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SUPPLEMENTAL ACCEPTANCE TEST PROCEDURE

Receiving Antenna Multicoupler

AMC-8/16/32 and LMC-8/16/32 Series

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1.0 Introduction

The TMC Series of AMC and LMC Receiving Antenna Multicouplers are broadbanded antenna-to-receiver coupling devices which permit the simultaneous use of eight, sixteen or thirty-two communications receivers from a single antenna input. The multicouplers are capable of working with any receiver operating in the LF/MF range (LMC series) or the MF/HF range (AMC series).

This supplemental acceptance test procedure is a subset of the Final Product Control procedure outlined in the TMC Quality Asssurance Manual (QAM), Section 11-4ff. It is used in conjunction with TMC final acceptance test procedure S-1269, as amended. The procedure insures that outgoing products are in full conformance with all of the customer's requirements. The numerous tests and inspection procedures followed during the manufacturing process on both components and sub-assemblies of the multicouplers were performed in conformance with MIL-Q-9858, as amended and incorporated in the QAM. Reference to the QAM should be made in delineating these prior tests.

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2.0 Procedure A: Initialization and Set Up

2.0.1 The multicouplers operate from a 115VAC, 50/60Hz power source with the input protected by two 0.5A fuses on each side of the line. Before applying power to the unit under test, make sure the fuses are firmly inserted in the front panel fuseholders. The front panel power toggle switch should be in the OFF (down) position.

2.0.2 Connect the primary power to the unit by plugging the power cable assembly provided into the power input connector socket on the rear panel. No further set-up is necessary to bring the multicouplers to a satisfactory readiness level.

2.0.3 Apply power to the unit by switching the front panel toggle switch to the ON (up) position. A steady incandescent lamp on the front panel indicates the successful application of primary power. Follow each step of this procedure in sequence, ending with the disconnect of the equipment as stated in Procedure E.

2.0.4 RF input/output connections are made at the rear panel to the female connectors on the chassis. No damage will result to the multicoupler if connections are made while power is applied although it is good practice to turn the unit off before making any adjustments. The RF input/output connections are made with a twisting or clockwise screwing motion depending on the type of output connector provided.

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2.1 Procedure B: Noise Figure

2.1.1 Performance Criteria

Less than 7dB over the frequency range of 2.0 to 30MHz for the AMC Series and 10KHz to 1.8MHz for the LMC.

2.1.2 Test Set-up Schematic - See Figure 2.0.

2.1.3 Test equipment

2.1.3.1 Random Noise Generator - 1 unit required
(Schematic reference A/Item 5 in Section 3.0)

2.1.3.2 RMS Voltmeter - 1 unit required
(Schematic reference C/Item 8 in Section 3.0)

2.1.3.3 Communications Receiver - 1 unit required
(Schematic reference B/Item 3 in Section 3.0)

2.1.4 Test Procedure

2.1.4.1 Connect the equipment as in Figure 2.0.

2.1.4.2 Set SW switch to position 1 and measure the noise figure of the receiver at 500KHz (LMC Series) or 10MHz (AMC Series). It should be less than 7dB. Record this reading in milliamperes as indicated on the noise generator meter and mark this as F_r.

2.1.4.3 Set switch to position 2. Note the voltmeter reading and gradually increase the output of the generator until this reading increases 3dB. Record this reading in milliamperes as indicated on the noise generator and mark this as F_o.

2.1.4.4 Calculate noise figure (NF) as follows:

$$NF = 10 \log_{10}[(F_o - F_r - 1)/G_m]$$

where G_m is the multicoupler gain in dB.

