

ROTEL[®]

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 SELECTOR 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

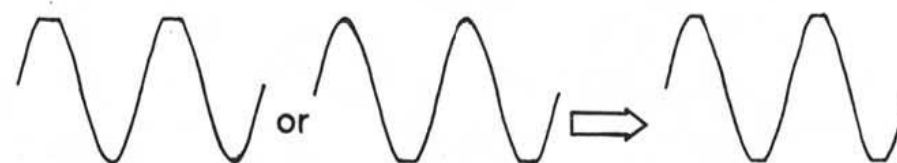
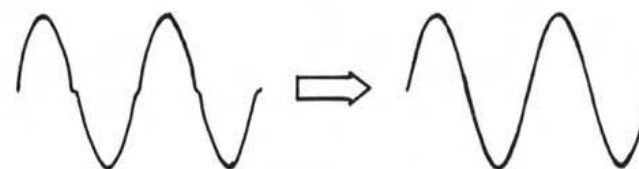


Fig. 2 Crossover Distortion Adjustment



ENTIRE UNIT INOPERATIVE

- I. 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,

- Output Circuits (including the speakers) are shorted out, or
- + B Circuits are shorted out, due to faulty C905 or faulty Transistors Tr703, Tr704, Tr705, Tr706, Tr707, Tr803, Tr804, Tr805, Tr806 or Tr807, or
- Faulty C708 or C808.

2. If the DC fuse is OK,

a. And if the B voltage is not OK,

- Rectifier (D901) is open, or
- Secondary Winding in the Power Transformer (center tap, black lead) is cut, or
- Faulty grounding of Black Lead Wire, or
- Faulty DC fuse connection.

b. And if the B voltage is OK,

- And if there is signal output at the TAPE OUT jacks,
 - Tape Monitor Switch connection is faulty, or
 - Transistors Tr503, Tr603, Tr701, Tr702, Tr704, Tr705, Tr706, Tr707, Tr801, Tr802, Tr804, Tr805, Tr806 or Tr807 are faulty.
- And if there is no signal output at TAPE OUT Jacks,
 - Transistor Tr501, Tr502, Tr601 or Tr602 are shorted out or open, or
 - C501, C502, C601 or C602 are open, or
 - Wires from the Function Switch are cut, or
 - 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,

- Transistors Tr401, Tr402, Tr403 or Tr404 are shorted out or open,
- C401, C405, C408, C409, C414 or C417 are faulty, or
- Function Switch connection is faulty.

TONE CONTROLS INEFFECTIVE

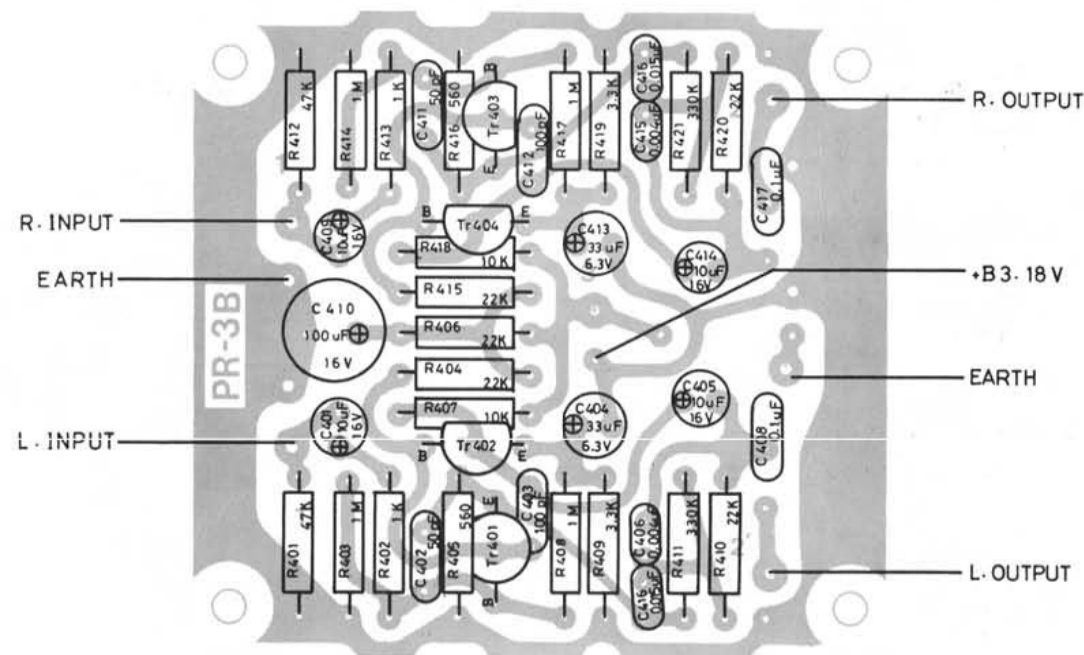
- C504, C505, C506, C507, C604, C605, C606 or C607 are faulty.

