



**SERVICE MANUAL
FOR
MODEL 2560 CASSEIVER**

Audio Section

EQUIPMENT NEEDED

Audio Oscillator
VTVM
Oscilloscope
Triplett VOM or Equivalent
Load
Attenuator
Distortion Meter
Variac
AC Supply Fixture
12 Volt Supply DC

Set Controls to the Following:

Balance Pot	Flat "O"
Input Selector	Phono
Tone Controls	Flat "O"
Loudness	Min.
Speaker Switch	ON
Power Switch	OFF
Tape Switch	Normal

Preliminary Visual Inspection and Continuity Checks

Inspect unit for defects such as broken wafers, loose stand-up resistors, cracked terminals and jacks, loose transformer bolts, and other such defects.

1. Voltage Checks

Check power supply +17 to 19 volts.

2. Sensitivity Check

Audio osc. to TAPE IN, tape switch to MONITOR at 0.25 (+2 dB) input. Connect 8 ohm load to main speaker taps. Turn loudness pot to max., observe output of 2 watts (5 V). Check tape output jack with troubleshooting lead for same output as signal.

3. Distortion Check

Distortion at 3V output, 1.5% max.

4. Speaker Switch and Phone Jack Check

Speaker switch to OFF pos. Note complete loss of signal. Loudness to min. Insert phone plug into phone jack, remove speaker leads and connect to phone plug. Loudness to max. Note drop of 26 ± 2 dB.

5. Loudness Volume

Adjust attenuator for 0 dB on 1 volt range.

Osc. to 1000 Hz, vol. pot to 4 flat. Switch osc. to 100 Hz; note rise of 7 ± 2 dB. Switch osc. to 10 kHz; note reading of 0 ± 2 dB.

6. Tracking

In TEN dB steps check tracking of volume pot in L & R channels. Output may be no more than 3 dB between channels down to -40 dB.

7. Crosstalk

Left channel at 1 kHz, full output 4 V. Turn Bal. pot to "L", note no drop in output. Bal. pot to "R", note 45 dB drop in output. With input and output in Right channel, no drop in "R" pos. and 45 dB drop in "L" pos. of pot.

Attenuate to obtain 0 dB on 1 volt scale.

8. Tone Controls

100 Hz	10 kHz
Bass	Treble
Boost – 10 dB \pm 2 dB	Boost – 10 \pm 2 dB
Cut – 10 dB \pm 2 dB	Cut – 14 \pm 2 dB

9. Frequency Response Check

With output 0 dB on 1 volt range, sweep osc. from 100 Hz to 10 kHz. Note no more than 2 db variation in output.

Low	3 dB pt. 100 Hz or lower
High	3 dB pt. 10 kHz or higher

10. Regulation Check

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

11. Preamp Gain Check @ 1 kHz

Attenuate input 36 dB, input leads to phono. Output 0 dB 1 V range \pm 2 dB.

12. Preamp Frequency Response Check

1 kHz	0 dB (ref)
10 kHz	-13 \pm 2 dB
100 Hz	+13 \pm 2 dB

13. Hum Checks

Position	Loudness Pot	Max Hum
Tape In	10	5 mV
Tape In	0	5 mV
Phono (Inputs shorted)	10	30 mV

14. Repeat Steps 2 through 13 for Right Channel..

AM SECTION

Pre-Test

1. Switch tuner to AM position, output from tape output jack.
2. Couple signal generator at 455 kHz to AM section of IF. Clip ground lead to chassis.
3. Peak IF's and detector for max, audio noise output, using no modulation. Final peaking should be done with 20 μ V from generator with output level of 100 mV \pm 2 dB.

Final Test

4. Remove signal generator coupling to IF's, connect generator to loop antenna cold side. The cold side of loop is closest to input jacks.

Calibration

5. Tune oscillator coil to 600 kHz and oscillator trimmer to 1600 kHz.

Sensitivity

6. Tune RF trimmer at 1400 kHz with a very weak signal for a peak. Be sure antenna leads are depressed properly.
7. Repeat Step 5 until unit is aligned and max. output at given frequencies has been achieved. Final calibration tracking check:

