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REV: Ø A				
COMPILED: SD	CHECKED:	APPD:	SHEET	OF
TITLE:				
4/23/73				

Test Procedure

RSU-1

I. EQUIPMENT REQUIRED:

A. Multimeter
B. Frequency Counter
C. Oscilloscope
D. Receiver - R390A (modified with KIT 375)
E. RSU-1 Schematic Diagrams and Assembly Drawings (refer to RSU-1 M/L)
F. RG58/U - R.E. Cable, fifty (50) inches long
G. NF-116-3 Frequency Standard
H. R.F. Signal Generator

II. MECHANICAL INSPECTION:

A. Make sure all PC boards are properly mounted and secured.
B. Be sure proper lamps and fuses are installed.

III. PRELIMINARY ELECTRICAL INSPECTION:

CAUTION: BE SURE AC POWER IS NOT CONNECTED TO THE RSU-1 UNIT.

A. Connect an OHM-METER across AC input plug of RSU-1 unit. Continuity should exist across the plug (approximately 3 ohms).
B. Removing either F101 or F102 will break continuity.
C. Continuity should not exist between AC leads and ground.
D. Remove OHM-METER from unit.
E. Set the STANDBY-SYNTH switch to STANDBY.
F. Set the COMPARE switch to SYNC COMPARE.
G. Set the FREQUENCY MHz switch assembly to 00.0000.

IV. POWER SUPPLY VOLTAGE CHECKS:

A. Connect AC power to the RSU-1. The LINE indicator should be ON.
B. Removing either fuse will cause the LINE indicator to go OUT.
C. Monitor XZ110 for the following voltages:
   1. XZ110 terminal 2 - +24 VDC ± 10%
   2. XZ110 terminal 3 - +28 VDC ± 10%

D. Set the STANDBY-SYNTH switch to SYNTH and monitor the following voltages.
   1. Z104 (PC653/A4928) terminal E3 - +5 VDC ± 10%
   2. Z102 (PC624/A4922) terminal E13- +5 VDC ± 10%
   3. Z102 (PC624/A4922) terminal E14- +12 VDC ± 10%
   4. TB101 terminal 2 - +33 VDC ± 10%
   5. Monitor TB101 terminal 4. The following results are obtained in conjunction with the FREQUENCY MHz switch, 10 MHz digit.

SWITCH SETTING	VOLTAGE
00.0000	+32 VDC ± 10%
10.0000	0
20.0000	0
30.0000	0

Set the FREQUENCY MHz switch back to 00.0000 the +32 VDC should reappear.

   6. Set the SYNTH-STANDBY switch to STANDBY and REMOVE AC power from the RSU-1.

E. Record results on test data sheet.

V. STANDARD:

A. Insert a NF-116-3 (1 MHz standard) into XZ110.
B. Connect AC power to the RSU-1. With the SYNTH-STANDBY switch in the STANDBY position, allow the internal standard (NF-116-3) about 30 minutes to warm up.
C. Connect an external 1 MHz standard frequency to J104 (EXT STD IN). Level should be 0.7V RMS. NOTE: The external standard used must be of the same frequency and stability as the internal standard.
D. Set the STANDBY-SYNTH switch to SYNTH.
E. Monitor J105 (1 MHz OUT) for a frequency of 1 MHz at 3VPP minimum.

NOTE: When an external standard is used it will always take precedence over the internal standard. Due to a switching network, removal of the external standard or a reduction in its level will cause the internal standard to take charge.

F. Monitor J105 (1 MHz OUT) and remove the external standard from J104 (EXT STD IN). There should still be 1 MHz present. Reconnect the external standard to J104.

G. Set the COMPARE switch to STD COMPARE. Assuming that both standards are close to each other in frequency, the PHASE COMPARATOR meter will indicate this by a slow swing from left to right. The speed of the fluctuation will slow or decrease when both standard frequencies approach each other.

H. The comparator circuitry is found on Z108 (PC654/A4929). Monitor E8 of Z108. The DC voltage will vary from about +0.3 VDC for a left full scale deflection of the PHASE COMPARATOR meter to about -0.3 VDC for a right full scale deflection of the PHASE COMPARATOR meter.

I. Set the COMPARE switch to SYNC COMPARE.

J. For the remainder of the test an internal or external standard may be used. If an internal standard is used be sure it is removed after the unit has been tested.

K. Record results on test data sheet.

VI. SPECTRUM GENERATOR Z102 (PC624/A4922)

A. Set the RSU-1 controls as follows:
   1. SYNTH-STANDBY to SYNTH
   2. COMPARE switch to SYNC COMPARE
   3. FREQUENCY MHz switch to 00.0000

B. Monitor E30 (1-15 MHz output) on Z102 with the Scope. Connect the Frequency Counter to the Scope VERT SIG output. Refer to the chart below and tune the proper coils for a maximum voltage at the given frequency. Output in all cases should be about 0.4 VPP ± 10%.

