COMPLETE TEST INSTRUCTIONS

FOR

MFTR-10K TRANSMITTER

TEST EQUIPMENT REQUIRED

A. Simpson 260 Multimeter or equivalent.

B. TER-25K 50 ohm unbalanced load.

A. NOTE TO TESTER

The three phase power input leads are not to be connected to the transmitter until so directed in this test specification.

B. MECHANICAL INSPECTION

1. Check all knobs and switches on the frame for proper operation.

2. Carefully check the PA compartment for good mechanical condition, obvious miswiring and loose connections.

3. Check the arrows on the Directional Coupler for the proper directions. Two diodes are incorporated in this coupler. The 25 Kw diode is for the forward power and the arrow must be pointing up. The second diode is for the reflected power and the arrow must be pointing down. At this time the inspection of the diodes should include checking to see that the diodes are properly seated in their sockets and making proper electrical contact. Also check the two coaxial leads with the fittings to see that they are secured properly to the front and the back coaxial fittings on the directional coupler.

C. PRELIMINARY

1. Check the 3 power input phases for shorts to ground; reading should be approximately 1 megohm.

2. Adjust time delay relay M302 to 5 minutes.

3. Pre-set overload adjustments as follows:

2R302	PA Bias	Fully	CW
2R308	PA Plate	"	CW
2R312	PA Screen	"	CCW
2R324	IPA Voltage	"	CW
2R317	Driver Plate	"	CW
2R318	IPA "A" Plate	"	CW
2R321	IPA "B" Plate	"	CW

The above procedure allows the transmitter H.V. to be energized without overload under normal conditions.

4. Pre-set all bias adjustments fully CCW. This applies full available bias to all tubes for initial energizing of H.V.

5. Set exciter unit to standby position.

6. Connect extender card for overload board and extender cable from driver output to PA tube.

7. Connect the 3 phase input power to the transmitter.

8. Turn the Main Power breaker ON. The PA, Main blower must operate.

9. Turn OFF the wall power disconnect switch and when the Main blower has slowed sufficiently, check the direction of rotation. It must turn in the direction of the arrow indicator. The top fan should have the fan hubs facing up as viewed from below and rotate clockwise.

D. FUSE CHECKS

In the below listed fuse checks, as the fuse is removed to check for the specified indication(s), each fuse must be checked for correct value and type. Turn ON the Main Power (HV OFF)

1. Remove the Fan fuse; the top fan should stop running.

2. Remove the PA filament fuse; the PA tube filament voltage must be removed.

3. Remove the Exciter fuses; the Exciter Power Lamp should go out.

4. Remove the Blower (IPA) fuse; the Blower Motor should be rendered inoperative.

5. Remove the Interlock fuse; must remove voltage from the interlock system and the interlock indicator light.

6. Remove the fuses on the Driver Drawer one at a time; must remove the associated voltage.

7. Remove the Blower fuses on the control panel and observe the Main Blower must stop.

NOTE: Turn Main Power OFF before removing Blower fuses. Turn Main Power ON and observe Blower should not operate.

E. INTERLOCK CIRCUIT CHECK

1. Check the following interlocks. If all the following interlock switches are closed, the interlock indicator will light as the interlock switch is turned to its 10 positions successively.

a.) Air Switch

b.) IPA Drawer

E. INTERLOCK CIRCUIT CHECK (continued)

c.) Exciter Drawer

d.) Rear Panels

e.) External (remove jumper to check)

f.) Front Panel

g.) Timer

h.) Band Switch

i.) Heat Overload

2. With Main Power, Circuit Breaker ON, the HV Circuit Breaker OFF, de-energize each of the aforementioned interlocks one at a time and observe the following:

   a.) The Interlock indicator should go OUT in each respective position.

   b.) The Shorting relay should de-energize.

   c.) The HV Circuit breaker should not hold in the ON position when so positioned, with the exception of the Heat Overload, Timer and Band Switch.

3. Before the HV is turned ON, the PA tube filaments should be pre-heated for 15 minutes. This is assuming that they have not been warmed up prior to this point.

   a.) When the HV contactor closes, the Plate voltmeter should read 10 KV $\pm$10%.

   b.) The HV light should go ON. The Plate elapsed time meter should also energize.

