

Service Manual

FM/AM Stereo Receiver

SA-104

[EX],[EH],[XA],[XL]

SA-104(K)

[EX],[EH]



- * The cabinet, front panel and knob are available in black color and silver types.
- * The black type model is provided with (K) in the service Manual.

Areas

- * [EX] is available in Switzerland and Scandinavia.
- * [EH] is available in Holland.
- * [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
- * [XL] is available in Australia.

Specifications

(Specifications are subject to change without notice for further improvement.)

(DIN 45 500)

■ AMPLIFIER SECTION

40 Hz~20 kHz continuous power output both channels driven	2 × 20W (4Ω) 2 × 20W (8Ω)
40 Hz~16 kHz continuous power output both channels driven	2 × 20W (4Ω) 2 × 20W (8Ω)
1 kHz continuous power output both channels driven	2 × 24W (4Ω) 2 × 22W (8Ω)
Total harmonic distortion	
rated power at 40 Hz~20 kHz	0.08% (4Ω) 0.04% (8Ω)
rated power at 40 Hz~16 kHz	0.08% (4Ω) 0.04% (8Ω)
rated power at 1 kHz	0.04% (4Ω) 0.04% (8Ω)
half power at 1 kHz	0.005% (8Ω)
-26 dB power at 1 kHz	0.1% (4Ω)
50 mW power at 1 kHz	0.12% (4Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.08%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.04%
Power bandwidth	
both channels driven, -3 dB	10 Hz~30 kHz (4Ω)
Damping factor	15 (4Ω), 30 (8Ω)
Input sensitivity and Impedance	
PHONO	2.5 mV/47kΩ
AUX	150 mV/22kΩ
TAPE	150 mV/22 kΩ
TAPE REC/PLAY	180 mV/22kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power (4Ω)	
PHONO	70 dB (IHF, A: 73 dB)
AUX, TAPE	88 dB (IHF, A: 95 dB)

-26 dB power (4Ω)

PHONO

64 dB

AUX, TAPE

66 dB

50 mW power (4Ω)

PHONO

62 dB

AUX, TAPE

62 dB

PHONO

RIIA standard curve

±0.8 dB (30 Hz~15 kHz)

7 Hz~70 kHz (-3 dB)

AUX, TAPE

Tone controls

BASS

50 Hz, +10 dB~-10 dB

TREBLE

20 kHz, +10 dB~-10 dB

Loudness control (volume at -30 dB)

50 Hz, +9 dB

Output voltage and Impedance

TAPE, REC OUT

150 mV

TAPE REC/PLAY

30 mV/82kΩ

Channel balance, AUX 250 Hz~6,300 Hz

±1 dB

Channel separation, AUX 1 kHz

55 dB

Headphones output level and Impedance

210 mV/330Ω

Load Impedance

MAIN or REMOTE

4Ω~16Ω

MAIN and REMOTE

8Ω~16Ω

■ FM TUNER SECTION

Frequency range	87.5~108 MHz
Sensitivity	
S/N 30 dB	1.9 μV (300Ω), 1.3 μV (75Ω)
S/N 26 dB	1.7 μV (300Ω), 1.2 μV (75Ω)
S/N 20 dB	1.5 μV (300Ω), 0.9 μV (75Ω)
IHF usable sensitivity	1.9 μV (IHF '58)
IHF 46 dB stereo quieting sensitivity	22 μV/75Ω
Total harmonic distortion	
MONO	0.15%
STEREO	0.3%
S/N	
MONO	60 dB (77 dB, IHF)
STEREO	58 dB (70 dB, IHF)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Frequency response	20 Hz~15 kHz, +1 dB~ -2 dB
Alternate channel selectivity	60 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	70 dB
Spurious response rejection at 98 MHz	80 dB
AM suppression	50 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	-35 dB (-35 dB, 1HF)
38 kHz	-50 dB (-50 dB, 1HF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μ V
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	300 Ω (balanced) 75 Ω (unbalanced)

Frequency range	525~1605 kHz
Sensitivity (S/N 20 dB)	30 μ V, 300 μ V/m
Selectivity	27 dB
Image rejection at 1,000 kHz	45 dB
IF rejection at 1,000 kHz	55 dB

■ GENERAL

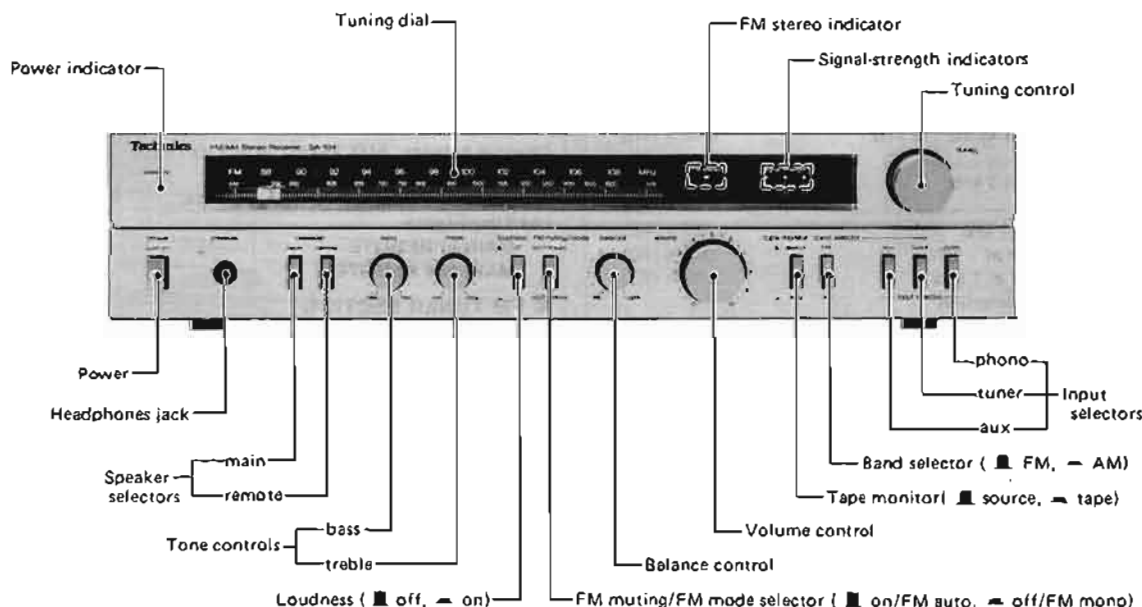
Power consumption	210W
Power supply	AC 50 Hz/60 Hz, 240V (For United Kingdom and Australia) AC 50Hz/60Hz, 220V (For continental Europe) AC 50 Hz/60 Hz, 110V/120V/220V/240V (For others)
Dimensions (W×H×D)	430 × 97 × 260 mm (16-15/16" × 3-13/16" × 10-1/4")
Weight	5.4 kg (11.9 lb.)

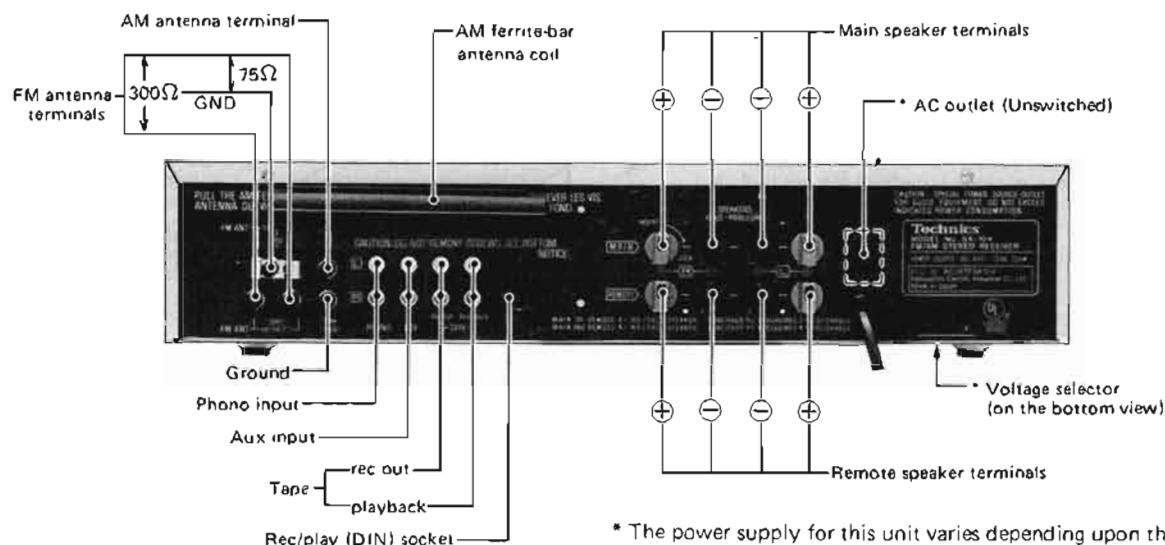
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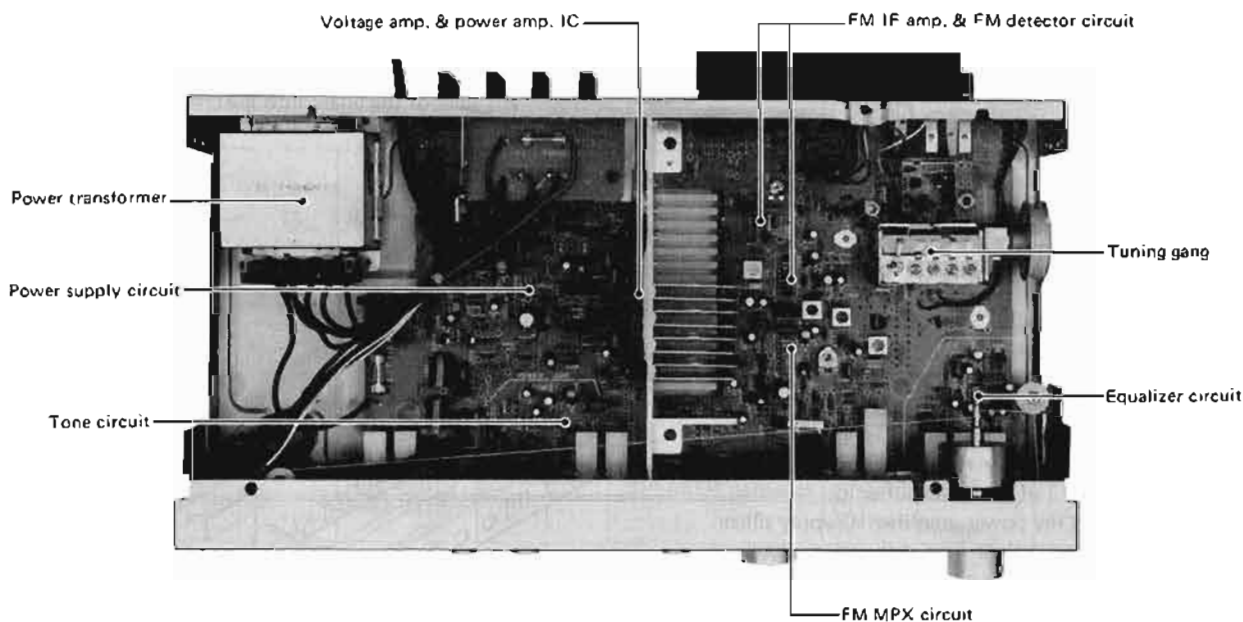
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■ LOCATION OF CONTROLS





- * The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different. So, refer to the circuit diagram and the replacement parts list.
- * {XA} area is provided with voltage selector and AC outlet.
- * Phono input capacitance is about 150pF.



