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SECTION I

GENERAL DESCRIPTION AND SPECIFICATIONS

1-1. GENERAL DESCRIPTION. The RD-300 is designed as a precision simulator-tester of aircraft weather radar instruments. The RD-300, in conjunction with the oscilloscope, can perform virtually all routine radar testing. Because the RD-300 is connected to the unit-under-test through just one calibrated coaxial cable, there is no need to reconfigure the test equipment to measure different parameters.

1-1-1. The RD-300 features a signal generator system which automatically acquires and tracks the magnetron frequency to eliminate constant retuning of the signal generator to compensate for magnetron or signal generator drift. The signal generator is modulated to simulate storm cell echoes in several modes, including Contour Mode. Contour Mode is used for rapid calibration and checkout of contour threshold circuits. The range delay of these simulated storm cell echoes is calibrated in microseconds (μs) or nautical miles (NM). Multiple returns can be generated to check and adjust the radar range ring display. An auxiliary modulation mode develops narrow, short range pulses for testing multimode radars.

1-1-2. Measurement of the magnetron frequency and PRF appears on the Digital Display (12). The magnetron condition and spectrum characteristics can be checked using the detector and discriminator outputs. Peak power measurements are possible with a full scale sensitivity of 12 kW (or 120 kW peaks with the external 10 dB attenuator).

1-1-3. The IF Signal Generator covers from 20 to 70 MHz and can be swept. The two-Volt-rms maximum output can be used for high level IF or AFC testing. Bandwidths and center frequencies are measured by the Marker Frequency Generator during swept IF tests. The RD-300 also features an antenna simulator output, which allows the display assembly to be swept at a variable rate.

1-2. SPECIFICATIONS

RF SIGNAL GENERATOR:

Variable Mode Frequency:	Continuously variable from 9.295 GHz to 9.425 GHz.
Track Mode Frequency:	Tracks magnetron frequency within ±25 kHz (pulse width > 2 µs); ±100 kHz (pulse width from 0.5 µs to 2.0 µs).
ΔF Mode (during Track):	Signal generator frequency may be offset ±0.75 MHz from magnetron for AFC centering tests. Front panel meter reads ΔF offset.
Output Power:	-50 to -127 dBm in 1 and 10 dB steps calibrated at R/T plus 0 to 20 dB boost with CONTOUR control; accuracy ±2 dB.
Aux RF Output:	-20 to -127 dBm plus 0 to 20 dB boost with CONTOUR control. (Maximum power with full boost: -10 dBm).
Source VSWR at Input of R/T unit under test:	<1.25.

IF SIGNAL GENERATOR:

Frequency:	20 to 70 MHz.
Sweep Width:	0 to 4 MHz centered at counter reading.
Marker Frequency:	Continuously variable from 20 to 70 MHz; may be displayed on frequency counter display.
Power:	+20 to -130 dBm in 1 and 10 dB steps in two ranges; accuracy ±1.5 dB.

MODULATION (IF or RF):	
Modes-Track (RF only):	PRF same as radar-under-test.
Internal:	PRF adjustable from 50 to 500 Hz.
CW:	Continuous wave
EXT (+), EXT (-):	External synchronization: Sine Wave or pulses, 2 to 50 V pk, 50 to 500 Hz.
Pulse Width:	Normal mode: 2.0 to 30 µs Auxiliary mode: 0.2 to 3.0 µs. Contour mode: 270 µs Fixed.
Pulse Delay:	Normal Mode: steps from 1 to 999 µs or NM, 1 to 9 pulses.
	Auxiliary Mode: continuously variable 2.1 to 29.6 µs (0.17 to 2.4 NM).
Sync Out Signal:	Simultaneous with signal generator pulse output or simultaneous with radar's magnetron pulse in Track Mode.
CONTOUR Mode (RF only):	Amplitude of the signal generator pulse may be increased 0 to 20 dB above the attenuator setting.
FREQUENCY COUNTER:	
RF:	Displays magnetron frequency in Track Mode and signal generator frequency in Manual or Auxiliary Modes; resolution 0.01 MHz.
IF:	Displays IF frequency, center frequency in sweep mode, or marker frequency upon push button command; resolution 1 kHz.

	PRF:	Displays pulse repetition frequency of magnetron in Track Mode or of signal generator in Internal Modulation Mode; resolution 1 Hz.
ANTENNA SIMULATOR OUTPUT:		Variable scan rate 0 to 150 looks per minute. Variable in angle to ±89°. Also variable in static position ±89°. Has resolver, three phase synchro, and pot output for antenna simulation and pitch or roll output with 8° lead for stabilization platform testing and 45° offset for RCA units.
POWER METER:		
	Range:	0.1 to 12 kW peak (or 1.0 to 120 kW peak with external 10 dB attenuator).
	Accuracy:	±0.6 dB from 2 to 12 kW peak.
MISCELLANEOUS OUTPUTS:		(Used to Evaluate Magnetron Spectrum)
	Detector:	Detected magnetron signal used to check pulse shape with external oscilloscope.
	Spectrum Analyzer:	Attenuated RF sample of magnetron signal used to check pulse spectrum with external analyzer.
	Discriminator:	Fast response discriminator output used to measure magnetron's frequency pushing using oscilloscope; 0.1 V/MHz sensitivity.

SPECIFICATIONS

PHYSICAL CHARACTERISTICS:

Power:	115/230 VAC 50 to 400 Hz, 150 watts
Dimensions:	16.75" (42.55 cm) wide, 7.50" (18.05cm) high, 18.38" (46.69 cm) deep.
Weight:	Approximately 53 lbs. (24.09 kg.)

SECTION II

INSPECTION

2-1. INCOMING INSPECTION. Each IFR Precision Simulator is carefully inspected for mechanical and electrical quality before shipment from the factory. On receipt, the instrument should be physically free of mars and scratches, and in perfect mechanical and electrical order. The instrument should be inspected immediately for possible in-transit physical damage. A check for supplied accessories,* and a test of the electrical performance of the instrument (as outlined in Section V of this manual) should also be made. Any damage or deficiency should be reported immediately to the carrier and a claim filed, if necessary. Refer to the LIMITED WARRANTY AND SERVICE INSTRUCTIONS of this manual for delineation of responsibilities and liabilities. Follow the directions in the LIMITED WARRANTY AND SERVICE INSTRUCTIONS when it becomes necessary to ship the instrument.

2-2. GROUNDING REQUIREMENTS. To protect operating personnel, the National Electrical Manufacturer's Association (NEMA) recommends that the instrument panel and cabinet be grounded. All IFR instruments are equipped with a three-conductor power cord which, when plugged into an appropriate receptacle, grounds the instrument. The offset pin on the power cord three-prong connector is the ground wire.

2-2-1. To preserve this protection feature when operating the instrument from a two-contact outlet, use a three-prong to two-prong adapter and connect the green pigtail on the adapter to ground.

2-3. CLEANING. It is wise to clean the dust, cobwebs, and other debris out of the test set prior to periodic inspection, repair or calibration. Some shops clean their test equipment on a regular basis such as biannual or annual proof-of-performance checks. Annual recalibration of the set is advisable.

2-3-1. Dust removal is best done with a hand controlled dry air jet of 25 to 50 psi (1.827 kg/cm^2 to 3.653 kg/cm^2). The Rear Panel should be cleaned with a dry cloth only. The Front Panel may be cleaned whenever necessary with a lint-free cloth moistened with rubbing alcohol.

2-3-2. CARE MUST BE TAKEN TO AVOID BREAKING WIRES OR SHORTING COMPONENT LEADS TOGETHER DURING CLEANING.

* Accessories Supplied: Dummy Load, Waveguide Directional Coupler, Serialized Coaxial Cable, RD-300 Manual, Antenna Simulator Connector, four sets of thumb screws and nuts, 50Ω type N Termination, Line Cord.

2-4. PRELIMINARY INSPECTION PROCEDURES. Preliminary inspection is necessary to determine the general condition of the test set. It has been determined through hard experience that deliberate moving, however slight, of the discrete components on the various PC Boards and other assemblies often causes unnecessary circuit problems and can quickly change simple problems into complex ones. Therefore, IFR recommends ONLY A VISUAL INSPECTION without touching the components. Test set owners and operators should be aware that ANY opening of the instrument casing can result in calibration deviations. Complex modules, such as RF modules, should NOT be opened during Preliminary Inspection.

2-4-1. Procedures:

1. Chassis. Inspect the chassis for tightness of sub-assemblies, damaged chassis-mounted connectors, and corrosion or damage to the metal surfaces. Surface damage may indicate further damage to parts in the area.

2. Capacitors. Inspect all readily available capacitors for loose mounting, deformities or obvious physical damage, and leakage or corrosion around the leads.

3. Connectors. Examine all readily available coax connectors for loose or broken parts, cracked insulation, and bad contacts. DO NOT disassemble connectors within the test set.

4. Potentiometer Controls. Any Front Panel potentiometer control that feels rough when rotated should be checked with an ohmmeter for proper operation.

5. Resistors. Inspect all readily available resistors for cracked, broken, charred, or blistered bodies and loose or corroded soldering connections.

6. Printed Circuit (PC) Boards. (Readily available PC Boards only). Check the connectors and mating plugs for corrosion and damage. Inspect all mounted components, including crystals and IC's, for damage. The PC Boards should be free of all foreign material.

7. Semiconductors. Inspect all readily available diodes, rectifiers, and transistors for cracked, broken, charred, or discolored bodies. Check the ends of the components to see that the seals around the leads are in place and in good condition.

8. Switches. Examine all readily available toggle switches for loose levers, terminals, and switch body connection to frame. The line switch contacts should not be bent or the switch action too loose.

9. Transformer. Inspect the transformer for signs of excessive heating, broken or charred insulation, and loose mounting hardware.

10. Wiring. Inspect all the wiring of the chassis for broken or loose ends and connections and for proper dress relative to other chassis parts. All the laced wiring should be tight with the ends securely tied.

2-5. REPACKING FOR SHIPPING. The LIMITED WARRANTY AND SERVICE INSTRUCTIONS contain detailed directions for repacking and shiping. Additional questions may be directed to the IFR Shipping Department.

NOTE

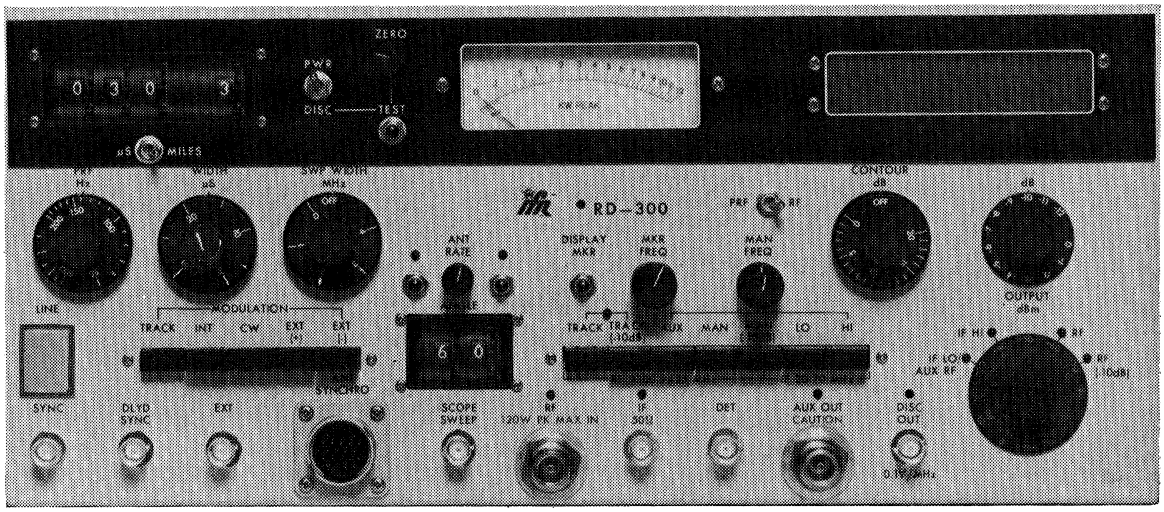
Any instrument shipped to IFR for any reason MUST be tagged with (1) its owner's identification, (2) the service or repair required, (3) its model number, and (4) its full serial number. Identify the instrument by prefix, model, and serial number in ALL correspondence.

2-5-1. IFR Precision Simulators should be shipped ONLY in their original containers. If the original container is not available, contact IFR for shipping instructions.

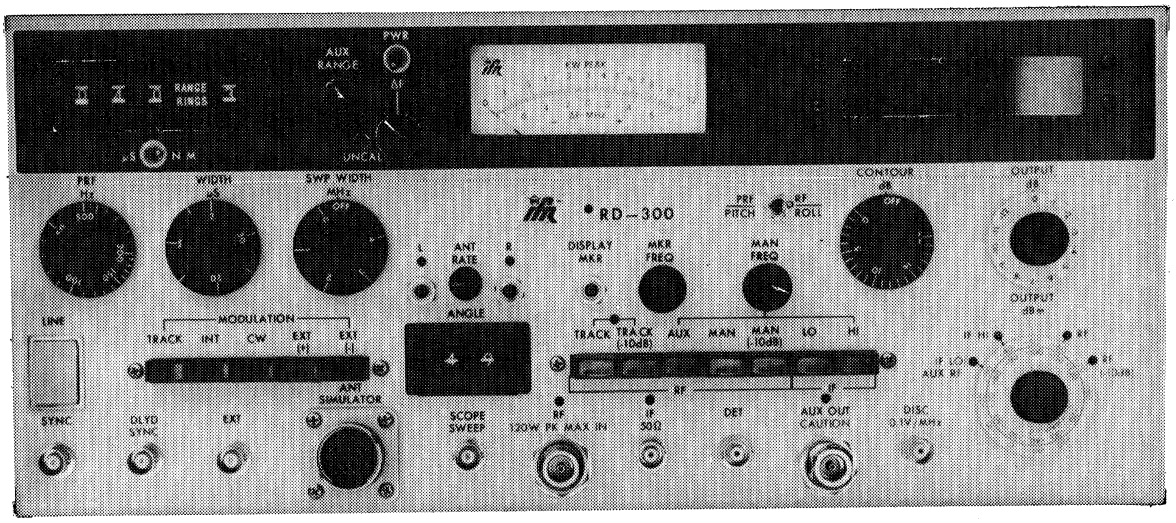
2-5-2. DO NOT return an instrument or its component parts to IFR without first receiving authorization from the IFR Customer Service Department. Refer to the LIMITED WARRANTY AND SERVICE INSTRUCTIONS for complete directions.

SECTION III

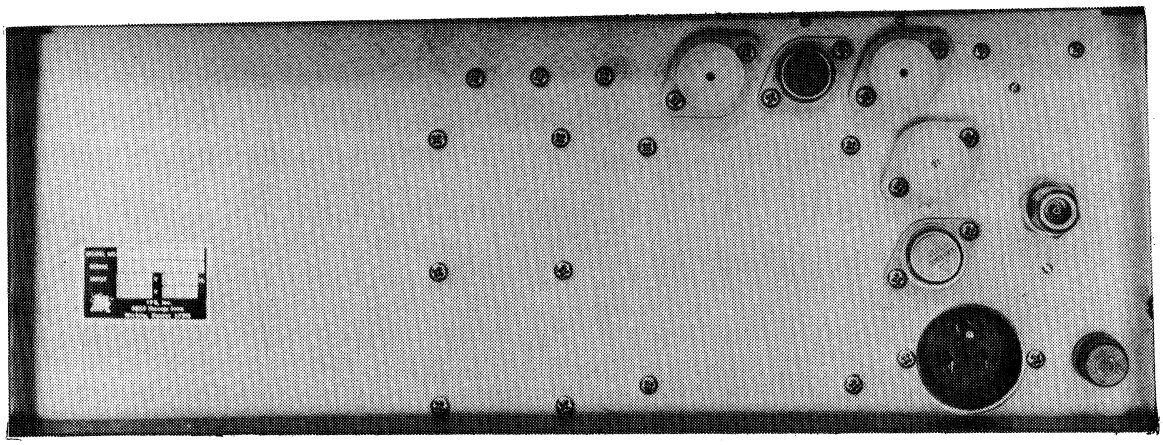
OPERATING PROCEDURES



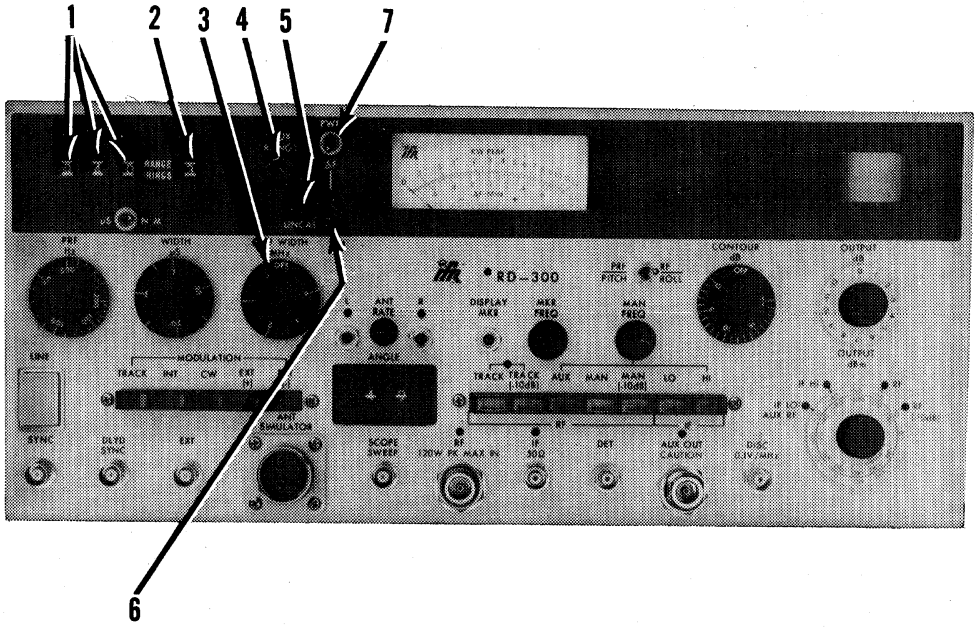
RD-300 Front Panel Effective Prior to S/N 109



