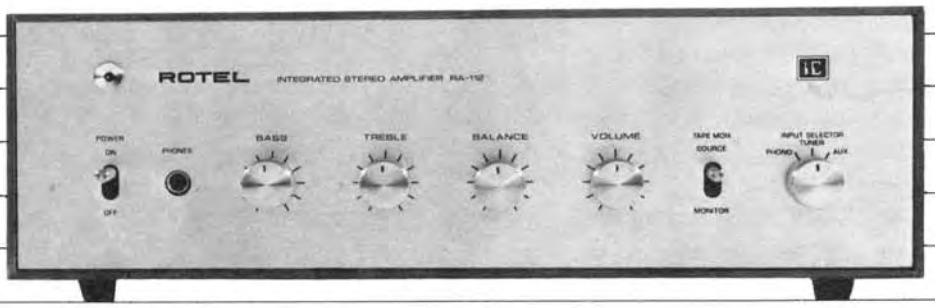
ROTEL®

RX-102 RA-112

AM/FM STEREO RECEIVER **STEREO PRE/MAIN AMPLIFIER**



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34. S4, Tape Monitor Switch
35. Antenna Terminal
36. Main Speaker Terminal
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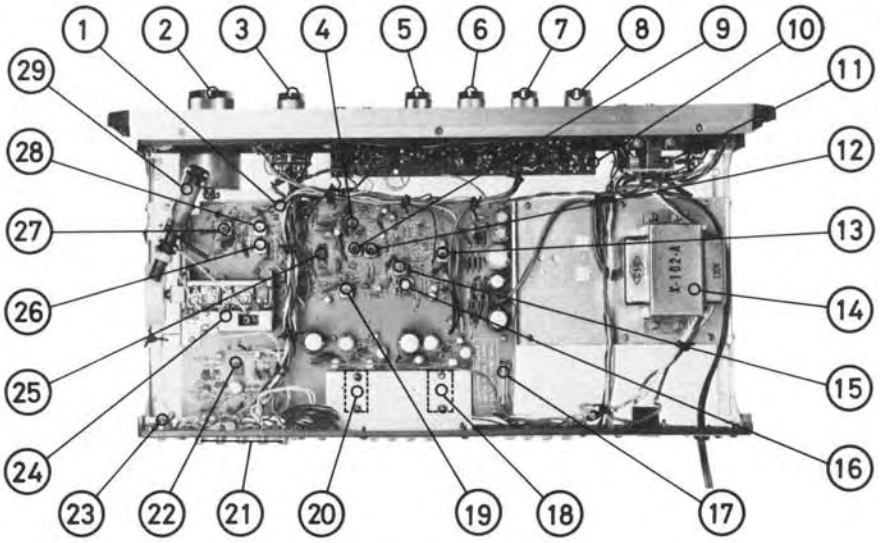
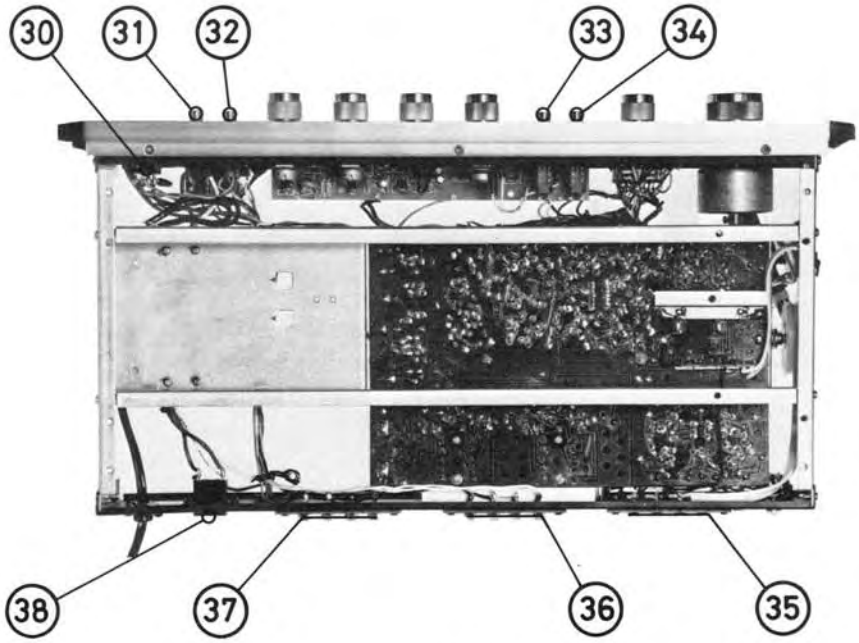


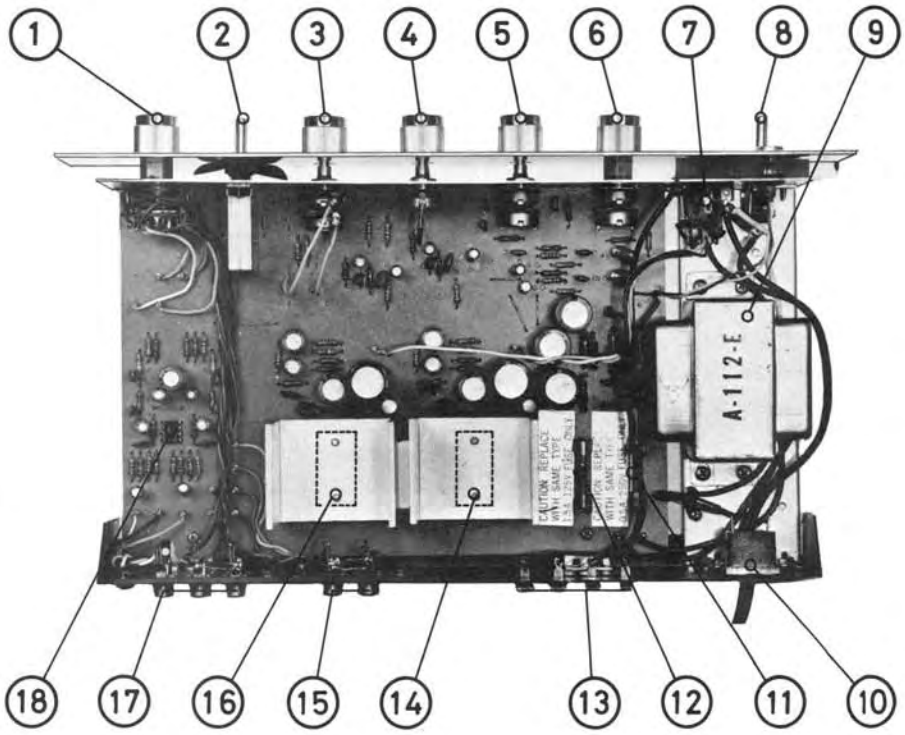
TOP VIEW



BOTTOM VIEW

MODEL RA-112 CHASSIS LAYOUT

1. S1, Function Selector
2. S2, Tape Monitor Switch
3. Volume Control
4. Balance Control
5. Treble Control
6. Bass Control
7. Headphone Jack
8. S3, Power Switch
9. T001, Power Transformer
10. AC Outlet
11. F901, AC Fuse
12. F601, DC Fuse
13. Speaker Terminal
14. IC601, Power Amp. IC, L-ch.
15. Tape Monitor Terminal
16. IC602, Power Amp. IC, R-ch.
17. Input Terminal
18. IC401, Phono Amp. IC



PRECAUTIONS

1. Always disconnect the chassis from the power line when soldering. Turning the power switch is not enough. Power line leakage passing through the heating element may destroy the IC's.
2. Never attempt to do any work on the IC amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.

RX-102 AM IF & RF ALIGNMENT PROCEDURE

Instruments: AM Signal Generator, AC VTVM and Oscilloscope.
Set Function Selector Switch to AM position.
Set VR101 (on IF Board) to mid-position before starting this procedure.
NOTE: Input signal must be kept as low as possible to avoid AVC action.

Step	Generator		Tuning Dial Setting	Output Indicator Connected to	Adjust	Adjust for
	Coupling	Frequency				
1	Q102 Base (on IF board ... Pin No. 8) Through a 0.01 mfd. capacitor.	455kHz (400Hz 30% Mod.)	Non interfering at low end of scale.	AC VTVM to TAPE OUT jack (L-ch. or R-ch.)	L102, 103 and 104	Maximum reading on VTVM.
2	Loop Antenna	600kHz (400Hz 30% Mod.)	600kHz		L101 (OSC) and L001 (ANT) Coil	
3		1400kHz (400Hz 30% Mod.)	1400kHz		CT5 (OSC) and CT4 (ANT) (on Front end) Trimmer	
4	Repeat steps 2 and 3 until no further improvement is noticed.					
5	Same as above step 2: Adjust Signal Generator output so that input level of AM Antenna terminal comes to 100 μV/m.	1000kHz (400Hz 30% Mod.)	1000kHz	Same as above Step 1.	VR101	Same as above Step 1.

