SPA-240 SERVICE NOTES

Second Edition

This issue makes the first edition obsolete.

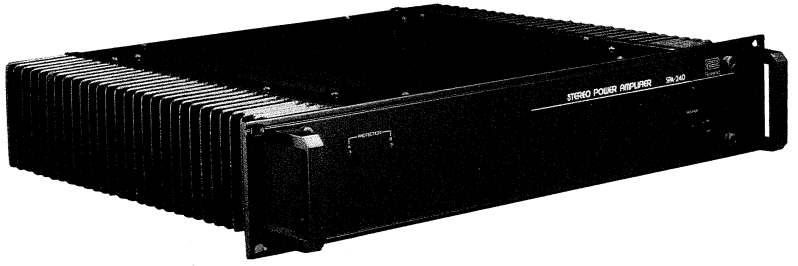
SPECIFICATIONS

Input level	
Balanced:	+4dBm (1.23v)
Unbalanced:	+4dBm (1.23v)
Input inpedance	
Balanced:	26kΩ
Unbalanced:	56kΩ
Output	
Speaker, stereo:	4to16Ω
Speaker, mono:	8to16Ω

Output power (20Hz—20kHz)

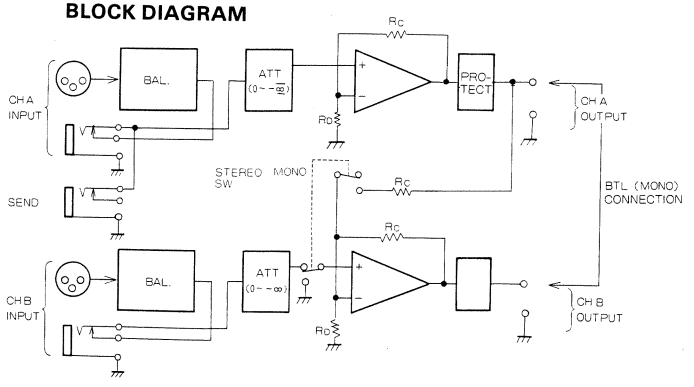
	120+120W (8Ω)
	180+180W (4Ω)
	360W (8Ω, mono)

THD:	better than 0.05%
Frequency response:	10Hz—100kHz, $^{+0}_{-1}$dB
Power bandwidth:	20Hz—100kHz
Damping factor:	better than 70
S/N ("A" weighted; input shorted):	better than 110dB
Power requirements:	100v, 117v, 220v, 240v; 50/60Hz
Power consumption:	210W
Dimensions:	482(W)×92(H)×442(D)mm 19" rack mount EIA-2U
Weight:	14kg



Removal of top cover provides accessibility for almost all servicing.

SPA-240 **BLOCK DIAGRAM**



IMPROVEMENTS & COMPONENTS CHANGES

PROTECTION CIRCUITS

The protection circuits incorporated in the SPA-240 of various versions (except early model) have undergone design changes to have more reliable performance. The changes are mainly concentrated on DC Level Detector and Low Impedance Sensor.

OUTPUT DC LEVEL DETECTOR

Detects DC bias at speaker terminal (radio waves of high energy, when induced, easily amplified; sometimes to the extent to become asymmetrical waveform which constitutes DC). And open-circuits speaker circuit by energizing a relay upon detecting DC exceeding predetermined level.
Change: Threshould — from 1.65V to 4V allowance for torelance.

LOW OUTPUT IMPEDANCE SENSOR

Also cuts off the speaker circuit with the relay when it becomes less than 4 ohms.
Change: Bias source for the first transistor of this stage — from positive supply to ground to make the circuit immune from variations on DC supply.

TEMPERATURE SENSOR

Measures on heat sink and activates relay when overheated.
No change.

CURRENT LIMITER

Regulates output current. Suppresses input signal level at power amplifier stage in propotion as speaker impedance decreases.
Change: Loosen torelance to extend dynamic range.

Not all of changes took place in parallel with, but with some modifications on different part. The productions are grouped into four sections in this Service Notes.

Group	Serial Number
1	840100-880849
2	890850-082559
3	092560-102729
4	112730-

Of above, No.4 is the latest and the remainder of versions should be modified as necessary. Modification procedures are on related pages as a reference for updating.

POWER TRANSISTORS

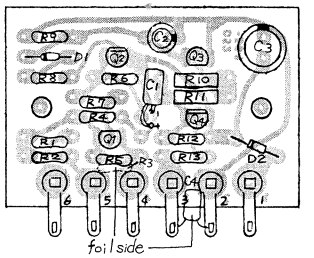
Because of discontinuance at the manufacturer, Roland has changed power transistrs.

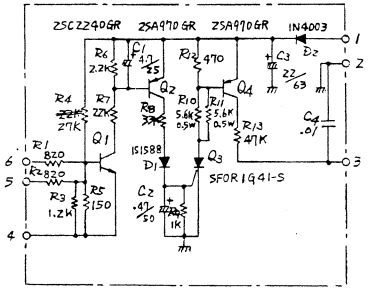
from	to
2SA1095	2SA1169
2SC2565	2SC2773

In replacing power transistors, the following must be observed in light of tone characteristic.

* Use NPN and PNP transistors of the same hfe range (Y or O) in a channel.
* Do not mix-use different brand in a channel even they have the same suffix (Y or O).

ET-63 (pcb 052-584)





