

REV	AD	APPLICATION		REVISIONS				
		NEXT ASSEMBLY	FINAL ASSEMBLY	REV	DESCRIPTION	DATE	APPROVED	APPROVED
SH	1			T	REVISED PER DCN W2421	09/25/02	V. Wallace	S. Wild
				U	REVISED PER DCN W2857	07/22/03	V. Wallace	S. Wild
650-017612				V	REVISED PER DCN W2999	12/16/03	R. Talken	S. Wild
				H	REVISED PER DCN W1713	10/25/01	V. Wallace	D. S. S.H.
				J	REVISED PER DCN W1730	10/30/01	V. Wallace	D. S. S.H.
				K	REVISED PER DCN W1797	12/13/01	V. Wallace	D. S. S.H.
				L	REVISED PER DCN W1828	01/18/02	V. Wallace	D. S. S.H.
				M	REVISED PER DCN W1909	02/14/02	V. Wallace	D.S S.W.
				N	REVISED PER DCN W1947	03/12/02	V. Wallace	D.S S.W.
				P	REVISED PER DCN W2117	06/14/02	V. Wallace	T.B. D.C.
				R	REVISED PER DCN W2317	09/11/02	V. Wallace	S. Wild
				T	REVISED PER DCN W2421	09/25/02	V. Wallace	S. Wild
				U	REVISED PER DCN W2857	07/22/03	V. Wallace	S. Wild
				V	REVISED PER DCN W2999	12/16/03	R. Talken	S. Wild
				W	REVISED PER DCN W3373	3/5/04	R. Talken	S. Wild
				Y	REVISED PER DCN W3634	5/13/04	R. Talken	KEH/DS
				AA	REVISED PER DCN W3900	8/20/04	V.WALLACE	S.HOVELSRUD
				AB	REVISED PER DCN W4721	01/25/06	V. Wallace	M.Beaumont
				AC	REVISED PER DCN W5031	3/23/06	D. Woodhurst	M. Beaumont
				AD	REVISED PER DCN W5166	5/11/06	Stan Wild	D. Woodhurst

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APPROVALS		DATE	
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CHECKED	---	---	
ENGINEER	T BERTRAND	03/29/93	
ISSUED	---	---	
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TABLE OF CONTENTS

1.0	PURPOSE	6
2.0	SCOPE	7
2.1	CERTIFICATION OF BOARDS / MODULES	8
3.0	REQUIRED EQUIPMENT	8
3.1	SOFTWARE SETUP	9
4.0	SYSTEM INTERCONNECT AND TURN ON PROCEDURE	10
5.0	RT-5000 SYSTEM TEST PROCEDURES	11
5.1	CATEGORY A: PRE-TEST DSP LOADING AND MOTHERBOARD ALIGNMENT	11
5.2	CATEGORY B: PRE-ENVIRONMENTAL SYSTEM TESTS	11
5.3	CATEGORY C: ENVIRONMENTAL COLD SYSTEM TESTS	11
5.4	CATEGORY D: ENVIRONMENTAL HOT SYSTEM TESTS	11
5.5	CATEGORY E: VIBRATION SYSTEM TESTS	12
5.6	CATEGORY F: FINAL SYSTEM TESTS	12
6.0	MTM GUARD XTS-3000 VHF TESTS	13
6.1	VHF CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS	13
6.2	VHF CATEGORY B: PRE-ENVIRONMENTAL TESTS	14
6.2.1	RECEIVER TESTS	14
6.2.2	TRANSMITTER TESTS	15
6.3	VHF MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C)	19
6.3.1	RECEIVER TESTS	19
6.3.2	TRANSMITTER TESTS	20
6.4	VHF MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	22
6.4.1	RECEIVER TESTS	22
6.4.2	TRANSMITTER TESTS	23
6.5	VHF MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS	25
6.5.1	RECEIVER TESTS	25
6.5.2	TRANSMITTER TESTS	25
6.6	VHF CATEGORY E: FINAL ACCEPTANCE TESTS	26
6.6.1	RECEIVER TESTS	26
6.6.2	TRANSMITTER TESTS	27
7.0	MTM GUARD XTS-3000 UHF LO TESTS	28
7.1	UHF LO CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS ...	28
7.2	UHF LO CATEGORY B: PRE-ENVIRONMENTAL TESTS	29
7.2.1	RECEIVER TESTS	29
7.2.2	TRANSMITTER TESTS	30
7.3	UHF LO MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C)	33
7.3.1	RECEIVER TESTS	33
7.3.2	TRANSMITTER TESTS	34
7.4	UHF LO MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	36
7.4.1	RECEIVER TESTS	36
7.4.2	TRANSMITTER TESTS	37
7.5	UHF LO MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS	39
7.5.1	RECEIVER TESTS	39
7.5.2	TRANSMITTER TESTS	39
7.6	UHF LO CATEGORY E: FINAL ACCEPTANCE TESTS	40
7.6.1	RECEIVER TESTS	40
7.6.2	TRANSMITTER TESTS	41
8.0	MTM GUARD XTS-3000 UHF HI TESTS	42
8.1	UHF HI CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS	42
8.2	UHF HI CATEGORY B: PRE-ENVIRONMENTAL TESTS	43
8.2.1	RECEIVER TESTS	43
8.2.2	TRANSMITTER TESTS	44
8.3	UHF HI MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C)	47
8.3.1	RECEIVER TESTS	47
8.3.2	TRANSMITTER TESTS	48
8.4	UHF HI MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	50

8.4.1	RECEIVER TESTS	50
8.4.2	TRANSMITTER TESTS.....	51
8.5	UHF HI MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS.....	53
8.5.1	RECEIVER TESTS	53
8.5.2	TRANSMITTER TESTS.....	53
8.6	UHF HI CATEGORY E: FINAL ACCEPTANCE TESTS.....	54
8.6.1	RECEIVER TESTS	54
8.6.2	TRANSMITTER TESTS.....	55
9.0	MTM GUARD XTS-3000 UHF 800 TESTS	56
9.1	UHF 800 CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS ..	56
9.2	UHF 800 CATEGORY B: PRE-ENVIRONMENTAL TESTS.....	57
9.2.1	RECEIVER TESTS	57
9.2.2	TRANSMITTER TESTS.....	58
9.3	UHF 800 MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C).....	61
9.3.1	RECEIVER TESTS	61
9.3.2	TRANSMITTER TESTS.....	62
9.4	UHF 800 MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	64
9.4.1	RECEIVER TESTS	64
9.4.2	TRANSMITTER TESTS.....	65
9.5	UHF 800 MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS	67
9.5.1	RECEIVER TESTS	67
9.5.2	TRANSMITTER TESTS.....	67
9.6	UHF 800 CATEGORY E: FINAL ACCEPTANCE TESTS	68
9.6.1	RECEIVER TESTS	68
9.6.2	TRANSMITTER TESTS.....	69
10.0	MTM GUARD XTS-3000 TEST DATA SHEETS	70
	RT-5000 MTM GUARD TEST DATA SHEET - VHF.....	70
	RT-5000 VHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 1	70
	RT-5000 VHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 2	71
	RT-5000 VHF MTM GUARD TEST DATA SHEET - COLD ENVIRONMENTAL TESTS.....	72
	RT-5000 VHF MTM GUARD TEST DATA SHEET - HOT ENVIRONMENTAL TESTS	73
	RT-5000 VHF MTM GUARD TEST DATA SHEET - VIBRATION TESTS.....	74
	RT-5000 VHF MTM GUARD TEST DATA SHEET - FINAL TESTS	75
	RT-5000 MTM GUARD TEST DATA SHEET - UHF.....	76
	RT-5000 UHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 1	76
	RT-5000 UHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 2	77
	RT-5000 UHF MTM GUARD TEST DATA SHEET - COLD ENVIRONMENTAL TESTS.....	78
	RT-5000 UHF MTM GUARD TEST DATA SHEET - HOT ENVIRONMENTAL TESTS	79
	RT-5000 UHF MTM GUARD TEST DATA SHEET - VIBRATION TESTS.....	80
	RT-5000 UHF MTM GUARD TEST DATA SHEET - FINAL TESTS.....	81
11.0	MTM GUARD XTS-5000 VHF TESTS	82
11.1	VHF CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS.....	82
11.2	VHF CATEGORY B: PRE-ENVIRONMENTAL TESTS.....	83
11.2.1	RECEIVER TESTS	83
11.2.2	TRANSMITTER TESTS.....	85
11.3	VHF MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C).....	88
11.3.1	RECEIVER TESTS	88
11.3.2	TRANSMITTER TESTS.....	89
11.4	VHF MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	91
11.4.1	RECEIVER TESTS	91
11.4.2	TRANSMITTER TESTS.....	92
11.5	VHF MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS	94
11.5.1	RECEIVER TESTS	94
11.5.2	TRANSMITTER TESTS.....	94
11.6	VHF CATEGORY E: FINAL ACCEPTANCE TESTS.....	95
11.6.1	RECEIVER TESTS	95
11.6.2	TRANSMITTER TESTS.....	96
12.0	MTM GUARD XTS-5000 UHF LO TESTS	97
12.1	UHF LO CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS ...	97
12.2	UHF LO CATEGORY B: PRE-ENVIRONMENTAL TESTS.....	98
12.2.1	RECEIVER TESTS	98

12.2.2	TRANSMITTER TESTS	99
12.3	UHF LO MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C)	102
12.3.1	RECEIVER TESTS	102
12.3.2	TRANSMITTER TESTS	103
12.4	UHF LO MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	105
12.4.1	RECEIVER TESTS	105
12.4.2	TRANSMITTER TESTS	106
12.5	UHF LO MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS	108
12.5.1	RECEIVER TESTS	108
12.5.2	TRANSMITTER TESTS	108
12.6	UHF LO CATEGORY E: FINAL ACCEPTANCE TESTS.....	109
12.6.1	RECEIVER TESTS	109
12.6.2	TRANSMITTER TESTS	110
13.0	MTM GUARD XTS-5000 UHF HI TESTS.....	111
13.1	UHF HI CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS...	111
13.2	UHF HI CATEGORY B: PRE-ENVIRONMENTAL TESTS	112
13.2.1	RECEIVER TESTS	112
13.2.2	TRANSMITTER TESTS	113
13.3	UHF HI MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C)	116
13.3.1	RECEIVER TESTS	116
13.3.2	TRANSMITTER TESTS	117
13.4	UHF HI MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C).....	119
13.4.1	RECEIVER TESTS	119
13.4.2	TRANSMITTER TESTS	120
13.5	UHF HI MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS.....	122
13.5.1	RECEIVER TESTS	122
13.5.2	TRANSMITTER TESTS	122
13.6	UHF HI CATEGORY E: FINAL ACCEPTANCE TESTS	123
13.6.1	RECEIVER TESTS	123
13.6.2	TRANSMITTER TESTS	124
14.0	MTM GUARD XTS-5000 UHF 800 TESTS	125
14.1	UHF 800 CATEGORY A: MOTHERBOARD SETUP AND POWER CALIBRATION TESTS	125
14.2	UHF 800 CATEGORY B: PRE-ENVIRONMENTAL TESTS.....	126
14.2.1	RECEIVER TESTS	126
14.2.2	TRANSMITTER TESTS	127
14.3	UHF 800 MTM GUARD CATEGORY C: ENVIRONMENTAL COLD TESTS (-30°C).....	130
14.3.1	RECEIVER TESTS	130
14.3.2	TRANSMITTER TESTS	131
14.4	UHF 800 MTM GUARD CATEGORY D: ENVIRONMENTAL HOT TESTS (+60°C)	133
14.4.1	RECEIVER TESTS	133
14.4.2	TRANSMITTER TESTS	134
14.5	UHF 800 MTM GUARD CATEGORY D: ENVIRONMENTAL VIBRATION TESTS	136
14.5.1	RECEIVER TESTS	136
14.5.2	TRANSMITTER TESTS	136
14.6	UHF 800 CATEGORY E: FINAL ACCEPTANCE TESTS	137
14.6.1	RECEIVER TESTS	137
14.6.2	TRANSMITTER TESTS	138
15.0	MTM GUARD XTS-5000 TEST DATA SHEETS	139
	RT-5000 MTM GUARD TEST DATA SHEET - VHF	139
	RT-5000 VHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 1	139
	RT-5000 VHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 2	140
	RT-5000 VHF MTM GUARD TEST DATA SHEET - COLD ENVIRONMENTAL TESTS.....	141
	RT-5000 VHF MTM GUARD TEST DATA SHEET - HOT ENVIRONMENTAL TESTS	142
	RT-5000 VHF MTM GUARD TEST DATA SHEET - VIBRATION TESTS.....	143
	RT-5000 VHF MTM GUARD TEST DATA SHEET - FINAL TESTS	144
	RT-5000 MTM GUARD TEST DATA SHEET - UHF	145
	RT-5000 UHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 1	145
	RT-5000 UHF MTM GUARD TEST DATA SHEET - PRE-ENVIRONMENTAL TESTS 2	146
	RT-5000 UHF MTM GUARD TEST DATA SHEET - COLD ENVIRONMENTAL TESTS.....	147
	RT-5000 UHF MTM GUARD TEST DATA SHEET - HOT ENVIRONMENTAL TESTS	148
	RT-5000 UHF MTM GUARD TEST DATA SHEET - VIBRATION TESTS.....	149

