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This word document contains figures representing the test and adjustment for the Receiver Transmitter RT-1401B. These figures are scanned images from section II of the maintenance manual part number 006-05342-0002, Revision 2 dated June 1994. It should be noted that those pages "Intentionally Left Blank" were not scanned and are therefore not included here.



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**MAINTENANCE MANUAL
RT-1401B RECEIVER-TRANSMITTER**

SECTION II RECEIVER-TRANSMITTER TESTING

1. General

This section contains information pertaining to the test and adjustment of RT-1401B Receiver-Transmitter 4000831-0105. The test and adjustment procedures in this section are intended only for use when the R-T unit does not meet the functional test requirements as presented in the RDR-1400C Colorvision Radar System Installation Manual, or as a periodic calibration procedure.

2. Test Conditions

The RDR-1300B/1400B System Test Harness shown in figure 2-4 is required to accomplish the test and adjustment procedures in this section. The R-T unit may be tested without an antenna. If an antenna is not used, place the TEST switch S3 on the test harness to the SYSTEM LESS ANTENNA position and perform the procedure, disregarding all instructions related to the antenna.

Refer to paragraph 6.B. in Section III for special precautions when handling electrostatic discharge sensitive (ESDS) devices.

3. Test Equipment

Table 2-1 lists the test equipment required to perform the tests and adjustments described in paragraph 4. Equipment other than that listed in table 2-1 under "Representative Type" can be substituted if their characteristics fulfill those listed under "Characteristics Required".

Figures 2-1 through 2-4 illustrate typical test setups and fixtures used during the test procedures.

WARNING: OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES. THE TECHNICIAN OR OPERATOR SHOULD OBSERVE ALL SAFETY PRECAUTIONS WHEN PERFORMING THE TESTS AND ADJUSTMENTS CONTAINED HEREIN.

ITEM	DESCRIPTION	COMMON NAME	CHARACTERISTICS REQUIRED	REPRESENTATIVE TYPE
1	RDR-1300B/1400B System Test Harness	test harness	Fabricate locally. Must be fabricated with junction box to enable easy access to interwiring for tests.	Fabricate in accordance with figure 2-4.

Test Equipment
Table 2-1 (Sheet 1 of 2)



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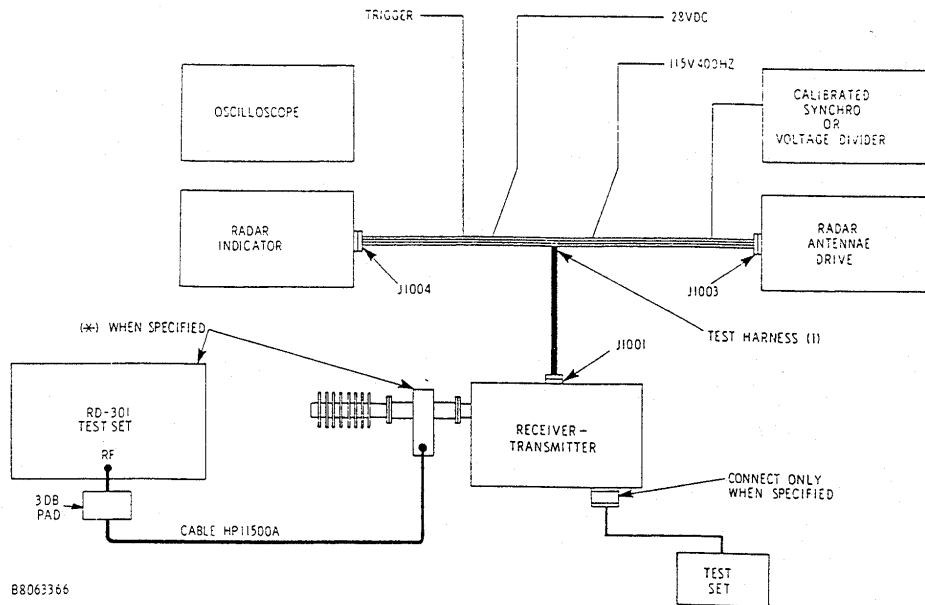
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ITEM	DESCRIPTION	COMMON NAME	CHARACTERISTICS REQUIRED	REPRESENTATIVE TYPE
2	Weather Radar Test Set	RD-301	Special test set for testing radar units.	IFR model RD-301 with cable and waveguide. See figure 2-3.
3	RD-301 Standard Waveguide Adapter	standard adapter	Supplied with RD-301	Refer to figure 2-2.
4	Oscilloscope	oscilloscope	Sensitivity; 5 mV/div	Tektronix Model 465B, with X1 and X10 probes
5	Current Probe	current probe	Frequency range: 450 Hz to 60 MHz (2 required)	Tektronix Model P6021AC
6	Digital Voltmeter	DVM	Capable of measuring 100 mV	Fluke Model 8000A
7	Stop Watch	stop watch	Interval timing 0-to-5 minutes	Haydon type KZ15151-R1-U4
8	Power Supply	power supply	0-to-40 Vdc, 50 A, 0.03% +2 mV drift	Hewlett-Packard Type HP6269B
9	Radar Indicator	indicator	Part of the RDR-1400C Colorvision Weather Radar System	Bendix/King Type IN-2025B
10	3 dB pad	3 dB pad	Type N, 3 dB, 5 W, DC to 12.4 GHz	Weinschel Eng., Model 1, 3 dB

