DATE 27 January 1964 SHEET 1 OF 11	TMC SPECIFICATION NO. S - 782
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APPROVED	

PRODUCTION TEST PROCEDURE

FOR

RECEIVER-TRANSMITTER SYSTEM TTR-10(V)

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 430M

DATE 27 January 1964	TMC SPECIFICATION NO. S- 782	Ø
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I. INTRODUCTION

The TMC model TTR-10(V) is a transmitter-receiver system comprised of various other units. These units include models TTRR-( ) receiver converters, TTRT-( ) transmitter converters, TTRA-( ) amplifier modules, and main chassis assembly AX-418. In addition, the system may utilize remote control systems TPC-1 and antenna tuner model TTC-1 . All units within the system should be tested and passed by the Test Department prior to their installation in the system. This specification covers testing of a single channel and should be repeated for additional channels as required.

II. EQUIPMENT REQUIRED

1. HP-410 VTVM.
2. HP-606A RF Signal Generator.
3. TMC model PTE-3 spectrum analyzer.
4. A two tone RF signal source, TMC models TTG, VOX, SBE-2 or SBE-3.
5. Ballantine Model 314 AC VTVM.
6. Dummy Load, 50 ohms, ±5% 100 watts minimum dissipation, non-inductive.
7. Schematic and block diagrams:

   CK-693, 694, 659, 653, 654, 655, 656, 683, 684, 685, 686, 689, 690, 691, 692.

8. Step attenuator, 50 ohms, DAVEN 65173 or equivalent.
9. 600 ohms resistor, 1 watt.
10. Frequency counter, HP-524C.
11. BNC "T" adapter UG-274A/U.
12. Sonic Analyzer, LP-1A.
13. AX-436 Extension Module.

III. PROCEDURE

IIIA. General -

1. Install models TTRR-( ), as per customer request for frequency channel.

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2. Do not install ancillary equipment at this time.

3. Set VOLUME control on front panel maximum clockwise.

4. Set PA METER switch to I_b position.

5. Set SIMPLEX-DUPLEX switch to SIMPLEX.

6. Set PTT-VOX switch to PTT.

7. Set XMTR AF GAIN maximum clockwise.

8. Set both sideband selectors to USB/REMOTE.

9. Set PA OVLD breaker to UP position.

10. Set ANTI-VOX control maximum counter-clockwise.

11. Set SQUELCH control maximum clockwise.

12. Set the mode switch to SSB position.

13. Set VOX GAIN maximum counter-clockwise.

14. Set RECEIVER CHANNEL selector to "T" position.

15. Set TRANSMITTER CHANNEL selector to Channel 1.

16. Set LINE-MIKE switch on the rear of the main chassis to LINE.

17. Set power switch to OFF.

18. The oven voltages utilized in the converter modules should be specified by the customer and stamped on the ovens within the module. If external oven voltage is specified, this voltage should agree with the voltage stamped on the ovens and should be applied through jack J901 from the source. The OVEN VOLTAGE switch on the rear of the power supply section of the TTR-10 should be set to EXT if the above applies. For oven voltages corresponding to the source voltage of the power supply, the OVEN VOLTAGE switch should be set to INT providing the power supply source voltage agrees with the voltage stamped on the ovens within the converter modules.

IIIB. Receiver Testing -

1. Connect a 600 ohm resistor between terminals 1 and 3 on TB1501.

2. Check that the jumper is installed between terminals 8 and 9 on TB1501.

3. Connect the HP-606A to the ANTENNA jack on the rear of the TTR-10; set at zero output.

4. Set the power switch to REC position. The red POWER indicator should light.

5. Connect the Ballantine VTVM between terminal 8, TB1501, and ground, (chassis).

6. Set the signal generator for an output of 100 mv at the operating frequency noted on the receiver converter frequency nameplate for Channel 1.

7. Tune the frequency generator for a beat note(e.g. 1 KC) on the speaker. Reduce signal generator output until beat note just exceeds noise. NOTE: Some generator retuning may be required as output is reduced.

8. Adjust VOLUME control for a comfortable listening level and obtain reading on the Ballantine VTVM.

9. Adjust receiver converter tuning capacitors A through E, in that order, for peak indication on the Ballantine. Signal generator output should be reduced to maintain signal level just above noise.

