McIntosh

MX 115

FM TUNER PREAMP

SERVICE INFORMATION

STARTING WITH SERIAL NO. AB1001

McINTOSH LABORATORY INC. 2 CHAMBERS STREET BINGHAMTON, NEW YORK

ELECTRICAL SPECIFICATIONS

FM TUNER SECTION

USEABLE SENSITIVITY

2.5 microvolts at 100% modulation (±75 kHz deviation) for 3% total noise and harmonic distortion IHF.

SIGNAL TO NOISE RATIO

70 dB below 100% modulation.

CAPTURE RATIO

1.5 dB minimum.

HARMONIC DISTORTION

Mono: Does not exceed 0.3% at 100% modulation ±75 kHz deviation.

Stereo: Does not exceed 0.7%.

AUDIO FREQUENCY RESPONSE

±1 dB 20 Hz to 15,000 Hz with standard de-emphasis (75 µsec.) and 19,000 Hz pilot filter.

SELECTIVITY

ADJACENT CHANNEL:

6 dB minimum IHF in "NORMAL" Position.
15 dB minimum IHF in "NARROW" Position.

ALTERNATE CHANNEL:

58 dB minimum IHF in "NORMAL" Position.
88 dB minimum IHF in "NARROW" Position.

SPURIOUS REJECTION

90 dB IHF minimum.

IMAGE REJECTION

95 dB minimum, 88 MHz - 108 MHz.

STEREO SEPARATION

35 dB at 1,000 Hz.

SCA FILTER

50 dB rejection from 67 kHz to 74 kHz.
275 dB per octave slope.

PREAMPLIFIER SECTION

FREQUENCY RESPONSE

±0.5 dB, 20 Hz to 20,000 Hz.

DISTORTION

Less than 0.1% at 2.5 volts 20Hz to 20 kHz.

INPUT SENSITIVITY (phono 1 and phono 2)

2 millivolts for 2.5 volts output at 1 kHz.

INPUT SENSITIVITY (aux, tape)

0.25 volts for 2.5 volts output.

HUM AND NOISE (phono 1 and phono 2)

72 dB below 10 millivolt input.

HUM AND NOISE (aux, tape)

85 dB below rated output.

OUTPUT (main)

2.5 volts with rated input. Up to 10 volts can be developed without distortion. FM and AM will produce up to 10 volts output at 100% modulation.

OUTPUT (tape)

0.25 volts with rated input. Phono input signal of 10 millivolts produces 1.2 volts output. FM and AM will produce 1.2 volts output at 100% modulation.

OUTPUT (center channel)

2 volts with rated input to both channels.

BASS CONTROL

-18 dB to +16 dB at 20 Hz.

TREBLE CONTROL

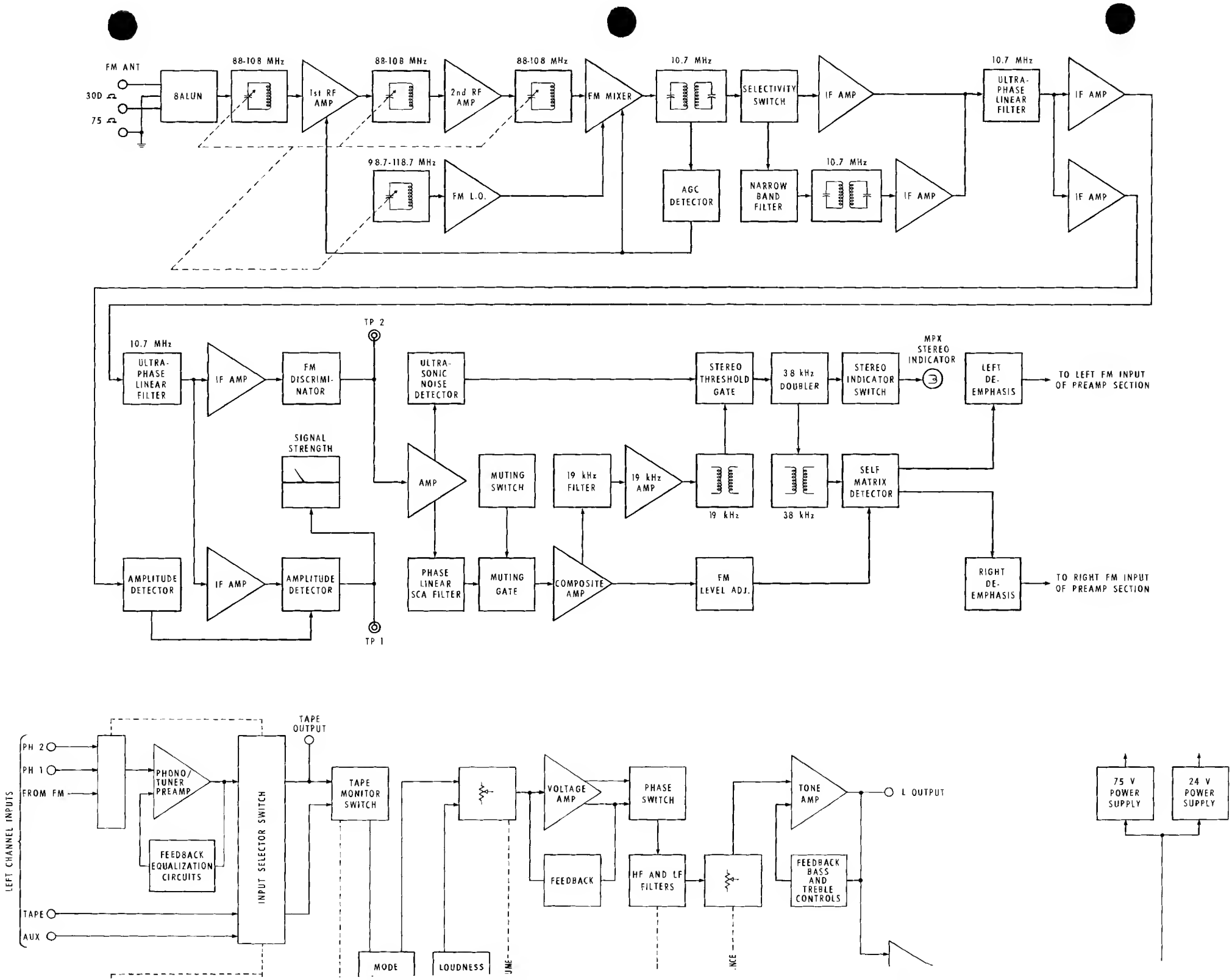
±20 dB to 20,000 Hz.

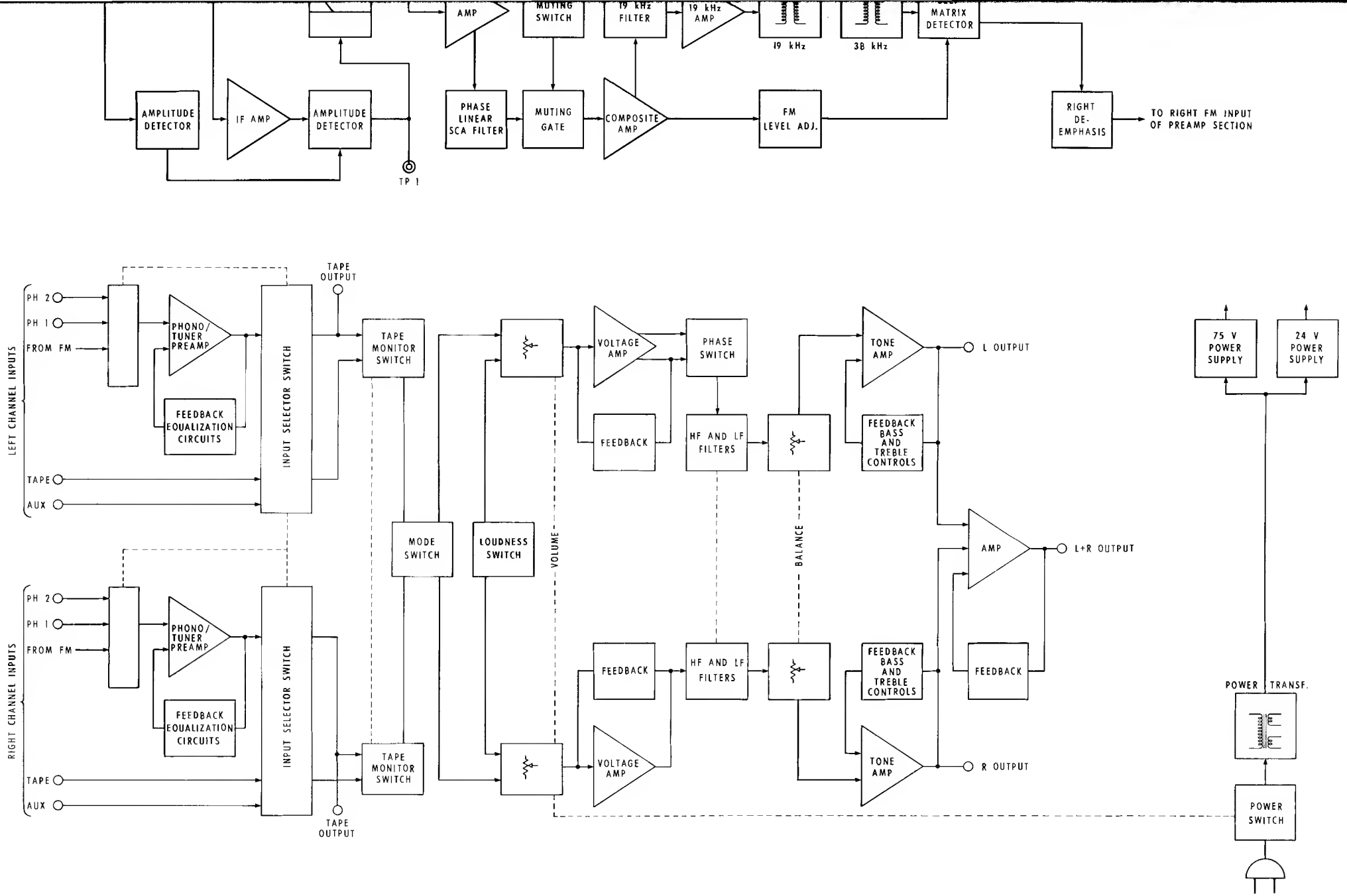
LF FILTER

Flat or roll off below 50 Hz, down 12 dB at 20 Hz.

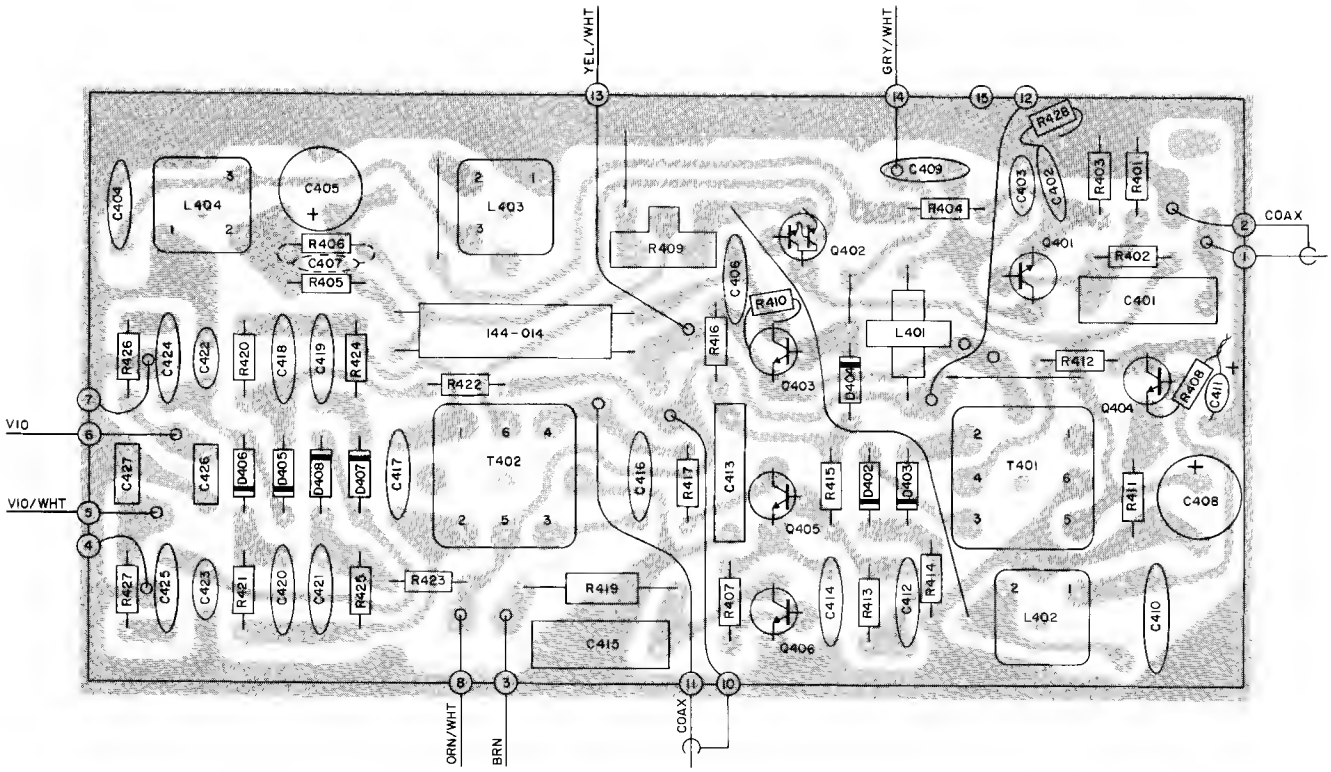
HF FILTER

Flat or roll off above 5000 Hz, down 12 dB at 20,000 Hz.

