TECHNICAL MANUAL
OPERATOR'S, UNIT, AND DIRECT SUPPORT
MAINTENANCE MANUAL

RADIO RELAY TEST SET
AN/URM-214

(NSN 6625-01-377-8125) (EIC: N/A)

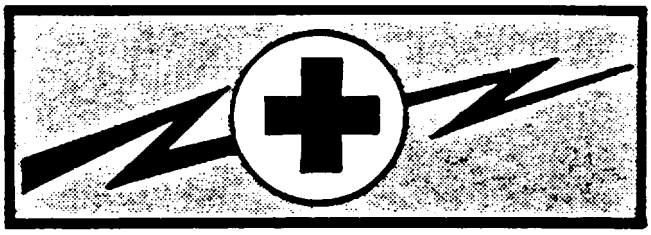
HEADQUARTERS, DEPARTMENT OF THE ARMY

1 APRIL 1994

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

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING



HIGH VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions

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

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

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

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

Warning: Do not be misled by the term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, Army Personnel refer to FM 21-11, Air Force Personnel refer to AFR 207 series regulations.

WARNING

Very high voltages are contained in this equipment. Turn OFF the primary power source POWER ON/OFF switch before replacing any line replaceable units (LRUs).

WARNING

Voltages capable of causing injury are used in Radio Transmitter, T-1573(V)1/AR, (V)2/AR. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

WARNING

When operating this unit in a potentially explosive environment, power to this unit must be turned 'OFF' before connecting external power cable. Failure to do so may result in hazardous spark generation.

WARNING

Test controller, TS-4398/U and cable assembly case, CY-8676/U, requires two-person lift. Injury to personnel may result if one-person lift is attempted.

WARNING

If nuclear, biological, or chemical (NBC) exposure is suspected, all air filters should be handled by personnel wearing protective equipment. Consult your NBC officer or NBC NCO for appropriate handling or disposal procedures.

WARNING

Receiver-Transmitter Test Group, OQ-458/U, requires two person lift. Injury to personnel may result if one-person lift is attempted.

WARNING

Very high voltages are contained in this equipment. On TS-4398/U, set Al ON/OFF to OFF before disassembling AN/URM-214. Failure to comply can result in serious injury or DEATH.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

WARNING

Transmitter, T-1573(V)1/AR, (V)2/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

WARNING

Radio-receiver, R-2500/AR, uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

WARNING

Radio Relay Test Set, AN/URM-214 uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

WARNING

Test Controller TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

WARNING

Receiver-Transmitter Test Group, OQ-458AJ uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any CCAs with the equipment power cable connected.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to install, remove, or replace any LRU with the equipment power cable connected. ,f *i*

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

Do not exceed a signal level of +10 dBm at the J3 connector from the signal generator. Exceeding +10 dBm will result in R-2500/AR, component damage.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

CAUTION

RRS, AN/ARW-85(V)2, 3 contains parts and assemblies sensitive to damage by electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

CAUTION

Torque screws to their required torque levels. Failure to do so may cause damage to the equipment.

CAUTION

Do not leave 'key' position on W18 for more than 1 minute or damage to the unit may occur.

CAUTION

To avoid damage to connectors, ensure pins are aligned when reconnecting.

CAUTION

When removing the four screws from the front of T-1573(V)2/AR, ensure that the Al module individual components (A1A1, A1A2, AIA3) are not separated.

CAUTION

This item contains parts and assemblies susceptible to damages by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

CAUTION

The filter element (glass) is supported by the display bezel. Hold the filter element while removing the display bezel.

CAUTION

Ensure that the power is off.

CAUTION

Ensure that all equipment is properly grounded before operating. Failure to do so may cause equipment damage.

Technical Manual

HEADQUARTERS
DEPARTMENT OF THE ARMY
No. 11-6625-3254-13 Washington, DC, 1 April 1994

Operator's, Unit, and Direct Support Maintenance Manual

RADIO RELAY TEST SET
AN/URM-214
(NSN 6625-01-377-8125) (EIC: N/A)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA form 2028 (Recommended Changes to Publications and Blank Forms), or DA form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LM-LT, Fort Monmouth, New Jersey 07703-5007. In either case a reply will be furnished direct to you.

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HOW TO USE THIS MANUAL

This manual is used by both the Army and Air Force for operation of Radio Relay Test Set, AN/URM-214.

This manual is divided into chapters, sections, and paragraphs which are numbered in sequence. Pages and paragraphs are numbered by chapters. For example, chapter 2, page 3 is marked 2-3; chapter 3 paragraph 5 is marked 3-5.

You must familiarize yourself with the entire maintenance procedure before performing the maintenance task.

Use table of contents in front of this manual, or index at rear, to help locate the section of manual needed. Use troubleshooting section in the chapter to determine what is wrong with the equipment. Do not attempt to troubleshoot beyond your authorized specific level of maintenance

Having located the faulty part, use the maintenance section in the chapter for instructions on how to replace damaged parts.

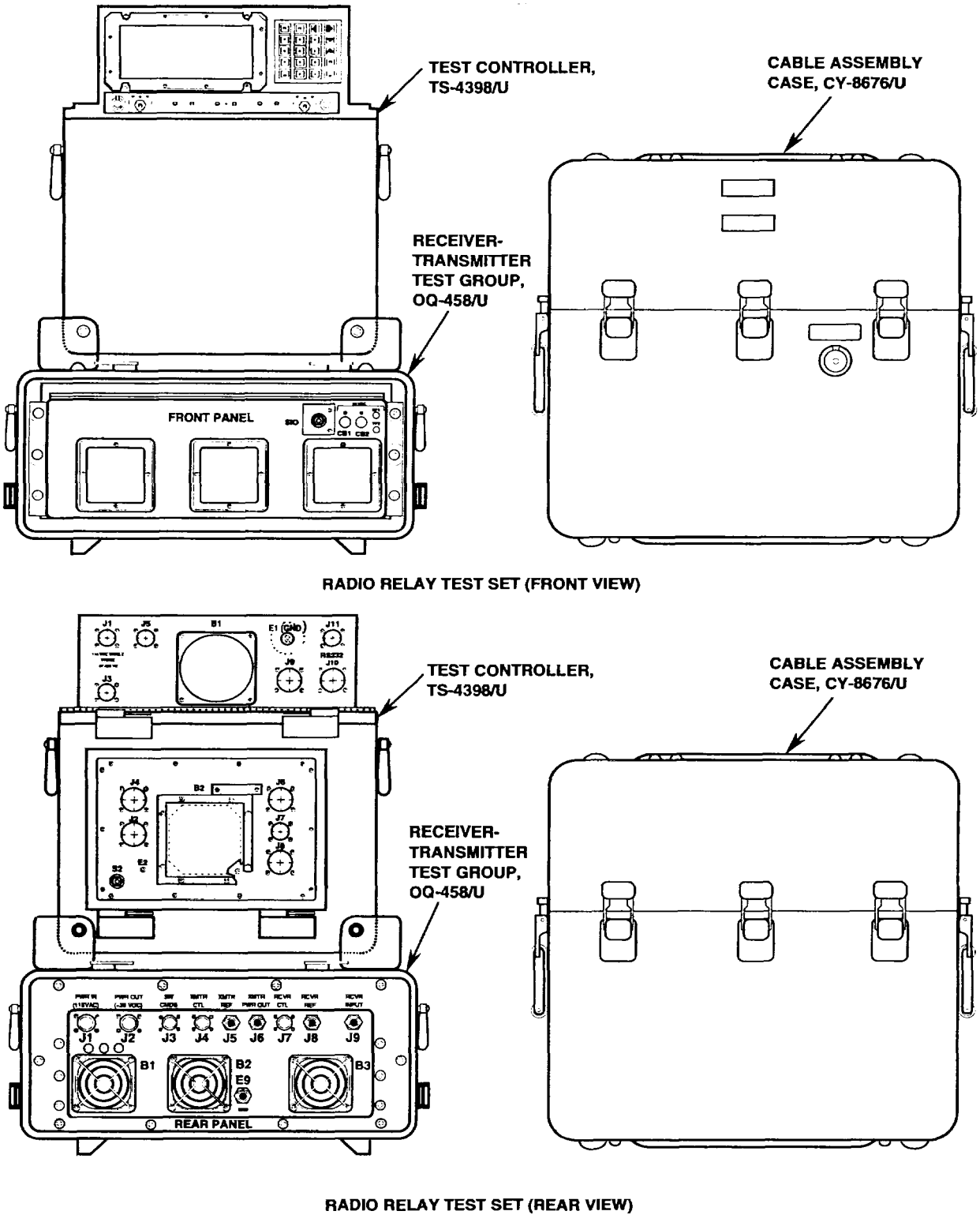


Figure 1-1. RADIO RELAY TEST SET, AN/URM 214

CHAPTER 1

INTRODUCTION

Section I - GENERAL INFORMATION.

1-1 SCOPE.

- Type of Manual: Operator's, Unit, and Direct Support Maintenance Manual
- Equipment: Radio Relay Test Set (RRTS), AN/URM-214
- Equipment Purpose: Provides Functional Testing of Radio Relay System (RRS), AN/ARW-85(V)2, and AN/ARW-85(V)3.

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

Army personnel should refer to DA Pam 25-30 to determine whether there are new editions, changes or additional publications pertaining to the equipment. Air Force personnel should refer to DPR 700 for a listing of all technical manuals.

1-3 MAINTENANCE FORMS, RECORDS, AND REPORTS.

1-3.1 Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

1-3.2 Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/MCO 4430.3J.

1-3.3 Transportation Discrepancy Report (TDR) (SF 361). Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

1-4 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

If your AN/URM-214 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 or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-ED-CFO, Fort Monmouth, New Jersey 07703-5023. We'll send you a reply.

1-5 ADMINISTRATIVE STORAGE.

Administrative storage of equipment issued to and used by Army activities must have preventive maintenance performed in accordance with the preventive maintenance checks and services (PMCS) charts before storing. When removing the equipment from administrative storage, the PMCS must be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraph 5-4.

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.

NOTE

In destruction of Army materiel to prevent enemy use, communications security (COMSEC) equipment and keying information have first priority. Materiel must be destroyed to the degree that the enemy cannot duplicate or learn its means of operation or function.

1-7 NOMENCLATURE CROSS-REFERENCE LIST.

Common Name	Official Nomenclature
CY-8676/U	Cable Assembly Case, CY-8676/URM-214
AN/ARW-85(V)2	Radio Relay System, AN/ARW-85(V)2
AN/ARW-85(V)3	Radio Relay System, AN/ARW-85(V)3
AN/URM-214	Radio Relay Test Set (RRTS), AN/URM-214
R-2500/AR	Radio Receiver, R-2500/AR
T-1573(V)1/AR	Radio Transmitter, T-1573(V)1
T-1573(V)2/AR	Radio Transmitter, T-1573(V)2
OQ-458/U	Receiver-Transmitter Test Set Group
(RTTG), OQ-458/URM-214	
SN-582/ARW-85(V)	Signal Data Translator (SDT),
SN-582/ARW-85(V)	
TS-4398/U	Test Control, TS-4398/URM-214
OA-9422(V)1/AR	1 Channel Interference Cancellation
Group (ICG), OA-9422(V)1/ARW-85(V)	
OA-9422(V)2/AR	2 Channel ICG, OA-9422(V)2/ARW-85(V)

1-8 LIST OF ABBREVIATIONS.

For a list of abbreviations associated with AN/URM-214, refer to the Glossary, Section I, in the back of the manual.

1-9 PREPARATION FOR STORAGE OR SHIPMENT.

Refer to paragraph 2-10 for the procedures to prepare AN/URM-214 for storage or shipment.

1-10 EQUIPMENT CONFIGURATION.

AN/URM-214 has only one configuration and consists of the following components:

COMPONENTS/ASSEMBLIES
Test Controller, TS-4398/U
Receiver-Transmitter Test Group, OQ-458/U
Cable Assembly Case, CY-8676/U

1-11 SAFETY, CARE, AND HANDLING.

High voltages exist in this equipment, and can be extremely dangerous if not handled correctly. Never work on the system unless authorized to do so, and do not take shortcuts. It isn't worth the risk. When work on the system must be performed, follow only authorized procedures and heed all warnings and cautions. For additional information, refer to the warning pages at the front of this manual.

Section II - EQUIPMENT DESCRIPTION.

1-12 EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

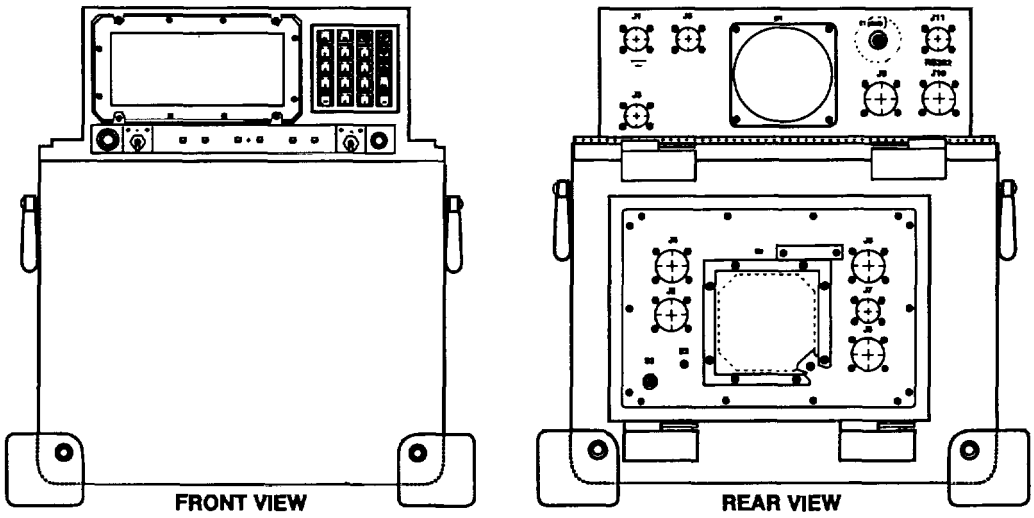
Major Features:

- Functions as a semi-automated tester
- Provides functional testing of AN/ARW-85(V)2,3
- Provides rack fault isolation testing
- Provides line-replaceable unit (LRU) level fault isolation testing
- Provides module-level testing
- Is in operational state at power-up
- Provides an operator interface
- Contains built-in self test capability

1-13 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

The locations of the major AN/URM-214 components are shown in figure 1-1. Figure 1-2 is the AN/URM-214 cabling diagram showing top and rear views. The major AN/URM-214 components are described in the following paragraphs.

1-13.1 Test Controller, TS-4398/U Description. TS-4398/U is the central processing unit of AN/URM-214. It provides mass storage capability for all AN/URM-214 software. It displays a menu of available tests, executes selected tests, and displays test results. TS-4398/U also provides operator, AN/ARW-85(V)2,3, link test set, prime power source, and OQ-458/U interfaces. **NOTE:** The Link Test Set is applicable to the Air Force configuration only.



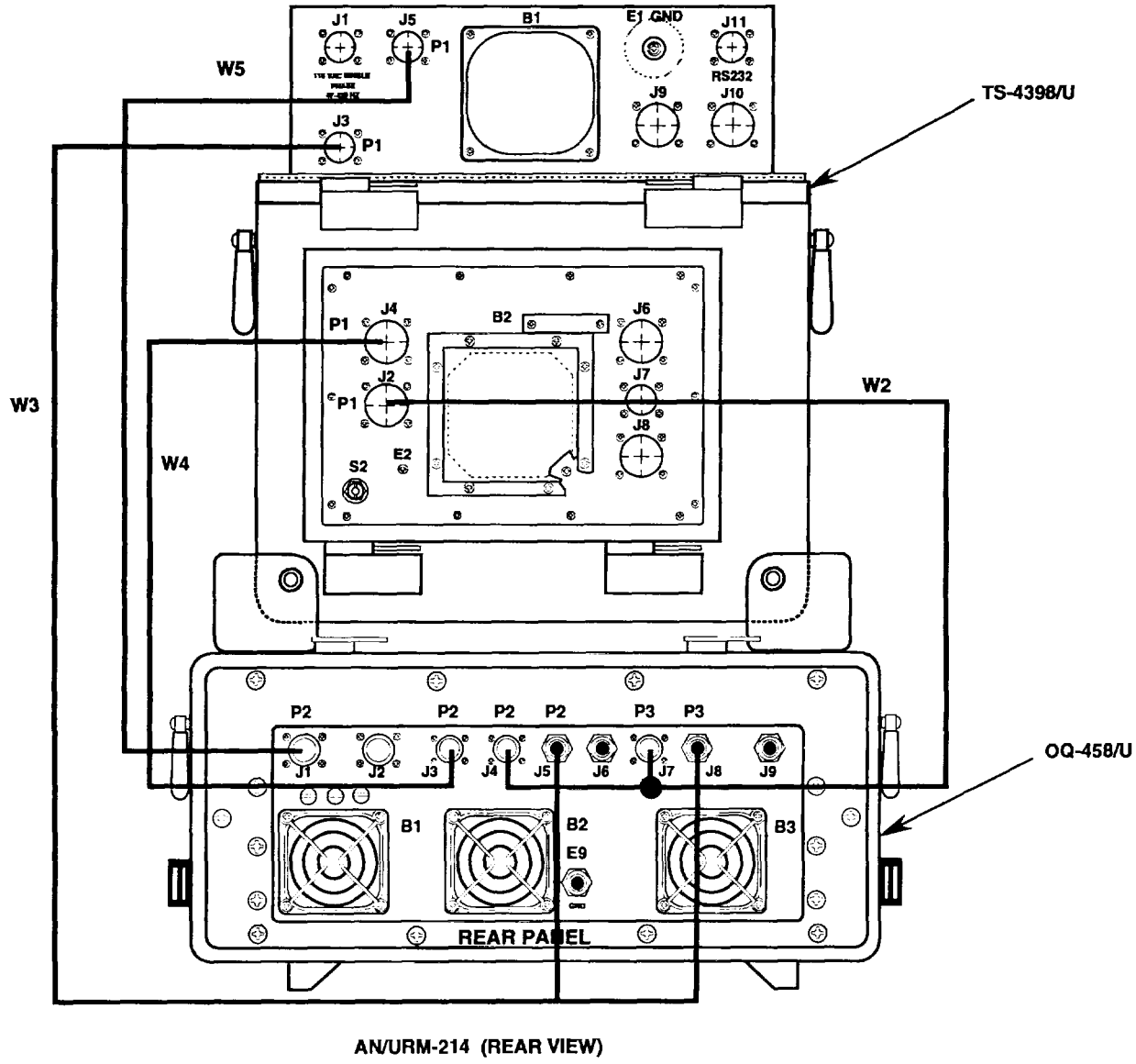
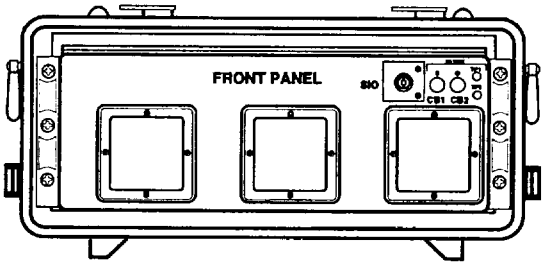
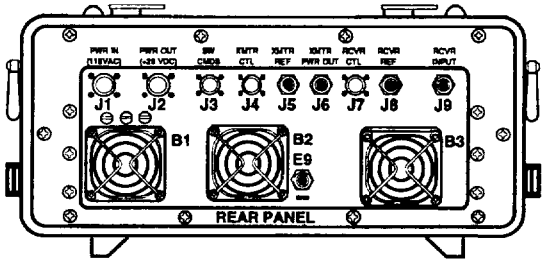


Figure 1-2. AN/URM-214 CABLING DIAGRAM

1-13.2 RTTG, OQ-458/U Description. OQ-458/U provides the attenuation, switching, transmitting, and receiving functions. These functions allow the AN/URM-214 to cable directly to the AN/ARW-85(V)2,3 radio frequency (RF) interfaces. OQ-458/U also provides 28 Vdc power to the unit/assembly under test. OQ-458/U is controlled by TS-4398/U.

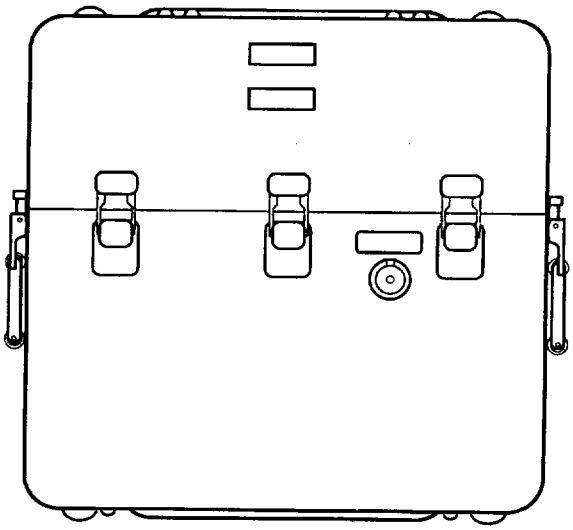


FRONT VIEW



REAR VIEW

1-13.3 Cable Assembly Case, CY-8676/U Description. CY-8676/U provides storage for all AN/URM-214 external cabling. These cables are necessary to perform the platform loop test, unit isolation tests, module tests, internal TS-4398/U test, external TS-4398/U test, internal OQ-458/U test, and external OQ-458/U test. Storage includes two extender CCAs, which are used for testing the AN/URM-214 and SN-582/ARW-85(V) modules. The cables between TS-4398/U and OQ-458/U are normally 5 feet in length. All cables connecting the AN/URM-214 with the AN/ARW-85(V)2,3, link test sets, and prime power source are normally 20 feet in length. The contents of CY-8676/U are listed in the following table.



CABLE ASSEMBLY CASE CY-8676/U CONTENTS.

QTY	REF DES	NOMENCLATURE
1	W1	Prime Electrical Power Cable Assembly
1	W2	Branched Electrical Special Purpose Cable Assembly
1	W3	Branched RF Cable Assembly
1	W4	Electrical Special Purpose Cable Assembly
1	W5	Electrical Power Cable Assembly
1	W6	Branched Electrical Special Purpose Cable Assembly
1	W7	Electrical Special Purpose Cable Assembly
1	W8	Branched Electrical Special Purpose Cable Assembly
1	W9	Branched RF Cable Assembly
1	W10	RF Cable Assembly
1	W11	RF Cable Assembly
1	W12	Electrical Power Cable Assembly
1	W13	Branched Electrical Special Purpose Cable Assembly
1	W14	Electrical Special Purpose Cable Assembly
1	W15	Electrical Test Power Cable Assembly
1	W16	Branched Electrical Test Special Purpose Cable Assembly
1	W17	RF Test Cable Assembly
1	W18	Branched Electrical Test Special Purpose Cable Assembly
1	W19	Electrical Special Purpose Cable Assembly
1	W20	RF Cable Assembly
1	W21	Special Transmitter Data Cable Assembly
1		Electronic Test Extender Card
1		SDT Extender Card Circuit Card Assembly

1-14 EQUIPMENT DATA.

- **AN/URM-214**

Power Requirements

Input Power	115 Vac, +15%, 47 to 420 Hz, single-phase power. (NOTE: AN/URM-214 is in operational state at power-up.)
Power Consumption	900 watts maximum. Environmental Conditions
Temperature	Operating, minimum -100C, maximum 500C. Nonoperating, minimum -300C, maximum +650C.
Altitude	Operating, from sea-level to 10,000 ft. Nonoperating, from sea-level to 40,000 ft.
Humidity	Operating, outside relative humidity of up to 90%. Nonoperating, outside relative humidity of up to 90%, including condensation in and on AN/URM-214.

- TS-4398/U (Continued)

Size	19 in. long, 20 in. wide, 22 in. high.
Weight	80 lb.

Power Requirements

Input Power	115 Vac, ±15%, 47 to 420 Hz, single-phase power. (NOTE: TS-4398/U is in operational state at power-up.)
Power Consumption	440 watts maximum.

- OQ-458/U

Size	29 in. long, 23 in. wide, 11 in. high.
Weight	60 lb.

Power Requirements

Input Power	115 Vac, +15%, 47 to 420 Hz, single phase power. (NOTE: OQ-458/U is in operational state at power-up.)
Power Consumption	460 watts maximum.

- CY-8676/U

Size	22 in. long, 24 in. wide, 19 in. high.
Weight	80 lb.

Section III - TECHNICAL PRINCIPLES OF OPERATION.

1-15 INTRODUCTION.

The AN/URM-214 is a semi-automated tester capable of functionally testing AN/ARW-85(V)2,3. Functional testing is provided by performing the platform loop test. There is one platform loop test (indirect connect) for AN/ARW-85(V)2. There are two platform loop tests (direct connect and indirect connect) for AN/ARW-85 (V)3.

NOTE

Each platform loop test is described in more detail in TM 11-5821-349-23,

1**-15.1 Indirect Connect Platform Loop Test**. The indirect connect platform loop test functionally tests AN/ARW-85(V)2,3 by sending selected test data and commands and checking the output for a predefined expected response. Communication between AN/ARW-85(V)2,3 and AN/URM-214 for this test is via the link test set interoperable data link (IDL) interface.

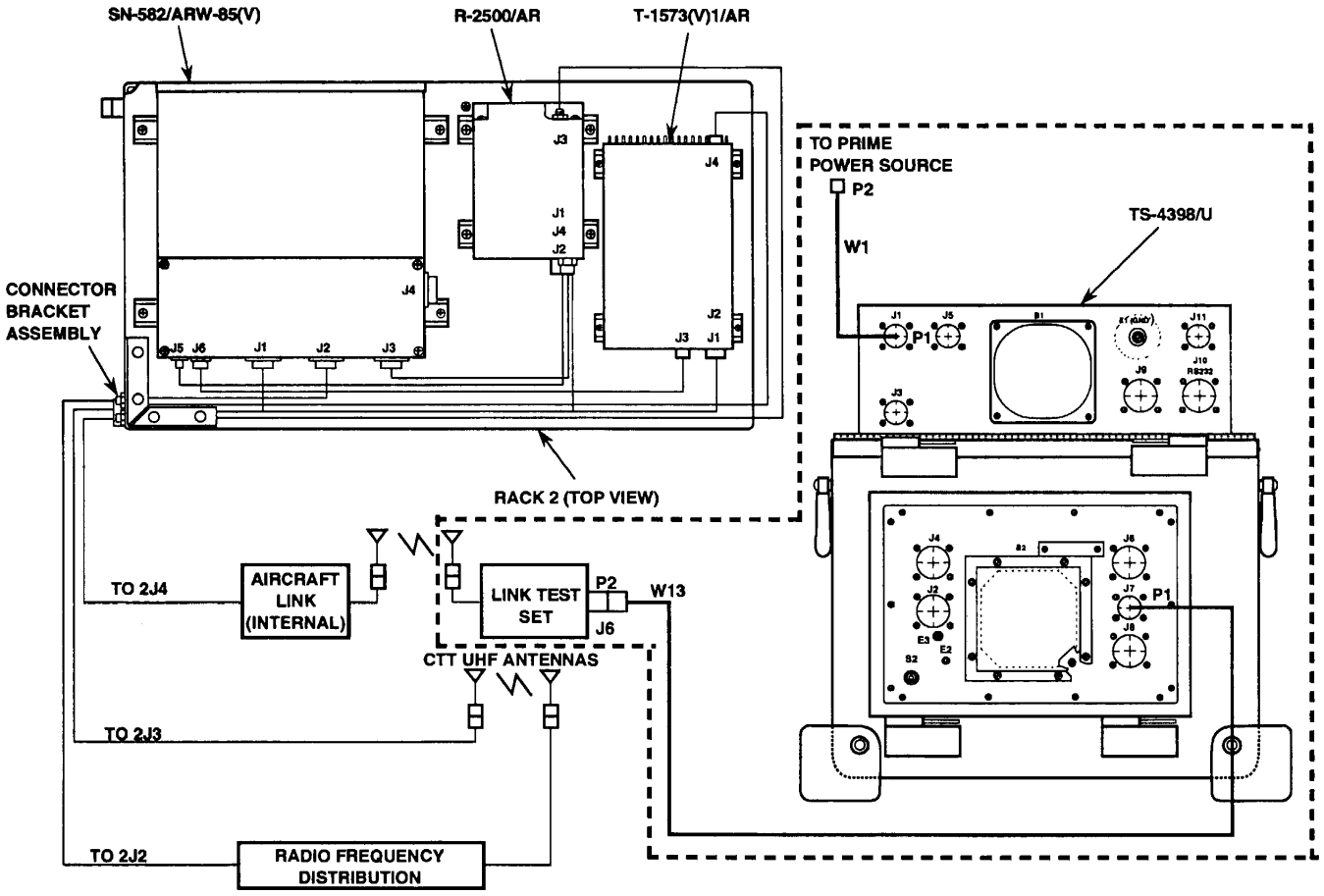
NOTE

For more information regarding operation of the IDL, refer to technical manual TM 11-5865-261-13-1/TO PX-9714.

1-15.2 Initialization of AN/ARW-85(V)2,3. N/ARW-85(V)2,3 are initialized by AN/URM-214 via the link test set IDL interface. Commands instruct AN/ARW-85(V)2,3 to tune the Radio Receiver, R-2500/AR, to a test frequency. Test data packets are then transmitted. AN/ARW-85(V)2,3 commands the Radio Transmitter, T-1573(V)1/AR, to transmit the test data on the same test frequency to which R-2500/AR is tuned. R-2500/AR receives the test data and passes it to the SDT, SN-582/ARW-85(V). SN-582/ARW-85(V) then returns this data to AN/URM-214 via the link test set IDL interface. AN/URM-214 verifies this data against the expected response. The absence of bit errors in the test data verification indicates test pass and AN/ARW-85(V)2,3 operational. The presence of one or more bit errors indicates test failure.

1-15.3 Indirect Connect Platform Loop Test Interconnection Diagrams. The interconnection diagram for the AN/ARW-85(V)2 indirect connect platform loop test is shown in figure 1-3. The interconnection diagram for the AN/ARW-85(V)3 indirect connect platform loop test is shown in figure 1-4.

1-15.4 AN/ARW-85(V)3 Direct Connect Platform Loop Test. The AN/ARW-85(V)3 direct connect platform loop test is identical to the AN/ARW-85(V)3 indirect connect platform loop test described above, with the following exceptions:



NOTE: EQUIPMENT ENCLOSED IN DASHED LINES MAY BE PART OF THE AGE VAN. REFER TO TMs ASSOCIATED WITH THE AN/USD-9.

Figure 1-3. AN/ARW-85(V)2 INDIRECT CONNECT PLATFORM LOOP TEST INTERCONNECTIONS.

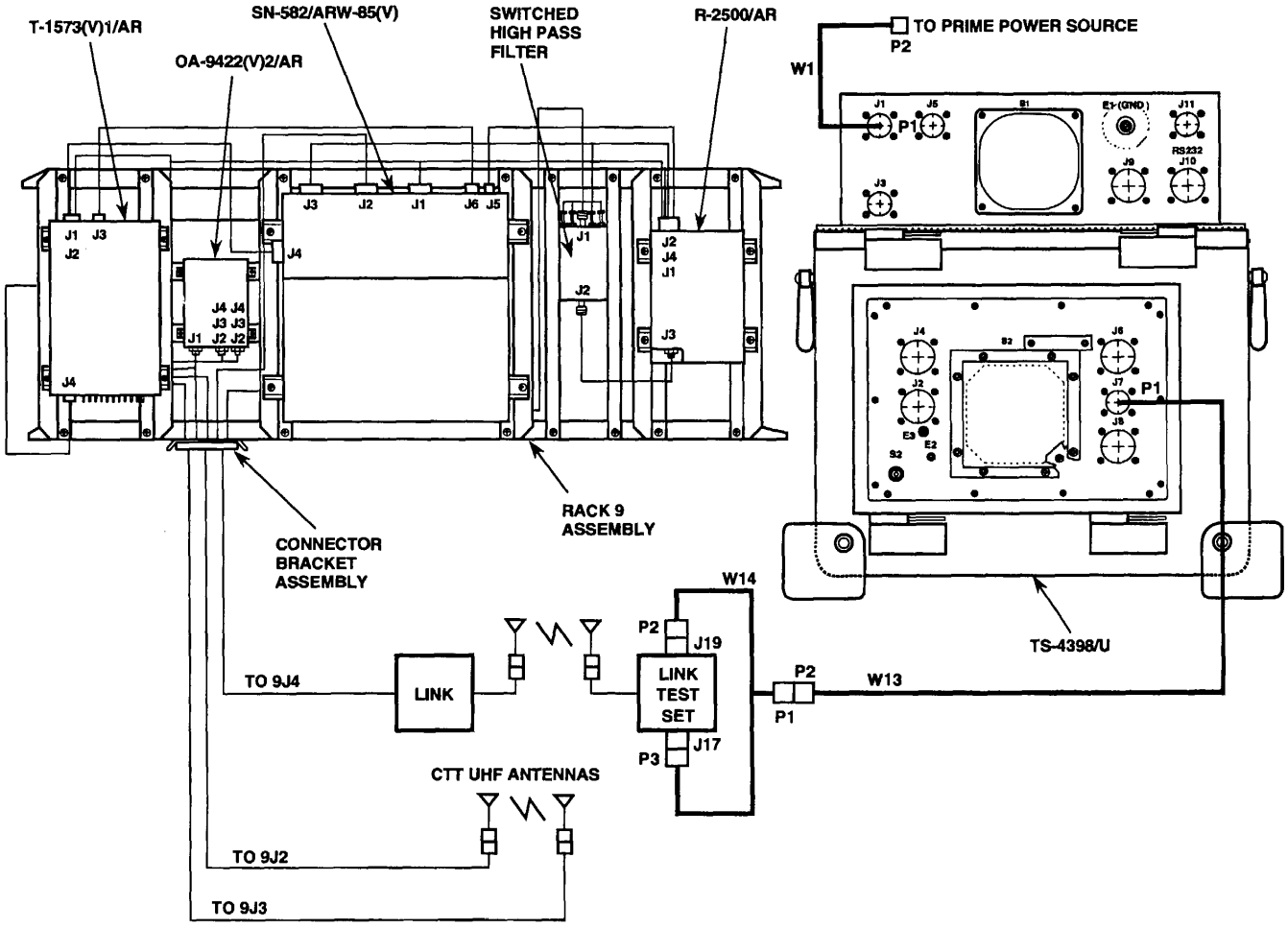


Figure 1-4. AN/ARW-85(V) 3 INDIRECT CONNECT PLATFORM TEST INTERCONNECTIONS.

a. All communication between AN/URM-214 and AN/ARW-85(V)3 is via the SN-582/ARW-85(V) IDL interface.

b. In the direct connect test, the AN/URM-214 (connector J7) is connected directly to the AN/ARW-85(V)3 rack 9 (connector 9J4) via cable W7. The link test set, link equipment, and cables W13 and W14 are not required.

1-15.5 AN/ARW-85(V)3 Direct Connect Platform Loop Test Interconnection Diagram. The interconnection diagram for the AN/ARW-85(V)3 direct connect platform loop test is shown in figure 1-5.

NOTE

Each platform loop test is described in more detail in TM 11-5821-349-21

1-15.6 AN/ARW-85(V)2,3 LRU Fault Isolation Testing. AN/URM-214 supports the performance of the LRU functional tests. LRU fault isolation is limited to the following replaceable AN/ARW-85(V)2 LRUs: rack 2 assembly, T-1573(V)l/AR, R-2500/AR, and SN-582/ARW-85(V). LRU fault isolation is also limited to the following replaceable AN/ARW-85(V)3 LRUs: rack 9 assembly, T-1573(V)1/AR, R-2500/AR, SN-582/ARW-85(V), directional coupler, switched high pass filter. Each LRU fault isolation test is described in detail in TM 11-5821-349-23/TO 31R2-ARW85(V)3-2.

1-15.7 AN/ARW-85(V)2,3 Module Fault Isolation Testing. AN/URM- 214 supports the performance of the module fault isolation testing. Module fault isolation testing is limited to the modules contained in the following replaceable LRUs: T-1573(V)1/AR, R-2500/AR, and SN-582/ARW-85(V). Table 1-1 lists the modules that are replaceable within AN/ARW-85(V)2,3. Each AN/ARW-85(V)2,3 module fault isolation test is described in detail in TM 11-5821-349-23/TO 31R2-ARW(85)V3-2.

1-15.8 AN/URM-214 Functional Diagram. AN/URM-214 consists of three units: TS-4398/U, OQ-458/U, and CY-8676/U. The functional block diagram of AN/URM-214 is shown in figure 1-6. 1-15.9 TS-4398/U. TS-4398/U is the central processing unit of AN/URM-214. It provides mass storage capability for all AN/URM-214 software. It displays a menu of available tests, executes selected tests, and displays test results. TS-4398/U also provides operator, AN/ARW-85(V)2,3, link test set, prime power source, and OQ-458/U interfaces.

1-15.10 OQ-458/U. OQ-458/U provides the attenuation, switching, transmitting, and receiving functions. These functions allow the AN/URM-214 to cable directly to the AN/ARW-85(V)2,3 RF interfaces. OQ-458/U also provides 28 Vdc power to the unit/assembly under test. OQ-458/U is controlled by TS-4398/U.

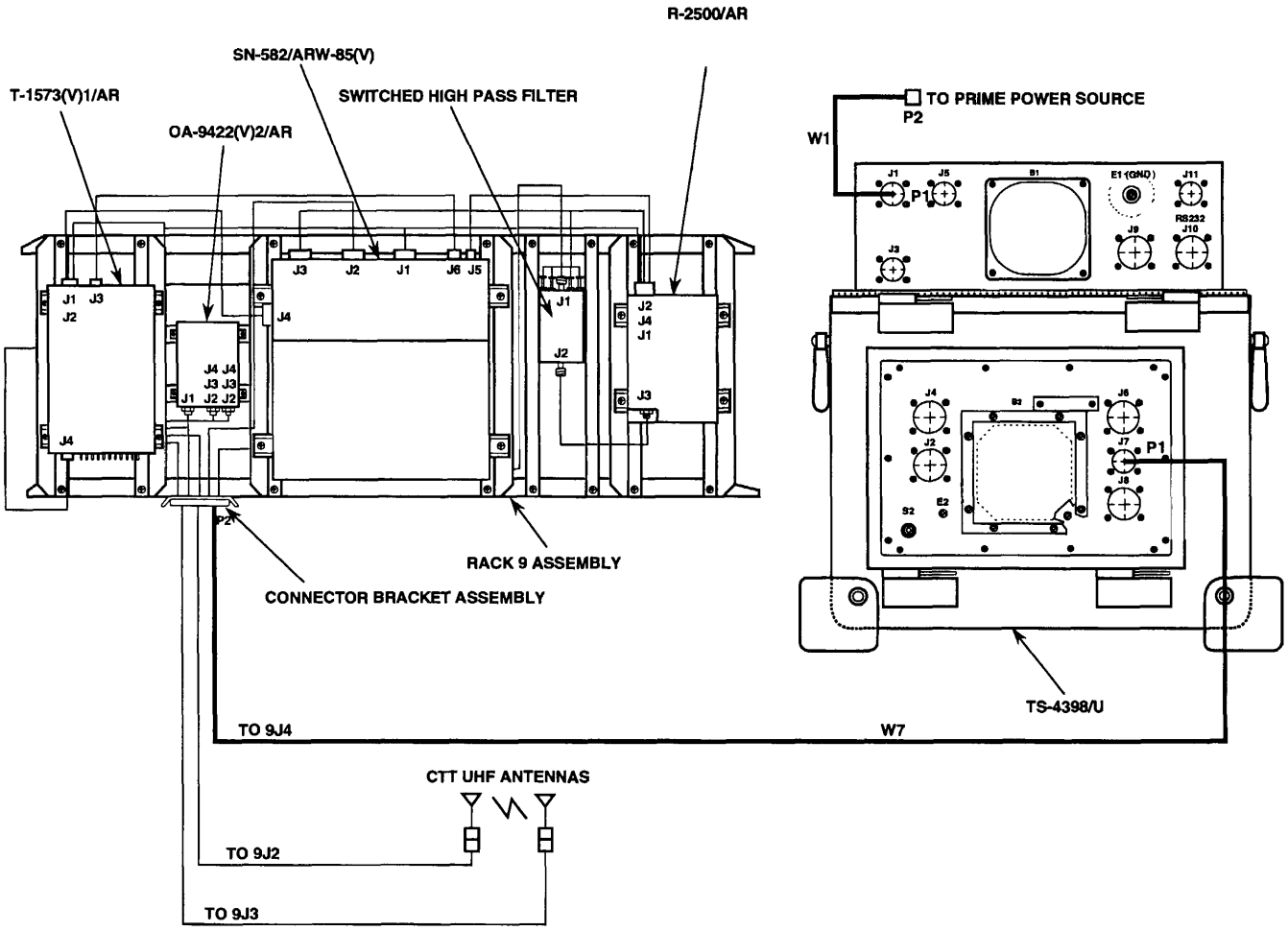


Figure 1-5. AN/ARW-85 (V) 3 DIRECT CONNECT PLATFORM LOOP TEST INTERCONNECTIONS.

TABLE 1-1. AN/ARW-85(V)2,3 REPLACEABLE MODULES.

LRU	REPLACEABLE MODULE
T-1573(V)1/AR	Power Converter Assembly (Al)
	Interface Control Module Assembly (A2)
	Phase-Locked-Loop/Voltage Controlled
	Oscillator (PLL/VCO) Synthesizer Module
	Assembly (A3)
	Bandpass Filter Module Assembly (A4)
	Power Amplifier Module Assembly (A5)
SN-582/ARW-85(V)	Acquirer Circuit Card Assembly (CCA) (Al)
	Controller CCA (A2)
	Processor CCA (A3)
	IDL Isolator CCA (A4)
	Oscillator CCA (A5)
	Input/Output (I/O) Driver CCA (A6)
	Voltage Regulator CCA (A8)
R-2500/AR	Electronic Components Assembly (Al)
	Decoder Module Assembly (A2)
	First Synthesizer Module Assembly (A3)
	Second Synthesizer Module Assembly (A4)
	Intermediate Frequency-Frequency Shift
	Key (IF-FSK) Module Assembly (A5)
	Preselect Module Assembly (A6)

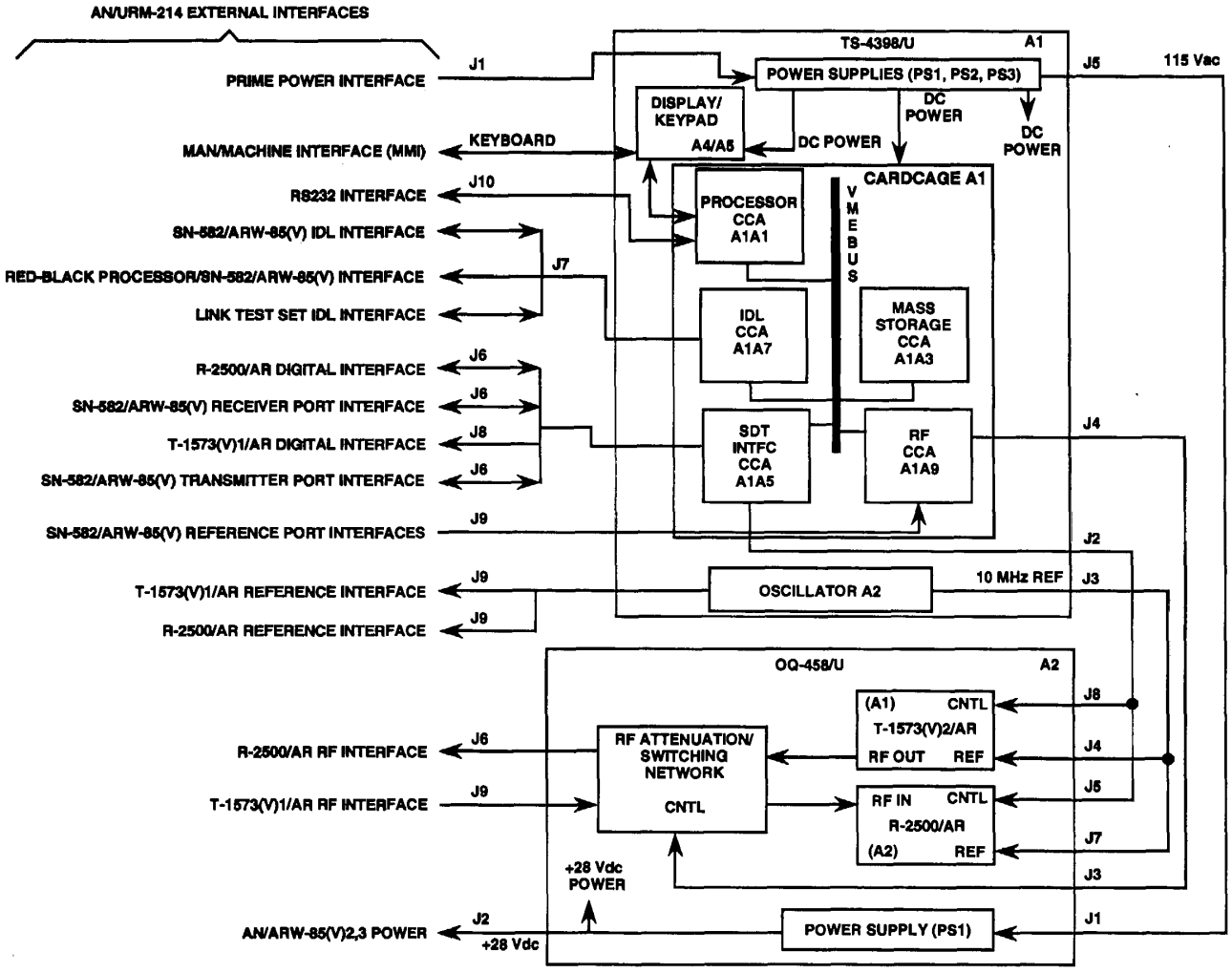


Figure 1-6. AN/URM-214 FUCTIONAL BLOCK DIAGRAM.

1-15.11 CY-8676/U. CY-8676/U provides storage space for external cabling necessary to perform the rack, LRU, and module fault isolation tests.:

1-16 TEST CONTROLLER, TS-4398/U.

TS-4398/U is a microprocessor-based computer system with a main memory, mass storage, flat panel display, and a keyboard. It supports the platform loop tests, LRU fault isolation tests, and module tests. TS-4398/U also supports internal TS-4398/U test and external TS-4398/U test.

1-16.1 Microprocessor Interface. TS-4398/U contains a 32-bit microprocessor with a clock speed of 16 MHz and 1 Mbyte of random access memory (RAM). The RS-232 interface, connector J10, provides a standard 8-bit, no parity, one-stop-bit, American National Standard Code for Information Interchange (ASCII) data stream at 9600 baud. The RS-232 connection is used for downloading software to the AN/URM-214 during development and depot level maintenance software updates. The mass storage CCA has a storage capacity of 1 Mbyte.

1-16.2 Man/Machine Interface (MMI). The MMI displays a menu of available tests, provides a keyboard for menu item selection, and displays test results. The flat panel display has a readable display under both normal day and night light conditions.

1-16.3 Power Interface. TS-4398/U interfaces with the operator, AN/ARW-85(V)2,3, link test set, OQ-458/U, and prime power source. It accepts a prime single-phase power input of 115 Vac, +15 percent, at 47 to 420 Hz. This input power enters TS-4398/U at connector J1 and is applied to TS-4398/U power supplies PS1, PS2, and PS3. PS1 provides +5 Vdc at a maximum power of 300 watts. PS2 provides +12 Vdc at 5 amps, -12 Vdc at 3 amps, and +28 Vdc at 4 amps. PS3 provides +15 Vdc and -15 Vdc output. These dc voltages are applied to the TS-4398/U card cage. In addition, TS-4398/U outputs 115 Vac, +15 percent, at 47 to 420 Hz (from connector J5) to operate OQ-458/U.

1-16.4 OQ-458/U Interfaces. TS-4398/U interfaces with OQ-458/U via connectors J2, J3, J4, and J5. This interface provides power, control, and reference signals to OQ-458/U. TS-4398/U provides power to OQ-458/U via connector J5. OQ-458/U accepts 115 Vac, +15 percent, 47 to 420 Hz, single-phase power. TS-4398/U outputs control and reference signals to OQ-458/U via connectors J2, J3, and J4. The control signals control the receive/transmit functions within OQ-458/U. The reference signal is a 10 MHz sinusoidal reference signal also provided for the receive/transmit functions within OQ-458/U.

1-16.5 IDL Interfaces. TS-4398/U interfaces with the IDL via connector J7. The IDL provides both an uplink and a downlink interface. TS-4398/U accepts as the uplink interface a serial clock pulse train at a nominal rate of 50 kilobits per second

(Kbps) from the IDL. The downlink interface is also a nominal 50 Kbps data channel. The clock is used to strobe the data from TS-4398/U into the IDL.

1-16.6 BN-582/ARW-85(V) Interfaces. TS-4398/U interfaces with the SN-582/ARW-85(V) transmitter, receiver, and reference ports via connectors J8, J6, and J9, respectively. These interfaces are shown in the AN/URM-214 functional block diagram, figure 1-6. SN-582/ARW-85(V) sends digital commands and modulation data to, and receives a status bit from, TS-4398/U via the SN-582/ARW-85(V) transmitter port interface. SN-582/ARW-85(V) sends digital commands to, and receives demodulated data and a status bit from, TS-4398/U via the SN-582/ARW-85(V) receiver port interface. The SN-582/ARW-85(V) reference port interface generates two 10 MHz sinusoidal reference signals whose amplitude and frequency are tested by TS-4398/U. The amplitude of the signal is tested for compliance with a signal strength greater than or equal to -3.0 dBm. The frequency of one of the two 10 MHz sinusoidal references is tested for compliance with a frequency of 10 MHz $\pm$ .5 Hz.

1-16.7 T-1573(V)1/AR Interface. TS-4398/U interfaces with T-1573(V)1/AR digital and reference interfaces via connectors J8 and J9, respectively. These interfaces are shown in the AN/URM-214 functional block diagram, figure 1-6.T-1573(V)1/AR receives digital commands and modulation data from, and sends a status bit to, AN/URM-214 via the T-1573(V)1/AR digital interface. Via the reference interface, AN/URM-214 provides a 10 MHz sinusoidal reference signal to T-1573(V)1/AR.

1-16.8 R-2500/AR Interface. TS-4398/U interfaces with the R-2500/AR digital and reference interfaces via connectors J6 and J9, respectively. These interfaces are shown in the AN/URM-214 functional block diagram, figure 1-6. R-2500/AR receives digital commands from, and sends modulation data and a status bit to, AN/URM-214 via the R-2500/AR digital interface. R-2500/AR receives a 10 MHz sinusoidal reference signal from the AN/URM-214 via the R-2500/AR reference interface.

1-17 RTTG, OQ-458/U. OQ-458/U is composed of R-2500/AR, Radio Transmitter, T-1573(V)2/AR, power supply, attenuators, and RF switches. These units combine to provide RF interfaces and perform both receive and transmit functions. These functions include attenuation and switching devices which allow AN/URM-214 to cable directly to the AN/ARW-85(V)2,3, T-1573(V)1/AR and R-2500/AR RF interfaces. OQ-458/U also provides 28 Vdc power to the unit/assembly under test during the rack, LRU, and module isolation tests. OQ-458/U also supports internal OQ-458/U test and external TS-4398/U test. OQ-458/U is controlled by TS-4398/U.

1-17.1 OQ-458/U Interfaces. OQ-458/U interfaces with both TS-4398/U and AN/ARW-85(V)2,3. These interfaces are shown in figure 1-6 and are discussed in the following paragraphs.

1-17.1.1 TS-4398/U Interfaces. OQ-458/U interfaces with TS-4398/U via connectors J1, J3, J4, J5, J7, and J8. Via these connectors, OQ-458/U is provided power, control, and reference signals from TS-4398/U.OQ-458/U receives power from TS-4398/U via connector J1.OQ-458/U accepts 115 Vac, +15 percent, 47 to 420 Hz, single-phase power.This input power is applied to power supply (PSI).PS1 provides +28 Vdc at a maximum power rate of 400 watts.This dc voltage is applied to the components of OQ-458/U.In addition, OQ-458/U provides +28 Vdc output to operate AN/ARW-85(V)2,3 during troubleshooting. OQ-458/U also receives control and reference signals from TS-4398/U via connectors J2, J3, and J4. The control signals control the receive/transmit functions. The reference signal is a 10 MHz sinusoidal reference signal also provided for the receive/transmit functions.

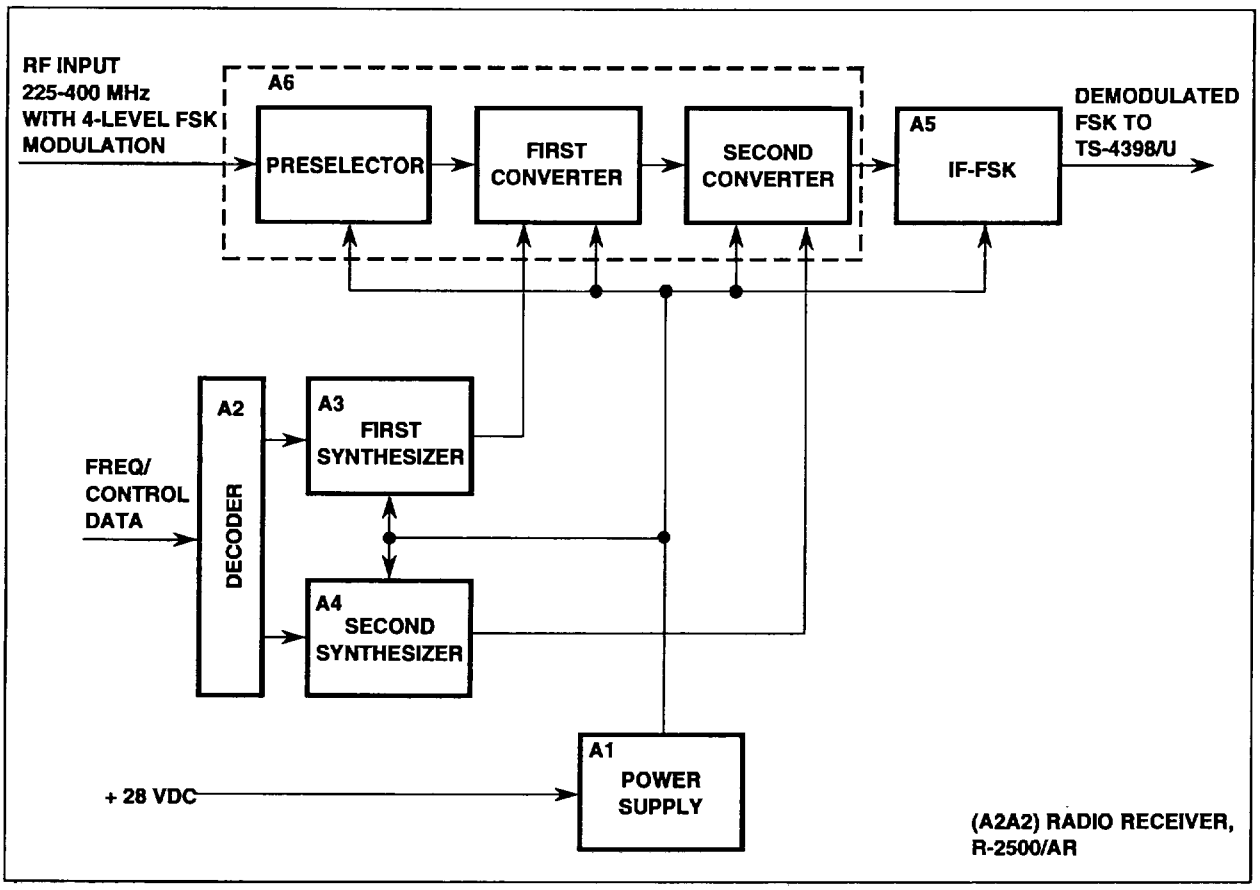
1-17.1.2 AN/ARW-85(V)2,3 R-2500/AR Interface. OQ-458/U interfaces with the R-2500/AR RF interface via connector J6. OQ-458/U emits RF stimulus to R-2500/AR during testing. This RF stimulus is a four-level FSK signal with a modulation index, which is defined as the peak-to-peak frequency shift divided by the data rate, normally 0.45. The normal spacing between the four FSK tones is 4.8 kHz. Ninety-nine percent of the energy in the modulated signal is contained within a 25 kHz bandwidth. This RF stimulus contains the following signal characteristics:

RF Output Signal Strength (high): (-) 45 dBm
RF Output Signal Strength (low): (-) 90 dBm
Input Impedance: 50 ohms
Voltage Standing Wave Ratio (VSWR): <= 3:1

1-17.1.3 AN/ARW-85(V)2,3 T-1573(V)1/AR Interface. OQ-458/U interfaces with the T-1573(V)1/AR RF interface via connector J9. This interface provides RF stimulus from T-1573(V)1/AR during testing. This RF stimulus is a four-level FSK signal with a modulation index, which is defined as the peak-to-peak frequency shift divided by the data rate, normally 0.45. The normal spacing between the four FSK tones is 4.8 kHz. Ninety-nine percent of the energy in the modulated signal is contained within a 25 kHz bandwidth. This RF stimulus contains the following signal characteristics:

RF Input Signal Strength: (+) 43 dBm maximum
Input Impedance: 50 ohms
VSWR: <= 3:1

1-17.2 OQ-458/U Radio Receiver, R-2500/AR. R-2500/AR forms the UHF uplink capability for OQ-458/U. R-2500/AR is controlled by TS-4398/U over a digital interface bus and is tunable from 225.000 MHz to 399.975 MHz in increments as small as 25 kHz. R-2500/AR is designed to receive FM signals. When provided with FSK modulation, it sends an analog data stream to TS-4398/U. R-2500/AR receives a four-level FSK signal with a peak-to-peak deviation of 14.4 kHz and sends out a 5 volt peak-to-peak differential signal on two pins with a 900 ohm termination. The



following functional diagram shows the signal flow through R-2500/AR. It consists of the following six interlocking modules that are bolted together to form a complete unit: Preselector Module (A6), First Synthesizer Module (A3), Second Synthesizer Module (A4), Electronic Components Assembly (Al), IF-FSK Module (A5), and Decoder Module (A2).

1-17.2.1 Preselector Module. The preselector module amplifies the incoming RF and divides the 225 to 400 MHz tuning range into four bands by switching in appropriate bandpass filters responding to a command from the decoder module. This protects the following circuitry from interfering signals external to the selected band. Band 1 extends from 225 MHz to 260 MHz, band 2 from 260 MHz to 300 MHz, band 3 from 300 MHz to 350 MHz, and band 4 from 350 MHz to 400 MHz. After filtering, the band-limited RF is passed on to the converter. This is a double conversion stage, producing a first IF in the 95 to 97 MHz range and a fixed second IF at 17 MHz. The required local oscillator (LO) frequencies are produced by the first and second synthesizers. After the first downconversion, the signal is amplified, filtered again, and then applied to the second stage of downconversion. The resulting 17 MHz is then routed out of the preselector module assembly and applied to the input of the IF-FSK module assembly.

1-17.2.2 First Synthesizer Module. The first synthesizer module phase locks to an external reference and produces the correct LO

frequencies for the first downconversion. Inputs to the module are a parallel digital word from the decoder module representing tuning information and a 10 MHz signal from an external frequency reference standard. The synthesizer contains a VCO that produces the actual LO frequencies used by the first converter in the preselector module assembly. Based on the incoming tuning information and the current frequency of the VCO, a signal is generated by the PLL circuitry to drive the VCO to the correct frequency. This frequency is between 321.25 MHz and 495.00 MHz and changes in steps as small as 1.25 MHz.

1-17.2.3 Second Synthesizer Module. The operation of the second synthesizer module assembly is almost identical to that of the first synthesizer module assembly. It also produces a phase-locked injection frequency for use in the second downconversion stage in the preselector module assembly. Inputs are a tuning word from the decoder module assembly and an external 10 MHz reference. The output frequency is between 78.025 MHz and 80.000 MHz in steps as small as 25 kHz, which is the smallest tuning step for R-2500/AR.

1-17.2.4 IF-FSK Module. The IF-FSK module assembly provides the FM detector function and determines the selectivity of the receiver. The incoming IF is first-band limited by a 28 kHz-wide crystal band-pass filter centered at 17 MHz. It then passes through a series of very-high-gain amplifying stages and another 17 MHz filter before being applied to the detector. The FM detector is a limiter-discriminator type to remove any amplitude variations from the signal prior to the frequency-to-voltage conversion. Since the original carrier and, hence, the 17 MHz IF are shifted to one of four tones, a unique voltage level is produced for each frequency shift. The voltage levels are buffered to produce the differential drive. The signal is dc-coupled out of the discriminator through the buffer to the output pins of the receiver. The final voltage outputs depend on the frequency of the frequency shift as shown in the following table:

NOTE

These levels assume a 900 ohm resistive load across the output pins. "Fo" is the tuned frequency of R-2500/AR.

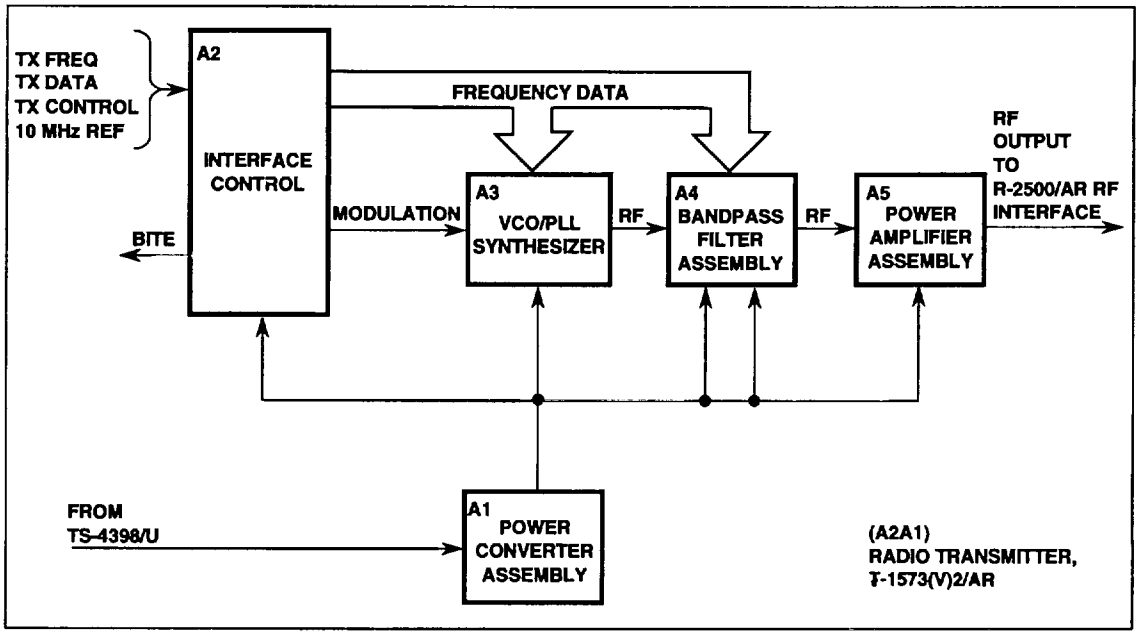
FREQUENCY	OUTPUT TRUE	OUTPUT FALSE
Fo +7.2 kHz	+1.25 Vdc	-1.25 Vdc
Fo +2.4 kHz	+0.417 Vdc	-0.417 Vdc
Fo -2.4 kHz	-0.417 Vdc	+0.417 Vdc
Fo -7.2 kHz	-1.25 Vdc	+1.25 Vdc

1-17.2.5 Power Supply Module. The power supply module contains a dc-to-dc converter which operates from a 28 Vdc input and typically draws less than 1 amp of line current. The output voltages of +15 Vdc, -15.5 Vdc, and +5.5 Vdc are routed to all

modules, although not all of the modules use all of the voltages. The dc converter also provides both protection from current overloads and an output voltage clamp.

1-17.2.6 Decoder Module. The decoder module provides the digital interface with TS-4398/U. It receives control information from TS-4398/U and processes this information into the format required by other R-2500/AR modules. Incoming digital commands consist of a 16-bit serial tuning word, a clock, and a frequency change pulse. The tuning word is internally converted into parallel form. These parallel lines are then routed to three programmable read only memory (PROMs) that interface both synthesizer modules and the preselector module. Together, they correctly tune the VCO/PLL synthesizer and switch band-pass filters in the preselector module. These PROMs also act as temporary memory storage units until enabled to change state. This enable command is produced by the frequency change pulse
which may occur at various times after the main tuning word is received. After this pulse is received, the outputs from the PROMs will change in a manner that depends on their inputs. They, in turn, directly tune the VCO/PLL synthesizer and preselector module. The decoder module assembly also contains the circuitry that monitors the outputs from the electronic component assembly. This monitor circuit normally provides a logic "high" to the status line if all outputs are present. If any one or more outputs fail, the status line goes to a logic "low." This information is provided on the control connector back to TS-4398/U.

1-17.3 OQ-458/U Radio Transmitter, T-1573(V)2/AR. T-1573(V)2/AR provides 1 watt UHF output with a four-level FSK modulation in a tightly controlled spectrum. T-1573(V)2/AR modulation, tuning, and gating are controlled by TS-4398/U. The following functional diagram shows the signal flow through T-1573(V)2/AR. It consists



of the following five interlocking modules that are bolted together to form a complete unit: VCO/PLL Synthesizer Module (A3), Power Converter Assembly Module (Al), Interface Control Module (A2), Bandpass Filter Assembly (A4), Power Amplifier Assembly (A5).

1-17.3.1 VCO/PLL Synthesizer Module. The VCO/PLL synthesizer module assembly generates the desired center frequency using the 10 MHz reference supplied from TS-4398/U. The VCO/PLL synthesizer module produces a 2-watt RF using basic 100 kHz channel spacing. The VCO/PLL synthesizer module consists of two multilayer printed circuit boards mounted in a single housing. Modulation linearity is maintained by individual coded PROMs that control multiplying digital-to-analog converters.

1-17.3.2 Power Converter Module. The power converter module accepts 22 to 29 Vdc input and produces +28, +8, +15, -2, and +300 Vdc outputs. It is a switching power converter operating at approximately 230 kHz and produces approximately 70 watts output.

1-17.3.3 Interface Control Module. The interface control module serves as buffer storage for all TS-4398/U control signals. Modulation data from TS-4398/U generates a four-tone FSK response in the VCO/PLL synthesizer module, and center frequency control data operates the VCO/PLL synthesizer module and tunes the bandpass filter module.

1-17.3.4 Bandpass Filter Module. The bandpass filter module tracks the VCO/PLL synthesizer module output to remove any excess noise.

1-17.3.5 Power Amplifier Module. The power amplifier module routes the bandpass filter module 1 watt RF output via internal RF cable Wl. The built-in-test (BIT) circuit indicates an error condition for either low output power or high reflected power.

CHAPTER 2

OPERATING INSTRUCTIONS

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

2-1 INTRODUCTION.

Illustrations and descriptions of the operator's controls and indicators for Radio Relay Test Set (RRTS), AN/URM-214, are shown in figures 2-1 through 2-6.

2-2 RECEIVER-TRANSMITTER TEST GROUP (RTTG), OQ-458/U, CONTROLS AND INDICATORS.

The operator's controls and indicators for OQ-458/U are illustrated and described in figures 2-1 and 2-2.

2-3 TEST CONTROLLER, TS-4398/U, CONTROLS AND INDICATORS.

The operator's controls and indicators for TS-4398/U are illustrated and described in figures 2-3 through 2-5.

2-4 CABLE ASSEMBLY CASE, CY-8676/U, CONTROLS AND INDICATORS.

The operator's controls and indicators for CY-8676/U are illustrated and described in figure 2-6.

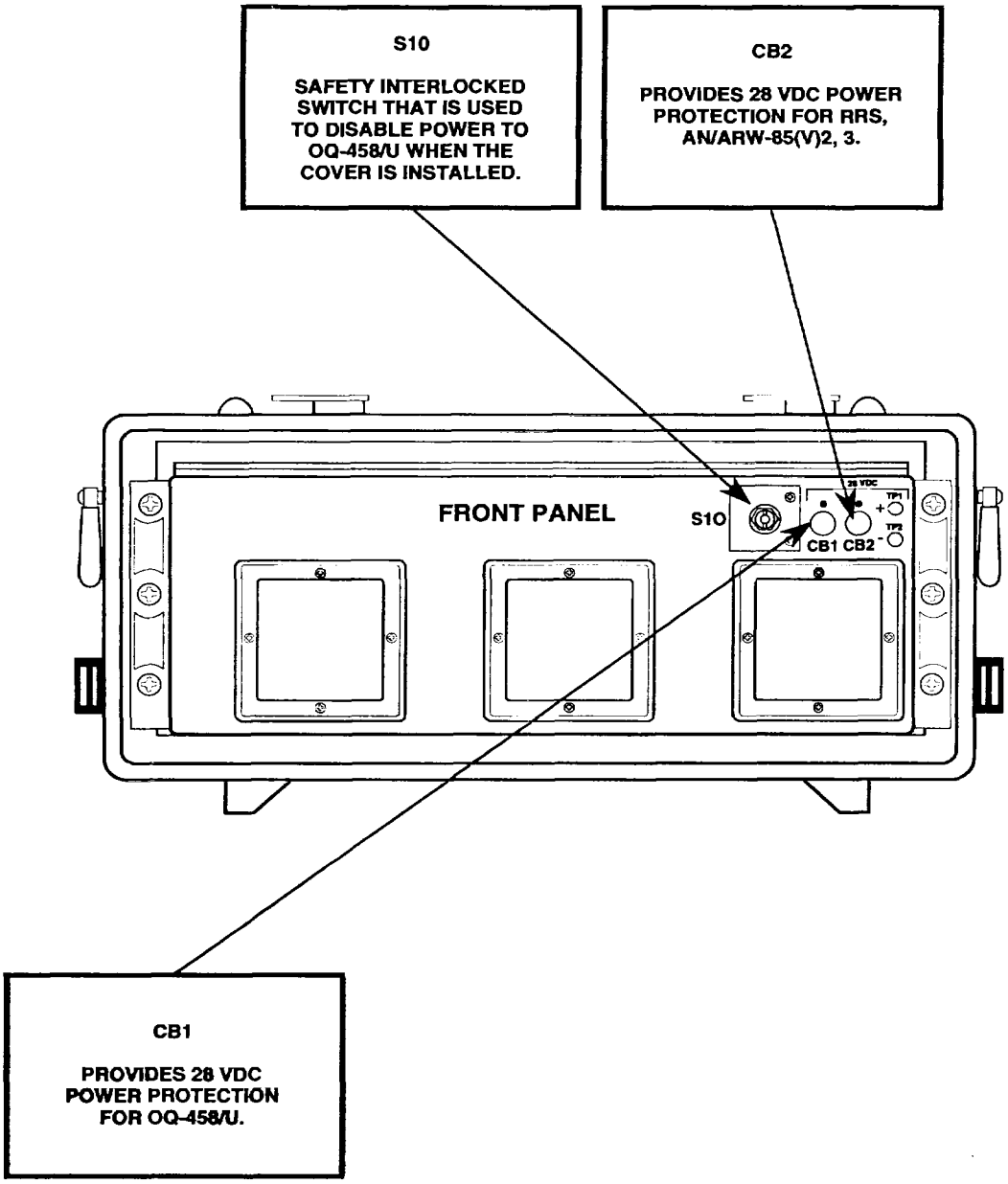


FIGURE 2-1. OQ-458/U FRONT PANEL CONTROLS AND INDICATORS.

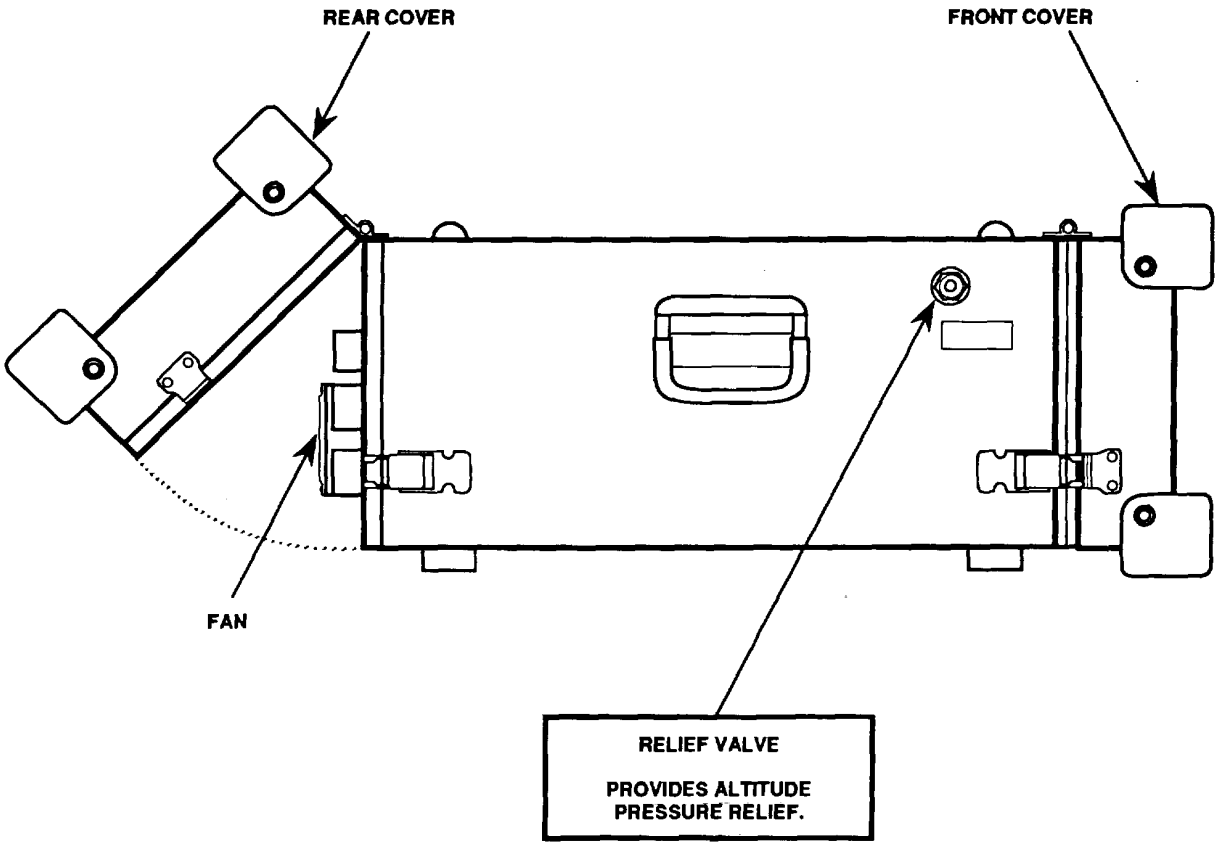


FIGURE 2-2. OQ-458/U SIDE PANEL CONTROLS AND INDICATORS.

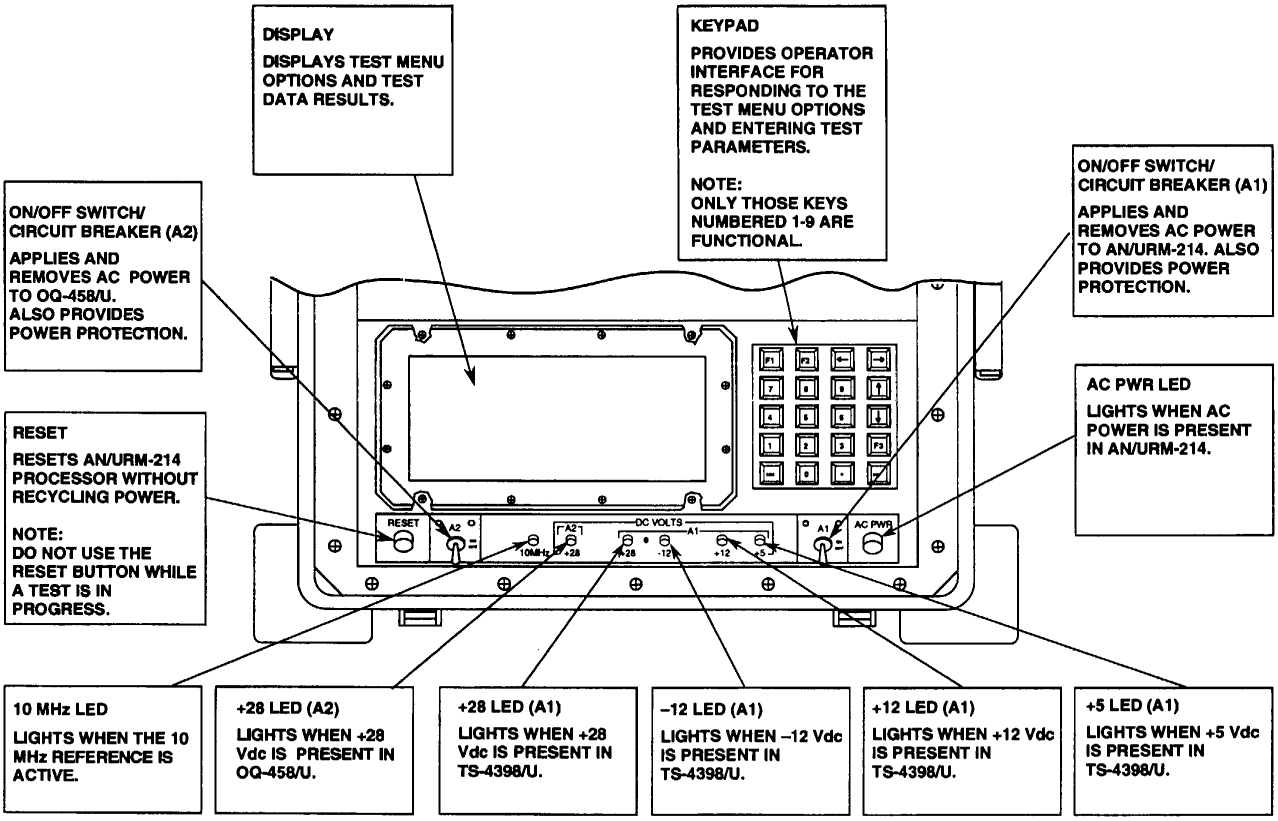


FIGURE 2-3. TS-4968/U FRONT PANEL CONTROLS AND INDICATORS.

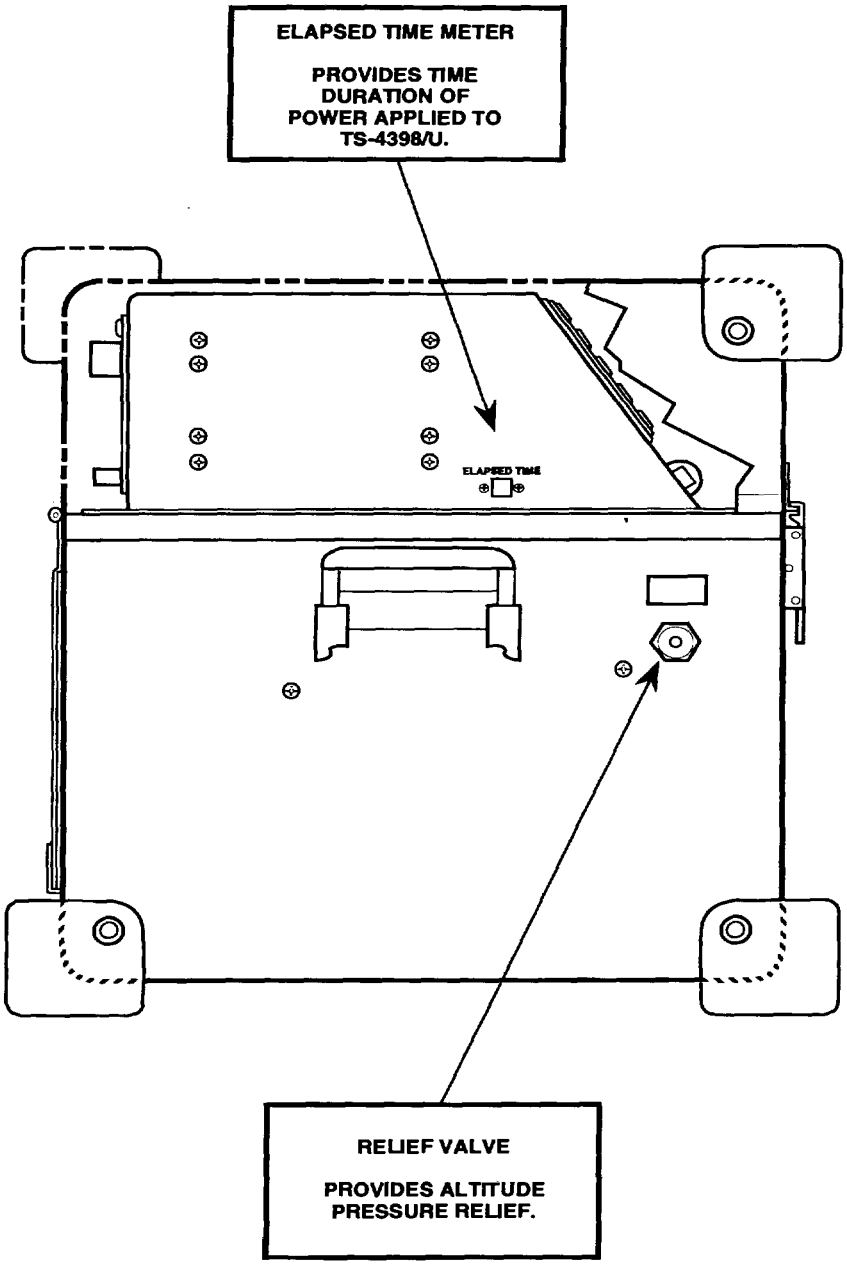


FIGURE 2-4. TS-4398/U SIDE PANEL CONTROLS AND INDICATORS.

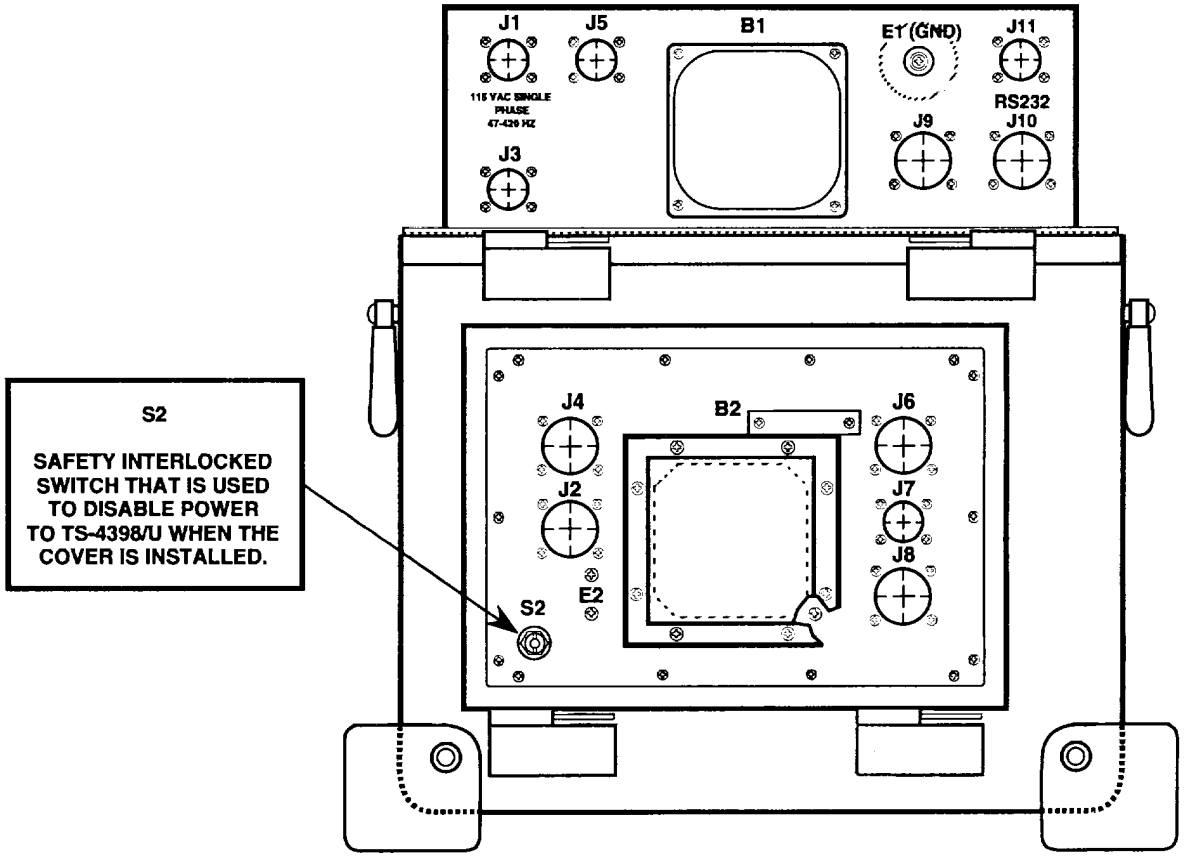


FIGURE 2-5. TS-4398/U REAR PANEL CONTROLS AND INDICATORS.

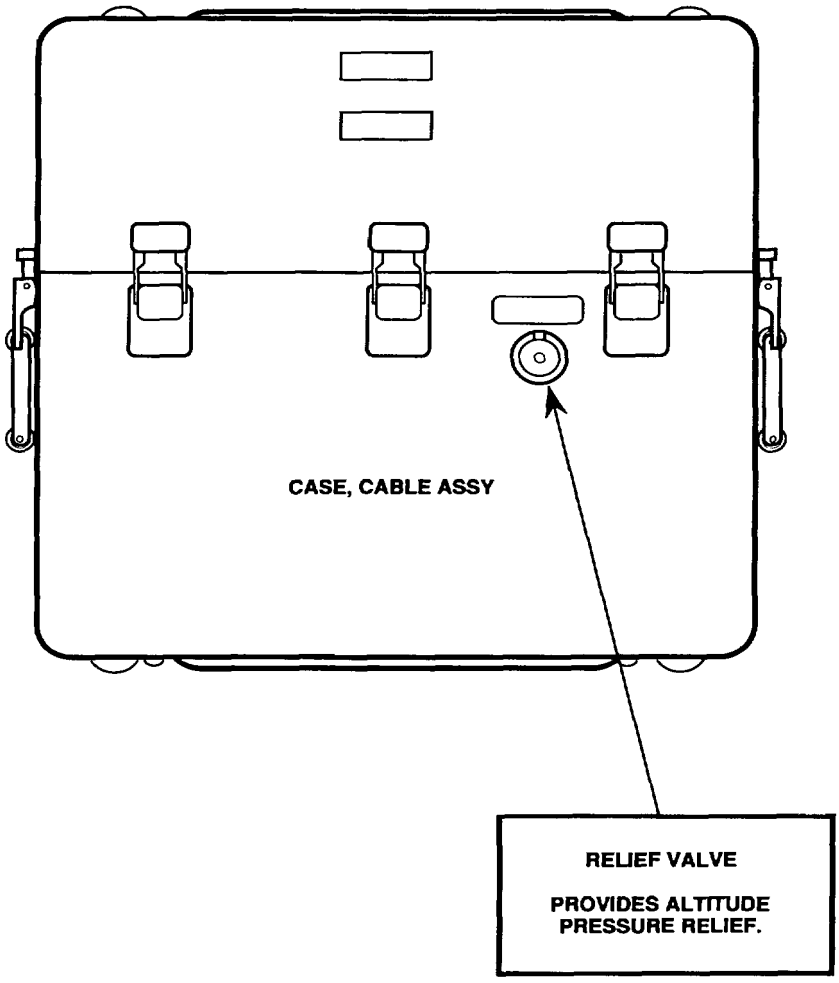


FIGURE 2-6. CY-8676/U SIDE PANEL CONTROLS AND INDICATORS.

Section II - OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

2-5 INTRODUCTION TO PMCS TABLE.

a. General. Your PMCS table is provided so you can keep your equipment in good operating condition and ready for mission.

b. Warnings and Cautions. Always observe the WARNING and CAUTIONS appearing in your PMCS table BEFORE, DURING, and AFTER you operate the equipment. The warnings and cautions appear before certain procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others or prevent your equipment from being damaged.

c. Explanation of Table Entries.

(1) *Item No. Column.* This column corresponds to the Items to be Checked or Serviced column.

(2) *Interval Column.* This column tells you when you must do the procedures in the procedure column. BEFORE procedures must be done before you operate or use the equipment for its intended mission. DURING procedures must be done during the time you are operating or using the equipment for its intended mission. AFTER procedures must be done immediately after you have operated or used the equipment.

(3) Items to be Checked or Service Column. This column provides the item to be checked or serviced.

(4) Procedure Column. This column gives the procedure you must follow to check the item listed in the Check/Service column to know the equipment is ready or available for its intended mission or for operation. You must follow the procedure at the time stated in the interval column.

(5) Not Fully Mission Capable If: Column.
Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

d. Other Table Entries. Information other than warnings, cautions, and notes appears in the PMCS table. Be sure to observe all special information appearing in your table.

e. Routine checks like cleaning, preservation, dusting, washing, checking for frayed cables, stowing items not in use, covering unused receptacles, checking for loose nuts and bolts and completeness are not listed as PMCS checks. They are things that you should do anytime you see they must be done. If you

find a routine check like one of those listed in your PMCS, it is because other operators reported problems with this item.

2-6 OPERATOR PMCS.

Item No.	Interval	Items to be Checked or Serviced	Procedure	Not Fully Mission Capable If:
	Before	AN/URN-Z14	Perform the Initial Adjustment, Daily Checks and Self-Test. Refer to paragraph 2-8.	Any of the Self-tests Fail

Section III - OPERATING UNDER USUAL CONDITIONS.

2-7 ASSEMBLY AND PREPARATION FOR USE.

RRTS, AN/URM-214, is received in shipping containers with each line replaceable unit (LRU) packaged separately. Maintenance personnel should refer to paragraph 5-4, Checking Unpacked Equipment, for procedures to follow while unpacking the equipment. The following instructions describe the assembly and preparation for use procedures for AN/URM-214.

WARNING

Test controller TS-4398/U and cable assembly case CY-8676/U require two-person lift. Injury to personnel may result if one-person lift is attempted.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

Ensure that power is off.

NOTE

All cables used during the AN/URM-214 assembly and preparation for use are found in CY-8676/U. All interconnections for the AN/URM-214 assembly and preparation for use are shown in figure 2-7.

1. Remove both RTTG, OQ-458/U, end covers.
2. Place TS-4398/U, on or near OQ-458/U.
3. Remove the TS-4398/U cover and rear connector cover panel.
4. Remove the CY-8676/U cover.
5. Ensure that all switches are in the "OFF" position.
6. Connect W5P1 to J5 on TS-4398/U. Connect W5P2 to J1 on OQ-458/U.
7. Connect W4P1 to J4 on TS-4398/U. Connect W4P2 to J3 on OQ-458/U.
8. Connect W3P1 to J3 on TS-4398/U. Connect W3P2 to J5 on OQ-458/U. Connect W3P3 to J8 on OQ-458/U.

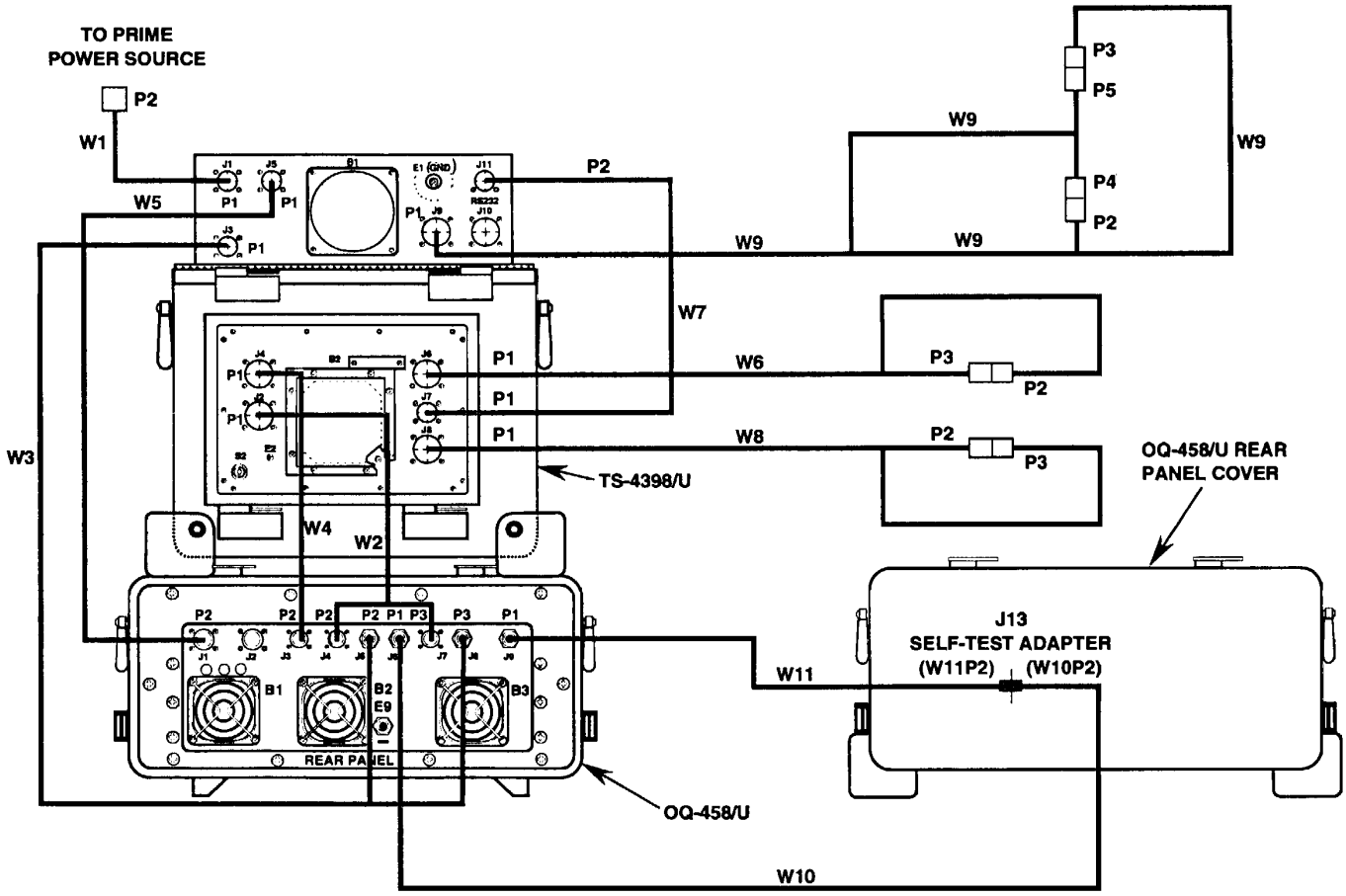


FIGURE 2-7. AN/URM-214 ASSEMBLY AND PREPERATION FOR USE INTERCONNECTIONS.

2-7 RRTS, AN/URM-214, Assembly and Preparation for Use (cont)

9. Connect W2P1 to J2 on TS-4398/U. Connect W2P2 to J4 on OQ-458/U. Connect W2P3 to J7 on OQ-458/U.

10. Connect W9P1 to J9 on TS-4398/U. Connect W9P2 to W9P4. Connect W9P3 to W9P5.

11. Connect W8P1 to J8 on TS-4398/U. Connect W8P2 to W8P3.

12. Connect W7Pl to J7 on TS-4398/U. Connect W7P2 to J11.

13. Connect W6P1 to J6 on TS-4398/U. Connect W6P2 to W6P3.

14. Connect W1OP1 to J6 on OQ-458/U. Connect W1OP2 to the adapter on the OQ-458/U rear panel cover.

15. Connect WllP1 to J9 on OQ-458/U. Connect WllP2 to the adapter on the OQ-458/U rear panel cover.

16. Connect WlP1 to J1 on TS-4398/U. Connect W1P2 to the prime power source.

2-8 INITIAL ADJUSTMENT, DAILY CHECKS, AND SELF-TEST.

2-8.1 RRTS, AN/URM-214, Initial Adjustment. The initial adjustment consists of setting default values, such as frequency, number of test runs, and test mode. The following procedures are performed to set up default values.

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
None

CONDITIONS
Ensure that power is off. 30- minute warm-up period is required before testing.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the AN/URM-214 initial adjustment are found in cable assembly case CY-8676/U unless otherwise noted. The TS-4398/U controls and indicators used during the test are shown in figure 2-8.

Item	Action	Normal Indication	Corrective Action
	AN/URN-214 Initial Adjustment.		
1.	Perform assembly and preparation for use procedures in paragraph 2-7.		
2.	Set Al ON/OFF to ON.	The screen shown below is displayed after 1 minute.	If the screen shown below is not displayed, check that the AC PWR LED is Lit (refer to item 3).

RRTS REMOTE MODE

KEY-6 LOCAL MODE

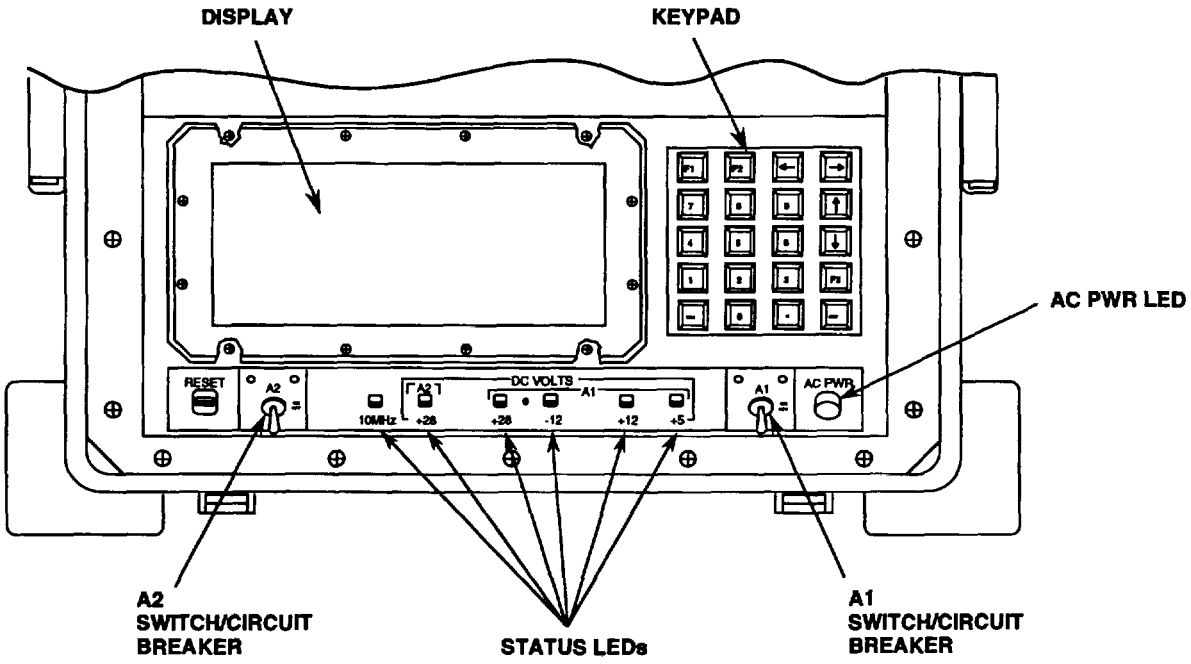


FIGURE 2-8. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
2.	Cont'd	The screen shown below is displayed after 1 minute.	If the screen shown below is still not displayed and the AC PWR LED is Lit, recycle power. Wait 15 seconds before reapplying power. If the screen shown below is still not displayed or is not readable, refer the problem to higher level maintenance.
		RRTS REMOTE MODE KEY-6 LOCAL MODE	
3.	Check that the AC PWR LED	The LED is lit. is lit.	If the LED is not Lit, check cable W1 connections and the prime power source. If the LED is still not Lit, refer to higher level maintenance.

2-8.1 RRTS, AN/URM-214, Initial Adjustment (cont)

Item	Action	Normal Indication	Corrective Action
4.	Ensure that both Test Controller, TS-4398/U fans (B1 and 82) are operating.	The fans are operating.	If the AC PWR LED is lit end both fans are not operating, refer to higher level maintenance
5.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to higher level maintenance.
6.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below Is displayed.	If the screen shown below is not displayed or is not readable, refer to higher Level maintenance.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 HOME

7.	Select DEFAULTS MODIFICATION by pressing "4" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to higher Level maintenance.

DEFAULT MODIFICATIONS CONFIGURATION

KEY-1 MODIFY RECEIVER FREQ. CONFIG.
KEY-2 MODIFY TRANSMITTER FREO. CONFIG.
KEY-3 ASSIGNED SLOT NO: x (1 thru 5)
KEY-4 LOOP COUNT: xxxx (0001 thru 1000)
KEY-5 TX MODE (AJ/NORMAL): AAAAAA
KEY-7 HOME

8.

a) To modify receiver frequencies, select MODIFY RECEIVER FREQ. CONFIG. by pressing "1" on the keypad, then go to item 9.

b) To modify transmitter frequencies, select MODIFY TRANSMITTER FREQ. CONFIG. by pressing "2" on the keypad, then go to item 10.

c) To assign a slot number, select ASSIGNED SLOT NO: 1 (1 THRU 5) by pressing "3" on the keypad, then go to item 11.

d) To set loop count, select LOOP COUNT: 0001 (0001 THRU 100 by pressing 4 on the keypad, then go to item 12.

2-8.1 RRTS, AN/URM-214, Initial Adjustment (cont)

Item	Action	Normal Indication	Corrective Action

e) To select transmit mode, select TX MODE (AJ/NORMAL): by pressing 5 on the keypad, then go to item 13.

NOTE

Last two digits of frequencies entered must be in multiples of 25 kHz (225.025, 230.075). For this test, frequency range is limited to 225.000 - 279.975 MHz.

9. Modify the receiver frequency by pressing the appropriate key and entering the six digit frequency in kHz.

```
MODIFY RECEIVER FREQ. CONFIG.

RECEIVER RANGE: 225.000 - 399.975 MHZ
KEY-1 RX FREQ: xxx.xxx
KEY-2 RX FREQ: xxx.xxx
KEY-3 RX_FREQ: xxx.xxx
KEY-4 RX FREQ: xxx.xxx
KEY-5 RX FREQ: xxx.xxx
KEY-7 HOME
```

NOTE

The transmitter frequency slots must be set to match the receiver frequency slots set in item 9.

Last two digits of frequencies entered must be in multiples of 25 kHz (225.025, 230.075). For this test, frequency range is limited to 225.000 - 279.975 MHz.

10. Modify the transmitter frequency by pressing the appropriate key and entering the six digit frequency in kHz.

```
MODIFY TRANSMITTER  FREQ.  CONFIG.

TRANSMITTER RANGE: 225.000 - 279.975 MHZ
KEY-1 TX_FREQ: xxx.xxx
KEY-2 TX FREQ: xxx.xxx
KEY-3 TX_FREQ: xxx.xxx
KEY-4 TX FREQ: xxx.xxx
KEY-5 TX FREQ: xxx.xxx
KEY-7 HOME
```

2-8.1 RRTS, AN/URM-214, Initial Adjustment (cont)

Item	Action	Normal Indication	Corrective Action
11.	Select the assigned slot number by entering 1 - 5 on the keypad.	ENTER SLOT NUMBER (1 - 5):	
12.	Set the loop count by entering 0001 thru 1000 on the keypad.	ENTER TEST REPEAT COUNT 0001 THRU 1000	
13.	Select transmit mode by pressing "0" for NORMAL or "1" for ANTI-JAM on the	ENTER 0 FOR NORMAL AND 1 FOR ANTI-JAM	
14.	Select HOME by pressing "7" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not problem to higher level maintenance.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.
KEY-7 REMOTE MODE

2-8.2 RRTS, AN/URM-214, Initial Checkout and Self-Test. The following instructions describe the initial checkout and self-test procedures for AN/URM-214.

INITIAL SETUP

Test Equipment
None

Tools and Special Tool
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off. 30-minute warm-up time is required before testing.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the AN/URM-214 initial checkout and self-test are found in cable assembly case CY-8676/U unless otherwise noted. The TS-4398/U controls and indicators used during the test are shown in figure 2-9.

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
	AN/URM-214 Initial Checkout and Self-Test.		
1.	Perform assembly and preparation for use procedures in paragraph 2-7.		
2.	Set A1 ON/OFF to ON.	The screen shown below is displayed after 1 minute.	If the screen shown below is not displayed, check that the AC PWR LED is lit (refer to item 3).

RRTS REMOTE MODE

KEY-6 LOCAL MODE

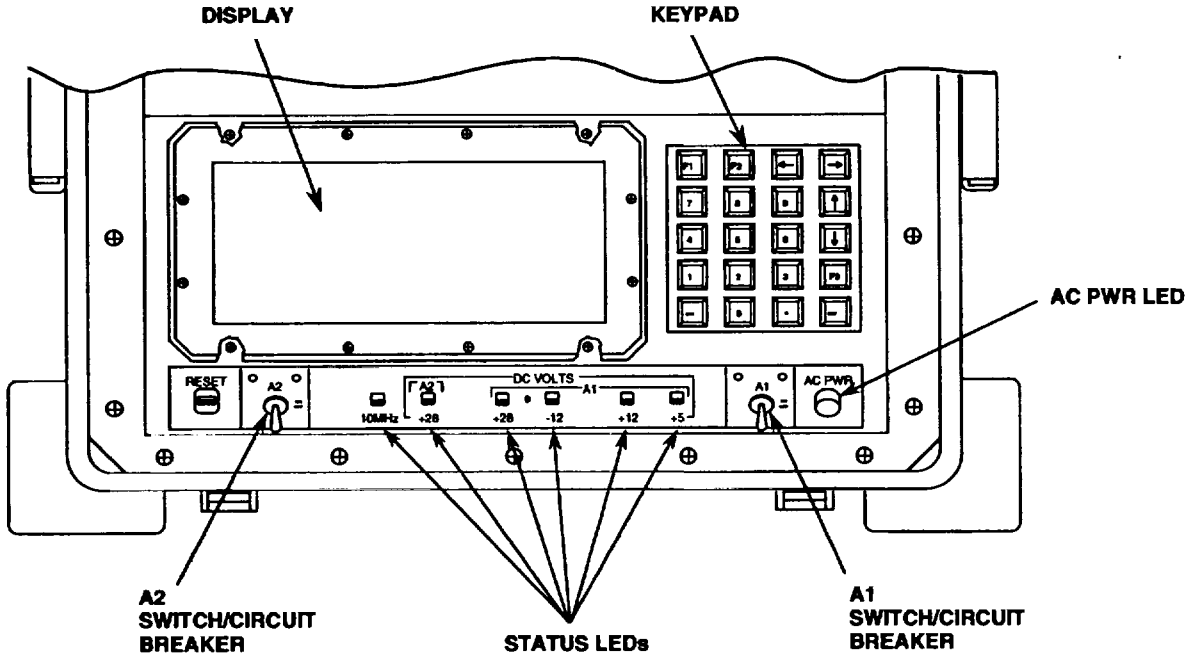


FIGURE 2-9. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
2.	Cont'd	The screen shown below is displayed after 1 minute.	If the screen shown below is still not displayed and the AC PWR LED is lit, recycle power. Wait 15 seconds before reapplying power. If the screen shown below is still not displayed or is not readable, refer the problem to higher level maintenance.
		RRTS REMOTE MODE KEY-6 LOCAL MODE	
3.	Check that the AC PUR LED is lit.	The LED is lit.	If the LED is not lit, check cable WIU connections and the prime power source. If the LED is still not lit, refer to higher level maintenance.

2-8.2 RRTS, AN/URM-214, Initial Checkout and Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
4.	Ensure that both Test Controller, TS-4398/U fans (B1 and B2) are operating.	The fans are operating.	If the AC PIR LED is Lit end both fans are not operating, refer to higher Level maintenance.
5.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not Lit, refer the problem to higher level maintenance.
6.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer the problem to higher level maintenance.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.
KEY-7 HOME

7.	Ensure receiver and transmitter default frequencies are the same (refer to paragraph 2-8.1).		
8.	Select SELF TEST by pressing "3" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer the problem to higher level maintenance.

RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST
KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE

9.	Initiate TEST CONTROLLER SELF TEST by pressing "1" on the keypad.		
10.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		

2-8.2 RRTS, AN/URM-214, Initial Checkout and Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
11.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item.	If a fail condition Is indicated, refer the problem to higher Level maintenance.
12.	Initiate TEST CONTROLLER CABLE SELF TEST by pressing "2" on the keypad.		
13.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
14.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item.	If a fail condition is indicated, refer to higher level maintenance.
15.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (A2) is not lit, check cables for proper connections. If the LED for +28 (A2) is not Lit after checking cables for proper connections, refer to higher Level maintenance. If the LED for +28 (A2) is not lit after removing and replacing OQ-458/U, refer to higher level maintenance.

```
RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE
-------------------------------------
INT TEST CONTROLLER TEST   P:1    F:O
IDL CCA          SDT CCA          RF CCA
PASSED           PASSED    PASSED
```

```
RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE
-------------------------------------
EXT TEST CONTROLLER TEST  P:1    F:O
IDL (W7,13,14,19) SDT (U6,8) RF (W9)
PASSED           PASSED    PASSED
```

2-8.2 RRTS, AN/URM-214, Initial Checkout and Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
16.	Ensure that RTTG, 00-458/U fans (B1 through 83) are operating.	The fans are operating.	If the fans are not operating, ensure that CB1 on RTTG, 00Q-458/U is engaged. If the fans are still not operating, refer to higher level maintenance.
17.	Initiate RX/TX TEST GROUP SELF TEST by pressing "3" on the keypad.		
18.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
19.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item.	If a fail condition is indicated, refer to higher level maintenance.

```
RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE

INT RX/TX TEST GROUP TEST   P:1     F:O
INT RX/TX TEST GROUP PASSED
```

20.	Initiate RX/TX TEST GROUP CABLE SELF TEST by pressing "4" on the keypad.		
21.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
22.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item.	If a fail condition is Indicated, refer to higher level maintenance.

```
RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE

EXT RX/TX TEST GROUP TEST  P:1     F:O
EXT RX/TX TEST GROUP PASSED
```

2-8.2 RRTS, AN/URM-214, Initial Checkout and Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
23.	Set A2 ON/OFF to OFF.		
24.	Set A1 ON/OFF to OFF.		
25.	Disconnect W1P2 from the prime power source. Disconnect WIP1 from JI on TS-4398/U.		
26.	Disconnect W2P2 from J4 on 00-458/U. Disconnect W2P3 from J7 on 00-458/U. Disconnect W2P1 from J2 on TS-4398/U.		
27.	Disconnect W3P2 from J5 on OQ-458/U. Disconnect W3P3 from J8 on Q0-458/U. Disconnect W3P1 from J3 on TS-4398/U.		
28.	Disconnect W4P2 from J3 on 00-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
29.	Disconnect W5P2 from J1 on 00-458/U. Disconnect W5P1 from J5 on TS-4398/U.		
30.	Disconnect W6P2 from W6P3. Disconnect W6P1 from J6 on TS-4398/U.		
31.	Disconnect W7P2 from Jll on TS-4398/U. Disconnect W7P1 from J7.		
32.	Disconnect W8P2 from W8P3. Disconnect W8P1 from J8 on TS-4398/U.		
33.	Disconnect W9P2 from W9P4. Disconnect W9P3 from W9P5. Disconnect W9P1 from J9 on TS-4398/U.		
34.	Disconnect W1OP2 from the adapter on the 00-458/U rear panel cover. Disconnect U1OP1 from J6 on 00-458/U.		
35.	Disconnect WllP2 from the adapter on the OQ-458/U rear panel cover. Disconnect WllP1 from J9 on OQ-458/U.		
36.	AN/URN-214 is prepared to test Radio Relay System (RRS), AN/ARW-85(V)2,3.		

2-9 OPERATING PROCEDURES.

AN/URM-214 is used to troubleshoot the malfunctions of the AN/ARW-85(V)2,3 and through the use of functional and isolation tests. These tests support AN/ARW-85(V)2,3 maintenance to a group of LRUs, an LRU, or a module. Before operating the AN/URM-214, refer to paragraph 2-7, Assembly and Preparation for Use, and paragraph 2-8, Initial Adjustment, Daily Checks, and Self-Test.

2-9.1 AN/URM-214 Functional Tests. Malfunctions within the AN/ARW-85(V)2,3 are evaluated through the use of functional tests. These tests support AN/ARW-85(V)2,3 maintenance to a group of LRUs, an LRU, or a module.

2-9.2 AN/URM-214 Fault Detection. AN/URM-214 performs complex tests of the AN/ARW-85(V)2,3. In the event of a failure, the operator may select progressively more complex tests to aid in determining the faulty group of LRUs, LRU, or module. Any faults detected during a test are indicated.

2-9.3 AN/URM-214 Test Limitations. In some cases, AN/ARW-85(V)2,3 design does not allow isolation to a single LRU. Therefore, the AN/URM-214's recommendation is to replace an LRU based on the most probable cause of failure (PCOF). To perform the AN/ARW-85(V)2,3 functional and isolation tests, refer to Unit and Direct Support Maintenance Manual: Radio Relay System, TM 11-5821-349-23/TO 31R2-ARW85(V)3-2.

2-9.4 AN/URM-214 Screen, Menus, and Test Performances. The screens, menus, and test performances of the AN/ARW-85(V)2,3 functional test are identical for both the direct connect and indirect connect tests. The RRTS LOCAL MODE menu screen is the primary screen of the AN/ARW-85(V)2,3 functional test. This screen appears upon entering the local mode after power-up of the AN/URM-214. It allows the operator access to all menus and/or the capability to run tests. To select a different menu and/or run tests, press the number on the keypad that corresponds to the function to be performed.

2-10 DISASSEMBLY AND PREPARATION FOR MOVEMENT.

Before moving AN/URM-214, it must first be disassembled. After disassembling AN/URM-214, install dust caps over the external connectors. Enclose AN/URM-214 in the original shipping container or equivalent with the packing material provided. The following instructions describe the disassembly and preparation for movement procedures for AN/URM-214.

2-10 Disassembly and Preparation for Movement (cont)

WARNING

Very high voltages are contained in this equipment. On TS-4398/U, set A1 ON/OFF to OFF before disassembling AN/URM-214. Failure to comply can result in serious injury or **DEATH.**

Test controller TS-4398/U and cable assembly case CY-8676/U require two-person lift. Injury to personnel may result if one-person lift is attempted.

NOTE

All cables used during the AN/URM-214 assembly and preparation for use are found in CY-8676/U. All interconnections for the AN/URM-214 assembly and preparation for use are shown in figure 2-7.

1. On TS-4398/U, set A2 ON/OFF to OFF.
2. On TS-4398/U, set Al ON/OFF to OFF.
3. Turn OFF the prime power source POWER ON/OFF switch.
4. Disconnect WIP2 from the prime power source. Disconnect WlPl from J1 on TS-4398/U.
5. Disconnect W2P2 from J4 on OQ-458/U. Disconnect W2P3 from J7 on OQ-458/U. Disconnect W2P1 from J2 on TS-4398/U.
6. Disconnect W3P2 from J5 on OQ-458/U. Disconnect W3P3 from J8 on OQ-458/U. Disconnect W3P1 from J3 on TS-4398/U.
7. Disconnect W4P2 from J3 on OQ-458/U. Disconnect W4P1 from J4 on TS-4398/U.
8. Disconnect W5P2 from J1 on OQ-458/U. Disconnect W5P1 from J5 on TS-4398/U.
9. Disconnect W6P2 from W6P3. Disconnect W6P1 from J6 on TS-4398/U.
10. Disconnect W7P2 from Jll on TS-4398/U. Disconnect W7P1 from J7.
11. Disconnect W8P2 from W8P3. Disconnect W8P1 from J8 on TS-4398/U.
12. Disconnect W9P2 from W9P4. Disconnect W9P3 from W9P5. Disconnect W9P1 from J9 on TS-4398/U.

2-10 Disassembly and Preparation for Movement (cont)

13. Disconnect W10OP2 from the adapter on the OQ-458/U rear panel cover. Disconnect WlOP1 from J6 on OQ-458/U.

14. Disconnect WllP2 from the adapter on the OQ-458/U rear panel cover. Disconnect WllP1 from J9 on OQ-458/U.

15. Disconnect all remaining cables from AN/URM-214 to AN/ARW-85 (V)2,3.

16. Insert cables in cable assembly case CY-8676/U.

17. Install the CY-8676/U cover.

18. Install the TS-4398/U cover.

19. Install both OQ-458/U end covers.

CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

Section I - TROUBLESHOOTING PROCEDURES.

3-1 INTRODUCTION.

The operator performs the initial adjustments, daily checks, and self-test to ensure the equipment is ready for operation. During operation, if the AN/URM-214 is not performing properly, the operator is required to correct the AN/URM-214 malfunction or refer to higher level maintenance personnel before continuing operation. The operator is limited to checking connections to correct a malfunction.

3-2 SYMPTOM INDEX.

Table 3-1 lists the common symptoms that may occur while performing initial adjustments, daily checks, and self-test or during normal operation. This symptom index references the appropriate step in table 3-2 for fault isolation.

3-3 FAULT ISOLATION.

Fault isolation is accomplished by performing the corrective action(s) listed in table 3-2. The table lists the common malfunctions which may occur during the initial adjustments, daily checks, and self-test or during normal operation. Perform the corrective actions in the order listed in table 3-2.

TABLE 3-1. SYMPTOM INDEX TABLE.

SYMPTOM	PROCEED TO TABLE 3-2
TS-4398/U AC PWR LED does not light.	**Step a**
TS-4398/U +5 LED (A1) does not light.	**Step b**
TS-4398/U +12 LED (A1) does not light.	**Step c**
TS-4398/U -12 LED (A1) does not light.	**Step d**
TS-4398/U +28 LED (A1) does not light.	**Step e**
TS-4398/U +28 LED (A2) does not light.	**Step f**
TS-4398/U 10 MHz LED does not light.	**Step g**
TS-4398/U screen has no display.	**Step h**
TS-4398/U screen has meaningless display.	**Step i**
TS-4398/U screen displays error messages.	**Step j**
TS-4398/U has unresponsive keypad.	**Step k**
OQ-458/U does not power up.	**Step 1**
No power applied to Radio Relay System (RRS), AN/ARW-85 (V)2,3.	**Step m**
TS-4398/U fan (B1 or B2) is not operating, but AC PWR LED is ON.	**Step n**
OQ-458/U fan (B1, B2, or B3) is not operating but AC PWR LED is ON.	**Step o**

TABLE 3-2. FAULT ISOLATION TABLE.

MALFUNCTION	CORRECTIVE ACTION
a. TS-4398/U AC PWR LED does not light.	**Make sure TS-4398/U Al ON/OFF is ON.** **Make sure the SAFETY INTERLOCKED SWITCH (S2) is not engaged (TS-4398/U cover must be removed).**

TABLE 3-2. FAULT ISOLATION TABLE (cont).

	MALFUNCTION	CORRECTIVE ACTION
a.	**TS-4398/U AC PWR LED does not light. (cont)**	**Check cable W1 connections between the power source and TS-4398/U.** If these actions do not correct the problem, refer to higher level maintenance personnel.
b.	**TS-4398/U +5 LED (A1) does not light.**	**Refer to higher level maintenance personnel.**
c.	TS-4398/U +12 LED (Al) does not light.	Refer to higher level maintenance personnel.
d.	TS-4398/U -12 LED (Al) does not light.	Refer to higher level maintenance personnel.
e.	TS-4398/U +28 LED (Al) does not light.	Refer to higher level maintenance personnel.
f.	TS-4398/U +28 LED (A2) does not light.	Make sure TS-4398/U Al ON/OFF is ON. Make sure TS-4398/U A2 ON/OFF is ON. Make sure TS-4398/U AC PWR LED is lit. Make sure the SAFETY INTERLOCKED SWITCH (S2) is not engaged (TS-4398/U cover must be removed). Make sure the SAFETY INTERLOCKED SWITCH (S10) is not engaged (OQ-458/U cover must be removed). Check OQ-458/U CB1. Ensure that it is enabled. Check cable W5 connections between TS-4398/U and OQ-458/U.

TABLE 3-2. FAULT ISOLATION TABLE (cont).

	MALFUNCTION	CORRECTIVE ACTION
f.	**TS-4398/U +28 LED (A2) does not light. (cont)**	**If these actions do not** correct the problem, refer to higher level maintenance personnel.
g.	**TS-4398/U 10 MHz LED does not light**	**Refer to higher level maintenance personnel**
h.	TS-4398/U screen has no display.	Recycle power. Wait 15 seconds before reapplying power. If these actions do not correct the problem, refer to higher level maintenance personnel.
i.	TS-4398/U screen has meaningless display	Recycle power. Wait 15 seconds before reapplying power. If these actions do not correct the problem, refer to higher level maintenance personnel.
j.	TS-4398/U screen displays error messages.	Refer to higher level maintenance personnel.
k.	TS-4398/U has unresponsive keypad.	Refer to higher level maintenance personnel.
1.	OQ-458/U does not power up.	Make sure TS-4398/U A1 ON/OFF is ON. Make sure TS-4398/U A2 ON/OFF is ON. Make sure TS-4398/U AC PWR LED is lit. Make sure the SAFETY INTERLOCK SWITCH (S2) is not engaged (TS-4398/U cover must be removed). Make sure TS-4399/U +28 LED (A2) is lit.

TABLE 3-2. FAULT ISOLATION TABLE (cont).

	MALFUNCTION	CORRECTIVE ACTION
1.	**OQ-458/U does not power up. (cont)**	Make sure the SAFETY INTERLOCK SWITCH (S10) is not engaged (OQ-458/U cover must be removed). Check OQ-458/U CB1. Ensure that it is enabled. Check cable W5 between TS-4398/U AND OQ-458/U. If these actions do not correct the problem, refer to higher level maintenance personnel.
m.	No power applied to AN/ARW-85 (V) 2,3.	Make sure TS-4398/U is powered up. Make sure OQ-458/U is powered up. Check OQ-458/U CB2. Ensure that it is enabled. Check cable W12 between OQ-458/U and AN/ARW-85(V)2,3. If these actions do not correct the problem, refer to higher level maintenance personnel.
n.	TS-4398/U fan (B1 or B@) is not operating but AC PWR LED is ON.	Refer to higher level maintenance personnel.
0.	OQ-458/U fan (B1, B2, or B3) is not operating but AC PWR LED is ON.	Refer to higher level maintenance personnel.

Section II - MAINTENANCE PROCEDURES.

3-4 INTRODUCTION.

This section contains the maintenance procedures that are the responsibility of the operator.

3-5 INSPECTION.

For AN/URM-214 inspection procedures, refer to paragraph 5-4, Checking Unpacked Equipment.

3-6 CHECKS/ADJUSTMENTS.

For procedures on checking, adjusting, and aligning AN/URM-214, refer to paragraph 2-8, Initial Adjustment, Daily Checks, and Self-Test.

3-7 REPAIR.

Operator repair procedures are limited to checking cable connections as discussed in paragraph 3-3, Fault Isolation.

3-8 TEST.

Perform the procedures in paragraph 2-8, Initial Adjustment, Daily Checks, and Self-Test, to verify proper operation of AN/URM-214.

CHAPTER 4

UNIT MAINTENANCE INSTRUCTIONS

Section I - TROUBLESHOOTING PROCEDURES.

4-1 INTRODUCTION.

Troubleshooting the Radio Relay Test Set (RRTS), AN/URM-214, is based on symptoms observed by the technician during initial adjustments, daily checks, and self-test as well as during normal operation. Unit level maintenance is limited to the replacement of test controller, TS-4398/U; the receiver-transmitter test group (RTTG) OQ-458/U; and cable assemblies.

4-2 SYMPTOM INDEX.

Table 4-1 lists the common symptoms that may occur while performing initial adjustments, daily checks, and self-test or during normal operation. This symptom index references the appropriate step in table 4-2 for fault isolation.

4-3 FAULT ISOLATION.

Fault isolation is accomplished by performing the corrective actions listed in table 4-2. The table lists the common malfunctions which may occur during initial adjustments, daily checks, and self-test or during normal operation. Perform the corrective actions in the order listed in table 4-2.

TABLE 4-1. SYMPTOM INDEX TABLE.

SYMPTOM	PROCEED TO TABLE 4-2
TS-4398/U AC PWR LED does not light.	**Step a**
TS-4398/U +5 LED (A1) does not light.	**Step b**
TS-4398/U +12 LED (A1) does not light.	**Step c**
TS-4398/U -12 LED (A1) does not light.	**Step d**
TS-4398/U +28 LED (A1) does not light.	**Step e**
TS-4398/U +28 LED (A2) does not light.	**Step f**
TS-4398/U 10 MHz LED does not light.	**Step g**
TS-4398/U screen has no display.	**Step h**
TS-4398/U screen has meaningless display.	**Step i**
TS-4398/U screen displays error messages.	**Step j**
TS-4398/U has unresponsive keypad.	**Step k**
OQ-458/U does not power up.	**Step 1**
No power applied to Radio Relay System (RRS), AN/ARW-85 (V)2,3.	**Step m**
TS-4398/U fan (B1 or B2) is not operating, but AC PWR LED is ON.	**Step n**
OQ-458/U fan (B1, B2, or B3) is not operating but AC PWR LED is ON.	**Step o**

TABLE 3-2. FAULT ISOLATION TABLE.

MALFUNCTION	CORRECTIVE ACTION
a. TS-4398/U AC PWR LED does not light.	**Make sure TS-4398/U Al ON/OFF is ON.** **Make sure the SAFETY INTERLOCKED SWITCH (S2) is not engaged (TS-4398/U cover must be removed).**

TABLE 4-2. FAULT ISOLATION TABLE (cont).

	MALFUNCTION	CORRECTIVE ACTION
a.	**TS-4398/U AC PWR LED does not light. (cont)**	**Check cable W1 connections between the power source and TS-4398/U.**
b.	**TS-4398/U +5 LED (A1) does not light.**	**Replace TS-4398/U.**
c.	TS-4398/U +12 LED (Al) does not light.	Replace TS-4398/U.
d.	TS-4398/U -12 LED (Al) does not light.	Replace TS 4398/U.
e.	TS-4398/U +28 LED (Al) does not light.	Replace TS 4398/U.
f.	TS-4398/U +28 LED (A2) does not light.	Make sure TS-4398/U A1 ON/OFF is ON. Make sure TS-4398/U A2 ON/OFF is ON. Make sure TS-4398/U AC PWR LED is lit. Make sure the SAFETY INTERLOCKED SWITCH (S2) is not engaged (TS-4398/U cover must be removed). Make sure the SAFETY INTERLOCKED SWITCH (S10) is not engaged (OQ-458/U cover must be removed). Check OQ-458/U CB1. Ensure that it is enabled. Check cable W5 connections between TS-4398/U and OQ-458/U. Replace TS-4398/U. Replace OQ-458/U.
g.	TS-4398/U 10 MHz LED does not light.	Replace TS-4398/U.

TABLE 4-2. FAULT ISOLATION TABLE (cont).

	MALFUNCTION	CORRECTIVE ACTION
h.	**TS-4398/U screen has no display.**	Recycle power. Wait 15 seconds before reapplying power. Replace TS-4398/U.
i.	**TS-4398/U screen has meaningless display.**	Recycle power. Wait 15 seconds before reapplying power. Replace TS-4398/U.
j.	TS-4398/U screen displays error messages.	If the display indicates that a cable has failed, then replace the failed cable assembly. If the display indicates that a component of OQ-458/U has failed, then replace OQ-458/U. If the display indicates that a component of TS-4398/U has failed, then replace TS-4398/U.
k.	TS-4398/U has unresponsive keypad.	Replace TS-4398/U.
1.	OQ-458/U does not power-up.	Make sure TS-4398/U A1 ON/OFF is ON. Make sure TS-4398/U A2 ON/OFF is ON. Make sure TS-4398/U AC PWR LED is lit. Make sure the SAFETY INTERLOCKED SWITCH (S2) is not engaged (TS-4398/U cover must be removed). Make sure TS-4398/U +28 LED (A2) is lit.