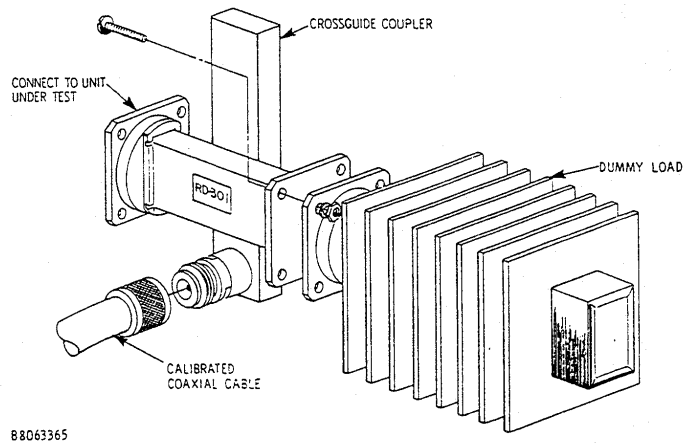
Test Equipment
Table 2-1 (Sheet 2)

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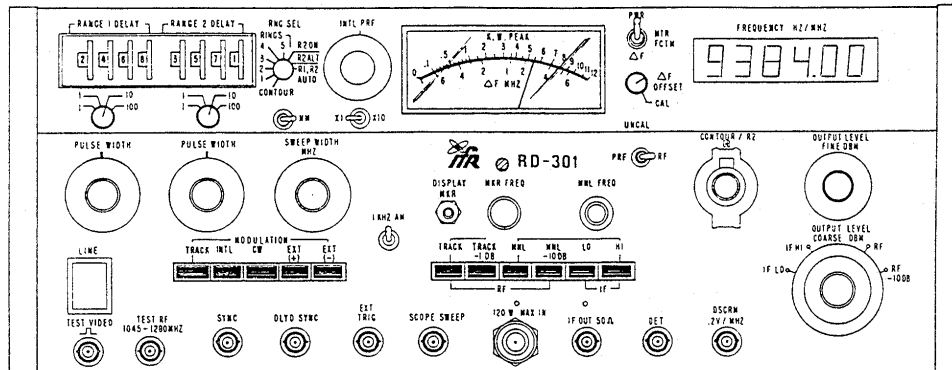
System Test Setup
Figure 2-1



RD-301 Standard Adapter Termination
Figure 2-2

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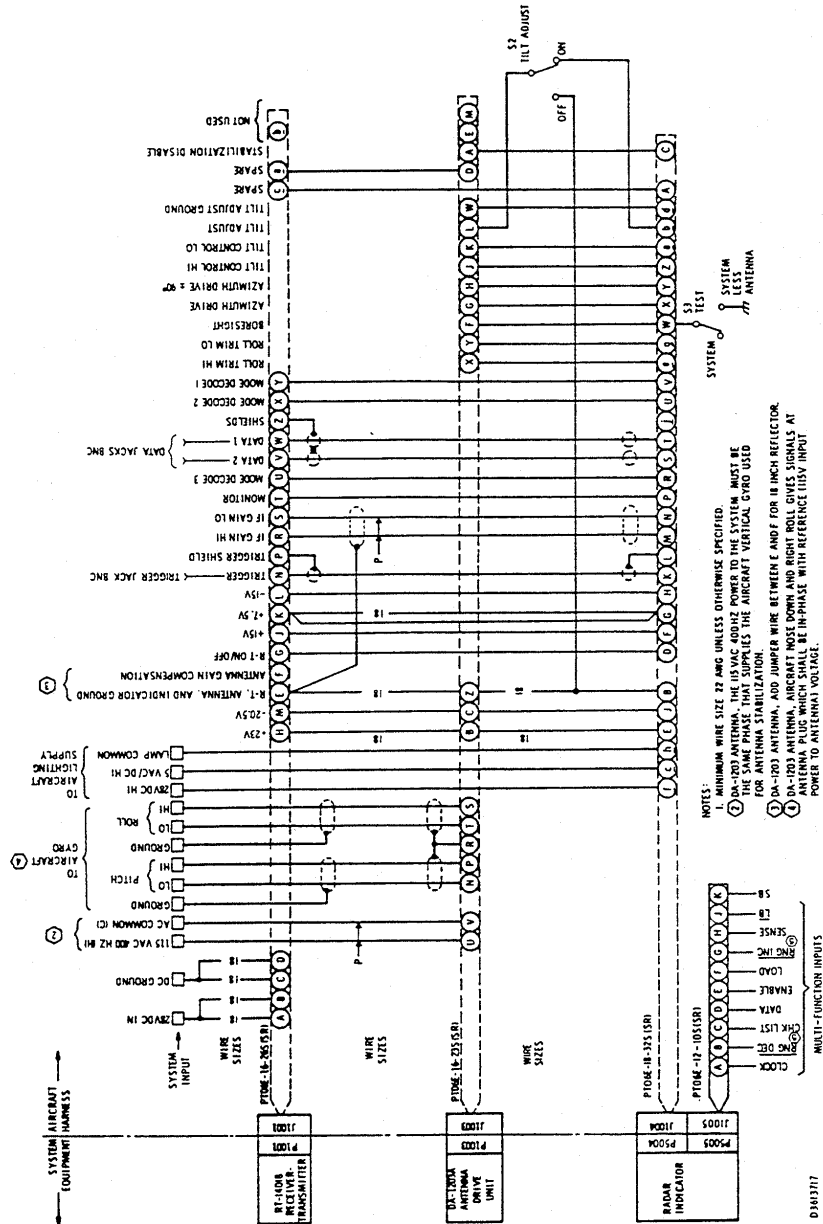
RD-301 Radar Test Set Front Panel Controls
Figure 2-3