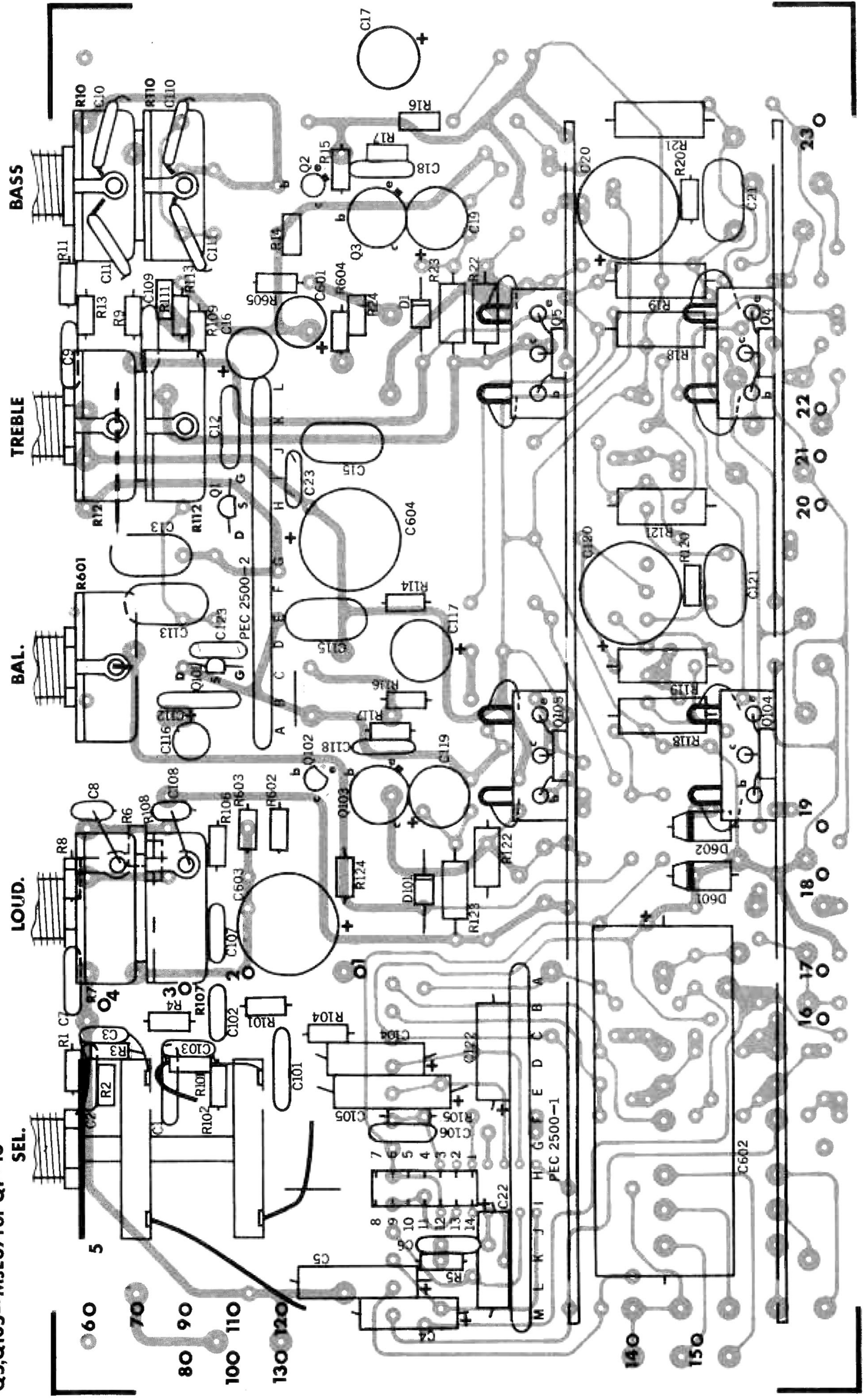
590 kHz \pm 10 kHz 850 kHz \pm 20 kHz 1030 \pm 20 kHz 1510 (tol. \pm 20 kHz)

8. With 10 μ V minus 2 dB input attenuation, output should be .25 to .40 @ 600 kHz and 1400 kHz.
9. With phones, check for AM calibration, oscillation, harmonic pickup, etc.

All output measurements are taken at 60% modulation.

TONE CONTROL - PRE-AMP

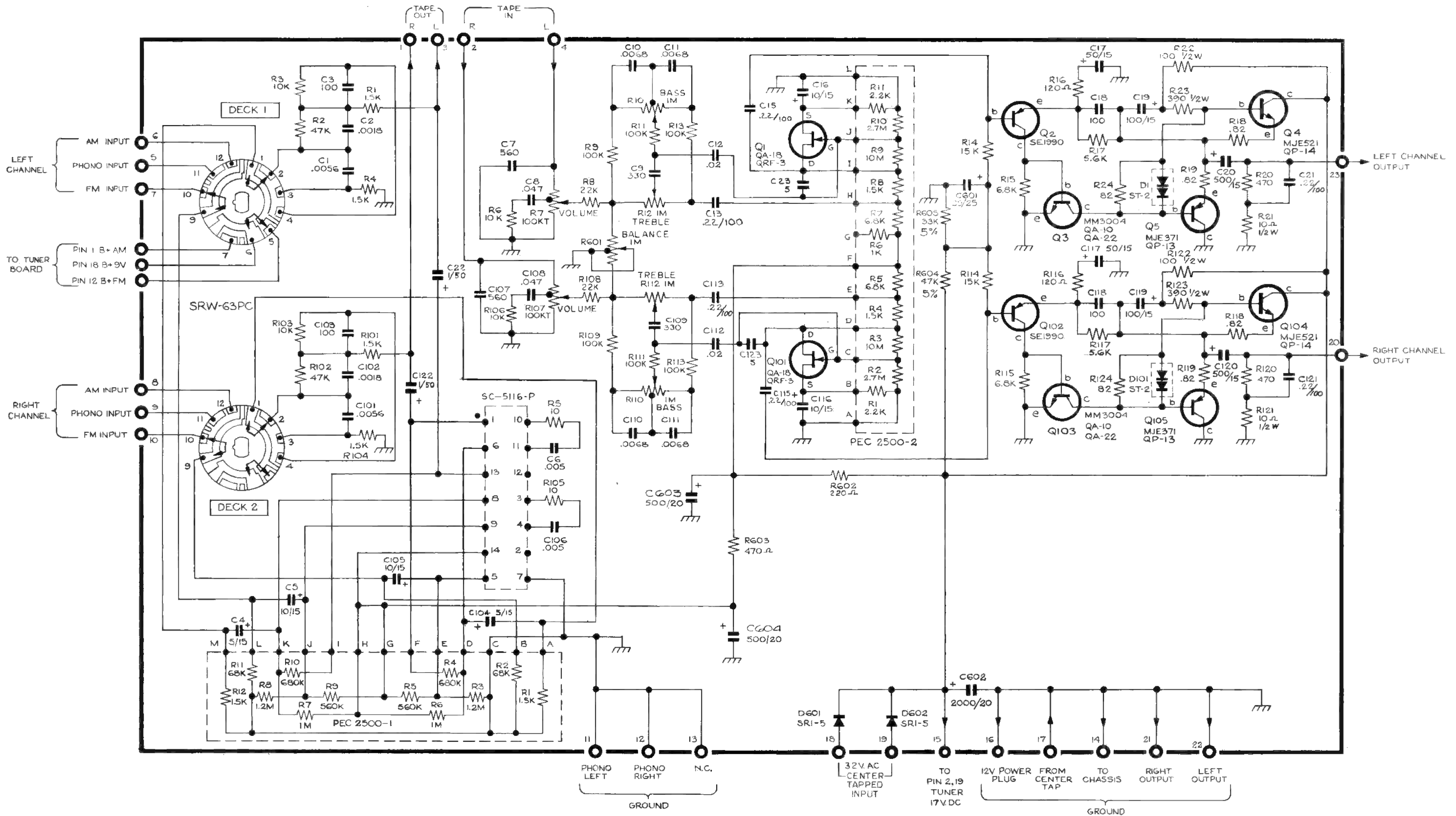
- Q1, Q101 - QA-18 or QRF-3
- Q2, Q102 - SE1990
- Q3, Q103 - MM3004, QA-10 or QA-22
- Q4, Q104 - MJE521 or QP-14
- Q5, Q105 - MJE371 or QP-13



