ENGINEERING SPECIFICATION

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	IT7510184	REV LTR
	CAGE CODE 55939	

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TITLE

INTEGRATED TEST SPECIFICATION FOR DM-850 PART NO. 7510184-9XX AND DM-855, PART NO. 7510184-855

PREPARED BY:	DATE	APPROVED BY TECHNICAL MANAGER	DATE	APPROVED BY ENGINEERING DEPARTMENT MANAGER	DATE
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FOR PAGE INDEX, SEE PAGE CR-2. REVISION RECORD FOLLOWS PAGE INDEX.

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V	SEE PAGE INDEX SHEET CR-2	SEE REV U FOR PREVIOUS REVISION INFORMATION. DOC. CONVERTED TO LATEST FORMAT C.O. 78246 (MAKE)	Tom Sisco 13 Jan 2000
W	SEE PAGE INDEX SHEET CR-2	C.O. 102924 (MAKE)	M. Inouye 1 Mar 00
Y	SEE PAGE INDEX SHEET CR-2	C.O. 24336 (BREAK IN*)	M. Inouye 10 Nov 00
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REV LTR

Y

TITLE: INTEGRATED TEST SPECIFICATION FOR DM-850 PART NO. 7510184-9XX AND DM-855, PART NO. 7510184-855

1. SCOPE

This Integrated Test Specification establishes the manufacturing and operational requirements that the DME modules listed below must meet to ensure that the units are in proper operating condition.

TYPE	PART NUMBER
DM-850	7510184-90X
Y DM-855	7510184-855

2. REFERENCE DOCUMENTS

Assembly Prints/Schematics

Power Supply/Modulator Assy	7510221
Transmitter Module Assy	7510210
Receiver Synthesizer Assy	7510190
DME CMPTR/VIDEO CCA	7510180
EPIC Interface CCA	7026160

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3. GENERAL INFORMATION

AE **3.1** Unless otherwise specified, all module level tests shall be done using the standard setup in Section 6.

AE **3.2** Deleted.

3.3 All input signals shall be applied between the designated terminal and ground unless otherwise stated.

3.4 No warm-up period is required.

3.5 Perform Appendix A calibration before testing unit.

3.6 All power output measurements shall take into account loss in RF cable at 1100 MHz.

3.7 All alphanumeric symbols bracketed by greater-than/less-than "< >" symbols will require the characters be typed and "ENTER" or "Return" typed.

3.8 The test equipment may continuously monitor the RCB port of the DME module. If such monitoring is provided, the DME module shall generate no bus errors except when the power is off or being cycled off or on.

AD **3.9** All tests shall be performed under conditions of 25 ± 10 °C and less than 90 percent relative humidity, unless otherwise specified. Temperature screening should be performed under conditions of -55 ± 10 °C and +70 ± 10 °C.

3.10 Unless otherwise specified all tests shall be performed with the antenna jack connected to a 50-ohm load.

3.11 Appendix B alignment procedures must be performed when the module is first integrated in production.

3.12 Instructions to setup test equipment or configure the radio will occur before the reading is taken. The test parameter reading will have a test number assigned. Taking the reading is the end of that test section and subsequent instructions belong to the next test parameter.

3.13 Tests are normally done in sequence and the test steps are written for this purpose. If tests are performed out of sequence the tester is responsible for insuring the correct mechanical and software setups are performed.

3.14 In cases where timing is required be sure to read the entire instruction before performing the test. The test setup and sequence is completed when the reading paragraph is performed. Any instructions after this reading are for the following test setup.

4. POWER REQUIREMENTS

Unless otherwise specified, all tests shall be conducted with the power-input voltage adjusted to 27.5 ± 0.1 V dc. This voltage shall be measured between the power-input terminals of the U.U.T..

5. TEST EQUIPMENT OR EQUIVALENT

Manual Test Equipment

R.F. Signal Generator	IFR ATC1400/S1403 OR JcAIR SDX-2000
Digital Multi-meter	Fluke Model 8840
Oscilloscope	Tektronix Model 2430
Radio Test Interface Unit (RTIU)	Honeywell 7511400-902
RTIU Software	7512001-XYY Where X = media code as specified on drawing 7512001 and YY = 17 or greater (software version)

NOTE: RTIU P/N 7511400-901 is equipped with software version 7512001-108. RTIU P/N 7511400-902 is equipped with software version 7512001-109.

Harness Assembly RTIU-DM-855	7511409-934
Harness Assembly RTIU-DM-850	7511409-911
IBM PC Equivalent	Hard drive, floppy, Monitor, RS-232 port.
Power Supply	28 VDC @ 2 amps

Alternate Test Equipment

AD	**EPIC-CATS**	
	Honeywell EPIC Computer Aided Test System	T336384
AE	DME Module Adapter	T336397
AE	DME Program	MT7510184-501 Rev G
AD	**PRIMUS-CATS**	
	Honeywell Computer Aided Test System	T360001
	COM Module Adapter	T360011
AE	DME Program	MT7510184 Rev W

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6. TEST SETUP

6.1 For –901 & -902 modules connect per Figure 1.

6.2 For –855 modules connect per Figure 2.

6.3 Range Calibration procedure per appendix A must be performed before continuing I.T. tests.

6.4 Appendix B alignment procedure must be performed when module is first integrated in production.

6.5 Initialization Setup

Turn power on the Computer and wait for RTIU screen.
AE Connect U.U.T. per Paragraph 6.1 or 6.2 above.
Turn the RTIU AC power on. (If not already on.)
Connect U.U.T. to RTIU CABLE
Connect a 600 ohm resistor between P1G3 (H) and P1H3 (Low) (568 DATA)
Connect a 600 ohm resistor between P1J3 (H) and P1K3 (Low) (568 CLK)
Connect a 600 ohm resistor between P1J6 (H) and P1C2 (Low) (568 SYNC)
When main menu appears on screen:

Select DME module (DM-850).	<11>	
FMS Installed	<I>	OPEN
EFIS/MLS Control	<F>	OPEN
SYS 2 DME INST	<R>	OPEN

Turn the RTIU 28 VDC: ON

RCB Source Display	<P>

6.6 Initial Setup for the IFR ATC1400/S1403

Freq/Select:	111.90 VOR Pair
Signal Level:	-70 dBm
Ident:	“OFF”
Squitter:	2700 PPS
TACAN Modulation:	On
Reply Efficiency:	100%
Velocity	0 Kts
Acceleration	0 ft/s/s
Range	34 NMI
DME P2 Dev.	0.0 Microseconds
-1/NORM Switch:	Norm
Suppressor:	Off
Suppressor Var:	Set for +18 V Pulse Amplitude
CW/Norm:	Norm
SLS/Echo:	OFF
Freq. Step Rate:	MAN

6.7 Initial Setup for JcAIR SDX2000

Menu Page	Operation	Selection		NOTES
Main Menu:	Select:	DME		
MEASURED PULSE	Select:	P2		
EXPANDED MENU	Select	Expanded menu		Located just below Measured Pulse. Larger of two icons.
P2 POSITION OFFSET	Select	P2 Position Offset Default Done		
EFFICIENCY	Select	Efficiency Default Done		
DME MODE (Output Frequency and Mode Select)				
	Select	DME Mode VOR .00		
	Select	VOR PAIR:	DEFAULT DONE	
SQUITTER	Select	Squitter Rate DEFAULT DONE		
REPLY POWER	Select	REPLY POWER	TOP POWER DEFAULT DONE ON DONE	
TRIG SCOPE	Select	TRIG SCOPE AT REPLY DONE		
ECHO PAIR	Select	ECHO PAIR OFF DONE		
IDENT	Select	IDENT OFF DONE		
EQUALIZER	Select	EQUALIZER OFF		

Menu Page	Operation	Selection		NOTES
568 DISTANCE	Select	568 DISTANCE DEFAULT DONE		
568 CONTROL	Select	568 CONTROL INTERNAL		
SUPPRESION	Select	SUPPRESSION ON VOLTS 18.00 DONE OFF DONE		
SELF INTERR	Select	SELF INTERR OFF		
Collapse to Single Menu				
RANGE	Select	RANGE DEFAULT DONE		
NORMAL/ -1	Select	NORMAL/ -1 NORMAL		
VELOCITY	Select	VELOCITY DEFAULT		
DIRECTION	Select	DIRECTION OUTBOUND		
ACCEL ft/s/s	Select	ACCEL –ft/s/s DEFAULT DONE		

7. TEST REQUIREMENTS

7.1 Software Applicability

The following UUT software versions shall be installed for the listed dash number and MOD letter status of the UUT. The software version number refers to the software installed and not the EPROM part number. These numbers shall be verified during TEST 1.000

Table 1. Module Modification Status vs. Software Version

Module Dash Number					
	-855	-902	-901	MOD	Software Version
			X	NONE	7510228-104 7510243-101
			X	A,B	7510228-106 7510243-102
		X		C	7510228-108 7510243-104
		X		G	7510228-108 7510243-105
	X	X		K	7510228-111 7510243-105

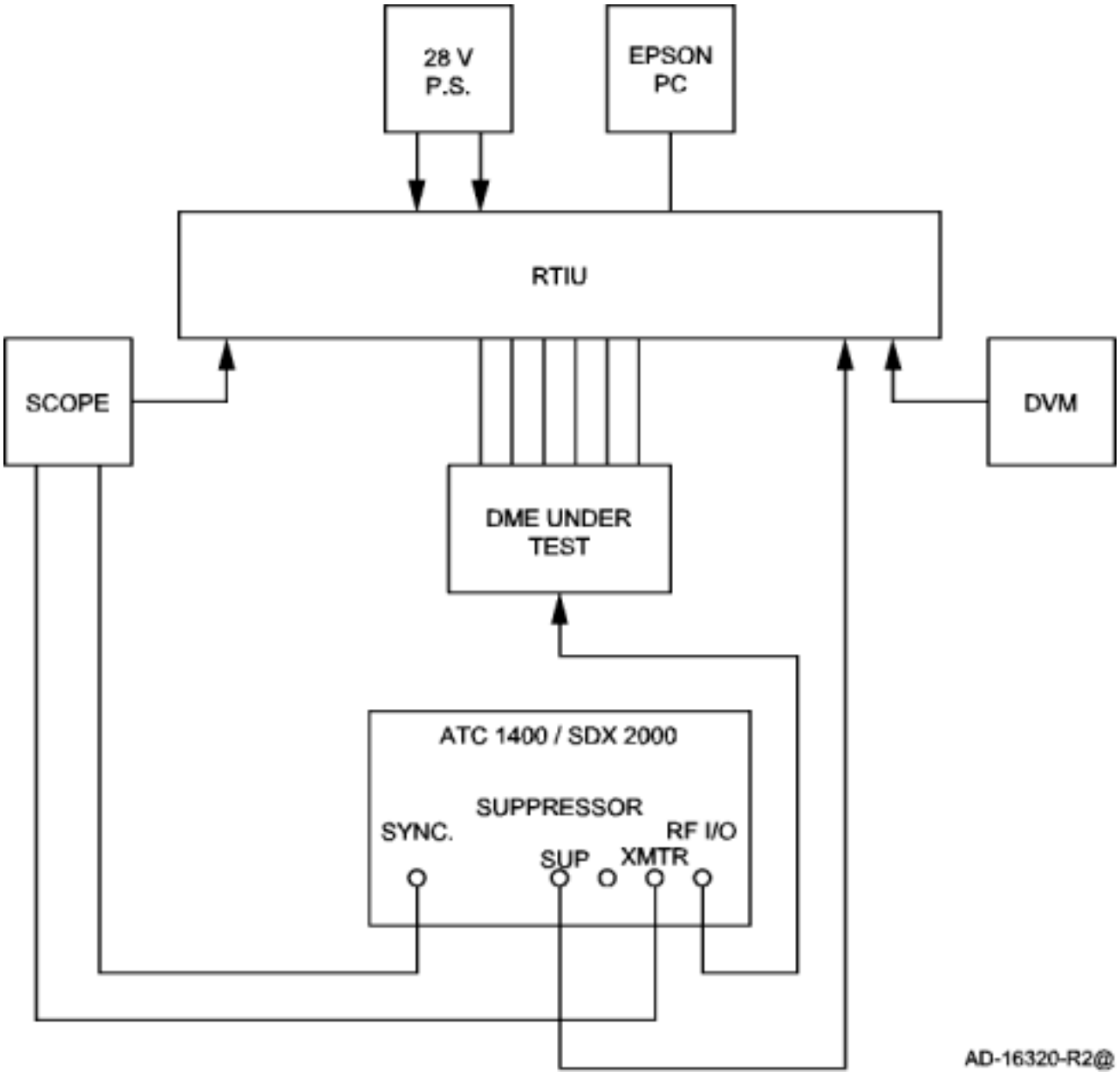


Figure 1. DME Module Test Setup

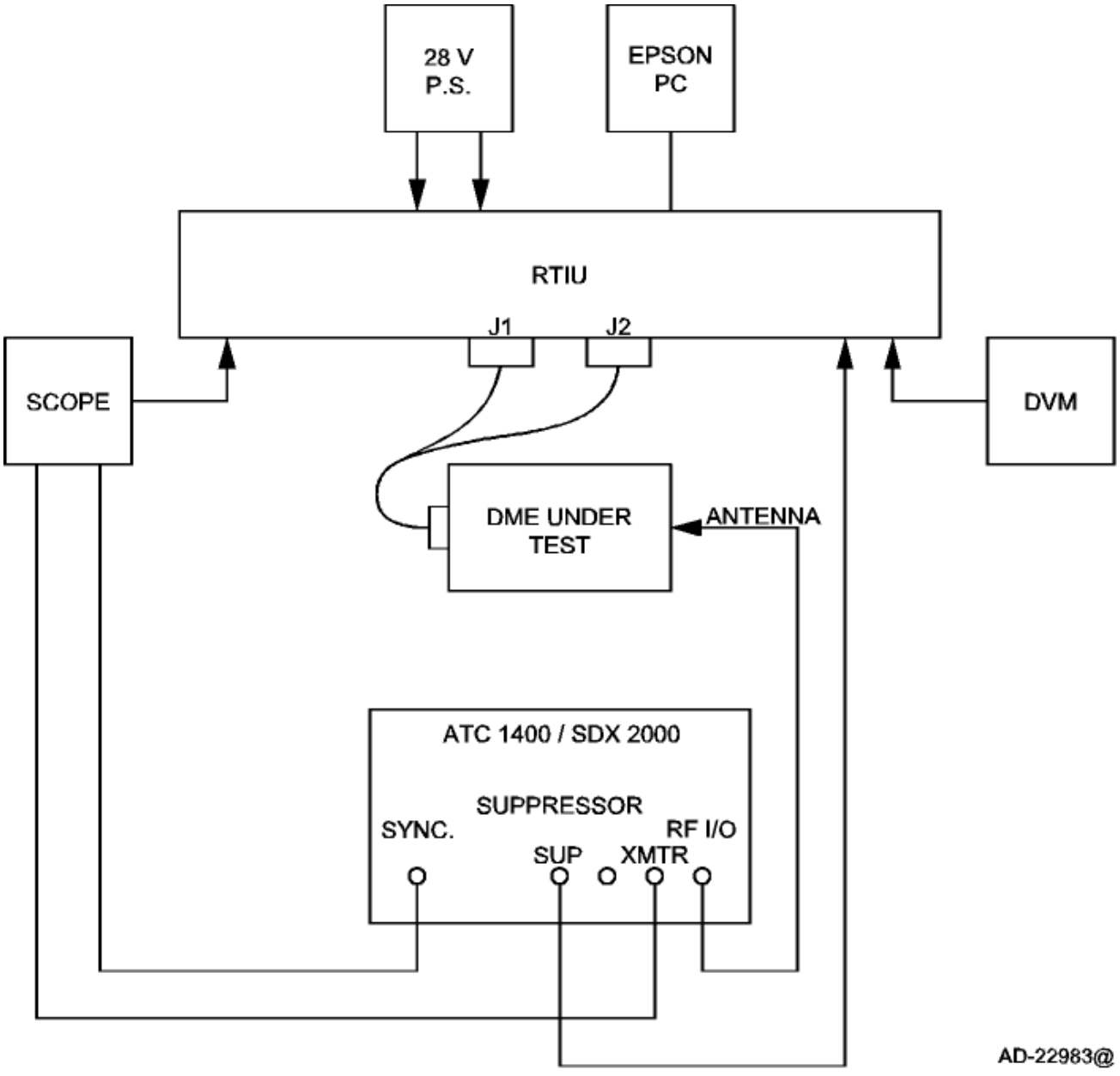


Figure 2. EPIC DME Module Test Setup

Column	Description
Rev Ltr	This column is used to identify revised material.
Test No.	Tests are numbered in sequence in steps of 10. If new tests are added adding 1-9 to the end of the appropriate section will number them e.g. add new test to 1.010 results in 1.011.
Opr Limits	Unit under test (UUT) shall meet these limits whenever tested at other than the manufacturing facility. When an item is marked OPTIONAL in this column, the corresponding test is not required except as an aid in troubleshooting.
Test Description	These items are the parameters to which the unit under test was designed. In addition, these items aid in troubleshooting by specifying the input and output signal terminals. For brevity, all conditions required are not repeated for each test. Conditions established in previous tests will also apply.
Switch Pos	Perform switch settings in order specified. When an item is entered in Work Steps Column opposite a switch setting other than the first or when there is additional space between switches, perform this item before setting any other switches.
Work Steps	When work step items are entered opposite first Switch Pos, perform all switch settings first. When items are entered opposite switch setting other than first setting or when there is additional space between switches, perform work step item before setting any other switches.
Mfg Limits	Unit under test shall meet these limits prior to customer delivery.
Code	A "1" in the column indicates that the material in the next column applies only to manual test procedures. A "2" in the column indicates that the material in the next column applies only to Automatic Test Equipment procedures. A blank column indicates that the material in the next column applies equally to manual and automated test procedures.

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
	1.000			DME SELF TEST CLEAR	Test Setup #1		DME SELF TEST CLEAR	
				Clear Power on Count	<H> <C>		Bench Source Display Clear Power on Count	
							RTIU:	
	1.010	POC: 0					RTIU: Maintenance Page Power on Count shall be as specified.	POC: 0
				Clear Maintenance Log	<M>		Clear Maintenance Log	
	1.020	BENCH CMD: 1					RTIU: Maintenance Page BENCH CMD shall be as specified.	BENCH CMD: 1
				Set Software Version	<V>		Enter number shown in Table 1: as the dash number of the 7510243 part for current MOD letter of the DME.	
					<P> <M> <X>		RCB Source Display Maintenance Display Display All	
	1.030			Software Version A Verification			Verify the software version for 7510228 is correct for the current MOD and DASH number of the radio under test	See Table 1
	1.040			Software Version B Verification			Verify the software version for 7510243 is correct for the current MOD and DASH number of the radio under test	See Table 1
	1.050						RTIU: Maintenance Log	No Errors
					<P> <O>		RCB Source Display DME On/Off: Off Wait 5 Sec.	
					<O> <M> <X>		DME On/Off: On Maintenance Display	
	1.060	POC: 1		Power On Count Verification			RTIU: Observe the CRT. The POC shall be as specified.	POC: 1

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
					<P> <L>		RCB Source Display Verify “A” channel DME STATUS: VH NH	
					<A>		If FF HL reset.	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	2.000			DME PAIRED CHANNEL TEST 111.90 MHZ	Test Setup #1		DME PAIRED CHANNEL TEST 111.90 MHZ GROUND STATION EQ: Set to measure 111.90 VOR PAIR	
					<F> <111.90> <G>		Frequency 111.90 paired channel All channels	
	2.010	9-11 PPS		Interrogator Freq. P.R.F.			Verify the P.R.F. on the ground station equipment. The reading shall be as specified.	9-11 PPS
	2.020	1080 MHz ± 100 kHz		Interrogator Frequency Accuracy			Verify the Interrogator Frequency on the ground station equipment. The reading shall be as specified.	1080 MHz ± 90 kHz
				PEAK POWER PULSE 1			PEAK POWER PULSE 1	
	2.030	Greater than or equal to 350 watts		Measure P1 peak power			Set ground station equipment to measure the P1 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts
				PEAK POWER PULSE 2			PEAK POWER PULSE 2	
	2.040	Greater than or equal to 350 watts		Measure P2 peak power			Set ground station equipment to measure the P2 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				SENSITIVITY			SENSITIVITY	
	2.050	Less than or equal to –90 dBm		Measure the minimum signal needed to remove the distance display flag.			Set the ground station R.F. attenuator to –120 dBm. Wait until the distance read out on the RTIU is flagged. (ASCII Happy Face will appear next to distance read out) Slowly adjust the R.F. attenuator level until the flag disappears. The attenuator reading shall be as specified. (NOTE: all cable losses and equipment errors shall be compensated.) Set ground station attenuator for –70 dBm.	Less than or equal to –93 dBm
				RANGE ACCURACY			RANGE ACCURACY	
	2.060	34.00 ± 0.05 NM		Measure the range accuracy.			RTIU: Observe RCB “L-SIDE (A)”. The range reading shall be as specified.	34.00 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				<u>For – 9XX Units Only</u>			<u>For – 9XX Units Only</u>	
					<N>		422/568 Source Display	
	2.070	34.00 ± 0.05 NM		Measure the ARINC 568 range accuracy			On the RTIU observe the 568 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
	2.080	34.00 ± 0.05		Measure the RS-422 range accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
							<u>RTIU:</u> Connect a DVM (+) to J1U3 and DVM (-) to 28 V dc RTN.	
							Set DVM to measure DC volts.	
	2.090	1.36 ± 0.06 V dc		Measure the analog range voltage.			The voltage at J1U3 shall be as specified.	1.36 ± 0.05 V dc
					<P>		RCB Source Display	