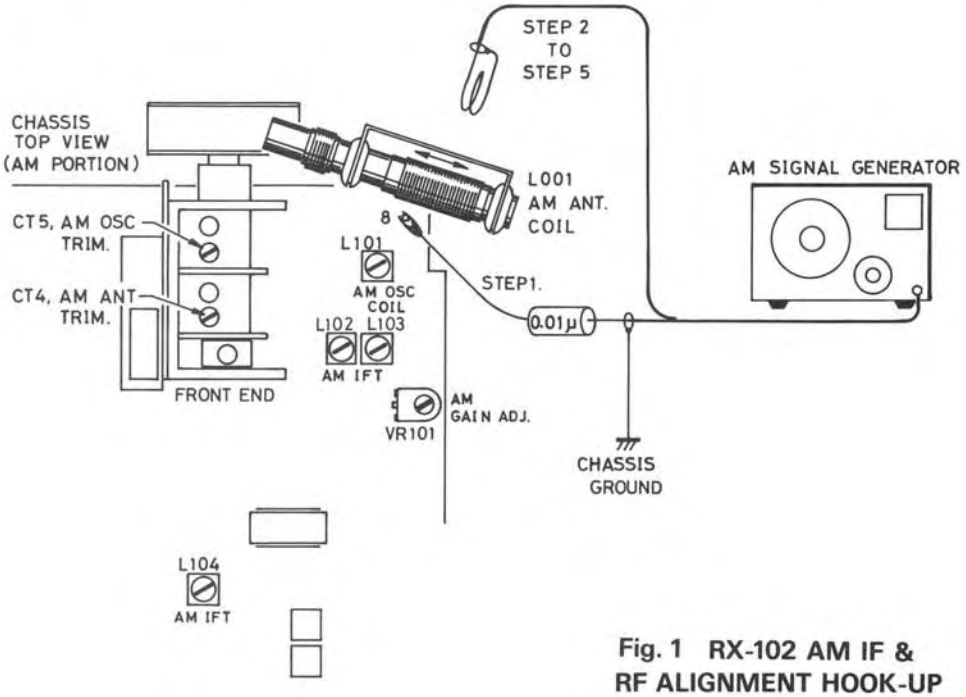


Fig. 1 RX-102 AM IF & RF ALIGNMENT HOOK-UP

RX-102 FM IF & RF ALIGNMENT PROCEDURE

Instruments: FM Signal Generator and H.D. Analyzer

- Set Function Selector Switch to "FM" position.
- Connect FM Signal Generator to FM antenna terminals.
- Connect H.D. Analyzer to Tape Out jack.

A. FM IF Alignment

1. Set Signal Generator frequency at 98 MHz (400 Hz, 100% Mod.) and tune the receiver to maximum output point. (The antenna terminal voltage should be 1 mV).
2. Adjust FM IFT L106 and T1 (on Front-end) to obtain maximum reading on Level Meter of H.D. Analyzer.
3. Adjust FM IFT, L105 to obtain minimum reading on Distortion Meter of H.D. Analyzer.

B. FM RF Alignment

1. Set Signal Generator Frequency at 106 MHz and also the receiver at 106 MHz on the dial scale. Then adjust FM OSC trimmer CT3 (on Front-end) to obtain maximum reading on Level Meter.
2. Set the receiver at 90 MHz on the dial scale, and change the frequency of Signal Generator so that the output of the receiver becomes maximum. Then make sure Signal Generator frequency stays within 90 MHz ± 150 kHz.
3. Sensitivity on this alignment must be attempted at 106 MHz by adjusting CT1 and CT2 (on Front-end) to obtain maximum reading on Level Meter, and fine adjust to balance sensitivity at 90 MHz and 106 MHz.

Caution: Bandpass Filters (X101 and X102) incorporated in FM IF circuit are classified into 5 divisions according to their center frequencies. It is thus necessary to use the same frequency division in case of exchanging the Bandpass Filters. Divisions of bandpass frequencies are indicated by colored dots as shown in the following chart.

COLOR	CENTER FREQ.	TOLERANCE
Red	10.70MHz	±30KHz
Blue	10.67MHz	±30KHz
Orange	10.73MHz	±30KHz
Black	10.64MHz	±30KHz
White	10.76MHz	±30KHz

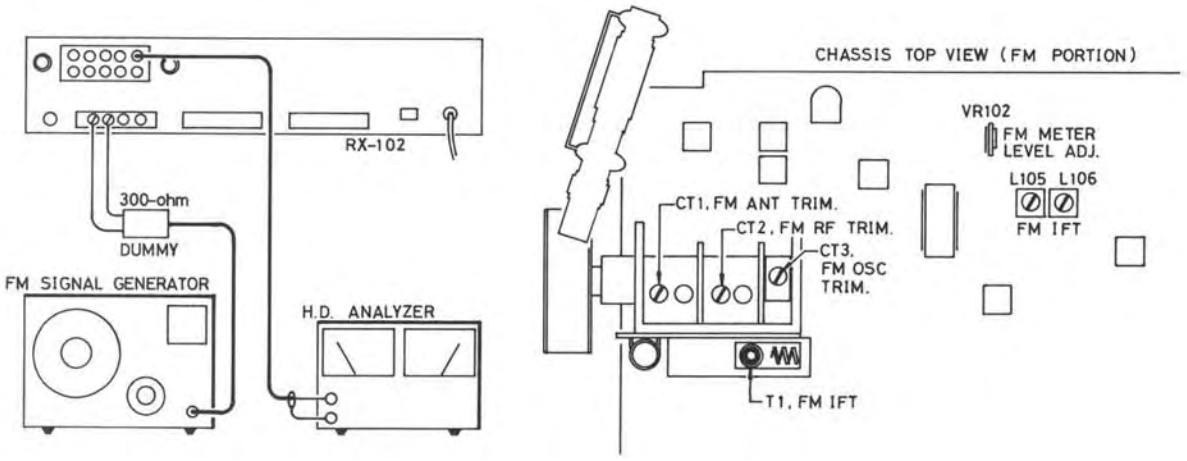


Fig. 2 RX-102 FM IF & RF ALIGNMENT HOOK-UP

RX-102 FM MPX ALIGNMENT PROCEDURE

NOTE: The FM IF Alignment must be completed before attempting this FM–MPX Alignment.
Poor IF alignment will result in poor FM–MPX Alignment.

Set Function Selector Switch to FM STEREO.

Connect FM Stereo Generator to FM antenna terminals.

Set Potentiometer VR301 (on MPX board) to mid-position before starting this procedure.

Step	Stereo Generator		Output Indicator Connected to	Adjust	Adjust for
	Modulation	RF Deviation			
1	19kHz Pilot only	1 – 2%	VTVM & Oscilloscope to Test Point	L302, L303	Maximum reading on VTVM.
2	Composite 1kHz signal to Left channel only.	Pilot 10% Signal 70%	VTVM & Oscilloscope to Left channel Tape Out	L302	Maximum and undistorted sine wave on scope.
3	Composite 1kHz signal to Right channel only			VR301	Minimum reading on VTVM.
4	Same as in Step 2		VTVM & Oscilloscope to Right channel Tape out		
5	Repeat steps 3 and 4 until no further improvement is noticed.				

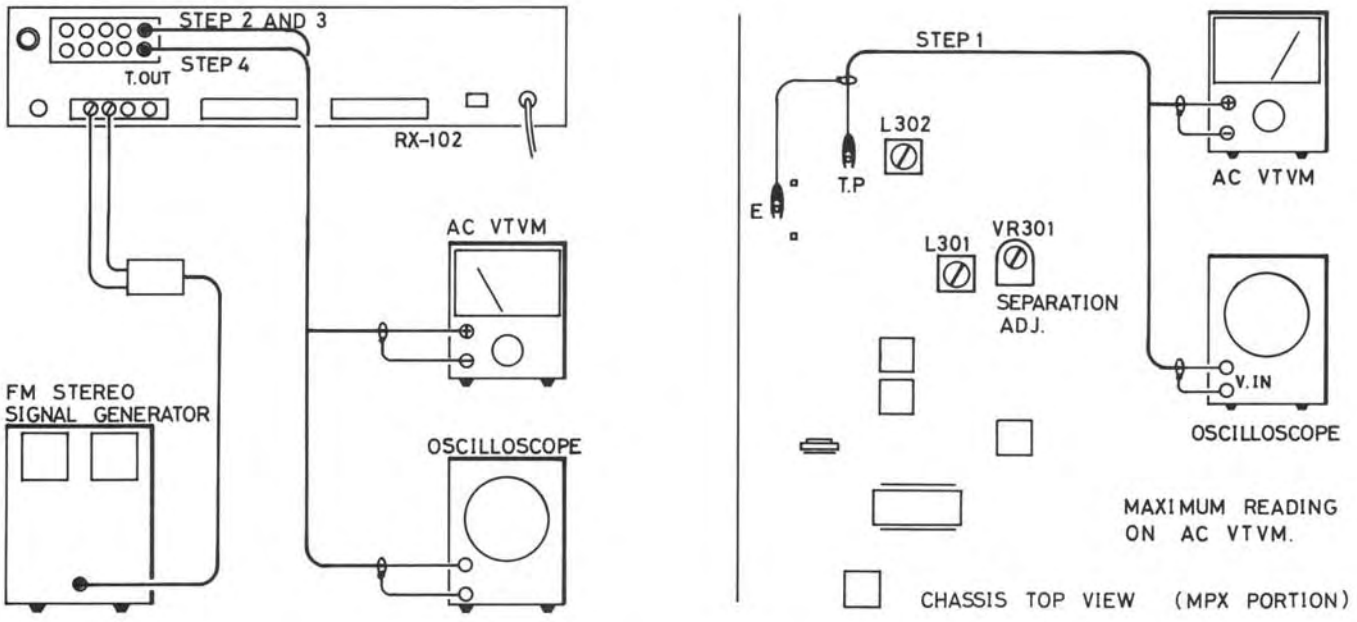


Fig. 3 RX-102 FM MPX ALIGNMENT PROCEDURE

RX-102, RA-112 TROUBLE SHOOTING GUIDE

I. Unit Inoperative.

A. Pilot lamp does not illuminate. – Check AC fuse.

1. If AC fuse is blown –
   a. Rectifier D901, 902, 903 or 904, may be shorted,
   b. Capacitor C903 (C904 in model RX-102) may be shorted, or
   c. Primary or secondary winding of transformer may be shorted.
2. If AC fuse is normal – Check voltage between (+) and (–) terminals on C903 (C904 in model RX-102).
   a. If no voltage across –
      1) Primary or secondary winding of transformer has broken, or
      2) Power switch may be faulty.

B. Pilot lamp illuminates. – Check DC fuse.

1. If DC fuse is blown –
   a. IC601 or 602 may be faulty, or
   b. Output circuit (including speaker system) may be shorted.

II. Hum and/or Noise

A. Hum and/or noise produced with VOLUME CONTROL set at Minimum.

1. Transistor Q501 or 502 may be faulty, or
2. Capacitor C501 or 505 (C502 or 513 for right channel) may be faulty.
   (C503 or 505/C511 or 513 for right channel/in model RX-102).
3. Resistor R507 or 509 (R508 or 510 for right channel) may be faulty.
   (R506 or 507/R518 or 519 for right channel/in model RX-102).

