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| DATE: 11/2/52 | TMC SPECIFICATION NO. S 792 | C |
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| NO. OF COPIES: 20 | AP CHECKED | TITLE: |
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GPR-92 TEST PROCEDURE

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TMC SPECIFICATION NO. S 792

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TITLE: GPR-92 TEST PROCEDURE

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A. TEST EQUIPMENT REQUIRED

1. AC VTVM Ballantine Model 314 or equivalent.
2. 16 ohm 2 watt resistor (LOAD).
3. RF GENERATOR MEASUREMENTS Model 82 or equivalent.
4. 455KC SWEEP GENERATOR.
5. OSCILLOSCOPE, Tektronix Model 545A with type L plug in head.
6. 4 ohm speaker and earphones (600 ohms).
7. VOM Simpson Model 260 series 3
8. COUNTER Hewlett Packard Model 524C or equivalent.
9. 455KC crystal.
10. XTAL CALIBRATOR Measurements Model 111B or equivalent.
11. ATTENUATOR box Daven Model 651-73 or equivalent.

B. PRELIMINARY

1. Check set for mechanical defects.
2. Check for wiring errors.
3. Check for B+ shorts with ohm meter between junction of R101, L101 and ground. The meter should read $25K + 10\%$.
4. Turn slugs all the way out on T122, T125, T126, T127, T128, T129 and T130.

C. SETTINGS

| | | |
|-----------------------|---|-----------------------------------|
| BAND SPREAD | - | Locked at 100 log. |
| TUNING | - | Gang half open. (50 on log scale) |
| HFO TRIM | - | Half mesh. (Set knob to 0) |
| AVC switch | - | OFF |
| SEND REC. switch | - | REC |
| BFO PITCH | - | 0 |
| MODE switch | - | AM |
| NOISE LIMITER | - | OFF |
| LIMITER switch | - | OFF |
| IF GAIN (R150) | - | MAXIMUM (CW) |
| RF GAIN | - | MAXIMUM (CW) |
| IF SELECTIVITY switch | - | 15KC |
| INT/EXT switch | - | INT |
| MONITOR AUDIO | - | MINIMUM (CCW) |
| tone | - | MINIMUM (CCW) |
| LINE LEVEL | - | MIDDLE POSITION |
| SQUELCH | - | MAXIMUM (CCW) |
| RANGE SELECTOR | - | .54-1.4 (BAND 1) |

D. POWER SUPPLY

1. Turn power on, check B+ at junction of R103 and L101 meter should read $250VDC + 10\%$.
2. Connect meter to TP71-72 meter should read $105VDC \pm 5\%$.

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E. 455KC IF ALIGNMENT

1. Connect RF generator to TP90.
2. Connect AC VTVM to TP99.
3. Adjust generator for 455KC. No modulation. Set attenuator for an indication on the VTVM.
4. Adjust bottom slug on T130 for maximum output, adjust top slug for dip (6-8db).
5. Connect generator to junction of R153, and C229.
6. Connect AC VTVM to TP50.
7. Adjust top slug of T126 for maximum gain, adjust T127 for dip (6-8db).
8. ~~Connect generator to TP51. Connect VTVM to P65. Adjust generator for indication on VTVM. Adjust top slug on T128 for maximum indication. Connect a jumper between TP62 and TP61.~~
9. Connect generator to junction of C192 and terminal 3 of S102F. (Front), connect AC VTVM to TP8.
10. Adjust top slug of T122 for maximum gain, and bottom slug for dip (6-8db).