I.B. 21401B-1

2-4
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RDR-1300/RDR-1400B System Test Harness
Figure 2-4

I.B. 21401B-1

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4. Test and Adjustment Procedure

A. General

Item numbers appearing in parenthesis directly following the test equipment common name pertain to the table of Test Equipment, table 2-1.

Test points and adjustment locations are stencilled on each PC board and subassembly. Locations of these test points are also shown on the pictorials accompanying each schematic diagram. Refer to section V.

The test and adjustment procedures are progressive tests and all controls and setups should be left in the last referenced step. If a test is not applicable to the unit being tested, then proceed with the next applicable test.

B. Initial Resistance Measurement

Before applying power on to the RT-1041B and before connecting the unit to the test setup, the input resistance must be measured to determine if it is safe to apply power.

Set the DVM (6) to the 20 k-ohm range and measure the resistance between pin A and pin C on the front panel connector P1001. The resistance should be greater than 1000 ohms.

C. Test Setup

(1) Set the RD-301 controls as follows:

LINE switch (Power)	ON
PULSE WIDTH control (Range 1)	50 usec
PULSE WIDTH Multiplier (Range 1)	1
RANGE 1 DELAY thumbwheel Switches	15 MILES
RANGE SEL switch	1
uS/NM switch	NM
INTL PRF control	(not required)
INTL PRF X1/X10 toggle switch	(not required)
MODULATION mode pushbuttons	TRACK
RF/IF mode pushbuttons	TRACK
PRF/RF toggle switch	RF
CONTOUR/R2 dB control	0 dB
OUTPUT LEVEL dBm controls	per following text



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- (2) Set the IN-2025B indicator controls as follows:

Mode selector	OFF
Tilt control	0
SRCH gain control	Maximum CW
BCN gain control	Maximum CW
Brightness control	Maximum CW

- (3) Set the test harness (1) switches as follows:

Tilt Adjust	ON
Test	As required

- (4) Connect the system to the test harness (1) per figures 2-1 and 2-4. Connect the harness to the 28 Vdc and to the 115 Vac 400 Hz power sources. The 400 Hz supply is not required if the antenna drive is not used.
- (5) Adjust the 28 volt power supply for 28.3 Vdc.
- (6) Attach the standard adapter load (3) to the R-T waveguide via the quick disconnect coupling and attach the wiring harness to connector P1001 on the R-T. Connect a 3 dB stick attenuator to the 20 dB coupler on the adapter, and cable the RD-301 test set to the stick attenuator.

NOTE: The RD-301 KW PEAK power meter will indicate one half (-3 dB) of the actual transmitter power.

D. Power Supply Test

WARNING: VOLTAGE DANGEROUS TO LIFE WILL BE PRESENT ON THE PULSE TRANSFORMER TERMINALS. EXERCISE CARE WHEN MAKING MEASUREMENTS.

NOTE: An RT failure will be displayed on the indicator when the system is in test; otherwise, the indicator will display ANT FAULT throughout the remainder of the test.

- (1) Disconnect P3023/J8023, located between the analog/video module and the mode-decode module.
- (2) Apply power (28.3 Vdc) to the test setup.
- (3) Remove the plastic wraparound cover from the magnetron chassis.
- (4) Turn the mode select switch on the indicator to the TEST position. The low voltage power supply fan motor should start running.

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- (5) Measure the magnetron filament voltage as follows:
 - (a) Set the DVM (6) to 20 Vdc.
 - (b) Measure the voltage on the magnetron leads, with the DVM (6) positive probe to white magnetron lead and the common probe to yellow magnetron lead. The voltage should be 6.3 Vdc \pm 0.3 Vdc. If necessary, adjust R5017 on the power supply to obtain correct voltage.

