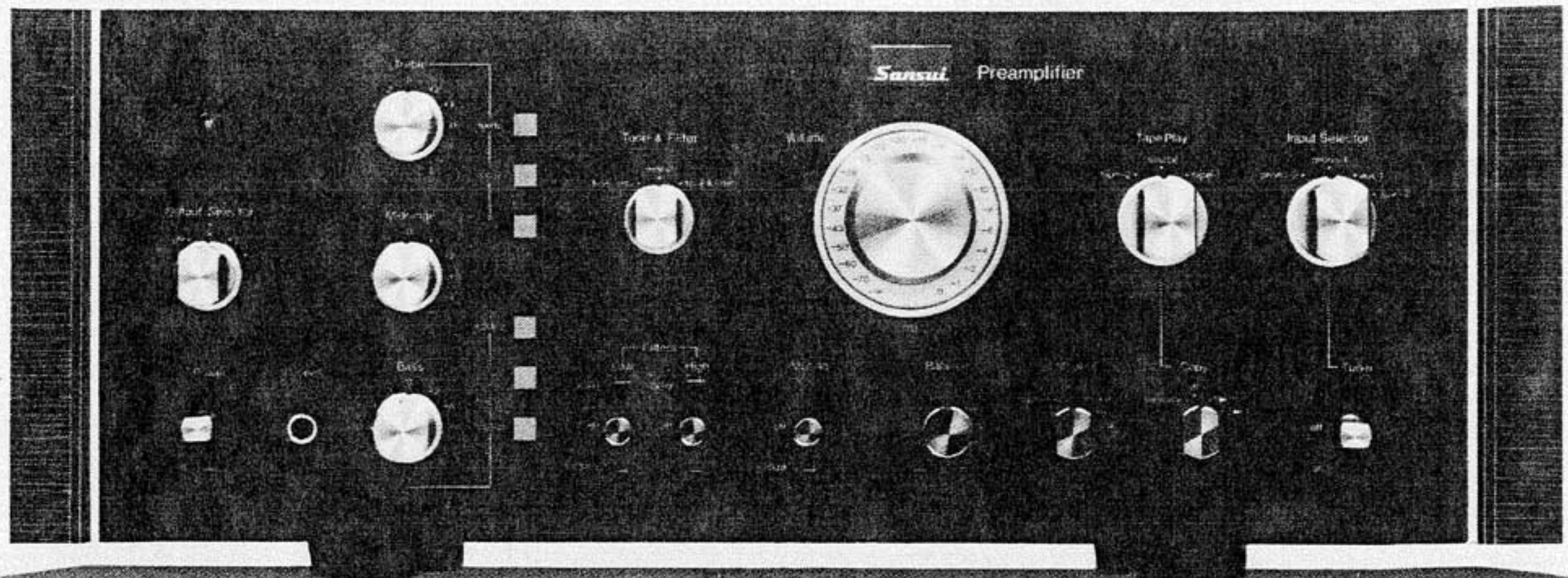


SERVICE MANUAL

PREAMPLIFIER **SANSUI CA-2000**



Sansui

SANSUI ELECTRIC CO., LTD.

This service manual is designed for service engineers to repair, adjust, maintain and order the replacement parts of the CA-2000 correctly. When ordering the parts, use the stock number and parts name specifically referring to the Parts Location and Parts Lists. For general usage and maintenance of the unit, please refer to the Operating Instructions attached with the unit.

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1. SPECIFICATIONS

OUTPUT VOLTAGE

- OUTPUT1.0 V (rated)
(Maximum output level: 12 V at 1 kHz with no more than 0.1% total harmonic distortion)
- TAPE REC-1, 2 (Pin jacks) .. 150 mV
- TAPE-2 REC/PLAY (DIN socket)
.....30 mV

TOTAL HARMONIC DISTORTION

.....less than 0.03%

INTERMODULATION DISTORTION (70 Hz: 7,000 Hz=4: 1

SMPTE method)less than 0.03%

FREQUENCY RESPONSE (at rated output)

.....10 Hz to 80 kHz ± 0.5 dB
 -1.0 dB

RIAA CURVE DEVIATION (PHONO)

.....+0.2dB, -0.2dB (20 Hz to 20 kHz)

INPUT SENSITIVITY AND IMPEDANCE

(1 kHz for rated output)

PHONO-12 mV, 4 mV, 8 mV/30 k Ω ,
50 k Ω , 100 k Ω

(Maximum input capability: 1V at 1 kHz, less than 0.1% distortion and PHONO SENSITIVITY switch at 8 mV)

PHONO-22 mV/50 k Ω

AUX150 mV/50 k Ω

TUNER150 mV/50 k Ω

TAPE PLAY-1, 2 (Pin jacks) 150 mV/50 k Ω

TAPE-2 REC/PLAY (DIN socket)

.....150 mV/50 k Ω

HUM AND NOISE (IHF)

PHONO-1better than 75 dB

(Input sensitivity switch at 4 mV)

AUXbetter than 90 dB

TUNERbetter than 90 dB

TAPE PLAY-1,2better than 90 dB

CONTROLS

BASS ± 10 dB (30 Hz)

TONE SELECTOR (turnover frequencies)

.....150 Hz, 300 Hz, 600 Hz

MIDRANGE ± 5 dB (1.5 kHz)

TREBLE ± 10 dB (20 kHz)

TONE SELECTOR (turnover frequencies)

.....2 kHz, 4 kHz, 8 kHz

LOW FILTER -3 dB (20 Hz), 12 dB/oct.

-3 dB (60 Hz), 12 dB/oct.

HIGH FILTER -3 dB (7 kHz), 6 dB/oct.

-3 dB (12 kHz), 12 dB/oct.

MUTING0 dB, -20 dB

POWER REQUIREMENTS

POWER VOLTAGE.....100, 120, 220, 240 V, 50/60 Hz

120 V (Usable 110-130 V),

60 Hz for U.S.A. & Canada

POWER CONSUMPTION..26 Watts

DIMENSIONS460 mm (18 1/8") W

160 mm (6 5/16") H

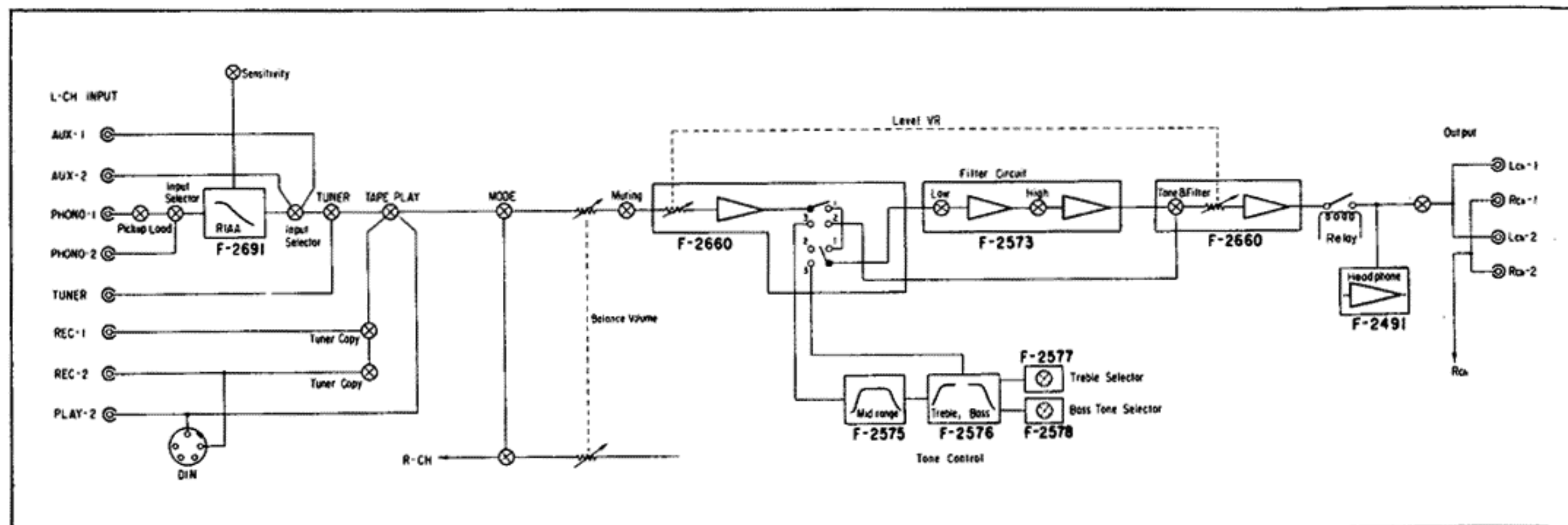
310 mm (12 1/4") D

WEIGHT9.9 kg (21.8 lbs) net

11.6 kg (25.6 lbs) packed

* Design and specifications subject to change without notice for improvements.

2. BLOCK DIAGRAM



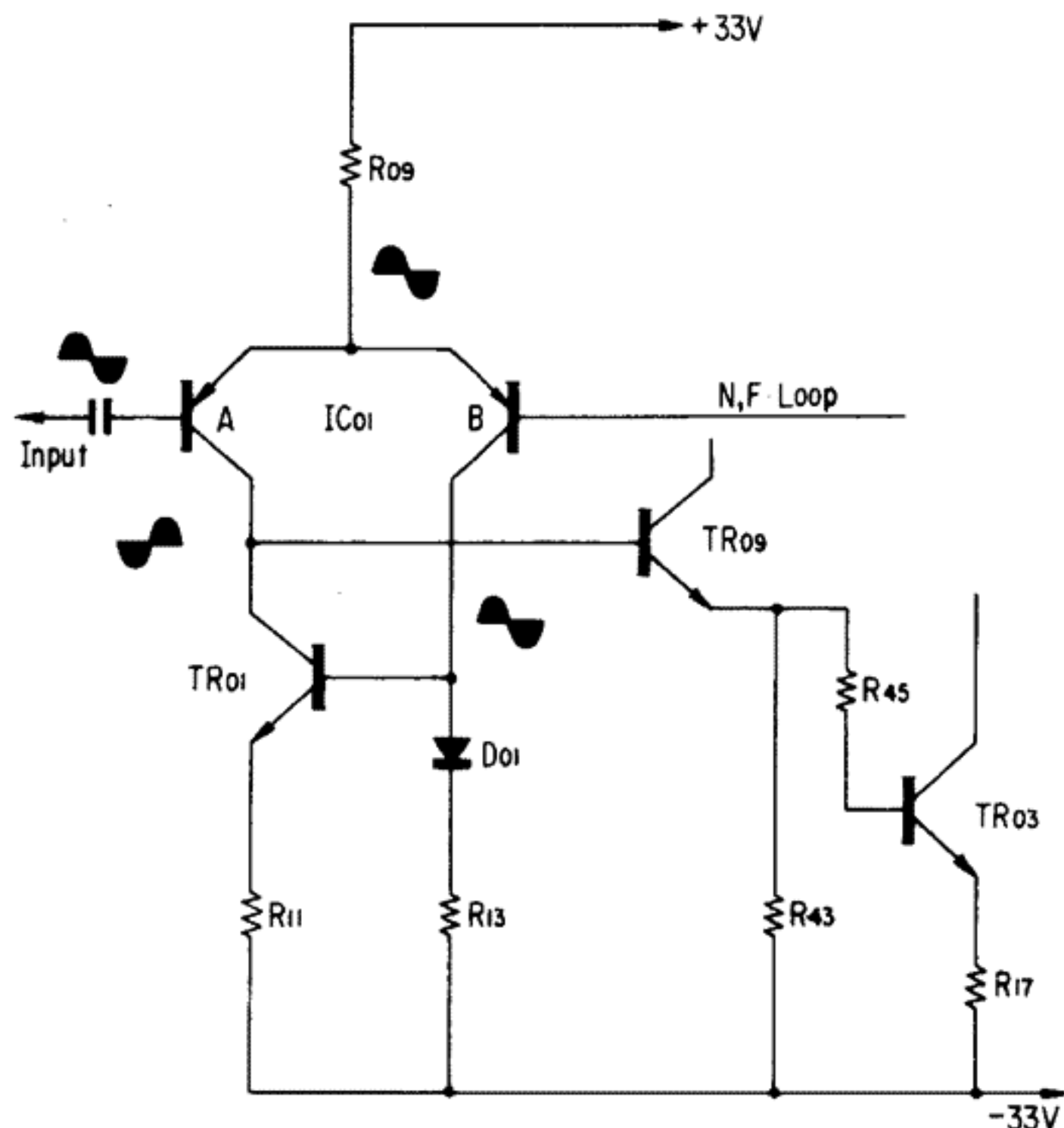
3. OPERATIONS OF NEW CIRCUITS

3-1. Current Mirror Circuit

◆Purpose of use in # CA-2000

By adding current mirror section to balanced-type signal amplifier as Fig. 3-1, the current mirror circuit is effective to improve signal to noise ratio, distortion factor and direct current stability.