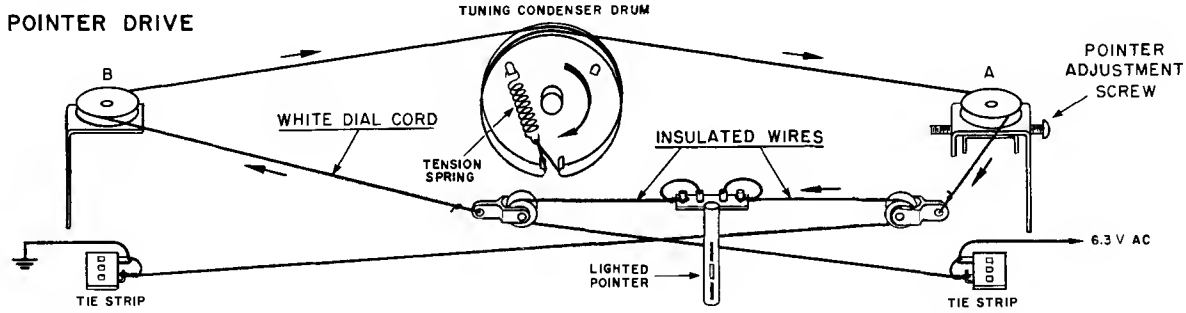

FM ANT
300Ω
75Ω
BALUN
88-108 MHz
1st RF AMP
2nd RF AMP
FM MIXER
98.7-118.7 MHz
FM L.O.
10.7 MHz
AGC DETECTOR
SELECTIVITY SWITCH
NARROW BAND FILTER
IF AMP
ULTRA-PHASE LINEAR FILTER
TP 2
TP 1
FM DISCRIMINATOR
ULTRA-SONIC NOISE DETECTOR
SIGNAL STRENGTH
AMP
MUTING SWITCH
19 kHz FILTER
19 kHz AMP
STEREO THRESHOLD GATE
38 kHz DOUBLER
STEREO INDICATOR SWITCH
MPX STEREO INDICATOR
LEFT DE-EMPHASIS
TO LEFT FM INPUT OF PREAMP SECTION
SELF MATRIX DETECTOR
AMPLITUDE DETECTOR
PHASE LINEAR SCA FILTER
MUTING GATE
COMPOSITE AMP
FM LEVEL ADJ.
RIGHT DE-EMPHASIS
TO RIGHT FM INPUT OF PREAMP SECTION
LEFT CHANNEL INPUTS
PH 2
PH 1
FROM FM
TAPE
AUX
PHONO/TUNER PREAMP
FEEDBACK EQUALIZATION CIRCUITS
INPUT SELECTOR SWITCH
TAPE OUTPUT
TAPE MONITOR SWITCH
MODE
LOUDNESS
VOLTAGE AMP
FEEDBACK
PHASE SWITCH
HF AND LF FILTERS
TONE AMP
FEEDBACK BASS AND TREBLE CONTROLS
L OUTPUT
75 V POWER SUPPLY
24 V POWER SUPPLY



MX 115 BLOCK DIAGRAM



MPX PRINTED CIRCUIT BOARD 044-291

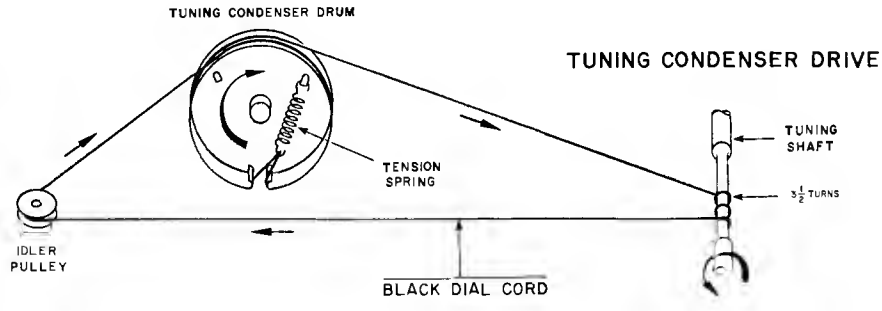


Step 1 Before stringing unit, turn pointer adjustment screw until pulley "A" is in the center of its travel.

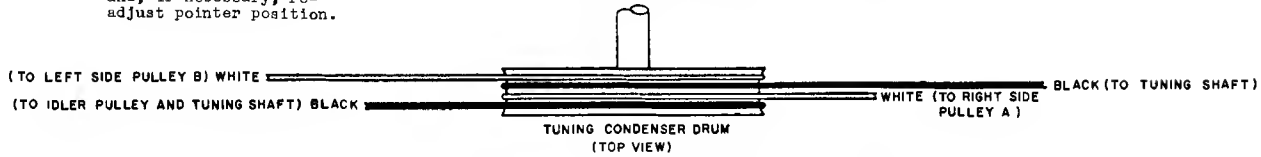
Step 2 String unit as shown.

Step 3 After stringing unit, turn tuning shaft until pointer is as far to the left as it will go. Turn the pointer adjustment screw until the pointer coincides with the zero bar of the logging scale.

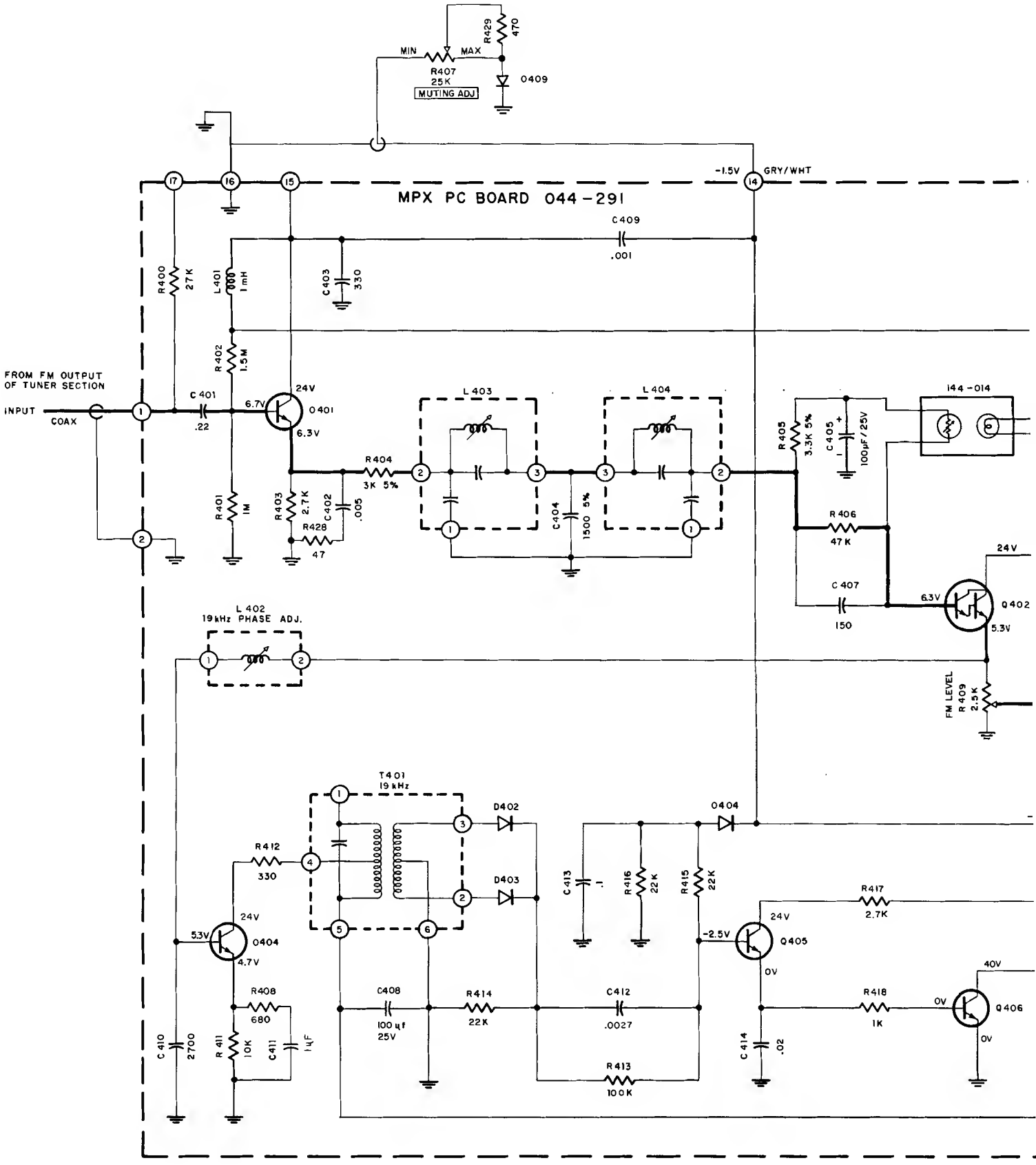
Step 4 Turn the tuning knob making the pointer move back and forth from one end of the dial scale to the other. Return pointer to the far left and, if necessary, re-adjust pointer position.



