TMC SPECIFICATION

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TITLE:

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TEST INSTRUCTIONS

FOR

GPT-10KRL

TEST EQUIPMENT REQUIRED:

A. TMC PTE Spectrum Analyzer

B. Simpson 260 Ohmmeter or equivalent

C. TER 18K 50 or 70 ohm unbalanced load

D. Calibrated directional coupler Wattmeter Model 4715 or equivalent

NOTE: For Transmitter not equipped with directional Wattmeter, Part "M" Tests shall be omitted.

*A. MECHANICAL INSPECTION

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

2. Check PA Tune, PA Load controls for a counter reading of about 000 corresponding to minimum capacity.

3. Check to see that PA bandswitch counter reading corresponds to proper PA bandswitch position.

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

5. Check power supply for loose connections and correct value of circuit components.

NOTE: Indicate completion and acceptance of portion(s) of this test preceded by (*) by recording required value or by check (✓) mark as required on attached Test Data Sheets.

B. PRELIMINARY ELECTRICAL INSPECTION

*1. With Main Power switch **OFF**, check for short circuits to ground:

a. The 3 power input phase should read not less than 1 megohm.

b. The positive side of the high voltage circuit should read not less than 70K ohms with the shorting relay contacts open. With the shorting relay contacts closed, this reading should be ZERO.

*2. The following units must be checked for proper termination of cables:

a. Relay Panel

b. Bias Drawer

c. IPA Drawer

*3. Check complete unit for correct value of fuses.

*4. Turn ON Main Power switches and observe following:

a. Main Power light must go on.

b. The PA Blower must turn in the same direction as arrow stamped on the housing.

c. The PA top fans must turn counterclockwise when viewed facing the hub.

*5. Circuit fusing checks:

a. With the Main Power switch Off, remove any two of the three main blower fuses; the main blower must not run when the Main Power switch is closed. Open Main Power switch and replace the two fuses. Close Main Power switch and continue fusing circuit checks below.

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b. Remove Rear Fan fuse; PA Top Fans must stop.

c. Remove the PA Filament fuse; the PA filament voltage must be removed.

d. Remove the Timer fuse; this must deactivate the Timer.

e. Remove the IPA Blower fuse; the IPA blower must stop.

f. Remove the IPA Filament fuse; the IPA filament voltage must be removed from the IPA tube.

g. Remove the IPA LV fuse; this must remove AC power from the LV power supply.

h. Remove the IPA Bias fuse; this must remove the IPA bias voltage and deactivate the IPA Bias relay.

i. Remove the B plus fuse on the driver drawer; this must remove the B plus voltages, 200 and 400 volts.

*6. Set Filament Adj. for 220 Volts AC position

*7. Set PA and IPA Bias Adjust to Maximum Clockwise

*8. Unlatch the following overload relays and note the corresponding overload light indicator; it must light.

a. PA Plate

b. PA Screen

c. IPA Plate

d. IPA Screen

By pushing the Overload Reset switch on the main control panel, the overload light indicators must go out and the overload relays must reset.

*9. The energizing of the Tune Operate lights must correspond to the position of the Tune-Operate switch. Also the Tune-Operate relay must energize and de-energize with this switch.

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*10. With the PA Screen switch in the ON position the PA Screen relay must be de-energized. When in the OFF position the relay must energize.

11. The Filament Elapse time meter must indicate when the filaments are on.

*12. Check the Time Delay for proper operation and time interval, between 3 and 5 minutes.

*13. With the Alarm switch ON the alarm must sound.

C. PROTECTIVE INTERLOCK SYSTEM

1. Before checking the interlock system insure that a jumper is connected from COM to NO (terminals 1 and 2 on E-1002). The interlock indicator light and switch are connected in such a manner that the indicator will be ON if all interlocks are closed. To find an open interlock always turn the interlock switch to extreme counter-clockwise position (IPA Bandswitch); rotate in clockwise direction to the position where the indicator light goes out. This is an open interlock. In cases where there is more than one interlock open, the above procedure must be repeated until all interlocks are closed and all individual interlock lights are energized. With the interlock switch in the HV Deck position the interlock indicator light is monitoring the IPA DRAWER and the HV Deck Interlocks. If the IPA Drawer Indicator is ON, and the High Volt Deck interlock Indicator is OFF, this condition indicates the IPA DRAWER is not properly closed.

*2. With the Main Power switch closed, each interlock must be checked individually by manually opening and observing the following:

a. The Shorting relay must release (de-energize).

b. The corresponding indicator light should go out.

D. HIGH VOLTAGE CHECKS

1. With the Main Power switch closed, PA tube should have a minimum of one half hour warmup time before applying plate voltage.