10. Adjust signal generator output to 1 microvolt.

11. Set the Ballantine to the 1 volt full scale position and adjust VOLUME control for a full scale (+20 db on red scale) deflection. This is the SIGNAL + NOISE level.

12. Remove signal generator input connection to ANTENNA jack and connect the 50 ohm dummy load. Read the output now indicated on the Ballantine using the SIGNAL + NOISE level as a +20 db reference. The output on the Ballantine is the NOISE level in db.

13. The difference between the levels obtained in Steps 11 and 12 is the SIGNAL + NOISE ÷ NOISE ratio. This ratio should be not less than 20 db. Record this ratio on the check sheet.

14. Remove the dummy load and reconnect the signal generator and retune if necessary to obtain beat note. Set output at 1 microvolt.

15. Adjust the VOLUME control to obtain a 0db reading with the Ballantine set on the 1 volt full-scale range.

16. Using the step output attenuator on the signal generator, increase the output 100 db to .1 volts. The Ballantine should show an increase in output not greater than +10 db.

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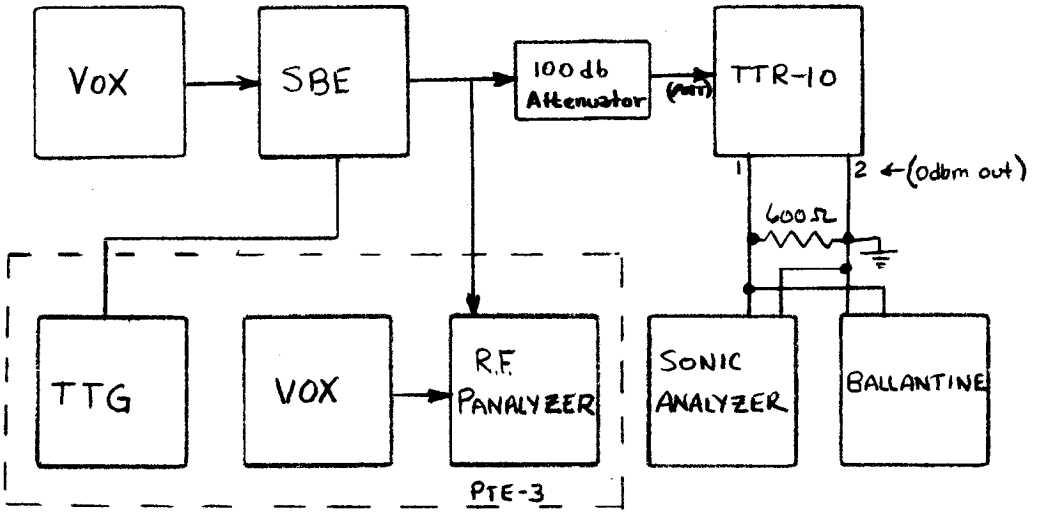
17. Disconnect the signal generator and install additional equipment as shown below:



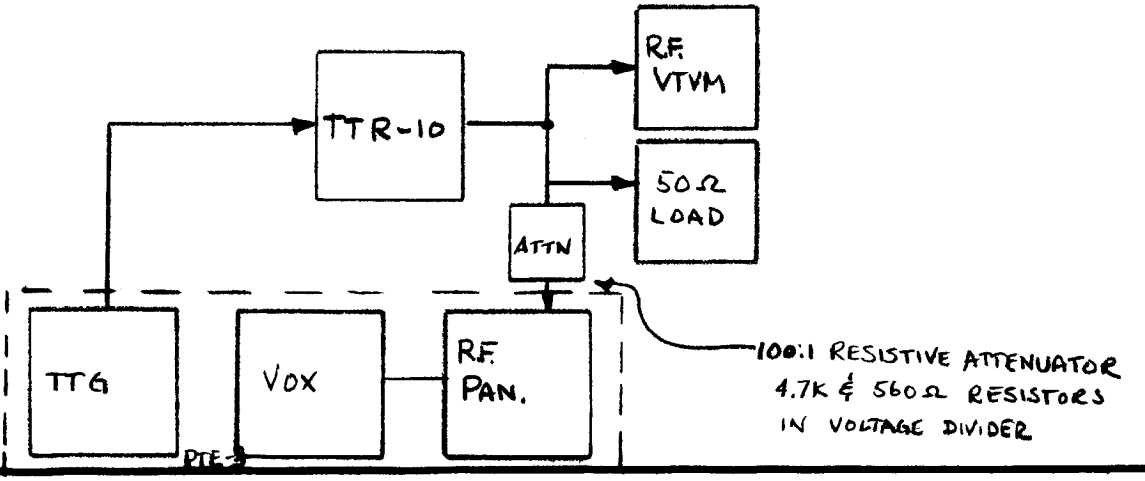
18. The input 3rd order distortion to the attenuator as part of the SBE output should not be less than 40 db below each tone at .1 volt RMS output. The attenuator setting of 100 db should produce a reading of 390MV across terminals 1 and 2 of TB1501. Readjust R1612 on the RCVR IF printed circuit board to obtain 390 MV if required. Do not readjust R1612 when testing channels 2, 3, and 4.