F. 3.955MC IF ALIGNMENT

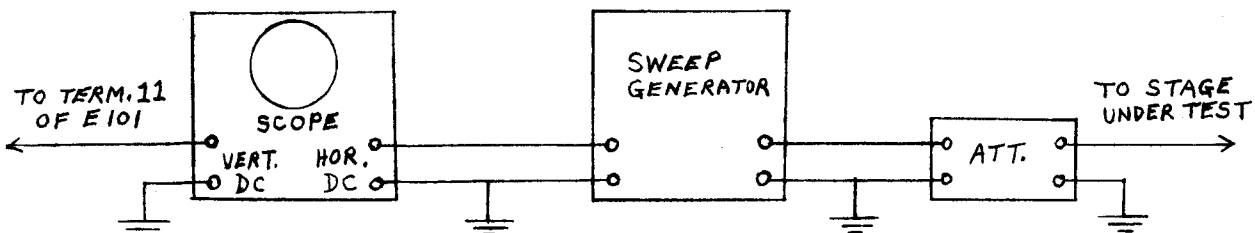
1. Set range selector to 5.6-9.5 range. Set EXT/INT to EXT. Connect AC VTVM to junction of R143 and R142. Connect generator to "hot" side of T116 on top. Set generator to 3.955MC and adjust the attenuator for an indication on the VTVM.
2. Adjust top and bottom slug of T125 for maximum output.

G. IFO IN ALIGNMENT

1. Connect RF generator to J106. Set generator to 3.5MC and the output for an indication on VTVM.
2. Adjust T129 for maximum indication on VTVM, at junction of R142 & R143.

H. IF SWEEP ALIGNMENT

FIG. 1



| | | |
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1. Connect instruments as shown in Fig. 1. Set RANGE SELECTOR to .54-1.4.
2. Connect ATT. to TP90. Connect the 455KC crystal between TP100 and ground, using clip leads.
3. Adjust top and bottom slug of T130 for maximum amplitude, and * flatness of curve so that the 455KC marker is in the center of the curve.
4. Connect ATT. to junction of R153 and C229. Adjust top slug of T126 and T127 for maximum amplitude and * flatness of curve. Keeping the 455KC marker in the center of the curve.
5. Connect ATT. to junction of R147 and C221. Remove cover on FL102. Adjust T132 for maximum amplitude so that the marker is in the center of the curve. Use a non-metallic tool. Replace FL102 cover. (adjustment of T132 can be omitted if marker is in the center of the curve).
6. Set IF SELECTIVITY switch to 3KC position, and adjust T131 for maximum flatness.
7. Set IF SELECTIVITY switch to 7.5KC position and adjust C227 so that the marker is in the center of the curve.
8. Repeat step 6, then set IF SELECTIVITY switch to 15KC position.
9. Connect ATT. to junction of C192 and terminal 3 of S102F (Front). Adjust top and bottom slug of T122 for maximum amplitude, and * flatness of curve so that the 455KC marker is in the center. (a 3db ripple is allowed in the pass band).
10. Remove 455KC crystal marker. Check selectivity curve for all positions of the SELECTIVITY switch. The bandwidth should be reduced according to the position of the SELECITVITY switch.

* MAXIMUM FLATNESS MAY HAVE A DIP IN THE CENTER OF THE CURVE.

I. IF SELECTIVITY

1. Set IF SELECTIVITY switch to 15KC position. Connect the RF generator to the attenuator box and the box to the junction of C-192 and terminal 3 of S102F (Front). Connect the counter to the RF generator output. Connect the AC VTVM to TP104 and switch to the 1 volt scale.
2. Set generator for 455KC, no modulation. Adjust the output for an indication on the VTVM. Use this indication as a reference point.
3. Check band pass it should not vary more than 3db for a band width of 15KC minimum.
4. Repeat step 3 for the rest of the positions on the IF SELECTIVITY switch. See test data sheet for frequency tolerance.
5. Remove test equipment.

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J. IF OSCILLATOR

1. Set RANGE SELECTOR to BAND 4. Set EXT/INT switch to INT.
2. Connect AC VTVM to junction of R143 and R142 it should read between 1 and 1½ volt.