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2. Turn On the High Voltage switch and check following:

*A. PA Plate voltage should read approximately 7.5 to 8 KV

B. The IPA Screen voltage must change from approximately 400 volts to 200 volts as the Tune-Operate switch is moved from the Operate to Tune position.

E. IDLING PLATE CURRENT ADJUSTMENTS

1. With transmitter energized, blowers running, HV switch ON, Tune-Operate switch in Operate postion and Screen Voltage switch in ON position make following adjustments:

*a. Adjust PA Bias on the relay panel to a PA Plate current reading of 0.5 amperes.

*b. Adjust IPA Bias on the driver drawer for an IPA Plate current of 200 ma.

F. CHECK OF PROTECTIVE DEVICES FOR REMOVAL OF HIGH VOLTAGES

1. With the transmitter energized as in paragraph F above, and with the Alarm switch in the On position; mechanically trip Protective Devices as listed below in sequence. Each time a Protective device is mechanically tripped, the device must be reset electrically and the HIGH VOLTAGE must be turned ON again before testing the next PROTECTIVE DEVICE.

*a. PA Plate overload

*b. PA Screen overload

*c. Zener Diode Protect relay

*d. IPA Plate overload

*e. IPA Screen overload

*f. PA and IPA Bias relays (by removal of respective fuses)

NOTE: Indicate completion and acceptance of portion(s) of this test preceded by (*) by recording required observed value or by check (✓) mark as required on attached Test Data Sheets.

2. Mechanically tripping each of the above devices one at a time; the High Voltage must go OFF, the alarm must be energized, the Plate Elapse Time Meter must stop running.
3. Turn the High Voltage switch to the OFF position.

*G. PARASITIC CHECK

1. Set the IPA and PA bandswitches to the 24-30 mc. band.
2. Set the PA loading capacitor to minimum capacity.
3. With no RF drive turn ON the High Voltage Switch.
4. Rotate the PA tune capacitor from minimum to maximum capacity. There must be no indication on the PA Output Meter.
5. Turn OFF the High Voltage Switch.

H. OVERLOAD ADJUSTMENTS

*1. PA Plate overload

a. Tune transmitter to full output on any frequency within its range.

b. Overloading the transmitter output by increasing the PA output loading (decreasing Output Load capacity.)

c. Retune the PA and increase the SB exciter output.

d. Adjust the PA Plate overload adjust to trip at 2. amperes.

*2. PA Screen overload

a. With the transmitter tuned as in paragraph 1a. above, underload transmitter output by decreasing the PA output loading (increasing Output Load capacity.)

b. Retune the PA and increase the output of the SB exciter to increase the screen current.

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c. Adjust the PA Screen overload with the PA Screen; Adjust to trip at 80 ma.

*3. IPA Plate Overload

a. Adjust the IPA Plate overload to trip at 600 ma. with the IPA Plate Overload Adjust and perform transmitter tuning as in paragraph 1, PA Plate Overload.

*4. IPA Screen Overload

a. Adjust the IPA Screen Overload to trip at 30 ma. with the IPA Screen Overload Adjust and perform transmitter tuning as in paragraph 2, PA Screen Overload.

I. TRANSMITTER TUNING GENERAL

1. Set transmitter tuning controls to the approximate setting for the desired output frequency either from previous tuning charts or sample tuning chart in the instruction book.

2. Normally during test the transmitter is tuned with a two tone audio signal connected to one of the two channel inputs. However, it may also be tuned with the carrier or a single audio tone.

3. Set the MMX exciter output to minimum to prevent the IPA Screen Overload from tripping, and always ascertain that the drive is at minimum before applying high voltage to the transmitter.

4. The PA tube must not be driven beyond .75 ampere of plate current with its output circuit in a non-resonant condition.

5. The IPA plate current must not be driven beyond 300 ma. with its output circuit in a non-resonant condition.

6. Turn transmitter ON with High Voltage OFF. Set MMX exciter to minimum.

7. Set the multimeter position on the driver to 1st AMP Ep. Advance exciter output slightly and commencing at the low end dial setting adjust 1st IPA Tuning to resonance, peak indication on the meter.

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8. Set the multimeter to IPA Eg and commencing at low end of dial setting adjust IPA Grid Tuning to resonance, peak indication on meter.

9. Set MMX exciter output to minimum and turn High Voltage ON.

10. Advance MMX exciter output to a point where the IPA Plate current increases and adjust IPA Tuning to resonance, dip in IPA Plate current and increase in PA Plate current.

11. Adjust PA Tune control for resonance,(dip in Pa Plate current,)and increase on PA Plate RF meter.

12. Adjust IPA Load until the IPA is properly loaded, 250 to 350 ma. depending on the frequency. After each change of loading the IPA Tuning should be returned to resonance.

