DATE 2/3/64 SHEET 1 OF 6	TMC SPECIFICATION NO. S- 809	A
W.P. COMPILED / W.A. Palmer CHECKED	TITLE:	
APPROVED		

PRODUCTION TEST PROCEDURE

FOR TMC MODELS

TTRT 1 thru 4

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The TTRT () is a series of plug-in fixed-tuned modules. Each module converts a low level 1.75 MC sideband signal to the operating frequency. Each consists of oscillator, buffer, balanced mixer, and three amplifier stages. Output power is .25 watts minimum with distortion products 35 db or more below PEP - sufficient to drive any TMC linear amplifier (eg. PAL-350. PAL-1k etc.) to full power. TTRT-1 covers the tuning range from 2 to 4 MC; and TTRT-2 from 4 to 8 MC; TTRT-3 from 8 to 16 MC; and TTRT-4 from 16 to 32 MC. Oscillator frequency may be pulled slightly to correct for crystal grinding tolerances. The unit accommodates two panel selected crystals either with or without a miniature oven (OC 100-()) crystal frequency and oven use is specified by the customer on the sales order. Frequency control is 1.75 MC above the operating frequency. This is accomplished by fundamental mode crystals. Above 16 MC, the crystal frequency is one half the injection frequency and the buffer becomes a doubler.

A. EQUIPMENT REQUIRED

1. 1.75 MC test set with cable or TTR 10 or SME 1 or TTR 40 with extension module AX 436.
2. Oscilloscope tektronix 545 or equivalent.
3. RF VTVM, HP 310 or equivalent.
4. Schematic diagrams CK 689, 690, 691, 692.
5. Frequency counter, H-P 525 or equivalent.
6. Coaxial "T" connector UG 274 A/U.
7. Resistors as required in figure 1.
8. Ballantine model 314 AC VTVM.

B. PRELIMINARY INSPECTION

1. Remove covers (MS 3378 and MS 3377) and inspect for mechanical defects.
2. Check for wiring defects especially on the oven supply cable ends and shield as the cable may carry high voltage.
3 Check transistor orientation. Most of the transistors used have 4 leads and may not be installed correctly.

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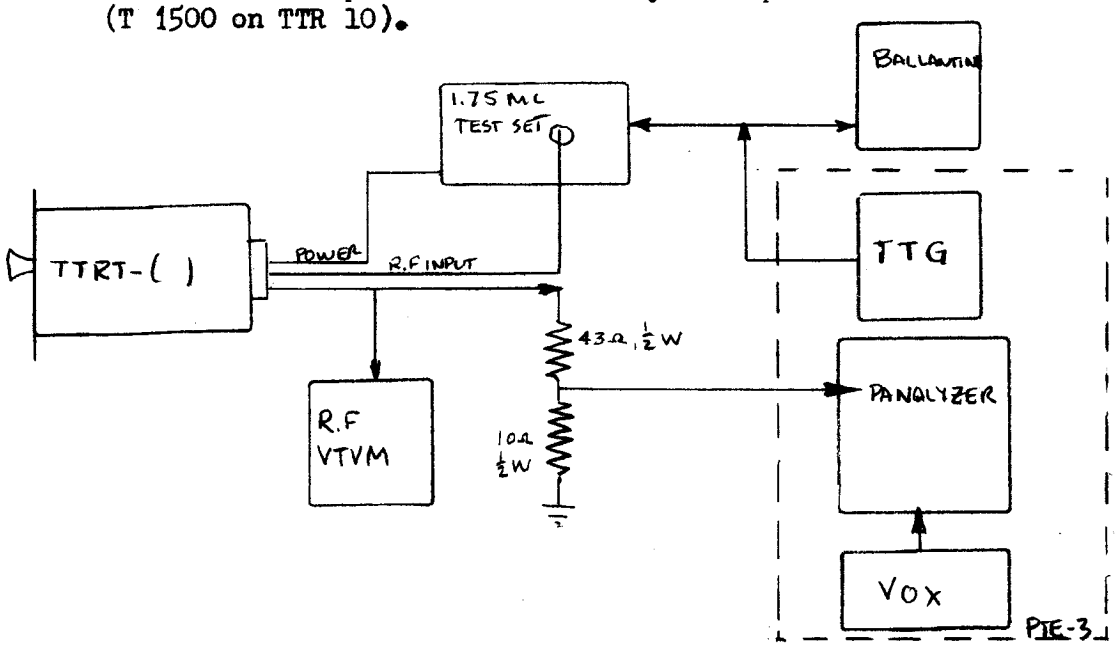
Polarizing tab should be lined up with the white spot on the board.

C. PROCEDURE

1. Install crystals in oven (OC-100-) or socket (XY 1, XY 2) as specified by the customer.
2. Connect unit to test set as shown in following diagram or to extension module (AX 436) in TTR- 10, SME-1, or TTR-40. If tested with the TTR-10 or TTR-40 put PA OVLD control in up position to remove energy from the linear amplifier, and measure output across secondary of input transformer (T 1500 on TTR 10).



3. Set TTG on TONE 1 and adjust AVON output control while monitoring output with Ballentine 314 for 14 mv RMS.
4. Set AUDIO TONE SELECTOR to OFF.
5. Replace left side plate (MS 3378) to cover printed wiring side of board.
6. Turn adjustment (D) maximum counterclockwise.
7. Apply power to module.