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
				For All Dash Numbers			For All Dash Numbers	
				PULSE WIDTH			PULSE WIDTH	
							Connect an oscilloscope channel to the detected transmitter pulse on the ground station test equipment.	
							Set the oscilloscope to measure the first interrogation pulse.	
							NOTE: Measure the pulse width at the 50% points of the voltage waveform.	
	2.100	3.5 ± 0.5 uSec		Measure the first interrogation pulse. The pulse shall be as specified.			The pulse width observed on the oscilloscope shall be as specified.	3.5 ± 0.5 uSec
				Rise & Fall Times			Rise & Fall Times	
							Set the oscilloscope to measure the rise and fall times of detected pulse.	
	2.110	Less than or equal to 3.0 uSec		Check the rise time (between 10% and 90% voltage point on the pulse) of the pulse. The reading shall be as specified.			With the oscilloscope measure the rise time of the detected pulse. The pulse rise time between the 10% and 90% points shall be as specified.	Less than or equal to 3.0 uSec
	2.120	Less than or equal to 3.0 uSec		Verify the fall time (between 90% and 10% voltage point on the pulse) of the pulse. The reading shall be as specified.			With the oscilloscope measure the fall time of the detected pulse. The pulse rise time between the 90% and 10% points shall be as specified	Less than or equal to 3.0 uSec
				Pulse Flatness			Pulse Flatness	
	2.130	Greater than or equal to 95%		Verify that the pulse level between the 95% points on the rising and falling edges does not decrease below the value specified.			With the oscilloscope measure the flatness of the detected pulse between the 95% rise and fall points. The pulse amplitude shall be as specified.	Greater than or equal to 97%

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
				Differential Pulse Amplitude NOTE: The amplitude of the second pulse shall be greater than 89% and less than 112% of the amplitude of the first pulse.			Differential Pulse Amplitude NOTE: The amplitude of the second pulse shall be greater than 89% and less than 112% of the amplitude of the first pulse.	
	2.140	Less than or equal to 1 dB		Measure the difference in pulse amplitude between the first and second pulses. The amplitude difference shall be as specified.			With the oscilloscope measure the difference in amplitude between the first and second pulse. The second pulse amplitude shall be as specified.	Less than or equal to 1 dB

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	3.000			DME PAIRED CHANNEL TEST 111.95 MHZ	Test Setup #1		DME PAIRED CHANNEL TEST 111.95 MHZ GROUND STATION EQ: Set to measure 111.95 VOR PAIR	
					<F> <111.95> <G>		Frequency 111.95 paired channel All channels	
	3.010	9-11 PPS		Interrogator Freq. P.R.F.			Verify the P.R.F. on the ground station equipment. The reading shall be as specified.	9-11 PPS
	3.020	1080 MHz ± 100 kHz		Interrogator Frequency Accuracy			Verify the Interrogator Frequency on the ground station equipment. The reading shall be as specified.	1080 MHz ± 90 kHz
				PEAK POWER PULSE 1			PEAK POWER PULSE 1	
	3.030	Greater than or equal to 350 watts		Measure P1 peak power			Set ground station equipment to measure the P1 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts
				PEAK POWER PULSE 2			PEAK POWER PULSE 2	
	3.040	Greater than or equal to 350 watts		Measure P2 peak power			Set ground station equipment to measure the P2 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				SENSITIVITY			SENSITIVITY	
	3.050	Less than or equal to –90 dBm		Measure the minimum signal needed to remove the distance display flag.			Set the ground station R.F. attenuator to –120 dBm. Wait until the distance read out on the RTIU is flagged. (ASCII Happy Face will appear next to distance read out) Slowly adjust the R.F. attenuator level until the flag disappears. The attenuator reading shall be as specified. (NOTE: all cable losses and equipment errors shall be compensated.) Set ground station attenuator for –70 dBm.	Less than or equal to –93 dBm
				RANGE ACCURACY			RANGE ACCURACY	
	3.060	34.00 ± 0.05 NM		Measure the range accuracy.			Observe RCB page on the RTIU. "L-SIDE(A)". The range reading shall be as specified.	34.00 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				<u>For – 9XX Units Only</u>			<u>For – 9XX Units Only</u>	
					<N>		422/568 Source Display	
	3.070	34.00 ± 0.05 NM		Measure the ARINC 568 range accuracy			On the RTIU observe the 568 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
	3.080	34.00 ± 0.05		Measure the RS-422 range accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
							<u>RTIU:</u> Connect a DVM (+) to J1U3 and DVM (-) to 28 V dc RTN.	
							Set DVM to measure DC volts.	
	3.090	1.36 ± 0.06 V dc		Measure the analog range voltage.			The voltage at J1U3 shall be as specified.	1.36 ± 0.05 V dc
					<P>		RCB Source Display	
							Ground station test equipment range set to 0 NM.	
				Tests 3.100 through 3.140 are mandatory only for original manufacturing tests.			Tests 3.100 through 3.140 are mandatory only for original manufacturing tests.	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				For All Dash Number Units			For All Dash Number Units	
				SENSITIVITY			SENSITIVITY	
							Adjust the R.F. level attenuator to –120 dBm. Wait until the distance read out is flagged. (ASCII Happy Face appears next to distance read out)	
	3.100	Less then or equal to –90 dBm		Measure the minimum R. F. signal input that causes the distance flag to disappear. The level shall be as specified.			Slowly adjust the R.F. attenuator until the flag disappears. The R.F. level shall be as specified	Less then or equal to –93 dBm
							Adjust the ground station simulator R.F. output to – 70 dBm.	
				RANGE ACCURACY			RANGE ACCURACY	
	3.110	0.00 ± 0.04 NM		Verify RCB range accuracy			Observe the RTIU RCB Page “L-SIDE(A)” range. The reading shall be as specified.	0.00 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				For –9XX Units Only			For –9XX Units Only	
					<N>		422/568 Source Display	
	3.120	0.00 ± 0.05		Measure the ARINC 568 range accuracy.			On the RTIU observe the 568 (ACTIVE) range. The range reading shall be as specified.	0.00 ± 0.04 NM
	3.130	0.00 ± 0.05		Measure the RS 422 accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	0.00 ± 0.04 NM
							RTIIU: Connect a DVM (+) to J1U3 and DVM (-) TO 28 V dc RTN	
	3.140	0.00 ± 0.06 V dc		Verify analog range voltage.			The voltage at J1U3 shall be as specified.	0.00 ± 0.05 V dc

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
AE				FOR ALL DASH NUMBER UNITS				
	4.000			DME PAIRED CHANNEL TEST 134.40 MHZ	Test Setup #1		DME PAIRED CHANNEL TEST 134.40 MHZ GROUND STATION EQ: Set to measure 134.40 VOR PAIR	
					<F> <134.40> <G>		Frequency 134.40 paired channel All channels	
	4.010	9-11 PPS		Interrogator Freq. P.R.F.			Verify the P.R.F. on the ground station equipment. The reading shall be as specified.	9-11 PPS
	4.020	1025 MHz ± 100 kHz		Interrogator Frequency Accuracy			Verify the Interrogator Frequency on the ground station equipment. The reading shall be as specified.	1025 MHz ± 90 kHz
				PEAK POWER PULSE 1			PEAK POWER PULSE 1	
	4.030	Greater than or equal to 350 watts		Measure P1 peak power			Set ground station equipment to measure the P1 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts
				PEAK POWER PULSE 2			PEAK POWER PULSE 2	
	4.040	Greater than or equal to 350 watts		Measure P2 peak power			Set ground station equipment to measure the P2 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				SENSITIVITY			SENSITIVITY	
	4.050	Less than or equal to –90 dBm		Measure the minimum signal needed to remove the distance display flag.			Set the ground station R.F. attenuator to –120 dBm. Wait until the distance read out on the RTIU is flagged. (ASCII Happy Face will appear next to distance read out) Slowly adjust the R.F. attenuator level until the flag disappears. The attenuator reading shall be as specified. (NOTE: all cable losses and equipment errors shall be compensated.) Set ground station attenuator for –70 dBm.	Less than or equal to –93 dBm
				RANGE ACCURACY			RANGE ACCURACY	
	4.060	34.00 ± 0.05 NM		Measure the range accuracy.			Observe RCB page on the RTIU. "L-SIDE(A)". The range reading shall be as specified.	34.00 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				<u>For – 9XX Units Only</u>			<u>For – 9XX Units Only</u>	
					<N>		422/568 Source Display	
	4.070	34.00 ± 0.05 NM		Measure the ARINC 568 range accuracy			On the RTIU observe the 568 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
	4.080	34.00 ± 0.05 NM		Measure the RS-422 range accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
							<u>RTIU:</u> Connect a DVM (+) to J1U3 and DVM (-) to 28 V dc RTN.	
							Set DVM to measure DC volts.	
	4.090	1.36 ± 0.06 V dc		Measure the analog range voltage.			The voltage at J1U3 shall be as specified.	1.36 ± 0.05 V dc
					<P>		RCB Source Display	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				For All Dash Numbers PULSE WIDTH			For All Dash Numbers PULSE WIDTH Connect an oscilloscope channel to the detected transmitter pulse on the ground station test equipment. Set the oscilloscope to measure the first interrogation pulse. NOTE: Measure the pulse width at the 50% points of the voltage waveform.	
	4.100	3.5 ± 0.5 uSec		Measure the first interrogation pulse. The pulse shall be as specified.			The pulse width observed on the oscilloscope shall be as specified.	3.5 ± 0.5 uSec
				Rise & Fall Times			Rise & Fall Times Set the oscilloscope to measure the rise and fall times of detected pulse.	
	4.110	Less than or equal to 3.0 uSec		Check the rise time (between 10% and 90% voltage point on the pulse) of the pulse. The reading shall be as specified.			With the oscilloscope measure the rise time of the detected pulse. The pulse rise time between the 10% and 90% points shall be as specified.	Less than or equal to 3.0 uSec

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
	4.120	Less than or equal to 3.0 uSec		Verify the fall time (between 90% and 10% voltage point on the pulse) of the pulse. The reading shall be as specified.			With the oscilloscope measure the fall time of the detected pulse. The pulse rise time between the 90% and 10% points shall be as specified	Less than or equal to 3.0 uSec
				Pulse Flatness			Pulse Flatness	
	4.130	Greater than or equal to 95%		Verify that the pulse level between the 95% points on the rising and falling edges does not decrease below the value specified.			With the oscilloscope measure the flatness of the detected pulse between the 95% rise and fall points. The pulse amplitude shall be as specified.	Greater than or equal to 97%
				Differential Pulse Amplitude			Differential Pulse Amplitude	
				NOTE: The amplitude of the second pulse shall be greater than 89% and less than 112% of the amplitude of the first pulse.			NOTE: T he amplitude of the second pulse shall be greater than 89% and less than 112% of the amplitude of the first pulse.	
	4.140	Less than or equal to 1 dB		Measure the difference in pulse amplitude between the first and second pulses. The amplitude difference shall be as specified.			With the oscilloscope measure the difference in amplitude between the first and second pulse. The second pulse amplitude shall be as specified.	Less than or equal to 1 dB

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	5.000			DME PAIRED CHANNEL TEST 108.00.MHZ	Test Setup #1		DME PAIRED CHANNEL TEST 108.00 MHZ GROUND STATION EQ: Set to measure 108.00 VOR PAIR	
					<F> <108.00> <G>		Frequency 108.00 paired channel All channels	
	5.010	9-11 PPS		Interrogator Freq. P.R.F.			Verify the P.R.F. on the ground station equipment. The reading shall be as specified.	9-11 PPS
	5.020	1041 MHz ± 100 kHz		Interrogator Frequency Accuracy			Verify the Interrogator Frequency on the ground station equipment. The reading shall be as specified.	1041 MHz ± 100 kHz
				PEAK POWER PULSE 1			PEAK POWER PULSE 1	
	5.030	Greater than or equal to 350 watts		Measure P1 peak power			Set ground station equipment to measure the P1 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				PEAK POWER PULSE 2			PEAK POWER PULSE 2	
	5.040	Greater than or equal to 350 watts		Measure P2 peak power			Set ground station equipment to measure the P2 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts
				SENSITIVITY			SENSITIVITY	
	5.050	Less than or equal to –90 dBm		Measure the minimum signal needed to remove the distance display flag.			Set the ground station R.F. attenuator to –120 dBm. Wait until the distance read out on the RTIU is flagged. (ASCII Happy Face will appear next to distance read out)	Less than or equal to –93 dBm
							Slowly adjust the R.F. attenuator level until the flag disappears. T he attenuator reading shall be as specified. (NOTE: all cable losses and equipment errors shall be compensated.)	
							Set ground station attenuator for –70 dBm.	
				RANGE ACCURACY			RANGE ACCURACY	
	5.060	34.00 ± 0.05 NM		Measure the range accuracy.			Observe RCB page on the RTIU.	34.00 ± 0.04 NM
							“L-SIDE(A)”. The range reading shall be as specified.	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				<u>For – 9XX Units Only</u>			<u>For – 9XX Units Only</u>	
					<N>		422/568 Source Display	
	5.070	34.00 ± 0.05 NM		Measure the ARINC 568 range accuracy			On the RTIU observe the 568 (ACTIVE) range. as specified.	34.00 ± 0.04 NM
	5.080	34.00 ± 0.05 NM		Measure the RS-422 range accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
							<u>RTIU:</u> Connect a DVM (+) to J1U3 and DVM (-) to 28 V dc RTN.	
							Set DVM to measure DC volts.	
	5.090	1.36 ± 0.06 V dc		Measure the analog range voltage.			The voltage at J1U3 shall be as specified.	1.36 ± 0.05 V dc
					<P>		RCB Source Display	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
AE				FOR ALL DASH NUMBER UNITS				
	6.000			DME PAIRED CHANNEL TEST 110.00.MHZ	Test Setup #1		DME PAIRED CHANNEL TEST 110.00 MHZ GROUND STATION EQ: Set to measure 110.00 VOR PAIR	
					<F> <110.00> <G>		Frequency 110.00 paired channel All channels	
	6.010	9-11 PPS		Interrogator Freq. P.R.F.			Verify the P.R.F. on the ground station equipment. The reading shall be as specified.	9-11 PPS
	6.020	1061 MHz ± 100 kHz		Interrogator Frequency Accuracy			Verify the Interrogator Frequency on the ground station equipment. The reading shall be as specified.	1061 MHz ± 90 kHz
				PEAK POWER PULSE 1			PEAK POWER PULSE 1	
	6.030	Greater than or equal to 350 watts		Measure P1 peak power			Set ground station equipment to measure the P1 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts
				PEAK POWER PULSE 2			PEAK POWER PULSE 2	
	6.040	Greater than or equal to 350 watts		Measure P2 peak power			Set ground station equipment to measure the P2 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				SENSITIVITY			SENSITIVITY	
	6.050	Less than or equal to –90 dBm		Measure the minimum signal needed to remove the distance display flag.			Set the ground station R.F. attenuator to –120 dBm. Wait until the distance read out on the RTIU is flagged. (ASCII Happy Face will appear next to distance read out) Slowly adjust the R.F. attenuator level until the flag disappears. The attenuator reading shall be as specified. (NOTE: all cable losses and equipment errors shall be compensated.) Set ground station attenuator for –70 dBm.	Less than or equal to –93 dBm
				RANGE ACCURACY			RANGE ACCURACY	
	6.060	34.00 ± 0.05 NM		Measure the range accuracy.			Observe RCB page on the RTIU. "L-SIDE(A)". The range reading shall be as specified.	34.00 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				<u>For – 9XX Units Only</u>			<u>For – 9XX Units Only</u>	
					<N>		422/568 Source Display	
	6.070	34.00 ± 0.05 NM		Measure the ARINC 568 range accuracy			On the RTIU observe the 568 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
	6.080	34.00 ± 0.05 NM		Measure the RS-422 range accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
							<u>RTIU:</u> Connect a DVM (+) to J1U3 and DVM (-) to 28 V dc RTN.	
							Set DVM to measure DC volts.	
	6.090	1.36 ± 0.06 V dc		Measure the analog range voltage.			The voltage at J1U3 shall be as specified.	1.36 ± 0.05 V dc
					<P>		RCB Source Display	

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
AE				FOR ALL DASH NUMBER UNITS				
	7.000			DME PAIRED CHANNEL TEST 117.90MHZ	Test Setup #1		DME PAIRED CHANNEL TEST 117.90 MHZ GROUND STATION EQ: Set to measure 117.90 VOR PAIR	
					<F> <117.90> <G>		Frequency 117.90 paired channel All channels	
	7.010	9-11 PPS		Interrogator Freq. P.R.F.			Verify the P.R.F. on the ground station equipment. The reading shall be as specified.	9-11 PPS
	7.020	1150 MHz ± 100 kHz		Interrogator Frequency Accuracy			Verify the Interrogator Frequency on the ground station equipment. The reading shall be as specified.	1150 MHz ± 90 kHz
				PEAK POWER PULSE 1			PEAK POWER PULSE 1	
	7.030	Greater than or equal to 350 watts		Measure P1 peak power			Set ground station equipment to measure the P1 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts
				PEAK POWER PULSE 2			PEAK POWER PULSE 2	
	7.040	Greater than or equal to 350 watts		Measure P2 peak power			Set ground station equipment to measure the P2 pulse. The equipment power meter shall read as specified.	Greater than or equal to 360 watts

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				SENSITIVITY			SENSITIVITY	
	7.050	Less than or equal to –90 dBm		Measure the minimum signal needed to remove the distance display flag.			Set the ground station R.F. attenuator to –120 dBm. Wait until the distance read out on the RTIU is flagged. (ASCII Happy Face will appear next to distance read out) Slowly adjust the R.F. attenuator level until the flag disappears. The attenuator reading shall be as specified. (NOTE: all cable losses and equipment errors shall be compensated.) Set ground station attenuator for –70 dBm.	Less than or equal to –93 dBm
				RANGE ACCURACY			RANGE ACCURACY	
	7.060	34.00 ± 0.05 NM		Measure the range accuracy.			Observe RCB page on the RTIU. "L-SIDE(A)". The range reading shall be as specified.	34.00 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				<u>For – 9XX Units Only</u>			<u>For – 9XX Units Only</u>	
					<N>		422/568 Source Display	
	7.070	34.00 ± 0.05 NM		Measure the ARINC 568 range accuracy			On the RTIU observe the 568 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
	7.080	34.00 ± 0.05 NM		Measure the RS-422 range accuracy.			On the RTIU observe the 422 (ACTIVE) range. The range reading shall be as specified.	34.00 ± 0.04 NM
							<u>RTIU:</u> Connect a DVM (+) to J1U3 and DVM (-) to 28 V dc RTN.	
							Set DVM to measure DC volts.	
	7.090	1.36 ± 0.06 V dc		Measure the analog range voltage.			The voltage at J1U3 shall be as specified.	1.36 ± 0.05 V dc
					<P>		RCB Source Display	

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
				For All Dash Numbers			For All Dash Numbers	
				PULSE WIDTH			PULSE WIDTH	
							Connect an oscilloscope channel to the detected transmitter pulse on the ground station test equipment.	
							Set the oscilloscope to measure the first interrogation pulse.	
							NOTE: Measure the pulse width at the 50% points of the voltage waveform.	
	7.100	3.5 ± 0.5 uSec		Measure the first interrogation pulse. The pulse shall be as specified.			The pulse width observed on the oscilloscope shall be as specified.	3.5 ± 0.5 uSec
				Rise & Fall Times			Rise & Fall Times	
							Set the oscilloscope to measure the rise and fall times of detected pulse.	
	7.110	Less than or equal to 3.0 uSec		Check the rise time (between 10% and 90% voltage point on the pulse) of the pulse. The reading shall be as specified.			With the oscilloscope measure the rise time of the detected pulse. The pulse rise time between the 10% and 90% points shall be as specified.	Less than or equal to 3.0 uSec
	7.120	Less than or equal to 3.0 uSec		Verify the fall time (between 90% and 10% voltage point on the pulse) of the pulse. The reading shall be as specified.			With the oscilloscope measure the fall time of the detected pulse. The pulse rise time between the 90% and 10% points shall be as specified	Less than or equal to 3.0 uSec
				Pulse Flatness			Pulse Flatness	
	7.130	Greater than or equal to 95%		Verify that the pulse level between the 95% points on the rising and falling edges does not decrease below the value specified.			With the oscilloscope measure the flatness of the detected pulse between the 95% rise and fall points. The pulse amplitude shall be as specified.	Greater than or equal to 97%