RT-5000 UHF MTM GUARD TEST DATA SHEET - FINAL TESTS..... 150

FIGURE 1 ATE SYSTEM INTERCONNECT10

FIGURE 2 MTM GUARD SYSTEM TEST INTERCONNECT10

TABLE 1: TEST APPLICABILITY7

1.0 PURPOSE

This document describes the performance tests required for a RT-5000 after it has been assembled from tested modules. If ATE performed tests are desired, use ATE system with software 320-018442-XX (use the greatest XX available, i.e., the latest revision) for RT-5000 Power Amp 300-018240 and Test Procedure 650-017612.

The test procedure is divided into six categories:

- A. Pre-test DSP Loading and Motherboard Alignment
- B. Pre-environmental Test
- C. Environmental Test Cold
- D. Environmental Test Hot
- E. Vibration Test
- F. Final Test

2.0 SCOPE

The table below lists the part numbers of RT-5000 can be tested by this procedure. Part numbers -0101 through 0501 are able to be completely tested on the ATE. Versions of the RT-5000 that contain an MTM Guard must have the special tests called out in the sections listed in the table below.

Table 1: TEST APPLICABILITY

RT-5000 P/N (XTS-3000)	Radio Frequency Range			
	VHF (Section 6)	UHF LO (Section 7)	UHF HI (Section 8)	UHF 800 (Section 9)
400-015525-0101	● ¹			
400-015525-0201	●			
400-015525-0301		● ¹		
400-015525-0401		●		
400-015525-0501			● ¹	
400-015525-06XX			●	
400-015525-07XX				● ¹
400-015525-08XX				●
400-015525-09XX	● ¹			●
400-015525-10XX	●			●
400-015525-11XX	● ¹			● ¹
400-015525-12XX	●			● ¹
400-015525-13XX	● ¹		●	
400-015525-14XX	●		●	
400-015525-15XX	● ¹		● ¹	
400-015525-16XX	●		● ¹	
400-015525-17XX	● ¹	●		
400-015525-18XX	●	●		
400-015525-19XX	● ¹	● ¹		
400-015525-20XX	●	● ¹		
400-015525-21XX			● ²	
400-015525-22XX				● ³
400-015525-23XX	● ¹			
400-015525-24XX	● ²			
400-015525-25XX				● ^{1,4}
400-015525-26XX				● ⁴
400-015525-27XX		● ¹		
400-015525-28XX	● ⁵			
400-015525-29XX	● ⁵		● ⁵	
400-015525-30XX	● ⁵	● ⁵		
(XTS-5000)	VHF (Section 11)	UHF LO (Section 12)	UHF HI (Section 13)	UHF800 (Section 14)
400-015525-50XX	● ^{4,5}			● ^{4,5}
400-015525-51XX	● ^{4,5}	● ^{4,5}		
400-015525-52XX	● ^{4,5}		● ^{4,5}	
400-015525-53XX				● ^{4,5}
400-015525-54XX		● ^{4,5}		
400-015525-55XX			● ^{4,5}	
400-015525-56XX	● ^{4,5}			

Notes: 1 – DES 2 – DVP-XL 3 – DVI-XL 4 – P25 TRUNKING 5 – AES/DES

2.1 Certification of Boards / Modules

Certification of boards/modules is accomplished by performing the following tests:

Motherboard: Section 5 if not tested with an MTM Guard or 5.1 and the MTM Guard sections from table 1

MTM Guard: All tests from table 1 for the appropriate part number

All other boards and modules: Section 5

3.0 REQUIRED EQUIPMENT

RT-5000 ATE Automatic Test Equipment System Setup P/N 402-015729

RT-5000 ATE Test Software P/N 320-018442-XX

- Use the greatest XX available, i.e., the latest revision
- Refer to 716-018442-XX, Software Configuration Index, for a complete description of the 320-018442-XX software and how to install it
- For old power amps, P/N 300-015266, use ATE software P/N 320-017612-02

AC Voltmeter

Environmental Chamber capable of +60°C. to -30°C

Vibration Table

C-5000 P/N 31300-1x02-1200

TSH-5000 System interface and TSH-5000 Serial interface boxes

Power Supply 22-33 volts DC, 15 amps with voltage and CURRENT meters

RF Cables and power cables

Communication analyzer Motorola model R-2670

HP 7000 Spectrum Analyzer

ATEN USB to RS232 serial converter for use with CPS

Note: Reference document number 150-341897 for acceptable substitute equipment

3.1 Software Setup

1) C-5000 RPWIN

The C-5000 MUST BE loaded with:

For XTS-3000 Tests

320-641355-01 SOFTWARE DATA, XTS-3000, RT5KTEST.RP2, REMOTE PROGRAMMER

OR

For XTS-5000 Tests

320-641355-02 SOFTWARE DATA, XTS-5000, RT5KTEST.RP2, REMOTE PROGRAMMER

using the Remote Programmer Software 320-141391-XX.

2) WINDOWS TANAPA CODEPLUGS

NOTE: Verify the following directories exist in C: \ Program Files \ Motorola \ ASTRO Products \ ASTRO

WinCodePlugs \ XTS3000

WinCodePlugs \ XTS5000

RadioCodePlugs

Create the directory if it does not exist

The XTS-3000 codeplug data files can be found in:

320-641130-**nn02** Software, Data, Tanapa Radio –**nn**, Codeplug – Windows Default, RT-5000

Where: **nn** = 01 thru highest released value = Tanapa Radio dash number (see 300-140913)

Copy all available released windows codeplug data files named 'arch**nn**02.cpg' into the directory:

C: \ Program Files \ Motorola \ ASTRO Products \ ASTRO Portable CPS \ WinCodePlugs \ XTS3000

The XTS-5000 codeplug data files can be found in:

320-649130-**nn02** Software, Data, Tanapa Radio –**nn**, Codeplug – Windows Default, RT-5000

Where: **nn** = 01 thru highest released value = Tanapa Radio dash number (see 246-049664)

Copy all available released windows codeplug data files named 'arch**nn**02.cpg' into the directory:

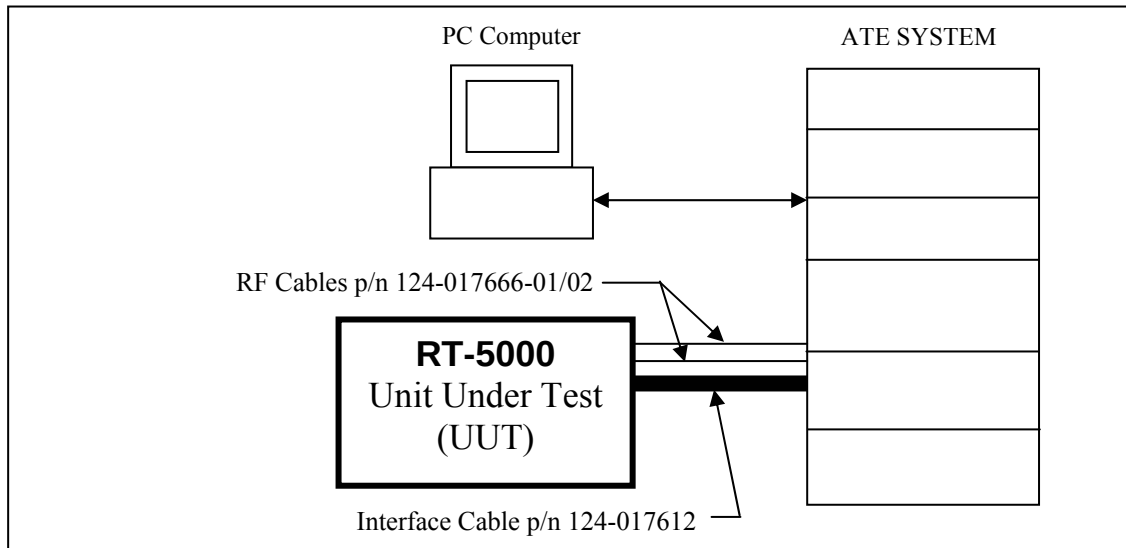
C: \ Program Files \ Motorola \ ASTRO Products \ ASTRO Portable CPS \ WinCodePlugs \ XTS5000

Verify or load the embedded Tanapa radio(s) with the latest codeplug data shown above.

4.0 SYSTEM INTERCONNECT AND TURN ON PROCEDURE

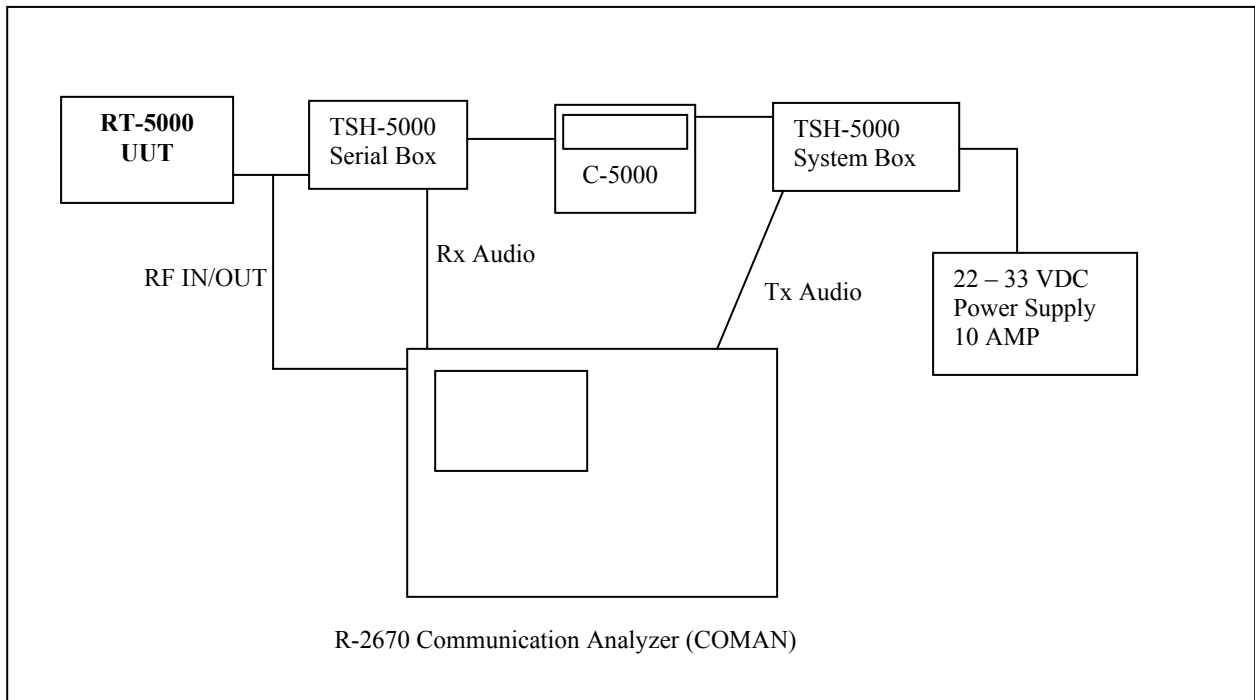
- 1) Connect the ATE interconnect cable to the UUT.
- 2) Connect the cable from ATE RF Port 1 (N connector) to the UUT RF low split N connector.
- 3) Connect the cable from ATE RF Port 2 (TNC connector) to the UUT RF high split TNC connector.

