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STEREO  
PREAMPLIFIER  
**BETA III**



**SERVICE MANUAL**

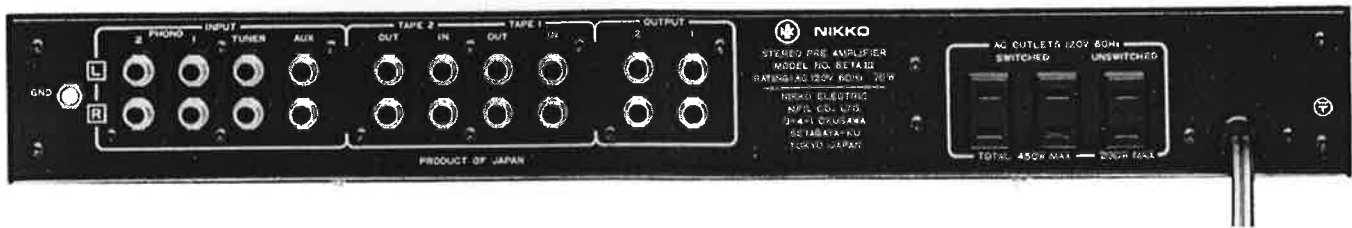
TYPE AND VOLTAGE

<b>W-TYPE</b> UL and CSA type	120V AC
<b>E-TYPE</b> NK-STD type	220/240V AC
<b>N-TYPE</b> DEMKO and SEMKO type	
<b>D-TYPE</b> DIN type	

**NIKKO**

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# SPECIFICATIONS

## Semiconductors:

Bipolar Transistors . . . . .	9
FETs . . . . .	36
Diodes . . . . .	9
LEDs . . . . .	1
Zener Diodes . . . . .	3

## Total Harmonic Distortion (20Hz to 20kHz):

Phono 1, 2 to Tape Out (3V output) . . . . .	.0004%
Tuner to Output (2V output) . . . . .	.0005%
Aux to Output (2V output) . . . . .	.0005%
Tape in 1, 2 to Output (2V output) . . . . .	.0005%

## Input Sensitivity (1kHz, 1V output):

Phono 1, 2 to Output . . . . .	.20mV
Tuner to Output . . . . .	.110mV
Aux to Output . . . . .	.110mV
Tape in 1, 2 to Output . . . . .	.110mV

## Maximum Input Signal (1kHz, 0.05%THD):

Phono 1, 2 . . . . .	350mV
Tuner . . . . .	2000mV
Aux . . . . .	2000mV
Tape In 1, 2 . . . . .	2000mV

## Input Impedance (1kHz, 1V output):

Phono 1, 2 . . . . .	22k/47k/100kohms
Tuner . . . . .	47kohms
Aux . . . . .	47kohms
Tape In 1, 2 . . . . .	47kohms

## Output Level (1kHz, 2mV input):

Phono 1, 2 to Tape Out 1, 2 . . . . .	.100mV
Phono 1, 2 to Output 1, 2 . . . . .	.950mV

## Output Impedance:

Tape Out 1, 2 . . . . .	2.2kohms
Output 1, 2 . . . . .	100ohms

## Signal to Noise Ratio (IHF A network):

Phono 1, 2 . . . . .	81dB
Tuner . . . . .	100dB
Aux . . . . .	100dB
Tape In 1, 2 . . . . .	100dB

## Frequency Response (10Hz to 50kHz):

Tuner . . . . .	±0.5dB
Aux . . . . .	±0.5dB
Tape In 1, 2 . . . . .	±0.5dB

## RIAA Equalization Deviation

### (30Hz to 15kHz):

Phono to Tape Out 1, 2 . . . . .	±0.2dB
----------------------------------	--------

## Tape Controls:

Bass (50Hz) . . . . .	±10dB
Treble (20kHz) . . . . .	±10dB

## Filters:

Subsonic . . . . .	20Hz—12dB/oct.
Low Cut . . . . .	40Hz—6dB/oct.

## Mute Time . . . . .

.3 second

## Power Input:

W-Type . . . . .	120V AC, 60Hz
E-Type, N-Type, D-Type . . . . .	220V or 240V AC, 50Hz

## Power Consumption:

W-Type . . . . .	20watts
E-Type, N-Type, D-Type . . . . .	23watts

## Dimensions:

Width . . . . .	19in. (482mm)
Height . . . . .	2-3/22in. (63.5mm)
Depth . . . . .	13in. (330mm)
Weight . . . . .	13 lbs. (5.9kg)

Specifications subject to change without notice.

# DISASSEMBLY

## CABINET COVER REMOVAL

Remove four tapping screws from the top of the metal cover. Remove four screws from both sides of the metal cover.

## BOTTOM PLATE REMOVAL

Remove eight tapping screws (no. 1—8) (Photo 1).

## FRONT PANEL REMOVAL

- As indicated in Photo 2, disconnect LED connector (2A) (Photo 2) from the LED mounted on the front panel by pulling it backward.
  - Remove six knobs (no. 1, 6—10) (Photo 2) from the front panel by pulling them forward.
  - Using a hexagon wrench, remove five screws (no. 2—5, 11) (Photo 2).
  - Remove two (three) nuts (no. 1, 2 (3) ) (Photo 3) and lift out the front panel.
- To reassemble, reverse the procedure.

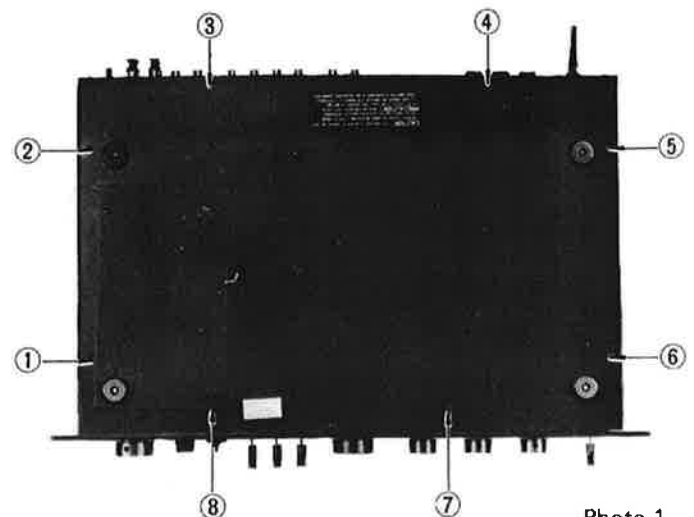


Photo 1

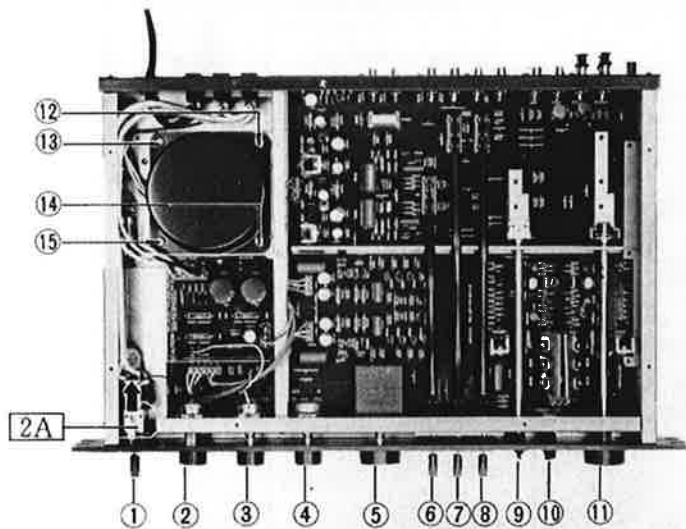


Photo 2

### POWER TRANSFORMER REMOVAL

1. Disconnect all wires from the power transformer.
  2. Remove four tapping screws (no. 12–15) (Photo 2) and lift the power transformer up and out of chassis.
- To reassemble, reverse the procedure.



