TMC SPECIFICATION			NO. S 800
REV: C D E			
COMPILED: R. Young	CHECKED:	APPD:	SHEET 1 OF 10
TITLE:			

MSR - 9 TEST PROCEDURE

I. PURPOSE:

The MSR-9, a filter type adapter, when used with any receiver which provides a nominal 455 KC I.F. output into low impedance load, will demodulate AM, SSB, CW and FS signals.

II. DESCRIPTION OF CONTROLS:

A. SIDEBAND

1. Manual/Xtal places the 1st oscillator in either crystal or variable operation.

2. Lower/Upper pilot lights indicate when MSR is set for reception of lower or upper sideband. In the Upper position the 1st oscillator frequency is 472 KC, in the lower position it is 438 KC.

B. Bandspread varies the 1st oscillator when on manual over nominal $\pm$ 3 KC from its mid frequency.

C. B.F.O. turns on 2nd oscillator which is at a fixed 17 KC and routes the signal through Product Detector. In B.F.O. off position, the signal is routed via envelope detector.

D. AVC:

1. On/Off switch shorts out the AVC voltage of MSR.

2. Slow/Fast switch changes time constant of AVC recovery circuit.

E. Audio Gain varies input to audio output amplifier.

F. Power switch connects or removes MSR-9 from AC power mains.

G. Rear deck output level switch S-8 reduces gain of Audio Amplifier and connects pad to output transformer.

III. TEST EQUIPMENT REQUIRED:

A. R.F. Signal Generator - 455 KC with 1 KCS mod. capability.
B. Audio Generator.
C. VTVM - Hewlett Packard 410B.
D. DB VTVM - Ballantine or equivalent.
E. Battery 0 - ± 4.5 Volts.
F. 600 ohm - 10 Watt Resistor.
G. 600 ohm - 1 watt Resistor.
H. Oscilloscope.
I. Frequency counter with a range of at least 1mc.

IV. TEST PROCEDURE:

A. POWER SUPPLY VOLTAGES

1. Connect MSR-9 power cord to AC power line. Turn POWER ON and measure and record the following:

a. DC voltage from terminal 7 of E2 to ground shall be 300 VDC ±10%.

b. DC voltage from terminal 8 of E2 to ground shall be between 142.5 and 157.5 VDC.

B. AUDIO CHANNEL CHECK

1. Initial Settings:

a. Input adjustment (R 1) fully clockwise.
b. AVC adjustment (R 35) fully counter-clockwise.
c. BFO - ON
d. Audio gain - fully clockwise.
e. Output level (S 8) - high position.
f. 600 ohm 10W Resistor across terminals 5 and 6 of E1.
g. DB VTVM across 600 ohm load.

2. Connect audio generator to pin 7 of V7. Set frequency to 1 KCS.

3. Adjust input voltage for an output voltage of 36 volts.

4. Measure and record input voltage at pin 7 of V7, should be between .07 and .3 VAC.

5. Check frequency response of low-pass filter through audio amplifier, keep input to pin 7, V7 constant.

6. The output voltage across the load must be as follows:
   1,000 cps - 36 Volts
   350 cps - not less than 30 V (Record Reading).
   4,500 cps - not less than 25 V (Record Reading).
   5,000 cps - less than 25 V (Record Reading).

7. Disconnect audio generator, measure and record the output voltage across the 600 ohm load. It must be greater than -40db down from 36 VAC.

8. Reconnect signal generator to pin 7 of V7 and set it for 36 V output across the load at 1,000 cps.

9. Place output level switch (S-8) in low. Output should drop to between 8 and 14 volts. (Record reading)

10. Connect a 600 ohm 1W resistor across terminals 2 and 3 (pin 3 common). Voltage across this load should be between 0.8 and 1.5 volts. Record this reading. Place output level switch in high position. Voltage across this load should drop to zero. Leave switch in high position for shipping.

11. Disconnect signal generator.

C. PRODUCT DETECTOR AND SECOND OSCILLATOR

1. Turn BFO ON.

2. Connect counter to 17 KC 2nd oscillator test point (TP 2).

3. Tune 17 KCS adjustment, C55, for 17,000 $\pm$ 1 cps. (Record reading)

4. Disconnect the counter.

D. BANDPASS FILTER OPERATION

1. Remove V3.
2. Turn off BFO.
3. Connect audio signal generator to J1 set at 1 VRMS.
4. Measure the AC voltage with a DB VTVM at pin 7 of V3 and adjust generator frequency for a peak reading. The voltage at the peak should be 1.8 to 3 VRMS.
5. Sweep upward from the reference frequency until the level reading drops 3 DB. This frequency shall be 20.600 KCS or greater. Record reading.
6. Sweep downward past the reference frequency until the level reading drops 3 DB. This frequency shall be 17.400 KCS or less. Record reading.
7. Continue to sweep downward in frequency until the level drops to -45 DB from the reference level. This frequency shall be 16.400 KCS or higher. Record reading.
8. Proceed upward in frequency until the output level again drops to -45 DB from the reference level. This frequency shall be 21.900 KCS or lower. Record reading.
9. Disconnect meter and audio generator.

E. FIRST OSCILLATOR

1. Connect counter to TP1 test point.
2. Set bandspread dial to zero (capacitor exactly half meshed).
3. Place reactance balance control (R 58) in its mid position.
4. Set sideband selector switch to manual USB position.
5. Tune Z3 for 472,000 $\pm$ 100 cps.

