Quality. Uncompromised.

ROTEL®

Technical Manual

NON-SWITCHING DC SERVO STEREO INTEGRATED AMPLIFIER

RA-700

TABLE OF CONTENTS

Serial No. Beginning
NE16311

THE ROTEL CO., LTD.
ROTEL ELECTRONICS CO., LTD.
ROTEL OF AMERICA, INC.
ROTEL HI FI LIMITED.

1-36-8 OHOKAYAMA, MEGURO-KU, TOKYO 152, JAPAN
2ND FLOOR, EVERGLORY BLDG., NO. 305, SECTION 3, NANKING E. ROAD, TAIPEI, TAIWAN, REPUBLIC OF CHINA
13528 SO. NORMANDIE, GARDENA, CALIF. 90249, U.S.A.
2-4 ERICA ROAD, STACEY BUSHES, MILTON KEYNES, BUCKINGHAMSHIRE, ENGLAND

Alignment

Instruments: Oscilloscope, DC millivoltmeter

POWER AMP SECTION

A. DC Balance Adjustment

1. Set vertical gain control of the oscilloscope to 0.1V/cm, and vertical input switch to GND. Bring the trace to central position on the screen; then set the vertical input switch to DC position.
   Before making adjustment, short-circuit pin E6 to pin TP3 (TP-4 for R-ch) on H-AF-119 p-c board, to avoid servo effect. (Fig. 1)
2. Connect the oscilloscope to pin TP3 (TP4 for R-ch) on main amp p-c board. Set volume control of the amplifier to minimum position. Turn on the power. When DC output appears on the screen (the trace will shift upwards or downwards as shown in Fig. 1), adjust potentiometer VR401 (VR402 for R-ch) on H-AF-119 p-c board so that the DC voltage present at the test point is 0V±50mV.
   After completing adjustment, disconnect the ground connection of TP terminal.

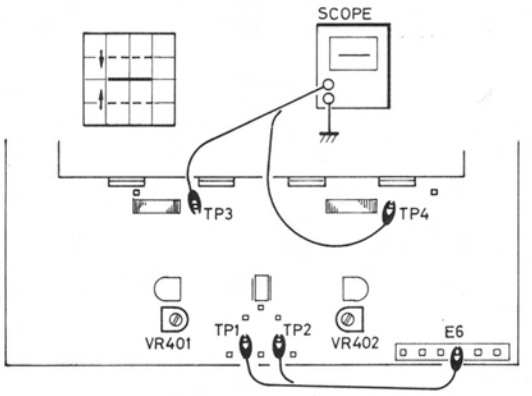


Fig. 1

B. Bias (Idling Current) Adjustment

1. Connect the plus lead of DC millivoltmeter to TP5 (TP6 for R-ch) on H-AF-119 and the minus lead to TP3 (TP4 for R-ch). Set volume control to minimum position. Turn on the power.
2. Adjust potentiometer VR403 (VR404 for R-ch) on H-AF-119 p-c board so that the DC millivoltmeter reads 10mV.

PHONO SECTION

DC Balance Adjustment

1. Set vertical gain control of the oscilloscope to 0.1V/cm, and vertical input switch to GND. Bring the trace to central position on the screen; then set the vertical input switch to DC.
   Before making adjustment short-circuit pin 1 (pin 2 for R-ch) to pin E on PR-123 p-c board, to avoid servo effect. (Fig. 3)
2. Connect the oscilloscope to pin 3 (pin 4 for R-ch) and pin E. Set Function Selector to PHONO (MC) position and volume control to minimum. Turn on the power.
   When DC output appears on the screen (the trace will shift upwards or downwards as shown in Fig. 3), adjust potentiometer VR101 (VR102 for R-ch) on PR-123 p-c board so that the DC voltage present at pin 3 (pin 4 for R-ch) is 0V±50mV.
   After completing adjustment, disconnect the ground connection of TP terminal.

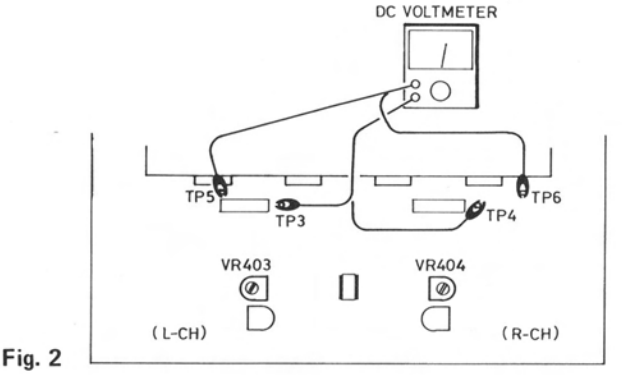


Fig. 2

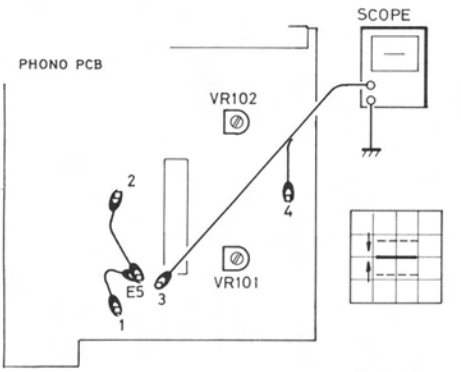


Fig. 3

ADDENDA

1. Circuit pattern and connection of the units with serial number up to NE16361 are slightly different from the ones given in this booklet.
2. Numbering of test points differs:
   TP3 and TP4 on this booklet are identical to TP9 and TP10 on the units with serial number up to 16361 respectively.

Specifications

Continuous Power Output	.40 watts* per channel, min. RMS both channels driven into 8 ohms from 20 to 20,000Hz with no more than 0.009% total harmonic distortion.
Total Harmonic Distortion. (20 to 20,000Hz, from AUX)	.No more than 0.009% (continuous rated power output) No more than 0.005% (continuous 1/2 rated power output) No more than 0.01% (1 watt per channel power output, 8 ohms)
Intermodulation Distortion (60Hz : 7kHz = 4 : 1)	.No more than 0.009% (continuous power output) No more than 0.009% (continuous 1/2 rated power output) No more than 0.01% (1 watt per channel power output, 8 ohms)
Output: Speaker	.A, B (8-16 ohms), A(8-16 ohms) + B (8-16 ohms)
Headphone	.8-16 ohms
Damping Factor	.55 (20 to 20,000Hz, 8 ohms)
Input Sensitivity/Impedance:	
PHONO (MC)	.0.2mV/100 ohms
PHONO (MM)	.2.5mV/47 kohms
TUNER, AUX	.150mV/39 kohms
TAPE MONITOR 1, 2	.150mV/39 kohms
Overload Level (T.H.D. 0.1%, 1kHz):	
PHONO (MC)	.38mV
PHONO (MM)	.390mV
AUX	.5V
Frequency Response:	
PHONO	.20 to 100,000Hz, ±0.5dB (RIAA STD)
AUX	.5 to 70,000Hz, +0.dB, −1.0dB
Tone Control:	
Graphic Equalizer	.40, 90, 200, 450, 1k, 2.5k, 6.5k, 16kHz/±12dB
Loudness Contour	.+10dB (100Hz), +4dB (10kHz) (volume control set at −40dB position)
Signal-to-Noise Ratio (IHF, A network):	
PHONO (MC)	.66dB
PHONO (MM)	.87dB
TUNER, AUX	.98dB
TAPE MONITOR 1, 2	.98dB
Subsonic Filter	.−3dB/16Hz