B. Hum and/or noise produced only in PHONO –

1. IC401 may be faulty, or
2. Capacitor C401 or 411 (C402 or 412 for right channel) may be faulty.
   (C402 or 408/C401 or 415 for right channel/in model RX-102).
3. Resistor R405 or 417 (R406 or 418 for right channel) may be faulty.
   (R405 or 406/R416 or 417 for right channel/in model RX-102).

Note: When power IC has been replaced, if the maximum output is then lower than that of specification (peak or base of wave is clipped before attaining the rated output), change the bias resistance value as follows:

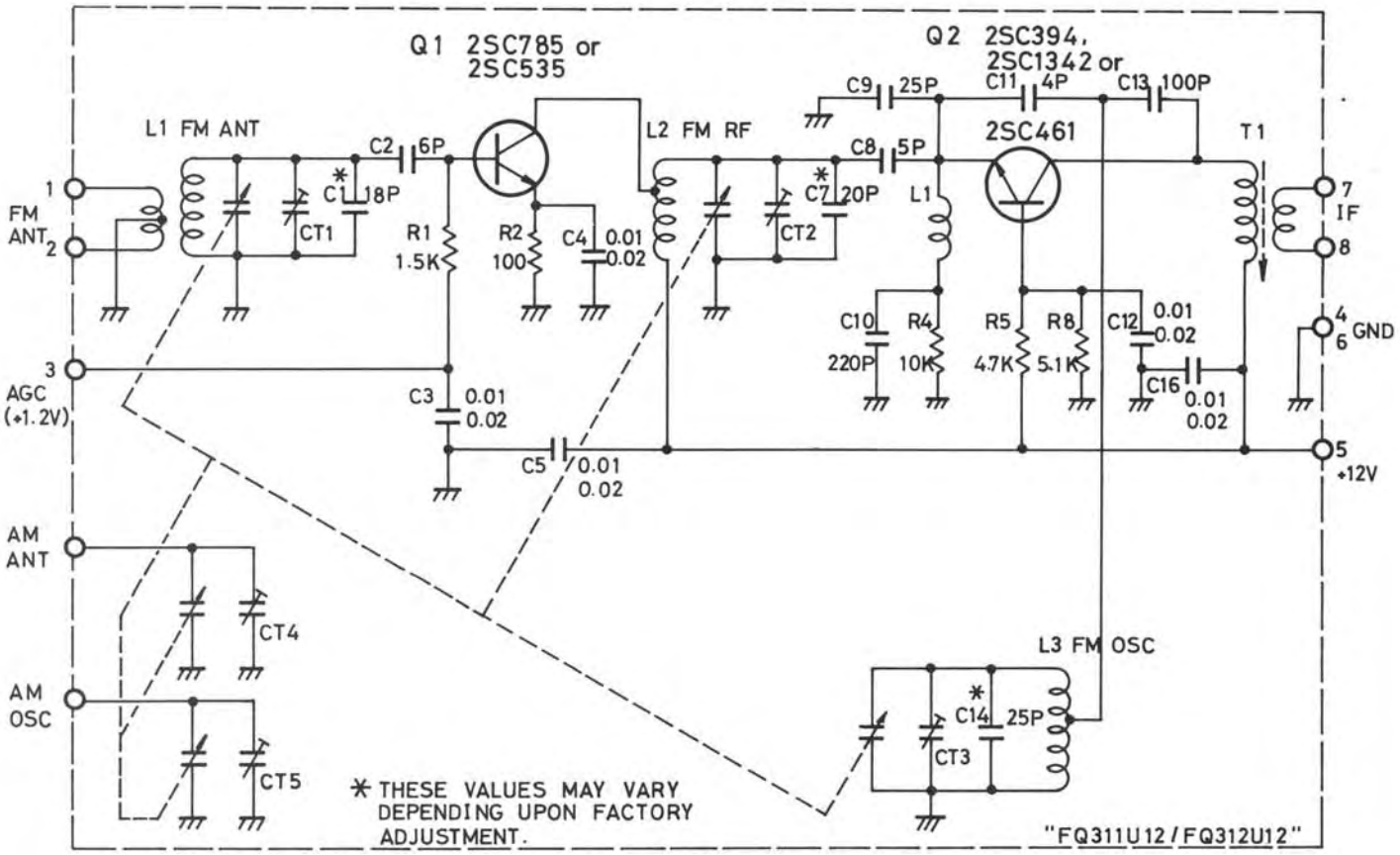
a. If peak of wave is clipped first,
   Change bias resistor 22KΩ (R603 or 604 in model RA-112 and R602 or 609 in model RX-102) to that of 23K–24KΩ.
b. If base of wave is clipped first,
   Use bias resistor 18KΩ instead of 22KΩ.
   If potentiometer is used as bias resistor, adjust it to meet the specification.

Note: 1. In model RA-112 with serial No. T40827 or higher, 50KB potentiometers VR601 and VR602 are employed in place of R603 and R604 respectively.

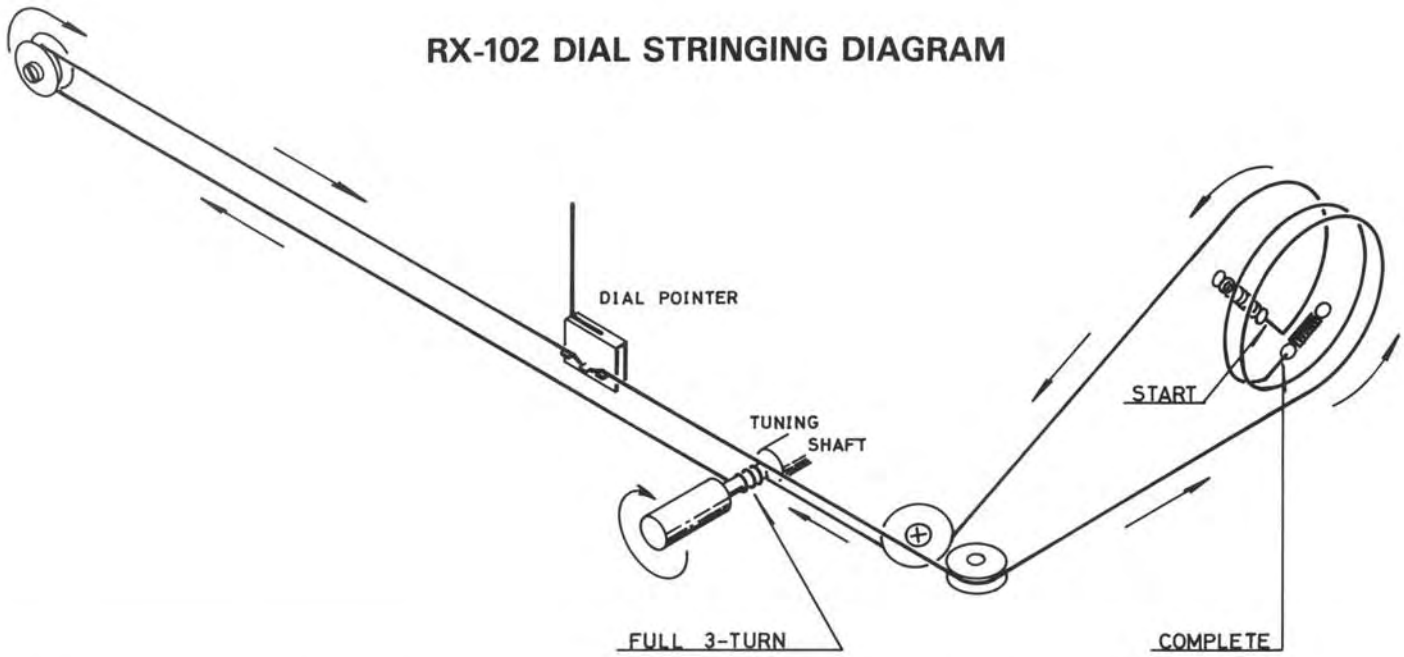
2. In model RX-102 with serial No. T38952 or higher, 50KB potentiometers VR601 and VR602 are employed in place of R602 and R609 respectively.

   This change, however, is not applicable to models that carry serial No. T86171 through T87602.