2.1.4.5 Repeat test for all channels.

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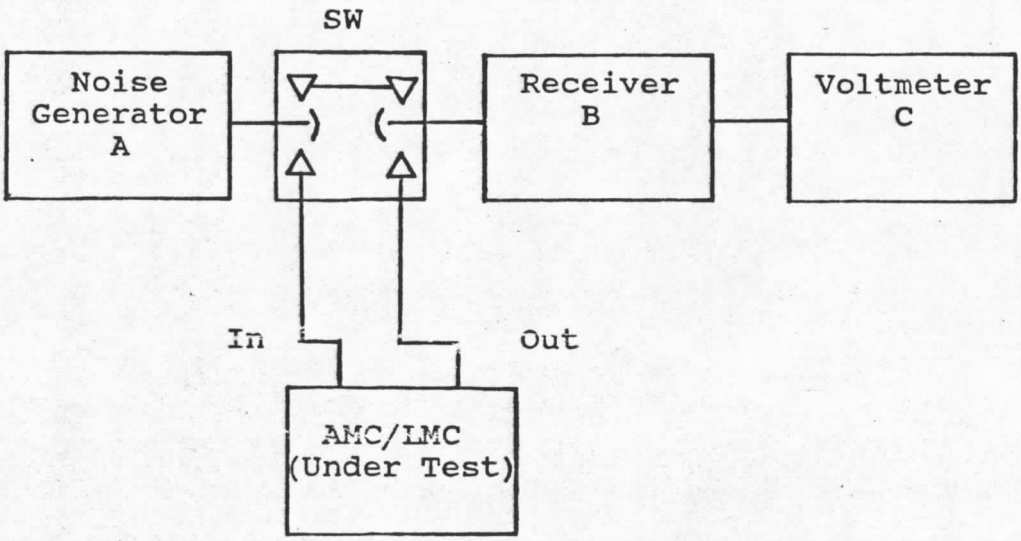
TEST SET-UP FOR PROCEDURE B

Noise Figure

Figure 2.0



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2.2 Procedure C: Phase Between Outputs

2.2.1 Performance Criteria

The phase shift between outputs shall be +/- 1.0 degree maximum over the frequency range 2 to 30MHz for the AMC Series and 10KHz to 1.8MHz for the LMC Series.

2.2.2 Test Set-up Schematic - See Figure 2.1.

2.2.3 Test Equipment

2.2.3.1 Signal Generator - 1 unit required
(Schematic reference A/Item 6A in Section 3.0)

2.2.3.2 Vector Voltmeter - 1 unit required
(Schematic reference C/Item 7 in Section 3.0)

2.2.3.3 Step Attenuator - 1 unit required
(Schematic reference B/Item 4 in Section 3.0)

2.2.4 Test Procedure

2.2.4.1 Connect the equipment as in Figure 2.1. Note that the coaxial cables to the voltmeter should be cut to equal lengths of about six (6) inches and phase-correlated to within +/- 0.1° at any frequency in the 10KHz to 1.8MHz range for the LMC Series and 2 to 30MHz for the AMC Series.

2.2.4.2 Adjust the signal generator to 1.8MHz (LMC Series) or 32MHz (AMC Series) at an amplitude sufficient to register on the "A" probe of the voltmeter.

2.2.4.3 Note the phase difference between multicoupler outputs #1 and #4 on the voltmeter (Note: Offset phase meter to obtain 0.1° resolution) and outputs #5 and #8.