DIAL CORD SEQUENCE

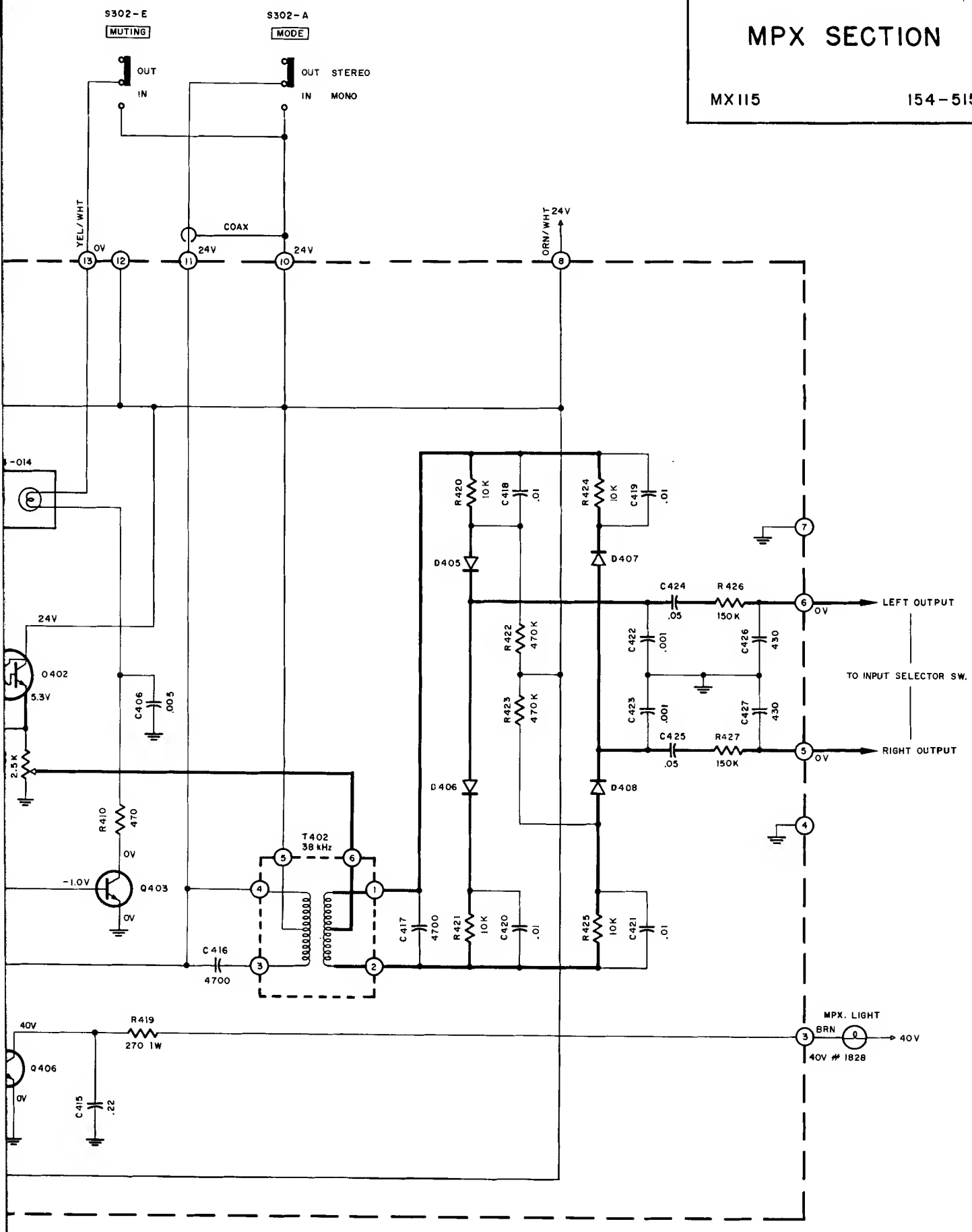


POINTER DIAL STRINGING


MPX PC BOARD 044-291
R429 470
MIN
MAX
R407 25K
MUTING ADJ
0409
-1.5V
GRY/WHT
C409 .001
R400 27K
L401 1mH
C403 330
R402 1.5M
FROM FM OUTPUT OF TUNER SECTION
INPUT
COAX
C401 .22
24V
6.7V
Q401
6.3V
R404 3K 5%
L403
L404
144-014
R405 3.3K 5%
C405 1 100µF/25V
R401 1M
R403 2.7K
C402 .005
R428 47
C404 1500 5%
R406 47K
C407 150
24V
6.3V
Q402
5.3V
L402 19kHz PHASE ADJ.
FM LEVEL R409 2.5K
T401 19kHz
D402
D403
Q404
R412 330
C413 .1
R416 22K
R415 22K
R417 2.7K
24V
-2.5V
Q405
0V
5.3V
24V
4.7V
R408 680
C408 100µf 25V
R414 22K
C412 .0027
R418 1K
40V
0V
Q406
0V
C410 2700
R411 10K
C411 1µF
C414 .02
R413 100K

MPX SECTION

MX115 154-515



SCHEMATIC NOTES

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

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 layouts.

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

The terminal numbering of rotary switches is for reference only.

All voltages indicated on the schematics are measured under the following conditions:

a. Use of an 11 megohm input impedance VTVM.

b. All voltages ±10% with respect to chassis ground.

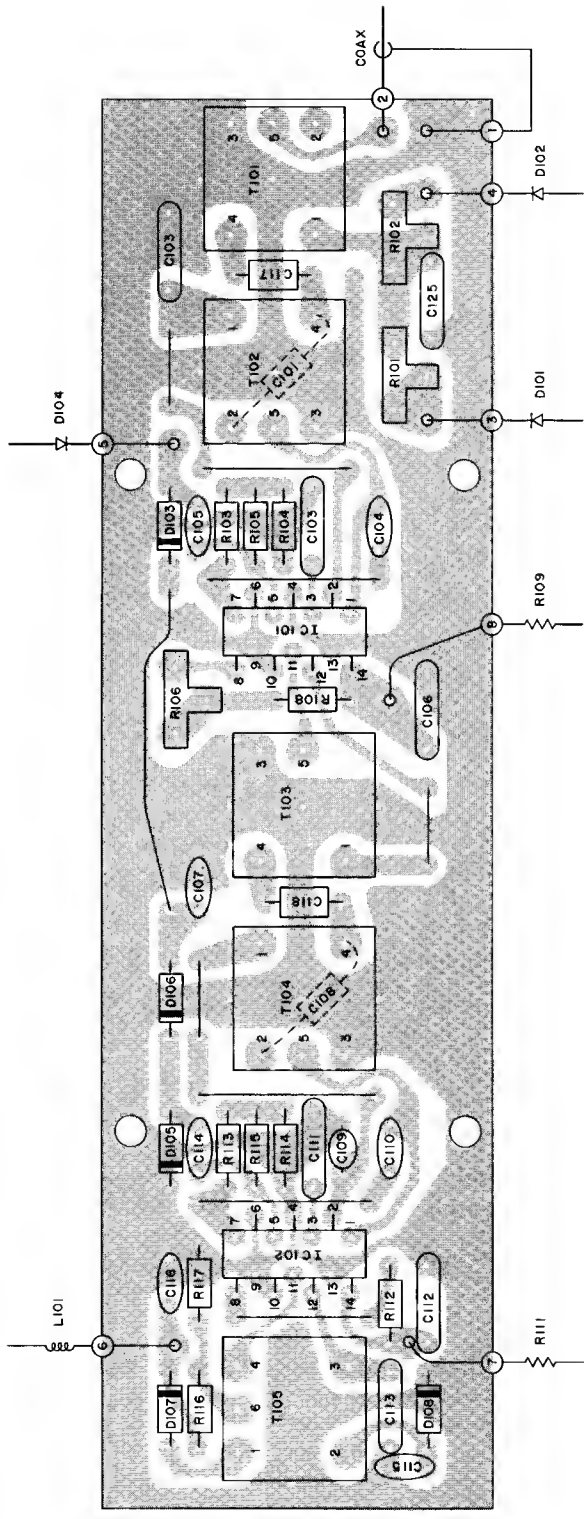
c. No signal at input or antenna terminals.

d. AC input at 120 volts, 50/60 Hz.

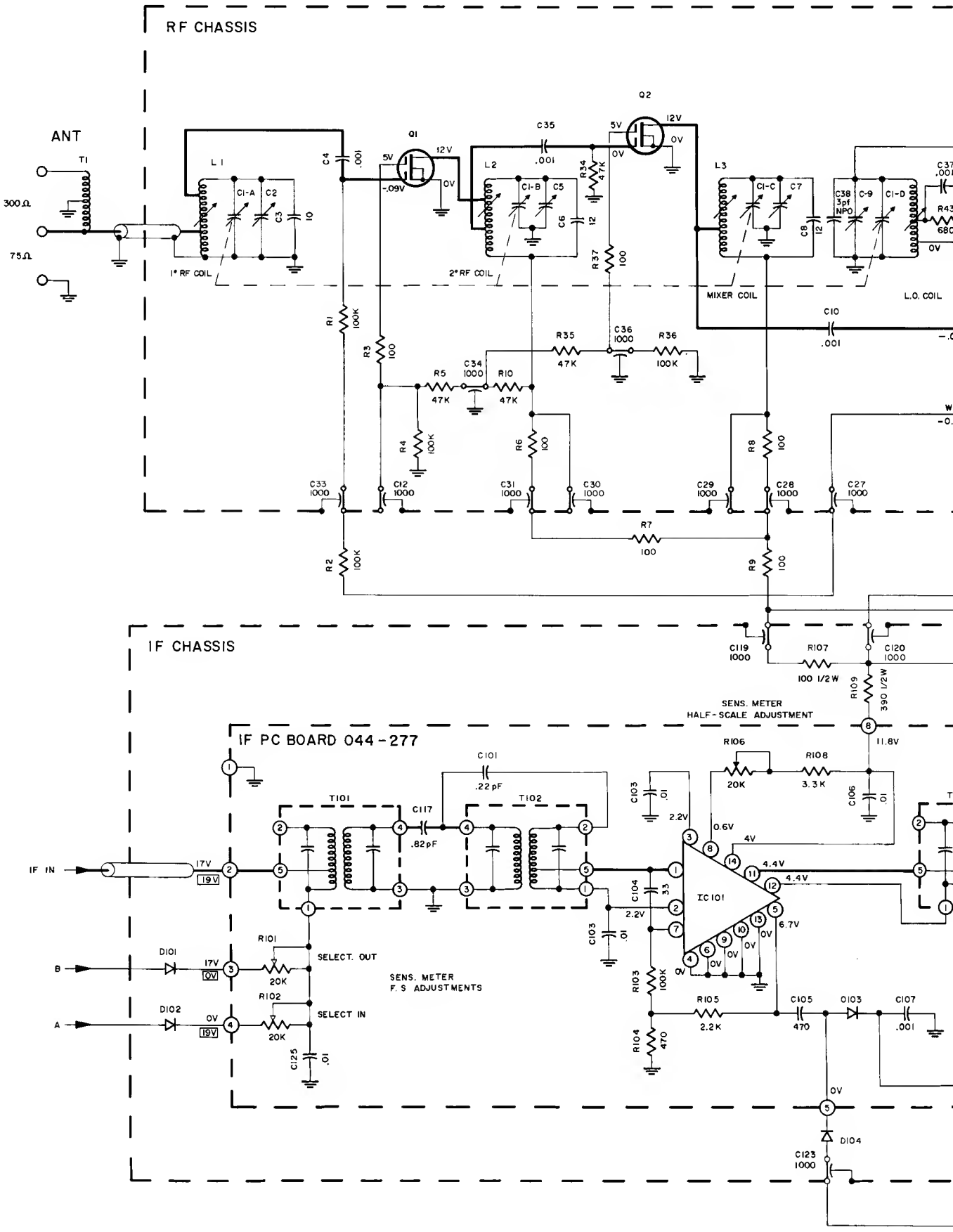
e. Front panel controls at:

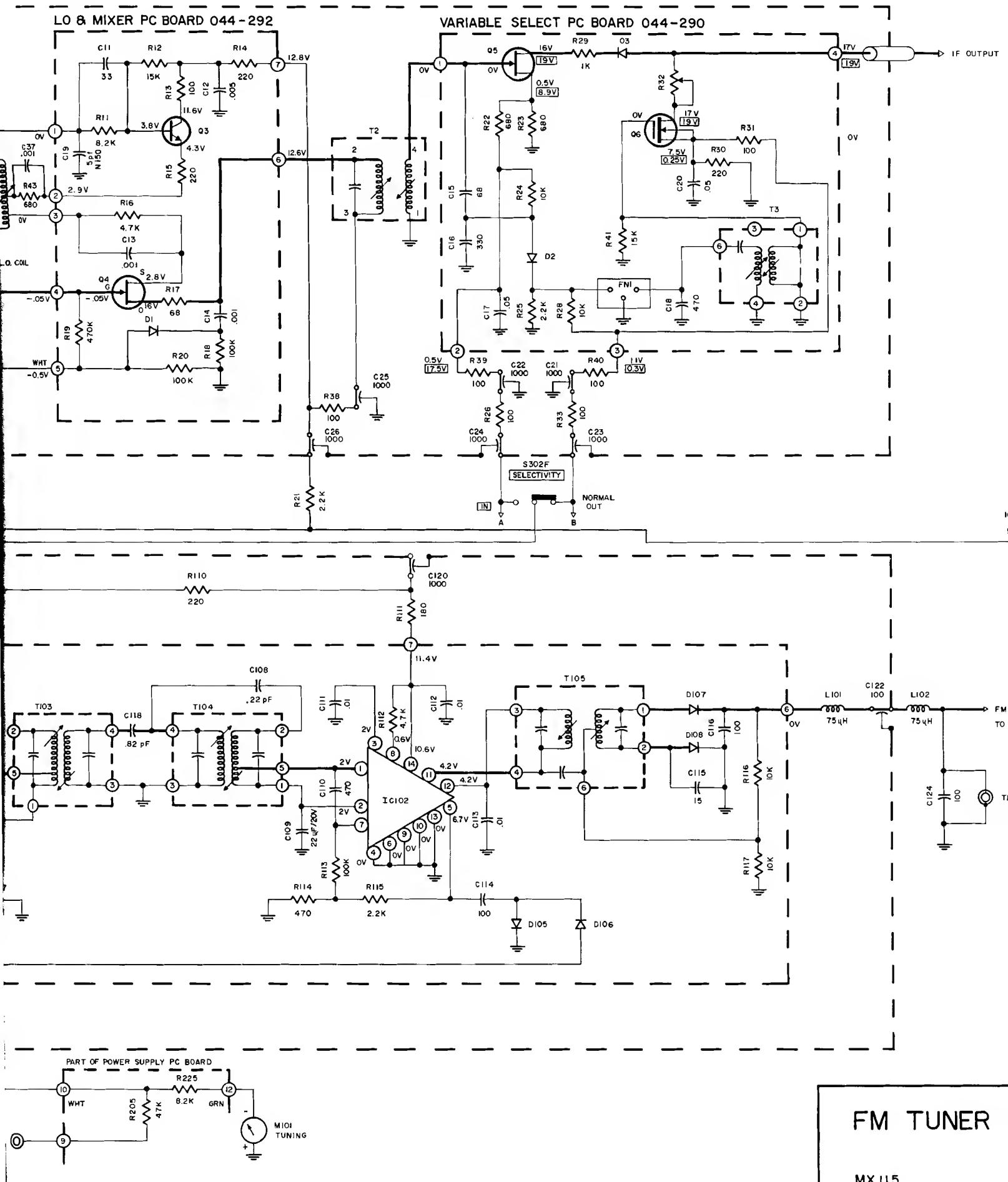
Tuning indicator	100 MHz (no signal)
Volume	Fully CCW
Mode	Stereo
Muting	Out
Input Selector	FM
Panel Lights	Bright
Selectivity	Out

f. Voltages shown in rectangles are measured with selectivity switch in the "In" position.