MISCELLANEOUS

Power Requirement	.120V/60Hz, 220V/50Hz, 240V/50Hz, or 120, 220, 240V/50-60Hz (switchable)
Power Consumption	.250 watts
Dimensions (overall)	.430 (W) x 91 (H) x 293 (D) mm 16-15/16" x 3-9/16" x 11-1/2"
Weight (net)	.7.2kg/15.9 lbs

- Specifications and design subject to possible modification without notice.
- *Measured pursuant to the Federal Trade Commission's Trade Regulation Rule on Power Claims for Amplifiers (applicable to the U.S.A. only).

Parts List

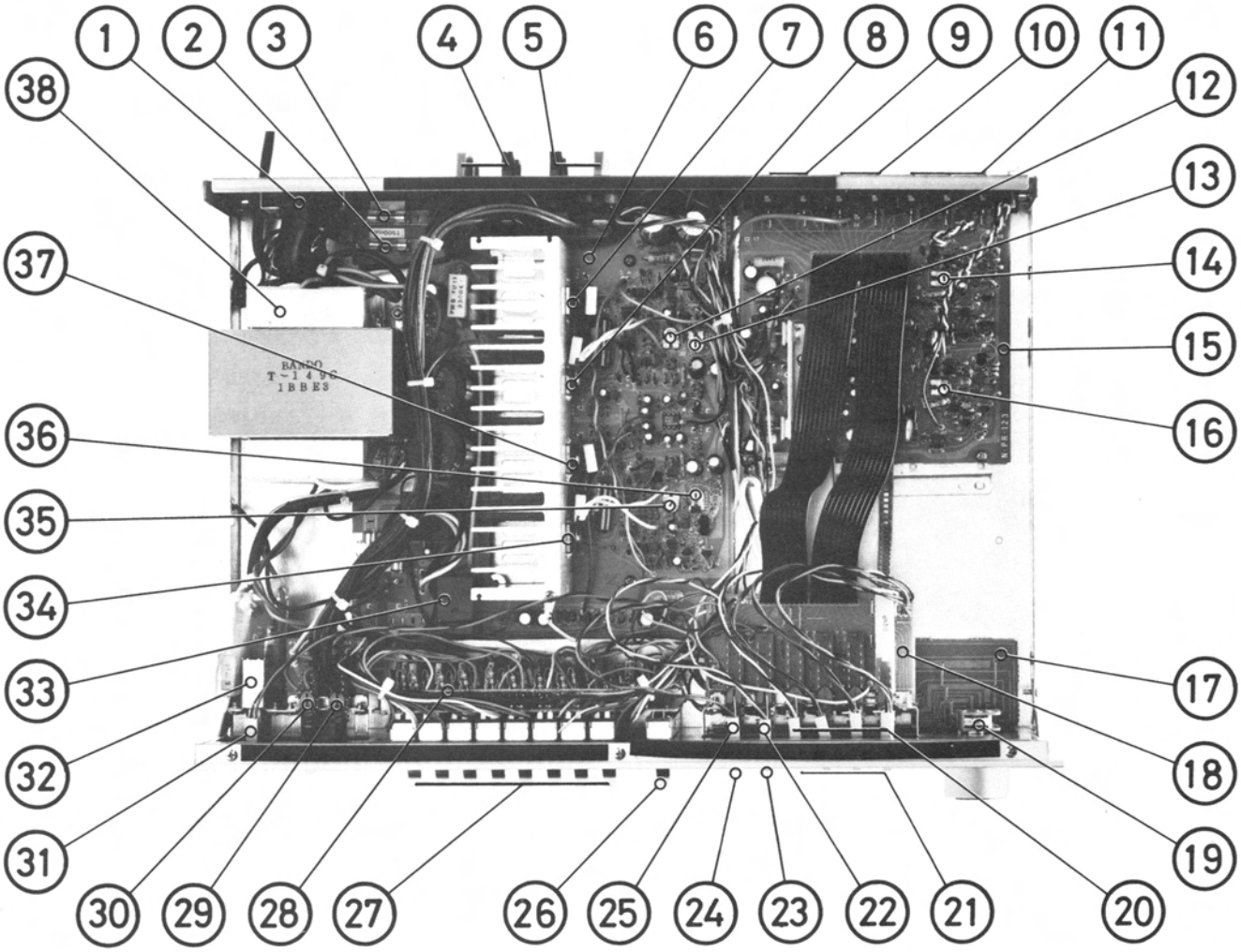
Schematic Location	Description	Part No.
TRANSISTORS, DIODES AND IC'S		
Q101, 102, 111, 112, 186, 249, 250, 253, 254, 257, 258, 261, 262, 265, 266, 269, 270, 273, 274, 277, 278, 401, 402, 413, 414, 512	2SA608KNP (F,G)	301001193
Q103 to 106 241 to 244 403 to 406	2SC1570 (G,H)	301201242
Q107 to 110 201, 202, 407, 408, 409, 410	2SK163 (K)	302001134
Q113, 114, 119, 120, 245, 246, 415, 416, 421, 422, 441, 442	2SA1016 (G, H)	301001194
Q115 to 118 247, 248, 419, 420, 429, 430, 431, 432, 443 513,	2SC2362 (G, H)	301201241
Q121, 122, 433, 434	2SD600 (E, F)	301301150
Q123, 124, 435, 436	2SB631 (E, F)	301101134
Q181, 184	2SK246 (GR)	302001132
Q182	2SC1984 (O, Y)	301201170
Q183, 251, 252, 255, 256, 259, 260, 263, 264, 267, 268, 271, 272, 275, 276, 279, 280, 411, 412, 417, 418, 511, 514, 515	2SC536KNP (F, G)	301201236
Q185	2SA919 (F, G)	301001192
Q187	2SA913 (Q, R)	301001143
Q423, 424, 427, 428	2SA1019 (E, F)	301001195
Q425, 426,	2SC2375 (E, F)	301201243
Q437, 438	2SC2578 (Q, Y)	301201235
Q439, 440	2SA1103 (Q, Y)	301001190
D101 to 110 401 to 406 409 to 424 511	MA150 (Si)	300111016
D111, 112	KB-269, Varistor	300212004
D181 to 183	WZ-140, Zener, 14V, 0,5W	300313018
D407, 408	SV-04S, Varistor	300212010
D531	RB-602, Rectifier	300919047
D532	KBP-02, Rectifier	300919027
D533	SR1K4, Rectifier	300919024
D534	WZ-120, Zener, 12V, 0.5W	300313013
D001, 006, 007	GL-9PR24, LED, (RED), Power, Tape, Ind	300414048
D002 to 005	GL-9NG24, LED, (GRN), Func, Ind	300414049
IC101, 401	NJM4558D	303452215
VARIABLE RESISTORS		
VR101, 102	100B, Pot, Phono DC Bal Adj	510502208
VR201	100kB x 2, Volume Control	525121152
VR202	250KW x 2, Balance Control	581005059
VR361 to 368	100KW x 2, Acoustic Control	581005058
VR401, 402	300B, Pot, Main DC Bal Adj	510502187
VR403, 404	10KB, Pot, Bias Adj	510502186
OTHERS		
L401, 402	Coil, Antiparasitic	228641126
T001	Power Transformer, "Type G"	207001528
	Power Transformer, "Type D"	204001528
RY511	Relay, Protection	240111251
S101	Switch, Remote, Phono MC/MM	615212298
S1 to 3 (1 Set)	Switch, Push 6-key, Func Selector, etc.	614051217
S4 to 7 (1 Set)	Switch, Push 4-key, Loudness, Mode, etc.	614040841
S8, 9 (1 Set)	Switch, Push 2-key, Speakers	614020451
S10	Switch, Push 1-key, Power	614010165
F531*1	Fuse, 3,5A, (Pri), for 120V Area	341222350
F532, 533	Fuse, 5A, (Sec), for 120V Area	341222500
	Fuse, T5A, (Sec), for 220/240V Area	345952500
F534, 535	Fuse, 1A, (Sec), for 120V Area	341222100
	Fuse, T500mA, (Sec), for 220/240V Area	345952050
C551	Noise Canceller, NSK-135, for 120V Area	470101118
	PME265MB522, for 220/240V Area	470101136
	Preamplifier & Graphic & EQ P-c Board Ass'y	141510184
	Main Amplifier & Power Supply P-c Board Ass'y	141610351
	Pin Jack, 6P, Phono, Tuner, AUX Input	624302206
	Pin Jack, 4P, Tape In/Out	624303204
	Speaker Terminal Board	649201123
	Phone Jack	626110037
	Voltage Selector	648211247
	Fuse Clip, ϕ6.35	648211257
	Fuse Clip, ϕ5.2	648211256
	LED Socket w/Wire (RED/BLK), L=200mm	648211284
	LED Socket w/Wire (ORG/BLK), L=200mm	648211285
	LED Socket w/Wire (YLW/BLK), L=200mm	648211286
	LED Socket w/Wire (GRN/BLK), L=200mm	648211287
	LED Socket w/Wire (BLU/BLK), L=200mm	648211288
	LED Socket w/Wire (PPL/BLK), L=200mm	648211289
	LED Socket w/Wire (BRN/BLK), L=300mm	648211292
	Flex Wire Ass'y	647110017
	Power Cord, for U.S.A., etc.	796301115
	Power Cord, for Europe	796301148
	Power Cord, for UK	796301138
	Cord Stopper, U.S.A., Europe, etc.	675201114
	Cord Stopper, UK	675201116
	Cover, Power SW	792011219
	Cover, Noise Canceller*2	792011220
	Cover, Voltage Selector	792011218
	Front Panel Ass'y	111911572
	Top Cover	138011324
	Knob, Volume	116310351
	Knob, Balance, etc.	116310310
	Button, Loudness, Mode, etc.	116210104
	Button, Func, Power, etc.	116210092

