

DATE <u>1-5-61</u>	TMC SPECIFICATION NO. S -515	B
SH. <u>1</u> OF <u>12</u>		
COMPILED BY	TITLE:	JOB

APPROVED *R. Kohn*

TEST PROCEDURE FOR MODEL RFC-1

DATE 10/28/63
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TMC SPECIFICATION NO. S-515

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TITLE:

TEST PROCEDURE FOR MODEL RFC-1

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1. INTRODUCTION:

- A. The TMC Model RFC-1 is a conservatively rated multi band general purpose transmitter providing 1000 watts PEP over the frequency range of 2-28 Mc.
- B. The RFC-1 uses TV-100 (PL8295/PL-172) ceramic tube as power amplifier. Operated Class AB for linear operation. It is coupled to a pi network providing an unblanced output of 50 Ω . This stage is neutralized to provide stable operation throughtout complete frequency range.
- C. The TV-100 is preceded by two Class A amplifier stages. A 6146 is used to provide drive for TV-100. This stage is also neutralized for stable operation.
- D. The first amplifier is a 6CL6 tube, its grid is terminated into a low impedance input jack (J201) 70 Ω . This tube requires approximately 15 volts for full output.
- E. Feedback is used internally from TV-100 to cathode of 6146 to decrease 3rd order distortion by another -10db.
- F. An effective ALDC (Automatic Load and Drive Control) system has been included to limit high drive peaks or load changes. This can be connected externally or internally by connecting jumper (on E201).
- G. The amplifier stages are divided into five bands:

Band I	2-4
Band II	4-8
Band III	8-16
Band IV	16-20
Band V	20-28

- H. The Pi tank is divided into nine bands:

Band I	2.0-2.5	Band VI	8-12
Band II	2.5-3	Band VII	12-16
Band III	3-4	Band VIII	16-20
Band IV	4-6	Band IX	20-28
Band V	6-8		

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TEST EQUIPMENT REQUIRED:

- a. TMC VOX and SBE
- b. HP VTVM or equivalent
- c. TMC Spectrum Analyzer, PTE
- d. 50 ohm, 500W load.
- e. RF Ammeter 0-5A scale; or, Bird Model 43 wattmeter
- f. RFC-1 power supply system

PRELIMINARY TEST:

1. Inspect entire unit for bad solder connections and loose hardware.
2. Check counters and see that variable capacitors are fully meshed when counter indicates 000.
3. Check entire unit for mechanical imperfections.
4. Check entire unit for electrical imperfections.
5. Take continuity measurements between ground and various high voltage B⁺ points to insure there are no shorts to ground. Remove TV-100 from its socket.
6. Turn on A.C. switch and observe direction of blower rotation. Air should blow through TV-100 socket.
7. Measure A.C. filament voltage at TV-100 socket. Voltage should be 6.3VAC \pm 5%.
8. Turn internal voltmeter switch to "IPA BIAS" position and adjust bias control for -100 volt indication. Recheck this voltage at TV-100 socket with VTVM to insure application of bias directly to TV-100 tube.
9. Shut off A.C. power and reinsert TV-100 tube in its socket.
10. Connect VOX output to input jack J-201.
11. Turn A.C. power on.

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ALIGNMENT OF R.F. TUNED CIRCUITS:

2-4 Mc BAND:

1. Set VOX to 2.0 megacycles and adjust output for 1.0 VRF at J201.
2. Set driver band switch (S201) to position #1 (2-4 Mc Band).
3. Adjust trimmer capacitor (C202) to approximately half capacity.
4. Set 1st amplifier tuning capacitor (C203 and 232) to 0.5 on front panel. Turn meter switch (S204 to position 5 (1st amplifier Ep.) and tune L201 for maximum meter deflection.
5. Turn meter switch (S204) to position 6 (IPA Eg.). Set IPA grid tuning capacitor (C231) to number 1 on front panel and tune L219 for maximum meter deflection. Return meter switch to position 5 (1st Ampl, Ep).
6. Set VOX to 4.0 megacycles. Set 1st amplifier tuning capacitor to number 9 on front panel. Tune C202 for peak indication. Turn meter switch to position 6 (IPA Eg) and tune IPA grid tuning capacitor for maximum meter deflection. Pointer should be at # 9 on front panel.
7. If this is not true, low end of band (2.0 Mc) must be retuned after adding or removing capacity from C231 or C203 and C232 by changing initial setting on front panel.
8. Proper meter readings at 2.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	Min. 24.0 VRF
IPA GRID Eg	Min. 130 VRF

Proper meter readings at 4.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	22.0 VRF Min.
IPA GRID Eg	140 VRF Min.

