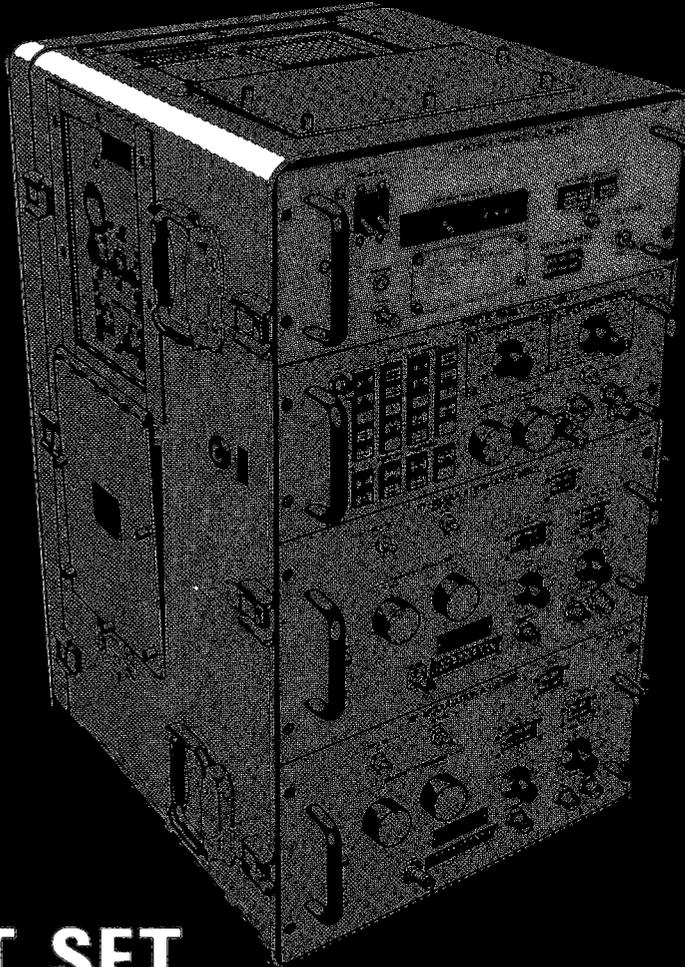


AVIATION INTERMEDIATE MAINTENANCE MANUAL



**TEST SET,
COUNTERMEASURES SET
TS-3615/ALQ-136(V)
(NSN 6625-01-121-8984)**

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WARNING

HIGH VOLTAGE

**is used in the equipment.
DEATH ON CONTACT
MAY RESULT IF SAFETY PRECAUTIONS
ARE NOT OBSERVED**

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 refer to FM21-11.

WARNING

Lifting BTS requires 4 persons. A minimum of two persons must be used in handling or lifting anything in excess of 40 pounds. Extreme care must be used in handling, to prevent injury to the individual or damage to equipment. RF Modulation Assembly weighs 44 pounds.

WARNING

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 technician is aided by operators, he must warn them 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 volts ac input connections when installing or operating this equipment.

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

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

For Artificial Respiration, refer to FM 21-11.

FIRST AID

- 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 WOODEN POLE OR A 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**

**AVIATION INTERMEDIATE
MAINTENANCE MANUAL**

**TEST SET, COUNTERMEASURES SET
TS-3615/ALQ-136(V)
(NSN 6625-01-121-8984)**

REPORTING OF 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: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703.

For Navy, submit comments on OPNAV 4790/66 (Technical Publications Deficiency Report) to the Commander, Naval Air Technical Services Facility, ATTN: Code 04, 700 Robbins Avenue, Philadelphia, Pennsylvania 19111.

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

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HOW TO USE THIS MANUAL

This manual tells you about maintaining the TS-3615/ALQ-136(V) Bench Test Set (BTS) at the Aviation Intermediate Maintenance (AVIM) Level. Aviation intermediate maintenance procedures for testing Countermeasures Set AN/ALQ-136(V)1 utilizing the BTS are described in TM-11-5865-202-30. AVIM procedures for testing the Flight Line Test Set (FLTS) TS-3614/ALQ-136(V) utilizing the BTS are described in TM-11-6625-2885-30. Relevant classified information will be found in TM-11-5865-202-30 appendix C. Repair parts and special tools required to perform AVIM on the BTS are listed in TM 11-6625-2884-20P.

Operating instructions and Aviation Unit Maintenance (AVUM) instructions for the TS-3615/ALQ-136(V) bench test set are described in TM-11-6625-2884-12. The AVUM manual also contains the maintenance allocation chart (MAC).

For your convenience this manual has been divided into chapters, sections and paragraphs which are numbered sequentially; tables are numbered in the same way. Illustrations are integrated with the text. In addition to this numbering system, a system of captions in colored print helps you quickly find the information you need. These captions name the equipment and maintenance procedures that you will be performing.

Some of the procedures consist of several smaller procedures. The captions for these smaller procedures are under the larger ones; both appear on each page as they are continued. Each large section begins with a section contents which lists the procedures by title and page number.

**NO ONE EVER REPAIRED OR TESTED
 ELECTRONIC EQUIPMENT WITHOUT
 FIRST READING THE AVIATION
 INTERMEDIATE MAINTENANCE
 (AVIM) MANUAL.**

**IT IS THE MOST
 IMPORTANT TOOL
 YOU HAVE !!!**





TEST SET, COUNTERMEASURES SET TS-3615/ALQ-136(V)

CHAPTER 1 INTRODUCTION

SECTION I GENERAL INFORMATION

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SCOPE

1-1. This is one of a series of technical manuals covering the operation and maintenance of Countermeasures Set AN/ALQ-136(V)1. It is used by Aviation Intermediate Maintenance (AVIM) personnel.

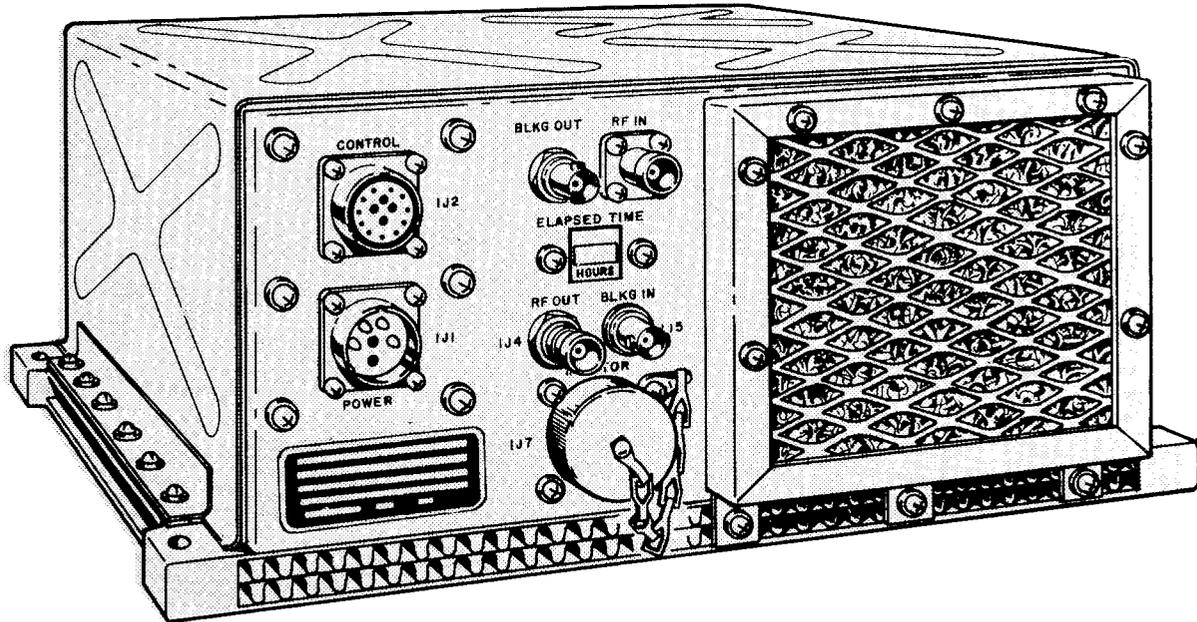
This manual contains physical and functional descriptions, principles of operation, maintenance instructions and schematic diagrams.

Type of Manual:	Aviation Intermediate Maintenance (AVIM)
Model Number and Equipment Name:	Test set, Countermeasures Set TS-3615/ALQ-136(V)
Purpose of Equipment:	Tests Countermeasures Set AN/ALQ-136(V)1 at AVIM level.
	Tests Test Set, Countermeasures Set TS-3614/ALQ-136(V) at AVIM level.

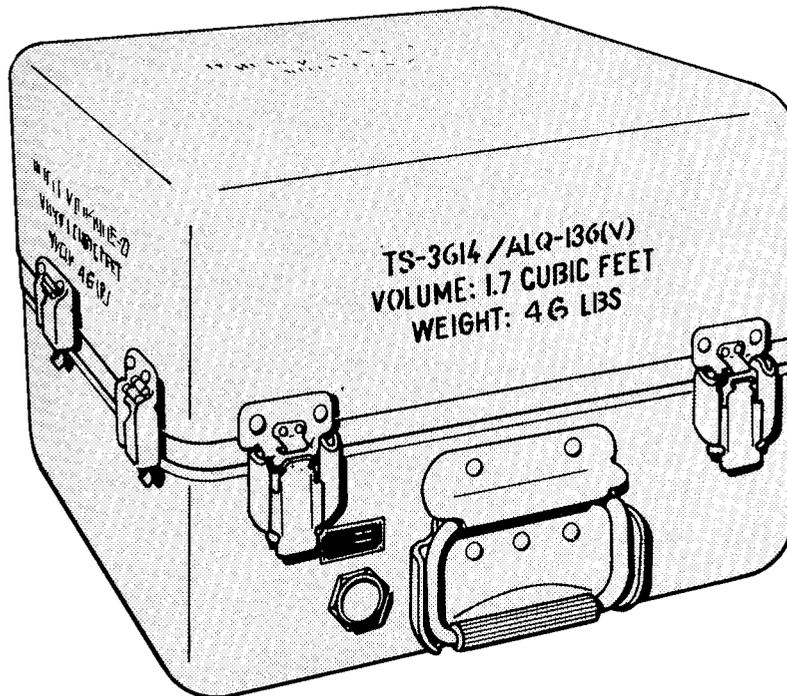
SCOPE (Continued)

The Bench Test Set (BTS) provides test signals and measurement circuits needed to perform Aviation Intermediate Maintenance (AVIM) on the following equipment:

- Receiver-Transmitter, Countermeasures Set: RT-1149(V)1/ALQ-136(V).



- Test Set, Countermeasures Set TS-3614/ALQ-136(V) (FLTS).



This manual contains functional descriptions, troubleshooting procedures and procedures for corrective maintenance.

CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

1-2. Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

MAINTENANCE FORMS, RECORDS AND REPORTS

1-3. 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.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750 as contained in Maintenance Management Update. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2, Vol 3 and unsatisfactory material/conditions (UR submissions) IAW OPNAVINST 4790.2, Vol 2, chapter 17.

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

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

DESTRUCTION OF ARMY ELECTRONICS MATERIEL

1-4. Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

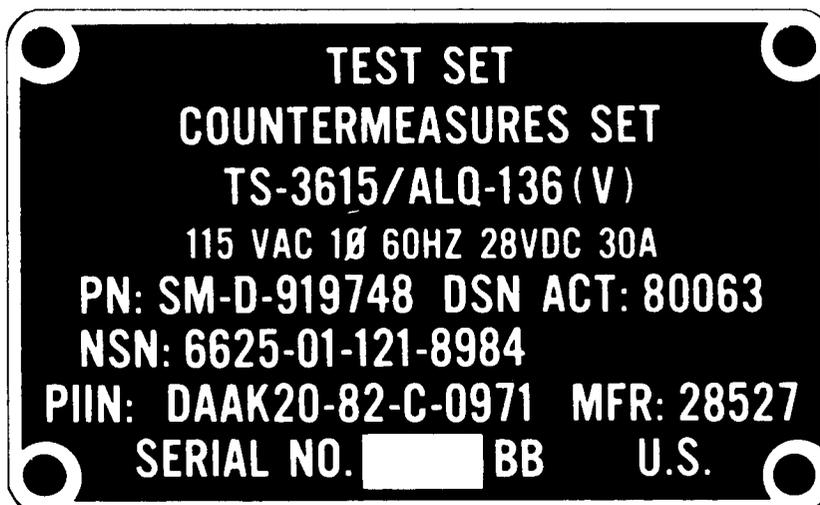
PREPARATION FOR STORAGE OR SHIPMENT

1-5. Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1. Store or ship the BTS with its front and rear covers securely latched. No extra packing is required. Be sure all ancillary equipment is stored in the front cover. (See page 1-8).

NOMENCLATURE CROSS-REFERENCE LIST

1-6. The following common names replace official nomenclature in this manual for simplicity:

OFFICIAL NOMENCLATURE	COMMON NAME	COMMON ABBREVIATION
Test Set, Countermeasures Set TS-3615/ALQ-136(V)	Bench test set	BTS
Countermeasures Set AN/ALQ-136(V)1	Countermeasures set	CM set
Receiver-Transmitter, Countermeasures Set RT-1149(V)1/ALQ-136(V)	Receiver-transmitter	LRU-1
Antenna AS-3007/ALQ-136(V)	Receive antenna	LRU-2A
Antenna AS-3007/ALQ-136(V)	Transmit antenna	LRU-2B
Control, Countermeasures Set C-9576/ALQ	Operator's control unit	LRU-3 (OCU)
Test Set, Countermeasures Set TS-361.4/ALQ-136(V)	Flight line test set	FLTS
Assembly, Control Panel SM-D-920374	Control panel	1A1
Assembly, Status Panel SM-D-920282	Status panel	1A2
Assembly, RF Modulation SM-D-919751	RF modulation assembly	1A3/1A4



REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

1-7.

a. Army. If your bench test set 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. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

b. Navy. Navy personnel are encouraged to submit EIR's through their local Beneficial Suggestion Program.

The image shows two overlapping forms. The top form is a Quality Deficiency Report (Category II) with the following fields:

- Section III
- 27a. From (Screening point)
- 27b. To (Screening point)
- 27c. Typed Name, Duty Phone and Signature
- 27d. Typed Name, Duty Phone and Signature

The bottom form is a Quality Deficiency Report (Category II) with the following fields:

- DO NOT DETACH THIS STUB ON COPIES FORWARDED TO SCREENING AND ACTION POINTS
- Carbon paper not required to complete this side.
- Phone Call/Visit (Specify)
- Section I
- 27a. From (Originating unit)
- 27b. To (Screening point)
- 27c. Typed Name, Duty Phone and Signature
- 27d. Typed Name, Duty Phone and Signature

STANDARD FORM 368, April 1974
General Services Administration (FPMR 101-26-7)

SECTION II EQUIPMENT DESCRIPTION AND DATA

<u>SECTION CONTENTS</u>	<u>PAGE</u>
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FRONT PANEL COMPONENTS	1-10
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS	1-20
EQUIPMENT DATA	1-33
EQUIPMENT CONFIGURATION	1-45
SAFETY, CARE AND HANDLING	1-47

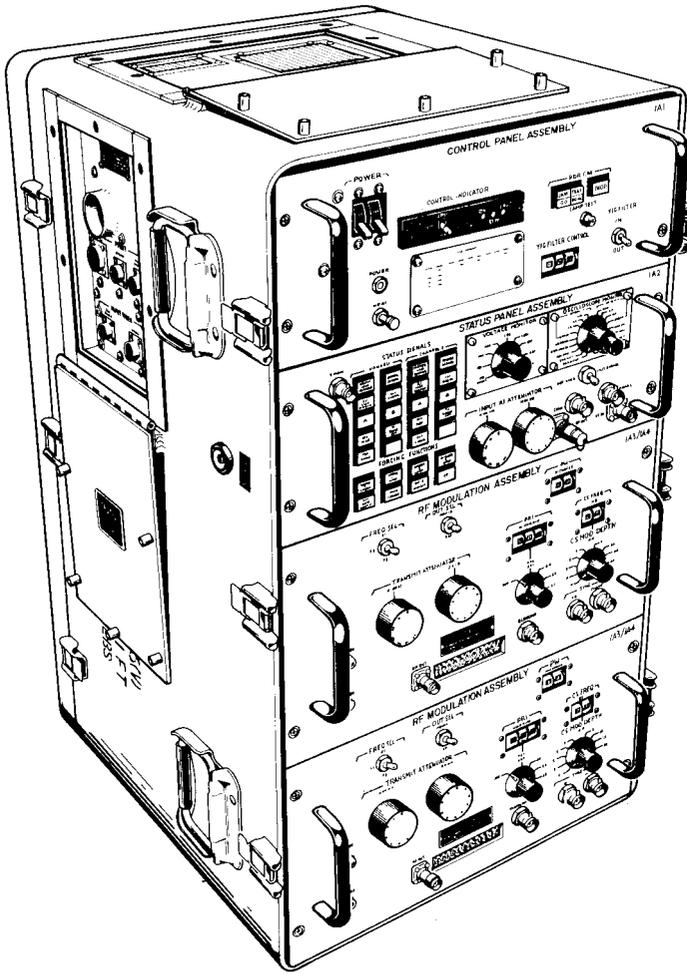
EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

1-8. The BTS provides stimulus (simulated radar threat signals) required for control and activation of the CM set or the FLTS. Response monitoring of the Unit Under Test (UUT) aids in maintenance, and failure diagnosis to each replaceable assembly.

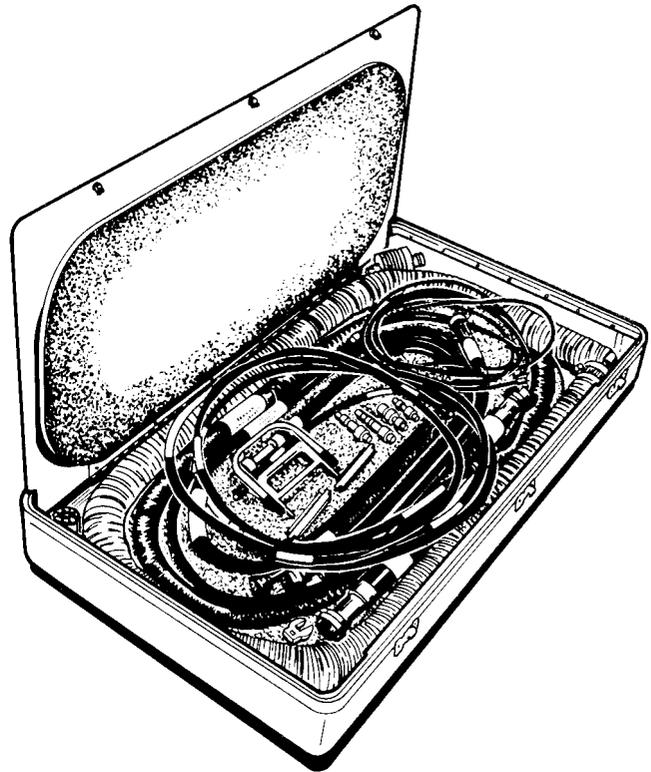
- Controls and distributes primary power to itself and to UUT.
- Controls UUT functions.
- Generates (and transmits to UUT) simulated radar threat signals.
- Provides facility for manually forcing various UUT functions.
- Monitors all UUT responses to simulated radar threat signals and forced functions.
- Modular design allows easy access to equipment for easy maintenance.
- Each component, and replaceable assembly can be repaired/replaced independently.

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES (Continued)

The following paragraphs describe the characteristics, capabilities and features of the BTS. The physical description of the BTS is explained in the Aviation Unit Maintenance (AVUM) Manual.



BENCH TEST SET

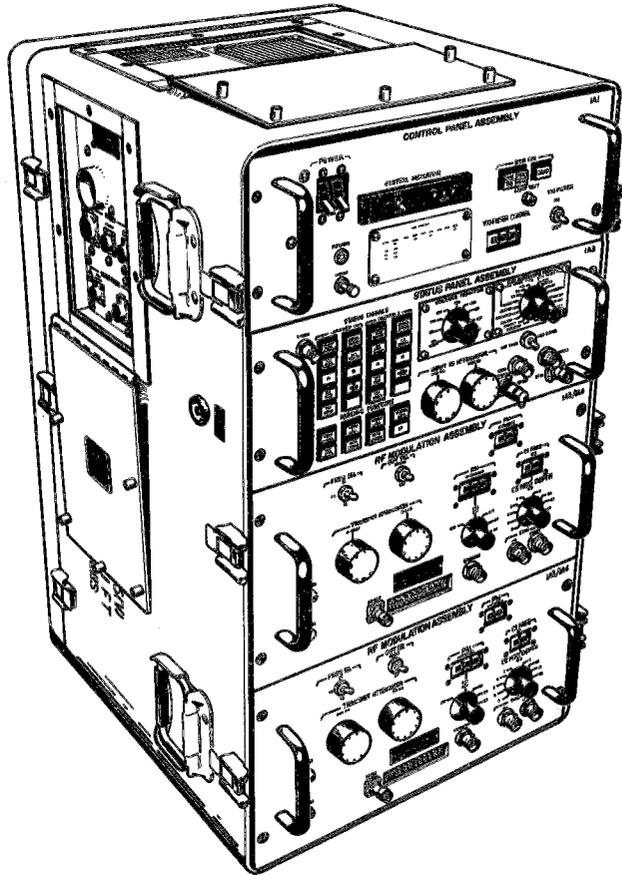


FRONT COVER REMOVED

The BTS provides two major functions required to test and troubleshoot LRU-1 or FLTS unit under test (UUT).

FUNCTION 1: Generates RF signals to activate the threat recognition circuits of the UUT.

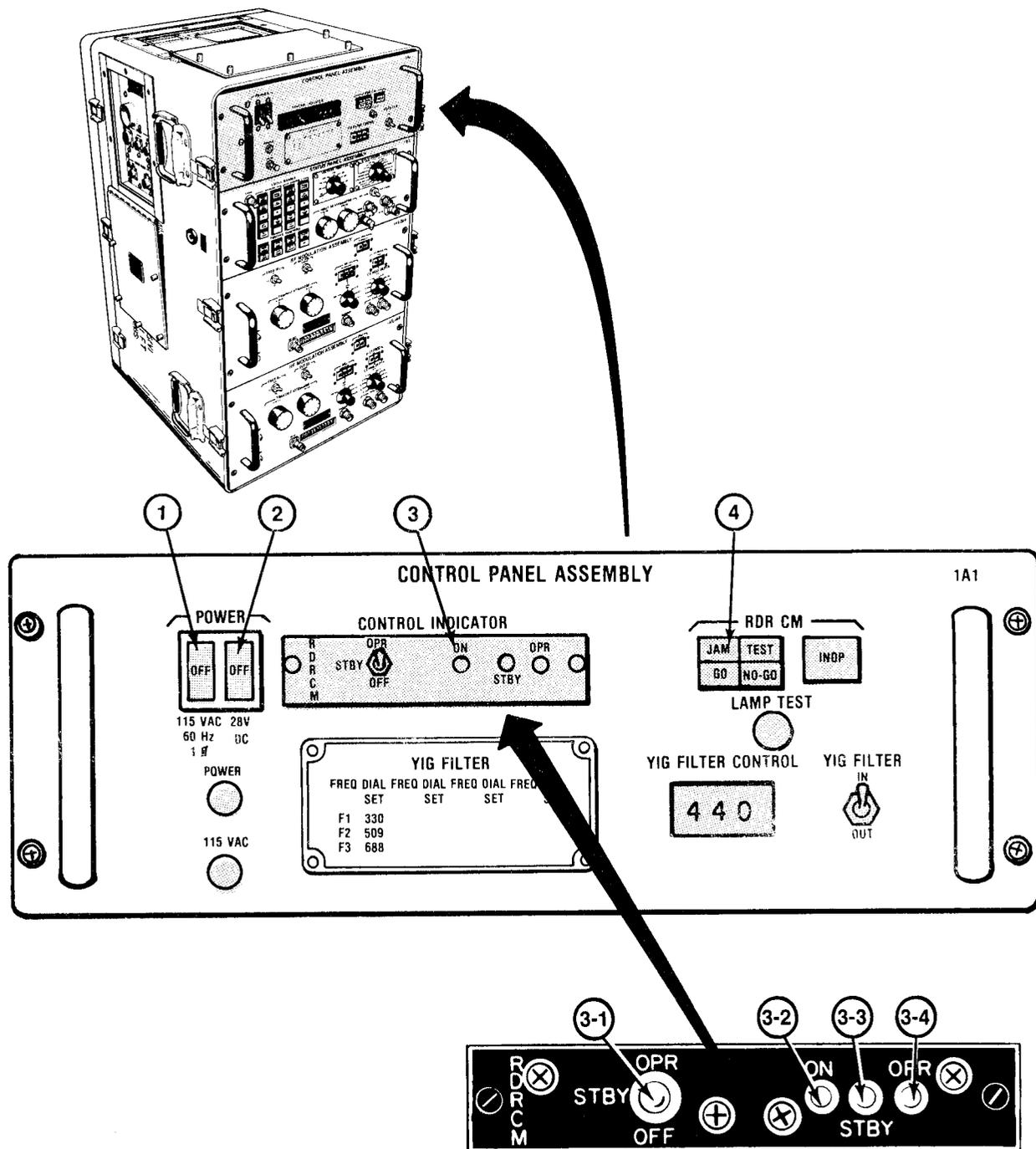
FUNCTION 2: Monitors the RF signals transmitted from the UUT and enables you to localize failures to an assembly or subassembly in the UUT.



FRONT PANEL COMPONENTS

1-9.

a. Control Panel Assembly 1A1. The controls and indicators of the control panel assembly, and their respective functions, are listed and described in table 1-1. They are shown on accompanying illustrations.



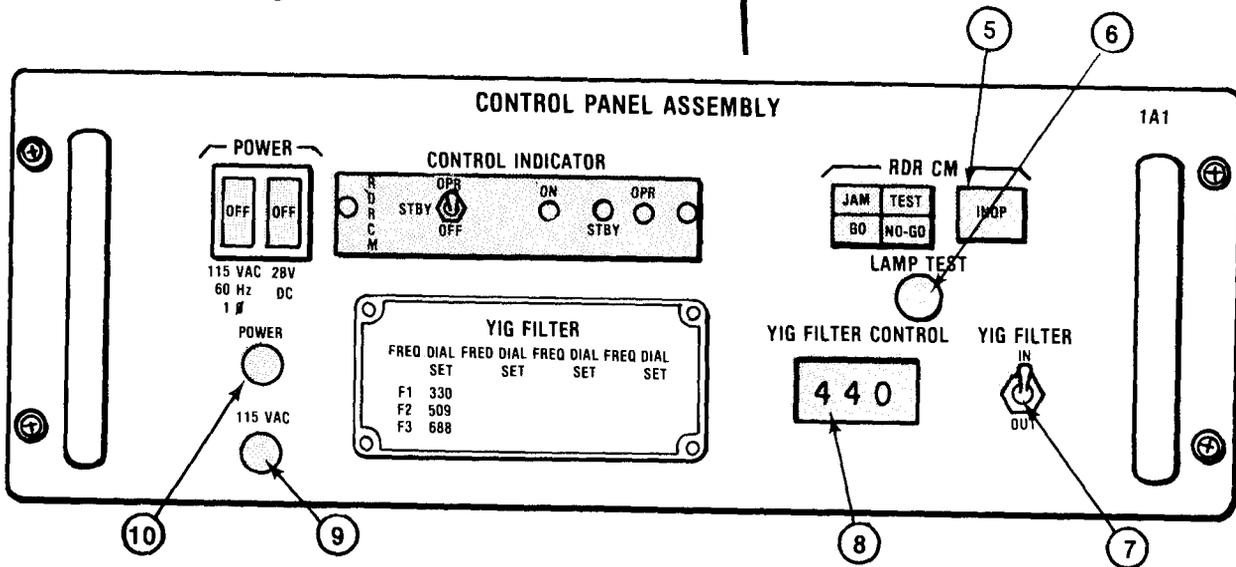
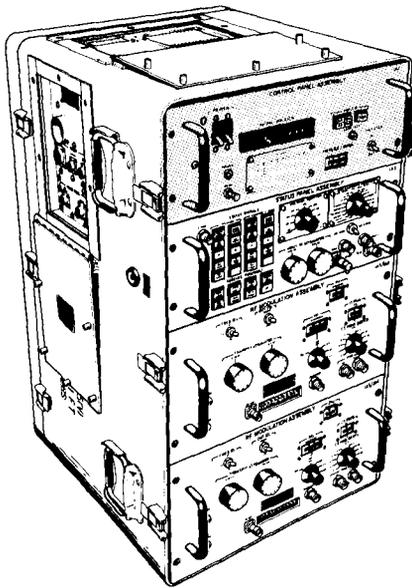
CONTROL PANEL ASSEMBLY CONTROLS AND INDICATORS

**TABLE 1-1. CONTROL PANEL ASSEMBLY (CONTROL INDICATOR 1A1A1)
 CONTROLS AND INDICATORS**

REFERENCE	DEVICE	FUNCTION
1	POWER 115 VAC 60 Hz 10 circuit breaker 1A1CB2	Controls application of ac power to BTS. Provides overcurrent protection to BTS.
2	POWER 28V DC circuit breaker 1A1CB1	Controls application of dc power to unit under test (UUT). Provides overcurrent protection to UUT.
3	CONTROL INDICATOR	Controls status of LRU-1.
3-1	OPR/STBY/OFF toggle switch 1A1A1S1	
	OPR	Applies high voltage to traveling wave tube (TWT) after 3 minute warm-up delay, (turns TWT on).
	STBY	Applies dc power to LRU-1, but inhibits LRU-1 TWT control.
	OFF	Removes all dc power from LRU-1.
3-2	ON indicator (green) 1A1A1DS1	When lit, indicates LRU-1 is in STBY or OPR mode.
3-3	STBY indicator (amber) 1A1A1DS2	When lit, indicates LRU-1 is in standby mode.
3-4	OPR indicator (green) 1A1A1DS3	When lit, indicates LRU-1 is in operate mode.
4	JAM/TEST/GO/NO-GO 1A1S4/D11	When pressed, initiates built-in-test equipment (BITE) in LRU-1 under test.
	JAM (green)	Lights when LRU-1 under test has acquired a simulated threat and has activated ECM.
	TEST (yellow)	Lights when BITE in LRU-1 under test has been initiated.
	GO (green)	Lights when LRU-1 under test is operating correctly.
	NO-GO (yellow)	Lights when a fault is detected LRU-1 under test.

TM 11-6625-2884-30/NAVAIR 16-35TS3615-2

FRONT PANEL COMPONENTS (Continued)



CONTROL PANEL ASSEMBLY CONTROLS AND INDICATORS

**TABLE 1-1. CONTROL PANEL ASSEMBLY (CONTROL INDICATOR 1A1A1)
 CONTROLS AND INDICATORS (Continued)**

REFERENCE	DEVICE	FUNCTION
5	RDR CM INOP indicator 1A1DS2	When lit, shows LRU-1 is inoperative due to a fault.
6	LAMP TEST pushbutton S1	When pressed, causes reference items 4 and 5 to light, testing their lamps.
7	YIG FILTER toggle 1A1S2	Controls switching the YIG Filter in and out of circuit.
8	YIG FILTER CONTROL thumbwheel switch 1A1S3	Controls center frequency of YIG
9	Secondary 115 VAC circuit breaker 1A1CB3	Controls application of power to control panel; provides over-current protection to panel.
10	POWER indicator 1A1DS3	When lit, indicates power has been applied to control panel assembly

FRONT PANEL COMPONENTS (Continued)

b. Status Panel Assembly 1A2. The controls and indicators of the status panel are listed and described in table 1-2. They are shown on the following illustration and keyed to the table reference numbers.

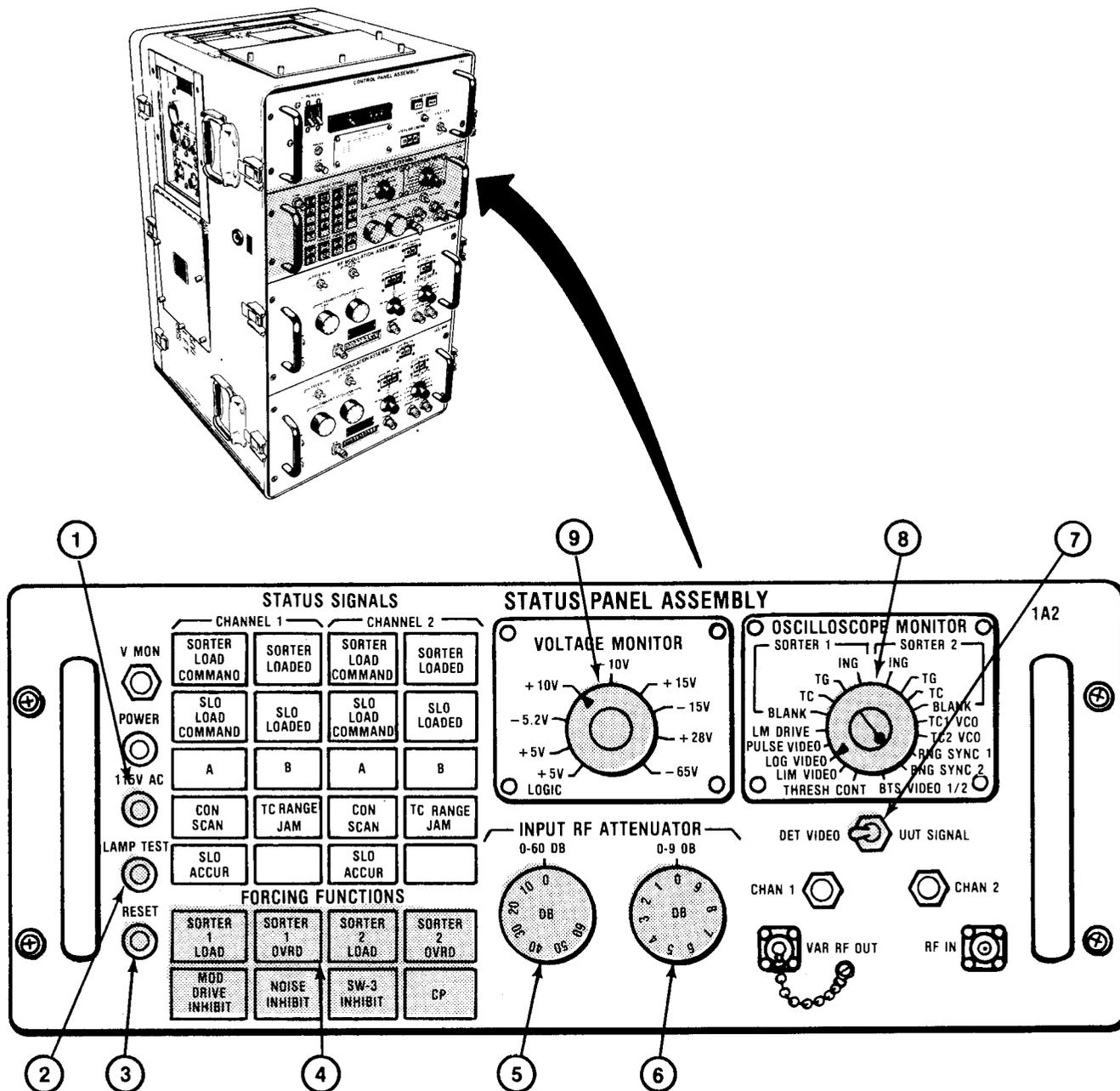


TABLE 1-2. STATUS PANEL CONTROLS AND INDICATORS

REFERENCE	DEVICE	FUNCTION
	<u>Controls</u>	
1	115V AC 1-1/2 amp circuit breaker CB1 (push to reset)	Provides overcurrent protection to the status panel.
2	LAMP TEST pushbutton (momentary) S13	Lights all STATUS SIGNAL indicators (11) and FORCING FUNCTION indicators (4) to test their lamps.
3	RESET pushbutton (momentary) S4	Closes a contact to ground to control UUT.
4	FORCING FUNCTIONS alternate acting pushbutton indicators S5-S12	Each pushbutton controls closure of a separate contact to ground to control UUT. Indicator lights when contact is closed.
5	INPUT RF ATTENUATOR 0-60 dB rotary control AT2	Controls attenuation between RF IN connector (16) and VAR RF OUT connector (13) in 10 dB steps.
6	INPUT RF ATTENUATOR 0-9 dB rotary control AT1	Controls attenuation between RF IN connector (16) and VAR RF OUT connector (13) in 1 dB steps.
7	DET VIDEO/UUT SIGNAL S3	Switches CHAN 1 connector (14) to BTS detected video in order to monitor signal from RF IN connector (16); or switches to UUT SIGNAL selected by black knob of OSCILLOSCOPE MONITOR (8).
8	OSCILLOSCOPE MONITOR dual concentric rotary control S1A/B	Black knob switches CHAN 1 connector (14) to one of 17 points in the UUT or to BTS VIDEO (1A3-J9). Red knob switches CHAN 2 connector (15) to one of 17 points in the UUT or to BTS video.
9	VOLTAGE MONITOR rotary control S2	Switches V MON connector (12) to one of nine voltage points in UUT. This control also has an unmarked off position (full CW).

FRONT PANEL COMPONENTS (Continued)

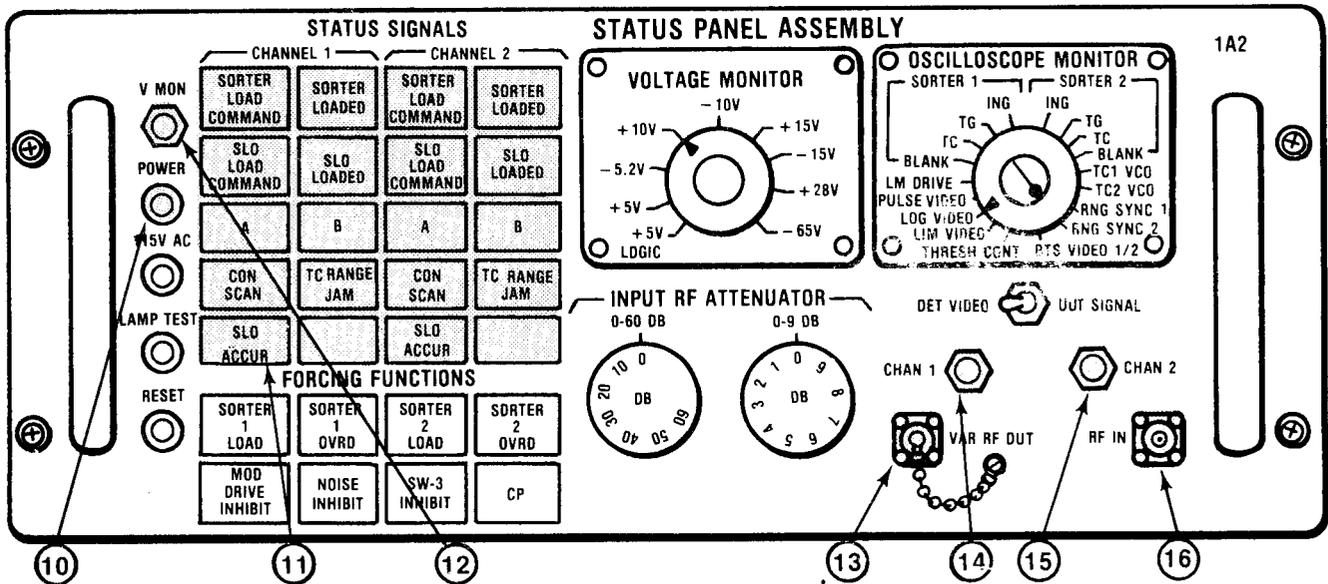
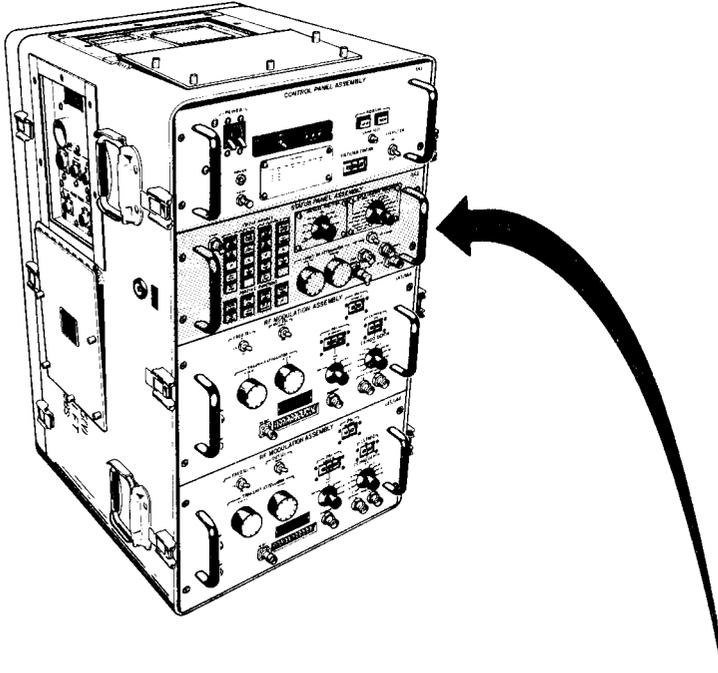


TABLE 1-2. STATUS PANEL CONTROLS AND INDICATORS (Continued)

REFERENCE	DEVI CE	FUNCTION
	<u>Indicators</u>	
10	POWER DS21 (green)	This indicator, when lit, indicates presence of 12 V dc power in status panel assembly confirming presence of 115 V ac power.
11	STATUS SIGNALS indicators DS1-DS20	Each indicator, when lit, shows continuity to ground at a separate point to be monitored in the UUT.
	<u>Connectors</u>	
12	V MON J6	Connects to voltage point in UUT selected by V MON (Voltage Monitor) control S2 (7).
13	VAR RF OUT J3	Undetected RF output controlled by INPUT RF ATTENUATOR (5,6).
14	CHAN 1 J4	Connects to point selected by DET VIDEO/ UUT SIGNAL switch S3 (9).
15	CHAN 2 J5	Connects to point selected by red knob S1B of OSCILLOSCOPE MONITOR control (8).
16	RF IN J2	Connects to input of INPUT RF ATTENUATOR AT1 (5,6).

FRONT PANEL COMPONENTS (Continued)

c. RF Modulation Assembly 1A3/1A4 controls and Indicators. The controls and indicators of the RF modulation assembly are listed and described in table 1-3. They are shown on the accompanying illustration. Since the two RF modulation assemblies in the bench test set are identical, this information applies to both.

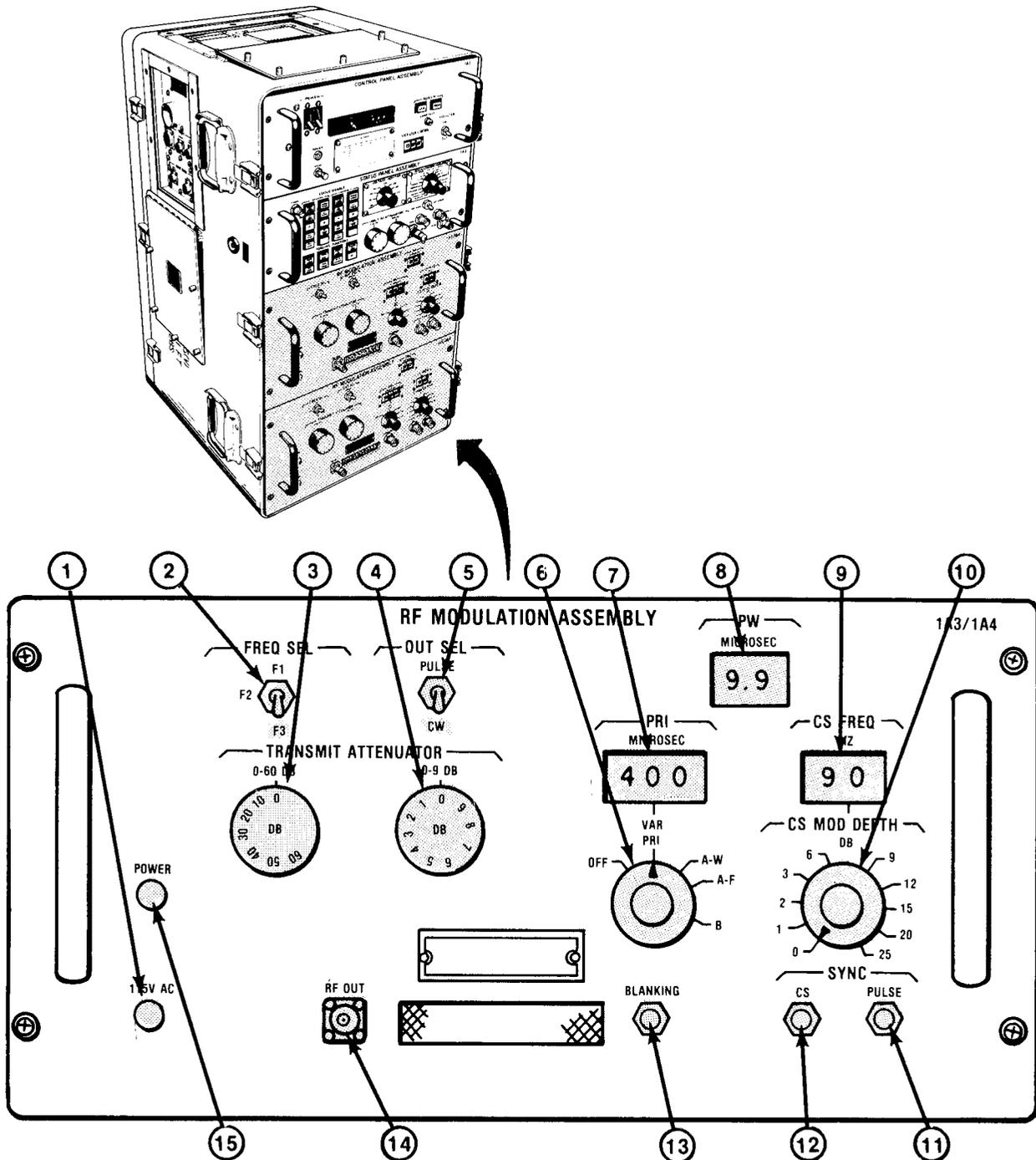


TABLE 1-3. RF MODULATION ASSEMBLY CONTROLS, INDICATORS AND CONNECTORS

REFERENCE	DEVICE	FUNCTION
	<u>Controls</u>	
1	115v Ac 1-1/2 amp circuit breaker CB1	Provides overcurrent protection to the RF modulation assembly.
2	FREQ SEL F1/F2/F3 three position toggle switch S1	Selects one of three preset RF frequencies.
3	TRANSMIT ATTENUATOR 0-60 dB rotary control AT4	Controls level at RF OUT connector (14) in 10 dB steps.
4	TRANSMIT ATTENUATOR 0-9 dB rotary control AT3	Controls level at RF OUT connector (14) in 1 dB steps.
5	OUT SEL PULSE/CW toggle switch S3	Permits selection of either pulse or CW RF output.
6	PRI OFF/VAR PRI /A-W/ A-F/B rotary control S7A/B	Permits selection of one of three preset PRI's, or variable PRI under control of PRI MICROSEC switches (7).
7	PRI MICROSEC three section thumbwheel control S5	Sets PRI when switch (6) is in VAR PRI position. PRI range is 300 to 999 us in steps of 1 us.
8	PW MICROSEC two section thumbwheel control S4	Sets pulse width in steps from 0.1 us to 9.9 us.
9	CS FREQ HZ two section thumbwheel control S2	Sets CS frequency in 1 Hz steps from 1 Hz to 99 Hz.
10	CS MOD DEPTH DB rotary control S6	Permits selection of one of ten preset CS modulation depths in discrete steps from 0 to 25 dB.
	<u>Connectors</u>	
11	SYNC PULSE J4	Supplies pulse sync.
12	SYNC CS J5	Supplies CS modulation sync.
13	BLANKING J6	Supplies negative going blanking pulses.
14	RF OUT J1	Supplies modulated RF output.
	<u>Indicator</u>	
15	POWER DS1	When lit, (green) shows the presence of -15 Vdc, confirming application of 115 Vac power to RF modulation assembly.

FRONT PANEL COMPONENTS (Continued)

NOTE

TM 11-6625-2884-12 Aviation Unit Maintenance (AVUM) on the bench test set provides the operation and basic descriptions of the RF modulation assembly functions.

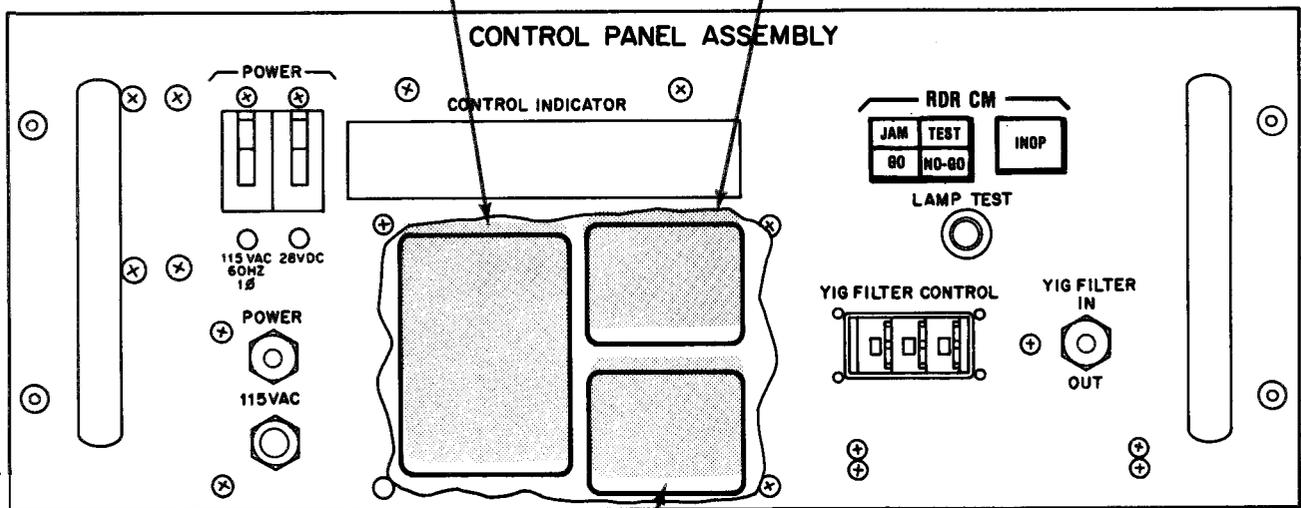
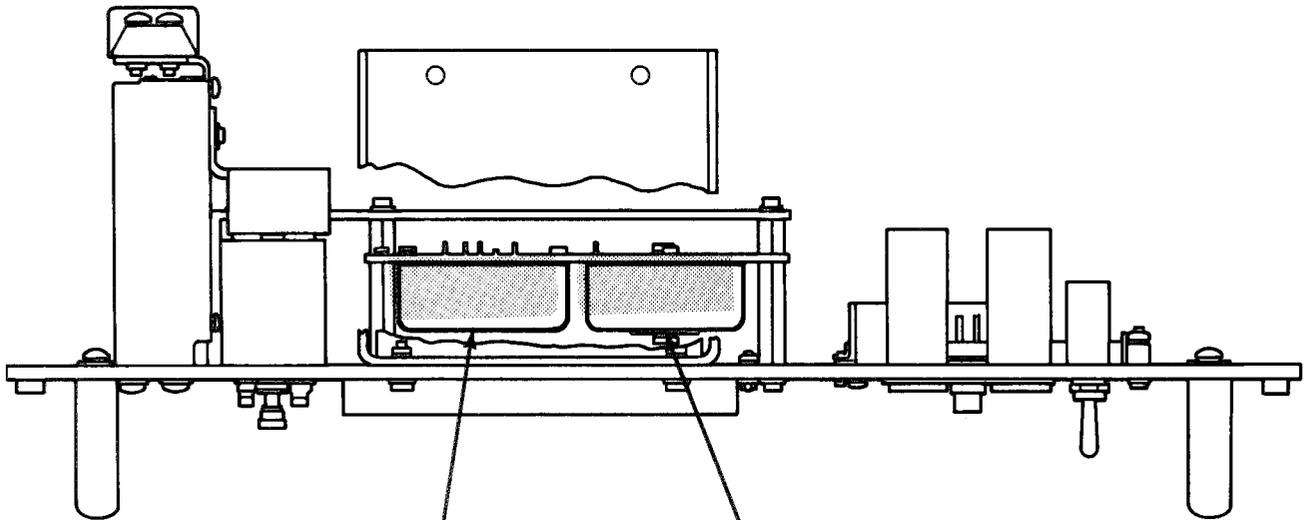
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1-10.

a. Control Panel Assembly 1A1 (Top View).

- (1) PS1 - Power supply that distributes -15 Vdc to the YIG filter in the status panel.
- (2) PS2 - Power supply that distributes +15 Vdc to the YIG filter in the status panel.
- (3) PS3 - Power supply that distributes +10 Vdc to the YIG FILTER CONTROL switch S3.

TOP VIEW

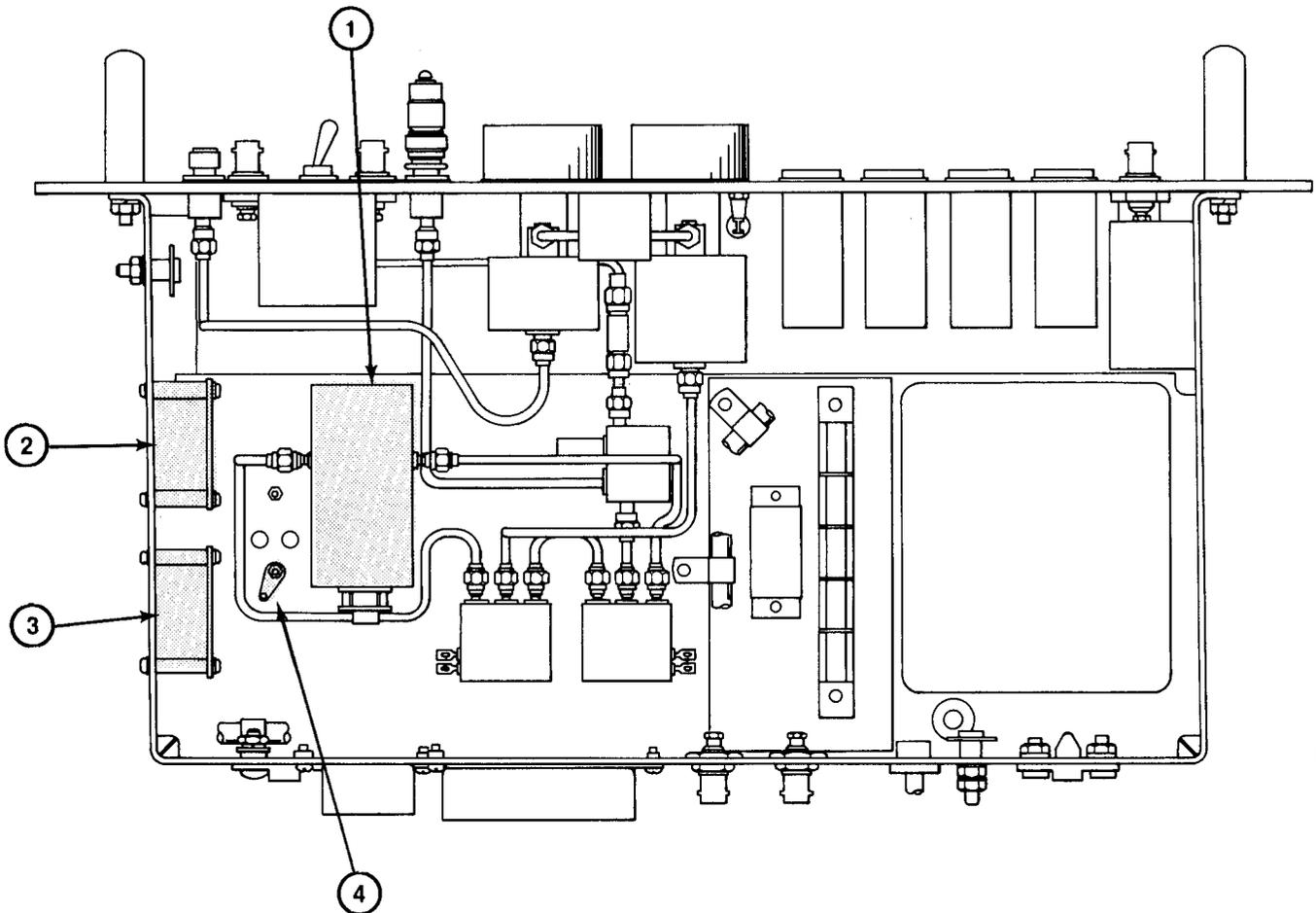


FRONT VIEW

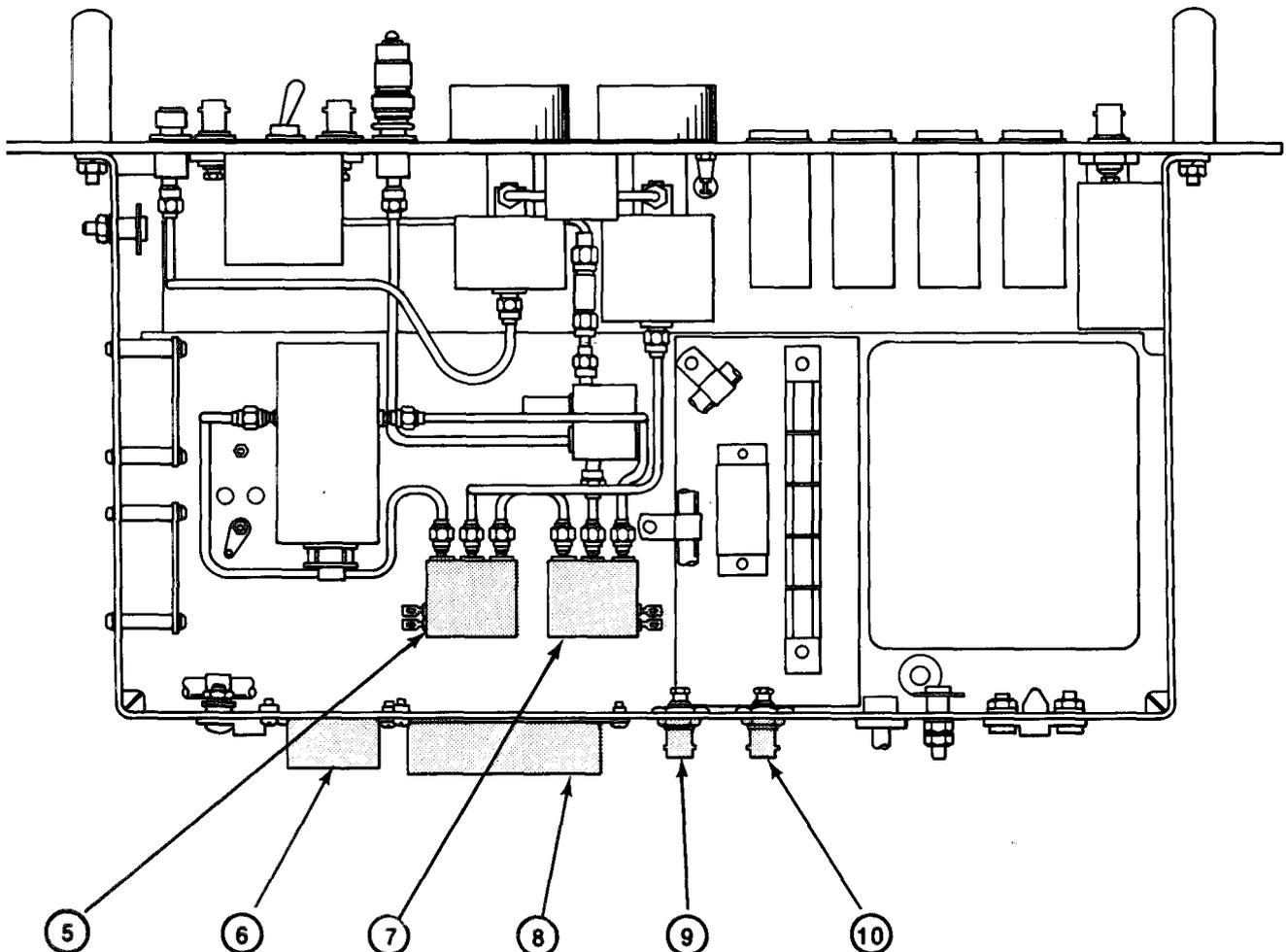
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

b. Status Panel Assembly 1A2 (Top View).

- (1) FL1 - YIG FILTER AND DRIVER ASSY. - Tuned to the F1, F2 or F3 frequencies by setting the YIG FILTER CONTROL switch on control panel.
- (2) A1 - TERMINATION ASSY. - Contains termination resistors for interfacing with LRU-1.
- (3) A2 - TERMINATION ASSY. - Contains termination resistors for interfacing with LRU-1.
- (4) VR1 - VOLTAGE REGULATOR - Regulates the 12-volt output of Power Supply PS1 down to 5 volts for integrated circuits.

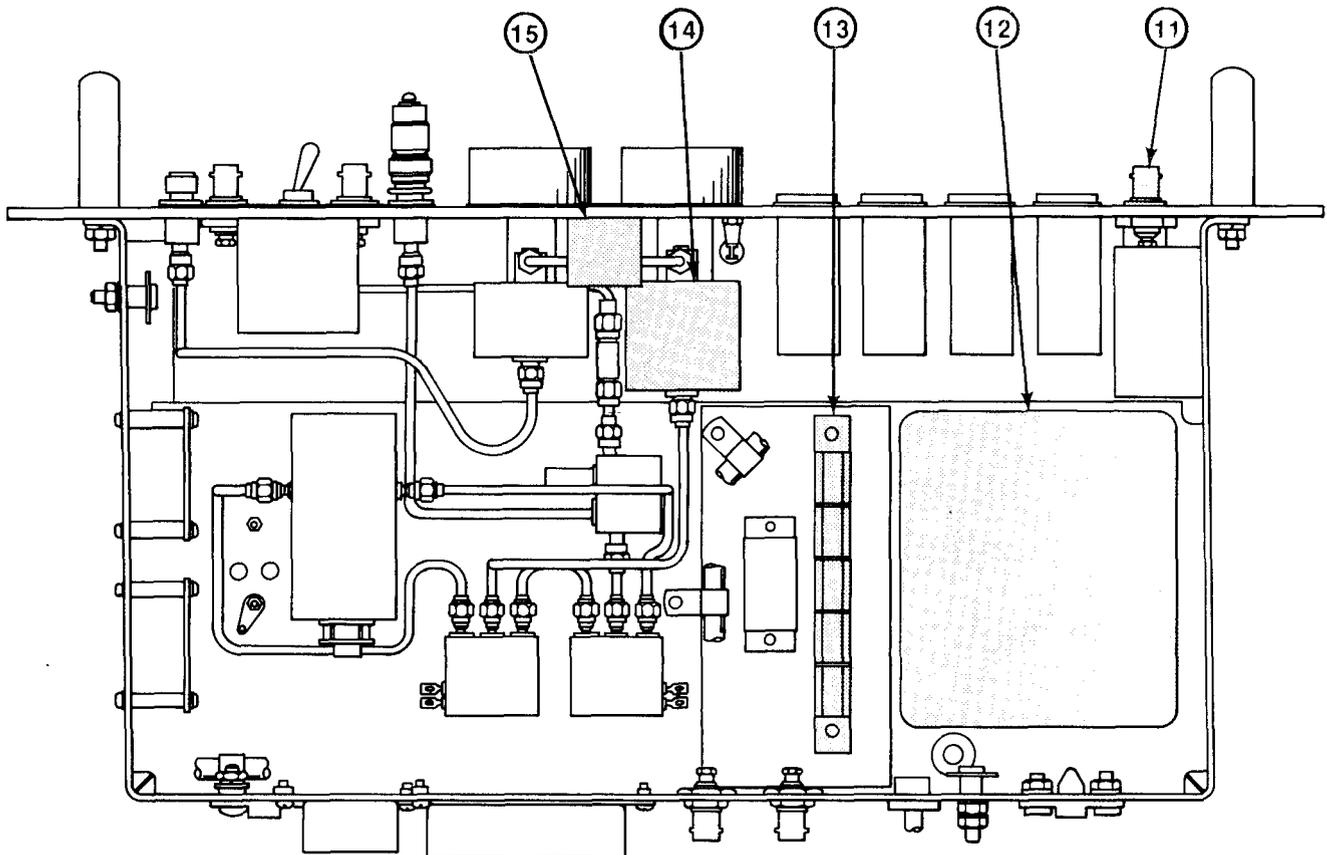


- (5) S14 - COAXIAL SWITCH - Controlled by YIG FILTER IN-OUT switch on Control Panel Assembly 1A1.
- (6) J10 - JACK - Interconnects YIG FILTER CONTROL and YIG FILTER IN-OUT switch on Control Panel Assembly 1A1.
- (7) S15 - COAXIAL SWITCH - Controlled by the YIG FILTER IN-OUT switch on control panel.
- (8) J1 - JACK - Interconnects control and status signals to LRU-1.
- (9) J7 - JACK - Connects to the conical scan signal from RF Modulation Assembly 1A4.
- (10) J8 - JACK - Connects to the conical scan signal from RF Modulation Assembly 1A3.

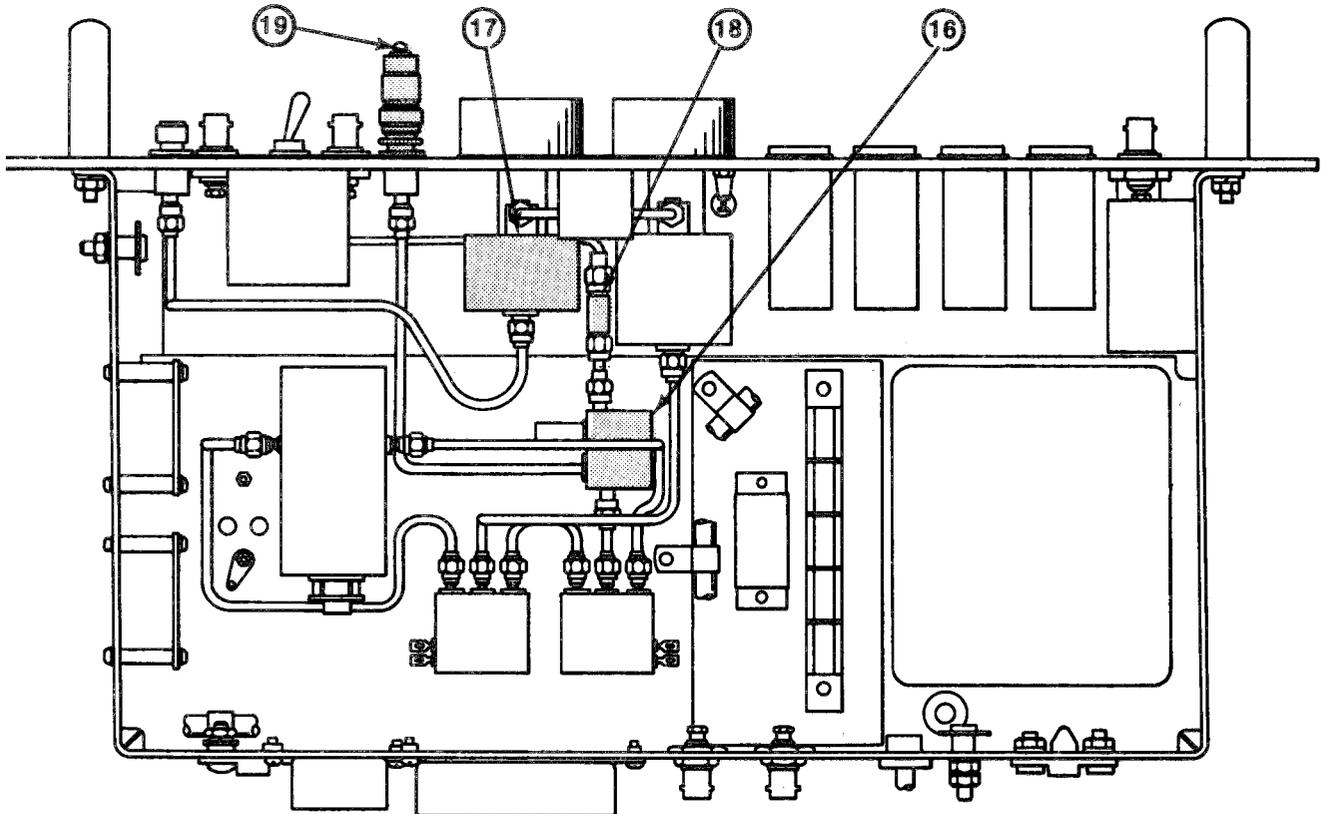


LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

- (11) J6 - JACK - Connects to voltage point in LRU-1 under test selected by the voltage monitor switch S2. (15)
- (12) PS1 - POWER SUPPLY - Supplies +12 Vdc to status signal, and forcing function lamps.
- (13) A3 - LAMP DRIVER ASSY - Provides a ground return to status signal lamps, when enabled by LRU-1 under test.
- (14) AT2 - INPUT RF ATTENUATOR - Controls RF output level at VAR RF OUT Connector J3 in 0-60 dB steps.
- (15) S2 - VOLTAGE MONITOR - Monitors dc voltages in the LRU-1 under test.

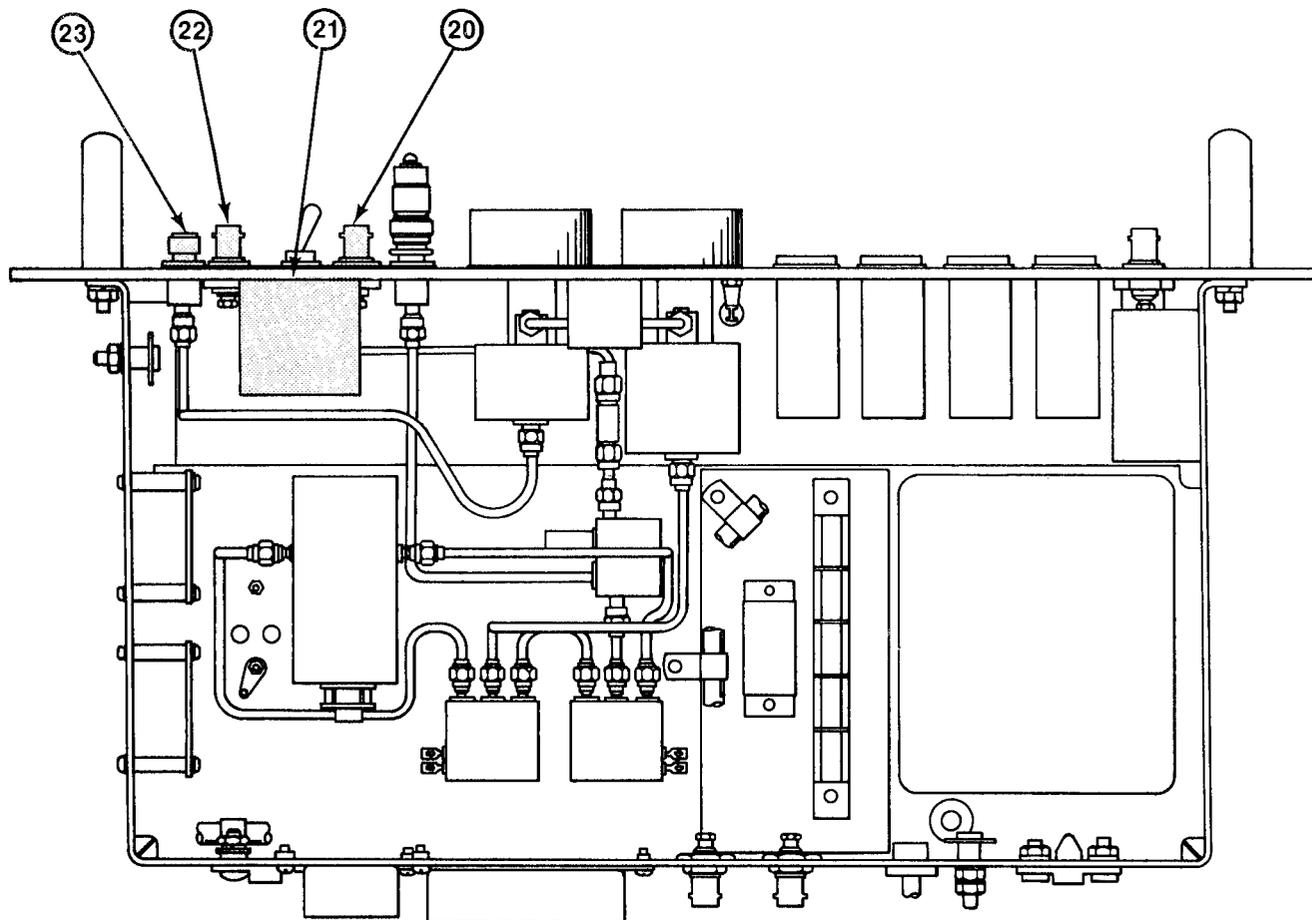


- (16) DC1 - DIRECTIONAL COUPLER - Splits RF received from Coaxial Switch S15 and directs the RF to Detector CR1 and to VAR RF OUT Connector J3.
- (17) AT1 - INPUT RF ATTENUATOR - Controls RF output level at VAR RF OUT connector J3 (19) in 0-9 db steps.
- (18) CR1 - RF DETECTOR - Converts RF to detected video to be monitored on the Oscilloscope.
- (19) J3, AT3 - VAR RF OUT AND DUMMY LOAD - Jack J3 provides variable RF output level that can be used for external monitoring. When not being used this jack is terminated with dummy load AT3.



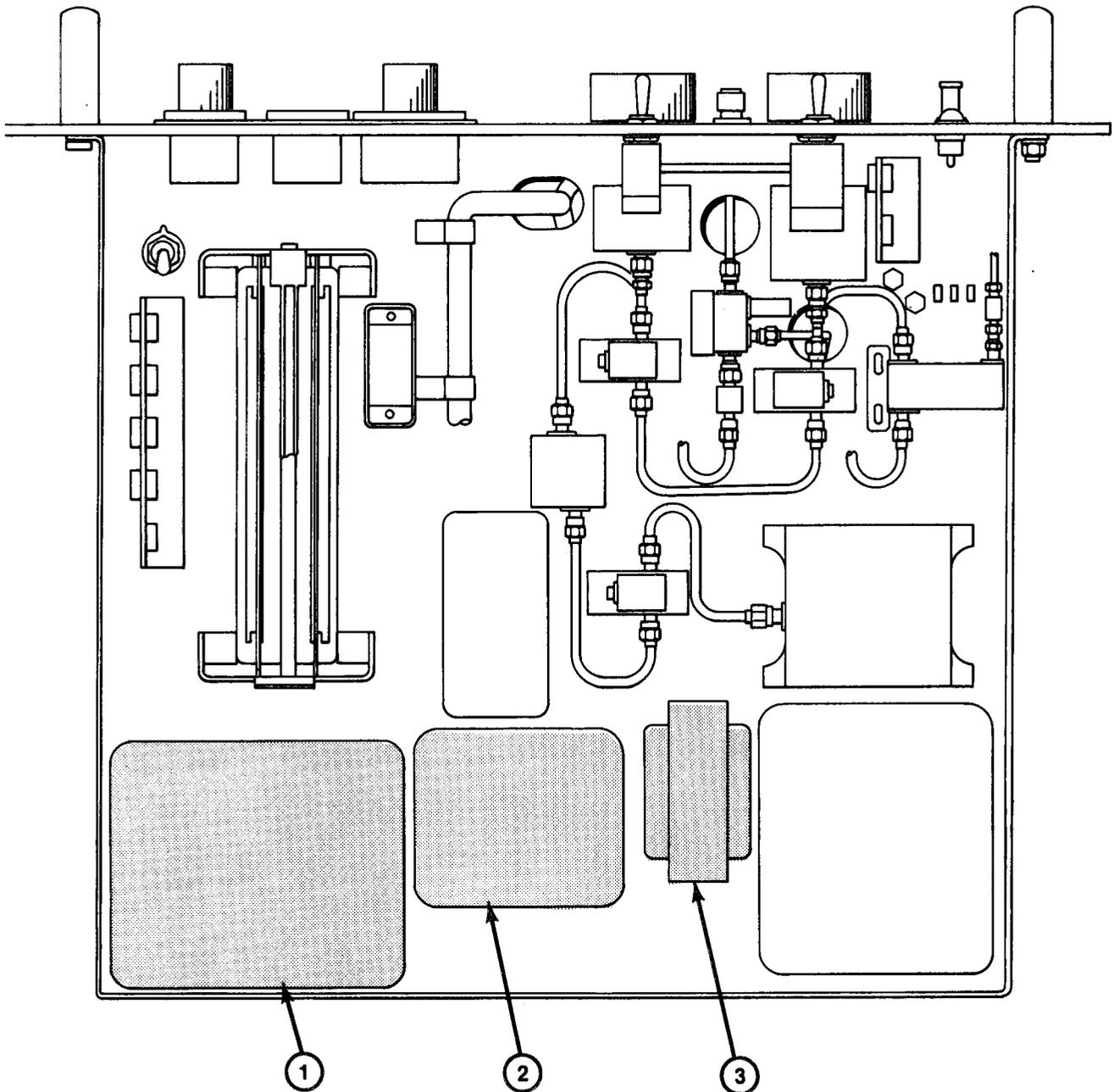
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

- (20) J4 - CHAN 1 - Connects to oscilloscope to monitor 17 test points in LRU-1 under test or 1 signal from BTS, controlled by the OSCILLOSCOPE MONITOR Switch S1 (21) and UUT SIGNAL/DET VIDEO Switch S3.
- (21) S1 - OSCILLOSCOPE MONITOR - Dual concentric rotary switch. Black knob switches CHAN 1 (20) connector to 1 of 17 points in the LRU-1 under test or to BTS 1 VIDEO J7 (9). Red knob switches CHAN 2 (22) connector to 1 of 17 points in LRU-1 under test or to BTS 2 VIDEO J8 (10).
- (22) J5 - CHAN 2 - Connects to oscilloscope to monitor 17 test points in LRU-1 under test or 1 signal from BTS.
- (23) J2 - RF IN - Connects to RF output of LRU-1 under test.



