McIntosh

MR 77

FM TUNER

SERVICE INFORMATION

FROM SERIAL NO. 10Y01 TO 53Y81

McINTOSH LABORATORY INC.  2 CHAMBERS STREET  BINGHAMTON, NEW YORK
SENSITIVITY
2μV for better than 35dB quieting. 2.5μV IHF usable sensitivity typical.

SIGNAL TO NOISE RATIO
Better than 75dB below 100% modulation.

HARMONIC DISTORTION
Less than 0.2% mono or stereo at 100% modulation 20Hz to 15kHz.
Typically less than 0.05% at 1kHz.

FREQUENCY RESPONSE
± 1dB 20Hz to 15kHz with standard 75μs de-emphasis.

CAPTURE RATIO
Better than 2.5dB IHF.

SPURIOUS REJECTION
Greater than 100dB IHF.

IMAGE REJECTION
Greater than 100dB at 90MHz; greater than 50dB at 105MHz IHF.

STEREO SEPARATION
Better than 40dB at 1kHz.

SCA FILTER
50dB down from 67kHz to 74kHz; 275dB per octave slope.

POWER REQUIREMENTS
117VAC, 50 - 60Hz, 35W.
SCHEMATIC NOTES

1. Unless otherwise specified: Resistance values are in ohms, 1/4 watt, and 10% tolerance; capacitance values smaller than 1 are in picofarads (pF); capacitance values greater than 1 are in microfarads (μF); inductors are in microhenries (μH).

2. Printed circuit board components are outlined on the schematics by dotted lines. The circled numbers around the dotted lines correspond to the numbers on the PC board layout.

3. The heavy lines on the schematics denote the primary signal path.

4. The terminal numbering of rotary switches is for reference only.

5. All voltages indicated on the schematics are measured under the following conditions:
   a. Use of an 11 regular input impedance VTM.
   b. All voltages ±10% with respect to chassis ground.
   c. No signal at input or antenna terminals.
   d. AC input at 115 volts, 50/60 Hz.
   e. Front panel controls at:
      - Tuning Indicator: 100μV (no signal)
      - Volume: Fully Cw
      - Stereo Filter: Out
      - Panel Lights: Bright

6. In units with Serial No.'s below 12788, C16 is 1.8μF and in units with Serial No.'s from 12788 to 21710, C16 is 3.9μF.

7. In units with Serial No.'s below 21710: C15 is 4.7μF; R14 is 4k; R12 is 1.8k; R13 is 2.7k; C307 is 1μF; C316 is 10μF and C318 is 4.7μF.

8. In units with Serial No.'s below 23500: C15 is 3.9μF; C17 is 1.8μF; C11 is 0.005μF, and the oscillator coil L6 is McIntosh Part No. 122-091.

9. In units with Serial No.'s below 33500: R501 (McIntosh Part No. 087-002) has only one set of contacts and is connected as shown by dotted line. There are no connections from R508 to the fixed output jacks; R307 is 27k; R316 is 12k; R318 is 5.2k, and C324 is used.

10. In units with Serial No.'s below 27500: C11 is used, and the Primary of L6 is connected from C11 to ground.

11. In units with Serial No.'s below 56004, C307 is 0.005μF and R316 is 1k.

LAMP & METER REPLACEMENT

To Replace Panel Lights
1. Remove bottom cover.
2. To Replace Dial Panel Lights
   1. Remove knobs & front panel.
   2. To Replace Stereo Light
      1. Remove dust cover.
3. To Replace Multipath Tube
   1. Remove knobs & front panel.
   2. Remove dial panel screws.
   3. Tilt dial panel forward.
   4. Slide out tube.
   5. To Replace Meters
      1. Remove knobs & front panel.
      2. Remove dial panel screws.
      3. Tilt forward dial panel sliding off pointer.
      4. Loosen meter screws & remove.
MR77 ALIGNMENT INSTRUCTIONS

All McIntosh tuners are carefully aligned and tested at the factory using the finest available test equipment. All McIntosh tuners will meet their published specifications when shipped from the factory.