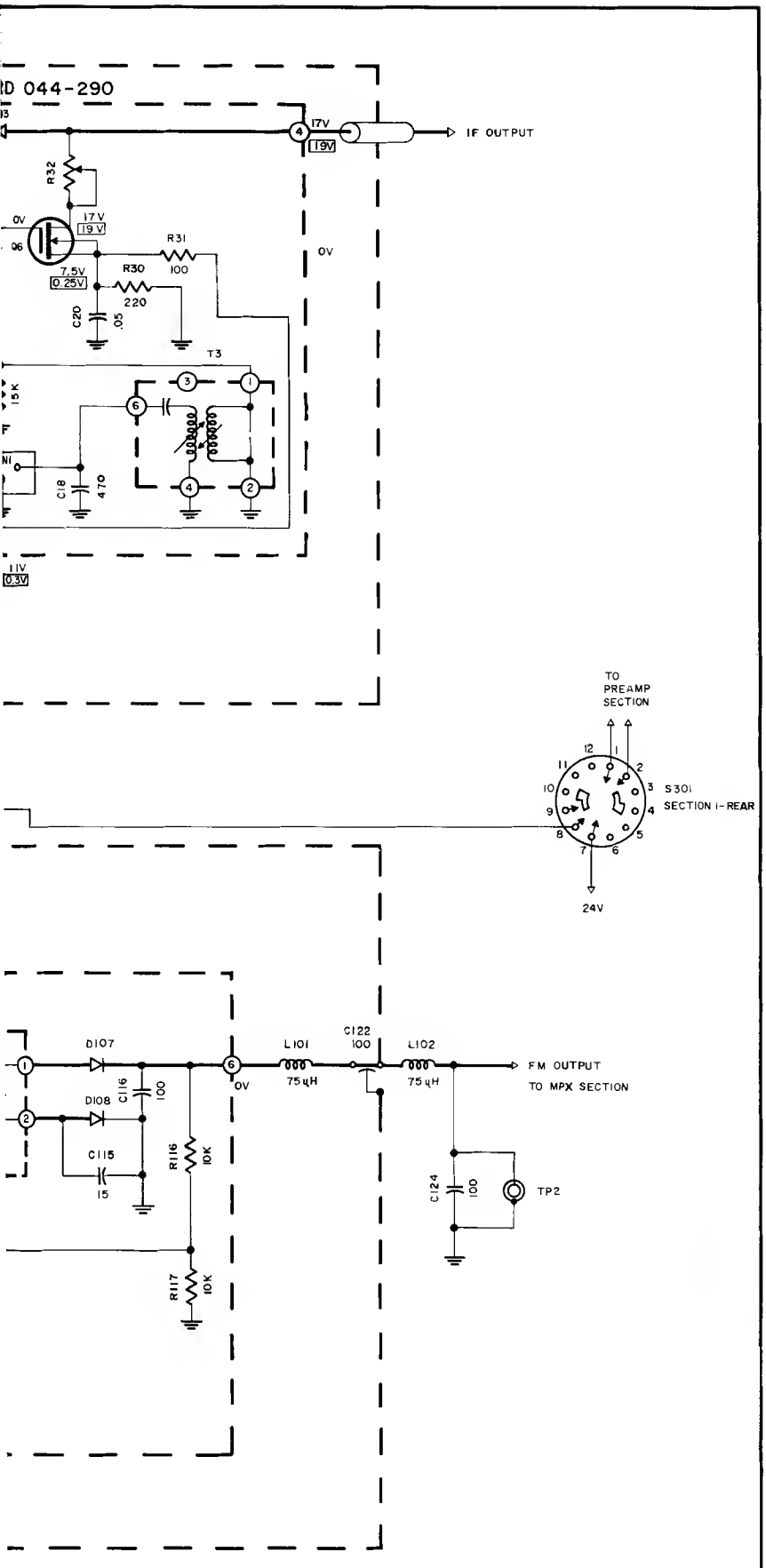
IF PC BOARD 044-277


RF CHASSIS
ANT
T1
300Ω
75Ω
L1
C1-A
C2
C3
10
1° RF COIL
C4
.001
Q1
5V
12V
0V
-.09V
L2
C1-B
C5
C6
12
2° RF COIL
C35
.001
Q2
5V
12V
0V
R34
47K
R37
100
L3
C1-C
C7
C8
12
MIXER COIL
C38
3pf
NPO
C-9
C1-D
L.O. COIL
C37
.001
R43
680
0V
C10
.001
R1
100K
R3
100
R35
47K
C36
1000
R36
100K
R5
47K
C34
1000
R10
47K
R4
100K
R6
100
R8
100
C33
1000
C12
1000
C31
1000
C30
1000
C29
1000
C28
1000
C27
1000
R7
100
R2
100K
R9
100
IF CHASSIS
C119
1000
R107
100 1/2W
C120
1000
R109
390 1/2W
SENS. METER
HALF-SCALE ADJUSTMENT
IF PC BOARD 044-277
11.8V
R106
20K
R108
3.3K
C101
.22pF
T101
T102
C117
.82pF
C103
.01
2.2V
0.6V
4V
C106
.01
IF IN
17V
19V
4.4V
4.4V
C104
33
2.2V
IC101
6.7V
0V
0V
0V
0V
0V
C103
.01
R103
100K
R101
20K
SELECT OUT
D101
B
17V
0V
SENS. METER
F.S ADJUSTMENTS
R102
20K
SELECT IN
D102
A
0V
19V
C125
.01
R105
2.2K
C105
470
D103
C107
.001
R104
470
0V
D104
C123
1000
TP1



