TMC SPECIFICATION

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TITLE:			

FINAL TEST AND PROCEDURE
FOR
HFTA-1K SERIES

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FINAL TEST AND INSPECTION PROCEDURE

FOR

HFTA-1K SERIES

Section 1

General Inspection and Manual Tuning

A. TEST EQUIPMENT REQUIRED:

1. TMC Model PTE Spectrum Analyzer or equivalent
2. Simpson Model 260 multimeter or equivalent
3. H-P Model 410B VTVM or equivalent
4. 2.5K Bird Dummy Load or equivalent
5. H-P Model 606A Signal Generator or equivalent
6. Laboratory Instrument 35 Ft. Whip Antenna Simulator (Laboratory Instrument)

B. MECHANICAL ISNPECTION

1. Give the rack a good visual inspection for obvious defects, check the cabling to see that no strain exists when the units are pulled out. All units should line up in rack and no contact made from panels.
2. Check all knobs and switches on the transmitter for proper operation.
3. Check PA Tune and PA Load controls for proper alignment (with load control set to zero, loading cap. should be on min. cap.)

C. PRELIMINARY ELECTRICAL INSPECTION

1. With Main Power Switch Off, check for short circuits to ground.
   a. The single phase power input should read not less than 1 megohm.
   b. The 2Kv and 4Kv supply (positive side) should read not less than 100K ohms to ground.
2. The following units must be checked for proper termination of cables:

TLAA-1K (Amplifier)
Control Unit for Antenna Coupler (if applicable)
S127-50 Handset panel (if applicable)
AX5130, Servo Control Unit
MMXA-2A Exciter Unit
TFP-1K Harmonic Filter (if applicable)
AP151 Low Voltage and Bias Supply
AP-152 High Voltage Power Supply

3. Check complete unit for correct value of fuses.
4. Check to insure that PA output circuitry is correctly connected, including Dummy Load.
5. Adjust 1st AMP, 2nd AMP and PA BIAS for maximum bias (clockwise)
   Before bias adjustments can be made the Low Voltage Power Supply must be extended out on its slides to expose the bias adjustment potentiometers.
6. Place **AUTO-MAN.** switch S204 in Low Voltage and Bias Supply in "MAN". position
7. Turn on Main Power switches and observe the following:
   a. Main Power light must go On.
   b. PA Blower must turn On.
   c. Band Indicator lights must go On.

D. CIRCUIT FUSING CHECKS:

1. Make sure that at least one interlock is open.
2. With the Main Power switch OFF, remove the Blower Fuse. The Blower must not run when the Main Power switch is closed.
3. Remove Filament **Fuse**, the AC input to FILAMENT TRANSFORMER T301 should be removed.
4. Remove **LOW** VOLTAGE FUSE, the AC input to LOW-VOLTAGE TRANSFORMER T302 should be removed.
5. Remove Bias Fuse, the Bias Voltages should be removed.
6. Remove DC Fuse, the 24V and Bandswitch Ledex Voltage should be removed.
7. Remove Control **Fuse**, the Bandswitch Ledex Voltage should be removed.

E. PROTECTIVE INTERLOCK SYSTEM:

1. Before checking the interlock system insure that jumpers are placed on (interface panel)
   from B to C EXTERNAL INTERLOCKS
   " E to G OVERLOAD RESET
   " R to S HV ON
   " T to U XMTR PTT
   The interlock indicator light is connected in such a manner that the indicator will be "ON" it all interlocks are closed, providing timer has cycled (timer cycles after 30 seconds, if any interlock except external interlock is opened timer starts to cycle again.)
2. Place Screen and Plate circuit breaker in the ON position. Each time an interlock is opened the High Voltage switch should be placed in the ON position. The OVLD relay K2 placed in the Overload position by any open interlock prevents HV from coming on.