2.2.4.4 Record these readings on the Test Data Sheet.

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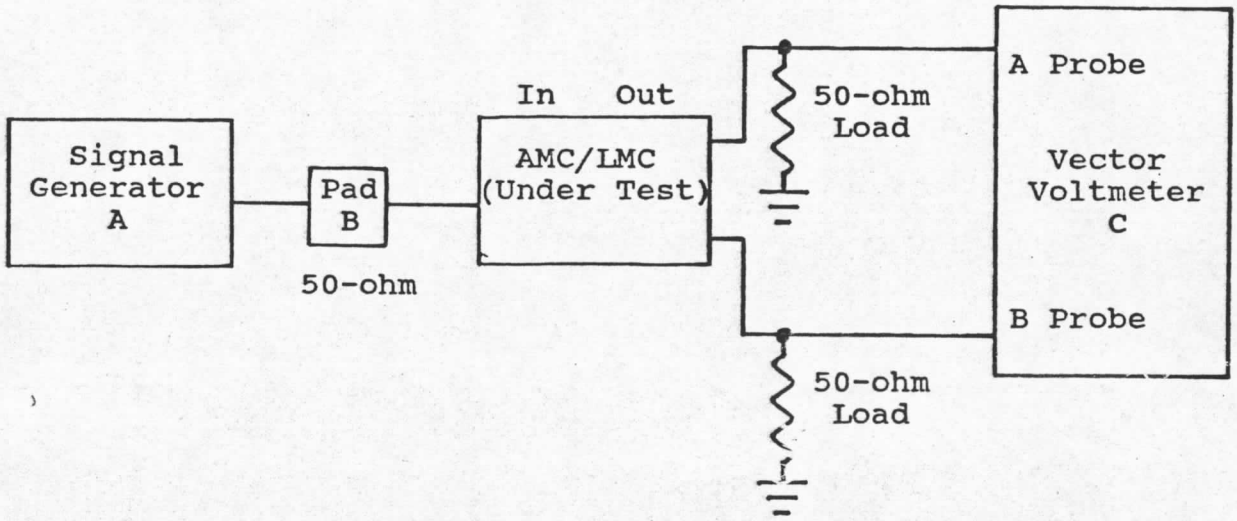
TEST SET-UP FOR PROCEDURE C

Phase Between Outputs

Figure 2.1



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2.3 Procedure D: Desensitization

2.3.1 Performance Criteria

The overall gain of the multicoupler to a 100 microvolt desired signal on any frequency within the range of 2 to 30MHz for the AMC Series or 10KHz to 1.8MHz for the LMC Series shall not be reduced more than 3dB by application of a signal of 3.5 volts peak at least 10% removed in frequency from the desired signal.

2.3.2 Test Set-up Schematic - See Figure 2.2.

2.3.3 Test Equipment

2.3.3.1 Signal Generator - 2 units required
(Schematic reference A1/Item 6A in Section 3.0)
(Schematic reference A2/Item 6B in Section 3.0)

2.3.3.2 Voltmeter - 1 unit required
(Schematic reference B/Item 9 in Section 3.0)

2.3.3.3 Step Attenuator - 1 unit required
(Schematic reference C/Item 4 in Section 3.0)

2.3.3.4 Communicationns Receiver - 1 unit required
(Schematic reference D/Item 3 in Section 3.0)

2.3.3.5 RMS Voltmeter - 1 unit required
(Schematic reference E/Item 8 in Section 3.0)

2.3.3.6 Combining Pad - (See schematic in Figure 2.2)

2.3.4 Test Procedure

2.3.4.1 Connect the equipment as in Figure 2.2.

2.3.4.2 Adjust signal generator A2 to +15dB above 100 microvolts at a frequency of 1.0MHz for the LMC Series and 25MHz for the AMC Series. Establish a reference level at RMS voltmeter E connected to the IF output of the receiver, which is tuned to 1.0MHz for the LMC or 25MHz for the AMC.

2.3.4.3 Adjust signal generator A1 to a level of 2.82Vrms at voltmeter B at 10KHz for the LMC and 2MHz for the AMC.

2.3.4.4 Reconnect the multicoupler under test and re-tune the receiver if necessary. The level should not drop more than 3dB below that set up in 2.3.4.3. Record readings.

2.3.4.5 Repeat 2.3.4.3 and 2.3.4.4 for signal generator A2 frequencies of 500KHz for the LMC and 6KHz for the AMC.

2.8 Procedure E: Disconnect

2.8.1 The disconnect process is essentially the reverse of Procedure A: Initialization and Set-up. The front-panel toggle switch is placed in the OFF (down) position, removing power from both the indicator lamp and the multicoupler. The power cable assembly connected to the rear panel connector is then removed with a twisting motion.

2.8.2 The RF input/output cables can be removed at any time without damage to the multicoupler. This procedure involves selecting the appropriate rear panel connector and removing the cable with a twisting or counter-clockwise unscrewing motion.

