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T.E.F.

TMC SPECIFICATION NO. S. 514

REV.
A

TITLE:

MSR-8 TEST PROCEDURE

JOB

APPROVED

**I. PURPOSE:**

The MSR-8, a filter type adapter, when used with any receiver which provides a nominal 500 KC I.F. output 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 517 KC, in the Lower position it is 483 KC.

B. Bandsread varies the 1st oscillator when on manual over nominal ± 4 KC from its mid frequency.

C. B.F.O. turns on 2nd oscillator which is at a fixed 17 KC.

D. AVC:

1. On/Off switch removes AVC control voltage from 1st I.F. amplifier of MSR.
2. Slow/Fast switch changes time constant of AVC circuit.

F. Audio Gain varies input to audio output amplifier.

G. Power switch connects or removes MSR-8 from AC power mains.

H. 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 - 500 KC
- B. Audio generator
- C. VTVM - Hewlett Packard h10 B
- D. AC VTVM - Daven or Heath
- E. Battery 0 - ± 10 V
- F. 600 ohm - 10 watt resistor

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- G. .01 mfd 400 V capacitor
- H. Oscilloscope
- I. Counter Mod. 524 C - Hewlett Packard

IV. PROCEDURE:

A. POWER SUPPLY:

- 1. Continuity check to ground, line cord disconnected. Power switch ON.
 - a. Terminal 2 and 3 of E₂ should be open. Push sideband switch - should be open.
 - b. Terminal 7 of E₂ - approximately 40 K
 - c. Terminal 8 of E₂ - approximately 40 K
 - d. Terminal 8 of E₁ - open
 - e. Terminal 12 of E₁ - approximately 1.5 Meg.
 - f. Terminal 10 of E₁
BFO - ON - short
BFO - OFF - .150 K
- 2. Voltage check - line cord connected to 115 V AC mains. Power ON.
 - a. AC voltage-terminal 2 to 3 of E₂ - 115 VAC.
 - b. DC voltage-terminal 7 of E₂ to ground, + 320 V.
 - c. DC voltage-terminal 8 of E₂ to ground, + 150 V.

B. AUDIO CHANNEL CHECK:

1. CONTROLS:

BFO - OFF

Audio Gain - Maximum clockwise

Output Level - High

600 ohm 10 watt resistor across terminals 5 and 6 of E₁

AC VTVM across 600 ohm output load.

- 2. Connect audio generator to pin 7 of V₄. Set frequency to 1 KC.
- 3. Adjust input voltage for an output voltage of 36.0 - output waveform should just start to clip.

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4. Measure AC voltage at pin 7 of V6. Should be between 6.5 and 7.5 volts.
5. Measure voltage at pin 7 of V5. Should be between .2 and .25 volts.
7. Measure input voltage at pin 7 of V4. Should be between .03 and .04 volts.
8. Check frequency response of low pass filter through audi amplifier, E input constant at .07 volt at pin 7 of V4.
9. Adjust Audio Gain for AC voltage across 600 ohm load f 36.0 volt. Change generator frequency to 17 KC. Output drop across 600 ohm load with constant input should be 55 db or greater. If drop is less, then filter requires retuning.
10. Set generator for 36.0 volts across Terminals 2 and 3. Place Output Level switch in Low Position. Output should drop to between 8 and 9 volts.
11. Connect another 600 ohm resistor across terminals 2 and 3. Voltage across this load should be between 0.7 and 0.8 volts. Place Output Level switch in High position. Voltage should drop to zero. Leave switch-in High position for shipping.

C. 2nd MIXER OPERATION:

1. Turn BFO switch ON.
2. Measure D.C. bias - should be approximately:
V5 pin 2 - 30 VDC
V4 pin 1 - 10 VDC
V4 pin 7 - 0

If bias is present on pin 7 of V4, adjust tone threshold (R60) until bias becomes zero.

