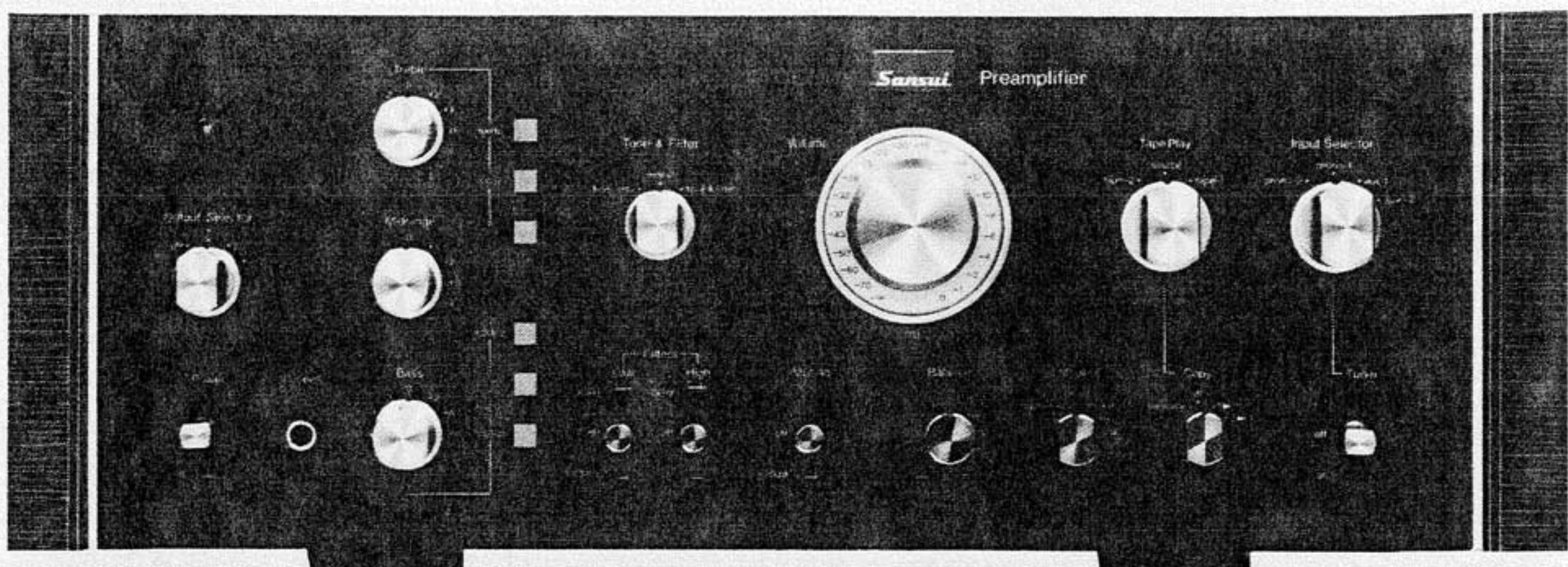


SERVICE MANUAL

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

OUTPUT	1.0 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} _{-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-1	.....	2 mV, 4 mV, 8 mV/30 kΩ, 50 kΩ, 100 kΩ
	(Maximum input capability: 1V at 1 kHz, less than 0.1% distortion and PHONO SENSITIVITY switch at 8 mV)	
PHONO-2	.....	2 mV/50 kΩ
AUX	.....	150 mV/50 kΩ
TUNER	.....	150 mV/50 kΩ
TAPE PLAY-1, 2 (Pin jacks)	150 mV/50 kΩ	
TAPE-2 REC/PLAY (DIN socket)	.....	150 mV/50 kΩ

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

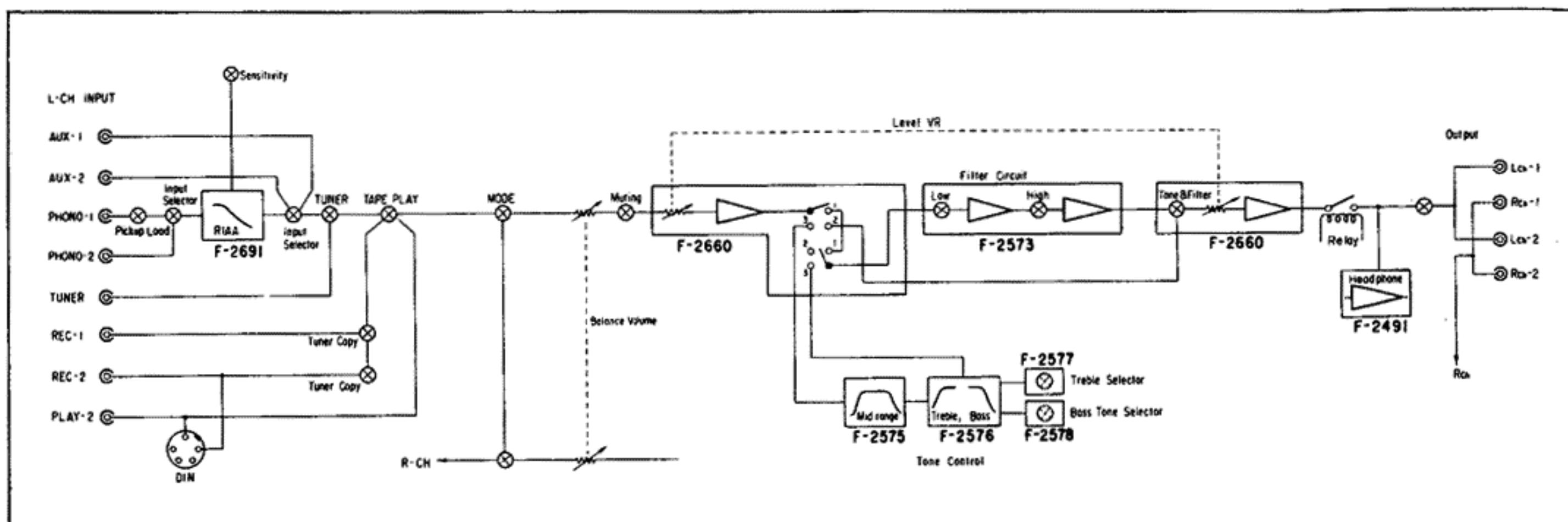
HUM AND NOISE (IHF)

PHONO-1	.....	better than 75 dB (Input sensitivity switch at 4 mV)
AUX	.....	better than 90 dB
TUNER	.....	better than 90 dB
TAPE PLAY-1, 2	.....	better 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.
MUTING	.....	0 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
DIMENSIONS	.....	460 mm (18 1/8") W 160 mm (6 5/16") H 310 mm (12 1/4") D
WEIGHT	.....	9.9 kg (21.8 lbs) net 11.6 kg (25.6 lbs) packed

2. BLOCK DIAGRAM



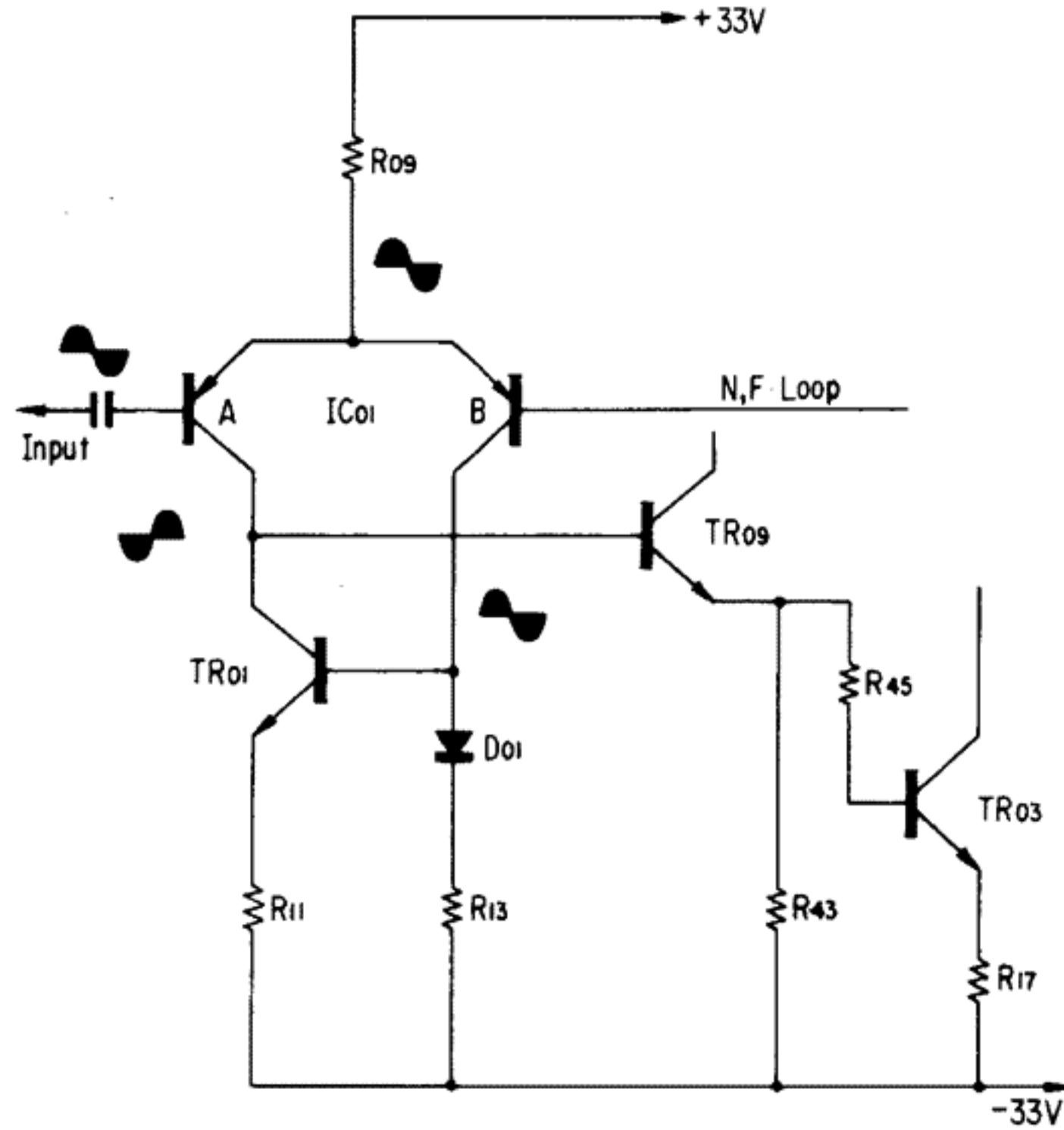
3. OPERATIONS OF NEW CIRCUITS

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 semiconductors, TR01 & Diode D01 using as the current mirror section, and a IC01 using as the balanced-type 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

