

DATE 3/25/53
SH. 1 OF 13

TMC SPECIFICATION NO. S -110

COMPILED BY

MAO

TITLE: TEST PROCEDURE-POWER SUPPLY CHASSIS-MODEL VOX

JOB

APPROVED

AJJ

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- 1-- Connect all cables. (Connections apparent)
- 2-- Insert a 455 kc Crystal in each BFO Crystal socket.
- 3-- Connect 1000 ohm load to BFO output connector.
- 4-- Turn on power switch, the following lights should go on.
 - 6.3 V. Milt.
 - 6.3 V. VMO
 - VMO Plate
 - Crystal Plate
 - Buffer Plate
 - 110 V. Lamp
- 5-- Turn meter switch to HFO and throw HFO plate switch to on --- HFO light should go on and meter should read approximately .75 ma (Meter should read regardless of HFO plate switch position)
- 6-- Turn meter switch to IFO and throw IFO plate switch to on--- IFO light should go on and meter should read approximately .75 ma (Be sure that IFO plate switch controls meter indication with meter switch in both HFO AND IFO positions.)
- 7-- Turn meter switch to BFO and throw BFO plate switch to on--- Turn potentiometer (R116) to maximum output. (Maximum clockwise.)
Meter indication should be peaked up by turning variable inductance (L102)
Tune L-102 counter-clockwise until BFO oscillator stops oscillating and note meter indication at this point.
Retune L-102 in the opposite direction until BFO oscillator commences to oscillate again. Now again tune to just before the point at which the oscillator conks out. Back off about one turn (approximately .32 ma) and the BFO oscillator is now properly aligned.
- 8-- Turn meter switch to Zero Beat (Meter should read approximately full scale) and turn on 100 Kc plate switch (on potentiometer) Now turn potentiometer to maximum. Plug in a pair of headphones. Tune zero beat control on test apparatus until zero beat is seen on meter and heard in phones. Center of zero beat should be about .65 ma.
- 9-- Measure audio gain of 12AU7 at phone jack with Simpson #303 VTVM. A.C. voltage should be about 32.5 at highest frequency tone.
- 10-- Turn meter switch to VMO and note that no switches or controls effect this indication. (Approximately .28 ma)
- 11-- Note that Crystal switch (S-105) when thrown into either position does not effect meter reading. Meter switch in BFO position.
- 12-- Note that oven fuse (F-101) controls 110 V lamp on test apparatus.
- 13-- Note that power fuse (F-102) controls all other lamps on test apparatus.
- 14-- Check voltages at pin jacks on test apparatus.
- 15-- Take tube voltages. (SEE: Form 133)