K. RF ALIGNMENT

1. Fasten bottom RF cover in place. Connect RF generator through a 20db matching pad (Fig. 3) to J104 (75 ohm antenna input). Set generator for 1000 cycles modulation. Connect AC VTVM to terminal 11 of E101. AVC switch to MANUAL. MODE switch to AM.
2. Set RANGE SELECTOR to BAND 1.
3. Set RF generator and TUNING dial for .60MC (LOW END) and adjust T118, T113 and T109 for maximum output.
4. Set ANTENNA TUNE for minimum capacity. Set RF generator and TUNING dial for 1.3MC and adjust C170, C164, C146 and T103 for maximum output.
5. Repeat steps 2, 3 and 4 for the other bands. Refer to Fig. 2 for proper tuning of bands.

FIG. 2

| BAND | LOW END MC | ADJUST | | | HIGH END MC | ADJUST | | | |
|------|---------------|--------|------|------|----------------|--------|------|------|------|
| | | OSC | MIX | RF | | OSC | MIX | RF | ANT |
| 1 | .60 | T118 | T113 | T109 | 1.3 | C170 | C164 | C146 | T103 |
| 2 | 1.5 | T119 | T114 | T110 | 3.2 | C171 | C165 | C147 | T104 |
| 3 | 3.4 | T120 | T115 | T111 | 5.4 | C172 | C166 | C148 | T105 |
| 4 | 6.0 | T121 | T116 | L102 | 9.0 | C173 | C167 | C149 | T106 |
| 5 | 10.00 | T123 | L114 | L103 | 17.0 | C174 | C168 | C150 | T107 |
| 6 | 18.0 | T124 | T117 | T112 | 32.0 | C175 | C169 | C151 | T108 |

L. OSCILLATOR CALIBRATION

1. Connect xtal calibrator to J104 (ANT. INF.), MOD. switch to OFF position and MEGACYCLE switch to 0.1 position. (1MC position where needed).
2. Connect 4 ohm speaker to 4 ohm output. Set AVC switch to AVC position. Set MODE switch to CW position.
3. Set RANGE SELECTOR to BAND 1 (.54-1.4).
4. Set TUNING dial to .6 MC and adjust T118 slug for zero beat.
5. Set TUNING dial to 1.3 MC and adjust C170 for zero beat.
6. Repeat steps 4 and 5 until there is no variation at the low and high end of the band.
7. Repeat steps 3, 4, 5 and 6 for the other bands. Refer to Fig.

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7. 2 for proper tuning of OSC section on the rest of the bands.
8. Check dial calibration. The error should not be more than 3/4 of a division. If it is, bend oscillator plates to correct for error.

M. OSCILLATOR BAND SPREAD CALIBRATION

1. Set RANGE SELECTOR to BAND 5. Switch xtal calibrator to 0.1MC position.
2. Set TUNING dial to 20M (14.5MC on TUNING dial) find zero beat and lock TUNING dial. Unlock BAND SPREAD dial.
3. Check 100KC points throughout the dial for calibration. If calibration is not correct, bend OSCILLATOR BAND SPREAD plates to correct for error.
4. Set RANGE SELECTOR to BAND 6 and TUNING dial to 15M (21.9MC on TUNING dial) Lock dial and repeat step 3.
5. Set TUNING dial to 10M (30.0MC), lock dial. Repeat step 3 and 4.
6. Set RANGE SELECTOR to BAND 3 and TUNING dial to 80M (4.1MC on TUNING dial). Lock dial and repeat step 3.
7. Set BAND SPREAD dial to 100 log and lock it.

N. FINAL RF ALIGNMENT

1. Connect RF generator through a 20db matching pad (Fig. 3) to J104. Set generator for 1000 cycle modulation. Connect AC VTVM to terminal 11 of E101. AVC switch to MANUAL. MODE switch to AM.
2. Set RANGE SELECTOR to BAND 1.
3. Set RF generator and TUNING dial for .55MC (LOW END) and adjust T113 and T109 for maximum output.
4. Set ANTENNA TUNE for minimum capacity. Set RF generator and TUNING dial for 1.39MC (HIGH END) and adjust C164, C146 and T103 for maximum output.
5. Repeat steps 3 and 4 until there is no variation at the low and high end of the band.
6. Repeat steps 2, 3, 4 and 5 for the other bands. Refer to Fig. 2 for proper tuning of MIX, RF, and ANT sections on the rest of the bands.
7. To check RF input at the low, middle and high end of each band. Adjust generator output for .35V on AC VTVM. Record attenuator reading on test data chart. It should be one microvolt or less. Repeat this procedure for all bands and frequencies shown on test data chart.