NOTE: Adjusting R5017 will also change the 23 Vdc at TP5001.

- (6) Set the DVM to 200 Vdc and measure the voltage across capacitor C5011 (TP5001) on the power supply. The voltage should be between 22 Vdc and 23.5 Vdc. If necessary, adjust R5017 on the power supply to obtain the correct voltage. If adjusted, repeat step (5) above.
- (7) Turn off the power to the R-T.
- (8) Reconnect P3023, and then reapply power to the R-T.
- (9) With the DVM, measure the regulated +5 volt output of the +5 volt regulator (U3014) on the analog/video board. Measure at pin 3 of U3014 on the analog/video board. The voltage should be between +4.75 Vdc and +5.25 Vdc.
- (10) With the DVM, measure the regulated -12 volt output from the -12 volt regulator (at pin 3 of U3013) on the analog/video board. Measure at TP5010 on the power supply. The voltage should be between -11.3 Vdc and -12.7 Vdc.
- (11) With the DVM, measure the regulated +12 volt output to the +12 volt regulator (at pin 3 of U3012) on the analog/video board. The voltage should be between +11.3 Vdc and +12.7 Vdc.
- (12) With the DVM, measure the unregulated -20.5 volt output to the front panel connector (P1003-5). Measure at TP5012 on the power supply. The voltage should be between -21.0 Vdc and -24.0 Vdc.
- (13) On the indicator, set the mode selector to OFF. Replace the magnetron plastic wraparound cover on the power supply. Leave the indicator turned off for at least 60 seconds before proceeding with the following tests.

E. Time Delay and Test Pattern Test

- (1) Set the stopwatch (7) to zero.

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- (2) Start the stopwatch and simultaneously set the indicator mode selector switch to the TEST position.
- (3) If the antenna drive is connected, observe that the antenna begins to scan before the test pattern appears.
- (4) Stop the stopwatch when the test pattern appears on the indicator screen. The elapsed time on the stopwatch should be between 70 and 90 seconds.
- (5) Observe the test pattern on the indicator screen. The yellow and green bands should be equal width, and the red band should be approximately 1.5 to 2 times the width of the green and yellow bands.
- (6) If necessary, adjust R2134 on the receiver board for equal width yellow and green bands.

F. Modulator Protection Test

WARNING: HAZARDOUS VOLTAGES ARE PRESENT IN THE MODULATOR CIRCUITS. EXERCISE EXTREME CARE WHEN CONNECTING TO THE SCR'S. NEVER MAKE PHYSICAL CONTACT WITH THE SCR LEADS WHILE POWER IS APPLIED.

- (1) Turn the mode selector switch on the indicator to the TEST position.
- (2) Locate CR4005 (the lower SCR) on the modulator. Connect an insulated test lead (with insulated clips) from the R-T chassis to the CR4005 lead that has a raised coil attached.
- (3) Turn the indicator mode switch to ON. Select the search 3 (SR3) mode and set the range to 20 NM. After 70 seconds, observe that the R-T does not transmit.
- (4) Remove the insulated clip from SCR CR4005. Observe that the R-T transmits to the RD-301.
- (5) Turn the mode selector switch on the indicator to the TEST position.
- (6) Locate CR4006 (the upper SCR) on the modulator. Connect the insulated test lead (with insulated clips) from the R-T chassis to the CR4006 lead that has a raised coil attached.
- (7) Turn the indicator mode switch to ON. Select the search 2 (SR2) mode and 20 NM range. Observe that the R-T does not transmit.
- (8) Remove the insulated clip from SCR CR4006. Observe that the R-T transmits to the RD-301.



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- (9) Turn the indicator mode selector switch back to the TEST position.

G. RF Trigger Pulse Test

- (1) Set the oscilloscope (4) sensitivity to 0.5 volts/div and set sweep speed to 0.5 us/div. Connect the oscilloscope to the DET output on the RD-301.
- (2) Turn the indicator mode selector switch to the ON position and select the search 3 (SR3) mode.
- (3) Adjust the vertical position on the oscilloscope to position the display at the bottom of the screen, and measure the pulse width of the displayed pulse. The pulse width at the 50% points should be between 2.20 us and 2.50 us. It may be necessary to change the sensitivity setting, depending upon the detector used.
- (4) On the indicator, select the search 2 (SR2) mode and set the range to 20 NM.
- (5) Set the oscilloscope sweep to 0.5 us/div and measure the pulse width at the 50% points. The pulse width should be between 0.45 us and 0.75 us.
- (6) Turn the indicator mode selector switch to the TEST position.
- (7) Set the Tektronix P6021 ac current probes (5) sensitivity to 10 mA/mV.