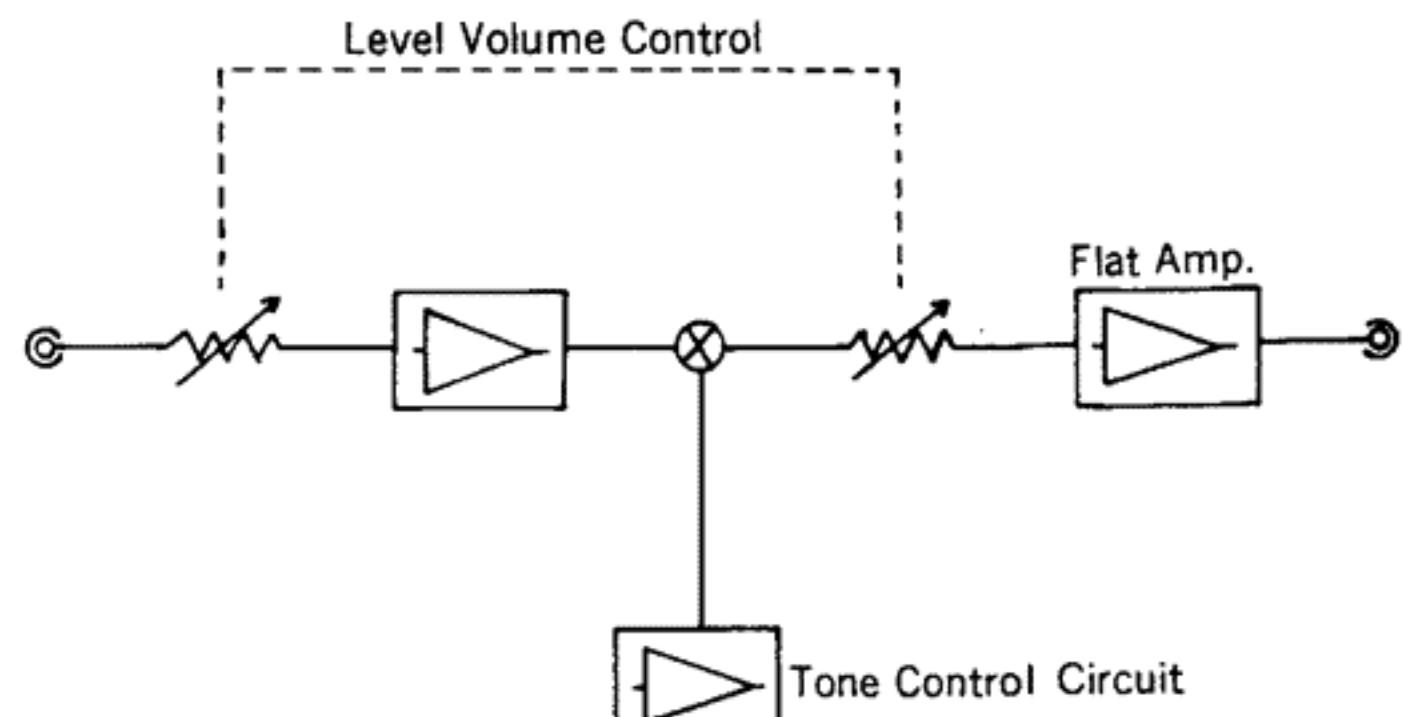
The open loop gain of conventional differential amplifier itself is approximately 30dB to 35dB in normal operation; furthermore, by adding the current mirror circuit in series to conventional differential amplifier, it is possible to obtain high open loop gain, approximately 70dB to 80dB. Consequently, 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.

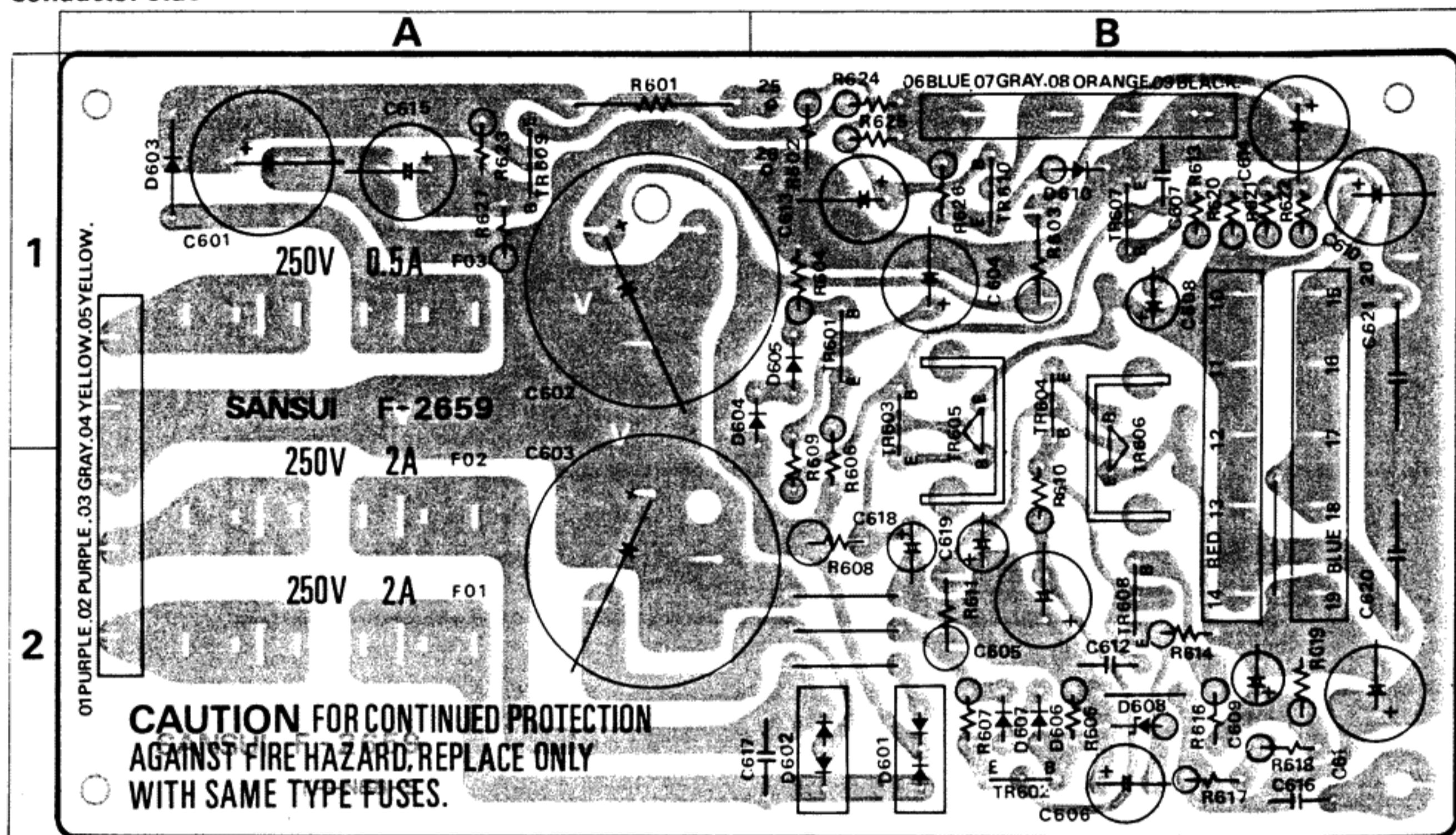
Fig. 3-2 Level Volume Control on one-channel