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8. Check the dial calibration at the low, middle and high end of each band. Record on test data chart.
9. To check the 10db noise figure at the low, middle and high end of each band. Set the attenuator on the generator for zero output. Read the AC VTVM in db, then increase the output on the generator until the VTVM reads 10db above the original reading. Record the attenuator reading on test data chart. It should be one microvolt or less. Repeat this procedure for all bands and frequencies shown on test data chart. (Except band 1 and low end of band 2).
10. To check the image rejection at the low, middle and high end of each band. Set generator and TUNING dial to basic frequency (see test data chart) and attenuator to one microvolt out. Read VTVM then increase generator frequency to $2 \times \text{IF} + \text{the basic frequency}$. Increase attenuator until the VTVM reads the same as before. (The H.F. FINE control on the generator, may be used to find the image frequency.) This will give the voltage ratio, which should not be less than 1000/1. Check all bands and record as per test data chart. (Except band 1 and low end of band 2).

NOTE: THE IF FREQUENCY FOR BAND 1, 2 AND 3 IS 455KC AND FOR BAND 4, 5 AND 6, IT IS 3.955MC, PEAK ANT TUNE CONTROL BEFORE EACH MEASUREMENT, BUT NOT ON THE IMAGE FREQUENCY.

O. BFO ADJUSTMENT

1. Set MODE switch to CW position. SEND/REC switch to SEND position. Disconnect RF generator. Connect Ballantine AC VTVM to junction of pin 6 of V115A and R189. Connect Counter to AMPLIFIER OUTPUT connector on Ballantine.
2. Loosen stop on BFO slug. Adjust slug to read exactly 455KC on Counter. Loosen knob and set to zero on panel (do not move slug) and fasten set screw on knob. Fasten stop on slug so that BFO can read $3\text{KC} \pm 10\%$ on each side of zero. Set MODE switch to SSB position and repeat 3KC check on each side of zero. Set MODE switch to AM position and SEND/REC switch to REC position.

P. 100KC ADJUSTMENT

1. Connect Ballantine AC VTVM to junction of C123 and R105. Connect counter to AMPLIFIER OUTPUT connector on Ballantine.
2. Press CAL switch and adjust C124 to read exactly 100KC on counter

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Q. BFO ISOLATION AMP.

1. Connect RF generator to J107. No modulation. Connect AC VTVM to TP80.
2. Set RF generator to 455KC. Set attenuator on generator for 3/4 volt out. The AC VTVM will read 1 volt or better.
3. Remove jumper between TP62 and TP61.

R. HFO IN OPERATION

1. Connect RF generator to J105. Connect AC VTVM to P2 of VY106. Set generator to 5MC and attenuator for indication on VTVM.

S. METER CALIBRATION

1. Set AVC switch to AVC and EXT/INT switch to INT position. Connect RF generator to J104. Set generator for 5.0MC at one microvolt out and 1KC, 30% modulation, R196 maximum clockwise position.
2. Set RF Gain and AUDIO GAIN controls to minimum position. Press red button and adjust R200 for zero on black scale. (When red button is released the "S" meter pointer will not be on zero, this is normal). Set RF GAIN control to maximum position.
3. Tune receiver to 5.0MC and adjust R150 until there is a slight deflection on "S" meter pointer.
4. Set output of generator for 1000 microvolts and adjust R196 to read 60db on "S" meter. Set output of generator for 100 microvolts. The meter should drop to 40db + 10%.
5. Set output of RF generator to 30 microvolts. Connect 600 ohm load across terminals 1 & 2. Connect Simpson VOM between terminals 1 & 2 of E101. Set VOM to 2.5V AC scale. Connect ear phones.
6. Press red button and hold in this position for the remainder of the test. Adjust LINE LEVEL to read zero db on VOM scale. Adjust R210 for zero center on red scale of "S" meter. Increase LINE LEVEL to read +5db on "S" meter, (it should read +5db on the VOM + 10%). Decrease LINE LEVEL to read -5db on "S" meter, (it should read -5db on the VOM + 10%).