19. The distortion shown on the sonic analyzer should be a minimum of 29 db below tone 1.

20. Repeat Steps 1 through 19 for channels 2, 3, and 4 if required.

IIIC. Transmitter Testing -

1. Remove test equipment for receiver testing and connect as shown below:



2. Install models TTRA-( ) amplifier modules to correspond to operating frequencies specified by the customer. Pre-set these modules as indicated on the tuning chart on Page .

3. Set PA OVLD breaker to down position and power switch to XMIT/REC. Allow three minutes to warm up.

4. Install the AX-436 extension module in channel 1.

5. Mount the TTRT-( ) for channel 1 into the AX-436.

6. Set control "D" on the TTRT-( ) maximum counter-clockwise.

7. Set the TTG output on TONE 1 at 1 MV between terminal 6, TB1500 and ground.

8. Ground terminal 8, TB-1500. The antenna relay should energize and the panel meter on the TTR-10 should read 50 MA with the PA METER switch in the 1db position.

9. Set control "D" on the TTRT-( ) about 1/8 turn clockwise. Note any change in PA plate current. If an increase in plate current is evident, adjust the IPA TUNING control on the TTRA-( ) for a peak reading. Do not allow plate current to exceed 150 ma.

10. Adjust controls "B", "C", "E" on the TTRT-( ) for a peak meter reading. Note the plate current, do not exceed 150 ma.

11. Re-tune the IPA for a peak reading.

12. Adjust the PA TUNING control for a dip (null) in plate current. An increase in control "D" on the TTRT-( ) may be required to obtain enough current for a good dip indication.

13. Retune IPA for peak current indication.

14. The adjustments PA TUNING and PA LOADING on the TTRA-( ) should be adjusted as a conventional pi-network in conjunction with drive control "D" on the TTRT-( ) for 50V RMS across the dummy load. Proper plate currents are noted on the chart on page . Optimum conditions are usually obtained at compromise settings of minimum drive and plate current to obtain 50V RMS output.

15. Leave control "D" set at position obtained in Step 14 and reduce TTG AUDIO OUTPUT control to zero.

16. Set AUDIO TONE SELECTOR on the TTG to TWO TONE position.

17. Increase TTG output to obtain 70.7 VRMS across the dummy load. The plate current required should be the same as obtained in Step 14.

18. The intermodulation distortion products as indicated on the panalyzer should be a minimum of 30 db below each tone of the two tone test. Improved

intermodulation distortion figures may be obtained by readjustment of control "A" on the TTRT-( ) and PA pi-network adjustments in conjunction with the AUDIO OUTPUT control on the TTG.

19. Remove ground from terminal 8 on TB-1500. The transmitter plate current and output voltage should drop to zero.

20. Remove TTRT-( ) from extension module AX-436.

21. Replace extension module with the TTRT-( ).

22. Ground terminal 8, TB-1500. The output voltage, plate current and intermodulation figure should be the same as in Step 18. Record on Test Sheet, Page .

23. Set the TTG to TONE 1.

24. Reduce AUDIO OUTPUT of TTG to zero.

25. Set LINE-MIKE switch on the rear of the TTR-10 to the MIKE position.

26. Increase AUDIO OUTPUT of the TTG and adjust R1719 on the XMTR AF printed circuit board to obtain 50 VRMS across the dummy load with 28 volts RMS at terminal 6, TB-1500. Lock R1719, remove ground from terminal 8, TB1500, and audio input at terminal 6, TB1500. Reset LINE-MIKE switch to LINE.