*1: Not used on the unit for 220/240V area.
*2: Not used on the unit for 120V area.

Schematic Location	Description	Part No.
	Foot	673402027
	Screw, M3 x 6 (Ni) Bind	705213006
	Screw, M3 x 12 (Ni), Bind	705213012
	Screw, M3 x 4 (Ni), Bind	705213004
	Screw, M3 x 8 (BLZ), Bind	705223008
	Screw, M3 x 6 (Ni), Ovalcountersunk	702213006
	Screw, M4 x 8 (BLZ) w/FW, Bind	755224008
	Screw, TP3 x 10 (Ni)	726213010
	Screw, TP3 x 8 (Ni)	726213008
	Screw, TP3 x 10 (BLZ)	726223010
	Screw, TP3 x 8 (BLZ)	726223008
	Screw, TP3 x 8 (Ni), Ovalcountersunk	722213006

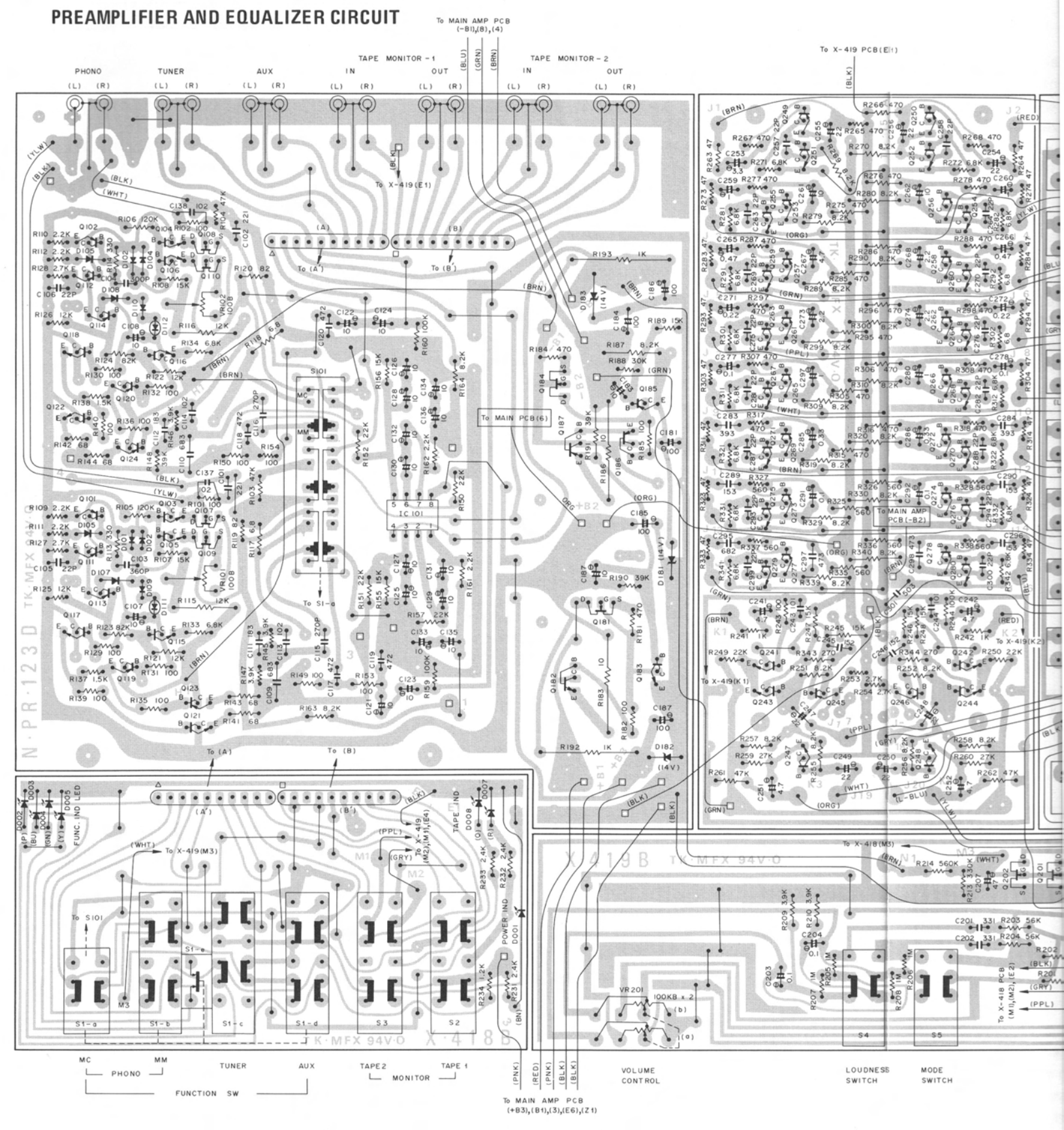
Schematic Location	Description	Part No.
	Screw, Tap-tight 4 x 10	765214010
	Washer, Plain M3	770500003
	Washer, Spring M3	770500010
	Washer, Spring M4	770500011
	Washer, Plain M7	770500006
	Nut, M3, Square, Tr Mtg.	770911144
	Nut, M4, Hex	770402202
	Nut, M7, Hex	770402205
	Stopper, Phone Jack	770911278
	Spacer, M3, L=8mm	770911301
	Insulation Collar, Tr Mtg.	992001111

Chassis Layout (Top View)