LOUDNESS CONTROL INEFFECTIVE

I. C508 or C608 is faulty, or

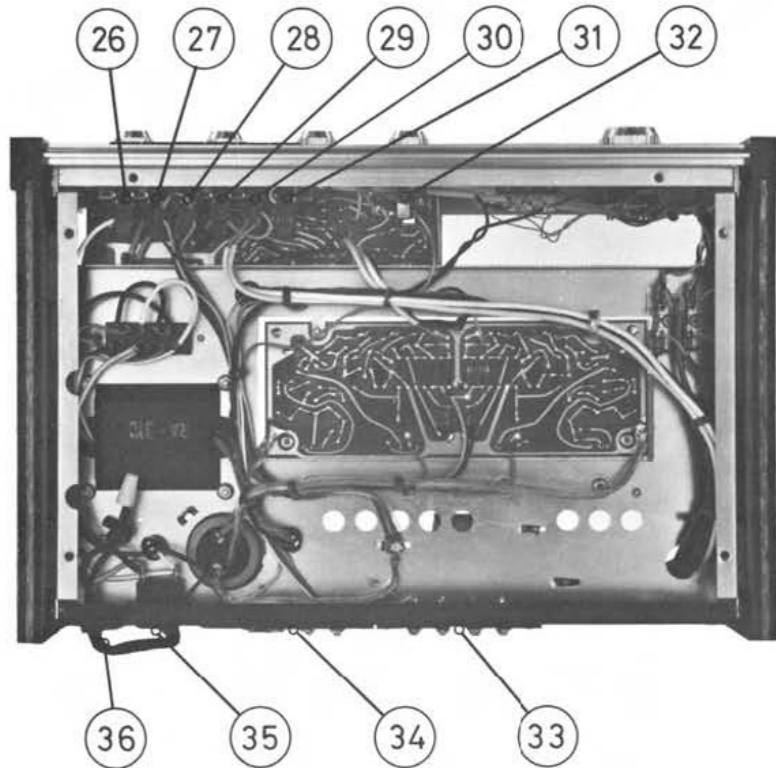
II. Loudness Switch connection is faulty.