27. Using handsets , check the operation of the PTT function and microphone inputs at the HANDSET jack on the front panel of the TTR-10.

28. Check the VOX operation using the **hand set** . Rotation of the ANTI-VOX control clockwise should require a more clockwise rotation of the VOX GAIN control to key the unit.

29. Repeat Steps 4 through 22 for additional channels.

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TMC SPECIFICATION NO. S-782

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TTR-10 TUNING CHART

TTRA-( ) #	FREQ. MC	P.A. TUNING	P.A. LOADING	Eg (TYPICAL)	Ib (TYPICAL)
TTRA-1	2	1	2	36	170
	2.2	1	2	33	160
	2.2	2	2	33	165
	2.5	2	3	32.5	165
	2.5	3	3	35	165
	3.1	3	3	30.5	160
	3.1	4	3	35.5	175
	4.0	4	4	33.5	170
	4.0	1	2	32.5	160
	5.0	1	3	31	160
	5.0	2	3	30	155
	6.3	2	4	30.5	155
	6.3	3 & 4	4	30	150
	8.	3 & 4	5	30	162
	8.	1	3	28.5	160
	9	1	3	28	155
	10	1	3	28	150
	10	2	3	28	150
	11	2	3	28	150
	12.6	2	4	28	155
	12.6	3 & 4	4	29	150
	14	3 & 4	4	29	150
	15	3 & 4	4	27	150
	16	3 & 4	4	26.5	145
	16	1	3	28	145
	18	1	4	28.5	150
	20	1	4	27.5	150
	20	2	4	31	160
	24	2	4	28	165
	24	3	4	29	160
	28	3	4	25.5	160
	28	4	4	27	155
	32	4	5	25	155

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CHECK CHART

TTR-10(V) SERIAL NO.: _____
MFG. NO.: _____

RECEIVER

MODEL	SER. NO.	MFG. NO.	CHANNEL	FREQUENCY	DISTORTION PRODUCTS	AGC INCREASE	INTERMOD.
TTRR-			1	F1 F2			
TTRR-			2	F1 F2			
TTRR-				F1 F2			
TTRR				F1 F2			

TRANSMITTER

TTRT-				F1 F2	
TTRT-				F1 F2	
TTRT-				F1 F2	
TTRT-				F1 F2	

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Clipper Adjustment_____

VOX and ANTI-VOX OP. check_____

Handset Op. check_____

DATE:_____

TESTER:_____

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REVISION SHEET	THE TECHNICAL MATERIEL CORP. MAMARONECK NEW YORK	S-782 0 LIST NO.

DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
3/5/65		1 of 11		0=ORIGINAL RELEASE FOR PRODUCTION.	

DATE 3 March 1965	TMC SPECIFICATION NO. S-782-1	Ø
SHEET 1 OF 6		
RDC COMPILED / CHECKED	TITLE:	
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SUPPLEMENTARY TEST PROCEDURE

for

CUSTOMER SPECIAL REQUIREMENTS

ORDER #_____

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. STOCK NO. 430M

TMC SPECIFICATION NO. S-782-1

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TITLE: SUPPLEMENTARY TEST PROCEDURE f r CUSTOMER SPECIAL REQUIREMENTS

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mtp ORDER #_____

INTRODUCTION

This specification supplements S-782, and covers the testing of th TTR-10 to a customer's special specifications.

SUPPLEMENTARY EQUIPMENT

1. WA-623/RC Voice Terminal (GAALT).
2. Dummy Load (receiver) DL101-4 (47 ohms).
3. VSWR Ratio Meter, Type SWR-1K.
4. 40 and 400 ohm Dummy Loads.

(THIS PROCEDURE REQUIRES TEST SET-UP FROM S-782, SECTION III.)

I. Test for Simultaneous Transmission and Reception (Duplex Operation)

1. Install modules in Channels A and B as follows:

   Receive A: 2.826 MC in TTRR-1 Module (Crystal Freq. 4.576 mc).