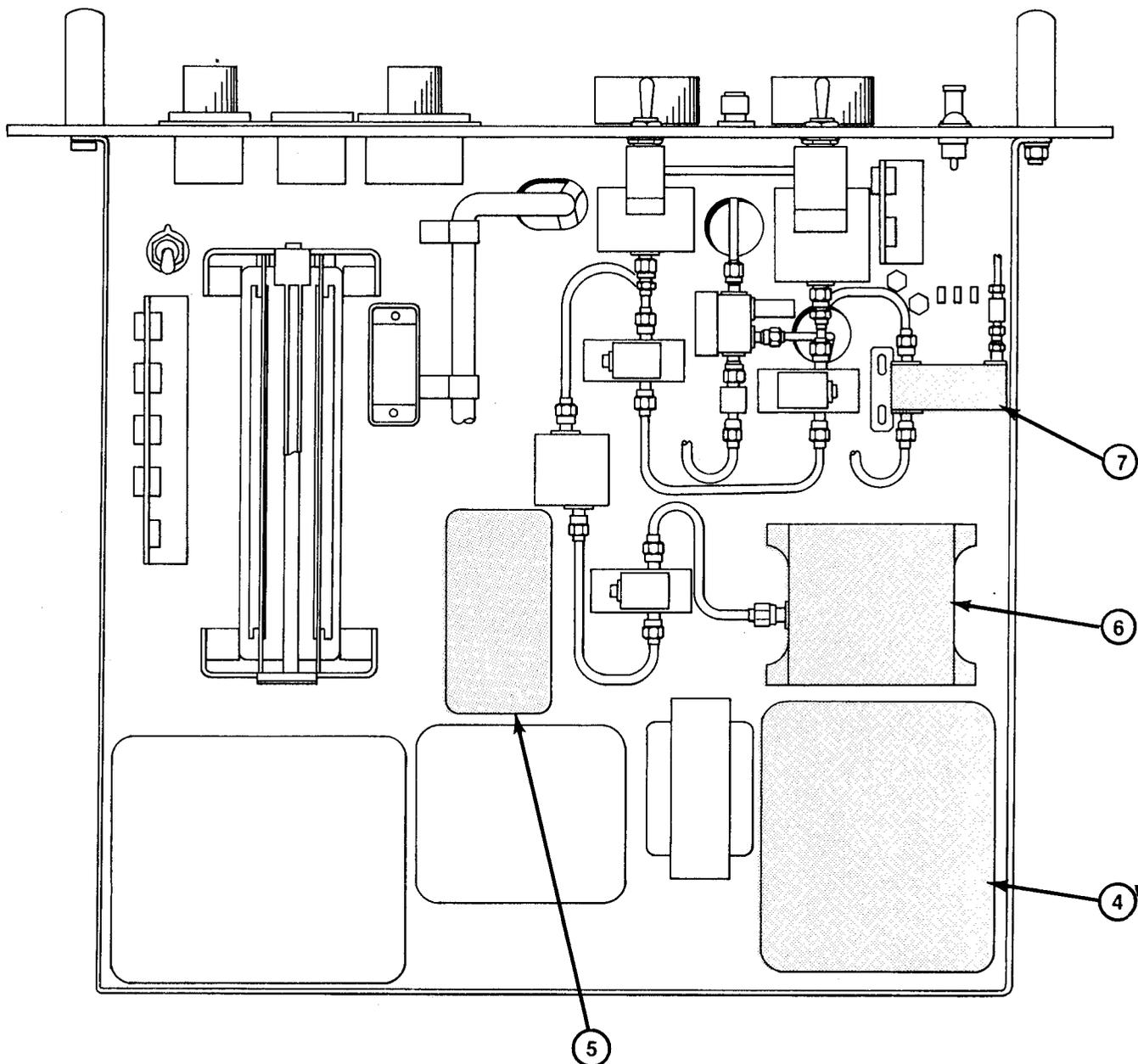
c. RF Modulation Assembly 1A3/1A4 (Top View)

- (1) PS1 - POWER SUPPLY - Supplies +5 V to digital and RF circuits.
- (2) PS2 - POWER SUPPLY - Supplies +15 V to analog and RF circuits.
- (3) PS3 - POWER SUPPLY - Supplies -65 V to the Voltage Controlled Oscillator (VCO) Y1 (6).

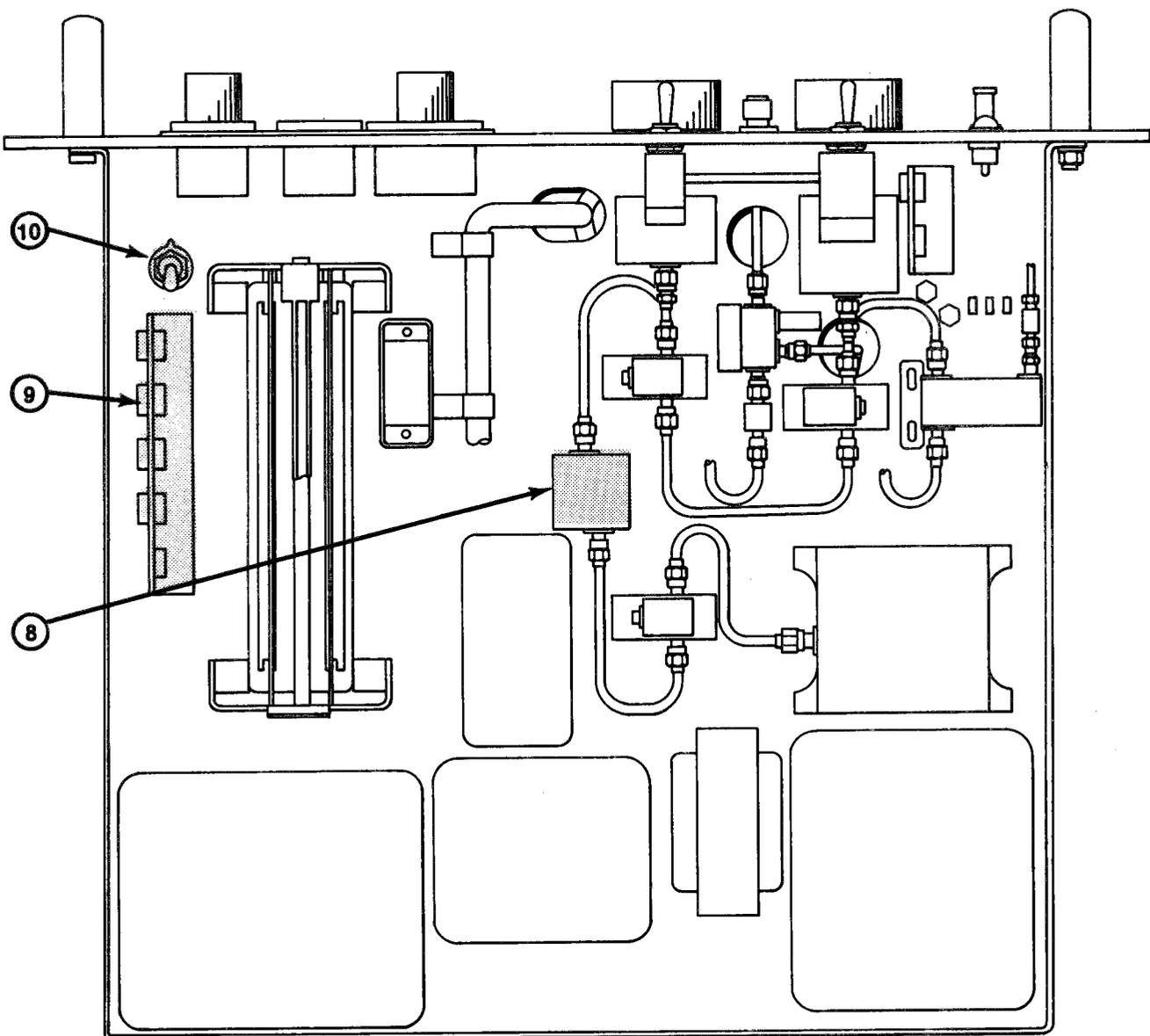


LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

- (4) PS4 - POWER SUPPLY - Supplies -15 V to analog and RF Circuits.
- (5) CR1 - OVER VOLTAGE PROTECTION - Provides over voltage protection for Power Supply PS1.
- (6) Y1 - VOLTAGE CONTROLLED OSCILLATOR - Tuned to the F1/F2/F3 frequencies and controlled by the frequency select switch S3.
- (7) CR2 - PIN SWITCH DIODE - Pulse modulates the RF signal and is controlled by the Pulse Generator Circuit Card Assembly (CCA) A1 (11).

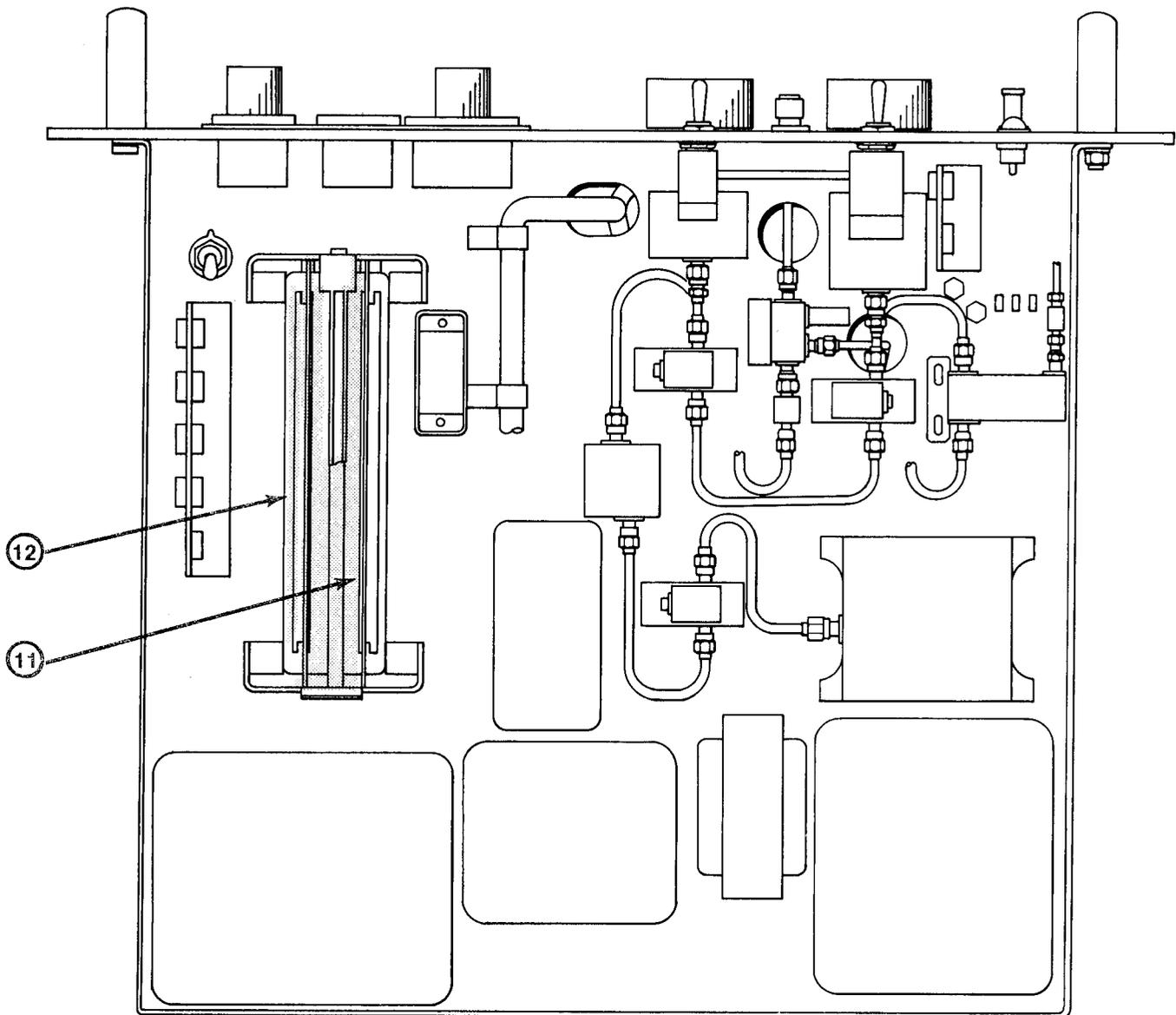


- (8) CR3 - LINEAR MODULATOR - Used to amplitude modulate the RF signal from the VCO (6) and is controlled by the CS and Pulse Control CCA AZ (12).
- (9) 1A3/A4-A3 - MOD DEPTH CONTROL ASSY - Nine potentiometers used to adjust the depth of modulation at 1, 2, 3, 6, 9, 12, 15, 20 and 25 dB.
- (10) S8 - NORMAL-PATTERN SYNC - Provides either PULSE SYNC or PATTERN SYNC to SYNC PULSE JACK (J4) on front panel.

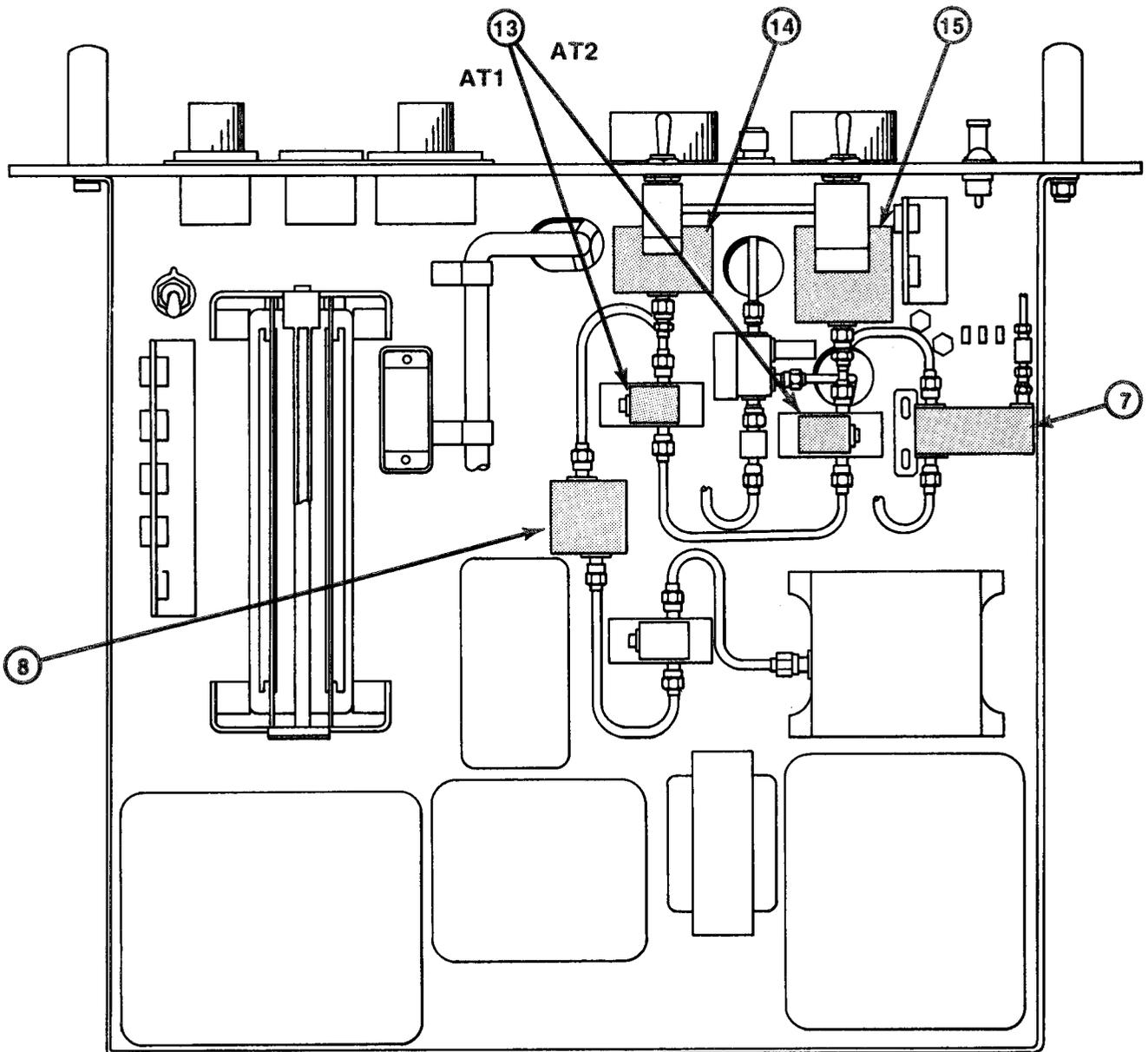


LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

- (11) 1A3/A4-A1 - PULSE GENERATOR CIRCUIT BOARD - Generates Pulse Repetition Interval (PRI), Pulse Width (PW) and Conical Scan (CS) frequency.
- (12) 1A3/A4-A2 - CS AND PULSE CONTROL CIRCUIT BOARD - Controls Pulse Repetition Interval (PRI) parameters and shapes the conical scan modulation signals.

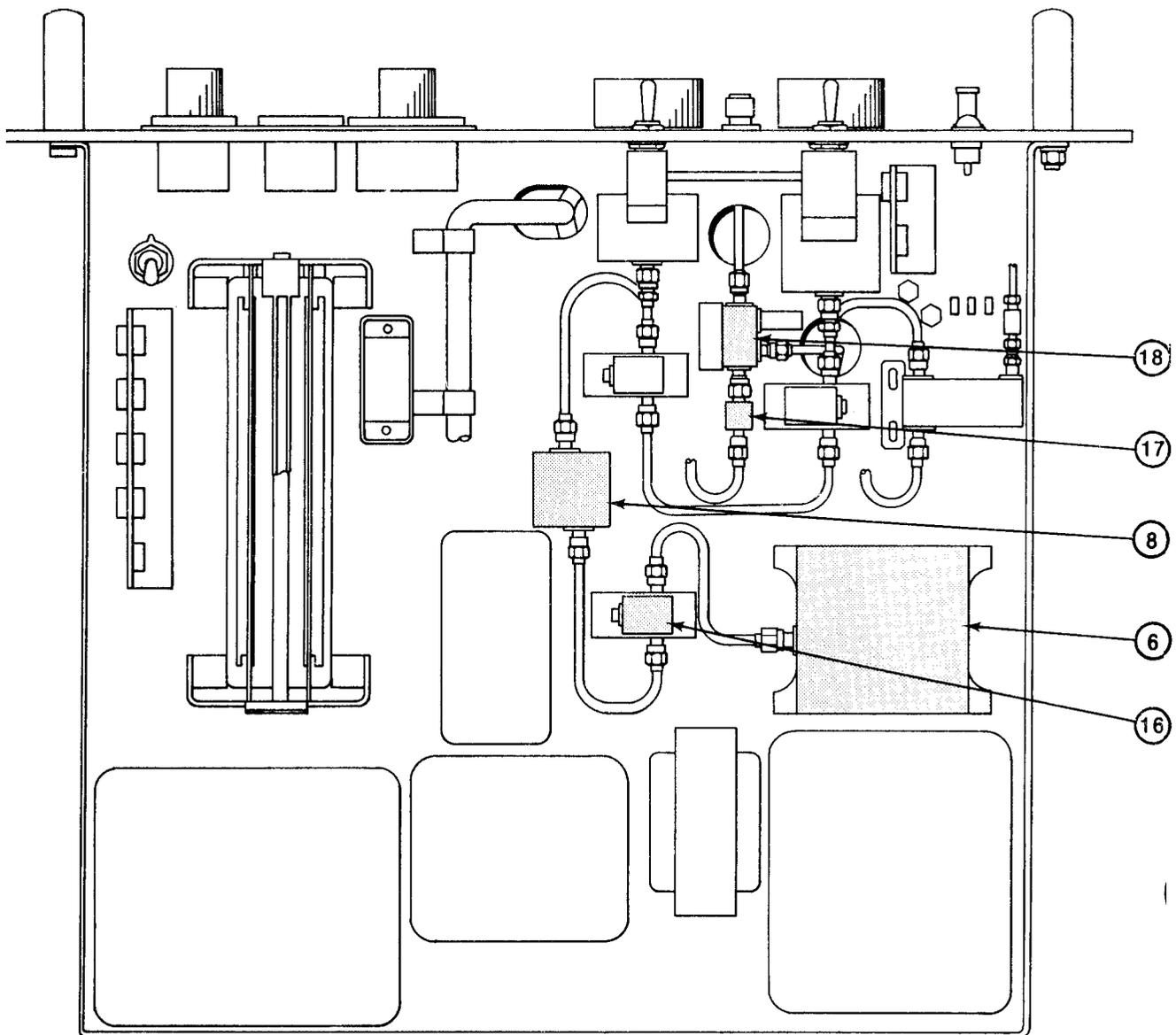


- (13) AT1-AT2 - RF ISOLATORS - Block any reflection of power from PIN Switch Diode CR2 (7) to Linear Modulator CR3 (8).
- (14) AT3 - VARIABLE ATTENUATOR 0-9 dB - Attenuates the RF output signal in steps from 0 to 9 dB.
- (15) AT4 - VARIABLE ATTENUATOR 0-60 dB - Attenuates the RF output signal in steps of 10 dB from 0 to 60 dB.



LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Continued)

- (16) AT5 - RF ISOLATOR - Blocks any reflection of power from Linear Modulator CR3 (8) to Voltage Controlled Oscillator Y1 (6).
- (17) A3 - DC BLOCK - Blocks direct current from flowing through Directional Coupler DC1 (18) to UUT.
- (18) DC1 - DIRECTIONAL COUPLER - Splits RF to RF OUTPUT HIGH (J1) on front panel and to RF OUTPUT Low (J2) on the rear panel.



EQUIPMENT DATA

1-11.

a. Leading Particulars. Table 1-4 provides a summary of the electrical characteristics of the bench test set.

b. Power Supply Information. Table 1-5 provides specifications on the bench test set power supplies.

c. Indicator Information. Table 1-6 provides information on the bench test set indicators.

d. Switch information. Table 1-7 provides information on the bench test set switches.

e. Cable information. Table 1-8 provides information on the cables used to interconnect the bench test set to LRU-1 or to the flight line test set.

TABLE 1-4. LEADING PARTICULARS

ITEM	CHARACTERISTICS
POWER TO BTS	105-125 volts ac 10, 50-60 Hz, 3 amps
POWER TO BTS AND UNIT UNDER TEST (UUT)	28 volts dc - 30 amps
PULSE REPETITION INTERVAL (PRI) RANGE	A-W 260 to 380 μ s
	A-F 267 to 276 μ s
	B
	Primary PRI = 760 μ s
	Secondary PRI = 350 μ s
	Variable PRI - 300 to 999 μ s in 1 μ s steps

TABLE 1-4. LEADING PARTICULARS (Continued)

ITEM	CHARACTERISTICS
PULSE WIDTH (PW) RANGE	0.1 to 9.9 μ s in 0.1 μ s-steps
RF FREQUENCY RANGE	Three preset adjustable frequencies F1 F2 F3
RF POWER OUTPUT LEVELS	HIGH - +3 dBm maximum at the RF OUT jack J1 on the RF Modulation Assemblies 1A3/1A4 LOW - -10 dBm minimum at combined RF jack J4 on the BTS connector panel
C S MOD DEPTH (Conical Scan Modulation Depth)	Adjustable from 0-25 dB in steps of 0, 1, 2, 3, 6, 9, 12, 15, 20 and 25.
OPERATING TEMPERATURE	+32°F to +131°F (0°C to 55°C)
STORAGE TEMPERATURE	-70°F to 160°F (-57°C to +71°C)

TABLE 1-5. BTS POWER SUPPLY INFORMATION

POWER SUPPLY	FUNCTION AND CHARACTERISTICS
1A1PS1	Supplies -15 V to the YIG FILTER in the Status Panel Assembly 1A2. The characteristics of the Power Supply are: INPUT VOLTAGE 105-125 V ac, 50-420 Hz OUTPUT VOLTAGE -14.85 to -15.15 V OUTPUT CURRENT 0.1 amp REGULATED - Yes OVERVOLTAGE PROTECTION - No SHORT CIRCUIT PROTECTION - Yes

TABLE 1-5. BTS POWER SUPPLY INFORMATION (Continued)

POWER SUPPLY	FUNCTION AND CHARACTERISTICS
1A1PS2	<p>Supplies +15 V to the YIG FILTER in the Status Panel Assembly 1A2. The characteristics of the power supply are:</p> <p>INPUT VOLTAGE 105-125 V ac, 50-420 Hz</p> <p>OUTPUT VOLTAGE +14.85 to +15.15 V dc</p> <p>OUTPUT CURRENT - 1.0 amp</p> <p>REGULATED - Yes</p> <p>OVERVOLTAGE PROTECTION - No</p> <p>SHORT CIRCUIT PROTECTION - Yes</p>
1A1PS3	<p>Supplies +10 V to the YIG FILTER CONTROL switch (S3) in Control Panel Assembly 1A1. The characteristics of the power supply are:</p> <p>INPUT VOLTAGE 105-125 V ac, 50-420 Hz</p> <p>OUTPUT VOLTAGE +9.9 to +10.1 V dc</p> <p>OUTPUT CURRENT - 0.12 amp</p> <p>REGULATED- Yes</p> <p>OVERVOLTAGE PROTECTION - No</p> <p>SHORT CIRCUIT PROTECTION - Yes</p>
1A2PS1	<p>Supplies +12 V to the status signal and forcing function lamps in the Status Panel Assembly 1A2. The characteristics of the power supply are:</p> <p>INPUT VOLTAGE 105-125 V ac, 50-420 Hz</p> <p>OUTPUT VOLTAGE - Adjustable from +11.4 to +12.5V</p> <p>OUTPUT CURRENT 3.0 amps</p> <p>REGULATED- Yes</p> <p>OVERVOLTAGE PROTECTION - Yes</p> <p>SHORT CIRCUIT PROTECTION - Yes</p>

TABLE 1-5. BTS POWER SUPPLY INFORMATION (Continued)

POWER SUPPLY	FUNCTION AND CHARACTERISTICS
1A3/1A4PS1	<p>Supplies +5 V to digital and RF circuits in 1A3/1A4. The characteristics of the power supply are:</p> <p style="padding-left: 40px;">INPUT VOLTAGE - 105-125 V ac, 50-420 Hz</p> <p style="padding-left: 40px;">OUTPUT VOLTAGE Adjustable from 4.7 to 5.3 V dc</p> <p style="padding-left: 40px;">OUTPUT CURRENT 6.0 amps</p> <p style="padding-left: 40px;">REGULATED - Yes</p> <p style="padding-left: 40px;">OVERVOLTAGE PROTECTION - Yes (Built-in turn-off circuit)</p> <p style="padding-left: 40px;">SHORT CIRCUIT PROTECTION - Yes</p>
1A3/1A4PS2	<p>Supplies +15 V to digital and RF circuits in 1A3/1A4. The characteristics of the power supply are:</p> <p style="padding-left: 40px;">INPUT VOLTAGE 105-125 V ac, 50-420 Hz</p> <p style="padding-left: 40px;">OUTPUT VOLTAGE - Adjustable from +13.7 to +15.2 V</p> <p style="padding-left: 40px;">OUTPUT CURRENT - 1.5 amps</p> <p style="padding-left: 40px;">REGULATED - Yes</p> <p style="padding-left: 40px;">OVERVOLTAGE PROTECTION - No</p> <p style="padding-left: 40px;">SHORT CIRCUIT PROTECTION - Yes</p>
1A3/1A4PS3	<p>Supplies -65 V to the voltage controlled oscillator (VCO). The characteristics of the power supply are:</p> <p style="padding-left: 40px;">INPUT VOLTAGE - 105-125 V ac, 50-420 Hz</p> <p style="padding-left: 40px;">OUTPUT VOLTAGE - Adjustable from -59.0 to -65.0 V</p> <p style="padding-left: 40px;">OUTPUT CURRENT .05 amps</p> <p style="padding-left: 40px;">REGULATED - Yes</p> <p style="padding-left: 40px;">OVERVOLTAGE PROTECTION - Yes (Built-in turn-off circuit)</p> <p style="padding-left: 40px;">SHORT CIRCUIT PROTECTION - Yes</p>

TABLE 1-5. BTS POWER SUPPLY INFORMATION (Continued)

POWER SUPPLY	FUNCTION AND CHARACTERISTICS
1A3/1A4PS4	<p>Supplies -15 V to digital and RF circuits in 1A3/1A4. The characteristics of the power supply are:</p> <p style="padding-left: 40px;">INPUT VOLTAGE 105-125 V ac, 50-420 Hz</p> <p style="padding-left: 40px;">OUTPUT VOLTAGE -14.85 to -15.15 V</p> <p style="padding-left: 40px;">OUTPUT CURRENT 0.1 amps</p> <p style="padding-left: 40px;">REGULATED - Yes</p> <p style="padding-left: 40px;">OVERVOLTAGE PROTECTION - No</p> <p style="padding-left: 40px;">SHORT CIRCUIT PROTECTION - Yes</p>

TABLE 1-6. BTS INDICATOR INFORMATION

INDICATOR	FUNCTION
1A1S4/D11	<p>JAM/TEST/GO/NO-GO - When pressed, initiates built-in-test equipment (BITE) in LRU-1 under test.</p> <p>JAM - Lights when LRU-1 under test has acquired a simulated threat and has activated ECM.</p> <p>TEST - Lights when BITE in LRU-1 under test has been initiated.</p> <p>GO - Lights when LRU-1 under test is operating correctly.</p> <p>NO-GO - Lights when a fault is detected in LRU-1 under test.</p>
1A1DS2	<p>INOP - Lights when the LRU-1 under test detects a fault in the pulsed TWT (AR1) or if a high temperature condition is sensed.</p>
1A1DS3	<p>POWER - Lights when the +15 V power supply is enabled, showing breaker-POWER 115 V ac is turned on.</p>
1A2DS1	<p>SORTER LOAD COMMAND (CHANNEL 1) - Lights when the first pulses are received in LRU-1 under test via supervisory control section of the CM set.</p>
1A2DS2	<p>SLO LOAD COMMAND (CHANNEL 1) - Lights when a PRI is acquired by sorter No. 1 in LRU-1 under test.</p>
1A2DS3	<p>THREAT A (CHANNEL 1) - Lights when the A-W or A-F threats are detected in channel 1 in LRU-1 under test</p> <p>CON SCAN (CHANNEL 1) - Lights when a conical scan modulation pattern generated by the BTS is detected in channel 1 in the LRU-1 under test.</p>

TABLE 1-6. BTS INDICATOR INFORMATION (Continued)

INDICATOR	FUNCTION
1A2DS5	SLO ACCURACY (CHANNEL 1) - Lights when SLO 1 in LRU-1 under test has locked on to the threat frequency.
1A2DS6	SORTER LOADED (CHANNEL 1) - Lights when sorter 1 in LRU-1 under test is in the tracking mode.
1A2DS7	SLO LOADED (CHANNEL 1) - Lights when the SLO in channel 1 in LRU-1 under test has acquired the threat frequency.
1A2DS8	THREAT B (CHANNEL 1) - Lights when the B threat is detected in channel 1 in LRU-1 under test.
1A2DS9	TC RANGE JAM (CHANNEL 1) - Lights when range deception is being transmitted in channel 1 of LRU-1 under test.
1A2DS10	SPARE - Included for future expansion.
1A2DS11	SORTER LOAD COMMAND (CHANNEL 2) - Lights when the first pulses are received in LRU-1 under test via supervisory control section of LRU-1.
1A2DS12	SLO LOAD COMMAND (CHANNEL 2) - Lights when a PRI is acquired by sorter No.2 in LRU-1 under test.
1A2DS13	THREAT A (CHANNEL 2) - Lights when the A-W or A-F threats are detected in channel 2 in LRU-1 under test.
1A2DS14	CON SCAN (CHANNEL 2) - Lights when a conical scan modulation pattern generated by the BTS is detected in channel 2 in LRU-1 under test.
1A2DS15	SLO ACCURACY (CHANNEL 2) - Lights when SLO 2 in LRU-1 under test has locked on to the threat frequency.
1A2DS16	SORTER LOADED (CHANNEL 2) - Lights when sorter 2 in LRU-1 under test is in the tracking mode.
1A2DS17	SLO LOADED (CHANNEL 2) - Lights when the SLO in channel 2 in LRU-1 under test has acquired the threat frequency.
1A2DS18	THREAT B (CHANNEL 2) - Lights when the B threat is detected in channel 2 in LRU-1 under test.
1A2DS19	TC RANGE JAM (CHANNEL 2) - Lights when range deception is being transmitted in channel 2 of the LRU-1 under test.
1A2DS20	SPARE - Included for future expansion.
1A2DS21	Lights green to indicate +12V power for status panel.

TABLE 1-7. BTS SWITCH INFORMATION

SWITCH	FUNCTION
1A1S1	LAMP TEST - Pushbutton switch, when pressed lights the JAM/TEST/GO/NO-GO (1A1S4/D11) and INOP (1A1DS2) indicators on the control panel assembly.
1A1S2	YIG FILTER IN OUT - Switch used to switch the YIG FILTER (FL1) "IN" or "OUT" of the RF path in Status Panel Assembly 1A2.
1A1S3	YIG FILTER CONTROL - Three decade thumbwheel switch used to tune the YIG filter in the Status Panel Assembly 1A2.
1A2S1	OSCILLOSCOPE MONITOR - Dual concentric rotary 18 position switch used for selecting 17 test points in the LRU-1 under test or 1 signal from the RF Modulation Assembly 1A3/1A4.
1A2S2	VOLTAGE MONITOR - Nine-position rotary switch used to monitor the nine dc voltages in LRU-1 under test.
1A2S3	DET VIDEO/UUT SIGNAL - Two position toggle switch. When in the DET VIDEO position, enables the monitoring of detected RF from the LRU-1 under test. When in the UUT position, enables the selection of one of 17 test points from LRU-1 under test, or 1 signal from BTS via OSCILLOSCOPE MONITOR switch 1A2S1A.
1A2S4	RESET - Pushbutton switch - When pressed provides a master reset signal to LRU-1 under test.
1A2S5	SORTER 1 LOAD - Alternate action pushbutton - When enabled, sends a load command to sorter 1 of LRU-1 under test.
1A2S6	SORTER 1 OVRD - Alternate action pushbutton - When enabled, prevents sorter 1 from locking to any input signal.
1A2S7	SORTER 2 LOAD - Alternate action pushbutton - When enabled, sends a load command to sorter 2 of LRU-1 under test.
1A2S8	SORTER 2 OVRD - Alternate action pushbutton - When enabled, prevents sorter 2 from locking to any input signal.
1A2S9	MOD DRIVE INHIBIT - Alternate action pushbutton - When enabled, scan modulation is disabled in LRU-1 under test.

TABLE 1-7. BTS SWITCH INFORMATION (Continued)

SWITCH	FUNCTION
1A2S10	NOISE INHIBIT - Alternate action pushbutton - When enabled inhibits random noise ECM in LRU-1 under test.
1A2S11	SW-3 INHIBIT - Alternate action pushbutton - When enabled inhibits SW-3 ECM in LRU-1 under test.
1A2S12	CP - Alternate action pushbutton - When enabled inhibits pulse program in LRU-1 under test.
1A2S13	LAMP TEST - Pushbutton switch - When pressed provides a ground return to light the status signal lamps and forcing function lamps on status panel.
1A2S14	<p>SWITCH COAXIAL - Enabled by the YIG FILTER IN-OUT switch on control panel.</p> <p>IN Position - YIG filter and driver control (FL1) is connected into the RF path of status panel.</p> <p>OUT Position - YIG filter and driver control (FL1) is disconnected from RF path.</p>
1A2S15	<p>SWITCH COAXIAL - Enabled by the YIG FILTER IN-OUT Switch on control panel.</p> <p>IN POSITION - YIG filter and driver control (FL1) is connected into the RF path of status panel.</p> <p>OUT POSITION - YIG filter and driver control (FL1) is disconnected from RF path.</p>
1A3/1A4S1	FREQ SEL (F1-F2-F3) - Three position toggle switch - Selects the low, mid and high RF frequencies directed to the UUT.
1A3/1A4S2	CS FREQ - Two decade thumbwheel switch- Sets conical scan (CS) frequency in 1 Hz steps from 0 to 99.
1A3/1A4S3	OUT SEL (PULSE/CW) - Two position toggle switch - Selects either pulse modulation of RF signal or Continuous Wave (CW) RF output to LRU-1 under test.
1A3/1A4S4	PW - Two decade thumbwheel switch - Sets the pulse width from 0.1 to 9.9 microseconds in 0.1 microsec steps.

TABLE 1-7. BTS SWITCH INFORMATION (Continued)

SWI TCH	FUNCTION
1A3/1A4S5	PRI - Three decade thumbwheel switch - Sets the PRI from 300 to 999 microseconds in 1 microsecond steps.
1A3/1A4S6	CS MOD DEPTH - Ten-position rotary switch - Sets the depth of CS modulation to 0, 1, 2, 3, 6, 9, 12, 15, 20 or 25 dB.
1A3/1A4S7	PRI SELECT - Five position rotary switch - Selects one of three preset pulse repetition intervals A-W/A-F/EI or a VAR PRI set by PRI switch S5.
1A3/1A4S8	SYNC (NORMAL/PATTERN) - Two position toggle switch (located inside the 1A3/1A4 chassis). Provides either pulse sync or pattern sync to the SYNC PULSE Jack (J4) on the front panel.

TABLE 1-8. BTS CABLE INFORMATION

ITEM	CABLE	FUNCTION
1	W1	CONTROL and STATUS - Connects MONITOR (LRU-1) 1J7 to MONITOR (BTS) 1J1. Used to interface the Status Panel Assembly 1A2 of the BTS with LRU-1 under test.
2	W2	CONTROL - Connects the CONTROL (BTS) 1J2 to CONTROL (LRU-1) 1J2. Connects power and control signals from the (BTS) Control Indicator 1A1A1 to LRU-1 under test.
3	W3	POWER - Connects the 28V POWER (BTS) 1J3 to POWER (LRU-1) 1J1. Supplies 28 Vdc to LRU-1 under test.
4	W4	RF COAX - Connects the RF OUT (LRU-1) 1J4 to RF IN (BTS) 1A2 J2 through 30 dB attenuator. Used to sample the RF output of LRU-1 under test.
5	W5	RF COAX - Connects either the CMBD RF (BTS) 1J4 or the RF OUT (BTS) 1A3/1A4J1 to RF IN (LRU-1) 1J3. Used to supply CW or pulse and pattern modulated RF to LRU-1 under test.
6	W6	INPUT POWER - Connects 115V-60 Hz (BTS) 1J5 to the ac power source.
7	W7	INPUT POWER - Connects 28 VDC (BTS) 1J6 to the 28 Vdc power supply.
8	W8	BLANKING - Connects BLANKING (BTS) 1A3/1A4 J6 to BLK IN (LRU-1) 1J5. Used to test external aircraft blanking circuits of LRU-1 under test.
9	W9	VOLTAGE MONITOR - Connects V MON (BTS) 1A2J6 to the digital multimeter. Used to monitor dc voltages in LRU-1 under test.
10	W10	<p>VIDEO CABLES - Three cables which connect:</p> <p style="padding-left: 40px;">CHAN 1 (BTS) 1A2J4 to CHAN 1 of the oscilloscope.</p> <p style="padding-left: 40px;">CHAN 2 (BTS) 1A2J5 to CHAN 2 of the oscilloscope.</p> <p style="padding-left: 40px;">SYNC (BTS) 1A3/1A4J4 PULSE to the external sync input of the oscilloscope</p> <p>Used to monitor various test points in LRU-1 under test.</p>

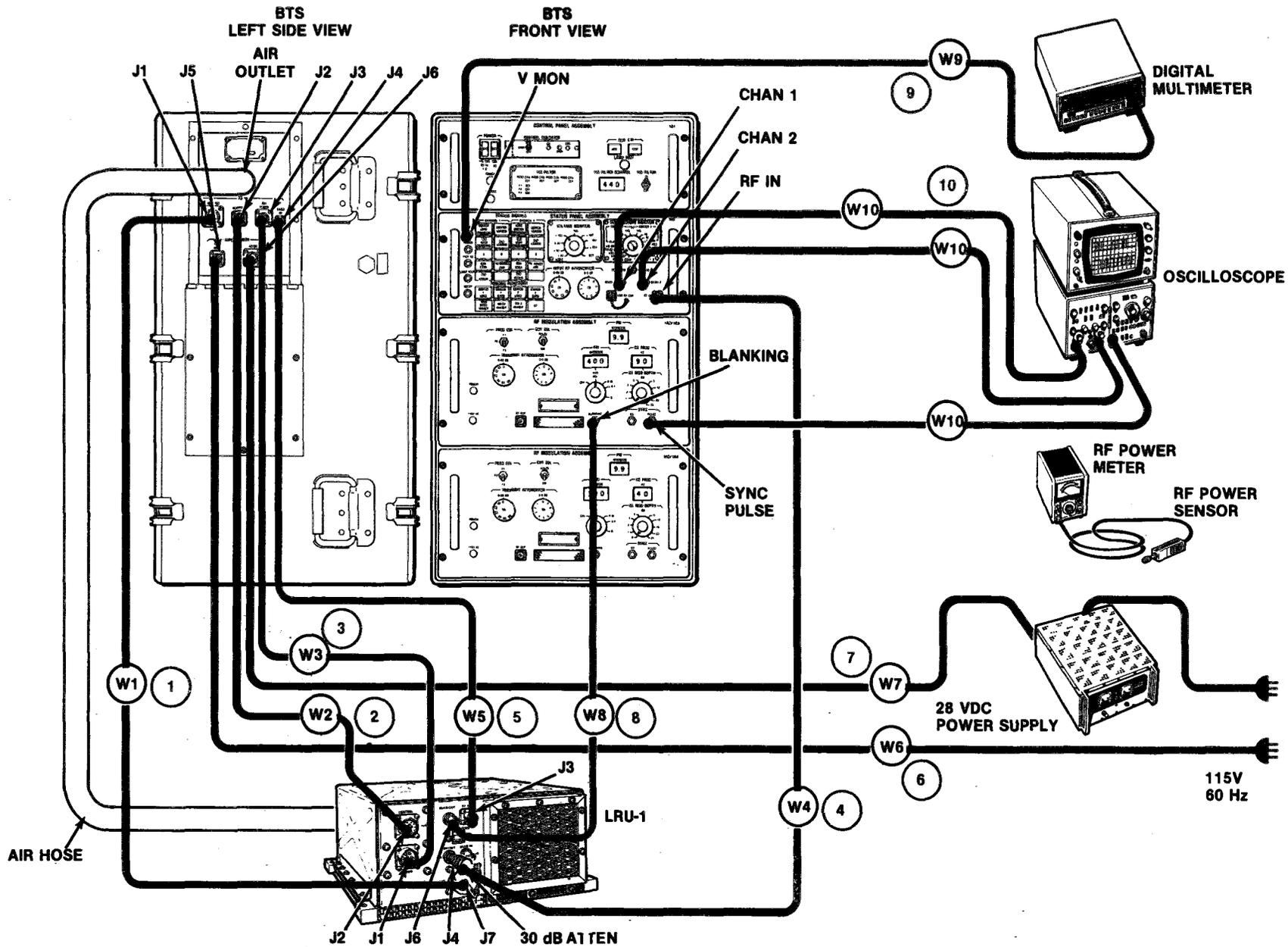
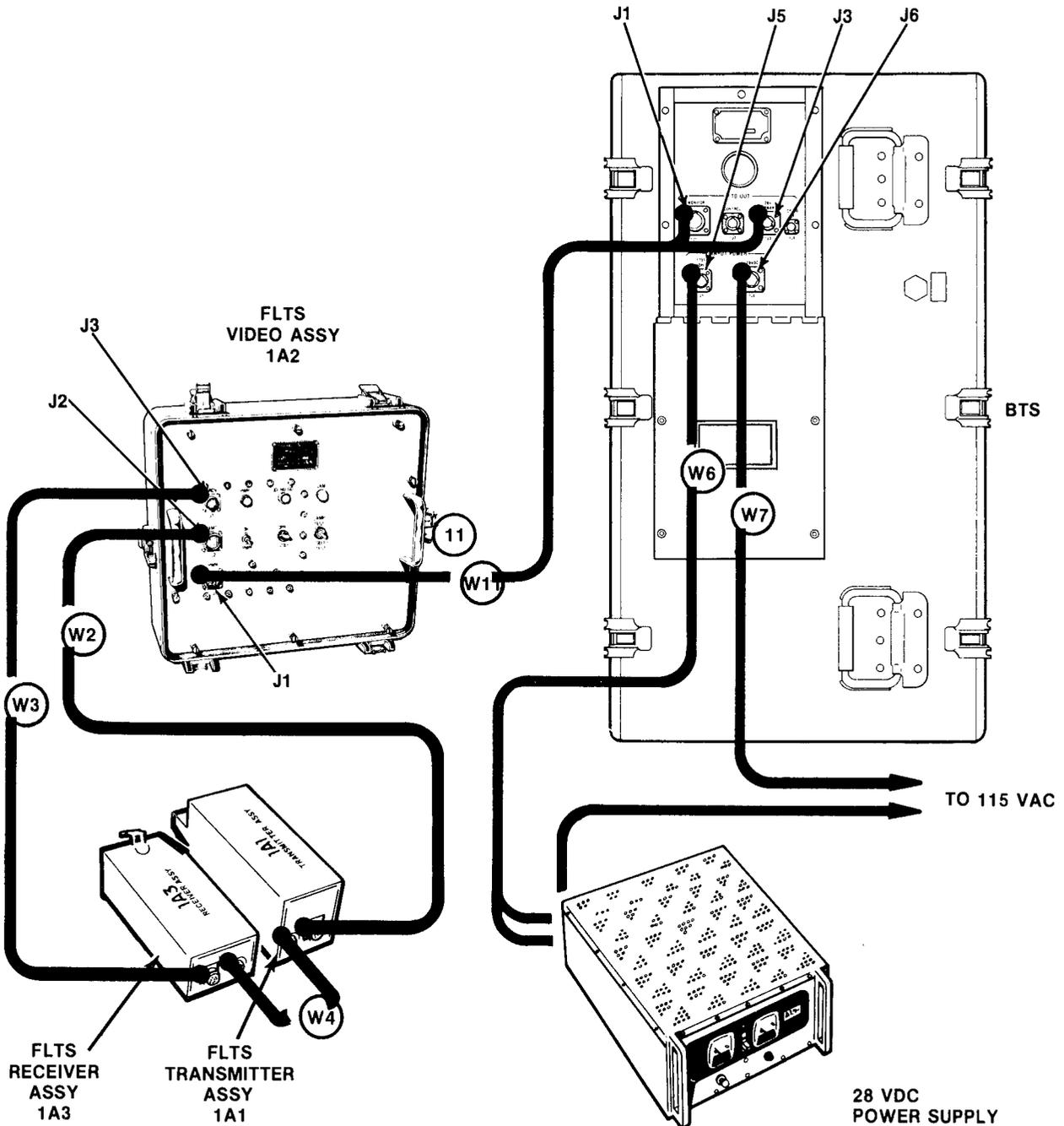


TABLE 1-8. BTS CABLE INFORMATION (Continued)

ITEM	CABLE	FUNCTION
11	W11	MONITOR and POWER - Connects (BTS) MONITOR 1J1 and POWER 1J3 to FLTS PWR 1A2J1. Used to perform AVIM on the flight line test set.



EQUIPMENT CONFIGURATION

1-12.

- a. Equipment Supplied. Table 1-9 provides a summary of the functions of the BTS equipment units.
- b. Equipment Required but not Supplied. Table 1-10 provides a summary for the equipment required but not supplied with the BTS.

TABLE 1-9. EQUIPMENT SUPPLIED

QTY	NOMENCLATURE	FUNCTION
1	COMBINATION CASE	Houses four major assemblies 1A1, 1A2, 1A3 and 1A4. Front cover provides storage for ancillary equipment. Rear cover provides access to equipment.
1	CONTROL PANEL ASSY. (1A1)	Provides the following: <ul style="list-style-type: none"> ● AC power distribution to BTS. ● DC power distribution to UUT. ● YIG FILTER control. ● Fault and status indicators ● CONTROL INDICATOR - Controls LRU-1 under test.
1	STATUS PANEL ASSY. (1A2)	Provides the following: <ul style="list-style-type: none"> ● Monitoring of power, RF and video signals on UUT. ● Monitoring of STATUS SIGNALS on LRU-1 under test. ● Manual control of functions in UUT.
2	RF MODULATION ASSY. (1A3/1A4)	Provides the following: <ul style="list-style-type: none"> ● Generation of CW, pulse and CS modulated RF signals to UUT.

TABLE 1-9. EQUIPMENT SUPPLIED (Continued)

QTY	NOMENCLATURE	FUNCTION
2	RF MODULATION ASSY. (Con' t)	<ul style="list-style-type: none"> ● Setting of PW, PRI, CS FREQ and CS MOD DEPTH. ● Control of RF generated to UUT.
1	FRONT COVER	Provides storage for the ancillary equipment. <ul style="list-style-type: none"> ● Cable assemblies and air hose. ● Adapters - RF, test point, air hose and torque wrench. ● Clamps for air hose. ● RF Attenuator (30 dB). ● Circuit card extractor.

TABLE 1-10. EQUIPMENT REQUIRED BUT NOT SUPPLIED

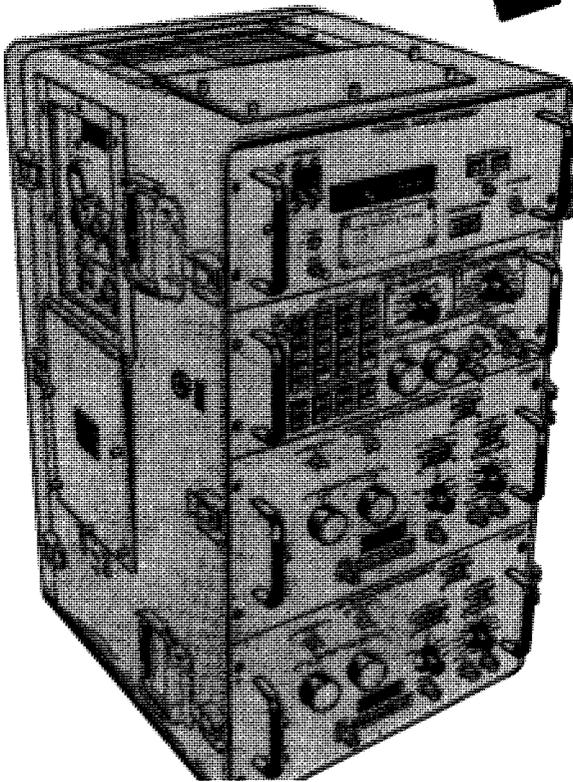
QTY	NOMENCLATURE	FUNCTION
1	OSCILLOSCOPE AN/USM-281A	Provides for the monitoring of detected video and the standard logic levels of LRU-1 under test. Logic 1 = +2.4 to 5.0 Volts Logic 0 = 0 to 0.6 Volts
	Including:	
1	AMPLIFIER, VERTICAL PLUG-IN	Amplifies test signals - 2 channels.
1	TIME BASE AND DELAY GENERATOR PLUG-IN	Provides time base and trigger delay.
1	DIGITAL MULTIMETER AN/USM-451	Provides for the monitoring of voltage, current and resistance in UUT.
1	+28V POWER SUPPLY PP-1104G	Provides prime power to UUT via the BTS. Also provides power for some BTS circuits.
1	RF POWER METER HP 435A	Provides RF power measurement while performing AVIM on UUT and the BTS.
1	RF POWER SENSOR HP 8481A	Senses RF power

SAFETY, CARE AND HANDLING

1-13.

The following safety precautions are for YOU the AVIM Technician,

and for the BTS equipment.

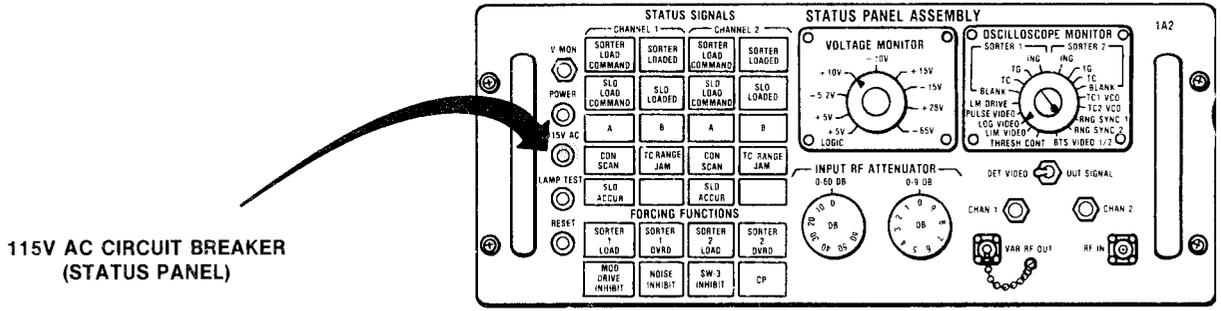


WARNING

High voltage is used in the operation of this equipment. Avoid contacting high-voltage connections when installing or operating this equipment. Injury or death may result if personnel fail to observe safety precautions.

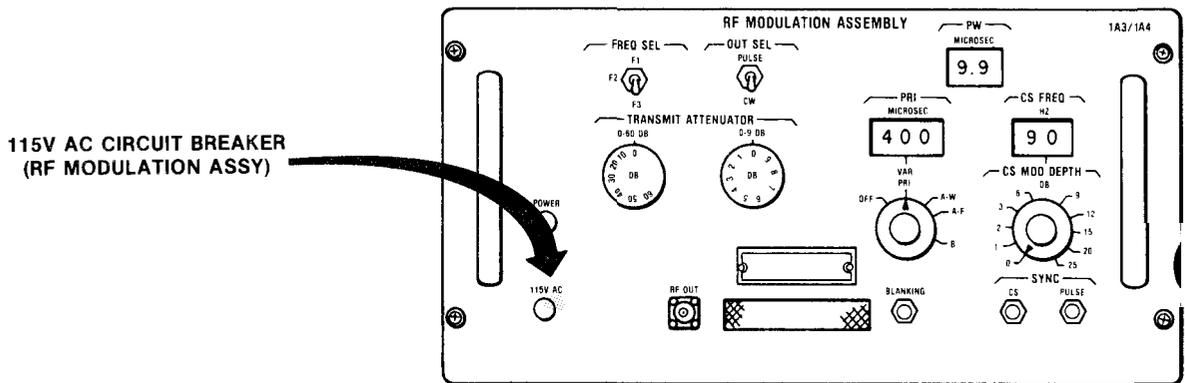
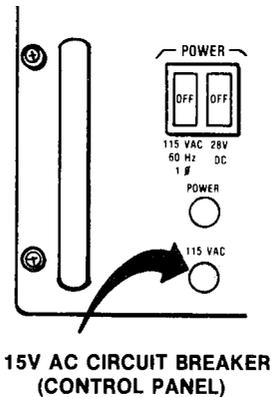
The BTS weighs 250 pounds. Four person lift. Handle with care to prevent personal injury or equipment damage.

SAFETY, CARE AND HANDLING (Continued)



CAUTION

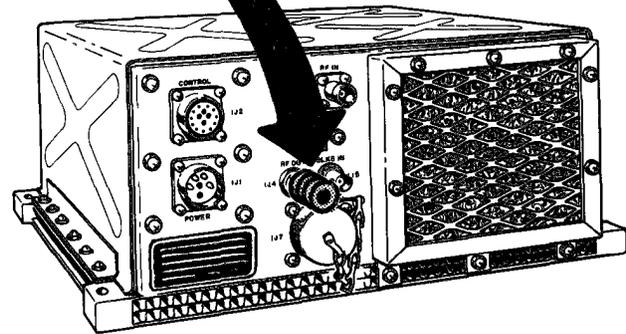
Circuit breakers, designated 115 VAC, on the front of the control panel, status panel and each of the two RF modulation assemblies are push-to-reset types. When the circuit breaker is closed, it is depressed in its housing concealing the side surface. When the breaker is open, a button protrudes from its housing displaying a white side surface. This visible white side surface on the button shows the breaker is open. These circuit breakers are not intended be used as on/off switches. Energizing/de-energizing of the bench test set is only to be controlled by use of 115 VAC 60 Hz, 10 POWER circuit breaker CB2 on the front of the control panel.



CAUTION

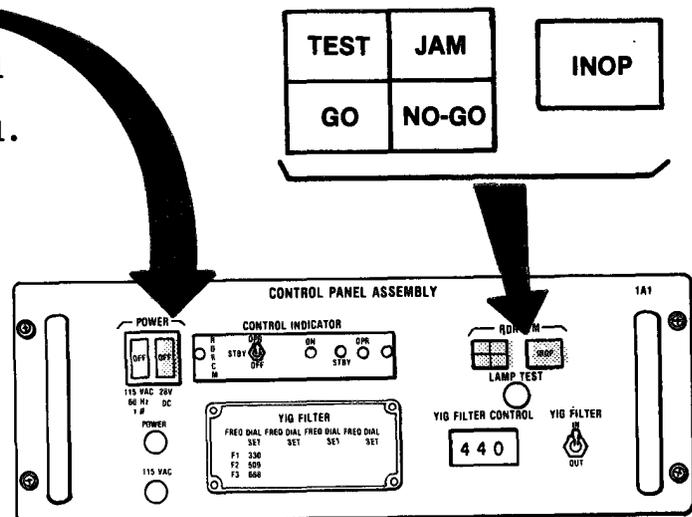
Connect a 30 dB attenuator supplied with the BTS to the RF OUT jack J4 when testing LRU-1.

Operating without this attenuator will damage the BTS and LRU-1.



CAUTION

If the INOP and the JAM indicator lights are off, turn off 28VDC circuit breaker on the control panel. This is an overheat condition in LRU-1 under test. Prolonged operation at elevated temperature will damage LRU-1.



SAFETY CARE AND HANDLING (Continued)

CAUTION

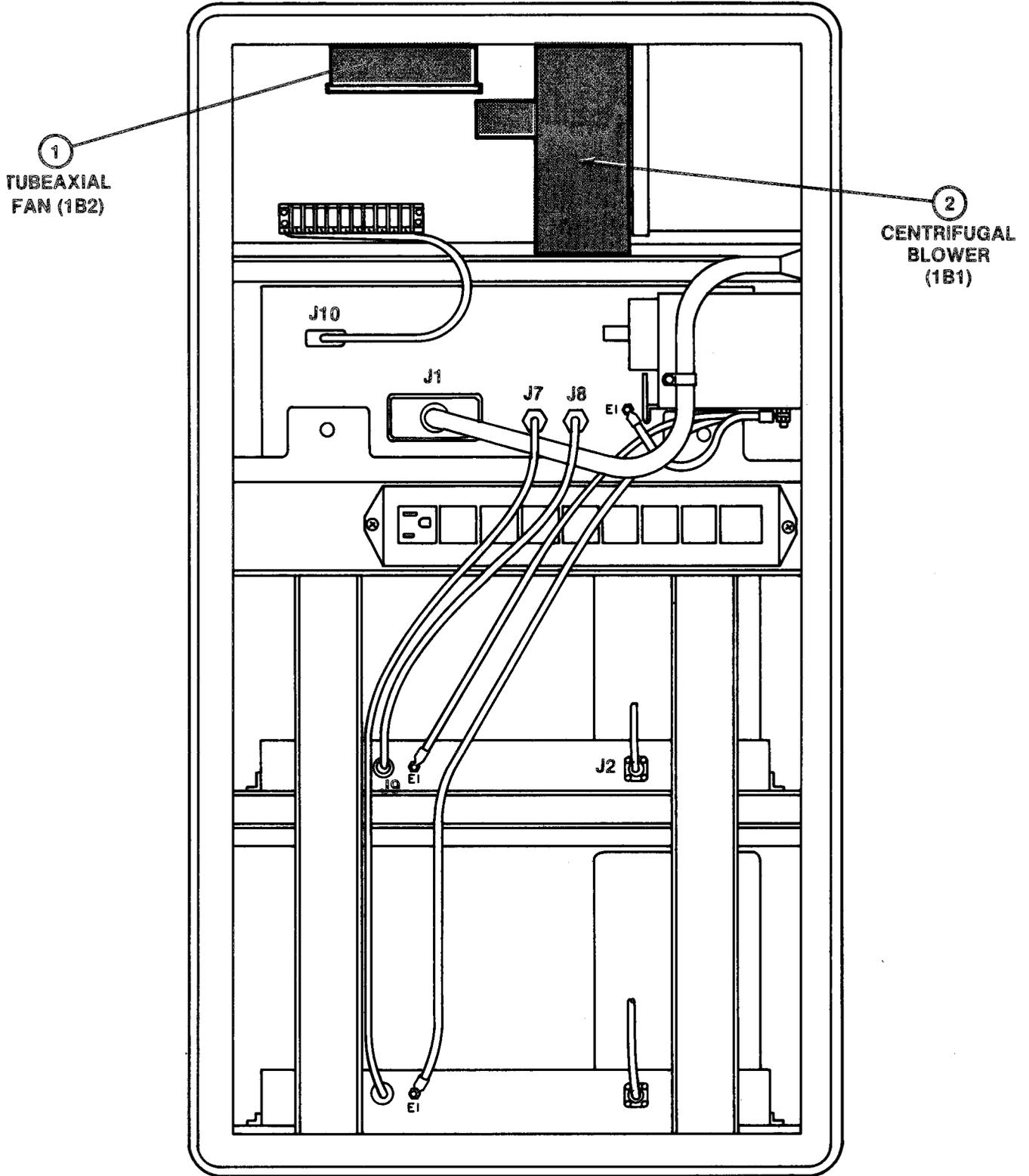
Blower Failure. In the event of a failure of the BTS tubeaxial fan (1) 1B2 (fan), remove the rear cover from the BTS to promote air circulation. Use an external fan to direct air from the rear toward the two RF modulation assemblies to cool them.

Replace a defective BTS fan promptly. Prolonged operation without it will damage the BTS.

CAUTION

If a failure of the Centrifugal Blower (2) 1B1 (blower) occurs, turn off the 28VDC circuit breaker on control panel.

Replace the defective BTS blower promptly. Operation without it will damage LRU-1 under test.



BTS (REAR VIEW)

CHAPTER 2

PRINCIPLES OF OPERATION

SECTION I

OVERALL BLOCK DIAGRAM DESCRIPTION

<u>SECTION CONTENTS</u>	<u>PAGE</u>
INTRODUCTION	2-1
BLOCK DIAGRAM DESCRIPTION	2-2
CONTROL PANEL ASSEMBLY 1A1	2-2
STATUS PANEL ASSEMBLY 1A2	2-5
RF MODULATION ASSEMBLIES 1A3/1A4	2-10

INTRODUCTION

2-1. This chapter describes the principles of operation of the bench test set (BTS). The chapter is divided into two sections:

SECTION I: OVERALL BLOCK DIAGRAM DESCRIPTION (fig. F0-1)

SECTION II: FUNCTIONAL BLOCK DIAGRAM DESCRIPTION

- CONTROL AND POWER DISTRIBUTION (fig. F0-2)
- RF MODULATION (fig. F0-3)
- PULSE MODULATION (fig. F0-4)
- LINEAR MODULATION (fig. F0-5)
- STATUS AND MONITORING (fig. F0-6)

INTRODUCTION(Continued)

Section I provides the overall block diagram description. The following units of the bench test set will be discussed:

- CONTROL PANEL ASSEMBLY 1A1
- STATUS PANEL ASSEMBLY 1A2
- RF MODULATION ASSEMBLY 1A3
- RF MODULATION ASSEMBLY 1A4

Section II provides a more detailed description of each of the major functions of the bench test set.

Foldout block diagrams and functional block diagrams of the BTS are included in the rear of this manual in Appendix C for reference purposes.

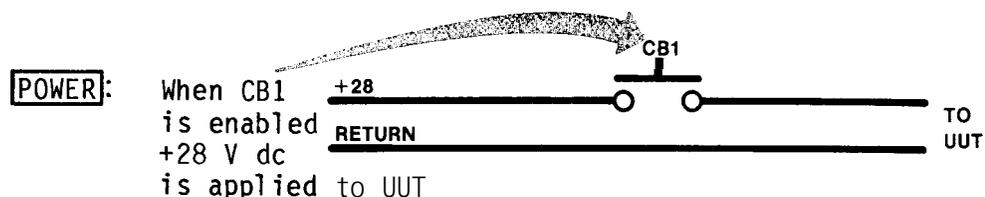
BLOCK DIAGRAM DESCRIPTION

2-2. (Refer to figure F0-1.) The bench test set consists of four assemblies, Control Panel Assembly 1A1, Status Panel Assembly 1A2, and two identical RF Modulation Assemblies 1A3 and 1A4.

a. Control Panel Assembly 1A1. (Refer to figure F0-1.)
 The control panel assembly is divided into two functional areas.

- Power, Control, Error and Status to and from LRU-1.
- Power to the bench test set for AC Power, distribution, cooling, and YIG FILTER CONTROL.

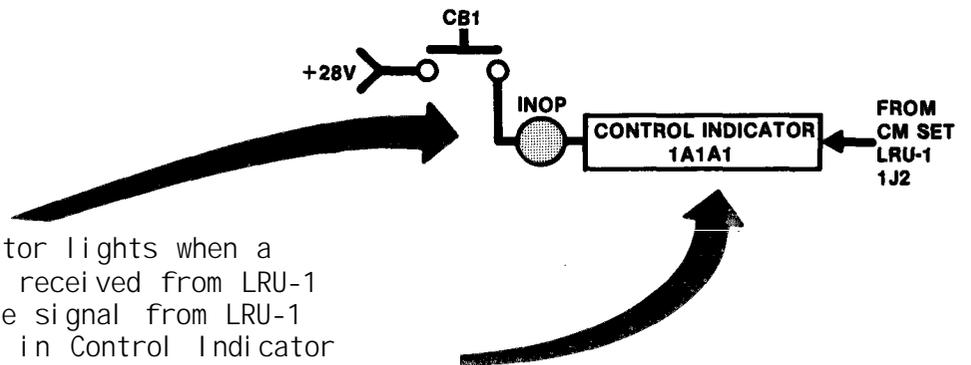
(1) Power, Control, Error & Status



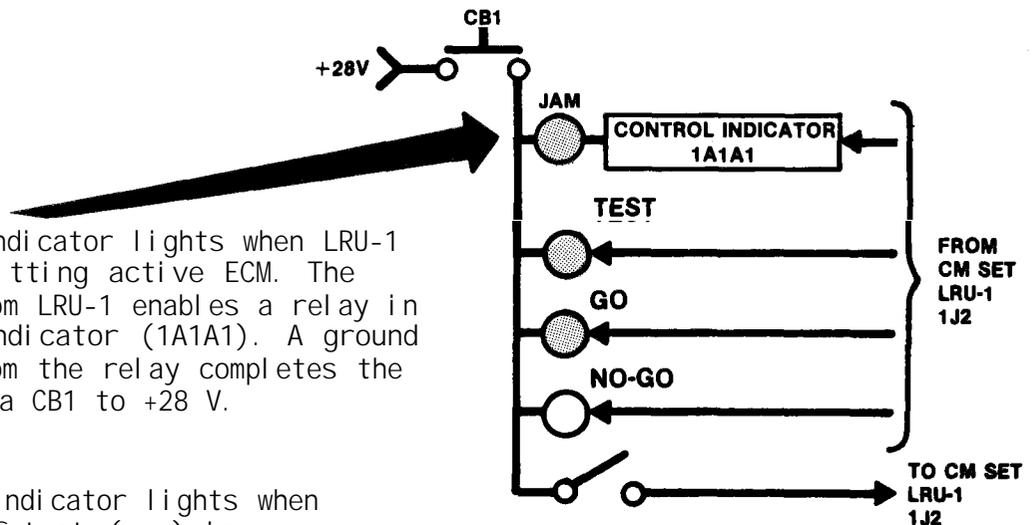


CONTROL : The Control Indicator 1A1A1 controls the mode of operation of LRU-1 under test. The three modes of operation are:

- OFF - No power applied to LRU-1
- STBY - +28 V applied to enable receiver circuits
- OPR - Enables some transmitting circuits



The INOP indicator lights when a fault signal is received from LRU-1 under test. The signal from LRU-1 enables a relay in Control Indicator (1A1A1). A ground return from the relay completes the circuit via CB1 to +28 V,



The JAM indicator lights when LRU-1 is transmitting active ECM. The signal from LRU-1 enables a relay in Control Indicator (1A1A1). A ground return from the relay completes the circuit via CB1 to +28 V.

The TEST indicator lights when LRU-1 self-test (BITE) is selected.

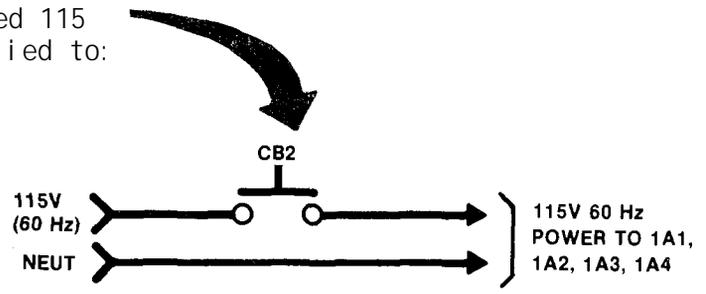
The GO [or the NO-GO] indicator lights to indicate that LRU-1 is (or is not) functioning correctly.

BLOCK DIAGRAM DESCRIPTION (Continued)

(2) AC Power Distribution, Cooling and YIG FILTER CONTROL

AC POWER DISTRIBUTION : When CB2 is enabled 115 V ac 60 Hz is applied to:

- CONTROL PANEL 1A1
- STATUS PANEL 1A2
- RF MODULATION 1A3
- RF MODULATION 1A4

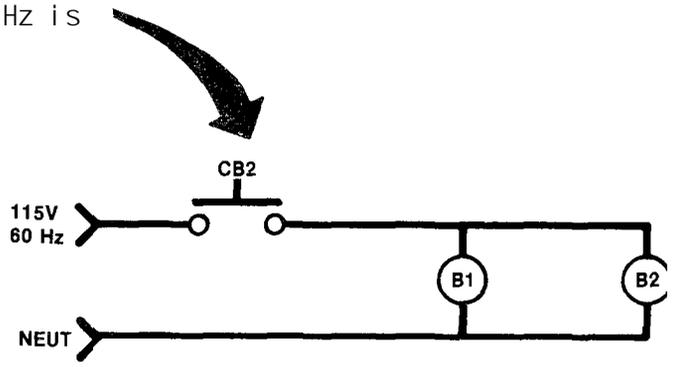


COOLING : When CB2 is enabled 115 VAC 60 Hz is applied to:

- CENTRIFUGAL BLOWER B1
- TUBEAXIAL FAN B2

Blower B1 is used to cool LRU-1 under test.

Blower B2 is used to cool the Bench Test Set.

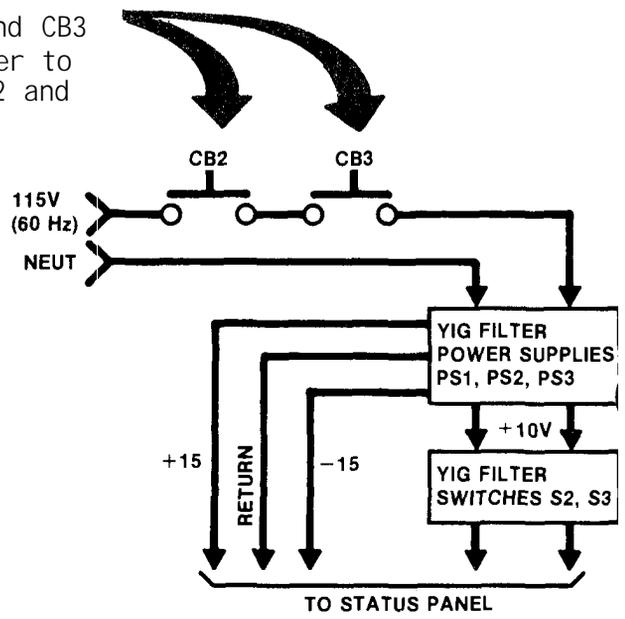


YIG FILTER CONTROL : Circuit Breakers CB2 and CB3 supply 115 V 60 Hz power to power supplies PS1, PS2 and PS3.

- PS1 - 15 volts } TO YIG FILTER ON STATUS PANEL
- PS2 + 15 volts }
- PS3 + 10 volts } TO YIG FILTER CONTROL SWITCHES

YIG FILTER IN/OUT switch S2 switches YIG FILTER in and out of RF PATH.

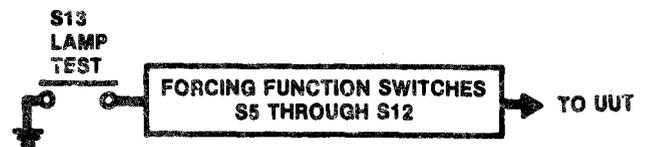
The YIG FILTER CONTROL S3 thumbwheel controls the YIG FILTER in status panel 1A2 for the setting of RF frequency.



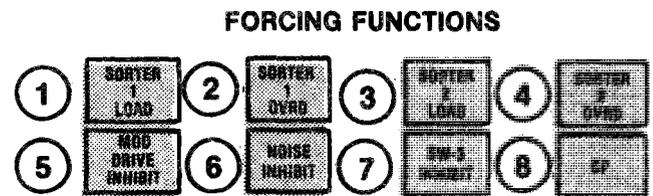
b. Status Panel Assembly 1A2 (Refer to figure F0-1). The Status panel Assembly (1A2) is divided into three functional areas.

- CONTROL
- STATUS & MONITORING
- RF PATH

CONTROL : The Status Panel (1A2) provides forcing function signals to UUT. Forcing Functions are enabled by pressing one of eight FORCING FUNCTION Lamp switches which connect a ground from the Status Panel to UUT. The forcing function signals consist of the following:



- 1 SORTER 1 LOAD (S5)
- 2 SORTER 1 OVRD (S6)
- 3 SORTER 2 LOAD (S7)
- 4 SORTER 2 OVRD (S8)
- 5 MOD DRIVE INHIBIT (S9)
- 6 NOISE INHIBIT (S10)
- 7 SW-3 INHIBIT (S11)
- 8 CP (S12)



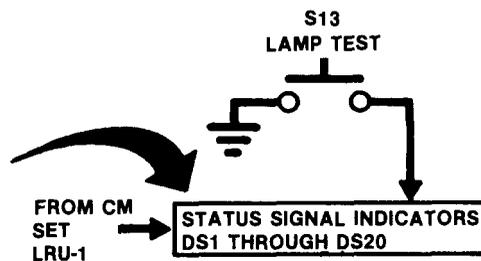
BLOCK DIAGRAM DESCRIPTION (Continued)

The LAMP TEST pushbutton (S13) lights all FORCING FUNCTION lamps on the Status Panel for test purposes.

- STATUS and MONITORING** : The Status and Monitoring Function consists of:
- STATUS SIGNAL INDICATOR
 - VOLTAGE MONITOR SWITCH
 - OSCILLOSCOPE MONITOR

STATUS SIGNAL INDICATORS : A total of 18 status signals are received from LRU-1 under test. The signals are monitored with indicator lights DS1 through DS20

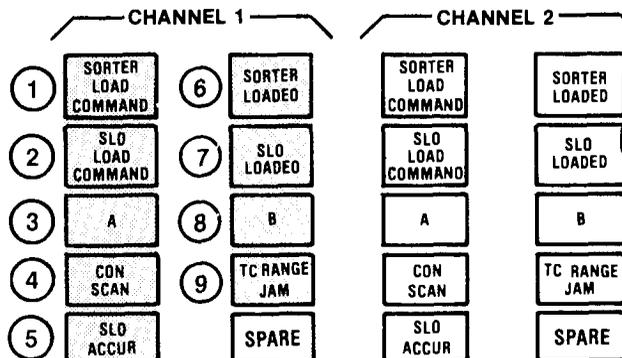
The Status Panel lamps monitor Sorter 1 and Sorter 2 in LRU-1 under test. The Status Panel lamps consist of the following:



CHANNEL 1 (SORTER 1)

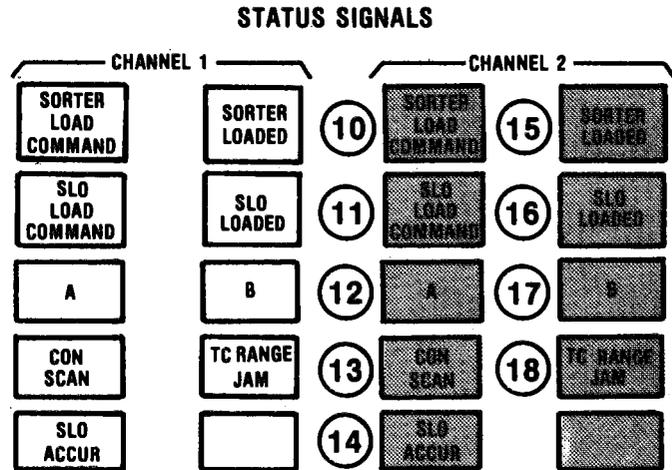
- 1 SORTER LOAD COMMAND (DS1)
- 2 SLO LOAD COMMAND (DS2)
- 3 THREAT A (DS3)
- 4 CON SCAN (DS4)
- 5 SLO ACCUR (DS5)
- 6 SORTER LOADED (DS6)
- 7 SLO LOADED (DS7)
- 8 THREAT B (DS8)
- 9 TC RANGE JAM (DS9)

STATUS SIGNALS



CHANNEL 2 (SORTER 2)

- 10 SORTER LOAD COMMAND (DS11)
- 11 SLO LOAD COMMAND (DS12)
- 12 THREAT A (DS13)
- 13 CON SCAN (DS14)
- 14 SLO ACCUR (DS15)
- 15 SORTER LOADED (DS16)
- 16 SLO LOADED (DS17)
- 17 THREAT B (DS18)
- 18 TC RANGE JAM (DS19)



The LAMP TEST pushbutton (S13) lights all Status signal lamps on the Status Panel for test purposes.