RD-300 Front Panel Effective S/N 109 & on



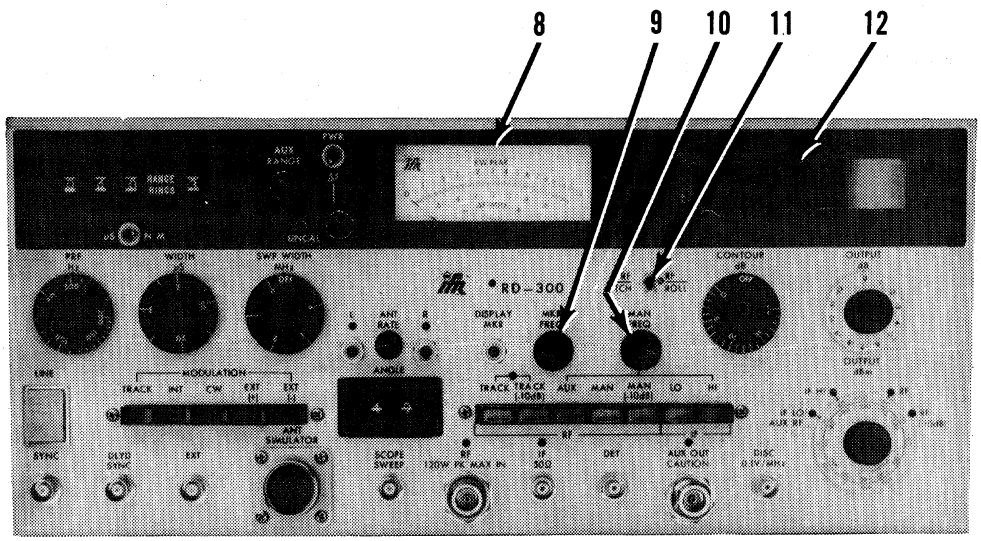
RD-300 Rear Panel



CONTROL/INDICATOR/CONNECTOR	FUNCTION
1. RANGE SELECTOR	THREE THUMBWHEEL SWITCHES USED TO SELECT RANGE DELAY OF SIMULATED RETURN FROM 1 TO 999 IN MICROSECONDS (µS) OR NAUTICAL MILES (NM). START OF DELAY IS CONTROLLED BY MODULATION MODE SELECTORS (42).
2. RANGE RING SELECTOR	THUMBWHEEL SWITCH USED TO SELECT NUMBER OF EQUALLY SPACED SIMULATED RETURNS. 1 THROUGH 9 POSITIONS SELECT NUMBER OF EQUALLY SPACED RANGE RINGS. AUX POSITION SELECTS SINGLE, CONTINUOUSLY VARIABLE RANGE RING WITH RANGE DELAY OF 2.1 TO 29.5 µS (.17 TO 2.4 NM) CONTROLLED BY AUX RANGE CONTROL (4) AND RING WIDTH OF 0.2 TO 3.0 µS CONTROLLED BY WIDTH CONTROL (43).

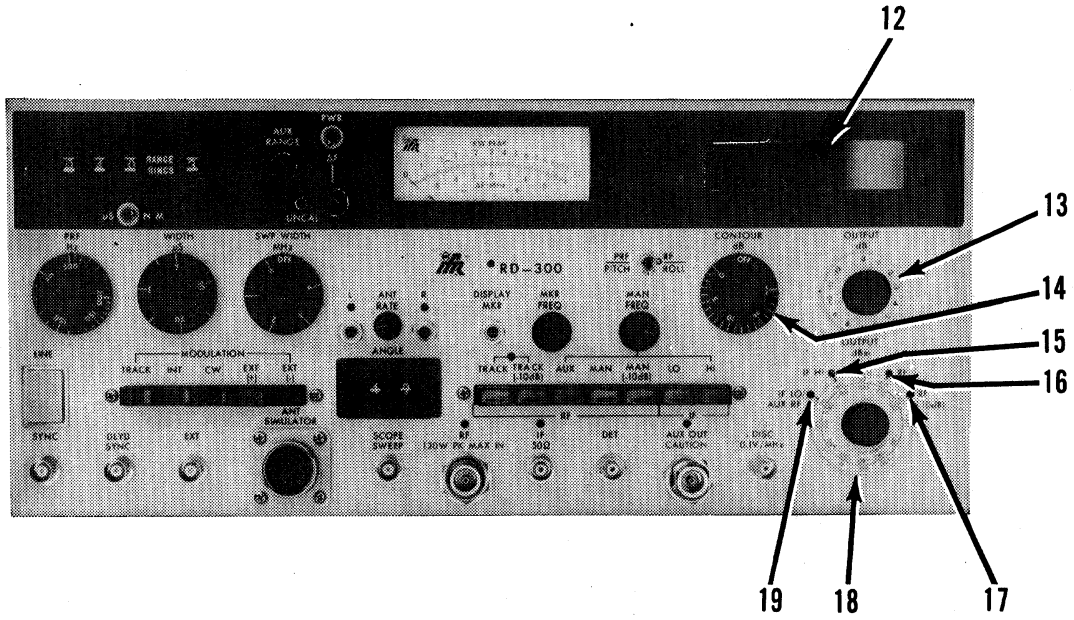
FIG 3-1
3-2

CONTROL/INDICATOR/CONNECTOR	FUNCTION
3. SWP WIDTH MHz CONTROL	SWEEP WIDTH CONTROL CONTROLS WIDTH OF PK-PK SWEEP OF IF SYSTEM. SWEEP RATE IS 100 Hz.
4. AUX RANGE CONTROL	PROVIDES CONTINUOUSLY VARIABLE DELAY OF SIMULATED RETURN FROM 2.1 TO 29.5 µS (.17 TO 2.4 NM) WHEN AUX RANGE RINGS (2) IS SELECTED.
5. UNCAL INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT THE ΔF CONTROL (6) IS NOT IN THE CAL, DETENT, POSITION AND THE SYSTEM (IN TRACK MODE) IS TRACKING THE MAGNETRON FREQUENCY WITH AN OFFSET DETERMINED BY THE ΔF CONTROL.
6. ΔF CONTROL	THE DELTA FREQUENCY (ΔF) CONTROL IS USED TO OFFSET THE RF SIGNAL GENERATOR FREQUENCY BY UP TO ±0.75 MHZ FROM THE MAGNETRON FREQUENCY IN THE RF TRACK MODES. FREQUENCY OFFSET IS INDICATED ON THE ΔF SCALE OF THE PANEL METER (8) WHEN THE PWR/ΔF SWITCH (7) IS IN THE ΔF POSITION. THE FREQUENCY OFFSET IS REMOVED WHEN THE ΔF CONTROL IS THE CAL, DETENT, POSITION.
7. PWR/ΔF CONTROL	POWER/DELTA FREQUENCY SWITCH CONTROLS THE FUNCTION OF PANEL METER (8). PWR POSITION, THE METER INDICATES THE PEAK PULSE OUTPUT POWER OF THE UNIT-UNDER-TEST. IN ΔF POSITION, THE METER INDICATES THE FREQUENCY DIFFERENCE BETWEEN THE MAGNETRON AND THE TEST SET SIGNAL GENERATOR. IN TRACK MODE, THE TEST SET CONTINUES TO TRACK THE MAGNETRON, BUT WITH AN OFFSET SELECTED BY THE ΔF CONTROL (6).



CONTROL/INDICATOR/CONNECTOR	FUNCTION
8. PANEL METER	METER USED TO INDICATE MAGNETRON PEAK POWER OR OFFSET BETWEEN MAGNETRON AND SIGNAL GENERATOR. KW PEAK SCALE INDICATES PEAK RF POWER OF MAGNETRON SIGNAL AT RF CONNECTOR OVER A 1 TO 12 KW RANGE. PWR/ΔF SWITCH (7) MUST BE IN PWR POSITION. TO MEASURE 10 TO 120 KW EXTERNAL 10 dB COAXIAL ATTENUATOR MUST BE CONNECTED TO CROSSGUIDE COUPLER OUTPUT. NOTE: CALIBRATION DEPENDS ON CROSSGUIDE COUPLER AND COAX CABLE LOSSES AND IS ONLY VALID WHEN THE TEST SET IS USED WITH ITS SERIALIZED COUPLER AND CABLE. TEST SET MUST BE RECALIBRATED IF REPLACEMENT COUPLER OR CABLE IS TO BE USED.

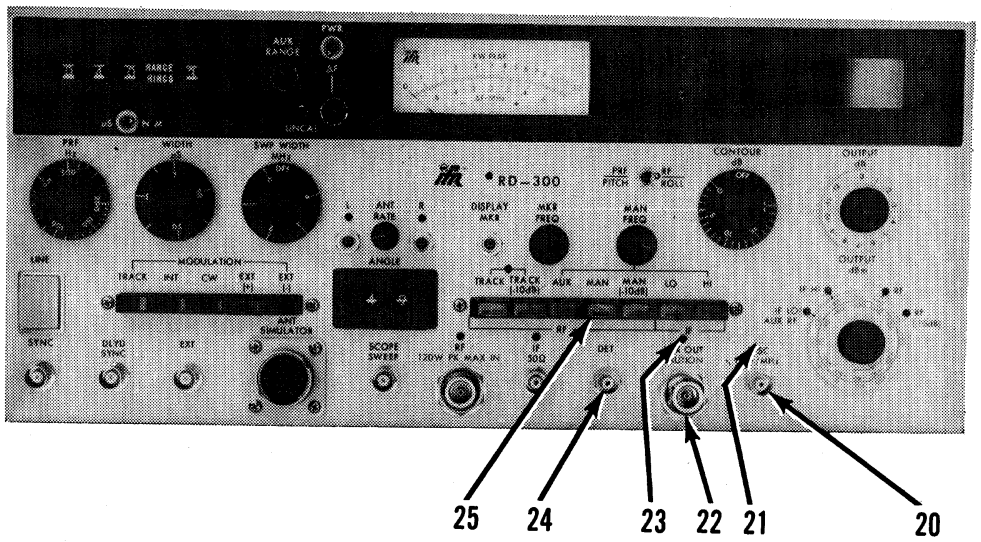
CONTROL/INDICATOR/CONNECTOR	FUNCTION
8. PANEL METER (CONT'D)	ΔF-MHz SCALE INDICATES OFFSET BETWEEN MAGNETRON AND SIGNAL GENERATOR FREQUENCIES FOR RF TRACK MODES. PWR/ΔF SWITCH (7) MUST BE IN ΔF POSITION.
9. MKR FREQ CONTROL	USED TO ADJUST IF MARKER FREQUENCIES WHEN DISPLAY MKR SWITCH (29) IS PRESSED.
10. MAN FREQ CONTROLS	MANUAL FREQUENCY CONTROLS ARE USED FOR COARSE (OUTER KNOB) AND FINE (INNER KNOB) ADJUSTMENT OF SIGNAL GENERATOR FREQUENCY FOR RF AUX, RF MAN, RF MAN (-10DB), IF LO, AND IF HI MODES (25).
11. PRF/RF - PITCH/ROLL SWITCH	USED TO CONTROL FUNCTION OF DIGITAL DISPLAY (12). PRF POSITION ALLOWS DIGITAL DISPLAY TO DISPLAY PRF OF INTERNAL OSCILLATOR, MAGNETRON, OR EXTERNAL MODULATION INPUT. RF POSITION ALLOWS DIGITAL DISPLAY TO DISPLAY RF OR IF FREQUENCIES. PITCH AND ROLL POSITIONS SWITCH THE SINE RESOLVER OUTPUT OF THE ANTENNA SIMULATOR SYSTEM BETWEEN PINS a AND b, RESPECTIVELY, OF THE ANTENNA SIMULATOR CONNECTOR. THE ANGLE OF PITCH OR ROLL IS DETERMINED BY THE ANGLE SELECTORS (33).
12. DIGITAL DISPLAY (SEVEN SEGMENT GAS DISCHARGE READOUTS).	DISPLAYS THE PRF, IF, AND RF FREQUENCIES. DISPLAYS PRF OF MAGNETRON IN TRACK MODULATION (42) MODE, PRF OF INTERNAL OSCILLATOR IN INT MODULATION (42) MODE, OR PRF OF EXTERNAL TRIGGER SIGNAL IN EXT MODULATION (42) MODE WHEN PRF/RF SWITCH (11) IS IN PRF POSITION.



CONTROL INDICATOR CONNECTOR	FUNCTION
12. DIGITAL DISPLAY (CONT'D)	WITH PRF/RF SWITCH (11) IN RF POSITION, DISPLAY IF SIGNAL GENERATOR FREQUENCY IN IF LO (25) AND IF HI (25) MODES OR IF MARKER FREQUENCY WHEN DISPLAY MKR SWITCH (29) IS PRESSED. WITH PRF/RF SWITCH (11) IN RF POSITION, DISPLAYS SIGNAL GENERATOR/MAGNETRON FREQUENCY IN RF TRACK MODES OR SIGNAL GENERATOR FREQUENCY IN RF AUX, RF MAN AND RF MAN (-10 DB) MODES.
13. OUTPUT DB CONTROL	1 DB STEPPED ATTENUATOR DECREASES RF OR IF OUTPUT IN 1 DB STEPS FROM 0 TO -12 DB, TO 10 DB (S/N 282 ON).
14. CONTOUR DB CONTROL	CONTROLS AN INCREASE IN OUTPUT LEVEL* ABOVE THE SETTINGS OF THE STEPPED OUTPUT ATTENUATORS. WHEN CONTROL IS NOT IN OFF (DETENT) POSITION, SIGNAL GENERATOR PULSE WIDTH IS FIXED AT 270 µS FOR 1 THROUGH 9 POSITIONS OF RANGE RINGS SELECTOR (2).

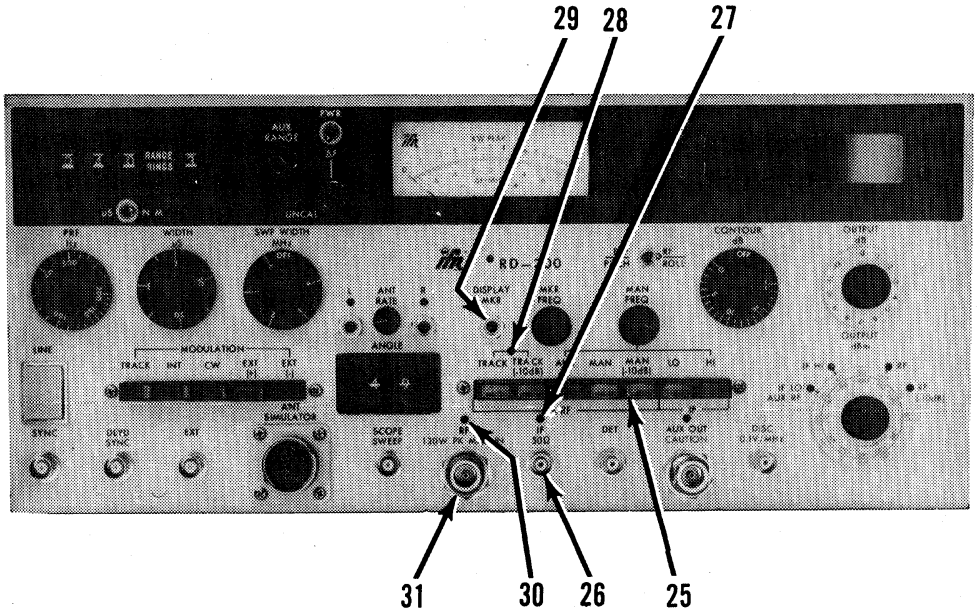
* OF RF AND AUX OUTPUTS ONLY

CONTROL/INDICATOR/CONNECTOR	FUNCTION
15. IF HI MODE INDICATOR (GREEN)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON WHEN IF HI MODE (25) IS SELECTED TO INDICATE WHICH COLOR SCALE AND WHICH INDEX MARK TO USE FOR THE OUTPUT dBm CONTROL (18) SETTING. THE GREEN SCALE SHOULD BE USED WITH THE INDEX BELOW THE INDICATOR.
16. RF MODE INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON WHEN RF TRACK OR RF MAN MODE (25) IS SELECTED TO INDICATE WHICH MARK TO USE FOR THE OUTPUT dBm CONTROL (18) SETTING. THE RED SCALE SHOULD BE USED WITH THE INDEX BELOW THE INDICATOR.
17. RF (-10dB) MODE INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON WHEN RF TRACK (-10 dB) OR RF MAN (-10 dB) MODE (25) IS SELECTED TO INDICATE WHICH COLOR SCALE AND WHICH INDEX MARK TO USE FOR THE OUTPUT dBm CONTROL (18) SETTING. THE RED SCALE SHOULD BE USED WITH THE INDEX BELOW THE INDICATOR.
18. OUTPUT dBm CONTROL	10 dB STEPPED ATTENUATOR VARIES RF OR IF OUTPUT IN 10 dB STEPS. RED AND GREEN SCALES ARE INDEXED TO INDEX MARK UNDER INDICATOR OF SAME COLOR.
19. IF LO/AUX RF MODE INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON WHEN IF LO OR AUX RF MODE (25) IS SELECTED TO INDICATE WHICH COLOR SCALE AND WHICH INDEX MARK TO USE FOR THE OUTPUT dBm CONTROL (18) SETTING. THE RED SCALE SHOULD BE USED WITH THE INDEX BELOW THE INDICATOR.



