

**ROTTBELL®**

**SERVICE MANUAL**

**RA-310 Pre-Main Stereo Amplifier**

— **Roland Electronics Co., Ltd.** —

## ALIGNMENT PROCEDURE

### PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.
3. Replacement for output and driver transistors, if necessary, must be made from the same beta group as the original type.
4. If one output transistor burns out (open or short) always remove all the output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohm-meter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.
5. When mounting a replacement power transistor, be sure that the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, for they may cause transistors failure.
6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

### PREDRIVER/DRIVER ADJUSTMENT

1. Set BALANCE, BASS and TREBLE controls to their center position.
2. Set MODE switch to "STEREO", SPEAKER switch to "ON" and SELEC-TOR switch to "AUX" position.
3. Connect an 8 ohm, 50-watt resistor across L speaker terminals. In parallel with the load resistor, connect the vertical input leads from the oscilloscope.
4. Connect an audio generator, set for 1,000 Hz (sine wave), to L chan. AUX input.
5. Connect the AC power cord and rotate the volume control to clockwise position, to full volume. Increase the generator output until the sine wave on the scope just starts clipping. Adjust the DC balance, VR701, for equal clipping on the positive and negative half cycles of the signal. (Fig. 1)

6. Rotate the volume control to counter-clockwise position, to achieve 0.1 watt (0.9 volt RMS, 8 ohm) output. To adjust for crossover distortion, adjust the VR702 until the crossover is extinguished. Or, adjust idling current using a DCmV meter, across R716 resistor on "AF-17" driver board and rotate VR702 to obtain a 10 mV reading on the DCmV meter (no signal input).
7. Repeat the preceding steps for the right channel.

Fig. 1 DC Balance Adjustment

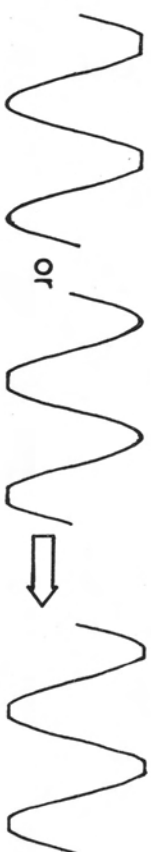
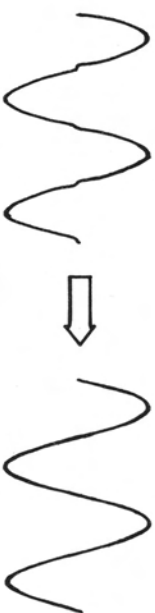


Fig. 2 Crossover Distortion Adjustment



### ENTIRE UNIT INOPERATIVE

1. If the pilot lamp does not light
  - A. Check to see if the AC Power Supply Cord is properly connected to the power source.
  - B. Check to see if there is adequate voltage from the power source.
  - C. If A & B are OK, check to see if the AC fuse is not blown.
    1. If the AC fuse is OK,
      - a. AC Power Supply Cord is cut, or
      - b. Primary Winding in the Power Transformer is cut, or
      - c. Power Switch connection is faulty.
    2. If the AC fuse is blown,
      - a. Primary Winding in the Power Transformer is shorted out, or
      - b. Secondary Winding in the Power Transformer is shorted out, or
      - c. Rectifier (D901 = 1S1850) is shorted out.

II. If the Pilot Lamp does Light,

A. Check to see if the DC fuse is not blown.

1. If the DC fuse blown,

a. Output Circuits (including the speakers) are shorted out, or  
 b. + B Circuits are shorted out, due to faulty C905 or faulty  
 Transistors Tr703, Tr704, Tr705, Tr706, Tr707, Tr803, Tr804,  
 Tr805, Tr806 or Tr807, or

c. Faulty C708 or C808.

2. If the DC fuse is OK,

a. And if the B voltage is not OK,

(1). Rectifier (D901) is open, or

(2). Secondary Winding in the Power Transformer (center tap,  
 black lead) is cut, or

(3). Faulty grounding of Black Lead Wire, or

(4). Faulty DC fuse connection.

b. And if the B voltage is OK,

(1). And if there is signal output at the TAPE OUT jacks,

(a). Tape Monitor Switch connection is faulty, or

(b). Transistors Tr503, Tr603, Tr701, Tr702, Tr704,  
 Tr705, Tr706, Tr707, Tr801, Tr802, Tr804, Tr805,  
 Tr806 or Tr807 are faulty.