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

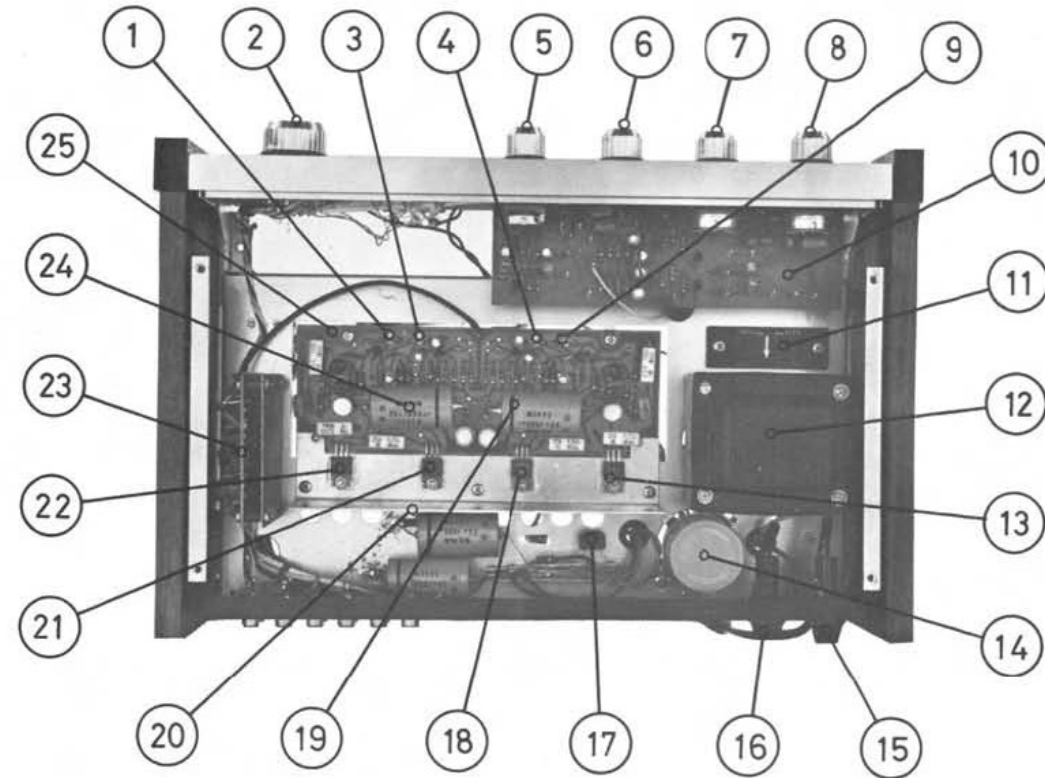


LAYOUT

BOTTOM VIEW

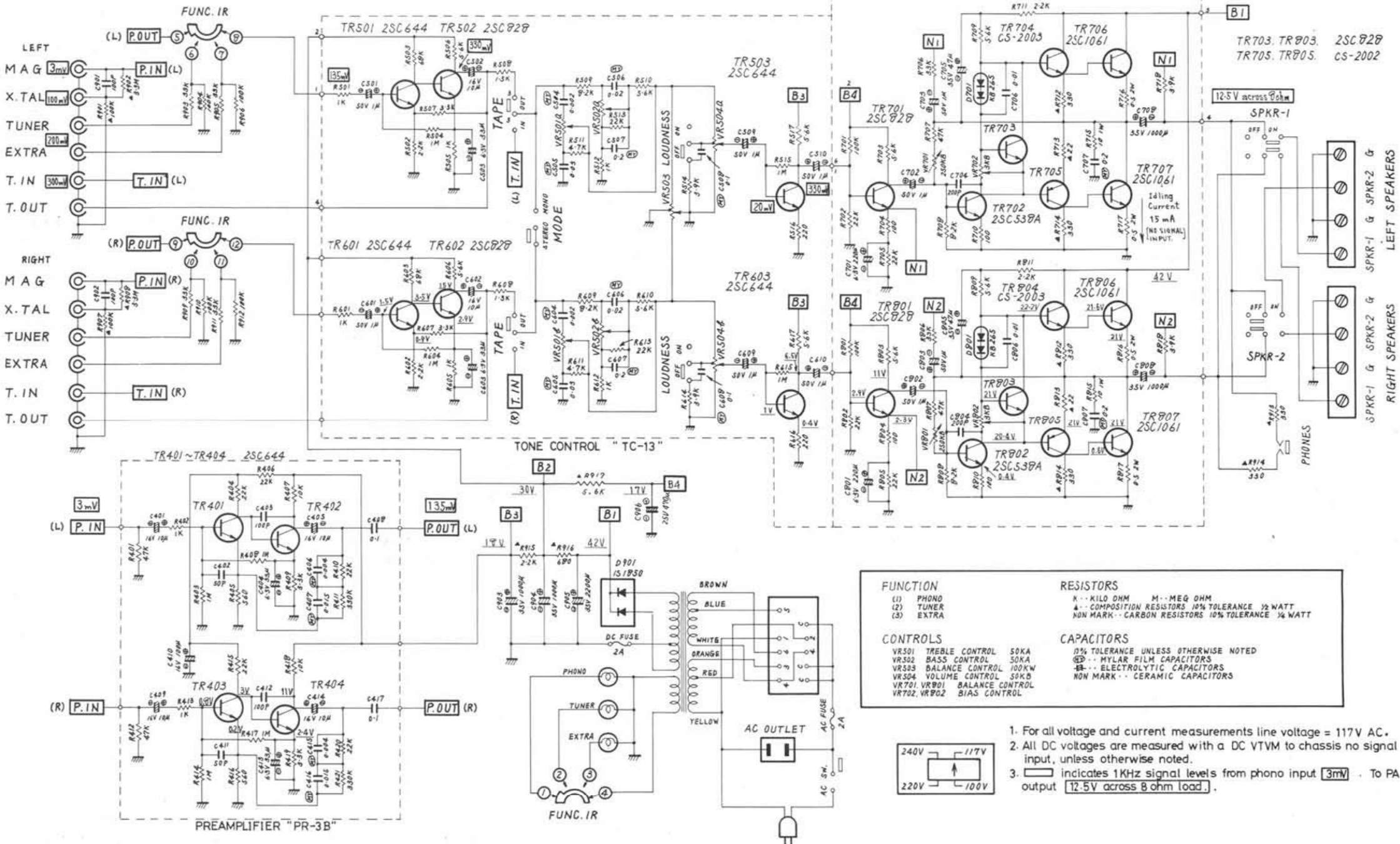


TOP VIEW



- | | | | |
|---|--|------------------------------|---------------------------------|
| 1. Right chan. Idling ADJ.
VR802 3KB | 8. Bass control | 17. Rectifier 1S1850 | 27. SPKR system-1 switch |
| 2. Function switch | 9. Left chan. Idling ADJ. VR702
3KB | 18. Power transistor Tr706 | 28. SPKR system-2 switch |
| 3. Right chan. DC balance*ADJ.
VR801 250KB | 10. Tone circuit board | 19. Stopping capacitor C708 | 29. Mode switch |
| 4. Left chan. DC balance ADJ.
VR701 250KB | 11. Line voltage selector | 20. Heat sink board | 30. Tape monitor switch |
| 5. Volume control | 12. Power transformer | 21. Power transistor Tr708 | 31. Loudness switch |
| 6. Balance control | 13. Power transistor Tr707 | 22. Power transistor Tr709 | 32. Headphones jack |
| 7. Treble control | 14. Filter capacitor C905 | 23. Preamplifier board | 33. Right chan. OUTPUT terminal |
| | 15. AC fuse 2A 3AG | 24. Stopping capacitor C808 | 34. Left chan. OUTPUT terminal |
| | 16. DC fuse 2A 3AG | 25. Predriver / Driver board | 35. AC outlet socket |
| | | 26. Power switch | 36. AC line cord |

