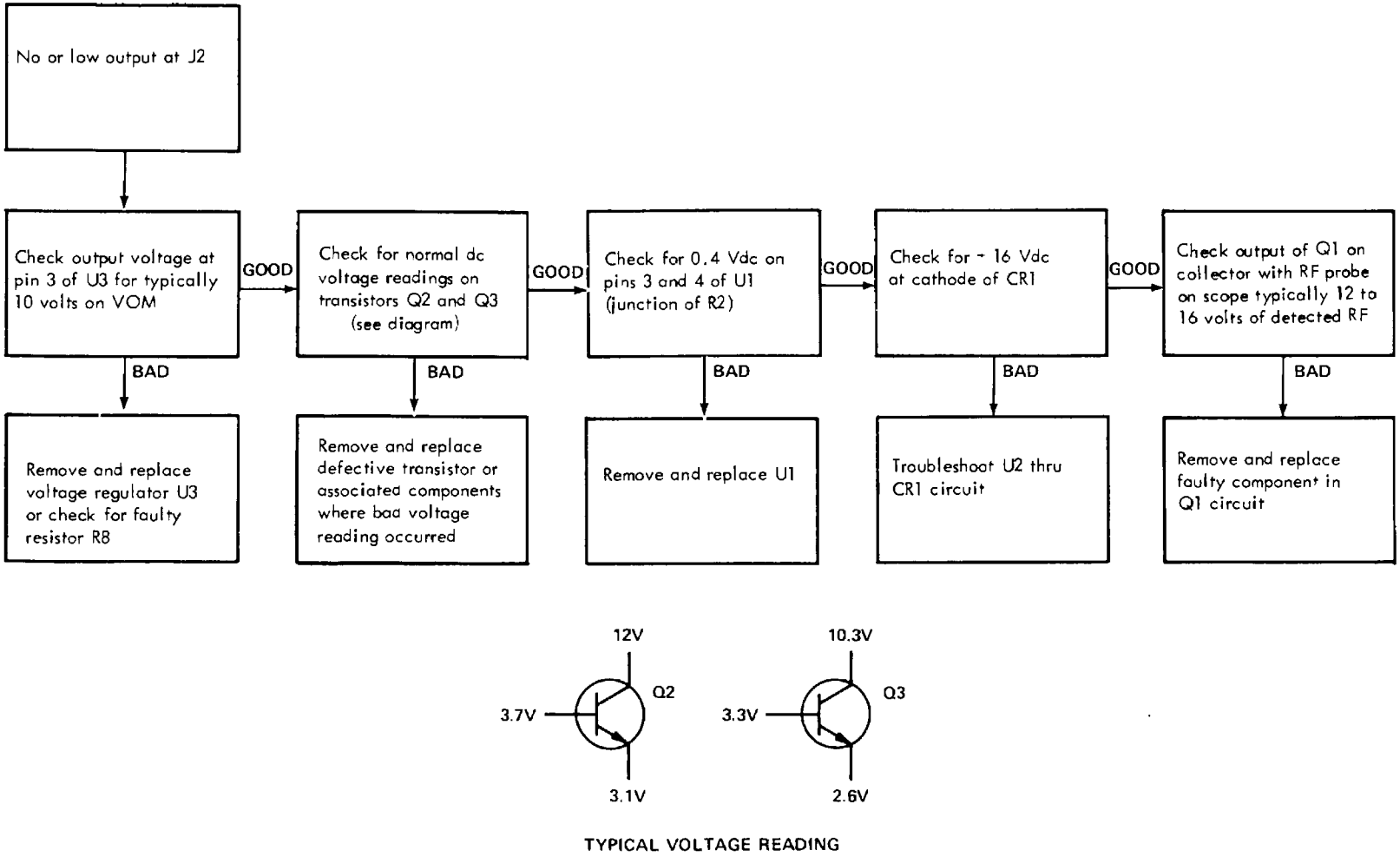


Figure 7-14. Modulation Eliminator Assembly, 1A5A5 Troubleshooting Chart to the Circuit Level

SECTION IV

REPAIR

7-7. INTRODUCTION. The following paragraphs contain repair procedures for the sideband transmitter and connectors. The repair procedures for the sideband transmitter are supported by tables containing cable requirements and lists of material needed to make each completely serviceable as applicable.

7-8. CONNECTOR AND WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair connectors and wiring harness damage. A list of all connectors by reference designation with a cross reference to the hand tools used for repair is provided in table 7-1. A wiring list showing point-to-point connections, wire type and size is provided in table 7-2A. Table 7-2B contains a list of materials.

7-9. SPECIAL REPAIR INSTRUCTIONS. See paragraph 3-30 for repair procedures for semiconductors and microcircuits.

Table 7-1. Sideband Transmitter Connector Maintenance Tool List Matrix

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
1A5J1	Crimp	910163-003	910195-001 (Male) 910195-002 (Male)	20-22 16-18	M8ND	N20RT-29	910923
1A5J2	Crimp	910163-001	910281-002 (Female) 910281-001 (Female)	16-18 20-22	M8ND M8ND	N16RT-24 N20RT-29	912923 910923
1A5J3	Crimp	910163-001	910281-002 (Female) 910281-001 (Female)	16-18 20-22	M8ND M8ND	N16RT-24 M20-RT-29	910923 910923
1A5J4	Crimp	910163-002	910281-001 (Female)	20-22	M8ND	N20RT-29	910923
1A5J5	Crimp	910163-001	910281-001 (Female)	20-22	M8ND	N20RT-29	910923
1A5XA1	Solder	910140-003	N/A	N/A	N/A	N/A	N/A

Table 7-2A. Sideband Transmitter Wiring List

Note: Point-to-point wire connections are listed in Table 7-2A and a list of materials to be used in conjunction with Table 7-2A is provided in Table 7-2B.

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	7		J1-3	25	E1		
2	5		J1-4	31	XK1-1		
3	5		J1-4	25	XDS1-1		
4	9		J1-5	31	S1-2		
5	14		J1-6		S1-7		
6	14		J1-6	25	XA1-5		
7	2		J1-9	21,25	XA1-28	21	
8	20		J1-13	25	XA1-29		
8s	4		J1-14	25	XF1-1	28,29	
9	1		J1-16	27	U1-1		
10	2		J3-1		J4-1	26	
11	8		J3-1	27	J2-2	26	
12	5		J3-2		U1-2		
13	5		J3-2	26	E1		
14	7		J3-3	26	A6-E5		
15	10		J3-6				

Table 7-2A. Sideband Transmitter Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
16	5		J4-2	26	U1-2		
17	7		J4-3	26	E1		
18	6		J4-4	26	A6-E10		
19	11		J4-6	26	A6-E7		
20	14		J4-7	26	XA1-5		
21	18		J4-10	26	XA1-2		
22	8		J2-1		U1-1		
23	8		J2-1	27	A6-E13		
24	7		J2-3		E1		
25	16		A6-E12	26	S2B-2		
26	12		A6-E8		S2B-6		
27	13		A6-E6		S2B-5		
28	17		A6-E2		S2B-3		
29	2		J5-1	26	U1-1		
30	5		J5-2	26	XA1-12		
31	7		J5-3	26	E1		

Table 7-2A. Sideband Transmitter Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
32	7		E1		A6-E11		
33	7		E1		XAL-I		
34	7		E1		U1-3		
35	6		A6-E10		XAl-l1		
36	5		A6-E9		XDS2-1		
37	5		A6- E9		XA1-12		
3	7		XA1-29		XA1-1		
39	6		A6-E4		S2A-4		
40	16		XA1-3		RI-l		
41	5		XA1-12		U1-2		
42	13		XA1-4		R1-3		
43	12		XK1-4		S1-Com #1		
44	2		XK1-6		U1-l		
45	3		XK1-7		XF1-2	28,29	
46	7		U1-3		XDS2-2		
47	7		U1-3		S2B-4		

Table 7-2A. Sideband Transmitter Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
48	7		U1-3		S1-Com #2		
49	14		XDS1-2		S1-9		
50	19		S2A-Com #1		M1- (-)		
51	10		S2B-Com #1		M1- (+)		
52	10		J4-5	26	A6-E5		
53	11		J5-6	26	A6-E7		

Table 7-2A. Sideband Transmitter Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
					S1-COM #2 S1-9		
					S2A-5		
1	40		S1-3	41	S2A-5		
2	40		S1-7	41	S2A-2		
3	40		S2A-6		S2A-2		
4	40		S2A-3	41	S2B-1		
5	40		S2A-3		S2B-1		
6	40		S2A-1		R1-2		
7	40		S2A-1				
8	40		S2B-4	41			
9	40		R1-1				

NOTE: Table 7-2A is comprised of a harness wire list and a cabinet assembly wire list. The cabinet assembly wire list is numbered separately for ease of reference.

Table 7-2B. Materials List

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	1	Wire #20 GRN	MIL-W-16878/4
AR	2	Wire #20 BLUE	MIL-W-16878/4
AR	3	Wire #20 W/BLU	MIL-W-16878/4
AR	4	Wire #22 BLK	MIL-W-16878/4
AR	5	Wire #22 ORG	MIL-W-16878/4
AR	6	Wire #22 YEL	MIL-W-16878/4
AR	7	Wire #22 GRN	MIL-W-16878/4
AR	8	Wire #22 BLU	MIL-W-16878/4
AR	9	Wire #22 GRY	MIL-W-16878/4
AR	10	Wire #22 WHT	MIL-W-16878/4
AR	11	Wire #22 W/BLK	MIL-W-16878/4
AR	12	Wire #22 W/BRN	MIL-W-16878/4
AR	13	Wire #22 W/RED	MIL-W-16878/4
AR	14	Wire #22 W/ORG	MIL-W-16878/4
AR	15	Wire #22 W/YEL	MIL-W-16878/4
AR	16	Wire #22 W/GRN	MIL-W-16878/4
AR	17	Wire #22 W/BLU	MIL-W-16878/4
AR	18	Wire #22 W/IO	MIL-W-16878/4
AR	19	Wire #22 W/GRY	MIL-W-16878/4
AR	20	Wire #22, 1 COND. SHLD'D	MIL-W-16878/4
2	21	Solder Sleeve	003700-2
3	22	Conn. 6 Pin, J2, 3, 5	910163-001
1	23	Conn. 12 Pin, J4	910163-002
1	24	Conn. 24 Pin, J1	910163-003
6	25	Contact #20-22 Male	910195-001
16	26	Contact #20-22 Female	910281-001
3	27	Contact #16-18 Female	910281-002
2	28	Term. Flag	910868-001
2	29	Term. Housing	910869-001
2	31	Contact #16-18 Male	910195-002
AR	32	Lacing Tape	MIL-T-152
X	33	Wire List	136666-250
	40	Wire, Solid AWG 22	QQ-W-343, Type S
	41	Sleeving, Insul No. 22	MIL-1-22129

SECTION V

ASSEMBLY

7-10. **GENERAL**. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

7-11. **ASSEMBLY PROCEDURES**. Assembly of the sideband transmitter is essentially the reverse of disassembly. No special instructions are required.

7-12. **TESTING**. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 5 of TM 11-5825-266-14-1.

7-13. **REFINISHING, PAINTING AND MARKING.** Refer to applicable cleaning and refinishing practices specified in TB 43-0118,Field Instructions for Painting and Preserving Electronics Command Equipment. Remove rust or corrosion from metal surfaces by lightly sanding them with No. 000 sandpaper. Apply two thin coats of paint (Finish No. P513E, per MIL-F-14072) on exposed metal areas to prevent further corrosion. Apply paint to only those areas which have been previously painted. Refer to SB 11-573, Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment, and AR 746-5, Color and Marking of Army Material.

CHAPTER 8

CONTROL-INDICATOR C-10526/FRN-41

MAINTENANCE, OVERHAUL AND REPAIR

SECTION I

DISASSEMBLY

8-1. GENERAL. This chapter details disassembly, inspection, troubleshooting, repair and assembly procedures necessary to restore the Control-Indicator C-10526/FRN-41 and all subassemblies contained therein to satisfactory operating condition after a failure or maintenance action. The text is supplemental with appropriate illustrations necessary to describe the repaired disassembly, repair and reassembly procedures. Do not disassemble the control indicator more than is necessary for repairs.

8-2. CONTROL-INDICATOR DISASSEMBLY PROCEDURES. Individual instructions for each subassembly and chassis-mounted components are provided in the following subparagraphs.

a. Front Panel Components Disassembly (see figure 8-1). The following disassembly procedure should be followed for removing components for repair or replacement.

(1) Remove the pushbutton tone generator (U1) from the front panel by removing two screws holding the pushbutton tone generator to the tone generator bracket.

(2) To disassemble any other front panel mounted components, locate the particular item on sheet 2 of figure 8-1 and disassemble in accordance with the applicable exploded view shown on the following sheets of figure 8-1.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

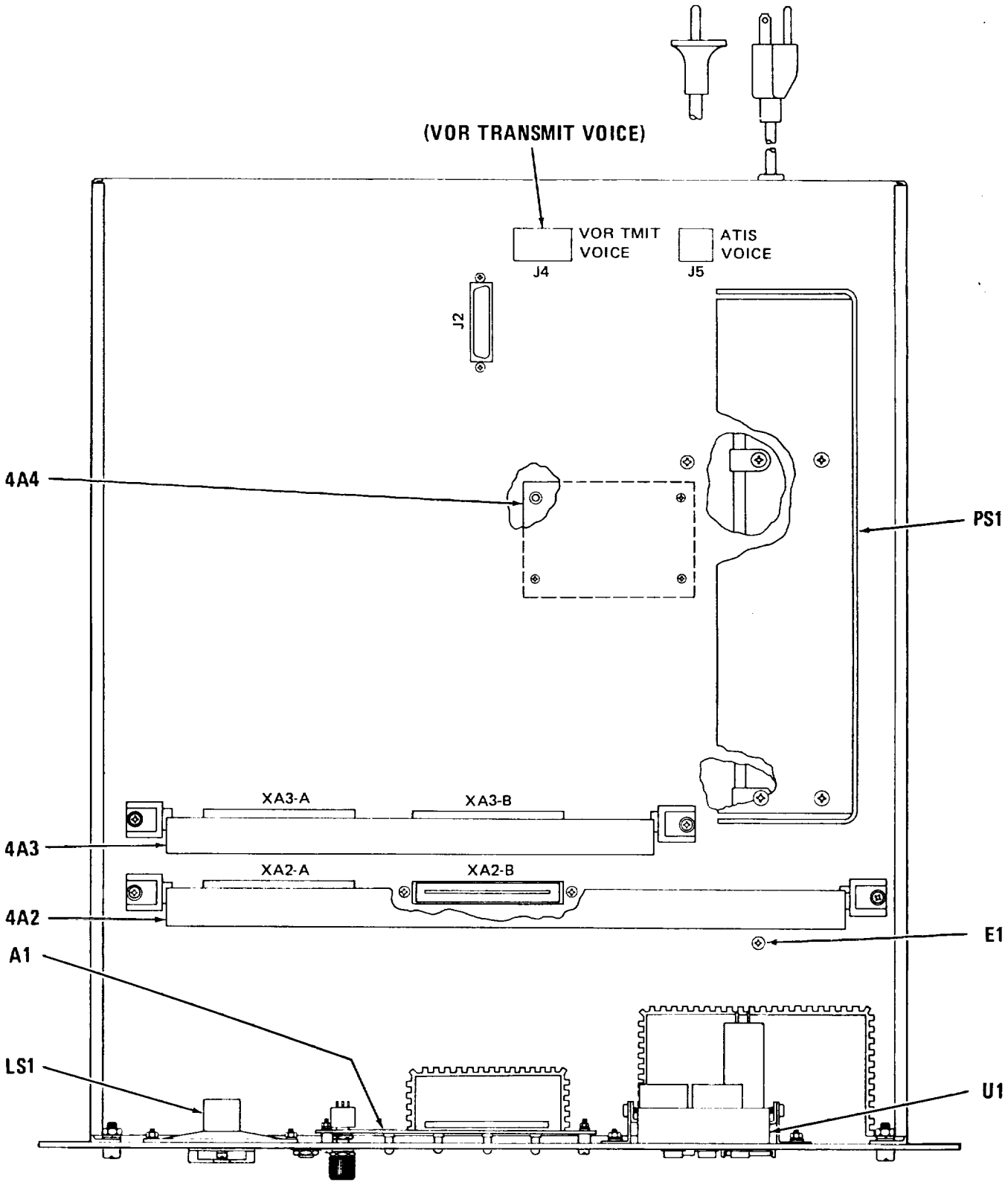


Figure 8-1. Control-Indicator Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 1 of 3)