Photo 3

## ALIGNMENT

### TEST EQUIPMENT

Allow a minimum of 10 minutes warm-up for test equipment.

Maintain rated line voltage.

DC Voltmeter

### LEFT/RIGHT CHANNEL EQ AMP DC BALANCE ADJUSTMENT

NOTE: See illustration, Figure 1. for test equipment hook-up.

1. Connect DC voltmeter to test points 13/15 and 14 on preamp PC board.
2. Adjust potentiometer R417/R418 for a  $0 \pm 2.0V$  DC voltmeter reading.
3. Remove DC voltmeter.

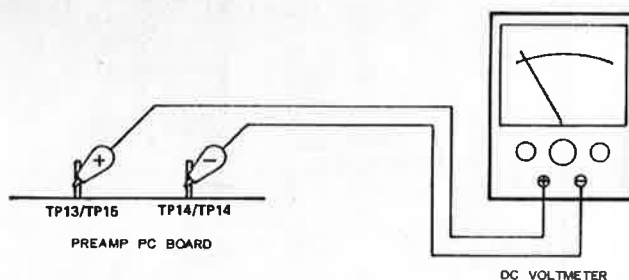
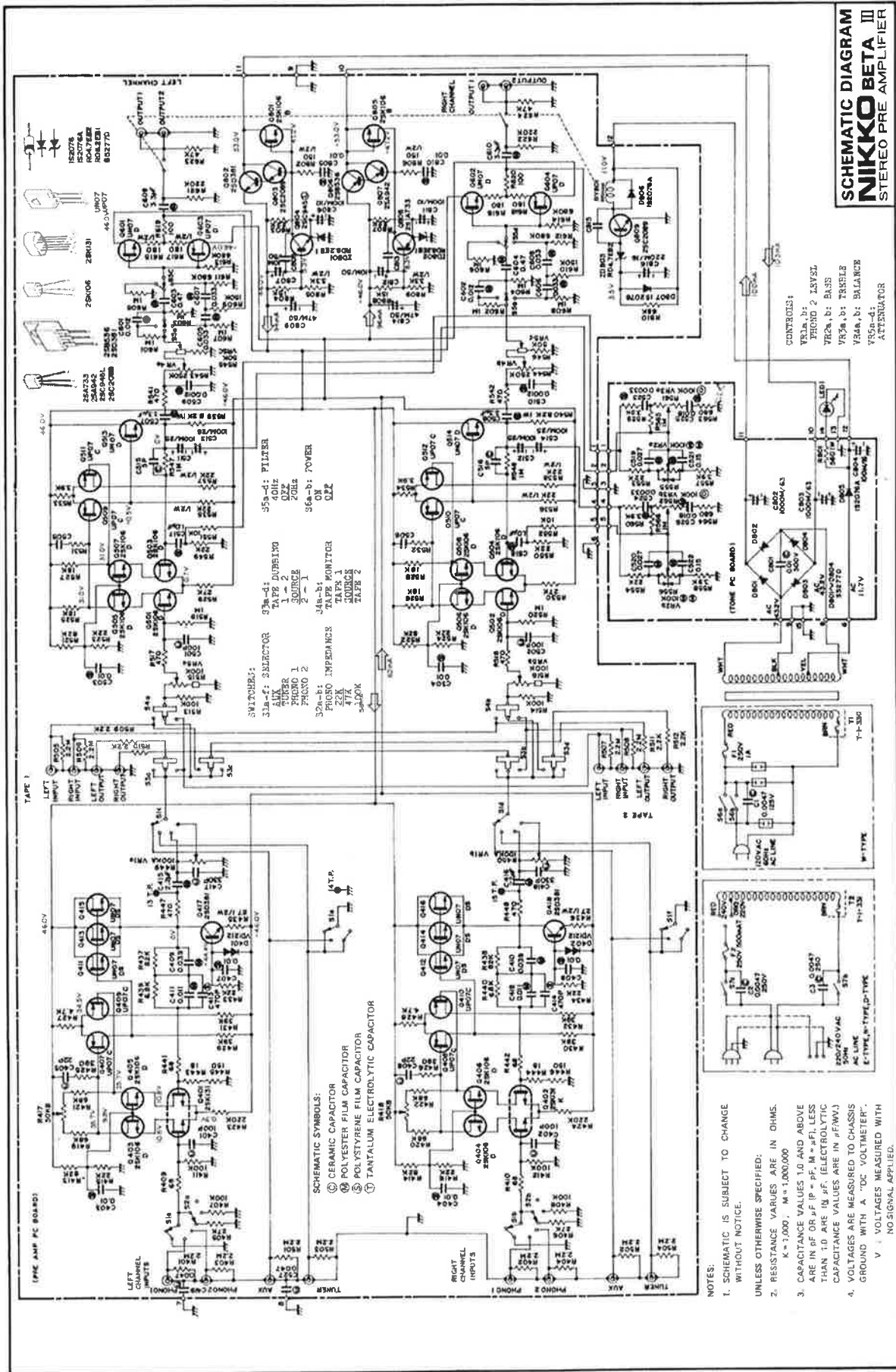
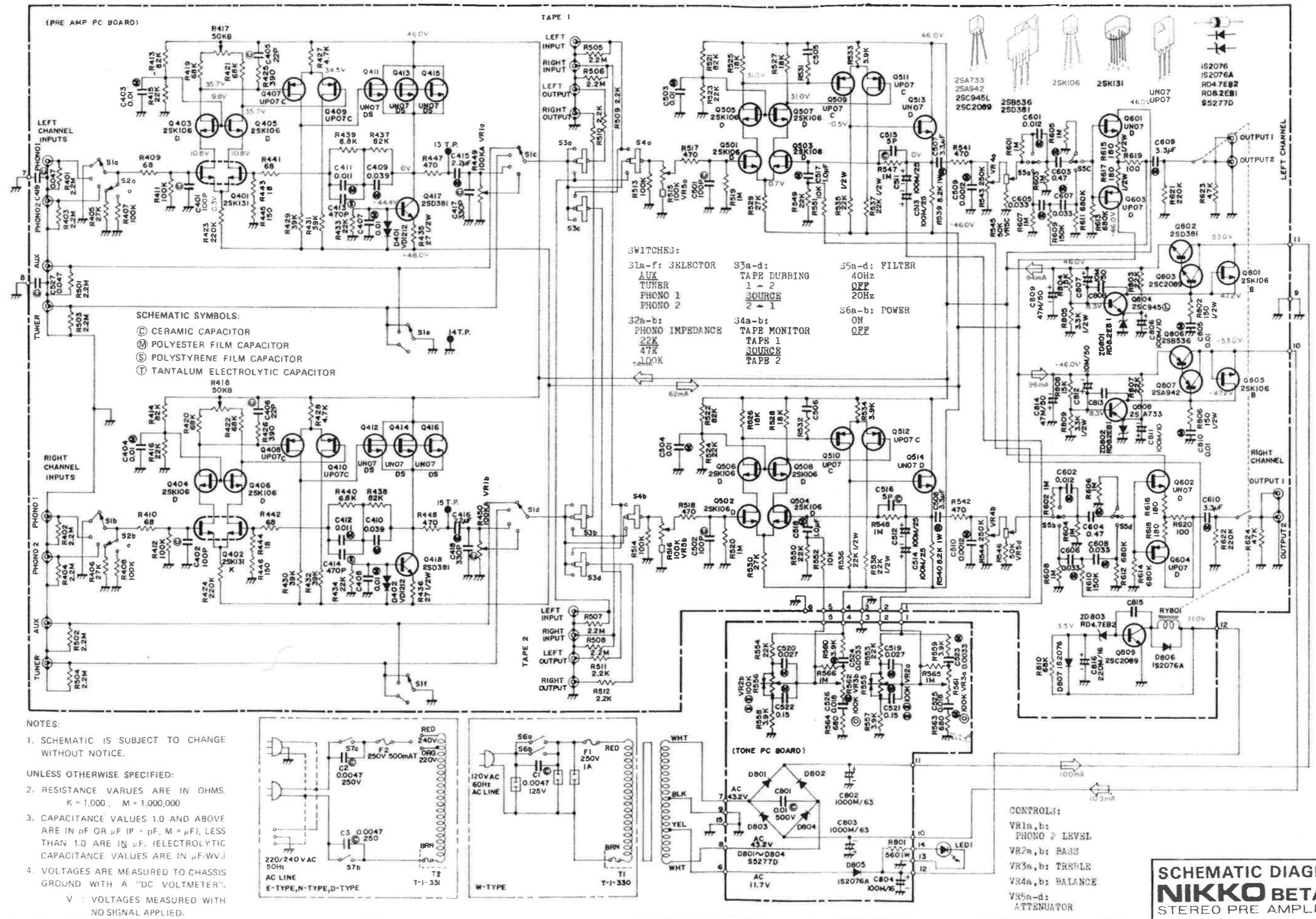