13. Readjust the PA Tune control for resonance and adjust PA Loading for the required output. After each cnage of PA Loading the PA tuning must be readjusted for resonance, and reresonate IPA Plate tuning.

14. Some indications of transmitter tuning conditions are:

    a. Transmitter output underloaded, PA Screen current over 40 ma.

    b. Transmitter output overloaded, PA Screen current will show little or no variation as PA is tuned through resonance.'

    c. Correct output loading, PA Screen current is 10 to 40 ma. for full output.

*J. UNBALANCE OUTPUT TUNING AND DISTORTION TEST

1. The transmitter PA output must be connected for Unbalance output 50-70 ohms, operation and terminated in 50-70 ohm unbalance load.

2. Two tone audio test signal from the analyzer must be connected with a shielded pair to LSB input, terminals A and C on J-1012. Connect the RF INPUT of the analyzer to J-1007. For this test the lower sideband will be employed.

NOTE: Indicate completion and acceptance of portion(s) of this test preceded by (*) by recording required observed value or by check (✓) mark as required on attached Test Data Sheets.

3. Tune the transmitter to all frequencies listed on tuning test chart CH-592, utilizing the tuning procedure in paragraph 1. Make signal distortion check at each frequency at full power output, 10 KW PEP. Record all data required by the tuning chart.

   Requirement:

   a. At 10 KW PEP the third order distortion products must be at least 35 db below the two tone test level.

4. Reconnect two tone audio test signal to USB Input Terminals E and G on J-1012.

5. Repeat test as described in above paragraph #3 (at 30 mc only).

K. ALDC CHECK

1. With transmitter loaded to full output, 10 KW PEP, on any frequency within its range turn on the ALDC. The transmitter output must decrease with an increase in ALDC voltage, counterclockwise rotation of ALDC control.

   a. Set the ALDC control full clockwise, no ALDC, make a distortion check.

   b. Adjust the ALDC to a point where the output commences to decrease and make a distortion check.

   Requirement:

   The distortion requirement of 35 db below the two tone test level at full output must not be degraded by application of ALDC in paragraph b above.

L. DIRECTIONAL WATTMETER

Due to large variation of output impedances that a transmitter must tune into, it is necessary to protect the transmitter and transmission line from a relative high standing wave. The (standing wave control unit) used in conjunction with a two tone calibrated directional wattmeter has two bi-directional elements that sense forward and reverse power in watts.

The forward element has 10 (ten) kilowatt range ± 5%. The reverse element has a 1 (one) kilowatt range ± 5%. There is no need for a calibrate circuit for the coupler was designed to give accurate output SWR for maximum output of GPT-10K which is 5 (five) kilowatts average or 10 (ten) kilowatts PEP (Peak Envelope Power).

The output of the Wattmeter sensing elements feeds the kilowatt output meter. This meter seves two functions, to read forward power and by activating a spring loaded switch on the main power panel read SWR (Standing Wave Ratio). This SWR switch in its normal position provides the kilowatt meter with forward power information and the SWR circuit in Exciter Drawer with reflected power information. The SWR circuit consists of a power supply, DC amplifier, high sensitive relay and a control relay. With approximately 540 watts of reflected power which constitutes a 2:1 standing wave ratio for 5 (five) kilowatts causes the reflected power element of the directional coupler to produce 51 (fifty-one) micro amperes.

This current causes the Hi-sens relay to energize and inject a bias voltage on the DC amplifier, this in turn causes the control relay to energize and trip the High Voltage breaker. The above is accomplished with the SWR switch on the Front Panel of Exciter Drawer in the 2:1 position. In the 3:1 position it takes approximately 1250 watts reflected, based upon 5 (five) kilowatts output to trip the high voltage breaker. Since this will produce a current that is out of the range of the meter (SWR portion). This position will be checked by reversing the reflected power diode and driving the transmitter to approximately 1250 watts for trip out of HV breaker. The control relay used in the SWR circuit is a latch type relay and in the event it is tripped, resetting is accomplished by the overload reset button on main power panel of GPT-10K.

M. TEST PROCEDURE FOR SWR

a. Place ratio switch of SWR in 2:1 position.

b. Rotate reflected power diode to read forward. Arrow on diode must point toward load.

c. Terminate transmitter to a 50 ohm load.

d. Apply power to transmitter and tune output to any frequency.

e. Increase side band exciter drive to 540 watts. This point is indicative by SWR ration of two (2) on the output power meter.

NOTE: SWR switch on Main Power Panel must not be activated.

*f. Leave power at this level until the High Voltage breaker trips.