Fig. 3-1 Current Mirror Circuit on F-2691 Equalizer Circuit Board



◆Advantages

1. By operation of differential amplification in this driver stage, the current mirror circuit is efficient to reduce the influence of the power line voltage deviation and *Common Mode Rejection Ratio (C.M.R.R.).

$$* \text{C.M.R.R. (dB)} = \frac{\text{Differential Gain}}{\text{Common Mode Gain}}$$

2. By basic functions of push-pull amplifier in this circuit, lower distortion factor is obtained.
3. Since the output impedance of this circuit can be kept extremely high, considerable high gain is obtained.

◆Operation

This Current Mirror Circuit is composed of two semi-conductors, TR01 & Diode D01 using as the current mirror section, and a IC01 using as the balanced-typed signal amplifier as shown in Fig. 3-1. The transistor, TR01, and transistor A of first stage built in the IC operate as a pushpull amplifier.

◆Phase Characteristics

When input signal shown in Fig. 3-1. is supplied to the base of the transistor A in the IC in normal operation,

1. Out-of phase signal against the input signal appears at the collector of transistor A.
 2. In-phase output signal against the input one appears at the emitter of transistor A.
 3. Since the base of transistor B built in the IC is grounded in AC equivalent circuit, transistor B operates as the function of common -base circuit; therefore, the signal appeared at collector of transistor B is in-phase signal against signal appeared at emitter of transistor B.
 4. The signal appeared at collector of transistor B is given to the base of TR01. The signal appeared at collector of TR01 is out-of phase to the signal at collector of transistor B and is in-phase signal at collector of transistor A.
- Thus, the combination of transistor A and TR01 is used as operation of push-pull amplifier.

◆Open Loop Gain

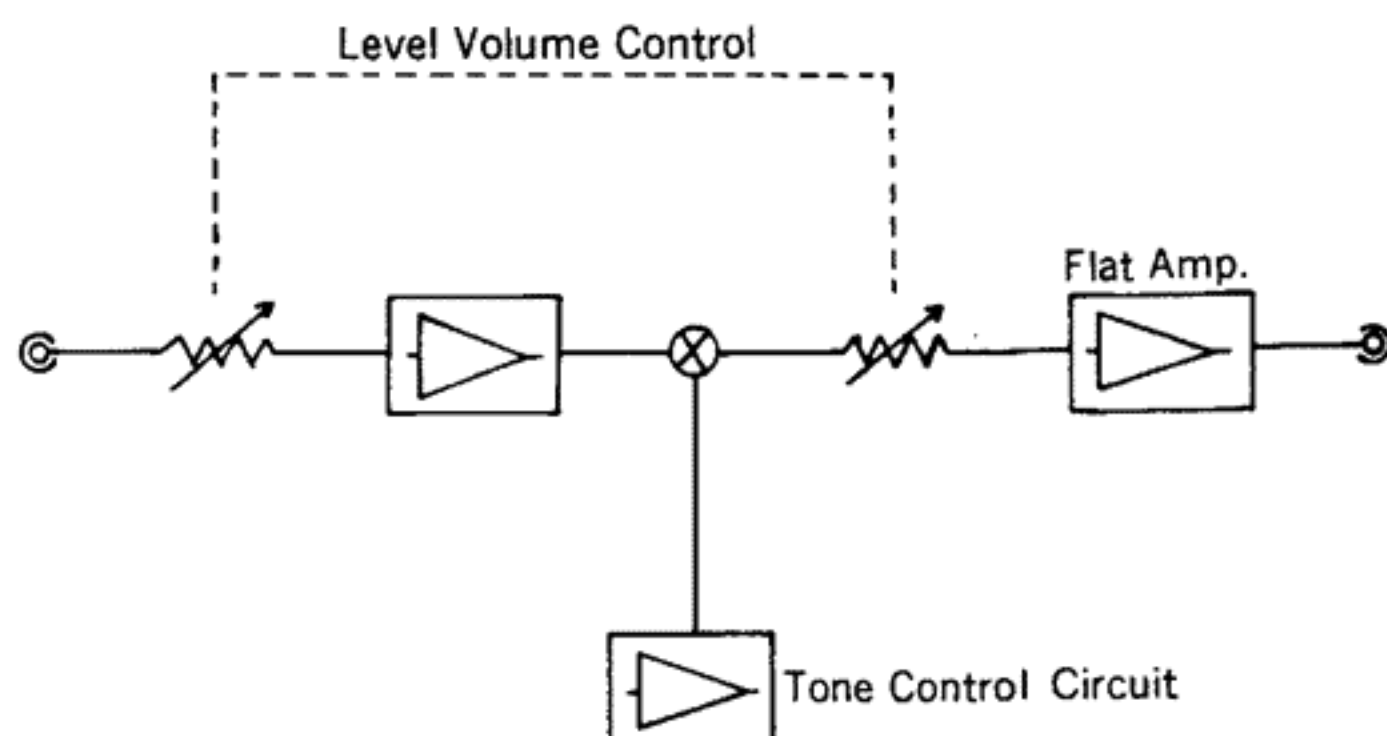
The open loop gain of conventional differential amplifier itself is approximately 30dB to 35dB in normal operation; furthermore, by adding the current mirror circuit in series to conventional differential amplifier, it is possible to obtain high open loop gain, approximately 70dB to 80dB. Consequently, the gain 40dB to 50dB, is able to add to negative feedback loop by using the current mirror circuit in order to improve distortion factors.

3-2. Four-gang Level Volume Control

This unit is equipped with four-gang level volume control for the purpose of the following reason.

Conventional 2-channel stereo control amplifier adopts twin (two)-gang level volume control connecting with the input side of tone control circuit. Therefore, noise components existing in equalizer circuit can be gradually decreased by turning level volume control downward, but noises occurred in tone control circuit appears direct to output speaker terminals. To eliminate the noises existing in tone control circuit to speaker terminals at a certain low level of volume control, this model, CA-2000 adopts four-gang level volume control which connects with both output and input sides of tone control circuit individually for 2-channel stereo function.

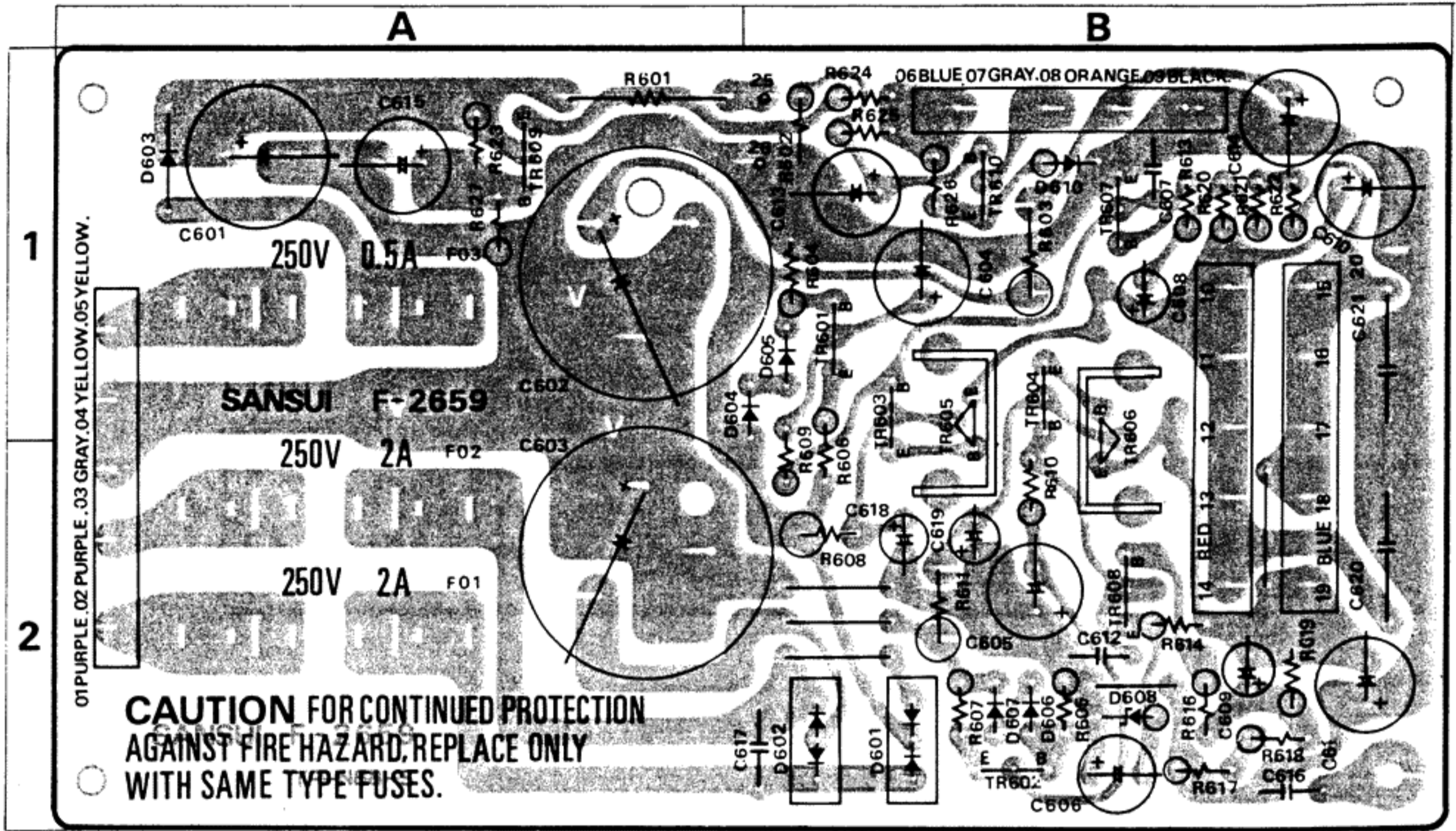
Fig. 3-2 Level Volume Control on one-channel



4. PARTS LOCATION & PARTS LIST

4-1. F-2659 Power Supply Circuit Board (Stock No. 7502101)

