SPECIFICATIONS

**TUNER (FM-MPX)**

- Usable Sensitivity (THF) 2.0 microvolts
- Cross Modulation Rejection 80 db
- Signal to Noise Ratio below 100% modulation 60
- Total Harmonic Distortion 0.8%
- Frequency Deviation (Drift) 0.02%
- Frequency Response 30 to 15,000 Hz ± 1 db
- Capture Ratio 2.5 db
- Selectivity 42 db
- Tuning Range 87 to 108 mc
- Accuracy of Calibration 0.5%
- Separation 40 db or more
- FM & IF Limiting Stages 9

*This is limit of FCC Stereo Broadcast specifications. All H. H. SCOTT tuners have far wider frequency response.

**TAPE OUTPUT**

- Rated Voltage Output to Tape Recorder 0.5 v
- Minimum Recommended Load Resistance 47 k ohms

**PRE-AMPLIFIER**

**Input:**

- Tape Head - Input Impedance 47 k ohms
- Signal for Rated Output 3 mv
- S/N Ratio 60 db
- Phono-Input Impedance (All Switch Positions) 47 k ohms
- High Level Inputs - Input Impedance 60 k ohms
- Signal for Rated Output 75 db
- S/N Ratio 80 db
- Frequency Response in Flat Position 18-25 khz 1.0 db
- Treble Controls Measured at 10,000 Hz, Boost & Cut 10 db ± 2 db
- Bass Controls Measured at 30 Hz, Boost & Cut 12 db ± 2 db
- Scratch Filter -6 db/octave; -3 db @ 5 k Hz
- Loudness Compensation (maximum) + 12 db @ 50 Hz
- Loudness Compensation + 4 db @ 10 k Hz

**AMPLIFIERS**

- Power Ratio (watts per channel) 32.5 watts
  @ 0.8% Harmonic Distortion 25 watts
  @ 4 ohms
  @ 8 ohms
  Continuous Output Single Channel
  @ 8 ohms, 0.8% Harmonic Distortion 18 watts
  Continuous Output Both Channels
  @ 8 ohms, 0.8% Harmonic Distortion 18 watts
Total Harmonic Distortion: 0.8%
Frequency Response: 18-25,000 ± 1 db
Power Bandwidth at Rated Distortion (IHF Method): 25-20,000 Hz
Hum and Noise (Phono): -55
Range of Line Voltage and Frequency: 105-120v, 50-60 Hz
Power Consumption - 117v at 60 Hz (AC only): 25-95 watts

EQUIPMENT NEEDED

Audio Oscillator
VTVM
Oscilloscope
VOM
Load Box
Attenuator
Distortion Meter
Variac
AC Supply Fixture

Set Controls to the Following:

Input Selector: Extra
Stereo Switch: Stereo
Tone Controls: Flat "0"
Loudness: Min.
Stereo Bal. Sw.: Norm.
Noise Filter: OUT
Speaker Switch: ON
Power Switch: OFF

1. Bias and Balance Settings and Voltage Checks

Turn unit on - watch carefully for any signs of voltage shorts. With bias pots (1K) still full ccw (from top of unit), check supply for 48 to 50. Adjust bias pots for 0.8 mA current from each test point in the rear of the unit to ground.

Check power supply board for 25V ±10%
Check power supply board for 12V ±10%

2. Sensitivity Check

Audio osc. to EXTRA at .3V (+2 dB) input. Connect 8 ohm load to main speaker taps. Turn loudness pot to max., observe output of 18 watts (12V). Check tape output jack with troubleshooting lead for same output as signal.

3. Distortion Check

At 12V output max. distortion 0.6%.

4. Tape Monitor Switch Check

Audio osc. to EXTRA at .3 input to L channel. Note output at left channel speaker terminal. Put tape monitor switch in the IN position. Note loss of output. Connect input cable from L channel tape out to L channel tape in. Note restoration of signal out. Repeat process for R channel, then return tape monitor switch to out position.
5. **Speaker Switch & Phone Jack Check**

Speaker switch to OFF position. Note complete loss of signal. Loudness to min. Insert phone plug to phone jack, remove speaker leads, and connect to phone plug leads. Loudness to max. Note drop of 26 ± dB. Switch main speakers in, note restoration of signal. Switch to remote speaker position on speaker taps and speaker switch. Note drop in output of 1 to 2 dB. Speaker switch off, note loss of signal. Return speaker switch to main position and load to main speaker taps.