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
				Differential Pulse Amplitude NOTE: The amplitude of the second pulse shall be greater than 89% and less than 112% of the amplitude of the first pulse.			Differential Pulse Amplitude NOTE: The amplitude of the second pulse shall be greater than 89% and less than 112% of the amplitude of the first pulse.	
	7.140	Less than or equal to 1 dB		Measure the difference in pulse amplitude between the first and second pulses. The amplitude difference shall be as specified.			With the oscilloscope measure the difference in amplitude between the first and second pulse. The second pulse amplitude shall be as specified.	Less than or equal to 1 dB

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
		8.000		RANGE ACCURACY	Test Setup #1		RANGE ACCURACY GROUND STATION EQ: range to 0.00 NM, and select VOR PAIR 111.90	
					<F> <111.90> <G>		Frequency 111.90 VOR PAIR ALL CHANNELS	
	8.010	0 ± 0.05 NM		Measure range accuracy with range input set for 0 NM. The reading shall be as specified.			RTIU: Observe "L-SIDE (A)" Range. The reading shall be as specified. Set ground station equipment range to 10.00 NM.	0 ± 0.04 NM
	8.020	10.00 ± 0.05 NM		Measure range accuracy with range input set for 10.00 NM. The reading shall be as specified.			RTIU: Observe "L-SIDE (A)" Range. The reading shall be as specified. Set ground station equipment range to 100.00 NM.	10.00 ± 0.04 NM
	8.030	100.00 ± 0.05 NM		Measure range accuracy with range input set for 100.00 NM. The reading shall be as specified.			RTIU: Observe "L-SIDE (A)" Range. The reading shall be as specified. Set ground station equipment range to 225.00 NM.	100.00 ± 0.04 NM
	8.040	225.00 ± 0.06 NM		Measure range accuracy with range input set for 225.00 NM. The reading shall be as specified.			RTIU: Observe "L-SIDE (A)" Range. The reading shall be as specified. Set ground station equipment range to 300.00 NM.	225.00 ± 0.05 NM
	8.050	300.00 ± 0.06 NM		Measure range accuracy with range input set for 300.00 NM. The reading shall be as specified.			RTIU: Observe "L-SIDE (A)" Range. The reading shall be as specified.	300.00 ± 0.05 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
				For –9XX Units only			For –9XX Units only	
					<N> <K> <2>		422/568 Source Display RS-422 Port (2)	
	8.060	300.00 ± 0.06 NM		Measure range accuracy with range input set for 300.00 NM. The reading shall be as specified.			RTIU: Observe the RS-422 distance display for Channel A. The reading shall be as specified.	300.00 ± 0.05 NM
					<P>		RCB Source Display	

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
AE				FOR ALL DASH NUMBER UNITS				
	9.000			Morse ID	Test Setup #1		Morse ID	
					<N>		422/568 Source Display	
					<N>		Discrete Source Display	
							Set ground station equipment IDENT: CODE	
AE	9.010	ACT ID KEY 1 & 2 must GO HI		Apply an IDENT CODE to the RF antenna port. The discrete output at ACT ID KEY 1 (P2-18) and ACT ID KEY 2 (P2-15) shall go to TTL HI.			RTIU: Observe discrete ACT ID keys 1 and 2. Shall be as specified.	ACT ID KEY 1 & 2 must GO HI
					<N>		Audio Source Display	
					<A>		Select Audio	
					<1>		(1)	
							Set ground station equipment IDENT: TONE	
	9.020	4.9 – 5.7 V dc		Apply an IDENT TONE to the RF antenna port. The audio output at P2-25 shall be as specified.			RTIU: Observe AUDIO LEV ( ). The level shall be as specified.	5.0 – 5.6 V dc
					<A>		Select Audio	
					<2>		(2)	
	9.030	4.9 – 5.7 V dc		Apply an IDENT TONE to the RF antenna port. The audio output at P2-26 shall be as specified.			RTIU: Observe AUDIO LEV( ). The level shall be as specified.	5.0 – 5.6 V dc
							Set ground station equipment IDENT: OFF	
							Connect an oscilloscope to RTIU J2T1 and 28 V dc RTN	
					<P>		Discrete Source Display	
					<P>		422/568 Source Display	
					<P>		RCB Source Display	

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
Y	9.040	28 ± 4 V dc when unit transmits		Toggling of mutual suppression line through the radio bus. The output at P2-1 shall indicate as shown.			Observe the oscilloscope. The pulse displayed shall read as specified. Set Oscilloscope to measure a 20 to 60 uSec pulse width.	28 ± 4 V dc when unit transmits
	9.050	40 ± 20 uSec		Measure the pulse width of the mutual suppression pulse at P2-1. The pulse shall be as specified.			Observed the oscillo-scope. The pulse width shall be as specified. Set the ground station equipment mutual suppressor to ON. Connect the ground station suppressor pulse to the RTIU pins J2T1 (H) and 28 V dc RTN	40 ± 20 uSec
	9.060	Range display flagged after 10 sec.		Apply an external mutual suppression pulse with the amplitude of 18.0 V to P2-1. The radio shall respond by flagging the RANGE output after the time specified.			RTIU: Observe “L-SIDE (A)” distance display. The display shall be as specified.	Range display flagged after 10 sec.
AD				(ALL EXCEPT –855)			(ALL EXCEPT –855) Set ground station equipment mutual suppression OFF. Connect a DVM to RTIU J1D1 (H) and 28 V dc RTN	
AD	9.070	28 ± 4 V dc		With no external mutual suppression applied the voltage at P2-38 shall be as specified.			Observe the DVM. The amplitude shall be as specified.	28 ± 4 V dc

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
AD				(ALL UNITS)			(ALL UNITS) **NOTE: THE NEXT TEST IS A TIMED TEST.** Set ground station equipment R.F. Level to –120 dBm.	
	9.080	10 ± 2 sec		With RF removed from the antenna port DISTANCE, TTS, and GROUD SPEED outputs from the radio shall flag invalid in the time specified.			RTIU: Observe “L-SIDE (A)” DISTANCE, TTS, and GROUND SPEED. The displays will be flagged at the time specified.	10 ± 2 sec

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	10.000			Scanning Test	Test Setup #1 <F> <108.00> <A> <F> <117.90> <D>		Scanning Test Frequency 108.00 Channel A Frequency 117.90 Channel D Set ground station equipment RANGE: 10 NM, FREQUENCY 108.00 VOR PAIR	
	10.010	10 ± 0.05 NM		Set the radio Channel A for 108.00 MHz and Channel D for 117.90 MHz. Apply a 108.00 VOR PAIR signal with a range delay of 10 Nautical Miles. Channel A shall respond showing the specified range.			RTIU: Observer "L-SIDE (A)" distance. The distance display shall be as specified.	10 ± 0.04 NM
	10.020	FLAGGED		Set the radio Channel A for 108.00 MHz and Channel D for 117.90 MHz. Apply a 108.00 VOR PAIR signal with a range delay of 10 Nautical Miles. Channel D shall respond showing the specified range.			RTIU: Observer "R-SIDE (D)" distance. The distance display shall be as specified. Set ground station RANGE: 122 NM, FREQUENCY: 117.90 VOR PAIR	FLAGGED
	10.030	FLAGGED		Set the radio Channel A for 108.00 MHz and Channel D for 117.90 MHz. Apply a 117.90 VOR PAIR signal with a range delay of 122 Nautical Miles. Channel A shall respond showing the specified range.			RTIU: Observer "L-SIDE (A)" distance. The distance display shall be as specified.	FLAGGED

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	10.040	122 ± 0.05 NM		Set the radio Channel A for 108.00 MHz and Channel D for 117.90 MHz. Apply a 117.90 VOR PAIR signal with a range delay of 122 Nautical Miles. Channel D shall respond showing the specified range.			RTIU: Observer "R-SIDE (D)" distance. The distance display shall be as specified.	122 ± 0.04 NM

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	11.000			Squitter Rate Range Accuracy Range Accuracy at 700 Squitter	Test Setup #1 <F> <111.90> <G>		Squitter Rate Range Accuracy Range Accuracy at 700 Squitter Set ground station equipment Squitter Rate: 700, Range: 34.00 NM Frequency 111.90 All Channels	
	11.010	34.00 ± 0.05 NM		L-SIDE(A) distance shall be as specified. Range Accuracy at 4700 Squitter			RTIU: Observe the "L-SIDE (A) distance display. The display shall read as specified. Range Accuracy at 4700 Squitter Set ground station equipment Squitter Rate: 4700	34.00 ± 0.04 NM
	11.020	34.00 ± 0.05 NM		L-SIDE(A) distance shall be as specified.			RTIU: Observe the "L-SIDE (A) distance display. The display shall read as specified. Set ground station equipment Squitter Rate: 2700	34.00 ± 0.04 NM

REV	TEST	SPECIFICATION			PROCEDURE			SPECIFICATION
LTR	NO.	OPR LIMITS	C	TEST DESCRIPTION	SWITCH POS	C	WORK STEPS	MFG LIMITS
	12.000			VELOCITY ACCURACY	Test Setup #1 <F> <111.90 <A>		VELOCITY ACCURACY Frequency 111.90 All Channels **NOTE: THIS TEST IS A TIME TEST.** Set ground station equipment VELOCITY: 350.0 KTS. Wait 90 sec	
	12.010	350.0 ± 5 KTS		The GROUND SPEED shall be as specified.			RTIU: Observe "L-SIDE (A) GROUND SPEED. The reading shall be as specified. Set ground station equipment VELOCITY: 0.0 KTS	350.0 ± 4 KTS

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	13.000			PAST MODE	Test Setup #1		PAST MODE	
					<F> <111.90> <A>		Frequency 111.90 All Channels	
					<S> <A> <A>		Test On Past Channel	
	13.010	DME PASS		Message			RTIU: Observe “L-SIDE (A)” Radio MSG. The reading shall be as specified.	DME PASS
AB	13.020	10.0 NM		DISTANCE			RTIU: Observe “L-SIDE (A)” DISTANCE. The reading shall be as specified.	10.0 NM
AB	13.030	120.0 KTS		GROUND SPEED			RTIU: Observe “L-SIDE (A)” GROUND SPEED. The reading shall be as specified.	120.0 KTS
AB	13.040	5		TTS			RTIU: Observe “L-SIDE (A)” TTS. The reading shall be as specified.	5
AB	13.050	TEST		IDENT			RTIU: Observe “L-SIDE (A)” IDENT. The reading shall be as specified.	TEST
					<S>		Test Mode OFF	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
	14.000			HOLD MODE For –9XX units only	Test Setup #1 <F> <111.90> <A> <L> <A> <N>		HOLD MODE For –9XX units only Frequency 111.90 All Channels DME HOLD Past 422/568 Source Display	
	14.010	DME STATUS: HOLD		With the radio set for HOLD MODE the 422 ACTIVE (A) STATUS shall be as specified.	<N>		RTIU: Observed 422 ACTIVE (A) STATUS. The reading shall be as specified. Discrete Source Display	DME STATUS: HOLD
	14.020	HIGH		With the radio set for HOLD MODE the TTL output at P2-19 (HOLD HI Z) shall be as specified.			RTIU: Observed Discrete HOLD HI Z. The reading shall be as specified	HIGH
	14.030	LOW		With the radio set for HOLD MODE the TTL output at P2-22 (HOLD LO Z) shall be as specified.	<P> <P> <L> <A> <N>		RTIU: Observed Discrete HOLD LO Z. The reading shall be as specified 422/568 Source Display RCB Source Display DME HOLD OFF 422/568 Source Display	LOW
	14.040	NOT HOLD		With the radio HOLD MODE OFF the 422 ACTIVE (A) STATUS shall be as specified.	<N>		RTIU: Observed DME STATUS. The reading shall be as specified Discrete Source Display	NOT HOLD
	14.050	LOW		With the radio HOLD MODE OFF the TTL output at P2-19 (HOLD HI Z) shall be as specified.			RTIU: Observed HOLD HI Z. The reading shall be as specified	LOW
	14.060	HIGH		With the radio HOLD MODE OFF the TTL output at P2-22 (HOLD LO Z) shall be as specified.			RTIU: Observed HOLD LOW Z. The reading shall be as specified	HIGH

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
					<P> <P>		422/568 Source Display RCB Source Display	

REV LTR	TEST NO.	SPECIFICATION OPR LIMITS	C	SPECIFICATION TEST DESCRIPTION	PROCEDURE SWITCH POS	C	PROCEDURE WORK STEPS	SPECIFICATION MFG LIMITS
AE				FOR ALL DASH NUMBER UNITS				
	15.000			CLEAR MAINTENANCE LOG	Test Setup #1		CLEAR MAINTENANCE LOG	
					<H>		Bench Page	
					<C>		Clear Power On Count	
	15.010	POC: 0		Clear POC.			After clearing the power on count the RTIU monitor shall read as specified.	POC: 0
					<M>		Clear Maintenance Log	
	15.020	BENCH CMD: 1		Clear Maintenance Log			After clearing the maintenance log the RTIU monitor shall read as specified.	BENCH CMD: 1
					<P>			
					<M>			
					<X>			
	15.030	END LIST		Verify Memory Cleared.			After sending update all data the RTIU monitor shall read as specified.	END LIST
					<P>		RCB PAGE	
					<E>		Main Page	
							Test is Complete! Turn RTIU 28 V dc OFF before removing UUT.	

APPENDIX A
CALIBRATION PROCEDURES

RANGE CALIBRATION

A1. [RTIU]

<F>	Select Frequency
<111.90>	Frequency
<A>	Channel

A2. [ATC 1400]
RANGE: 1.00 NM

A3. [RTIU]

<H>	BENCH PAGE
<Z>	Zero Mile Offset
<O>	Zero Miles
<P>	RCB SOURCE DISPLAY

A4. Read L-SIDE (A) distance on display. Should be in the order of .970 to 1.030 NM. Calculate offset error by subtracting this number from 1.000 NM. This is the error.

Example: NM read on display after zeroing = 1.017

1.000
- 1.017
- 0.017

Error Offset = -0.017 * 1000 = -17

A5. [RTIU]

<H>	BENCH PAGE
<Z>	Zero Mile Offset
<-17>	Enter number calculated in A4.
<P>	RCB SOURCE DISPLAY

A6. Read L-SIDE (A) distance on display. Shall be as specified: 1.000 ± 0.005 NM.

A7. [ATC 1400]
RANGE: 34.00 NM

A8. Continue with I.T.

APPENDIX B
ALIGNMENT PROCEDURES

Additional Test Equipment

H. P. RF Power Meter Model 8900C or equivalent
DME RF Extender Cable, P/N T-360074-3
DME Nanohex to BNC Cable, P/N T-360074-5

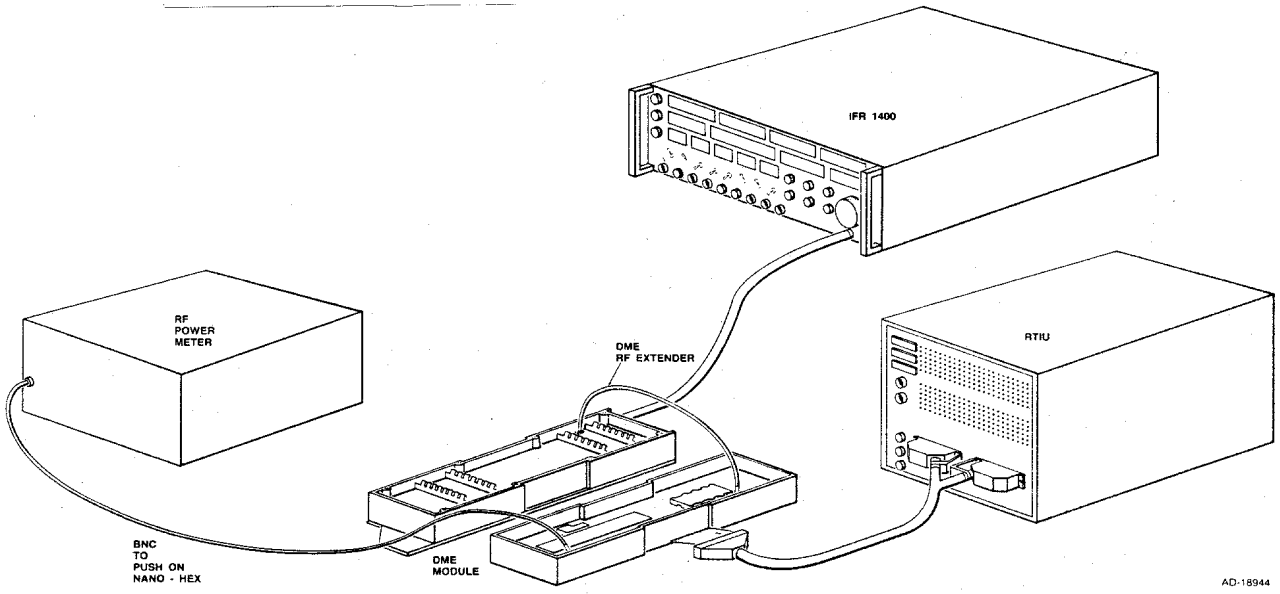


Figure B-1. Test Setup

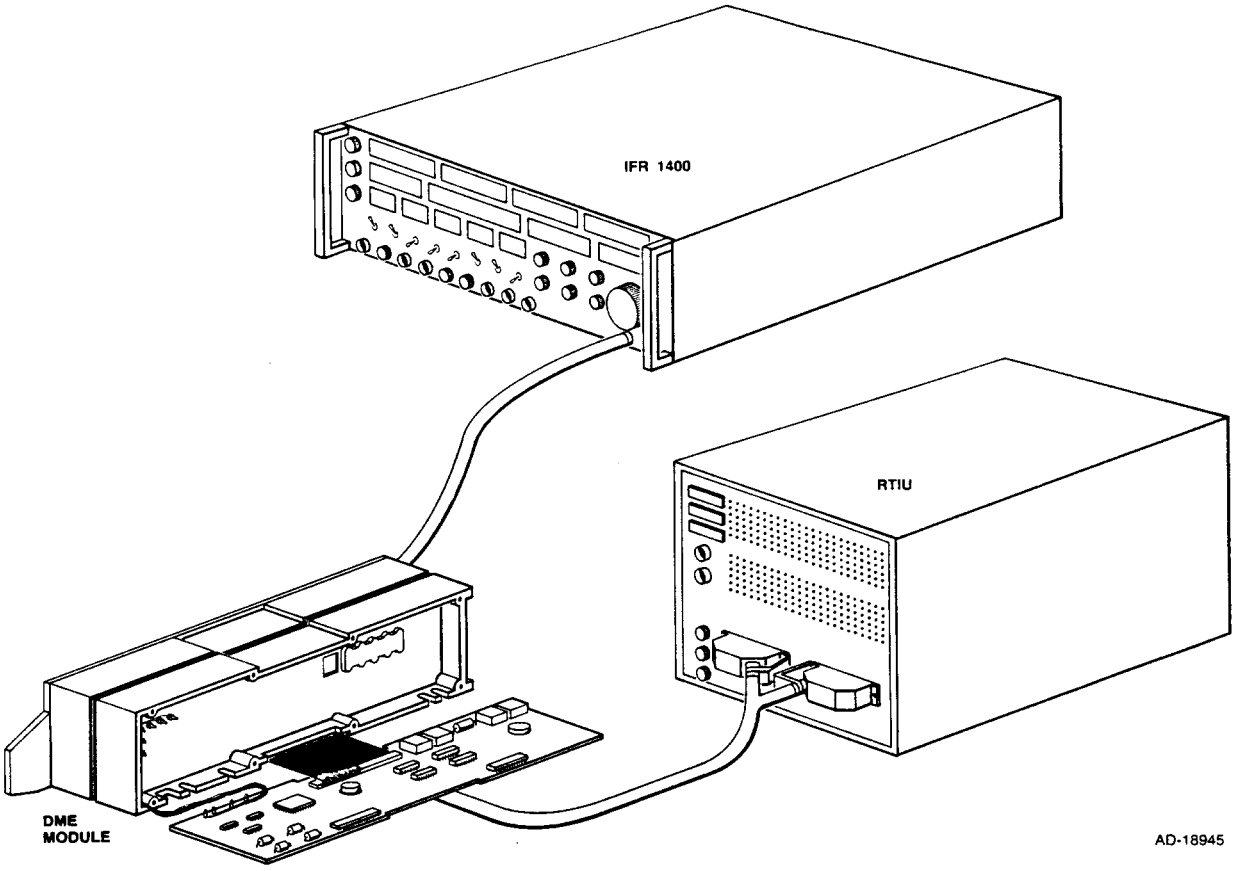


Figure B-2. Test Setup

REV LTR

AE

1. MODULATOR/POWER SUPPLY A4 CCA ADJUSTMENTS

Disassemble DME to gain access to the A4 Modulator/Power Supply CCA.

NOTE: Set trimmer caps on A3 CCA (C25, C34, and C35) to full CCW position.