(2). And if there is no signal output at TAPE OUT Jacks,

(a). Transistor Tr501, Tr502, Tr601 or Tr602 are shorted  
 out or open, or

(b). C501, C502, C601 or C602 are open, or

(c). Wires from the Function Switch are cut, or

(d). Wires to the Tape Monitor Switch are cut.

ONLY PHONO SECTION INOPERATIVE

I. If there is no fault in the wires to the Pre-amplifier board,

A. Transistors Tr401, Tr402, Tr403 or Tr404 are shorted out or open,

B. C401, C405, C408, C409, C414 or C417 are faulty, or

C. Function Switch connection is faulty.

TAPE MONITOR SWITCH INEFFECTIVE

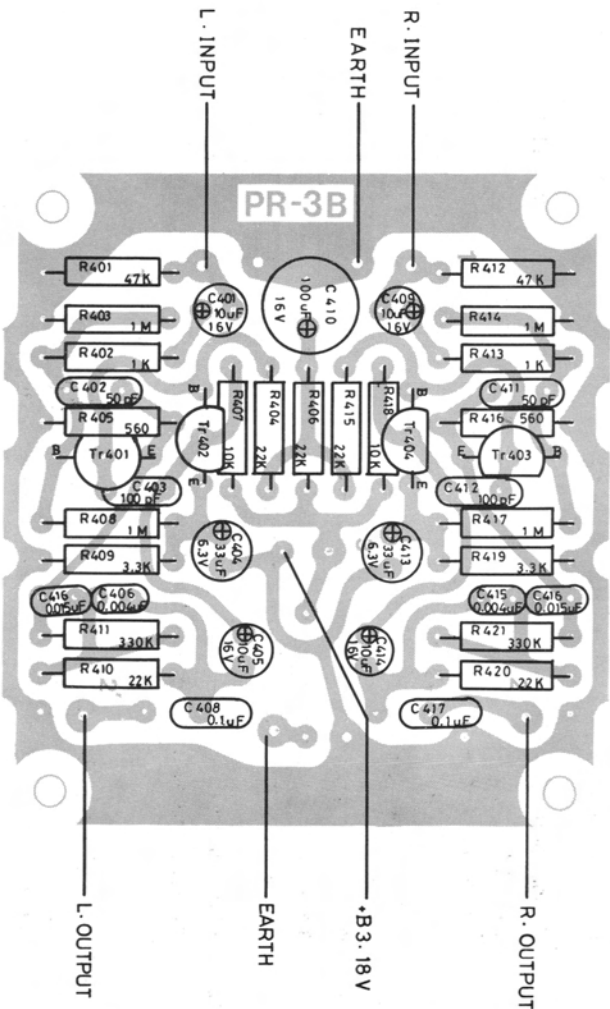
I. C504, C505, C506, C507, C604, C605, C606 or C607 are faulty.