6. **Loudness Volume Check**

Loudness pot to $\frac{4}{3}$ flat, osc. to 1 kHz. Take reference. Osc. to 100 Hz. Note rise of 7dB +2. Switch osc. to 10 kHz. Note rise of 0 ±2 dB. Loudness pot to max. Osc. 1KHz output 12V. Loudness to min., drop of 70 dB. Loudness pot to max.

7. **Tracking Check**

In 10dB steps check tracking of L & R channels, output may be no more than 3 dB between channels down to 40 dB down.

8. **Crosstalk and Stereo Switch Check**

At 1 kHz turn loudness pot to 10 flat, output to 12V, mono-stereo switch to stereo, bal switch to bal. left. Note drop of 0 dB. Bal. switch to bal. right. Note additional drop of 50dB. Return controls to previous settings. Loudness pot to max., attenuate to 0 dB on 1V range.

9. **Tone Control Check (0dB 1V range)**

<table>
<thead>
<tr>
<th>Bass 100 Hz</th>
<th>Treble 10 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boost - 10 dB +2 dB</td>
<td>Boost - 10 dB +2 dB</td>
</tr>
<tr>
<td>Cut - 15 dB +2 dB</td>
<td>Cut - 10 dB +2 dB</td>
</tr>
</tbody>
</table>

10. **Frequency Response Check**

Osc. 0 dB 1 kHz reference on 1V range. Sweep osc. from 35 Hz to 20 kHz, note maximum variation of ±2 dB. 3 dB down point 20 Hz or lower 3 dB down point 30 kHz

11. **Regulation Check**

At 1kHz 0 dB 1 V range remove 8 ohm load switch. Output rise of 1dB max.

12. **Noise Filter Check**

At 5 kHz noise filter IN. Note 4 dB drop in output +2 dB.

13. **Preamp Gain Check @1 kHz**

Attenuate input 35 dB, input leads to phono low. Output 0 dB 1V range +1 dB. Stereo mono switch to mono, note drop of 7 dB in output. Stereo mono switch to stereo. Input selector switch to phono - high, note drop of 7 dB. Input selector switch back to phone - low, output 0 dB 1V range.
14. **Preamp Frequency Response Check**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Decibels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz</td>
<td>0 dB (ref)</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-12 ±2 dB</td>
</tr>
<tr>
<td>100 kHz</td>
<td>+13 ±2 dB</td>
</tr>
</tbody>
</table>

15. **Hum Checks (all inputs shorted)**

<table>
<thead>
<tr>
<th>Position</th>
<th>Loudness Pot</th>
<th>Max Hum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra</td>
<td>0</td>
<td>3 mV</td>
</tr>
<tr>
<td>Extra</td>
<td>10</td>
<td>5 mV</td>
</tr>
<tr>
<td>Phono High</td>
<td>10</td>
<td>30 mV</td>
</tr>
<tr>
<td>Phono Low</td>
<td>10</td>
<td>30 mV</td>
</tr>
</tbody>
</table>

16. Repeat steps 2 through 15 for R channel.
382B TUNER-AM SECTION

1. Switch tuner to AM position, output from tape output jack.

2. Connect signal generator at 455 kHz through .05 capacitor to green lead from If board to feedthrough terminal in front end. Clip ground lead to chassis. Remove RF transistor.

3. Peak IF's and detector for maximum A.G.C. (tuning meter indication) of audio noise output, using no modulation. Final peaking should be done with 20 uv from generator with output level of 100 mv ± 2 db.

4. Remove signal generator coupling to IF's, connect generator to external antenna terminals. Install RF transistor.

5. Tune oscillator coil to 600 KHz and oscillator trimmer to 1600 kHz. Tune RF trimmer at 1400 KHz, and antenna slug at 800 KHz. Seal antenna core.

6. Repeat Step 5 until unit is aligned and max. output at given frequencies has been achieved. Calibrate:

   590 KHz ±10 KHz     850 KHz     1030     1510 (tol. ±20 KHz)

7. Check signal-to-noise at 600 KHz, 100 uv for 10 db, at 1400 KHz, 10 uv for 10 db.

8. Remove generator connection from external antenna terminals, loop around low end of loop antenna using 47 ohm resistor, and at 1400 KHz peak antenna trimmer.

9. Check output level left and right tape jacks, at 100 uv output should be 250mv ± 2 db.

10. With phones, check for AM calibration, oscillation, harmonic pickup, etc.

11. With AM tuned to low end of band, set meter adjust control so meter reads "0". Switch to FM and note little or no change max. difference between AM and FM across band, 2 meter divisions.
1. Connect RF generator to the antenna terminals with the following adaptations:

```
FROM
GEN.
```

2. Set RF generator and FM tuning dial to 92 mHz. Generator output should be about 6 uv. Peak L205, L204 and L201 for maximum audio output.