FM TUNER S

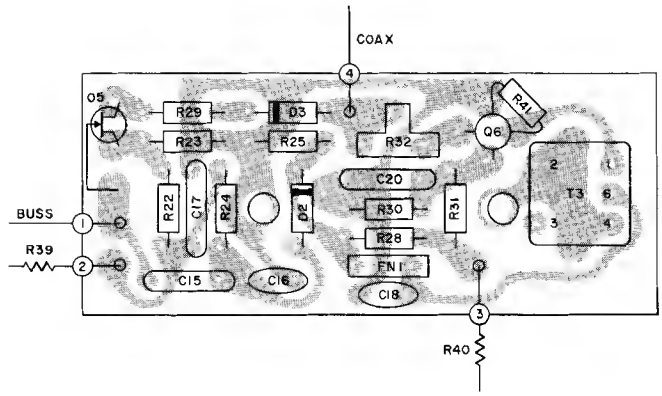
MX115

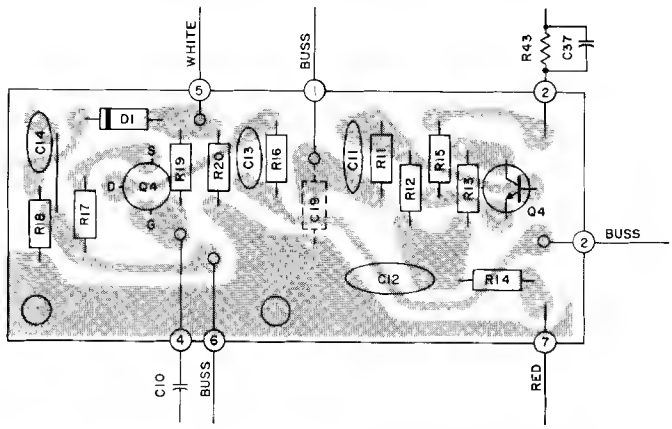


FM TUNER SECTION

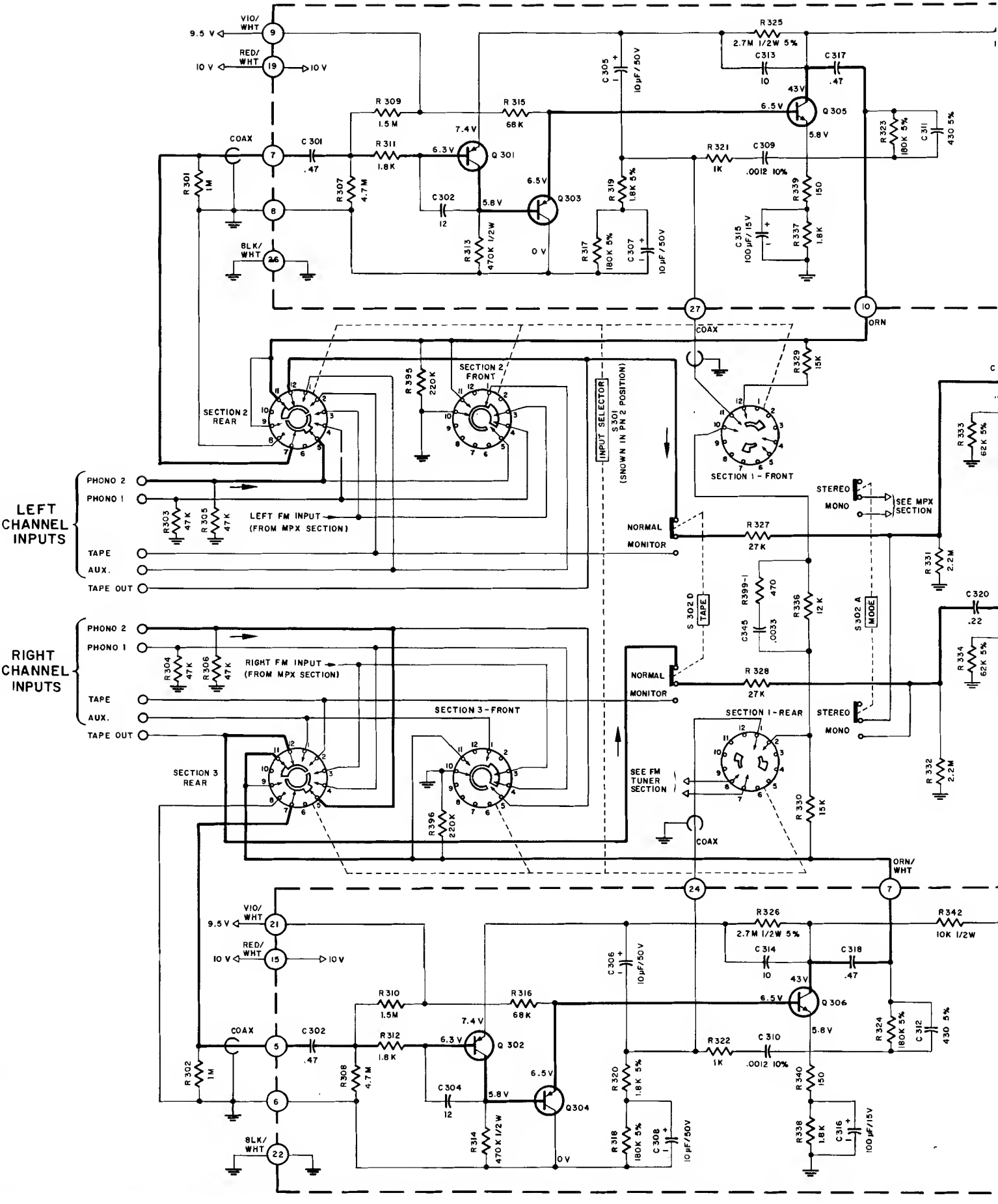
MX 115 154-516

SELECTIVITY PC BOARD 044-290

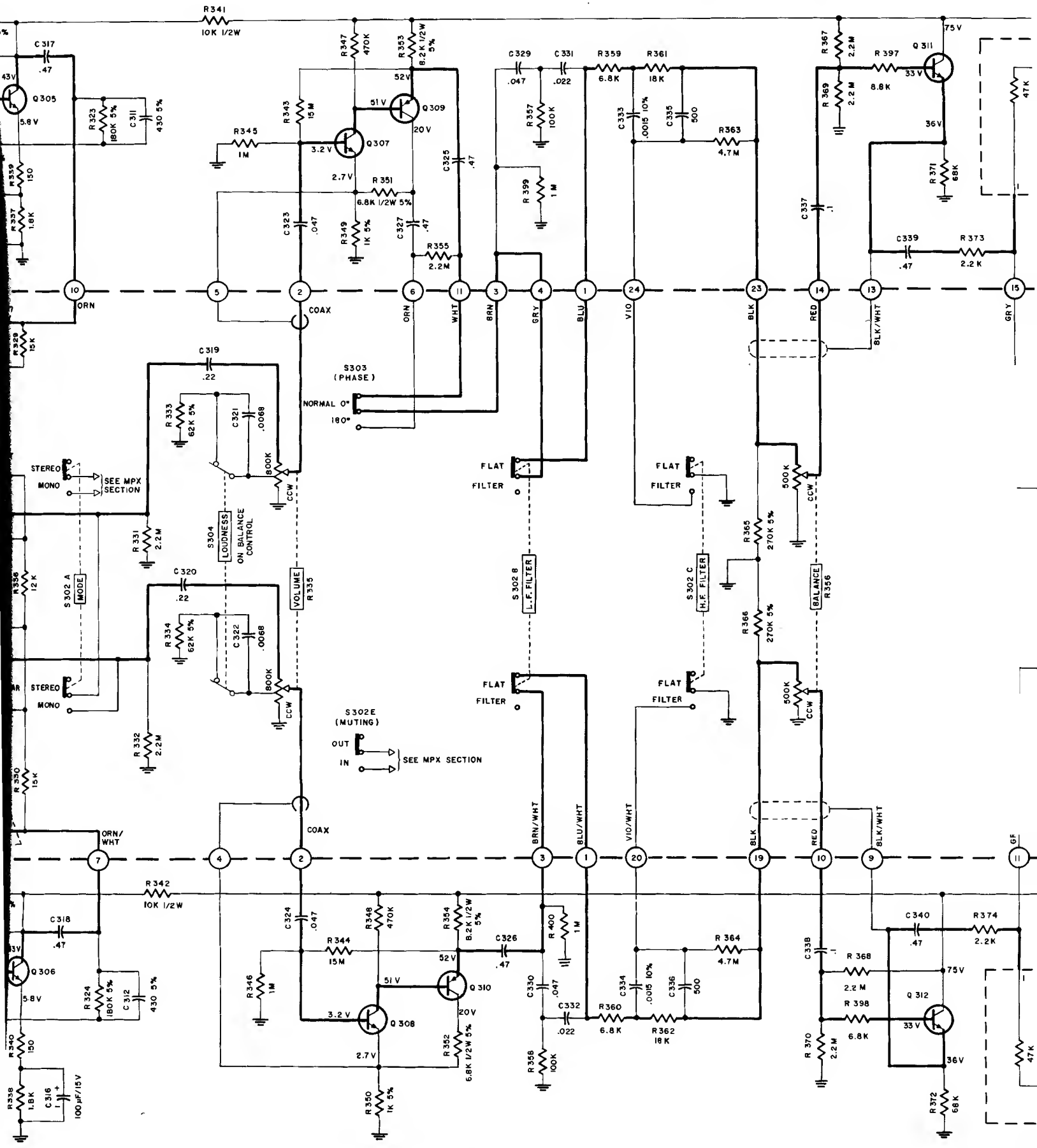




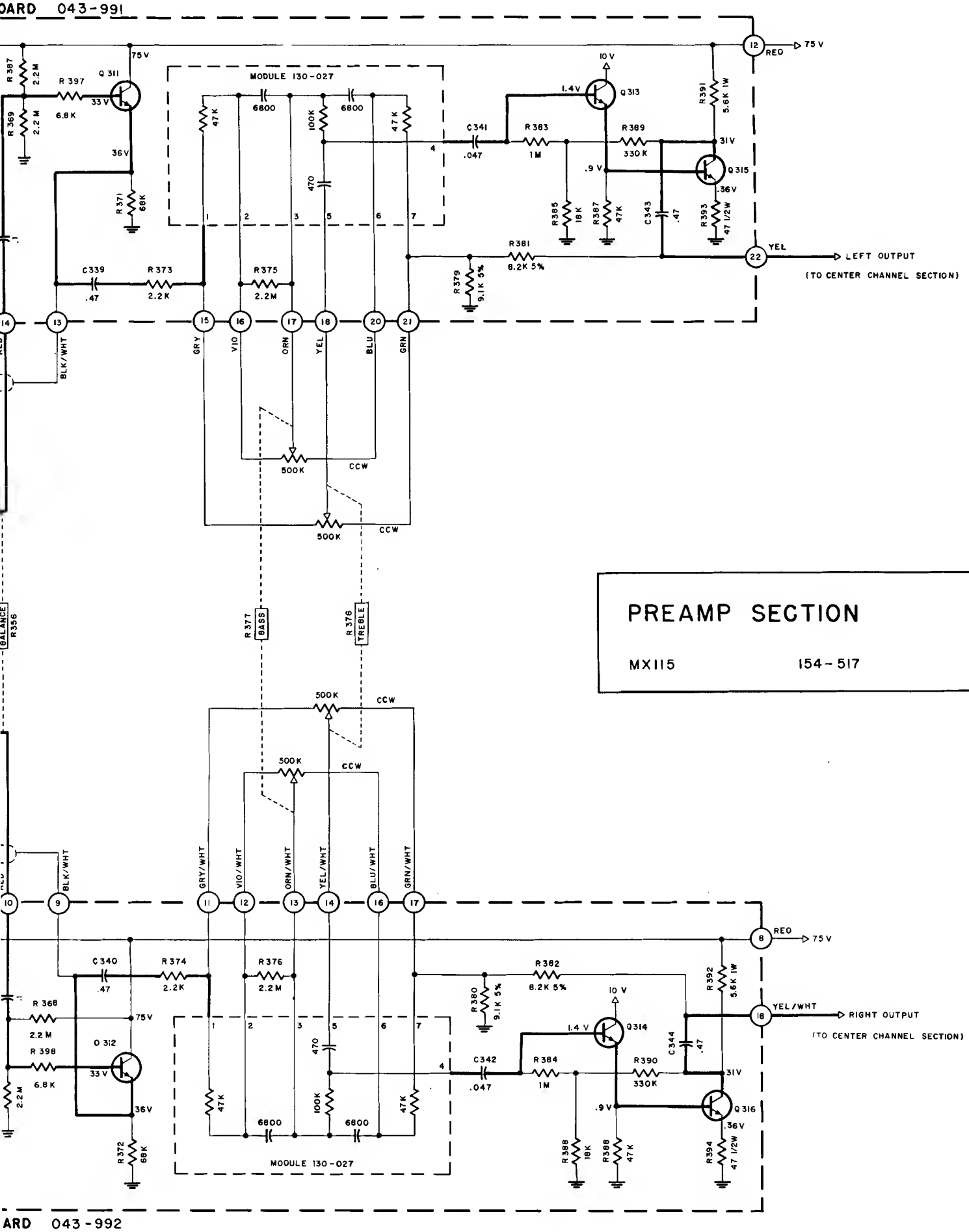
MIXER & LOCAL OSCILLATOR PC BOARD 044-292

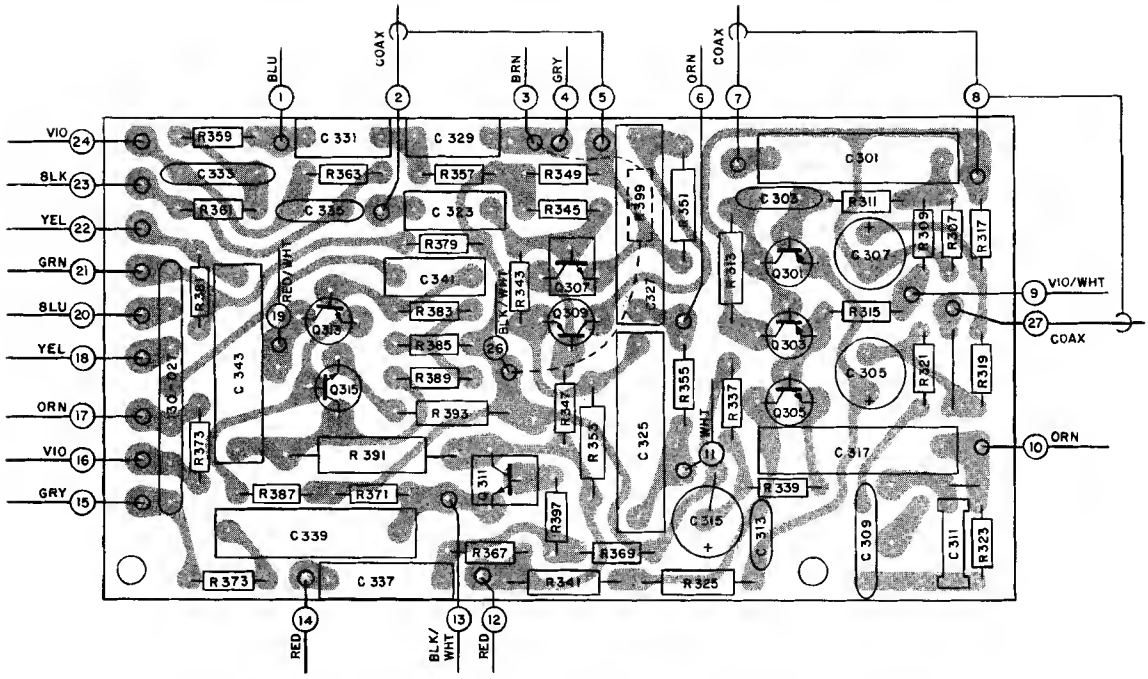

LEFT CHANNEL INPUTS
RIGHT CHANNEL INPUTS
PHONO 2
PHONO 1
TAPE
AUX.
TAPE OUT
LEFT FM INPUT (FROM MPX SECTION)
RIGHT FM INPUT (FROM MPX SECTION)
SECTION 2 REAR
SECTION 2 FRONT
SECTION 3 REAR
SECTION 3 - FRONT
SECTION 1 - FRONT
SECTION 1 - REAR
INPUT SELECTOR S301 (SHOWN IN PN 2 POSITION)
NORMAL MONITOR
STEREO MONO
SEE MPX SECTION
SEE FM TUNER SECTION
S302 D TAPE
S302 A MODE
COAX
VIO/WHT
RED/WHT
BLK/WHT
ORN
ORN/WHT
9.5 V
10 V
Q301
Q302
Q303
Q304
Q305
Q306
7.4 V
6.3 V
6.5 V
5.8 V
43 V
0 V
R301 1M
R302 1M
R303 47K
R304 47K
R305 47K
R306 47K
R307 4.7M
R308 4.7M
R309 1.5M
R310 1.5M
R311 1.8K
R312 1.8K
R313 470K 1/2W
R314 470K 1/2W
R315 68K
R316 68K
R317 180K 5%
R318 180K 5%
R319 1.8K 5%
R320 1.8K 5%
R321 1K
R322 1K
R323 180K 5%
R324 180K 5%
R325 2.7M 1/2W 5%
R326 2.7M 1/2W 5%
R327 27K
R328 27K
R329 15K
R330 15K
R331 2.2M
R332 2.2M
R333 62K 5%
R334 62K 5%
R336 12K
R337 1.8K
R338 1.8K
R339 150
R340 150
R342 10K 1/2W
R395 220K
R396 220K
R399-1 470
C301 .47
C302 12
C302 .47
C304 12
C305 10µF/50V
C306 10µF/50V
C307 10µF/50V
C308 10µF/50V
C309 .0012 10%
C310 .0012 10%
C311 430 5%
C312 430 5%
C313 10
C314 10
C315 100µF/15V
C316 100µF/15V
C317 .47
C318 .47
C320 .22
C345 .0033