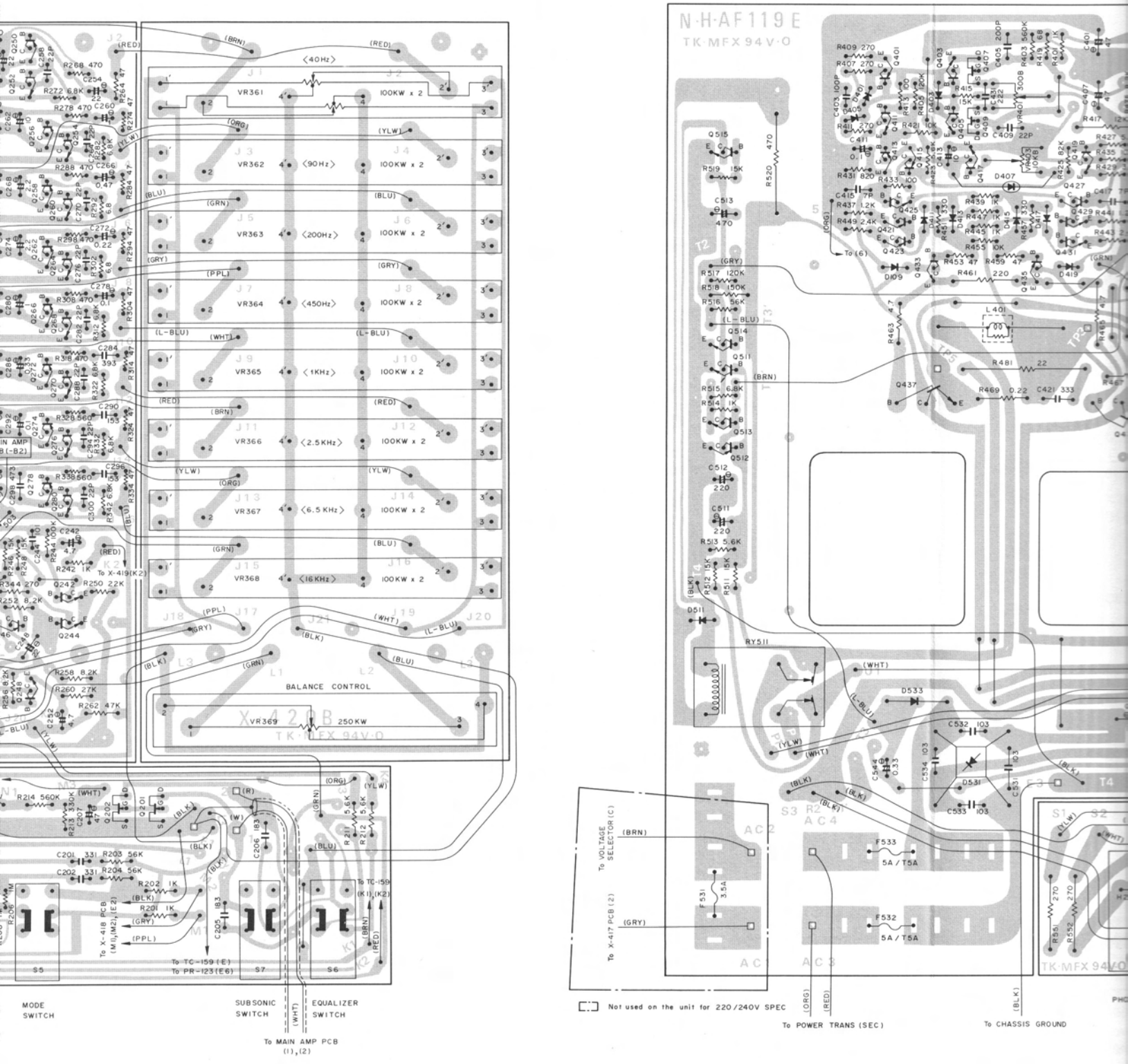


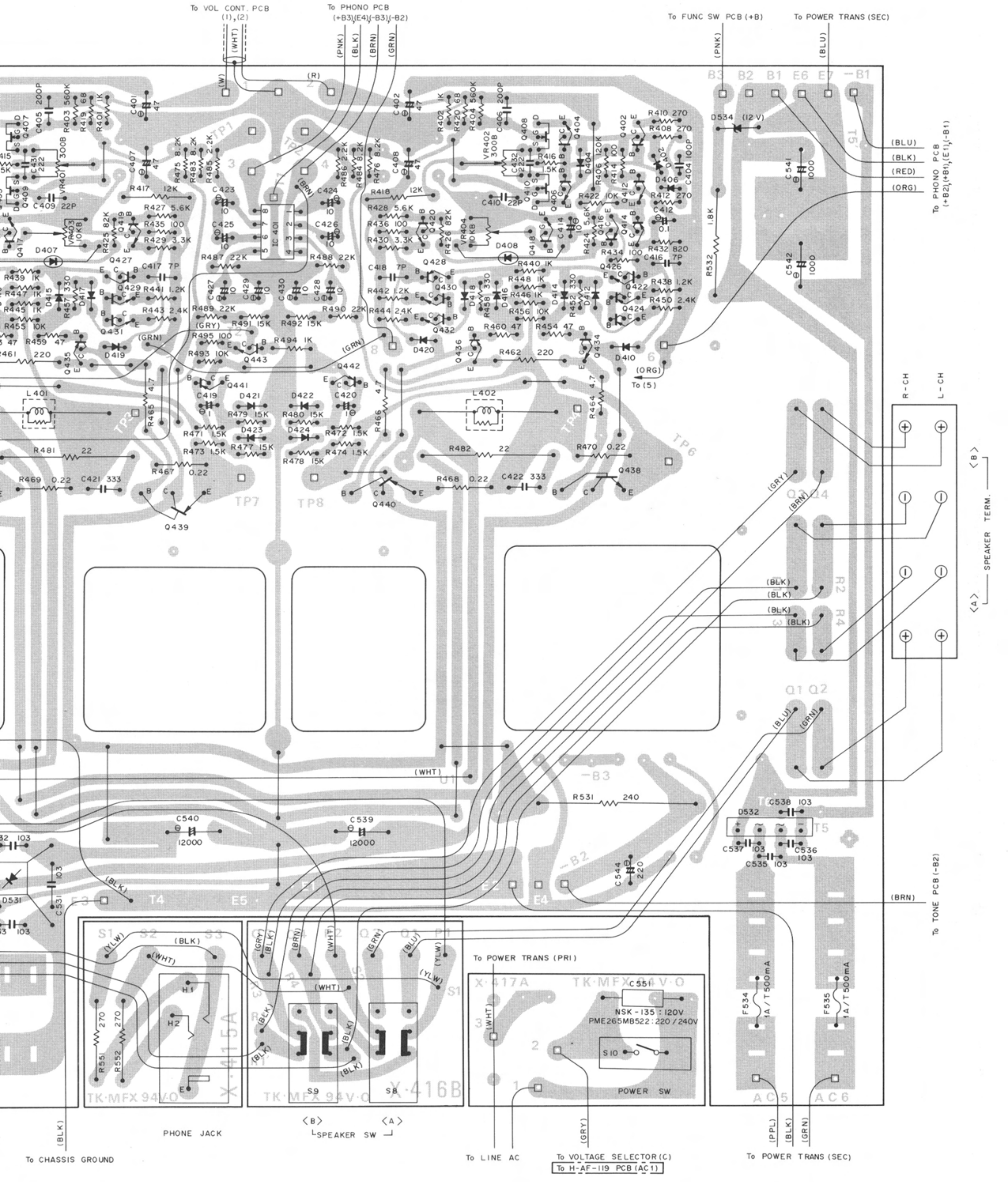
1. VOLTAGE SELECTOR
2. F534, FUSE
3. F535, FUSE
4. SPEAKER 'A' TERMINALS
5. SPEAKER 'B' TERMINALS
6. MAIN AMP AND POWER SUPPLY P-C BOARD
7. Q438, R-CH POWER TRANSISTOR
8. Q440, R-CH POWER TRANSISTOR
9. TAPE MONITOR-2 JACKS
10. TAPE MONITOR-1 JACKS
11. INPUTS JACKS
12. VR404, R-CH IDLING (BIAS) CURRENT ADJ
13. VR402, R-CH MAIN AMP OFF-SET (DC BALANCE) ADJ
14. VR102, R-CH PHONO AMP OFF-SET (DC BALANCE) ADJ
15. PHONO AMP P-C BOARD
16. VR101, L-CH PHONO AMP OFF-SET (DC BALANCE) ADJ
17. VOLUME CONTROL AND MUTING P-C BOARD
18. FUNCTION SELECTOR P-C BOARD
19. VOLUME CONTROL
20. FUNCTION INDICATOR
21. FUNCTION SELECTOR
22. TAPE-2 INDICATOR
23. TAPE-2 SWITCH
24. TAPE-1 SWITCH
25. TAPE-1 INDICATOR
26. BALANCE CONTROL
27. ACOUSTIC CONTROLS
28. EQUALIZER P-C BOARD
29. SPEAKER 'B' SWITCH
30. SPEAKER 'A' SWITCH
31. POWER INDICATOR
32. POWER SWITCH
33. PROTECTION RELAY
34. Q437, L-CH POWER TRANSISTOR
35. VR403, L-CH IDLING (BIAS) CURRENT ADJ
36. VR401, L-CH OFF-SET (DC BALANCE) ADJ
37. Q439, L-CH POWER TRANSISTOR
38. T001, POWER TRANSFORMER