Figure 1. Test Equipment Hook-up

# SCHEMATIC DIAGRAM



**SCHEMATIC DIAGRAM**  
**NIKKO BETA**  
**STEREO PRE AMPLIFIER**



SCHEMATIC DIAGRAM  
**NIKKO BETA III**  
STEREO PRE AMPLIFIER



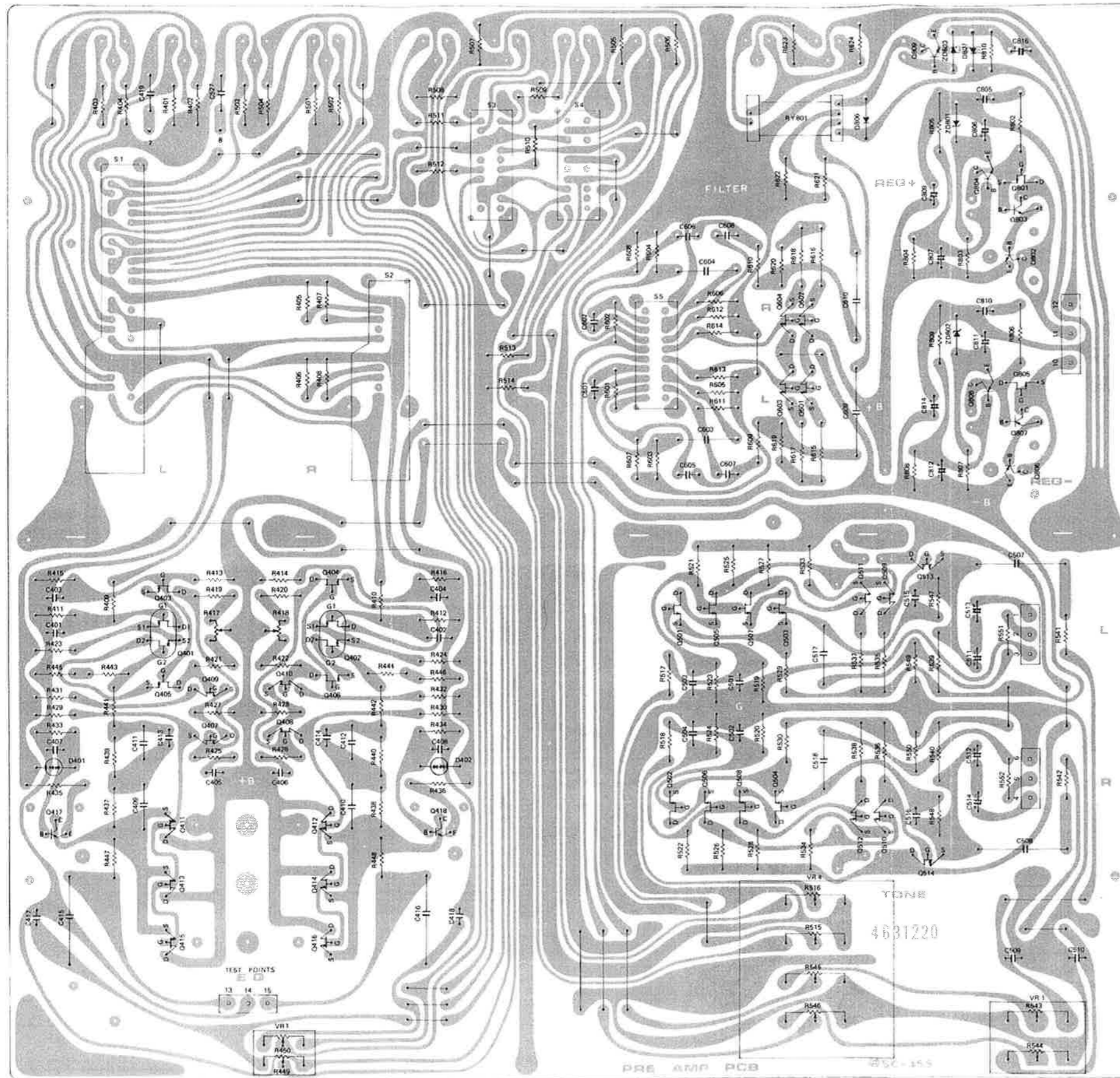


Figure 2. Preamp PC Board (Bottom View)

- ① To 1, TONE PC BOARD
- ② To 2, TONE PC BOARD
- ③ To 3, TONE PC BOARD
- ④ To 4, TONE PC BOARD
- ⑤ To 5, TONE PC BOARD
- ⑥ NO CONNECTION
- ⑦⑧ To GND TERMINAL, BACK PLATE
- ⑨ To CHASSIS GROUND
- ⑩ To 10, TONE PC BOARD
- ⑪ To 11, TONE PC BOARD
- ⑫ To 12, TONE PC BOARD