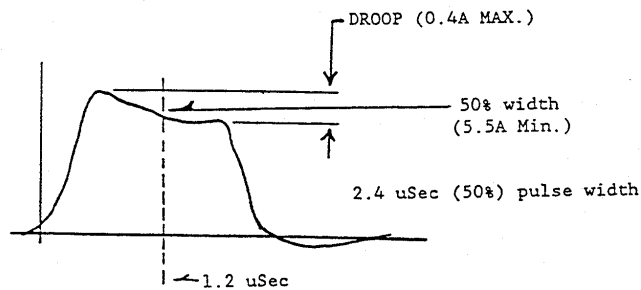
NOTE: Two current probes are required.

- (8) Connect the current probes to the oscilloscope channel 1 and channel 2 inputs, and set the oscilloscope input mode to ADD. Set oscilloscope sensitivity to 0.1 V/div and sweep to 0.5 us/div.
- (9) Connect the current probes to the magnetron leads.
NOTE: The probe polarities must both be in the same direction.
- (10) Turn the indicator mode selector to ON and select the search 3 (SR3) mode.
- (11) On the oscilloscope, measure the pulse amplitude and the pulse droop. The amplitude should be 5.5 amperes minimum, and the droop should be 0.4 amperes maximum as shown in figure 2-5.

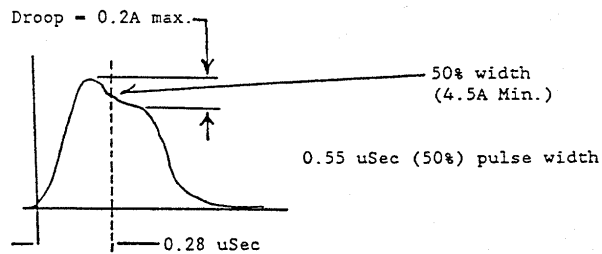
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- (12) Set the indicator mode to search 2 (SR2) and set the range to 20 NM.
- (13) On the oscilloscope, measure the pulse amplitude and the pulse droop. The amplitude should be 4.5 amperes minimum, and the droop should be 0.2 amperes maximum as shown in figure 2-6.
- (14) Set the indicator mode to TEST, and disconnect the current probes from the R-T and the oscilloscope.



SRCH 3 RF Trigger Current Pulse
Figure 2-5



SRCH 2 RF Trigger Current Pulse
Figure 2-6



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H. RF Power Test

- (1) Set indicator to ON and select the search 2 (SR2) mode and the 20 NM range.
- (2) Observe the power meter reading on the RD-301. The meter should read 3.7 kW minimum, which is one-half the actual transmitter output power, due to the 3 dB attenuator in the path.
- (3) On the indicator, select the search 3 (SR3) mode. The RD-301 power meter should read 3.7 kW minimum.
- (4) On the indicator, select the search 2 (SR2) mode with the BCN mode. The RD-301 power meter should read 3.7 kW minimum.

I. Crystal Current Test

- (1) Set the indicator to the search 3 (SR3) mode.
- (2) On the receiver board, measure the voltage between terminal E2 and E3 with the DVM set to dc volts. If necessary, adjust ATTENUATOR on the mixer-duplexer until the voltage is ± 0.20 Vdc ± 0.02 Vdc.

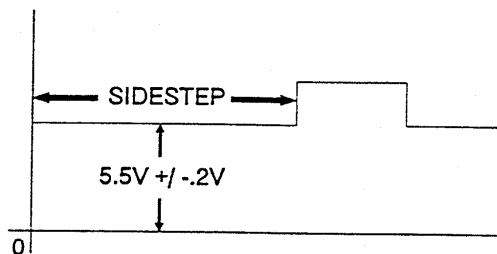
J. AFC Tests

- (1) Set the indicator to select the search 3 (SR3) mode. Set the oscilloscope sensitivity to 2 V/div and set the sweep to 0.5 ms/div. Connect the oscilloscope probe to test point TP3004 on the analog/video board.
- (2) Observe the FREQUENCY Hz/MHz digital display on the RD-301. If necessary, loosen the setscrews holding the magnetron frequency adjustment screw and adjust the magnetron tuning screw until the frequency is 9375 ± 0.5 MHz.
- (3) Tighten the setscrews holding the tuning adjustment.
- (4) On the local oscillator, turn the tuning screw counterclockwise two turns to ensure that the local oscillator frequency is higher than the magnetron frequency.
- (5) Observe the voltage at TP3004 on the oscilloscope. The voltage should be sweeping from 12 volts to near ground.
- (6) Slowly turn the local oscillator tuning screw clockwise while observing the voltage at TP3004. Continue to turn the tuning screw until the voltage stops sweeping and locks. The voltage should be $5.5V \pm 0.2V$. If necessary, repeat the above two steps.