Figure 1 ATE SYSTEM INTERCONNECT



- 4) Turn ON the ATE.
NOTE: The ATE must be turned on before the computer or the GPIB bus will lock up.
- 5) Turn ON the computer and let it boot. The ATE system program will load and run.

Figure 2 MTM GUARD SYSTEM TEST INTERCONNECT



5.0 RT-5000 SYSTEM TEST PROCEDURES

5.1 Category A: Pre-test DSP Loading and Motherboard Alignment

This test need only be run if a DSP EEPROM loading error or Motherboard misalignment is suspected. If this test will not be run, skip to test category B.

- 1) Press <CTRL> S on the computer keyboard to enable the System Control softkeys.
- 2) Press F3 to select the System Configuration softkeys.
- 3) Press F8 then F5 to select the Program menu page.
- 4) Use the UP/DOWN arrow keys to select the MBSETUP program then press <ENTER>.
- 5) After the program has loaded press F1 to return to the System Control softkeys.
- 6) Press F1 to begin the DSP Loading and Motherboard Alignment procedure. Follow any instructions on the computer screen.
- 7) After the alignment completion, note any failures on the printout sheet. Do not proceed with further system testing unless all alignment tests PASS.

5.2 Category B: Pre-environmental System Tests

- 1) Press <CTRL> D on the computer keyboard to enable the System Control softkeys.
- 2) Press the F6 toggle until PRE ENVIRON appears at the softkey label.
- 3) Press F1 to begin the Pre-environmental System Tests.
- 4) After completion of the pre-environmental tests, note any failures on the printout sheet. Do not proceed with further system testing unless all tests PASS.
- 5) If testing an RT-5000 with an MTM Guard, perform section categories A' and B' for the Sections listed in Table 1 for the part number of RT-5000 that is being tested.

5.3 Category C: Environmental Cold System Tests

- 1) Place the UUT in the environmental chamber.
- 2) Set the environmental chamber for -30°C. After the chamber has reached -30°C.; allow the UUT to cold soak for 1.0 hours.
- 3) Press <CTRL> D on the computer keyboard to enable the System Control softkeys.
- 4) Press the F6 toggle until ENVIRON COLD appears at the softkey label.
- 5) Press F1 to begin the Environmental System Tests.
- 6) After completion of the Environmental tests, note any failures on the printout sheet. Do not proceed with further system testing unless all tests PASS.
- 7) If testing an RT-5000 with an MTM Guard, perform section categories C' for the Sections listed in Table 1 for the part number of RT-5000 that is being tested.

5.4 Category D: Environmental Hot System Tests

- 1) Place the UUT in the environmental chamber.
- 2) Set the environmental chamber for +60°C. After the chamber has reached +60°C. allow the UUT to hot soak for 1.0 hours.
- 3) Press <CTRL> D on the computer keyboard to enable the System Control softkeys.
- 4) Press the F6 toggle until ENVIRON HOT appears at the softkey label.
- 5) Press F1 to begin the Environmental System Tests.
- 6) After completion of the environmental tests, note any failures on the printout sheet. Do not proceed with further system testing unless all tests PASS.
- 7) If testing an RT-5000 with an MTM Guard, perform section categories D' for the Sections listed in Table 1 for the part number of RT-5000 that is being tested.

5.5 Category E: Vibration System Tests

- 1) Mount the radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio or until a quarter starts to walk.
- 2) Press <CTRL> D on the computer keyboard to enable the System Control softkeys.
- 3) Press the F6 toggle until VIBRATION appears at the softkey label.
- 4) Press F1 to begin the Vibration System Tests.
- 5) After completion of the Vibration tests, note any failures on the printout sheet. Do not proceed with further system testing unless all tests PASS.
- 6) If testing an RT-5000 with an MTM Guard, perform section categories E' for the Sections listed in Table 1 for the part number of RT-5000 that is being tested.

5.6 Category F: Final System Tests

- 1) Press <CTRL> D on the computer keyboard to enable the System Control softkeys.
- 2) Press the F6 toggle until FINAL TEST appears at the softkey label.
- 3) Enter 10 underscores to S/N Entry Block.
- 4) Press F1 to begin the Final system Tests.
- 5) After completion of the Final system tests, note any failures on the printout sheet.
- 6) If testing an RT-5000 with an MTM Guard, perform sections listed in Table 1 for the part number of RT-5000 that is being tested.
- 7) Do not proceed with further system testing unless all tests PASS.
- 8) Mark printed test data sheet with MTN of RT-5000 tested.

6.0 MTM GUARD XTS-3000 VHF TESTS

6.1 VHF Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 104 (155.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 100-200 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (10 ± 2 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARDTXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the VHF Module in the MTM Guard.

6.2 VHF Category B: Pre-environmental Tests

6.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 155.125MHz, FM 300 Hz tone, 3 kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 155.125MHz, FM 3000 Hz tone, 3 kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS...

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, –80 dBm.

- 15) Using the volt meter measure “MTM GUARD RXFM AUDIO OUTPUT @1000 Hz” ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure “MTM GUARD RXFM AUDIO DISTORTION” (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure “MTM GUARD RXFM AUDIO H&N UNSQLCHD” (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure “MTM GUARD RXFM AUDIO H&N SQLCHD” (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure “MTM GUARD RXFM SQ THRESHOLD SINAD” (10 to 16 dB)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure “MTM GUARD RXFM SBAND SINAD @.5uV” (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

- 21) Using the volt meter measure “MTM GUARD RXFM AUDIO OUTPUT @1000 Hz” (2.75 Vrms, $\pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure “MTM GUARD RXFM AUDIO DISTORTION” (<5%)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

- 23) Using the volt meter measure “MTM GUARD AUDIO OUTPUT @300 Hz” (>5 Vrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

- 24) Using the volt meter measure “MTM GUARD AUDIO OUTPUT @3000 Hz” (<1 Vrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure “MTM GUARD RXFM AUDIO H&N UNSQLCHD” (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD” (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure “MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD” (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure “MTM GUARD RXFM NBAND SINAD @.5uV” (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011 Hz pattern, –80 dBm.

- 29) Using the volt meter measure “MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz” ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure “MTM GUARD RXP25 AUDIO DISTORTION” <5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure “MTM GUARD RXP25 SQ THRESHOLD dBm” (<-114 dBm)

6.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (10.0 ± 5 watts)

33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (10.0 ± 5 watts)

39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (10.0 ± 2 watts)

45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 112 (155.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)

55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 101 (140.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 102 (145.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 103 (150.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 105 (160.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 106 (165.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 107 (170.125 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25Vrms into the TSH-5000 System box Pri Mic input.

56) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 2 Watts)

57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)

58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)

59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (10.0 ± 2 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

6.3 VHF MTM GUARD Category C: Environmental Cold Tests (-30°C)

6.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

6.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 100-200 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (10.0 ± 4.5 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 500 Hz)

6.4 VHF MTM GUARD Category D: Environmental HOT Tests (+60°C)

6.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

6.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to Low TX Power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 29) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4.0 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (3300 ± 500 Hz)

6.5 VHF MTM GUARD Category D: Environmental Vibration Tests

6.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Remove RF until the unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

6.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 104 (155.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 3 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

6.6 VHF Category E: Final Acceptance Tests

6.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to generate 155.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

6.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 101 (140.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 102 (145.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 103 (150.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 105 (160.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 106 (165.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 107 (170.125 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

7.0 MTM GUARD XTS-3000 UHF LO TESTS

7.1 UHF LO Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 154 (440.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 400-600 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (3.0 ± 1 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARD TXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the UHF Module in the MTM Guard.

7.2 UHF LO Category B: Pre-environmental Tests

7.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 440.125MHz, FM 300 Hz tone, 3kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 440.125MHz, FM 3000 Hz tone, 3kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS.

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Add 1.0 kHz tone modulation.

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 15) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 21) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" (2.75 Vrms, $\pm$.50 Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 23) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 24) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure "MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011 Hz pattern, -80 dBm.

- 29) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" (1.75 $\pm$.25 Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

7.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to Monitor 400-500 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

- 32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (3.0 ± 1 watts)
- 33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

- 35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

- 38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (3.0 ± 1 watts)
- 39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

- 41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

- 44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (3.0 ± 1 watts)
- 45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

- 46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

- 47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

- 49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

- 51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

- 52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 162 (440.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

- 54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)
- 55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 151 (410.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 152 (420.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 153 (430.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 155 (450.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 156 (460.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 157 (465.125 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to channel 160 (440.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25Vrms into the TSH-5000 System box Pri Mic input.

- 56) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)
- 57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)
- 58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)
- 59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

- 60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

7.3 UHF LO MTM GUARD Category C: Environmental Cold Tests (-30°C)

7.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO RESPONSE @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

7.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 500 Hz)

7.4 UHF LO MTM GUARD Category D: Environmental HOT Tests (+60°C)

7.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

7.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (3300 ± 500 Hz)

7.5 UHF LO MTM GUARD Category D: Environmental Vibration Tests

7.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

7.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 154 (440.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

7.6 UHF LO Category E: Final Acceptance Tests

7.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to generate 440.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

7.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 150 (405.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 151 (410.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 152 (420.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 153 (430.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 155 (450.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 156 (460.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 157 (465.125 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

8.0 MTM GUARD XTS-3000 UHF HI TESTS

8.1 UHF HI Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 204 (480.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 400-600 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (3.0 ± 1 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARDTXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the UHF Module in the MTM Guard.

8.2 UHF HI Category B: Pre-environmental Tests

8.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 480.125MHz, FM 300 Hz tone, 3kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 480.125MHz, FM 3000 Hz tone, 3kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS.

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 15) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 21) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" (2.75 Vrms, $\pm$.50 Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 23) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 24) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure "MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011 Hz pattern, -80 dBm.

- 29) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" (1.75 $\pm$.25 Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

8.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to Monitor 400-500 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

- 32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (3.0 ± 1 watts)
- 33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

- 35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

- 38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (3.0 ± 1 watts)
- 39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

- 41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

- 44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (3.0 ± 1 watts)
- 45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

- 46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

- 47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

- 49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

- 51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

- 52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 212 (480.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

- 54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)
- 55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 201 (455.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 202 (460.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 203 (470.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 205 (490.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 206 (500.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 207 (511.975 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (2.5 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to channel 210 (480.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25Vrms into the TSH-5000 System box Pri Mic input.

- 56) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)
- 57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)
- 58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)
- 59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

- 60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

8.3 UHF HI MTM GUARD Category C: Environmental Cold Tests (-30°C)

8.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz ($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

8.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 500 Hz)

8.4 UHF HI MTM GUARD Category D: Environmental HOT Tests (+60°C)

8.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" ($>10 - 16$ dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" ($<5\%$)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

8.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" ($<5\%$)

Remove audio into the Pri Mic input.