TONE CONTROL PRE AMP

Z-PC-TP-2

TONE CONTROL-PRE-AMP



NOTES:

1. UNLESS OTHERWISE SPECIFIED: ALL RESISTANCE IN OHMS $\pm 10\%$, CAPACITANCE IN MFD'S, RESISTORS $\frac{1}{4}$ WATT, AND VOLTS ARE D.C. $\pm 15\%$ MEASURED WITH $20K\Omega/V.V.O.M.$

2. ARROWS—HEADS INDICATE MAIN SIGNAL PATH.

HIGHEST SERIES NO'S.

R24	R124	C23	C123
Q5	Q105	D1	D101
R605	C604		

FM SECTION

EQUIPMENT NEEDED

VTVM, Oscilloscope, VOM, Distortion Meter, FM Generator (or source),
MX Generator (or source), Audio Generator (or source).

Set Controls to the Following:

Input Select. Switch FM

PRELIMINARY CHECKS

Make certain all transistors are firmly seated in correct sockets. Take output from tape-out jacks. Turn unit on, check voltage at Regulator; should measure $+10 \pm 1$ V, and $17 \text{ V} \pm 2$ V for stereo light supply.

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 bottom slug for max. audio and top slug for min. distortion.

2. Sensitivity and Distortion

For sensitivity check, an electronic 19 kHz and 38 kHz filter may be used. Measure sensitivity of tuner with 7 uV RF input. Must obtain 30 dB usable sensitivity at 92 and 106 MHz. Recheck distortion, 1K uV input. 400 Hz – max. distortion of 0.8%. Audio output spec. at 1K, 0.5 to 1.0 volts.

De-Emphasis Check

Tune to 90 MHz (modulation of 8.2 kHz), note decrease of 12 ± 2 dB in output.

Calibration Check

Check calibration against stations – max. tolerance 200 kHz.

3. FM Multiplex Alignment

With a composite stereo signal from generator or source connected to the unit, the multiplex alignment will be as follows:

4. 67 kHz Alignment

Using an RF signal modulated with 67 kHz, note output taken directly from the multiplex (either pin located adjacent to the PEC 312). With signal applied, adjust the LV015 (67 kHz trap) for lowest possible reading on VTVM.

5. 19 kHz and 38 kHz Alignment

With a low capacity scope probe connected to the base of Q2 (first QA15), adjust first pilot can (next to AM det. can) for max. output. After the first pilot can has been adjusted, move scope probe to the base of Q1 (SE1990) and adjust the second pilot can (directly behind AM section of front end) for max. output. The 38 kHz alignment can be done with the scope probe at any of the four demodulator diodes surrounding the TRV.038tt can. Peak the 38 kHz can for max. output as was done to the others.

Separation has been preset by a resistor divider; therefore, the spec. is:

Separation	400 Hz	20 dB min. without filter
		25 dB min. with filter

Any difference in channels greater than 3 dB can be brought within spec. by detuning one of the pilot cans slightly, thereby equalizing the separation.

6. Listening Check

Check unit for ac short, calibration, oscillations and hum.