RX-102 FRONTEND SCHEMATIC DIAGRAM



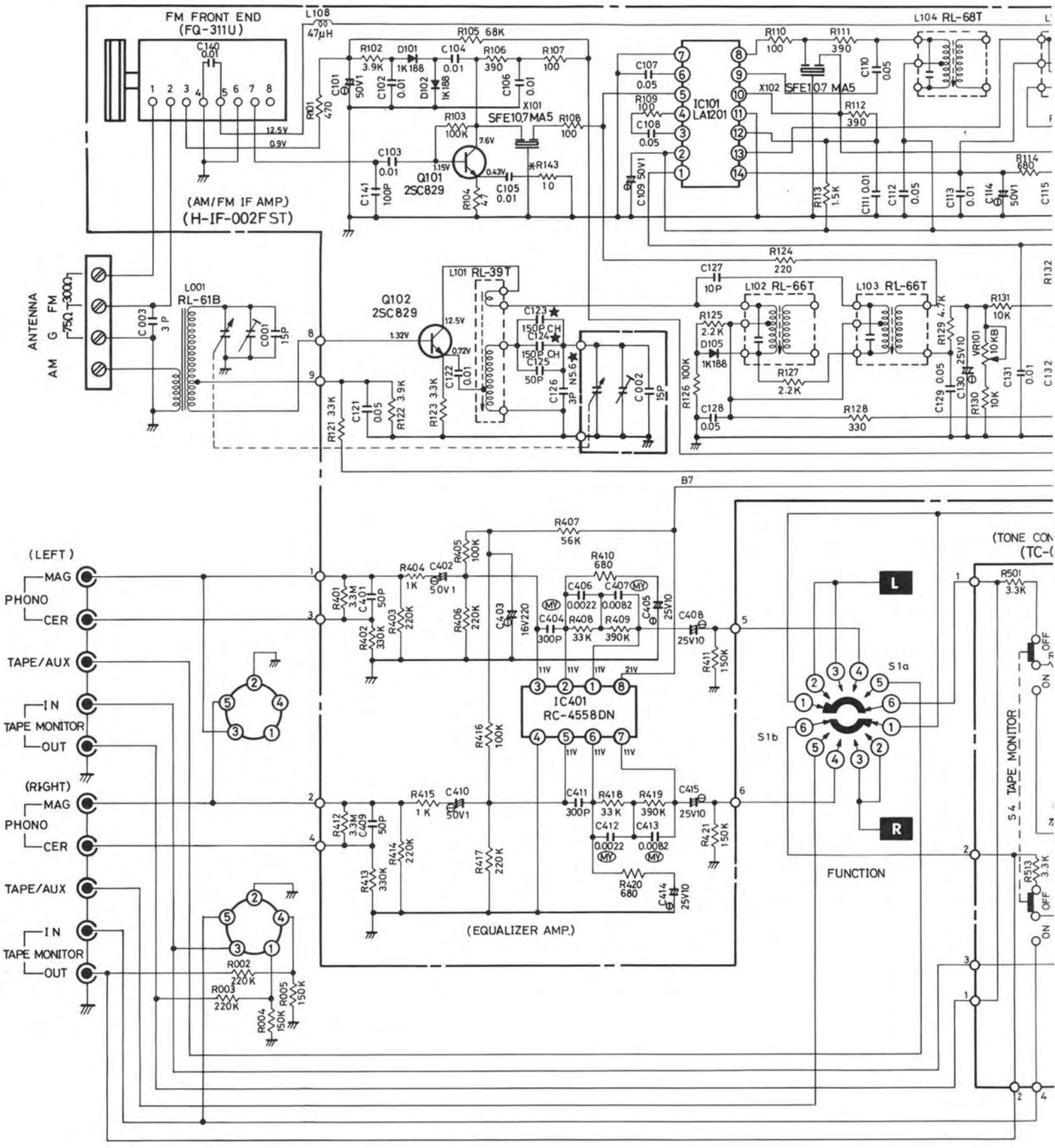
RX-102 DIAL STRINGING DIAGRAM

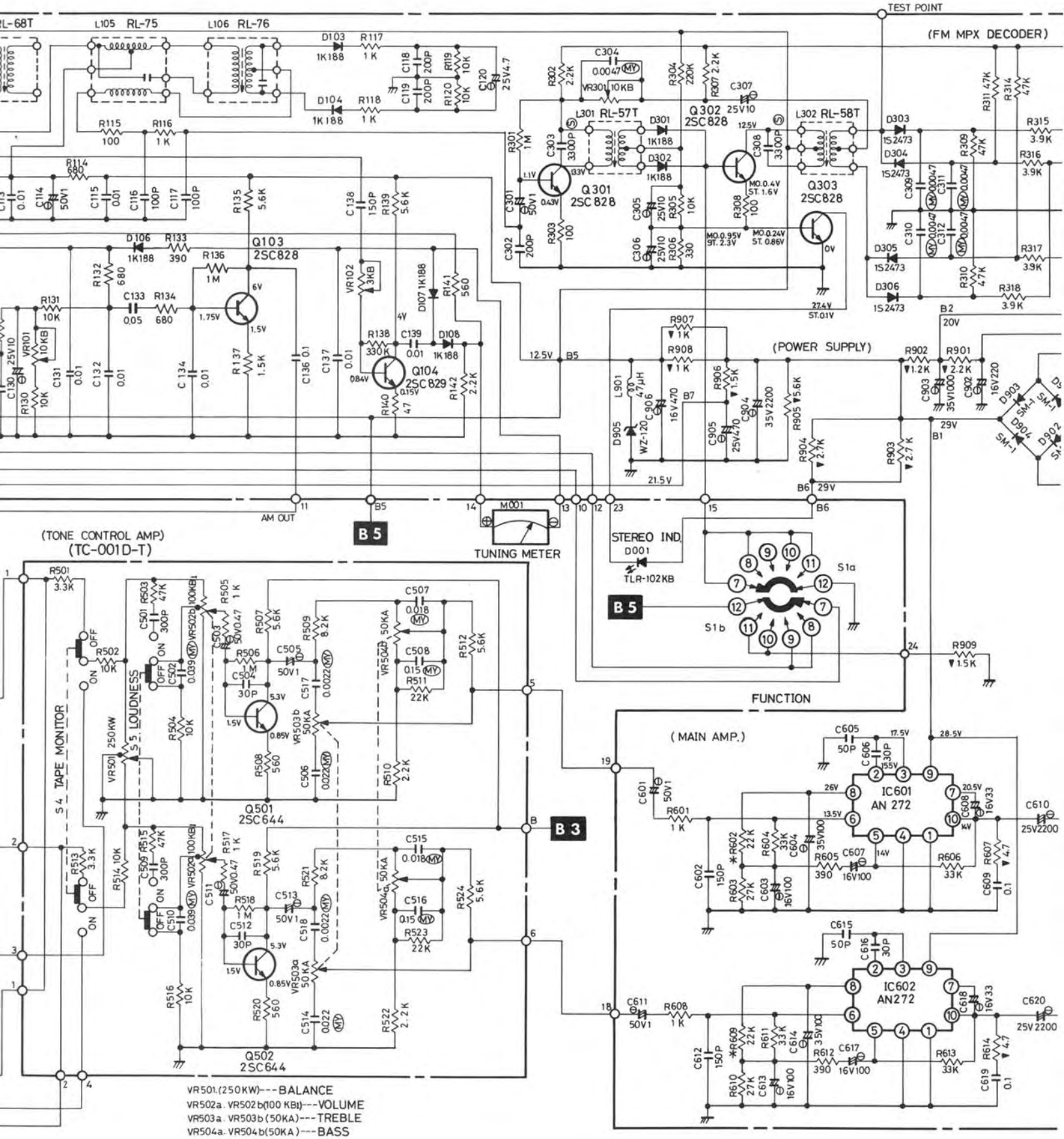


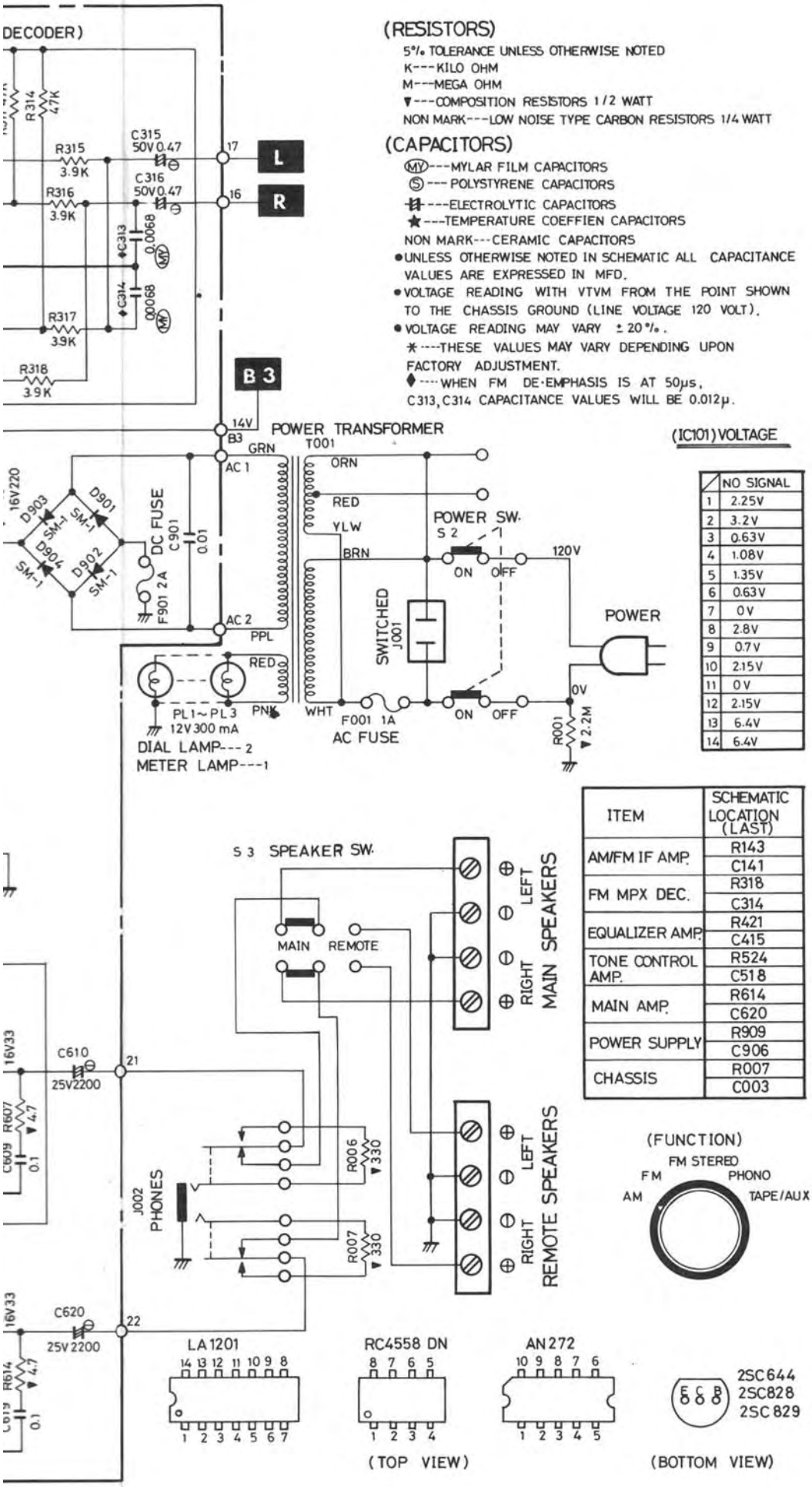
DIAL STRINGING PROCEDURES

1. Remove the unit from the cabinet and remove all front panel control knobs. (Do not remove push buttons.) Then remove the front panel by loosening the 6 mounting screws: 3 on top and 3 at the bottom.
2. Carry out stringing according to the diagram with the front end set at VC minimum.
3. In the final process, the string is wound from outside to inside (in the direction of front end) of the drum. Be careful not to press down on the wound string when inserting the string end into the drum to fix it onto the spring.
4. After completing the stringing process, attach the dial pointer. Turn the tuning shaft to VC maximum and fix the pointer mounting position so that it is aligned with the center of "0" on the 0 – 100 dial scale log.