PREAMPLIFIER AND EQUALIZER CIRCUIT

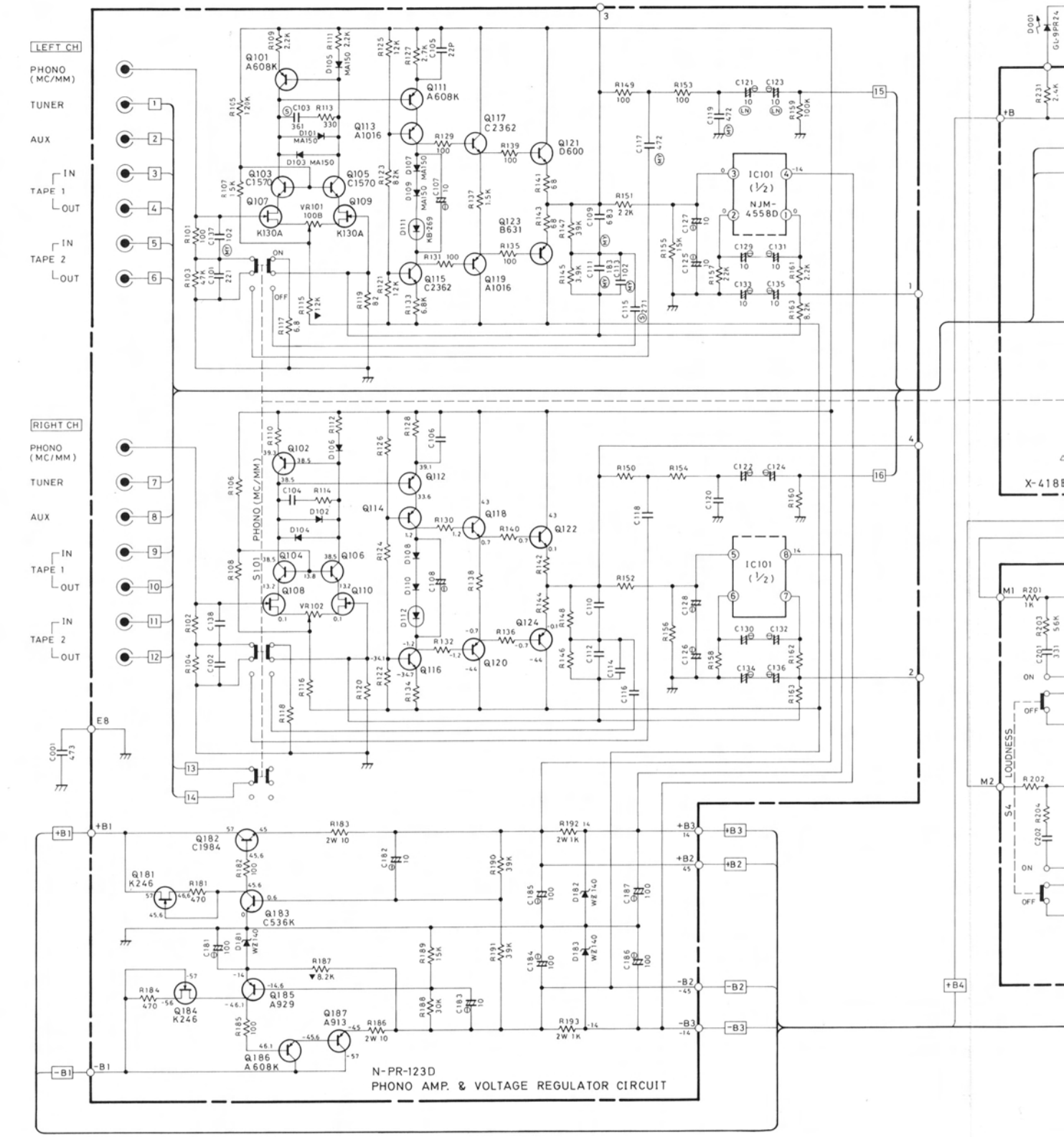


MAIN AMP AND POWER SUPPLY CIRCUIT




To VOL CONT. PCB (1),(2)
To PHONO PCB (+B3),(E4),(-B3),(-B2)
To FUNC SW PCB (+B)
To POWER TRANS (SEC)
To PHONO PCB (+B2),(+B1),(E1),(-B1)
To (5)
R-CH
L-CH
<B>
<A>
SPEAKER TERM.
To TONE PCB (-B2)
To POWER TRANS (PRI)
NSK-135 : 120V
PME265MB522 : 220/240V
POWER SW
PHONE JACK
<B> <A>
SPEAKER SW
To CHASSIS GROUND
To LINE AC
To VOLTAGE SELECTOR (C)
To H-AF-119 PCB (AC1)
To POWER TRANS (SEC)
X-415A
X-416B
X-417A
TK-MFX 94V-0
F534 1A/T500mA
F535 1A/T500mA
C540 12000
C539 12000
IC 401
L401
L402
D534 (12V)
C541 1000
C542 1000
R531 240
C544 220