After extensive operation, or servicing, it may be desirable to realign the tuner circuits for best performance. The charts below give complete information on the circuit realignment procedure for the MR77.

The test equipment listed (or its equivalent) is necessary to properly align an MR77. The accuracy of the alignment will be directly related to the accuracy and calibration of the test equipment used.

If the necessary test equipment is not available, alignment should not be attempted. For additional information, contact Customer Service Department, McIntosh Laboratory, Inc., 2 Chambers Street, Binghamton, New York 13903 (telephone 607-726-3552).

Alignment should be done in the following order: FM-MPX

TEST EQUIPMENT REQUIRED

1. FM Signal Generator (Measurement 188 or Sound Technology 1000A)
2. VTVM (RCA MR96C)
3. Multiplex Generator (Radiometer 5MG) or Sound Technology 1000A.
4. 10.7 MHz FM sweep generator (Kay 381 or equivalent). (Not needed if Measurement 275 IF converter is available.)
5. 10.7 MHz Generator (preferably crystal controlled)
6. Oscilloscope (Hewlett-Packard 1208 or equivalent)
7. Harmonic Distortion Analyzer (Hewlett-Packard 333A or equivalent)
8. 10.7 MHz ±75 kHz sweep marker generator.

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<table>
<thead>
<tr>
<th>STEP</th>
<th>TUNER DIAL SETTING</th>
<th>SIGNAL GENERATOR</th>
<th>INDICATOR</th>
<th>ADJUST</th>
<th>TEST LIMITS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Point of Int. Interference</td>
<td>10.7 MHz</td>
<td>TP-3</td>
<td>Oscilloscope</td>
<td>TP-1</td>
<td>Top (primary) and bottom (secondary) of 12</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>2</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>3</td>
<td>Same</td>
<td>Same</td>
<td>OK</td>
<td>VTVM</td>
<td>TP-2</td>
<td>M301 adjust R210</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>4</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Fixed audio output jacks</td>
<td>Bias not R203</td>
<td>Maximum audio output</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
</tr>
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</table>
### MULTIPLEX DECODER ALIGNMENT

<table>
<thead>
<tr>
<th>STEP</th>
<th>TUNER DIAL SETTING</th>
<th>SIGNAL GENERATOR</th>
<th>INDICATOR</th>
<th>ADJUST</th>
<th>TEST LIMITS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300 MHz or point of no interference</td>
<td>Same as tuner dial with interferences</td>
<td>Oscilloscope and AC/DC VOM connected to either fixed audio output jacks</td>
<td>R317</td>
<td>2.5V RMS at fixed audio output jacks</td>
<td>Make sure tuning meter is at zero center. Maximum indication on signal strength meter and center indication on tuning meter should coincide.</td>
</tr>
<tr>
<td>2</td>
<td>Same as tuner dial for no interference</td>
<td>3000 MHz antenna terminals with approx. 1000 MHz</td>
<td>Oscilloscope and AC/DC VOM connected to either fixed audio output jacks</td>
<td>R317</td>
<td>2.5V RMS at fixed audio output jacks</td>
<td>Make sure tuning meter is at zero center. Maximum indication on signal strength meter and center indication on tuning meter should coincide.</td>
</tr>
</tbody>
</table>

The table below shows the alignment steps for the multiplex decoder.