TABLE 4-2. FAULT ISOLATION TABLE (cont).

	MALFUNCTION	CORRECTIVE ACTION
1.	**OQ-458/U does not power up. (cont)**	Make sure the SAFETY INTERLOCK SWITCH (S10) is not engaged (OQ-458/U cover must be removed). Check OQ-458/U CB1. Ensure that it is enabled. Check cable W5 between TS-4398/U AND OQ-458/U. Replace OQ-458/U. Replace TS-4398/U.
m.	No power applied to AN/ARW-85 (V) 2,3.	Make sure TS-4398/U is powered up. Make sure OQ-458/U is powered up. Check OQ-458/U CB2. Ensure that it is enabled. Check cable W12 between OQ-458/U and AN/ARW-85(V)2,3. Replace OQ-458/U. personnel.
n.	TS-4398/U fan (B1 or B@) is not operating but AC PWR LED is ON.	Refer to higher level maintenance personnel.
0.	OQ-458/U fan (B1, B2, or B3) is not operating but AC PWR LED is ON.	Refer to higher level maintenance personnel.

Section II - MAINTENANCE PROCEDURES.

4-4 INTRODUCTION.

This section contains the maintenance procedures that are the responsibility of the unit level maintenance technician.

4-5 INSPECTION.

For AN/URM-214 inspection procedures, refer to paragraph 5-4, Checking Unpacked Equipment.

4-6 CHECKS/ADJUSTMENTS.

For procedures on checking and adjusting AN/URM-214, refer to paragraph 2-8, Initial Adjustment, Daily Checks, and Self-Test.

4-7 REMOVAL AND INSTALLATION PROCEDURES.

Cables between OQ-458/U and TS-4398/U are disconnected and the OQ-458/U or TS-4398/U are replaced.

4-8 REPAIR.

Unit level repair procedures are limited to the replacement of LRUs and cables as discussed in paragraph 4-3, Fault Isolation.

4-9 TEST.

Perform the self-test procedures which follow.

Paragraph	Test
4-9.1	Test Controller, TS-4398/U Self-Test
4-9.2	Test Controller, TS-4398/U Cables Self-Test
4-9.3	RTTG, OQ-458/U Self-Test
4-9.4	RTTG, OQ-458/U Cables Self-Test

4-9.1 Test Controller, TS-4398/U, Self-Test**. There are no initial adjustments or daily checks for TS-4398/U. The following instructions describe the self-test procedures for TS-4398/U.**

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off. 30-minute warm-up period is required before testing.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U self-test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 4-1. All controls and indicators used during the test are shown in figure 4-2.

Item	Action	Normal Indication	Corrective Action
a.	TS-4398/U Self-Test.		
1.	Remove the TS-4398/U cover.		
2.	Ensure that all switches are in the "OFF" position.		
3.	Connect W1P1 to J1 on TS-4398/U. Connect W1P2 to the prime power source.		

4-9.1Test Controller, TS-4398/U, Self-Test (cont)

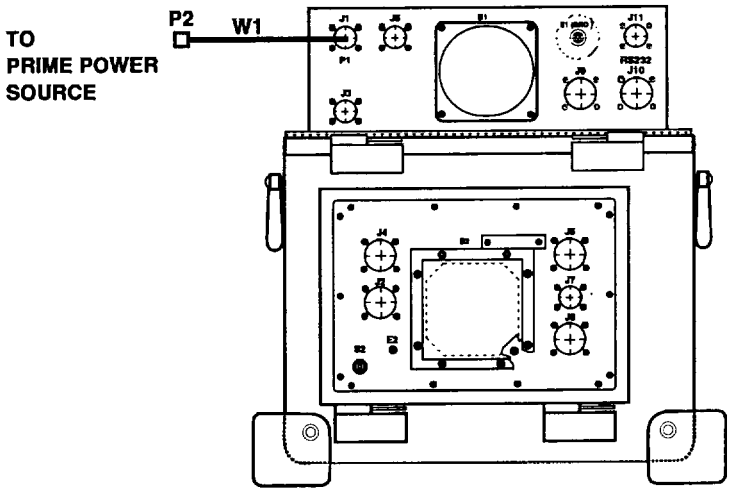


FIGURE 4-1. TS-4398/U SELF-TEST INTERCONNECTION.

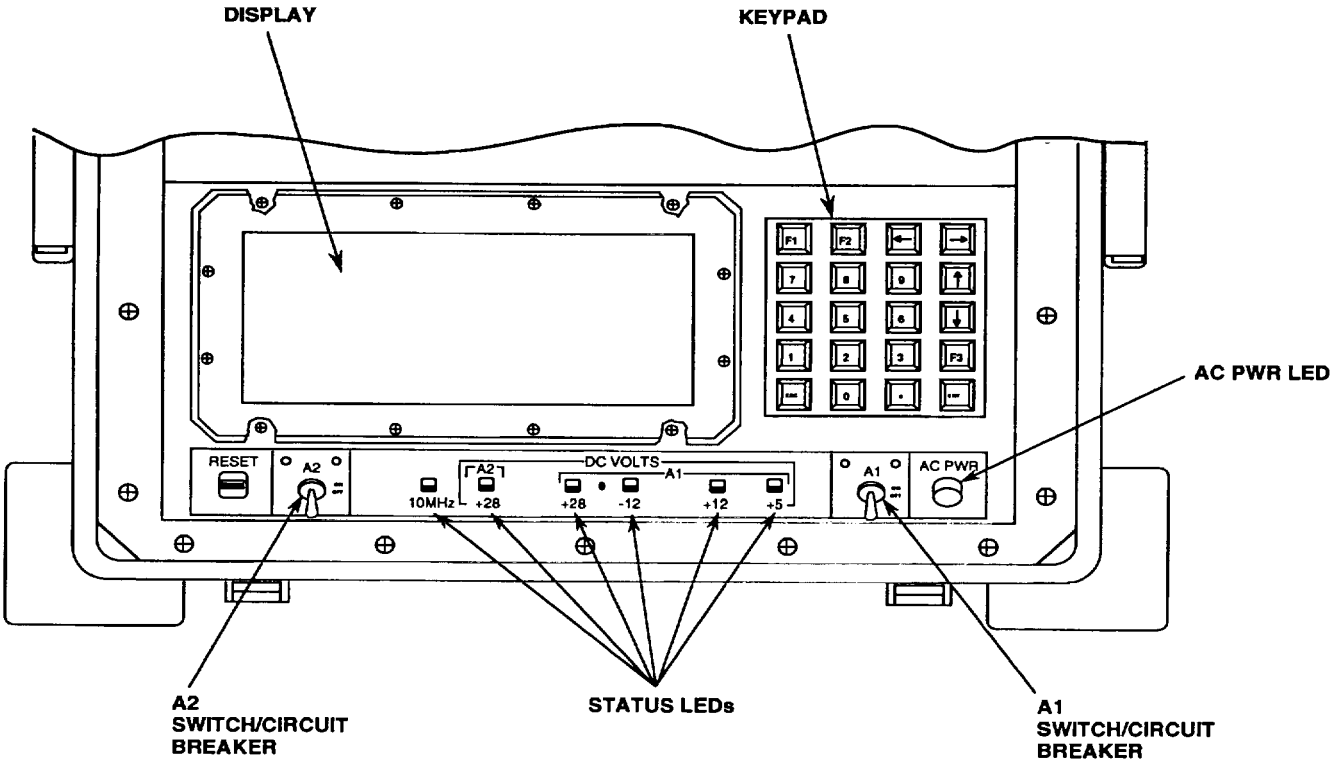


FIGURE 4-2. TS-4398/U CONTROLS AND INDICATORS.

4-9.1 Test Controller, TS-4398/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
4.	Set A1 ON/OFF to ON.	The screen shown below is displayed.	If the screen shown below is not displayed, check that the AC PWR LED is Lit (refer to item 5). If the screen shown below is still not displayed and the AC PUR LED is Lit, recycle power. Wait 15 seconds before reapplying power. If the screen shown below is still not displayed or is not readable, mark for repair and refer to higher level maintenance.
		RRTS REMOTE MODE KEY-6 LOCAL MODE	
5.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not Lit, check cable WU1 connections and the prime power source. If the LED is not lit after checking cable W1 connections, refer to higher level maintenance.
6.	Ensure that both TS-4398/U fans (B1 and B2) are operating. level maintenance.	The fans are operating.	If the AC PWR LED is Lit and both fans are not operating, refer to higher
7.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, mark for repair and refer to higher level maintenance.
8.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, mark for repair and refer to higher level maintenance.
		RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	

4-9.1 Test Controller, TB-4398/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
9.	Ensure receiver and transmitter default frequencies are the same (refer to paragraph 2-8.1).		
10.	Select SELF TEST by pressing "3" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, mark for repair and refer to higher level maintenance.

```
RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME
```

11.	Initiate TEST CONTROLLER SELF TEST by pressing "1" on the keypad.		
12.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
13.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item.	If a fail condition is indicated, remove and replace TS-4398/U and reperform the TS-4398/U self-test. Mark the faulty TS-4398/U for repair and refer to higher level maintenance.

```
RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST
KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE
------------------------------------------------------------
INT TEST CONTROLLER TEST   P:1        F:O
IDL CCA          SDT CCA          RF CCA
PASSED           PASSED           PASSED
```

14.	Set A1 ON/OFF to OFF.		
15.	Disconnect W1P2 from the prime power source. Disconnect WlP1 from 1 on TS-4398/U.		

4-9.2 Test Controller, TS-4398/U, Cables Self-Test**. The following instructions describe the TS-4398/U cables self-test procedures.**

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U cables self-test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 4-3. The TS-4398/U controls and indicators used during the test are shown in figure 4-4.

Item	Action	Normal Indication	Corrective Action
a.	TS-4398/U Cables Self-Test.		
	1. Remove the TS-4398/U cover.		
	2. Ensure that all switches are in the "OFF" position.		
	3. Connect W9P1 to J9 on TS-4398/U. Connect W9P2 to WP4. Connect W9P3 to W9P5.		
	4. Connect W8P1 to J8 on TS-4398/U. Connect W8PZ to W8P3.		
	5. Connect W7P1 to J7 on TS-4398/U. Connect W7P2 to J11.		
	6. Connect W6P1 to J6 on TS-4398/U. Connect W6PZ to U6P3.		

4-9.2 Test Controller, TS-4398/U, Cables Self-Test (cont)

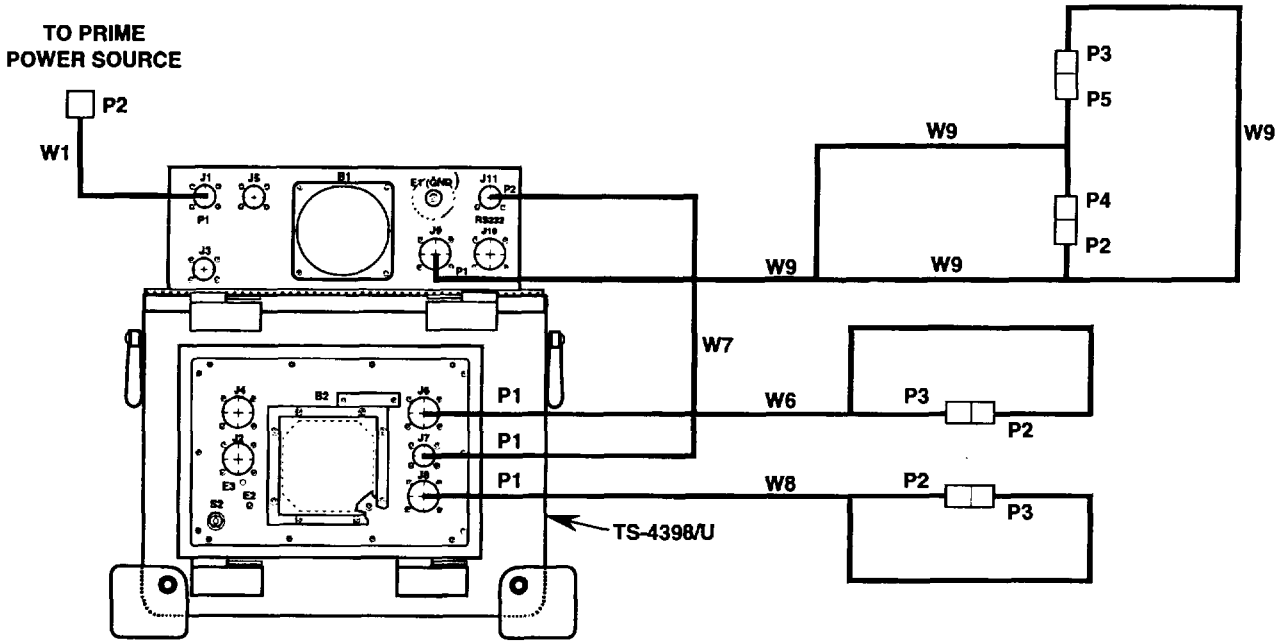


FIGURE 4-3. TS-4398/U CABLES SELF-TEST INTERCONNECTIONS.

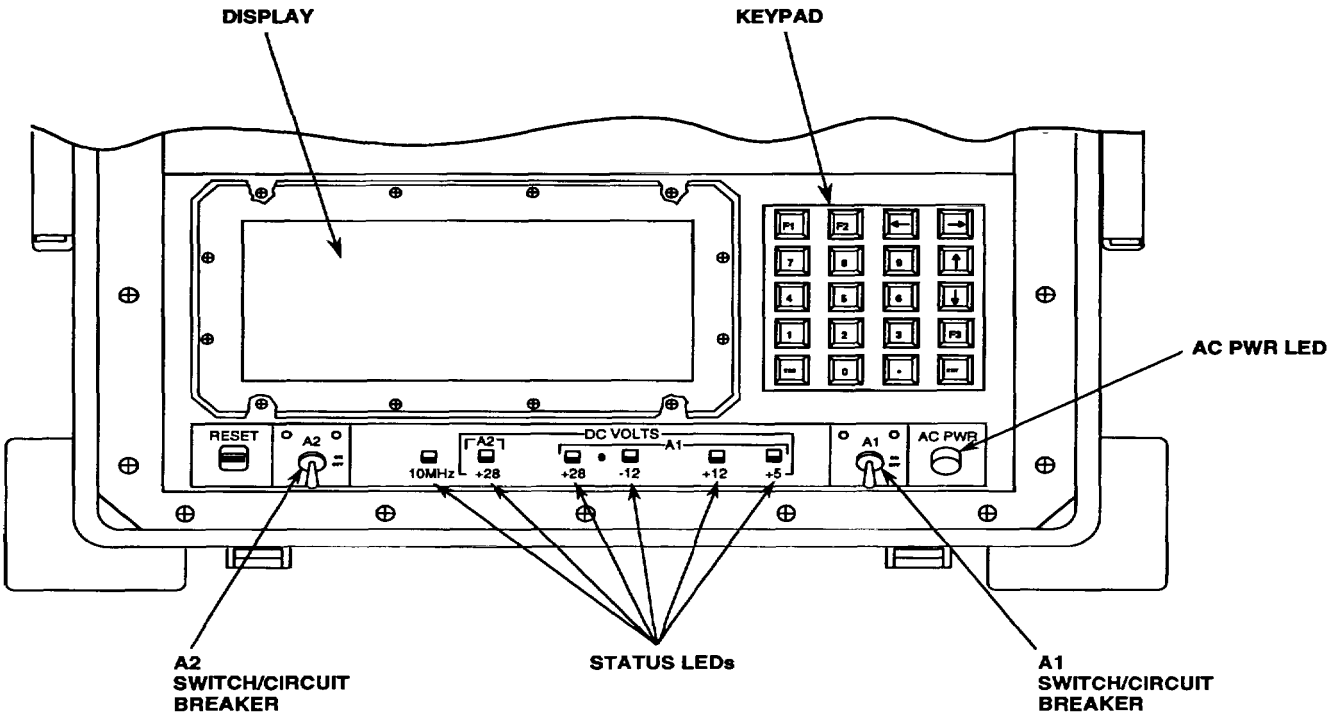


FIGURE 4-4. TS-4398/U CONTROLS AND INDICATORS

4-9.2 Test Controller, TS-4398/U, Cables Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
7.	Connect WIP1 to J1 on TS-4398/U. Connect U1P2 to the prime power source.		
8.	Set A1 ON/OFF to ON.	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL MODE	If the screen shown below is not displayed, check that the AC PWR LED is lit (refer to item 9). If the screen shown below is still not displayed and the AC PWR LED is Lit, recycle power. Wait 15 seconds before reapplying power. If the screen shown below is still not displayed or is not readable, remove and replace TS-4398/U.
9.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not Lit, check cable WU connections and the prime power source. If the LED is not Lit after checking cable W1 connections, refer to higher level maintenance.
10.	Ensure that both TS-4398/U	The fans are operating. fans (B1 and B2) are operating.	If the AC PWR LED is lit and both fans are not operating, refer to higher Level maintenance.
11.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not Lit, remove and replace TS-4398/U.
12.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed. RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, remove and replace TS-4398/U.

4-9.2 Test Controller, TS-4398/U, Cables Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
13.	Ensure receiver and transmitter default frequencies are the same (refer to paragraph 2-8.1).		
14.	Select SELF TEST by pressing "3" on the keypad.	The screen shown below is displayed. RRTS SELF TEST CONFIGURATION KEY-1 TEST CONTROLLER SELF TEST KEY-2 TEST CONTROLLER CABLE SELF TEST KEY-3 RX/TX TEST GROUP SELF TEST KEY-4 RX/TX TEST GROUP CABLE SELF TEST KEY-6 ABORT TEST IN PROGRESS KEY-7 HOME	If the screen shown below is not displayed or is not readable, remove and replace TS-4398/U.
15.	Initiate TEST CONTROLLER CABLE SELF TEST by pressing "2" on the keypad.		
16.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
17.	Select the condition which applies and take the action. the next item.	If a pass condition is indicated (the screen shown below is displayed), go to RRTS SELF TEST CONFIGURATION KEY-1 TEST CONTROLLER SELF TEST KEY-2 TEST CONTROLLER CABLE SELF TEST KEY-3 RX/TX TEST GROUP SELF TEST KEY-4 RX/TX TEST GROUP CABLE SELF TEST KEY-6 ABORT TEST IN PROGRESS KEY-7 REMOTE MODE --- EXT TEST CONTROLLER TEST P:1 F:O IDL (W7,13,14,19) SDT (W6,8) RF (W9) PASSED PASSED PASSED	If a fail condition is indicated, remove and replace the failed cable assembly and reperform the TS-4398/U self-test.
18.	Set A1 ON/OFF to OFF.		
19.	Disconnect W1P2 from the prime power source. Disconnect W1P1 from J1 on TS-4398/U.		
20.	Disconnect W6P2 from W6P3. Disconnect W6P1 from J6 on TS-4398/U.		
21.	Disconnect W7P2 from J11 on TS-4398/U. Disconnect W7P1 from J7 on TS-4398/U.		

4-9.2 Test Controller, TS-4398/U, Cables Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
22.	Disconnect W8PZ from W8P3. Disconnect W8P1 from J8 on TS-4398/U.		
23.	Disconnect U9P2 from U9P4. Disconnect W9P3 from W9P5. Disconnect W9P1 from J9 on TS-4398/U.		

4-9.3 RTTG, OQ-458/U, Self-Test**. There are no initial adjustments or daily checks for OQ-458/U. The following instructions describe the self-test procedures for OQ-458/U.**

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure OQ-458/U has been powered on for one-half hour for RCVR warmup.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the OQ-458/U self-test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 4-5. The TS-4398/U controls and indicators used during the test are shown in figure 4-6.

Item	Action	Normal Indication	Corrective Action
a.	OQ-458/U Self-Test.		
1.	Remove both O0-458/U end covers.		
2.	Place test controller, TS-4398/U, on or near OQ-458/U.		
3.	Remove the TS-4398/U cover.		
4.	Remove the CY-8676/U cover.		
5.	Ensure that all switches are in the "OFF" position.		
6.	Connect W5P1 to J5 on TS-4398/U. Connect W5P2 to J1 on OQ-458/U.		
7.	Connect W4P1 to J4 on TS-4398/U. Connect W4PZ to J3 on OQ-458/U.		

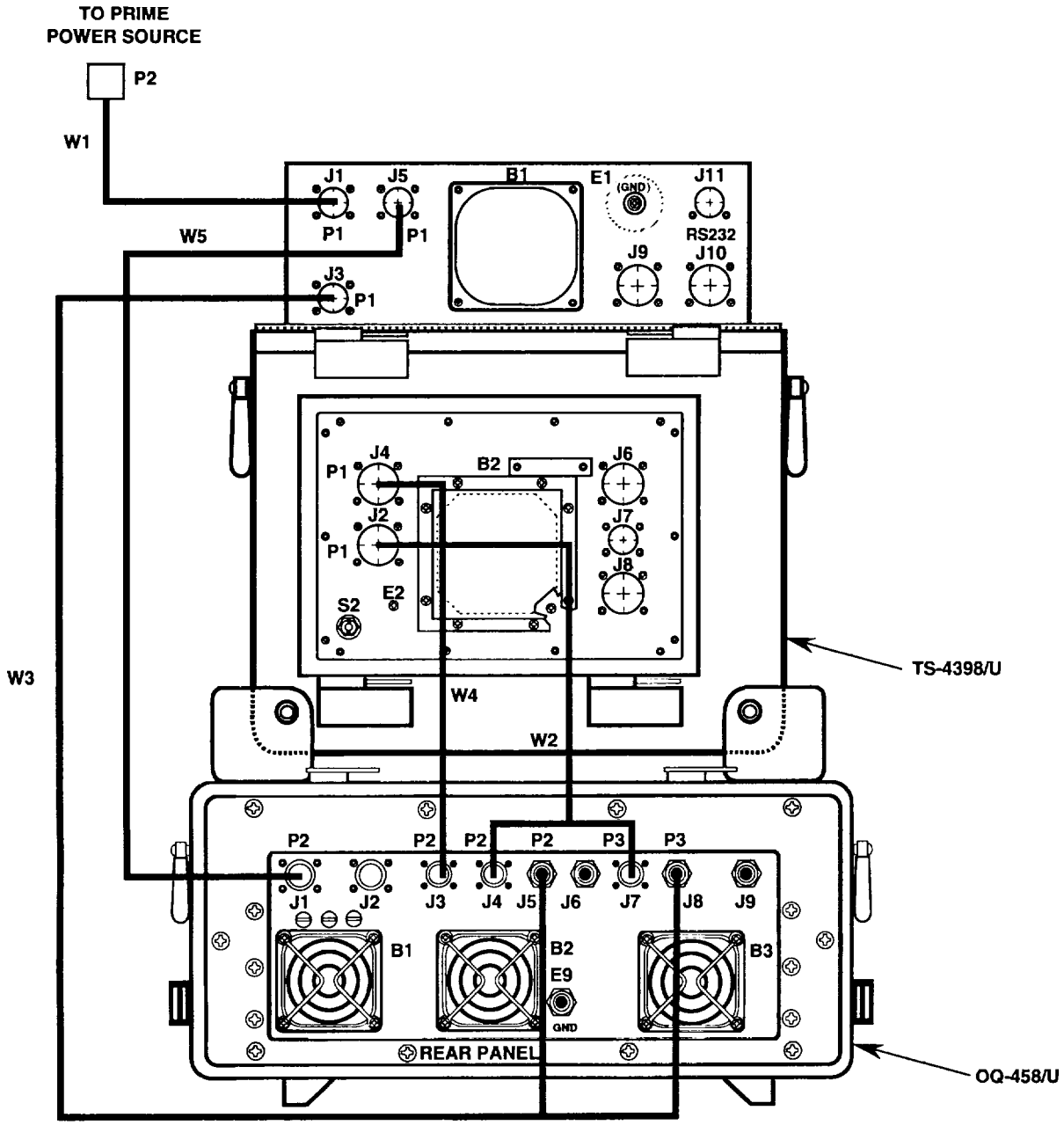


FIGURE 4-5. OQ-458/U SELF-TEST INTERCONNECTIONS

4-9.3 RTTG, OQ-458/U, Self-Test (cont)

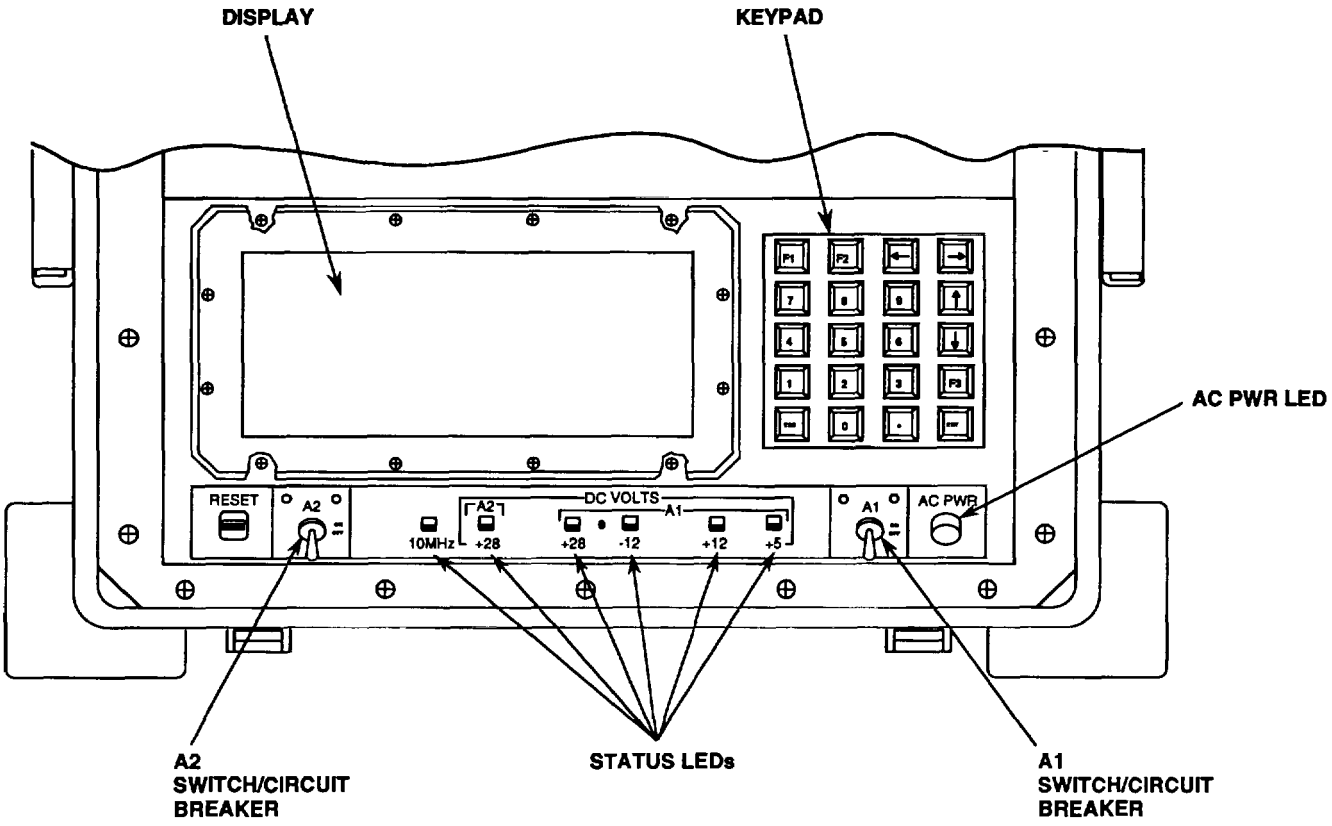


FIGURE 4-6. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
8.	Connect W3P1 to J3 on TS-4398/U. Connect W3P2 to J5 on 00-458/U. Connect W3P3 to J8 on OQ-458/U.		
9.	Connect WZP1 to J2 on TS-4398/U. Connect W2P2 to J4 on OQ-458/U. Connect WZP3 to J7 on 00-458/U.		
10.	Connect WiP1 to J1 on TS-4398/U. Connect W1P2 to the prime power source.		

4-9.3 RTTG, OQ-458/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
11.	Set A1 ON/OFF to ON.	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL MODE	If the screen shown below is not displayed, check that the AC PWR LED is Lit (refer to item 12). If the screen shown below is still not displayed and the AC PWR LED is Lit, recycle power. Wait 15 seconds before reapplying power. If the screen shown below is still not displayed or is not readable, remove and replace TS-4398/U.
12.	Check that the AC PWR LED is lit.	The LED is Lit.	If the LED is not Lit, check cable Wi connections and the prime power source. If the LED is not lit after checking cable WI connections, refer to higher Level maintenance.
13.	Ensure that the TS-4398/U fans (B1 and B2) are operating.	The fans are operating.	If the AC PWR LED is Lit and the fans are not operating, refer to higher level maintenance.
14.	Monitor the status LEDs.	All LEDs should be Lit, except the LED for +28 (A2).	If the appropriate LEDs are not Lit, remove and replace TS-4398/U.
15.	On TS-4398/U, set AZ ON/OFF to ON.	The LED for +28 (AZ) is Lit.	If the LED for +28 (A2) is not lit, check cables for proper connections. If the LED for +28 (AZ) is not lit after checking cables for proper connections, then remove and replace OQ-458/U. If the LED for +28 (A2) is not Lit after removing and replacing OQ-458/U, then remove and replace TS-4398/U.
16.	Ensure that the OQ-458/U fans (B1, 82, and B3) are operating.	The fans are operating.	If the +28 (AZ) LED is Lit and the fans are not operating, refer to higher level maintenance.

4-9.3 RTTG, OQ-458/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
17.	Select LOCAL MODE by pressing "6" on the keypad. readable, remove and replace TS-4398/U.	The screen shown below is displayed.	If the screen shown below is not displayed or is not
		RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	
18.	Ensure receiver and transmitter default frequencies are the same (refer to paragraph 2-8.1).		
19.	Select SELF TEST by pressing "3" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, remove and replace TS-4398/U.
		RRTS SELF TEST CONFIGURATION KEY-1 TEST CONTROLLER SELF TEST KEY-2 TEST CONTROLLER CABLE SELF TEST KEY-3 RX/TX TEST GROUP SELF TEST KEY-4 RX/TX TEST GROUP CABLE SELF TEST KEY-6 ABORT TEST IN PROGRESS KEY-7 HOME	
20.	Initiate RX/TX TEST GROUP SELF TEST by pressing "3" on the keypad.		
21.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
22.	Select the condition which applies and take the action. the next item. self-test.	If a pass condition is indicated (the screen shown below is displayed), go to reperform the 00-458/U	If a fail condition is indicated, remove and replace OQ-458/U and
		RRTS SELF TEST CONFIGURATION KEY-1 TEST CONTROLLER SELF TEST KEY-2 TEST CONTROLLER CABLE SELF TEST KEY-3 RX/TX TEST GROUP SELF TEST KEY-4 RX/TX TEST GROUP CABLE SELF TEST KEY-6 ABORT TEST IN PROGRESS KEY-7 REMOTE MODE ---------- INT RX/TX TEST GROUP TEST P:1 F:O INT RX/TX TEST GROUP PASSED	
23.	Set A2 ON/OFF to OFF.		
24.	Set A1 ON/OFF to OFF.		

4-9.3 RTTG, OQ-458/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
25.	Disconnect W1P2 from the prime pouer source. Disconnect WlP1 from J1 on TS-4398/U.		
26.	Disconnect W2P2 from J4 on OQ-458/U. Disconnect W2P3 from J7 on OQ-458/U. Disconnect W2P1 from J2 on TS-4398/U.		
27.	Disconnect W3P2 from J5 on 00-458/U. Disconnect W3P3 from J8 on OQ-458/U. Disconnect U3P1 from J3 on TS-4398/U.		
28.	Disconnect W4P2 from J3 on OQ-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
29.	Disconnect WSP2 from J1 on OQ-458/U. Disconnect W5P1 from J5 on TS-4398/U.		

4-9.4 RTTG, OQ-458/U, Cables Self-Test**. The following instructions describe the OQ-458/U cables self-test procedures.**

INITIAL SETUP

Test Equipment
None

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the OQ-458/U cables self-test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 4-7. The TS-4398/U controls and indicators used during the test are shown in figure 4-8.

Item	Action	Normal Indication	Corrective Action
a.	OQ-458/U Cables Self-Test.		
1.	Remove both OQ-458/U end covers.		
2.	Place test controller, TS-4398/U, on or near 00-458/U.		
3.	Remove the TS-4398/U cover.		
4.	Remove the CY-8676/U cover.		
5.	Ensure that the switches are in the "OFF" position.		
6.	Connect W5Pl to J5 on TS-4398/U. Connect W5P2 to J1 on OQ-458/U.		
7.	Connect W4P1 to J4 on TS-4398/U. Connect W4P2 to J3 on 00-458/U.		

4-9.4 RTTG, OQ-458/U, Cables Self Test (cont)

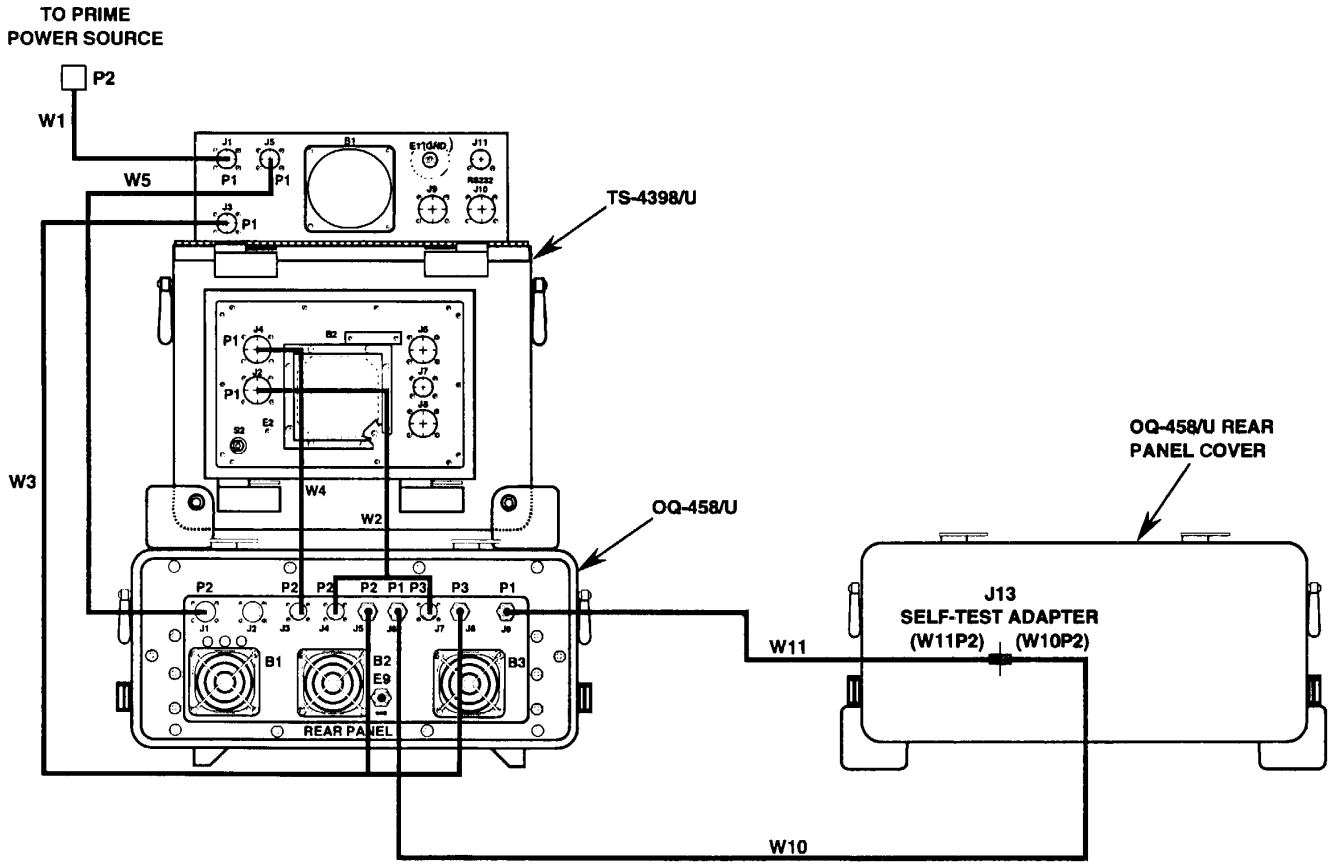


FIGURE 4-7. OQ-458/U CABLES SELF TEST INTERCONNECTIONS.

4-9.4 RTTG, OQ-458/U, Cables Self-Test (cont)

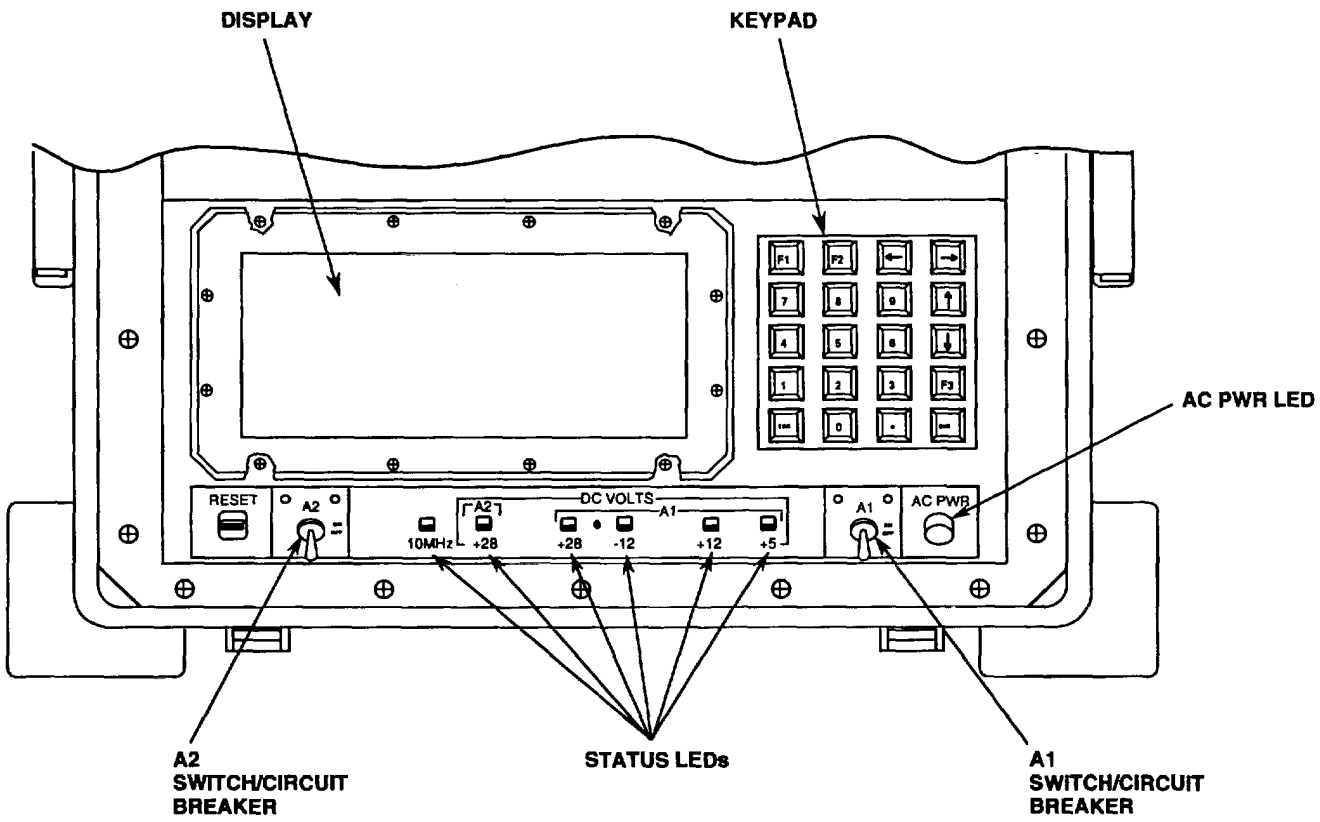


Figure 4-8. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
8.	Connect W3P1 to J3 on TS-4398/U. Connect W3PZ to J5 on OQ-458/U. ConnectW3P3 to J8 on OQ-458/U.		
9.	Connect WZP1 to J2 on TS-4398/U. Connect W2PZ to J4 on oQ-458/U. Connect WZP3 to J7 on OQ-458/U.		
10.	Connect WiOP1 to J6 on 00-458/U. Connect W10P2 to the adapter on the OQ-458/U rear panel cover.		
11.	Connect W11P1 to J9 on 00-458/U. Connect W11PZ2 to the adapter on 00-458/U rear panel cover.		
12.	Connect W1P1 to J1 on TS-4398/U. Connect W1PZ to the prime power source.		

4-9.4 RTTG, OQ-458/U, Cables Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
13.	Set Al ON/OFF to ON.	The screen shown below is displayed.	If the screen shown below is not displayed, check that the AC PWR LED is lit (refer to item 14). If the screen shown below is still not displayed and the AC PWR LED is lit, recycle power. Wait 15 seconds before reapplying power. If the screen shown below is still not displayed or is not readable, remove and replace TS-4398/U.
		RRTS REMOTE MODE KEY-6 LOCAL MODE	
14.	Check that the AC PWR LED	The LED is lit. .	If the LED is not lit, check cable WI connections and the prime power source. If the LED is not lit after checking cable WI connections, refer to higher level maintenance.
15.	Ensure that the TS-4398/U fans (Bi and BZ) are operating.	The fans are operating.	If the AC PWR LED is lit and the fans are not operating, refer to higher level maintenance.
16.	Monitor the status LEDs.	All LED should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, remove and replace TS-4398/U.
17.	On TS-4398/U, set AZ ON/OFF to ON.	The LED for +28 (AZ) is lit.	If the LED for +28 (AZ) is not lit, check cables for not lit after checking cables for proper connections, .If the LED for +28 (AZ) is not lit after removing and replacing OQ-458/U, then remove and replace TS-4398/U.
18.	Ensure that the OQ-458/UThe fans are operating.		If the +28 (AZ) LED is lit fans (B1, 82, and 83) are the fans. operating, refer to higher level maintenance.

4-9.4 RTTG, OQ-458/U, Cables Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
19.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, remove and replace TS-4398/U.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MOOE

20.	Ensure receiver and transmitter default frequencies are the same (refer to paragraph 2-8.1).		
21.	Select SELF TEST by .	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, remove and replace TS-4398/U.

RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME

22.	Initiate RX/TX TEST GROUP CABLE SELF TEST by pressing "4" on the keypad.		
23.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
24.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item. self-test.	If a fail condition is indicated, remove and replace OQ-458/U and reperform the OQ-458/U

RRTS SELF TEST CONFIGURATION

KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST
KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE
EXT RX/TX TEST GROUP TESTP:1 F:O
EXT RX/TX TEST GROUP PASSED

4-9.4 RTTG, OQ-458/U, Cables Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
25.	Set A2 ON/OFF to OFF.		
26.	Set Al ON/OFF to OFF.		
27.	Disconnect W1P2 from the prime power source. Disconnect U1P1 from Ji on TS-4398/U.		
28.	Disconnect W2P2 from J4 on OQ-458/U. Disconnect W2P3 from J7 on 00-458/U. Disconnect W2P1 from J2 on TS-4398/U.		
29.	Disconnect W3P2 from J5 on OQ-458/U. Disconnect W3P3 from J8 on Oq-458/U. Disconnect W3P1 from J3 on TS-4398/U.		
30.	Disconnect W4P2 from J3 on OQ-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
31.	Disconnect W5P2 from J1 on OQ-458/U. Disconnect W5P1 from J5 on TS-4398/U.		
32.	Disconnect W10P2 from the adapter on the OQ-458/U rear panel cover. Disconnect W10P1 from J6 on OQ-458/U.		
33.	Disconnect W11P2 from the adapter on the OQ-458/U rear panel cover. Disconnect W11P1 from J9 on Q0-458/U.		

CHAPTER 5

DIRECT SUPPORT MAINTENANCE

Section I - REPAIR PARTS, SPECIAL TOOLS, TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE), AND SUPPORT EQUIPMENT.

5-1 COMMON TOOLS AND EQUIPMENT.

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

5-2 SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

The special tools and test equipment required for maintenance of Radio Relay Test Set (RRTS), AN/URM-214, are listed in appendix B, Section III, Tool and Test Equipment Requirements for Radio Relay Test Set, AN/URM-214.

5-3 REPAIR PARTS.

Repair parts are listed and illustrated in the Radio Relay Test Set Repair Parts and Special Tools List, TM 11-6625-3254-23P/ 33D7-URM214-4.

Section II - SERVICE UPON RECEIPT.

5-4 CHECKING UNPACKED EQUIPMENT.

Perform the following procedures while unpacking the equipment:

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy (ROD).

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of SF 361, Transportation Discrepancy Report (TDR).

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

5-3/(5-4 Blank)

Section III - PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

5-5 PMCS FOR AN/URM-214.

This paragraph contains the PMCS procedures for AN/URM-214. These procedures are to be performed on a scheduled basis. The maintenance actions are presented in table 5-1. The interval column designates how often each procedure is performed.

INITIAL SETUP

Test Equipment and Electronic Components
Vacuum Cleaner

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off. The AN/URM-214 requires a 30- minute warm-up period before testing.

WARNING

AN/URM-214 uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/ replace the air filter elements with the power cable connected.

CAUTION

AN/URM-214 contains parts and assemblies sensitive to damage by electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

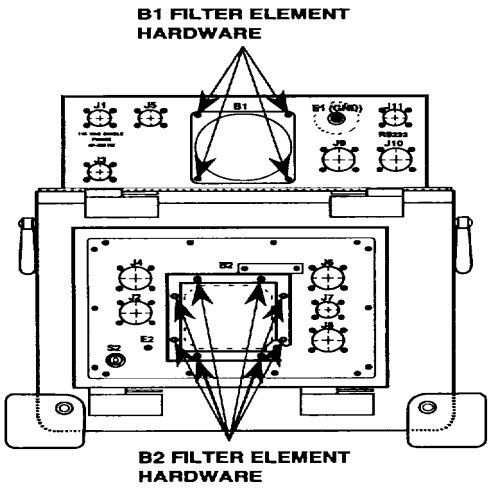
Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the AN/URM-214 PMCS are found in cable assembly case CY-8676/U unless otherwise noted.

TABLE 5-1. PMCS FOR AN/URM-214.

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
1.	Monthly	TS-4398/U Air Filter Elements	On TS-4398/U, set A2 ON/OFF to OFF. On TS-4398/U, set Al ON/OFF to OFF. Disconnect the power cable (W1P2) from the prime power source. Using a No. 1 Phillips screwdriver, remove the four screws and washers that secure the B1 air filter element to TS-4398/U. Remove the B1 air filter element. Using a No. 1 Phillips screwdriver, remove the eight screws and washers that secure the 82 air filter element to TS-4398/U. Remove the B2 air filter element.	



Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
1. Cont)	Monthly	TS-4398/U Air Fitter Elements	Gently place the air filter elements on an easy-to-clean surface away from any air intakes. Vacuum both sides of the air filter elements, touching them with the vacuum nozzle as little as possible.	

TABLE 5-1. PMCS FOR AN/URM-214 (cont).

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
1. (Cont)	Monthly	TS-4398/U Air Filter Elements	If this equipment is not available, gently tap the air filter elements against a surface until excess dirt is knocked out. Install the cleaned air filter elements on TS-4398/U. Using a No. 1 Phillips screwdriver, install the four screws and washers that secure the BI air filter element to TS-4398/U. Using a No. 1 Phillips screwdriver, install the eight screws and washers that secure the B2 air filter element to TS-4398/U.	

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/ replace the air filter elements with the power cable connected.

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
2.	Monthly	Air Filter Elements	OQ-458/UOn TS-4398/U, set **AZ** ON/ OFF to OFF. On TS-4398/U, set Al ON/OFF to OFF. Remove both OQ-458/U end covers. Disconnect the power cable (W5P2) from J1 of OQ-458/U. Using a No. 1 Phillips screwdriver, remove the four screws and washers that secure each air filter element to the electrical equipment chassis. Remove the air filter elements.	

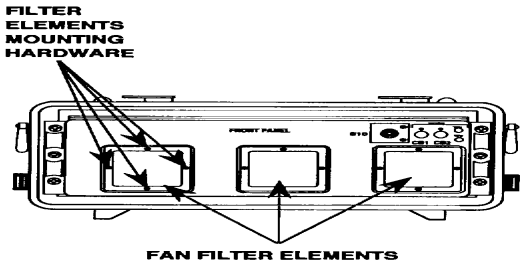


TABLE 5-1. PMCS FOR AN/URM-214 (cont).

Item No.	Interval	Location Item to Check/ Service	Procedure	Not Fully Mission Capable If:
2. (cont)	Monthly Element	00-458/U Air Fitter the air filter	Gently place the air filter elements on an easy-to-clean surface away from any air intakes. Vacuum both sides of elements, touching with the vacuum nozzle as little as possible. If this equipment is not available, gently tap the air filter elements against a surface until excess dirt is knocked out of it. Install the cleaned air filter elements on the electrical equipment chassis. Using a No. 1 Phillips screwdriver, install the four screws and washers that secure each air filter element to the electrical equipment chassis.	
3.	Every six months.	TS-4398/U 10 MHz oscillatoris	Perform procedures in paragraph 5-6.2.	Oscillator frequency not 10 mHz s.025 Hz

Section IV - TROUBLESHOOTING PROCEDURE.

NOTE

Test fixtures, such as connectors/plugs and cables (other than the cables found in CY-8676/U), are listed in the INITIAL SETUP and the associated illustrations as recommended items only.

5-6 TROUBLESHOOTING.

Table 5-2 lists the common symptoms that may occur while performing self-tests or during normal operation and references the appropriate troubleshooting paragraph. Table 5-3 lists the troubleshooting paragraphs and the appropriate paragraph number and page number.

TABLE 5-2. SYMPTOM INDEX.

SYMPTOM	TROUBLESHOOTING PARAGRAPH
TS-4398/U AC PWR light-emitting diode (LED) does not light.	5-6.1.2
TS-4398/U +5 LED (Al) does not light.	5-6.1.3
TS-4398/U +12 LED (Al) does not light.	5-6.1.3
TS-4398/U -12 LED (Al) does not light.	5-6.1.3
TS-4398/U +28 LED (Al) does not light.	5-6.1.3
TS-4398/U +28 LED (A2) does not light.	5-6.3.1
TS-4398/U 10 MHz LED does not light.	5-6.1.3
TS-4398/U screen has no display.	5-6.1.1
TS-4398/U screen display is not readable.	5-6.1.1
TS-4398/U screen displays error messages.	5-6.1
OQ-458/U does not power up.	5-6.3.1
No power applied to Radio Relay System (RRS), AN/ARW-85 (V)2,3.	5-6.3.1
OQ-458/U not receiving/transmitting.	5-6.3.3

TABLE 5-3. TEST LOCATOR INDEX.

TEST DESCRIPTION	PARAGRAPH	PAGE #
Test Controller, TS-4398/U, Self-Test	5-6.1	5-9
Test Controller, TS-4398/U, Display		
Test	5-6.1	5-17
Test Controller, TS-4398/U, AC PWR LED		
Test	5-6.1.	5-21
Test Controller, TS-4398/U, Status		
LEDs Test	5-6.1.	5-25
Test Controller, TS-4398/U, 10 MHz Oscillator Test	5-6.2	5-28
RTTG, OQ-458/U, Self-Test	5-6.3	5-20
RTTG, OQ-458/U, Power Supply Test	5-6.3.1	5-25
RTTG, OQ-458/U, Isolation Test	5-6.3.2	5-30
RTTG, OQ-458/U, RF Test	5-6.3.3	5-43
Radio Transmitter, T-1573(V)2/AR,		
Module Fault Isolation Test	5-6.4	5-66
Power Converter Module Test	5-6.4.1	5-90
Interface Control Test	5-6.4.2	5-98
VCO/PLL Synthesizer Test	5-6.4.3	5-109
Bandpass Filter Test	5-6.4.4	5-117
Power Amplifier Test	5-6.4.5	5-123
Radio Receiver, R-2500/AR, Module Fault Isolation Test	5-6.5.5	5-129
Radio Receiver, R-2500/AR, No Output on Any Band Test	5-6.5.1	5-143
Radio Receiver, R-2500/AR, No Output on Bands 1 and 2 Test		
Radio Receiver, R-2500/AR, No Output on Bands 3 and 4 Test	5-6.5.2	5-151
	5-6.5.3	5-156

TABLE 5-3. TEST LOCATOR INDEX (cont).

5-6.1 Test Controller, TS-4398/U, Self-Test. To accomplish the TS-4398/U self-test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
None

Tools and Special Tools

TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off. 30-minute warm-up period is required before testing.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U self-test are found in cable assembly case CY-8676/U unless otherwise noted. All interconnections for the test are shown in figure 5-1. All controls and indicators used during the test are shown in figure 5-2.

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
	TS-4398/U Self-Test.		
1.	Remove the cover.		
2.	Ensure that all switches are in the OFF position.		
3.	Connect W1P1 to J1 and W1P2 to the prime power source.		
4.	Set A1 ON/OFF to ON.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

RRTS REMOTE MODE

KEY-6 LOCAL MODE

5-6.1 Test Controller, TS-4398/U, Self-Test (cont)

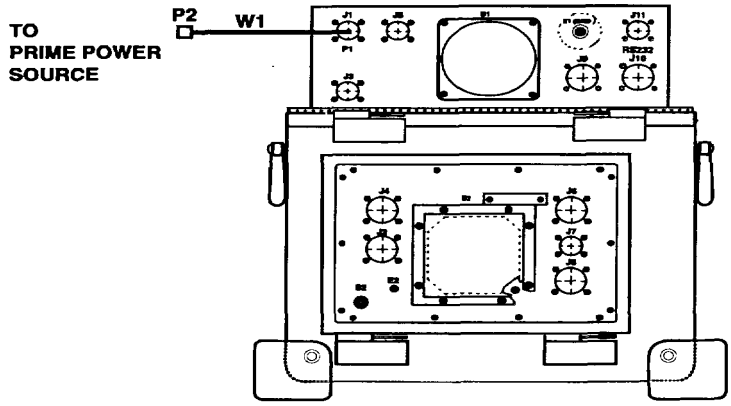


Figure 5-1. TS-4398/U TEST INTERCONNECTION

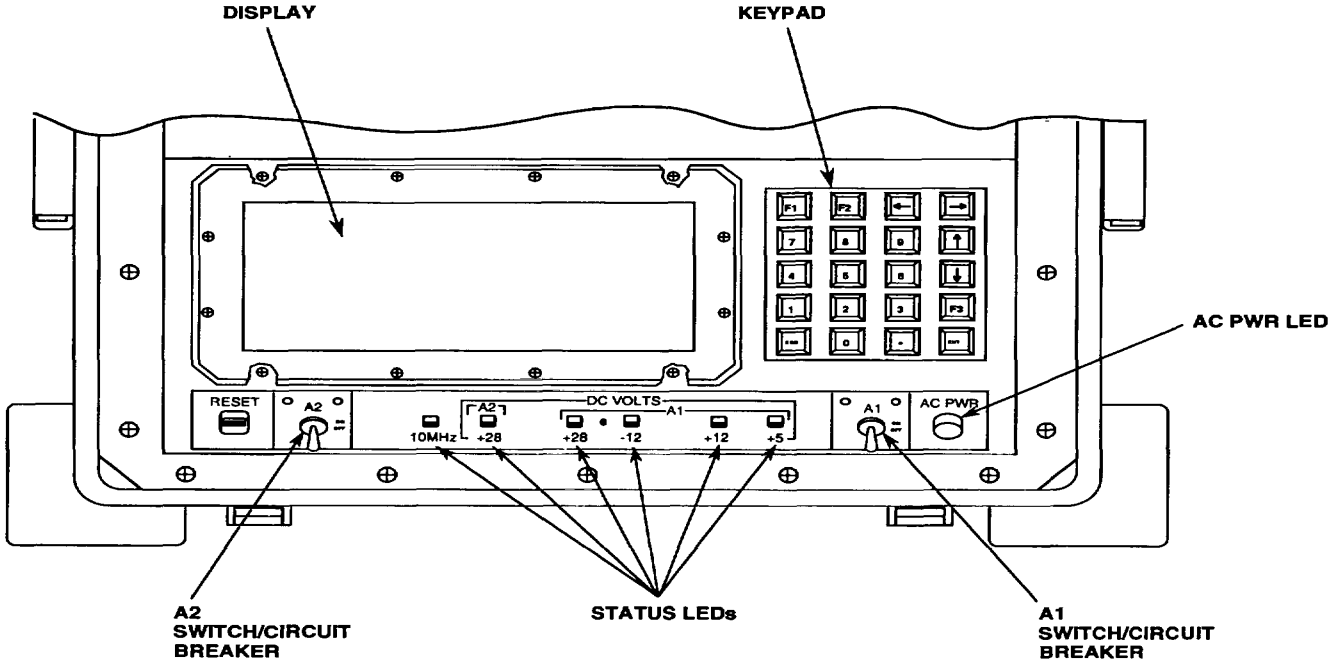


Figure 5-2. TS-4398/U CONTROLS AND INDICATORS

5-6.1 Test Controller, TS-4398/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
5.	Check that the AC PWR LED is lit.	The LED is Lit.	If the LED is not lit, refer to paragraph (refer to paragraph 5-8).
7.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If all LEDs except the LED for +28 (A2) are not lit, refer to paragraph 5-6.1.3.
8.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not displayed paragraph 5-6.1.1.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE

or

9.	Ensure receiver and frequencies are the same (refer to paragraph 2-8.1).		
10.	Select SELF TEST by pressing **"3"** on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not paragraph 5-6.1.1.

RRTS SELF TEST CONFIGURATION

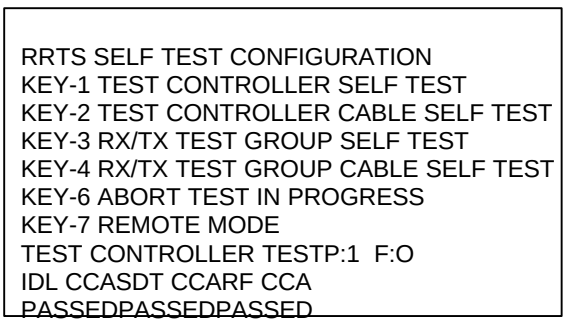
KEY-1 TEST CONTROLLER SELF TEST
KEY-2 TEST CONTROLLER CABLE SELF TEST
KEY-3 RX/TX TEST GROUP SELF TEST
KEY-4 RX/TX TEST GROUP CABLE SELF TEST

KEY-6 ABORT TEST IN PROGRESS
KEY-7 REMOTE MODE

11.	Initiate TEST CONTROLLER SELF TEST by pressing "1" on the keypad.		
12.	Monitor the pass/fail and error notification messages on the screen.		

5-6.1 Test Controller, TS-4398/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
13.	Select the condition which applies and take the action.	If a pass condition isNOTE indicated (the screen shown below is displayed), go to the next item.	Before removing and replacing a CCA, check cabling connections and reseat CCA. Reperform the TS-4398/U self-test. If a failed condition is indicated for the RF CCA, then remove and replace it (refer to paragraph 5-8). If a failed condition is indicated for the RF CCA after removing and replacing the RF CCA, then perform the TS-4398/U oscillator test (refer to paragraph 5-6.2). If a failed condition for the receive portion of the test is indicated for the signal data translator (SDT) CCA, then remove and replace the +15 volt power supply (PS3) (refer to paragraph 5-8). If a failed condition is indicated for the signal data translator (SDT) CCA after removing and replacing PS3, then remove and replace the SDT CCA (refer to paragraph 5-8). If a failed condition is indicated for the SDT CCA after removing and replacing the SDT CCA, then perform the TS-4398/U oscillator test (refer to paragraph 5-6.2). If a failed condition is indicated for the interoperable data link (IDL) interface CCA, then remove and replace it (refer to paragraph 5-8).



5-6.1 Test Controller, TS-4398/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	Set Al ON/OFF to OFF.		
15.	Disconnect W1PZ from the prime power source. Disconnect W1P1 from J1.		

5-6.1.1 Test Controller, TS-4398/U, Display Test. To accomplish the TS-4398/U display test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
None

Tools and Special Tools

TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U display test are found in cable assembly case CY-8676/U unless otherwise noted. All interconnections for the test are shown in figure 5-3. All controls and indicators used during the test are shown in figure 5-4.

The TS-4398/U Display Test procedure is to be performed when referenced to by another test procedure. After correcting the display malfunction, return to the original test procedure.

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
	TS-4398/U Display Test.		
1.	**Remove the TS-4398/U cover.**		
2.	**Ensure that all switches are in the OFF position.**		
3.	**Connect W1P1 to J1 and W1P2 to the prime power source.**		

5-6.1.1 Test Controller, TS-4398/U, Display Test (cont)

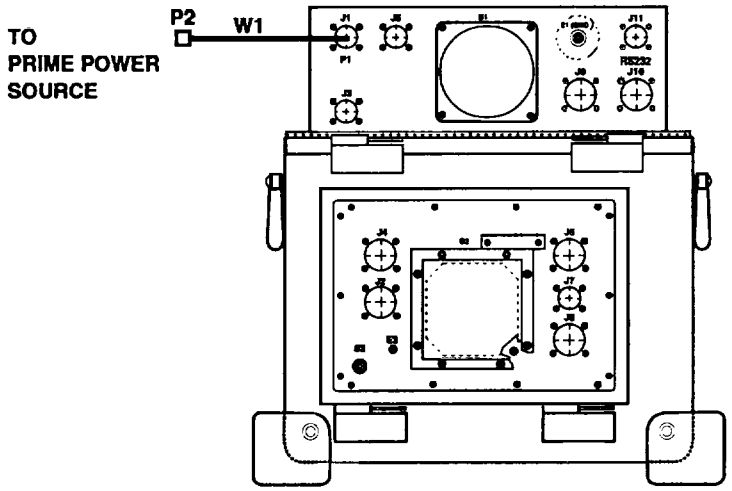


Figure 5-3. TS-4398/U DISPLAY TEST INTERCONNECTION.

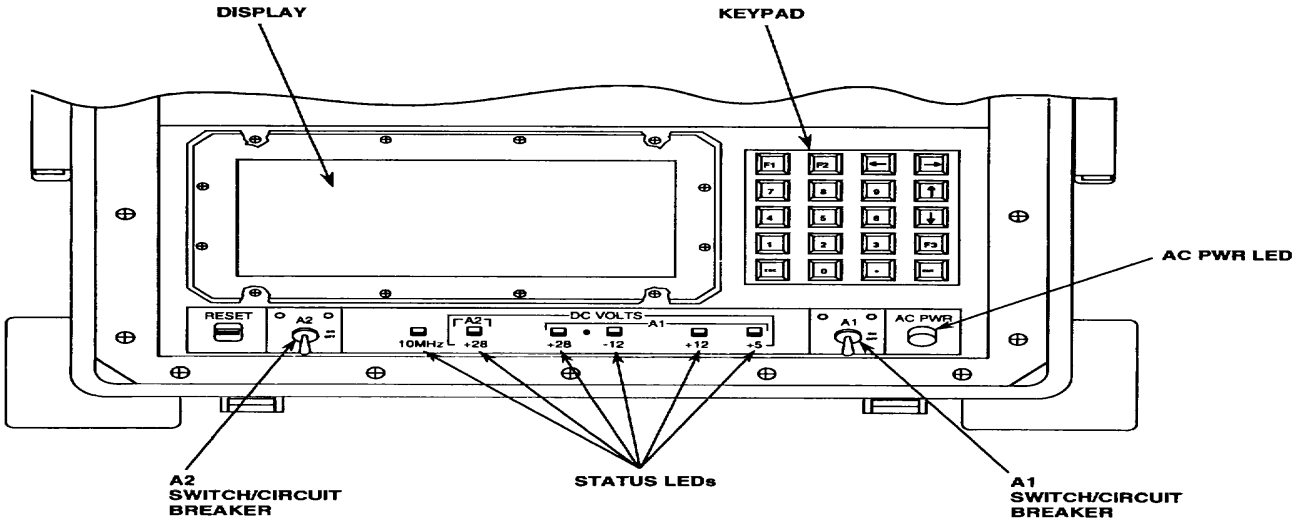


Figure 5-4. TS-4398/U CONTROLS AND INDICATORS

5-6.1.1 Test Controller, TS-4398/U, Display Test (cont)

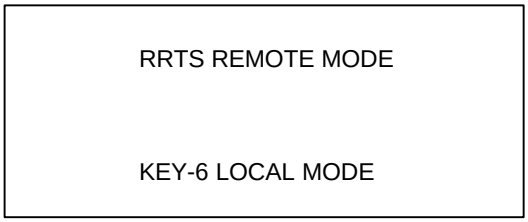
Item	Action	Normal Indication	Corrective Action
		NOTE	
	Before removing and replacing a CCA, verify that all cabling to the CCAs is seated properly. Reseat suspect CCA prior to removing and replacing a CCA.		
4.	Set Al ON/OFF to OFF.	The screen shown below is displayed. Return to the original test procedure.	If the screen shown below is not displayed or is not readable, check that the PWR LED is lit. If the AC PWR LED is not lit, refer to paragraph 5-6.1.2.
		If the screen shown below is displayed, but the display does not respond to	
		an operator input from the keypad, perform the 10 MHz oscillator test.	If the screen shown below is not displayed or is not readable, and the AC PWR LED is Lit, monitor the status LEDs. All LEDs should be lit except the +28 (A2). If an LED is not lit, refer to paragraph 5-6.1.3.
		NOTE	
		Check cabling to the keypad removing and replacing the keypad.	
		If the screen does not respond to an operator input, and the 10 MHz oscillator test was successful, remove and replace the keypad (refer to paragraph 5-8).	If the screen shown below is still not displayed, recycle power. Wait 15 seconds before reapplying power.
			the screen shown below is still not displayed or is not readable, and the AC PWR LED and the appropriate status LEDs are lit, then remove and replace the processor CCA (refer to paragraph 5-8). If the appropriate LEDs are lit, the processor CCA has been replaced, and the screen shown below is not displayed or is not readable, then remove and replace the mass storage CCA (refer to paragraph 5-8).

RRTS REMOTE MODE

KEY-6 LOCAL MODE

5-6.1.1 Test Controller, TS-4398/U, Display Test (cont)

Item	Action	Normal Indication	Corrective Action
4.	(cont)	The screen shown below is displayed. Return to the original test procedure.	If the appropriate LEDs are lit, the processor CCA and mass storage CCA have been replaced, and the screen shown below is not displayed or is not readable, then remove and replace the SDT CCA (refer to paragraph 5-8). If the appropriate LEDs are Lit, the processor, mass storage, and SDT CCAs have been replaced, and the screen shown below is not displayed or is not readable, then remove and replace the IDL CCA (refer to paragraph 5-8). If the appropriate LEDs are lit, the processor, mass storage, SDT, and IDL CCAs have been replaced, and the screen shown below is not displayed or is not readable, then remove and replace the RF CCA (refer to paragraph 5-8). If the appropriate LEDs are Lit, all CCAs have been replaced, and the screen shown below is not displayed or is not readable, then remove and replace the display unit (refer to paragraph 5-8). If the screen shown below is still not displayed, return the TS-4398/U to higher level maintenance.



5-6.1.2 Test Controller, TS-4398/U, AC PWR LED Test'. To accomplish the TS-4398/U AC PWR LED test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
Digital Multimeter, AN/GSM-64D or equivalent

Tools and Special Tools

TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U AC PWR LED test are found in cable assembly case CY-8676/U unless otherwise noted. All interconnections for the test are shown in figure 5-5. All controls and indicators used during the test are shown in figure 5-6.

The TS-4398/U AC PWR LED Test procedure is to be performed when referenced by another test procedure. After correcting the AC PWR LED malfunction, return to the original test procedure.

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
	TS-4398/U AC PWR LED Test.		
1.	Remove the TS-4398/U cover.		
2.	Ensure that all switches are in the OFF position.		
3.	Connect W1P1 to J1 and W1P2 to the prime power source.		

5-6,1.2 Test Controller, TS-4398/U, AC PWR LED Test (ont)

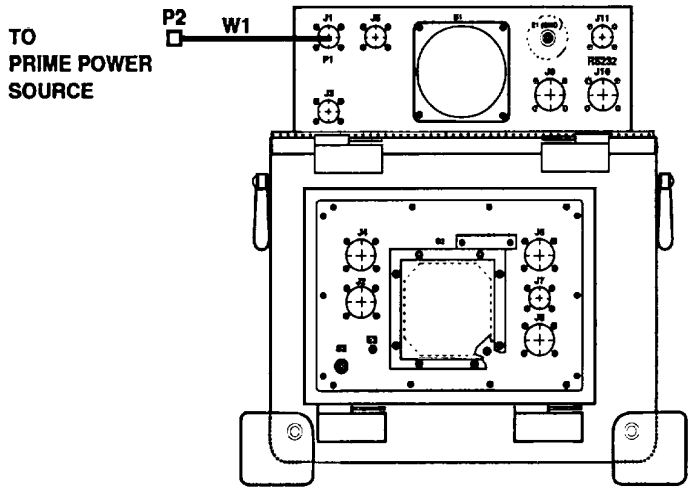


Figure 5-5. TS-4398/U DISPLAY TEST INTERCONNECTION.

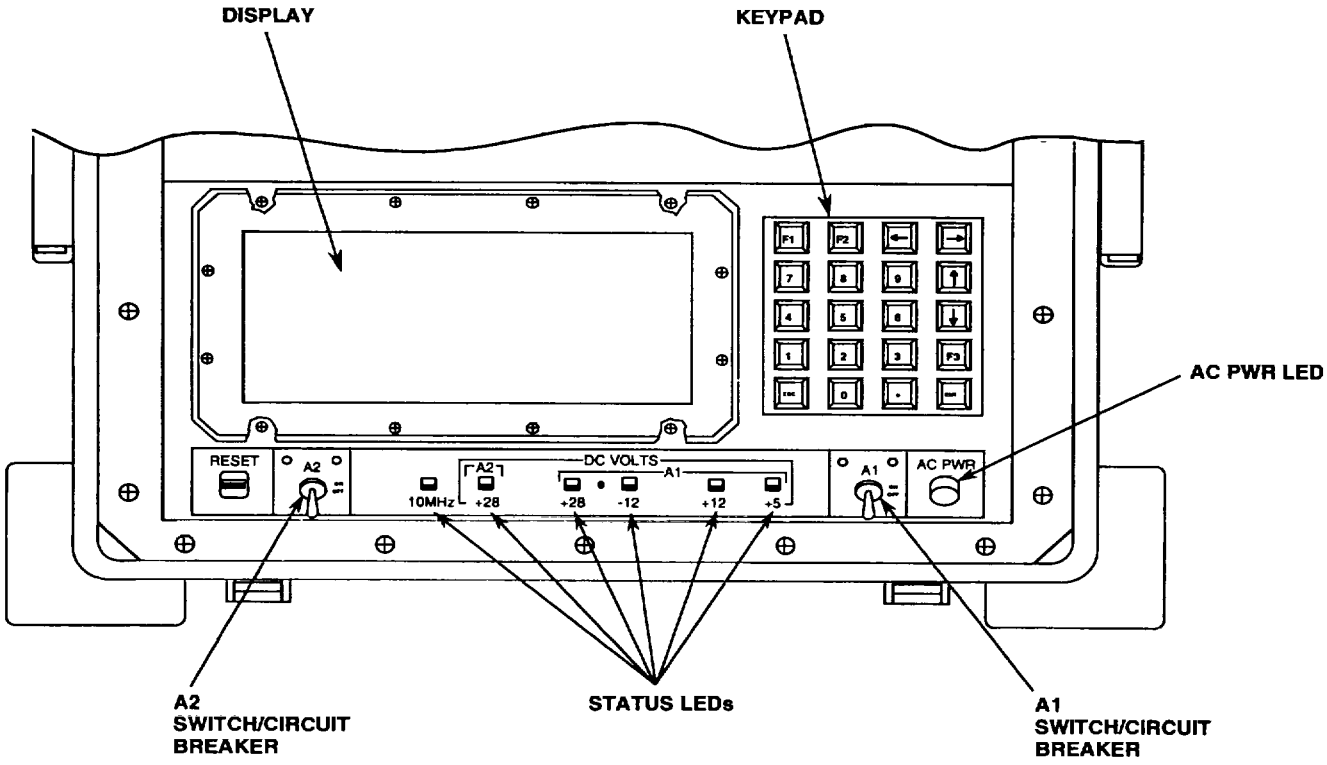
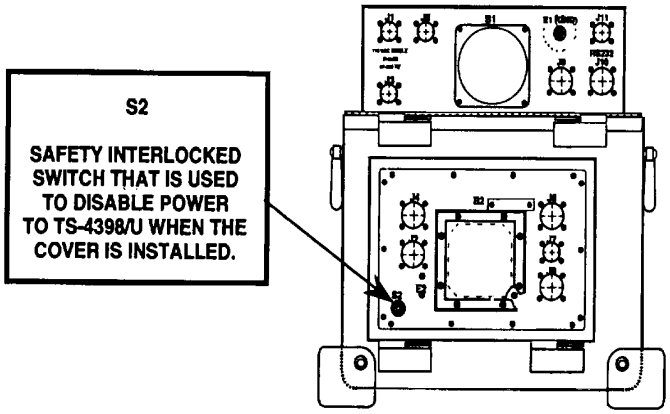
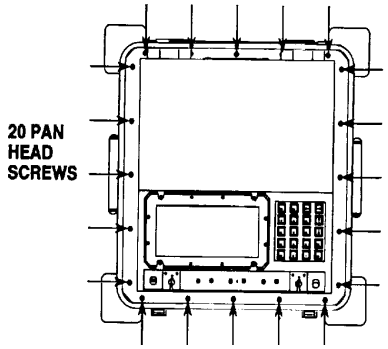


Figure 5-6. TS-4398/U CONTROLS AND INDICATORS

5-6.1.2 Test Controller, TS-4398/U, AC PWR LED Test (cont)

Item	Action	Normal Indication	Corrective Action
4	.Check that the AC PWR LED is lit.	The LED is Lit. Return to the original test procedure.	If the LED is not Lit, check cable W1 connections and the prime power source. If the LED is still not Lit, remove and replace the LED (refer to paragraph 5-8). If the LED is not lit, and the fans (B1 and B2) are operating, return the TS-4398/U to higher level maintenance. If the LED is not Lit, and the fans (B1 and BZ) are not operating, go to the next item.
5.Ensure that interlock switch (S2) on the rear panel of TS-4398/U is disabled.		The LED is lit. Return to the original test procedure.	If the LED is not lit, and s2 is enabled, go to the next item.





6. Using a No. 2 Phillips screwdriver, remove the 20 screws, flatwashers, and lock washers.

5-6.1.2 Test Controller, TS-4398/U, AC PWR LED Test (cont)

Item	Action	Normal Indication	Corrective Action

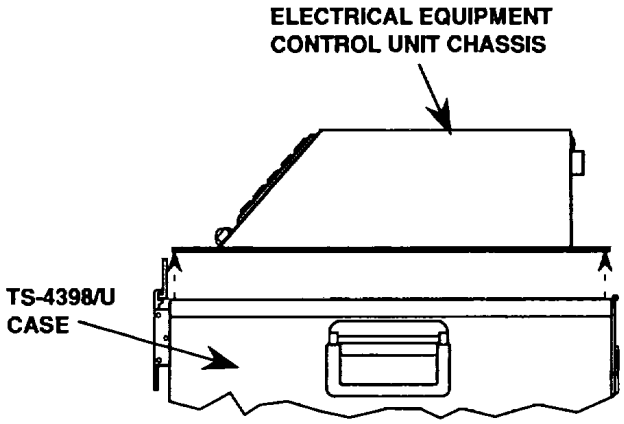
WARNING

The TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

Take care to support the electrical equipment control unit chassis to avoid damage to cabling and parts.

7. Lift and support the electrical equipment control unit chassis from the case.



WARNING

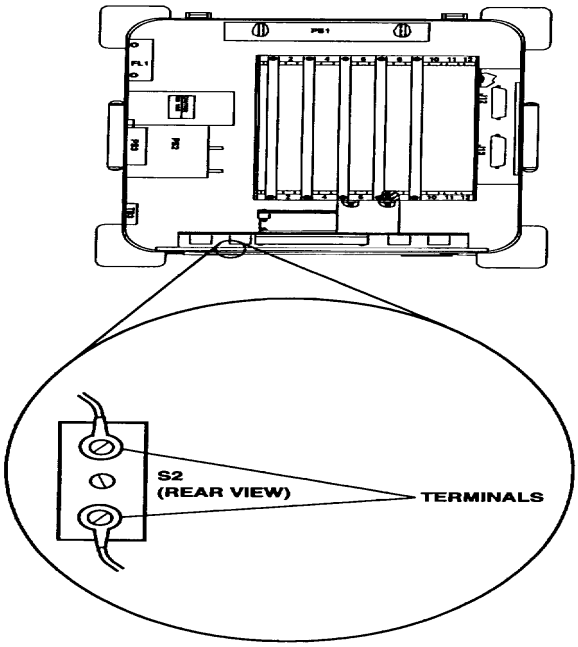
The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

8. Disconnect all cables that attach the electrical equipment control unit chassis to the TS-4398/U case. Note all connections.

9. Remove the electrical equipment control unit chassis from the TS-4398/U case.

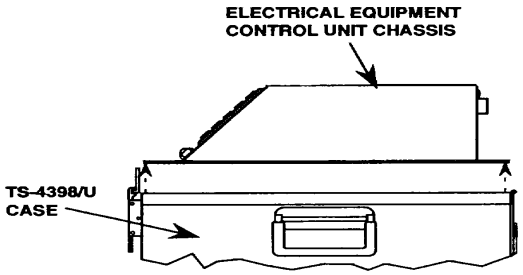
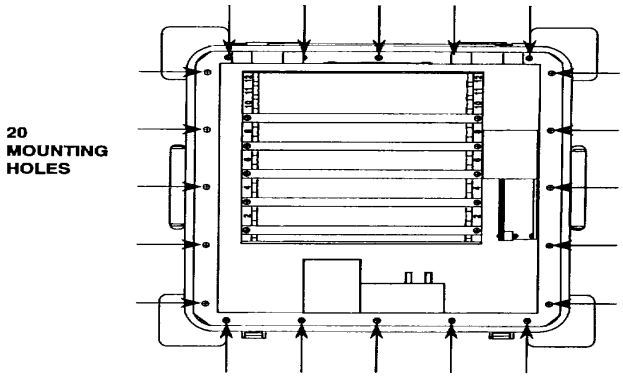
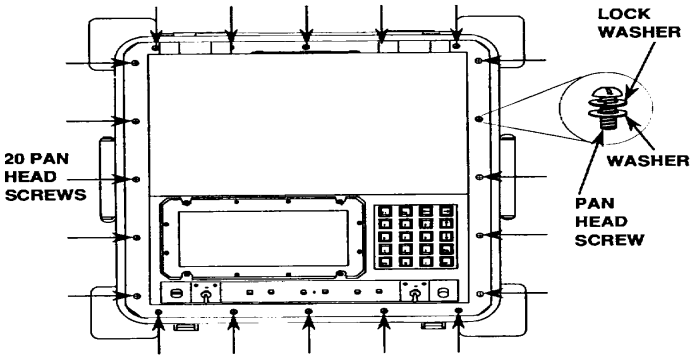
5-6.1.2 Test Controller, TS-4398/U, AC PWR LED Test (cont)

Item	Action	Normal Indication	Corrective Action
10.	Using a digital multimeter, perform a continuity check on S2.	SZ should read an open when disabled and should read a short when enabled.	If SZ is not functioning properly, remove and replace S2 (refer to



11.	Check that the AC PWR LED is lit.	The LED is Lit. Return to the original test procedure.	If the LED is not lit, and S2 has been replaced, go to the next item.
12.	Measure the AC Line input by placing the Leads of a multimeter on pins 1 and 3 of the AC line filter.	A 120 Vac + 5 Vac reading should be displayed. If the correct voltage reading is displayed, remove and replace the AC line filter (refer to paragraph 5-8).	If the correct voltage reading is not displayed, remove and replace the Al ON/OFF switch (CB 1) (refer to paragraph 5-8).
13.	Check that the AC PWR LED is Lit. procedure.	The LED is Lit. Return to the original test higher level maintenance.	If the LED is not lit, return the TS-4398/U to

5-6.1.2 Test Controller, TS-4398/U, AC PWR LED Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	Sit the electrical equipment control unit chassis on the top of the case.		
15.	Align the electrical equipment control unit chassis with the mounting holes.		
16	Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the case.		

5-6.1.3 Test Controller, TS-4398/U, Status LEDs Test. To accomplish the TS-4398/U status LEDs test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
None

Tools and Special Tools

TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U status LEDs test are found in cable assembly case CY-8676/U unless otherwise noted. All interconnections for the test are shown in figure 5-7. All controls and indicators used during the test are shown in figure 5-8.

The TS-4398/U Status LEDs Test procedure is to be performed when referenced by another test procedure. After correcting the status LEDs malfunction, return to the original test procedure.

Item	Action	Normal Indication	Corrective Action
	TS-4398/U Status LEDs Test.		
1.	Remove the TS-4398/U cover.		
2.	Ensure that all switches are in the OFF position.		
3.	Connect WIP1 to J1 and W1P2 to the prime power source.		

5-6.1.3 Test Controller, TS-4398/U, Status LEDs Test (cont)

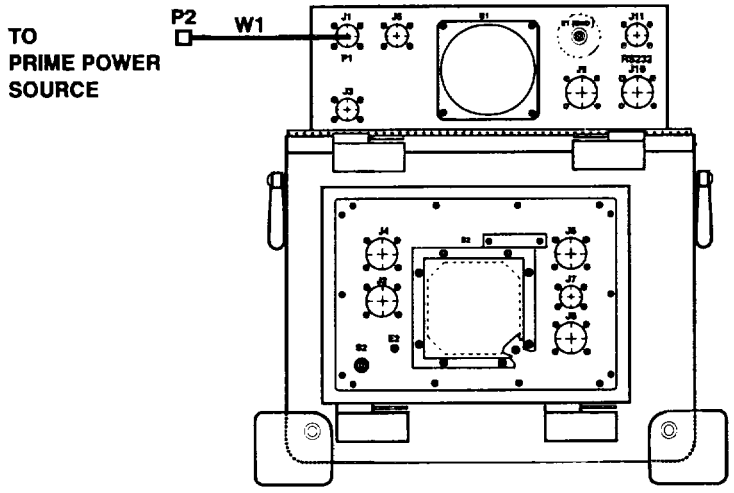


Figure 5-7. TS-4398/U STATUS LEDS TEST INTERCONNECTION.

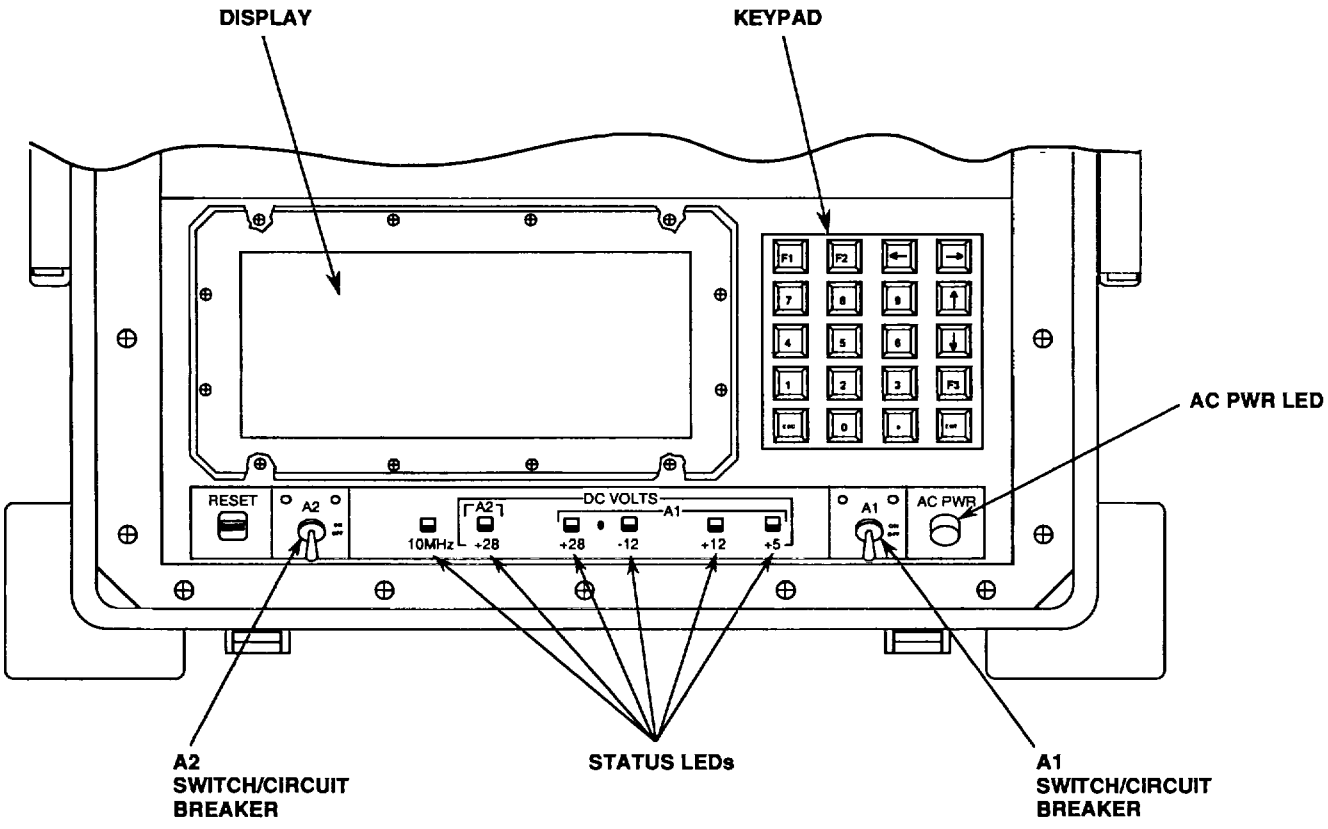


Figure 5-8. TS-4398/U CONTROLS AND INDICATORS

5-6.1.3 Test Controller, TS-4398/U, Status LEDs Test (cont)

Item	Action	Normal Indication	Corrective Action
4.	Monitor the status LEDS.	ALL LEDs should be Lit, except the LED fr- +28 (A2). Return to the original test procedure.	If an LED is not Lit, remove and replace the LED (refer to paragraph 5-8). If the LED still does not light, go to the next item.
5.	Select the condition which applies and take the action.	ALL LEDs are lit except the LED for +28 (A2). Return to the original test procedure.	If no status LEDs are lit, remove and replace the RF CCA (refer to paragraph 5-8). If no status LEDs are lit, and the RF CCA has been replaced, then remove and replace the +5 Vdc power supply (refer to paragraph 5-8). If no status LEDs are lit after replacing the RF CCA and the +5 Vdc power supply, perform the TS-4398/U oscillator test (refer to paragraph 5-6.2). If the status LED for the -12 Vdc power supply is not lit, then remove and replace the -12 Vdc power supply (refer to paragraph 5-8). If the status LED for the +12 Vdc power supply is not lit, then remove and replace the +12 Vdc power supply (refer to paragraph 5-8). If the status LED for the +5 Vdc power supply is not lit, then remove and replace the +5 Vdc power supply (refer to paragraph 5-8). If the status LED for 10 MHz is not Lit, then perform the TS-4398/U oscillator test (refer to paragraph 5-6.2). If the appropriate status LED(s) is still not lit, return the TS-4398/U to higher level maintenance.

5-6.2 Test Controller, TS-4398/U, 10 MHz Oscillator Test. To accomplish the TS-4398/U 10 MHz oscillator test, perform the following procedure.

INITIAL SETUP:

Test Equipment and Electronic Components
- Rubidium Frequency Standard, HP5065A or equivalent
- Frequency and Time Interval Analyzer, HP5371A or equivalent
- Cable with BNC plugs on both ends
- Cable with an SMA male plug and a BNC male plug

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment
- No. 1 Nonmetallic Flat Screwdriver
- No. 2 Phillips Screwdriver

CONDITIONS
30-minute warm-up period is required before testing.

WARNING

The TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

The TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the TS-4398/U 10 MHz oscillator test are found in cable assembly case CY-8676/U unless otherwise noted. All interconnections for the test are shown in figure 5-9 and 5-11. All TS-4398/U controls and indicators used during the test are shown in figure 5-10.

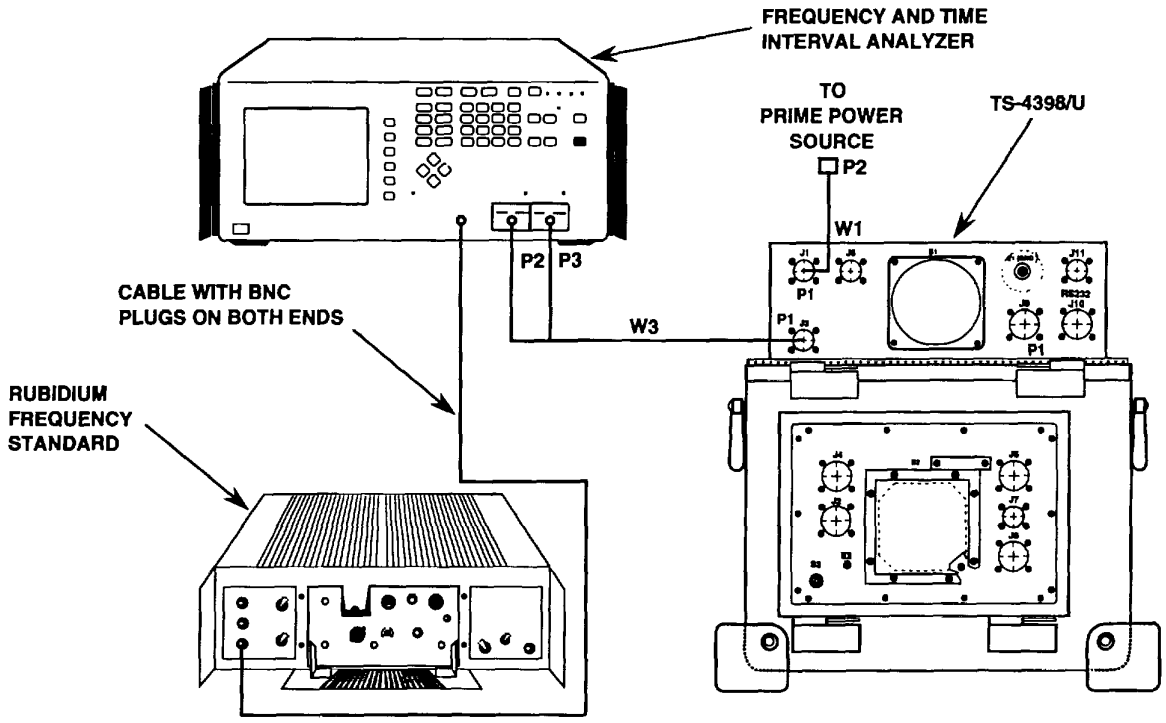


FIGURE 5-9. TS-4398/U 10 MHZ OSCILLATOR TEST INTERCONNECTIONS.

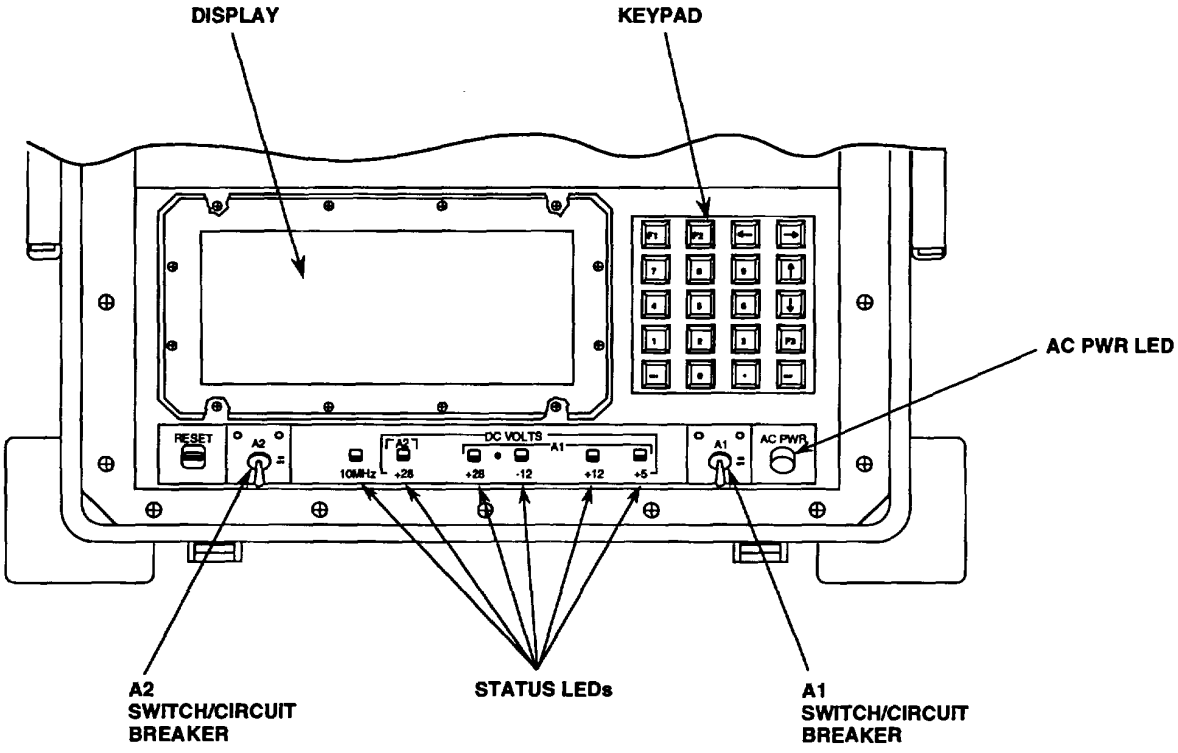


FIGURE 5-10. TS-4398/U CONTROLS AND INDICATORS.

5-6.2 Test Controller, TS-4398/U, 10 MHz Oscillator Test (cont)

Item	Action	Normal Indication	Corrective Action
	TS-4398/U 10 MHz Oscillator Test.		
1.	Remove the TS-4398/U cover.		
2.	Ensure that all switches are in the OFF position.		
3.	Using a cable, connect the Rubidium Frequency Standard to the external frequency standard input of the frequency and time interval analyzer (see figure 5-10).		
4.	Connect W3P1 to J3 of TS-4398/U, W3P2 to the signal measurement input A of the Frequency and Time Interval Analyzer, and W3P3 input B.		
5.	Connect W1P1 to J1 of TS-4398/U and W1P2 to the prime power source.		
6.	Turn on the Rubidium Frequency Standard.		
7.	Turn on the Frequency and Time Interval Analyzer.		
8.	Setup the Frequency and Time Interval Analyzer as follows: Arm Mode: Interval Sampling or Time Sampling Acquire 1 block of 1 meas. Stop Arm Mode: Delay = 1.000000000 sec.		
9.	On TS-4398/U, set Al ON/OFF to ON.	TS-4398/U displays the screen shown below. **RRTS REMOTE MODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1. If the screen shown below is not displayed, remove and replace the RF CCA (refer to paragraph 5-8). If the screen shown below is not displayed and the RF CCA has been removed and replaced, continue with the next item.

5-6.2 Test Controller, TS-4398/U, 10 MHz Oscillator Test (cont)

Item	Action	Normal Indication	Corrective Action

NOTE

30-minute warm-up period is required before testing.

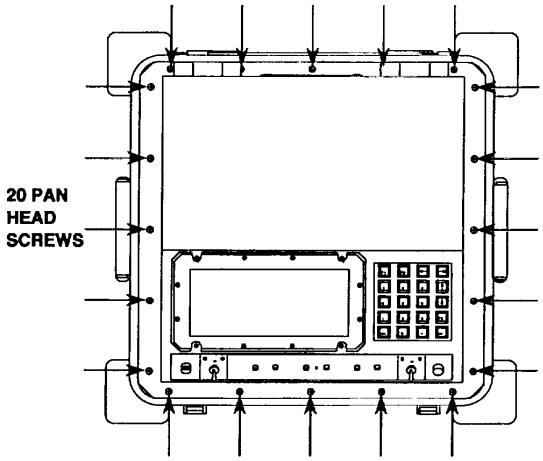
10. Monitor the frequency of each channel displayed on the Frequency and Time Interval Analyzer. Analyzer. If the correct frequency is displayed, go to item 21

Verify a 10 MHz +.025 Hz frequency is displayed on each channel of the Frequency and Time Interval

If 10 MHz +.025 Hz is not displayed on both channels, replace cable W3. Go to the next item.

.

11.Using a NO. 2 PnlttipS screwdriver, remove the 20 screws, flat washers, and lock washers.



WARNING

The TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

CAUTION

Take care to support the electrical equipment control unit chassis to avoid damage to cabling and parts.

12. Lift and support the electrical equipment control unit chassis from the case.

13. Locate the 10 MHz oscillator.

14. Remove cable A2J1 from the 10 MHz oscillator and connect the oscillator output to the input of the Time Frequency Interval Analyzer (see figure 5-11). MHz oscillator and reperform the 10 MHz oscillator test. (item 4)

If a 10 MHz signal is displayed, go to item 21.

If a 10 MHz +.025 Hz signal is not displayed, go to the next item.

If no signal is present, remove and replace the 10

NOTE

If the cable self-test fails, but the 10 MHz oscillator checks pass when monitoring W3P2 and W3P3, remove and replace the RF power divider (refer to paragraph 5-8).

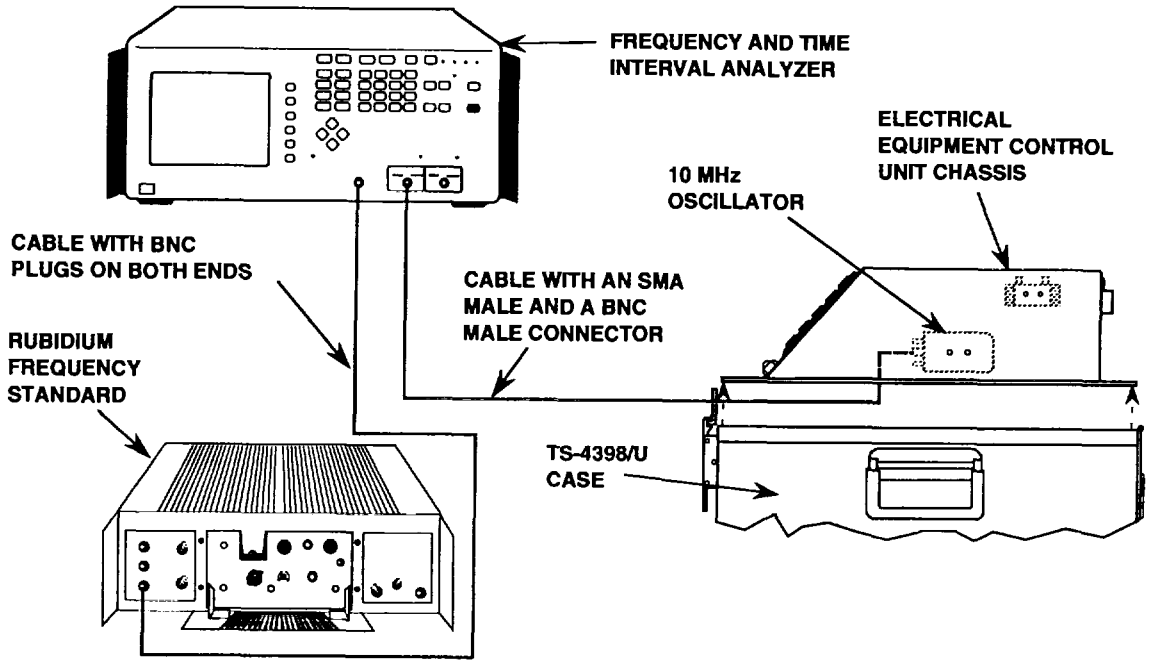
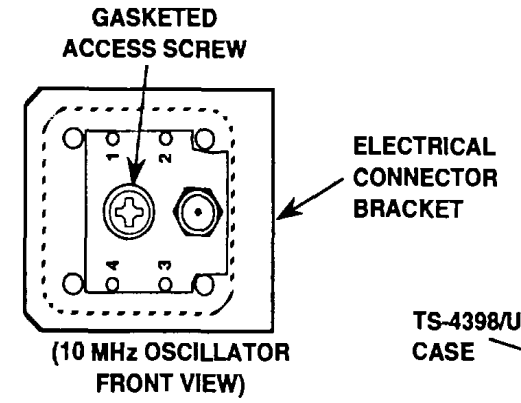
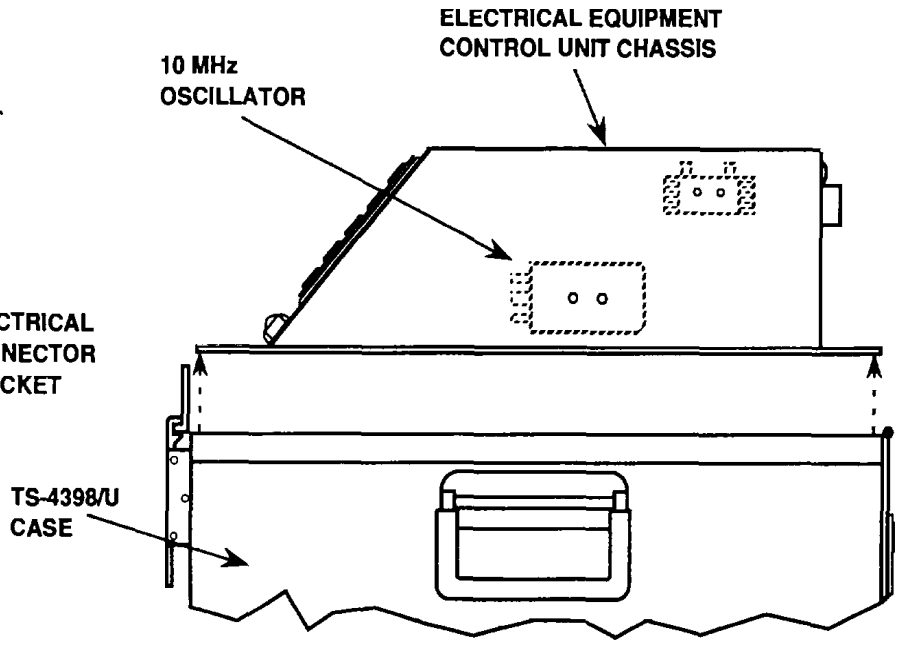


FIGURE 5-11. TS-4398/U OSCILLATOR OUTPUT TEST INTERCONNECTIONS.

Item	Action	Normal Indication	Corrective Action

15. Using a No. 2 Phillips screwdriver, remove the gasketed access screw, which covers the oscillator adjustment screw.





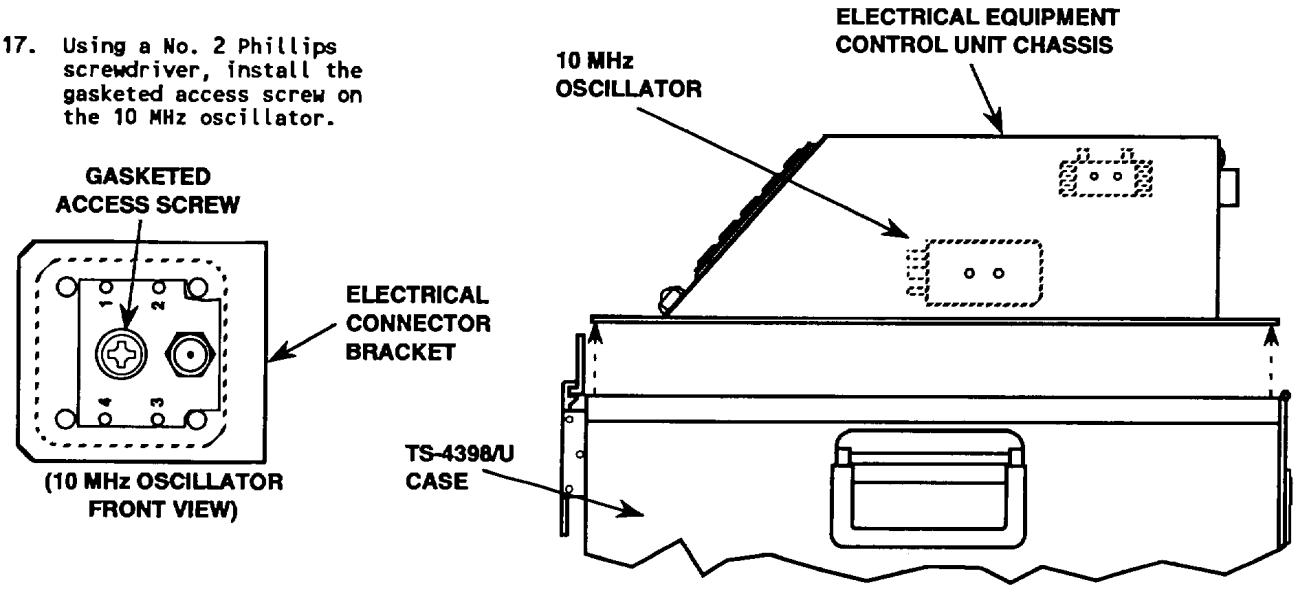
5-6.2 Test Controller, TS-4398/U, 10 MHz Oscillator Test (cont)

Item	Action	Normal Indication	Corrective Action
16. Using a nonmetallic No. 1 flat screwdriver, adjust the oscillator adjustment screw so that a 10 MHz ±.025 Hz frequency is displayed. If no signal is present on either W3P2 or W3P3, perform a Test Controller Cable Self-Test (refer to paragraph 4-9.2). If cable self-test passes, check RRTS cable W3. If cable W3 passes continuity checks, remove and replace the RF Power Divider (refer to paragraph 5-8) and reperform the 10 MHz oscillator test. If cable self-test fails, remove and replace the failed cable and reperform cable self-test. If cable self-test fails, go to the next item.		If a 10 MHz +.025 Hz frequency is displayed, then go to the next item. to paragraph 5-8).	If the oscillator frequency is not adjustable to 10 MHz 4.025 Hz, remove and replace the 10 MHz oscillator (refer

NOTE

If the display does not respond to an operator input, disconnect cable A9J3 from the RF CCA and monitor the 10 MHz +.025 Hz signal. If the 10 MHz oscillator and the RF Power Divider passes, suspect the cable that goes between the power divider and the RF CCA.

17. Using a No. 2 Phillips screwdriver, install the gasketed access screw on the 10 MHz oscillator.

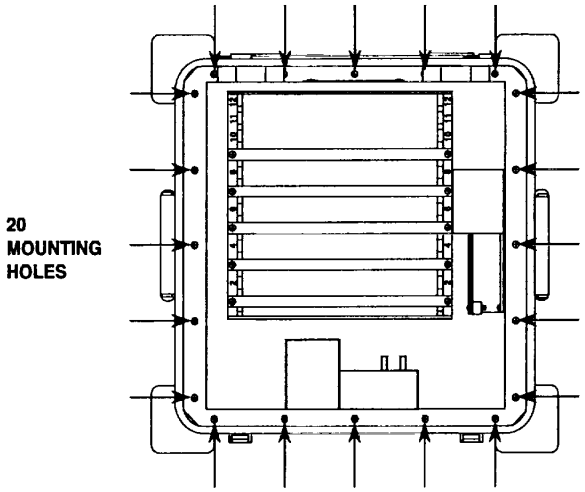


5-6.2 Test Controller, TS-4398/U, 10 MHz Oscillator Test (cont)

Item	Action	Normal Indication	Corrective Action

18. Sit the electrical equipment control unit chassis on the top of the case.

19. Align the electrical equipment control unit chassis with the mounting holes.



20. Using a No. 2 Phillips screwdriver, install the 2(screws, fLat washers, and lock washers securing the electrical equipment chassis to the case.

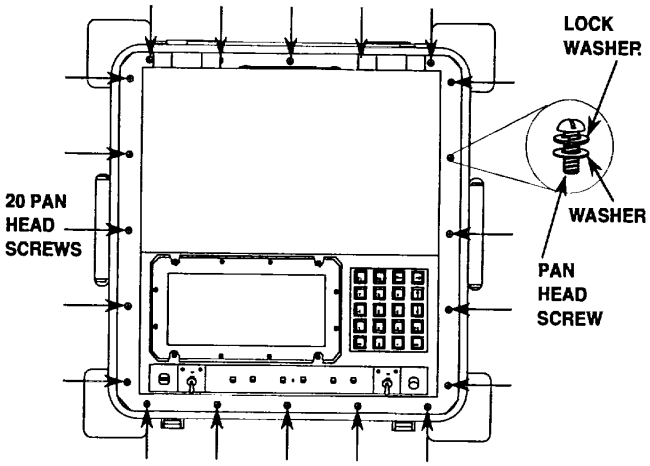
21. Turn off the Rubidium Frequency Standard.

22. Turn off the Frequency and Time Interval Analyzer.

23. Set Al ON/OFF to OFF.

24. Disconnect W3P1 from J3 of TS-4398/U and W3P2 from the signal measurement input o0 the Frequency and Time Interval Analyzer.

25. Disconnect W1P2 from the prime power source. Disconnect WiP1 from J1 of TS-4398/U.



5-6.3 RTTG, OQ-458/U, Self-Test. To accomplish the OQ-458/U self-test, perform the following procedure.

INITIAL SETUP:

Test Equipment
None

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the OQ-458/U self-test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 5-12. Test controller, TS-4398/U, controls and indicators used during the test are shown in figure 5-13.

Item	Action	Normal Indication	Corrective Action
	00-458/U Self-Test.		
1.	Remove the TS-4398/U cover.		
2.	Remove both OQ-458/U end covers.		
3.	Remove the CY-8676/U cover.		
4.	PLace TS-4398/U on or near OQ-458/U.		
5.	Ensure that all switches are in the OFF position.		
6.	Connect W5P1 to J5 on TS-4398/U. Connect W5P2 to J1 on 00-458/U.		
7.	Connect W4P1 to J4 on TS-4398/U. Connect W4P2 to J3 on OQ-458/U.		
8.	Connect W3P1 to J3 on TS-4398/U. Connect W3P2 to J5 on OQ-458/U. Connect W3P3 to J8 on OQ-458/U.		

5-6.3 RTTG, OQ-458/U, Self-Test (cont)

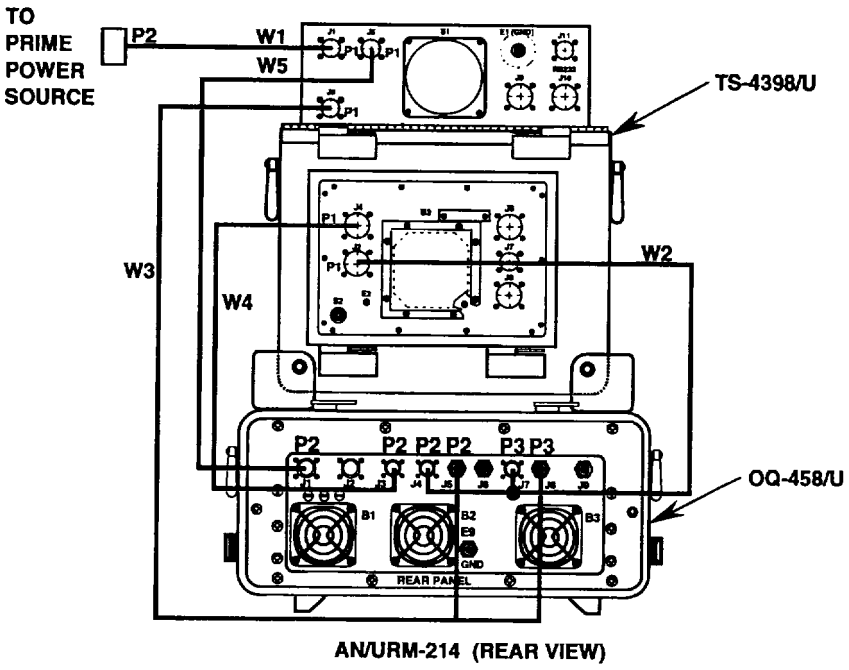


FIGURE 5-12. OQ-458/U SELF-TEST INTERCONNECTIONS.

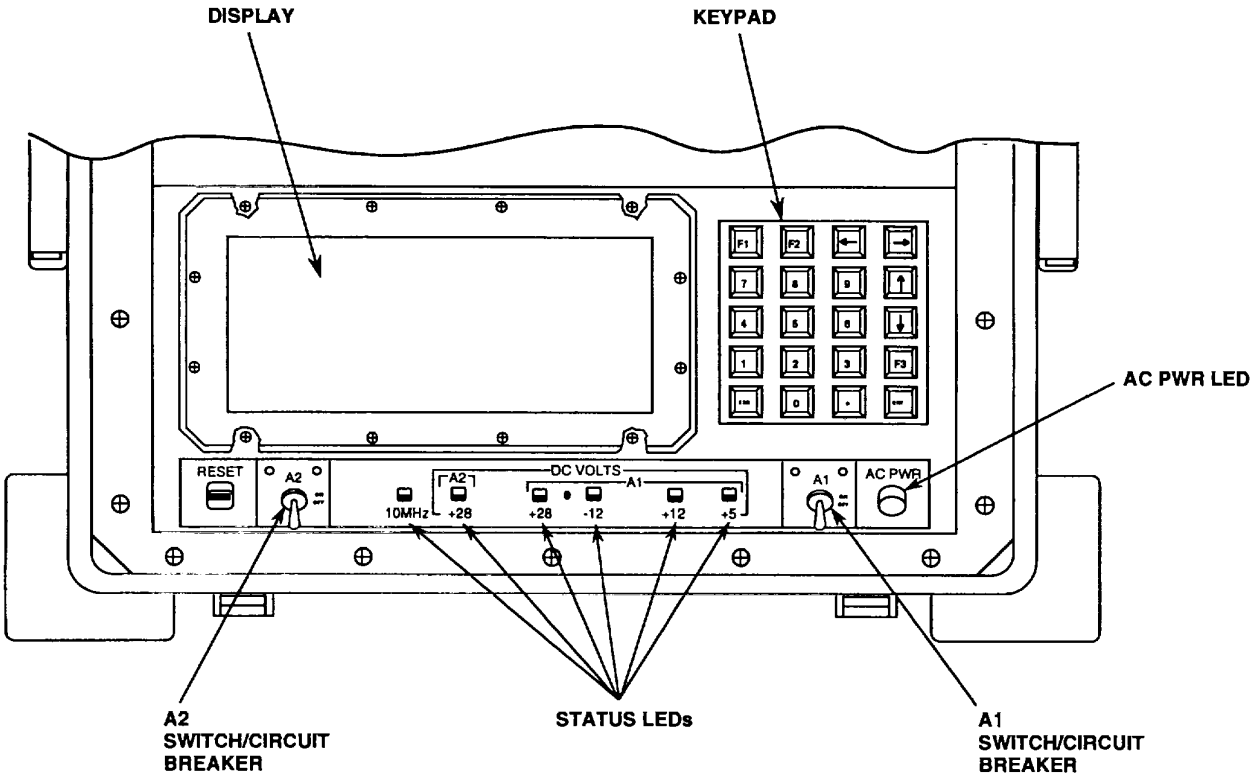


FIGURE 5-13. TS-4398/U CONTROLS AND INDICATORS.

5-6.3 RTTG, OQ-458/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
9.	Connect W2P1 to J2 on TS-4398/U. Connect W2PZ to J4 on OQ-458/U. Connect W2P3 to J7 on OQ-458/U.		
10.	Connect WIP1 to J1 on TS-4398/U. Connect W1P2 to the prime power source.		
11.	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed. **RRTS REMOTE MODE** **KEY-6 LOCAL NODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
12.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not lit, refer to paragraph 5-6.1.2.
13.	Monitor the status LEDs. +28 (A2) should be lit.	All LEDs except the LED for	If an LED is not lit, refer to paragraph 5-6.1.3.
14.	On TS-4398/U, set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (A2) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the 00-458/U power supply test (refer to paragraph 5-6.3.1). If the LED for +28 (A2) is not lit after performing the Q0-458/U power supply test, then remove and replace the LED (refer to paragraph 5-8).
15.	Ensure that OQ-458/U fans (B1, B2, and B3) are operating.	Fans are operating.	If a fan is not operating, remove and replace the failed fan (refer to paragraph 5-8).
16.	Select LOCAL MODE by pressing “6” on the keypad.	The screen shown below is displayed. **RRTS LOCAL MODE** **KEY-1 SYSTEM LOOP TEST CONFIGURATION** **KEY-2 ISOLATION TEST CONFIGURATION** **KEY-3 SELF TEST** **KEY-4 DEFAULTS MODIFICATION** **KEY-5 DS SUPPORT MAINTENANCE CONFIG.** **KEY-7 REMOTE NODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

5-6.3 RTTG, OQ-458/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
17.	Ensure receiver and transmitter default frequencies are the same (refer to paragraph 2-8.1).		
18.	Select SELF TEST by pressing “3” on the keypad. paragraph 5-6.1.1.	The screen shown belw i displayed.	If the screen shown below is not displayed or is not
		RRTS SELF TEST CONFIGURATION **KEY-1 TEST CONTROLLER SELF TEST** **KEY-2 TEST CONTROLLER CABLE SELF TEST** **KEY-3 RX/TX TEST GROUP SELF TEST** **KEY-4 RX/TX TEST GROUP CABLE SELF TEST** **KEY-6 ABORT TEST IN PROGRESS** **KEY-7 HOME**	
19.	Initiate RX/TX TEST GROUP SELF TEST by pressing “3” on the keypad.		
20.	Monitor the pass/fail and error notification messages on the TS-4398/U screen.		
21.	Select the condition which applies and take the action.	If a pass condition is indicated (the screen shown below is displayed), go to the next item.	If a failed condition is indicated, perform the 00-458/U isolation test (refer to paragraph 5-6.3.2).
		RRTS SELF TEST CONFIGURATION **KEY-1 TEST CONTROLLER SELF TEST** **KEY-2 TEST CONTROLLER CABLE SELF TEST** **KEY-3 RX/TX TEST GROUP SELF TEST** **KEY-4 RX/TX TEST GROUP CABLE SELF TEST** **----------** **KEY-6 ABORT TEST IN PROGRESS** **KEY-7 HOME** **INT RX/TX TEST GROUP TEST P:1 F:O** **INT RX/TX TEST GROUP PASSED**	
22.	Set A2 ON/OFF to OFF.		
23.	Set Al ON/OFF to OFF.		
24.	Disconnect W1P2 from the prime power source. Disconnect WlP1 from J1 on TS-4398/U.		
25.	Disconnect W2P2 from J4 on OQ-458/U. Disconnect W2P3 from J7 on OQ-458/U. Disconnect W2P1 from J2 on TS-4398/U.		

5-6.3 RTTG, OQ-458/U, Self-Test (cont)

Item	Action	Normal Indication	Corrective Action
26.	Disconnect W3P2 from J5 on 00-458/U. Disconnect W3P3 from J8 on OQ-458/U. Disconnect W3P1 from J3 on TS-4398/U.		
27.	Disconnect W4P2 from J3 on 00-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
28.	Disconnect W5P2 from J1 on 00-458/U. Disconnect W5P1 from J5 on TS-4398/U.		

5-6.3.1 RTTG, OQ-458/U, Power Supply Test. To accomplish the OQ-458/U power supply test, perform the following procedure.

INITIAL SETUP

Test Equipment
Digital Multimeter, AN/GSM-64D or equivalent

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that power is off.

WARNING

OQ-458/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the OQ-458/U power supply test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test, between the test controller, TS-4398/U, and OQ-458/U, are shown in figure 5-14. The TS-4398/U controls and indicators used during the test are shown in figure 5-15.

Item	Action	Normal Indication	Corrective Action
	O-458/U Power Supply Test.		
1.	Remove the TS-4398/U cover.		
2.	Remove both OQ-458/U end covers.		
3.	Remove the CY-8676/U cover.		
4.	Place TS-4398/U on or near OQ-458/U.		
5.	Ensure that all switches are in the OFF position.		

5-6.3.1 RTTG, OQ-458/U, Power Supply Test (cont)

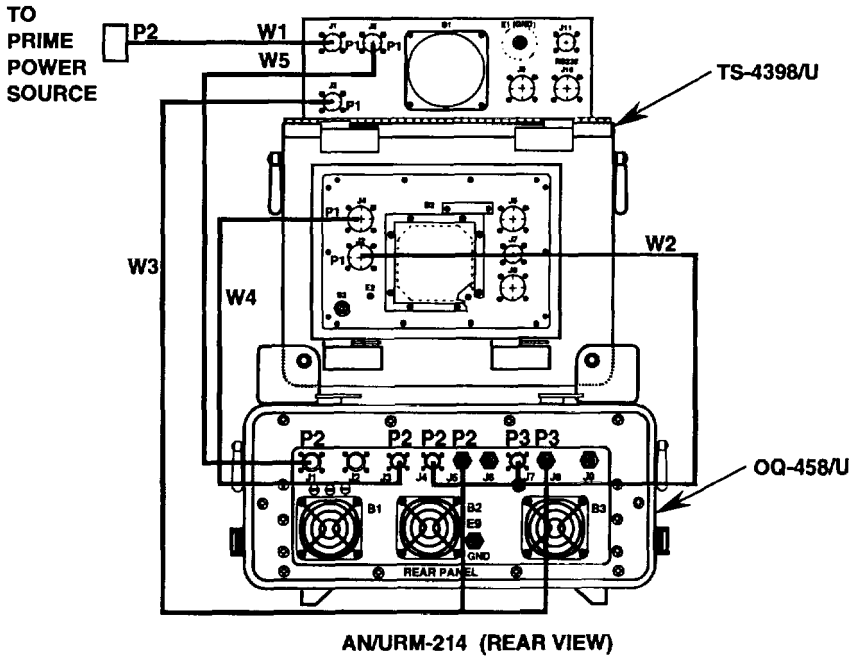


FIGURE 5-14. OQ-458/U POWER SUPPLY TEST INTERCONNECTIONS.

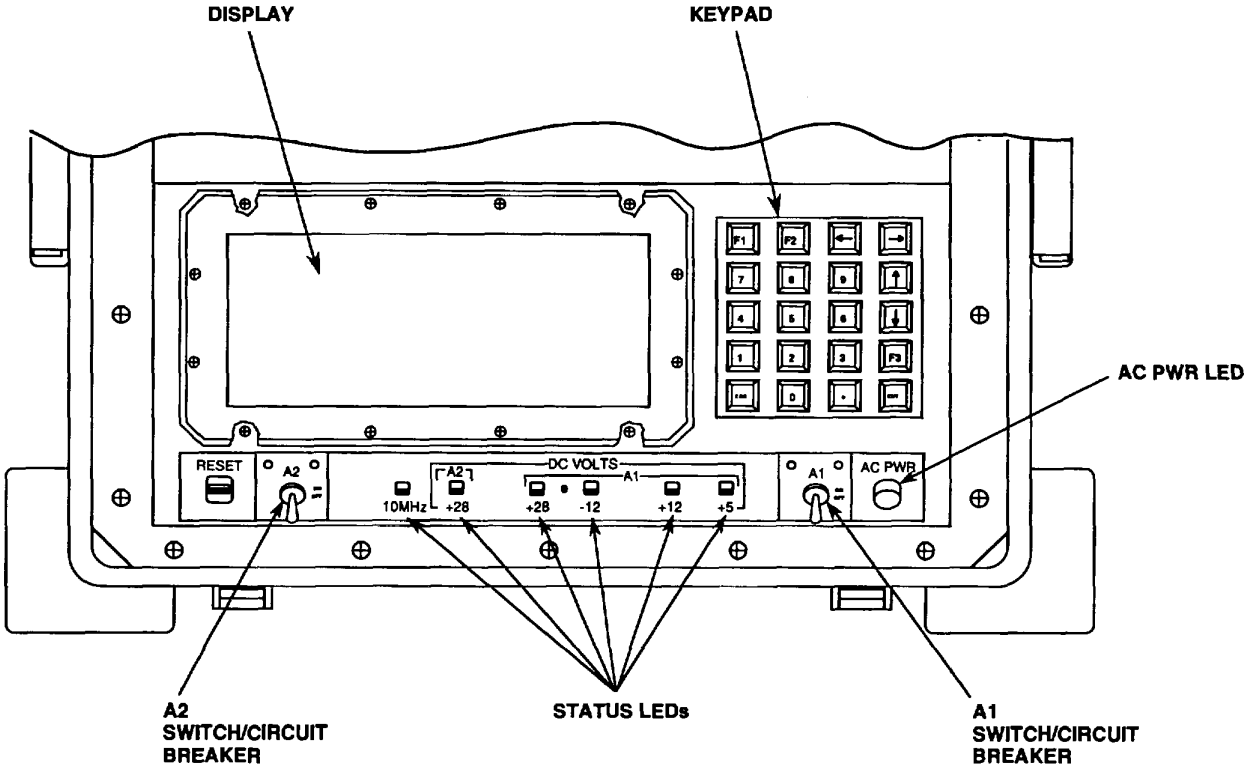
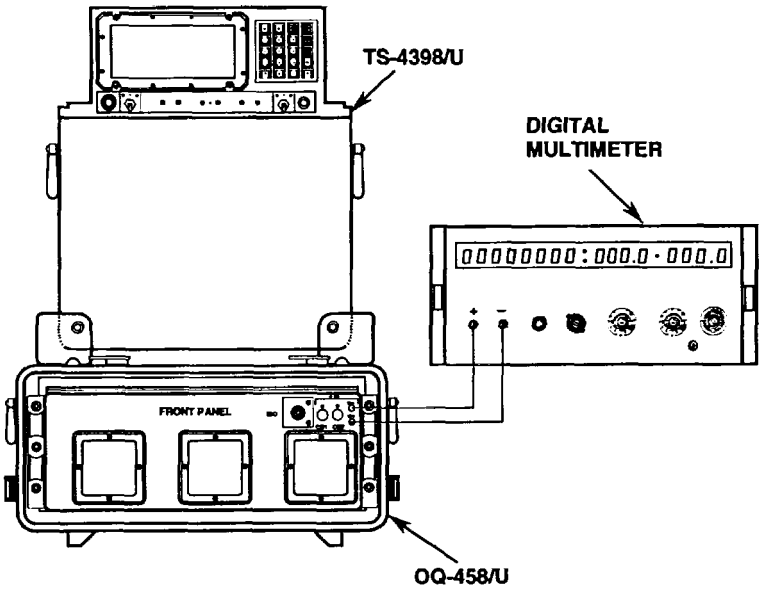


FIGURE 5-15. TS-4398/U CONTROLS AND INDICATORS.

5-6.3.1 RTTG, OQ-458/U, Power Supply Test (cont)

Item	Action	Normal Indication	Corrective Action
6.	Connect W5P1 to J5 of TS-4398/U. Connect W5P2 to J1 of 00-458/U.		
7.	Connect W4P1 to J4 of TS-4398/U. Connect W4P2 to J3 of OQ-458/U.		
8.	Connect W3P1 to J3 of TS-4398/U. Connect W3P2 to J5 of 00-458/U. Connect w3P3 to J8 of OQ-458/U.		
9.	Connect W2P1 to J2 of TS-4398/U. Connect W2P2 to J4 of OQ-458/U. Connect W2P3 to J7 of OQ-458/U.		
10.	Connect WlP1 to J1 of TS-4398/U. Connect W1P2 to the prime power source.		
11.	Connect the negative lead from the digital multimeter to TP2 on the front panel of OQ-458/U.		
12.	Connect the positive lead from the digital multimeter to TP1 on the front panel of OQ-458/U.		
13.	On TS-4398/U, set A1 ON/FF to ON.	Tne screen snown etow is displayed. **RRTS REMOTE MODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
14.	Turn on the digital multimeter and set to DC Volts.		
15.	On TS-4398/U, check that the AC PWR LED is Lit.	The LED is Lit.	If the LED is not Lit, refer to paragraph
16.	Monitor the status LEDs. ALL LEDs should be Lit, except the LED for +28 (A2).	are not Lit, refer to paragraph 5-6.1.3.	If the appropriate LEDs
17.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit. The digital multimeter reads 28 Vdc ± 2 Vdc.	If the LED for +28 (A2) is not Lit, and/or the digital multimeter does not read 28 Vdc + 2 Vdc, go to the next item.