AM - FM STEREO TUNER

Q1-QA-16

Q2-S1990-2N2964-2N4249

Q3, Q4-QA-15

Q5-QA-10

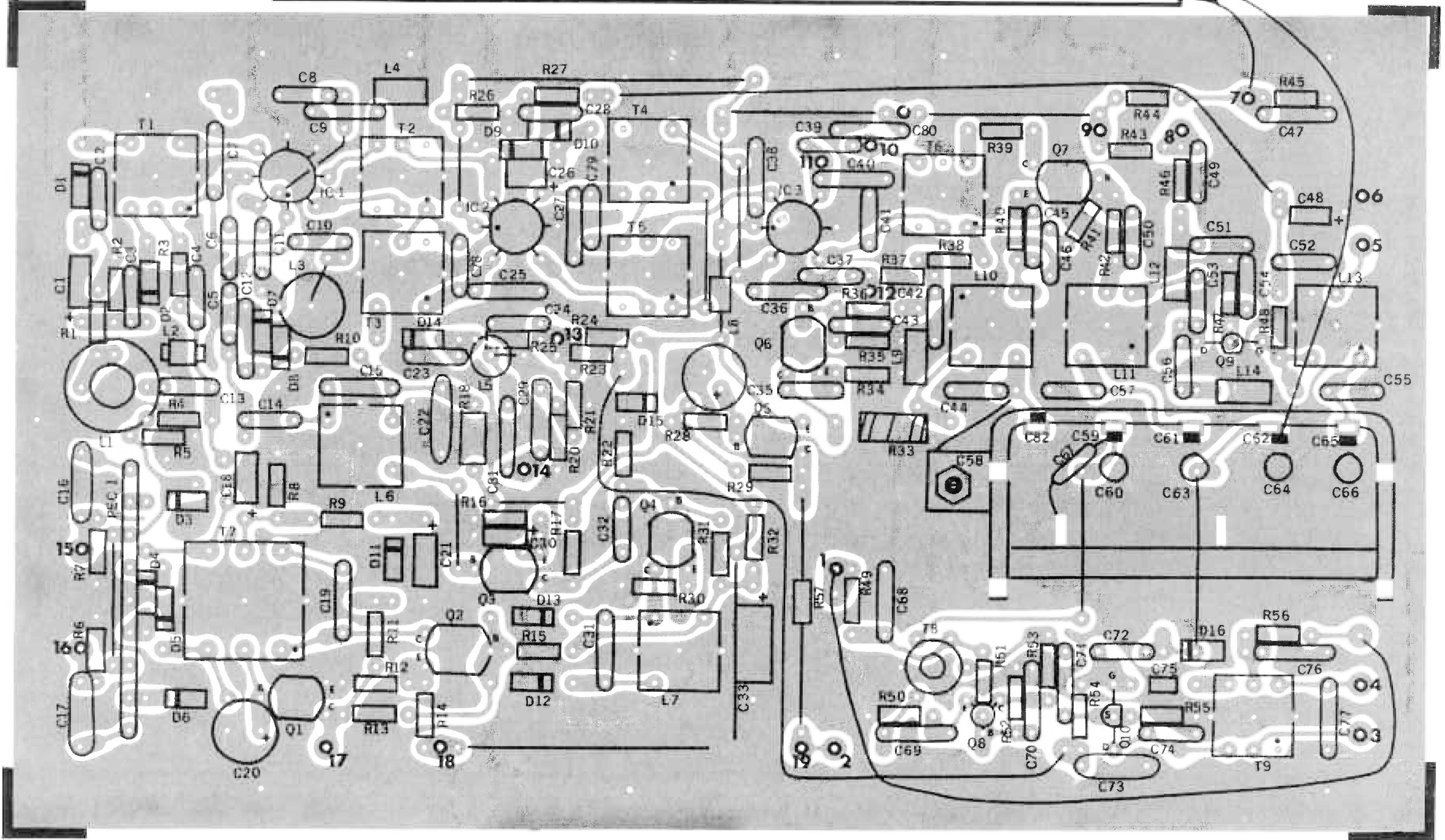
Q6, Q7, Q8-QRF-2

Q9, Q10-QRF-3

IC1-QMA719

IC2, IC3-QMA703

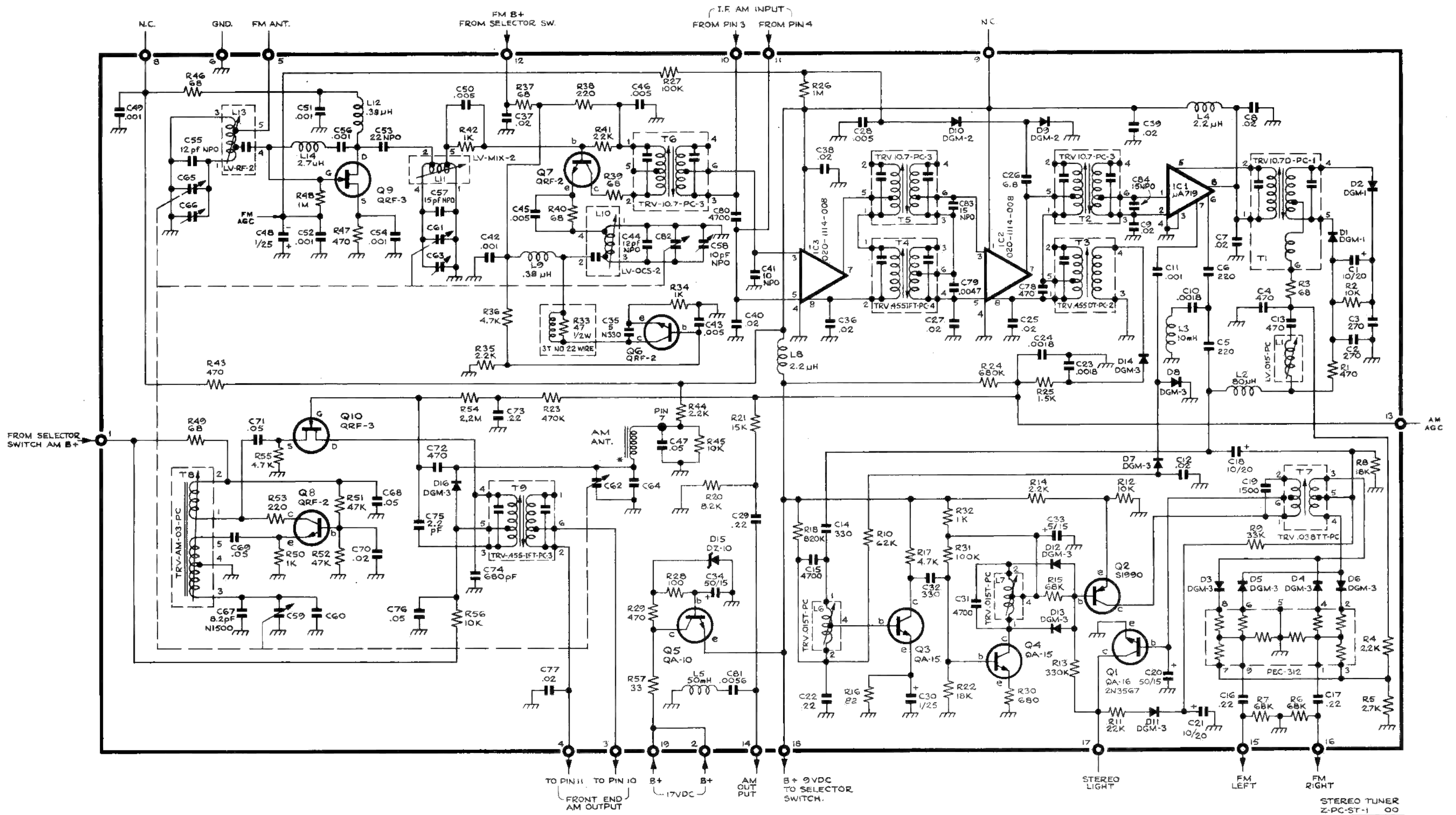
ANT-AM-12



AM/FM STEREO TUNER

PC-160

AM - FM STEREO TUNER



NOTES:
 1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCE IN OHMS $\pm 10\%$, CAPACITANCE