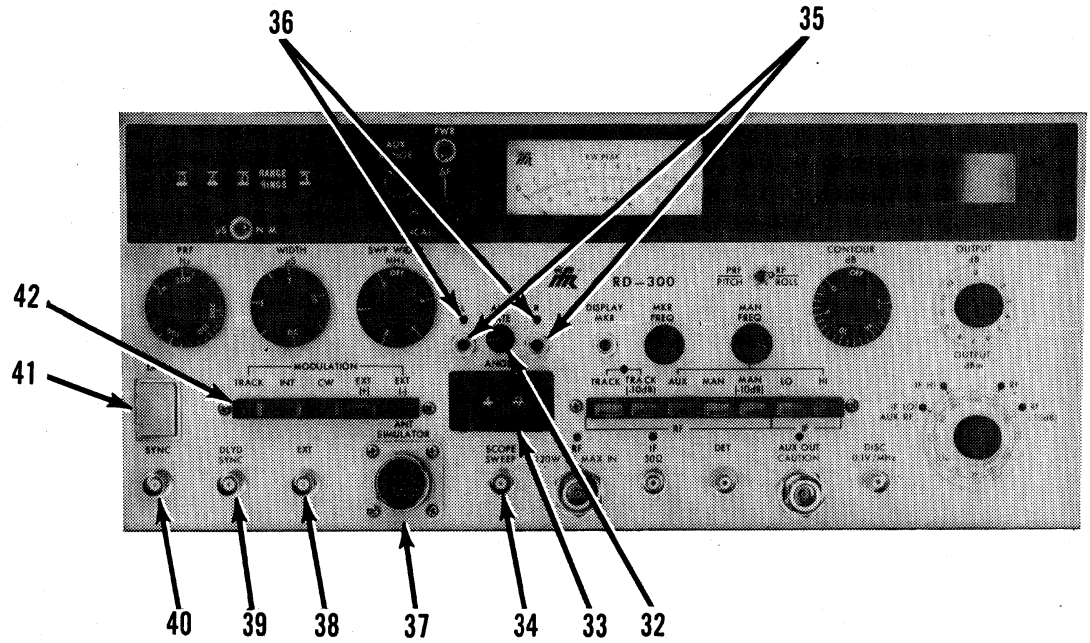
CONTROL/INDICATOR/CONNECTOR	FUNCTION
20. DISC OUT CONNECTOR	DISCRIMINATOR OUTPUT CONNECTOR FOR PULSE DISCRIMINATOR USED TO MONITOR MAGNETRON PULSE FREQUENCY VS. TIME CHARACTERISTICS ON EXTERNAL OSCILLOSCOPE, TRIGGERED FROM SYNC OUTPUT. CALIBRATION FACTOR IS 0.1V/MHZ WHEN TERMINATED IN 50 OHMS AT THE SCOPE. A 35 µS SYSTEM REFERENCE PULSE OCCURS 50 µS AFTER THE MAGNETRON SIGNAL.
21. FINE OFFSET ADJUST	A SCREWDRIVER FINE ADJUSTMENT USED TO ALIGN THE RD-300 FREQUENCY WITH - THE FREQUENCY OF THE MAGNETRON.
22. AUX OUT CONNECTOR	AUXILIARY OUTPUT USED FOR GENERAL SIGNAL GENERATOR APPLICATIONS WITH OUTPUT LEVEL CALIBRATED AT THE CONNECTOR. FULLY PROTECTED AGAINST ACCIDENTAL CONNECTION TO CABLE FROM CROSSGUIDE COUPLER ON R/T UNIT.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
22. AUX OUT CONNECTOR (CONT'D)	OUTPUT LEVEL IS SUM OF OUTPUT dBM (18), OUTPUT dB (13), AND CONTOUR dB (14), CONTROL SETTINGS. MAXIMUM OUTPUT POWER WITH -20 dBM OUTPUT AND FULL CONTOUR BOOST IS APPROXIMATELY -10 dBm.
23. AUX OUT INDICATOR	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT RF OUTPUT IS AVAILABLE AT AUX OUT CONNECTOR (22) FOR AUX MODE (25).
24. DET CONNECTOR	DETECTOR OUTPUT FOR DISPLAYING MAGNETRON PULSE SHAPE CHARACTERISTICS ON AN EXTERNAL OSCILLOSCOPE. OUTPUT SHOULD BE TERMINATED IN 50 OHMS AT SCOPE FOR BEST PULSE FIDELITY.
25. RF/IF MODE SELECTORS	PUSHBUTTON SELECTORS USED TO SELECT OPERATING MODE OF TEST SET. IN TRACK MODE, RF SIGNAL GENERATOR SYSTEM ACQUIRES AND TRACKS MAGNETRON FREQUENCY OF R/T UNIT CONNECTED TO RF CONNECTOR (31). TRACK (-10 dB) MODE IS SIMILAR TO TRACK MODE BUT IS ONLY USED WITH AN EXTERNAL 10 dB COAXIAL ATTENUATOR INSERTED AT THE CROSSGUIDE COUPLER OUTPUT FOR R/T UNITS WITH 10 TO 120 KW PEAK POWER OUTPUT. IN AUX MODE, RF SIGNAL GENERATOR FREQUENCY IS CONTROLLED BY MAN FREQ CONTROL (10) AND CALIBRATED OUTPUT IS AVAILABLE AT AUX OUT CONNECTOR (22).



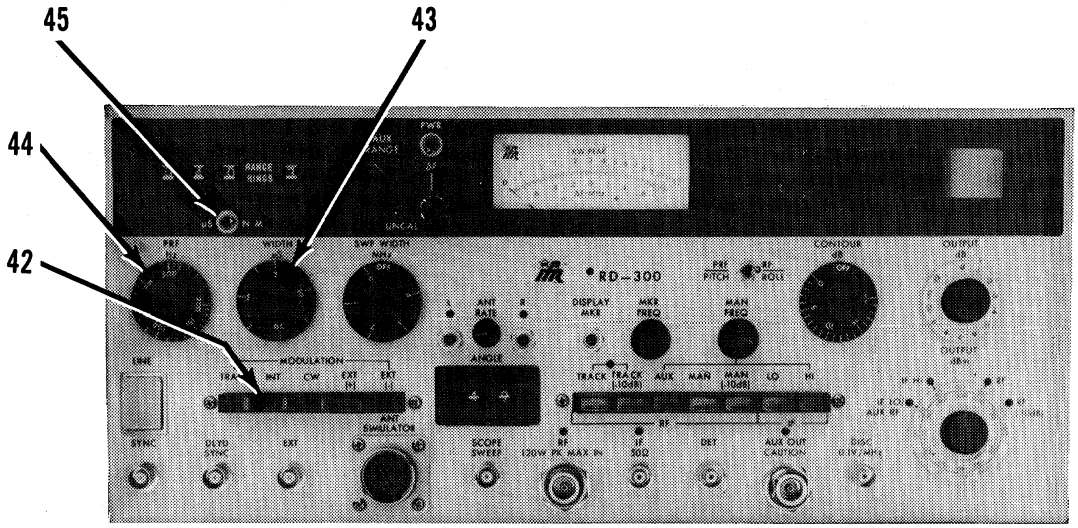
CONTROL/INDICATOR/CONNECTOR	FUNCTION
25. RF/IF MODE SELECTORS (CONT'D)	IN MAN MODE, RF SIGNAL GENERATOR FREQUENCY IS CONTROLLED BY MAN FREQ CONTROL (10). OUTPUT IS THROUGH RF CONNECTOR (31) AND IS CALIBRATED AT R/T UNIT WITH SERIALIZED COAX CABLE AND CROSSGUIDE COUPLER. MAN (-10 DB) MODE IS SIMILAR TO MAN MODE BUT IS ONLY USED WITH AN EXTERNAL 10 DB COAXIAL ATTENUATOR INSERTED AT CROSSGUIDE COUPLER OUTPUT FOR R/T UNITS WITH 10 TO 120 KW PEAK POWER OUTPUT. IN LO MODE, IF SIGNAL GENERATOR IS ACTIVATED IN LOW POWER RANGE (-20 TO -130 dBm). MAN FREQ CONTROL (10) CONTROLS FREQUENCY FROM 20 TO 70 MHZ. OUTPUT IS AVAILABLE AT IF CONNECTOR (26).

CONTROL/INDICATOR/CONNECTOR	FUNCTION
25. RF/IF MODE SELECTORS (CONT'D)	IN HI MODE, IF SIGNAL GENERATOR IS ACTIVATED IN HIGH POWER RANGE (+20 TO -90 dBm). MAN FREQ CONTROL (10) CONTROLS FREQUENCY FROM 20 TO 70 MHz. OUTPUT IS AVAILABLE AT IF CONNECTOR (26).
26. IF OUTPUT CONNECTOR	50 OHM OUTPUT CONNECTOR FOR IF SIGNAL GENERATOR. OUTPUT LEVEL IS SUM OF OUTPUT dBM (18) AND OUTPUT dB (13) CONTROL SETTINGS.
27. IF OUTPUT INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT IF OUTPUT IS AVAILABLE AT IF OUTPUT CONNECTOR (26) FOR IF LO OR IF HI MODES (25).
28. TRACK INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT RF SIGNAL GENERATOR SYSTEM HAS ACQUIRED MAGNETRON FREQUENCY AND IS TRACKING THE FREQUENCY IN TRACK MODES (25).
29. DISPLAY MKR SWITCH	DISPLAY MARKER SWITCH IS PRESSED TO ADD MARKER SIGNAL (SIGNAL LEVEL APPROX. -20 DBC) TO IF OUTPUT (26) AND DISPLAY MARKER GENERATOR FREQUENCY ON DIGITAL DISPLAY (12).
30. RF OUTPUT INDICATOR (RED)	LIGHT EMITTING DIODE INDICATOR WHICH COMES ON TO INDICATE THAT RF OUTPUT IS AVAILABLE AT RF OUTPUT CONNECTOR (31) FOR TRACK, TRACK (-10 DB), MAN OR MAN (-10 DB) MODES (25).
31. RF OUTPUT CONNECTOR	INPUT/OUTPUT CONNECTOR TO COUPLE TEST SET TO ANTENNA WAVEGUIDE PORT ON R/T UNIT. OUTPUT IS CALIBRATED AT R/T UNIT USING SERIALIZED COAX CABLE AND CROSSGUIDE COUPLER. OUTPUT LEVEL IS SUM OF OUTPUT DBM (18), OUTPUT DB (13) AND CONTOUR DB (14) CONTROL SETTINGS.



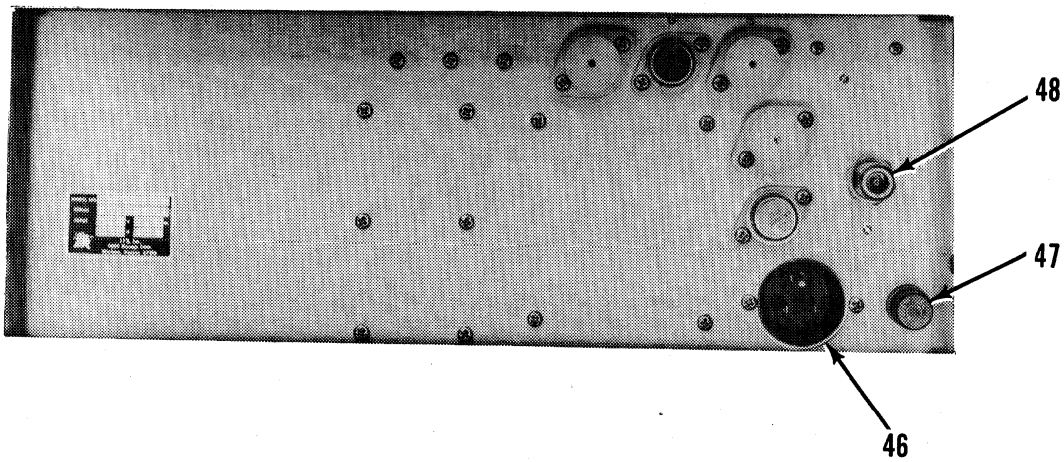
CONTROL/INDICATOR/CONNECTOR	FUNCTION
32. ANT RATE CONTROL	CONTROLS SCAN RATE OF ANTENNA SIMULATOR SYSTEM FROM 0 TO 150 LOOKS PER MINUTE. IN DETENT (OFF) POSITION, SIMULATED ANTENNA POSITION IS STATIC (FIXED) AT ANGLE SELECTED BY ANGLE SELECTORS (33) IN QUADRANT SELECTED BY ANTENNA QUADRANT SELECTORS (35).
33. ANGLE SELECTORS	TWO THUMB WHEEL SWITCHES USED TO SELECT MAXIMUM SWEEP ANGLE FOR ANTENNA SIMULATOR SWEEP SYSTEM OR STATIC SIMULATED ANTENNA POSITION WHEN ANT RATE CONTROL (32) IS IN DETENT POSITION (SWEEP SYSTEM DISABLED). ANGLE CAN BE VARIED FROM 0° TO 89°. PITCH AND ROLL POSITIONS OF THE PRF/RF - PITCH/ROLL SWITCH (11) SET THE SINE RESOLVER OUTPUT OF THE ANTENNA SIMULATOR SYSTEM BETWEEN PINS a AND b, RESPECTIVELY, OF THE ANTENNA SIMULATOR CONNECTOR. THE ANGLE OF PITCH OR ROLL IS DETERMINED BY THE ANGLE SELECTORS.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
34. SCOPE SWEEP CONNECTOR	OUTPUT FOR 2.5 VOLT PK-PK, 100 Hz RAMP FOR HORIZONTAL DRIVE TO AN EXTERNAL OSCILLOSCOPE DURING IF SWEEP TESTS.
35. ANTENNA QUADRANT SELECTORS	PUSHBUTTON SWITCHES USED TO SELECT EITHER A RIGHT OR LEFT STATIC SIMULATED ANTENNA POSITION WHEN ANT RATE CONTROL (32) IS IN DETENT POSITION. ANTENNA QUADRANT INDICATORS (36) INDICATE QUADRANT.
36. ANTENNA QUADRANT INDICATORS (RED)	LIGHT EMITTING DIODE INDICATORS WHICH COME ON TO INDICATE WHICH QUADRANT OF THE DISPLAY THE SIMULATED ANTENNA IS SCANNING {LEFT (L) OR RIGHT (R) OF CENTER OF DISPLAY}.
37. ANT SIMULATOR CONNECTOR	OUTPUT CONNECTOR FOR ANTENNA SIMULATOR SYSTEM. SYNCHRO, RESOLVER, AND DC POT OUTPUTS ARE AVAILABLE TO SWEEP RADAR INDICATOR.
38. EXT CONNECTOR	INPUT CONNECTOR FOR EXTERNAL 2 TO 50 VOLT PEAK PULSE USED TO TRIGGER START OF RANGE DELAY IN EXT (+) AND EXT (-) MODULATION MODES (42).
39. DLYD SYNC CONNECTOR	OUTPUT FOR DELAYED SYNC PULSE WITH LEADING EDGE COINCIDENT WITH END OF RANGE DELAY. DELAYED SYNC PULSE IS GENERATED FOR 1 THRU 9 AND AUX POSITIONS OF RANGE RINGS SELECTOR (2).
40. SYNC CONNECTOR	OUTPUT FOR SYNC PULSE WITH LEADING EDGE COINCIDENT WITH START OF RANGE DELAY.
41. LINE SWITCH	PUSH-ON/PUSH-OFF SWITCH USED TO APPLY POWER TO THE TEST SET.
42. MODULATION MODE SELECTORS	PUSHBUTTON SELECTORS USED TO SELECT MODE FOR STARTING SIMULATED RETURN DELAY. TRACK SELECTOR STARTS DELAY AT LEADING EDGE OF MAGNETRON PULSE FROM R/T UNIT CONNECTED TO RF CONNECTOR (31).