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4-8 Mc BAND:

1. Set 6146 (V202) neutralizing capacitor (C229) to approximately 1/4 capacity.
2. Set driver bandswitch (S201) to position number 2 (4-8 Mc Band).
3. Set 1st Amplifier Tuning Capacitor pointer to 0.5 on front panel. Set IPA grid tuning capacitor to 0.5 on front panel. Turn meter switch to position 5 (1st Amplifier Ep) and tune L202 for maximum meter deflection.
4. Turn meter switch to position 6 (IPA Eg) and tune L220 for maximum deflection.
5. Set VOX to 8.0 megacycles. Tune 1st amplifier tuning capacitor to high end of band. Tune to peak and note pointer. Pointer should be at approximately number 9 on front panel. Tune IPA grid tuning capacitor to peak indication. This pointer should also point to number 9 on front panel. If one or both pointers do not point to number 9, the low end (4.0 Mc) will have to be RETUNED after either increasing or decreasing the capacity of the 1st amplifier tuning capacitor. Retuning consists of peaking L202 and L220. Check high end of band again.
6. Proper meter readings at 4.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	12.0 VRF Min.
IPA GRID Eg	120 VRF Min.

Proper meter readings at 8.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	18.0 VRF Min.
IPA GRID Eg	160 VRF Min.

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8-16 Mc BAND:

1. Set driver band switch (S201) to position number 3 (8-16 Mc Band).
2. Set 1st amplifier tuning capacitor pointer to 0.5 on front panel.
Turn meter switch to position 5 (1st amplifier Ep) and tune L209 for maximum meter deflection.
3. Set IPA grid tuning capacitor to 0.5 on front panel. Turn meter switch to position 6 (IPA Eg) and tune L223 for maximum deflection.
4. Set VOX to 16.0 megacycles. Tune 1st amplifier tuning capacitor to peak at high end of band. Pointer should be at approximately 8 on front panel.
5. Tune IPA Grid Tuning Capacitor to peak indication. Pointer should be at approximately 8 on front panel. If pointers do not point to 8, the low end (8.0 Mc) of the band will have to be retuned after either increasing or decreasing the capacity of the 1st amplifier tuning capacitor. Retuning consists of peaking L209 and L223. Check high end of band again and if not yet satisfactory repeat compensation process until band is tracking properly.
6. Proper meter readings at 8.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER	7.0 VRF Min.
IPA GRID Eg	78.0 VRF Min.

Proper meter readings at 16.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	13.0 VRF Min.
IPA GRID Eg	110 VRF Min.

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16-20 Mc BAND:

1. Set driver band switch to position 4.
2. Set 1st Amplifier Tuning Capacitor pointer to 5 on front panel. Turn meter switch to position 5 (1st Amplifier Ep) and tune L210 for maximum meter deflection.
3. Set IPA grid tuning capacitor to 6 on front panel. Turn meter switch to position 6 (IPA Eg) and tune L224 for maximum deflection.
4. Set VOX to 20.0 megacycles. Tune 1st amplifier tuning capacitor to peak at high end of band. Pointer should be at approximately 8 on front panel.
5. Tune IPA grid tuning capacitor to peak indication. Pointer should be at approximately 8 on front panel. If pointers do not point to 8, the low end of the band (16 Mc) will have to be retuned after either increasing or decreasing the capacity of the 1st amplifier tuning capacitor. Retuning consists of peaking L210 and L224. Check high end of band again and if not yet satisfactory repeat compensation process until band is tracking properly.
6. Proper meter readings at 16.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	10.0 VRF Min.
IPA GRID Eg	84.0 VRF Min.

Proper meter readings at 20.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	11.5 VRF Min.
IPA GRID Eg	95.0 VRF Min.