Conductor Side

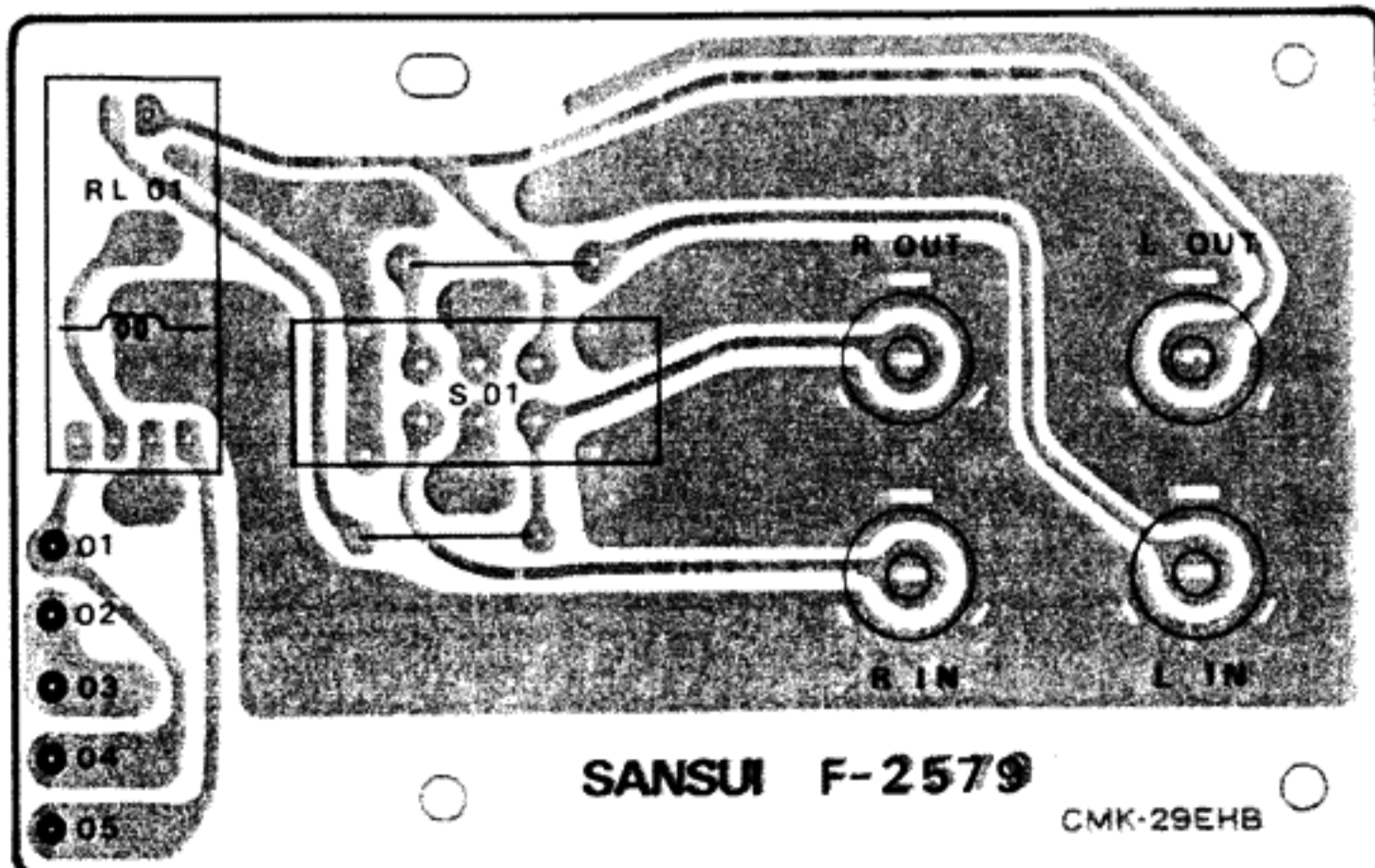


Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position	
TR601	0300470.1	2SA726 (F. G)	1 B	D602	0310801	10DC2R	Diode	R603	0202101	100Ω	2 W M.C.	
TR602	0306070.1	25C1313 (F. G)	2 B	D603	0310340	10D1 (1S2226)		1 A	R608	0201121	120Ω	1 W M.C.
TR603	0306070.1	25C1313 (F. G)	1, 2 B	D604	0340120	VD1212	1 B	R611	0201121	120Ω	2 B	
TR604	0300470.1	2SA726 (F. G)	1 B	D605	0340120	VD1212	1 B	F01	{ 0431240	2A 250V	AC Fuse	2 A
TR605	{ 0308450.1	25D356 (C. D)	1, 2 B	D606	0340120	VD1212	2 B		{ or	2A 250V		
	{ 0308611.2	25D357 (D. E)		D607	0340120	VD1212	2 B		{ 0432240	2A 250V		
TR606	{ 0303280.1	25B526 (C. D)	1, 2 B	D608	0316250	RD-10E (B)	Zener Diode	2 B	{ 0431240	2A 250V	2 A	
	{ or	or		{ 0303441.2	25B527 (D. E)	D610	0311180	{ 1S1588	Diode	1 B	{ or	2A 250V
TR607	0306070.1	25C1313 (F. G)	1 B	C602	0549206	1000rF	63V E.C.	1 A		{ 0432240	2A 250V	
TR608	0300470.1	2SA726 (F. G)	2 B	C603	0549206	1000rF	63V E.C.	2 A	{ 0431210	0.5A 250V	1 A	
TR609	0306070.1	25C1313 (F. G)	1 A	C617	0655103	10000pF	500V C.C.	2 B	{ or	0.5A 250V		
TR610	0306070.1	25C1313 (F. G)	1 B	C620	0602109	1.0rF	100WV M.C.	2 B				
D601	{ 0310800	10DC2	Diode	C621	0602109	1.0rF	100WV M.C.	1 B				
	{ or	or		R601	0104152	1.5kΩ	1 W C.R.	1 A				
	{ 0311180	1S1588										

4-2. F-2579 Pre-Main Switch Circuit Board (Stock No. 7594591)

Conductor Side

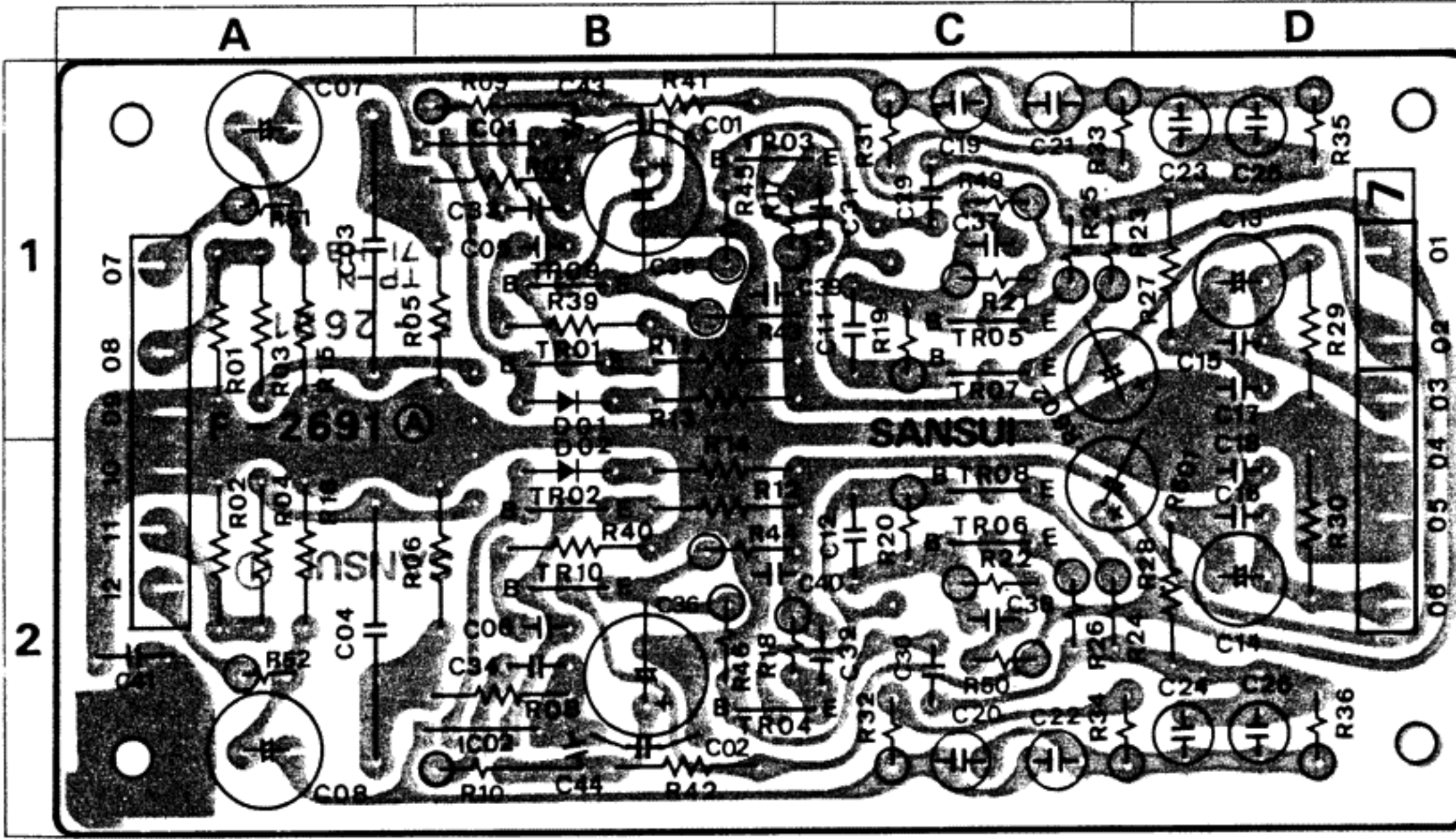


Parts List

Parts No.	Stock No.	Description
D01	{ 0311160	1S2473D } Diode
	{ or	
	{ 0311180	1S1588
RL01	1150320	Relay Switch
	2430260	Female Pin Jack (White)
	2430270	Female Pin Jack (Red)

4-3. F-2691 Equalizer Circuit Board (Stock No. 7551031)

Conductor Side

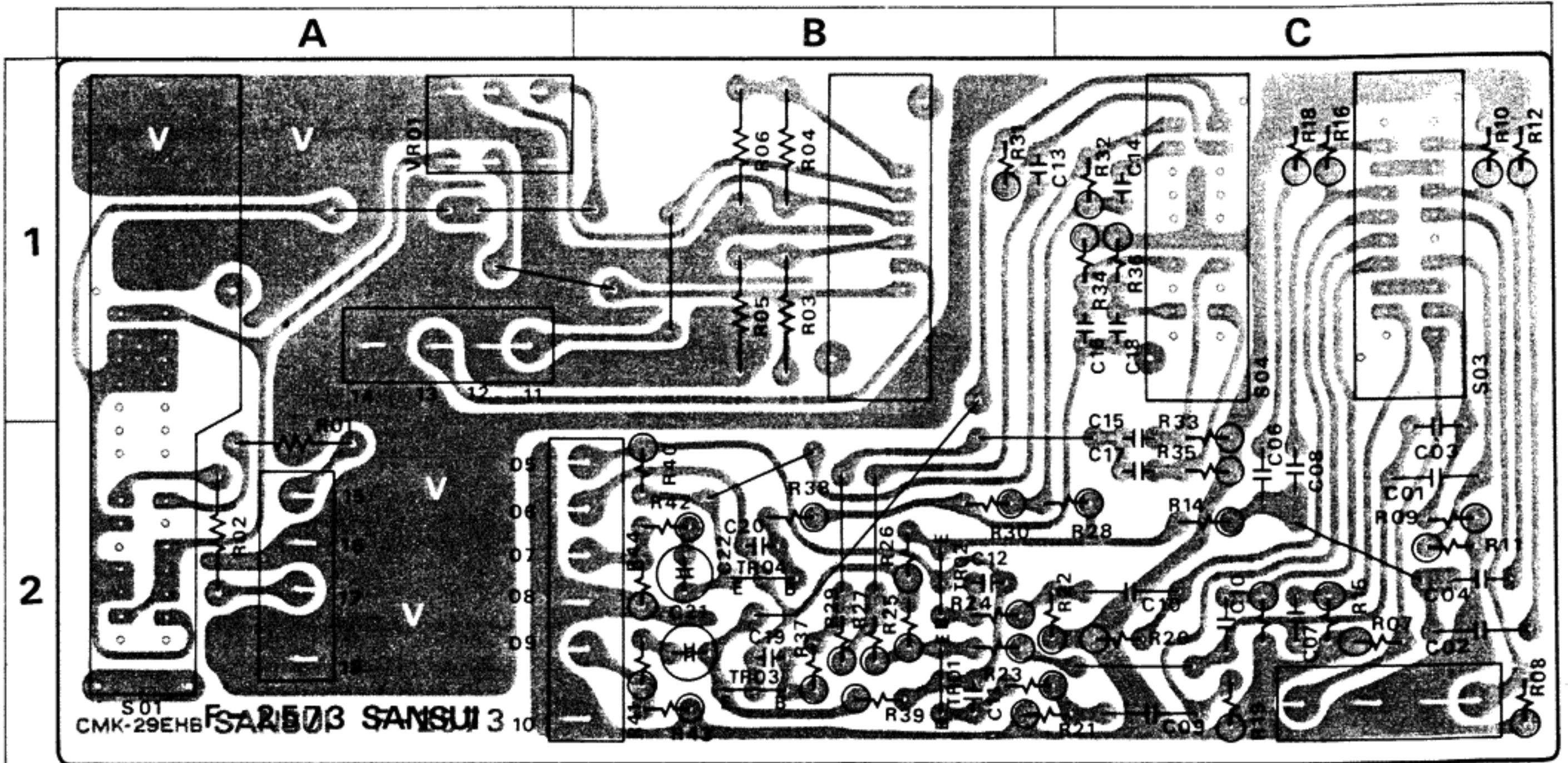


Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position				
TR01.02	0306070.2	2SC1313 (F. G)	1 C. 2 C	IC01.02	0360370.1	2SA798 (F. G) Transistor	1 C. 2 C	C25.26	0620391	390pF 50V P.C.	1 A. 2 A				
TR03.04	0306270.1	2SC1708 (F. G)	1 B. C	D01.02	0311160 or 0311180	1S2473D or 1S1588	Diode	R15.16	0231332	3.3kΩ	1 D. 2 D				
TR05.06	0306270	2SC1708 (F)	1 B. 2 B									C03.04	0602229	2.2μF 100WV M.C.	1 D. 2 D
	0306271	2SC1708 (G)													
TR07.08	0300710	2SA847 (F)	1 B. 2 B	C21.22	0620101	100pF	50V P.C.	1 B. 2 B	R31.32	0231223	22kΩ	1 B. 2 B			
	0300711	2SA847 (G)											1 B. 2 B	C23.24	0625122
TR09.10	0306270.1	2SC1708 (F. G)	1 C. 2 C	R35.36	0231473	47kΩ	1 A. 2 A	R51.52	0231102	1.0kΩ	1 D. 2 D				

4-4. F-2573 Filter Accessory Circuit Board (Stock No. 7561581)

Conductor Side

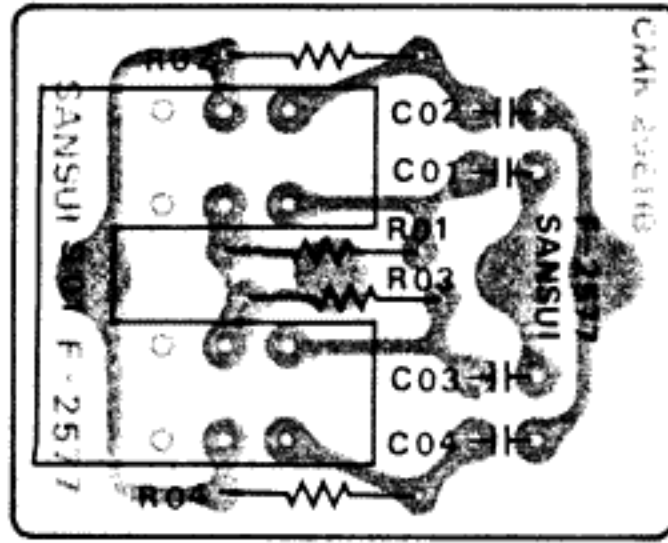


Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
TR01.02	0306270.1	2SC1708 (F. G)	Transistor 2 B	VR01	1015170.1	250kΩ (M. N) Balance Volume	1 A	S03	1170950	Low Filter Switch	1 C
TR03.04	0300760.1	2SA917 (1. 2)		S01	1190250	Mode Switch	1. 2 A	S04	1170950	High Filter Switch	1 C
C15.16	0620821	820pF 50V P.C.	2 C. 1 C	S02	1170770	Muting Switch		2410590	4P Pin Ass'y (Type D)		
								2410910	2P Pin Ass'y (Type E)		

