TMC SPECIFICATION

REV: ⊗			NO. S 10143
COMPILED: R.M.	CHECKED:	APPD:	SHEET OF

TITLE: TEST PROCEDURE FOR THE LMC-20

DATE Nov. 21/67 SH. 1 OF 11 COMPILED BY	TMC SPECIFICATION NO. S 10143	
	TITLE: TEST PROCEDURE FOR THE LMC-20	JOB
APPROVED		

INTRODUCTION:

The following are the test procedures for factory testing the LMC-20.

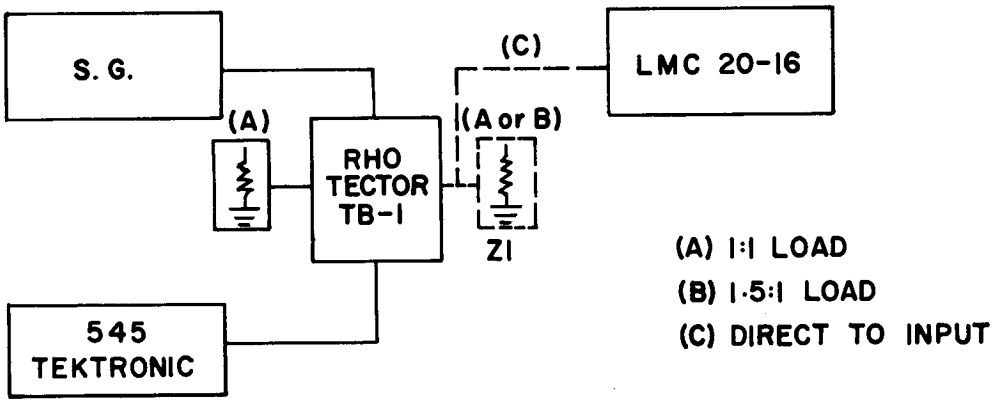
OVERALL EQUIPMENT REQUIRED:

2 Measurements Model 82 Signal Generator or Hewlett-Packard Model 606A Signal Generator.
1 Hewlett-Packard Model 410B V.T.V.M.
1 Telonic Rho-Tector
1 TMC Model GPR90RXD Receiver
1 Simpson Model 260 Multimeter
1 6db, 50 ohm Combining Pad
1 Telonic Model TG-9050 or Step Attenuator or equivalent
1 Tektronic Scope Type 545 with 53/54 Preamp.

V.S.W.R.

I GENERAL:

The input impedance will vary with frequency and is quoted as a nominal 50 ohm. The variation of the impedance will produce a mismatch to a 50 ohm source. The ratio of the actual to the nominal is stated as a Voltage Standing Wave Ratio.



EQUIPMENT REQUIRED:

Signal Generator ..... 1 req.
Tektronic Scope Type 545 ..... 1 req.
Telonic RHO-Tector Mod TRB-1 with loads ..... 1 req.

PROCEDURE:

(a) Set up the Rho-tector as shown, and observe the output on the scope. With the signal generator at 50 Khz, 400 Khz and 2MHz.

(b) Replace Z1 on the Rho-tector with load No. TRM1-1.50F (V.S.W.R. 1.5:1)

(c) Set the scope to give a deflection easily readable and note the maximum deflection.

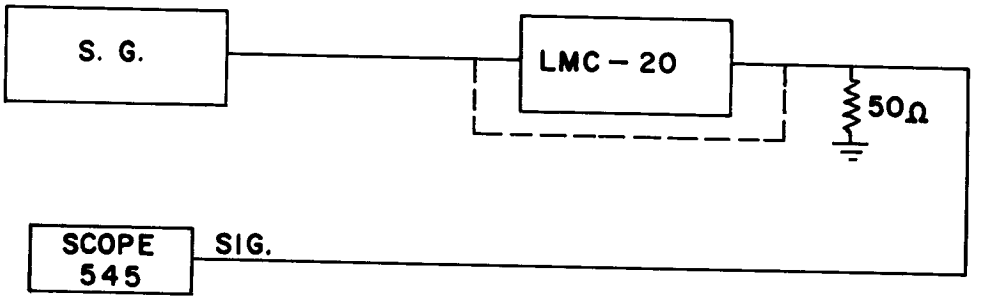
(d) Replace Z1 with a BNC adapter and hook up to the input using a short 52 ohm cable to antenna input LMC-20.

(e) Note the DC deflection on the scope. The V.S.W.R. should not exceed the calibrated deflection on the scope that represents 1.5:1 V.S.W.R.

(f) Record with check mark if less than 1.5: 1 V.S.W.R.

II GAIN MEASUREMENTS:

System losses are made up in the preamplifier; as a result, the gain approaches Unity.