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- (7) Set the indicator to search 3 (SR3) mode without BCN, and set the range to 20 NM.
- (8) Set the oscilloscope sweep to 0.5 ms/div and measure the side-step delay at TP3004 on the analog/video board. The side-step delay should be between 3.0 ms and 4.0 ms as shown in figure 2-7.
- (9) Set the indicator to the search 2 (SR2) mode with the range at 20 NM.
- (10) Set the oscilloscope sweep to 0.1 ms/div and measure the width of the side-step pulse at TP3004 on the analog/video board. The pulse width should be between 0.65 ms and 0.95 ms as shown in figure 2-7.



AFC Gate at TP3004
Figure 2-7

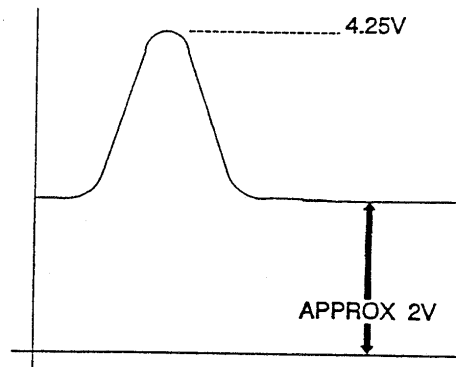
- (11) On the RD-301, set the controls as follows.

RF/IF mode pushbuttons	TRACK
MODULATION mode pushbuttons	TRACK
RANGE 1 DELAY thumbwheel switches	15 NM
PULSE WIDTH control (range 1)	50 us
OUTPUT LEVEL dBm controls	-90 dBm
- (12) Set the indicator to the search 2 (SR2) mode and set the range to 20 NM.
- (13) Connect the oscilloscope, via a X10 probe, to test point TP8009 on the mode-decode board.
- (14) Set the RD-301 to the MNL (manual) mode.

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- (15) On the RD-301, adjust the MNL FREQ control to peak the video waveform on the oscilloscope and thereby determine the center frequency of the wide-band filter (employed in the search 2 mode at 20 NM). Note the frequency on the RD-301's FREQUENCY Hz/MHz meter.
- (16) Switch the indicator mode to search 3 (to select the narrow-band filter in the R-T).
- (17) While observing the oscilloscope display, adjust L2027 on the receiver board to peak the target response on the oscilloscope at the same frequency determined in step (15) above.
- (18) Set the RD-301 to TRACK.
- (19) Adjust L3003 on the analog/video board to peak the video response (target) on the oscilloscope.
- (20) Position the display at the bottom of the oscilloscope screen. Adjust L3006 to peak the voltage at TP3009.
- (21) Set the indicator to search 2 mode at 20 NM, and adjust R3025 until this voltage is within the limits as shown in figure 2-8.
- (22) Secure tuning inductors L2027, L3003, and L3006 with staking compound if they were adjusted.



Locking Window Waveform at TP3009
Figure 2-8

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K. False Alarms Test

- (1) Set the indicator to the weather mode (WX) with beacon (BCN). Set the range to 240 NM.
- (2) Set the RD-301 OUTPUT LEVEL dBm attenuator controls to -120 dBm.
- (3) While observing the indicator display, adjust R3095 on the analog/video board to obtain approximately 5 green noise dots on the display. If necessary, adjust R3093 to reduce the white noise dots on the indicator screen.
- (4) Adjust R3093 to display approximately 5 flashing white noise dots on the indicator screen.

L. Log Receiver Tests (MDS, FTC, and Contour)

NOTE: Due to limitations of the test equipment, if MDS or contour readings cannot be met because the readings fall between attenuator settings, round off MDS or contour readings to highest RF level.

(1) Weather Mode MDS Test

- (a) Set the indicator to the WX mode and set the range to 240 NM.
- (b) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 120 NM and set the PULSE WIDTH control and multiplier switch to 500 USEC.
- (c) Reduce the OUTPUT LEVEL dBm attenuator control setting on the RD-301 until an MDS target is displayed on the indicator. The control settings should be -110 dBm typical and -106 dBm minimum. Record the attenuator setting for future use.

(2) Weather With Beacon Mode MDS Test

- (a) Set the indicator mode to weather (WX) with beacon (BCN) mode.
- (b) Slowly adjust the OUTPUT LEVEL dBm attenuator control setting on the RD-301 to obtain an MDS target on the display. The control settings should be less than 2 dB change from the setting in step 4.L.(1)(c) above.

(3) Search Mode MDS Test

- (a) Set the indicator to select the search 3 (SR3) mode, without the BCN selected and 240 NM range.