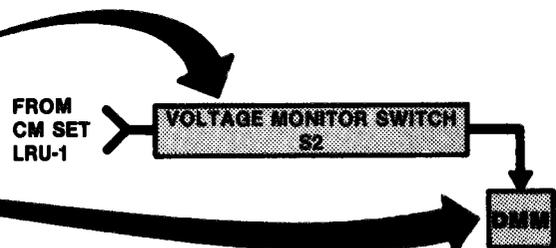
VOLTAGE MONITOR SWITCH

Nine DC voltages are monitored from LRU-1 under test. The voltages are selected by VOLTAGE MONITOR SWITCH S2 and sent to the

DIGITAL MULTIMETER.

The voltages monitored are:

- +5V LOGIC
- +5V
- 5.2V
- +10V
- 10V
- +15V
- 15V
- +28V
- 65V



BLOCK DIAGRAM DESCRIPTION (Continued)

OSCILLOSCOPE MONITOR SWITCHES:

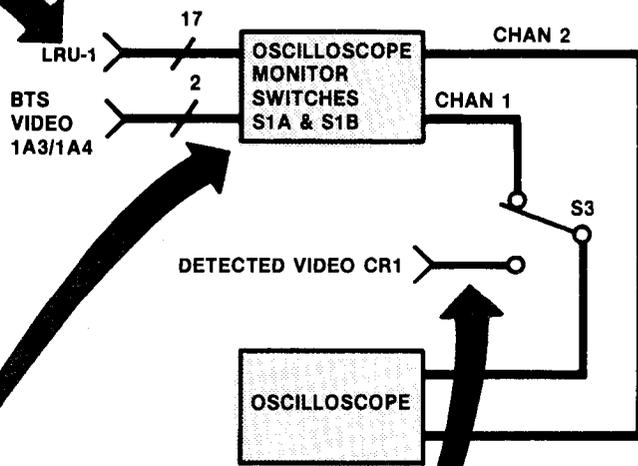
Switches S1A and S1B receive 17 pulsed or varying system monitor signals from LRU-1

and

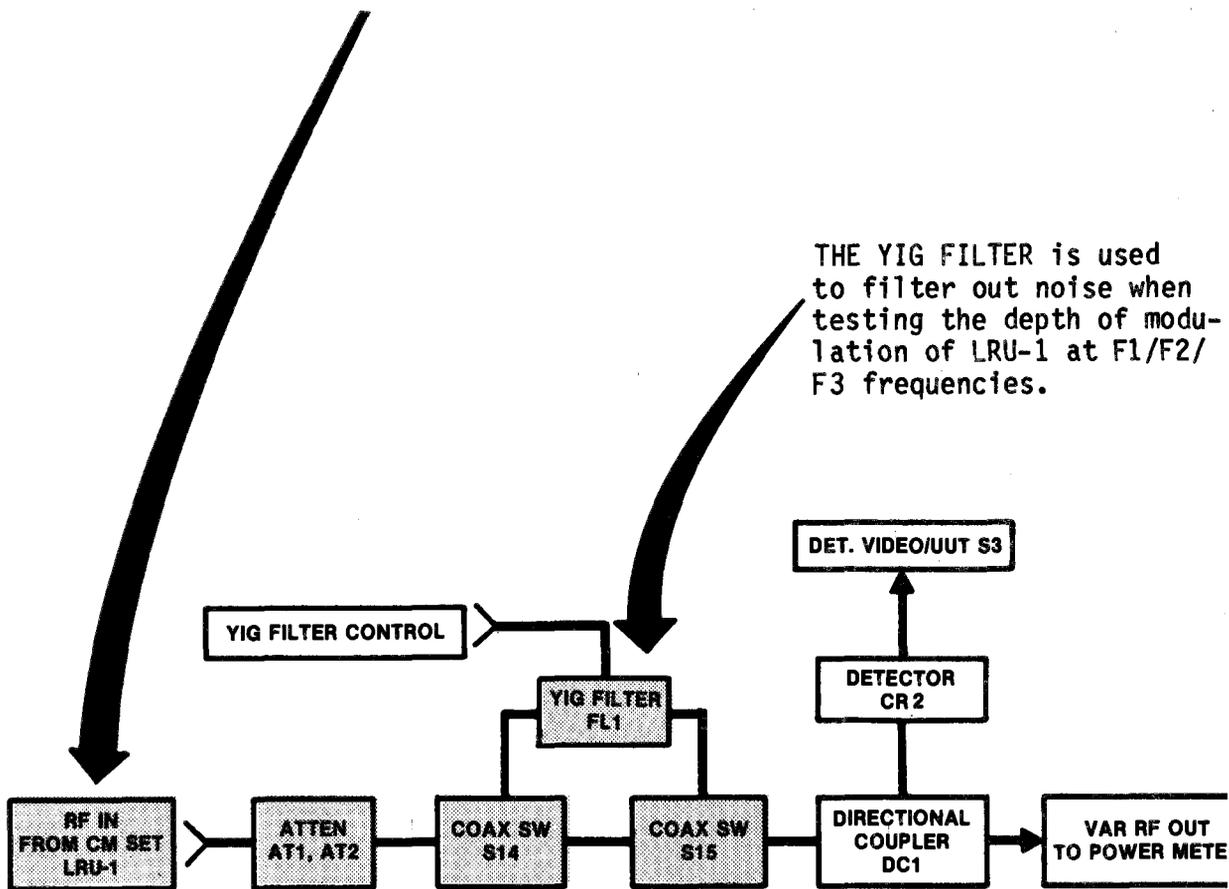
BTS Video from RF Modulation assemblies 1A3/1A4

These signals are connected through the OSCILLOSCOPE MONITOR dual concentric rotary switch S1A & S1B to CHAN 1 and CHAN 2 of the oscilloscope.

Detected Video from CR1 in the RF path can also be monitored on the oscilloscope through DET VIDEO/UUT SIGNAL switch S3.



RF PATH: The RF output from LRU-1 under test is reduced to a safe level by a 30 dB attenuator and applied to RF Input of the status panel.



THE YIG FILTER is used to filter out noise when testing the depth of modulation of LRU-1 at F1/F2/F3 frequencies.

The RF feeds through two step attenuators

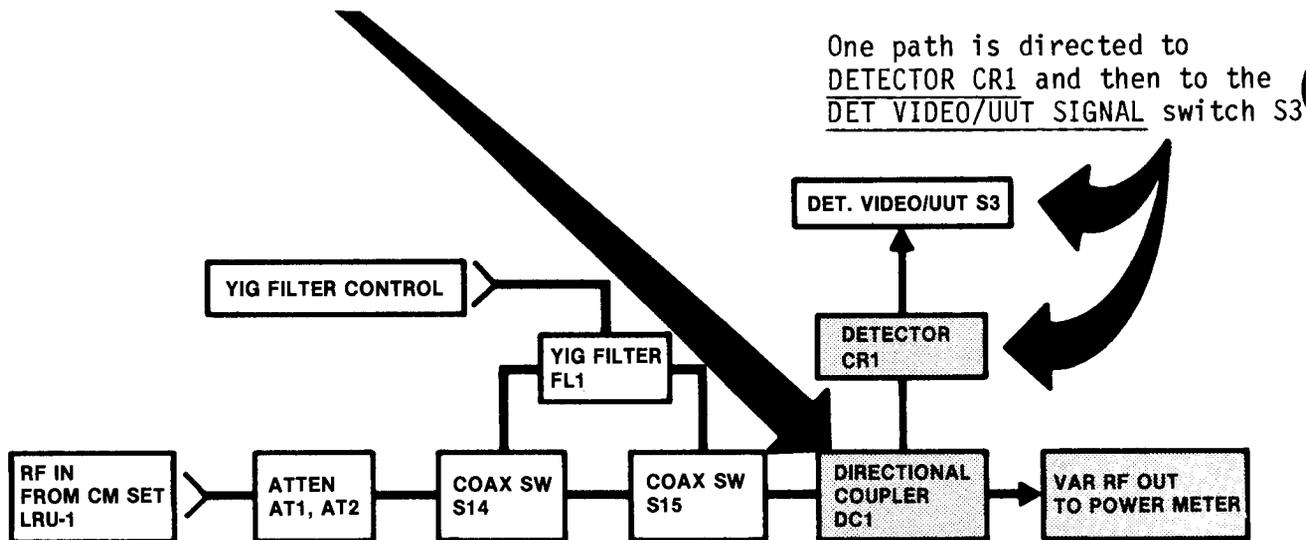
- AT1 - 0-9dB
- AT2 - - 0

Coax Switches S14 and S15 controlled by the YIG FILTER IN-OUT switch on control 1A1 directs the RF either:

THROUGH YIG FILTER - RF MODULATED SIGNALS.

BLOCK DIAGRAM DESCRIPTION (Continued)

The RF signal from Coax Switch S15 is split at DIRECTIONAL COUPLER DC1



The other path (-6 dB) is directed to the VAR RF OUT jack which connects to the power meter when testing LRU-1. When VAR RF OUT jack is not being used it should be terminated with RF load AT3.

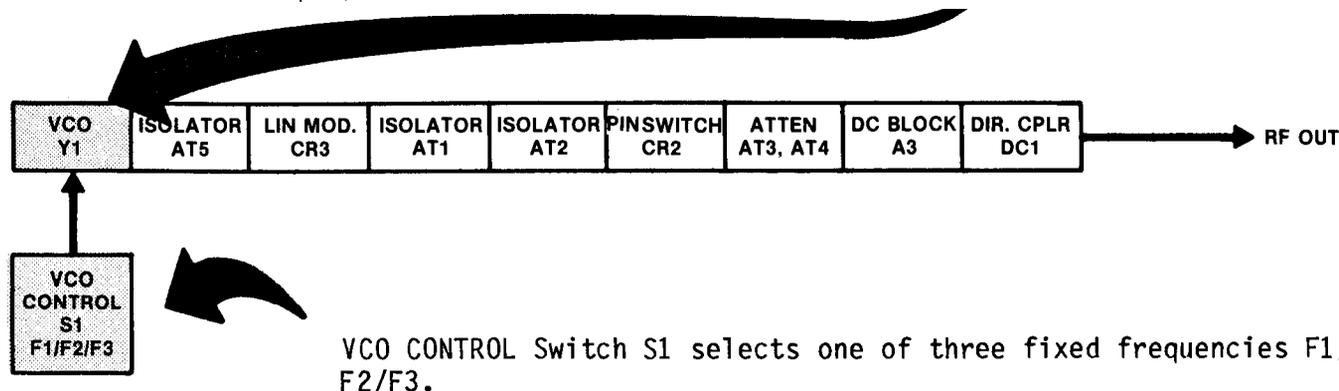
c. RF Modulation Assemblies 1A3/1A4. (Refer to figure F0-1.) The RF Modulation Assemblies are divided into three functional areas.

RF PATH (CW)

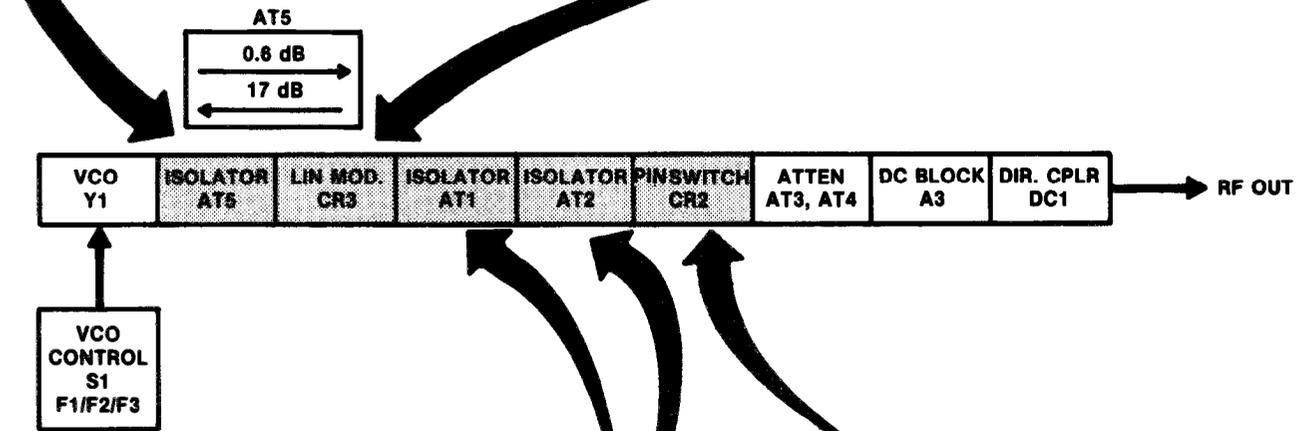
LINEAR MODULATION (CON SCAN)

PULSE MODULATION (A-W/A-F/B/VAR PRI)

(1) RF Path (CW). (Refer to figure F0-1.) The RF source is a linearized voltage controlled oscillator VCO. (+17 dBm output)



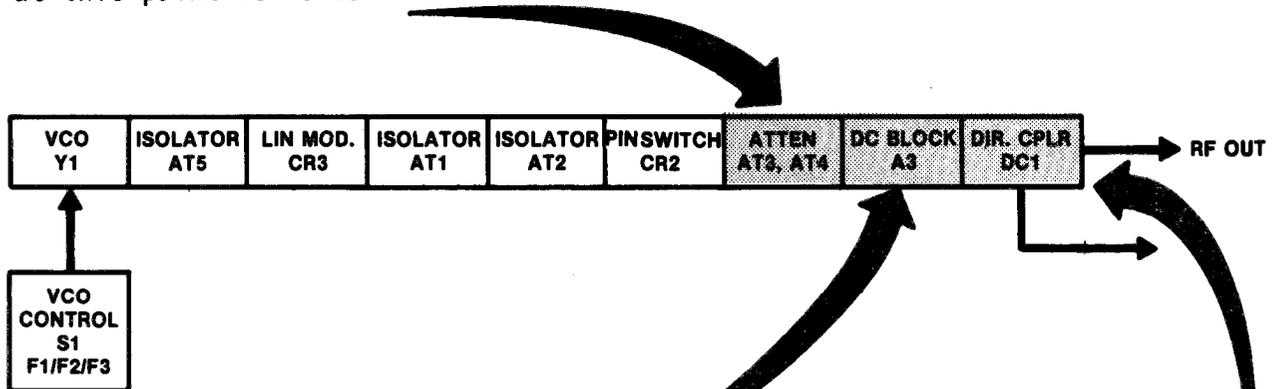
Isolator AT5 maintains a constant loading to the VCO when the linear modulator is being enabled.



Isolators AT1 and AT2 are low loss isolators, each providing 0.6 dB forward attenuation. The power output at AT2 will be approximately 11.2 dBm for a CW signal with the Linear Modulator insertion loss of approximately 4 dB.

PIN Switch CR2 receives the CW signal from Isolator AT2 and directs it to variable step attenuators AT3 and AT4. The power output at this point is +7 dBm.

AT3 and AT4 have 1 dB insertion loss at 0 setting. The power output at this point is +5 dBm.



The DC BLOCK A3 prevents any DC from being applied to LRU-1. The power output at this point is +4 dBm.

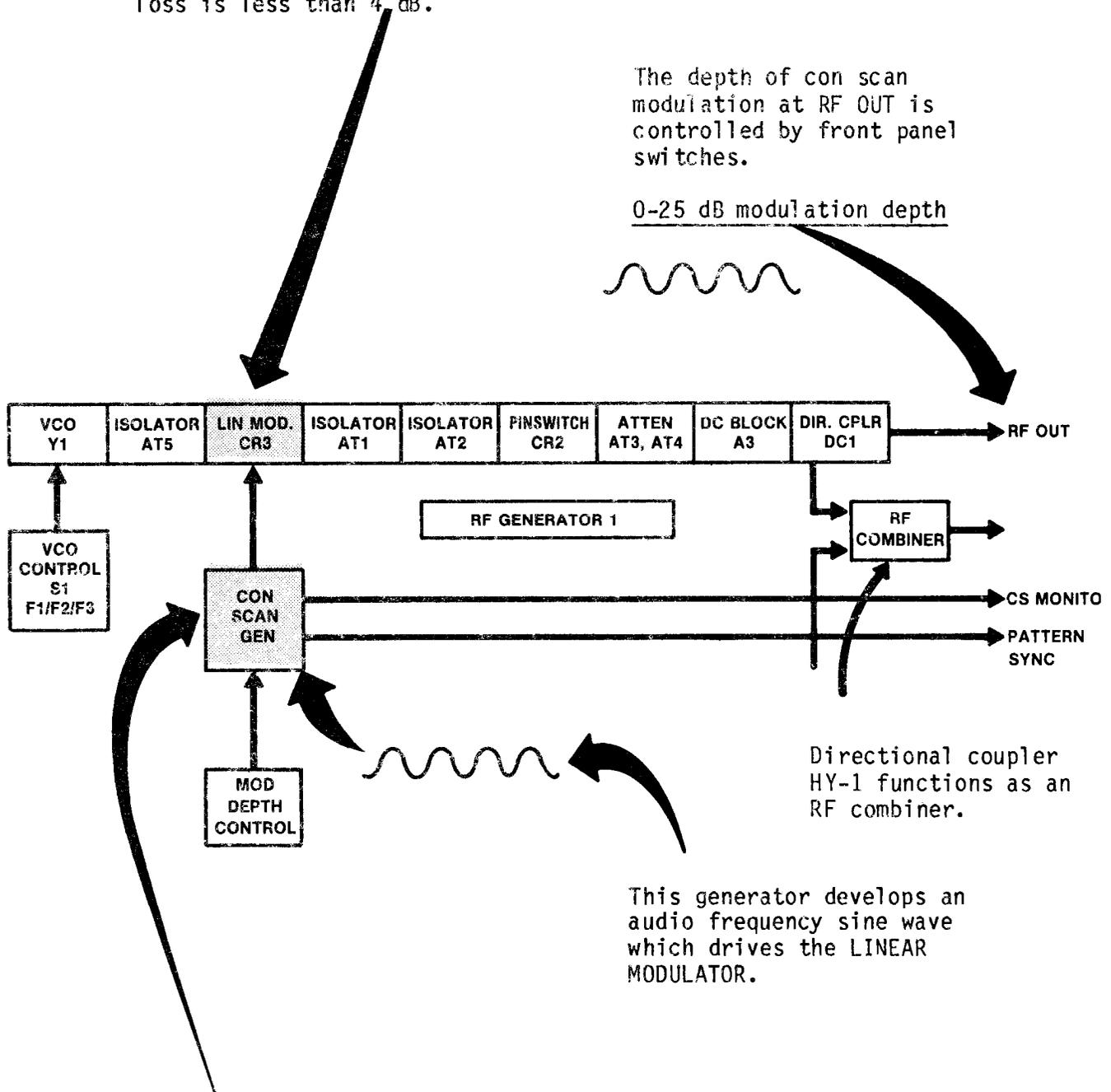
DIRECTIONAL COUPLER DC1 feeds the CW signal to the RF OUT jack at a power level of +3 dBm. This signal is applied to LRU-1 under test.

BLOCK DIAGRAM DESCRIPTION (Continued)

(2) Linear Modulation (Con Scan). (Refer to figure F0-1.) The Linear Modulator is used to modulate the RF signal from the VCO with amplitude characteristics. The minimum insertion loss is less than 4 dB.

The depth of con scan modulation at RF OUT is controlled by front panel switches.

0-25 dB modulation depth

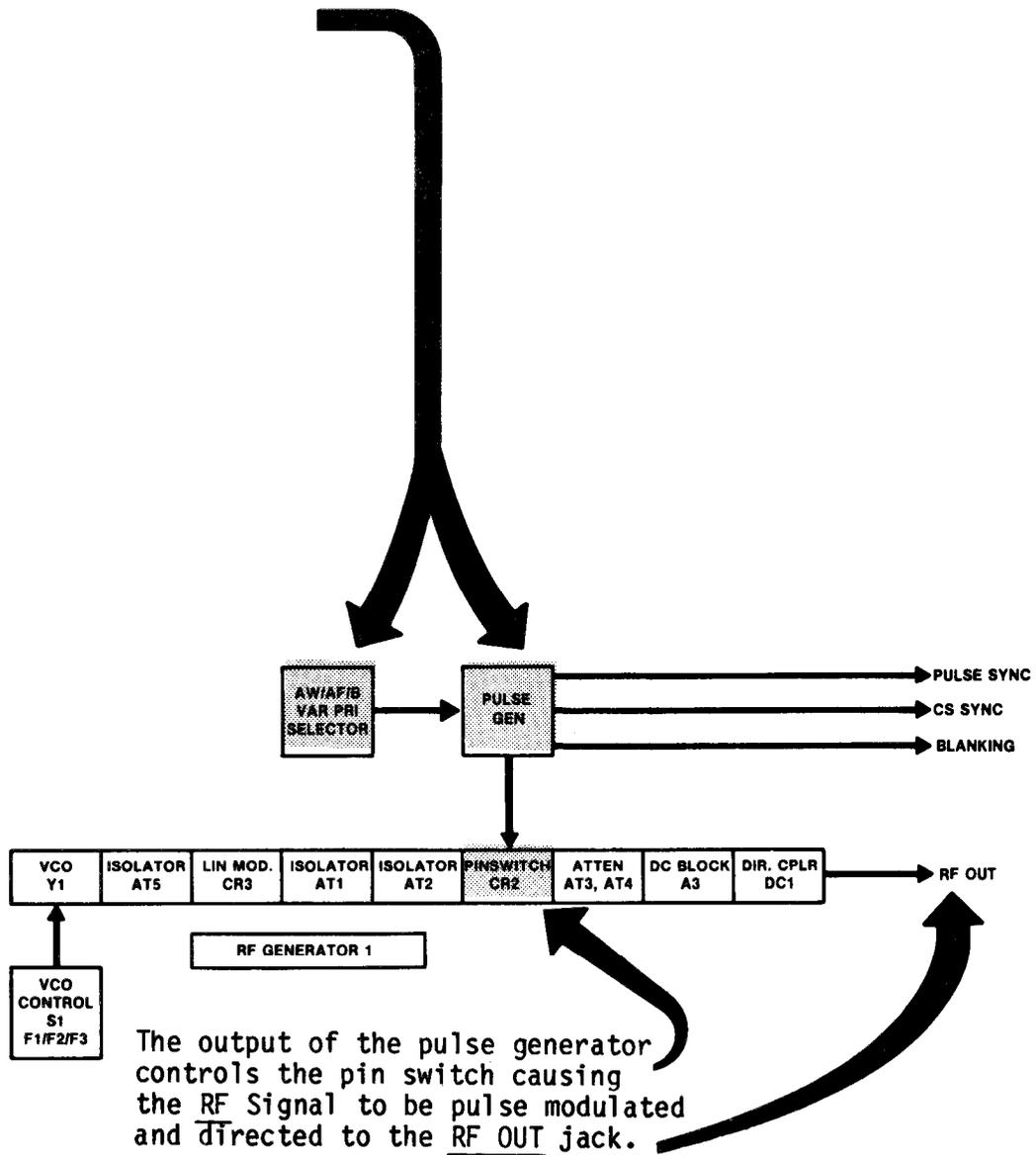


Directional coupler HY-1 functions as an RF combiner.

This generator develops an audio frequency sine wave which drives the LINEAR MODULATOR.

The Conical Scan Generator frequencies are generated digitally and controlled by thumbwheel switches on the front panel of 1A3/1A4.

- (3) Pulse Modulation (A-W/A-F/B/VAR PRI). (Refer to figure F0-1.)
 PULSE MODULATION is initialized the PRI selector switch and
 the pulse generator.



SECTION II

FUNCTIONAL BLOCK DIAGRAM DESCRIPTION

<u>SECTION CONTENTS</u>	<u>PAGE</u>
CONTROL AND POWER DISTRIBUTION	2-15
RF MODULATION	2-23
PULSE MODULATION	2-30
LINEAR MODULATION	2-34
STATUS AND MONITORING	2-36

CONTROL AND POWER DISTRIBUTION

2-3. (Refer to figure F0-2.) The control and power distribution functions will be discussed in the following five sections, all located on figure F0-2.

- 115 Vac power distribution to the bench test set and blowers.
- YIG filter control.
- +28 Vdc power distribution to UUT and the control indicator.
- Control signals to LRU-1.
- Status signals from LRU-1.

CONTROL AND POWER DISTRIBUTION (Continued)

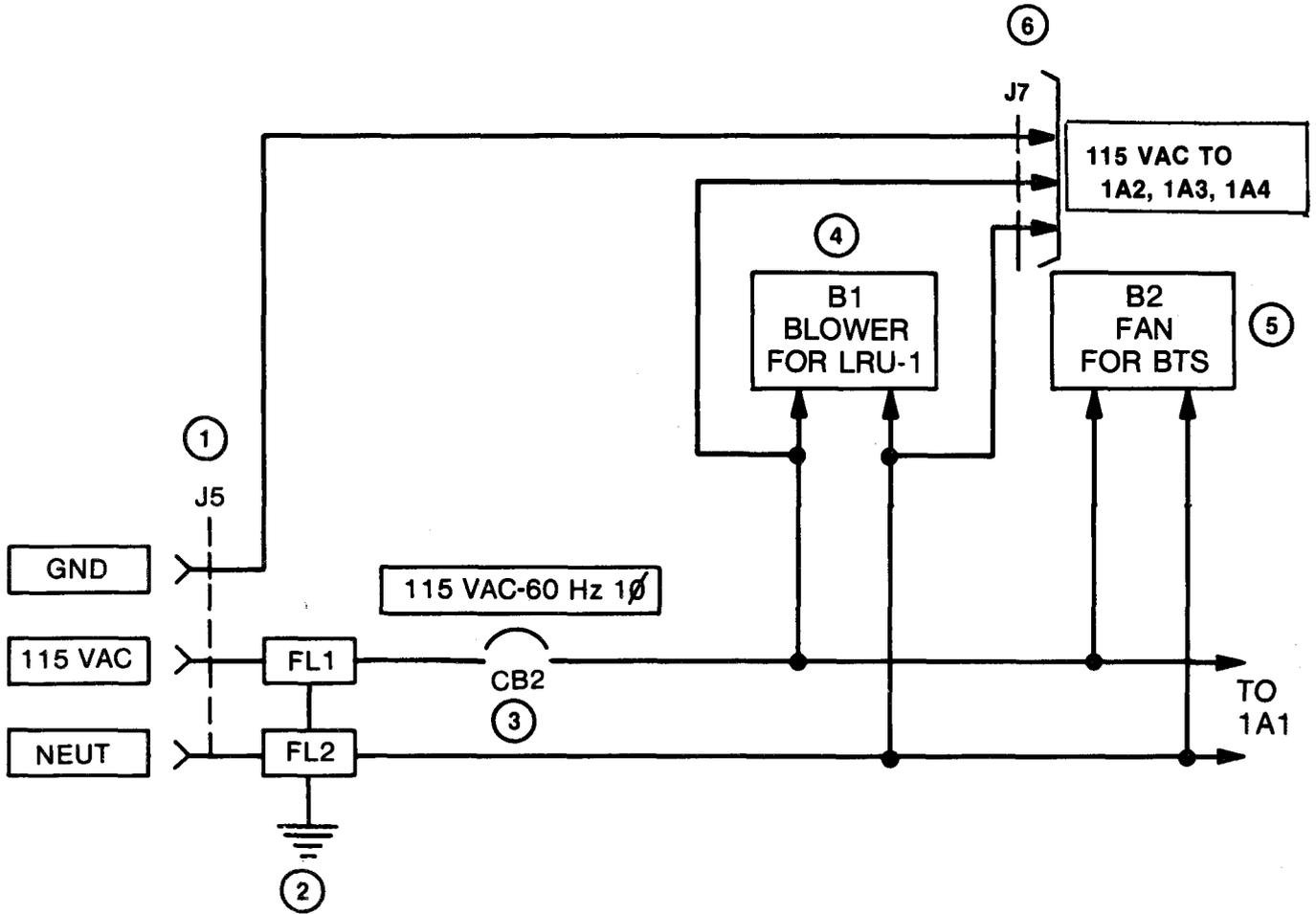
a. 115 Vac Power Distribution to the Bench Test Set and Blowers.

- (1) 115 Vac, 60 Hz Power Cable W6 connects 115 Vac to input power 115 VAC, 60 Hz jack J5.
- (2) Filters, FL1 and FL2 provide electromagnetic interference EMI integrity. The line filters eliminate conductive interference from the BTS.
- (3) When circuit breaker CB2 is enabled 115 Vac is applied to Blowers B1 and B2.
- (4) Centrifugal Blower B1 when enabled delivers cooling air to LRU-1 at 145 CFM at a nominal motor speed of 3150 RPM.
- (5) Tubeaxial Fan B2 when enabled delivers cooling air to the BTS cabinet at 110 CFM at a nominal motor speed of 3250 RPM.
- (6) The 115 Vac, 60 Hz, single phase feeds Control Panel Assembly 1A1, and is distributed through Jack J7 to:

STATUS PANEL _____ 1A2

RF MODULATION ASSEMBLY _____ 1A3

RF MODULATION ASSEMBLY _____ 1A4



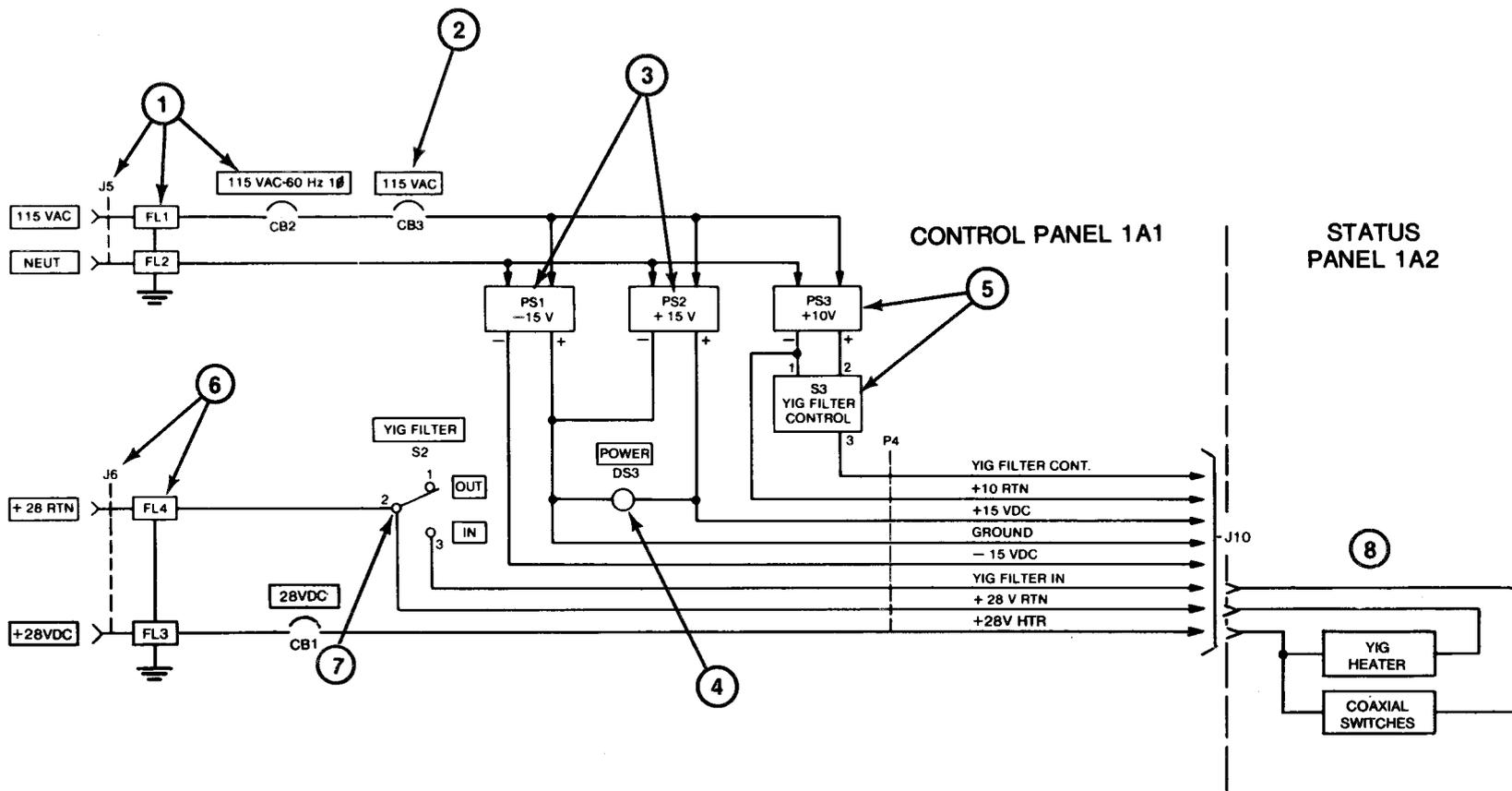
CONTROL AND POWER DISTRIBUTION (Continued)

b. YIG FILTER Control . The BTS contains a microwave bandpass filter of the Yttrium Iron Garnet (YIG) type.

- (1) 115 VAC, 60 Hz, 10 is applied through input power jack J5 to line filters FL1 and FL2 which eliminate conductive EMI from the BTS. Circuit Breaker CB2, when enabled, supplies input ac power to Circuit Breaker CB3.
- (2) Circuit Breaker CB3 is a push-to-reset device located on the front panel of 1A1. When CB3 is enabled ac power is applied to YIG Filter Power Supplies PS1, PS2 and PS3.
- (3) Power Supply PS1, when enabled, supplies -15 Vdc $\pm 1\%$ with an output current of 0.1 amps to the YIG filter in the status panel assembly. Power Supply PS2, when enabled, supplies +15 Vdc $\pm 1\%$ with an output current of 1.0 amps to the YIG filter in the status panel.
- (4) POWER Indicator DS3 lights when +15V Power Supply PS2 is enabled.
- (5) Power Supply PS3, when enabled, supplies +10 Vdc $\pm 1\%$ with an output current of 0.12 amps to the YIG FILTER CONTROL switch S3. S3 is a three decade thumbwheel switch used to tune the YIG filter to the F1, F2 and F3 frequencies.
- (6) The +28 Vdc is applied through INPUT POWER jack J6 to line filter FL3 and FL4 which eliminate conductive EMI from the BTS. Circuit Breaker CB1, when enabled, supplies heater power to YIG filter 1A2FL1.
- (7) YIG FILTER IN/OUT Switch S2 is used to switch the YIG filter in or out of the RF Path in the status panel.

OUT position - YIG filter bypassed (no insertion loss)

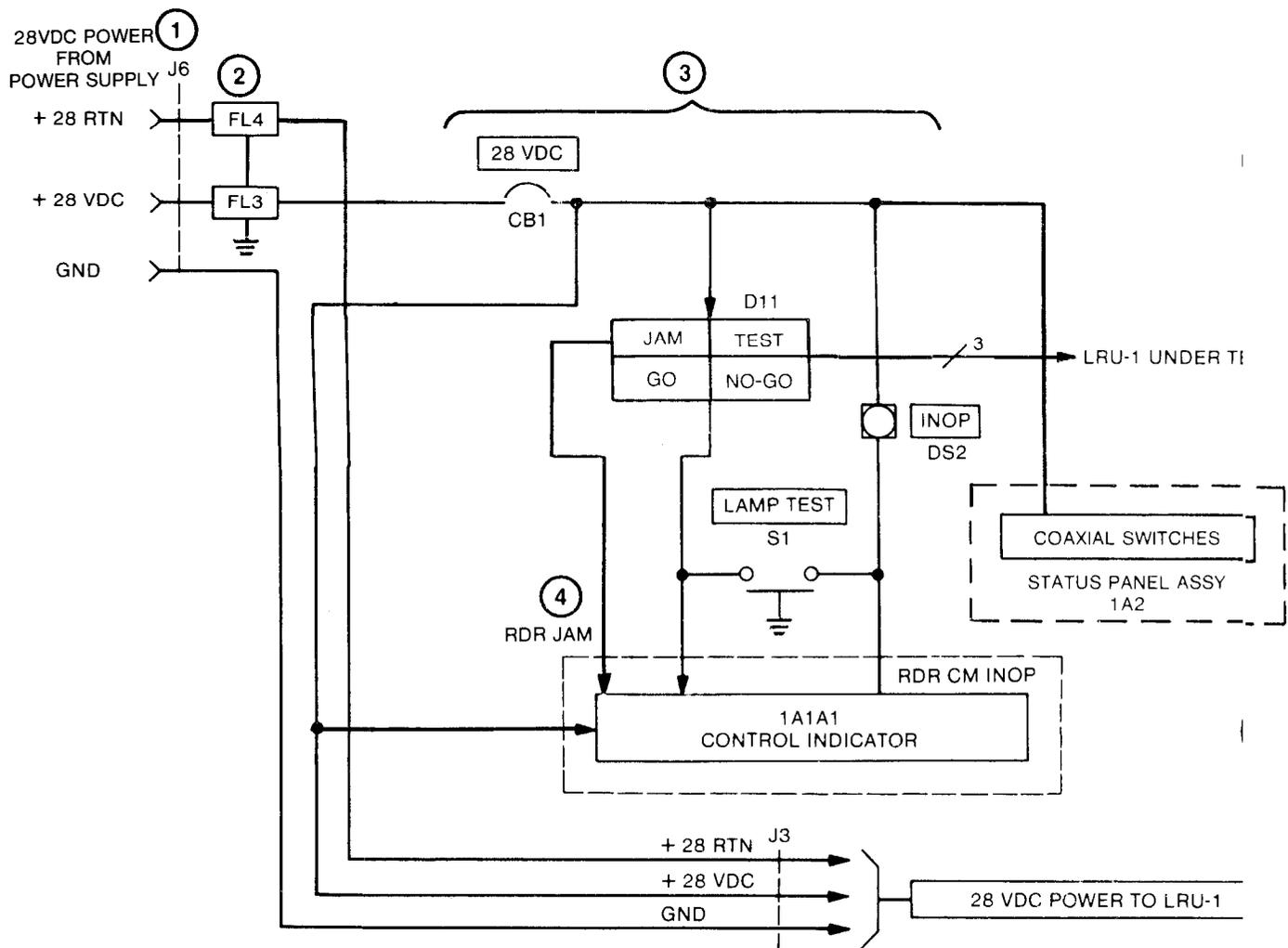
IN position = YIG filter in circuit (used to measure depth of modulation)
- (8) All 1 signals are routed through P4 to status panel connector 1A2J10.



CONTROL AND POWER DISTRIBUTION (Continued)

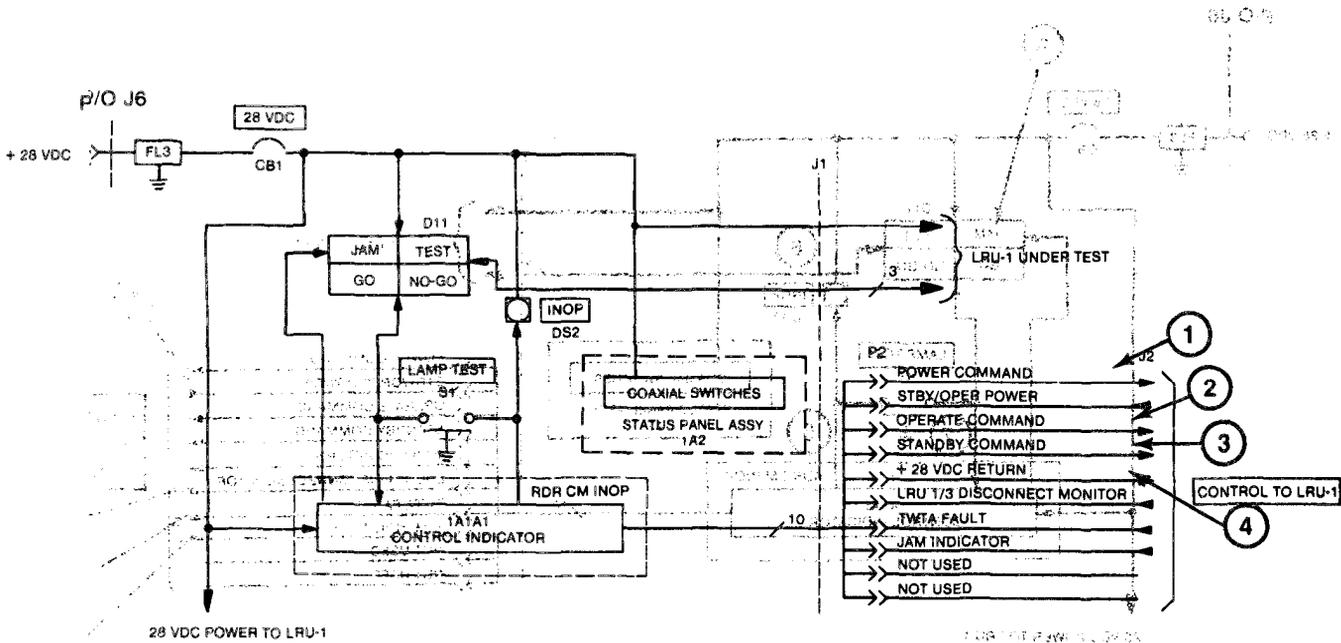
c. 28 VDC Power Distribution to LRU-1 and the Control Indicator.

- (1) Power cable W7 connects 28 Vdc from the power supply to Input Power 28 VDC jack J6.
- (2) Line Filters FL3 and FL4 contribute to electromagnetic interference (EMI) integrity. The filters eliminate conductive interference from the BTS.
- (3) When circuit breaker CB1 is enabled, 28 Vdc is applied to control indicator, UUT, one side of the JAM and INOP lamps and to YIG filter coaxial switches on 1A2.
- (4) 28 Vdc to the control indicator enables LRU-1 disconnect monitor relay K3 which sets up conditions for entering the standby and operate modes.
- (5) 28 Vdc is routed through 28V POWER jack J3 to UUT via cable W3.



d. Control Signals to LRU-1.

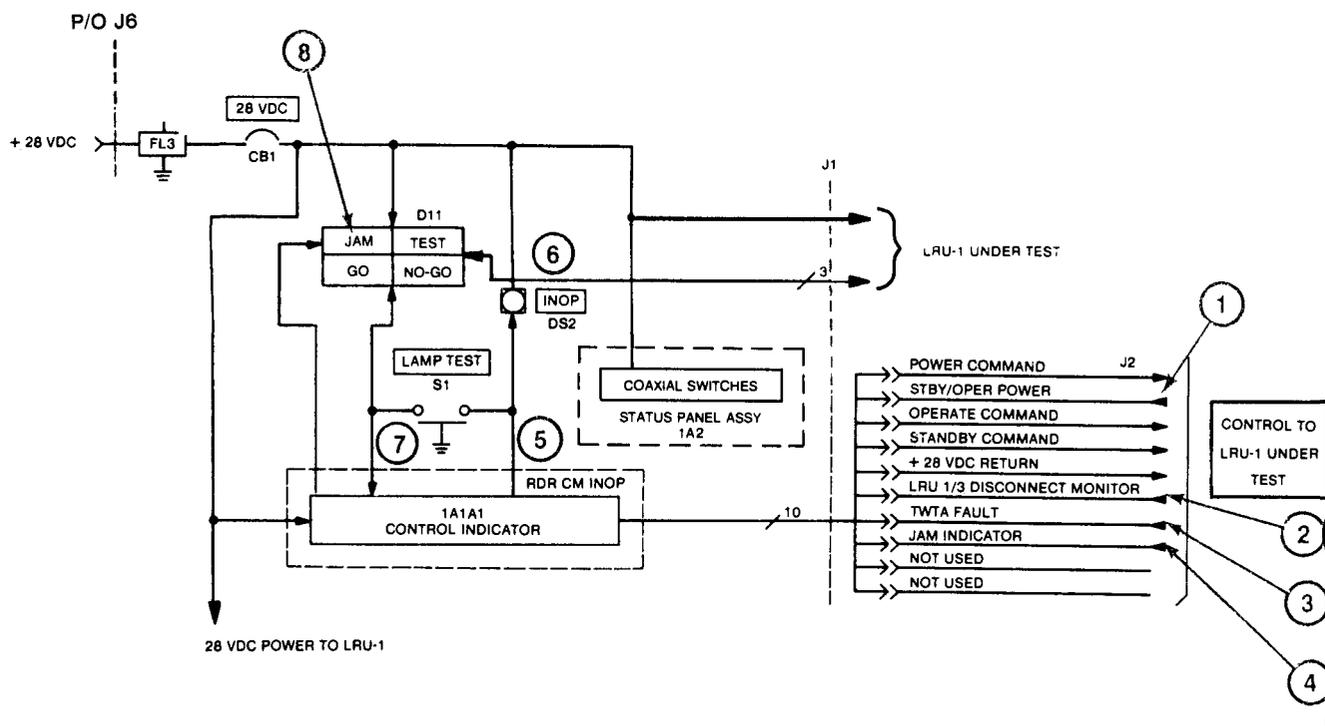
- (1) **POWER COMMAND (DSPWCM):** The power command is enabled when the OFF/STBY/OPR switch on Control Indicator 1A1A1 is in either the STBY or OPR position. A power command provides a ground return to LRU-1 which energizes two relays supplying +28 Vdc to the low voltage and high voltage power supplies.
- (2) **OPERATE COMMAND (DSSWTHO):** The operate command is enabled when the OFF/STBY/OPR switch on Control Indicator 1A1A1 is in the OPR position and LRU-1 has exceeded a 180 second warmup period. A return to LRU-1 is completed, enabling the high voltage power supply and transmitter circuits in LRU-1.
- (3) **STANDBY COMMAND (DSSWTHS):** The standby command is present until the OFF/STBY/OPR switch on the control indicator is set to the OPR position. In the STBY position a return to LRU-1 is completed holding the standby/operator flip-flop in the standby condition. This enables the receiver circuits and inhibits the transmitter circuits in LRU-1.
- (4) **+28 VDC RETURN (GOP28ST):** Provides a ground return continuity between BTS and LRU-1.



CONTROL AND POWER DISTRIBUTION (Continued)

e. Status Signals from LRU-1 (refer to Figure F0-13).

- (1) STBY/OPR POWER (DQTDOPR): The STBY/OPR Power (+28 V dc) is received from the low voltage power bus in LRU-1 when the control indicator is switched to standby or operate. The +28 Vdc enables the 180 second time delay relay and supplies +23 V to the ON, STBY and OPR indicators in Control Indicator 1A1A1.
- (2) LRU-1 DISCONNECT MONITOR (GOP28ST): The LRU-1 disconnect monitor (ground) is received from LRU-1 and energizes the LRU-1 disconnect monitor relay in Control Indicator 1A1A1.
- (3) TWTA FAULT (OVPT FLT): When a fault occurs in the high voltage power supply or traveling wave tube amplifier or if an overtemperature condition occurs in LRU-1, a TWTA fault signal is generated. This causes the fault relay in the control indicator to de-energize, generating an INOP (5) ground level signal, illuminating the INOP (6) lamp on the control panel.
- (4) JAM INDICATE (1YJAM): When LRU-1 is transmitting active ECM, the JAM INDICATE signal (high level) is received from the high voltage power supply in LRU-1. This causes the jam relay to energize in the control indicator producing a JAM (7) signal (ground level) which illuminates the JAM (8) lamp on the control panel.



RF MODULATION

2-4. (Refer to figure F0-3.) The RF modulation functions will be discussed in the following sections as in figure F0-3.

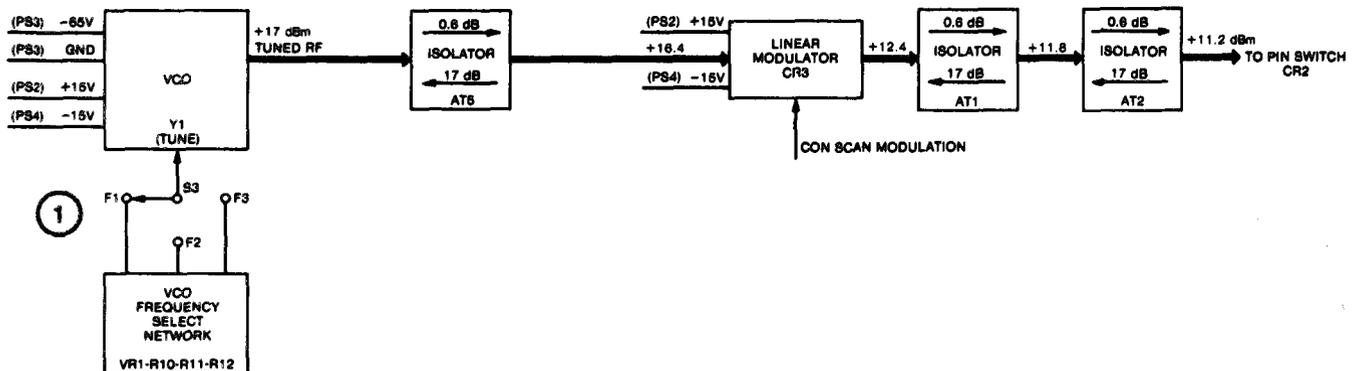
- RF Path
- Digital Circuits
- Analog Circuits

a. RF Path.

(1) The VCO frequency select network consists of three adjustable potentiometers R10, R11, R12 and diode VR1. The potentiometers are adjusted to tune VCO (Y1) to three fixed RF frequencies, selected by frequency select switch S3. The following chart specifies the switch position, and potentiometer adjusted.

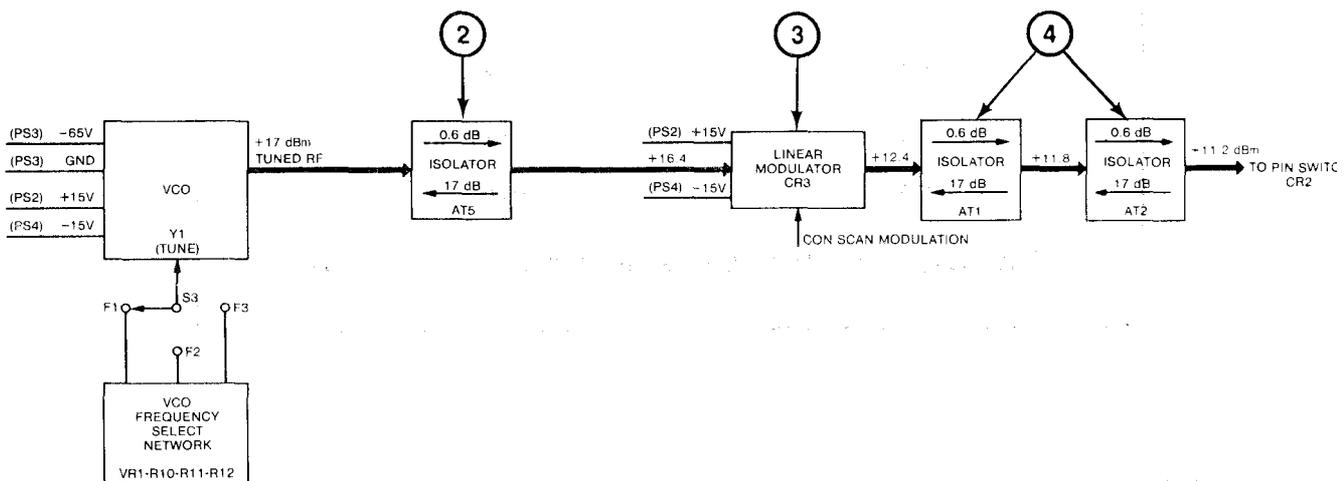
S3-Switch Position	Potentiometer Adjusted
F1	R12
F2	R11
F3	R10

The output of the VCO is approximately +17 dBm.



RF MODULATION (Continued)

- (2) ISOLATOR AT5 provides a constant loading to the VCO and prevents RF reflections from the linear modulator.
- (3) LINEAR MODULATOR CR3 is an absorptive pin diode modulator with integral drivers. The linear modulator is used to amplitude modulate the RF signal from the VCO with the threat amplitude characteristics. The minimum insertion loss is 4 dB. The modulator has the capability of increasing the attenuation above this insertion loss by 60 dB. The con scan modulation control can vary the attenuation between 0 dB and 25 dB.
- (4) ISOLATORS AT1 and AT2 provide a constant loading to the linear modulator and prevent any RF reflections from Pin Switch CR2.



- (5) PIN SWITCH CR2 is a pin diode SPST switch and associated driver. When enabled, the RF signal is pulse modulated at the rate of the pulse drive input. The maximum attenuation is 70 dB plus 3 dB insertion loss. The control voltage to the switch (PULSE DRIVE) is a standard logic level (SLL) signal. A logic one (2.4V to 5V) places the switch in its maximum attenuation condition. A logic zero (0.0V to 0.6V) places the switch in its minimum attenuation state. The pin switch is capable of switching from maximum to minimum attenuation or from minimum to maximum attenuation within 50 nanoseconds.

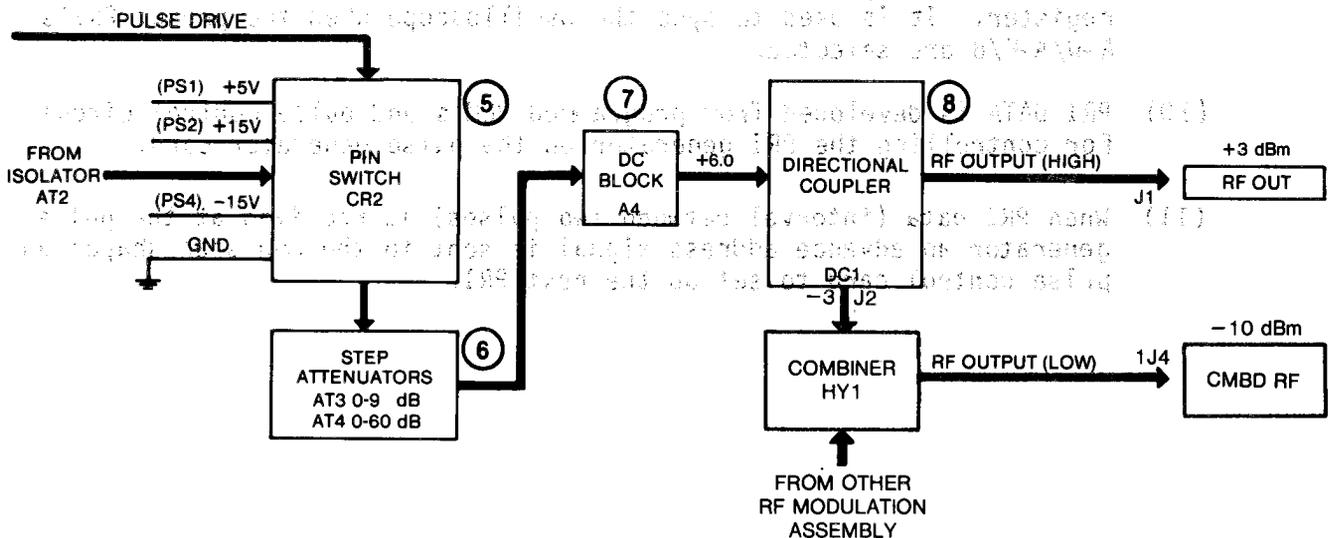
- (6) **VARIABLE STEP ATTENUATORS AT4 and AT3.** The output of the pin switch is fed through two broad-band subminiature step attenuators in series. The step attenuators enable the output power level to be adjusted in fixed steps. Attenuator AT4 is adjustable from 0 to 60 dB in 10 dB steps. Attenuator AT3 is adjustable from 0 to 9 dB in 1 dB steps for a total range of 0 to 69 dB.
- (7) **DC BLOCK A3.** The output of Attenuator AT3 is fed to DC Block A3. The dc block is inserted to prevent any direct current from being applied to LRU-1 of the CM set.
- (8) **DIRECTIONAL COUPLER DC1.** The output of the DC Block A3 is fed to Directional Coupler DC1 which provides two signals. One a high level output and the other a signal to the Combiner HY1. The high level path feeds the RF OUT connector on the front panel for connection to LRU-1. The other signal is applied to a 3 dB hybrid for combining. The output level of the combiner is -10 dBm minimum.

b. **Digital Circuits.** The digital and analog circuits are located on the following circuit card assemblies:

PULSE GENERATOR 1A3A1/1A4A1

CON. SCAN and PULSE CONTROL 1A3A2/1A4A2

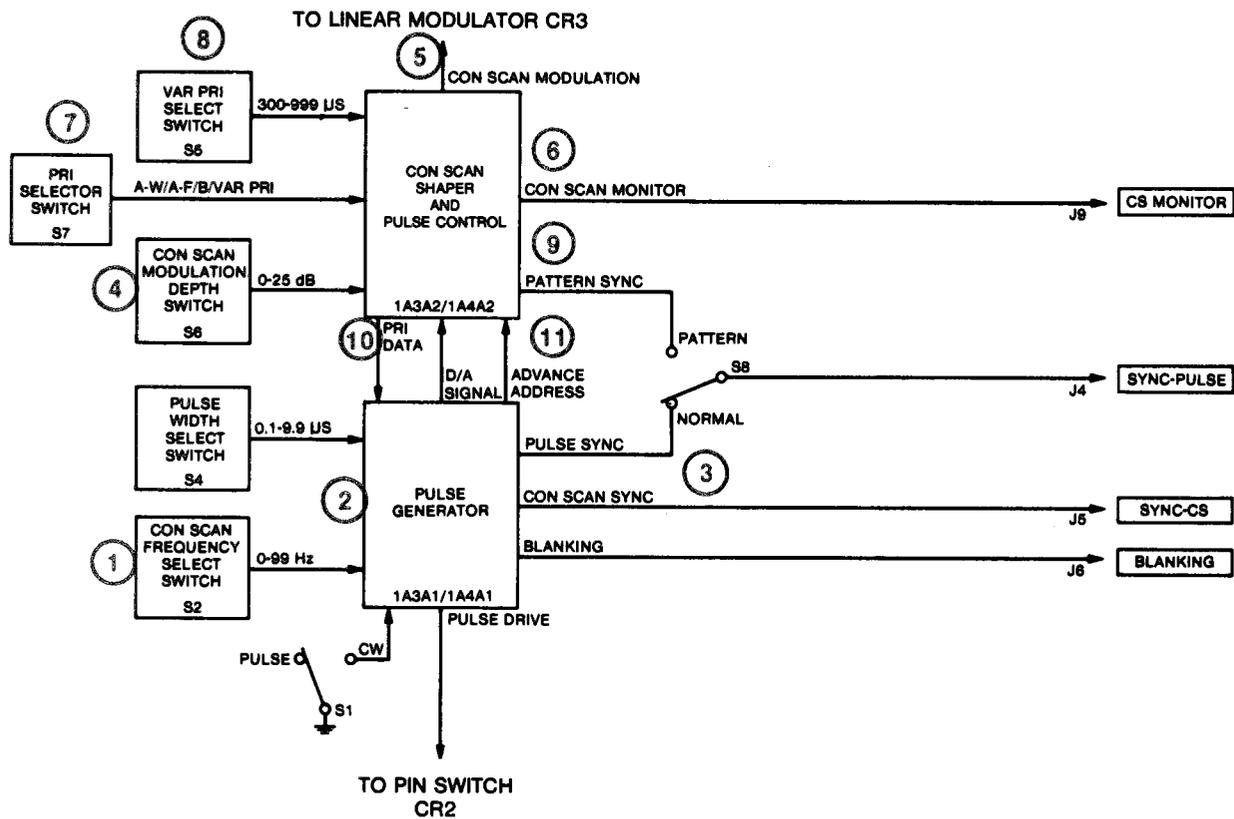
The digital/analog circuits are divided into two functional sections. One section develops the Con Scan modulation which is applied to Linear Modulator CR3. The other section develops the pulse modulation applied to Pin Switch CR2.



RF MODULATION (Continued)

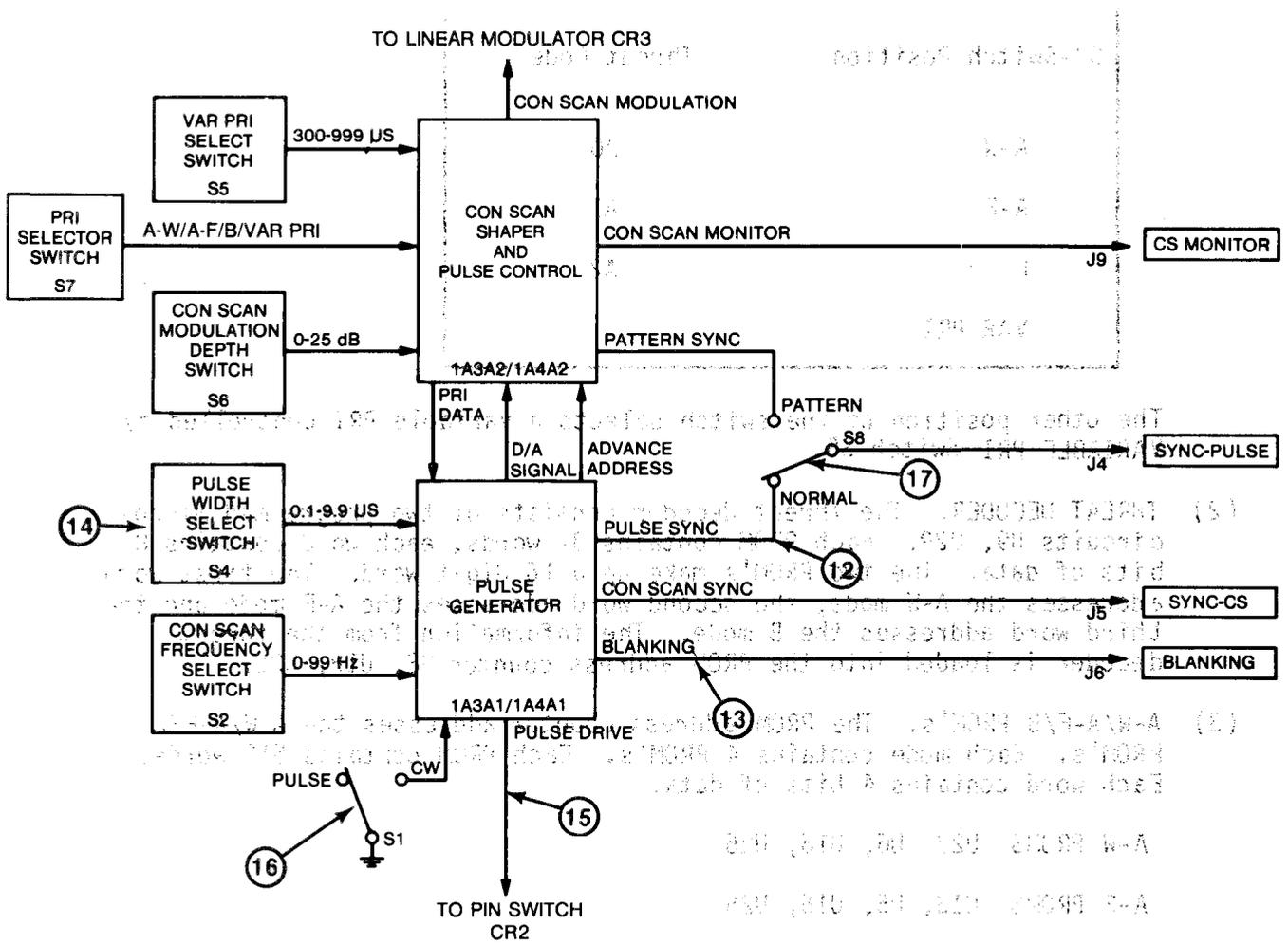
c. Analog Circuits

- (1) CON SCAN FREQUENCY SELECT SWITCH S2 is a two decade thumbwheel switch which selects the con scan frequency from 0-99 Hz.
- (2) PULSE GENERATOR 1A3A1/1A4A1 contains a clock generator, counters, comparators, digital con scan generator and a D/A converter which produce a triangle wave at the preset frequency of the con scan frequency select switch S2.
- (3) The digital con scan generator provides the CON SCAN SYNC at the zero crossover of the triangle wave at front panel jack SYNC-CS J5.
- (4) CON SCAN SHAPER and PULSE CONTROL 1A3A2/1A4A2 receives the triangle wave and shapes it into a sinewave. The depth of modulation of the sinewave is controlled by CON SCAN MODULATION DEPTH SWITCH S6, adjustable from 0-25 dB.
- (5) The sinewave output of the shaper is amplified and sent to LINEAR MODULATOR CR3.
- (6) The sinewave output of the shaper is also directed to CS MONITOR jack J9. Jack J9 connects to BTS VIDEO on the Status Panel 1A2 to be monitored by the oscilloscope.
- (7) PULSE MODULATION TO PIN SWITCH CR2. PRI Selector Switch S7 selects on of three preset PRI's A-W, A-F, B, or a variable PRI set by the PRI select switch S5.
- (8) VARIABLE PRI Select Switch is a three decade thumbwheel switch with a range of 300 to 999 microseconds.
- (9) PATTERN SYNC signal is developed from a threat decoder and PROM address register. It is used to sync the oscilloscope when the preset PRI's A-W/A-F/B are selected.
- (10) PRI DATA is developed from programmed ROM's and pulse control circuitry for controlling the PRI generator on the pulse generator card.
- (11) When PRI data (interval between two pulses) is received at the pulse generator an advance address signal is sent to the con scan shaper and pulse control card to set up the next PRI.



RF MODULATION (Continued)

- (12) PULSE SYNC is generated together with ADDRESS ADVANCE and is used to sync the oscilloscope.
- (13) BLANKING pulse is generated 100 ns prior to the leading edge of the PULSE DRIVE signal and ends 600 ns after the trailing edge of PULSE DRIVE. The pulse is available at Blanking Jack J6 to simulate the blanking pulse supplied to LRU-1 from the aircraft.
- (14) PULSE WIDTH SELECT SWITCH S4. This control is capable of setting the width from 0.1 to 9.9 μ s in 0.1 μ s steps.
- (15) PULSE DRIVE. The PRI generator produces a pulse train simulating radar threats except when PRI select switch is in OFF. The pulse drive signal enables Pin Switch CR2 to pulse modulate the RF signal.
- (16) PULSE/CW SWITCH S1. In the pulse position, the pulse drive signal is
In the CW position the pulse drive signal is inhibited.
- (17) NORMAL/PATTERN SWITCH S8. Selects either pulse sync or pattern sync to sync the oscilloscope when performing maintenance on LRU-1.



PULSE MODULATED

2-5. (Refer to figure F0-4.) The pulse modulation circuits are located on CCA, CS and Pulse Control 1A3A2/1A4A2 and CCA, Pulse Generator 1A3A1/1A4A1.

- (1) PRI SELECT SWITCH S7 is a four position rotary switch which selects the PRI pattern for the Pulse Generator. Three positions of the switch select one of three preset PRI's. The switch position and threat codes are as follows:

S7-Switch Position	Threat Code
A-W	A0
A-F	A1
B	A2
VAR PRI	

The other position of the switch selects a variable PRI controlled by VARIABLE PRI Switch S5.

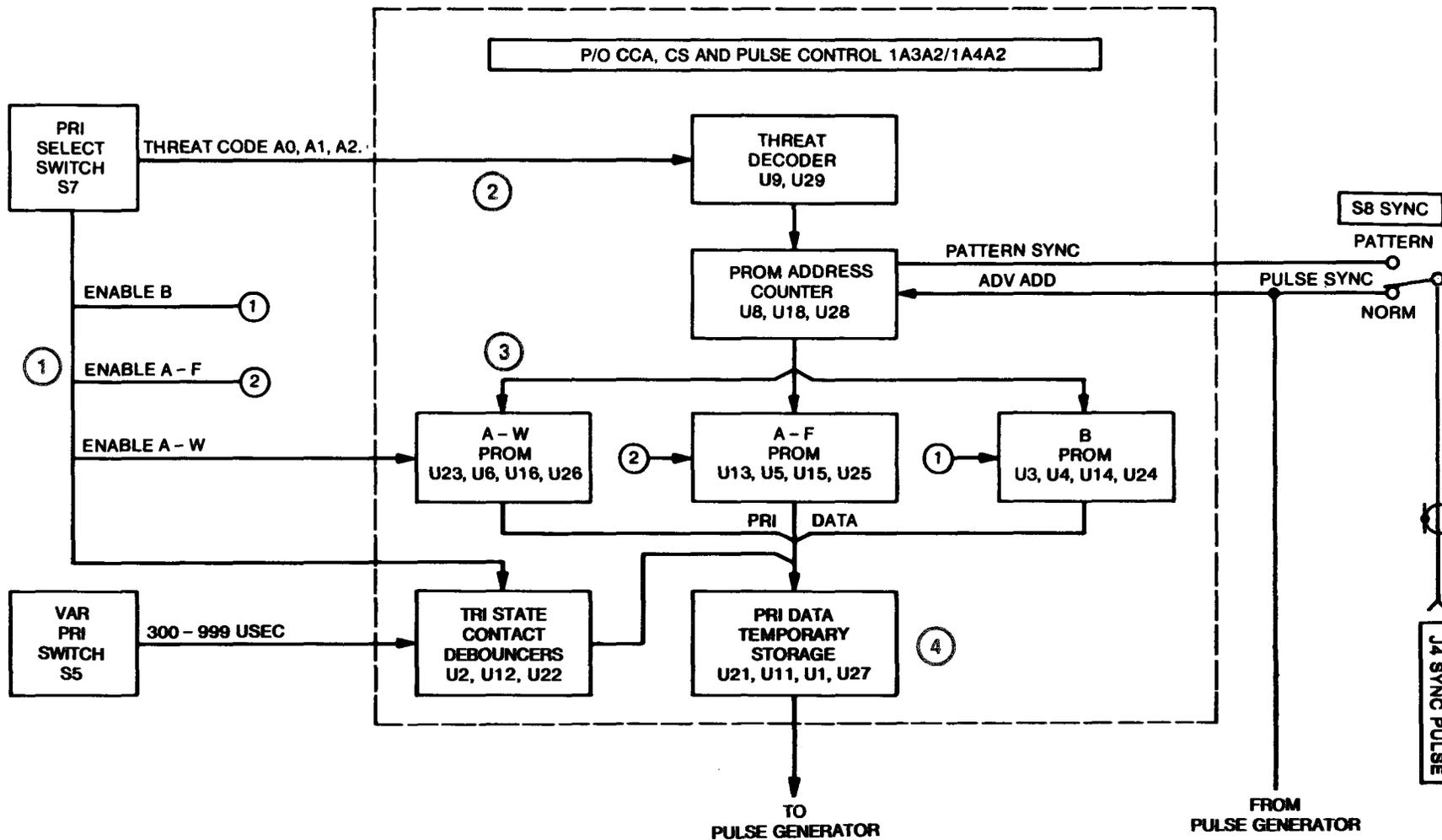
- (2) THREAT DECODER. The threat decoder consists of two programmed micro-circuits U9, U29. Each PROM contains 32 words, each word contains 8 bits of data. The two PROM's make up a 16 digit word. The first word addresses the A-W mode, the second word addresses the A-F mode and the third word addresses the B mode. The information from the threat decoder is loaded into the PROM address counter U8, U18, U28.
- (3) A-W/A-F/B PROM'S. The PROM address counter addresses the A-W/A-F/B PROM's, Each mode contains 4 PROM'S. Each PROM contains 512 words. Each word contains 4 bits of data.

A-W PROMS U23, U6, U16, U26

A-F PROMS U13, U5, U15, U25

B PROMS U3, U4, U14, U24

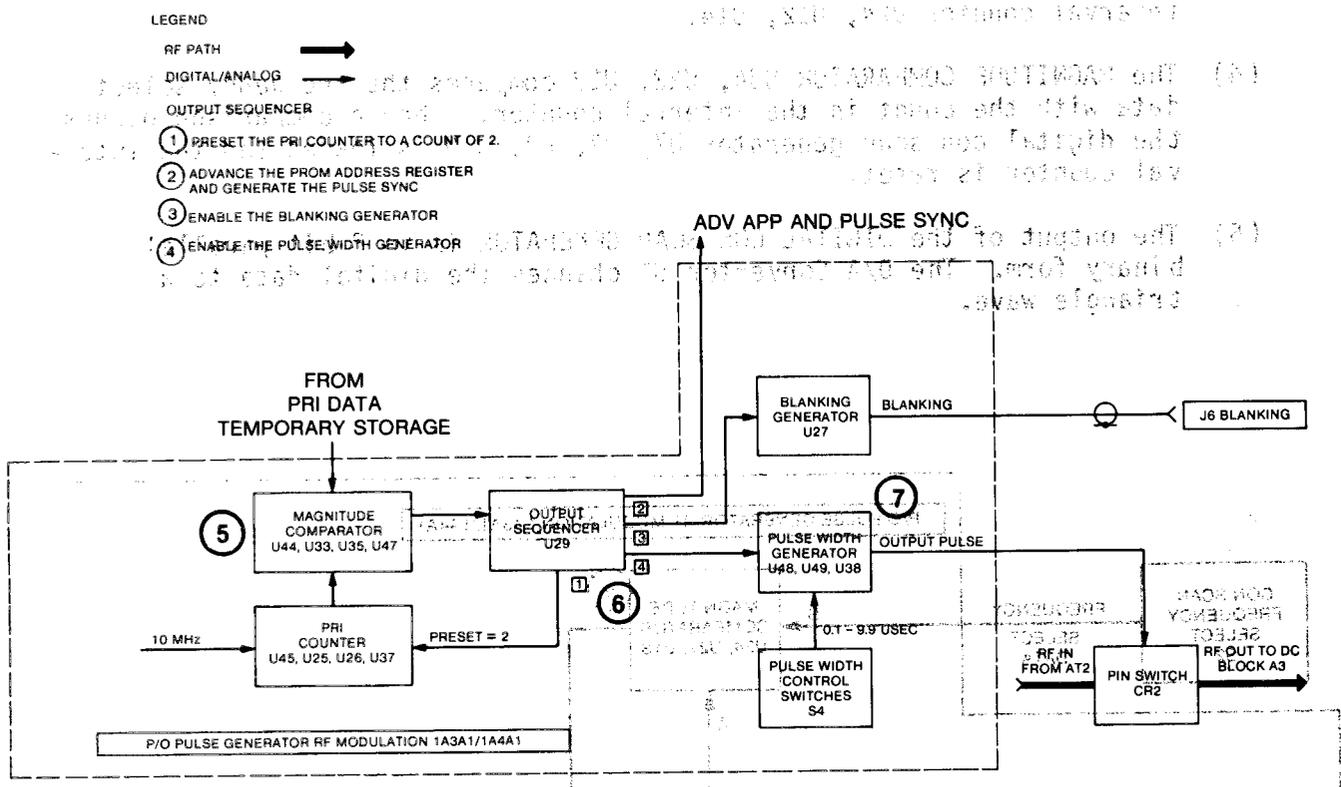
- (4) PRI DATA TEMPORARY STORAGE. 16 bits of PRI data from A-W/A-F/B, and 16 bits of PRI data from the VAR PRI switch S5, via contact denouncers U2, U12, U22, are OR'ed at the input of the PRI data temporary storage U21, U11, U1, U27. The information stored is determined by the enable signals from the PRI select switch S7.



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PULSE MODULATION (Continued)

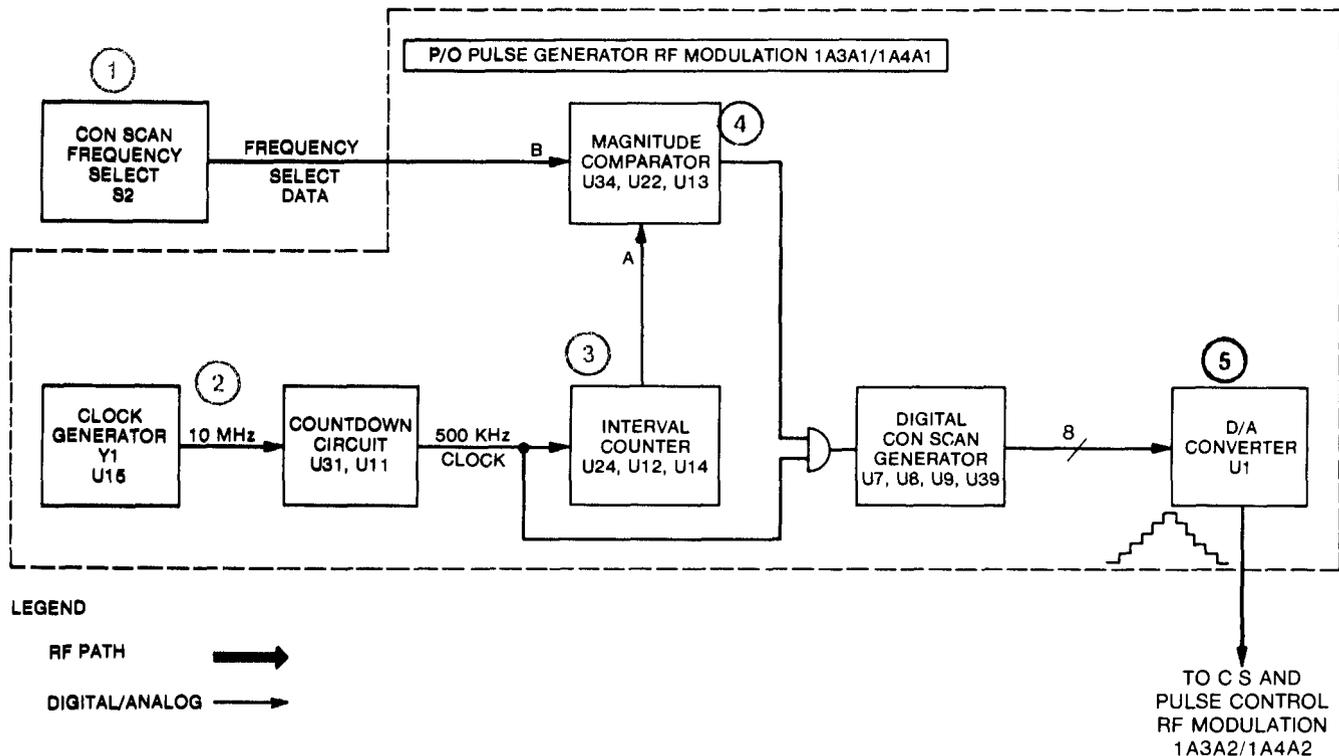
- (5) MAGNITUDE COMPARATOR. The magnitude comparator U44, U33, U35, U47 compares the PRI data in the temporary storage with the PRI counter U45, U25, U26, U37. When a comparison occurs, output sequencer U29 is enabled.
- (6) OUTPUT SEQUENCER. When the output sequencer is enabled the following events occur:
- PRI COUNTER is preset (1) to a count of 2.
 - PROM ADDRESS REGISTER is advanced (2) and pulse sync is generated.
 - BLANKING GENERATOR U27 is enabled (3).
 - PULSE WIDTH GENERATOR U48, U49, U38 is enabled (4).
- (7) PULSE WIDTH GENERATOR. The pulse width generator, when enabled by the output sequencer, generates the output pulse to PIN Switch CR2. The width of the pulse is determined by the setting of the pulse width control switch S4.