SCHEMATIC DIAGRAM



PARTS PRICE LIST FOR MODEL RA-310

Item No.	Roland Parts No.	Symbol No.	Description	@Price US \$	Q'ty per set	Item No.	Roland Parts No.	Symbol No.	Description	@Price US \$	Q'ty per set	Item No.	Roland Parts No.	Symbol No.	Description	@Price US \$	Q'ty 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 50V2200MFD	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 1000MFD	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 470MFD	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 47MFD	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 100MFD	0.07	1	84	502100123	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 33MFD	0.04	4	85	502560123	R405, 416	Carbon Resistor	560 ohm	0.01 2
12	116310016		Knob, Function	0.20	1	50	402220509	C701, 801	Electrolytic 6.3V 220MFD	0.07	2	86	502010223	R402, 413, 501, 601	Carbon Resistor	1 Kohm	0.01 8
13	116310017		Knob, VOL., BAL., Bass, Treble	0.19	4	51	402100739	C501, 601, 509, 609	Electrolytic 50V 1MFD	0.04	12			R505, 605, 512, 612			
14	676223011		Indicator Bush (RED)	0.02	1			C510, 610, 511, 611				87	502015223	R508, 608	Carbon Resistor	1.5 Kohm	0.01 2
15	676253011		Indicator Bush (GREEN)	0.02	1			C702, 802, 703, 803				88	502022223	R502, 602, 705, 805	Carbon Resistor	2.2 Kohm	0.01 4
16	676263011		Indicator Bush (BLUE)	0.02	1	52	402100629	C401, 405, 409, 414	Electrolytic 25V 10MFD	0.04	6	89	502033223	R503, 603, 409, 419	Carbon Resistor	3.3 Kohm	0.01 4
17	205001300		Power Transformer	3.65	1			C502, 602				90	502039223	R514, 614, 718, 818	Carbon Resistor	3.9 Kohm	0.01 4
18	301901111	Tr704, 804	Transistor, CDC8002	0.25	2	52	440100835	C408, 417	Ceramic 50V 0.1MFD	0.03	2	91	502056223	R510, 610, 506, 606,	Carbon Resistor	5.6 Kohm	0.01 8
19	301901112	Tr705, 805	Transistor, CDC9002	0.27	2	53	440501283	C402, 411	Ceramic 250V 50pF	0.02	2			R703, 803, 517, 617			
20	301201115	Tr502, 602, 701, 801	Transistor, 2SC828	0.12	6	55	440501183	C709, 809	Ceramic 250V 500pF	0.02	2	92	502010323	R407, 418	Carbon Resistor	10 Kohm	0.01 2
		Tr703, 803				56	440301183	C704, 804	Ceramic 250V 200pF	0.02	2	93	502022323	R404, 406, 410, 415	Carbon Resistor	22 Kohm	0.01 9
21	301201114	Tr401, 402, 403, 404	Transistor, 2SC644	0.14	8	57	440101183	C403, 412, 901, 902	Ceramic 250V 100pF	0.02	4			R420, 513, 613, 702, 802			
		Tr501, 601, 503, 603				58	440100985	C706, 806	Ceramic 250V 0.01MFD	0.02	2	94	502047323	R401, 412	Carbon Resistor	47 Kohm	0.01 2
22	301201113	Tr702, 802	Transistor, 2SC538A	0.18	2	59	450401033	C415, 406	Mylar 50V 0.004MFD	0.03	2	95	502010423	R701, 801, 904, 906	Carbon Resistor	100 Kohm	0.01 6
23	301201125	Tr706, 707, 806, 807	Transistor, 2SC1061	0.40	4	60	450150933	C416, 407	Mylar 50V 0.015MFD	0.03	2			R910, 912			
24	300919005	D901	Rectifier, 1S1850	0.20	1	61	450200933	C506, 606	Mylar 50V 0.02MFD	0.03	2	96	502010523	R403, 408, 414, 417	Carbon Resistor	1 Mohm	0.01 8
25	300212001	D701, 801	Varistor, KB265	0.10	2	62	450201033	C504, 604	Mylar 50V 0.002MFD	0.03	2			R504, 604, 515, 615			
26	614061201		Push Switch	1.26	1	63	450300933	C505, 605	Mylar 50V 0.03MFD	0.03	2	97	502033423	R411, 421	Carbon Resistor	330 Kohm	0.01 2
27	624100212		Input Terminal Jack	0.40	1	64	450200833	C507, 607	Mylar 50V 0.2MFD	0.07	2	98	502033323	R706, 806, 903, 905	Carbon Resistor	33 Kohm	0.01 6
28	641210104		Output Terminal Board	0.15	2	65	450100833	C508, 608	Mylar 50V 0.1MFD	0.05	2			R909, 911			
29	620101114		AC Outlet Socket	0.07	1	66	525101111	VR501, 502	Variable Resistor, Tone	0.45	2	99	502082223	R509, 609	Carbon Resistor	8.2 Kohm	0.01 2
30	640253334		Fuse Holder	0.19	2	67	525121112	VR504	Variable Resistor, VOL.	0.53	1	100	502068323	R503, 603	Carbon Resistor	68 Kohm	0.01 2
31	626007702		Headphone Jack	0.16	1	68	515121112	VR503	Variable Resistor, Balance	0.20	1	101	502220123	R516, 616	Carbon Resistor	220 ohm	0.01 2
32	675201111		Cord Stopper	0.02	1	69	521005022	VR702, 802	Variable Resistor, Idling ADJ.	0.08	2	102	502047223	R511, 611	Carbon Resistor	4.7 Kohm	0.01 2
33	341220020		Fuse in glass 2A 3AG	0.02	2	70	521250302	VR701, 801	Variable Resistor, DC Balance ADJ.	0.08	2	103	796301115		AC Line Cord		0.19 1
34	620021111		Line Voltage Selector	0.22	1	71	504005053	R716, 717, 816, 817	Bath-tub Resistor 0.5 ohm	0.07	4	104	812001202		Packing Case		0.52 1
35	352080015		Funct. Indicator Lamp 8V 150mA	0.12	3	72	504010153	R715, 815	Bath-tub Resistor 10 ohm	0.07	2	105	811001202		Filler		0.13 1
36	673301121		Rubber Leg	0.03	4	73	501022133	R713, 813	Composition Resistor 22 ohm	0.01	2	106	855001202		Vinyl Bag		0.03 1
37	643110011		Wire Connector	0.02	1	74	501100133	R710, 810	Composition Resistor 100 ohm	0.01	2	107	833201202		Operating Manual		0.26 1
38	645302002		Lug Terminal 2E2	0.02	2	75	501330133	R712, 714, 812, 814,	Composition Resistor 330 ohm	0.01	6	108	815001202		Styroform Side Moulding		0.11 2
39	645301001		Lug Terminal 1E1	0.02	2			R913, 914				109	835201202		Service Manual		

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.