<table>
<thead>
<tr>
<th>STEPS</th>
<th>TUNER DIAL SETTING</th>
<th>FREQUENCY MODULATION</th>
<th>COUPLING</th>
<th>TYPE</th>
<th>CONNECTED TO</th>
<th>ADJUST</th>
<th>TEST LIMITS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>100MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>6</td>
<td>90 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>7</td>
<td>90 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>8</td>
<td>90 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>9</td>
<td>104 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>10</td>
<td>92 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>11</td>
<td>92 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
<tr>
<td>12</td>
<td>92 MHz</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Same. Repeat Steps 5 and 6 until dial is accurate.</td>
</tr>
</tbody>
</table>

*Note: Steps 1 and 2 are optional and can be performed as necessary.*
<table>
<thead>
<tr>
<th>STEP</th>
<th>TUNER DIAL SETTING</th>
<th>SIGNAL GENERATOR</th>
<th>INDICATOR</th>
<th>ADJUST</th>
<th>TEST LIMITS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Same as tuner dial</td>
<td>3000 antenna terminals with approximately 1000V signal thru matching network or balun</td>
<td>Mono (A - L) modulation Oscilloscope and AC- VOM connected to either fixed audio output jacks</td>
<td>R317</td>
<td>2.5V RMS at fixed output jacks</td>
<td>Make sure tuning meter is at zero center. Maximum indication on signal strength meter and center indication on tuning meter should coincide.</td>
</tr>
<tr>
<td>2</td>
<td>Same</td>
<td>Same</td>
<td>6kHz and 5kHz at 25kHz deviation</td>
<td>Oscilloscope, Pin 13 of IC 1 on stereo decoder board</td>
<td>L302 and L303</td>
<td>Adjust L302 for maximum 5kHz, L303 for minimum 6kHz. Do not attempt to detect 6kHz at tone output jacks. Ground scope probe close to multiplex board. Repeat adjustments of L302 and L303 until optimum condition is reached.</td>
</tr>
<tr>
<td>3</td>
<td>Same</td>
<td>Same</td>
<td>19 kHz pilot</td>
<td>Oscilloscope base of Q305</td>
<td>L301 and T301</td>
<td>Maximum amplitude for maximum pilot level, if necessary, so that 19 kHz distortion do not limit or saturate. Decrease pilot level if necessary.</td>
</tr>
<tr>
<td>4</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Oscilloscope T302 Pin 1 or 2 T302 top and bottom</td>
<td>Maximum amplitude Use normal (90) pilot level. Remove scope probe before going to Step 5.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Same</td>
<td>Same</td>
<td>Stereo 1 kHz (clockwise looking from front of tuner), AC- VOM fixed output jack</td>
<td>T302 bottom (wee) and R4</td>
<td>40dB minimum for maximum separation. Repeat the adjustment of T302 bottom and R4 until maximum separation is obtained. Then reverse channels and measure left channel separation.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Same</td>
<td>Same</td>
<td>Stereo pilot carrier modulation only</td>
<td>AC- VOM L or R output jack</td>
<td>Less than 50mV of residual</td>
<td>With modulation off but pilots on, (NOTE: Stereo generator must have low output of residual.)</td>
</tr>
</tbody>
</table>

FIG. 1 ANTEenna MATCHING NETWORK

FIG. 2 TYPICAL IF RESPONSE CURVE
REPLACEMENT PARTS

All parts listed are common items obtainable from radio parts jobbers. Replacement parts may be obtained when ordered by PART NUMBER from:

Micintosh Laboratory, Inc.
Customer Service Department
2 Chambers Street
Binghamton, New York 13903
(telephone 607-723-3517)