3. Tune generator to 17.00 KC. Connect generator to pin 7 of V4
E in = 5.0 volt.
4. Connect oscilloscope to terminal 2 to Z2 low pass filter.
5. Tune Z4 trimmer to obtain a zero beat pattern on the scope.
6. Remove generator. Measure 17 KC across 600 ohm load with Audi Gain fully on. Should be less than 6.0 volts.
7. Turn BFO switch to OFF.

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D. FIRST MIXER OPERATION (AS AMPLIFIER)

1. Connect Audio Generator through .01 mfd capacitor to pin 7 of V3 (1st mixer).
2. Connect AC VTVM to pin 1 of V4 (2nd mixer).
3. Tune generator for peak on meter within range of 17 KC to 21 KC. Adjust output to obtain 1.0 volt on meter.
4. Generator input should be approximately .5 to .6.
5. Vary generator frequency checking output drop of filter as follows:

<u>FREQUENCY KC'S</u>	<u>OUTPUT DROP + L DB</u>
17.4	3 db
20.5	3
17.2	6
20.8	6
16.6	45
21.85	45

E. 1st oscillator (variable) - When upper sideband indicator is ON - the oscillator center frequency should be 517.00 KC. When lower sideband indicator is ON, the oscillator frequency should be 483.00 KC:

1. Sideband switch set for Upper.
2. Measure bias on pin 1 of V7. Should be approximately -2 to -3V in both Upper and Lower sideband positions.
3. Connect R.F. signal to pin 7 of V3. Connect CRO to pin 5 of V3.
4. Place reactance balance control in its mid position.
5. Tune generator to 517.00 KC. Tune core of Z3 to obtain zero beat on CRO.
6. Switch sideband to Lower position.
7. Tune trimmer C29 to frequency of 483.00 KC.

F. 1st Oscillator (crystal)

1. Place correct crystals in sockets.
 Y₁ - 483.000
 Y₂ - 517.000

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2. Turn manual/Xtal switch to Xtal position.
3. Bias on pin 1 of V8 should be between 5.0 V. and 5.5 V. in Upper and Lower positions.
4. Measure crystal frequency by zero beat method.
Upper - 517000 \pm 50 cps.
Lower - 483000 \pm 50 cps.

G. I.F. AMPLIFIER AND 1st MIXER:

1. Connect signal generator to I.F. input jack, J1.
2. Connect VTVM HP - 410B AC probe to pin 7 of V3 (1st mixer).
3. Set signal generator as follows with unmodulated signal.
AVC - OFF. Check output on pin 7.

Frequency - 500 KC

<u>E In</u>	<u>E Out + 10%</u>
0.20	1.1
0.50	3.4
1.0	7.0
2.0	13.0

4. Flip AVC switch ON and FAST. Set signal generator as follows at 500 KC:

<u>E In</u>	<u>E Out + 10%</u>
0.20	1.1
0.50	3.4
1.0	7.0
2.0	13.0

5. AVC Check:

- a. Increase generator input to 1 volts.
- b. Switch AVC ON in FAST position. Note rate of output drop.
- c. Switch AVC OFF in SLOW position.
- d. Switch AVC ON in SLOW position. Note rate of output drop. should be slower than step (b).

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H. SENSITIVITY:

1. Turn BFO ON.
2. AVC - OFF
3. Set signal generator unmodulated to 499 KC to produce a 1 KC note at output.
4. Check sensitivity. Manual/Xtal, Upper/Lower
E in - less than 0.1
E out at 600 ohm load - 36.0

I. REACTANCE SHIFT:

1. Apply DC supply across 11 and 12 of E1, set voltage as follows and check frequency of oscillator by zero beat method. Adjust reactance balance control to obtain results.

<u>CONTROL VOLTAGE</u>	<u>FREQUENCY SHIFT ± 10%</u>	
	<u>UPPER KC.</u>	<u>LOWER KC.</u>
+ 4.5	+ 6.8	+ 5.8
+ 2.0	+ 4.0	+ 3.5
0	0	0
- 2.0	- 3.5	- 3.0
- 4.5	- 6.2	- 5.5

2. Retune oscillator for 483.00 KC in Lower position and 517.00 KC in Upper position with reactance control voltage set to zero.