IN MFD'S, RESISTORS $\frac{1}{4}$ WATT, AND VOLTS ARE D.C. $\pm 15\%$ MEASURED WITH 20K Ω /V.V.O.M.
 2. ARROWS - HEADS INDICATE MAIN SIGNAL PATH.
 3. mH = MILLI-HENRIES μ H = MICRO-HENRIES.

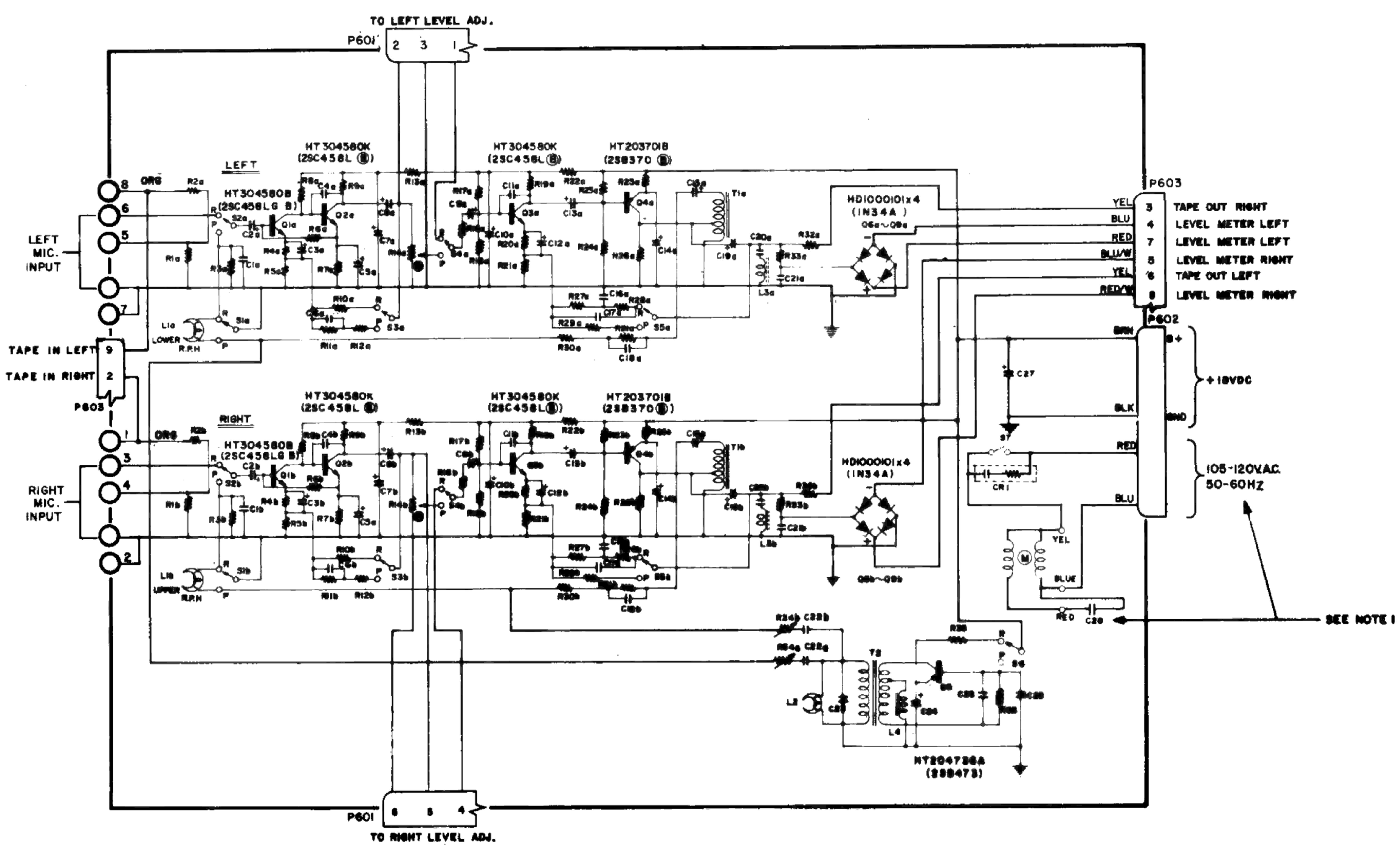
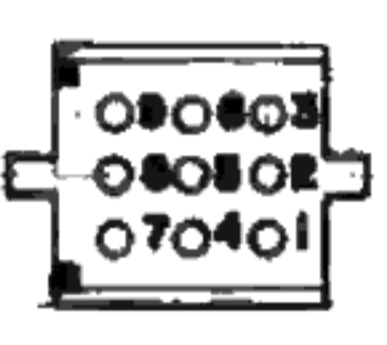
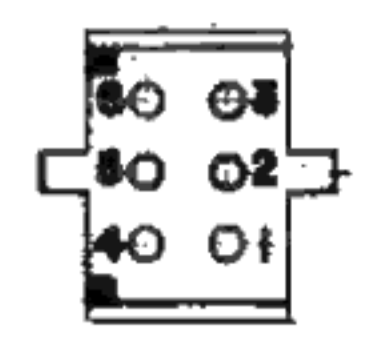
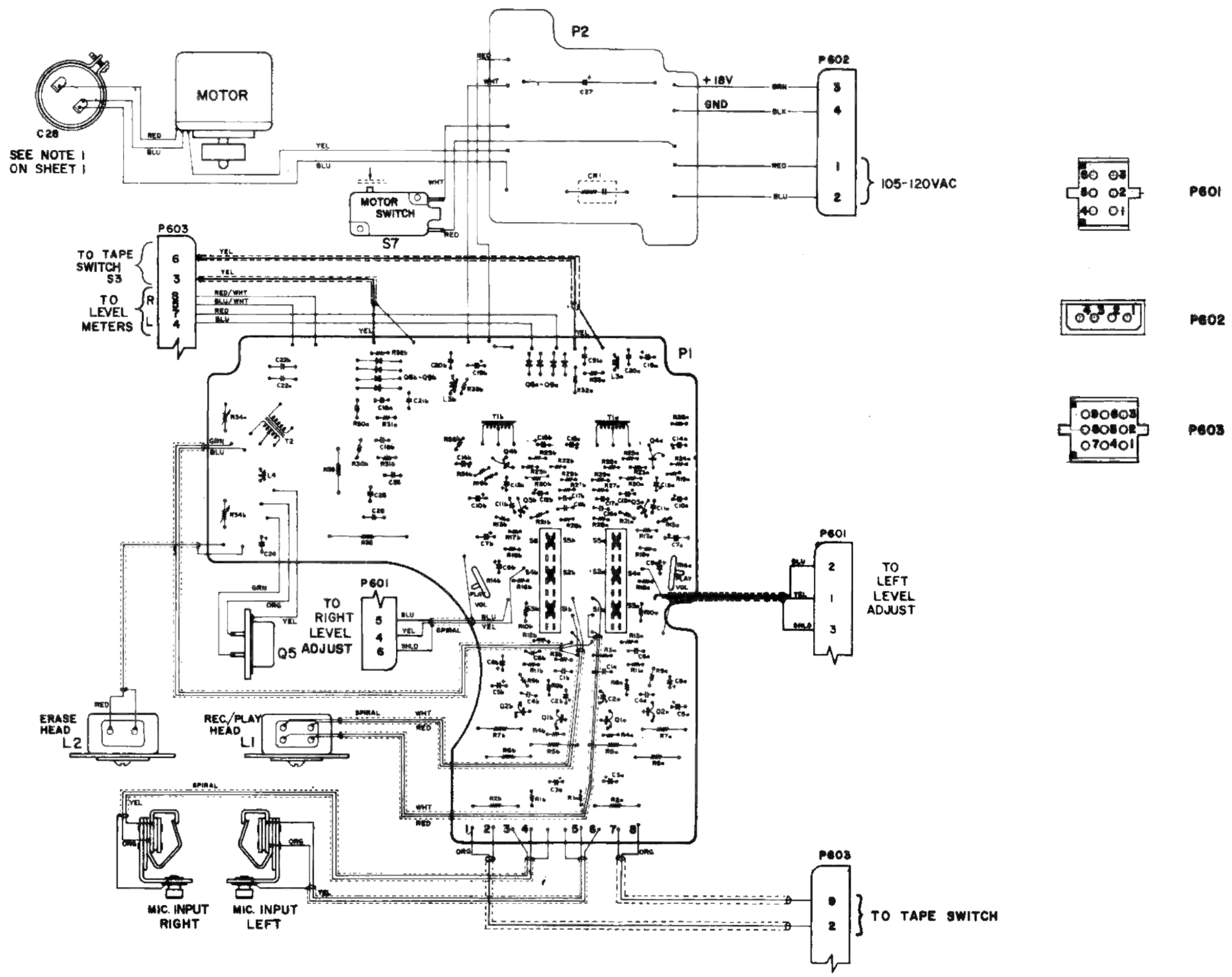
CASSETTE RECORDER