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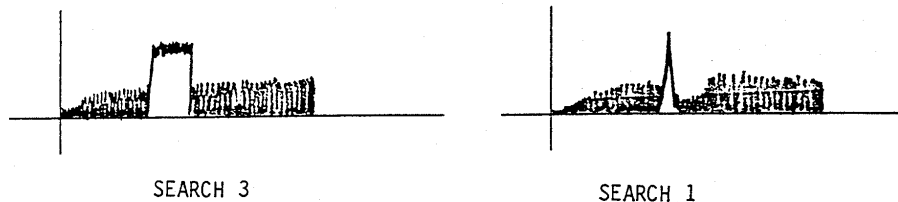
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- (b) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 120 NM and set the PULSE WIDTH control and multiplier switch to 500 USEC.
 - (c) Reduce the OUTPUT LEVEL dBm attenuator control settings on the RD-301 until an MDS target is displayed on the indicator. The control settings should be -110 dBm typical and -106 dBm minimum.
 - (d) Because of variable STC in search 3 and search 2, there will be several false alarms on 20 and 40 NM ranges with full manual gain.
- (4) Contour Tests
- (a) Weather Mode
 - 1 Set the indicator to the weather (WX) mode.
 - 2 On the MD-301, adjust the OUTPUT LEVEL dBm attenuator controls until the target on the indicator contours (50% yellow and 50% red). Record the attenuator setting.
 - 3 Subtract the attenuator setting in the above step from the setting in step 4.L.(1)(c). Record this value. The difference level should be 17 dBm \pm 2 dB.
 - (b) Weather With Beacon Mode
 - 1 On the indicator, press the BCN mode button to select weather with beacon mode.
 - 2 On the MD-301, adjust the OUTPUT LEVEL dBm attenuator controls until the target on the indicator contours (50% yellow and 50% red). Record the attenuator setting.
 - 3 Subtract the attenuator control settings in the above step from the setting in step 4.L.(1)(c). Record this value. The difference level should be 17 dBm \pm 3 dB.
- (5) Fast Time Constant (FTC) Test
- (a) Set the indicator to the search 1 (SR1) mode and set the range to 10 NM.
 - (b) On the MD-301, set the RANGE 1 DELAY thumbwheel switches to 5 NM, and set the PULSE WIDTH control and multiplier switch to 50 us. Set the OUTPUT LEVEL dBm attenuator controls to -60 dBm.

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- (c) Connect the oscilloscope probe to TP8009 on the mode-decode board. Set the oscilloscope sweep speed to 20 us/div.
- (d) Observe that the FTC is working by observing that the video changes as illustrated in figure 2-9.



FTC Waveform at TP8009
Figure 2-9

M. Beacon Receiver Bandwidth and MDS Tests

(1) Bandwidth Test

- (a) Set the indicator to the beacon only (BCN) mode and set the range to 240 NM.
- (b) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 120 NM, set the PULSE WIDTH control and multiplier switch to 500 us, set the OUTPUT LEVEL dBm attenuator controls to -83 dBm, and set the RF/IF mode pushbuttons to MNL. Adjust the MNL FREQ control to 9310 ± 1 MHz.
- (c) On the indicator, connect the oscilloscope to TP8009 on the mode-decode board. Set the oscilloscope sweep speed to 0.5 ms/div and observe the waveform.
- (d) Adjust C7082 on the beacon receiver board and L2020 on the log receiver board until the two controls cause the target in the video waveform to peak on the oscilloscope.

NOTE: C7082 has a narrower bandpass characteristic and therefore more influence than L2020.



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- (e) Adjust the oscilloscope vertical position to set a peak reference level on the display.
- (f) On the RD-301, set the OUTPUT LEVEL dBm attenuator controls to -80 dBm.
- (g) On the RD-301, adjust the MNL FREQ control to frequencies above and below the peaked frequency (9310 MHz) until the video waveform returns to the reference level. Record the upper and lower frequencies.
- (h) Subtract the lower frequency from the upper frequency obtained in the previous step. The difference should be 12 MHz minimum.

(2) MDS Test

- (a) On the RD-301, set the MNL FREQ control to 9310 MHz. Set the RANGE 1 DELAY thumbwheel switches to 120 NM, and set the PULSE WIDTH control and multiplier switch to 0.5 us.
- (b) Set the indicator to the beacon mode and set the range to 240 NM.
- (c) Measure the beacon MDS by adjusting the OUTPUT LEVEL dBm attenuator controls until an MDS target (white arc is 50%) appears on the indicator display. The MDS level should be -84 dBm minimum as indicated on the RD-301.

N. AGC Voltage Test

- (1) Set the indicator to the search 2 (SR2) mode, set the range to 20 NM, and set the SRCH gain control to the maximum clockwise position.
- (2) Connect the digital voltmeter (6) to test point TP3008 on the analog/video board and measure the voltage. The voltage should be 1.0 volt minimum to 5.8 volts maximum.
- (3) Set the indicator to the search 3 (SR3) mode and measure the voltage at TP3008 on the analog/video board. The voltage should be 1.0 volt minimum to 4.3 volts maximum.
- (4) Set the indicator to the beacon mode and turn the BCN gain control to the maximum clockwise position.
- (5) Measure the voltage at TP8007 on the mode-decoder board. The voltage should be 0.5 volt minimum to 6.0 volts maximum.