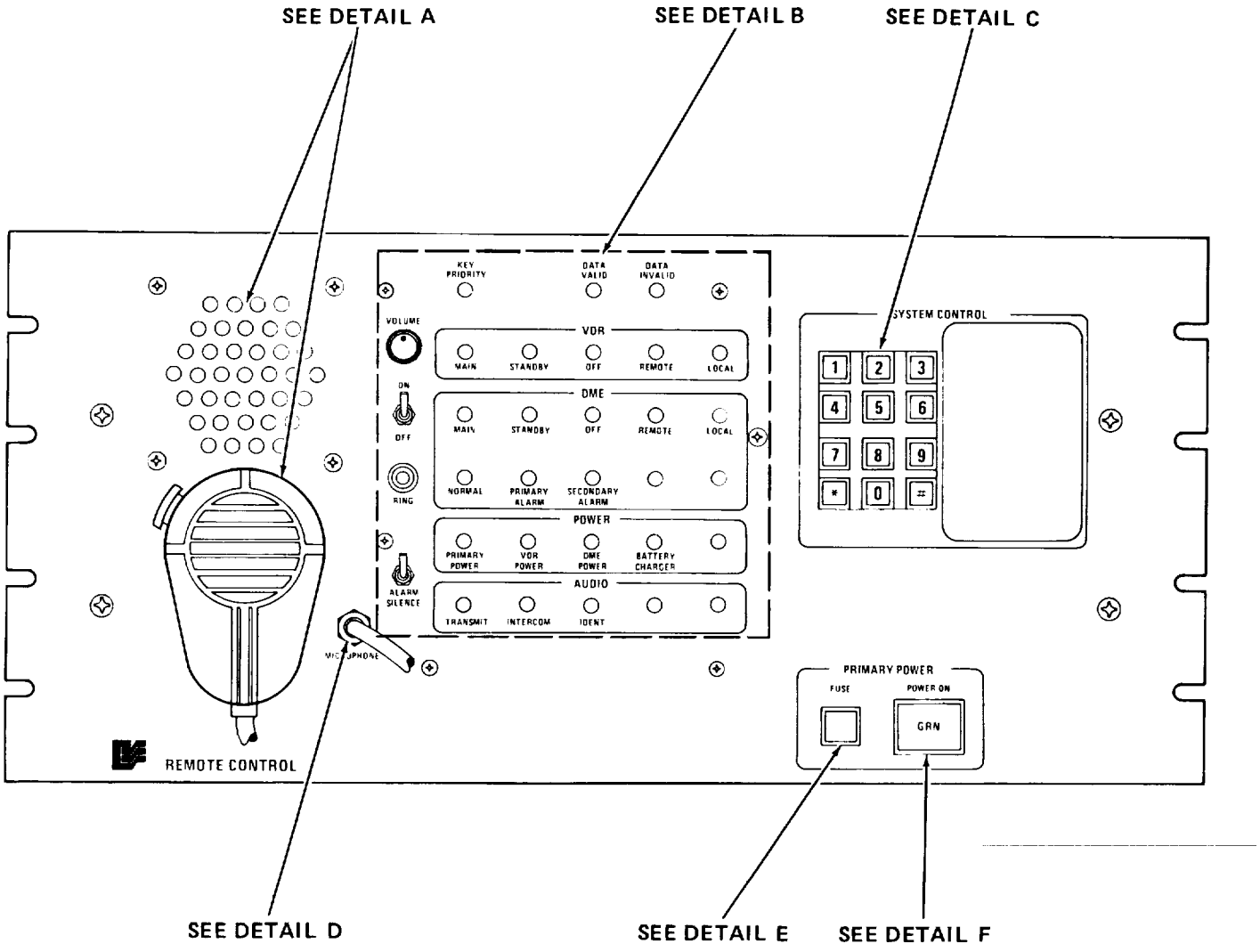


Figure 8-1. Control-Indicator Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 2 of 3)

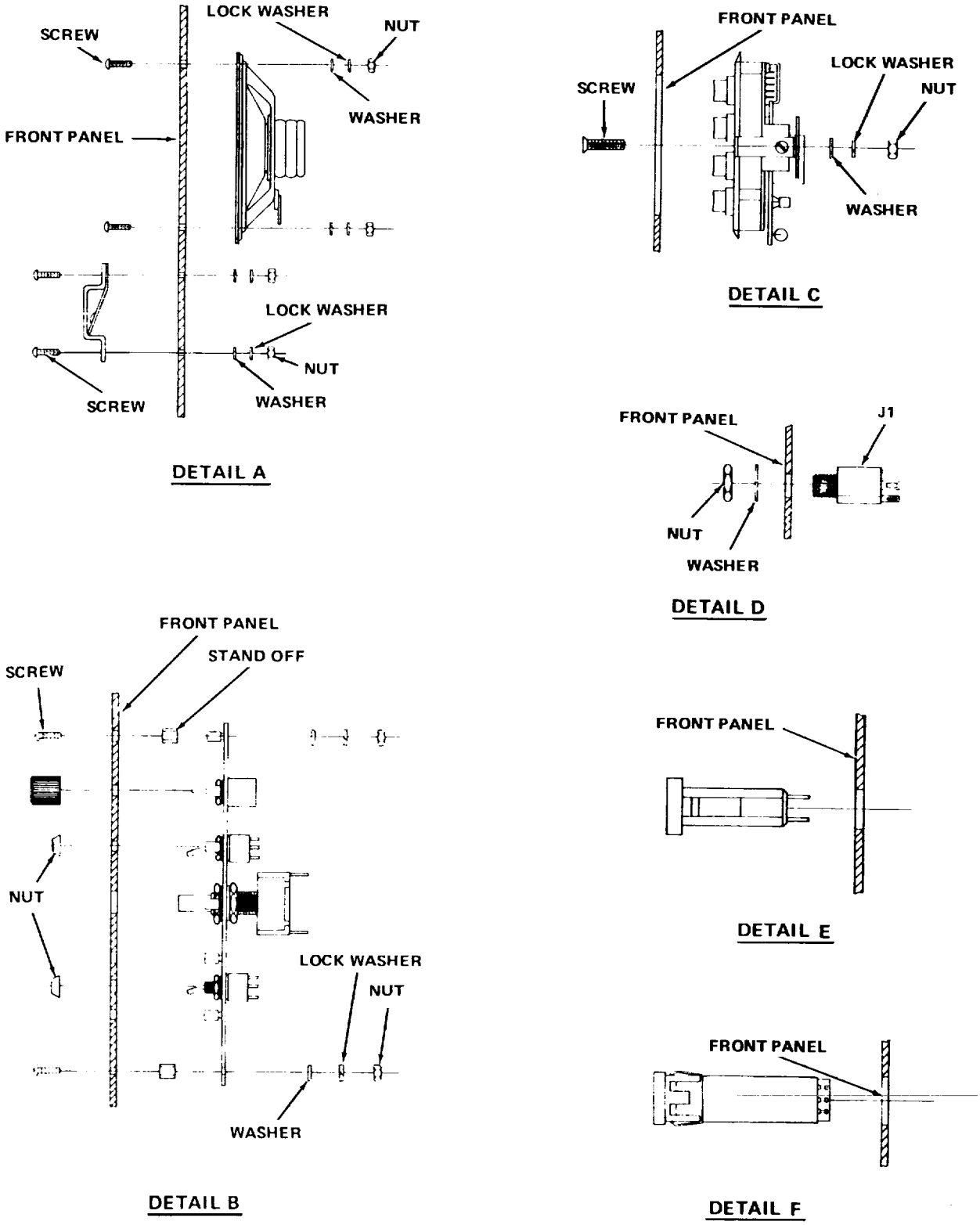
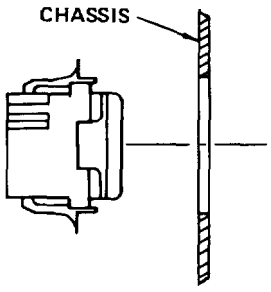


Figure 8-1. Control-Indicator Front Panel and Chassis-Mounted Parts Location Diagram (Sheet 3 of 3)

(3) To disassembly any one of the chassis-mounted components, identify the component on sheet 1 of figure 8-1 and disassemble per the following instructions.

(a) Disassemble chassis-mounted connectors 4J4 and 4J5 by pushing on the side locks on the underside of each connector and lifting out. Use extractor tool to remove wire connections.

(b) Disassemble chassis-mounted connector 4J2 by removing the two screws, nuts and washers which hold the connector to the chassis. Use extractor tool to remove wire connections.



DETAIL G

b. LED Display Circuit Card Assembly (4A1) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement Refer to figure 8-2 for location of component to be replaced.

(1) Remove four screws, washers and electrical spacers holding the LED Display circuit card assembly to the front panel.

(2) Remove and tag the 44 wire leads on the ribbon cable from the LED Display circuit card assembly.

(3) Disconnect and remove VOLUME, ON/OFF and ALARM SILENCE switches from front panel.

(4) Remove the LED Display circuit card assembly from the chassis assembly.

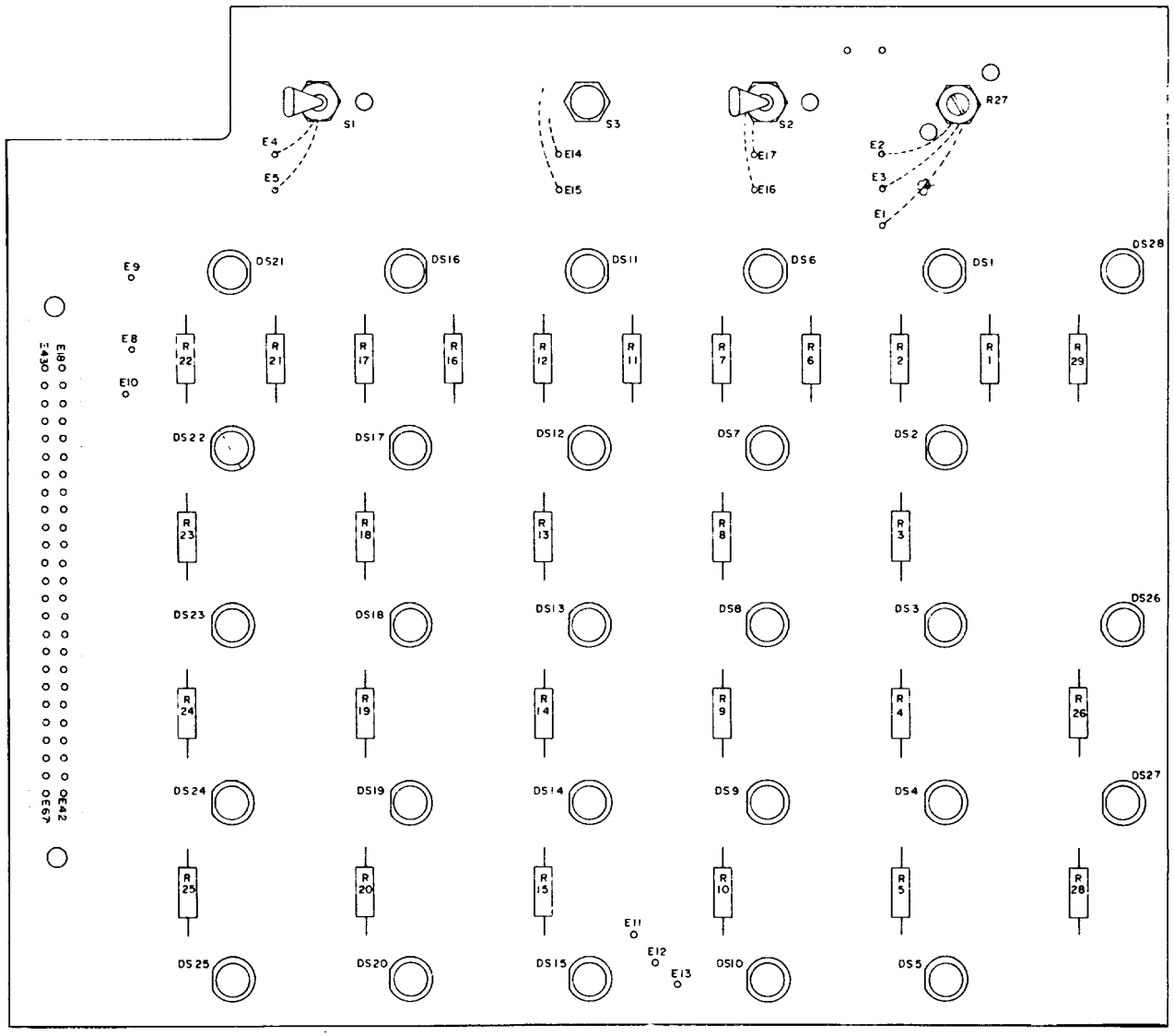


Figure 8-2. LED Display Circuit Card Assembly, 4A1 Parts Location Diagram

c. Operation Voice Buffer Circuit Card Assembly (4A2) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 8-3 for location of components to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. SMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit crd. Following removal of a circuit card place it on a piece of plastic sheeting.

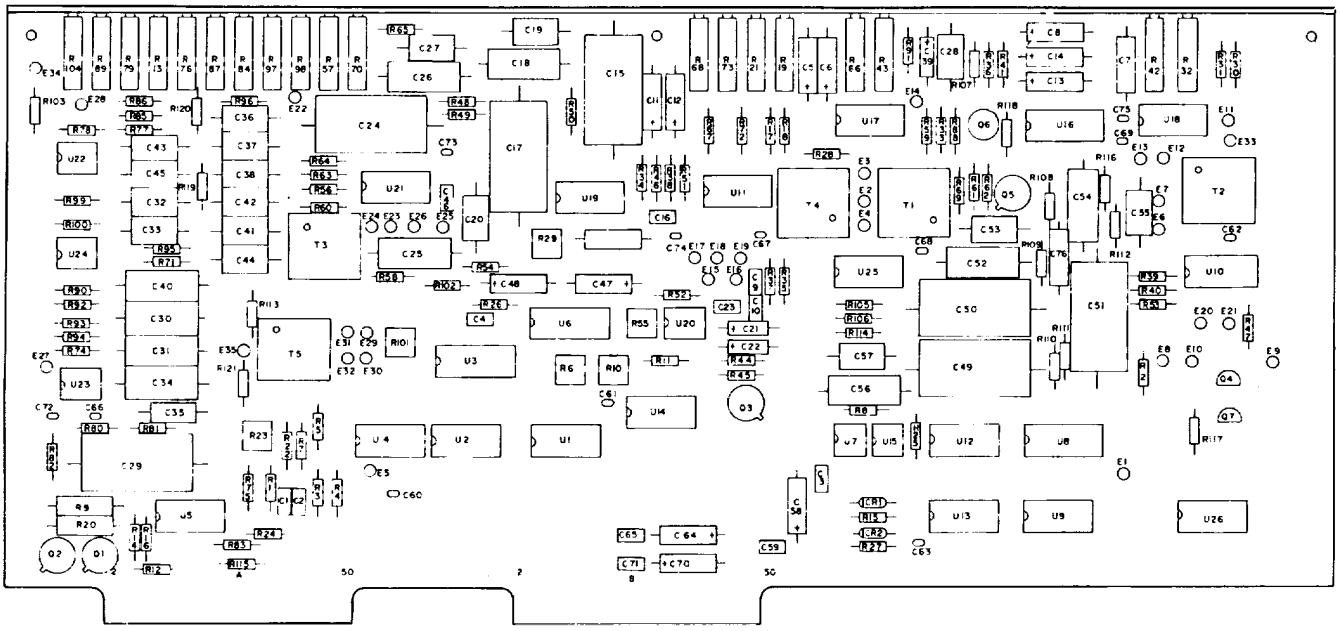


Figure 8-3. Operations Voice Buffer Circuit Card Assembly, 4A2 Parts Location Diagram

d. Operations Site (Remote) Modem Circuit Card Assembly (4A3) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, grasp both edges of the card and pull up. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 8-4 for location of component to be replaced.

