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COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA, U. S. A.

# PRODUCTION TEST REQUIREMENTS

FOR

175 WATT AMATEUR TRANSCEIVER

TYPE KWM-2

APPROVED BY

PROJECT ENGINEER E. O. Shrade DATE 12-31-58

| No. | Date | Rev. No. | DESCRIPTION OF CHANGE | Eng. App. | Sales App. |
|---|---|---|---|---|---|
| E | 10-24-62 | S90072 | | DJD | |
| D | 5-1-60 | R88188 | | | |
| C | 1-7-60 | R81742 | | | |
| B | 11-18-59 | R7xx | | | |
| A | 10-22-59 | R80486 | | | |
| 0 | 4-22-59 | | | | |

REVISIONS

SPECIFICATION NO. 569 1236 00 PAGES 1 THRU 19

1. SCOPE

These Production Test Requirements apply to the Collins Type KWM-2 Amateur SSB Transceiver, Part No. 522 1611 00.

2. REFERENCE INFORMATION

2.1 Specifications:

KWM-2 Equipment Specification, Part No. 568 0988 00
516F-2 Test Requirements, Part No.
516F-2 Equipment Specification, Part No.

2.2 Publications:

KWM-2 Instruction Book, Part No. 520 5964 00

2.3 Drawings:

KWM-2 Schematic Diagram, Part No. 549-5623-006

3. TEST EQUIPMENT REQUIRED

The following equipments or their equivalents are required to perform the specified tests:

1. Receiver, Collins 51J.
2. Speaker, with enclosure, either 500 ohms or 4 ohms impedance.
3. R-F Load, 52 ohms, 120 watts, Bird Type 611.
4. VTVM with r-f probe, Hewlett Packard 410B.
5. R-F Sampling Connector for Hewlett Packard 410B.
6. Audio Output Meter and Load, CR 583A.
7. Audio Oscillator, Hewlett Packard 200 CD.
8. Distortion Analyzer, Hewlett Packard 330B.
9. R-F Sig. Gen. Meas. Type 65B with X 0.1 term. head and 47 ohm dummy ant.
10. Oscilloscope, Central Electronics, Model MM-1.
11. Vibration Table, Part No. 029 0608 00.
12. Dynamic Mic with three-circuit plugs, Part No. 361 0001 00, Mic, Part No. 020 0186 00.
13. Power Supply and Metering Panel, Collins Part No. 029 6161 00.
14. Tuning Tool for Transformer T1, T2, L4, L9, T5 and Z5, Walsco Type 2543.
15. C.W. Coding Wheel.
16. XTAL for 29.5 to 29.7 MC operation P/N 290 9149 00 .
17. Relay Contact Burnishing Tool, Part No. C24 3800 00.
18. Spectrum Analyzer 478R-1.
19. 100 KC Frequency Standard, Measurements 111B.
20. 28 Volt Filament Tester, Part No. 029 3060 001 (with adapter plug to fit KWM-2).
21. Reliability Test Fixture, Part No. 029 5136 001.
22. Talk out JIG 029 0377 00
23. Triplett Model 630 N.A. Volt Ohmmeter.
24. 399C-1 External VFO.
25. Two Tone AF Generator 029 2329 00

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4. TEST CONDITIONS

4.1 Power: Power Source Voltage should be 115 V ±1%, 60 cps.

4.2 Ambient Temperature and Humidity: Normal factory ambient conditions.

4.3 Atmospheric Conditions: All KWM-2 transceiver tests shall be performed at normal factory atmospheric conditions.

4.4 Operational Duty Cycle: Continuous receive, 50% duty cycle CW transmission, continuous SSB transmission.

4.5 Warm-Up Period: For calibration and frequency stability, 10 minutes; for all other tests, one minute. 15 Min for gain & carrier balance.

5. PRELIMINARY TESTS

5.1 Unless otherwise specified, set knobs and tuning controls as follows:

1. "OFF, ON, N.B., CAL" - On.
2. Exciter Tune - 7 MC.
3. Bandswitch - 7.2 MC.
4. R-F Gain - full clockwise.
5. A-F Gain - full clockwise.
6. Kilocycle Dial - 100.
7. Meter Switch - PA Grid.
8. Mic Gain - as required.
9. VOX Gain - in maximum counterclockwise position.
10. P.A. Tune - 7 MC; Load - 50 ohms.
11. Anti-Trip - full counterclockwise.
12. Emission Switch - SSB.
13. Remove fuse from 800 V Power Supply.