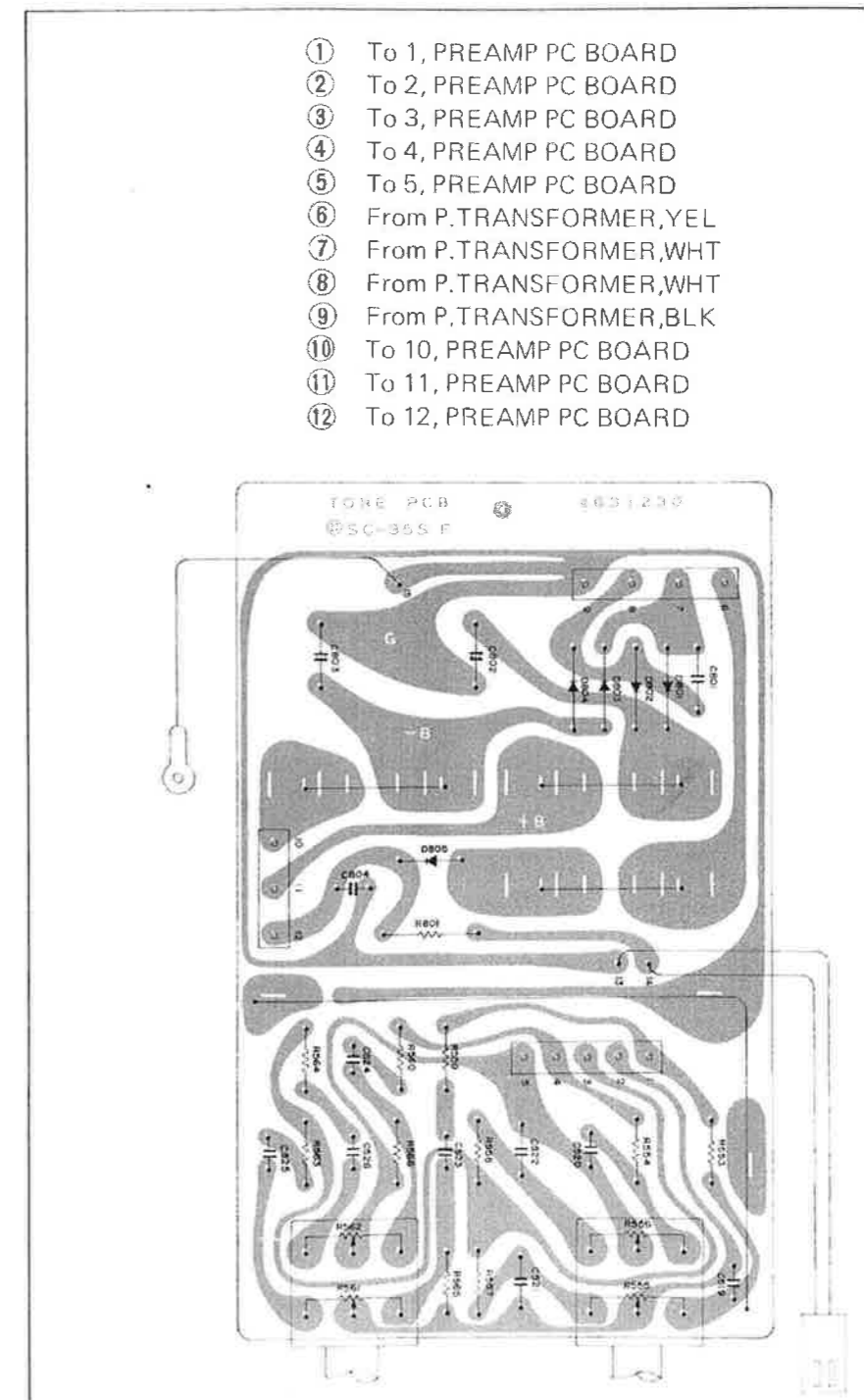


Figure 3. Tone PC Board (Bottom View)

# PARTS LOCATION

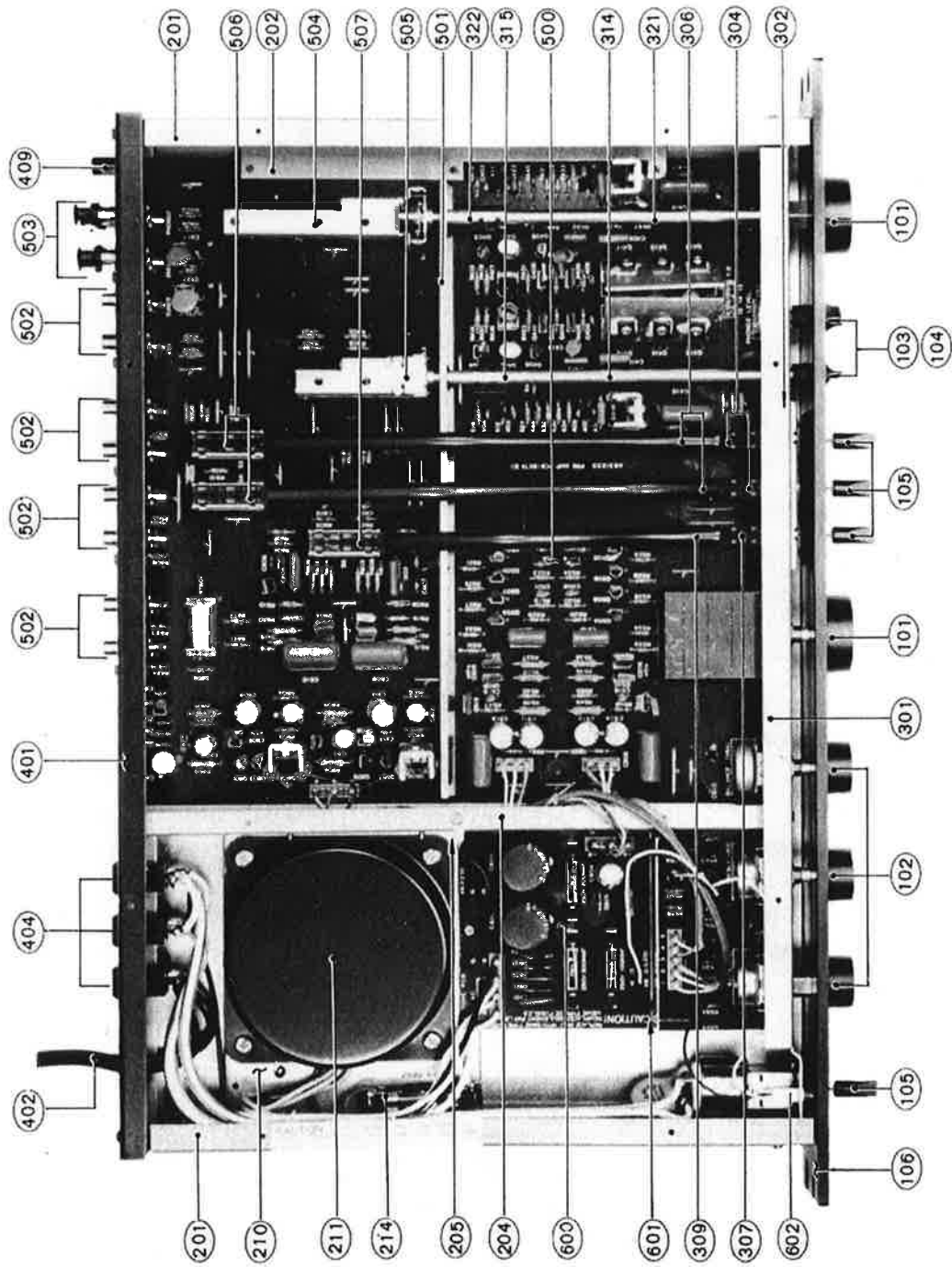


Photo 4



# PARTS LIST

## NOTES:

1. ★ The KEY NUMBER (#) marked with a (★) on parts list relate to numbers of three digits with a (○). (Photo 4)
2. + Numerals in file indicate the quantity of parts used in one type.
3. ++ FET: Field effect transistor  
IC: Integrated circuit  
VR: Volume control (Variable resistor)  
RES: Carbon film fixed resistor  
MO-RES: Metal oxide film fixed resistor  
CEM-RES: Cemented wirewound fixed resistor  
NF: Nonflammable  
C-CAP: Ceramic capacitor  
E-CAP: Aluminium electrolytic capacitor  
M-CAP: Polyester film capacitor  
S-CAP: Polystyrene film capacitor

T-CAP: Tantalum electrolytic capacitor  
BP-CAP: Bipolar electrolytic capacitor  
E-CAP, T-CAP and BP-CAP values (1 x 10uF, 10) WV.