LOUDNESS CONTROL INEFFECTIVE

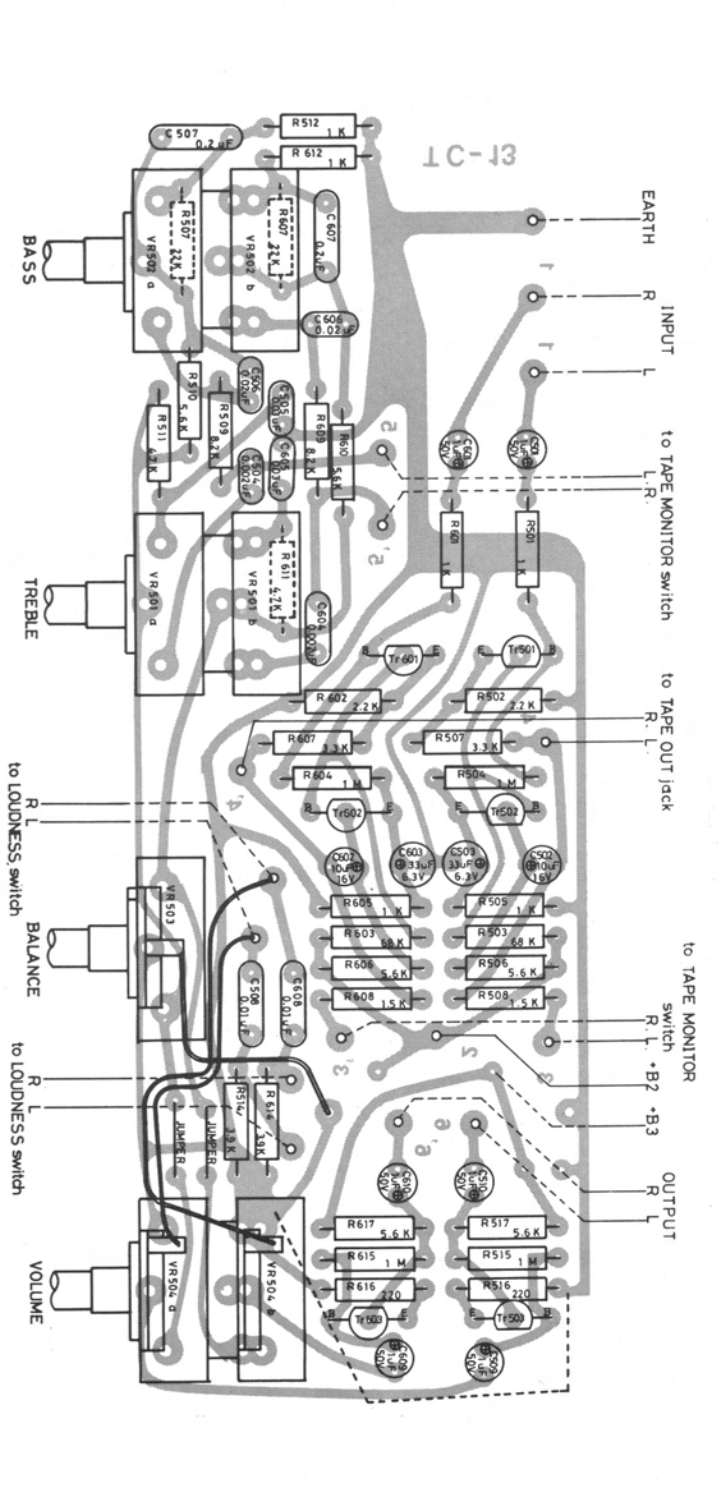
I. C508 or C608 is faulty, or

II. Loudness Switch connection is faulty.

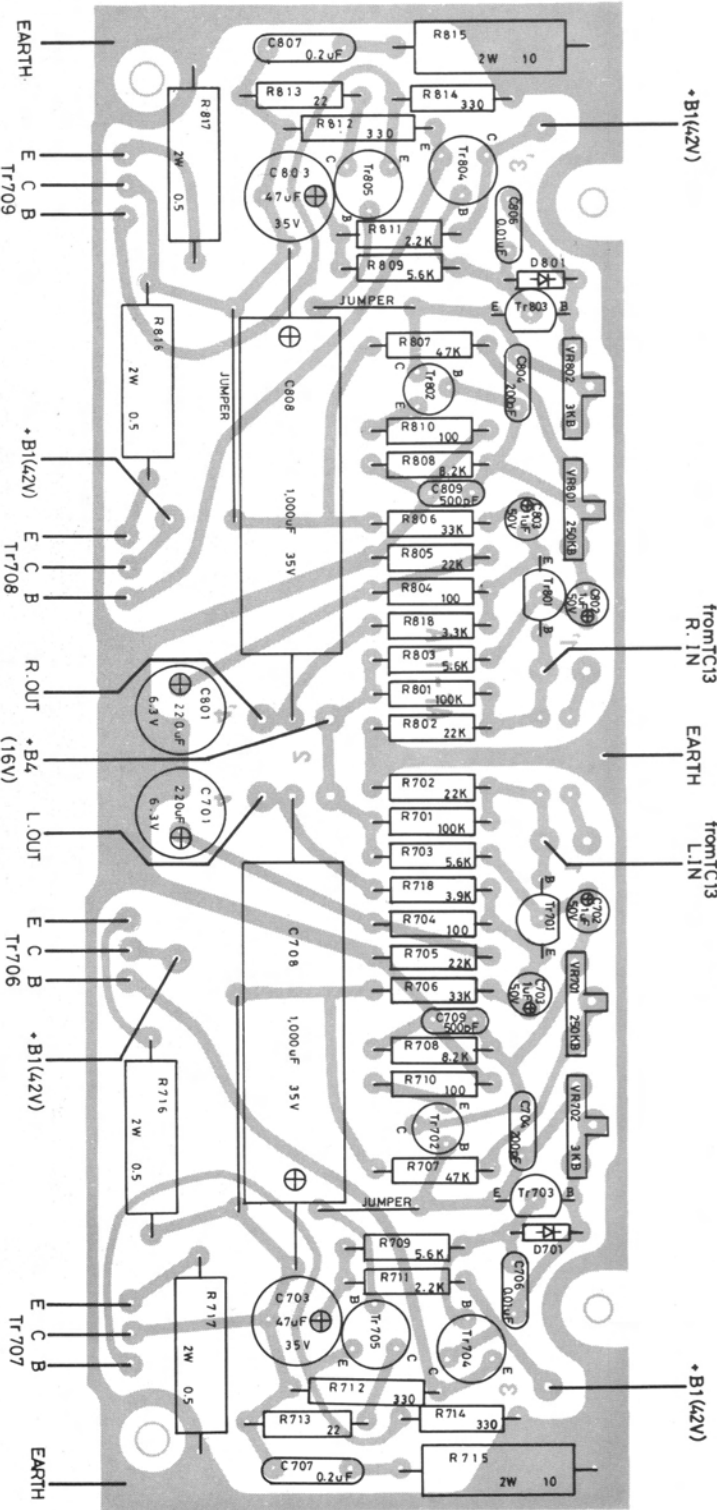