FINAL LISTEN CHECK

1. Check dc supply to cassette at 82 ohm resistor for 16 to 18 V dc.
2. Depress UP button and insert blank cassette tape into carriage. Close carriage and prepare to record.
3. Both level controls should be at full CCW position and tape counter at "000" position.
4. Tape pushbutton on front pannel at NORMAL, turn on receiver and go to FM position.
5. Select a strong FM station, preferably stereo, and depress the RECORD and PLAY simultaneously. Set the record level by putting the receiver in MONO and advance both level controls on the tape deck until peaks in the music just reach the red in both level meters. Return Stereo-Mono switch to STEREO and continue to record in stereo. After a short passage has been recorded, press stop button and rewind tape to start of recording as shown by the tape counter.
6. Push the tape switch in and depress the PLAY button on the cassette and listen to the passage just recorded.
7. While listening to recorded passages be *very* critical of:
 1. Excessive background hiss
 2. Recorded hum
 3. Pauses in the recording (drop out)
8. If there seems to be any "drop-outs"-hum or hiss- the tape you are using could be at fault and not the recorder, so another short recording might be necessary on a different station and also at another place on the tape. After a short second recording, if the fault still remains, question it. The recorder could be at fault.

FUNCTION CHECK

1. Check mechanical action of all pushbuttons on tape deck and make sure no mechanical hesitations are present.
2. Check Fast Forward and Rewind for good operation while running a tape.
3. While playing the recorder, depressing any button should not harm the unit nor harm or break the tape.