4. PARTS LOCATION & PARTS LIST

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

Conductor Side

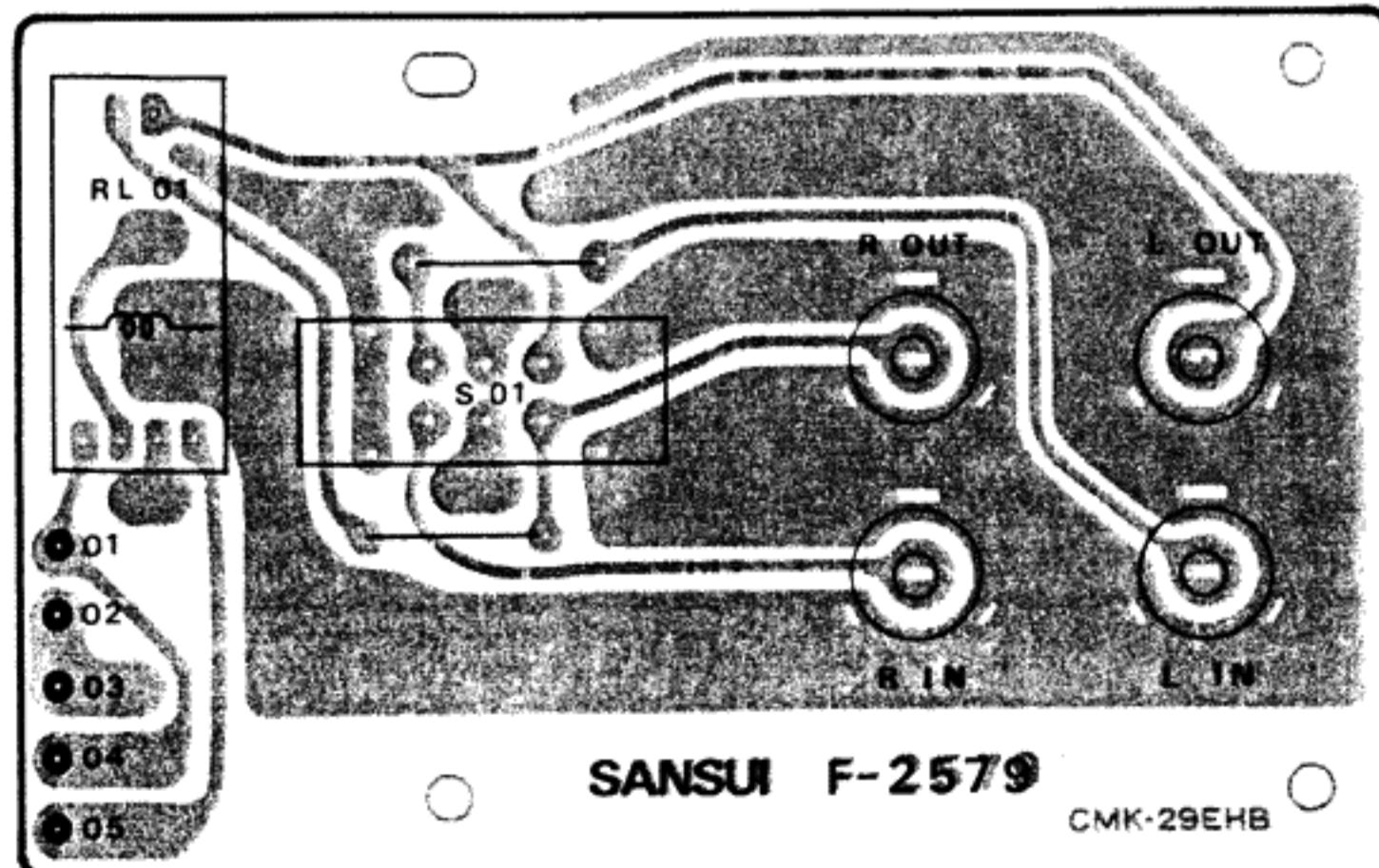


Parts List

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	2 B	R603	0202101	100Ω 2 W M.C.	1 B
TR602	0306070.1	2SC1313 (F, G)	2 B	D603	0310340	10D1 (1S2226)	1 A	R608	0201121	120Ω 1 W M.C.	2 B
TR603	0306070.1	2SC1313 (F, G)	1, 2 B	D604	0340120	VD1212	1 B	R611	0201121	120Ω 1 W M.C.	2 B
TR604	0300470.1	2SA726 (F, G)	1 B	D605	0340120	VD1212	1 B	F01	{ 0431240	2A 250V	2 A
TR605	{ 0308450.1	2SD356 (C, D)	1, 2 B	D606	0340120	VD1212	2 B	{ 0432240	or 2A 250V	2A 250V	
or	or			D607	0340120	VD1212	2 B	{ 0431240	or 2A 250V	2A 250V	
TR605	{ 0308611.2	2SD357 (D, E)		D608	0316250	RD-10E (B) Zener Diode	2 B	F02	{ 0432240	or 2A 250V	AC Fuse
or	or			D610	0311180	{ 1S1588 or 1S2473D } Diode	1 B	{ 0431210	or 0.5A 250V	2 A	
TR606	{ 0303280.1	2SB526 (C, D)	1, 2 B	C602	0549206	1000μF 63V E.C.	1 A	F03	{ 0432210	or 0.5A 250V	1 A
or	or			C603	0549206	1000μF 63V E.C.	2 A	{ 0432210	or 0.5A 250V		
TR606	{ 0303441.2	2SB527 (D, E)		C617	0655103	10000 pF 500V C.C.	2 B				
TR607	0306070.1	2SC1313 (F, G)	1 B	C620	0602109	1.0μF 100WV M.C.	2 B				
TR608	0300470.1	2SA726 (F, G)	2 B	C621	0602109	1.0μF 100WV M.C.	1 B				
TR609	0306070.1	2SC1313 (F, G)	1 A	R601	0104152	1.5kΩ 1 W C.R.	1 A				
TR610	0306070.1	2SC1313 (F, G)	1 B								
D601	{ 0310800	10DC2	2 B								
or	or										
D601	{ 0311180	1S1588									

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

Conductor Side

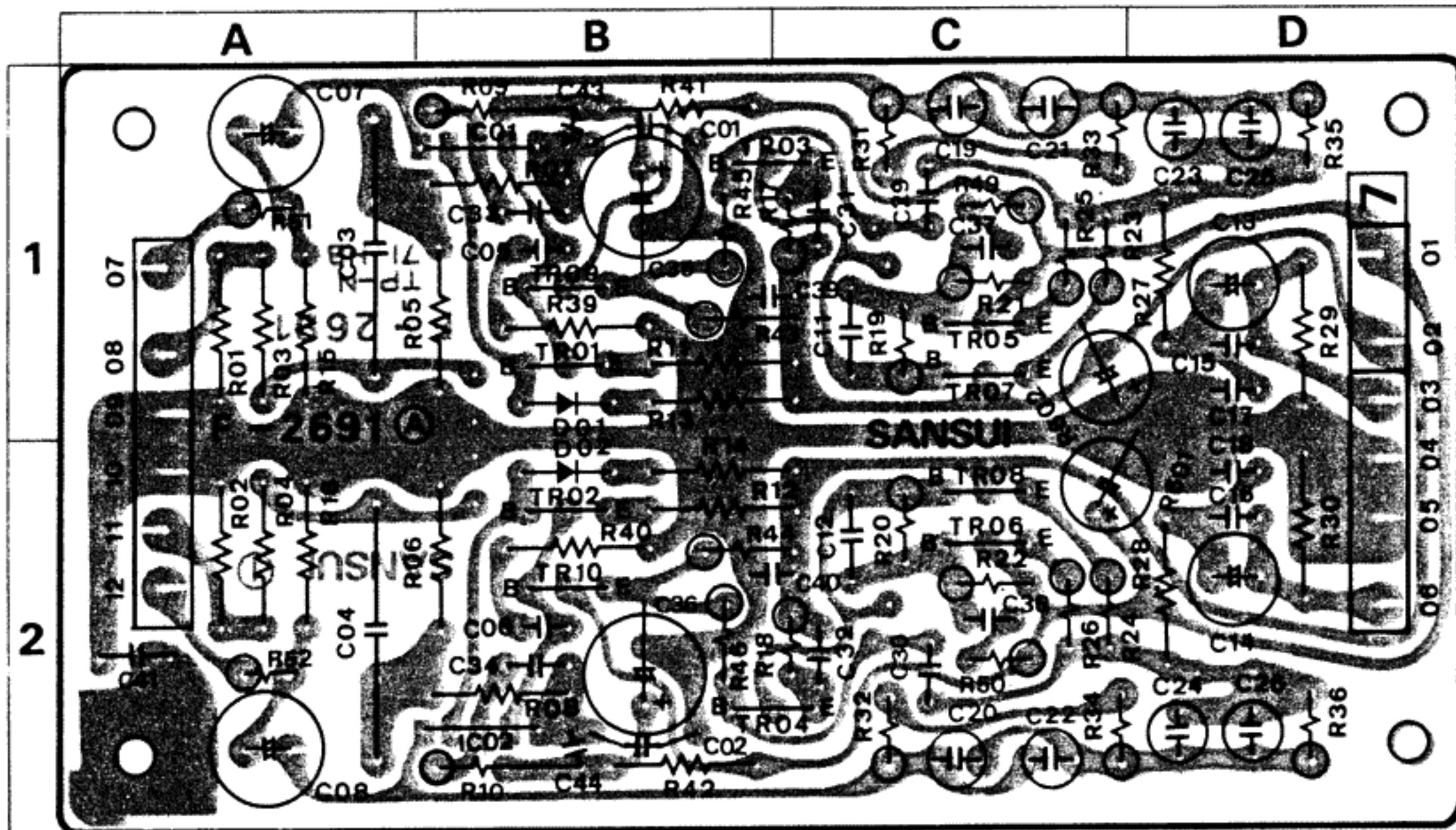


Parts List

Parts No.	Stock No.	Description
D01	{ 0311160 or 0311180	{ 1S2473D or 1S1588 } Diode
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

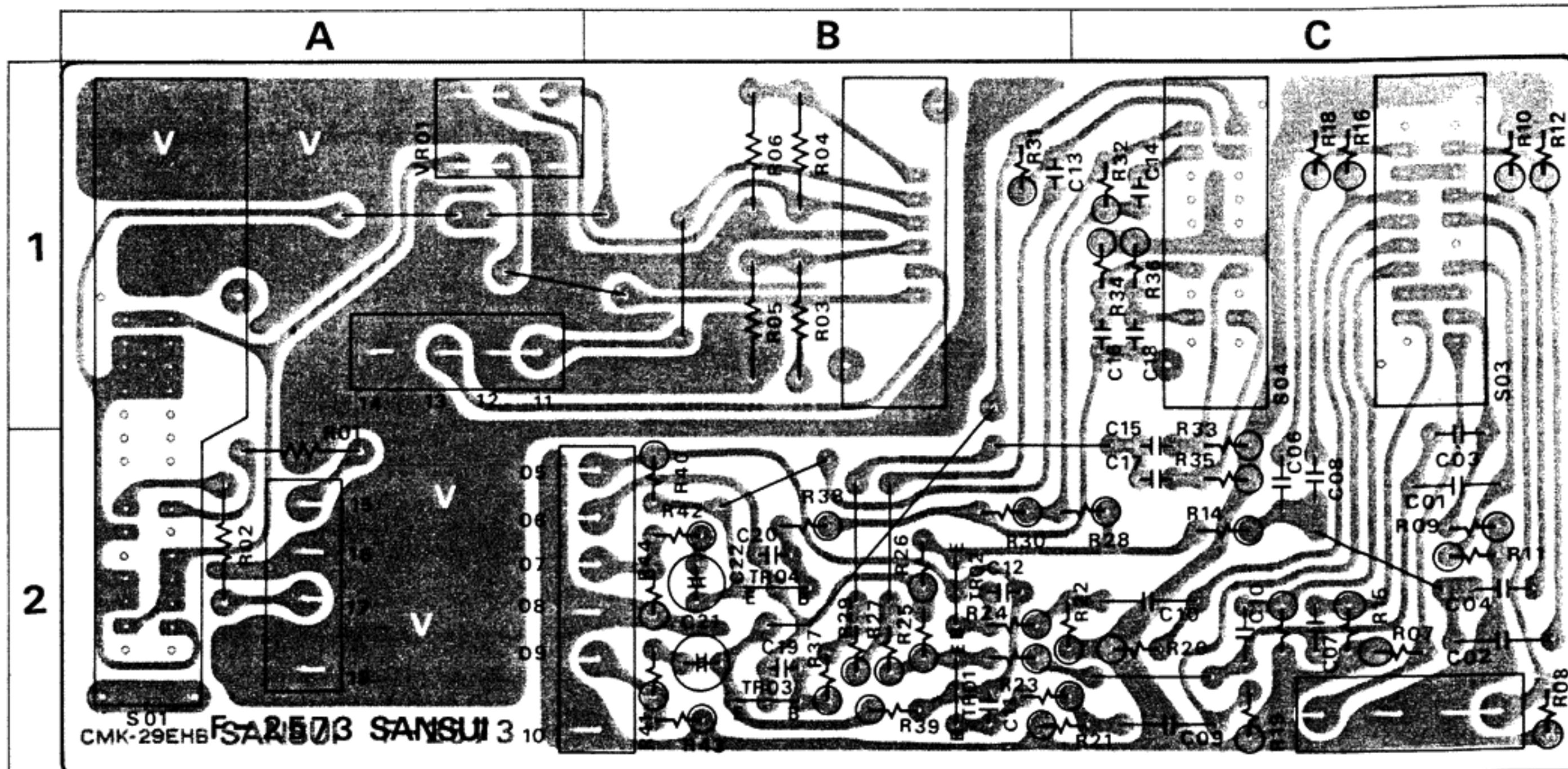
Parts No.	Stock No.	Description	Position
TR01, 02	0306070, 2	2SC1313 (F, G)	1 C, 2 C
TR03, 04	0306270, 1	2SC1708 (F, G)	1 B, C
TR05, 06 or 0306270	2SC1708 (F) or 0306271	2SC1708 (G)	1 B, 2 B
TR07, 08 or 0300710	2SA847 (F) or 0300711	2SA847 (G)	1 B, 2 B
TR09, 10	0306270, 1	2SC1708 (F, G)	1 C, 2 C