5.2 Check that P17 Jumper Plug is in place.

5.3 Be sure jumper bus is not connected between J5 and J6 (P.A. disable).

5.4 With Power Plug P13 disconnected, check B+ and bias lines for shorts.

Normal 275V B+ to ground resistance = 12 K,
Normal bias resistance = 30 K. 800 volt line should read open.

5.5 Check filament operation on 28 V using filament test fixture, Part No. 029 3060 001.

5.6 Check slug rack for proper operation, make adjustment in rack end bearing where necessary. For torque details see 544 9697 00

5.7 Check mechanical operation of all controls.

5.8 Connect Power Plug P13 and check B+ voltage. B+ on receive should be approximately 290 V; transmit approximately 260 V. (PA Disabled)

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| | A 10-22-59 R80486 | D | R88188 6 May 1960 | G | | | |
| | B 11-18-59 R8962c | E | S90072 24 Oct 1962 | H | | | |

5.9 With K2 in non-energized (receive) condition check transmitter stages for cut off bias, and B+ switching.

5.10 Energize K2 and check receiver stages for cut off bias and B+ switching.

5.11 Injection Level Check:

5.11.1 Check injection levels in both transmit and receive.

| | Test Point | Voltage |
|---|---|---|
| VFO Xmit | Junction of C217, 218 | 1.55 V |
| VFO Receive | V17 pin 9 | *1.25 V |
| Crystal Xmit | V6 pin 3 or 8 | 1.1 to 1.8 V** |
| Crystal Receive | V12 pin 8 | 1.7 to 3.1 V** |
| BFO Xmit | V15 pin 9 | 1.2 V |
| BFO Receive | V15 pin 9 | 1.2 V |

*If this voltage varies more than ±10%, trouble may be encountered with receiver tweets. It may be readjusted by selecting a new value for R162.

**Slug rack must be tracked to obtain correct answers.

5.11.2 Check output of Tone Oscillator by turning emission switch to "Tune". Set Mic Gain full clockwise. At least 5 V of audio should be present at pin 7 of V3.

6. INITIAL ADJUSTMENTS

6.1 Transmitter 455 KC IF Alignment:

1. Place A-C probe of a VTVM from pin 1 of V4 to ground.
2. Set emission switch to "tune" position.
3. Set Mic Gain in maximum CCW position.
4. Voltage appearing is due to carrier. Adjust carrier balance pot (R15) and capacitor (C9) for minimum voltage. This is a coarse adjustment.
5. Turn Mic Gain clockwise until a reading of approximately 1 volt is obtained.
6. Peak primary and secondary of T1.
7. Remove meter.

6.2 Transmitter Band Pass VIF Rough Alignment:

1. Lightly couple receiver tuned to 3.055 MC to pin 2 of V6.
2. Tune VFO dial to 100, emission switch to tune, and advance Mic Gain until sufficient signal for alignment is obtained in the receiver.
3. Peak slugs in T2 and L4. (This is a rough alignment, a more precise alignment will be made later.)

6.3 R-F Alignment:

1. Adjust all ceramic trimmer capacitors including the three below the chassis midway between minimum and maximum capacity (omit Carrier Balacne Capacitor). (Except C70, 37, 109, 130 Set to 2/3 of Max. cap).
2. Position VFO to 100 kc.
3. Switch band to 3.6 mc.
4. Place a-c probe of VTVM from grid (pin 5) of P.A. tube to ground.
5. Set "exciter" tuning control to center of 3.5 mc band (logging position 2.1).
6. Adjust Mic Gain until a nominal 15 V reading is obtained on the VTVM.
7. Adjust slugs until maximum reading on VTVM is obtained.
   CAUTION: Be sure slugs are not tuned to VIF frequency. If necessary feed signal generator tuned to 3.7 mc to Pin 2 of V5 in order to get r-f slugs peaked properly.
8. Switch band to 7.0 mc.
9. Set VFO Dial to 150 set exciter tuning control to logging position 3.6.
10. Adjust Mic Gain until a nominal 15 V reading is obtained on the VTVM and adjust each of the 7 mc trimmers for a maximum reading.
11. Switch band to 14.0 set exciter tuning to logging position 6.1, set VFO Dial to 150, tune slug in L14 for max. reading.
12. Adjust Mic Gain for nominal 15 VTVM indication and peak all 14 mc trimmers.
13. Switch band to 21.2 mc, and set exciter tuning to logging position 7.6.
14. Set VFO to 100 adjust Mic Gain for nominal 15 VTVM indication and peak all 21 mc trimmers.
15. Switch band to 28A and set exciter tuning to logging position 9.0.
16. Adjust Mic Gain for nominal 15 VTVM indication and peak all 28 mc trimmers.
17. Remove VTVM probe. Later touch up alignment will compensate for probe capacity.
    Note: It is permissible to select a new value for C14 for proper tuning of mechanical filter.