PREAMPLIFIER PCB "PR-3B" (Viewed from Components Side)



TONE CONTROLS "TC-13" (Viewed from Components Side)

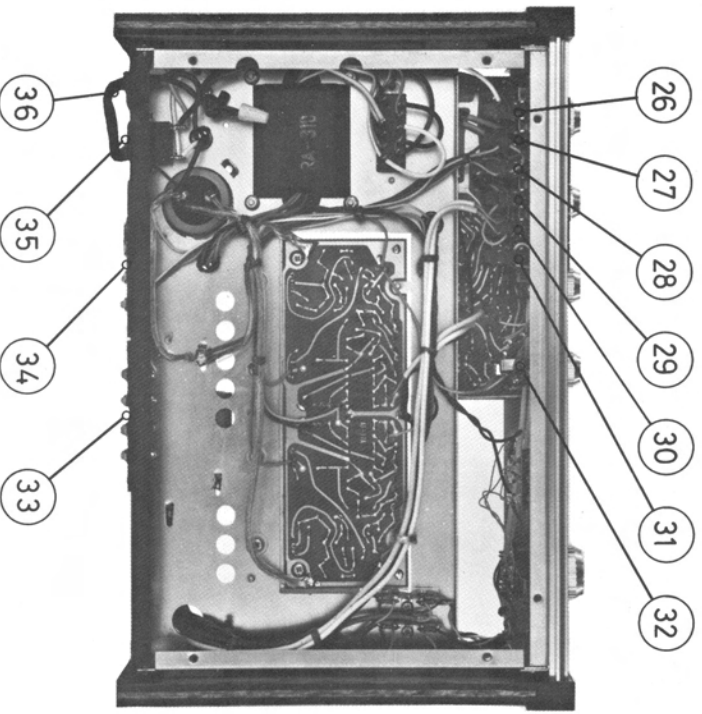


PREDRIVER/DRIVER "AF-17A" (Viewed from Components Side)