F. TRANSMITTER BIAS ADJUSTMENT PROCEDURE

1. Place MAIN POWER, PLATE and SCREEN breakers to the ON position.
2. Set AUTO/MANUAL switch to MANUAL
3. Insure that RF GAIN control is at minimum (max counter clockwise rotation) for exciter MMX or Signal Generator can be used.
4. Press HIGH VOLTAGE button to light indicator subsequently applying HIGH VOLTAGE.
5. Observe "1p" meter and adjust PA BIAS control for an indication between 200 ma - 210 ma as read on 1p meter.
6. Hold meter switch "UP" (to 2nd AMP position), observe 1p meter and adjust 2nd AMP bias control for an indication between 260 ma and 280 ma as read on 1p meter.
7. Hold meter switch down (1st AMP position) observe 1p meter and adjust 1st AMP bias control for an indication between 60 ma - 80 ma as read on the 1p meter.
8. Press HIGH VOLTAGE switch to OFF position. (HIGH VOLTAGE indicator must go out)

G. OVERLOAD CIRCUIT TEST:

Before tuning the Transmitter, check PA Tune, PA Load and Drive up Board Limit Switches for proper alignment.

Drive Up Board (RF Gain Control) A211 Limit Switches S1 and S2 are set to trigger when potentiometer is set to Min. (counterclockwise). Make sure S2 triggers first.

S3 on Drive Up Board is set to trigger when potentiometer is on Max.

To check PA Tune and PA Load Limit Switches, tune Transmitter Manual to 2 MHz and set Limit Switch on time Cap. to trigger a little past that point.

Tune Transmitter on 8-12 MHz Band to 12 MHz and set Limit Switch to trigger a little past that point.

The load Cap is set so that overloading on front panel corresponds with Max. Cap on loading Cap. and triggers the microswitch.

1. Energize Transmitter.
2. Power Level Switch to Position 4.
3. HIGH VOLTAGE Switch to ON.
4. Apply rf (11 mHz) to HFLA-1K.
5. Tune HFLA-1K for rated output.
6. Reduce rf drive to minimum.

NOTE

When overload occurs, HIGH VOLTAGE Switch must be pressed twice to re-apply high voltage. Press to reset overload and press to apply high voltage.

7. PA PLATE OVERLOAD ADJUSTMENT
   a. Adjust Overload indicator (adjustment screw located directly below meter face) for 300 mA as indicated on Plate current meter.

b. Increase drive until Plate Current Meter indicates 300 ma.
c. When meter indicator reaches 300 ma the high voltage will trip off, meter face will illuminate, meter indicator will remain at the overload value to indicate which caused overload condition.
d. Reduce rf drive to minimum and press HIGH VOLTAGE pushbutton to reset high voltage, set overload indicator for indication of 800 ma.

8. 2ND AMPLIFIER PLATE OVERLOAD ADJUSTMENT:

a. Repeat paragraph G from 1 to 6.
b. Push "PLATE" meter switch up and ovserve 2ND AMP. Plate Current.
c. Adjust Bias until 2ND AMP Plate Current indicates 400 ma.
d. Adjust 2ND AMP PLATE OVERLOAD potentiometer until high voltage trips off (located on bottom of TLAA-1K)
e. PLATE Current Meter will illuminate, HIGH VOLTAGE will trip OFF, HIGH VOLTAGE indicator will go out, PLATE Current meter will indicate zero.
f. Adjust Bias to Max. Clockwise Position. Press High Voltage Button twice to reapply High Voltage. Readjust IPA Current to 260 ma.
g. SWR OVERLOAD ADJUSTMENT:
   a. Repeat paragraph G. from 1 to 6.
   b. Simulate a high reactive condition. (Temporarily disconnect the dummy load.)
   c. Press HIGH VOLTAGE pushbutton to apply High Voltage.
   d. Push SWR pushbutton and increase drive until a reading of 250 watts (on KILOWATT meter, corresponding to a VSWR of 3:1 (110 watts is 2:1) is observed on the reflected power scale.)
   e. Adjust SWR potentiometer until High Voltage trips OFF (located on bottom of TLAA-1K).
   f. The OUTPUT meter will illuminate, High Voltage will trip OFF.
      High Voltage indicator will go out.
      Plate Current Meter will indicate zero.
   g. To further check operation of SWR Overload, reduce rf drive, press HIGH VOLTAGE pushbutton to ON and increase rf drive again until overload trips HIGH VOLTAGE OFF.