EQUIPMENT REQUIRED:

Signal Generator Measurements Model 82 or HP Model 606A ..... 1 req.
Oscilloscope, Tektronix 545 with 53/54B Preamp ... 1 req.

PROCEDURE:

a) Set up equipment as shown.

b) Connect the scope, with 50 ohm load, to the output of the signal generator and set the generator and the scope to usable deflection, and note.

c) Connect the scope to outputs of LMC and the generator to the Antenna input.

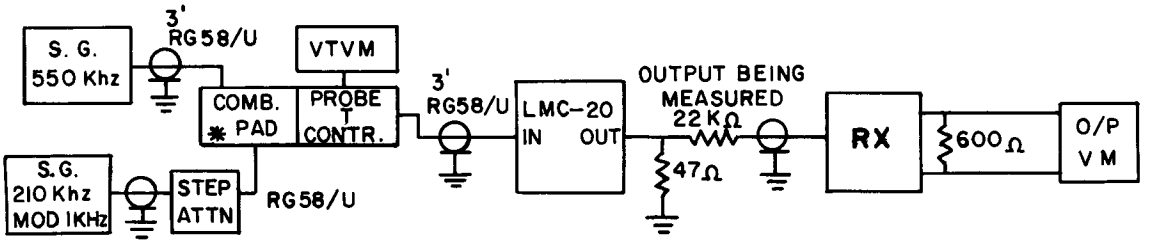
d) The output can now be read directly from the scope, and the ratio converted directly to DB.

e) Spec. limit: 0db ± 2db.

f) Record gain in DB's at 400Khz and record check mark if complete output is within specs. at 2MHz & 50Khz.

III INTERMODULATION:

Any non-linearities in the Multicoupler will distort the applied signal and produce intermodulation products. The preamp is operated in push pull and the tubes are balanced by means of R111 for best second order supression.



* Combining Pad should match the output of the generator to the MC and should not attenuate 6db.

EQUIPMENT REQUIRED:

2 Measurements Corp Model 82 Signal Generator or Hewlett-Packard Model 606A Signal Generator.
1 50 ohm 6db Combining Pad
1 Hewlett-Packard 410B VTVM
1 TMC Model GPR90RXD Receiver
1 Simpson Model 260 Multimeter
1 Telonic Model TG-9050 Step Attenuator

PROCEDURE: - 2nd order product

a) Set up equipment as shown with all outputs loaded with 47 ohm. The LMC should be on at least 1/2 hour before any measurements are made. All attenuation switched out.

b) Tune the receiver to 760Khz. Receiver controls as follows:

HFO Sw. to VAR
RF Selectivity Sw. to NON XTAL
Audio Gain max. c/w
Cal. off
AVC Sw. to MANUAL
LIMITER Sw. - OFF
BFO. - OFF
ANT TUNE to peak noise indication
RF GAIN to produce slight noise deflection on the Multimeter with meter set to lowest AC Voltage range.
Audio Selector Sw. to NORMAL.

c) Reduce the output of one generator to zero. Tune the other to 550Khz modulated 1Khz at 30% and adjust the output to 0.1VRMS on the VTVM. Note the output setting and reduce output to zero. Tune the other generator to 210Khz unmodulated: Adjust its level to 0.1VRMS. Return the 550Khz generator to its original output setting of 0.1VRMS.

d) Fine tune one of the generators so as to get a peak on the output meter while adjusting receiver gain so as not to pin the output meter.

e) Reduce the output of the 550Khz generator to zero. Tune the modulated generator to receiver frequency (760Khz) and set the output meter on a higher range. Adjust the generator for 0.1V on the VTVM. Reduce generator output using Telonic Attenuator to regain reference point with output meter on its lowest AC voltage range, as before. The setting in "db" is the amount of suppression of the second order intermod product. A 6db correction is added to this reading so that it can be referred to in terms of db below the peak of the combined input. Record on test data sheet.

f) Spec. limit 50db below input.

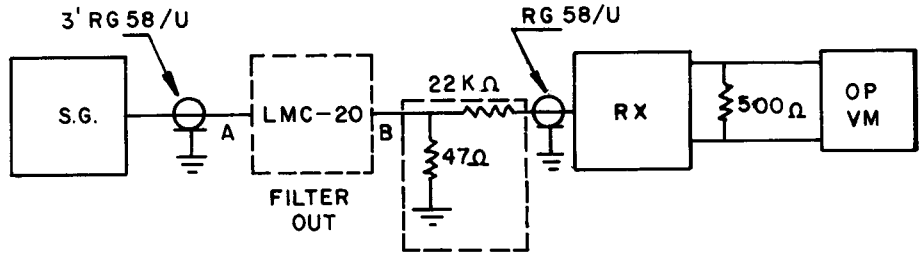
NOTE:

If HP Model 606A Generators are used, the Telonic Attenuator is not needed.