5-6.3.1 RTTG, OQ-458/U, Power Bupply Test (cont)

Item	Action	Normal Indication	Corrective Action
18.	Select the condition which applies and take the action.	If the output voltage is correct, the +28 Vdc power supply is working properly. Go to the next item.	If the voltage at TP1/TPZ is not correct on the digital multimeter, the LED for +28 CA2) is not lit, and the AC PWR LED is on, check circuit breaker one (CB1) on OQ-458/U to see if it is enabled and check cables for proper connection. Reperform the OQ-458/U power supply test. If the voltage at TPI/TP2 is not correct on the digital multimeter, the LED for +28 (A2) is not lit, and the AC PWR LED is on, measure the AC voltage on connector J5 (pins B and C) of TS-4398/U. If no voltage is present, remove and replace the A2 ON/OFF switch (CB2) on TS-4398/U (refer to paragraph 5-8). If the voltage at TP1/TP2 is not correct on the digital multimeter, the LED for +28 (A2) is not lit, CB1 and the cables have been checked, and the AC PWR LED is on, then remove and replace the OQ-458/U +28 Vdc power supply (refer to paragraph 5-8). If the voltage at TP1/TP2 is correct on the digital multimeter, the LED for +28 (A2) is not lit, the AC PWR LED is on, and CB1 and the cables have been checked, then remove and replace the +28 (A2) LED (refer to paragraph 5-8), and reperform the OQ-458/U power supply test. If no power is applied to AN/ARU-85(V)2,3, the LED for +28 (A2) is lit, and the AC PWR LED is on, check to ensure that CB2 is engaged. If CB2 is engaged and there is still no power to AN/ARU-85(V)2,3, remove and replace CB2 on the OQ-458/U (refer to paragraph 5-8).

5-6.3.1 RTTG, OQ-458/U, Power Supply Test (cont)

Item	Action	Normal Indication	Corrective Action
18.	(cont)		If the voltage at TP1/TP2 is correct on the digital mulitmeter, the LED for the +28 (A2) is not lit, the AC PWR LED is on, CB1 and the cables have been checked, and the +28 (AZ) LED has been replaced, then remove and replace the RF CCA (refer to paragraph 5-8). If the voltage at TP1/TPZ is correct on the digital multimeter, the LED for the +28 (AZ) is not lit, the AC PWR LED is on, CB1 and the cables have been checked, the +28 (AZ) LED has been replaced, and the RF CCA has been replaced, then check wiring between the +28 Vdc power supply and the LED, and reperform the OQ-458/U power supply test.
19.	Set Al ON/OFF to OFF.		
20.	Set A2 ON/OFF to OFF.		
21.	Turn off the digital multimeter.		
22.	Disconnect W1P2 from the prime power source. Disconnect W1P1 from J1 of TS-4398/U.		
23.	Disconnect the positive lead of the digital multimeter from TP1 on the front panel of 00-458/U.		
24.	Disconnect the negative lead of the digital multimeter from TP2 on the front panel of OQ-458/U.		
25.	Disconnect WSP2 from J1 of 00-458/U. Disconnect W5P1 from J5 of TS-4398/U.		
26.	Disconnect W4P2 from J3 of OQ-458/U. Disconnect W4P1 from J4 of TS-4398/U.		
27.	Disconnect W3P1 from J3 of TS-4398/U. Disconnect W3P2 from J5 of OQ-458/U. Disconnect W3P3 from J8 of OQ-458/U.		
28.	Disconnect W2Pl from JZ of TS-4398/U. Disconnect W2P2 from J4 of OQ-458/U. Disconnect W2P3 from J7 of OQ-458/U.		

5-6.3.2 RTTG, OQ-458/U, Isolation Test. To accomplish the OQ-458/U isolation test, perform the following procedure.

INITIAL SETUP

Test Equipment
RRTS
Spectrum Analyzer, AN/USM-489(V)1 or equivalent
40 dB Attenuator (.1 to 400 MHz, 10 watt)
(2) BNC male to SMA male cable, PE3562-24 or equivalent
50n Terminator

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16-inch wrench
5/16-inch 8-inch-long torque wrench

CONDITIONS
Ensure that power is off.

WARNING

OQ-458/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the OQ-458/U isolation test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figures 5-16 and 5-18. Figure 5-16 shows the Radio Transmitter, T-1573(V)2/AR, J4 output test interconnection. Figure 5-18 shows the AT15 output test interconnection. The test controller, TS-4398/U, controls and indicators used during the test are shown in figure 5-17.

Item	Action	Normal Indication	Corrective Action
	OQ-458/U Isolation Test.		
1.	Remove the TS-4398/U cover.		
2.	Remove both OQ-458/U end covers.		

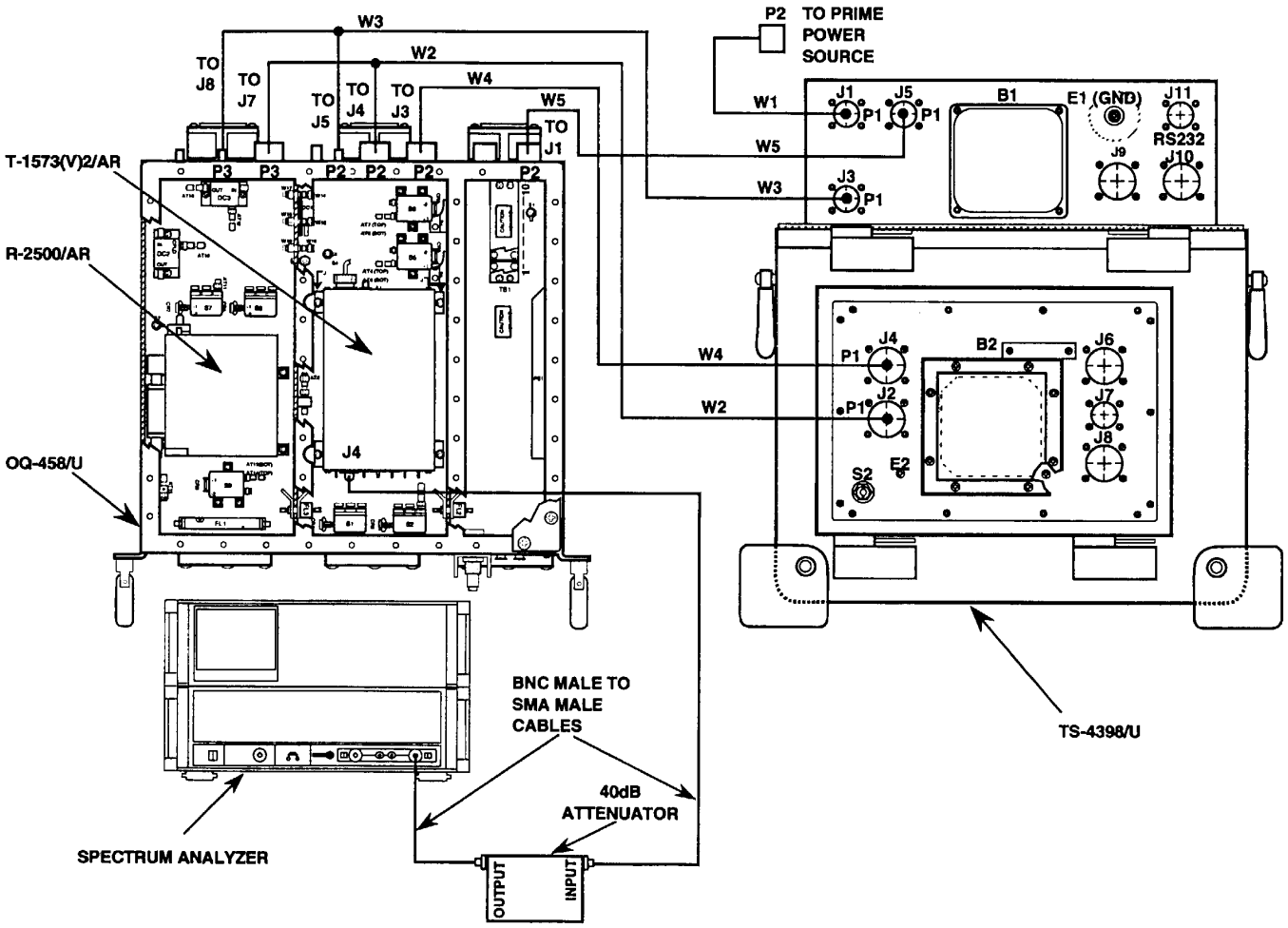


FIGURE 5-16. OQ-458/U ISOLATION TEST INTERCONNECTIONS.

5-6.3.2 RTTG, OQ-458/U, Isolation Test (Cont)

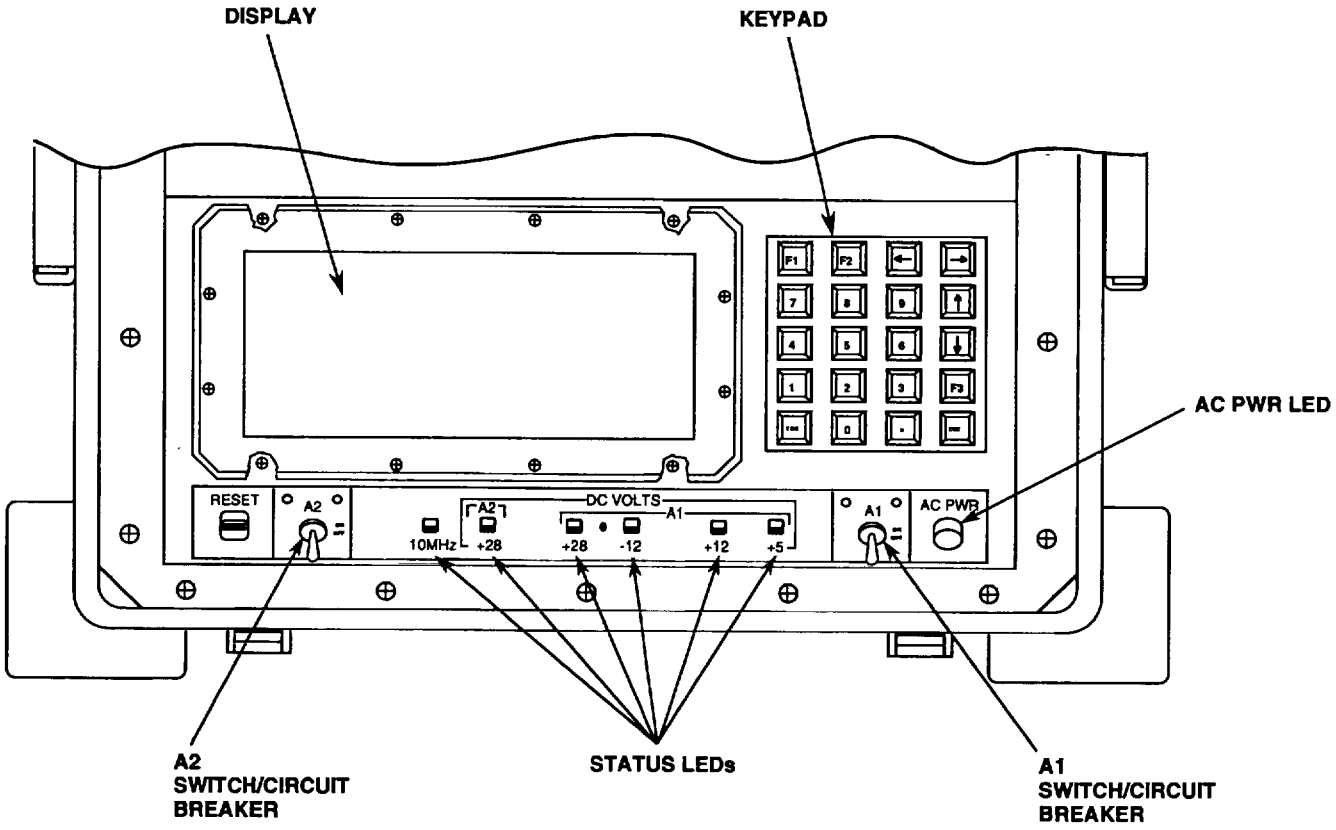
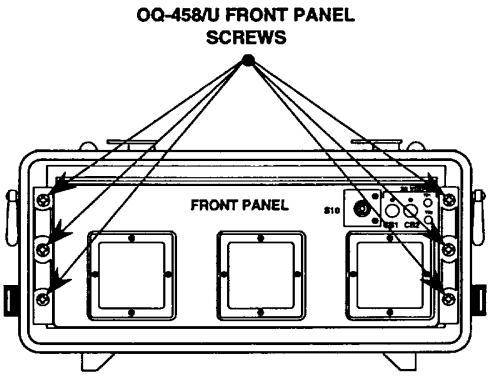
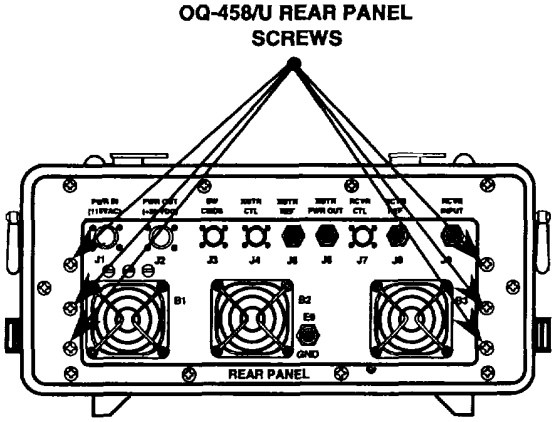
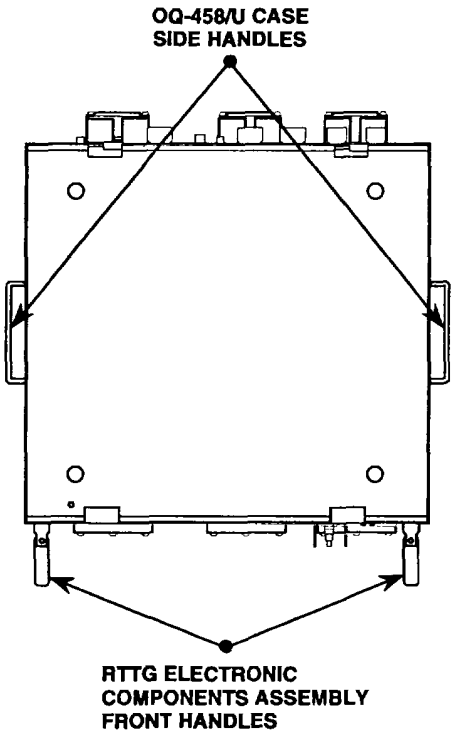


FIGURE 5-17. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
3.	Remove the CY-8676/U cover.		
4.	Place TS-4398/U near OQ-458/U.		
5.	Ensure that all switches are in the OFF position.		
6.	Using a No. 2 Phillips screwdriver, remove the six front panel screws ,flat washers, and Lock washers on the OQ-458/U.		

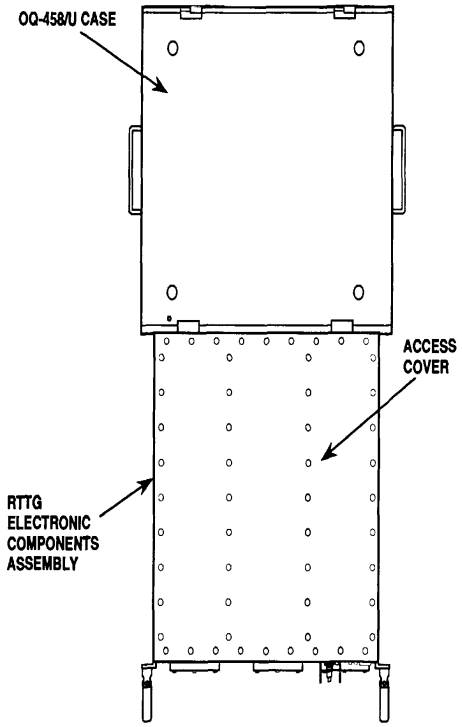


5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
7.	Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers on the 00-458/U.		
8.	While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.		
9.	Using a No. Z Phillips screwdriver, release the 58 ¼-turn fasteners.		

5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
10.	Remove the access cover.		
11.	Connect WSP1 to J5 of TS-4398/U. Connect W5P2 t¢ J1 of OQ-458/U.		
12.	Connect W4P1 to J4 of TS-4398/U. Connect W4P2 t¢ J3 of 00-458/U.		
13.	Connect W3P1 to J3 of TS-4398/U. Connect W3P2 t¢ J5 of OQ-458/U. Connect W3P3 to J8 of OQ-458/U.		
14.	Connect W2P1 to J2 of TS-4398/U. Connect W2P2 t¢ J4 of OQ-458/U. Connect W2P3 to J7 of 00-458/U.		
15.	Connect WIP1 to J1 of TS-4398/U. Connect W1P2 to the prime power source.		
16.	Connect a ground wire from the spectrum analyzer to the electrical equipment chassis assembly.		
17.	Connect cable from the input of the spectrum analyzer to the output of the 40 dB attenuator. 18. Disconnect WUP1 from J4 on T-1573(V)2/AR.		
19.	Connect a cable from J4 on T-1573(V)2/AR to the input of the 40 dB attenuator.		
20.	Turn on the spectrum analyzer.		
21.	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed. **RRTS REMOTE MODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
22.	On TS-4398/U, check that the AC PWR LED is Lit.	The LED is lit.	If the LED is not tit, refer to paragraph



5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
23.	Monitor the status LEDs. except the LED for +28 (A2).paragraph 5-6.1.3.	ALL LEDs should be lit, are not Lit, refer to	If the appropriate LEDs
24.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit. The digital multimeter reads 28 Vdc + 2 Vdc.	If the LED for +28 (AZ) is not Lit, and/or the digital multimeter does not read 28 Vdc + 2 Vdc, go to the next item.
25.	Select LOCAL NODE by pressing “6” on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

RRTS LOCAL MODE
KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.
KEY-7 REMOTE MODE

26. Select DEFAULTS MODIFICATION by pressing “4” on the keypad.

DEFAULTS MODIFICATION CONFIGURATION
KEY-1 MODIFY RECEIVER FREQ. CONFIG.
KEY-2 MODIFY TRANSMITTER FREQ. CONFIG.
KEY-3 ASSIGNED SLOT NO: 1 (1 THRU 5)
KEY-4 LOOP COUNT:0001 (0001 THRU 1000)
KEY-5 TX MODE (AJ/NORMAL):NORMAL
KEY-7 HOME

27. Select MODIFY TRANSMITTER by pressing “2” on the keypad.

MODIFY TRANSMITTER FREQ. CONFIG.
KEY-i TX-FREQ:XXX.XXX
KEY-2 TX-FREQ:XXX.XXX
KEY-3 TX-FREQ:XXX.XXX
KEY-4 TX-FREQ:XXX.XXX
KEY-5 TX-FREQ:XXX.XXX

KEY-7 HONE

28.Enter a valid frequency.
29.Set the spectrum analyzer center frequency to the first T-1573(V)2/AR frequency set.

5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
30.	Select HOME by pressing “7” on the keypad to return to	**RRTS LOCAL MODE.** **RRTS LOCAL MODE** **KEY-1 SYSTEM LOOP TEST CONFIGURATION** **KEY-2 ISOLATION TEST CONFIGURATION** **KEY-3 SELF TEST** **KEY-4 DEFAULTS MODIFICATION** **KEY-5 DS SUPPORT MAINTENANCE CONFIG.** **KEY-7 REMOTE MODE**	
31.	Set the spectrun analyzer frequency span to 60 MHz and max. hold.		
32.	On TS-4398/U, select SELF TEST by pressing “3” on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
		RRTS SELF TEST CONFIGURATION **KEY-1 TEST CONTROLLER SELF TEST** **KEY-2 TEST CONTROLLER CABLE SELF TEST** **KEY-3 RX/TX TEST GROUP SELF TEST** **KEY-4 RX/TX TEST GROUP CABLE SELF TEST** **KEY-6 ABORT TEST IN PROGRESS** **KEY-7 HOME**	
33.	Initiate RX/TX TEST GROUP SELF TEST by pressing “3” on the keypad.		

NOTE

The pass/fail and error notification messages on the TS-4398/U screen should be ignored.

Test 10 of the OQ-458/U self-test may fail when the OQ-458/U is out of its casing. After a failed item has been removed and replaced, reinstall the OQ-458/U in its case before reperforming the OQ-458/U self-test.

34.	Monitor the spectrun analyzer for a -13 dBm 5 dB signal.		

5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
35.	Select the condition which applies and take the action.	The signal is present on the spectrum analyzer. Go to the next item.	If the signal is not present, disconnect the cable from J1 on digital multimeter, measure the voltage on that cable by placing the negative lead on pin 8 and the positive lead on pin A. If 28 Vdc + 2 Vdc is not displayed, remove and replace FL2 (refer to paragraph 5-8). If the signal is still not present on the spectrum analyzer, check the TS-4398/U 10 MHz oscillator for proper operation. Perform the TS-4398/U 10 MHz oscillator test (refer to paragraph 5-6.2). If the 10 MHz oscillator is working properly, remove and replace T-1573(V)2/AR (refer to paragraph 5-8) and reperform RTTG self-test. If self-test still fails, go to next item.
36.	On TS-4398/U, set A2 ON/OFF to OFF.		
37.	Set Al ON/OFF to OFF.		
38.	Turn off the spectrum analyzer.		
39.	Disconnect the cable from J4 on T-1573(V)2/AR, and remove the 40 dB attenuator.		
40.	Reconnect W1P1 to J4 on T-1573(V)2/AR.		
41.	Using a 5/16-inch wrench, disconnect W29P2 from AT15.		
42.	Connect a cable from the input of the spectrum analyzer to the AT15 output (see figure 5-18).		
43.	Using a 500 terminator, terminate J3 of R-2500/AR.		
44.	Turn on the spectrum analyzer.		

5-6.3.2 RTTG, OQ-458/U , Isolation Test (cont)

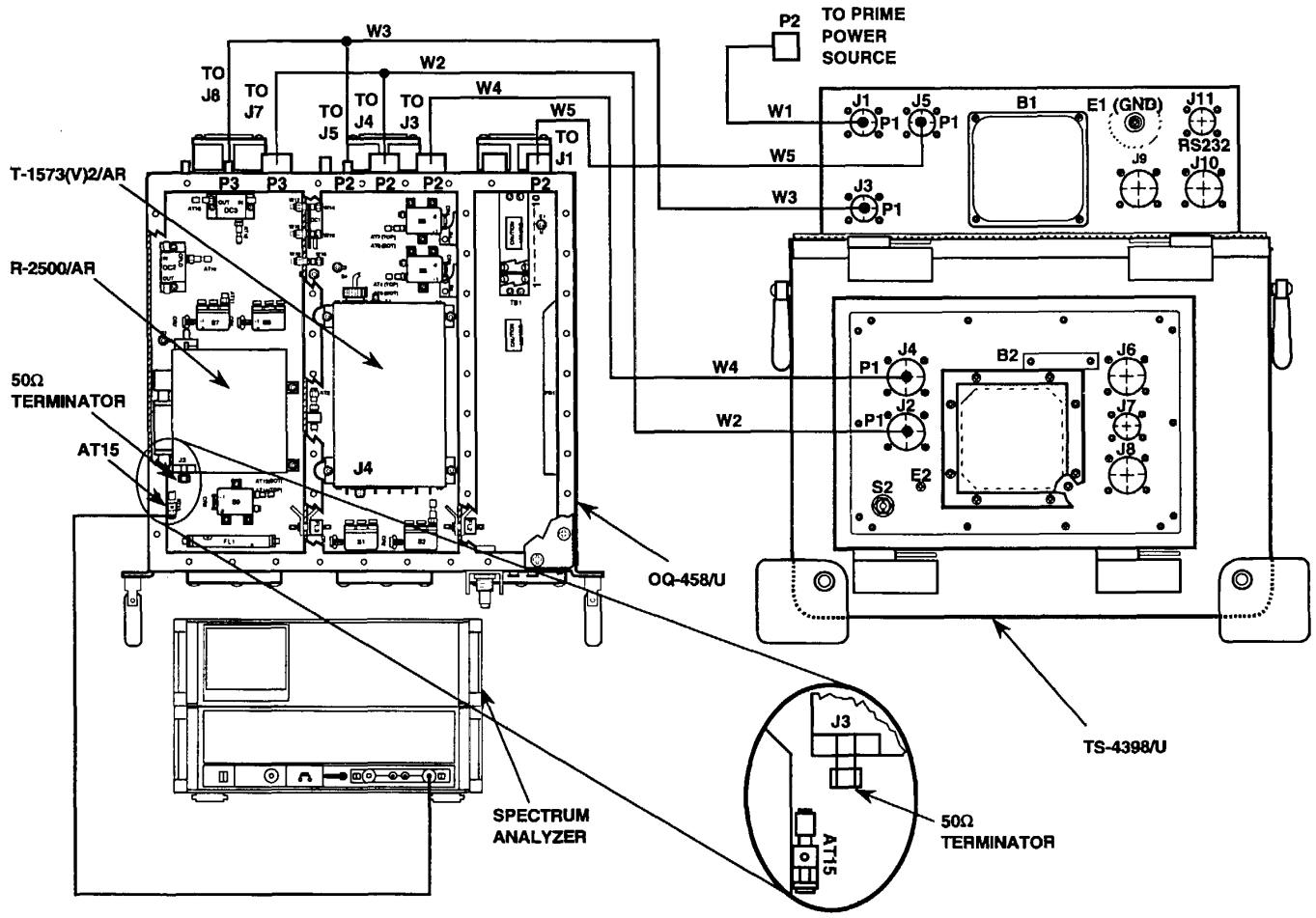


Figure 5-18. OQ-458/U ISOLATION TEST INTERCONNECTIONS (AT15 OUTPUT).

5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
45.	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed. **RRTS REMOTE MODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
46.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not lit, refer to paragraph 5-6.1.2.
47.	Monitor the status LEDs. +28 (A2) should be lit.	All LEDs except the LED for refer to paragraph 5-6.1.3.	If an LED is not lit,
48.	Set the spectrum analyzer center frequency to the first T-1573(V)2/AR default frequency.		
49.	Set the spectrum analyzer frequency span to 20 MHz and max. hold.		
50.	On TS-4398/U, set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (A2) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the 00-458/U power supply test (refer to paragraph 5-6.3.1). If the LED for +28 (A2) is not Lit after performing the OQ-458/U power supply test, then remove and replace the LED (refer to paragraph 5-8).
51.	Select LOCAL MODE by pressing “6” on the keypad.	The screen shown below is displayed. **RRTS LOCAL MODE** **KEY-1 SYSTEM LOOP TEST CONFIGURATION** **KEY-2 ISOLATION TEST CONFIGURATION** **KEY-3 SELF TEST** **KEY-4 DEFAULTS MODIFICATION** **KEY-5 DS SUPPORT MAINTENANCE CONFIG.** **KEY-7 REMOTE MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
52.	Select SELF TEST by pressing “3” on the keypad. readable, refer to paragraph 5-6.1.1.	The screen shown below is displayed. **RRTS SELF TEST CONFIGURATION** **KEY-1 TEST CONTROLLER SELF TEST** **KEY-2 TEST CONTROLLER CABLE SELF TEST** **KEY-3 RX/TX TEST GROUP SELF TEST** **KEY-4 RX/TX TEST GROUP CABLE SELF TEST** **KEY-6 ABORT TEST IN PROGRESS** **KEY-7 REMOTE MODE**	If the screen shown below is not displayed or is not
53.	Initiate RX/TX TEST GROUP SELF TEST by pressing “3” on the keypad.		

NOTE

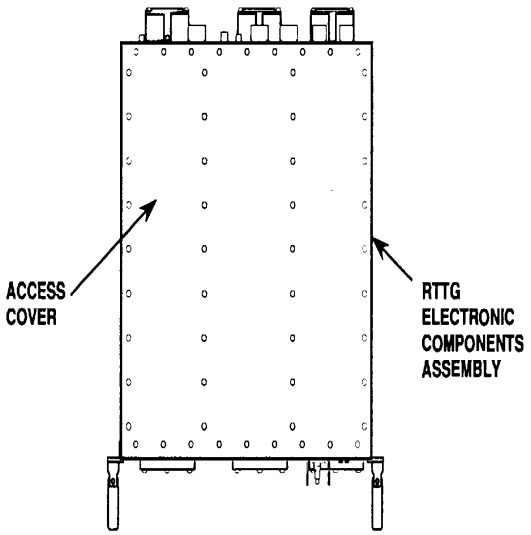
The pass/fail and error notification messages on the TS-4398/U screen should be ignored.

Test 10 of the OQ-458/U self-test may fail when the OQ-458/U is out of its casing. After a failed item has been removed and replaced, reinstall the OQ-458/U in its case before reperforming the OQ-458/U self-test.

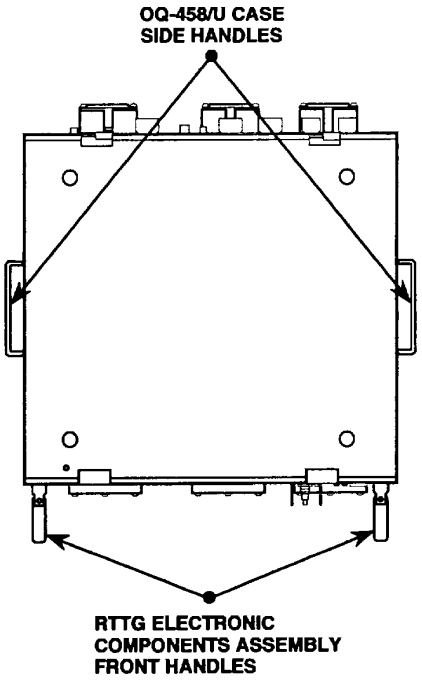
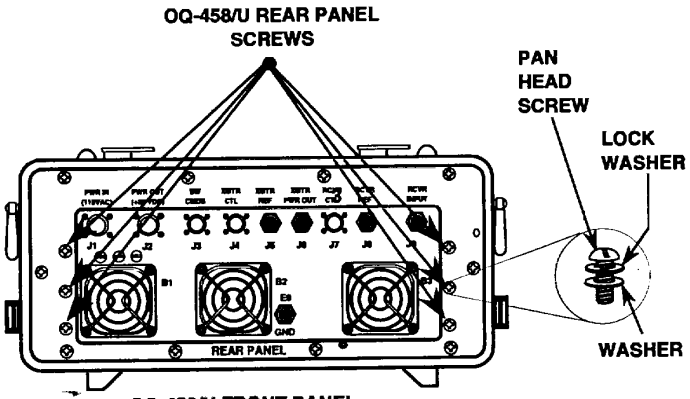
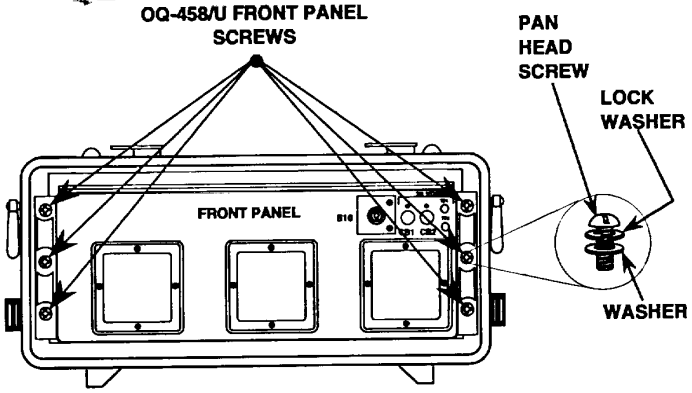
54.	Monitor the spectrum analyzer for a -50 dB 5 dB signal.		
55.	Select the condition which applies and take the action.		If the signal is present, disconnect cable from J1 of R-2500/AR. Using a digital multimeter, measure the voltage on that cable by placing the negative lead on pin B and the positive lead on pin A. If 28 Vdc ± 2 Vdc is not displayed, remove and replace filter FL3. If the desired voltage is not achieved after removing and replacing FL3, then remove and replace FL2. If the signal is still present on the spectrum analyzer, check the TS-4398/U 10 MHz oscillator for proper operation. Perform the TS-4398/U 10 MHz oscillator test (refer to paragraph 5-6.2). If the 10 MHz oscillator is working properly, remove and replace R-2500/AR (refer to paragraph 5-8).

5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
55.	(cont)		If the signal is not
56.	Reperform RTTG self-test.		Present on the spectrum
57.	Turn off the spectrum analyzer.		analyzer, perform the OQ-458/U RF test, refer to
58.	On TS-4398/U, set A2 ON/OFF to OFF.		paragraph 5-6.3.3).
59.	Set Al ON/OFF to OFF.		If test fails, replace
60.	Using a 5/16-inch wrench, disconnect the cable from the AT15 output and from the input of the spectrum analyzer.		transmitter and reperform RTTG self-test. If test continues to fail, Perform the OQ-458/U RF
61.	Reconnect W29P2 to AT15.		test (refer to paragraph
62.	Disconnect l1P2 from the prime power source. Disconnect WUP1 from J1 on TS-4398/U.		5-6.3.3).
63.	Disconnect W2P2 from J4 on OQ-458/U. Disconnect W2P3 from J7 on OQ-458/U. Disconnect W2P1 from J2 on TS-4398/U.		
64.	Disconnect W3P2 from J5 on OQ-458/U. Disconnect U3P3 from J8 on OQ-458/U. Disconnect W3P1 from J3 on TS-4398/U.		
65.	Disconnect W4P2 from J3 on OQ-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
66.	Disconnect WU5P2 from J1 on OQ-458/U. Disconnect W5P1 from J5 on TS-4398/U.		
67.	Disconnect the ground wire from the spectrum analyzer and from the electrical equipment chassis assembly.		
68.	Place the access cover in position.		
69.	Using a No. 2 Phillips screwdriver, lock the 58 ¼-turn fasteners. If the signal is not present on the spectrum analyzer, perform the OQ-458/U RF test, refer to paragraph 5-6.3.3). If test fails, replace transmitter and reperform RTTG self-test. If test continues to fail, perform the OQ-458/U RF test (refer to paragraph 5-6.3.3).		



5-6.3.2 RTTG, OQ-458/U, Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
70.	While holding the handles on the side of the case, insert the RTTG, electronic components assembly.		
71.	Slide the RTTG, electronic components assembly firmly into the case.		
72.	Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.		
73.	Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.		

5-6.3.3 RTTG, OQ-458/U, RF Test. To accomplish the OQ-458/U RF test, perform the following procedure.

INITIAL SETUP

Test Equipment
Spectrum Analyzer, AN/USM-489(V)l
40 dB attenuator, 527 40DB or equivalent
BNC male to SMA male cable, PE3562-24 or equivalent
Cable with SMA elbow connectors

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Ensure that all switches are in the OFF position before connecting power.

WARNING

OQ-458/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

Ensure that all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the OQ-458/U RF Test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figures 5-20 and 5-23. Figure 5-20 shows the RF flow test I interconnection. Figure 5-23 shows the RF flow test II interconnection. Figures 5-21 and 5-24 show the RF flow test I and RF flow test II test points, respectively. The test controller, TS-4398/U, controls and indicators used during the test are shown in figure 5-19. The OQ-458/U RF Flow Diagram is shown in figures 5-22 and 5-25.

Item	Action	Normal Indication	Corrective Action
	OQ-458/u RF Test.		
1.	Perform and record the results of the OQ-458/U self-test (refer to paragraph 5-6.3).		

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

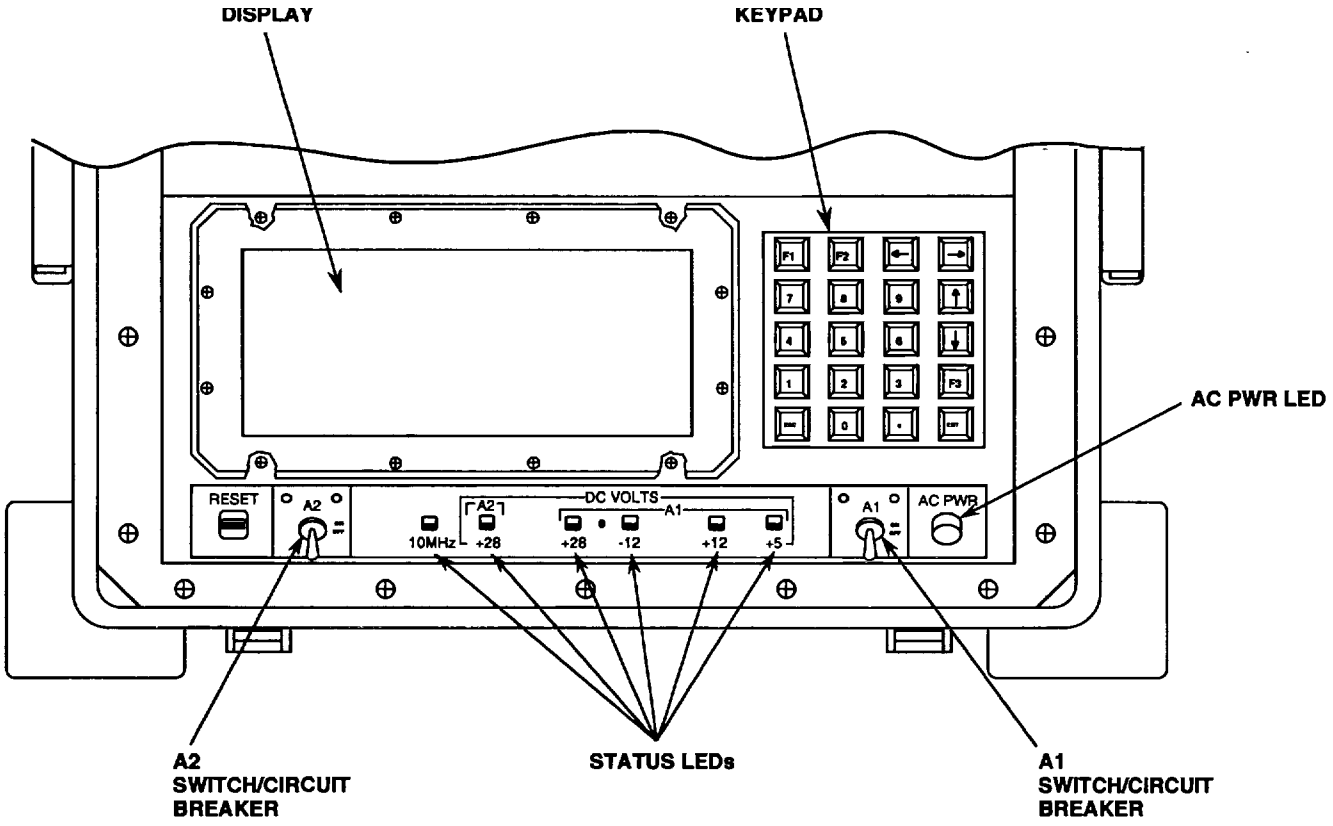


FIGURE 5-19. TS-4398/U CONTROLS AND INDICATORS

Item	Action	Normal Indication	Corrective Action
2.	Perform and record the results of the 00-458/U cables self-test (refer to paragraph 4-9.4).		
3.	Select the condition which applies and take the action.	If the OQ-458/U self-test passed and the 00-458/U cables self-test passed, then RRTS, AN/URN-214, is operational. The OQ-458/U RF test is complete.	If the 00-458/U self-test failed and the 00-458/U cables self-test passed, proceed using OQ-458/U RF flow test I (refer to paragraph 5-6.3.3, procedure(b)). If the 00-458/U self-test passed and the OQ-458/U cables self-test failed, proceed using 00-458/U RF flow test II (refer to paragraph 5-6.3.3, procedure (c)). If the Q0-458/U self-test failed and the OQ-458/U cables self-test failed, proceed using OQ-458/U RF flow test I (refer to paragraph 5-6.3.3 procedure (b)).

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action

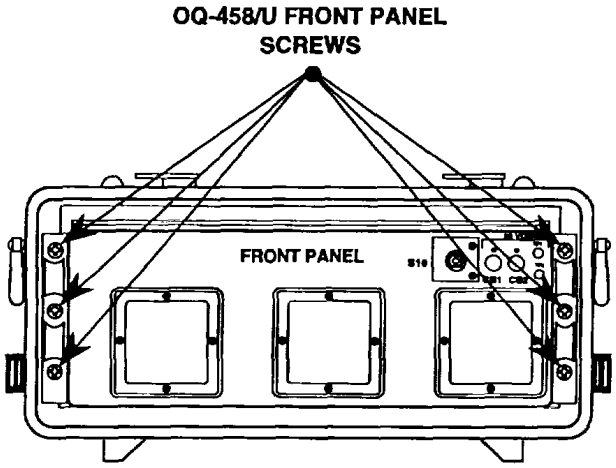
b. OQ-0458/U RF Flow Test I.

1. Remove the TS-4398/U cover.

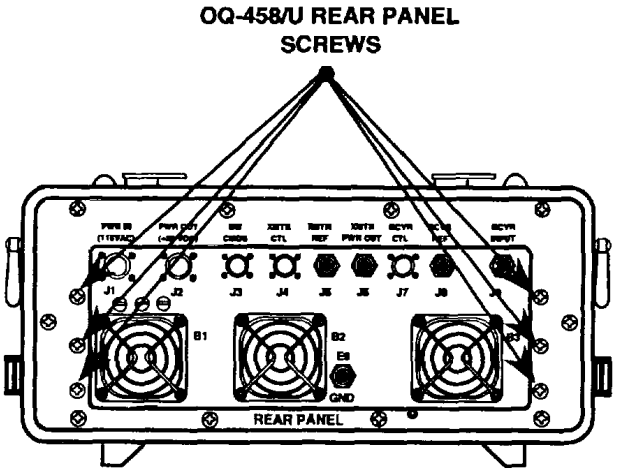
2. Remove both 00-458/U end covers.

3. Remove the CY-8676/U cover.

4. Place the TS-4398/U near 00-458/U.



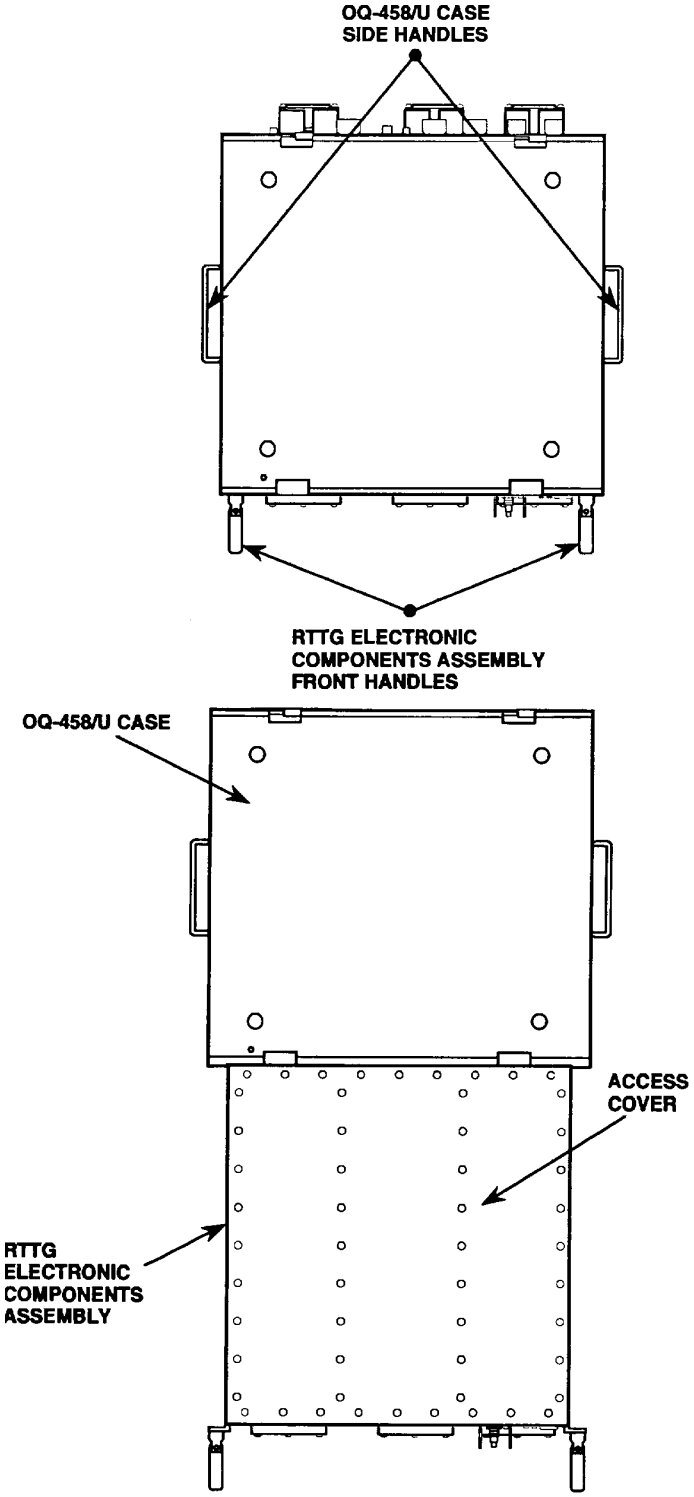
5. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



6. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and Lock washers.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
7.	While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.		
8.	Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.		
9.	Remove the access cover.		
10.	Connect WSP1 to J5 of TS-4398/U. Connect WSP2 to J1 of OQ-458/U.		
11.	Connect U4P1 to J4 of TS-4398/U. Connect W4P2 to J3 of OQ-458/U.		
12	Connect W3P1 to J3 of TS-4398/U. Connect W3P2 to J5 of OQ-458/U. Connect U3P3 to J8 of 00-458/U.		
13	Connect W2P1 to J2 of TS-4398/U. Connect W2P2 to J4 of OQ-458/U. Connect W2P3 to J7 of OQ-458/U.		
14.	Connect WlP1 to J1 of TS-4398/U. Connect W1P2 to the prime power source.		
15.	Connect a ground wire from the spectrum analyzer to the electrical equipment chassis assembly.		



5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
16.	Using table 5-4 and figure 5-22, disconnect the identified cable and connect the input of the spectrum analyzer to the various test points to isolate to the test point where the signal is not correct. Begin at a test point half-way through the circuit to save troubleshooting time. Reconnect cables before going to the next test point. If the expected signal is not found, work backwards through the table until a desired signal is found, then suspect the next item in table.		

NOTE

Test 10 of the OQ-458/U self-test may fail with the OQ-458/U disassembled. After removing and replacing a suspected malfunctioning component, reassemble the OQ-458/U and reperform the OQ-458/U self-test.

17	Turn on the spectrum analyzer.		
18.	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed. **RRTS RENOTE NODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
19.	On TS-4398/U, check that the AC PWR LED is lit.	The LED is Lit.	If the LED is not Lit, refer to paragraph

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

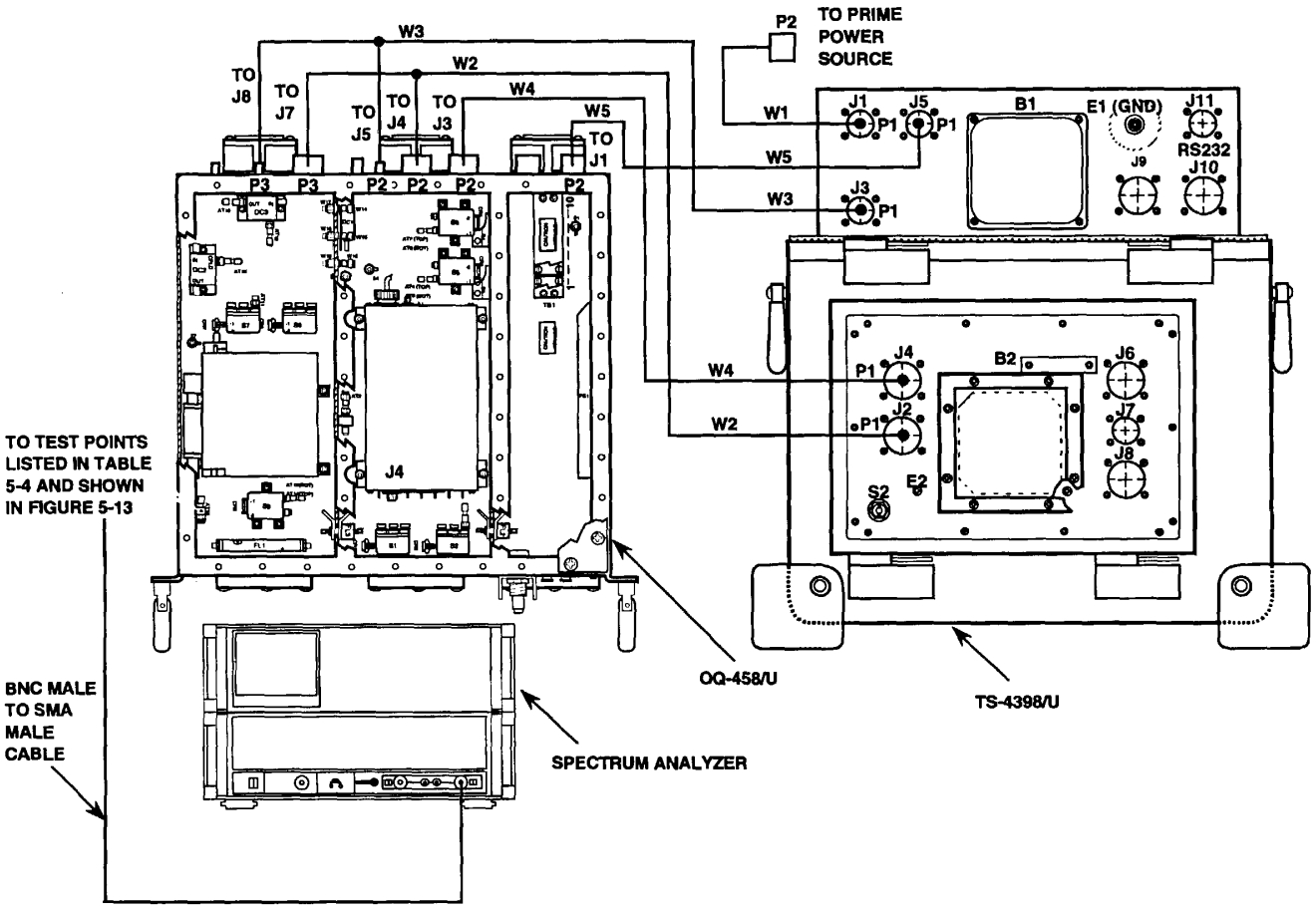


FIGURE 5-20. OQ-458/U RF FLOW TEST I INTERCONNECTIONS.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

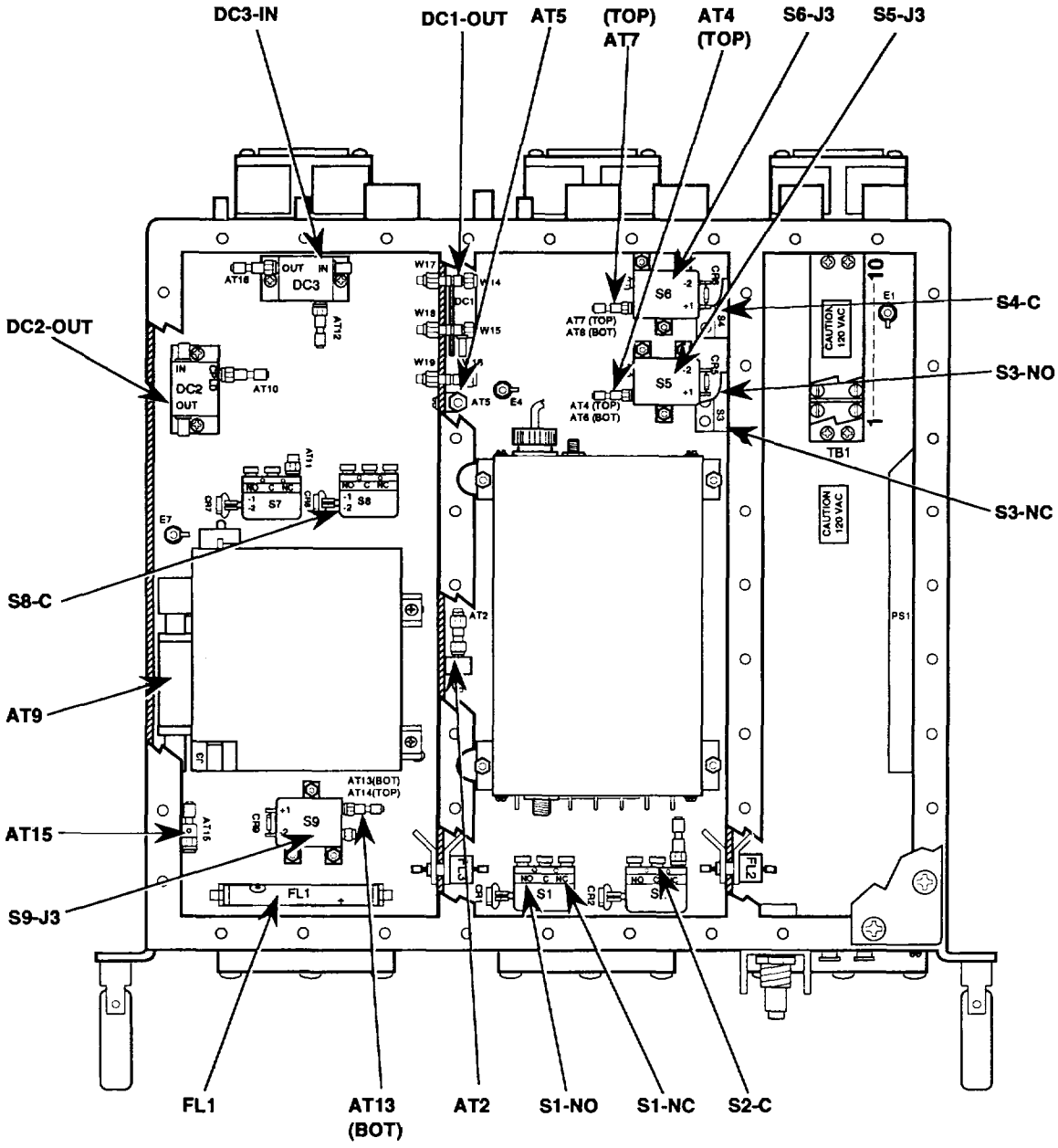


FIGURE 5-21. OQ-458/U RF FLOW TEST I TEST POINTS.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

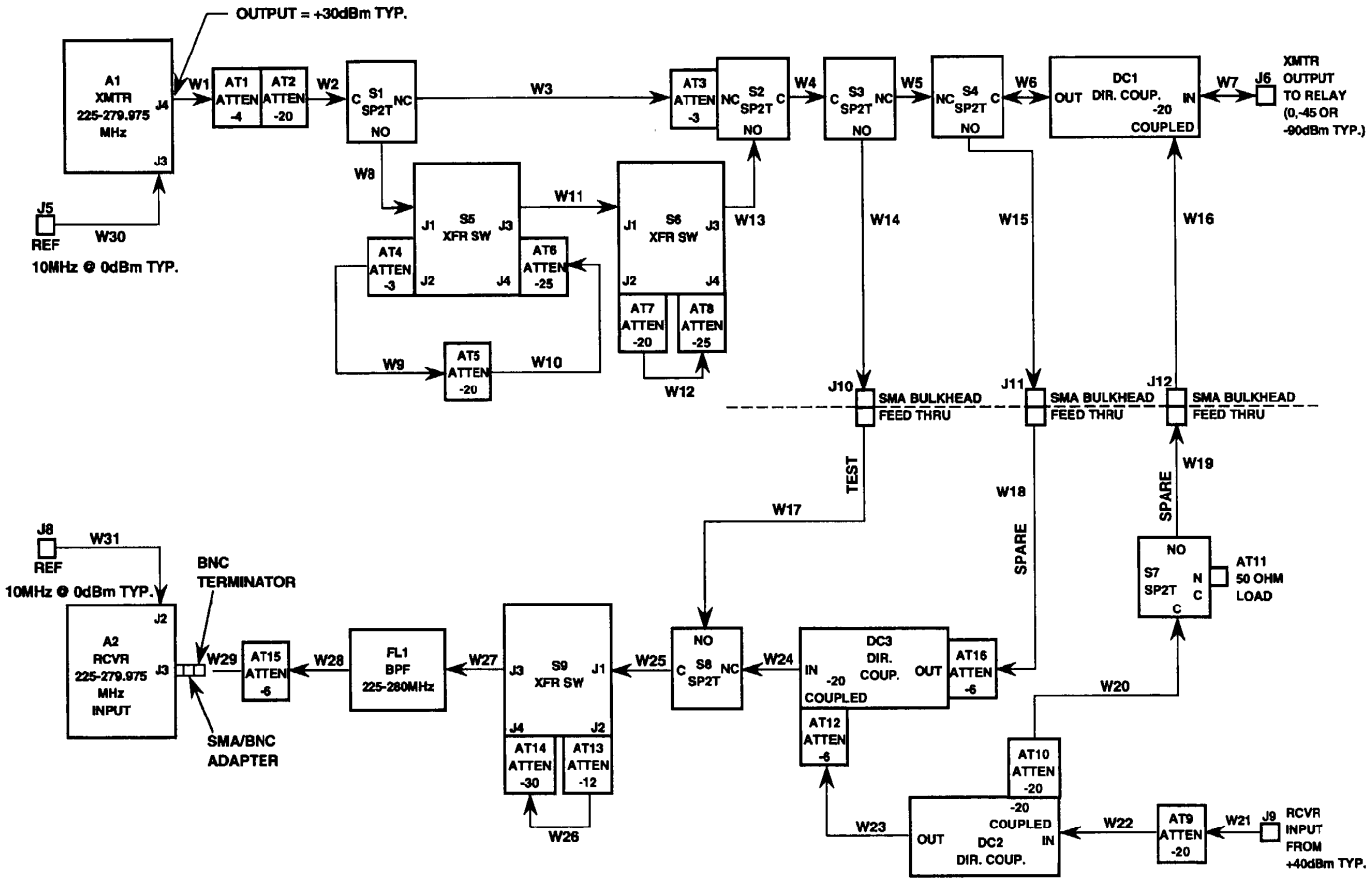


FIGURE 5-22. OQ-458/U RF FLOW DIAGRAM.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

TABLE 5-4. OQ-458/U RF FLOW TEST I.

CABLE TO DISCONNECT	DISCONNECT FROM	TEST POINT	EXPECTED SIGNAL	PROBABLE FAILURE	SECONDARY FAILURE
W2	AT2	AT2	1 to 9 dBm	AT1, AT2	-
W4	S2-C	S2-C	-46 to -38 dBm	S2	-
W8	S1-N0	S1-NO	1 to 9 dBm	S1	-
W11	S5-J3	55-J3	1 to 9 dBm	S5	-
W13	S6-J3	56-J3	-45 to -37 dBm	S6	AT7, AT8
W14	S3-NO	S3-NO	-46 to -38 dBm	S3	-
W25	S8-C	S8-C	-46 to -38 dBm	S8	-
W27	S9-J3	S9-J3	-47 to -38 dBm	S9	-
W28	FL1	FL1	-49 to -39 dBm	FL1	-
W29	AT15	AT15	-55 to -45 dBm	AT15	-

Item	Action	Normal Indication	Corrective Action
20.	Monitor the status LEDs.	All LEDs should be Lit, except the LED for +28 (A2).	If the appropriate LEDs are not Lit, refer to paragraph 5-6.1.3.
21.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (A2) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1). If the LED for +28 (A2) is not lit after performing the 00-458/U power supply test, then remove and replace the LED (refer to paragraph 5-8).
22.	Select LOCAL MODE by pressing 11611 on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.
KEY-7 REMOTE MODE

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
23.	Set the spectrum analyzer center frequency to the first T-1573(V)2/AR default frequency.		
24.	Set the spectrum analyzer frequency span to 60 MHz and max. hold.		
25.	On TS-4398/U, select SELF TEST by pressing "3" on the keypad.	The screen shown below is displayed. **RRTS SELF TEST CONFIGURATION** **KEY-1 TEST CONTROLLER SELF TEST** **KEY-2 TEST CONTROLLER CABLE SELF TEST** **KEY-3 RX/TX TEST GROUP SELF TEST** **KEY-4 RX/TX TEST GROUP CABLE SELF TEST** **KEY-6 ABORT TEST IN PROGRESS** **KEY-7 HOME**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
26.	Initiate RX/TX TEST GROUP SELF TEST by pressing "3" on the keypad.		

NOTE

This test should be run each time a new test point is selected according to table 5-4. Remember to reconnect previously removed cables before proceeding to the next test point.

The pass/fail and error notification messages on the TS-4398/U screen should be ignored.

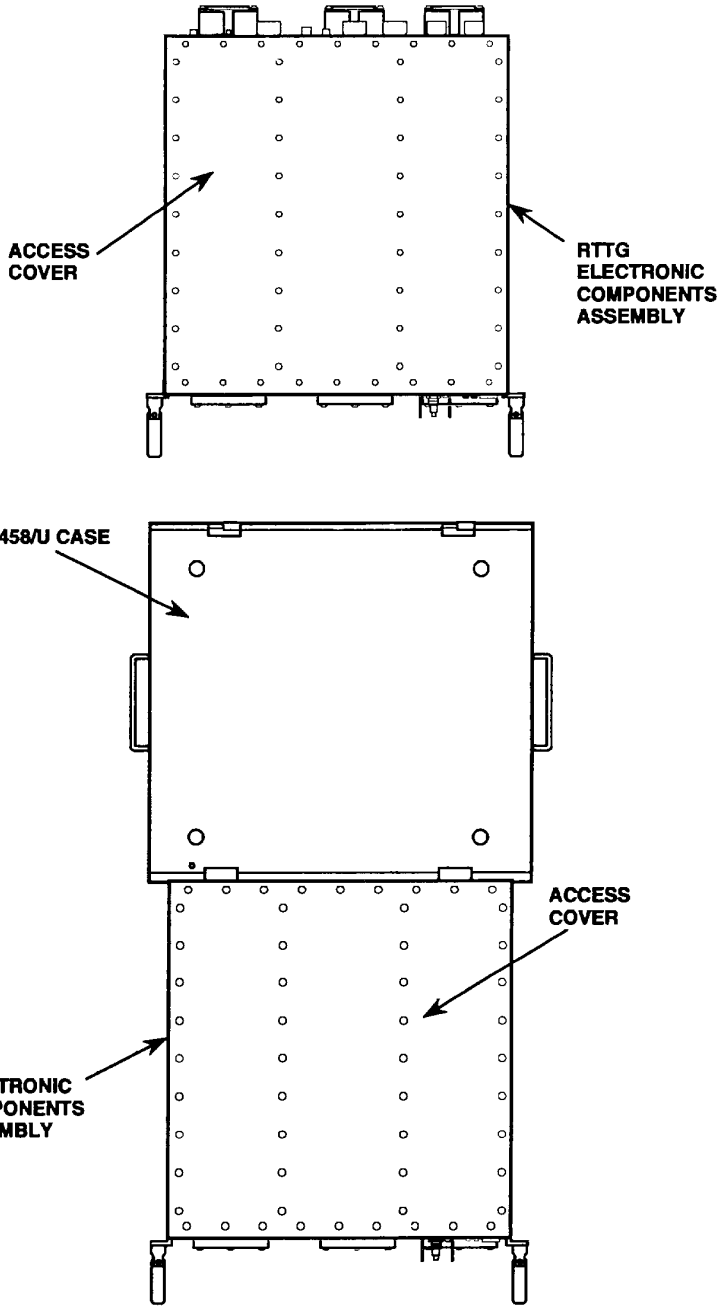
27.	Monitor the spectrum analyzer for the expected signal (see table 5-4 and figure 5-25).		
28.	Select the condition which applies and take the action.	If the signals are as expected, go to the next item.	If the expected signal is not correct at a test point, work backwards through the table until the desired signal is found, then suspect next item in the table (Probable Failure column). Remove and replace the appropriate item (refer to paragraph 5-8) and reperform the O0-458/U self-test.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
29.	Remove the 50 Q terminator from J3 of R-2500/AR and reconnect cable W9 to J3 of R-2500/AR.		
30.	Disconnect AT6 from S5 and connect AT6 to the input of the spectrum analyzer.		
31.	Setup the spectrum analyzer as follows: reference level to 0 dBm, span to 65 MHz, and set to max hold.		
	NOTE		
	Several signals may be displayed as OQ-458/U self-test is executing. The Normal Indication measurement should be made only after the self-test has completed.		
32.	Perform the OQ-458/U self-test by pressing "3" on the keypad. is as expected, reconnect AT4, AT5, AT6, and reinstall 50 a terminator on J3 of R-2500/AR. Proceed using OQ-458/U RF flow test II (refer to paragraph 5-6.3.3, item 18).	The spectrum analyzer should display a -47 to -39 dBm signal. If the signal replace AT4, AT5, and AT6 one at a time to determine which attenuator has failed and reperform the OQ-458/U RF test.	If the spectrum analyzer does not display a -47 to -39 dBm signal, remove and
	NOTE		
	If test 10 of OQ-458/U self-test was failing and the expected signals were achieved for Flow Test I, remove and replace switch (S9) and reperform the OQ-458/U self-test. If test 10 of the OQ-458/U self-test continues to fail, suspect AT13 and AT14.		
33.	On TS-4398/U, set A2 ON/OFF to OFF.		
34.	Set A1 ON/OFF to OFF.		
35.	Turn off the spectrum analyzer.		
36.	Disconnect W1P2 from the prime power source. Disconnect WlP1 from J1 on TS-4398/U.		
37.	Disconnect W2P2 from J4 on 00-458/U. from J7 on Disconnect WZP1 from J2 on TS-4398/U.	Disconnect W2P3 Q0-458/U.	

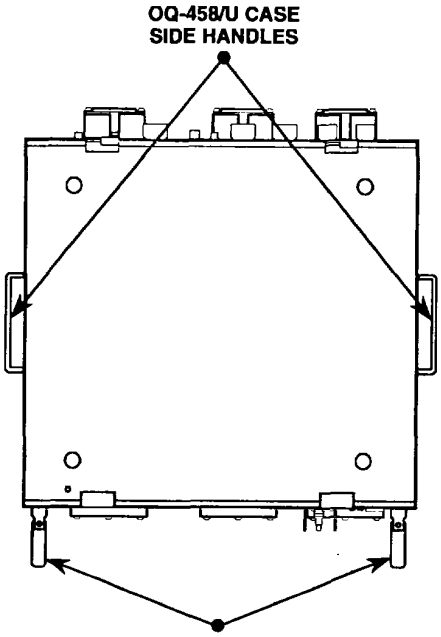
5-6.3.3 RTTG, OQ-45

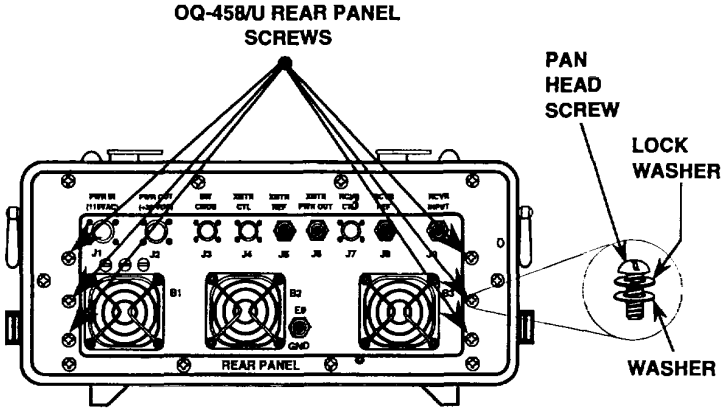
Item	Action	Normal Indication	Corrective Action
38.	Disconnect W3P2 from J5 on OQ-458/U. Disconnect W3P3 from J8 on OQ-458/U. Disconnect U3P1 from J3 on TS-4398/U.		
39.	Disconnect U4P2 from J3 on OQ-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
40.	Disconnect W5P2 from J1 on OQ-458/U. Disconnect W5P1 from J5 on TS-4398/U.		
41.	Disconnect the ground wire from the spectrum analyzer and from the electrical equipment chassis assembly.		
42.	Place the access cover in position.		
43.	Using a No. 2 Phitlips screwdriver, lock the 58 1/4-turn fasteners.		
44.	While holding the handles on the side of the case, insert the RTTG, electronic components assembly.		

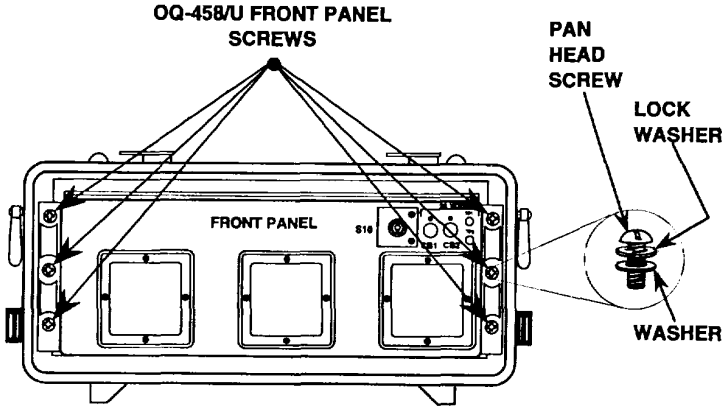


5-6.3.3 RTTG, OQ-4!

Item	Action	Normal Indication	Corrective Action
41.	Slide the RTTG, electronic components assembly firmly into the case.		
42.	Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers		
43.	Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.		





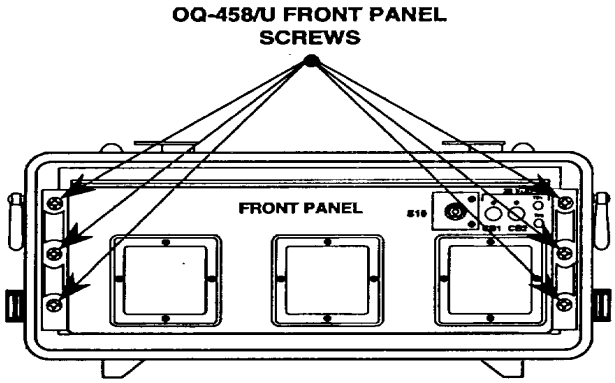


5-6.3.3 RTTG, OQ-458/

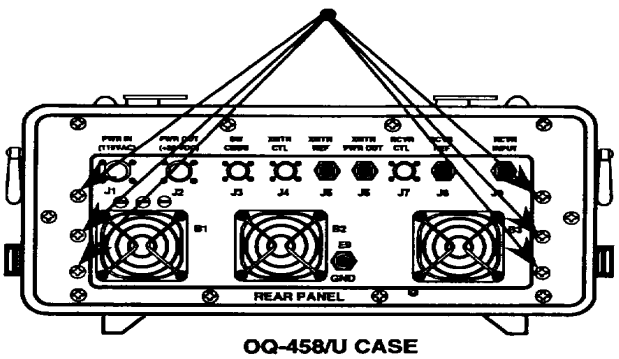
Item	Action	Normal Indication	Corrective Action

C. OQ-458/U RF Flow Test II.

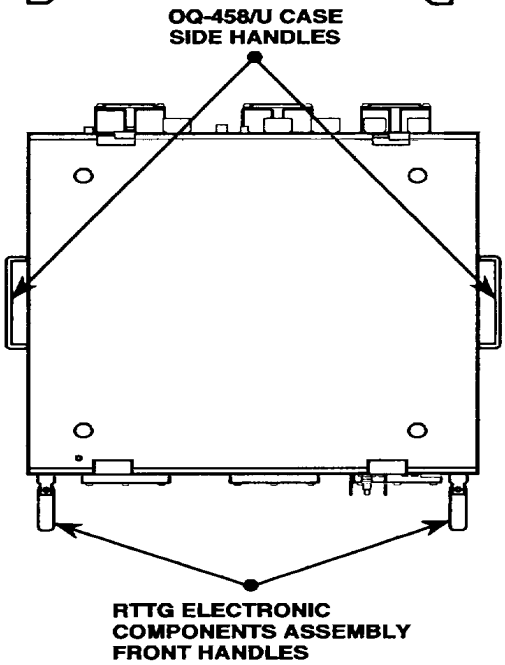
1. Remove the TS-4398/U cover.
2. Remove both C0-458/U end covers.
3. Remove the CY-8676/U cover.
4. Place the TS-4398/U near OQ-458/U.
5. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



6. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.

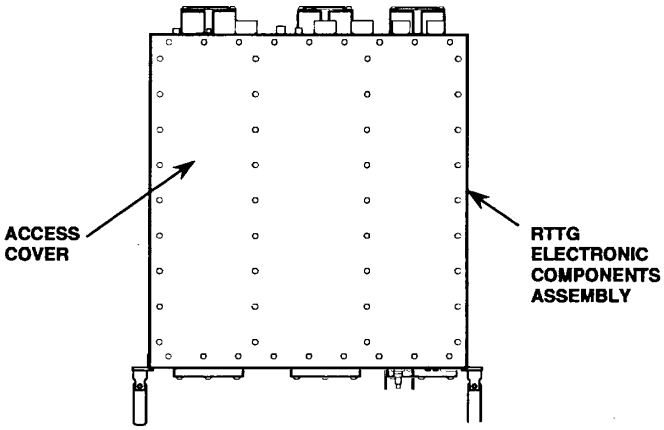


7. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assenbly completety out of the case.



5-6.3.3 RTTG, OQ-458

Item	Action	Normal Indication	Corrective Action
8.	Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.		
9.	Remove the access cover.		
10.	Connect W11P1 to J9 on OQ-458/U. Connect W1OP2 to the adapter on the OQ-458/U rear panel cover.		
11.	Connect W1OP1 to J2 on OQ-458/U. Connect WllP2 to the adapter on the OQ-458/U rear panel cover.		
12.	Connect W5P1 to J5 of TS-4398/U. Connect WSP2 to J1 of OQ-458/U.		
13.	Connect W4P1 to J4 of TS-4398/U. Connect W4P2 to J3 of OQ-458/U.		
14.	Connect W3P1 to J3 of TS-4398/U. Connect W3P2 to J5 of OQ-458/U. Connect W3P3 to J8 of OQ-458/U.		
15.	Connect W2P1 to J2 of TS-4398/U. Connect W2PZ to J4 of OQ-458/U. Connect W2P3 to J7 of OQ-458/U.		
16.	Connect WIPI to J1 of TS-4398/U. Connect Wl1P2 to the prime power source.		
17.	Connect a ground wire from the spectrum analyzer to the electrical equipment chassis assembly.		
18.	Using table 5-5, disconnect the identified cable and connect the input of the spectrum analyzer to the various test points to isolate to the test point where the signal is not correct. Begin with the step that disconnects cable W10 from OQ-458/U J6. If the desired signal is not found, work backwards in the table until a desired signal is found, then suspect that the next item is bad. Reconnect cables before going to the next test point.		
19.	Turn on the spectrum analyzer.		



5-6.3.3 RTTG, OQ-458/U, RF TEST (cont)

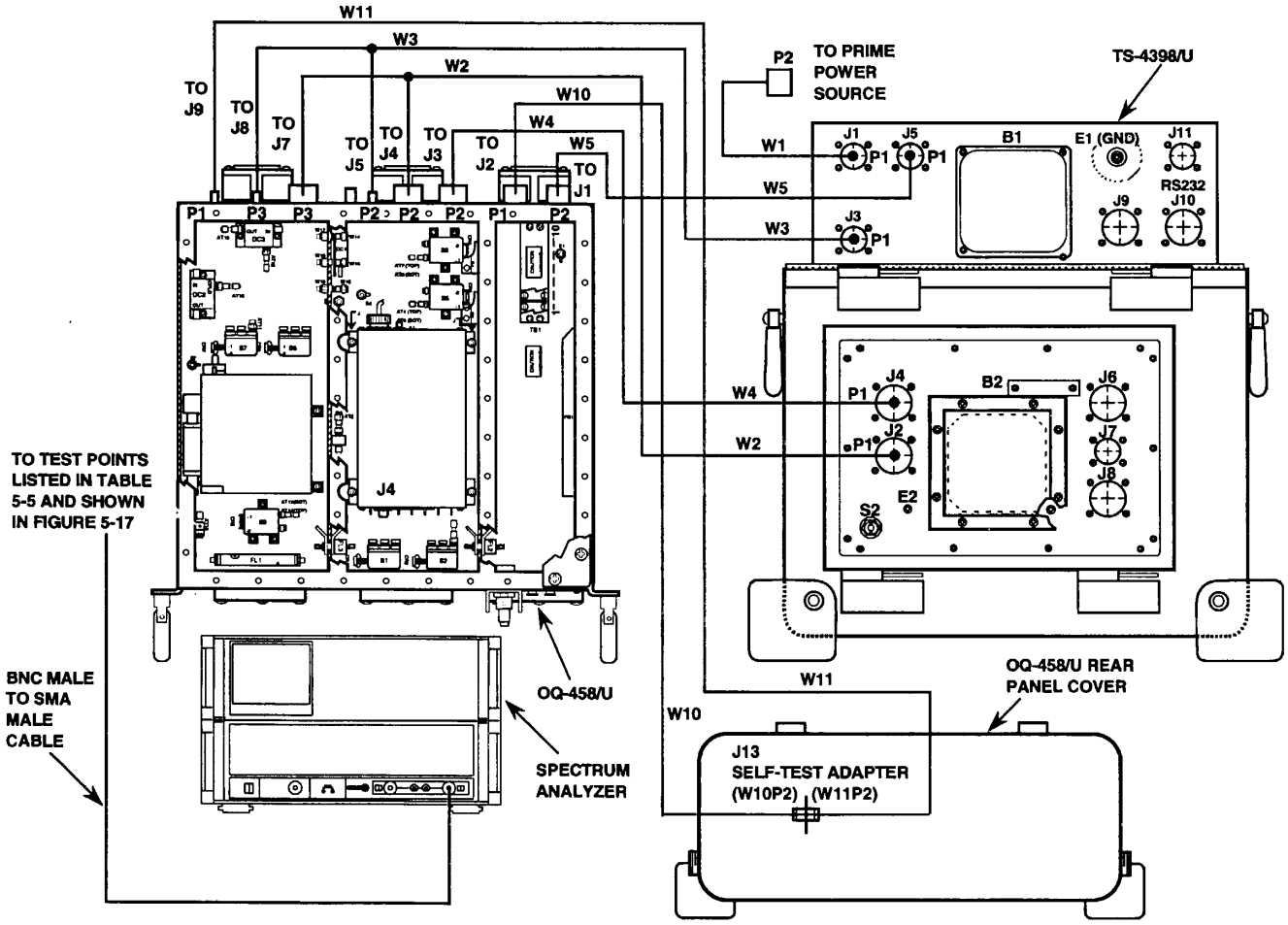


FIGURE 5-23. OQ-458/U RF FLOW TEST II INTERCONNECTIONS

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

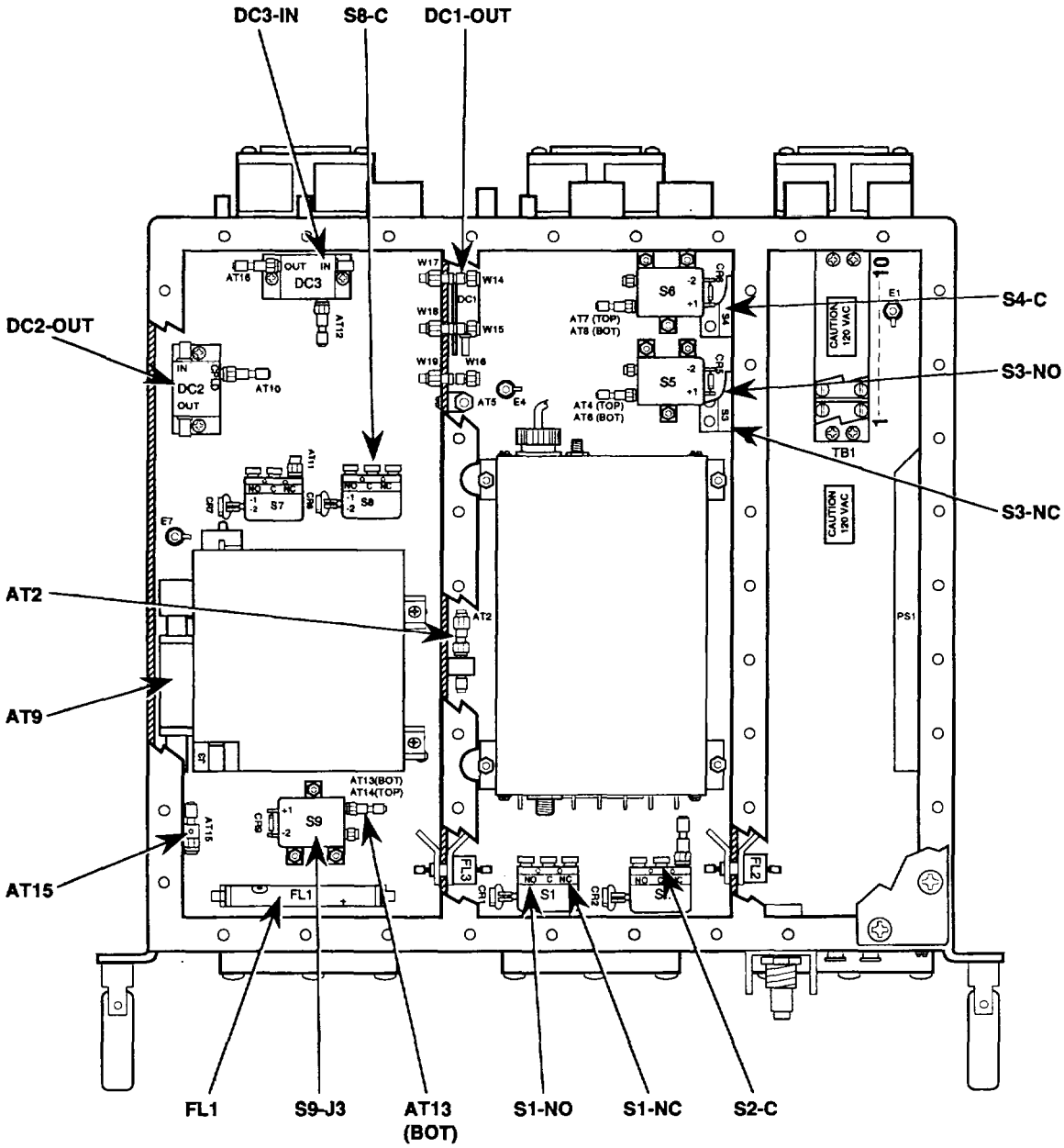


FIGURE 5-24. OQ-458/U RF FLOW TEST II TEST POINTS.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

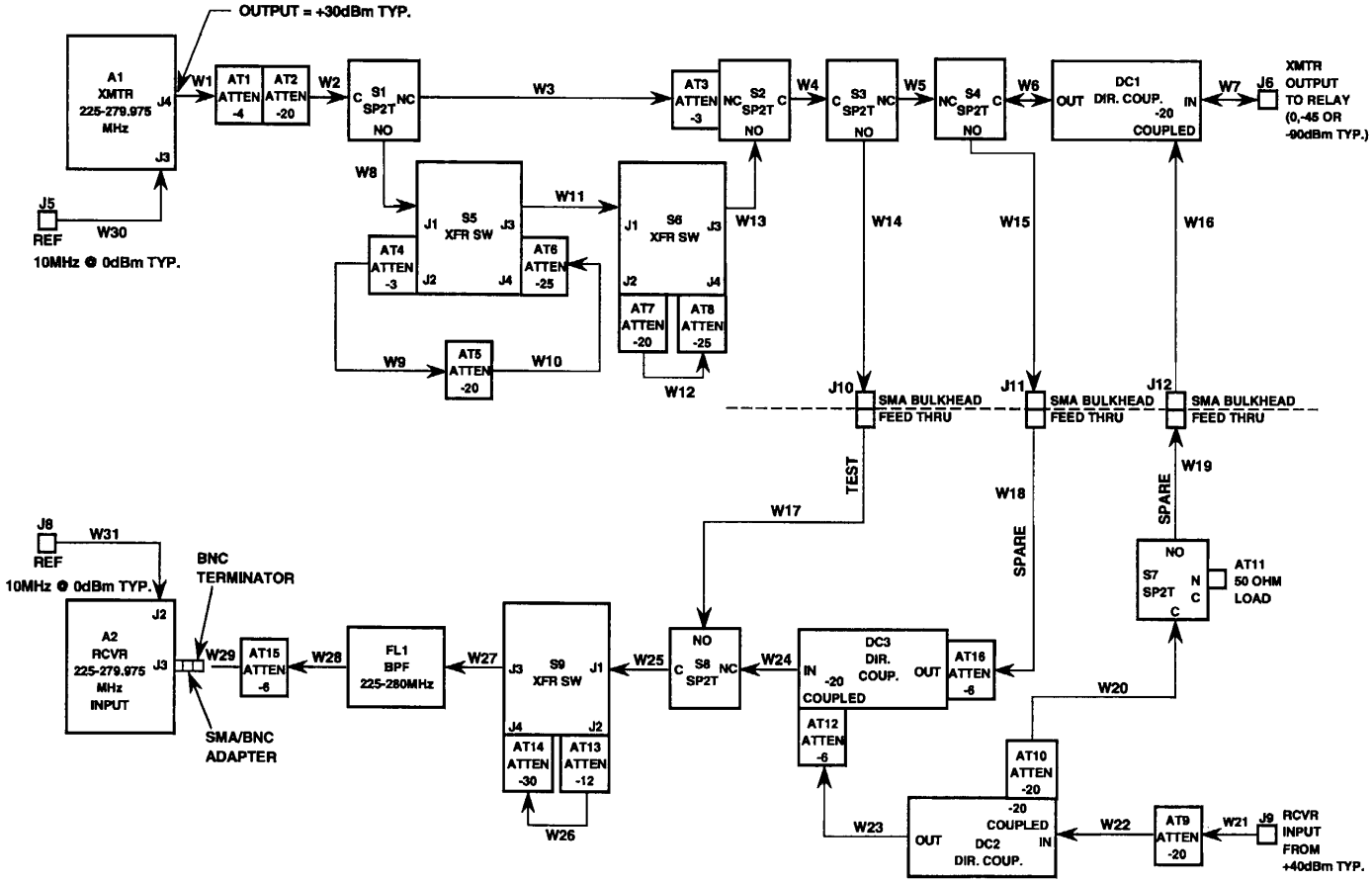


FIGURE 5-25. OQ-458/U RF FLOW DIAGRAM.

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

TABLE 5-5. RTTG, OQ-458/U RF FLOW TEST II.

CABLE TO DISCONNECT	DISCONNECT FROM	TEST POINT	EXPECTED SIGNAL	PROBABLE FAILURE	SECONDARY FAILURE
W2	AT2	AT2	1 to 9 dcm	AT1, AT2	-
W3	S1-NC	S1-NC	1 to 9 dBm	S1	-
W4	S2-C	SZ-C	-3 to +5 dBm	S2	AT3
W5	S3-NC	S3-NC	-3 to +5 dcm	53	-
W6	54-C	S4-C	-3 to +5 dBm	S4	-
W10	OQ-458/UJ6	OQ-458/UJ6	-5 to +4 dBm	DC1	-
W22	AT9	AT9	-25 to -16 dbm	AT9	-
W23	DC2-OUT	DC2-OUT	-25 to -16 dBm	DC2	-
W24	DC3-IN	DC3-IN	-52 to -42 dBm	DC3	AT12
W25	S8-C	S8-C	-53 to -42 dBm	58	-
W27	S9-J3	S9-J3	-53 to -43 dBm	S9	-
W28	FL1	FL1	-54 to -44 dam	FL1	-
W29	AT15	AT15	-60 to -50 dam	AT15	-

Item	Action	Normal Indication	Corrective Action
20.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed. **RRTS REMOTE MODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
21.	On TS-4398/U, check that the AC PWR LED is lit.	The LED is lit.	If the LED is not lit, refer to paragraph 5-6.1.2.
22.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.
23.	Set A2 ON/OFF to ON.	The Led FOR +28 (A2) is lit.	If the LED for +28 (AZ) is Not lit, remove and replace the LED. If the LED for +28 (A2) is not Lit after removing and replacing the LED, then check cables for proper connections. If the LED for 28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
24.	Select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
		RRTS LOCAL MODE **KEY-1 SYSTEM LOOP TEST CONFIGURATION** **KEY-2 ISOLATION TEST CONFIGURATION** **KEY-3 SELF TEST** **KEY-4 DEFAULTS MODIFICATION** **KEY-5 DS SUPPORT MAINTENANCE CONFIG.** **KEY-7 REMOTE MODE**	
25.	Set the spectrum analyzer center frequency to the first T-1573(V)2/AR default frequency.		
26.	Set the spectrum analyzer frequency span to 60 MHz.		
27.	On TS-4398/U, select SELF TEST by pressing "3" on the keypad.	The screen shown below is displayed.	If the screen shown below is displayed or is not readable, remove and replace TS-4398/U.
		RRTS SELF TEST CONFIGURATION **KEY-1 TEST CONTROLLER SELF TEST** **KEY-2 TEST CONTROLLER CABLE SELF TEST** **KEY-3 RX/TX TEST GROUP SELF TEST** **KEY-4 RX/TX TEST GROUP CABLE SELF TEST** **KEY-6 ABORT TEST IN PROGRESS** **KEY-7 REMOTE MODE**	
28.	Initiate RX/TX TEST GROUP CABLE SELF TEST by pressing 11"4" on the keypad.		

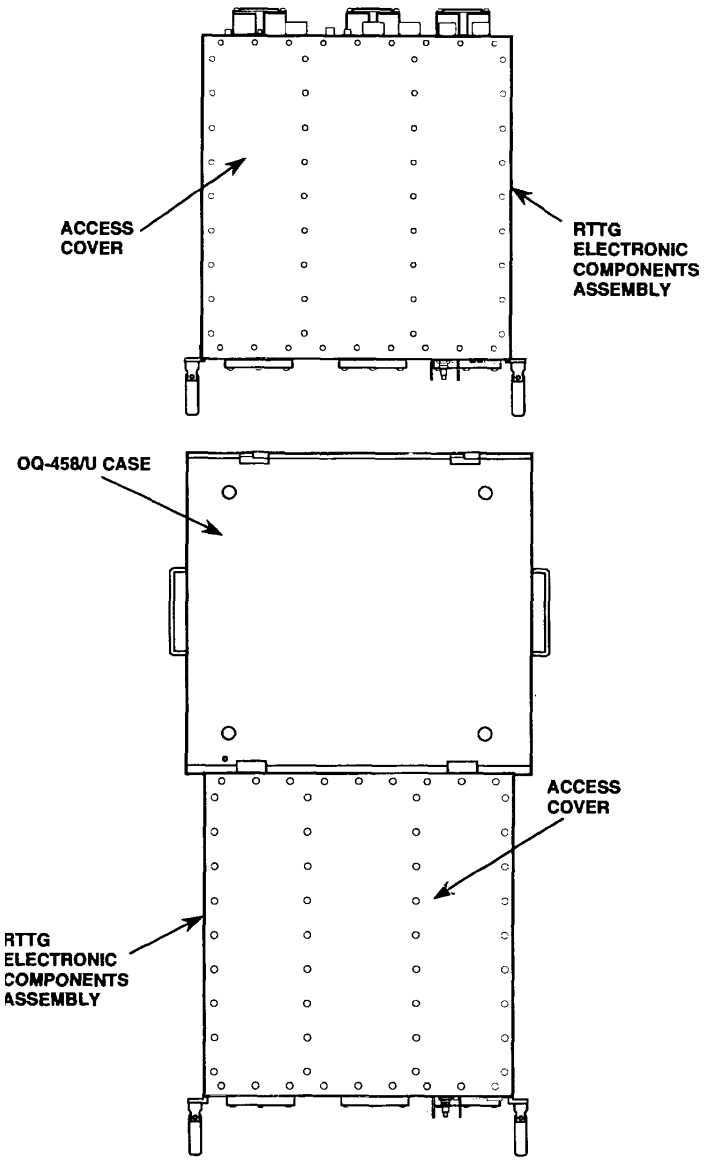
NOTE

The pass/fail and error notification messages on the TS-4398/U screen should be ignored.

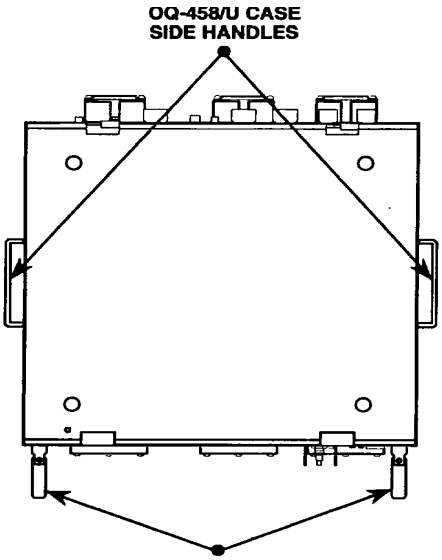
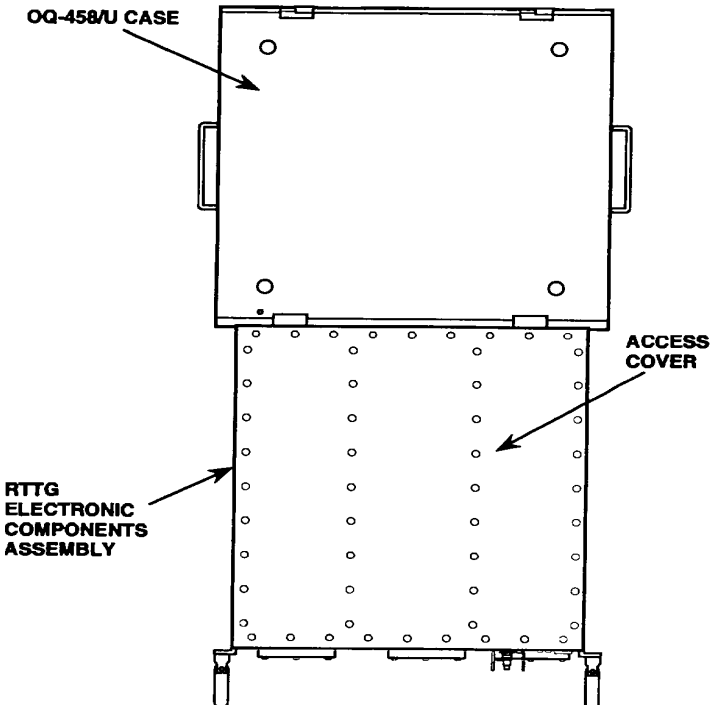
29.	Monitor the spectrum analyzer for the expected signal (see table 5-5).		
30.	Select the condition which applies and take the action.	If the signals are as expected, go to the next item.	If the expected signal is not correct at a test point until a desired signal is found, then suspect the next item (Probable Failure column).
31.	On TS-4398/U, set A2 ON/OFF to OFF.		

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

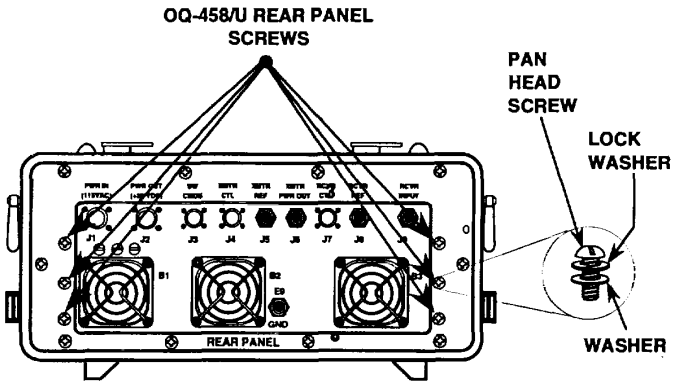
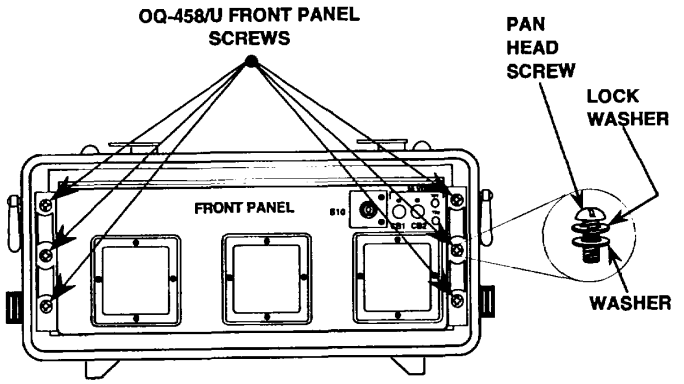
Item	Action	Normal Indication	Corrective Action
32.	Set A1 ON/OFF to OFF.		
33.	Turn off the spectrum analyzer.		
34.	Disconnect WiP1 from the prime power source. Disconnect WiP1 from J1 on TS-4398/U.		
35.	Disconnect W2P2 from J4 on OQ-458/U. Disconnect W2P3 from J7 on 00-458/U. Disconnect W2P1 from J2 on TS-4398/U.		
36.	Disconnect W3P2 from J5 on OQ-458/U. Disconnect U3P3 from J8 on 00-458/U. Disconnect W3P1 from J3 on TS-4398/U.		
37.	Disconnect W4P2 from J3 on WO-458/U. Disconnect W4P1 from J4 on TS-4398/U.		
38.	Disconnect W5P2 from J1 on WO-458/U. Disconnect W5P1 from J5 on TS-4398/U.		
39.	Disconnect W10OP2 from the adapter on the 00-458/U rear panel cover. Disconnect W10P1 from J9 on 00-458/U.		
40.	Disconnect W11P2 from the adapter on the 00-458/U rear panel cover. Disconnect W11P1 from J2 on 00-458/U.		
41.	Disconnect the ground wire from the spectrum analyzer and from the electrical equipment chassis assembly.		
42.	Place the access cover in position.		
43.	Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.		



5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
44.	While holding the handles on the side of the case, insert the RTTG, electronic components assembly.		
45.	Slide the RTTG, electronic components assembly firmly into the case.		

5-6.3.3 RTTG, OQ-458/U, RF Test (cont)

Item	Action	Normal Indication	Corrective Action
46.	Using a No. 2 Phillips screwdriver, install the six rear panel screws, flaqt washers, and lock washers.		
47.	Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.		

5-6.4 Radio Transmitter, T-1573(V)2/AR, Module Fault Isolation Test. This test is used to troubleshoot T-1573(V)2/AR to a replaceable module. To accomplish the T-1573(V)2/AR module fault isolation test, perform the following procedures.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Pulse Generator, HP8118A or equivalent
- Modulator Test Set, ME-505A/U or equivalent
- Oscilloscope, OS-291/G or equivalent
- Spectrum Analyzer, AN/USM-489(V)1 or equivalent
- Digital Multimeter, AN/GSM-64D or equivalent
- (2) 40 dB attenuator, (.1 to 400 MHz, 10 watt)
- Power divider, (1 watt, 225 - 280 MHz min)
- BNC terminator, (50 ohm, 1 watt, BNC terminator)
- SMA male to SMA male adapter
- BNC jack to SMA plug adapter
- (3) BNC plug to SMA plug adapter
- (5) Three foot long BNC male to BNC male cable
- (2) One foot long TNC plug to SMA plug cable
- 32 kHz trigger cable
- Signal Generator, SG1207/U or equivalent

Materials/Parts
- Silicone Compound Sealant

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment
- 5/16 in. Torque Wrench
- Torque Wrench Kit (#2 Phillips Screwdriver Bit)
- Antistatic DIP Remover

CONDITIONS

To troubleshoot T-1573(V)2/AR to a replaceable module, it must first be removed from RTTG, OQ-458/U (refer to paragraph 5-8). Ensure that power is off.

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

CAUTION

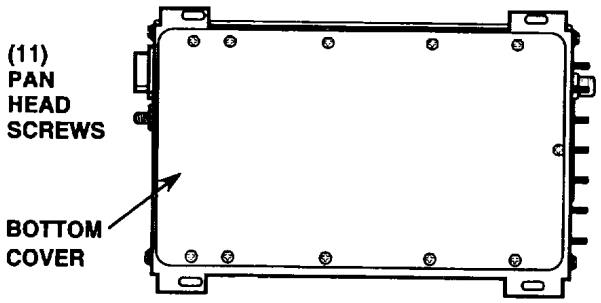
This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Torque screws to their required torque levels. Failure to do so may cause damage to the equipment.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the T-1573(V)2/AR module fault isolation test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figures 5-27 through 5-31. Figure 5-27 shows the T-1573(V)2/AR output test interconnections. Figure 5-28 shows the bandpass filter module output test interconnections. Figure 5-29 shows the voltage-controlled oscillator/phase-locked-loop (VCO/PLL) synthesizer module output test interconnections. Figure 5-30 shows the interface control module output test interconnections. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-26.

Item	Action	Normal Indication	Corrective Action
1.	Before operating AN/URN-214, perform the AN/URM-214 assembly and preparation for use and self-test procedures. Leave cables W1 through W5 connected after performing these procedures.		
2.	Ensure that all switches are in the "OFF" position.		
3.	Using a No. 1 Phillips screwdriver, remove the 11 screws and flat washers along the edges of the bottom cover of the T-1573(V)2/AR.		

5-6.4 T-1573 (V)2/AR Module Fault Isolation Test (cont)

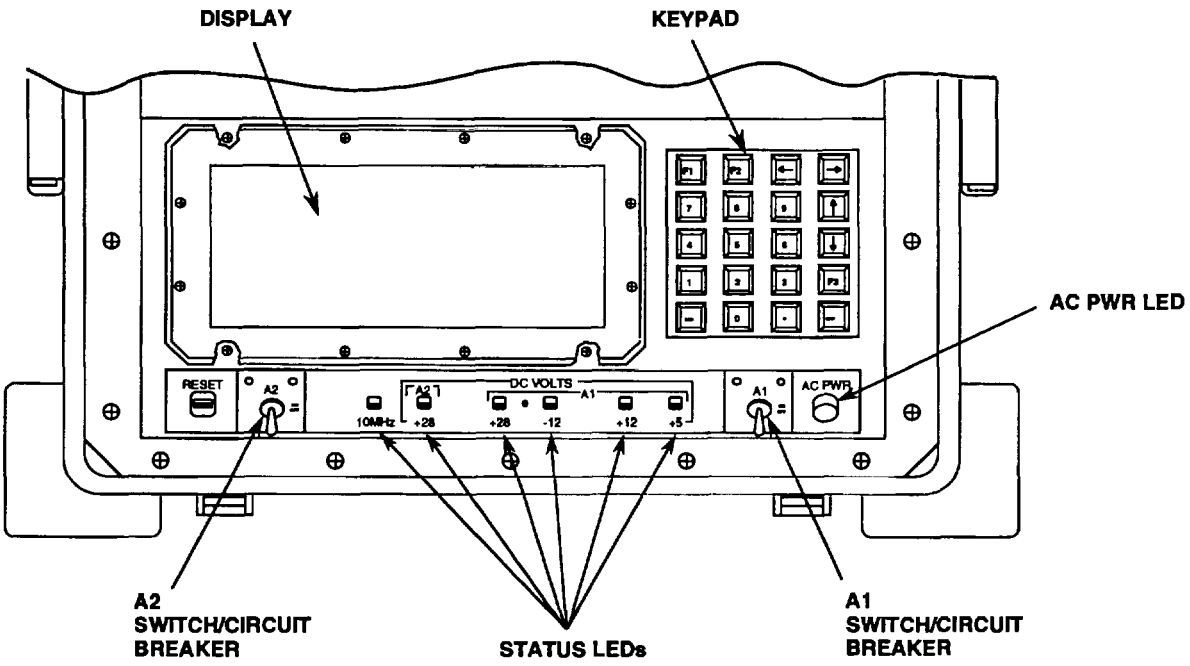
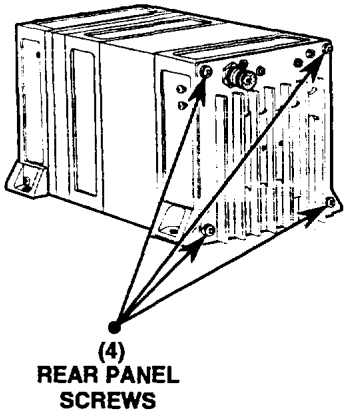
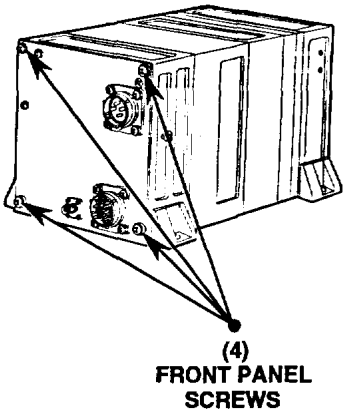


FIGURE 5-26. TS-4398/U CONTROLS AND INDICATORS..

Item	Action	Normal Indication	Corrective Action
4.	Using a No. 2 Phillips screwdriver, slightly Loosen the four front panel screws and the four rear panel screws to free the bottom cover.		
5.	Remove the bottom cover and inspect cables for damage. If cables are suspected malfunctioning, remove and test continuity using procedures found in General Shop Practice Manual TO 00-25-234/TM 43-0158.		
6.	Using a torque wrench with a No. 2 Phillips screwdriver bit, torque the eight front and rear panel screws to 12 + 2 in. Lb.		
7.	Connect W12P2 to J1 on T-1573(V)2/AR. Connect W12P1 to J2 on OQ-458/U to provide 28 Vdc from AN/URM-214.		

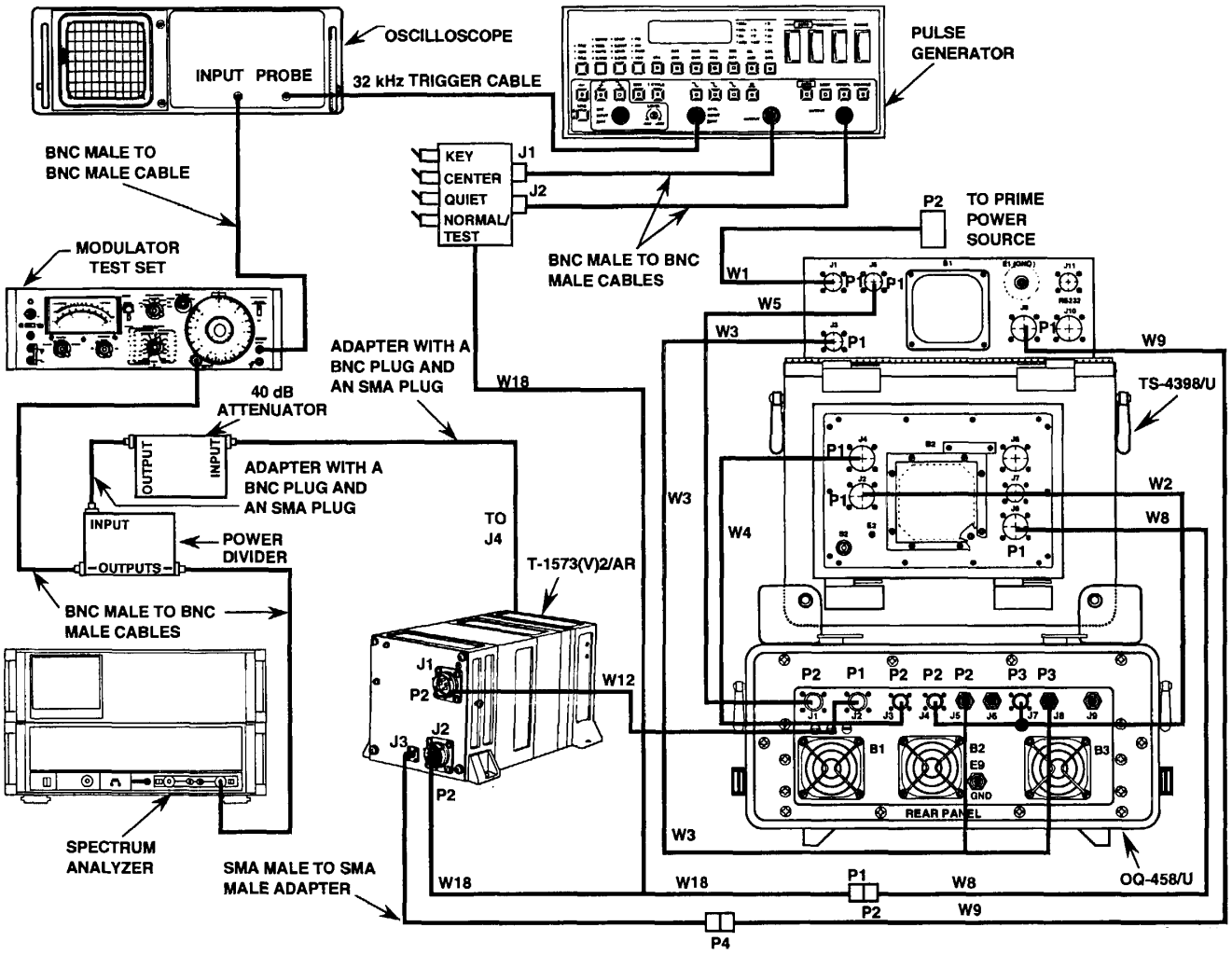


FIGURE 5-27. T-1573 (V)2/AR OUTPUT TEST INTERCONNECTIONS.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
8.	Connect W9P4 to J3 of T-1573(V)2/AR.		
9.	Connect W9P1 to J9 on TS-4398/U to provide a 10 MHz, 0 dBm + 3 dB reference signal from AN/URN-214.		
10.	Connect W18P2 to J2 on T-1573(V)2/AR. Connect W18P1 to W8P2.		
11.	Connect W8P1 to J8 on TS-4398/U to provide tuning and output connections with AN/URM-214.		
12.	Connect a cable from output 1 of the pulse generator to U18J1.		
13.	Connect a cable from output 2 of the pulse generator to W18J2.		
14.	Connect a cable from J4 of T-1573(V)2/AR to a 40 dB attenuator.		
15.	Connect the attenuator to the input of the power divider.		
16.	Connect a cable from an output of the power divider to the input of the spectrum analyzer.		
17.	Connect a cable from an output of the power divider to the input of the modulator test set.		
18.	Connect a cable from the audio/LF/detected output of the modulator test set to the channel 1 input of the oscilloscope.		
19.	Connect the 32 kHz trigger cable between the pulse generator and the channel 2 input of the oscilloscope.		
20.	Turn on the oscilloscope.		
21.	Turn on the spectrum analyzer.		
22.	Turn on the modulator test set.		
23.	Turn on the pulse generator.		

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
24.	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed. **RRTS REMOTE MODE** **KEY-6 LOCAL MODE**	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
25.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not lit, refer to paragraph
26.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.
27.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (A2) is not Lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
28.	Set the spectrum analyzer frequency span to cover 200 MHz to 300 MHz (100 MHz span) and reference level to 0 dBm.		
29.	Set the spectrum analyzer to a 250 NHz center frequency.		
30.	Set the modulator test set to 250 NHz, RF input, FM modulation, and 15 kHz low pass filter.		

NOTE

If your modulation test set has a gain control, perform item 31. If not, go to item 32.

If your modulation test set is manually tuneable, you may need to use a signal generator to inject a signal to verify that the modulation test set is tuned properly.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
31.	Using a signal generator, calibrate the modulation test set by injecting an FM modulated/250 MHz carrier such that the output of the modulation test set indicates 10 kHz and the oscilloscope displays 1.6 Vpp.		
	NOTE If your modulation test set does not provide enough gain to achieve a 1.6 Vpp signal, set the gain to the maximum value.		
32.	Set the oscilloscope audio input for 200 mv/division on a 10 μsec setting, Trigger Channel 2.		
33.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed. RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
	NOTE To enter default values, refer to paragraph 2-6.17, Default Modifications.		
34.	Ensure the following values are entered as defaults. RX and TX frequencies: 225.000 259.000 260.000 278.000 278.000 Assigned Slot No: 1 Loop Count: 0001 TX Node: NORMAL		

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
35	Select DS SUPPORT MAINTENANCE CONFIG. by pressing 1"5"1 on the keypad. paragraph 5-6.1.1.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to

DIRECT SUPPORT MAINTENANCE CONFIG.

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME

CAUTION

Do not leave “KEY” position on W18 ON for more than 1 minute or damage to unit may occur.

36. Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.

37. Select TUNE TRANSMITTER by pressing "Z" on the keypad.

38. Tune T-1573(V)2/AR to 250.000 MHz.

39. Position the switches on W18 to modulate by setting CENTER to OFF, QUIET to ON, NORM/TEST to TEST, and KEY to OFF.

40. Set the pulse generator to provide a 16384 bit length pseudo- random-binary sequence on both outputs and 32 kHz clock internal.

a. Timing
Period 32as 32 kHz clock
Channel 1 = Channel 2
Delay Range: 9.99 #sec
Width: 31 µsec
Transition: Fixed
Strobe:
Delay: 15 #sec
Width: 10 µsec

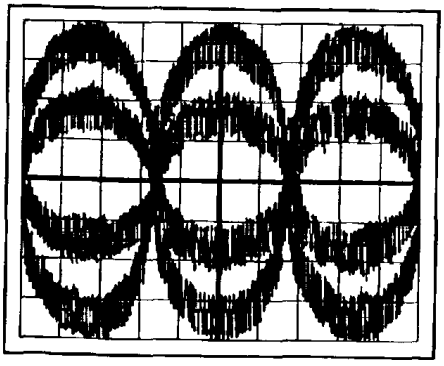
b. Output
Channel 1 = Channel 2
State: ON
Polarity: Normal
Addition: OFF
High Level: +2.00 V
Low Level: 0.00 V
Limit: ON
Data Format: RZ
Strobe
Mode Bit

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
40.	cont'd c. Data Frame Mode: Bit No. of bits: 16384 Break Mode: OFF d. Data Entry Display: both channels (to randomize) [SH I FT] [MODIFY] RANDOMIZE BOTH CHANNELS from digits O thru 16383 (EXECUTE) e. CNTRL Trigger Mode: Auto Mode Threshold: 2.4V External Clock State: OFF f. Press START	Cycling Mode Auto Data Format Channel 1: RZ Channel 2: RZ Base: Bin Control State: ON Delay Cycling Mode: Auto	
41.	Set the oscilloscope to trigger on a 32 kHz clock.		

CAUTION

Do not leave “KEY” position on W18 ON for more than 1 minute or damage to unit may occur.

42.	Position the switches on W18 to key by setting KEY to ON.		
43.	Monitor the spectrum analyzer for 250 MHz + 100 kHz, -3 dBm, ± 5 dB.		
44.	Monitor the oscilloscope for a four-level tone (eye pattern).		NOTE A WAVEFORM SIMILAR IN SHAPE WILL APPEAR ON THE SCREEN
45.	Record the results from items 43 and 44.		
46.	Position the switch on W18 to unkey the transmitter by setting KEY to OFF.		

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
47.	Select the condition which applies and take the action.	The T-1573(V)2/AR output is correct. Go to the next item.	If there is no T-1573(V)2/AR output, perform the power converter module test (refer to paragraph If there is no T-1573(V)2/AR output and the power converter test was successful, record results and go to the next item. If the T-1573(V)2/AR output is not correct, record results and go to the next item.
48.	On TS-4398/U, set A2 ON/OFF to OFF.		
49.	Disconnect the adapter from the input of the power divider and connect it to a BNC terminator (see figures 5-27 and 5-28).		
50.	Connect an adapter to the input of the power divider and to the other 40 dB attenuator output (see figure 5-28).		
51.	Connect an adapter from the 40 dB attenuator input to W17P2.		
52.	On T-1573(V)2/AR disconnect cable W7 from A4J6.		
53.	Connect W17P1 to T-1573(V)2/AR at A4J6.		
54.	On TS-4398/U, press "7" until RRTS REMOTE MODE screen is displayed.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to

RRTS REMOTE MODE

KEY-6 LOCAL MODE

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

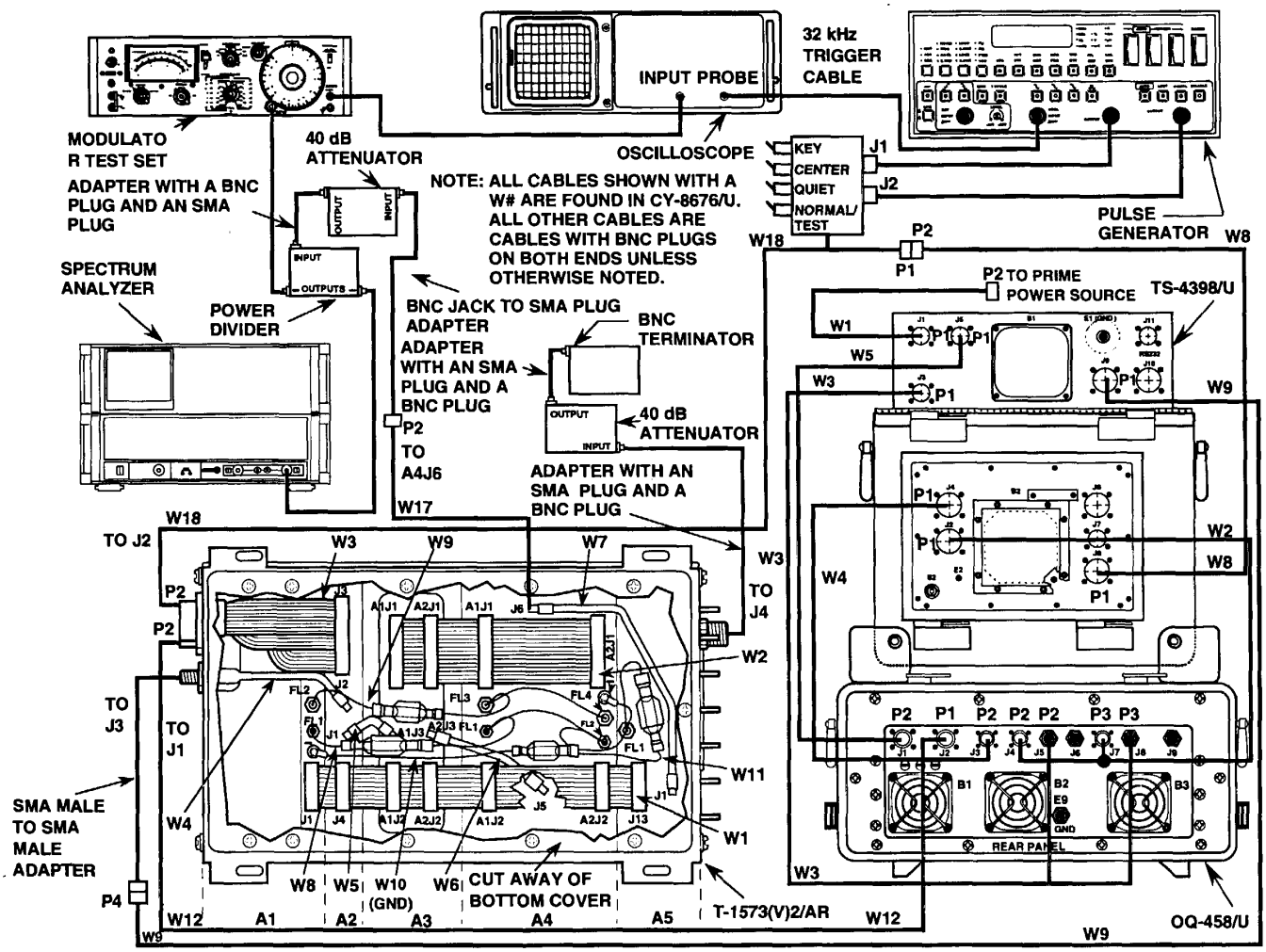


Figure 5-28. T-1573 (V)2/AR BANDPASS FILTER OUTPUT TEST INTERCONNECTIONS.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
55.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is Lit.	If the LED for +28 (AZ) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not Lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
56.	Set the spectrum analyzer to a 250 MHz center frequency.		
57.	Set the spectrum analyzer frequency span to 60 MHz.		
58.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed. RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
59.	On TS-4398/U, select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed. DIRECT SUPPORT MAINTENANCE CONFIG. KEY-1 SWEEP TUNE TRANSMITTER KEY-2 TUNE TRANSMITTER KEY-3 TUNE RECEIVER KEY-4 SDT TEST FIXTURE CONFIGURATION KEY-6 ABORT TEST IN PROGRESS KEY-7 HONE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
60.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
61.	Select SWEEP TUNE TRANSMITTER by pressing "1" on the keypad.		

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
62.	Position the switches on W18 to display output by setting CENTER to ON, QUIET to ON, NORM/TEST to TEST, and KEY to OFF.		If power Level is not within tolerance, note for Later use (see item 99).
63.	Monitor the spectrum analyzer for -13 dBm, ± 5 dB until the sweep two test is complete; "TRANSMIT SWEEPTEST COMPLETE" appears on the screen of the test controller.		
64.	Record the results.		
65.	On TS-4398/U, set A2 ON/OFF to OFF.		
66.	Disconnect W17P1 from T-1573(V)2/AR at A4J6.		
67.	Reconnect W7 to A4J6 (see figure 5-29).		
68.	On T-1573(V)2/AR, disconnect cable W6 from A3A2J3.		
69.	Connect W17P1 to T-1573(V)2/AR at A3A2J3.		
70.	On TS-4398/U, press "7" until RRTS REMOTE MODE screen is displayed. paragraph 5-6.1.1.	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL NODE	If the screen shown below is not displayed or is not readable, refer to
71.	Set A2 ON/OFF to ON. for proper connections.	The LED for +28 (A2) is lit.	If the LED for +28 (A2) is not lit, then check cables If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the 00-458/U power supply test (refer to paragraph 5-6.3.1).
72	Set the oscilloscope audio input for 200 mv/division on a 10 μsec setting.		

5-6.4 T-1573 (V) 2/AR Module Fault Isolation Test (cont)

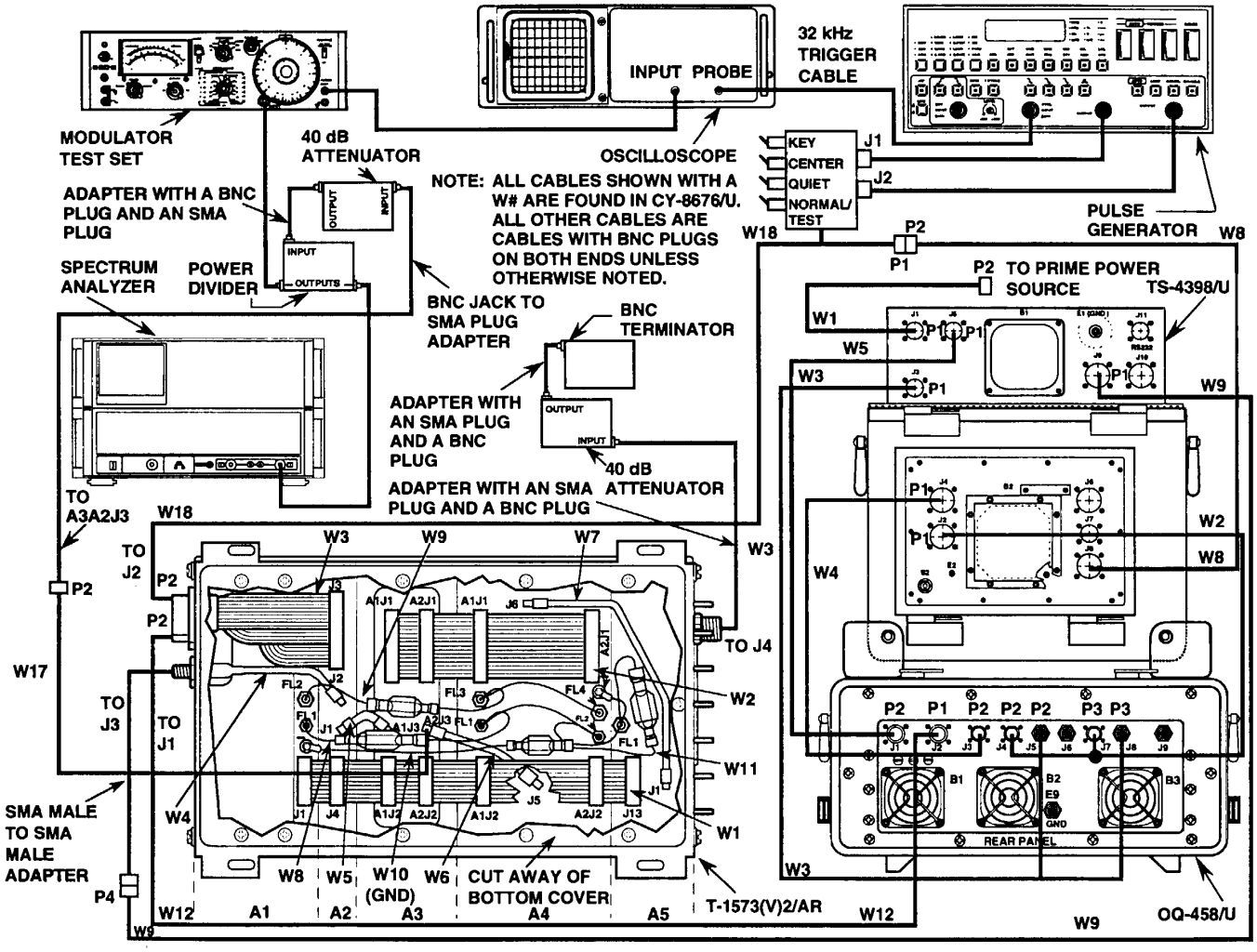


FIGURE 5-29. T-1573 (V) 2/AR VCO/PLL SYTHESIZER OUT PUT TEST INTERCONNECTIONS.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

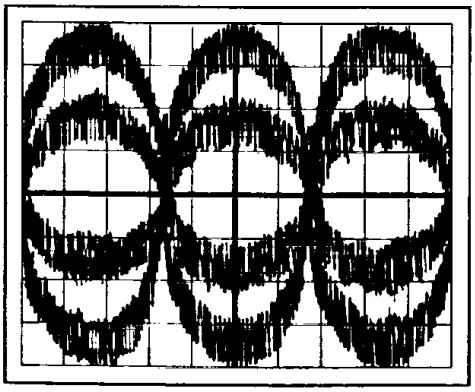
Item	Action	Normal Indication	Corrective Action
73.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed. RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
74.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed. DIRECT SUPPORT MAINTENANCE CONFIG. KEY-1 SWEEP TUNE TRANSMITTER KEY-2 TUNE TRANSMITTER KEY-3 TUNE RECEIVER KEY-4 SDT TEST FIXTURE CONFIGURATION KEY-6 ABORT TEST IN PROGRESS KEY-7 HOME	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
75.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to TEST, and KEY to OFF.		
76.	Select TUNE TRANSMITTER by pressing "2" on the keypad.		
77	Tune T-1573(V)2/AR to 250.000 MHz.		

CAUTION

Do not leave “KEY” position on W18 ON for more than 1 minute or damage to unit may occur.

78.	Position the switches on W18 to modulate by setting CENTER to OFF, QUIET to ON, NORM/TEST to TEST, and KEY to ON.		
79.	Monitor the spectrum analyzer for 250 MHz ± 100 kHz, -10 dBm, + 5 dB.		If power level is not within tolerance, note for later use (see item 99).

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
80.	Monitor the oscilloscope for a four-level tone (eye pattern).	 FOUR LEVEL TONE EYE PATTERN	NOTE: A WAVEFORM SIMILAR IN SHAPE WILL APPEAR ON THE SCREEN
81.	Record the results from items 79 and 80.		
82.	On TS-4398/U, set AZ ON/OFF to OFF.		
83.	Disconnect W17P1 from A3AZJ3.		
84.	Reconnect cable U6 to A3A2J3 (see figure 5-30).		
85.	On T-1573(V)2/AR, disconnect cable U5 from A2J1.		
86.	Connect W17P1 to T-1573(V)2/AR at A2J1.		
87.	On TS-4398/U, press "7" on the keypad until RRTS REMOTE MODE screen is displayed.	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
88.	Set A2 ONIOFF to ON.	The LED for +28 (AZ) is lit.	If the LED for +28 (A2) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
89.	Set the spectrum analyzer to a 100 kHz center frequency.		