Gaussian Pulse Pair Amplitude

1.1 Adjust the Oscilloscope to 10 V dc/Div, 5 microseconds. Sec./Div, Internal Sync.

1.2 Turn the 28 V dc on the RTIU ON.

1.3 Connect a scope probe to A3FL4, and sync scope for Gaussian Pulse pair. Adjust A4R10 for pulse amplitude of +53 volts peak from base line.

1.4 Connect a scope probe to A3FL5, and sync scope. Gaussian Pulse pair should be identical to A3FL4.

1.5 Connect a scope probe to A3FL6, and sync scope for Final Gaussian Pulse pair. Adjust A4R28 for maximum amplitude. Pulse width at the 50% amplitude point must be 3.5 ± 0.5 microseconds. sec.

FORWARD POWER MONITOR

1.6 Adjust the Oscilloscope to 2 V dc/Div, 5 microseconds. Sec./Div, Internal Sync.

1.7 Enter the following RTIU commands:

<F>

<108>

<G>

1.8 Connect a scope probe to A4TP2. Adjust A4R42 for 6-volt level from ground reference.

POWER SUPPLY SWITCHING FREQUENCY

1.9 Adjust the Oscilloscope to 2 V dc/Div, 2 microseconds. Sec./Div, Internal Sync.

1.10 Connect a scope probe to cathode junction of A4CR109 and A4CR110. Adjust A4R101 for 80 KHz, (pulse spacing of 12.5 microseconds from leading edge to leading edge). Stake all pots on A4 CCA with gray RTV.

2. RECEIVER A2 CCA ALIGNMENT

RF BANDPASS ADJUSTMENT

2.1 Disassemble DME to gain access to the A2 Receiver CCA.

NOTE: Insure that trimmer caps on A3 CCA are adjusted fully CCW.

2.2 Adjust the Oscilloscope to 50 mVac/Div, 10 microvolts. sec./Div

2.3 Enter the following RTIU commands:

<F>

<117.9>

<G>Adjust the IFR 1400 to:

2.4 Freq.: 117.90 VOR Pair

2.5 RF Level: -25 dBm CW

2.6 Turn the 28 V dc on the RTIU ON

2.7 Connect a scope probe to A2U1 pin 4. Adjust A3R12, R16, R28, and R23 for max output. Minimum 100 mV.

2.8 Adjust the IFR 1400 to:

2.9 Freq.: 134.40 VOR Pair

2.10 RF Level: -25 dBm CW

2.11 Enter the following RTIU commands:

<F>

<134.4>

<G>

2.12 Connect a scope probe to A2U1 pin 4. Observe output: Minimum of 150 mV. If correct, proceed to next step. If not correct, adjust A3R12, R16, R28, and R23 and recheck step 1.

IF GAIN ADJUSTMENT

2.13 Adjust the Oscilloscope to 1 V dc/Div, 2 microvolts. sec./Div

2.14 Adjust the IFR 1400 to:

2.15 Freq.: 134.40 VOR Pair

2.16 RF Level: -70 dBm NORM

2.17 Enter the following RTIU commands:

<F>

<134.4>

<G>

2.18 Connect a scope probe to A2FL113. Observe two video pulses approx. 5V peak. Adjust A2C77, C83, and C89 for max gain, while lowering ATC1400 RF Level.

2.19 Adjust the IFR 1400 to:

2.20 RF Level: -120 dBm NORM

2.21 Observe "Happy Face" flag next to "Distance" field on RCB page. Read noise level on Oscilloscope and adjust A2C89 for 2V max noise level. Slowly increase ATC1400RF Level until flag on RCB page disappears. DME must trigger at -93 dBm MIN.

2.22 Adjust the IFR 1400 to:

2.23 Freq.: 117.90 VOR Pair

2.24 RF Level: -120 dBm

2.25 Enter the following RTIU commands:

<F>

<117.9>

<G>

2.26 Repeat noise and ranging checks from step 1.

2.27 Stake all pots and adjustable caps on A2 CCA with gray RTV.

3. TRANSMITTER A3 CCA ALIGNMENT

Xmitter Power Output

3.1 Adjust the Oscilloscope to 200 mV dc/Div, 2 microvolts/seconds/div., Channel One (Xmitter Output from ATC1400).

3.2 Enter the following RTIU commands:

<F>

<117.9>

<G>

3.3 Note ATC1400 Xmitter Power Watts

3.4 Enter the following RTIU commands:

<F>

<134.4>

<G>

3.5 Note ATC1400 Xmitter Power Watts. Xmitter Power should be 420 watts min. at both frequencies. Stub tune Xmitter power levels for 117.9 (Xmit freq. 1150 MHz) and 134.4 (Xmit freq. 1025 MHz) so that they are within 40 watts of each other.

3.6 Enter the following RTIU commands:

<F>

<111.9>

<G>

3.7 Xmitter Power at 111.9 (Xmit freq. 1080 MHz) should be greater than at 134.4 and 117.9.

3.8 Check Xmitter Output pulse shape and width, (3.1 mic. sec. to 3.9 mic. sec.) and retune Xmitter if necessary.

4. TRANSMITTER SELF TEST CIRCUIT TEST

4.1 Enter the following RTIU commands:

<S>

<A>

<A>

4.2 Observe RCB page. Radio MSGS field should read "DME TEST" for approx. 10 seconds then change to "DME PASS." Channel A should read: Frequency, 108.00; Distance, 10.00; GND speed, 120; TTS, 5; IDENT, Test; DME OPMODE, Test; and DME Status should be flashing.

5. COMPUTER/VIDEO A1 CCA ADJUSTMENTS

Range LSI Crystal Oscillator Adjustment

5.1 Adjust the IFR 1400 to:

5.2 Freq.: 111.90 VOR Pair

5.3 RF Level: -70 dBm

5.4 Range: 300.00 NM

5.5 Enter the following RTIU commands:

<F>

<111.9>

<G>

5.6 Observe Distance field on RCB Page. Adjust A1C23 until 300.00 ± 0.05 NM is displayed. After each adjustment, wait 10 seconds for range to stabilize.

5.7 Stake A1C23 with gray RTV.

12 MHz Clock Adjustment

NOTE: Adjusting 12 MHz Clock affects Transmitter output frequency. High, middle, and low xmit channels should be checked after clock adjustment to ensure frequencies are within spec. (Center freq. ±0.090).

REV LTR

5.8 **Attach Frequency Counter to A1TP8.**

5.9 Adjust A1C1 for 12.0005 MHz.

5.10 Stake A1C1 with gray RTV.

Analog 40 mV/NM Adjustment

5.11 Adjust the IFR 1400 to:

5.12 Freq.: 111.90 VOR Pair

5.13 RF Level: -70 dBm NORM

W **5.14** Range: 1.00 NM

5.15 Connect a Digital Multi Meter (DMM) to RTIU front panel pins J1U3 (+) and GRND.

5.16 Enter the following RTIU commands:

<F>

<111.9>

<G>

5.17 Adjust A1R13 for 0.040 V dc on DMM.

5.18 Adjust the IFR 1400 to:

5.19 Range: 300.00 NM

5.20 Adjust A1R7 for +12 V dc on DMM.

5.21 Adjust the IFR 1400 to:

5.22 Range: 1.00 NM

5.23 Repeat steps 1 and 2 as necessary.

5.24 Stake A1R7 and A1R13 with gray RTV.

Analog Audio Adjustment

5.25 Adjust the IFR 1400 to:

5.26 Freq.: 111.90 VOR Pair

5.27 RF Level: -70 dBm

5.28 Code/Tone Switch: Tone

5.29 Enter the following RTIU commands:

<F>

<111.9>

<G>

<N>

<N>

5.30 Observe on Discrete Source Display, ACT ID Key 1 and ACT ID Key 2 read "HIGH."

5.31 Enter the following RTIU commands:

<N>

<A>

<1>

5.32 Observe ACT Audio 1 has been selected. Adjust A1R102 for a reading of 5.3 V ac rms.

5.33 Enter the following RTIU commands:

<A>

<2>

5.34 Observe ACT Audio 2 has been selected. Adjust A1R103 for a reading of 5.3 V ac rms.

5.35 Adjust the IFR 1400 to:

5.36 Code/Tone Switch: OFF

5.37 Enter the following RTIU commands:

<P>

<P>

<P>

5.38 Return to RCB Page, and observe NO Flags.

NOTE: Do not stake A1R102 and A1R103.

Analog Flag Output Test

5.39 Adjust the IFR 1400 to:

5.40 Freq.: 111.90 VOR Pair

5.41 RF Level: -70 dBm

5.42 Range: 34 NM

5.43 Enter the following RTIU commands:

<F>

<111.9>

<G>

5.44 Connect a digital multi-meter (DMM) to RTIU to front panel pins J1D1 (+) and 28 V dc RTN.

5.45 Observe 34.00 NM (approx.) in Distance field on RCB page, and 28 ± 2 V dc on DMM.

5.46 Adjust the IFR 1400 to:

5.47 Suppressor Switch: ON

5.48 After 15 seconds, "Happy Face" flags should appear on Distance, GND Speed, and TTS fields on RCB page, and 0 ± 1 V dc on DMM.

5.49 Adjust the IFR 1400 to:

5.50 Suppressor Switch: OFF

5.51 Observe NO "Happy Face" flags, 34.00 NM (approx.) in Distance field on RCB page, and 28 ± 2 V dc on DMM.

APPENDIX C
TEMPERATURE SCREENING

AD

APPENDIX C
TEMPERATURE SCREENING

NOTE: The following test is required to ensure proper operation over specified temperature range. Reference "General Information" Section 3.9.

1. DME MODULE, 7510184, FUNCTIONAL TESTS OVER TEMPERATURE

1.1 Check module operation to specification below at 25 C.

1.2 Turn off module and lower temperature to -55 C.

1.3 After 30 minutes, turn on module and check operation to specification below.

1.4 Turn unit off. Raise chamber temperature to +70 C.

1.5 After 30 minutes, turn on module and check operation to specification below.

2. DME MODULE TEMPERATURE TEST SPECIFICATION

2.1 Perform the following test to closed DME module at VOR paired frequencies of:

134.40 MHz (1025 MHz TRANSMIT)

113.00 MHz (1101 MHz TRANSMIT)

117.95 MHz (1150 MHz TRANSMIT)

With a standard DME test signal of -85 dBm measure:

	SPECIFICATION
OUTPUT POWER:	200W MINIMUM
RCB ACCURACY:	±0.05 NM ±.1% @ 1.0, 10.0 AND 275 NM
RS-422 ACCURACY:	±0.05 NM ±.1% @ 10.0 NM
ANALOG ACCURACY:	±100 mV AT 100 NM
FREQUENCY STABILITY:	±100 kHz

Also verify the following outputs at temperature:

HOLD AND HOLD* OUTPUTS

ANALOG FLAG OUTPUT

IDENT DIGITAL OUTPUT

IDENT ANALOG OUTPUT

SELF TEST -10 NM 120 KTS 5 MIN "TEST" "DME PASS"

APPENDIX D
DM-850 DME MODULE FIELD TEST PROCEDURE

TITLE: FIELD TEST PROCEDURE FOR THE DME MODULE, PART NO. 7510184-VAR

1. SCOPE

This test procedure gives the steps necessary to put the DME Module in serviceable condition. This procedure is for approved field service organizations only.

2. GENERAL INFORMATION

2.1 Signal Measurements

All input signals must be applied between the given terminal and ground, unless specified differently. All output voltages should be measured with respect to ground, unless specified differently. Ground is specified as any one of the four test points labeled GND on the RTIU front panel, or chassis ground.

2.2 Standard Test Conditions

All tests must be done under temperature conditions of 25 ± 15 degrees Celsius, and less than 90 percent relative humidity, unless specified differently.

2.3 Warmup

Permit 15 minutes of warmup time for the test equipment.

2.4 Document Compatibility

This appendix is a field certification document for the DM-850 DME Interrogator Module. It is compatible to the factory Integrated Test Specification (IT), in the front of this document. If the IT is changed in any manner which would conflict with this appendix, the appendix must be changed to reflect the IT.

3. POWER REQUIREMENTS

+28 ± 1.0 V dc

4. REQUIRED TEST EQUIPMENT

4.1 Honeywell Built/Supplied

RU-850 Radio Test Interface Unit (RTIU), Part No. 7511400-90X

Adapter Cable, DM-850 DME module, Part No. 7511409-911

RTIU Software, Part No. 7512001-1rr

Where 1 = media code = 5 1/4" diskette

rr = 08 software version for RTIU Part No. 7511400-901 or

09 or greater software version for RTIU Part No. 7511400-902

4.2 Vendor Built

Personal Computer, IBM compatible with 80286, 80386, or 80486 microprocessor and 12 MHz or higher clock speed, 640K or more RAM

Oscilloscope, Tektronix 465B or equivalent with 10:1 probes

DMM, Fluke 8000A or equivalent (4 1/2 digits recommended)

DME Signal Simulator, IFR Model 1400 or 1400A or equivalent

4.3 Shop Built/Supplied

Test Leads:

DMM test leads to fit the test points on the RTIU front panel (0.080 pin jacks)

DMM test leads with needle probes

4.4 Coaxial Cable Considerations

RG-58: 50 Ω coaxial cables with BNC connectors on both ends to connect between the signal simulator and oscilloscope.

RG-214: 50 Ω coaxial cable with slide-on coaxial connector, Part No. 7500335-7 on one end, and on the other end a connector to connect to the DME signal simulator (N-Type for IFR). The length of this cable must be a whole number of half waves at the center operating frequency of 1100 MHz. One half-wave length in space at 1100 MHz is 5.367 in. or 136.36 mm. The velocity factor of the chosen coaxial cable must be factored into the equation when you make the cable. RG-214 has a velocity factor of 0.677, and results in half-wave cable lengths of 3.634 in. or 92.32 mm.

EXAMPLE: If you assemble a 10 half-wave length of RG-214 -- from the above, 1 half-wave length is 3.634 in. By multiplying by 10, you arrive at a figure of 36.34 in. of RG-214 coaxial cable.

If you use metric measurements -- from the above, 1 half-wave length is 92.32 mm. By multiplying by 10, you get a figure of 923.2 mm. These lengths include the coaxial connectors.

5. TEST SETUP

Connect the test equipment as shown in figure D-1.

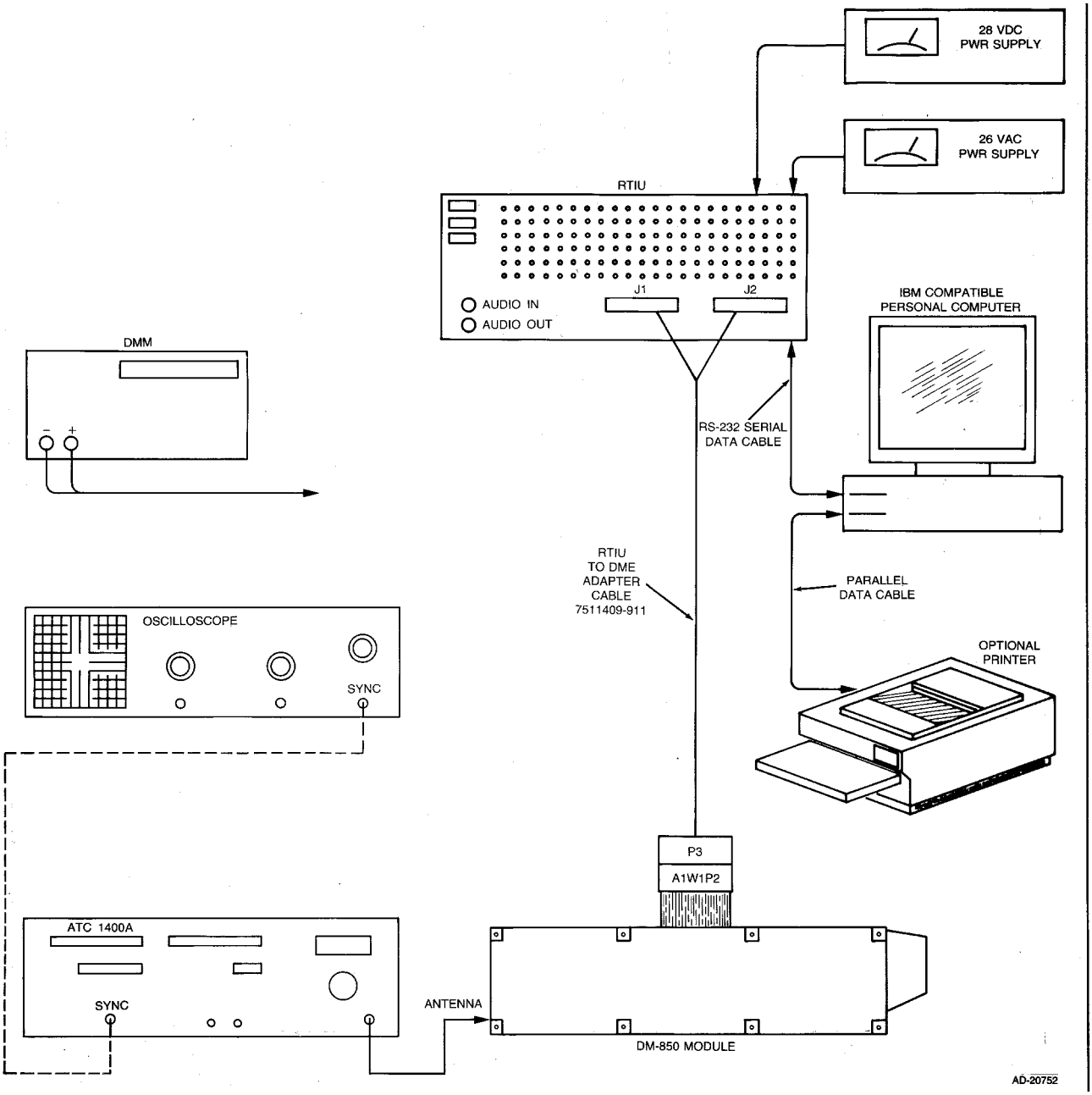


Figure D-1. Test Setup

6. GENERAL TEST INFORMATION

CAUTION: THE DME TRANSMITTER MUST BE TERMINATED INTO A 50 Ω LOAD AT ALL TIMES TO PREVENT DAMAGE TO THE DME MODULE. DO NOT REMOVE THE ANTENNA CABLE WITH POWER APPLIED TO THE DME MODULE. DAMAGE TO THE DME MODULE MAY RESULT.

6.1 Test Procedure

The test procedure must be done in its entirety upon completion of any modification or repair to the unit under test (UUT).

6.2 Procedure Sequence

The procedure sequence is based on functional requirements. It is recommended that these procedures be done in the order given. Individual tests may be done provided that the preliminary setup procedures are followed and that all tests are started at a major test heading.

Warmup is not required for the UUT.

6.3 RTIU Keystrokes on the PC

Keystrokes for RTIU commands are found inside the < > symbols. The keystrokes within the < > symbols are first entered on the keyboard followed by a "RETURN" or "ENTER" keystroke on the keyboard.

Any other keystroke or error in a keystroke sequence may put the RTIU into an unknown condition, which makes it necessary for the RTIU software to be restarted (rebooted).

7. TEST SETUP REQUIREMENTS

7.1 Initial Setup for the IFR ATC-1400 Test Set

Settings for the IFR signal simulator:
Channel: 111.90 MHz, VOR Pair, (Channel 56X)
Signal Level: -70 dBm
Ident: "Off" position
Squitter: 2700 PPS
TACAN Modulation: ON
Reply Efficiency: 100%
Velocity: Initial tests begin with IFR in range mode.
IN/OUT: IN
Acceleration: Initial tests begin with IFR in range mode.
Range: 34 NM
DME P2 Dev: 0.0 Microseconds
-1/Norm: Norm
Suppressor: OFF
Suppressor Var: Set for 18 V Pulse Amplitude
CW/Norm: Norm
SLS/Echo: OFF
Freq. Step Rate: MAN

7.2 Setup for the RTIU Test Set

NOTE: For detailed test procedures using the RTIU, refer to Honeywell Pub. No. 31-3800-10, Volume III, Users Guide For Testing SRZ-850 Series Integrated Radio System.

A. Set up RTIU per Figure 1 of the test and adjustment procedure. Set the RTIU and PC main power switch (top switch on the RTIU) to ON.

B. Load the RTIUMAIN program into the PC.

C. After the RTIU has been initialized, the MAIN MENU will come into view on the PC Monitor. Select the DM-850 for test.

D. From the MAIN MENU, select the command that follows:

DM-850 for test <11>

7.3 Setup for the Unit Under Test (UUT)

A. On the CONFIGURATION page, select the commands that follow:

FMCS Installed (OPEN)	<I>
EFIS/MLS Control (OPEN)	<F>
SYS 2 DME Installed (OPEN)	<R>

B. Connect the adapter test cable, Part No. 7511409-911, from the RTIU to the DME.

C. Set the RTIU 28V DC power switch to ON. The UUT will begin to communicate with the RTIU and the ERROR message field on the monitor must be blank.

D. Go to the RCB page. <P>

8. TEST PROCEDURES

8.1 Pilot Activated Self-Test

NOTE: This test is an overall performance test of the DME module. All RF, IF and digital process circuitry is functionally tested.