BEFORE REPAIR AND ADJUSTMENT

Turn off the power supply and short-circuit both ends of power supply condensers (C701, C702, 4700μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Avoid short-circuit with a screwdriver or the like, otherwise the transistors or diodes may break down.

Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a voltage regulator to make sure that the current consumed is free of abnormality. The current consumed at 60Hz/50Hz in no-signal mode is 110V: (120 ~ 300mA), 120V: (100 ~ 240mA), 220V: (50 ~ 150mA), 240V: (40 ~ 120mA).

DISASSEMBLY INSTRUCTIONS

How to remove the cabinet

1. Remove the 6 setscrews (Fig. 1: ① ~ ⑥) of the cabinet.

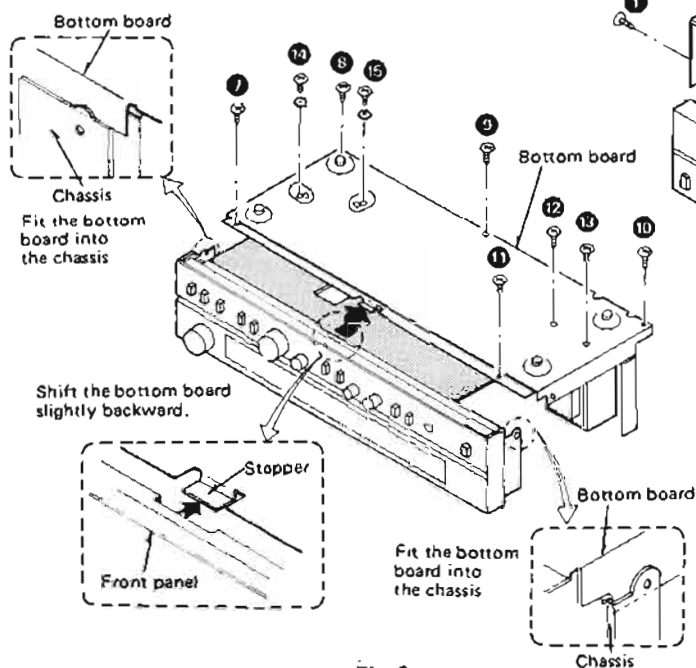


Fig. 2

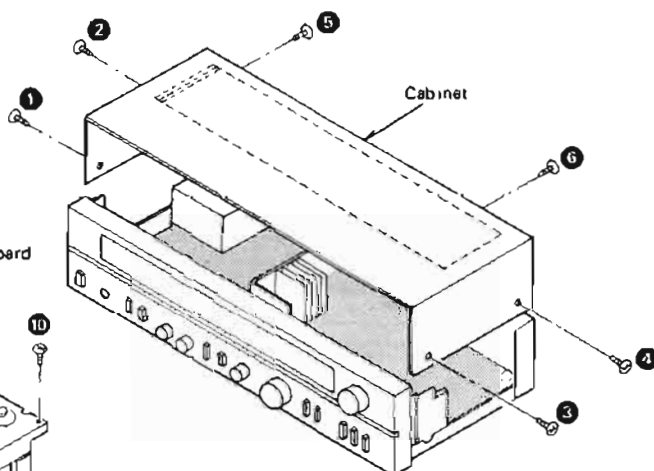


Fig. 1

How to remove the bottom board

1. Remove the cabinet.
2. Remove the 9 setscrews (Fig. 2: ⑦ ~ ⑮) of the bottom board.
3. Remove the bottom board as shown in Fig. 2.
4. When attaching the bottom board, fit the right and left sides of the board into the chassis.

How to remove the front panel

1. Remove the cabinet.
2. Remove the 4 setscrews (Fig. 3: ⑯ ~ ⑲) of the front panel.

How to remove the power amplifier IC.

1. Remove the cabinet and bottom board.
2. Unsolder the power amplifier IC. (Fig. 4)
3. IC can be detached by removing the 2 setscrews. (Fig. 5: ⑳, ㉑) of power amplifier IC.
4. When mounting the power amplifier IC, apply silicon compound (or equivalent heat diffuser) to the back of power amplifier IC.

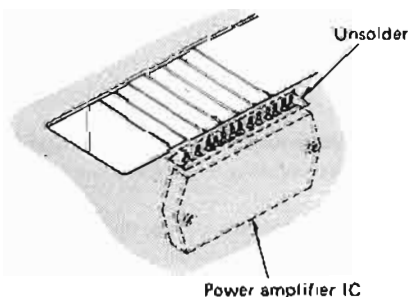


Fig. 4

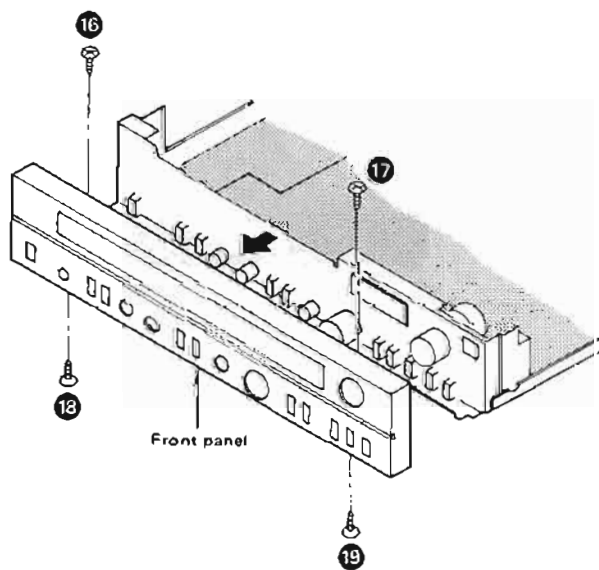


Fig. 3

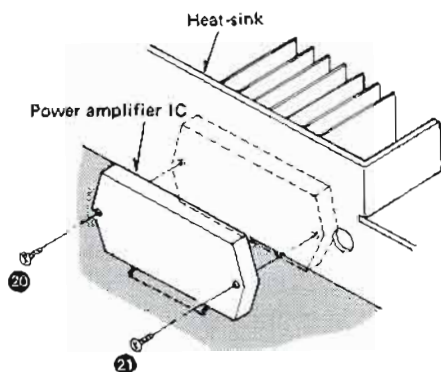


Fig. 5

• How to check the printed circuit board

1. Remove the cabinet and bottom board.
2. Raise the chassis as shown in Fig. 6.

Note) Measure the voltage on the basis of the earth line of the printed circuit board.

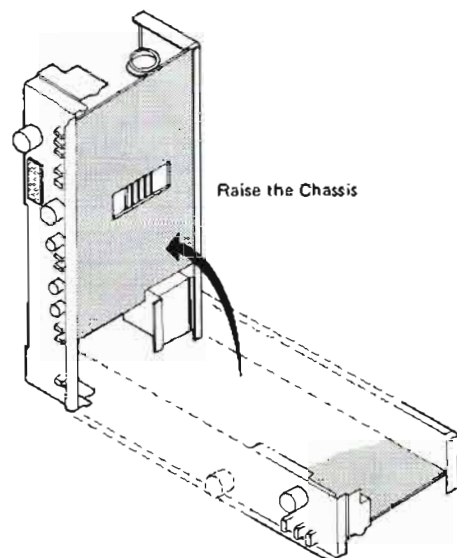


Fig. 6

• How to replace the pilot lamp (Fig. 7)

1. The pilot lamp can be removed by pulling it out of the cover.
2. When inserting the pilot lamp, be sure to insert it with the blue lamp down.

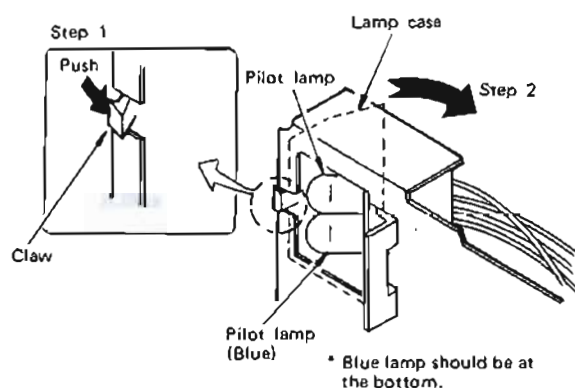


Fig. 7

■ DIAL CORD INSTALLATION GUIDE

* For threading a fresh cord, proceed as follows. (Fig. 8)

1. Prepare a fresh cord more than 180cm (70-15/16") in length.
2. Bring the variable capacitor into a state where the drum is completely turned to the right (maximum capacity and lowest frequency for the variable capacitor.)
3. Direct the cord in the order from 1 to 7.
4. Stretch the cord in such a tension as the spring length is elongated by 1.5 times that of the original state.
5. Fix the knot of the cord with the adhesive.