23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" ($<5\%$)

Remove audio into the Pri Mic input.

28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (3300 ± 500 Hz)

8.5 UHF HI MTM GUARD Category D: Environmental Vibration Tests

8.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

8.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 204 (480.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

8.6 UHF HI Category E: Final Acceptance Tests

8.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to generate 480.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

8.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 201 (455.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 202 (460.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 203 (470.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 205 (490.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 206 (500.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 207 (511.975 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

9.0 MTM GUARD XTS-3000 UHF 800 TESTS

9.1 UHF 800 Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 254 (859.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 800-900 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (3.0 ± 1 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARDTXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the UHF Module in the MTM Guard.

9.2 UHF 800 Category B: Pre-environmental Tests

9.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 254 (859.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 859.125MHz, FM 300 Hz tone, 3kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 859.125MHz, FM 3000 Hz tone, 3kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS.

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 250 (851.125 MHz SBAND FM)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 258 (868.975 MHz SBAND FM)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 15) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 21) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" (2.75 Vrms $\pm$.50 Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 23) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @300 Hz" (>5 Vrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 24) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure "MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011 Hz pattern, -80 dBm.

- 29) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" (1.75 $\pm$.25 Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

9.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 254 (812.125 MHz SBAND MHz)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

- 32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (3.0 ± 1 watts)
- 33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

- 35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

- 38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (3.0 ± 1 watts)
- 39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

- 41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

- 44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (3.0 ± 1 watts)
- 45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

- 46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

- 47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

- 49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

- 51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

- 52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 262 (812.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

- 54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)
- 55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 250 (806.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)

Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 251 (807.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 252 (808.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 253 (810.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 254 (812.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 255 (814.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 256 (816.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 257 (818.125 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to channel 260 (812.125 MHz NBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25Vrms into the TSH-5000 System box Pri Mic input.

- 56) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)
- 57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)
- 58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)
- 59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

- 60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (2700 ± 300 Hz)

9.3 UHF 800 MTM GUARD Category C: Environmental Cold Tests (-30°C)

9.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 250 (851.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 258 (868.975 MHz SBAND FM)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO RESPONSE @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120dB RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz ($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

9.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 250 (806.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 800-900 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 260 (812.125 MHz NBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (2700 ± 500 Hz)

9.4 UHF 800 MTM GUARD Category D: Environmental HOT Tests (+60°C)

9.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 250 (851.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 258 (868.975 MHz SBAND FM)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

9.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 250 (806.125 MHz SBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 260 (812.125 MHz NBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (2700 ± 500 Hz)

9.5 UHF 800 MTM GUARD Category D: Environmental Vibration Tests

9.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 254 (859.125 MHz SBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

9.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 254 (812.125 MHz SBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

9.6 UHF 800 Category E: Final Acceptance Tests

9.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 254 (859.125 MHz SBAND FM)

Set the COMAN to generate 859.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

9.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 254 (812.125 MHz FM SBAND)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 250 (806.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 251 (807.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 252 (808.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 253 (810.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 254 (812.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 255 (814.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 256 (816.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 257 (818.125 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 260 (812.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (2700 ± 300 Hz)

10.0 MTM GUARD XTS-3000 TEST DATA SHEETS

RT-5000 MTM Guard Test Data Sheet - VHF

MTN # _____ Tester: _____ Start Date: _____

6.1 Category A: Motherboard setup and Power Calibration Tests

VHF MODULE Test Frequency: Mid Band

- | | | |
|--------------------------------------|-------|-------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT | _____ | (2.75 ± .25 Vrms) |
| 2) MTM GUARD RXFM STANDBY CURRENT | _____ | (<2.5 Amps) |
| 3) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 2 Watts) |
| 4) MTM GUARD TXFM CURRENT | _____ | (<4.5 Amps Max) |
| 5) MTM GUARD TXFM DEVIATION @1000 Hz | _____ | (3000 ± 200 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - Pre-environmental Tests 1

6.2 Category B: Pre-environmental Tests

VHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (<5%) |
| 3) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (>5 Vrms) |
| 4) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 5) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 6) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (<50 mVrms) |
| 7) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 8) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-------------------|
| 9) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 10) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 11) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 12) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 13) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 14) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|-------------------|
| 15) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 16) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 18) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 19) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 20) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|-------------------|
| 21) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 22) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (> 5 Vrms) |
| 24) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 25) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 26) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 27) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 28) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|--|-------|-------------------|
| 29) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 30) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 31) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

RT-5000 VHF MTM Guard Test Data Sheet - Pre-environmental Tests 2

6.2 Category B: Pre-environmental Tests

VHF Transmitter:

Test Frequency: Mid Band @22.0V

32) MTM GUARD TXFM HI POWER @22.0V	_____	(10.0 $\pm$ 5.0 Watts)
33) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
34) MTM GUARD TXFM LO POWER @22.0V	_____	(1.0 $\pm$.2 Watts)
35) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 $\pm$ 200 Hz)
36) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
37) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band @33.0V

38) MTM GUARD TXFM HI POWER @33.0V	_____	(10.0 $\pm$ 5.0 Watts)
39) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
40) MTM GUARD TXFM LO POWER @33.0V	_____	(1.0 $\pm$.2 Watts)
41) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 $\pm$ 200 Hz)
42) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
43) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band @27.5V

44) MTM GUARD TXFM HI POWER @27.5V	_____	(10.0 $\pm$ 2.0 Watts)
45) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
46) MTM GUARD TXFM LO POWER @27.5V	_____	(1.0 $\pm$.2 Watts)
47) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 $\pm$ 200 Hz)
48) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)
49) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
50) MTM GUARD TXFM SBAND 300 Hz DEVIATION	_____	(<1000 Hz)
51) MTM GUARD TXFM SBAND 3000 Hz DEVIATION	_____	(>2000 Hz)
52) MTM GUARD TXFM SBAND MOD LMT	_____	(<5100 Hz) *Input tone is @2500 Hz and >.795 Vrms
53) MTM GUARD TXFM SBAND MOD FLT	_____	(<1000 Hz) *Input tone is @3500 Hz and .25Vrms Mic input
54) MTM GUARD TXFM SBAND TONE DEVIATION	_____	(500 to 1000 Hz) *No input modulation

55)

MTM GUARD TX Frequency	HIGH TX POWER (10.0 $\pm$ 2 Watts)	HIGH TX POWER CURRENT (<4.5A)	LOW TX POWER (1.0 $\pm$.2 Watts)	LOW TX POWER CURRENT (<4.0A)
A				
B				
C				
D				
E				
F				
G				
H				
I				

Test Frequency: Mid Band NBAND

56) MTM GUARD TXFM HI POWER	_____	(10.0 $\pm$ 2.0 Watts)
57) MTM GUARD TXFM LO POWER	_____	(1.0 $\pm$.2 Watts)
58) MTM GUARD TXFM NBAND MIC DEVIATION	_____	(1500 $\pm$ 100 Hz)
59) MTM GUARD TXFM NBAND AUDIO DISTORTION	_____	(<5%)
60) MTM GUARD TXFM NBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band P25 NBAND

61) MTM GUARD TXP25 HI POWER	_____	(10.0 $\pm$ 2.0 Watts)
62) MTM GUARD TXP25 NBAND DEVIATION	_____	(3300 $\pm$ 300 Hz)

RT-5000 VHF MTM Guard Test Data Sheet - COLD Environmental Tests**6.3 Category C: COLD Environmental Tests (-30°C)****VHF Receiver:****Test Frequency: FM Low Band Edge (25 kHz Standard Band FM Channel)**

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (> 12 dB) |

Test Frequency: FM High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|-------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75, ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (<-114 dBm) |

VHF Transmitter:**Test Frequency: Low Band FM SBAND**

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: High Band FM SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-------|------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (10.0 ± 4 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 ± 500 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - HOT Environmental Tests**6.4 Category D: HOT Environmental Tests (+60°C)****VHF Receiver:****Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)**

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCH | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

VHF Transmitter:**Test Frequency: Low Band SBAND**

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: High Band SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-------|------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (10.0 ± 4 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 ± 500 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - Vibration Tests

6.5 Category E: Vibration Tests

VHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-----------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | ($2.75 \pm .5$ Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 200 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 100 mVrms) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

VHF Transmitter:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-----------------------|
| 6) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 3 Watts) |
| 7) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 8) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD TXFM SBAND H&N | _____ | (< 200 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - Final Tests**6.6 Category F: Final Tests****VHF Receiver:****Test Frequency: Mid Band (25 kHz Standard Band FM Channel)**

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (<100 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 5) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 6) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|-------------------|
| 7) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75, ± .5 Vrms) |
| 8) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 10) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 11) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (P25 Channel 1011 pattern)

- | | | |
|--|-------|-------------------|
| 12) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 13) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 14) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (-114 dBm) |

VHF Transmitter:**Test Frequency: Mid Band SBAND**

- | | | |
|---|-------|-----------------|
| 15) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 200 Hz) |
| 16) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD TXFM SBAND H&N | _____ | (< 100 Hz) |

MTM GUARD TX Frequency	HI TX POWER (10.0±2.0 Watts)
18) A	
19) B	
20) C	
21) D	
22) E	
23) F	
24) G	
25) H	
26) I	

Test Frequency: Mid Band NBAND

- | | | |
|---|-------|-----------------|
| 27) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 200 Hz) |
| 28) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (< 5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-------|-----------------|
| 29) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 ± 300 Hz) |
|-------------------------------------|-------|-----------------|

RT-5000 MTM Guard Test Data Sheet - UHF

MTN # _____ Tester: _____ Start Date: _____

7.1/8.1/9.1 Category A: Motherboard setup and Power Calibration Tests

UHF MODULE Test Frequency: Mid Band

- | | | |
|--------------------------------------|-------|--------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT | _____ | (2.75 ± .25 Vrms) |
| 2) MTM GUARD RXFM STANDBY CURRENT | _____ | (<2.5 Amps) |
| 3) MTM GUARD TXFM HIGH POWER | _____ | (3.0 ± 1 Watts) |
| 4) MTM GUARD TXFM CURRENT | _____ | (<4.5 Amps Max) |
| 5) MTM GUARD TXFM DEVIATION @1000 Hz | _____ | (3000 Hz ± 200 Hz) |

RT-5000 UHF MTM Guard Test Data Sheet - Pre-environmental Tests 1

7.2/8.2/9.2 Category B: Pre-environmental Tests – Page 1

UHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (<5%) |
| 3) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (>5 Vrms) |
| 4) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 5) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 6) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (<50 mVrms) |
| 7) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 8) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-------------------|
| 9) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 10) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 11) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 12) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 13) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 14) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|-------------------|
| 15) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 16) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 18) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 19) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 20) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|-------------------|
| 21) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 22) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (> 5 Vrms) |
| 24) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 25) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 26) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 27) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 28) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|--|-------|-------------------|
| 29) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 30) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 31) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

7.2/8.2/9.2 Category B: Pre-environmental Tests – Page 2

Test Frequency: Mid Band @22.0V

- | | | |
|---|-------|------------------|
| 32) MTM GUARD TXFM HI POWER @22.0V | _____ | (3.0 ± 1.0 Watt) |
| 33) MTM GUARD TXFM CURRENT | _____ | (< 4.5 Amps) |
| 34) MTM GUARD TXFM LO POWER @22.0V | _____ | (1.0 ± .2 Watts) |
| 35) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 200 Hz) |
| 36) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 37) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