5-6.4 T-1573 (V) 2/AR Module Fault Isolation Test (cont)

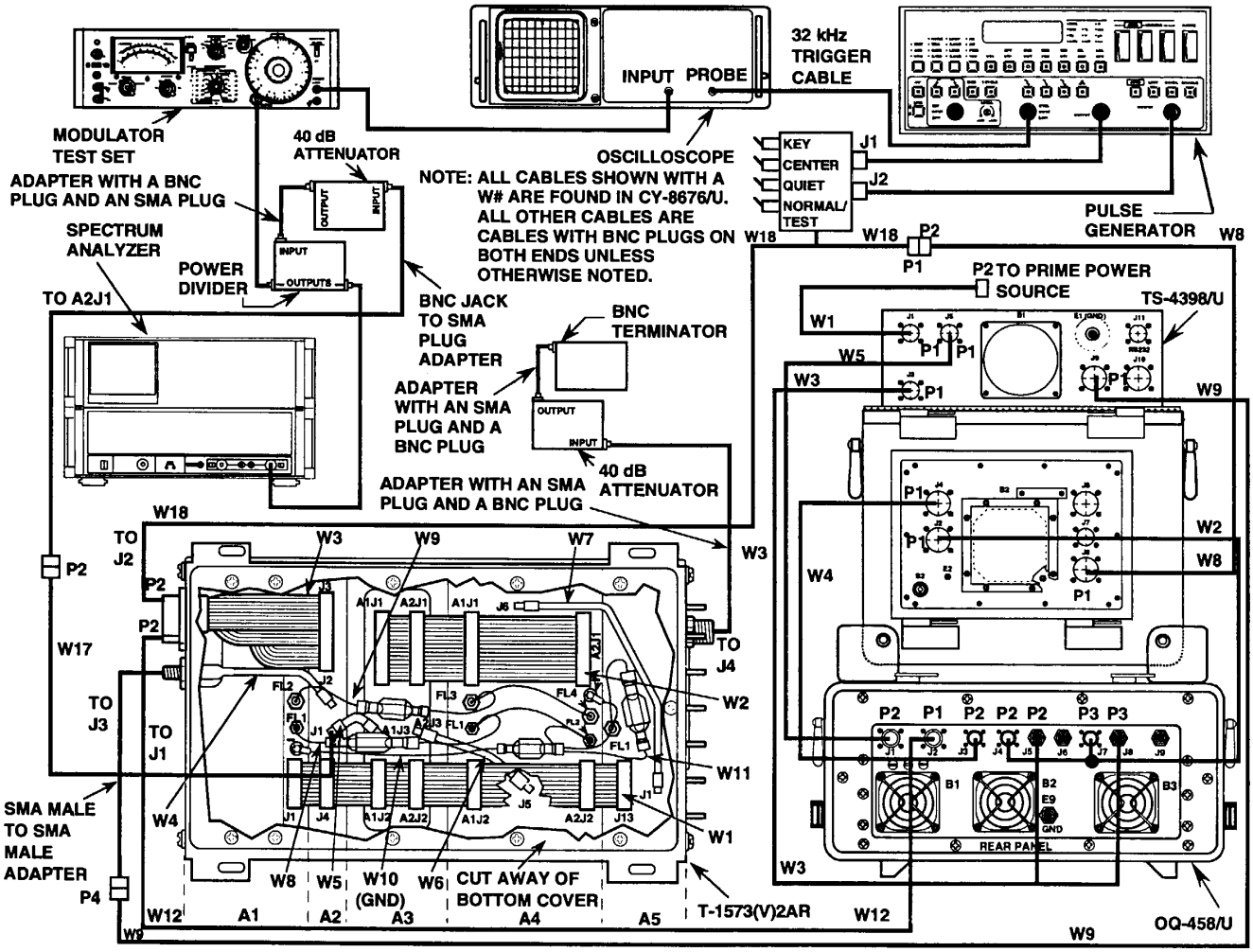


FIGURE 5-30. T-1573 (V) 2/AR INTERFACE CONTROL OUTPUT TEST INTERCONNECTIONS.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
90.	Set the spectrum analyzer frequency span to 60 kHz, reference level to -20 dBm.		
91.	Set the oscilloscope audio input for 2v/division on a 20 µsec setting.		
92.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed. RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
93.	On TS-4398/U, select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed. DIRECT SUPPORT MAINTENANCE CONFIG. KEY-1 SWEEP TUNE TRANSMITTER KEY-2 TUNE TRANSMITTER ~ KEY-3 TUNE RECEIVER KEY-4 SDT TEST FIXTURE CONFIGURATION KEY-6 ABORT TEST IN PROGRESS KEY-7 HOME	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
94.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
95.	Select TUNE TRANSMITTER by pressing "2" on the keypad.		
96.	Tune T-1573(V)2/AR to 250.000 MHz.		
97.	Monitor the spectrum analyzer for a 100 kHz + 1 kHz signal at -30 dBm $\pm$ 6 dB.		
98.	Record the results.		

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
99.	Select the condition which applies and take the action.	ALL T-1573(V)2/AR outputs are correct. Go 'o the next item.	If there is incorrect output at A2J1 from the interface control module assembly, at A3A2J3 from the VCO/PLL synthesizer module assembly, at A4J6 from the bandpass filter module assembly, and at J4 from the power amplifier module assembly, perform the interface control test (refer to paragraph 5-6.4.2). If there is incorrect output at A4J6 from the bandpass filter module assembly, and incorrect output at J4 from the power amplifier module assembly, but correct output at all other test points, perform the bandpass filter test (refer to paragraph 5-6.4.4). If there is incorrect output at A3A2J3 from the VCO/PLL synthesizer module assembly, at A4J6 from the bandpass filter module assembly, and at J4 from the power amplifier module assembly, but correct output at all other test points, perform the VCO/PLL test (refer to paragraph 5-6.4.3). If there is incorrect output at J4 from the power amplifier module assembly, but correct output at all other test points, perform the power amplifier test (refer to paragraph 5-6.4.5).
100.	Turn off the oscilloscope.		
101.	Turn off the spectrum analyzer.		
102.	Turn off the modulator test set.		
103.	Turn off the pulse generator.		
104.	On TS-4398/U, set A2 ON/OFF to OFF.		
105.	Disconnect W18P2 from J2 on T-1573(V)2/AR. Disconnect W18P1 from W8P2.		

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
106.	Disconnect the adapter from J4 on T-1573(V)2/AR.		
107.	Disconnect W17P1 from A2J1.		
108.	On T-1573(V)2/AR, reconnect W5 to AZJ1.		
109.	Connect W2Z1P2 to J2 on T-1573(V)Z/AR. Connect W21P1 to W8P2. (See figure 5-31.)		
110.	Connect W11P2 to J4 on T-1573(V)2/AR. Connect W11P1 to J9 of OQ-458/U to provide RF data to AN/URN-214.		
111.	Press "7" until the RRTS LOCAL MODE screen is displayed.	The screen shown below is displayed. RRTS LOCAL NODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
112.	Set AZ ON/OFF to ON.	The LED for +28 (AZ) is lit.	If the LED for +28 (AZ) is not lit, then check cables for proper connections. If the LED for +28 (AZ) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).

NOTE

To enter default values, refer to paragraph 2-6.17, Default Modifications.

113.	Ensure the following values are entered as defaults. RX and TX frequencies: 225.000 259.000 260.000 278.000 278.000 Assigned Slot No: 1 Loop Count: 0001 TX Mode: NORMAL		

5-6.4 T-1573 (V) 2/AR Module Fault Isolation Test (cont)

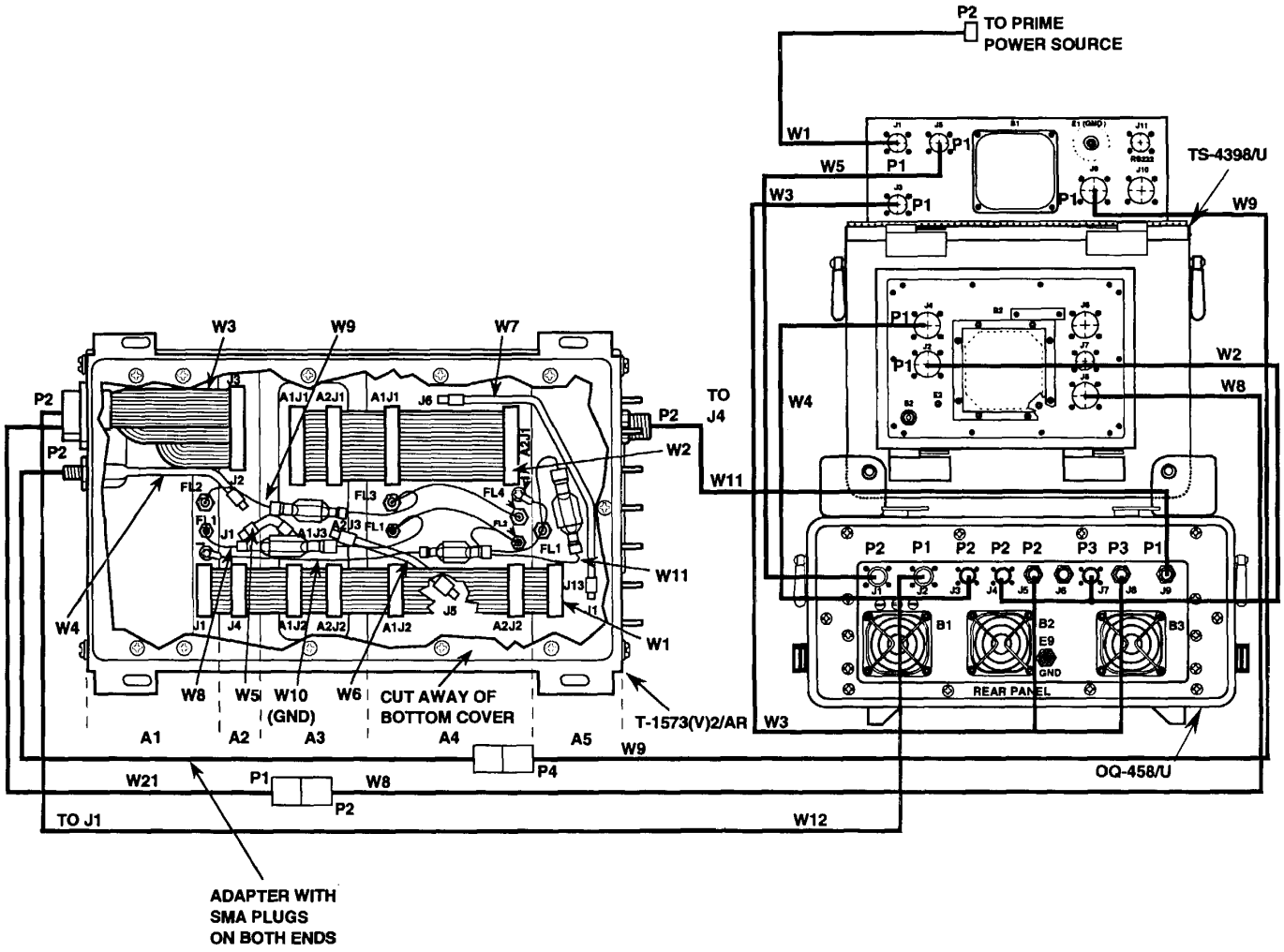


FIGURE 5-31. T-1573 (V) 2/AR ISOLATION TEST INTERCONNECTIONS.

5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
114.	Select ISOLATION TEST CONFIGURATION by pressing 11"2" on the keypad.	The screen shown below is displayed. ISOLATION TEST CONFIGURATION KEY-1 SDT ISOLATION TEST KEY-2 RECEIVER ISOLATION TEST KEY-3 TRANSMITTER ISOLATION TEST KEY-4 SDT/RX/TX ISOLATION TEST KEY-6 ABORT TEST IN PROGRESS KEY-7 HOME	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
115.	Initiate TRANSMITTER ISOLATION TEST by pressing "3" on the keypad.		
116.	Select the condition which applies and take the action.	The TRANSMITTER ISOLATION TEST passed. T-1573(V)Z/AR is serviceable. Go to the next item.	If the TRANSMITTER ISOLATION TEST failed, reperform the T-1573(V)2/AR Module Fault Isolation Test (refer to paragraph 5-6.4). If the TRANSMITTER ISOLATION TEST continues to fail replace T-1573(V)2/AR.
117.	On TS-4398/U, set AZ ON/OFF to OFF.		
118.	On TS-4398/U, set Al ON/OFF to OFF.		
119.	Disconnect W12P2 from J1 on T-1573(V)Z/AR. Disconnect W1ZP1 from J2 on OQ-458/U.		
120.	Disconnect W21P2 from J2 on T-1573(V)Z/AR. Disconnect W21P1 from WSP2.		
121.	Disconnect the adapter from J3 on T-1573(V)2/AR and from WP4.		
122.	Disconnect W11PZ from J4 on T-1573(V)Z/AR. Disconnect W11P1 from J9 on OQ-458/U.		

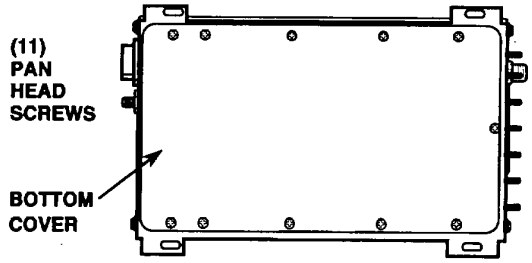
5-6.4 T-1573(V)2/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action

NOTE

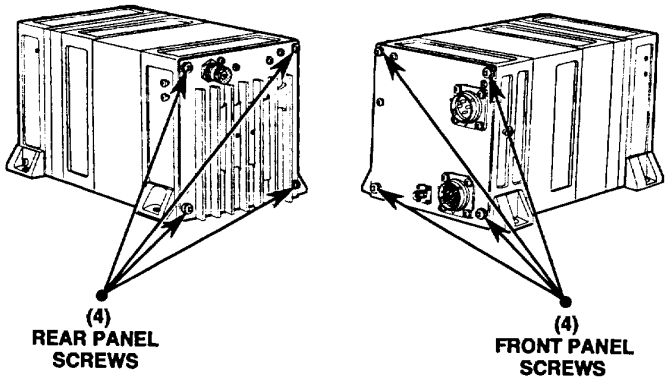
It may be necessary to use a No. 2 Phillips screwdriver to slightly loosen the four front panel screws and four rear panel screws in order to install the bottom cover.

123. Position the bottom cover in piece.



124. Using a torque wrench with a No. 2 Phillips screwdriver bit, torque the four front panel screws and the four rear panel screws to 12 + 2 in. lb.

125. Secure the bottom cover by using a No. 1 Phillips screwdriver to install the 11 screws and flat washers along the edges of the bottom cover.



5-6.4.1 Power Converter Module Test. To accomplish the power converter module test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)l or equivalent
- Oscilloscope, OS-291/G (with probe cable)
- 40 dB attenuator (.1 to 400 MHz, 10 watt)
- BNC terminator, (50 ohm, 1 watt)
- SMA male to SMA male adapter
- (3) BNC plug to SMA plug adapter
- (5) Three foot long BNC male to BNC male cable
- One foot long TNC plug to SMA plug cable

Materials/Parts
- Silicone Compound Sealant

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment
- 5/16 in. Torque Wrench
- Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS

Radio Transmitter, T-1573(V)2/AR, is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

5-6.4.1 Power Converter Module Test (cont)

NOTE

All cables used during the power converter module test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figures 5-33 through 5-35. Figure 5-33 shows the power converter module test interconnections. Figure 5-34 shows the power converter module AlA2FL1 test interconnections. Figure 5-35 shows the power converter module A1A2FL2 test interconnections. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-32.

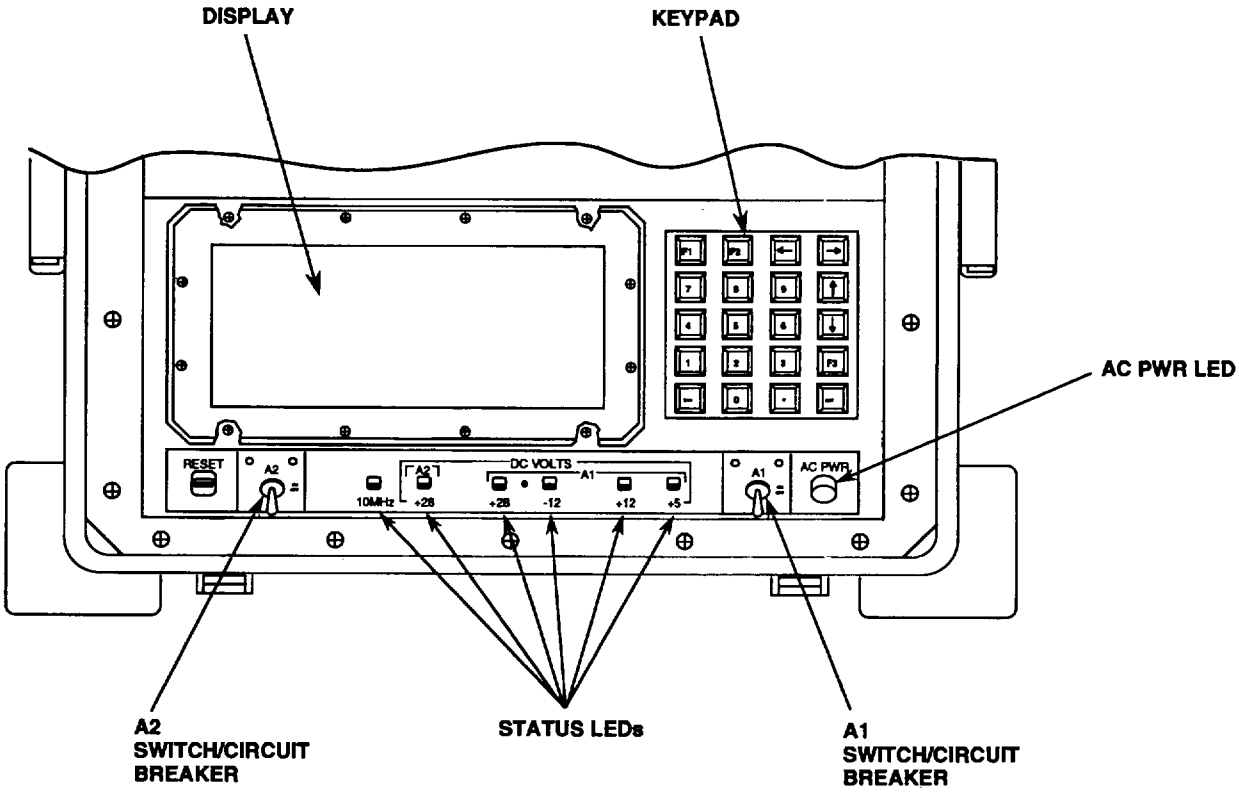


FIGURE 5-32. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action

Power Converter Module Test.

1. Ensure that all switches are in the "OFF" position.

5-6.4.1 Power Converter Module Test (cont)

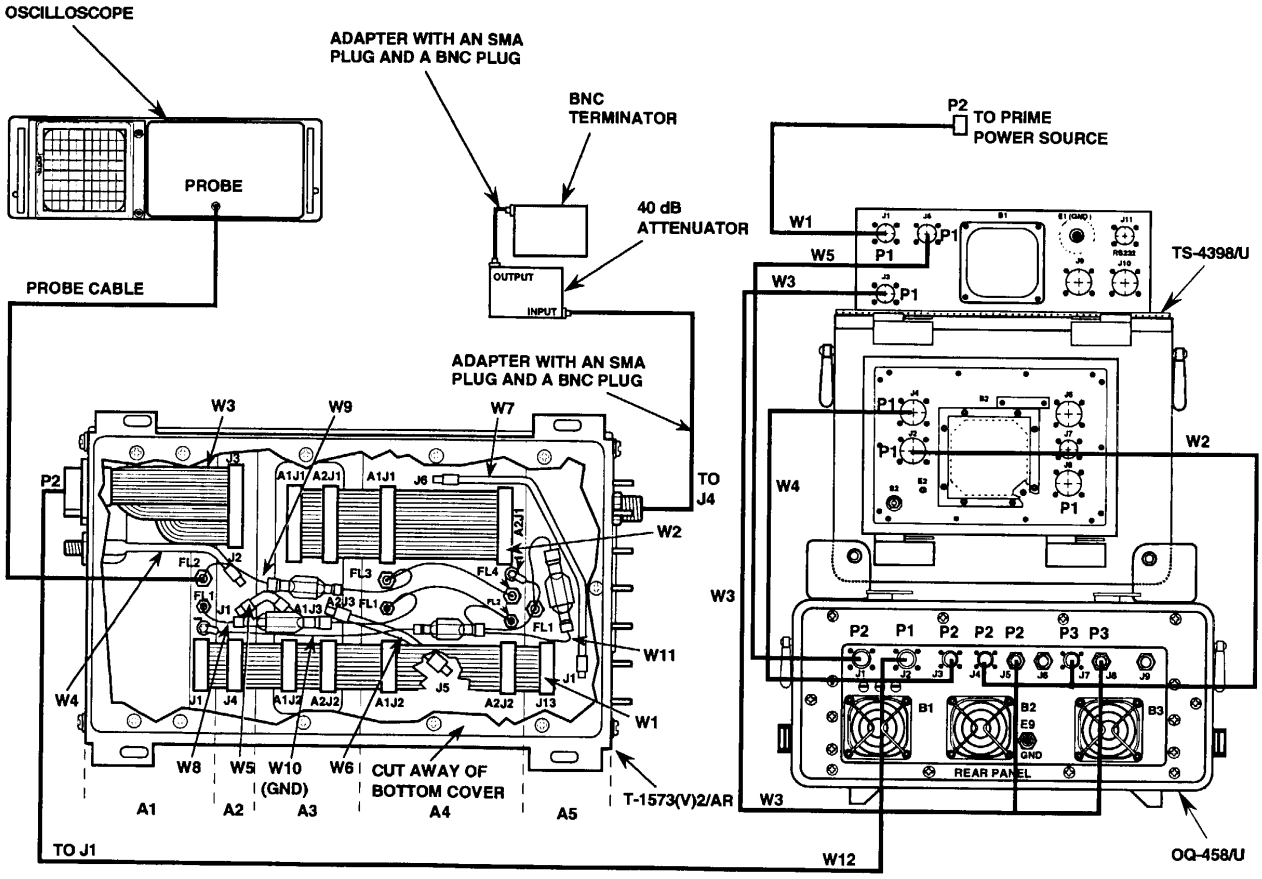


FIGURE 5-33. T-1573 (V) 2/AR POWER CONVERTER MODULE TEST INTERCONNECTIONS.

5-6.4.1 Power Converter Module Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Disconnect W18P2 from J2 on T-1573(V)2/AR.		
3.	Disconnect the adapter from J3 on T-1573(V)2/AR and from W9P4.		
4.	Connect a cable from J4 on T-1573(V)2/AR to the input of the 40 dB attenuator.		
5.	Connect an adapter from the 40 dB attenuator output to the input of the BNC terminator.		
6.	Connect a probe cable to the oscilloscope.		
7.	Ground the probe to T-1573(V)2/AR.		
8.	Turn on the oscilloscope.		
9.	On TS-4398/U, set Al ON/OFF to ON .	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL MODE	If the screen shown below is not displayed or is not paragraph 5-6.1.1.
10.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not Lit, refer to paragraph
11.	Monitor the status LEDs.	All LEDs should be Lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.
12.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is Lit.	If the LED for +28 (AZ) is not Lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
13.	Set the oscilloscope to measure dc voltage.		

5-6.4.1 Power Converter Module Test (cont)

Item	Action	Normal Indication	Corrective Action
	NOTE Without removing the W1 A5J13 connector, probe the pins listed in the following items. These pins are accessible via the top of the W1 A5J13 connector. The location of pins 1, 2, 9, and 10 are marked on the A5 module. The first row includes pins 1, 3, 5, 7, and 9. The second row includes pins 2, 4, 6, 8, and 10.		
14.	Probe pin 9 of cable W1 at connector A5J13.	The oscilloscope trace is +13.5 Vdc to +19 Vdc.	If the oscilloscope trace is not +13.5 Vdc to 19 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
15.	Probe pin 4 of cable WI at connector A5J13.	The oscilloscope trace is -13.5 Vdc to -19 Vdc.	If the oscilloscope trace is not -13.5 Vdc to -19 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
16.	Probe pin 5 of cable WI at connector A5J13.	The oscilloscope trace is +7 Vdc to +11 Vdc.	If the oscilloscope trace is not +7 Vdc to +11 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
17.	Probe pin 6 of cable W1 at connector A5J13.	The oscilloscope trace is +7 Vdc to +11 Vdc.	If the oscilloscope trace is not +7 Vdc to +11 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
18.	Probe pin 7 of cable W1 at connector A5J13.	The oscilloscope trace is +26 Vdc to +33 Vdc.	If the oscilloscope trace is not +26 Vdc to +33 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).

5-6.4.1 Power Converter Module Test (cont)

Item	Action	Normal Indication	Corrective Action
19.	Probe pin 8 of cable W1 at connector A5J13.	The oscilloscope trace is +26 Vdc to +33 Vdc.	If the oscilloscope trace is not +26 Vdc to +33 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
20.	Probe pin 1 of cable WI at connector A5J13.	The oscilloscope trace is 0 Vdc.	If the oscilloscope trace is not 0 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
21.	Probe pin 10 of cable W1 at connector A5J13.	The oscilloscope trace is 0 Vdc.	If the oscilloscope trace is not 0 Vdc, remove and converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
22.	On TS-4398/U, set A2 ON/OFF to OFF.		

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

23.	Remove sufficient potting from A1A2FL2 connection to attach a probe.		
24.	Attach a probe from the oscilloscope to A1A2FL2 (see figure 5-34).		
25.	On TS-4398/U, set A2 ON/OFF to ON.	The oscilloscope reads +270 Vdc to +330 Vdc.	If the oscilloscope does not read +270 Vdc to +330 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8).
26.	On TS-4398/U, set A2 ON/OFF to OFF.		
27.	Remove the probe from A1A2FL2.		
28.	Remove sufficient potting from A1A2FL1 connection to attach a probe.		

5-6.4.1 Power Converter Module Test (cont)

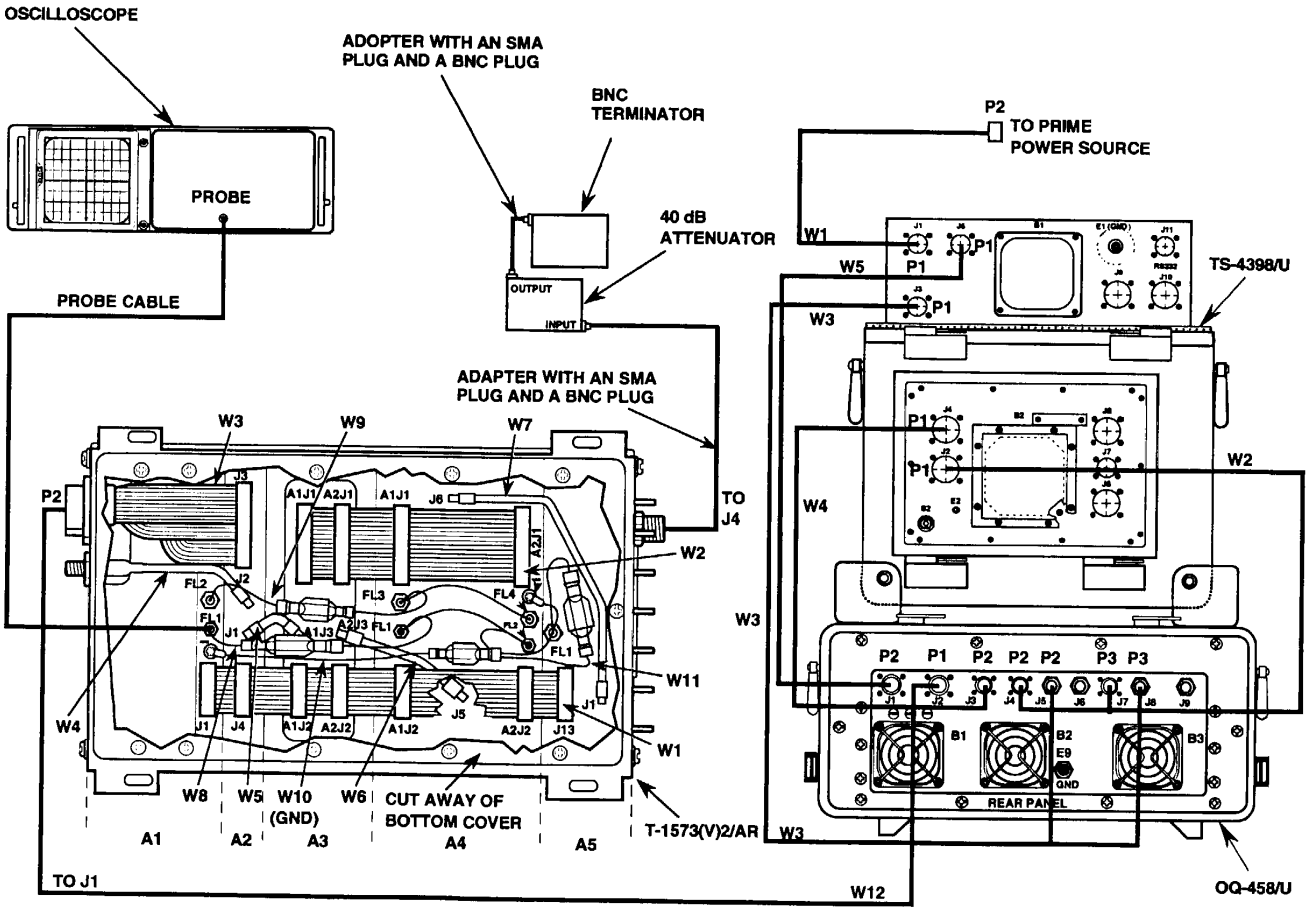


FIGURE 5-34. T-1573 (V) 2/AR POWER CONVERTER MODULE A1A2FL2 TEST INTERCONNECTIONS.

5-6.4.1 Power Converter Module Test (cont)

Item	Action	Normal Indication	Corrective Action

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

29.	Attach a probe from the oscilloscope to A1A2FL1 (see figure 5-35).		
30.	On TS-4398/U, set AZ ON/OFF to ON. correct.	The oscilloscope reads -1.8 Vdc to -2.2 Vdc. All output voltages are Apply silicone compound sealant to A1AZFL1 and A1A2FLZ so no conductor is exposed. Reperform T-1573(V)Z/AR output test (refer to paragraph 5-6.4).	If the oscilloscope does not read -1.8 Vdc -2.2 Vdc, remove and replace the power converter module assembly (refer to paragraph 5-8). Reperform the power converter module test (refer to paragraph 5-6.4.1).
31.	Remove the probe from A1AZFL1.		
32.	Set A2 ON/OFF to OFF.		
33.	Connect W18P2 to J2 on T-1573(V)2/AR. Connect W18P1 to W8P2.		
34.	Connect W8P1 to J8 on TS-4398/U to provide tuning and output connections with AN/URN-214.		

5-6.4.1 Power Converter Module Test (cont)

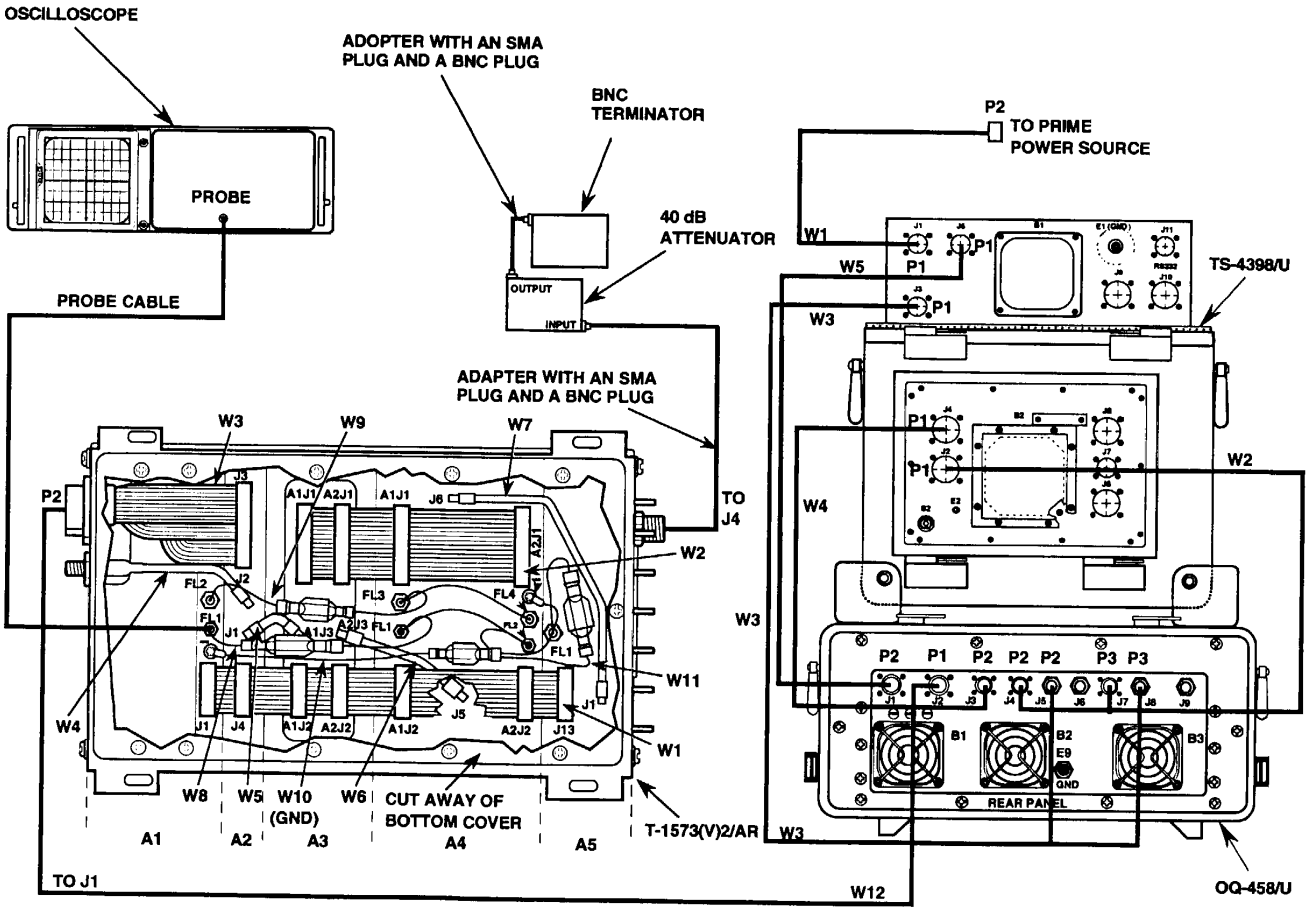


FIGURE 5-35. T-1573 (V) 2/AR POWER CONVERTER MODULE A1A2FL1 TEST INTERCONNECTIONS.

5-6.4.2 Interface Control Module Test. To accomplish the interface control module test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)1 or equivalent
- Digital Multimeter, AN/GSM-64D or equivalent
- (2) 40 dB attenuator(.1 to 400 MHz, 10 watt)
- Power divider (1 watt, 225 - 280 MHz min)
- BNC terminator (50 ohm, 1 watt)
- SMA male to SMA male adapter
- (3) BNC plug to SMA plug adapter
- One foot long TNC plug to SMA plug cable

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment
- 5/16 in. Torque Wrench
- Torque Wrench Kit (#2 Phillips Screwdriver Bit)
- Antistatic DIP Remover

CONDITIONS

Radio Transmitter, T-1573(V)2/AR, is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

5-6.4.2 Interface Control Test (cont)

NOTE

All cables used during the interface control module test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figures 5-37 and 5-38. Figure 5-37 shows the interface control module A3A1J1 test interconnections. Figure 5-38 shows the interface control module A2J1 test interconnections. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-36.

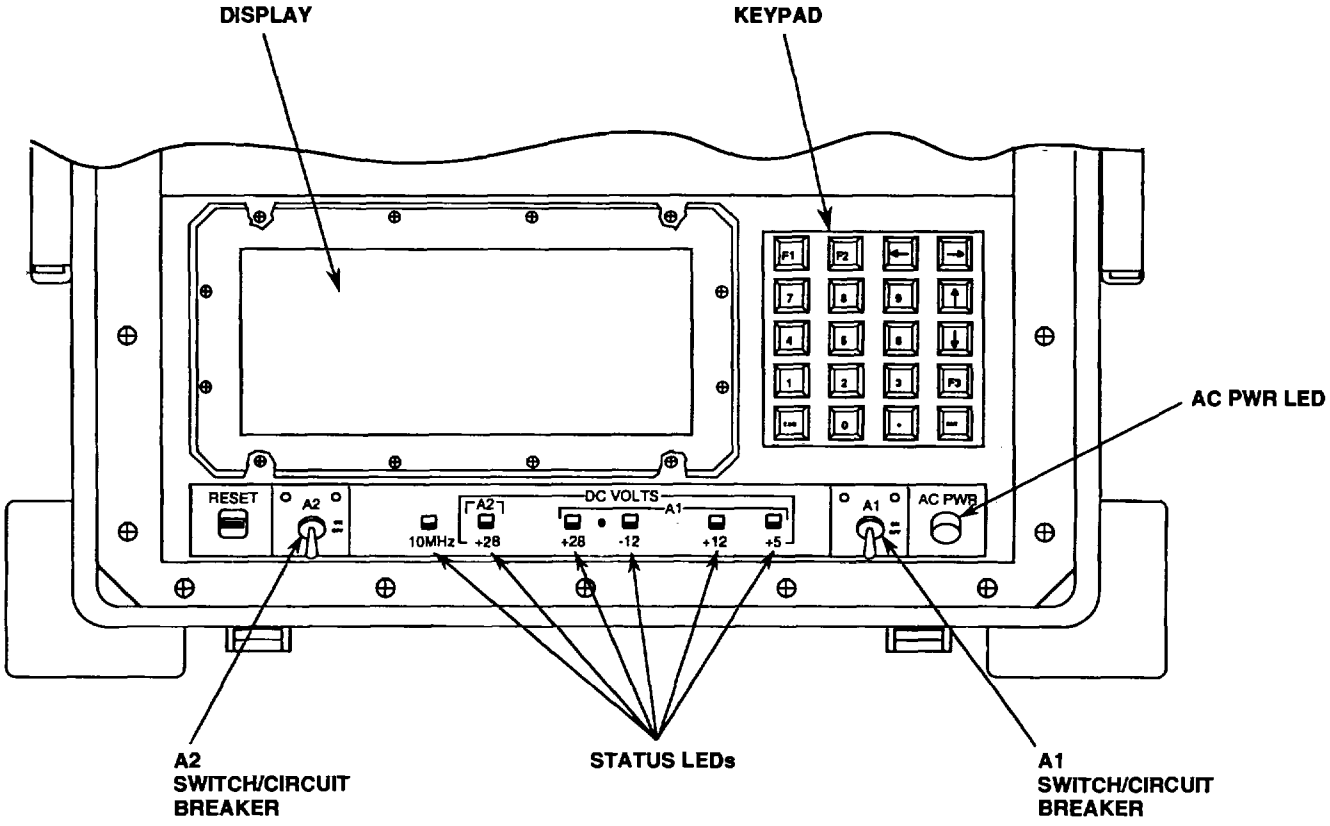


FIGURE 5-36. TS-4398/U CONTROLS AND INDICATORS

Item	Action	Normal Indication	Corrective Action
	Interface Control Module Test.		
1.	Ensure that all switches are in the "OFF" position.		

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Disconnect W17Pl from AZJ1.		
3.	On T-1573(V)2/AR, reconnect W5 to A2J1.		
4.	Disconnect the cable from output 1 of the pulse generator from W18J1.		
5.	Disconnect the cable from output 2 of the pulse generator from W18J2.		
6.	Ground the digital Multimeter to T-1573(V)2/AR.		
7.	Connect a probe cable to the digital Multimeter.		
8.	Turn on the digital Multimeter.		
9.	Set the digital multimeter to dc Volts.		
10.	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed. RRTS REMOTE NODE KEY-6 LOCAL MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
11.	Check that the AC PWR LED is Lit.	The LED is Lit.	If the LED is not Lit, refer to paragraph
12.	Monitor the status LEDs.	ALL LEDs should be lit, except the LED for +28 (AZ).	If the appropriate LEDs are not Lit, refer to paragraph 5-6.1.3.
13.	Set A2 ON/OFF to ON.	The LED for +28 (AZ) is lit.	If the LED for +28 (A2) is not Lit, then check cables for proper connections. If the LED for +28 (A2) is not Lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).

5-6.4.1 Interface Control Test (cont)

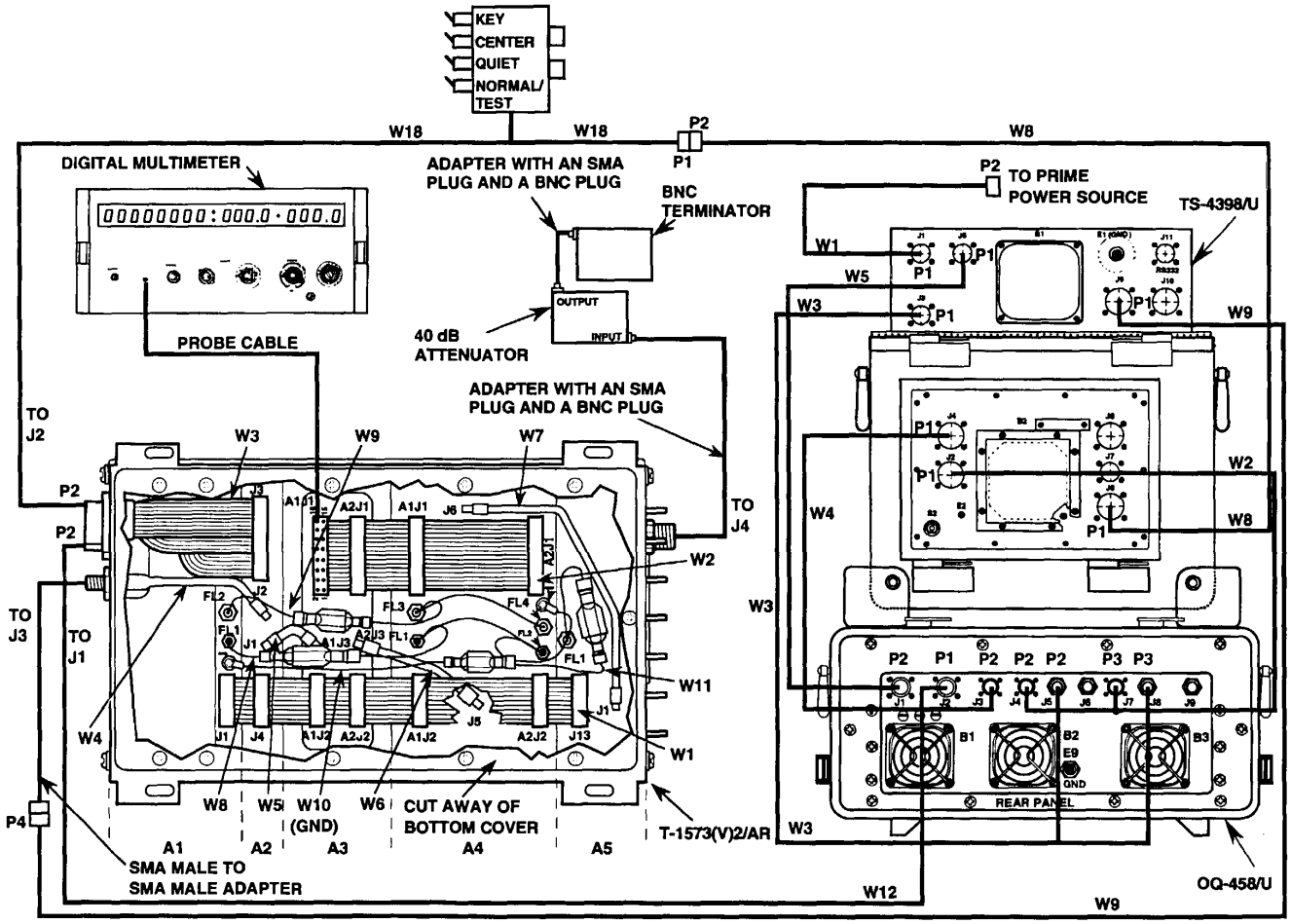


FIGURE 5-37. T-1573 (V) 2/AR INTERFACE CONTROL MODULE A3A1J1 TEST INTERCONNECTORS.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
15.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing 1511 on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
16.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
17.	Select TUNE TRANSMITTER by pressing "2" on the keypad.		
18.	Tune T-1573(V)2/AR to 259.175 MHz.		

```
RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION

KEY-5 DS SUPPORT MAINTENANCE CONFIG.
KEY-7 REMOTE MODE
```

```
DIRECT SUPPORT MAINTENANCE CONFIG.

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME
```

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
	NOTE The locations of pins 1, 2, 15, and 16 are marked on the A3 module. The first row includes pins 1, 3, 5, 7, 9, 11, 13, and 15. The second row includes pins 2, 4, 6, 8, 10, 12, 14, and 16. Digital (1) is logic TTL high and digital (0) is logic TTL low.		
19.	Using the digital multimeter, probe the 25 kHz control line (pin 14 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
20.	Using the digital multimeter, probe the 50 kHz control line (pin 13 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
21.	Using the digital multimeter, probe the 100 kHz control line (pin 12 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
22.	Using the digital multimeter, probe the 200 kHz control line (pin 11 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
23.	Using the digital multimeter, probe the 400 kHz control line (pin 10 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
24.	Using the digital multimeter, probe the 800 kHz control line (pin 9 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
25.	Using the digital multimeter, probe the 1.6 MHz control line (pin 8 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
26.	Using the digital multimeter, probe the 3.2 MHz control Line (pin 7 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
27.	Using the digital multimeter, probe the 4 MHz control Line (pin 6 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
28.	Using the digital multimeter, probe the 8 MHz control Line (pin 5 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
29.	Using the digital multimeter, probe the 16 MHz control line (pin 4 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
30.	Using the digital multimeter, probe the 32 MHz control line (pin 3 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
31.	Using the digital multimeter, probe the 256/192 MHz control line (pin 2 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
32.	Ensure the switches on W18 are set as follows; CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
33.	Using TS-4398/U, tune T-1573(V)2/AR to 255.200 MHz.		
34.	Using the digital multimeter, probe the 25 kHz control Line (pin 14 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
35.	Using the digital multimeter, probe the 50 kHz control Line (pin 13 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
36.	Using the digital multimeter, probe the 100 kHz control Line (pin 12 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
37.	Using the digital multimeter, probe the 200 kHz control Line (pin 11 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
38.	Using the digital multimeter, probe the 400 kHz control Line (pin 10 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
39.	Using the digital multimeter, probe the 800 kHz control line (pin 9 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
40.	Using the digital multimeter, probe the 1.6 MHz control Line (pin 8 of A3AIJ1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
41.	Using the digital multimeter, probe the 3.2 MHz control line (pin 7 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
42.	Using the digital multimeter, probe the 4 MHz control line (pin 6 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
43.	Using the digital multimeter, probe the 8 MHz control line (pin 5 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
44.	Using the digital multimeter, probe the 16 MHz control line (pin 4 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
45.	Using the digital multimeter, probe the 32 MHz control line (pin 3 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
46.	Using the digital multimeter, probe the 256/192 MHz control linre (pin 2 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
47.	On TS-4398/U, set AZ ON/OFF to OFF.		
48.	Reconnect cable W2 at connector A3A1J1 (see figure 5-38).		
49.	On T-1573(V)2/AR, disconnect cable W5 from A2J1.		
50.	Connect W17P1 to A2J1.		

5-6.4.2 Interface Control Test (cont)

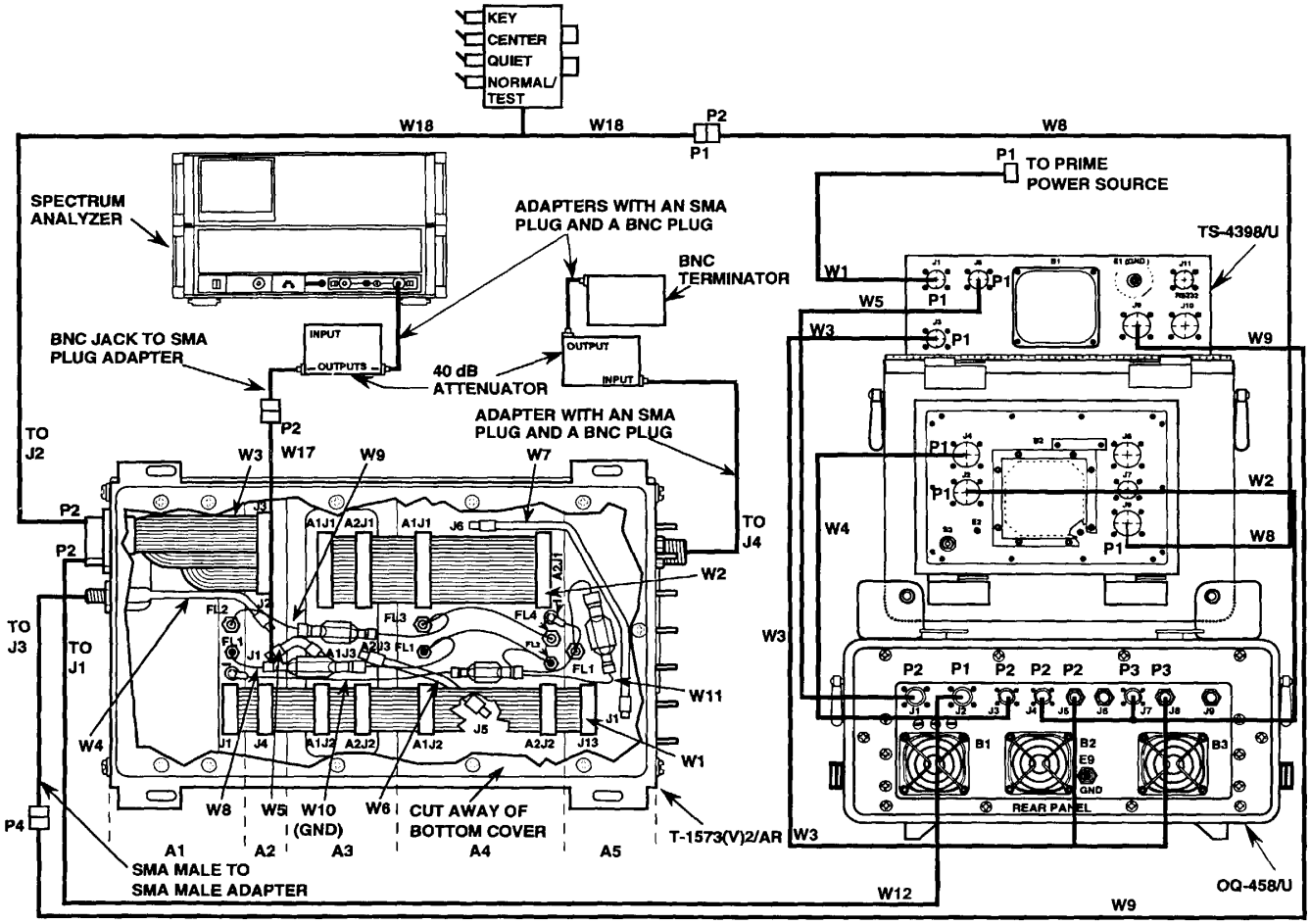


FIGURE 5-38. T-1573 (V) 2/AR INTERFACE CONTROL MODULE A2J1 TEST INTERCONNECTIONS.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
51.	Connect an adapter to W17PZ and to the 40 dB attenuator.		
52.	Connect an adapter from the 40 dB attenuator to the input of the spectrum analyzer.		
53.	Turn on the spectrum analyzer.		
54.	Set the spectrum analyzer for a 100 kHz center frequency and set the frequency span to 10 kHz.		
55.	On TS-4398/U, set A2 ON/OFF to ON.		
56.	Monitor the spectrum analyzer for 100 kHz + 1 kHz at -30 dCm + 6 dB.		
57.	Select the condition which applies and take the action.	All T-1573(V)2/AR outputs are correct. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4 procedure (a)).	If the T-1573(V)2/AR outputs are not correct, remove and replace the interface control module (refer to paragraph 5-8). Reperform the interface control module test (refer to paragraph 5-6.4.2).
58.	On TS-4398/U, set AZ ON/OFF to OFF.		
59.	Disconnect W17P1 from AZJ1.		
60.	Reconnect cable W5 to A2J1.		

5-6.4.3 VCO/PLL Synthesizer Module Test. To accomplish the VCO/PLL synthesizer module test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Pulse Generator, HP8118A or equivalent
- Modulator Test Set, ME-505A/U or equivalent
- Oscilloscope, OS-291/G or equivalent
- Spectrum Analyzer, AN/USM-489(V)1 or equivalent
- (2) 40 dB attenuator (.1 to 400 MHz, 10 watt)
- Power divider (1 watt, 225 - 280 MHz min)
- BNC terminator (50 ohm, 1 watt)
- SMA male to SMA male adapter
- (3) BNC plug to SMA plug adapter
- (5) Three foot long BNC male to BNC male cable
- One foot long TNC plug to SMA plug cable
- 32 kHz trigger cable

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment
- 5/16 in. Torque Wrench
- Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS

Radio Transmitter, T-1573(V)2/AR, is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

5-6.4.3 VCO/PLL Synthesizer Test (cont)

NOTE

All cables used during the VCO/PLL synthesizer test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 5-40. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-39.

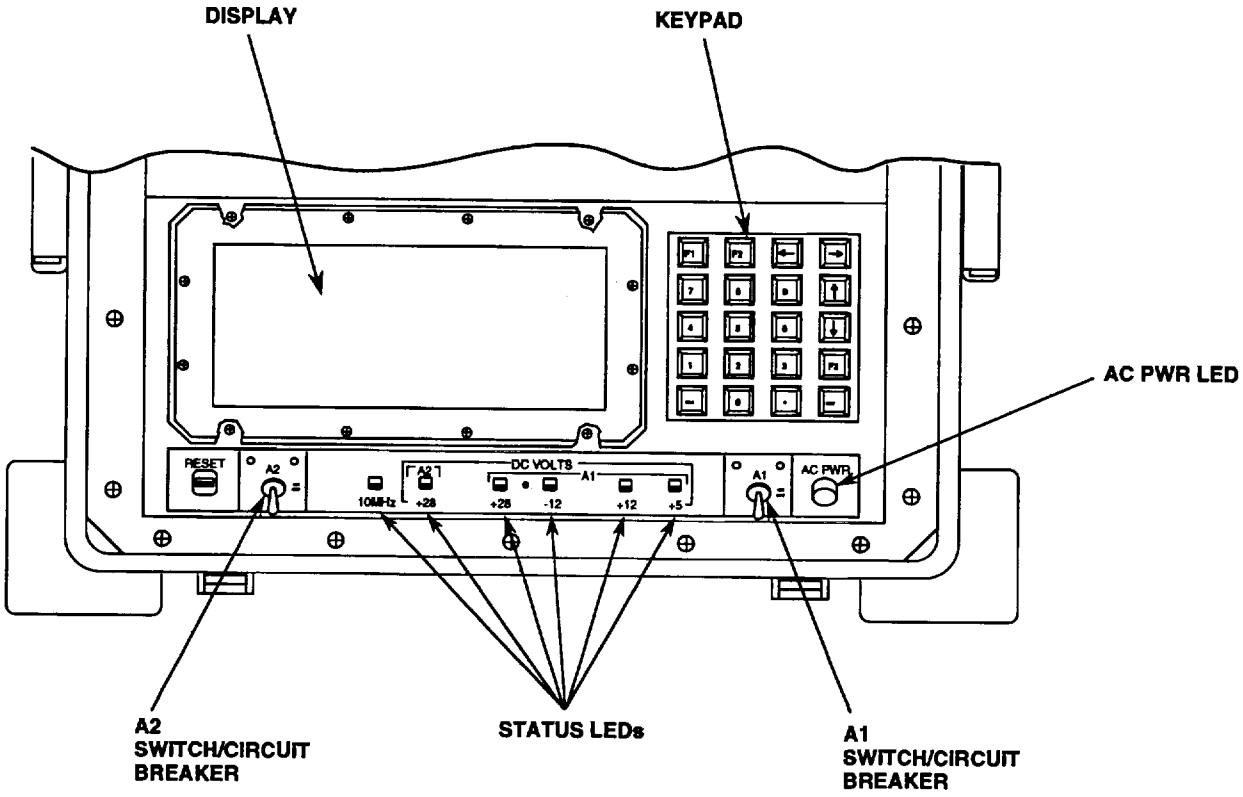


FIGURE 5-39. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
	VCO/PLL Synthesizer Module Test.		
1.	Ensure that all switches are in the "OFF" position.		

5-6.4.3 VCO/PLL Synthesizer Test (cont)

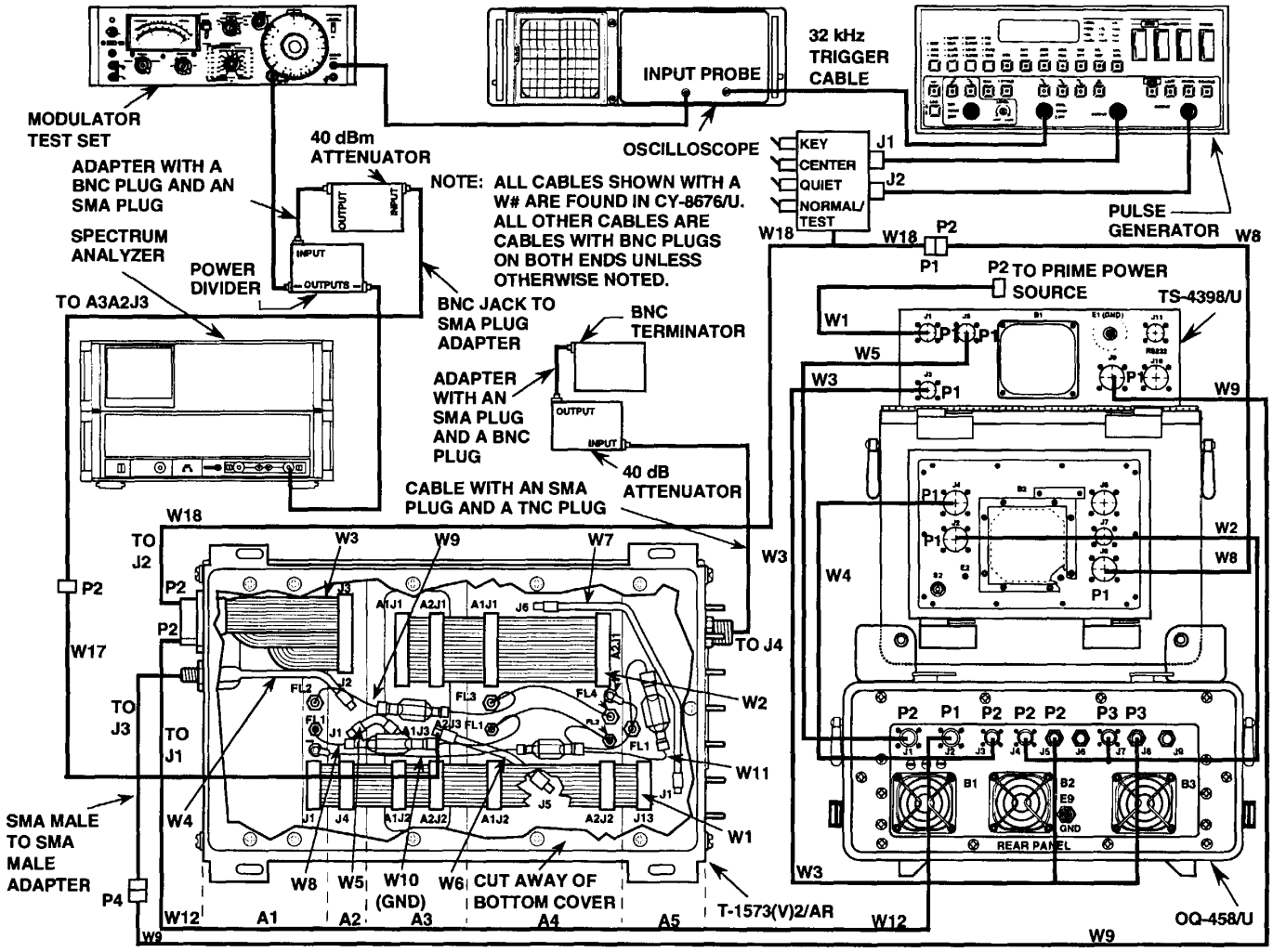


FIGURE 5-40. T-1573 (V) 2/AR VCO/PLL SYNTHESIZER MODULE TEST INTERCONNECTIONS.

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Disconnect W17P1 from AZJ1.		
3.	On T-1573(V)2/AR disconnect cable W6 from A3A2J3.		
4.	Connect W17P1 to A3A2J3.		
5.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
6.	Check that the AC PWR LED is lit.	The LED is Lit.	If the LED is not Lit, refer to paragraph
7.	Monitor the status LEDs.	ALL LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.
8.	Set AZ ON/OFF to ON.	The LED for +28 (A2) is Lit.	If the LED for +28 (AZ) is not Lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
9.	Set the spectrum analyzer to a 250 MHz center frequency.		
10.	Set the spectrum analyzer frequency span to 60 MHz.		
11.	Set the modulator test set to 250 MHz, RF input, FM modulation, and 15 kHz low pass filter.		
12.	Set the oscilloscope to trigger on a 32 kHz clock.		
13.	Set the oscilloscope audio input for 200 mv/division on a 10 μsec setting.		

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
15.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
16.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
17.	On TS-4398/U, select TUNE TRANSMITTER by pressing "2" on the keypad.		
18.	Tune T-1573(V)Z/AR to 250.000 NHz.		
19.	Set the pulse generator to provide a word length of 511 pseudo-random binary sequence on both outputs and 32 kHz clock internal.		

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE

DIRECT SUPPORT MAINTENANCE CONFIG.

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME

a. Timing
Period 32.s 32 kHz clock
Channel 1 = Channel 2
Delay Range: 9.99 µsec
Width: 31 µsec
Transition: Fixed
Strobe:
Delay: 15 µsec
Width: 10 µsec

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action

19. Cont'd

b. Output
Channel 1 = Channel 2
State: ON
Polarity: Normal
Addition: OFF
High Level: +2.00 V
Low Level: 0.00 V
Limit: ON
Data Format: RZ
Strobe
Mode Bit

c. Data

Frame	Cycling	
Mode: Bit	Mode Auto	
No. of bits: 16384	Data Format	
Break		Channel 1: RZ
Mode: OFF	Channel 2: RZ	

d. Data Entry
Display: both channels Base: Bin
(to randomize)
[SHIFT] [MODOIFY]
RANDOMIZE BOTH CHANNELS
from digits 0 thru 16383 (EXECUTE)

e. CNTRL

Trigger	Control	
Mode: Auto	State: ON	
	Mode: Delay	
Threshold: 2.4V		
External Clock	Cycling	
State: OFF	Mode: Auto	

f. Press START

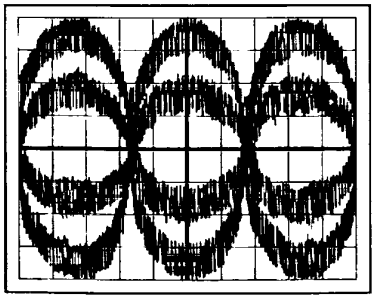
CAUTION

Do not leave "KEY" position on W18 ON for more than 1 minute or damage to unit may occur.

20. Set the switches on W18 to modulate by setting CENTER to OFF, QUIET to ON, NORM/TEST to TEST, and KEY to ON.

21. Monitor the spectrum analyzer for 250 MHz, ± 100 kHz, -13 dam ± 5 dB.

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action
22.	Monitor the oscilloscope for a four-level tone (eye pattern). Set W18 KEY switch to OFF to unkey transmitter.	 NOTE: A WAVEFORM SIMILAR IN SHAPE WILL APPEAR ON THE SCREEN	
		FOUR LEVEL TONE EYE PATTERN	
23.	Select the condition which applies and take the action.	All T-1573(V)Z/AR outputs are correct. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4).	If T-1573(V)2/AR outputs are not correct, remove and replace VCO/PLL synthesizer module (refer to paragraph 5-8). Reperform the VCO/PLL synthesizer test (refer to paragraph 5-6.4.3).
24.	Set A2 ON/OFF to OFF.		
25.	Disconnect W17P1 from A3A2J3.		
26.	Reconnect cable U6 to A3A2J3.		

5-6.4.4 Bandpass Filter Module Test. To accomplish the bandpass filter test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
RRTS, AN/URM-214
Spectrum Analyzer, AN/USM-489(V)1 or equivalent
(2) 40 dB attenuator (.1 to 400 MHz, 10 watt)
BNC terminator (SO ohm, 1 watt)
SMA male to SMA male adapter
(3) BNC plug to SMA plug adapter
One foot long TNC plug to SMA plug cable
32 kHz trigger cable

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench
Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS
Radid Transmitter, T-1573(V)2/AR, is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

Voltage-s capable of causing injury are used in this equipment. Do not contact the 300 volt line with power. applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all- test equipment is properly grounded bef ore operating. Failure to do so may cause equipment damage..

5-6.4.4 Bandpass Filter Test (cont)

NOTE

For information regarding operation of the AN/URM-214, personnel must refer to TM 11-6625-3254-13 All cables used during the bandpass filter module test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 5-42. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-41.

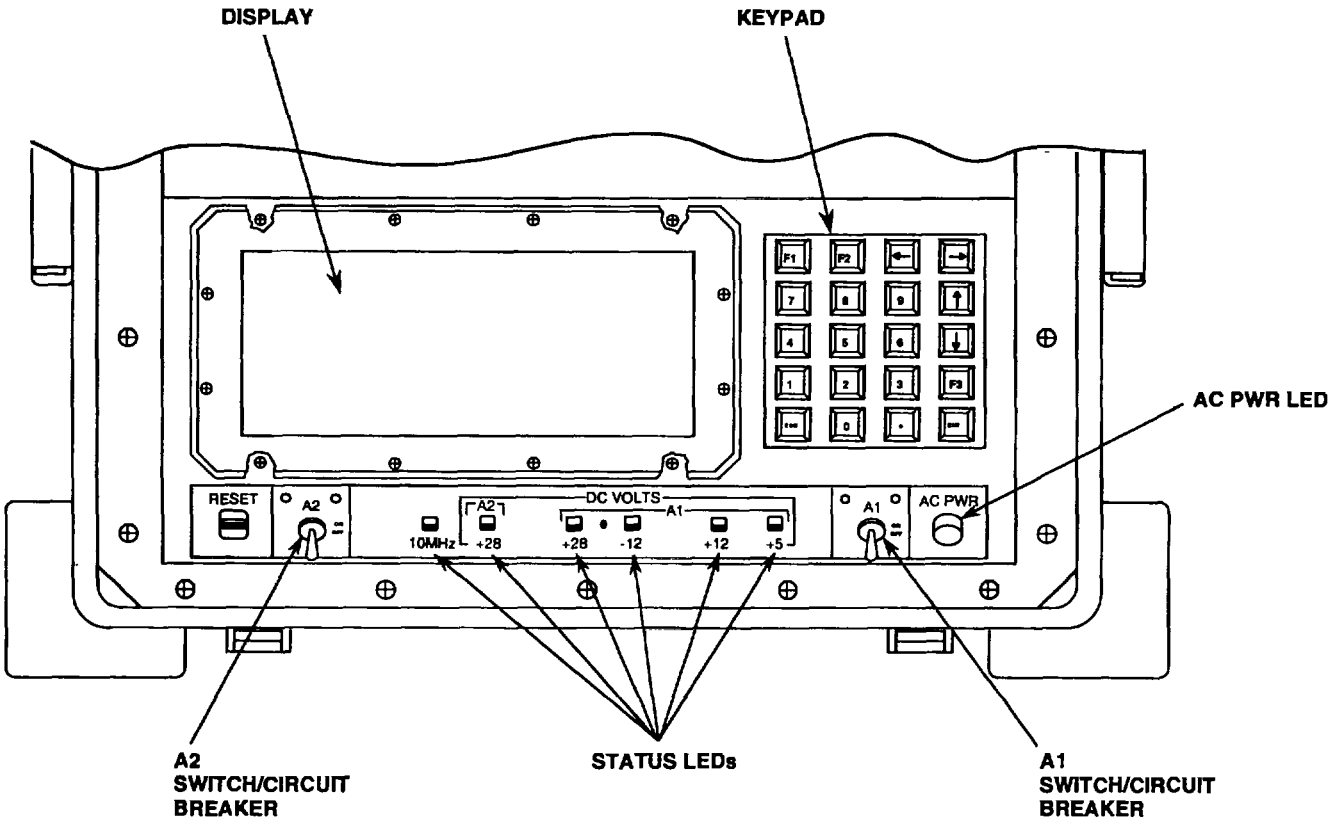


FIGURE 5-41. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
a.	Bandpass Filter Module Test.		
1.	Ensure that all switches are in the "OFF" position.		

5-6.4.4 Bandpass Filter Test (cont)

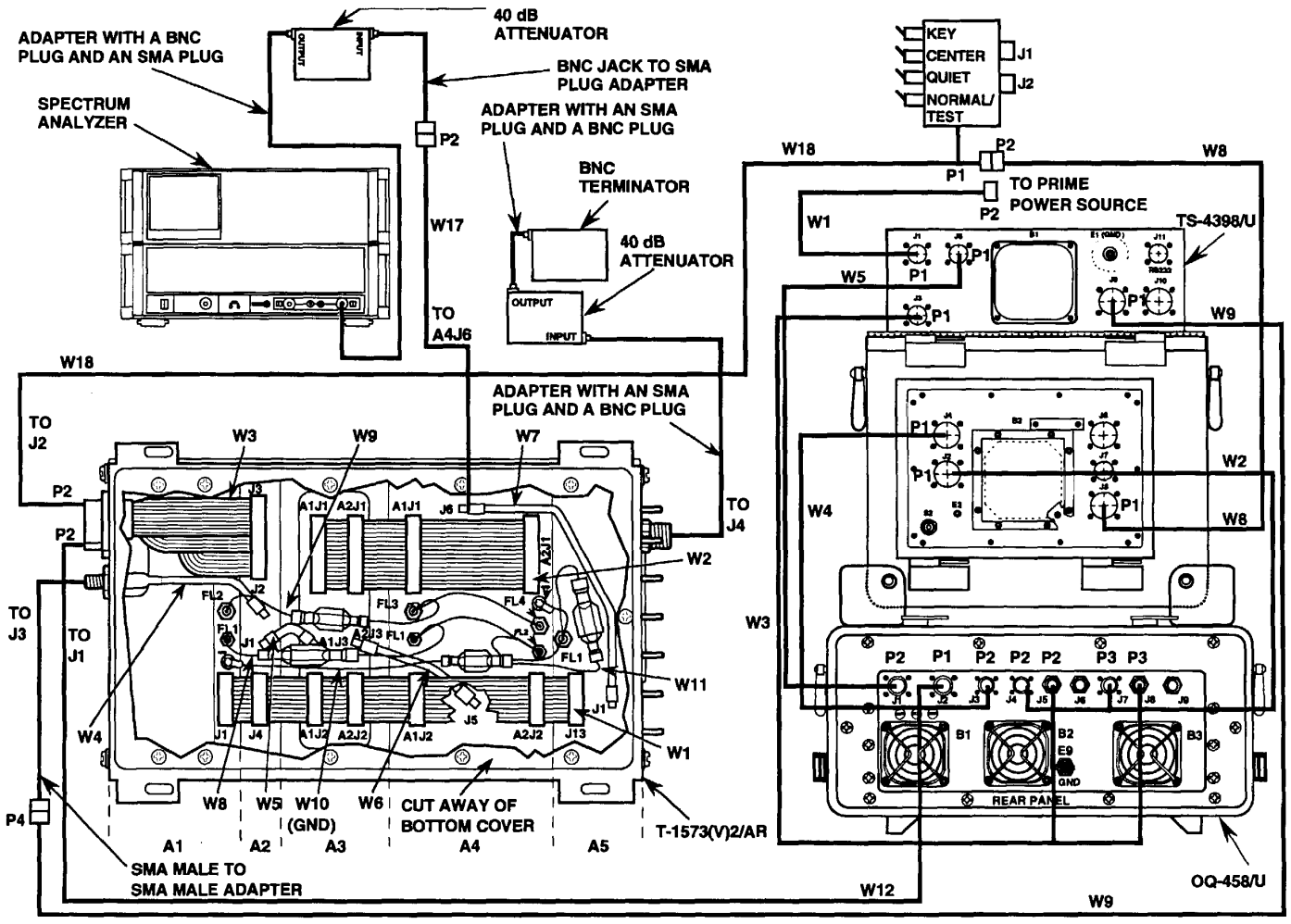
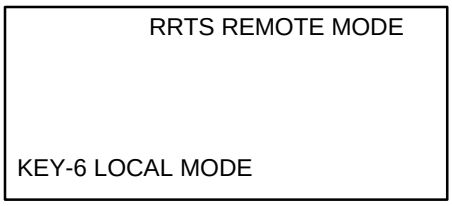


FIGURE 5-42. T-1573 (V) 2/AR BANDPASS FILTER MODULE TEST INTERCONNECTIONS.

5-6.4.4 Bandpass Filter Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Disconnect W17P1 from A2J1.		
3.	On T-1573(V)2/AR, reconnect W5 to A2J1.		
4.	Disconnect the cable from output 1 of the pulse generator from W18J1.		
5.	Disconnect the cable from output 2 of the pulse generator from W18J2.		
6.	On T-1573(V)2/AR, disconnect cable W7 from connector A4J6.		
7.	Connect W17P1 to A4J6.		
8.	Connect an adapter from W17P2 to a 40 dB attenuator.		
9.	Connect an adapter from the 40 dB attenuator output to the spectrum analyzer input.		
10.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed. 	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
11.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not lit, refer to paragraph 5-6.1.2.
12.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.

5-6.4.4 Bandpass Filter Test (cont)

Item	Action	Normal Indication	Corrective Action
13.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (AZ) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
14.	Set the spectrum analyzer to a 250 MHz center frequency and I MHz resolution bandwidth.		
15.	Set the spectrum analyzer frequency span to 65 MHz and select MAXIMUM HOLD.		
16.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

```
RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE
```

17.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

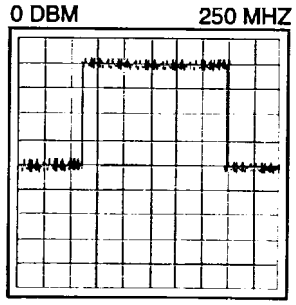
```
DIRECT SUPPORT MAINTENANCE CONFIG

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME
```

18.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
19.	On TS-4398/U, select SWEEP TUNE TRANSMITTER by pressing "1" on the keypad. This tunes T-1573(V)2/AR from 225.000 MHz to 279.975 MHz in 25 kHz steps.		

5-6.4.4 Bandpass Filter Test (cont)

Item	Action	Normal Indication	Corrective Action
20.	To observe the waveform set W18 switches: CENTER to OFF, QUIET to ON, NORM/TEST to TEST, and KEY to OFF.		
21.	Monitor the spectrum analyzer for -10 dBm ± 10 dB across the band and check for dropouts.		
		 TRANSMITTER OUTPUT	
22.	Select the condition which applies and take the action.	All T-1573(V)Z/AR outputs are correct. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4, procedure (a)).	If T-1573(V)Z/AR outputs are not correct, remove and replace the bandpass filter module assembly (refer to paragraph 5-8). Reperform the bandpass filter module test (refer to paragraph 5-6.4.4).
23.	Set A2 ON/OFF to OFF.		
24.	Disconnect W17P1 from A4J6.		
25.	Reconnect cable W7 to A4J6.		

5-6.4.5 **Power Amplifier** Test. To accomplish the power amplifier test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
RRTS, AN/URM-214
Spectrum Analyzer, AN/USM-489(V)1 or equivalent
40 dB attenuator (.1 to 400 MHz, 10 watt)
SMA male to SMA male adapter
(3) BNC plug to SMA plug adapter
One foot long TNC plug to SMA plug cable

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench
Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS
Radio Transmitter, T-1573(V)2/AR is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

'Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, 'or inserting-parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may Cause. equipment damage.

Do not leave "KEY" *position ON for 'more than 1 minute or damage to unit may occur.

NOTE

The interconnections for the test are shown in figure 5-44. The test controller TS-4398/U controls and indicators- used during the test are shown in figure 5-43.

5-6.4.5 Power Amplifier Test (cont)

NOTE

All cables used during the power amplifier test are found in cable assembly case CY-8676/U unless otherwise noted.

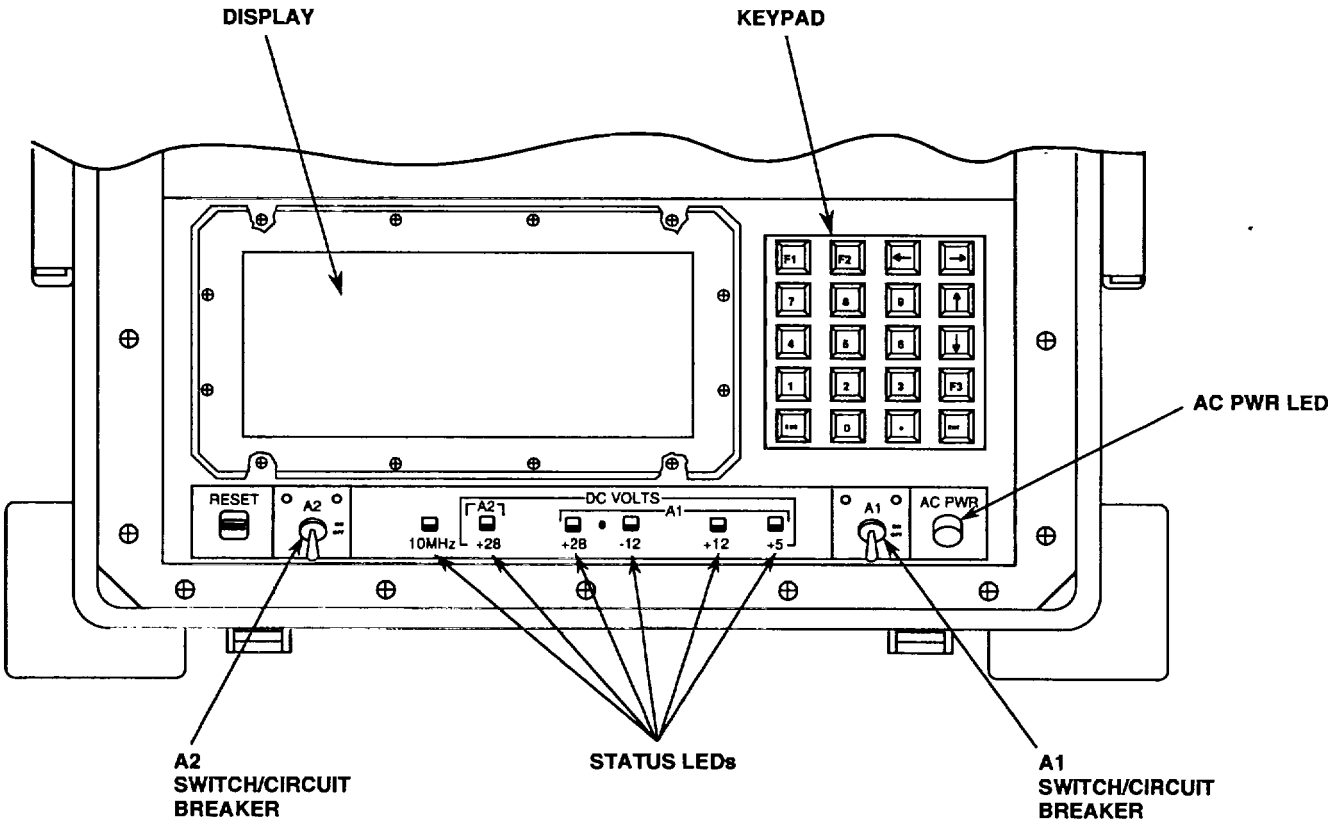


FIGURE 5-43. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
a.	Power Amplifier Test.		
1.	Ensure that all switches are in the "OFF" position.		
2.	Connect W18P2 to J2 on T-1573(V)2/AR. Connect W18P1 to W8P2.		
3.	Connect W8P1 to J8 on TS-4398/U to provide tuning and output connections with AN/URN-214.		
4.	Connect a cable from J4 on T-1573(V)Z/AR to the input of the 40 db attenuator.		

5-6.4.5 Power Amplifier Test (cont)

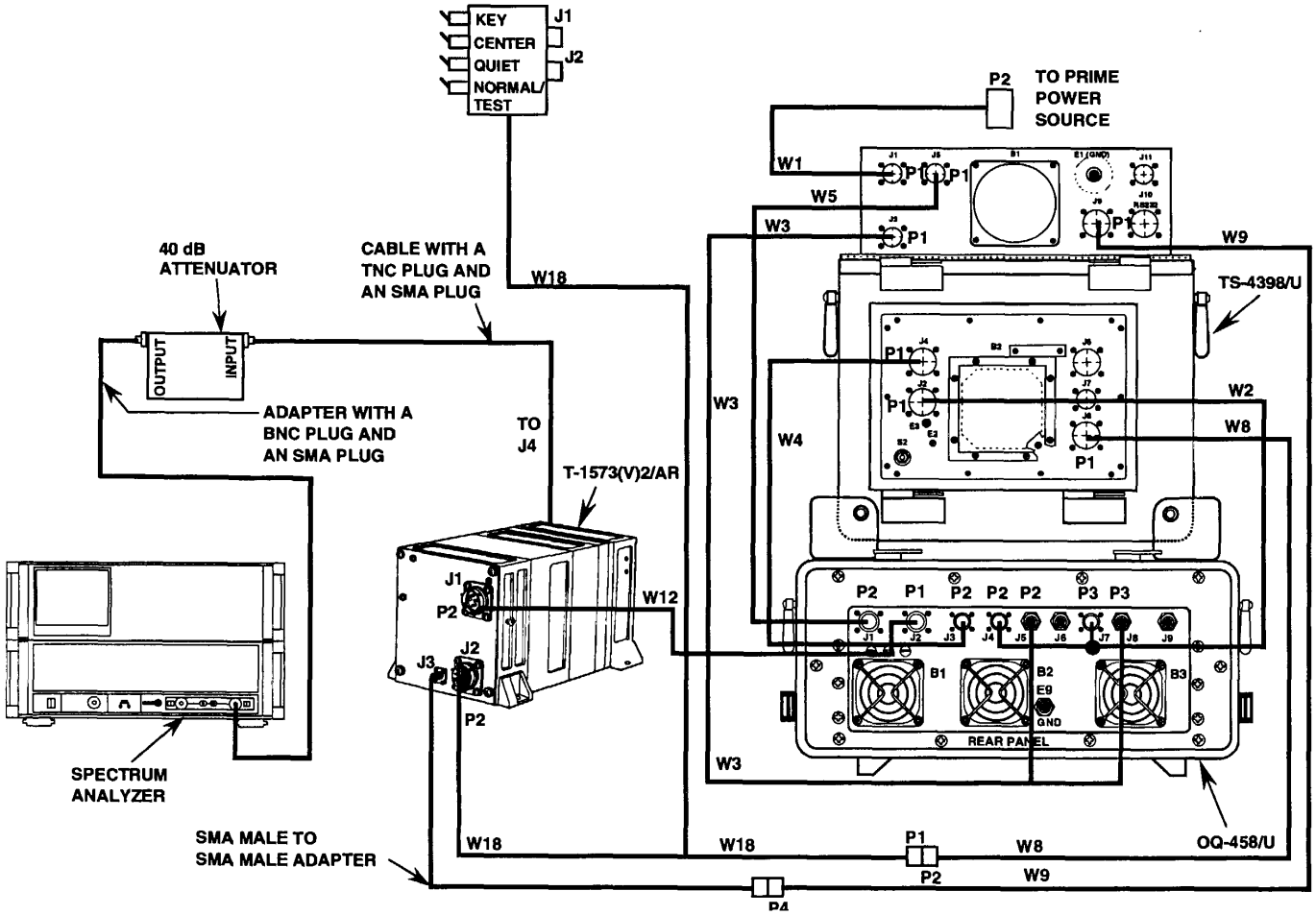
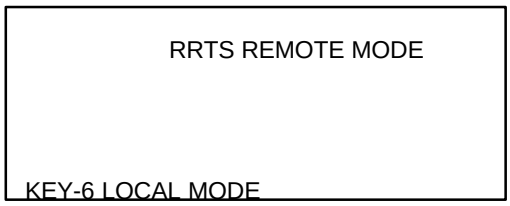


FIGURE 5-44. T-1573 (V) 2/AR POWER AMPLIFIER TEST INTERCONNECTIONS.

5-6.4.5 Power Amplifier Test (cont)

Item	Action	Normal Indication	Corrective Action
5.	Connect a cable from the 40 dB attenuator output to the input of the spectrum analyzer.		
6.	Set the spectrum analyzer to a 250 MHz center frequency.		
7.	Set the spectrum analyzer frequency span to 65 MHz.		
8.	Set the spectrum analyzer to 1 dB/division.		
9.	Select MAXIMUM HOLD on the spectrum analyzer.		
10.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed.  	If the screen shown below is not displayed or is not paragraph 5-6.1.1.
11.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not Lit, refer to paragraph
12.	Monitor the status LEDs.	ALL LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not Lit, refer to paragraph 5-6.1.3.
13.	Set A2 ON/OFF to ON.	The LED for +28 (AZ) is lit.	If the LED for +28 (AZ) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the 0Q-458/U power supply test (refer to paragraph 5-6.3.1).

5-6.4.5 Power Amplifier Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE

15.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

DIRECT SUPPORT MAINTENANCE CONFIG.

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME

16. Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.

17. Select TUNE TRANSMITTER by pressing "2" on the keypad.

18. Tune T-1573(V)2/AR to 225.000 MHz.

NOTE

Do not leave "KEY" position on for more than 1 minute or damage to unit may occur.

19. Position the switches on W18 by setting CENTER to ON, QUIET to ON, NORM/TEST to TEST, and KEY to ON.

20. Monitor the spectrum analyzer for -13 dBm + 5 dB. Position switch KEY on W18 to OFF to unkey transmitter.

21. Repeat items 16 through 20 for 250 and 279.975 MHz.

5-6.4.5 Power Amplifier Test (cont)

Item	Action	Normal Indication	Corrective Action
22.	Select the condition which applies and take the action.	The T-1573(V)Z/AR output is correct. Go to the next item. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4).	If the T-1573(V)Z/AR output on the spectrun analyzer is not correct, replace the power amptifier module (refer to lt paragraph 5-8). Reperform the power amplifier test (refer to paragraph 5-6.4.5).
23.	On TS-4398/U, set A2 ON/OFF to OFF.		

5-6.5 Radio Receiver, R-2500/AR, Module Fault Isolation Test. This test is used to troubleshoot R-2500/AR to a replaceable module. To accomplish the R-2500/AR module fault isolation test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
RRTS, AN/URM-214
Spectrum Analyzer, AN/USM-489(V)l or equivalent
Digital Multimeter, AN/GSM-64D or equivalent
Signal Generator, SG1207/U or equivalent
BNC female to double banana plug adapter
SMA male to SMA male adapter
BNC plug to BNC plug cable
SMA male to BNC female adapter

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
To troubleshoot R-2500/AR to a replaceable module, it must first be removed from RTTG, OQ-458/U. Ensure that power is off.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies. Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the R-2500/AR module fault isolation test are found in cable assembly case CY-8676/U unless otherwise noted.

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

NOTE

The interconnections for the R-2500/AR module fault isolation test are shown in figures 5-46 through 5-49. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-45. Figure 5-46 shows the R-2500/AR electronic component module output test interconnections. Figure 5-47 shows the R-2500/AR IF output test interconnections. Figure 5-48 shows the R-2500/AR A5J5 output test interconnections. Figure 5-49 shows the R-2500/AR offset test

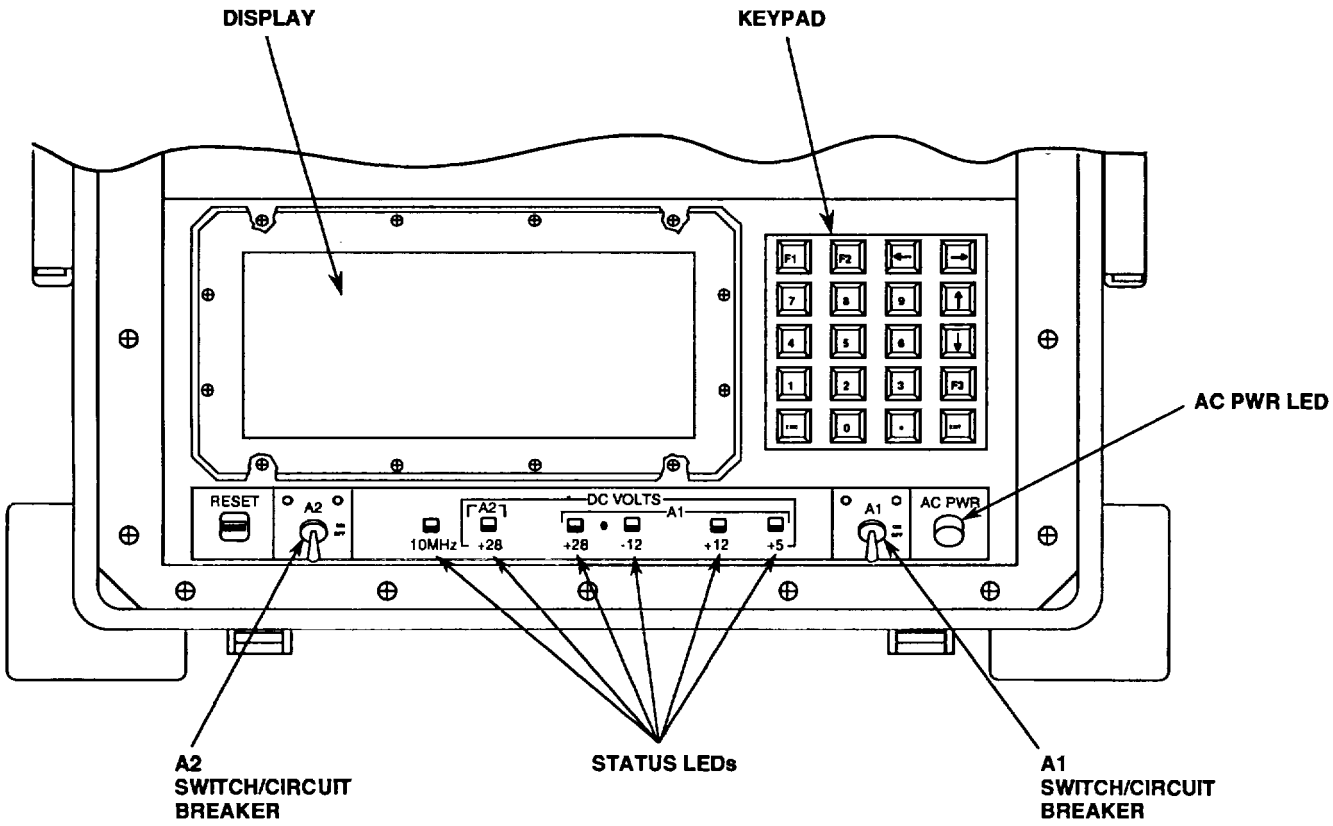
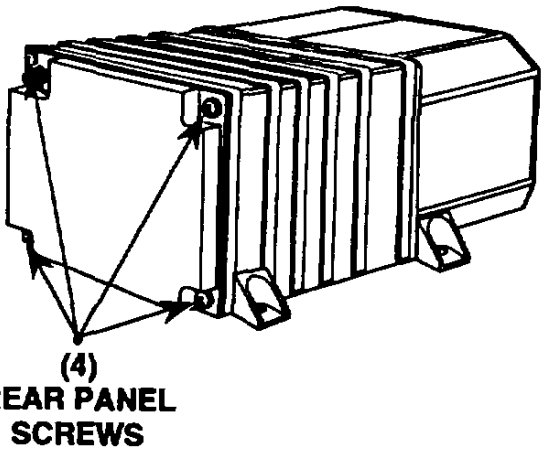


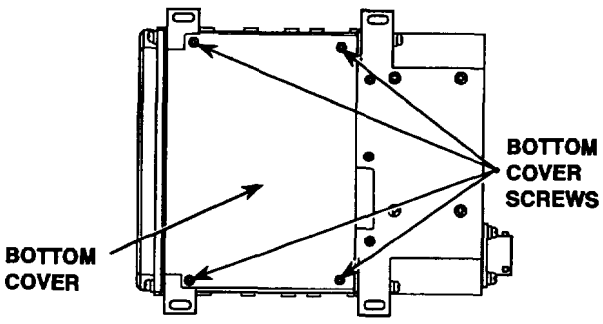
FIGURE 5-45. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
1.	Before operating AN/URM-214, perform the AN/URN-214 assembly and preparation for use and self-test procedures. Leave cables W1 through W5 connected after performing these procedures.		

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Ensure that all switches are in the "OFF" position.		
3.	Using a No. 1 Phillips screwdriver, remove the four short screws along the edges of the bottom cover.		
4.	It may be necessary to use a No. 2 Phillips screwdriver to slightly loosen several of the four rear panel screws to free the bottom cover.		
5.	Remove the bottom cover. If cables are suspected malfunctioning, remove and test continuity using procedures found in General Shop Practice Manual TO 00-25-234/TM 43-0158.		
a.	Electronic Coponent Assebly Power Module Test.		
(1)	Connect W15PZ to J1 on R-2500/AR. Connect W15P1 to W12P2. (See figure 5-46.)		
(2)	Connect W12P1 to J2 on OQ-458/U to provide 28 Vdc from AN/URN-214.		
(3)	Connect an adapter to JZ on R-2500/AR and to W9P5.		
(4)	Connect W9P1 to J9 on TS-4398/U to provide a 10 Mhz, 0 dBm ± 3 dB reference signal.		
(5)	Connect a cable to J3 on R-2500/AR and to the signal generator output.		
(6)	Connect W16P2 to J4 on R-2500/AR. Connect W16P1 to U6P3.		
(7)	Connect W6P1 to J6 of TS-4398/U to provide tuning and output connections with AN/URM-214.		
(8)	Ground the digital multimeter to R-2500/AR.		
(9)	Turn on the digital multimeter.		





5-6.5 R-2500/AR Module Fault Isolation Test (cont)

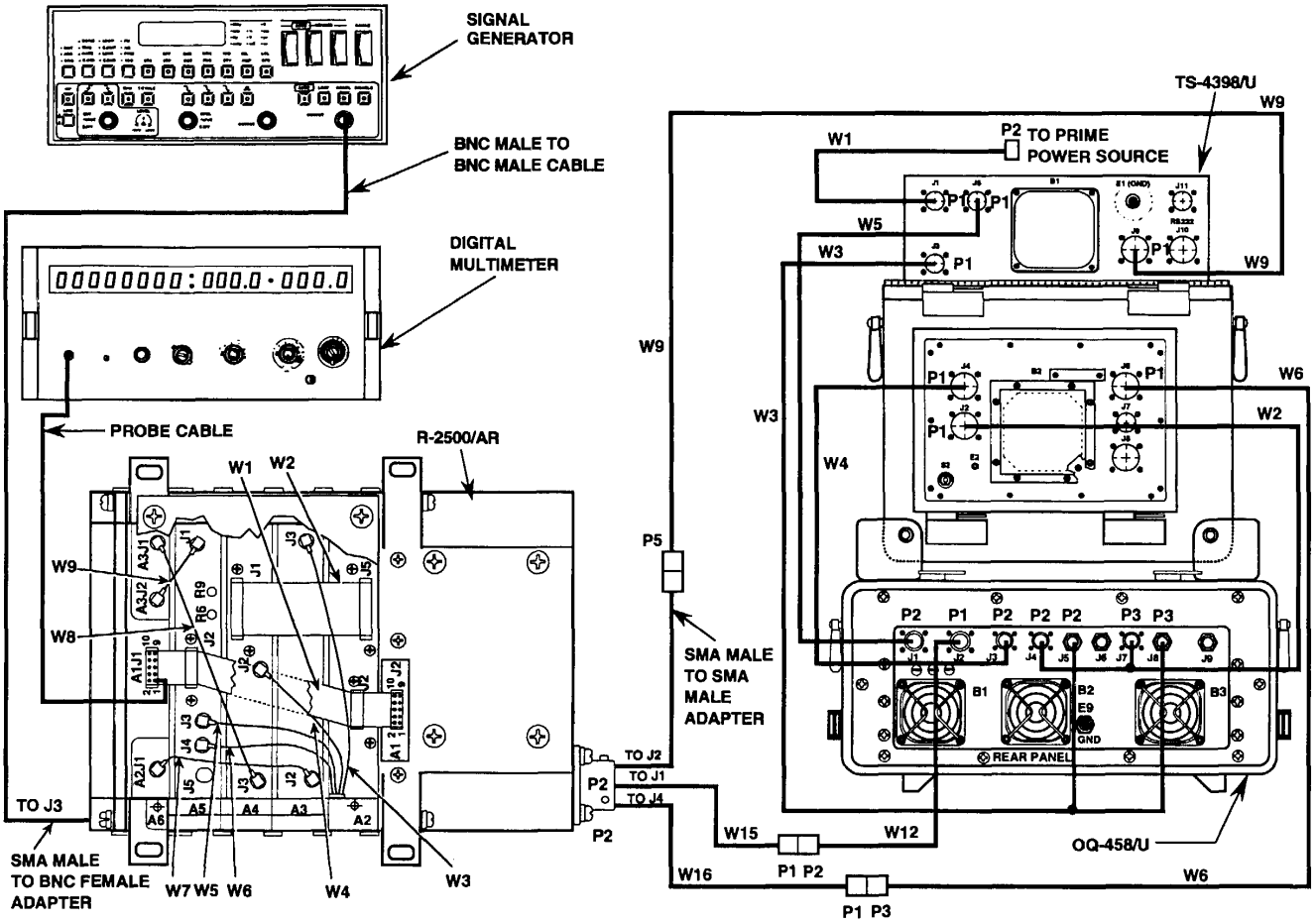


FIGURE 5-46. R-2500/AR ELECTRONIC COMPONENT ASSEMBLY OUTPUT TEST INTERCONNECTIONS.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad	The screen shown below is displayed. RRTS LOCAL MODE KEY-1 SYSTEM LOOP TEST CONFIGURATION KEY-2 ISOLATION TEST CONFIGURATION KEY-3 SELF TEST KEY-4 DEFAULTS MODIFICATION KEY-5 DS SUPPORT MAINTENANCE CONFIG. KEY-7 REMOTE MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
15.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing 1511 on the keypad.	The screen shown below is displayed. DIRECT SUPPORT MAINTENANCE CONFIG. KEY-1 SWEEP TUNE TRANSMITTER KEY-2 TUNE TRANSMITTER KEY-3 TUNE RECEIVER KEY-4 SDT TEST FIXTURE CONFIGURATION KEY-6 ABORT TEST IN PROGRESS KEY-7 HOME	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
16.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
17.	Select TUNE TRANSMITTER by pressing "2" on the keypad.		
18.	Tune T-1573(V)2/AR to 259.175 MHz.		

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
	NOTE The locations of pins 1, 2, 15, and 16 are marked on the A3 module. The first row includes pins 1, 3, 5, 7, 9, 11, 13, and 15. The second row includes pins 2, 4, 6, 8, 10, 12, 14, and 16. Digital (1) is logic TTL high and digital (0) is logic TTL low.		
19.	Using the digital multimeter, probe the 25 kHz control line (pin 14 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
20.	Using the digital multimeter, probe the 50 kHz control line (pin 13 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
21.	Using the digital multimeter, probe the 100 kHz control line (pin 12 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
22.	Using the digital multimeter, probe the 200 kHz control line (pin 11 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
23.	Using the digital multimeter, probe the 400 kHz control line (pin 10 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
24.	Using the digital multimeter, probe the 800 kHz control line (pin 9 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
25.	Using the digital multimeter, probe the 1.6 MHz control line (pin 8 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
26.	Using the digital multimeter, probe the 3.2 MHz control Line (pin 7 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
27.	Using the digital multimeter, probe the 4 MHz control Line (pin 6 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
28.	Using the digital multimeter, probe the 8 MHz control Line (pin 5 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
29.	Using the digital multimeter, probe the 16 MHz control line (pin 4 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
30.	Using the digital multimeter, probe the 32 MHz control line (pin 3 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
31.	Using the digital multimeter, probe the 256/192 MHz control line (pin 2 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
32.	Ensure the switches on W18 are set as follows; CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
33.	Using TS-4398/U, tune T-1573(V)2/AR to 255.200 MHz.		
34.	Using the digital multimeter, probe the 25 kHz control Line (pin 14 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
35.	Using the digital multimeter, probe the 50 kHz control Line (pin 13 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
36.	Using the digital multimeter, probe the 100 kHz control Line (pin 12 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
37.	Using the digital multimeter, probe the 200 kHz control Line (pin 11 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
38.	Using the digital multimeter, probe the 400 kHz control Line (pin 10 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
39.	Using the digital multimeter, probe the 800 kHz control line (pin 9 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
40.	Using the digital multimeter, probe the 1.6 MHz control Line (pin 8 of A3AIJ1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
41.	Using the digital multimeter, probe the 3.2 MHz control line (pin 7 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
42.	Using the digital multimeter, probe the 4 MHz control line (pin 6 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
43.	Using the digital multimeter, probe the 8 MHz control line (pin 5 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
44.	Using the digital multimeter, probe the 16 MHz control line (pin 4 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
45.	Using the digital multimeter, probe the 32 MHz control line (pin 3 of A3A1J1).	The digital multimeter should read 5 volts (digital 1).	If the digital multimeter does not read 5 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
46.	Using the digital multimeter, probe the 256/192 MHz control linre (pin 2 of A3A1J1).	The digital multimeter should read 0 volts (digital 0).	If the digital multimeter does not read 0 volts, remove and replace the interface control module (refer to paragraph 5-8). Reperform Interface Control Test, paragraph 5-6.4.2.
47.	On TS-4398/U, set AZ ON/OFF to OFF.		
48.	Reconnect cable W2 at connector A3A1J1 (see figure 5-38).		
49.	On T-1573(V)2/AR, disconnect cable W5 from A2J1.		
50.	Connect W17P1 to A2J1.		

5-6.4.2 Interface Control Test (cont)

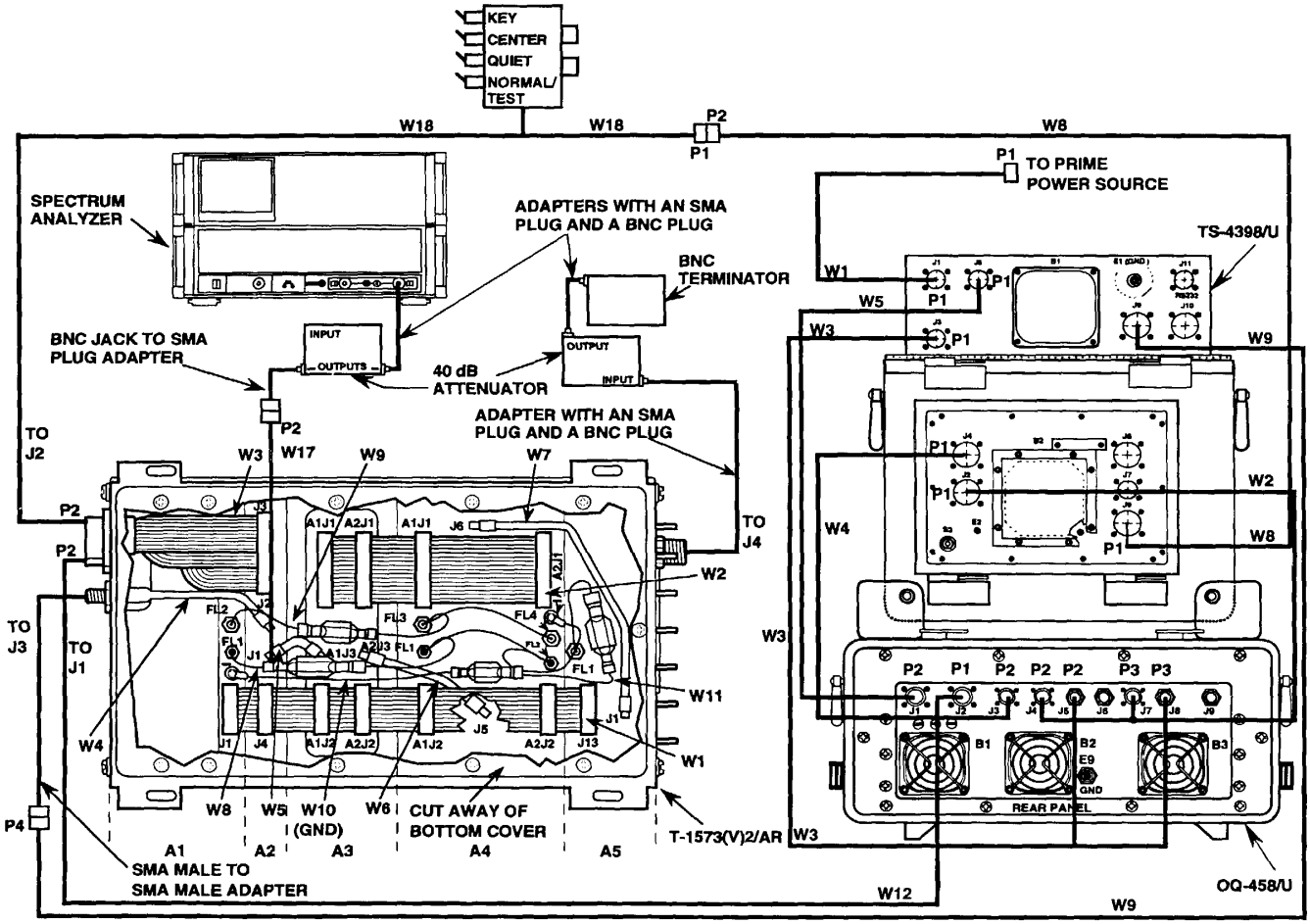


FIGURE 5-38. T-1573 (V) 2/AR INTERFACE CONTROL MODULE A2J1 TEST INTERCONNECTIONS.

5-6.4.2 Interface Control Test (cont)

Item	Action	Normal Indication	Corrective Action
51.	Connect an adapter to W17PZ and to the 40 dB attenuator.		
52.	Connect an adapter from the 40 dB attenuator to the input of the spectrum analyzer.		
53.	Turn on the spectrum analyzer.		
54.	Set the spectrum analyzer for a 100 kHz center frequency and set the frequency span to 10 kHz.		
55.	On TS-4398/U, set A2 ON/OFF to ON.		
56.	Monitor the spectrum analyzer for 100 kHz + 1 kHz at -30 dCm + 6 dB.		
57.	Select the condition which applies and take the action.	All T-1573(V)2/AR outputs are correct. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4 procedure (a)).	If the T-1573(V)2/AR outputs are not correct, remove and replace the interface control module (refer to paragraph 5-8). Reperform the interface control module test (refer to paragraph 5-6.4.2).
58.	On TS-4398/U, set AZ ON/OFF to OFF.		
59.	Disconnect W17P1 from AZJ1.		
60.	Reconnect cable W5 to A2J1.		

5-6.4.3 VCO/PLL Synthesizer Module Test. To accomplish the VCO/PLL synthesizer module test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Pulse Generator, HP8118A or equivalent
- Modulator Test Set, ME-505A/U or equivalent
- Oscilloscope, OS-291/G or equivalent
- Spectrum Analyzer, AN/USM-489(V)1 or equivalent
- (2) 40 dB attenuator (.1 to 400 MHz, 10 watt)
- Power divider (1 watt, 225 - 280 MHz min)
- BNC terminator (50 ohm, 1 watt)
- SMA male to SMA male adapter
- (3) BNC plug to SMA plug adapter
- (5) Three foot long BNC male to BNC male cable
- One foot long TNC plug to SMA plug cable
- 32 kHz trigger cable

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment
- 5/16 in. Torque Wrench
- Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS

Radio Transmitter, T-1573(V)2/AR, is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

5-6.4.3 VCO/PLL Synthesizer Test (cont)

NOTE

All cables used during the VCO/PLL synthesizer test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 5-40. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-39.

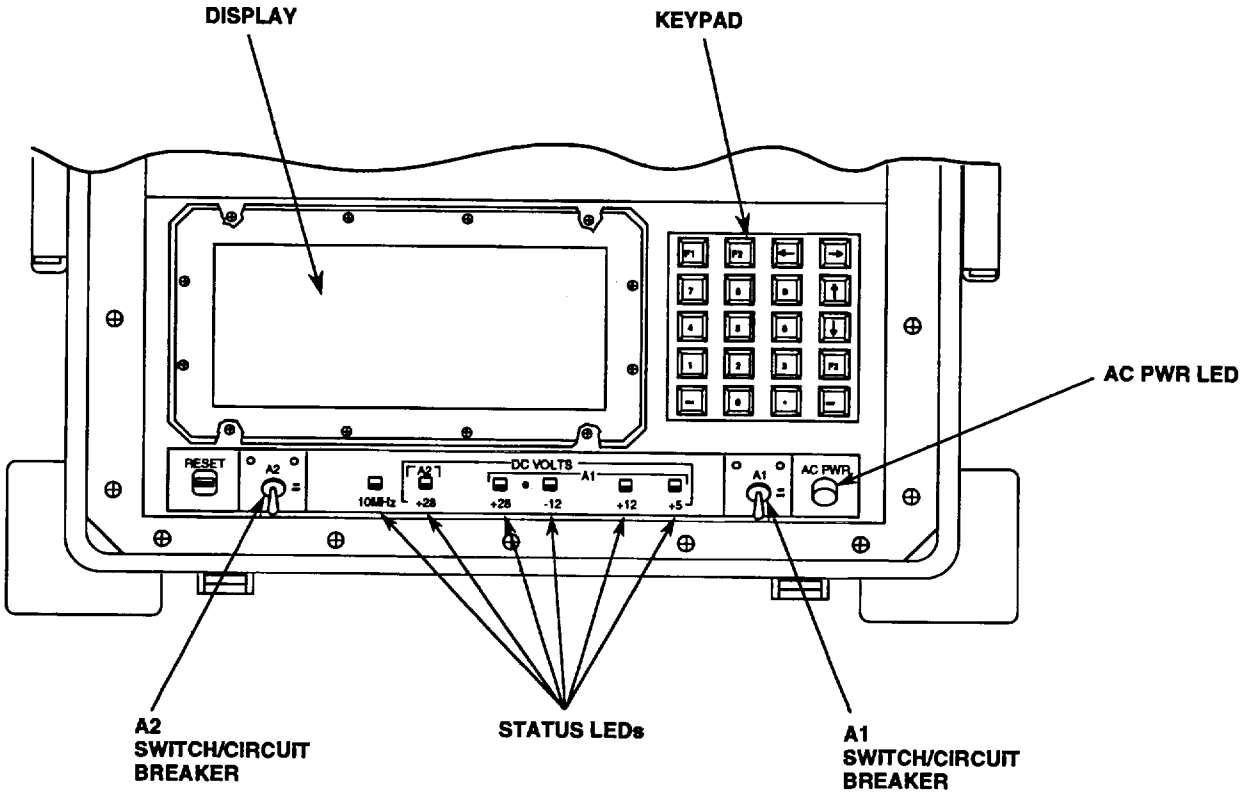


FIGURE 5-39. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
	VCO/PLL Synthesizer Module Test.		
1.	Ensure that all switches are in the "OFF" position.		

5-6.4.3 VCO/PLL Synthesizer Test (cont)

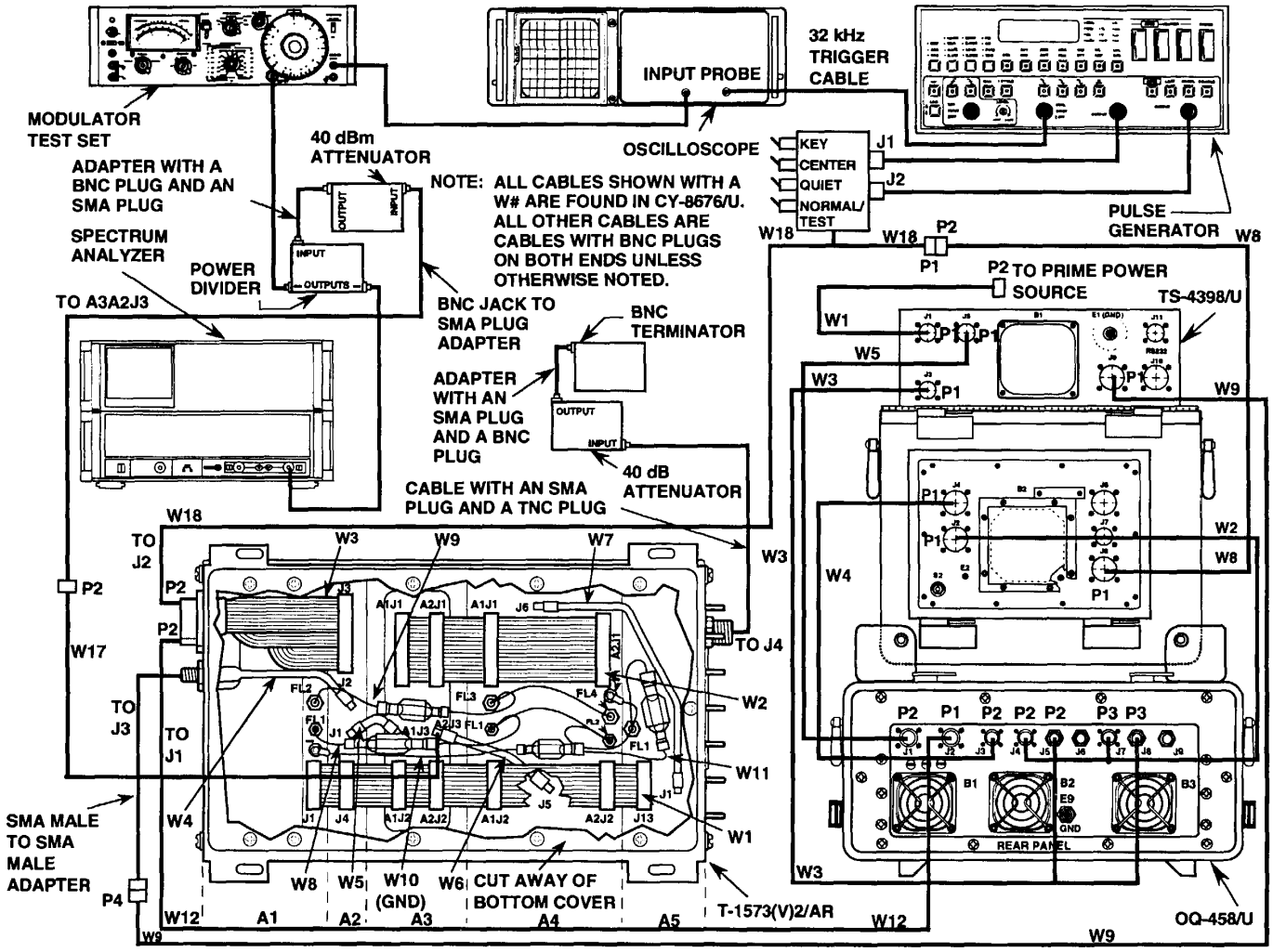


FIGURE 5-40. T-1573 (V) 2/AR VCO/PLL SYNTHESIZER MODULE TEST INTERCONNECTIONS.

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Disconnect W17P1 from AZJ1.		
3.	On T-1573(V)2/AR disconnect cable W6 from A3A2J3.		
4.	Connect W17P1 to A3A2J3.		
5.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed. RRTS REMOTE MODE KEY-6 LOCAL MODE	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
6.	Check that the AC PWR LED is lit.	The LED is Lit.	If the LED is not Lit, refer to paragraph
7.	Monitor the status LEDs.	ALL LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.
8.	Set AZ ON/OFF to ON.	The LED for +28 (A2) is Lit.	If the LED for +28 (AZ) is not Lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
9.	Set the spectrum analyzer to a 250 MHz center frequency.		
10.	Set the spectrum analyzer frequency span to 60 MHz.		
11.	Set the modulator test set to 250 MHz, RF input, FM modulation, and 15 kHz low pass filter.		
12.	Set the oscilloscope to trigger on a 32 kHz clock.		
13.	Set the oscilloscope audio input for 200 mv/division on a 10 μsec setting.		

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
15.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
16.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
17.	On TS-4398/U, select TUNE TRANSMITTER by pressing "2" on the keypad.		
18.	Tune T-1573(V)Z/AR to 250.000 NHz.		
19.	Set the pulse generator to provide a word length of 511 pseudo-random binary sequence on both outputs and 32 kHz clock internal.		

```
RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE
```

```
DIRECT SUPPORT MAINTENANCE CONFIG.

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME
```

a. Timing
Period 32.s 32 kHz clock
Channel 1 = Channel 2
Delay Range: 9.99 µsec
Width: 31 µsec
Transition: Fixed
Strobe:
Delay: 15 µsec
Width: 10 µsec

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action

19. Cont'd

b. Output
Channel 1 = Channel 2
State: ON
Polarity: Normal
Addition: OFF
High Level: +2.00 V
Low Level: 0.00 V
Limit: ON
Data Format: RZ
Strobe
Mode Bit

c. Data
Frame
Mode: Bit
No. of bits: 16384
Break
Mode: OFF
Cycling
Mode Auto
Data Format
Channel 1: RZ
Channel 2: RZ

d. Data Entry
Display: both channels Base: Bin
(to randomize)
[SHIFT] [MODOIFY]
RANDOMIZE BOTH CHANNELS
from digits 0 thru 16383 (EXECUTE)

e. CNTRL
Trigger
Mode: Auto
Threshold: 2.4V
External Clock
State: OFF
Control
State: ON
Mode: Delay
Cycling
Mode: Auto

f. Press START

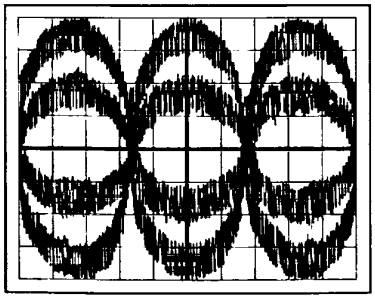
CAUTION

Do not leave "KEY" position on W18 ON for more than 1 minute or damage to unit may occur.

20. Set the switches on W18 to modulate by setting CENTER to OFF, QUIET to ON, NORM/TEST to TEST, and KEY to ON.

21. Monitor the spectrum analyzer for 250 MHz, ± 100 kHz, -13 dam ± 5 dB.

5-6.4.3 VCO/PLL Synthesizer Test (cont)

Item	Action	Normal Indication	Corrective Action
22.	Monitor the oscilloscope for a four-level tone (eye pattern). Set W18 KEY switch to OFF to unkey transmitter.	 NOTE: A WAVEFORM SIMILAR IN SHAPE WILL APPEAR ON THE SCREEN	
		FOUR LEVEL TONE EYE PATTERN	
23.	Select the condition which applies and take the action.	All T-1573(V)Z/AR outputs are correct. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4).	If T-1573(V)2/AR outputs are not correct, remove and replace VCO/PLL synthesizer module (refer to paragraph 5-8). Reperform the VCO/PLL synthesizer test (refer to paragraph 5-6.4.3).
24.	Set A2 ON/OFF to OFF.		
25.	Disconnect W17P1 from A3A2J3.		
26.	Reconnect cable U6 to A3A2J3.		

5-6.4.4 Bandpass Filter Module Test. To accomplish the bandpass filter test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
RRTS, AN/URM-214
Spectrum Analyzer, AN/USM-489(V)1 or equivalent
(2) 40 dB attenuator (.1 to 400 MHz, 10 watt)
BNC terminator (SO ohm, 1 watt)
SMA male to SMA male adapter
(3) BNC plug to SMA plug adapter
One foot long TNC plug to SMA plug cable
32 kHz trigger cable

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench
Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS
Radid Transmitter, T-1573(V)2/AR, is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

Voltage-s capable of causing injury are used in this equipment. Do not contact the 300 volt line with power. applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all- test equipment is properly grounded bef ore operating. Failure to do so may cause equipment damage..

5-6.4.4 Bandpass Filter Test (cont)

NOTE

For information regarding operation of the AN/URM-214, personnel must refer to TM 11-6625-3254-13 All cables used during the bandpass filter module test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 5-42. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-41.

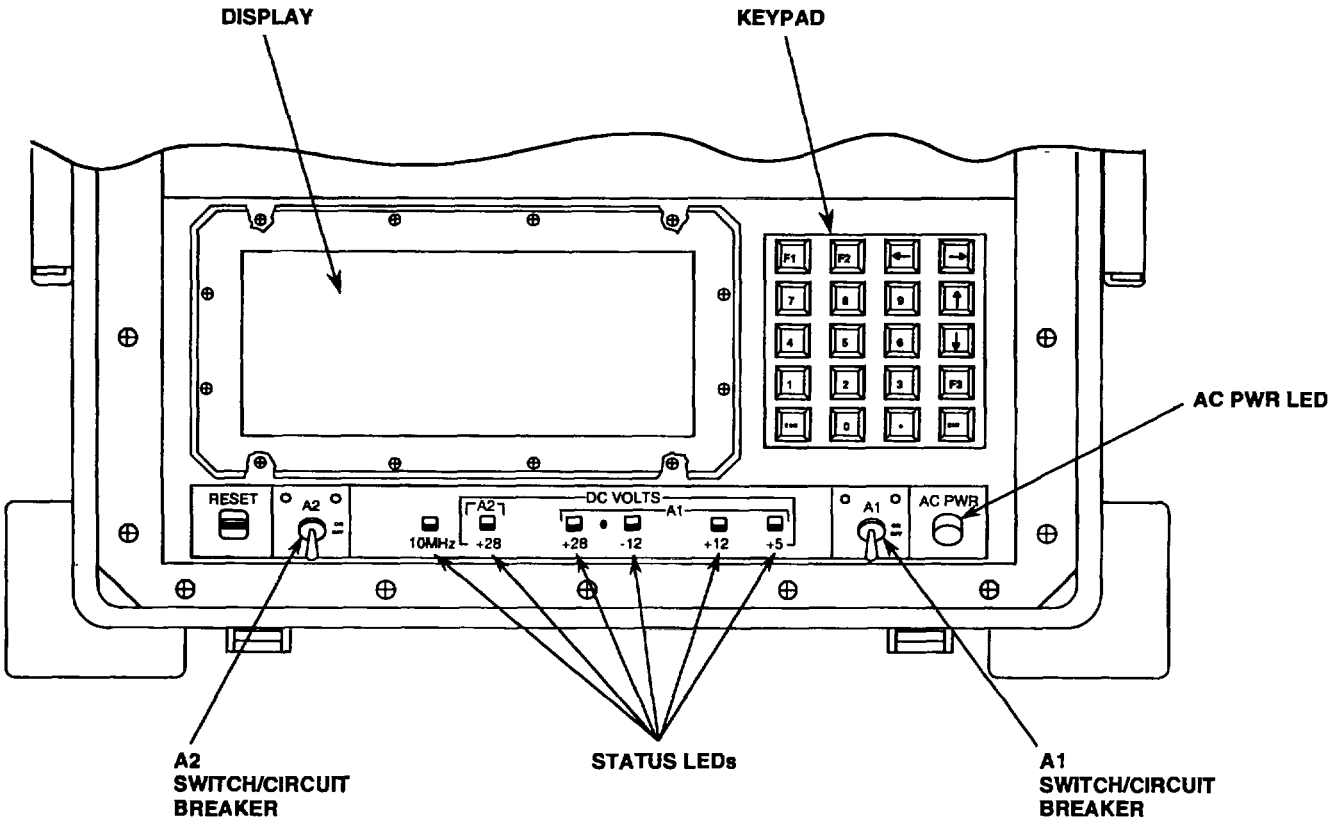


FIGURE 5-41. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
a.	Bandpass Filter Module Test.		
1.	Ensure that all switches are in the "OFF" position.		

5-6.4.4 Bandpass Filter Test (cont)

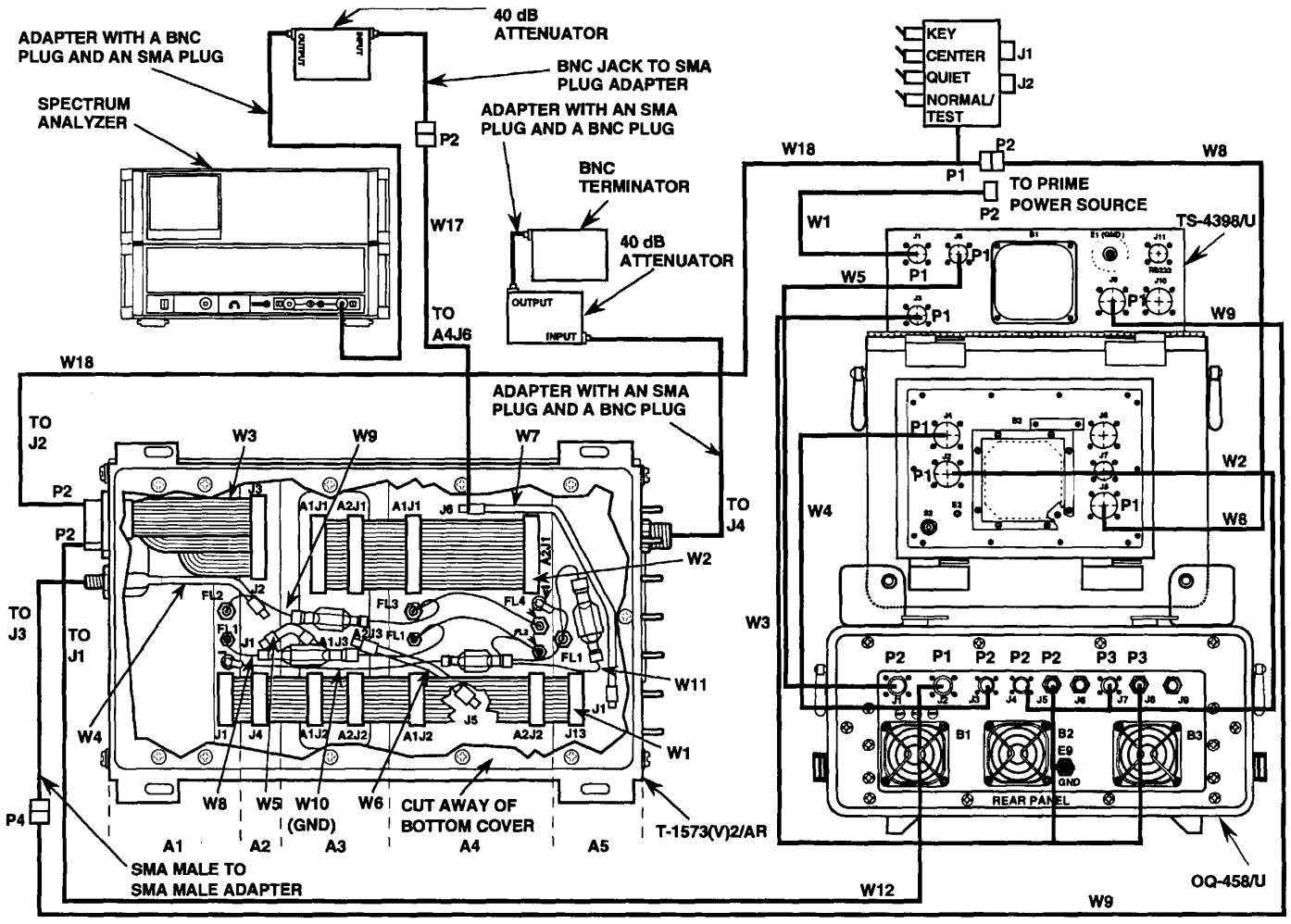
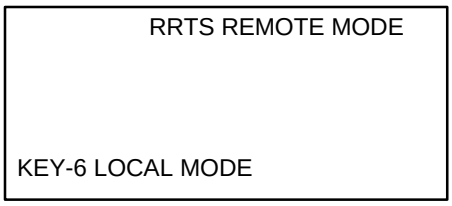


FIGURE 5-42. T-1573 (V) 2/AR BANDPASS FILTER MODULE TEST INTERCONNECTIONS.