Parts No.	Stock No.	Description	Position
IC01, 02	0360370, 1	2SA798 (F, G)	Transistor
D01, 02	[0311160 or 0311180]	[1S2473D or 1S1588]	Diode
C03, 04	0602229	2.2/ μ F 100WV M.C.	1 D, 2 D
C19, 20	0625562	5600pF	1 B, 2 B
C21, 22	0620101	100pF	1 B, 2 B
C23, 24	0625122	50V P.C.	1 B, 2 B
		1200pF	1 B, 2 B

Parts No.	Stock No.	Description	Position
C25, 26	0620391	390pF 50V P.C.	1 A, 2 A
R15, 16	0231332	3.3k Ω	1 D, 2 D
R31, 32	0231223	22k Ω	1 B, 2 B
R33, 34	0231564	560k Ω	1 B, 2 B
R35, 36	0231473	47k Ω	1 A, 2 A
R31, 32	0231102	1.0k Ω	1 D, 2 D

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

Conductor Side



Parts List

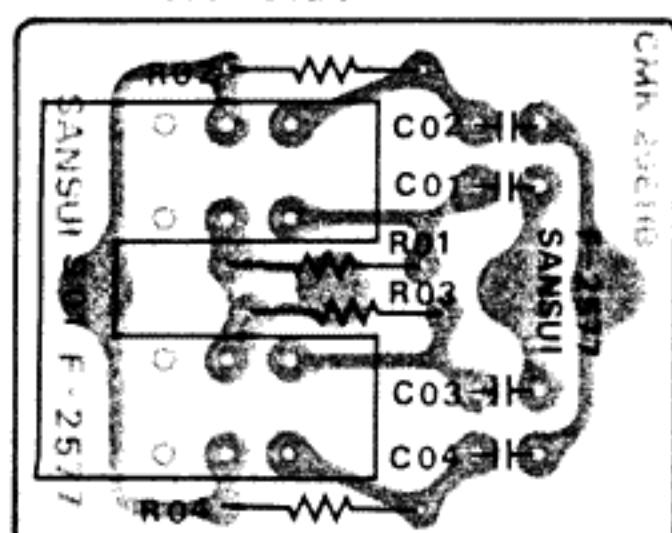
Parts No.	Stock No.	Description	Position
TR01, 02	0306270, 1	2SC1708 (F, G)	2 B
TR03, 04	0300760, 1	2SA917 (1, 2)	2 B

Parts No.	Stock No.	Description	Position
VR01	1015170, 1	250k Ω (M, N) Balance Volume	1 A
S01	1190250	Mode Switch	1, 2 A
S02	1170770	Muting Switch	

Parts No.	Stock No.	Description	Position
S03	1170950	Low Filter Switch	1 C
S04	1170950	High Filter Switch	1 C
	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

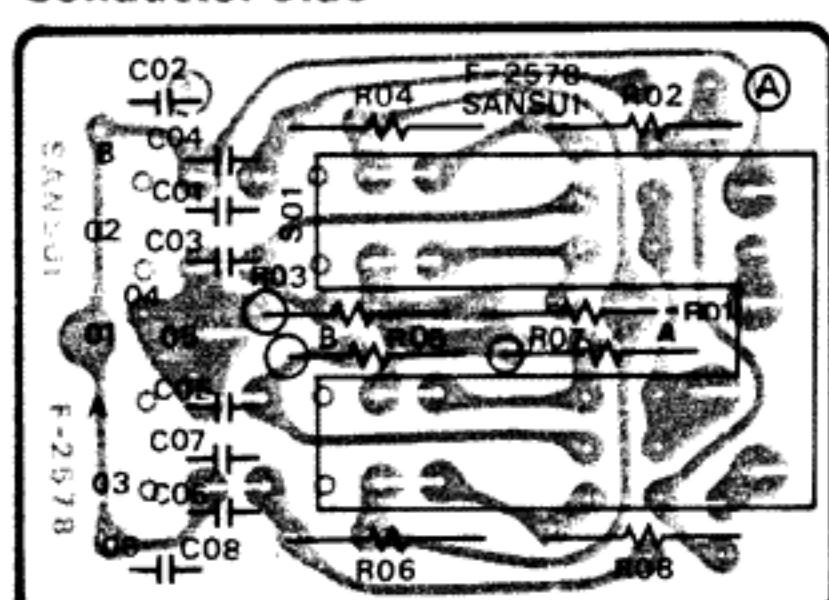


Parts List

Parts No.	Stock No.	Description
C01,02	0620331	330 pF
C03,04	0620911	910 pF } 50V P.C.
S01	1131150	Treble Tone Push Switch

