

DATE 2-4-59
SH. 1 OF 31
COMPILED BY

TMC SPECIFICATION NO. S 412

TITLE: PRODUCTION TESTING OF MODEL RTF-2

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COMPLETE INSTRUCTIONS FOR THE PRODUCTION TESTING OF THE
MODEL RTF-2

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1. Purpose and Description

See Instruction Manual

2. Test Equipment Required

1. Vacuum Tube: voltmeter, RF Boonton Model 62 or Equivalent
2. Ohmmeter: Simpson Model 260 or Equivalent
3. Audio Generator: Heath Kit Model AO-1 or Heath Kit AG-8
4. RF Generator: Boonton Model 65-B
5. 5000 Ω non-inductive Resistor: IRC Type MPA or Equivalent
6. Termline Coaxial Resistor: Bird Model 82-C
7. Power Supply, 500 VDC: Lambda Model 41
8. Power Supply, 270 VDC: Heath Kit Model PS-2
9. Power Supply, -210 VDC: Heath Kit Model PS-2
10. Millimeter: MR-115
11. Ammeter RF, 5A
12. Millimeter: 100 MA RF
13. VTVM, Heath Kit, Model V-6
14. AC Voltmeter, Heath Kit, Model AV-2
15. SBE or equivalent.
16. VOX or equivalent.

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3. General Instrument Layout

a. Interconnect set-up as shown below:

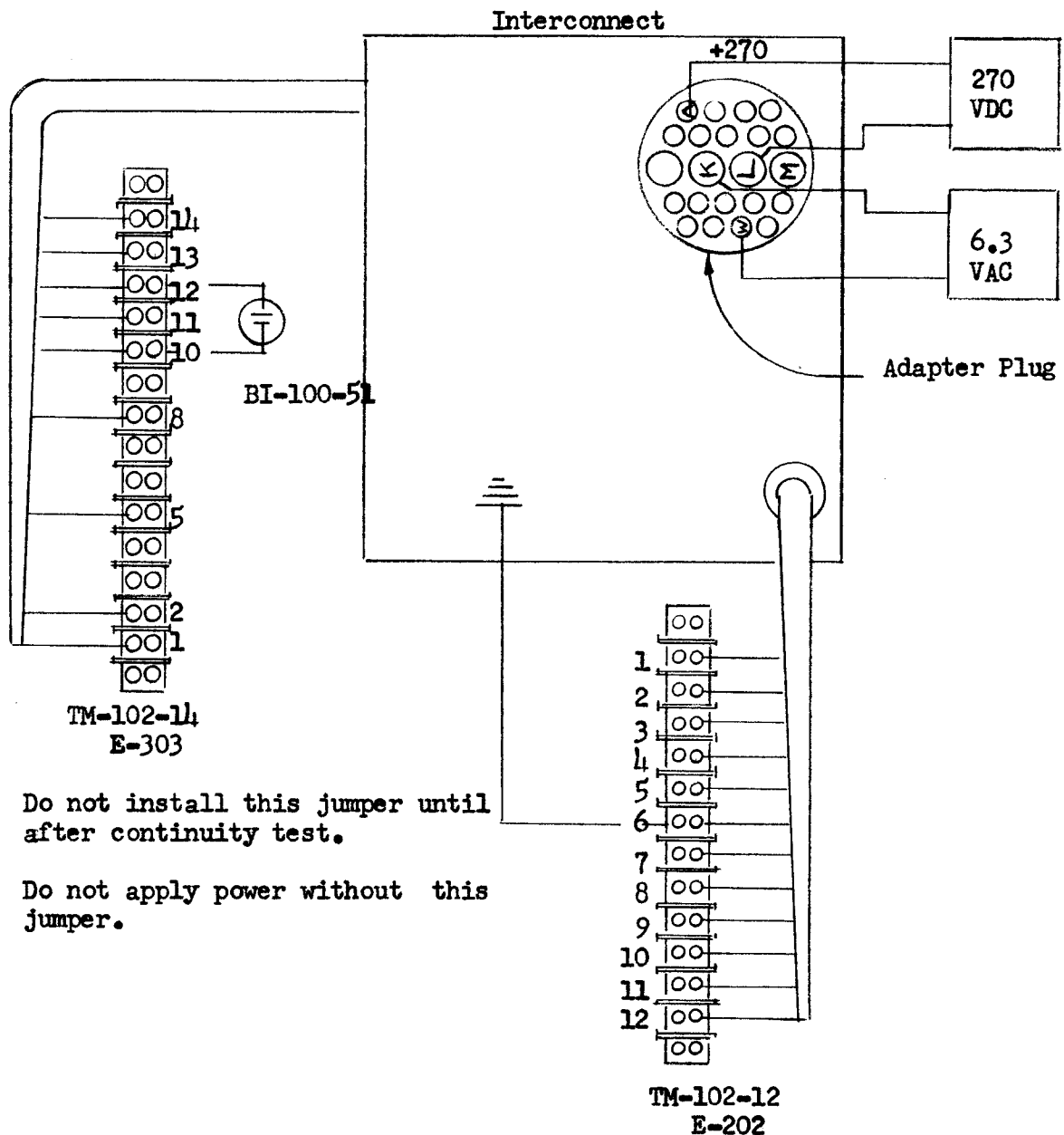
XTAL 2, 3,
4 mcs.