3. Set generator and FM tuning dial to 106 mHz. Peak RF trimmer and mixer trimmer.

4. With about 3 uv from FM generator, repeat procedure until no further output is obtained. Signal should look like this:

```
\[ \text{Signal diagram} \]
```

5. The only time that the oscillator mixer and trimmer should be touched is if the calibration is out of specification.
Mechanical layout of Front Ends denoting, Oscillator, Mixer, Antenna Coils and Voltages present under normal operating conditions.
ALL VOLTAGES POSITIVE DC±15% MEASURED WITH 20 K ohm/V VOM AND 117 VAC LINE.
FM VOLTAGES MEASURED WITH 300 OHM LOAD ON EXTERNAL FM ANTENNA TERMINALS. TUNER
OFF-STATION. INPUT SWITCH IN FM POSITION. AM VOLTAGES MEASURED WITH LOOP ANTENNA, TUNER OFF-STATION, INPUT SWITCH IN "AM" POSITION.

Q301, Q302 - QSE1002

AM - FM I.F.
All voltages measured with 20,000 ohm/volt VOM; 300 ohm antenna and no signal.

<table>
<thead>
<tr>
<th>Q201</th>
<th>Q202</th>
<th>Q203</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>D</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>S</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>0.25</td>
<td>.45</td>
<td>3</td>
</tr>
<tr>
<td>9.2</td>
<td>.05</td>
<td>2.6</td>
</tr>
<tr>
<td>1.05</td>
<td>10.8</td>
<td>10.2</td>
</tr>
</tbody>
</table>

Troubleshooting Guide

**Trouble**                  **Possible Remedy**
Low gain                    Replace Q201
No Output                   Open LRFC 2.2 or .33
No AM signal                defective Q201, Q202, Q204
                            Open LRFC 2.2 (L209)
                            Defective (L208)
                            Defective D203
Oscillation                 D203
Low or intermittent AM      Shorted Plates in tuning condenser
All voltages measured with 20,000 ohm/volt VOM; 300 ohm antenna and no signal.

**Q201**
- G .025
- D 9.2
- S 1.05

**Q202**
- B .45
- E .05
- C 10.8

**Q204**
- B 3
- E 2.6
- C 10.2

**Troubleshooting Guide**

**Trouble**
- Low gain
- No Output

**Possible Remedy**
- Replace Q201
- Open LRFC 2.2 or .33
- Defective Q201, Q202, Q204
EQUIPMENT NEEDED

VTVM
Oscilloscope
VOM
Distortion Meter

Set Controls to the Following:

Separation Pots \[
\text{Max CW}
\]
Input Select. Switch \[
\text{FM}
\]

1. Mono Alignment and Sensitivity Check

Front End and IF Alignment

With about 10 uv generator output, align and peak front end for max. output. With 3 uv input, align IF's for max. audio. With 1 or 2 K uv input, align detector for minimum distortion.

2. Sensitivity and Distortion

Measure sensitivity of tuner with 3 uv RF input. Must obtain 30 dB usable sensitivity at 92, 98, and 106 mc. Recheck distortion, 2K uv input. 400 Hz- max. distortion of 0.8%.

3. FM Hum Check

Tune to 91.5 mc, measure min. of 60 dB (AC plug may be reversed).

4. De-emphasis Check

Tune to 90 mc (change modulator to 8 KHz), note decrease of 12 ± dB in output.

5. Calibration Check

Check calibration against stations - max. tolerance ±2 mc.

4. Multiplex Alignment - Unit to Stereo

\( a \) Pilot Adjustment - Scope probe (low - cap) to test point at base of Q3, peak L2 and L3 for max. pilot. With VOM, measure 2.5 to 3.5 dc across 2.2K resistor in the emitter of Q3.

\( b \) With VOM across 2.2K resistor carefully tune L2 & L3 for max., then tune T1 for dip.

\( c \) Separation Adjustment - Output from Ch. A. Adjust scope to obtain pattern and adjust L2 for min. output observing scope. Adjust A separation pot for min. output. Tuner output from Ch. B and adjust B separation pot for min. as outlined above. Repeat between A & B until no further improvement is seen.

\( d \) Final separation measurements to be done in each channel:

\[
\begin{align*}
\text{Audio Modulation} &\quad 400 \text{ Hz} \\
\text{Minimum Separation} &\quad 30 \text{ dB}
\end{align*}
\]

If separation specs are not met, recheck IF's for proper alignment. Also recheck steps 4.b) and 4.c)

\( e \) Stereo Switchover Check

Check switchover point (at generators), min. 10 uV, max. 30 uV. Switchover may be adjusted by threshold pot on MX board.