IV JACK TO JACK ISOLATION:

GENERAL:

The greater the isolation the less effect the receiver input characteristics will have on the antenna and other receivers.



PROCEDURE:

a) Set up equipment as shown.

b) Tune receiver to 400Khz, and set controls as indicated in Section I.

c) Calibrate by interconnecting probes A and B. Tune the generator to receiver frequency with an input level to produce half scale reference point with attenuator dial reading of 10 uv, higher if necessary. Note level.

d) Connect to LMC-20 input.

e) Connect probe A to output 1 of multicoupler and B to each output of that LMC.

f) Read the difference, in dial reading between (e), and the calibration level, in "db" and record as the Jack to Jack Isolation.

LIMITS:

50DB

V BACK TO FRONT ISOLATION:

PROCEDURE:

a) Repeat as above feeding signal from outputs to inputs.

b) Record in "db".

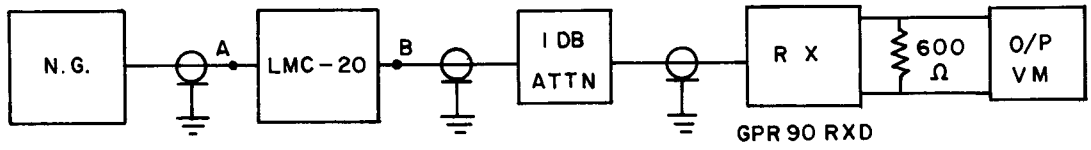
LIMITS:

60DB

VI NOISE MEASUREMENT:

GENERAL:

All components in the multicoupler will generate a small amount of noise, which when combined and amplified can degrade incoming low level signals. A convenient method of measuring the noise is to double the noise power using a broad-band noise diode generator.



PROCEDURE:

a) Tune the receiver to 400Khz. Adjust RF gain control for 0DB on output meter (1.5V range) or (Simpson 260 on 2.5V)

b) Switch on noise generator diode current and adjust for a 3DB increase on the output meter. Note as the receiver + multicoupler noise current's "F_3" (i.e., noise factor). Switch off noise current.

c) Remove from LMC-20 and connect point A to B. Adjust receiver RF gain control for a -3DB. Turn on noise diode current and adjust for a 3DB increase (i.e., 0DB) on the output meter. This is a receiver noise current "F" (i.e., noise factor.)

d) The LMC noise factor is determined as follows:

$$F_1 = F_3 - \frac{(F_2 - 1)}{MCGp}$$

Where F_1 is the AMC noise factor.
F_2 is the receiver noise factor.
MCGp is the gain power of the ACG determined from gain measurements.

e) Convert to noise figure in DB by the following formula: $NF = 10 \log_{10} F_1$

f) Record on the test data sheet.

LIMITS:

9DB

Decibel - Voltage, Current and Power Ratio Table

-			+	
Voltage or Current Ratio	Power Ratio	DB	Voltage or Current Ratio	Power Ratio
1.0000	1.0000	0	1.000	1.000
.9886	.9772	.1	1.012	1.023
.9772	.9550	.2	1.023	1.047
.9661	.9333	.3	1.035	1.072
.9550	.9120	.4	1.047	1.096
.9551	.8913	.5	1.059	1.122
.9331	.8710	.6	1.072	1.148
.9226	.8611	.7	1.084	1.175
.9120	.8318	.8	1.096	1.202
.9016	.8128	.9	1.109	1.230
.8913	.7943	1.0	1.722	1.259
.8810	.7762	1.1	1.135	1.288
.8710	.7586	1.2	1.148	1.318
.8610	.7413	1.3	1.161	1.349
.8511	.7244	1.4	1.175	1.380
.8414	.7079	1.5	1.189	1.413
.8318	.6918	1.6	1.202	1.445
.8222	.6761	1.7	1.216	1.479
.8128	.6607	1.8	1.230	1.514
.8035	.6457	1.9	1.245	1.549
.7943	.6310	2.0	1.259	1.585

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TEST RESULTS

	Test 1 V.S.W.R.	Test 2 Gain	Test 3 IM
INPUT			
OUTPUT 1			
2			
3			
4			
5			
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13			
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DATE Nov. 21/67 SH. 11 OF 11 COMPILED BY	TMC SPECIFICATION NO. S 10143	
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TEST RESULTS

	Test 4 JACK TO JACK	Test 5 BACK TO FRONT	Test 6 NOISE
INPUT			
OUTPUT 1			
2			
3			
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REVISION SHEET

TMC (Canada) LTD.
OTTAWA ONT.

S10143

MODEL LMC 20 PROJECT NO.

DATE	REV.	PAGE	ITEM	DESCRIPTION	REMARKS	CHK.	APP.
18/12/67	0	ALL	ALL	Released to Production		J.X.J.	V.A.