All voltages taken to ground with Simpson #303 VTVM

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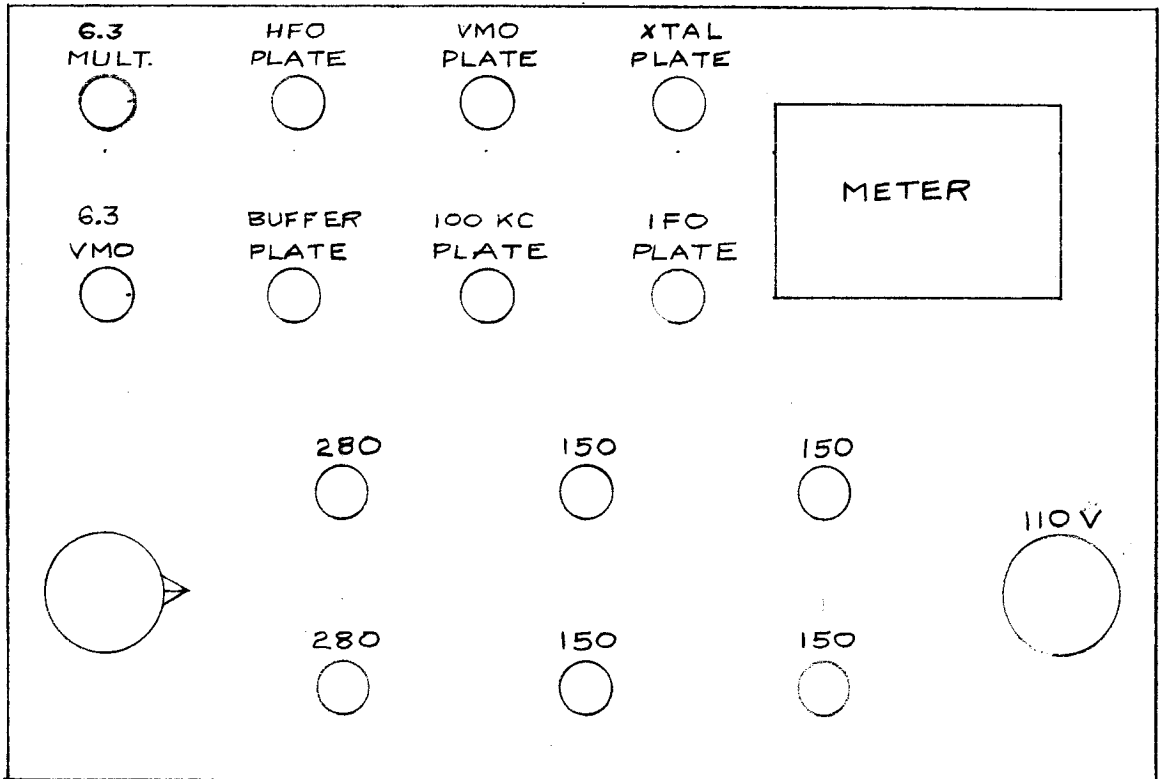
TMC SPECIFICATION NO. S-110

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JOB

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DATE <u>7/17/52</u> SH. <u>3</u> OF <u>13</u> COMPILED BY	TMC SPECIFICATION NO. S-110	
	TITLE: ADJUSTMENT OF VOX COMPENSATING CAM	JOB -101
APPROVED <u>AJJ</u>	<u>A</u>	

1. Before installation of oscillator chassis into test unit, examine carefully.

Observe the following points.

 - a. Rotation of main condenser gearing without excessive binding.
 - b. Coating of Moly on small spur gear ball bearings.
 - c. Observe solidarity of all soldered connections in oscillator circuit.

Return any evidence of poor or rosin joints back to production.
 - d. Check proper orientation of L bracket which holds slug in coil L301. Move shaft to and fro observing if shaft is tight and the spring functions properly. Slug should clear screws at end of coil.
 - e. Check bare wires of 100 kc circuit, see that they do not touch ground.
2. Preliminary Adjustments
 - a. Remove the 6/32 screw which grounds one end of the coil L301 and raise lug above ground.
 - b. Place special jig over the main tuning condenser.
 - c. Connect an ohmmeter across this same condenser.
 - d. Bring condenser into full mesh, observing when the meter reads a closed circuit. This is the full mesh setting of the condenser and should be done carefully, attention should be given to the setting of the jig, ie. proper spring action, flush against plates, no erroneous indications.
 - e. Unloosen allen acrows which hold motor shaft onto mounted gear drive.
 - f. With the position of the condenser as indicated in (d)

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APPROVED <u>ATT A</u>		

orient the flat on the drive shaft so that it faces up. This is, in the position in which the osc. chassis is installed into the oven the flat is facing the top of the VOX. Re-tighten the allen screws of the cam securely on the condenser shaft.

g. Remove jig tuning plates. See Form 134

3. Installation into Test Unit

- a. Set the dial reading on the front panel to 1900000. Set dial lock.
- b. Install osc. chassis into test unit retaining condenser setting as set up in the preliminary adjustments, tighten drive shaft to the motor coupling. Tighten all other control couplings.
- c. Unloosen dial lock and rotate dial to 2,000,000. Re-lock.
- d. Unloosen allen screws which hold cam on condenser shaft. Orient cam so that cam follower arm rests at the 2 mc point. Re-tighten allen screws. Apply a slight rotational torque to the cam and observe that there is not the possibility of internal slipping. Observe the proper position and action of the split gears as to back lash and free motion of one gear over the other.
- e. Since considerable stress has been applied to the cam and gearing in these tests it is advisable to re-check the 1900000 setting of the main tuning condenser with the aid of the special jig. If the original setting has not been disturbed, remove the jig and re-ground end of coil L301 securely with a 6/32 screw.