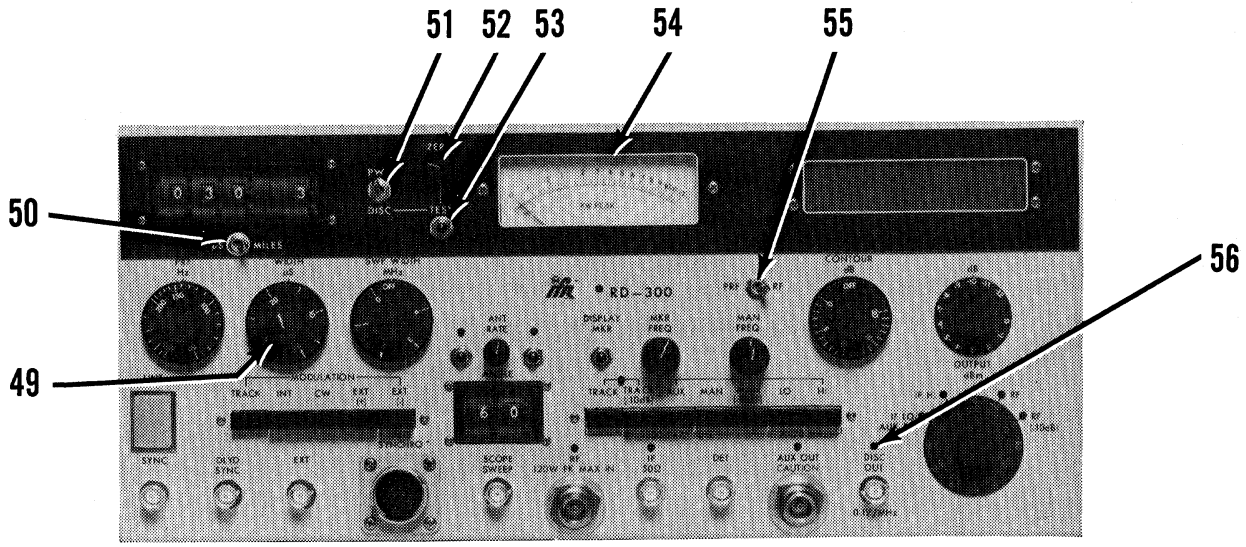


CONTROL/INDICATOR/CONNECTOR →	FUNCTION
42. MODULATION MODE SELECTORS (CONT'D)	INT (INTERNAL) SELECTOR STARTS DELAY UNDER CONTROL OF INTERNAL PRF OSCILLATOR. CW SELECTOR SELECTS CONTINUOUS WAVE RF OR IF OUTPUTS. EXT (+) SELECTOR STARTS DELAY AT LEADING EDGE OF 2 TO 50 VOLT PEAK, POSITIVE-GOING PULSE APPLIED TO EXT CONNECTOR (38). EXT (-) SELECTOR STARTS DELAY AT LEADING EDGE OF 2 TO 50 VOLT PEAK, NEGATIVE-GOING PULSE APPLIED TO EXT CONNECTOR (38).
43. WIDTH µS CONTROL	USED TO ADJUST PULSE WIDTH OF SIMULATED RETURN FROM 2 TO 30 µS FOR 1 TO 9 RANGE RINGS (2) OR .2 TO 3 µS FOR AUX RANGE RINGS (2).

CONTROL/INDICATOR/CONNECTOR	FUNCTION
43. WIDTH µS CONTROL (CONT'D)	NOTE: PULSE WIDTH FOR 1 TO 9 RANGE RINGS IS FIXED AT 270 µS WHEN CONTOUR dB (14) CONTROL IS OUT OF DETENT (OFF) POSITION.
44. PRF Hz CONTROL	CONTROLS FREQUENCY OF PULSE REPETITION FREQUENCY (PRF) OSCILLATOR FOR INT MODULATION MODE (42).
45. µS/NM SWITCH	SELECTS UNITS OF RANGE SELECTOR (1) DELAY IN MICROSECONDS OR NAUTICAL MILES.
* X1, X4 SWITCH	OPTIONAL SWITCH USED TO MULTIPLY THE SELECTED PULSE WIDTH BY FOUR. FOR USE IN NORMAL (1-9 RANGE RINGS) MODE ONLY.



CONTROL/INDICATOR/CONNECTOR	FUNCTION
46. AC CONNECTOR	INPUT CONNECTOR FOR 115/230 VOLTS AC 50 TO 400 Hz, 150 WATTS LINE.
47. FUSE HOLDER	HOLDS MDL-1 FUSE.
48. SPECTRUM ANALYZER CONNECTOR	PROVIDES ATTENUATED RADAR SIGNAL FOR A SPECTRUM ANALYZER.



CONTROL/INDICATOR/CONNECTOR	FUNCTION
49. AUX RANGE CONTROL	PROVIDES CONTINUOUSLY VARIABLE DELAY OF SIMULATED RETURN FROM 2.1 TO 29.5 µS (0.17 TO 2.4 NM) WHEN AUX RANGE RINGS (2) IS SELECTED.
50. µS/MILES SWITCH	SELECTS UNITS OF RANGE SELECTOR (1) DELAY IN MICROSECONDS OR NAUTICAL MILES.
51. PWR/DISC SWITCH	THE POWER/DISCRIMINATOR FREQUENCY SWITCH CONTROLS THE FUNCTION OF PANEL METER (54). PWR POSITION, THE METER INDICATES THE PEAK PULSE OUTPUT POWER OF THE UNIT-UNDER-TEST. WHEN THE PWR/DISC SWITCH IS IN DISC, THE METER INDICATES IF THERE IS A FREQUENCY DIFFERENCE BETWEEN THE MAGNETRON AND THE TEST SET SIGNAL GENERATOR.
52. ZERO CONTROL	THE ZERO CONTROL IS USED IN CONJUNCTION WITH THE TEST SWITCH (53) TO ALIGN THE FREQUENCY OF THE RD-300 WITH THE FREQUENCY OF THE UNIT-UNDER-TEST.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
53. TEST SWITCH	A PUSHBUTTON SWITCH WHICH ACTIVATES A 30 MHZ TEST SIGNAL USED IN ALIGNING THE FREQUENCY OF THE RD-300 WITH THE FREQUENCY OF THE UNIT-UNDER-TEST. THE PANEL METER (54) INDICATION IS ZEROED, THROUGH THE USE OF THE ZERO CONTROL (52), WHILE THE TEST SWITCH IS DEPRESSED. THE METER INDICATION IS PROPERLY ALIGNED WITH THE RADAR R/T UNIT FREQUENCY WHEN THE PANEL METER (54) INDICATES THE SAME READING WITH OR WITHOUT THE TEST SWITCH BEING ACTIVATED.
54. PANEL METER	METER USED TO INDICATE MAGNETRON PEAK POWER OR TO SHOW THE PRESENCE OF A FREQUENCY OFFSET BETWEEN THE MAGNETRON AND THE SIGNAL GENERATOR. WHEN PWR/DISC SWITCH (51) IS IN PWR, THE KW SCALE OF THE METER INDICATES THE PEAK RF POWER OF THE MAGNETRON OVER A RANGE OF 1 TO 12 KW. IF AN EXTERNAL 10 DB COAXIAL ATTENUATOR IS ATTACHED TO THE WAVEGUIDE DIRECTIONAL COUPLER A RANGE OF 10 TO 120 KW MAY BE MEASURED WITH THE PWR/DISC SWITCH (51) AT PWR. NOTE: CALIBRATION DEPENDS ON CROSSGUIDE COUPLER AND COAX CABLE LOSSES AND IS ONLY VALID WHEN THE TEST SET IS USED WITH ITS SERIALIZED COUPLER AND CABLE. TEST SET MUST BE RECALIBRATED IF REPLACEMENT COUPLER OR CABLE IS TO BE USED. WHEN PWR/DISC SWITCH (51) IS IN DISC, THE PANEL METER (54) INDICATES WHETHER A FREQUENCY OFFSET EXISTS BETWEEN THE MAGNETRON AND THE SIGNAL GENERATOR.

CONTROL/INDICATOR/CONNECTOR	FUNCTION
55. PRF/RF SWITCH	USED TO CONTROL FUNCTION OF DIGITAL DISPLAY (12). PRF POSITION ALLOWS DIGITAL DISPLAY TO DISPLAY PRF OF INTERNAL OSCILLATOR, MAGNETRON, OR EXTERNAL MODULATION INPUT. RF POSITION ALLOWS DIGITAL DISPLAY (12) TO INDICATE RF, IF OR MARKER FREQUENCIES.
56. BASELINE CLIPPER SCREWDRIVER ADJUST	FINE ADJUSTMENT OF THE INTERNAL FUNCTION OF THE 30 MHZ DISCRIMINATOR.

3-1. The following paragraphs supplement the radar unit manufacturer's test procedures and demonstrate the capabilities of the RD-300 Radar Test Set. The procedures should be used in conjunction with manufacturer's procedures. Each procedure is complete within itself. Only those controls which have a direct effect on the procedure are called out. Other controls are internally disabled or have no effect on the outcome of the procedure.

3-2. The operator must be familiar with the RD-300 controls, indicators, and connectors and their functions as described in Figure 3-1. All control settings are for the Test Set unless otherwise noted. The Test Set should be turned on and have a short time to stabilize before testing is begun.

3-3. An oscilloscope is the only additional test equipment required with the RD-300. Provisions should be made at the test bench for oscilloscope monitoring of the video signal from the radar R/T unit. If no control settings are specified for the oscilloscope, the operator should set the controls for a suitable display.

3-4. An antenna and servo mechanism are not required for testing the radar R/T unit. The RD-300 Test Set has provisions for an antenna simulator which will sweep the indicator display. Refer to paragraph 3-21 for Antenna Simulator Connections.

3-5. In Test Sets with serial numbers 96 to 99 and 101 to 108 the ZERO offset needs to be set only once after the Test Set has been turned on and may be checked periodically thereafter. There is no need to adjust the ZERO offset for each procedure if the procedures are performed consecutively.

3-6. NOTE

The following procedures are applicable to all RD-300 Radar Test Sets unless otherwise noted. An instruction in brackets, [], are applicable only to sets with serial numbers 96 to 99 and 101 to 108 and should be used instead of the instruction which preceeds it.

In test sets with serial numbers 96 to 99 and 101 to 108 the discriminator must be manually adjusted to zero the frequency error. The instruction [Zero Discriminator] requires that the following steps be performed.

1. Wait for TRACK Indicator (28) to come on.
2. Note reading on DISC scale of Test Set Panel Meter (8).
3. Press TEST Switch and adjust ZERO Control until meter indication corresponds to the reading noted in step 2.

3-7. PEAK POWER MEASUREMENT

DESCRIPTION: The peak power output to the radar R/T unit is measured directly from the Panel Meter (8) on the front panel of the Test Set.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set PWR/ΔF [PWR/DISC] control (7) to PWR position.
3. Read peak power measurement on Panel Meter (8).

3-8. MAGNETRON FREQUENCY MEASUREMENT

DESCRIPTION: The frequency of the magnetron of the radar R/T unit is measured directly from the Digital Display (12) on the Test Set.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set controls as follows:

   RF/IF Mode (25) . . . . . TRACK

   MODULATION Mode (42). . . . . TRACK

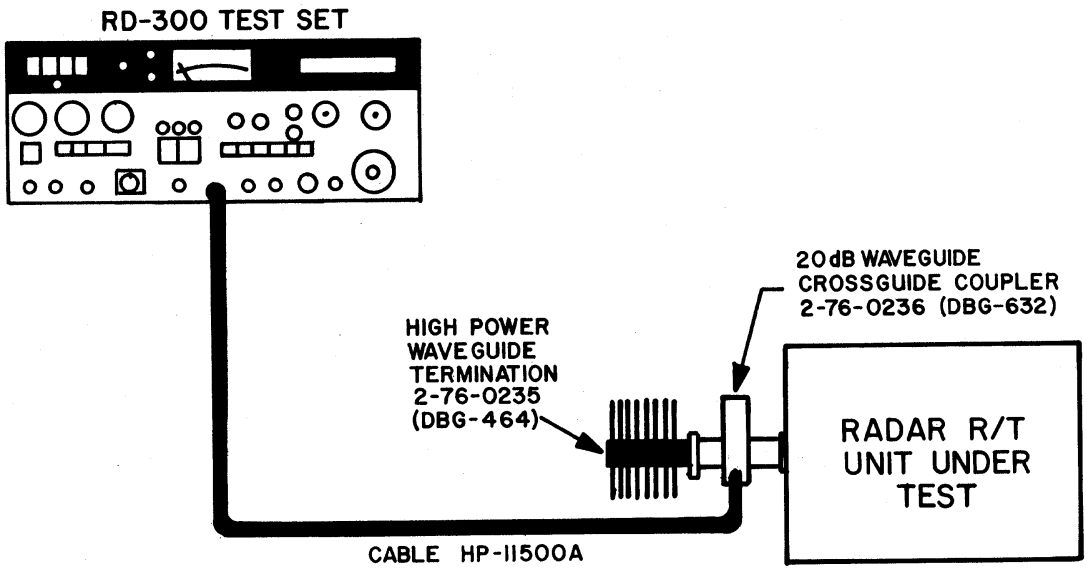
   PRF/RF (11) . . . . . RF

   ΔF (6). . . . . Cal (detent)
   [PWR/DISC . . . . . DISC]

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Read magnetron frequency directly from Digital Display (12).

3-9. PULSE REPETITION FREQUENCY MEASUREMENT

DESCRIPTION: The PRF of the radar R/T unit is measured directly on the Digital Display (12) on the Test Set.



CAUTION

ATTENUATOR CONNECTION PER SHEET 2 MUST BE USED FOR R/T UNITS ABOVE 12KW AND BELOW 120KW.

NOTE

See Sheet 2 For Attenuator Connection For 12 To 120KW R/T Units.

Figure 3-2 Normal Operating Setup (Sheet 1 of 2)

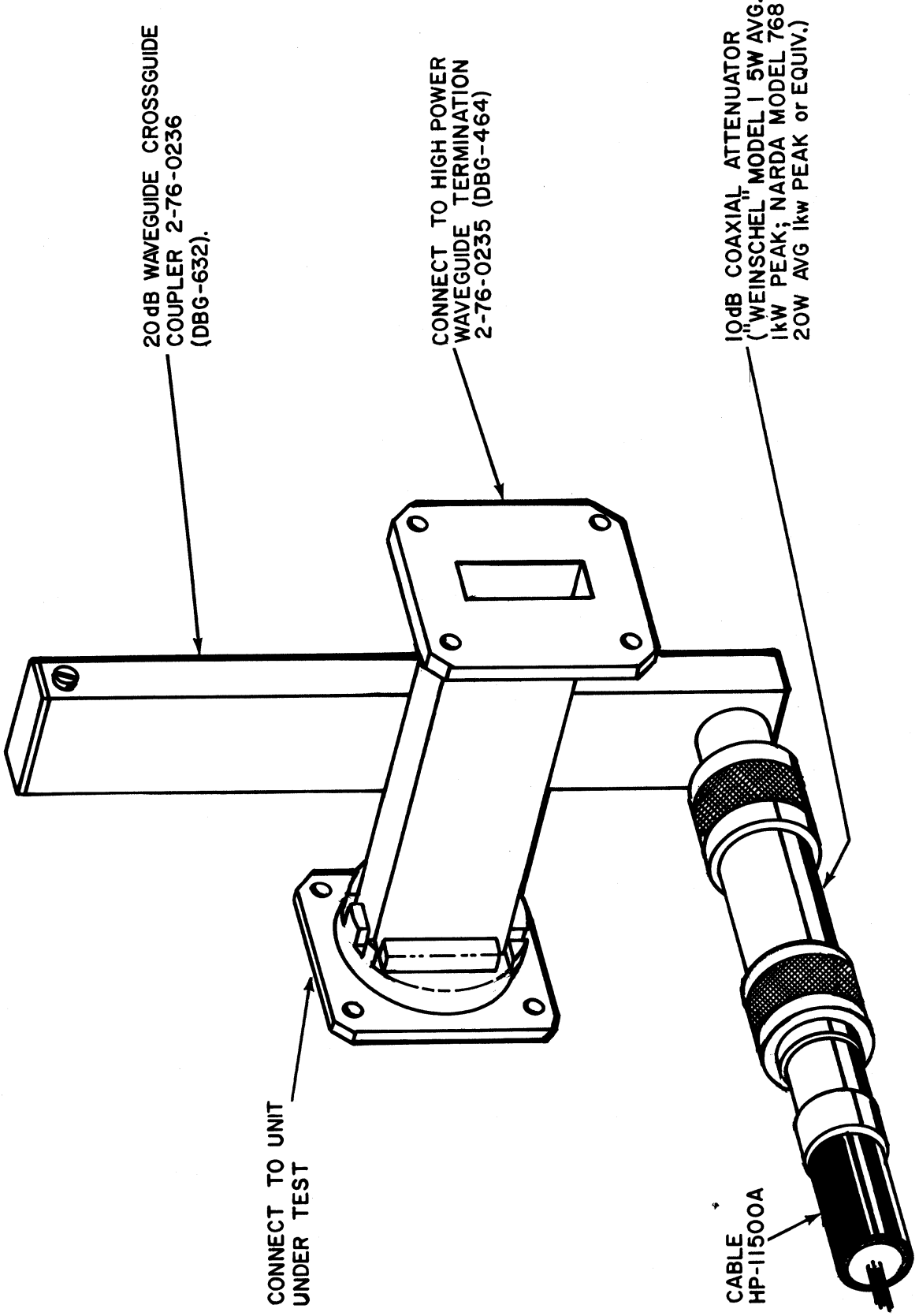


Figure 3-2 Normal Operating Setup (Sheet 2 of 2)

3-9. PULSE REPETITION FREQUENCY MEASUREMENT (cont'd)

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set PRF/RF Switch (11) to PRF position.
3. Read PRF directly from Digital Display (12).