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20-28 Mc BAND:

1. Set driver band switch to position 4.
2. Set 1st Amplifier Tuning Capacitor pointer to 9 on front panel.
Set VOX to 28 MCS.
Turn meter switch to position 5 (1st Amplifier Ep) and tune L211 for maximum meter deflection.
3. Set IPA grid tuning capacitor to 9 on front panel. Turn meter switch to position 6 (IPA Eg) and tune L225 for maximum deflection.
4. Set VOX to 20 megacycles. Tune 1st amplifier tuning capacitor to peak at low end of band. Pointer should be at approximately 4 on front panel.
5. Tune IPA grid tuning capacitor to peak indication. Pointer should be at approximately 6 on front panel. If pointer does not line up on approximately 6, the high end of the band(28mc) will have to be retuned after either increasing or decreasing the capacity of the 1st amplifier tuning capacitor. Retuning consists of peaking L211 and L225. Check high end of band again and if not yet satisfactory repeat compensation process until band is tracking properly.
6. Proper meter readings at 20.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	7.2 VRF Min.
IPA GRID Eg	68.0 VRF Min.

Proper meter readings at 28.0 megacycles

E INPUT	1.0 Volts
1st AMPLIFIER Ep	8.5 VRF Min.
IPA GRID Eg	65.0 VRF Min.

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IPA NEUTRALIZATION

1. Connect 50 ohm load to output jack J-202.
2. Tune RFC-1 to 8 mcs, do not exceed 350 ma IPA plate current.
3. Turn High Voltage OFF and connect VTVM across IPA tank circuit. Increase drive for an indication of RF voltage on the VTVM.
4. Adjust neutralizing capacitor, C-255 for minimum VTVM indication.
5. Repeat above neutralizing procedure on 28 mcs. If setting of C-255 changes from what it was at 8 mcs a compromise setting should be used to maintain low VTVM indication. If take-off is experienced at any of the frequencies during the Power output/Signal-to-distortion tests, which follows, the IPA should be neutralized at that frequency.

POWER OUTPUT & SIGNAL-TO-DISTORTION TEST:

1. Connect test equipment and RFC-1 as per attached sketch. (Fig 1, Sh. II)
2. Tune to 2 mcs, with 2-tone AF drive to the SBE from the TTG on the PTE analyzer. Load the RFC-1 until the RFA on the 50 ohm load indicates 3.15 amperes, or, Model 43 Bird wattmeter indicates 405 W, or, a VTVM reads 225 VRMS across the 50 ohm load. The PEP output will be the required ONE (1) KW in either case.
3. The IPA plate current should be within 450 ma.
4. With the RFC-1 at 1 KW PEP measure the signal-to-distortion with the PTE analyzer.

REQUIREMENT: At ONE (1) KW PEP the S/D must be at least 40 db below the 2-tone level over the entire frequency range of the RFC-1.

5. Record the required data on the RFC-1 test data sheet.

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(CONTINUATION)

6. Repeat above procedure for the other frequencies listed on the RFC-1 test data sheet.

ALDC CHECK:

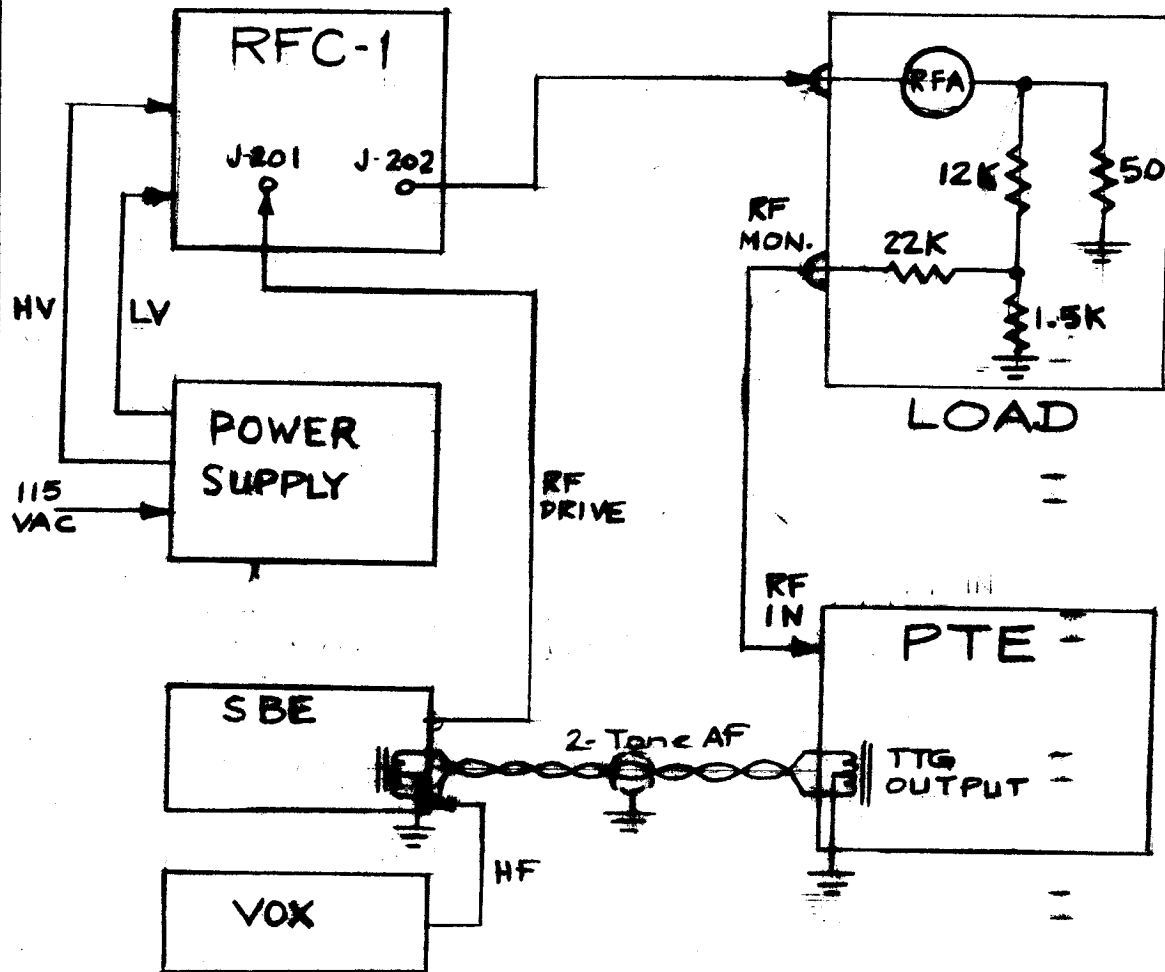
1. With the RFC-1 tuned to 28 mcs, or any other frequency within its range, turn off the drive and high voltage.
2. Remove jumper from terminals 1 & 2 of E-201 and connect across terminals 1 & 3.
3. Turn ON high voltage and adjust drive for 1 KW PEP output.
4. Increase ALDC voltage by adjusting ALDC potentiometer, R-228, on rear of chassis until RF output commences to decrease. Increasing the drive should cause little increase in the RFC-1 output.
5. Turn OFF drive and high voltage and disconnect the RFC-1 from the test equipment. The jumper across terminals 1 & 3 should be placed across on terminals 1 & 2 of E201. This concludes production testing of the RFC-1.

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FIGURE 1



RFC-1 & TEST EQUIPMENT HOOKUP

- NOTE:
1. Feed the HF drive directly out of the VOX to the RFC-1 during alignment tests.
 2. To minimize undesired pickup during S/D tests, the 2-tone AF should be run with a shielded twisted twin lead. The SBE AF input and TTG AF output should be connected for "BALANCED" line operation with the centertaps tied to the shield of the cable and grounded to the TTG and SBE chassis.

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Model RFC-1
 Test Data Sheet

1. General Inspection.....
2. Alignment of Controls & Knobs.....
3. Alignment of RF circuits.....
4. Neutralization.....
5. AIDC Check.....
6. Power Output & S/D Test; Reqmt: At least 40 db below 2-tones at ONE (1) KW PEP output.

F	Driver BAND	IPA BAND	Grid TUN'G	1st. AMP TUN'G	IPA TUN'G	IPA LOAD'G	IPA LOAD SW.	IPA Ep DC V	IPA Ip MA	IPA Ep RF V	I KW PEP S/D (db)
2	2-4	2-2.5									
4	4-8	4-6									
8	8-16	8-12									
16	16-20	12-16									
28	20-28	20-28									

NOTE: ONE (1) KW PEP with 2-tones obtained with:- 3.15 amperes RF thru 50 ohm load,
 or, 225 V RMS across 50 ohm load,
 or, 405 W with Bird wattmeter Model 43.

Tested by _____
 Approved by _____
 Date _____