38) MTM GUARD TXFM HI POWER @33.0V	_____	(3.0 ± 1.0 Watt)
39) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
40) MTM GUARD TXFM LO POWER @33.0V	_____	(1.0 ± .2 Watts)
41) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 ± 200 Hz)
42) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
43) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

44) MTM GUARD TXFM HI POWER @27.5V	_____	(3.0 ± 1.0 Watt)
45) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
46) MTM GUARD TXFM LO POWER @27.5V	_____	(1.0 ± .2 Watts)
47) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 ± 200 Hz)
48) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)
49) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
50) MTM GUARD TXFM SBAND 300 Hz DEVIATION	_____	(<1000 Hz)
51) MTM GUARD TXFM SBAND 3000 Hz DEVIATION	_____	(>2000 Hz)
52) MTM GUARD TXFM SBAND MOD LMT	_____	(<5100 Hz) *Input tone is @2500 Hz and >.795 Vrms
53) MTM GUARD TXFM SBAND MOD FLT	_____	(<1000 Hz) *Input tone is @3500 Hz and .25Vrms Mic input
54) MTM GUARD TXFM SBAND TONE DEVIATION	_____	(500 to 1000 Hz) *No input modulation
55)		

MTM GUARD TX Frequency	HIGH TX POWER (3.0+1 Watts)	HIGH TX POWER CURRENT (<4.5A)	LOW TX POWER (1.0+2 Watts)	LOW TX POWER CURRENT (<4.0A)
A				
B				
C				
D				
E				
F				
G				
H				
I				

56) MTM GUARD TXFM HI POWER	(3.0 ± 1.0 Watts)
57) MTM GUARD TXFM LO POWER	(1.0 ± .2 Watts)
58) MTM GUARD TXFM NBAND MIC DEVIATION	(1500 ± 100 Hz)
59) MTM GUARD TXFM NBAND AUDIO DISTORTION	(<5%)
60) MTM GUARD TXFM NBAND H&N	(<100 Hz)

61) MTM GUARD TXP25 HI POWER _____ (3.0 ± 1.0 Watts)
 62) MTM GUARD TXP25 NBAND DEVIATION _____ (3300 Hz ± 300 Hz for 7.2 / 8.2)
OR _____ (2700 Hz ± 300 Hz for 9.2)

RT-5000 UHF MTM Guard Test Data Sheet - COLD Environmental Tests
7.3/8.3/9.3 Category C: COLD Environmental Tests (-30°C)

UHF Receiver:

Test Frequency: FM Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (> 12 dB) |

Test Frequency: FM High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (<-114 dBm) |

UHF Transmitter:

Test Frequency: FM Low Band SBAND

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .5 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: FM High Band SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .5 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watts) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .5 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-----------|----------------------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (3.0 ± 1 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 Hz ± 500 Hz for 7.3 / 8.3) |
| | OR | _____ (2700 Hz ± 500 Hz for 9.3) |

RT-5000 UHF MTM Guard Test Data Sheet - HOT Environmental Tests
7.4/8.4/9.4 Category D: HOT Environmental Tests (+60°C)

UHF Receiver:

Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

UHF Transmitter:

Test Frequency: Low Band SBAND

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: High Band SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watts) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-----------|----------------------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (3.0 ± 1 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 Hz ± 500 Hz for 7.4 / 8.4) |
| | OR | _____ (2700 Hz ± 500 Hz for 9.4) |

RT-5000 UHF MTM Guard Test Data Sheet - Vibration Tests
7.5/8.5/9.5 Category E: Vibration Tests

UHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 200 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 100 mVrms) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

UHF Transmitter:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-----------------|
| 6) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watts) |
| 7) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 8) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD TXFM SBAND H&N | _____ | (< 200 Hz) |

RT-5000 UHF MTM Guard Test Data Sheet - Final Tests
7.6/8.6/9.6 Category F: Final Tests

UHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (<100 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 5) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 6) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|------------------|
| 7) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 8) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 10) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 11) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (P25 Channel 1011 pattern)

- | | | |
|--|-------|-------------------|
| 12) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 13) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 14) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (-114 dBm) |

UHF Transmitter:

Test Frequency: Mid Band SBAND

- | | | |
|---|-------|-----------------|
| 15) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 200 Hz) |
| 16) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD TXFM SBAND H&N | _____ | (< 100 Hz) |

MTM GUARD TX Frequency	HI TX POWER (3.0±1.0 Watts)
18) A	
19) B	
20) C	
21) D	
22) E	
23) F	
24) G	
25) H	
26) I	

Test Frequency: Mid Band NBAND FM

- | | | |
|---|-------|-----------------|
| 27) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 200 Hz) |
| 28) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (< 5%) |

Test Frequency: Mid Band NBAND P25

- | | | |
|-------------------------------------|-----------------|----------------------------------|
| 29) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 Hz ± 300 Hz for 7.6 / 8.6) |
| | OR _____ | (2700 Hz ± 500 Hz for 9.6) |

11.0 MTM GUARD XTS-5000 VHF TESTS

11.1 VHF Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 104 (155.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 100-200 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (10 ± 2 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARDTXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the VHF Module in the MTM Guard.

11.2 VHF Category B: Pre-environmental Tests

11.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 155.125MHz, FM 300 Hz tone, 3 kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 155.125MHz, FM 3000 Hz tone, 3 kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS...

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, –80 dBm.

- 15) Using the volt meter measure “MTM GUARD RXFM AUDIO OUTPUT @1000 Hz” ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure “MTM GUARD RXFM AUDIO DISTORTION” (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure “MTM GUARD RXFM AUDIO H&N UNSQLCHD” (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure “MTM GUARD RXFM AUDIO H&N SQLCHD” (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure “MTM GUARD RXFM SQ THRESHOLD SINAD” (10 to 16 dB)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure “MTM GUARD RXFM SBAND SINAD @.5uV” (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

- 21) Using the volt meter measure “MTM GUARD RXFM AUDIO OUTPUT @1000 Hz” (2.75 Vrms, $\pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure “MTM GUARD RXFM AUDIO DISTORTION” (<5%)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

- 23) Using the volt meter measure “MTM GUARD AUDIO OUTPUT @300 Hz” (>4 Vrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

- 24) Using the volt meter measure “MTM GUARD AUDIO OUTPUT @3000 Hz” (<1 Vrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, –80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure “MTM GUARD RXFM AUDIO H&N UNSQLCHD” (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD” (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure “MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD” (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure “MTM GUARD RXFM NBAND SINAD @.5uV” (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011 Hz pattern, –80 dBm.

- 29) Using the volt meter measure “MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz” ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure “MTM GUARD RXP25 AUDIO DISTORTION” <5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure “MTM GUARD RXP25 SQ THRESHOLD dBm” (<-114 dBm)

11.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (10.0 ± 5 watts)

33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (10.0 ± 5 watts)

39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (10.0 ± 2 watts)

45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 112 (155.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)

55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 101 (140.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 102 (145.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 103 (150.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 105 (160.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 106 (165.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 107 (170.125 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (10.0 ± 2 Watts)

Measure HIGH TX POWER CURRENT (<4.5A)

Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)

Measure LOW TX POWER CURRENT (<4.0A)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @ .25Vrms into the TSH-5000 System box Pri Mic input.

56) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 2 Watts)

57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)

58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)

59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (10.0 ± 2 Watts)

62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

11.3 VHF MTM GUARD Category C: Environmental Cold Tests (-30°C)

11.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

11.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 100-200 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (10.0 ± 4.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 500 Hz)

11.4 VHF MTM GUARD Category D: Environmental HOT Tests (+60°C)

11.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 138.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 173.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

11.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to Low TX Power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 4.0 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (3300 ± 500 Hz)

11.5 VHF MTM GUARD Category D: Environmental Vibration Tests

11.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Remove RF until the unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

11.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 104 (155.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (10.0 ± 3 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

11.6 VHF Category E: Final Acceptance Tests

11.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to generate 155.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

Set the COMAN to generate 155.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone AUDIO modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 155.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to generate 155.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

11.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM)

Set the COMAN to Monitor 100-200 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 100 (138.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 101 (140.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 102 (145.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 103 (150.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 104 (155.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 105 (160.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 106 (165.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 107 (170.125 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 108 (173.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (10.0 ± 2 watts)

Tune the C-5000 to Channel 110 (155.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 114 (155.125 MHz NBAND P25)

Set the COMAN to Monitor 100-200 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

12.0 MTM GUARD XTS-5000 UHF LO TESTS

12.1 UHF LO Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 154 (440.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 400-600 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (3.0 ± 1 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARDTXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the UHF Module in the MTM Guard.

12.2 UHF LO Category B: Pre-environmental Tests

12.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 440.125MHz, FM 300 Hz tone, 3kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 440.125MHz, FM 3000 Hz tone, 3kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS.

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Add 1.0 kHz tone modulation.

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM)

Set the COMAN to generate 380.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 15) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 21) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" (2.75 Vrms, $\pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 23) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 24) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure "MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011 Hz pattern, -80 dBm.

- 29) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" <5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

12.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to Monitor 400-500 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (3.0 ± 1 watts)

33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (3.0 ± 1 watts)

39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (3.0 ± 1 watts)

45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 162 (440.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)

55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 151 (390.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 152 (405.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 153 (425.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 155 (450.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 156 (460.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 157 (465.125 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to channel 160 (440.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25Vrms into the TSH-5000 System box Pri Mic input.

- 56) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)
- 57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)
- 58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)
- 59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

- 60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

12.3 UHF LO MTM GUARD Category C: Environmental Cold Tests (-30°C)

12.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 380.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO RESPONSE @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

12.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 300-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 500 Hz)

12.4 UHF LO MTM GUARD Category D: Environmental HOT Tests (+60°C)

12.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 380.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 405.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 469.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

12.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM)

Set the COMAN to Monitor 300-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (3300 ± 500 Hz)

12.5 UHF LO MTM GUARD Category D: Environmental Vibration Tests

12.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

12.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 154 (440.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

12.6 UHF LO Category E: Final Acceptance Tests

12.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to generate 440.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

Set the COMAN to generate 440.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 440.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to generate 440.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

12.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 150 (380.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 151 (390.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 152 (405.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 153 (425.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 154 (440.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 155 (450.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 156 (460.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 157 (465.125 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 158 (469.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 160 (440.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 164 (440.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

13.0 MTM GUARD XTS-5000 UHF HI TESTS

13.1 UHF HI Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

R312 for VHF Tx audio spec

R304 for VHF Rx audio spec

R311 for UHF Tx audio spec

R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 204 (480.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 400-600 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (3.0 ± 1 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARD TXFM DEVIATION @1kHz" deviation reading on the COMAN is $3000 \text{ Hz} \pm 200 \text{ Hz}$ deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the UHF Module in the MTM Guard.

13.2 UHF HI Category B: Pre-environmental Tests

13.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 480.125MHz, FM 300 Hz tone, 3kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 480.125MHz, FM 3000 Hz tone, 3kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS.

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 15) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 21) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" (2.75 Vrms, $\pm$.50 Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 23) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 24) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure "MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011 Hz pattern, -80 dBm.

- 29) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" (1.75 $\pm$.25 Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

13.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to Monitor 400-500 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.
Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

- 32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (3.0 ± 1 watts)
- 33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

- 35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

- 38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (3.0 ± 1 watts)
- 39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

- 41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

- 44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (3.0 ± 1 watts)
- 45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

- 46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

- 47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

- 49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

- 51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

- 52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 212 (480.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

- 54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)
- 55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 201 (455.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 202 (460.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 203 (470.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 205 (490.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 206 (500.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 207 (505.975 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (2.5 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to channel 210 (480.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25Vrms into the TSH-5000 System box Pri Mic input.