3-10. RECEIVER SENSITIVITY MEASUREMENT

DESCRIPTION: The sensitivity of the radar receiver is measured by applying a controlled signal level to the receiver and monitoring the receiver video to determine the Minimum Discernable Signal (MDS) or Tangential Sensitivity Signal (TGS).

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set Controls as follows:

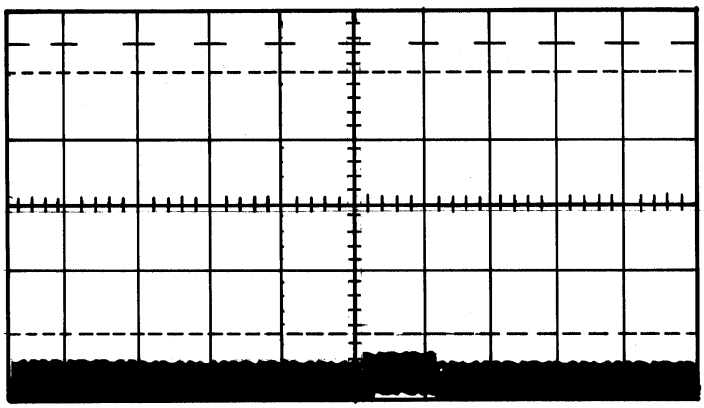
   RF/IF Mode (25). . . . . TRACK

   MODULATION Mode (42) . . . . . TRACK

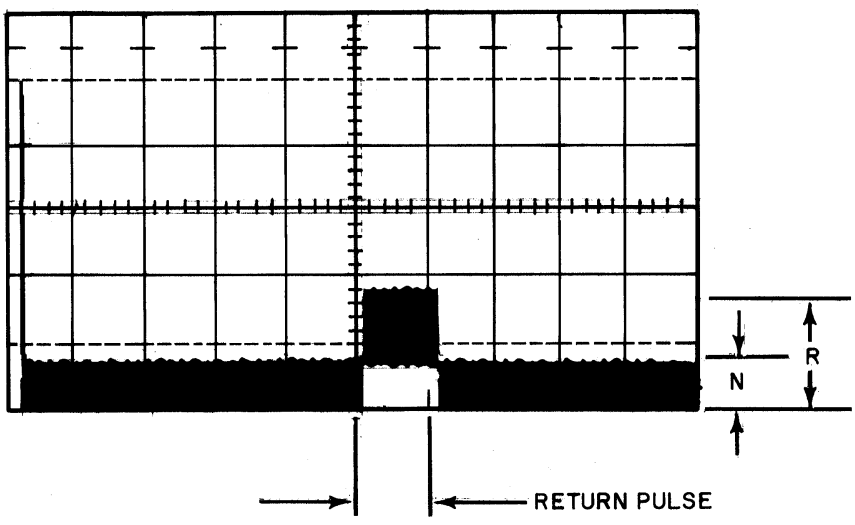
   RANGE RING (2) 1

   ΔF (6) . . . . . Cal (detent)
   [PWR/DISC. . . . . DISC]

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Adjust WIDTH μs Control (43) and Range Selector (1) for desired pulse width and range delay. If a pulse wider than 30 μs is desired, 270 μs pulse is available by adjusting the CONTOUR dB Control (14), out of detent, to 0 dB position.
5. Connect oscilloscope to monitor receiver video. Trigger scope from DLYD SYNC Connector (39) on Test Set.
6. Use OUTPUT dB Control (13) and OUTPUT dBm Control (18) to lower output of Test Set until oscilloscope response is just discernable (MDS) or until simulated return pulse just rises above the noise level (TGS) as shown in Figure 3-3. Receiver sensitivity is then read directly from the OUTPUT Control dials (13 & 18).



MINIMUM DISCERNABLE SIGNAL
(MDS)



TANGENTIAL SENSITIVITY SIGNAL
(TGS)

FIG. 3-3 RECEIVER SENSITIVITY OSCILLOSCOPE DISPLAY

3-11. CONTOUR THRESHOLD MEASUREMENT

DESCRIPTION: The output of the Test Set is set to the level to which the contour level of the R/T is referenced (MDS or TGS). The output level is then increased until the contour threshold is reached and the level above the reference is read directly off the dial.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set controls as follows:

   RF/IF Mode (25). . . . . TRACK

   MODULATION Mode (42) . . . . . TRACK

   ΔF (6) . . . . . Cal (detent)
   [PWR/DISC. . . . . DISC]

   RANGE RING (2) 1

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.
5. Set Test Set OUTPUT controls (13 & 18) for output level corresponding to level of reference for contour threshold (MDS or TGS). See Paragraph 3-10.
6. According to manufacturer's recommendations or standard practices, monitor the video on an oscilloscope or monitor the radar indicator display in order to determine when the contour level is reached.
7. Adjust the CONTOUR dB Control (14) until the contour level is reached. Read contour threshold level from CONTOUR dB Control (14) dial.

3-12. RECEIVER IF BANDWIDTH MEASUREMENT

DESCRIPTION: The Test Set is used to track magnetron frequency and to offset the return signal frequency while monitoring the radar R/T video or indicator to determine the frequencies at which the video level is 3 dB down from maximum. The bandwidth is then the difference between the frequencies of the upper and lower -3 dB points.

3-12. RECEIVER IF BANDWIDTH MEASUREMENT (cont'd)

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   RANGE RING (2). 1

   PWR/ΔF (7) . . . . . .ΔF
   [PWR/DISC. . . . . .DISC]

   ΔF (6) . . . . . .Cal (detent)

3. Note that TRACK Indicator (28) comes on.
   [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Connect oscilloscope to monitor R/T unit video signal and trigger scope from DLYD SYNC Connector (39) on Test Set.

6. Set OUTPUT Controls (13 & 18) for output level of approximately 25 dB above MDS.

7. Set OUTPUT Controls (13 & 18) to 3 dB below present setting and mark the level on the oscilloscope as reference. Set OUTPUT controls (13 & 18) back to initial setting. For a digital indication, adjust the OUTPUT Controls (13 & 18) until the simulated return is between two intensity levels and use this indication as the reference level. Increase the attenuator output by 3 dB.

8. Adjust ΔF Control (6) until Panel Meter (8) indicates in the negative portion of the scale and signal level matches the -3 dB reference level established in Step 7. Record ΔF indication on Panel Meter (8). [Adjust ZERO Control ccw until signal level on scope matches the -3 dB reference level established in Step 8. Record magnetron frequency as displayed on Digital Display (12).]

   _____MHz

   [_____MHz]

3-12. RECEIVER IF BANDWIDTH MEASUREMENT (cont'd)

PROCEDURE:

9. Adjust ΔF control (6) until Panel Meter (8) indicates in the positive portion of the scale and the signal level matches the -3 dBm reference level established in Step 7. Record ΔF indication on Panel Meter (18). [Adjust ZERO Control cw until signal level on scope peaks and decreases to match the -3 dB reference level established on Digital Display (12)].

_____MHz

10. Calculate bandwidth by adding the ΔF frequency offsets recorded in Steps 8 and 9. [Calculate bandwidth by substracting frequency recorded in Step 8 from frequency recorded in Step 9.]

_____MHz
[_____MHz]

3-13. AFC (Automatic Frequency Control) CENTERING TEST

DESCRIPTION: The Test Set is used to track the magnetron frequency and to offset the return signal frequency while monitoring the radar R/T video or indicator to determine the -3 dB point frequencies of the receiver and check that they are centered about the magnetron frequency.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

RF/IF Mode (25). . . . . .TRACK

MODULATION Mode (42) . . . . . .TRACK

RANGE RING (2) 1

PRF/RF (11). . . . . .RF

PWR/ΔF (7) . . . . . .ΔF
[PWR/DISC. . . . . .DISC]

ΔF (6) . . . . . .Cal (detent)

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

3-13. AFC CENTERING TEST (cont'd)

PROCEDURE:

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Connect oscilloscope to monitor R/T unit video signal and trigger scope from DLYD SYNC Connector (39) on Test Set.

6. Set OUTPUT Controls (13 & 18) for output level of approximately 25 dB above MDS. Observe return pulse on scope.

7. Set OUTPUT Controls (13 & 18) to 3 dB below present setting. Note that output level on scope is now 3 dB down from maximum level, and set controls back to initial settings. For a digital indication, adjust the OUTPUT Controls (13 & 18) until the simulated return is between two intensity levels and use this indication as the reference level. Increase the OUTPUT dB Control (13) output by 3 dB. [Record magnetron frequency as displayed on Digital Display (12).]

_____MHz

[_____MHz]

8. Adjust ΔF Control (6) until Panel Meter (8) indicates in the negative portion of the scale and signal level matches the level which is 3 dB down. Record ΔF indication on Panel Meter (8). [Adjust ZERO Control ccw until output level on scope matches the level which is 3 dB down. Record magnetron frequency as displayed on Digital Display (12).]

Lower -3 dB point:_____MHz

[_____MHz]

9. Adjust ΔF Control (6) until Panel Meter (8) indicates in the positive portion of the scale and signal level matches the reference -3 dB down level. Record ΔF indication on Panel Meter (8). [Adjust ZERO Control cw until output level on scope reaches a peak and then decreases back down to the -3 dB down level. Record magnetron frequency as displayed on Digital Display (12).]

Upper -3 dB point:_____MHz

[_____MHz]

3-13. AFC CENTERING TEST (cont'd)

PROCEDURE:

10. The difference between the positive and negative ΔF indications is the AFC centering error. If the centering is not within the manufacturer's tolerance, perform the procedures in Paragraph 3-14. If the centering is within the manufacturer's tolerance, go directly to Paragraph 3-15. [Calculate the average frequency for the two frequencies recorded in Steps 8 and 9. If this frequency matches the frequency recorded in Step 7, the AFC is centered. If the frequencies do not match follow Paragraph 3-14.]

3-14. AFC CENTERING ADJUSTMENT

DESCRIPTION: The Test Set is used as a signal generator which will track the magnetron frequency while the AFC is adjusted for maximum sensitivity.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   ΔF (6) . . . . . .Cal (detent)
   [PWR/DISC. . . . . .DISC]

   RANGE RING (2) 1

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Connect oscilloscope to monitor R/T unit video signal and trigger scope from DLYD SYNC Connector (39) on Test Set.

6. Set OUTPUT Controls (13 &18) for output level just above MDS.

7. Adjust AFC centering control on R/T unit for maximum video signal level as observed on the oscilloscope.

3-15. DIGITAL VIDEO LEVEL THRESHOLD MEASUREMENTS

DESCRIPTION: The output of the Test Set is varied to simulate different levels of signal return and to determine the points referenced to MDS or TGS at which different digital video levels are reached.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   ΔF (6) . . . . . .Cal (detent)
   [PWR/DISC. . . . . .DISC]

   RANGE RING (2) 1

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Set Range Selector (1) to a range delay which will position simulated return beyond STC range.

5. Set OUTPUT Controls (13 & 18) for output level corresponding to level of reference for video levels (MDS or TGS).

6. According to manufacturer's recommendations or standard practices, monitor the video A/D level circuitry or the radar indicator display to determine the transition points between the video levels.

7. Adjust the CONTOUR dB Control (14) until a video level transition is noted and read the threshold level, above reference, directly from the CONTOUR dB Control (14) dial. Repeat until all transition levels have been determined.

3-16. RANGE RING CHECK

DESCRIPTION: To check the accuracy the Test Set is used to generate precision range rings which are compared with the rings generated by the indicator. The start of the range delay is triggered from the leading edge of the magnetron pulse.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Set controls as follows:

   RF/IF Mode (25). . . . . TRACK

   MODULATION Mode (42) . . . . . TRACK

   ΔF (6) . . . . . Cal (detent)
   [PWR/DISC. . . . . DISC]

   μs/NM (45) . . . . . NM

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]
4. Use WIDTH μs Control (43) to adjust pulse width as desired.
5. Select range to be tested on radar indicator.
6. Set RANGE RING Selector (2) to correspond to number of range rings on indicator.
7. Adjust Range Selector (1) until Test Set range rings are superimposed over indicator range rings. Check that distance between range rings indicated on Range Selector (1) corresponds to specified distance between indicator range rings.

3-17. TRANSMITTER PULSE MEASUREMENTS

DESCRIPTION: An oscilloscope is attached to the DET Connector (24) and the transmitter pulse width is measured at the 50% amplitude points.

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.
2. Connect oscilloscope to DET Connector (24) on Test Set and trigger from SYNC connector (41). Waveform on scope should be similar to Figure 3-4.

3-17. TRANSMITTER PULSE MEASUREMENTS (cont'd)

PROCEDURE:

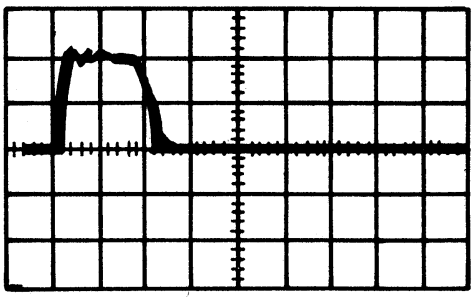
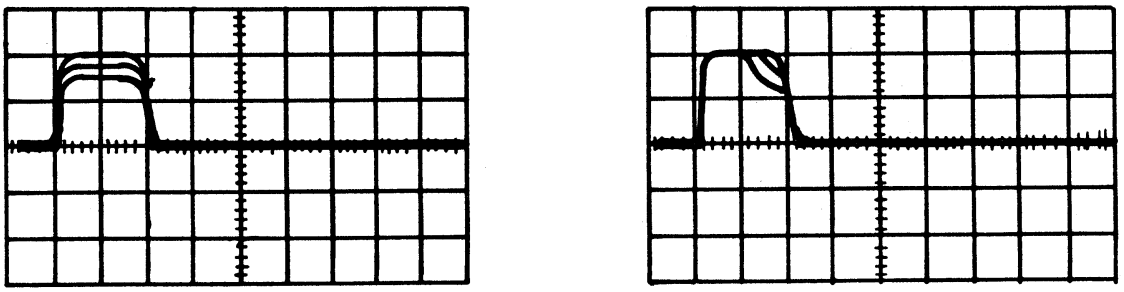


Figure 3-4. Detector Output Waveform

3. Examine pulse shape for evidence of mode skipping or mode splitting as indicated in Figure 3-5. These waveforms indicate that the magnetron is not functioning properly or that the magnetron is not being modulated properly.



MODE SKIPPING MODE SPLITTING

Figure 3-5. Detector Output Waveforms for Faulty Transmitters[1]

4. Measure pulse width at 50% amplitude points.

5. Check that flatness variation across top of waveform is 20% or less of mean pulse amplitude.

6. Measure rise time, 10 to 90%, and fall time, 90 to 10%.

[1]Instruction Manual AVQ-20 Weather Radar, Radio Corporation of America: Los Angeles, CA., July 31, 1964, p. 709.

3-18. MAGNETRON PUSHING OR PULLING MEASUREMENTS

DESCRIPTION: The DISC OUT Connector (20) is used to monitor magnetron pulse frequency versus time characteristics on an attached oscilloscope. The oscilloscope display will show magnetron "pushing" or "pulling".

PROCEDURE:

1. Connect Test Set to R/T unit per Figure 3-2.

2. Set controls as follows:

   RF/IF Mode (25). . . . . .TRACK

   MODULATION Mode (42) . . . . . .TRACK

   ΔF (6) . . . . . .Cal (detent)
   [PWR/DISC. . . . . .DISC]

3. Note that TRACK Indicator (28) comes on. [Zero Discriminator]

4. Connect oscilloscope input to DISC OUT Connector (20). Terminate cable in 50 ohms at scope.

5. Trigger oscilloscope from SYNC Connector (40).

6. FM During Pulse (frequency pushing from incorrect modulator pulse):
   Examine oscilloscope display for evidence of magnetron frequency modulation. Frequency modulation is characterized by a slope in the top of the waveform. The magnitude of the modulation can be determined using the vertical calibration factor of 0.1 Volts/MHz. See Figure 3-6.

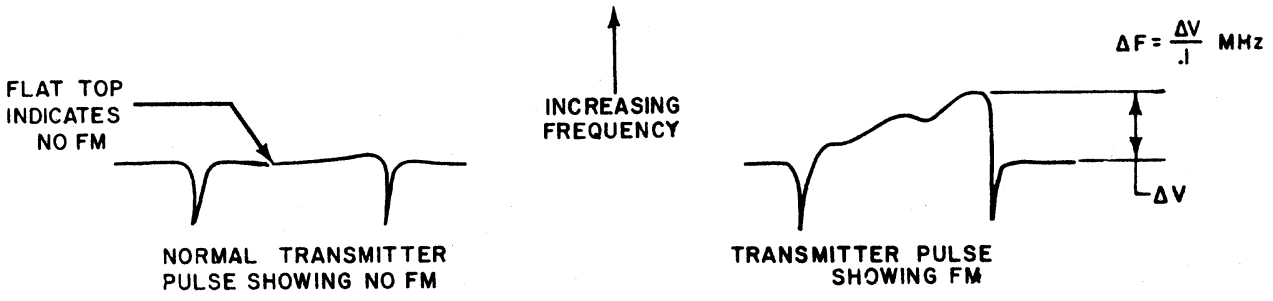


Figure 3-6. Magnetron Frequency Modulation Discriminator Waveforms.