6.4 P. A Neutralization:

1. With the P. A. plate and screen voltage still disconnected, connect the 50 ohm load to the r-f output jack.
2. Place VTVM probe across 50 Ω load.
3. Turn emission switch to "tune"; bandswitch to 28.A mc; VFO to 100 meter switch to P. A. grid.
4. Increase Mic Gain to full clockwise and P. A. tuning control for maximum a-c voltage across the 50 ohm load (level may be less than 0.5V.
5. Adjust the P.A. neutralizing capacitor, C184, accessible from the bottom of the set for a dip in the voltage across the 50 ohm load.

6.5 Driver Neutralization:

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| | A | R80486 10-22-59 | D | R88188 6 May 1960 | G | |
| | B | R79620 11-18-59 | E | S90072 24 Oct 1962 | H | |

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1. At this point, connect the high voltage plate supply to the P. A. tubes by replacing the fuse. Connect the screen supply to the P. A. tube by jumpering the P. A. disable jack with a short phono cable assembly.
2. Remove the heater voltage to the driver tube V8, by disconnecting L29 from C241.
3. Place VTVM probe across the 50 ohm dummy load.
4. Turn emission switch to "Lock Key," meter switch to P. A. Plate.
5. Adjust bias control in power supply for 40 MA of P. A. plate current.
6. Increase Mic Gain and tune exciter tuning and P. A. tuning for maximum voltage across the 50 ohm load. The level will be very low-less than .3 volts.
7. Adjust the driver neutralizing capacitor, C117, (located on the shield partition, closest to the shield cover) for a voltage dip.
8. Restore driver heater voltage.

6.6 Feedback Neurtalization:

1. Tune up transmitter on 28.6 mc.
2. Adjust the feedback neutralizing capacitor, C120 (located below the chassis) until plate current dip and Grid current dip coincide. Adjust the Mic Gain control to hold the P. A. grid current to Mid scale during this step.
3. Check the feedback Neut. on all other bands.
4. If there is a significan difference check radio for trouble-possibly loose coil cans.

6.7 Carrier Balance: Turn emission switch to "LSB," Mic gain full CCW with transmitter tuned up on 3.7 mc. Ground break in line to put transmitter on the air, and adjust carrier balance pot and capacitor (R15,C9) for minimum output across 50 ohm load. Repeat for USB. If there is any difference between the two settings, make suitable compromise. Level across 50 ohm load should be less than 0.2 V rms after balancing.

6.8 Plate Meter Calibration:

1. Remove power and check d-c resistance to ground from pin 6 of V10. Call this resistance R-1 (use Triplett Model 630NA ohmmeter for resistance measurement in order to assure sufficient accuracy).
2. Reconnect power and tune up transmitter on 14 mc. (Set drive to grid current thresh)
3. Adjust P. A. loading until d-c voltage measured from pin 6 of V10 to ground, divided by RI = 250 MA.

$$\frac{E_I}{R_I} = 250 \text{ MA}$$

4. Select value of R161 to set P. A. plate meter reading to 250 MA.

6.9 P. A. Plate Loading:

1. Tune up transmitter on 21.0 mc in lock Key Posistion.
2. Note the position of the P. A. Tuning Control with the Plate

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| | A R30486 10-22-59 | D R33188 6 May 1960 | G | | |
| | B R79620 11-18-59 | F S90072 24 Oct 1962 | H | | |

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Current dipped and loaded to 230 MA at plate current saturation. It should be at logging position 8.0. If it is at a lower logging position, increase the inductance of the 10 meter coil by compressing it slightly. If it is at a higher logging position, decrease the inducta inductance of the 10 meter coil by stretching it slightly.