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

Conductor Side

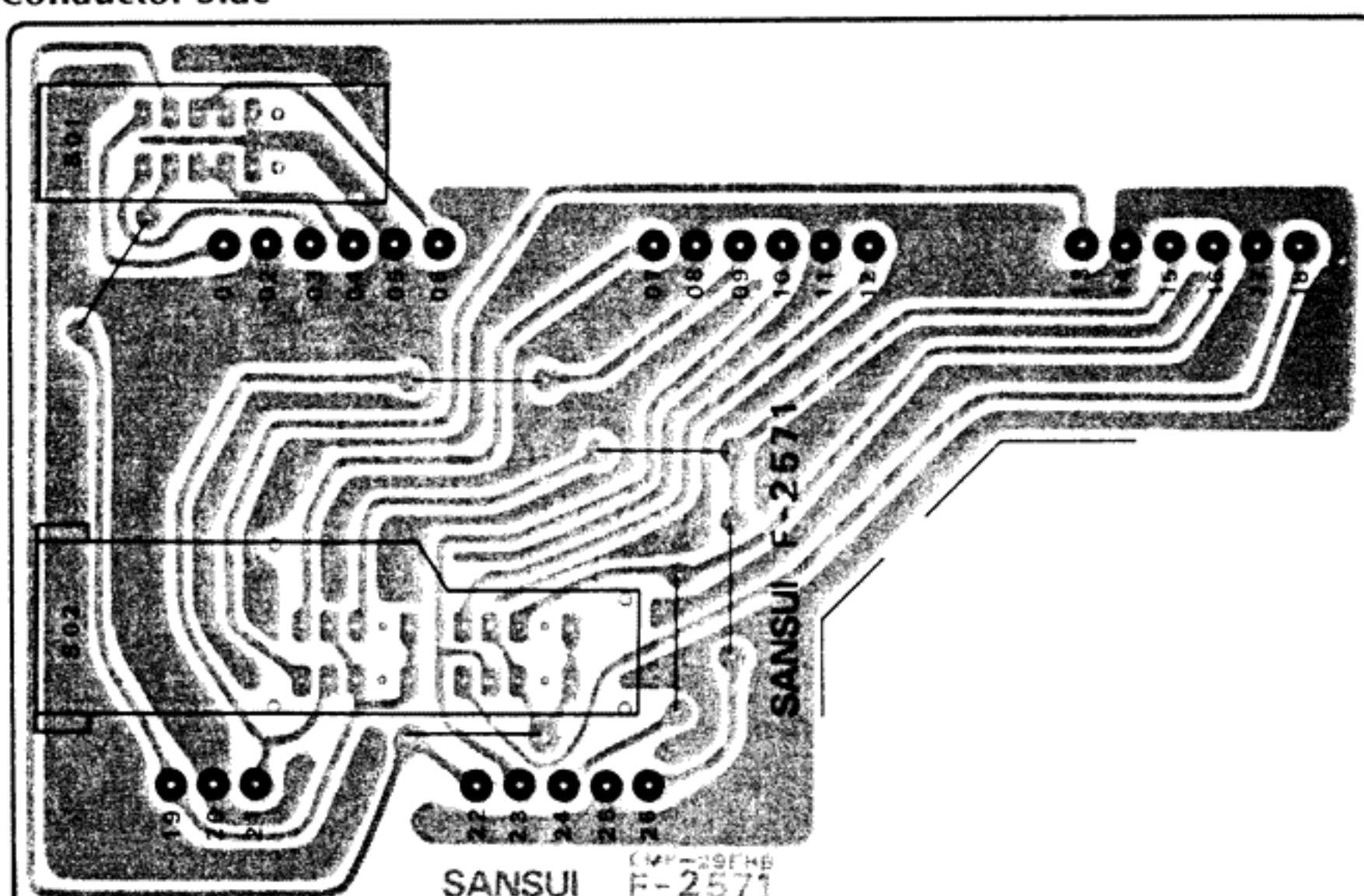


Parts List

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

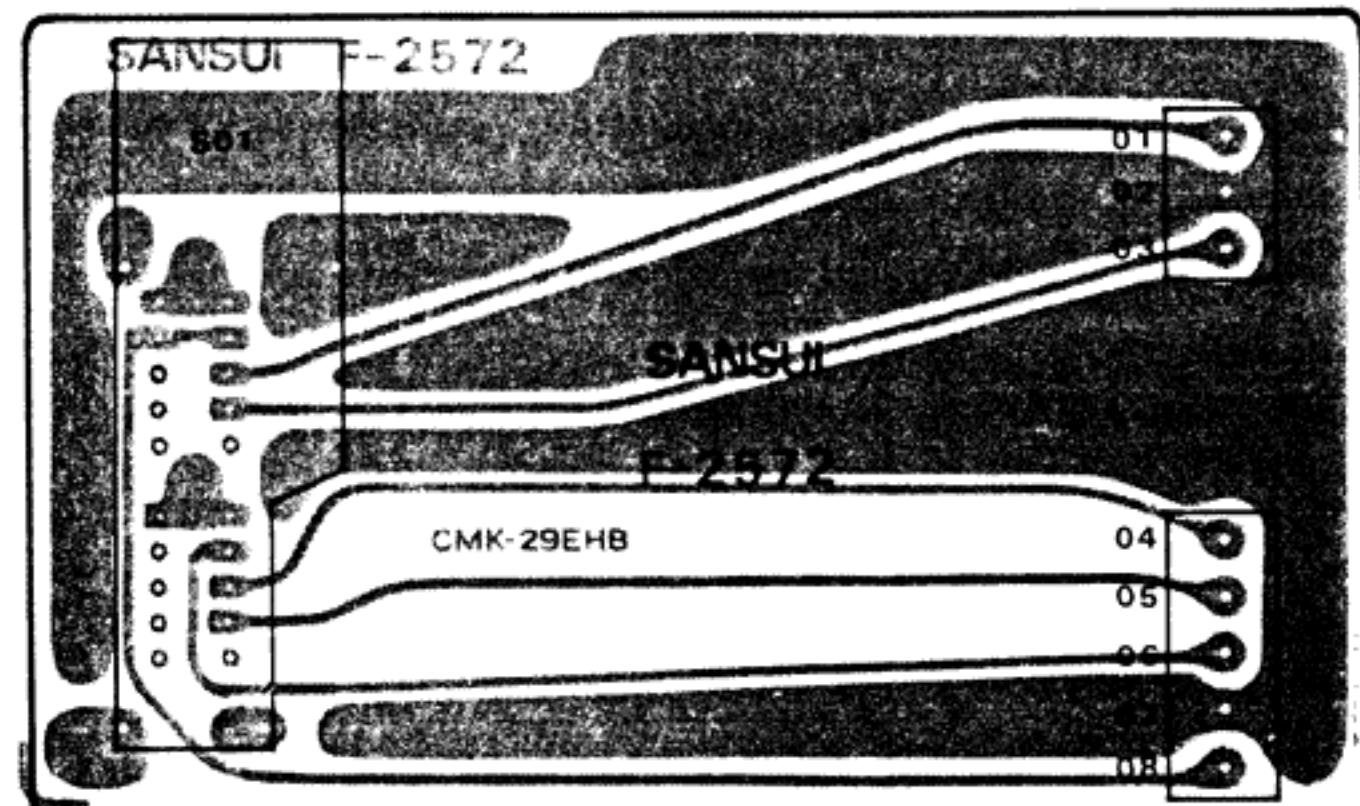


Parts List

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

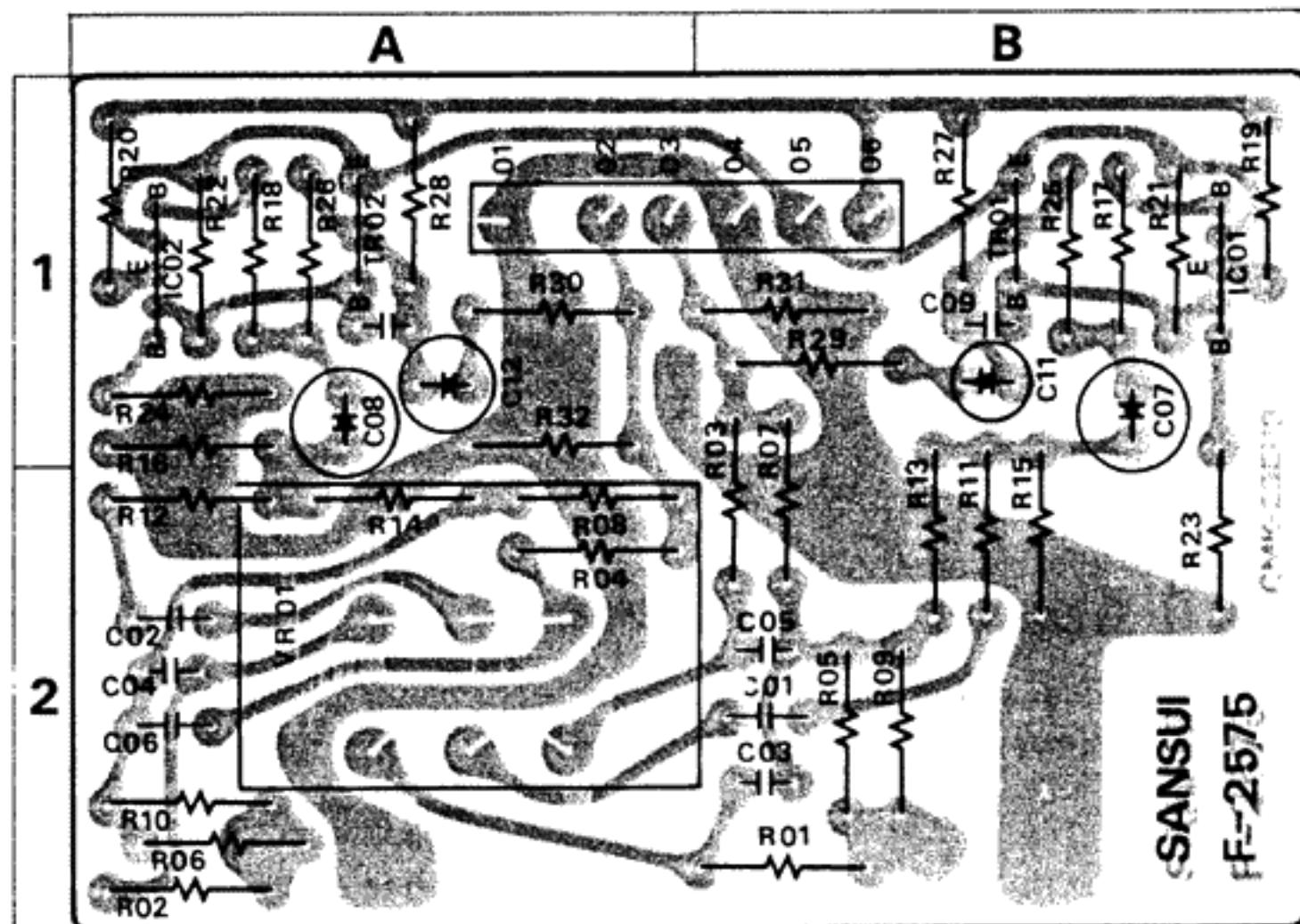


Parts List

Part# 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

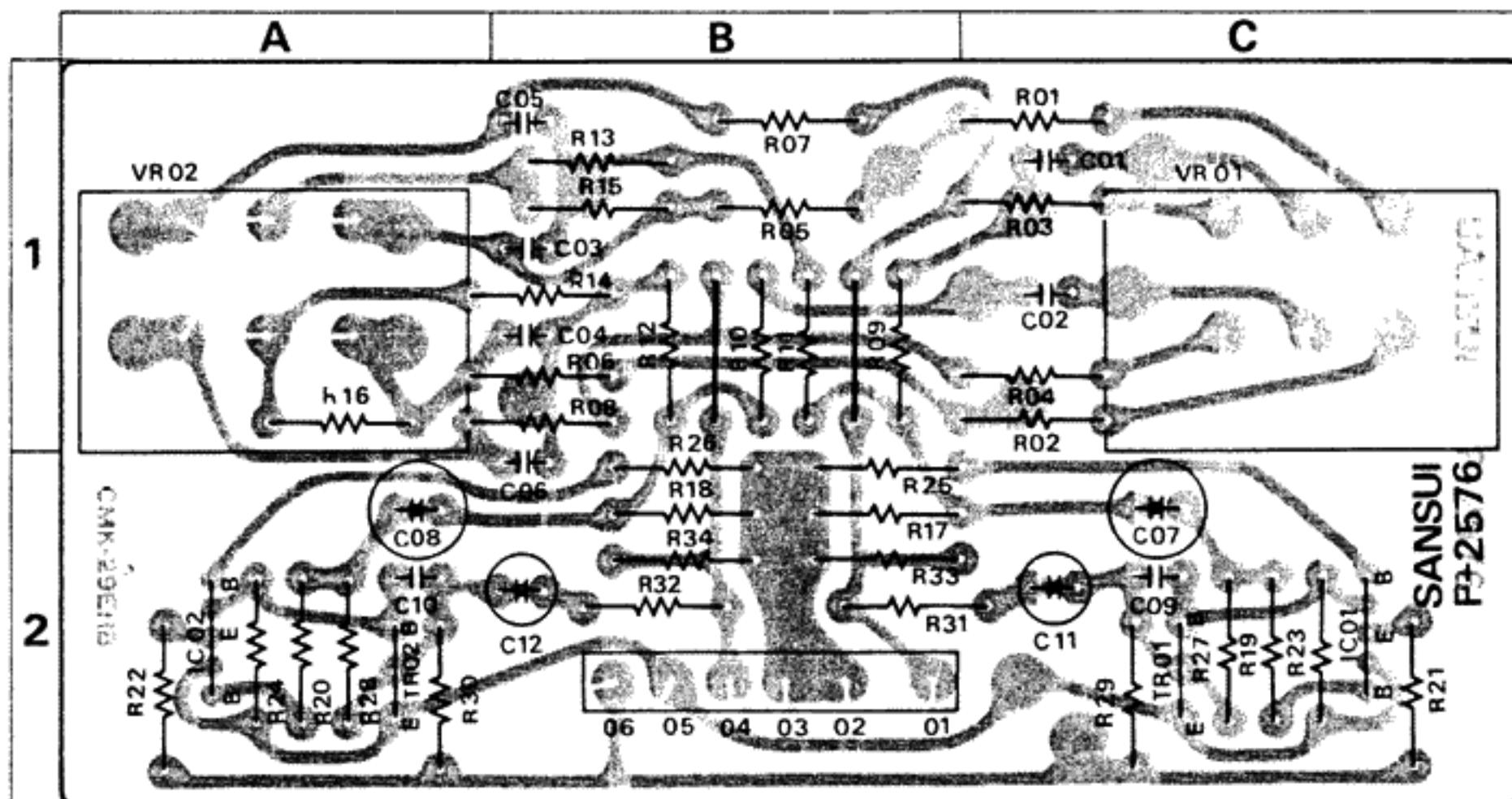


Parts List

Parts No.	Stock No.	Description	Position
TR01,02	0306270.1	2SC1708 (F, G) Transistor	2A, 2B
IC01,02	0360290.1	2SA798 (F, G) IC	2A, 2B
VR01	1090150.1	50kΩ (B) × 2 Midrange Volume	1B
	2410700	6P Pin Ass'y (Type F)	