LAYOUT

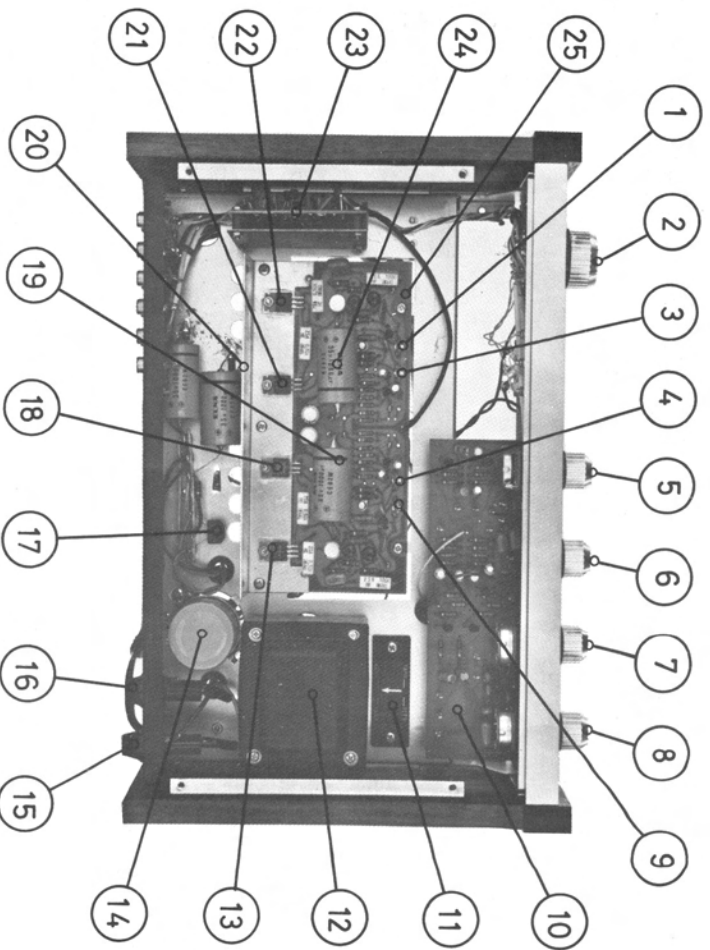
BOTTOM VIEW



1. Right chan. Idling ADJ. VR802 3KB
2. Function switch
3. Right chan. DC balance ADJ. VR801 250KB
4. Left chan. DC balance ADJ. VR701 250KB
5. Volume control
6. Balance control
7. Treble control

8. Bass control
9. Left chan. Idling ADJ. VR702 3KB
10. Tone circuit board
11. Line voltage selector
12. Power transformer
13. Power transistor Tr707
14. Filter capacitor C905
15. AC fuse 2A 3AG
16. DC fuse 2A 3AG