CAUTION: Do not draw P. A. grid current under these conditions for any period of time since screen dissipation will be exceeded.

3. Switch to 21.3 mc and tune the transmitter.
4. Set P.A. Loading control at 50 ohm mark.
5. Increase Mic Gain until plate current saturates. The P.A. Plate current should read 230 MA. If current is less, less capacity is required. If it is greater, more capacity is required. Adjust the 10 and 15 meter trimmer, C155, until the correct loading is obtained. It will be necessary to retune the P.A. Tuning Control as C155 is varied. Always tune for plate current dip.
6. Switch to 28.6 mc and tune the transmitter in Lock Key position.
7. Adjust Mic Gain for plate current saturation. With the P.A. Loading Control at the 50 ohm mark, note the plate current. If current is less than 230 MA, less capacity is required. If it is greater, more capacity is required. Adjust C155 for a compromise between 28.6 mc and 21.3 mc, since this same trimmer is used on both bands. Recheck both 21.3 mc and 28.6 mc to insure that the transmitter can be tuned and loaded to 230 MA plate current at plate current saturation with the Loading Control near the 50 ohm mark.
8. Tune the transmitter at 14.150 mc with the Loading Control set at the 50 ohm mark. Adjust C152 for 230 MA maintaining plate current dip.
9. Repeat step 8 at 7.150 mc using C153.
10. Repeat step 8 at 3.700 mc using C154.

6.10 Final Alignment of Transmitter Tuned Circuits:

1. Tune up transmitter at 3.7 Mc.
2. Feed Two Tone, 30 MV test signal to Mic or PHONE PATCH JACK.
3. Set Mic gain for Mid scale ALC.
4. Peak slugs in T1 for max. ALC reading, keeping ALC near mid scale with Mic Gain.
5. Align VIF by placing swamping tool from Pin 1 of T2 to ground and peak slug for secondary of T2 (Top Slug).
6. Remove swanmping tool from Pin 1 of T2 and place on Pin 3 of T2.
7. Peak primary slug of T2 (Bottom Slug). Remove Swamping tool.
8. Remove Swamping tool, tune transmitter to 3655 KC and Peak L9 for max. ALC. If VIF response is not flat enough, it is permissable to readjust L9 slightly.
9. Peak all slug rack slugs except L14 for maximum ALC at 3.7 MC. (Log Point 2.1)
10. Tune up transmitter at 7.150 MC and peak all 7 MC RF and crystal trimmers for maximum ALC. (Log point 3.6)
11. Tune up transmitter on 14.150 MC and peak all 14 MC RF and crystal trimmers for maximum ALC. (Log point 6.1)
12. Tune up transmitter on 21.3 MC and peak all 21 MC trimmers for maximum ALC. (Log point 7.6)

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13. Tune up transmitter on 28.6 Mc and peak all 28 Mc trimmers for maximum ALC. (Log point 9.0)

6.11 Adjustment of Transmitter Gain:

1. Select R140 so that approximately a 3.0 MV two tone test signal provides ALC threshold at 14.3 MC. Increase two tone signal level to 30 Millivolts, and see that at least S9+20 db reading is obtained on all bands at all settings of the VFO dial.
2. Check carrier balance to see that it does not exceed 0.2 V rms on any band after selection of R140.

6.12 Adjustment of ALC Zero, VFO and Crystal Oscillator Feedthru:

1. Tune up transmitter on 14.1 mc.
2. Turn Mic Gain to full counterclockwise position, switch meter to ALC, set emission switch to LSB and ground break in line.
3. Zero ALC meter with ALC Zero Pot R30.
4. Loosely couple a 51J receiver to the transmitter output and tune it to 14.555 mc. Adjust the first mixer balance pot R24 and trimmer C21 for minimum output.
5. Tune the transmitter to 28.5 mc. Set emission switch to USB operate PTT line and turn Mic Gain down. Measure the a-c voltage across the 50 ohm load. The level should be less than .7 volts.