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

Conductor Side

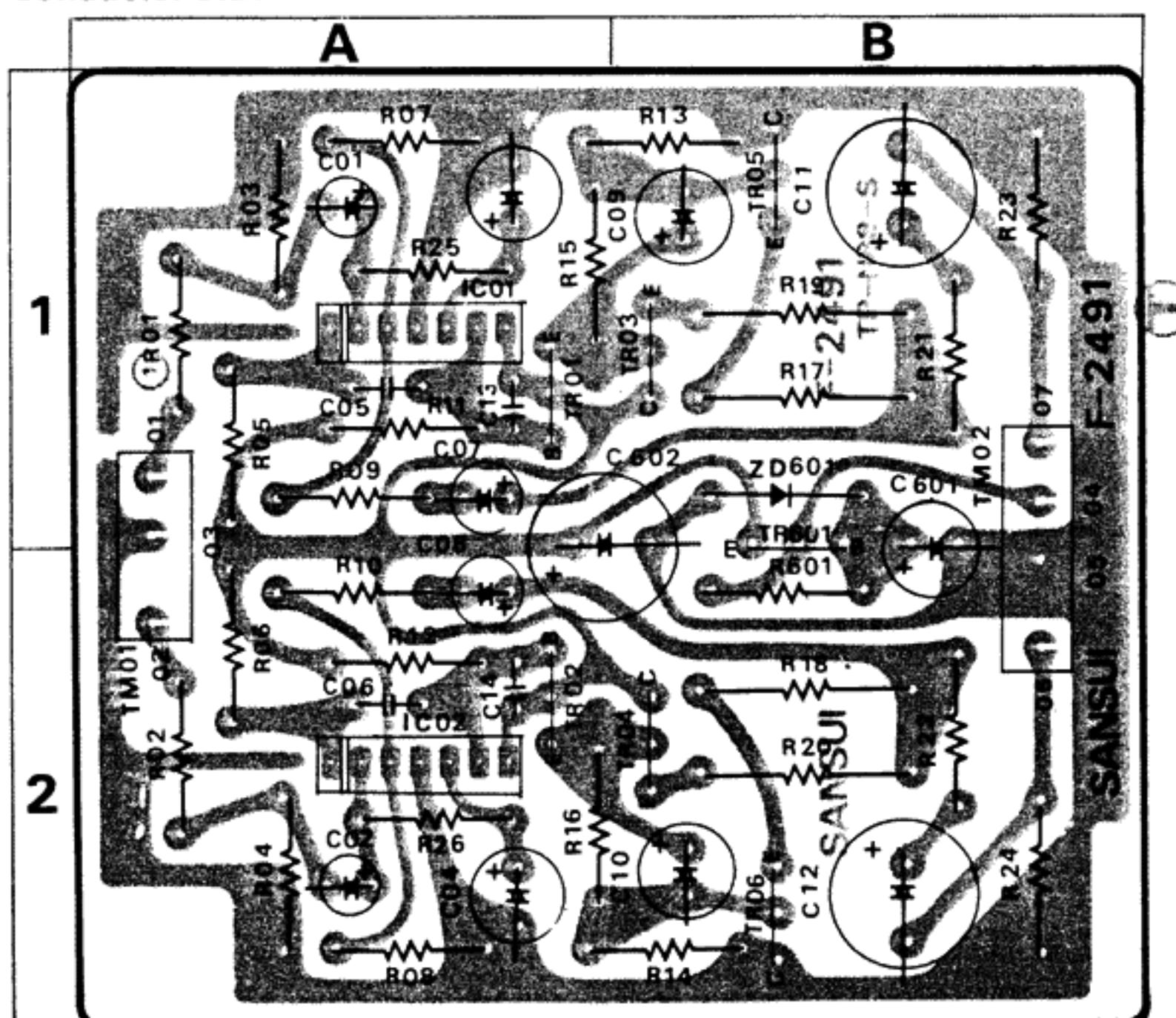


Parts List

Parts No.	Stock No.	Description	Position
TR01,02	0306270.1	2SC1708 (F, G) Transistor	2C, 2A
IC01,02	0360290.1	2SA798 (F, G) IC	2C, 2A
C01,02	0620301	300pF 50V P.C.	1C
VR01	1090150.1	50kΩ (B) × 2 Treble Volume	1C
VR02	1090150.1	50kΩ (B) × 2 Bass Volume	1A
	2410700	6P Pin Accessory (Type F)	

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

Conductor Side

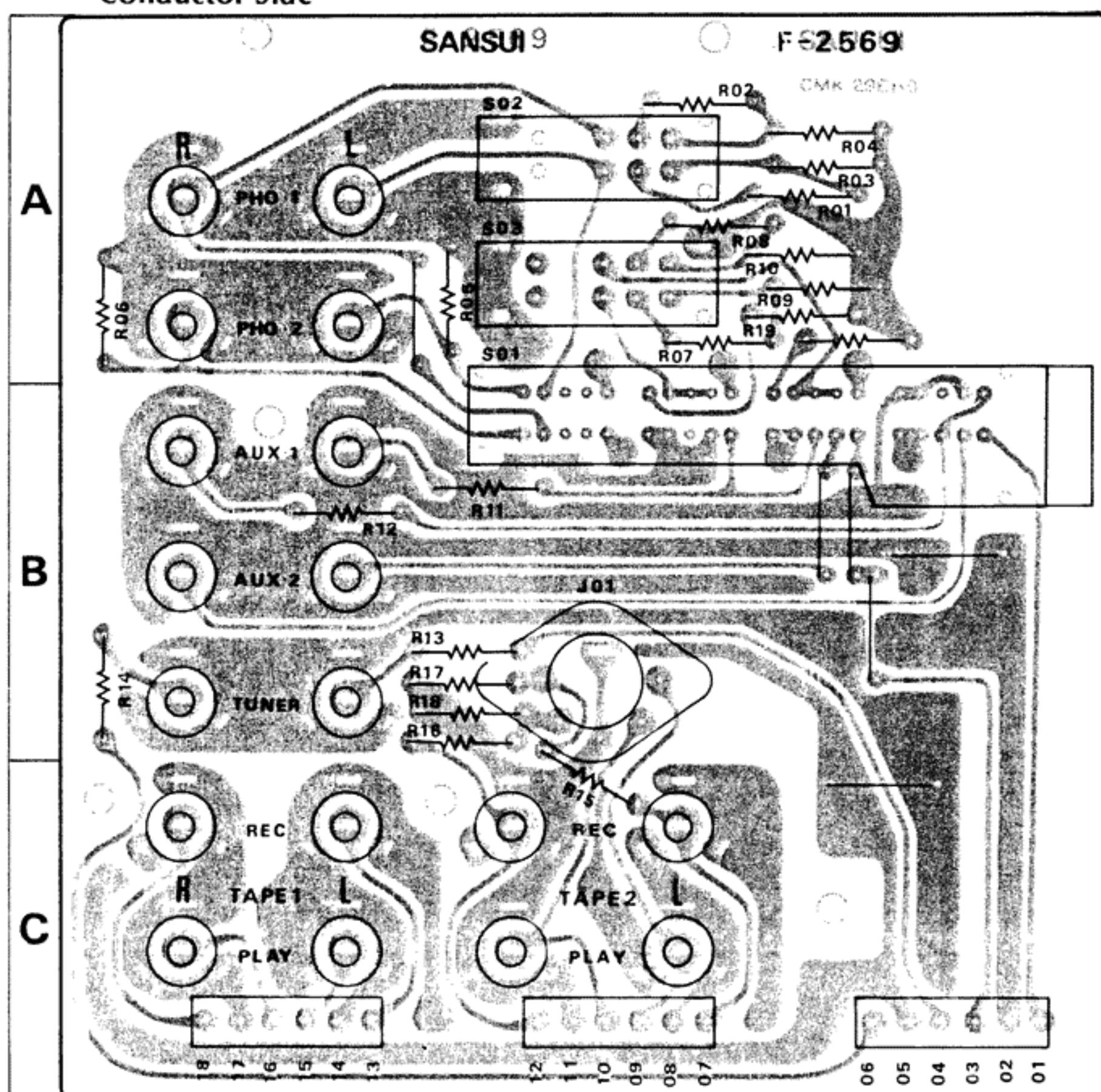


Parts List

Parts No.	Stock No.	Description	Position
TR01,02	0306070.1	2SC1313 (F, G)	1A, 2A
TR03,04	0305901.2	2SC1124 (2, 3)	1B, 2B
TR05,06	0300391.2	2SA706	Transistor 1B, 2B
TR01	0308450.1	2SD356 (C, D)	1B
IC01,02	0360190	BA312	1A, 2A
D601	0316600	RD36E (C)	
R17,18	{ 0104330 or 0211330	33Ω 1W C.R. or 33Ω 1W M.R.	1B, 2B
R19,20	{ 0104330 or 0211330	33Ω 1W C.R. or 33Ω 1W M.R.	1B, 2B
R21,22	0103100	10Ω 1W C.R.	1B, 2B
R23,24	0103331	33Ω 1W C.R. 2410580 3P Pin Ass'y (Type D) 2410590 4P Pin Ass'y (Type D)	1B, 2B