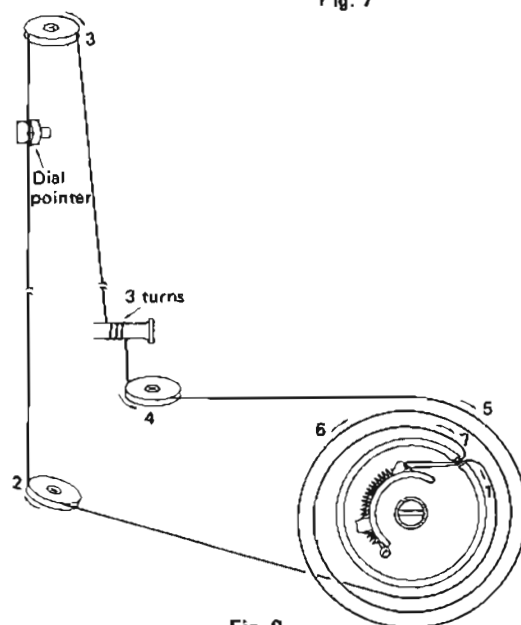


Fig. 8

TECHNICAL GUIDE

1. Muting (shock noise prevention) with power switch ON.

- When power is turned "on", $\ominus B$ is applied to the base of Q701 through R713 and R709, turning Q701 ON.
- As Q701 turns ON, Q702 turns OFF and $\ominus B$ of IC601 is cut off. (state of muting)
- Two or 3 sec. later, $\oplus B$ is applied from D702 to the base of Q701, turning Q701 OFF and Q702 ON, and then $\ominus B$ is applied to IC601 causing muting to be discontinued.

2. Muting (shock noise prevention) with power switch OFF.

- When power is turned "off", the level of $\oplus B$ from D702 drops fast but the voltage of $\ominus B$ becomes negative at the base of Q701 due to the large capacity condenser (C702) connected, thus cutting off $\ominus B$ of IC601 in the same way as power is turned "on".

3. Operation of the protection circuit with speaker terminal short-circuited.

- Q601 is usually OFF. When the speaker terminal is short-circuited to ground, a large amount of current flows to the power amplifier IC601 causing a voltage to be generated at R615, and then Q601 turns ON.
- When Q601 turns ON, the base voltage of Q703 rises causing both Q703 and Q704 to turn ON. (hold circuit)
- As Q704 is ON, the emitter voltage of Q704 drops causing the base voltage of Q701 to decrease as well.
- Thus, Q702 turns OFF in the same way as in muting operation and $\ominus B$ of IC601 is cut off.

Note: If this protection circuit works for muting operation, set the power switch to "on" about 30 seconds after turning it "off" even when the power amplifier and the load are free of abnormality, otherwise normal operation cannot be restored. This protection circuit using a hold circuit is employed in SA-103, SA-222, etc.

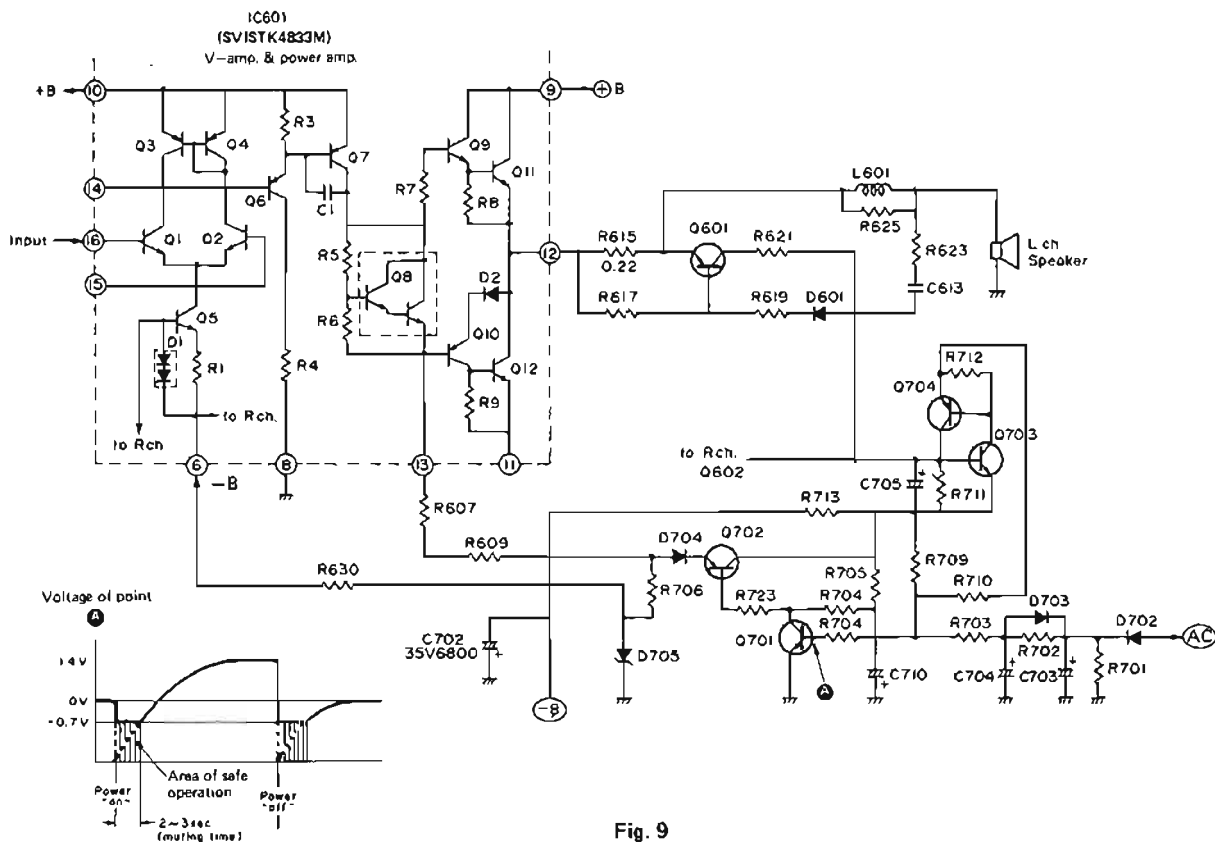


Fig. 9

MEASUREMENTS AND ADJUSTMENTS

AM ADJUSTMENT

• Setting and Equipment use

1. AC and DC electronic voltmeters (VTVM).
2. AM signal generator (AM-SG).
3. Oscilloscope.
4. Maintain line voltage at rated voltage.

5. Output of signal generator should be no higher than necessary to obtain an output reading.
6. Pull the AM ferrite-bar antenna (L201) outward.
7. Use a non-metal screwdriver for the adjustment.

Step No.	AM/FM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	CONNECTION	FREQUENCY				
	08-E05-01 AM-RF ADJUSTMENT					
1	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input).	600kHz (30% Mod. with 400Hz)	600kHz	Connect AC VTVM or scope to "SPEAKER" terminals.	L202 (AM OSC Coil) L201 (AM ANT Coil)	1. Adjust for maximum output. 2. Adjust L201 by moving coil bobbin along ferrite core.
2		1500kHz (30% Mod. with 400Hz)	1500kHz	Connect AC VTVM or scope to "SPEAKER" terminals.	CT202 (AM OSC Trimmer) CT201 (AM ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2).

FM ADJUSTMENT

• Equipment used

1. FM signal generator (FM-SG).
2. Stereo modulator (or separation meter).
3. Oscilloscope.
4. AC and DC electronic voltmeters (VTVM).
5. Frequency counter (19kHz and 108MHz measurable).
6. FM 300Ω dummy antenna.

• Preparation of FM signal generator (FM-SG).

1. Connect stereo modulator to FM-SG.
2. Apply SG output to antenna terminal of the set through 300Ω FM dummy antenna.
3. The standard input of the set is 60dB (1mV), 400Hz 100% modulation (Because of using dummy antenna, SG output must be 12dB plus (IHF). That is, when input is 60dB, SG output is to be 72dB).

• Setting

1. Band selector.....FM.
2. FM muting/mode switch.....off/mono.

FM-IF ADJUSTMENT

3	—	No Signal	Point of noninterference.	Connect DC VTVM between TP103 and TP104 terminal through choke coil. (Refer to Fig. 10)	T101 (Discr. IFT)	1. FM muting/mode switch to "on/FM auto" position. 2. Adjust T101 core so that voltage measured in signal mode is 0mV in 300mV range.
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FM-RF ADJUSTMENT

4	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna.	90MHz (100% Mod. with 400Hz) Weak input.	90MHz	Connect scope to "SPEAKER" terminal.	L4 (OSC Coil) L1 (ANT Coil) L2 (RF DET Coil)	1. Add weak input so that noise is included in the output wave form. 2. Make the adjustment so that the output wave form is vertically symmetrical. (Fig. 11). 3. Repeat the steps (4) and (5) until the frequency correctly matches the dial scale.
5		106MHz (100% Mod. with 400Hz) weak input.	106MHz	Connect scope to "SPEAKER" terminal.	CT3 (OSC Trimmer) CT2 (ANT Trimmer) CT1 (RF DET Trimmer)	

FM MUTING LEVEL ADJUSTMENT

6	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna. Apply 21dB to tuner.	100MHz (100% Mod. with 400Hz)	100MHz	Connect AC VTVM or scope to "SPEAKER" terminals.	VR101 (Muting level)	1. Set the FM muting/mode to "on/auto". 2. Adjust so that output can be obtained.
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FM MPX V.C.O. ADJUSTMENT

USING A FREQUENCY COUNTER			USING ALTERNATE SYSTEM		
7	1. 100MHz 60dB Non-modulated mono signal applied to set. 2. FM muting/mode switch to "on/FM auto". 3. Connect frequency counter to TP301 through resistor (100kΩ). 4. Adjust VR301 to 19kHz±30Hz.		1. Apply a stereo signal to the set or receive a stereo broadcast. 2. Adjust VR301 and fix the sliding contact of VR301 in the middle of the stereo indicator ON-range. (See Fig. 12.)		