LEFT CHANNEL PREAMP. PRINTED CIRCUIT BOARD 043-991

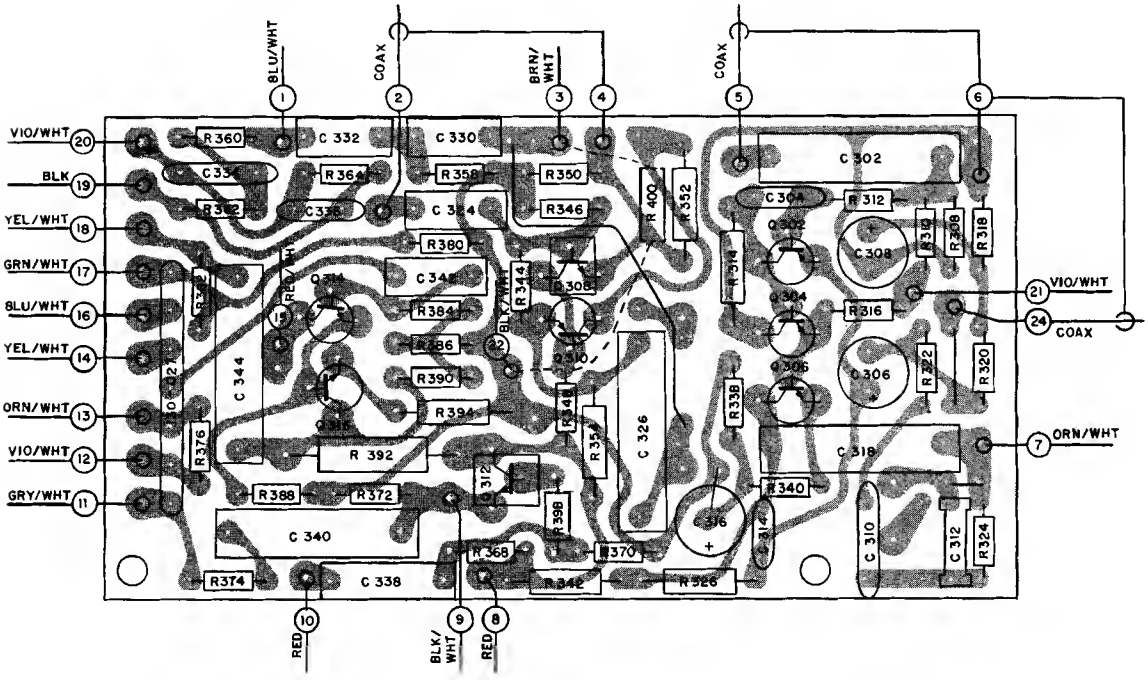


RIGHT CHANNEL PREAMP. PRINTED CIRCUIT BOARD 043-992

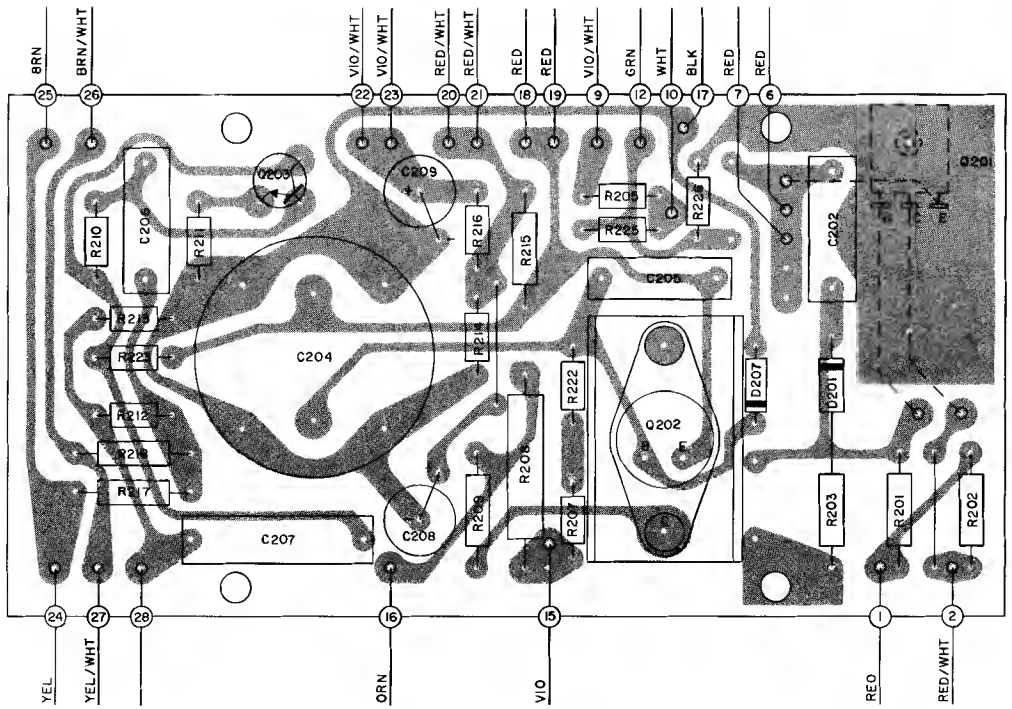

BOARD 043-991
MODULE 130-027
Q 311
Q 313
Q 315
Q 312
Q 314
Q 316
75V
10 V
1.4V
33 V
36V
31V
.9 V
R 387 2.2M
R 369 2.2 M
R 397 6.8K
R 371 68K
R 391 5.6K 1W
R 389 330K
R 383 1M
C341 .047
R 385 18K
R 387 47K
C343 .47
R 393 47 1/2W
R 381 8.2K 5%
R 379 9.1K 5%
C339 .47
R 373 2.2K
R 375 2.2M
47K
6800
100K
470
12 RED
22 YEL
LEFT OUTPUT
(TO CENTER CHANNEL SECTION)
13 BLK/WHT
15 GRY
16 VIO
17 ORN
18 YEL
20 BLU
21 GRN
500K CCW
R 377 BASS
R 376 TREBLE
BALANCE R356
PREAMP SECTION
MX115 154-517
10 BLK/WHT
9 BLK/WHT
11 GRY/WHT
12 VIO/WHT
13 ORN/WHT
14 YEL/WHT
16 BLU/WHT
17 GRN/WHT
8 RED
18 YEL/WHT
RIGHT OUTPUT
(TO CENTER CHANNEL SECTION)
C340 .47
R 374 2.2K
R 376 2.2M
R 368 2.2 M
R 398 6.8K
R 372 68K
C342 .047
R 384 1M
R 390 330K
C344 .47
R 382 8.2K 5%
R 380 9.1K 5%
R 392 5.6K 1W
R 388 18K
R 386 47K
R 394 47 1/2W
BOARD 043-992