Heath Kit
Model V-6
or
Equivalent

Heath Kit
Model V-6
or
Equivalent

Heath Kit
Model OA-1
or
Equivalent

Boonton
Model 65-B
or
Equivalent



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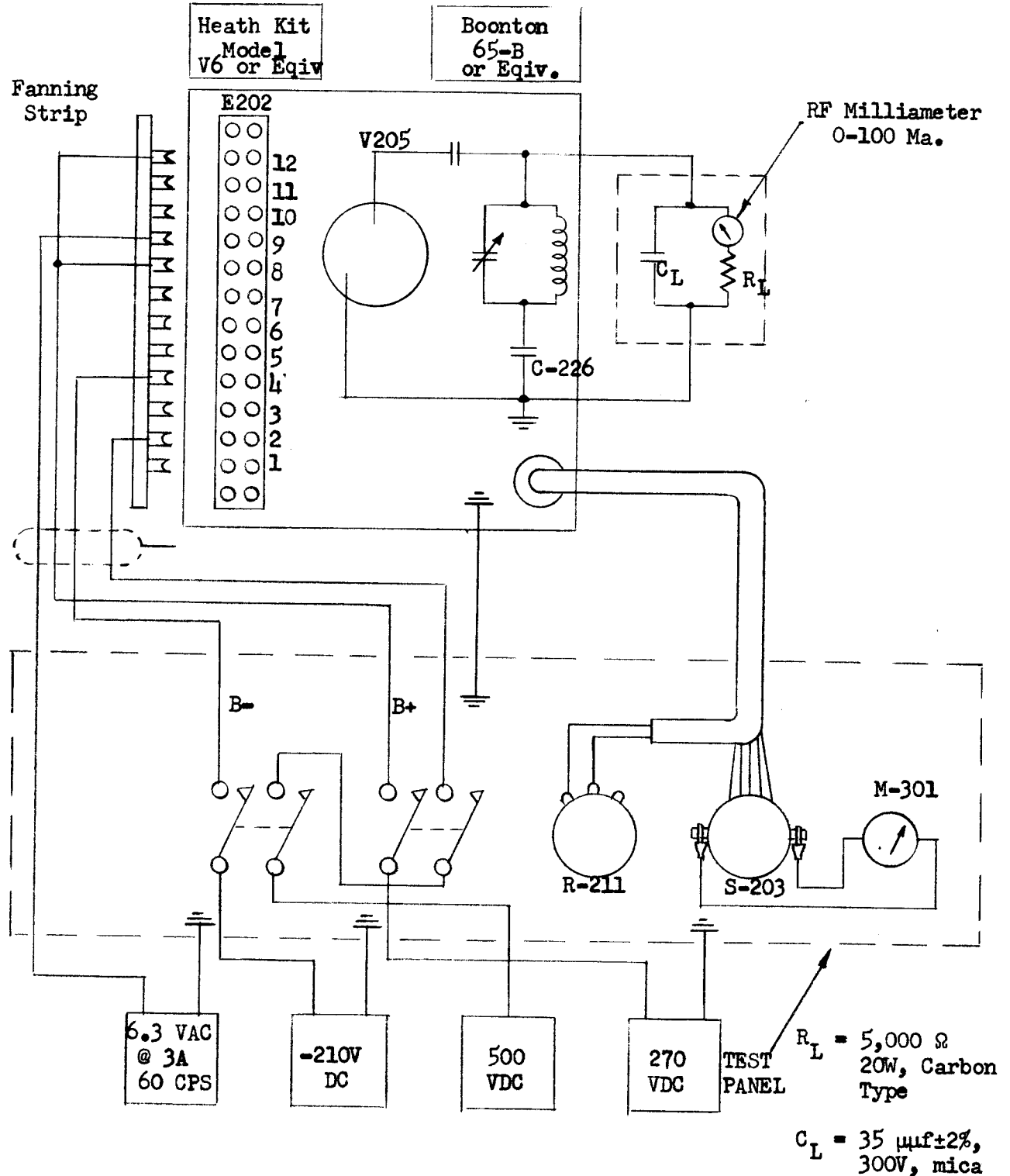
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b. Multiplier set-up as shown below:



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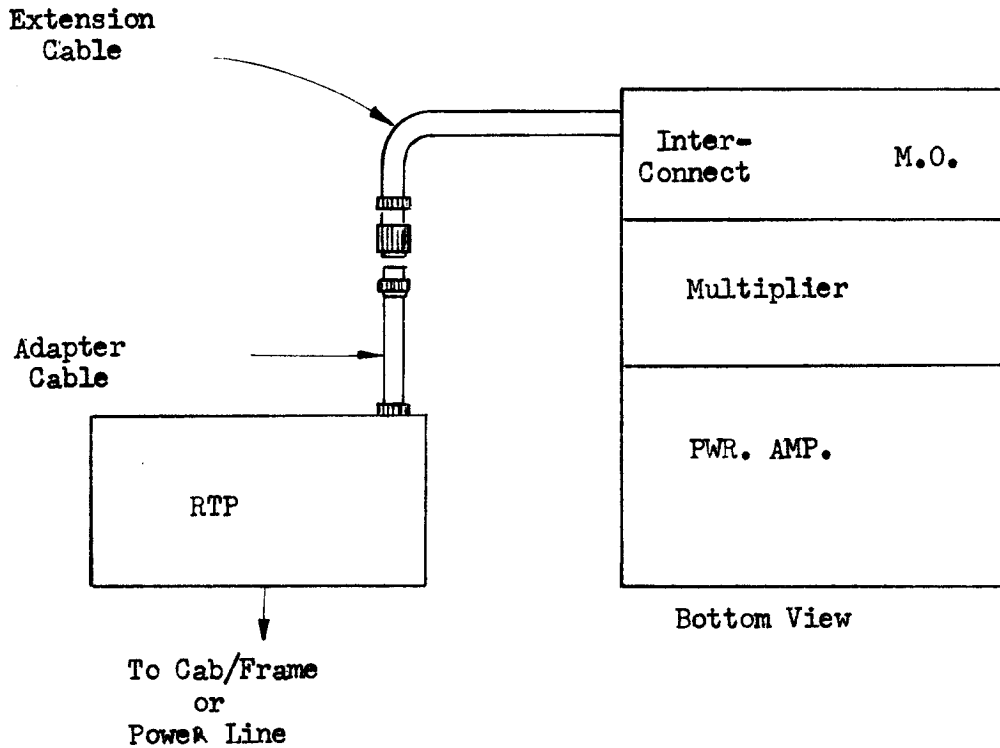
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c. Alignment of Multiplier set-up as shown:



1. Power to RTF-2 may be supplied from either Cab/Frame or directly through an adapter.
2. Keep the final plate switch OFF during this set-up.
3. Place the mode switch in tune position.
4. Defeat the interlocks.
5. Power Line must be 110 to 120 volts at 60 CPS.
6. Place 2 and 4 mcs crystals into the crystal oven.