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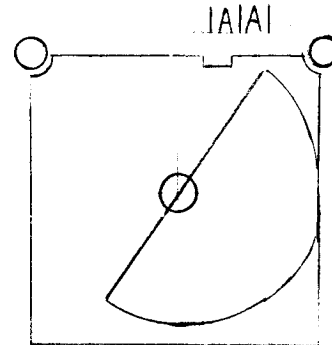
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- f. Adjust the setting of the correction condenser C302 as shown in the diagram.



- g. Lock set screws on cam arm and connect to power supply.

4. Alignment

- a. Place power on unit, with the aid of crystal frequencies and a proper receiver, align the ends of the tuning range, 2 and 4 mc.
- b. Set the dial to 2.5 mc. Pick up WWV at 5 mc on the receiver. Beat the second harmonic of the osc. with the 5 mc signal of WWV. Evidence of Zero beat of the two carriers may be observed by the fluctuations of the S-meter at the difference frequency. Zero beat must be seen on the S-meter since it is possible to obtain beats with the carrier modulation. When the osc. has been adjusted for zero beat with WWV, listen to the beat not between the osc. and the 100 kc calibrating crystal. These two may be set to zero beat by adjustment of the 100 kc trimmer condenser.
- c. When the ends of the tuning range have been aligned satisfactorily, set the dial to 2.6 mc. An audio beat note will be heard on the ear phones. Rotate the dial to approach a zero beat. Normally with an original setting the dial will be off-set about 6 kc above the 2.6 mc point

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to approach the zero beat. Observe the approximate magnitude. If the magnitude of the beat is very much larger than 8 kc a close inspection and analysis must be made to determine the reason for the wide deviation.

- d. If everything is normal and the dial reading fell above the 2.6 mc reading turn the adjusting screw at the rear of C302 clockwise a small amount with the aid of the special tool. If the setting of the dial fell below 2.6 mc turn the screw counter-clockwise. In any adjustment of the condenser C302 the ends of the oscillator must be re-aligned before an observation is made of the effect at the 2.6 mc point of the condenser adjustment.
- e. Repeat the adjustment of the condenser C302 as long as necessary until the beat at the 2.6 mc point is below 200 cycles.
- f. Make an initial calibrating run through the 2-4 mc range adjusting the cam screws. In this initial setting do not attempt to approach a zero beat at the check points. Set the beat about 500 cycles below the calibration point on the dial. This is to be done in order to allow the pulling up of the cam strip by the highest point in the vicinity. On the second calibrating run the setting is to be made exact since changes in cam screws will be slight, having a minimum effect on the other screws on the strip. Calibration should be made at the 100 kc points, however, if it is seen that the cam is riding at a point between two screw adjustments the 50 kc check point should be employed so that the cam is riding directly above an adjusting screw.
- g. Upon the completion of a satisfactory cam, glyptol the screws under the cam strip.
- h. If for any reason the cam proves unsatisfactory, or in any stage of the testing trouble occurs with the alignment, properly tag the unit giving full information as to the reasons why the unit is considered unsatisfactory. Be explicit in your description so that someone else will know exactly why the unit was rejected.