3-18. MAGNETRON PUSHING OR PULLING MEASUREMENTS. (cont'd)

PROCEDURE:

7. Note magnetron frequency on Digital Display (12).

8. Select RF MAN Mode on the RF/IF Mode Selectors (25) and adjust MAN FREQ Controls (10) to correspond to magnetron frequency noted in Step 7.

9. Frequency Pulling Due to Antenna Impedance Variations:

   With the antenna scan system operating, observe the behavior of the discriminator pulse. As the antenna rotates, watch for a periodic shift up and down or "breathing" effect in the display. This is magnetron "pulling", which is a shift in operating frequency as the magnitude or phase of the load impedance reflection coefficient varies throughout the antenna scan. The pulling effect can be calculated as noted in Figure 3-7.

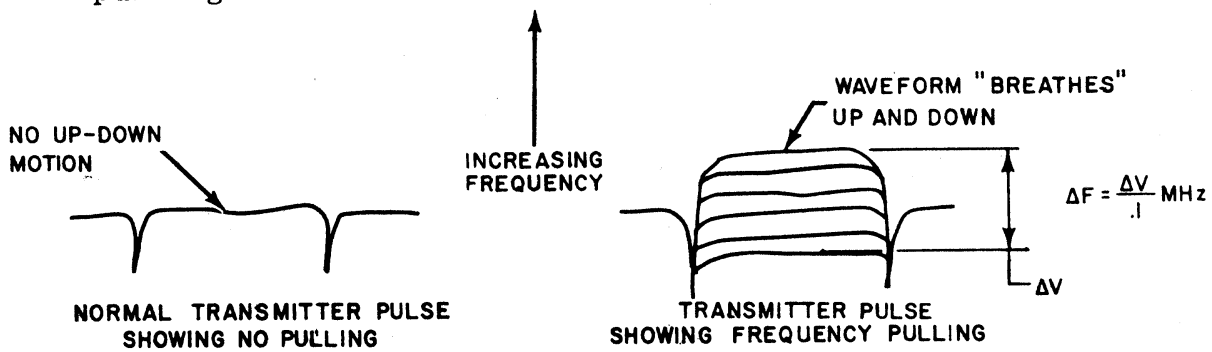


Figure 3-7. Magnetron Frequency Pulling Discriminator Waveform

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS

DESCRIPTION: The Test Set is used to generate a RF or IF pulse, with the pulse width and range delays specified by the radar maintenance procedures, to verify a decrease in receiver sensitivity at short range delays.

The Test Set can generate RF or IF pulses of variable width, 0.2 to 30 µs, or fixed width, 270 µs, with a delay of 0 to 999 microseconds or nautical miles. The start of the pulse delay can be triggered from the leading edge of the magnetron pulse or from an external (system) trigger, or the Test Set internal PRF oscillator can be used to trigger the delay and to generate a TTL sync pulse coincident with the start of the delay to trigger the STC circuits.

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS (cont'd)

PROCEDURES:

1. Magnetron Trigger

Perform the following steps if the start of the pulse delay is to be triggered from the leading edge of the magnetron pulse. These steps can be used to generate RF or IF pulses as noted. Refer to manufacturer's maintenance or service manual for detailed test procedures.

1. Connect Test Set to R/T unit per Figure 3-2. If IF pulses are required, connect a 50 ohm cable between IF output and R/T unit as required.

2. Set controls as follows:

RF/IF Mode (25)	RF TRACK (RF Pulses) IF LO (IF Pulses)
MODULATION Mode (42)	TRACK
RANGE RING (2)	1

3. Adjust MAN FREQ Controls (10) for IF frequency (if applicable).

4. Use WIDTH µs Control (43) to adjust pulse width as specified in maintenance procedures. If a wider pulse width is desired a 270 µs pulse can be generated by adjusting CONTOUR dB Control (14), out of detent, to 0 dB position.

5. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to select pulse delays as specified in maintenance procedures.

6. Use OUTPUT Controls (13 & 18) to set output level as specified in maintenance procedures.

7. If oscilloscope is used for measurements, trigger time base from DLYD SYNC Connector (39).

8. Verify decrease in receiver sensitivity at short range delays per maintenance specifications.

2. External Trigger

Perform the following steps if the start of the pulse delay is to be triggered from the system trigger pulse. These steps can be used to generate RF or IF pulses as noted. Refer to manufacturer's maintenance or service manual for detailed test procedures.

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS (cont'd)

PROCEDURES:

1. Connect Test Set to R/T unit per Figure 3-2. If IF pulses are required, connect 50 ohm cable between IF output and R/T unit as required.

2. Set controls as follows:

   RF/IF Mode (25). . . . . RF TRACK (RF Pulses)
   IF LO (IF Pulses)

   RANGE RING (2) 1

3. Adjust MAN FREQ Controls (10) for IF frequency (if applicable).

4. Connect system trigger to EXT Connector (38).

5. Select EXT (+), for positive-going system trigger, or EXT (-), for negative-going system trigger, MODULATION Mode Selector (42).

6. Use WIDTH µs Control (43) to adjust pulse width as specified in maintenance procedures. If a wider pulse width is desired, a 270 µs pulse can be generated by adjusting CONTOUR dB Control (14), out of detent, to 0 dB position.

7. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to select pulse delays as specified in maintenance procedures.

8. Use OUTPUT Controls (13 & 18) to set output level as specified in maintenance procedures.

9. If oscilloscope is used for measurements, trigger time base from DLYD SYNC Connector (39).

10. Verify decrease in receiver sensitivity at short range delays per maintenance specifications.

3. Internal Trigger

Perform the following steps if the internal PRF oscillator is to be used to start the pulse delay and trigger STC circuits. These steps can be used to generate RF or IF pulses as noted. Refer to manufacturer's maintenance or service manual for detailed test procedures.

3-19. SENSITIVITY TIME CONSTANT (STC) MEASUREMENTS (cont'd)

PROCEDURES:

1. Set controls as follows:

   RF/IF Mode (25). . . . . .RF MAN (RF Pulses)
   IF LO (IF Pulses)

   MODULATION Mode (42) . . . . . .INT

   RANGE RING (12). 1

2. For RF operation, connect test set to R/T unit per Figure 3-2. For IF operation, connect 50 ohm cable between IF Output Connector (26) and circuit under test.

3. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Control (10) for desired frequency (RF or IF).

4. Use SYNC Connector (40) to trigger circuit under test at start of pulse delay, (SYNC level is standard TTL behind 220 ohm source resistance).

5. Set PRF/RF Switch (11) to PRF position and adjust PRF Hz Control (44) for frequency specified in maintenance procedure.

6. Use WIDTH µs control (43) to adjust pulse width as specified in maintenance procedures. If a wider pulse width is desired a 270 µs pulse can be generated by adjusting CONTOUR dB Control (14), out of detent, to 0 dB position.

7. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to select pulse delays as specified in maintenance procedure.

8. Use OUTPUT Controls (13 & 18) to set output level as specified in maintenance procedure.

9. If oscilloscope is used for measurements, trigger time base from DLYD SYNC Connector (39).

10. Verify decrease in receiver sensitivity at short range delays per maintenance specifications.

3-20. IF TESTING

DESCRIPTION: IF testing can be accomplished using the Continuous Wave (CW), Sweep, or Pulse Modulated Generator functions built into the Test Set. The Pulse Modulated Generator can be triggered internally by the PRF oscillator or by external trigger pulses. Refer to manufacturer's manual for testing procedures.

PROCEDURES:

1. CW Generator

    1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on the RF/IF Mode Selectors (25).

    2. Select CW Mode on the MODULATION Mode Selectors (42).

    3. Use OUTPUT Controls (13 & 18) to set desired output level.

    4. Set PRF/RF (11) Switch to RF position and adjust MAN FREQ Controls (10) for desired frequency.

    5. Output is available from IF Output Connector (26).

2. Externally Triggered Pulse Modulated Generator.

    1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on the RF/IF Mode Selectors (25).

    2. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Controls (10) for desired frequency.

    3. Set OUTPUT Controls (13 & 18) to desired output level.

    4. Adjust WIDTH µs Control (43) for desired pulse width.

    5. Select 1 on the RANGE RING Selector (2).

    6. Use Range Selector (1) and µS/NM [µS/MILES] Switch (45) to set pulse delay.

    7. Select EXT (+), if external trigger is positive-going, or EXT (-), if external trigger is negative-going, on MODULATION Mode Selectors (42).

    8. Connect external trigger to EXT Connector (38).

    9. Trigger oscillosoope from DLYD SYNC Connector (39).

    10. Output is available from IF Output Connector (26).

3-20. IF TESTING (cont'd)

PROCEDURES:

3. Internally Triggered Pulse Modulated Generator

1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on the RF/IF Mode Selector (25).
2. Select INT Mode on the MODULATION Mode Selectors (42).
3. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Controls (10) for desired frequency.
4. Set PRF/RF Switch (11) to PRF position and adjust PRF Hz Control (44) for desired pulse repetition frequency.
5. Set OUTPUT Controls (13 & 18) to desired output level.
6. Adjust WIDTH μs Control (43) for desired pulse width.
7. Trigger oscilloscope from DLYD SYNC Connector (39).
8. Output is available from IF Output Connector (26).

4. Sweep Generator (including Marker)

1. Select IF LO (-20 to -132 dBm) or IF HI (+20 to -92 dBm) mode on RF/IF Mode Selectors (25).
2. Adjust SWP WIDTH MHz Control (3) to desired sweep width.
3. Set PRF/RF Switch (11) to RF position and adjust MAN FREQ Controls (10) for desired frequency.
4. Set OUTPUT Controls (13 & 18) to desired output level.
5. Select CW Mode on MODULATION Mode Selectors (42).
6. Link IF Output Connector (26) to input of IF strip or AFC system to be tested.
7. Link SCOPE SWEEP Connector (34) to horizontal input of oscilloscope.
8. Connect detected output of circuit-under-test to oscilloscope vertical input.
9. To use marker, press DISPLAY MKR Switch (29) and adjust MKR FREQ Control (9) until zero beat superimposed on detected output is positioned to the desired point. Read frequency on Digital Display (12).

3-20. IF TESTING (cont'd)

Figure 3-8. Typical IF Amplifier Video Sweep Output

3-21. ANTENNA SIMULATOR CONNECTIONS

PROCEDURES:

1. The ANT SIMULATOR Connector (37) simulates servo signals from the radar antenna to sweep the display indicator. The antenna assembly does not have to be removed from the aircraft for this test. The simulator modulates an external reference signal according to the setting of the ANGLE Selectors (33). The simulator develops outputs in three-phase synchro, two phase resolver, or linear azimuth pot formats. Table 3-1 lists the Pin Assignments for the Antenna Simulator Connector (J73). Figures 3-9 and 3-10 show typical connections for the reference inputs and simulator outputs respectively.

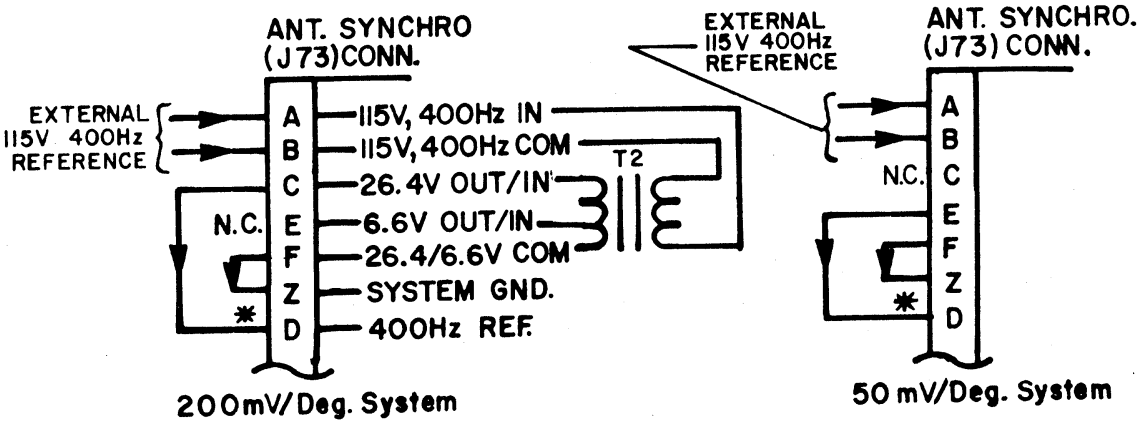
2. Figure 3-9 shows the 400 Hz reference input connections for the Antenna Gyro Simulator. The Antenna Gyro Simulator requires a 400 Hz input of 115, 26.4 or 6.6 Volts as a reference for the servo outputs. Typical connections are shown for both 200 mV/degree and 50 mV/degree servo systems using each of the possible reference input voltage combinations.

3. Synchro, resolver, and linear pot simulator output connections are shown in Figure 3-10. The synchro and resolver outputs are both referenced to the 400 Hz inputs. The azimuth pot outputs are provided for sweep systems which require a linear pot sweep (King KWX-50 or equivalent). The RD-300 simulates the sweep of a linear 1000 ohm pot with a position factor of 9.5 ohms/degree. The sweep rate for each of the three output modes is controlled by the ANT RATE Control (32) and the sweep angle is controlled by the ANGLE Selectors (33).

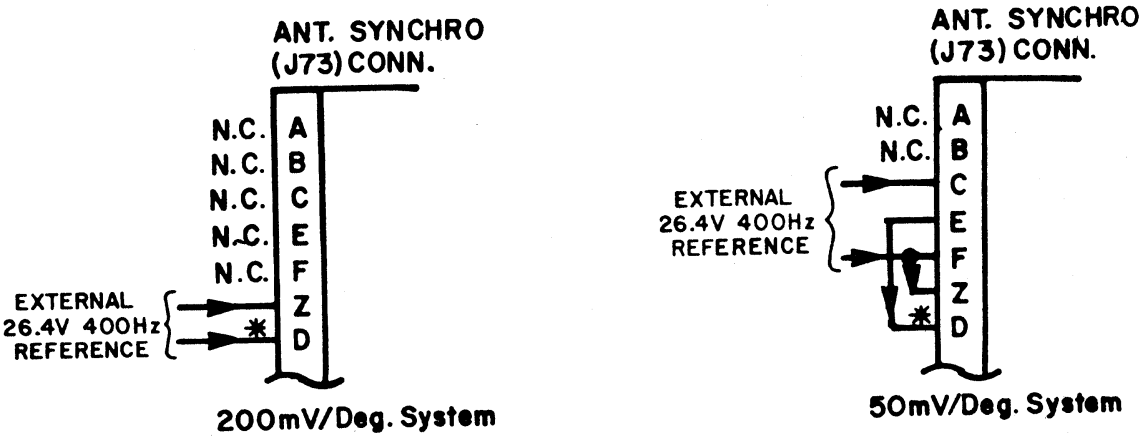
4. To achieve a phase shift in the Sine Resolver Output while testing a radar antenna stabilization platform, connect the 400 Hz reference to Pin W instead of Pin D. The Sine Resolver Output Phase Shift is 8° (+4°, -2°) with respect to the reference input.