LEFT CHANNEL PREAMP PRINTED CIRCUIT BOARD 043-991



RIGHT CHANNEL PREAMP. PRINTED CIRCUIT BOARD 043-992



POWER SUPPLY / CENTER CHANNEL PRINTED CIRCUIT BOARD 044-296

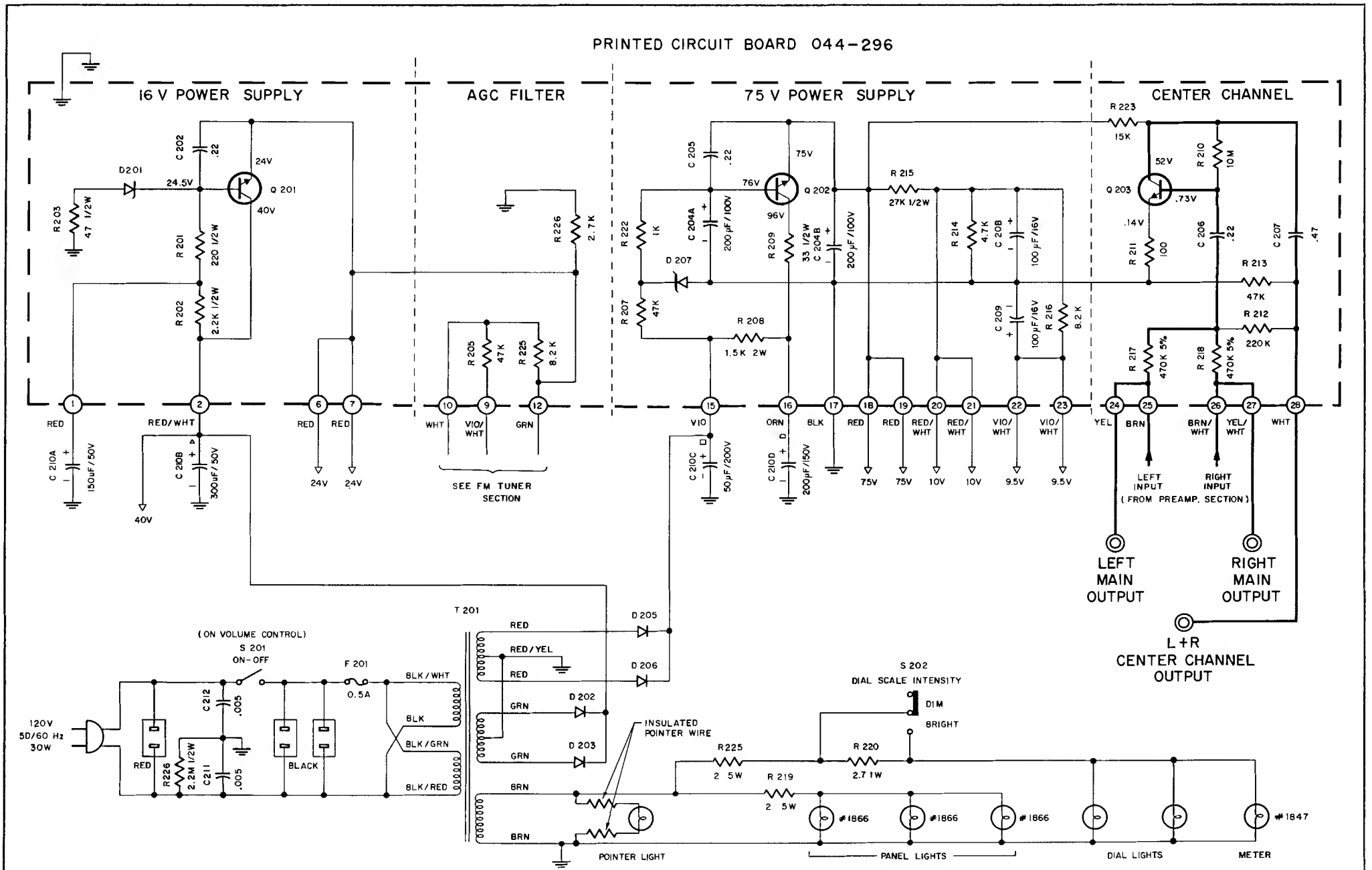
PRINTED CIRCUIT BOARD 044-296

16 V POWER SUPPLY

AGC FILTER

75 V POWER SUPPLY

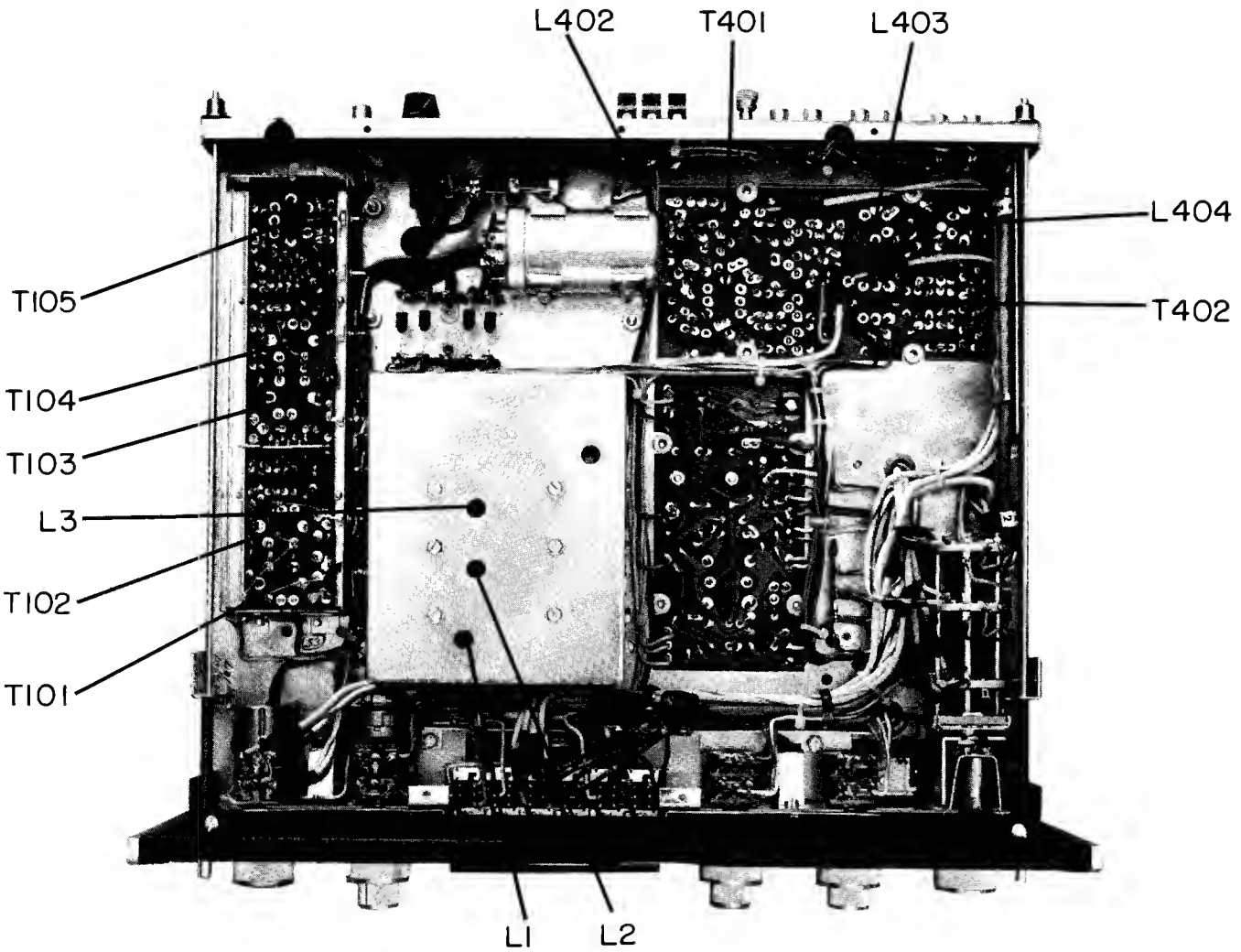
CENTER CHANNEL



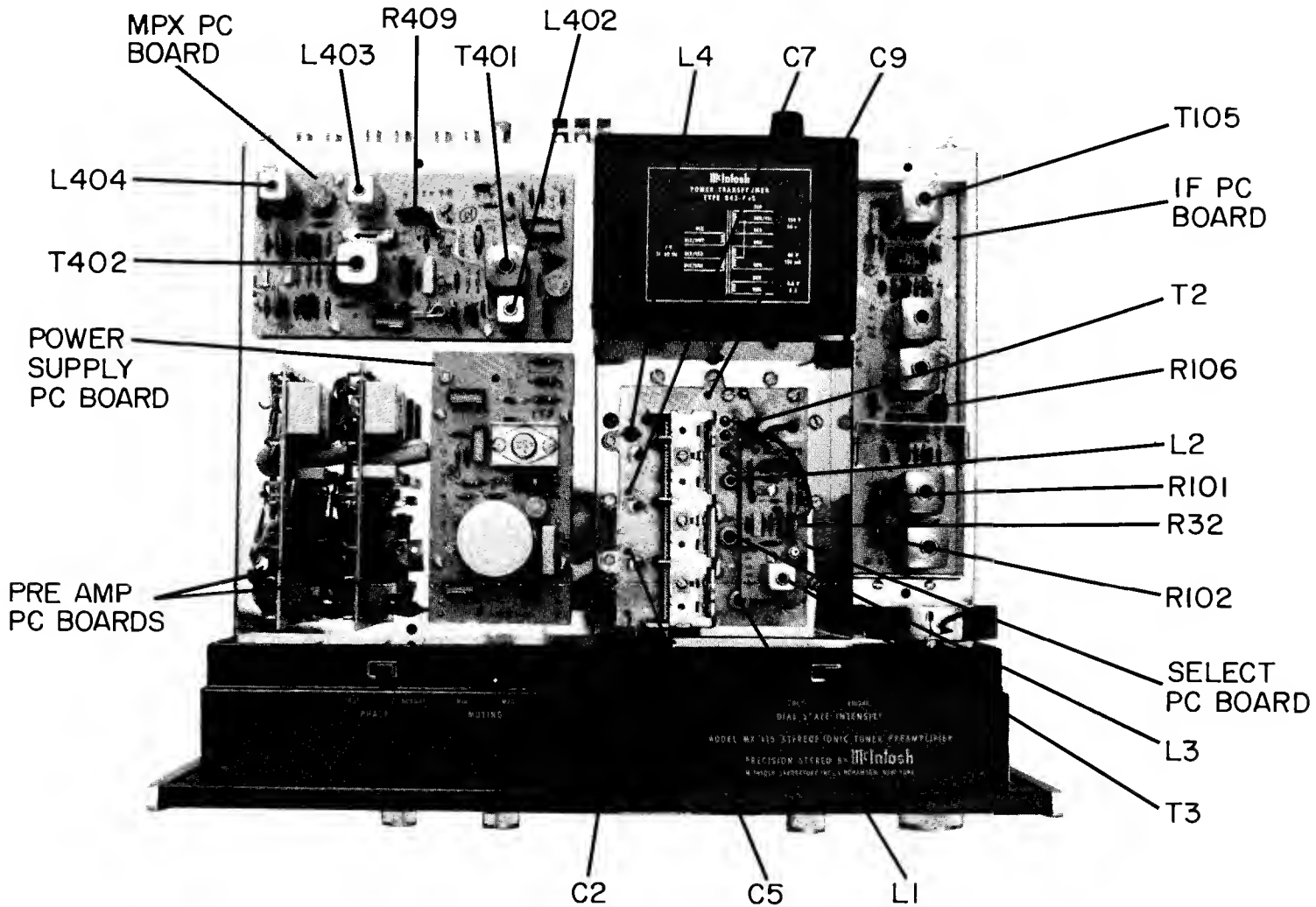
POWER SUPPLY / CENTER CHANNEL SECTION

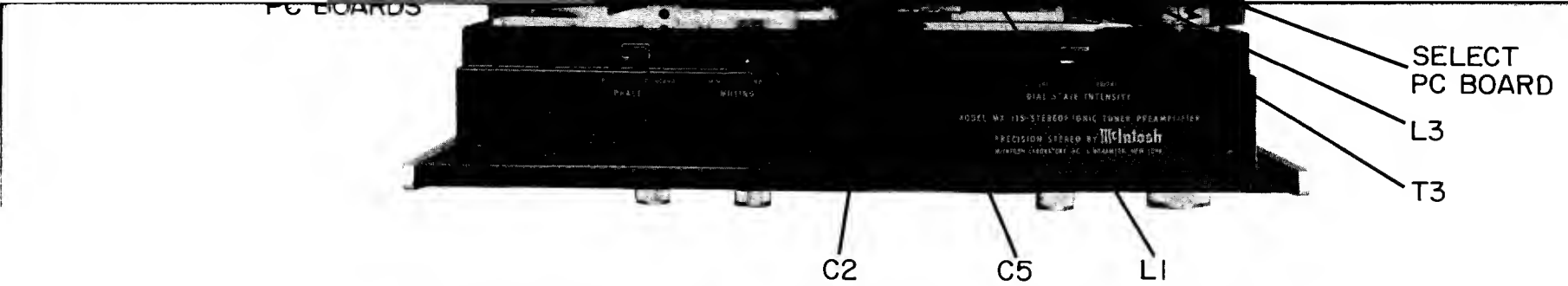
MX 115 154-518

MX 115


L402
T401
L403
L404
T402
T105
T104
T103
L3
T102
T101
L1
L2


L1
L2


MPX PC BOARD
L403
R409
T401
L402
L4
C7
C9
T105
L404
IF PC BOARD
T402
T2
POWER SUPPLY PC BOARD
R106
L2
R101
R32
PRE AMP PC BOARDS
R102
SELECT PC BOARD
L3
T3
C2
C5
L1



MX 115 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 MX 115.

The test equipment listed (or its equivalent) is necessary to properly align an MX 115. 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 607-723-3512).

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 WV98C).
3. Multiplex Generator (Radiometer SMG1) or Sound Technology 1000A.
4. 10.7 MHz FM Sweep Generator (Kay 385 or equivalent). (Not needed if Measurement 275 IF converter is available.)
5. 10.7 MHz Generator (preferably crystal controlled).
6. Oscilloscope (Hewlett-Packard 120B or equivalent).
7. Harmonic Distortion Analyzer (Hewlett-Packard 333A or equivalent).
8. 10.7 MHz ±75 kHz Sweep Marker Generator

FM ALIGNMENT

STEP	TUNER DIAL SETTING	SIGNAL GENERATOR			INDICATOR		ADJUST	TEST LIMITS	REMARKS
		FREQ.	COUPLING	MODULATION	TYPE	CONNECTED TO			
1	Point of no interference.	10.7MHz	Through external .01µF capacitor to Q4 gate.	FM ±200kHz sweep @ 60Hz rate.	Oscilloscope	TP1	Top (Primary) and Bottom (Secondary) of T2.	Maximum height of 10.7MHz marker and best symmetry of 10.7MHz ±75kHz markers.	Selectivity switch must be in the normal position. Turn muting off for alignment tests. Keep signal generator output low to prevent limiting.
							Top (Primary) and Bottom (Secondary) of T3.		Selectivity switch must be in the "select" position. All further test and alignment steps selectivity switch in "normal" position. Adjust R32 for equal height of markers in both positions of "select" switch.
2	Same	Same	Same	Same	Same	Same	Top and Bottom cores of IF filters.	Same	Rimo filters do not have a flat-topped re See typical response curve - Fig. 2. Do not stagger tune.
3	Same	Same	Same	C.W.	VTVM	TP2	Top (sec) core of T105.	Zero DC at TP2.	The linear phase filters as employed in the IF do not have a flat-topped response. See typical response curve - Fig. 2. Do not stagger tune.
4	Same	Same	Same	Same	Same	Pin 6 of T105	Bottom (Pri.) core of T105.	Maximum possible negative voltage.	If a distortion analyzer is available, omit this step. Adjust T105 (Pri.) after Step 6. At that time use a 1mV signal from an FM generator. Modulate 100% @ 400Hz. Adjust primary of T105 for minimum disotrtion. Should be less than 0.3%.
5	105MHz	105MHz	300Ω antenna terminals w/* matching network.	100% @ 400Hz	VTVM connected to TP1 and oscilloscope connected to L or R main output.		Oscillator trimmer C9.	Maximum negative voltage at TP1.	As TP1 voltage increases reduce output of signal generator to keep TP1 voltage as low as possible.
6	90MHz	90MHz	Same	Same	Same		Oscillator coil L4.	Same	Repeat steps 5 & 6 until dial calibration is accurate.
7	105MHz	105MHz	Same	Same	Same		Mixer RF2, RF1 trimmers C7-5-2	Same	Same as step 5.
8	90MHz	90MHz	Same	Same	Same		Mixer RF2, RF1 coils L3-2-1.	Same	Same as step 5. Then repeat steps 7 & 8 until TP1 voltage is as high as possible for the least signal input at both alignment frequencies.
9	Same	Same	Same	Same	VTVM connected to TP1 and a harmonic distortion analyzer to L or R output.				This step is an overall sensitivity check. Reduce input signal to the point where total noise and distortion reads 3% (-30dB). The input signal will then be the usable sensitivity and should be less than 2.5µV.
	Same	Same	Same	Same			R101, 102, 106		With generator output at 200µV, adjust R106 for sensitivity meter reading of 6. With generator output at 100kµV, adjust

9	Same	Same	Same	Same	VTVM connected to TP1 and a harmonic distortion analyzer to L or R output.			This step is an overall sensitivity check. Reduce input signal to the point where total noise and distortion reads 3/ (-30dB). The input signal will then be the usable sensitivity and should be less than 2.5μV.
10	Same	Same	Same	Same		R101,102, 106		With generator output at 200μV, adjust R106 for sensitivity meter reading of 6. With generator output at 100kμV, adjust R101 for full scale of sensitivity meter ("select" switch "Out"). Adjust R102 for full scale of sensitivity meter ("select" switch "In).