4-5. F-2577 Treble Tone Selector Circuit Board (Stock No. 7561611)

Conductor Side

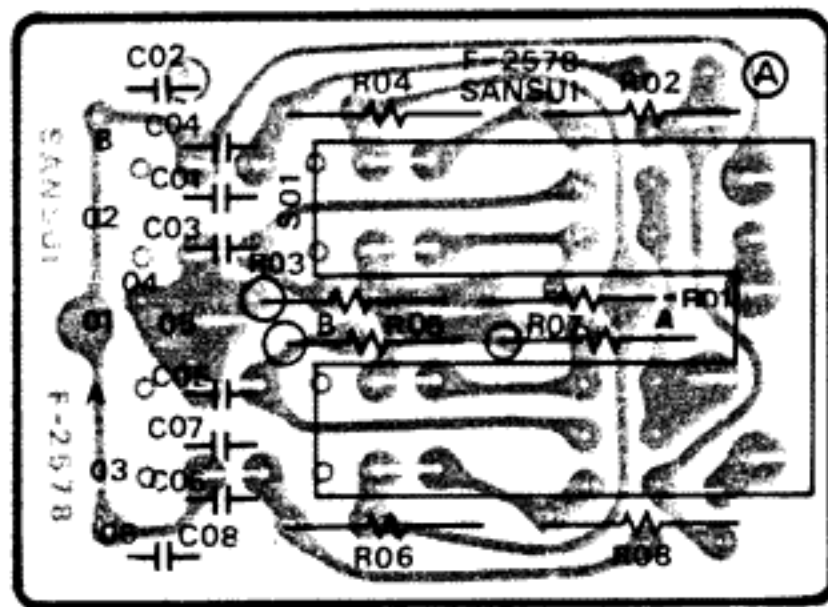


Parts List

Parts No.	Stock No.	Description
C01, 02	0620331	330 pF } 50V P.C.
C03, 04	0620911	
S01	1131150	Treble Tone Push Switch

4-6. F-2578 Bass Tone Selector Circuit Board (Stock No. 7561621)

Conductor Side

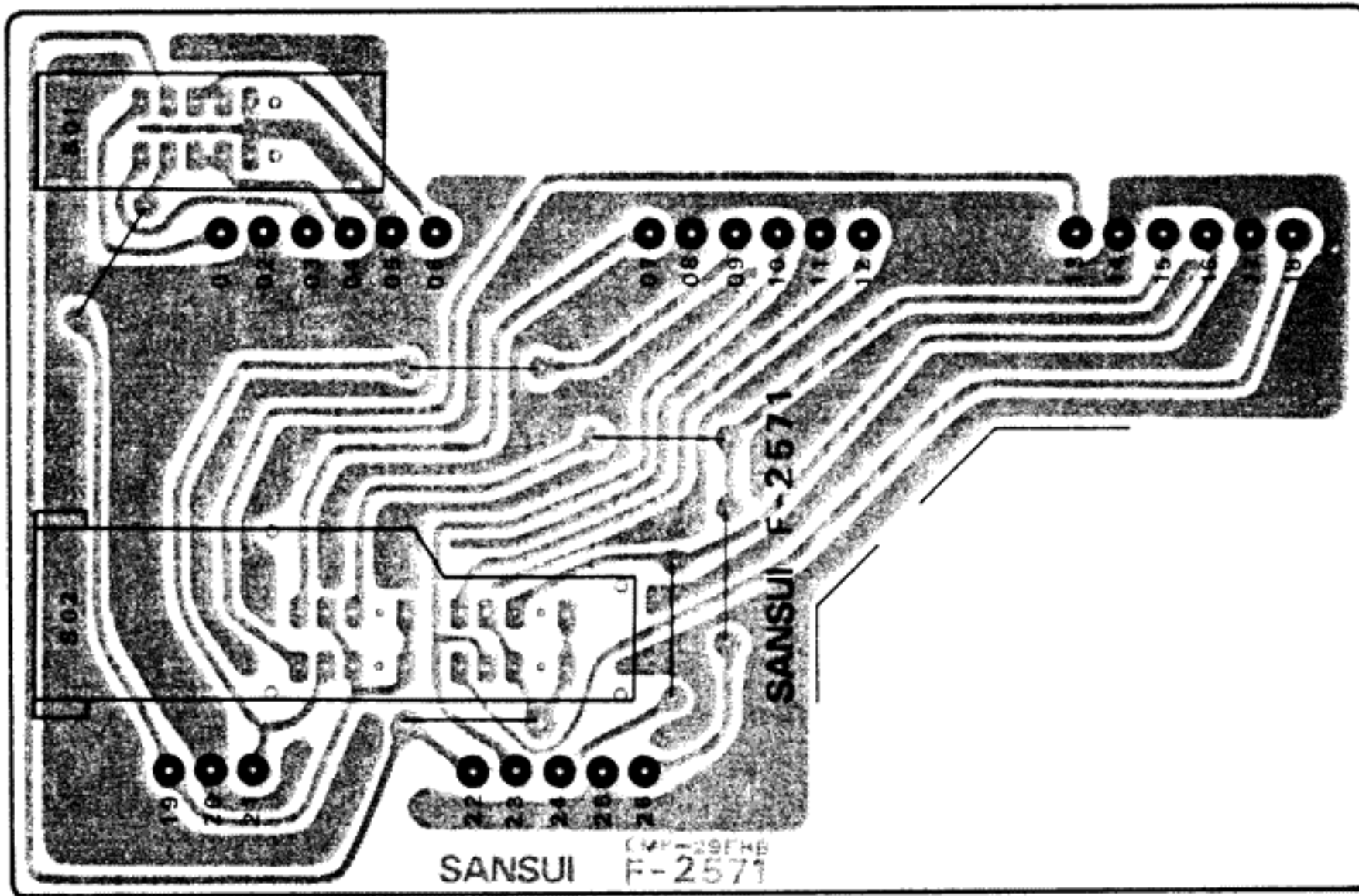


Parts List

Parts No.	Stock No.	Description
S01	1131140	Bass Tone Push Switch

4-7. F-2571 Tape Copy & Tuner Signal Switching Circuit Board (Stock No. 7594561)

Conductor Side

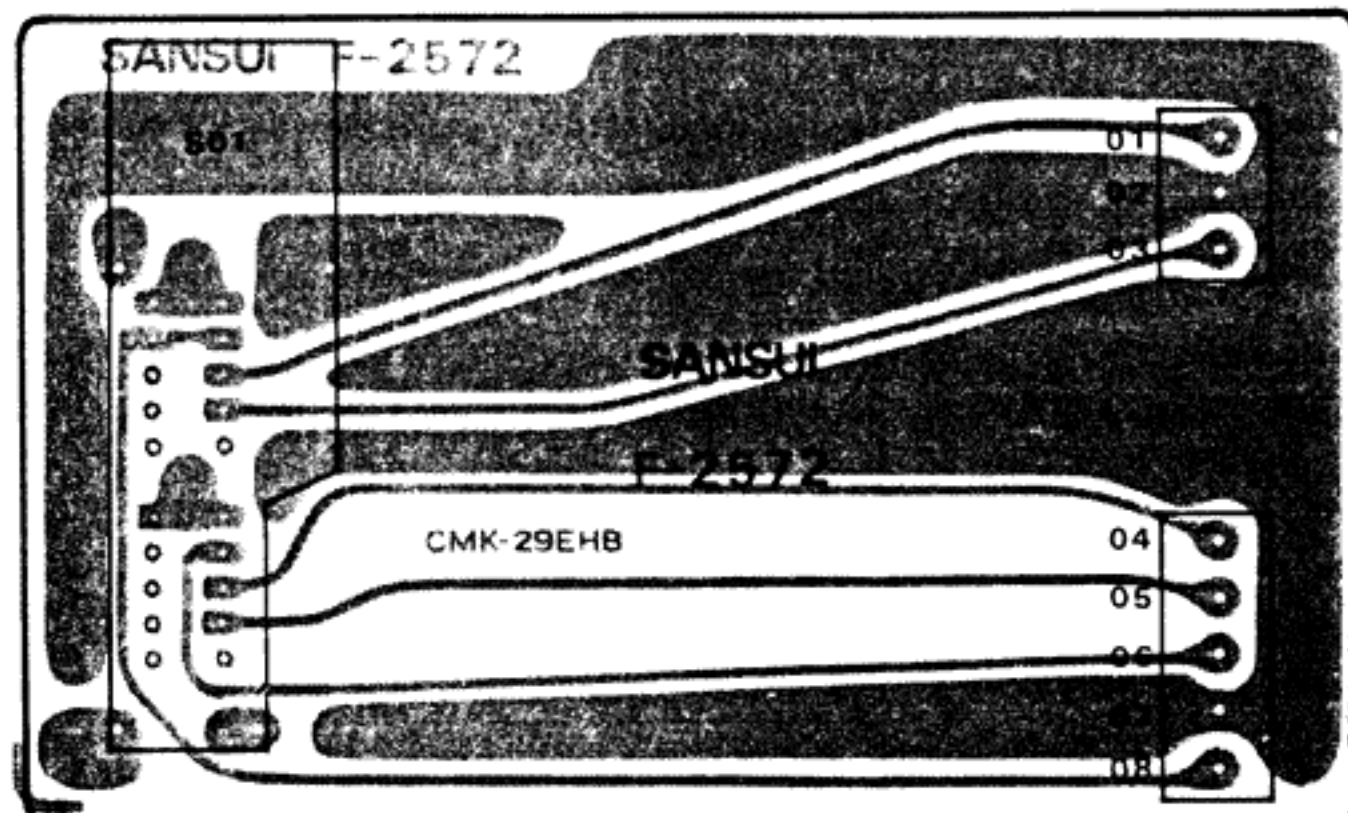


Parts List

Parts No.	Stock No.	Description
S01	1170870	Lever Switch, tuner
S02	1190280	Tape Copy Switch

4-8. F-2572 Tape Play Circuit Board (Stock No. 7594571)

Conductor Side

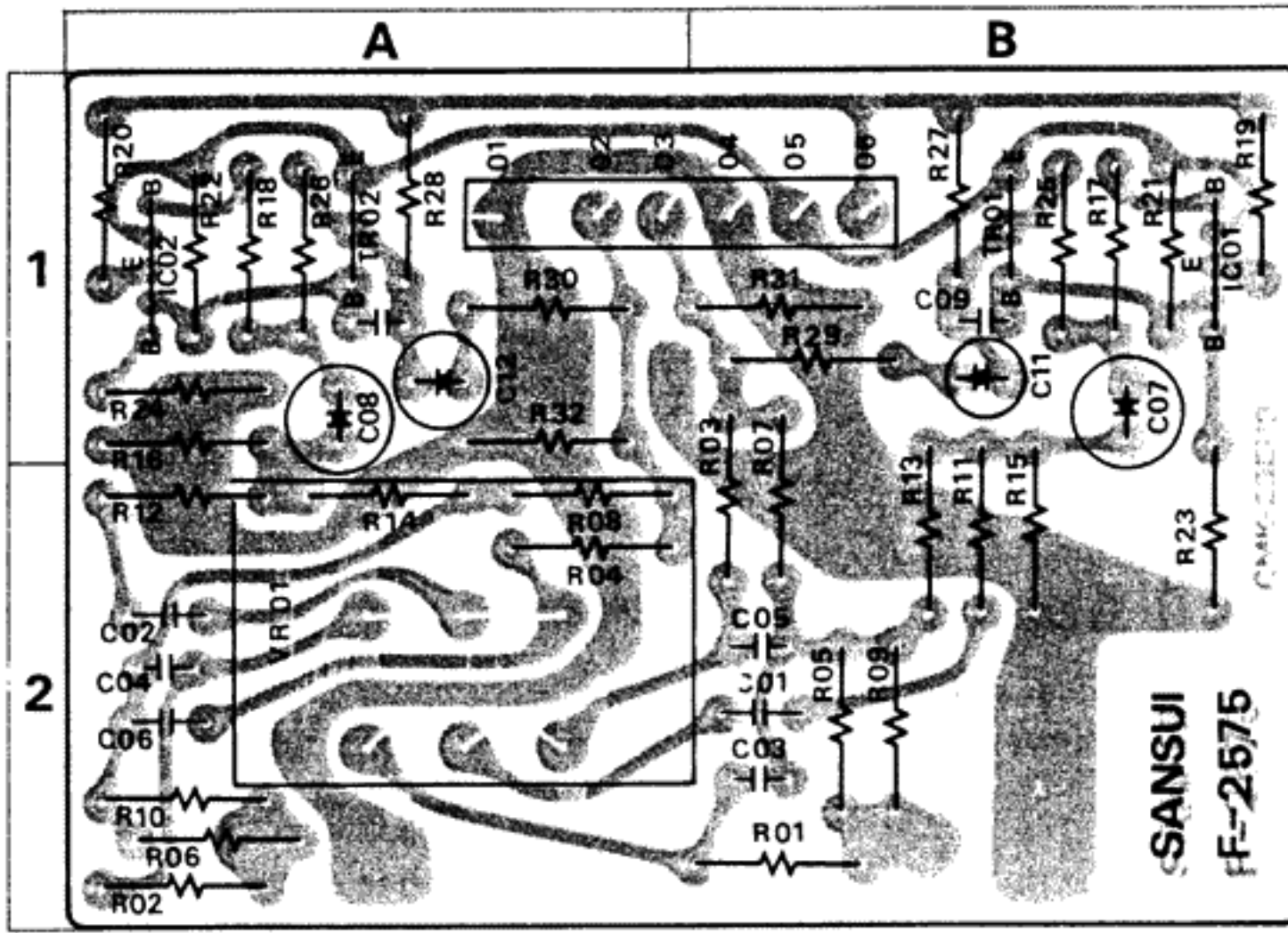


Parts List

Parts No.	Stock No.	Description
S01	1190270	Tape Play switch
	2410760	3P Pin Ass'y (Type C)
	2410780	6P Pin Ass'y (Type C)