ALDC ADJUSTMENT PROCEDURE

1. Extend the Servo Control drawer out on its chassis slides to expose the four ALDC adjustment potentiometers.
2. Set MANUAL/AUTO switch to MANUAL POWER LEVEL switch to position 4.
3. Tune and load transmitter manually to any carrier frequency between 2MHZ and 30NHZ
4. Adjust RF GAIN control for a PA OUTPUT indication of 1100 watts.
5. Adjust ALDC control (on front panel of TLAA) until ALDC holds PA OUTPUT at 1100 watts
6. Adjust ALDC ADJ number 4 for a PA OUTPUT indication of 1kw
7. Increase RF GAIN (to check ALDC capture) PA OUTPUT should remain constant.

7. Reduce RF drive to minimum, set POWER LEVEL switch to position number 1 and adjust RF GAIN control for on OUTPUT indication of 350 watts
8. Adjust ALDC ADJ number 1 until power OUTPUT decreases to 250 watts
9. INcrease RF GAIN (to check ALDC capture) PA OUTPUT should.
10. Reduce RF drive to minimum, set POWER LEVEL switch to position number2.
    Adjust RF GAIN for an OUTPUT indication of 600 watts
11. Adjust ALDC ADJ number 2 until power OUTPUT decreases to 500 watts.
12. INcrease RF drive (to check ALDC capture) PA OUTPUT should remain constant.
13. Rrduce RF drive to minimum, set POWER LEVEL switch to position number 3.
    Adjust RF GAIN for OUTPUT indication of 900 watts.
14. Adjust ALDC ADJ number 3 until power OUTPUT decreases to 850 watts.
    Reduce RF drive to minimum and slide Servo Control Drawer back into cabinet.
    This completes the ALDC adjustment procedure.

AVERAGE POWER LEVEL ADJUSTMENT PROCEDURE

The transmitter features four pre-set power levels and are selected depending on the position of the POWER LEVEL switch. The specific ranges are as follows:

POWER LEVEL POSITION 1 0-250watts
POWER LEVEL POSITION 2 250-500 watts
POWER LEVEL POSITION 3 500-850 watts
POWER LEVEL POSITION 4 750-1000 watts

the following outlined procedural steps are for adjusting and/ or calibrating the four power levels.

1. Initial lower Limit Reference Adjustment

A. Energize transmitter (place Main Power) PLATE and SCREEN Breakers to the ON positions. HIGH VOLTAGE MUST BE OFF.

B. Place a jumper from TP-1 to TP 2 on A 202 (A 202 located on Servo Contral Drawer Chassis)

C. Temporarily extend TLAA Drawer out on its chassis slides, remove top cover .

D. Set POWER LEVEL switch to position 1, rotate PWR LEVEL ADJ 1 (located in Servo Control Drawer behind front panel) clockwise until there is no output on meter with MTR cal. sw. pushed down and place AUTO/ MANUAL switch to AUTO.

E. Press TUNE button twice

F. Adjust Level potentiometer (located on PC 206) until READY

indicator lights. Press TUNE button twice and readjust Level control in Opposite direction slightly until READY indicator dose not come on (Repeat as often as necessary to obtain a contition that READY indicator does not light when there is no indication on OUTPUT meter.

UPPER LIMIT REFERENCE ADJUSTMENT

1. Repeat paragraph 1 a an b
2. Set POWER LEVEL switch to position 1 Hold METER CAL button down and press TUNE button twice.
3. While holding METER CAL button down adjust "PWR LEVEL ADJ 1" counterclockwise until OUTPUT meter indicates full scale deflection (1500 watts).
4. Adjust "MTR CAL ADJ" until Ready indicator lights. Press TUNE button twice and observe that READY indicates full scale deflection.
5. Adjust "PWR LEVEL ADJ 1" for 500 watt indication on OUTPUT meter, press TUNE button twice and READY indicator should not come on.