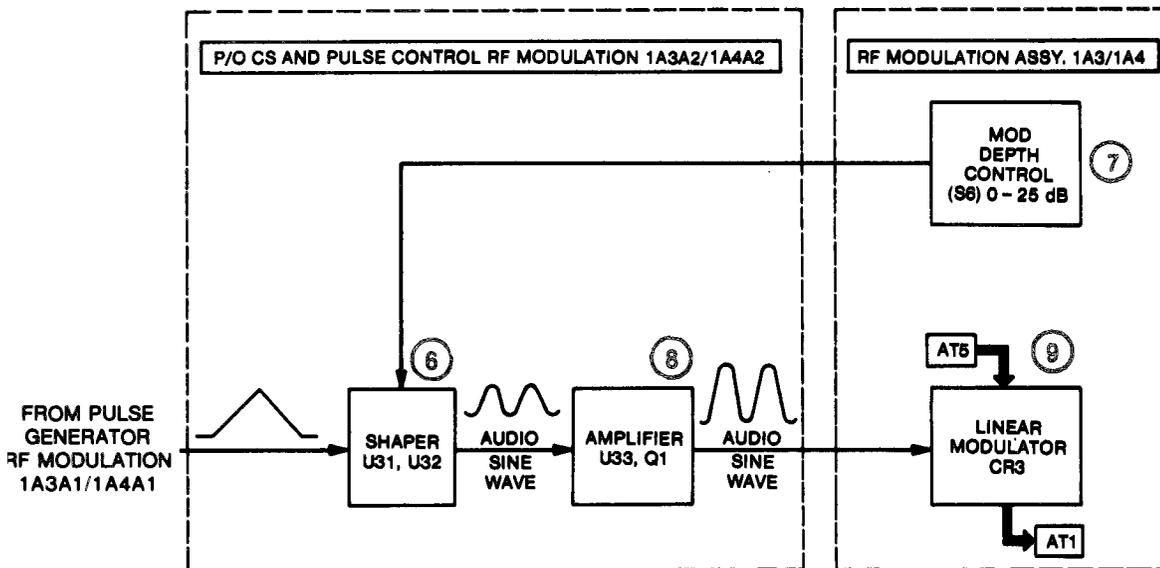
LINEAR MODULATION

2-6. (Refer to figure F0-5.) Linear modulation is developed by a con scan generator located on circuit cards 1A3A1/1A4A1 and 1A3A2/1A4A2. This generator develops an audio sine wave which drives the linear modulator to amplitude modulate the RF signal.

- (1) The CON SCAN FREQUENCY SELECT S2 is a two decade thumbwheel switch which selects the con scan frequency in 1 Hz steps from 1 Hz to 99 Hz.
- (2) CLOCK GENERATOR Y1 (U15) is a 10 MHz oscillator which feeds countdown circuit U31, U11.
- (3) The output of countdown circuit is a 500 KHz clock which steps the interval counter U24, U12, U14.
- (4) The MAGNITUDE COMPARATOR U34, U22, U13 compares the frequency select data with the count in the interval counter. When a comparison occurs the digital con scan generator U7, U8, U9, U39 is loaded and the interval counter is reset.
- (5) The output of the DIGITAL CON SCAN GENERATOR is in 8-bit parallel binary form. The D/A Converter U1 changes the digital data to a triangle wave.



- (6) The output of the D/A CONVERTER U1 feeds SHAPER U31, which develops an audio sine wave and shifts it all above zero baseline.
- (7) MOD DEPTH CONTROL S6 sets the depth of modulation of the audio sine wave from 0-25 dB.
- (8) AMPLIFIER U33, Q1 amplifies the audio sine wave and outputs the signal to the linear modulator.
- (9) The LINEAR MODULATOR CR3 amplitude modulates the RF frequency.



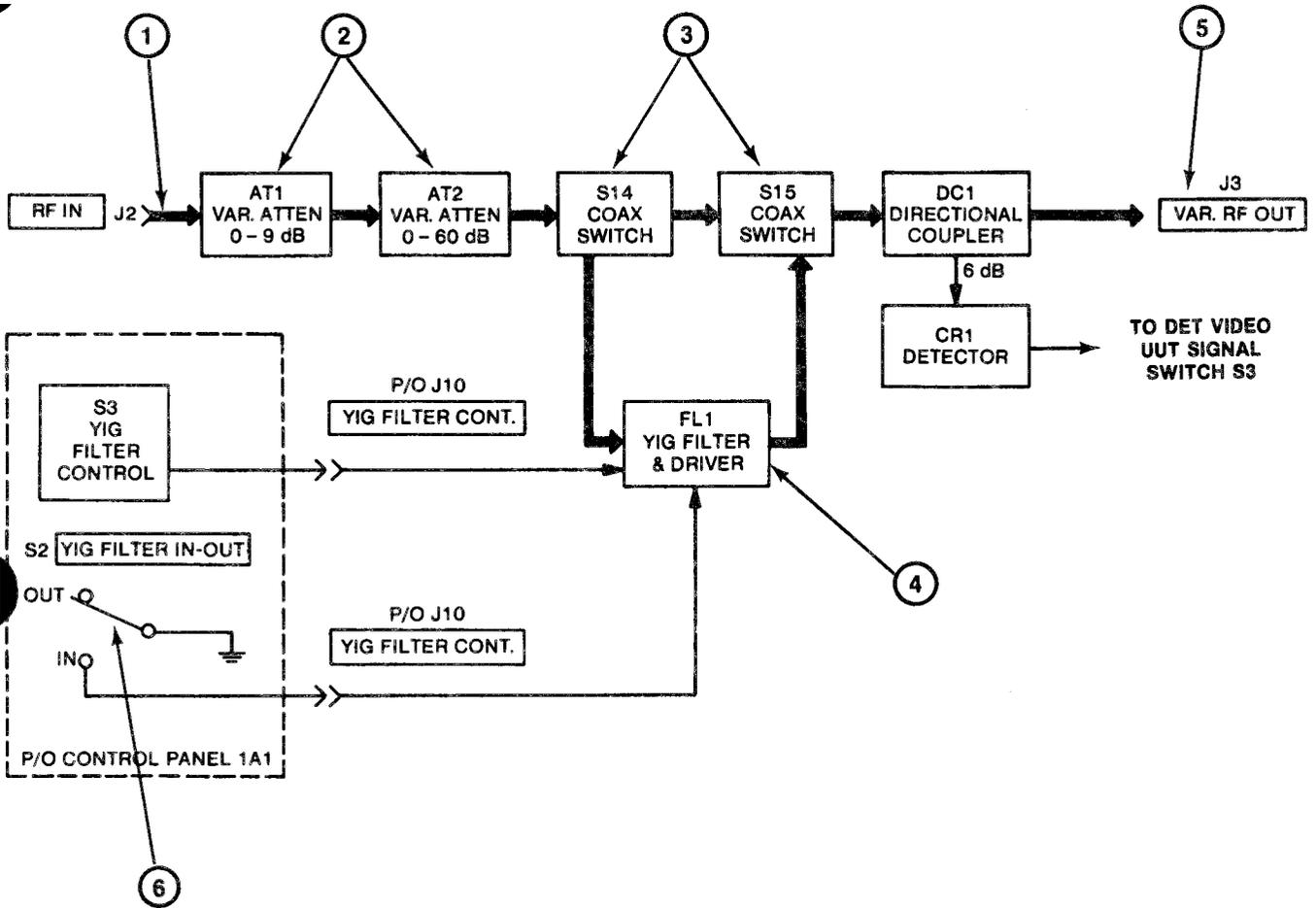
STATUS AND MONITORING

2-7. (Refer to figure F0-6.) Status Panel Assembly 1A2 has an RF path, monitoring switch, status indicators and control switches relating to UUT status.

a. RF Path.

- (1) The high RF power output from LRU-1 is reduced by a 30 dB RF power attenuator installed at the RF output of LRU-1. The output of the 30 dB attenuator is coupled through RF IN Jack J2 at the front of the status panel and then through two step attenuators.
- (2) Attenuator AT1 provides 0 dB to 9 dB in increments of 1 dB. Attenuator AT2 provides 0 dB to 60 dB in increments of 10 dB. This provides a range of 0 dB to 69 dB by the settings of the respective switches.
- (3) Coax Switches S14 and S15 are controlled by the YIG FILTER IN/OUT Switch S2 on the control panel. When the switch is in the OUT position, the coax switch is de-energized and RF is directed straight through to Directional Coupler DC1. This is the normal condition when monitoring detected video signals.
- (4) When a modulation depth signal is being tested, the YIG FILTER IN/OUT switch S2 will be in the IN position. This energizes Coax Switches S14 and S15, directing the RF through YIG filter and driver and then to Directional Coupler DC1.
- (5) Directional Coupler DC1 splits the RF. One path going to VAR RF OUT Jack J3 at the front of the status panel and the other path (reduced by 6 dB) going to Detector CR1. The detected video from CR1 is sent to the DET VIDEO/UUT SIGNAL Switch S3.
- (6) The YIG FILTER CONTROL Switch S3 located on Control Panel Assembly 1A1 is used to tune the YIG Filter and Driver FL1 to the F1, F2 and F3 frequencies as follows:

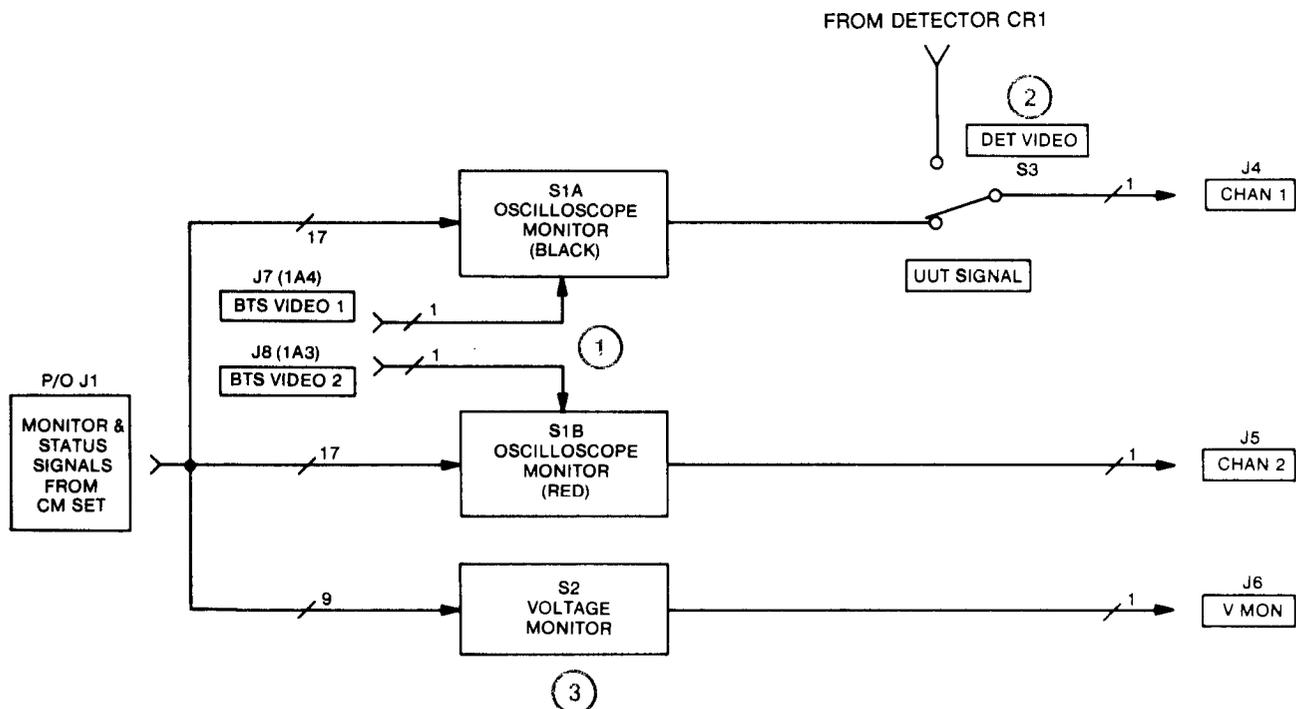
FREQUENCY	YIG FILTER CONTROL SETTINGS
F1	330
F2	509
F3	688



STATUS AND MONITORING (Continued)

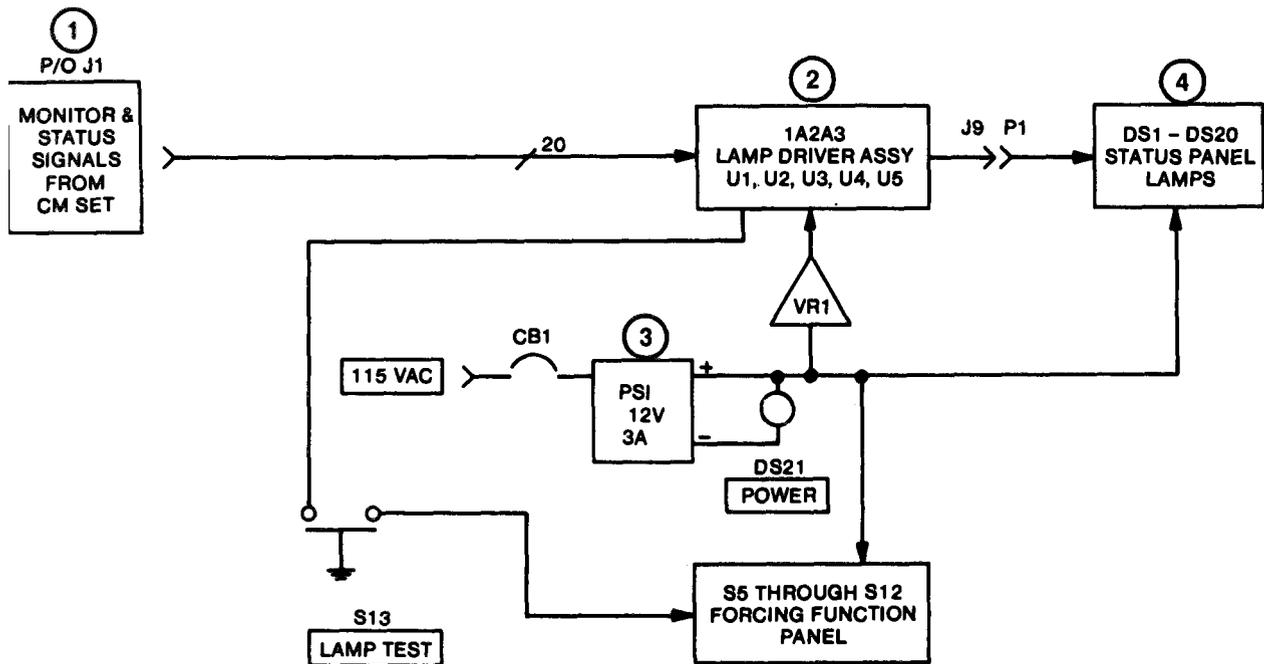
b. Monitoring.

- (1) OSCILLOSCOPE MONITOR (BLACK) S1A and OSCILLOSCOPE MONITOR (RED) S1B. This dual concentric rotary switch receives a total of 17 pulsed or varying system monitor signals from LRU-1 jack J7, connected through cable W1 to jack J1 on the status panel. The switch also receives the BTS VIDEO 1 (J7) from RF Modulation Assembly 1A4 and BTS VIDEO 2 (J8) from RF Modulation Assembly 1A3. The rotary switch black knob switches CHAN 1 connector J4 to one of 17 points in LRU-1 or to BTS VIDEO J7. The rotary switch red knob switches CHAN 2 (J5) to one of 17 points in the UUT or the BTS VIDEO J8.
- (2) DET VIDEO/UUT SIGNAL S3. This toggle switch selects either the detected video from CR1 in the RF path or the signal being monitored by OSCILLOSCOPE MONITOR (BLACK) S1A and directs it to CHAN 1 connector J4.
- (3) VOLTAGE MONITOR S2. Nine DC voltages from the low voltage power supply in LRU-1 are connected through LRU-1 J7, Cable W1, to status panel jack J1. The voltages are selectable by VOLTAGE MONITOR Switch S2 on the front panel for measurement with an external digital multimeter connected to V MON J6.

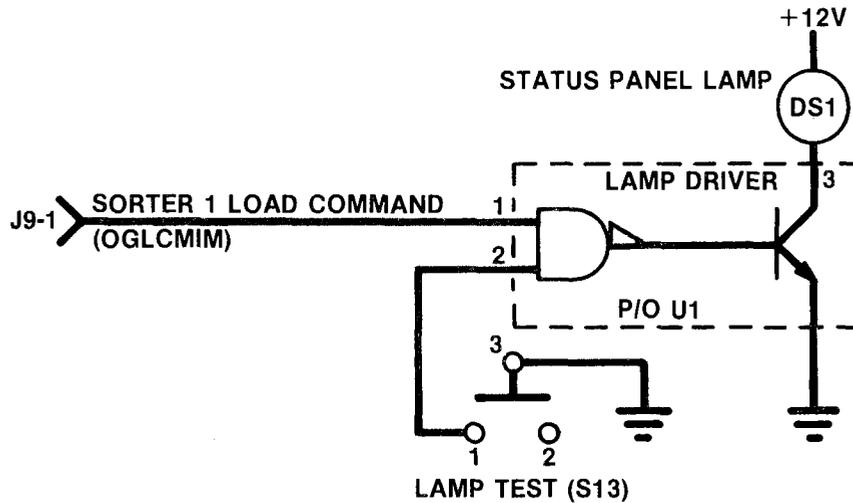


c. Status.

- (1) A total of 18 status signals and 2 spares are supplied from LRU-1 to the BTS to monitor the status of LRU-1. The signals are monitored by indicator lights. The status signal, negative logic is connected from LRU-1 Jack J7 through Cable W1 to Jack J1 on the status panel.
- (2) LAMP DRIVER ASSY 1A2A3 (U1, U2, U3, U4, U5) receives the status signals from J1. The status signals are connected to five identical integrated circuit chips. Each chip contains four lamp driver circuits. Each driver consists of a two-input nand gate and output power driver.
- (3) Power Supply PS1 supplies +12 Volts to one terminal of all status panel lamps.
- (4) Whenever the inverting output power driver receives a positive logic 1 signal, that particular status panel lamp illuminates. The following is a simplified circuit of the U1 lamp driver and status lamp DS1.



STATUS AND MONITORING (Continued)

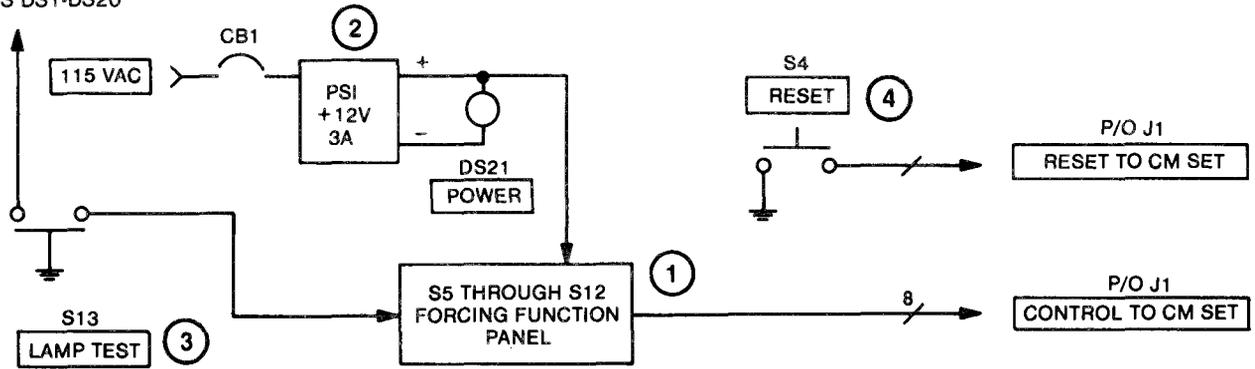


LAMP TEST Switch S13, when depressed, applies a ground level to one input of the nand gate on the lamp driver assembly. The high output from the nand gate turns on the output power drivers, illuminating the lamps on the status panel.

d. Control .

- (1) The status panel provides forcing signals to LRU-1 to force it to a particular state. This is accomplished by pressing one of 8 forcing function lamp switches S5 through S12 on the forcing function panel. The forcing function lamp switches connect a ground from the Status Panel to a point in LRU-1. When a function is being forced, the indicator on the forcing function switch is lit.
- (2) POWER SUPPLY PS1 supplies +12V to one terminal of each forcing lamp. When the switch is depressed a ground return is supplied to the other terminal.
- (3) LAMP TEST S13, when depressed, provides a ground return to illuminate all forcing function lamps.
- (4) RESET S4, when depressed, provides a master reset signal (ground level) to LRU-1 under test.

TO STATUS PANEL
LAMPS DS1-DS20



CHAPTER 3

MAINTENANCE INSTRUCTIONS

SECTION I

REPAIR PARTS, SPECIAL TOOLS; TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

<u>SECTION CONTENTS</u>	<u>PAGE</u>
INTRODUCTION	3-1
SCHEMATIC DIAGRAMS	3-2
TOOLS AND REPAIR PARTS	3-2
TEST EQUIPMENT	3-2

INTRODUCTION

3-1. This chapter contains the aviation intermediate maintenance instructions for the BTS. Section II contains installation instructions for the BTS. Section III provides detailed troubleshooting procedures for detecting a fault and isolating it to a Shop Replaceable Unit (SRU). Section IV provides unit location, removal, and replacement information including power supply adjustment procedures. Section V provides AVIM testing and re-test instructions.

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SCHEMATIC DIAGRAMS

3-2. Foldout schematic diagrams of the BTS are included in the rear of this manual, for reference purposes and as further troubleshooting aids.

TOOLS AND REPAIR PARTS

3-3. Tool Kit, Electronic Equipment TK-105/G contains hand tools necessary for maintenance of the BTS. Various sizes of screwdrivers and wrenches are needed to remove and replace the BTS chassis assemblies and power supplies. Refer to TM 11-6625-2884-30P for repair parts.

TEST EQUIPMENT

3-4. The following test equipment is required to maintain the BTS. Test equipment similar to and having characteristics equal to this test equipment may be used.

<u>Common Name</u>	<u>Manufacturer and Type</u>
Oscilloscope including: Dual Channel Amplifier Time Base & Delay Generator 10X Probe (2 each)	AN/USM-281A
Digital Multimeter	AN/USM-451
Frequency Meter	HP P532A
RF Power Meter	HP 435A
RF Power Sensor	HP 8481A
Power Supply, 28V (30A min)	PP-1104/G

SECTION II INSTALLATION INSTRUCTIONS

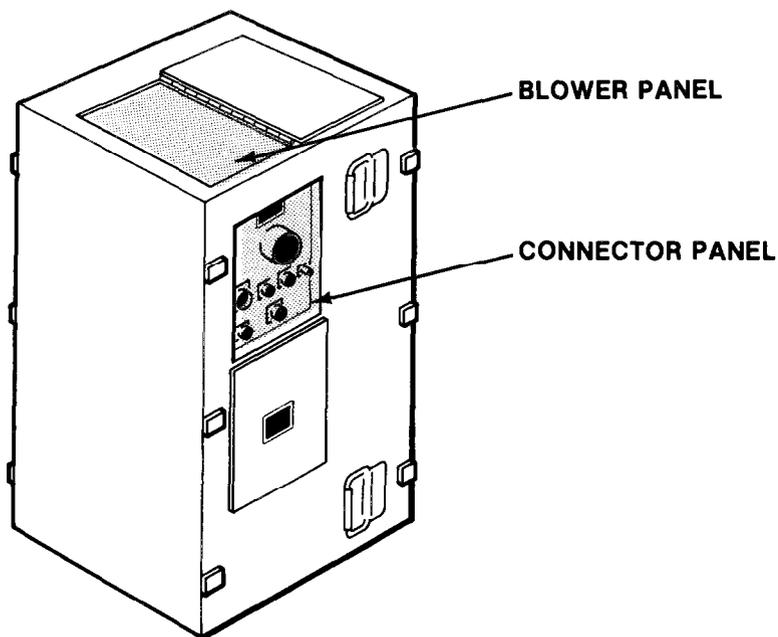
<u>SECTION CONTENTS</u>	<u>PAGE</u>
GENERAL	3-3
CONNECTIONS	3-3
CABLING/HOSE ATTACHMENT TO BTS CONNECTOR PANEL	3-4
POWER REQUIREMENTS	3-6
CHECKOUT	3-6

GENERAL

3-5. This section describes the bench requirements, cable and air duct connections and ac power requirements of the BTS. Use a bench at least 30" x 72", capable of supporting 500 lbs.

CONNECTIONS

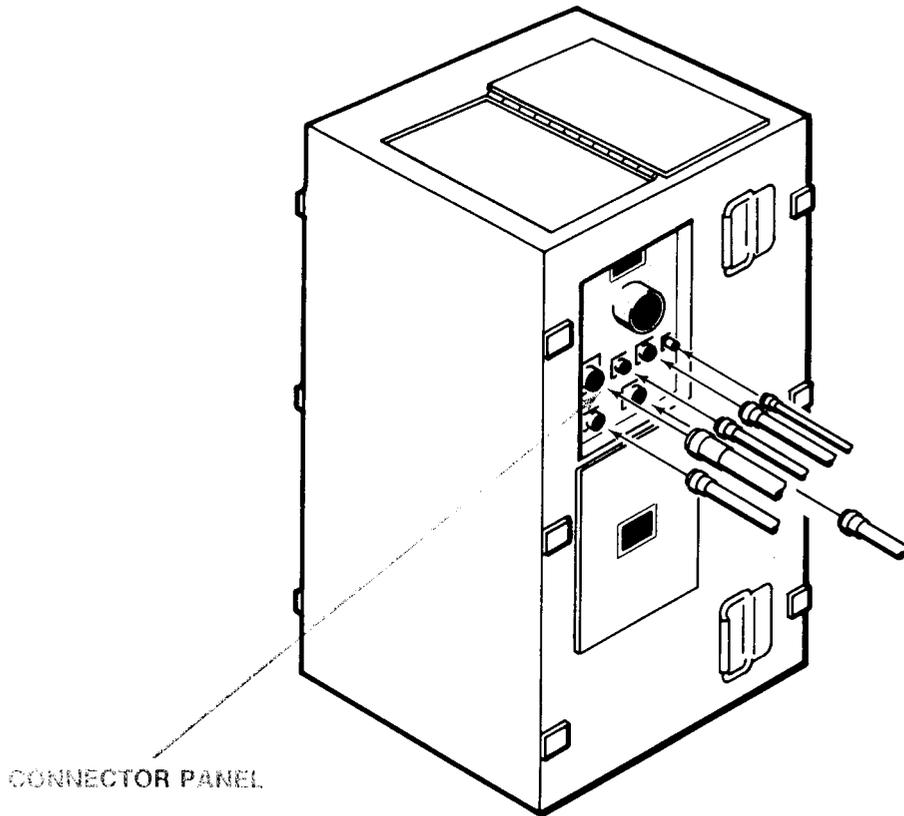
3-6. Loosen cover fasteners and open hinged covers on the upper left side and top of the BTS to expose the connector panel and blower panel.



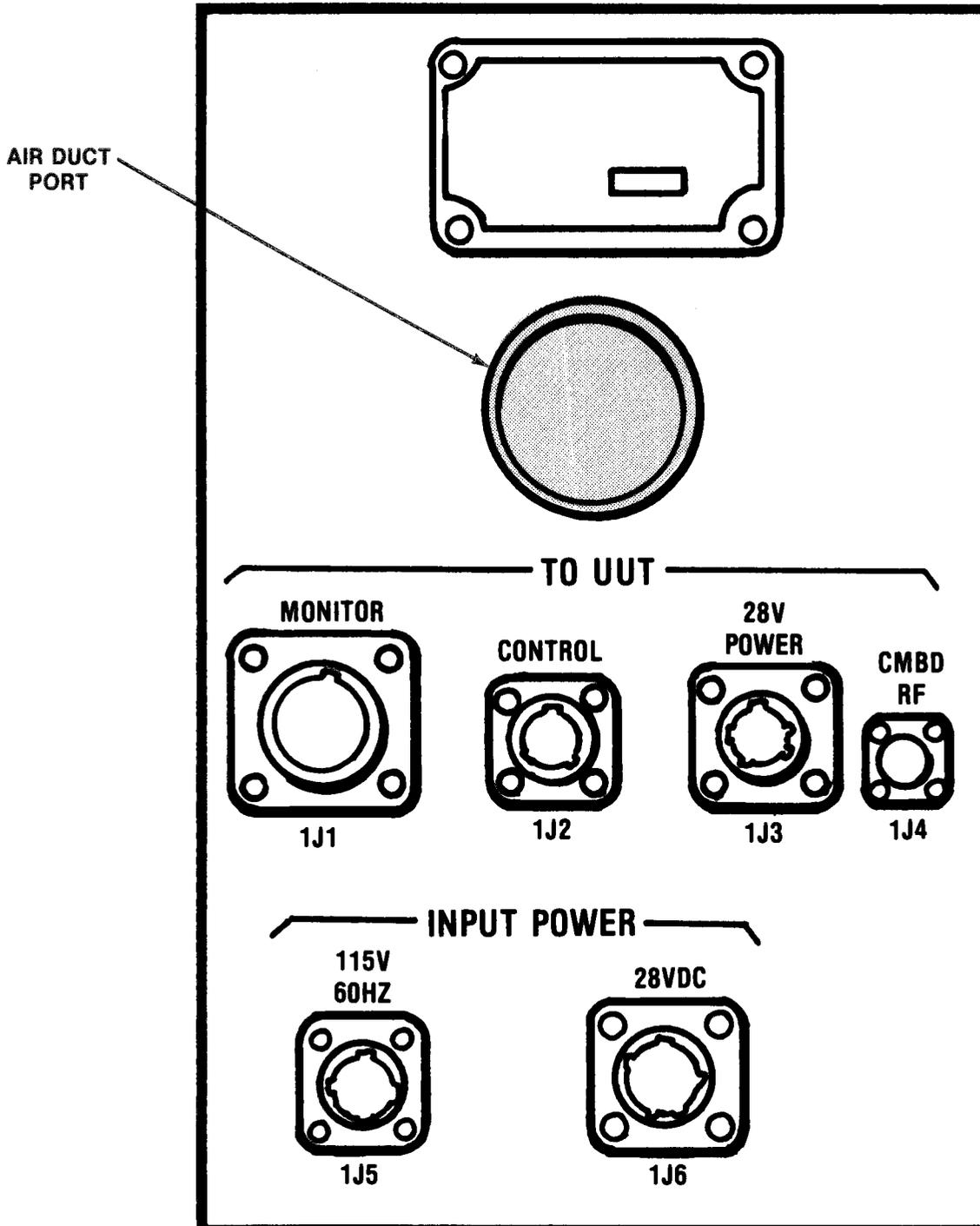
CABLING/HOSE ATTACHMENT TO BTS CONNECTION PANEL

3-7. Connect one end of each test cable designated in the left column of the following listing to the associated jack listed in the right column.

CABLE DESIGNATION	JACK NOMENCLATURE AND NUMBER
W1	Monitor J1
W2	Control J2
W3	28V Power J3
W5	CMBD RF J4
W6	115V 60 Hz J5
W7	28 VDC J6
Air Duct (Hose)	Not designated (located near top of panel)

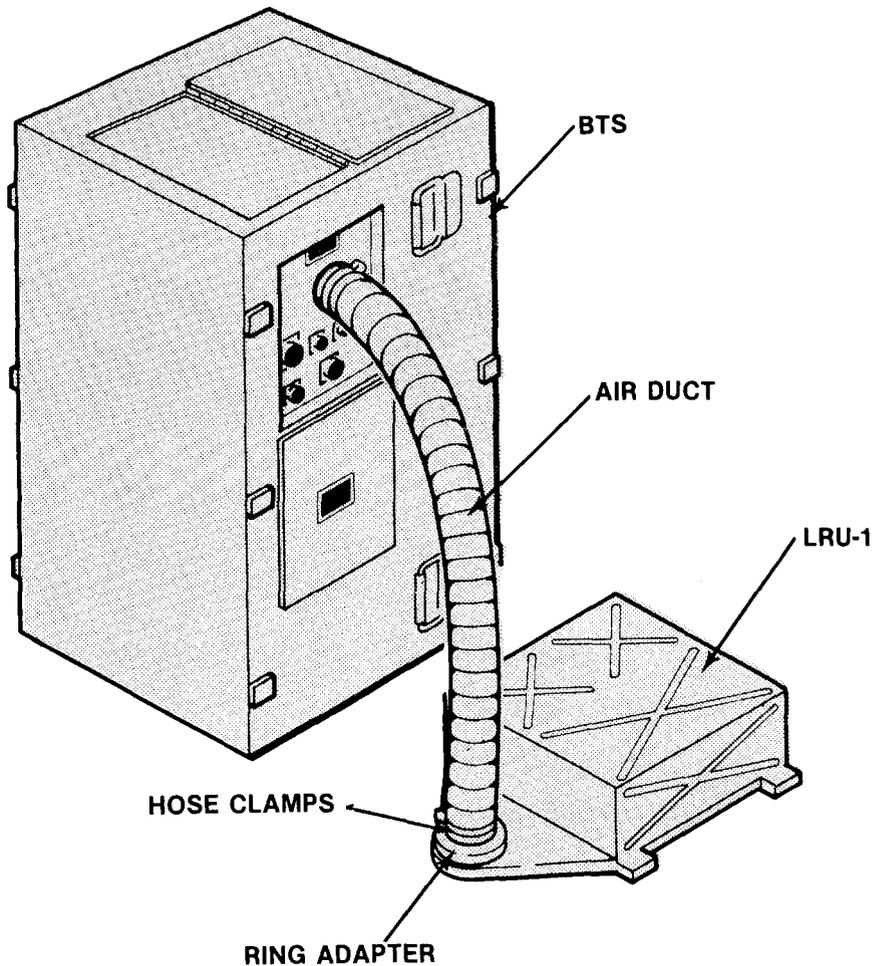


CONNECTOR PANEL



CABLING/HOSE ATTACHMENT TO BTS CONNECTOR PANEL (Continued)

Secure the air duct to the BTS using one of two supplied hose clamps. Use the second hose clamp to secure the air duct to LRU-1, using the BTS ring adapter.



POWER REQUIREMENTS

3-8. Equip the test bench for 115 Vac 60 Hz to operate the BTS, and with 28 Vdc with 30 ampere capacity via a PP-1104/G power supply, or equivalent, to operate LRU-1.

CHECKOUT

3-9. After installation, adjustment, repair or replacement of a BTS component, check out the BTS as in section III.

SECTION III TROUBLESHOOTING

<u>SECTION CONTENTS</u>	PAGE
GENERAL	3-7
TEST CONDITIONS	3-9
DEFINITIONS	3-9
TEST EQUIPMENT USE	3-9
PRELIMINARY TEST SET-UP	3-11
RF OUTPUT LEVEL CHECK	3-14
RF OUTPUT FREQUENCY CHECK	3-19
VARIABLE PRI CHECK	3-23
CON SCAN MODULATION CHECK	3-29
PRI CHECK	3-36
BLANKING OUTPUT TEST	3-40
PULSE SYNC TEST	3-43
CON SCAN SYNC TEST	3-46
STATUS PANEL INDICATOR CHECK	3-49
STATUS PANEL FORCING FUNCTION CHECK	3-52
STATUS PANEL OSCILLOSCOPE MONITOR CHECK	3-55
STATUS PANEL VOLTAGE MONITOR CHECK	3-60
YIG FILTER CHECK	3-62
CONTROL PANEL CHECK	3-70

GENERAL

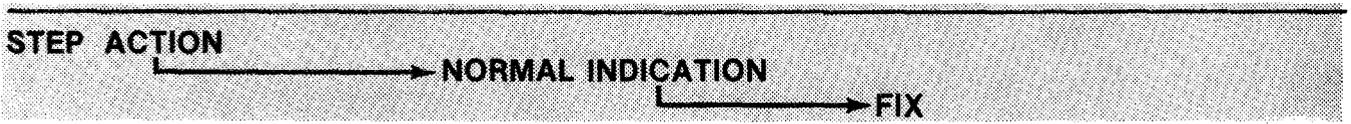
3-10. Troubleshooting information is covered in paragraphs 3-15 through 3-28. Each paragraph provides the test set-up and contains tests in tabular logic tree format consisting of four staggered columns. Column 1 contains STEP numbers with the steps in ascending order. Column 2 designated ACTION explains the test. Column 3 NORMAL INDICATION states what measurements should be observed for normal circuit operation. Column 4 designated FIX lists what course to follow if a measurement deviates excessively from the stated value in column 3.

COLUMN 1

COLUMN 2

COLUMN 3

COLUMN 4



GENERAL (Continued)

To fix a specific trouble, go to the page listed in the following symptom index.

SYMPTOM INDEX

TROUBLE WITH	PAGE
CONTROL PANEL ASSEMBLY 1A1	
Controls	3-70
YIG Filter	3-62
STATUS PANEL ASSEMBLY 1A2	
Forcing Functions	3-52
Status Indicators	3-49
Oscilloscope Monitor	3-55
Voltage Monitor	3-60
RF MODULATION ASSEMBLY 1A3/1A4	
Blanking Output	3-40
Con Scan Modulation	3-29
Con Scan Sync	3-46
PRI	3-36
Pulse Sync	3-43
RF Output Level	3-14
RF Output Frequency	3-19
Variable PRI	3-23

To check out the entire BTS, perform all the procedures in this section.

TEST CONDITIONS

3-11. Unless otherwise specified, all tests will be performed under the following conditions.

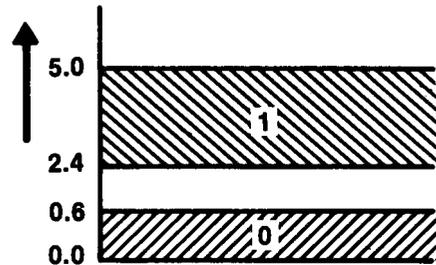
- Temperature: Room ambient (+25 ±5°C)
- Altitude: Normal ground
- Humidity: Room ambient (up to 90 percent relative humidity)
- Input Power: 105 - 125V, 60 Hz
- Warm Up: 5 minutes, associated test equipment 30 minutes

DEFINITIONS

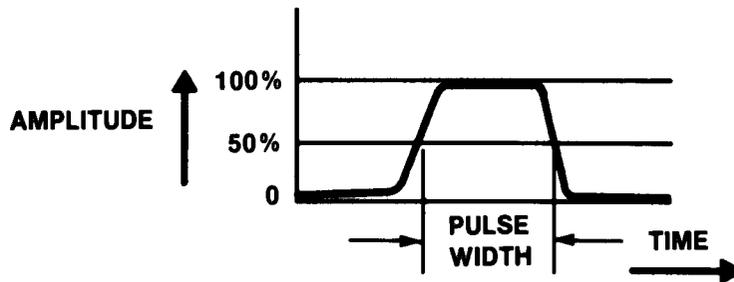
3-12. The following definitions apply throughout this book:

a. Standard Logic Levels (SLL).

- Logical 1 = +2.4 to +5.0 volts
- Logical 0 = 0 to +0.6 volts



b. Pulse Width. Pulse width is time measured between the 50% points of the waveshape.



- c. Pulse Repetition Interval (PRI). PRI is the time between consecutive pulses, usually given microseconds. PRI is measured from a point on one pulse to the corresponding point on the next pulse.
- d. Continuity. 0 to 3 ohms.

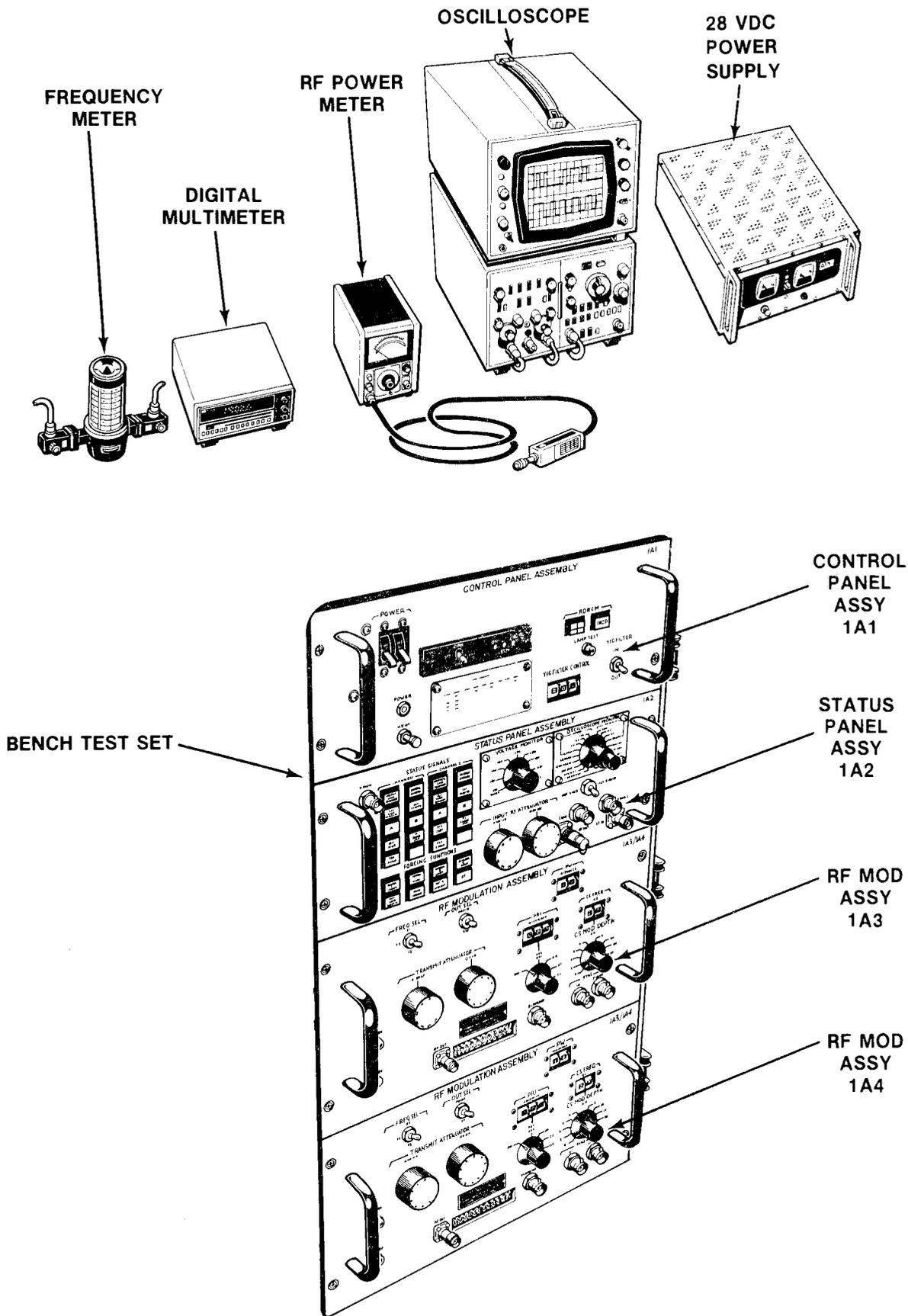
TEST EQUIPMENT USE

3-13.

a. Oscilloscope. Either one of the dual channel vertical inputs shall be used. Triggering shall be as specified in the test instructions.

b. Other Test Equipment. Normal inputs/outputs implied unless otherwise specified.

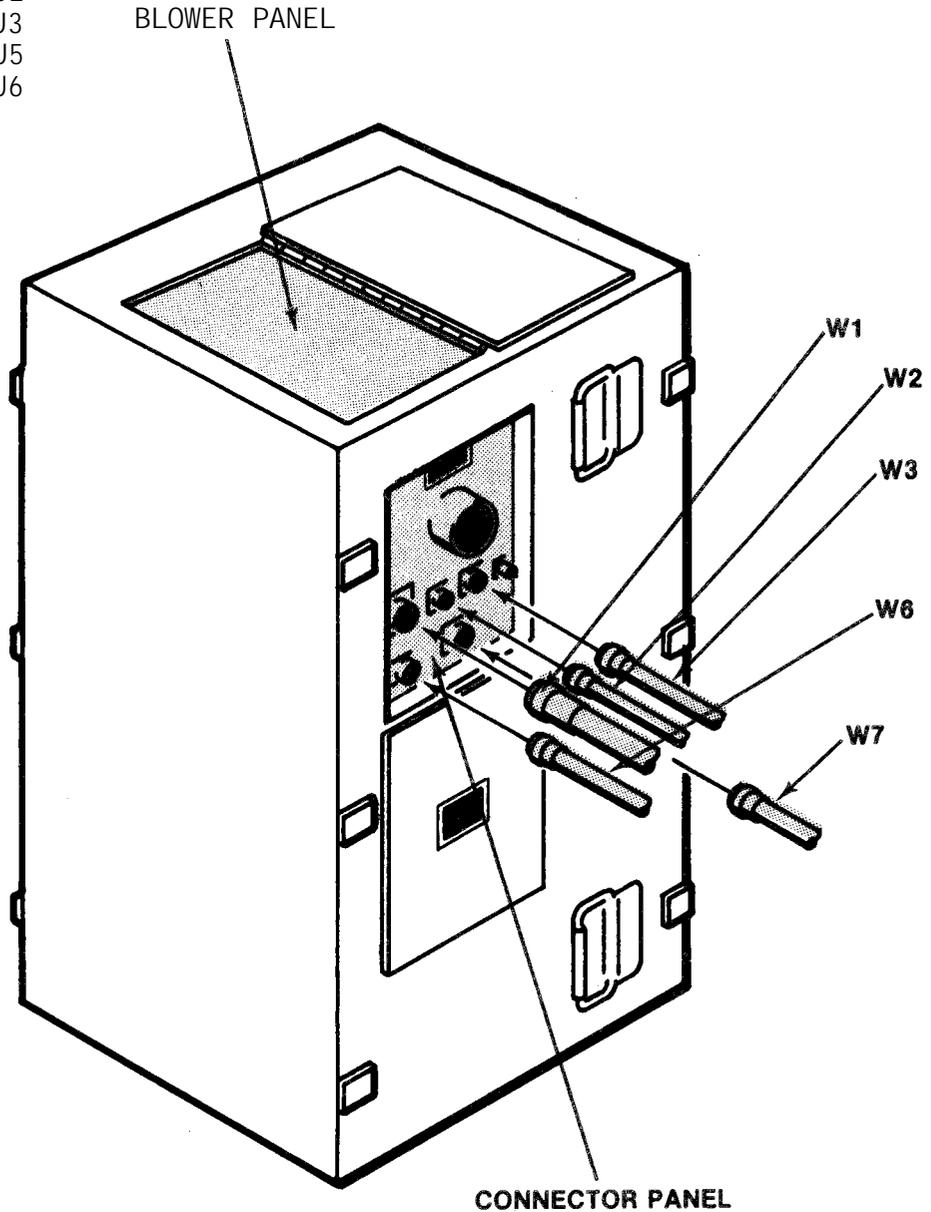
TEST EQUIPMENT USE (Continued)



PRELIMINARY TEST SET-UP

3-14. Install the following cables to their respective jacks.

<u>Cable</u>	<u>Jack</u>
W1	J1
W2	J2
W3	J3
W6	J5
W7	J6

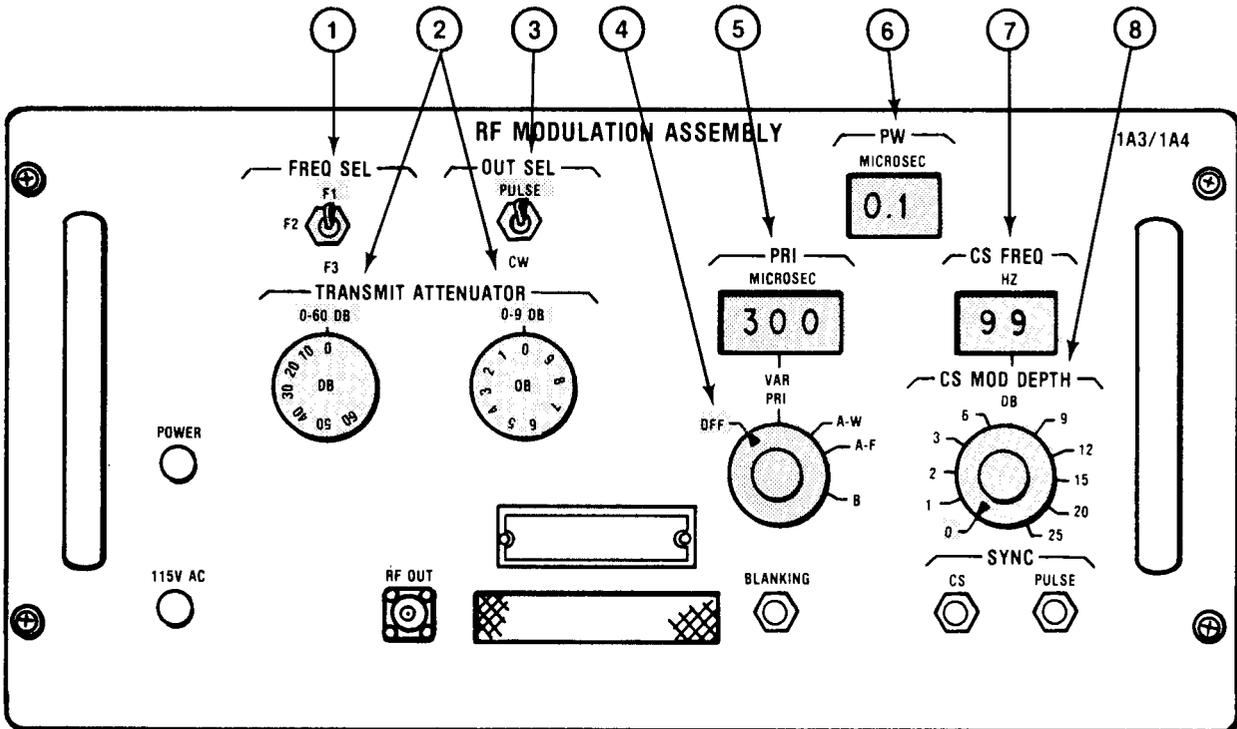


Make sure 115 VAC, 60 Hz switch on the control panel is set to OFF. Connect cable W6 to a 115 Vac power source.

PRELIMINARY TEST SET-UP (Continued)

a. On the RF Modulation Assemblies 1A3 and 1A4, set switches and controls as follows:

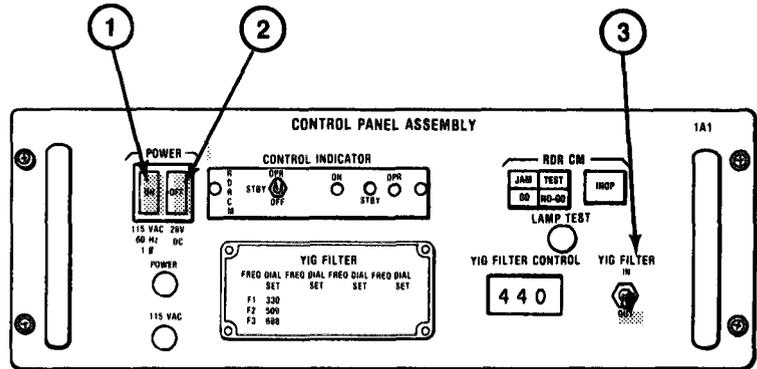
- ① FREQ SEL F1
- ② TRANSMIT ATTENUATOR
 (0-60) DB 0 DB
 (0-9) DB 0 DB



- ③ OUT SEL PULSE
- ④ PRI selector OFF
- ⑤ PRI MICROSEC 300
- ⑥ PW MICROSEC 0.1
- ⑦ CS FREQ Hz 99
- ⑧ CS MOD DEPTH 0 DB

b. On Control panel Assembly 1A1:

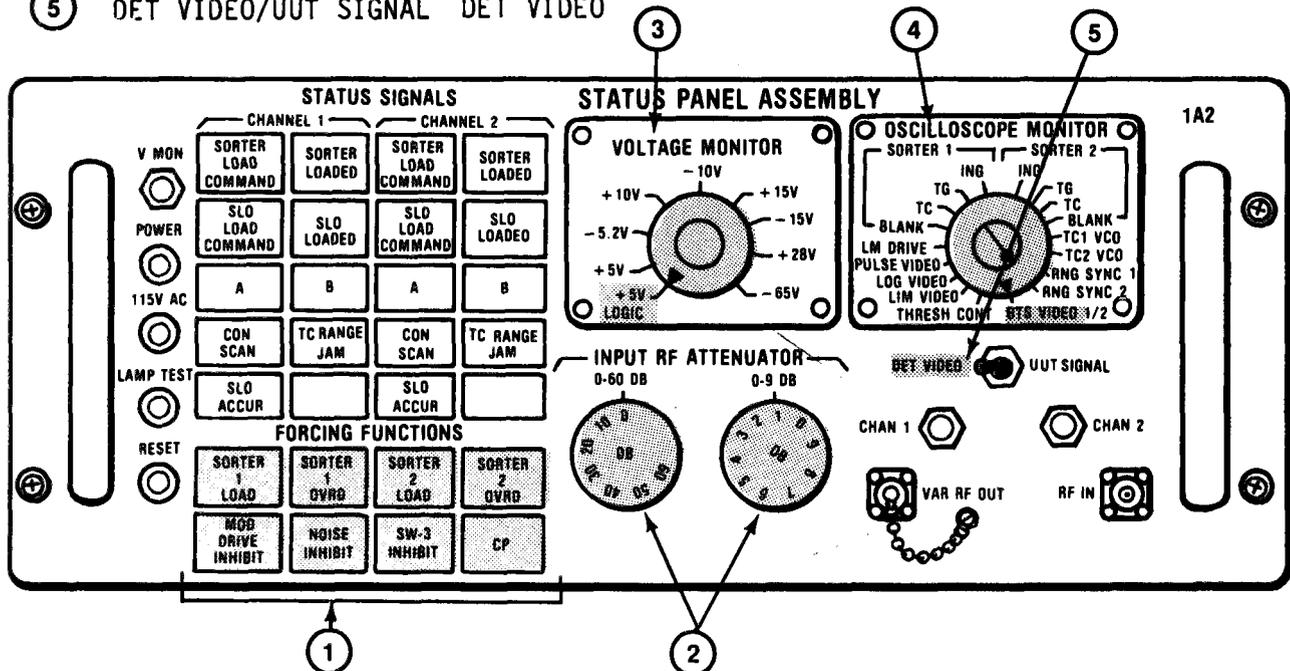
- ① 115 VAC ON
- ② 28 VDC OFF
- ③ YIG FILTER (IN/OUT) OUT



c. On Status Panel Assembly 1A2:

Press the eight FORCING FUNCTIONS pushbutton switches until their respective lamps are out.

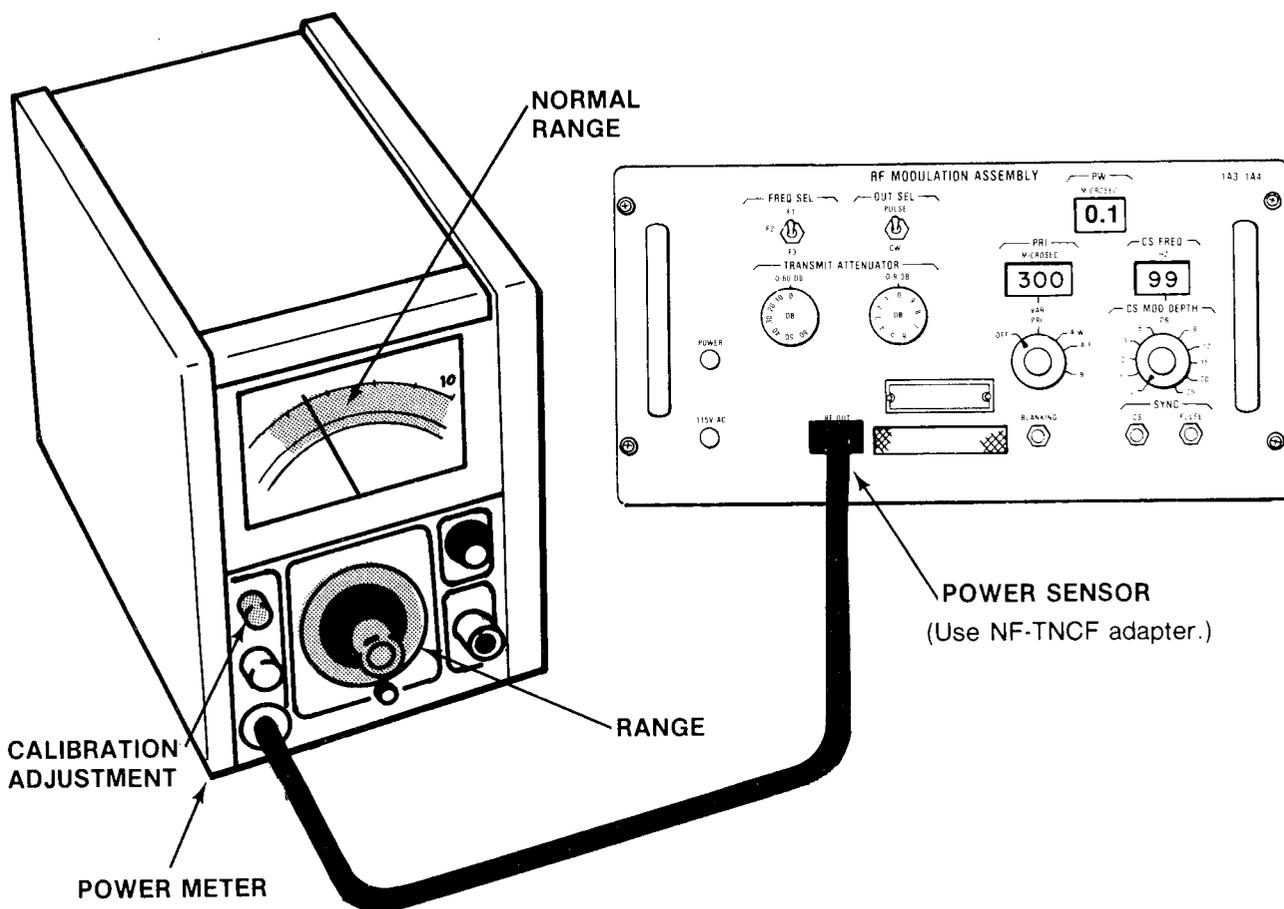
- ② INPUT RF ATTENUATOR
 (0-60) DB 0 DB
 (0-9) DB 1 DB
- ③ VOLTAGE MONITOR +5V LOGIC
- ④ OSCILLOSCOPE MONITOR
 Red knob BTS VIDEO 1/2
- ⑤ DET VIDEO/UUT SIGNAL DET VIDEO



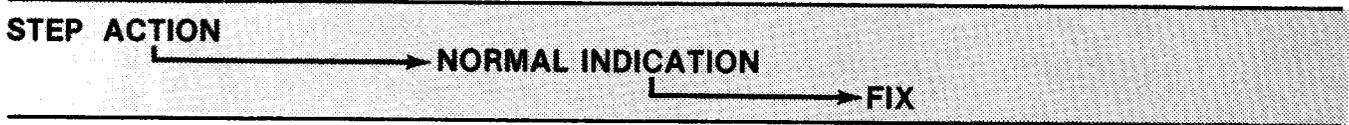
RF OUTPUT LEVEL CHECK

- 3-15.
- a. Test Equipment. Use the following test equipment or equivalent to troubleshoot the RF section of RF Modulation Assemblies 1A3/1A4.

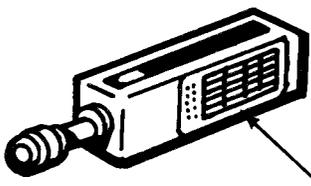
RF POWER METER HP435A
RF POWER SENSOR HP8481A
 - b. Test Connections and Conditions.
 - (1) Make sure all chassis units are in place and all internal cables are connected.
 - (2) Connect RF power sensor to RF OUT jack on upper RF modulation assembly 1A3.
 - c. Initial Test Equipment Setting. Set the RF power meter to a full scale range 5 dB above the normal indication (+10 dBm full scale). Other equipment settings are as in paragraph 3-14a.



d. Procedure.



1. On RF Power meter, set calibration adjustment to value for F1 of the sensor calibration curve. On IA3 set OUT SEL switch to CW and PRI selector to VAR PRI. Record power level.

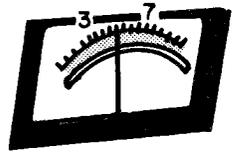


CALIBRATION CURVE

NOTE

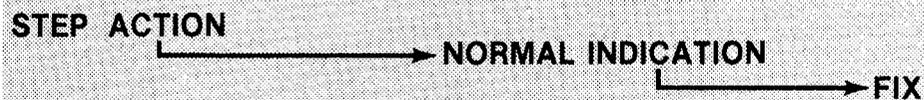
See (S) TM 11-5865-202-30(U) appendix C for value of F1.

Output power level shall be +3 dBm min. If power level is normal go to step 3.

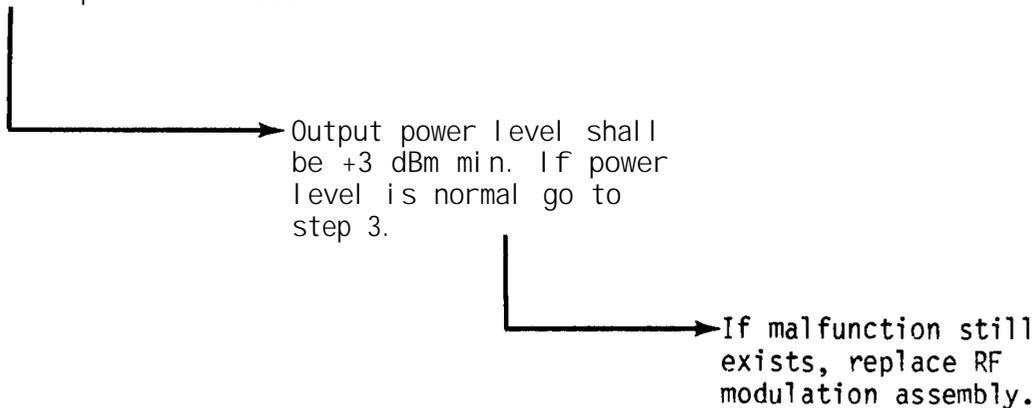


Disconnect cables at rear of RF modulation assembly, remove from BTS and place upside down on test bench. Connect power cord to 115 V ac, 60 Hz source. Check voltages of power supplies PS1, PS2, PS3 and PS4 (see table 1-2). If a power supply is defective, remove and replace power supply and adjust power supply (refer to para's 3-33, 3-34, 3-35). If all power supplies check good, go to step 2.

RF OUTPUT LEVEL CHECK (Continued)

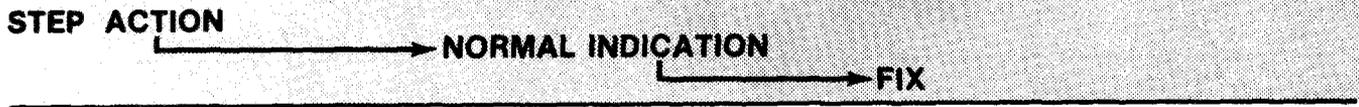


2. Disconnect power from RF modulation assembly. Place assembly right side up and substitute circuit cards A1 and A2. Connect power to drawer.



3. Repeat steps 1 and 2 for FREQ SEL set for F2 and F3.





4. Set FREQ SEL to F1. Set TRANSMIT ATTENUATOR 0-9 DB through all its positions. Note RF power readings.

RF power should decrease 1 ± 0.5 dB for each step. If readings are correct, set attenuator to 0 and go to step 5.

Replace RF modulation assembly and check for normal indication.

5. Set TRANSMIT ATTENUATOR 0-60 D13 to its 10 and 20 DB positions. Note RF power readings.

RF power should decrease 10 ± 1 dB for each position. If power level is normal, go to step 6.

Replace RF modulation assembly and check for normal indication.

RF OUTPUT LEVEL CHECK (Continued)

STEP ACTION

NORMAL INDICATION

FIX

- 6.** Return TRANSMIT ATTENUATOR to 1 DB. Set OUT SEL switch on 1A3 to PULSE and connect power meter sensor to CMBD RF J4 on left side of BTS cabinet. Set OUT SEL switch to CW and record Power level.

Power level reading above -10 dBm. If power level is normal, go to step 7.

If testing RF Modulation Assembly 1A3, replace internal cable W2. If testing RF modulation assembly 1A4, replace internal cable W3. If mal function still exists, trace RF signal from RF modulation assembly to J4 (fig. F0-7).

- 7.** Repeat step 6 for FREQ SEL set to F2 and F3.
- 8.** Set 1A3 OUT SEL switch to PULSE, PRI mode switch to OFF.
- 9.** Connect RF power sensor to RF Modulation Assembly 1A4 RF OUT jack. Repeat steps 1 through 8 for RF Modulation Assembly 1A4.
- 10.** Remove power meter sensor.

END OF TEST.

RF OUTPUT FREQUENCY CHECK

3-16.

a. Test Equipment.

Frequency Meter with adapters HP P532A

RF Power Meter HP 435A

Power Sensor HP 8481A

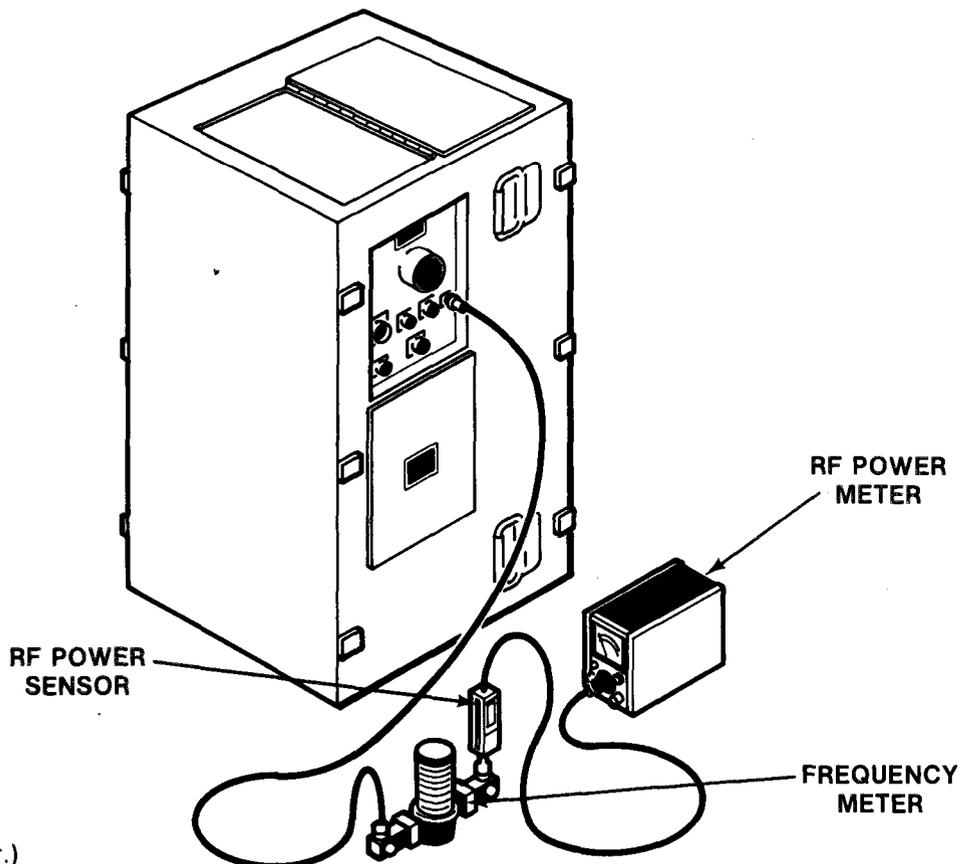
b. Test Connections and Conditions.

(1) Make sure all chassis units are in place, and all internal cables are connected. Turn on 115 V ac power.

(2) Warm-up for 30 minutes.

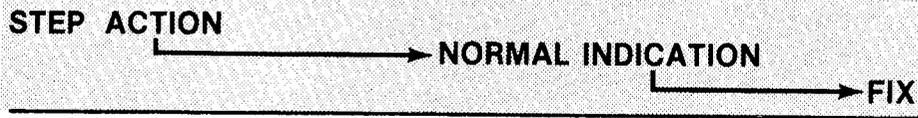
c. Initial Test Equipment Setting. Set the RF power meter to a full scale range, approximately 5 dB above the normal indication (0 dBm full scale). Other controls are as in paragraph 3-14a.

d. Reference Material. See (S) TM 11-5865-202-30(U) for frequency data where 1, F2 and F3 is referenced in procedures. Schematics of this equipment are in foldout illustrations at the rear of this manual.

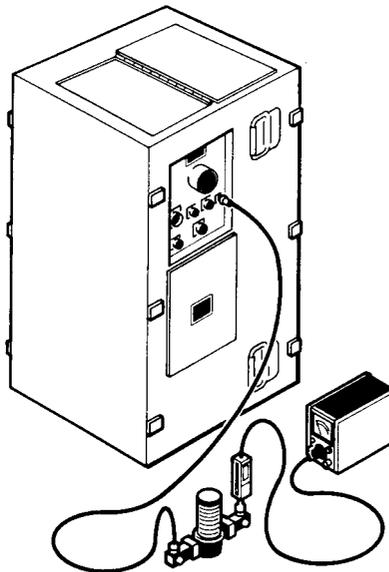


Use NM-TNCF adapter.)

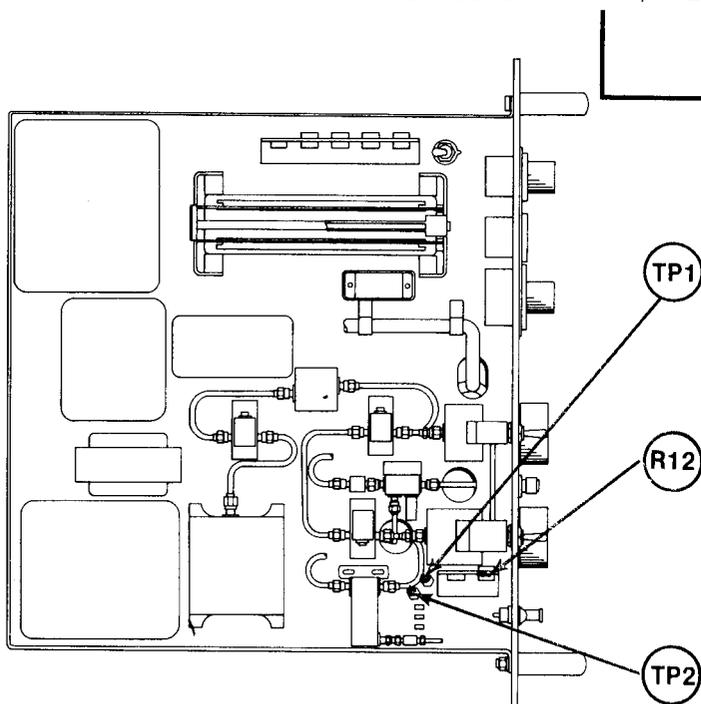
e. Procedure. **RF OUTPUT FREQUENCY CHECK (Continued)**



1. Connect frequency meter to CMBD RF jack J4 on upper left side of BTS cabinet.
2. Connect RF power meter sensor to the frequency meter output.
3. Set OUT SEL switch on 1A3 to CM, PRI selector switch to VAR PRI. Set 1A4 PRI selector switch to OFF.
4. Tune RF frequency meter for a dip in RF power as observed on the power meter, record dial reading at which the dip occurs as frequency F1.

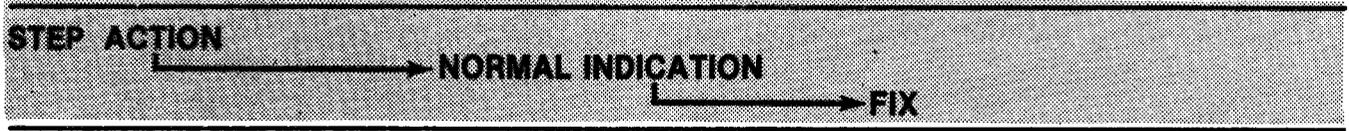


Frequency = $F1 \pm 0.1$ GHz
 (See (S) TM-11-5865-202-30 (U)
 for values of F1, F2 and F3.)

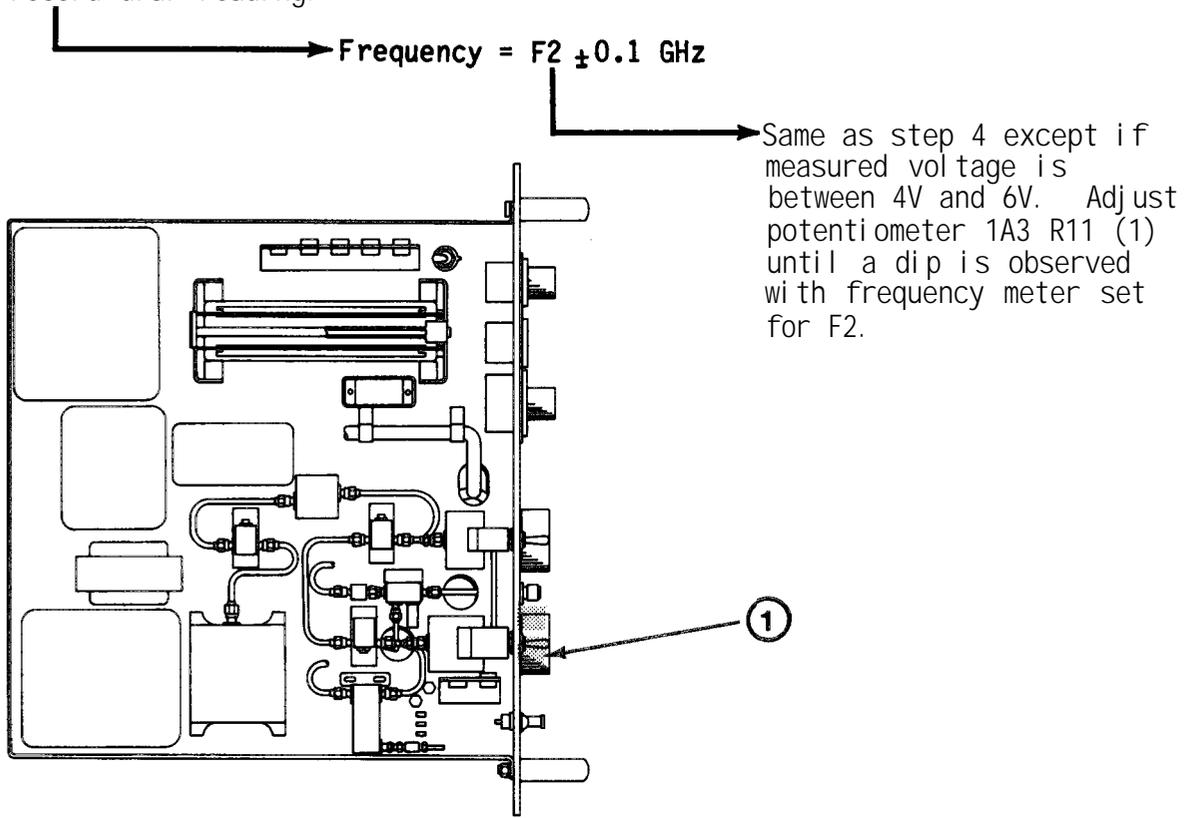


If the frequency is outside limits of tolerance, perform the following steps.

- a. Remove semi-rigid connector from jack J2 on rear of unit. Disconnect frequency meter from jack J4, and connect to RF OUT connector on front panel of unit.

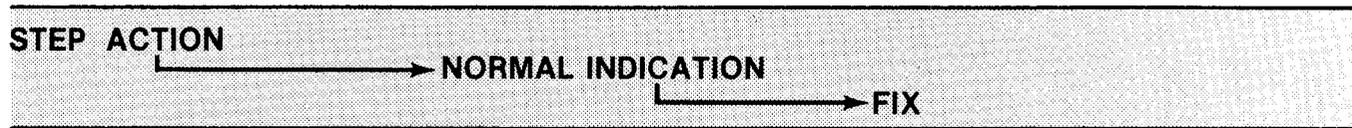


- 5. Set FREQ SEL switch on 1A3 to F2 position.
- 6. Tune the frequency meter for a dip in power and record dial reading.
- b. Measure voltage between test points TP1 and TP2. If voltage is between 0.5V and 1.5V, adjust potentiometer 1A3 R12 until a dip is observed with frequency meter set for F1.
 - c. Replace RF Modulation Assembly 1A3.



- 7. Set FREQ SEL switch on 1A3 to F3.

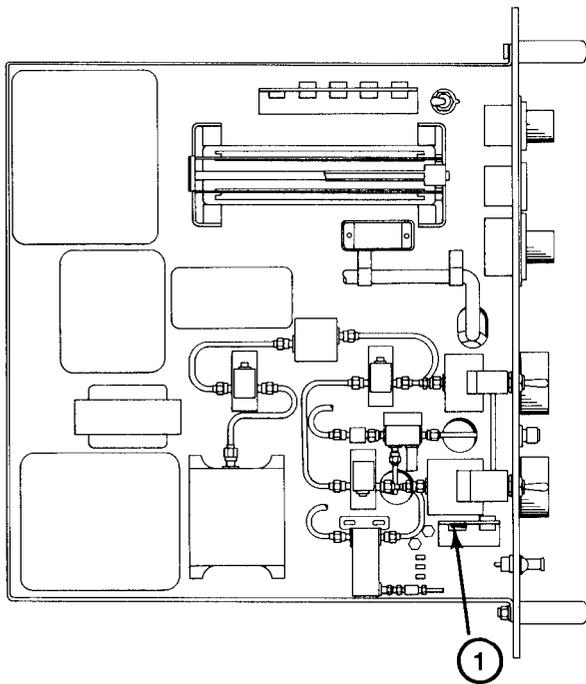
RF OUTPUT FREQUENCY CHECK (Continued)



- a. Tune the frequency meter for a dip in power and record dial reading.