6.13 Receiver Alignment:

1. Connect jumper cable between J20 and J21.
2. Feed 100 uv 14.3 mc from signal generator with 50 ohm output to RF output connector of KWM-2.
3. Set R132 full clockwise, peak exciter tuning control.
4. Peak slugs in L9 and T5 using "S" meter as indication.
5. Adjust R132 (R-F Gain ADJ) for AGC threshold of 2.5 microvolts.
6. Tune receiver to internal signal at 7047 kc.
7. Adjust tweet trap (Z5) for minimum signal. (Check 80 meter internal signal, it may be necessary to readjust Z-5 slightly.
8. Check AGC voltage on VIB 2V3B control grid. If voltage is more than .2 V lower than AGC static bias, replace the offending 6AZ8. Make this check after receiver has warmed up for at least 10 minutes. (No Signal)

6.14 Calibrator Frequency Adjustment:

1. Tune in WWV at 15.00 mc.
2. Turn Function Switch to "Cal" position.
3. Zero beat with WWV's carrier using "Cal Zero" C76.

6.15 VFO Dial Adjustment:

1. Set fiducial to center of dial opening.
2. Tune receiver to 3.400 mc Cal point and zero beat.
3. Loosen set screws on VFO dial and set dial to read zero.
4. Tune VFO to 200 kc Cal point and note VFO dial reading. VFO tracking error should not exceed 1,000 cps over the range of the VFO. If ERROR IS IN EXCESS OF 1000 CPS, RE SET OSCILLATOR END POINTS.

6.16 VFO Side Step Alignment:

1. Place emission switch in LSB, tune in 3.4 mc Cal point.
2. Switch to USB and tune C308 on the VFO for zero beat.

6.17 S Meter:

1. Set S meter zero.

7. TEST REQUIREMENTS:

7.1 Transmitter Gain:

1. Tune and load transmitter to 230 MA on P.A. plate meter at 3.7 mc (threshold of P.A. grid current). Set H. V. to 800 V at 230 MA load. Feed two tone audio through a suitable attenuation into Mic Jack. Ground break in line to put transceiver in transmit position. Set emission switch to LSB MIC gain full clockwise, meter switch to ALC. Increase audio input until ALC threshold is reached and record audio input voltage.
2. Repeat for 7.1 mc
3. Repeat for 14.1 mc
4. Repeat for 21.3 mc
5. Repeat for 28.6 mc

7.2 CW OUTPUT:

1. Turn emission switch to "lock key".
2. Tune and load transmitter to 230 ma Ip with Ig adjusted to S-2 at 3.7 mc.
3. Record power output.
4. Repeat at 7.1 mc, 14.1 mc, 21.3 mc, & 28.6 mc.

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7.3 Transmitter Distortion:

1. Tune up transmitter on 14.3 mc
2. Set emission switch to USB.
3. Set Mic Gain control at 12 o'clock, Meter Switch to "ALC."
4. Feed 950 and 2000 cycle test tones, voltage not to exceed .07 V RMS, to Mic Jack and adjust for S-3 ALC reading.
5. Measure 3rd and 5th order distortion products using 478R-1 test rack.

7.4 Transmitter Hum and Noise Level:

1. Short output of AF generator, with controls set as they were in section 7.3.
2. Measure Hum and Noise level using 478R-1 test rack.

7.5 Carrier Suppression:

1. Measure carrier suppression below. Two tone output for both USB and LSB by switching tones off. It is permissible to rebalance if necessary.

7.6 Transmitter Audio Response:

1. With the transmitter tuned to 14.2 mc, and controls set as in section 7.3, feed 1,000 cps audio tone into Mic Jack.
2. Adjust audio level so that 30 volts RF output across 50 ohms dummy load is obtained.
3. Vary audio frequency + and - from 1,000 cps until RF output voltage drops to 15 volts. (6 db points of audio response).
4. Repeat with LSB.

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7-7 CW

1. Connect RF scope across dummy load, key transmitter with coding wheel up to 40 wpm. Observe that keyed wave shape is clean.

2. Using hand key, set Vox gain to operate on keyed signal. Send the letter "R" while listening to the keyed note on a 51J receiver. Be sure that the 1st dot is not lost while the Vox circuit is pulling in.

3. Check Sidetone to see that it is functioning properly.

7.8 3500 KC Transmitter Spurious

1. Tune Transmitter to 3500 kc.

2. Using 478R-1 test rack, check level of transmitter spurious output caused by RF output of transmitter getting into 1st transmit mixer, beating with 455 kc, to produce a signal in the VIF passband. (This signal will tune in the opposite direction; i.e., if the dial is moved to 3510 kc, the spurious will move to 3490 kc).