J. BANDSPREAD CONTROL:

Check shift of oscillator with Bandsread control at each mark on panel. Reactance control voltage set to zero.

MIN VALUE + 20%

<u>DIAL</u>	<u>UPPER KC</u>	<u>LOWER KC</u>
- 3	- 2.9 to 3.5	- 2.2 to 2.8
- 2	- 2.1 to 2.5	- 1.6 to 3.0
- 1	- 1.0 to 1.2	- 0.8 to 1.0
0	0	0
+ 1	+ 1.1 to 1.3	+ 0.9 to 1.1
+ 2	+ 2.2 to 2.6	+ 1.8 to 2.2
+ 3	+ 2.9 to 3.3	+ 2.5 to 3.1

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K. Sideband Switching Remotely

1. Connect D.C. source to 7 and 8 of E₁, with negative lead on 8.
2. Vary voltage from zero to minus 9 volts.
3. Adjust relay threshold (R54) on rear panel so switching occurs between - 7.5 and - 8.0 volts.

L. Sideband Tone Generator

1. Turn BFO switch to ON.
2. Place AC VTVM on pin 7 of V₄.
3. Set D.C. voltage in at pin 7 and 8 of E₁ to - 5.0 volts.
4. Adjust tone threshold (R60) so that Sidetone Oscillator just starts.

NOTE: Oscillator will start at two positions of threshold. Correct position produces increased output of oscillator when control voltage goes more negative.

5. Decrease control voltage to maximum of -9.0. Oscillator output should increase to 2.5 volts.
6. Connect counter on 600 Ω output load.
7. Set sideband to Lower position.
8. Tune trimmer on Z5 for 500 cps output frequency. Be careful with screwdriver on trimmer screw slot.

NOTE: As trimmer is turned clockwise, beat note should drop in pitch.

9. Set sideband to Upper position.
10. Output frequency should be above 2.5 KC. If the output frequency is higher in Lower position than in Upper, then the leads are reversed on relay.

M. Phone Jack

Plug head set into phone jack. Output should be audible with drop of 2 db across load.

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V. FINAL CHECK:

- A. Connect speaker across terminal 4 and 5 of E₁.
- B. BFO - ON.
- C. Audio Gain as desired.
- D. Signal generator into I.F. input jack J₁ - tuned to 500.00 KC.
- E. Sideband on Upper/Manual
 1. Tune bandspread control to + position and note audio tone.
 2. Tune bandspread control to - position and note audio tone.
- F. Sideband on Lower/Manual
 1. Tune bandspread control to + position and note audio tone.
 2. Tune bandspread control to - position and note audio tone.
- G. Switch sideband to Upper/Xtal
 1. Tune signal generator 500 KC + audio note
 2. Tune signal generator 500 KC - audio note
- H. Switch sideband to Lower/Xtal
 1. Tune signal generator to 500 KC + audio note
 2. Tune signal generator to 500 KC - audio note
- I. Switch sideband to Upper/Manual
 1. Tune signal generator to obtain zero beat
 2. Switch sideband to Lower.
 3. No change of zero beat should occur.

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SENSITIVITY _____

REMOTE SELECTION UPPER/LOWER _____

SIDEBAND

SIDEBAND INDICATION LAMPS

XTAL - UPPER _____

UPPER _____

- LOWER _____

LOWER _____

MANUAL - UPPER _____

TOBE UPPER _____

- LOWER _____

LOWER _____

REMOTE TUNING - UPPER _____

- LOWER _____

AVC

- SLOW _____

- FAST _____

NOISE LIMITER _____

AUDIO GAIN _____

AUDIO OUTPUT _____

PAD _____

DATE _____

TESTED BY _____