A. On the RCB page, select the commands that follow:

SELF TEST as PAST	<S> <A>
for CHANNEL A	<A>

B. Monitor the results that follow:

RTIU Monitor	DME OPMODE	PAST
	RADIO MSGS	DME TEST
	Wait 10 seconds:	
	RADIO MSGS	DME PASS

NOTE: After the words DME PASS appear in the RADIO MSGS field, the DME should display a distance of 10 NM, groundspeed of 120 KTS and 5 minutes TTS.

C. Select the command that follows:

SELF TEST	<S>

NOTE 1: When the ENTER key is pressed, the self-test function will be terminated. If the DME is not taken out of the self-test mode, it will not operate in its normal DME mode.

NOTE 2: If a self-test failure occurs, the DME's maintenance log should be read to localize the problem to a specific circuit card or area.

8.2 Power Supply

NOTE: These tests make sure the power supply circuitry contained on the DME modulator/power supply CCA is operating correctly.

A. On the RCB page, select the command that follows:

Go to the BENCH page <H>

B. Monitor the results that follow:

RTIU Monitor	Make sure the output voltages are as specified.
-5 VOUT =	-5 ± 1.0 V dc
+5 VOUT =	+5 ± 0.5 V dc
+15 VOUT =	+15 ± 0.7 V dc
+30 VOUT =	+30 ± 3.0 V dc
+70 VOUT =	+70 ± 7.0 V dc

C. Measure the combined current draw of the DME module and the RTIU.

NOTE: The RTIU does not display this measurement; it must be read from the ammeter on the power supply or an ammeter installed between the RTIU and the +28 V dc power supply.

D. Monitor the results that follow:

Power Supply Ammeter	<1 Ampere DC

E. Select the command that follows:

Go to the RCB page <P>

NOTE: If a power supply failure occurs, refer to the schematic diagram for the A4 CCA, which contains the power circuitry. The power supply has no adjustments which affect the above voltage readings.

8.3 PRF Rate

NOTE: This test makes sure the transmit section of the DME digital and analog modulator PRF circuitry is operating correctly. The rate of transmission is controlled by software and initiated by the A1U2 microcontroller generating the T/R switch, Bracket pulse, P1 and P2 pulses.

A. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 111.90 MHz	<111.90>
for all CHANNELS	<G>

(DME XMIT FREQUENCY at 111.90 VOR PAIRED IS 1080 MHz)

B. Set IFR 1400 signal simulator to a frequency of 111.90.

C. Monitor the results that follow:

IFR 1400 PRF Readout	9 - 11 pulses per second

NOTE: If the test fails, refer to Computer Video CCA, A1, schematic diagram sheet No. 1. Check circuit point E16 (XMIT) for proper P1-P2 pulses out of the A1 CCA. Check circuit point E14 (T/R) for the presence of the proper T/R pulse. Lack of either of these pulses indicates a probable failure on the A1 CCA and its associated circuitry. If transmit pulses are being properly supplied to the modulator A4 CCA, and transmitter A3 CCA, improper interrogations out of the DME to the IFR 1400 indicates a problem on either the A3 or A4 CCAs. No adjustments are available which will directly affect the DME interrogation rate.

8.4 DME Frequency Accuracy

NOTE: This test makes sure the transmitter frequency is accurate. The drive frequency is developed by the VCO section on the Receiver A2 CCA.

A. The IFR 1400 must remain on a frequency of 111.90 MHz. The DME must remain ON or have all channels set to a frequency of 111.90.

B. Monitor the results that follow:

IFR 1400 Frequency Readout	1080 ± 0.09 MHz

NOTE: If this test fails, check the frequency accuracy of the 12 MHz clock to the synthesizer, also check for the proper VCO positive dc drive level at A2 FL114. To do this check, channel the DME and IFR 1400 to 134.40 MHz (channel 1X). Connect DMM to A2FL114 and ground, the voltage must be +1.70 V dc.

If it is not, adjust A2C63 until the voltage is +1.70 V dc. If it is not possible to adjust A2C63 to attain the proper drive level, troubleshoot the A2 synthesizer and VCO circuitry.

After repair or adjustment, channel the DME and IFR 1400 to a frequency of 111.90 MHz and repeat the test.

8.5 Peak Power

NOTE: This test examines the DME modulator/transmitter circuitry. All power measurements must take into account the RF cable losses between the DME and the IFR 1400 at 1100 MHz.

A. Set the IFR 1400 to a frequency of 133.60 MHz (DME xmit frequency of 1087 MHz).

B. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 133.60 MHz	<133.60>
for all CHANNELS	<G>

C. Set the IFR 1400 peak power switch to F1/P1.

D. Monitor the results that follow:

IFR 1400 Peak Power Readout	>360 watts

E. Set the IFR 1400 peak power switch to F2/P2.

F. Monitor the results that follow:

IFR 1400 Peak Power Readout	>360 watts

G. Set the IFR 1400 frequency to 134.40 (DME xmit frequency of 1025).

H. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for all CHANNELS	<G>

I. Set the IFR 1400 peak power switch to F1/P1.

J. Monitor the results that follow:

IFR 1400 Peak Power Readout	>360 watts

K. Set the IFR 1400 peak power switch to F2/P2.

L. Monitor the results that follow:

IFR 1400 Peak Power Readout	>360 watts

M. Set the IFR 1400 frequency to 117.90 (DME xmit frequency of 1150).

N. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 117.90 MHz	<117.90>
for all CHANNELS	<G>

O. Set the IFR 1400 peak power switch to F1/P1.

P. Monitor the results that follow:

IFR 1400 Peak Power Readout	>360 watts

Q. Set the IFR 1400 peak power switch to F2/P2.

R. Monitor the results that follow:

IFR 1400 Peak Power Readout	>360 watts

NOTE: If this test fails, do the procedures that follows. The modulator (A2 CCA) adjustments which affect peak power are A2R10 and A2R28. Channel both the DME and the IFR 1400 to 111.90 MHz. Connect an oscilloscope between A2E15 and ground. Sync the scope on the Gaussian Pulse pair and adjust A2R10 for a pulse amplitude of +50 V dc from ground to pulse peak.

Connect scope to A2E14 and ground; adjust A2R28 for a pulse amplitude of +50 V dc from ground to pulse peak. The pulse peak at E14 must be Gaussian shaped (rounded) and the pulse width at the 50% amplitude points must be 3.5 ± 0.5 microseconds wide.

Transmitter RF adjustments are made on the A3 CCA with variable capacitors A3C25, A3C34 and A3C35. For these adjustments do the transmitter alignment procedure in appendix E.

8.6 Receiver Sensitivity

NOTE: This test is designed to find the minimum signal which will cause the DME to recognize and process valid replies, display accurate range data and output +28 V dc to pull the DME flag.

A. The IFR 1400 must remain on a frequency of 117.90 MHz (UUT receive frequency of 1213 MHz). The DME must remain on or have all channels set to a frequency of 117.90.

B. Set the IFR 1400 RF output level to -120 dBm.

C. Wait until the distance readout on the RCB page shows a flagged condition (happy face symbol before the distance information field on the RCB page).

D. Slowly increase the IFR 1400 RF output level until the happy face symbol goes away.

E. Monitor the results that follow:

IFR 1400 -dBm Attenuator Dial	Less than or equal to -92 dBm

F. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for all CHANNELS	<G>

G. Set IFR 1400 frequency to 134.40 MHz (DME receive frequency of 962 MHz) and RF output level to -120 dBm.

H. Wait until the distance readout on the RCB page shows a flagged condition (happy face symbol before the distance information field on the RCB page).

I. Slowly increase the IFR 1400 RF output level until the happy face symbol goes away.

J. Monitor the results that follow:

IFR 1400 -dBm Attenuator Dial	Less than or equal to -92 dBm

K. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.45>
for all CHANNELS	<G>

L. Set IFR 1400 frequency to 134.45 MHz (DME receive frequency of 1088 MHz) and RF output level to -120 dBm.

M. Wait until the distance readout on the RCB page shows a flagged condition (happy face symbol before the distance information field on the RCB page).

N. Slowly increase IFR 1400 RF output level until the happy face symbol goes away.

O. Monitor the results that follow:

IFR 1400 -dBm Attenuator Dial	Less than or equal to -92 dBm

NOTE: This is the receiver Acquisition Sensitivity Level. When the happy face symbol goes away, the DME must begin to display distance information on the RCB and 422/568 pages.

P. Return the IFR signal output level to -70 dBm.

NOTE: If this test fails, do the receiver alignment procedure in appendix E. Sensitivity adjustments can only be made while performing the receiver alignment procedure.

8.7 Digital Range Accuracy

NOTE: This test determines the accuracy of DME digital range data outputs.

A. Setup

(1) The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain on or have all channels set to a frequency of 134.40. Set the IFR 1400 DME distance to a range of 34 NM.

(2) Make sure that the IFR generator is in the Range mode (mode switch is in range position and IFR is displaying 34 nautical miles).

B. Monitor the results that follow:

RTIU Monitor	RCB page distance field 34 ± 0.04 NM.

C. On the RCB page, select the command that follows:

Go to the 422/568 page <N>

D. Monitor the results that follow:

RTIU Monitor	422 column A and the 568 bus column must show 34 ± 0.04 NM.

NOTE: If this test fails, do the digital range alignment procedure in appendix E. Digital range calibration is performed in the alignment procedure and must be done prior to analog range calibration.

E. Select the command that follows:

Go to the RCB page <P>

8.8 Analog Range Accuracy

NOTE: This test measures the accuracy of the DME analog range output.

A. Setup

(1) The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain on or have all channels set to a frequency of 134.40. Set the IFR 1400 DME distance to a range of 34 NM.

(2) Make sure that the IFR generator is in Range mode (mode switch is in range position and IFR is displaying 34 nautical miles).

(3) Connect a DMM between RTIU front panel pins J1U3 (HI) and GND (LO).

B. Monitor the results that follow:

DMM	1.36 ± 0.05 V dc

NOTE: If this test fails, do the procedures that follow: Analog range calibration is performed on the Computer Video A1 CCA. Set the IFR 1400 DME distance to a range of 34 NM and make sure the DME has channels A,B,C and D on the same channel as the IFR 1400.

The DME must be on and communicating with the RTIU. The distance information should be displayed on the RCB page. Set the IFR 1400 to 1 NM in range mode. Connect a DMM between RTIU front panel pins J1U3 (HI) and GND (LO). Adjust A1R13 (Offset) for a +0.040 ± 0.002 V dc reading on the DMM. Set the IFR 1400 to 300 NM and adjust A1R7 (Gain) for a +12.00 ± 0.5 V dc reading on the DMM.

Since the DME analog offset and gain adjustments can interact it may necessary to repeat both adjustments.

8.9 Range Accuracy At Selected Distances

NOTE: This test measures the DME range accuracy display characteristics from 10 to 300 NM.

A. The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain on or have all channels set to a frequency of 134.40.

B. Set IFR distance to 00.0 NM.

C. Monitor the results that follow:

RTIU Monitor	Distance field, channels A through D must be 0 ± 0.04 NM.

D. Repeat step B with the distances that follow entered into the IFR 1400: 10.00 NM, 100.00 NM, 225.00 NM and 300.00 NM.

E. Monitor the results that follow:

RTIU Monitor	10.00 ± 0.04 NM 100.00 ± 0.04 NM 225.00 ± 0.05 NM 300.00 ± 0.05 NM

NOTE: If this test fails, a calibration or digital signal processing problem exists. Do the Digital Range alignment procedure in appendix E.

8.10 RS-422 Channel 2 Bus Test

NOTE: This test makes sure that both RS-422 digital buses are operating correctly with data being output and displayed for both RS-422 channels. Microcontroller U101 on the Computer Video A1 CCA is the controller for the RS-422 data bus. U101 acts as a converter changing data from RCB bus structure to the RS-422 format.

A. The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain on or have all channels set to a frequency of 134.40.

B. The DME must be on and displaying distance information on the RCB page.

C. On the RCB page, select the commands that follow:

Go to the 422/568 page	<N>
select PICK RS422 PORT as 2	<K> <2>

NOTE: Since DME information is normally output to the RTIU through port 1, port 2 must be selected by the PICK A PORT command. The DME under test will now begin communicating with the RTIU through RS-422 port 2.

D. Monitor the results that follow:

RTIU Monitor	When the RTIU begins to display port 2 data on the CRT screen, no noticeable change on the screen will be apparent if the DME is operating correctly.

NOTE: If this test fails, U101 or its associated circuitry is the probable cause.

8.11 ACT (Active) Audio

NOTE: Aircraft audio is generated internally by the DME when a valid morse identifier has been decoded by LSI A1U8 on the Computer Video CCA. If valid identifier(s) are decoded by the LSI, the LSI A1U8 will output analog audio tones to an external audio system. Also, through the digital audio bus, a bit will be sent to the digital audio panel to enable the DME tone generator.

A. Setup

(1) The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain ON or have all channels set to a frequency of 134.40.

(2) The DME must be ON and displaying distance information on the RCB page.

B. Digital Audio

(1) Set the RTIU 28 V dc power switch to OFF. Wait 10 seconds and then set the 28 V dc power switch back to ON.

(2) On the RCB page, select the commands that follow:

Go to the DISCRETE page	<N> <N>

(3) Set the IFR 1400 tone switch to the IDENT position.

(4) Monitor the results that follow:

RTIU Monitor	As the incoming identifiers are decoded, the ACT IDENT 1 and 2 KEYS on the DISCRETE page must flash from LOW to HIGH.

NOTE: If this test fails, a problem in the LSI or its associated circuitry exists.

C. Analog Audio

(1) Select the commands that follow:

Go to the AUDIO page	<N>
and SELECT ACT AUDIO as 1	<A> <1>

NOTE: ACT #1 = number one active audio channel; there are two active audio channels.)

(2) Once audio has been selected, make sure that the IFR 1400 tone switch is in the 1350 HZ position.

(3) Monitor the results that follow:

RTIU Monitor	The AUD LEVEL field must show 5.3 ± 0.30 Vrms

(4) Select the commands that follow:

SELECT ACT AUDIO as 2 <A> <2>

(testing number two active audio channel)

(5) Monitor the results that follow:

RTIU Monitor	The AUD LEVEL field must show 5.3 ± 0.30 Vrms

NOTE: If this test fails after passing the Digital Audio test procedure, do the procedures that follow. ACT analog audio is adjustable through the casting without opening the DME module.

See figure E-1 in appendix E for location of channel 1 and 2 ACT analog audio potentiometers.

To set the amplitude of ACT 1 AUDIO, adjust A1R102; for ACT 2 AUDIO, adjust A1R103.

8.12 Morse Identifier

NOTE: This test makes sure the digital decoding, encoding and display of the morse identifier are operating correctly.

A. The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain on or have all channels set to a frequency of 134.40. On the IFR 1400 set the TACAN switch to
B. the OFF position.
The DME must be ON and displaying distance information on the RCB page.
C. Set the IFR 1400 tone switch to the IDENT position.
D. Set the RTIU 28V DC power switch to OFF. Wait 10 seconds and then set the RTIU 28V DC power switch back to ON.

E. Monitor the results that follow:

RTIU Monitor	Within 120 seconds the "IFR" identifier will be decoded and displayed under the A and D channel columns.

F. On the IFR 1400, set the TACAN switch to the ON position.

8.13 Mutual Suppression

NOTE: The mutual suppression line is connected between all L band transceivers in the aircraft and is used to eliminate interference caused when one unit is in the transmit mode while another is in the receive mode. During transmit, a high level suppression pulse is output by the L band transceiver that is transmitting. This in turn shuts down all other onboard L band receivers preventing them from picking up unwanted transmissions. Mutual suppression is initiated at the start of every transmit cycle and is controlled by the T/R switch. The pulsewidth is dependent upon the channel being selected for transmit (W,X,Y,Z).

A. The IFR 1400 must remain on a frequency of 134.40 MHz. The DME must remain on or have all channels set to a frequency of 134.40.

B. The DME must be on and displaying distance information on the RCB page.

C. Connect the suppressor output of the IFR 1400 to the RTIU, IFR common/shield ground to RTIU front panel pin GND and the IFR 1400 suppressor center conductor to front panel pin J2T1.

D. Set the IFR 1400 suppression switch to ON.

E. Monitor the results that follow:

RTIU Monitor	After 11 seconds, all range data must be flagged (a happy face symbol preceding distance, ground speed and TTS information fields).

F. Set the IFR 1400 suppressor switch to OFF. Remove the cable between the IFR suppression jack and the RTIU.

G. Connect an oscilloscope probe to RTIU front panel pins J2T1 (probe tip) and GND (probe ground). The oscilloscope must be set to internal sync with scope triggering on the positive or rising edge of the suppression pulse.

H. When the DME transmits, a high level mutual suppression pulse will be output on J2T1.

I. Monitor the results that follow:

Oscilloscope	The pulse amplitude must be 28 ± 2.0 V dc. The pulse-width must be 25 ± 2.0 μsec.

NOTE: If this test fails, a problem in the A1U2 microcontroller produced T/R switch or the analog drive circuitry on the Modulator/Power Supply A4 CCA exists.

8.14 DME Scanning

NOTE: This test examines the scanning function of the DME. The DME must under proper strap conditions, scan up to four channels for distance information and two additional channels for the morse identifiers.

A. Set the IFR 1400 to a frequency of 108.00 MHz, Range Mode, and the RF signal level to -70 dBm and distance to 10.0 NM.

B. Select the RCB page.

C. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 108.00 MHz	<108.00>
for channel A	<A>
CHANGE FREQUENCY	<F>
to 117.90 MHz	<117.90>
for channel D	<D>

D. Monitor the results that follow:

RTIU Monitor	Channel A distance field 10 ± 0.04 NM. Channel D distance field flagged

E. Set the IFR 1400 to a frequency of 117.90 MHz, and distance to 122 NM.

F. Monitor the results that follow:

RTIU Monitor	Channel A distance field flagged Channel D distance field 122 ± 0.05 NM.

NOTE: If this test fails, do a Pilot Activated Self Test (PAST) to localize the problem to a specific area.

8.15 Range Accuracy Under Varying Squitter Rate

NOTE: DME Squitter is transmitted by the DME ground stations between active replies at an average rate of 2700 pulse pairs per second. Since replies to all airborne interrogations are also generated by the ground stations, the DME must be capable of recognizing and decoding only those replies that were generated by its interrogation.

A. The IFR 1400 must remain on a frequency of 117.90 MHz.

B. Set the IFR 1400 squitter rate to 700 and distance to 34.00 NM.

C. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 117.90 MHz	<117.90>
for all channels	<G>

D. Monitor the results that follow:

RTIU Monitor	The distance field on channels A through D must be 34 ± 0.04 NM

E. Set the IFR 1400 squitter rate to 4700.

F. Monitor the results that follow:

RTIU Monitor	The distance field on channels A through D must be 34 ± 0.04 NM

NOTE: A failure of this test indicates a digital problem in the A1U2 microcontroller, A1U8 LSI or their associated circuitry. If the failure occurs only at low squitter rates, the AGC circuitry may be faulty.

8.16 Velocity Accuracy

NOTE: Velocity or groundspeed is determined by measuring the rate at which the DME ground station reply timing changes.

A. The IFR 1400 must remain on a frequency of 117.90 MHz. The DME must remain on or have all channels set to a frequency of 117.90.

B. Set the IFR 1400 to VELOCITY mode, set velocity (groundspeed) to 350 KTS and set the IN/OUT slew switch to the IN position.

C. Wait 90 seconds for the GND SPEED to stabilize.

D. Monitor the results that follow:

RTIU Monitor	The GND SPEED field must show 350 ± 4 KTS

NOTE: If this test fails, a faulty A1U2 processor, A1U8 LSI and/or their associated digital circuitry exists.

8.17 Hold Mode

NOTE: This test makes sure the DME discrete hold outputs are enabled and disabled by the presence of a hold command from the cockpit RMU.

A. The IFR 1400 must remain on a frequency of 117.90 MHz. The DME must remain on or have all channels set to a frequency of 117.90.

B. On the RCB page, select the commands that follow:

DME HOLD	<L>
on CHANNEL A	<A>

C. Monitor the results that follow:

RTIU Monitor	The DME STATUS field must show the abbreviation HL

D. Select the command that follows:

Go to the DISCRETE page	<N> <N>

E. Monitor the results that follow:

RTIU Monitor	In LOGIC column, make sure that HOLD HI Z is HIGH, and HOLD LO Z is LOW.

F. Select the commands that follow:

Go to the RCB page	<P> <P>
select DME HOLD	<L>
on CHANNEL A	<A>

G. Monitor the results that follow:

RTIU Monitor	The DME STATUS field must show the abbreviation NH

H. Select the commands that follow:

Go to the DISCRETE page	<N> <N>

I. Monitor the results that follow:

RTIU Monitor	In LOGIC column, make sure that HOLD HI Z is LOW, and HOLD LO Z is HIGH.

J. Select the commands that follow:

Go to the RCB page <P> <P>

NOTE: If this test fails, examine the digital circuitry on the Computer/Video A1 CCA. When a hold command is received through the RCB, microcontroller A1U2 will signal analog controller A1U101 to toggle the discrete HOLD and NOT HOLD lines.