6. Set sideband switch to **MANUAL** LSB position.

7. Tune C 33 for 438,000 ± 100 cps.

8. Turn sideband selector switch to XTAL LSB position.

9. Adjust C 45 for 438,000 ± 1 cps. The XTAL must be tunable through at least ± 5 cps.

10. Turn sideband selector switch to XTAL USB position.

11. Adjust C 46 for 472,000 ± 1 cps. The XTAL must be tunable through at least ± 5 cps.

F. REACTANCE SHIFT

1. Connect counter to TP-1.

2. Set sideband selector switch to manual USB position.

3. Apply DC supply across 11 and 12 of E1, set voltage as follows and check frequency of oscillator with the counter. Adjust reactance balance control to obtain results.

	Frequency shift upper & lower sideband	
Control Voltage	Min.	Max.
+4.5	+3200	+5500
0	0	0
-4.5	-3200	-5500

4. Return oscillator for 472 KC ± 100 cps in upper position and 438 KC ± 100 cps in lower position with reactance control voltage set to zero.

G. BANDSPREAD CONTROL

1. Connect counter to TP-1.

2. Set Bandspread dial to +3 and to -3 on both manual upper and lower sideband. Reactance control voltage set to zero. Record results as follows:

3.

Dial	USB KCS	LSB KCS
-3	Less than 469.100	Less than 435.800
+3	Greater than 474.900	Greater than 440.500

4. Remove counter from TP-1.

H. SENSITIVITY CHECK

1. Turn audio gain completely clockwise.

2. REPLACE V3.

3. Connect DB VTVM meter across the load.

4. Connect signal generator to J1. Set generator output attenuator for 1,000 micro-volts and approximately 455 Kcs.

5. Set sideband selector on X-TAL LSB.

6. Turn BFO on.

7. Tune signal generator around 456 Kcs for maximum output on the meter and readjust H.F. generator attenuator for 36 V output across the 600 ohm load. The RF input voltage must be between 500 and 1,000 micro-volts. Record reading. Retain these attenuator and frequency settings for the next test.

I. ENVELOPE DETECTOR

1. Complete Paragraph "H" prior to following test.

2. Turn off the BFO, (the output should drop off towards zero).

3. Apply 30% of 1 Kcs modulation at the signal generator.

4. Retune generator frequency for maximum output out of the MSR-9. The output voltage should be 7 to 15 volts across the 600 ohm load.

5. Turn off modulation at the signal generator.

J. AVC CHECK

1. Turn on BFO.

2. Tune the signal generator H. F. frequency dial for maximum output out of the MSR-9 and set the generator for 1000 micro-volts input to the MSR-9.
NOTE: If the output is higher than 36 V, readjust audio gain.

3. Place the AVC switch (S2) in ON position.

4. Set R 35 AVC ADJ to fully clockwise position.

5. With DC VTVM, measure terminal 8 of E 1 - should be greater than 13VDC.

6. Leave the meter connected to terminal 8 of E 1.

7. Place AVC SLOW/FAST switch (S 1) in FAST position.

8. Disconnect signal generator from J 1 and observe the fall of AVC voltage. It should take an estimated .1 second for the AVC voltage to return to zero. Record result.

9. Reconnect signal generator and place AVC SLOW/FAST switch (S 1) in SLOW position.

10. Disconnect signal generator and observe the fall of AVC voltage. It should take an estimated 1½ seconds to lose half of the AVC voltage. Record result.

11. Disconnect DC VTVM from E1 Pin 8.

K. LIMITER CHECK

1. Connect scope to pin 2 of V 4.

2. Turn the BFO off.

3. Reconnect the signal generator and apply 30% of 1 Kcs modulation at the H. F. signal generator. Retune the signal generator H. F. dial to obtain maximum output out of the MSR-9.

4. Observe the modulation envelope on the scope, it must be undistorted.

5. Place the limiter switch (S6) in ON position and again observe the modulation envelope, it now must show a slight clipping action, indicating the limiter is in working condition. Record result.

6. Place limiter switch in off position.

7. Remove scope from Pin 2 V4.

MSR-9 Test Data Sheet

Mfg. No._____ Serial No._____

A. POWER SUPPLY VOLTAGES:

A.1_____VAC, A.1(a)_____VDC, A.1(b)_____VDC

B. AUDIO CHANNEL CHECK:

B.4_____VDC

B.6 350 cps_____VAC, 4.5 KC/S_____VAC, 5 KC/S_____VAC
B.7_____DB, B.9_____VAC, B.10_____VAC

C. SECOND OSCILLATOR: C.3_____cps

D. BANDPASS FILTER OPERATION:

D.5_____KC/S
D.6_____KC/S
D.7_____KC/S
D.8_____KC/S

E. FIRST OSCILLATOR:

E.5_____KC/S
E.7_____KC/S
E.9_____KC/S
E.11_____KC/S

F. REACTANCE SHIFT:

F.3 (+4.5)_____cps, F.3(-4.5)_____cps

G. BANDSPREAD CONTROL:

	USB KC/S	LSB KC/S
-3		
+3		

H. SENSITIVITY CHECK:

H.7_____u/v

I. ENVELOPE DETECTOR:

I.4_____VAC

J. AVC CHECK:

J.5_____VDC, J.8(Fast)_____ J.10(Slow)_____

K. LIMITER: _____OK

TESTED BY:_____ DATE:_____

REVISION SHEET

THE TECHNICAL MATERIEL CORP.
MAMARONECK NEW YORK

MODEL MSR-9 PROJECT NO. _____

DATE	REV.	PAGE	EMN #	DESCRIPTION	CHK.	APP.
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