Same as step 4 except if measured voltage is between 8V and 10V, adjust potentiometer 1A3 (1) R10 until a dip is observed with frequency meter at F3.



- 9. Set 1A3 OUT SEL switch to PULSE, PRI select switch to OFF and repeat steps 3 through 7 for RF Modulation Assembly 1A4.
- 10. Disconnect and remove frequency and power meters.

END OF TEST

VARIABLE PRI CHECK

3-17.

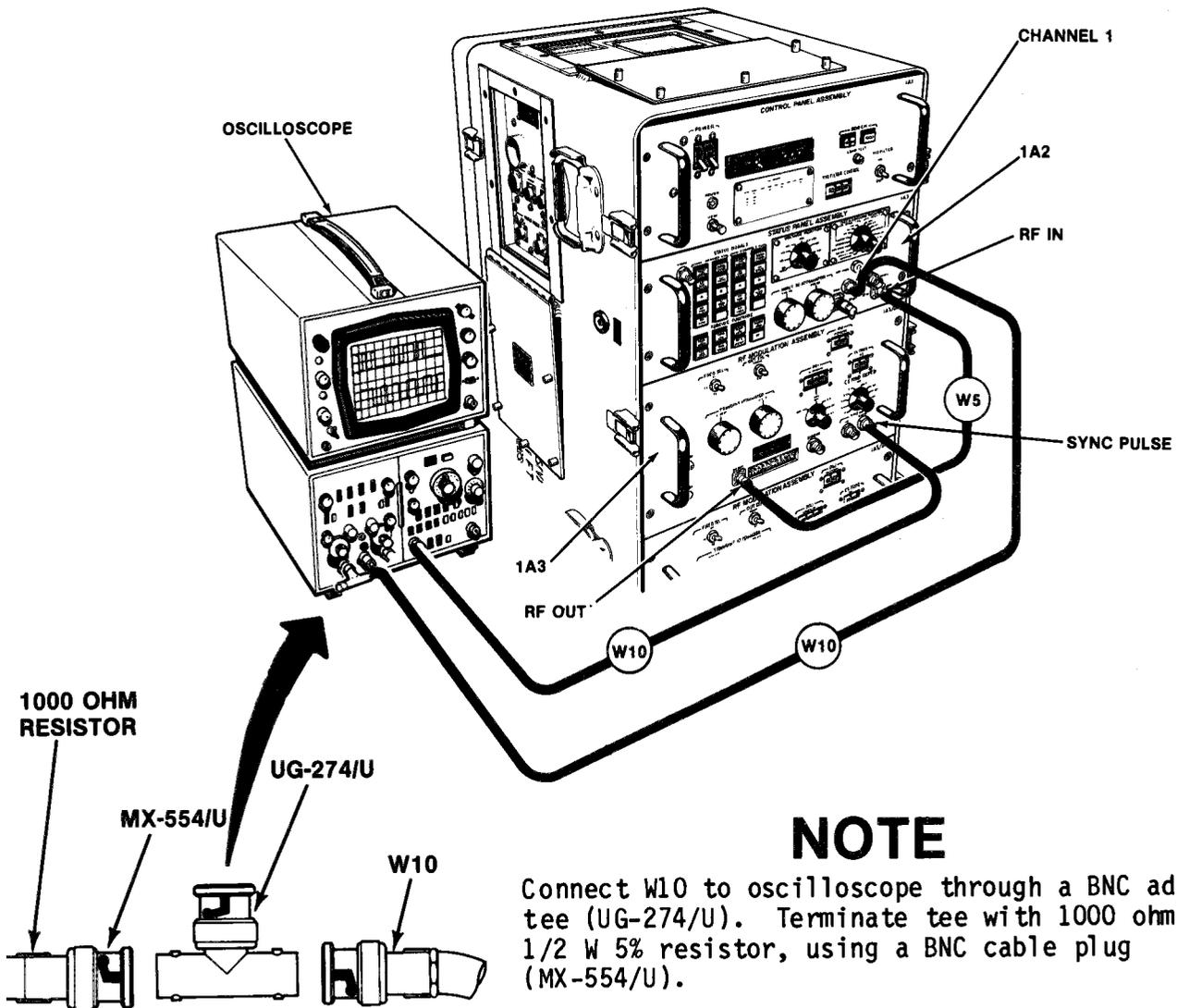
a. Test Equipment.

Oscilloscope AN/USM-218A

b. Test Connections and Conditions.

1. Connect RF Cable W5 from 1A3 RF OUT jack to 1A2 RF IN jack.
2. Connect Video cable W10 from Status Panel 1A2 CHAN 1 to oscilloscope vertical input jack.
3. Connect Video cable W10 from RF Modulation Assembly 1A3 SYNC PULSE to oscilloscope external sync jack.

c. Initial Test Equipment Setting. Set oscilloscope sensitivity to 0.1 V/DIV. Other equipment settings are as in paragraph 3-14a.

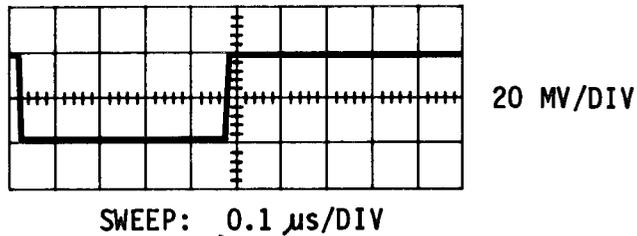


STEP ACTION → **NORMAL INDICATION** → **FIX**

2. Adjust oscilloscope to view the first pulse. Use 50 ohm termination.

Set the 1A3 PW tenths switch from 9 down to zero while observing the output pulse width at each step.

→ The width decreases $0.1 \pm 0.05 \mu\text{s}$ for each step.



→ Same as step 1, FIX 1c and 1d.

3. Set 1A3 PW units switch to 9.0.

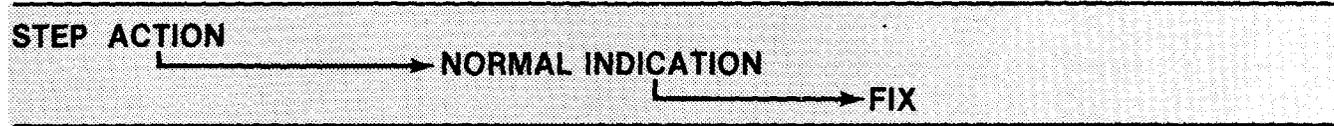
→ Pulse width - 9.0 $\pm 0.5 \mu\text{s}$.

4. Repeat step 2 using the PW units switch while observing the output pulse width at each step.

→ The output pulse width decreases $1 \mu\text{s}$ for each step.

→ Same as step 1, FIX 1c and 1d.

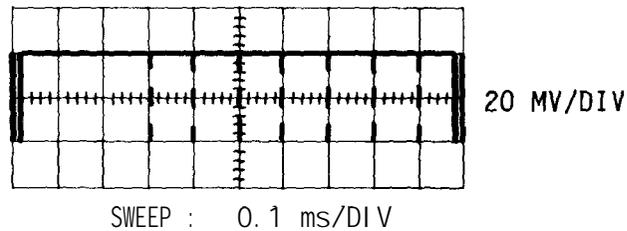
VARIABLE PRI CHECK (Continued)



5. Set PW switch to 9.9 μ s.
 Pulse Width = 9.9 μ s.

6. Adjust oscilloscope sweep speed to 0.1 ms/div.

7. Set PRI hundreds switch from 9 down to 3 while observing the output PRI.
 PRI decreases 100 μ s for each switch step.



Same as step 1, FIX 1c and 1d.

8. Check that PRI hundreds switch is at 3.

9. Set oscilloscope sweep speed to 50 μ s/div.

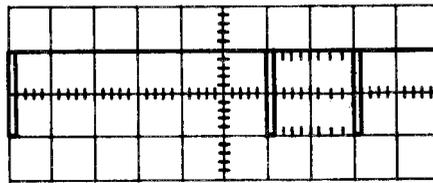
STEP ACTION

NORMAL INDICATION

FIX

10. Set **1A3 PRI** switch from 300 to 390 in **steps** of 10 while observing **PRI** on **oscilloscope**.

The **PRI** increases **10 μ s** for each step.



20 MV/DIV

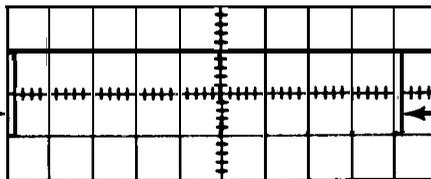
SWEEP: 50 μ s/DIV

Same as step 1, **FIX 1c** and **1d**.

11. Set oscilloscope to view the leading edge of the second output pulse at an expanded speed of **1 μ s/div**. (Refer to TM 11-6625-1703-15 for instructions).

12. Set **PRI** switch from 300 up to 309 while **observing** the pulse.

The leading edge advances **1 μ s** for each switch step.



Setting at 0

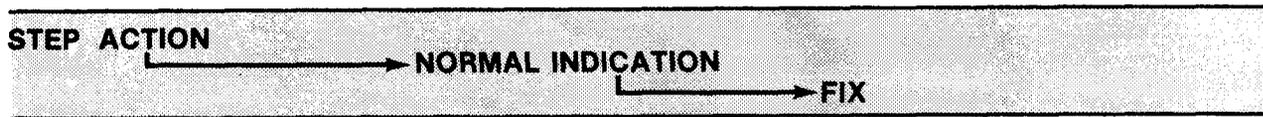
20 MV/DIV

Setting at 9

SWEEP: 1.0 μ s/DIV
 delayed 300 μ s

Same as step 1, **FIX 1c** and **1d**.

VARIABLE PRI CHECK (Continued)

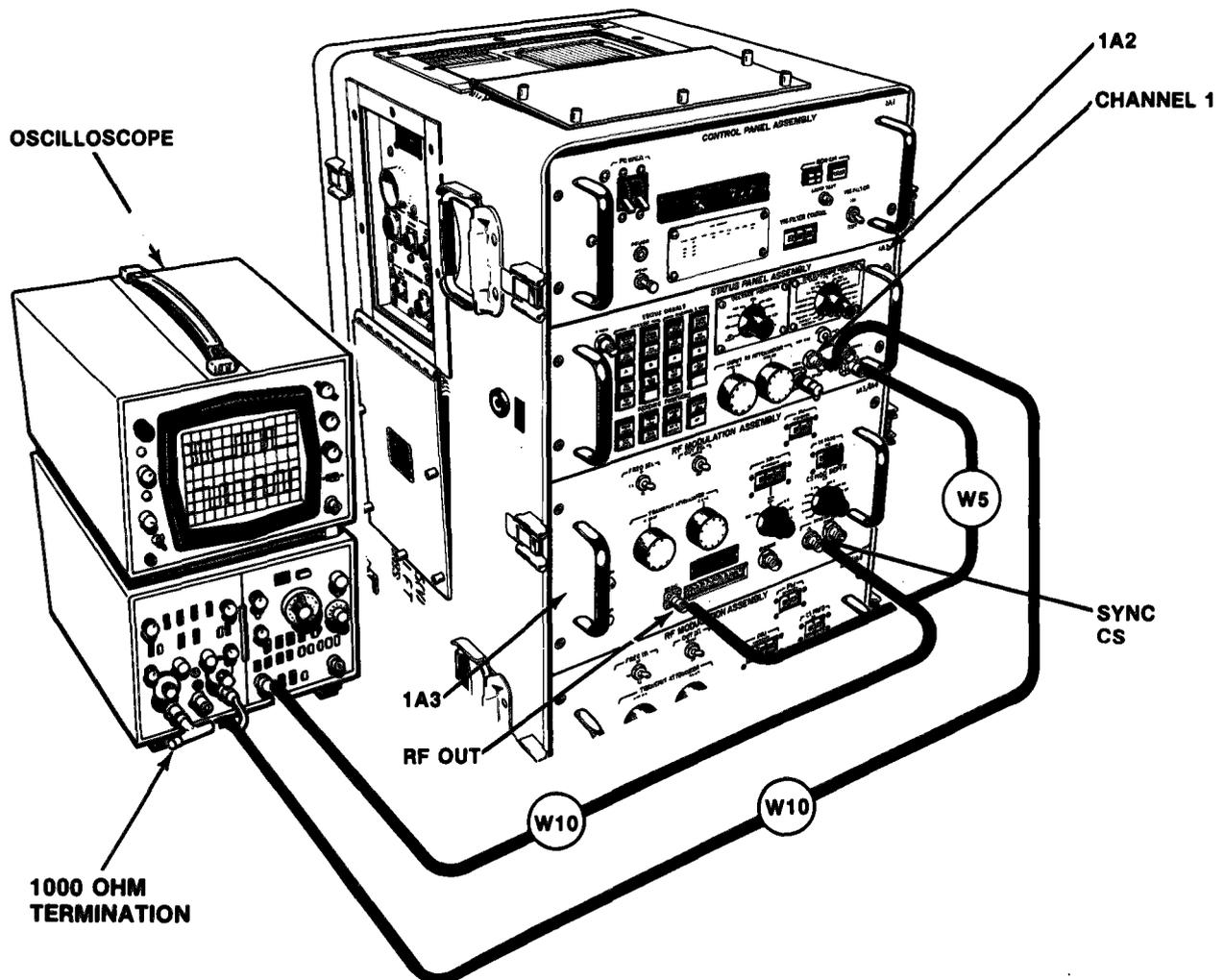


13. Disconnect W5 from 1A3 RF OUT and connect to 1A4 RF OUT. Connect oscilloscope external sync to 1A4 SYNC PULSE jack.

14. Repeat steps 1 through 12 substituting RF Modulation Assembly 1A4 for 1A3.
END OF TEST

CON SCAN MODULATION CHECK

- a. Test Equipment. Oscilloscope AN/USM-281A with HP 1805A and HP 1825A plug-ins, or equivalent.
- b. Test Connections and Conditions.
 - (1) Connect oscilloscope external sync jack to 1A3 SYNC CS jack.
 - (2) Connect oscilloscope vertical input to Status Panel 1A2 CHAN 1 jack.
 - (3) Connect RF cable W5 from 1A3 RF OUT jack to 1A2 RF IN jack.

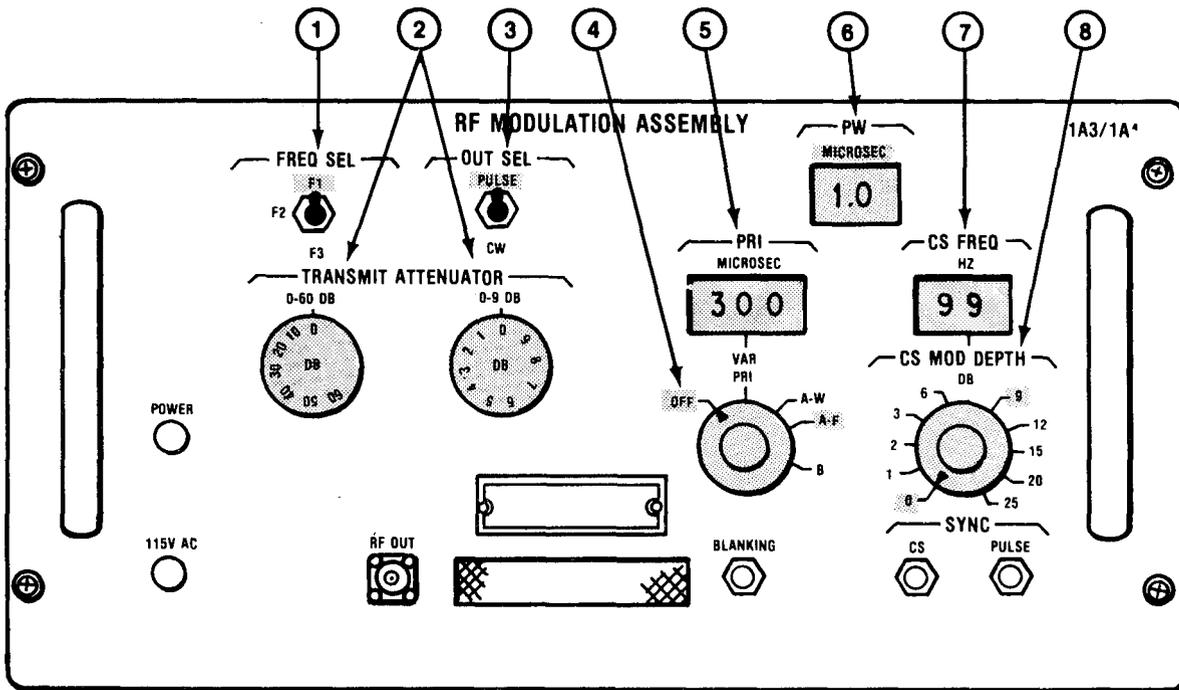


CON SCAN MODULATION CHECK (Continued)

c. Initial Test Equipment Setting.

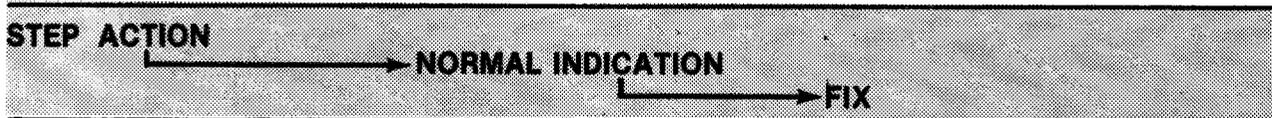
On the RF Modulation Assemblies 1A3 and 1A4, set switches and controls as follows:

	1A3	1A4
(1) FREQ SEL	F1	
(2) TRANSMIT ATTENUATOR		
0-60 DB	0 DB	60 DB
0-9 DB	0 DB	0 DB

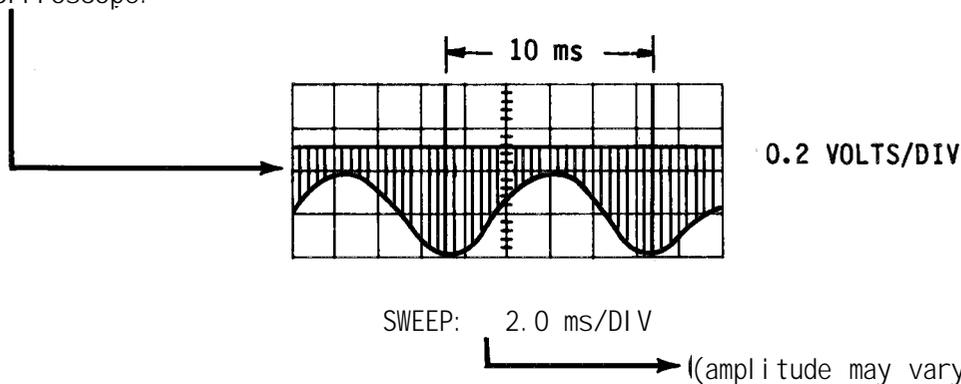


	<u>1A3</u>	<u>1A4</u>
(3) OUT SEL	PULSE	PULSE
(4) PRI Selector	A-F	OFF
(5) PRI MICROSEC	300	300
(6) PW MICROSEC	1.0	1.0
(7) CS FREQ HZ	99	99
(8) CS MOD DEPTH DB	9	9

d. Procedure.



1. Measure the 10 ms period of the modulated pulse on the oscilloscope.



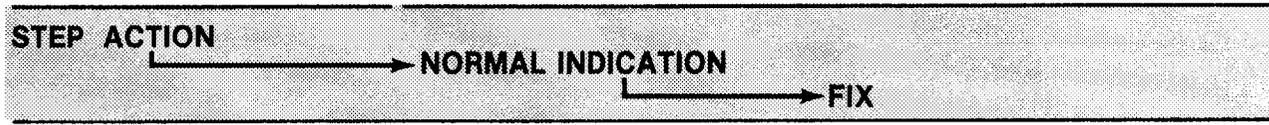
- a. Check voltages of bench test set power supplies 1A3 PS1, 1A3 PS2, 1A3 PS3, and 1A2 PS1.
- b. Replace the two circuit cards in the RF modulation assembly. Reinstall circuit cards if no improvement is noted.
- c. Replace RF modulation assembly 1A3.

2. Set the CS FREQ units switch from 9 down to 0 while observing the modulation period.

→ Period increases in even steps from 10 ms to 11 ms.

- a. Substitute circuit card 1A3A1. Restore circuit card if no improvement is noted.
- b. Check con scan frequency select switch 1A3S2.

CON SCAN MODULATION CHECK (Continued)



3. Set CS FREQ tens switch and observe modulation period.

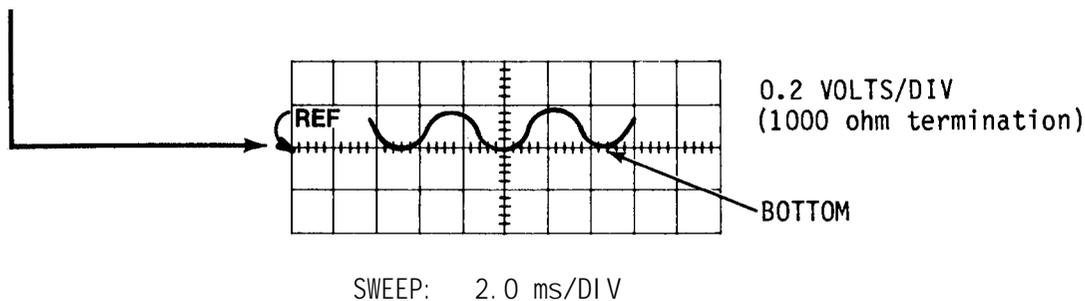
Switch Position	Period
8	12.5 ms
7	14.3 ms
6	16.7 ms
5	20.0 ms
4	25.0 ms
3	33.3 ms
2	50.0 ms
1	100.0 ms

Same as in step 2.

4. Set CS FREQ switch to 90 and CS MOD DEPTH switch to 1 dB.

5. Set INPUT RF ATTENUATOR 1A2AT1 on Status Panel to 2 dB.

6. Set oscilloscope for - UP display. set Pw to 4 μ s. Set PRI to VAR PRI. Increase oscilloscope gain until the modulation is equal to 1 DIV peak-to-peak. Set modulation bottom on a horizontal reference line.



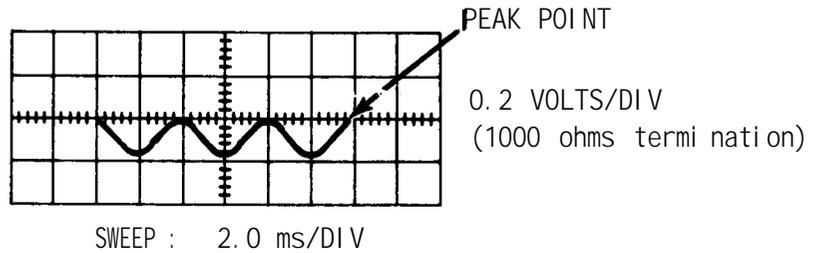
STEP ACTION

NORMAL INDICATION

FIX

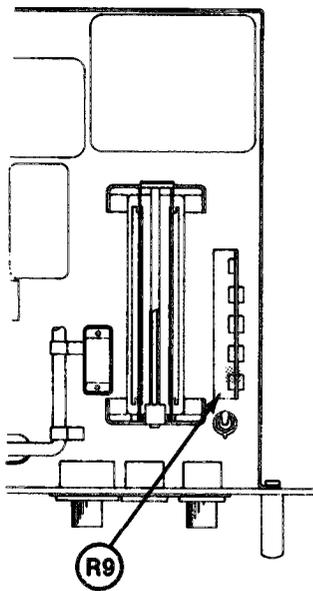
7. Add 1 dB to the 1A2 attenuator and observe.

Modulation peak point is now on the same reference line ± 0.2 DIV.



C A U T I O N

Before moving 1A3 or 1A4 assemblies, remove back cover and disconnect coaxial RF cables. Moving these assemblies without disconnecting coax cables may damage cables.

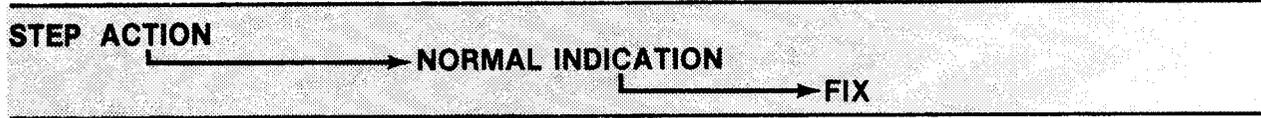


C A U T I O N

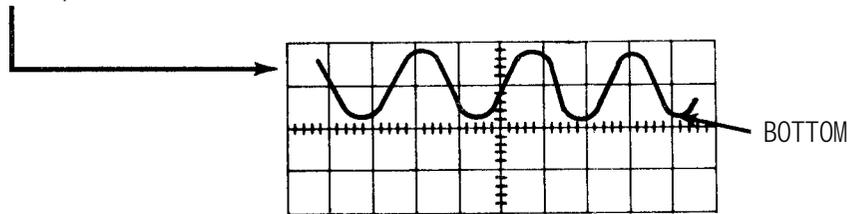
Loosen four front panel mounting bolts (1A3). Gently slide 1A3 forward for access. Use a thin screwdriver to adjust potentiometer 1A3A3R9 on chassis until minimum point is on reference line.

- a. Replace 1A3A2 circuit card. If no improvement is noted, reinstall original circuit card.
- b. Replace RF Modulation Assembly 1A3.

CON SCAN MODULATION CHECK (Continued)

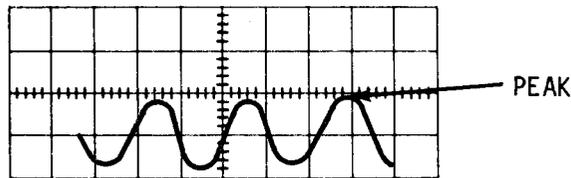


8. Set CS MOD DEPTH switch to 2 DB and the 1A2 INPUT RF ATTENUATOR to 2 DB. Set the modulation bottom on a horizontal reference line using the oscilloscope dc level control. Oscilloscope vertical gain remains as set in step (6) (1 dB/DIV).



9. Add 2 dB to the INPUT RF ATTENUATOR.

Modulation peak point is on the horizontal reference line ± 0.2 DIV.



As in step 7 except adjust R8.

10. Repeat steps (8) and (9) for the remaining positions of the CS MOD DEPTH switch as follows.
 Set MOD DEPTH switch to next higher position.
 Set INPUT RF ATTENUATOR to 2 DB. Set modulation bottom on reference line.

Increase gain and use off-set as necessary. Increase INPUT RF ATTENUATOR by CS MOD DEPTH setting. observe modulation peak.

Modulation sinewave will appear distorted on oscilloscope because of video detector.

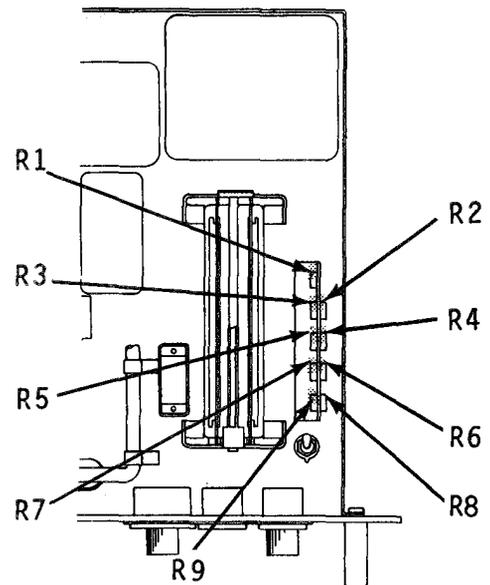
CS MOD DEPTH and 1A2 Attenuation Tolerance.

<u>Mod Depth</u>	<u>Tolerance</u>	<u>Set</u>
	±0.1 dB	R9
1 dB	±0.2 dB	R8
3 dB	±0.3 dB	R7
6 dB	±0.6 dB	R6
9 dB	±0.9 dB	R5
12 dB	± 1.0 dB	R4
15 dB	± 1.0 dB	R3
20 dB	±1.0 dB	R2
25 dB	± 1.0 dB	R1

As in step 7 except adjust the corresponding potentiometer (SET).

- Disconnect W5 from 1A3 RF OUT and reconnect to 1A4 RF OUT. Connect oscilloscope external sync to 1A4 sync CS. Set 1A3 CS MOD DEPTH to 0 and 1A3 VAR PRI to OFF. Set 1A4 CS MOD DEPTH to 9 dB. Repeat steps 1-10 above.

END OF TEST



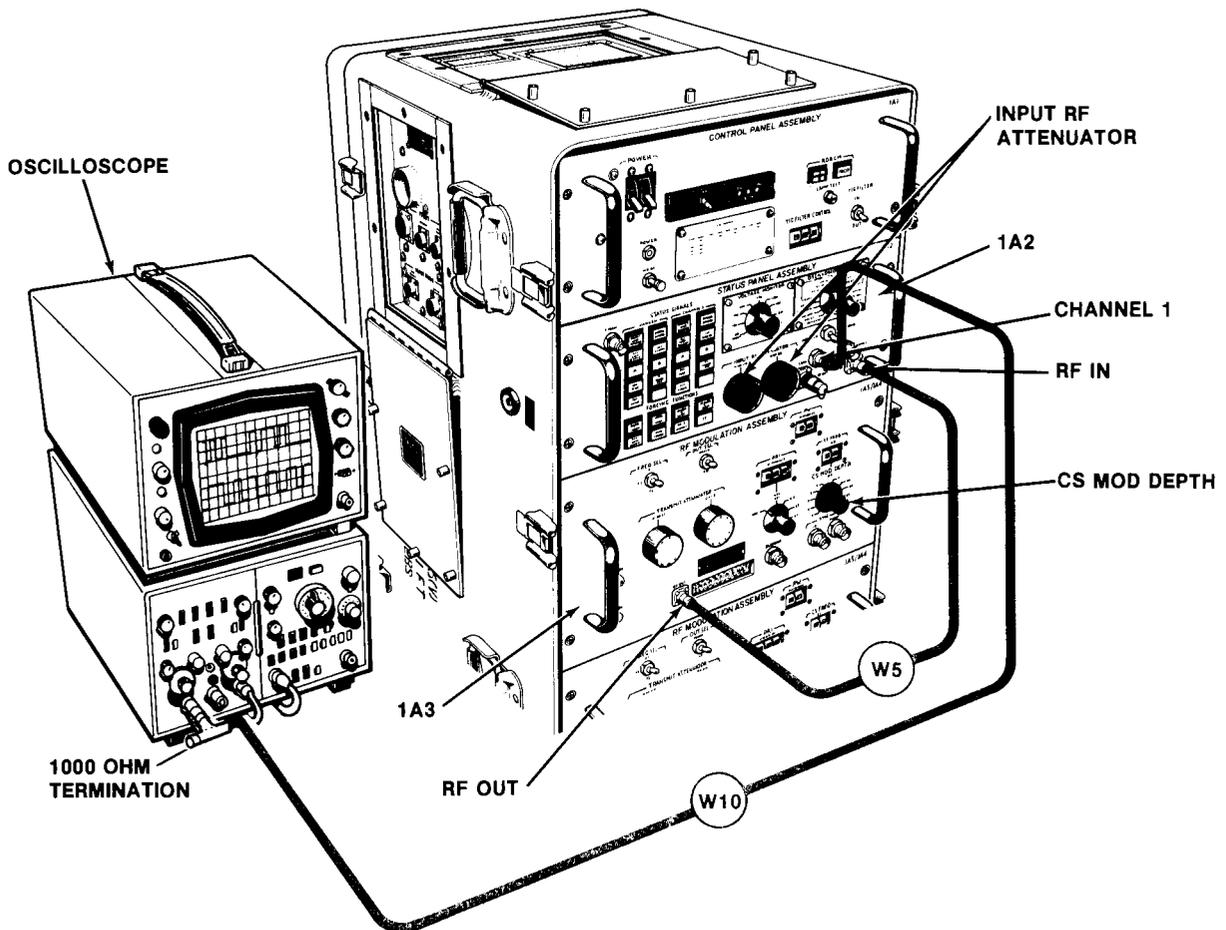
PRI CHECK

3-19.

a. Test Equipment.

Oscilloscope AN/USM-281A.

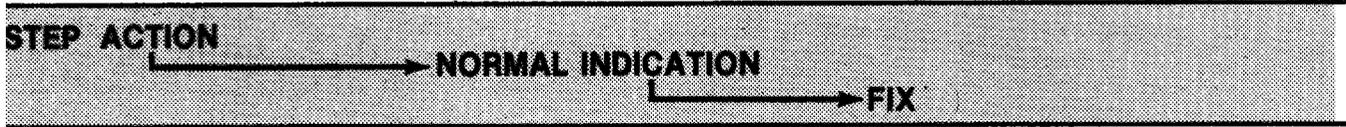
b. Test Connections and Conditions. Connect RF cable W5 from 1A3 RF OUTPUT jack to 1A2 RF IN jack. Connect coax cable W10 from oscilloscope vertical input to status panel 1A2 CHAN 1 jack.



c. Initial Test Equipment Settings.

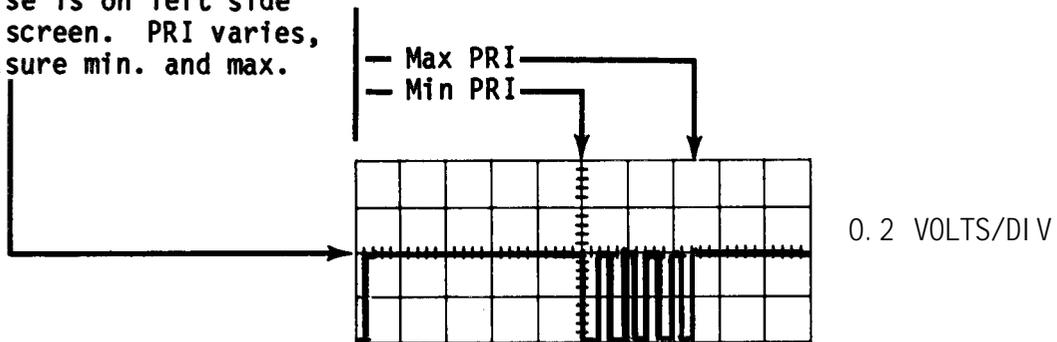
- (1) Set oscilloscope sync to internal.
- (2) Set sweep speed to 50 μ s/div.
- (3) Set 1A3 CS MOD DEPTH to 0 DB.
- (4) Set 1A2 INPUT RF ATTENUATOR to 0 DB.
- (5) Other controls are as in paragraph 3-14.

d. Procedure.



PRI A-W

1. Set 1A3 PRI switch to A-W .
2. Terminate oscilloscope in 1000 ohms, adjust oscilloscope so first pulse is on left side of screen. PRI varies, measure min. and max.



SWEEP : 50 μ s/DIV
 Min PRI 260 μ s
 Max PRI 380 μ s

- a. Check voltages of BTS power supplies 1A3 PS1, 1A3 PS2, 1A3 PS3, and 1A3 PS4.
- b. Replace the two circuits cards in 1A3. Reinstall circuit cards if there is no improvement.
- c. Replace RF Modulation Assembly 1A3.

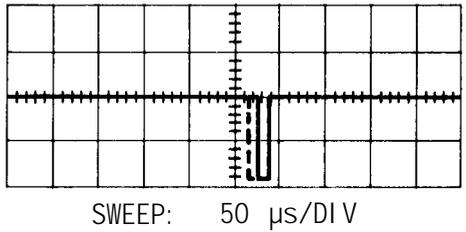
PRI CHECK (Continued)



PRI A-F

- Set 1A3 PRI switch to A-F

Max PRI 267 μ s (first 5 pulses)
 Min PRI 276 μ s (pulse 6 shows weak)



0.2 VOLTS,

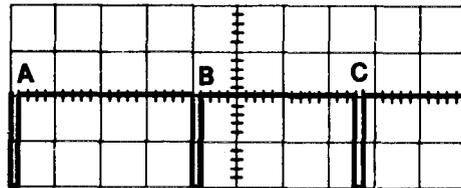
Same as in step 2, FIX 2b and 2c.

- Set 1A3 PRI switch to B.

- Adjust oscilloscope so first pulse is on left side of screen, with three pulses on screen. Measure PRI first pulse to second, and second to third. Set oscilloscope sweep speed to 0.1 ms/div.



410A μ s A to B, 3504 μ s B to C

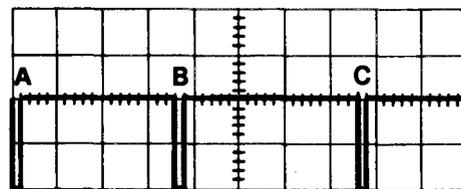


0.2 VOLTS/DIV

SWEEP: 0.1 ms/DIV

or

350 μ s A to B, 410 μ s B to C



0.2 VOLTS/DIV

SWEEP: 0.1 ms/DIV

Same as in step 2, FIX 2b
and 2c.

6. Move W5 from 1A3 RF OUT
jack to 1A4 RF OUT jack,
and repeat steps 1 through
5.



END OF TEST

BLANKING OUTPUT TEST

3-20.

a. Test Equipment.

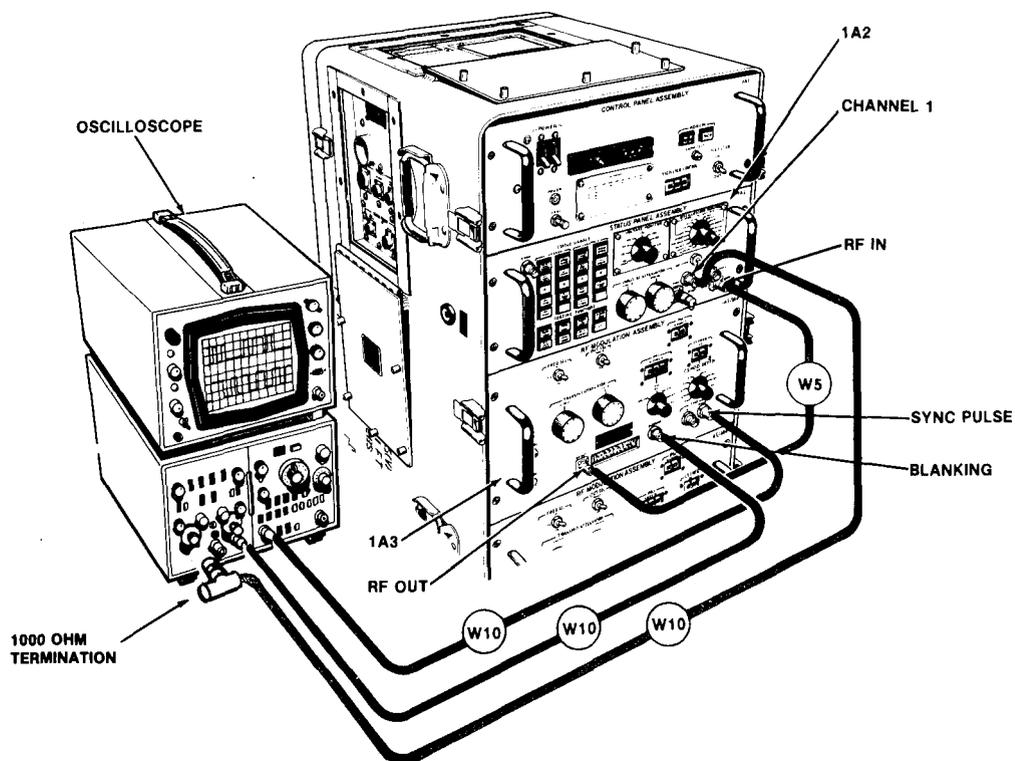
Oscilloscope AN/USM-281A

b. Test Connection and Conditions.

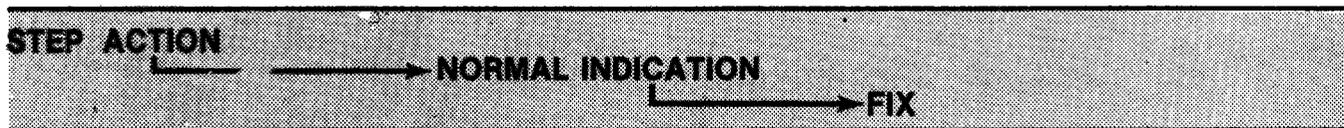
- (1) Connect RF cable W5 from 1A3 RF OUT jack to 1A2 RF IN jack.
- (2) Connect W10 cable from 1A3 SYNC PULSE jack to oscilloscope external sync jack.
- (3) Connect W10 cable from 1A2 CHAN 1 jack to oscilloscope vertical channel A.
- (4) Connect W10 cable from 1A3 BLANKING jack to oscilloscope vertical channel B.

c. Initial Test Equipment Setting.

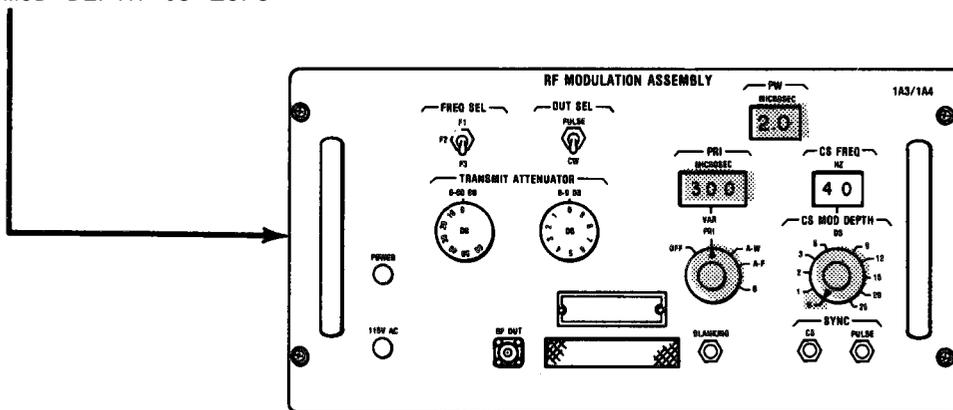
- (1) Set oscilloscope to ALT mode, delayed sweep.
- (2) Other settings are as in paragraph 3-14.



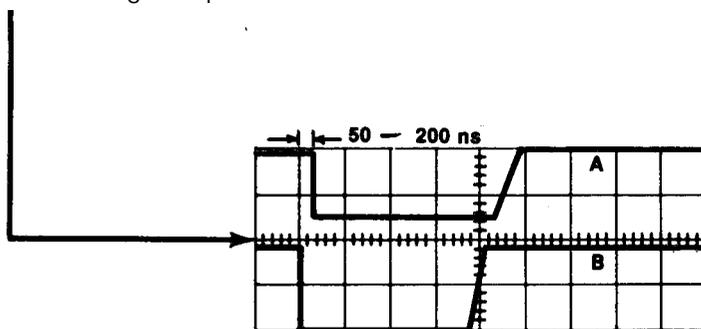
d. Procedure.



1. Set 1A3 switches and controls as follows:
 PRI selector switch) VAR PRI
 PRI thumbwheel switch to 300f μ s PW to 2 μ s
 CS MOD DEPTH to zero



2. Observe the relationship between the second detected output pulse and the blanking output.



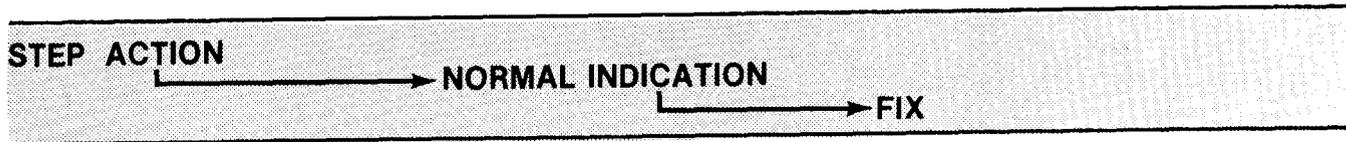
'VOLTS/DIV A 0.2V, B 2.0V
 I DET VIDEO (1000 ohm

I BLANKING PULSE

SWEEP : MAIN 50 μ s/DIV
 DELAY 0.5 μ s

If waveform is not as specified perform following:

BLANKING OUTPUT TEST (Continued)



2. (Continued)

- a. Check voltages of bench test set Power Supplies 1A3PS1, 1A3PS2, 1A3PS3 and 1A3PS4.
- b. Replace 1A3A1 circuit card in the RF modulation assembly. Reinstall circuit card if no improvement is noted.
- c. Replace RF Modulation Assembly 1A3.

3. Reconnect W5 to 1A4 RF OUT jack. Reconnect oscilloscope channel B to 1A4 BLANKING. Reconnect oscilloscope syric to SYNC PULSE on 1A4. Repeat steps 1 through 2 for 1A4 drawer.



END OF TEST.

PULSE SYNC TEST

3-21.

a. Test Equipment.

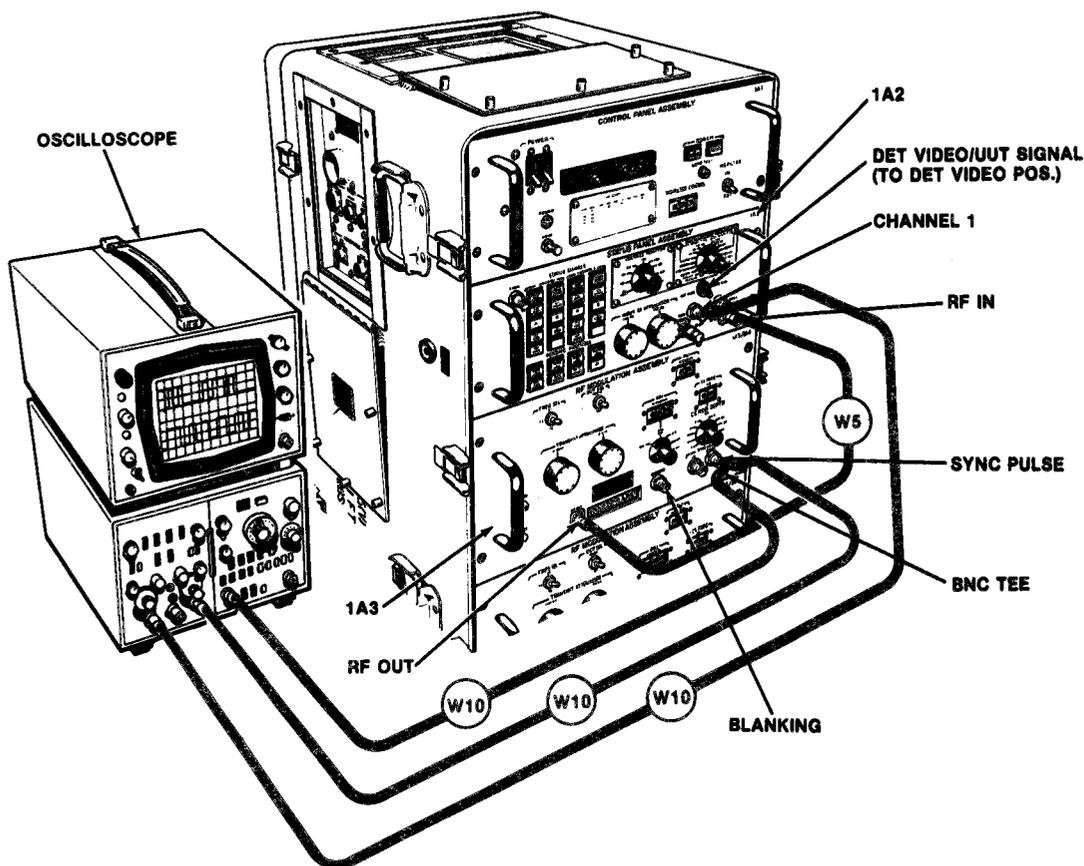
Oscilloscope AN/USM-281A.

b. Test Connections and Conditions.

- (1) Connect RF Cable W5 from RF OUT jack on RF Modulation Assembly 1A3 to RF IN jack on status panel.
- (2) Install a BNC tee connector at SYNC PULSE jack of RF Modulation Assembly 1A3. Connect one side of BNC tee to oscilloscope EXT input. The other side of BNC tee to oscilloscope B input.
- (3) Set switch to DET VIDEO on status panel. Connect CHAN 1 to oscilloscope A Input.

c. Initial Test Equipment Setting.

- (1) On oscilloscope time base and delay generator, set POS/NEG push-button switch to NEG.
- (2) Set oscilloscope for CHOP MODE and TIME/DIV for 0.5 μ s.



d. Procedure.

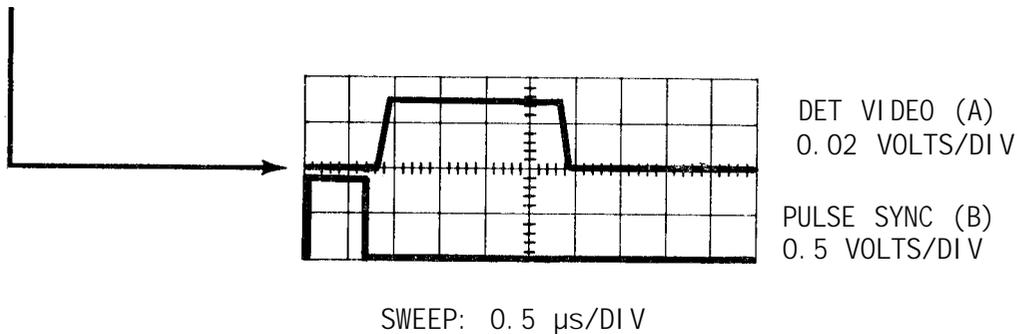
PULSE SYNC TEST (Continued)

STEP ACTION

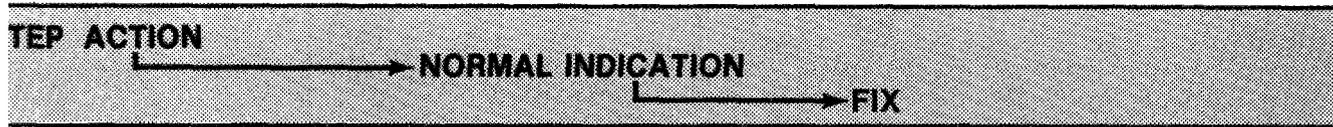
NORMAL INDICATION

FIX

1. Adjust oscilloscope display to position PULSE SYNC leading edge on left vertical line. Measure time delay between PULSE SYNC leading edge and leading edge of DET VIDEO pulse. The delay shall be $0.8 \pm .15 \mu\text{s}$. Use 50 ohm terminations, Chan A-UP.



- a. Check voltages of BTS Power Supplies 1A3 PS1, 1A3 PS2, 1A3 PS3 and 1A3 PS4.
- b. Replace circuit card 1A3A1. Restore circuit card if there is no improvement.
- c. Replace RF Modulation Assembly 1A3.



-
Disconnect RF Cable
W5 from RF Modulation
Assembly 1A3 and
connect to RF Mod-
ulation Assembly 1A4
Disconnect BNC TEE
from SYNC PULSE jack
on 1A3 and connect to
SYNC PULSE jack on
1A4. Repeat. step 1 for
1A4 assembly.

END OF TEST.

CON SCAN SYNC TEST

3-22.

a. Test Equipment.

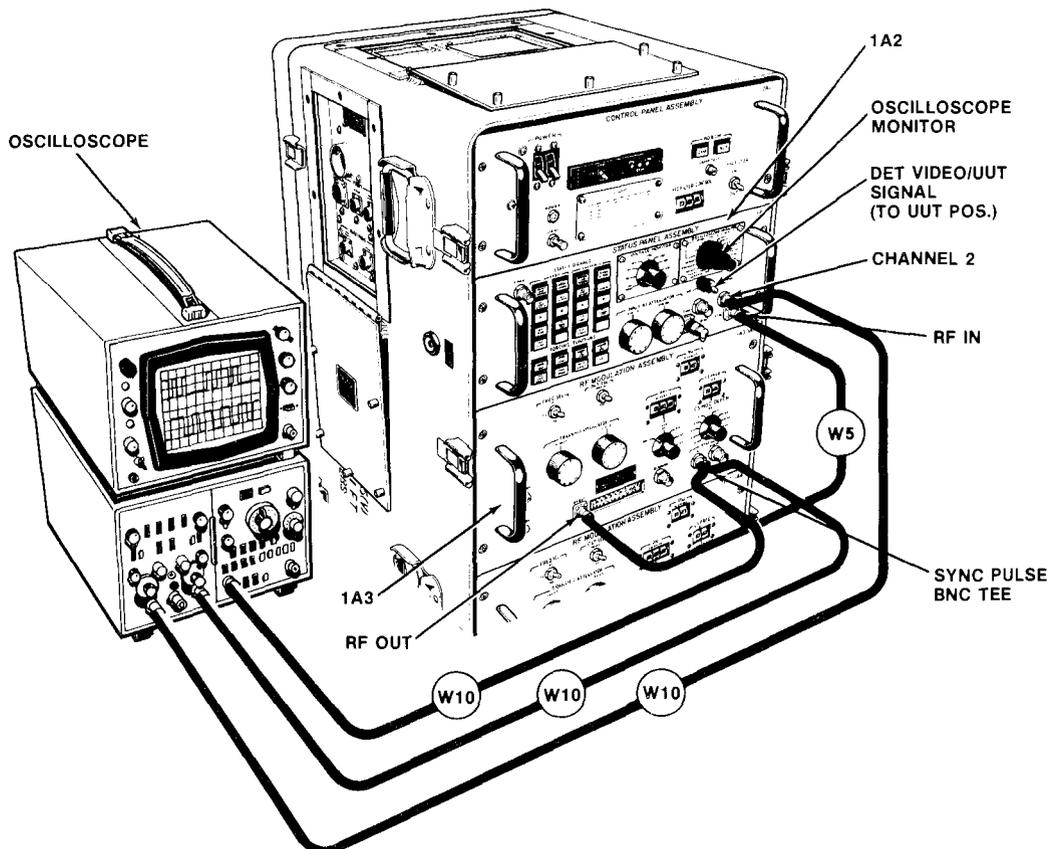
Oscilloscope AN/USM-281A

b. Test Connections and Conditions.

- (1) Connect RF Cable W5 from RF OUT jack on RF Modulation Assembly 1A3 to RF IN jack on status panel.
- (2) Install a BNC tee Connector at SYNC CS jack of RF Modulation Assembly 1A3. Connect one side of BNC tee to oscilloscope EXT Input. Connect other side of BNC tee to oscilloscope B INPUT.
- (3) On status panel set switch to UUT SIGNAL and OSCILLOSCOPE MONITOR black and red switches to BTS VIDEO 1/2. Connect CHAN 2 to oscilloscope A input.

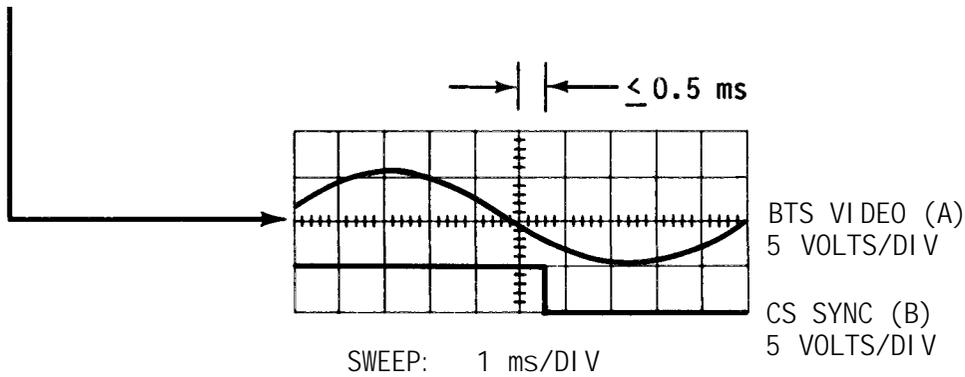
c. Initial Test Equipment Setting.

- (1) Set +UP/-UP to -UP
- (2) Set oscilloscope for CHOP mode and TIME/DIV for 1 ms.



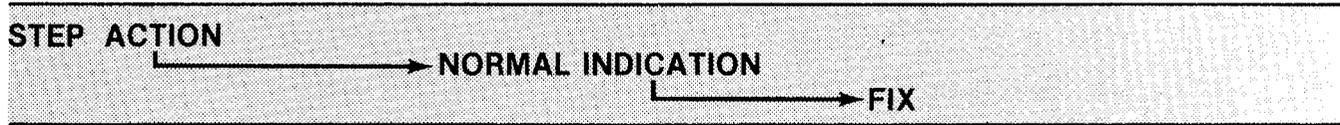
d. Procedure.

1. Measure the time difference between the leading edge of the CS sync pulse and the negative going crossover of sine wave. It shall be equal to or less than 0.5 ins., dc termination.



- a. Check voltages of BTS Power Supplies 1A3 PSI, 1A3 PS2, 1A3 PS3 and 1A3 PS4.
- b. Replace circuit cards 1A3A1 and 1A3A2. Reinstall circuit cards if there is no improvement.
- c. Replace RF Modulation Assembly 1A3.

CON SCAN SYNC TEST (Continued)



2. Disconnect RF Cable W5 from RF Modulation Assembly 1A3 and connect to RF Modulation Assembly 1A4. Disconnect BNC tee from SYNC CS jack on 1A3 and connect to SYNC CS jack on 1A4. Connect CHAN 1 to oscilloscope A input. Repeat step 1 for 1A4 Assembly.

END OF TEST

STATUS PANEL INDICATOR CHECK

3-23.

a. Test Equipment.

None

Test Connections and Conditions.

b.

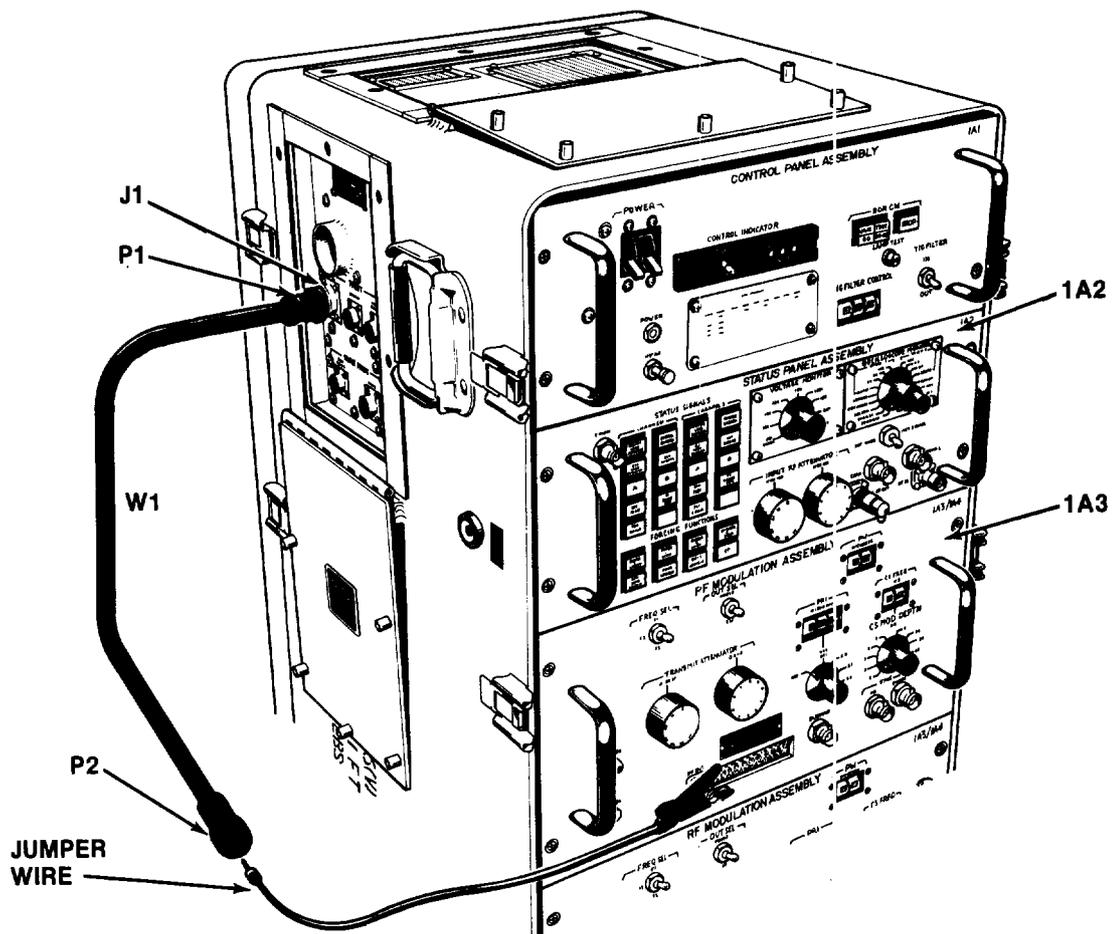
(1) Connect Cable W1 to jack J1 on left side of BTS.

(2) Turn on 115 V ac power.

c. Initial Test Equipment Setting. Not applicable.

NOTE

Only one lamp is used inside each indicator or switch indicator.



STATUS PANEL INDICATOR CHECK (Continued)

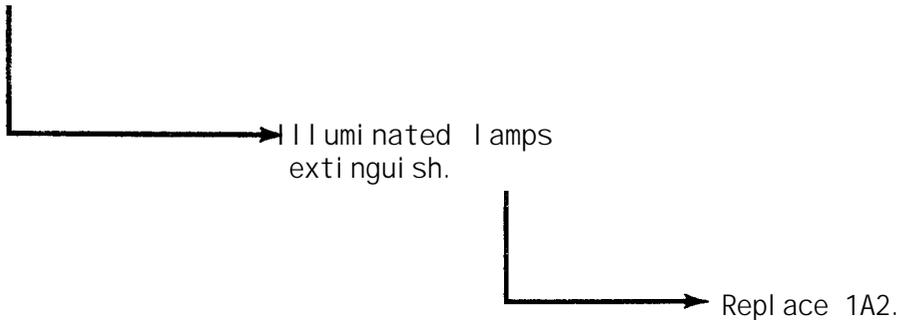
d. Procedure.

STEP ACTION

NORMAL INDICATION

FIX

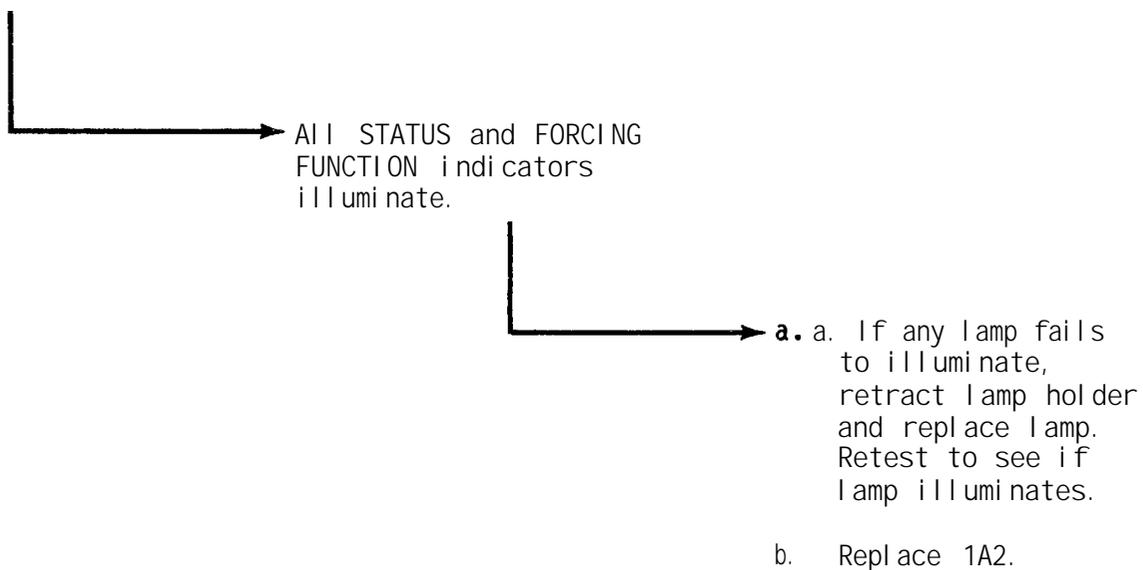
1. If any FORCING FUNCTION switches are illuminated, press them once.



C A U T I O N

Do not install more than one bulb in lamp holder. Extra bulbs may overload 12 Vdc Power Supply 1A2PS1.

2. Press LAMP TEST pushbutton switch.

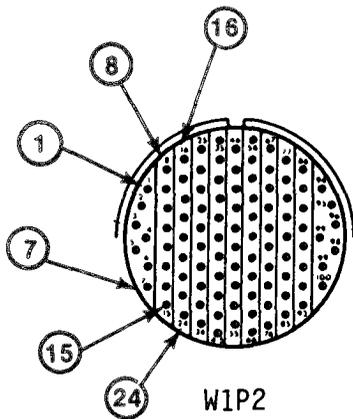
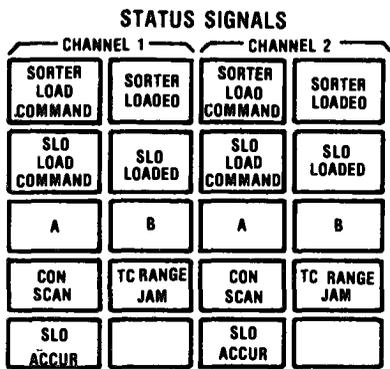


STEP ACTION → **NORMAL INDICATION** → **FIX**

- Use a jumper wire to connect the following W1 connector pins to cabinet ground. The correct status indicator illuminates as its pin is grounded.



W1-P2	Pin	Channel	Signal
	1	CHANNEL 1	SORTER LOAD COMMAND
	2	CHANNEL 1	SORTER LOADED
	3	CHANNEL 2	SORTER LOAD COMMAND
	4	CHANNEL 2	SORTER LOADED
	5	CHANNEL 1	SLO LOAD COMMAND
	6	CHANNEL 1	SLO LOADED
	7	CHANNEL 2	SLO LOAD COMMAND
	8	CHANNEL 2	SLO LOADED
	9	CHANNEL 1	A
	10	CHANNEL 1	B
	11	CHANNEL 2	A
	12	CHANNEL 2	B
	13	CHANNEL 1	CON SCAN
	14	CHANNEL 1	TC RANGE JAM
	15	CHANNEL 2	CON SCAN
	16	CHANNEL 2	TC RANGE JAM
	17	CHANNEL 1	SLO ACCUR
	18	CHANNEL 1	SPARE
	19	CHANNEL 2	SLO ACCUR
	20	CHANNEL 2	SPARE



- If any of the status signal lamps fails to light, check Cable W1. If W1 is good, replace 1A2.

END OF TEST.

STATUS PANEL FORCING FUNCTION CHECK

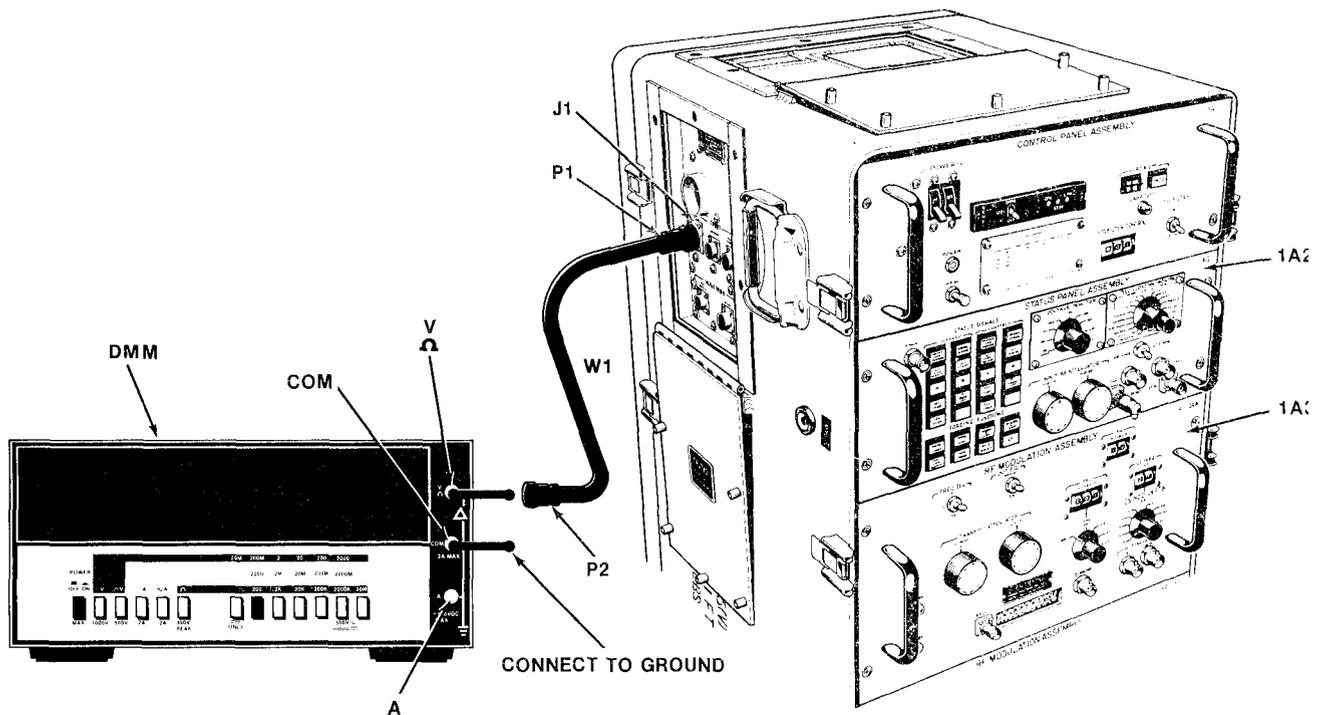
3-24.

a. Test Equipment.

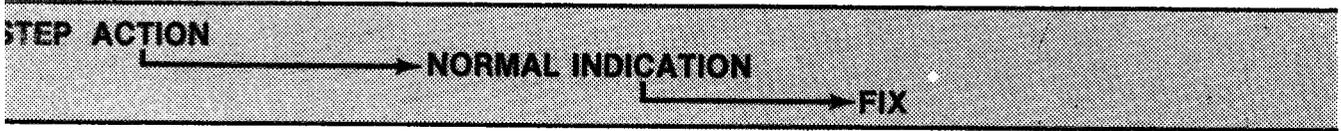
Digital Multimeter (DMM) AN/USM-451

b. Test Connections and Conditions. Turn off 115 VAC power.

c. Initial Test Equipment Setting. Set DMM to 200 ohm scale. Set multimeter switch to ON position.



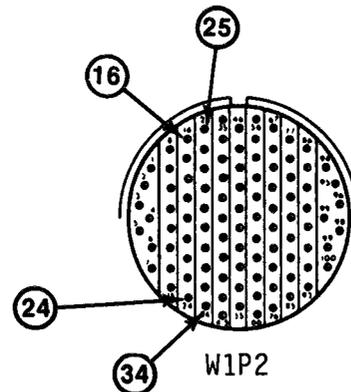
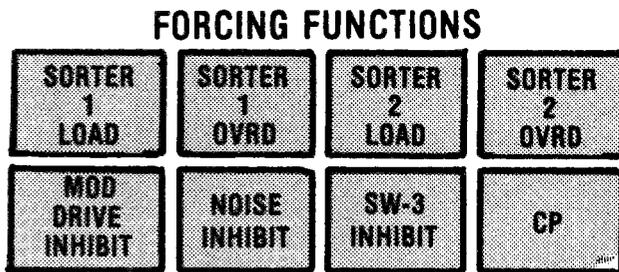
d. Procedure.



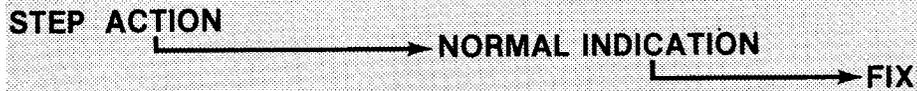
1. Connect digital multi-meter between the following pins of W1 and ground. Press the indicator forcing function switch and observe.

When switch is closed, a maximum of 3 ohms to ground exists. With the switch open the DMM reads 10,000 ohms minimum for the following:

FORCING FUNCTION SWITCH	W1 PIN NO.
SORTER 1 LOAD	21
SORTER 1 OVRD	22
SORTER 2 LOAD	23
SORTER 2 OVRD	24
MOD DRIVE INHIBIT	25
NOISE INHIBIT	26
SW-3 INHIBIT	27
CP	28



STATUS PANEL FORCING FUNCTION CHECK (Continued)



2. Disconnect multimeter.
Turn on BTS 115 VAC power. Exercise each forcing function switch by pressing it twice.

Indicator lamp light comes on and off.

- a. If switch lamp does not illuminate, it may be defective. Retract switch lamp holder and replace lamp and retest.
- b. If lamp does not illuminate, replace 1A2.
- c. If switch lamp illuminates but resistance reading exceeds 3 ohms, connection may be defective. Look for broken wiring at either connector of cable WI. Repair and retest.
- d. Switch lamp could be faulty. Replace 1A2 - refer -to depot level.

3. Turn off BTS 115 VAC power.

END OF TEST.

STATUS PANEL OSCILLOSCOPE MONITOR CHECK

3-25.

a. Test Equipment.

Oscilloscope AN/USM-281A

Digital Multimeter AN/USM-451

b. Test Connections and Conditions.

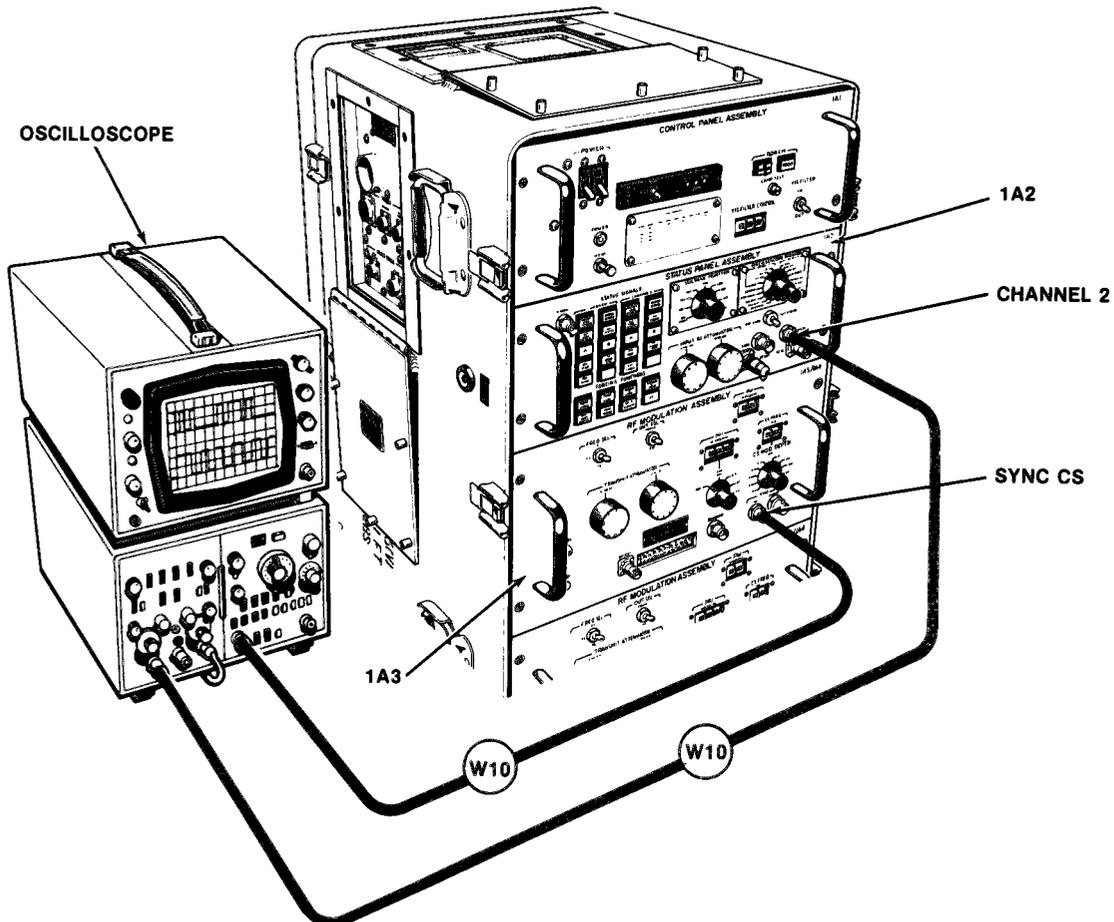
(1) Connect oscilloscope external sync jack to 1A3 SYNC CS jack.

(2) Connect oscilloscope vertical input jack to 1A2 CHAN 2 jack.

c. Initial Test Equipment Setting.

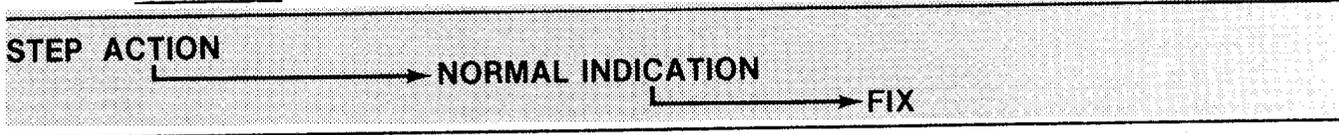
(1) Set sweep speed to 5 ms/DIV.

(2) Other controls are as in paragraph 3-14a.