• Adjustment points

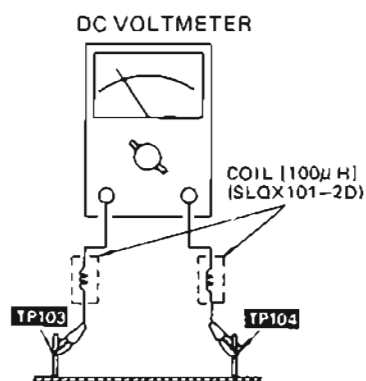
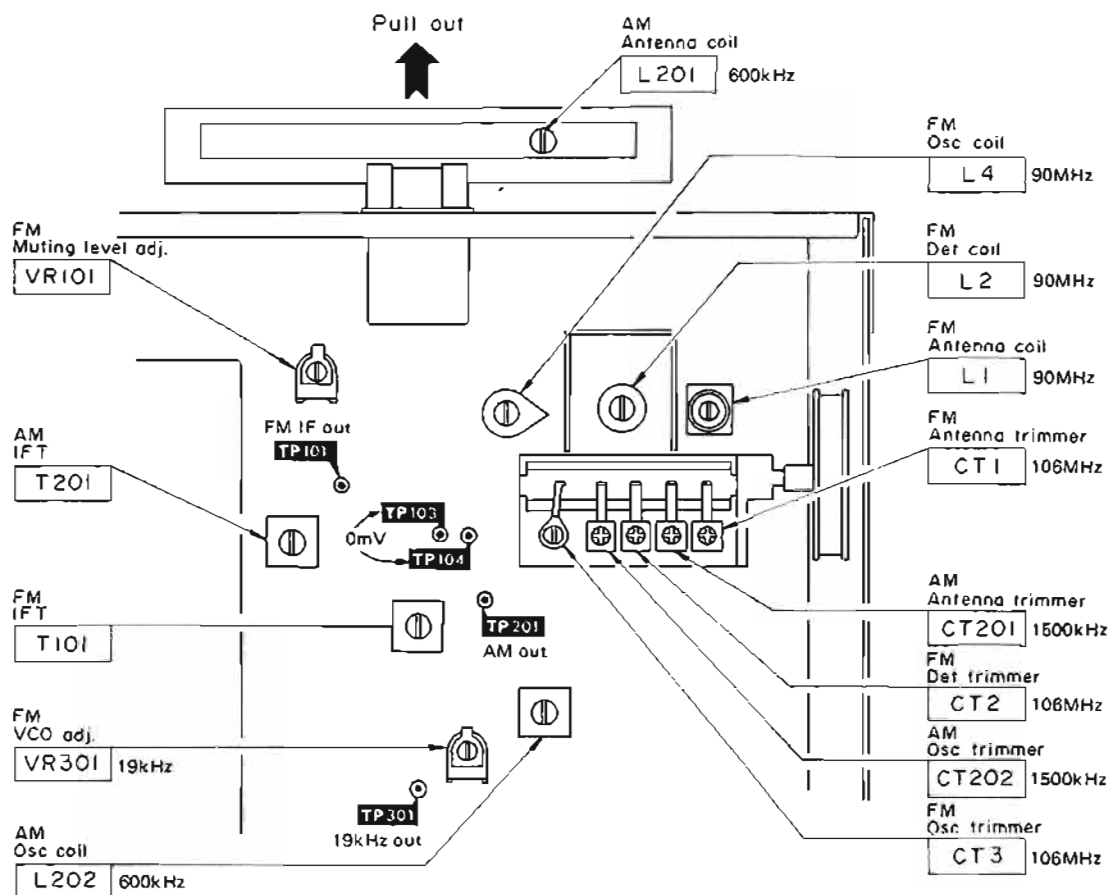


Fig. 10
(Abb. 10)

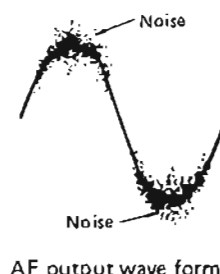
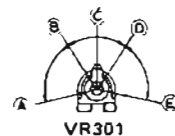


Fig. 11
(Abb. 11)



A - B, D - E : Stereo OFF.
B - D : Stereo ON. (indicator ON).
C : Pilot circuit adjusting point.
(in the middle of B - D).

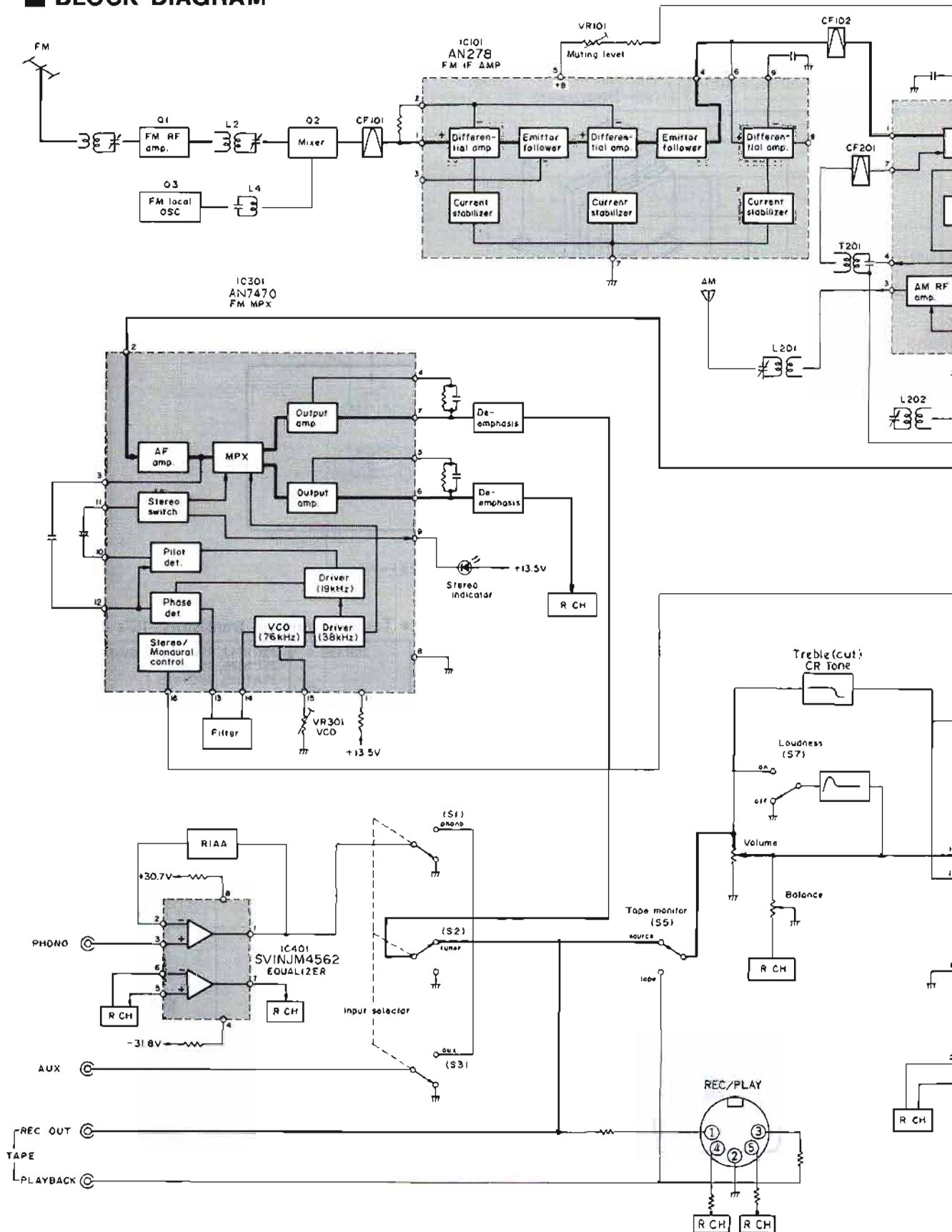
Fig. 12
(Abb. 12)

• Check point

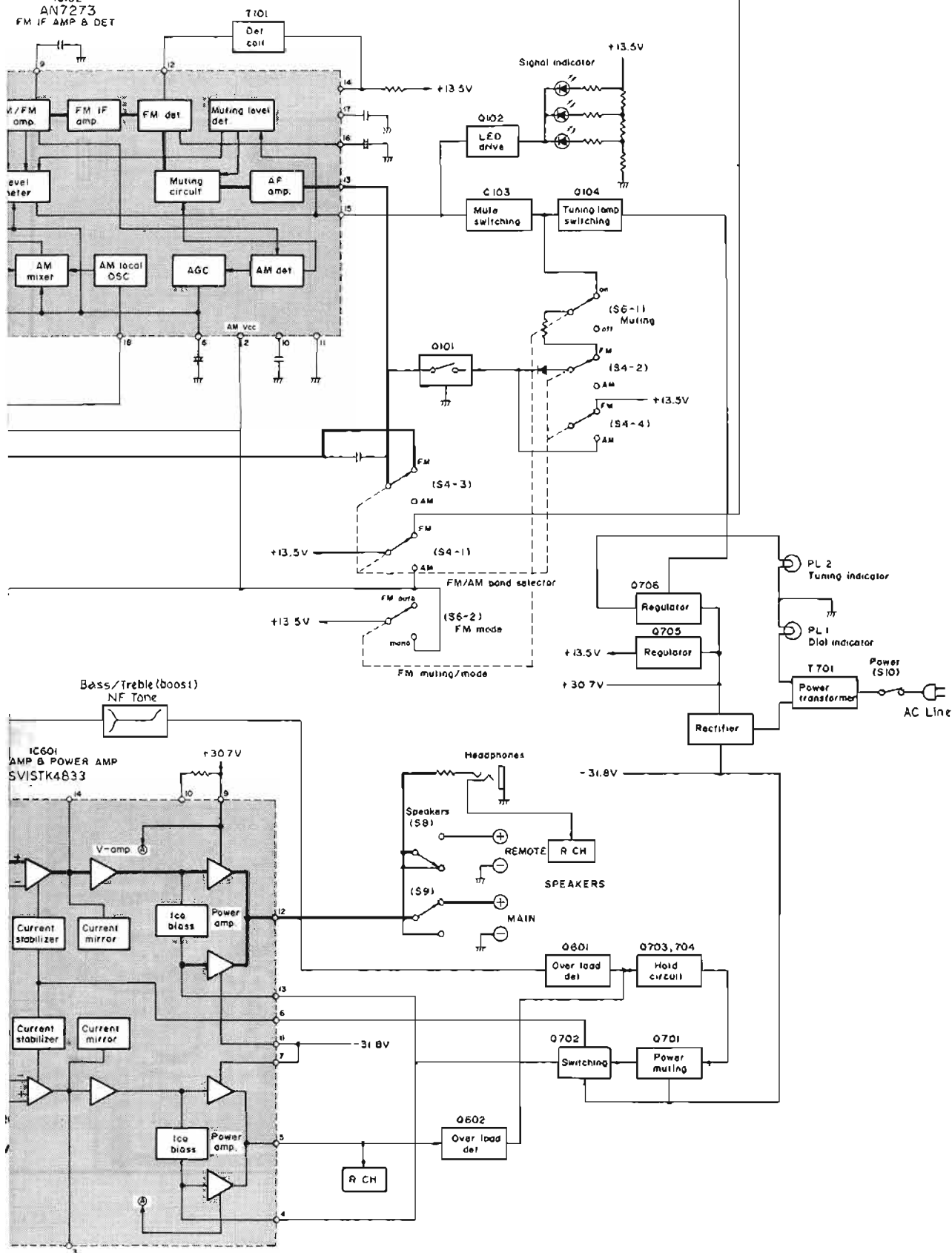
Overload detection circuit

- ① Connect 8Ω load to "main" speaker terminal and 5W 0.33Ω resistance to "remote" speaker terminal.
- ② Apply 1kHz 100mV signal to "TUNER" terminal.
- ③ Make the sound volume maximum.
- ④ With speaker selector set at main and remote, make sure that relay in the set is OFF and no output is delivered.