RX-102 SCHEMATIC DIAGRAM



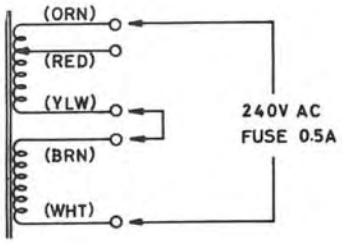

TEST POINT
(FM MPX DECODER)
L105 RL-75
L106 RL-76
L301 RL-57T
L302 RL-58T
Q301 2SC828
Q302 2SC828
Q303 2SC828
Q103 2SC828
Q104 2SC829
(POWER SUPPLY)
AM OUT
TUNING METER
STEREO IND.
D001
TLR-102KB
(TONE CONTROL AMP)
(TC-001D-T)
S4 TAPE MONITOR
S5 LOUDNESS
S1a
S1b
FUNCTION
(MAIN AMP.)
IC601 AN 272
IC602 AN272
Q501 2SC644
Q502 2SC644
B5
B3
B6
B7
B1
B2
VR501.(250KW)---BALANCE
VR502a. VR502b(100 KBI)---VOLUME
VR503a. VR503b(50KA)---TREBLE
VR504a. VR504b(50KA)---BASS

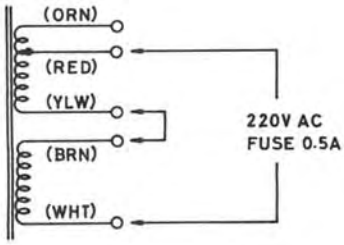


ITEM	SCHEMATIC LOCATION (LAST)
AM/FM IF AMP.	R143
	C141
FM MPX DEC.	R318
	C314
EQUALIZER AMP.	R421
	C415
TONE CONTROL AMP.	R524
	C518
MAIN AMP.	R614
	C620
POWER SUPPLY	R909
	C906
CHASSIS	R007
	C003