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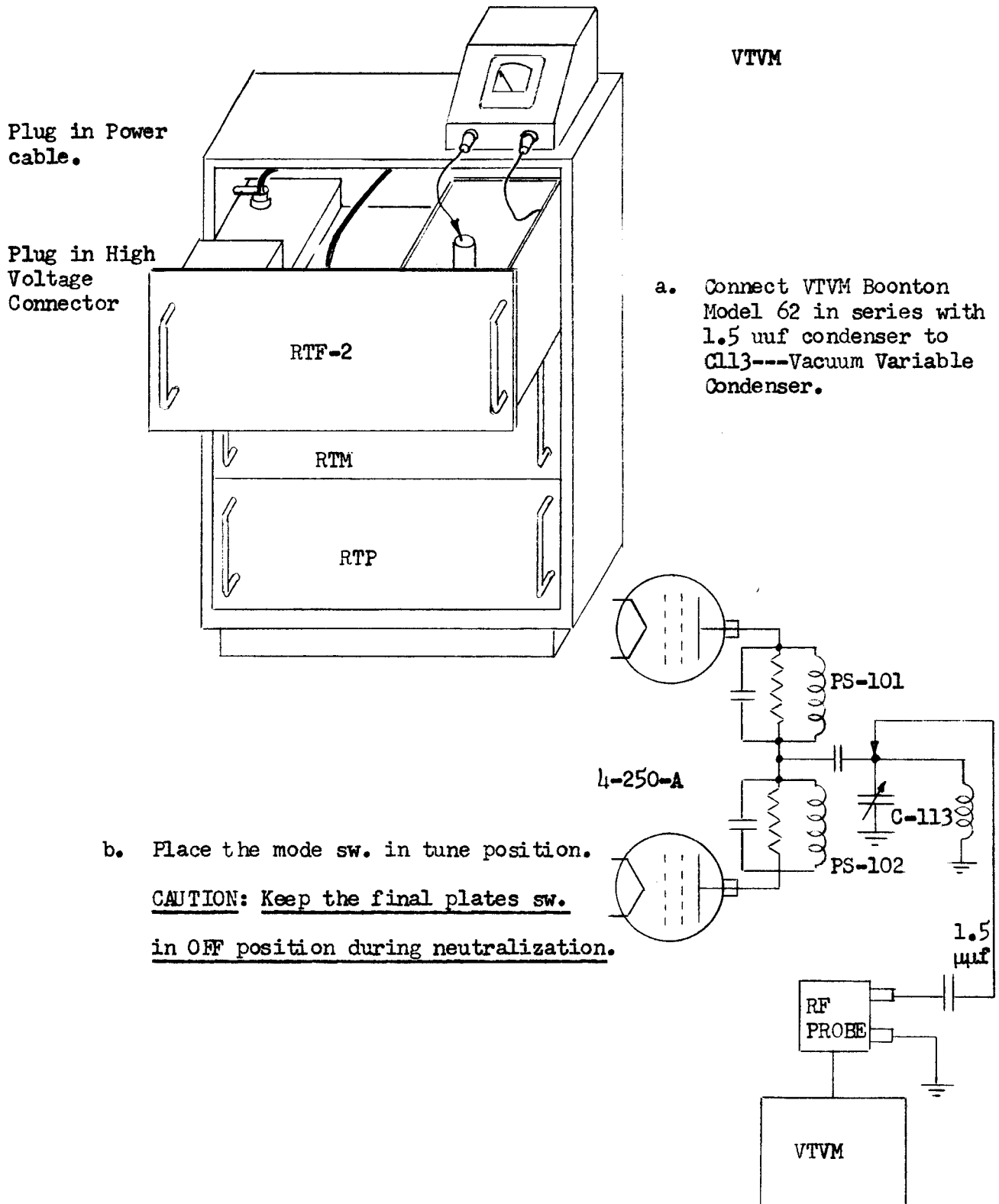
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d. Neutralization of RTF-2 set-up as follows:



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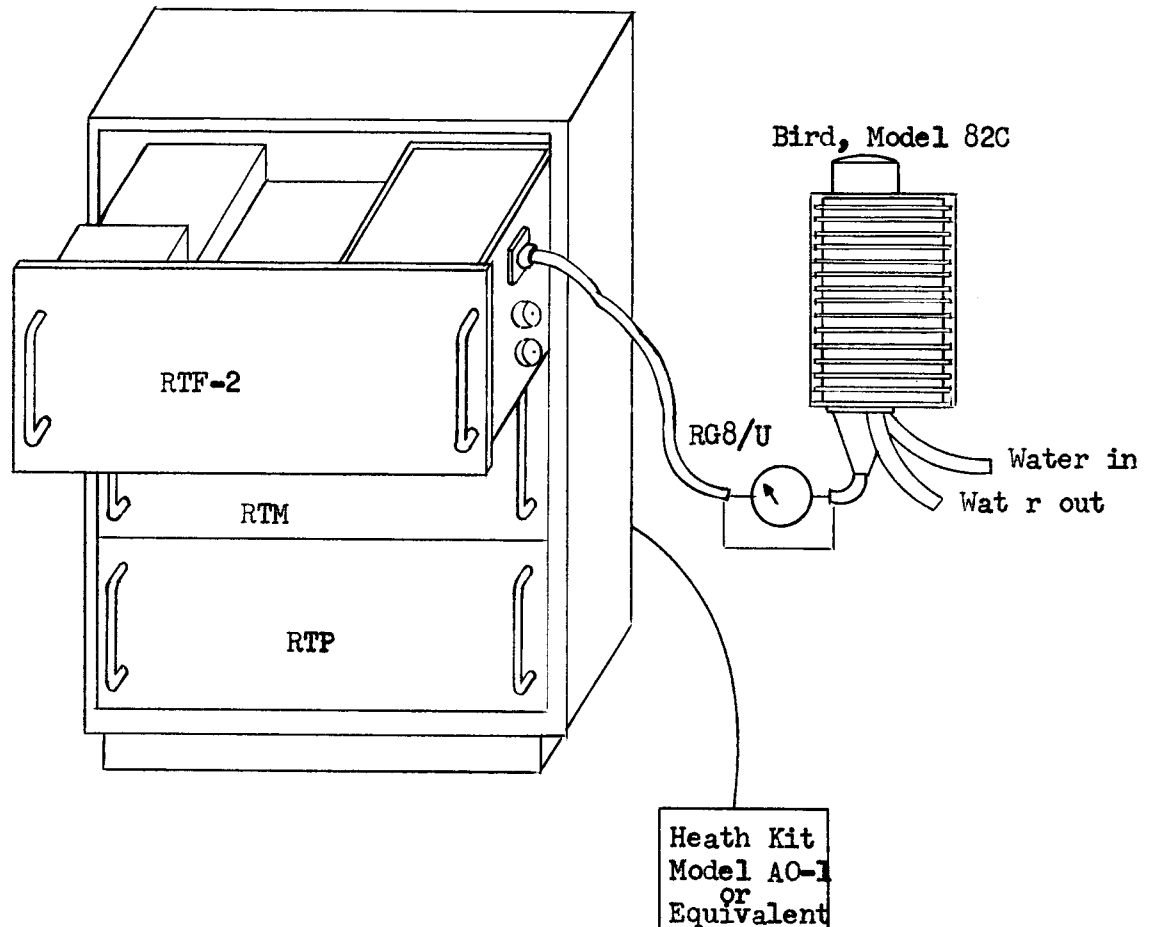
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- a. RTF-2 Efficiency and Modulation set-up as follows:



- a. Defeat the interlocks.
in the Cab/Frame.
- b. The Mode switch on the power supply S601 must be
in CW-FS position for Efficiency Test and in Phone
position for Modulation Test.
- c. The load must be water cooled.