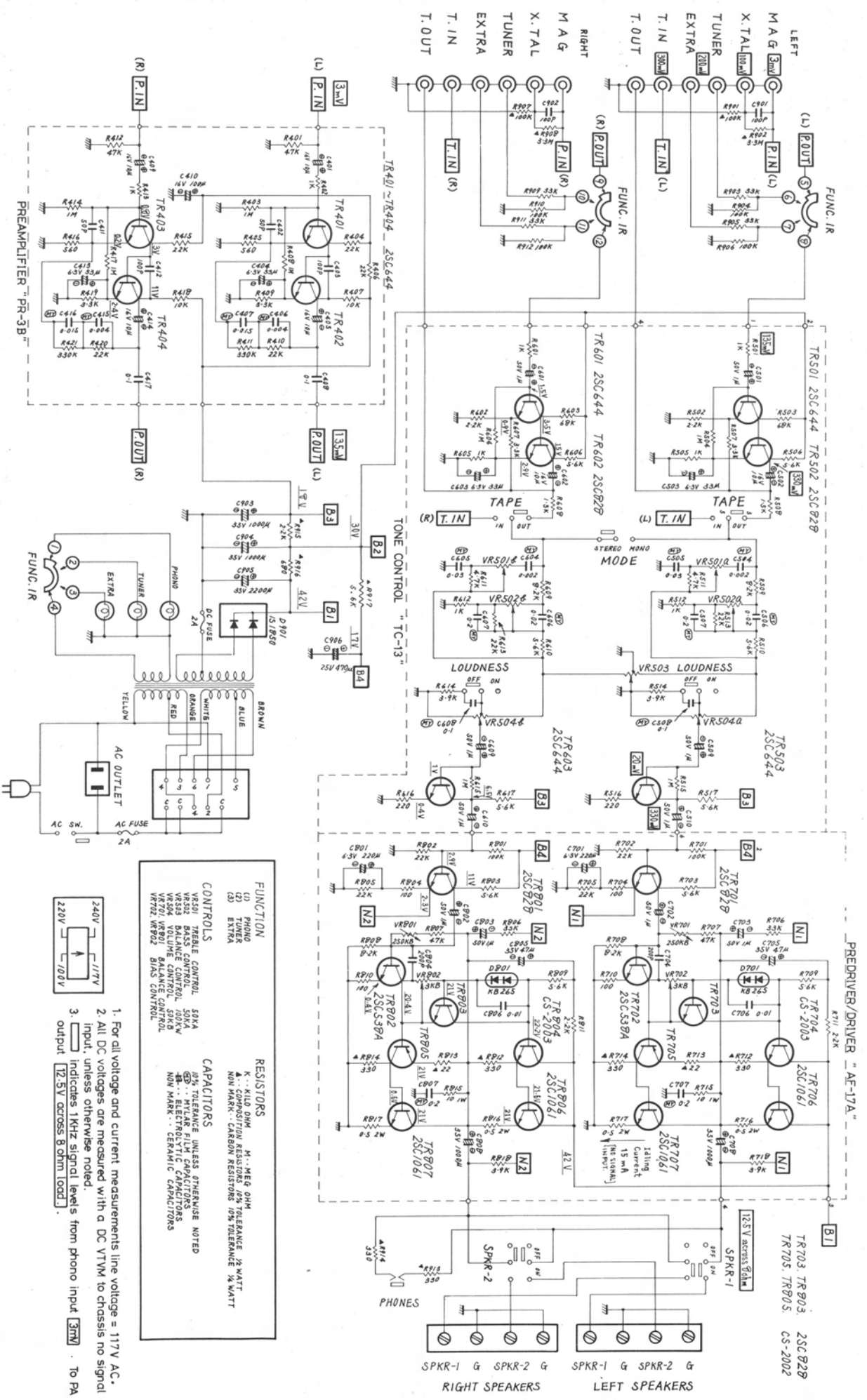
TOP VIEW



17. Rectifier 1S1850
18. Power transistor Tr706
19. Stopping capacitor C708
20. Heat sink board
21. Power transistor Tr708
22. Power transistor Tr709
23. Preampifier board
24. Stopping capacitor C808
25. Predriver / Driver board
26. Power switch

27. SPK R system-1 switch
28. SPK R system-2 switch
29. Mode switch
30. Tape monitor switch
31. Loudness switch
32. Headphones jack
33. Right chan. OUTPUT terminal
34. Left chan. OUTPUT terminal
35. AC outlet socket
36. AC line cord

# SCHEMATIC DIAGRAM



FUNCTION		RESISTORS	
(1) PHONO	(2) TUNER	K... KILO OHM	M... MEG OHM
(3) EXTRA		Ω... COMPOSITION RESISTORS 10% TOLERANCE 1/2 WATT	NON MARK... CARBON RESISTORS 10% TOLERANCE 1/2 WATT
CONTROLS		CAPACITORS	
VR501 TREBLE CONTROL	58KA	10% TOLERANCE UNLESS OTHERWISE NOTED	
VR502 BASS CONTROL	58KA	Ⓢ... SILVER FILM CAPACITORS	
VR503 TUNER	58KA	Ⓢ... CERAMIC CAPACITORS	
VR504 VOLUME CONTROL	58KA	NON MARK... CERAMIC CAPACITORS	
VR701 VR702	58KA		
VR703 VR704	58KA		

- For all voltage and current measurements line voltage = 117V AC.
- All DC voltages are measured with a DC VTVM to chassis no signal input, unless otherwise noted.
- Indicates 1KHz signal levels from phono input **3mV** to PA output **12.5V** across 8 ohm load.