4-9. F-2575 Midrange Tone Control Circuit Board (Stock No. 7561591)

Conductor Side

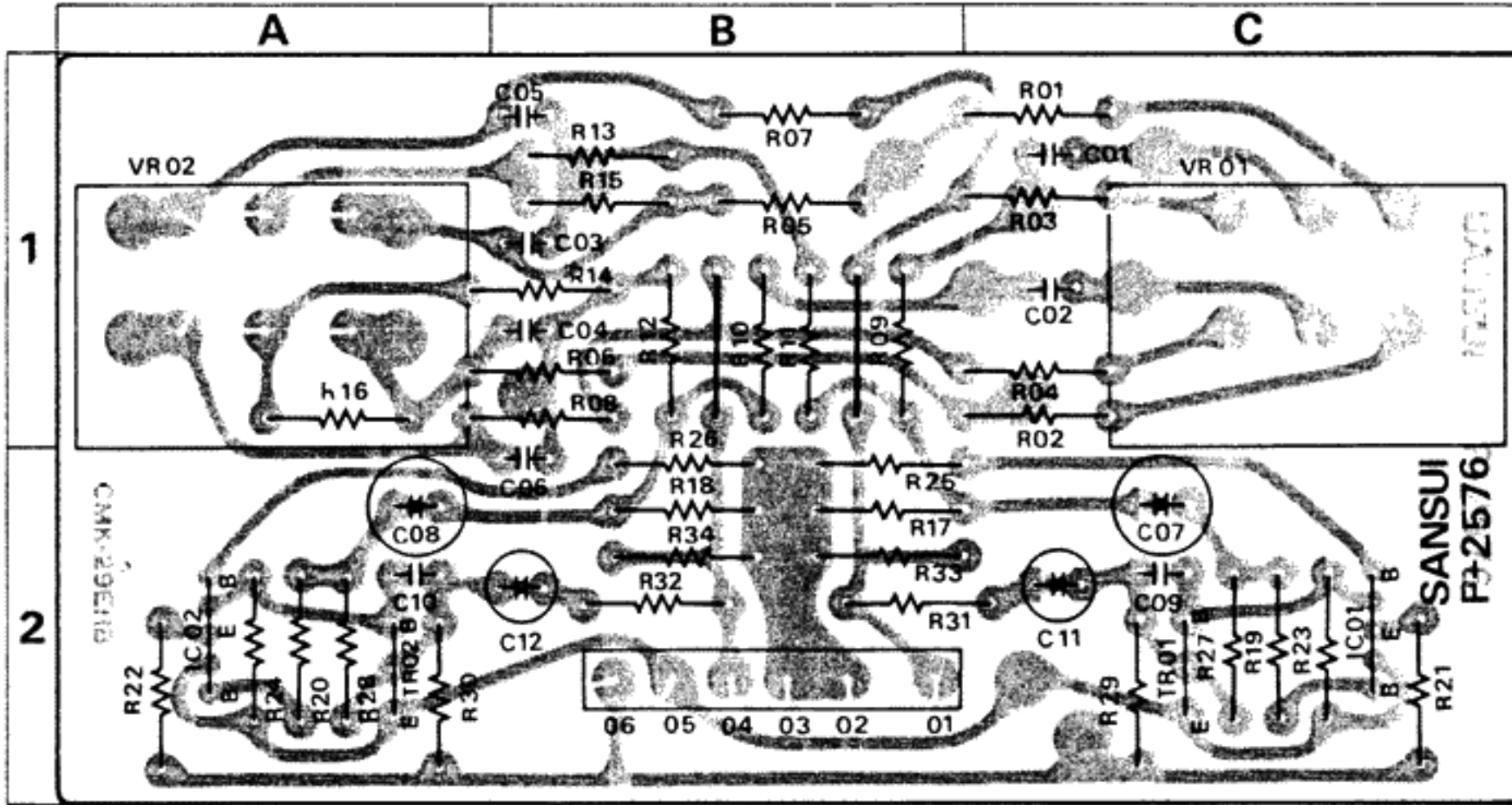


Parts List

Parts No.	Stock No.	Description	Position
TR01,02	0306270, 1	2SC1708 (F, G) Transistor	2 A, 2 B
IC01,02	0360290, 1	2SA798 (F, G) IC	2 A, 2 B
VR01	1090150, 1	50kΩ (B) × 2 Midrange Volume	1 B
	2410700	6P Pin Ass'y (Type F)	

4-10. F-2576 Bass & Treble Tone Control Circuit Board (Stock No. 7561601)

Conductor Side

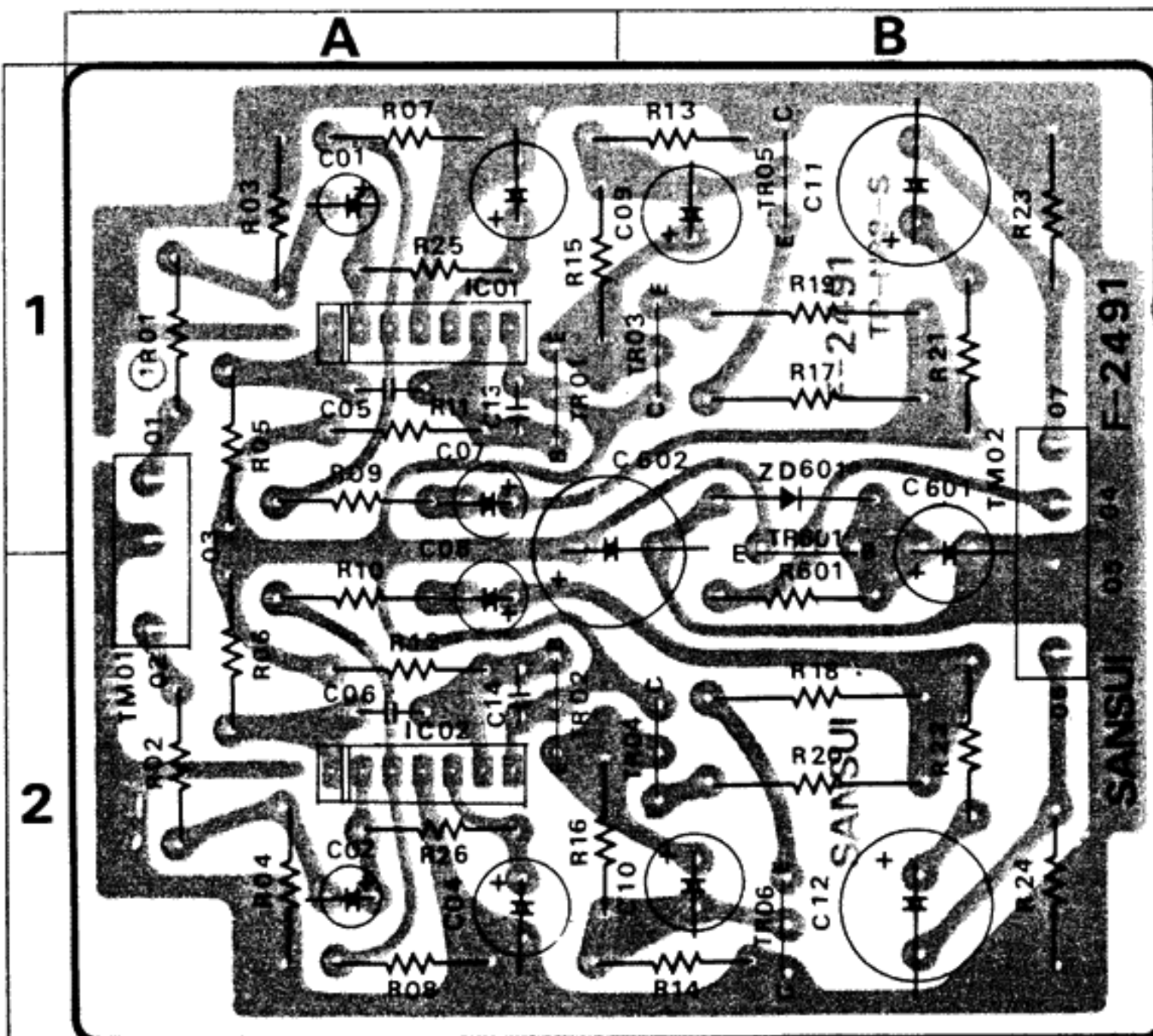


Parts List

Parts No.	Stock No.	Description	Position
TR01,02	0306270, 1	2SC1708 (F, G) Transistor	2 C, 2 A
IC01,02	0360290, 1	2SA798 (F, G) IC	2 C, 2 A
C01,02	0620301	300pF 50V P.C.	1 C
VR01	1090150, 1	50kΩ (B) × 2 Treble Volume	1 C
VR02	1090150, 1	50kΩ (B) × 2 Bass Volume	1 A
	2410700	6P Pin Accessory (Type F)	

4-11. F-2491 Circuit Board for Headphone (Stock No. 7594601)

Conductor Side

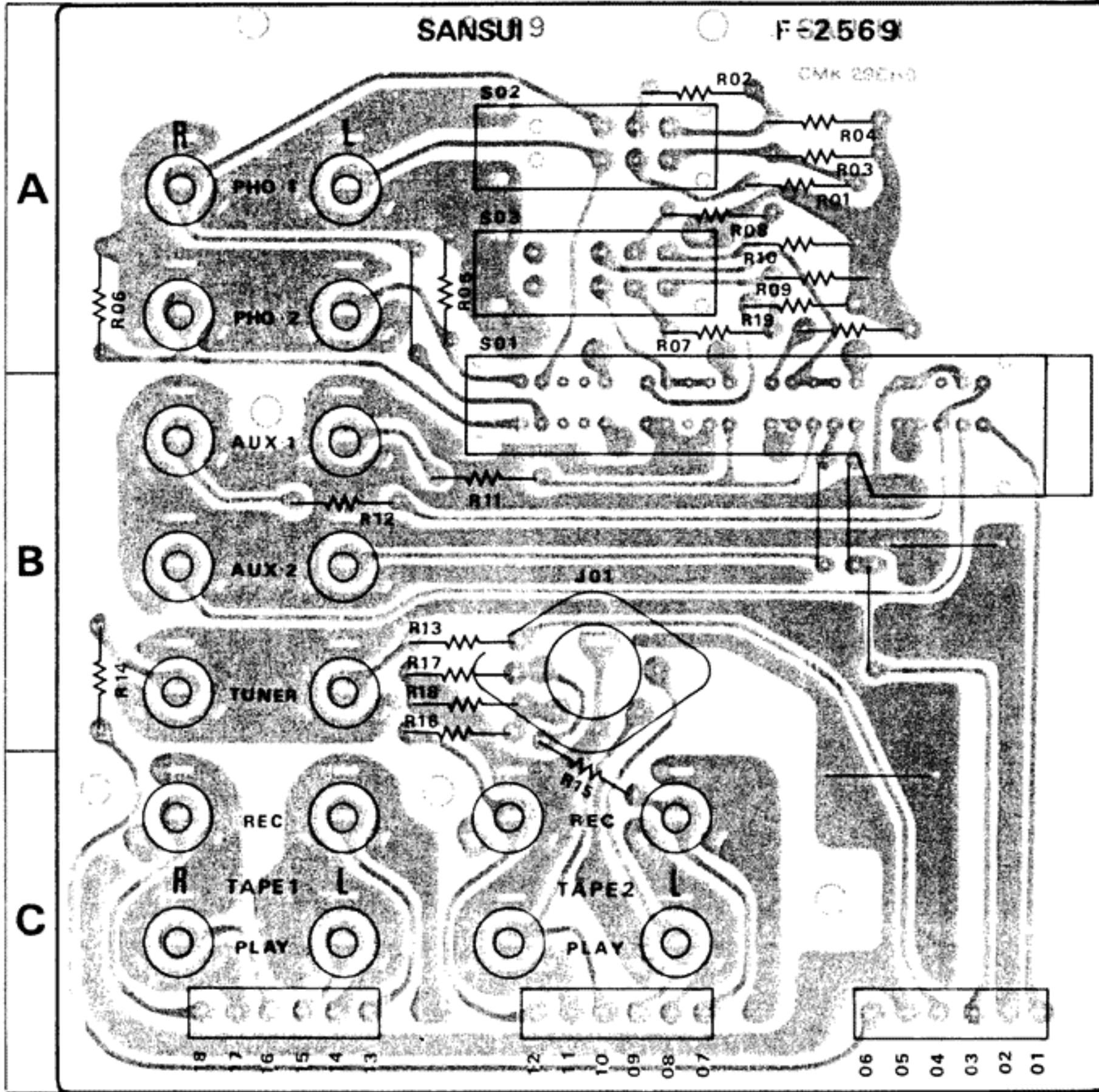


Parts List

Parts No.	Stock No.	Description	Position
TR01,02	0306070, 1	2SC1313 (F, G)	} Transistor
TR03,04	0305901, 2	2SC1124 (2, 3)	
TR05,06	0300391, 2	2SA706	
TR601	0308450, 1	2SD356 (C, D)	
IC01,02	0360190	BA312	1 A, 2 A
D601	0316600	RD36E (C)	
R17, 18	{ 0104330 or 0211330	{ 33Ω 1W C.R. or 33Ω 1W M.R.	} 1 B, 2 B
R19, 20	{ 0104330 or 0211330	{ 33Ω 1W C.R. or 33Ω 1W M.R.	
R21, 22	0103100	10Ω	} 1/2W C.R.
R23, 24	0103331	330Ω	
	2410580	3P Pin Ass'y (Type D)	
	2410590	4P Pin Ass'y (Type D)	