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4. Test Instructions:

Section 1: Individual Units of RTF-2

- a. Proceed with the test of the individual units as outlined in Test Sequence and Procedure, Part 1 to Part 4 inclusive.
 - b. Fill in blanks on Report Sheets, rejecting those units which do not meet the specifications stated herein.
 - c. Sign Report Sheets and submit them to your supervisor.
- All accepted units must bear a tag or stamp of acceptance .

Section 2: RTF-2

- a. Continue as outlined in Test Sequence and Production from Part 5.
- b. Fill in blanks on Report Sheets, rejecting those units which do not meet the specifications stated herein.
- c. Sign Report Sheets, remove tags and submit them to your supervisor.

5. Test Sequence and Procedure

Part 1: Initial Calibration of Master Oscillator

- a. Set up and Calibrate the 100 KCS oscillator as per the first part of specification S-110 which relates to this subject alone.
- b. Set up and Calibrate the Master Oscillator cam as per the first part of specification S-110 which relates to this subject alone.

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Part 2: Interconnect

Test A: General Inspection:

- a. Inspect the unit for obvious mechanical errors.
- b. Inspect the unit for obvious electrical errors.
- c. Carefully inspect the unit for loose screws on all critical points such as under tube sockets, ground lugs, etc.
- d. Inspect the spring loaded clamps. The relay K101 and crystal oven Z-1 must be readily removeable.
- e. Place appropriate check mark on the Report Sheet

Test B: Continuity:

- a. Set up the unit for testing as in General Instrument Layout, paragraph 3a, with the exception of Power Supply (270 VDC, 6.3 VAC).
NOTE: Power supply must not be connected for this test.
- b. Set drive switch to CW-PHONE position.
- c. Set oscillator switch in "MO" position.
- d. Remove relay K-401.

J-405

<u>TERMINAL</u>	<u>TO GROUND</u>	<u>CONTINUITY TO</u>	<u>REMARKS</u>
A	Open	Terminal 8 of E202; short	
B	Open	Terminal 2 of E202; short	
C	Open	Terminal A of J401; short	Short to ground when osc. sw. is in calibrate pos.: Open in all XTAL pos.
D	Open	Terminal 13 of E303; short	
E	Open	Terminal 12 of E202; short	
F	Open	Terminal 1 of E202; short	

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<u>TERMINAL</u>	<u>TO GROUND</u>	<u>CONTINUITY TO</u>	<u>REMARKS</u>
G	Open	Terminal 13 of E201; short	
H	Open	Terminal 14 of E3-3; short	
I	Open	Terminal 7 of E202; short	
J	Open	Terminal 9 of E202; short	
K	Approx. .1 Ω		
L	Short		
M	Open	Terminal 11 of E202; short	
N	Open	Terminal 5 of E202; short	
T	Open	Terminal 2 of E303; short	
U	Open	Terminal 4 of E202; short	
V	Open	Terminal D of J401; approx. .4Ω	
W	Short		
X	Open	Terminal 10 of E202; short	

e. Place check mark in appropriate place on the Report Sheet.

E-303

<u>TERMINAL</u>	<u>TO GROUND</u>	<u>CONTINUITY TO</u>	<u>REMARKS</u>
1	Open	Terminal 2 of K401; short	
5	Open	Terminal 4 of K401; short	
8	Open	Terminal 3 & 5 of K401; short	Also continuity to terminal 11 of E202; short
10	8-12K		
11	Open	Pin 1 of V406; short	
12	Open	Terminal 7 of E202; short	

a. Place appropriate check mark on the report sheet.

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Keyed Circuit

a. Connect the ohmmeter to pin 1 of V403 and ground.

<u>NUMBER</u>	<u>CONDITION</u>	<u>EXCITATION SWITCHING</u>	<u>OSCILLATOR SWITCHING</u>
1	Open	CW-PHONE	MO position
2	80-120 K	L.O. "ON" F.S.	XTAL 1
3	80-120 K	L.O. "OFF" F.S.	XTAL 2
4	Open	L.O. "ON" SSB	XTAL 3
5	Short	Any	Calibrate

b. Place appropriate check mark on the Report Sheet.

Test C: Wiring of J401

a. Connect Power Supply as shown in General Instrument Layout, paragraph 3b.

b. Set excitation switch in CW-PHONE position.

c. Set Oscillator switch in calibrate position.

d. Connect NE51 to terminals 10 and 11 of E303.

e. Place a jumper between pin 6 and pin 3 at E202.

f. Turn the power "ON".

g. With VTVM, measure following voltages:

J-401

<u>PIN</u>	<u>VOLTS</u>
B	145 to 155 VDC
C	145 to 155 VDC

h. Set the Oscillator switch at M.O. position

i. Pin B of J401, 145 to 155 VDC.

j. Pin C of J401, 0 volts.

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- k. Set Oscillator switch at any crystal position.
- l. Pin B and C of V_{401} , 0 volts
- m. Set excitation switch in L.O. "ON" F.S. position.
NOTE: VR tube V_{401} must be "ON".
- n. Set excitation switch in L.O. "OFF" F.S. position.
NOTE: VR tube V_{401} must be "OFF".
- o. Set excitation switch in L.O. "ON" SBB position.
NOTE: VR tube V_{401} must be "ON".
- p. Set excitation switch in L.O. "OFF" SSB position.
NOTE: VR tube V_{401} must be "OFF".
- q. Return excitation switch to CW-FS position.
- r. Place appropriate check mark on the Report Sheet.

Test D: Mixer and Audio Amplifier

- a. Connect an Audio Signal Generator set for 500 cps and .2 volts output at pin of V_{4-5} . The Oscillator Switch S_{401} must be in "Calibrate" position. The output at pin 10 of E303 must be 20 volts with ± 5 volts.
- b. The same output results must be obtained with the Signal Generator set for .4 volts at pin 7 of V_{405} .
- c. While still connected to pin 7 of V_{405} and driving with .4V, set Generator at its lowest frequency. NE-51 bulb, connected to terminals 10 and 11 of E303 must then flash "ON" and "OFF".
- d. Turn B+ "OFF"
- e. Place appropriate check mark on the Report Sheet.