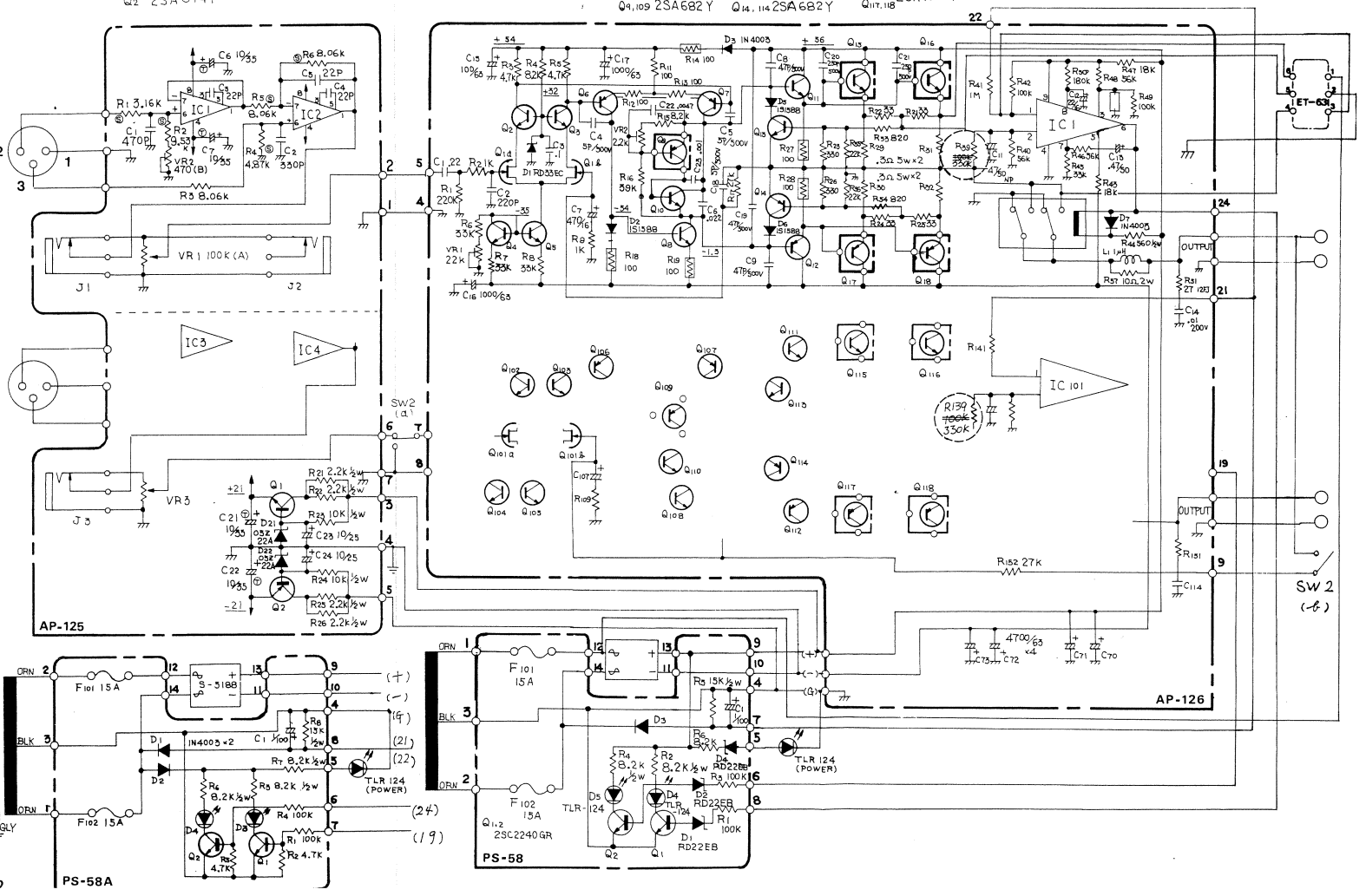
Serial Number 840100-880849

ET-63 is not on all of the products in this group.

SPA-240

IC1~4 HA1457W
Q1 2SC1624Y
Q2 2SA814Y

Q1,101 E412
Q2~5,10 Q102~105,110 2SC2240GR
Q6,7 Q106,107 2SA818Y
Q8,108 2SC1628Y
Q9,109 2SA682Y
Q11,111 2SC2238Y
Q12,112 2SA968Y
Q13,14 2SA682Y
Q15,16 Q115,116 2SC2565Y
Q17,18 Q117,118 2SA1095Y
IC1,101 TA7317P



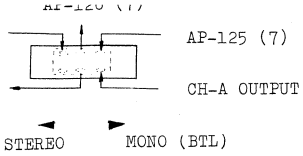
As explained on the cover page, protection circuits have been improved on later versions.
The following modifications will make relay circuits more positive.

Without ET-63
DC detector (AP-126)
R39, 139 ..... 100K to 330K

With ET-63
DC detector (AP-126)
R39, 139 ..... 100K to 330K
Impedance sensor (ET-63)
R4 ..... 22K to 27K

AP-126 (141-126) Serial No. 840100~880849

(PCB 052-494)

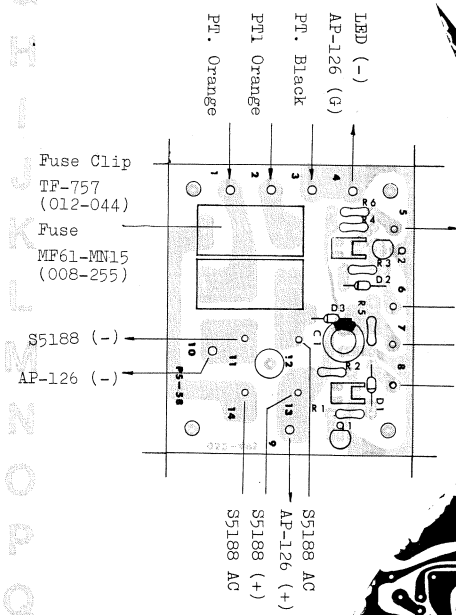


SW-2 WIRING

(Front view)