F. RF OUTPUT

1. Prior to tuning the transmitter, insure that all necessary safety shields are properly installed and an unbalanced 50 ohm TER-25K is connected to the output of the transmitter.

G. TUNING NOTES

A. Power Output Indication:

1. Single tone indications, 10kw on Forward Power Meter for 10kw average.

2. For proper tuning of the transmitter to its rated full power output, 10kw, the meter indications listed below should not be exceeded:

PA Plate Current	4.0 amperes
PA Screen Current	50.0 ma.

H. IDLE PLATE CURRENT ADJUSTMENT

With transmitter turned ON but no RF drive from the exciter, set the PA idle plate current with the Bias Adjust Control for 2.5 amperes.

a.) Turn meter switch on IPA drawer to "DRIVER". Turn DRIVER BIAS control clockwise to obtain an indication of 20 on meter.

b.) Turn meter switch to IPA "A". Adjust IPA bias until meter indicates 25.

c.) Turn meter switch to IPA "B". Adjust IPA "B" bias until meter indicates 25.

NOTE: Meter positions Driver to IPA "B" times four (4) are actual PLATE CURRENT (i.e. 20 x 4 = 80 ma.) IPA total times eight (8) are total Plate Current of IPA "A" and "B" (i.e. 25 x 8 = 200 ma.)

The PA Plate idle current adjustment must be re-checked after 15 minutes. As PA tube heats up further the quiescent current increases. The above are the correct idling currents for normal operation.

I. OVERLOAD TRIGGER ADJUSTMENTS

The overload circuits are an important integral part of the METR-10K. They serve the purpose of protecting the tubes and power supplies from extreme conditions and malfunctions, should such arise.

It should be remembered that the METR-10K is capable of peak power output many times that of the front panel meter indications. Therefore, the adjustments which appear to be much higher than normal indications are protecting the transmitter against peak surges higher than the transmitter rated capability. Overload trigger adjustments as follows: After each adjustment has been completed, return plate current to normal IDLING conditions.

a.) Turn High Voltage and adjust IPA voltage SLOWLY until overloads trigger back-off SLIGHTLY (CW) from this adjustment. Re-set overloads.

b.) Set PA BIAS ADJ for 6 Amps, Plate I and adjust PA plate overload to trip at this point. Re-set overload and check setting. Do not keep Plate Current at 6 Amps for more than 30 seconds.

c.) PA BIAS OVERLOAD THRESHOLD ADJUSTMENT: Adjust Bias Overload to point where transmitter trips. Retard setting slightly to obtain threshold adjustment. Re-set overload and check setting. Return Bias to normal if proper setting is obtained.

d.) Set Driver Bias Adjust to read 40 on meter. Adjust driver overload to trip at this point. Re-set overload and check. Return DRIVER IP to normal.

e.) Set IPA "A" Plate I to read 55 on meter. Adjust IPA "A" overload to trip at this point. Re-set and check for proper setting. Return Plate I to normal.

f.) For IPA "B" follow IPA "A" procedure.

g.) PA Screen Overload. This adjustment must be made after transmitter has been tuned up and operating. PA Screen Adjustment as follows:

Unload transmitter as much as possible and return PA until maximum screen current is obtainable. Adjust PA screen overload to trip at this point. It should trip at approximately 60 Ma. Re-set overload and check setting.

Transmitter Overloads are now set and transmitter is now ready for operation.

J. UNBALANCE OUTPUT TUNING

1. Place MFE channel selector in position #1, mode switch to FSK, and drive at minimum.

2. Turn on H.V.

3. Advance MFE drive until PA plate current indicates 2.5 amps.

4. Adjust channel #1 pre-position control (R901) until PA Plate and Output meters indicate resonance. At this point increase drive until 10Kw is indicated.

5. Repeat above procedure for the remaining channels.

K. REMOTE TUNING

1. Connect Remote system interconnect cable to J-1003 on transmitter interface panel. Place jumpers between G-H and F-J of J-1004.