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Test E: R.F. Stages

- a. Place a 75 Ω load at the output P401.
- b. Insert 2 and 4 mcs crystals into crystal 1 and crystal 2 respectively.
- c. Insert 3 mcs crystals into crystal 3.
- d. Set trimmer condensers C420, C423 and C424 at mid capacity.
- e. Turn exciter switch to CW-FS position.
- f. Connect Signal Generator Set at approximately 3.0 mcs and 2 V. to J-402.
- g. Turn the power on and measure following voltages at P-401.

Oscillator Switch Position

P-401 R.F. Volts RMS

1. Calibrate	0
2. M.O.	5 to 8
3. XTAL - 1	5 to 8
4. XTAL - 2	5 to 8
5. XTAL - 3	5 to 8

- h. Disconnect equipment.
- g. Place appropriate check mark on the Report Sheet

Part 3: Multiplier

Test A: General Inspection

- a. Inspect the unit for obvious mechanical errors.
- b. Inspect the unit for obvious electrical errors.
- c. Carefully inspect the unit for loose screws on shafts, couplings and other critical points such as under tub sockets, ground lugs, button capacitors, tc.
- d. Inspect alignment of condensers C201, A,B,C.

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- e. Inspect alignment of switches S201 A,B,C, S202 A,B and detend SW-179.
- f. Place a check mark in the appropriate place on Report Sheet.
- g. Resistors: R210, R221, R232 must be $10 \Omega \pm 5\%$ (Brown, Black, Black and Gold).
- h. Resistors: R216, R223, R233 must be $18 K \Omega \pm 5\%$ (Brown, Gray, Orange and Gold).
- i. Resistor: R222 must be $430 K \Omega \pm 5\%$ (Yellow, Orange, Yellow and Gold).
- j. Place a check mark in the appropriate place on Report Sheet.

Test B: Resistance and Continuity:

WARNING: Do not connect multimeter (50 μ a.) to the multiplier during application of an ohmmeter. Otherwise permanent damage to the multimeter will result.

- a. Turn potentiometer, drive control R211, fully counter-clockwise for minimum drive and ground its case to the main chassis, i.e. through a clip lead this R211 must remain grounded throughout the Part 2, Prealignment of Multiplier.
- b. Tune following measurement from E-201 and E202 to ground.

TERM.	1	2	3	4	5	6	7	8	9	10	11	12	13	20
R in Ω	Open	40K 45K	Short	250K 300K	Open	170K 220K	19K 25K	23K 29K	approx. .152	Open	Open	170K 230K	Open	Open

- c. Tune following readings pin to pin:

<u>PIN</u>	<u>PIN</u>	<u>RESISTANCE</u>
10 of E202	11 of E202	Open
10 of E202	21 and 24 of E201	Short
11 of E202	22 and 23 of E201	Short

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- d. Place a check mark in the appropriate place on the Report Sheet.

Test C: Drive Control and Keying Circuits

(Prepare the unit for test as described in Paragraph 3b, General Instrument Layout).

- a. Load the driver output.
- b. Connect MR-115 to serve as M-301.
- c. Set meter switch, S-203 at position #2, Driver IP Plate.
- d. Set S-204 in normal position.
- e. For the purpose of this test, temporarily ground the case of C-201 with C-128.
- f. Connect power to E-202 as follows:
- 6.3 to pin 9 and ground -210VDC to pin 4 and ground.
- 270 VDC to pins 8 and 12 and ground.
- 500 VDC to pin 2 and ground.

WARNING: In order to avoid serious damage to the P.A. Driver, V-205, always apply negative voltage first and do not remove it until all other DC voltages are "OFF".

- g. Turn the filament voltage on and allow a few moments to warm up.
- h. Turn all B voltages "ON" starting from negative voltage.
- i. Take following voltage readings:

pin 6 of E-202 --- 65 ± 15 VDC
pin 7 of E-202 --- 27 ± 5 VDC
pin 2 of V-201 --- 65 ± 15 VDC
pin 3 of V-201 --- 3 ± 3 VDC
pin 6 of V-204 --- 3 ± 3 VDC
pin 5 of V-205 --- 95 ± 15 VDC
pin 3 of V-205 --- 3 ± 3 VDC

- j. Set SSB Switch in SSB position
- pin 3 of V-205 --- 185 ± 15 VDC

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- k. Pin 3 of V-201 --- 150 ± 5 VDC
- l. Ground pin 7 of E-202, M-301 must now read 40 to 55 ma.
- m. Turn all B voltages "OFF", negative voltage last, and turn the drive control, R211, clockwise for maximum drive.
- n. Set SSB switch to normal position.
- o. Turn B voltages "ON". NOTE: Meter M301 will now read approx. 5 ma.
- p. Take following voltage reading:
 - pin 6 of E202 --- 0 ± 1 VDC
 - pin 2 of V201 --- 0 ± 1 VDC
 - pin 3 of V201 --- 140 ± 10 VDC
 - pin 6 of V204 --- 140 ± 10 VDC
 - pin 5 of V205 --- 38 ± 5 VDC
 - pin 3 of V205 --- 145 ± 10 VDC
- q. Turn all B voltages "OFF"

Test D: Prealignment of Multiplier

- a. Set capacitors C210, C212, C218, C231, C232, C237, C238 and C239 to their mid position.
- b. Set the Driver Band switch 2-4 mcs position.
- c. Connect the load assembly as shown in paragraph 3b.
- d. Set the Main Tuning condenser, C201, to fully meshed position and then rotate it approximately 10° .
- e. Set the VOX at 2 mcs. output and connect it to terminal J201.
- f. Set S-204 to SSB position.
- g. Turn th power "ON" and slowly advance the output control at the VOX until some plate current change is noted on th meter (M-301).

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- h. Tune L-203 for a peak on M-301. NOTE: Decrease.
- i. Tune L-211 for a peak in R.F. output current. R.F. current of 30 ma to be acceptable.
- j. Set the Driver Band Switch to 4-8 mcs position.
- k. Set the VOX to 4 mcs and apply drive slowly until some indication is obtained on M-301.
- l. Tune L-212 for maximum indication on R.F. meter, an output of 30 ma R.F. current is acceptable.
- m. Set the Driver Band Switch to 8-16 mcs position.
- n. Set VOX to 8 mcs and apply drive slowly until some indication is obtained on M-301.
- o. Tune L-207 for maximum indication on M-301.
- p. Tune L-213 for maximum indication on R.F. meter. An output of 30 ma R.F. current is acceptable.
- q. Set Driver Band switch to 16-32 mcs. position.
- r. Set VOX to 16 mcs position and advance Drive Control slowly until some indication is obtained on M-301.
- s. Tune L-208 until some indication is obtained on M-301.
- t. Tune L-214 for maximum R.F. output on M-301. An output of 30 ma R.F. current is acceptable.