7.9 Vox Sensitivity

1. Turn Mic gain control to MIN Gain (not OFF).

2. Turn Vox gain control full clockwise.

3. Feed 1000 cps audio tone to Mic Jack and meausre minimum level required to actuate Vox relay.

4. Remove jumper cable from P.A. disable jacks.

7.10 Receiver Sensitivity:

1. Feed .5 uv CW signal from properly terminated 50 ohm signal generator into J1 (RF Output), peak exciter tuning and check S/N ratio at 3-7 mc. CAUTION: Do not switch to transmit or serious damage to the signal generator will occur.

2. Repeat at 7.3 mc

3. Repeat at 14.3 mc

4. Repeat at 21.5 mc

5. Repeat at 28.6 mc

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| | B | 11-18-59 R79620 | E | S90072 24 Oct 1962 | H |

7.11 Receiver AGC Threshold

1. Set RF gain to maximum, emission switch to USB, feed 2 14.3 mc signal from the signal generator into the antenna jack. Increase the input until the S meter indicates an increase from zero, and note the signal input to the receiver.

7.12 AGC Characteristics

1. Connect audio load box (and meter) to 500 audio output.
2. Inject a 10 uv 3.7 mc signal and tune for a beat note of 1000 cps. Adjust audio gain for an output of 5 milliwatts.
3. Increase the input to 1 volt and note db difference in output.

7.13 Overall Gain

1. Set 3.7 mc signal from properly terminated 50 ohm signal generator to AGC threshold LEVEL, tune for 1000 cps beat note.
2. Advance AF gain to its full clockwise position and measure AF output level.

7.14 S Meter

Adjust input signal to 100 uv at 14.3 mc, S meter should read approximately S-9.

7.15 Selectivity

1. Adjust signal generator output for S-3 (3.7 mc) indication on S meter. Note level.
2. Increase output of signal generator 80 db, detuen receiver lower in frequency until reference level is noted on S meter, note dial reading.
3. Retune receiver higher in frequency until reference level is again noted on S meter.
4. Record frequency difference between steps 2 and 3.

7.16 Audio Frequency Distortion

1. Adjust signal generator output to 1000 uv at 3.7 mc.
2. Tune receiver for 1000 cps beat note.

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3. Adjust AF gain for output level of 1 watt.

4. Measure harmonic distortion.

7.17 Crystal Calibrator:

1. Tune in crystal calibration at 28.6 mc. Record S meter reading.

2. Turn calibrator "off".

7.18 Oscillator Drift:

1. Feed ext. 100 kc standard to receiver. Tune receiver to 28.6 mc signal from standard and tune for 1000 cps beat note at 115 volt line.

2. Lower voltage to 103.5 volt and record beat frequency after 2 minutes have elapsed.

3. Raise voltage to 126.5 volts and record beat frequency after 2 minutes elapsed.

4. Compute frequency difference between steps 2 and 3 and record.

7.19 Image Rejection:

1. Tune receiver to 21.5 mc, set signal generator for AGC threshold, and note generator output reading.

2. Tune signal generator to 27.610 mc (Sig. Freq. +2 x 3.055 mc) and note level required for AGC threshold.

3. Record db difference between levels in steps 1 and 2.

7.20 Internal Signals: (Be sure relay cover is in place).

Place a 50 ohm dummy load in the antenna jack, set emission switch to USB and use maximum RF and AF gain. Carefully tune each band listening for crossover tweets. Log any tweets encountered and record the tweet output level over (3.7 Mc) the CW background.

7.21 Hum Test: Feed 1000 uv input to receiver. (1000 cps tone) Set AF gain for 1 watt output. Remove signal, turn RF gain full counterclockwise, and measure hum. CHECK IN USB, LSB, AND CW.

7.22 External Function Checks:

1. Ext. VFO - Plug in external VFO 392C-1 (J17 and J18) and check that all functions are properly performed with remote VFO.

2. Noise Blanker- Check pin voltages against schematic at J-24 to assure that all socket pin connections are wired correctly.

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| | 0 | | C | R81742 1-7-60 | F |
| | A | 10-22-59 R80486 | D | R83100 6 May 1960 | G |
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3. Ant. Relay- Using an ohmmeter, check that ant, relay jack (J3) for grounded when transceiver is in transmit condition.

4. 500 Audio - Check 500 ohm audio rack (J9) for proper operation.