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

Conductor Side

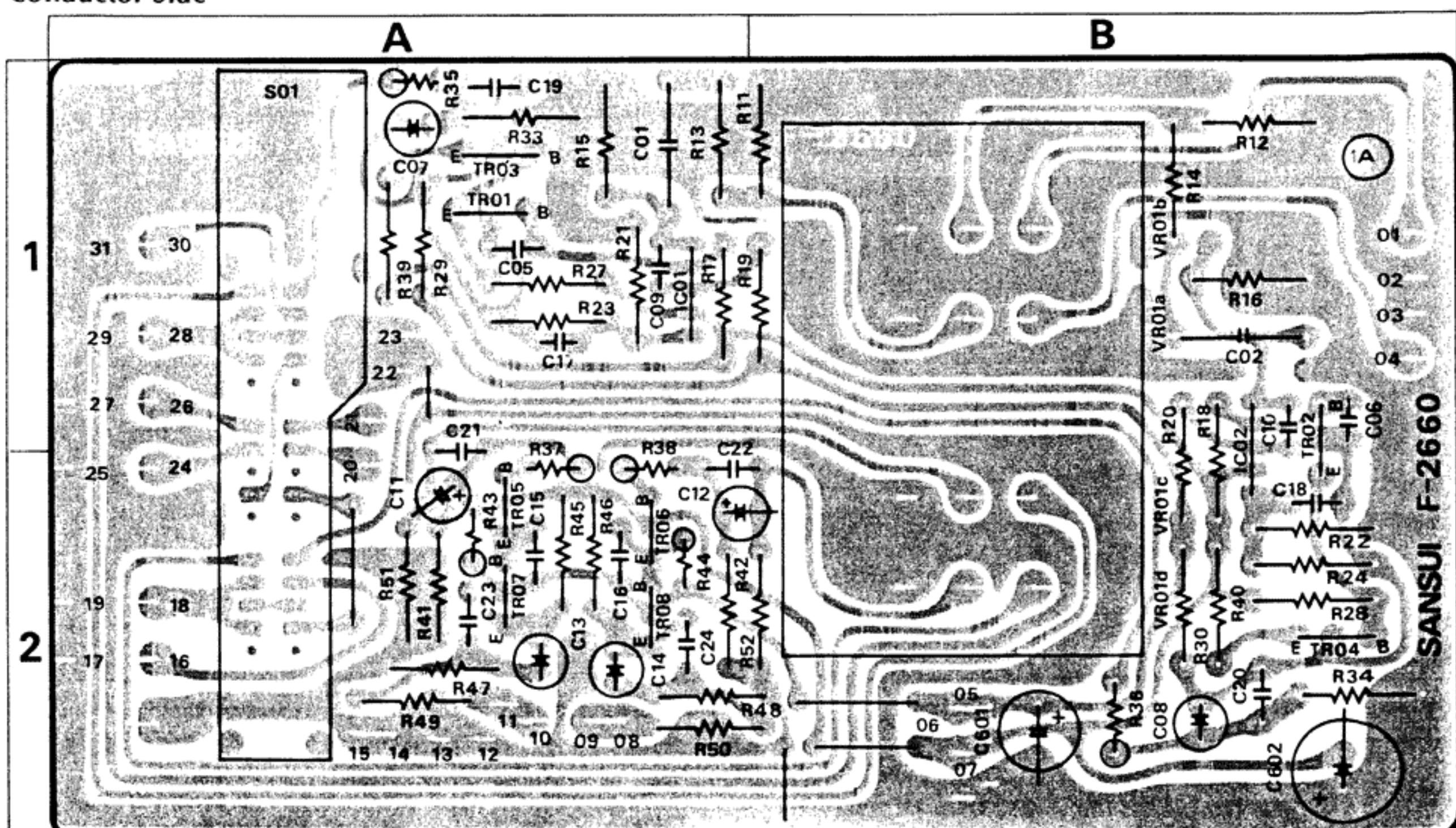


Parts List

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



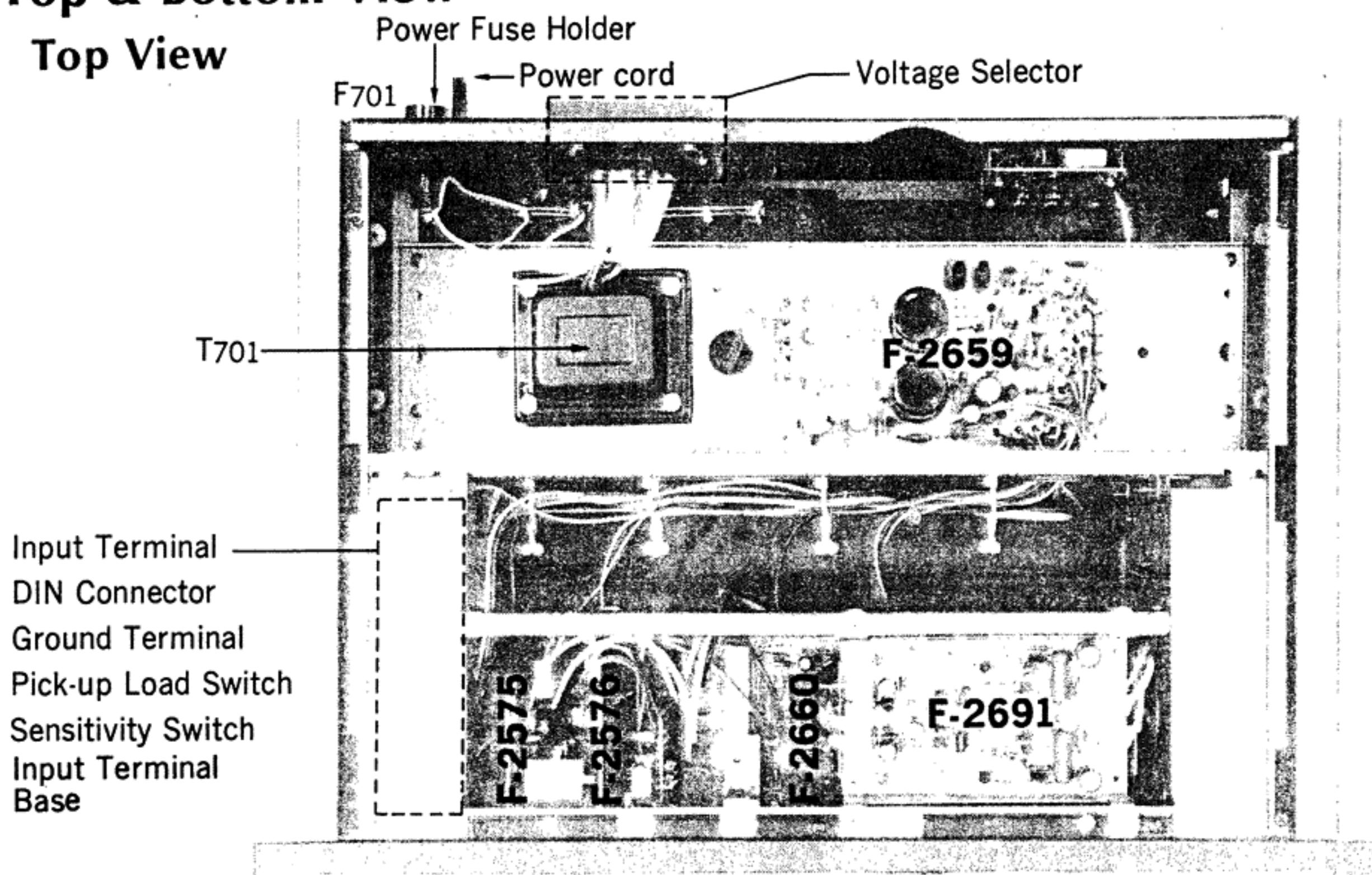
Parts List

Parts No.	Stock No.	Description	Position
TR01.02	0306270.1	2SC1708 (F, G)	1 A. 1.2B
TR03.04	0306360.1	2SC1951 (1, 2)	1 A. 2B
TR05.06	0300470.1	2SA726 (W) (F, G)	2 A
TR07.08	0306070.1	2SC1313 (F, G)	2 A
IC01.02	0360370.1	2SA798 (F, G)	1 A. 1.2B
C01.02	0602109.1	1μF 100V M.C.	1 A. 1B
VR01	1090220	100kΩ × 4 Detent Volume	
S01	1190290	Tone & Filter Switch	1.2A