RSU-1

FREQUENCY MHz	TUNE	OUTPUT FREQUENCY
00.0000	T17	1 MHz
01.0000	T16	2 MHz
02.0000	T15	3 MHz
03.0000	T14	4 MHz
04.0000	T6	5 MHz
05.0000	T13	6 MHz
06.0000	T5	7 MHz
07.0000	T8	8 MHz
08.0000	T8 (Previously tuned)	8 MHz
09.0000	T5 "	" 7 MHz
10.0000	T13 "	" 6 MHz
11.0000	T6 "	" 5 MHz
12.0000	T14 "	" 4 MHz
13.0000	T15 "	" 3 MHz
14.0000	T16 "	" 2 MHz
15.0000	T17 "	" 1 MHz
16.0000		NO OUTPUT
17.0000	T17 "	" 1 MHz
18.0000	T16 "	" 2 MHz
19.0000	T15 "	" 3 MHz
20.0000	T14 "	" 4 MHz
21.0000	T6 "	" 5 MHz
22.0000	T13 "	" 6 MHz
23.0000	T5 "	" 7 MHz
24.0000	T8 "	" 8 MHz
25.0000	T10	9 MHz
26.0000	T7	10 MHz
27.0000	T12	11 MHz
28.0000	T9	12 MHz
29.0000	T11	13 MHz
30.0000	T4	14 MHz
31.0000	T3	15 MHz

Set FREQUENCY MHz switch to 00.0000

C. Monitor E21 on Z102 and tune T2 for maximum voltage. Output should be 15 MHz.

D. Monitor J103 (17 MHz) and tune T1 for maximum voltage. Output should be 17 MHz at 4 VPP ± 10%.
E. Monitor J102 (100 KHz) and tune L1 for maximum voltage. Output should be 100 KHz at 15 VPP minimum.
F. Monitor E9 on Z102 output should be 100 KHz.
G. Monitor E11 on Z102. Output should be 100 KHz at 3.0 VPP minimum.
H. Monitor junction of C23 & R35 on Z102 and tune L4, L6, and L5 for maximum voltage at 900 KHz.
I. Monitor output at E15 on Z102. Square wave output should be 90 KHz.
J. Monitor output at E17. Square wave output should be .9 KHz at 3 VPP minimum.
K. Record results on test data sheet.

VII. 1st MIXER Z101 (PC658/A4932):

The first mixer is used to compare the receiver HFO frequency with the RSU-1, resulting in a difference frequency of 19 MHz. It is necessary at this point to use a R390A receiver which has been modified (KIT 375).

A. Set the RSU-1 FREQUENCY MHz switch to 16.0000 MHz.
B. Set the R390A receiver to 16.000 MHz.
C. Connect the HFO output of the R390A to J109 (XTAL OSC IN).
D. Monitor the junction of R10 and T1 on Z101. Tune T1 for maximum voltage at 19 MHz.
E. Monitor E6 of Z101 and tune T2 for maximum voltage. Output should be 19 MHz.
F. Record results on test data sheet.

VIII. 2nd MIXER Z107 (PC652/A4927):

The 2nd mixer is tuned to 16 MHz as follows:

A. Remove the HFO signal from J109.
B. Connect 16 MHz at 1.5V P.P. to J108 (VFO IN).
NOTE: Use an R.F. SIGNAL GENERATOR and verify the frequency using a FREQUENCY COUNTER.
C. Monitor junction of C11 and R17 and tune L12 and T1 for maximum voltage.
D. Remove the 16 MHz signal from J108 and reconnect the HFO signal to J109.
E. Record results on test data sheet.

IX. 4th MIXER Z103 (PC650/A4925):

A. Connect the FREQUENCY COUNTER to J106 (555 KHz OUTPUT).
B. Adjust C3 for 555.000 KHz.
C. Remove FREQUENCY COUNTER and connect the R.G. 58/U R.F. cable to J106. Monitor J106 (555 KHz) with a scope and tune L6 for maximum voltage. Output should be 555 KHz at 15 VPP minimum. Remove the R.F. cable from J106.
D. Monitor E4 on Z103 and tune L7, L8, and T1 for a maximum voltage. Output should be 455 KHz.
E. Record results on test data sheet.

X. 3rd MIXER Z106 (PC646/A4923):

A. Connect the R390A VFO output to J108 (VFO IN).
B. Set the R390A to 16.000 MHz.
C. Set the RSU-1 to 16.0000 MHz.
D. Monitor E7 on Z106 and adjust the R390A KILOCYCLE CHANGE control for a reading fo 1 MHz ± 50 CPS at E7. Level should be about 5 VPP minimum.
E. Record results on test data sheet.

XI. PROGRAMMABLE DIVIDER Z104 (PC653/A4928):

The PROGRAMMABLE DIVIDER does not require any adjustments or tuning. It is controlled by the last four (4) digits of the FREQUENCY MHz switch (100 KHz, 10 KHz, 1 KHz and .1 KHz).