4. Assembled and parts are subject to change without notice.
5. Parts ordering procedure:
  - A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER (these are control # for the factory only.)
  - B. Include in any order.
    - a. Part number.
    - b. Part description.
    - c. Model number.
 (any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE+ W-type U-type C-type D-type	DESCRIPTION++	PART NO.
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### PACKING MATERIALS & ACCESSORIES

001		1 1 1 1	Carton	9825430
002		1 1 1 1	Pad (L)	9840750
003		1 1 1 1	Pad (R)	9840760
004		1 1 1 1	Sack, polyethylene cloth	9640650
005		1 1 1 1	Dryer, SILICA GEL	9890010
006		1 1 1 1	Sack (#13), polyethylene cloth	9640320
007a		1 - - -	Manual (E), instruction	980246E
007b			Manual (SEI), instruction	
007c		- 1 1 -	Manual (K), instruction	960247K
007d		- - - 1	Manual (G), instruction	
008		1 1 1 1	Cloth, polishing	9690040
009		1 1 1 1	Cord 2T-1(NK), phono pin plug	962014A
010		4 4 4 4	Plug, shorting pin	4440180

### CABINET ASSEMBLY

101a		2 2 2 2	Knob, 2GL-34D - SELECTOR/ATTE-NUATOR <<GOLD MODEL>>	7851460
★101b		2 2 2 2	Knob, 2BK-34D - SELECTOR/ATTE-NUATOR <<BLACK MODEL>>	7851740
102a		3 3 3 3	Knob, 2GL-23D - BALANCE/BASS/TREBLE <<GOLD MODEL>>	7851670
★102b		3 3 3 3	Knob, 2BK-23D - BALANCE/BASS/TREBLE <<BLACK MODEL>>	7851770
★103		2 2 2 2	Knob, P2BK-16LVD - PHONO IMPED-ANCE/PHONO 2 LEVEL	7851800
★104		2 2 2 2	Washer, POLY SL 10φ - for P2BK-16LVD	7001920
105a		4 4 4 4	Knob, tab type, 15GL-8LS - DUBBING/MONITOR/FILTER/POWER <<GOLD MODEL>>	7841110
★105b		4 4 4 4	Knob, tab type, 15BK-8LS - DUBBING, MONITOR/FILTER/POWER <<BLACK MODEL>>	7841120
106a		1 1 1 1	Panel (G), front - <<GOLD MODEL>>	7884150
★106b		1 1 1 -	Panel (BW), front - <<BLACK MODEL>>	7884160
106c		- - - 1	Panel (BY), front - <<BLACK MODEL>>	
107		1 1 1 1	Cloth, DUST COV (3) - for dubbing, monitor, filter switches	7001960

KEY NO.	SYMBOL NO.	TYPE+ W-type U-type C-type D-type	DESCRIPTION++	PART NO.
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108		1 1 1 1	Cloth, DUST COV 2442 - for power switch	7001760
★109		1 1 1 1	LED, GD-4-207RD	5060010
110		3 3 3 3	Nut, SN 9φ	892249S
111		3 3 3 3	Washer, W 9φ	893109S
★112a		1 - - -	Cover, metal	7820870
112b		- 1 1 1	Cover, metal	7820880
113		4 4 4 4	Screw, TFTS 4φ x 10	887410W
114		4 4 4 4	Washer, W 4φ	893104W
115		4 4 4 4	Screw, PTS 3φ x 6	814306W
116		1 1 1 1	Plate, bottom	7325210
117		6 6 6 6	Screw, PTS 3φ x 6 BLK	814306W
118		1 1 1 1	Plate, bottom shield	7226700
119		4 4 4 4	Screw, PTS 3φ x 6 BLK	814306W
120		4 4 4 4	Foot	7401350
121		4 4 4 4	Screw, PTS 3φ x 8	814308S

### CHASSIS ASSEMBLY

★201		2 2 2 2	Angle, side	7226630
★202		1 1 1 1	Holder, PC board	7226650
203		8 8 8 8	Screw, PTS 3φ x 6	814306S
★204		1 1 1 1	Angle, center	7226670
★205		1 1 1 1	Lug, solder	4400000
206		3 3 3 3	Screw, PTS 3φ x 6 (Front Plate Assembly)	814306S
207		2 2 2 2	Screw, PTS 3φ x 6 (Back Plate Assembly)	814306S
208		6 5 5 5	Screw, PTS 3φ x 6 BLK	814306W
209		10111111	Screw, PTS 3φ x 8 BLK	814308W
★210		1 1 1 1	Holder, power transformer	7226670
★211a	T1	1 - - -	Transformer, power, T-1-330 - 120V only	1103300
211b	T2	- 1 1 1	Transformer, power, T-1-331 - 220/240V	1103310
212		4 4 4 4	Screw, BLTS 4φ x 6	874406S
213		4 4 4 4	Washer, TW(1) 4φ	893404U
★214a	F1	1 - - -	Fuse, 1A	4700590
215b		1 - - -	Holder, fuse	4581840
216c		1 - - -	Screw, PTS 3φ x 10	814310S
214a	F2	- 1 1 1	Fuse, midget, 500mAT - time-lag	4720310
215b		- 1 1 1	Holder, midget fuse	4581430

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KEY NO.	SYMBOL NO.	TYPE+	DESCRIPTION++	PART NO.
		W-type-u -type-c -type-d -type-g E-Z-D		
216c		- 1 1 1	Screw. PTS 3φ x 8  (PRE AMP PCB ASSY)	814308S
217		1 1 1 1	Spacer (#885) - for attenuator	7152230
218		2 2 2 2	Screw. PTS 3φ x 8	814308S
219		1 1 1 1	Washer. TW(I) 3φ (TONE PCB ASSY)	893403U
220		1 1 1 1	Spacer (#885) - for bass control	7152230
221		2 2 2 2	Screw. PTS 3φ x 6	814306S
222		1 1 1 1	Washer. TW(I) 3φ	893403U

KEY NO.	SYMBOL NO.	TYPE+	DESCRIPTION++	PART NO.
		W-type-u -type-c -type-d -type-g E-Z-D		
403b		1 1 1 1	Bracket (EH), cord stopper	7029800
★404		3 - - -	Socket, AC	4500150
405		- 1 1 1	Plate, blind	7031690
406		2 1 1 1	Screw. PTS 3φ x 6 BLK	814306W
407		- 1 1 1	Screw. PTS 3φ x 8 BLK	814308W
408		1 1 1 1	Shaft (MK-3), ground terminal	7152050
★409		1 1 1 1	Nut (MK-2), ground terminal	7152060
410		1 1 1 1	Washer. W 3φ	893203D
411		1 1 1 1	Nut. 1N 3φ	892013S
412		1 1 1 1	Washer. TW(I) 3φ	893403U
413		1 1 1 1	Lug, solder	4400000