Disconnect Equipment

The Multiplier unit which has passed the specifications above is acceptable to be marked into an RTF-2 Frame.

Part 4: Power Amplifier Wiring

Test A: General Inspection:

- a. Inspect th unit for obvious mechanical errors.

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- b. Inspect the unit for obvious electrical errors, especially for shorts in the R.F. carrying straps relative to ground and among each other.
- c. Carefully inspect the unit for loose screws in shafts, couplings, springs, gears and other critical points, such as coils, switches, tube sockets, etc.
- d. Verify the placement of the taps on the coils and switches.
- e. Inspect all major solder connections, such as taps on coils and switches.

Test B: Continuity Test

Take the following readings:

- a. Plate cap of V101 to V102 --- infinite resistance relative to ground.
- b. Plate cap (V101 to V102) approximately 1.5 Ω relative to the junction C-111 and L-109.

Test C: Safety Switch, S-104

- a. Place ohmmeter across normally closed terminals of the switch S-104.
- b. Turn very slowly PS Band Switch in either direction and make sure that the safety switch will open before the feelers of the switches S-101 and S-102 leave their pins. After the above has happened, return the switch slowly into its previous position, observing that the feelers must contact their respective pins before the S-104 closes.

Test D: Filament and Blower:

- a. Connect 112 to 118 V 60 cps to cable lugs, numbers 3 and 4, and to the Blower B-101.

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- b. With AC Voltmeter measure pin 1 of V101 relative to ground 5±.3 volts. Pin 5 of V102 relative to ground -- volts.
- c. The blower must provide adequate air cooling. The Power Amplifier which meets the specifications above is acceptable to be mounted into RTF-2 Frame.
- d. Place appropriate check mark on the Report Sheet.

Part 5: RTF-2 Alignment

Test A: General Inspection:

- a. Inspect the master oscillator's counter and calibrate gear assembly for mechanical imperfections.
- b. Inspect all other shafts and couplings.
- c. Carefully inspect the helical gears below the vacuum variable condenser, C113, and be sure that the assembly is running smooth.

Test B: Alignment of Knobs:

- a. Set the Antenna loading knob so that pointer will read "0" when C-117 is fully mashed.
- b. Position the Driver Tuning pointer by means of the coupling at the Vernier, so that it will be horizontal and to the left, when C201 is fully mashed.
- c. Check all other knobs, which have pointers, that they are aligned properly.
- d. The PA Tuning counter must read approximately 99.8 when the C113 is fully mashed. If not --- return such unit for readjustment.

Test C: Alignment of Multiplier

- 1. Place the model RTF-2 on its power amplifier side and provide

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all the necessary power as shown in paragraph 3c, General Instrument Layout.

2. Place the Mode switch in a tune position.
3. Place the SSB switch in the SSB position.
4. Place excitation switch to SSB, L.O. "OFF"
5. Set Driver Band switch to 4-8 mc Band.
6. Place multimeter switch to driver plate position.
7. Turn transmitter plate switch "ON".
8. Set SSB to 4 mc and turn the output control to minimum.
9. Set Driver Tuning to 2 mc mark, $\pm 2^\circ$.
10. Advance the output from SBE slowly until there is some increase in Driver current.
11. Tune L204 for peak indication on multimeter, reducing the output control at SBE to maintain Driver Plate current within the multimeter range.
12. Set multimeter switch to PA grid R.F. volt position.
13. Tune L212 for maximum indication on multimeter, reducing the output at SBE to maintain a voltage of approximately 50 volts.
14. Set SBE for 8 mc output.
15. Set Driver Tuning to 4 mc mark, $\pm 2^\circ$.
16. Tune C218 and C238 for maximum indication on the multimeter.
17. Repeat steps thru 16 until no further adjustments are necessary and lock the coils.
18. Set the Drive Band switch to 8-16 mc band.
19. Set the Driver Tuning to 2 mc mark, $\pm 2^\circ$.
20. Set the multimeter switch to Driver Plate position
21. S t the SBE to 8 mc output.

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22. Increase the Driver slowly until some indication on multimeter is obtained.
23. Tune L207 for peak on multimeter.
24. Set multimeter to PA grid R.F. voltage position.
25. Tune L213 for maximum indication on R.F. volt meter, reducing the Drive from SBE to maintain 50 volts.
26. Set Driver Tuning to 4 mc mark, $\pm 2^\circ$.
27. Set the SBE to 16 mc output.
28. Tune C231 and C239 for maximum indication on R.F. volt meter.
29. Repeat steps 18 thru 28 until no further adjustments are necessary and lock the coils.
30. Set Driver Band switch to 16-32 mc Band.
31. Set Driver Band to 2 mc mark, $\pm 2^\circ$.
32. Tune L208 for maximum indication on R.F. volt multimeter.
33. Tune L214 for maximum indication on R.F. volt multimeter.
34. Set the SBE for 32 mc output.
35. Set Driver Tuning to 4 mc mark, $\pm 2^\circ$.
36. Tune C232 for maximum indication on R.F. volt multimeter, readjusting the Driver Tuning also for maximum indication.
37. Repeat steps 30 thru 36 until no further adjustments are necessary and lock the coils.
38. Tune the Driver stages for maximum output at 16 mc.
39. Leaving the Driver Tuning control in tact, set SSB switch to normal position and multimeter switch to PA grid Ma. position.
40. Plac excitation switch to CW-PHONE position.
41. Set the Oscillator switch to 2 Mc crystal position.