CAUTION

Prior to removing circuit card assemblies, ensure power is turned off. CMOS circuits are extremely susceptible to damage from static electricity and precautions should be taken to reduce this possibility. Do not remove circuit cards from drawer except at a ground station. Avoid walking across a carpeted area while carrying a circuit card. Following removal of a circuit card place it on a piece of plastic sheeting.

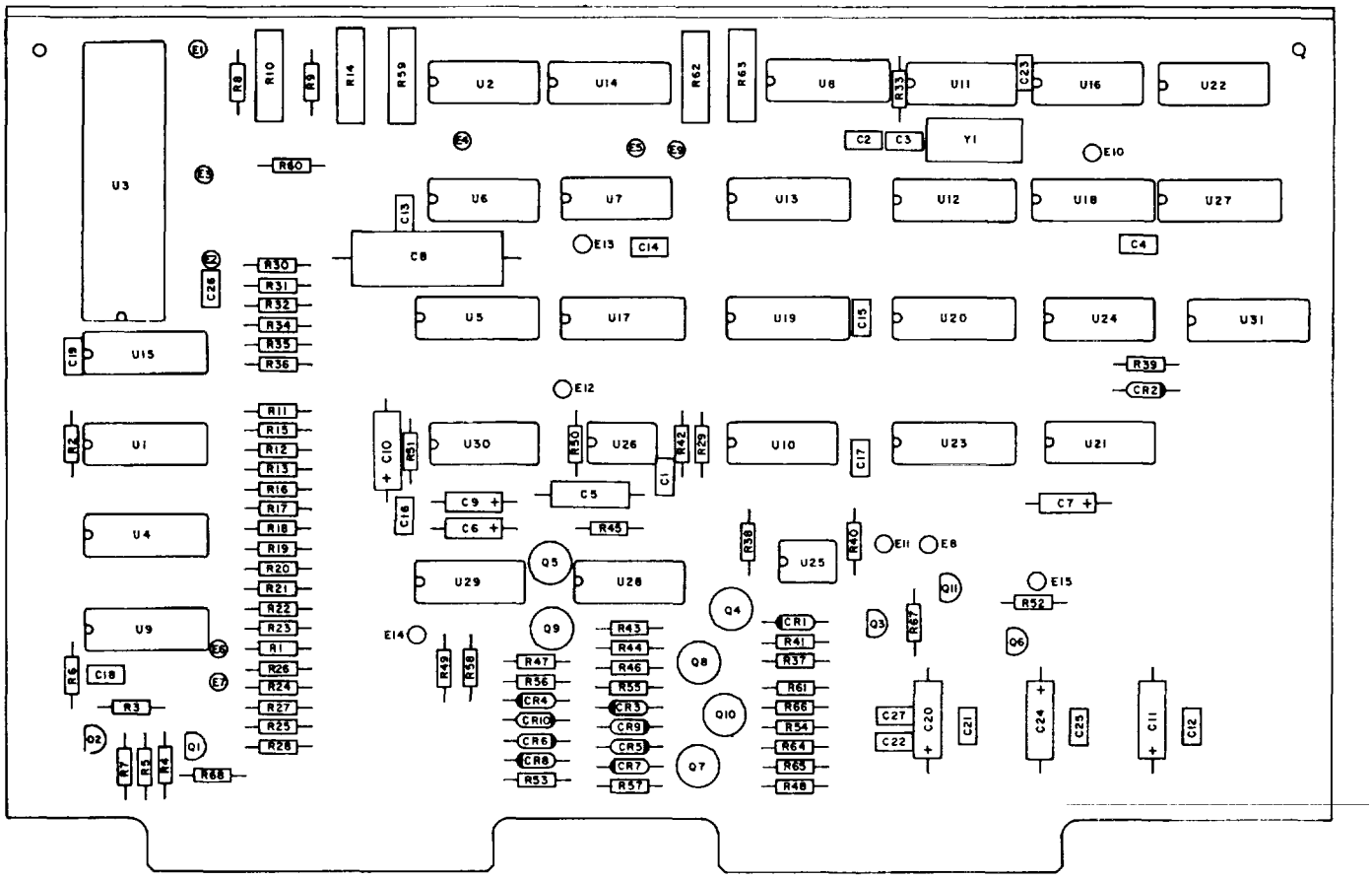


Figure 8-4. Operations Site (Remote) Modem Circuit Card Assembly, 4A3, Parts Location Diagram

e. Voltage Surge Suppressor Circuit Card Assembly (4A4) Disassembly. This circuit card assembly should be removed only when servicing or component replacement is required. To remove this circuit card assembly, perform the following procedures. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 8-5 for location of components to be replaced.

(1) Remove four screws, washers and electrical spacers holding the voltage surge suppressor circuit card assembly to the front panel.

(2) Disconnect the 14 wire leads from the voltage surge suppressor circuit card assembly.

(3) Remove the voltage surge suppressor circuit card assembly from the chassis assembly.

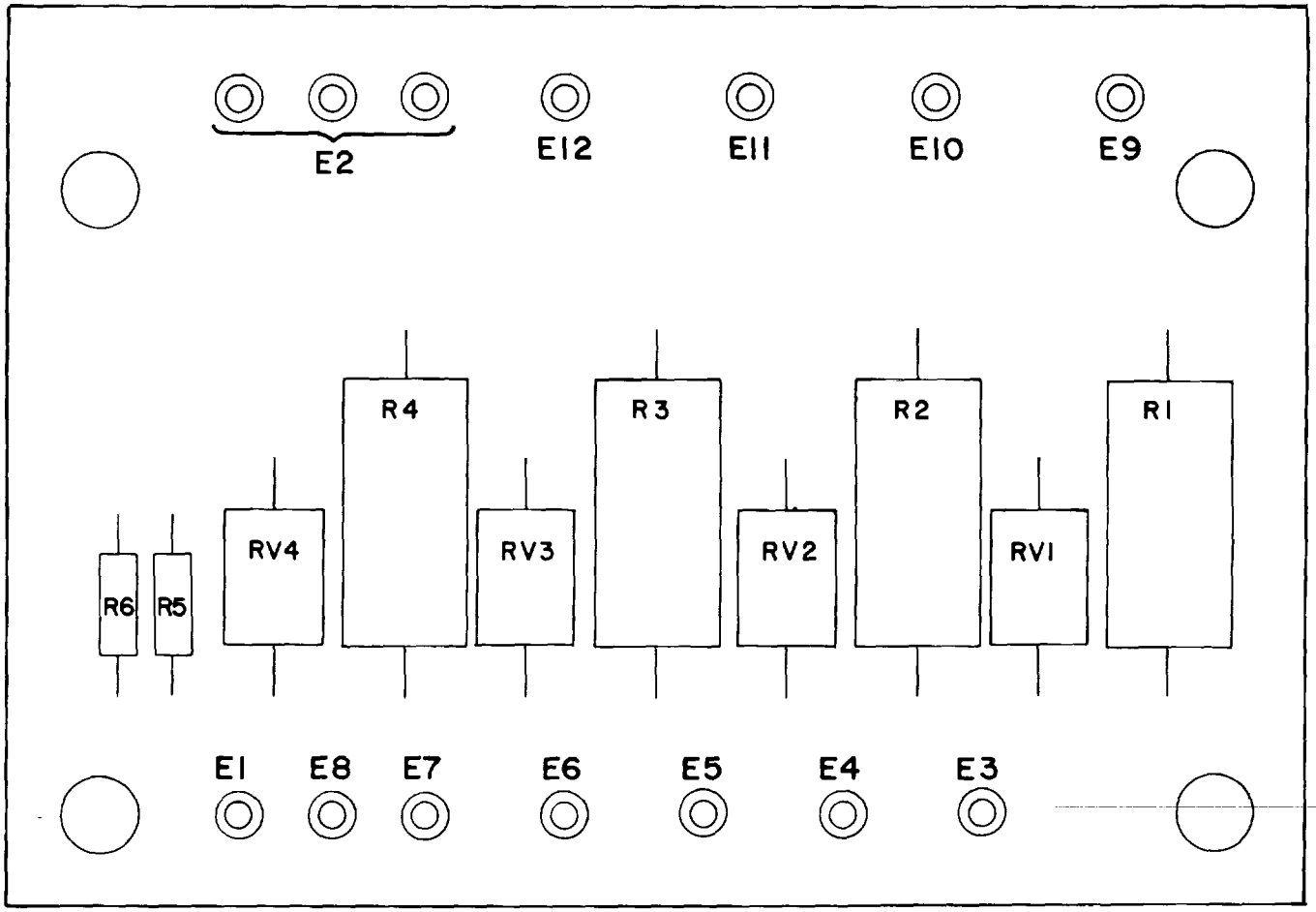


Figure 8-5. Voltage Surge Suppressor Circuit Card Assembly, 4A4 Parts Location Diagram

f. Power Supply (4PS1) Disassembly. To remove the power supply, perform the following steps.

(1) Remove the four screws, washers and nuts holding power supply 4PS1 in place.

(2) Tag and disconnect the wires from the wiring terminals on the transformer and 4PSlA1, 4PS1A2 and 4PS1A3 circuit card assemblies.

(3) Remove the power supply from the chassis.

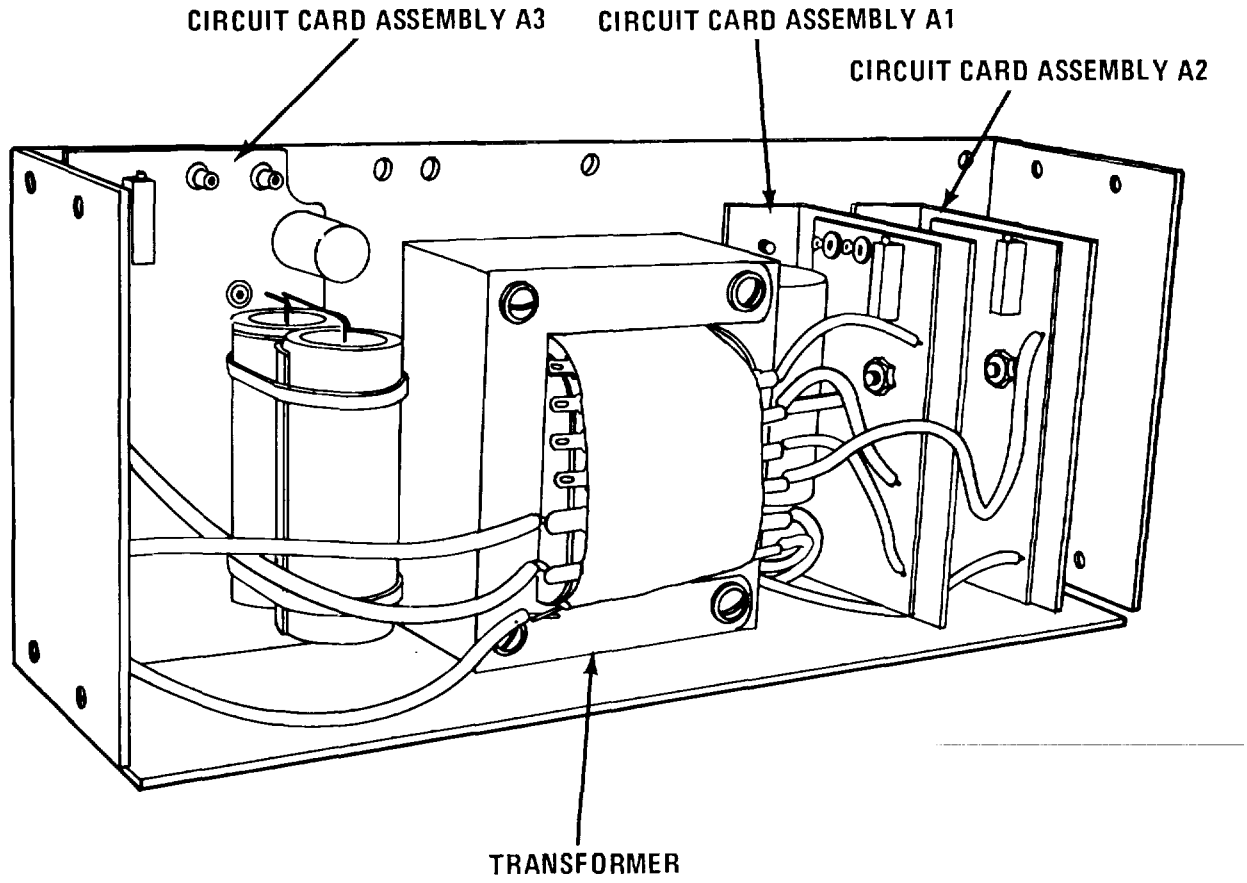


Figure 8-6. Power Supply, 4PS1

g. 4PS1A1 Circuit Card Assembly Disassembly. To disassemble 4PSlA1 circuit card assembly for servicing or component replacement, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 8-6 for location of circuit card.

(1) Disconnect the green wire from the top of the card.

(2) Remove the two screws on the back cover of the power supply.

(3) Disconnect the two orange wires from the top of the card.

(4) Remove the bracket with the circuit card still attached.

(5) Remove the two screws holding transistor Q2 to the bracket.

(6) Unsolder the black ground wire from the back of the card and remove card.

h. 4PS1A2 Circuit Card Assembly Disassembly. To disassemble 4PS1A2 circuit card assembly for servicing or component replacement, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 8-6 for location of circuit card.

(1) Disconnect the green wire from the top of the card.

(2) Remove the two screws on the back cover of the power supply.

(3) Disconnect the violet wire from the top of the circuit card.

(4) Remove the bracket with the circuit card still attached.

(5) Remove the two screws holding transistor Q2 to the bracket.

(6) Unsolder the black ground wire from the back of the card and remove card.

i. 4PS1A3 Circuit Card Assembly Disassembly. To disassemble 4PS1A3 circuit card assembly for servicing or component replacement, perform the following steps. Further disassembly should be limited to removal of parts for repair or replacement. Refer to figure 8-6 for location of circuit card.

(1) Disconnect the green wire from the top of the card.

(2) Remove the two screws on the back cover of the power supply.

(3) Disconnect the four yellow wires from the top of the card.

(4) Disconnect the grey and white wires from transformer T1.

(5) Remove the four screws holding transistors Q2 and CR1 to the power supply.

(6) Unsolder the black ground wire from the back of the card and remove card.

SECTION II

CLEANING AND INSPECTION

8-3. CLEANING. Clean the control indicator as required, following the procedures specified below. Do not clean anything which inspection does not show needs cleaning.

CAUTION

Do not use freon when cleaning circuit cards which contain plastic components, as damage to the cards will result. Use denatured alcohol to clean these circuit cards.

a. Remove dust and loose dirt from outside surfaces with a clean, soft cloth.

NOTE

Freon fumes are toxic. Provide adequate ventilation. Do not use near a flame. Freon is not flammable, but exposure to high heat can convert fumes to a highly toxic gas.

b. Remove grease and ground-in dirt from outside surfaces with a cloth dampened (not wet) with freon.

c. Remove dust and dirt from electrical connectors with a soft-bristled brush.

WARNING

Bodily injury or equipment damage can result from cleaning with compressed air at pressures in excess of 15 pounds per square inch.

d. If repair procedures require disassembly, remove dust from exposed inner parts of assembly by loosening with a soft-bristled brush and blowing with a jet of dry air at not more than 15 pounds per square inch.