NOTES:

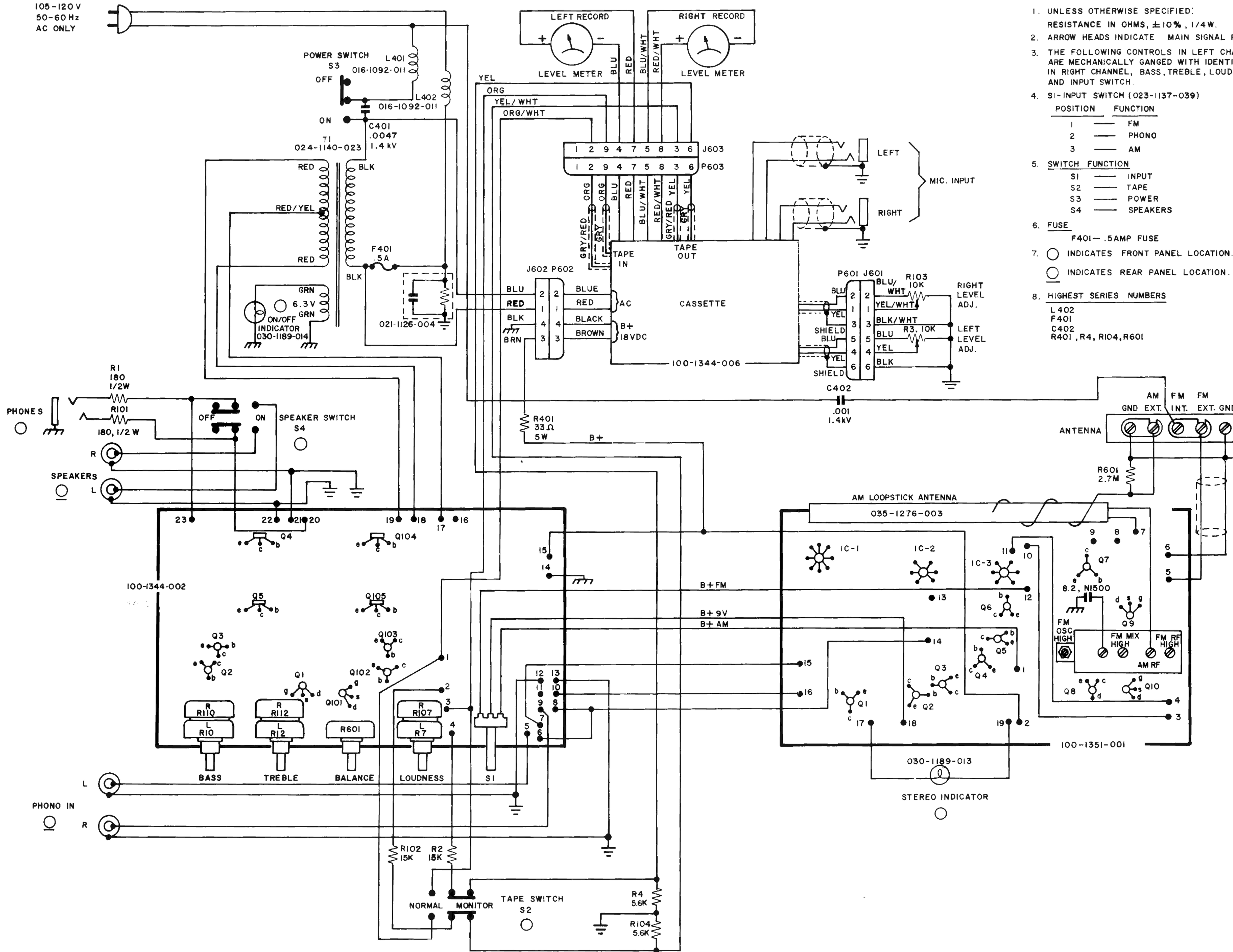
1. FOR 50HZ OPERATION ADD 0.1UF 600WV CAPACITOR, H.H.SCOTT INC. PART NO. 011-1008-021, ACROSS C28 CAP. ALSO CHANGE MOTOR PULLY TO H.H.SCOTT INC. PART NO. 031-1203-006.