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0. Logarithmic Receiver STC and Manual Gain Tests

(1) Setup

- (a) The wiring harness must be set for use with a 12-inch antenna. Check that pin F from the R-T connector is not grounded, but is left floating for the 12-inch antenna. Refer to Note 3 in figure 2-4.
- (b) Set the indicator for search 2 (SR2) mode, set range to 20 NM.
- (c) Connect the oscilloscope probe (X10) to test point TP8021 on the mode-decode board. Observe the waveform and adjust the SRCH gain control until the variable part of the voltage waveform has a +0.5 volt step (positive pulse) in it.
- (d) Leave the SRCH gain control at this setting for future search and STC adjustments.

(2) Weather STC

- (a) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 1.5 NM, set the PULSE WIDTH control and multiplier switch to 0.5 us, set the OUTPUT LEVEL dBm attenuator controls to -50 dBm, and set the RF/IF mode pushbuttons to TRACK.
- (b) Adjust R8058 on the mode-decode board to display an MDS type target (50% green arc) on the indicator. (Ignore STC target at bottom of display.)
- (c) Set the indicator to weather mode and set the range to 10 NM.
- (d) On the RD-301, set the Range Delay to 4 NM and set the target width to 12 us.
- (e) On the RD-301, adjust the OUTPUT LEVEL dBm attenuator controls to obtain an MDS target at approximately 5 NM on the indicator screen. Record the RD-301 attenuator setting. It should be -88 ± 3 dBm.

(3) Manual Gain, Search Mode

- (a) Set the indicator to search 2 (SR2) mode and set range to 10 NM.
- (b) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 6 NM, and set the PULSE WIDTH control and multiplier switch to 0.5 us.

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NOTE: Make sure pin F on the R-T connector is still unconnected for a 12-inch antenna.

- (c) On the indicator, turn the SRCH gain control to the maximum clockwise position.
- (d) On the RD-301, set the OUTPUT LEVEL dBm attenuator controls to produce an MDS target and record the attenuator setting.
- (e) On the RD-301, adjust the OUTPUT LEVEL dBm attenuator controls to a setting that is 30 dB above the setting obtained in the previous step.
- (f) On the indicator, turn the SRCH gain control to the maximum counterclockwise position. Observe that the MDS target does not reappear on the indicator screen.

P. Beacon Receiver STC and Manual Gain Tests

(1) Beacon STC

- (a) On the RD-301, set the RF/IF mode pushbuttons to MNL mode, and adjust the MNL FREQ control to 9310 MHz as indicated on the RD-301 FREQUENCY display.
- (b) Set the indicator to the beacon mode.
- (c) Connect an oscilloscope probe (X10) to test point TP8021 on the mode-decode board. While observing the waveform, adjust the BCN gain control on the indicator until the variable part of the voltage waveform has a +0.5 volt step (positive pulse) in it.
- (d) Leave the BCN gain control at this setting for future BCN STC tests.
- (e) On the RD-301, set the uS/NM toggle switch to uS, set the RANGE 1 DELAY thumbwheel switches to 42 us, and set the OUTPUT LEVEL dBm attenuator controls to -57 dBm.
- (f) Adjust R8094 on the mode-decode board for an MDS target (50% white) on the indicator.
- (g) Set the indicator range to 20 NM.
- (h) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 128 us.
- (i) On the RD-301, adjust the OUTPUT LEVEL dBm attenuator controls to obtain an MDS target on the indicator. The attenuator controls should be -66 dBm \pm 3 dB.



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(2) Beacon Manual Gain

- (a) After successfully performing the above STC test procedure, set the indicator range to 5 NM. Set the BCN gain control to the maximum clockwise position.
- (b) On the RD-301, set the RANGE 1 DELAY thumbwheel switches to 36 us, and set the OUTPUT LEVEL dBm attenuator controls to produce an MDS target (50% white screen).
- (c) Record the OUTPUT LEVEL dBm control settings.
- (d) On the indicator, readjust the BCN gain control to the maximum counterclockwise position.
- (e) On the RD-301, adjust the OUTPUT LEVEL dBm attenuator controls until the MDS target reappears on the indicator.
- (f) Record the OUTPUT LEVEL dBm control settings.
- (g) Subtract the value recorded in step (c) from the value recorded in step (f). The difference between the two should be 30 dB or greater.

Q. Fault Monitor Test

- (1) Disconnect the local oscillator cable connector P6012.
- (2) Observe that the RT FAULT message is displayed on the indicator screen before one full sweep of the indicator.
- (3) Reconnect the local oscillator cable connector P6012 and observe that the RT FAULT message disappears from the indicator screen.
- (4) With an insulated test lead, connect a jumper short between test points TP8007 and TP8015 on the mode-decode board.

CAUTION: USE EXTREME CARE TO AVOID ACCIDENTALLY SHORTING TO THE WRONG TEST POINT. DAMAGE TO THE RT COULD RESULT.

- (5) Observe that the RT FAULT message is displayed on the indicator screen before four full sweeps of the indicator.
- (6) Remove the short and observe that the RT FAULT message disappears.