BLOCK DIAGRAM



IC102
AN7273
FM IF AMP & DET



REPLACEMENT PARTS LIST Electrical Parts

- Notes:**
1. Parts numbers are indicated on most mechanical parts. Please this part number for parts orders.
 2. Important safety notice:
Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components use only manufacturer's specified parts.
 3. Bracketed indicators in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.
 4. The "S" mark is service standard parts and may differ from production parts.

Areas

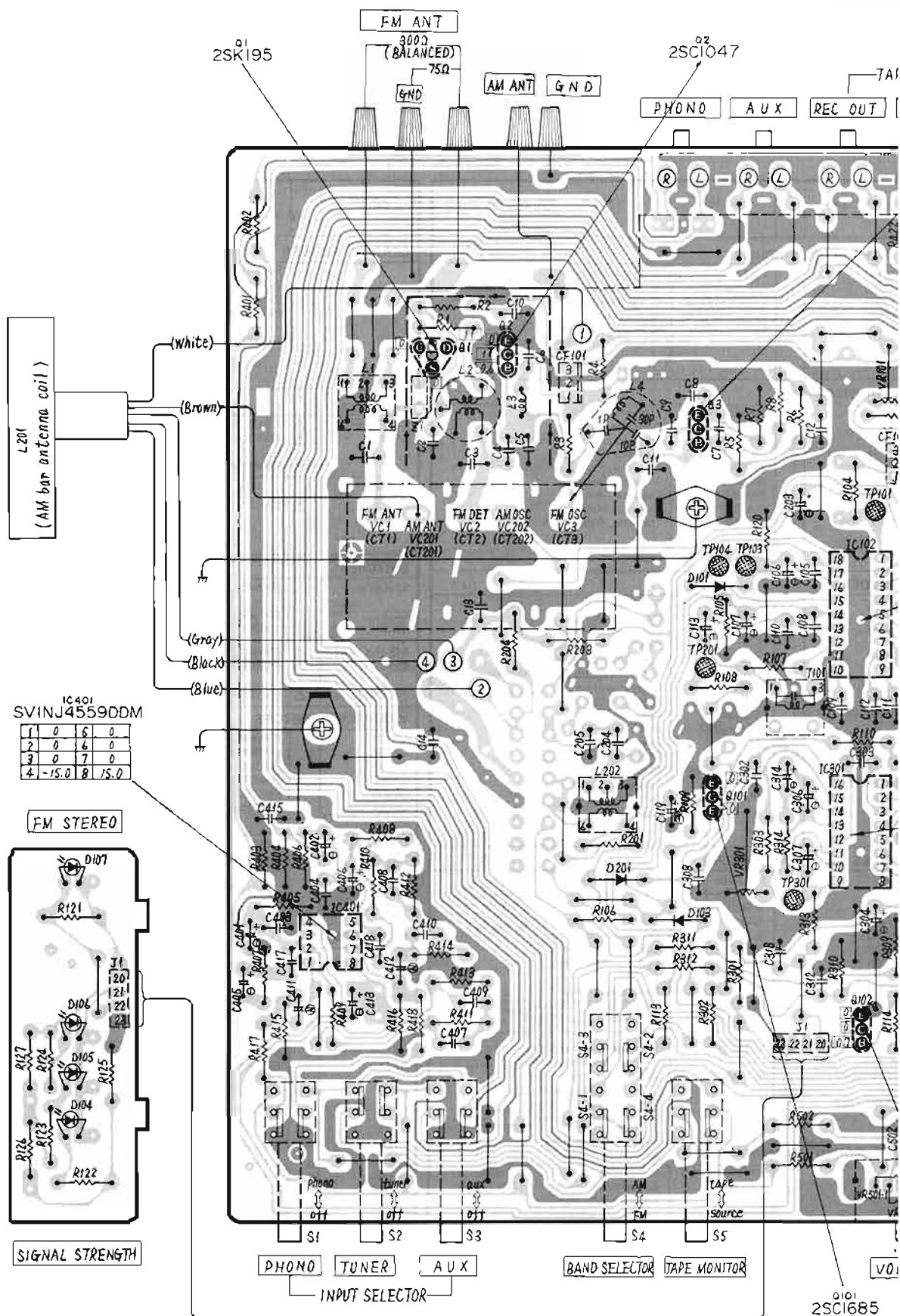
- (EX) is available in Switzerland and Scandinavia.
- (EH) is available in Holland.
- (XA) is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
- (XL) is available in Australia.

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC101 IC102 IC301 IC401 IC601	AN278 AN7273 SV1UPC1161C3 SV1NJ4559DDM SV1STK4833M	IC, FM IF Amplifier IC, AM Converter, FM-IF Amplifier IC, FM Stereo Decoder (MPX) IC, Equalizer Amplifier IC, Power Amplifier
TRANSISTORS		
Q1 Q2 Q3 Q101 ~ 104 Q601, 602 Q701, 702 Q703 Q704 Q705, 706	2SK195-H2 2SC1047-C 2SC1675-L 2SC1685-S 2SA992-E 2SA1015-Y 2SC1815-Y 2SA1015-Y 2SD880-Y	Transistor, FM RF Amplifier Transistor, FM Mixer Transistor, FM Local Oscillator Transistor, Switching Transistor, Over Load Detector Transistor, Switching Transistor, Hold Transistor, Hold Transistor, Ripple Filter
DIODES		
D101 D103 D104 ~ 106 D107 D108 D201 D601, 602 D701 D702 D703, 704 D705 D706, 707 D708	S MA27W-A MA162A LN446YP LN846RP 20A90 MA162A MA162A Δ SVD54VB20 Δ S VDSR1K2 MA162A S RVD0R6P2EB MA2150B MA1110	Diode, Switching Diode, Switching Light Emitting Diode Signal Strength Indicator Light Emitting Diode, Signal Strength & Stereo Indicator Diode, Switching Diode, Switching Diode, Switching Diode, Rectifier Diode, Rectifier Diode, Switching Diode, 6.2V Zener Diode, 15V Zener Diode, 11V Zener
COILS and TRANSFORMERS		
L1 L2 L3 L4 L201 L202 L301 L601, 602 T101 T201 T701 (EX, EH) T701 (XA) T701 (XL)	SLA4N15 SLD4P69-P SLQ5A77-D SLO4P107-P SLF2C45 SLO2C1-P SLM1C61-P SLQY15G-30 SLI4C533-Z SLI2C139-M SLT5M203 SLT5M207 SLT5M209	Coil, FM Antenna Coil, FM Detector Coil, Choke Coil, FM Oscillator Coil, AM Antenna Coil, AM Oscillator Coil, Low Pass Filter Coil, Choke Transformer, FM Detector Transformer, FM IF (1st) Transformer, Power Source (Made in Singapore) Transformer, Power Source (Made in Japan) Transformer, Power Source (Made in Japan)
COMPONENT COMBINATIONS		
Z1 Z301, 302 Z601, 602 Z701, 702	EXRP150K104C EXRP181K473C ECQJ0517 SXRFS203ZSM	Component Combination, 100k Ω & 15pF Component Combination, 47k Ω & 180pF Component Combination, 10 Ω & 0.047 μ F Component Combination, 0.01 μ F x 2