NOTE

If READY indicator go on repeat procedure selecting a different Setting on the METER CAL potentiometer to light READY indicator.

6. After adjustments are completed. remove jumper from TP- 1 and TP- 2. This completes the Upper Limit adjustment

POWER LEVEL ADJUSTMENS

Once the upper and Lower reference Limits have been calibrated, power Levels may be calibrated by holding the four " PWR LEVEL ADJ" as follows:

Adjust PWR LEVEL ADJ#1 for 150 watts on OUTPUT meter
Adjust PWR LEVEL ADJ#2 for 400 watts on OUTPUT meter
Adjust PWR LEVEL ADJ#3 for 750 watts on OUTPUT meter
Adjust PWR LEVEL ADJ#4 for 900 watts on OUTPUT meter

NOTE

The above initial settings may appear to be Low, however because of over- shoot the calibration must be set accordingly to allow for the fact that the motorized RF GAIN control is a Log-Log control. Th above settings simply provid RF GAIN motor stopping information.

AUTO TUNING ADJUSTMENT PROCEDURE

The following paragraphs give information for adjusting controls that enable the transmitter auto tuning. The transmitter auto - tuning is seqvential, extremely rapid and interdependent on preceding functions that supply control voltages to enable auto tuning.

1. TUNE LEVEL Adjustment

The TUNE LEVEL control determines the tune up Level needed during auto - tuning Before attempting to make a TUNE LEVEL adjustment proceed as follows:

A. Insure that Transmitter is properly terminated into a 50 ohms dummy load.

B. Set controls on RF 601 A/C CONTROL ANTENNA COUPLER to following positions MANUAL- SILENT -Auto switch to "MANUAL" Function switch to "L" Press "RIGHT" button for approx 2 sec till TUNE light comes on and FUNCTION METER Starts reading up in numbers. Turn main power switch off.

C. Place MAIN POWER breaker, PLATE and SEREEN breaker to their ON positions.

D. Place AUTO/ MANUAL switch on servo control unit to MANUAL position (RF drive must be at minimum).

E. Press HIGH VOLTAGE switch to light indicator subsequently applying High Voltage.

F. Check quiescent current values as indicated in paragraph F.

G. Place AUTO MANUAL switch on Servo control unit to AUTO.

H. Press TUNE button twice and observe the following transmitter actions and/or indicators.

SERVO indicator Lights
SEARCH indicator Lights

I. The TUNE LEVEL control must be adjusted so that PA PLATE current increases from quiescent value to 280ma.

NOTE

When PA Cathode voltage is less than tune level voltage, transmitter Drives up.

When PA Cathode voltage is greater than Tune Level voltage, Transmitter Drives-down.

When Tune Level Voltage is incorrectly adjusted too high, Transmitter tuning Level high.

When Tune Level voltage is incorrectly adjusted too low, transmitter Drives-down.

When PA Cathode voltage is missing, Transmitter Drives up to limit switch.

When Tune level voltage is missing, Transmitter Drives-down

2. RF trigger adjustment.

The RF trigger control when adjusted determines the amount of voltage required to stop the TUNING capacitor from Searching thereby ending the SEARCH mode and beginning the SERVO and OPERATE mode. Initially as the TUNING capacitor approches resonance and /or zero tune sense voltage, the OPERATE lamp lights indicating resonance and search and servo mode completed. During the auto tuned cycle of the transmitter if the tuning capacitor continues to rotate (search mode) the OPERATE lamp fails to light, the RF TRIGGER VOLTAGE may be insufficient to stop the tuning capacitor. To adjust the RF trigger control proceed as follows:

a. Set transmitter controls for MANUAL operation.
b. Place H.V. on and tune transmitter manually at MHz. Reduce output until PLATE meter indicates 280.
c. Place test VTVM at TUN SEN TP-1.
d. Manually adjust RF GAIN control clockwise slightly to apply drive to transmitter and adjust tuning control observing Plate current metter and test VTVM. Plate current must be at 280ma. Test VTVM should indicate appoximately zero at resonance.
e. Once zero indication has been observ d place test Met r in RF Trigger TP-3 test jack.
f. The RF trigger control must be adjust for a reading about 6VDC on VTVM.