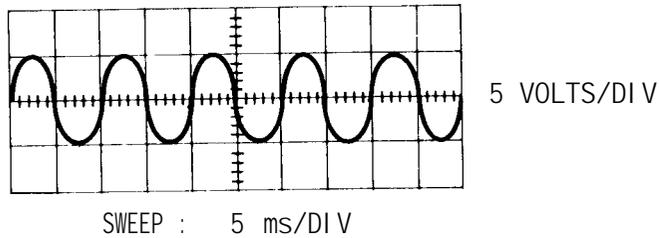
STATUS PANEL OSCILLOSCOPE MONITOR CHECK (Continued)

d. Procedure.



- Turn on 115 VAC power. Set DET VIDEO/UUT SIGNAL switch to UUT SIGNAL and both red and black OSCILLOSCOPE MONITOR switches to BTS VIDEO 1/2.

Oscilloscope display is a sine wave, in sync with an amplitude of 10 volts p-p minimum.



5 VOLTS/DIV

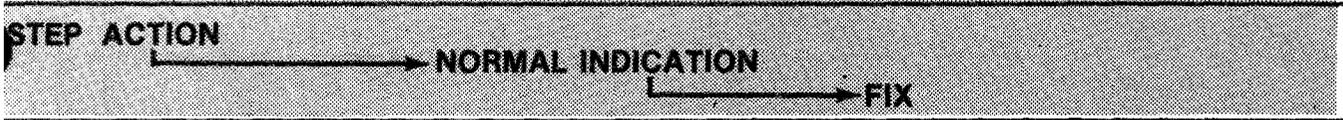
SWEEP : 5 ms/DIV

- Check voltages of 1A3 PS 1, 1A3 PS 2, 1A3 PS 3.
- Replace the two circuit cards in 1A3. Reinstall cards if no improvement is noted.
- Replace 1A3.

- Change 1A3 CS FREQUENCIES switch.

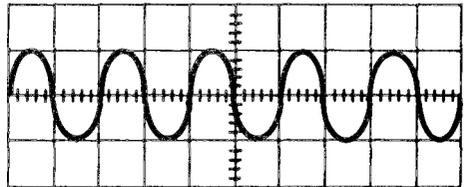
Frequency of displayed sine wave also changes.

Same as step 1.



3. Connect oscilloscope sync to 1A4 Assembly CS sync jack and scope vertical input to CHAN 1 on the status panel.

→ Oscilloscope display is a sine wave, in sync with an amplitude of 10 Vp-p minimum.



5 VOLTS/DIV

SWEEP: 5 ms/DIV

4. Change 1A4 CS FREQ tens switch.

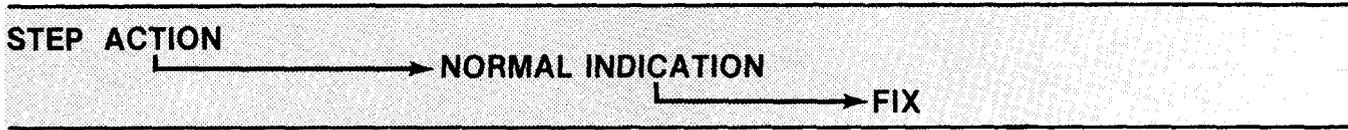
→ The frequency of the displayed sine wave also changes.

→ Check 1A4 as in the FIX of step 1.

→ Check 1A4 as in Step 1.

5. Set the BTS 115 VAC 60 Hz 10 POWER circuit breaker to OFF.

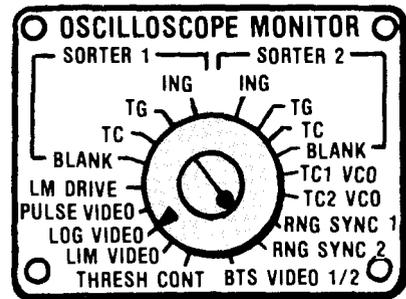
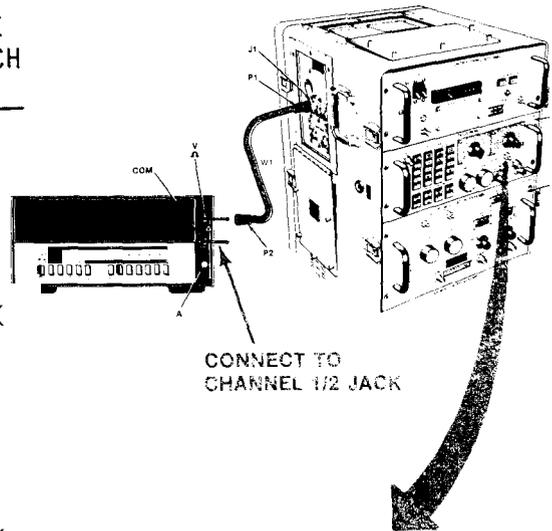
STATUS PANEL OSCILLOSCOPE MONITOR CHECK (Continued)

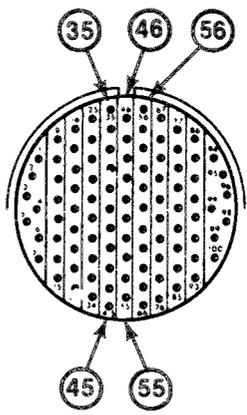
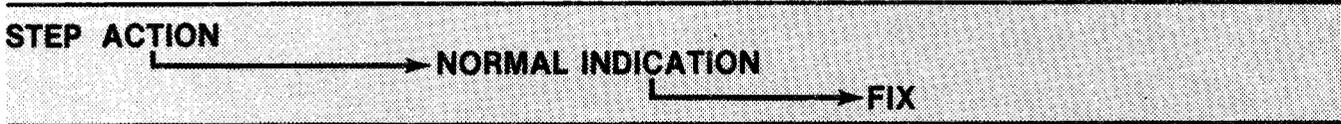


6. Set DET VIDEO/UUT SIGNAL switch to UUT SIGNAL. Check for continuity between the following points using a DMM.

Continuity, 3 ohms max, from designated W1 pins to the CHAN 1 jack when the black knob of the OSCILLOSCOPE MONITOR Switch is in the designated position and to the CHAN 2 jack when the red knob is in the designated position.

W1 PIN NO	OSCILLOSCOPE MONITOR SWITCH POSITION
58	THRESH CONT
61	LIM VIDEO
57	LOG VIDEO
43	PULSE VIDEO
56	LM DRIVE
41	SORTER 1 BLANK
39	SORTER 1 TC
37	SORTER 1 TG
35	SORTER 1 ING
45	SORTER 2 ING
54	SORTER 2 TG
52	SORTER 2 TC
50	SORTER 2 BLANK





W1P2

Check conductors at their respective connectors for defective wiring. Repair connections and retest.

7. The following resistances are present between the CHAN 1 monitor jack and ground with the black knob of the monitor switch set as directed.

└── Status Panel Oscilloscope

OSCILLOSCOPE MONITOR SWITCH POSITION	RESISTANCE
THRESH CONT	1 ±0.2 K
LIM VIDEO	400 ±100
LOG VIDEO	1 ±0.2 K
LM DRIVE	10 ±1 K
TC 1 VCO	1 ±0.2 K
TC 2 VCO	1 ±0.2 K

└── If resistance readings are not within tolerances allowed replace 1A2.

END OF TEST.

STATUS PANEL VOLTAGE MONITOR CHECK

3-26

a. Test Equipment.

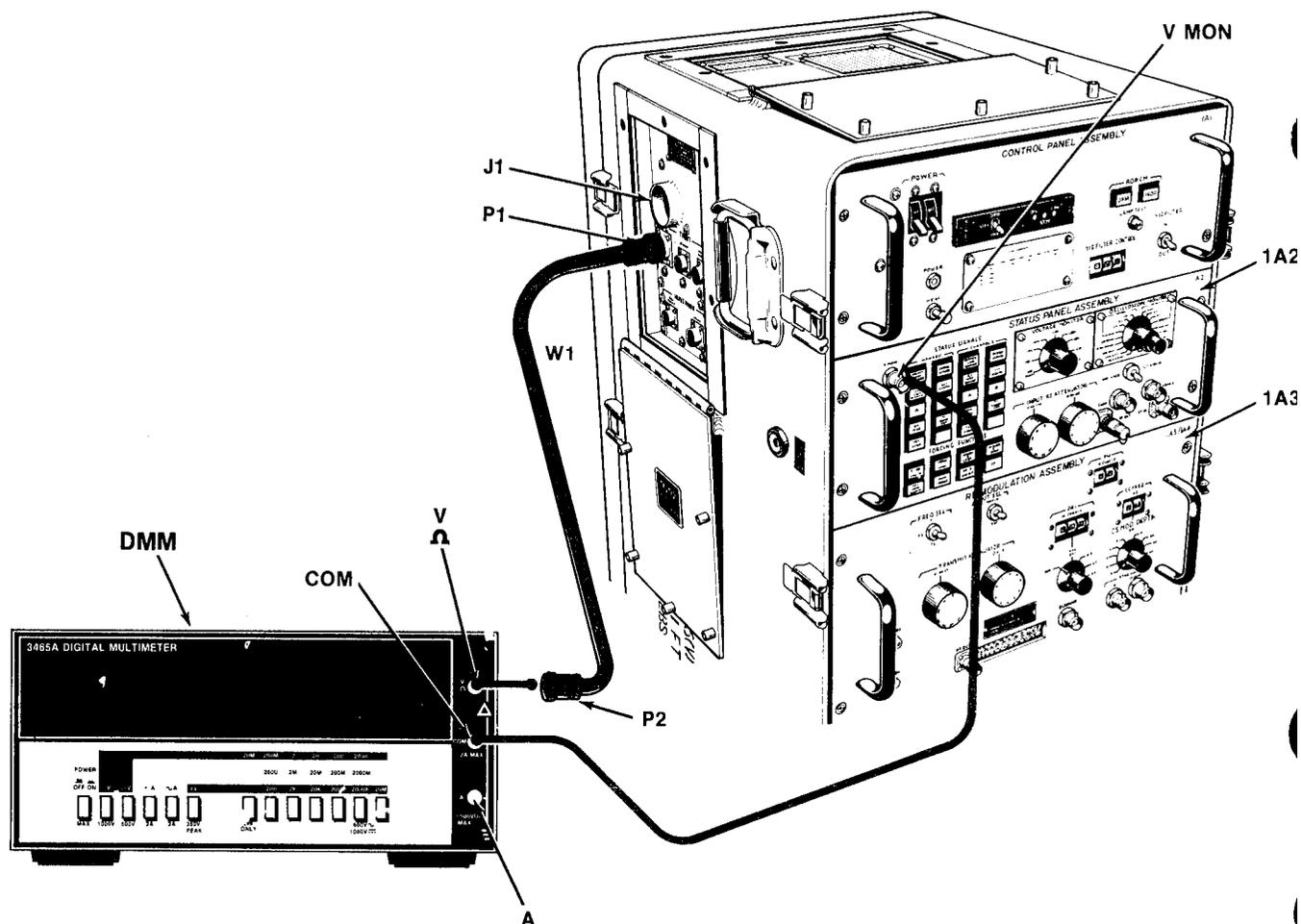
Digital Multimeter (DMM) AN/USM-451

b. Test Connections and Conditions.

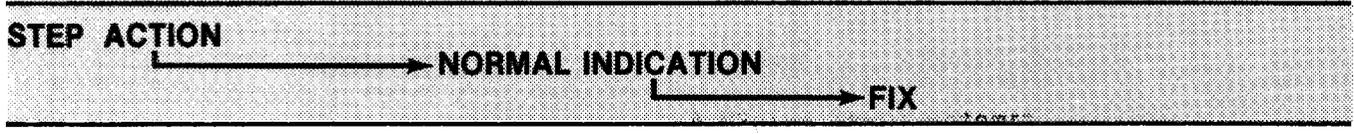
- (1) Turn off 115 VAC power.
- (2) Connect negative lead of DMM to 1A2 V MON jack.

c. Initial Test Equipment Setting.

- (1) Set DMM to 200 ohm scale.
- (2) Other controls are as in paragraph 3-14a.



d. Procedure.



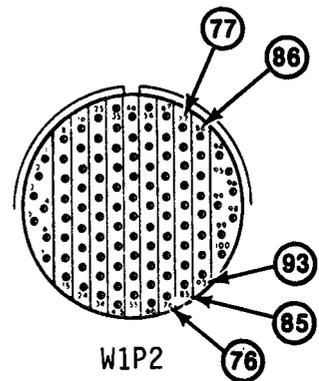
1. Connect negative lead of ohmmeter to V MON jack J6 and the positive lead to the following cable W1P2 pins and check for continuity as the status panel VOLTAGE MONITOR switch is set to the following positions.

Each continuity measurement 2.2K ±10% for the following:

VOLTAGE MONITOR SWITCH

W1P2 PIN NO

+5V LOGIC	77
+5V	78
-5.2V	79
+10V	80
-10V	86
+15V	87
-15V	88
+28V	83
-65V	89



If measurement is not 2.2 K +10% it probably is indicated by an infinite reading, which means an open R2 or an open in one of the two connectors or in the J1 female receptacle on the connector panel at the left side of the bench test set. Carefully probe and repair any defect at the BTS jack, or at either connector of Cable W1.

END OF TEST

YIG FILTER CHECK

3-27

a. Test Equipment.

RF Power Meter HP 435A

RF Power Sensor HP 8481A

28 Vdc Power Supply PP-1104()/G

b. Test Connections and Conditions.

(1) Connect RF Cable W5 from RF Modulation Assembly 1A3 RF OUT jack to RF IN jack on status panel.

(2) Connect RF power meter sensor to VAR RF OUT jack on status panel.

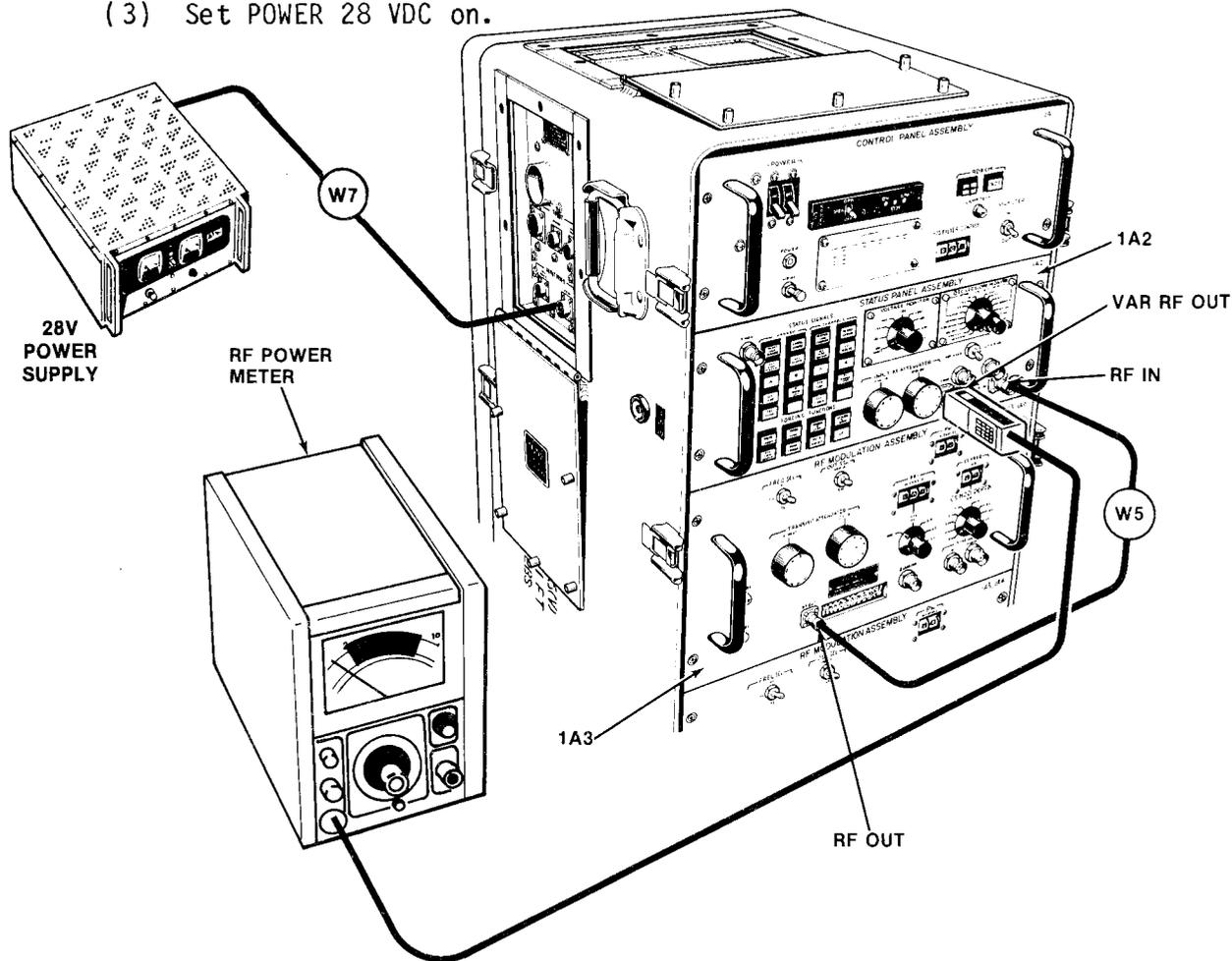
(3) Connect W7 to 28 Vdc power supply.

c. Initial Test Equipment Setting.

(1) Set RF power meter to +10 dBm scale.

(2) Other equipment settings are as paragraph 3-14.

(3) Set POWER 28 VDC on.



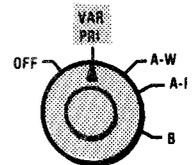
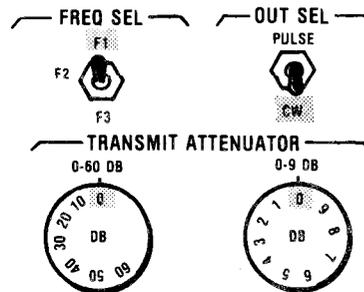
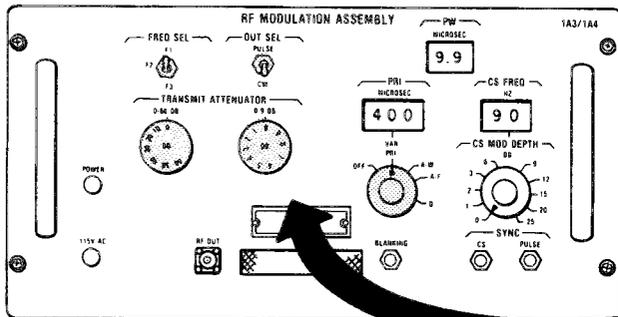
d. Procedure .

STEP ACTION

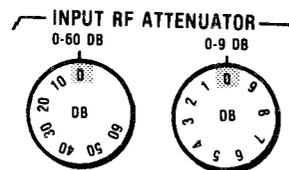
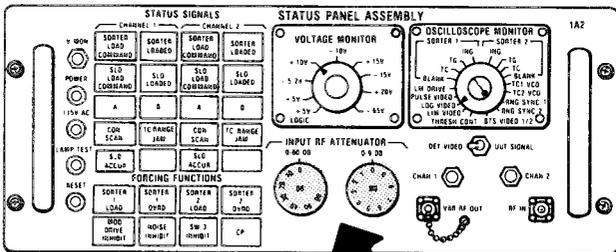
NORMAL INDICATION

FIX

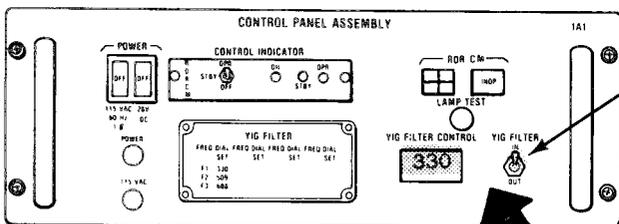
1. On RF Modulation Assembly 1A3, set FREQ SEL to F1, OUT SEL to CW, PRI switch to VAR PRI, TRANSMIT ATTENUATOR 0-60 DB and 0-9 DB to 0.



2. On Status Panel 1A2, set INPUT RF ATTENUATOR 0-60 DB and 0-9 DB to 0.

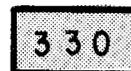


3. On Control Panel Assembly 1A1, set YIG FILTER switch to IN and YIG FILTER CONTROL to 330.

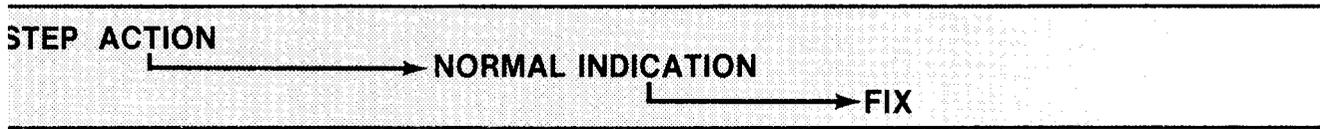


IN

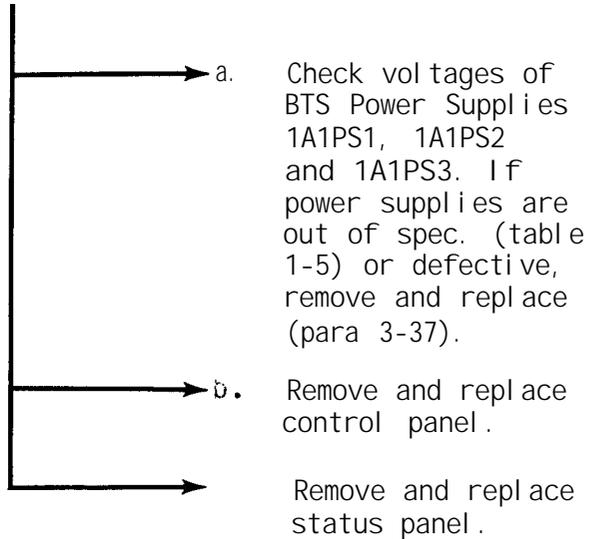
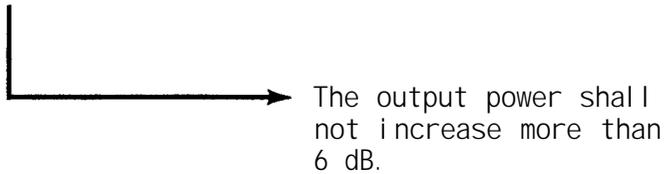
YIG FILTER CONTROL YIG FILTER



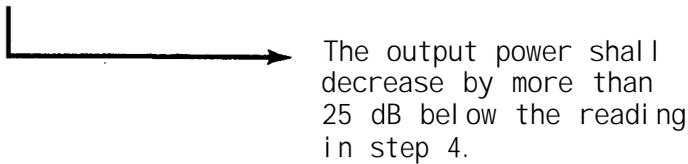
YIG FILTER CHECK (Continued)



4. Adjust YIG FILTER CONTROL up or down until the output power is peaked. Record reading and set YIG FILTER switch to OUT.



5. On Control Panel Assembly 1A1, set YIG FILTER switch to IN and YIG FILTER CONTROL to a number that is 10 less than the final setting of step 4.



STEP ACTION

NORMAL INDICATION

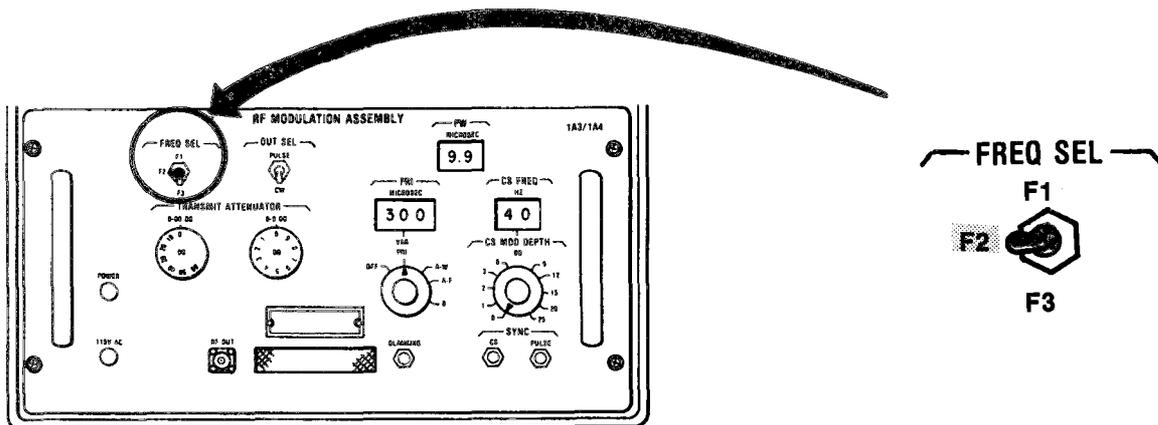
FIX

6. On Control Panel Assembly 1A1, set YIG FILTER CONTROL to a number that is 10 more than the final setting of step 4.

→ The output power shall decrease by more than 25 dB below the reading in step 4.

→ Same as Step 4.

7. On RF Modulation Assembly 1A1, set FREQ SEL to F2.



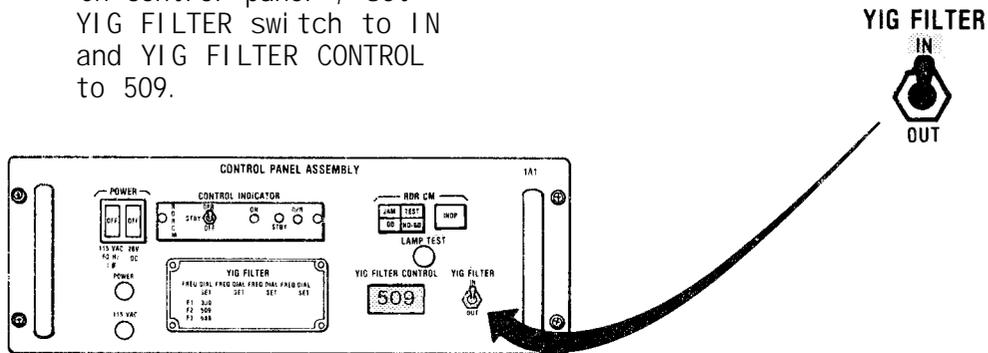
YIG FILTER CHECK (Continued)

STEP ACTION

NORMAL INDICATION

FIX

8. On control panel, set YIG FILTER switch to IN and YIG FILTER CONTROL to 509.



9. Adjust YIG FILTER CONTROL up or down until the output power is peaked. Record reading and set YIG FILTER switch-to OUT.

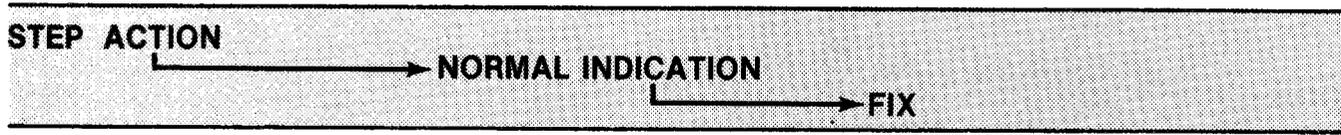
The output power shall not increase more than 6 dB.

→ Same as step 4.

10. On control panel, set YIG FILTER switch to IN and YIG FILTER CONTROL to a number that is 10 less than the final setting of step 9.

→ The output power shall decrease by more than 25 dB below the reading in step 9.

→ Same as step 4.

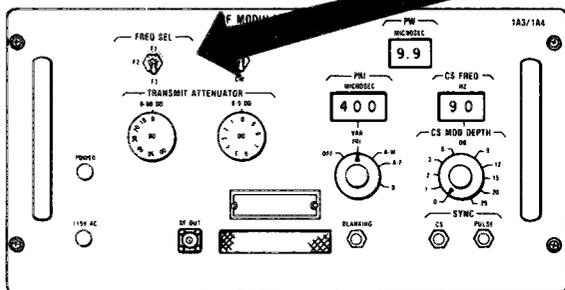


11. On control panel, set YIG FILTER CONTROL to a number that is 10 more than the final setting of step 9.

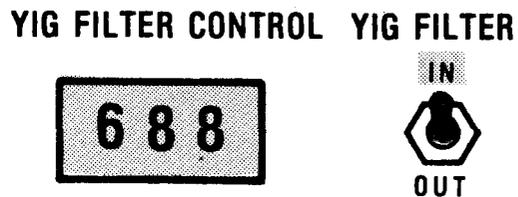
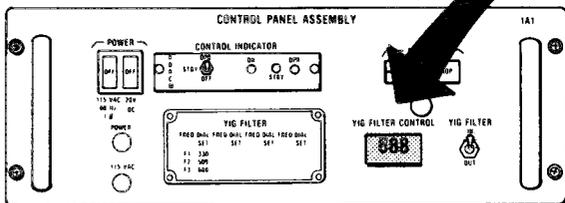
The output power shall decrease by more than 25 dB below the reading in step 9.

Same as step 4.

12. On RF Modulation Assembly 1A3, set FREQ SEL to F3.



13. On control panel, set YIG FILTER switch to IN and YIG FILTER CONTROL to 688.



YIG FILTER CHECK (Continued)

STEP ACTION

NORMAL INDICATION

FIX

14. Adjust YIG FILTER CONTROL up or down until the output power is peaked. Record reading and set YIG FILTER switch to OUT.

YIG FILTER CONTROL

688

The output power shall not increase more than 6 dB.

Same as step 4.

15. On Control Panel Assembly 1A1, set YIG FILTER switch to IN and YIG FILTER CONTROL to a number that is 10 less than the final setting of step 14.

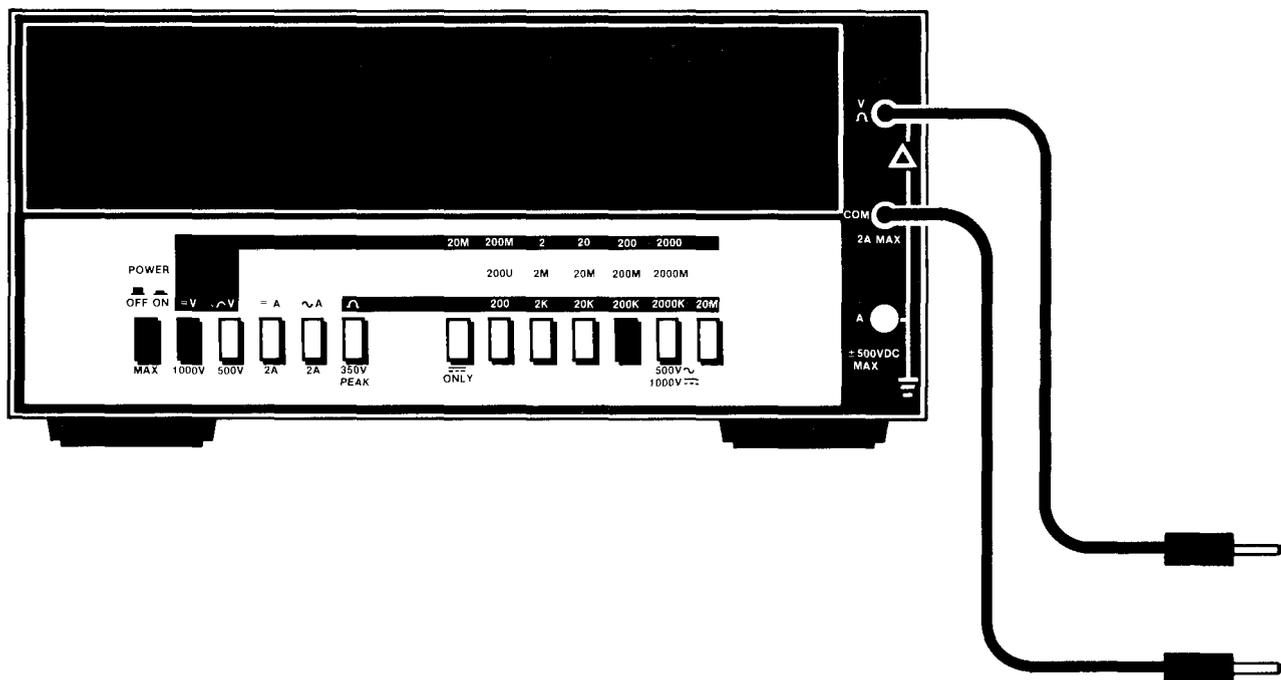
The output power shall decrease by more than 25 dB below the reading in step 14.

Same as step 4.

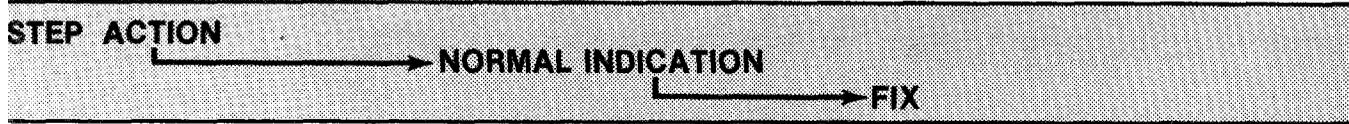
CONTROL PANEL CHECK

3-28

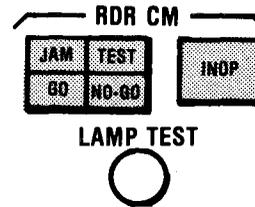
- a. Test Equipment. Digital Multi meter AN/USM-451
- b. Test Connections and Conditions. Turn on 28 VDC circuit breaker (CB1) on control panel.
- c. Initial Test Equipment Setting. Set digital multi meter as follows:
 - (1) OFF/ON pushbutton to ON
 - (2) = V to ON
 - (3) 200V to ON



d. Procedure.



1. On control panel, press the LAMP TEST pushbutton switch.



JAM/TEST/GO/NO-GO and INOP indicators light.

- a. If JAM TEST, GO, or NO-GO lamp fails to light, twist and remove lens. Replace failed lamp and re-install lens.
- b. If INOP lamp fails to light, extract INOP lamp holder. Replace failed lamp and re-install lamp holder.
- c. Using digital multi-meter check the circuit breaker CB1 for +28 V.
- d. If the above checks fail to correct the mal function, replace control panel.

END OF TEST.

SECTION IV
 MAINTENANCE PROCEDURES

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GENERAL

3-29. This section gives instructions for performing the alignment, repair, removal, and replacement actions listed in section III and in the Maintenance Allocation Chart. These instructions include illustrations showing parts locations. The section describes how to remove Control Panel Assembly 1A1, Status Panel Assembly 1A2 and the two RF Modulation Assemblies 1A3 and 1A4 from the BTS case. In addition, the section discusses replacement of the two printed circuit cards of the BTS which are located in an enclosure on RF Modulation Assemblies 1A3/1A4.

Instructions are provided for removal, replacement and adjustment of the internal power supplies in the BTS.

Three of the power supplies are located in Control Panel Assembly 1A1.

- +5V Power Supply PS1.
- +15V Power Supply PS2.
- +10V Power Supply PS3.

One power supply is located in Status Panel Assembly 1A2:

+12V Power Supply PS1.

Four of the power supplies are located in RF Modulation Assembly 1A3/1A4.

- +5V Power Supply PS1.
- -65V Power Supply PS3.
- +15V Power Supply PS2.
- -15V Power Supply PS4.

CORRECTIVE ACTION

3-30. The two-fold purpose of troubleshooting procedures in Section III is to detect trouble in the system and to isolate the malfunction to a particular assembly or subassembly. If the trouble is traced to the single power supply on the status panel, replace the power supply. Similarly, four power supplies on RF Modulation Assembly units 1A3 or 1A4 may be replaced if necessary. If a malfunction is traced to the three power supplies in the control panel, replace the defective power supply. If the control indicator on Control Panel Assembly 1A1 is defective, another control indicator may be substituted. One RF modulation assembly may be substituted for the other.

LAMP REPLACEMENT

3-31. Lamp replacement is accomplished from the panel front without the use of any tools.

C A U T I O N

In lamp assemblies with dual sockets, install only a single lamp. Sockets are wired in parallel and a second lamp would overload the lamp power supply.

The dual-lamp light capsule which holds the lamps and front lens is held to the unit housing by spring clips which allow it to be removed from the front panel for quick and easy lamp replacement. To obtain access to the lens, diffuser, or color filter, slide the holder vertically upward and off the light capsule. In the BITE 4-lamp assembly, pull lens forward and rotate 90 degrees: pull and hinge lamp assembly downward: remove colored filters from suspected defective lamp; press lamp to rear and remove. Press replacement lamp in socket, replace filter and reinstall lamp assembly. After replacement of a lamp, the indicator should be retested by depressing the LAMP TEST switch on the front of the control panel assembly to check that the new lamp lights. For power indicators, unscrew lens (ccw), pull lamp from lens, press in replacement lamp and screw lens (cw) back into socket.

ASSEMBLY REMOVAL AND REPLACEMENT

3-32. The procedure for removal of Status Panel Assembly 1A2, or the two RF Modulation Assemblies 1A3 or 1A4 is the same. To remove any one of the three assemblies or all of them, perform the following:

- a. Removal of 1A2, 1A3 or 1A4 Panel Assemblies.

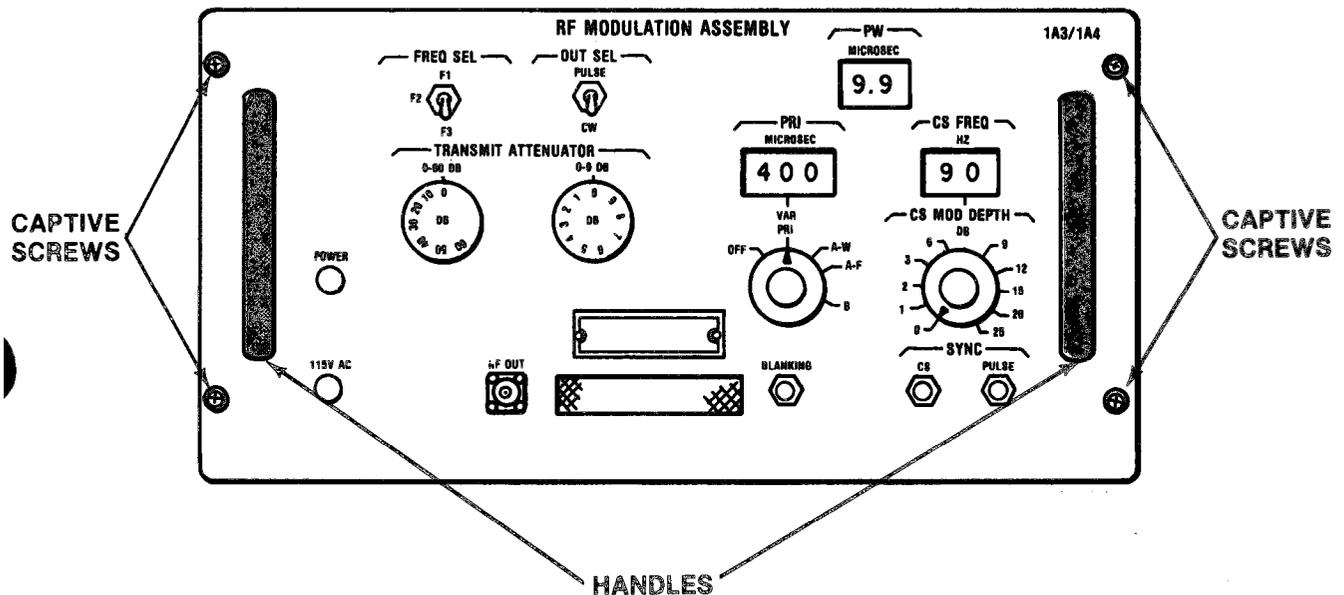
W A R N I N G

Exercise the utmost care during assembly removal as the RF Modulation Assembly weighs 44 pounds.

C A U T I O N

- When connecting or disconnecting jackscrew connectors:
 - Turn one screw one turn.
 - Turn other screw one turn.
 - Repeat alternate turning of screws.
 - Do not use excessive torque.
- Turning one screw too far or using excessive torque may crack connector body or strip screw thread!
- Be sure to disconnect semi-rigid coax cables from rear of assembly before removing it. Pulling assembly with cable attached may damage cable.
- Retain nuts and washers when removing grounding straps. Do not let loose nuts or washers fall into BTS. Loose hardware can cause a short circuit.

- (1) Remove the front and rear covers of the case.
- (2) Remove 115 V ac and 28 V dc power from the BTS.
- (3) Disconnect all cables, grounding straps and semi-rigid coax cables from the front and rear panels of the assembly to be removed.
- (4) Loosen the four captive screws securing the assembly to the case



- (5) **Firmly** grasp the two handles of the assembly to be removed and gently **pull** the assembly out. Continue pulling slowly until the assembly is almost out of its closure at which time carefully and slowly pull-it free of the case and gently lower the assembly to the test bench.

NOTE

Two guides on the back of the case frame mate with two holes at the rear of the assembly for the purposes of assembly alignment and stability.

ASSEMBLY REMOVAL AND REPLACEMENT (Continued)

- b. Replacement of 1A2, 1A3 or 1A4 Panel Assemblies. The procedure for replacement of Status Panel Assembly 1A2, or the two RF Modulation Assemblies 1A3 or 1A4 is the same. To replace any of the three assemblies, perform the following:

WARNING

Exercise the utmost care during assembly replacement as the RF modulation assembly weighs 44 pounds.

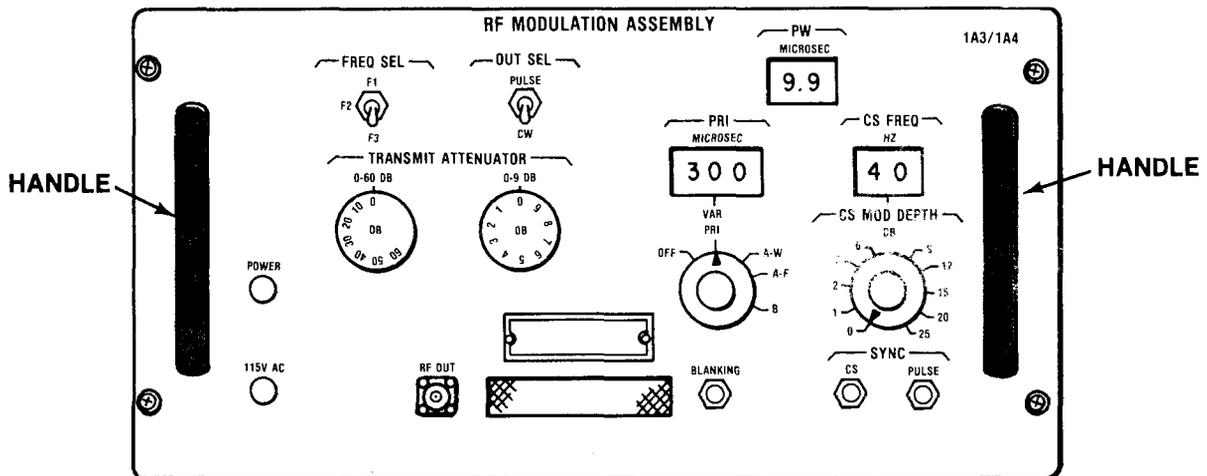
CAUTION

Pulling assemblies forward without disconnecting cables may damage cables.

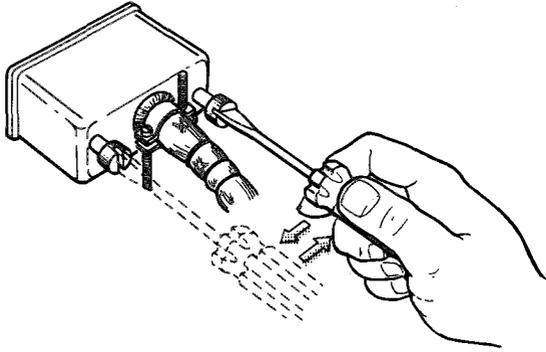
NOTE

Two guides on the back of the case frame mate with two holes at the rear of the assembly for the purposes of assembly alignment and stability.

- (1) Firmly grasp the two handles of the assembly to be replaced and gently push the assembly into the case. Continue slowly until the assembly is almost in its closure at which time carefully and slowly push it fully in, engaging the guide pins at the rear of the assembly.



- (2) Secure panel assembly to BTS case frame with four captive screws.
- (3) Connect all cables and grounding straps to front and rear panels of assembly being replaced.

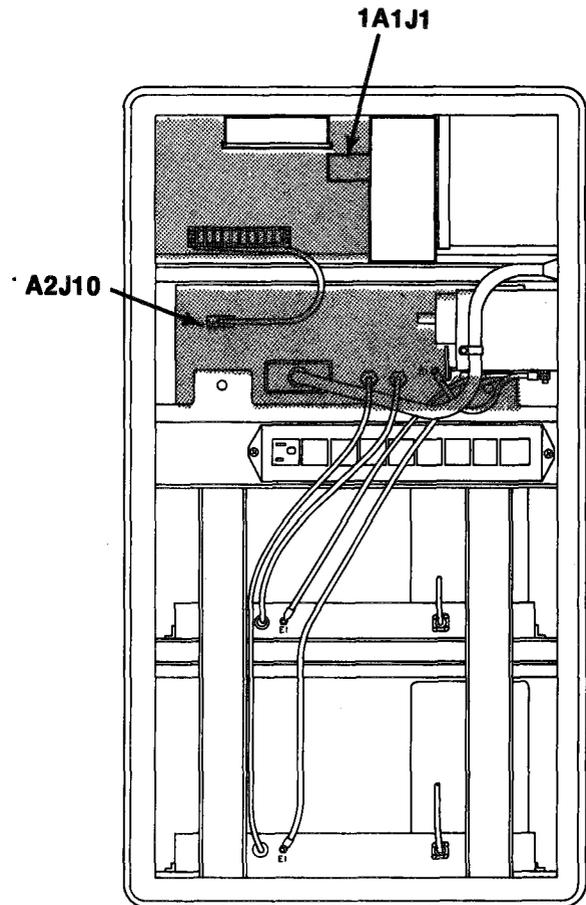


CAUTION

When connecting or disconnecting jack screw connectors:

- Turn one screw one turn.
- Turn other screw one turn.
- Repeat alternate turning of screws.
- Do not use excessive torque.

Turning one screw too far or using excessive torque may crack connector body or strip screw thread!



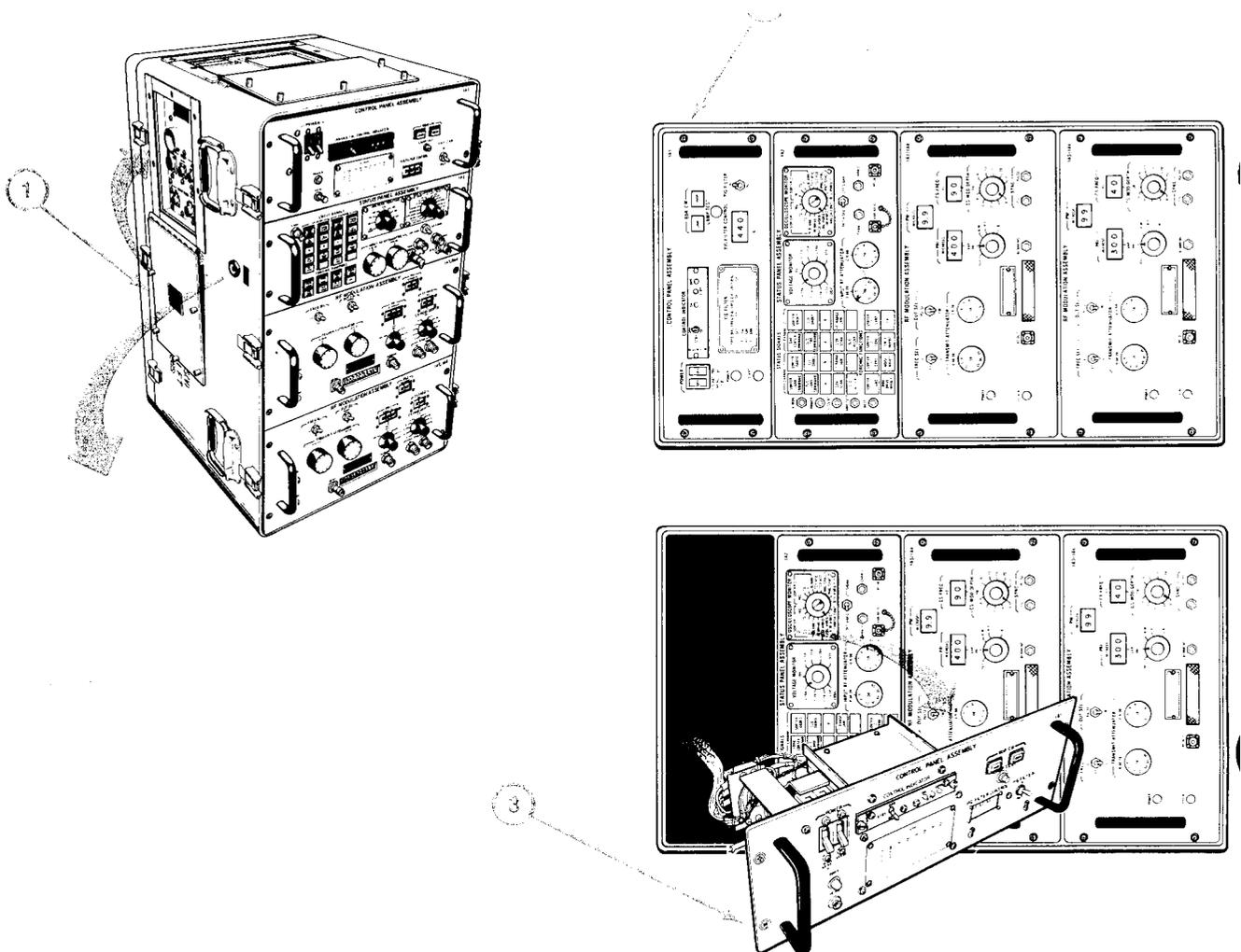
c. Removal of Control Panel Assembly 1A1. For removal of the control panel, perform the following procedure:

- (2) Remove 115 Vac and 28 Vdc input power to the BTS Connector Panel Jacks J5 and J6.
- (3) From the rear of the BTS, disconnect cable P4 from 1A2 J10 on Status Panel 1A2 and Cable P2 from 1A1J1 on the control panel.

- (4) Make sure that air hose and all connectors are disconnected from BTS.
- (5) Close hinged cover (1) over BTS side connector panel.
- (6) Lay BTS down (2) on hinged cover side. Close latches on side of BTS.
- (1) Remove four screws holding Control Panel Assembly 1A1 to BTS.

Control Panel Assembly 1A1 is wired to BTS. Be careful not to pull or twist wires while handling 1A1.

- (8) Pull Control Panel Assembly 1A1 forward. Rotate 1A1 and set it in front of BTS.



(9) Tag and disconnect the following wires from the rear of the control panel :

115 VAC from TB1-3

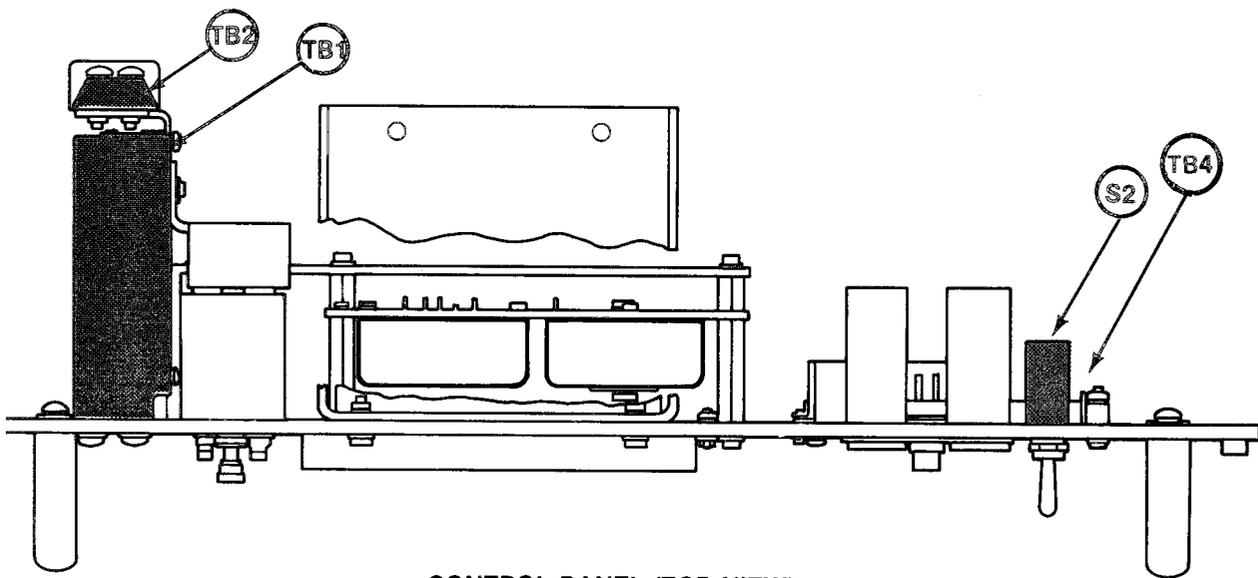
●NEUT from TB1-2

●GND from TB1-1

●+28 VDC from TB2-4, TB2-2 and TB2-1

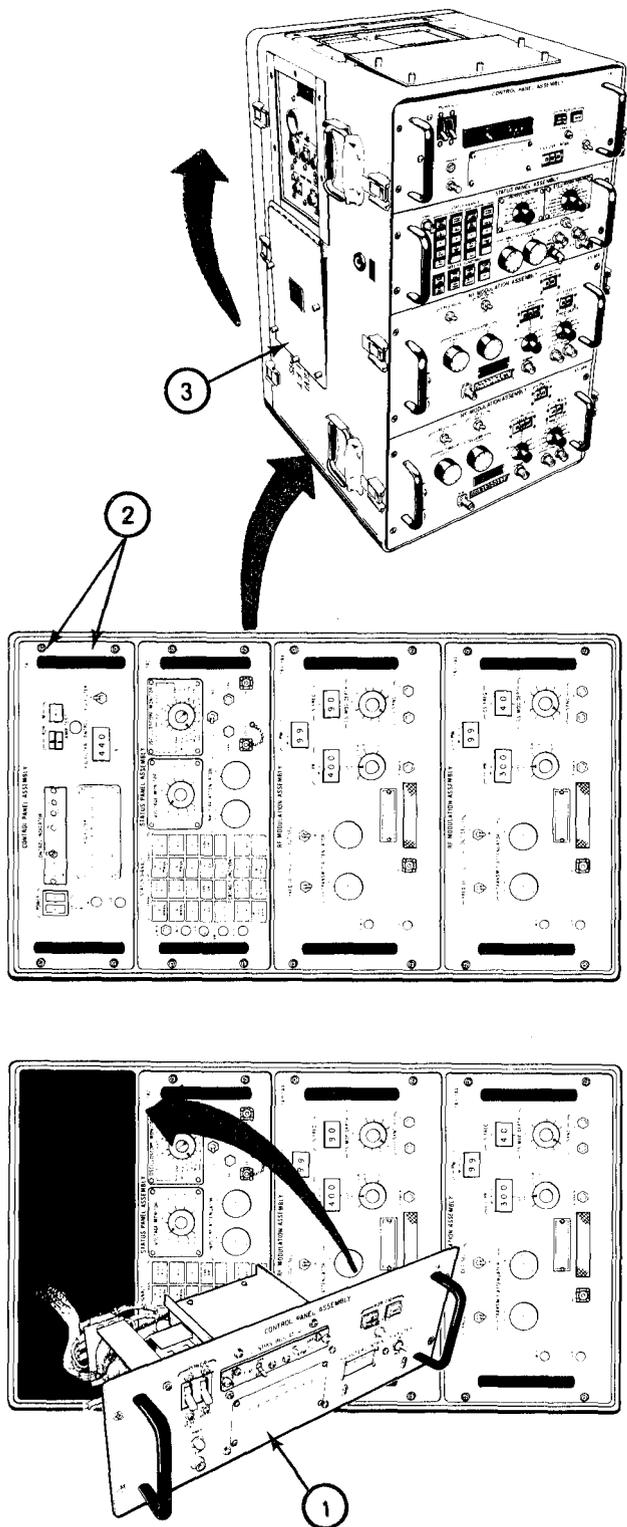
●+28 VDC RTN from Switch S2-2

●Four wires from TB4



CONTROL PANEL (TOP VIEW)

ASSEMBLY REMOVAL AND REPLACEMENT (Continued)



d. Replacement of Control Panel Assembly 1A1.

(1) Connect following wires to rear of control panel:

115 VAC to TB1-3

o NEUT to TB1-2

o GND to TB1-1

o +28 VDC to TB2-4, TB2-2 and TB2-1

o +28 VDC RTN to Switch S2-2

o Four wires to TB4

(2) Insert 1A1 assembly (1) in BTS.

(3) Fasten panel with four captive screws (2).

(4) Stand up BTS.

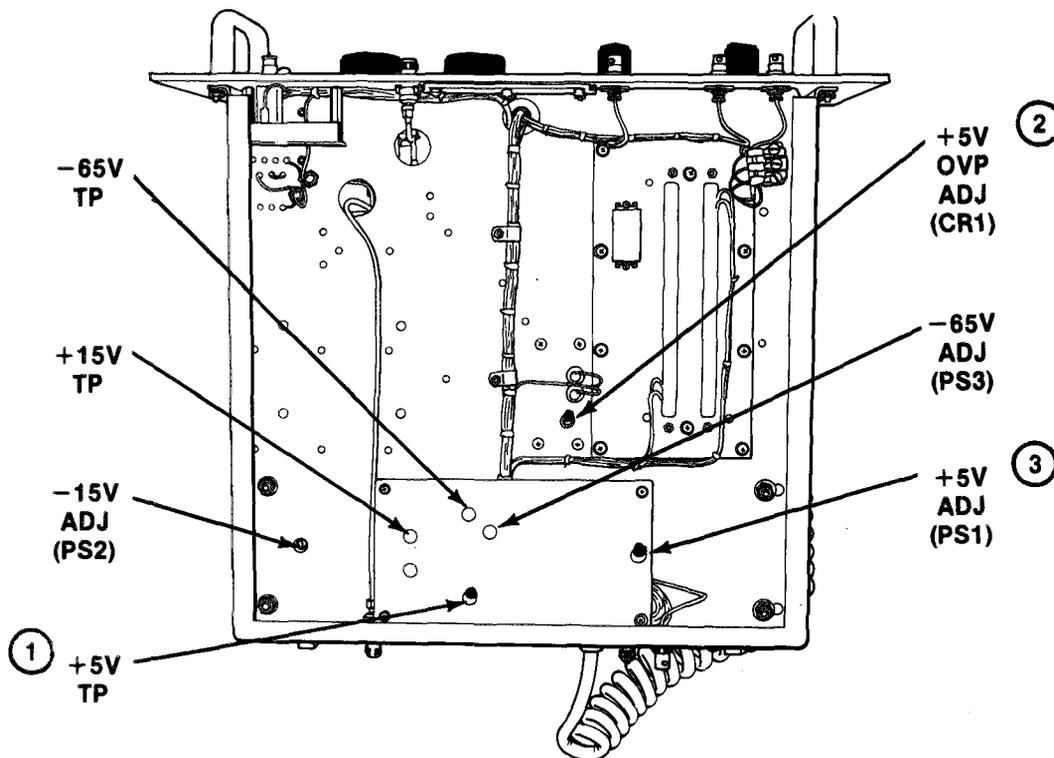
(5) Open hinged cover (3).

ADJUSTMENT OF +5 V POWER SUPPLY 1A3/1 A4 PS1

- 3-33. To adjust +5 V Power Supply 1A3/1A4 PS1, perform the following:
- Remove RF modulation assembly from bench test set in accordance with paragraph 3-32a. Set the RF modulation assembly upside down on the test bench. Connect power cord to an energized 115 V ac 60 Hz source.
 - Check that front pane? POWER lamp illuminates.

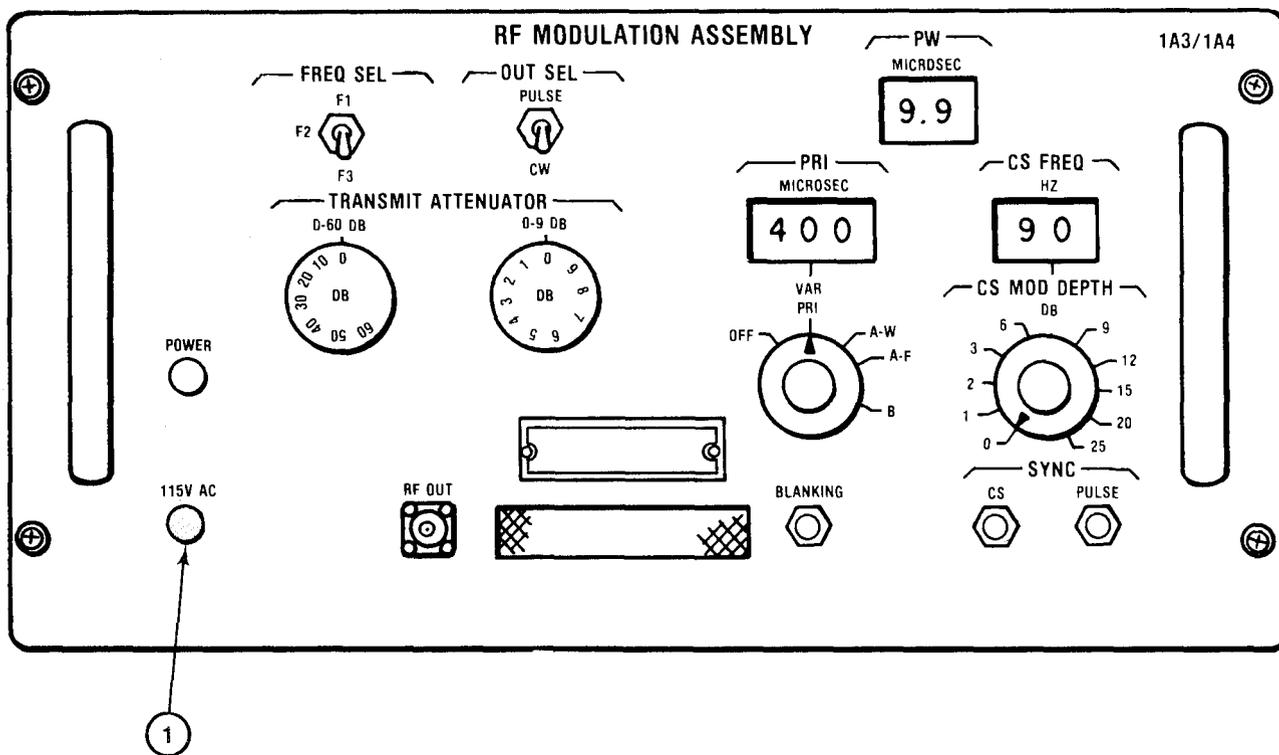
If lamp does not light, check that front panel circuit breaker on the RF modulation assembly has not been tripped.

- Connect the V lead of the DMM to the +5 V test point (1) and the COM lead to chassis ground.
- Adjust CR1 (2) control fully clockwise.
- Using screwdriver, rotate the PS1 +5 V ADJ control (3) until DMM indicates +5.0 v.
- Adjust CR1 control (2) counterclockwise while observing DMM. When DMM reading drops to less than 2 volts, stop adjustment.
- Adjust CR1 control (2) 1/2 turn clockwise.



ADJUSTMENT OF +5 V POWER SUPPLY 1A3/1A4 PS1 (Continued)

- h. Pull and set POWER circuit breaker (1).
- i. Observe DMM for a +5 V reading.
- j. Remove test leads from RF modulation assembly.
- k. Replace RF modulation assembly in BTS using the procedure in paragraph 3-32b.



ADJUSTMENT OF +15 V POWER SUPPLY 1A3/1A4 PS2

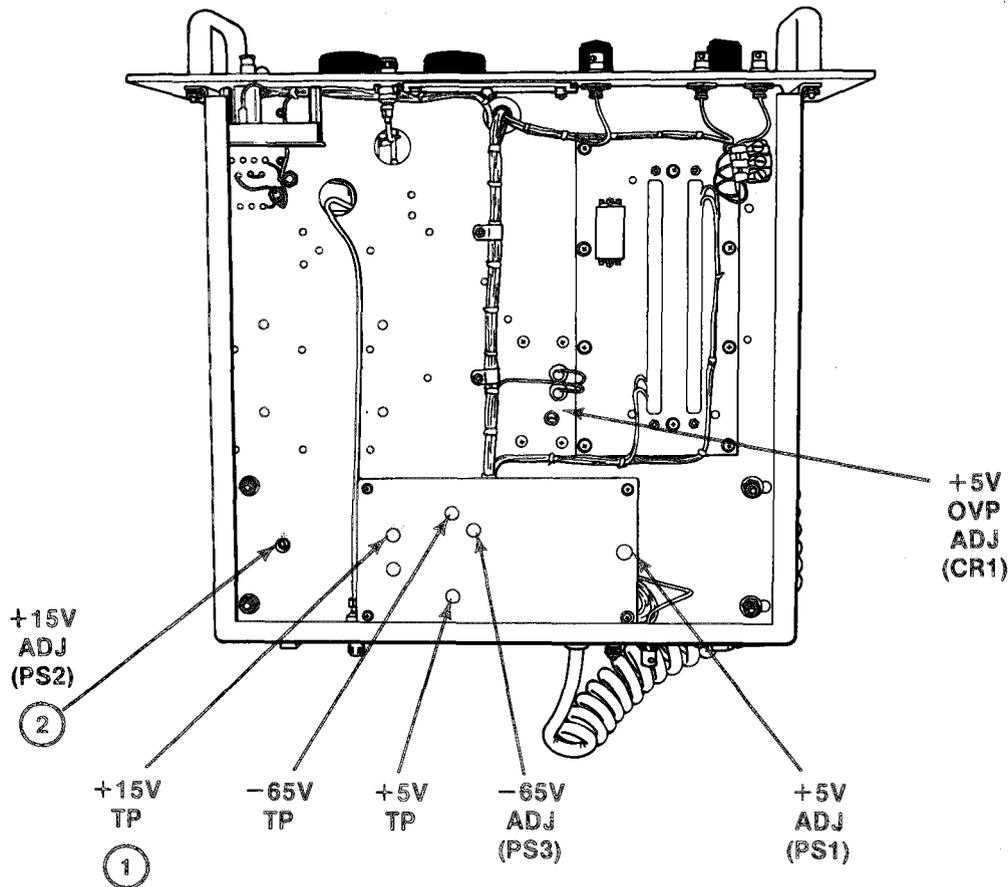
3-34.

- a. +15 V Power Supply 1A3/1A4 PS2. To adjust +15 V Power Supply 1A3/1A4 PS2 perform the following:
 - (1) Remove RF modulation assembly from bench test set in accordance with paragraph 3-32a. Set RF modulation assembly upside down on the test bench. Connect the power cord to an energized 115 V ac, 60 Hz. source.
 - (2) Check that front panel power lamp DS1 illuminates,

N O T E

If lamp does not light, check that front panel circuit breaker on the RF modulation assembly has not been tripped.

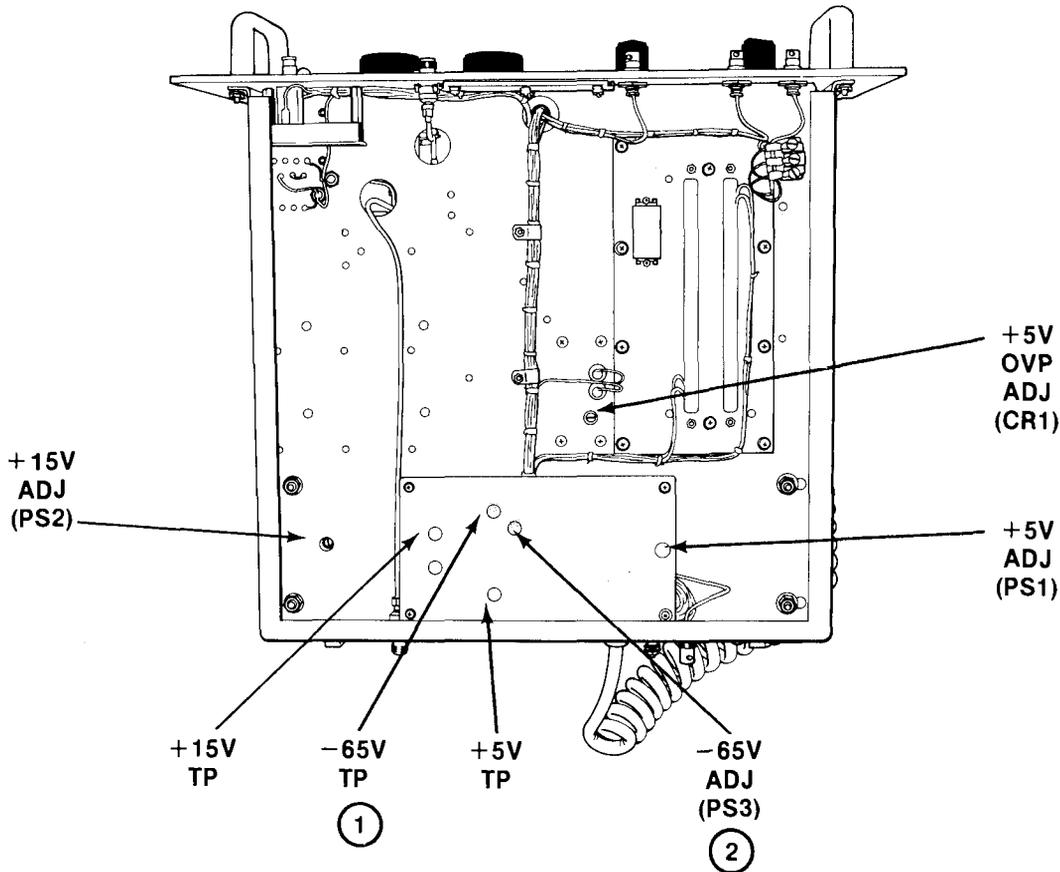
- (3) Connect the $V\Omega$ lead of the DMM to the +15 V test point (1) and DMM common lead to the chassis ground.
- (4) Using screwdriver, rotate the PS2 +15 V ADJ control (2) clockwise or counterclockwise until the DMM indicates +15.0 V.
- (5) Remove test 1 cads from RF modulation assembly.
- (6) Reinstall RF modulation assembly in BTS using the procedure in paragraph 3-32b.



- b. -15V Power Supply. There is no adjustment to the -15 V Power Supply.

ADJUSTMENT OF -65 V POWER SUPPLY 1A3/1A4 PS3

- 3-35. To adjust -65 V Power Supply 1A3/1A4 PS3 perform the following:
- a. Remove RF modulation assembly from bench test set in accordance with paragraph 3-32a. Set the RF modulation assembly upside down on the test bench. Connect the power cord to an energized 115 V ac, 60 Hz source.
 - b. Check that front panel power lamp DS1 illuminates.
 - c. Connect the common lead of the DMM to ground and the DMM $V\Omega$ lead to the -65 V test point (1).
 - d. Using screwdriver, rotate the PS3 -65 V ADJ control clockwise or counter-clockwise until the DMM meter indicates -65.0 V (2).
 - e. Remove test leads from RF modulation assembly.
 - f. Reinstall RF modulation assembly in BTS using the procedure in paragraph 3-32b.



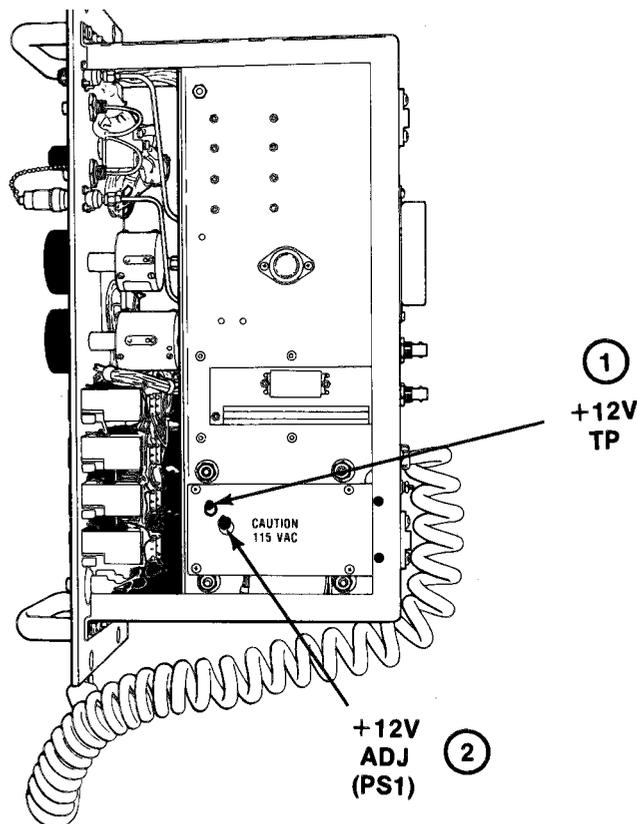
ADJUSTMENT OF +12 V POWER SUPPLY 1 A2 PS1

- 3-36. To adjust +12 V Power Supply 1A2 PSI perform the following:
- a. Remove Status Panel Assembly 1A2 from the bench test set in accordance with paragraph 3-32a. Set the status panel assembly upside down on the test bench. Connect the power cord to an energized 115 V ac, 60 Hz source.
 - b. Check that front panel lamp DS21 illuminates.

N O T E

If lamp does not light, check that front panel circuit breaker on the status panel has not been tripped.

- c. Connect the Ω of the DMM to the +12 V test point (1) and the COM lead to the chassis ground.
- d. Using screwdriver, rotate the +12 V ADJ control (2) clockwise or counter-clockwise until the DMM meter indicates +12.0 V.
- e. Remove test leads from the status panel.
- f. Reinstall status panel in BTS using the procedure in paragraph 3-32b.



REPLACEMENT OF POWER SUPPLIES

3-37. Replacement of the eight internal power supplies of the BTS is accomplished by performing one of the following respective procedures.

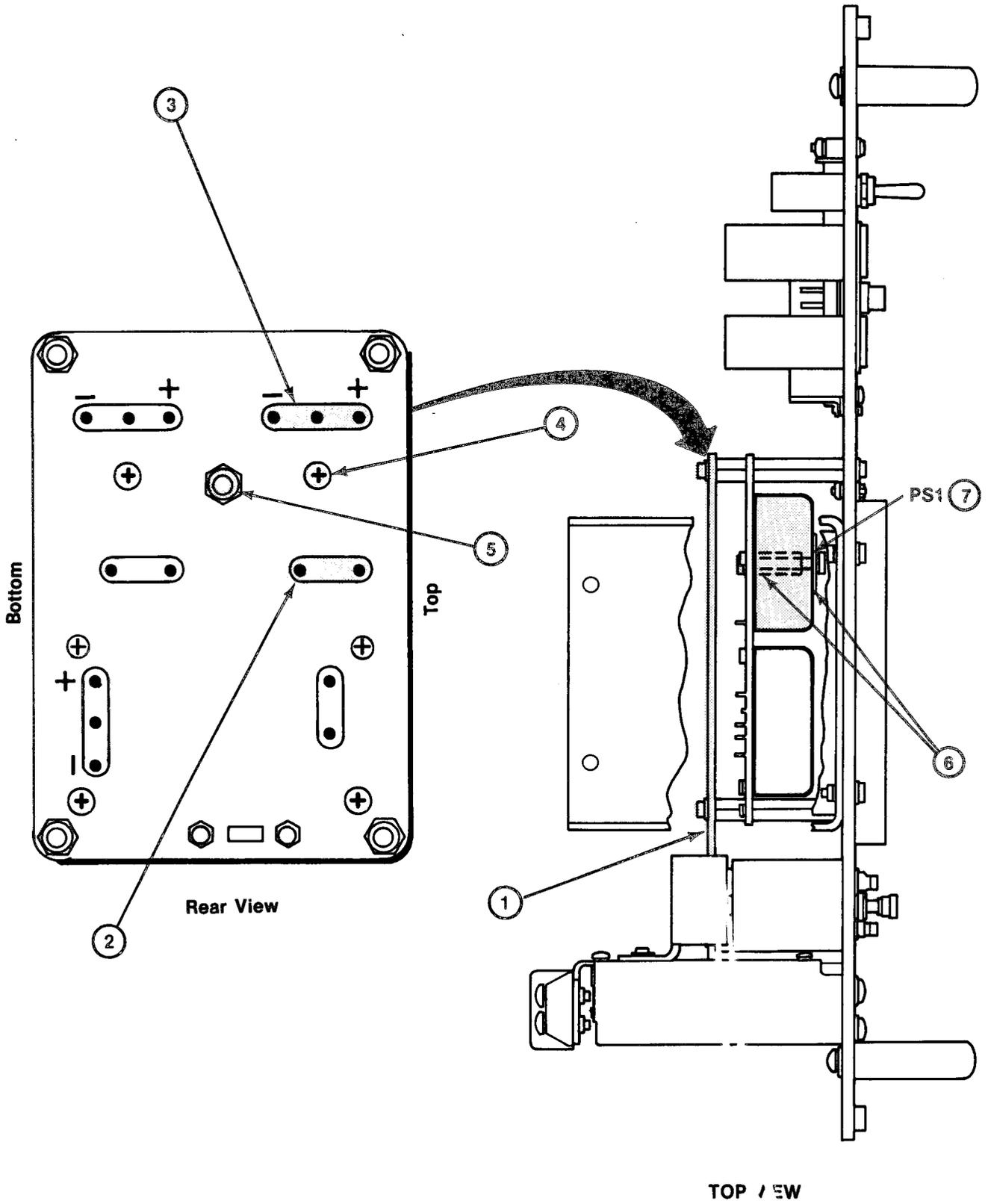
- a. Control Panel Assembly Power Supply 1A1PS1 (-15 Vdc). Remove Control Panel Assembly 1A1 from them in accordance with paragraph 3-32c and perform the following:

REMOVAL

- (1) Place the control panel in an upside down position on the test bench.
- (2) Remove caution plate (1) - four pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires (3) from Power Supply PS1.
- (4) Remove pan head screw and lockwasher (4) securing PS1 to power supply bracket.
- (5) Remove pan head screw, lockwasher and flat washer (5), securing the hold down bracket, between PS1 and PS3 (6).
- (5) Lower and remove PS1 (7) with the hold down bracket and post (6).