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42. Rotate the Driver control flowing clockwise.
43. Tune L217 for maximum output.
44. Place the SBE switch to SSB position.
45. Place excitation switch to SSB L.O. "OFF" position.
46. Set the SBE for 32 mc output.
47. Set the Driver for 32 mc output.
48. Leaving the Driver Tuning control in tact, set the SSB switch to normal position.
49. Set the excitation switch to CW-PHONE position.
50. Set the oscillator switch to 4 mc position.
51. Tune C232 for maximum output on R.F. volt meter.
52. Slightly retune L217 to obtain 30 Ma on multimeter.
53. Set the oscillator switch to 2 Mc position and tune the Driver Tuning for 16 Mc output.
54. An output of 30 Ma must be obtained, readjust L205 if necessary.
55. Set the Oscillator switch to 4 Mc position and tune the Driver Tuning for 32 Mc output.
56. An output of 30 Ma must be obtained.
57. Turn "OFF" the SBE.
58. Set Driver Band switch to 8-16 Mc Band.
59. Check output at 8 Mc, an output of 30 Ma must be obtained.
60. Check output at 16 Mc, an output of 30 Ma must be obtained.
61. Set Driver Band switch to 4-8 Mc Band.
62. Check output at 4 Mc, an output of 30 Ma must be obtained.
63. Ch ck output at 8 Mc, an output of 30 Ma must be obtained.
64. Set Driv r Band switch at 2-4 Driver Band.
65. Set the Driv r Tuning at 2 Mc mark, $\pm 2^\circ$.

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66. Drive with 2 Mc crystal and tune L203 for maximum output.
67. Tune L211 for maximum output.
68. Set Driver Tuning at 4 Mc mark to $\pm 2^\circ$, tune C210 & C237 for max. output.
69. Repeat steps 66 thru 68 until no further adjustments are necessary and an output of 30 Ma is obtained, and lock the coils.
70. Check the multiplier at 3,6,12 and 24 Mc and in each case an output of 30 Ma must be obtained.
71. Place a check mark in the appropriate place on the report sheet.

Part 6: RTF-2 Neutralization

WARNING: In performing this following operation do not contact any parts, since High potentials of R.F. and DC are present.

Be sure that you are thoroughly familiar with this equipment.

Even with the Transmitter Plates Switch Off, there is still DC potential on the neutralizing condenser (C-211), PA grids, and on some other components mainly on the resistance boards.

NO UNAUTHORIZED PERSONNEL SHALL BE PERMITTED TO BE IN THE VICINITY OF THIS EQUIPMENT WHILE IT IS OPERATED WITH ALL HIGH VOLTAGE COMPONENTS EXPOSED. WARNING SIGNS MUST BE POSED SO THAT THEY CAN NOT BE OVERLOOKED.

Test A: Neutralizing PA

The purpose of this test is to obtain minimum amount of coupling between grid plate due to the inter-electrode capacitance.

WARNING: KEEP THE FINAL PLATE SWITCH OFF THROUGHOUT THIS TEST.

- a. Slide the Model RTF-2 into the upper shelf of Cab/Frame.
- b. Unit must slide easily. If mechanical misalignment of slides is found, return such unit to production for adjustment.

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- c. Push the unit all the way in and pull out until the automatic stops, will prevent the unit from further sliding.
- d. Attach Power Cable to J4-5 and the H.V. cable J303.
- e. Turn the main power switch on, allow a few minutes to warm up.
- f. Connect VTVM (Boonton, Model 62) in series with 1.5 uuf to the tank of the final amplifiers (junction C113 and L112).
- g. Drive the Power Amplifiers at 8 Mcs., and adjust the drive control for 20 Ma. of PA grid current.
- h. Set the PA band at 6-8 mcs.
- i. Set the Antenna Loading Condenser at "50".
- j. Set the Antenna Loading Switch at "2" and set the PA Tuning to the peak on VTVM.
- k. Adjust the neutralizing condenser C104 for approximately 2 V output on the VTVM and if necessary the lead length from C201 to C128.
- l. Turn the Transmitter Plates Switch off.
- m. Disconnect VTVM

Part 7: Master Oscillator Calibration:

After having concluded Part 6, leave the unit on until the inner oven commences to cycle. Depending upon ambient temperature condition, as much as three or four hours may be required to reach this point.

Test A: Inner Oven Cycling

Observe the inner oven cycling by means of I301. The on time should be, very roughly, one minute and the off time, very roughly, two minutes. Do not pass a unit which varies radically from these figures.
(By mor than -50, +100%)

Test B: Outer Oven Cycling

Outer oven cycling should be, roughly, two or four seconds on, and

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thirty to one hundred and twenty seconds off.

Test C: 100 Kcs Oscillator Calibration:

- a. Couple lightly J402 to a communications receiver tuned to WWV at either 2.5 mcs. or 5 mcs. (be sure BFO is off).
- b. Tune the Master Oscillator dial to the region of 2.5 mcs.
- c. Be sure the Drive Switch is set at Normal Position.
- d. Turn Transmitter Plate Switch to "ON" position.
- e. Set the Oscillator Switch at M.O. Position.
- f. Carefully zero beat the Master Oscillator against WWV to within a fraction of one cycle.
- g. Set the Oscillator Switch at Calibrate position.
- h. By means of C311 and the beat indicator (I202), zero beat the 100 Kcs. crystal oscillator against the Master Oscillator to within a fraction of a cycle. The unit can be passed only after this operation has been concluded.

Test D: Master Oscillator Calibration:

Recalibrate the master oscillator at both the upper and lower ends, and then, with out again touching either end adjustment control, record the amount of error in the Master Oscillator dial against the 100 Kcs. point between 2 and 4 mcs. A form has been provided for this purpose. No unit may be passed where this error exceeds 200 cps.

NOTE: DO NOT turn the Final plates switch on during this test.

Part 8: RTF-2 Output:

WARNING: Do not make any adjustments in the unit while high voltage is "ON". This may cause a serious lectrical shock, or R.F. burn, or in some cases instantaneous death. After the High Voltage has been shut "OFF", always short the high potential B+ to ground, before handling.

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m. Turn Final Plate and Transmitter Plates Switch "OFF"

TEST B: P.A. Efficiency

NOTE: For tune-up procedure see Instruction Book.

a. Connect the Resistive load, (Bird, Termaline Coaxial Resistor, 51.5 Ω) in series with 0-5 amps R.F. ammeter to J-101.

SEE: General Instrument Layout (sub-paragraph "e" for interconnection.)

b. Tune the Model RTF-2 to frequencies as stated in the chart below. At 530 Ma. of P.A. Plate current, the R.F. output must be better than 4.2 amperes. This corresponds to our efficiency.

c. Fill in blank space on report sheet.

If on one or more frequencies the efficiency figure falls below 70%, reject such units.

OUTPUT f.	PA BAND mcs.	PA TUNING approx.	ANTENNA LOADING approx.
2.0	2.0 - 2.5	07.0	50
2.5	2.5 - 3.0	07.3	20
3.0	3.0 - 4.0	07.4	10
4.0	4.0 - 6.0	05.7	00
8.0	6.0 - 8.0	16.0	65
12.0	8.0 - 12	18.2	75
16.0	12 - 16	20.0	75
24.0	16 - 24	20.0	75
32.0	24 - 32	20.1	80

NOTE: Keep the Antenna Loading Switch in Position #2.