A. Place the scope lead on the positive (+) side of C4.
B. Connect a FREQUENCY COUNTER to the VERT SIG output of the scope. Set the FREQUENCY COUNTER as follows:
   1. FUNCTION PERIOD AVERAGE - 10
   2. TIME BASE 10 μ Sec
C. Adjust the R390A KILOCYCLE CHANGE control until a reading of 10000. u Sec is obtained.
D. Change the last four (4) digits on the FREQUENCY MHz step switch one step at a time. Its corresponding digit will be indicated on the FREQUENCY COUNTER. FOR EXAMPLE: A FREQUENCY MHz setting of 16.1234 will result in a FREQUENCY COUNTER reading of 11234 u Sec. After each digit has been checked set the FREQUENCY MHz switch on the RSU-1 to 16.0000.
E. Monitor E5 on Z104 for 1 KHz output at 0.5 VPP.
F. Do not disturb R390A settings as they are important for further tests.
G. Record results on test data sheet.

XII. 10 KHz and 100 KHz MULTIPLIER Z108 (PC654/A4929).

A. Monitor E1 on Z108 and verify a frequency of exactly 1 KHz.
B. Monitor the base of Q2 and tune coils L2, L3, and L1 for maximum voltage at 5 KHz.
C. Monitor the base of Q6 and tune coils L6, L7, and L8 for maximum voltage at 10 KHz.
D. Monitor E11 on Z108 and tune coils L13, L12, and L9 for a maximum voltage. Output should be 100 KHz at 0.8 VPP ± 10%.
E. Record on test data sheet.

XIII. PHASE DETECTOR Z109 (PC657/A4931):

A. Monitor J107 (ERROR VOLTAGE). As the VFO drifts the DC voltage will vary from about + 2.0 VDC ± 10% to about - 2.0 VDC ± 10%.
B. Monitor E1 on Z109. The voltage will vary from about + 0.1 VDC to about -0.1 VDC.
C. The PHASE COMPARATOR meter pointer will deflect to a full scale left with a positive voltage to a full scale right with a negative voltage.
D. The SYNC indicator will go ON and OFF in step with the meter movement.
E. Record results on test data sheet.

XIV: RECEIVER CONTROL:

A. Connect the R390A (modified) receiver and the RSU-1 unit as shown by wiring diagram CK1984. All cables should be fifty (50) inches long. This section of the procedure may also be used in the field to test the R390A receiver and CV-157 converter after they have been modified with KIT 375.
   NOTE: Steps B and C are done in the field. The coils mentioned in steps B and C have previously been tuned. These coils would require a slight adjustment due to their final termination.
B. Monitor J103 (17 MHz) and tune T1 on Z102 (PC624/A4922) for a maximum voltage output (Frequency MHZ set to 02.0000 MHz).
C. When a CV-157 (modified converter) is connected in the system, the following adjustments are necessary in the RSU-1.

1. Monitor J102 (100 KHz) and tune L1 on Z102 (PC624/A4922) for a maximum voltage output.
2. Monitor J106 (555 KHz) and tune L6 on Z103 (PC650/A4925) for a maximum voltage output.

D. Check the R390A and RSU-1 for at least one (1) frequency on each band of the R390A (2-31.999 MHz). In each case the SYNC indicator in the RSU-1 must come ON. A "0" center reading must be obtained on the PHASE COMPARATOR meter. The receiver will be in a "PHASE LOCKED" condition. A slight counter clockwise movement of the KILOCYCLE CHANGE control on the R390A will result in a deflection of the PHASE COMPARATOR meter toward the left. Conversely a clockwise movement of the KILOCYCLE CHANGE control on the 390A will result in a deflection of the PHASE COMPARATOR meter toward the right.

TEST DATA SHEET FOR RSU-1

1. POWER SUPPLY _____ OK
2. STANDARD _____ OK
3. SPECTRUM GENERATOR (Z102) _____ OK
4. 1st MIXER (Z101) _____ OK
5. 2nd MIXER (Z107) _____ OK
6. 4th MIXER (Z103) _____ OK
7. 3rd MIXER (Z106) _____ OK
8. PROGRAMMABLE DIVIDER (Z104) _____ OK
9. 10 KHz and 100 KHz MULTIPLIER (Z108) _____ OK
10. PHASE DETECTOR (Z109) _____ OK
11. RECEIVER CONTROL _____ OK

TESTED BY _____ DATE _____

MFG. NO. _____

REVISION SHEET

THE TECHNICAL MATERIEL CORP.
MAMARONECK NEW YORK

S 1317
LIST NO.

DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
4/25/73	Ø			ORIGINAL RELEASE FOR PRODUCTION	
5/17/73	A			REVISED AS PER EMN 21076	CL

TMC FORM MLR-1, OGILVIE PRESS, INC. NO. 450M TYPEMASTER