5-6.4.4 Bandpass Filter Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Disconnect W17P1 from A2J1.		
3.	On T-1573(V)2/AR, reconnect W5 to A2J1.		
4.	Disconnect the cable from output 1 of the pulse generator from W18J1.		
5.	Disconnect the cable from output 2 of the pulse generator from W18J2.		
6.	On T-1573(V)2/AR, disconnect cable W7 from connector A4J6.		
7.	Connect W17P1 to A4J6.		
8.	Connect an adapter from W17P2 to a 40 dB attenuator.		
9.	Connect an adapter from the 40 dB attenuator output to the spectrum analyzer input.		
10.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed. 	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
11.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not lit, refer to paragraph 5-6.1.2.
12.	Monitor the status LEDs.	All LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.

5-6.4.4 Bandpass Filter Test (cont)

Item	Action	Normal Indication	Corrective Action
13.	Set A2 ON/OFF to ON.	The LED for +28 (A2) is lit.	If the LED for +28 (AZ) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
14.	Set the spectrum analyzer to a 250 MHz center frequency and I MHz resolution bandwidth.		
15.	Set the spectrum analyzer frequency span to 65 MHz and select MAXIMUM HOLD.		
16.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE

17.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

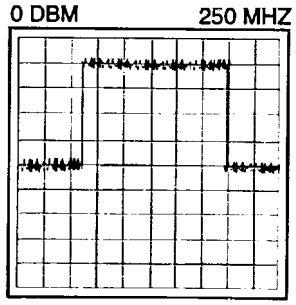
DIRECT SUPPORT MAINTENANCE CONFIG

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME

18.	Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.		
19.	On TS-4398/U, select SWEEP TUNE TRANSMITTER by pressing "1" on the keypad. This tunes T-1573(V)2/AR from 225.000 MHz to 279.975 MHz in 25 kHz steps.		

5-6.4.4 Bandpass Filter Test (cont)

Item	Action	Normal Indication	Corrective Action
20.	To observe the waveform set W18 switches: CENTER to OFF, QUIET to ON, NORM/TEST to TEST, and KEY to OFF.		
21.	Monitor the spectrum analyzer for -10 dBm ± 10 dB across the band and check for dropouts.		
		 TRANSMITTER OUTPUT	
22.	Select the condition which applies and take the action.	All T-1573(V)Z/AR outputs are correct. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4, procedure (a)).	If T-1573(V)Z/AR outputs are not correct, remove and replace the bandpass filter module assembly (refer to paragraph 5-8). Reperform the bandpass filter module test (refer to paragraph 5-6.4.4).
23.	Set A2 ON/OFF to OFF.		
24.	Disconnect W17P1 from A4J6.		
25.	Reconnect cable W7 to A4J6.		

5-6.4.5 **Power Amplifier** Test. To accomplish the power amplifier test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
RRTS, AN/URM-214
Spectrum Analyzer, AN/USM-489(V)1 or equivalent
40 dB attenuator (.1 to 400 MHz, 10 watt)
SMA male to SMA male adapter
(3) BNC plug to SMA plug adapter
One foot long TNC plug to SMA plug cable

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench
Torque Wrench Kit (#2 Phillips Screwdriver Bit)

CONDITIONS
Radio Transmitter, T-1573(V)2/AR is in maintenance configuration with bottom cover removed. Ensure that power is off.

WARNING

'Voltages capable of causing injury are used in this equipment. Do not contact the 300 volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, 'or inserting-parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may Cause. equipment damage.

Do not leave "KEY" *position ON for 'more than 1 minute or damage to unit may occur.

NOTE

The interconnections for the test are shown in figure 5-44. The test controller TS-4398/U controls and indicators- used during the test are shown in figure 5-43.

5-6.4.5 Power Amplifier Test (cont)

NOTE

All cables used during the power amplifier test are found in cable assembly case CY-8676/U unless otherwise noted.

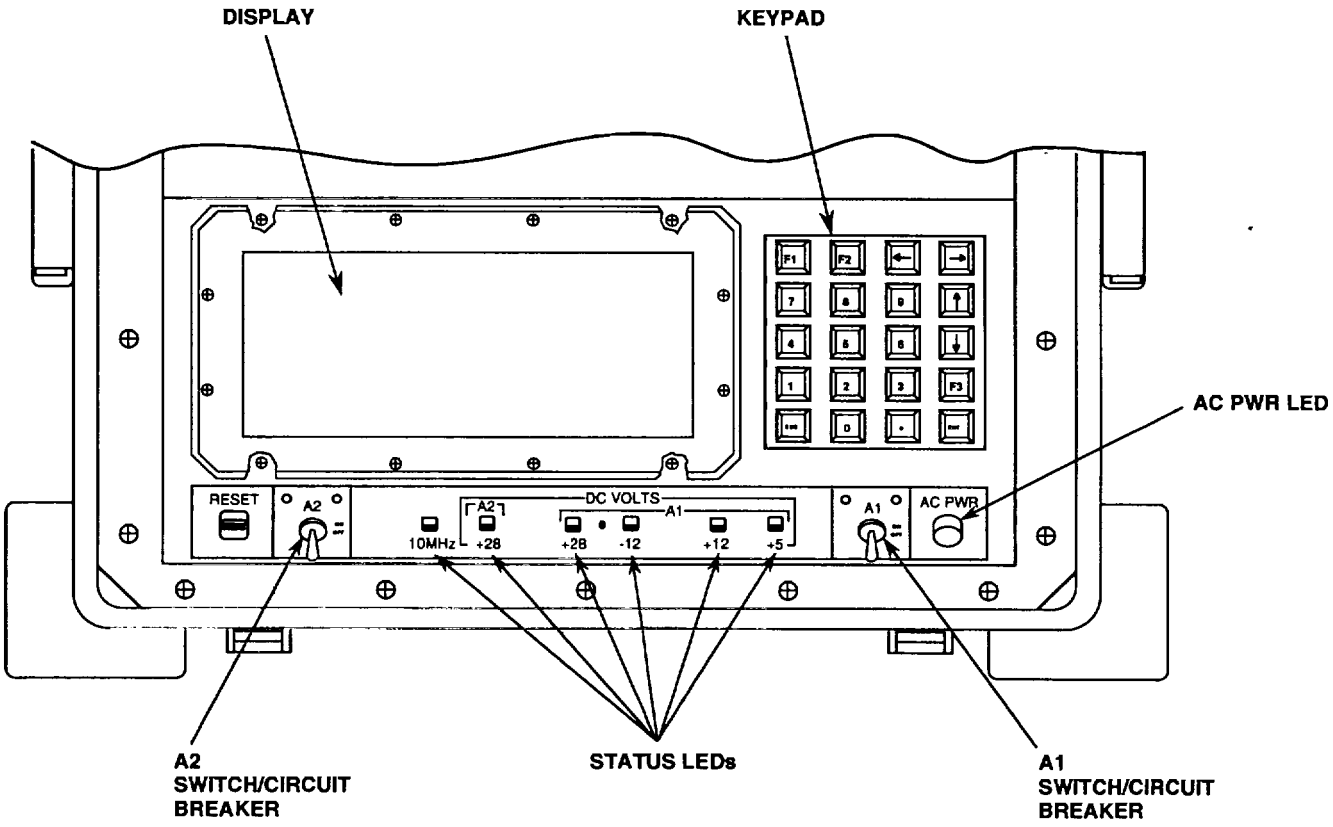


FIGURE 5-43. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
a.	Power Amplifier Test.		
1.	Ensure that all switches are in the "OFF" position.		
2.	Connect W18P2 to J2 on T-1573(V)2/AR. Connect W18P1 to W8P2.		
3.	Connect W8P1 to J8 on TS-4398/U to provide tuning and output connections with AN/URN-214.		
4.	Connect a cable from J4 on T-1573(V)Z/AR to the input of the 40 db attenuator.		

5-6.4.5 Power Amplifier Test (cont)

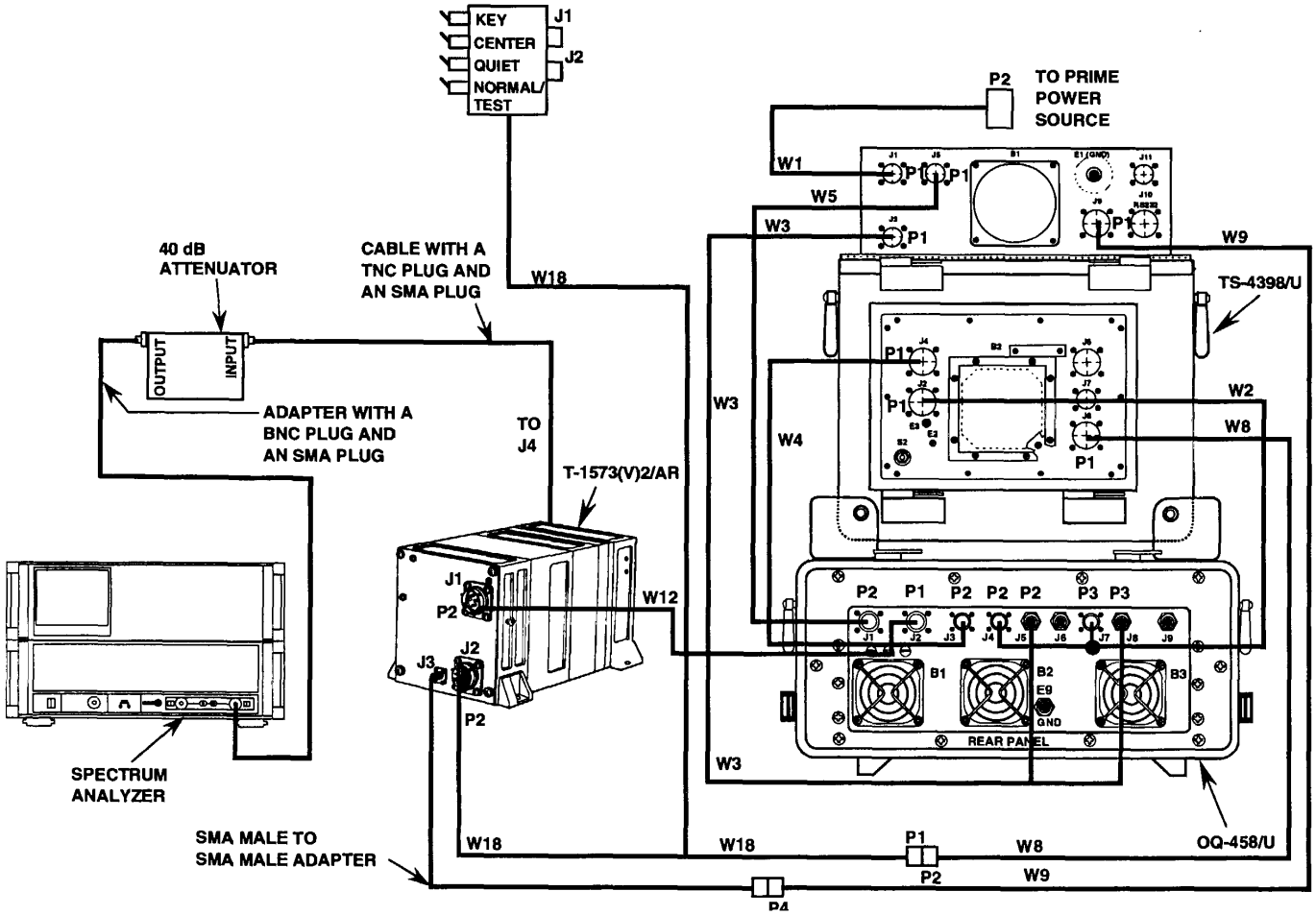
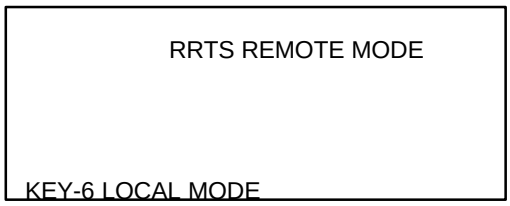


FIGURE 5-44. T-1573 (V) 2/AR POWER AMPLIFIER TEST INTERCONNECTIONS.

5-6.4.5 Power Amplifier Test (cont)

Item	Action	Normal Indication	Corrective Action
5.	Connect a cable from the 40 dB attenuator output to the input of the spectrum analyzer.		
6.	Set the spectrum analyzer to a 250 MHz center frequency.		
7.	Set the spectrum analyzer frequency span to 65 MHz.		
8.	Set the spectrum analyzer to 1 dB/division.		
9.	Select MAXIMUM HOLD on the spectrum analyzer.		
10.	On TS-4398/U, set A1 ON/OFF to ON.	The screen shown below is displayed.  	If the screen shown below is not displayed or is not paragraph 5-6.1.1.
11.	Check that the AC PWR LED is lit.	The LED is lit.	If the LED is not Lit, refer to paragraph
12.	Monitor the status LEDs.	ALL LEDs should be lit, except the LED for +28 (A2).	If the appropriate LEDs are not Lit, refer to paragraph 5-6.1.3.
13.	Set A2 ON/OFF to ON.	The LED for +28 (AZ) is lit.	If the LED for +28 (AZ) is not lit, then check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the 0Q-458/U power supply test (refer to paragraph 5-6.3.1).

5-6.4.5 Power Amplifier Test (cont)

Item	Action	Normal Indication	Corrective Action
14.	On TS-4398/U, select LOCAL MODE by pressing "6" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

RRTS LOCAL MODE

KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE

15.	Select DS SUPPORT MAINTENANCE CONFIG. by pressing "5" on the keypad.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

DIRECT SUPPORT MAINTENANCE CONFIG.

KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION

KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME

16. Position the switches on W18 to tune by setting CENTER to ON, QUIET to ON, NORM/TEST to NORM, and KEY to OFF.

17. Select TUNE TRANSMITTER by pressing "2" on the keypad.

18. Tune T-1573(V)2/AR to 225.000 MHz.

NOTE

Do not leave "KEY" position on for more than 1 minute or damage to unit may occur.

19. Position the switches on W18 by setting CENTER to ON, QUIET to ON, NORM/TEST to TEST, and KEY to ON.

20. Monitor the spectrum analyzer for -13 dBm + 5 dB. Position switch KEY on W18 to OFF to unkey transmitter.

21. Repeat items 16 through 20 for 250 and 279.975 MHz.

5-6.4.5 Power Amplifier Test (cont)

Item	Action	Normal Indication	Corrective Action
22.	Select the condition which applies and take the action.	The T-1573(V)Z/AR output is correct. Go to the next item. Reperform the T-1573(V)2/AR output test (refer to paragraph 5-6.4).	If the T-1573(V)Z/AR output on the spectrun analyzer is not correct, replace the power amptifier module (refer to lt paragraph 5-8). Reperform the power amplifier test (refer to paragraph 5-6.4.5).
23.	On TS-4398/U, set A2 ON/OFF to OFF.		

5-6.5 Radio Receiver, R-2500/AR, Module Fault Isolation Test. This test is used to troubleshoot R-2500/AR to a replaceable module. To accomplish the R-2500/AR module fault isolation test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)l or equivalent
- Digital Multimeter, AN/GSM-64D or equivalent
- Signal Generator, SG1207/U or equivalent
- BNC female to double banana plug adapter
- SMA male to SMA male adapter
- BNC plug to BNC plug cable
- SMA male to BNC female adapter

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS

To troubleshoot R-2500/AR to a replaceable module, it must first be removed from RTTG, OQ-458/U. Ensure that power is off.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies. Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the R-2500/AR module fault isolation test are found in cable assembly case CY-8676/U unless otherwise noted.

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

NOTE

The interconnections for the R-2500/AR module fault isolation test are shown in figures 5-46 through 5-49. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-45. Figure 5-46 shows the R-2500/AR electronic component module output test interconnections. Figure 5-47 shows the R-2500/AR IF output test interconnections. Figure 5-48 shows the R-2500/AR A5J5 output test interconnections. Figure 5-49 shows the R-2500/AR offset test

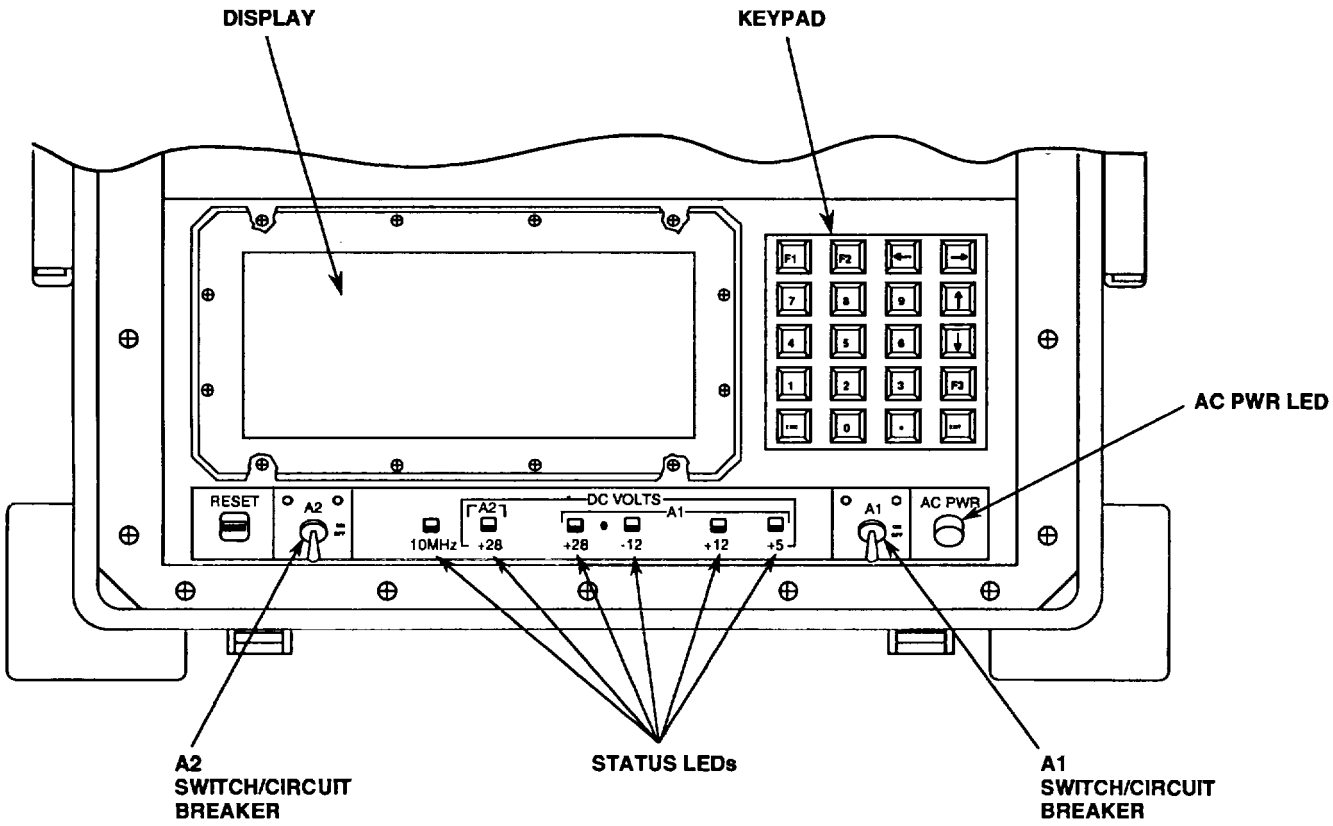
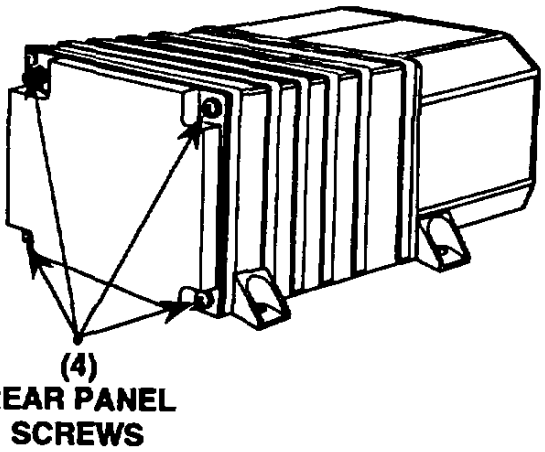


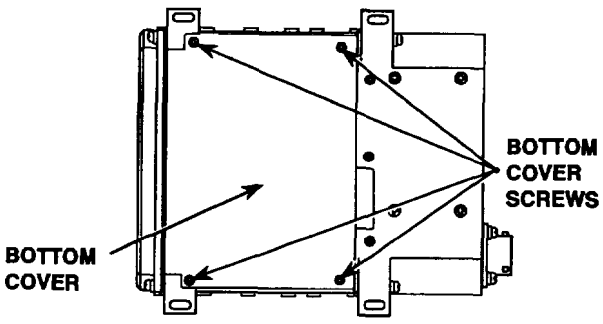
FIGURE 5-45. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
1.Before operating AN/URM-214, perform the AN/URN-214 assembly and preparation for use and self-test procedures. Leave cables W1 through W5 connected after performing these procedures.			

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

Item	Action	Normal Indication	Corrective Action
2.	Ensure that all switches are in the "OFF" position.		
3.	Using a No. 1 Phillips screwdriver, remove the four short screws along the edges of the bottom cover.		
4.	It may be necessary to use a No. 2 Phillips screwdriver to slightly loosen several of the four rear panel screws to free the bottom cover.		
5.	Remove the bottom cover. If cables are suspected malfunctioning, remove and test continuity using procedures found in General Shop Practice Manual TO 00-25-234/TM 43-0158.		
a.	Electronic Coponent Assebly Power Module Test.		
(1)	Connect W15PZ to J1 on R-2500/AR. Connect W15P1 to W12P2. (See figure 5-46.)		
(2)	Connect W12P1 to J2 on OQ-458/U to provide 28 Vdc from AN/URN-214.		
(3)	Connect an adapter to JZ on R-2500/AR and to W9P5.		
(4)	Connect W9P1 to J9 on TS-4398/U to provide a 10 Mhz, 0 dBm ± 3 dB reference signal.		
(5)	Connect a cable to J3 on R-2500/AR and to the signal generator output.		
(6)	Connect W16P2 to J4 on R-2500/AR. Connect W16P1 to U6P3.		
(7)	Connect W6P1 to J6 of TS-4398/U to provide tuning and output connections with AN/URM-214.		
(8)	Ground the digital multimeter to R-2500/AR.		
(9)	Turn on the digital multimeter.		





5-6.5 R-2500/AR Module Fault Isolation Test (cont)

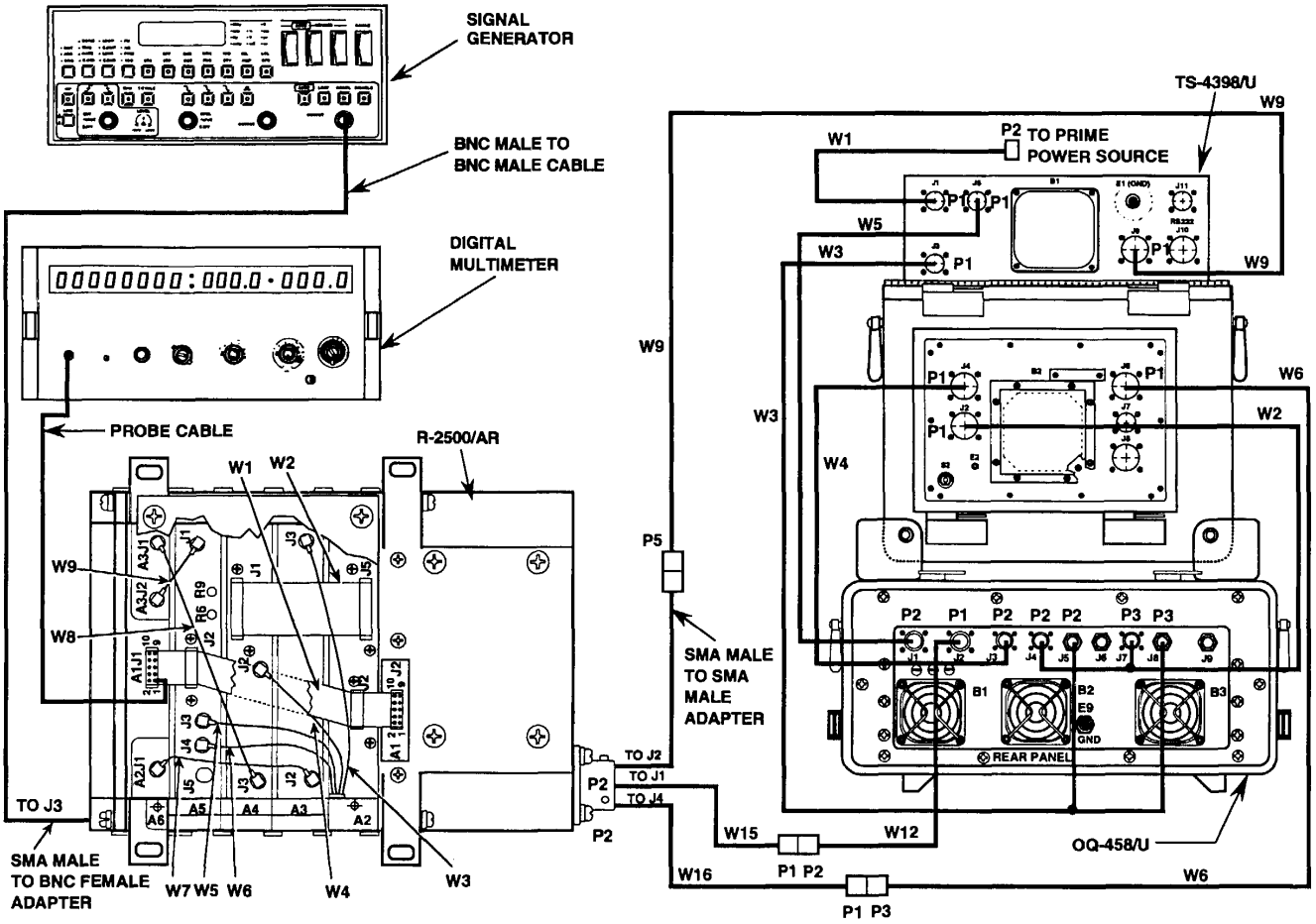


FIGURE 5-46. R-2500/AR ELECTRONIC COMPONENT ASSEMBLY OUTPUT TEST INTERCONNECTIONS.

5-6.5 R-2400/AR Module Fault Isolation Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
(10)	On TS-4398/U, set Al ON/OFF to ON.	The screen shown below is displayed.	If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.
(11)	Check that the AC PWR LED Is lit.	The LED is lit.	If the LED is not lit, refer to paragraph
(12)	Monitor the status LEDs.	All LEDs should be Lit, except the LED for +28 (A2).	If the appropriate LEDs are not lit, refer to paragraph 5-6.1.3.
(13)	Set A2 ON/OFF to ON.	The LED for +28 (A2) is Lit.	If the LED for +28 (A2) is not lit, check cables for proper connections. If the LED for +28 (A2) is not lit after checking cables for proper connections, then perform the OQ-458/U power supply test (refer to paragraph 5-6.3.1).
(14)	Set the digital multimeter to dc volts.		

RRTS REMOTE NODE

KEY-6 LOCAL NODE

NOTE

The location of pins 1, 2, 9, and 10 are marked on the Al and A6 modules in figure 5-46. The first row includes pins 1, 3, 5, 7, and 9. The second row includes pins 2, 4, 6, 8, and 10.

(15)	Without removing any plugs, connect the probe sequentially to the pins identified in the following table. These pins are accessible along the top surface of the plug.	If voltages are obtained, proceed to procedure b.	If expected output voltages are not obtained, remove and replace the electronic component assembly power module (refer to paragraph 5-8). Reperform the electronic component assembly power module (A1) test (refer to paragraph 5-6.5, procedure

A6A1J1 PIN	EXPECTED OUTPUT
7	+15.0 Vdc + 0.5 Vdc
5	-15.5 Vdc + 0.5 Vdc
6	+5.5 Vdc ± 0.5 Vdc

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

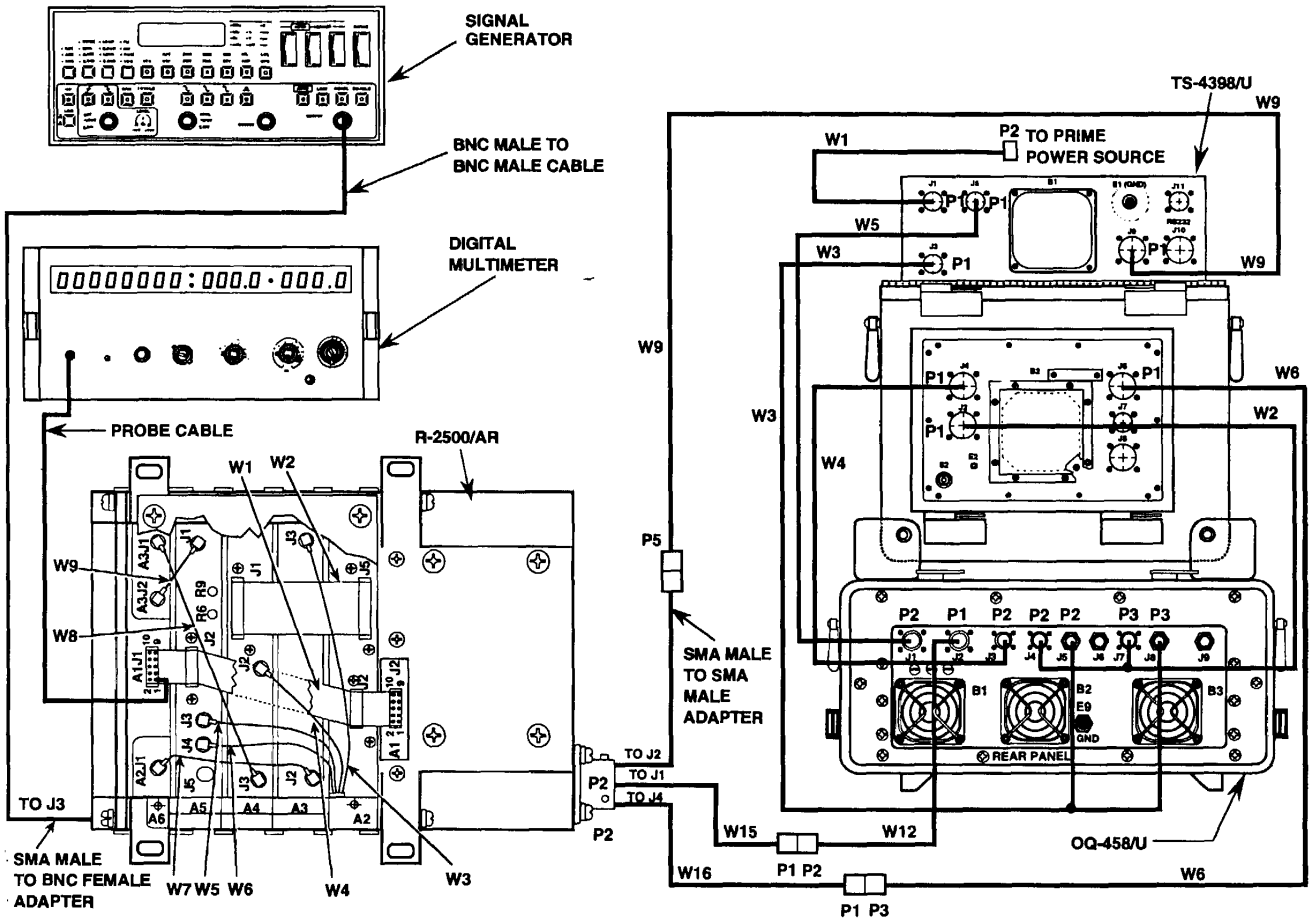


FIGURE 5-47. R-2500/AR PREDETECTION OUTPUT TEST INTERCONNECTIONS.

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

b. Predetection Output Test.

CAUTION

Do not exceed a level of +10 dBm at the J3 connector from the signal generator. Exceeding +10 dBm will result in R-2500/AR component damage.

(1) Turn on the signal generator.

(2) On TS-4398/U, select LOCAL MODE by pressing “6” on the keypad. paragraph 5-6.1.1.

The screen shown below is displayed. readable, refer to

If the screen shown below is not displayed or is not

```
RRTS LOCAL MODE
KEY-1 SYSTEM LOOP TEST CONFIGURATION
KEY-2 ISOLATION TEST CONFIGURATION
KEY-3 SELF TEST
KEY-4 DEFAULTS MODIFICATION
 KEY-5 DS SUPPORT MAINTENANCE CONFIG.

KEY-7 REMOTE MODE
```

(3) Select DS SUPPORT MAINTENANCE CONFIG. by pressing “5” on the keypad.

The screen shown below is displayed.

If the screen shown below is not displayed or is not readable, refer to paragraph 5-6.1.1.

```
DIRECT SUPPORT MAINTENANCE CONFIG.
KEY-1 SWEEP TUNE TRANSMITTER
KEY-2 TUNE TRANSMITTER
KEY-3 TUNE RECEIVER
KEY-4 SDT TEST FIXTURE CONFIGURATION
KEY-6 ABORT TEST IN PROGRESS
KEY-7 HOME
```

(4) Select TUNE RECEIVER by pressing “3” on the keypad.

(5) Tune R-2500/AR and the signal generator to the first frequency (225.000 MHz) listed in table 5-6.

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

TABLE 5-6. R-2500/AR BANDS AD LO INJECTION FREQUENCIES

BAND	TUNED FREQ (Mhz)	LO1 (Mhz)	LOZ (Mhz)
1	225.000	321.25	79.250
1	259.975	355.00	78.025
2	260.000	356.25	79.250
2	299.975	395.00	78.025
3	300.000	396.25	79.250
3	349.975	445.00	78.025
4	350.000	446.25	79.250
4	399.975	495.00	78.025

(6)	Adjust the signal generator output for a Level of -104 dBm.		
(7)	Turn on the spectrum analyzer.		
(8)	Connect W17 between the input of the spectrum analyzer and A5J5.(See figure 5-48.)		
(9)	Set the spectrum analyzer to: Center Frequency of 17 MHz, Frequency Span of 100 kHz, Resolution Bandwidth of 3 kHz, video bandwidth of 100 Hz and Reference Level of -10 dBm	The amplitude should be approximately -40 dBm.	If the output Level is Less than -50 d8m, note the R-2500/AR and signal generator frequency but continue the test.
(10)	Repeat items 4 through 9 for the remaining frequencies in table 5-6.		
(11)	Repeat items 4 through 9 for the following frequencies: 233.000 Mhz, 233.025 Mhz, 382.000 Mhz, 383.000 Mhz, and 2T7.775		
(12)	Select the condition which applies and take the action.	Output is present at all frequencies. Disconnect W17P1 from A5J5 and perform the offset test (refer to paragraph 5-6.5, procedure (c)).	If there is no output on any band, disconnect W17P1 from A5J5 and perform the no output on any band test (refer to paragraph 5-6.5.3). If there is no output on bands 1 and 2, perform the no output on bands 1 and Z test (refer to paragraph 5-6.5.2). If there is no output on bands 3 and 4, perform the no output on bands 3 and 4 test (refer to paragraph 5-6.5.3).

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

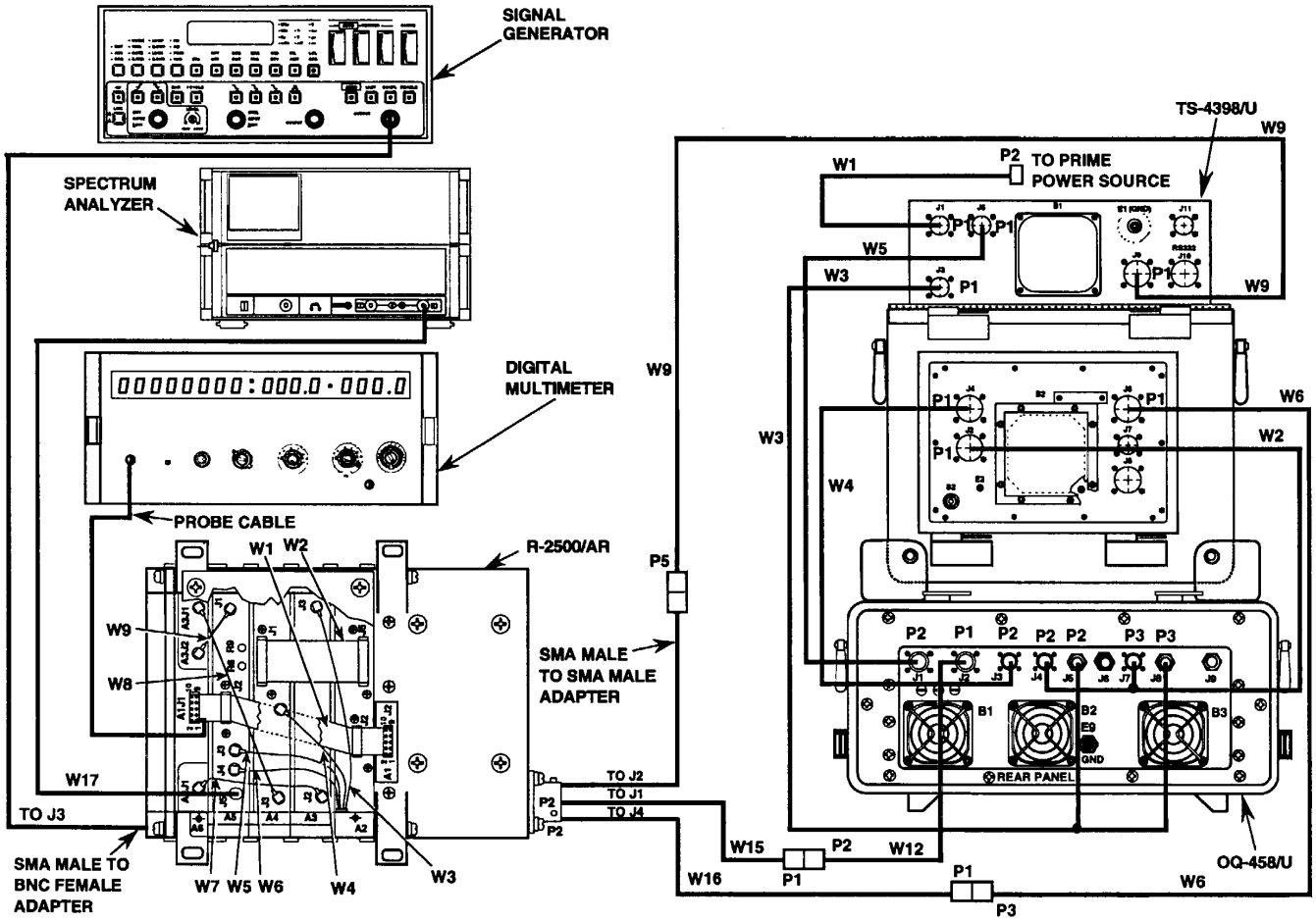


FIGURE 5-48. R-2500/AR A5J5 OUTPUT TEST INTERCONNECTIONS.

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
(12)	(cont)		If there is no output on a single band with other bands good, or no output on bands 1 and 3, or no output on bands 2 and 4, disconnect W17P1 from A5J5, and perform the no output on a single band with other bands good, or no output on bands 1 and 3, or no output on bands 2 and 4 test (refer to paragraph 5-6.5.4). If there is no output at one or more frequencies in item 11, go to item 14. If there is insufficient IF output level (Less than -50 dBm), go to item 13.
(13)	Observe on the spectrum analyzer display that there is no output on a single frequency or several unrelated frequencies.		With no output on a single frequency or several unrelated frequencies, remove and replace the decoder module assembly (refer to paragraph 5-8). If the problem persists after removing and replacing the decoder module assembly, remove and replace the first synthesizer module assembly (refer to paragraph 5-8). If the problem persists after removing and replacing the decoder module and first synthesizer module, assembly (refer to paragraph 5-8).
(14)	Observe on the spectrum analyzer display that there is insufficient IF output level on a single band or insufficient IF output level on two or more bands.	If there is insufficient IF output level on a single band, remove and replace the preselector module assembly (refer to paragraph 5-8).	If there is insufficient IF output Level on two or more bands, disconnect W17P1 from A5J5 and perform insufficient IF output level on two or more bands test (refer to paragraph 5-6.5.5).

5-6.5 R-2500/AR Module Fault Isolation Test (cant)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
c.	Offset Test.	**CAUTION** Do not exceed a level of +10 dBm at the J3 connector from the signal generator. Exceeding +10 dBm will result in R-2500/AR component damage.	
(1)	Select TUNE RECEIVER by pressing "3" on the keypad.		
(2)	Tune R-Z500/AR and the signal generator to 225 MHz.		
(3)	Adjust the output level of the signal generator to 40 dBm.		
(4)	Turn on the digital multimeter.		
(5)	Connect W16P3 to the digital multimeter input via an adapter.		
(6)	Set the digital multimeter to the dc volts.		
		NOTE Before proceeding with the measurements below, assure the receiver has had power applied continuously for 30 minutes.	
(7)	Note the offset voltage on the digital multimeter. and + 0.5 Vdc. Go to the next item.	A steady dc voltage is obtained between - 0.5 Vdc	If a randomly varying voltage is obtained, or a steady dc voltage outside the specified range, remove and replace the IF module assembly (refer to paragraph 5-8). Reperform the offset test (refer to paragraph 5-6.5, procedure ©).

TABLE 5-7. TUNING FREGUENCIES AND EXPECTED VOLTAGES.

FREQENCY	EXPECTED VOLTAGE
F + 7.2 Khz	+2.5 Vdc + 0.20 Vdc
F + 2.4 Khz	+0.833 Vdc + 0.10 Vdc
F - 2.4 Khz	-0.833 Vdc + 0.10 Vdc
F - 7.2 Khz	-2.5 Vdc ± 0.20 Vdc

5-6.5 R-2500/AR Module Fault Isolation Test (cant)

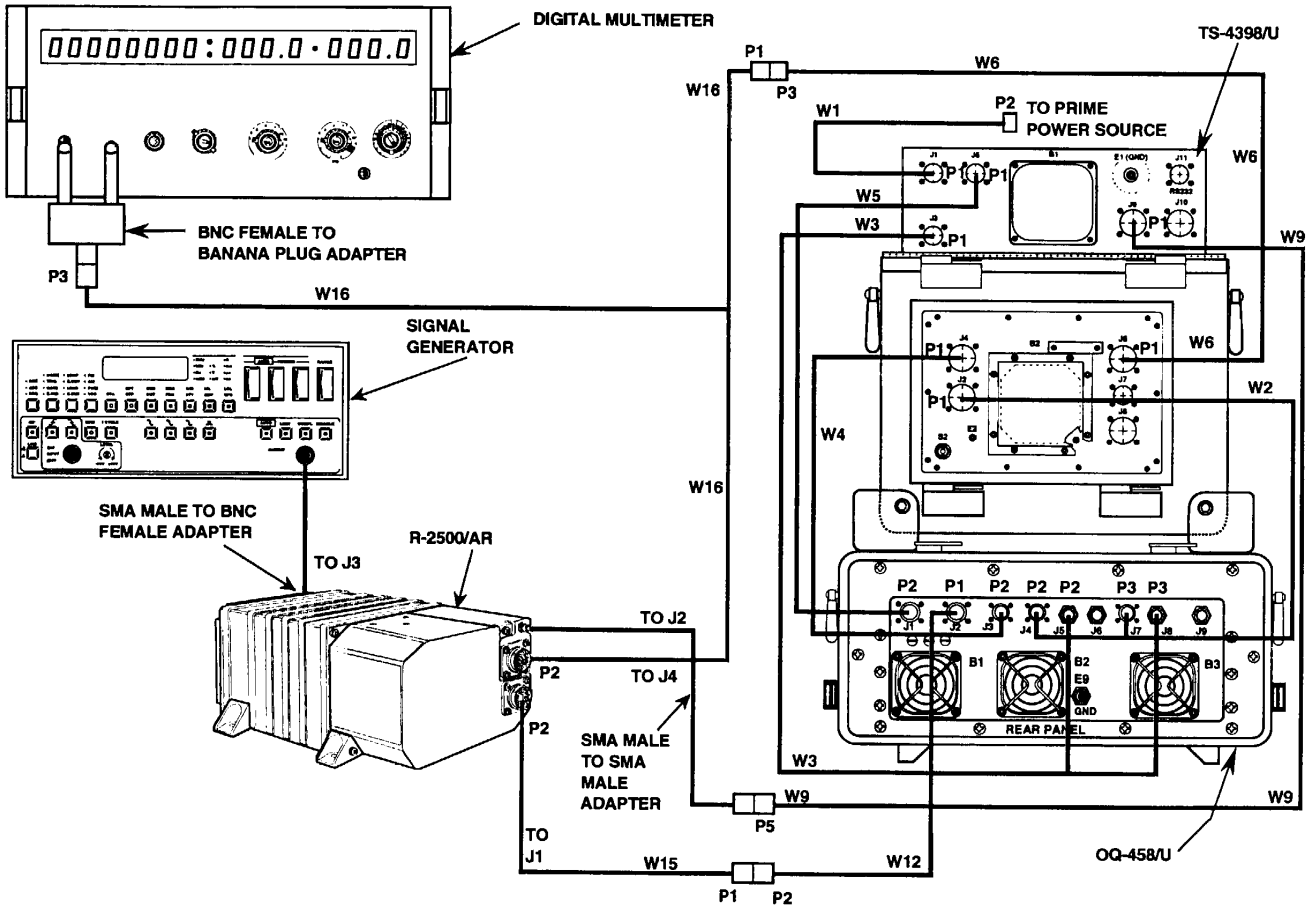


FIGURE 5-49. R-2500/AR OFFSET TEST INTERCONNECTIONS.

5-6.5 R-2500/AR Module Fault Isolation Test (cont

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

NOTE

F is the frequency from item 2. Keep R-2500/AR tuned to this frequency throughout the remainder of this test.

(8) Tune the signal generator to each of the frequencies in table 5-7. Subtract the offset voltage in item 8 from the measured voltages. Check that the corresponding output dc voltage levels are within the expected range.

If expected outputs are not obtained, remove and replace the IF module assembly (refer to paragraph 5-8). Reperform the offset test (refer to paragraph 5-6.5, procedure ©).

(9) Disconnect W16P3 from the multimeter and connect W16P4 to the multimeter.

(10) Tune signal generator to 225 MHz.

(11) Note the offset voltage on the multimeter.

(12) Tune the signal generator to each of the frequencies in table 5-8. Subtract the offset voltage from the measured voltages. Check that the corresponding output dc voltage levels are within the expected range.

TABLE 5-8. TUNING FREQUECIES AND EXPECTED VOLTAGES.

FREQUENCY	EXPECTED VOLTAGE
F + 7.2 Khz	-2.5 Vdc + 0.20 Vdc
F + 2.4 Khz	-0.833 Vdc ± 0.10 Vdc
F - 2.4 Khz	+0.833 Vdc ± 0.10 Vdc
F - 7.2 Khz	+2.5 Vdc + 0.20 Vdc

(13) Turn off the digital multimeter.

(14) Turn off the signal generator.

(15) On TS-4398/U, set A2 ON/OFF to OFF.

(16) Set Al ON/OFF to OFF.

(17) Disconnect W15P2 from J1 on R-2500/AR.

5-6.5 R-2500/AR Module Fault Isolation Test (cont)

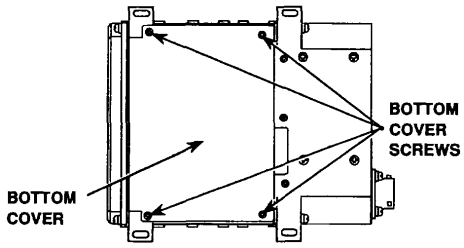
ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

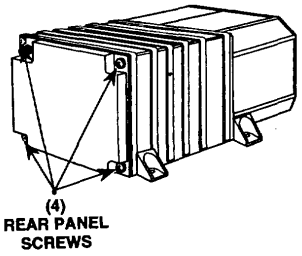
(18) Disconnect the adapter from J2 on R-2500/AR and from W9P5.

(19) Disconnect W16P2 from J4 on R-2500/AR.

(20) Disconnect the cable from J3 on R-2500/AR.

(21) Position the bottom cover in place.





(22) Using a No. 2 Phillips screwdriver, tighten the four rear panel screws.

(23) Secure the bottom cover by using a No. 1 Phillips screwdriver to install and tighten the four short screws along the edges of the bottom cover.

5-6.5.1 Radio Receiver, R-2500/AR, No Output On Any Band Test.

This test is used to test R-2500/AR when there is no output on any band. To accomplish the no output on any band test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)l or equivalent
- Frequency Counter, AN/USM-459A or equivalent
- SMA male to SMA male adapter
- BNC male to SMA male cable
- BNC male to BNC female cable
- SMA male to BNC female adapter

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Radio Receiver, R-2500/AR, is in maintenance configuration from previous test.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the no output on any band test are found in cable assembly case CY-8676/U unless otherwise noted.

5-6.5.1 No Output On Any Band Test (cont)

NOTE

The interconnections for the no output on any band test are shown in figures 5-51 through 5-54. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-50. Figure 5-51 shows the R-2500/AR no output on any band test interconnections. Figure 5-52 shows the R-2500/AR A3J2 output test interconnections. Figure 5-53 shows the R-2500/AR A4J3 output test interconnections. Figure 5-54 shows the R-2500/AR A6A3J2 output test interconnections.

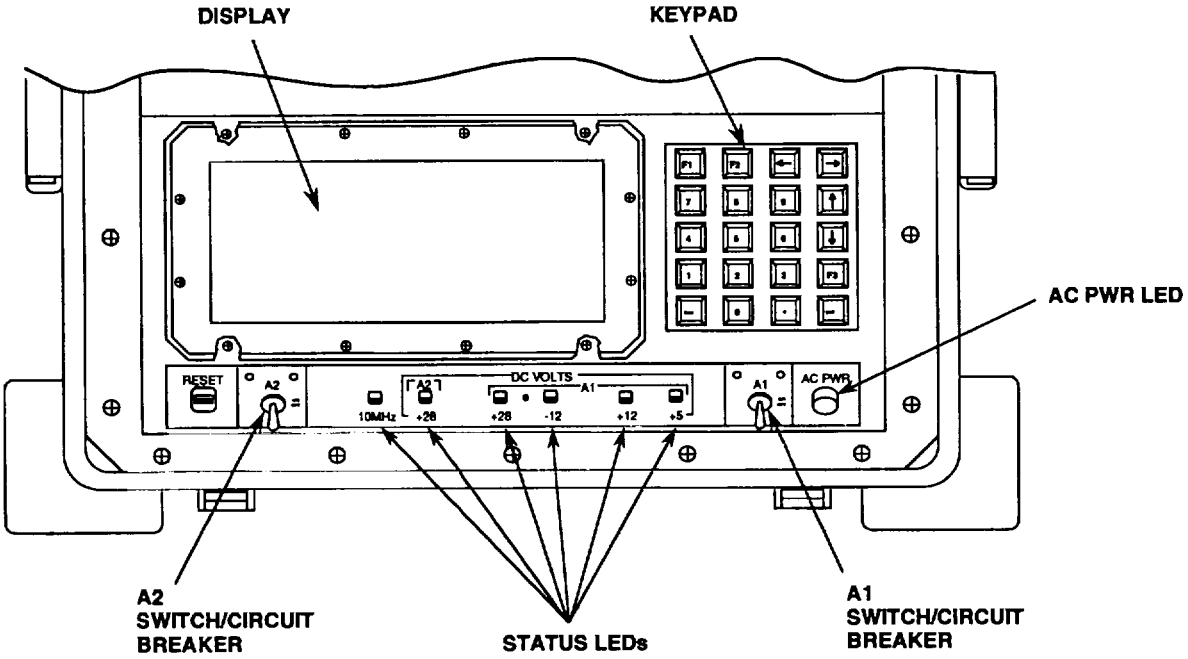


Figure 5-50. TS-4398/U CONTROLS AND INDICATORS.

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

No Output On Any Band Test.

1. Select TUNE RECEIVER by pressing “3” on the keypad.

2. Tune R-2500/AR to the first frequency in table 5-6.
   On R-2500/AR, disconnect the W7 coax connector at A3J2.

5-6.5.1 No Output On Any Band Test (cont)

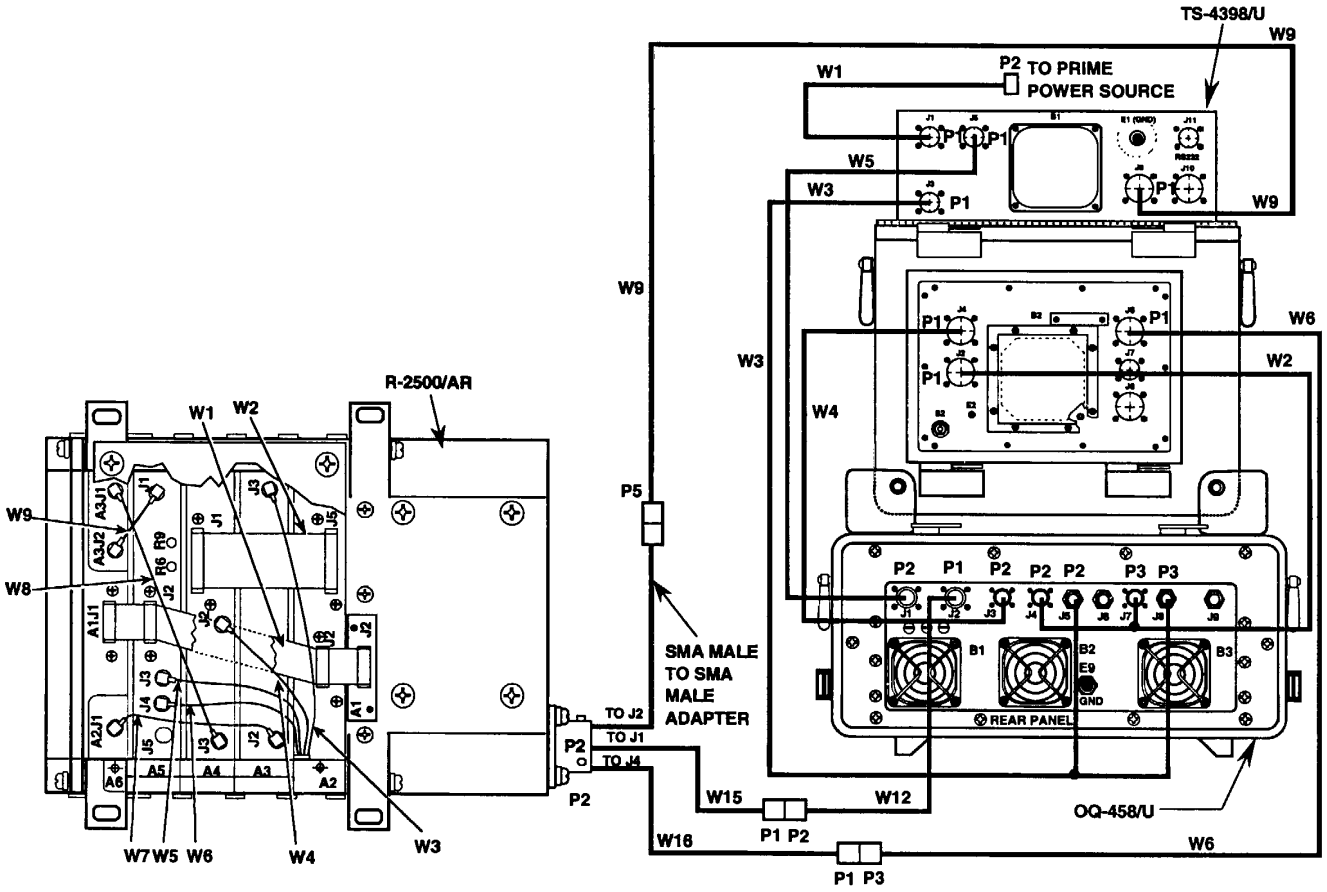


FIGURE 5-51. R-2500/AR NO OUTPUT ON ANY BAND TEST INTERCONNECTIONS.

5-6.5.1 No Output On Any Band Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
4.	Connect W17P2 to the frequency counter. (See figure 5-52.)		
5.	Turn on the frequency counter.		
6.	Connect W17P1 to A3J2.		
7.	Check all the frequencies listed in table 5-6. Select the condition which applies and take the action.	The reading on the frequency counter matches the L01 frequencies for the tuned frequencies listed in table 5-6. Go to the next item.	If the reading on the frequency counter does not match the L01 frequencies for the tuned frequencies in table 5-6, remove and replace the first synthesizer module assembly (refer to paragraph 5-8). Reperform the no output on any band test (refer to paragraph 5-6.5.1). If the first synthesizer module assembly has been replaced and the frequency still does not match the L01 frequencies for the tuned frequencies in table 5-6, remove and replace the decoder module assembly (refer to paragraph 5-8). Reconnect W7 coax connector at A3J2, then perform the predetection output test (refer to paragraph 5-6.5, procedure (b)).
8.	Disconnect W8 at A4J3.		
9.	Disconnect W17P1 from A3JZ.		
10.	Connect W17PI to A4J3. (See figure 5-53.)		
11.	Check all frequencies listed in table 5-6. Select the condition which applies and take the action.	The frequencies match the LOZ frequencies for the tuned frequencies in table 5-6. Go to the next item.	If the reading on the frequency counter does not match the LO2 frequencies for the tuned frequencies in table 5-6, remove and replace the second synthesizer module assembly (refer to paragraph 5-8). Reperform the no output on any band test (refer to paragraph 5-6.5.1). If the frequencies are correct after replacing the second synthesizer module assembly, reconnect W7 coax connector at A3J2 and W8 coax connector at A4J3, then perform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

5-6.5.1 No Output On Any Band Test (cont)

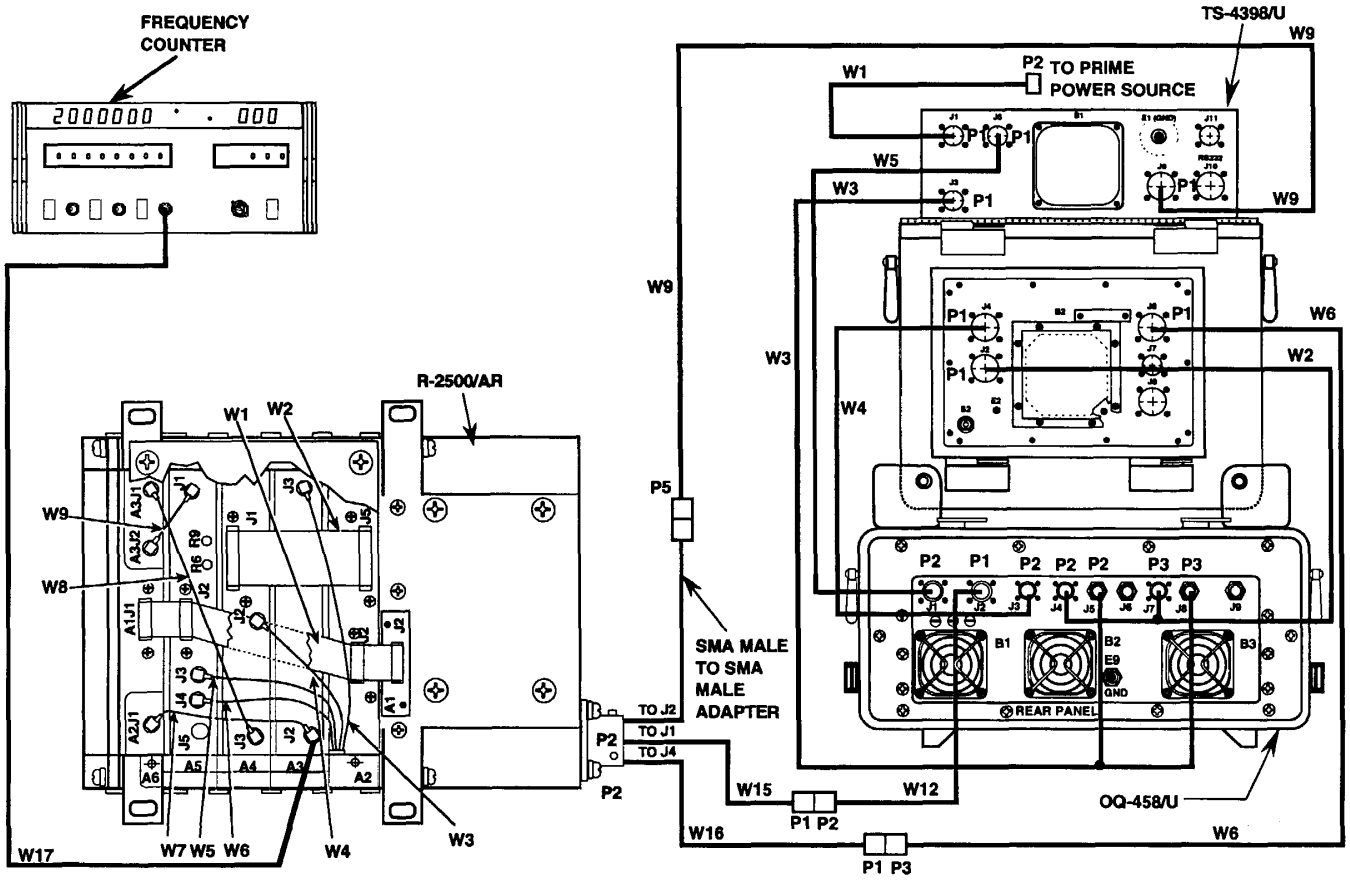


FIGURE 5-52. R-2500/AR A3J2 OUTPUT TEST INTERCONNECTIONS.

5-6.5.1 No Output On Any Band Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
11.	(cont)		If the second synthesizer module assembly has been replaced and the frequencies still do not match the L02 frequencies for the tuned frequencies in table 5-6, remove and replace the decoder module assembly (refer to paragraph 5-8). Reconnect W7 coax connector at A3J2 and U8 coax connector at A4J3, then perform the predetection output test (refer to paragraph 5-6.5, procedure (b)).
12.	Reconnect W7 at A3J2.		
13.	Disconnect W17P1 from A4J3. Reconnect W8 at A4J3.		
14.	Connect J3 on R-2500/AR to the signal generator output. (See figure 5-54.)		
15.	Disconnect W9 at A6A3J2.		
16.	Connect W17Pl to A6A3J2.		
17.	Disconnect W17P2 from the frequency counter. Connect W17P2 to the spectrum analyzer.		
	CAUTION Do not exceed a level of +10 dBm at the J3 connector from the signal generator. Exceeding +10 dBm will result in R-2500/AR component damage.		
18.	Tune the signal generator and R-2500/AR to 300 MHz and inject a -43 dBm signal.		
19.	Observe the spectrum analyzer. displays a 17 Mhz signal at 25 dBm. Reperform the R-2500/AR module fault isolation test (refer to paragraph 5-6.5).	The spectrum analyzer -25 dBm, remove and replace the preselector module assembly (refer to paragraph 5-8). Reconnect W9 coax cable to A6A3J2.	If the signal is Less than Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)). If the signal is greater than -25 dBm, remove and replace the IF module assembly (refer to paragraph 5-8). Reconnect W9 coax cable to A6A3J2. Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

5-6.5.1 No Output On Any Band Test (cont)

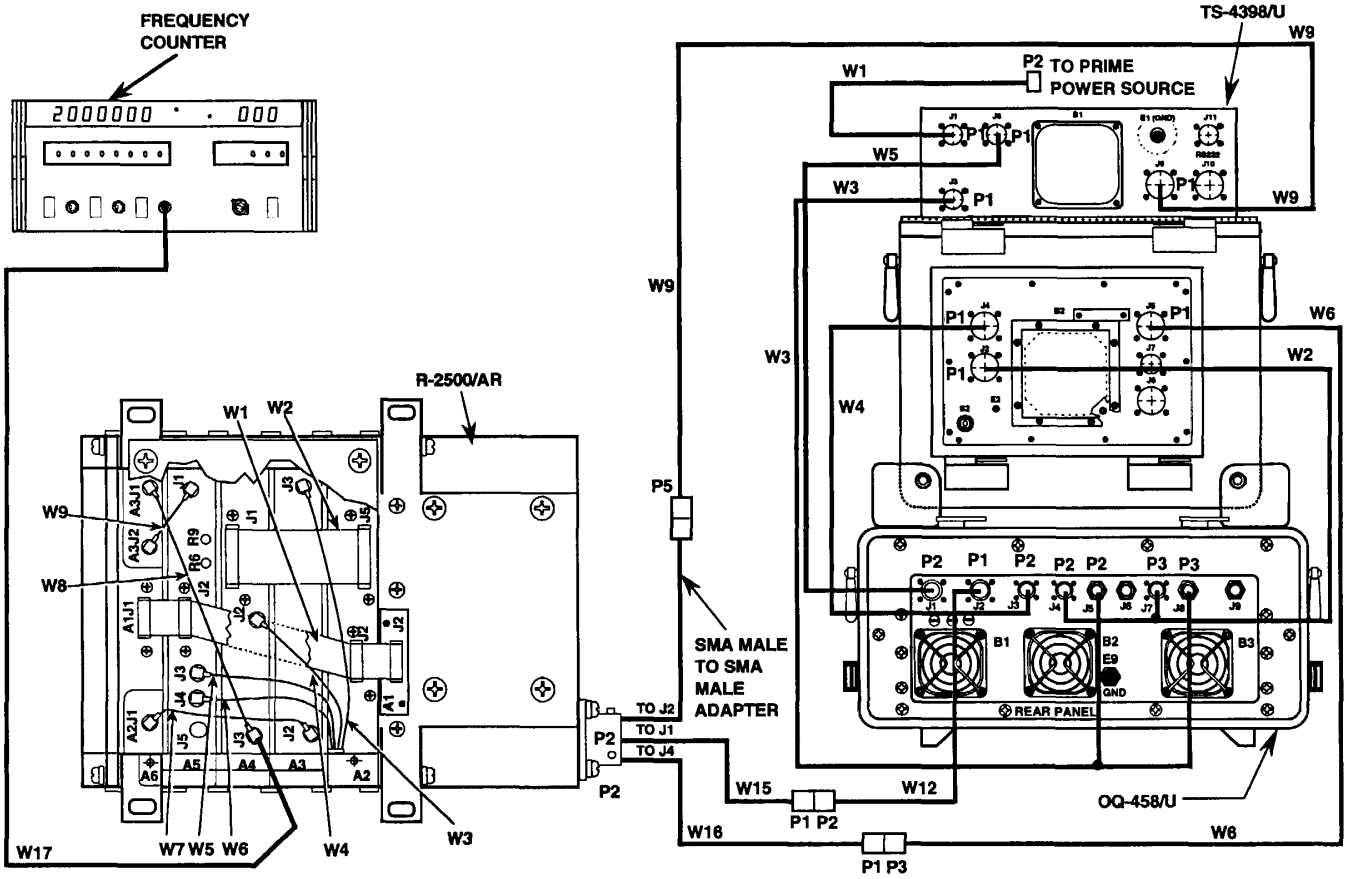


FIGURE 5-53. R-2500/AR A4J3 OUTPUT TEST INTERCONNECTIONS.

5-6.5.1 No Output On Any Band Test (cont)

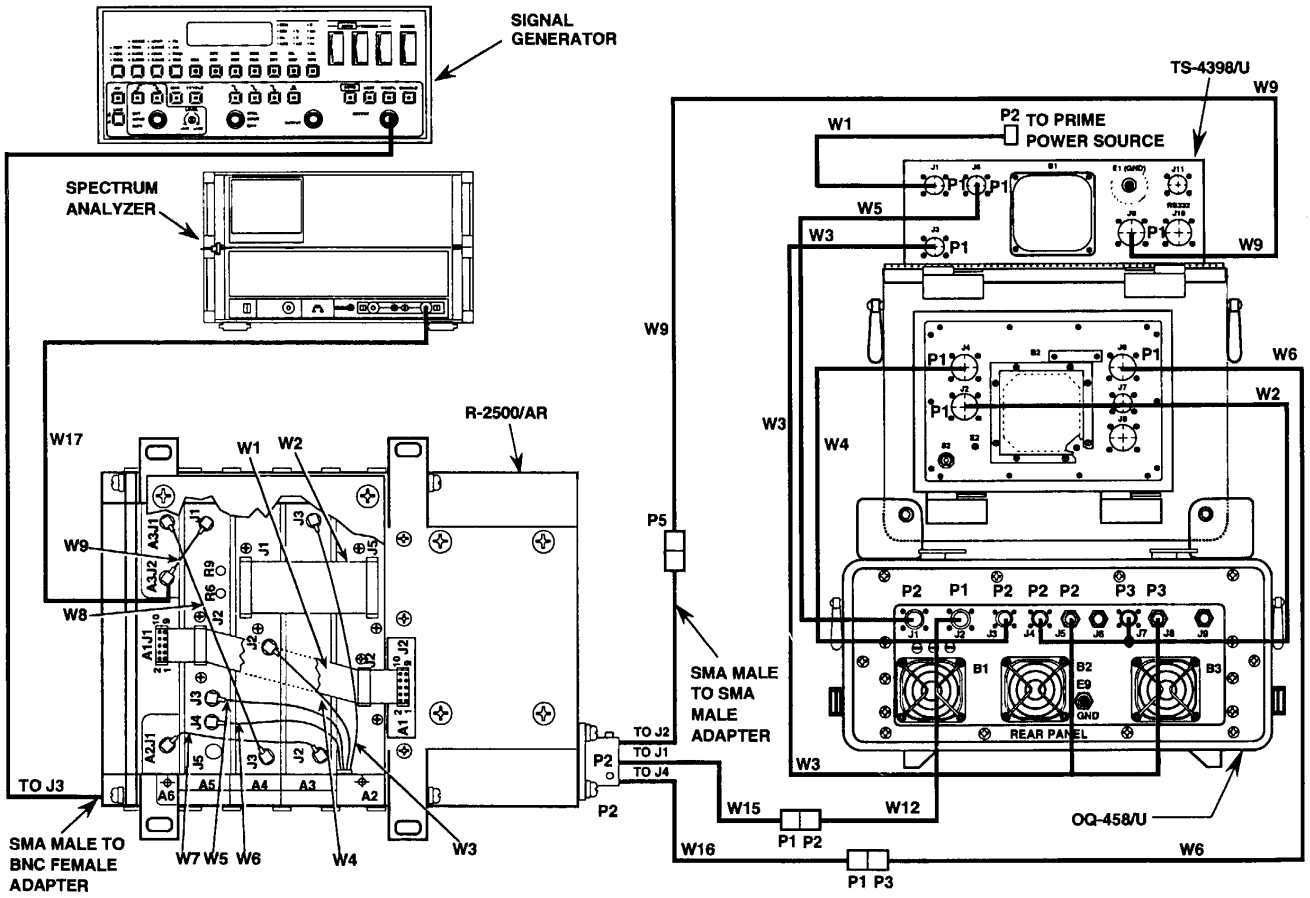


FIGURE 5-54. R-2500/AR A6A3J2 OUTPUT TEST INTERCONNECTIONS.

5-6.5.2 Radio Receiver, R-2500/AR, No Output On Bands 1 and 2 Test. This test is used to test R-2500/AR when there is no output on bands 1 and 2. To accomplish the no output on bands 1 and 2 test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)1 or equivalent
- Digital Multimeter, AN/GSM-64D or equivalent
- Signal Generator, SG1207/U or equivalent
- SMA male to SMA male adapter
- BNC male to SMA male cable
- BNC male to BNC female cable

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS

Radio Receiver, R-2500/AR, is in maintenance configuration from previous testing.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the no output on bands 1 and 2 test are found in cable assembly case CY-8676/U unless otherwise noted.

5-6.5.2 No Output On **Bands 1 and 2 Test (cont)**

NOTE

The interconnections for the no output on bands 1 and 2 test are shown in figures 5-56 and 5-57. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-55. Figure 5-56 shows the no output on bands 1 and 2 test interconnections. Figure 5-57 shows the A6AlJ1 output test interconnections.

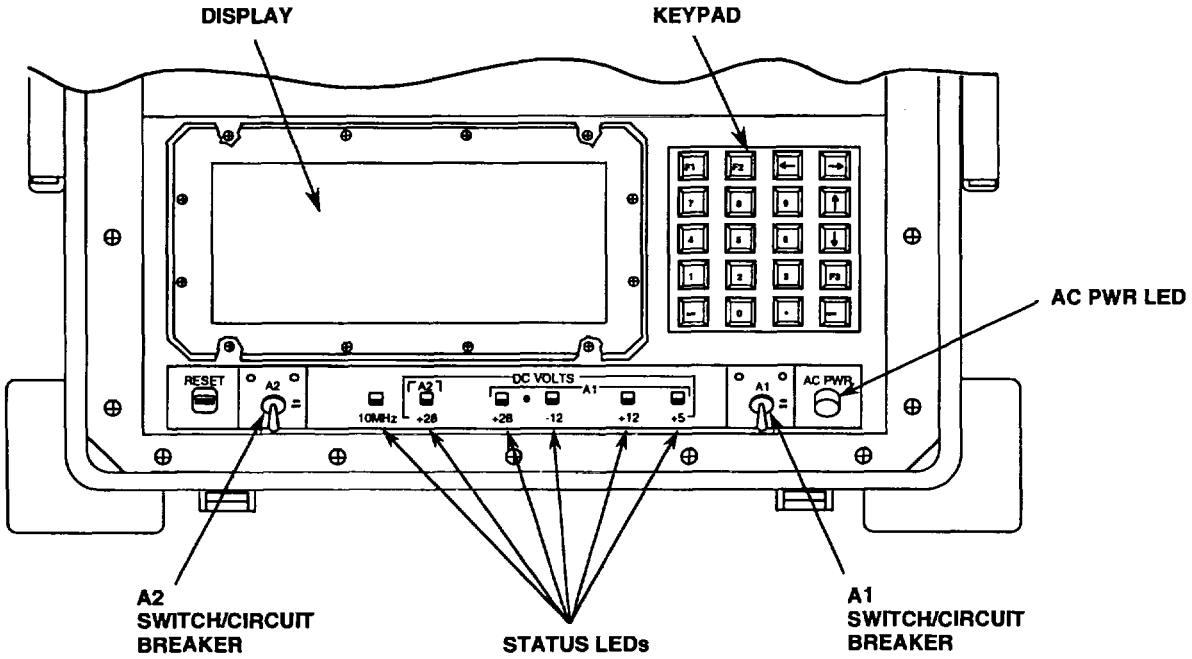


Figure 5-55. TS-4398/U CONTROLS AND INDICATORS.

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

No Output On Bands 1 and Z Test.

1. Select TUNE RECEIVER by pressing “3” on the keypad.

2. Adjust the signal generator output for a Level of -104 dBm.

3. Tune R-2500/AR and the signal generator to 302.000 MHz and then to 303.000 Mhz.

5-6.5.2 No Output On Bands 1 and 2 Test (cont)

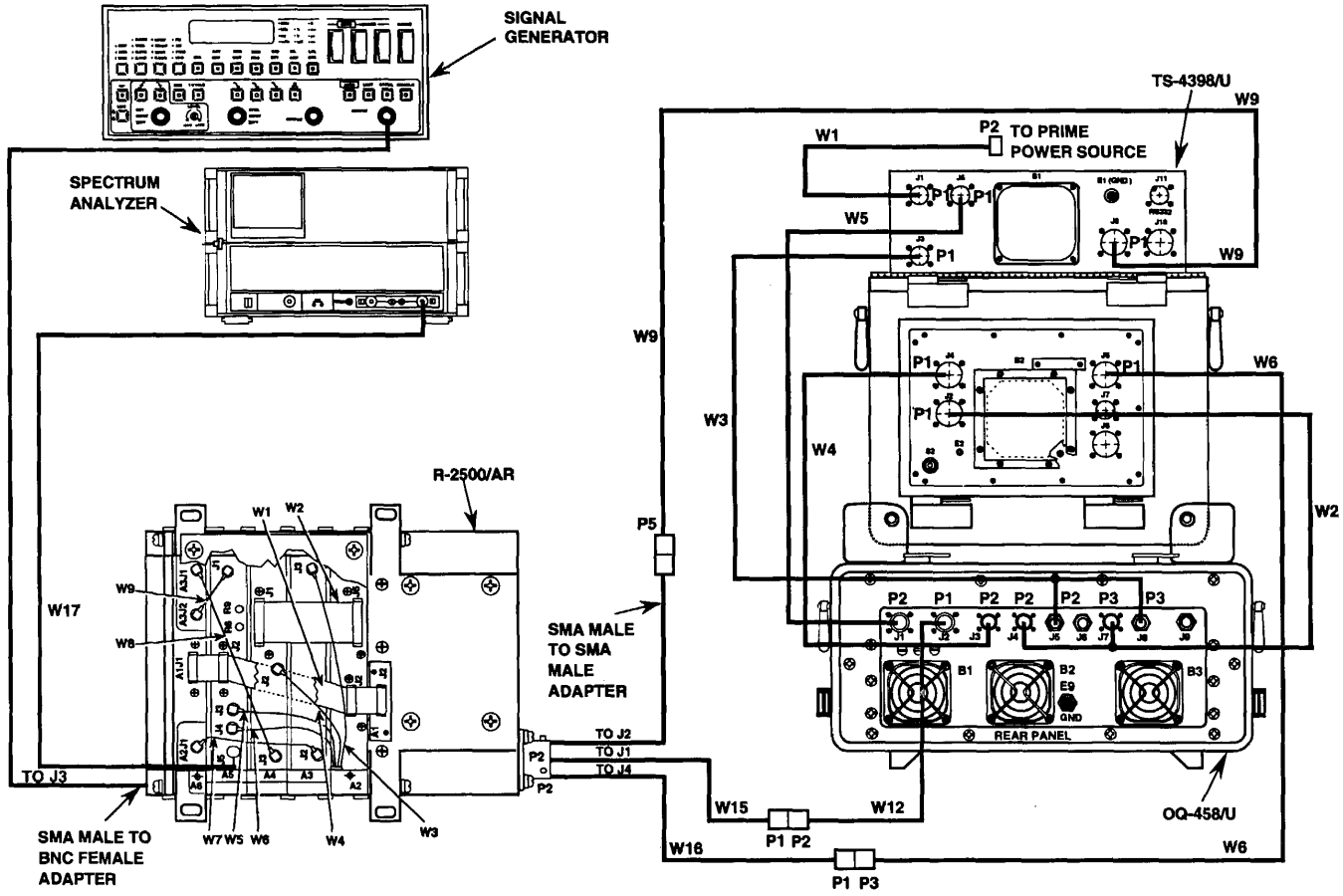


FIGURE 5-56. R-2500/AR NO OUTPUT ON BANDS 1 AND 2 TEST INTERCONNECTIONS.

5-6.5.2 No Output On Bands 1 and 2 Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
4.	Check the output on the spectrum analyzer display.	A 17 MHz frequency is displayed on the spectrum analyzer at both frequencies, go to the next item.	If the output is absent on the spectrum analyzer at 302.000 MHz, but present at 303.000 MHz, remove and replace the first synthesizer module assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).
5.	Connect the probe cable to the input of the digital multimeter. (See figure 5-57.)		
	NOTE The locations of pins 1, 2, 9, and 10 are marked on the Al and A6 modules. The first row includes pins 1, 3, 5, 7, and 9. The second row includes pins 2, 4, 6, 8, and 10.		
6.	Without removing the W2Z A6A1J1 plug, check Logic levels at pins 2 and 3 using the digital multimeter. These pins are accessible along the top surface of the plug. Refer to table 5-9 for Logic levels and tune R-2500/AR to the bands listed in table 5-6.		

TABLE 5-9. PRESELECTOR BANIDIDTH LOGIC (POSITIVE LOGIC).

BAND	PIN 2	PIN 3
1	L	L
2	L	H
3	H	L
4	H	H

H = +5 Vdc
L = 0 Vdc

7.	Select the condition which applies and take the		If the logic is correct, remove and replace the assembly (refer to paragraph 5-8). Reperform the predection output test (refer to paragraph 5-6.5, procedure (b)). If the Logic is incorrect, remove and replace the decoder module assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

5-6.5.2 No Output On Bands 1 and 2 Test (cont)

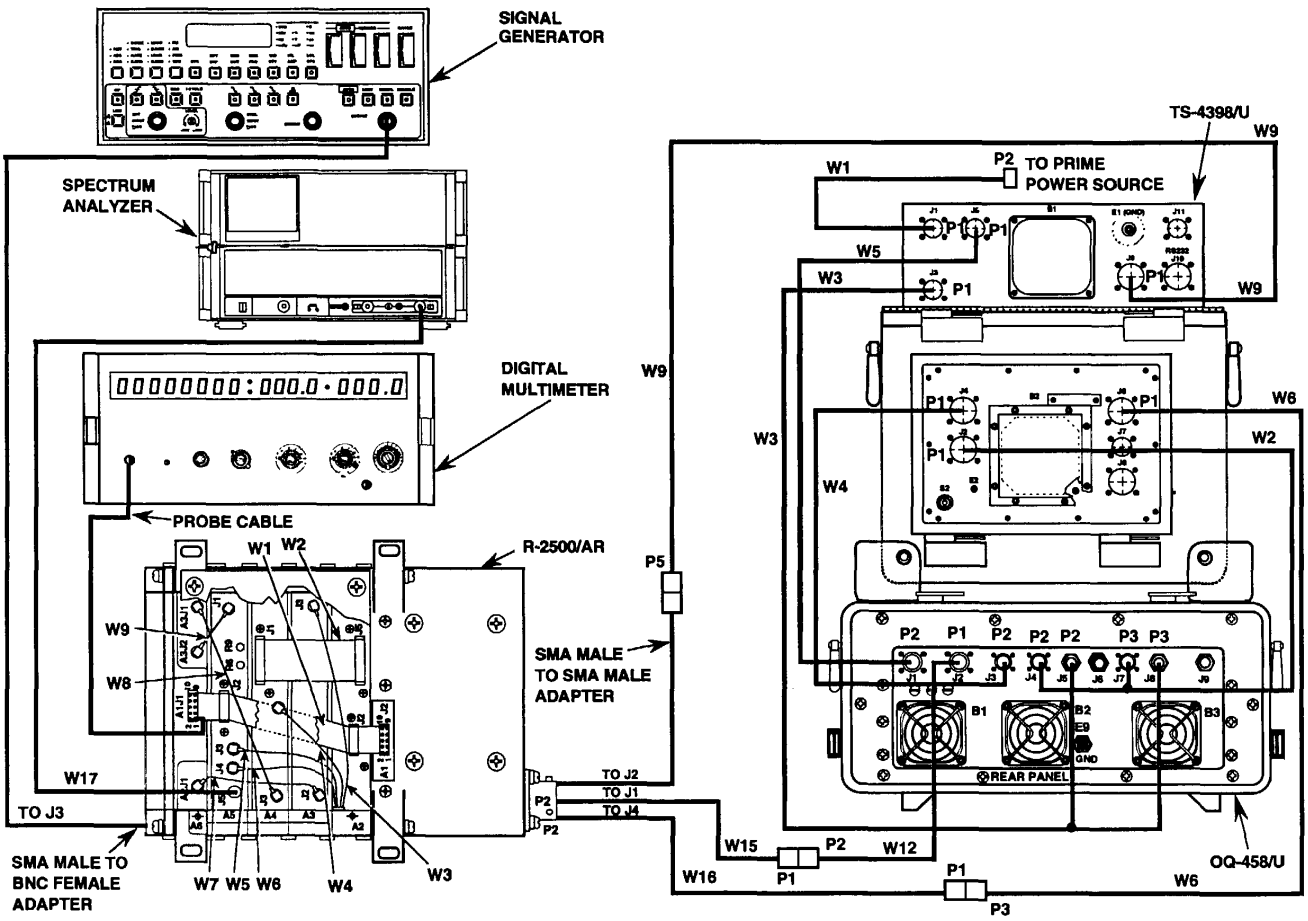


Figure 5-57. R-2500/AR A6A1J1 OUTPUT TEST INTERCONNECTIONS.

5-6.5.3 Radio Receiver, R-2500/AR, No Output On Bands 3 and 4 Test. This test is used to test R-2500/AR when there is no output on bands 3 and 4. To accomplish the no output on bands 3 and 4 test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)I or equivalent
- Digital Multimeter, AN/GSM-64D or equivalent
- Signal Generator, SG1207/U or equivalent
- SMA male to SMA male adapter
- BNC male to SMA male cable
- BNC male to BNC female cable

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS

Radio Receiver, R-2500/AR, is in maintenance configuration from previous test.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the no output on bands 3 and 4 test are found in cable assembly case CY-8676/U unless otherwise noted.

5-6.5.3 No Output On Bands 3 and 4 Test (cont)

NOTE

The interconnections for the no output on bands 3 and 4 test are shown in figures 5-59 and 5-60. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-58. Figure 5-59 shows the no output on bands 3 and 4 test interconnections. Figure 5-60 shows the A6AlJ1 output test interconnections.

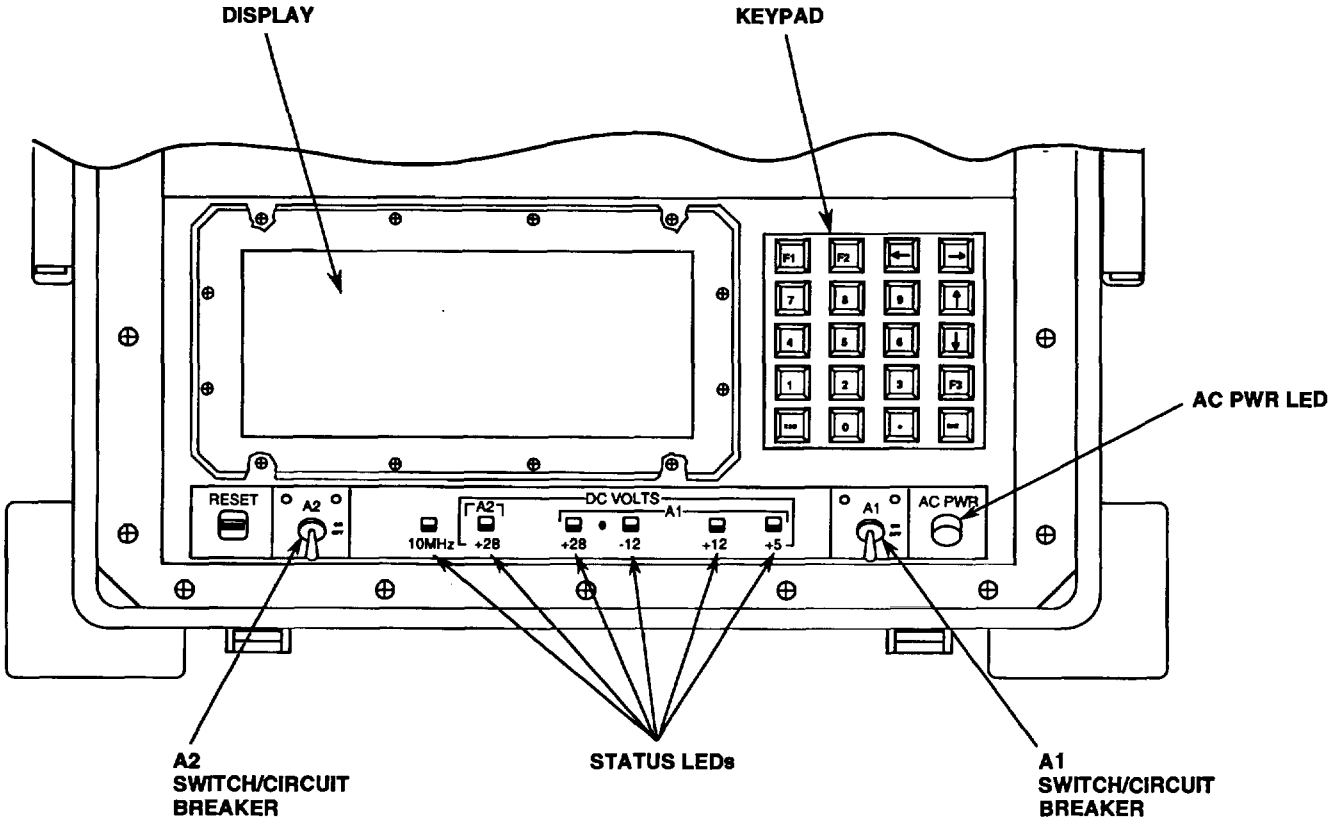


FIGURE 5-58. TS-4398/U CONTROLS AND INDICATORS.

5-6.5.3 No Output On Bands 3 and 4 Test (cont)

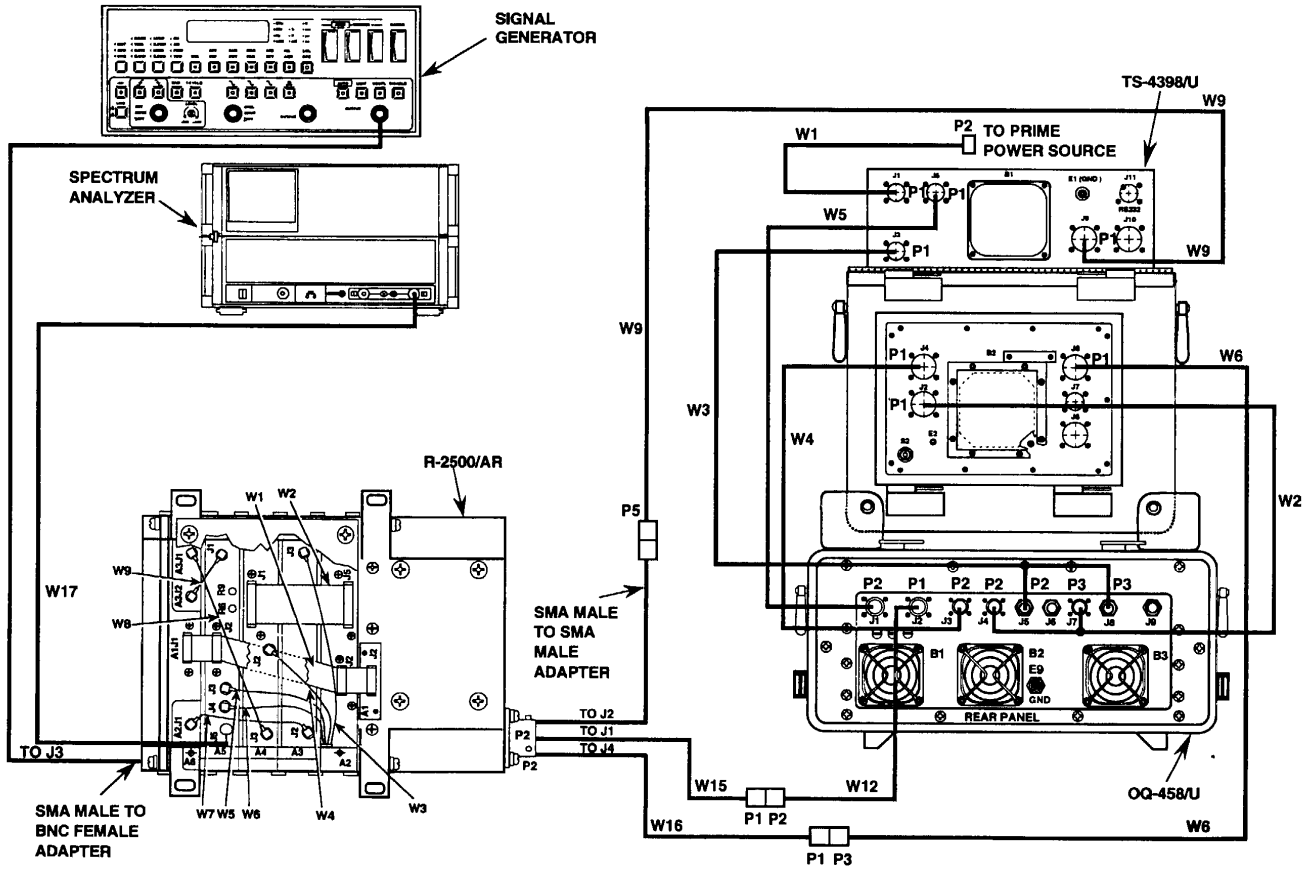


FIGURE 5-59. R-2500/AR NO OUTPUT ON BANDS 3 AND 4 TEST INTERCONNECTIONS.

5-6.5.3 No Output On Bands 3 and 4 Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION
	No Output On Band 3 and 4 Test.		
	CAUTION Do not exceed a level of +10 dBm at the J3 connector from the signal generator.Exceeding +10 dBm will result in R-2500/AR component damage.		
1.	Select TUNE RECEIVER by pressing “3” on the keypad.		
2.	Adjust the signal generator output for a Level of -104 dBm.		
3.	Tune R-2500/AR and the signal generator to 302.000 MHz and then to 303.000 MHz.		
4.	Check the output on the spectrum analyzer display.	A 17 MHz frequency is displayed on the spectrum analyzer at both frequencies.	If the output is absent on the spectrum analyzer at 302.000 MHz and 303.000 MHz but present at 299.975 MHz, go to the next item. If the put is observed at 302.000 MHz but is absent for 303.000 MHz, remove and replace the first synthesizer module assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).
5.	Turn on the digital multimeter. (Set to DC VoLts.)		
6.	Connect the probe cable to the input of the digital multimeter. (See figure 5-60.)		

5-6.5.3 No Output On Bands 3 and 4 Test (cont)

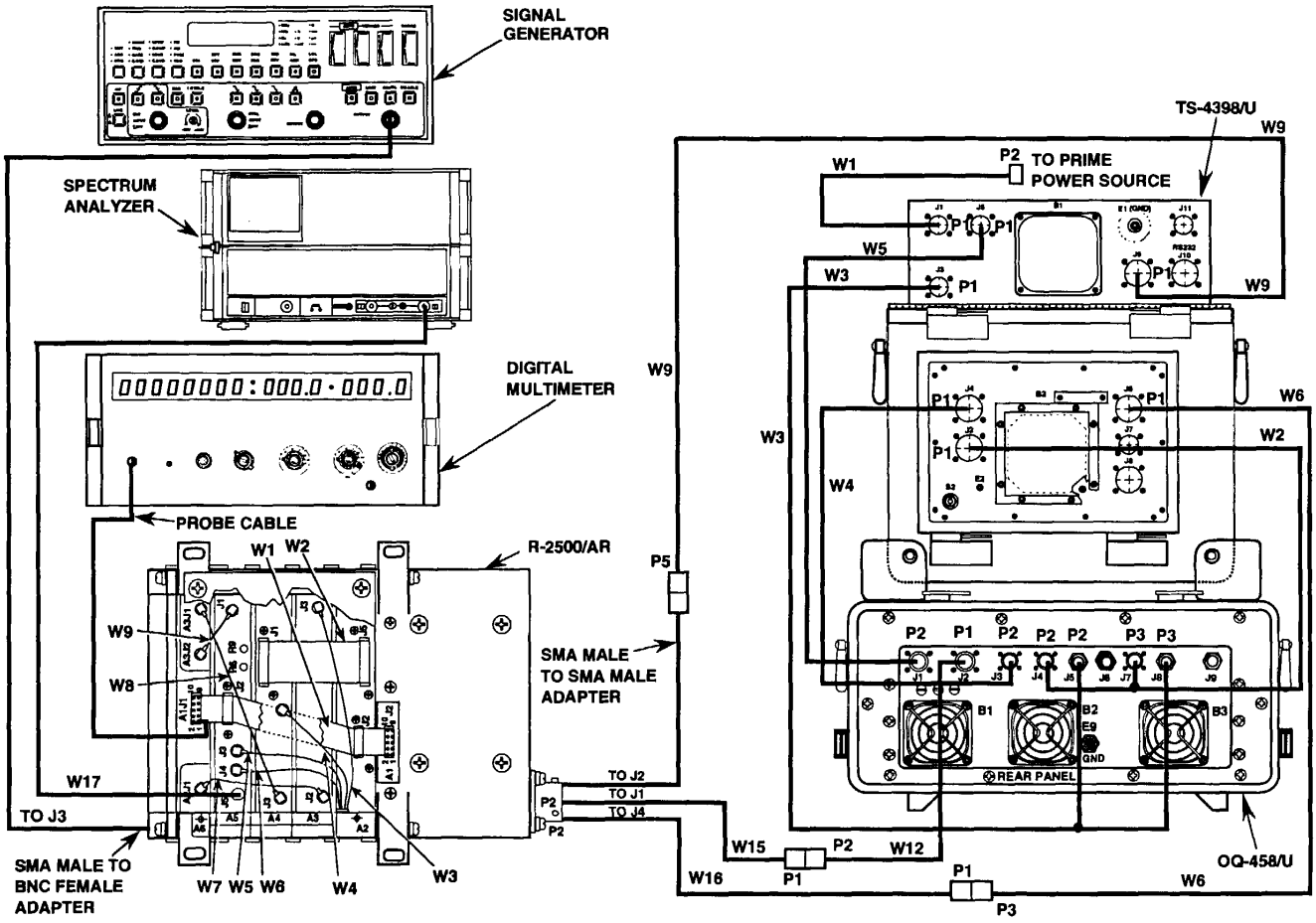


FIGURE 5-60. R-2500/AR A6A1J1 OUTPUT TEST INTERCONNECTIONS.

5-6.5.3 No Output On Bands 3 and 4 Test (cont)

ITEM	ACTION	NORMAL INDICATION	CORRECTIVE ACTION

NOTE

The location of pins 1, 2, 9, and 10 are marked on the A1 and A6 modules. The first row includes pins 1, 3, 5, 7, and 9. The second row includes pins 2, 4, 6, 8, and 10.

7. Without removing the W2 A6A1J1 plug, check logic levels at pins 2 and 3 using the digital multimeter. These pins are accessible along the top surface of the plug. Refer to the Preselector Bandwidth Logic table for Logic Levels and tune R-2500/AR to the bands listed in the R-2500/AR Bands and LO Injector Frequencies table.

PRESELECTOR BANDWIDTH LOGIC (POSITIVE LOGIC).

BAND	PIN 2	PIN 3
1	L	L
2	L	H
3	H	L
4	H	H

H = +5 Vdc L = 0 Vdc

R-2500/AR BAND AM. LO INJECTION FREQUECIES.

BAND	TUNED FREQ (Mhz)	LO1 (Mhz)	L02 (Mhz)
1	225.000	321.25	79.250
1	259.975	355.00	78.025
2	260.000	356.25	79.250
2	299.975	395.00	78.025
3	300.000	396.25	79.250
3	349.975	445.00	78.025
4	350.000	446.25	79.250
4	399.975	495.00	78.025

8. Select the condition which applies and take the action.

If the logic is correct, remove and replace the Preselector module assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

If the logic is incorrect, remove and replace the decoder module assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

5-6.5.4 Radio Receiver, R-2500/AR, No Output On a Single Band With Other Bands Good, or No Output On Bands 1 and 3, or No Output On Bands 2 and 4 Test. This test is used to troubleshoot R-2500/.R when there is no output on a single band with other bands good, or no output on bands 1 and 3, or no output on bands 2 and 4. To accomplish this test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
RRTS, AN/URM-214
Digital Multimeter, AN/GSM-64D or equivalent
SMA male to SMA male adapter

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Radio Receiver, R-2500/AR, is in maintenance configuration from previous test.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the no output on a single band with other bands good, or no output on bands 1 and 3, or no output on bands 2 and 4 test are found in cable assembly case CY-8676/U unless otherwise noted. The interconnections for the test are shown in figure 5-62. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-61.

5-6.5.4 No Output On a Single Band With Other Bands Good, or No Output On Bands 1 and 3, or No Output On Bands 2 and 4 Test (cont)

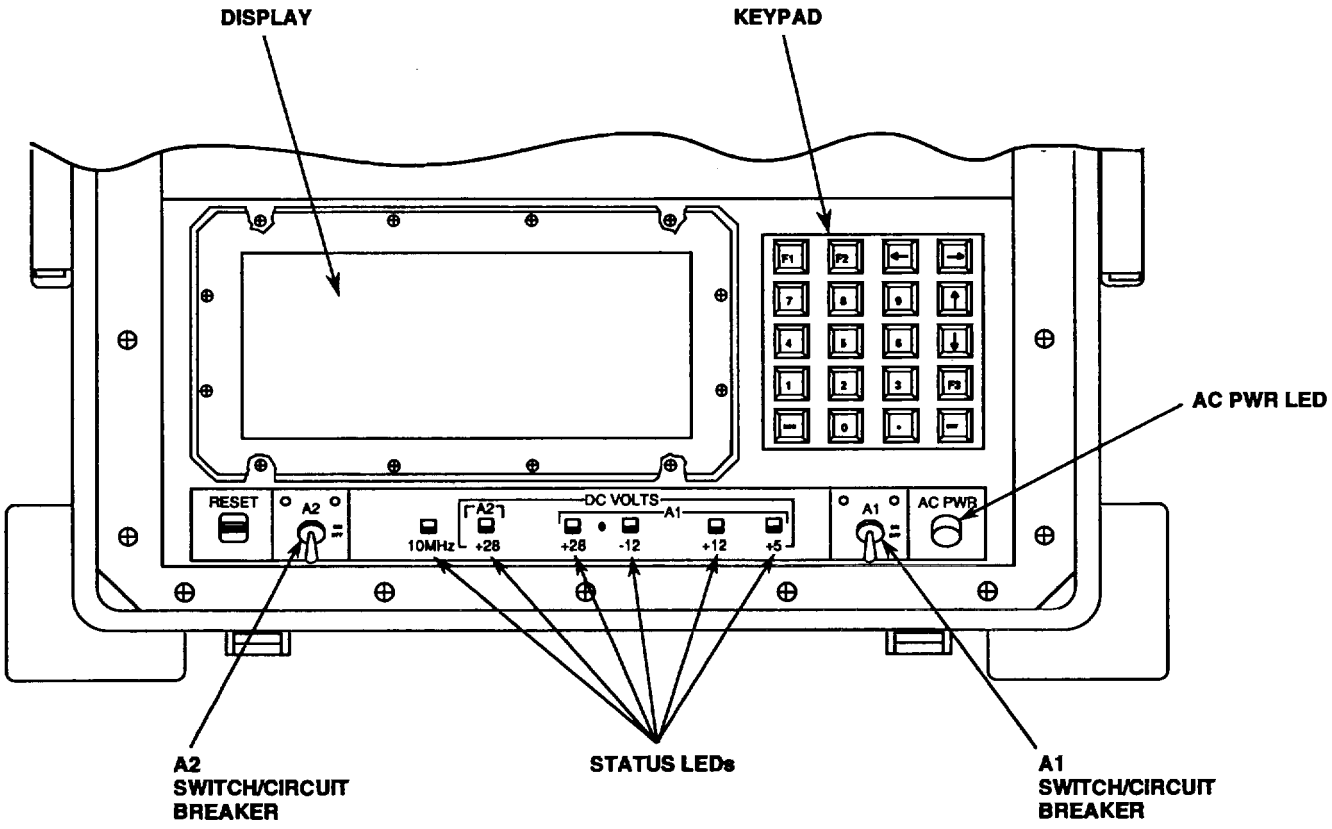


FIGURE 5-61. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
No Output On A Single Band With Other Bands Good, or No Output On Bands 1 and 3, or No Output On Bands 2 and 4 Test.			
	1. Select TUNE RECEIVER by pressing "3', on the keypad.		
	2. Tune R-2500/AR to a frequency in the inoperative band.		

5-6.5.4 No Output on a Single Band With Other Bands Good, or No Output On Bands 1 and 3, or No Output On Output On Bands 2 and 4 Test (cont)

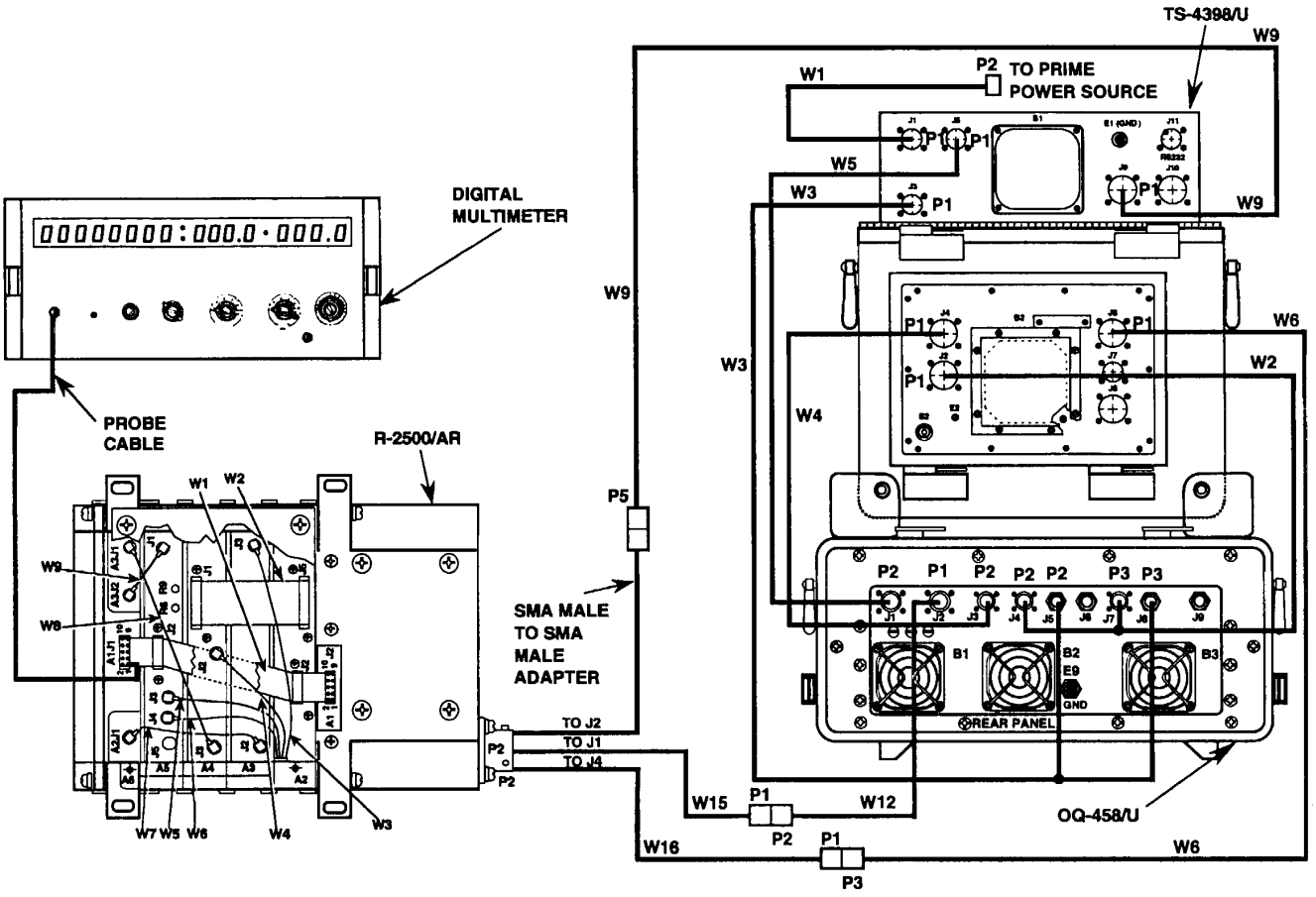


FIGURE 5-62. R-2500/AR NO OUTPUT ON A SINGLE BAND WITH OTHER BANDS GOOD, OR NO OUTPUT ON BANDS 1 AND 3, OR NOT OUTPUT ON BANDS 2 AND 4 TEST INTERCONNECTIONS.

5-6.5.4 No Output On a Single Band With Other Bands Good, or No Output On Bands 1 and 3, or No Output On Bands 2 and 4 Test (cont)

Item	Action	Normal Indication	Corrective Action
	NOTE The location of pins 1, 2, 9, and 10 are marked on the A1 and A6 modules. The first row includes pins 1, 3, 5, 7, and 9. The second row includes pins 2, 4, 6, 8, and 10.		
3.	Without removing the W2 A6A1J1 plug, check Logic levels at pins 2 and 3 using the digital multimeter. These pins are accessible along the top surface of the plug. Refer to table 5-9 for Logic levels and tune R-2500/AR to the bands listed in table 5-6.		
4.	Select the condition which applies and take the action. assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).	If the logic is correct, remove and replace the preselector module	
			If the logic is incorrect, remove and replace the decoder module assembly (refer to paragraph 5-8). Reperform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

5-6.5.5 Radio Receiver, R-2500/AR, Insufficient IF Output Level On Two or More Bands Test. This test is used to troubleshoot R-2500/AR when there is insufficient IF output level on two or more bands. To accomplish the insufficient IF output level on two or more bands test, perform the following procedure.

INITIAL SETUP

Test Equipment and Electronic Components
- RRTS, AN/URM-214
- Spectrum Analyzer, AN/USM-489(V)1 or equivalent
- Signal Generator, SG1207/U or equivalent
- SMA male to SMA male adapter
- BNC male to SMA male cable
- BNC male to BNC female cable

Tools and Special Tools
- TK-105/G, Tool Kit, Electronic Equipment

CONDITIONS
Radio Receiver, R-2500/AR, is in maintenance configuration from previous test.

WARNING

R-2500/AR uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Ensure all test equipment is properly grounded before operating. Failure to do so may cause equipment damage.

NOTE

All cables used during the insufficient IF output level on two or more bands test are found in cable assembly case CY-8676/U unless otherwise noted.

5-6.5.5 Insufficient IF Output Level Two or More Bands Test (cont)

NOTE

The interconnections for the insufficient IF output level on two or more bands test are shown in figures 5-64 through 5-66. The test controller TS-4398/U controls and indicators used during the test are shown in figure 5-63. Figure 5-64 shows the R-2500/AR insufficient IF output level on two or more bands test interconnections. Figure 5-65 shows the R-2500/AR A4J3 output test interconnections. Figure 5-66 shows the R-2500/AR A6A3J2 output test interconnections.

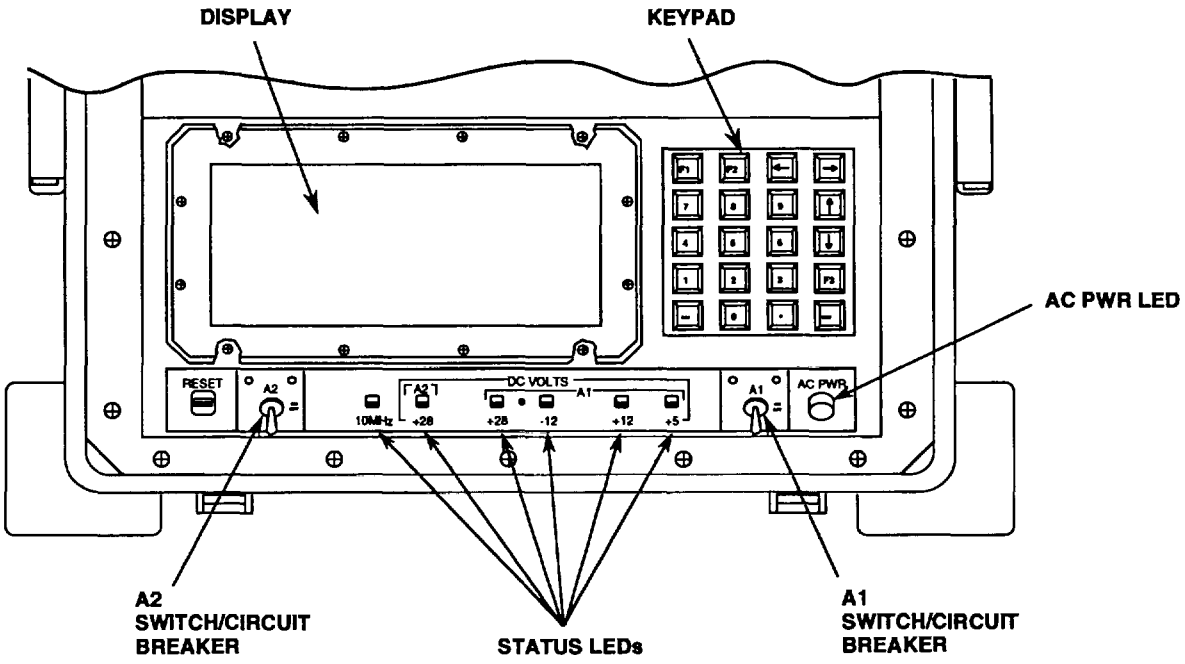


Figure 5-63. TS-4398/U CONTROLS AND INDICATORS.

Item	Action	Normal Indication	Corrective Action
Insufficient IF Output Level On Two or More Bands Test.			
1.	Select TUNE RECEIVER by pressing "3" on the keypad.		
2.	Tune R-2500/AR to the first frequency (225.000 MHz) Listed in table 5-6.		

5-6.5.5 Insufficient IF Output Level Two or More Bands Test (cont)

Item	Action	Normal Indication	Corrective Action
3.	Tune the spectrum analyzer to the L01 frequency corresponding to the tuned frequency, reference level to +20 dBm. Remove V7 from A3J2 and connect W17 between the spectrum analyzer and A3J2. Check for output.		
4.	Repeat items I thru 3 for the remaining frequencies in table 5-6.		
5.	Select the condition which applies and take the action.	If the L01 output level amplitude on the spectrum analyzer is in the range of -5 dcb to +10 ndm, go to the next item.	If the reading on the spectrum analyzer is below -5 cBm, remove and replace the first synthesizer module assembly (refer to paragraph 5-8). Reconnect W7 coax connector at A3JZ and perform the predetection output test (refer to paragraph 5-6.5, procedure (b)).
6.	Disconnect W17P1 from A3J2.		
7.	Disconnect 8WS coax connector at A4J3.		
8.	Connect W17P1 to A4J3. (See figure 5-65.)		
9.	Tune R-2500/AR to the first frequency listed in table 5-6.		
10.	Tune the spectrum analyzer to the LOZ frequency corresponding to the tuned frequency, reference level to +20 dBm, and check for output.		
11.	Repeat items 9 and 10 for the second frequency in table 5-6.		
12.	Select the condition which applies and take the action. 0 to +8 dBm, go to the next	If the L02 output level amplitude on the spectrum analyzer is in the range of the second synthesizer item.	If the reading on the spectrum analyzer is below 0 dBm, remove and replace module assembly (refer to paragraph 5-8). Reconnect U8 coax connector at A4J3 and W7 coax connector A3J2 and perform the predetection output test (refer to paragraph 5-6.5, procedure (b)).

5-6.5.5 Insufficient IF Output Level Two or More Bands Test (cont)

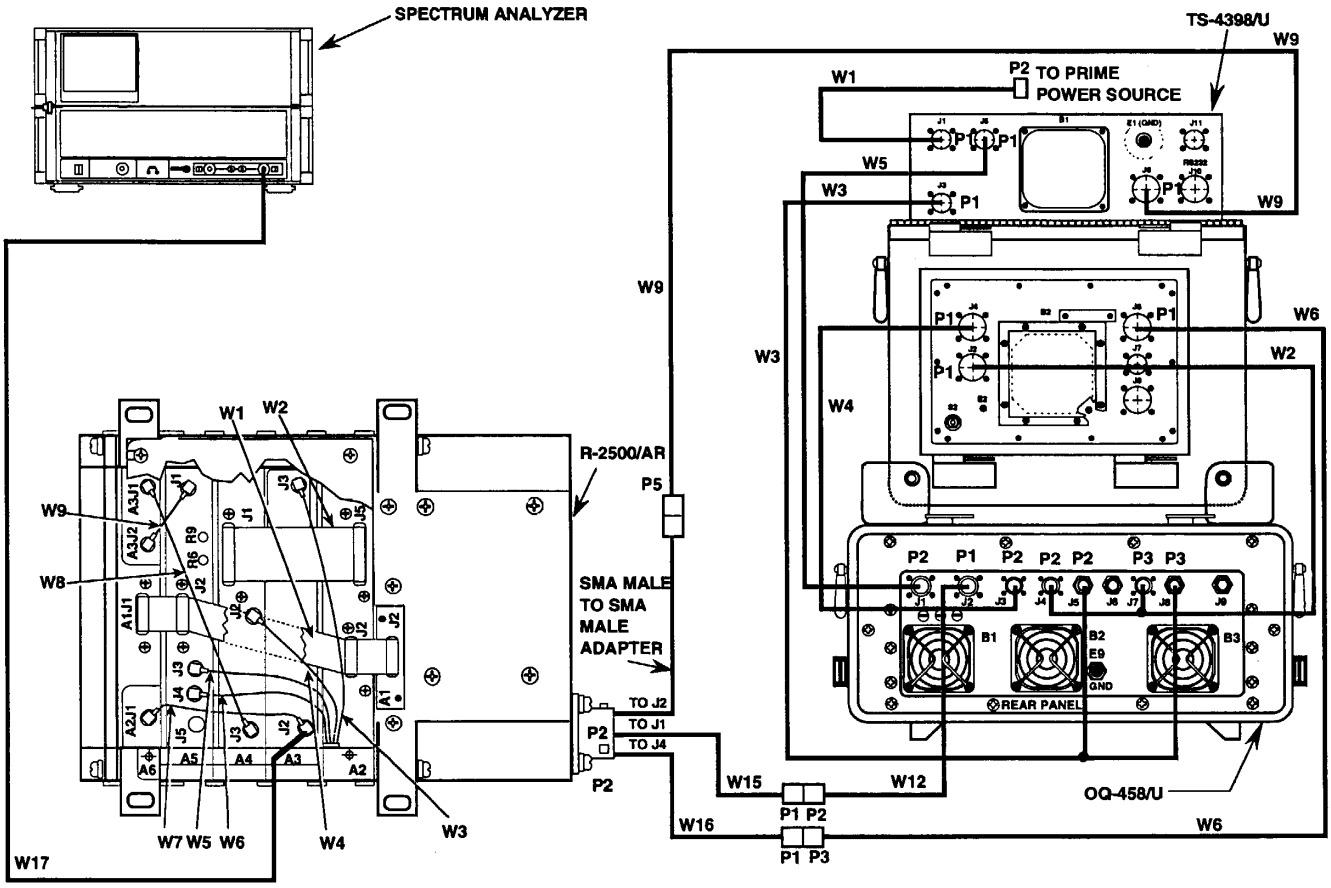


FIGURE 5-64. R-2500/AR INSUFFICIENT IF OUTPUT LEVEL ON TWO OR MORE BANDS TEST INTERCONNECTIONS.

5-6.5.5 Insufficient IF Output Level Two or More Bands Test (cont)

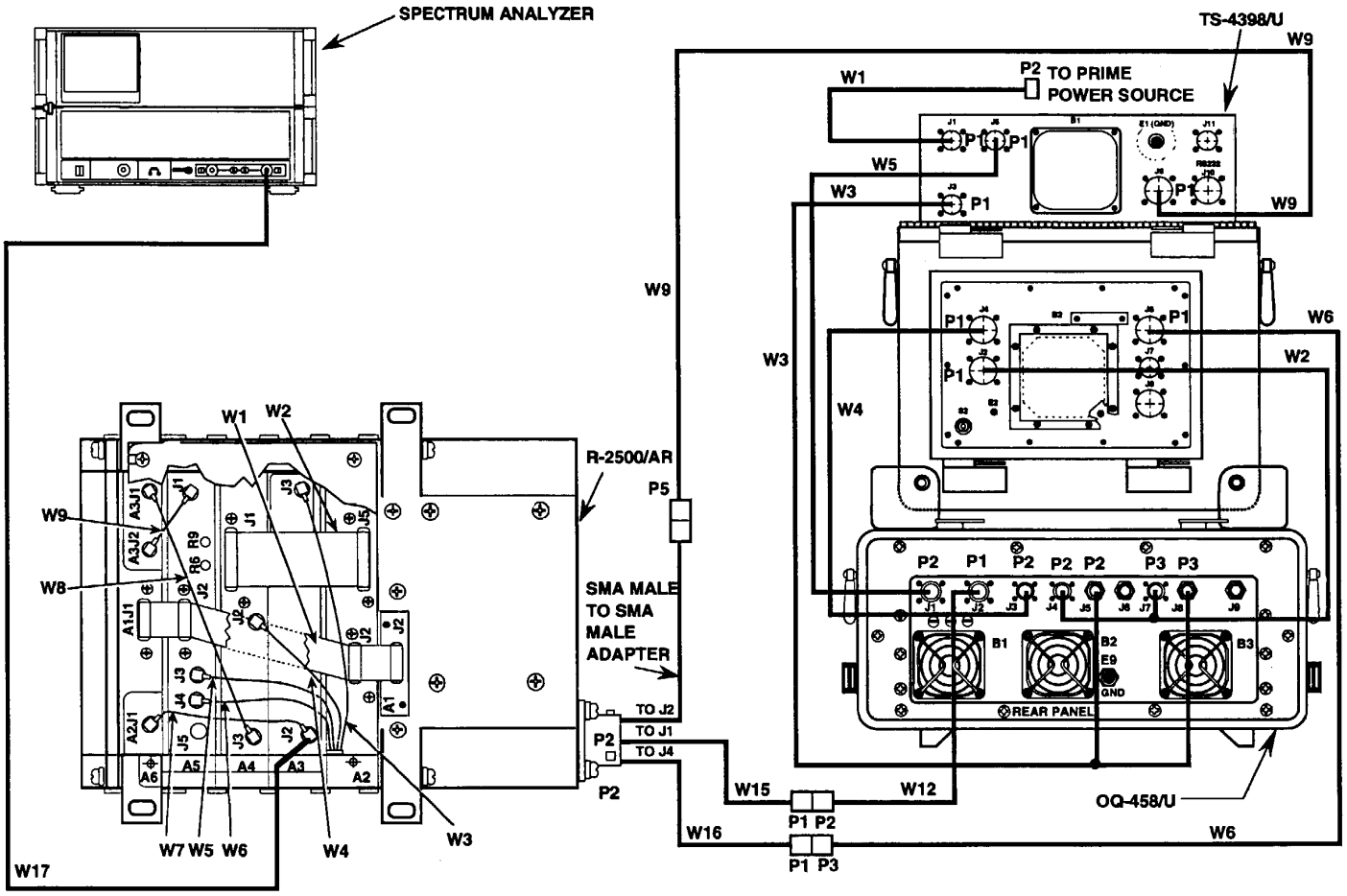


FIGURE 5-65. R-2500/AR A4J3 OUTPUT TEST INTERCONNECTIONS.

5-6.5.5 Insufficient IF Output Level Two or More Bands Test (cont)

Item	Action	Normal Indication	Corrective Action
13.	Reconnect W8 coax connector at A4J3 and W7 coax connector at A3J2.		
14.	Connect J3 on R-2500/AR and to the signal generator output. (See figure 5-66.)		
	CAUTION Do not exceed a level of +10 dBm at the J3 connector from the signal generator. Exceeding +10 dBm will result in R-2500/AR component damage.		
15.	Disconnect W9 coax connector at A6A3J2.		
16.	Connect W17P1 to A6A3J2.		
17.	Tune the signal generator and R-2500/AR to 300 MHz and inject a signal at -43 dBm.		
18.	Observe the spectrum analyzer for the 17 MHz signal.		
19.	Select the condition which applies and take the action.	If the output level is less than -30 dlm, remove and replace the preselector module assembly (refer to paragraph 5-8). Reconnect W9 coax cable to A6A3J2 and perform the predetection output test (refer to paragraph 5-6.5, procedure (b)). If the output level is -30 dBm or greater, remove and replace the IF module assembly (refer to paragraph 5-8). Reconnect the W9 coax cable to A6A3J2 and perform the predetection output test (refer to paragraph 5-6.5, procedure (b)).	

5-6.5.5 Insufficient IF Output Level Two or More Bands Test (cont)

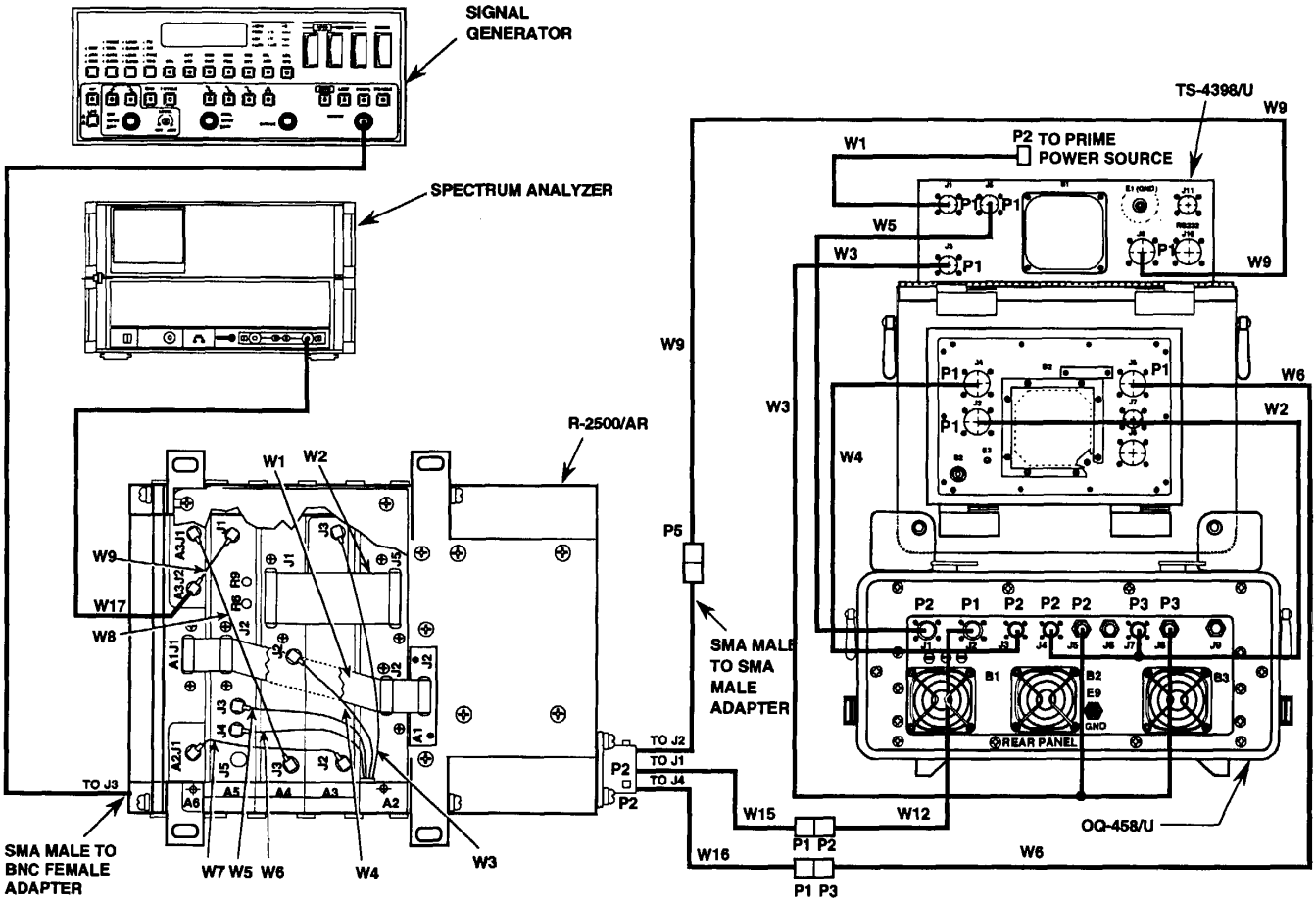


FIGURE 5-66. R-2500/AR A6A3J2 OUTPUT TEST INTERCONNECTIONS.

5-6.6 Cable Assembly Case, CY-8676/U, Cables Test (W1 through W20). Test CY-8676/U cables for continuity according to the pin interconnections listed in the following table.