8.18 Clear DME Module POC/Maintenance Log

A. On the RCB page, select the commands that follow:

Go to the BENCH page	<H>
Select CLEAR LOG (to clear the maintenance log)	<M>
Select CLEAR POC (to reset the power on count to zero)	<C>
Select the DME ON/OFF command (to toggle the DME off)	<O>
Wait 10 seconds	
Toggle the DME back on again	<O>
Go to the DME MAINTENANCE page	<P> <M> <X>

B. Monitor the results that follow:

RTIU Monitor	Make sure that the POC field reads 0. Also make sure that there are no errors in the maintenance log and that the first field reads END LIST.

C. Return to the MAIN MENU. <E>

APPENDIX E
DM-850 DME MODULE FIELD ADJUSTMENT AND ALIGNMENT PROCEDURE

TITLE: FIELD ADJUSTMENT AND ALIGNMENT PROCEDURE FOR DM-850 DME INTERROGATOR MODULE, PART NO. 7510184-VAR.

1. SCOPE

When a test fails or when it is necessary to repair the DME module, do one or more of the alignment procedures in this appendix. It is recommended that only the procedures related to the individual test discrepancy be done.

2. EQUIPMENT AND MATERIALS REQUIRED

In addition to the equipment necessary to do the DME test procedures, the tools specified below are necessary to do the measurements and adjustments in this procedure.

- Cable Assembly, DME RF Extender (2ea.), Honeywell Part No. T360074-3
- Tuning Tool, Johanson 8777, (Honeywell Part No. 7500634-2)
- RF Tuning Tool, Murata Erie ME502, (Honeywell Part No. 7500634-1)
- Male BNC to Banana Adapter, User supplied
- Resistor, 10 kΩ 1/8 watt, User supplied
- Capacitor, 22 μF, 50 VDCW, User supplied

3. GENERAL INFORMATION

3.1 RTIU Keystrokes on PC

Keystrokes for RTIU commands are found inside the < > symbols. The keystrokes within the < > symbols are first entered on the keyboard followed by a "RETURN" or "ENTER" keystroke.

Any other keystroke, or error in a keystroke sequence, can put the RTIU into an unknown condition, which makes it necessary for the RTIU software to be restarted (rebooted).

3.2 Coaxial Cable Considerations

Do not use RG-58 coaxial cable when connecting the UUT RF input to the IFR 1400 Test Set. RG-214 coaxial cable is recommended.

RG-214 50Ω coaxial cable with slide-on coaxial connector (Part No. 7500335-7) on one end, and on the other end a connector to connect to the DME signal simulator (N-Type for IFR). The length of this cable must be a whole number of half waves at the center operating frequency of 1100 MHz. One-half wave length in space at 1100 MHz is 5.367 in. or 136.36 mm. The velocity factor of the coaxial cable must be factored into the equation when you make the cable. RG-214 has a velocity factor of 0.667, and results in half-wave cable lengths of 3.634 in. or 92.32 mm.

EXAMPLE: If you assemble a 10 half-wave length of RG-214 -- from the above, 1 half-wave length is 3.634 in. By multiplying by 10, you arrive at a figure of 36.34 in. of RG-214 coaxial cable.

If you use metric measurements -- from the above, 1 half-wave length is 92.32 mm. By multiplying by 10, you get a figure of 923.2 mm. These lengths include the coaxial connectors.

3.3 Trimmer Capacitor Adjustments

A. If a trimmer capacitor adjustment is necessary, carefully remove adhesive from capacitor before doing the adjustment.

B. Use RF tuning tool, Murata Erie ME502 (Honeywell Part No. 7500634-1), to adjust trimmer capacitors.

C. After adjustments have been completed, apply gray RTV 3145 adhesive (HMN 97P5378) to all trimmer capacitors.

4. DISASSEMBLY FOR ALIGNMENT

NOTE: Refer to the Illustrated Parts List (IPL) for the DME exploded view. After removing the casting screws, the module casting will split into two sections. One section contains the A1 and A2 CCAs and the other section contains the A3 and A4 CCAs. With the module split in halves and folded open the A2 and A3 CCAs should be exposed and facing up. Remove the shield that separates the two castings. To access the modulator/power supply CCA A4, remove the four screws used to attach the CCA to the casting and fold the CCA out away from the casting.

5. ALIGNMENT SETUP REQUIREMENTS

See the test setup in appendix D for RTIU and IFR 1400 operation and initial switch position information.

5.1 RTIU Setup

NOTE: For detailed test procedures using the RTIU, refer to Honeywell Pub. No. 31-3800-10, Volume III, Users Guide For Testing SRZ-850 Series Integrated Radio System.

D. Set the RTIU and PC main power switch (top switch on the RTIU) to ON.

E. Load the RTIUMAIN program into the PC.

F. After the RTIU has been initialized, the PRIMUS II® MAIN MENU will come into view on the PC Monitor.

5.2 DM-850 Setup

CAUTION: THE DME TRANSMITTER MUST AT ALL TIMES BE TERMINATED INTO A 50Ω LOAD TO PREVENT DAMAGE TO THE DME MODULE. DO NOT REMOVE THE ANTENNA CABLE WITH POWER APPLIED TO THE DME MODULE.

A. Select the command that follows:

Select the DM-850 for test (The first page that will appear is the DM-850 CONFIGURATION page)	<11>

B. Select the STRAP commands that follow:

FMCS INSTALLED (OPEN)	<I>
SYS 2 DME INST (OPEN)	<R>
EFIS/MLS CONTROL (OPEN)	<F>

C. Set the RTIU 28V DC power switch to ON.

D. After approximately 5 seconds the UUT will begin to communicate with the RTIU, and the ERRORS field on the monitor must be blank.

6. DME MODULE

Refer to figure E-1 for adjustment and test point locations.

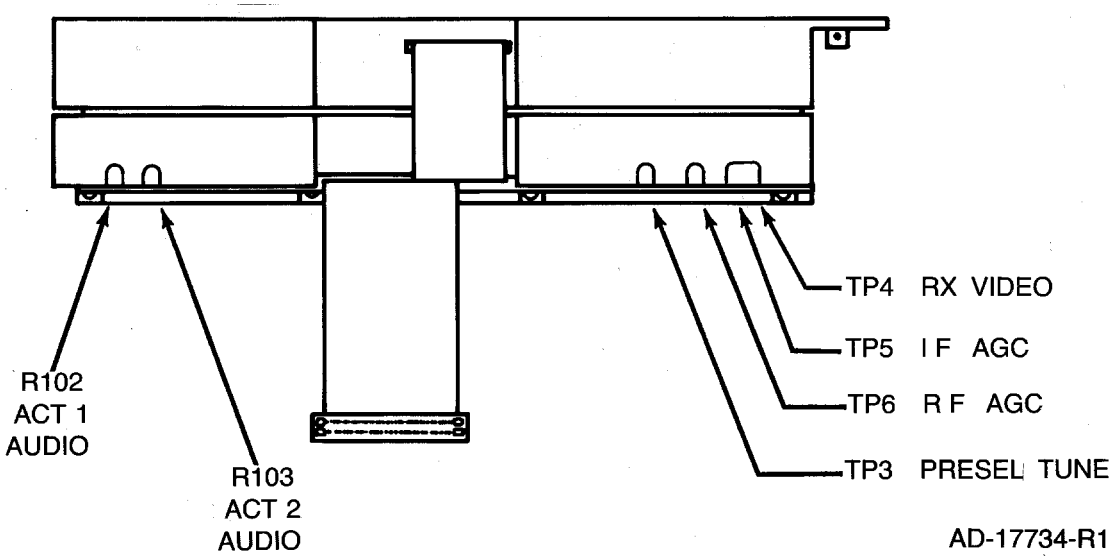


Figure E-1. Audio Adjustment and Test Point Location

7. MODULATOR/POWER SUPPLY CCA A4 ADJUSTMENTS

7.1 Power Supply Switching Frequency

NOTE: Under normal operating conditions, the power supply switching frequency of the DME and the other RNZ-850 modules is controlled by the ADF module microprocessor. This is done to prevent interference between the power supplies and the ADF Receiver when it is tuned to low frequencies. In the event of an ADF failure, the DME must default to a known switching frequency. To set the default frequency, a potentiometer in the power supply must be adjusted.

A. Gain access to the Modulator/Power Supply CCA A4 by doing the Disassembly for Alignment instructions.

B. Disable the power supply sync by connecting a jumper between the RTIU front panel pins marked +5 V dc and J2S1.

C. Connect an oscilloscope probe to the cathode junction of CR109, CR110 on the A4 CCA. See figure E-2 for component locations.

D. On the A4 CCA layout, locate A4R101.

E. Adjust A4R101 for a pulse spacing of 12.5 microseconds, from leading edge to leading edge. This adjustment sets the power supply switching frequency to 80 kHz.

NOTE: This adjustment does not directly affect the accuracy of the different supply voltages developed on the A4 CCA.

7.2 Modulator - Gaussian Pulse Pair Amplitude

NOTE: Modulator adjustments have a direct effect on DME peak power out. If the modulator is not properly adjusted, it can result in out of tolerance peak power readings on the IFR 1400 power meter.

A. Set the IFR 1400 frequency to 108 MHz VOR paired.

B. Make sure that the RCB page on the RTIU Monitor is shown and that the FREQUENCY for channels A through F is 108.00.

C. Setup the oscilloscope for 10V/DIV, 5µs/DIV and internal sync. Connect the scope probe to A4E15 (35 W GAUSSIAN). Sync the scope to the gaussian pulse pair at A4E15 (35 W GAUSSIAN). See figure E-2 for test point locations.

D. Adjust A4R10 for a pulse pair amplitude of +50 volts peak, from the baseline of scope trace to gaussian pulse peak.

E. Remove the scope probe from A4E15 and connect it to A4E14. Sync the scope to the gaussian pulse pair at A4E14 (FINAL GAUSSIAN).

F. Adjust A4R28 for a pulse pair amplitude of +50 volts peak, from the baseline of scope trace to gaussian pulse peak. Pulse width at the 50% amplitude points must be 3.5 ± 0.5 microseconds.

7.3 Forward Power Monitor

A. Set the IFR 1400 frequency to 108 MHz VOR paired.

B. Make sure the RCB page is shown on the RTIU Monitor and that the FREQUENCY for channels A through F is 108.00.

C. Connect an oscilloscope probe to A1U25 pin 4 [A1U25 pin 9 for -903 CCA] (FWD PWR).

D. Adjust A4R42 for 6-volt peak gaussian pulses. Measure from pulse baseline to pulse peak.

8. RECEIVER/VCO CCA A2 ALIGNMENT

8.1 Voltage Controlled Oscillator (7510190-901 CCAs only)

A. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for channels A through F	<G>
Go to the BENCH PAGE	<H>

NOTE: This is the lowest frequency generated by the VCO.

B. Remove the synthesizer cover on the A2 CCA.

C. Connect the DMM to A2FL114 (SYNTH TUNE). Adjust A2C63 for a +1.70 V dc reading on the DMM. The VCO frequency generated at this voltage is 1025 MHz. See figure E-3 for component locations.

D. On the BENCH PAGE, the SYN LCK VOUT field must read greater than 3.5 V dc.

E. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 117.90 MHz	<117.90>
for channels A through F	<G>

NOTE: This is the highest frequency generated by the VCO.

F. The VCO drive voltage at A2FL114 must be less than +12 V dc.

G. On the BENCH PAGE, the SYN LCK VOUT field must read greater than 3.5 V dc.

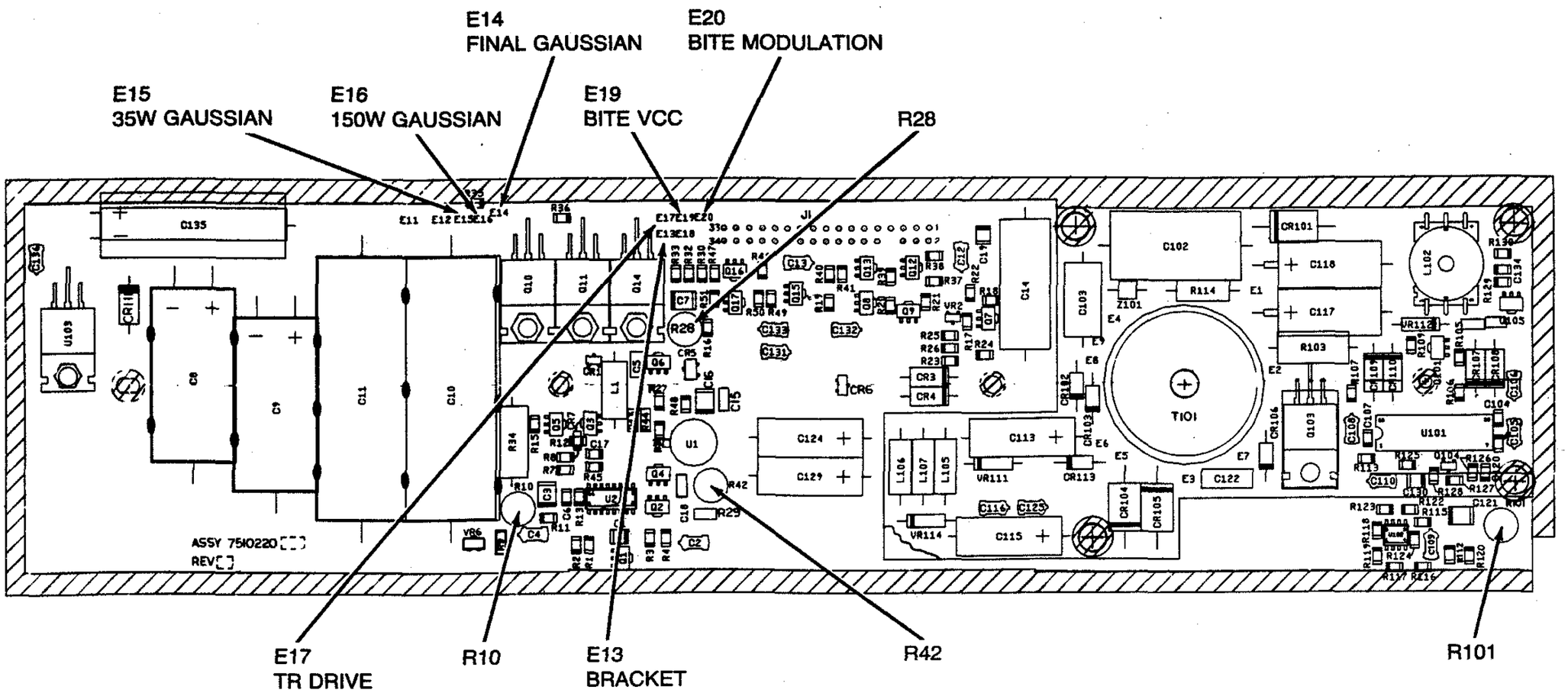
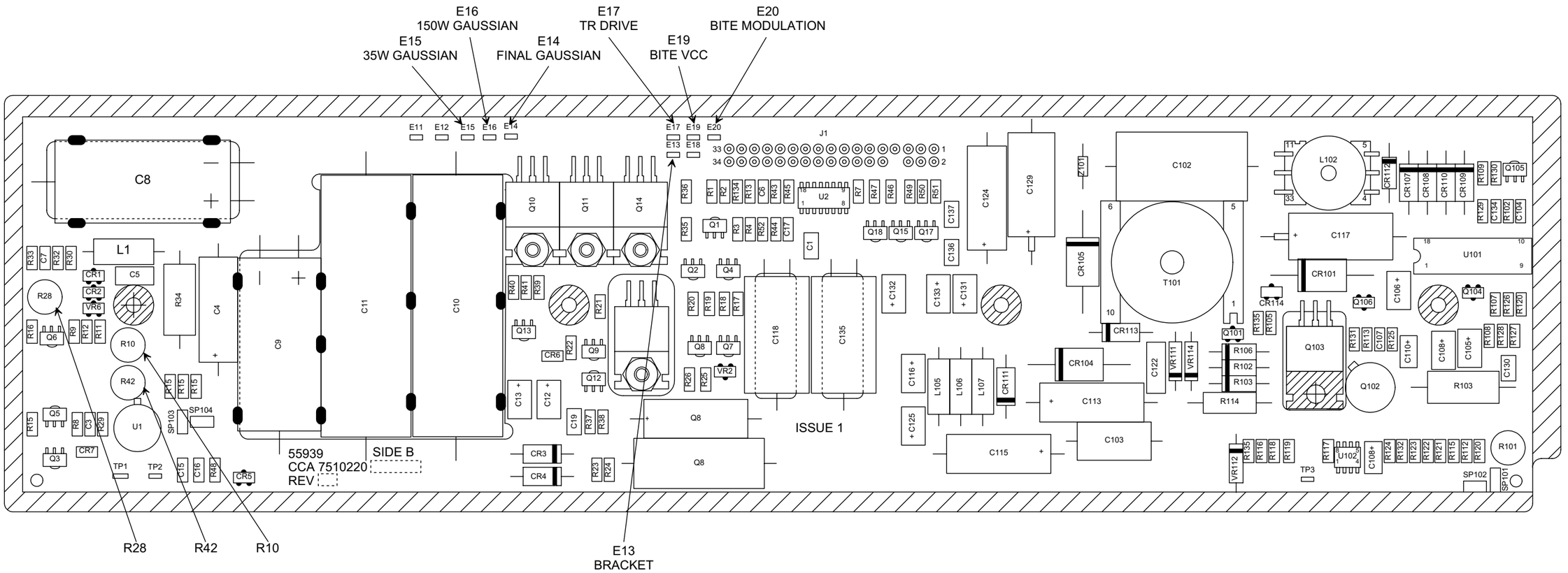


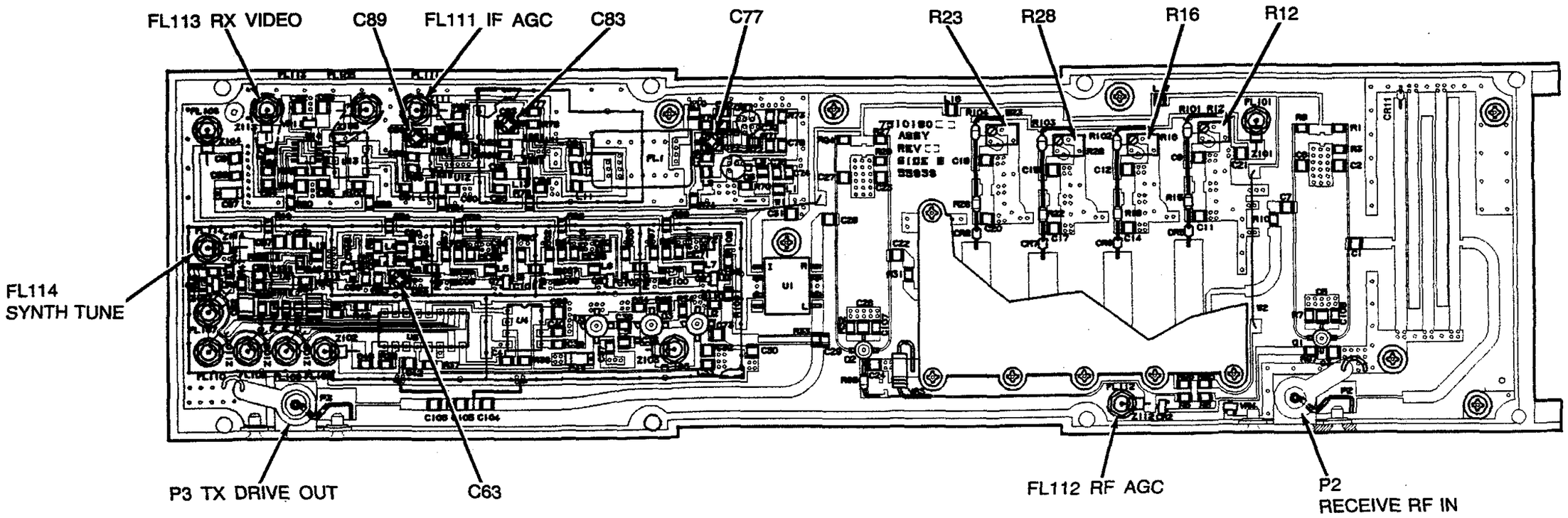
Figure E-2. Modulator/Power Supply CCA A4 Test Points and Adjustable Component Locations (Sheet 1)



NOTE:
THIS SHEET IS FOR 7510220-902 CCA.