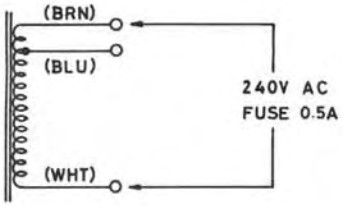
POWER TRANSFORMER STRAPPING

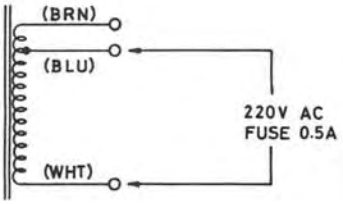
X-102-CT



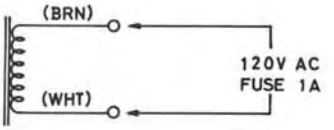


X-102-E

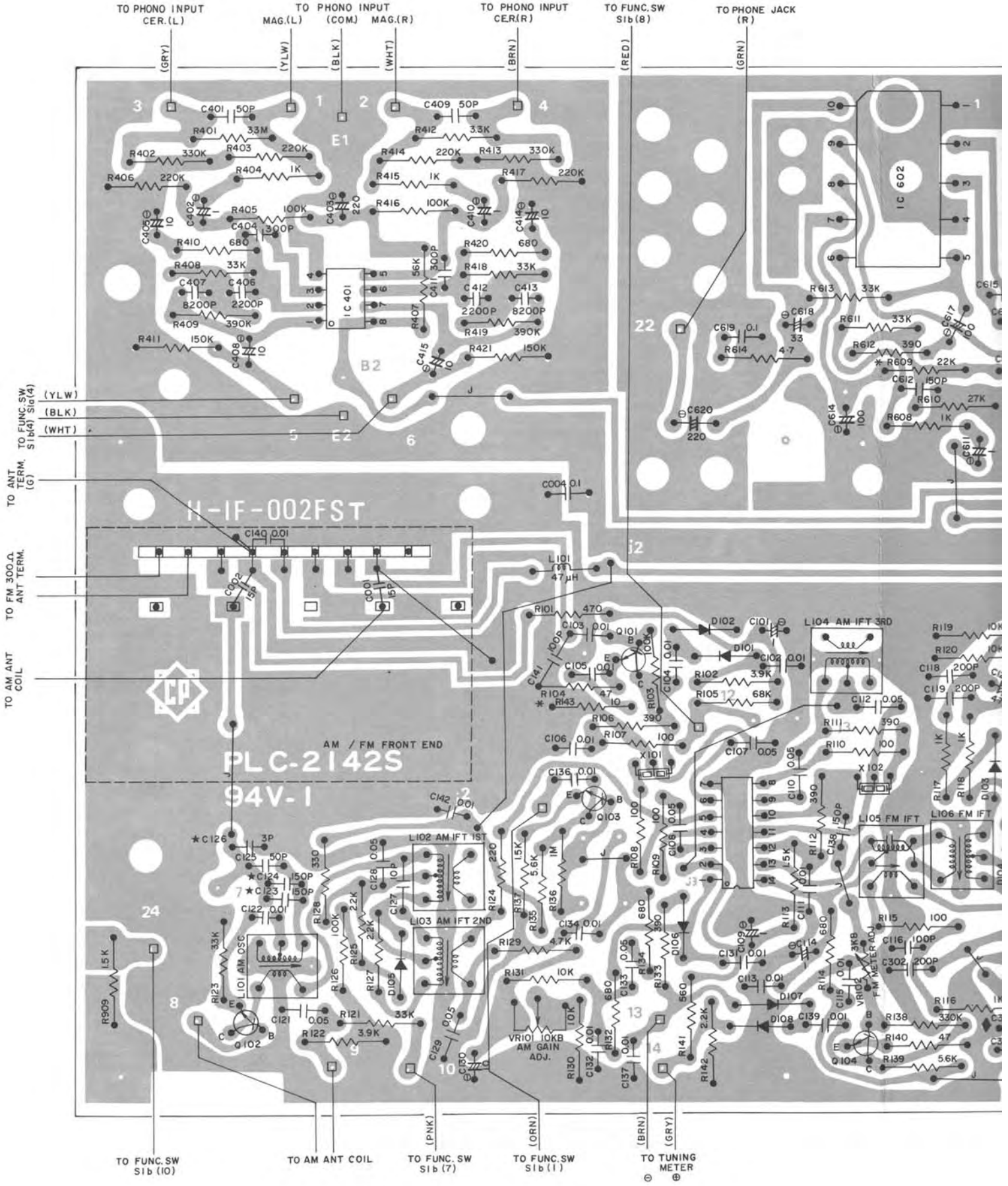




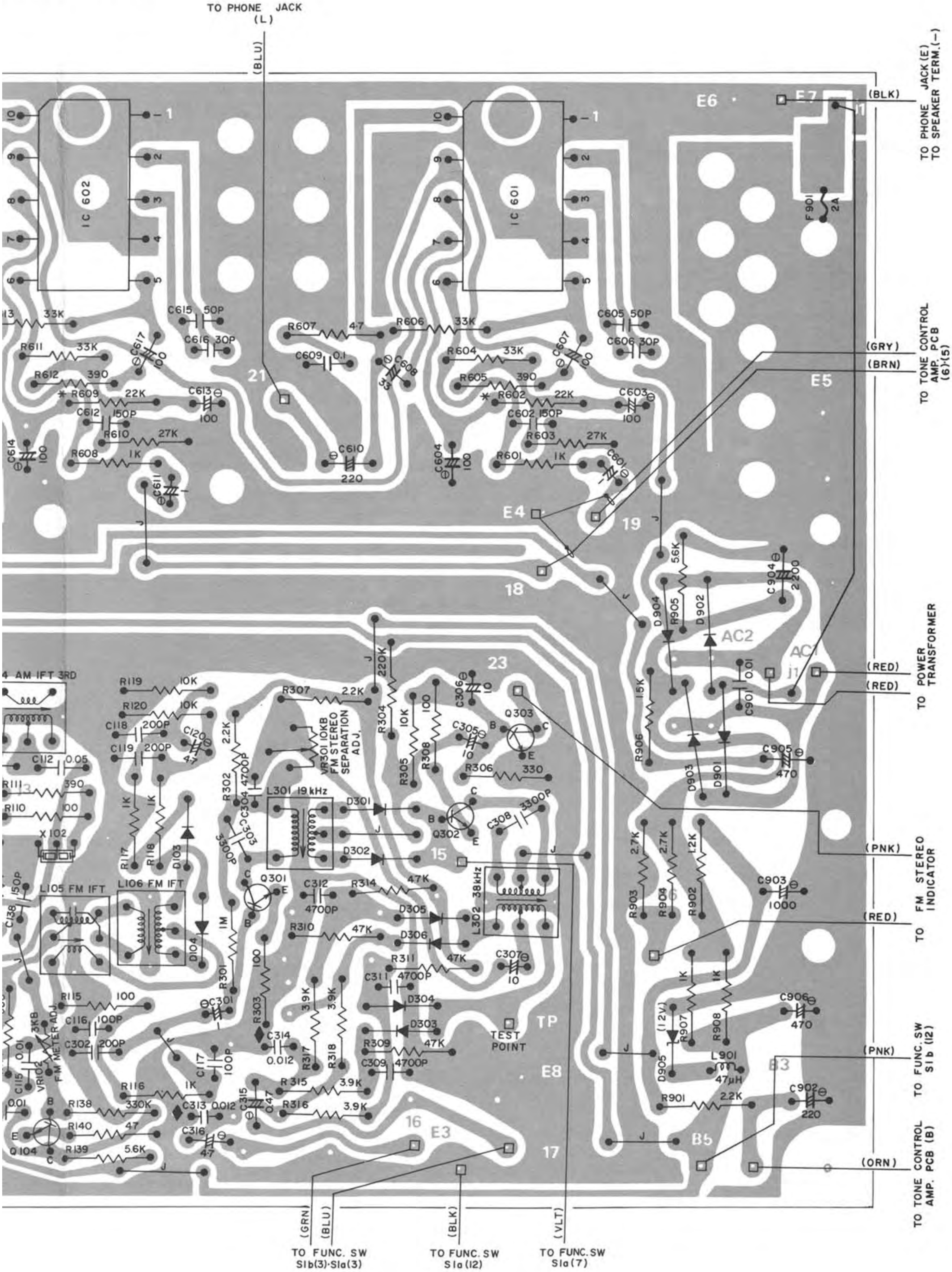
X-102-A



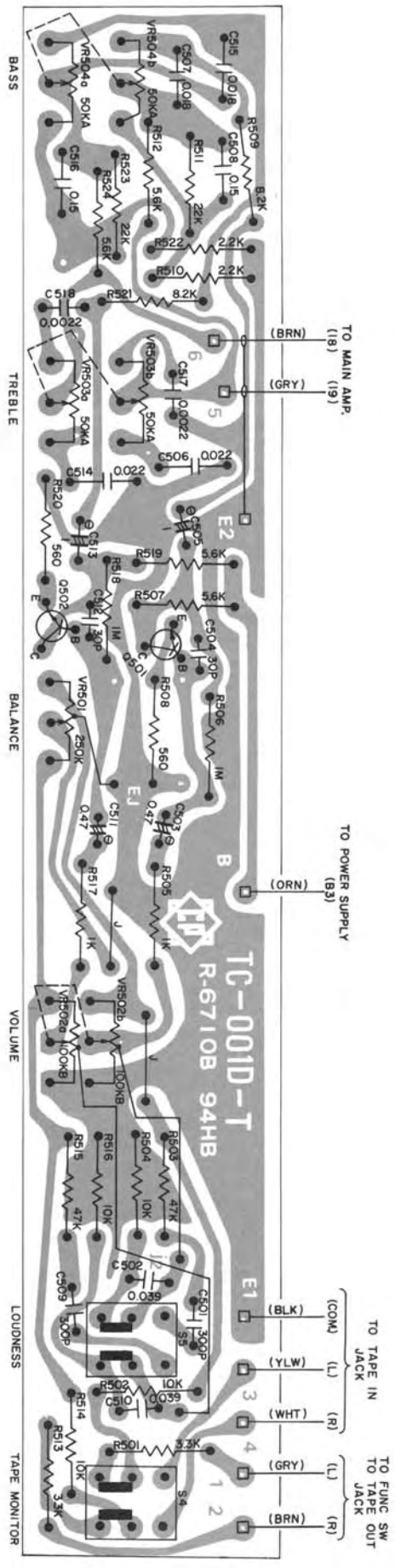
RX-102 AM/FM/MPX/PHONO/MAIN AMP. & POWER SUPPLY CIRCUIT BOARD DIAGRAM



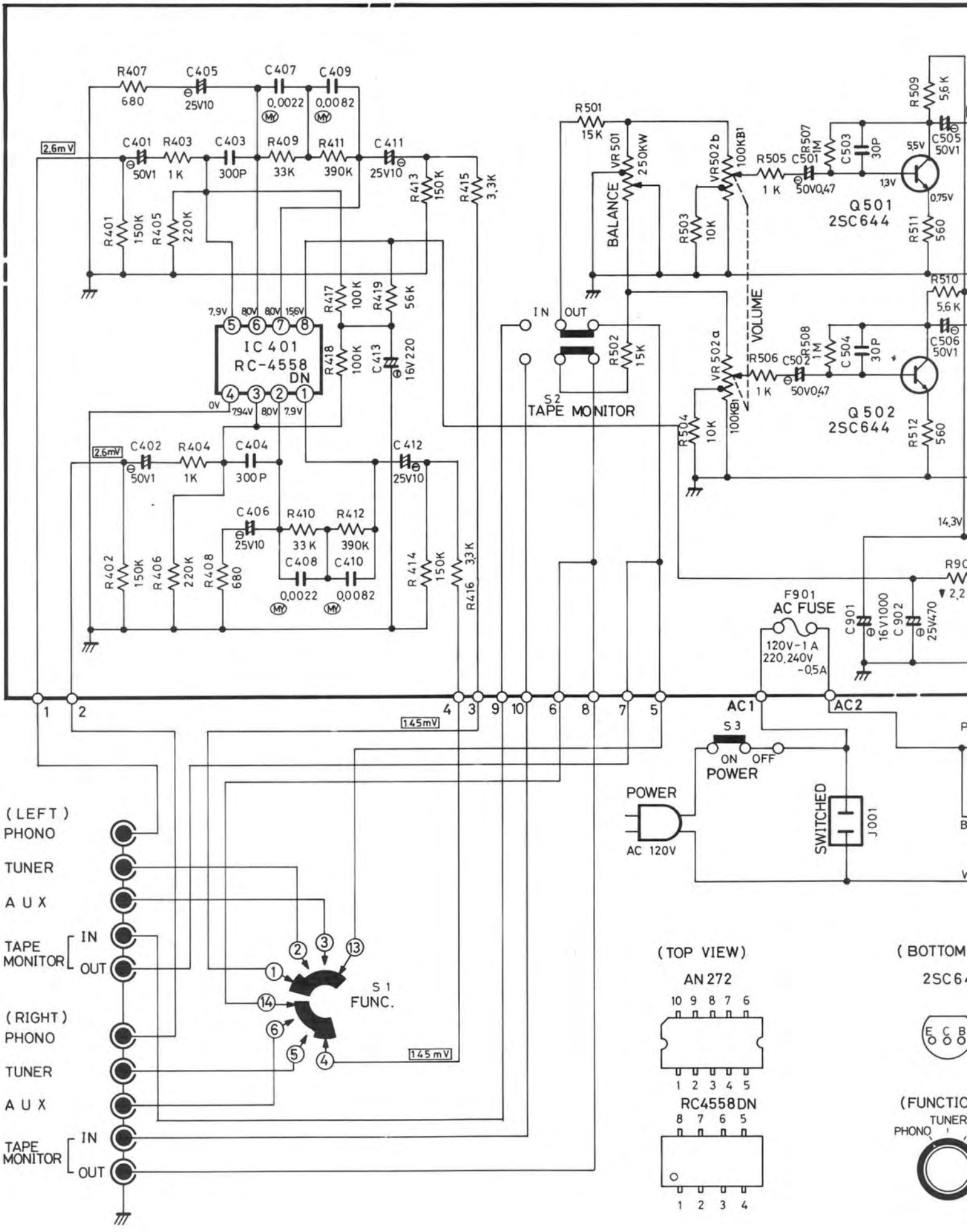
D DIAGRAM

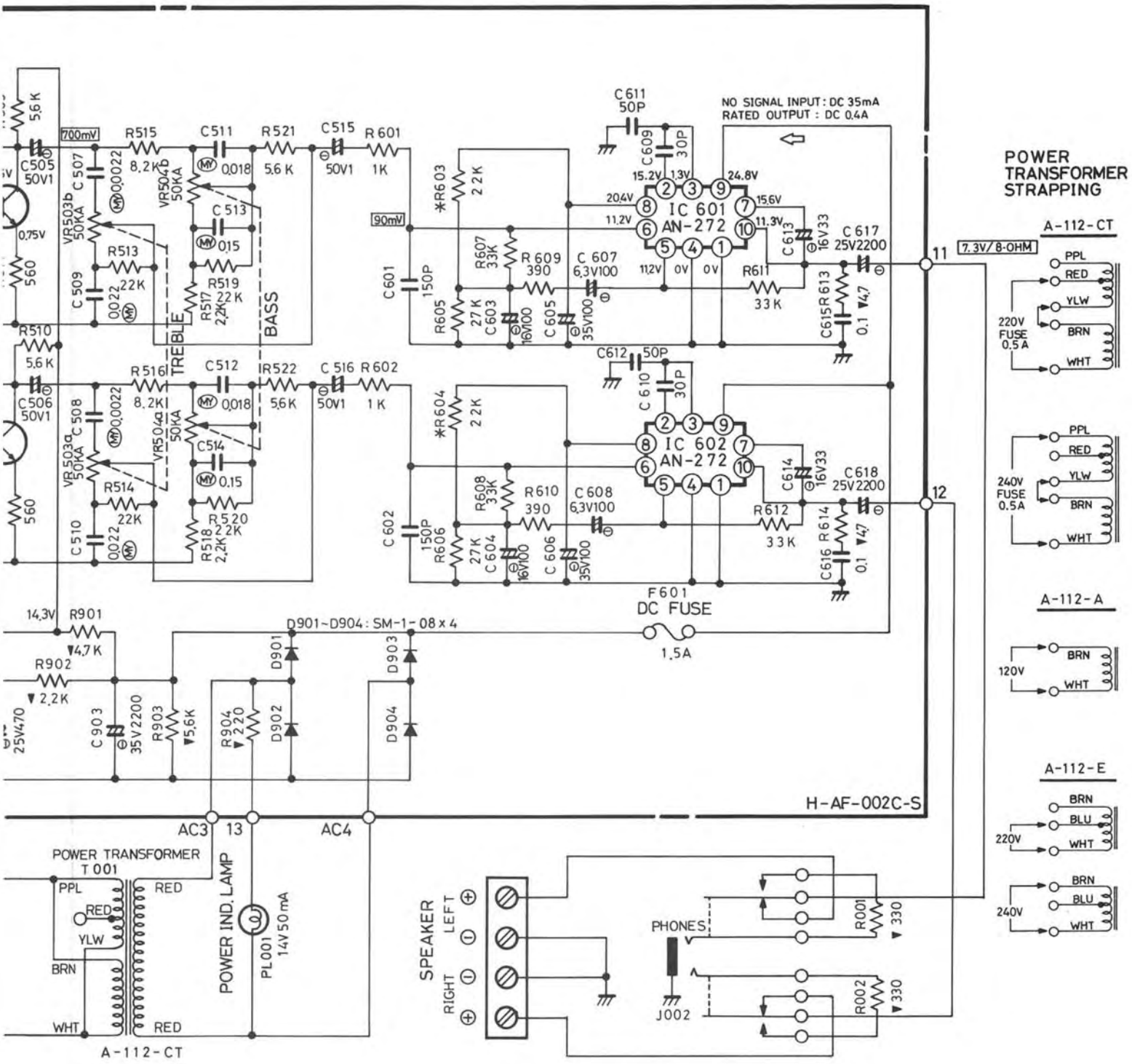

TO PHONE JACK (L)
(BLU)
(BLK)
TO PHONE JACK (E)
TO SPEAKER TERM. (−)
(GRY)
(BRN)
TO TONE CONTROL AMP. PCB (6)·(5)
(RED)
(RED)
TO POWER TRANSFORMER
(PNK)
TO FM STEREO INDICATOR
(RED)
(PNK)
TO FUNC. SW S1b (12)
(ORN)
TO TONE CONTROL AMP. PCB (B)
(GRN)
(BLU)
TO FUNC. SW S1b(3)·S1a(3)
(BLK)
TO FUNC. SW S1a (12)
(VLT)
TO FUNC. SW S1a (7)
IC 602
IC 601
F901 2A
E6
E7
E5
E4
E3
E8
AC1
AC2
J1
B3
B5
21
19
18
23
15
16
17
TP
TEST POINT
L301 19kHz
L302 38kHz
VR301 10KB FM STEREO SEPARATION ADJ.
L105 FM IFT
L106 FM IFT
AM IFT 3RD
X102
VR102 3KB FM METER ADJ.
L901 47μH
Q301
Q302
Q303
Q104