CAUTION

Do not plug TTRT-( ) into energized connector as transients caused by this action may destroy the 2N2219A in the output amplifier

8. Attach scop probe to TP-1. There sh uld be a clean sine

9. wave at this point which is 1.75 MC above received frequency. Attach scope probe to TP-2. Signal level shall be at least .6 volts. On TTRT-4, adjust screw (F) until the pattern at figure 2 is maximum. Be careful not to peak up on any of the patterns of figure 3.

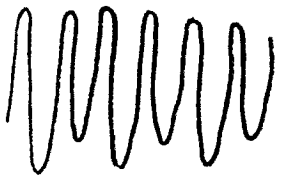
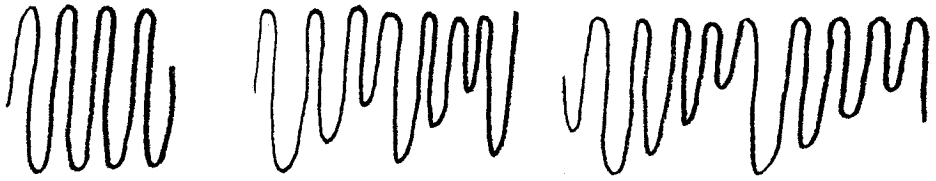


Fig. 2 2nd Harmonic



FUNDAMENTAL 3rd HARMONIC 4th HARMONIC

Fig. 3

10. Attach test probe to TP-3 and increase scope gain to maximum.

11. Remove 1.75 Kc signal at Test Jig.

12. Tune screw (E) for maximum oscillator signal.

13. Adjust Balance Potentiometer for Minimum Signal.

14. Reconnect 1.75 Kc signal at test jig.

15. Set audio tone selector on TTG to Two Tone.

16. Starting at maximum capacitance, re-adjust screw (E) for Pattern in Figure 4. Scope speed should be approximately 1 ms/cm.

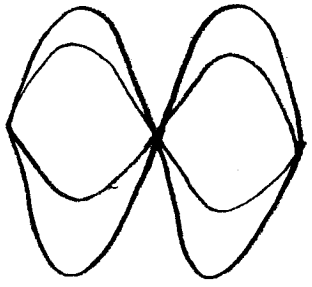


FIGURE 4.

17. Attach scope probe to stator of capacitor (C). Adjust screw (C) for maximum two-tone pattern. Screw (D) may have to be rotated slightly clockwise to get an indication.

NOTE

In steps 17 through 19 these general rules should be followed: use minimum setting of screw (D) (minimum is counterclockwise) which will give a scope indication; readjust capacitors (E), (C), (B) when moving probe to next capacitor. **Initial adjustment of capacitors should be from maximum capacity.**

18. Repeat step 17 with capacitor (B) also readjusting (C) and (E) for peak indication.
19. Adjust capacitor (A) with scope probe across load, keeping output voltage below 3.2 VRMS by resetting (D) as needed.
20. Install right side plate, slight repeaking of (A), (B), (C) and (E) may be necessary.
21. Distortion products as indicated by panalyzer should now be 35 db below PEP (add 6db reading from tone peak for PEP). Slight re-adjustment of the tuning controls may be necessary to accomplish this at first. The 2N2219 sometimes needs to age in 15 to 30 minutes before intermodulation is at a minimum.
22. Attach frequency counter to load.
23. Switch test set or equipment used to power TTRT-( ) to +6 DB CARR (AM).
24. Set AUDIO TONE SELECTOR on TTG to OFF.
25. The crystal frequency adjustment can be set for only one crystal. Generally the sales order will specify one frequency as the operating frequency and the other as an alternate or CW frequency (in the TTR, CW signal is approximately 1KC away from carrier frequency so a crystal should be used for FZ to bring the radiated signal back to the correct operating frequency). Set the panel switch F1-F2 to the crystal for the operating frequency.

    NOTE: Crystal retaining plate MS3446 must be in place (if ovens are not used) before adjusting frequency.

26. Adjust panel mounted capacitor (C*01) for the operating frequency specified. If ovens are to be used, connect oven supply leads of the cable to the proper voltage as indicated on the oven and sales sheet, and allow 15-30 minutes for the crystals to reach operating temperature before adjusting the frequency control.

27. This completes tune up procedure. Turn screw "D" counterclockwise to stop and remove power.

DATE 2/3/64 SHEET 6 OF 6	TMC SPECIFICATION NO. S - 809	A'
WP COMPILED / W.A. Palmer CHECKED	TITLE: PRODUCTION TEST PROCEDURE FOR TMC MODELS TTRT-1 thru 4	
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THE TECHNICAL MATERIEL CORPORATION
MAMARONECK N.Y.

TTRT - _____ TEST DATA

SERIAL NO. _____
MFG. NO. _____

MECHANICAL _____ OK
WIRING _____ OK
TRANSISTOR ORIENTATION _____ OK
INJECTION VOLTAGE, TP-Z _____ VOLTS P-P
DISTORTION PRODUCTS ACROSS LOAD _____ db BELOW PEP
• (ADD 6db TO READING FROM EVELOPE MAXIMUM)
FREQUENCY AND CHANNEL F1 _____ MC F2 _____ MC
CH _____

DATE _____
TESTER _____

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REVISION SHEET	THE TECHNICAL MATERIEL CORP. MAMARONECK NEW YORK	S-809 LIST NO.

DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
2/3/64		1 of 6		O= ORIGINAL RELEASE FOR PRODUCTION.	
3/8/65	A	4,5	13616	Revised shts.4,5 per EMN	