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3.0 Test Equipment Required

Item	Equipment	Model	Serial#
1	Level Measuring Set	Wandel-Golterman WM-50	TMC5658
2	Frequency Counter	Hewlett-Packard 5245L	TMC1530
3	LF/MF/HF Receiver	TMC Model GPR-90RXDS	TMC-1308
4	Step Attenuator	Telonic 50	TMC8803
5	Noise Generator	GenRad 1390B	TMC8802
6A	Signal Generator	Hewlett-Packard 606A	TMC1861
6B	Signal Generator	Hewlett-Packard 606A	TMC1886
7	Vector Voltmeter	Hewlett-Packard 4815A	TMC2014
8	RMS Voltmeter	Hewlett-Packard 3400A	TMC1881
9	Voltmeter	Hewlett-Packard 410B	TMC2493

Note: Calibration data sheets are filed under the appropriate test equipment records in the Quality Assurance Department files and are available for review by the customer's representative upon request.

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3.1 Comments

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3.2 Test Data Sheet #1 - AMC/LMC Series

Procedure A Initialization and Set-up - No test data.

Procedure B Noise Figure

									Channel
Input (F_r) Noise Figure									
2.1.4.3 F_o	___	___	___	___	___	___	___	___	[1- 8]
7.0dB	___	___	___	___	___	___	___	___	[9-16]
	___	___	___	___	___	___	___	___	[17-24]
	___	___	___	___	___	___	___	___	[25-32]
2.1.4.4 NF	___	___	___	___	___	___	___	___	[1- 8]
7.0dB	___	___	___	___	___	___	___	___	[9-16]
	___	___	___	___	___	___	___	___	[17-24]
	___	___	___	___	___	___	___	___	[25-32]

Procedure C Phase Between Outputs

Input signal	1	2	3	4	5	6	7	8	
Output-output	X	___	___	___	___	___	___	___	[1]
+/-1.0°	___	X	___	___	___	___	___	___	[2]
2.2.4.4	___	___	X	___	___	___	___	___	[3]
	___	___	___	X	___	___	___	___	[4]
	___	___	___	___	X	___	___	___	[5]
	___	___	___	___	___	X	___	___	[6]
	___	___	___	___	___	___	X	___	[7]
	___	___	___	___	___	___	___	X	[8]

Note: Use continuation sheets for 16/32-outputs.

Procedure D Desensitization

Input signal									
Desensitization	___	___	___	___	___	___	___	___	[1- 8]
3dB	___	___	___	___	___	___	___	___	[9-16]
2.3.4.4	___	___	___	___	___	___	___	___	[17-24]
	___	___	___	___	___	___	___	___	[25-32]
Input signal									
Desensitization	___	___	___	___	___	___	___	___	[1- 8]
3dB	___	___	___	___	___	___	___	___	[9-16]
2.3.4.5	___	___	___	___	___	___	___	___	[17-24]
	___	___	___	___	___	___	___	___	[25-32]

Procedure E Disconnect - No test data.

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AMC/LMC Model Number _____

Serial Number _____

Manufacturing Number _____

Test Engineer _____

Date Unit Tested _____

TMC SPECIFICATION			NO.
REV:			
COMPILED:	CHECKED:	APPD:	SHEET OF
TITLE:			

TEST DATA SHEET
ANTENNA MULTICOUPLER

UNIT TYPE LMC2X8 MFG. NO._____

SERIAL NO._____

NOMINAL INPUT
IMPEDANCE 50 OHMS

	LF	MF
INPUT VSWR LESS THAN 1.5:1	_____ OK	_____ OK
OUTPUT VSWR LESS THAN 1.2:1	_____ OK	_____ OK

	LF	MF
INSERTION MAX. GAIN	_____ DB	_____ DB
MIN. GAIN	_____ DB	_____ DB

INSERTION	JACK TO JACK		BACK TO FRONT	
	LF	MF	LF	MF
	_____ DB	_____ DB	_____	_____ DB

	FX-309	FX-310
FILTER	_____ OK	_____ OK
MECHANICAL	_____ OK	_____ OK
FINAL TEST	_____ OK	_____ OK

TESTER_____

DATE _____