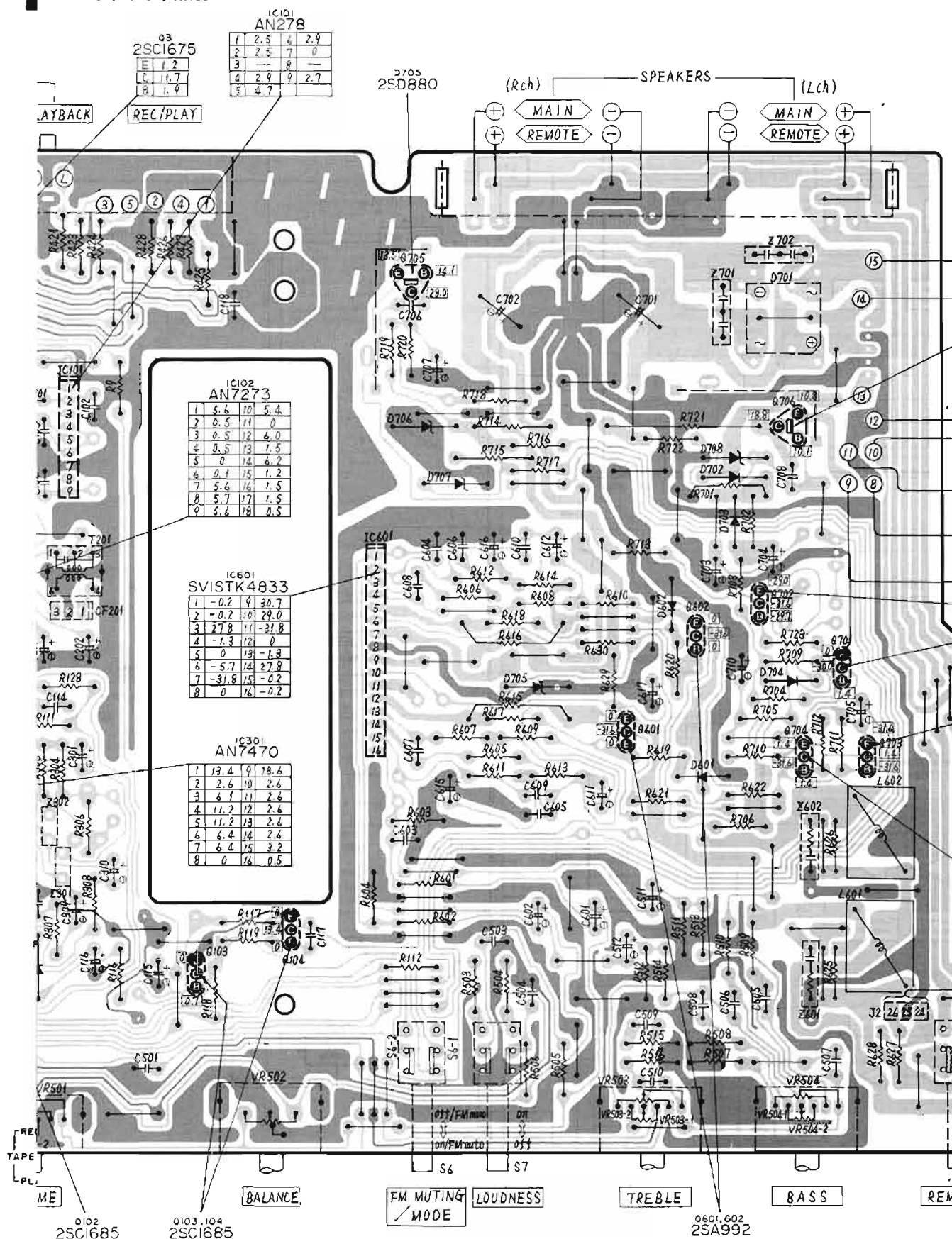
Ref. No.	Part No.	Part Name & Description
CERAMIC FILTERS		
CF101, 102 CF201	SVFE107MS2-A SVFE107MS2-B SVFE107MS2-C SVFE107MS2-D SVFE107MS2-E SVFSFU450B	Ceramic Filter, 10.7MHz Ceramic Filter, 10.67MHz Ceramic Filter, 10.73MHz Ceramic Filter, 10.64MHz Ceramic Filter, 10.76MHz Ceramic Filter, AM-IF 450kHz
FUSE		
F1 (EX, EH, XL) F1 (XA) F2	Δ XBA2C08TRO Δ XBA2C16TRO Δ XBA2C03TRO	Fuse, 0.8A(250V) Fuse, 1.6A(250V) Fuse, 0.3A(250V)
LAMP		
PL1, 2	Δ SWL119	Lamp, 12V 0.22A
SWITCHES		
S1 ~ 5 S6, 7 S8, 9 S10 (EX, XA) S10 (EH, XL) S11 (XA) only	SSH543 SSH2015 SSH2017 Δ ESB822S Δ ESB90619S Δ ESE37219	Switch, Input Selector, Band Selector & Tape Monitor Switch, FM Muting/FM Noise & Loudness Switch, Main Speaker & Remote Speaker Switch, Power Source Switch, Power Source Switch, Voltage Adjuster
VARIABLE RESISTORS		
VR101 VR301 VR501 VR502 VR503 VR504	S EVNK4AA00B33 EVTS3MA00B53 EWCXTA000B15 EWH51AF20G15 EWC5SAF20012 EWC5WAF20C15	Muting Level Adjustment, 5k Ω (B) PLL VCO Adjustment, 5k Ω (B) Volume Control, 100k Ω (B) Balance Control, 100k Ω (G) Treble Control Bass Control, 100k Ω (C)
VARIABLE CAPACITOR		
VC1, 2, 3 201, 202 (CT1, 2, 3 201, 202)	ECV5MD34X71G	Tuning Gang, FM & AM (w/ Trimmer)
RESISTORS		
R1 R2 R3 R4 R5 R6 R7 (EX, EH) R7 (XA, XL) R8 R9 R101 R102, 104 R105 R106 R107 R108 R109	S ERD25FJ220 S ERD25FJ221 S ERD25TJ564 S ERD25FJ391 S ERD25FJ103 S ERD25TJ473 S ERD25FJ102 S ERD25FJ681 S ERD25FJ331 S ERD25FJ820 S ERD25FJ331 S ERD25FJ471 S ERD25FJ681 S ERD25FJ331 S ERD25FJ122 S ERD25TJ153 S ERD25TJ104	Carbon, 1/4W, 22 Ω , $\pm$ 5% Carbon, 1/4W, 220 Ω , $\pm$ 5% Carbon, 1/4W, 560k Ω , $\pm$ 5% Carbon, 1/4W, 390 Ω , $\pm$ 5% Carbon, 1/4W, 10k Ω , $\pm$ 5% Carbon, 1/4W, 47k Ω , $\pm$ 5% Carbon, 1/4W, 1k Ω , $\pm$ 5% Carbon, 1/4W, 680 Ω , $\pm$ 5% Carbon, 1/4W, 330 Ω , $\pm$ 5% Carbon, 1/4W, 82 Ω , $\pm$ 5% Carbon, 1/4W, 330 Ω , $\pm$ 5% Carbon, 1/4W, 470 Ω , $\pm$ 5% Carbon, 1/4W, 680 Ω , $\pm$ 5% Carbon, 1/4W, 330 Ω , $\pm$ 5% Carbon, 1/4W, 12k Ω , $\pm$ 5% Carbon, 1/4W, 15k Ω , $\pm$ 5% Carbon, 1/4W, 100k Ω , $\pm$ 5%

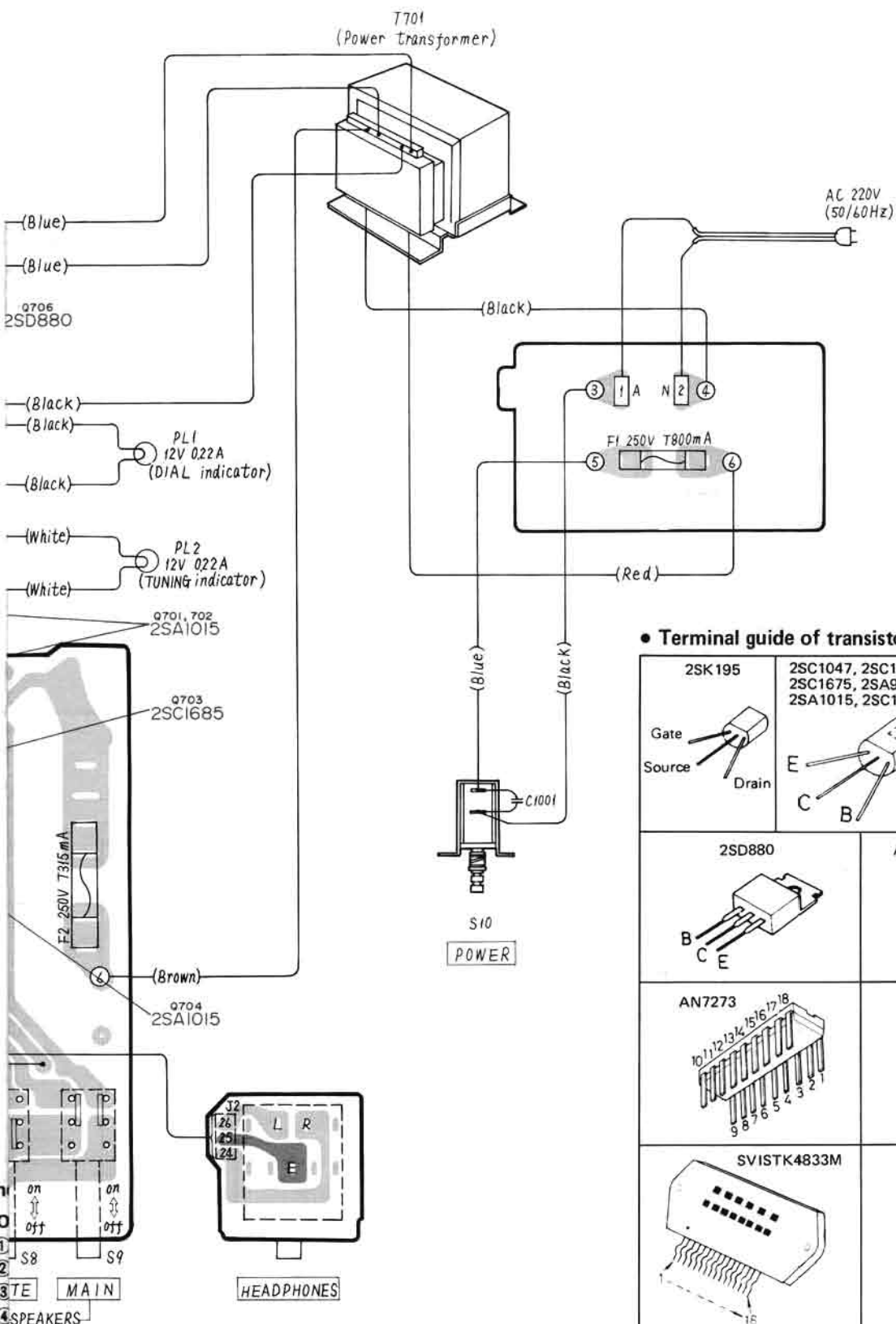
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CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM



■ Ground (Earth) lines



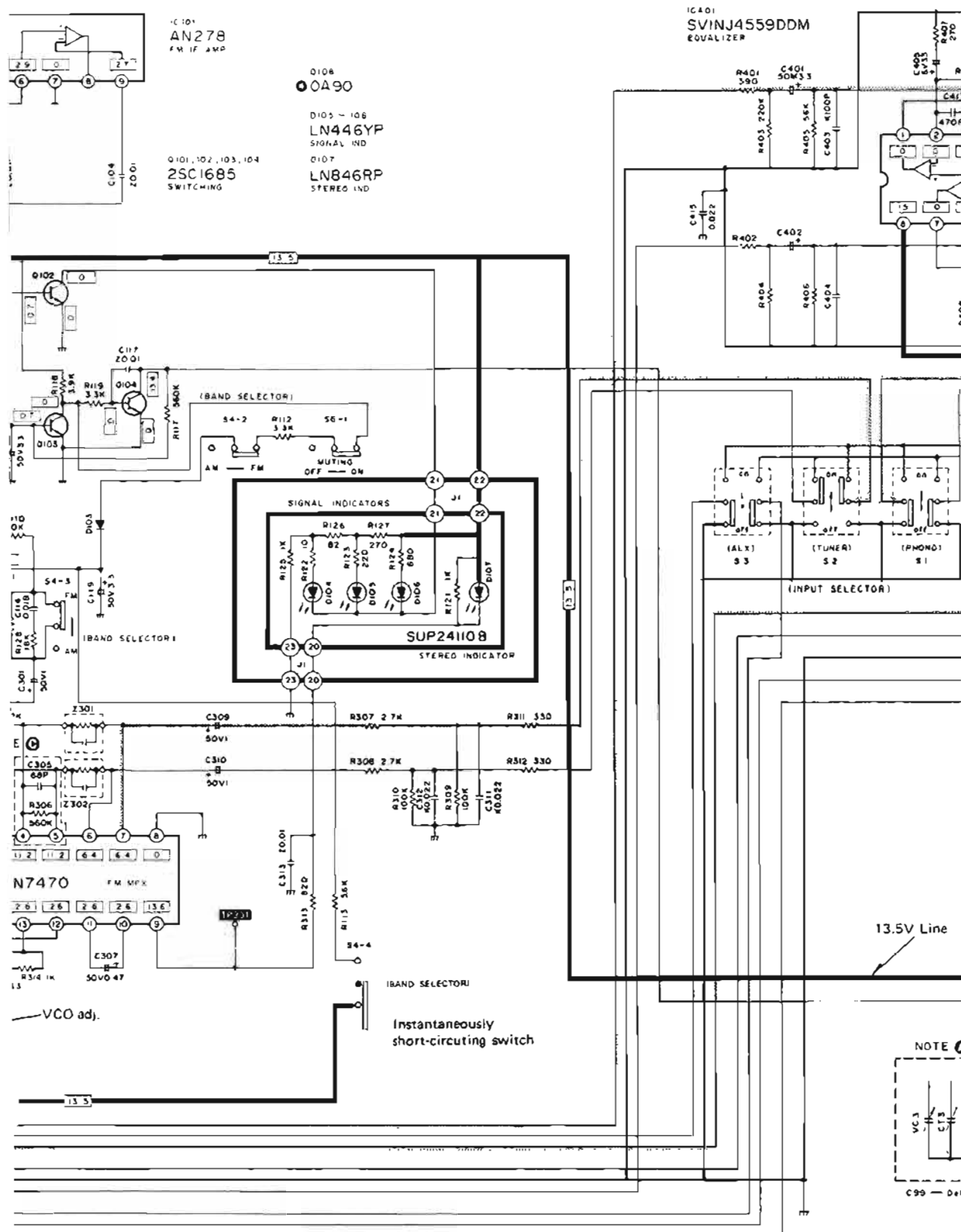


• Terminal guide of transistors, IC's and diodes

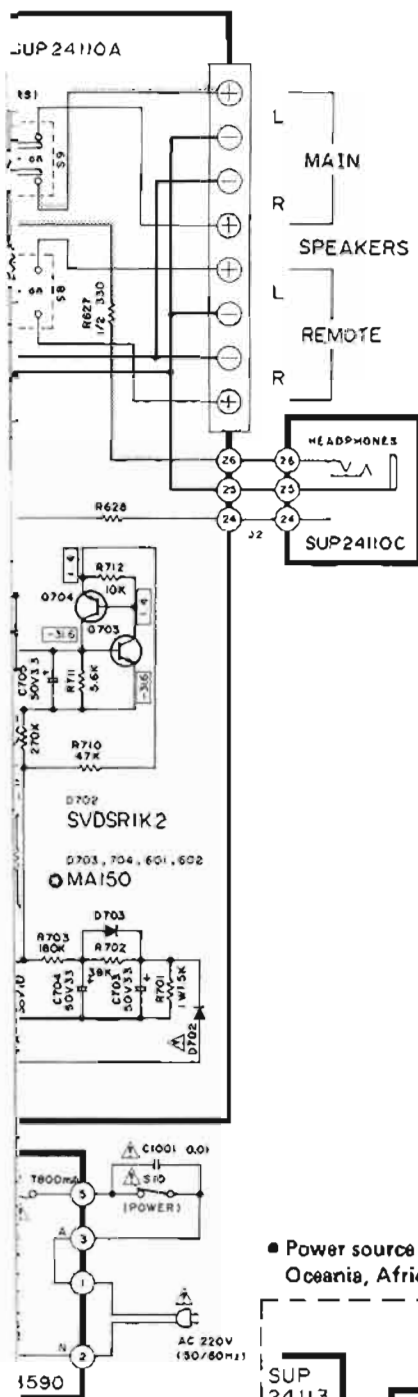
2SK195	2SC1047, 2SC1685, 2SC1675, 2SA992, 2SA1015, 2SC1815	SVINJM4562DD
2SD880	AN278	
AN7273	AN7470	
SVISTK4833M	LN446YP (Amber) LN846RP (Orange)	

(This schematic diagram may be modified at any time with the development of new t









Notes:

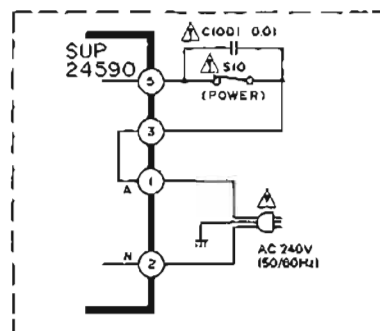
- The part No. of transistors, IC and diodes mentioned in schematic diagram stand for production Part No.

Regarding the Part No. without $\circ$ mark, the production Part No. are different from replacement Part No.

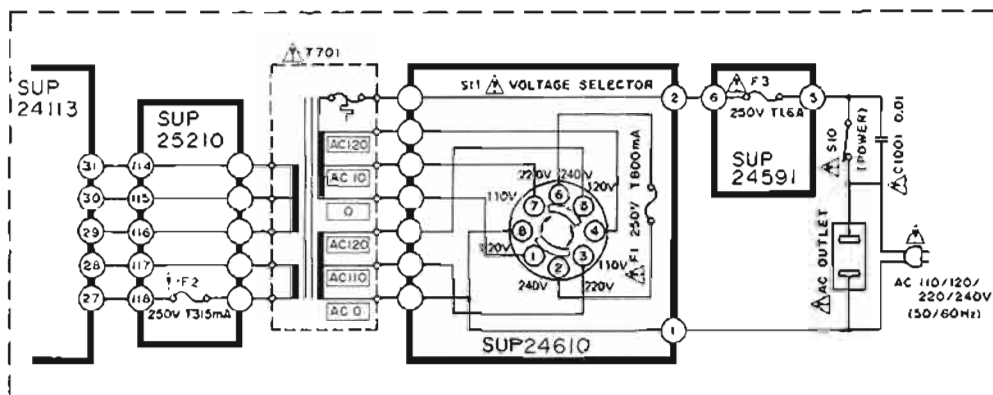
Therefore, when placing an order for replacement parts, please use the Part No. in the replacement parts list.

- S1 ~ S3 : Input selector switch in "tuner" position.
phone (S1) $\rightarrow$ tuner (S2) $\rightarrow$ aux (S3)
- S4-1 ~ S4-4 : Band selector switch in "FM" position.
FM $\rightarrow$ AM
- S5 : Tape monitor switch in "source" position.
source $\rightarrow$ tape
- S6-1, S6-2 : FM muting/mode switch in "on/FM auto" position.
on/FM auto $\rightarrow$ off/FM mono
- S7 : Loudness switch in "off" position.
off $\rightarrow$ on
- S8 : Main speaker switch in "on" position.
off $\rightarrow$ on
- S9 : Remote speaker switch in "off" position.
off $\rightarrow$ on
- S10 : Power source switch in "on" position.
- S11 (XA only) : Voltage selector switch in "240V" position.
110V $\rightarrow$ 120V $\rightarrow$ 220V $\rightarrow$ 240V
- Indicated voltage values are the standard values for the unit measured by the DC electron circuit tester (high impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
* Figures in $\square$ standard for DC voltage in FM signal reception mode.
* Figures in $\{ \}$ standard for DC voltage in AM signal reception mode.
- $\rightarrow$ FM signal lines.
 - $\rightarrow$ AM signal lines.
 - $\rightarrow$ AF signal lines.
 - $\rightarrow$ Positive voltage lines.
- Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

• Power source circuit for Australia [XL].



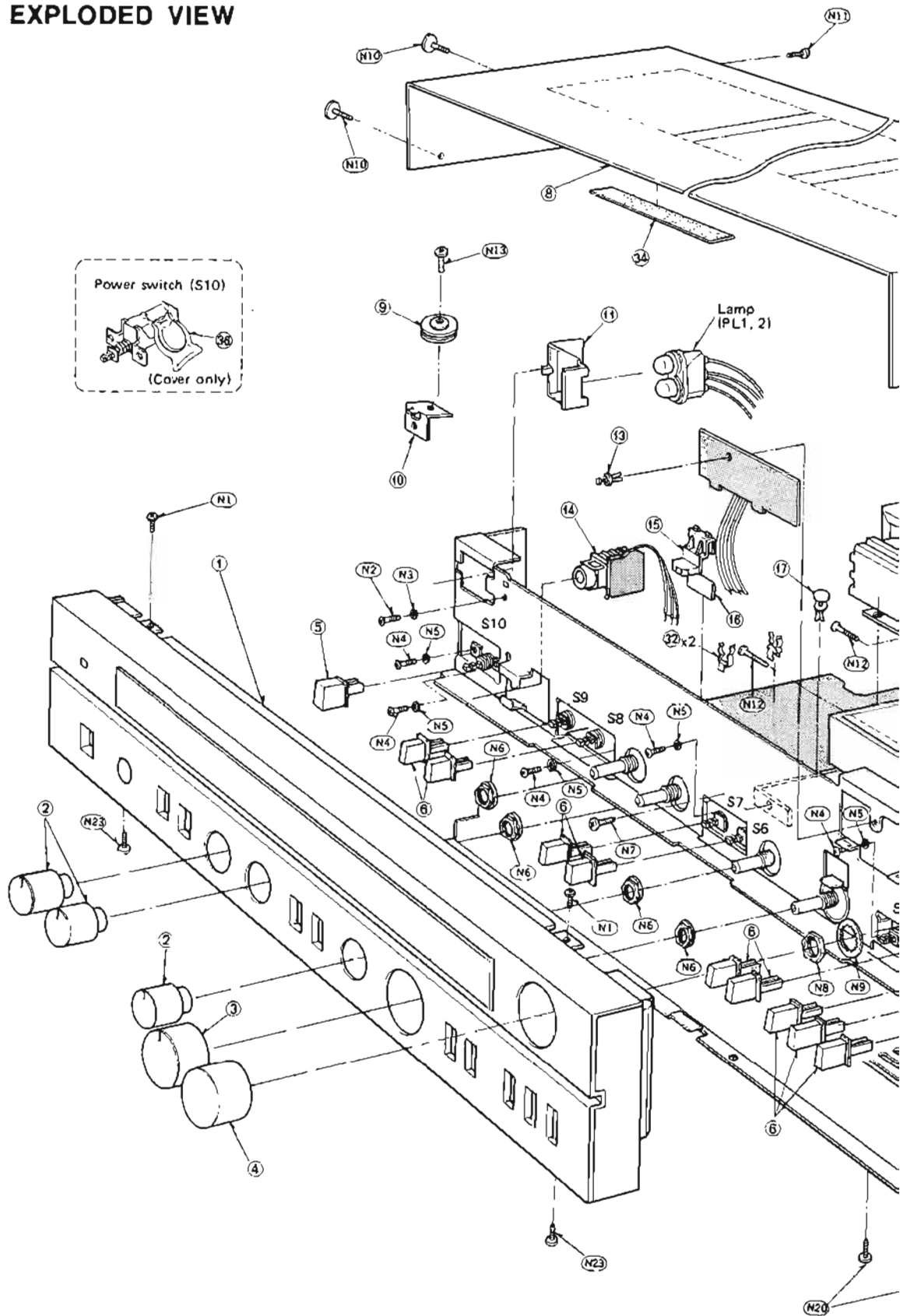
• Power source circuit for Southeast Asia, Oceania, Africa, Middle Near East and Central South America [XA].