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TMC SPECIFICATION NO. S-110

TITLE: TEST PROCEDURE VOX R.F. CHASSIS

JOB

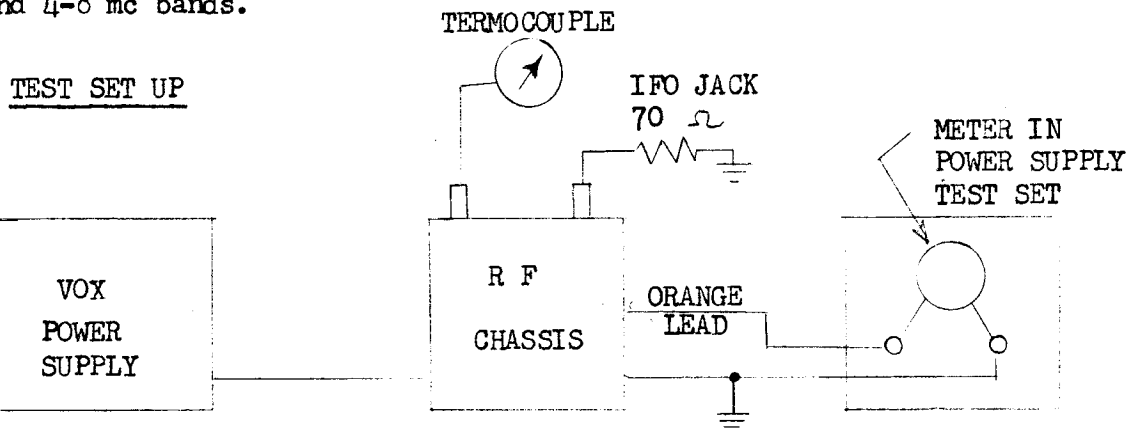
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TEST EQUIPMENT

1. R.F. Thermocouple with inherent 70 ohm load.
2. VTVM, and R.F. Probe.
3. 2,3,4 mc Xtals

PRELIMINARY:

The R.F. Chassis consists principally of R.F. multipliers extending from 2 to 64 mc. Its alignment is no more complex than the ordinary alignment of a tuned ckt. which is tracked at both ends Ex. R.F. section of hammarlund receiver. The only exception is the common trimmer used on the 2-4 and 4-8 mc bands.



PROCEDURE

1. Set trimmers C235, C232, C227, C224 to mid capacity.
 2. Carefully bend plates (rotor) of 1st and last section of the tuning bank (C225-A, C225-D) together so as to obtain a slightly greater maximum capacity. X.
 3. Rotate tuning condenser (C225) into full mesh adjust pointer on tuning knob so that pointer makes about 5° with the horizontal in the clockwise direction at the 2 mc end.
 4. Insert 2 mc Xtal in Y 204.
Insert 3 mc Xtal in Y203.
Insert 4 mc Xtal in Y 202
- Meter switch to HFO

See: Form 135

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5. Turn power on, HFO plate power on.
 6. Switch xtal to position #1 set band switch to 2-4 mc range.
Set tuning dial to 2 mc, set C210 to maximum capacity, output to maximum.
 7. dc voltage at pin 6 V202 -9.6 V.
 8. dc voltage at pin 1 V203 -10 to 12.
 9. Rotate output control to maximum output.
 10. Tune L203 for dc voltage pin 1 V205 -16.5 V. maximum output.
 11. Set xtal switch to pos. #2 record dc voltage pin 6 V202 -11V.
 12. Set xtal switch to pos. #3 record dc voltage pin 6 V202 -11 V.
 13. Switch band switch to 4-8 mc range. Tuning condenser at 2 mc. Xtal #1 tune L205 for maximum output, dc voltage pin 1 V205 -10.5 V.
 14. Set tuning condenser to 4 mc. Switch to xtal #3, trim C224 for maximum output, retrack low end then repeat high end for maximum output.
- | | | | | | |
|---------|---|----------------|--------------|---|----------------|
| Output: | 2 | <u>-10.5V.</u> | Panel Meter: | 2 | <u>.44 ma.</u> |
| | 4 | <u>-10.5V.</u> | | 4 | <u>.44 ma.</u> |
15. Set tuning condenser to 2 mc band switch to 2-4 mc. Xtal switch to pos. #1. Tune L203 for maximum output, output -18 V. .72 ma on panel meter.
 16. Set tuning condenser to 4 mc, xtal pos. #3 note frequency at which tuning dial peaks 4.2 mc output -20 V. panel meter .84 ma.
 17. Set tuning condenser to 2 mc, band switch to 8-16 mc., xtal #1 tune L206 for maximum output. Record dc voltage pin 1 V206 -6.5 V.
 18. Set tuning condenser to 4 mc, xtal #3 tune C227 for maximum output; retract low end, then high end until proper tracking is

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18. assured.