Schematic Diagram

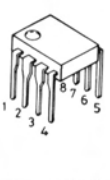


2SC2375
2SC2362
2SA1016
2SA1019
2SC536KNP
2SC1570
2SA929
2SA608KNP

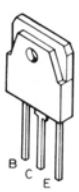
2SA913

2SC1984

2SD600
2SB631



NJM4558D

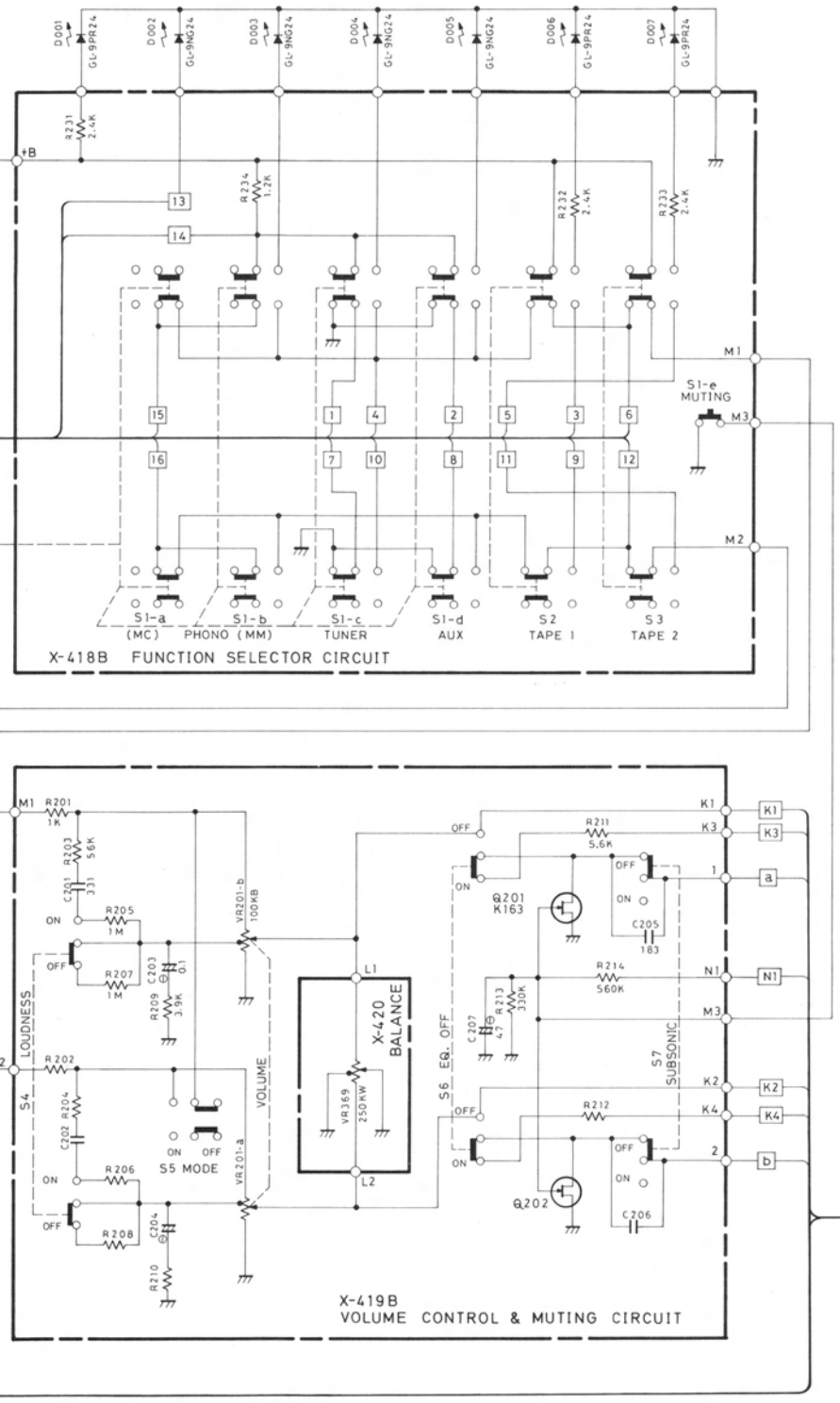


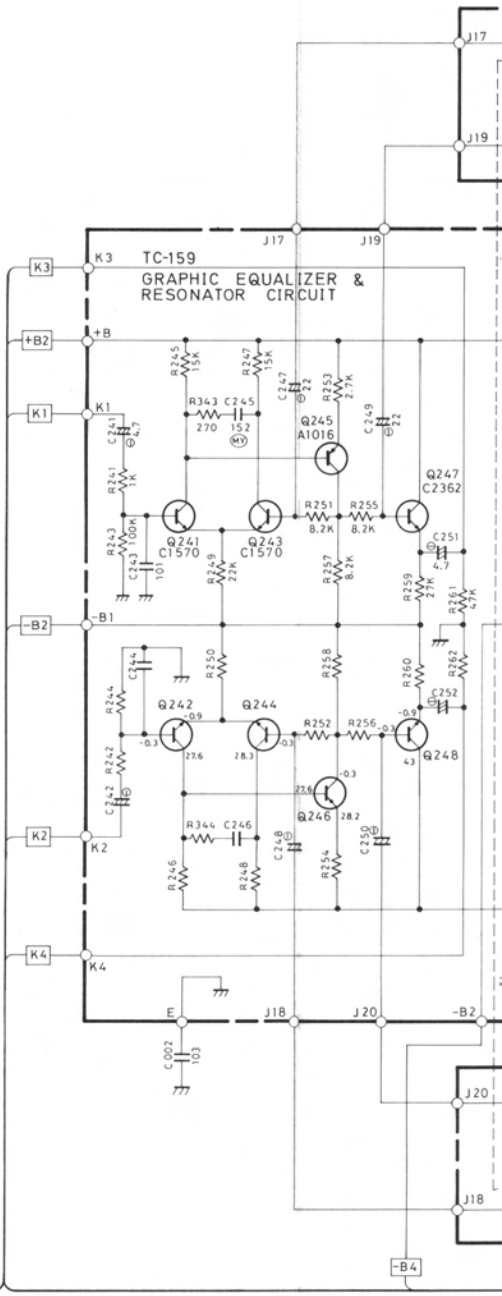
2SC2578
2SA1103

2SK163
2SK130A