G. Place MANUAL/AUTO switch to AUTO. Press TUNE button twice and obs observe the following:

SEARCH lamp should light.
TUNING control should rotate seeking resonance and stop.

3. LOAD SENSE ADJUSTMENT

The LOAD SENSE control is used to adjust the position of the LOAD capacitor for correct loading at 280ma on plate current meter. When the transmitter is in the AUTO mode of operation the LOAD capacitor immediately rotates to minimum capacitance when High Voltage is ON and PA Plate Current is present. This condition is mormal. During transmitter loading the LOAD capacitor travels toward maximum capacitance and stops when loading is correct.

a. Energize Transmitter (MAIN POWER, SCREEN AND PLATE BREAKERS to ON) HV switch pressed to ON.

b. Place MANUAL/AUTO switch to MANUAL POWER LEVEL switch to posit tion 4. Turn load sense adj. fully clockwise.

c. At 12 MHz operate TUNE and LOAD control to produce the maximum PA OUTPUT with the least amount of PA Plate Current.

d. Increase RF DRIVE until PA OUTPUT meter mindicates rated output. (NOTE setting of LOAD capacitor).

e. Reduce PA OUTPUT until PLATE current meter indicates 280ma.

f. Adjust LOAD SENSE control until voltage on TP-1 and TP-2 are equal.

g. Place MANUAL/AUTO switch in AUTO and press TUNE button twice.

NOTE

LOAD setting should be same as previous. If not, turn LOAD SENSE control CCW to increase setting or CW to decrease setting.

Transmitter indicator lamps and meter indicator should indicate i in the following.

P

Servo Lamp Lights

PA Quiescent current 200ma as read on lp meter. PA Plante Current increases to 220ma. Search lamp folled by OPERATE lamp lights Transmitter output indication increases to rated or preset output and READY lamp lights.

4. FAULT INDICATION ADJUSTMENT PROCEDURE

The transmitter is designed to servo tune to rated or pre-selected output in less than 10 seconds. The fault circuit featured in the transmitter, senses the transmitter tuning time and will remove voltage to the servo amplifiers, RF drive motor and bias the transmitter at or near cutoff if the transmitter has not completed the tuning cycle within the duration of time affixed by the following adjustment.

a. Remove RF output cable from exciter. Place MANUAL-AUTO switch to AUTO.
b. Place MAIN POWER, PLATE and SCREEN breakers to their ON positions.
c. Press HIGH VOLTAGE switch to light indicator.
d. Press TUNE button twice. Adjust R4 on PC 5g1 until FAULT indicator lights 15 seconds after TUNE button was pressed. (Repeat the adjustment as often as necessary to obtain optimum results.)
e. Replace RF output cable from exciter.

M. TRANSMITTER TUNING INTO FR 601/A/C

(IF applicable)
After all the above mentioned adjustments to the HFTA 1K Transmitter have been made the transmitter is now ready to tune into the R 601 A/C antenna tuner

1. Make shure MAIN POWER SWITCH is OFF.
2. Connect Transmitter RF output to RF 601 A/C antenna tuner.
3. Connect antenna tuner.
4. Set controls on RF 601 A/C CONTROL ANTENNA COUPLER To following positions.