Test C: Modulation

The purpose of this test is to find defective condensers and to get final assurance of the spacings between the high tension straps and ground. It is not a Modulator Test.

a. After the Model RTF-2 has been set to any arbitrary frequency, adjust its P.A. plate current to approximately 400 Ma. (1 kw plate input.)

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This is necessary in case the stored energy in the condensers had not enough time to discharge through the bleeder.

Test A: Spurious P.A.:

CAUTION: Under any circumstances do not allow the Power amplifiers to dissipate a total of more than 450 W. Under no load condition, this corresponds to the plate current of approximately 150 Ma.

- a. Connect the high voltage cable to J303.
- b. Leave the drawer pulled out.
- c. Be sure there is no load connected to the unit.
- d. Set the Meter Switch to PA grid position.
- e. Turn the final plate switch "ON".
- f. Pull out the P.S. drawer and adjust (R-608) the PA grid bias until the PA plate current reads 100 Ma.
- g. Push in the drawer.
- h. Set the Driver Switch to 2-4 mcs. band. (See chart below).
- i. Set the PA tuning control as shown in the chart below.
- j. Set the PA controls at approximately 2.0 mcs. (See chart below).
- k. Observing PA grid current and PA plate current, rotate the Driver Tuning from one extreme to the other. Be especially elert while the driver tuning pointer is passing th 2.0 mc mark.
- l. Repeat the steps i. thru l., however, with different settings as follows:

	f	Driver Band	PA TUNING APPROX.	ANTENNA LOADING APPROX.	P.A. BAND
Antenna Sw.	2	2-4	07.0	50	2.0-2.5
st at pos.	8	8-16	14.1	50	8.0-12
number 2.	32	16-32	20.1	80	24-32

If a peak or dip in th PA plate or grid current is noticed, reject such units, since this indicates s lf oscillation. Most likely the unit must be reneutralized.

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- b. Connect an Audio Signal Generator to terminal 1 and 3 of E401 set at .1 V out and at 1000 cps.
- c. Turn the Modulator level to minimum.
- d. Set the S601 to phone position.
- e. Slowly increase the level control until Modulator plate current reads 380 Ma.

NOTE: Do not leave the unit turned on in this condition for a prolonged period of time. A modulation test of 15 seconds is sufficient.

Test D: Keying:

- a. Remove the interlock jumper from the cabinet.
 - b. Push into the cabinet all drawers. This is necessary to obtain minimum leakage of R.F.
 - c. Set the units for CW operation at any arbitrary frequency and at approximately 750 W output.
 - d. Insert key at J-302.
 - e. Pick up the signal on a communication receiver.
 - f. Key the Model RTF-2 at above five cps. rate (fifteen words per minute) and listen on the receiver to see that the keying sounds clean and follows the key.
 - g. The test key must key the unit when depressed in any direction.
- When all of the proceeding tests have been successfully completed, the unit must be placed in its final form with cover plates on, etc., and prepared for shipment. One copy of each report sheet shall be enclosed with each Model RTF-2.

Part 9: SSB

- a. Set the SSB for 2 tone output at frequencies as per checked below.

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- b. Set Mode switch to SSB position.
- c. Set excitation switch to SSB L.O. "ON".
- d. Set the Single Side Band switch to SSB.
- e. Tune the unit in accordance with the procedure outlined in the Instruction Manual.
- f. Output of 160 volts RMS across the 50 Ω load measured with Hewett Packard VTVM must be obtained. The Screen grid current must read approximately 4 Ma and there must be no grid current detectable.

f mcs.	Driver Band	PA Band	PA Tuning approx.	Antenna Load approx.
2.0	2-4	2-2.5		
2.5	2-4	2-2.5		
3.0	2-4	2.5-3.0		
4.0	2-4	3.0-4.0		
6.0	4-8	4.0-6.0		
8.0	8-16	6.0-8.0		
12.0	8-16	8.0-12		
16.0	8-16	12-16		
24.0	16-32	16-24		
32.0	16-32	24-32		

- g. When all of the preceding tests have been successfully completed, the unit must be placed in its final form with cover plates on, tc., and prepared for shipment. One copy of each Report Sheet shall be enclosed with each Model RTF-2.

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APPROVED [Signature]

TEST REPORT SHEET
ACCEPTED

PART 1: <u>Initial Calibration</u>	<u>MO CAM CALIBRATION</u>	
PART 2: <u>Interconnect</u>	FREQ. CK	CYCLES DEVIATION
TEST A: General Inspection	_____ 2000	_____
TEST B: Continuity Test	_____ 2100	_____
TEST C: Wiring of J-401	_____ 2200	_____
TEST D: Mixer and Audio Amplifier	_____ 2300	_____
TEST E: R.F. Stages	_____ 2400	_____
PART 3: <u>Multiplier</u>	_____ 2500	_____
TEST A: General Inspection	_____ 2600	_____
TEST B: Resistance & Continuity	_____ 2700	_____
TEST C: Drive Control & Keying Circuits	_____ 2800	_____
TEST D: Prealignment	_____ 2900	_____
PART 4: <u>Power Amplifier Wiring</u>	_____ 3000	_____
TEST A: General Inspection	_____ 3100	_____
TEST B: Continuity Test	_____ 3200	_____
TEST C: Safety Switch	_____ 3300	_____
TEST D: Filaments & Blower	_____ 3400	_____
PART 5: <u>RTF-2 Alignment</u>	_____ 3500	_____
TEST A: General Inspection	_____ 3600	_____
TEST B: Alignment of Knobs	_____ 3700	_____
TEST C: Alignment of Multiplier	_____ 3800	_____
PART 6: <u>RTF-2 Neutralization</u>	_____ 3900	_____
TEST A: Neutralizing P.A.	_____ 4000	_____
PART 7: <u>Master Oscillator Calibration</u>	Serial No. _____	
TEST A: Inner Oven Cycling	Date: _____	
TEST B: Outer Oven Cycling	Accepted _____	
TEST C: 100 Kcs. Osc. Calibration	MO Condenser No. _____	
TEST D: Master Osc. Calibration	Tested By _____	
PART 8: <u>RTF-2 Output</u>		
TEST A: Spurious, P.A.	_____	
TEST B: P.A. Efficiency	_____	
TEST C: Modulation	_____	
TEST D: Keying	_____	
PART 9: <u>SSB</u>		
TEST A: Tuning	_____	