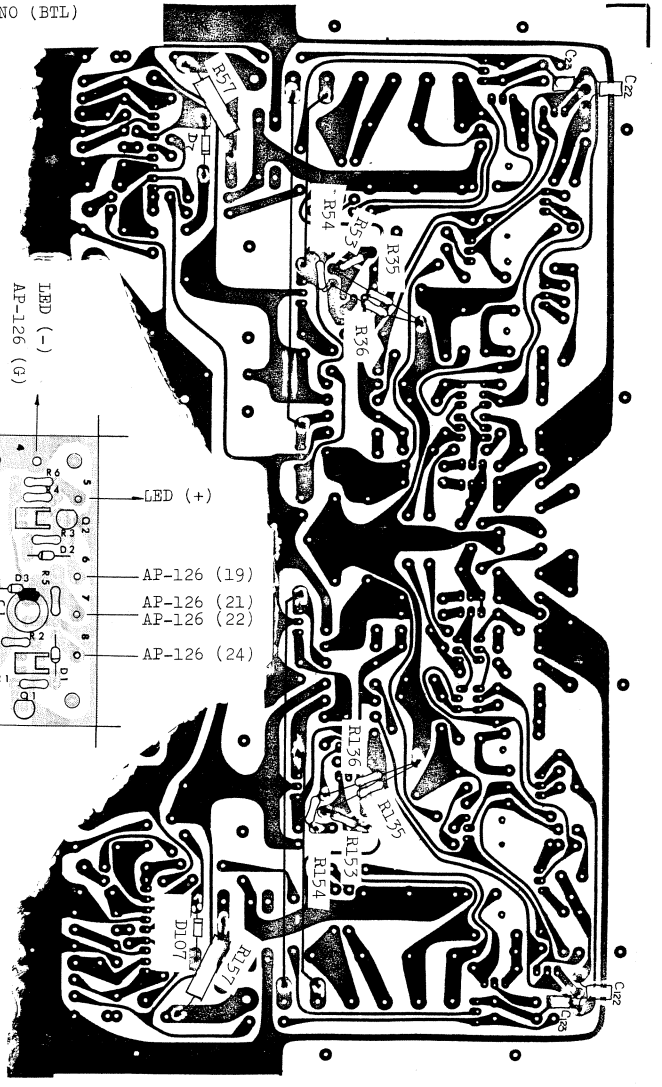
CORRECTION -PS-58-

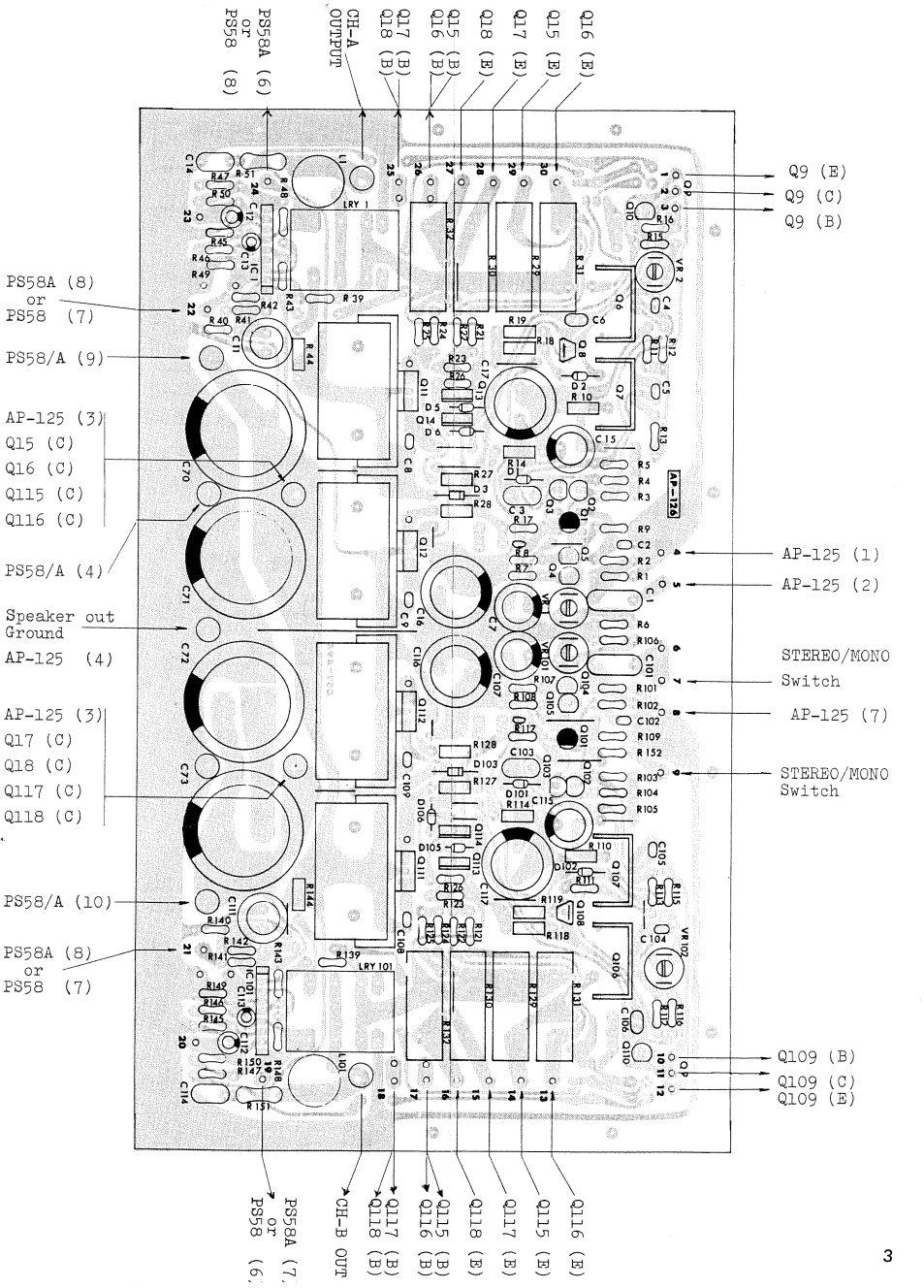
PCB
1. add D4 to R6
2. D1, D2 reverse



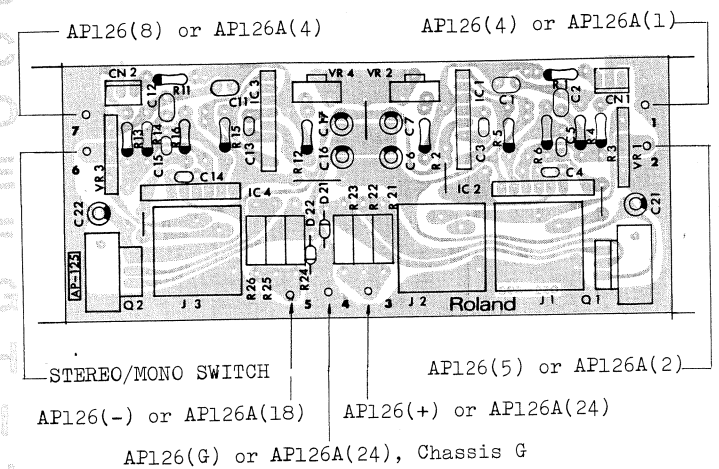
PS-58 (146-058)