2. Place MFE channel selector in Remote position.

3. Set Standby-ON switch to Standby.

4. Select channel 1 on the remote panel.

5. Turn on H.V. The following will happen:

   a.) The transmitter P.A. will begin to tune.

   b.) The MFE will go into standby.

   c.) When the transmitter reaches resonance, the "Ready" light will come on.

   d.) The MFE will go from Standby to ON and drive the transmitter to the pre-selected power output.

6. Repeat steps 4 and 5 for the remaining channels.

L. HARMONICS

1. Connect test equipment as per Fig. 1

2. Tune transmitter to channel 1 and drive to full power.

3. Tune spectrum analyzer to the channel frequency and establish a 0 db reference.

4. Tune the spectrum analyzer to the 2nd harmonic and determine how many db down the signal is. The signal should be at least 60 db down.

5. Record the level on to test data sheet.

6. Repeat steps 1 to 5 for the other channels.

M. ANTENNA TUNER

1. Connect control cable from transmitter to antenna tuner.

2. Set H.V. on transmitter to OFF.

3. At the antenna tuner set the channel select switch to Channel 1. The motorized bandswitch should rotate to position 1.

4. Adjust Band Adjust control 1 clockwise or counter-clockwise as necessary, to set variable capacitor C1 to its mid position. When the capacitor reaches the mid position the "Ready" lamp should come on.

5. Repeat steps 3 and 4 for each remaining channel. Adjust the respective potentiometer for each channel.

TEST SETUP
FOR
HARMONIC MEASUREMENTS

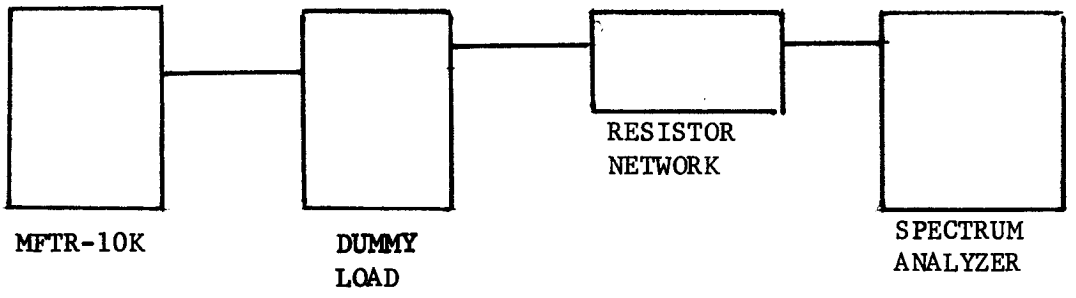

FIG. 1

TUNING CHART

The purpose of this tuning chart is to provide a record of the individual transmitter with respect to its frequency coverage and power output.

EXCITER FREQUENCY	CHANNEL	SCREEN CURRENT (ma.)	PLATE CURRENT (amps)	FORWARD PWR		HARMONICS
				CW	FSK	
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					

TESTED BY _____ MFG. NO. _____

SERIAL NO. _____ DATE _____

REMARKS _____

_____

_____

CHECK OFF SHEET

A. Mechanical Inspection completed _____( )

B. Preliminary _____( )

C. Fuse checks completed _____( )

D. Interlocks and Overloads:

1. Interlock Circuit check _____( )

2. Plate Voltage after contactor closes _____( )

E. P. A. Idle Plate Current adjusted to _____( )

1. Driver Plate Current adjusted to _____( )

2. IPA "A" Idle Plate Current adjusted to _____( )

3. IPA "B" Idle Plate Current adjusted to _____( )

F. Overloads adjusted to trip as follows:

1. PA Plate at _____( )

2. PA Screen at _____( )

3. PA Bias Overload _____( )

4. IPA "A" Overload _____( )

IPA "B" Overload _____( )

5. IPA Voltage Set Overload at Plate RF _____( )

and PA Plate Current _____( )

6. Driver Plate Current set at _____( )

G. Unbalance Output Tuning Test completed _____( )

H. Remote Tuning Test _____( )

I. Harmonics Test _____( )

J. Antenna Tuner check _____( )