CABLE AND PIN INTERCONNECTIONS

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Prime Electrical Power Cable (W1)		
120 Vac Line	P1-A	P2-L
AC Neutral	P1-B	P2-N
Chassis GND	P1-C	P2-G
Not Connected	P1-D	
Branched Electrical Power Cable Assembly (W2)		
Tune Clock Line	P1-8	P2-1
Tune Clock RTN	P1-9	P2-2
Tune Data Line	P1-11	P2-3
Tune Data RTN	P1-12	P2-4
Strobe Line	P1-13	P2-5
Strobe RTN	P1-14	P2-6
Quiet Line	P1-15	P2-7
Quiet RTN	P1-16	P2-8
Key Line	P1-17	P2-9
Key RTN	P1-18	P2-10
Freq Change Line	P1-19	P2-11
Freq Change RTN	P1-20	P2-12
XMTR MSB Data Line	P1-21	P2-13
XMTR MSB Data RTN	P1-22	P2-14
XMTR LSB Data Line	Pl-23	P2-15
XMTR LSB Data RTN	P1-24	P2-16
Status Line	P1-25	P2-17
Status RTN	P1-26	P2-18
Center Line	P1-27	P2-19
Center RTN	P1-28	P2-20
Not Connected	P1-52	P2-21
Not Connected	P1-53	P2-22
Not Connected	P1-54	
Not Connected	P1-55	
RCVR GND	P1-31	P3-4
Data Output True	P1-32	P3-5
Data Output False	P1-33	P3-6
Status Line	P1-34	P3-9
Status RTN	P1-35	P3-10
FREQ Change Line	P1-36	P3-12
FREQ Change RTN	P1-37	P3-13
Tune Data Line	P1-38	P3-16
Tune Data RTN	P1-39	P3-17
Tune Clock Line	P1-40	P3-19
Tune Clock RTN	P1-41	P3-20

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Power Cable Assembly (W2) (cont)		
Not Connected	P1-1	P3-1
Not Connected	P1-2	P3-2
Not Connected	P1-3	P3-3
Not Connected	P1-4	P3-7
Not Connected	P1-5	P3-8
Not Connected	P1-6	P3-11
Not Connected	P1-7	P3-14
Not Connected	P1-10	P3-15
Not Connected	P1-29	P3-18
Not Connected	P1-30	P3-21
Not Connected	P1-42	P3-22
Not Connected	P1-43	
Not Connected	P1-44	
Not Connected	P1-45	
Not Connected	P1-46	
Not Connected	P1-47	
Not Connected	P1-48	
Not Connected	P1-49	
Not Connected	P1-50	
Not Connected	P1-51	
Branched RF Cable Assembly (W3)		
10 MHz Input Reference	P1-A	P2
Not Connected	P1-B	
10 MHz Input Reference	P1-C	P2
Not Connected	P1-D	
Electrical Special Purpose Cable Assembly (W4)		
+28 Vdc	P1-16	P2-16
S1 Control	P1-17	P2-17
+28 Vdc	P1-18	P2-18
S2 Control	P1-19	P2-19
+28 Vdc	P1-20	P2-20
S3 Control	P1-21	P2-21
+28 Vdc	P1-22	P2-22
S4 Control	P1-23	P2-23
+28 Vdc	P1-24	P2-24
S5 Control	P1-25	P2-25
+28 Vdc	P1-26	P2-26
S6 Control	P1-27	P2-27
+28 Vdc	P1-28	P2-28
S7 Control	P1-29	P2-29
+28 Vdc	P1-30	P2-30

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Electrical Special Purpose Cable Assembly (W4) (cont)		
S8 Control	P1-31	P2-31
+28 Vdc	P1-32	P2-32
S9 Control	P1-33	P2-33
+28 Vdc MEAS	P1-34	P2-34
+28 Vdc RTN	P1-35	P2-35
Not Connected	P1-36	P2-36
Not Connected	P1-37	P2-37
Not Connected	P1-I	P2-1
Not Connected	P1-2	P2-2
Not Connected	P1-3	P2-3
Not Connected	P1-4	P2-4
Not Connected	P1-5	P2-5
Not Connected	P1-6	P2-6
Not Connected	P1-7	P2-7
Not Connected	P1-8	P2-8
Not Connected	P1-9	P2-9
Not Connected	P1-10	P2-10
Not Connected	P1-11	P2-11
Not Connected	P1-12	P2-12
Not Connected	P1-13	P2-13
Not Connected	P1-14	P2-14
Not Connected	P1-15	P2-15
Electrical Power Cable Assembly (W5)		
120 Vac Line	P1-A	P2-A
Neutral	P1-B	P2-B
Chassis GND	P1-C	P2-C
Not Connected	P1-D	P2-D
Branched Electrical Special Purpose Cable Assembly (W6)		
Not Connected	P1-1	P2-1
Not Connected	P1-2	P2-2
Not Connected	Pl-4	P2-3
Not Connected	P1-5	P2-4
Not Connected	P1-6	P2-5
Not Connected	P1-7	P2-6
Not Connected	P1-8	P2-7
RX GND	P1-9	P2-8
BYPASS	P1-11	P2-9
+5 Vdc	P1-12	P2-10
+12 Vdc	P1-13	P2-11
DC RTN	P1-14	P2-12

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Special Purpose Cable Assembly (W6) (Cont)		
RCVR Data True	P1-15	P2-13
RCVR Data False	P1-16	P2-14
RCVR Status RTN	P1-17	P2-15
RCVR Status Line	P1-18	P2-16
RCVR Tune Data RTN	P1-19	P2-17
RCVR Tune Data Line	P1-20	P2-18
RCVR FREQ Change RTN	P1-21	P2-19
RCVR FREQ Change Line	P1-23	P2-20
RCVR Tune Clock RTN	P1-23	P2-21
RCVR Tune Clock Line	P1-24	P2-22
Not Connected	P1-3	
Not Connected	P1-10	
Not Connected	Pl-46	
Not Connected	P1-49	
Not Connected	P1-50	
Not Connected	P1-51	
Not Connected	P1-52	
Not Connected	P1-53	
Not Connected	P1-54	
Not Connected	P1-55	
Not Connected	P1-25	
Not Connected	P1-26	P3-1
Not Connected	P1-27	P3-2
Not Connected	Pl-28	P3-3
Not Connected	P1-29	P3-4
Not Connected	P1-30	P3-5
Not Connected	P1-31	P3-6
Not Connected	P1-32	P3-7
RCVR GND	P1-33	P3-8
Bypass	P1-34	P3-9
+5 Vdc	P1-35	P3-10
+12 Vdc	P1-36	P3-11
DC RTN	P1-37	P3-12
RCVR Data True	P1-38	P3-13
RCVR Data False	P1-39	P3-14
RCVR Status RTN	P1-40	P3-15
RCVR Status Line	P1-41	P3-16
RCVR Tune Data RTN	P1-42	P3-17
RCVR Tune Data Line	P1-43	P3-18
RCVR FREQ Change RTN	P1-44	P3-19
RCVR FREQ Change Line	P1-45	P3-20
RCVR Tune Clock RTN	P1-47	P3-21
RCVR Tune Clock Line	P1-48	P3-22

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Electrical Special Purpose Cable Assembly (W7)		
Not Connected	P1-1	P2-1
Not Connected	P1-2	P2-2
Not Connected	P1-3	P2-3
Not Connected	P1-4	P2-4
Not Connected	P1-5	P2-5
Not Connected	P1-6	P2-6
Not Connected	P1-7	P2-7
Key 2 Line	P1-8	P2-8
Key 2 RTN	P1-9	P2-9
Not Connected	P1-10	P2-10
Not Connected	P1-11	P2-11
Not Connected	P1-12	P2-12
Not Connected	P1-13	P2-13
IDL GND	Pl-14	P2-14
Out Data False	P1-15	P2-15
Out Data True	Pl-16	P2-16
Out Clock False	P1-17	P2-17
Out Clock True	P1-18	P2-18
In Data False	P1-19	P2-19
In Data True	P1-20	P2-20
In Clock False	P1-21	P2-21
In Clock True	P1-22	P2-22
Branched Electrical Special Purpose Cable Assembly (W8)		
Not Connected	P1-1	P2-1
Not Connected	P1-2	P2-2
Not Connected	P1-3	P2-3
Not Connected	P1-4	P2-4
Not Connected	P1-5	P2-5
Not Connected	P1-6	P2-6
Not Connected	P1-7	P2-7
Not Connected	P1-10	P2-8
Not Connected	P1-29	P2-9
Not Connected	P1-46	P2-10
TX BITE RTN	P1-8	P2-11
TX BITE Line	P1-9	P2-12
TX Strobe RTN	P1-11	P2-13
TX Strobe Line	P1-12	P2-14
TX Tune Data RTN	P1-13	P2-15
TX Tune Data Line	P1-14	P2-16
TX Tune Clock RTN	P1-15	P2-17
TX Tune Clock Line	P1-16	P2-18
TX FREQ Change RTN	P1-17	P2-19
TX FREQ Change Line	P1-18	P2-20

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Special Purpose Cable Assembly (W8) (Cont)		
Key 1 RTN	P1-29	P2-21
Key 1 Line	P1-20	P2-22
Quiet Line	P1-21	P2-23
Quiet RTN	P1-22	P2-24
TX Data LSB Line	P1-23	P2-29
TX Data LSB RTN	P1-24	P2-30
TX Data MSB Line	P1-25	P2-31
TX Data MSB RTN	P1-26	P2-32
Center RTN	P1-27	P2-34
Center Line	P1-28	P2-35
5 Vdc Pullup	P1-51	P2-25
RTN	P1-52	P2-26
Not Connected	Pl-53	P2-27
Not Connected	P1-54	P2-28
Not Connected	P1-55	P2-33
Not Connected		P2-36
Not Connected		P2-37
TX BITE RTN	P1-30	P3-11
TX BITE Line	P1-31	P3-12
TX Strobe RTN	P1-32	P3-13
TX Strobe Line	P1-33	P3-14
TX Tune Data RTN	P1-34	P3-15
TX Tune Data Line	P1-35	P3-16
TX Tune Clock RTN	P1-36	P3-17
TX Tune Clock Line	P1-37	P3-18
TX FREQ Change RTN	P1-38	P3-19
TX FREQ Change Line	P1-39	P3-20
Key 1 RTN	P1-40	P3-21
Key 1 Line	P1-41	P3-22
Quiet Line	P1-42	P3-23
Quiet RTN	P1-43	P3-24
TX Data LSB Line	P1-44	P3-29
TX Data LSB RTN	P1-45	P3-30
TX Data MSB Line	P1-47	P3-31
TX Data MSB RTN	P1-48	P3-32
Center RTN	P1-49	P3-34
Center Line	P1-50	P3-35
Not Connected		P3-1
Not Connected		P3-2
Not Connected		P3-3
Not Connected		P3-4
Not Connected		P3-5
Not Connected		P3-6
Not Connected		P3-7
Not Connected		P3-8

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Special Purpose Cable Assembly (W8) (Cont)		
Not Connected		P3-9
Not Connected		P3-10
Not Connected		P3-25
Not Connected		P3-26
Not Connected		P3-27
Not Connected		P3-28
Not Connected		P3-33
Not Connected		P3-36
Not Connected		P3-37
Branched RF Cable Assembly (W9)		
RCVR 10 MHz Reference Out	P1-A	P2
XMTR 10 MHz Reference Out	P1-B	P3
XMTR 10 MHz Reference In	P1-C	P4
RCVR 10 MHz Reference In	P1-D	P5
RF Cable Assembly (W10)		
RF	P1	P2
RF Cable Assembly (W11)		
RF	P1	P2
Electrical Power Cable Assembly (W12)		
+28 Vdc	P1-A	P2-A
+28 Vdc RTN	P1-B	P2-B
+28 Vdc	P1-C	P2-C
+28 Vdc RTN	P1-D	P2-D
Electrical Special Purpose Cable Assembly (W13)		
IDL U/L Data True	P1-20	P2-66
IDL U/L Data False	P1-19	P2-67
IDL U/L Clock True	P1-7	P2-68
IDL U/L Clock False	P1-6	P2-69
IDL D/L Data True	P1-16	P2-76
IDL D/L Data False	P1-15	P2-77
IDL D/L Clock True	P1-5	P2-78
IDL D/L Clock False	P1-4	P2-79
Not Connected	P1-1	

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Electrical Special Purpose Cable Assembly (W13) (cont)		
Not Connected	P1-2	
Not Connected	P1-8	
Not Connected	P1-14	
Not Connected	P1-17	
Not Connected	P1-18	
Not Connected	P1-21	
Not Connected	P1-22	
SCT		P2-70
SCT		P2-80
Not Connected		P2-1
Not Connected		P2-65
Not Connected		P2-71
Not Connected		P2-75
Not Connected		P2-81
Not Connected		P2-128
Branched Electrical Special Purpose Cable Assembly (W14)		
IDL U/L Data True	P1-66	P2-58
IDL U/L Data False	P1-67	P2-59
IDL U/L Clock True	P1-68	P2-60
IDL U/L Clock False	P1-69	P2-61
P1-70	P2-62	
Not Connected	P1-1	P2-1
Not Connected	P1-65	P2-57
Not Connected	P1-71	P2-63
Not Connected	P1-75	P2-66
IDL D/L Data True	P1-76	P3-76
IDL D/L Data False	P1-77	P3-77
IDL D/L Clock True	P1-78	P3-78
IDL D/L Clock False	P1-79	P3-79
P1-80	P3-80	
Not Connected	P1-81	P3-75
Not Connected	P1-128	P3-81
Not Connected		P3-128
Electrical Test Power Cable Assembly (W15)		
+28 Vdc	P1-A	P2-A
+28 Vdc RTN	P1-B	P2-B
+28 Vdc	P1-C	P2-C
+28 Vdc RTN	P1-D	P2-D 6

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Test Special Purpose Cable Assembly (W16)		
Not Connected	P1-1	P2-1
Not Connected	P1-2	P2-2
Not Connected	P1-3	P2-3
Not Connected	P1-4	P2-8
Not Connected	P1-5	P2-11
Not Connected	P1-6	P2-14
Not Connected	P1-7	P2-15
RCVR GND	P1-8	P2-18
Bypass (Not Connected)	P1-9	
+5 Vdc (Not Connected)	P1-10	
+12 Vdc (Not Connected)	P1-11	
DC RTN (Not Connected)	P1-12	
RCVR Data True	P1-13	
RCVR Data False	P1-14	
RCVR Status RTN	P1-15	P2-10
RCVR Status Line	P1-16	P2-9
RCVR Tune Data RTN	P1-17	P2-17
RCVR Tune Data Line	P1-18	P2-16
RCVR FREQ Change RTN	P1-19	P2-13
RCVR FREQ Change Line	P1-20	P2-12
RCVR Tune Clock RTN	P1-21	P2-20
RCVR Tune Clock Line	Pl-22	P2-19
Not Connected		P2-21
Not Connected		P2-22
RCVR Data True	P3	P2-5
RCVR Data True (GND)		P2-4
RCVR Data False	P4	P2-6
RCVR Data False (GND)		P2-7
RF Cable Assembly (W17)		
RF	P1	P2
Branched Electrical Test Special Purpose Cable Assembly (W18)		
Not Connected	P1-1	
Not Connected	P1-2	
Not Connected	P1-3	
Not Connected	P1-4	
Not Connected	P1-5	
Not Connected	P1-6	
Not Connected	P1-7	
Not Connected	P1-8	
Not Connected	P1-9	
Not Connected	P1-10	

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Test Special Purpose Cable Assembly (W18)		
TX BITE RTN	P1-11	
TX BITE Line	P1-12	
TX Strobe RTN	P1-13	
TX Strobe Line	P1-14	
TX Tune Data RTN	P1-15	
TX Tune Data Line	P1-16	
TX Tune Clock RTN	P1-17	
TX Tune Clock Line	P1-18	
TX FREQ Change RTN	P1-19	
TX FREQ Change Line	P1-20	

NOTE

The Normal/Test Switch (S1) must be in the NORMAL position for the following W18 continuity tests. In addition, the Quiet Switch (S3), Center Switch (S4), and Key Switch (S2) must be in the DISABLE position.

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Test Special Purpose Cable Assembly (W18)		
Key 1 RTN	P1-21	P2-10
Quiet RTN	P1-24	P2-8
Center RTN	P1-34	P2-20

NOTE

The Normal/Test Switch (S1) must be in the TEST position for the following W18 continuity test. In addition, the Quiet Switch (S3), Center Switch (S4), and Key Switch (S2) must be in the ENABLE position.

CABLE AND PIN INTERCONNECTIONS (CONT)

CABLE AND SIGNAL NAMES	PLUG/PIN NO.	PLUG/PIN NO.
Branched Electrical Test Special Purpose Cable Assembly (W18)		
RTN/Key 1 RTN	P1-26	P2-10
RTN/Quiet RTN	P1-26	P2-8
RTN/Center RTN	P1-26	P2-20
Key 1 Line	P1-22	P2-9
Quiet Line	P1-23	P2-7
Not Connected	P1-29	
Not Connected	P1-30	
Not Connected	P1-31	
Not Connected	P1-32	
Center Line	P1-35	P2-19
5 Vdc Pullup (Not Connected)	P1-25	
Not Connected	P1-27	
Not Connected	P1-28	
Not Connected	P1-33	
Not Connected	P1-36	
Not Connected	P1-37	
Not Connected		P2-21
Not Connected		P2-22
TX DATA LSB LINE	J1	P2-13
TX DATA LSB RTN		P2-16
TX DATA MSB LINE	J2	P2-15
TX DATA MSB RTN		P2-14
Electrical Special Purpose Cable Assembly (W19)		
IDL U/L Data True/IDL D/L Data True	P1-58	P2-66
IDL U/L Data False/IDL D/L Data False	P1-59	P2-67
IDL U/L Clock True/IDL D/L Clock True	P1-60	P2-68
IDL U/L Clock False/IDL D/L Clock False	P1-61	P2-69
P1-62	P2-80	
Not Connected	P1-1	P2-1
Not Connected	P1-57	P2-75
Not Connected	P1-63	P2-81
Not Connected	P1-66	P2-128
RF Cable Assembly (W20)		
RF	P1	P2

Section V - MAINTENANCE PROCEDURES.

5-7 CORRECTIVE MAINTENANCE.

Corrective maintenance consists of taking the correct maintenance action to repair any malfunction or damage found.

5-8 DIRECT SUPPORT LEVEL REMOVAL AND REPLACEMENT PROCEDURES.

The following paragraphs describe the removal and replacement procedures for Direct Support assemblies. Table 5-10 lists the paragraph numbers and page numbers for the individual removal and replacement procedures.

TABLE 5-10. REMOVAL AND REPLACEMENT INDEX TABLE.

REMOVAL AND REPLACEMENT PROCEDURE	PARAGRAPH No.
Test Controller, TS-4398/U	
Processor CCA	5-8.1.1
Mass Storage CCA	5-8.1.2
SDT CCA	5-8.1.3
IDL Interface CCA	5-8.1.4
RF CCA	5-8.1.5
10 MHz Crystal Controlled Oscillator	5-8.1.6
Display Unit	5-8.1.7
+5 Vdc Power Supply (PS1)	5-8.1.8
±12 Vdc and +28 Vdc Power Supply (PS2)	5-8.1.9
±15 Vdc Power Supply (PS3)	5-8.1.10
LEDs (DS1-DS6)	5-8.1.11
LED (DS8 and Lampholder)	5-8.1.12
Circuit Breaker/Switch (CB1 and CB2)	5-8.1.13
Pushbutton Switch (S1)	5-8.1.14
Elapsed Time Meter (M1)	5-8.1.15

TABLE 5-10. REMOVAL AND REPLACEMENT INDEX TABLE. (cont)

REMOVAL AND REPLACEMENT PROCEDURE	PARAGRAPH No.
Keypad	5-8.1.16
Fan (B1)	5-8.1.17
Fan (B2)	5-8.1.18
RF Power Divider	5-8.1.19
Power Protection Unit (FL1)	5-8.1.20
Switch (S2)	5-8.1.21
RTTG, OQ-458/U	
+28 Vdc Power Supply (PS1)	5-8.2.1
Fans (B1-B3)	5-8.2.2
Fan Filter Elements	5-8.2.3
Radio Transmitter, T-1573(V)2/AR	5-8.2.4
Radio Receiver, R-2500/AR	5-8.2.5
Attenuators (AT1-AT16)	5-8.2.6
RF Switches (S1-S9)	5-8.2.7
Bandpass Filter (FL1)	5-8.2.8
RF Filters (FL2 and FL3)	5-8.2.9
Directional Coupler (DC1 through DC3)	5-8.2.10
Switch (SlO)	5-8.2.11
Circuit Breakers (CB1 and CB2)	5-8.2.12
Radio Transmitter, T-1573(V)2/AR, Module and Cable Level Removal and Replacement	5-8.2.13
Radio Receiver, R-2500/AR, Module and Cable Level Removal and Replacement	5-8.2.14

5-8.1 Test Controller, TS-4398/U, Direct Support Level Removal and Replacement. TS-4398/U has five field-replaceable CCAs, three field-replaceable power supplies, a replaceable display unit, and a replaceable 10 MHz oscillator. Use the following procedures to remove and replace these assemblies.

5-8.1.1 Processor CCA. The processor CCA is contained in slot one of TS-4398/U. To remove and replace the processor CCA, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any CCAs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies**.**

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

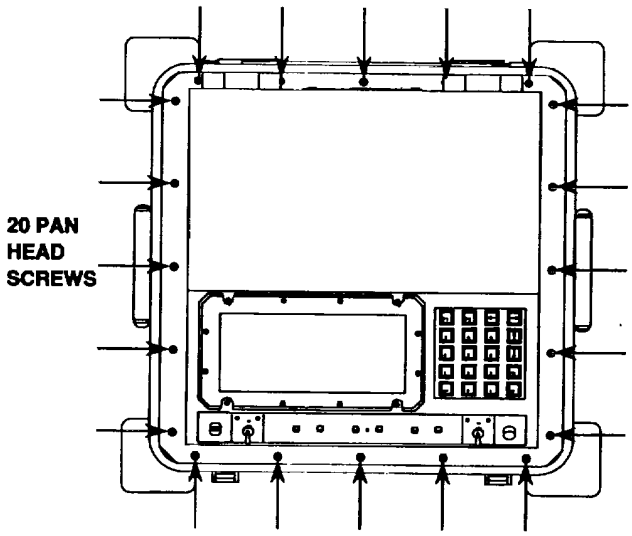
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the processor CCA.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

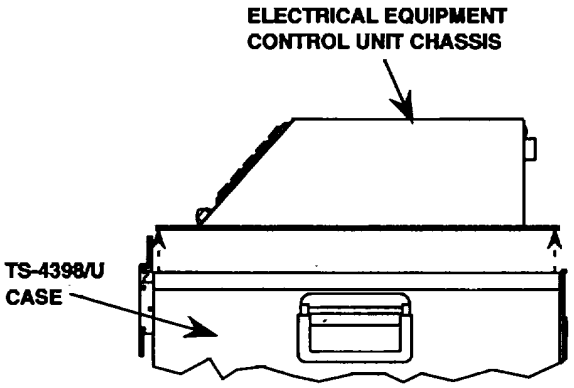
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



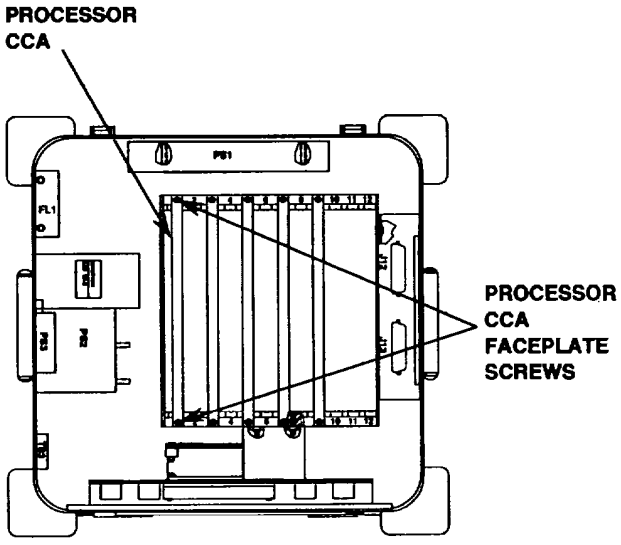
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Using a 3-in. long, 1/8-in. flat blade screwdriver, loosen the two captive faceplate screws that attach the processor CCA to the card cage in slot one.



7. Carefully slide out the processor CCA.

REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

1. Carefully insert the replacement processor CCA into slot one.

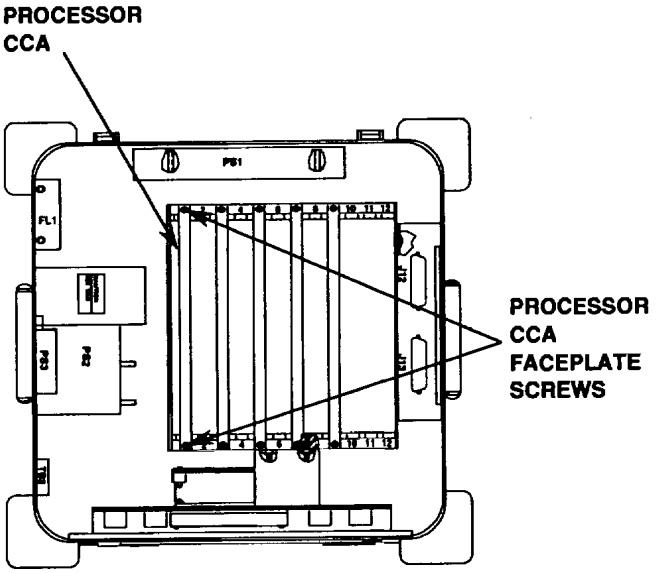
2. Using a 3-in. long, 1/8-in. flat blade screwdriver, tighten the two captive faceplate screws that attach the processor CCA to the card cage.

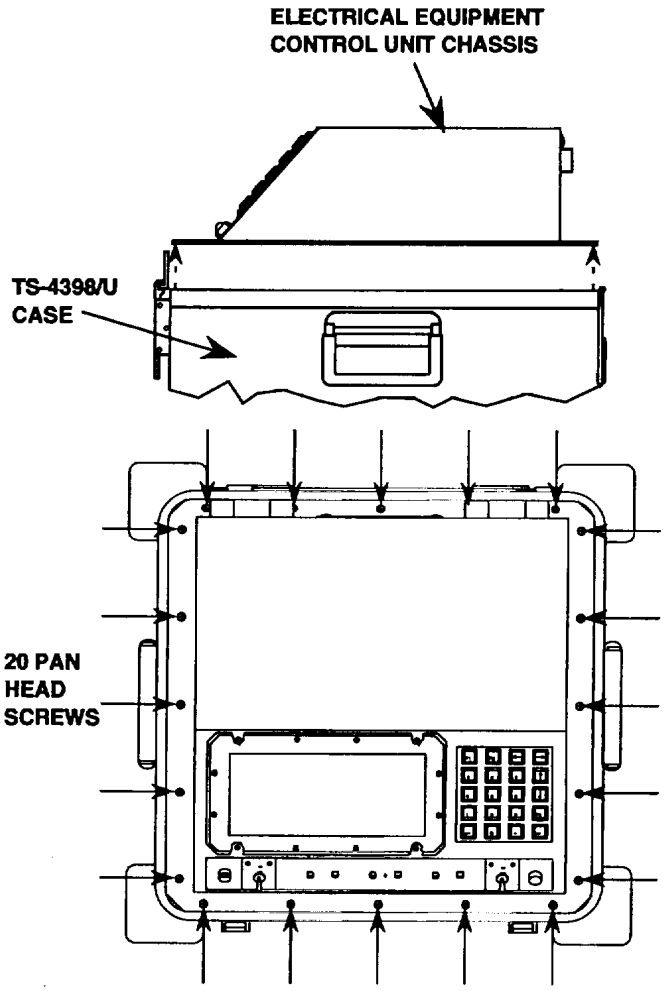
3. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

4. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

5. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

6. Install the top cover on TS-4398/U and latch in place.





5-8.1.2 Mass Storage CCA. The mass storage CCA is contained in slot three of TS-4398/U. To remove and replace the mass storage CCA, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any CCAs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

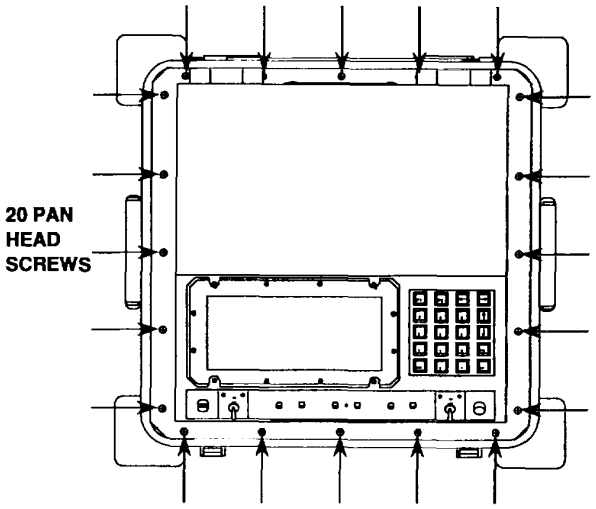
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the mass storage CCA.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

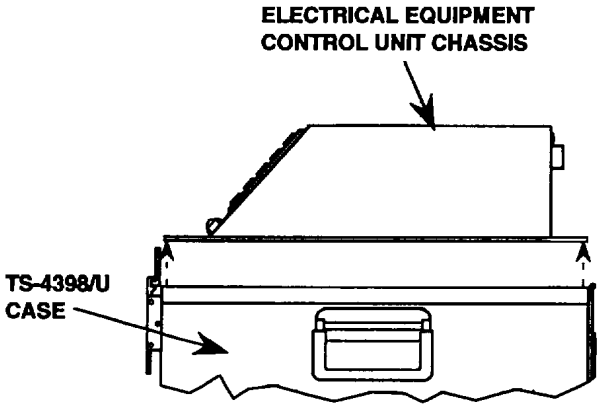
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

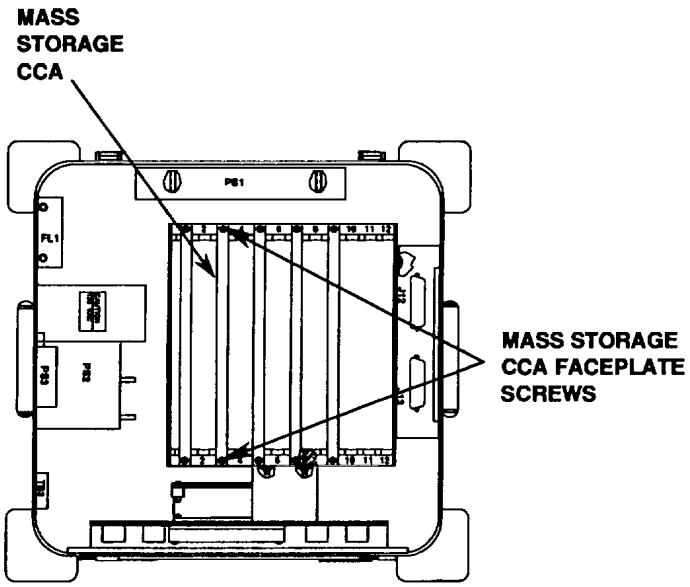
The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Using a 3-in. long, 1/8-in. flat blade screwdriver, loosen the two captive faceplate screws that attach the mass storage CCA to the card cage in slot three.

7. Carefully slide out the mass storage CCA.



REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

1. Carefully insert the replacement mass storage CCA into slot three.

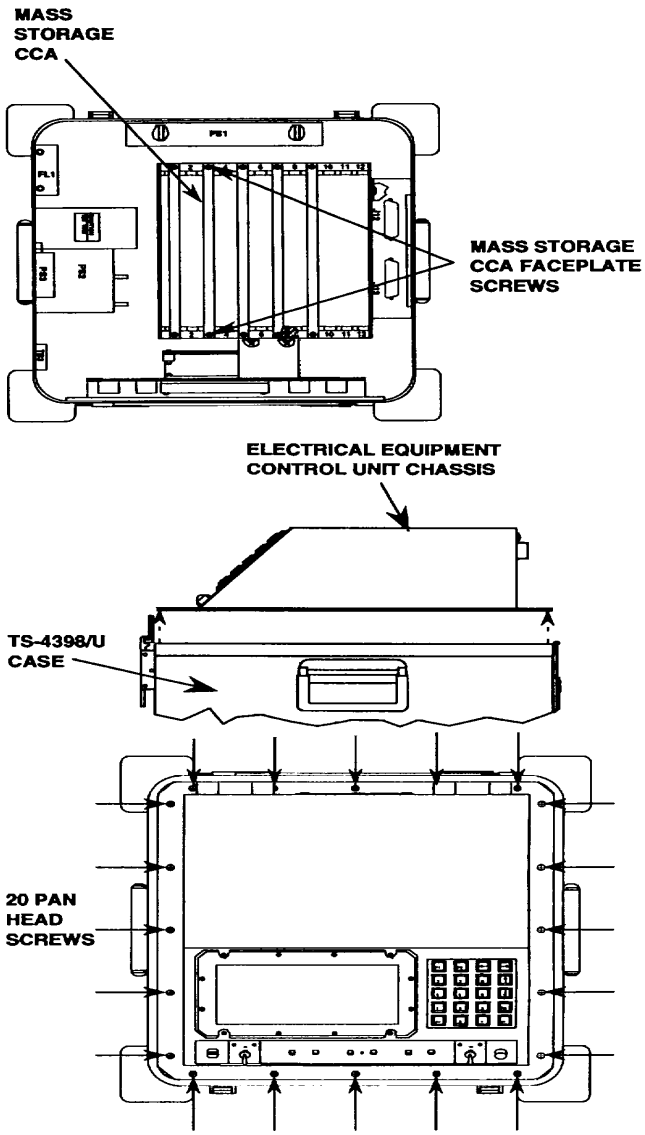
2. Using a 3-in. long, 1/8-in.flat blade screwdriver, tighten the two captive faceplate screws that attach the mass storage CCA to the card cage.

3. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

4. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

5. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

6. Install the top cover on TS-4398/U and latch in place.



5-8.1.3 SDT CCA. The SDT CCA is contained in slot five of TS-4398/U. To remove and replace the SDT CCA, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any CCAs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

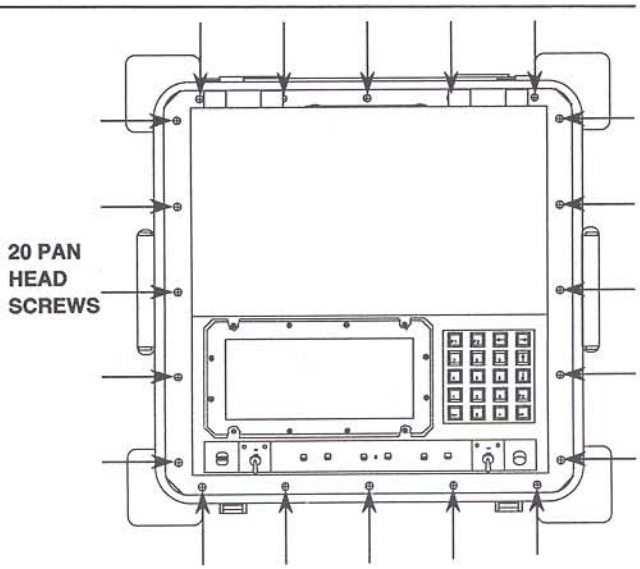
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the SDT CCA.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

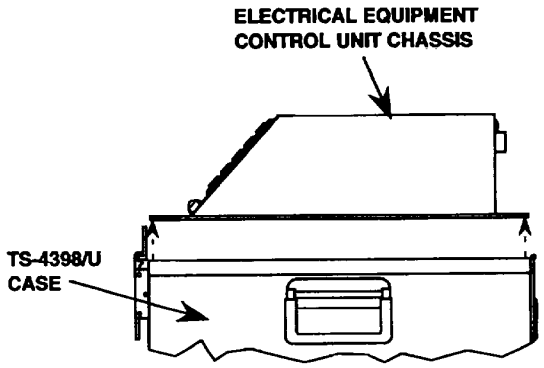
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

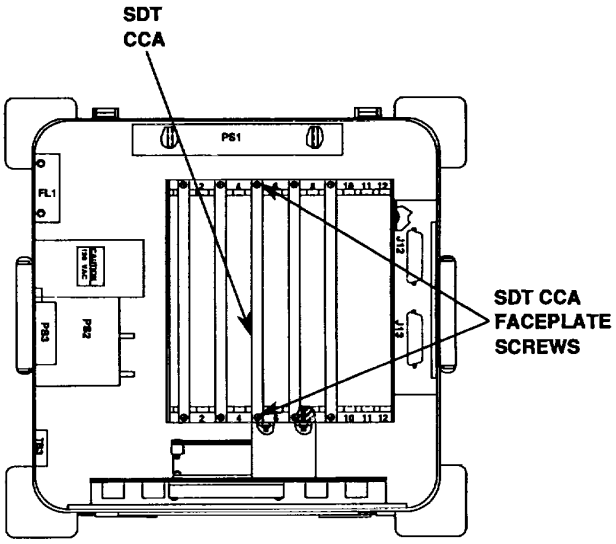
The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Disconnect all cable connectors from the SDT CCA, noting all connections.

7. Using a 3-in. long, 1/8-in. flat blade screwdriver, loosen the two captive faceplate screws that attach the SDT CCA to the card cage in slot five.



8. Carefully slide out the SDT CCA.

REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

1. Carefully insert the replacement SDT CCA into slot five.

2. Using a 3-in. long, 1/8-in. flat blade screwdriver, tighten the two captive faceplate screws that attach the SDT CCA to the card cage.

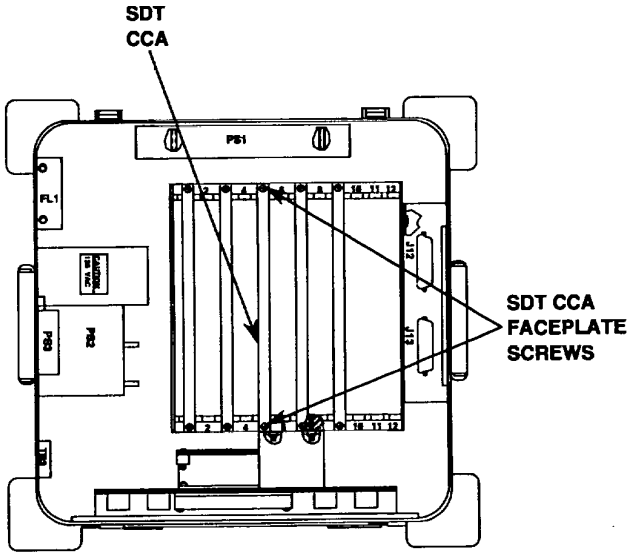
3. Connect all cable connectors to the replacement SDT CCA.

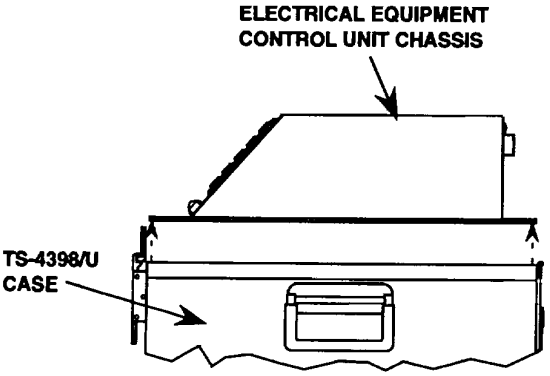
4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

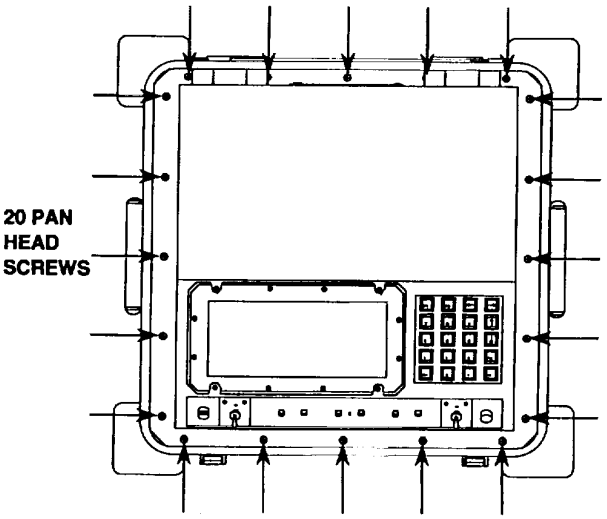
5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on TS-4398/U and latch in place.







5-8.1.4 IDL Interface CCA. The IDL Interface CCA is contained in slot seven of TS-4398/U. To remove and replace the IDL Interface CCA, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any CCAs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

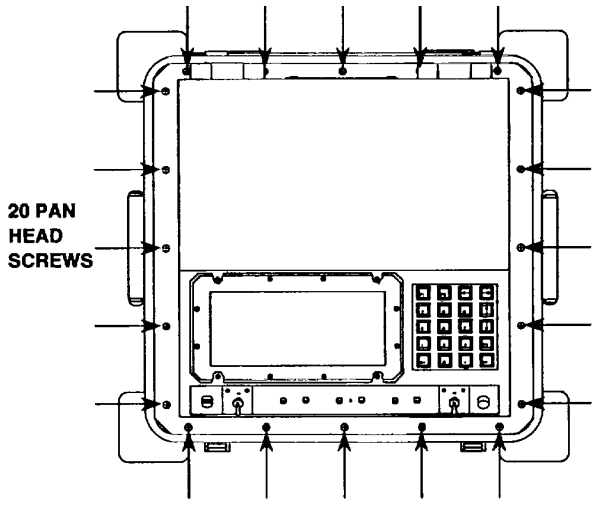
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the IDL Interface CCA.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

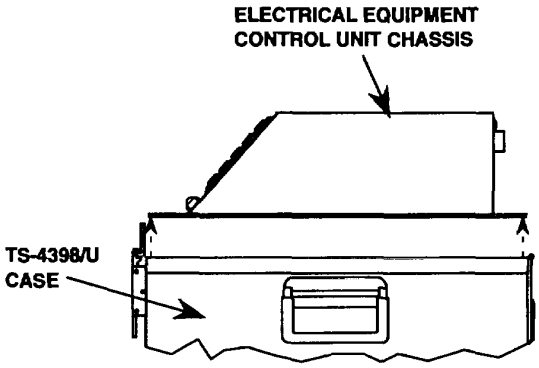
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



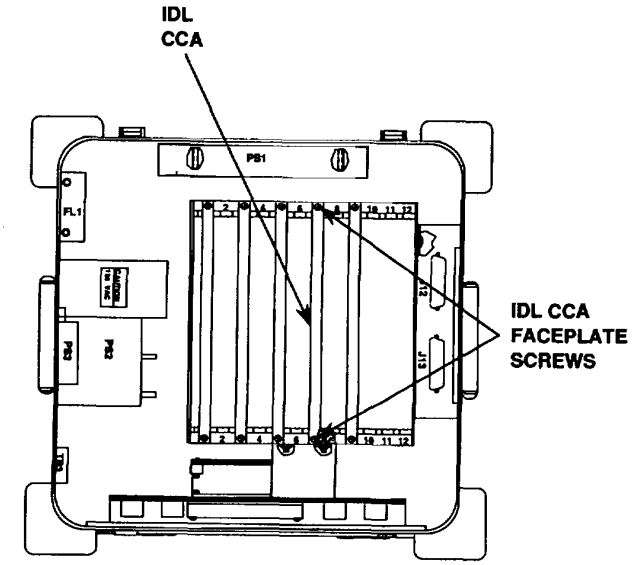
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Using a 3-in. long, 1/8-in. flat blade screwdriver, loosen the two captive faceplate screws that attach the IDL Interface CCA to the card cage in slot seven.



7. Carefully slide out the IDL Interface CCA.

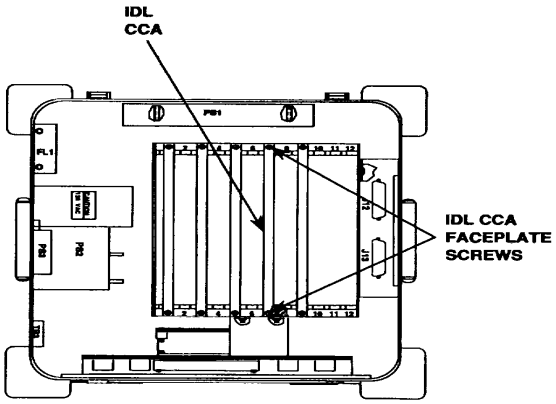
REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

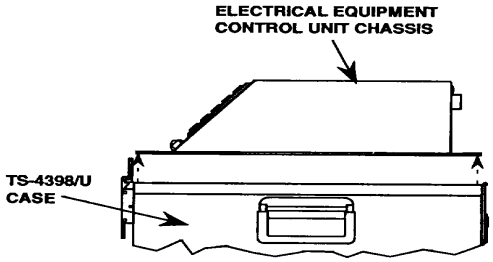
1. Carefully insert the replacement IDL Interface CCA into slot seven.

2. Using a 3-in. long, /8-in. flat blade screwdriver, tighten the two captive faceplate screws that attach the IDL Interface CCA to the card cage.



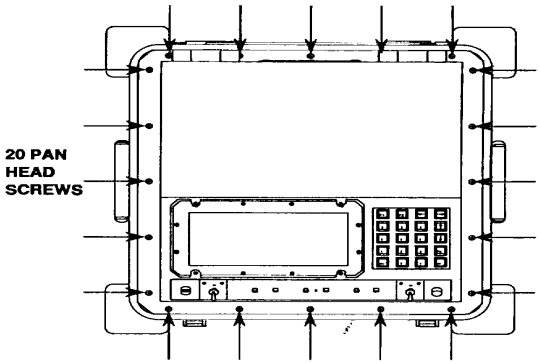
3. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

4. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



5. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

6. Install the top cover on TS-4398/U and latch in place.



5-8.1.5 RF CCA. The RF CCA is contained in slot nine of TS-4398/U. To remove and replace the RF CCA, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH**.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any CCAs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

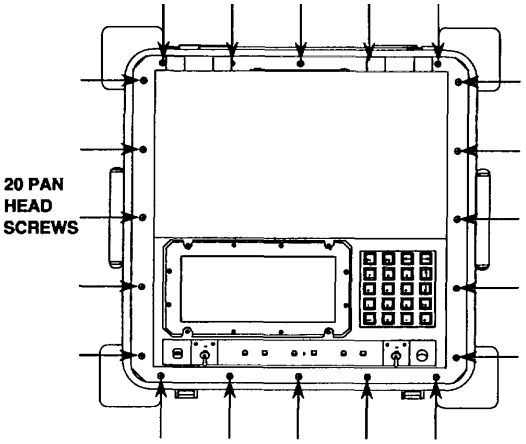
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the RF CCA.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

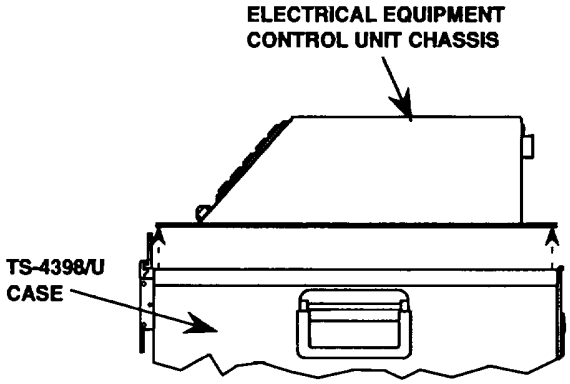
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



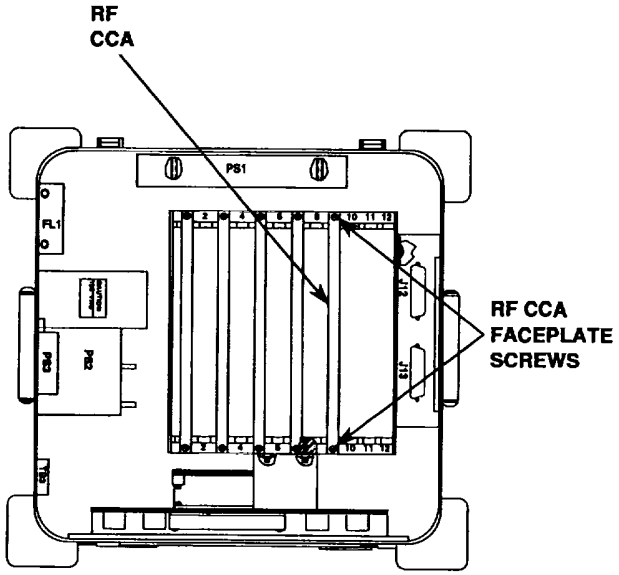
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/! case. Note all connections.

5.Remove the electrical equipment chassis from the TS-4398/U case.

6.Disconnect all cable connectors from the RF CCA, noting all connections.



7. Using a 3-in. long, 1/8-in. flat blade screwdriver, loosen the two captive faceplate screws that attach the RF CCA to the card cage in slot nine.

8. Carefully slide out the RF CCA.

REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

1. Carefully insert the replacement RF CCA into slot nine.

2. Using a 3-in. long, 1/8-in. flat blade screwdriver, tighten the two captive faceplate screws that attach the RF CCA to the card cage.

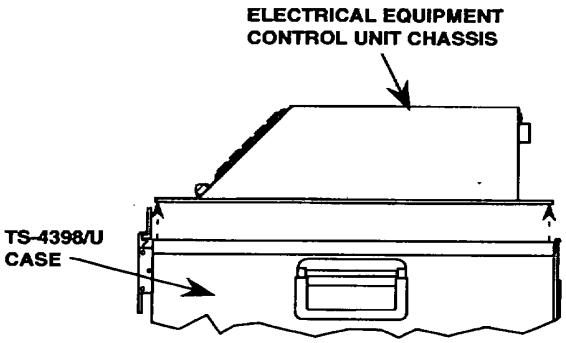
3. Connect all cable connectors to the replacement RF CCA.

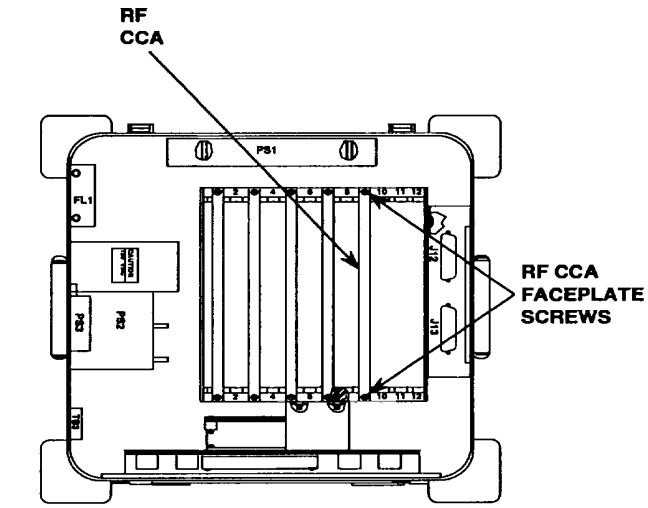
4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

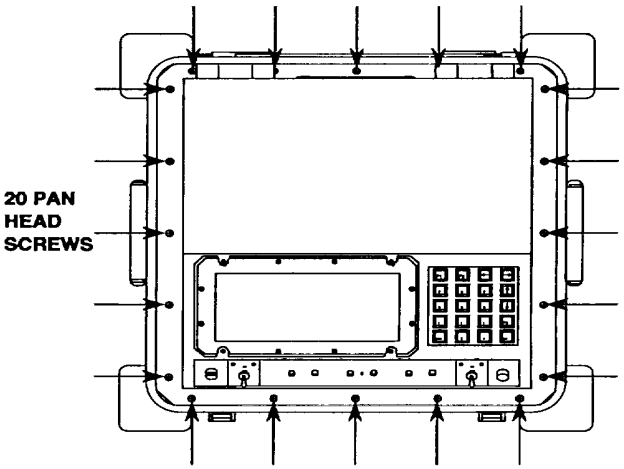
5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on TS-4398/U and latch in place.







5-8.1.6 10 MHzs Crystal-Controlled Oscillator. The 10 MHz Oscillator is contained in the electrical equipment chassis of TS-4398/U. To remove and replace the 10 MHz oscillator, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace the oscillator with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.
This task covers:

a. Removal b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
Solder Gun
Desoldering Attachment

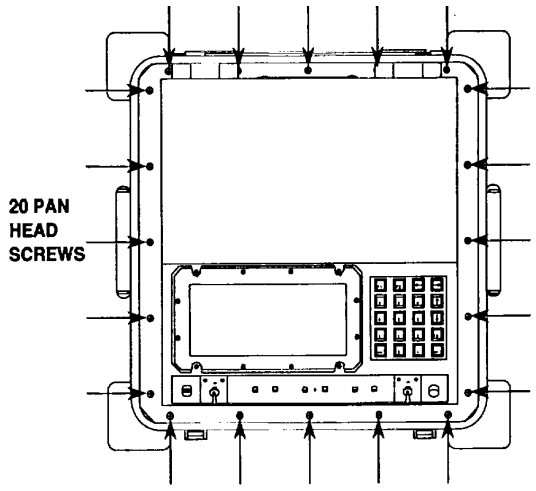
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the oscillator.

Materials
Solder
Heat Shrinkable Tubing

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and par

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

WARNING

The gasket at the top of TS-439 case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

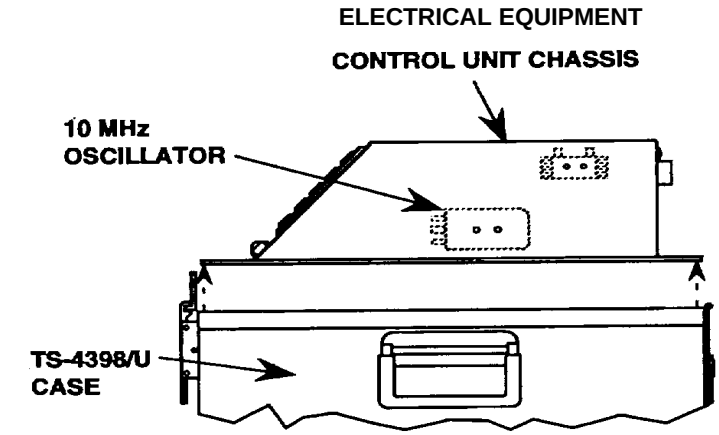
5. Remove the electrical equipment chassis from the TS-4398/U case.

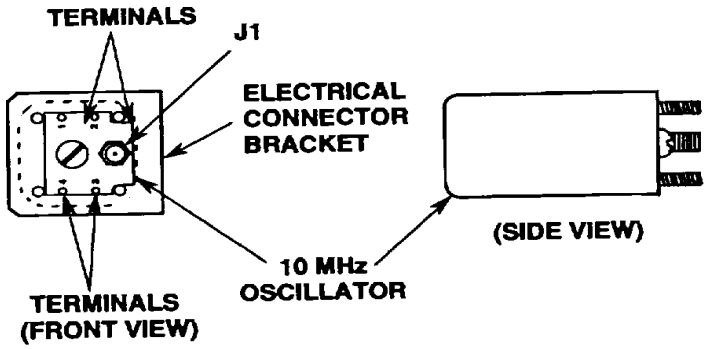
6. Disconnect connector W3P1 from J1 of the 10 MHz oscillator.

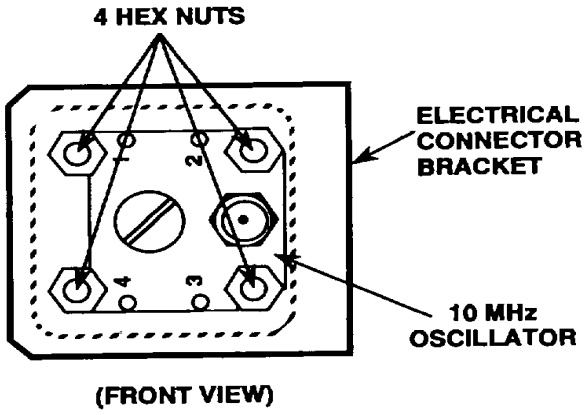
7. Using an electrician's pocket knife, remove the heat shrinkable tubing from the two terminals.

8. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals. Note all connections.

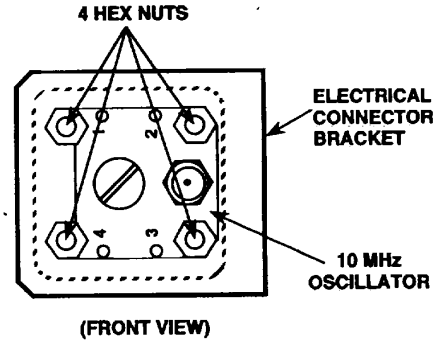
9. Using a 5/16 in. socket wrench, remove the four hex nuts, flat washers, and lock washers that attach the 10 MHz oscillator to the electrical connector bracket.







10. Remove the 10 MHz oscillator. Note the orientation of the oscillator.

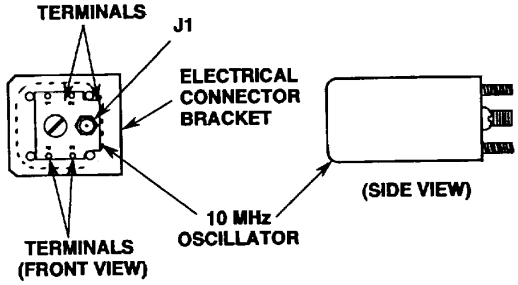


REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

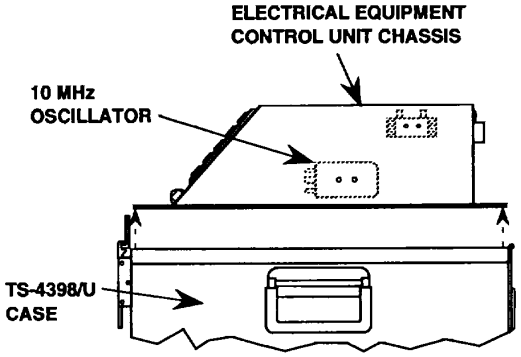
1. Using a 5/16 in. socket wrench, tighten the four hex nuts, flat washers, and lock washers that attach the 10 MHz oscillator to the electrical connector bracket.



2. Tin and solder wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/ TM 43-0158.

3. Reconnect connector W3P1 to J1 of the 10 MHz oscillator.

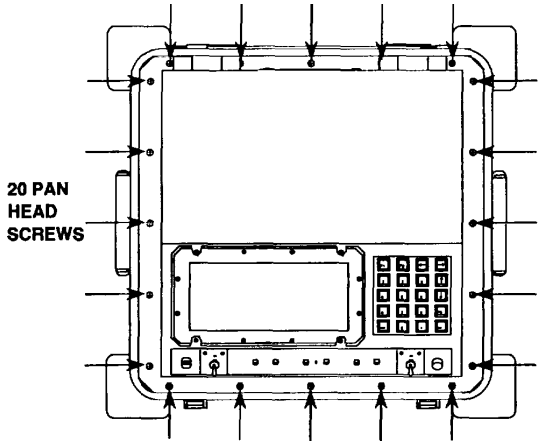
4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.



5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on TS-4398/U and latch in place.



5-8.1.7 Display Unit. The display unit is contained in the electrical equipment chassis of TS-4398/U. To remove and replace the display unit, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace the display unit with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal
b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

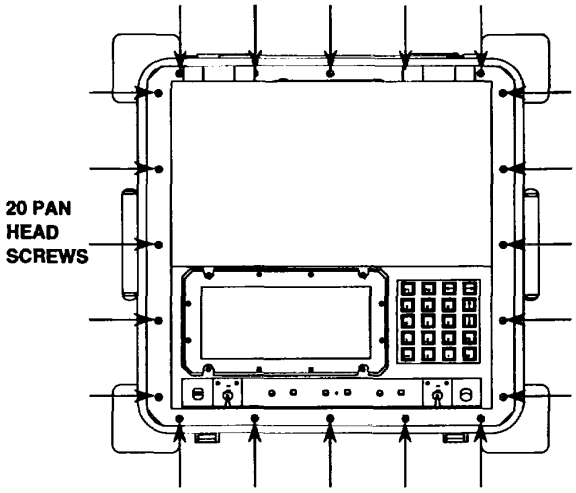
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the display unit.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

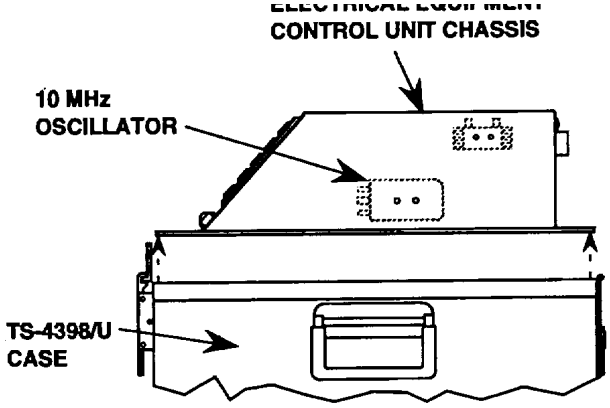
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis t avoid damage to cabling and pa

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

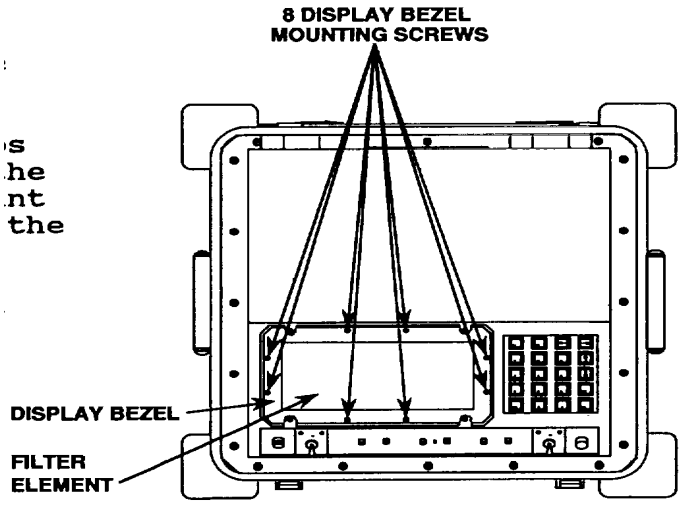
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. On the display unit, disconnect connector P18 from J1. Disconnect connector W4P1 from J3. Disconnect connector P19 from J4. Note all connections.

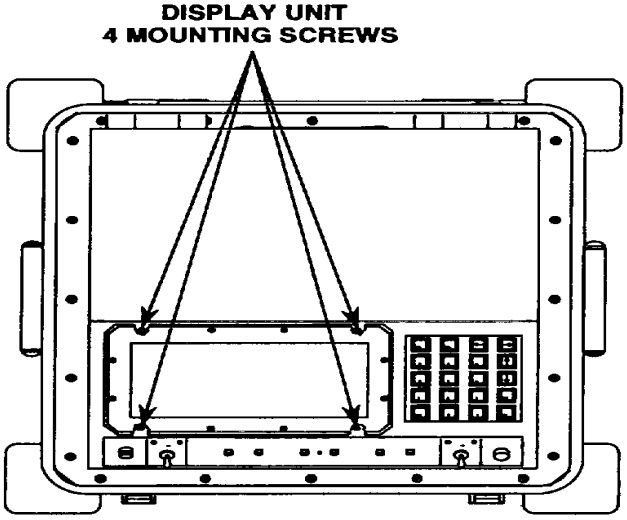
CAUTION

The filter element (glass) is supported by the display bezel. Hold the filter element while removing the display bezel.

7. Using a No. 1 Phillips screwdriver, remove the eight screws that mount the display bezel to the electrical equipment chassis. Remove the display bezel and the filter element.



8. While holding the display unit, use a No. 1 Phillips screwdriver to remove the four screws that mount the display unit to the electrical equipment chassis.



REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

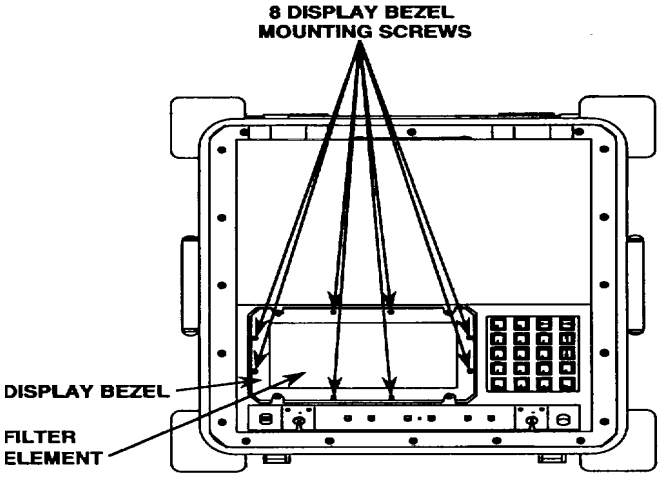
1. Position the display unit in place.

2. Using a No.1 Phillip screwdriver, tighten the four screws that mount the display unit to the electrical equipment chassis.

3. Position the display bezel and filter element in place.

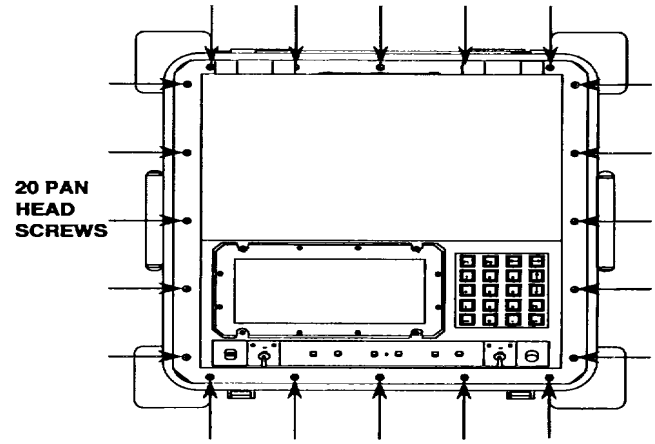
4. Using a No. 1 Phillips screwdriver, tighten the eight screws that mount the display bezel to the electrical equipment chassis.

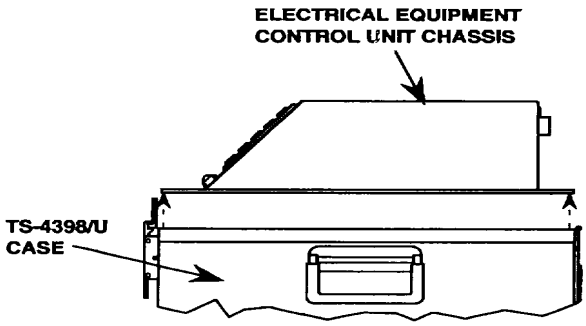
5. On the display unit, connect P19 to J4. Connect W4P1 to J3. Connect P18 to J1.



6. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

7. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.





8. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers and lock washers securing the electrical equipment chassis to the TS-4398/U case.

9. Install the top cover on the TS-4398/U case.

5-8.1.8 Power Supply +5 Vdc (PS1). PS1 is contained in the TS-4398/U case. To remove and replace PS1, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace PS1 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
Solder Gun
Desoldering
Attachment

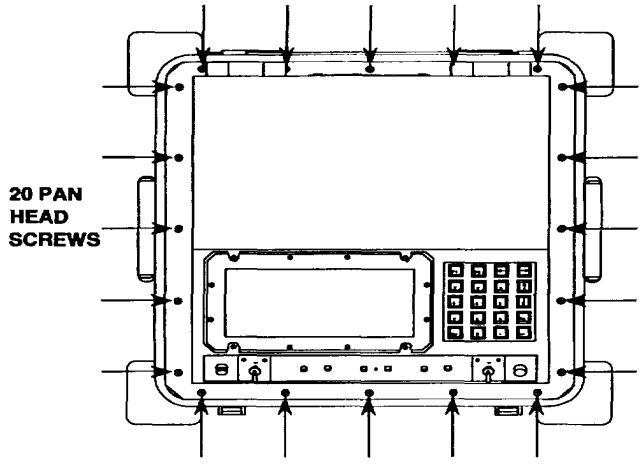
Equipment Conditions
TS-4398/U must have the
power cable disconnected
before removing and
replacing PS1.

Materials
Solder
Heat Shrinkable Tubing

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

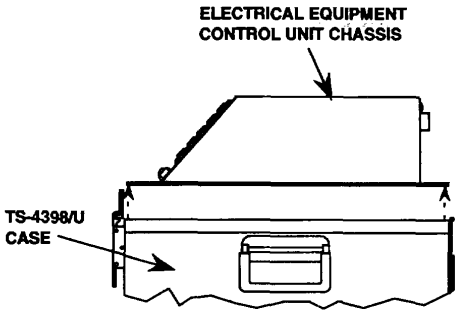
WARNING

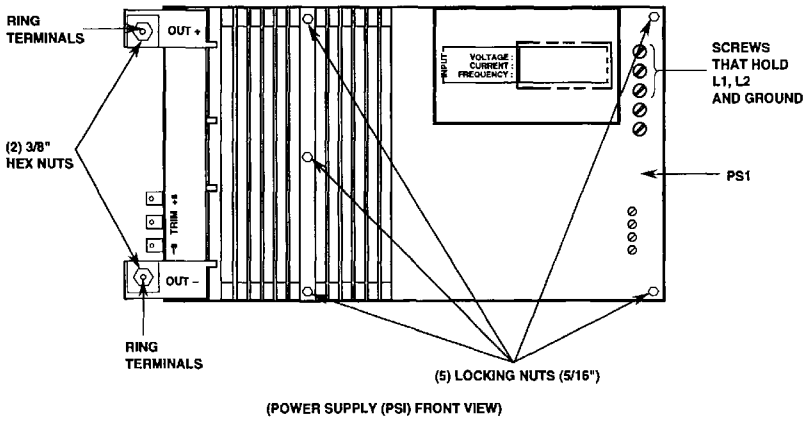
The gasket at the top of TS-4398/ case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

5. Remove the electrical equipment chassis from the TS-4398/U case.

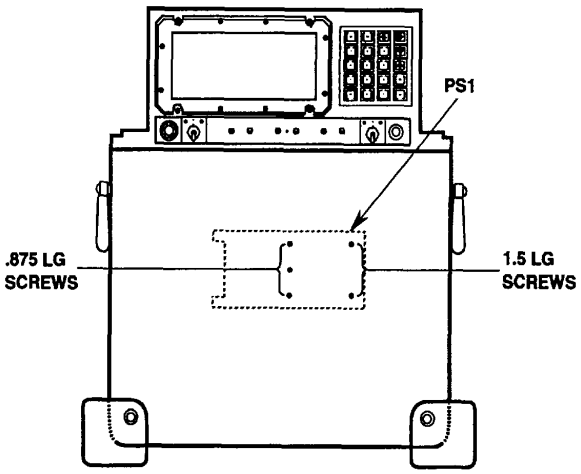
6. Using a 3/8 in. socket wrench, remove the two hex nuts, ring terminals, and washers. Note all connections.





(POWER SUPPLY (PSI) FRONT VIEW)

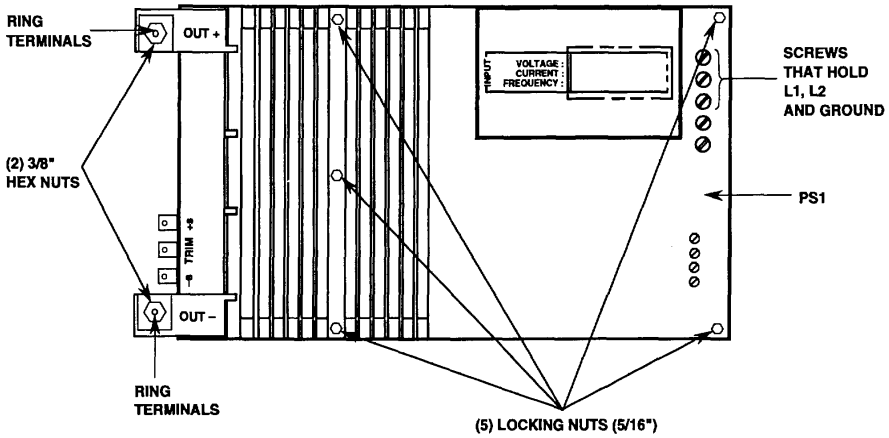
7. Using a No. 2 Phillips screwdriver and a 5/16 in. socket wrench, remove the five locking nuts, flat washers, three .875LG screws, and two 1.5LG screws that mount the power supply to the electrical equipment chassis.



8. Using an electrician's pocket knife, remove the heat shrinkable tubing from the two tabs (+S and -S). Desolder and remove the wires from the tabs according to procedures in TO 00-25-234/TM 43-0158. Note all connections.

9. Using a 3-in. long, 1/8-in. flat screwdriver, loosen the screws that hold wires into L1, L2, and ground. Remove the wires. Note all connections.

10. Remove the power supply.



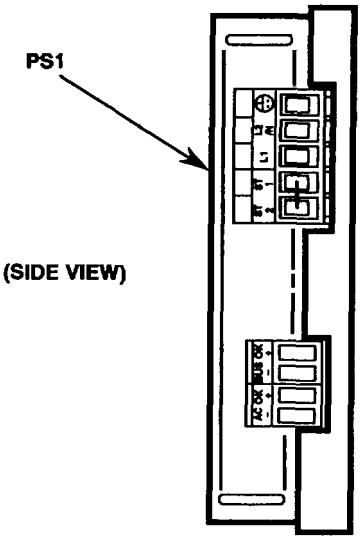
(POWER SUPPLY (PSI) FRONT VIEW)

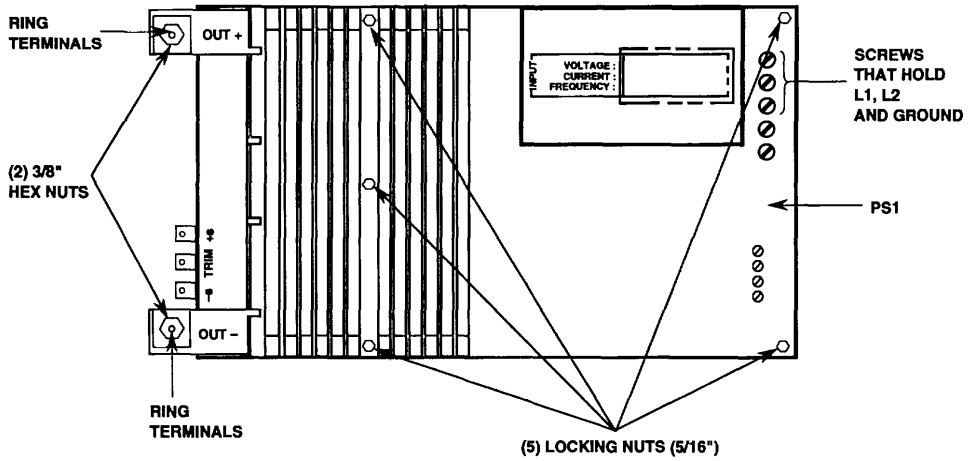
REPLACEMENT

1. Install a jumper in the replacement power supply from ST1 to ST2, using 18-22 awg (American Wire Gage) wire. Use procedures found in TO 00-25-234/TM 43-0158 for stripping, tinning, etc.

2. Make connections to L1, L2, and ground with wires as previously noted. Using a 3-in. long, 1/8-in. flat screwdriver, tighten the screws that make connections to L1, L2, and ground.

3. Solder the two wires to +S (red wire) and -S (black wire). Apply heat shrinkable tubing according to procedures



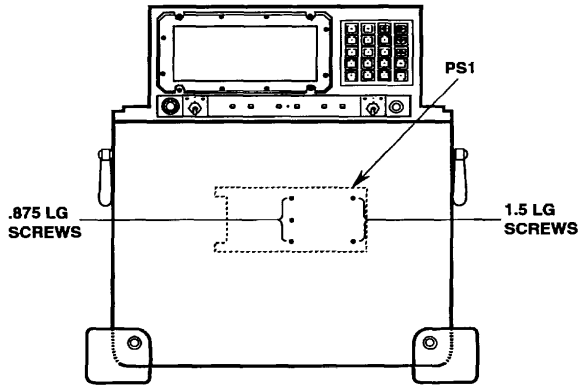


(POWER SUPPLY (PSI) FRONT VIEW)

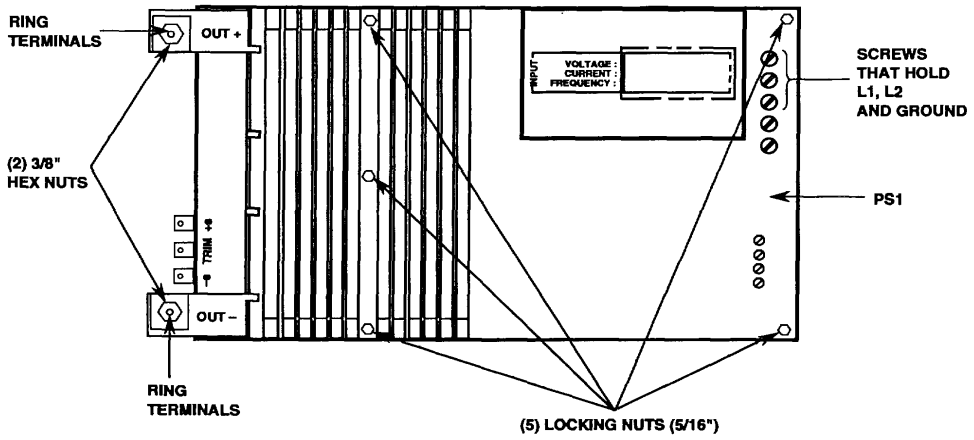
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Using a No. 2 Phillips screwdriver and a 5/16 in. socket wrench, install the five lockin' nuts, flat washers, three .875LG screws, an, two 1.5LG screws that mount the power supply to the electrical equipment chassis.



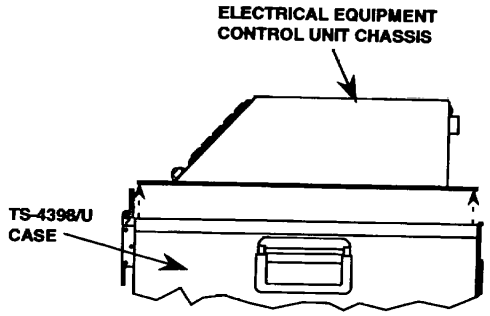
5. Using a 3/8 in. socket wrench, install the two hex nuts, ring terminals, and washers.



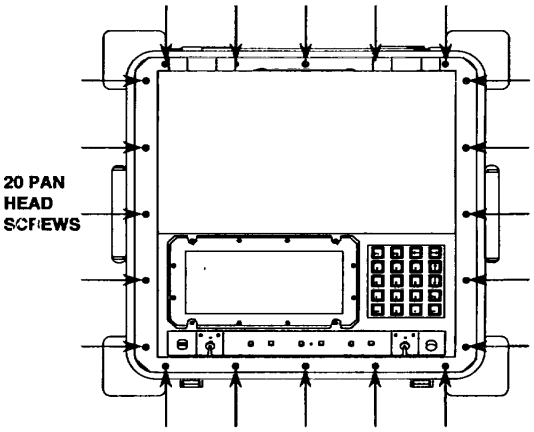
(POWER SUPPLY (PSI) FRONT VIEW)

6. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

7. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



8. Using a No. 2 Phillips screwdriver, install the 20 pan head screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



9. Install the top cover on the TS-4398/U case.

5-8.1.9 Power Supply ±12 Vdc and +28 Vdc (PS2). PS2 is contained in the TS-4398/U case. To remove and replace PS2, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace PS2 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

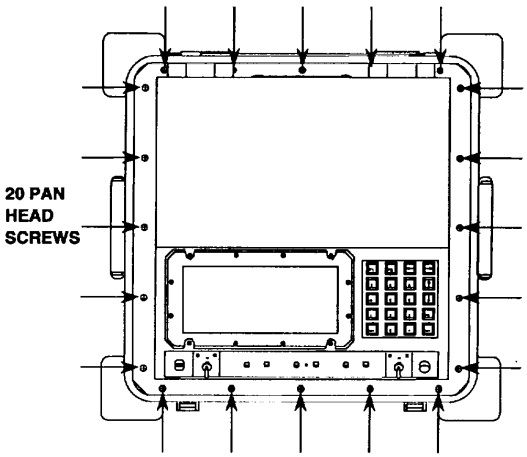
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing PS2.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/1 case. Note all connections.

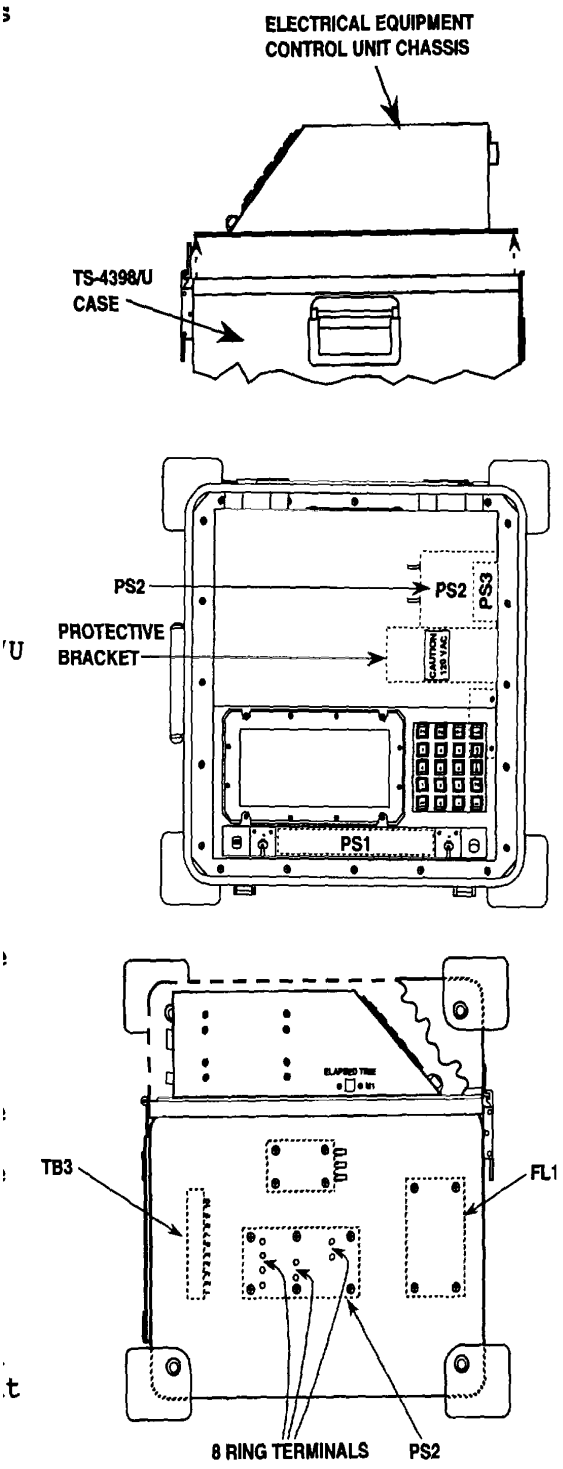
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Using a No. 1 Phillips screwdriver, remove the two screws that mount the protective bracket.

7. Using a No. 2 Phillips screwdriver, remove the six screws that mount the power supply to the case.

8. Using a 3/16 in. socket wrench, remove the eight nuts that secure the ring terminals. Note all connections.

9. Remove the power supply.



REPLACEMENT

1.Using a 3/16 in. socket wrench, tighten the eight nuts that secure the ring terminals to the replacement power supply.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur the gasket contacts the skin

2. Using a No. 2 Phillips screwdriver, screw the six screws that mount the power supply to the case.

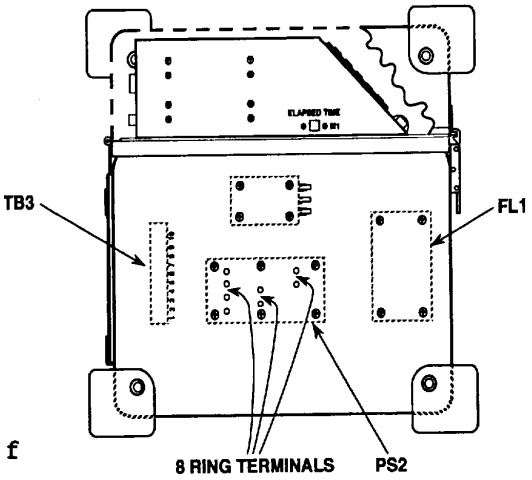
3. Using a No. 1 Phillips screwdriver, screw the two screws that mount the protective bracket to the case.

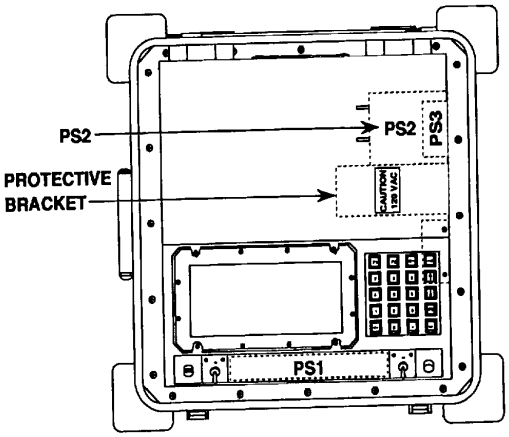
4. Position the electrical equipment chassis on th TS-4398/U case. Ensure that the electronic shielding gasket remain in position.

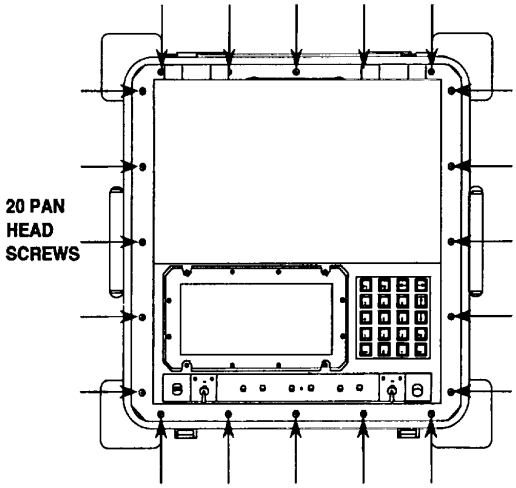
5. Using a No. 2 Phillips screwdriver, install the 20 pan head screws, flat washers and lock washers securing the electrical equipment chassis to the TS-4398/U case.

6. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover or the TS-4398/U case.







5-8.1.10 Power Supply c+15 Vdc (PS3). PS3 is contained in the TS-4398/U case. To remove and replace PS3, perform the following.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace PS3 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies. This task covers:

a. Removal

b. Replacement

INITIAL 8STUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

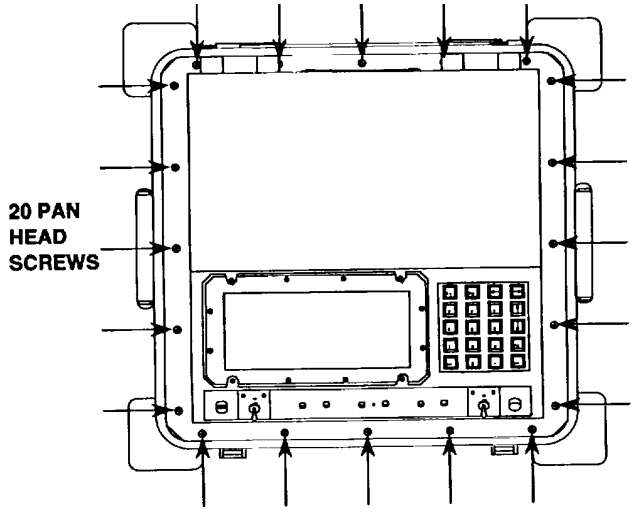
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing PS3.

Materials
Locking Compound

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

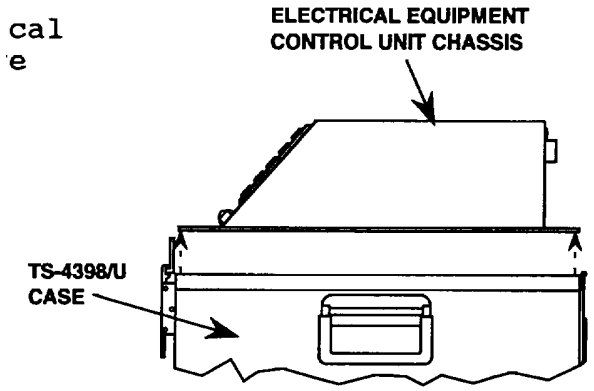
5. Remove the electrical equipment chassis from the TS-4398/U case.

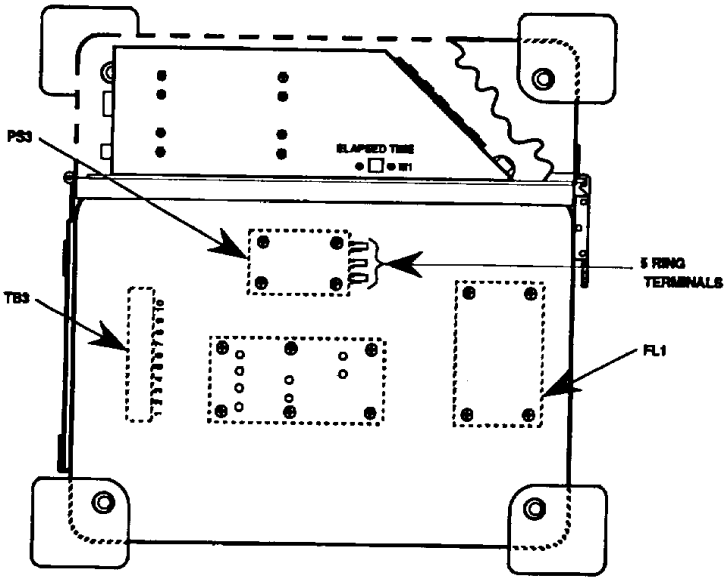
6. Using a No. 1 Phillips screwdriver, remove the four screws that mount the bracket around the power supply to the case.

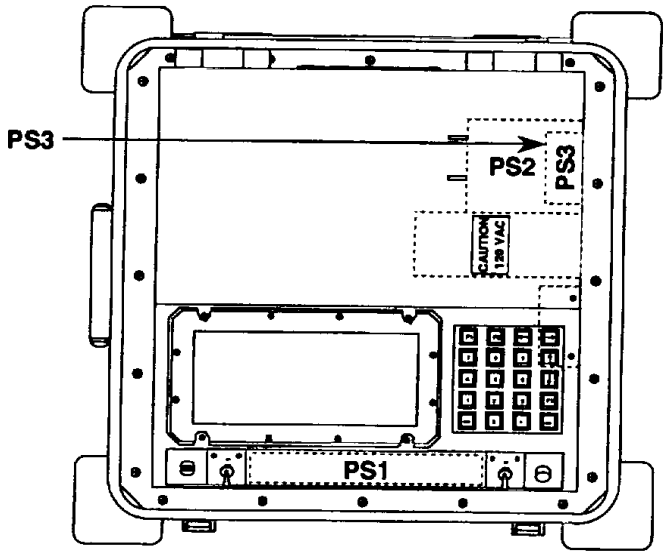
7. Using a No. 1 Phillips screwdriver, remove the two screws that mount the bracket covering the ring terminals to the case.

8. Using a No. 1 Phillips screwdriver, remove the four screws that mount the power supply to the case.

9. Using a 3-in. long, 1/8-in. flat blade screwdriver, remove the five screws that secure the ring terminals. Note all connections.







10. Remove the power supply.

REPLACEMENT

1. Using a 3-in. long, 1/8-in. flat blade screwdriver, tighten the five screws that secure the ring terminals to the replacement power supply.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

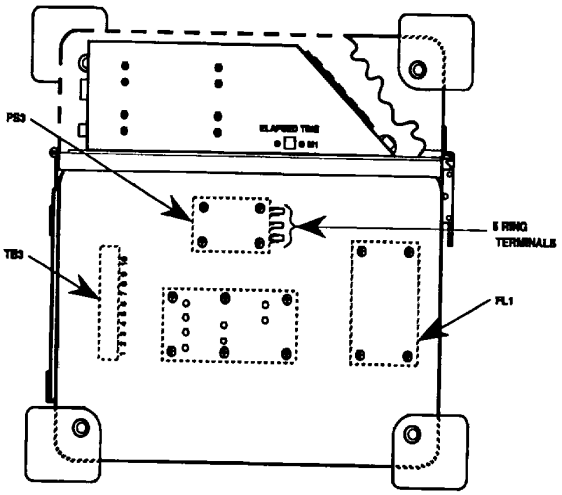
2. Align the power supply to the case mounting holes. While applying locking compound, use a No. 1 Phillips screwdriver to screw the four screws that attach the power supply to the case.

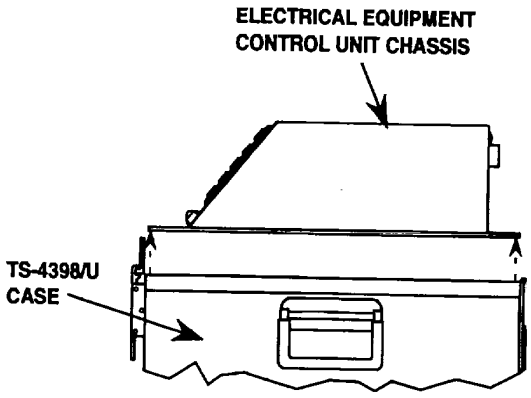
3. Using a No. 1 Phillips screwdriver, mount the bracket covering the ring terminals to the case.

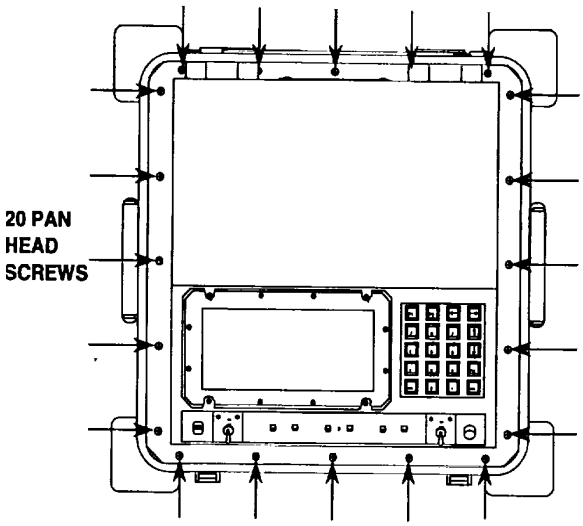
4. Using a No. 1 Phillips screwdriver, mount the bracket around the power supply to the case.

5. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

6. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.







7. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

8. Install the top cover on TS-4398/U and latch in place.

5-8.1.11 LEDs (DS1-DS6). DS1 through DS6 are contained in the electrical equipment chassis of TS-4398/U. To remove and replace these LEDs, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or **DEATH.**

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any LEDs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
Solder Gun
Desoldering Attachment

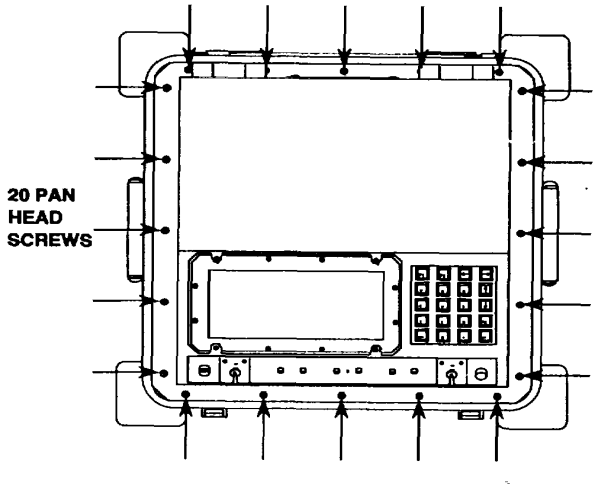
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing DS1 through DS6.

Materials
Solder
Heat Shrinkable Tubing

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



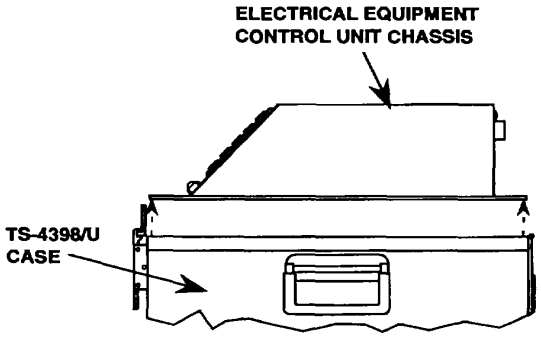
CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.



4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

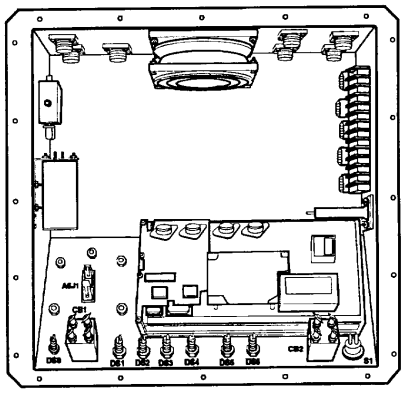
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Rotate the electrical equipment chassis upside down so that you have access to the LED terminals and hardware.

7. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals of the LED to be replaced. Note all connections.

8. Using a 13/32 in. wrench, remove the hex nut that mounts the LED to the front panel.

9. Remove the LED.



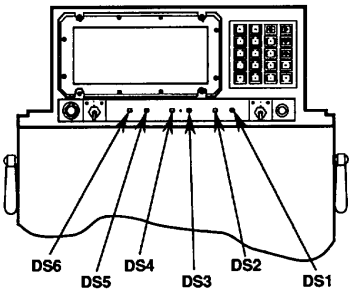
REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

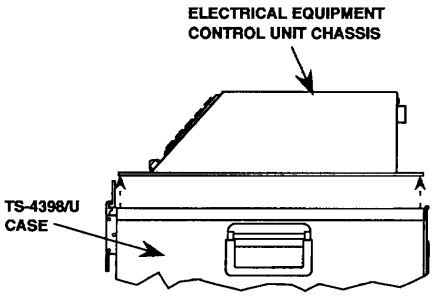
1. Position the replacement LED in place.

2. Using a 13/32 in. wrench, install the hex nut that mounts the LED to the front panel.



3. Tin and solder wires to their appropriate terminals according to the procedures in TO 00-25-234/TM 43-0158.

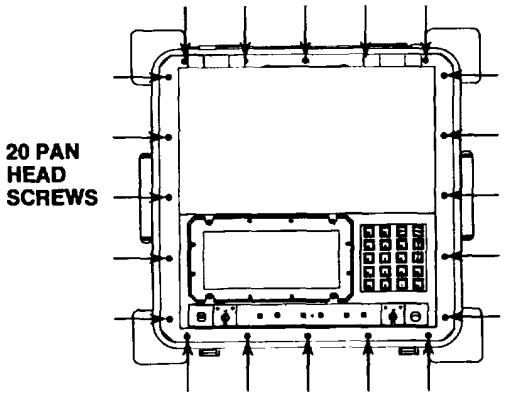
4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.



5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/t case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on the TS-4398/U case.



5-8.1.12 LED (DS8) and Lampholder. DS8 and the lampholder are contained in the electrical equipment chassis of TS-4398/U. To remove and replace these components, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any LEDs with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
Solder Gun
Desoldering Attachment
13/32 in. Wrench

Materials
Solder
Heat Shrinkable Tubing

Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing DS8.

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Unscrew the lamp cover.

NOTE

If only the lamp is to be replaced, remove lamp by pulling it straight out. Go to step 5 of the replacement procedures.

3. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

CAUTION

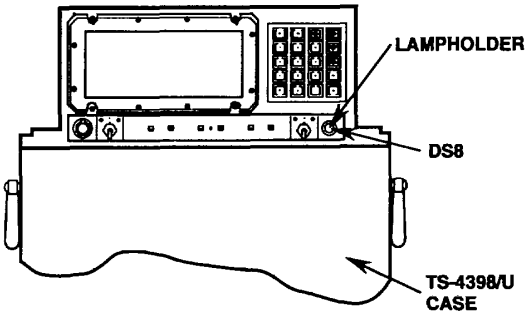
Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

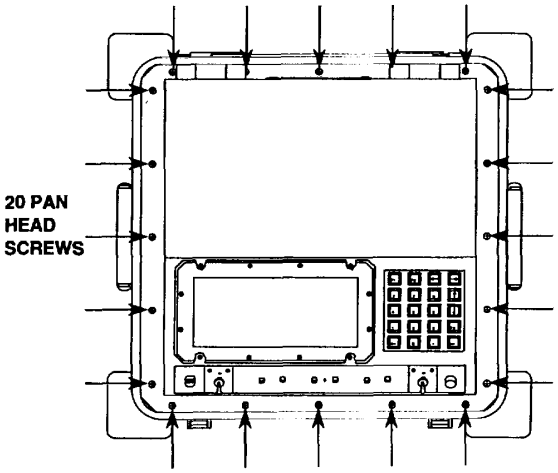
4. Lift and support the electrical equipment chassis from the TS-4398/U case.

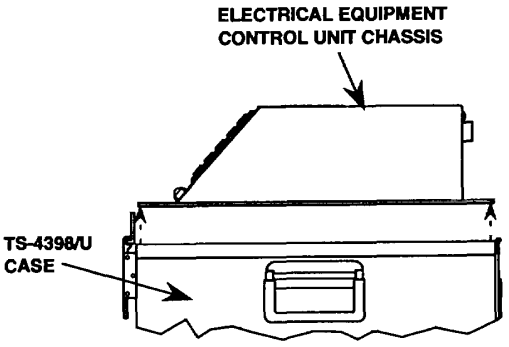
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

5. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.







6. Remove the electrical equipment chassis from the TS-4398/U case.

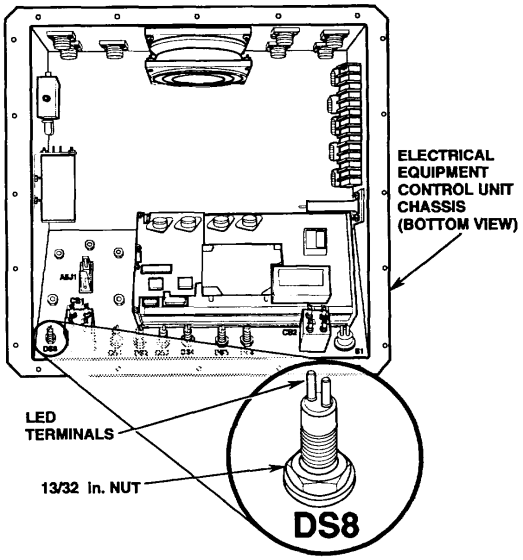
7. Rotate the electrical equipment chassis upside down so that you have access to the DS8 terminals.

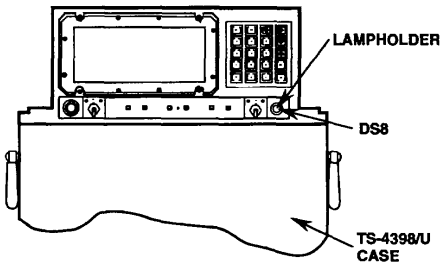
8. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals. Note all connections.

9. Using a 13/32 in. wrench, remove the hex nut that mounts the lamp to the front panel and the retaining nut.

10. Unscrew the lampholder from the chassis.

11. Remove DS8.





REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

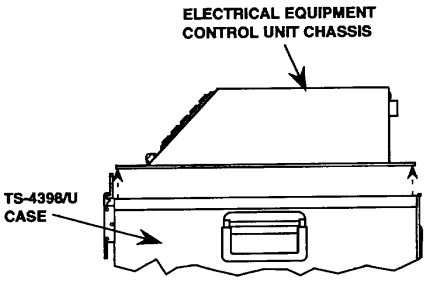
1. Position the replacement DS8 in place.

2. Screw the lampholder into the chassis.

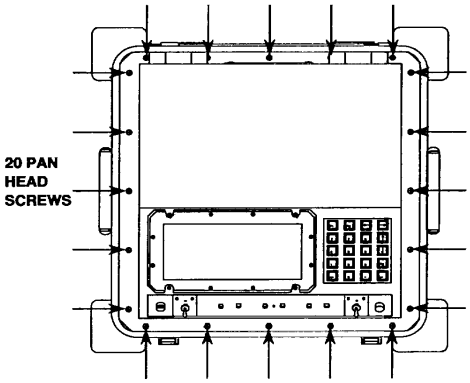
3. Using a 13/32 in. wrench, install the hex nut that secures the LED to the front panel and retaining nut.

4. Tin and solder wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/ TM 43-0158.

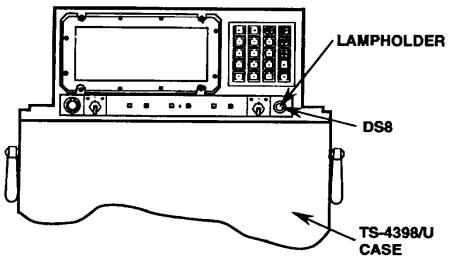
5. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.



6. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



7. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



8. Insert the replacement lamp into the lampholder.

9. Screw the lamp cover on.

10. Install the top cover on the TS-4398/U case.

5-8.1.13 Circuit Breaker/Switch (CB1 and CB2). CB1 and CB2 are contained in the electrical equipment chassis of TS-4398/U. To remove and replace CB1 and CB2, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace CB1 and CB2 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
Solder Gun

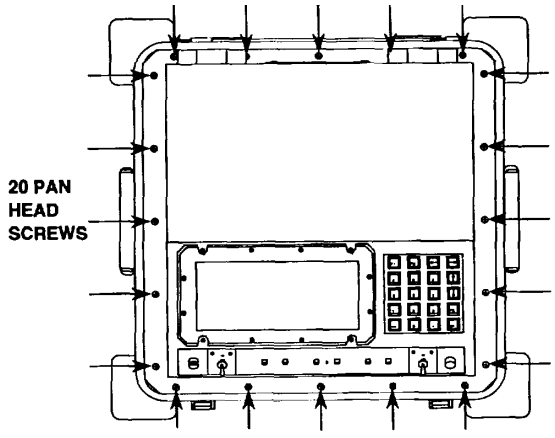
Materials
Heat Shrinkable Tubing

Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing CB1 and CB2.

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-439E case. Note all connections.

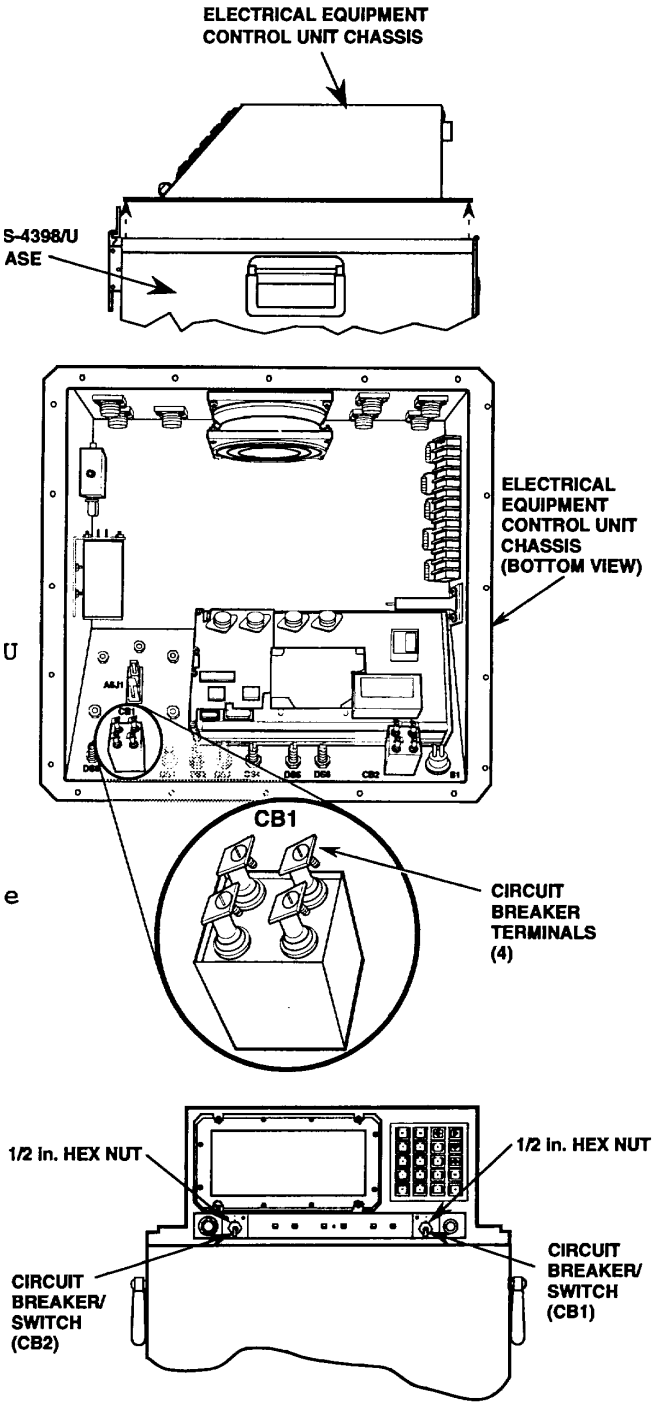
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Rotate the electrical equipment chassis upside down so that you have access to the circuit breaker/switch terminals.

7. Remove the insulation sleeving from the soldered connections.

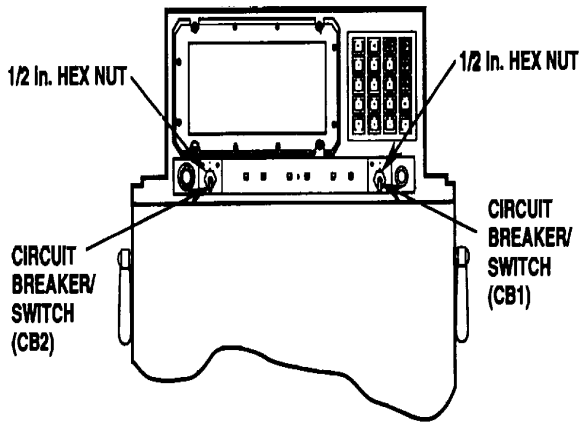
8. Using a 3-in. long, 1/8-in. flat blade screwdriver, remove wires from the terminals. Note all connections.

9. Using a ½ in. wrench remove the nut that mounts the circuit breaker/switch to the front panel.



10. Using a No. 2 Phillips screwdriver, remove the two screws that hold the circuit breaker/switch to the front panel.

11. Remove the circuit breaker/switch.



REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

1. Position the replacement circuit breaker/switch in place.

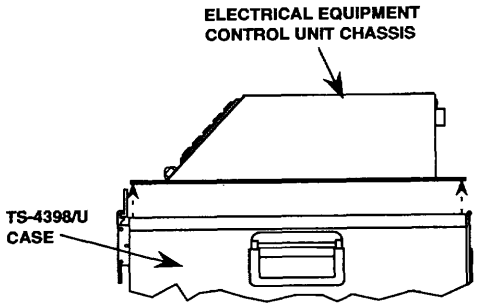
2. Using a No. 2 Phillips screwdriver, install the two screws that secure the circuit breaker/switch to the front panel.

3. Using a ½ in. wrench, install the nut that mounts the circuit breaker/switch to the front panel.

4. Screw wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/ TM 43-0158.

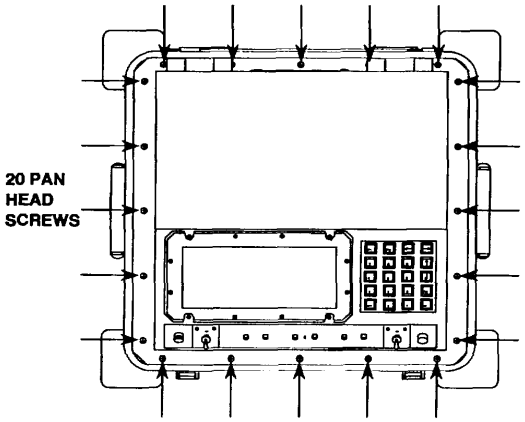
5. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

6. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



7. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

8. Install the top cover on the TS-4398/U case.



5-8.1.14 Pushbutton Switch (S1). S1 is contained in the electrical equipment chassis of TS-4398/U. To remove and replace S1, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace S1 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
Solder Gun
Desoldering Attachment
¾ in. Wrench

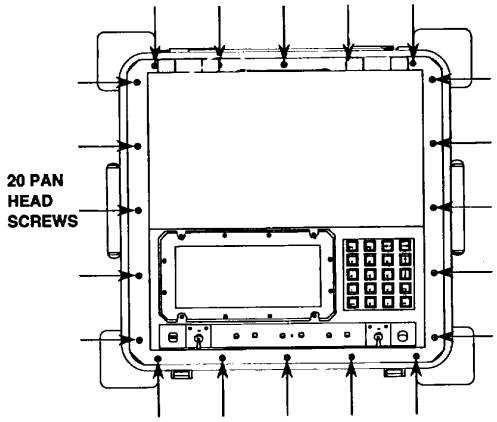
Materials
Solder
Heat Shrinkable Tubing

Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing S1.

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

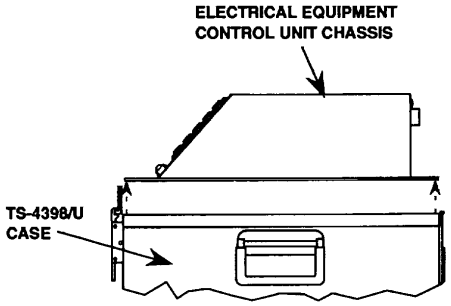
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

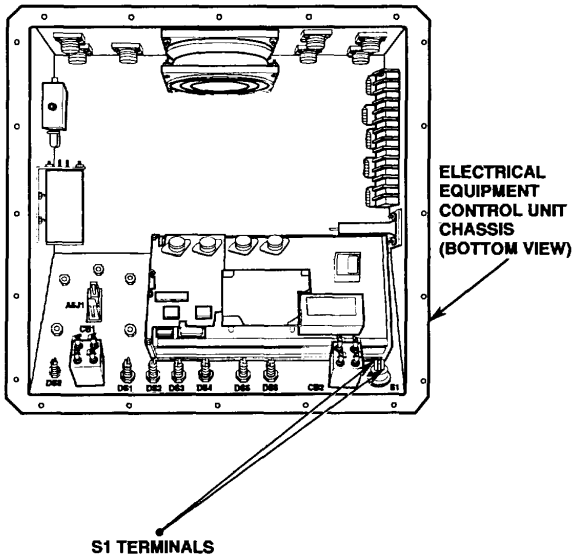
5. Remove the electrical equipment chassis from the TS-4398/U case.

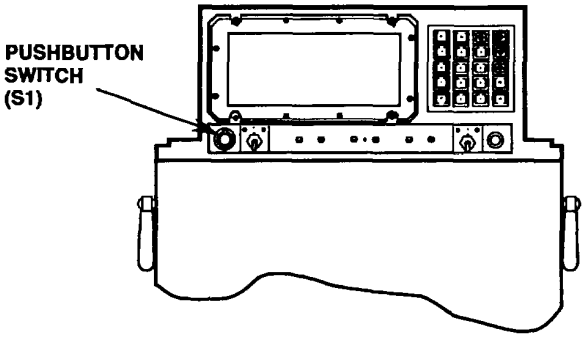
6. Rotate the electrical equipment chassis upside down so that you have access to the S1 terminals.

7. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals. Note all connections.

8. Using a ¾ in. wrench, remove the nut that mounts S1 to the front panel.

9. Remove S1.





REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

1. Position the replacement S1 in place.

2. Using a ¾ in. wrench install the nut that mounts S1 to the front panel.

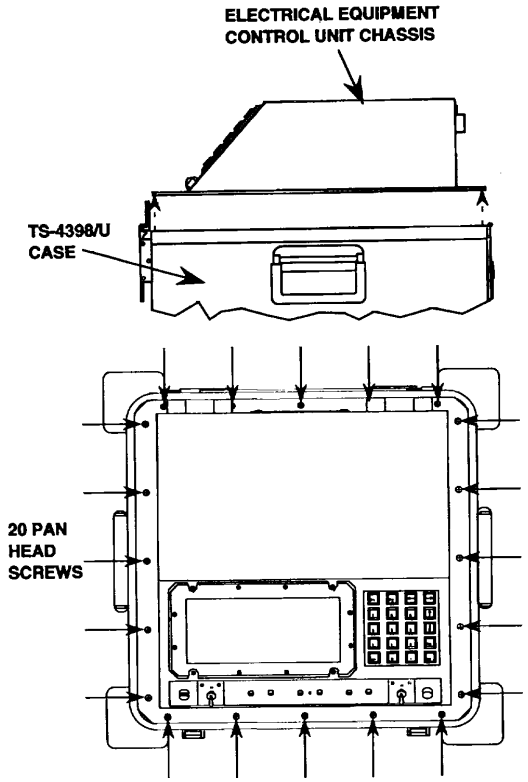
3. Tin and solder wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/ TM 43-0158.

4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on the TS-4398/U case.



5-8.1.15 Elapsed Time Meter (M1). M1 is contained in the electrical equipment chassis of TS-4398/U. To remove and replace M1, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace M1 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
Solder Gun
Desoldering Attachment

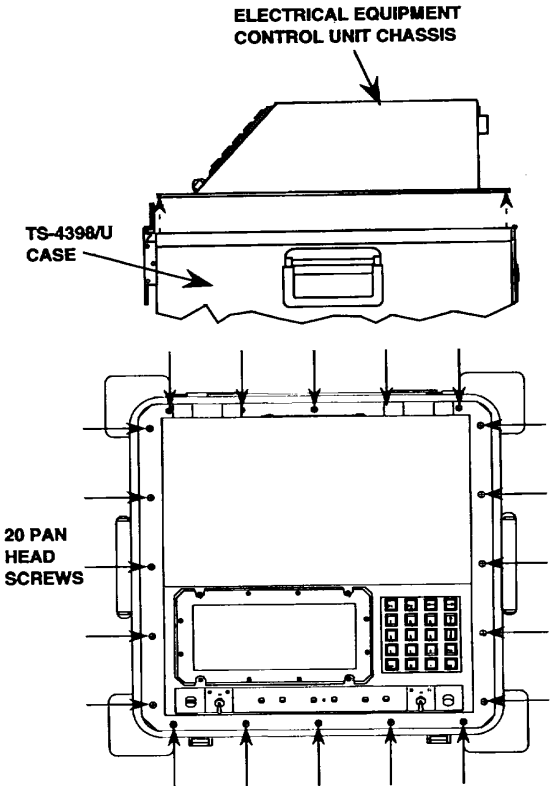
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing M1.

Materials
Solder
Heat Shrinkable Tubing

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

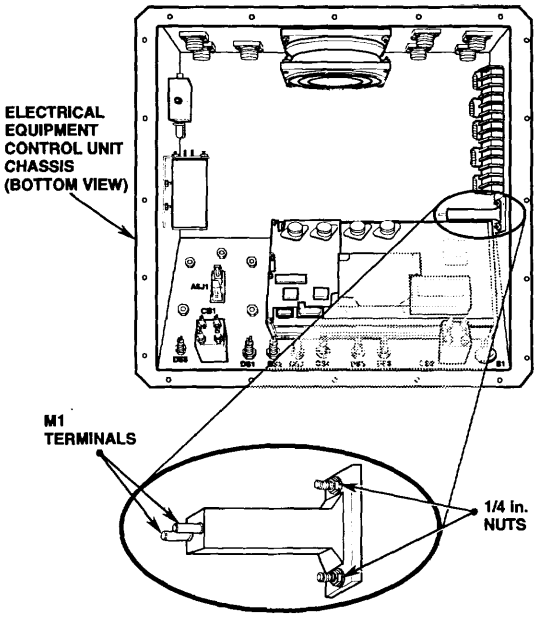
3. Lift and support the electrical equipment chassis from the TS-4398/U case.

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/1 case. Note all connections.

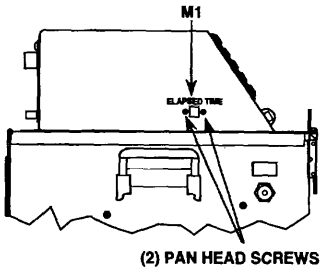
5. Remove the electrical equipment chassis from the TS-4398/U case.



6. Rotate the electrical equipment chassis upside down so that you have access to the M1 terminals and hardware.

7. Remove the insulation sleeving from the soldered connections.

8. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals. Note all connections.



9. Using a ¼ in. wrench and a No. 1 Phillips screwdriver, remove the hardware that mounts M1 to the front panel.

10. Remove M1.

REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

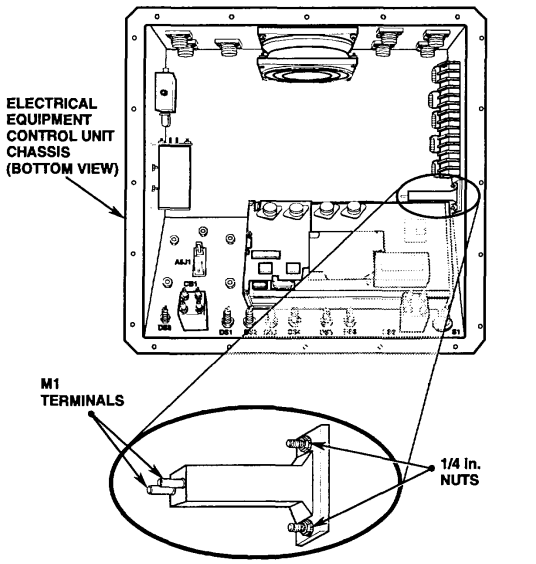
1. Position the replacement M1 in place.

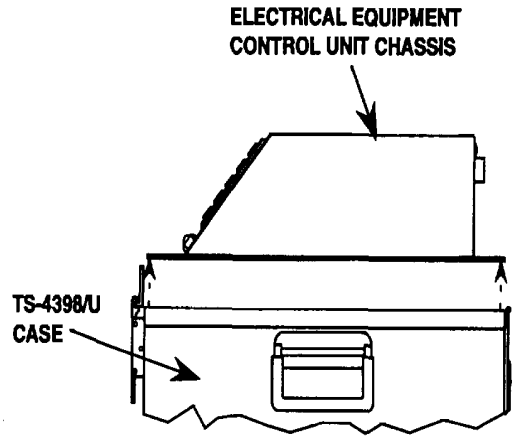
2. Using a ¼ in. wrench and a No. 1 Phillips screwdriver, install the hardware that mounts M1 to the front panel.

3. Tin and solder wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/TM 43-0158.

4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

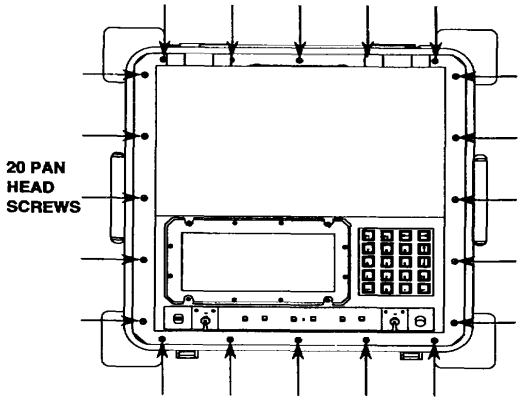
5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/[case.





6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on the TS-4398/U case.



5-8.1.16 Keypad. The keypad is contained in the electrical equipment chassis of TS-4398/U. To remove and replace the keypad, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace the keypad with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

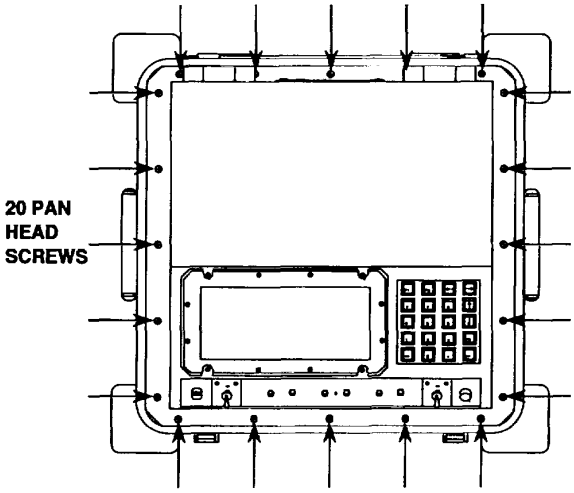
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the keypad.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

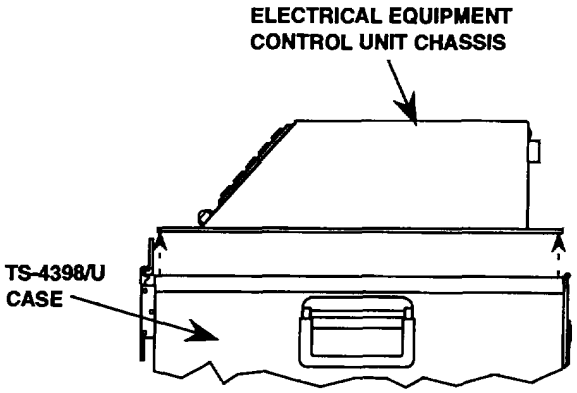
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Rotate the electrical equipment chassis ups down so that you have access to the keypad connector and hardware.

7. Disconnect W4P2 from A5J1.

8. Using a 5/16 in. wrench remove the nuts that mount the keypad to the front panel.

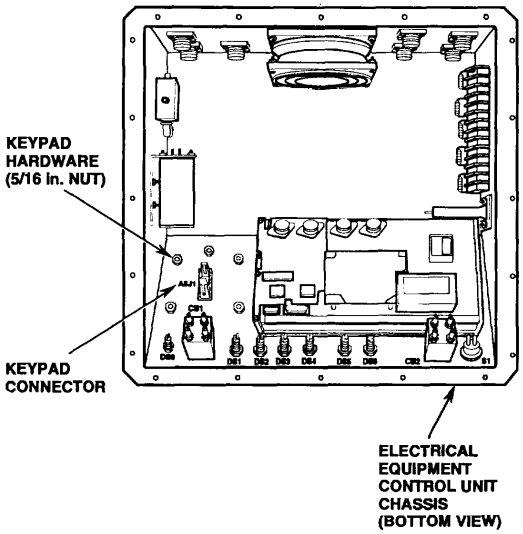
9. Remove the keypad.

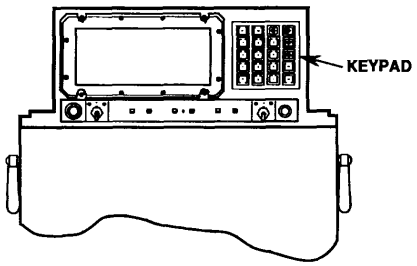
REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

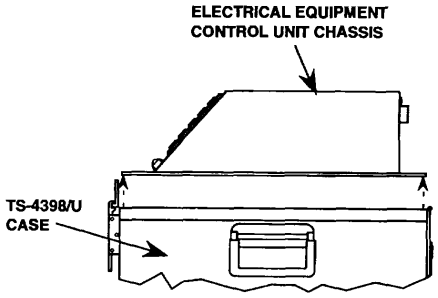
1. Position the replacement keypad in place.





2. Using a 5/16 in. wrench, install the nuts that mount the keypad to the front panel.

3. Connect W4P2 to A5J1.

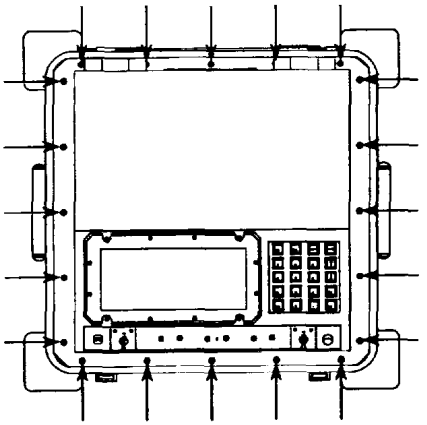


4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on the TS-4398/U case.