Table 3-1. Pin Assignment for Antenna Simulator Connector (J73)

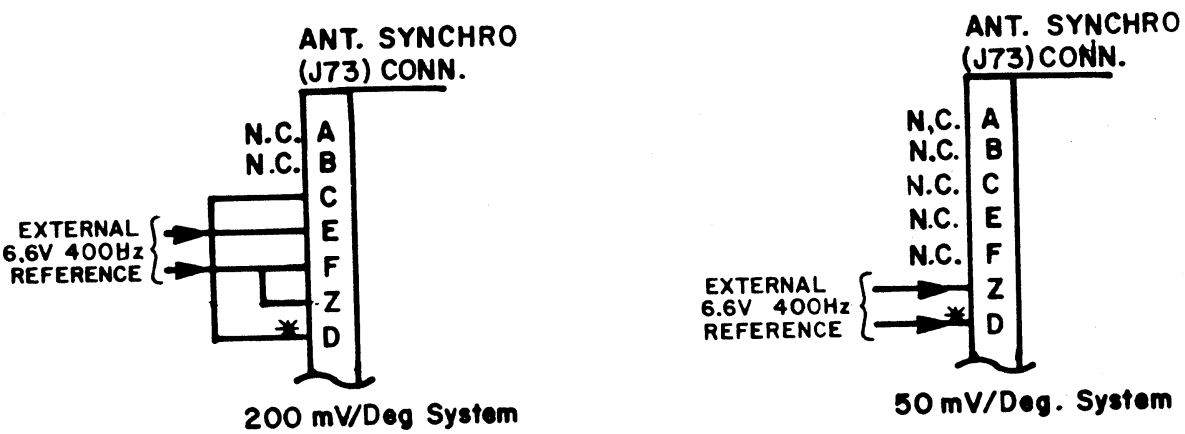
Pin	Function
A	115 V 400 Hz Input High
B	115 V 400 Hz Input Low
C	26.4 V 400 Hz Output
D	System Reference
E	6.6 V 400 Hz Common
F	26.4/6.6 V 400 Hz Common
H	Synchro Out Phase X
J	Synchro Out Phase Y
K	Synchro Out Phase Z
L	Cos Resolver Common
M	Cos Resolver Out
N	Reference Input for RCA AVQ Series Radar
P	T3-4
R	Sine Resolver Common
S	Sine Resolver Out
T	Azimuth Pot High (King Radar)
U	Azimuth Pot Low (King Radar)
V	Azimuth Pot Control (King Radar)
W	Reference Input for Sine Resolver Phase Shift
X	GND when testing AVQ-45, -46,-47
Y	Pot System GND
Z	System Ground
a	Pitch Output
b	Roll Output



EXTERNAL 115V 400Hz REFERENCE



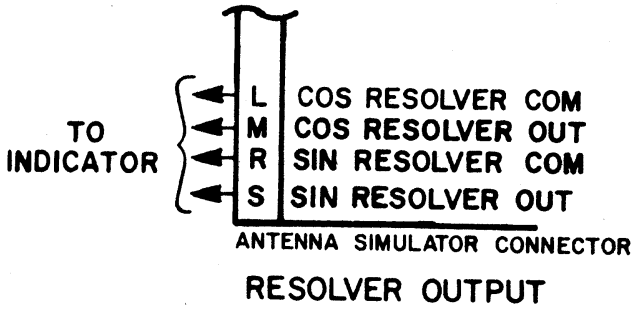
EXTERNAL 26.4V 400Hz REFERENCE



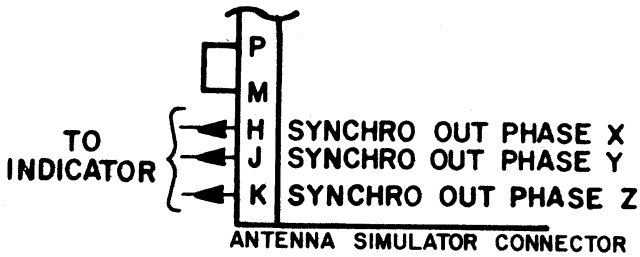
* FOR SW RESOLVER OUTPUT PHASE SHIFT, 400Hz REFERENCE INPUT SHOULD BE APPLIED TO PIN 'W' INSTEAD OF PIN 'D'

EXTERNAL 6.6V 400Hz REFERENCE

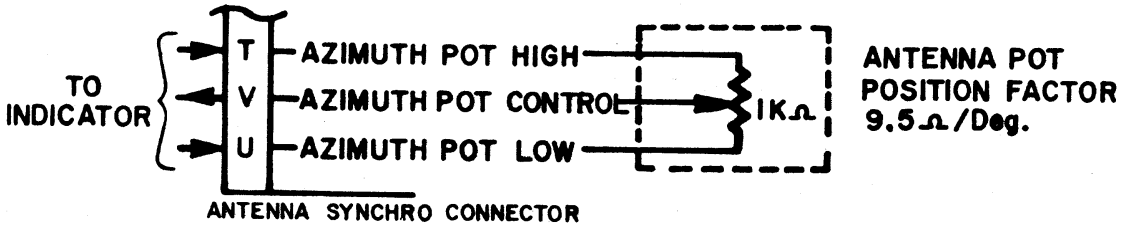
Figure 3-9 Antenna Simulator 400Hz Reference Input Connections



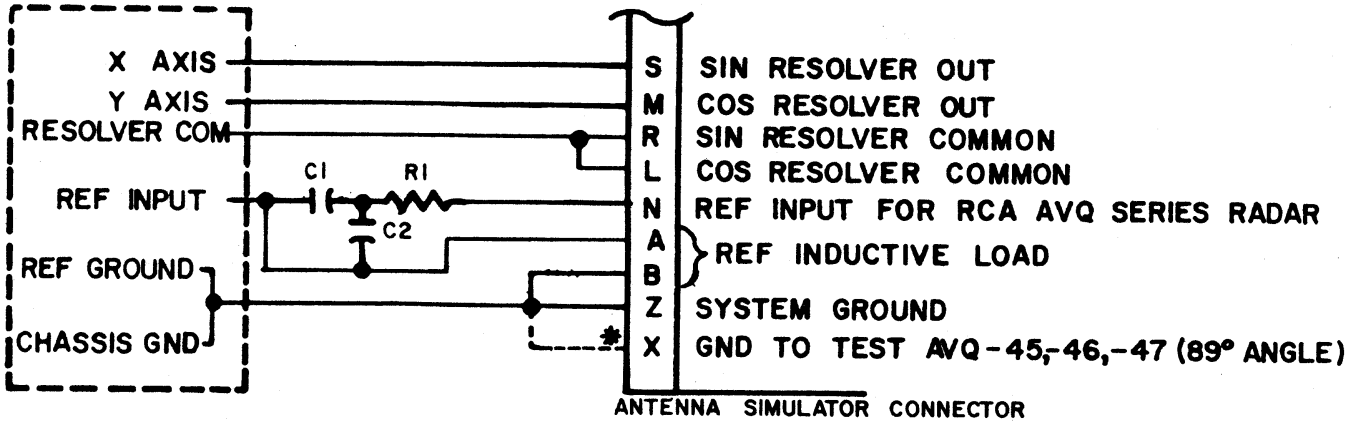
RESOLVER OUTPUT



SYNCHRO OUTPUT



LINEAR POT OUTPUT
(KING KWX-50 or SIMILAR)



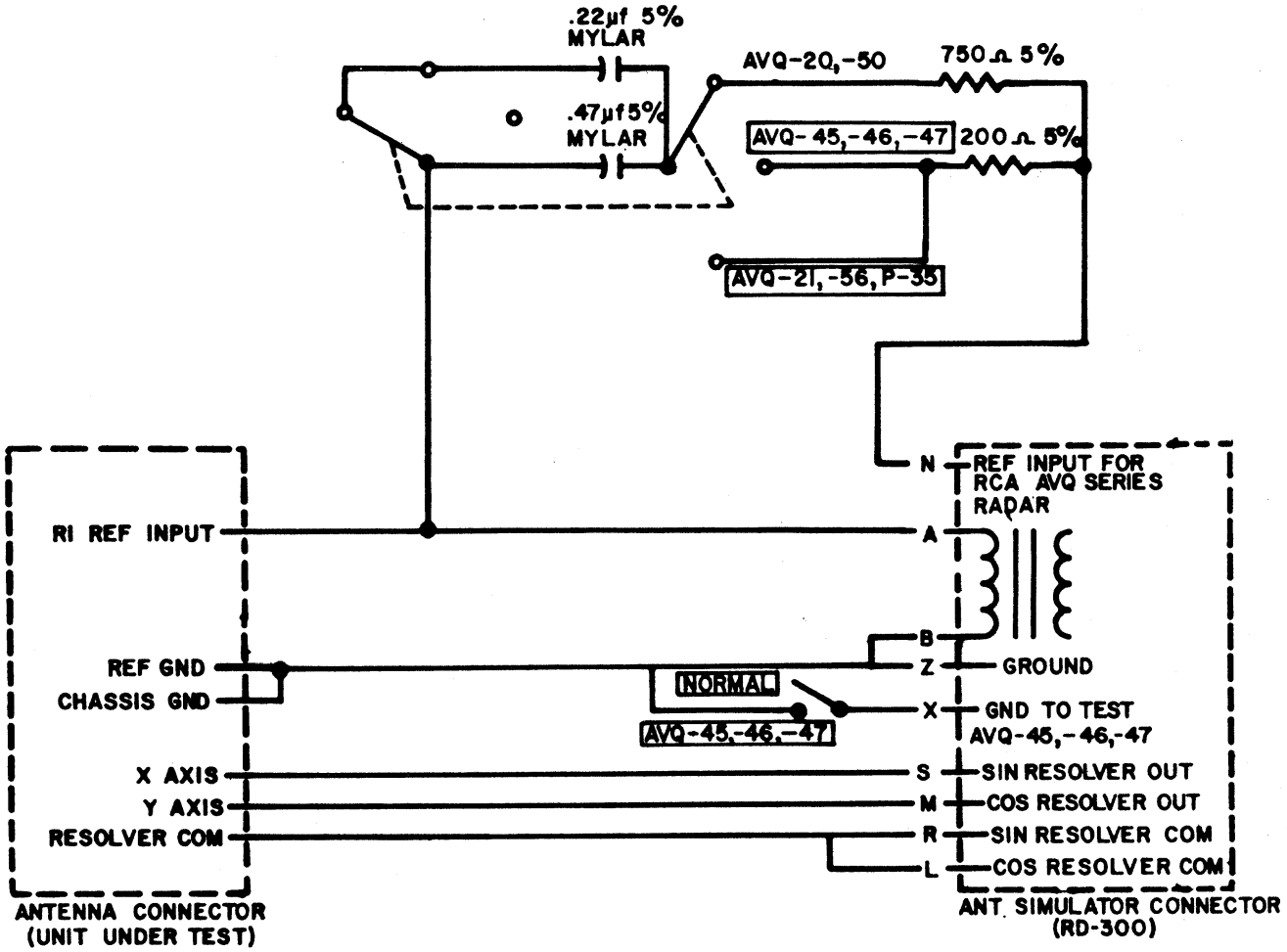
RESOLVER OUTPUT FOR RCA AVQ-SERIES RADAR

AVQ	R1 1/4W, 5%	C1 5% MYLAR	C2 5% MYLAR
-20, -55	750Ω	.47μf	.22μf
-45, -46, -47	200Ω	.47μf	.22μf
-21 -56, P-35	200Ω	.47μf	NONE

NOTE:
Set "ANGLE" selectors to 89° for AVQ-45,-46,-47 Radar.

*-USED WITH AVQ-45,-46,-47 RADARS ONLY

Figure 3-10 Antenna Simulator Output Connections



NOTE
Set ANGLE Selectors to 89°
for AVQ-45,-46,-47 Radars.

Figure 3-11 Optional Switch Box Circuit For RCA Radars (Not Supplied by IFR, INC)

GENERAL THEORY OF OPERATION

SECTION IV

4-1. Introduction.

4-2. This section presents a general theory of operation which is consistant with Block Diagram 3-25-126 (REV. A). Specialized theories of operation for most of the schematics in this manual will be found at appropriate places in the SCHEMATIC SECTION, SECTION VIII. Refer to the appropriate theory of operation, as needed.

4-3. Operation.

4-4. The RF Signal Generator System determines the magnetron frequency of the unit under test and generates a similar frequency to within 25 kHz of the magnetron frequency. The generated frequency is made to follow any frequency drift that might occur from the magnetron. The RF Generator output is directed to the radar unit under test as a test signal. This signal is controllable in amplitude, pulse width and pulse spacing.

4-5. For the RD-300 to generate the same frequency as the radar unit is transmitting, it is necessary to sample the radar unit's output frequency and compare it to the VCO frequency generated by the RD-300. Changes in the radar units magnetron frequency are also determined by this method.

4-6. High level RF pulses from the radar under test are attenuated and mixed with the output of the 8.25 GHz Local Oscillator to produce the XMTR SAMPLE frequency which is applied to the Single Sideband Module.

4-7. The Single Sideband Module produces the 30 MHz Information and Cal pulse which are used by the 30 MHz Pulse Discriminator to control the frequency of the VCO in the TRACK Mode of operation. If the VCO frequency is more than 4 MHz from the XMTR SAMPLE Frequency, the tune output of the 30 MHz Pulse Discriminator causes the VCO to sweep to the proper frequency.

4-8. The CAL TEST DRIVE signal from the 30 MHz Pulse Discriminator causes the Single Sideband Module to output the Cal Pulse. This pulse is a 40 µs wide, 30 MHz pulse and is outputted to the 30 MHz Pulse Discriminator 40 µs after the Information pulse.

4-9. The 30 MHz Pulse Discriminator processes the mixed-down magnetron detector pulses from the X-Band Front End and the Cal and Information pulses from the Single Sideband Module. The 30 MHz Pulse Discriminator causes the L-Band VCO to sweep and then track

the mixed-down magnetron frequency. The 30 MHz Pulse Discriminator produces an output whose amplitude is proportional to the difference between the L-Band VCO frequency and the frequency of the mixed-down transmitter sample. This voltage is applied to the TUNE input of the VCO Module.

4-10. With the MAN MODE SWITCH depressed, the 30 MHz Pulse Discriminator ignores the 30 MHz Information pulse input. At this time, the tune voltage input to the VCO is controlled by the COARSE and FINE MAN FREQ CONTROLS on the Front Panel.

4-11. The power meter circuitry on the Auxiliary Board converts the detected XMTR pulses to a d.c. voltge for the POWER METER. The Power Meter System provides an analog display of peak power measurements. Radar units under test with a peak output greater than 12kW require an external 10 dB pad in series with the pulse cable from the external Directional Coupler.

4-12. The output of the VCO is leveled and contoured by circuitry in the Leveler Distribution Module of the VCO Assembly and on the Auxiliary Board. The leveled and contoured output of the VCO Assembly is applied to the Main Diode Switch via the Output Attenuators. The Main Diode Switch uses the modulation output signals from the Range and Contour Board, and the RF & AUX LEVEL CAL voltages from the Auxiliary Board to produce the modulated L-Band VCO pulses, of the proper level, used by the X-Band Front End.

4-13. The Range and Contour Board of the RD-300 develops a variety of modulation signals used to modulate the L-Band output of the VCO Module. These signals are also used to modulate the output of the IF Amplifier, and are applied to the RF MODULATION INPUT of the Main Diode Switch.

4-14. In the X-Band Front End, the L-Band output of the Main Diode Switch is mixed with the 8.25 GHz output of the Local Oscillator to produce the X-Band output used by the radar unit under test.

4-15. Selection of either the IF "lo" or IF "hi" MODE SWITCHES of the Front Panel allows the appropriate output of the IF Amplifier to pass through the stepped attenuators to the IF OUTPUT CONNECTOR on the Front Panel. Modulation characteristics of the IF signal at the IF OUTPUT CONNECTOR are the same as for the modulated VCO output of the Main Diode Switch.

4-16. The IF Sweep Oscillator provides a sweep sawtooth that may be used on an Oscilloscope's horizontal input. This sweep signal is provided to the Front Panel SCOPE SWEEP CONNECTOR WHEN the SWP WIDTH MHz CONTROL is not in the OFF, detent, position. The MARKER system is activated by depressing the DISPLAY MARKER PUSHBUTTON on the Front Panel. This adds the output of the MARKER Oscillator to the output of the IF Oscillator.

4-17. The Prescaler provides prescaled MARKER, RF and IF frequencies to the Digital Counter Assembly. Selection between RF prescaled output and IF prescaled output is controlled by the Front Panel IF MODE SELECTOR PUSHBUTTON. Selection of the prescaled MARKER frequency is accomplished by depressing the DISPLAY MARKER PUSHBUTTON on the Front Panel.

4-18. The Digital Counter Assembly provides a display of the PRF of the radar unit under test. It also provides a display of either the RD-300's prescaled IF, MARKER or L-Band VCO frequency. The counters on the Counter Board are driven by a 10 KHz clock signal from the Range and Contour Board. The Digital Counter Assembly provides the sweep ramp signal used to sweep the IF Oscillator. This signal is also applied to the Front Panel SCOPE SWEEP CONNECTOR.

4-19. The Servo Simulator System (not shown on block diagram) provides a sweep signal to radar indicators that normally require a sweep motor and resolver synchro signals from an antenna. It modulates an external reference voltage with position information that can be selected at fixed angles. The external reference voltage may also be modulated with position information that is swept between angles selected on the ANT ANGLE THUMBWHEELS. The Servo Simulator System develops outputs in either 3-phase synchro, 2-phase resolver, or linear azimuth pot formats.