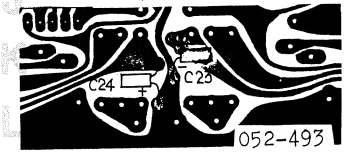
Serial No. up to 870549
(Use PS-58A for the replacement)

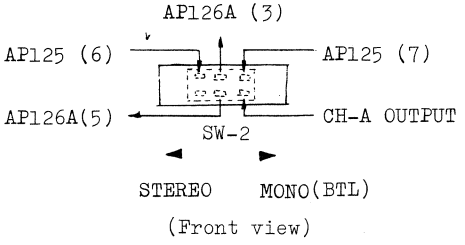




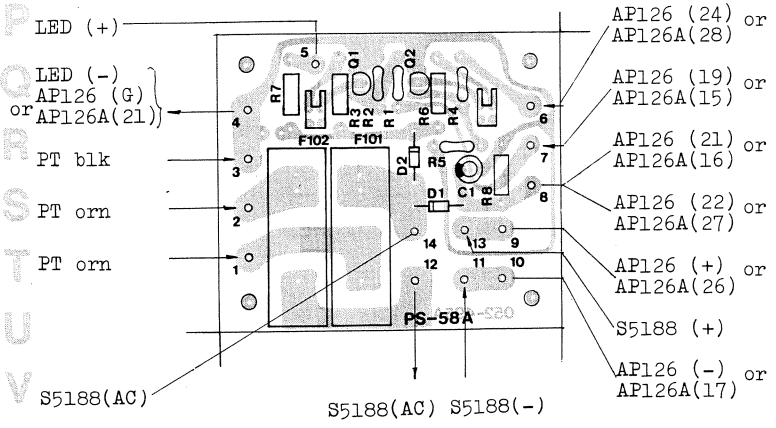
AP-125 (141-125) (PCB 052-493)



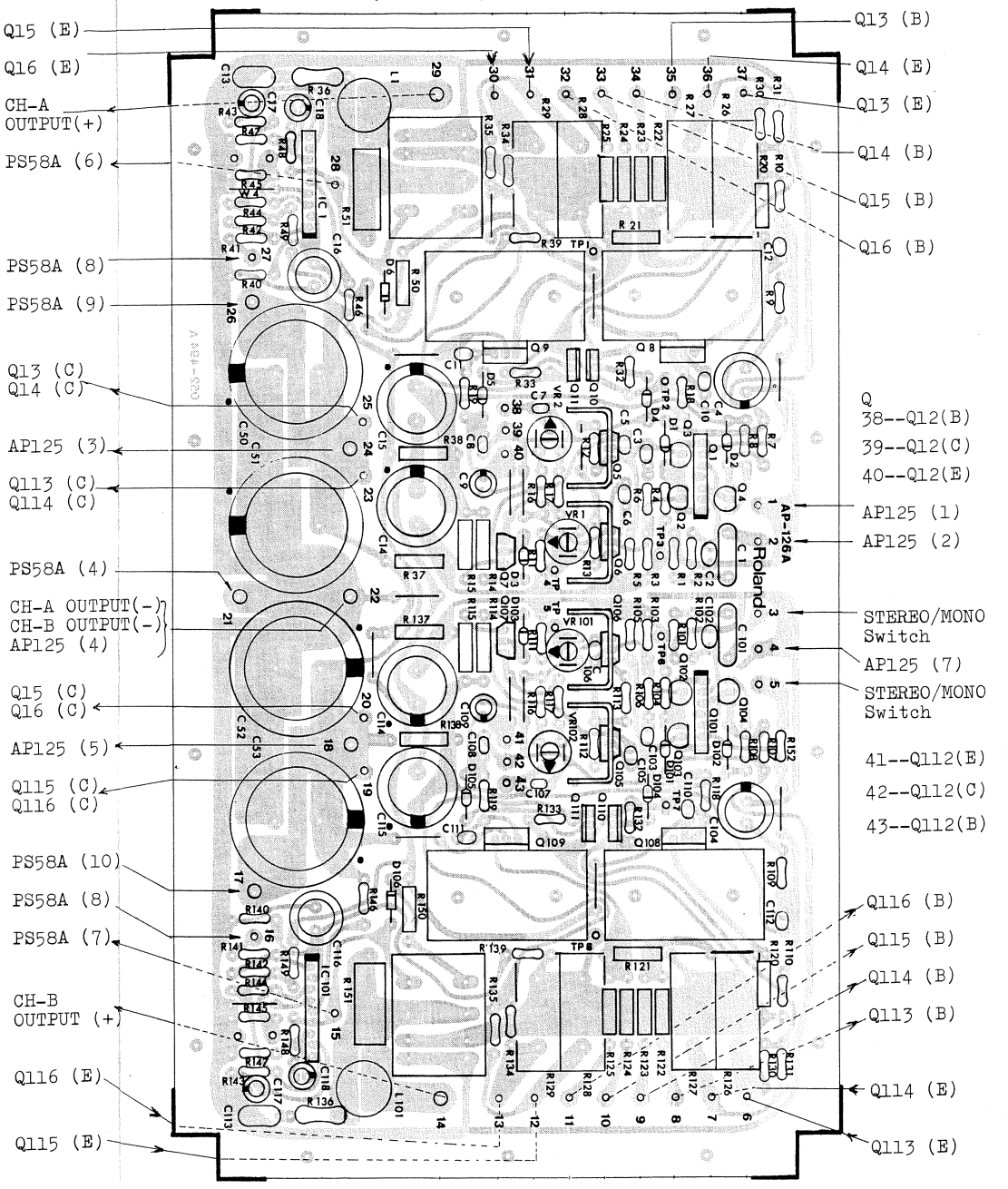




PS-58A (146-058A)
(PCB 052-495A)
Serial Nos. 870550 and higher

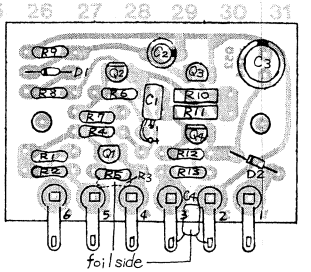


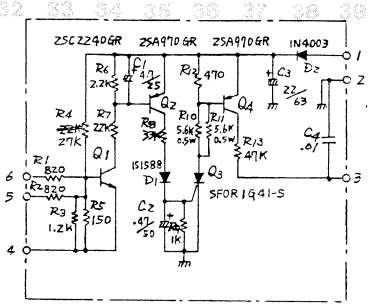
AP-126A (141-126A) Serial Nos. 890850 -082559 (PCB 052-494A)