2SK246

RES
Unle
noise
K .
M .
▼ .





RA-700 (NO.1)

RA-700

RESISTORS

Unless otherwise specified, resistors are 1/4 watts, low noise type carbon film type with a tolerance of 5%

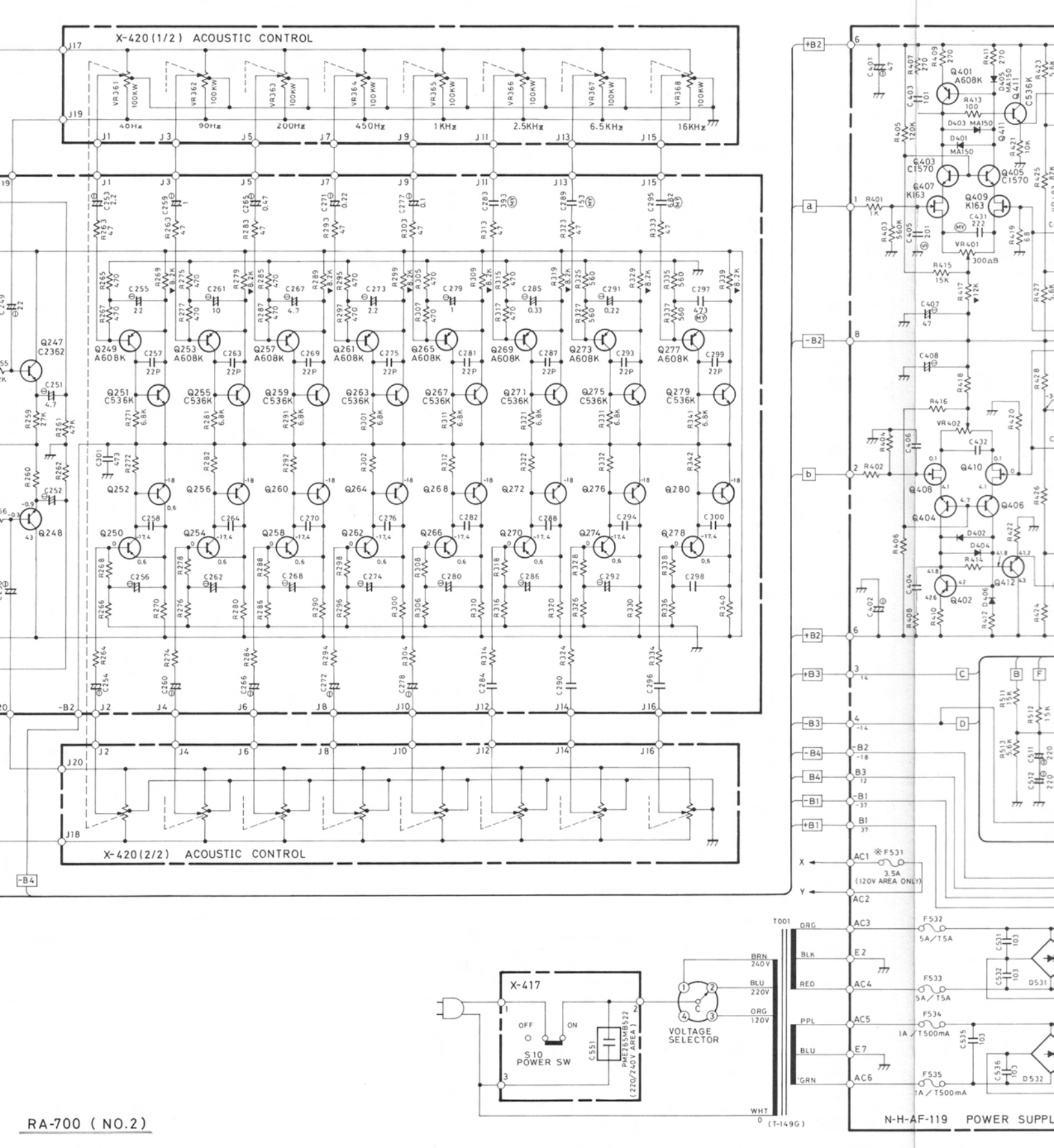
K . . . . . .Kilohm
M . . . . . .Megohm
▼ . . . . . .Uninflammable carbon film resistor, 1/2 watts