8-4. INSPECTION. After disassembly, fabrication action, repair action or final assembly, subject the items to an in-process inspection. General inspection requirements shall be in accordance with MIL-M-45208. Adequate records of all inspections and tests shall be maintained (Appendix C), as applicable. The in-process inspection should include, but not be limited to, the following criteria:

a. Mounting of Parts. Inspect parts, components, or hardware, etc., to ensure that they are assembled, mounted and secured so as to satisfactorily accomplish their intended purpose.

b. Fabrication. Inspect finish for a smooth, continuous coating and a reasonable color match where surfaces have been touched up. Where conformal coating has been used, ensure that coating material has not covered areas purposely left unpainted or uncoated for electrical contact purposes. On circuit cards, there shall be no evidence of lifting or separation of plating from the conductor pattern or of conductors from the base laminate. There shall be no slivers or whiskers. There shall be no evidence of burns or corona discharge.

c. Threaded Parts or Devices. Inspect screws, nuts, bolts, etc., for cross-threading, detrimental or hazardous burrs, or mutilation.

d. Tightness. Inspect all screw-type fasteners for tightness. Fasteners shall be firmly secure and there shall be no relative movement possible between them and attached parts.

e. Soldering. Inspect leads to see that they are tightly crimped to terminals and that they show no signs of having been moved while soldering. Solder must show a shiny, smooth surface feathering out at the edges where it joins the surface of terminal or conductor. In addition, solder connections shall show only enough solder to cover the joint, and shall show no indication of burns, acid, or acid salts.

NOTE

Acid or acid salts should be used only as permitted for pretinning or soldering mechanical joints. No acid or acid salts may be used near insulation. Where acid or acid salts have been used as permitted, they shall be completely neutralized and removed.

f. Moisture/Fungus-Proofing. Conformally coated parts shall have unbroken coating. The coating material shall appear on areas purposely left unpainted or uncoated for electrical contact purposes.

g. Wiring. Inspect wiring for neatness and sturdiness. Wires shall be positioned to preclude or be protected from contact with rough or irregular surfaces and sharp edges. Ensure that wiring dress does not result in incorrect electrical operation. Inspect insulation for evidence of burns, abrasion or pinch marks. There shall be no splices on wiring between terminals. Clearance between wires and parts shall be such that there is no deterioration of wiring due to heat dissipation from the parts. Clearance between bare connections and bare conductors shall be sufficient to prevent contact or arcing during operation.

SECTION III

TROUBLESHOOTING

8-5. GENERAL. System-level fault isolation procedures to the unit or assembly level is provided in Chapter 3. This chapter provides fault isolation procedures to the module and circuit level for the Control-Indicator.

8-6. FAULT ISOLATION. To utilize the troubleshooting charts in this section, it is first necessary to identify the chart which corresponds to the observed failure reflected by the equipment. The step-by-step procedures contained in the troubleshooting charts (figures 8-7, 8-8 and 8-9) provide fault isolation to the module level and circuit level. These charts provide the means to fault isolate to the suspected circuit group. Isolation down to the part level is accomplished using schematics and circuit theory provided in TM 11-5825-266-14-1 and -2 and standard troubleshooting practices.

NOTE

Ensure that all internal wiring is good before assuming a circuit card to be defective. Verify that all inputs to the circuit card assembly have been properly checked.

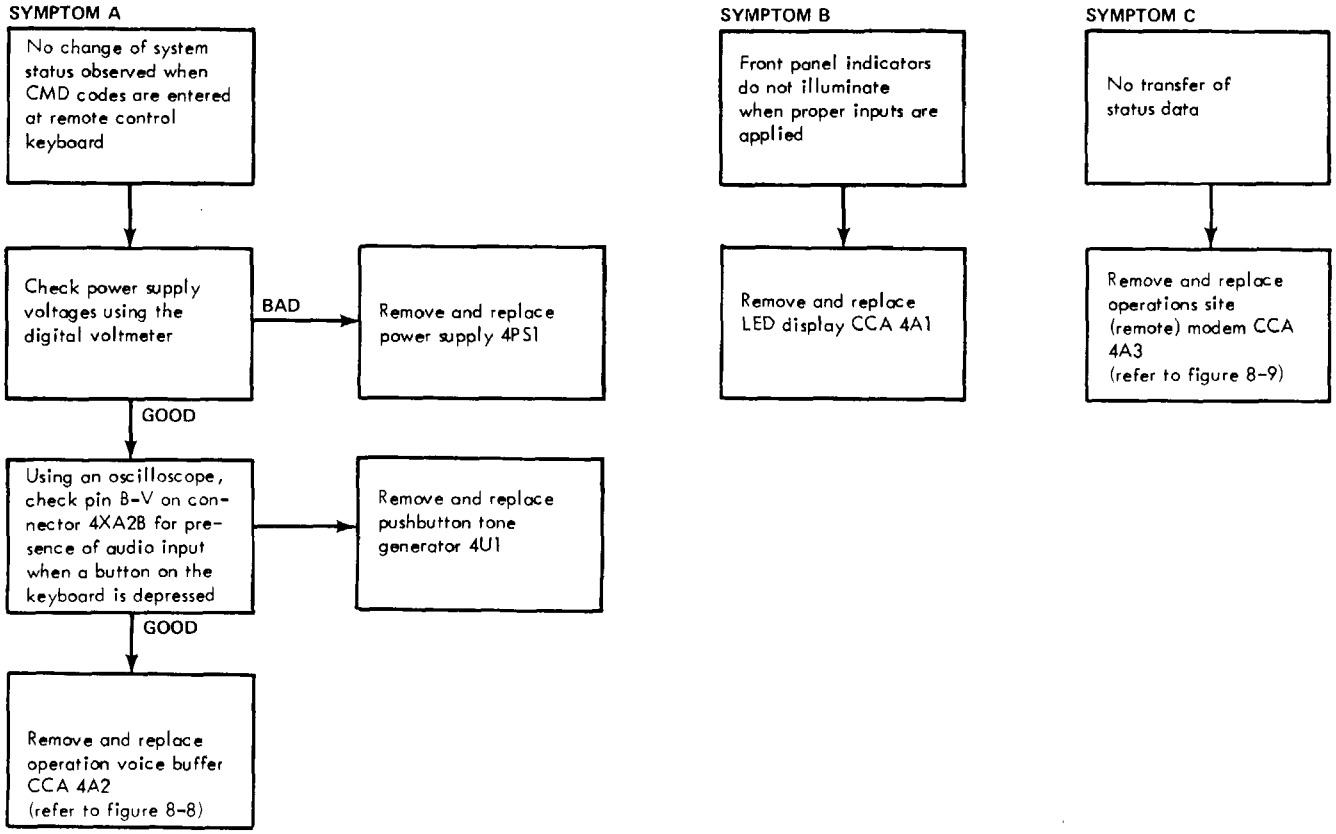


Figure 8-7. Control – Indicator (Remote Control) Troubleshooting Chart to the Module Level (Sheet 1 of 3)

8-17

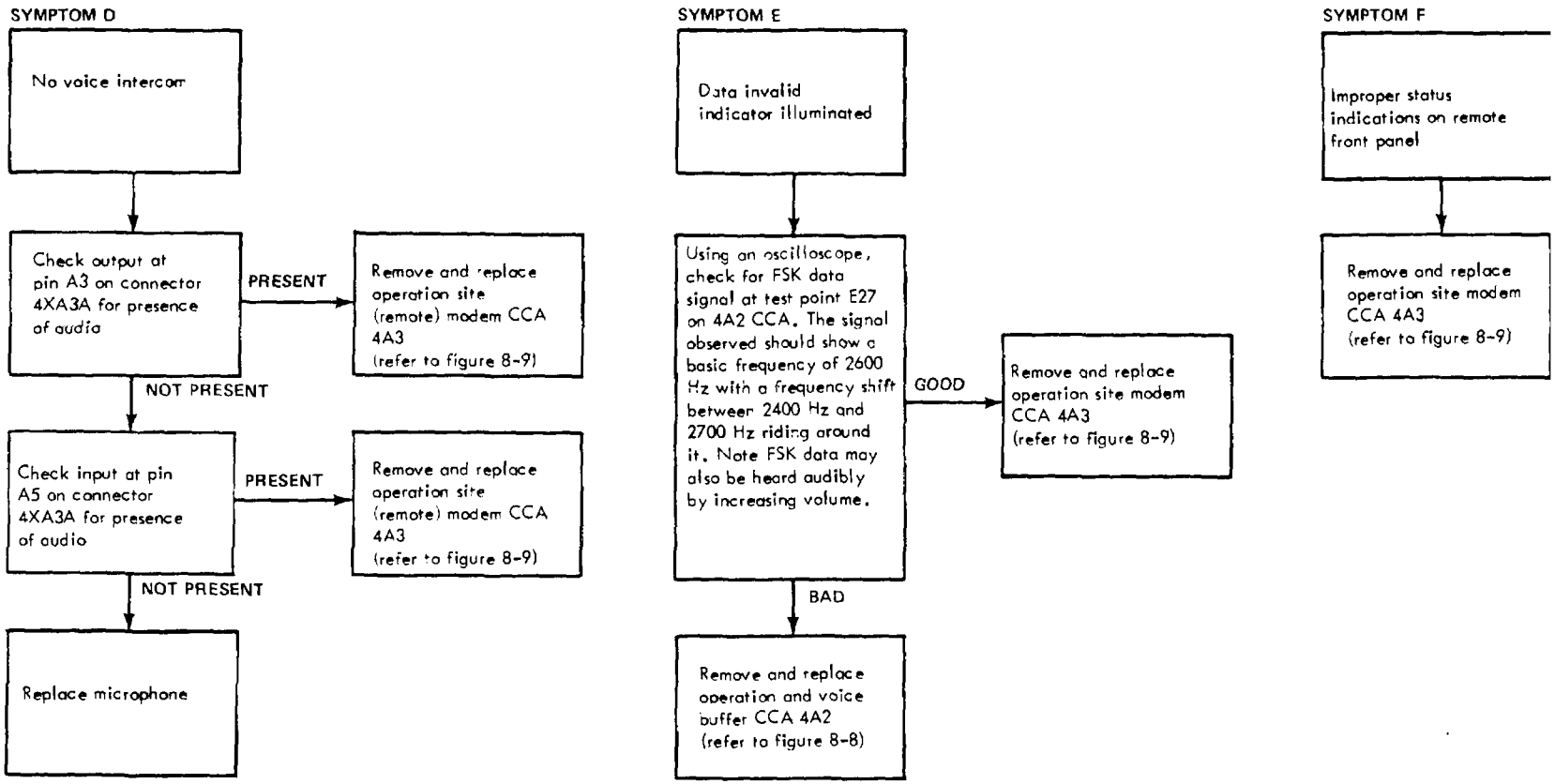
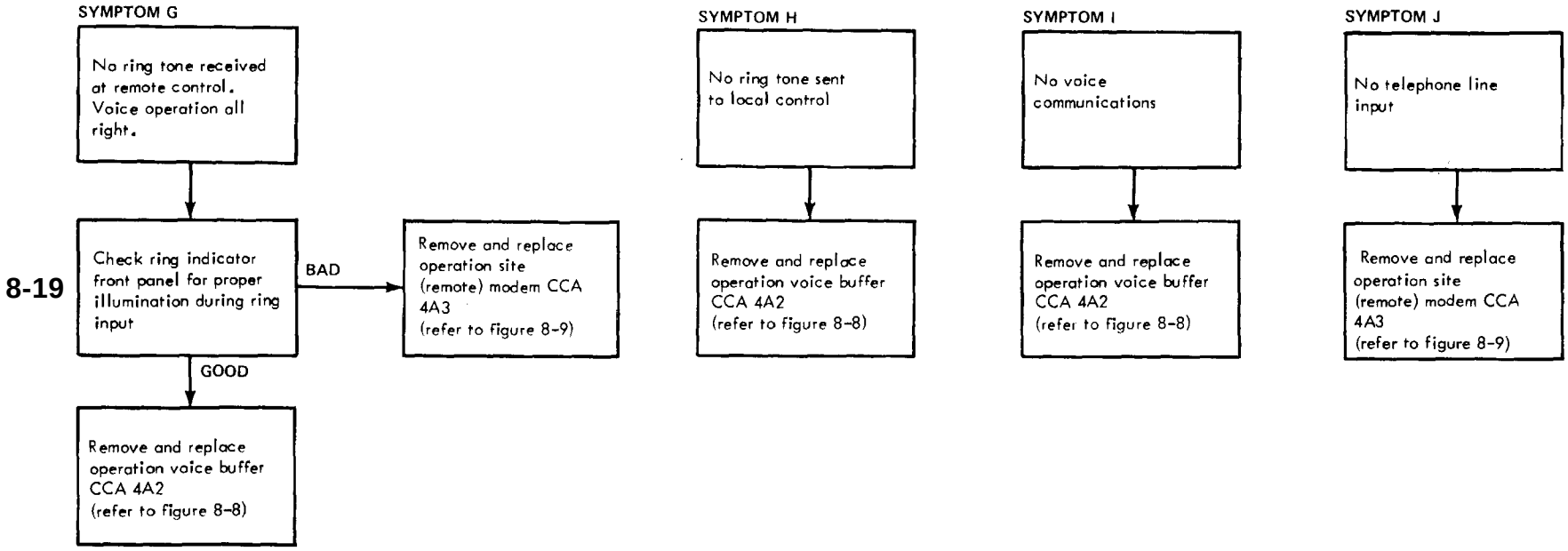


Figure 8-7. Control – Indicator (Remote Control) Troubleshooting Chart to the Module Level (Sheet 2 of 3)



8-19

Figure 8-7. Control – Indicator (Remote Control) Troubleshooting Chart to the Module Level (Sheet 3 of 3)

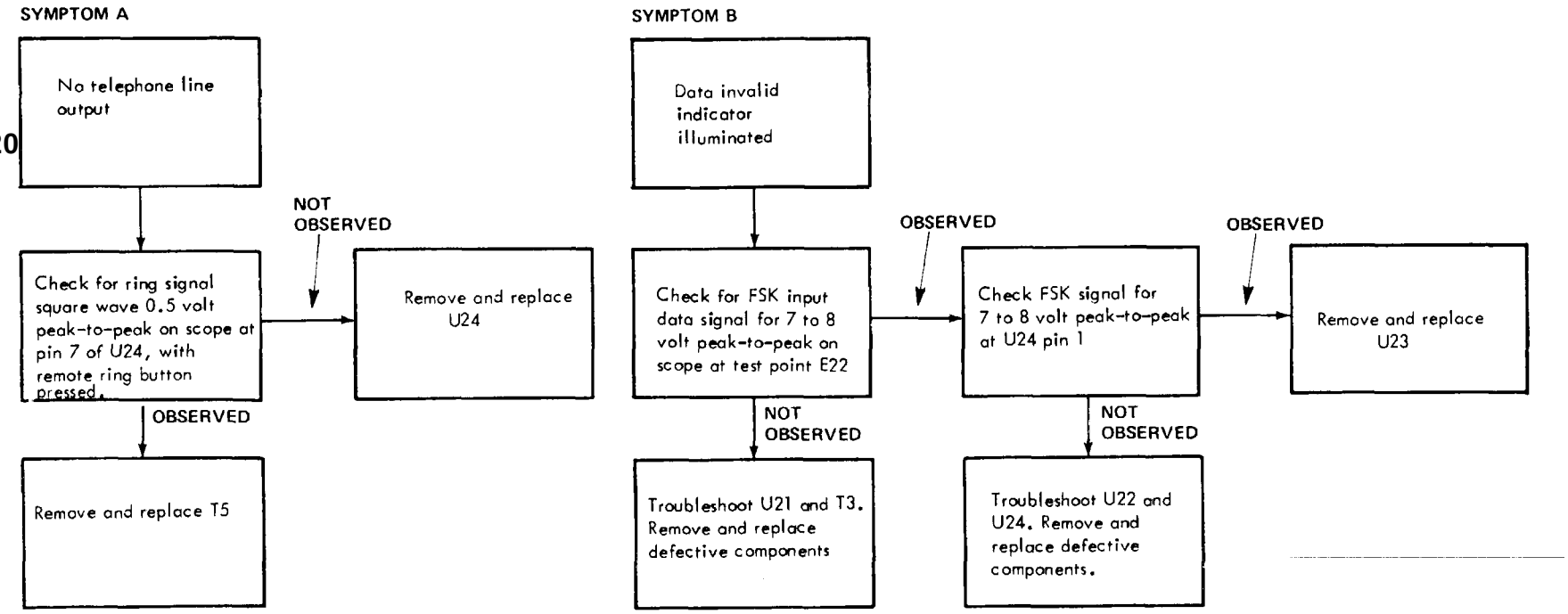


Figure 8-8. Operation Voice Buffer Circuit Card Assembly, 4A2, Troubleshooting Chart to the Circuit Level (Sheet 1 of 2)