T. SEND/REC SWITCH OPERATION

1. Switch to SEND position. The receiver is disabled. Switch in REC position. The receiver will operate.

U. AVC SWITCH OPERATION

1. Remove earphones.
Connect 16 ohm load across terminals 4 and 7. Connect AC VTVM across load. Set RF generator and TUNING dial to 5MC.
2. Set generator attenuator for 1 microvolt. Set LINE LEVEL control for 2 volts on AC VTVM. Set attenuator for 10,000 microvolts. The output should remain constant within 2db.

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3. Set attenuator on generator for 100 microvolts. Set MODE switch to CW position. Remove RF generator input, the pointer on the "S" meter will move fast towards zero db.
4. Reconnect RF generator. Set MODE switch to SSB position. Remove RF generator, the pointer on the "S" meter will move slowly toward zero db. Return MODE switch to AM position.

V. HUM LEVEL

1. Set RF generator attenuator to 5 microvolts. Set AUDIO LEVEL control for 4 volts on AC VTVM.
2. Turn RF GAIN control to full CCW position. The hum level should be 50db down or better.

W. SQUELCH OPERATION

1. Set RF generator attenuator to 50 microvolts. Connect VOM to terminals 13 and 14 of E101 and switch to OHMS scale. Set ~~SQUELCH~~ control to full CW position.
2. Carefully turn ~~SQUELCH~~ control in CCW direction, until ~~SQUELCH~~ relay pulls in (VOM indicates open circuit). Set generator attenuator to 5 microvolts. The ~~SQUELCH~~ relay should open (VOM indicates closed circuit).

X. RF & AUDIO NOISE LIMITERS

1. Remove AC VTVM and connect oscilloscope across 16 ohm load. Set RF generator for 50% modulation.
2. Turn RF NOISE LIMITER control toward full CW position. The waveform will be clipped depending on the position of the control. Turn NOISE LIMITER control OFF.
3. Set LIMITER toggle switch to LIMITER position (the waveform will be clipped). Return LIMITER toggle switch to OFF position. Remove oscilloscope and return modulation to 30%.

Y. MONITOR AUDIO CONTROL OPERATION

1. Plug earphones into PHONES jack. Vary MONITOR AUDIO control. The amplitude should vary with the position of the control. Remove earphones from PHONES jack.

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Z. SPURIOUS BEATS

1. Ground ANT. connector. Set MODE switch to CW, RF GAIN and LINE LEVEL control for maximum. Tune through each band listening for spurious beats. There should be no beats of appreciable magnitude.

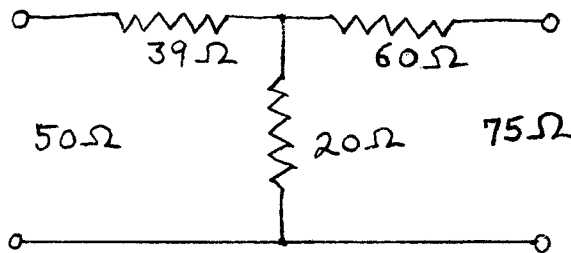
AA INTERMODULATION

1. Connect AC VTVM to TP104. Connect RF generator to J104 ANT input. Set generator to 9.5MC, no modulation, and adjust attenuator for .35 volts on VTVM.
2. Connect two RF generators to a 20db "T" pad. Connect output of "T" pad to attenuator box and the box to J104.
3. Set one generator to 31MC, the other to 21.5MC and both generator attenuators for .1 volts output.
4. Adjust attenuator box for .35 volts on VTVM. Read db of attenuator box, the intermodulation should be 70db or better.