Serial Number 890850-082559

ET-63 (pcb 052-584)





IC 1~4 HA1457W
Q1 2SC1624Y
Q2 2SA814Y

Q1,101 2SK150GR

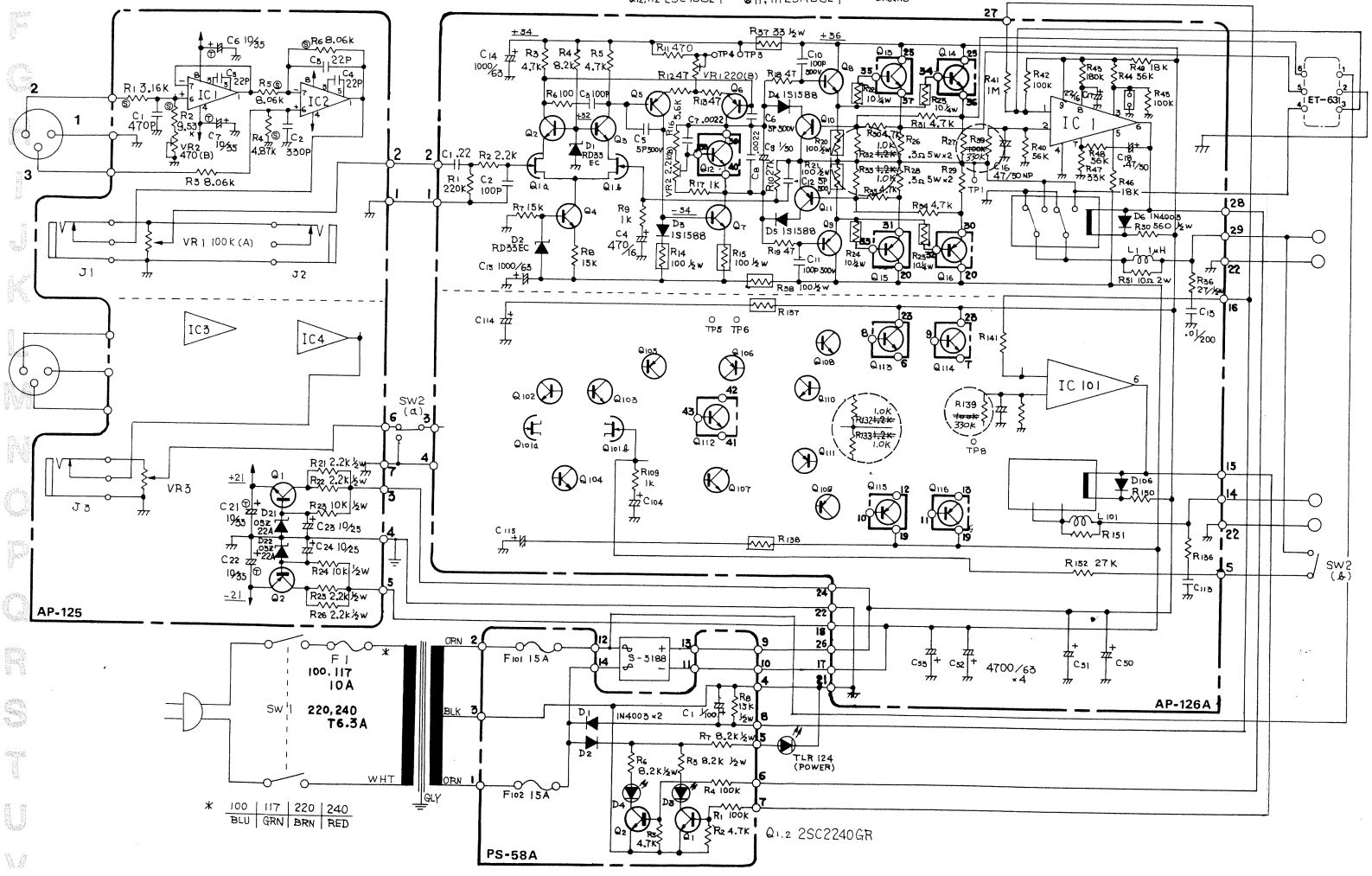
Q2~4, Q102~104 2SC2240GR

Q5,6 Q105,106 2SA818Y
Q7,107 2SC1628Y
Q12,112 2SC1382Y

Q8,108 2SC2238Y
Q9,109 2SA968Y
Q10,110 2SC1382Y
Q11,111 2SA682Y

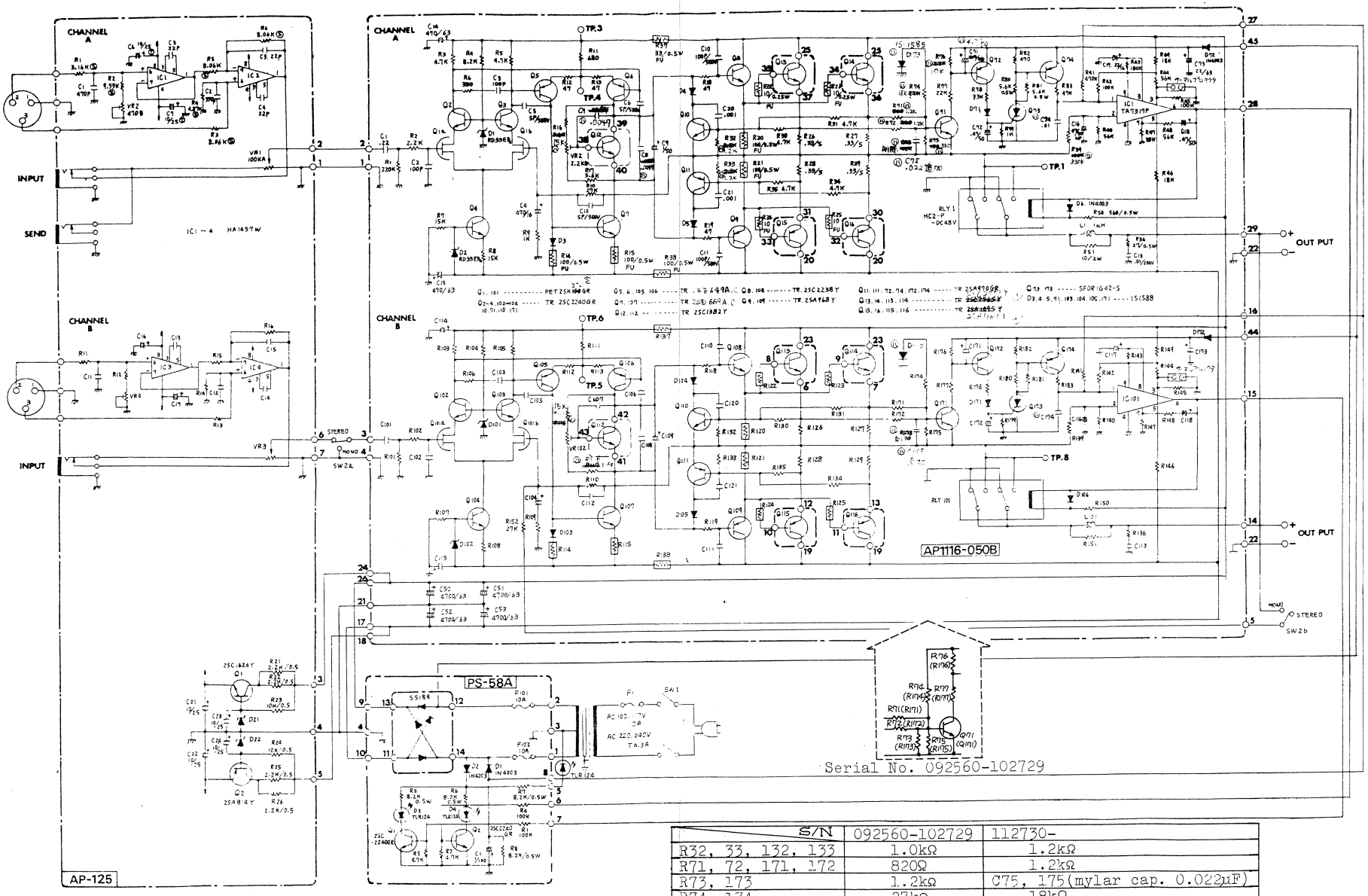
Q13,14 Q113,114 2SC2563Y
Q15,16 Q115,116 2SA1095Y

IC 1,101 TA7317P



As described on the cover page, protection circuits have been improved on later versions.
For more positive relay switching, the following modifications should be done on the products in this group.