\( f \) Final Listen Check

Check all inputs and outputs (including phone jacks), switches and controls for proper operation. Check overall appearance and scrap inside unit. Check for proper switching of stereo light. Check calibration against stations specs are ±0.2 mc.
VOLTAGE CHECKS (UA703)

Pin 1  B+ 12 Volts
Set VOM on 3 volt scale: positive lead of meter on pin 1, negative lead on pin 2 and/or pin 6. If voltage is apparent, then that particular stage of IC is operating normally.

No output or distortion check diodes D303 and D304 for defect

Meter operates okay

Meter pegging either direction defective D301 or D302
UL T I P L E X

Q1-2N2924
Q2-2N2925 or SE4010 or QA-15
Q3-2N3964 or 2N4249 or 2N4250
Q4-2N3567

STEP A & B OF MULTIPLEX ALIGNMENT

AUTOMATIC MULTIPLEX DEMODULATOR Z-PC-MX-14

NOTES:
- UNLESS OTHERWISE SPECIFIED RESISTANCE IN OHMS 3-1/2
- CAPACITANCE IN MFD RESISTORS IN MAX.
- RAYS ON POTENTIOMETERS AS DIRECT OR ROTATION.
<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
<th>Customer List</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-DC-20</td>
<td>Dial Cord</td>
<td>$1.75</td>
</tr>
<tr>
<td>A-FW-B</td>
<td>Flywheel Assembly</td>
<td>4.80</td>
</tr>
<tr>
<td>CETM-1000/30</td>
<td>Electrolytic Capacitor</td>
<td>2.65</td>
</tr>
<tr>
<td>CETM-1000/50</td>
<td>Electrolytic Capacitor</td>
<td>3.48</td>
</tr>
<tr>
<td>CHM- .22/250</td>
<td>Electrolytic Capacitor</td>
<td>1.50</td>
</tr>
<tr>
<td>F-AGX-2</td>
<td>Speaker Fuse</td>
<td>.24</td>
</tr>
<tr>
<td>F-SB-1½</td>
<td>Power Fuse</td>
<td>.45</td>
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<td>J-3-ST-5</td>
<td>Phone Jack</td>
<td>.65</td>
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<tr>
<td>KN-001</td>
<td>Knob</td>
<td>.40</td>
</tr>
<tr>
<td>KN-002</td>
<td>Knob</td>
<td>.40</td>
</tr>
<tr>
<td>KN-005</td>
<td>Tuning Knob</td>
<td>.50</td>
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<tr>
<td>L-RC-2</td>
<td>Choke</td>
<td>.25</td>
</tr>
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<td>M-SS-11</td>
<td>Meter</td>
<td>5.95</td>
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<tr>
<td>N-342-B-1</td>
<td>Panel</td>
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<td>N-D-FM-23</td>
<td>Dial Glass</td>
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<td>QP-8</td>
<td>Power Transistor</td>
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<tr>
<td>QP-11</td>
<td>Power Transistor</td>
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<td>RW-2-.82</td>
<td>Wire Wound Transistor</td>
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<td>RCV-15-2X2</td>
<td>Stand Up Resistor</td>
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<td>RCV-10K-PH</td>
<td>Potentiometer</td>
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<tr>
<td>SS-22-3/3A</td>
<td>Rectifier</td>
<td>.80</td>
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<tr>
<td>SS-43</td>
<td>Slide Switch</td>
<td>.40</td>
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<tr>
<td>SPS-12-3</td>
<td>Slide Switch</td>
<td>.50</td>
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<tr>
<td>SBW-115-2</td>
<td>On-Off Switch</td>
<td>.48</td>
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<tr>
<td>TR-8-9</td>
<td>Rotary Switch</td>
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<tr>
<td>V-PL-1819</td>
<td>Power Transformer</td>
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<tr>
<td>V-PL-1847</td>
<td>Neon Lite Bulb</td>
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<td>Z-FM-15</td>
<td>Pilot Lite Bulb</td>
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<tr>
<td>Z-PC-IF-4</td>
<td>Front End</td>
<td>48.15</td>
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<td>Z-PC-NX-14</td>
<td>IC Board</td>
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<td>Z-PC-TD-6</td>
<td>Multiplex</td>
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<tr>
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<td>Driver Board</td>
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<tr>
<td></td>
<td>Front End</td>
<td>41.10</td>
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