BB LISTENING TEST

1. Connect an outside antenna to the ANT. input of the receiver and listen in on all bands throughout the range.

FIG. 3



50 to 75 ohm matching pad with 20db loss.

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THE TECHNICAL MATERIEL CORPORATION
 MAMARONECK, N.Y.

GPR-92 TEST DATA SHEET #1

SERIAL NO. _____
 MFG. NO. _____

- B. 1. Mechanical check _____ OK
- 2. Wiring check _____ OK
- D. 1. 250VDC line \pm 10% _____ VOLTS
- 2. 150VDC line \pm 5% _____ VOLTS
- F. 2. 3.955MC IF alignment _____ OK
- G. 2. IFO IN alignment _____ OK
- I. IF Selectivity _____

| IF SELECTIVITY CONTROL SETTING | BANDWIDTH AT 3db |
|--------------------------------|------------------|
| 15KC - MINIMUM | |
| 7.5KC \pm 15% | |
| 3KC \pm 15% | |
| 2KC \pm 15% | |
| 1KC \pm 15% | |
| .5KC \pm 15% | |

J. 2. IFO Oscillator, voltage at junction of R143 and R142 (1-1 $\frac{1}{2}$ volt)
 _____ Volts.

M. BAND SPREAD

| AMATEUR BAND | TUNING DIAL CHECK POINTS | BANDSPREAD DIAL CHECK POINTS | MAX FREQUENCY ERROR |
|--------------|--------------------------|------------------------------|---------------------|
| 160 M | 1.28MC | Every 100KC | |
| 80 M | 4.1 MC | Every 100KC | |
| 40 M | 7.4 MC | Every 100KC | |
| 20 M | 14.5 MC | Every 100KC | |
| 15 M | 21.8 MC | Every 100KC | |
| 10 M | 30.0 MC | Every 100KC | |

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GPR-92 TEST DATA SHEET #2

N. FINAL RF ALIGNMENT

| BAND | FREQ. MCS. | MICROVOLT INPUT FOR .35 ACROSS DET. LOAD | MICROVOLT INPUT FOR 10DB SIGNAL TO NOISE RATIO | IMAGE RATIO | MAX. FREQ. ERROR |
|------|------------|--|--|-------------|---------------------|
| 1 | .60 | | X | X | |
| | 1.00 | | | | |
| | 1.3 | | | | |
| 2 | 1.5 | | X | X | |
| | 2.40 | | | | |
| | 3.2 | | | | |
| 3 | 3.4 | | | | |
| | 4.40 | | | | |
| | 5.4 | | | | |
| 4 | 6.0 | | | | |
| | 7.5 | | | | |
| | 9.0 | | | | |
| 5 | 10.00 | | | | |
| | 14.0 | | | | |
| | 17.0 | | | | |
| 6 | 18.0 | | | | |
| | 24.00 | | | | |
| | 32.0 | | | | |

- O. 2. BFO Adjustment _____ OK
- P. 2. 100KC Adjustment _____ OK
- Q. 2. BFO Isolation Amp. Check _____ OK
- R. 1. HFO IN operation _____ OK
- S. 2-6. Meter Calibration _____ OK
- T. 1. SEND/REC switch operation _____ OK
- U. 2-4 AVC operation _____ OK
- V. 2. HUM LEVEL (should be 50db down or better) _____ db
- W. 2. SQUELCH operation _____ OK
- X. 2. Noise Limiter operation _____ OK
3. Limiter operation _____ OK
- Y. 1. Monitor Audio control operation _____ OK
- Z. 1. Check for beats at 7.0MC and 10.5MC _____ OK.
- Check for beats at 1.82MC, 2.275MC 2.73MC, 3.18MC, 3.64MC.
- OK
- AA 4. Intermodulation at 31.0MC-21.5MC = 9.5MC (70db or better) _____ db.

DATE _____

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