5. 6.3 V AC - Measure 6.3 V AC at J19.

6. N. B. Ant.- Visually check wiring at J10 and J18 to assure that RF chokes L27 and L28 are connect4d properly.

7. Conv. Output- Approximately .25 V AC should be present at J12 at 14.1 mc and 100 watts output.

8. PTT - Ground PTT Jack (J16). Vox relay should operate.

9. ALC- Approximately -1.2 should be present at J4 with unit in transmit.

10. Rec. Ant. - Feed 3.7 mc signal to Rec. Ant. Jack (J-2) and assure that receiver gain is consistent with measurements taken is section 7.13.

11. Ext. Rec. Mute- Check J-8, Ext. Rec. Mute, for ground in receive condition, and -70V in transmit condition.

12. Int. Rec. Mute - Remove patch cord between J20 and J21 and note that receiver is placed in standby condition.

13. Remove patch cord between PA disable jacks. This should remove voltage from the PA screen.

14. Remove power and solder #20 bus wire jumpers between J20 and J21 and between J5 and J6.

7.23 Final Talk Out Test:

1. Recheck all controls for proper mechanical operation.

2. Connect unit to mobile mount talk out JIG. Tune up transmitter on 21.4 mc. Check VOX and Anti-VOX for smooth operation. Also check push to talk operation.

3. Switch meter to ALC, note that sufficient ALC action is obtained. (At least S9+20 indication on all portions of all bands.)

4. Recheck VFO dial alignment.

5. Connect antenna to receiver and listen to a few signals to assure that receiver operation is normal "on the air." Listen to assure that AGC is not pumping.

6. Tune in WWV to check XTAL calibrator accuracy.

7. Check all mulitmeter positions.

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| Tolerance Unless Otherwise Specified: Fractional: ± | Decimal: ± | Angle: ± | Scale: | Detail: |
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8. Tune up transmitter on all bands (At zero and 200 VFO dial). It should be possible to pin the grid current meter when in "Lock Key" position on all bands except 14.8 to 15.0.

9. Tune up transmitter at 28.6 mc, peaking exciter tuning for max grid current in lock key position. Turn on calibrator, retune KWM-2 to receive condition, and mote S meter reading of cal signal, and again note reading. Difference between 2 meter readings shall not exceed 2 1/2 S units.

10. Switch band switch through all bands and check to see that corresponding ant. switch lamp lights. This checks proper wiring of J-25.

11. Place unit on vibration table in operating condition. Vibrate unit at 3 G's, 10 to 33 cps. Check transmitter and receiver operation during vibration. For 3 minutes receive, 3 minutes transmit. Alternate bands between radios being tested.

7.24 Reliability Test:

1. Place unit in reliability test console and run for 21 hours.

2. Tune up transmitter on 14.0 mc, (adjust PA idle current to 40 ma.).

3. Tune receiver to cal point and check for normal operation.

4. Set emission switch to CW position, mike gain to full counter clockwise position, connect keying lead from reliability test console to key jack, and run the following duty cycle for 21 hours:

Receive 1 hr.
Transmit 1/2 hr.
Power Off 1 1/2 hr.

Roughly recheck receiver and transmitter for proper operation.

8. DATA SHEET REQUIREMENTS:

8.1

| Transmitter Gain | Mic Input | Input NMT |
|---|---|---|
| 3.4 mc | _____ | 5 mv |
| 3.6 mc | _____ | |
| 3.7 mc | _____ | |
| 3.8 mc | _____ | |
| 7.1 mc | _____ | |
| 14.0 mc | _____ | |
| 14.1 mc | _____ | |
| 14.2 mc | _____ | |
| 21.3 mc | _____ | |
| 28.5 mc | _____ | |
| 28.6 mc | _____ | |
| 28.7 mc | _____ | |
| 29.7 mc | _____ | |

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8.2 CW Power Output

| FREQ MC | Power Output Watts | NLT |
|---|---|---|
| 3.7 | ___W | 100 |
| 7.1 | ___W | 100 |
| 14.1 | ___W | 100 |
| 21.3 | ___W | 90 |
| 28.6 | ___W | 80 |