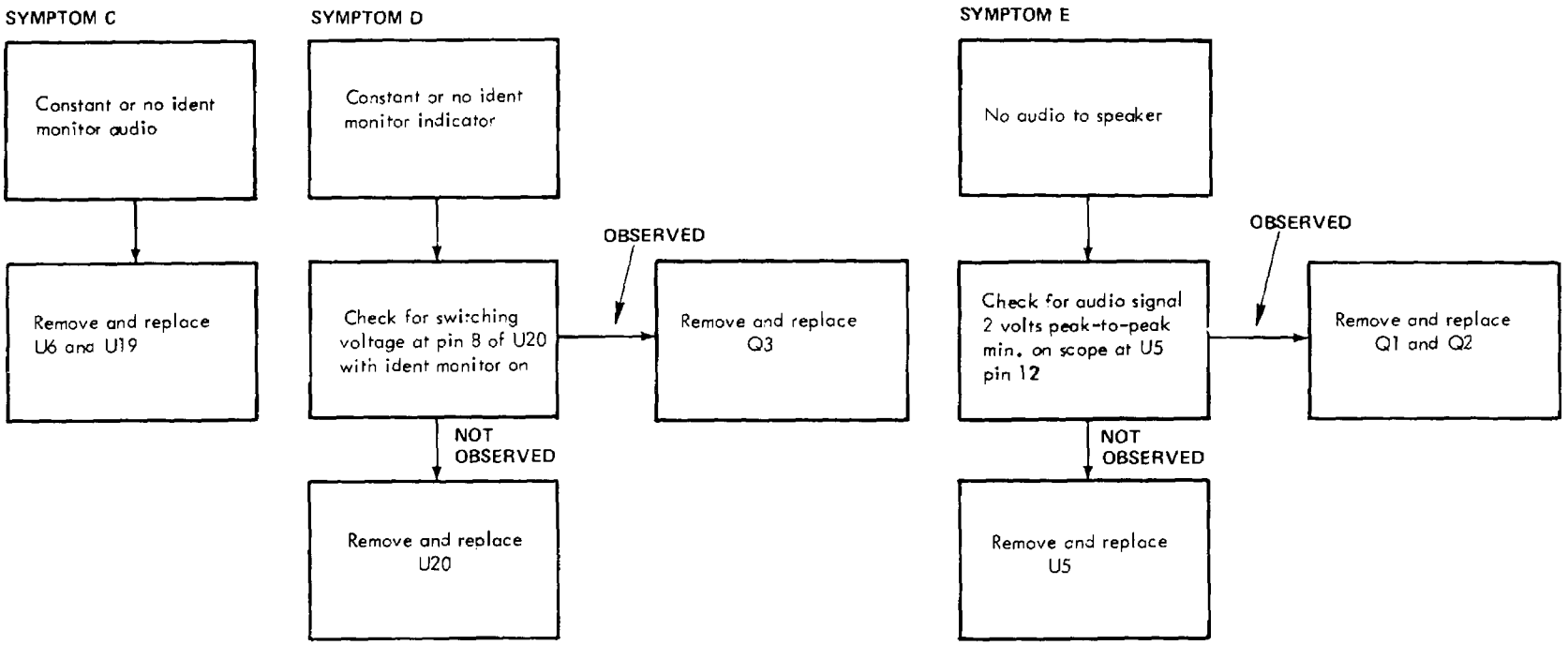


Figure 8-8. Operation Voice Buffer Circuit Card Assembly, 4A2, Troubleshooting Chart to the Circuit Level (Sheet 2 of 2)

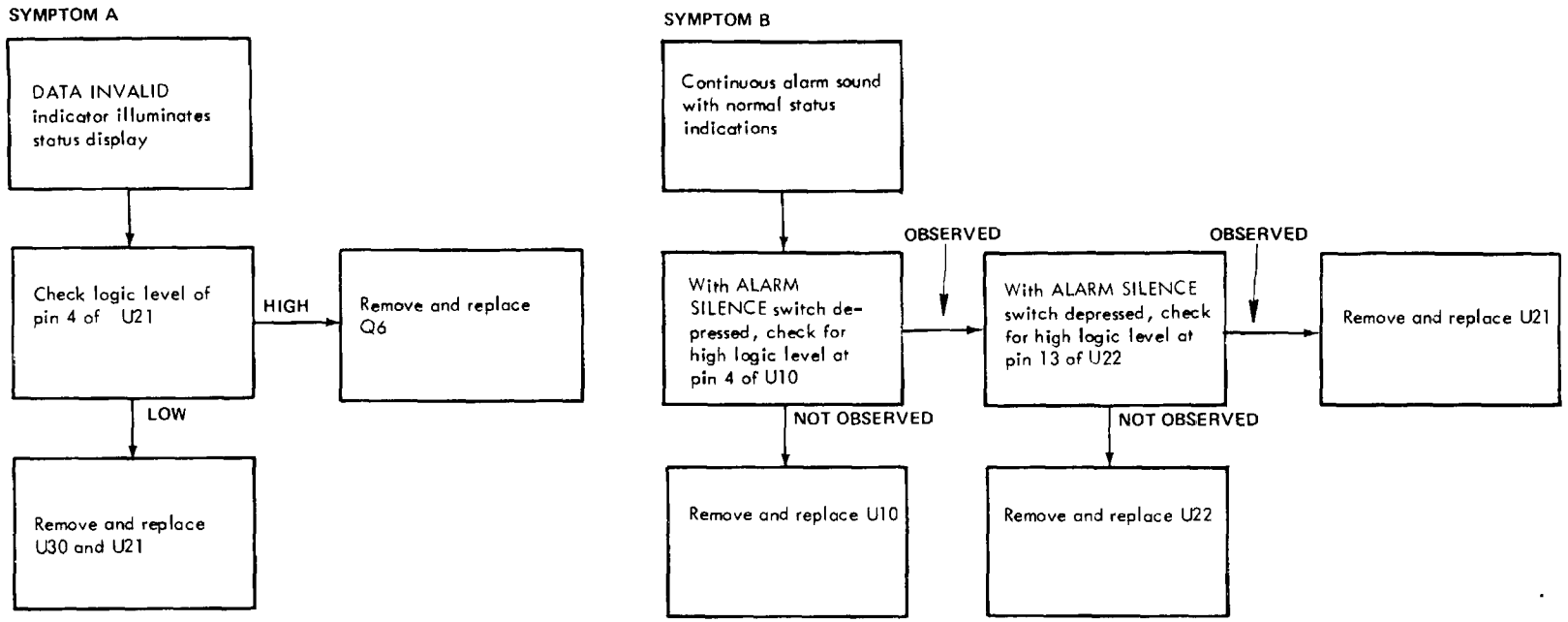


Figure 8-9. Operations Site (Remote) Modem Circuit Card Assembly, 4A3, Troubleshooting Chart to the Circuit Level (Sheet 1 of 4)

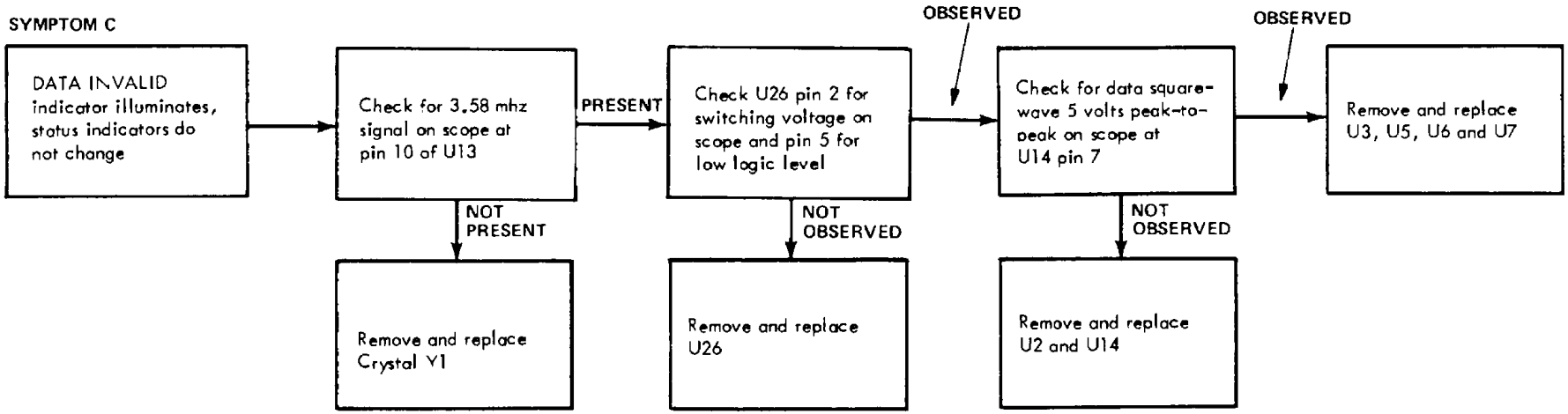


Figure 8-9. Operations Site (Remote) Modem Circuit Card Assembly, 4A3, Troubleshooting Chart to the Circuit Level (Sheet 2 of 4)

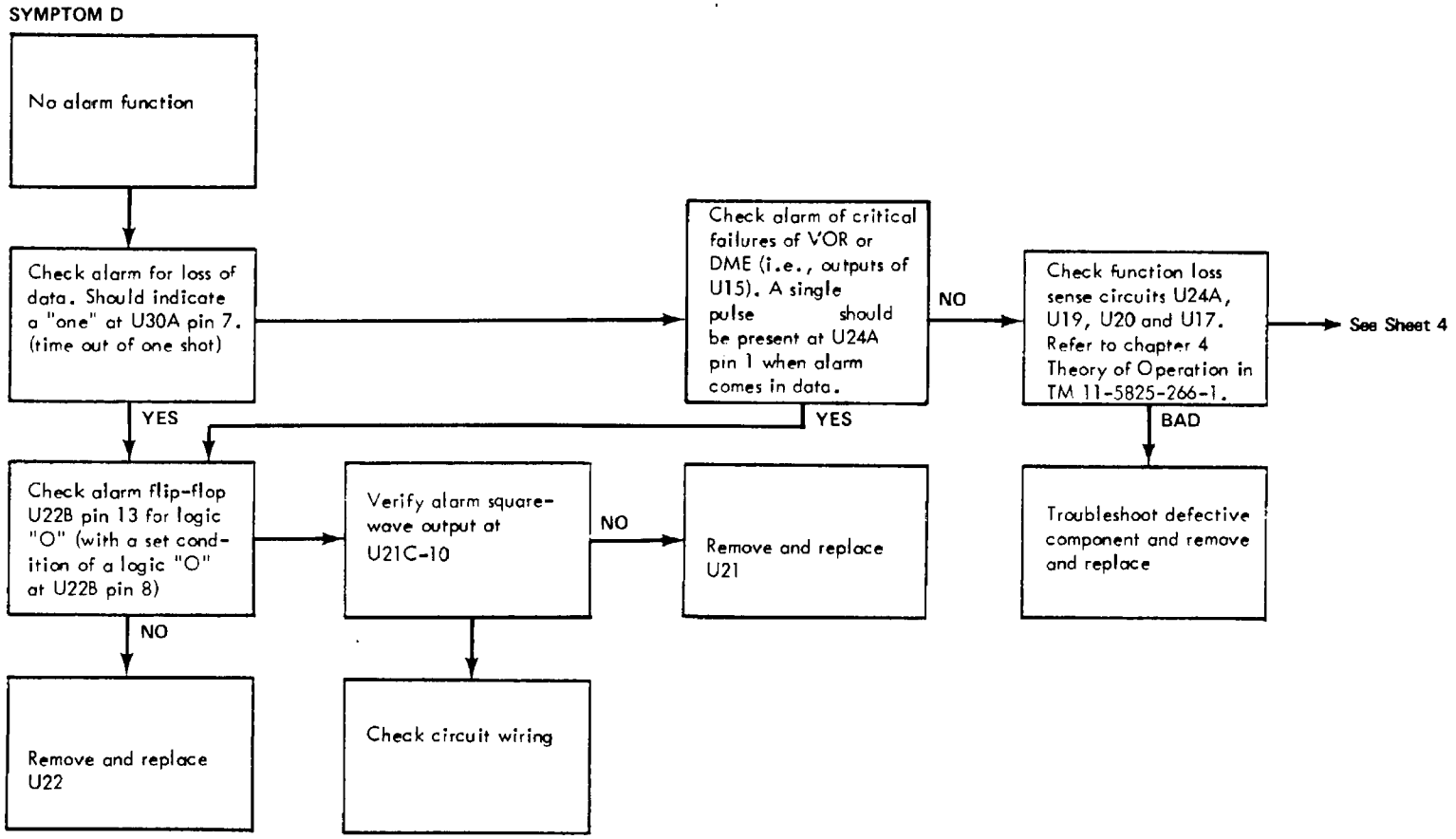


Figure 8-9. Operations Site (Remote) Modem Circuit Card Assembly, 4A3, Troubleshooting Chart to the Circuit Level (Sheet 3 of 4)

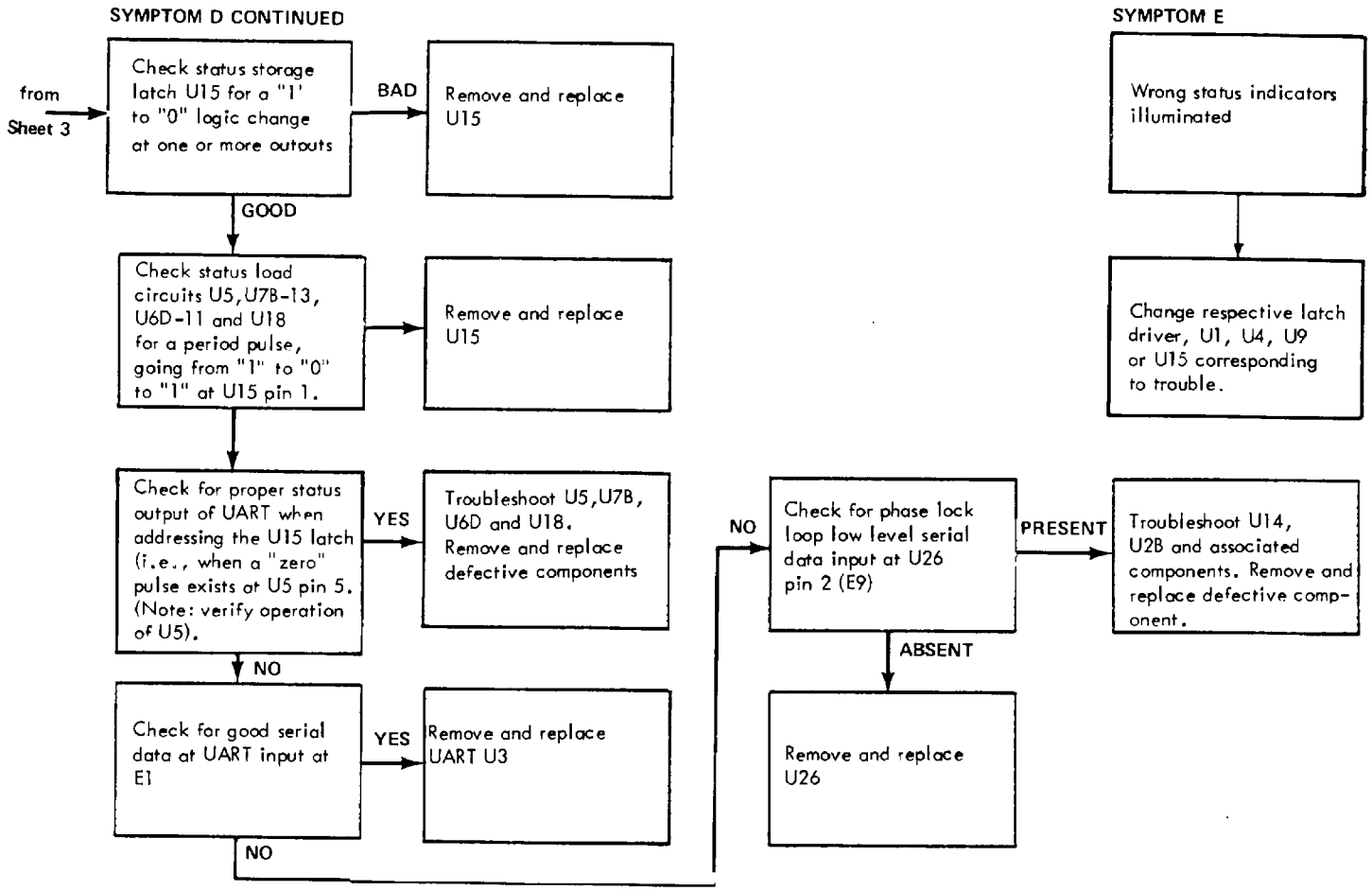


Figure 8-9. Operations Site (Remote) Modem Circuit Card Assembly, 4A3, Troubleshooting Chart to the Circuit Level (Sheet 4 of 4)

SECTION IV

REPAIR

8-7. INTRODUCTION. The following paragraphs contain repair procedures for the Control-Indicator and connectors. The repair procedures for the Control-Indicator are supported by tables containing cable requirements and lists of material needed to make each completely serviceable as applicable.