MULTIPLEX DECODER ALIGNMENT

STEP	TUNER DIAL SETTING	SIGNAL GENERATOR			INDICATOR		ADJUST	TEST LIMITS	REMARKS
		FREQ.	COUPLING	MODULATION	TYPE	CONNECTED TO			
1	100MHz	100MHz	300Ω antenna terminals w/ approx. 1000 microvolts signal w/* matching network.	75kHz Deviation @ 67kHz	AC-VTVM	L or R output jack.	L403 and L404 (SCA adj.)	Minimum output @ L or R output jack.	Adjust for minimum output with 67kHz modulation.
2	100MHz	100MHz	Same	19kHz stereo pilot.	AC-VTVM or oscilloscope w/very low cap. probe.	T401, Pin 2 or 3.	L402 (19kHz phase adj.) & T401 (19 kHz doubler)	Adjust for maximum AC voltage.	Decrease pilot level, if necessary, so that 19kHz circuits do not limit or saturate.
3	Same	Same	Same	Same	Same	T402, Pin 1 or 2.	T402 (Pri) & bottom (Sec) tuning slugs	Adj. for maximum AC voltage.	Decrease pilot level so that 19kHz and 38kHz circuits do not limit. Mode switch must be in stereo position.
4	Same	Same	Same	1kHz (100% modulation) L or R only, pilot level normal and on.	Same	L or R output jack.	T402, Bottom (Sec.) tuning slug.	35dB separation or more.	Modulate left channel and measure right channel output. Adjust T402 bottom - tuning slug (Sec.) for minimum right channel output (maximum separation). Then, reverse channels and measure left channel separation. For this adjustment and measurement, no test lead should be connected to TP-2.
5	100MHz	100MHz	Same	1kHz (100% modulation) L or R only, pilot on.	AC-VTVM	L or R output jack.		Less than 12mV of residual.	Adjust "FM-Level" control (R409) for 1.2 volts of audio output at fixed output jacks. Then, turn off the modulation and measure the residual of the 19kHz and 38kHz frequencies.

2	100MHz	100MHz	Same	19kHz stereo pilot.	AC-VTVM or oscilloscope w/very low cap. probe.	T401, Pin 2 or 3.	L402 (19kHz phase adj.) & T401 (19 kHz doubler)	Adjust for maximum AC voltage.	Decrease pilot level, if necessary, so that 19kHz circuits do not limit or saturate.
3	Same	Same	Same	Same	Same	T402, Pin 1 or 2.	T402 (Pri) & bottom (Sec) tuning slugs	Adj. for maximum AC voltage.	Decrease pilot level so that 19kHz and 38kHz circuits do not limit. Mode switch must be in stereo position.
4	Same	Same	Same	1kHz (100% modulation) L or R only, pilot level normal and on.	Same	L or R output jack.	T402, Bottom (Sec.) tuning slug.	35dB separation or more.	Modulate left channel and measure right channel output. Adjust T402 bottom - tuning slug (Sec.) for minimum right channel output (maximum separation). Then, reverse channels and measure left channel separation. For this adjustment and measurement, no test lead should be connected to TP#2.
5	100MHz	100MHz	Same	1kHz (100% modulation) L or R only, pilot on.	AC-VTVM	L or R output jack.		Less than 12mV of residual.	Adjust "FM-Level" control (R409) for 1.2 volts of audio output at fixed output jacks. Then, turn off the modulation and measure the residual of the 19kHz and 38kHz frequencies.

Note 1: If signal generator has other than 50 ohm internal impedance, use a resistor of 150 ohms less internal generator impedance.

FIG. 1 ANTENNA MATCHING NETWORK

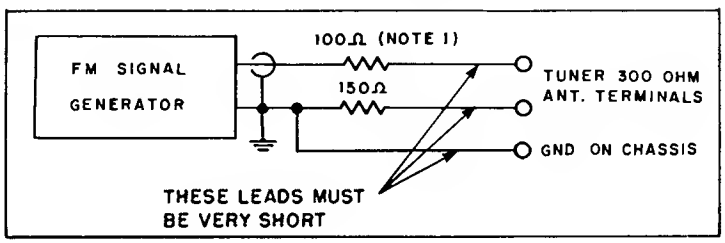
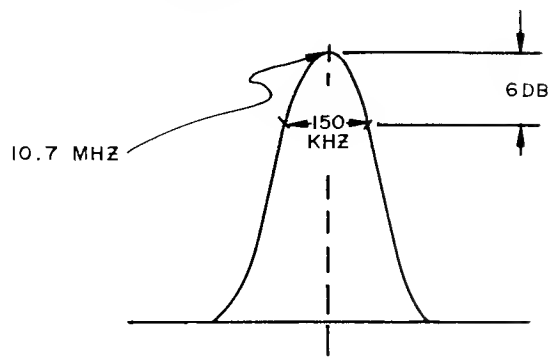


FIG. 2 TYPICAL IF RESPONSE CURVE



REPLACEMENT PARTS

All parts not listed are common items obtainable from radio parts jobbers.

Replacement parts may be obtained when ordered by PART NUMBER from:

McIntosh Laboratory, Inc.
Customer Service Department
2 Chambers Street
Binghamton, New York 13903
(telephone 607-723-3512)

CAPACITORS

Symbol Number	Description			Part Number
C109	Ta. Elect.	22μF	20V	066-148
C202	Mylar	.22μF	250V	064-068
C204	Elect.	200/200μF	100V	066-129
C205,206	Mylar	.22μF	250V	064-068
C207	Mylar	.47μF	250V	064-069
C208,209	Elect.	100μF	16V	066-177
C210	Elect.	50/200/300/150μF 200/150/50/50V		066-128
C301,302	Mylar	.47μF	250V	064-069
C305,306	Ta. Elect.	10μF	20V	066-149
C307,308	Ta. Elect.	10μF	20V	066-149
C315,316	Elect.	100μF	15V	066-127
C317,318	Mylar	.47μF	250V	064-069
C319,320	Mylar	.22μF	200V	064-087
C321,322	Polypropylene	.0068μF		064-103
C323,324	Mylar	.047μF	250V	064-066
C325,326	Mylar	.47μF	250V	064-069
C327	Mylar	.47μF	250V	064-069
C329,330	Mylar	.047μF	250V	064-066
C331,332	Mylar	.022μF	250V	064-065
C337,338	Mylar	.1μF	250V	064-067
C339,340	Mylar	.47μF	250V	064-069
C341,342	Mylar	.047μF	250V	064-066
C343,344	Mylar	.47μF	250V	064-069
C401	Mylar	.22μF	250V	064-068
C405	Elect.	100μF	25V	066-161
C408	Elect.	100μF	25V	066-161
C411	Ta. Elect.	1.0μF	35V	066-147
C415	Mylar	.22μF	250V	064-068

DIODES

D1	Ge. signal diode	070-003
D2,3	Si. diode	070-022
D101,102	Si. diode	070-022
D103,104	Ge. signal diode	070-003
D105,106	Ge. signal diode	070-003
D107,108	Si. diode	070-022
D201	Zener diode 24V	070-049
D202,203	Si. diode	070-031
D205	Si. diode	070-031
D206	Si. diode	070-031
D207	Zener diode 75V	070-025
D402,403	Si. diode	070-022
D404	Si. diode	070-022
D405,406	Ge. signal diode	070-003
D407,408	Ge. signal diode	070-003
D409	Ge. signal diode	070-003

CHOKES & COILS

L1	1st RF coil	122-115
L2	2nd RF coil	122-114
L3	Mixer coil	122-113
L4	Oscillator coil	122-112
L101,102	Choke 75μH	122-013
L401	Choke 1MH	122-092
L402	Filter coil (19kHz)	122-080
L403,404	Filter coil (SCA)	122-079

TRANSISTORS

Q1,2	Si. M.O.S. F.E.T.	132-088
Q3	Si. NPN transistor	132-015
Q4	Si. Junction F.E.T.	132-084
Q5	Si. Junction F.E.T.	132-068
Q6	Si. M.O.S. F.E.T.	132-086
Q201	Si. NPN transistor	132-065
Q202	Si. NPN transistor	132-028
Q203	Si. NPN transistor	132-069
Q301,302	Si. PNP transistor	132-056
Q303,304	Si. PNP transistor	132-056
Q305,306	Si. NPN transistor	132-069
Q307,308	Si. NPN transistor	132-054
Q309,310	Si. PNP transistor	132-056
Q311,312	Si. NPN transistor	132-054
Q313,314	Si. NPN transistor	132-057
Q315,316	Si. NPN transistor	132-042
Q401	Si. NPN transistor	132-057
Q402	Si. NPN transistor	132-090
Q403,404	Si. NPN transistor	132-057
Q405	Si. NPN transistor	132-057
Q406	Si. NPN transistor	132-042

D105,106	Ge. signal diode	070-003
D107,108	Si. diode	070-022
D201	Zener diode 24V	070-049
D202,203	Si. diode	070-031
D205	Si. diode	070-031
D206	Si. diode	070-031
D207	Zener diode 75V	070-025
D402,403	Si. diode	070-022
D404	Si. diode	070-022
D405,406	Ge. signal diode	070-003
D407,408	Ge. signal diode	070-003
D409	Ge. signal diode	070-003
	CHOKES & COILS	
L1	1st RF coil	122-115
L2	2nd RF coil	122-114
L3	Mixer coil	122-113
L4	Oscillator coil	122-112
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L401	Choke 1MH	122-092
L402	Filter coil (19kHz)	122-080
L403,404	Filter coil (SCA)	122-079
	TRANSISTORS	
Q1,2	Si. M.O.S. F.E.T.	132-088
Q3	Si. NPN transistor	132-015
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Q301,302	Si. PNP transistor	132-056
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Q313,314	Si. NPN transistor	132-057
Q315,316	Si. NPN transistor	132-042
Q401	Si. NPN transistor	132-057
Q402	Si. NPN transistor	132-090
Q403,404	Si. NPN transistor	132-057
Q405	Si. NPN transistor	132-057
Q406	Si. NPN transistor	132-042

	FUSES	
F201	Fuse .5A slo-blo	089-020
	POTENTIOMETERS	
R335	Volume control	134-202
R356	Loudness/Balance control	134-236
R377	Bass control	134-203
R378	Treble control	134-203
R407	Muting control	134-216
	RESISTORS	
R219	Wirewound 2Ω 5W	139-005
R220	Wirewound 2.7Ω 1W	139-002
R225	Wirewound 2Ω 5W	139-005
	SWITCHES	
S301	Input selector switch	146-130
S302	Mode selector switch	150-004
S304	Loudness/Balance control	134-236
	TRANSFORMERS	
T1	Balun	043-226
T2	FM IF transformer	162-059
T3	FM IF transformer	162-042
T101	FM IF filter input	162-053
T102	FM IF filter output	162-052
T103	FM IF filter input	162-053
T104	FM IF filter output	162-052
T105	FM discriminator	162-036
T201	Power transformer	043-865
T401	FM RF transformer (19kHz)	162-031
T402	FM RF transformer (38kHz)	162-039
	MODULES	
	Tone control module	130-027
	LDR network	144-013
	METERS	
M101	Tuning meter	124-005
	INTEGRATED CIRCUIT	
IC101,102	Integrated circuit	133-002
	FILTERS	
FN1	FM filter	180-009
	LAMPS	
	#1847 (Meter)	058-008
	#1866 (Front Panel)	058-014

#1828 (MPX)	058-027
Festoon lamp	058-032

FRONT PANEL & TRIM

Front panel	044-297
Front panel end caps	018-120
Volume knob	043-253
Input selector knob	043-253
Tuning knob	043-272
Bass knob (rear)	090-009
Bass knob (front)	043-625
Treble knob (rear)	090-009
Treble knob (front)	043-625
Loudness knob	043-625
Balance knob	090-009
Level set knob	090-010

MOUNTING SYSTEM

Shelf bracket (right)	043-622
Shelf bracket (left)	043-623
Mounting template #100	038-179
Hardware package	043-446

MISCELLANEOUS ITEMS

Plastic feet	017-041
Tuning shaft	021-067
Shipping carton	044-365
Push terminal (antenna)	074-032
Owners manual	038-528
Dial cord	044-226
Dial pointer	043-876
Shorting plug	127-021
AC line cord	170-021
FM dipole antenna	170-033
Fuseholder	178-001
Dial glass	044-366