(2) Xtal No. 1 Freq. 2mc Output 8.1 volts 3.5 ma.

(3) Xtal No. 2 Freq. 3mc Output 9.0 volts 4.0 ma.

(4) Xtal No. 3 Freq. 4mc Output 9.1 volts 4.0 ma.

19. Set tuning condenser to 2 mc, band switch to 16-32 mc, xtal #1.
tune L207 for maximum output, voltage pin 1 -40 V.

20. Set tuning condenser to 4 mc xtal #3 tune C232 for maximum output.
Retract low end, then high end until proper tracking is assured.

Xtal No. 1 Freq. 2 mc Output 6 volts 24 ma.

Xtal No. 2 Freq. 2.9 mc Output 8.4 volts 4 ma.

Xtal No. 3 Freq. 4.1 mc Output 9.8 volts .44 ma.

21. Set tuning condenser to 2 mc band switch to 32-64 mc, Xtal #1,
Tune L208 for maximum output.

22. Set tuning condenser to 4 mc xtal switch to position #3, tune
C235 for maximum output. Retract both ends.

Xtal No. 1 Freq. 2 mc Output 7 volts 4.4 ma.

Xtal No. 2 Freq. 3 mc Output 8.4 volts 5 ma.

Xtal No. 3 Freq. 4 mc Output 7.5 volts 4.8 ma.

23. 3.5 mc Oscillator check. Turn IFO plate switch on, connect 70 ohm
load across J205 to grid, set meter switch on IFO, Tune L201
for maximum output. R.F. -3.4 volts Amp. meter reading _____ Ma.

24. Connect J205 to J203, band switch to 2-4 mc tune in signal at
3.5 mc. Xtal switch to V.M.O.

25. Remove cable from J203 & J205, leave frequency band switch at 2-4 mc
switch xtal frequency to position 2 which is 3 mc tune tuning con-
denser til R.F. output peaks at maximum output on VTVM. The
indicator on the tuning knob should point to 3 mc on panel.

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27. Disconnect VTVM and R.F. probe from multiplier strip gray and brown even wires and test for AC gray wires 110 VAC between the two brown wires 6.3 VAC to grid.

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TITLE: TEST DATA SHEET JOB _____

APPROVED ATT A

MODEL VOX POWER SUPPLY

VOX SERIAL NO _____

SUPPLY NUMBER _____

TEST

- 7. B.F.O. OSCILLATOR OUTPUT _____ MA
- 8. ZERO BEAT INDICATION _____ OK
- 9. AUDIO OUTPUT _____ volts AC
- 12. OVEN FUSE _____ OK
- 13. POWER FUSE _____ OK
- 14. PIN JACK VOLTAGES _____ OK

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TITLE: TEST DATA SHEET

JOB _____

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AJJ A

MODEL VOX CAM CALIBRATION

VOX SERIAL NO. _____

CONDENSER NO. _____

CALIBRATION OF 100 KC XTAL AGAINST WWV _____ OK

FREQUENCY KC

CYCLES DEVIATION

2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000

DATE _____

TESTED BY _____

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TMC SPECIFICATION NO. S-110

TITLE: TEST DATA SHEET

JOB _____

APPROVED ATT | A

MODEL VOX RF CHASSIS

VOX SERIAL NO. _____

CHASSIS NO. _____

1. MULTIPLIER OUTPUT

<u>BAND</u>	<u>FREQ. MC</u>	<u>R.F. OUTPUT VOLTS</u>	<u>PANELMETER MA</u>
2-4	2	_____	_____
2-4	4	_____	_____
4-8	4	_____	_____
4-8	8	_____	_____
8-16	8	_____	_____
8-16	16	_____	_____
16-32	16	_____	_____
16-32	32	_____	_____
32-64	32	_____	_____
32-64	64	_____	_____

2. IFO OUTPUT _____ VOLTS R.F.

3. VMO CO-AX CONNECTOR CHECK _____ OK

DATE _____

TESTED BY _____

TMC Form 135