REPLACEMENT

- (1) Position replacement -15 Vdc Power Supply 1A1PS1 (7) and bracket and post (6) on control panel.
- (2) Fasten 1A1PS1 to power supply bracket, using pan head screw and lockwashers (4).
- (3) Fasten hold down bracket and post (6) to power supply bracket, using pan head screws, lockwasher and flat washer (5).
- (4) Solder 115 Vac input wires (2) and two output wires (3) to Power Supply PS1, observing dc polarity.
- (5) Install caution plate (1) with four pan head screws, lockwashers and flat washers.
- (6) Replace control panel in BTS according to paragraph 3-32d.



REPLACEMENT OF POWER SUPPLIES (Continued)

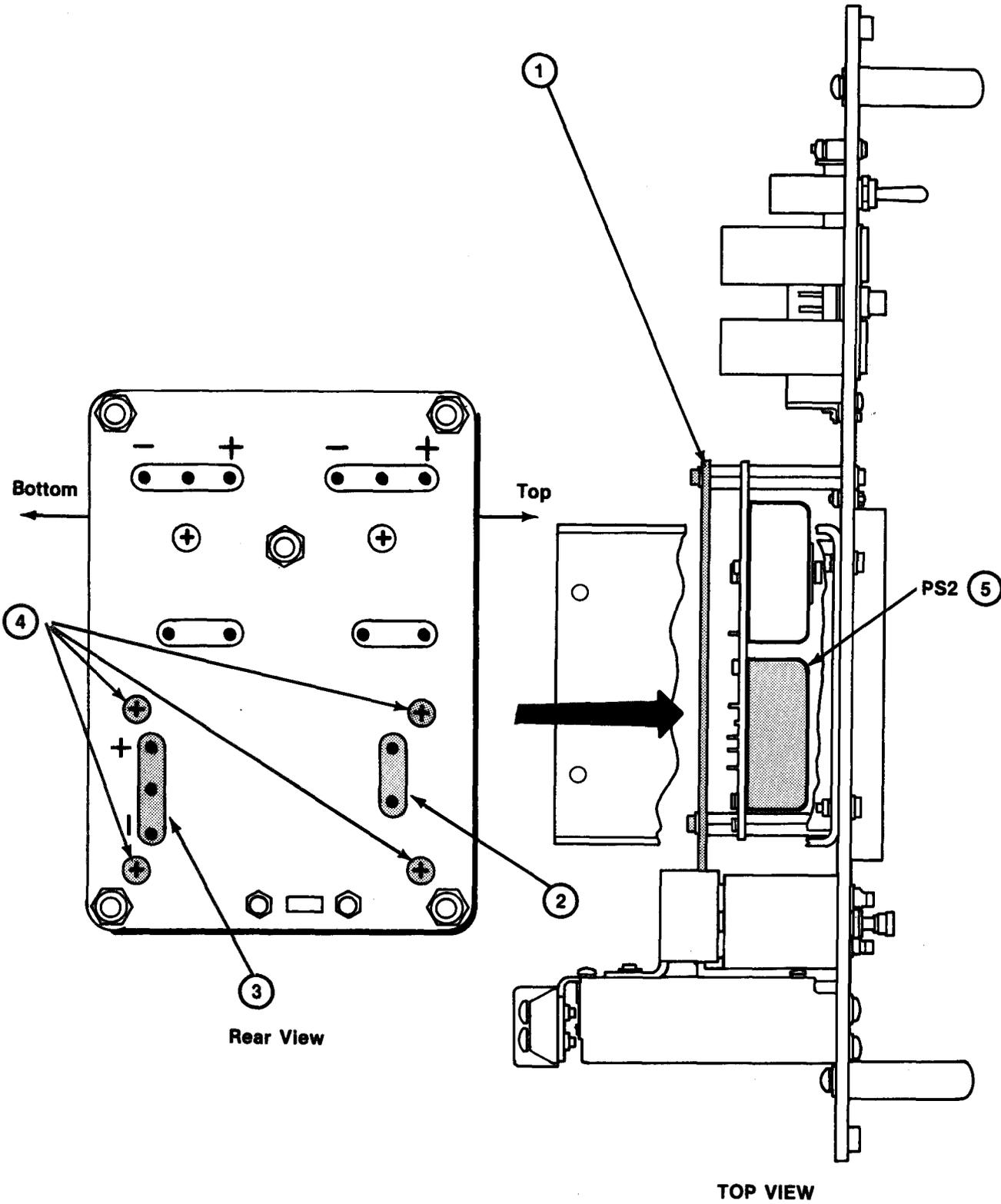
- b. Control Panel Assembly Power Supply 1A1PS2 (+15 Vdc). Remove Control Panel Assembly 1A1 from the BTS in accordance with paragraph 3-32c and perform the following:

REMOVAL

- (1) Place the control panel in an upside down position on the test bench.
- (2) Remove caution Plate (1) - four pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires **(3)** from Power Supply PS2.
- (4) Remove four pan head screws and lockwashers (4) securing PS2 to power supply bracket.
- (5) Lower and remove PS2 (5) from the control panel.

REPLACEMENT

- (1) Position replacement +15 Vdc Power Supply PS2 (5) on control panel.
- (2) Fasten PS2 to power supply bracket, using four pan head screws and lockwashers (4).
- (3) Solder 115 Vac input wires (2) and two output wires (3) to Power Supply PS2, observing dc polarity.
- (4) Install caution plate (1) with four pan head screws, lockwashers and flat washers.
- (5) Replace control panel in BTS according to paragraph 3-32d.



REPLACEMENT OF POWER SUPPLIES (Continued)

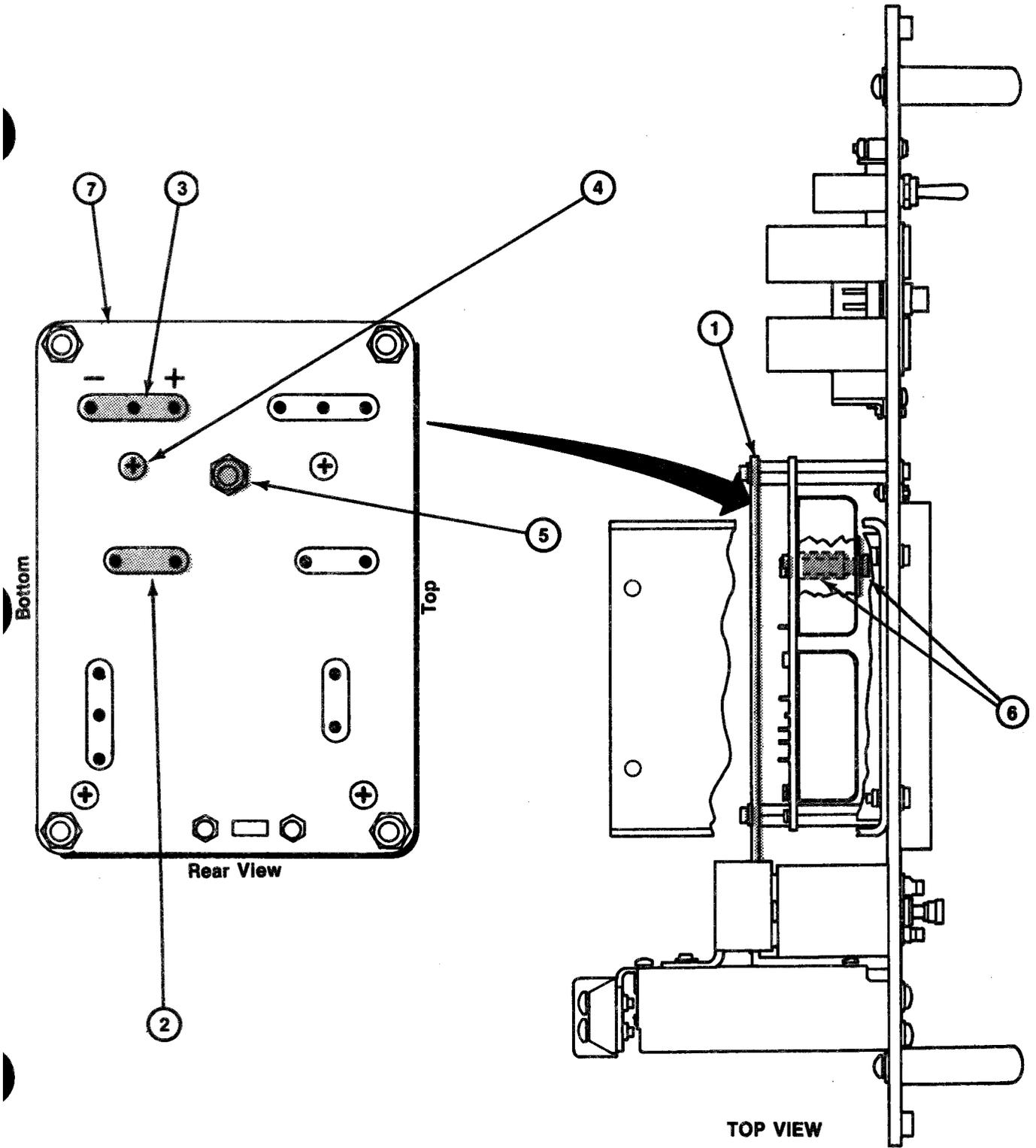
- c. Control Panel Assembly Power Supply 1A1PS3 (+10 Vdc). Remove Control Panel Assembly 1A1 from the BTS in accordance with paragraph 3-32B and perform the following:

REMOVAL

- (1) Place the control panel in an upside down position on the test bench.
- (2) Remove caution plate (1) - four pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires (3) from Power Supply PS3.
- (4) Remove pan head screw and lockwasher (4) securing PS3 to power supply bracket.
- (5) Remove pan head screw, lockwasher and flat washer (5) securing the hold down bracket between PS1 and PS3.
- (6) Lower and remove PS3 (7) with the hold down bracket and post (6).

REPLACEMENT

- (1) Position replacement +10 Vdc Power Supply 1A1PS3 (7) and bracket and post (6) on control panel.
- (2) Fasten PS3 to power supply bracket, using pan head screw and lockwasher (4).
- (3) Fasten hold down bracket and post (6) to power supply bracket, using pan head screw, lockwasher and flat washer (5).
- (4) Solder 115 Vac input wires (2) and two output wires (3) to Power Supply PS3, observing dc polarity.
- (5) Install caution plate (1) with four pan head screws, lockwashers and flat washers.
- (6) Replace control panel in BTS according to paragraph 3-32d.

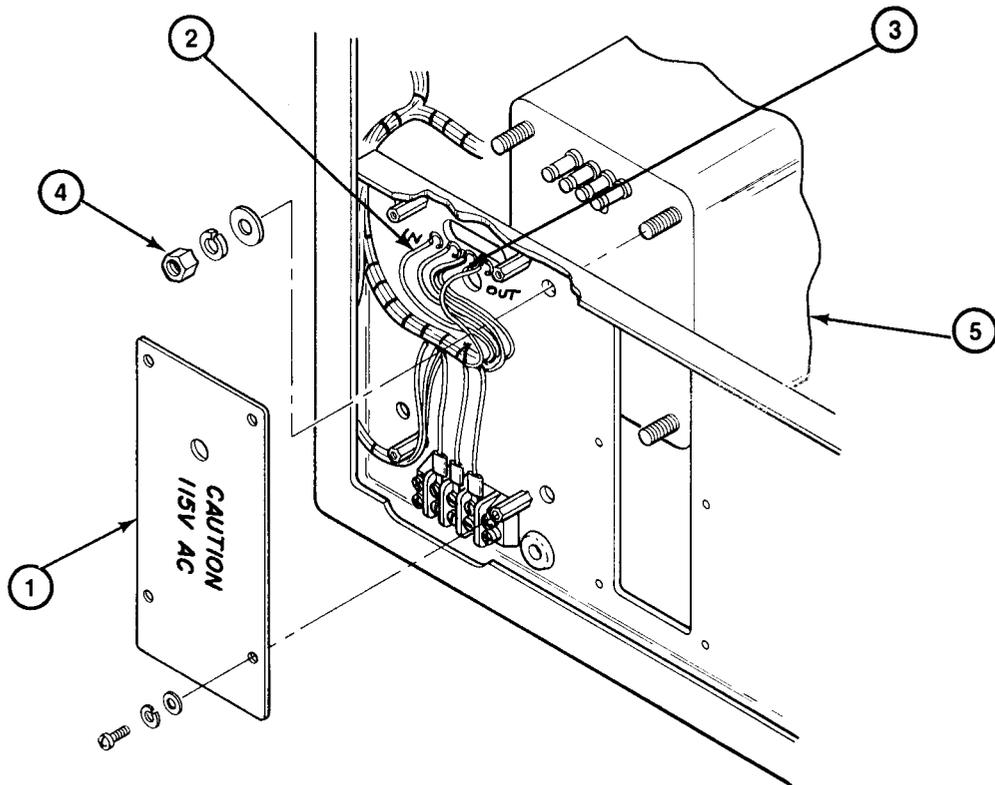


REPLACEMENT OF POWER SUPPLIES (Continued)

- d. Status Panel Assembly Power Supply 1A2PS1 (+12 Vdc). Remove status panel from in accordance with paragraph 3-32a and perform the following:

REMOVAL

- (1) Place the status panel in an upside down position on the test bench.
- (2) Remove caution plate (1) - four pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and two output wires (3) from Power Supply PS1.
- (4) Remove the hex nuts, lockwashers and flat washers (4) from the bottom side of the status panel to which the power supply is attached.
- (5) Lower and remove PS1 (5) from the status panel.



R E P L A C E M E N T

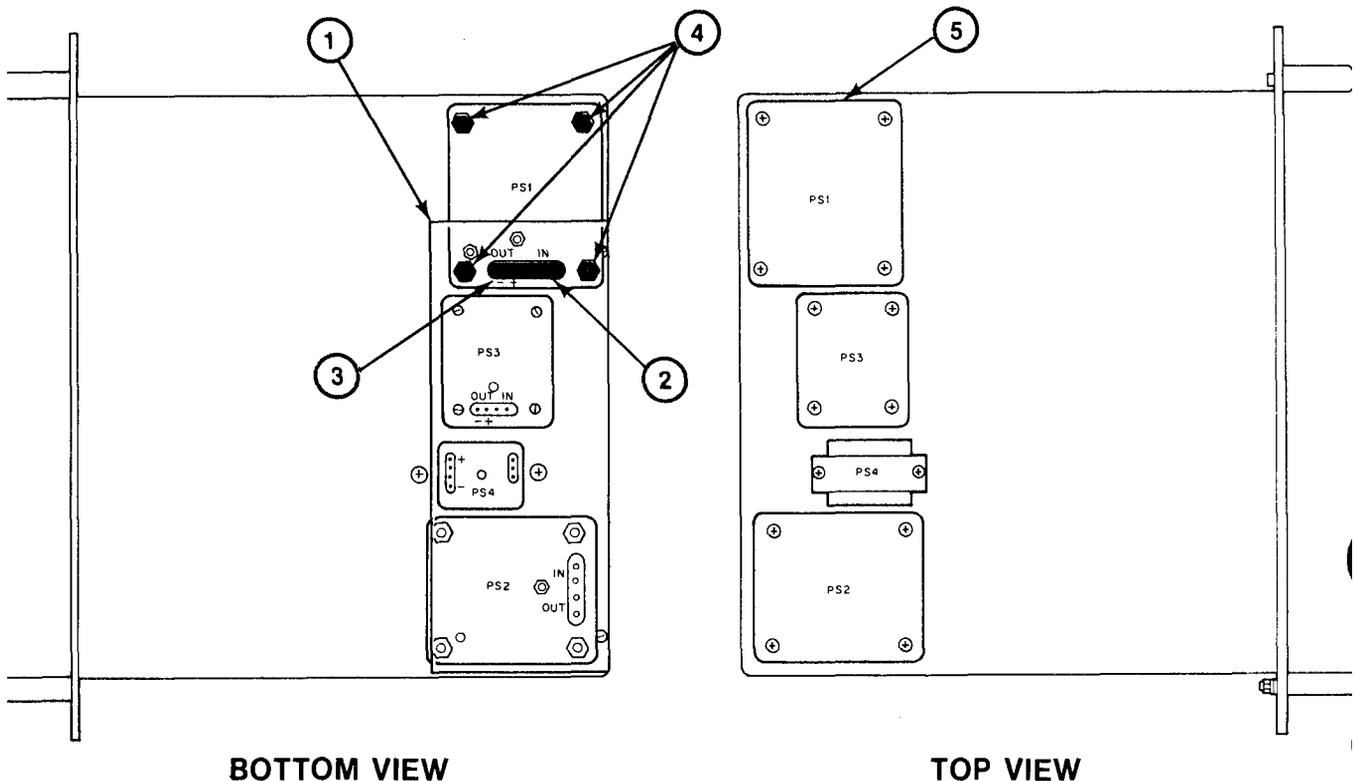
- (1) Position replacement Power Supply (5) in status panel.
- (2) Fasten power supply (5) to status panel, using four hex nuts, lockwashers and flat washers (4).
- (3) Solder 115 Vac input wires (2) and two output wires (3) to Power supply PSI.
- (4) Adjust +12 Vdc power supply as in paragraph 3-36.
- (5) Install caution plate (1), using four pan head screws, lockwashers, and flat washers.
- (6) Replace status panel in BTS as in paragraph 3-32b.

REPLACEMENT OF POWER SUPPLIES (Continued)

- e. RF Modulation Assembly Power Supply 1A3/1A4PS1 (+5 Vdc). Remove RF modulation assembly from in accordance with paragraph 3-32a.

REMOVAL

- (1) Place the RF modulation assembly in an upside down position on the test bench.
- (2) Remove caution plate (1) - five pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires (3) from power supply PS1.
- (4) Remove the hex nuts, lockwashers and flat washers (4) from the bottom side of the RF modulation assembly to which the power supply is attached.
- (5) Lower and remove PS1 (5) from the RF modulation assembly.



REPLACEMENT

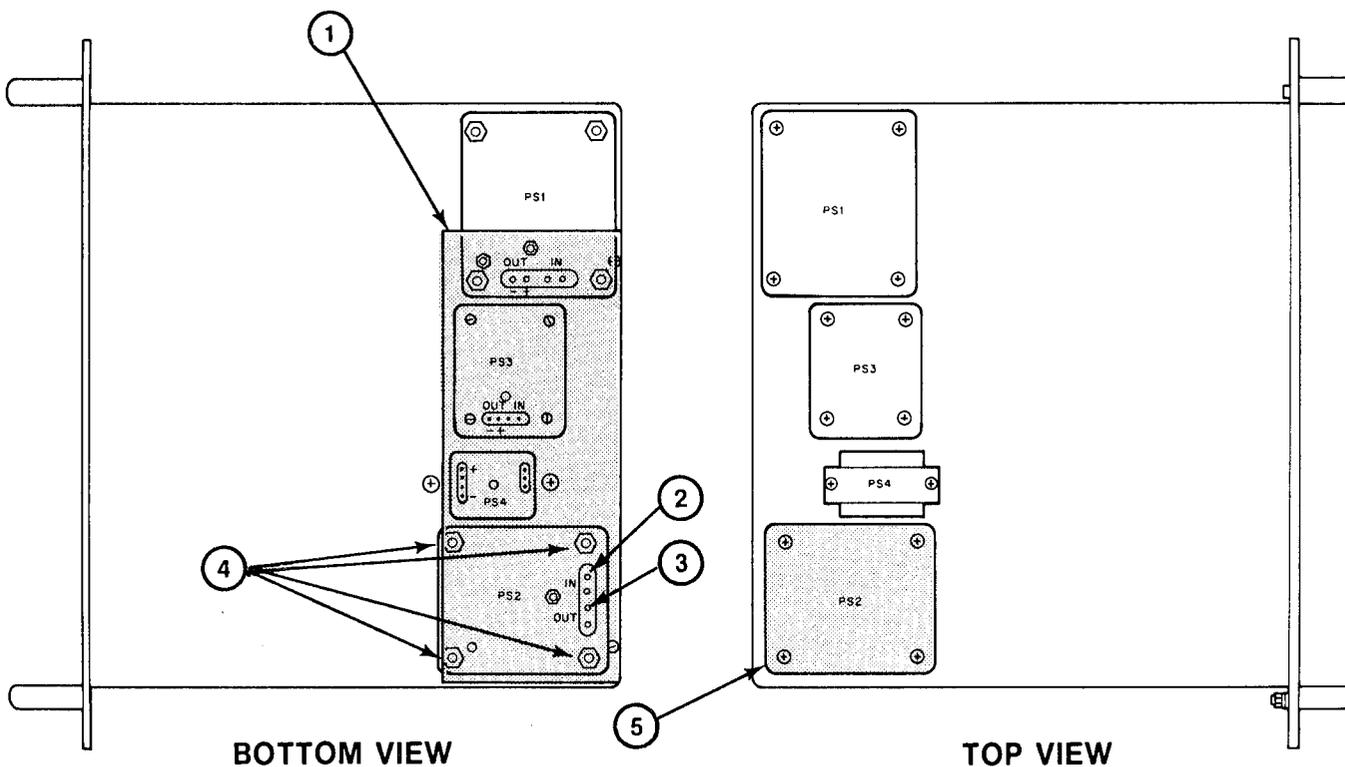
- (1) Position replacement Power supply PS1 (5) in RF modulation assembly.
- (2) Fasten Power Supply PS1 (5) to chassis, using four hex nuts, lockwashers and flat washers (4).
- (3) Solder 115 Vac input wires (2) and two output wires (3) to +5 Vdc power supply.
- (4) Adjust Power Supply PS1 as in paragraph 3-33.
- (5) Reinstall caution plate (1), using five pan head screws, lockwashers and flat washers.
- (6) Install RF modulation assembly in BTS as in paragraph 3-32b.

REPLACEMENT OF POWER SUPPLIES (Continued)

- f. RF Modulation Assembly 1A3/1A4PS2 (+15 Vdc). Remove RF modulation assembly from BTS in accordance with paragraph 3-32a.

REMOVAL

- (1) Place the RF modulation assembly in an upside down position on the test bench.
- (2) Remove caution plate (1) - five pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires (3) from Power Supply PS2.
- (4) Remove the hex nuts, lockwashers and flat washers (4) from the bottom side of the RF modulation assembly to which the power supply is attached.
- (5) Lower and remove PS2 (5) from the RF modulation assembly.



REPLACEMENT

- (1) Position replacement +15 Vdc Power Supply PS2 (5) in RF modulation assembly.
- (2) Fasten power supply PS2 (5) to chassis, using four hex nuts, lockwashers and flat washers (4).
- (3) Solder 115 Vac input wires (2) and two output wires (3) to power supply PS2.
- (4) Adjust +15 Vdc power supply as in paragraph 3-34.
- (5) Reinstall caution plate (1), using five pan head screws, lockwashers and flat washers.
- (6) Install RF modulation assembly in BTS as in paragraph 3-32b.

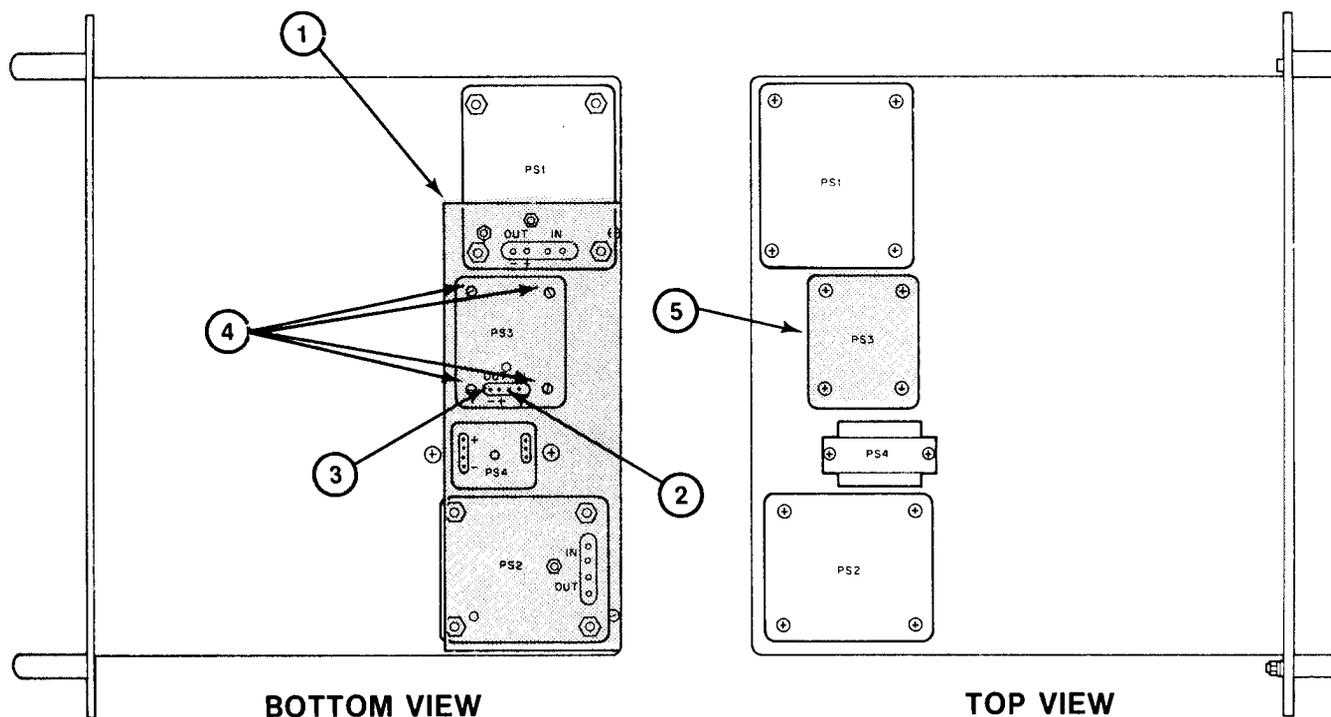
TM 11-6625-2884-30/NAVAIR 16-35TS3615-2

REPLACEMENT OF POWER SUPPLIES (Continued)

- g. RF Modulation Assembly 1A3/1A4 PS3 (-65 Vdc). Remove RF modulation assembly from BTS in accordance with paragraph 3-32a.

REMOVAL

- (1) Place the RF modulation assembly in an upside down position on the test bench.
- (2) Remove caution plate (1) - five pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires (3) from Power Supply 1A3/1A4 PS3.
- (4) Remove the hex nuts, lockwashers and flat washers (4) from the bottom side of the RF modulation assembly to which the power supply is attached.
- (5) Lower and remove 1A3/1A4 PS3 (5) from the RF modulation assembly.



REPLACEMENT

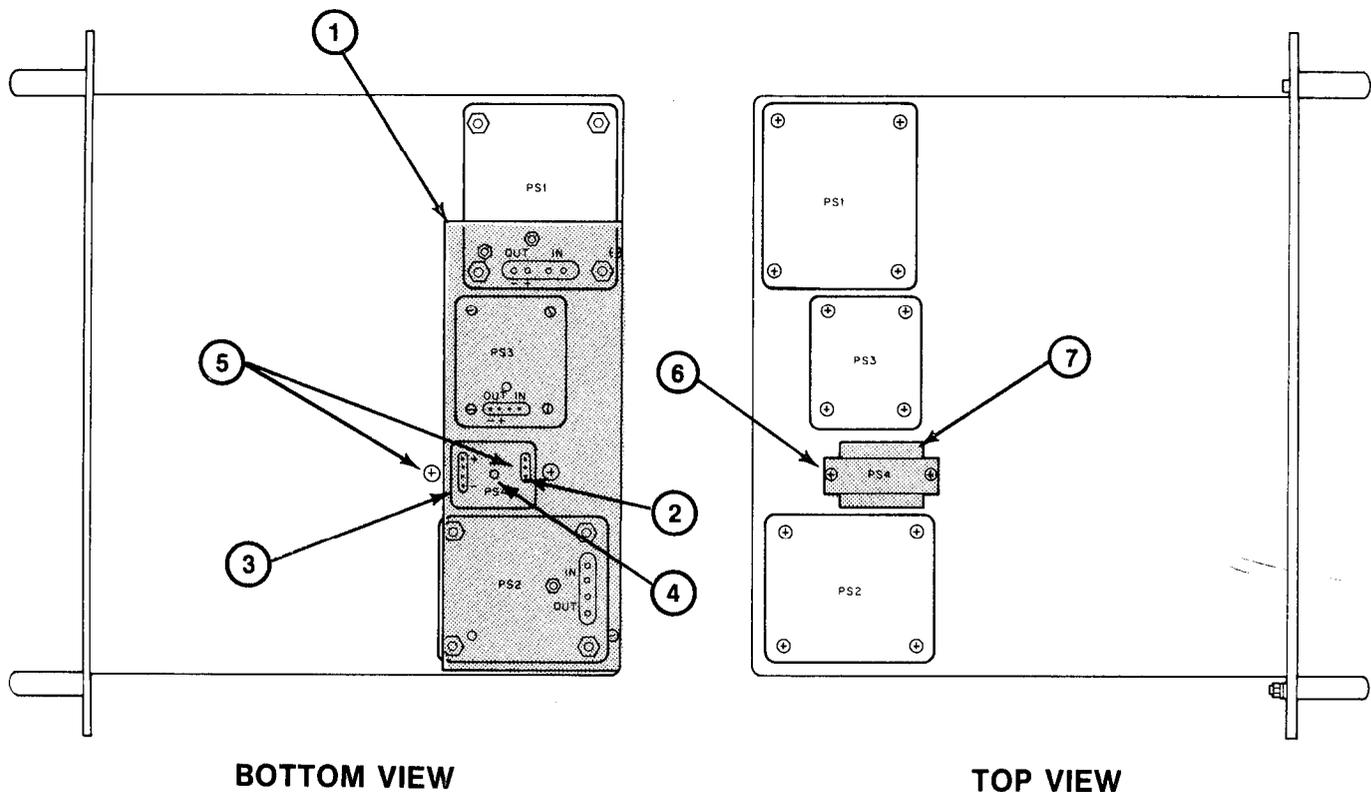
- (1) Position replacement -65 Vdc Power Supply PS3 (5) in RF modulation assembly.
- (2) Fasten -65 Vdc power supply (5) to chassis, using four hex nuts, lockwashers and flat washers (4).
- (3) Solder 115 Vac input wires (2) and two output wires (3) to -65 Vdc power supply.
- (4) Adjust -65 Vdc power supply as in paragraph 3-35.
- (5) Reinstall caution Plate (1), using five pan head screws, lockwashers and flat washers.
- (6) Install RF modulation assembly in BTS as in paragraph 3-32b.

REPLACEMENT OF POWER SUPPLIES (Continued)

- h. RF Modulation Assembly 1A3/1A4 PS4 (-15 Vdc). Remove RF modulation assembly from BTS in accordance with paragraph 3-32a.

REMOVAL

- (1) Place the RF modulation assembly in an upside down position on the test bench.
- (2) Remove caution plate (1) - five pan head screws, lockwashers and flat washers.
- (3) Tag and unsolder the 115 Vac input wires (2) and the two output wires (3) from Power Supply PS4.
- (4) Remove pan head screw and lockwasher (4) securing PS4 to the RF modulation assembly chassis.
- (5) Remove the pan head screws, lockwashers and flat washers (5) securing the hold down bracket (6) to the RF modulation assembly.
- (6) Lower and remove PS4 (7) with the hold down bracket and two standoff posts.



REPLACEMENT

- (1) Position replacement -15 V dc Power Supply PS4 (7) and bracket (6) on RF modulation assembly.
- (2) Fasten PS4 to power supply bracket, using pan head screw and lock-washers (4).
- (3) Fasten hold down bracket (6) to RF modulation assembly, using pan head screw and lockwasher (4).
- (4) Solder 115 Vac input wires (2) and two output wires (3) to Power Supply PS4, observing dc polarity.
- (5) Reinstall caution plate (1), with five pan head screws, lock-washers and flat washers.
- (6) Replace RF modulation assembly in BTS as in paragraph 3-32b.

REPLACEMENT OF PRINTED CIRCUIT BOARDS

3-38. Replace either or both printed circuit boards in 1A3 or 1A4,

CCA, Pulse Generator 1A3/1A4-A1

CCA, CS and Pulse Control 1A3/1A4-A2

as follows.

REMOVAL

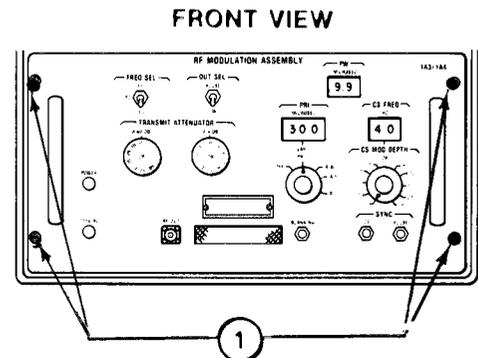
- a. Perform the following steps.

CAUTION

Disconnect all cables from rear of unit before retracting it from case.

- (1) Disconnect cables from rear of 1A3/1A4 as follows:

<u>Cable</u>	<u>From</u> <u>1A3</u>	<u>Cable</u>	<u>From</u> <u>1A4</u>	
1A3 Power		1A4 Power		from 1J7
1W2	J2	1W3	J2	
1W4	J9	1W5	J9	
Groundwire E1		Groundwire E1		

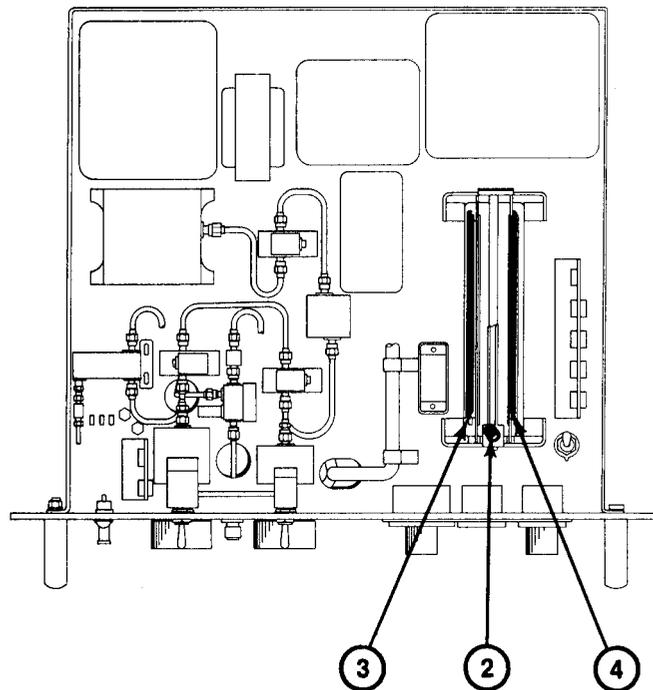


REPLACEMENT OF PRINTED CIRCUIT BOARDS (Continued)

REMOVAL (Continued)

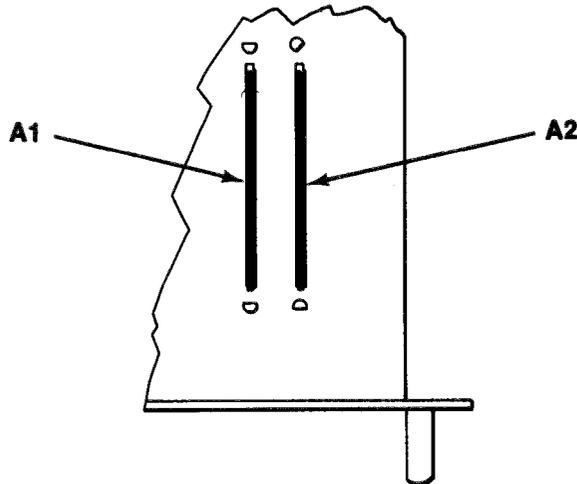
- (2) Loosen four captive screws (1) on the front of RF Modulation Assembly 1A3/1A4 and retract from the BTS cabinet.
- (3) Using a screwdriver, rotate the captive screw (2) counterclockwise until free and rotate lid of enclosure to the rear. Both circuit cards are now ready for removal.
- (4) Grasp circuit card 1A3/1A4-A1 (3) or 1A3/1A4-A2 (4) and pull circuit card directly out of jack.

TOP VIEW



REPLACEMENT

- b. Perform the following steps.
1. Loosen captive screw (2) and lift enclosure lid for access.
 2. Identify circuit card by part number, and locate its chassis connector.
 3. Orient circuit card so its connector polarizing pins match holes at ends of chassis connector.
 4. Slide circuit card into card guides and push to chassis connector.
 5. Be sure polarizing pins enter matching holes, then seat circuit card fully in chassis connector.
 6. Pull enclosure lid forward over circuit cards, and fasten with captive screw (2).

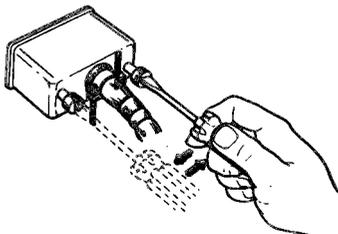


REPLACEMENT OF CONTROL INDICATOR 1A1A1

3-39. To replace Control Indicator 1A1A1, remove the front and rear covers of the BTS and perform the following steps.

C A U T I O N

When connecting or disconnecting jackscrew connectors:



- Turn one screw one turn.
- Turn other screw one turn.
- Repeat alternate turning of screws.
- Do not use excessive torque.

Turning one screw too far or using excessive torque may crack connector body or strip screw thread.

REPLACEMENT OF CONTROL INDICATOR 1A1A1 (Continued)

REMOVAL

- a. Disconnect air hose and all connectors from BTS:

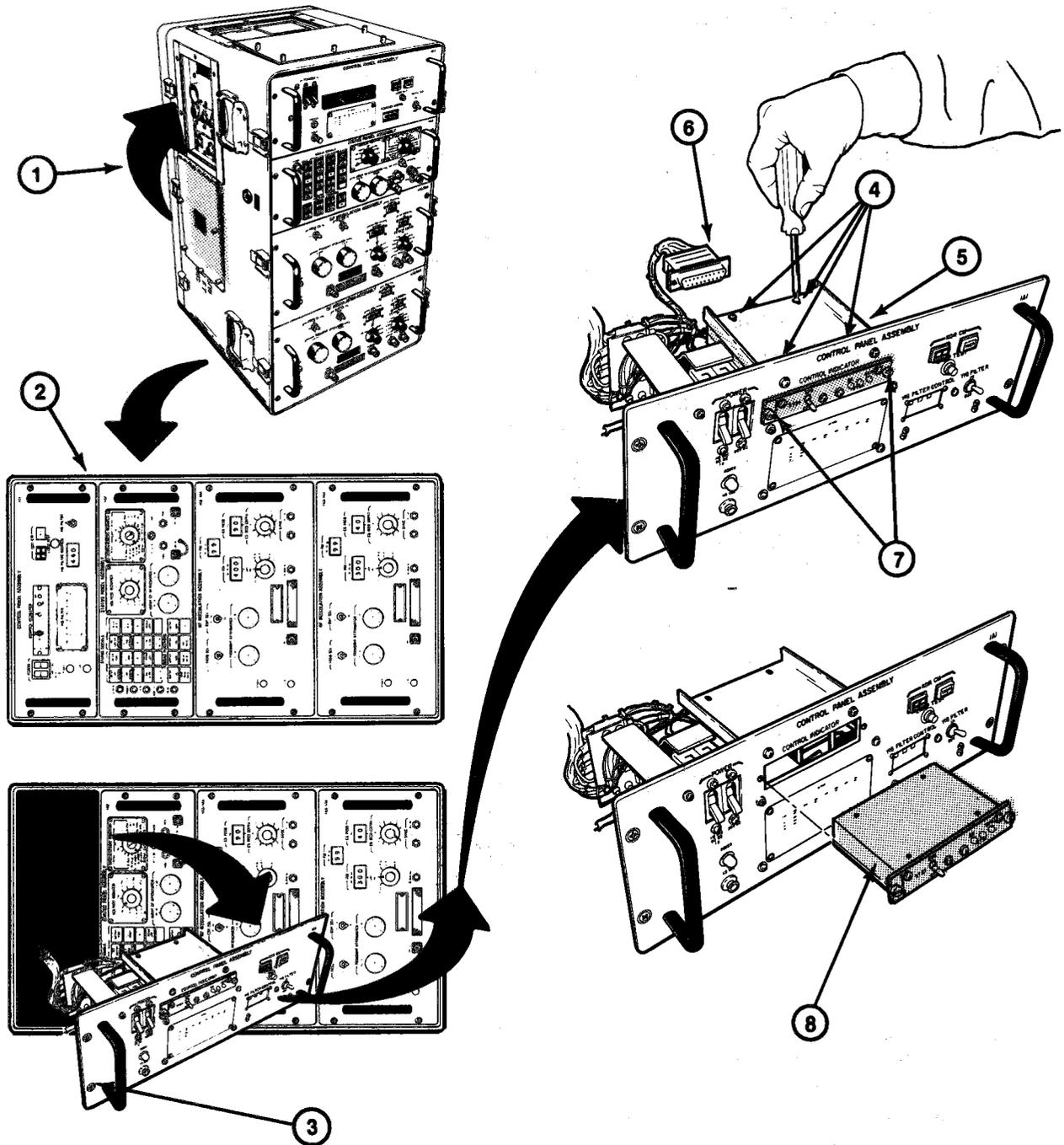
CABLE DESIGNATION	JACK NOMENCLATURE AND NUMBER
W1	Monitor J1
W2	Control J2
W3	28V Power J3
W5	CMBD RF J4
W6	115V 60 Hz J5
W7	28 VDC J6
Air Duct	Not designated (located near top of panel)

- b. Close hinged cover (1) over BTS side connector panel.
- c. Lay BTS down (2) on hinged cover side.
- d. Loosen four screws holding Control Panel Assembly 1A1 to BTS.

C A U T I O N

Control Panel Assembly 1A1 is wired to the BTS. Be careful not to pull or twist wires while handling 1A1.

- e. Pull Control Panel Assembly 1A1 forward. Rotate 1A1 and set it in front of BTS (3).
- f. Remove four Phillips head screws and washers (4) from control indicator gusset (5).
- g. Remove connector (6) from rear of Control Indicator 1A1A1.
- h. On front of 1A1A1 turn two fasteners (7) to left.
- i. Pull 1A1A1 forward and out of control panel assembly.



REPLACEMENT OF CONTROL INDICATOR 1A1A1 (Continued)

REPLACEMENT

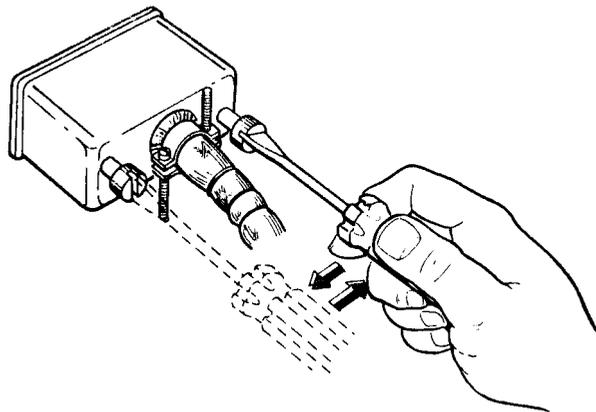
- a. Push replacement Control Indicator 1A1A1 (1) into opening in control panel assembly.
- b. Fasten control indicator to panel by turning fasteners (2) clockwise.
- c. Connect plug (3) to rear of control indicator.

C A U T I O N

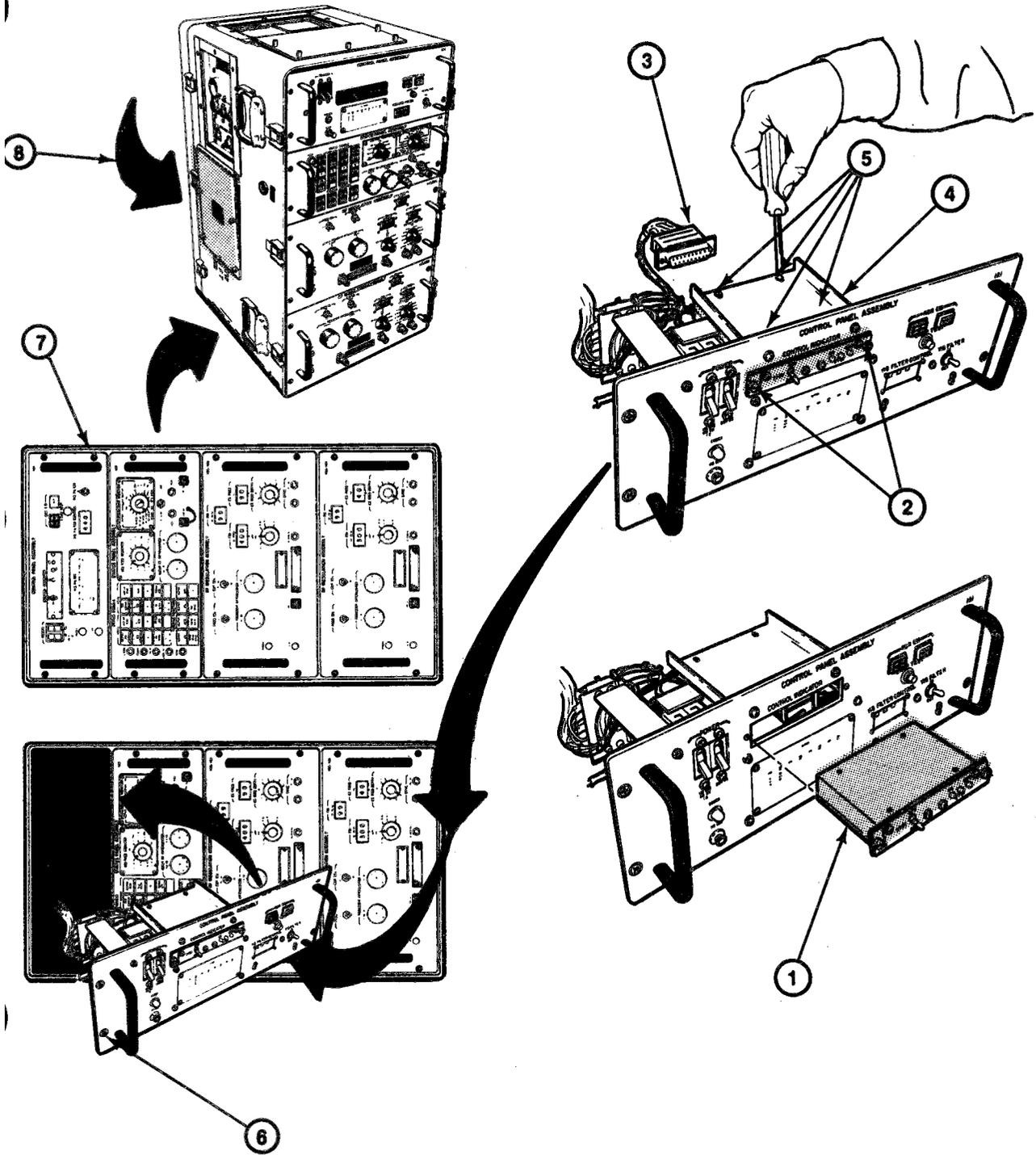
When connecting or disconnecting jackscrew connectors:

- Turn one screw one turn.
- Turn other screw one turn.
- Repeat alternate turning of screws.
- Do not use excessive torque.

Turning one screw too far or using excessive torque may crack connector body or strip screw thread.



- d. Fasten control indicator to gusset (4) with four Phillips head screws and washers (5).
- e. Replace Control Panel Assembly 1A1 in BTS. Fasten with four captive screws (6).
- f. Set BTS (7) erect, and open hinged cover (8).

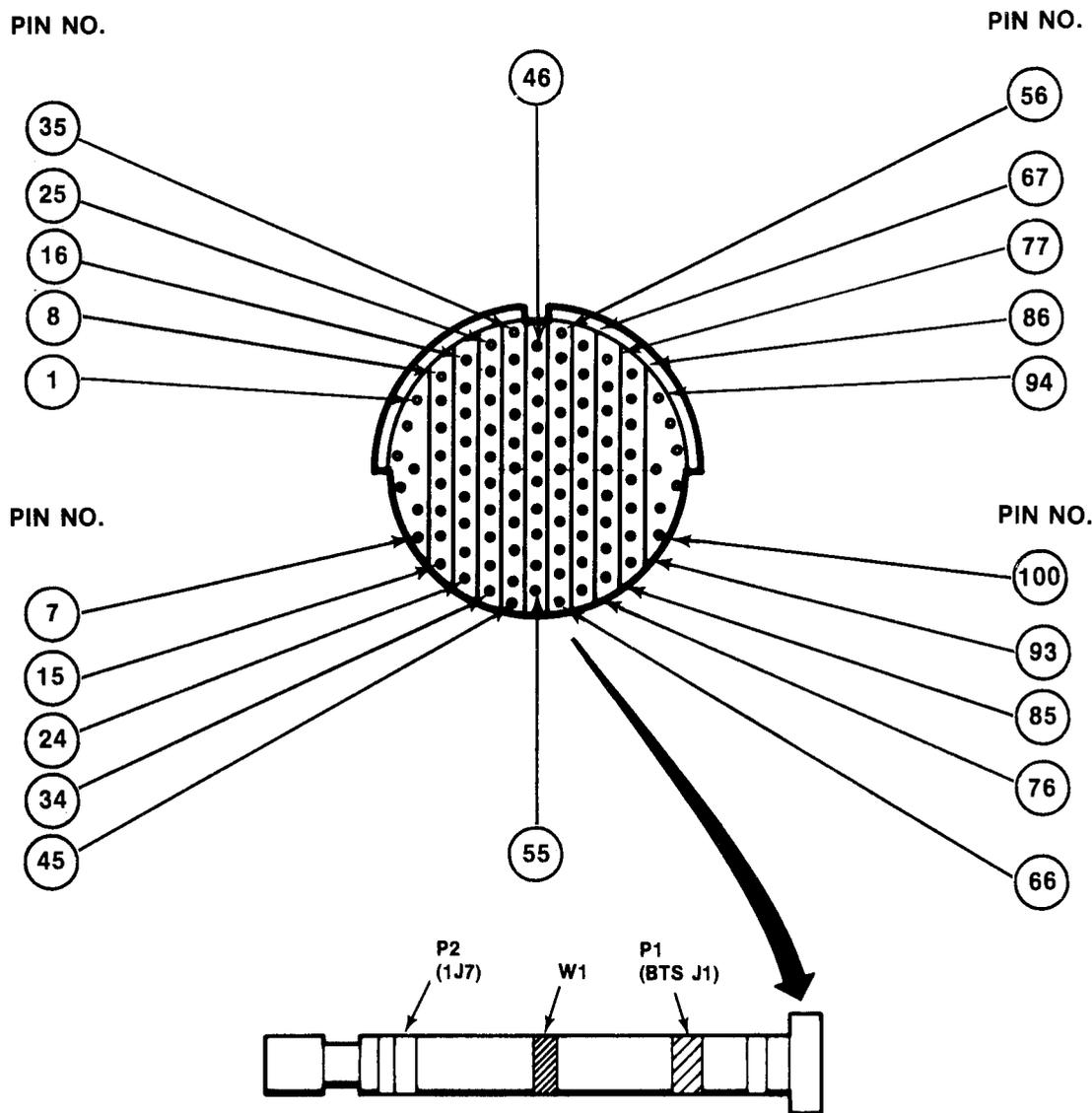


CABLE REPAIRS

3-40. Minor cable repair (broken wires at connectors or connector replacement) may be performed as directed in TM 55-1500-323-25. It is more cost effective to replace a cable which requires major repairs. The following illustrations and text will assist You in checking out and performing minor cable repairs. The cables that will be covered are:

- W1 - CM Set Control and Status
- W2 -Control
- W3 - Power
- W4 -RF Coax
- W5 - RF Coax
- W6 - Input Power 115V, 60 Hz
- W7 - Input Power 28 Vdc
- W8 - Blanking
- W9 - Voltage Monitor
- W10 - Oscilloscope Monitor
- W11 - FLTS Control Status and Power

a. BTS Cable W1 - Interconnects BTS monitor jack J1 with LRU-1 test jack 1J7.



BTS CABLE W1 WIRE LIST

WI RE		FROM	TO	CI RCUI T FUNCTI ON
AWG	COLOR			
22	WHI TE	P1-1	P2-1	OGLC1M
22	WHI TE	P1-2	P2-2	OSCLK1M
22	WHI TE	P1-3	P2-3	OGLCM2M
22	WHI TE	P1-4	P2-4	ODSLK2M
22	WHI TE	P 1 - 5	P2-5	OGSLL1M
22	WHI TE	P1-6	P2-6	OLSLQ1M
22	WHI TE	P1-7	P2-7	OGSLL2M
22	WHI TE	P1-8	P2-8	OLSLQ2M
22	WHI TE	P1-9	P2-9	OCSGC1M
22	WHI TE	P1-10	P2-10	OS18M
22	WHI TE	P1-11	P2-11	ODSGC2M
22	WHI TE	P1-12	P2-12	OS28M
22	WHI TE	P1-13	P2-13	OEC SR1M
22	WHI TE	P1-14	P2-14	OG1RJM
22	WHI TE	P1-15	P2-15	OCESR2M
22	WHI TE	P1-16	P2-16	OG2RJM
22	WHI TE	P1-17	P2-17	OLSL1AM
22	WHI TE	P1-18	P2-18	(Spare 1)
22	WHI TE	P1-19	P2-19	OLSL2AM
22	WHI TE	P1-20	P2-20	(Spare 2)
22	WHI TE	P1-21	P2-21	OMFS1LC
22	WHI TE	P1-22	P2-22	OMFS1LO

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CABLE REPAIRS (Continued)

BTS CABLE W1 WIRE LIST (Continued)

WIRE		FROM	TO	CIRCUIT FUNCTION
AWG	COLOR			
22	WHITE	P1-23	P2-23	OMFS2LC
22	WHITE	P1-24	P2-24	OMFS2LO
22	WHITE	P1-25	P2-25	OMFOD
22	WHITE	P1-26	P2-26	OMFAVN
22	WHITE	P1-27	P2-27	OMFSM3
22	WHITE	P1-28	P2-28	OMFVCP
22	WHITE	P1-29	P2-29	OMSYSRS
TP {	24	WHITE	P1-35	OES11GM
	24	BLACK	P1-36	
TP {	24	WHITE	P1-37	OCST1M
	24	BLACK	P1-38	
TP {	24	WHITE	P1-39	OCTGC1M
	24	BLACK	P1-40	
TP {	24	WHITE	P1-41	OGS3K1M
	24	BLACK	P1-42	
TP {	24	WHITE	P1-43	OGPULVM
	24	BLACK	P1-44	
TP {	24	WHITE	P1-46	OESY2M
	24	BLACK	P1-47	
TP {	24	WHITE	P1-48	OESY1M
	24	BLANK	P1-49	
TP {	24	WHITE	P1-50	OGSBK2M
	24	BLACK	P1-51	

WIRE		FROM	TO	CIRCUIT FUNCTION	
AWG	COLOR				
TP {	24	WHITE	P1-52	P2-52	ODTGC2M
	24	BLACK	P1-53	P2-53	
TP {	24	WHITE	P1-54	P2-54	ODSTP2M
	24	BLACK	P1-55	P2-55	
TP {	24	WHITE	P1-45	P2-45	OES21GM
	24	BLACK	P1-34	P2-34	
	RG-179 B/U	P1-56	P2-56	AGLMDRM	
	SHIELD	P1-67	P2-67		
	RG-179B/U	P1-57	P2-57	AALVM	
	SHIELD	P1-68	P2-68		
	RG-179 B/U	P1-58	P2-58	AGTHLEVM	
	SHIELD	P1-69	P2-69		
	RG-179 B/U	P1-59	P2-59	ALVC02M	
	SHIELD	P1-70	P2-70		
	RG-179 B/U	P1-60	P2-60	ALVC01M	
	SHIELD	P1-71	P2-71		
TPSH {	24	WHITE	P1-61	P2-61	OALMTVM
	24	BLACK	P1-62	P2-62	
		SHIELD	P1-72	P2-72	
22	BLACK	P1-64	P2-64	GND	
		P1-65		SPARE	
		P1-66		SPARE	

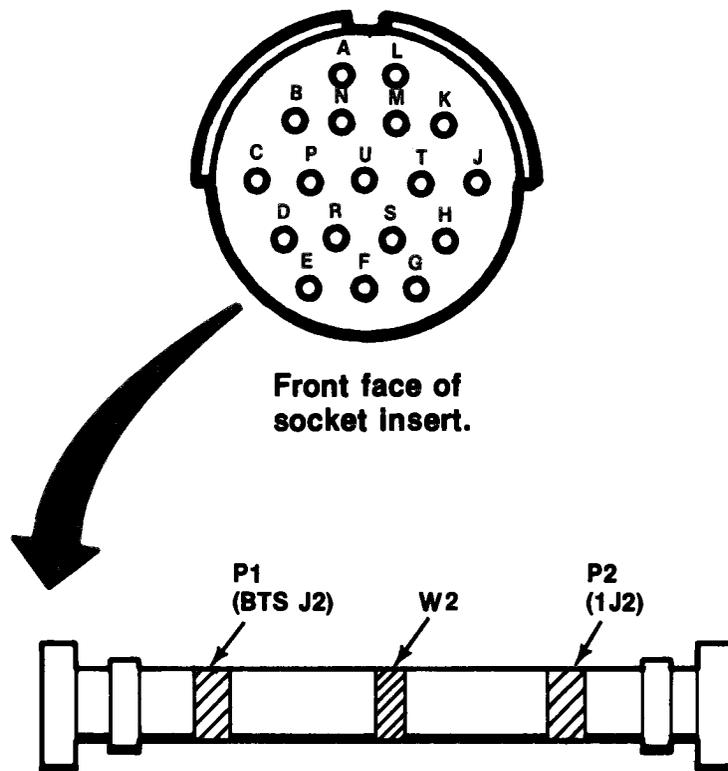
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CABLE REPAIRS (Continued)

BTS CABLE W1 WIRE LIST (Continued)

WIRE		FROM	TO	CIRCUIT FUNCTION
AWG	COLOR			
22	ORANGE	P1-75		SPARE
		P1-75	P2-75	SPARE
		P1-76	P2-76	SPARE
		P1-83	P2-83	+28v
		P1-84		SPARE
		P1-85		SPARE
		P1-91		SPARE
		P1-92		SPARE
		P1-93		SPARE
22	WHITE	P1-77	P2-77	+5V Logic
22	WHITE	P1-78	P2-78	+5V
22	WHITE	P1-79	P2-79	-5.2V
22	WHITE	P1-80	P2-80	+10V
22	WHITE	P1-86	P2-86	-10V
22	WHITE	P1-87	P2-87	+15V
22	WHITE	P1-88	P2-88	-15V
22	WHITE	P1-89	P2-89	-65V

- b. BTS Cable W2. Interconnects BTS Control 1J2 with LRU-1 Control 1J2.

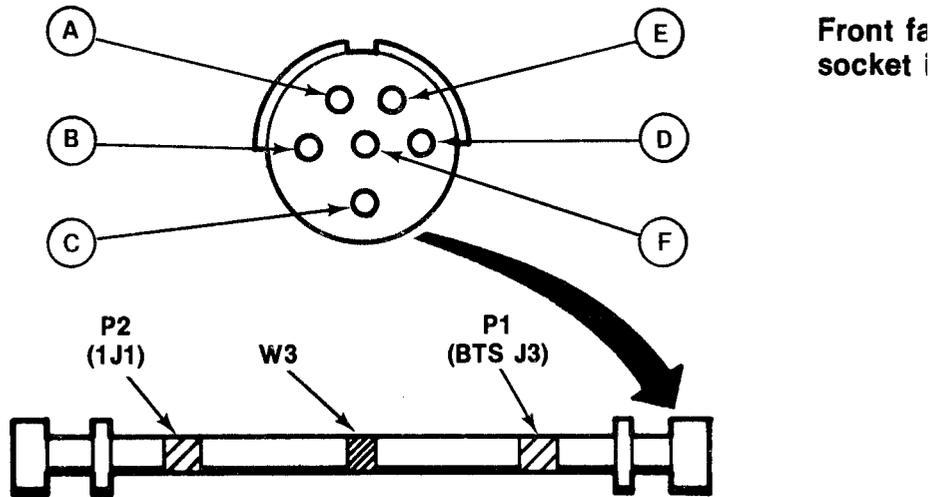


BTS CABLE W2 WIRE LIST

AWG	COLOR	FROM	TO	CIRCUIT FUNCTION
22	BLACK	P1-A	P2-A	GQP28ST
22	BLACK	P1-B	P2-B	GQP28ST
22	WHITE	P1-C	P2-C	DSPWCM
22	WHITE	P1-D	P2-D	DQTDOPR
22	WHITE	P1-E	P2-E	DSSWTHO
22	WHITE	P1-F	P2-F	DQCBR
22	WHITE	P1-G	P2-G	OVPTFLT
22	WHITE	P1-H	P2-H	IYJAM
22	WHITE	P1-J	P2-J	ODSTINT
22	WHITE	P1-K	P2-K	DSSWTHS
22	WHITE	P1-L	P2-L	DYFAL
22	WHITE	P1-M	P2-M	DYTOK
22	WHITE	P1-N	P2-N	DYTONB
20	WHITE	P1-P	P2-P	SPARE
22	WHITE	P1-R	P2-R	SPARE

CABLE REPAIRS (Continued)

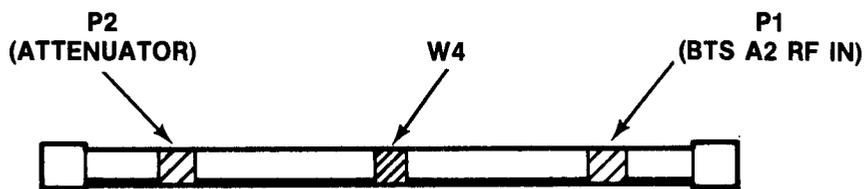
- c. BTS Cable W3. Interconnects BTS +28 Vdc Power 1J3 to LRU-1 Power 1J1.



BTS CABLE W3 WIRE LIST

WIRE		FROM	TO	CIRCUIT FUNCTION
AWG	COLOR			
12	ORANGE	P1-A	P2-A	+28V
12	RED	P1-B	P2-B	+28V
12	BLACK	P1-D	P2-D	28V RET
12	WHITE	P1-E	P2-E	28V RET
12	GREEN	P1-F	P2-F	GND

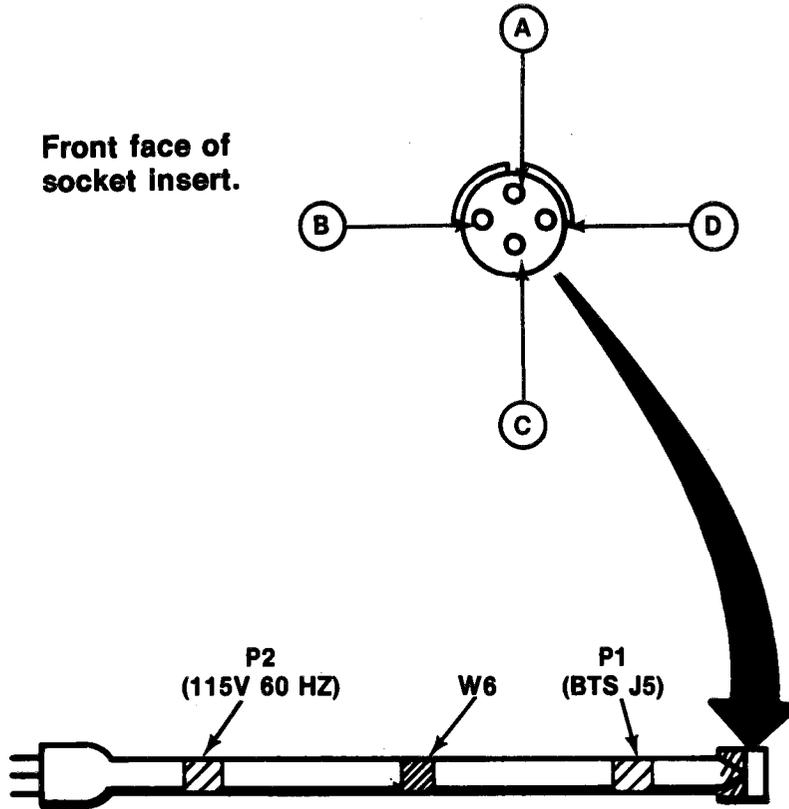
- d. BTS Cable W4. Interconnects BTS Status Panel RF IN jack 1A2J2 to LRU-1 RF OUT jack 1A1J4 (via a 30 dB attenuator). Used to sample the RF output of LRU-1 under test.



- e. BTS Cable W5 - Interconnects either the BTS CMBD RF jack 1J4 or the BTS RF OUT 1A3/1A4 J1 to LRU-1 RF IN 1J3. Used to supply CW or pulse and pattern modulated RF to LRU-1 under test.



- f. BTS Cable W6. Interconnects BTS 115V - 60 Hz Input Power to the AC Power Source.

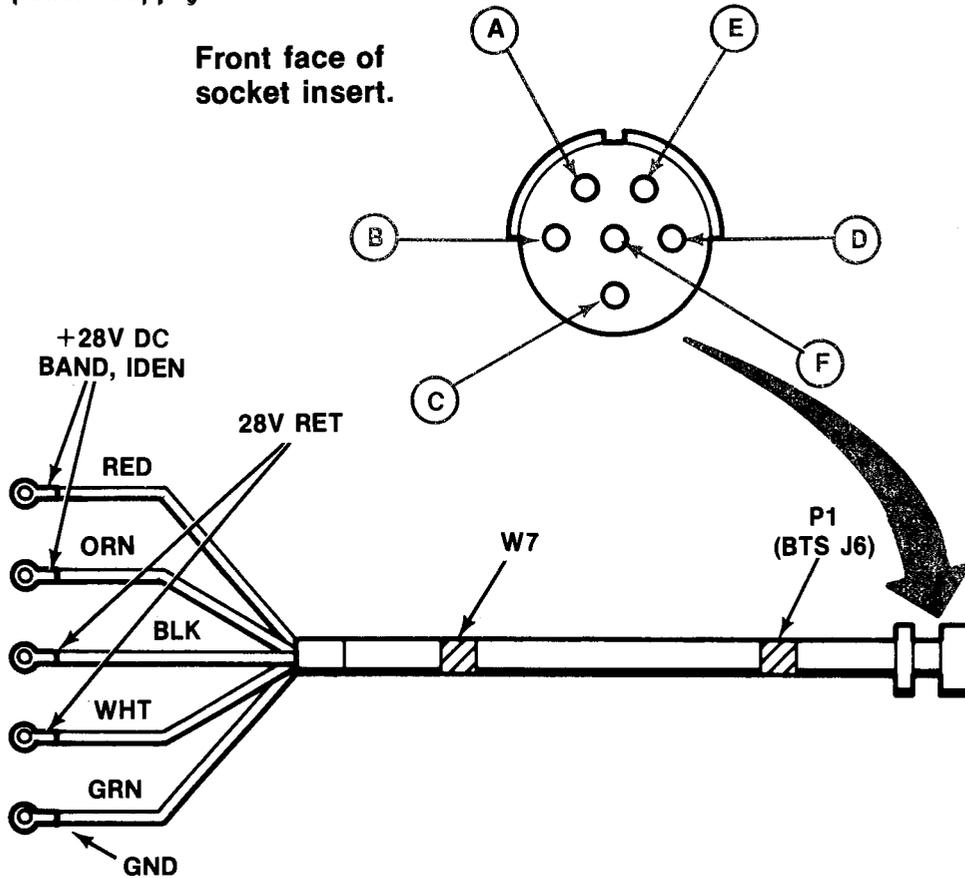


BTS CABLE W6 WIRE LIST

WIRE		CIRCUIT FUNCTION	
AWG	COLOR		
16	BLACK		
16	WHITE	P1-B	AC NEUT
16	GREEN	P1-c	GND

CABLE REPAIRS (Continued)

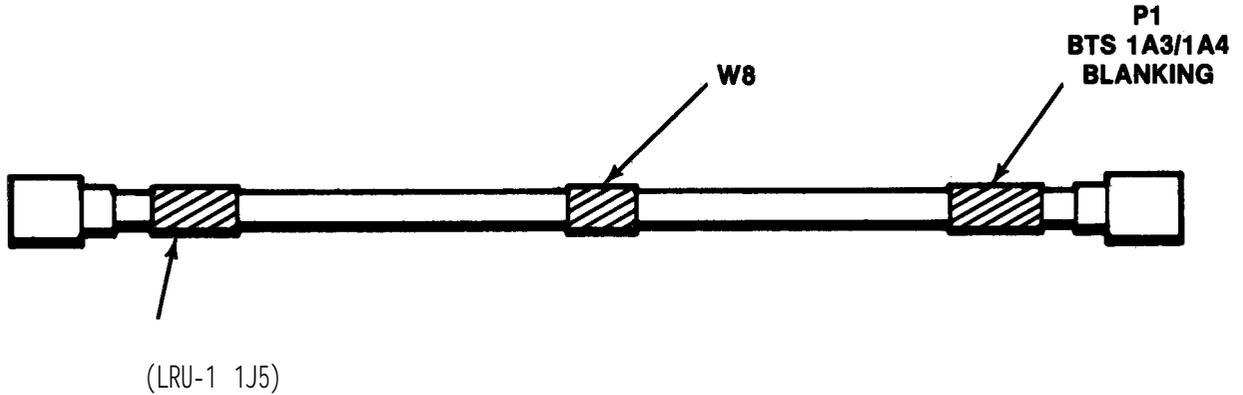
- g. BTS Cable W7 - Interconnects BTS 28 VDC input power to the 28 Volt power supply.



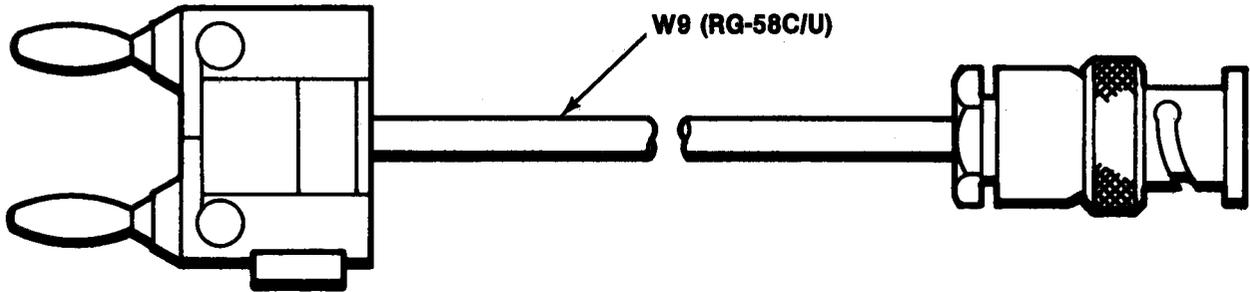
BTS CABLE W7 WIRE LIST

WI RE		FROM	CI RCUI T FUNCTI ON
AWG	COLOR		
12	ORANGE	P1-A	+28V
12	RED	P1-B	+28V
12	BLACK	P1-D	28V RET
12	WHI TE	P1-E	28V RET
12	GREEN	P1-F	GND

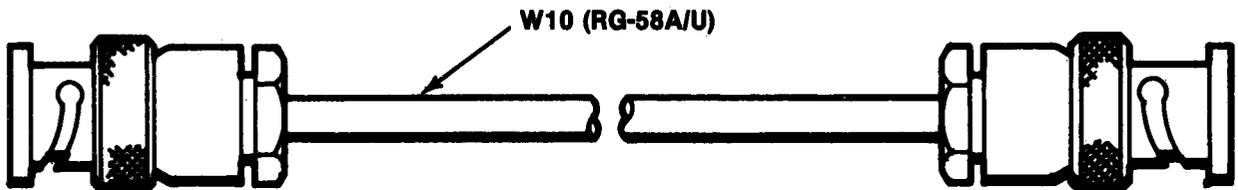
- h. BTS Cable W8 - Interconnects BTS BLANKING 1A3/1A4 to LRU-1 BLKG IN.



- i. BTS Cable W9 - Interconnects BTS Status Panel V MON to digital multimeter.

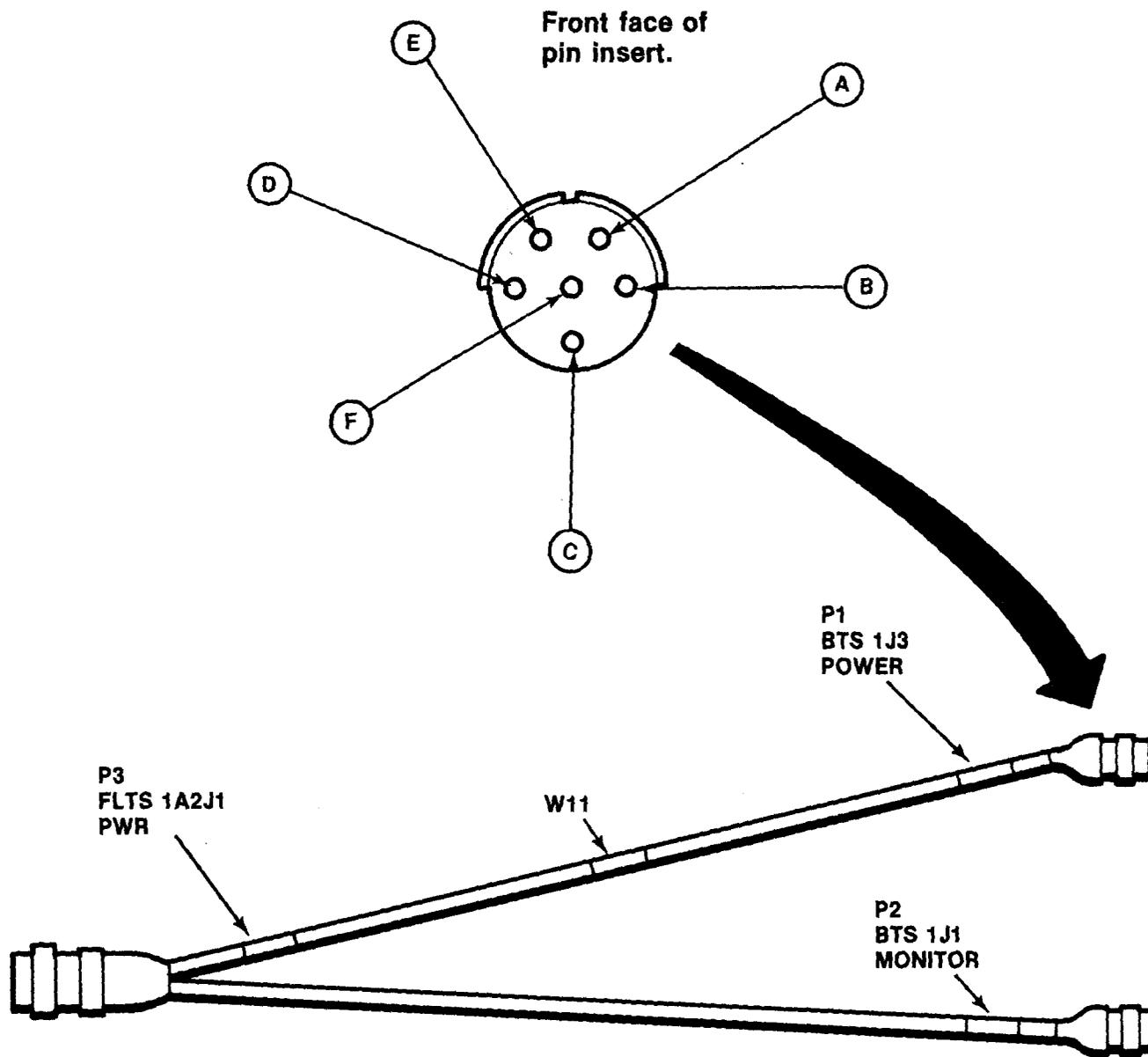


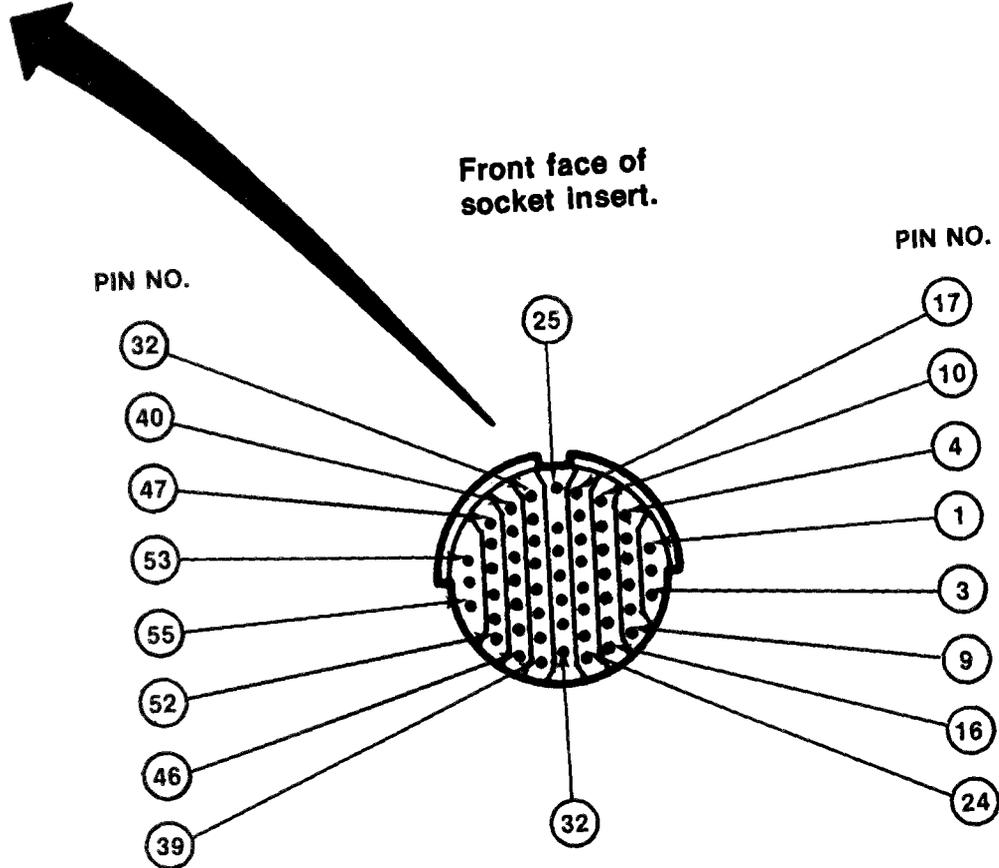
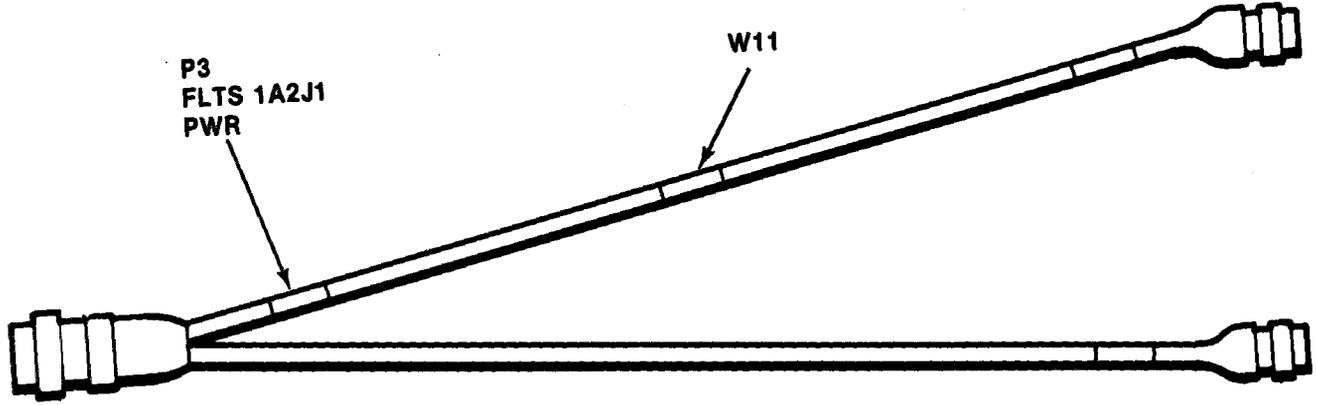
- j. BTS Cable W10 - Interconnects BTS Status Panel CHAN 1 and/or CHAN 2 to the oscilloscope.