5-8.1.17 Fan (B1). The fan is contained in the electrical equipment chassis of TS-4398/U. To remove and replace the fan, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace the fan with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
Solder Gun
Desoldering Attachment

Materials
Solder
Heat Shrinkable Tubing

Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the fan.

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

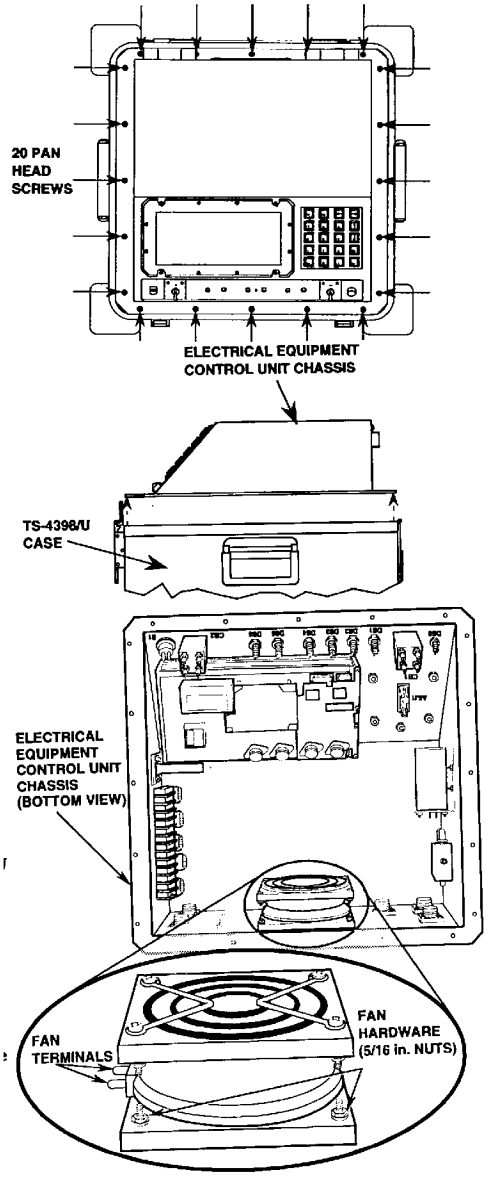
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

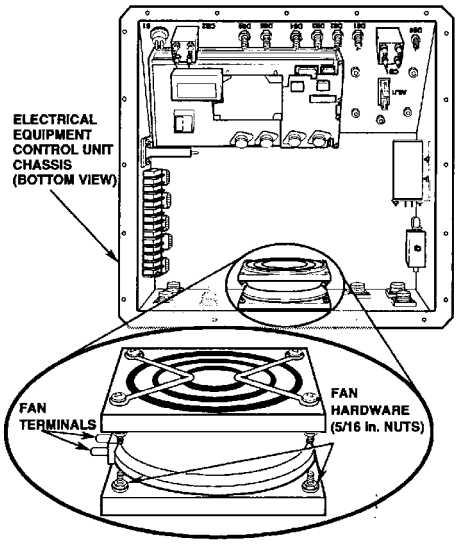
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Rotate the electrical equipment chassis upside down so that you have access to the fan terminals and hardware.



7. Remove the insulation sleeving from the soldered connections.

8. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals. Note all connections.



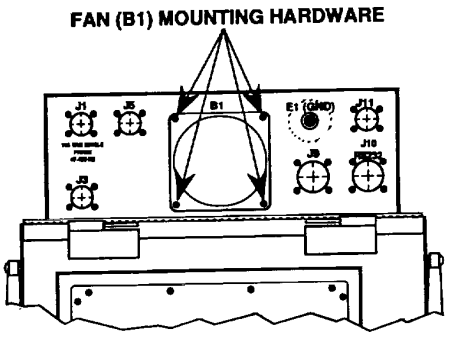
9. Using a 5/16 in. wrench and a No. 1 Phillips screwdriver, remove the hardware that mounts the fan to the rear panel.

10. Remove the fan.

REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.



1. Position the replacement fan in place.

2. Using a 5/16 in. wrench and a No. 1 Phillips screwdriver, install the hardware that mounts the fan to the rear panel.

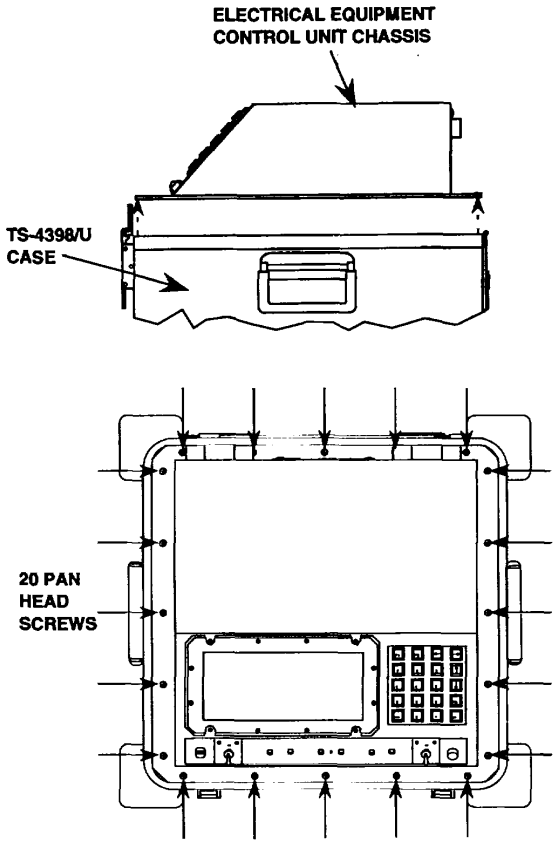
3. Tin and solder wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/ TM 43-0158.

4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.

6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on the TS-4398/U case.



5-8.1.18 Fan (B2). The fan is contained in the TS-4398/U case. To remove and replace the fan, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace the fan with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b. Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
Solder Gun
5/16 in. Longneck Wrench
Desoldering Attachment

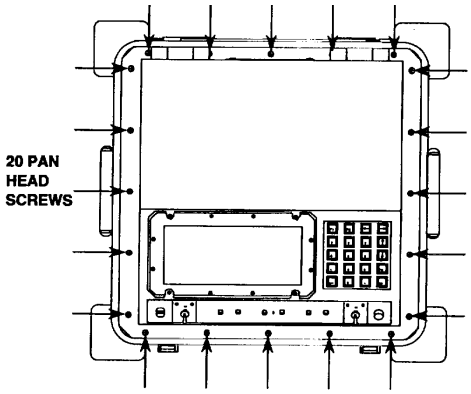
Equipment Conditions
The SDT CCA (AiA5) and IDL Interface CCA (AlA7) must be removed and the power cable must be disconnected before removing and replacing the fan.

Materials
Solder
Heat Shrinkable Tubing

REMOVAL

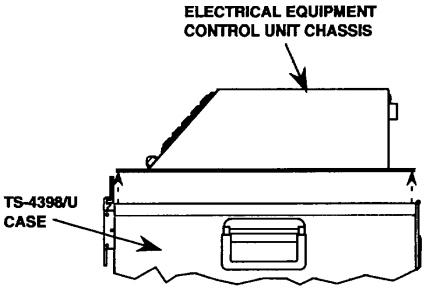
1. Unlatch and remove the top cover from TS-4398/U.

2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION
Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

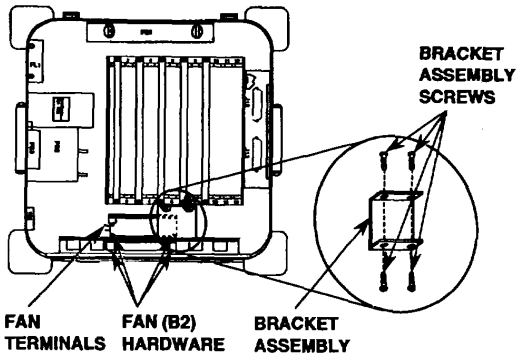
5. Remove the electrical equipment chassis from the TS-4398/U case.

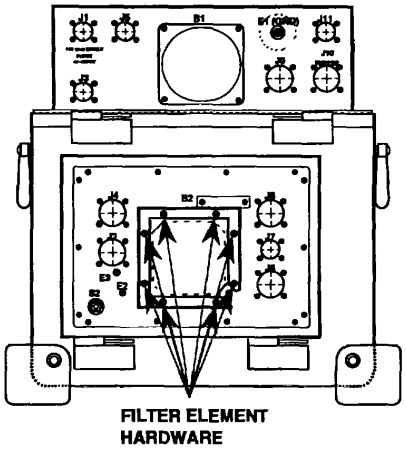
6. While holding the bracket assembly, use a No. 1 Phillips screwdriver to remove the four screws that secure the bracket assembly to the card cage and the case. Remove the bracket assembly.

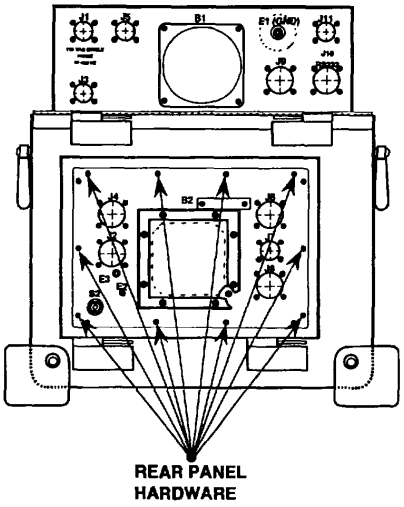
7. Remove the insulation sleeving from the soldered connections.

8. While holding the filter element, use a No. 2 Phillips screwdriver to remove the eight screws that secure it to the TS-4398/U case. Remove the filter element.

9. Using a No. 2 Phillips screwdriver, remove the 14 screws that secure the TS-4398/U rear panel to the case. Remove the rear panel.



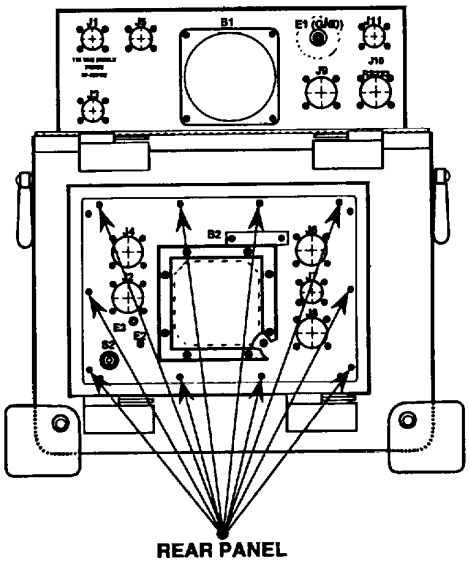




10. Following procedures from TO 00-25-234/ TM 43-0158, desolder and remove wires from the terminals. Note all connections.

11. Using a 5/16 in. longneck wrench and a No. 1 Phillips screwdriver, remove the four screws that mount the fan to the rear panel.

12. Remove the fan.



REAR PANEL HARDWARE

REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

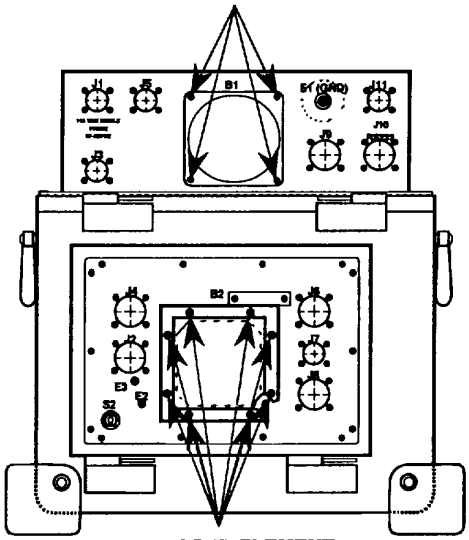
1. Position the replacement fan in place.

2. Using a 5/16 in. longneck wrench and a No. 1 Phillips screwdriver, install the four screws that mount the fan to the rear panel.

3. Using a No. 2 Phillips screwdriver, install the 14 screws that secure the TS-4398/U rear panel to the case.

4. While holding the filter element in place, use a No. 2 Phillips screwdriver to install the eight screws that secure it to the TS-4398/U case.

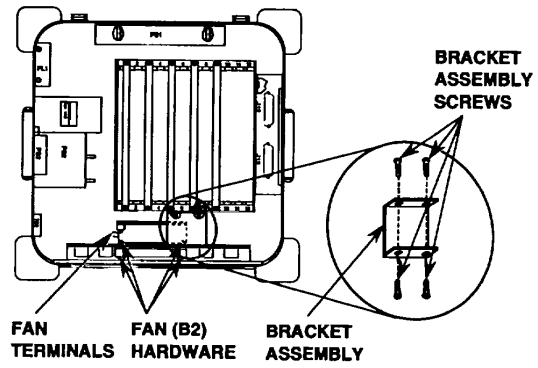
B1 FILTER ELEMENT HARDWARE



B2 FILTER ELEMENT HARDWARE

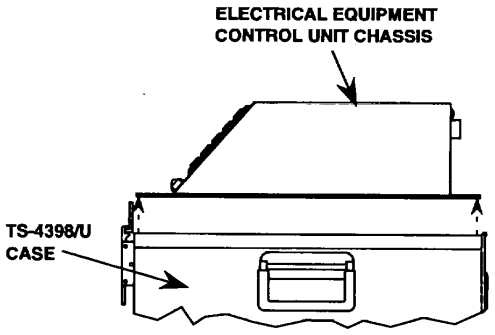
5. Tin and solder wires to their appropriate terminals and apply heat shrinkable tubing according to procedures in TO 00-25-234/ TM 43-0158.

6. While holding the bracket assembly in place, use a No. 1 Phillips screwdriver to install the four screws that secure it to the card cage.

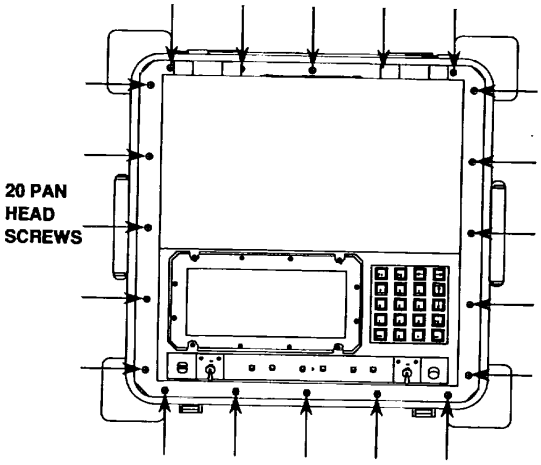


7. Reinstall the removed CCAs and cables.

8. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.



9. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



10. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.

11. Install the top cover on the TS-4398/U case.

5-8.1.19 RF Power Divider. The RF power divider is contained in the electrical equipment chassis of TS-4398/U. To remove and replace the RF power divider, perform the following procedures.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace the RF power divider with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:

a. Removal b Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench

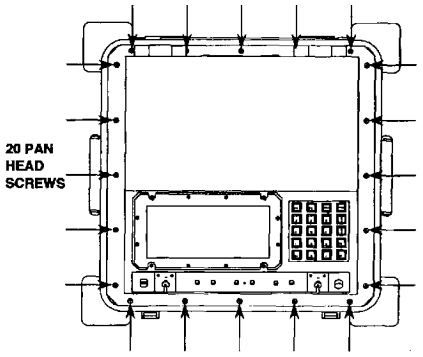
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing the RF power divider.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

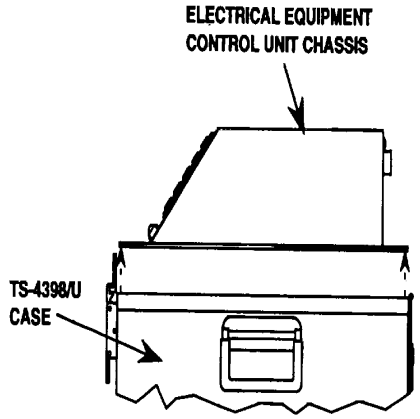
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/ case. Note all connections.

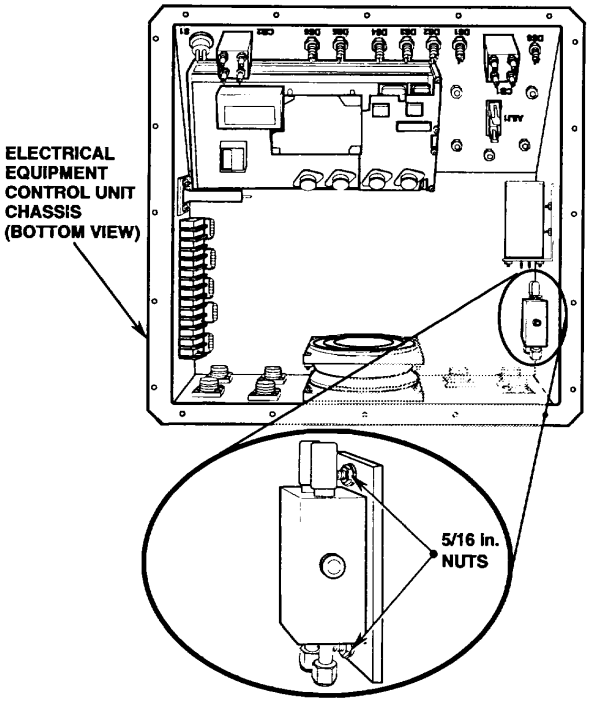
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Rotate the electrical equipment chassis upside down so that you have access to the RF power divider connectors and hardware.

7. Using a 5/16 in. wrench unscrew seven SMA connectors. Note all connections.

8. Using a 5/16 in. wrench and a No. 2 Phillips screwdriver, remove the hardware that mounts the RF power divider to the side panel.

9. Remove the RF power divider.



REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

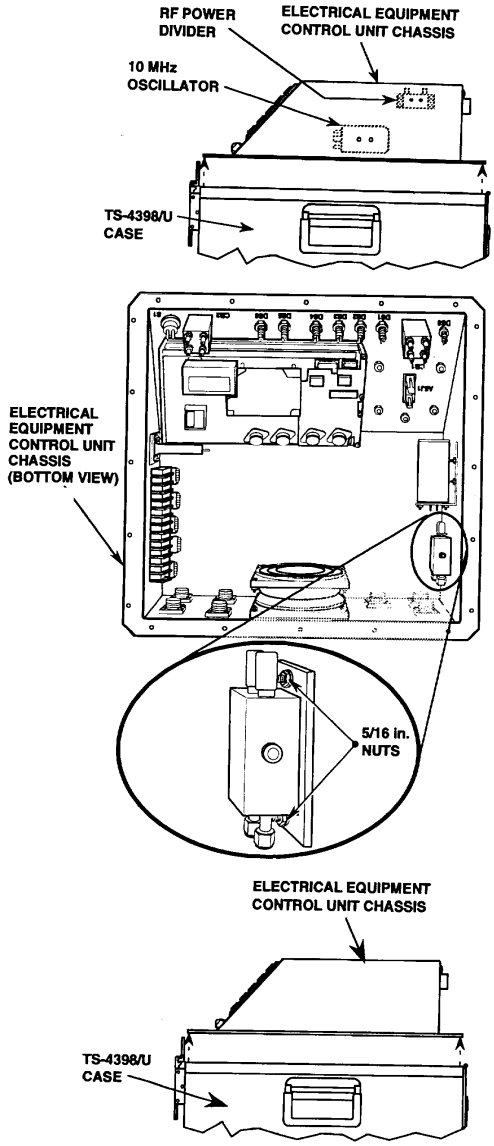
1. Position the replacement RF power divider in place.

2. Using a 5/16 in. wrench and a No. 2 Phillips screwdriver, install the hardware that mounts the RF power divider to the side panel.

3 . Using a 5/16 in. torque wrench, connect the seven SMA connectors to power divider. Torque to 7 to 10 in. lb.

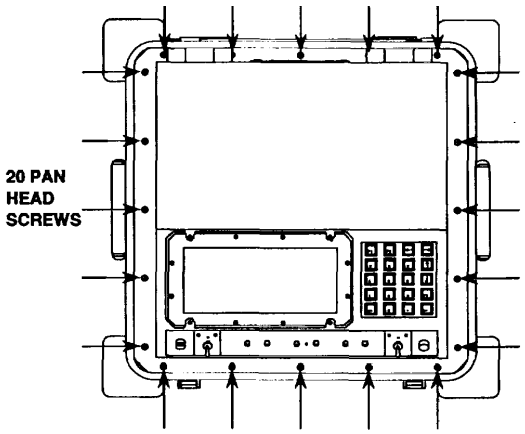
4. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.

5. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers and lock washers securing the electrical equipment chassis to the TS-4398/U case.

7. Install the top cover on the TS-4398/U case.



5-8.1.20 Power Protection Unit (PL1). FL1 is contained in the TS-4398/U case. To remove and replace FL1, perform the following.

WARNING

TS-4398/U uses hazardous voltages. Exercise caution when working near voltage. Failure to comply can result in serious injury or DEATH.

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace FL1 with the equipment power cable connected.

CAUTION

TS-4398/U contains parts and assemblies sensitive to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

This task covers:
a. Removal b Replacement

INITIAL SETUP:

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

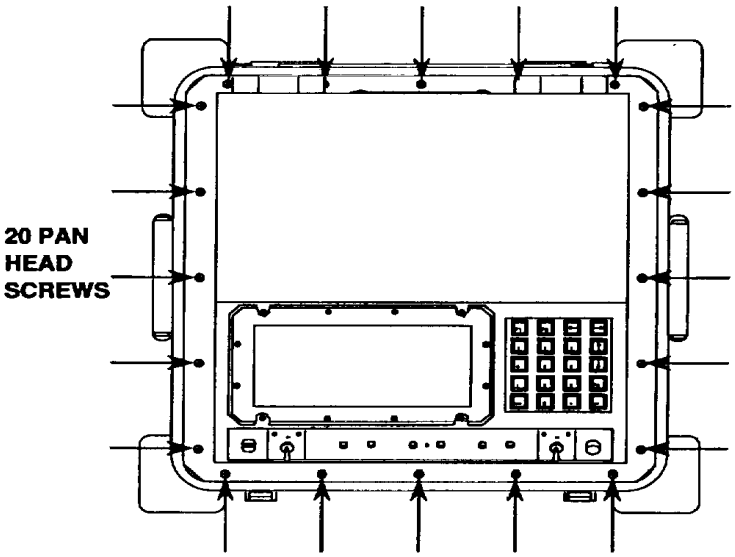
Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing FL1.

Materials
None

REMOVAL

1. Unlatch and remove the top cover from TS-4398/U.

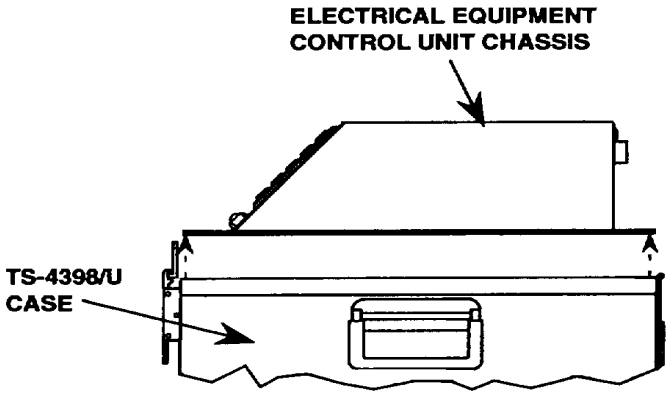
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.



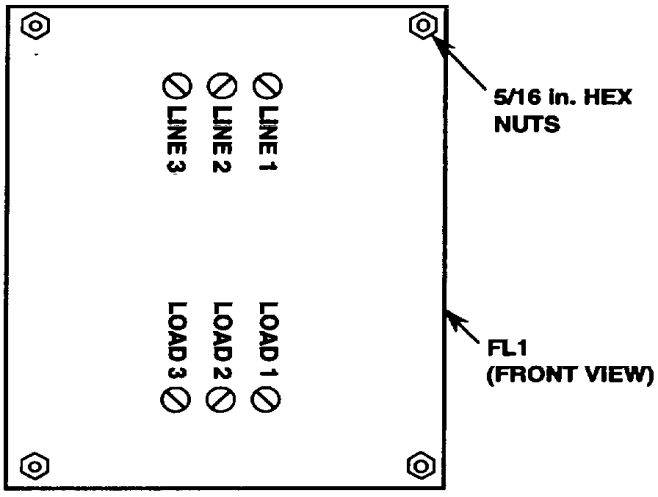
WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.

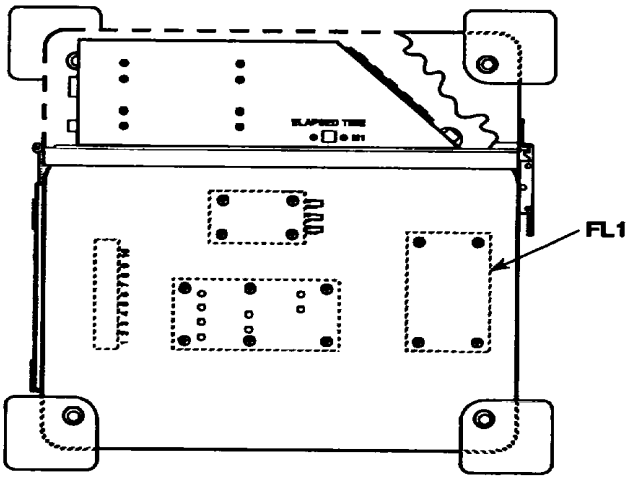
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Using a 3-in. long, 1/8-in. flat screwdriver, loosen the screws that hold wires into Line 1 through Line 3 and Load 1 through Load 3. Note all connections.



7. Using a No. 2 Phillips screwdriver and a 5/16 in. socket wrench, remove the hardware that mounts FL1 to the case.

8. Remove FL1.



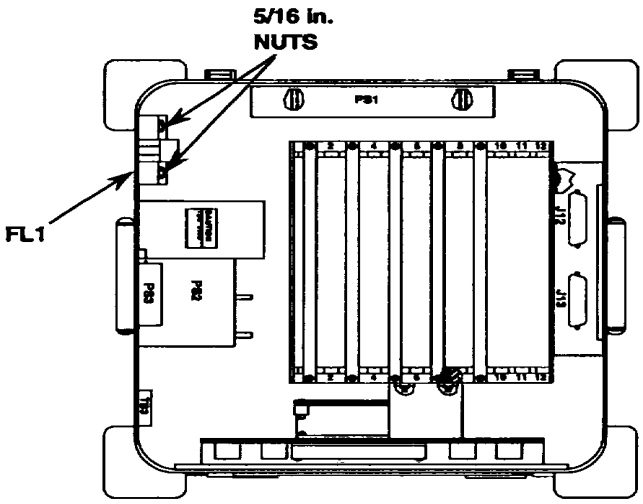
REPLACEMENT

WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

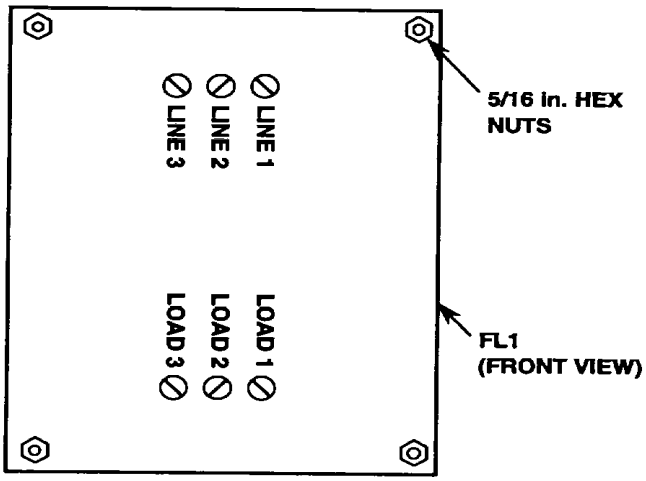
1. Align replacement FL1 to the case mounting holes.

2. Using a No. 2 Phillips screwdriver and a 5/16 in. socket wrench, install the hardware that mounts FL1 to the case.

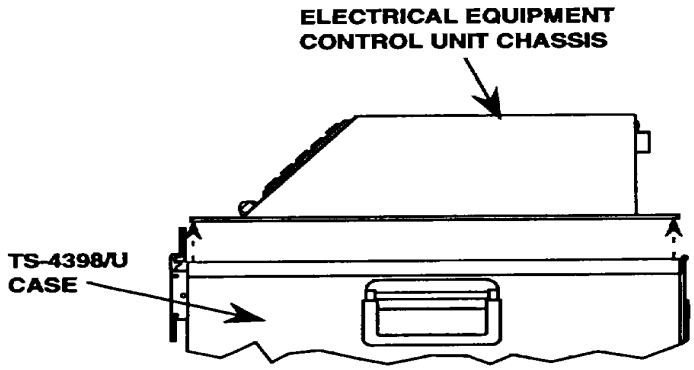


3. Make connections to Line 1 through Line 3 and Load 1 through Load 3 as previously noted. Using a 3-in long, 1/8-in. flat screwdriver, tighten the screws that make connections to Line 1 through Line 3 and Load 1 through Load 3.

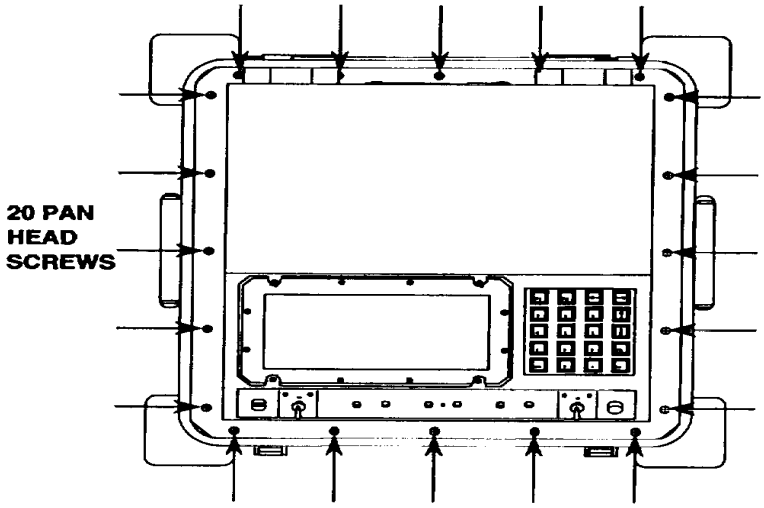
4. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.



5. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.



6. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



7. Install the top cover on TS-4398/U and latch in place.

5-8.1.21 Switch (S2). S2 is contained within TS-4398/U. To remove and replace S2, perform the following procedure.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

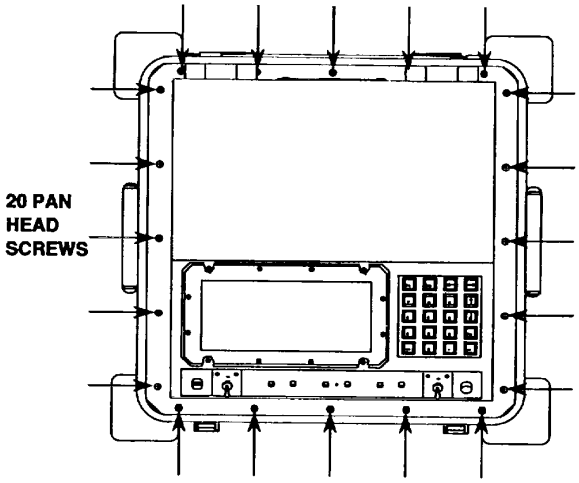
Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
11/16 in. Wrench

Equipment Conditions
TS-4398/U must have the power cable disconnected before removing and replacing S2.

Materials
None

REMOVAL

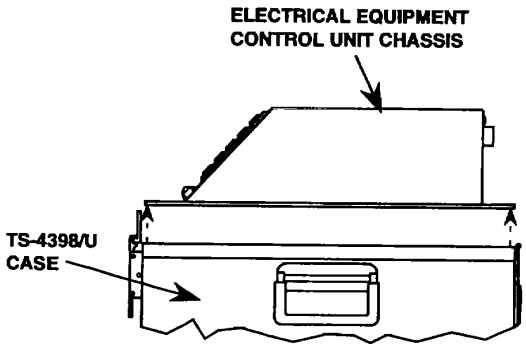
1. Unlatch and remove the top cover from TS-4398/U.
2. Using a No. 2 Phillips screwdriver, remove the 20 screws, flat washers, and lock washers securing the electrical equipment chassis to the TS-4398/U case.



CAUTION

Take care to support the electrical equipment chassis to avoid damage to cabling and parts.

3. Lift and support the electrical equipment chassis from the TS-4398/U case.

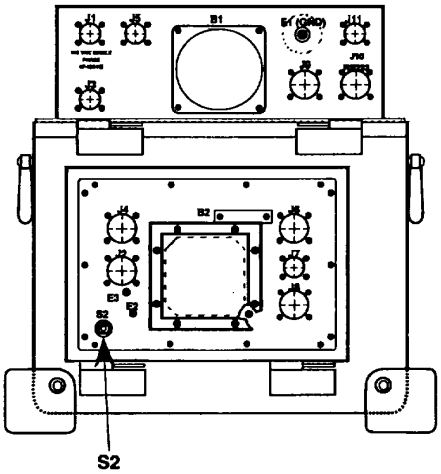


WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

4. Disconnect all cables that attach the electrical equipment chassis to the TS-4398/U case. Note all connections.
5. Remove the electrical equipment chassis from the TS-4398/U case.

6. Locate S2 on the TS-4398/U rear panel.

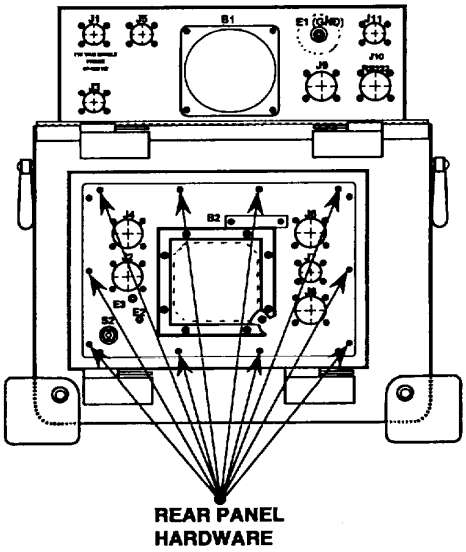


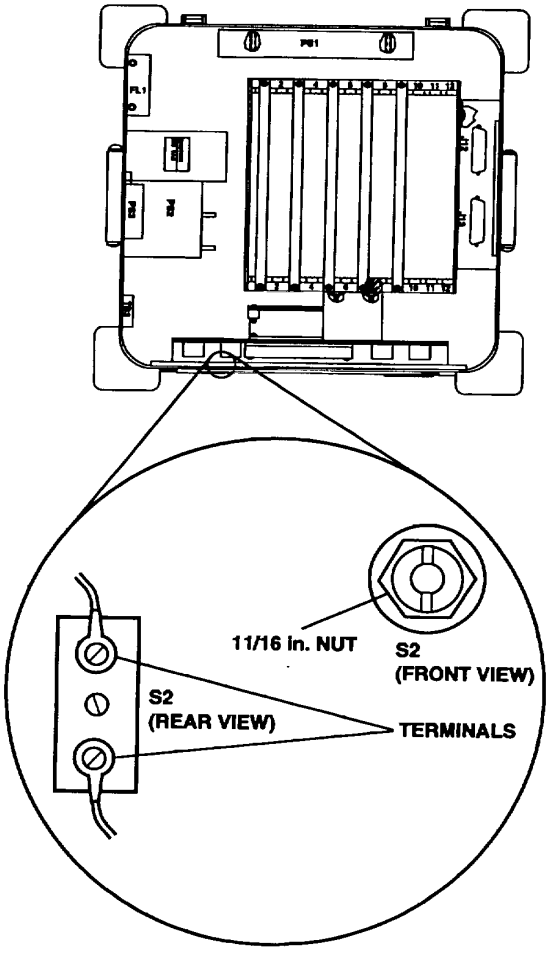
7. Using a No. 2 Phillips screwdriver, remove the 14 screws that secure the TS-4398/U rear panel to the case. Remove the rear panel.

8. Using a 3-in. long, 1/8-in. flat screwdriver, remove the wires connected to S2. Note all connections.

9. Using a 11/16 in. wrench, remove the nut that secures S2 to the TS-4398/U rear panel.

10. Remove S2.





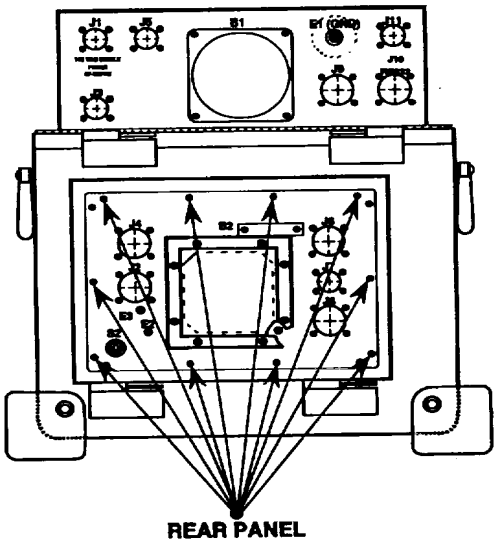
REPLACEMENT

1. Position the replacement S2 in place.

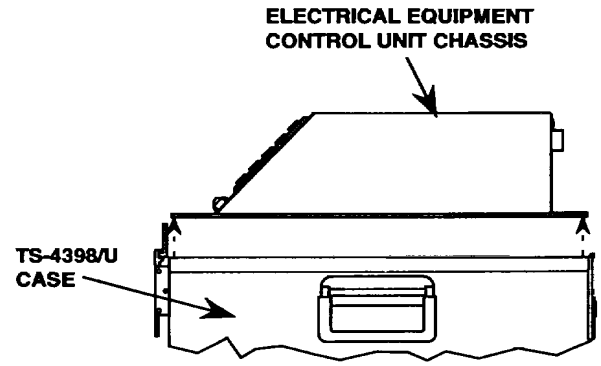
2. Using a 11/16 in. wrench, install the nut that secures S2 to the TS-4398/U rear panel.

3. Using a 3-in. long, 1/8-in. flat screwdriver, install and tighten the wires connected to S2 as previously noted.

4. Using a No. 2 Phillips screwdriver, install the 14 screws that secure the TS-4398/U rear panel to the case.



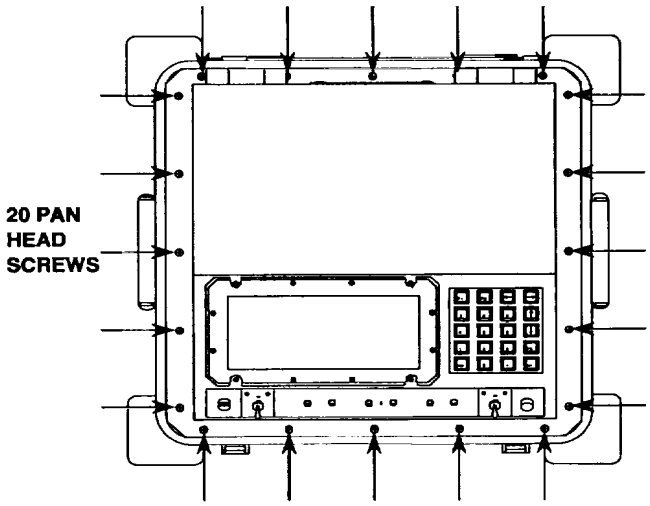
5. Position the electrical equipment chassis on the TS-4398/U case. Ensure that the electronic shielding gasket remains in position.



WARNING

The gasket at the top of TS-4398/U case is highly abrasive. Injury may occur if the gasket contacts the skin.

6. Reconnect all cables that attach the electrical equipment chassis to the TS-4398/U case.
7. Using a No. 2 Phillips screwdriver, install the 20 screws, flat washers and lock washers securing the electrical equipment chassis to the TS-4398/U case.



8. Install the top cover on the TS-4398/U case.

5-8.2 RTTG, OQ-458/U, Direct Support Level Removal and Replacement. The fans (B1-B3), fan filter elements, +28 Vdc power supply (PS1), Radio Transmitter T-1573(V)2/AR and components, and Radio Receiver R-2500/AR and components compose the OQ-458/U assemblies replaceable at Direct Support level.

5-8.2.1 Power Supply +28 Vdc (PS1). To remove and replace PS1 installed in OQ-458/U, perform the following procedures.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace PS1 with OQ-458/U connected to TS-4398/U.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
- TK-105/G, Tool Kit, OQ-458/U must be Electronic Equipment
- Solder Gun
- Desoldering Attachment

Equipment Conditions

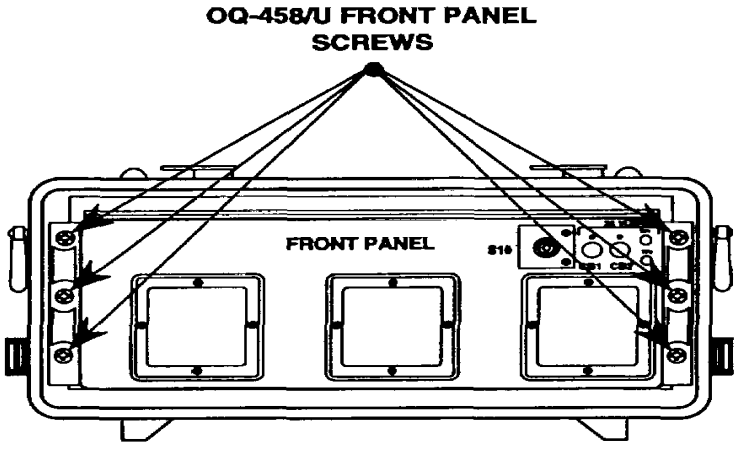
disconnected from TS-4398/U before removing and replacing PS1.

Materials
- Solder
- Heat Shrinkable Tubing

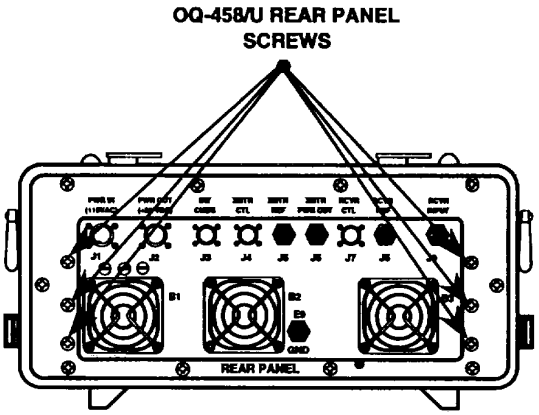
REMOVAL

1. Remove both OQ-458/U end covers.

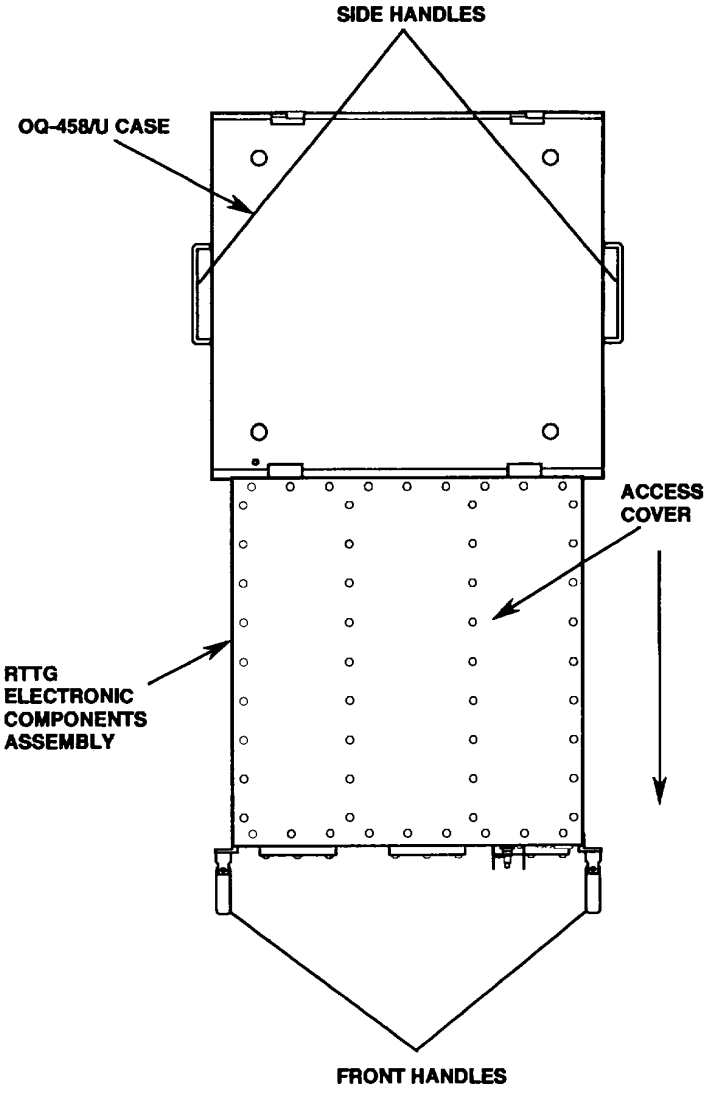
2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.



4. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.



5. Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.

6. Remove the access cover.

7. Using a No. 2 Phillips screwdriver and a 5/16 in. socket wrench, remove the five locking nuts, five flat washers, three flat .875LG screws, and two flat 1.5LG screws that mount PS1 to the chassis.

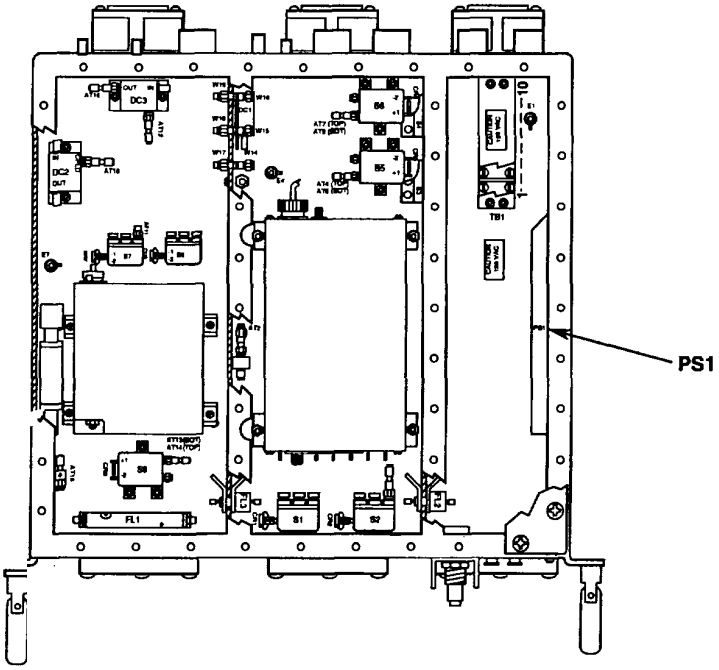
8. Using a 3/8 in. socket wrench, remove the two hex nuts, ring terminals, and washers. Note all connections.

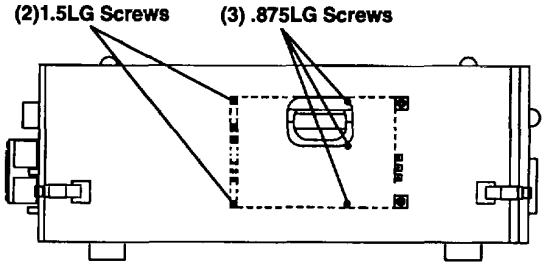
9. Using an electrician's pocket knife, remove the heat shrinkable tubing from the two tabs, +S and -S.

10. Desolder and remove wires from the tabs according to procedures in TO 00-25-234/ TM 43-0158. Note all connections.

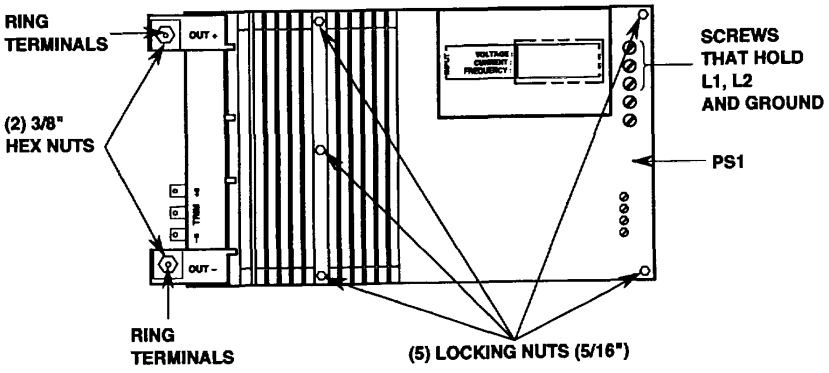
11. Using a 3-in. long, 1/8-in. flattip screwdriver, loosen the screws that hold wires into L1, L2, and ground. Note all connections.

12. Remove PS1.





(OQ-458/U SIDE VIEW)



(POWER SUPPLY (PSI) FRONT VIEW)

REPLACEMENT

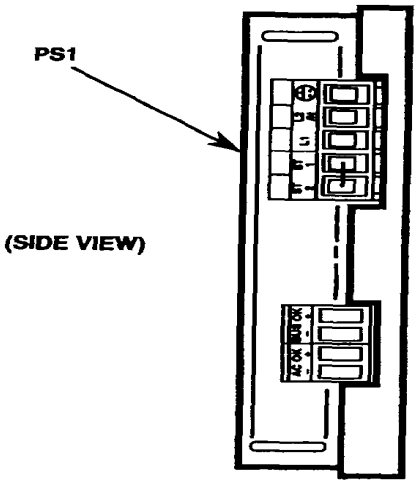
1. Install an 18-22 awg wire between ST1 and ST2. Use procedures found in TO 00-25-234/TM 43-0158 for stripping, tinning, etc.

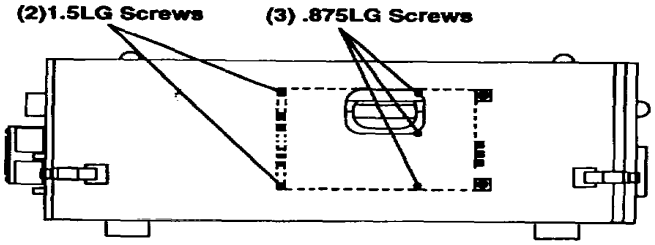
2. Using a 3-in. long, 1/8-in. flattip screwdriver, install and make connections to L1, L2, and ground with wires as previously noted.

3. Solder the two wires to +S (red wire) and -S (black wire), then apply heat shrinkable tubing, according to procedures in TO 00-25-234/TM 43-0158.

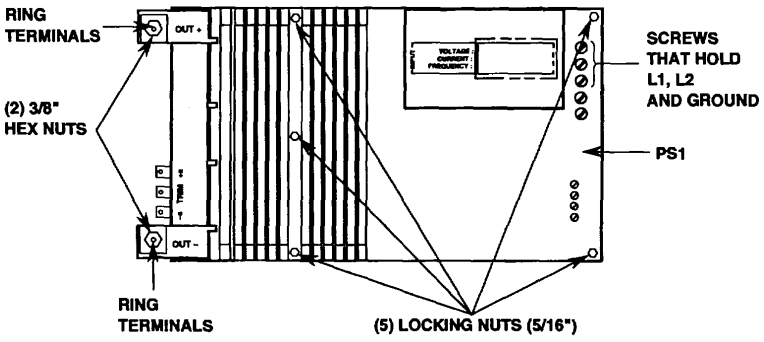
4. Using a 3/8 in. socket wrench, replace the two hex nuts, ring terminals, and washers.

5. Using a No. 2 Phillips screwdriver and a 5/16 in. socket wrench, replace the five locking nuts, five flat washers, two flat .875LG screws, and three flat 1.5LG screws.





(OQ-458/U SIDE VIEW)



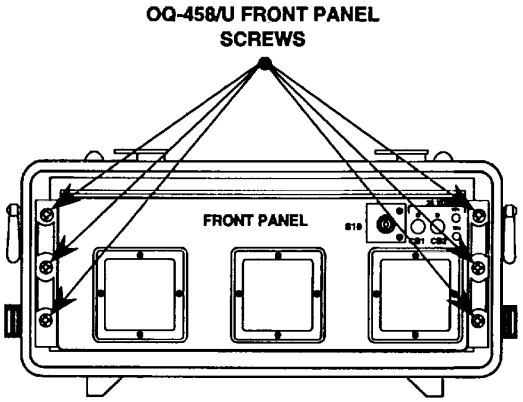
(POWER SUPPLY (PSI) FRONT VIEW)

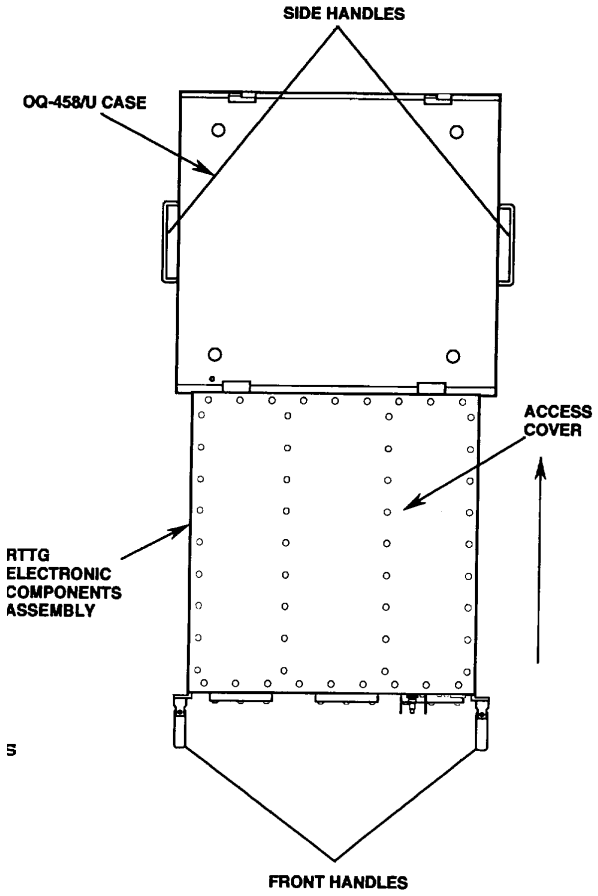
6. Place the access cove in position.

7. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners

8. While holding the handles on the side o the case, insert the RTTG, electronic components assembly.

9. Slide the RTTG, electronic components assembly firmly into the case.

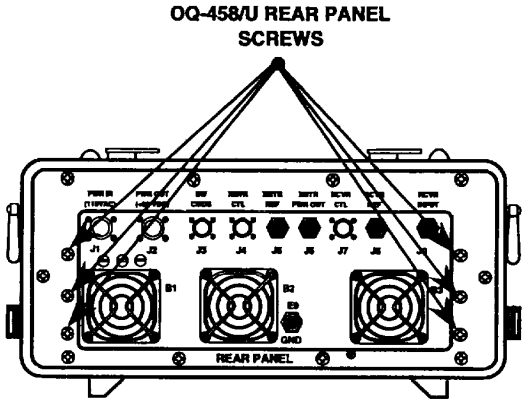




10. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.

11. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.

12. Install both OQ-458/U end covers.



5-8.2.2 Fans (B1-B3). Fans (B1-B3) are contained within OQ-458/U. To remove and replace a fan installed in OQ-458/U, perform the following procedures.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

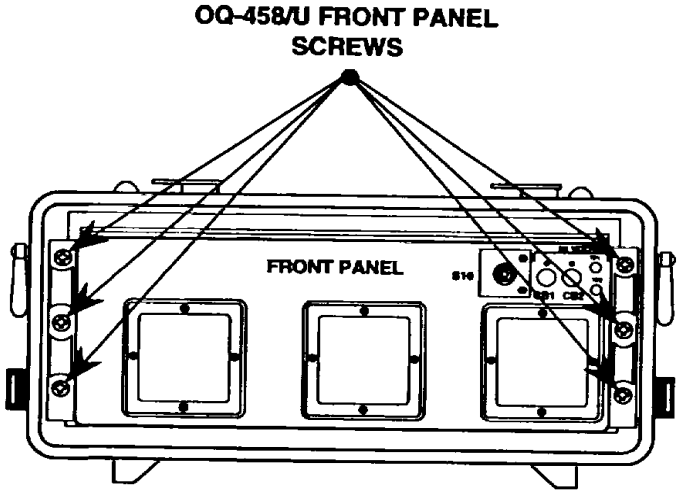
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing fans (B1-B3).

Materials
None

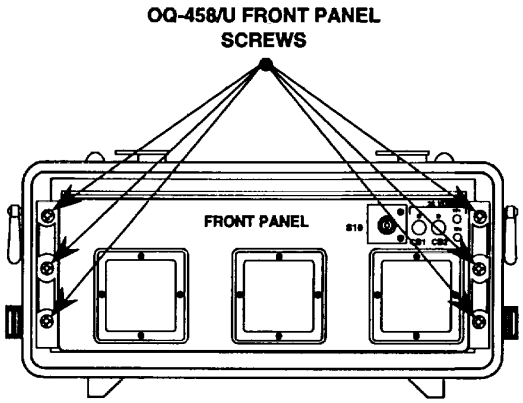
REMOVAL

1. Remove both OQ-458/U end covers.

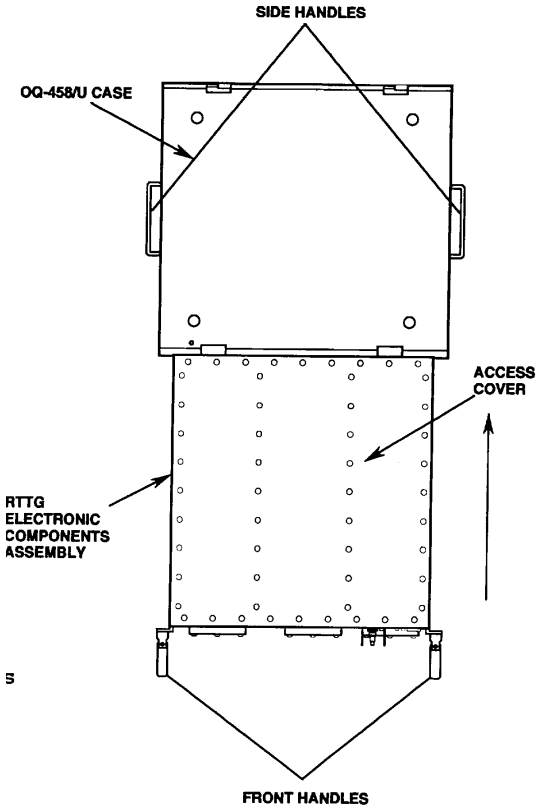
2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.



4. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.

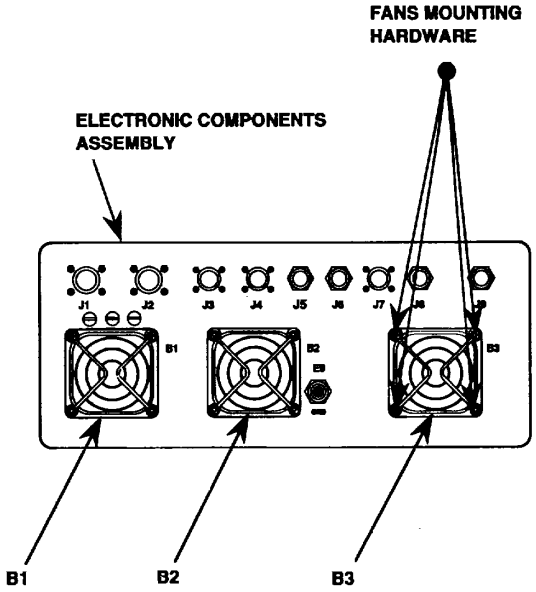


5. Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.

6. Remove the access cover.

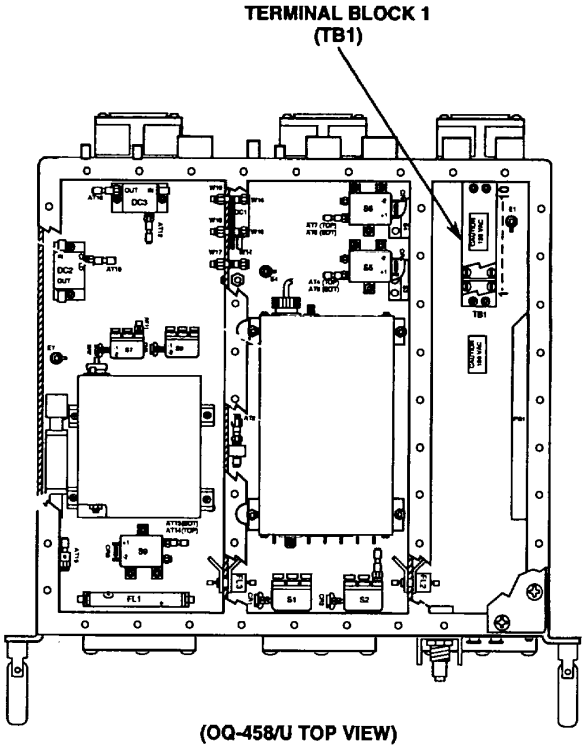
7. Remove the terminal block 1 (TB1) cover.

8. Using a 3-in. long, 1/16-in. flattip screwdriver, disconnect the wires for fan B1 from TB1 terminals 4 and 7; for fan B2 from TB1 terminals 5 and 8; and for fan B3 from TB1 terminals 6 and 9. Note all connections.



9. Using a 5/16 in. wrench and a No. 1 Phillips screwdriver, remove the four nuts, flat washers, lock washer, and pan head screws.

10. Remove the fan, fan impeller guard, and filter element.



REPLACEMENT

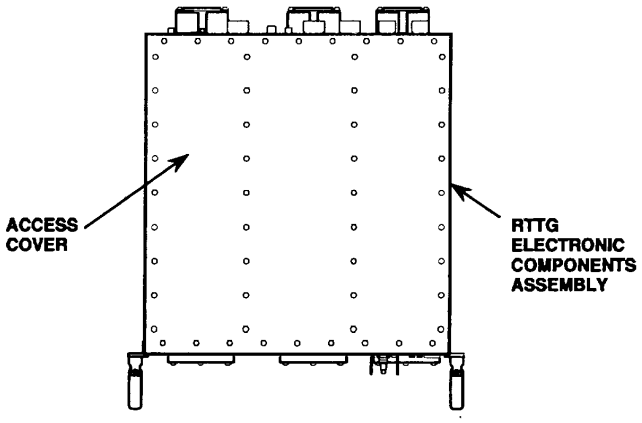
1. Mount the fan, fan impeller guard, filter element, and fan mounting hardware using a 5/16 in. wrench and a No. 1 Phillips screwdriver.

2. Connect the disconnected wires to the replacement fan and to the TB1 terminals as previously noted.

3. Replace the TB1 cover.

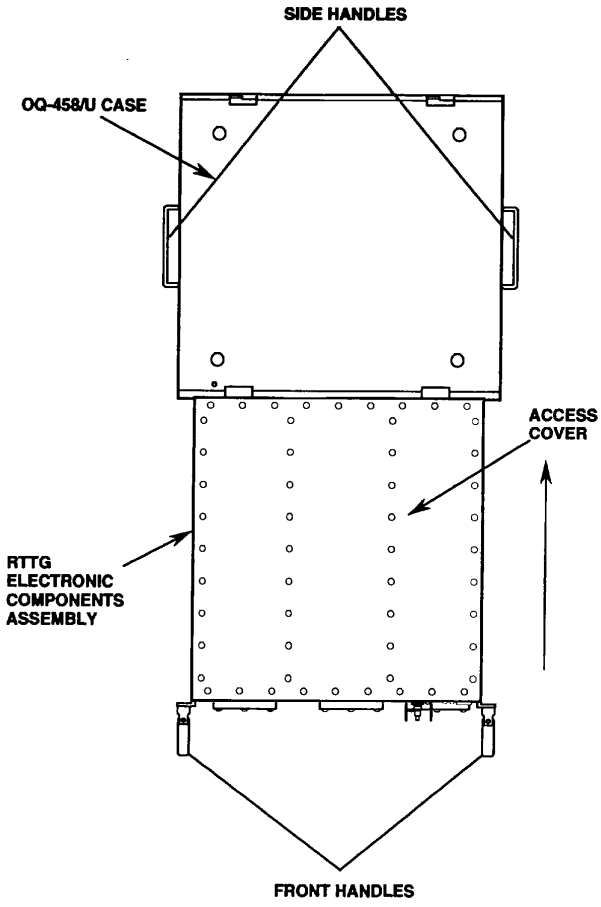
4. Place the access cover in position.

5. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.

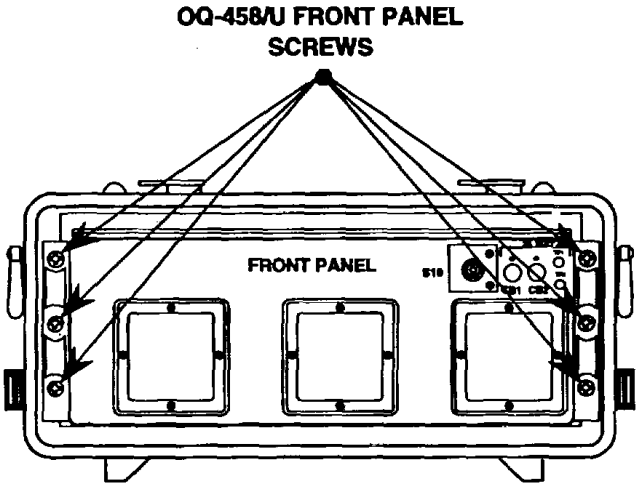


6. While holding the handles on the side of the case, insert the RTTG, electronic components assembly.

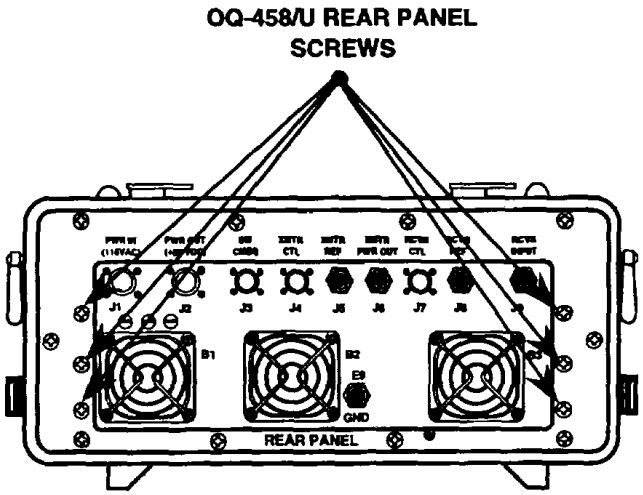
7. Slide the RTTG, electronic components assembly firmly into the case.



8. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.



9. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.
10. Install both OQ-458/U end covers.



5-8.2.3 Fan Filter Elements. The fan filter elements are contained within OQ-458/U. To remove and replace a fan filter element, perform the following procedure.

This task covers:

a. Removal

b. Replacement

INITIAT. SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment

Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing a fan filter element.

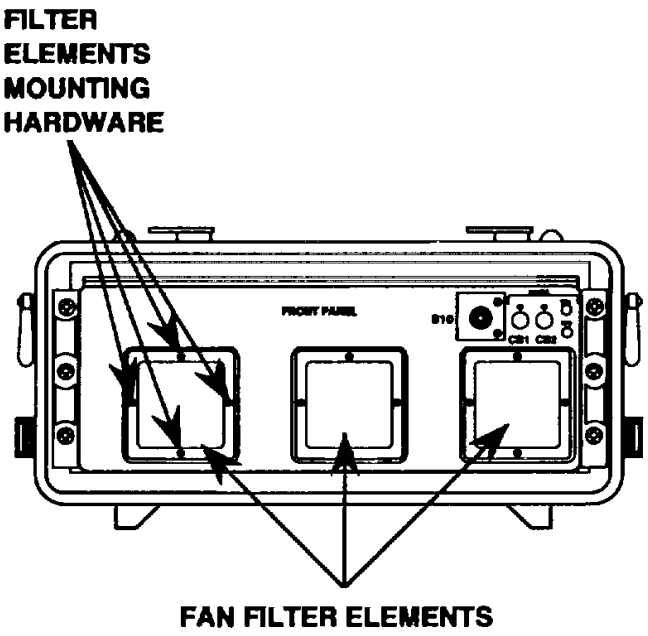
Materials
None

REMOVAL

1. Remove both OQ-458/U end covers.
2. Using a No. 2 Phillips screwdriver, remove the four screws and washers from the electrical equipment chassis.
3. Remove the filter element.

REPLACEMENT

1. Mount the replacement filter element in place.
2. Using a No. 2 Phillips screwdriver, secure the filter element to the electrical equipment chassis with the fan filter element hardware.



5-8.2.4 Radio Transmitter, T-1573(V)2/AR. T-1573(V)2/AR is contained within OQ-458/U. To remove and replace T-1573(V)2/AR, perform the following procedure.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace T-1573(V)2/AR with OQ-458/U connected to TS-4398/U.

This task covers:

a. Removal

b. Replacement

INITIAL BETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
5/16 in. Torque Wrench
5/16 in. Wrench

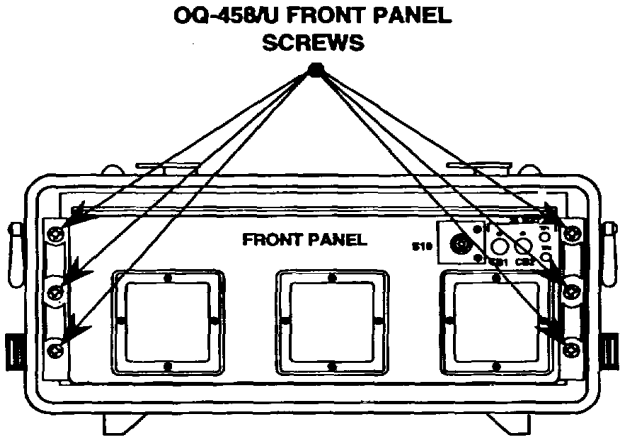
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing T-1573 (V) 2/AR.

Materials
None

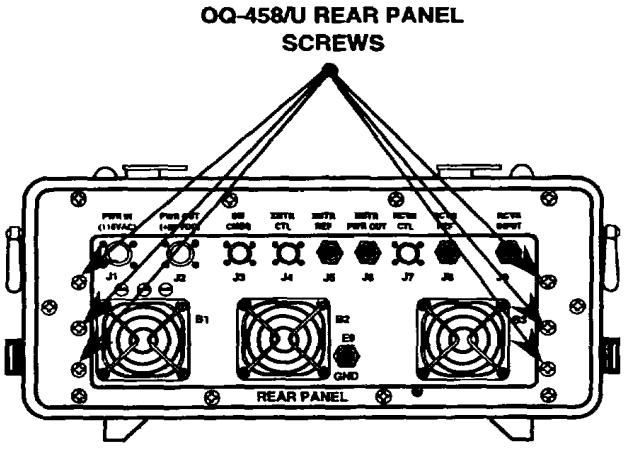
REMOVAL

1. Remove both OQ-458/U end covers.

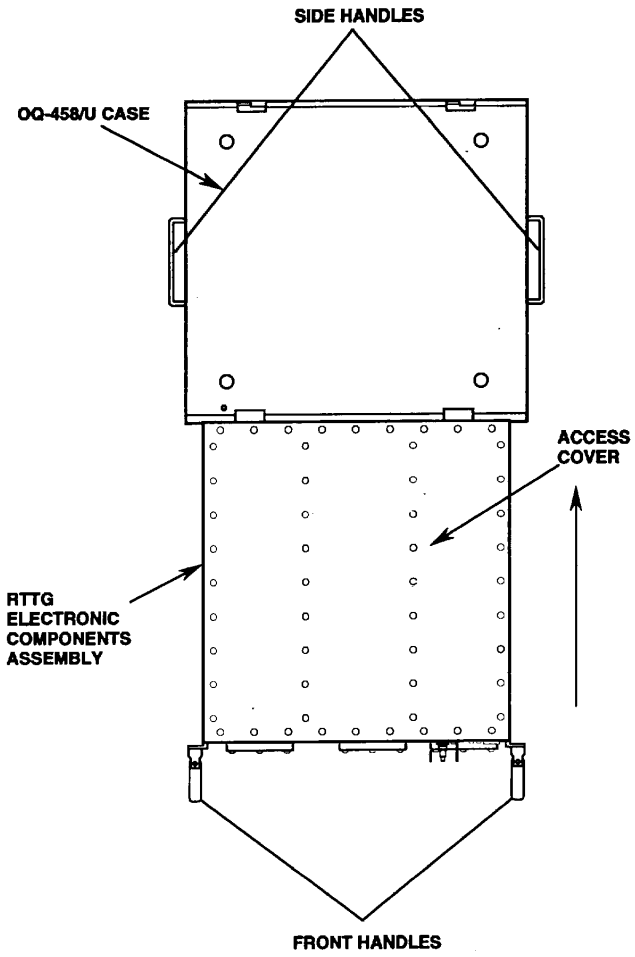
2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.



4. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.



5. Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.

6. Remove the access cover.

7. Disconnect plug P1 from connector AIJ1.

8. Using a 5/16 in. wrench, disconnect cable W30P1 from connector A1J3.

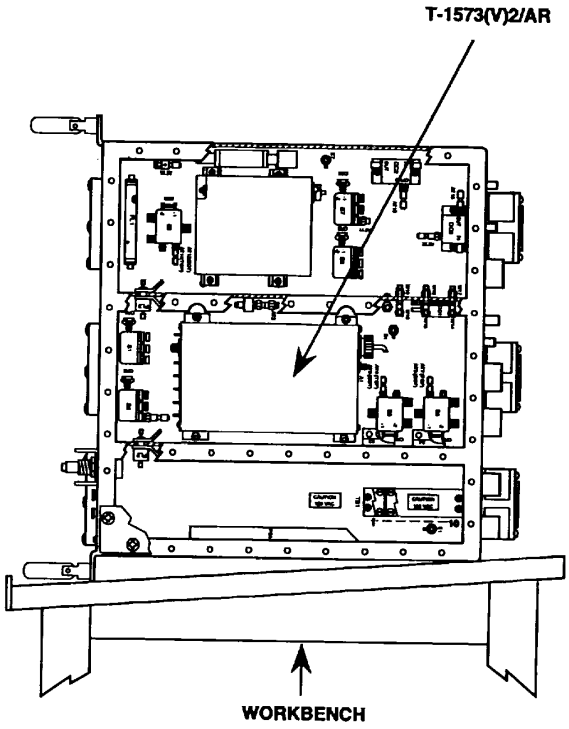
9. Disconnect cable W32P1 from connector A1J2.

10. Disconnect cable W1 from connector A1J4.

11. Rotate the RTTG, electronic components assembly on its side.

12. While holding T-1573(V)2/AR, use a No. 2 Phillips screwdriver and a 7/32 in. socket wrench to remove the T-1573(V)2/AR mounting hardware.

13. Remove T-1573(V)2/AR from the RTTG, electronic components assembly.



REPLACEMENT

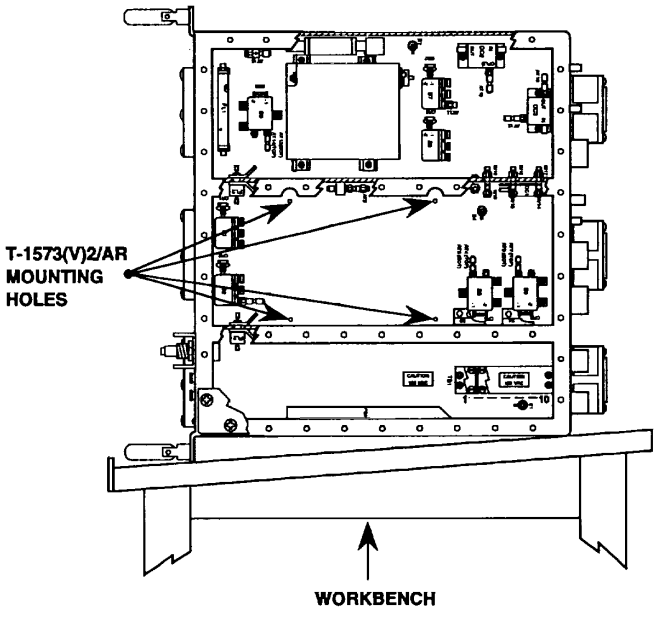
1. Place the RTTG, electronic components assembly so that the front panel is facing you.
2. Turn T-1573(V)2/AR so that the J4 connector is facing you.

3. Place T-1573(V)2/AR directly over its foul mounting holes.

4. While holding T-1573(V)2/AR in the RTTG, electronic components assembly, rotate the RTTG, electronic components assembly on its side.

5. Install the four screws in the four mounting holes of T-1573(V)2/AR from the bottom of the RTTG, electronic components assembly.

6. Using a 7/32 in. socket wrench and a No. 2 Phillips screwdriver, install the four flat washers and locking nuts on the screws.



7. While holding the handles on the side of the case, insert the RTTG, electronic components assembly.

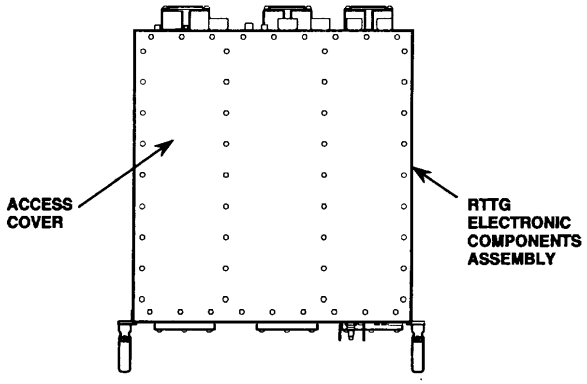
8. Using a 5/16 in. torque wrench, connect cable W30P1 to connector A1J3. Torque to 8-12 in. lb.

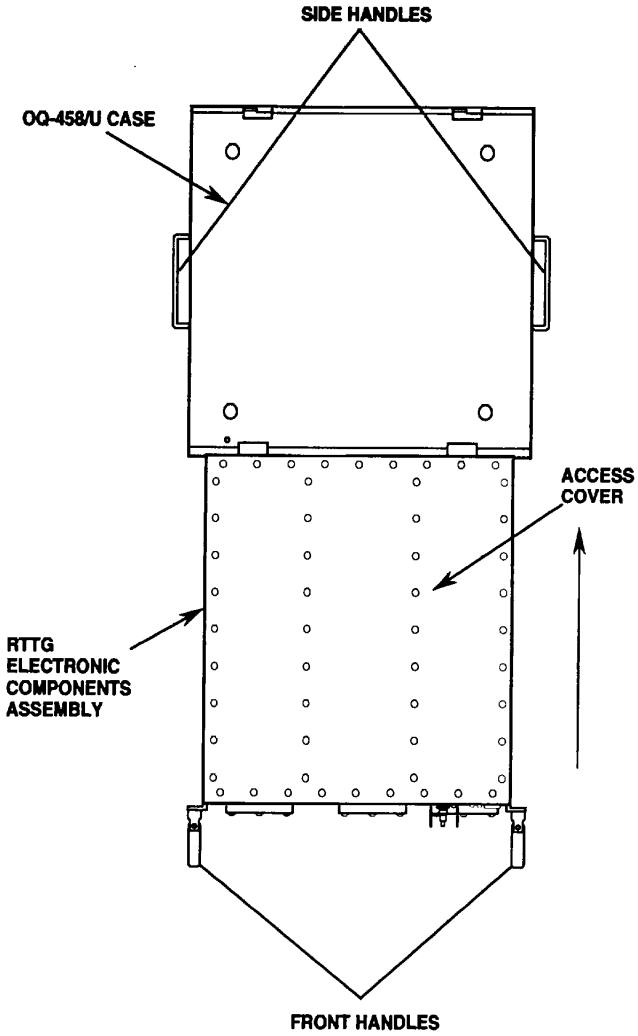
9. Connect cable W32P1 to connector A1J2.

10. Connect cable W1 to connector AiJ4.

11. Place the access cover in position.

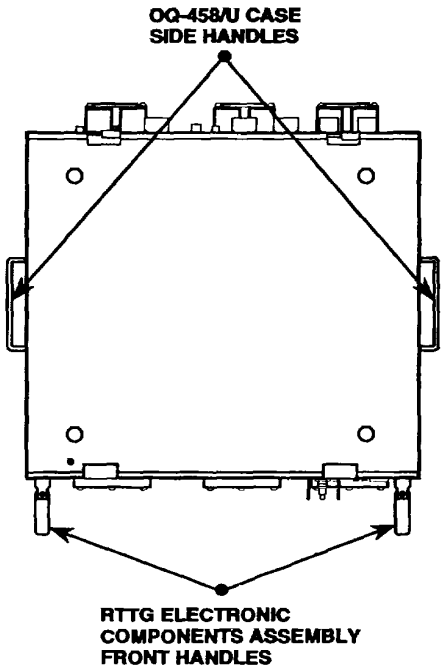
12. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.



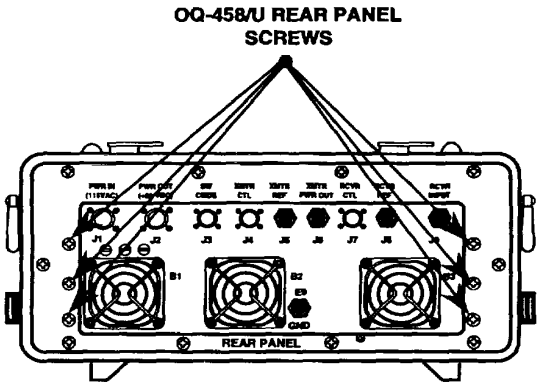


13. While holding the handles on the side of the case, insert the RTTG, electronic components assembly.

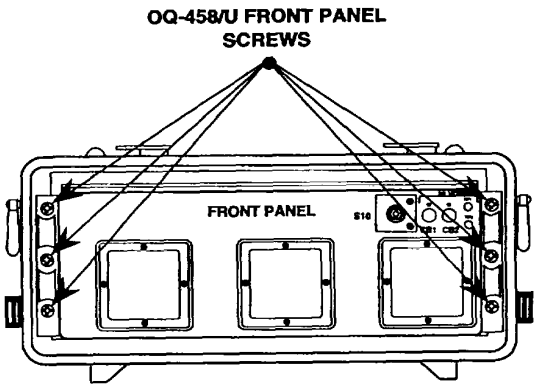
14. Slide the RTTG, electronic components assembly firmly into the case.



15. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.



16. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.



17. Install both OQ-458/U end covers.

5-8.2.5 Radio Receiver, R-2500/AR. R-2500/AR is contained within OQ-458/U. To remove and replace R-2500/AR, perform the following procedures.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace R-2500/AR with OQ-458/U connected to TS-4398/U.

The OQ-458/U requires a two-person lift.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

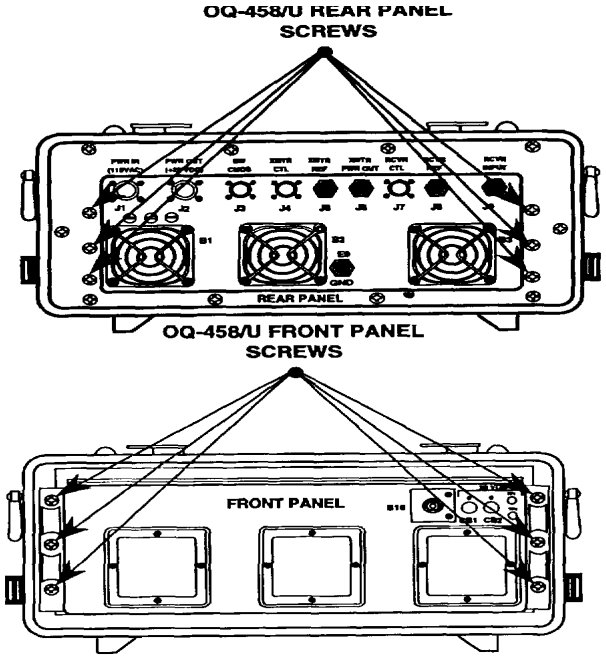
Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
5/16 in. Torque Wrench

Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing R-2500/AR.

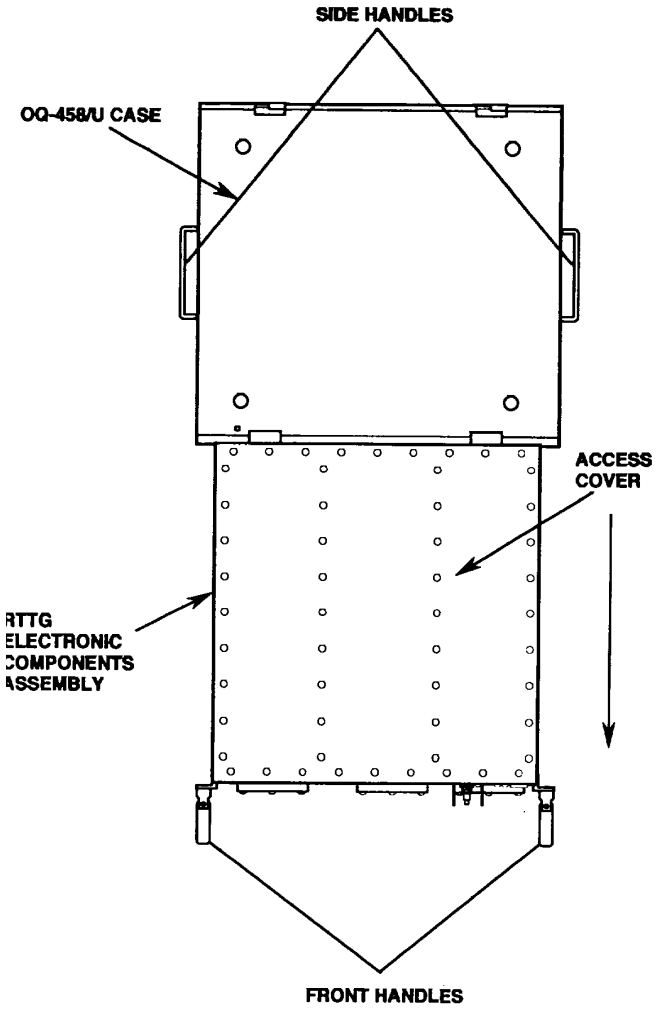
Materials
None

REMOVAL

1. Remove both OQ-458/U end covers.
2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.
3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.



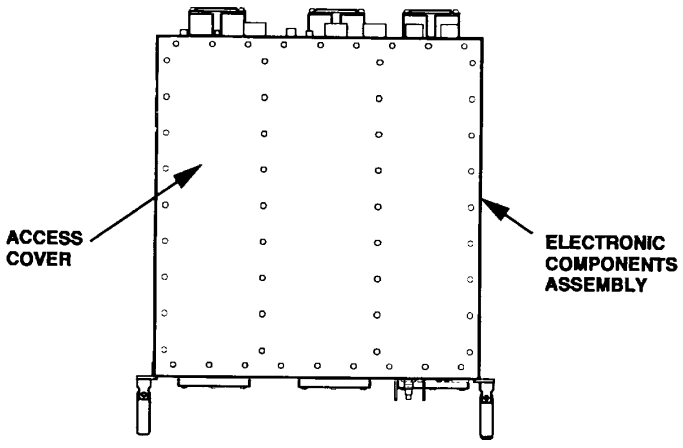
4. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.



5. Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.
6. Remove the access cover.

7. Disconnect plug P2 from connector A2J1.
8. Using a 5/16 in. wrench, disconnect cable W31P1 from connector A2J2.
9. Using a 5/16 in. wrench, disconnect cable W29 from connector A2J3.

10. Disconnect cable W33P1 from connector A2J4.

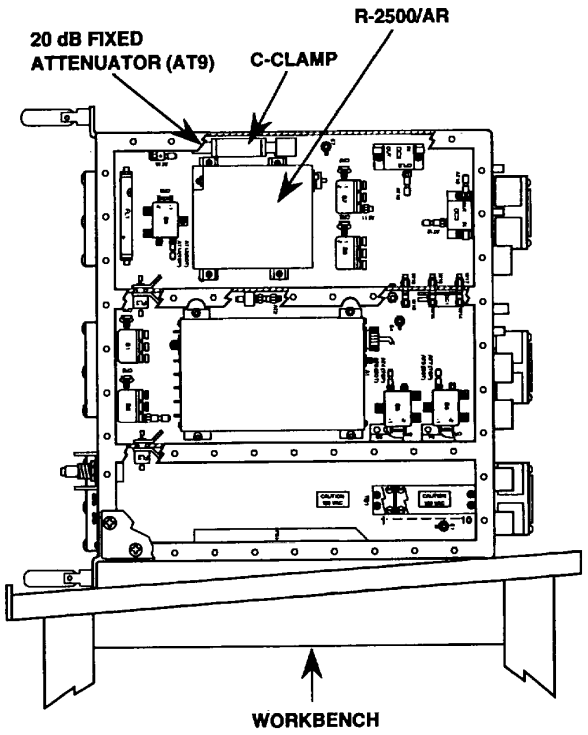


11. Rotate the RTTG, electronic components assembly on its side.

12. Remove the attenuator (AT9) from the C-clamp that holds it in the RTTG, electronic components assembly.

13. Using a No. 2 Phillips screwdriver and a 7/32 in. socket wrench, remove the R-2500/AR mounting hardware.

14. Remove R-2500/AR from the RTTG, electronic components assembly.



REPLACEMENT

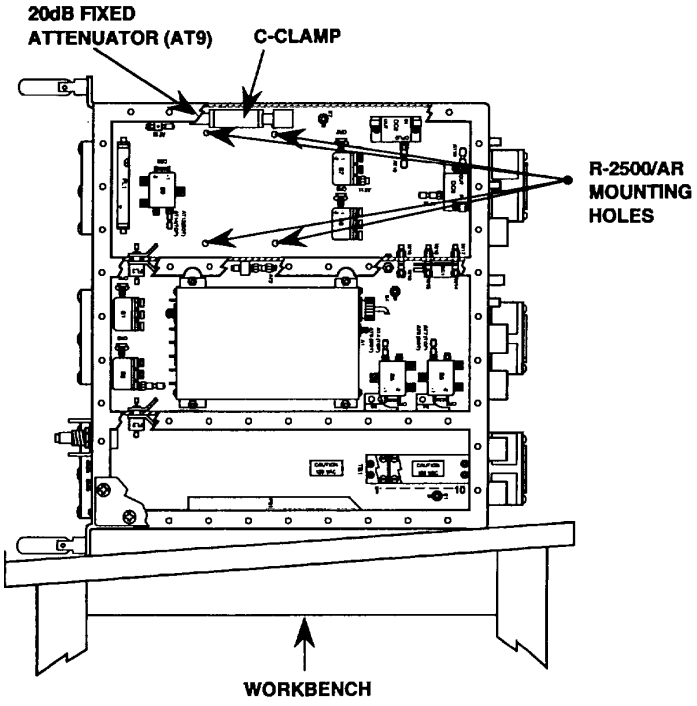
1. Place the RTTG, electronic components assembly so the front panel is facing you.

2. Turn the R-2500/AR so that the J3 connector is facing you.

3. Place the R-2500/AR directly over its four mounting holes.

4. While holding the R-2500/AR in place, rotate the RTTG, electronic components assembly on its side.

5. Using a 7/32 in. socket wrench and a No. 2 Phillips screwdriver, install the four screws in the R-2500/AR mounting holes from the bottom of the RTTG, electronic components assembly and secure with four flat washers and locking nuts.



6. Connect plug P2 to connector A2J1.

7. Using a 5/16 in. torque wrench, connect cable W3lP1 to connector A2J2 and torque to 8 to 12 in. lb.

8. Using a 5/16 in. torque wrench, connect cable W29 to connector A2J3 and torque to 8 to 12 in. lb.

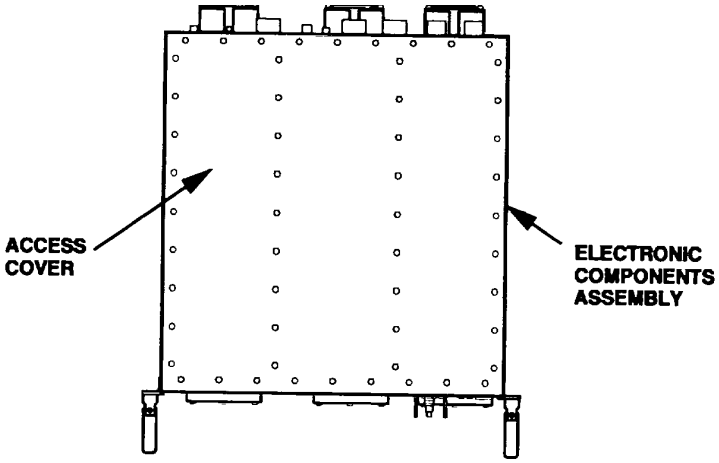
9. Connect cable W33P1 to connector A2J4.

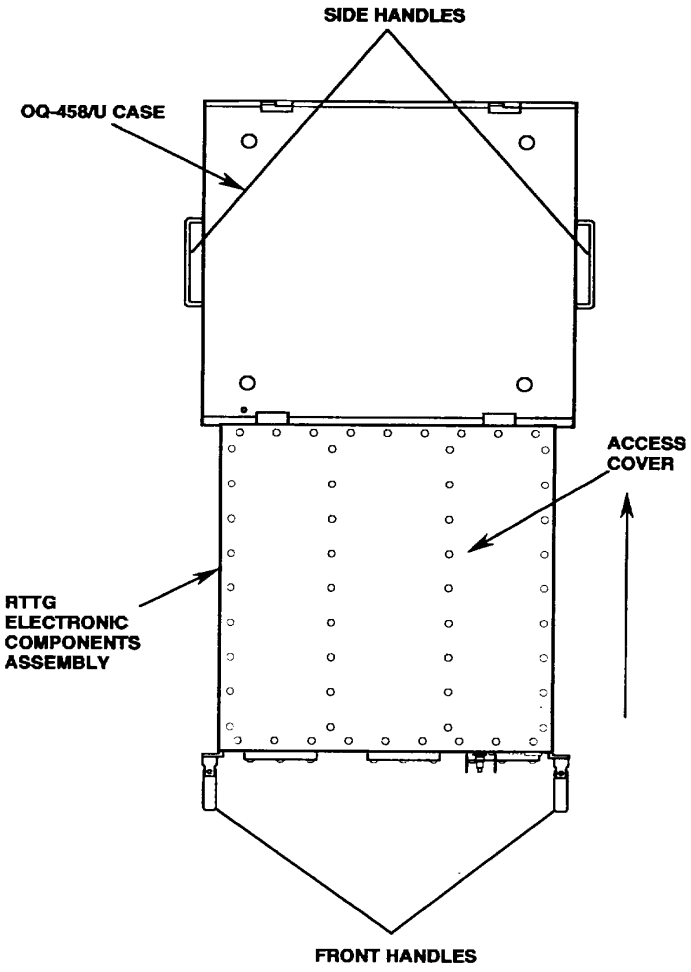
10. Install the 20 dB fixed attenuator (AT9) in the C-clamp that holds it in the RTTG, electronic components assembly.

11. Place the access cover in position.

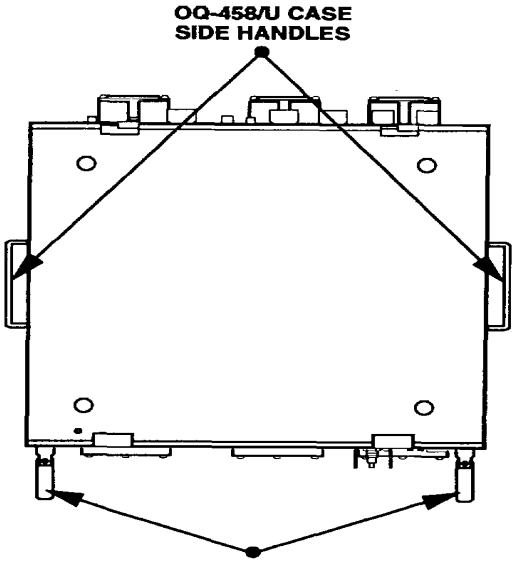
12. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.

13. While holding the handles on the side o the case, insert the RTTG, electronic components assembly.

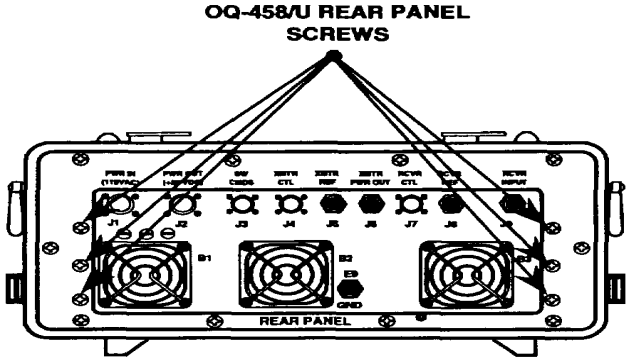




14. Slide the RTTG, electronic components assembly firmly into the case.

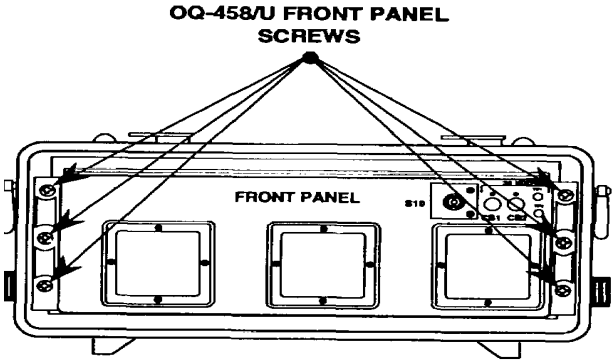


15. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.



16. Using a No. 2 Phillips screwdriver, install the six front panel screws,flat washers, and lock washers.

17. Install both OQ-458/U end covers.



5-8.2.6 Attenuators (AT1-AT16). To remove and replace the attenuators installed in OQ-458/U, perform the following procedures.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any attenuators with OQ-458/U connected to TS-4398/U.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
5/16 in. Torque Wrench

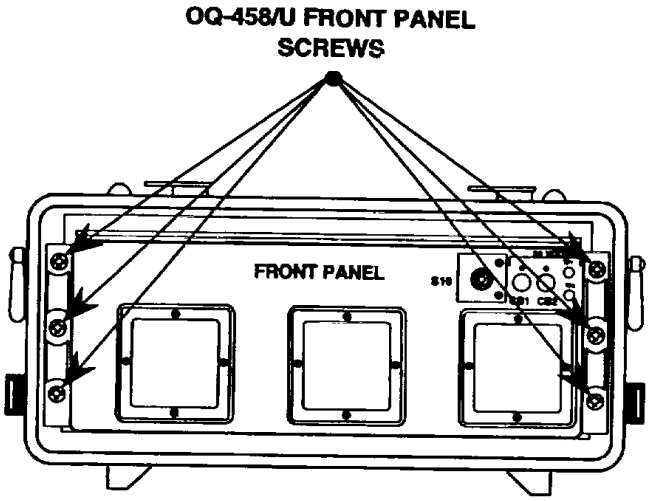
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing any attenuators.
Before removing and replacing AT1 and AT2, Radio Transmitter, T-1573(V)2/AR, must be removed.

Materials
None

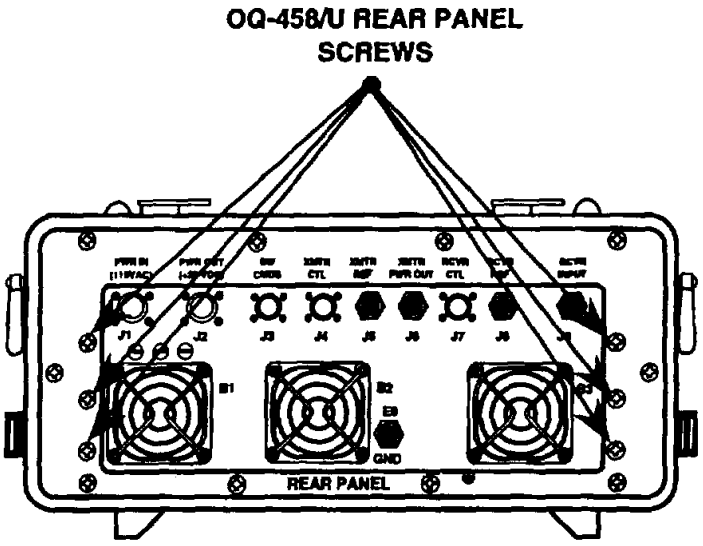
REMOVAL

1. Remove both OQ-458/U end covers.

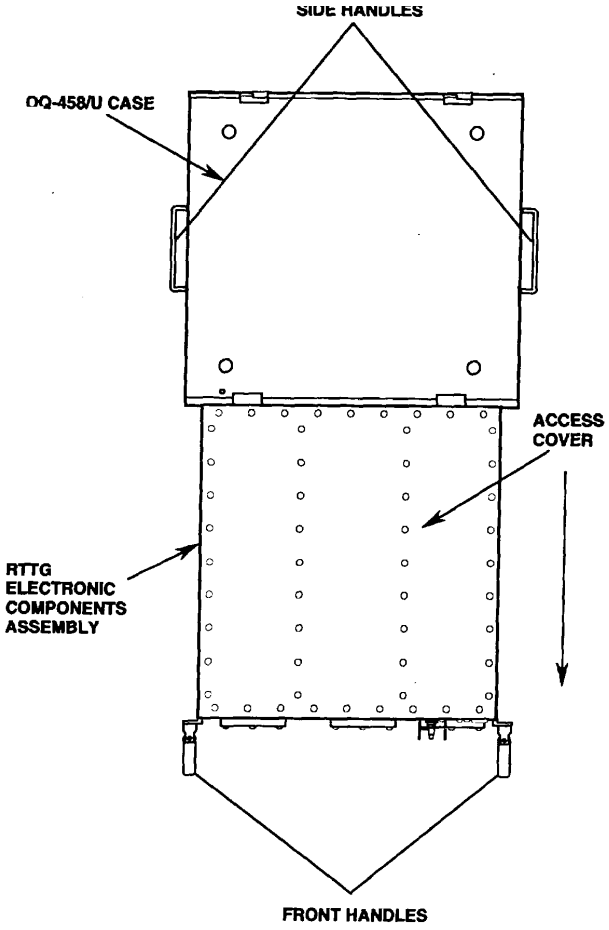
2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.



4. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.



5. Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.

6. Remove the access cover.

NOTE

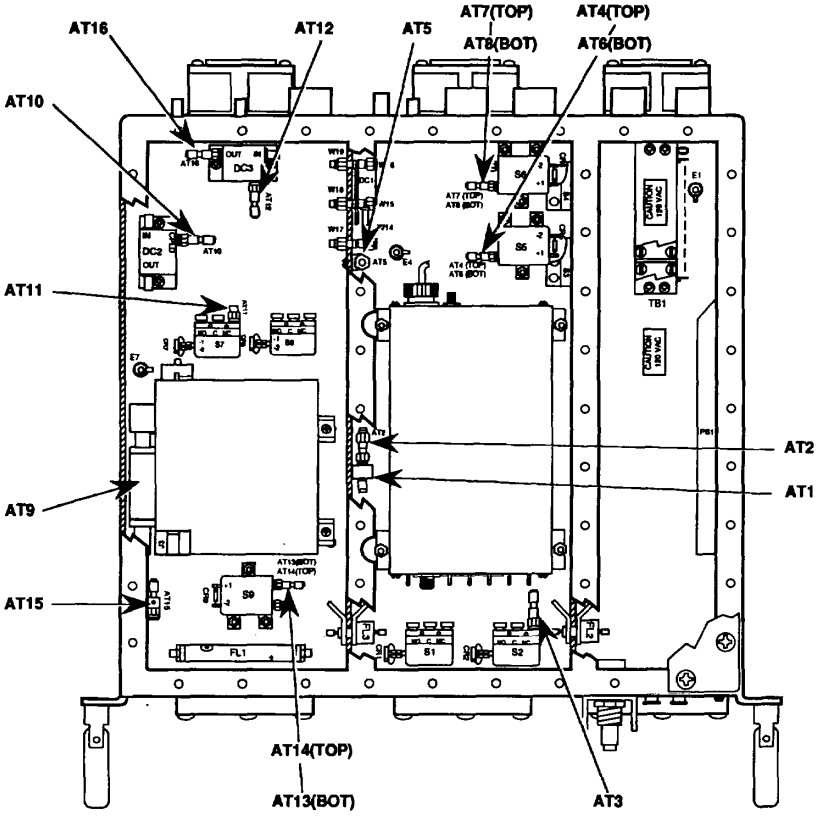
The locations of AT1 through AT16 are shown in the following illustration.

7. Locate the attenuator to be replaced.

8. Using a 5/16 in. wrench, unscrew the cable connector(s) from the attenuator. Note all connections.

9. Using a 5/16 in. wrench, unscrew and remove the attenuator.

10. For AT9, remove attenuator from C-clamp and unscrew connectors.

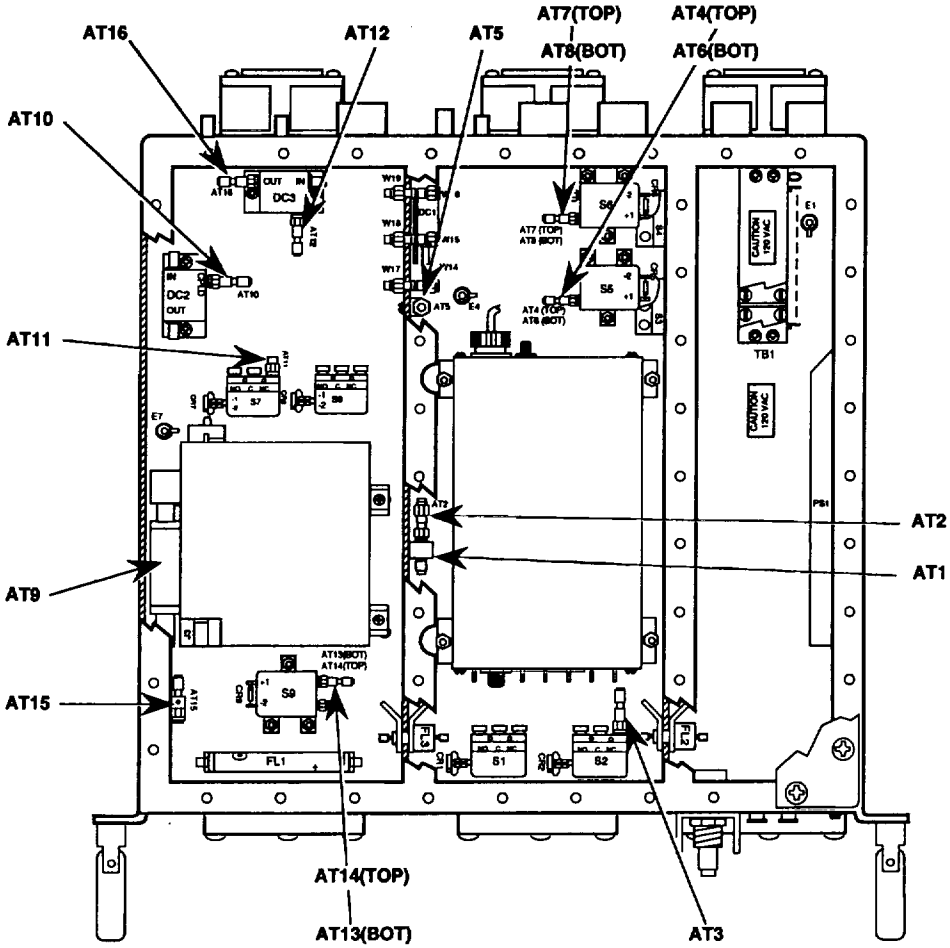


REPLACEMENT

1. **Using a 5/16 in. wrench, install and tighten the attenuator in place.**
2. **Using a 5/16 in. torque wrench, screw the cable connector(s) to the attenuator as previously noted.**

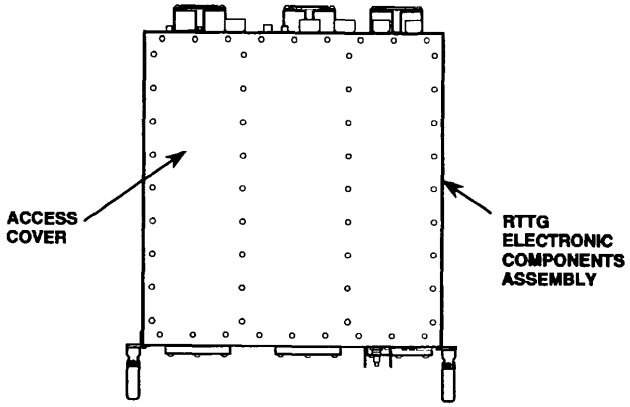
3. **Torque the connectors to 8-12 in. lb.**

4. **For AT9, screw connectors onto attenuator and place in C-clamp.**



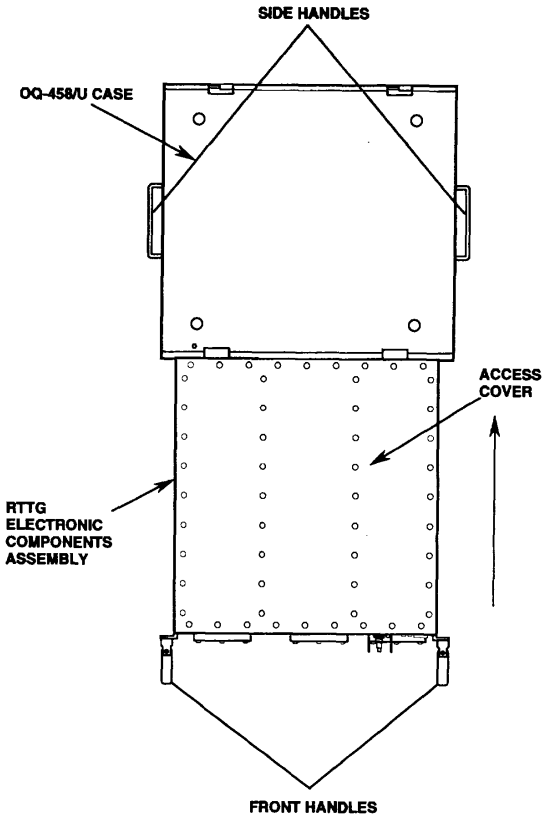
5. **Place the access cover in position.**

6. **Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.**

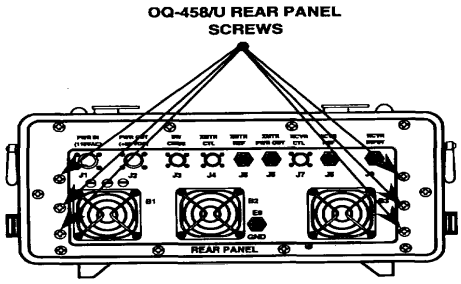


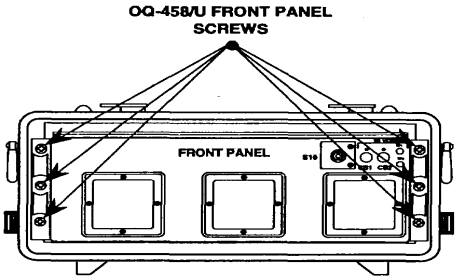
7. **While holding the handles on the side of the case, insert the RTTG, electronic components assembly.**

8. **Slide the RTTG, electronic components assembly firmly into the case.**



9. **Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.**





10. **Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.**
11. **Install both OQ-458/U end covers.**

5-8.2.7 RF Switches (81-S9). **The RF switches are contained within OQ-458/U. To remove and replace an RF switch, perform the following procedure.**

This task covers:

a. Removal **b. Replacement**

INITIAL SETUP

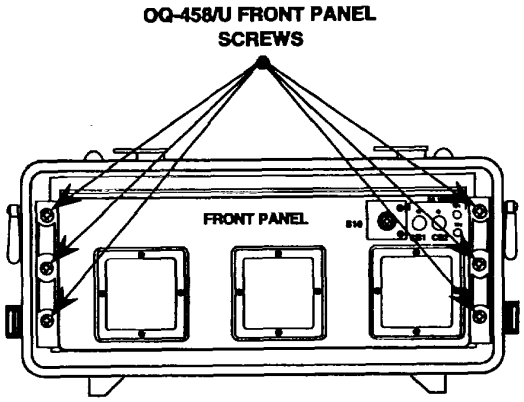
Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
Solder Gun
5/16 in. Torque Wrench

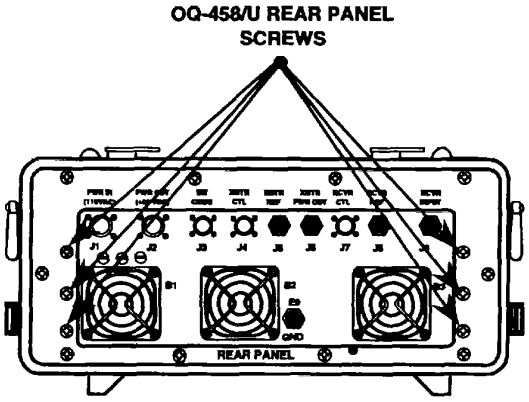
Materials
Solder
Heat Shrinkable Tubing

Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing an RF switch.

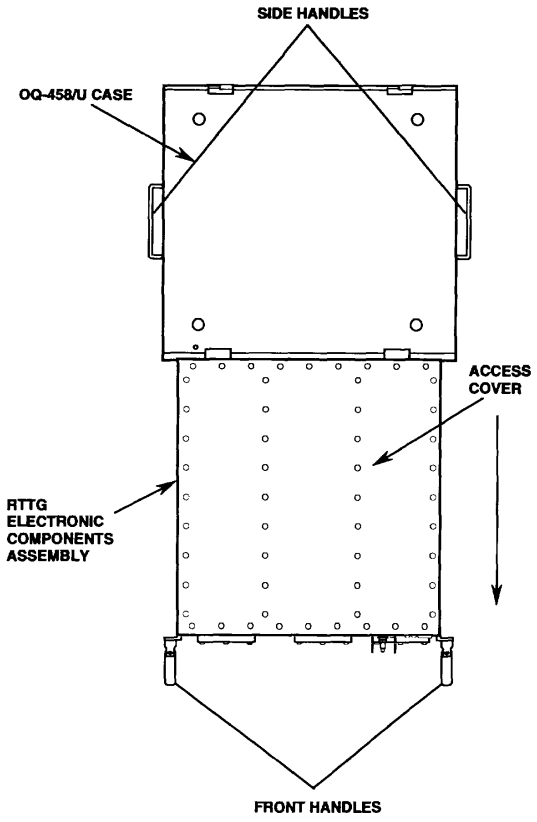
REMOVAL

1. **Remove both OQ-458/U end covers.**
2. **Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.**
3. **Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.**





4. **While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.**
5. **Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.**



6. **Remove the access cover.**

7. **Locate the RF switch to be replaced.**

8. **Using a 5/16 in. wrench, unscrew the cable connector(s) and attenuators from the RF switch. Note all connections.**

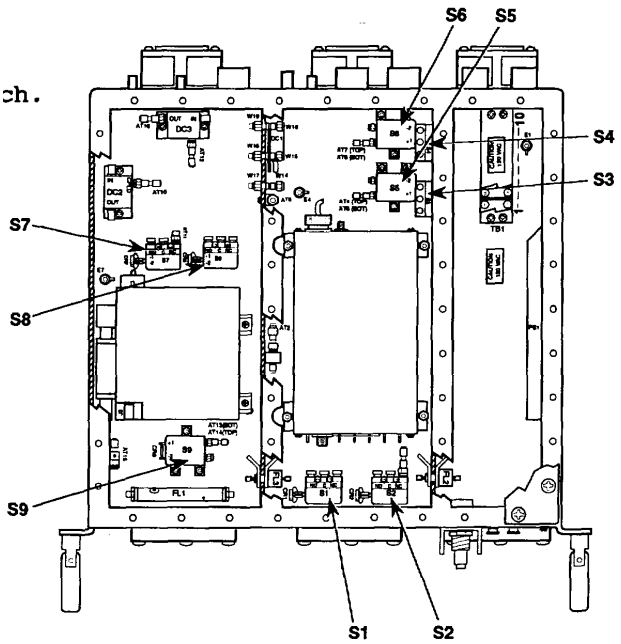
9. **Using a 1/4 in. wrench and a No. 2 Phillips screwdriver, unscrew and remove the RF switch hardware.**

NOTE

In order to gain access to RF switches during removal, it may be necessary to remove the Radio Transmitter, T-1573(V)2/AR (refer to paragraph 5-8.2.4) or the Radio Receiver, R-2500/AR (refer to paragraph 5-8.2.5).

10. **Desolder all wire diodes from the R switch. Note all connections.**

11. **Remove the RF switch**



REPLACEMENT

1. **Position the replacement RF switch in place.**

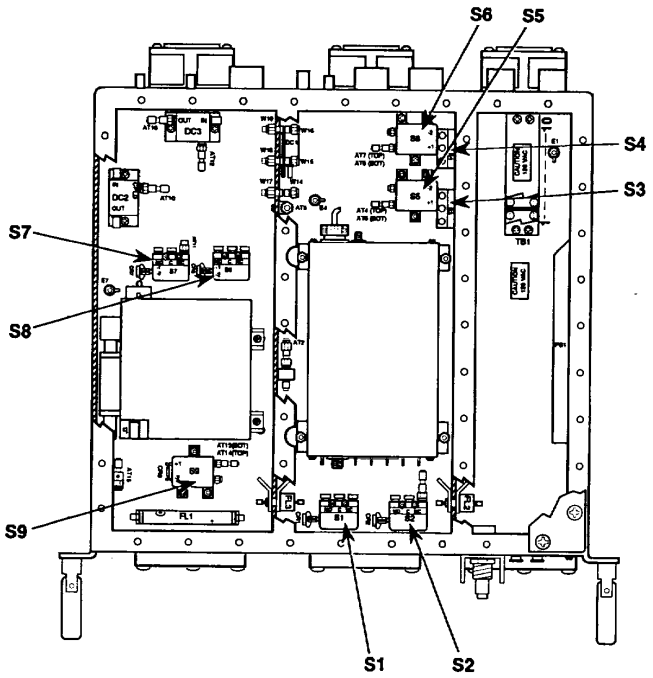
NOTE

Replace the Radio Transmitter, T-1573(V)2/AR or the Radio Receiver, R-2500/AR if removed during RF switch removal procedure, refer to paragraph 5-8.2.4 (T-1573(V)2,3/AR Radio Transmitter) or paragraph 5-8.2.5 (R-2500/AR Radio Receiver).

2. **Solder all diodes and wires to the RF switch as previously noted.**

3. **Using a 1/4 in. wrench and a No. 2 Phillips screwdriver, install and tighten the RF switch hardware.**

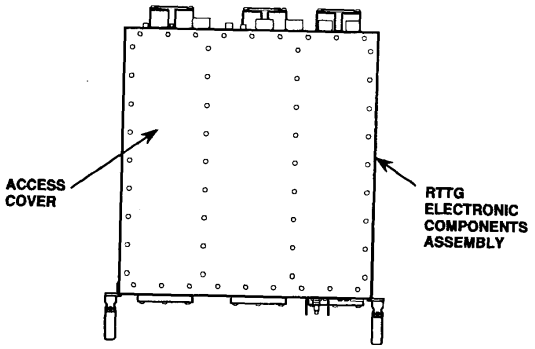
4. **Using a 5/16 in. torque wrench, screw the cable connector(s) and attenuators to the RF switch as previously noted.**



5. **Torque the connectors to 8 to 12 in. lb.**

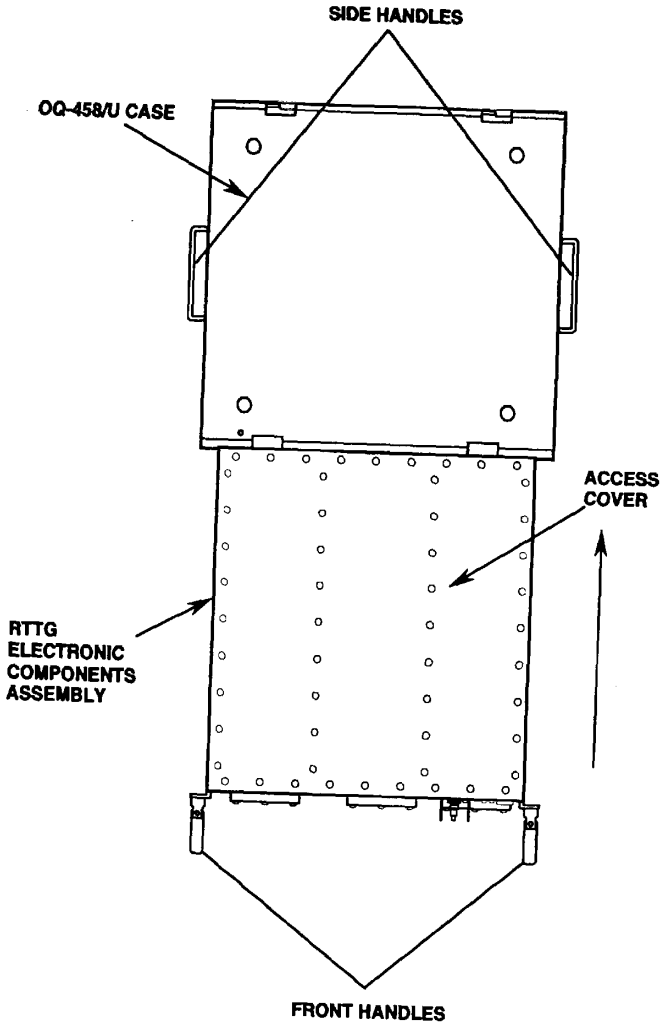
6. **Place the access cover in position.**

7. **Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.**

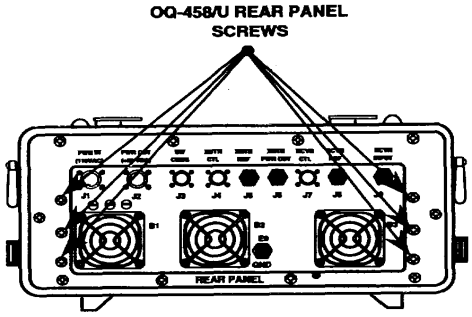


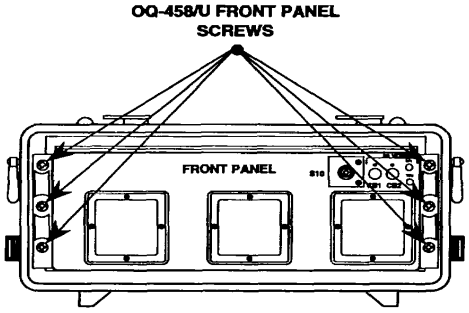
8. **While holding the handles on the side of the case, insert the RTTG, electronic components assembly.**

9. **Slide the RTTG, electronic components assembly firmly into the case.**



10. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.





11. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.

12. Install both OQ-458/U end covers.

5-8.2.8 Bandpass Filter (FL1). **FL1 is contained within OQ-458/U. To remove and replace FL1, perform the following procedure.**

This task covers:

a. Removal **b. Replacement**

INITIA. SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench
removing and replacing

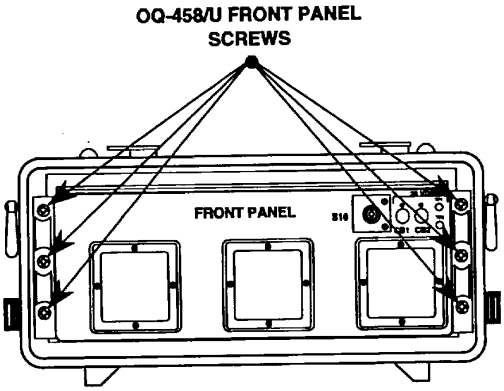
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before

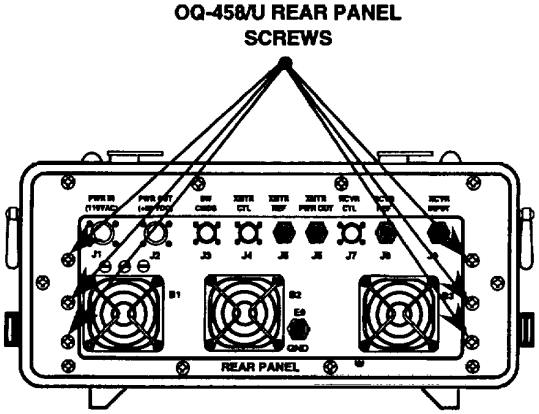
FL1.