   Receive B: 4.893 MC in TTRR-2 Module (Crystal Freq. 6.643 mc).

   Transmit A: 3.3985 MC in TTRT-1 Module (Crystal Freq. 5.1485 mc).

   Transmit B: 5.4455 MC in TTRT-2 Module (Crystal Freq. 7.1955 mc).

2. Set Simplex-Duplex switch to the Duplex position.

3. Set both sideband selectors to Upper Sideband mode.

4. Connect "Transmit" dummy load - 50 ohm, 100 watt, to the main antenna jack marked "Antenna" at the rear of the set.

5. Connect dummy load, DL101-4, in place of the BNC connector marked "R - ceiver Antenna J1502" to be found at lower part of rear apron.

6. Set rec iver channel to r ceiv r Channel A. This will be det rmin d by the modul position into which above modules wer positioned.

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7. Set Transmitter Selector to position of module Channel A. For proper operation of the transmitter, it should be operated in accordance with instructions found in the basic test procedure for 100 watts PEP.

8. With the Ballantine Meter connected across the audio output, s t the audio gain controls to indicate the noise from the module at some conv ni nt level. (This is similar to the NOISE test in the basic procedure.)

9. Now, while observing this level, operate transmitter to produce 1., full PEP carrier and 2., -20 dbm input single tone sideband modulation. Noise lev l, as read on the Ballantine, should NOT change for unit to be acceptable.

II. Sensitivity for 1 Microvolt, with 30% AM Modulation

1. Set up equipment per S-782, Section III B.

2. Set Signal Generator for an output of 1 microvolt at the operating frequency noted on channel under test.

3. Set Signal Generator to AM 1 KC tone 30% modulation.

4. Set Ballantine to 1 volt full-scale condition, and adjust volume c ntrol to produce full-scale deflection on the Ballantine (+20DB).

5. Remove Signal Generator and connect 50 ohm dummy load across Ant nna Input.

The output now shown on the Ballantine is the noise level in DB.

The difference between the first and second readings is the differ nc in Signal + Noise-to-Noise. To compute:

reading A minus reading B = result, and must be greater than 15 db for unit to be acceptable.

NOTE RESULT ON TEST SHEET.

Repeat this procedure for each receiving channel.

III. Residual Noise on Carrier

1. With dummy load connected to transmitter, and 100:1 attenuator conn cted to dummy load as in Section III C, transmit PEP carrier and set PTE-3 for full-scale indication.

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2. Remove carrier by switching to SSB.

3. Advance attenuators of PTE-3 to permit viewing 40 db below PEP indication. There should be no residual noise or other indications at this time.

RECORD RESULTS ON TEST SHEET.

IV. 40 to 400 Ohm Output Tuning Test

1. Connect SWR ratio meter to antenna of TTR-10.

2. Connect 40 ohm dummy load to output of SWR meter.

3. Set transmitter to Channel A, and adjust IPA and PA module for maximum PEP output and minimum VSWR. NOTE THIS RATIO.

4. Repeat for Channel B.

5. Remove 40 ohm dummy load and connect for 400 ohm dummy load.

6. Re-tune IPA and PA to maximum output and minimum VSWR for each channel.

RECORD THE RESULTS OF EACH PROCEDURE.

For acceptance, with VSWR of 3:1 or less, into each of the loads specified, maximum PEP of 100 watts must be achieved.

V. Checkout of TTR-10 With WA 623 Voice Equipment

1. This test should be performed after TTR-10 equipment is mounted, tog th r with the WA 623 unit, in the equipment rack and connected as shown in int r-connect diagram _____.

2. Connect HF-100-3D microphone to terminals of WA 623 Unit, through auxiliary panel.

3. Turn a-c power of both units ON, and put TTR-10 in "Receive" position.

4. Put "Simplex-Duplex" switch in "Duplex" position.

5. Place both sideband selectors in "Upper Sideband Remote" positions.

6. Set PTT-VOX switch to VOX position.

7. Advanc v lum control on front panel until background nois is plainly heard in TTR-10 loudsp ak r.

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8. Place WA 623 metering switch in "Receive" position, and observe defection. Meter should show indication that signal being heard is causing the met r to d - flect. Position THRESHHOLD control to approximately 5 dbm above noise level. (See WA 623 installation and operating instructions, Chapter 2.)