8-8. CONNECTOR AND WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair connectors and wiring harness damage. A list of all connectors by reference designation with a cross reference to the hand tools used for repair is provided in table 8-1. A wiring list showing point-to-point connections, wire type and size is provided in table 8-2A. Table 8-2B contains a list of materials.

8-9. SPECIAL REPAIR INSTRUCTIONS. See paragraph 3-30 for repair procedures for semiconductors and microcircuits.

Table 8-1. Control Indicator, C-10526/FRN-41 Connector Maintenance Tool List Matrix

Connector Data				Wire Size	Crimp Tool		Extraction Tool
Reference Designation	Type	Part Number	Contact Part Number		Type	Positioner	
4J1	Jack	910134-003	N/A	N/A	N/A	N/A	N/A
4J2	Solder	03159-4					
4P2	(Mating Connector)	02956-4		20			
4J3		(Not Used)					
4J4	Crimp	910163-002	910281-001	20-22	M8ND	N20RT-29	910923
4P4	(Mating Connector)	910189-002					
4J5	Crimp	910163-001	910281-001	20-22	M8ND	N20RT-29	910923
4P4	(Mating Connector)	910189-001					
4XA2A	910923-002	910933-001			N/A	N/A	Amphenol 91073-1
4XA2B	910923-002	910933-001			N/A	N/A	91073-1
4XA3A	910923-002	910933-001			N/A	N/A	91073-1
4XA3B	910923-002	910933-001			N/A	N/A	91073-1

Table 8-2A. Control-Indicator, C-10526/FRN-41 Wiring List

Note: Point-to-point wire connections are listed in Table 8-2A and a list of materials to be used in conjunction with Table 8-2A is provided in Table 8-2B.

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
1	6		J2-1		BS1	26	
2	12		J2-3		XA3B-M		
3W	27		J2-15		A4-E10	28	
3B	-		J2-17		A4-E11		
3S	1		FLOAT		A4-E2		
4W	27		J2-16		A4-E9	28	
4B	-		J2-18		A4-E12		
4S	1		FLOAT		A4-E2		
5	6		J2-25		BS1		
6	12		J4-1	23	XA2B-L		
7	11		J4-2	23	XA2B-M		
8	10		J4-3	23	A4-E7		
9	6		J4-4	23	BS1		
10	13		J4-5	23	XA2B-X		
11	14		J4-6	23	XA2B-5		
12	15		J4-7	23	XA3B-J		
13	16		J4-8	23	XA3B-K		
14	17		J4-9	23	XA3B-A		
15	18		J4-10	23	XA3B-C		
16	19		J4-11	23	XA2B-J		
17	2		J4-12	23	XA2B-H		
18	10		J5-1	23	XA2B-20		
19	11		J5-2	23	XA2B-21		
20	2		J5-3	23	A4-E8		
21	6		J5-4	23	BS1		
22	13		J5-5	23	XA2B-6		
23	15		J5-6	23	XA2B-7		
24	1		BS1		E2		
25-	9		PSI-TI-I		S1-1		
26	10		PS1-T1-4		S1-6		
27	4		PS1-(+12V)		S1-2		

Table 8-2A. Control-Indicator, C-10526/FRN-41 Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
28	4		PS - (+12V)		A4- E1		
29	8		PS1-(-12V)		XA2B-U		
30	5		PS1-(+5V)		XA2A-15		
31	5		PS1- (+5V)		XA2B-c		
32	5		PSI-(+5V)		A1-E32		
33	5		PSI-(+5V)		A1-E33		
34	6		PS1-(+12V RET.)		E2		
35	6		PSI-(-12V RET.)		E2		
36	6		PSI-(+5V RET.)		E2		
37	6		E2		A4-E2		
38	4		A4-E1		XA2B-S		
39	6		A4-E2		XA3A-6		
40	16		A4-E3		XA2A-Y		
41	17		A4-E4		XA2A-13		
42	18		A4-E5		XA2A-14		
43	19		A4-E6		XA2A-Z		
44	13		A1 - E42		XA3B-V		
45	15		A1-E67		XA2B-18		
46	10		A1-E66		XA2B-D		
47	11		A1 -E39		XA3A-22		
48	2		A1-E65		XA3A-a		
49	12		A1-E38		XA3A-21		
50	3		A1-E64		XA3A-Z		
51	14		A1-E37		XA3A-20		
52	13		A1-E63		XA3A-Y		
53	15		A1-E36		XA3A-19		
54	19		A1-E62		XA3A-X		
55	16		A1-E35		XA3A-18		
56	10		A1-E61		XA3A-W		
57	17		A1-E34		XA3A-17		
58	3		A1-E60		XA3A-V		

Table 8-2A. Control-Indicator, C-10526/FRN-41 Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
59	12		A1-E59		XA3A-U		
60	18		A1 -E58		XA3A-T		
61	10		A1-E31		XA3A-14		
62	19		Al-E57		XA3A-S		
63	2		A1 -E30		XA3A-13		
64	17		A1-E56		XA3A-R		
65	15		A1-E29		XA2B-E		
66	3		A1-E55		XA2B-V		
67	11		A1-E28		XA3A-11		
68	12		A1-E54		XA2A-18		
69	19		A1 -E27		XA3A-10		
70	18		A1-E53		XA3B-L		
71	13		A1-E26		XA3A-9		
72	10		A1-E52		XA3B-W		
73	14		A1-E25		XA3A-8		
74	3		A1-E51		XA3A-K		
75	2		A1-E24		XA2B-10		
76	19		Al-E50		XA3A-J		
77	16		Al-E22		XA3A-5		
78	17		Al-E47		XA3B-19		
79	15		A1-E20		XA2A-3		
80	12		A1-E45		XA2A-18		
81	11		Al-E18		XA2B-a		
82	6		A1-E44		J1-4		
83	6		A1-E43		S1-5		
84	17		Al-E13		Ul-TBI-2		
85	6		Al-E12		U1-TBI-3		
86	3		Al-EO1		J1-1		
87	6		Al-E9		J1-3		
88	6		Al-E7		LSI-2		

Table 8-2A. Control-Indicator, C-10526/FRN-41 Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
89	13		A1-E6		LSl-1		
90	10		A1-E8		J1-2		
91	15		XA2B-N		XA3A-3		
92	18		XA2B-F		XA3B-X		
93	13		XA2B-C		XA3A-23		
94	19		XA2B-B		XA3B-P		
95	10		XA2A-H		U1-TBI-1		
96	6		XA2A-F		XA2B-23		
97	12		XA2B-9		XA3A-L		
98	16		XA2B-8		XA3A-H		
99	11		XA2B-1		XA3A-M		
100	2		XA2A-17		XA3A-25		
101	5		XA2A-16		XA3A-16		
102	19		XF1-2	24, 25	S1-4		

Table 8-2A. Control-Indicator, C-10526/FRN-41 Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
*1	81		XA2B-c		XA2B-b		
2			XA2B-24		XA2B-b		
3			XA2B-24		XA2B-25		
4			XA3B-c	82	XA2B-25		
5			XA3B-c		A3B-b		
6			XA3B-24		XA3B-b		
7			XA3B-24		XA3B-25		
8			XA2A-15		XA2A-16		
9							
10			XA2B-S		XA2B-R		
11			XA2B-14		XA2B-R		
12			XA2B-14	82	XA3B-R		
13			XA3B-S		XA3B-R		
14			XA3B-S		XA3B-15		
15			XA3B--14		XA3B-15		
16			XA2B-U		XA2B-T		
17			XA2B-16		XA2B-T		
18			XA2B-16		XA2B-17		
19			XA3B-U	82	XA2B-17		
20			XA3B-U		XA3B-T		
21			XA3B-16		XA3B-T		
22			XA3B-16		XA3B-17		
23			XA2B-a		XA2B-Z		
24			XA2B-22		XA2B-Z		
25			XA2B-22		XA2B-23		
26			XA2A-F	82	XA2A- D		
27			XA2A-B	82	XA2A- D		
28			XA2A-B		XA2A-A		
81			XA2A-1		XA2A-A		

NOTE: Table 8-2A is comprised of a harness wire list and a cabinet assembly wire list. The cabinet assembly wire list is numbered separately for ease of reference.

Table 8-2A. Control-Indicator, C-10526/FRN-41 Wiring List (Contd)

WIRE NO.	MAKE FROM ITEM NO.	APPROX LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS. ITEM NO.	
30	81		XA2A-1		XA2A-2		
31			XA2A-4	82	XA2A-2		
32			XA2A-4	82	XA2A-6		
33			XA3A-F	82	XA2A-6		
34			XA3A-F	82	XA3A-D		
35			XA3A-B	82	XA3A-D		
36			XA3A-B		XA3A-A		
37			XA3A-1		XA3A-A		
38			XA3A-1		XA3A-2		
39			XA3A-4	82	XA3A-2		
40			XA3A-4	82	XA3A-6		
41	81		J1-3		J1-4		

Table 8-2B. Materials List

Qty	Item	Nomenclature or Description	Part Number or Specification
AR	1	Wire #22 Blk	MIL-W-16878/4
AR	2	Wire #22 Brn	MIL-W-16878/4
AR	3	Wire #22 Red	MIL-W-16878/4
AR	4	Wire #22 Org	MIL-W-16878/4
AR	5	Wire #22 Yel	MIL-W-16878/4
AR	6	Wire #22 Gm	MIL-W-16878/4
	7		
AR	8	Wire #22 Vio	MIL-W-16878/4
AR	9	Wire #22 Gry	MIL-W-16878/4
AR	10	Wire #22 Wht	MIL-W-16878/4
AR	11	Wire #22 W/Blk	MIL-W-16878/4
AR	12	Wire #22 W/Brn	MIL-W-16878/4
AR	13	Wire #22 W/Red	MIL-W-16878/4
AR	14	Wire #22 W/Org	MIL-W-16878/4
AR	15	Wire #22 W/Yel	MIL-W-16878/4
AR	16	Wire #22 W/Grn	MIL-W-16878/4
AR	17	Wire #22 W/Blu	MIL-W-16878/4
AR	18	Wire #22 W/Vio	MIL-W-16878/4
AR	19	Wire #22 W/Gry	MIL-W-16878/4
1	20	Conn J2	003159-4
1	21	Conn J4	910163-002
1	22	Conn J5	910163-001
18	23	Contact #20-22 Male	910281-001
1	24	Term. Flag	910868-001
1	25	Term. Housing	910869-001
1	26	Term. Splice BS1	MS2574-4
AR	27	Wire 2 Cond. Shid. W/Blk AWG-22	MIL-W-16878/4
2	28	Solder Sleeve	003700-2
X	29	Wire List	136820-251
AR	81	Wire, Solid AWG 22	QQ-W-434-Type S
AR	82	Sleeving, Ins. No. 22	MIL-1-22129

SECTION V

ASSEMBLY

8-10. GENERAL. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

8-11. ASSEMBLY PROCEDURES. Assembly of the Control-Indicator is essentially the reverse of disassembly. No special instructions are required.

8-12. TESTING. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 10.

8-13. REFINISHING, PAINTING AND MARKING. Refer to applicable cleaning and refinishing practices specified in TB 43-0118,Field Instructions for Painting and Preserving Electronics Command Equipment. Remove rust or corrosion from metal surfaces by lightly sanding them with No. 000 sandpaper. Apply two thin coats of paint (Finish No. P513E, per MIL-F-14072) on exposed metal areas to prevent further corrosion. Apply paint to only those areas which have been previously painted. Refer to SB 11-573, Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment, and AR 746-5, Color and Marking of Army Material.

CHAPTER 9

SHELTER S-597/FRN-41

MAINTENANCE, OVERHAUL AND REPAIR

SECTION I .

DISASSEMBLY

9-1. GENERAL. This chapter details disassembly, inspection, repair and reassembly procedures necessary to restore the Shelter S-597/FRN-41, power distribution box, environmental control unit, radome and obstruction lights to satisfactory operating condition after a failure or maintenance action. The text is supplemented with appropriate illustrations necessary to describe disassembly, repair and reassembly procedures. Do not disassemble the shelter more than is necessary for repairs.

9-2. SHELTER DISASSEMBLY PROCEDURES. Refer to TM 11-5825-266-14-1 (Chapter 2, Section III) for assembly procedures to be used as a guide for shelter disassembly.

9-3. POWER DISTRIBUTION BOX DISASSEMBLY PROCEDURES. Refer to figure 9-1 for the power distribution box layout. Repair of the power distribution box is basically limited to removing and replacing circuit breakers. Prior to removing circuit breakers, ensure the master circuit breaker is turned off as high voltage is present To obtain access to the circuit breakers, remove the screws around the front panel. To remove the circuit breakers, remove the two screws, pull the circuit breakers forward and disconnect the input power wires from the circuit breaker terminals.

9-4. ENVIRONMENTAL CONTROL UNIT DISASSEMBLY PROCEDURES. (Refer to figure 9-2.) Remove supply air duct and return air duct covers. Disassemble six square head bolts, flat washers, ring washers and hex nuts which hold the air conditioning unit to the shelter wall. Remove the two wood spacers on either side of the air conditioning unit.

NOTE

Two wood spacers on either side of the air conditioner must be stored and reinstalled upon completion of repair or replacement of the environmental control unit.