**FRONT PLATE ASSEMBLY**

★301		1 1 1 1	Plate, front	7325220
★302		1 1 1 1	Holder, lever switch	7226640
303		3 3 3 3	Screw. PTS 3φ x 6 Dubbing/Monitor Switch	814306S
★304		2 2 2 2	Lever Section. SLL02301D	4025340
305		4 4 4 4	Screw. PMS 3φ x 6	810306S
★306		2 2 2 2	Wire Section. SWR-216MM Filter Switch	4582360
★307		1 1 1 1	Lever Section. SLL02301D	4025340
308		2 2 2 2	Screw. PMS 3φ x 6	810306S
★309		1 1 1 1	Wire Section. SWR-168MM	4582350
★310		1 1 1 1	Bearing - for phono impedance	7152340
311		1 1 1 1	Nut. SN 9φ	892249S
312		1 1 1 1	Washer. TW(I) 9φ	893409U
313		1 1 1 1	Washer. W 9φ	893109S
★314		1 1 1 1	Shaft	7152390
★315		1 1 1 1	Joint	7121060
316		4 4 4 4	Screw. SET SCW 3 x 4	7121070
★317		1 1 1 1	Bearing - for selector switch	7152340
318		1 1 1 1	Spacer (#985)	7152240
319		1 1 1 1	Washer. TW(I) 9φ	893409U
320		1 1 1 1	Washer. W 9φ	893109S
★321		1 1 1 1	Shaft	7152390
★322		1 1 1 1	Joint	7121060
323		4 4 4 4	Screw. SET SCW 3 x 4	7121070
324a	S6	1 - - -	Switch, lever - POWER	4025290
324b	S7	- 1 1 1	Switch, lever - POWER	4025150
325		2 2 2 2	Screw. PMS 3φ x 6	810306S
326	C1	1 - - -	C-CAP 0.0047uf 125VAC	239472C
327	C2, C3	- 2 2 2	C-CAP 0.0047uf 250VAC	239472E
328		- 2 2 2	Cover (M), C-CAP	7400980

**BACK PLATE ASSEMBLY**

★401a		1 - - -	Plate, back	7325230
401b		- 1 1 1	Plate, back	7325240
★402a		1 - - -	Cord, AC line. SPT-2	606008A
402b		- 1 1 1	Cord, AC line. CEE-2T	600508A
403a		1 1 1 1	Stopper, Cord. SR-4N-4	7400690

**PREAMP PC BOARD**

★500		1 1 1 1	PC Board, complete. PRE AMP PCB ASSY	9441350
★501		1 1 1 1	PCB Stay	7226680
★502		4 4 4 4	Terminals, pin jack. CB 2P x 2 (SE) - TUNER, AUX/TAPE 1/TAPE 2/OUT-PUT	4444030
★503		1 1 1 1	Terminals, pin jack. CB 2P x 2 (G) - PHONO	4444050
(EQ AMP SECTION)				
C401,C402		2 2 2 2	C-CAP 100pf 10% 50V SL	232101K
C403,C404		2 2 2 2	M-CAP 0.01uf 10% 50V	222103K
C405,C406		2 2 2 2	C-CAP 22pf 10% 50V SL	232220K
C407,C408		2 2 2 2	M-CAP 0.01uf 10% 50V	222103K
C409,C410		2 2 2 2	M-CAP 0.039uf 2% 50V ECQ-P	228393G
C411,C412		2 2 2 2	M-CAP 0.011uf 2% 50V ECQ-P	228113G
C413,C414		2 2 2 2	S-CAP 470pf 5% 50V	223471V
C415,C416		2 2 2 2	M-CAP 2.2uf 10% 100V	282225K
C417,C418		2 2 2 2	C-CAP 330pf 10% 50V SL	232331K
C419		1 1 1 1	C-CAP 0.047uf 80, -20% 50V YG	231473Z
D401,D402		2 2 2 2	Diode. VD1212	505016S
Q401,D402		2 2 2 2	FET 2SK131(K)	516028S
Q403				
~Q406		2 2 2 2	FET 2SK106(D)	516029S
Q407				
~Q410		4 4 4 4	FET UP07(C)	517004S
Q411				
~Q416		6 6 6 6	FET UN07(DS)	516030S
Q417,Q418		2 2 2 2	Transistor. 2SD381(M,N)	510038S
R401				
~R404		4 4 4 4	RES 2.2megohm 5% 1/4W	328225J
R405,R406		2 2 2 2	RES 27kohm 5% 1/4W	328273J
R407,R408		2 2 2 2	RES 100kohm 5% 1/4W	328104J
R409,R410		2 2 2 2	RES 68ohm 5% 1/4W	328680J
R411,R412		2 2 2 2	RES 100kohm 5% 1/4W	328104J
R413,R414		2 2 2 2	RES 82kohm 5% 1/4W	328823J
R415,R416		2 2 2 2	RES 22kohm 5% 1/4W	328223J
R417,R418		2 2 2 2	Potentiometer. B50kohm (M-HVR-RVG-0911V)	4300840
R419				
~R422		4 4 4 4	RES 68kohm 5% 1/4W	328683J