4-12. F-2569 Input Terminal & Switch Circuit Board (Stock No. 7594551)

Conductor Side

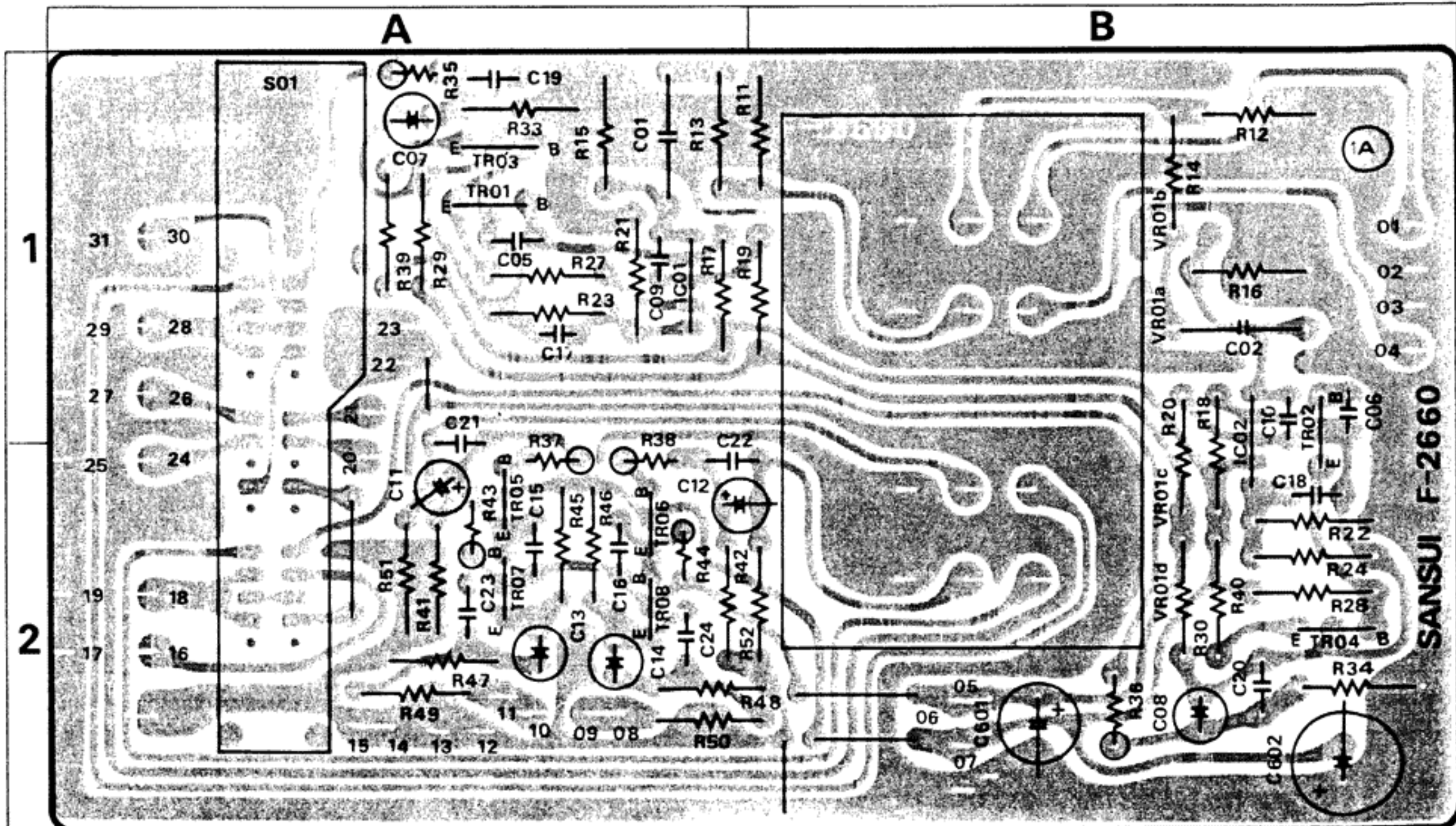


Parts List

Parts No.	Stock No.	Description	Position
R07.08	0231202	2.0kΩ 1/2W M.R.	A
S01	1190260	Input Selector Switch	A, B
S02	1110310	Pick-up Load Switch	A
S03	1110310	Sensitivity Switch	A
J01	2090030	5P DIN Socket	B
	2410780	6P Pin Ass'y (Type C)	
	2430260	1P Jack (White)	
	2430270	1P Jack (Red)	

4-13. F-2660 Level Volume Control Circuit Board (Stock No. 7594581)

Conductor Side



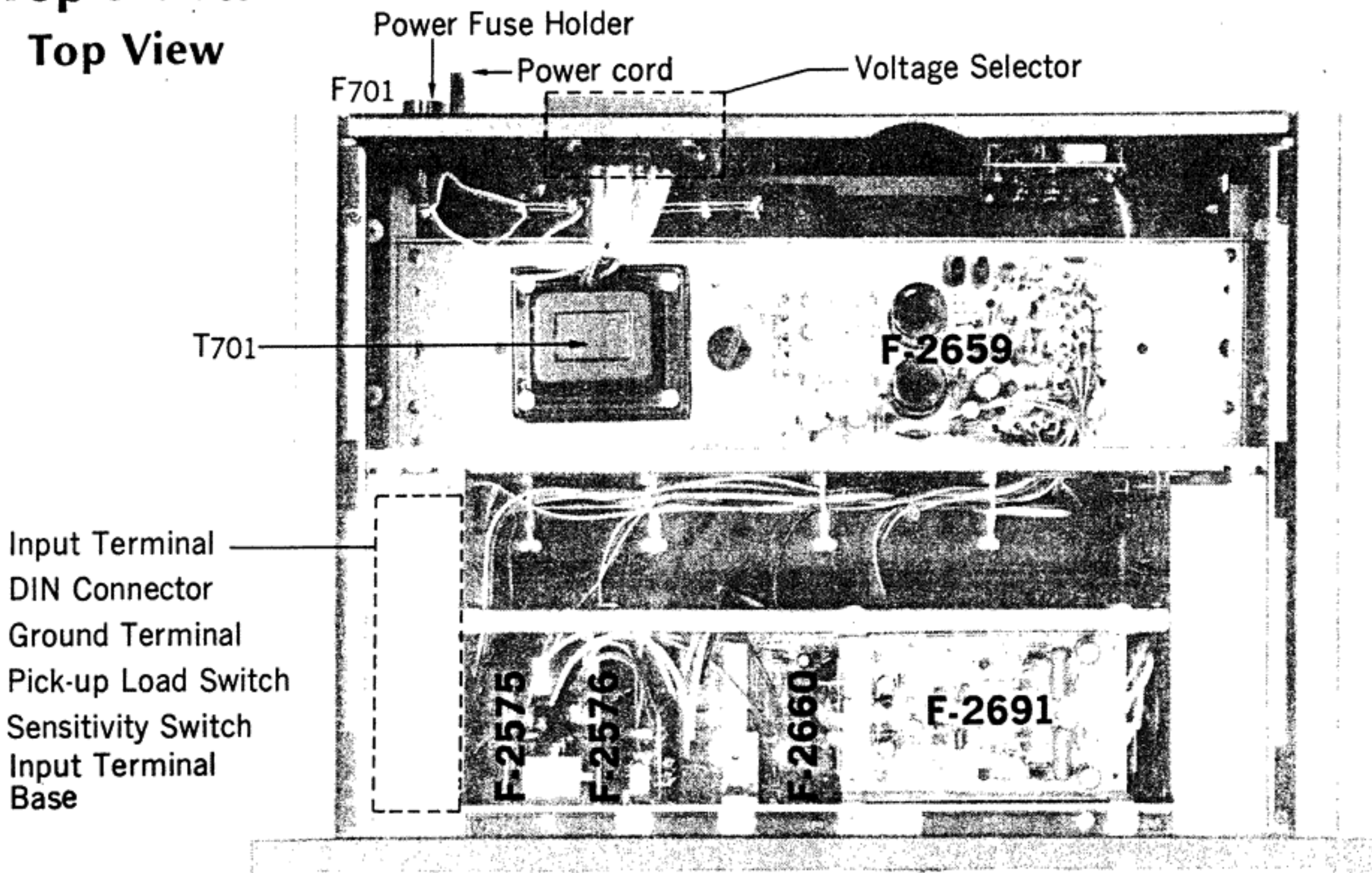
Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
TR01.02	0306270.1	2SC1708 (F, G)	1 A. 1. 2B	C01.02	0602109.1	1μF 100V M.C.	1 A. 1 B
TR03.04	0306360.1	2SC1951 (1, 2)	1 A. 2 B	VR01	1090220	100kΩ × 4 Detent Volume	
TR05.06	0300470.1	2SA726 (F, G)	2 A	S01	1190290	Tone & Filter Switch	1. 2A
TR07.08	0306070.1	2SC1313 (F, G)	2 A				
IC01.02	0360370.1	2SA798 (F, G)	1 A. 1. 2B				