	from	to
DC detector R39, 139	100K	330K
Impedance sensor R4(ET-63)	22K	27K
Current limiter R32, 132 R33, 133	2.2K	1.0K



S/N	092560-102729	112730-
R32, 33, 132, 133	1.0kΩ	1.2kΩ
R71, 72, 171, 172	820Ω	1.2kΩ
R73, 173	1.2kΩ	C75, 175(mylar cap. 0.022μF)
R74, 174	27kΩ	18kΩ
R75, 175	150Ω	560Ω
R76, 176	2.2kΩ	10kΩ
C71, 171	4.7μF/25V	4.7μF/50V

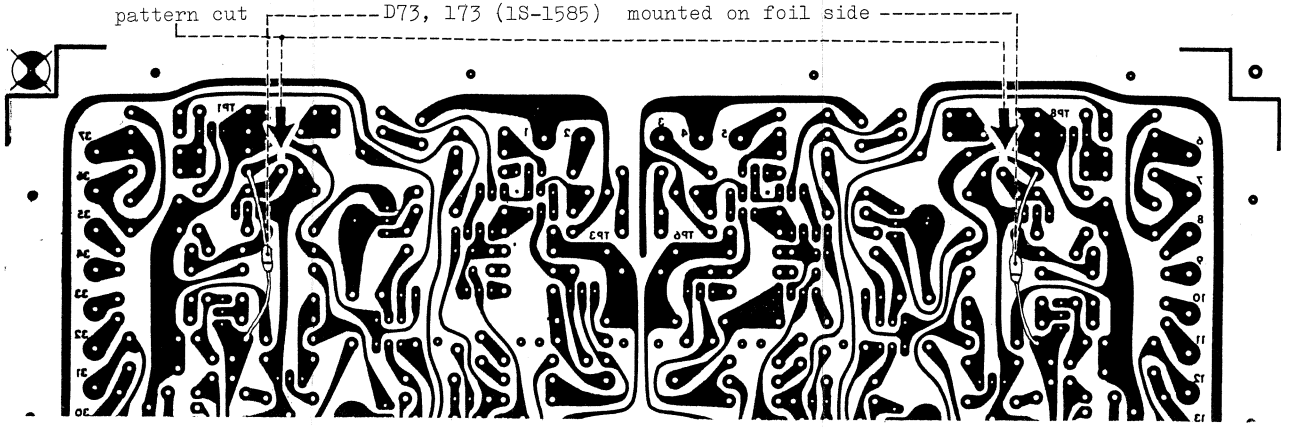
Serial Number 092560 and up

For Serial Numbers 092560-102729
The following modifications are effective to make protection circuits more reliable without changing all the components listed in the table on the opposite page.