- 56) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)
- 57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)
- 58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)
- 59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

- 60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

13.3 UHF HI MTM GUARD Category C: Environmental Cold Tests (-30°C)

13.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz ($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

13.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 500 Hz)

13.4 UHF HI MTM GUARD Category D: Environmental HOT Tests (+60°C)

13.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 450.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 511.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

13.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" ($<5\%$)

Remove audio into the Pri Mic input.

28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (3300 ± 500 Hz)

13.5 UHF HI MTM GUARD Category D: Environmental Vibration Tests

13.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

13.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 204 (480.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

13.6 UHF HI Category E: Final Acceptance Tests

13.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to generate 480.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

Set the COMAN to generate 480.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 480.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to generate 480.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

13.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM)

Set the COMAN to Monitor 400-600 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 200 (450.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 201 (455.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 202 (460.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 203 (470.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 204 (480.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 205 (490.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 206 (500.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 207 (505.975 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 208 (511.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 210 (480.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 214 (480.125 MHz NBAND P25)

Set the COMAN to Monitor 400-600 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (3300 ± 300 Hz)

14.0 MTM GUARD XTS-5000 UHF 800 TESTS

14.1 UHF 800 Category A: Motherboard Setup and Power Calibration Tests

NOTE: When testing dual tanapa radios remove module. Put extender card on the MTM Module and adjust as needed:

- R312 for VHF Tx audio spec
- R304 for VHF Rx audio spec
- R311 for UHF Tx audio spec
- R302 for UHF Rx audio spec

Connect the UUT per Figure 2.0

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to channel 254 (859.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1 on the C5000.

Connect a volt meter and the AUDIO Input of the COMAN to the Headset OUTPUT on the TSH-5000 Serial

- 1) Measure "MTM GUARD RXFM AUDIO OUTPUT" using the voltmeter. Adjust R1003 on the motherboard for a meter reading of $2.75 \pm .25$ Vrms.
- 2) Read CURRENT meter on the power supply and verify "MTM GUARD RXFM STANDBY CURRENT" <2.5 Amps.

Set the COMAN to Monitor; SCAN 800-900 MHz FM, 20 dB attenuator

Set the COMAN to generate a .630 Vpp sine wave at 1 kHz out the MOD OUT port.

Connect MOD OUT port to PRI MIC input the TSH-5000 System Box.

Adjust MOD OUT level on the COMAN until Mic input voltage is $.250 \text{ Vrms} \pm .01 \text{ Vrms}$.

- 3) Transmit and measure "MTM GUARD TXFM HI TX POWER" (3.0 ± 1 Watts).
- 4) Transmit and read the current meter on the power supply and verify "MTM GUARD TXFM CURRENT" (<4.5 Amps).
- 5) Transmit and adjust R123 on the motherboard until the "MTM GUARD TXFM DEVIATION @1kHz" deviation reading on the COMAN is 3000 Hz $\pm$ 200Hz deviation.

NOTE: Perform on each Tanapa upon first pass of system test.

This completes Motherboard setup for the UHF Module in the MTM Guard.

14.2 UHF 800 Category B: Pre-environmental Tests

14.2.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 254 (859.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone modulation, 3 kHz deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the AUDIO Input on the COMAN to the Headset output on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 859.125MHz, FM 300 Hz tone, 3kHz Deviation, -80 dBm.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 859.125MHz, FM 3000 Hz tone, 3kHz Deviation, -80 dBm.

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Set the COMAN to measure AC VOLTS.

Remove 1.0 kHz tone Audio modulation.

- 5) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 6) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD (< 50 mVrms)

Increase RF until the unit unsquelches.

- 7) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5 uV signal level.

- 8) Measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM)

Set the COMAN to generate 764.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion

- 10) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 12) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the unit unsquelches.

- 13) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 14) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 258 (868.975 MHz SBAND FM)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

- 15) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .50$ Vrms)

Set the COMAN to measure Distortion.

- 16) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 17) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Lower RF input level until the unit squelches (No AUDIO and squelch light goes out).

- 18) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase RF level until the radio unsquelches

- 19) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV signal level.

- 20) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 21) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" (2.75 Vrms $\pm$.50 Vrms)

Set the COMAN to measure Distortion.

- 22) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 23) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @300 Hz" (>4 Vrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

- 24) Using the volt meter measure "MTM GUARD AUDIO OUTPUT @3000 Hz" (<1 Vrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Remove the 1.0 kHz tone modulation.

- 25) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No AUDIO and squelch light goes out).

- 26) Using the volt meter measure MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD

Increase the RF input signal until the unit unsquelches.

- 27) Using the COMAN measure "MTM GUARD MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5 uV signal level.

- 28) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011 Hz pattern, -80 dBm.

- 29) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" (1.75 $\pm$.25 Vrms)

Set the COMAN to measure Distortion.

- 30) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" <5%)

Lower RF level until the radio squelches.

Increase RF level until the radio unsquelches.

- 31) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

14.2.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 254 (812.125 MHz SBAND MHz)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.
Connect the MOD OUT to the Sinad/Dist input jack on the COMAN.

Set the input Power Supply voltage to 22.0 V.

- 32) Transmit and Measure "MTM GUARD TXFM HI POWER @22.0V" (3.0 ± 1 watts)
- 33) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 34) Transmit and Measure "MTM GUARD TXFM LO POWER @22.0V" ($1.0 \pm .2$ watts)

Change to HIGH TX POWER

- 35) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 36) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 37) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 33.0 V.

- 38) Transmit and Measure "MTM GUARD TXFM HI POWER @33.0V" (3.0 ± 1 watts)
- 39) Transmit and Measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Press the Edit button on the C5000 and change to low transmit power.

- 40) Transmit and Measure "MTM GUARD TXFM LO POWER @33.0 V" ($1.0 \pm .2$ watts)

Set the channel back to high transmit power

- 41) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 42) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 43) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Set the input Power Supply voltage to 27.5 V.

- 44) Transmit and measure "MTM GUARD TXFM HI POWER @27.5 V" (3.0 ± 1 watts)
- 45) Transmit and measure "MTM GUARD TXFM CURRENT" (<4.5 Amps)

Change the channel to low transmit power.

- 46) Transmit and measure "MTM GUARD TXFM LO POWER @27.5 V" ($1.0 \pm .2$ watts)

Change to high transmit power

- 47) Transmit and measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)
- 48) Transmit and measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Remove AUDIO into the Pri Mic input.

- 49) Transmit and measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Set the COMAN to inject a 300 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 50) Transmit and measure "MTM GUARD TXFM SBAND 300 Hz DEVIATION" (<1000Hz).

Set the COMAN to inject a 1000 Hz tone into the TSH-5000 System box Pri Mic input.

Transmit and adjust input amplitude of tone until deviation is 1000 Hz.

Set the COMAN to 2500 Hz.

- 51) Transmit and measure transmit deviation. "MTM GUARD TXFM SBAND 3000 Hz DEVIATION" (>2000Hz)

Increase input tone amplitude to .795 Vpp.

- 52) Transmit and Measure "MTM GUARD TXFM SBAND MOD LMT" (<5100 kHz).

Set the COMAN to inject a 3500 Hz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 53) Transmit and Measure "MTM GUARD TXFM SBAND MOD FLT" (<1000 Hz).

Tune the C-5000 to channel 262 (812.125 MHz SBAND FM)

Remove 1.0 kHz tone modulation.

- 54) Transmit and measure "MTM GUARD TXFM SBAND TONE DEVIATION" (500 to 1000 Hz)
- 55) Transmit and measure "MTM GUARD TX POWER AND TX CURRENT" as follows:

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM) (A)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 251 (807.125 MHz SBAND FM) (B)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 252 (808.125 MHz SBAND FM) (C)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 253 (810.125 MHz SBAND FM) (D)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 254 (812.125 MHz SBAND FM) (E)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 255 (814.125 MHz SBAND FM) (F)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 256 (816.125 MHz SBAND FM) (G)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 257 (818.125 MHz SBAND FM) (H)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM) (I)

Measure HIGH TX POWER OUTPUT (3.0 ± 1 Watts)
Measure HIGH TX POWER CURRENT ($<4.5A$)
Measure LOW TX POWER OUTPUT ($1.0 \pm .2$ Watts)
Measure LOW TX POWER CURRENT ($<4.0A$)

Tune the C-5000 to channel 260 (812.125 MHz NBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @ .25Vrms into the TSH-5000 System box Pri Mic input.

- 56) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)
- 57) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .2$ Watts)
- 58) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 100 Hz)
- 59) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" ($<5\%$)

Remove AUDIO into the Pri Mic input.

- 60) Transmit and Measure "MTM GUARD TXFM NBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

- 61) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1 Watts)
- 62) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (2700 ± 300 Hz)

14.3 UHF 800 MTM GUARD Category C: Environmental Cold Tests (-30°C)

14.3.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 764.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a volt meter and the AUDIO Input on the COMAN to the Headset OUTPUT on the TSH-5000 Serial.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 to 16 dB)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD" @.6uV (>12 dB)

Tune the C-5000 to Channel 258 (868.975 MHz SBAND FM)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce the input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD AUDIO RESPONSE @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120dB RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6 uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure MTM GUARD RXP25 NBAND AUDIO OUTPUT @1kHz ($1.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 17) Using the COMAN measure "MTM GUARD RXP25 NBAND AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No AUDIO and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dB)

14.3.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM)

Set the COMAN to Monitor; Scan 700-900 MHz, FM, 20 dB attenuation.

Inject the MOD OUT AUDIO of the COMAN into the Sinad/Dist input of the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change back to high transmit power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 23) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM)

Set the COMAN to Monitor; Scan 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to high transmit power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio going into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 260 (812.125 MHz NBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .5$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXP25 HI POWER" (3.0 ± 1.0 Watts)

34) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (2700 ± 500 Hz)

14.4 UHF 800 MTM GUARD Category D: Environmental HOT Tests (+60°C)

14.4.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM)

Press the TEST button and verify the Receive indicator lights.

Set the COMAN to generate 764.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the RF input level until the unit unsquelches.

- 4) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 851.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 5) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 258 (868.975 MHz SBAND FM)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 6) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 7) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone AUDIO modulation.

- 8) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF level until the unit unsquelches.

- 9) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16dB)

Set the COMAN to generate 868.975 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 10) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 11) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 12) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 13) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, -120db RF level.

Set the COMAN to measure SINAD.

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase the input RF until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (>10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .6uV.

Press the "TEST" button on the C-5000.

- 15) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.6uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011 pattern, -80 dBm.

Verify the Receive indicator lights for Radio #1.

- 16) Using the volt meter measure "MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz" ($1.75 \pm .5$ Vrms)

Set the COMAN to measure distortion

- 17) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce input RF until the unit squelches (No audio and squelch light goes out).

Increase input RF until the unit unsquelches.

- 18) Measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114dBm)

14.4.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM)

Set the COMAN to Monitor 700-900 MHz, FM, 20 dB attenuation.

Inject the MOD OUT port on the COMAN into the Sinad/Dist port on the COMAN.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 19) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 20) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000

- 21) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 22) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 23) Transmit and using the voltmeter measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

- 24) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to Low TX Power on the C-5000.

- 25) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change back to High TX Power on the C-5000.

- 26) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 27) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove audio into the Pri Mic input.

- 28) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 260 (812.125 MHz NBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

29) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)

Change to low transmit power.

30) Transmit and Measure "MTM GUARD TXFM LO POWER" ($1.0 \pm .3$ watts)

Change to High transmit power.

31) Transmit and Measure "MTM GUARD TXFM NBAND MIC DEVIATION" (1500 ± 400 Hz)

Set the COMAN to measure Distortion.

32) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

33) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 Watts)

34) Transmit and Measure "MTM GUARD TXFM NBAND DEVIATION" (2700 ± 500 Hz)

14.5 UHF 800 MTM GUARD Category D: Environmental Vibration Tests

14.5.1 RECEIVER TESTS

Mount radio on the vibration table. Set the vibration machine frequency to produce a vibration acceleration of 2g on the radio, or until a quarter starts to walk.