AD-31612-R1@

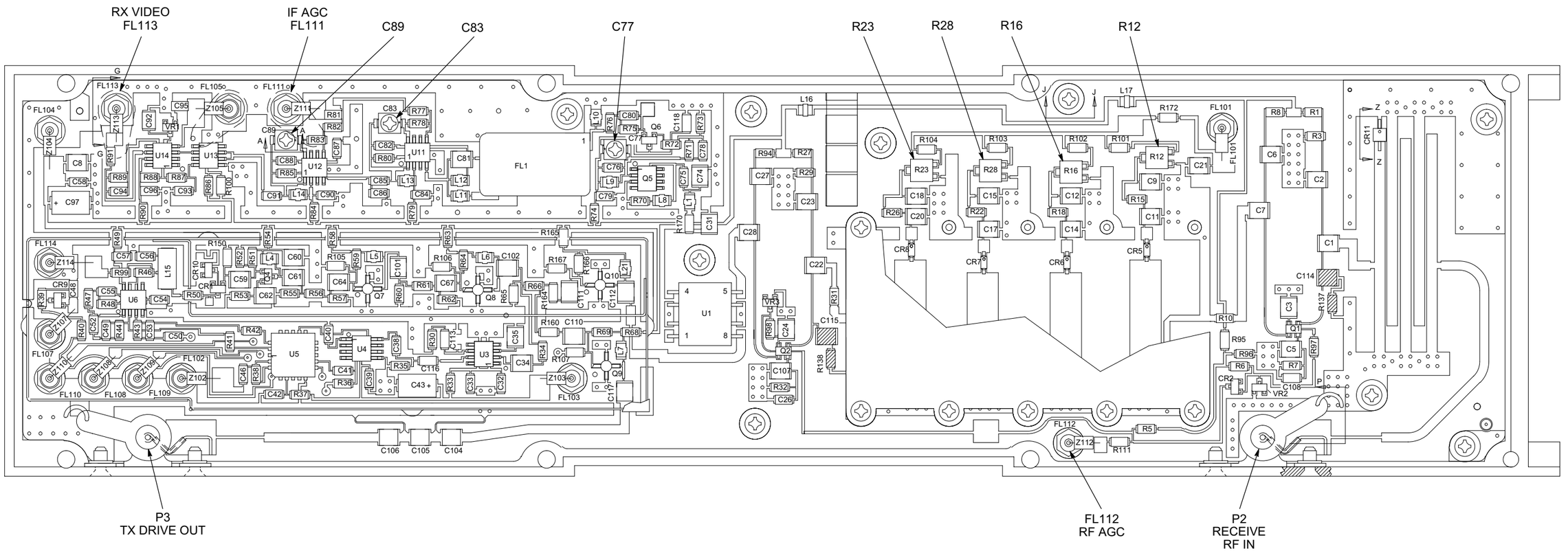
Figure E-2. Modulator/Power Supply CCA A4 Test Points and Adjustable Component Locations (Sheet 2)



NOTE: THIS SHEET IS FOR 7510190-901 CCAs.

AD-20479-R2

Figure E-3. Receiver CCA A2 Test Points and Adjustable Component Locations (Sheet 1)



NOTE: THIS SHEET IS FOR 7510190-902 CCAs

E7510190-902-2(R)
AD-37710@

Figure E-3. Receiver CCA A2 Test Points and Adjustable Component Locations (Sheet 2)

8.2 RF AGC Test

NOTE: Before you do the RF or IF alignment procedure, complete the tests that follow to determine whether the alignment is necessary.

A. Set the IFR 1400 frequency to 135.25 and the RF level to -90 dBm. All other settings remain the same as the setup in appendix D.

B. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 135.25 MHz	<135.25>
for channels A through F	<G>

NOTE: This is the middle of the receiver bandwidth.

C. Set the IFR 1400 NORM/CW/OFF switch to the OFF position.

D. Connect an oscilloscope probe to test point A1TP6. This test point is accessible through the casting without opening the module. See figure E-1 for test point location.

E. Set the oscilloscope coupling to GND and position the trace to the second graticule line up from the bottom of the scope display. This is the reference point from which to measure the RF AGC.

F. Set the oscilloscope horizontal to 5ms/DIV, vertical to 1V/DIV and coupling to DC. Measure from the GND reference level to the top of the inverted AGC pulses. If the AGC is working properly it should be approximately 5 ± 1.0 volts (5 divisions on the scope display). See figure E-4 for the RF AGC waveform with no signal applied to the DME module.

G. Increase the RF signal level and monitor the RF AGC waveform. The waveform must move towards 0 V dc to reduce the receiver gain.

8.3 IF AGC Test

NOTE: Before you do the RF or IF alignment procedure, complete the tests that follow to determine whether the alignment is necessary.

A. Set the IFR 1400 frequency to 135.25 and the RF level to -90 dBm. All other settings remain the same as the setup in appendix D.

B. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 135.25 MHz	<135.25>

NOTE: This is the middle of the receiver bandwidth.

C. Set the IFR 1400 NORM/CW/OFF switch to the OFF position.

D. Connect a scope probe to A1TP5 (IF AGC). See figure E-1 for test point location.

E. Set the oscilloscope to GND and position the trace to the second graticule line up from the bottom of the scope display. This is the reference point from which to measure the IF AGC. Set the horizontal sweep to 5ms/DIV, vertical to 5V/DIV and coupling to DC.

F. On the oscilloscope, measure from the GND reference level to the bottom of the AGC pulses.

G. If the AGC is working properly, the pulses should be approximately 12 ± 2.5 V dc from the ground reference line on the scope display. See figure E-5 for the IF AGC waveform with no signal applied to the DME module.

NOTE: If the AGC is not working properly, do not continue with the receiver alignment tests. Stop and troubleshoot the AGC circuitry until the problem is corrected, then return to the RF and IF tests.

H. Monitor the RF AGC waveform and slowly increase the RF signal level. The waveform must move towards 15 volts dc to reduce the receiver gain.

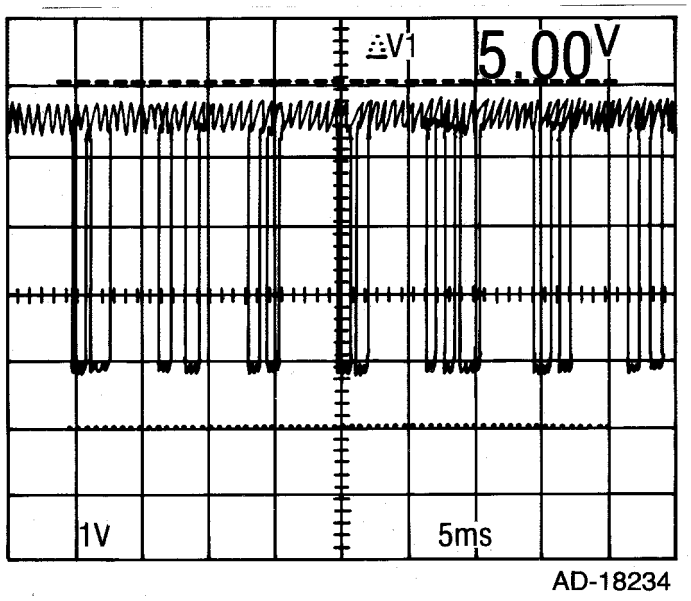


Figure E-4. RF AGC Waveform (TP6)

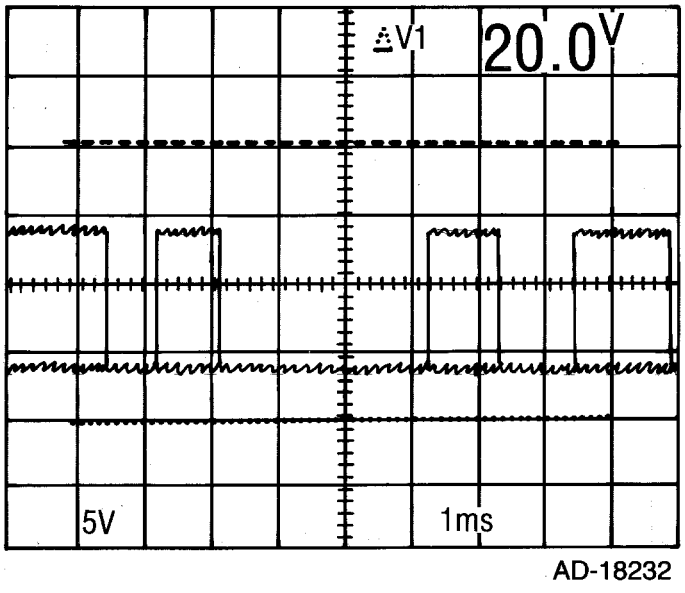


Figure E-5. IF AGC Waveform (TP5)

8.4 Receiver Alignment

A. Set the IFR 1400 frequency to 135.25, the RF level to -90 dBm and the TACAN modulation switch to OFF. All other settings remain the same as the setup in appendix D.

B. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 135.25 MHz	<135.25>
for channels A through F	<G>

NOTE: This is the middle of the receiver bandwidth.

C. Connect an oscilloscope probe to RX VIDEO test point A1TP4. This test point is accessible through the casting without opening the DME module. See figure E-1 for location of A1TP4.

D. Examine the RX VIDEO waveform at A1TP4 for a pulse pair that has the same characteristics as the one in figure E-6. See figure E-1 for TP4 location.

NOTE: If the waveform is present and displays the same character-istics, then receiver sensitivity is correct at the center of the band. If the pulse pair is not present, but the DME passes the RF and IF AGC tests, troubleshoot the RF and IF stages to isolate the defective component.

E. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for channels A through F	<G>

NOTE: This is the low end of the receiver band.

F. Set the IFR 1400 frequency to 134.40, the RF level to -90 dBm and the TACAN modulation switch to OFF. All other settings remain the same as the setup in appendix D.

G. Check the RX VIDEO at A1TP4 for a pulse pair that has the same characteristics as the one in figure E-6.

H. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 117.90 MHz	<117.90>
for channels A through F	<G>

NOTE: This is the high end of the receiver band.

I. Set the IFR 1400 frequency to 117.90, the RF level to -90 dBm and the TACAN modulation switch to OFF. All other settings remain the same as the setup in appendix D.

J. Check the RX VIDEO at A1TP4 for a pulse pair that has the same characteristics as the one in figure E-6.

NOTE: If the waveform matches at all three frequencies and does not disappear into the noise, the RF and IF do not require alignment. If the waveform is present at the center frequency of 135.250 and appears to be the same as shown in figure E-6, but is weak or noisy at the other frequencies, do the DME alignment procedure.

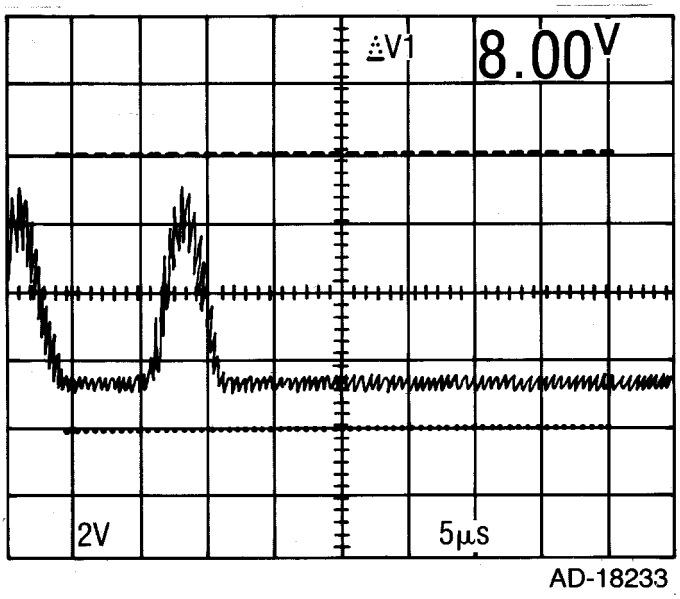


Figure E-6. RX VIDEO Pulse Pair Waveform (TP4)

8.5 Receiver RF Alignment

NOTE: The DME Receiver is comprised of two sections, the RF and IF circuitry. It is recommended that the receiver alignment be done only when a repair has been made in the RF or IF circuitry. If during testing/fault isolation, it is determined that the DME has good sensitivity, but is not flat across the band, the alignment procedure should be done.

A. Gain access to the DME Receiver CCA A2 by doing the Disassembly for Alignment instructions. Install the RF extender cables, Part No. T360074-3.

B. Connect the two DME RF extender cables, Part No. T360074-3, between A2P2, A2P3 and A3J2, A3J3 respectively.

C. Set the IFR 1400 frequency to 134.40 and the RF level to -90 dBm.

D. Set the RTIU 28V DC power switch to ON. The DME will begin to communicate with the RTIU and the ERROR message field on the Monitor must be blank, indicating normal operation.

E. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for channels A through F	<G>

NOTES: 1. This is a receive frequency of 962 MHz, low end of DME band.

2. Because of the preselector construction and the use of GaAsFETs, the RF section is much more sensitive at the high end of the band. Since this is the case, when the RF circuitry is tuned for maximum sensitivity at the low end of the band it typically still has good sensitivity at the high end of the band.

F. Connect the oscilloscope channel 1 probe to A1TP4 (RX VIDEO). Set the scope vertical to 2V/DIV and sync up to IF AGC pulse train.

G. Connect a 10 kΩ resistor and a 22 μF capacitor between A1FL111 and a DMM as shown in figure E-7.

H. Adjust A2R12, A2R16, A2R28 and A2R23 (figure E-3) in the preselector for the maximum dc voltage level attainable on the DMM. This is the point at which the RF signal is the strongest. Repeat the adjustments until no further increase in dc voltage is possible. Recheck DME sensitivity at the high end of the band.

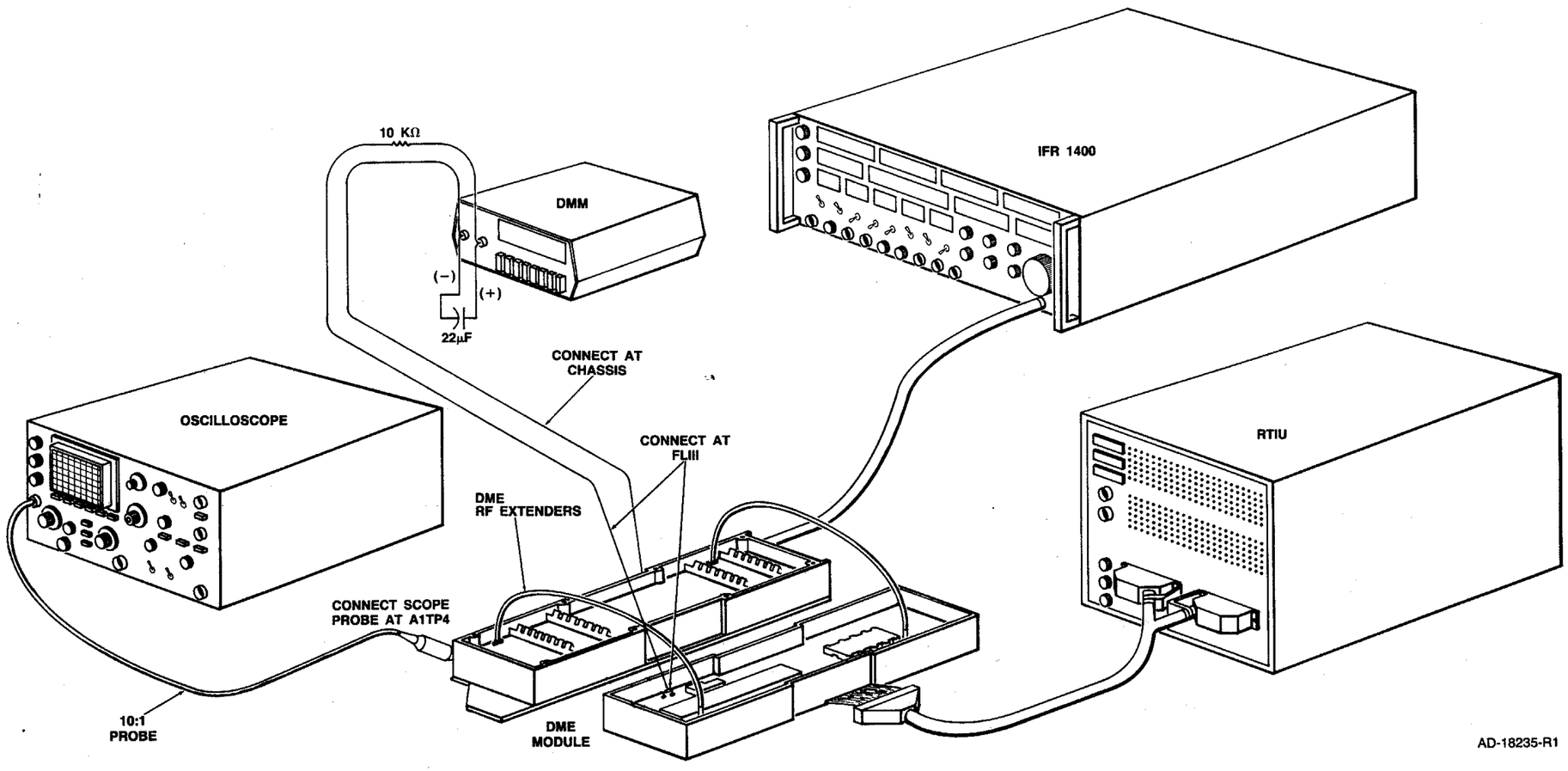


Figure E-7. RF and IF Alignment Setup

8.6 Receiver IF Alignment

NOTE: The DME Receiver is comprised of two sections, the RF and IF circuitry. It is recommended that the receiver alignment be done only when a repair has been made in the RF or IF circuitry. If during testing/troubleshooting, it is determined that the DME has good sensitivity, but is not flat across the band, the alignment procedure should be done.

A. Gain access to the DME Receiver CCA A2 by doing the Disassembly for Alignment instructions. Install the RF extender cables, Part No. T360074-3.

B. Connect the two DME RF extender cables, Part No. T360074-3, between A2P2, A2P3 and A3J2, A3J3 respectively.

C. Set the IFR 1400 frequency to 134.40 and the RF level to -90 dBm.

D. Set the RTIU 28V DC power switch to ON. The DME will begin to communicate with the RTIU and the ERROR message field on the monitor must be blank, indicating normal operation.

E. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for channels A through F	<G>

F. Connect the oscilloscope channel 1 probe to A1TP4 (RX VIDEO). Set the scope vertical to 2V/DIV and sync up to IF AGC pulse train.

G. Connect a 10 kΩ resistor and a 22 μF capacitor between A1FL111 and a DMM, as shown in figure E-7.

H. Monitor the pulse pair on the scope and the dc voltage on the DMM.

CAUTION: DAMAGE TO THE TRIMMER CAPACITORS CAN RESULT IF THE PROPER TOOL IS NOT USED. THE HONEYWELL AUTHORIZED RF TUNING TOOL FOR THE DME IS (ME 502), PART NO. 7500634-1.

I. Adjust trimmer capacitors A2C77, A2C83 and A2C89 (figure E-3) for the maximum dc voltage on the DMM, and the maximum pulse pair amplitude on the oscilloscope that contains the least amount of noise.

J. Repeat the adjustments until no further increase in voltage or pulse pair amplitude is possible.

9. TRANSMITTER CCA A3 ADJUSTMENTS

NOTE: Transmitter adjustments are made to achieve maximum peak power across the transmitter band from 1025 to 1150 MHz. Before doing the transmitter alignment section, do the Disassembly for Alignment instructions and install the DME RF extender cables, Part No. T360074-3.

Peak Power Out

A. On the RCB page, select the commands that follow:

CHANGE FREQUENCY	<F>
to 133.60 MHz	<133.60>
for channels A through F	<G>

NOTE: This is the middle of the transmitter bandwidth.

B. Using tuning tool, Part No. 7500634-1, slowly adjust A3C25, A3C34 and A3C35 for a maximum peak power reading on the IFR 1400 power meter. If this reading is not greater than 350 watts, troubleshoot the DME transmitter to isolate the defective component. See figure E-8 for capacitor locations.

C. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 134.40 MHz	<134.40>
for channels A through F	<G>

NOTE: This is the low end of the transmitter band.

D. Check the peak power reading on the IFR 1400. It must be greater than 350 watts. If the power indication is not greater than 350 watts, slowly adjust A3C25, A3C34 and A3C35 (figure E-8) for an indication slightly greater than 350 watts.

E. Select the commands that follow:

CHANGE FREQUENCY	<F>
to 117.90 MHz	<117.90>
for channels A through F	<G>

NOTE: This is the high end of the transmitter band.

F. Examine the peak power reading on the IFR 1400. It must be greater than 350 watts.

NOTE: If the power indication is not greater than 350 watts, slowly adjust A3C25, A3C34 and A3C35 for an indication slightly greater than 350 watts.

G. Make sure the peak power out is greater than 350 watts at 133.60 MHz and at 134.40 MHz.

NOTE: It may be necessary to go back and forth between transmitter alignment steps to achieve equal peak power out on all three channels. Make all adjustments slowly; the IFR power meter will not change instantaneously with each adjustment so give it time to react to any adjustments made to the transmitter.