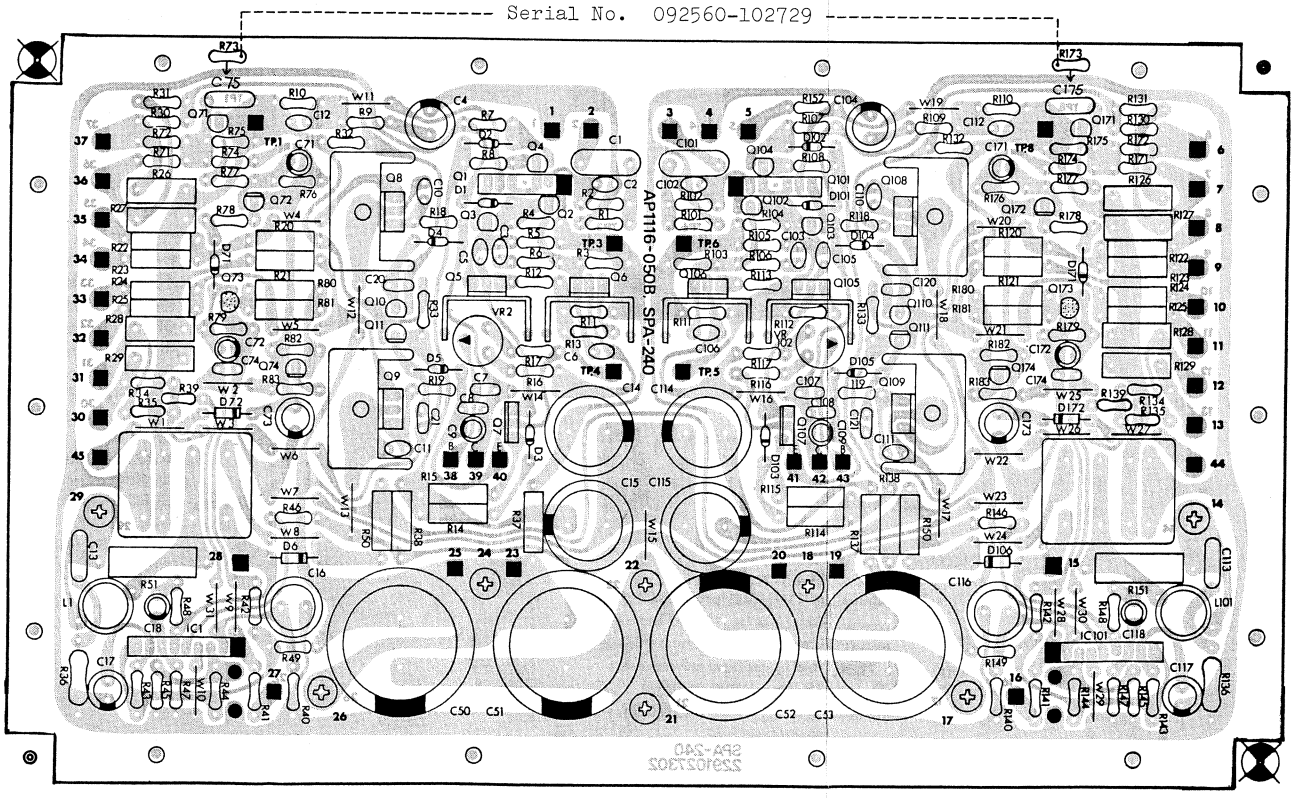
	from	to
DC detector R39, 139	100K	330K
Impedance sensor R74, 174	22K	27K
Current limiter R32, 33, 132, 133	2.2K	1.0K

Keep C18(C118) away L1(101) and R51(151), and glue them to IC1(IC101). This reduces radio frequency induction between components and eliminates mistriggering the relay.

Q1, 101 ..... 2SK150GR or 2SK270GR
Q2-4, 10, 71, 102-104, 110, 171 ..... 2SC2240GR
Q5, 6, 105, 106 ..... 2SB649AC
Q7, 107 ..... 2SD669AC
Q8, 108 ..... 2SC2238Y
Q9, 109 ..... 2SA968Y
Q11, 72, 111, 172, 174 ..... 2SA970GR
Q13, 14, 113, 114 ..... 2SC2565Y or 2SC2773Y
Q15, 16, 115, 116 ..... 2SA1095Y or 2SA1169Y
Q73, 173 ..... SFOR1G42-S
D3-4, 71, 103-105, 171 ..... 1S1588
D6, 72, 106, 172 ..... 1N4003
D1, 2, 101, 102 ..... RD33EB4
R26-29, 126-129 ..... MPC71 (metal plate)



AP1116-050B(7111605006) (pcb 2291027302)



PARTS LIST

072-288	Panel No.288 front
072-289	Panel No.289 rear
017-012	Cover No.12 top. bottom
108-021	Handle No.21 mounting hole 5mm
108-021A	Handle No.21A 6mm-hole Serial No. 880650 and higher
047-033	Cord (line) hook No.33
111-021	Rubber foot G-5
009-030	Jack HLJ0264-01-030
010-263	Receptacle (XLR type) NC-3 FP female
042-053	Terminal T-3830 black
042-054	Terminal T-3830 red
042-062	Terminal No.62 earth
001-058	Switch SSC-22-13.5 slide
001-282	Switch ESB-997R power 100/117V
001-283	Switch ESB-9929S power 220/240V
016-009	Button No.9 power switch
016-077	Knob No.77 pot.
022-141	Powertransformer No.141 100/117V
022-141D	Powertransformer No.141D 220/240V
022-144	Coil No.144 1μH

FUSE. FUSE HOLDER

012-020	Post SN-2059 100/117V
012-019	Post SN-2250 220/240V
012-044	Clip TF-757 sec.
008-164	Fuse MGC 10A prim. 100/117V
008-076	Fuse CEE T6.3A prim. 220/240V
008-255	Fuse MF61-MN15 15A sec.
008-250	Thermal protector T100.10U/M2

HEAT SINK

048-075	No.75 radiator black
048-032	No.32 AP-126/A large
048-067	No.67 AP-126/A small
048-018	No.18 AP-125

PCB

7111605006	AP1116-050B (pcb 2291027302) Serial Number 112730 and higher. Compatible with former PCBs with care on terminal connections.
141-125	AP-125 (PCB 052-493)
146-58A	PS-58A (PCB 052-495A) can replace PS-58
052H195	LED mounting less parts

SEMICONDUCTOR

Transistor

15119703	2SA1169-O or Y
15129706	2SC2773-O or Y
017-034	2SA682-Y
017-031	2SA818-Y
017-143	2SA968-Y
017-035	2SC1382-Y
017-028	2SC1628-Y
017-144	2SC2238-Y
017-123	2SC2240-GR
017-030	2SA814-Y
017-029	2SC1624-Y
15139114	2SK270-GR FET (AP1116-050B)
017-036	E-412 FET (AP-126)

Diode

018-022	1N4003
018-059	1S1588
018-102	S-5188 bridge rectifier
018-050	RD22EB zener (AP-125. PS-58)
018-104	RD33E zener
019-028	TL-124 LED