RX-102 TONE CONTROL AMP. CIRCUIT BOARD DIAGRAM



RA-112 SCHEMATIC DIAGRAM





OTTOM VIEW)

2SC644

JNCTION)

ITEM	SCHMATIC LOCATION (LAST)
EQUALIZER AMP.	R 419
	C 413
TONE CONTROL AMP.	R 516
	C 522
MAIN AMP.	R 614
	C 618
POWER SUPPLY	R 904
	C 903
CHASSIS	R 002
	——

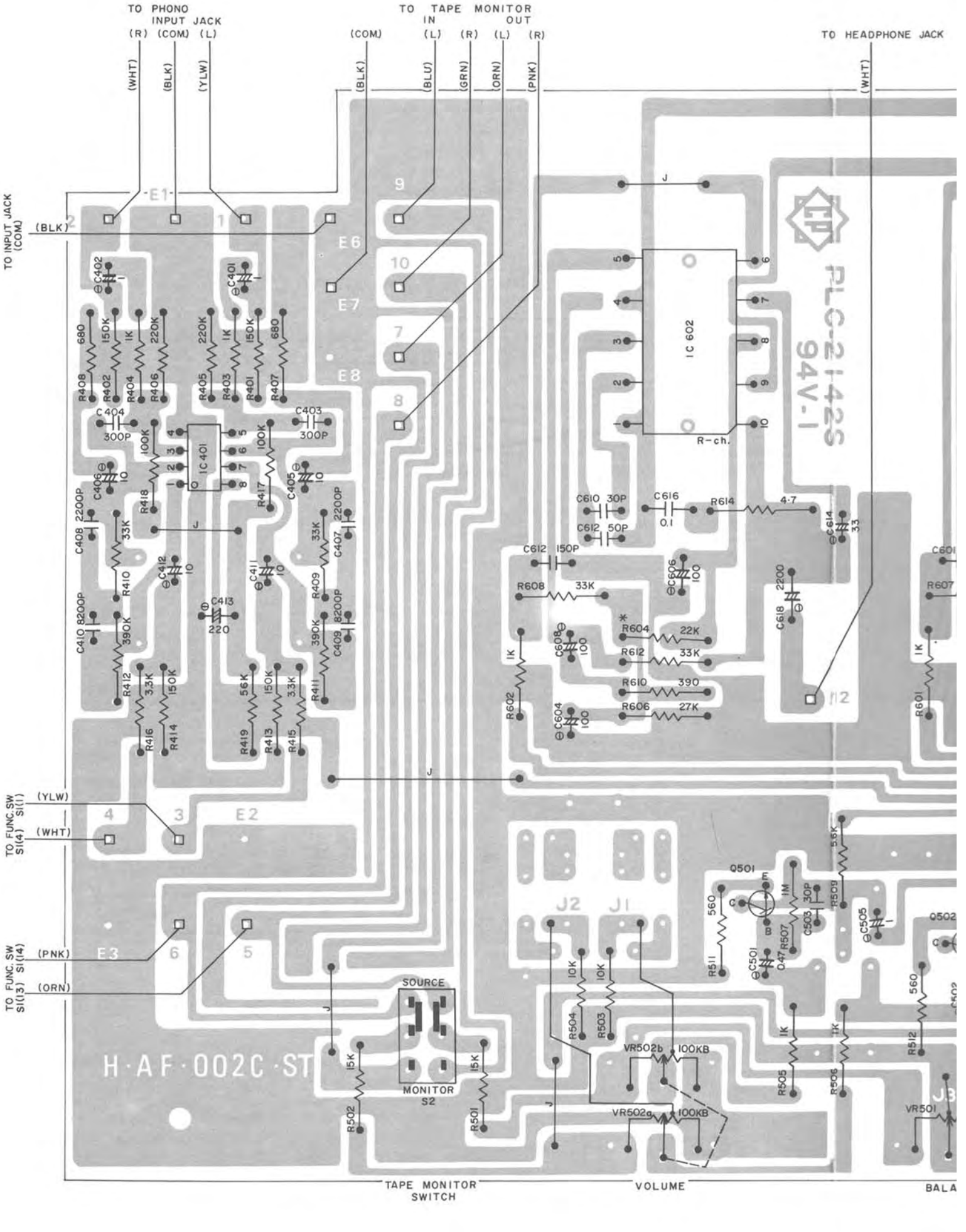
(RESISTORS)

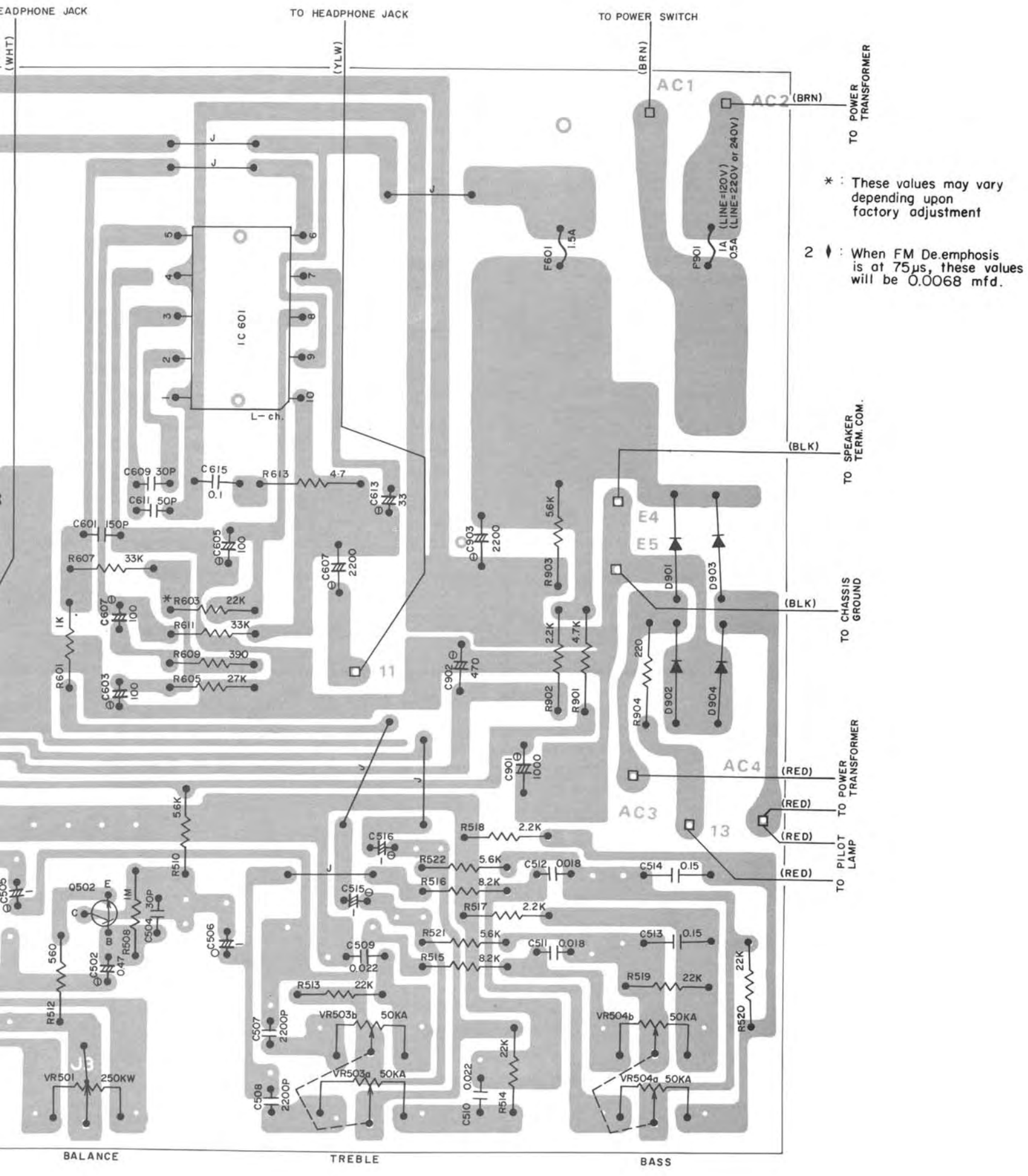
5 % TOLERANCE UNLESS OTHERWISE NOTED
K--- KILO OHM
M--- MEGA OHM
▼--- COMPOSITION RESISTORS 1/2 WATT
NON MARK--- LOW NOISE TYPE CARBON RESISTORS 1/4 WATT

(CAPACITORS)