SUBJECT TO MINOR CHANGES OF PARTS WITHOUT PRIOR NOTICE

PARTS PRICE LIST FOR MODEL RA-310

Item No.	Roland Parts No.	Symbol No.	Description	@Price US \$	Qty per set	Item No.	Roland Parts No.	Symbol No.	Description	@Price US \$	Qty per set	Item No.	Roland Parts No.	Symbol No.	Description	@Price US \$	Qty per set	
1	121011250		Chassis	0.99	1	40	645701001		Lug Terminal 1E1	0.02	1	76	501022233	R711, 811, 915	Composition Resistor	2.2Kohm	0.01	3
2	12401125		Bottom Cover	0.56	1	41	645703003		Lug Terminal 3E3	0.03	1	77	501056233	R709, 809	Composition Resistor	5.6Kohm	0.01	2
3	127012119		Heat-sink board	0.18	1	42	610112133		Input Selector Switch	0.33	1	78	501082233	R708, 808	Composition Resistor	8.2Kohm	0.01	2
4	120012110		Pre-amp. pcb Fixture	0.07	2	43	672200811		Cord Bush	0.02	3	79	501047333	R707, 807	Composition Resistor	47 Kohm	0.01	2
5	123011250		Rear Chassis	0.78	1	44	400220439	C905	Electrolytic 50V/2200uMFD	0.67	1	80	501033533	R902, 903	Composition Resistor	3.3 Mohm	0.01	2
6	138011250		Top Cover	0.60	1	45	401100439	C708, 808, 903, 904	Electrolytic 35V/1000uMFD	0.24	4	81	501010433	R901, 907	Composition Resistor	100 Kohm	0.01	2
7	122011250		Front Chassis	0.52	1	46	401470519	C906	Electrolytic 16V 470uMFD	0.10	1	82	501680133	R916	Composition Resistor	680 ohm	0.01	1
8	133191250		Indicator Lamp Cover	0.05	3	47	402470639	C705, 805	Electrolytic 35V 47uMFD	0.08	2	83	501068233	R917	Composition Resistor	6.8 ohm	0.01	1
9	133291250		Right side Panel	0.93	1	48	402100519	C410	Electrolytic 16V 100uMFD	0.07	1	84	502010123	R704, 804	Carbon Resistor	100 ohm	0.01	2
10	133211250		Left side Panel	0.93	1	49	402330609	C404, 413, 503, 603	Electrolytic 6.3V 33uMFD	0.04	4	85	502560123	R405, 416	Carbon Resistor	560 ohm	0.01	2
11	116310016		Knob, Function	0.20	1	50	402220509	C701, 801	Electrolytic 6.3V 220uMFD	0.07	2	86	502010223	R402, 413, 501, 601	Carbon Resistor	1 Kohm	0.01	8
12	116310017		Knob, VOL., BAL., Bass, Treble	0.19	4	51	402100739	C501, 601, 509, 609	Electrolytic 50V 1uMFD	0.04	12	87	502015223	R505, 605, 512, 612	Carbon Resistor	1.5 Kohm	0.01	2
13	116310018		Indicator Bush (RED)	0.02	1			C702, 802, 703, 803			88	502022223	R502, 602, 705, 805	Carbon Resistor	2.2 Kohm	0.01	4	
14	67623011		Indicator Bush (GREEN)	0.02	1			C401, 405, 409, 414			89	502033223	R503, 603, 409, 419	Carbon Resistor	3.3 Kohm	0.01	4	
15	67623011		Indicator Bush (BLUE)	0.02	1	52	402100629	C502, 602	Electrolytic 25V 10uMFD	0.04	6	90	502039223	R514, 614, 718, 818	Carbon Resistor	3.9 Kohm	0.01	4
16	67623011		Indicator Bush (GREEN)	0.02	1			C502, 602			91	502056223	R510, 610, 506, 606,	Carbon Resistor	5.6 Kohm	0.01	8	
17	205001300		Power Transformer	3.65	1	53	440100835	C408, 417	Ceramic 50V 0.1uMFD	0.03	2	92	502010323	R407, 418	Carbon Resistor	10 Kohm	0.01	2
18	301901111	T704, 804	Transformer, CDC8002	0.25	2	54	440501283	C402, 411	Ceramic 250V 500pF	0.02	2	93	502022323	R404, 406, 410, 415	Carbon Resistor	22 Kohm	0.01	9
19	301901112	T705, 805	Transformer, CDC9002	0.27	2	55	440501183	C709, 809	Ceramic 250V 200pF	0.02	2	94	502047323	R401, 412	Carbon Resistor	47 Kohm	0.01	2