IC

020-211	TA7317P
020-080	HA1457W

POTENTIOMETER

026-150	EVHF4AP20A15 100KA
030-654	CR29R 470-ohm trimmer
030-461	SR19R 2.2K trimmer
030-409	SR19R 22K trimmer (AP-126)
030-480	SR19R 220-ohm trimmer (AP-126A)

CAPACITOR

Electrolytic

032-266	ECET63R472SW 4700mfd 63V large can
032-245	ECEA50N47U 47mfd 50V non-polar
032-230	10mfd 35V tantalum
035-103	ECQ2103KZ 0.01mfd 200V ±10% polypropylene

RESISTOR

008-118	FN-1 10-ohm ¼W fusing
008-087	FN-1 33-ohm ¼W fusing
008-093	FN-1 100-ohm ½W fusing
044-253A	M0-4P 0.3-ohm 5W wirewound
044-193	MS-2 10-ohm 2W wirewound
050-012	Relay AP3423 HC2-P-DC480

MISCELLANEOUS

Holder

064-255	No.255 power switch mounting
064-259	No.259 power transformer mounting
064-260	No.260 AP-126/A mounting
064-261	No.261 AP-126/A mounting
064-257	No.257 AP125 mounting
120-052	Boss nut 3 x 7mm PS-58/A mounting
129-541	Hexagon socket head bolt 6 x 15mm front panel

ADJUSTMENT

	AP-126 Serial no. up to 880849		AP-126A Serial no.890850 and higher	
	CHANNEL A	CHANNEL B	CHANNEL A	CHANNEL B
	CIRCUIT CURRENT			
Connect a DC voltmeter across	R11	R111	TP-3 and TP-4	TP-5 and TP-6
Trimmer to be adjusted	VR-1	VR-101	VR-1	VR-101
	With no signal input, adjust the VRs for the readings:			
	0.6V	0.6V	2.5V	2.5V
	POWER TRANSISTOR IDLING CURRENT (SETTING QUIESCENT POINT)			
Connect a DC voltmeter across	R31	R131	R27	R127
Trimmer to be adjusted	VR-2	VR-102	VR-2	VR-102
	With no signal input, adjust the VRs for 24mV reading.			

COMMON MODE REJECTION

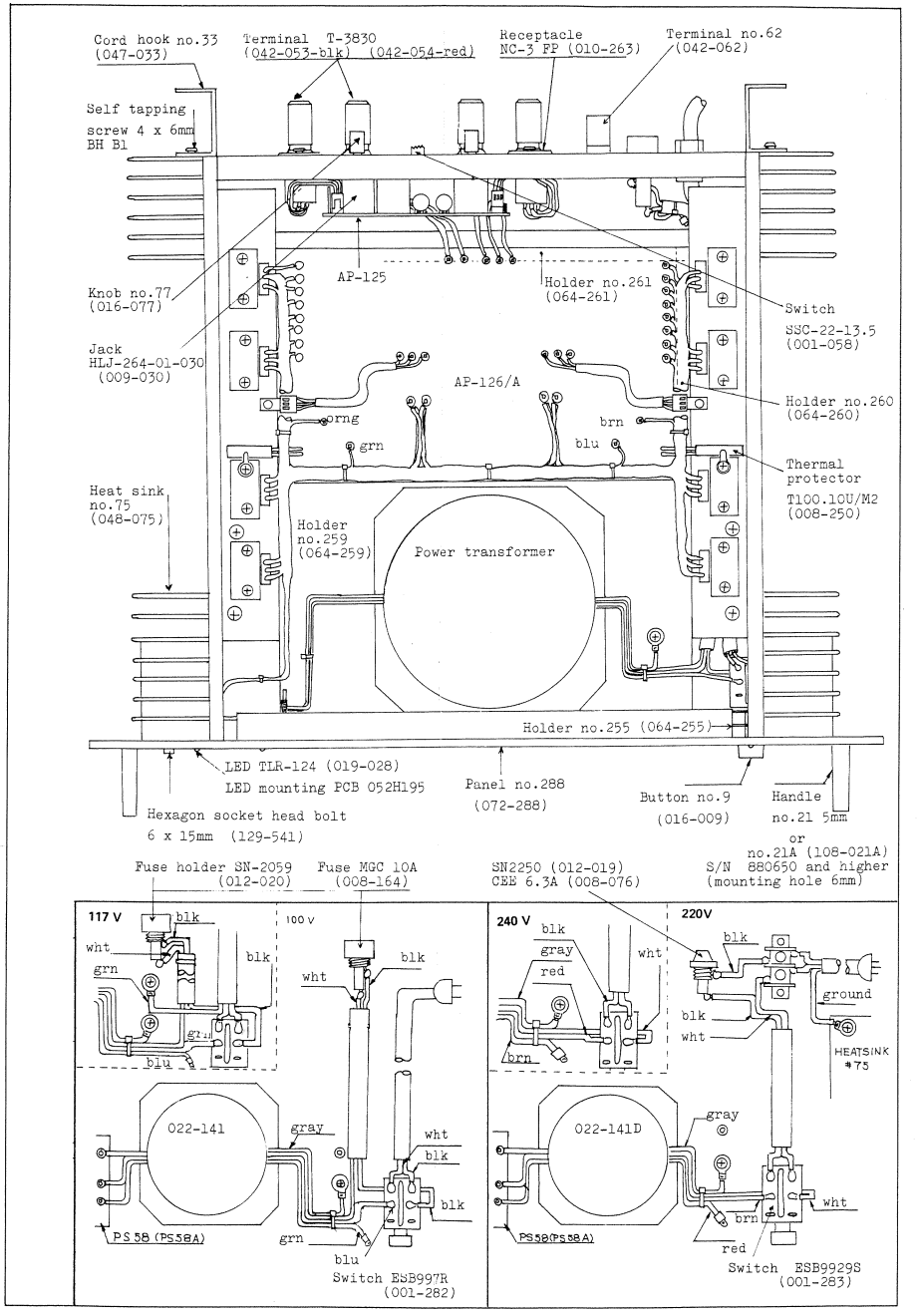
Set MODE Switch in STEREO.

CHANNEL A

1. Join pins 2 and 3 of CH-A input socket by a lead for in-phase inputting.
2. Apply a signal, 60Hz, sine into the socket.
3. Set VR-2 on the AP-125 for the minimum signal output at CH-A speaker terminals.

CHANNEL B

Set VR-4 in the same manner as VR-2.



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