Tune the C-5000 to Channel 254 (859.125 MHz SBAND FM)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect a voltmeter and the SINAD/DISTORTION input on the COMAN to the Headset output on the TSH-5000 Serial Box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz" ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove the 1.0 kHz tone audio modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<200 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until unit squelches (no audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (<100 mVrms)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .6uV.

Set the COMAN to measure SINAD.

Press the "TEST" button on the C-5000.

- 5) Measure "MTM GUARD RXFM SBAND SINAD @.6uV" (>12 dB)

14.5.2 TRANSMITTER TESTS

Tune the C-5000 to channel 254 (812.125 MHz SBAND FM)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Inject the COMAD MOD OUT audio into the SINAD/DISTORTION port of the COMAN.

Set the COMAN to inject a 1Khz tone @ .25 Vrms into the TSH-5000 System box Pri Mic input.

- 6) Transmit and Measure "MTM GUARD TXFM HI POWER" (3.0 ± 1 watts)
- 7) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 400 Hz)

Set the COMAN to measure Distortion.

- 8) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove the audio going into the Pri Mic input.

- 9) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<200 Hz).

14.6 UHF 800 Category E: Final Acceptance Tests

14.6.1 RECEIVER TESTS

Connect the UUT per Figure 2.0.

Turn on the DC power supply (verify it is set to 27.5 volts) and allow the system to initialize.

Press the TEST button and verify the receive indicator lights for Radio #1.

Tune the C-5000 to Channel 254 (859.125 MHz SBAND FM)

Set the COMAN to generate 859.125 MHz, FM, 1.0 kHz tone modulation, 3 kHz Deviation, -80 dBm.

Verify the Receive indicator lights for Radio #1.

Connect the volt meter and audio input on the COMAN to the Headset output on the TSH-5000 Serial box.

- 1) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion

- 2) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 3) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Remove RF until the unit squelches (No audio and squelch light goes out).

- 4) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N SQLCHD" (< 50 mVrms)

Set the COMAN to measure SINAD.

Increase the RF input level until the unit unsquelches.

- 5) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 3 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 6) Using the COMAN measure "MTM GUARD RXFM SBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 260 (859.125 MHz NBAND FM)

Set the COMAN to generate 859.125 MHz, FM, 1.0 kHz tone modulation, 1.5 kHz Deviation, -80 dBm.

- 7) Using the volt meter measure "MTM GUARD RXFM AUDIO OUTPUT @1000 Hz ($2.75 \pm .5$ Vrms)

Set the COMAN to measure Distortion.

- 8) Using the COMAN measure "MTM GUARD RXFM AUDIO DISTORTION" (<5%)

Remove 1.0 kHz tone modulation.

- 9) Using the volt meter measure "MTM GUARD RXFM AUDIO H&N UNSQLCHD" (<100 mVrms)

Add 1.0 kHz tone modulation.

Set the COMAN to measure SINAD.

Remove RF until the unit squelches (No audio and squelch light goes out).

Increase RF level until the unit unsquelches.

- 10) Using the COMAN measure "MTM GUARD RXFM SQ THRESHOLD SINAD" (10 - 16 dB)

Set the COMAN to generate 859.125 MHz, FM 1.0 kHz tone, 1.5 kHz Deviation, .5uV.

Press "TEST" button on the C-5000.

- 11) Using the COMAN measure "MTM GUARD RXFM NBAND SINAD @.5uV" (>12 dB)

Tune the C-5000 to Channel 264 (859.125 MHz NBAND P25)

Set the COMAN to generate 859.125 MHz, P25 1011Hz pattern, -80 dBm.

- 12) Using the volt meter measure MTM GUARD RXP25 AUDIO OUTPUT @1000 Hz ($1.75 \pm .25$ Vrms)

Set the COMAN to measure Distortion.

- 13) Using the COMAN measure "MTM GUARD RXP25 AUDIO DISTORTION" (<5%)

Reduce RF input level until the unit squelches.

Increase RF input level until the unit unsquelches.

- 14) Using the COMAN measure "MTM GUARD RXP25 SQ THRESHOLD dBm" (<-114 dBm)

14.6.2 TRANSMITTER TESTS

Tune the C-5000 to Channel 254 (812.125 MHz FM SBAND)

Set the COMAN to Monitor 800-900 MHz, FM, 20 dB attenuation.

Set the COMAN to inject a 1Khz tone @.25 Vrms into the TSH-5000 System box Pri Mic input.

Inject the MOD OUT of the COMAN into the SINAD/DISTORTION port on the COMAN.

- 15) Transmit and Measure "MTM GUARD TXFM SBAND MIC DEVIATION" (3000 ± 200 Hz)

Set the COMAN to measure Distortion.

- 16) Transmit and Measure "MTM GUARD TXFM SBAND AUDIO DISTORTION" (<5%)

Remove AUDIO into the Pri Mic input.

- 17) Transmit and Measure "MTM GUARD TXFM SBAND H&N" (<100 Hz).

Tune the C-5000 to Channel 250 (764.125 MHz SBAND FM) (A)

- 18) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 251 (807.125 MHz SBAND FM) (B)

- 19) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 252 (808.125 MHz SBAND FM) (C)

- 20) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 253 (810.125 MHz SBAND FM) (D)

- 21) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 254 (812.125 MHz SBAND FM) (E)

- 22) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 255 (814.125 MHz SBAND FM) (F)

- 23) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 256 (816.125 MHz SBAND FM) (G)

- 24) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 257 (818.125 MHz SBAND FM) (H)

- 25) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 258 (823.975 MHz SBAND FM) (I)

- 26) Transmit and Measure MTM GUARD TXFM HI POWER (3.0 ± 1 watts)

Tune the C-5000 to Channel 260 (812.125 MHz NBAND FM)

- 27) Transmit and Measure MTM GUARD TXFM NBAND MIC DEVIATION (1500 ± 200 Hz)

Set the COMAN to measure Distortion.

- 28) Transmit and Measure "MTM GUARD TXFM NBAND AUDIO DISTORTION" (<5%)

Tune the C-5000 to Channel 264 (812.125 MHz NBAND P25)

Set the COMAN to Monitor 800-900 MHz, P25, 20 dB attenuation.

- 29) Transmit and Measure "MTM GUARD TXP25 NBAND DEVIATION" (2700 ± 300 Hz)

15.0 MTM GUARD XTS-5000 TEST DATA SHEETS

RT-5000 MTM Guard Test Data Sheet - VHF

MTN # _____ Tester: _____ Start Date: _____

11.1 Category A: Motherboard setup and Power Calibration Tests

VHF MODULE Test Frequency: Mid Band

- | | | |
|--------------------------------------|-------|-------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT | _____ | (2.75 ± .25 Vrms) |
| 2) MTM GUARD RXFM STANDBY CURRENT | _____ | (<2.5 Amps) |
| 3) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 2 Watts) |
| 4) MTM GUARD TXFM CURRENT | _____ | (<4.5 Amps Max) |
| 5) MTM GUARD TXFM DEVIATION @1000 Hz | _____ | (3000 ± 200 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - Pre-environmental Tests 1

11.2 Category B: Pre-environmental Tests

VHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (<5%) |
| 3) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (>4 Vrms) |
| 4) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 5) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 6) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (<50 mVrms) |
| 7) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 8) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-------------------|
| 9) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 10) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 11) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 12) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 13) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 14) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|-------------------|
| 15) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 16) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 18) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 19) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 20) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|-------------------|
| 21) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 22) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (> 4 Vrms) |
| 24) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 25) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 26) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 27) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 28) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|--|-------|-------------------|
| 29) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 30) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 31) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

RT-5000 VHF MTM Guard Test Data Sheet - Pre-environmental Tests 2

11.2 Category B: Pre-environmental Tests

VHF Transmitter:

Test Frequency: Mid Band @22.0V

32) MTM GUARD TXFM HI POWER @22.0V	_____	(10.0 $\pm$ 5.0 Watts)
33) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
34) MTM GUARD TXFM LO POWER @22.0V	_____	(1.0 $\pm$.2 Watts)
35) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 $\pm$ 200 Hz)
36) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
37) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band @33.0V

38) MTM GUARD TXFM HI POWER @33.0V	_____	(10.0 $\pm$ 5.0 Watts)
39) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
40) MTM GUARD TXFM LO POWER @33.0V	_____	(1.0 $\pm$.2 Watts)
41) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 $\pm$ 200 Hz)
42) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
43) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band @27.5V

44) MTM GUARD TXFM HI POWER @27.5V	_____	(10.0 $\pm$ 2.0 Watts)
45) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
46) MTM GUARD TXFM LO POWER @27.5V	_____	(1.0 $\pm$.2 Watts)
47) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 $\pm$ 200 Hz)
48) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)
49) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
50) MTM GUARD TXFM SBAND 300 Hz DEVIATION	_____	(<1000 Hz)
51) MTM GUARD TXFM SBAND 3000 Hz DEVIATION	_____	(>2000 Hz)
52) MTM GUARD TXFM SBAND MOD LMT	_____	(<5100 Hz) *Input tone is @2500 Hz and >.795 Vrms
53) MTM GUARD TXFM SBAND MOD FLT	_____	(<1000 Hz) *Input tone is @3500 Hz and .25Vrms Mic input
54) MTM GUARD TXFM SBAND TONE DEVIATION	_____	(500 to 1000 Hz) *No input modulation

55) 55)

MTM GUARD TX Frequency	HIGH TX POWER (10.0 $\pm$ 2 Watts)	HIGH TX POWER CURRENT (<4.5A)	LOW TX POWER (1.0 $\pm$.2 Watts)	LOW TX POWER CURRENT (<4.0A)
A				
B				
C				
D				
E				
F				
G				
H				
I				

Test Frequency: Mid Band NBAND

56) MTM GUARD TXFM HI POWER	_____	(10.0 $\pm$ 2.0 Watts)
57) MTM GUARD TXFM LO POWER	_____	(1.0 $\pm$.2 Watts)
58) MTM GUARD TXFM NBAND MIC DEVIATION	_____	(1500 $\pm$ 100 Hz)
59) MTM GUARD TXFM NBAND AUDIO DISTORTION	_____	(<5%)
60) MTM GUARD TXFM NBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band P25 NBAND

61) MTM GUARD TXP25 HI POWER	_____	(10.0 $\pm$ 2.0 Watts)
62) MTM GUARD TXP25 NBAND DEVIATION	_____	(3300 $\pm$ 300 Hz)

RT-5000 VHF MTM Guard Test Data Sheet - COLD Environmental Tests**11.3 Category C: COLD Environmental Tests (-30°C)****VHF Receiver:****Test Frequency: FM Low Band Edge (25 kHz Standard Band FM Channel)**

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (> 12 dB) |

Test Frequency: FM High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|-------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75, ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (<-114 dBm) |

VHF Transmitter:**Test Frequency: Low Band FM SBAND**

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: High Band FM SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-------|------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (10.0 ± 4 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 ± 500 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - HOT Environmental Tests**11.4 Category D: HOT Environmental Tests (+60°C)****VHF Receiver:****Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)**

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCH | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

VHF Transmitter:**Test Frequency: Low Band SBAND**

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: High Band SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 4 Watts) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-------|------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (10.0 ± 4 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 ± 500 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - Vibration Tests

11.5 Category E: Vibration Tests

VHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-----------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | ($2.75 \pm .5$ Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 200 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 100 mVrms) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

VHF Transmitter:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-----------------------|
| 6) MTM GUARD TXFM HI POWER | _____ | (10.0 ± 3 Watts) |
| 7) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 8) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD TXFM SBAND H&N | _____ | (< 200 Hz) |