20	301201115	T502, 602, 701, 801	Transformer, 25C828	0.12	6	56	440301183	C704, 804	Ceramic 250V 0.01uMFD	0.02	2	95	502010423	R701, 801, 904, 906	Carbon Resistor	100 Kohm	0.01	6
21	301201114	T703, 803	Transformer, 25C844	0.14	8	57	440101183	C403, 412, 901, 902	Ceramic 250V 100pF	0.02	4	96	502010523	R403, 408, 414, 417	Carbon Resistor	1 Mohm	0.01	8
22	301201113	T702, 802	Transformer, 25C538A	0.18	2	58	440100985	C706, 806	Ceramic 250V 0.01uMFD	0.02	2	97	502033423	R411, 421	Carbon Resistor	33 Kohm	0.01	6
23	301201125	T706, 707, 806, 807	Transformer, 25C1061	0.40	4	59	450401033	C415, 406	Mylar 50V 0.004uMFD	0.03	2	98	502033323	R706, 806, 903, 905	Carbon Resistor	33 Kohm	0.01	6
24	300919005	D901	Rectifier, 1S1850	0.20	1	60	450150933	C416, 407	Mylar 50V 0.015uMFD	0.03	2	99	502082223	R509, 609	Carbon Resistor	8.2 Kohm	0.01	2
25	300212001	D701, 801	Varistor, KE265	0.10	2	61	450200933	C506, 606	Mylar 50V 0.02uMFD	0.03	2	100	502068323	R503, 603	Carbon Resistor	68 Kohm	0.01	2
26	614061201		Push Switch	1.26	1	62	450201033	C504, 604	Mylar 50V 0.002uMFD	0.03	2	101	502220123	R516, 616	Carbon Resistor	220 ohm	0.01	2
27	624100212		Input Terminal Jack	0.40	1	63	450300933	C505, 605	Mylar 50V 0.03uMFD	0.03	2	102	502047223	R511, 611	Carbon Resistor	4.7 Kohm	0.01	2
28	641210104		Output Terminal Board	0.15	2	64	450200833	C507, 607	Mylar 50V 0.2uMFD	0.07	2	103	796301115	AC Line Cord		0.19	1	
29	620101114		AC Outlet Socket	0.07	1	65	450100833	C508, 608	Mylar 50V 0.1uMFD	0.05	2	104	812001202	Packing Case		0.52	1	
30	640253334		Fuse Holder	0.19	2	66	525101111	VR501, 502	Variable Resistor, Tone	0.45	2	105	811001202	Filler		0.13	1	
31	62600702		Headstopper	0.16	1	67	525121112	VR504	Variable Resistor, VOL.	0.53	1	106	855001202	Vinyl Bag		0.03	1	
32	675201111		Fuse in glass 2A 3AG	0.02	2	68	515121112	VR503	Variable Resistor, Balance	0.20	1	107	833201202	Operating Manual		0.26	1	
33	3412202020		Line Voltage Selector	0.22	1	69	521005022	VR702, 802	Variable Resistor, Idling ADJ.	0.08	2	108	815001202	Syrovom Side Moulding		0.11	2	
34	620021111		Funct. Indicator Lamp 8V 150mA	0.12	3	70	521250302	VR701, 801	Variable Resistor, DC Balance ADJ.	0.08	2	109	835201202	Service Manual				
35	352080015		Rubber Leg	0.03	4	71	504005063	R716, 717, 816, 817	Bath-tub Resistor 0.5 ohm	0.07	4							
36	673301121		Wire Connector	0.02	1	72	504010153	R715, 815	Bath-tub Resistor 10 ohm	0.07	2							
37	643110011		Lug Terminal 2E2	0.02	2	73	501022133	R713, 813	Composition Resistor 22 ohm	0.01	2							
38	645302002		Lug Terminal 1E1	0.02	2	74	501100133	R710, 810	Composition Resistor 100 ohm	0.01	2							
39	645301001		Lug Terminal 1E1	0.02	2	75	501330133	R712, 714, 812, 814, R913, 914	Composition Resistor 330 ohm	0.01	6							

Note: All parts listed herein are subject to price change and replacement by equivalent parts without prior notice. In ordering spare parts, to expedite handling procedures, please be sure to include the Item No., Roland Parts No., Symbol No., Description, Quantity and price.