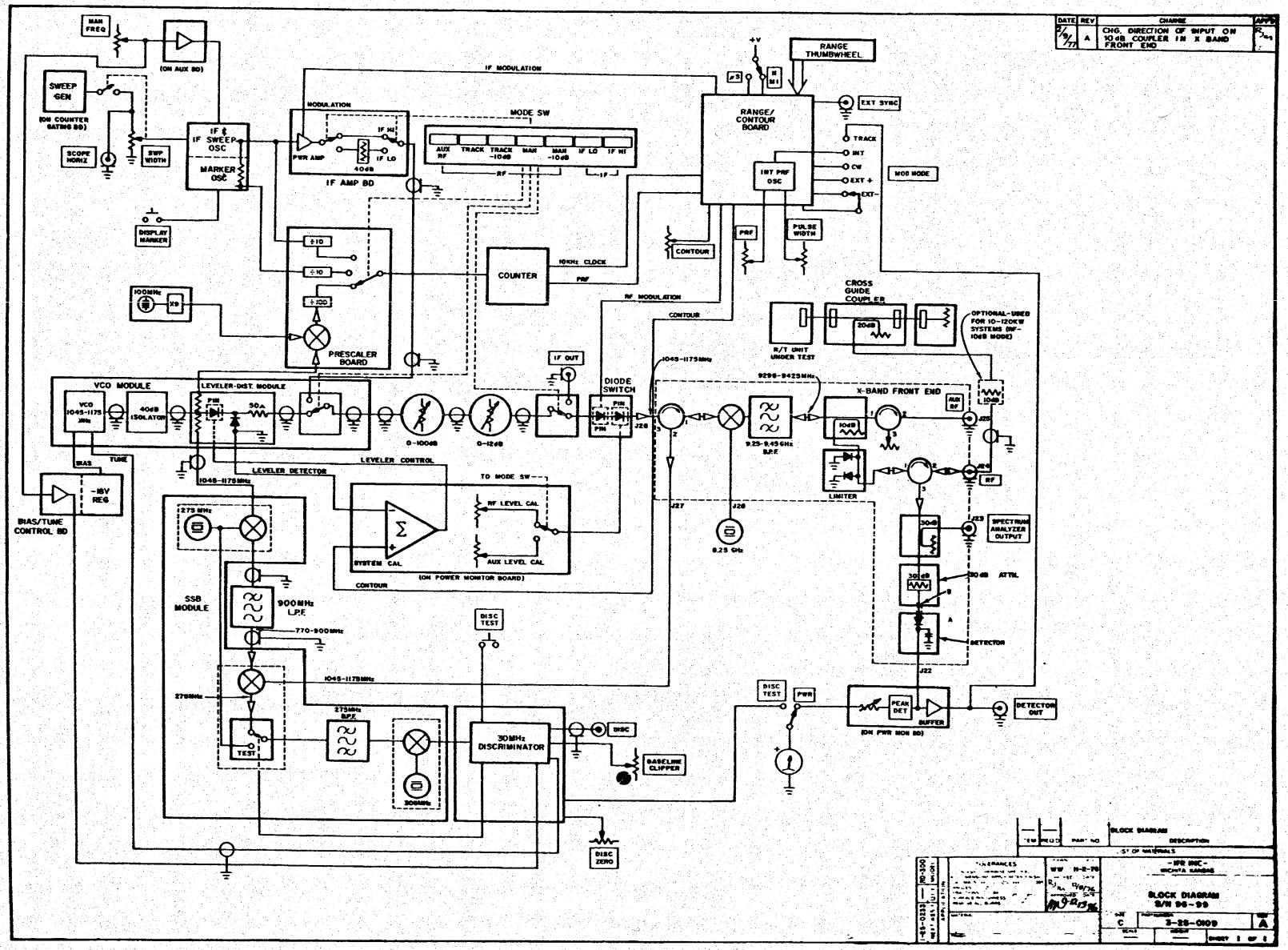

MAN FREQ
(ON AUX BD)
SWEEP GEN
(ON COUNTER GATING BD)
SCOPE HORIZ
SWP WIDTH
IF & SWEEP OSC
MARKER OSC
DISPLAY MARKER
100MHz
X9
÷10
÷10
÷200
PRESCALER BOARD
IF MODULATION
MODULATION
PWR AMP
IF HI
IF LO
40dB
IF AMP BD
MODE SW
AUX RF
TRACK -10dB
TRACK
MAN -10dB
MAN
IF LO
IF HI
RF
IF
COUNTER
10KHz CLOCK
PRF
RF MODULATION
CONTOUR
RANGE THUMBWHEEL
+V
RANGE/ CONTOUR BOARD
EXT SYNC
TRACK
INT
CW
EXT +
EXT-
MOD MODE
INT PRF OSC
CONTOUR
PRF
PULSE WIDTH
CROSS GUIDE COUPLER
20dB
R/T UNIT UNDER TEST
OPTIONAL-USED FOR 10-120KW SYSTEMS (NF-10dB MODE)
IF OUT
DIODE SWITCH
PIN
PIN
J28
1045-1175MHz
9298-9425MHz
X-BAND FRONT END
AUX RF
10dB
J25
RF
VCO MODULE
VCO 1045-1175 MHz
40dB ISOLATOR
LEVELER-DIST. MODULE
PIN
30
0-100dB
0-12dB
BIAS
TUNE
-15V REG
BIAS/TUNE CONTROL BD
LEVELER DETECTOR
1045-1175MHz
LEVELER CONTROL
TO MODE SW
RF LEVEL CAL
AUX LEVEL CAL
SYSTEM CAL
(ON POWER MONITOR BOARD)
CONTOUR
9.25-9.45GHz B.P.F.
J27
J26
8.25 GHz
LIMITER
30dB
J23
SPECTRUM ANALYZER OUTPUT
30dB
30dB ATTN.
DETECTOR
J22
275 MHz
SSB MODULE
900MHz L.P.F.
770-900MHz
1045-1175MHz
275MHz
TEST
275MHz B.P.F.
300MHz
30MHz DISCRIMINATOR
DISC
BASELINE CLIPPER
DISC ZERO
DISC TEST
PWR
PEAK DET
BUFFER
DETECTOR OUT
(ON PWR MON BD)
DATE
REV
CHANGE
APP'D
A
CHG. DIRECTION OF INPUT ON 10dB COUPLER IN X BAND FRONT END
BLOCK DIAGRAM
DESCRIPTION
BLOCK DIAGRAM
S/N 96-99
3-25-0109
A
SHEET 1 OF 1

Fig. 4-1

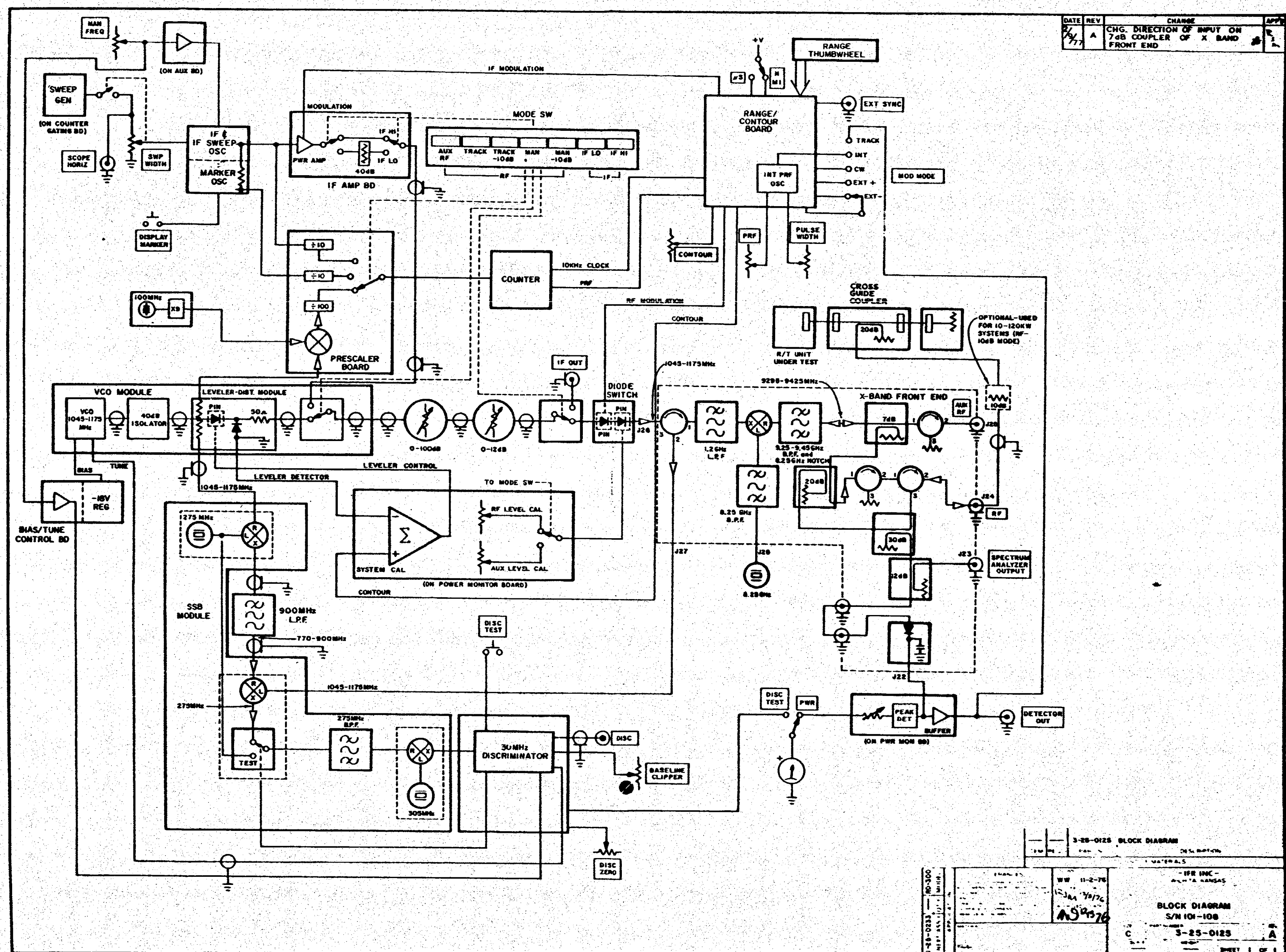

MAN FREQ
(ON AUX BD)
SWEEP GEN
(ON COUNTER GATING BD)
SCOPE HORIZ
SWP WIDTH
IF & IF SWEEP OSC
MARKER OSC
DISPLAY MARKER
MODULATION
PWR AMP
40dB
IF HI
IF LO
IF AMP BD
IF MODULATION
MODE SW
AUX RF
TRACK
TRACK -10dB
MAN
MAN -10dB
IF LO
IF HI
RF
IF
RANGE THUMBWHEEL
RANGE/ CONTOUR BOARD
INT PRF OSC
EXT SYNC
TRACK
INT
CW
EXT +
EXT -
MOD MODE
CONTOUR
PRF
PULSE WIDTH
÷10
÷10
÷100
PRESCALER BOARD
100MHz
X8
COUNTER
10KHz CLOCK
PRF
RF MODULATION
CONTOUR
CROSS GUIDE COUPLER
20dB
R/T UNIT UNDER TEST
OPTIONAL-USED FOR 10-120KW SYSTEMS (RF-10dB MODE)
VCO MODULE
VCO 1045-1175 MHz
40dB ISOLATOR
LEVELER-DIST. MODULE
PIN
50Ω
0-100dB
0-12dB
IF OUT
DIODE SWITCH
PIN
J26
1045-1175MHz
9298-9425MHz
X-BAND FRONT END
1.2GHz L.P.F
9.25-9.45GHz B.P.F. and 8.256GHz NOTCH
7dB
AUX RF
J25
8.25 GHz B.P.F
J28
8.256GHz
20dB
J24
RF
30dB
J23
SPECTRUM ANALYZER OUTPUT
12dB
J22
J27
BIAS
TUNE
-18V REG
BIAS/TUNE CONTROL BD
LEVELER CONTROL
LEVELER DETECTOR
1045-1175MHz
TO MODE SW
RF LEVEL CAL
AUX LEVEL CAL
SYSTEM CAL
(ON POWER MONITOR BOARD)
CONTOUR
275 MHz
SSB MODULE
900MHz L.P.F
770-900MHz
DISC TEST
1045-1175MHz
275MHz
275MHz B.P.F.
TEST
305MHz
30MHz DISCRIMINATOR
DISC
BASELINE CLIPPER
DISC ZERO
DISC TEST
PWR
PEAK DET
BUFFER
(ON PWR MON BD)
DETECTOR OUT
DATE
REV
CHANGE
APPD
A
CHG. DIRECTION OF INPUT ON 7dB COUPLER OF X BAND FRONT END
3-25-0125 BLOCK DIAGRAM
-IFR INC-
BLOCK DIAGRAM
S/N 101-108
C
3-25-0125
A

Fig. 4-2

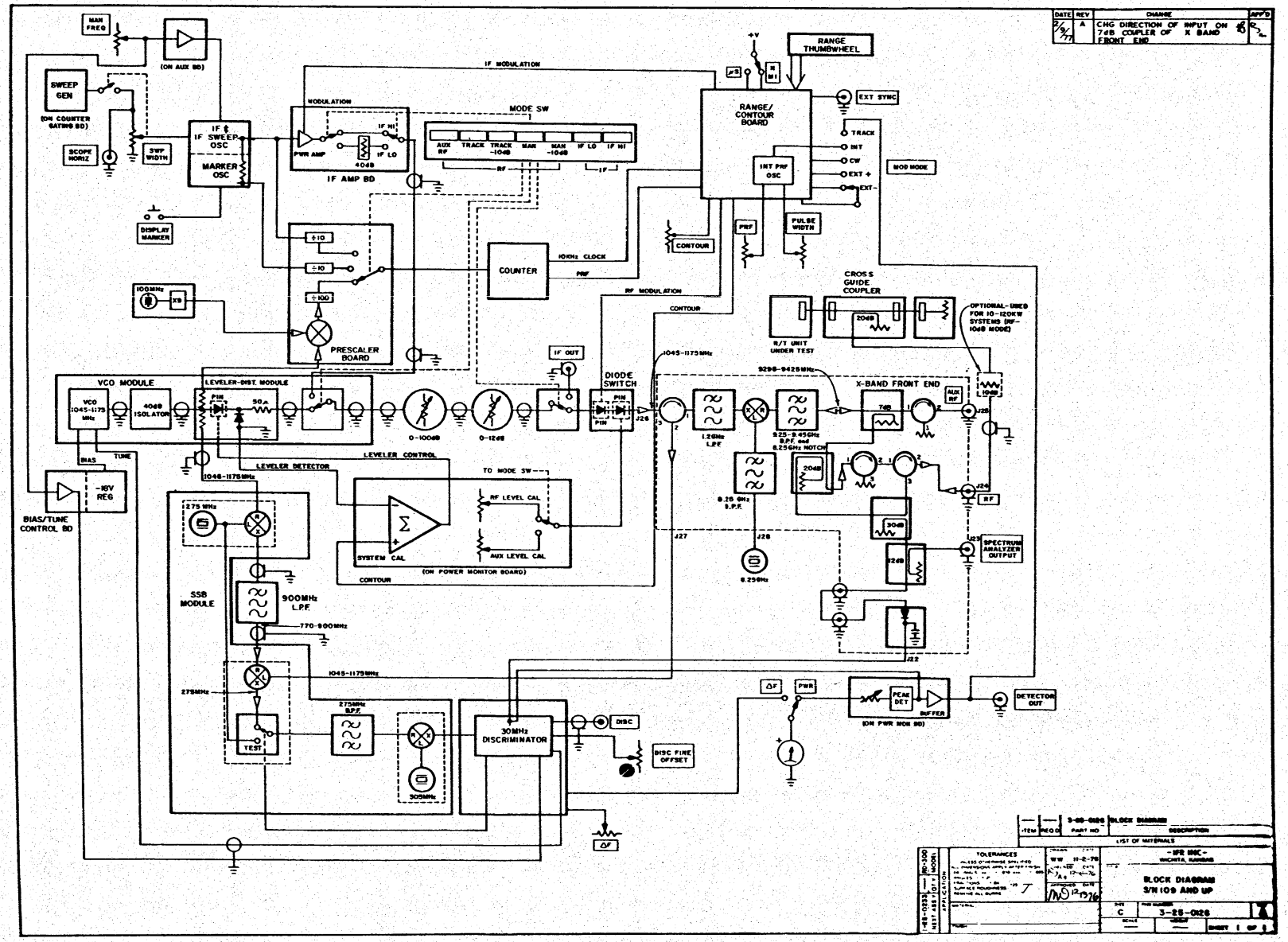

MAN FREQ
(ON AUX BD)
SWEEP GEN
(ON COUNTER GATING BD)
SCOPE HORIZ
SWP WIDTH
IF & SWEEP OSC
MARKER OSC
DISPLAY MARKER
100MHz
XTL
÷10
÷10
÷100
PRESCALER BOARD
IF MODULATION
MODULATION
PWR AMP
IF HI
IF LO
4048
IF AMP BD
MODE SW
AUX RF
TRACK
TRACK -10dB
MAN
MAN -10dB
IF LO
IF HI
RF
IF
RANGE THUMBWHEEL
RANGE/ CONTOUR BOARD
EXT SYNC
TRACK
INT
CW
EXT +
EXT-
MOD MODE
INT PRF OSC
PULSE WIDTH
CONTOUR
PRF
COUNTER
10KHz CLOCK
PRF
RF MODULATION
CONTOUR
CROSS GUIDE COUPLER
20dB
R/T UNIT UNDER TEST
OPTIONAL-USED FOR 10-120KW SYSTEMS (RF-10dB MODE)
IF OUT
1045-1175MHz
9296-9425MHz
X-BAND FRONT END
VCO MODULE
VCO 1045-1175 MHz
4048 ISOLATOR
LEVELER-DIST. MODULE
PIN
50Ω
0-10dB
0-12dB
DIODE SWITCH
PIN
J26
J3
J2
1.2GHz L.P.F.
9.25-9.45GHz B.P.F. and 8.25GHz NOTCH
7dB
AUX RF
10dB
J25
RF
0.26 GHz B.P.F.
20dB
J24
30dB
J23
SPECTRUM ANALYZER OUTPUT
J27
J28
0.256Hz
20dB
J22
BIAS
TUNE
LEVELER DETECTOR
1048-1178MHz
LEVELER CONTROL
TO MODE SW
-15V REG
BIAS/TUNE CONTROL BD
275 MHz
RF LEVEL CAL
SYSTEM CAL
AUX LEVEL CAL
(ON POWER MONITOR BOARD)
CONTOUR
SSB MODULE
900MHz L.P.F.
770-900MHz
1045-1179MHz
275MHz
TEST
275MHz B.P.F.
30MHz
30MHz DISCRIMINATOR
DISC
DISC FINE OFFSET
ΔF
PWR
PEAK DET
BUFFER
(ON PWR MON BD)
DETECTOR OUT
DATE
REV
CHANGE
APP'D
2/5/71
A
CHG DIRECTION OF INPUT ON 7dB COUPLER OF X BAND FRONT END
TOLERANCES
WW 11-2-70
BLOCK DIAGRAM S/N 109 AND UP
3-28-0126
C

Fig. 4-3