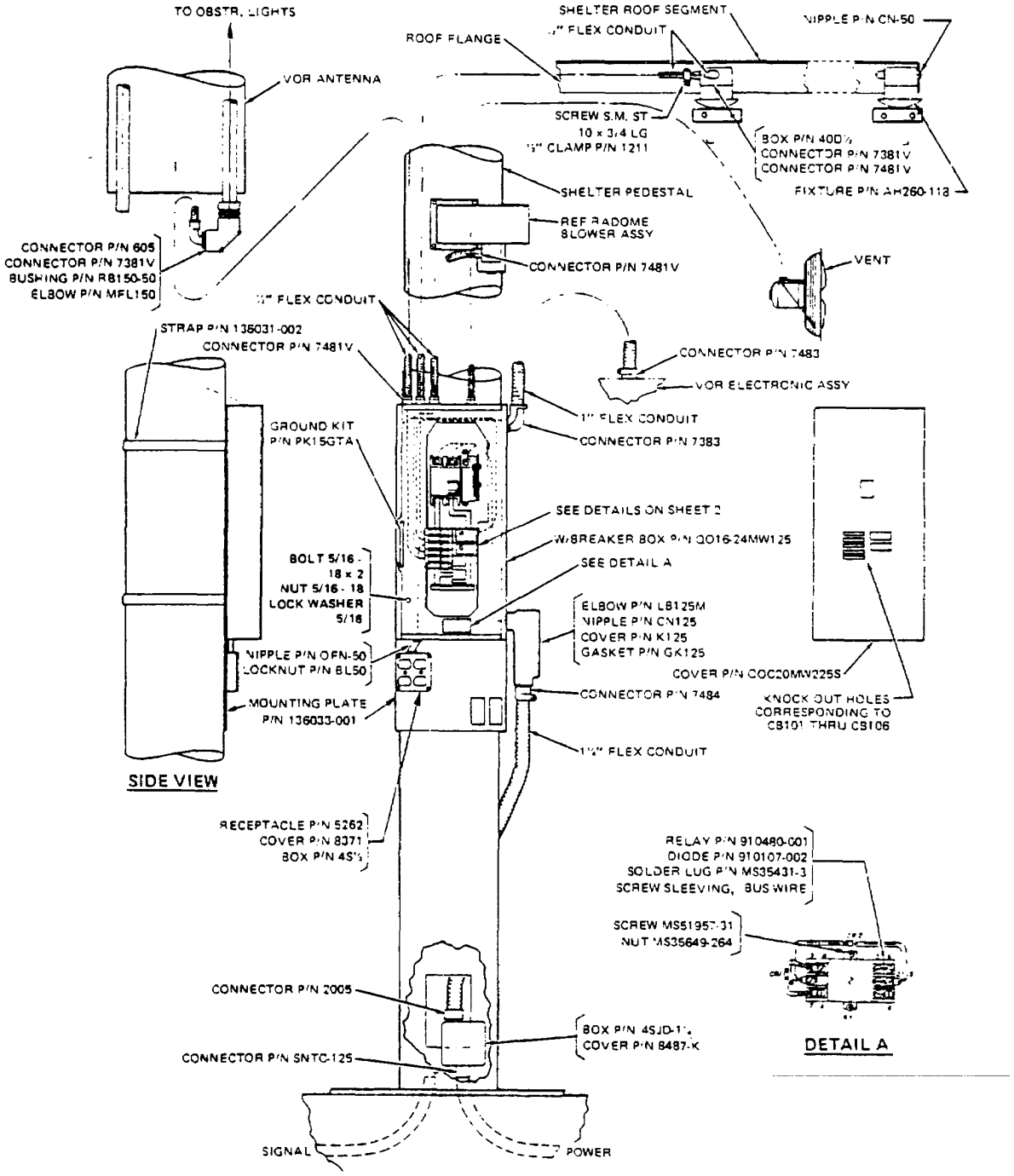
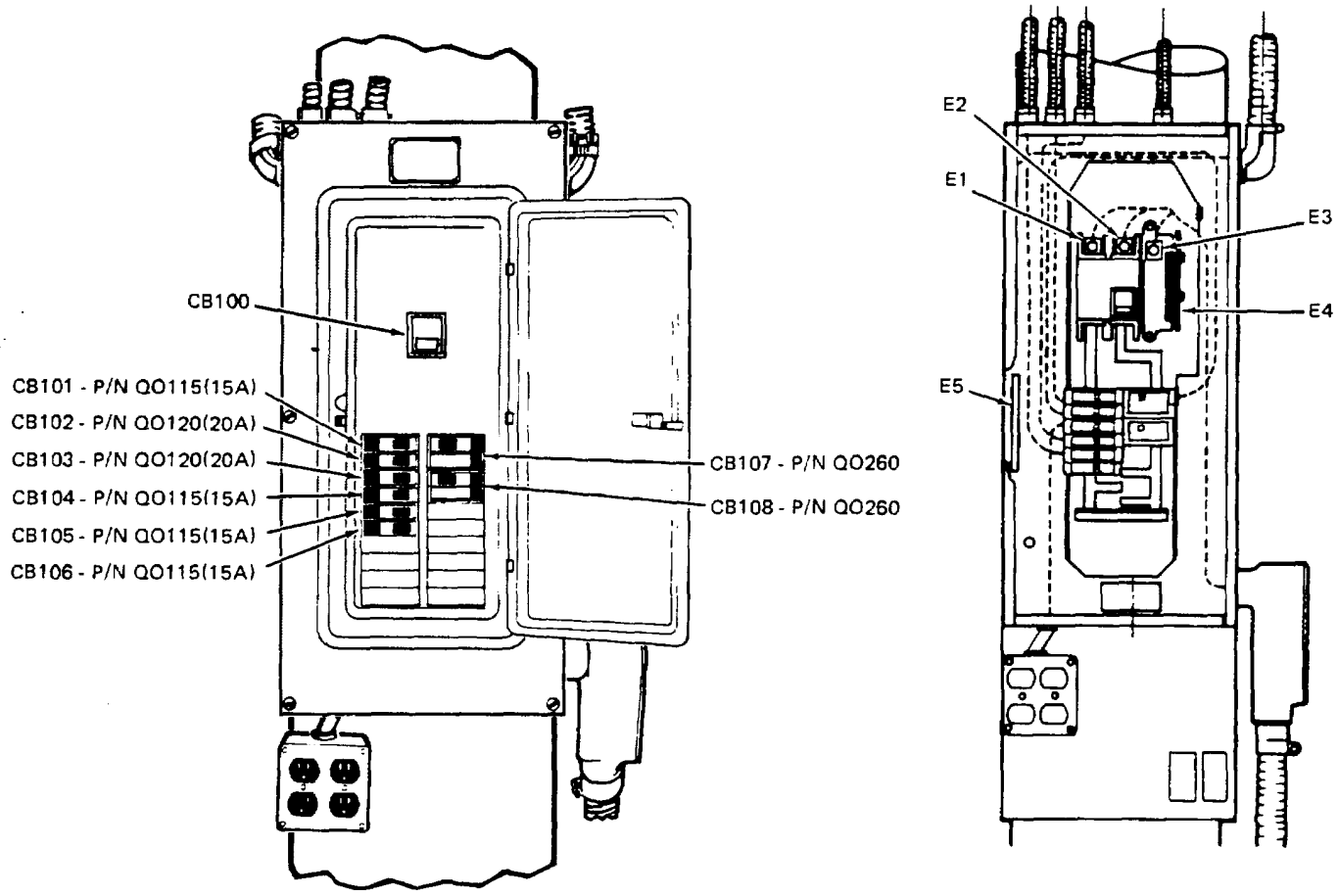


Figure 9-1. Power Distribution Layout (Sheet 1 of 2)



NOTE:
Point-to-point wiring information for the Power Distribution System is provided in table 9-1A. The wire numbers listed in table 9-IA correspond to the wire numbers shown in parentheses on figure 7-1 in TM-1 1-5825-266-14.

Figure 9-1. Power Distribution Layout (Sheet 2 of 2)

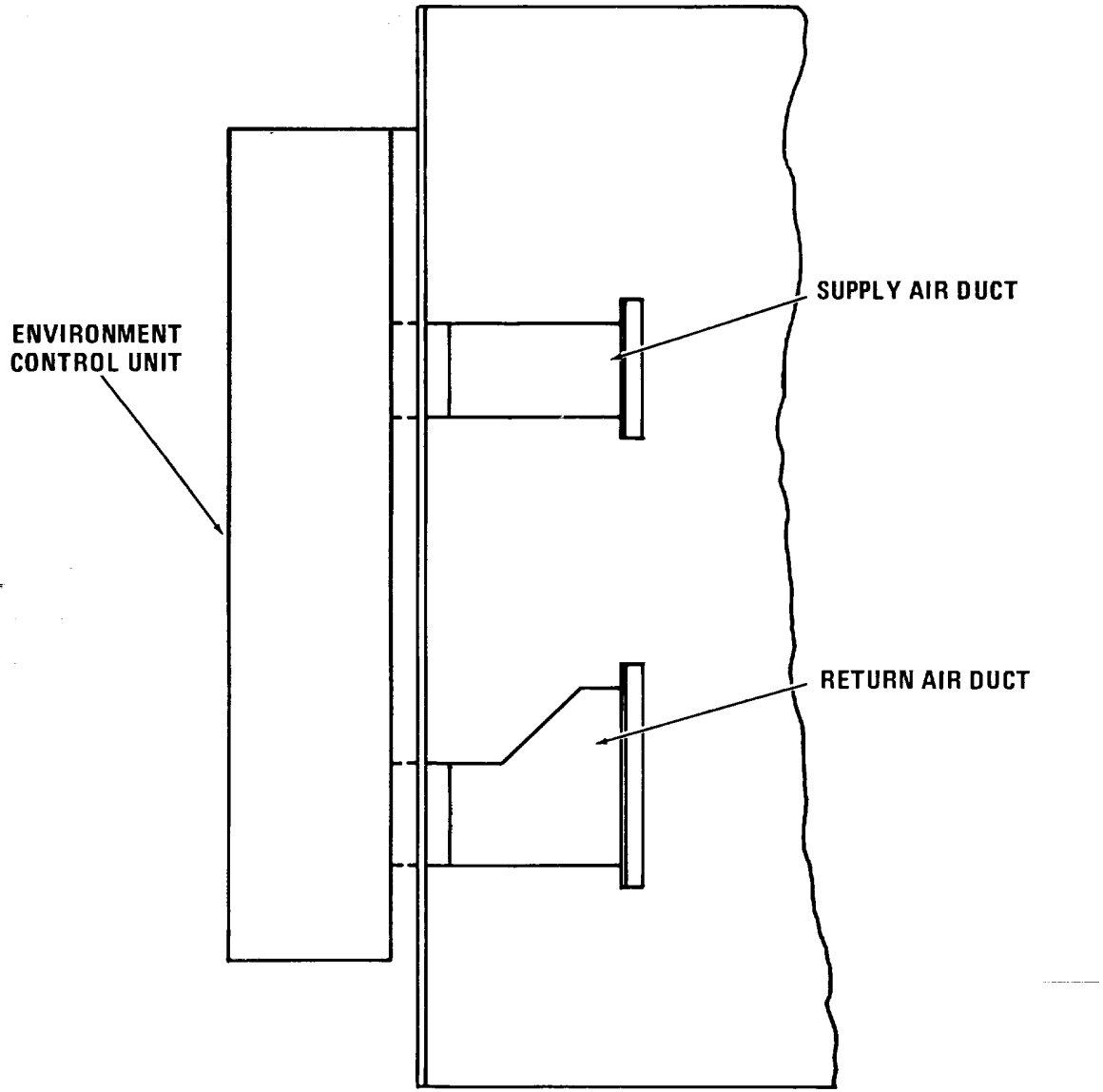


Figure 9-2. Environmental Control Unit (Sheet 1 of 2)

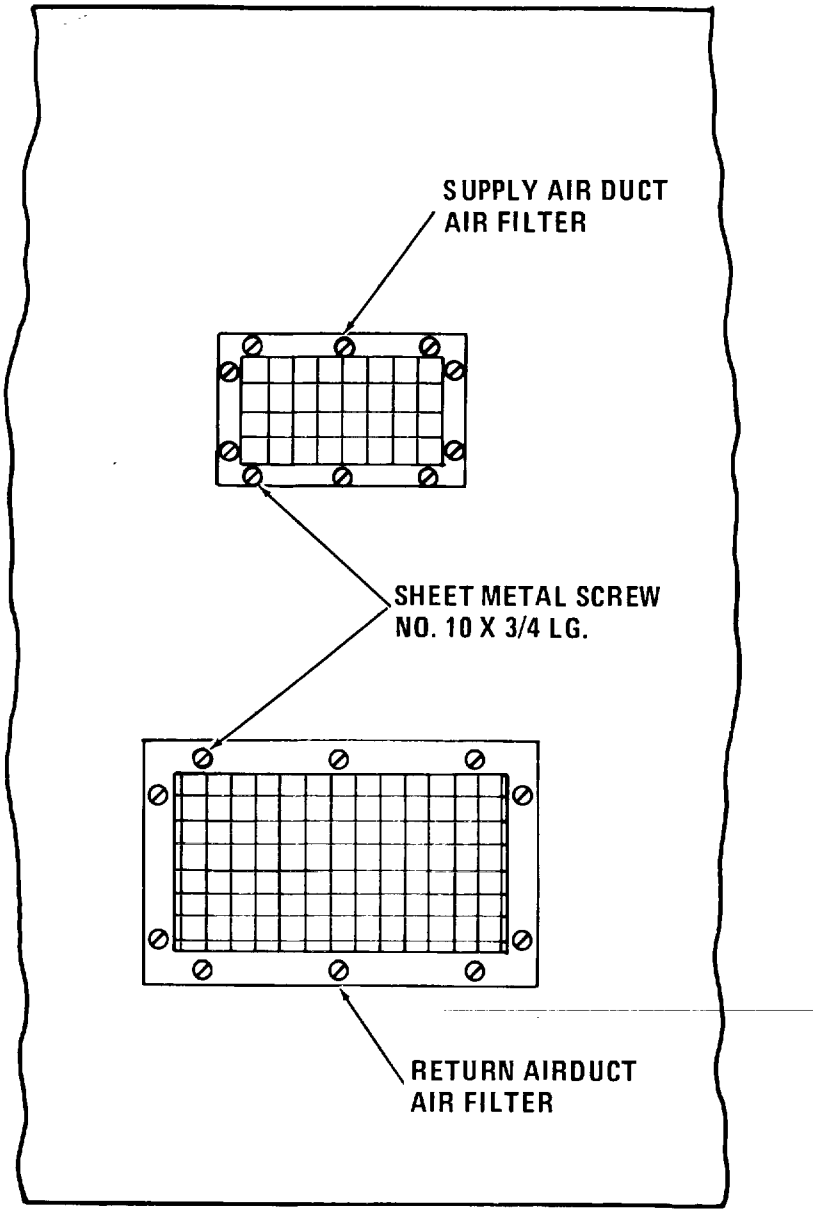


Figure 9-2. Environmental Control Unit (Sheet 2 of 2)

9-5. RADOME DISASSEMBLY PROCEDURES. (Refer to figure 9-3.) The radome is divided into three basic pieces These pieces are gasketed and held in place with nylon bolts and sealing washers. To disassemble the radome, remove the nuts, bolts and washers attaching the radome to the counterpoise. To reassemble the radome, assemble the two halves and the top piece. Orient the radome to the roof and bolt in place. Replace the door and seal all seams with caulking compound.

NOTE

If necessary to remove the obstruction lights assembly prior to removing the radome, disconnect the obstruction light wiring inside the radome at the top.

9-6. OBSTRUCTION LIGHTS DISASSEMBLY. Do not disassemble the obstruction lights more than is necessary for repairs. Disassemble the obstruction lights per figure 9-4.