NOTE: SWR switch on Main Power Panel must not be activated.

g. Reduce drive to minimum and reset SWR overload by pushing overload reset button.

h. Reduce drive and turn OFF High Voltage.

i. Place SWR switch to 3:1 position. Turn transmitter on and drive to approximately 1250 watts.

NOTE: SWR switch on Main Power Panel must not be activated. Use external coupler to determine output power for this check.

*j. High Voltage breaker must trip at ± 10% of the above power.

k. Remove power and assemble wattmeter to its normal state.

M. KEYING TEST

1. Connect square wave generator to terminals C and D on J-1011. Set generator frequency at 25 cps, set generator output to 50 Volts.

2. Set MMX exciter controls as follows: Mode switch in FSK position, shift selector to 425 cps (S-110 rear of unit), voltage selector at 50 Volts (S-111 rear of unit).

3. Tune transmitter to any frequency, at low power.

4. Tune receiver to transmitted frequency, a clear FSK signal should be heard.

5. Connect square wave generator to terminals F and G of J-1011, set exciter mode switch to FAX.

NOTE: Indicate completion and acceptance of portion(s) of this test preceded by (*) by recording required observed value or by check (✓) mark as required on attached Test Data Sheets.

6. A clear FAX signal should be heard in receiver.

7. Turn OFF High Voltage, and disconnect square wave generator.

8. Connect dry contact key to terminals B and A of J-1011.

9. Turn ON High Voltage & Key. A clear CW signal should be heard in receiver. Turn OFF High Voltage.

N. REMOTE TEST

1. Remove jumpers from terminals 1 and 2, 4 and 5 of E-1002.

2. Connect Remote Test J1G # to J-1013.

3. Test J1G controls as follows: All switches in OFF position, Gain Control, full clockwise.

4. External Interlock Indicator should indicate OPEN.

5. Place Interlock switch on TEST J1G in ON position. External Interlock Indicator should indicate CLOSED.

6. Place transmitter High Voltage switch in ON position. Now place Test J1G High Voltage switch in ON position. The following should take place: Transmitter High Voltage should energize, red lamp on Test J1G should light.

7. Turn OFF High Voltage by placing Test J1G High Voltage switch in OFF position.

8. Tune Transmitter to any frequency at full power.

9. Turn Test J1G Gain Control CCW. Transmitter output should go to zero.

10. Turn OFF High Voltage

11. Remove Test J1G from J-1013

12. Reconnect jumpers from 1 and 2, 4 and 5 of E-1002.

TEST DATA SHEET

1. (A) Mechanical Inspection _____
2. (B-1) Short Circuit Checks _____
3. (B-2) Cable Termination Checks _____
4. (B-3) Fuse Checks _____
5. (B-4) Blower Checks _____
6. (B-5) Circuit Fusing Checks _____
7. (B-6) Filament Primary Voltage set at _____
8. (B-8) Overload Relays Check _____
9. (B-9) Tune-Operate Lights and Relay Check _____
10. (B-10) PA Screen Switch and Relay Check _____
11. (B-12) Time Delay Relay Operation Check _____
12. (B-13) Alarm Operation Check _____
13. (C-2) Protective Interlock System Check _____
14. (D) High Voltage Circuits Check _____
    a. (2A) PA Plate Voltage _____
    (2B) IPA Screen Voltage, Operate _____V;Tune _____
15. (E)(a) PA Idling Plate Current Adjusted to _____Amp.
    (b) IPA Idling Plate Current Adjusted to _____ma.

16. (F) CHECK PROTECTIVE DEVICES FOR REMOVAL H.V.

a. (a) PA Plate Overload _____

b. (b) PA Screen Overload _____

c. (c) Zener Diode Protect Relay _____

d. (d) IPA Plate Overload _____

e. (e) IPA Screen Overload _____

f. (f) PA & IPA Bias Relays _____

17. (G) Parasitic Check _____

18. (H) Overload Adjustments _____

a. (1) PA Plate Overload set to trip at _____ Amp.

b. (2) PA Screen Overload set to trip at _____ ma.

c. (3) IPA Plate Overload set to trip at _____ ma.

d. (4) IPA Screen Overload set to trip at _____ ma.

19. (J) Unbalance Tuning Completed _____

(K) ALDC Circuit test made on _____ MC _____

(L) Directional Wattmeter

a. SWR on 2 to 1 trips out _____

(M) SWR on 3 to 1 trips out _____

20. (N) REMOTE TEST _____

Tested by _____ Mfg. No. _____

Approved by _____ Date _____

Remarks _____

_____

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DATE	REV.	SHEET	EMN #	DESCRIPTION	APP.
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