RT-5000 VHF MTM Guard Test Data Sheet - Final Tests**11.6 Category F: Final Tests****VHF Receiver:****Test Frequency: Mid Band (25 kHz Standard Band FM Channel)**

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (<100 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 5) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 6) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|-------------------|
| 7) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75, ± .5 Vrms) |
| 8) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 10) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 11) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (P25 Channel 1011 pattern)

- | | | |
|--|-------|-------------------|
| 12) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 13) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 14) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (-114 dBm) |

VHF Transmitter:**Test Frequency: Mid Band SBAND**

- | | | |
|---|-------|-----------------|
| 15) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 200 Hz) |
| 16) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD TXFM SBAND H&N | _____ | (< 100 Hz) |

MTM GUARD TX Frequency	HI TX POWER (10.0±2.0 Watts)
18) A	
19) B	
20) C	
21) D	
22) E	
23) F	
24) G	
25) H	
26) I	

Test Frequency: Mid Band NBAND

- | | | |
|---|-------|-----------------|
| 27) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 200 Hz) |
| 28) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (< 5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-------|-----------------|
| 29) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 ± 300 Hz) |
|-------------------------------------|-------|-----------------|

RT-5000 MTM Guard Test Data Sheet - UHF

MTN # _____ Tester: _____ Start Date: _____

12.1/13.1/14.1 Category A: Motherboard setup and Power Calibration Tests

UHF MODULE Test Frequency: Mid Band

- | | | |
|--------------------------------------|-------|--------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT | _____ | (2.75 ± .25 Vrms) |
| 2) MTM GUARD RXFM STANDBY CURRENT | _____ | (<2.5 Amps) |
| 3) MTM GUARD TXFM HIGH POWER | _____ | (3.0 ± 1 Watts) |
| 4) MTM GUARD TXFM CURRENT | _____ | (<4.5 Amps Max) |
| 5) MTM GUARD TXFM DEVIATION @1000 Hz | _____ | (3000 Hz ± 200 Hz) |

RT-5000 UHF MTM Guard Test Data Sheet - Pre-environmental Tests 1

12.2/13.2/14.2 Category B: Pre-environmental Tests – Page 1

UHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (<5%) |
| 3) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (>4 Vrms) |
| 4) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 5) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 6) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (<50 mVrms) |
| 7) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 8) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-------------------|
| 9) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 10) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 11) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 12) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 13) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 14) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|---|-------|-------------------|
| 15) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 16) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 18) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 19) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 20) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|-------------------|
| 21) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .50 Vrms) |
| 22) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD RXFM AUDIO OUTPUT @300 Hz | _____ | (> 4 Vrms) |
| 24) MTM GUARD RXFM AUDIO OUTPUT @3000 Hz | _____ | (< 1 Vrms) |
| 25) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 26) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 27) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 28) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (> 12 dB) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|--|-------|-------------------|
| 29) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 30) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 31) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

RT-5000 UHF MTM Guard Test Data Sheet - Pre-environmental Tests 2**12.2/13.2/14.2 Category B: Pre-environmental Tests – Page 2****UHF Transmitter:****Test Frequency: Mid Band @22.0V**

32) MTM GUARD TXFM HI POWER @22.0V	_____	(3.0 ± 1.0 Watt)
33) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
34) MTM GUARD TXFM LO POWER @22.0V	_____	(1.0 ± .2 Watts)
35) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 ± 200 Hz)
36) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
37) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band @33.0V

38) MTM GUARD TXFM HI POWER @33.0V	_____	(3.0 ± 1.0 Watt)
39) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
40) MTM GUARD TXFM LO POWER @33.0V	_____	(1.0 ± .2 Watts)
41) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 ± 200 Hz)
42) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
43) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band @27.5V

44) MTM GUARD TXFM HI POWER @27.5V	_____	(3.0 ± 1.0 Watt)
45) MTM GUARD TXFM CURRENT	_____	(< 4.5 Amps)
46) MTM GUARD TXFM LO POWER @27.5V	_____	(1.0 ± .2 Watts)
47) MTM GUARD TXFM SBAND MIC DEVIATION	_____	(3000 ± 200 Hz)
48) MTM GUARD TXFM SBAND H&N	_____	(<100 Hz)
49) MTM GUARD TXFM SBAND AUDIO DISTORTION	_____	(<5%)
50) MTM GUARD TXFM SBAND 300 Hz DEVIATION	_____	(<1000 Hz)
51) MTM GUARD TXFM SBAND 3000 Hz DEVIATION	_____	(>2000 Hz)
52) MTM GUARD TXFM SBAND MOD LMT	_____	(<5100 Hz) *Input tone is @2500 Hz and >.795 Vrms
53) MTM GUARD TXFM SBAND MOD FLT	_____	(<1000 Hz) *Input tone is @3500 Hz and .25Vrms Mic input
54) MTM GUARD TXFM SBAND TONE DEVIATION	_____	(500 to 1000 Hz) *No input modulation

55)

MTM GUARD TX Frequency	HIGH TX POWER (3.0±1 Watts)	HIGH TX POWER CURRENT (<4.5A)	LOW TX POWER (1.0±.2 Watts)	LOW TX POWER CURRENT (<4.0A)
A				
B				
C				
D				
E				
F				
G				
H				
I				

Test Frequency: Mid Band NBAND

56) MTM GUARD TXFM HI POWER	_____	(3.0 ± 1.0 Watts)
57) MTM GUARD TXFM LO POWER	_____	(1.0 ± .2 Watts)
58) MTM GUARD TXFM NBAND MIC DEVIATION	_____	(1500 ± 100 Hz)
59) MTM GUARD TXFM NBAND AUDIO DISTORTION	_____	(<5%)
60) MTM GUARD TXFM NBAND H&N	_____	(<100 Hz)

Test Frequency: Mid Band P25 NBAND

61) MTM GUARD TXP25 HI POWER	_____	(3.0 ± 1.0 Watts)
62) MTM GUARD TXP25 NBAND DEVIATION	_____	(3300 Hz ± 300 Hz for 7.2 / 8.2)
OR	_____	(2700 Hz ± 300 Hz for 9.2)

RT-5000 UHF MTM Guard Test Data Sheet - COLD Environmental Tests
12.3/13.3/14.3 Category C: COLD Environmental Tests (-30°C)

UHF Receiver:

Test Frequency: FM Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (> 12 dB) |

Test Frequency: FM High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: FM Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (<-114 dBm) |

UHF Transmitter:

Test Frequency: FM Low Band SBAND

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .5 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: FM High Band SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .5 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (<5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watts) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .5 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-----------|----------------------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (3.0 ± 1 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 Hz ± 500 Hz for 7.3 / 8.3) |
| | OR | _____ (2700 Hz ± 500 Hz for 9.3) |

RT-5000 UHF MTM Guard Test Data Sheet - HOT Environmental Tests
12.4/13.4/14.4 Category D: HOT Environmental Tests (+60°C)

UHF Receiver:

Test Frequency: Low Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 4) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: High Band Edge (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 6) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 7) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 8) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 9) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 10) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|---|-------|------------------|
| 11) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 12) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 13) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 14) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 15) MTM GUARD RXFM NBAND SINAD @.6uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz P25 Channel)

- | | | |
|--|-------|------------------|
| 16) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .5 Vrms) |
| 17) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 18) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (< -114 dBm) |

UHF Transmitter:

Test Frequency: Low Band SBAND

- | | | |
|---|-------|------------------|
| 19) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 20) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 21) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 22) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 23) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: High Band SBAND

- | | | |
|---|-------|------------------|
| 24) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watts) |
| 25) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 26) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 27) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 28) MTM GUARD TXFM SBAND H&N | _____ | (<100 Hz) |

Test Frequency: Mid Band FM NBAND

- | | | |
|---|-------|------------------|
| 29) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watt) |
| 30) MTM GUARD TXFM LO POWER | _____ | (1.0 ± .3 Watts) |
| 31) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 400 Hz) |
| 32) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (<5%) |

Test Frequency: Mid Band P25 NBAND

- | | | |
|-------------------------------------|-----------|----------------------------------|
| 33) MTM GUARD TXP25 HI POWER | _____ | (3.0 ± 1 Watts) |
| 34) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 Hz ± 500 Hz for 7.4 / 8.4) |
| | OR | _____ (2700 Hz ± 500 Hz for 9.4) |

RT-5000 UHF MTM Guard Test Data Sheet - Vibration Tests
12.5/13.5/14.5 Category E: Vibration Tests

UHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 200 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 100 mVrms) |
| 5) MTM GUARD RXFM SBAND SINAD @.6uV | _____ | (>12 dB) |

UHF Transmitter:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|-----------------|
| 6) MTM GUARD TXFM HI POWER | _____ | (3.0 ± 1 Watts) |
| 7) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 400 Hz) |
| 8) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD TXFM SBAND H&N | _____ | (< 200 Hz) |

RT-5000 UHF MTM Guard Test Data Sheet - Final Tests
12.6/13.6/14.6 Category F: Final Tests

UHF Receiver:

Test Frequency: Mid Band (25 kHz Standard Band FM Channel)

- | | | |
|--|-------|------------------|
| 1) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 2) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 3) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (<100 mVrms) |
| 4) MTM GUARD RXFM AUDIO H&N SQLCHD | _____ | (< 50 mVrms) |
| 5) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 6) MTM GUARD RXFM SBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (12.5 kHz Narrow Band FM Channel)

- | | | |
|--|-------|------------------|
| 7) MTM GUARD RXFM AUDIO OUTPUT @1000Hz | _____ | (2.75 ± .5 Vrms) |
| 8) MTM GUARD RXFM AUDIO DISTORTION | _____ | (< 5%) |
| 9) MTM GUARD RXFM AUDIO H&N UNSQLCHD | _____ | (< 100 mVrms) |
| 10) MTM GUARD RXFM SQ THRESHOLD SINAD | _____ | (10 – 16 dB) |
| 11) MTM GUARD RXFM NBAND SINAD @.5uV | _____ | (>12 dB) |

Test Frequency: Mid Band (P25 Channel 1011 pattern)

- | | | |
|--|-------|-------------------|
| 12) MTM GUARD RXP25 AUDIO OUTPUT @1000Hz | _____ | (1.75 ± .25 Vrms) |
| 13) MTM GUARD RXP25 AUDIO DISTORTION | _____ | (< 5%) |
| 14) MTM GUARD RXP25 SQ THRESHOLD dBm | _____ | (-114 dBm) |

UHF Transmitter:

Test Frequency: Mid Band SBAND

- | | | |
|---|-------|-----------------|
| 15) MTM GUARD TXFM SBAND MIC DEVIATION | _____ | (3000 ± 200 Hz) |
| 16) MTM GUARD TXFM SBAND AUDIO DISTORTION | _____ | (< 5%) |
| 17) MTM GUARD TXFM SBAND H&N | _____ | (< 100 Hz) |

MTM GUARD TX Frequency	HI TX POWER (3.0±1.0 Watts)
18) A	
19) B	
20) C	
21) D	
22) E	
23) F	
24) G	
25) H	
26) I	

Test Frequency: Mid Band NBAND FM

- | | | |
|---|-------|-----------------|
| 27) MTM GUARD TXFM NBAND MIC DEVIATION | _____ | (1500 ± 200 Hz) |
| 28) MTM GUARD TXFM NBAND AUDIO DISTORTION | _____ | (< 5%) |

Test Frequency: Mid Band NBAND P25

- | | | |
|-------------------------------------|-----------------|----------------------------------|
| 29) MTM GUARD TXP25 NBAND DEVIATION | _____ | (3300 Hz ± 300 Hz for 7.6 / 8.6) |
| | OR _____ | (2700 Hz ± 500 Hz for 9.6) |