2. S1 THRU S6 ARE MECHANICALLY GANGED.

SYMBOL	PART NUMBER	DESCRIPTION	SYMBOL	PART NUMBER	DESCRIPTION
C1 ab	DF1722201	2000P MYLAR	C26	DK1710301	0.01μ CERAMIC
C2 ab	EA4750161	5μ15V ELECTROLY	C27	ED3370251	300μF25V ELECTROLY
C3 ab	EA1070061	100μ6V ELECTROLY	C28	DG1660450	0.6μ 250V MP
C4 ab	DD1620101	200P CERAMIC			
C5 ab	EA1070061	100μ6V ELECTROLY			
C6 ab	DF1733301	0.03μ MYLAR			
C7 ab	EA1070161	100μ15V ELECTROLY			
C8 ab	EA4750161	5μ15V ELECTROLY	T1 ab	TO1240601	OUTPUT TRANSF.
C9 ab	EA4750161	5μ15V ELECTROLY	T2	TC1018003	O.S.C. TRANSF.
C10 ab	EA1070161	100μ15V ELECTROLY			
C11 ab	DD2511101	110P CERAMIC			
C12 ab	EA1070061	100μ6V ELECTROLY			
C13 ab	EA4750161	5μ15V ELECTROLY	IND. ab	IM1102407	LEVEL METER
C14 ab	EA1070101	100μ10V ELECTROLY	M	MI0117006	A.C. METER
C15 ab	EA4750161	5μ15V ELECTROLY	S1a)S5a	SS0602019	SLIDE SWITCH
C16 ab	DF1722301	0.02μ MYLAR	S1b)S6	SS0602020	SLIDE SWITCH
C17 ab	DD1650101	500P CERAMIC	S7	SC0101009	MICRO SWITCH
C18 ab	DF6550101	500P POLYSTYRENE			
C19 ab	EA3360061	30μ6V ELECTROLY			
C20 ab	DF1710301	0.01μ MYLAR			
C21 ab	DF1722301	0.02μ MYLAR			
C22 ab	DF6528150	280P POLYSTYRENE			
C23	DF1610350	0.01μ200WV MYLAR			
C24	EA1070161	100μ15V ELECTROLY			
C25	DF6532201	3200P POLYSTYRENE			
R1 ab	RT1022114	220Ω 1/4W 10%	R26 ab	RT1010214	1KΩ 1/4W 10%
R2 ab	RT1010414	100KΩ "	R27 ab	RT1022214	2.2KΩ "
R3 ab	RT1015314	15KΩ "	R28 ab	RT1027214	2.7KΩ "
R4 ab	RT1018214	1.8KΩ "	R29 ab	RT1047214	4.7KΩ "
R5 ab	RT1068014	68Ω "	R30 ab	RT1010314	10KΩ "
R6 ab	RT1082314	82KΩ "	R31 ab	RT1056314	56KΩ "
R7 ab	RT1018214	1.8KΩ "	R32 ab	RT1056214	5.6KΩ "
R8 ab	RT1010414	100KΩ "	R33 ab	RT1082114	820Ω "
R9 ab	RT1010314	10KΩ "	R34 ab	RA0154001	150KΩ (B)
R10 ab	RT1015314	15KΩ "	R35	RT1075001	75Ω 1W 10%
R11 ab	RT1082314	82KΩ "	R36	RT1027314	27KΩ 1/4W ±10%
R12 ab	RT1039214	3.9KΩ "			
R13 ab	RT1047214	4.7KΩ "			
R14 ab	RA0503003	50KΩ (B) 20%			
R15 ab	RK0103009	10KΩ (A) 20%			
R16 ab	RT1056214	5.6KΩ 1/4W 10%	CRI	BF1040001	0.1μF +120Ω
R17 ab	RT1033314	33KΩ "			
R18 ab	RT1022314	22KΩ "			
R19 ab	RT1056214	5.6KΩ "			
R20 ab	RT1047214	4.7KΩ "	L1 ab	LH4265102	REC/PLAY STEREOHEAD
R21 ab	RT1050014	50Ω "	L2	LH3100016	ERASE HEAD
R22 ab	RT1015214	1.5KΩ "	L3 ab	LC1474003	CHOKE COIL 470μH
R23 ab	RT1082214	8.2KΩ "	L4	LC1103001	CHOKE COIL 10μH
R24 ab	RT1010314	10KΩ "			
R25 ab	RT1068114	680Ω "			

COMPLETE SCHEMATIC

105-120 V
50-60 Hz
AC ONLY



NOTES

- UNLESS OTHERWISE SPECIFIED:
RESISTANCE IN OHMS, $\pm 10\%$, 1/4 W.
- ARROW HEADS INDICATE MAIN SIGNAL PATH
- THE FOLLOWING CONTROLS IN LEFT CHANNEL ARE MECHANICALLY GANGED WITH IDENTICAL CONTROLS IN RIGHT CHANNEL, BASS, TREBLE, LOUDNESS, AND INPUT SWITCH.
- SI-INPUT SWITCH (023-1137-039)

POSITION	FUNCTION
1	FM
2	PHONO
3	AM
- SWITCH FUNCTION

S1	INPUT
S2	TAPE
S3	POWER
S4	SPEAKERS
- FUSE
F401— .5AMP FUSE
- INDICATES FRONT PANEL LOCATION.
INDICATES REAR PANEL LOCATION.
- HIGHEST SERIES NUMBERS
L402
F401
C402
R401, R4, R104, R601

VOLTAGES

UNLESS OTHERWISE SPECIFIED:
ALL VOLTAGES POSITIVE DC $\pm 15\%$ MEASURED WITH 20,000 Ω /VOLT VOM +117VAC LINE 300 Ω LOAD ON EXTERNAL ANTENNA TERMINALS TUNER OFF STATION AND INPUT SWITCH IN "FM" POSITION.
* VOLTAGES MEASURED UNDER SAME CONDITIONS AS ABOVE ONLY MODE SWITCH IN "STEREO" POSITION WITH STEREO SIGNAL FED INTO TUNER.
** VOLTAGES MEASURED WITH INPUT SWITCH IN "AM" POSITION AND NO SIGNAL.

	e		b		c	
	*	**	*	**	*	**
Q1	0	0	0	.4	18.0	.3
Q2	7.5	6.2	8.0	4.8	0	.7
Q3	0	0	.4	.4	8.4	1.75
Q4	.3	.3	.7	.7	8.0	8.0
Q5	8.7		9.3		18.0	
Q6	2.3		2.3		8.4	
Q7	.1		.35		8.0	
Q8	0	2.9	0	3.2	0	7.9

	GATE		DRAIN		SOURCE	
	*	**	*	**	*	**
Q9	0	0	7.3	7.3	1.1	1.1
Q10	0	0	0	5.8	0	1.9

	e		b		c	
	*	**	*	**	*	**
IC-1	8.5	4.5	7.5	8.6	0	1.5
IC-2, IC-3	8.5	8.2	1.5	0	1.5	8.2

	GATE		DRAIN		SOURCE	
	*	**	*	**	*	**
Q1, Q101	0	0	8.5	2.0		
Q2, Q102	8.2	5.6		.6		
Q3, Q103	0	.6		8.6		
Q4, Q104	9.4	9.9		18.0		
Q5, Q105	9.2	8.6		0		

AGC VOLTAGE TERMINALS B-V AND 9+V
-.5 TO -1.2V WITH 1000 JUV SIGNAL FED TO EXTERNAL ANTENNA TERMINALS AND INPUT SWITCH IN "FM" POSITION.