MANUAL-SILENT-AUTO switch to AUTO
Turn MAIN POWER switch to "ON"
Turn ALARM OFF switch to "ALARM"

5. Place MAIN POWER,PLATE and SCREEN breakers to their ON positions.
6. Place MANUAL-AUTO switch to"AUTO".
7. Select frequenzy on Exciter (POWER AMPL. bandswitch and Harmonic-filter bandswitch has to follow.
8. Press High voltage switch to light indicator.
9. Press TUNE button twice.
Transmitter should auto tune and drive up to preset POWER-Level.

N. INTERMODULATION DISTORTION AND POWER TEST
Repeat paragraph M, servo tune transmitter.

Section 1

General Inspection and Manual Tuning

A. TEST EQUIPMENT REQUIRED:

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2. Simpson Model 260 multimeter, or equivalent
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4. 2.5K Bird Dummy Load, or equivalent
5. HP Model 606A Signal Generator, or equivalent
6. Laboratory Instrument 35 Ft. Whip Antenna Simulator (as required).

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1. Give the rack a good visual inspection for obvious defects, check the cabling to see that no strain exists when the units are pulled out. All units should line up in rack and no contact made from panels.
2. Check all knobs and switches on the transmitter for proper operation.
3. Check PA Tune and PA Load controls for proper alignment (with load control set to zero, loading cap. should be on min. cap.)

C. PRELIMINARY ELECTRICAL INSPECTION

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   a. The single phase power input should read not less than 1 megohm.
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2. The following units must be shecked for proper termina-- tion of cables.

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AX5130, Servo Control Unit
MMXA-2A Exciter Unit
TFP-1K Harmonic Filter (if applicable)
AP151 Low Voltage and Bias Supply
AP-152 High Voltage Power Supply

3. Check copmlete unit for correct value of fuses.

4. Check to insure that PA output circuitry is correctly connected, including Dummy Load.

5. Adjust 1st AMP, 2nd AMP and PA BIAS for maximum bias (clockwise)
Before bias adjustments can be made the Low Voltage Power supply must be extended out on its slides to expose the bias adjudtment potentiometers.

6. Place AUTO-MAN. switch S204 in AX5130, Servo control anit to"MAN" position.

7. Turn on Main Power switch and observe the following:

A. Main Power light must go on.
b. PA Blower must turn on.
c. Band Indicator lights must go on.

D. CIRCUIT FUSING SHECKS:

1. Make sure that at least one interlock is open.

2. With the Main Power switch OFF, remove the Blower Fuse.

The Blower must not run when the Main Power switch is closed.

3. Remove Filament Fuse, the AC input to filament transformer T301 should be removed.

4. Remove low voltage fuse, the AC input to low voltage transformer former T302 should be removed.

5. Remove Bias fuse, the Bias Voltages should be removed.

6. Remove DC Fuse, the 24V and Bandswitch Ledex Voltage should be removed

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TITLE: FINAL TEST AND INSPECTION PROCEDURE FOR HFTA-1K SERIES

SERIAL NUMBER

CHECK-OFF SHEET

B. MECHANICAL INSPECTION _____

C. PRELIMINARY ELECTRICAL INSPECTION _____

D. CIRCUIT FUSING CHECKS _____

E. PROTECTIVE INTERLOCK SYSTEM _____

F. TRANSMITTER BIAS ADJUSTMENT _____

G. OVERLOAD CIRCUIT TEST: _____

7. PA PLATE OVERLOAD SET AT _____ ma
8. 2ND AMPLIFIER PLATE OVERLOAD SET AT _____ ma
9. SWR OVERLOAD SET AT _____

H. ALDC ADJUSTMENT _____

I. AVERAGE POWER LEVEL _____

J. UPPER LIMIT REFERENCE _____

K. POWER LEVEL ADJUSTMENTS _____

L. AUTO TUNING ADJUSTMENT PROCEDURE:

1. TUNE LEVEL ADJUSTED TO _____ ma
2. RF TRIGGER _____ vdc
3. LOAD SENSE _____
4. FAULT INDICATION _____ seconds

TLAA-1K#_____ AX5175#_____

AX5130#_____ AX5176#_____

MMX ( )2#_____

AP151# _____

AP15 # _____