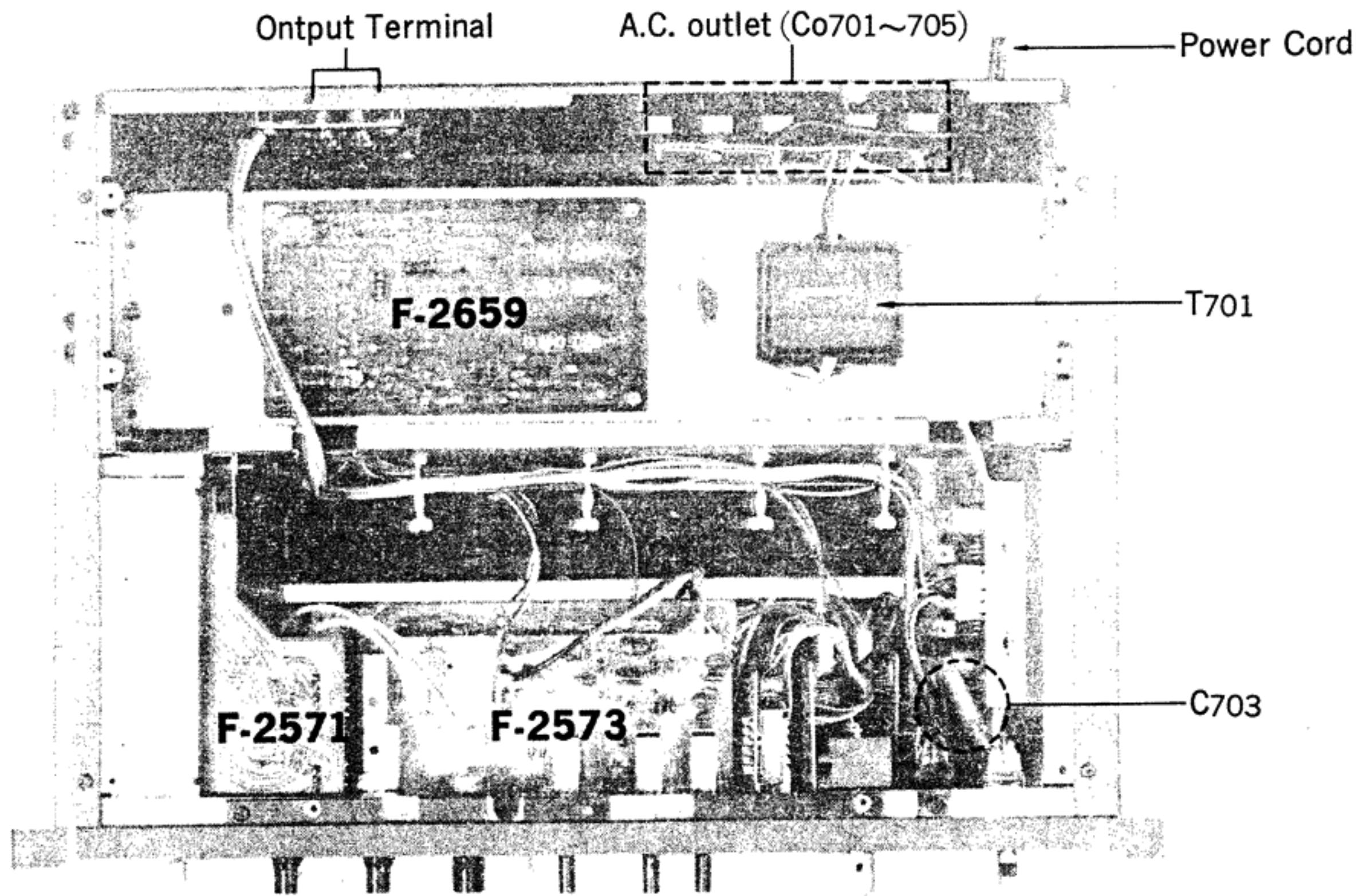
5. OTHER PARTS

5-1. Top & Bottom View

Top View



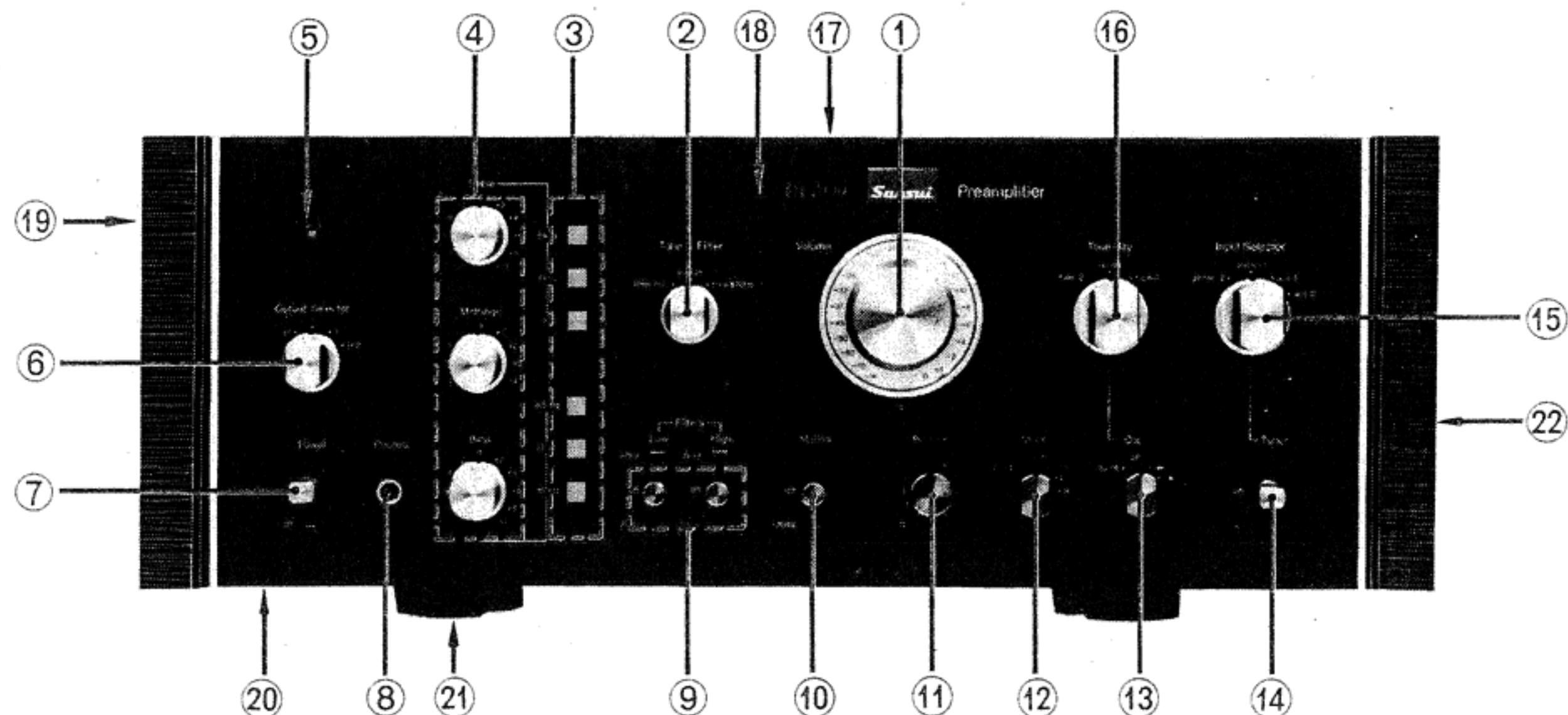
Bottom View



Parts List

Parts No.	Stock No.	Description	Parts No.	Stock No.	Description
F701	{0432220 0432240	1A 250V (AC 220V~240V) 2A 250V (AC 100V~120V)		4002550	Power Transformer
CO701~705	2450060	AC outlet	C703	0659801	0.01μF 150V C.C.
	2300060	Power Fuse Holder		2430260	Female Pin Jack (White)
	2290150	Ground Terminal		2430270	Female Pin Jack (Red)
	2410091	Voltage Selector Plug		5287411	Input Terminal Base
	2410830	Voltage Selector Socket		1110310	Pick-up Load Switch
	3800240	Power Cord		1110310	Sensitivity Switch
				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 1090220	G-6 Type Knob, Level Volume 100kΩ × 4 4-gang detent level volume	5	5326520 1170950	E-3 Type Knob, filter & muting switch Low Filter Switch	16	1190270	Tape Play Switch
2	5318262 1190290	C-6 Type Knob, Tone & Filter Switch Tone & Filter Switch	4	5047470	High Filter Switch	17	5006630	Metal Bonnet
3	1131150 1131140	Treble Tone Push Switch Bass Tone Push Switch	3	5326520	Masking, lever switch	18	7007460	Panel Ass'y
4	5318253 1090150, 1	B-6 Type Knob, Treble Volume B-6 Type Knob, Midrange Volume B-6 Type Knob, Bass Volume	2	5047470	E-3 Type Knob, filter & muting switch	6906480 5326530	Spring, push knob Push Knob	
5	7726170	LED Ass'y, Protector indicator	10	1170950	Muting Switch	5286721	Knob Guide	
6	5318262 1101770, 1	C-6 Type Knob, output selector Rotary Switch, output selector	9	5318271	D-6 Type Knob, balance volume	5286731	Lever Guide for 1 Contact	
7	5326510 1170510	E-2 Type Knob, power switch Lever Switch, power switch	11	1015170, 1	250kΩ (M.N) × 2, Balance Volume	5286741	Lever Guide for 2 Contacts	
8	5047470 2430170	Masking, lever switch Headphone Jack	12	5318281 1190250	F-6 Type Knob, mode switch Mode Switch	5336581	Sansui Mark	
			13	5318281 1190280	F-6 Type Knob, Tape Copy Switch Tape Copy Switch	19	5006640	Left Side Bonnet
			14	5326510 1170870	E-2 Type Knob, Tuner Switch Lever Switch, tuner	20	5058700	Bottom Plate
			15	5047470 1190260	Masking, lever switch	21	5517050	Leg
			16	5318371 5318371	H-6 Type Knob, Input Selector Input Selector Switch	22	5006650	Right Side Bonnet
					H-6 Type Knob, Tape Play Switch			

5-3. Figures

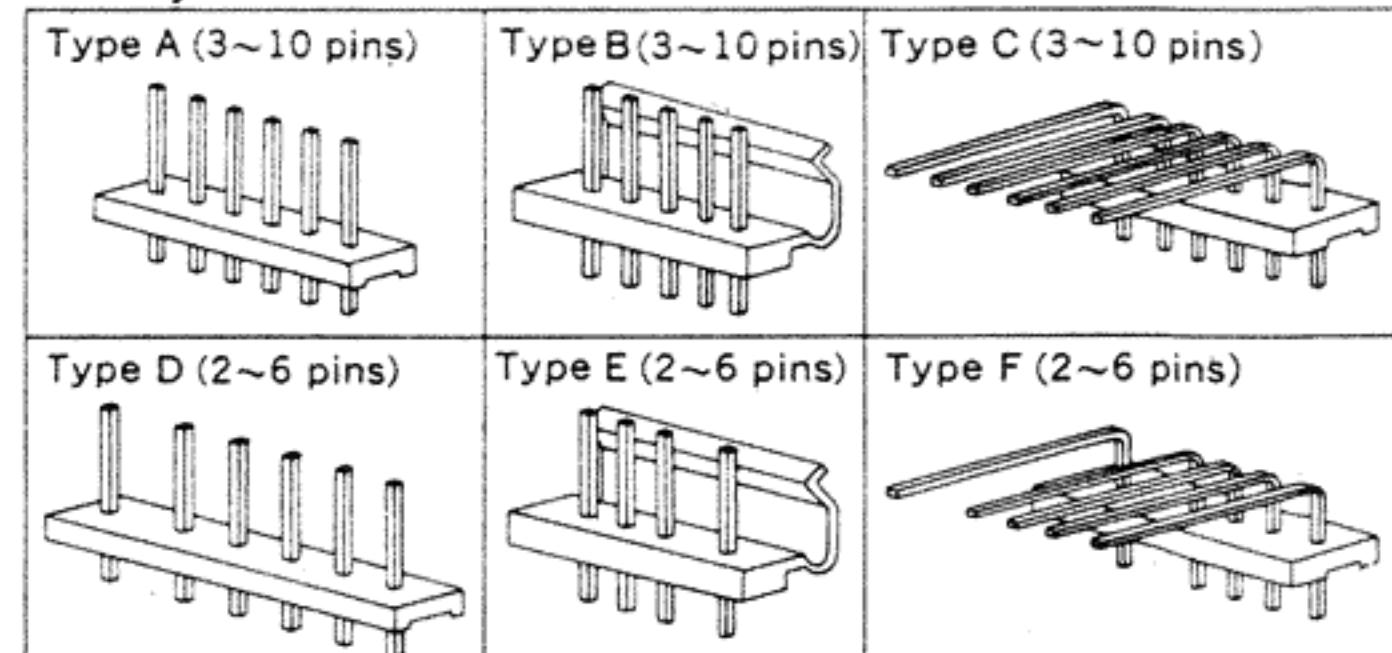
Connectors & Pin Ass'y

Connectors

Type A (3~10 pins)	Type B (2~6 pins)	Stock No.
2 Pins	2420450	
3 Pins	2420460	
3 Pins (RED)	2420650	
4 Pins	2420470	
5 Pins	2420480	
6 Pins	2420490	

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.