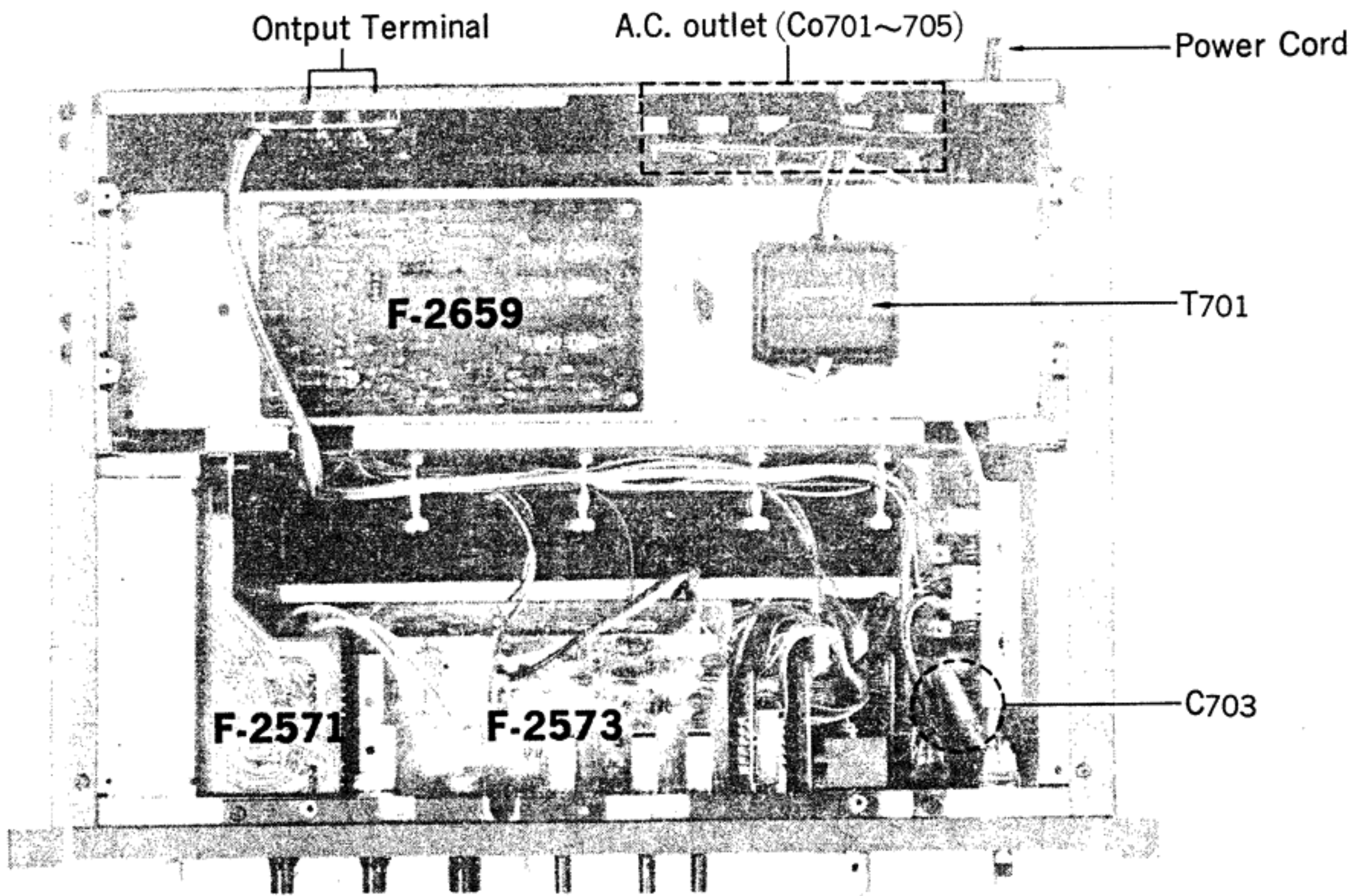
5. OTHER PARTS

5-1. Top & Bottom View

Top View



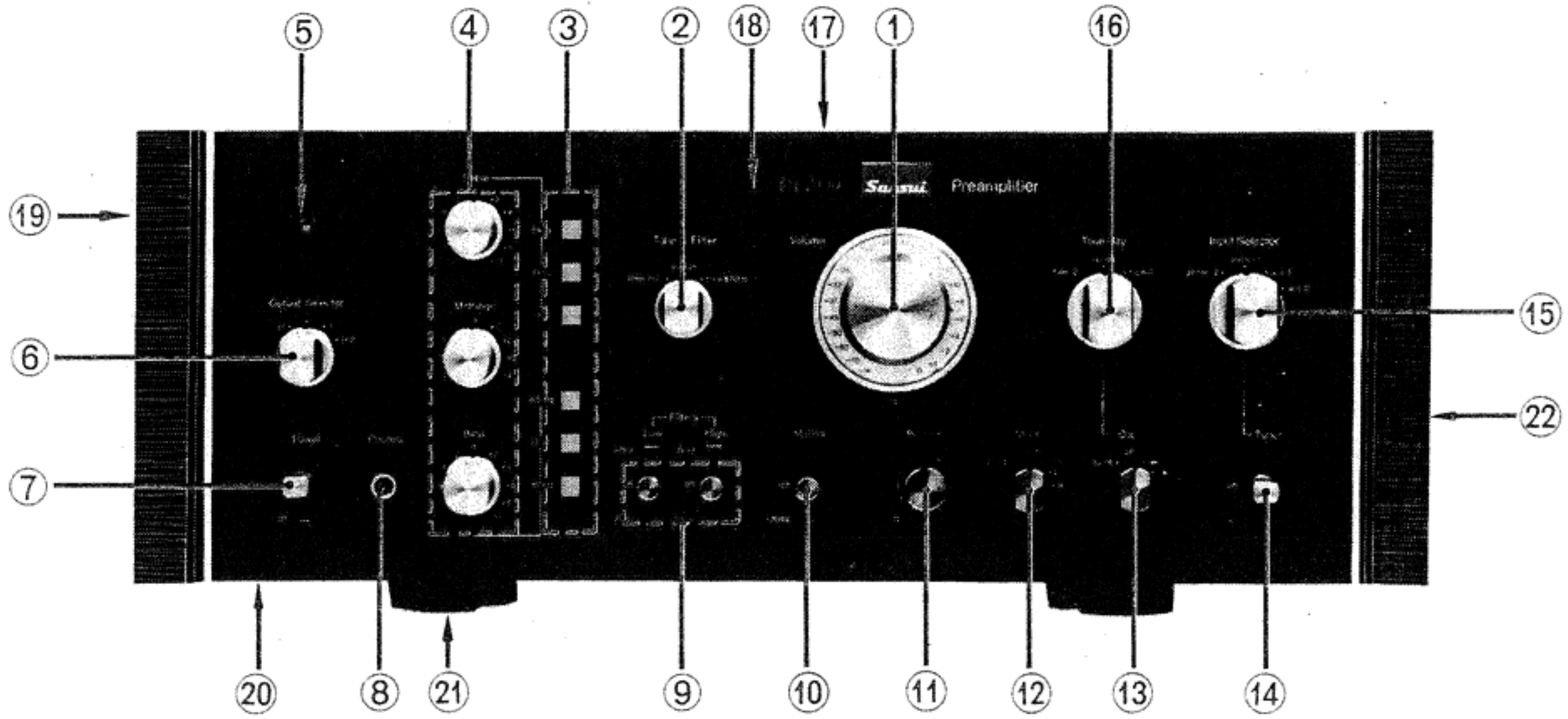
Bottom View



Parts List

Parts No.	Stock No.	Description	Parts No.	Stock No.	Description
F701	0432220	1A 250V (AC 220V~240V)	C703	4002550	Power Transformer
	0432240	2A 250V (AC 100V~120V)		0659801	0.01 μ F 150V C.C.
CO701~705	2450060	AC outlet	2430260	Female Pin Jack (White)	
	2300060	Power Fuse Holder	2430270	Female Pin Jack (Red)	
	2290150	Ground Terminal	5287411	Input Terminal Base	
	2410091	Voltage Selector Plug	1110310	Pick-up Load Switch	
	2410830	Voltage Selector Socket	1110310	Sensitivity Switch	
	3800240	Power Cord	2090030	DIN Jack	

5-2. Front View

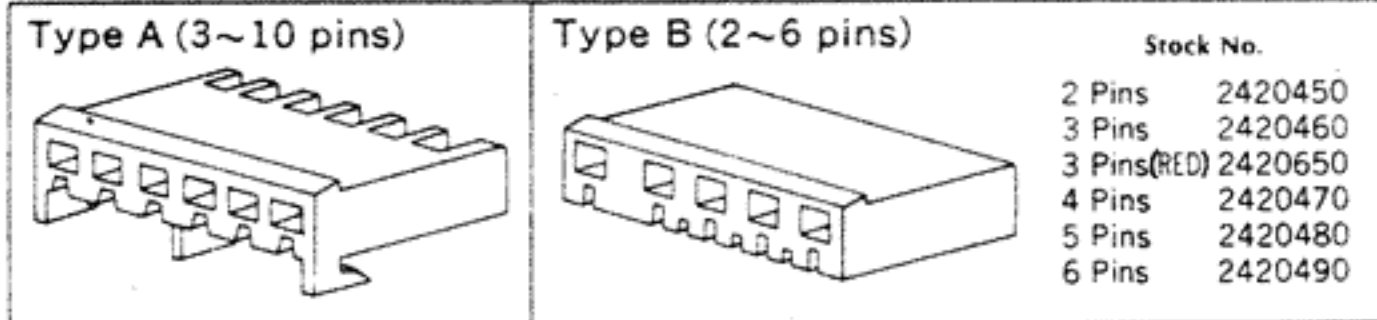


Parts List

Parts No.	Stock No.	Description	Parts No.	Stock No.	Description	Parts No.	Stock No.	Description
1	5318800	G-6 Type Knob, Level Volume	9	5326520	E-3 Type Knob, filter & muting switch	16	1190270	Tape Play Switch
	1090220	100kΩ × 4 4-gang detent level volume		1170950	Low Filter Switch		17	5006630
2	5318262	C-6 Type Knob, Tone & Filter Switch	10	5047470	High Filter Switch	18	7007460	Panel Ass'y
	1190290	Tone & Filter Switch		5326520	Masking, lever switch		6906480	Spring, push knob
3	1131150	Treble Tone Push Switch	11	5326520	E-3 Type Knob, filter & muting switch	19	5326530	Push Knob
	1131140	Bass Tone Push Switch		1170950	Muting Switch		5286721	Knob Guide
4	5318253	B-6 Type Knob, Treble Volume	12	5047470	Masking, lever switch	20	5286731	Lever Guide for 1 Contact
		B-6 Type Knob, Midrange Volume		5318271	D-6 Type Knob, balance volume		5286741	Lever Guide for 2 Contacts
		B-6 Type Knob, Bass Volume		1015170, 1	250kΩ (M.N) × 2, Balance Volume		5336581	Sansui Mark
	1090150, 1	50kΩ (B) × 2 Treble Volume		5318281	F-6 Type Knob, mode switch		5006640	Left Side Bonnet
5	7726170	LED Ass'y, Protector indicator	13	1190250	Mode Switch	21	5517050	Leg
	5318262	C-6 Type Knob, output selector		5318281	F-6 Type Knob, Tape Copy Switch		22	5006650
6	1101770, 1	Rotary Switch, output selector	14	1190280	Tape Copy Switch			
	5326510	E-2 Type Knob, power switch		5326510	E-2 Type Knob, Tuner Switch			
7	1170510	Lever Switch, power switch	15	5047470	Masking, lever switch			
	5047470	Masking, lever switch		5318371	H-6 Type Knob, Input Selector			
8	2430170	Headphone Jack	16	1190260	Input Selector Switch			
				5318371	H-6 Type Knob, Tape Play Switch			

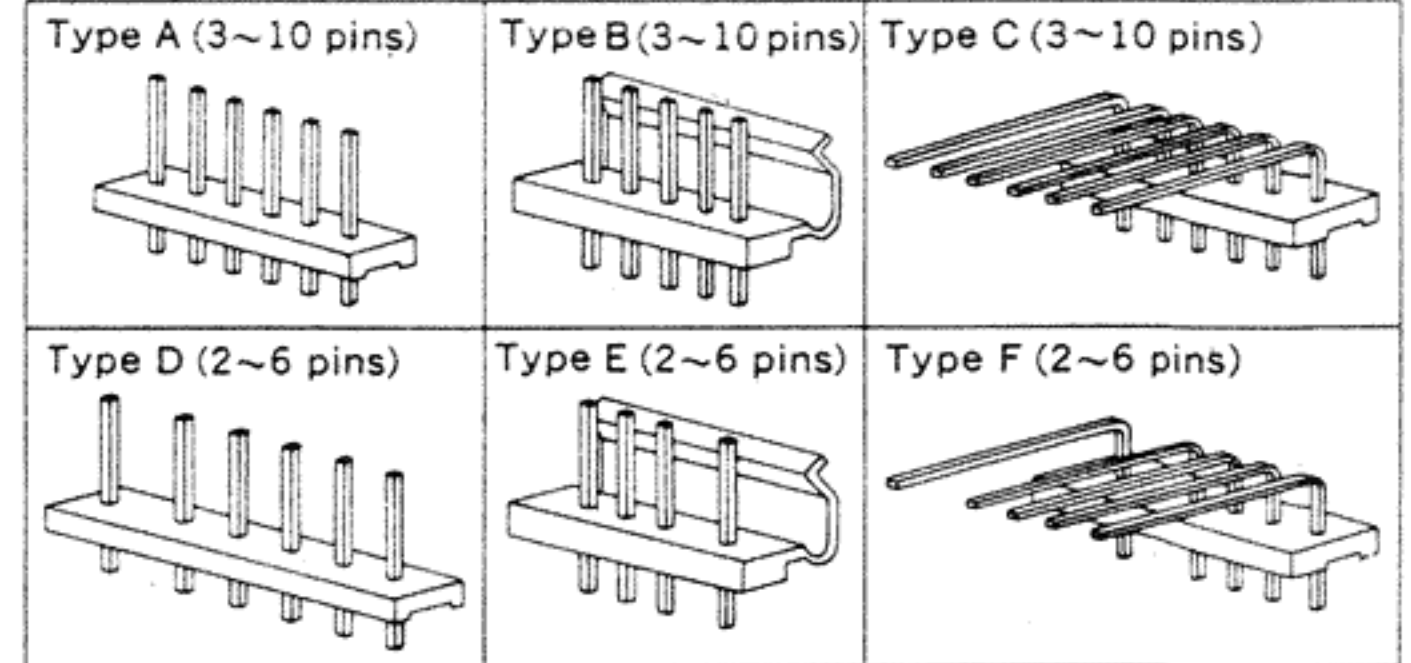
5-3. Figures Connectors & Pin Ass'y

Connectors



NOTE: Since stock number of female connectors (type B) with wires are not shown in each parts list of Complete circuit board, please refer to the above parts list when ordering the connector.