9. With this adjustment, the noise from the receiver should be heard in the receiver of the telephone headset.

10. To check transmitting phases, connect an oscilloscope to the dummy load of the transmitter to indicate when transmitter is "ON THE AIR". (See Section III C of basic procedure.)

11. Condition WA 623 to trensmit operating by setting send-gain to position 4, and meter to "SEND".

12. Depress "RING" switch and set VOX threshhold so ring-tone activates transmitter of TTR-10, as indicated in scope.

13. Release "RING" switch and set ANTI-VOX until transmitter-carri r is turned off.

14. Talk into microphone and observe if transmitter goes into the transmit condition. If not, adjust VOX control or SEND-GAIN control until this is accom- plished reliably when the microphone is used with a normal tone of voic .

15. As long as transfer functions and satisfactory reception are experi nced during the above tests, equipment compatability is demonstrated and unit is acceptable.

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APPROVED: Mtp		

SUPPLEMENTARY TEST DATA SHEET FOR TTR-10

per

CUSTOMER'S SPECIAL REQUIREMENTS

ORDER # _____

SERIAL NO.: _____

MFG. NO.: _____

1. Test for simultaneous transmission. _____ OK

2. a. Sensitivity for 1 microvolt with 30% modulation. _____ OK
   b. Signal + Noise-to-Noise ratio. _____ DB

3. Residual noise on carrier. _____ OK

4. a. 40 ohm load. _____ OK
   b. 400 ohm load. _____ OK

5. TTR-10 with WA 623:

   a. RING (VOX) _____ OK
   b. Push-to-talk _____ OK

TESTER: _____

DATE: _____

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MAMARONECK NEW YORK

S-782-1
LIST NO.

DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
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NO. S 782-Z

REV: 0A

COMPILED: RDev | CHECKED: | APPD: 6/4/65 | SHEET 1 OF 4

TITLE:

Typed by mtp 4/23/64

ADDENDUM TO TEST PROCEDURE

for

TTR-10 SPECIAL (IMMIGRATION)

I. PRELIMINARY

The major differences between the TTR-10 and TTR-10 Special are as follows:

1. In the TTR-10 - only one (1) receiver module is operative at any one time.

2. The receiver module can be chosen either by the Receiver Knob, or by the XMTR Knob when the Receiver Knob is in the "T" position.

3. The RF modules can be switched to one of two closely spaced incoming frequencies.

4. In the TTR-10 Special - the receiver modules are controlled by the Receiver Knob only, in two (2) different modes:

a. In Positions 1 thru 4, only one (1) receiver module is operative at any one time.

b. In the "T" position, all four receiver modules are operating simultaneously.

5. The RF modules can be switched to either one of two closely spaced incoming frequencies, or to neutral.

II. In order to avoid positive feedback and consequent oscillation when operating at the same frequency for XMTR and Receiver in the CW Mode, the following features were added:

1. When the key is depressed, the AGC level to the RF modules is increased, thereby blocking the transmitted signal from entering into the RF modules.

2. When the key is released, the +12V to the XMTR RF modules is r moved, ther by making the modules inoperative.

a. The +12V to the XMTR AUDIO board is r placed by -12V, thereby making the AUDIO module inoperative.

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COMPILED: RDeV	CHECKED:	APPD:	SHEET 3 OF

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Typed by mtp 4/23/63

III. Test the TTR-10 Special in the SSB MODE according to Test Specification S-782.

1. Set LINE MIKE SWITCH to LINE, SIMPLEX-DUPLEX to DUPLEX, PTT-VOX to PTT, and short Pin 8, TB1501, to GND.

2. Set Signal Generator to 3 uv at one of the operating frequencies.

3. Set XMTR Knob to the above module, and Receiver Knob to "T". Measure 0 DBM = .78 VRMS across the 600 ohm load.

4. Depress key and adjust output for 50W i.e. 50 VRMS.

5. Key the transmitter on and off, and listen in between the keying to the signal from the Signal Generator coming through loud and clear, and without any time delay.

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6/7/65		1 of 2		O=ORIGINAL RELEASE FOR PRODUCTION.	
2/23/66	A	all	15824	Revised per EMN	

TMC FORM MLR-1 2-65—AINS.