**PART ORDERING PROCEDURE** . . . . . A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only)  
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KEY NO.	SYMBOL NO.	TYPE+ W-type-u E-type-n Z-type-d D-type-g	DESCRIPTION++	PART NO.	KEY NO.	SYMBOL NO.	TYPE+ W-type-u E-type-n Z-type-d D-type-g	DESCRIPTION++	PART NO.
	R423,R424	2 2 2 2	RES 220kohm 5% 1/4W	328224J		R541,R542	2 2 2 2	RES 470ohm 5% 1/4W	328471J
	R425,R426	2 2 2 2	RES 390ohm 5% 1/4W	328391J		R543+R544		-VR4-	
	R427,R428	2 2 2 2	RES 4.7kohm 5% 1/4W	328472J		R545+R546		-1/2 VR5-	
	R429,R430	2 2 2 2	RES 39kohm 5% 1/4W	328393J		R547,R548	2 2 2 2	RES 1megohm 5% 1/4W	328105J
	R433,R434	2 2 2 2	RES 22kohm 5% 1/4W	328223J		R549,R550	2 2 2 2	RES 22kohm 5% 1/4W	328223J
	R435,R436	2 2 2 2	NF-MO-RES 27ohm 5% 1/2W	360270L		R551,R552	2 2 2 2	RES 10kohm 5% 1/4W	328103J
	R437,R438	2 2 2 2	M-RES 82kohm 2% 1/4W MR25G	304823G					
	R439,R440	2 2 2 2	M-RES 6.8kohm 2% 1/4W MR25G	304682G	★506	S3, S4	2 2 2 2	Switch, lever slide, SSR24302D - DUBBING/MONITOR	4020530
	R441,R442	2 2 2 2	RES 68ohm 5% 1/4W	328680J		VR4	1 1 1 1	VR MN250kohm(GJ60E024) - BALANCE	4320820
	R443,R444	2 2 2 2	RES 18ohm 5% 1/4W	328180J		VR5	1 1 1 1	VR S50kohm x 2 + S100kohm x 2 (WKHJ-110A03) - ATTENUATOR	4390140
	R445,R446	2 2 2 2	RES 150ohm 5% 1/4W	328151J					
	R447,R448	2 2 2 2	RES 470ohm 5% 1/4W	328471J					
	R449+R450		-VR1-						
★504	S1	1 1 1 1	Switch, rotary slide. SRZ-K084S - SELECTOR	4055150					
★505	S2	1 1 1 1	Switch, rotary slide. SRZ-V043S - PHONO IMPEDANCE	4051090					
	VR1	1 1 1 1	VR A100kohm x 2(GM80R540C) - PHONO 2 LEVEL	4320830				(FILTER AMP SECTION)	
		2 2 2 2	Heat Sink - for Q411~413/Q414~416	7082060		C601,C602	2 2 2 2	M-CAP 0.012uf 10% 50V	222123K
	10101010		Screw. PTS 3φ x 8	814308S		C603,C604	2 2 2 2	M-CAP 0.47uf 10% 100V	282474K
		2 2 2 2	Washer. TW(1) 3φ	893403U		C605			
		2 2 2 2	Heat Sink (S10) - for Q417, Q418	7081820		~C608	4 4 4 4	M-CAP 0.033uf 10% 50V	222333K
		2 2 2 2	Screw. PMS 3φ x 6	810306S		C609,C610	2 2 2 2	M-CAP 3.3uf 10% 100V	282335K
		2 2 2 2	Washer. TW(1) 3φ	893403U					
						Q601,Q602	2 2 2 2	FET UN07(D)	516031S
						Q603,Q604	2 2 2 2	FET UP07(D)	517003S
			(FLAT AMP SECTION)			R601			
	C501,C502	2 2 2 2	C-CAP 100pt 10% 50V SL	232101K		~R608	8 8 8 8	RES 1megohm 5% 1/4W	328105J
	C503,C504	2 2 2 2	M-CAP 0.01uf 10% 50V	222103K		R609,R610	2 2 2 2	RES 150kohm 5% 1/4W	328154J
	C505,C506		-DELETED-			R611			
	C507,C508	2 2 2 2	M-CAP 3.3uf 10% 100V	282335K		~R614	4 4 4 4	RES 680kohm 5% 1/4W	328684J
	C509,C510	2 2 2 2	M-CAP 0.0012uf 10% 50V	222122K		R615			
	C511					~R618	4 4 4 4	MO-RES 180ohm 5% 1/2W	360181L
	~C514	2 2 2 2	E-CAP 25R100uf	211330V		R619,R620	2 2 2 2	RES 100ohm 5% 1/4W	328101J
	C515,C516	2 2 2 2	C-CAP 5pf ±0.5pf 50V SL	232509D		R621,R622	2 2 2 2	RES 220kohm 5% 1/4W	328224J
	C517,C518	2 2 2 2	M-CAP 1uf 10% 100V	282105K		R623,R624	2 2 2 2	RES 47kohm 5% 1/4W	328473J
	C527	1 1 1 1	C-CAP 0.047uf 80, -20% 50V YG	231473Z	★507	S5	1 1 1 1	Switch, lever slide. SSR24301D - FILTER	4020520
	Q501								
	~Q508	8 8 8 8	FET 2SK106(D)	516029S					
	Q509							(REGULATOR SECTION)	
	~Q512	4 4 4 4	FET UP07(C)	517004S		C805	1 1 1 1	M-CAP 0.01uf 10% 50V	222103J
	Q513,Q514	2 2 2 2	FET UN07(D)	516031S		C806	1 1 1 1	E-CAP 10R100uf	211130V
						C807	1 1 1 1	E-CAP 50R10uf	211520V
	R501					C808		-DELETED-	
	~R508	2 2 2 2	RES 2.2megohm 5% 1/4W	328225J		C809	1 1 1 1	E-CAP 50R47uf	211525V
	R509					C810	1 1 1 1	M-CAP 0.01uf 10% 50V	222103J
	~R512	2 2 2 2	RES 2.2kohm 5% 1/4W	328222J		C811	1 1 1 1	E-CAP 10R100uf	211130V
	R513,R514	2 2 2 2	RES 100kohm 5% 1/4W	328104J		C812	1 1 1 1	E-CAP 50R10uf	211520V
	R515+R516		-1/2 VR5-			C813		-DELETED-	
	R517,R518	2 2 2 2	RES 470ohm 5% 1/4W	328471J		C814	1 1 1 1	E-CAP 50R47uf	211525V
	R519,R520	2 2 2 2	RES 1megohm 5% 1/4W	328105J					
	R521,R522	2 2 2 2	RES 82kohm 5% 1/4W	328823J		Q801	1 1 1 1	FET 2SK106(B)	516033S
	R523,R524	2 2 2 2	RES 22kohm 5% 1/4W	328223J		Q802	1 1 1 1	Transistor. 2SD381(M,N)	510038S
	R525					Q803	1 1 1 1	Transistor. 2SC2089(BL)	511024S
	~R528	2 2 2 2	RES 18kohm 5% 1/4W	328183J		Q804	1 1 1 1	Transistor. 2SC945(L,P,Q)	515077S
	R529,R530	2 2 2 2	RES 27kohm 5% 1/4W	328273J		Q805	1 1 1 1	FET 2SK106(B)	516033S
	R531,R532		-DELETED-			Q806	1 1 1 1	Transistor. 2SB536(M,N)	510039S
	R533,R534	2 2 2 2	RES 3.9kohm 5% 1/4W	328392J		Q807	1 1 1 1	Transistor. 2SA942(BL)	510049S
	R535					Q808	1 1 1 1	Transistor. 2SA733(Q,R)	514074S
	~R538	2 2 2 2	MO-RES 22kohm 5% 1/2W	360223L					
	R539,R540	2 2 2 2	MO-RES 8.2kohm 5% 1W	361822L					

**PART ORDERING PROCEDURE**----- A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only)  
 B. Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE+ W-type E-type Z D	DESCRIPTION++	PART NO.	KEY NO.	SYMBOL NO.	TYPE+ W-type E-type Z D	DESCRIPTION++	PART NO.
R802		1 1 1 1	MO-RES 150ohm 5% 1/2W	360151L	★601		1 1 1 1	Plate, shield	7226690
R803		1 1 1 1	RES 22kohm 5% 1/4W	328223J					
R804		1 1 1 1	RES 15kohm 5% 1/4W	328153J					
R805		1 1 1 1	MO-RES 3.3kohm 5% 1/2W	360332L				(TONE SECTION)	
R806		1 1 1 1	MO-RES 150ohm 5% 1/2W	360151L					
R807		1 1 1 1	RES 22kohm 5% 1/4W	328223J		C519,C520	2 2 2 2	M-CAP 0.027uf 5% 50V	222273J
R808		1 1 1 1	RES 15kohm 5% 1/4W	328153J		C521,C522	2 2 2 2	M-CAP 0.15uf 5% 50V	222154J
R809		1 1 1 1	MO-RES 3.3kohm 5% 1/2W	360332L		C523,C524	2 2 2 2	M-CAP 0.0033uf 5% 50V	222332J
						C525,C526	2 2 2 2	M-CAP 0.018uf 5% 50V	222183J
ZD801,									
ZD802		2 2 2 2	Zener Diode. RD8.2EB1	502052S	R553,R554	2 2 2 2	RES 22kohm 5% 1/4W	328223J	
		2 2 2 2	Heat Sink (S10) - for Q802, Q806	7081820	R555+R556		-VR2-		
		2 2 2 2	Screw. PMS 3φ x 6	810306S	R557				
		2 2 2 2	Washer, TW(1) 3φ	893403U	~R560	4 4 4 4	RES 3.9kohm 5% 1/4W	328392J	
					R561+R562		-VR3-		
					R563,R564	2 2 2 2	RES 680ohm 5% 1/4W	328681J	
					R565,R566	2 2 2 2	RES 1megohm 5% 1/4W	328105J	
			(RELAY DRIVER SECTION)		VR2	1 1 1 1	VR V24L5G4PHN-25R61Z100Kx2 - BASS	4320840	
C816		1 1 1 1	E-CAP 16R220uf	211232V	VR3	1 1 1 1	VR V24L5G4PHN-25R62Z100Kx2 - TREBLE	4320850	
D806		1 1 1 1	Diode, 1S2076A - navy blue	501020S					
D807		1 1 1 1	Diode, 1S2076 - light blue	501019S					
Q809		1 1 1 1	Transistor, 2SC2089(BL)	511024S			(REGULATOR SECTION)		
R810		1 1 1 1	RES 68kohm 5% 1/4W	328683J	C801	1 1 1 1	C-CAP 0.01uf 100, -0% 500V	238103P	
RY801		1 1 1 1	Reed Relay. URT103	1700200	C802,C803	2 2 2 2	E-CAP 63R1000uf TSW	217640Q	
ZD803		1 1 1 1	Zener Diode. RD4.7EB2	502051S	C804	1 1 1 1	E-CAP 16R100uf	211230V	
					D801				
					~DB04	4 4 4 4	Diode, S5277D	560047S	
					D805	1 1 1 1	Diode, 1S2076A	501020S	
					R801	1 1 1 1	MO-RES 560ohm 5% 1W	361561L	
			<b>TONE PC BOARD</b>		★602	1 1 1 1	Socket (3021-2-N), LED cable	4510090	
★600		1 1 1 1	PC Board, complete. TONE PCB ASSY	9441330					