CAPACITORS

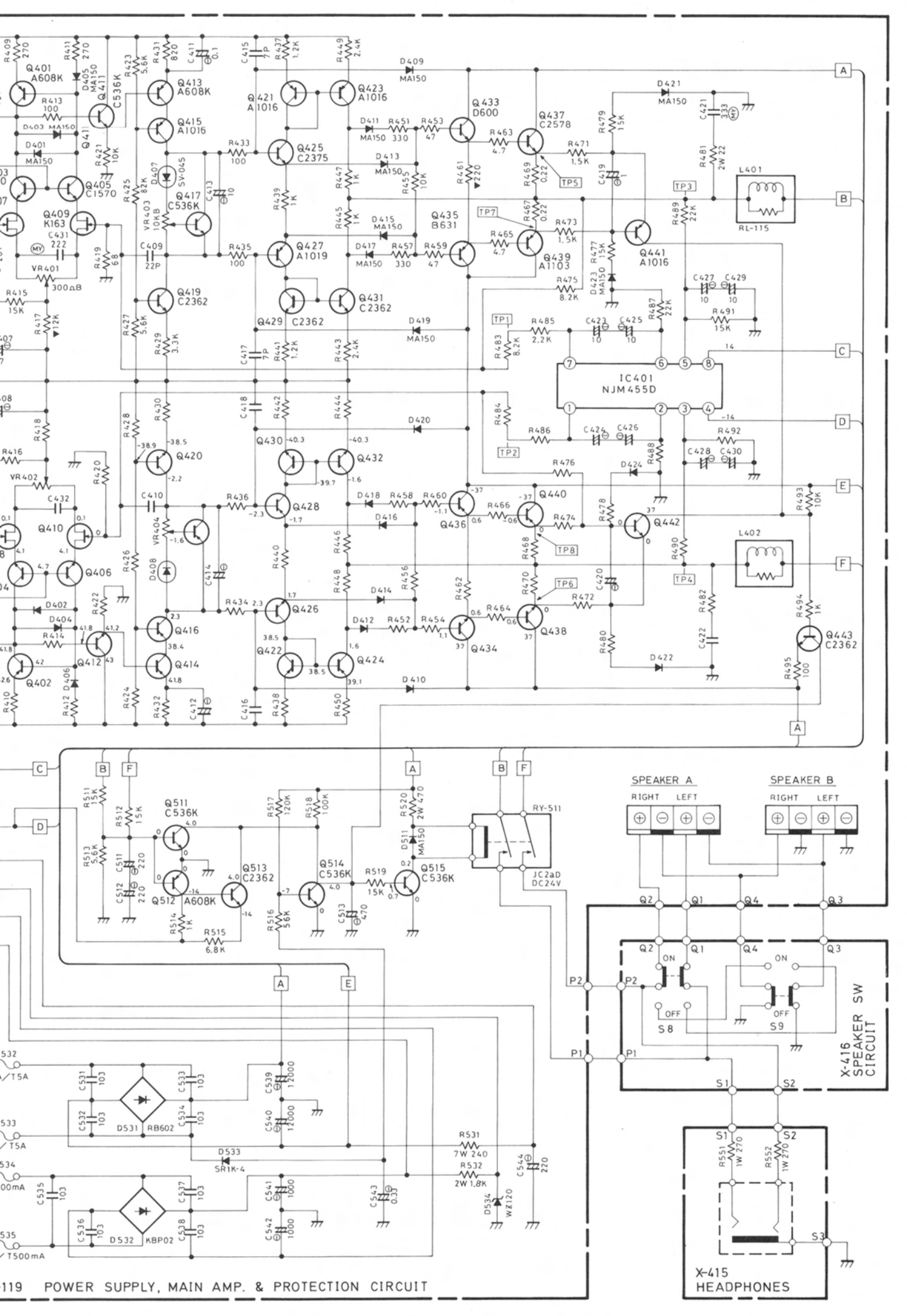
Unless otherwise specified, all capacitance values are expressed in mfd.

S . . . . . .Polystyrene film capacitor
MY . . . . . .Mylar film capacitor
⊣⊢ . . . . . .Electrolytic capacitor
Non mark . . .Ceramic capacitor

- Voltage read with VTVM across the point shown and the chassis ground (line voltage: 120V)
- Voltage reading tolerance: ±20%


X-420(1/2) ACOUSTIC CONTROL
VR361 100KW 40Hz
VR362 100KW 90Hz
VR363 100KW 200Hz
VR364 100KW 450Hz
VR365 100KW 1KHz
VR366 100KW 2.5KHz
VR367 100KW 6.5KHz
VR368 100KW 16KHz
X-420(2/2) ACOUSTIC CONTROL
X-417
S10 POWER SW
OFF
ON
C551
PME265MB522
(220/240V AREA)
VOLTAGE SELECTOR
BRN 240V
BLU 220V
ORG 120V
WHT
T001
ORG
BLK
RED
PPL
BLU
GRN
AC1
AC2
AC3
AC4
AC5
AC6
E2
E7
F531 3.5A (120V AREA ONLY)
F532 5A/T5A
F533 5A/T5A
F534 1A/T500mA
F535 1A/T500mA
D531
D532
+B2
-B2
+B3
-B3
-B4
B4
-B1
+B1
N-H-AF-119 POWER SUPPL

RA-700 (NO.2)



119 POWER SUPPLY, MAIN AMP. & PROTECTION CIRCUIT