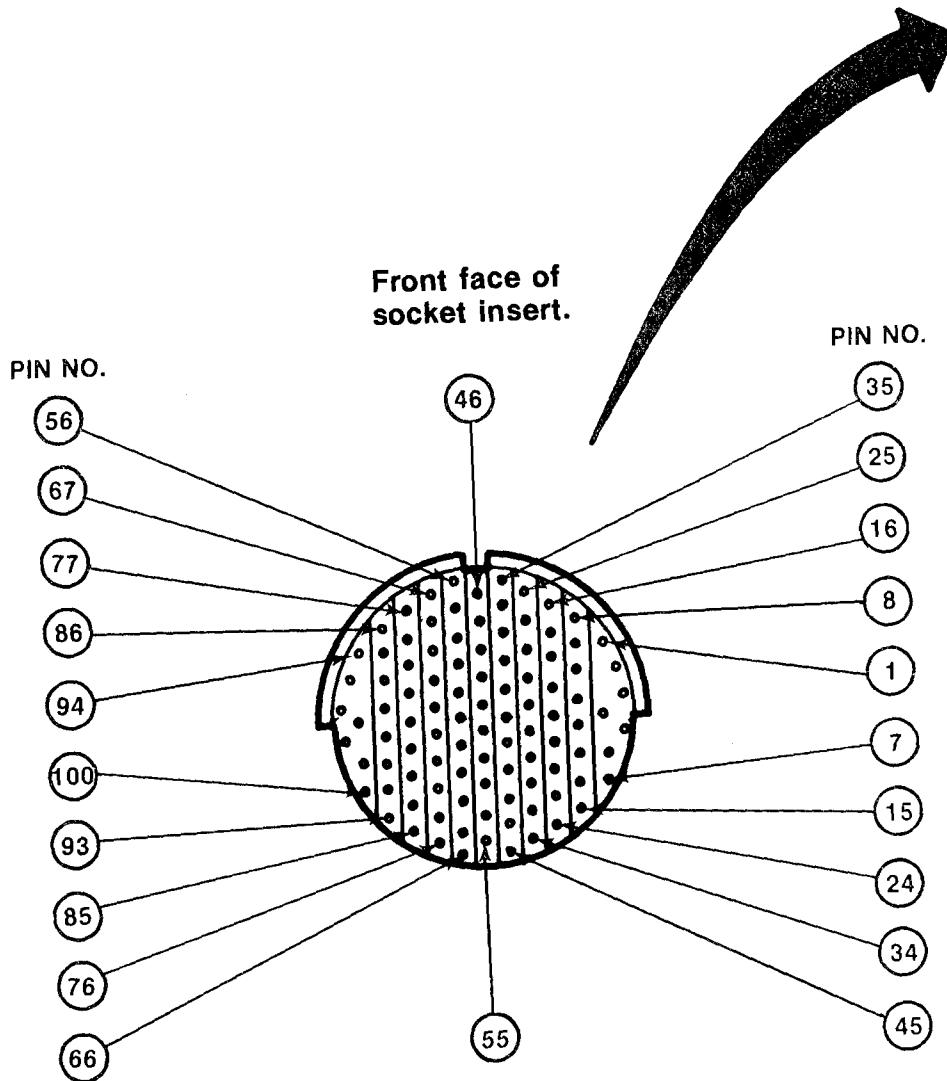
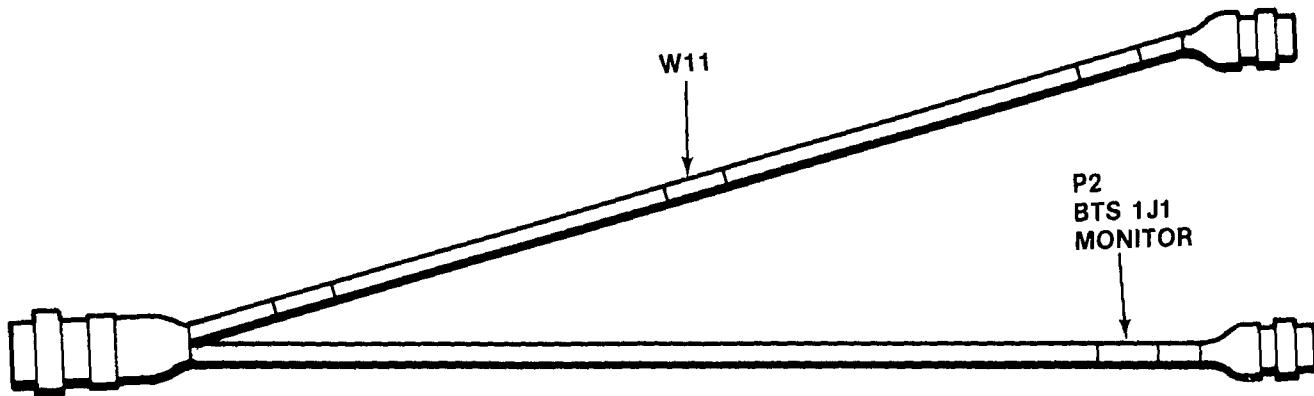
CABLE REPAIRS (Continued)

- k. BTS Cable W11 - Interconnects BTS MONITOR(1J1) and POWER (1J3) to the flight line test set PWR (1A2J1).





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CABLE W11 WIRE LIST

REF No.	WI RE		FROM	TO	CI RCUI T FUNCTI ON
	AWG	COLOR			
1	22	BLACK	P3-1	P1-A	+28 Vdc
2	22	BLACK	P3-2		
3	22	WHI TE	P3-4	P1-D	28V RET
4	22	WHI TE	P3-5		
5	22	GREEN	P3-7	P1-F	GND
6	22	GREEN	P3-8		
7	22	WHI TE	P3-13	P2-21	
8	22	WHI TE	P3-14	P2-22	
9	22	WHI TE	P3-15	P2-23	
10	22	WHI TE	P3-17	P2-24	
11	22	WHI TE	P3-18	P2-25	
12	22	WHI TE	P3-19	P2-26	
13	22	WHI TE	P3-49	P2-27	
14		RG-179 B/U SHI ELD	P3-47 P3-48	P2-48 P2-49	
15		RG-179 B/U SHI ELD	P3-45 P3-46	P2-46 P2-47	
16	*	BROWN	P3-39	P2-77	+5V
17	*	RED	P3-40	P2-87	+15V
18	*	YELLOW	P3-41	P2-88	-15V
19	*	ORANGE	P3-42	P2-83	+28V
20	*	BLUE	P3-43	P2-89	-65V

CABLE REPAIRS (Continued)

BTS CABLE W11 WIRE LIST (Continued)

REF NO.	WIRE		FROM	TO	CIRCUIT FUNCTION
	AWG	COLOR			
21	*	GREEN	P3-44	P2-64	GND
22	*	BLACK	P3-38	P2-34	SHLD
23		RG-179 B/U	P3-51	F2-28	
		SHIELD	P3-52	P2-42	SHLD

Description: Cable, multi conductor, shielded and jacketed.

The cable shall be in accordance with MIL-W-16878/4 and shall meet the following requirements:

Number of Conductors: 6, teflon insulated

Type Letter: E

Number of strands per conductor: 19 x 36

Wire size: 24 AWG

The cable shall be shielded and covered with a teflon jacket.

Colors: red, orange, blue, green, yellow and brown.

Color of outer jacket: White.

SECTION V

AVIM TESTING PROCEDURES

<u>SECTION CONTENTS</u>	<u>PAGE</u>
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GENERAL

3-41. Testing of support equipment circuits is accomplished by following the troubleshooting procedures in Section III. Step-by-step conformance to the normal indication columns of the troubleshooting procedures ensures that the bench test set meets performance standards.

POST REPAIR REQUIREMENTS

3-42. If any repairs or adjustments have been made to the bench test set, perform column 1 (ACTION) and verify with column 2 (NORMAL INDICATION) of the appropriate troubleshooting procedure as given in section 111. If any additional troubles are encountered while following the procedure, perform column 3 (FIX), and retest.

APPENDIX A

REFERENCES

A-1 . GENERAL INFORMATION

- AR 55-38 Reporting of Transportation Discrepancies in Shipments.
- AR 735-11-2 Reporting of Item Discrepancies Attributable to Shippers.
- DA PAM 310-1 Consolidated Index of Army Publications and Blank Forms.
- TM 38-750 The Army Maintenance Management Systems (TAMMS).

A-2. TECHNICAL MANUALS

- TM 11-5865-202-12 Operator's and Aviation Unit Maintenance Manual Countermeasures Set AN/ALQ-136(V)1 (NSN 5805-01-127-6880).
- (S) TM 11-5865-202-30 Aviation Intermediate Maintenance Manual Countermeasures Set AN/ALQ-136(V)1 (NSN 5805-01-127-6880) (u).
- TM 11-6625-2884-12 Operator's and Aviation Unit Maintenance Manual Test Set, Countermeasures Set TS-3615/ALQ-136(V) (NSN 6625-01-121-8984).
- TM 11-6625-2885-12 Operator's and Aviation Unit Maintenance Manual Test Set, Countermeasures Set TS-3614/ALQ-136(V) (NSN 6625-01-121-8983).
- TM 11-6625-2885-30 Aviation Intermediate Maintenance Manual Test Set, Countermeasures Set TS-3614/ALQ-136(V) (NSN 6625-01-121-8983).

A-3. REPAIR PARTS AND SPECIAL TOOLS LIST

- TM 11-6625-2884-30P Aviation Intermediate Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Test Set, Countermeasures Set TS-3615/ALQ-136(V) (NSN 6625-01-121-8984).
- TM 11-6625-2885-30P Aviation Intermediate Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Test Set, Countermeasures Set TS-3614/ALQ-136(V) NSN 6625-01-121-8983.

REFERENCES (Continued)

A-4. GENERAL REPAIR INSTRUCTIONS

- TM 43-0139 Painting Instructions for Field Use.
- TM 55-1500-323-25 Organizational, Direct Support, and Depot Maintenance Manual, Installation Practices for Aircraft Electric and Electronic Wiring.

A-5. GENERAL TYPE EQUIPMENT PUBLICATIONS

- SC 5180-91-CL-R07 Tool Kit, Electronic Equipment TK-105/G
- SC 5180-91-CL-R13 Tool Kit, Electronic Equipment TK-100/G
- TM 11-6625-1703-15 Operators Manual for Oscilloscope AN/USM-281A

APPENDIX B

EXPENDABLE SUPPLIES AND MATERIALS LIST

SECTION I INTRODUCTION

B-1 . SCOPE

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

B-2. EXPLANATION OF COLUMNS

The columns in this list are explained below.

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

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

(enter as applicable)

- 0 - Aviation Unit Maintenance
- F - Direct Support Maintenance

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

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetic abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit to issue that will satisfy your requirements.

SECTION II EXPENDABLE SUPPLIES AND MATERIALS

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(J) DESCRIPTION	(5) U/M
1	O, F		Cloths, lint-free cleaning	A/R
2	O, F		Tri chlorotri fluoroethane	A/R
3	F		Paint, light gray, FED-STD-595 color no. 26307	QT
4	F		Sandpaper	A/R
5	F		Brush, wire	EA
6	F		Brush, paint	EA

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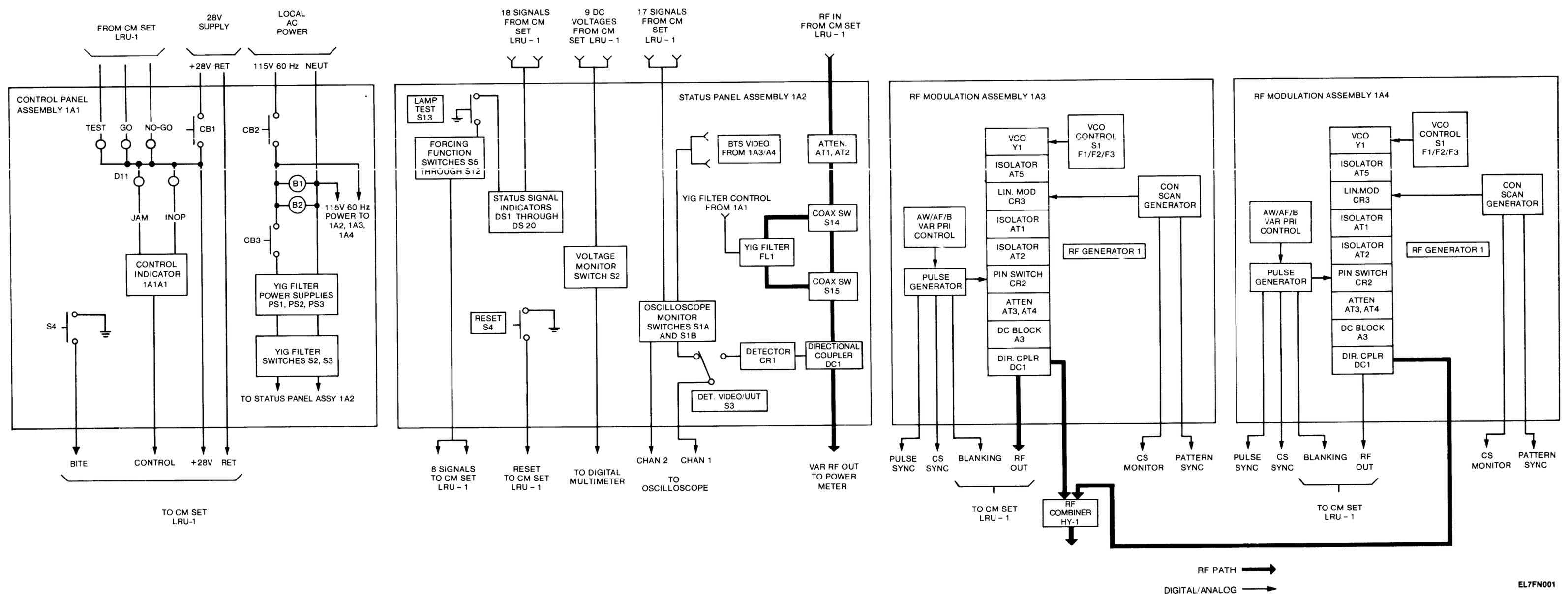
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EL7FN001

Figure FO-1 BENCH TEST SET (BTS) BLOCK DIAGRAM

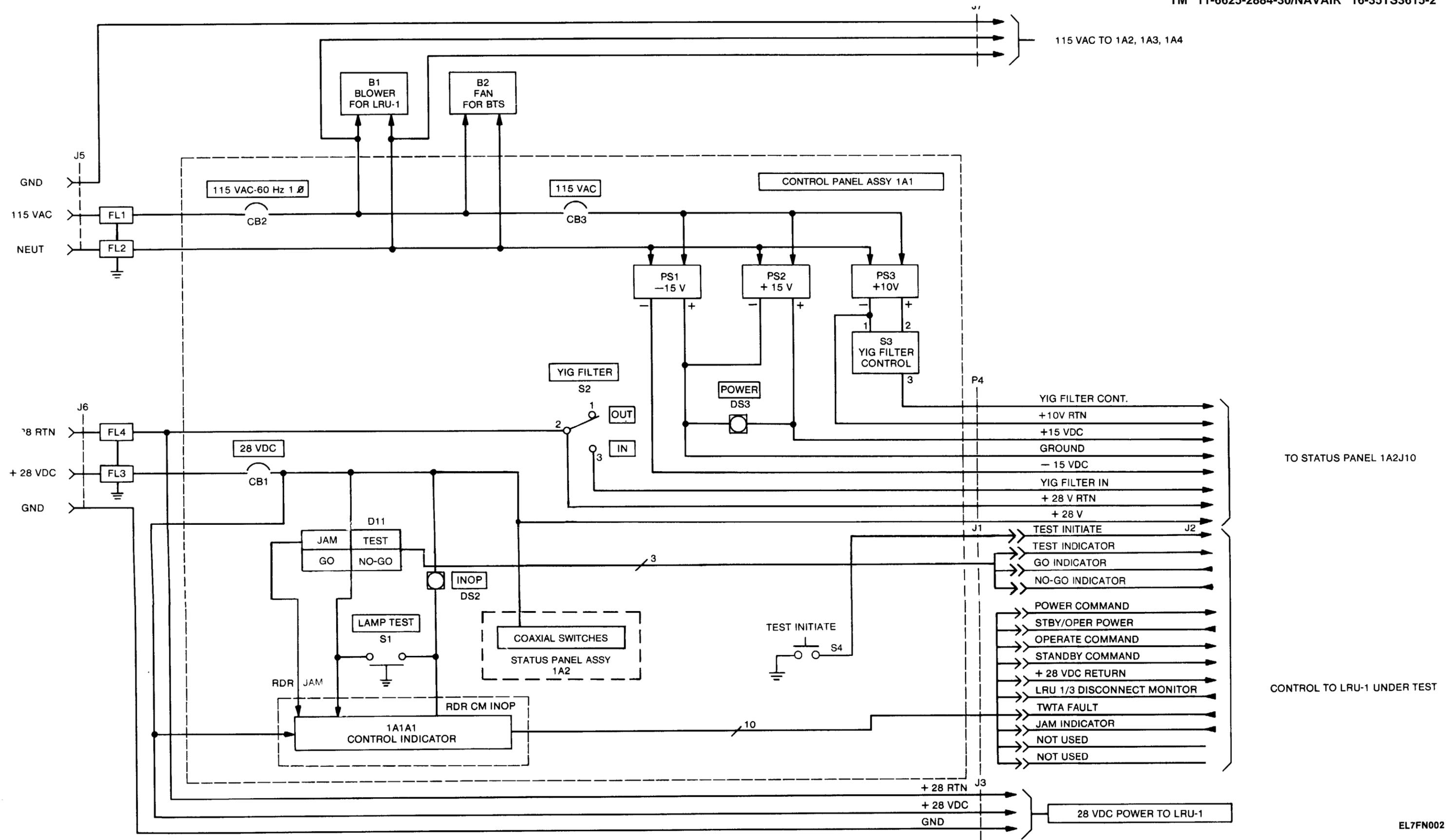
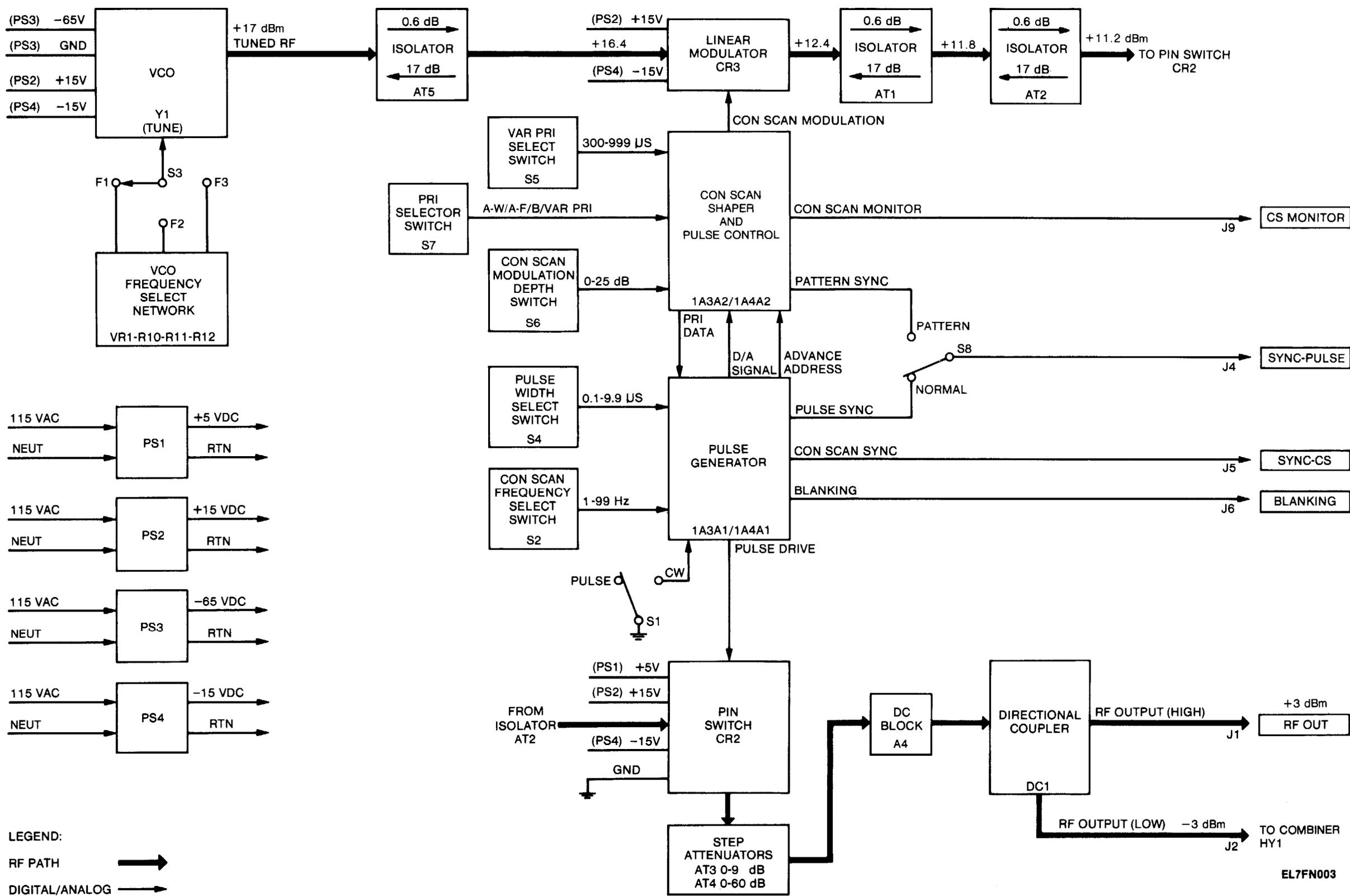


Figure FO-2. CONTROL AND POWER DISTRIBUTION FUNCTIONAL BLOCK DIAGRAM



EL7FN003

Figure FO-3 RF MODULATION ASSEMBLY FUNCTIONAL BLOCK DIAGRAM

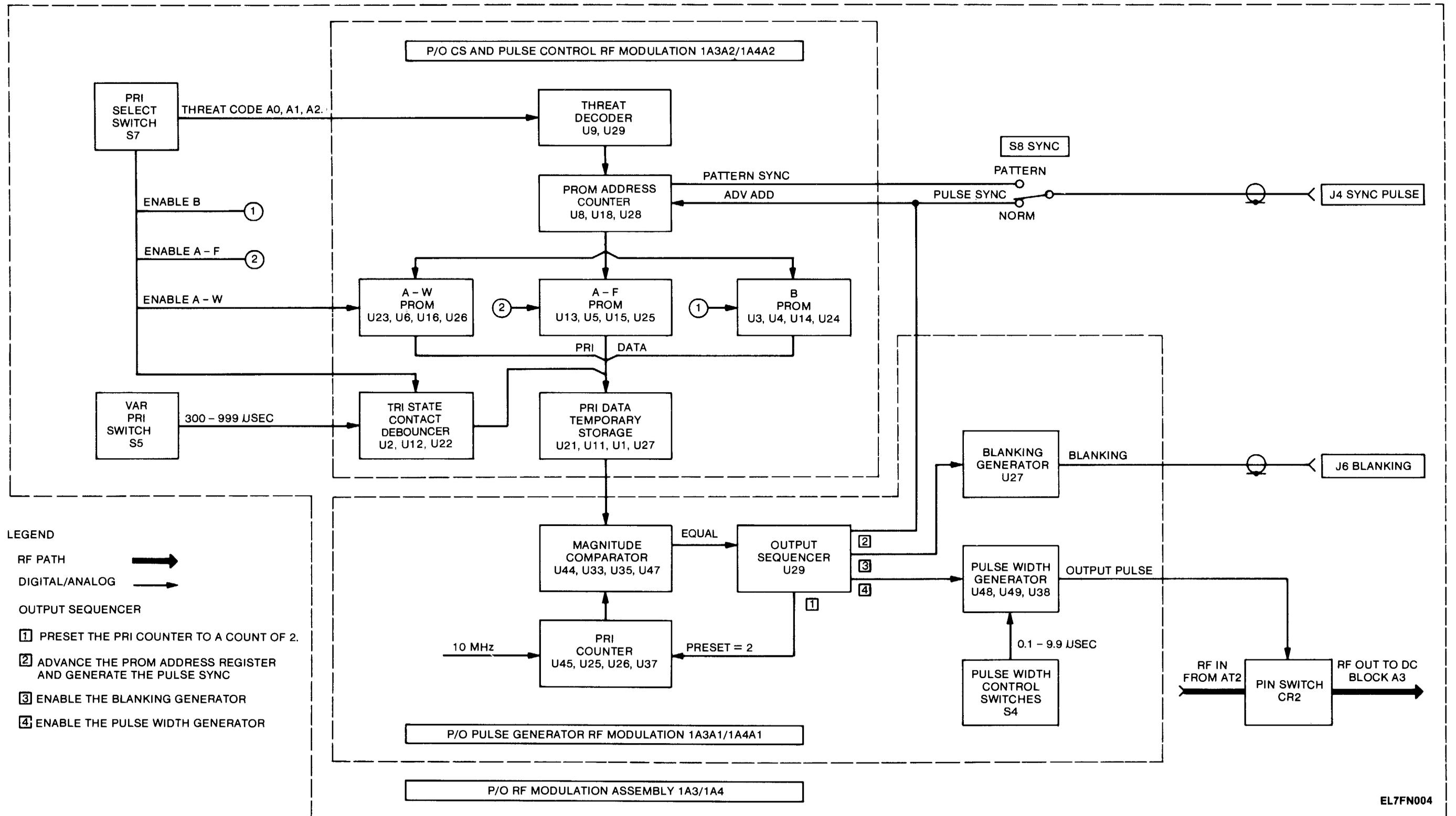
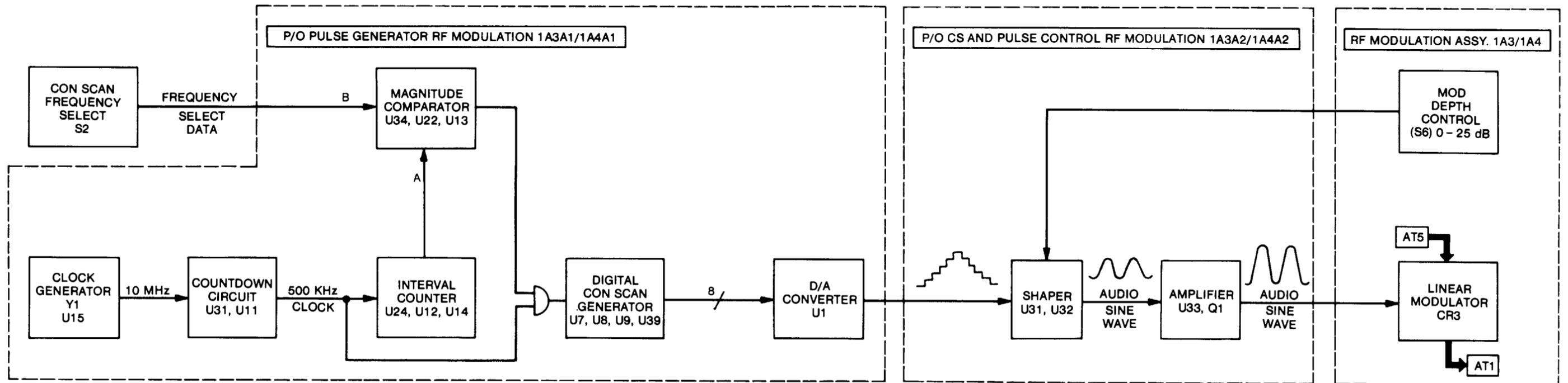


Figure FO-4 RF PULSE MODULATION
 FUNCTIONAL BLOCK DIAGRAM

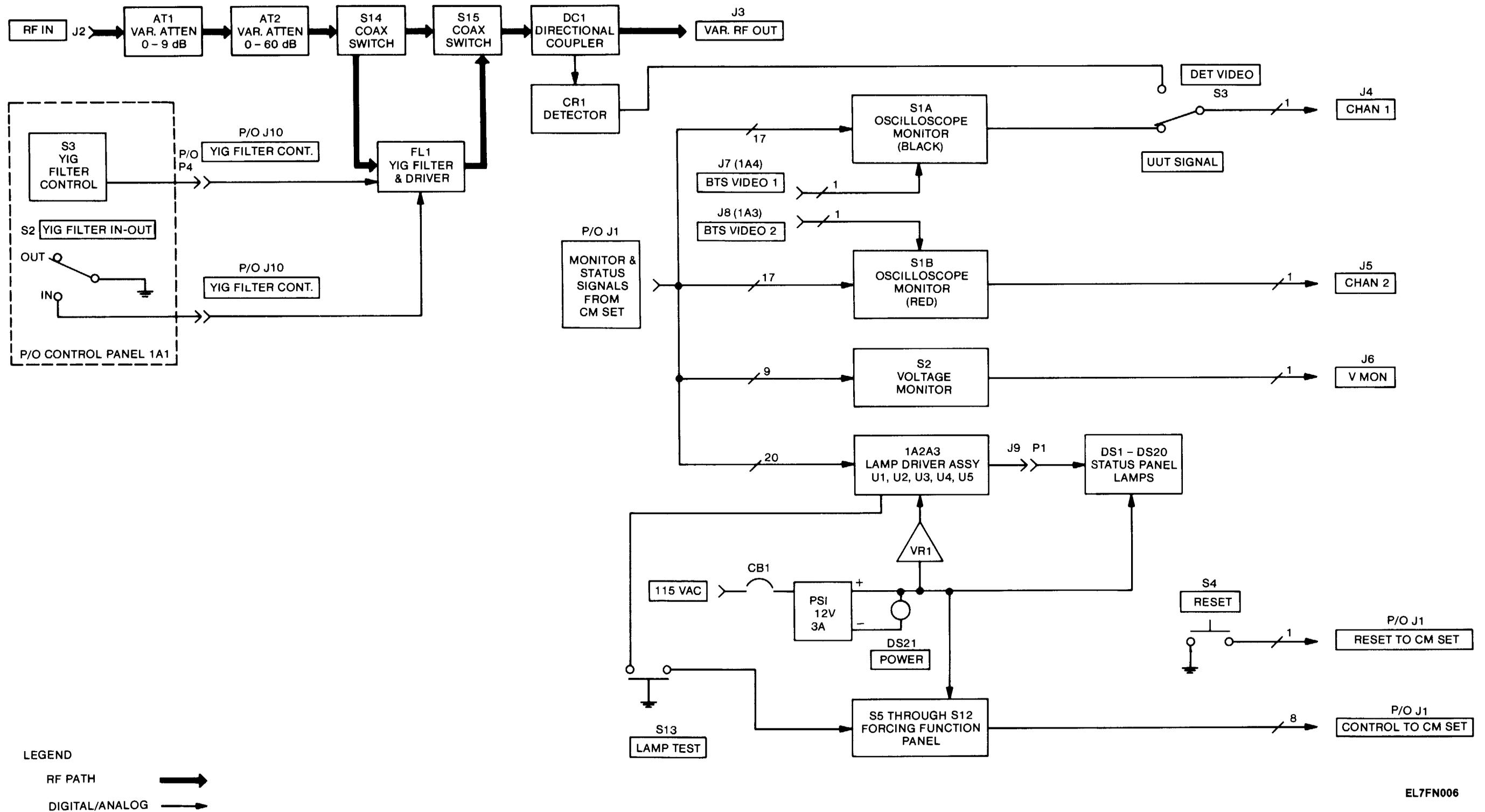


LEGEND

- RF PATH
- DIGITAL/ANALOG

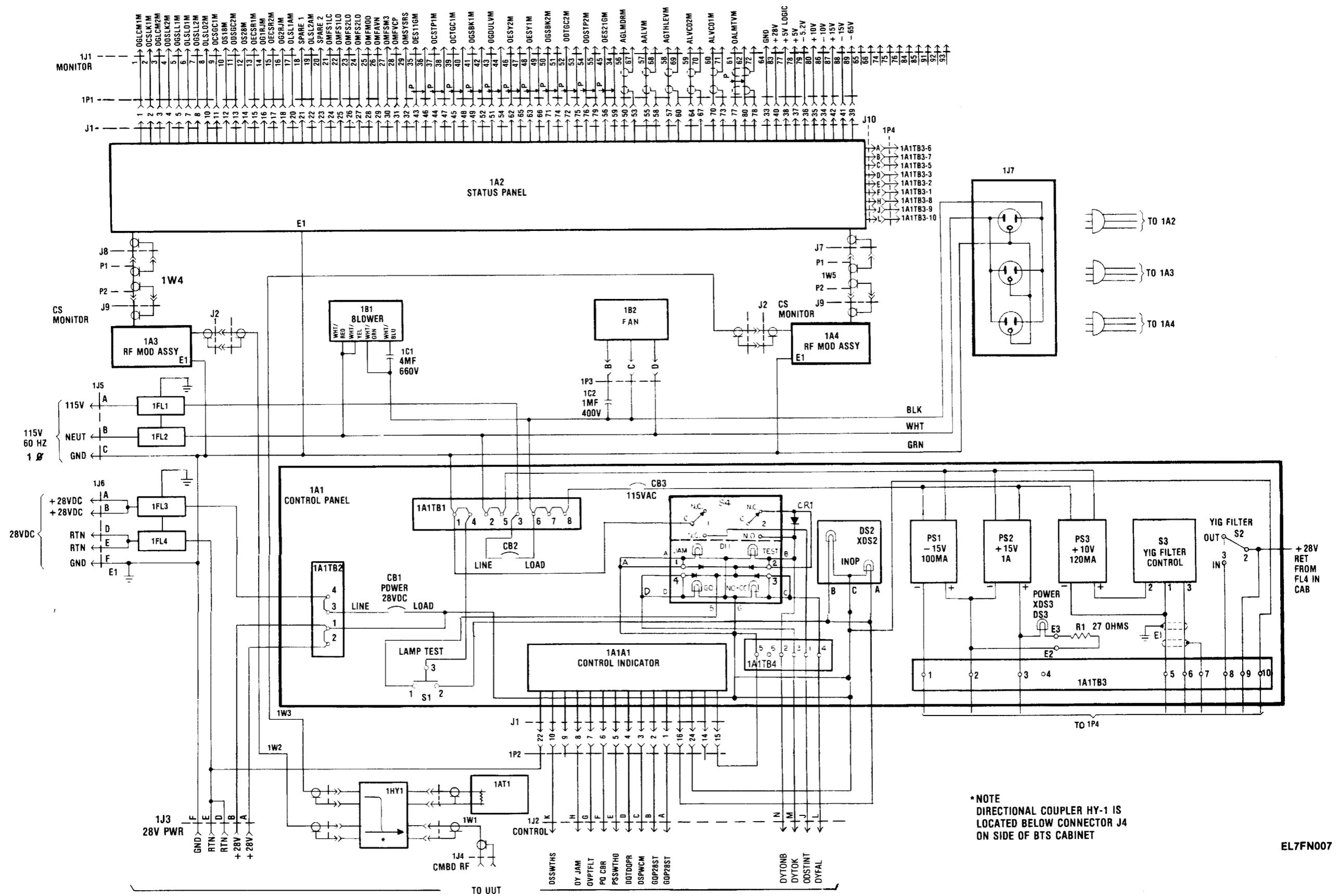
EL7FN005

Figure FO-5 RF LINEAR MODULATION FUNCTIONAL BLOCK DIAGRAM



EL7FN006

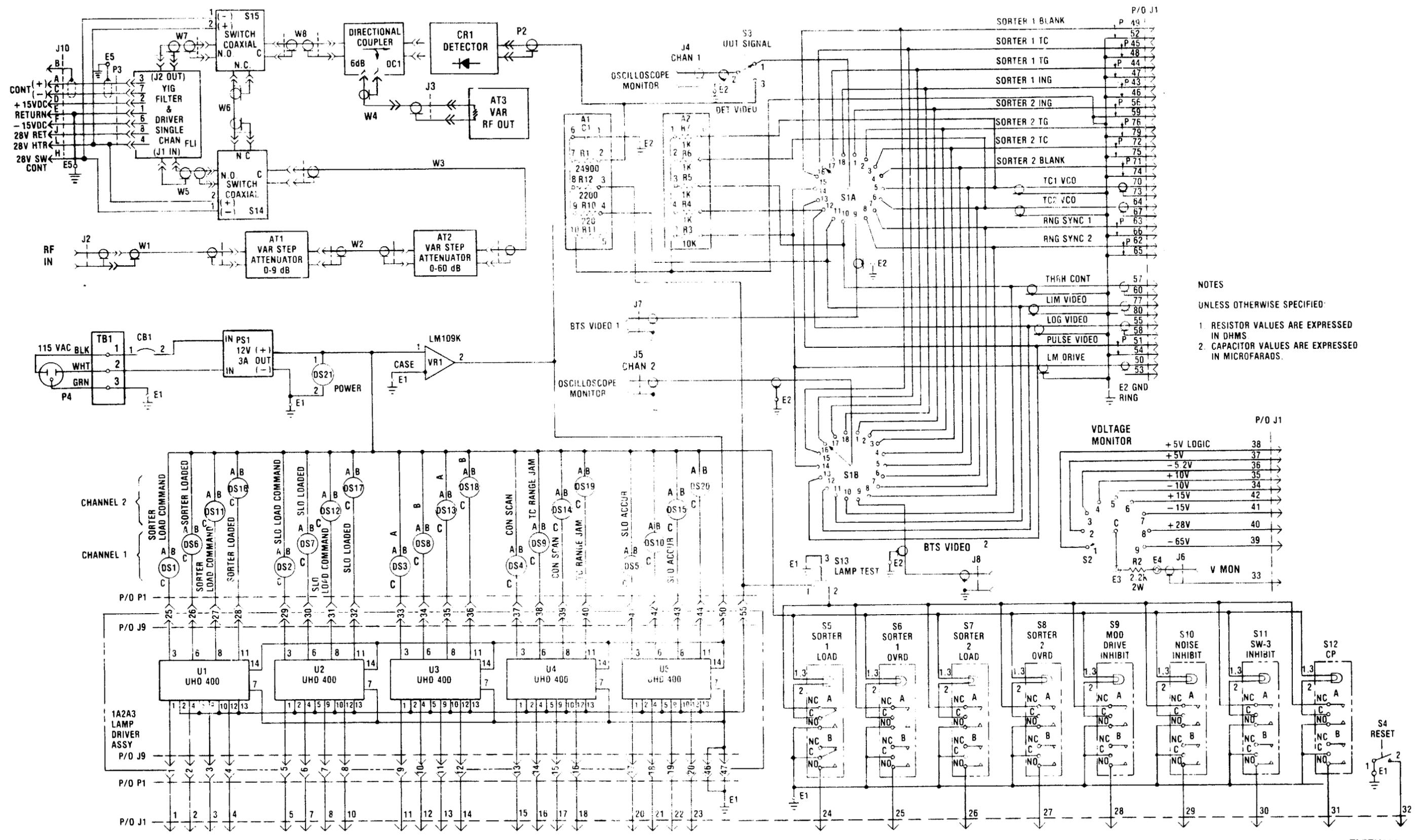
Figure FO-6 STATUS AND MONITORING
 FUNCTIONAL BLOCK DIAGRAM



*NOTE
 DIRECTIONAL COUPLER HY-1 IS
 LOCATED BELOW CONNECTOR J4
 ON SIDE OF BTS CABINET

EL7FN007

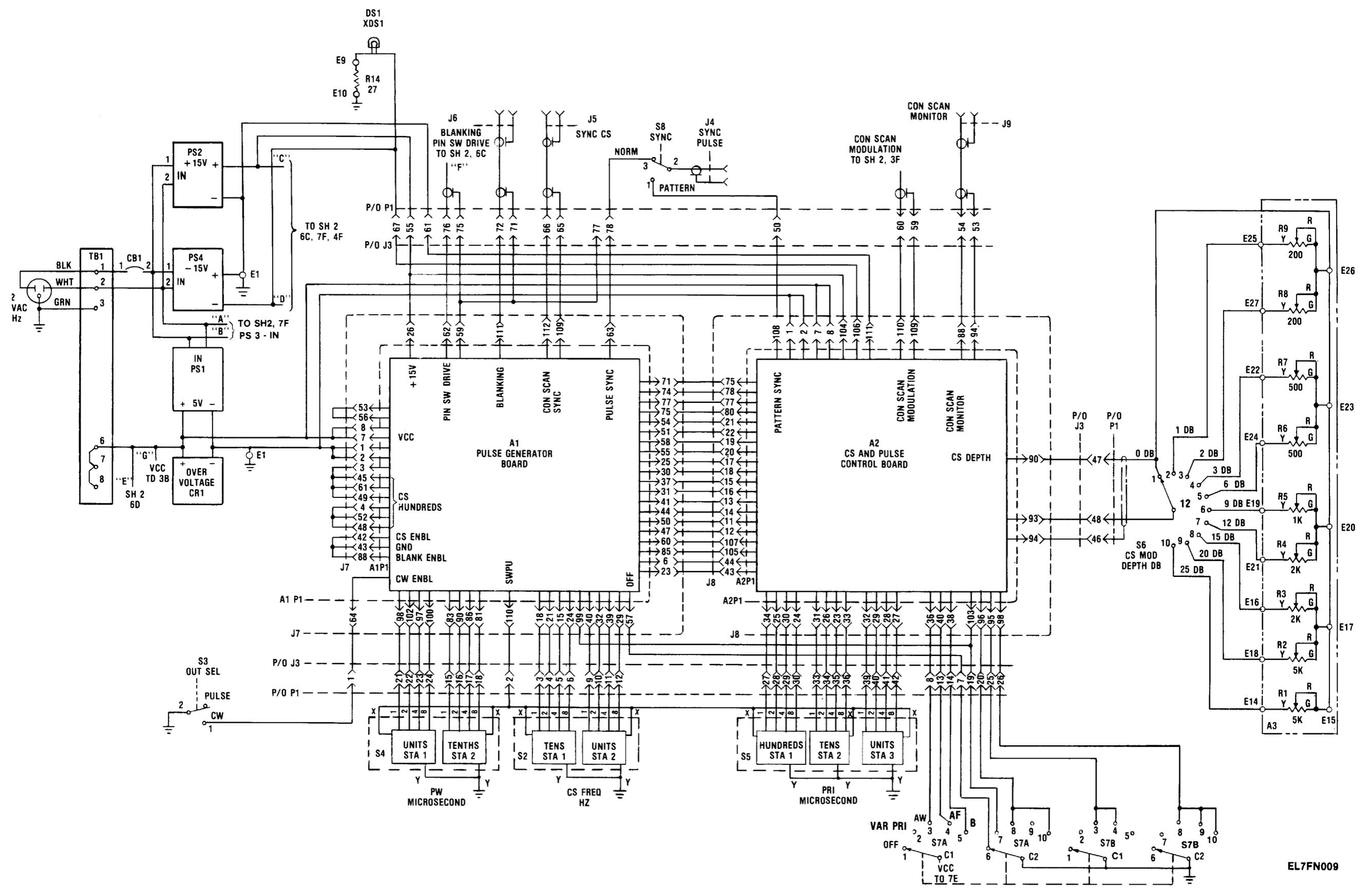
Figure FO-7 BTS CABINET AND CONTROL PANEL SCHEMATIC DIAGRAM



- NOTES
 UNLESS OTHERWISE SPECIFIED:
1. RESISTOR VALUES ARE EXPRESSED IN OHMS
 2. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.

EL7FN008

Figure FO-8 STATUS PANEL ASSEMBLY 1A2 SCHEMATIC DIAGRAM



EL7FN009

Figure FO-9 RF MODULATION ASSEMBLY 1A3/1A4
 SCHEMATIC DIAGRAM (Sheet 1 of 2)

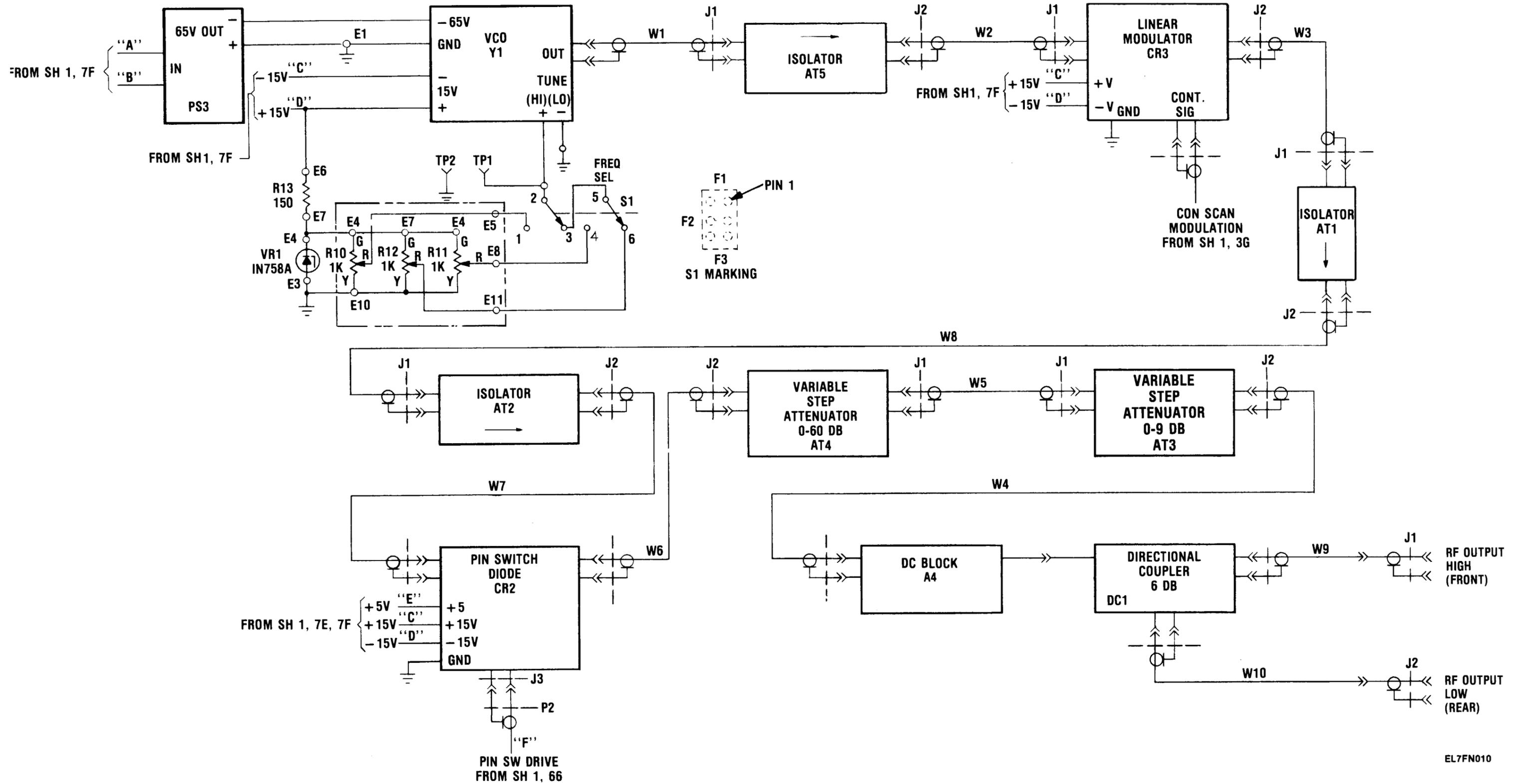
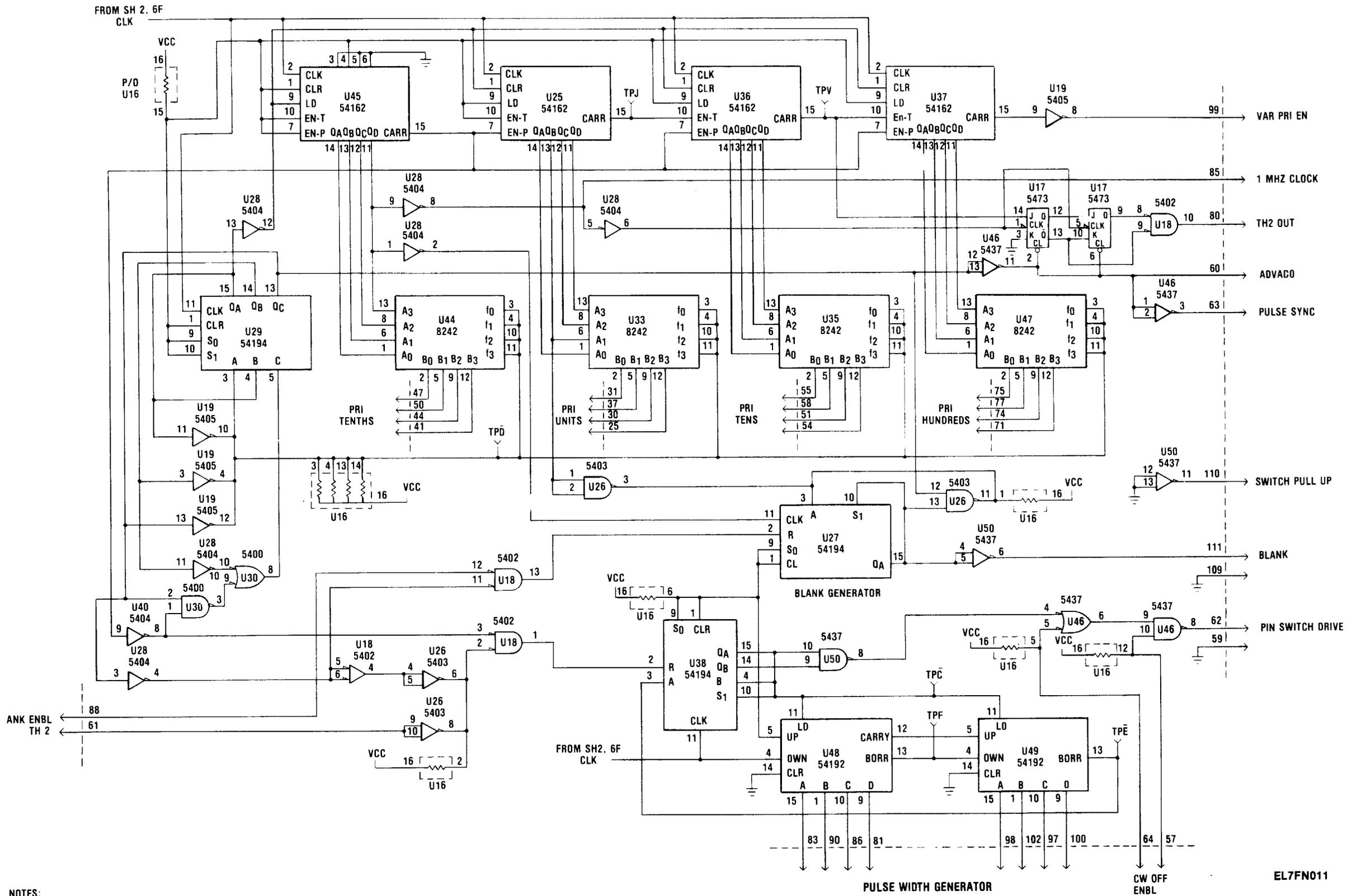


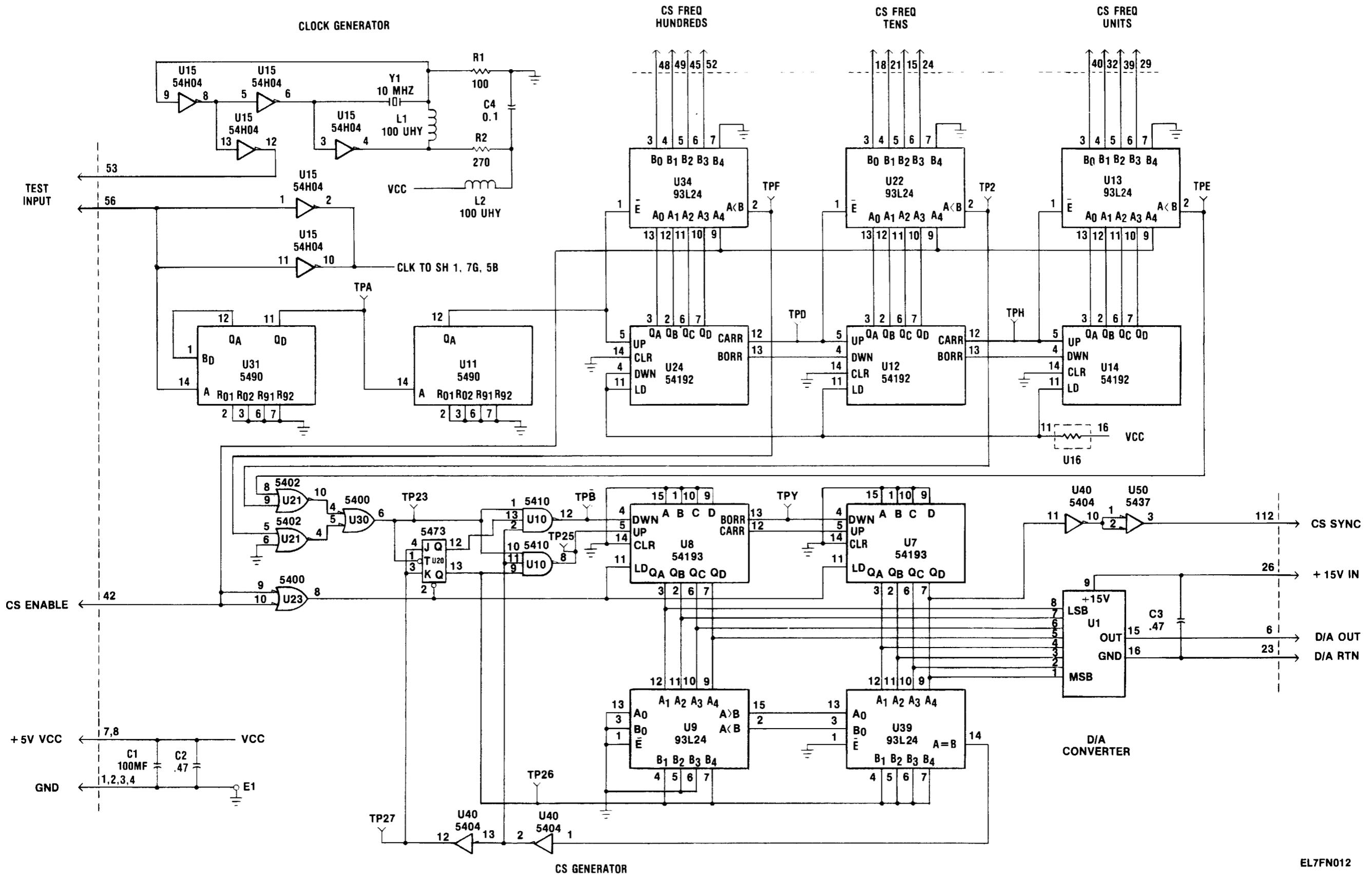
Figure FO-9 RF MODULATION ASSEMBLY 1A3/1A4
 SCHEMATIC DIAGRAM (Sheet 2 of 2)



NOTES:
 UNLESS OTHER SPECIFIED:
 RESISTORS P/O RESISTOR NETWORK, U16, ARE 2200 OHMS.
 ALL CAPACITORS ARE IN MICROFARADS.

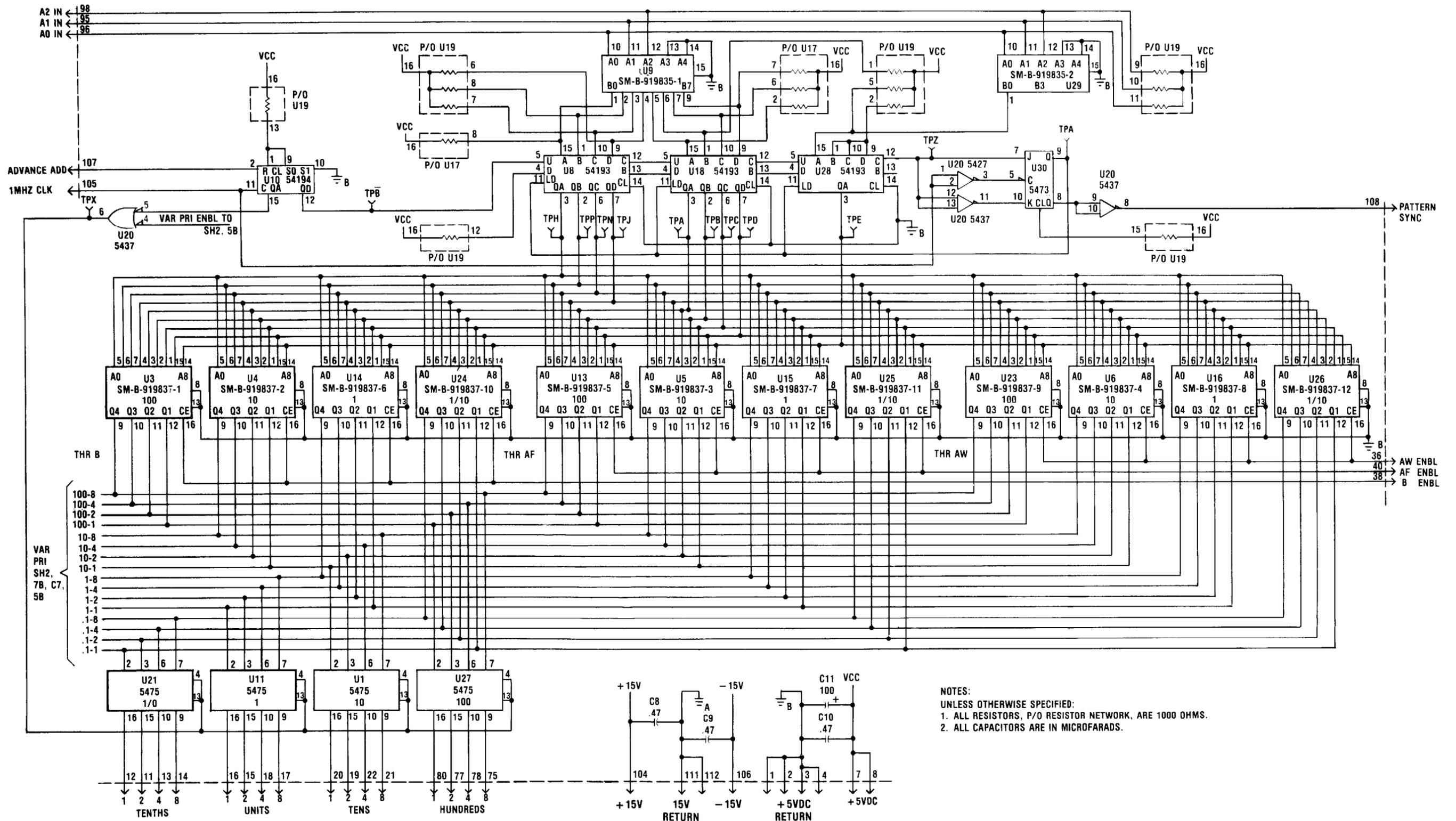
EL7FN011

Figure FO-10 CCA, PULSE GENERATOR 1A3A1/1A4A1
 SCHEMATIC DIAGRAM (Sheet 1 of 2)



EL7FN012

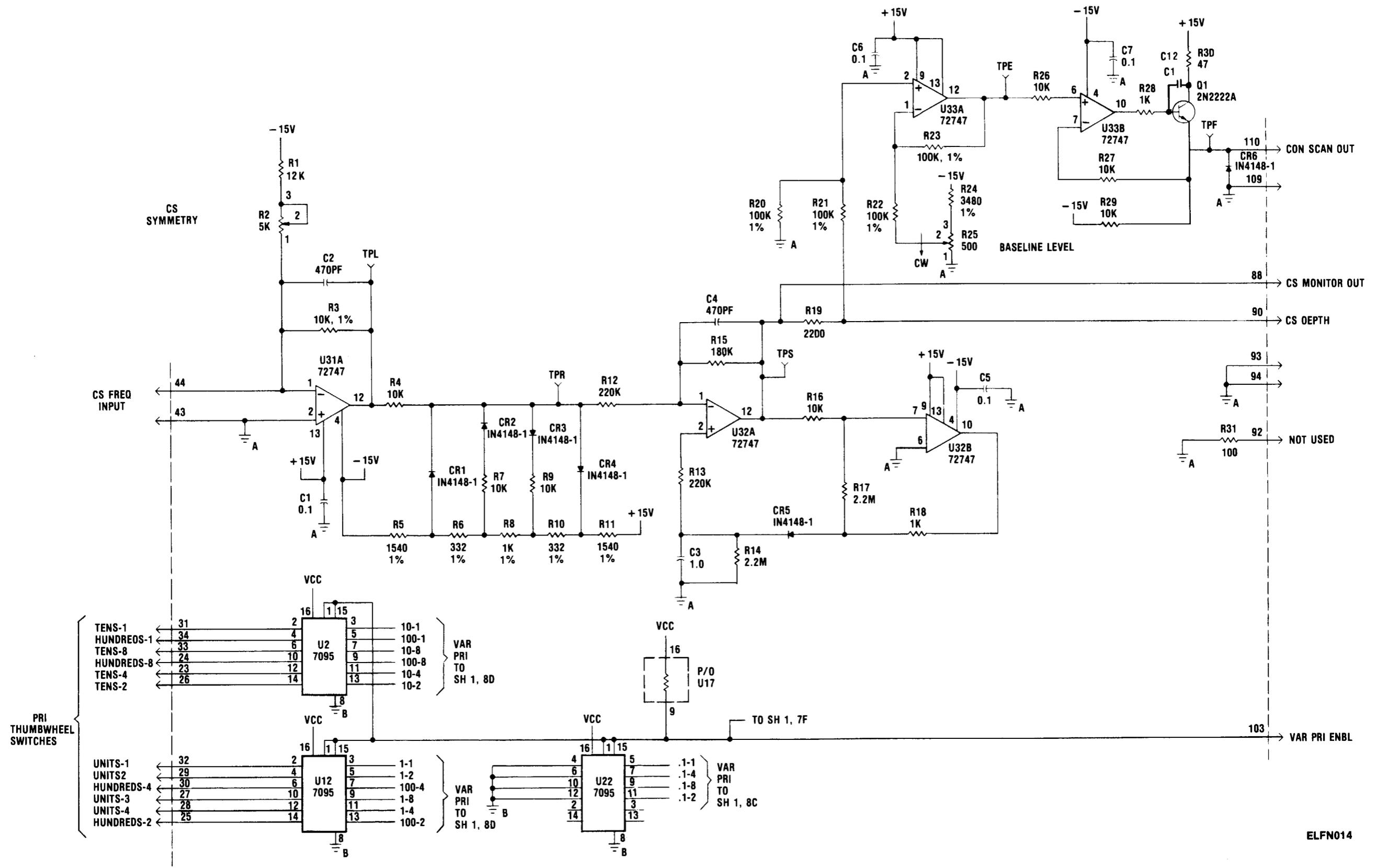
Figure FO-1 O CCA, PULSE GENERATOR 1A3A1/1A4A1 SCHEMATIC DIAGRAM (Sheet 2 of 2)



NOTES:
 UNLESS OTHERWISE SPECIFIED:
 1. ALL RESISTORS, P/O RESISTOR NETWORK, ARE 1000 OHMS.
 2. ALL CAPACITORS ARE IN MICROFARADS.

ELFN013

Figure FO-11 CCA, CS AND PULSE CONTROL 1A3A2/1A4A2 SCHEMATIC DIAGRAM (Sheet 1 of 2)



ELFN014

Figure FO-11 CCA, CS AND PULSE CONTROL 1A3A2/
 1A4A2 SCHEMATIC DIAGRAM (Sheet 2 of 2)

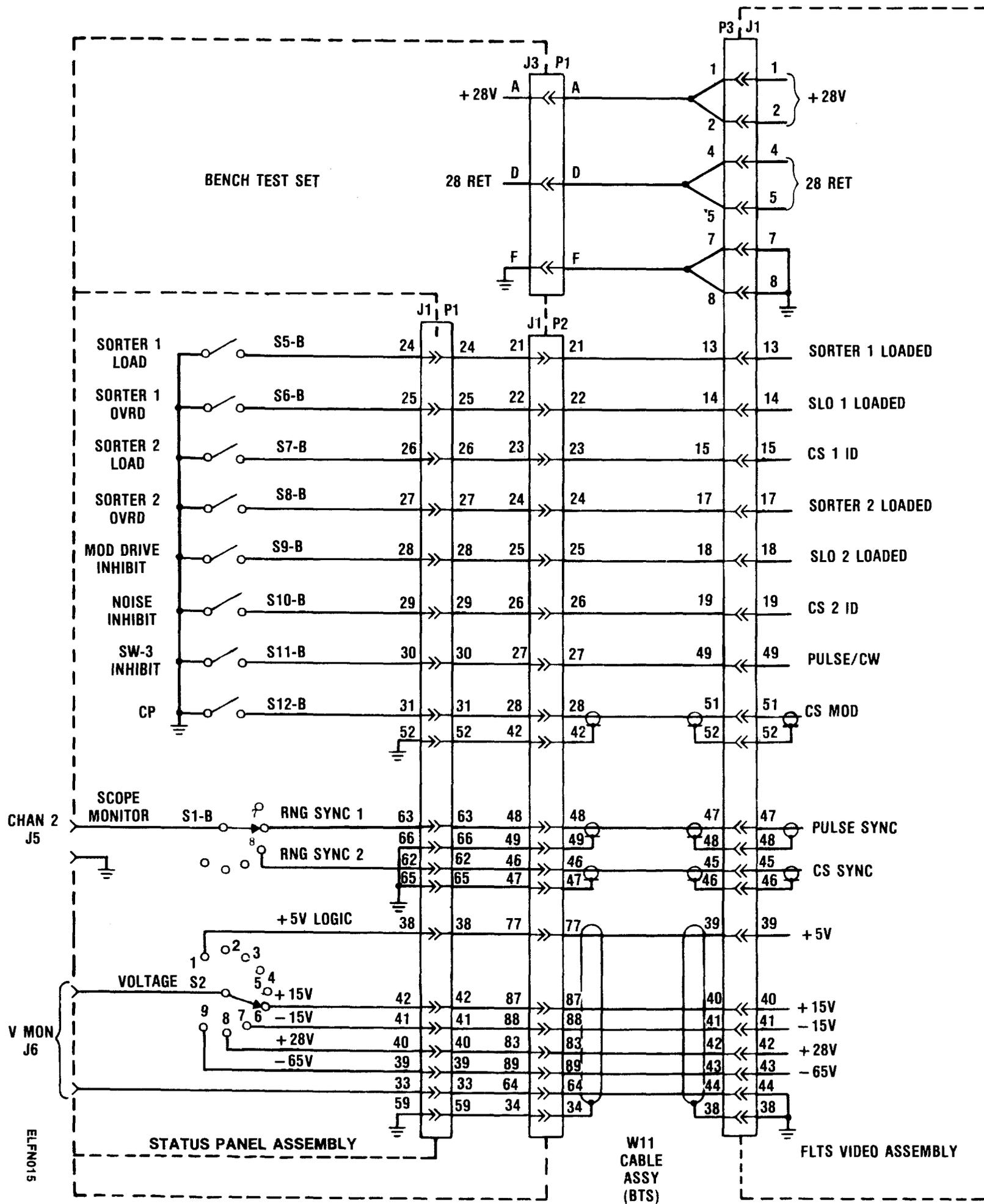
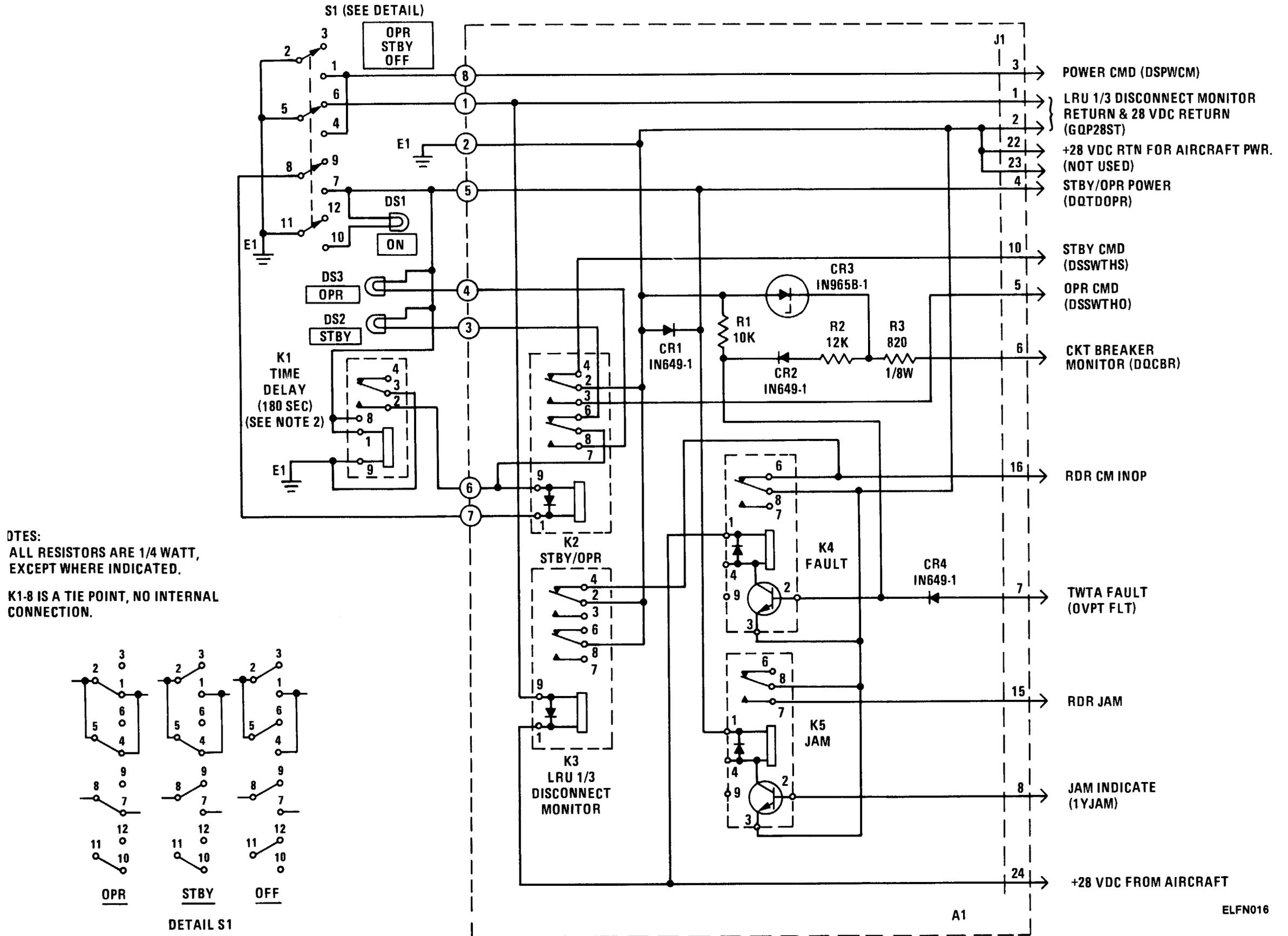


Figure FO-12 BTS-FLTS INTERFACE
 SCHEMATIC DIAGRAM



ELFN016

Figure FO-13 CONTROL INDICATOR 1A1A1 SCHEMATIC DIAGRAM

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TM 11-5840-340-12

PUBLICATION DATE

23 Jan 74

PUBLICATION TITLE

Radar Set AN/PRC-76

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
---------	------------	-----------	----------

2-25	2-28		
3-10	3-3		3-1
5-6	5-8		

FO3

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°

REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure the the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed step e.1, above."

REASON: To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SSG I. M. DeSpirito 999-1776

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Test Set, Countermeasures Set
 TS-3615/ALQ-136(V)

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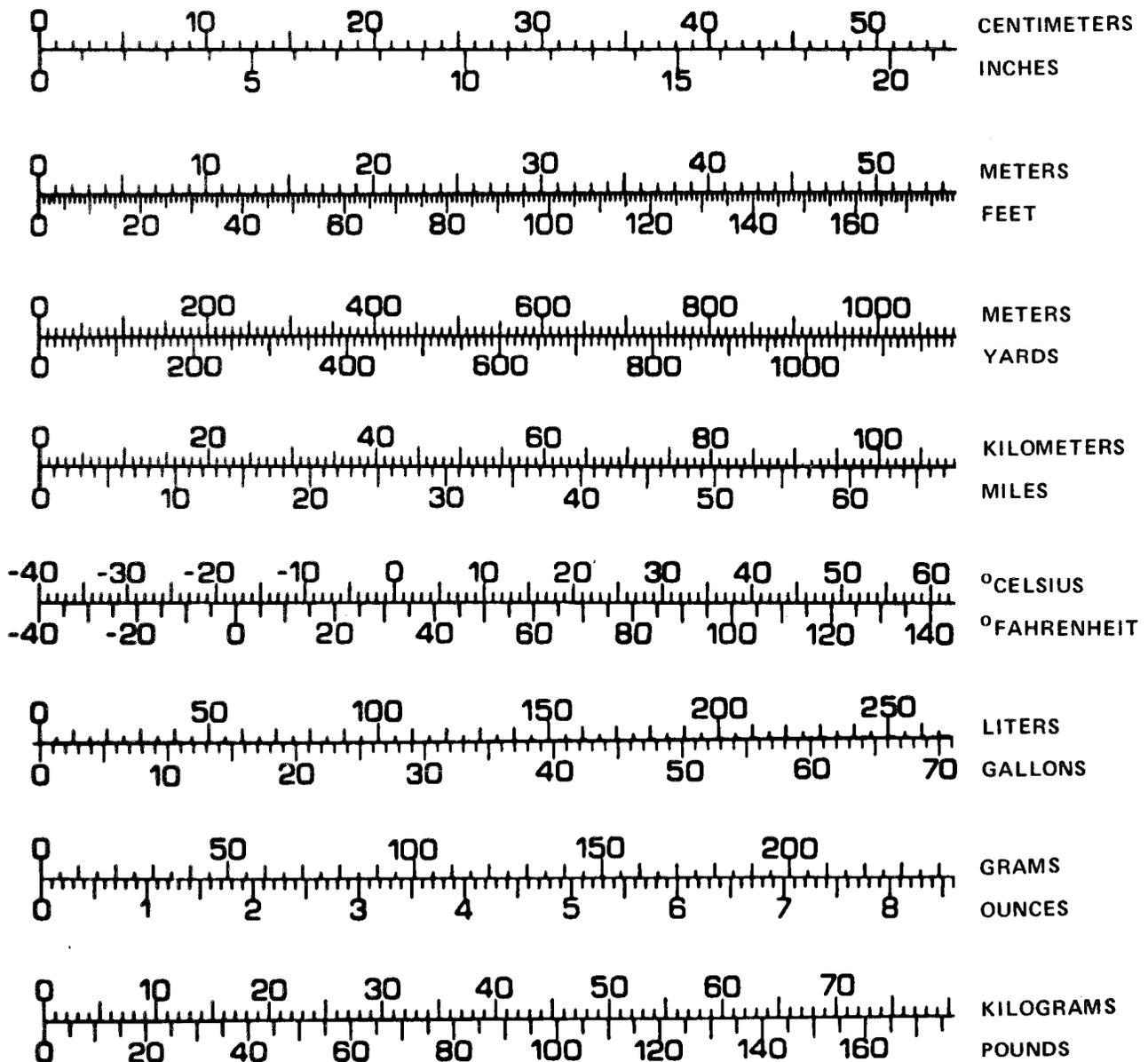
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US Army Communications-Electronics Command
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Fort Monmouth, New Jersey 07703

USE OF METRIC MEASURING SYSTEM

In this manual, you'll find weights and measurements given in American Standard units with the same measurement in Metric units shown in parentheses.

Tools, or nuts and bolts that have been manufactured in American Standard units are described in those units. For example: 1/2 inch hex nut, 3/4 inch bolt, 1/2 inch wrench.

Use the following Metric/American Standard table as a measurement guide for any conversions you have to make.



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