# SEMICONDUCTOR DATA

NOTES Ge: Germanium Si: Silicon A: Alloy B: Base D: Diffused Dd: Double-diffused Df: Drift-field E: Epitaxial G: Grown J: Junction M: Mesa P: Planar Pc: Point-contact Td: Triple-diffused

## TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute Maximum Values: (TA = 25°C unless otherwise specified)										ELECTRICAL CHARACTERISTICS Typical Values: (TA = 25°C unless otherwise specified)										MANUFACTURER
			Collector-to-Base Voltage VCB0 (V)	Emitter-to-Base Voltage VEB0 (V)	Collector Current IC (mA)	Collector Dissipation PC (mW)	Junction Temperature TJ (°C)	Collector Cutoff Current ICBO (μA)	VCE (V)	hFE	VCE (V)	IC (mA)	VCE(sat) (V)	IC (mA)	IB (mA)	fT (MHz)	VCE (V)	IC (mA)	Output Capacitance Cob (pF)	Others			
2SA733(Q,R)	AF	PNP Si-E	-50	-5	-100	250	125	-0.1	-40	90 ~270	-6	-1	-0.1	-30	-3	180	-6	10	12		NEC		
2SA942(B,L)	AF: Low noise amp.	PNP Si-E	-90	-5	-50	300	125	-0.1	-90	350 ~700	-6	-2	-0.4	-10	-1			5.0 max	NF=6.0dB	TOSHIBA			
2SB536(M,N)	AF: Power amp.	PNP Si-E	-130	-5	-1.5A (TC=25°C)	20V	150	-1.0	-120	60 ~160	-12	-2	max	-1A	-0.1A	40	-5	-0.1A	35		NEC		
2SC945(L,P,Q)	AF: Low noise general amp.	NPN Si-E	50	5	100	250	125	0.1	60	135 ~400	6	1	0.15	100	10	250	6	10	3.5		NEC		
2SC7089(B,L)	AF: Low noise amp.	NPN Si-E	120	5	50	300	125	0.1	120	350 ~700	6	2	0.3	10	1			3.0 max	NF=6.0dB	TOSHIBA			

## FIELD EFFECT TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute Maximum Values: (TA = 25°C unless otherwise specified)										ELECTRICAL CHARACTERISTICS Typical Values: (TA = 25°C unless otherwise specified)										MANUFACTURER			
			Gate-to-Drain Voltage VGD0 (V)	Gate-to-Source Voltage VGS0 (V)	Gate Current IG (mA)	Drain Current ID (mA)	Total Dissipation PD (mW)	Channel Temperature Tch (°C)	Gate Leak Current IGSS (mA)	Gate-to-Drain Breakdown Voltage VBDG0 (V)	Drain Current IDSS (mA)	Test Conditions	VGS (V)	Test Conditions	VDS (V)	Test Conditions	IGSS (mA)	VGS (V)	Test Conditions	IF (mA)	Test Conditions	Crss (pF)		Test Conditions	QPS (dB)	Test Conditions
2SK106 (B)	AF: Low noise amp.	N-channel Si-J	-50		10	20	300	125	VGS=-30V VDS=0V	-10 max		VDS=10V VGS=0V	1~3	VDS=10V ID=10μA	-1.5 max	VDS=10V ID=0.5mA f=1kHz	3.5 min									HITACHI
2SK106 (D)												4~12														
2SK131 (K)	AF: Low noise amp.	N-channel Si-J Dual FET	-30	-30	10	50	250	125	VGS=-20V VDS=0V	-1.0 max		VDS=5.0V VGS=0V	5.0~12.0	VDS=5.0V ID=10μA	-1.5 max	VDS=5.0V ID=5.0mA f=1kHz	32	VDS=5.0V ID=5.0mA f=1kHz	10						NEC	
UN07 (D)	AF	N-channel Si-J	-100	-50	10	50	800	125	VGS=-30V VDS=0V	-5.0 max		VDS=50V VGS=0V	8.0~24.0	VDS=50V ID=1μA	-1.2	VDS=50V ID=1mA f=1kHz	3.8	VGS=-50V f=1kHz	2.0						SHINDENGEN	
UN07 (DS)												12.0~24.0														
UP07 (C)	AF	P-channel Si-J	100	50	10	50	800	125	VGS=+30V VDS=0V	5.0 max		VDS=-50V VGS=0V	4.0~12.0	VDS=-50V ID=-1μA	1.2	VDS=-50V ID=-1μA f=1kHz	3.8	VGS=-50V f=1kHz	3.8						SHINDENGEN	
UP07 (D)												24.0														

## DIODES, LEDs

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (TA = 25°C unless otherwise specified)										ELECTRICAL CHARACTERISTICS Typical Values: (TA = 25°C unless otherwise specified)										MANUFACTURER
			Reverse Surge Voltage VRS (V)	Peak Reverse Voltage VRM (V)	Reverse Voltage VR (V)	Peak Forward Voltage VFM (V)	Forward Current IFM (mA)	Average Rectified Current IO (mA)	Forward Surge Current IF surge (A)	Junction Temperature TJ (°C)	Total Power Dissipation PD (mW)	Forward Current IFmin (mA)	Test Condition VF (V)	Forward Voltage VFmax (V)	Test Condition IF (mA)	Reverse Current IRmax (μA)	Test Condition VR (V)	Others					
1S2075	Various detector	Si-DJ		35	30		450	150	1	175	250			0.8	10	1	30		HITACHI				
1S2078A	Various detector	Si-DJ		70	60		450	150	1	175	250			0.8	10	1	30		HITACHI				
SS277D	Rectifier	Si-DJ			200		2.0A	1.0A	50A	150			1.2	1.0A	10	200		TOSHIBA					
GD4-207RD	LED lamp	GaP-J			3			IF=50mA		100	100			1.7	20	100	3	10μA L IF=20mA	STANLEY				

## ZENER DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (TA = 25°C unless otherwise specified)			ELECTRICAL CHARACTERISTICS Typical Values: (TA = 25°C unless otherwise specified)										MANUFACTURER		
			Total Power Dissipation PD (mW)	Zener Current IZ (A)	Junction Temperature TJ (°C)	Zener Voltage VZ			Differential Resistance Fz		Temperature Coefficient γZ		Reverse Current IZ		Others			
						MIN (V)	TYP (V)	MAX (V)	IZ (mA)	TYP (Ω)	MAX (Ω)	IZ (mA)	MAX (%/°C)	IZ (mA)			MAX (μA)	VR (V)
RD4.7EB2	Stabilized power supply		400		175	4.55		4.80	20	35	20			10	1.0			NEC
RD8.2EB1	Stabilized power supply		400		175	7.53		7.82	20	10	20			2	5.0			NEC



**NIKKO ELECTRIC MFG. CO., LTD.**

**HEAD OFFICE**

4-1, Okusawa 3-chome, Setagaya-ku, Tokyo 158, Japan

**SALES OFFICE**

Mitsubishi Bank Bldg., 3-2, Dogenzaka 1-chome  
Shibuya-ku, Tokyo 150, Japan

**NIKKO ELECTRIC CORP. OF AMERICA**

**HEAD OFFICE**

16270 Raymer St., Van Nuys, Ca. 91406, U.S.A.

**NY OFFICE**

218 Sherwood Ave., Farmingdale, NY 11735, U.S.A.