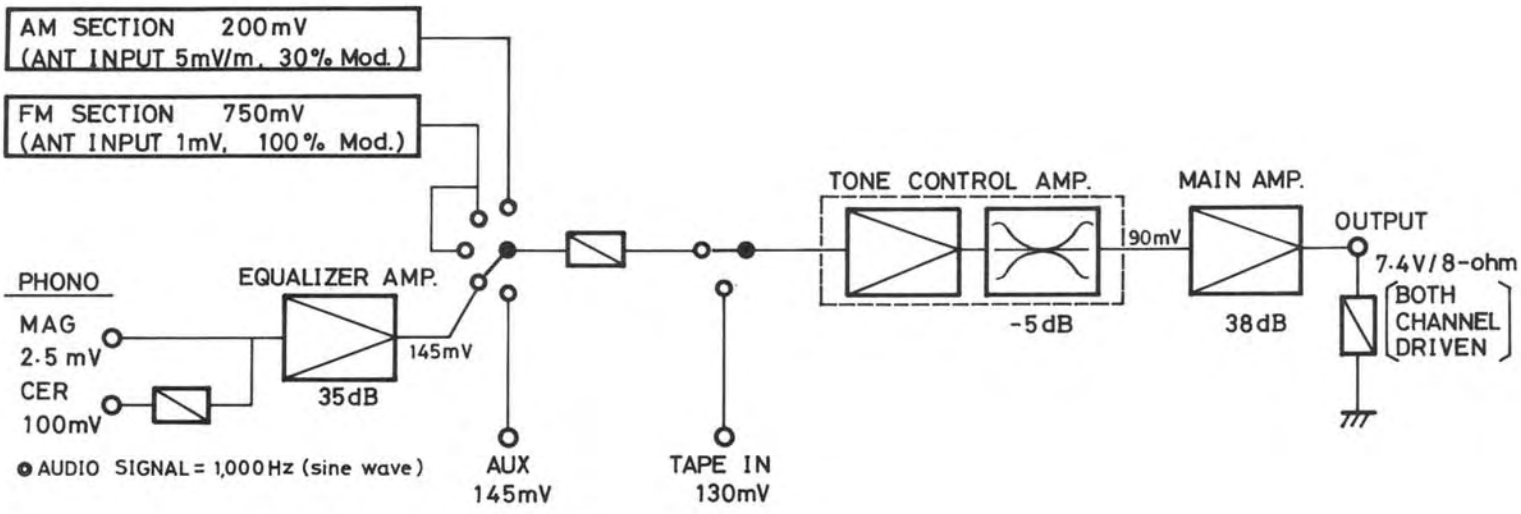
(MY)--MYLAR FILM CAPACITORS
⊕--ELECTROLYTIC CAPACITORS
NON MARK----CERAMIC CAPACITORS
• UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE VALUES ARE EXPRESSED IN MFD.
• VOLTAGE READING MAY VARY ± 20 %.
• [ ] INDICATES 1kHz SIGNAL LEVELS FROM PHONO INPUT : [2.6mV] TO PA OUTPUT : [7.3V ACROSS 8-OHM LOAD]
* THESE VALUES MAY VARY DEPENDING UPON FACTORY ADJUSTMENT.

RA-112 PRE/MAIN AMP. & POWER SUPPLY CIRCUIT BOARD DIAGRAM

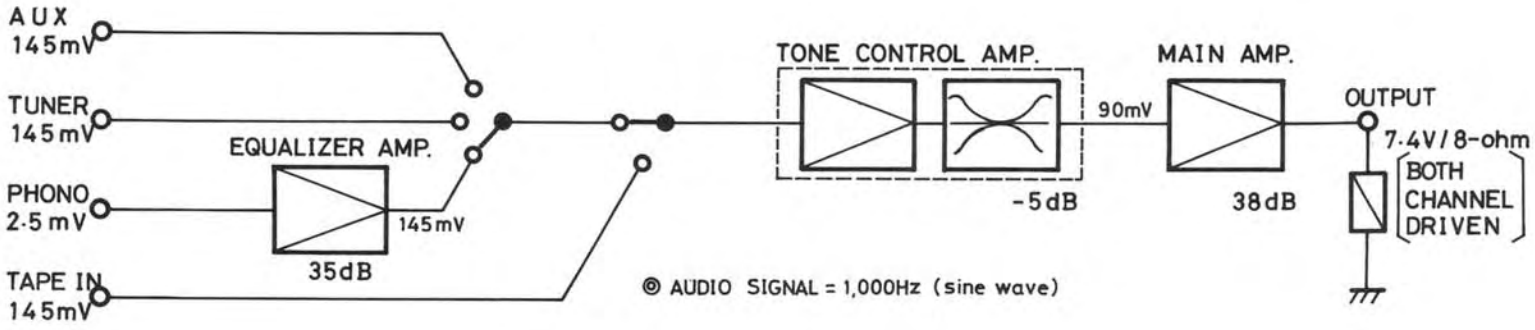



EADPHONE JACK
(WHT)
TO HEADPHONE JACK
(YLW)
TO POWER SWITCH
(BRN)
AC1
AC2
(BRN)
TO POWER TRANSFORMER
(LINE=120V)
(LINE=220V or 240V)
F901
1A
0.5A
F601
1.5A
* : These values may vary depending upon factory adjustment
2 ♦ : When FM De.emphosis is at 75μs, these values will be 0.0068 mfd.
IC 601
L-ch.
(BLK)
TO SPEAKER TERM. COM.
E4
E5
D901
D903
(BLK)
TO CHASSIS GROUND
D902
D904
AC4
(RED)
AC3
13
(RED)
(RED)
(RED)
TO PILOT LAMP
TO POWER TRANSFORMER
11
C609 30P
C611 50P
C615 0.1
R613 4.7
C613 33
C601 150P
C605 100
C607 2200
C903 2200
R903 5.6K
R607 33K
R603 22K
R611 33K
R609 390
R605 27K
C607 100
C603 100
1K
R601
C902 470
R902 2.2K
R901 4.7K
R904 220
C901 1000
R518 2.2K
C516
R522 5.6K
C512 0.018
C514 0.15
R516 8.2K
C515
R517 2.2K
R521 5.6K
C511 0.018
C513 0.15
R515 8.2K
R519 22K
R520 22K
C509 0.022
R513 22K
VR503b 50KA
VR504b 50KA
C507 2200P
VR503a 50KA
VR504a 50KA
C508 2200P
C510 0.022
R514 22K
VR501 250KW
R512 560
C502 0.047
Q502
R508 1M
C504 30P
C505
C506
R510 5.6K
BALANCE
TREBLE
BASS

RX-102 GAIN DIAGRAM



RA-112 GAIN DIAGRAM



REPAIR PARTS LIST

RX-102

Symbol No.	Part No.	Description
TRANSISTORS, IC'S AND DIODES		
Q101, 102, 104	301201117	2SC829 (C), FM IF Amp., AM Conv., etc.
Q103, 301, 302, 303	301201115	2SC828 (R), AM Audio Amp., MPX Amp. etc.
Q501, 502	301201114	2SC644 (S), Pre-amp.
IC101	303452148	LA1201, AM IF and FM IF Amp.
IC401	303452152	RC-4558 (DN or NB), Phono Amp.
IC601, 602	303452153	AN272, Power Amp.
D101, 102, 103, 104, 105, 106, 107, 108 301, 302	300111008	1K188, FM AGC, FM Det., MPX Doubler, etc.
D303, 304, 305, 306	300111010	1S2473,MPX Dec.
D901, 902, 903, 904	300919016	SM-1-08, Rectifier
D905	300313013	WZ-120, Zener Regulator, 12V
D001	300414004	TLR-102KB, FM Stereo Indicator
COILS AND TRANSFORMERS		
L101	223301127	Coil, AM Local Oscillation
L102, 103	225301131	IFT, AM, 455 kHz, 1st, 2nd
L104	225301133	IFT, AM, 455 kHz, 3rd
L105	225501125	IFT, FM, Ratio (PRI.)
L106	225501126	IFT, FM, Ratio (SEC.)
L107		Not used
L108, 901	226501123	Coil, 47 micro-Henry, RF Choke
L301	225601133	Coil, MPX, 19 kHz Tune
L302	225601134	Coil, MPX, 38 kHz Tune
L001	222301204	Coil, AM Antenna
T001	207001383	Transformer, Power Supply (120V, 220V, 240V)
VARIABLE RESISTORS		
VR101, 301	510502126	10KB, AM Gain Adj.
VR102	510502134	3KB, FM Meter Level Adj.
VR501	515121120	250KW, Balance Control
VR502	525121129	100KB x 2, Volume Control
VR503, 504	525101127	50KA x 2, Bass, Treble Control
OTHERS		
S1	601011255	Switch, Function Selector
S2, 3	614020406	Switch, Power Supply, Speaker Selector
S4, 5	614020407	Switch, Push 2-key, Loudness, Tape Monitor
	321304374	Front end, AM/FM
PL1, 2, 3	352126030	Lamp, 12.6V, 300mA, Dial Light
F001	341240010	Fuse, 1A-250V, AC Circuit Protector
F901	341220015	Fuse, 1.5A-125V, DC Circuit Protector
M001	231310046	Meter, AM/FM Tuning Ind.
X101, 102	229101134	Bandpass Filter, 10.7 MHz,
	141710261	Tone Control Amp. Circuit Assembly
	141010107	AM/FM/MPX/PHONO/MAIN & Power Supply Circuit Assembly (without Front end and heat sink. for Power Amp. IC's)

RA-112

Symbol No.	Part No.	Description
TRANSISTORS, IC'S AND DIODES		
Q501, 502	301201114	2SC644 (S), Pre Amp.
IC401	303452152	RC-4558 (DN or NB), Phono Amp.
IC601, 602	303452153	AN·272, Power Amp.
D901, 902, 903, 904	30919016	SM-1-08, Rectifier
VARIABLE RESISTORS		
VR501	515121122	250KW, Balance Control
VR502	525121130	100KB x 2, Volume Control
VR503, 504	525101131	50KA x 2, Bass, Treble Control
OTHERS		
S1	601011247	Switch, Function Selector
S2	611001629	Switch, Tape Monitor
S3	611001631	Switch, Power Supply
F601	341220015	Fuse, 1.5A-3AG, DC Circuit Protector
F901	341220010	Fuse, 1A-3AG, (line 120V)
	341220005	Fuse, 0.5A-3AG (line 220V or 240V)
PL001	351140005	Lamp, 14V, 50mA, Pilot
T001	207001384	Transformer, Power Supply (Multi-voltage Type)
	201001384	Transformer, Power Supply (120V only)
	206001384	Transformer, Power Supply (220V or 240V)
	141010108	Pre/Main Amp. Circuit Assembly (without heat sink for Power Amp. IC's)

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