8.3 Transmitter Distortion:

Upper 3rd Order Product _____db
Upper 5th Order Product _____db NLT 30 db

Lower 3rd Order Product _____db
Lower 5th Order Product _____db

8.4 Transmitter Hum and Noise Level:

_____db NLT 40 db down

8.5 Carrier Suppression:

Upper _____db
Lower _____db NLT 50 db

8.6 Transmitter Audio Response Test Limit

Lower Sideband

| Level DB | Freq. cps | |
|---|---|---|
| -6 | _____ | 100 - 500 cps |
| 0 | 1000 cps | |
| -6 | _____ | 2200 - 2600 cps |

Upper Sideband

| | | |
|---|---|---|
| -6 db | _____ | 100 - 500 cps |
| 0 | 1000 cps | |
| -6 db | _____ | 2200 - 2600 cps |

8.7 CW

_____ok

8.8 3500 KC Transmitter Spurious

_____db NLT 40 db down

8.9 Vox Sensitivity

_____V NMT.010 V

| Tolerance Unless Otherwise Specified: Fractional: ± | Decimal: ± | Angle: ± | Scale: | Detail: |
|---|---|---|---|---|

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8.10 Receiver Sensitivity — Test Limit

| Freq. (mc) | S/N | NLT 10 db |
|---|---|---|
| 3.7 | ____DB | |
| 7.3 | ____DB | |
| 14.3 | ____DB | |
| 21.5 | ____DB | |
| 28.6 | ____DB | |

8.11 Receiver AGC Threshold

Frequency 28.6 mc — Input _____uv — NMT 4.0 MV

8.12 AGC Characteristics

| Input | AF Output | Test Limit |
|---|---|---|
| 10 uv | 0 DB | NMT 20 db 10 uv to 1 v |
| 1 volt | _____DB | |

8.13 Over-all Gain

_____watts — NLT 1 Watt

8.14 S Meter

S meter reading _____ — S8 to S9 + 10

8.15 Selectivity

Upper Frequency _____Kc — NMT 8.5 Kc

Lower Frequency _____Kc

Total _____Kc

8.16 Audio Frequency Distortion

Distortion _____% — NMT 10%

8.17 Crystal Calibrator

S _____ — NLT S2

8.18 Oscillator Drift

| Line Volts | Beat Note | Total Cycles Change | |
|---|---|---|---|
| 103.5 | _____ | _____ | |
| 115 | _____ | _____ | NMT 100 cps |
| 126.5 | _____ | _____ | |

8.19 Image Rejection

Desired Sig _____uv

Image Sig _____uv — NLT 35 DB

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Tolerance Unless Otherwise Specified: Fractional: ± Decimal: ± Angle: ± Scale: Detail:

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Image rejection _____ DB

8.20 Internal Signals:

3.570 mc _____ NMT 20 DB

3.690 mc _____ 4153

3.810 mc _____

7.045 mc _____
7.200 mc _____

15.000 mc _____

21.420 mc _____

_____ mc _____

_____ mc _____

8.21 Hum: NLT 50 db below 1 watt

USB _____ DB

~~LSB~~ _____ ~~DB~~

CW _____ DB

8.22 External Function Checks:

1. Ext VFO ) _____ ok
2. Noise Blanker _____ ok
3. Ant Relay _____ ok
4. 500 ohm Audio _____ ok
5. 6-3 AC _____ ok
6. N.B. Ant _____ ok
7. Conv. Output _____ ok
8. PTT _____ ok
9. ALC _____ ok
10. Rec. Ant _____ ok
11. Ext. Rec. Mute _____ ok
12. Int. Rec. Mute _____ ok
13. P.A. Disable _____ ok
14. Jumpers Soldered _____ ok

CAL CHANGE

Tolerance Unless Otherwise Specified: Fractional: ± Decimal: ± Angle: ± Scale: Detail:

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8.23 Final Talk out Test

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1. Operation of controls _____ok
2. Vox operation _____ok
3. ALC _____ok
4. VFO Dial Alignment _____ok
5. Rec. on the air tests _____ok
6. Multimeter _____ok
7. Transmitter Drive _____ok
8. T/R Coincidence _____ok Difference NMT 2½S Units
9. Ant. SW _____ok
10. Crystal calibration accuracy _____ok
11. Vibration _____ok

Comments _____

_____

8.24 Reliability Tests

Transmitter _____ok

Receiver _____ok

Comments _____

_____

CAL CHANGE

Tolerance Unless Otherwise Specified: Fractional: ± Decimal: ± Angle: ± Scale: Detail:

| REVISION | | | | | |
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