CAPACITORS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Number</th>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>C021, 13</td>
<td>Silver Mica 270pF 20V</td>
<td>063-010</td>
<td></td>
</tr>
<tr>
<td>C034</td>
<td>Tantalum, 10pF 35V</td>
<td>066-239</td>
<td></td>
</tr>
<tr>
<td>C036</td>
<td>Electrolytic 220µF 25V</td>
<td>066-240</td>
<td></td>
</tr>
<tr>
<td>C038</td>
<td>Tantalum, 10pF 35V</td>
<td>066-239</td>
<td></td>
</tr>
<tr>
<td>C039</td>
<td>Polypropylene 270pF 25V</td>
<td>066-219</td>
<td></td>
</tr>
<tr>
<td>C0310</td>
<td>Tantalum, 10pF 35V</td>
<td>066-119</td>
<td></td>
</tr>
<tr>
<td>C0315</td>
<td>Polypropylene 1500µF 25V</td>
<td>066-092</td>
<td></td>
</tr>
<tr>
<td>C0316</td>
<td>Tantalum, 10pF 35V</td>
<td>066-239</td>
<td></td>
</tr>
<tr>
<td>C0316</td>
<td>Tantalum, 10pF 35V</td>
<td>066-239</td>
<td></td>
</tr>
<tr>
<td>C0323</td>
<td>Electrolytic 1µF 50V</td>
<td>066-245</td>
<td></td>
</tr>
<tr>
<td>C0325</td>
<td>Electrolytic 1µF 25V</td>
<td>066-240</td>
<td></td>
</tr>
<tr>
<td>C0326, 327</td>
<td>Polypropylene 4700µF 35V</td>
<td>066-003</td>
<td></td>
</tr>
<tr>
<td>C0328</td>
<td>Tantalum, 10pF 35V</td>
<td>066-239</td>
<td></td>
</tr>
<tr>
<td>C0331</td>
<td>Polypropylene 0.0033µF</td>
<td>066-090</td>
<td></td>
</tr>
<tr>
<td>C0334</td>
<td>Polypropylene 0.0068µF</td>
<td>066-090</td>
<td></td>
</tr>
<tr>
<td>C0335</td>
<td>Polypropylene 0.068µF</td>
<td>066-091</td>
<td></td>
</tr>
<tr>
<td>C0336, 337</td>
<td>Polypropylene 2700µF 25V</td>
<td>066-003</td>
<td></td>
</tr>
<tr>
<td>C0338</td>
<td>Polypropylene 0.0033µF</td>
<td>066-090</td>
<td></td>
</tr>
<tr>
<td>C049, 405</td>
<td>Electrolytic 220µF 25V</td>
<td>066-240</td>
<td></td>
</tr>
<tr>
<td>C049, 409</td>
<td>Electrolytic 10µF 35V</td>
<td>066-239</td>
<td></td>
</tr>
<tr>
<td>C050</td>
<td>Electrolytic 200µF 50V</td>
<td>066-154</td>
<td></td>
</tr>
<tr>
<td>C0504</td>
<td>Electrolytic 0.005µF/50V 200/50/50/50</td>
<td>066-155</td>
<td></td>
</tr>
<tr>
<td>C0505</td>
<td>Mylar .22µF 250V</td>
<td>684-068</td>
<td></td>
</tr>
<tr>
<td>C0506</td>
<td>Electrolytic 150µF 63V</td>
<td>066-005</td>
<td></td>
</tr>
</tbody>
</table>

DIODES

R010, 102 | Ge. signal diode | 070-003 |
R013, 104 | Ge. signal diode | 070-003 |
R021, 204 | Si. signal diode | 070-012 |
R025, 204 | Si. signal diode | 070-017 |
R031, 302 | Si. signal diode | 070-047 |
R083, 304 | Si. signal diode | 070-047 |
R095, 306 | Si. signal diode | 070-047 |

S01 | Si. signal diode | 070-048 |
S011 | Si. signal diode | 070-048 |
S011, 102 | Si. rectifier diode | 070-031 |
S015, 504 | Si. rectifier diode | 070-031 |
S015 | Zener diode 24V | 070-065 |

CHOKES

L01 | Antenna coil | 122-087 |
L02 | RF coil: Input | 122-088 |
L03 | Mixer coil | 122-090 |
L04 | RF coil: Output | 122-089 |
L05 | Choke 1.5µH | 122-032 |
L06 | Oscillator coil | 122-117 |
L07 | Choke 1.5µH | 122-032 |
L08 | Choke 7.5µH | 122-013 |
L101, 202 | Choke 7.5µH | 122-013 |
L101 | Filter coil (1900) | 122-014 |
L102, 303 | Filter coil (SCA) | 122-093 |
L104 | Choke 1MH | 122-093 |
L105 | Choke 2.2MH | 122-007 |