Materials
None

REMOVAL

1. **Remove both OQ-458/U end covers.**
2. **Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.**
3. **Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.**

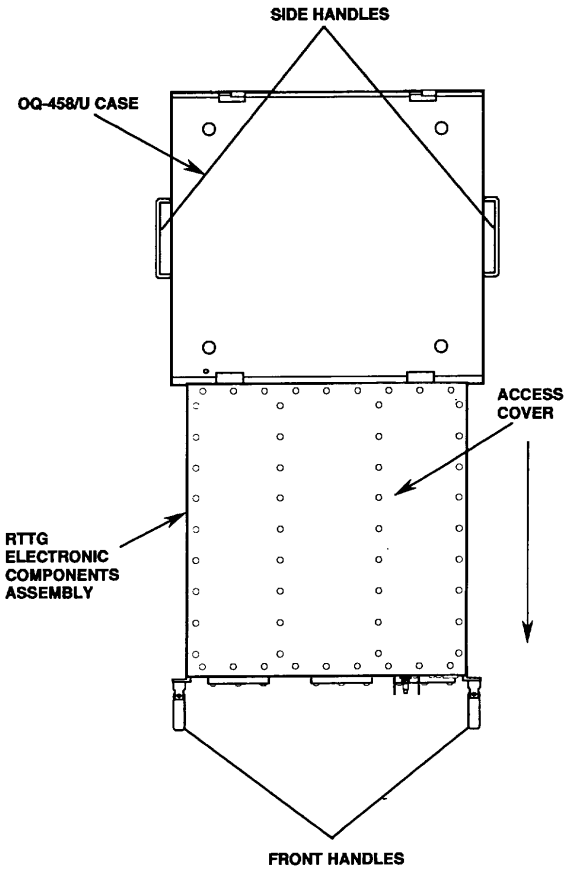




4. **While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.**

5. **Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.**

6. **Remove the access cover.**



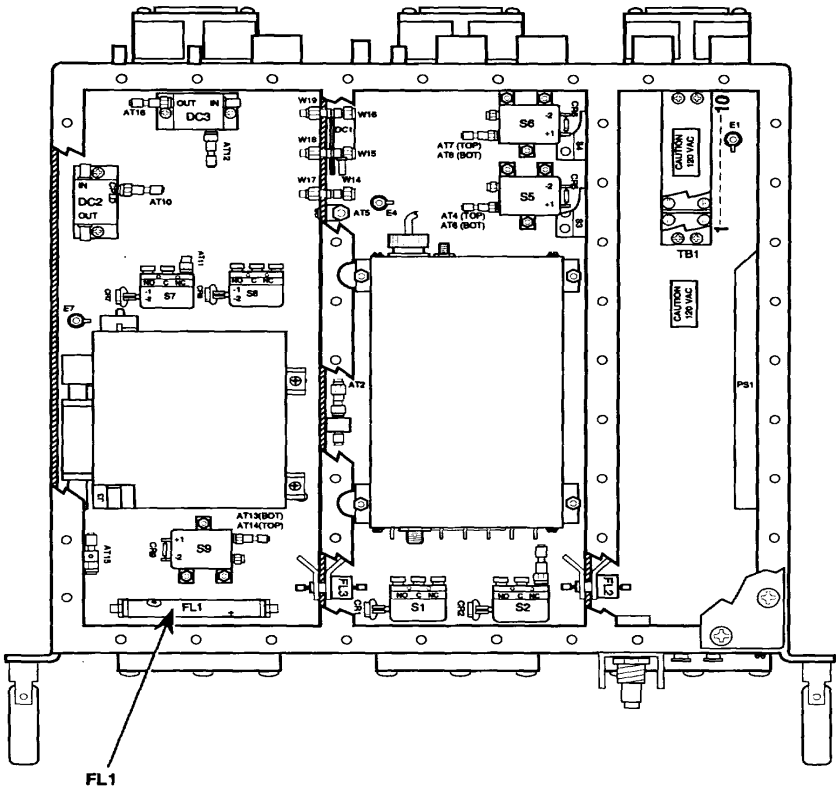
7. **Locate FL1.**

8. **Using a 5/16 in. wrench, unscrew the cable connectors from FL1. Note all connections.**

9. **Place the RTTG, electronic components assembly on its side.**

10. **Using a No. 0 Phillips screwdriver, unscrew the two screws that mount FL1 to the RTTG, electronic components assembly case.**

11. **Remove FL1.**



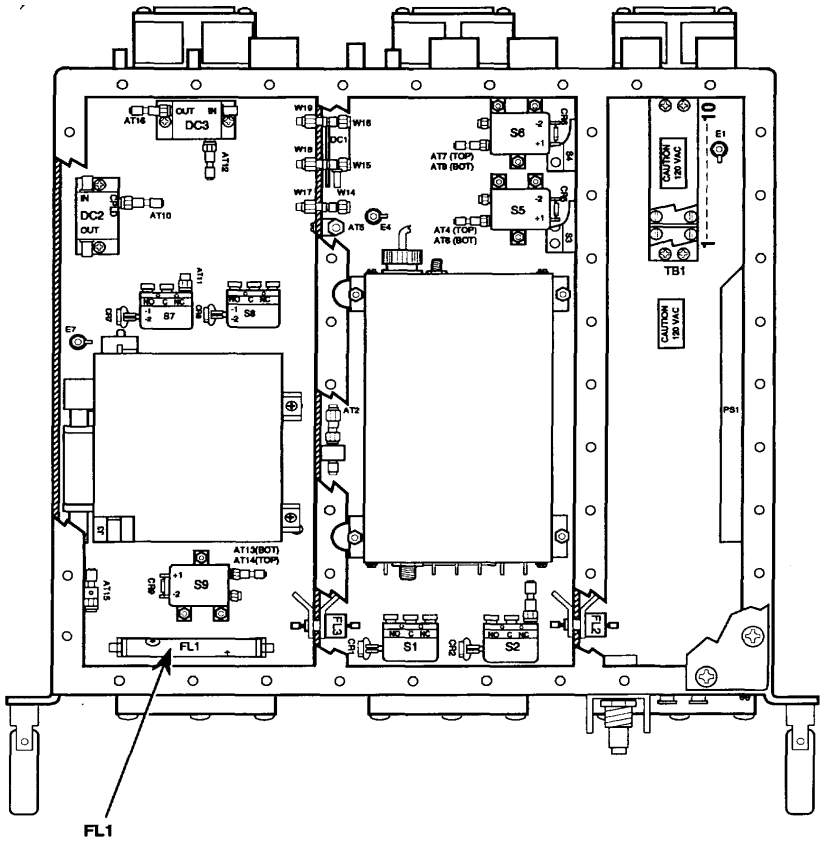
REPLACEMENT

1. **Position the replacement FL1 in place.**

2. **Using a No. 1 Phillips screwdriver, install the screws that mount FL1 to the RTTG, electronic components assembly case.**

3. **Using a 5/16 in. torque wrench, screw the cable connectors to FL1 as previously noted.**

4. **Torque the connectors to 8 to 12 in. Lb.**

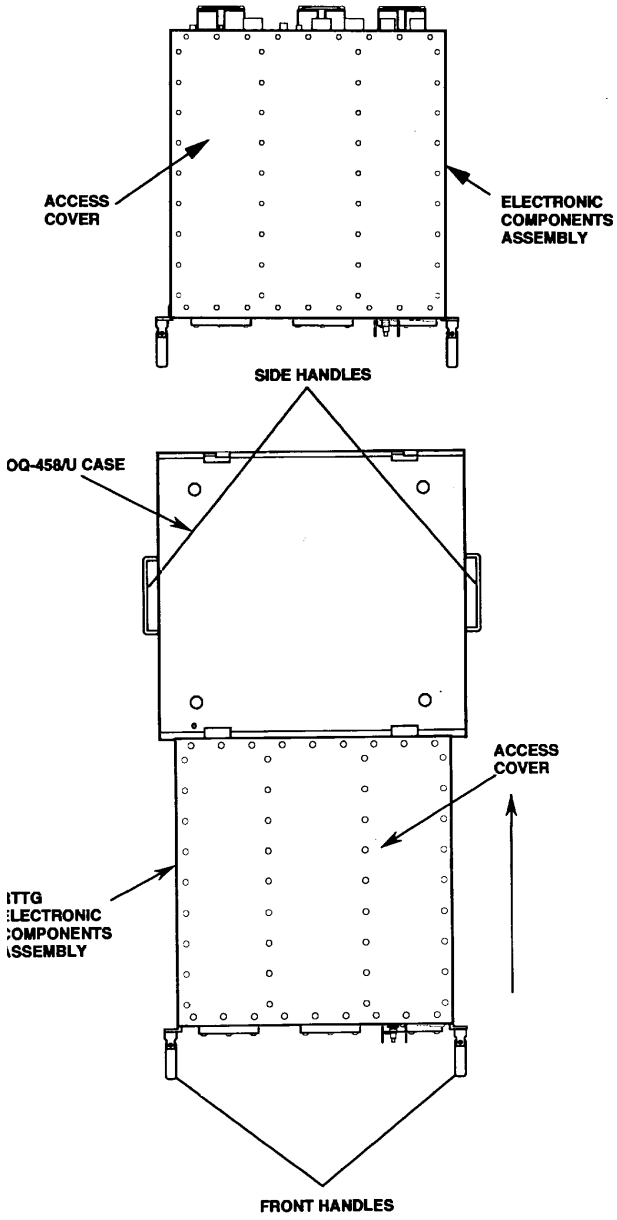


5. **Place the access cover in position.**

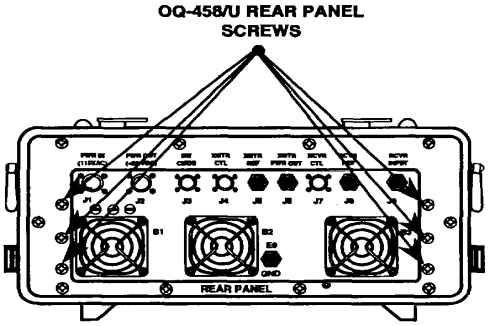
6. **Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.**

7. **While holding the handles on the side of the case, insert the RTTG, electronic components assembly.**

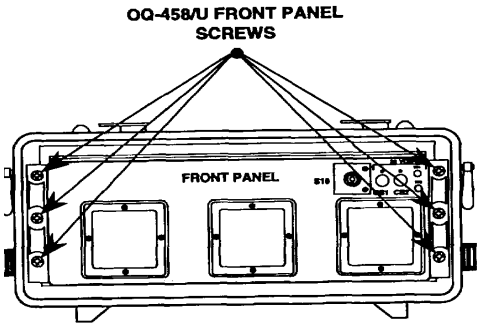
8. **Slide the RTTG, electronic components assembly firmly into the case.**



9. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.



10. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.



11. Install both OQ-458/U end covers.

5-8.2.9 RF Filters (FL2 and FL3). **The RF filters are contained within OQ-458/U. To remove and replace an RF filter, perform the following procedure.**

This task covers:

a. Removal b. Replacement

INITIAL SETUP

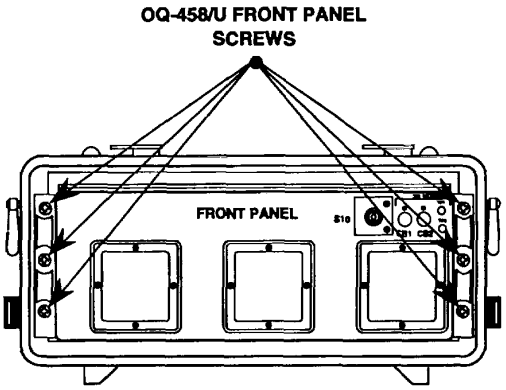
Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
Solder Gun
Desoldering Attachment

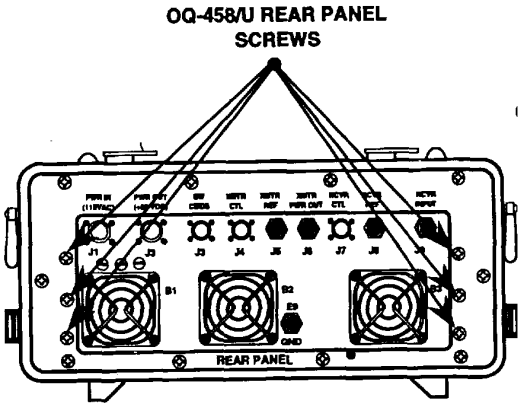
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing an RF filter.

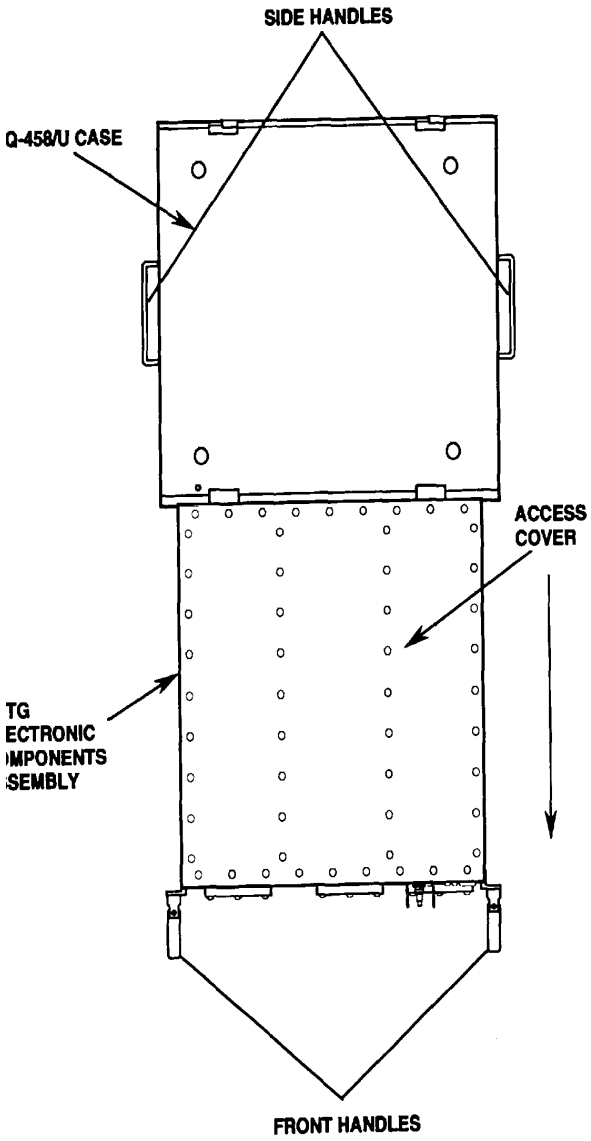
Materials
Solder
Heat Shrinkable Tubing

REMOVAL

1. **Remove both OQ-458/U end covers.**
2. **Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.**
3. **Using a No. 2 Phillips screwdriver, remove**







4. **While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.**

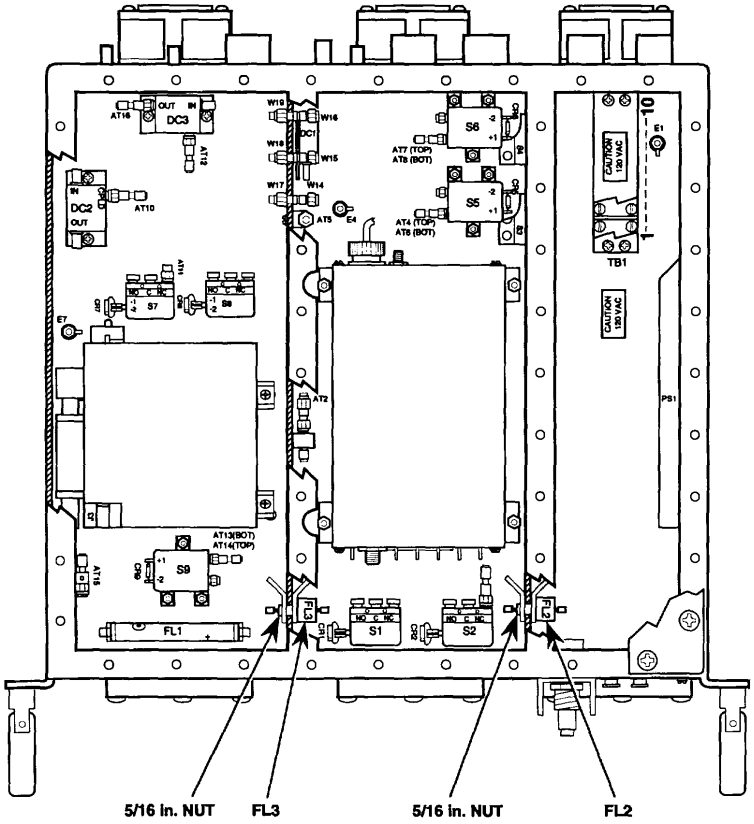
5. **Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.**
6. **Remove the access cover.**

7. **Locate the RF filter to be replaced.**

8. **Desolder all wires from the RF filter. Note all connections.**

9. **Using a 5/16 in. wrench, unscrew and remove the RF filter nut.**

10. **Remove the RF filter.**

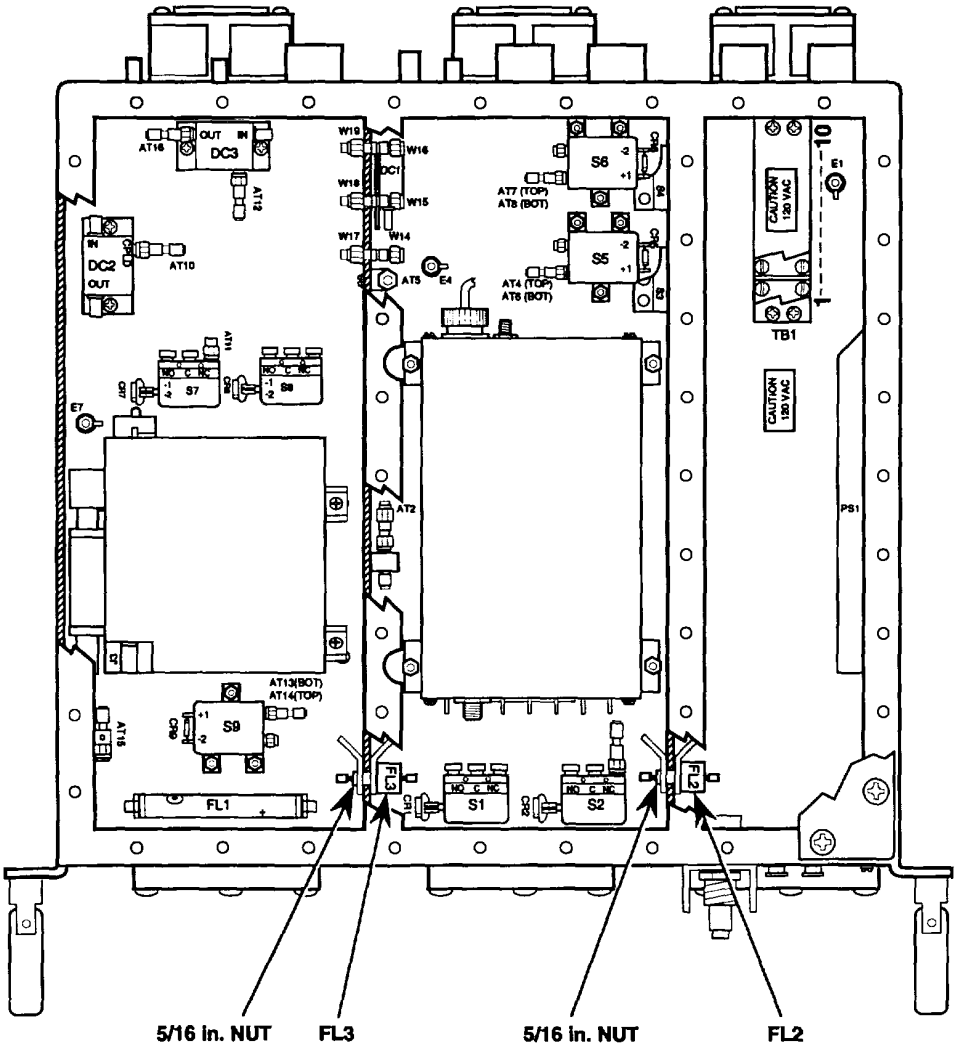


REPLACMENT

1. **Install the replacement RF filter in place.**

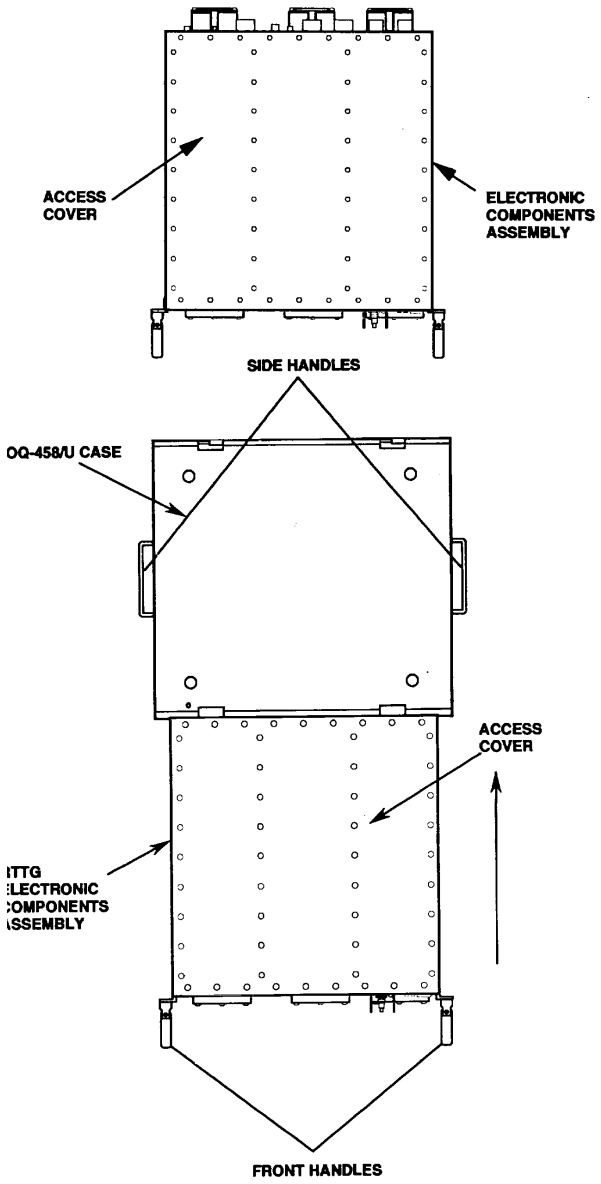
2. **Using a 5/16 in. wrench, install and tighten the RF filter nut.**

3. **Solder all wires to the RF filter as**



4. **Place the access cover in position.**

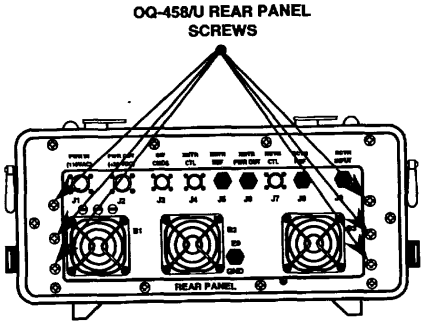
5. **Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.**



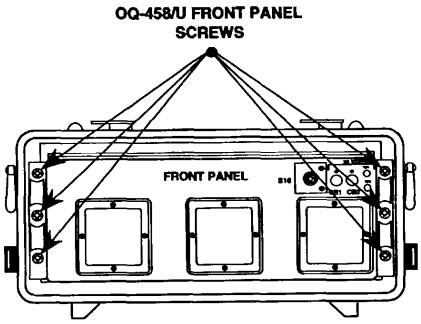
6. **While holding the handles on the side of the case, insert the RTTG, electronic components assembly.**

7. **Slide the RTTG, electronic components assembly firmly into the case.**

8. **Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.**



9. **Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.**



10. **Install both OQ-458/U end covers.**

5-8.2.10 Directional Coupler (DC1-DC3). **The directional couplers are contained within OQ-458/U. To remove and replace directional coupler perform the following procedure.**

This task covers:

a. Removal **b. Replacement**

INITIAL BSETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
5/16 in. Torque Wrench
removing and replacing a directional coupler.

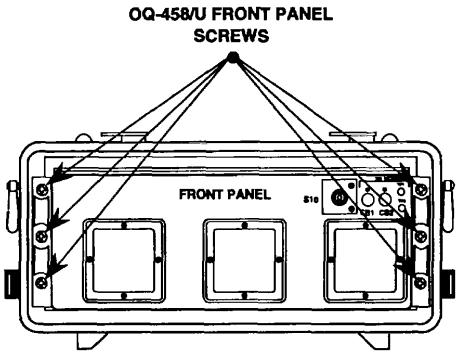
Materials
None

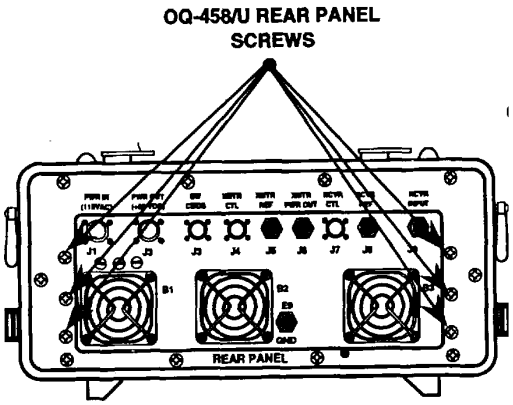
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before

REMOVAL

1. **Remove both OQ-458/U end covers.**

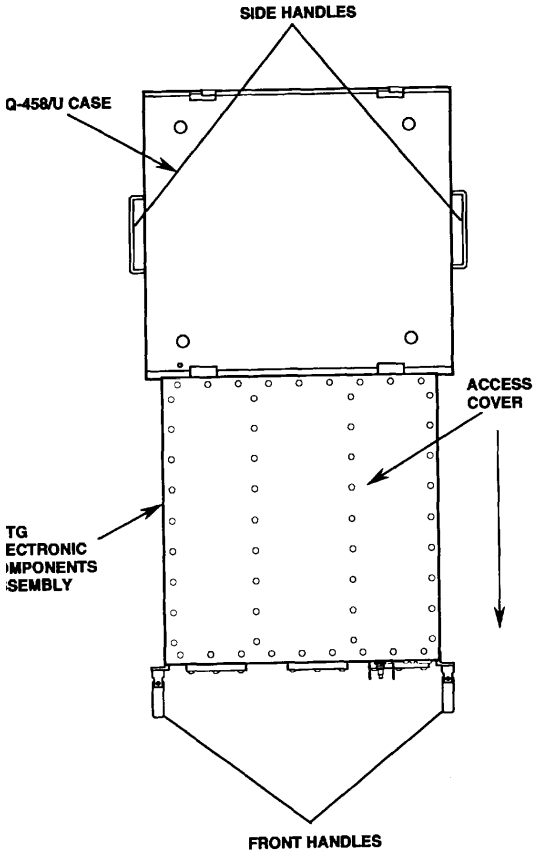
2. **Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.**





3. **Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.**

4. **While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.**



5. **Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.**

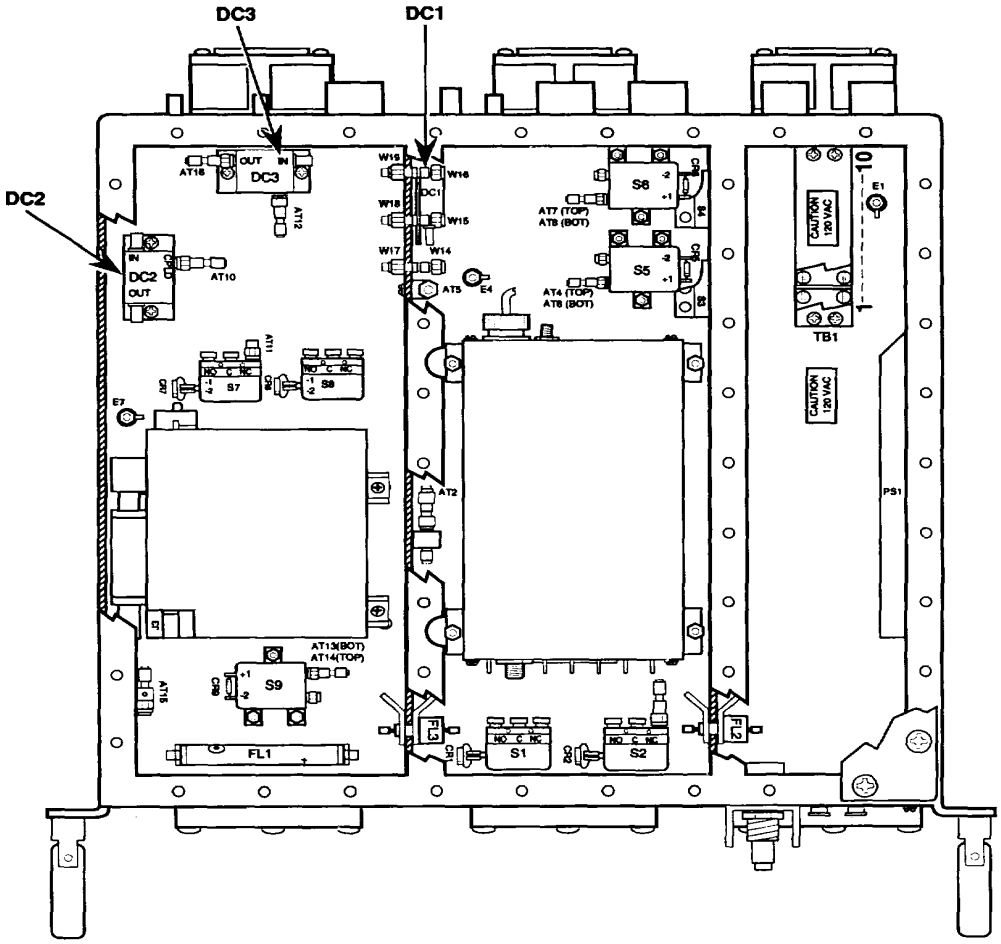
6. **Remove the access cover.**

7. **Locate the directional coupler to be replaced.**

8. **Using a 5/16 in. wrench, unscrew the cable connector(s) and attenuators from the directional coupler. Note all connections.**

9. **Using a No. 1 Phillips screwdriver, unscrew and remove the directional coupler**

10. **Remove the directional coupler.**



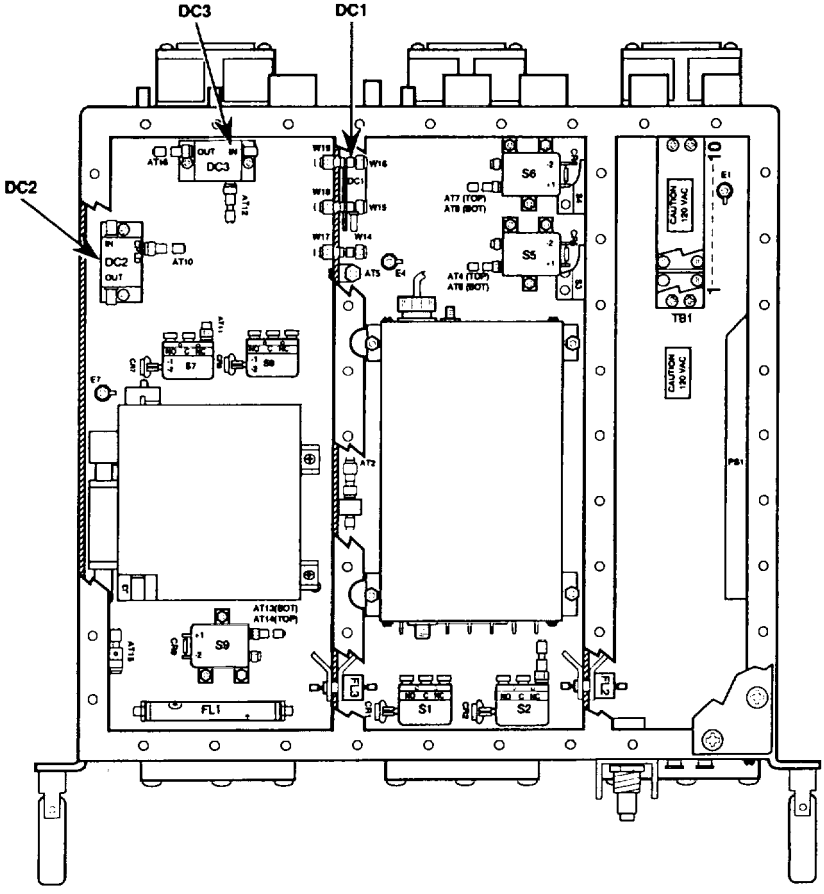
REPLACEMENT

1. Position the replacement directional coupler in place.

2. Using a No. 1 Phillips screwdriver, install and tighten the directional coupler hardware.

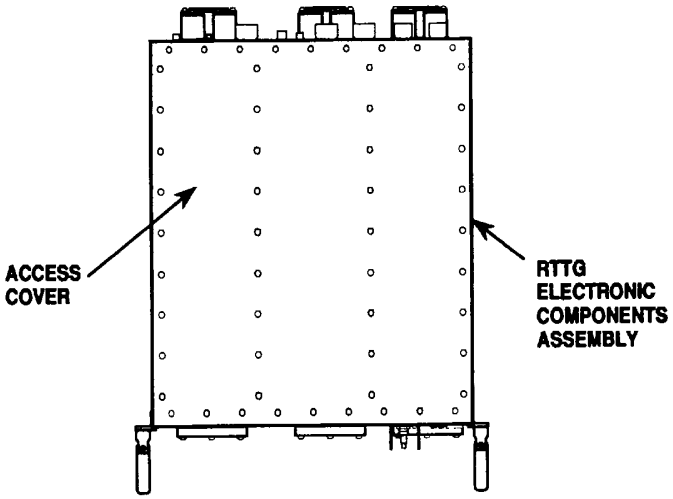
3. Using a 5/16 in. torque wrench screw the cable connector(s) and attenuators to the directional coupler as previously noted.

4. Torque the connectors to 8 to 12 in. lb.



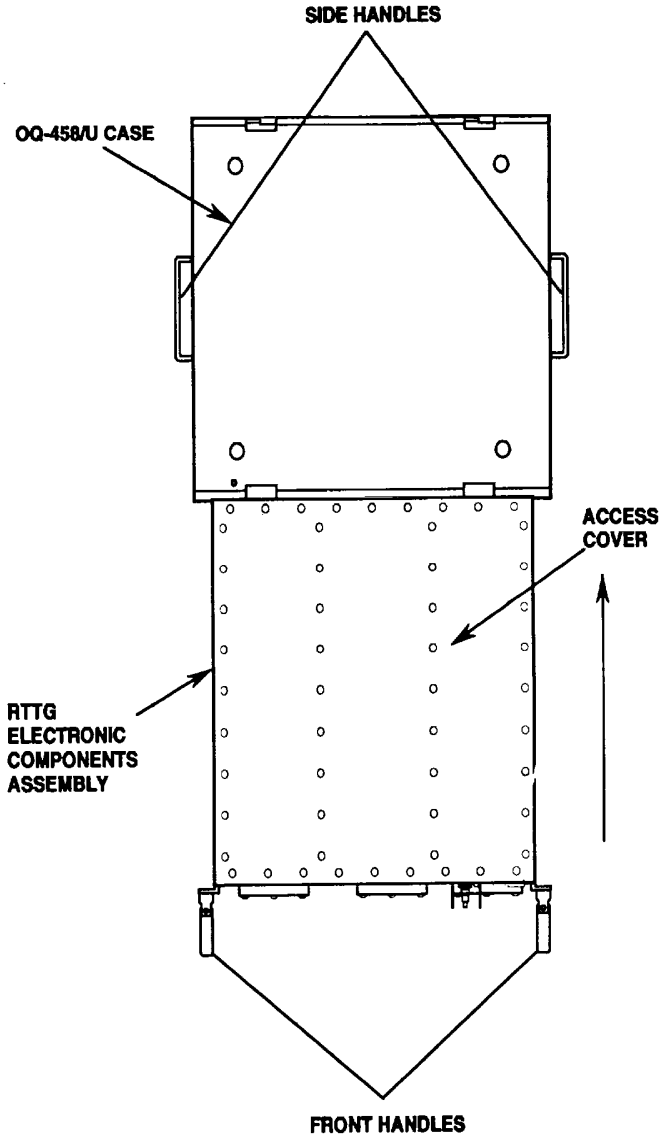
5. Place the access cover in position.

6. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.



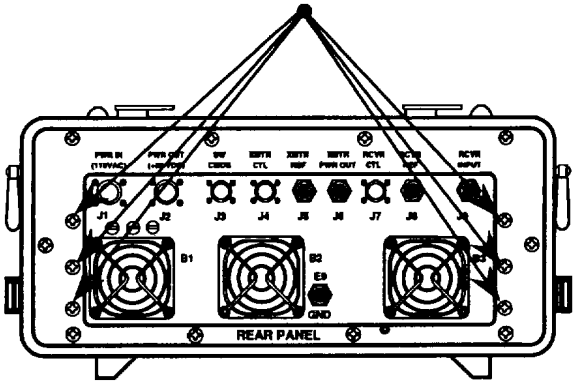
7. While holding the handles on the side of the case, insert the RTTG, electronic components assembly.

8. Slide the RTTG' electronics components assembly firmly into the case.

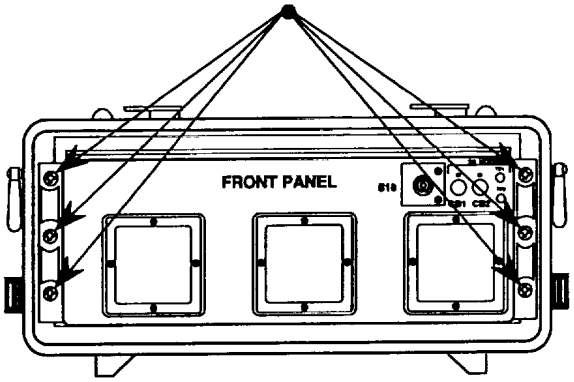


9. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.

OQ-458/U REAR PANEL SCREWS



OQ-458/U FRONT PANEL SCREWS



10. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.

11. Install both OQ-458/U end covers.

5-8.2.11 Switch (S10). S10 is contained within OQ-458/U. To remove and replace S10, perform the following procedure.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

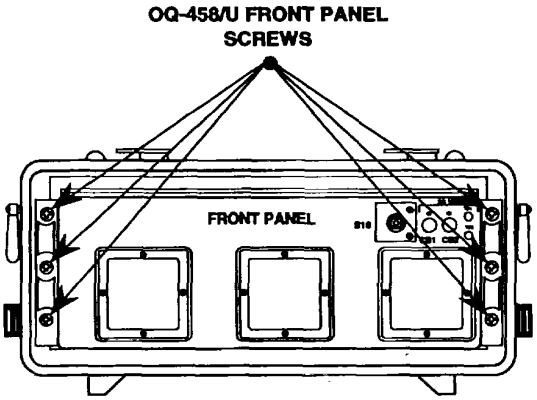
Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing S10.

Materials
None

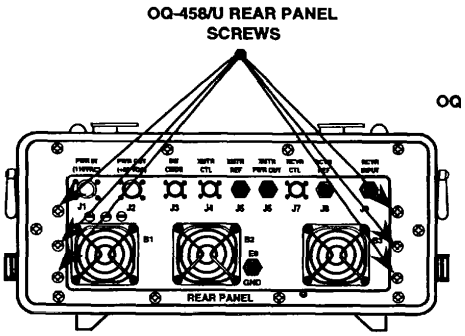
REMOVAL

1. Remove both OQ-458/U end covers.

2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.



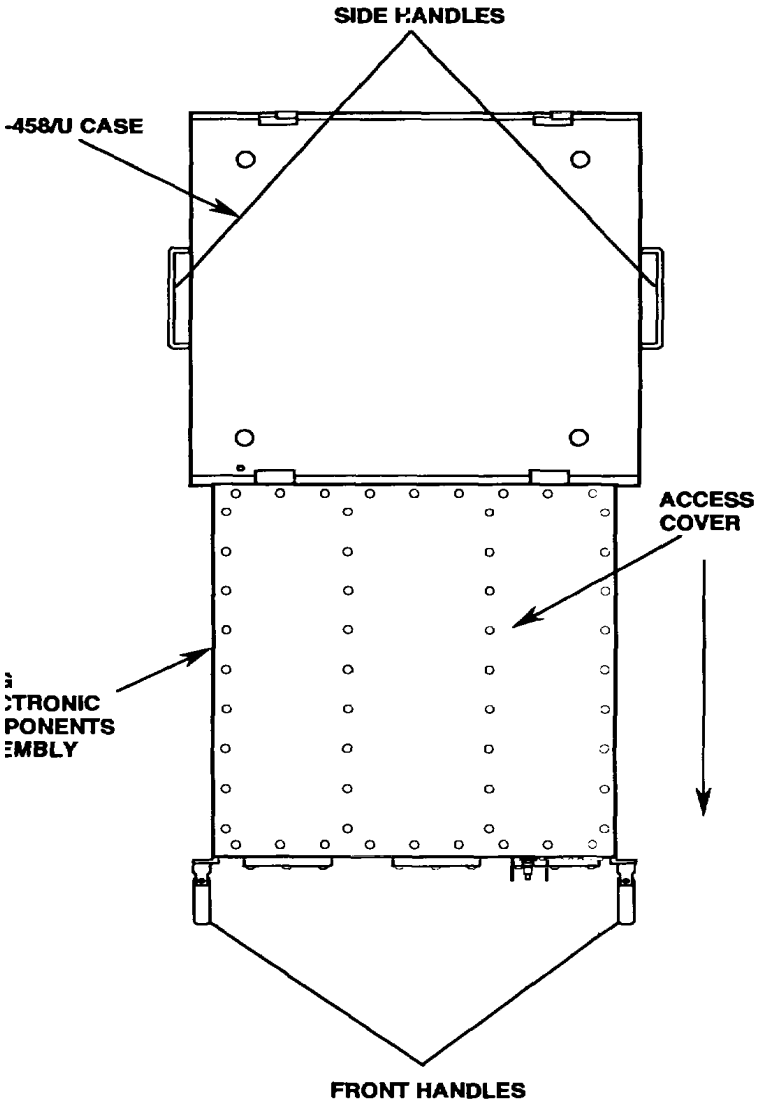
3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.



4. While holding the handles on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.

5. Using a No. 2 Phillips screwdriver, release the 58 1/4-turn fasteners.

6. Remove the access cover.

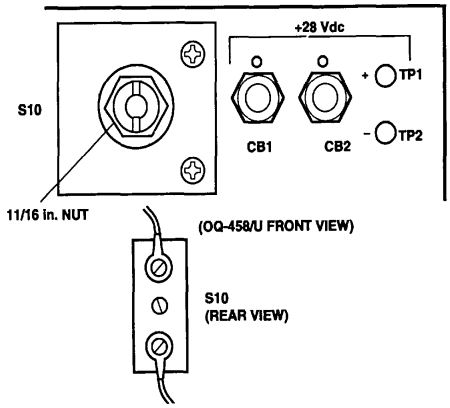


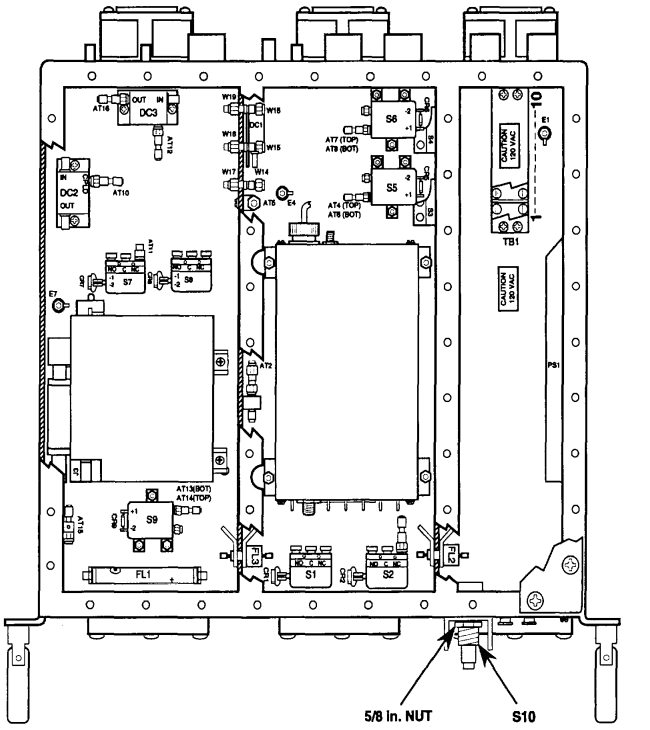
7. Locate S10.

8. Using a 3-in. Long, 1/8-in. flattip screwdriver, remove the wires connected S10. Note all connections.

9. Using a 11/16 in. Wrench, remove the nut that secures S10 to the OQ-458/U front panel.

10. Remove S10.



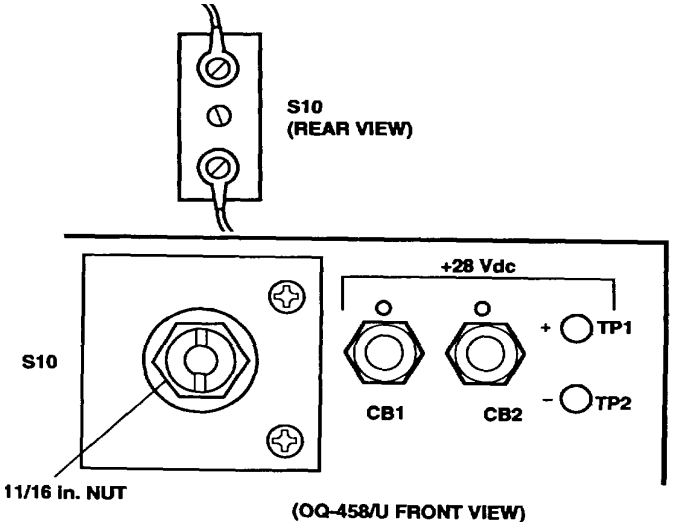


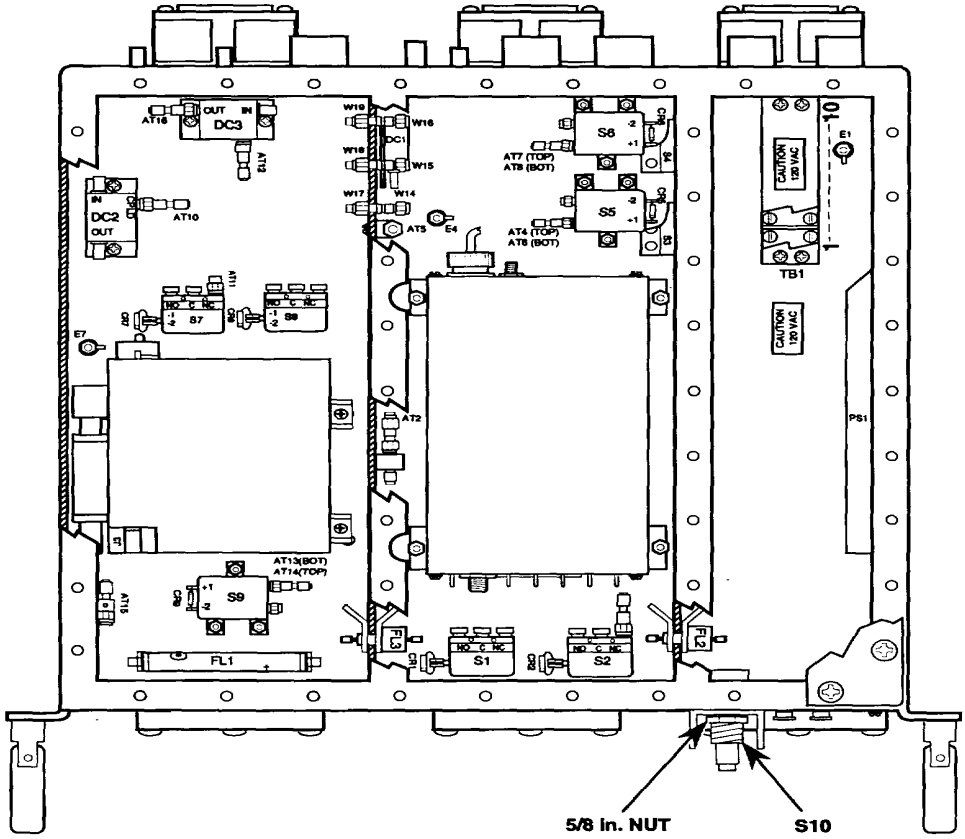
REPLACEMENT

1. Position the replacement S10 in place.

2. Using a 11/16 in. Wrench, install the nut that secures S10 to the OQ-458/u front panel.

3. Using a 3-in. Long, 1/8-in. Flattip screwdriver, install and tighten the wires connected to S10 as previously noted.



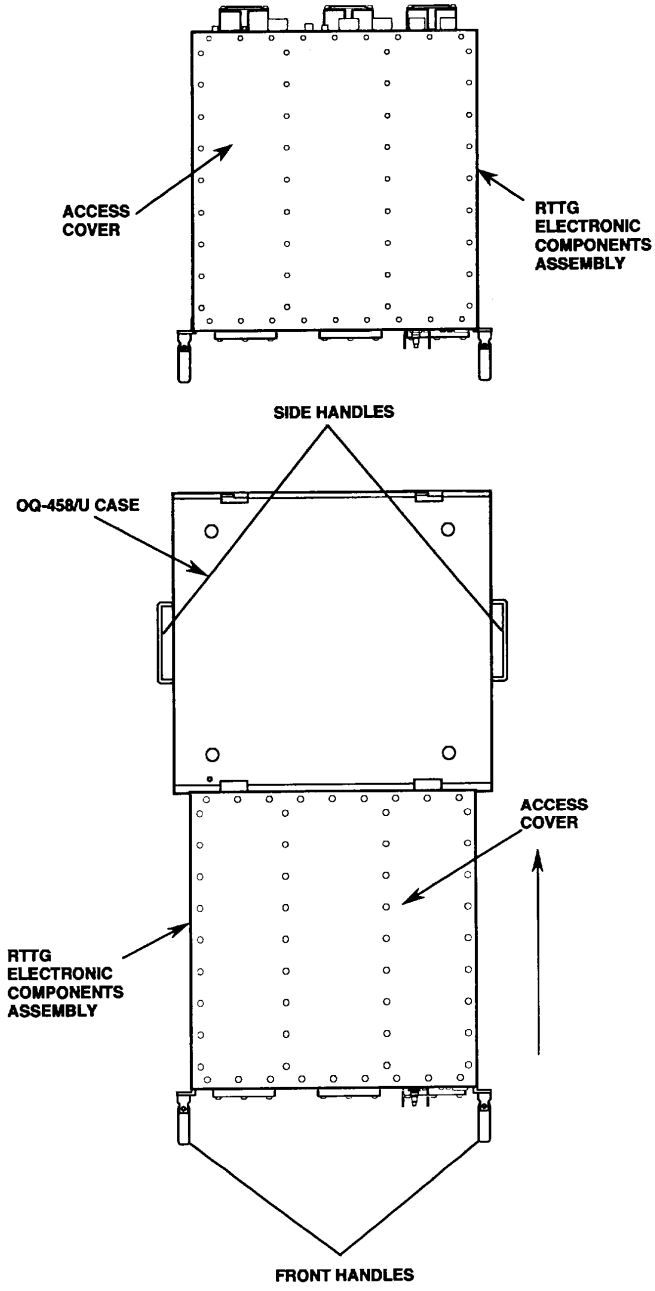


4. Place the access cover in position.

5. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.

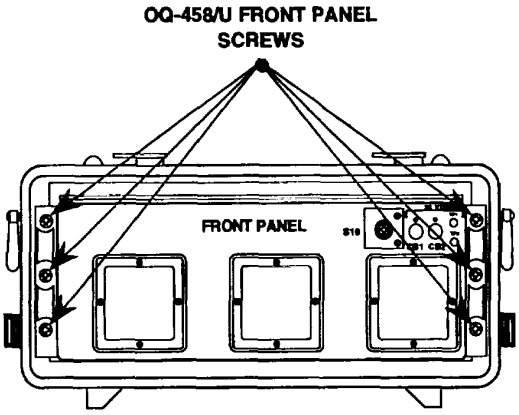
6. While holding the handles on the side of the case, insert the RTTG, electronic components assembly.

7. Slide the RTTG, electronics components assembly firmly into the case.



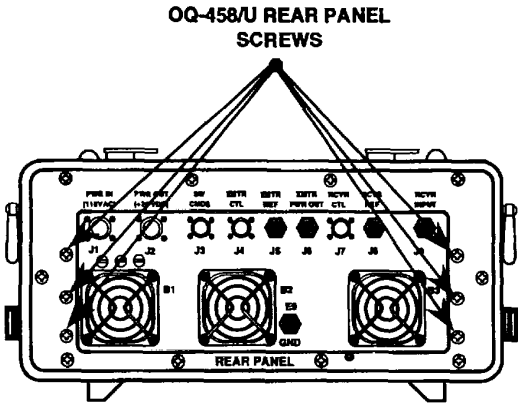
5-325

8. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.



9. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.

10. Install both OQ-458/U end covers.



5-8.2.12 Circuit Breakers (CB1 and CB2). The circuit breakers are contained within OQ-458/U. To remove and replace a circuit breaker, perform the following procedure.

This task covers:

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment

Equipment Conditions
OQ-458/U must be disconnected from TS-4398/U before removing and replacing a circuit breaker.

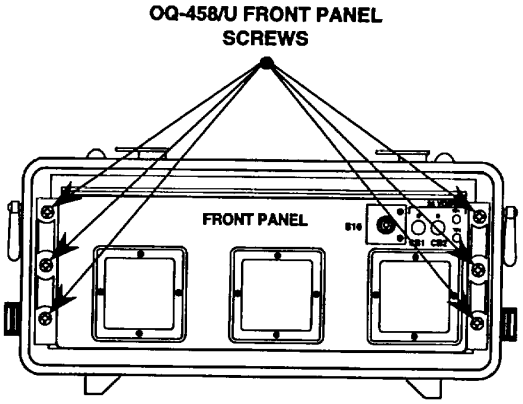
Materials
None

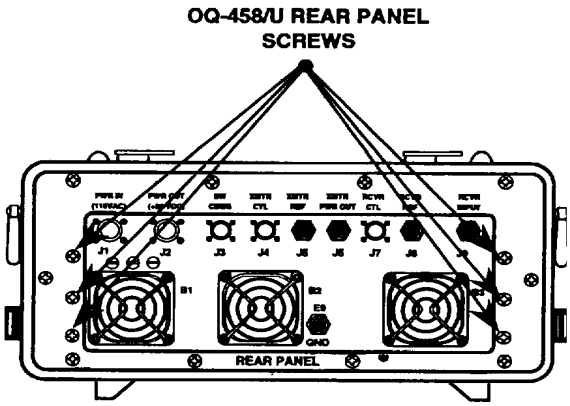
REMOVAL

1. Remove both OQ-458/U end covers.

2. Using a No. 2 Phillips screwdriver, remove the six front panel screws, flat washers, and lock washers.

3. Using a No. 2 Phillips screwdriver, remove the six rear panel screws, flat washers, and lock washers.

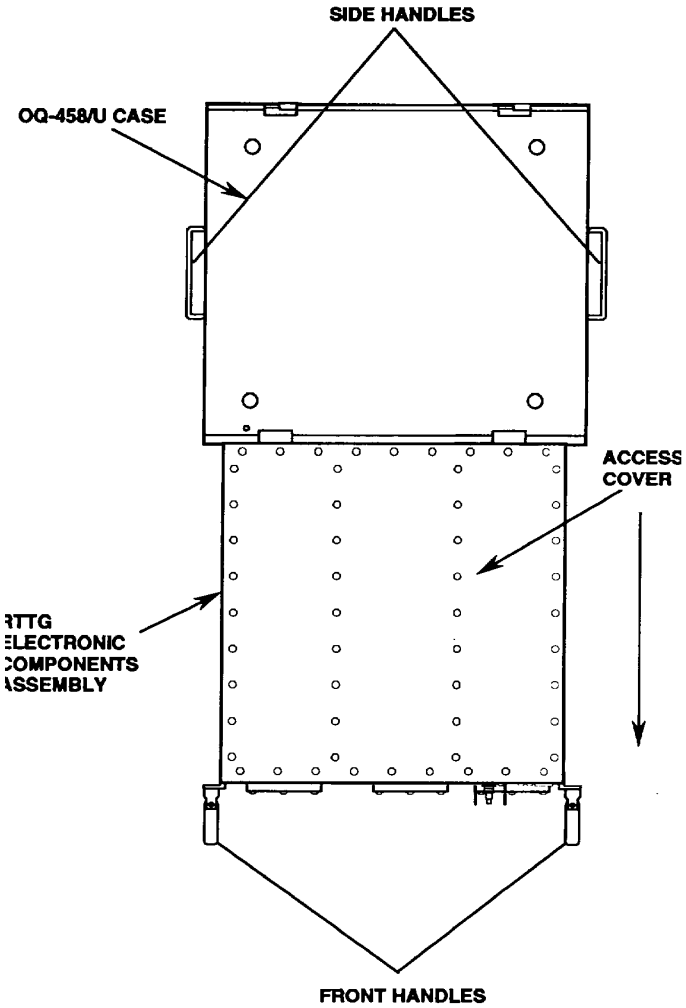




4. While holding the handle on the side of the case, pull firmly on the RTTG, electronic components assembly front handles and slide the assembly completely out of the case.

5. Using a No. 2 Phillips screwdriver, release the58 1/4-turn fasteners.

6. Remove the access cover.

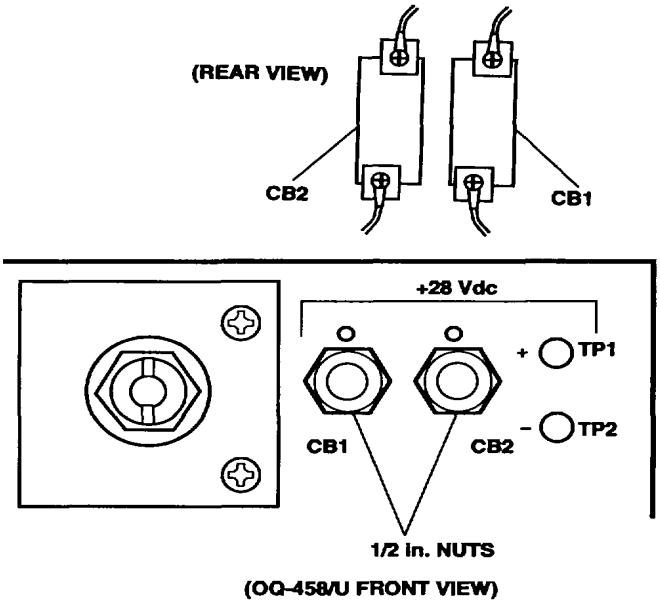


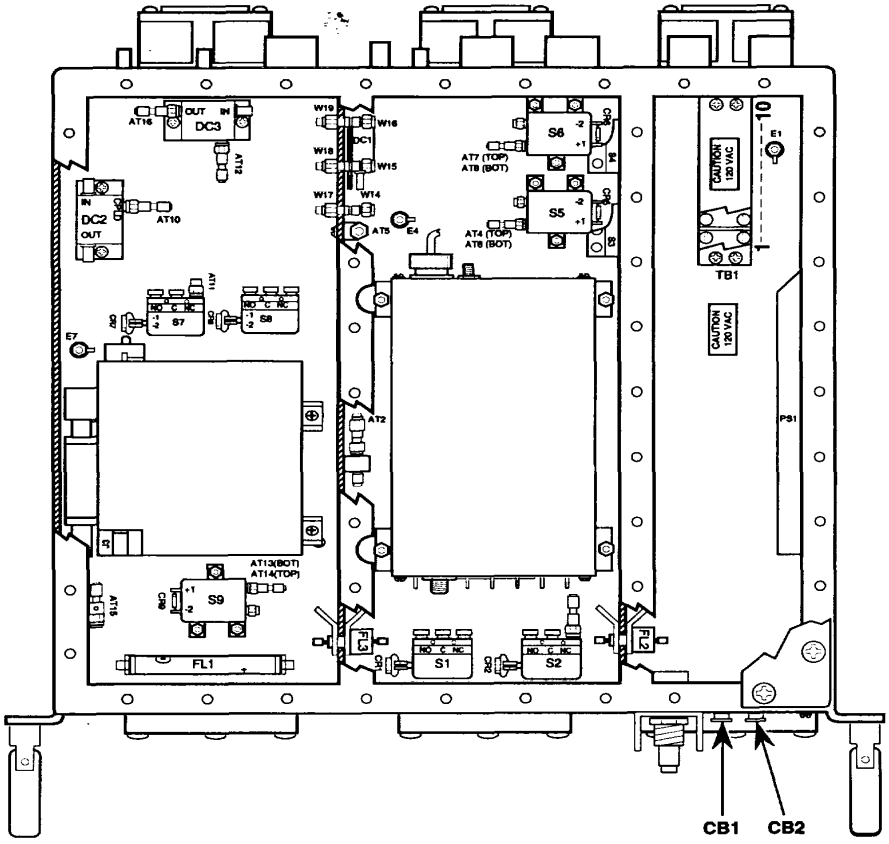
7. Locate the circuit breaker to be replaced.

8. Using a No. 2 Phillips screwdriver, remove the wires connected to the circuit breaker. Note all connections.

9. Using a 1/2 in. wrench, remove the nut that secures the circuit breaker to the S1i OQ-458/U front panel.

10. Remove the circuit breaker.



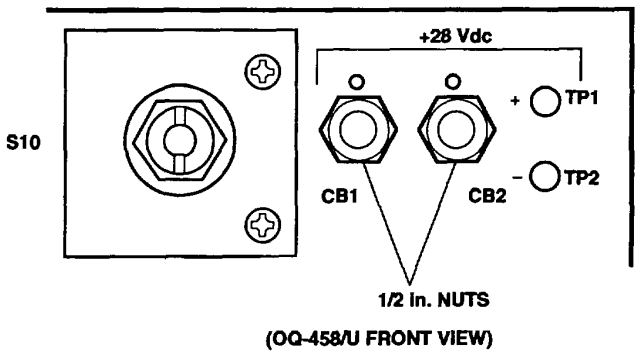


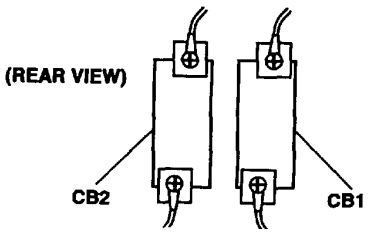
REPLACEMENT

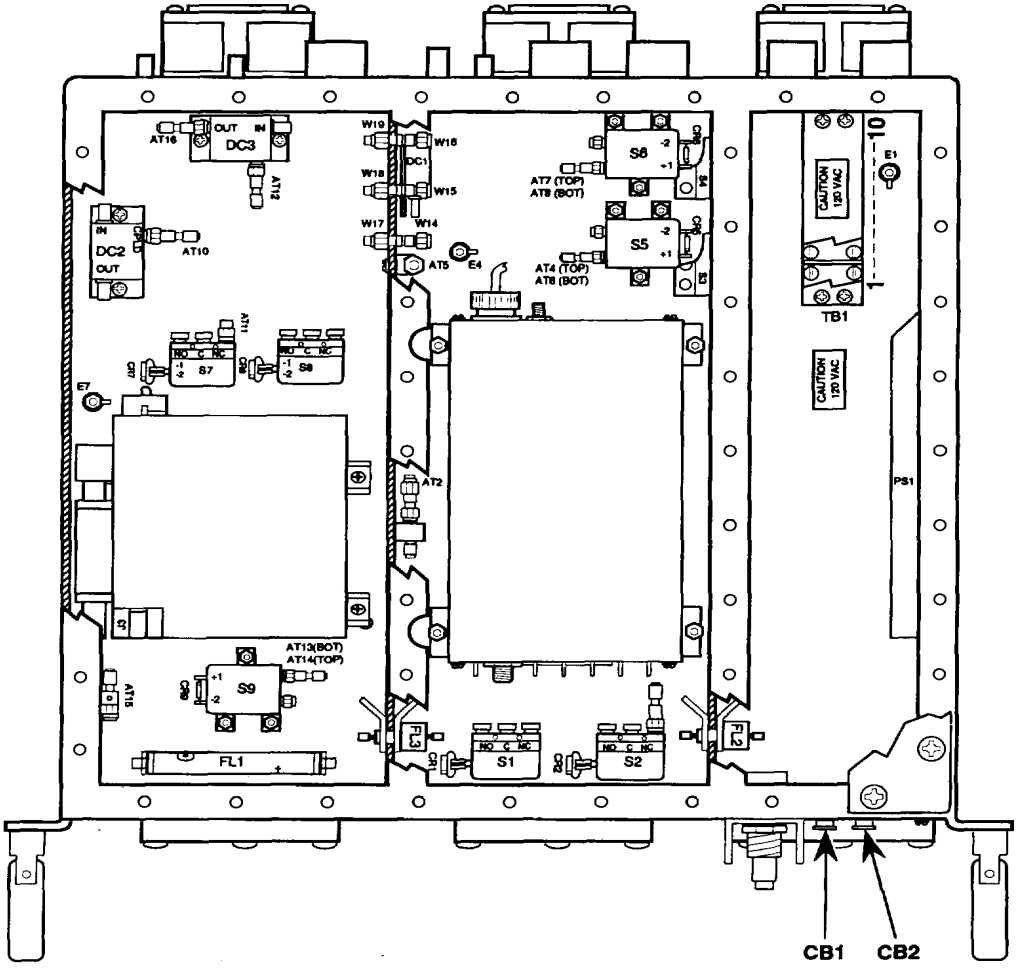
1. Position the replacement circuit breaker in place.

2. Using a 1/2 in. wrench, install the nut that secures the circuit breaker to the OQ-458/U front panel.

3. Using a No. 2 Phillips screwdriver, install and tighten the wires connected to the circuit breaker as previously noted.

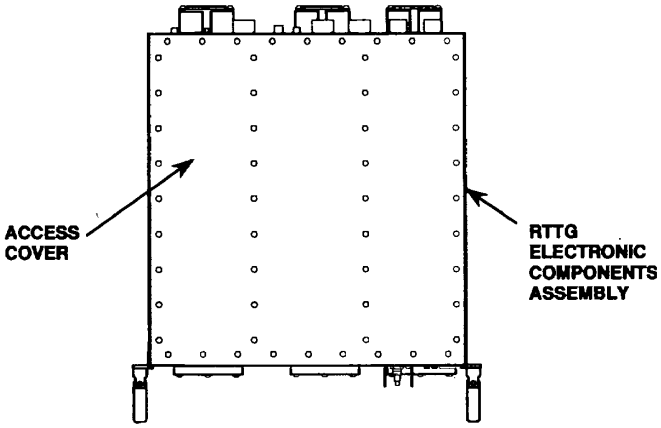






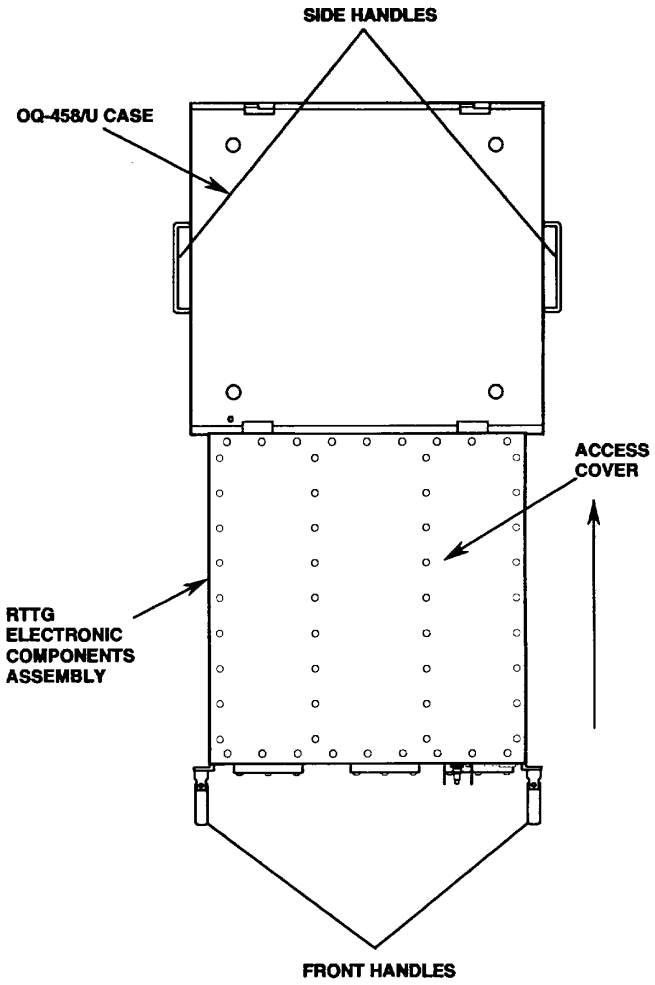
4. Place the access cover in position.

5. Using a No. 2 Phillips screwdriver, lock the 58 1/4-turn fasteners.

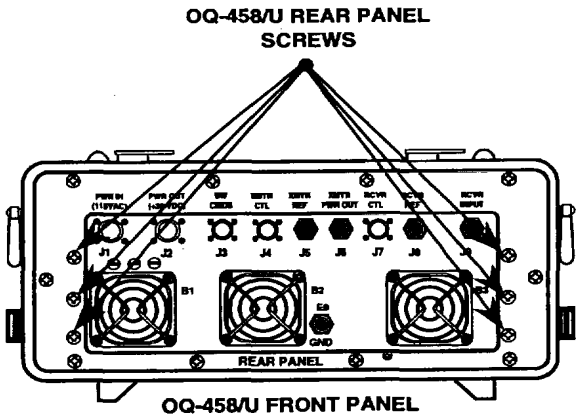


6. While holding the handles of the side of the case, insert the RTTG, electronic components assembly.

7. Slide the RTTG, electronic components assembly firmly into the case.

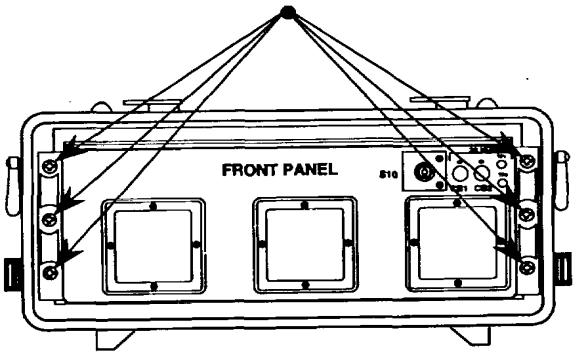


8. Using a No. 2 Phillips screwdriver, install the six rear panel screws, flat washers, and lock washers.



9. Using a No. 2 Phillips screwdriver, install the six front panel screws, flat washers, and lock washers.

10. Install both OQ-458/U end covers.



5-8.2.13 Radio Transmitter, T-1573(V)2/AR, Module and Cable Removal and Replacement. T-1573(V)2/AR has five field-replaceable modules and five field-replaceable cables. Use the following procedures to remove and replace a module or cable installed in T-1573(V)2/AR.

Radio Transmitter, T-1573(V)2/AR Modules

A1	Power Converter
A2	Interface Control
A3	Synthesizer VCO/PLL
A4	Bandpass Filter
A5	Power Amplifier

WARNING

Voltages capable of causing injury are used in this equipment. Do not contact the 300 Volt line with power applied to the equipment. Do not attempt to remove/replace any modules with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

CAUTION

To avoid damage to connectors, ensure pins are aligned when reconnecting.

Torque screws to their required torque levels. Failure to do so may cause damage to the electrical equipment.

Disconnect all test equipment from T-1573(V)2/AR prior to removing and replacing any module. Failure to do so may cause equipment damage.

When disconnecting cables W8, W9, W10, and W11, use two sets of needle nose pliers. Wiggle mating connectors to loosen before using needle nose.

When removing cables W1, W2, and W3, use an antistatic DIP remover to disconnect cables.

a. Removal b. Replacement

INITIAL SETUP

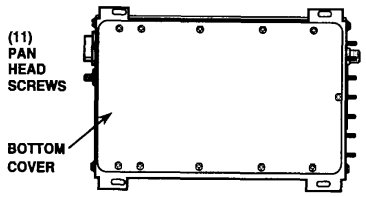
Tools and Special Tools
TK-105/G, Tool Kit, Electronic Equipment
No. 2 Phillips Torque Screwdriver
Antistatic DIP Remover

Equipment Conditions
T-1573(V)2/AR must be removed from the rack assembly before removing and replacing a module and/or cable assembly.

Materials
None

REMOVAL

1. Using a No. 1 Phillips Screwdriver, remove the 11 screws and flat washers along the edges of the bottom cover.



2. Using a No. 2 Phillips screwdriver, slightly loosen the four front panel screws and the four rear panel screws to free the bottom cover.

3. Remove the bottom cover.

NOTE

To remove a suspected malfunctioning cable, go to step 4. To remove a malfunctioning module, go t step 5.

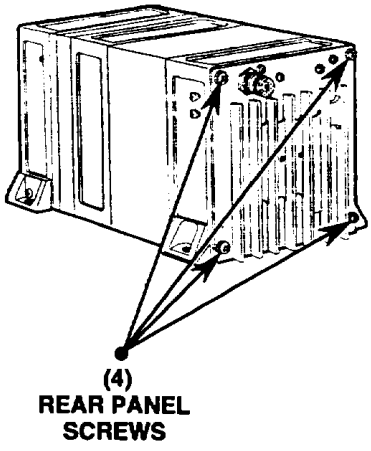
4. Refer to table 5-11 and see figure 5-67 to remove a suspected malfunctioning cable (go to the replacement procedure).

5. Refer to table 5-11 and see figure 5-67 to remove the cables.

CAUTION

When removing the four screws in the following step, ensure that the Al module individual components (A1A1, A1A2, A1A3) are not separated.

6. Using a No. 2 Phillips screwdriver, remove the four screws from the front of T-1573 (V) 2/AR.



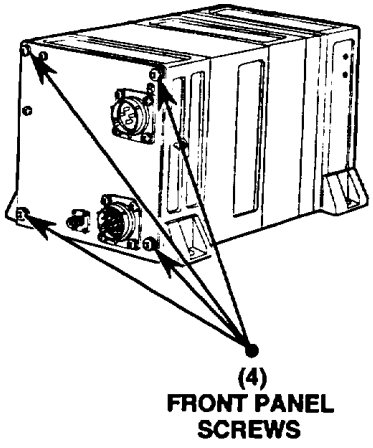


TABLE 5-11. T-1573 (V) 2/AR CABLE CONNECTIONS

	W1	W2	W5	W6	W7
A1J1	•				
A2J4	•				
A2J1			•		
A3A1J1		•			
A3A1J2	•				
A3A2J1		•			
A3A1J3			•		
A3AZJ2	•				
A3A2J3				•	
A4A1J1		•			
A4A1J2	•				
A4A2J1		•			
A4A2J2	•				
A4J5				•	
A4J6					•
A5J1					•
A5J13	•				

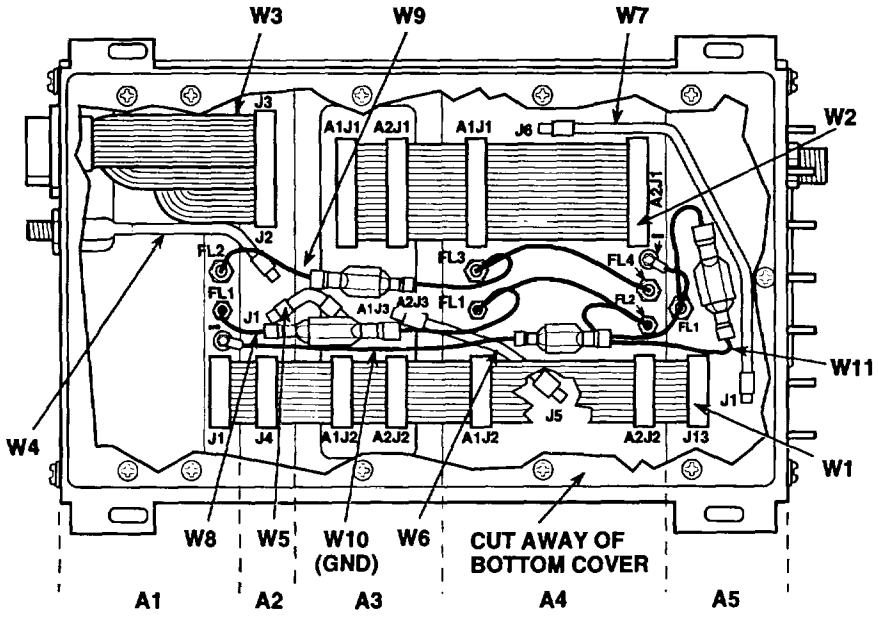
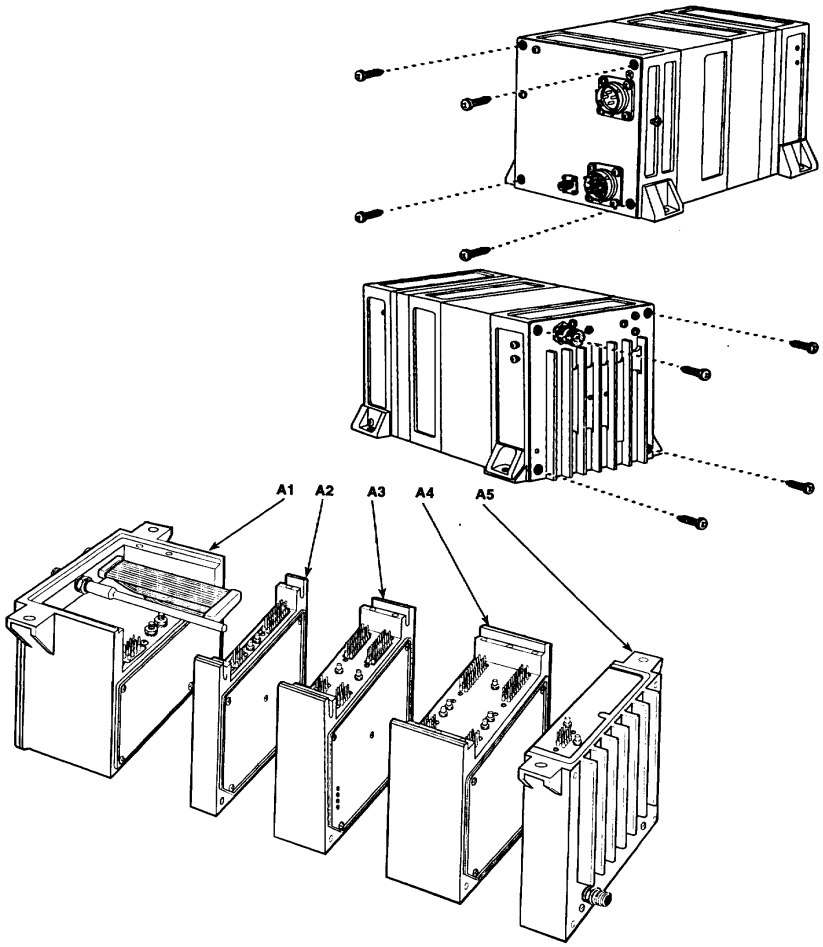


FIGURE 5-67. T-1573 (V) 2/AR BOTTOM VIEW WITH COVER REMOVED.

7. Using a No. 2 Phillips screwdriver, remove the four screws from the rear of T-1573 (v) 2/AR.

8. Separate the modules.

9. Remove the suspected malfunctioning module.



REPLACEMENT

NOTE

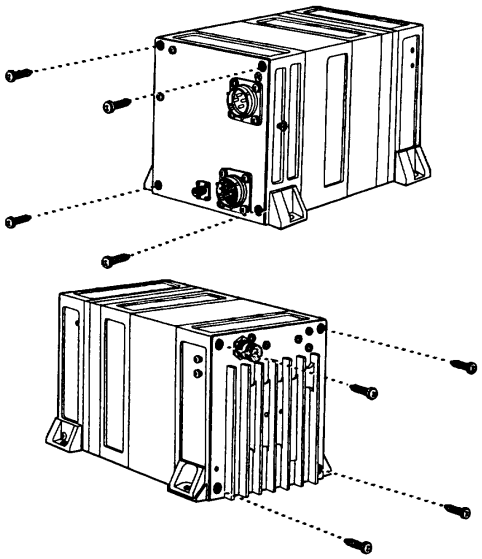
To replace a suspected malfunctioning cable, go to step 5.

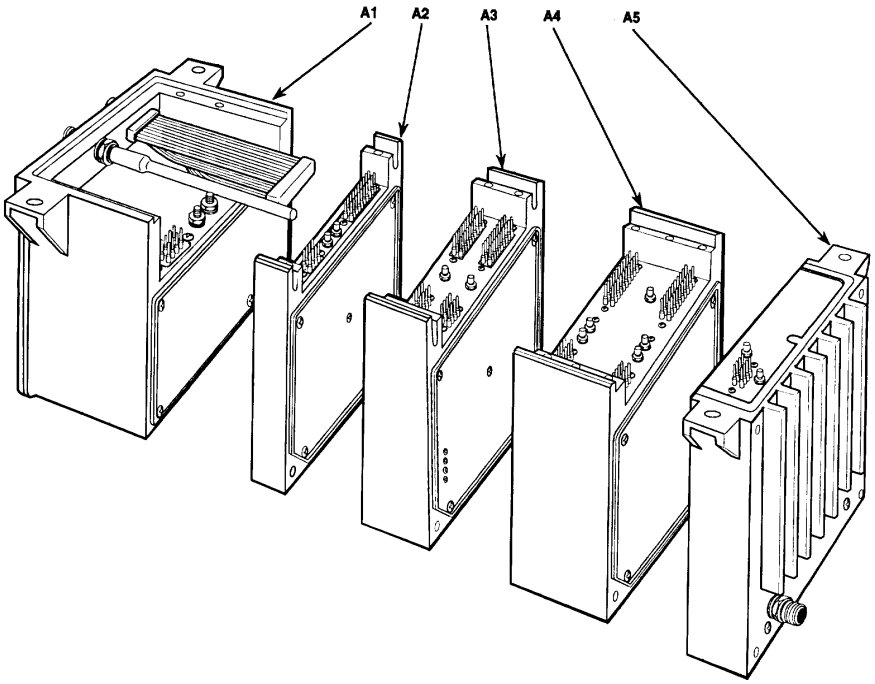
1. Install the replacement module securely in place.

2. Reassemble the modules.

3. Using a No. 2 Phillips screwdriver, replace but do not fully tighten the four screws in the front of T-1573 (V) 2/AR.

4. Using a No. 2 Phillips screwdriver, replace but do not fully tighten the four screws in the front of T-1573 (V) 2/AR.





5. Refer to table 5-12 and see figure 5-68 to replace the cable (s).

TABLE 5-12. T-1573 (V) 2/AR CABLE CONNECTIONS

	W1	W2	W5	W6	W7
A1J1	•				
A2J4	•				
A2J1			•		
A3A1J1		•			
A3A1J2	•				
A3A2J1		•			
A3A1J3			•		
A3AZJ2	•				
A3A2J3				•	
A4A1J1		•			
A4A1J2	•				
A4A2J1		•			
A4A2J2	•				
A4J5				•	
A4J6					•
A5J1					•
A5J13	•				

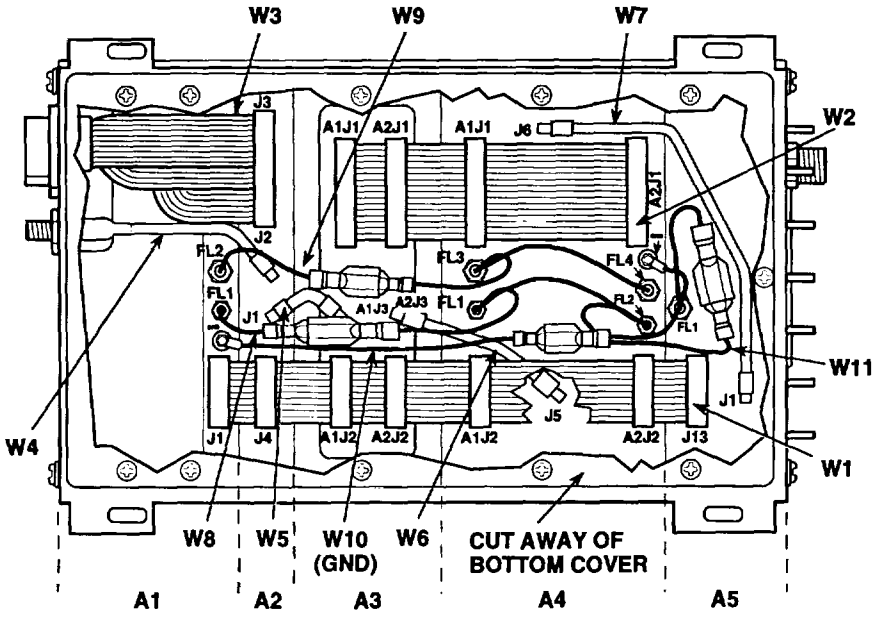
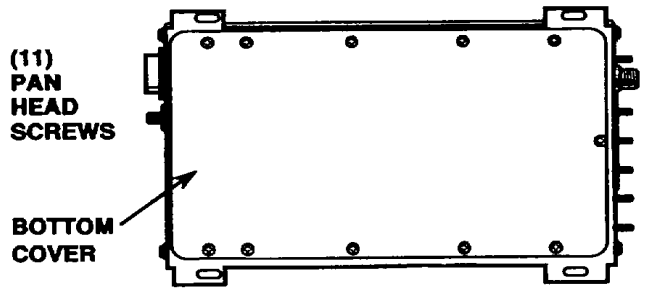


FIGURE 5-68. T-1573 (V) 2/AR BOTTOM VIEW WITH COVER REMOVED.

6. Replace the bottom cover by using a No. 1 Phillips screwdriver to install the 11 screws and flat washers along the edges of the bottom cover.

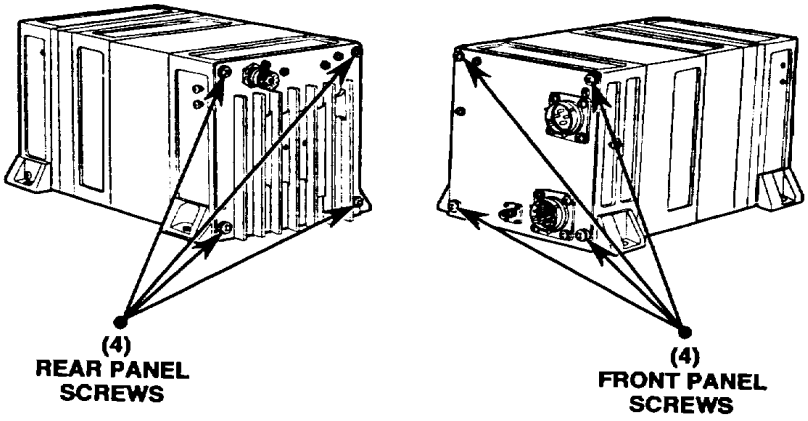
NOTE

Do not tighten the screws at this time.



7. Using a No. 2 Phillips torque screwdriver, tighten the four rear panel screws and the four front panel screws. Torque to 12 ± 2 in. lb.

8. Tighten the 11 screws that secure the bottom cover.



5-8.2.14 Radio Receiver, R-2500/AR, Module and Cable Removal and Replacement. R-2500/AR has six field-replaceable modules and five field-replaceable cables. Use the following procedures to remove and replace a module or cable installed in R-2500/AR.

WARNING

Voltages capable of causing injury are used in this equipment. Do not attempt to remove/replace any components with the equipment power cable connected.

CAUTION

This item contains parts and assemblies susceptible to damage by ESD. Use ESD precautionary procedures when touching, removing, or inserting parts and assemblies.

Disconnect all test equipment from R-2500/AR prior to removing and replacing any module. Failure to do so may cause equipment damage.

To avoid damage to connectors, ensure pins are aligned when reconnecting.

Torque screws to their required torque levels. Failure to do so may cause damage to the electrical equipment.

When removing cables W1 and W2, use an antistatic DIP remover to disconnect cables.

a. Removal

b. Replacement

INITIAL SETUP

Tools and Special Tools
TK-105/G, Tool Kit,
Electronic Equipment
Antistatic DIP Remover

Equipment Conditions
R-2500/AR must be removed from the rack assembly before removing and replacing a module and/or cable assembly.

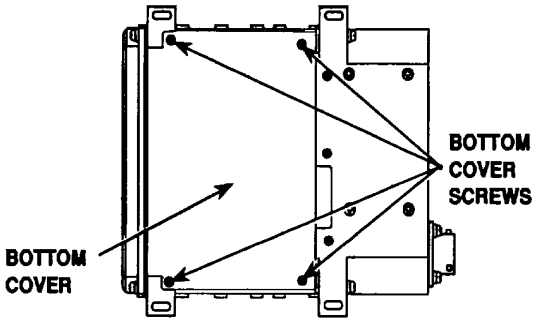
Materials
None

Radio Receiver, R-2500/AR Modules

A1	Power Supply
A2	Receiver Decoder
A3	Receiver First Synthesizer
A4	Receiver Second Synthesizer
A5	Receiver IF
A6	Receiver Preselector

REMOVAL

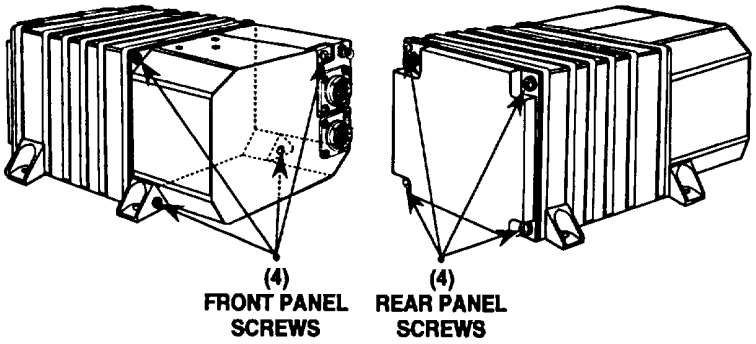
1. Using a No. 1 Phillips Screwdriver, remove the four short screws along the edges of the bottom cover.



2. Using a No. 2 Phillips screwdriver, slightly loosen the four front panel screws and the four rear panel screws to free the bottom cover.

3. Remove the bottom cover.

To remove a suspectea malfunctioning cable, go to step 4. To remove a malfunctioning module, go to step 5.



4. Refer to table 5-13 and see figure 5-69 to remove a suspected malfunctioning cable (go to the replacemen procedure).

5. Refer to table 5-13 and see figure 5-69 to remove the cables.

TABLE 5-13. R-2500/AR CABLE CONNECTIONS

	W1	W2	W7	W8	W9
A1A1J2	•				
A2J2	•				
A2J5		•			
A3JZ			•		
A4J1"		•		•	•
A4J3				•	
A5J1					
A5J2	•				
A6A1J1	•				
A6A2J1			•	•	
A6A3J1					
A6A3J2					•

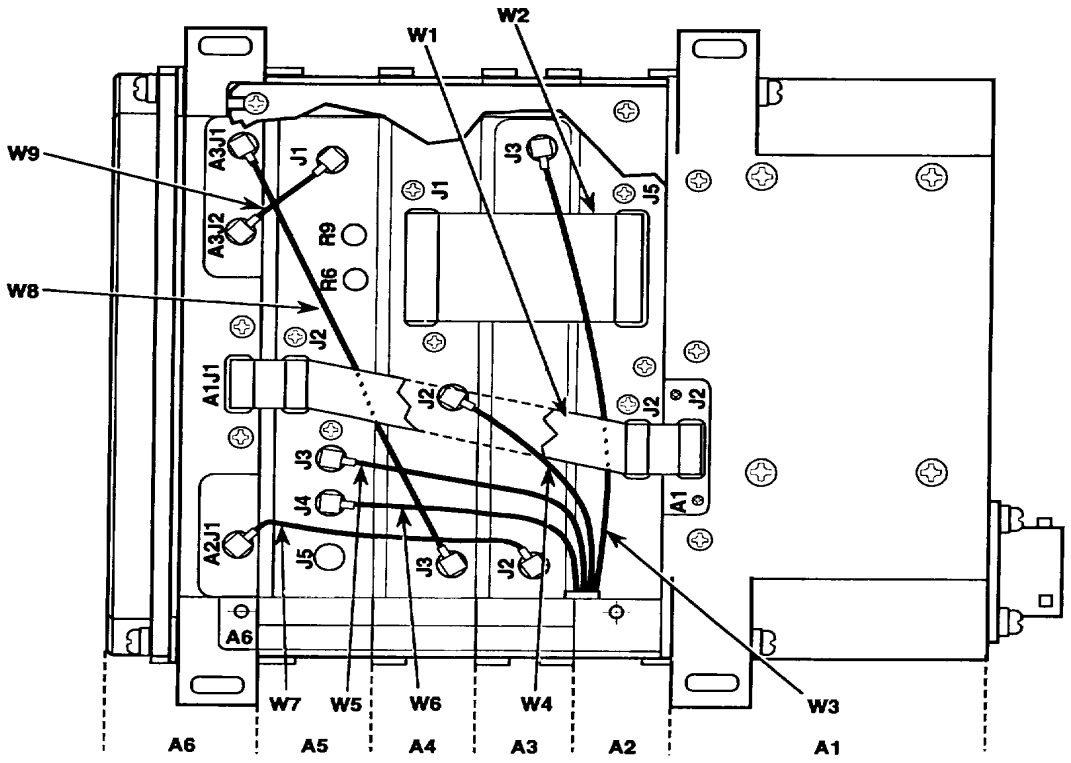
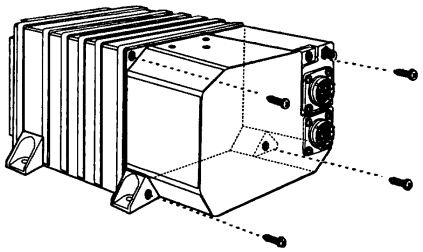
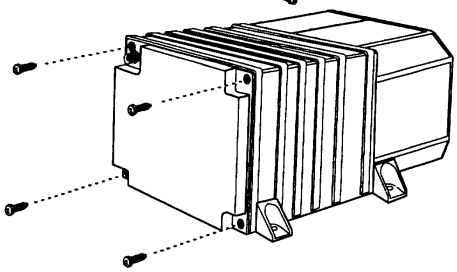


Figure 5-69. R-2500/AR BOTTOM VIEW WITH COVER REMOVED

6. Using a No. 2 Phillips screwdriver, remove the four screws from the front R-2500/AR

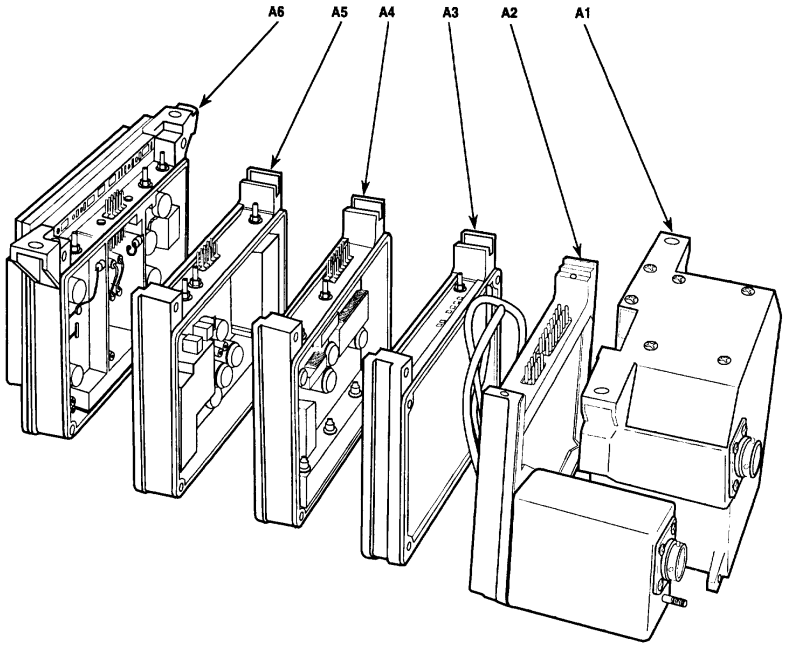


7. Using a No. 2 Phillips screwdriver, remove the four screws from the rear of R-2500/AR



8. Separate the modules.

9. Remove the suspected malfunctioning module



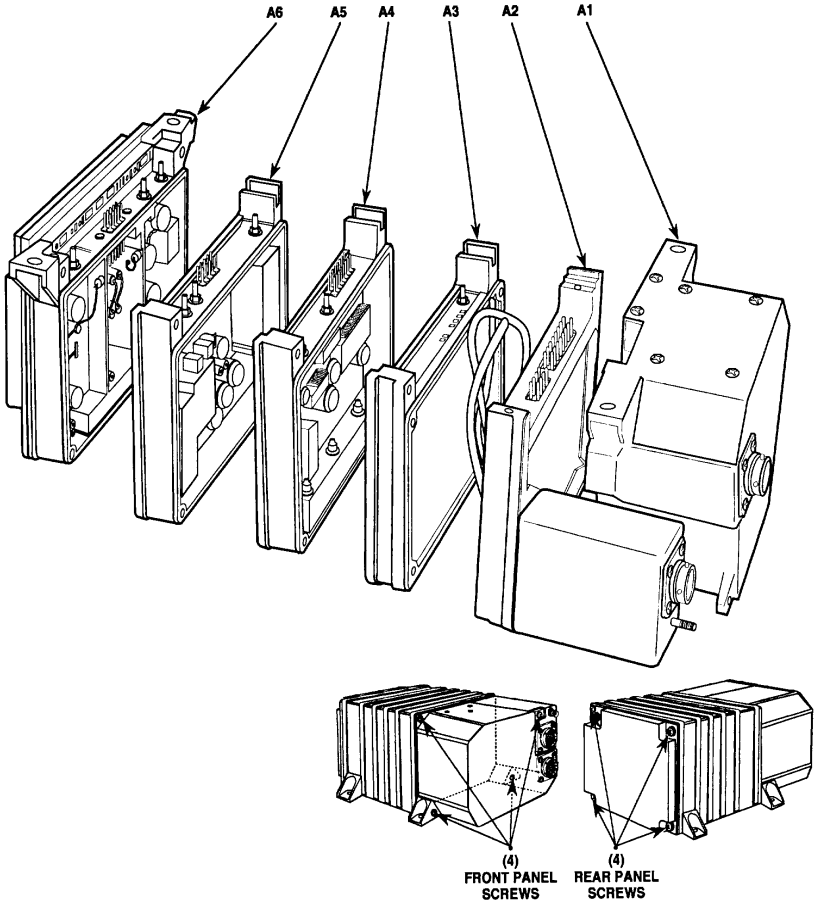
REPLACEMENT

NOTE

To replace a malfunctioning cable, go to step 5.

1. Install replacement module securely in place

2. Reassemble modules.



3. Using a No. 2 Phillips Screwdriver, replace but do not fully tighten the four screws in the front of R-2500/AR

4. Using a No. 2 Phillips screwdriver, replace but do not fully tighten the fiur screws in the rear of R-2500/AR.

5. Refer to table 5-14 and see figure 5-70 to replace the cable(s).

TABLE 5-14. R-2500/AR CABLE CONNECTIONS

	W 1	W 2	W 7	W 8	W 9
A1A1J2	•				
A2J2	•				
A2J5	•	•			
A3J2			•		
A4J1		•			
A5J1				•	
A5J2	•				•
A6A1J1	•				
A6A2J1					
A6A3J1			•		
A6A3J2				•	•

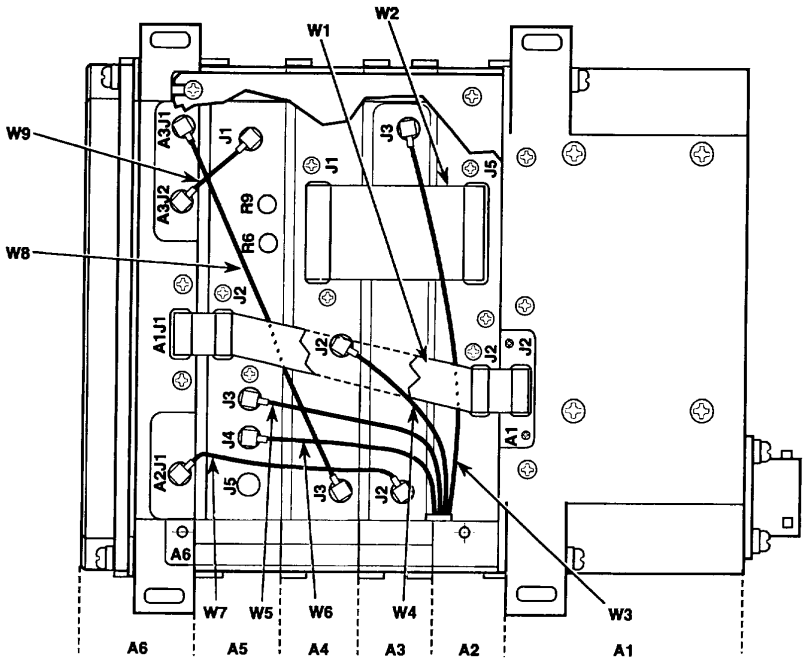
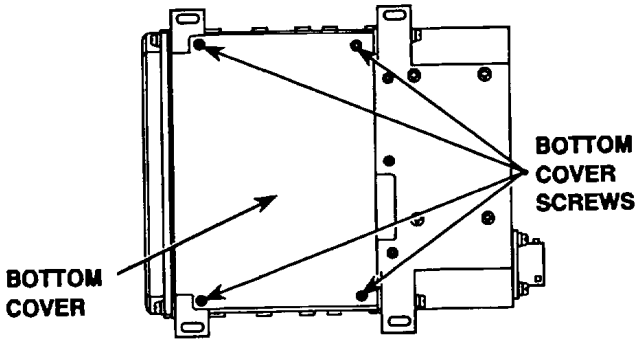


Figure 5-70. R-2500/AR BOTTOM VIEW WITH COVER REMOVED.

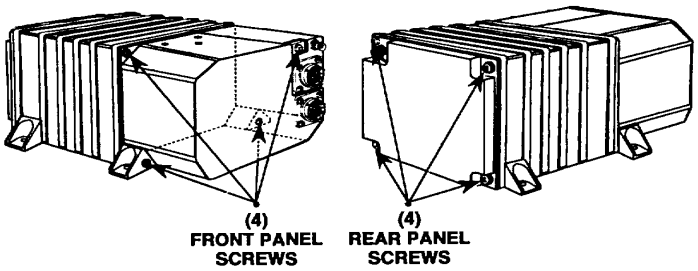
6. Replace the bottom cover by using a No. 1 Phillips screwdriver to install the four short screws along the edges of the bottom cover.

CAUTION

Ensure that the rear lip of the bottom cover is under the]rear cover.



7. Using a No. 2 Phillips torque screwdriver, tighten the four rear panel screws and the four front panel screws. Torque to 12 ± 2 in. lb



APPENDIX A
REFERENCES

A-1. Scope

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. Forms

Transportation Discrepancy Report (TDR) ..... SF 361
Report of Discrepancy (ROD) ..... SF 364
Product Quality Deficiency Report ..... SF 368

A-3. Field Manuals

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

A-4. Technical Manuals

General Shop Practice Manual ..... TO 00-25-234/TM 43-0158
Organizational and Direct Support Maintenance
Repair Parts and Special Tools Ust
(Including Depot Maintenance Repair Parts and
Special Tools) for Commanders' Tactical Terminal,
Radio Relay System AN/ARW-85(V)2
and AN/ARW85(V)3 ..... TM 11-5821-349-23P/31R2-ARW85(V)3-4

Operator's and Unit Maintenance Manual: Communications
Terminal, ANTFSC-125(V) ..... TM 11-5895-1490-12

Direct Support Maintenance Manual: Communications
Terminal, ANFTSC-125(V) ..... TM 11-5895-1490-30

Radio Relay Test Set Repair Parts and Special
Tools List TM 11 -6625-3254-23P/33D7-URM21 4-4

Procedures for Destruction of Electronics Materiel
to Prevent Enemy Use ..... TM 750-244-2

Operator's and Organizational Maintenance Manual for
Special Purpose Detecting System AN/U8D-9B ..... TM 11-5865-273-12

Operator's and Organizational Maintenance Manual for
Special Purpose Detecting System AN/U5D-9C ..... TM 11-5865-307-12

Operator's, Unit, Intermediate Direct Support, and General
Support Maintenance Manual for Digital Multimeter AN/GSM-64D
(NSN 6625-01-221-9367) ..... TM 11-6625-464143

Operator's, Organizational, Direct Support, and General
Support Maintenance Manual Including Repair Parts and
Special Tools List for Counter, Electronic, Digital Readout
AN/USM-459 (Hewlett-Packard Model 5328A/E42)
(NSN 6625-01-061-8928) ..... TM 11-6625-2941-14&P

Operators and Organizational Maintenance Manual
for Spectrum Analyzer AN/USM-489(V)1 (NSN 662501-079-9495)..... TM 11-66253136-12

Operator's, Organizational, Direct Support and General
Support Maintenance Manual for Modulation Meter,
ME-505AIU (MARCONI Instruments, Model 2305)
(NSN 6625-01-154-4844).....TM 1166253146-14

General Support Maintenance Manual for
Oscilloscope OS-291/G (TEKTRONIX Model 2430A)
(NSN 6625-01-258-0022) (TM 09045B-40/2) ..... TM 11-662524140

A-5. Miscellaneous Publications

Consolidated Index of Army Publications and Blank Forms .....DA Pam 230
The Army Maintenance Management System (TAMMS) .....DA Pam 738-750
Reporting of Item and Packaging Discrepancies (Page 1 - 2) ..... AR 73511-2
Reporting of Transportation Discrepancies in Shipments (Page 1 - 2)..... AR 5538
Electronic Equipment Tool Kit TK-105/G, NSN 5180-00610-177..... SC-5180-91-CL-R07

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION I - INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for Radio Relay Test Set, AN/URM-214.

It authorizes levels of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2 Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. *Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. *Test.* To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

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

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

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

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

h. *Replace.* The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart. *i. Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. *Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. *Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments /components.

B-3. Column Entries

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

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

c. *Column 3, Maintenance Functions*. Column 3 lists the functions to be performed on the item listed In column 2. When items are listed without maintenance functions, it is solely for the purposeof having the group numbers in the MAC and RPSTL coincide.

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

Unit	Intermediate	Depot
C - Operator/Crew	F - Direct Support	D - Depot
O - Organizational	H - General Support	

e. *Column 5, Tools and Equipment*. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. *Column 6, Remarks*. Column 6 contains an alphabetic code which leads to the remark in section IV. Remarks, which is pertinent to the item opposite the particular code.

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

a. *Tool or Test Equipment Reference Code*. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. *Maintenance Level*. The codes in this column indicate the maintenance level allocated the tool or test equipment.

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

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

e. *Tool Number*. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

B-5. Remarks (Section IV)

a. *Reference Code*. This code refers to the appropriate item in section II, column 6.

b. *Remarks*. This column provides the required explanatory information necessary to clarify items appearing in section III.

SECTION II - MAINTENANCE ALLOCATION CHART
FOR
RADIO RELAY TEST SET,AN/URM-214

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS & EQPT.	(6) REMARKS
0	TEST SET, RADIO RELAY AN/URM-214		0.0	0.1	0.0	0.0	0.0		A
		INSPECT	0.0	0.2	0.0	0.0	0.0		B
		TEST	0.0	0.0	0.2	0.0	0.0		B
		INSPECT	0.0	0.0	0.1	0.0	0.0		A
		REPAIR	0.0	0.9	0.0	0.0	0.0	1	C
		REPAIR	0.0	0.0	0.9	0.0	0.0	2	
01	CONTROLLER, TEST TS-4398/U A1	INSPECT	0.0	0.1	0.0	0.0	0.0		A
		INSPECT	0.0	0.0	0.1	0.0	0.0		
		TEST	0.0	0.0	0.2	0.0	0.0		D
		CALIBRATE	0.0	0.0	0.2	0.0	0.0	3,4	G
		TEST	0.0	0.2	0.0	0.0	0.0		D
		REPLACE	0.0	0.5	0.0	0.0	0.0	1	E
		REPLACE	0.0	0.0	0.5	0.0	0.0	2	E
		REPAIR	0.0	0.0	1.8	0.0	0.0	2	F
01AB	CCA, PROCESSOR A1A1	REPLACE	0.0	0.0	0.6	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
01A	CCCA, MASS STORAGE A1A3	REPLACE	0.0	0.0	0.6	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	0.8	5	E
01AD	CCA, SIG DATA XLTR A1A5	REPLACE	0.0	0.0	0.6	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	0.8	5	H
01AD0K	CCA, SIG DATA XLTR A1A5A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
01AE	CCA, IDL INTERFACE A1A7	REPLACE	0.0	0.0	0.6	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	0.8	5	H
01AF	CCA, RF A1A9	REPLACE	0.0	0.0	0.6	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	0.8	5	H
010J	DISPLAY UNIT A1A4	REPLACE	0.0	0.0	0.7	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	8.0	5	I
02	RCVR-XMTR TEST GP OQ-458/U A2	INSPECT	0.0	0.0	0.1	0.0	0.0		A
		TEST	0.0	0.0	0.5	0.0	0.0	6, 7, 8, 9	J, K
		REPAIR	0.0	0.0	1.1	0.0	0.0	2	L
0201AA	TRANSMITTER, RADIO T-1573(V)2 A2A1	INSPECT	0.0	0.0	0.1	0.0	0.0		M
		TEST	0.0	0.0	0.7	0.0	0.0	6,7,8,9,10, 11,12,13,14	
		REPLACE	0.0	0.0	0.1	0.0	0.0	2	E
		REPAIR	0.0	0.0	2.9	0.0	0.0	2	N
0201AA01	ELEC CMPNT ASSY POWER CONVERTER A2A1A1	REPLACE	0.0	0.0	1.5	0.0	0.0	2	E
		REPAIR	0.0	0.0	0.0	0.0	0.8	5	H
0201AA01 AAA	FILTER ASSY, ELEC A2A1A1A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
		REPAIR	0.0	0.0	0.0	0.0	8.0	5	H

SECTION II. MAINTENANCE ALLOCATION CHART FOR RADIO RELAY TEST SET, AN/URM-214 (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS & EQPT.	(6) REMARKS
0201AA01AAB	CCA, EMI FILTER A2A1A1A1A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AA01AA0	CCA,POWER STAGE A2A1A1A1A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AA01ADI	ELEC CMPN ASSY A2A1A1A2	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AA01ADJ	CCA, OUTPUT FILTER	REPAIR	0.0	0.0	0.0	0.0	0.8	5	H
0201AA01AEU	ELEC CMPNTASSY CONVERTER A2A1A1A3	REPAIR	0.0	0.0	0.0	0.0	0.8	5	H
0201AA01AEV	CCA, CONTROL BD A2A1A1A3	REPAIR	0.0	0.0	0.0	0.0	.0 8	5	H
0201AA02	ELEC CMPNT ASSY INTERFACE CONTROL A2A1A3A1	REPLACE REPAIR	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.8 8.0	2 5	H
0201AA02AAA	CCA, INTFC CONTROL	REPAIR	0.0	0.0	0.0	0.	8.0	5	H
0201AA03	ELEC CMPNT ASSY SYNTHESIZER, VCOIPLL A2A1A3	REPLACE REPAIR	0.0 0.0	0.0 0.0	1.5 0.0	0.0 0.0	8.0 8.0	2 5	E
0201AA03AAA	CCA, PHASE DETECTO A2A1A3	RREPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AA03ADA	CCA, VCO A2A1A3A1	REPAIR	0.0	0.0	0. 0.	0.0	8.0	5	H
0201AA04	ELEC CMPNT ASSY BANDPASS, FILTER A2A1A3A1	REPLACE REPAIR	0.0 0.0	0.0 1 0.0	0.0 0.0	0.0 0.0	8.0 8.0	2	E
0201AA04AAA	CCA, DRIVER A2A1A4A1, A2A1A4A2	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AA04ABW	CCA TUNING BD, FLTR A2A1A4A3, A2A1A4A4	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AA05	ELEC CMPNT ASSY POWER AMPLIFIER A2A1A5	REPLACE REPAIR	0.0 0.0	0.0 0.0	1.5 0.0	0.0 0.0	8.0 8.0	1 5	E
0201AB	RECEIVER, RADIO R-2500/AR A2A2	INSPECT TEST REPLACE	0.0 0.0 0.0	0.0 0.0 0.0	0.1 1.0 0.1	0.0 0.0 0.0	8.0 0.0 0.0	 2,4,6,7,8,15,16 2	0 E
0201AA05	ELEC CMPNT ASSY POWER AMPLIFIER A2A1A5	REPAIR	0.0	0.0	4.1	0.0	0.0	2	0
0201AB01	ELEC CMPNT ASSY POWER SUPPLY	REPLACE REPAIR	0.0 0.0	0.0 0.0	2.1 0.0	0.0 0.0	0.0 8.0	2	E
0201AB02	ELEC CMPNT ASSY DECODER, RCVR A2A2A2	REPLACE REPAIR	0.0 0.0	0.0 0.0	2.1 0.0	0.0 0.0	0.0 8.0	2 5	E H

SECTION II. MAINTENANCE ALLOCATION CHART FOR RADIO RELAY TEST SET, AN/URM-214 (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS & EQPT.	(6) REMARKS
0201AB02AAA	CCA, DECODER A2A2A2A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB02EA	ELEC CMPNT ASSY CONNECTOR, RCVR A2A2A2A7	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
00201B03	ELEC CMPNT ASSY 1ST SYNTHESIZER, RCVR	REPLACE REPAIR	0.0 0.0	0.0 0.0	2.1 0.0	0.0 0.0	0.0 8.0	2 5	E H
0201AB03AAA	CCA, 1ST SYNTH A2A2A3A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB03ADA	OSCILLATOR, NONCRYSTAL A2A2A3A1U3	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB03ADB	CCA, VCO, 1ST SYNTH A2A2A3A1U3A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB04	ELEC CMPNT ASSY 2ND SYNTHESIZER, RCVR	REPLACE REPAIR	0.0 0.0	0.0 0.0	2.1 0.0	0.0 0.0	0.0 8.0	2 5	E H
0201AB04AEA	OSCILLATOR, NONCRYSTAL A2A2A4A1U10	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB04AEB	CCA, VCO, RCVR A2A2A4A1U10A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB05	ELEC CMPNT ASSY IF RCVR A2A2A5	REPLACE REPAIR	0.0 0.0	0.0 0.0	2.1 0.0	0.0 0.0	0.0 8.0	2 5	E H
0201AB05AAA	CCA, IF, RCVR, NN A2A2A5A1	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB06	ELEC CMPT ASSY DECODER, RVCR A2A2A6	REPLACE REPAIR	0.0 0.0	0.0 0.0	2.1 0.0	0.0 0.0	0.0 8.0	2 5	E H
0201AB06AA	CCA,RCVCR,CONV, INFC A2A2A6A2	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB06AAR	CCA, 1ST,CONV,RCVR A2A2A6A3	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB06AB0	CCA,FLTR,AMP,RCVR A2A2A6A4	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB06ACL	CCA,RCVRINPUT FLTR A2A2A6A5	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H
0201AB06ADB	CCA,RCVR OUTPUT FLTR A2A2A6A6	REPAIR	0.0	0.0	0.0	0.0	8.0	5	H

SECTION II. MAINTENANCE ALLOCATION CHART
FOR
RADIO RELAY TEST SET, AN/URM-214 (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS & EQPT.	(6) REMARKS
03	CASE, CABLE ASSY	INSPECT	0.0	0.1	0.0	0.0	0.0		N
	CY-8676/U	INSPECT	0.0	0.0	0.1	0.0	0.0		N
	A3	REPAIR	0.0	0.5	0.0	0.0	0.0		P
		REPAIR	0.0	0.0	0.5	0.0	0.0		P
0301	CABLE ASSY, PWR, ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W1	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
0302	CABLE ASSY, SP, ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W2	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0303	CABLE ASSY, RF	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A2W3	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0304	CABLE ASSY, SP	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W5	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0305	CABLE ASSY, PWR, ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W5	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0306	CABLE ASSY, SP, ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W6	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0307	CABLE ASSY, SP, ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0308	CABLE ASSY, SP, ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W8	TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	

SECTION II. MAINTENANCE ALLOCATION CHART FOR RADIO RELAY TEST SET, AN/URM-214 (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS & EQPT.	(6) REMARKS
0309	CABLE ASSY, RF A3W9	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.0	0.0	0.0	0.0		E
		REPLACE	0.0	-0.0	0.3	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0310	CABLE ASSY RF A3W10	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0..3	0.0	0.0		E
		REPAIR	0.0	0.0	0.1	0.0	0.0	2	
0311	CABLE ASSY, RF A3W11	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0312	CABLE ASSY,PWR, ELEC A312	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0313	CABLE ASSY, SP, ELEC A3W13	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1`	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0314	CABLE ASSY,SP ELEC A3W14	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0315	CABLE ASSY,POWER A3W15	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1`	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0316	CABLE ASSY,SP,ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0317	CABLE ASSY,RF,TEST	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.0	0.1	0.0	0.0	7	Q
		REPLACE	0.0	0.1	0.0	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	

SECTION II. MAINTENANCE ALLOCATION CHART FOR RADIO RELAY TEST SET, AN/URM-214 (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS & EQPT.	(6) REMARKS
03018	CABLE ASSY,SP,ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W18	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0319	CABLE ASSY,ELEC	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W19	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0320	CABLE ASSY, RF	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
	A3W20	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	
0333	CABLE ASSY,SP TRANA	TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		TEST	0.0	0.1	0.0	0.0	0.0	7	Q
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPLACE	0.0	0.0	0.1	0.0	0.0		E
		REPAIR	0.0	0.0	0.3	0.0	0.0	2	

SECTION III - TOOL AND TEST EQUIPMENT REQUIREMENTS FOR RADIO RELAY TEST SET, AN/URM-214

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
0001	0	TOOL KIT, ELEC EQUIP	5180-00-064-5178	TK-101/G
0002	F	TOOL KIT, ELEC EQUIP	5180-00-6108170	TK-105/G
0003	F	CESIUM BEAM FREQUENCY STANDARD	6625-01-260-6886	HP5061B
0004	F	ANALYZER, FREQUENCY DEVIATION	6625-01-2965044	HP5371A
0005'	D	DEPOT MAINTENANCE PLANT EQUIPMENT		
0006	F	MULTIMETER	6625-01-221-9367	AN/GSM-64D
0007	O, F	TEST SET, RADIO RELAY		ANNRM-214
0008	F	ANALYZER, SPECTRUM	6625-01-079-9495	ANUSM-489(V)1
0009	F	ATTENUATOR, FIXED		527 40DB
0010	F	GENERATOR, PULSE	6625-01-144-9293	HP811 A
0011	F	MODULATOR, RADIO TRANSMITTER	6625-01-154-4844	*ME-505A/*
0012	F	OSCILLOSCOPE	6625-01-258-0022	OS-2911G
0013	F	DIVIDER, POWER, RADIO, FREQUENCY	5985-01-217-0169	ZSC-2-1
0014	F	DUMMY LOAD		3202-6100-00
0015	F	COUNTER, FREQUENCY DIGITAL READOUT	6625-01-271-3012	AN/USM-459A
0016	F	GENERATOR, SIGNAL	6625-01-2334615	SG1207A)

*NOTE: Depot tools and Test Equipment Requirements will not be listed separately In this document.

SECTION IV - REMARKS

REFERENCE CODE	REMARKS
A	Inspect for visible signs of damage.
B	A failed Radio Relay Test Set uses self test to Identify the failed unit.
C	Repair of Radio Relay Test Set 'O' level is limited to replacement of the Test Controller, Receiver Transmitter Test Group or individual cables from the Cable Case.
D	The test controller utilizes self test for both performance check and fault isolation.
E	Replace item to repair next higher assembly.
F	Repair of the Test Controller includes replacing repairable assemblies and throw away cable assemblies A1W3, A1W40, AIWI, A1W2, the oscillator 010G, power supply PS1, power supply PS2, power supply PS3, LEDs DS1-DS6, LED DS8, circuit breaker CB1 and CB pushbutton switch S1, elapsed time meter M1, keypad, fan B1, fan B2, RF power divide protection FL1, and switch S2.
G	The crystal oscillator A1A2 requires calibration every180 days. This calibration will be performed by DS field personnel.
H	Repair by piece part replacement.
I	Vendor Repairable Item. Return to depot for processing.
J	The test of the Receiver Transmitter Test Group utilizes a combination of the use of the Radio Relay Test Set self test capability and TMDE.
K	At DS level the Radio Relay Test Set uses BIT to fault Isolate to the failed unit or subassembly. The failed unit or subassembly is then replaced to make the Radio Relay Test Set operational. That operational test set Is then used to fault Isolate the removed failed unit or subassembly to
L	Repair of the Receiver Transmitter Test Group includes replacing repairable assemblies and throw away cable assemblies A2W1 thru A2W33; circuit breakers A2CB1 and A2CB2 switches A2S1 thru A2S10; directional couplers A2DC1, A2DC2, A2DC3; attenuators A2AT1 thru A2AT10, and A2AT12 thru A2AT16; Dummy Load A2AT11; bandpass filter A2FL1, power supply A2PS1; semiconductor A2CRI thru A2CR9, ; fans A2B1, A2B2 A2B3; air filter elements P/N 573031- 20303-57 and 06325-C; RF filters A2FL2 and A2FL3; connector adapters A2J10, A2J11, A2J12 and P/N KA-99-114-M06.
M	Inspect for visible signs of loose connections or damage.
N	Repair of the Radio Transmitter includes repladng repairable assemblies and throw away cable assemblies A2A1 W, A2A1W2, A2AlW5, A2A1W6, or A2A1W7.
O	Repair of the Radio Receiver includes replacing repairable assemblies and throw away cable assemblies A2A2WI, A2A2W2, A2A2W7, A2A2W8, or A2A2W9.
P	The repair of the Cable Case consists of replacing failed cables or Throwaway Extender Cards A3113515-001 and A3113524-001.
Q	Test of the cables included in the Cable Case is performed using the self test capability of the Radio Relay Test Set.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I - INTRODUCTION

C-1. Scope

This appendix lists components of end item and basic issue items for Radio Relay Test Set (RRTS), AN/URM-214, to help inventory items required for safe and efficient operation.

C-2. General

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

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

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

C-3. Explanation of Columns

An explanation of columns in the tabular listing is as follows:

a. *Column (1). National Stock Number.* Indicates the national stock number assigned to the item and will be used for requisitioning purposes.

b. *Column (2). Description.* Indicates the national item name. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) followed by the part number. If required, a minimum description is included to locate the item.

c. Column (3). Unit of Measure. Indicates the measure used in performing the actual operationav maintenance function. This measure is expressed by a two-character alphabetical abbreviation.

d. *Column (4). Quantity Required.* Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II - COMPONENTS OF END ITEM

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION CAGEC & PART NUMBER USABLE ON CODE U/I RECM	(3)	(4) QTY
XXXX-XX-XXX-XXXX	Test Controller, TS-4398/U 04071 A3113378-001	EA	1
XXXX-XX-XXX-XXXX	Receiver-transmitter Test Group (RTTG) OQ-458/U 04071 A3113463-001	EA	1
XXXX-XX-XXX-XXXX	Cable Assembly Case, CY-8676/U 04071 A3113475-001	EA	1
XXXX-XX-XXX-XXXX	Prime Electrical Power Cable Assembly (Wl), 04071 3113478-001	EA	1
XXXX-XX-XXX-XXXX	Branched Electrical Special Purpose Cable Assembly (W2), 04071 3113479-001	EA	1
XXXX-XX-XXX-XXXX	Branched Radio Frequency Cable Assembly (W3), 04071 3113481-001	EA	1
XXXX-XX-XXX-XXXX	Electrical Special Purpose Cable Assembly (W4), 04071 3113482-001	EA	1
XXXX-XX-XXX-XXXX	Electrical Power Cable Assembly (W5), 04071 3113483-001	EA	1
XXXX-XX-XXX-XXXX	Branched Electrical Special Purpose Cable Assembly (W6), 04071 3113417-001	EA	1
XXXX-XX-XXX-XXXX	Electrical Special Purpose Cable Assembly (W7), 04071 3113425001	EA	1

SECTION II. COMPONENTS OF END ITEM (Continued)

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION CAGEC & PART NUMBER USABLE ON CODE	(3) U/I	(4) QTY RECM
XXXX-XX-XXX-XXXX	Branched Radio Frequency Cable Assembly (W9), 04071 3113433-001	EA	1
XXXX-XX-XXX-XXXX	Radio Frequency Cable Assembly (W10), 04071 3113435-001	EA	1
XXXX-XX-XXX-XXXX	Radio Frequency Cable Assembly (Wl11), 04071 3113436-001	EA	1
XXXX-XX-XXX-XXXX	Electrical Power Cable Assembly (W12), 04071 3113444-001	EA	1
XXXX-XX-XXX-XXXX	Branched Electrical Special Purpose Cable Assembly (W13), 04071 3113517-001	EA	1
XXXX-XX-XXX-XXXX	Electrical Special Purpose Cable Assembly (W14), 04071 3113516-001	EA	1
XXXX-XX-XXX-XXXX	Test Electrical Power Cable Assembly (Wi15), 04071 3113452-001	EA	1
XXXX-XX-XXX-XXXX	Test Branched Electrical Special Purpose Cable Assembly (W16), 04071 3113576-001	EA	1
XXXX-XX-XXX-XXXX	Test Radio Frequency Cable Assembly (W17), 04071 3113566-001	EA	1
XXXX-XX-XXX-XXXX	Test Branched Electrical Special Purpose Cable Assembly (W18), 04071 3113575-001	EA	1

SECTION II. COMPONENTS OF END ITEM (Continued)

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION CAGEC & PART NUMBER USABLE ON CODE	(3) U/I	(4) QTY RECM
XXXX-XX-XXX-XXXX	Radio Frequency Cable Assembly (W20), 04071 3113141-001	EA	1
XXXX-XX-XXX-XXXX	Electronic Test Extender Card, 04071 3113515-001	EA	1
XXXX-XX-XXX-XXXX	SDT Extender Card Circuit Card Assembly, 04071 3113524-001	EA	1

SECTION III - BASIC ISSUE ITEMS

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM AND PART NO.	(3) UM	(4) QTY
	Operator's, Unit, and Director Support Maintenance Manual: Radio Relay Test Set, AN/URM-214 TM 11-6625-3254-13	EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

SECTION I. INTRODUCTION

D-1. Scope

This appendix lists additional items authorized for the support of Radio Relay Test Set (RRTS), AN/URM-214.

D-2. General

This list identifies items that do not have to accompany the RRTS, and that do not have to be turned in with it. These items are all authorized by CTA, MTOE, TDA, or JTA.

D-3. Explanation of Listing

National VNATO stock numbers, descriptions, units of measure, and quantities are provided to help identify and request the additional items required to support this equipment. The items are listed in alphabetical sequence by item name under the type document (CTA, MTOE, TDA, or JTA) that authorizes the item.

SECTION II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION FSCM AND PART NO.	(3) UM	(4) QTY REQD
NA			

APPENDIX E
EXPENDABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

E-1. Scope

This appendix lists expendable supplies and materials needed to operate and maintain Radio Relay Test Set, AN/URM-214. These items are authorized by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. Explanation of Columns

a. *Column 1. Level.* This column identifies the lowest level of maintenance that requires the listed item.
- C - Operator/Crew
- O - Organizational Maintenance
- F - Direct Support Maintenance
- H - General Support Maintenance

b. *Column 2. National/NATO Stock Number.* This is the National/NATO stock number assigned to the item. Use it to request or requisition the item.

c. *Column 3. Description.* This column indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

d. *Column 4. Unit of Measure (U/M).* This column indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (for example, ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) LEVEL	(2) NATIONAL/NATO STOCK NUMBER	(3) DESCRIPTION	(4) U/M
F	8030004081-2333	Locking Compound	EA
F		Solder	EA
F		Tie Straps	EA
F		Heat Shrink (Tubing)	FT
F		Threadlocking Adhesive	OZ
		1S22 AWGWire	FT
		Silicone Compound Sealant	OZ

GLOSSARY

Section I. ABBREVIATIONS

AJ	Anti-Jam
ASCII	American Standard Code for Information Interchange
BIT	Built-in-Test
BITE	Built-in-Test Equipment
C	Celsius
CB	Circuit Breaker
CCA	Circuit Card Assembly
CNTL	Control
COMSEC	Communications Security
CPL	Couple
CTT	Commanders' Tactical Terminal
DAC	Digital-to-Analog Converter
dB	Decibel
dBc	Decibels from Carrier
DF	Direction Finding
DIP	Dual In-Line Package
EMI	Electromagnetic Interface
ESD	Electrostatic Discharge
ESDS	Electrostatic Discharge Sensitive
FM	Frequency Modulation
FREQ	Frequency
FSK	Frequency Shift Key
ft	Feet
GND	Ground
GPF	Ground Processing Facility
Hz	Hertz
ICG	Interference Cancellation Group
IDL	Interoperable Data Link
IF	Intermediate Frequency
in.	Inches
I/O	Input/Output
IPF	Integrated Processing Facility
J	Jack
Kbps	Kilobits Per Second
kHz	Kilohertz
LED	Light Emitting Diode
LO	Local Oscillator
LRU	Line Replaceable Unit
LSB	Least Significant Bit
mHz	Millihertz
MHz	Megahertz
MMI	Man/Machine Interface
MSB	Most Significant Bit
Msg	Message
P	Plug
PLL	Phase-Locked-Loop
PME	Prime Mission Equipment
PROM	Programmable Read Only Memory
PWR	Power
RAM	Random Access Memory
RCVR	Receiver
REF	Reference
RF	Radio Frequency
RFD	Radio Frequency Distributor
RRS	Radio Relay System
RRTS	Radio Relay Test Set
RTTG	Receiver-Transmitter Test Group
RX	Receive
S	Switch
SDT	Signal Data Translator
SIM	Simulated
TDMA	Time-Division Multiple Access
TFDF	Triangulum Fast Direction Finding
TP	Test Point
TX	Transmit
UHF	Ultra High Frequency
VCO	Voltage Controlled Oscillator
VSWR	Voltage Standing Wave Ratio
XMIT	Transmit
XMTR	Transmitter
W	Cable

Section II. DEFINITION OF UNUSUAL TERMS

Term	Definition
Automatic Frequency Control (AFC)	A circuit that holds a radio receiver on the frequency of the station to which it is tuned.
Channel Spacing	The frequency increment between the assigned frequency of two adjacent radio frequency channels.
Frequency Shift Keying (FSK)	A method of transmitting the elements of a data code by shifting the carrier frequency a fixed amount.
Input Impedance	The impedance at the transverse plane of the port. This impedance is independent of the generator impedance.
Link Test Set	Provides an indirect interface between the Test Controller, TS-4398/U and Radio Relay System, AN/ARW-85 (V)3.
Nominal Voltage	The voltage by which the unit is designated and to which certain operating characteristics of the system are related.
Time-Division Multiple Access (TDMA)	The division of time into five equal time slots on a repetitive basis.
Triangulum Fast Direction Finding (TFDF)	System for performing direction finding functions.
Voltage Standing Wave Ratio (VSWR)	In a stationary wave system (i.e., waveguide), the ratio of the amplitude of the electric field or voltage at a voltage maximum to that at an adjacent voltage minimum.

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ALPHABETICAL INDEX (CONT)

ALPHABETICAL INDEX (CONT)

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official: Milton H. Hamilton

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
06104

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