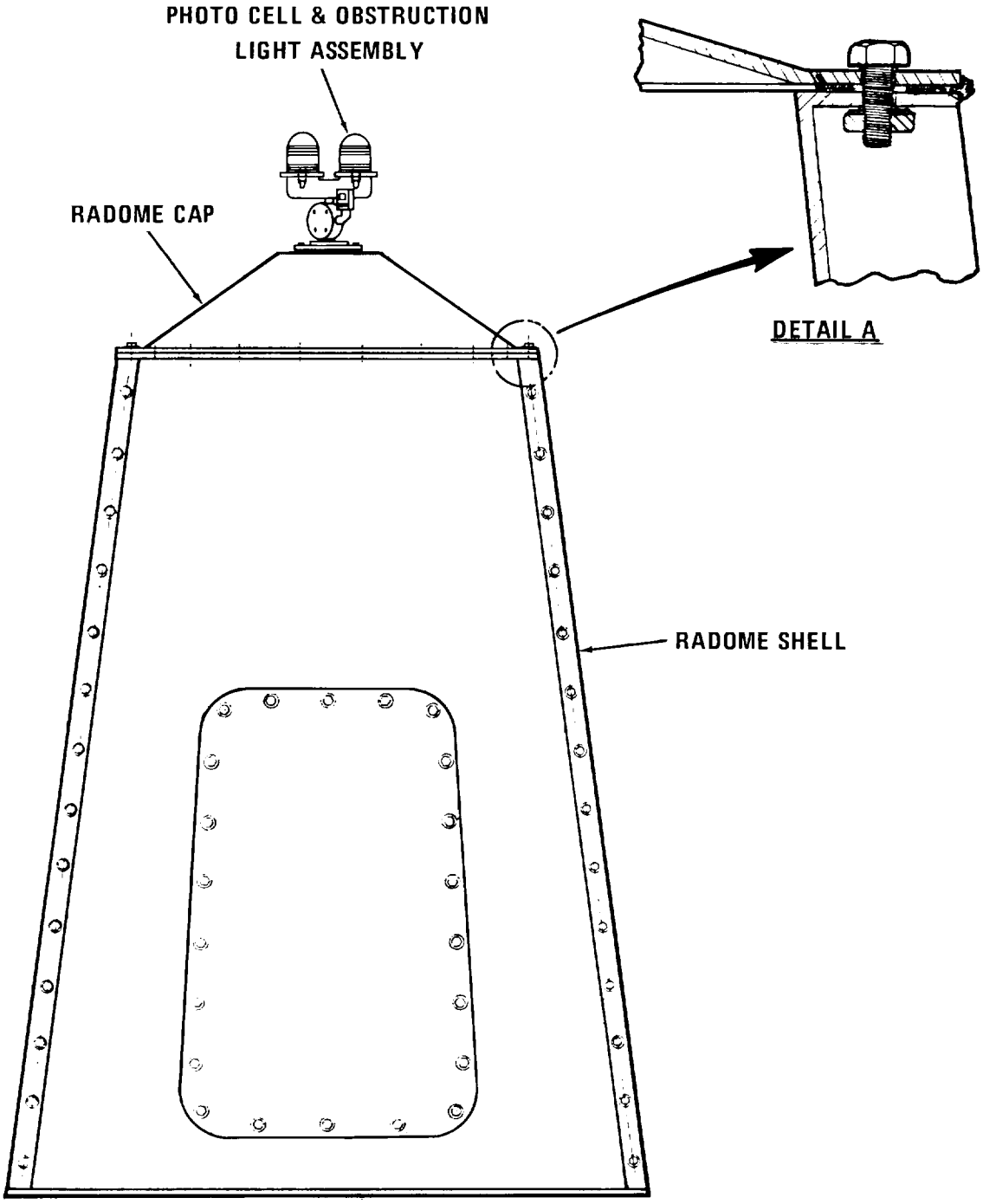


Figure 9-3. Radome Assembly

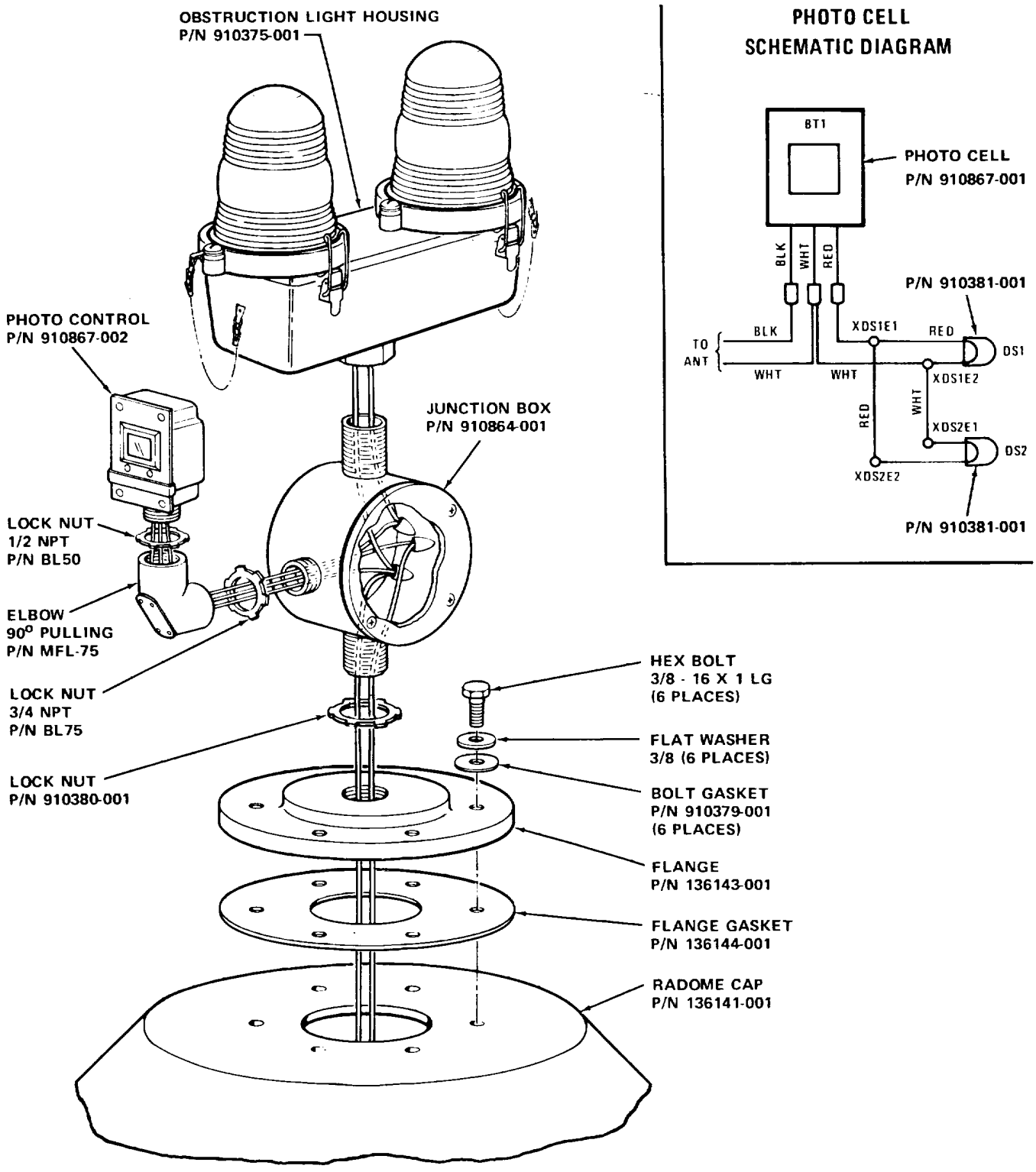


Figure 9-4. Obstruction Lights Assembly

SECTION II

CLEANING AND INSPECTION

9-7. CLEANING. Clean the environmental control unit, the power distribution box and the radome following the procedures specified below. Do not clean anything which inspection indicates does not need cleaning.

a. Remove dust and loose dirt from outside surfaces with a clean, soft cloth.

WARNING

Freon fumes are toxic. Provide adequate ventilation. DO NOT use near a flame. Freon is not flammable, but exposure to high heat can convert fumes to a highly toxic gas.

b. Remove grease and ground-in dirt from outside surfaces with soap and water.

c. Remove dust and dirt from electrical connectors with a soft-bristled brush.

WARNING

Bodily injury or equipment damage can result from cleaning with compressed air at pressures in excess of 15 pounds per square inch.

d. If repair procedures require disassembly, remove dust from exposed inner parts of assembly by loosening with a soft bristled brush and blowing with a jet of dry air at not more than 15 pounds per square inch.

9-8. INSPECTION. General inspection requirements shall be in accordance with MIL-M-45208.

SECTION III

TROUBLESHOOTING

9-9. GENERAL. System-level fault isolation procedures to the unit or assembly level are provided in chapter 3 This chapter provides fault isolation procedures to the assembly or part level.

9-10. FAULT ISOLATION. As an aid in troubleshooting, interconnection diagrams and schematic diagrams are provided in TM 11-5825-266-14. Basically, the repair concept replicas defective part with a known serviceable item after a technician has employed standard troubleshooting techniques to logically fault isolate this system down to a defective assembly or part.

SECTION IV

REPAIR

9-11. GENERAL. The following paragraphs contain repair procedures for the shelter, the environmental control unit, the power distribution box, the radome and obstruction lights.

9-12. POWER DISTRIBUTION BOX WIRING HARNESS MAINTENANCE. The following procedures provide necessary reference data to repair damage to the power distribution box wiring harness. A wiring list showing point-to-point connections, wire type and size is provided in table 9-1A. Table 9-1B contains a list of materials.

9-13. SEALING AND INSULATING REPAIR PROCEDURES.

a. Caulking. A final seal between the environmental control unit and the shelter and between the radome and the shelter shall be formed using a caulking gun (part number 58105) and caulking compound, Butylflex 12.

b. Insulating Compound. Clean all connections with freon prior to applying insulating compound. Coat all repaired connections (which are not insulated with tubing) with quick drying electrical insulating compound conforming to Military Specification MIL-1-17384.

Table 9-1A. VOR POWER Distribution Wiring List (See Figure 7-1 in TM-11-5825-266-14

WIRING LIST							
WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS ITEM NO.	
1	10		MP1 E2		A2E1		
2	8		MP1 E2		A2E2		
3	9		MPE13		A2E3		
4	5	7	E1		A2E5		
5	7	2	A2CB101		S2		
5A	7	12	S2		XDS1E1		Include blk wire from XDS1 & wire 6 in splice
6	7	12	XDS1E1		XDS1E1 XDS2E1		
7	7	12	XDS2E1		XDS3E1		Include blk wire from XDS2 & wire 7 in splice
8	7	12	XDS3E1		XDS4E1		Include blk wire from XDS3 & wire 8 in splice
9	6	12	A2		S2		Include blk wire from XDS4 in splice.
9A	6		S2		XDS1E2		
10	6	12	XDS1E2		XDS2E2		Incclude wht wire from XDS1 & wire 10 in splice
11	6	12	XDS2E2		XDS3E2		
12	6	12	XDS3E2		XDS4E2		Incclude wht wire from XDS2 & wire 11 in splice
13	5	12	A2		XDS1E3		
14	5	12	XDS1E4		XDS2E3		
15	5	12	XDS2E4		XDS3E3		Include wht wire from xds# &
16	5	12	XDS3E4		XDS4E3		wire 12 in splice
17	7	2	A2CB103		E2		
18	6	2	A2E4		E1		Include wht wire from XDS$ in
19	5	2	A2E5		E3		splice.
20	6	1	E1		E4		
21	7	1	E2		E5		
22	7	6	A2CB104		B1E1		
23	6	6	A2E4		B1E2		
24	5	6	A2E5		B1E3		Silver coloredmtg screw Gold colore mtg screw
25			Not used				GM colored mtg screw
26			Not Used				Silver coloredmtg screw
27			Not Used				Gold coloredmtg screw
28	7	12	A2CB102		1A1TB1-1		Splice with blk wire from B1
29	6	12	A2E4		1A1TB1-2		
30	5	12	A2E5		1A1TB1-3		Splice from wht wire from B1
31	7	13	A1XK1-4		3A1A1BT1-blk		
32			Not Used				Connect to B! frame
33	6	20	A2E4		3A1A1BT1-wht		
	5	13	A2E5				
	3	13	A2XK1-A				
	1	13	A2XK1-5				
	4		A2XK1-8				
			Not Used				
	7	2	A2CB105				
			Not Used				
	4	1	A2XK1-B				Gold coloredmtg screw
	10		A2CBL06				
	8		A2CB106				

WIRING LIST							
WIRE NO.	MAKE FROM ITEM NO.	APPROX. LENGTH INCHES	FROM		TO		REMARKS
			CIRCUIT POINT	ACCESS. ITEM NO.	CIRCUIT POINT	ACCESS ITEM NO.	
34	5	20	A2E5		Connect toA1A1BT1frame		
35	3	13	A2XK1-A		1A1TB3-10		
36	1	13	A2XK1-5		1A1TB3-11		
37	4	13	A2XK1-8		1A1TB3-12		
38			Not Used				
39	7	2	A2CB105		A1XK1-7		
40			Not Used				
41	4	1	A2XK1-B		A2XK1-8		
100	10		A2CBL06		A1E1		Lowerpole of CB106
101	8		A2CB106		A1E2		Upperpole of CB106
102	9		A2E5		A1E5		
103			Not Used				
104			Not Used				
105	10		A2CB108		A1E3		Splice with 2A6H1 and 2A6H2
106	8		A2CB108		A1E4		Splice with 2A6H3
107			Not Used				
108			Not Used				
109			Not Used				

Table 9-1B. Wiring Materials List

MAKE FROM	DESCRIPTION
1	WIRE, 22 AWG W/GRN
2	WIRE, 22 AWG W/VIO
3	WIRE, 22 AWG W/GRA
4	WIRE, 22 AWG ORN
5	WIRE, 12 AWG, CU, GRN, STR TYPE THHN
6	WIRE, 12 AWG, CU, WHT, STR TYPE THHN
7	WIRE, 12 AWG, CU, BLK, STR TYPE THHN
8	WIRE, 4 AWG, CU, RED, STR TYPE TH HN
9	WIRE, 4 AWG, CU, WHT, STR TYPE THHN
10	WIRE, 4 AWG, CU, BLK, STR TYPE THHN

SECTION V

ASSEMBLY

9-14. GENERAL. This section contains assembly and testing requirements for equipment which has been disassembled for testing, repair or replacement.

9-15. ASSEMBLY PROCEDURES. Assembly of the shelter and its subassemblies is essentially the reverse of disassembly. No special instructions are required.

9-16. TESTING. Testing of all equipment will be accomplished in accordance with the requirements specified in chapter 5 of TM 11-5825-266-14-1.

9-17. REFINISHING, PAINTING AND MARKING. Refer to applicable cleaning and refinishing practices specified in TB 43-0118,Field Instructions for Painting and Preserving Electronics Command Equipment. Remove rust or corrosion from metal surfaces by lightly sanding them with No. 000 sandpaper. Apply two thin coats of paint (Finish No. P513E, per MIL-F-14072) on exposed metal areas to prevent further corrosion. Apply paint to only those areas which have been previously painted. Refer to SB 11-573, Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment, and AR 746-5, Color and Marking of Army Material.

CHAPTER 10

PRESERVATION, PACKAGING, PACKING, MARKING AND SHIPPING

10-1. GENERAL. This chapter contains instructions for preservation, packaging, packing, marking and shipping the AN/FRN-41. Reference is made to applicable military specifications and standards covering these requirements. Materials required for packaging and packing are listed in the applicable military standards and specifications. National stock numbers for these materials, or their equivalents, are listed in DOD 4100.38-M.

10-2. PRESERVATION AND PACKAGING. Preservation and packaging shall be in accordance with FE D-STD-356A.

10-3. PACKING AND MARKING. Packing and marking shall be in accordance with FED-STD-356A.

APPENDIX A

REFERENCES

DA PAM 310-4	Index of Technical Publications: Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA PAM 310-7	U.S. Army Equipment Index of Modification Work Orders.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX B

CROSS REFERENCE FOR MONTEK CONNECTOR

TO MANUFACTURER CONNECTOR

MONTEK	MONTEK	MANUFACTURER	
CONNECTOR PART NUMBER	PIN REQUIRE	CODE	PART NUMBER
002956-4	N/A	71468	DBMA-25P-A106
003159-4	N/A	71468	DBMA-25S-A106
004518	N/A	74868	82-5373
005478	N/A	74868	31-315
006107	N/A	74868	31-318
910134-003	N/A	--	114B
910140-003	N/A	11769	00-7024-029-163-001
910163-001	910195-001 & 910281-001	09922	SMS6R-1
910163-002	910195-002 & 910281-002	09922	SM S12R-1
910163-003	910195-001 & 910281-002	09922	SMS24R-1
910163-004	910195-001	09922	SMS36R-1
910189-001	910195-001	09922	SMS6P-1
910263-001	N/A	89709	31-2373
910360-001	N/A	26805	3001-7141-10
910361-001	N/A	89709	82-4352
910498-001	N/A	89709	82-356

APPENDIX B (CONTD)

CROSS REFERENCE FOR MONTEK CONNECTOR

TO MANUFACTURER CONNECTOR

MONTEK CONNECTOR PART NUMBER	MONTEK PIN REQUIRE	MANUFACTURER CODE	MANUFACTURER PART NUMBER
910694-001	N/A	89709	31-316
910932-002	N/A	00779	1-583718-1
M39012/16-0001	N/A	81349	5935-00-835-05-8
M39012/26-0011	N/A	81349	5935-01-136-6912
M39012/27-0011	N/A	81349	5935-00-134-5718

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USAES (2)
USAICS (3)
MAAG (1)
USARMIS (1)
USAERDAA (1)
USAERDAW 'I
Ft Gordon (10)
Ft Carson (5)
Army Dep (1) except
LBAD (14)
SAAD (30)
TOAD (14)
SHAD (3)
Ft. Gillem (10)
USA Dep (1)
Sig Sec USA Dep (1)
Ft Richardson (CERCOM Ofc) (2)
Units org under fol TOE:
29-207 (2)
29-610 (2)

NG: None

USAR: None

For explanation of abbreviations used see AR 310-50.

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