TRANSISTORS

Q01 | Si. NPN transistor | 132-066 |
Q03 | Si. Junction E.E.T. | 132-097 |
Q05 | Si. Junction E.E.T. | 132-098 |
Q07 | Si. NPN transistor | 132-097 |
Q091, 202 | Si. NPN transistor | 132-092 |
Q091 | Si. NPN transistor | 132-092 |
Q092 | Si. NPN transistor | 132-092 |
Q094 | Si. NPN transistor | 132-092 |
Q095 | Si. NPN transistor | 132-092 |
Q096 | Si. NPN transistor | 132-092 |
Q0993 | Si. NPN transistor | 132-092 |
Q091, 404 | Si. NPN transistor | 132-093 |
Q095, 402 | Si. NPN transistor | 132-093 |
Q095, 404 | Si. NPN transistor | 132-093 |
Q095, 406 | Si. NPN transistor | 132-093 |
Q095 | Si. NPN transistor | 132-093 |
Q095 | Si. NPN transistor | 132-093 |

FUSES

F01 | Fuse 0.5A slow-blow | 089-024 |

POTENTIOMETERS

R012 | Full scale adj. | 134-260 |
R016 | Mid scale adj. | 134-260 |
MR 77

RESISTORS
R203 Bias adj. 134-265
R210 M301 adj. 134-265
R317 Audio level 134-258
R481 Separation adj. 134-260
R418 Volume control 134-217

RESISTORS
R205,206 Wirewound 2200 5/1 W 139-076
R207,208 Film 56,20 1/4 W 144-014
R333,334 Film 33 1/2 W 144-015
R338,339 Film 33 1/2 W 144-015
R503 Wirewound 150 10/5 W 139-041
R508 Wirewound 20 10/5 W 139-085
R509 Wirewound 1,800 10/5 W 139-077

SWITCHES
S301 Mode selector 146-138
S302 Muting switch 146-138
S303 Stereo filter 146-137
S502 Dial scale intensity 148-023

TRANSISTORS
T1 Bolin 043-226
T2 Mixer 162-051
T101 1st IF filter 162-053
T102 1st IF filter 162-052
T103 2nd IF filter 162-053
T104 2nd IF filter 162-052
T201 Driver transformer 044-121
T202 Output transformer 044-121
T203 FM detector 044-123
T301 AF transformer [19 kHz] 162-055
T302 AF transformer [38 kHz] 162-055
T501 Power transformer 064-120

TUBES
V401 6H66 165-025

INTEGRATED CIRCUITS
IC1 Integrated circuit 133-005
IC101,102 Integrated circuit 133-002
IC301A,B Integrated circuit 133-004

METERS
M181 Signal strength meter 124-004
M381 Tuning meter 124-006

RELAY
KJ01 Reed relay 087-008

LAMPS
1842 (Motor lamp) 058-008
1866 (Front panel) 058-014
1828 (MPX lamp) 058-027

Festoon lamp [Dial glass] 058-032

FRONT PANEL & TRIM
Front panel 041-109
Front panel end caps 018-120
Tuning knob 041-122
Muting control knob 044-322
Mode selector knob 044-322
Stereo filter knob 044-322
Volume control knob 044-322

MOUNTING SYSTEM
Shelf bracket (right) 043-592
Shelf bracket (left) 043-593
Mounting template 100 038-179
Hardware package 043-446

MISCELLANEOUS ITEMS
FM dipole antenna 170-033
Dial glass 044-164
Polester 043-876
Dial cord [complete] 044-226
Fuseholder 178-001
AC power cord 170-021
Shipping carton 044-328
Owners manual 038-912
Plastic feet 017-041
Push terminal (antenna) 074-033
Audio cable [6/1] 170-015

MR 77 SCHEMATIC PART NO. 038-978