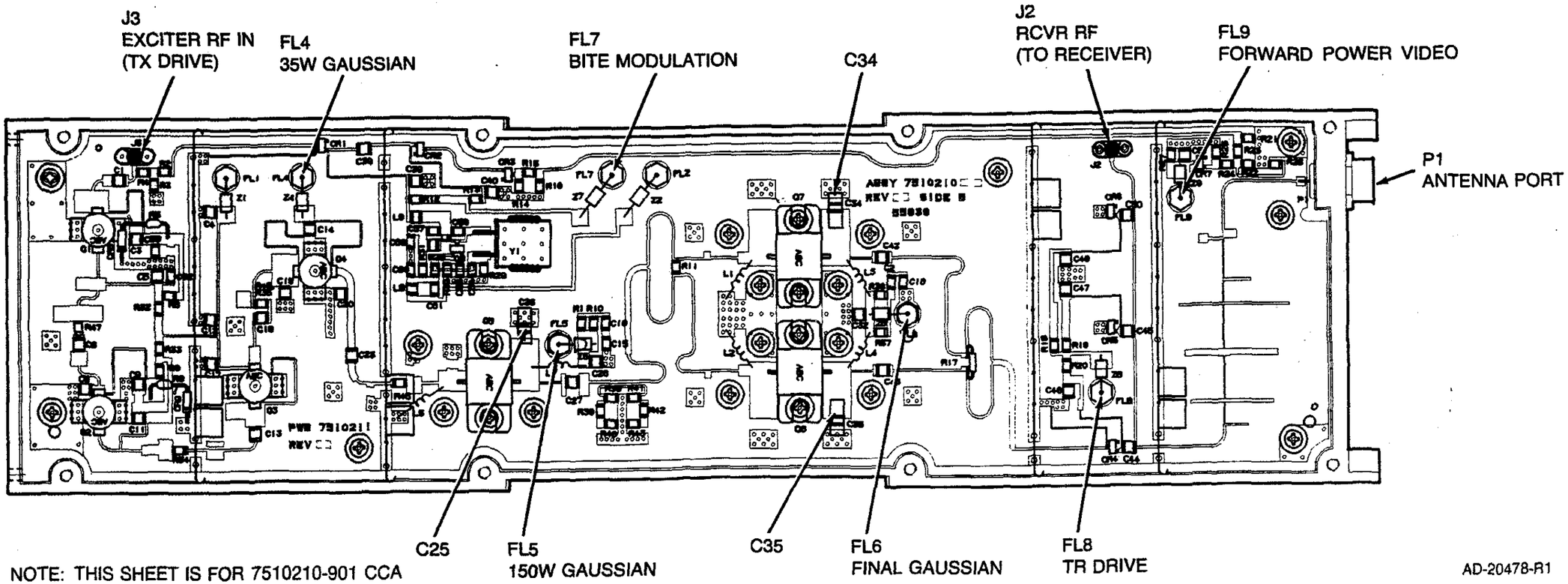
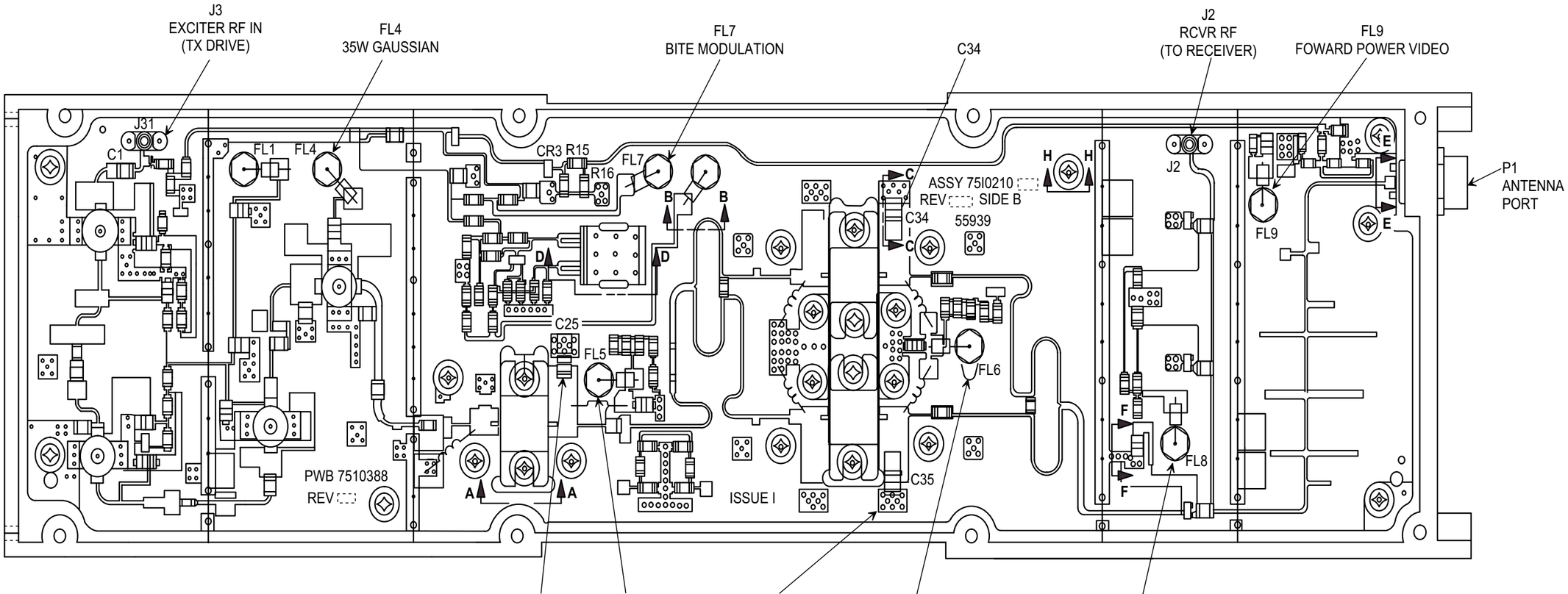


Figure E-8. Transmitter CCA A3 Test Points and Adjustable Component Locations (Sheet 1)



NOTE:
THIS SHEET IS FOR 7510210-902 CCA

AD-31613-R1@

Figure E-8. Transmitter CCA A3 Test Points and Adjustable Component Locations (Sheet 2)

10. COMPUTER VIDEO CCA A1 ADJUSTMENTS

10.1 Analog Aircraft Audio 1

NOTE: Analog audio adjustments can be accomplished without opening the DME casting. See figure E-1 for details.

A. Make sure that the DME frequency displayed on the RTIU Monitor and the IFR 1400 are identical, and that the DISTANCE flag is not visible.

B. On the RCB page, select the commands that follow:

Go to the AUDIO page	<N> <N> <N>
SELECT ACT AUDIO	<A>
as ACT 1 audio	<1>

C. Set the IFR 1400 tone switch to the 1350 Hz position.

D. Monitor the audio voltage being displayed on the AUDIO page.

E. Adjust A1R102 for a reading of 5.3 Vrms.

10.2 Analog Aircraft Audio 2

NOTE: Analog audio adjustments can be accomplished without opening the DME casting. See figure E-1 for details.

A. Make sure that the DME frequency shown on the RTIU monitor and the IFR 1400 are identical, and that the DISTANCE flag is not visible.

B. On the RCB page, select the commands that follow:

Go to the AUDIO page	<N> <N> <N>
SELECT ACT AUDIO	<A>
as ACT 2 audio	<2>

C. Set IFR 1400 tone switch to the 1350 Hz position.

D. Monitor the audio voltage being shown on the AUDIO page.

E. Adjust A1R103 for a reading of 5.3 Vrms.

10.3 Microprocessor Clock Speed

A. The DME must be on and communicating with the RTIU and displaying range data on the RCB page.

B. Connect an oscilloscope probe to A1U2 pin 21 (TP8 on -903 CCAs). Make sure that a clock signal is present on this line. Remove the scope probe and connect a frequency counter probe on the same pin and adjust A1C1 until the counter reads 12.000 MHz. See figure E-9 for component and test point locations.

10.4 Range LSI Calibration

A. The DME must be on and communicating with the RTIU and displaying range data on the RCB page.

B. Connect the frequency counter probe to A1U8 pin 12 (TP9 on -903 CCAs) and adjust A1C23 until the counter reads 16.182 MHz. (The crystal fundamental frequency is 16.18254 MHz.)

C. On the IFR 1400, set the range to 300 NM. Adjust A1C23 until 300.00 ±0.01 NM is displayed on the RCB page DISTANCE field. After each adjustment, wait 10 seconds for the range data to stabilize in the RCB page distance field before making another adjustment.

NOTE: This adjustment sets the LSI counter for the correct amount of gain at 300.00 NM.

D. Perform Digital Range Calibration as specified in paragraph 10.5.

10.5 Digital Range Calibration

NOTE: The Digital Range Calibration offset entry must be done after the range gain adjustment is made in Range LSI Calibration.

A. The DME must be on and communicating with the RTIU and displaying range data on the RCB page.

B. Change the range setting on the IFR 1400 to 1.00 NM.

C. Select the commands that follow:

Go to the BENCH page	<H>
ZERO MILE OFFSET	<Z>
as "0" (zero)	<0>
Go to the RCB page	<P>

D. Read and record the distance displayed in the DISTANCE message field. It must between 0.970 and 1.030 NM.

E. Calculate the offset error by subtracting the number displayed in the distance field from 1.000 NM. This is the offset error that must be entered into the DME NOVRAM through the computer keyboard.

Example:

Correct NM that should be displayed =	1.000
Actual NM displayed on RCB page =	-1.017
Error =	-0.017

Multiply error by 1000 (1000 * -0.017) = -17
Computed Offset Error = -17

F. Select the commands that follow:

Go to the BENCH page	<H>
ZERO MILE OFFSET	<Z>
enter Computed Offset Error with sign, + -	<error>
Go to the RCB page	<P>

G. On the RCB page, make sure that the distance now reads 1.000 ± 0.005 NM.

10.6 Analog Range Calibration

NOTE: The Digital Range Calibration must be done before you do the Analog Range Calibration.

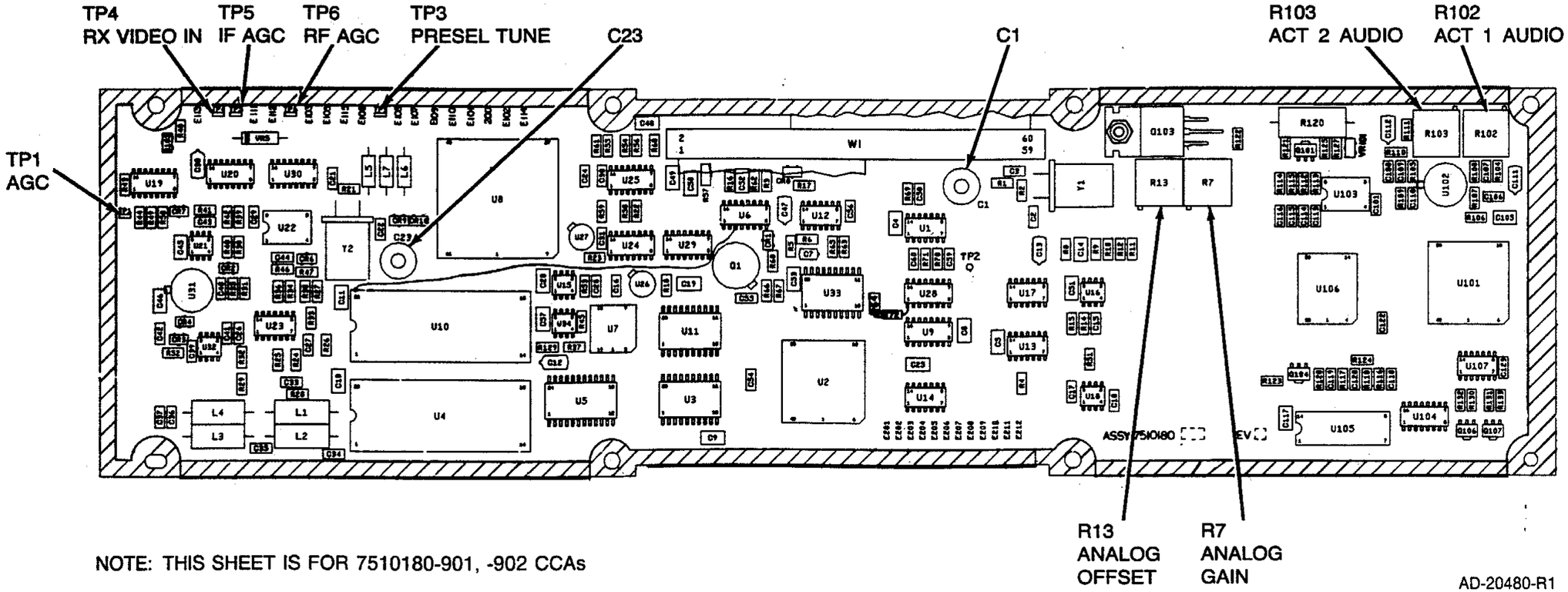
A. The DME must be on and communicating with the RTIU and displaying range data on the RCB page.

B. Set the IFR 1400 range to 1.00 NM.

C. Connect a DMM between the RTIU front panel pins J1U3 (+) and GND. Adjust A1R13 (ANALOG OFFSET) for a +0.040 V dc reading on the DMM. See figure E-9 for A1R13 location.

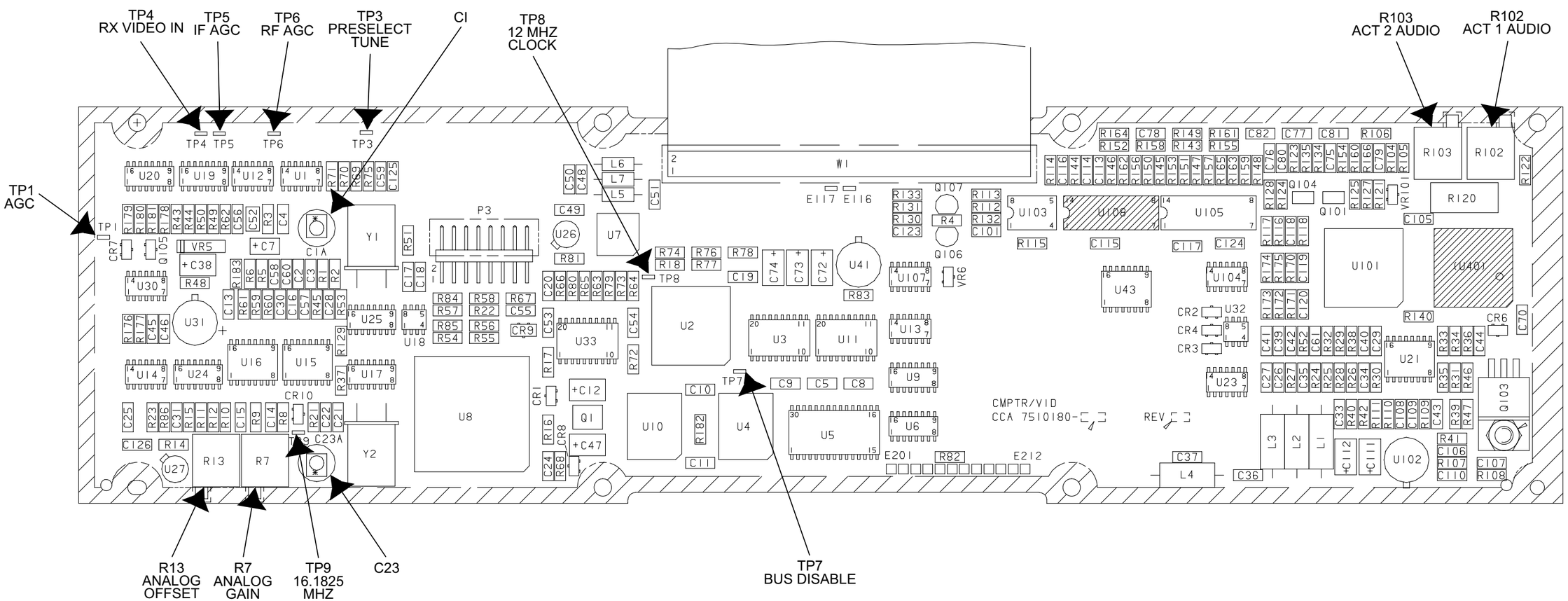
D. Set the IFR 1400 range to 300.00 NM.

E. Adjust A1R7 (ANALOG GAIN) for a +12.00 V dc reading on the DMM. See figure E-9 for A1R7 location.



NOTE: THIS SHEET IS FOR 7510180-901, -902 CCAs

Figure E-9. Computer Video CCA A1 Test Points and Adjustable Component Locations (Sheet 1)



NOTE: THIS SHEET IS FOR 7510180-903 CCA.

E7510180-903-2-C(R)
AD-34855@

Figure E-9. Computer Video CCA A1 Test Points and Adjustable Component Locations (Sheet 2)

APPENDIX F
QUALITY CONTROL FUNCTIONAL TEST REPORT

REV LTR

QUALITY CONTROL FUNCTIONAL TEST REPORT

PART NO. 7510184- | **SERIAL/SHOP NO.**

TEST FIXTURES AND SUPPORT EQUIPMENT

Test Fixture or Type	Serial Number	Model	SPC/ID	REV	CAL DUE DATE
RTIU					
PC					
Oscilloscope					
IFR1400A					
S1403					
DMM					
RTIU Software					

P/N 7510184	REV.	CO.	DATE:
IT NO. 7510184	REV.	CO.	DATE:
APPROVED BY			

TESTER	DATE	FTR SHEET 1 OF 4

REV LTR

QUALITY CONTROL FUNCTIONAL TEST REPORT

PART NO. 7510184- | **SERIAL/SHOP NO.**

AB

1.000	POWER ON CURRENT TEST
1.010	POC
1.020	BNH CMD
1.030	VER
1.040	VER
1.050	ERRORS
1.060	POC

2.000	DME PAIRED CHANNEL TEST 111.90 MHz
2.010	PPS
2.020	MHz
2.030	WATTS
2.040	WATTS
2.050	dBm
2.060	NM
2.070	NM
2.080	NM
2.090	VDC
2.100	USEC
2.110	USEC
2.120	USEC
AE 2.130	%
2.140	dB

3.000	DME PAIRED CHANNEL TEST 111.95 MHz
3.010	PPS
3.020	MHz
3.030	WATTS
3.040	WATTS
3.050	dBm
3.060	NM
3.070	NM
3.080	NM
3.090	VDC
3.100	dBm
AC 3.110	NM
3.120	NM
3.130	NM
3.140	VDC

4.000	DME PAIRED CHANNEL TEST 134.40
4.010	PPS
4.020	MHz
4.030	WATTS
4.040	WATTS
4.050	dBm
4.060	NM
4.070	NM
4.080	NM
4.090	VDC
4.100	USEC
4.110	USEC
4.120	USEC
4.130	%
4.140	dB

TESTER	DATE	FTR SHEET 2 OF 4

REV LTR

QUALITY CONTROL FUNCTIONAL TEST REPORT

PART NO. 7510184- | **SERIAL/SHOP NO.**

REV LTR			
	5.000	**DME PARIED CHANNEL TEST 108.00**	
	5.010		PPS
	5.020		MHz
	5.030		WATTS
	5.040		WATTS
AA	5.050		dBm
	5.060		NM
	5.070		NM
	5.080		NM
	5.090		VDC
	6.000	**DME PARED CHANNEL TEST 110.00 MHz**	
	6.010		PPS
	6.020		MHz
	6.030		WATTS
	6.040		WATTS
AA	6.050		dBm
	6.060		NM
	6.070		NM
	6.080		NM
	6.090		VDC
	7.00	**DME PARED CHANNEL TEST 117.90 MHz**	
	7.010		PPS
	7.020		MHz
	7.030		WATTS
	7.040		WATTS
	7.050		dBm
	7.060		NM
	7.070		NM
	7.080		NM
	7.090		VDC
	7.100		USEC
AC	7.110		USEC
AE	7.120		USEC
	7.130		%
	7.140		dB

	8.000	**RANGE ACCURACY**	
	8.010		NM
	8.020		NM
	8.030		NM
	8.040		NM
	8.050		NM
	8.060		NM
	9.000	**MORSE ID**	
	9.010		KEYS 1&2
	9.020		VDC
	9.030		VDC
	9.040		VDC
	9.050		USEC
	9.060		SEC
	9.070		VDC
	9.080		SEC
	10.000	**SCANNING TEST**	
	10.010		NM
	10.020		FLAG
	10.030		FLAG
	10.040		NM
	11.000	**SQITTER RATE RANGE ACCURACY**	
	11.010		NM
	11.020		NM
	12.000	**VELOCITY ACCURACY**	
	12.010		KTS
	13.000	**PAST MOVE**	
	13.010		MSG
	13.020		NM
	13.030		KTS
	13.040		TTS
	13.050		IDENT

TESTER	DATE	FTR SHEET 3 OF 4

REV LTR

QUALITY CONTROL FUNCTIONAL TEST REPORT

PART NO. 7510184- | **SERIAL/SHOP NO.**

REV LTR			
	14.000	**HOLD MODE**	
	14.010		STATUS
AB	14.020		HI
AB	14.030		LO
	14.040		STATUS
AB	14.050		HI
AB	14.060		LO
	15.000	**CLEAR MAINT. LOG TEST**	
	15.010		POC
	15.020		BH CMD
	15.030		LIST

TESTER	DATE	FTR SHEET 4 OF 4