Pin Ass'y

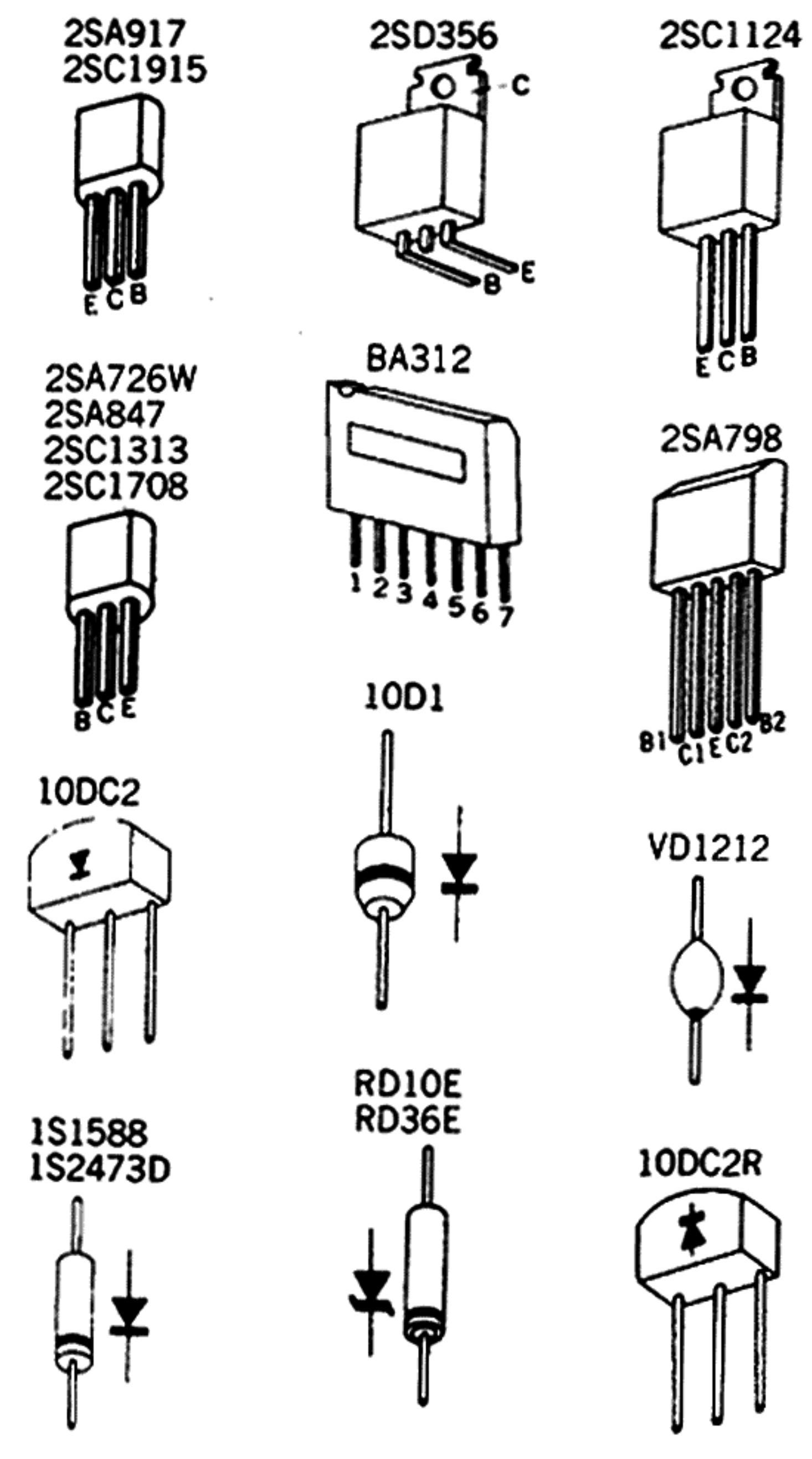
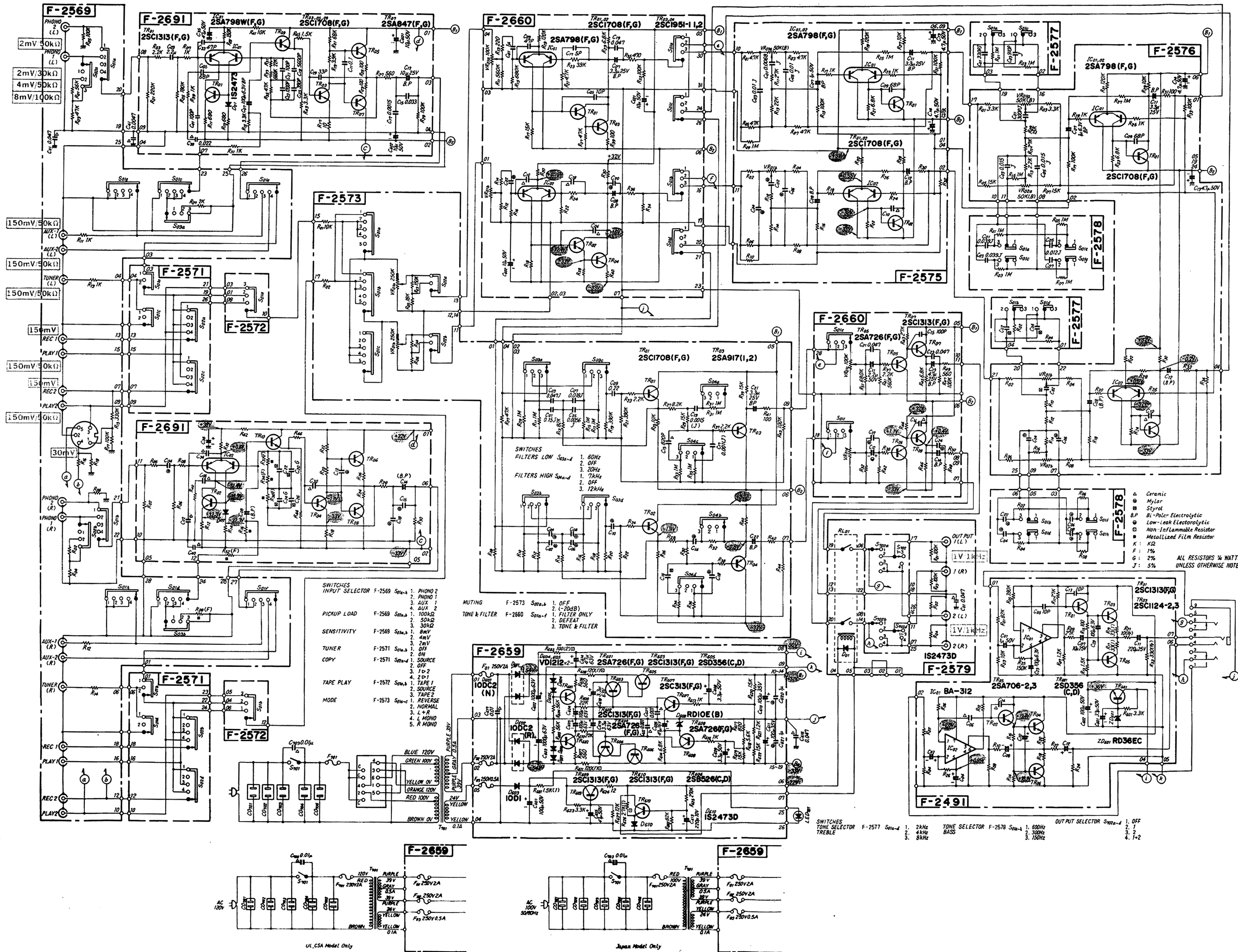


Abbreviations

C.R. : Carbon Resistor	E.C. : Electrolytic Capacitor
S.R. : Solid Resistor	BP.E.C.: Bi-Polar Electrolytic Capacitor
Ce.R. : Cement Resistor	C.C. : Ceramic Capacitor
M.R. : Metallized Film Resistor	Mi.C. : Mica Capacitor
F.R. : Fusing Resistor	O.C. : Oil Capacitor
N.I.R. : Non-Inflammable Resistor	P.C. : Polystyrene Capacitor
M.C. : Mylar Capacitor	E.C. : Tantalum Capacitor

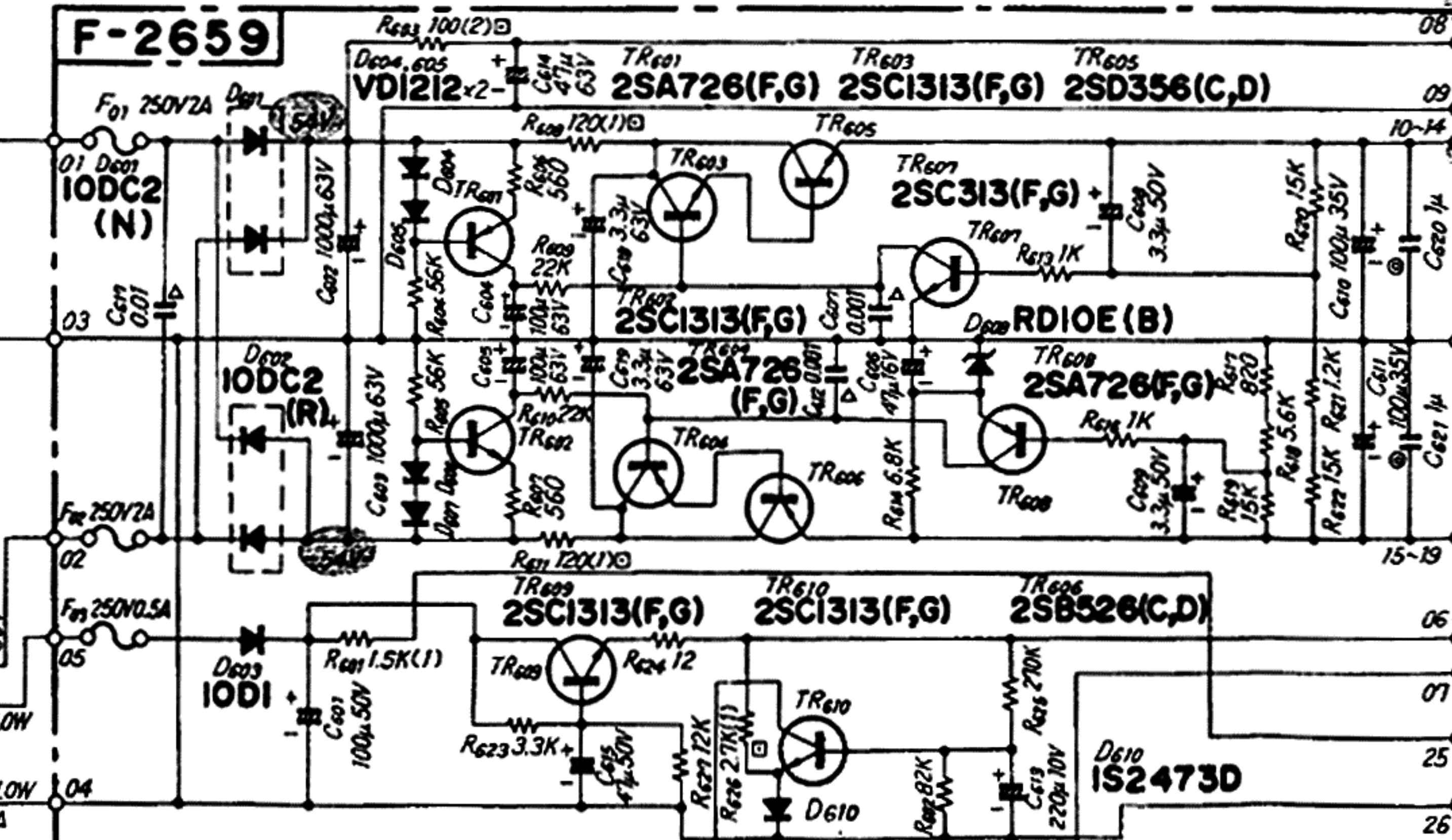
6. SCHEMATIC DIAGRAM

* La présentation et les spécifications sont susceptibles d'être modifiées sans préavis par suite d'améliorations éventuelles.
 * Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.
 * Design and specification subject to change without notice for improvements.



- SWITCHES**
 INPUT SELECTOR F-2569 Seta-1: PHONO 2
 2. PHONO 1
 3. AUX 1
 4. AUX 2
 PICKUP LOAD F-2569 Seta-1: 100KΩ
 2. 30KΩ
 3. 30KΩ
 SENSITIVITY F-2569 Seta-1: 8mV
 2. 2mV
 3. 2mV
 TUNER F-2571 Seta-1: OFF
 2. ON
 COPY F-2571 Seta-1: SOURCE
 2. OFF
 3. 1-2
 4. 2-1
 TAPE PLAY F-2572 Seta-1: TAPE 1
 2. SOURCE
 3. TAPE 2
 MODE F-2573 Seta-1: REVERSE
 2. NORMAL
 3. L + R
 4. L MONO
 5. R MONO

- MUTING** F-2573 Seta-1: 1. OFF
 2. (-70dB)
tone & filter F-2660 Seta-1: 1. FILTER ONLY
 2. DEFEAT
 3. TONE & FILTER



- SWITCHES**
 TONE SELECTOR F-2577 Seta-1: 1. 2kHz
 2. 4kHz
 3. 8kHz
TONE SELECTOR F-2578 Seta-1: 1. 600Hz
 2. 300Hz
 3. 150Hz
OUT PUT SELECTOR Seta-1: 1. OFF
 2. 1
 3. 2
 4. 1-2