Continued from page 11.

Ref. No.		Part No.	Part Name & Description				Ref. No.		Part No.	Part Name & Description			
R110	S	ERD25FJ103	Carbon,	1/4W,	10k Ω ,	$\pm 5\%$	R720	S	ERD25FJ332	Carbon,	1/4W,	3.3k Ω ,	$\pm 5\%$
R111	S	ERD25TJ104	Carbon,	1/4W,	100k Ω ,	$\pm 5\%$	R721	Δ	ERG3ANJ560	Metal Oxide	3W	56 Ω ,	$\pm 5\%$
R112	S	ERD25FJ332	Carbon,	1/4W,	3.3k Ω ,	$\pm 5\%$	R722	Δ	ERDS1FJ222	Carbon,	1/2W,	2.2k Ω ,	$\pm 5\%$
R113	S	ERD25FJ562	Carbon,	1/4W,	5.6k Ω ,	$\pm 5\%$	R723	S	ERD25FJ222	Carbon,	1/4W,	2.2k Ω ,	$\pm 5\%$
R114	S	ERD25FJ122	Carbon,	1/4W,	1.2k Ω ,	$\pm 5\%$	CAPACITORS						
R116	S	ERD25FJ392	Carbon,	1/4W,	3.9k Ω ,	$\pm 5\%$	C1	S	ECCD1H120KC	Ceramic,	50V,	17pF,	$\pm 1\%$
R117	S	ERD25TJ564	Carbon,	1/4W,	560k Ω ,	$\pm 5\%$	C2	S	ECKD1H102ZF	Ceramic,	50V,	0.001 μ F,	$\pm 1\%$
R118	S	ERD25FJ392	Carbon,	1/4W,	3.9k Ω ,	$\pm 5\%$	C3	S	ECCD1H120KC	Ceramic,	50V,	12pF,	$\pm 1\%$
R119	S	ERD25FJ332	Carbon,	1/4W,	3.3k Ω ,	$\pm 5\%$	C4	S	ECCD1H030CC	Ceramic,	50V,	3pF,	$\pm 1\%$
R120	S	ERD25TJ154	Carbon,	1/4W,	150k Ω ,	$\pm 5\%$	C5	S	ECCD1H060CC	Ceramic,	50V,	6pF,	$\pm 1\%$
R121	S	ERD25FJ102	Carbon,	1/4W,	1k Ω ,	$\pm 5\%$	C6	S	ECCD1H181K	Ceramic,	50V,	180pF,	$\pm 1\%$
R122	S	ERD25FJ100	Carbon,	1/4W,	10 Ω ,	$\pm 5\%$	C7	S	ECCD1H390KC	Ceramic,	50V,	39pF,	$\pm 1\%$
R123	S	ERD25FJ271	Carbon,	1/4W,	270 Ω ,	$\pm 5\%$	C8	S	ECCD1H100KC	Ceramic,	50V,	10pF,	$\pm 1\%$
R124	S	ERD25FJ681	Carbon,	1/4W,	680 Ω ,	$\pm 5\%$	C9	S	ECKD1H102ZF	Ceramic,	50V,	0.001 μ F,	$\pm 1\%$
R125	S	ERD25FJ102	Carbon,	1/4W,	1k Ω ,	$\pm 5\%$	C10	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R126	S	ERD25FJ626	Carbon,	1/4W,	62 Ω ,	$\pm 5\%$	C11	S	ECKD1H221KE	Ceramic,	50V,	220pF,	$\pm 1\%$
R127	S	ERD25FJ221	Carbon,	1/4W,	220 Ω ,	$\pm 5\%$	C12 ~ 14	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R128	S	ERD25TJ183	Carbon,	1/4W,	18k Ω ,	$\pm 5\%$	C50, 51{XL}only	Δ	ECKDHS101MB	Ceramic,	400VAC,	100pF,	$\pm 2\%$
R150, 151	S	ERD25FJ100	Carbon,	1/4W,	10 Ω ,	$\pm 5\%$	C52, 53{XL}only	Δ	ECKDHS102MD	Ceramic,	400VAC,	0.001 μ F,	$\pm 2\%$
R201	S	ERD25FJ122	Carbon,	1/4W,	1.2k Ω ,	$\pm 5\%$	C99{EX, EH}only	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R203	S	ERD25FJ221	Carbon,	1/4W,	220 Ω ,	$\pm 5\%$	C102	S	ECKD1H223ZF	Ceramic,	50V,	0.022 μ F,	$\pm 1\%$
R204	S	ERD25FJ472	Carbon,	1/4W,	4.7k Ω ,	$\pm 5\%$	C103 ~ 105	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R301	S	ERD25FJ150	Carbon,	1/4W,	15 Ω ,	$\pm 5\%$	C106	S	ECEA50ZRA7	Electrolytic,	50V,	0.47 μ F	
R302	S	ERD25FJ103	Carbon,	1/4W,	10k Ω ,	$\pm 5\%$	C107	S	ECEA1ES470	Electrolytic,	25V,	47 μ F	
R303	S	ERD25TJ153	Carbon,	1/4W,	15k Ω ,	$\pm 5\%$	C108	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R304, 305	S	ERD25TJ223	Carbon,	1/4W,	22k Ω ,	$\pm 5\%$	C109	S	ECKD1H223ZF	Ceramic,	50V,	0.022 μ F,	$\pm 1\%$
R306 {EX, EH}	S	ERD25TJ564	Carbon,	1/4W,	560k Ω ,	$\pm 5\%$	C110	S	ECCD1H101K	Ceramic,	50V,	100pF,	$\pm 1\%$
R308 {XA, XL}	S	ERD25TJ274	Carbon,	1/4W,	270k Ω ,	$\pm 5\%$	C111	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R307, 308	S	ERD25FJ272	Carbon,	1/4W,	2.7k Ω ,	$\pm 5\%$	C112	S	ECKD1H103MD	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R309, 310	S	ERD25TJ104	Carbon,	1/4W,	100k Ω ,	$\pm 5\%$	C113	S	ECEA25Z4R7	Electrolytic,	25V,	4.7 μ F	
R311, 312	S	ERD25FJ331	Carbon,	1/4W,	330 Ω ,	$\pm 5\%$	C114	S	ECCQ1H183JZ	Polyester,	50V,	0.018 μ F,	$\pm 1\%$
R313	S	ERD25FJ821	Carbon,	1/4W,	820 Ω ,	$\pm 5\%$	C115	S	ECEA50Z3R3	Electrolytic,	50V,	3.3 μ F	
R314	S	ERD25FJ102	Carbon,	1/4W,	1k Ω ,	$\pm 5\%$	C116	S	ECEA1ES220	Electrolytic,	25V,	22 μ F	
R401, 402	S	ERD25FJ391	Carbon,	1/4W,	390 Ω ,	$\pm 5\%$	C117	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R403, 404	S	ERD25TJ224	Carbon,	1/4W,	220k Ω ,	$\pm 5\%$	C118	S	ECCD1H680K	Ceramic,	50V,	68pF,	$\pm 1\%$
R405, 406	S	ERD25TJ563	Carbon,	1/4W,	56k Ω ,	$\pm 5\%$	C119	S	ECEA50Z3H3	Electrolytic,	50V,	3.3 μ F	
R407, 408	S	ERD25FJ271	Carbon,	1/4W,	270 Ω ,	$\pm 5\%$	C201	S	ECEA25Z4R7	Electrolytic,	25V,	4.7 μ F	
R409, 410	S	ERD25FJ680	Carbon,	1/4W,	68 Ω ,	$\pm 5\%$	C202	S	ECEA1AS101	Electrolytic,	10V,	100 μ F	
R411, 412	S	ERD25TJ184	Carbon,	1/4W,	180k Ω ,	$\pm 5\%$	C203	S	ECEA1HS100	Electrolytic,	50V,	10 μ F	
R413, 414	S	ERD25TJ123	Carbon,	1/4W,	12k Ω ,	$\pm 5\%$	C204	S	ECCQ1361JZ	Polyester,	125V,	360pF,	$\pm 1\%$
R415, 416	S	ERD25TJ224	Carbon,	1/4W,	220k Ω ,	$\pm 5\%$	C205	S	ECCD1H150KC	Ceramic,	50V,	15pF,	$\pm 1\%$
R417, 418	S	ERD25FJ102	Carbon,	1/4W,	1k Ω ,	$\pm 5\%$	C301	S	ECEA50Z1	Electrolytic,	50V,	1 μ F	
R421, 422	S	ERD25FJ472	Carbon,	1/4W,	4.7k Ω ,	$\pm 5\%$	C302	S	ECKD1H102ZF	Ceramic,	50V,	0.001 μ F,	$\pm 1\%$
R423, 424	S	ERD25FJ472	Carbon,	1/4W,	4.7k Ω ,	$\pm 5\%$	C303	S	ECCQ1H473JZ	Polyester,	50V,	0.047 μ F,	$\pm 1\%$
R425, 426	S	ERD25TJ394	Carbon,	1/4W,	390k Ω ,	$\pm 5\%$	C304	S	ECEA1ES101	Electrolytic,	25V,	100 μ F	
R501, 502	S	ERD25FJ222	Carbon,	1/4W,	2.2k Ω ,	$\pm 5\%$	C305	S	ECCD1H680K	Ceramic,	50V,	68pF,	$\pm 1\%$
R503, 504	S	ERD25TJ153	Carbon,	1/4W,	15k Ω ,	$\pm 5\%$	[EX, EH]only						
R505, 506	S	ERD25TJ393	Carbon,	1/4W,	39k Ω ,	$\pm 5\%$	C306	S	ECEA50Z1	Electrolytic,	50V,	1 μ F	
R507, 508	S	ERD25FJ392	Carbon,	1/4W,	3.9k Ω ,	$\pm 5\%$	C307	S	ECEA50ZRA7	Electrolytic,	50V,	0.47 μ F	
R509, 510	S	ERD25TJ223	Carbon,	1/4W,	22k Ω ,	$\pm 5\%$	C308	S	ECCQ1471JZ	Polyester,	125V,	470pF,	$\pm 1\%$
R511, 512	S	ERD25FJ397	Carbon,	1/4W,	3.9k Ω ,	$\pm 5\%$	C309, 310	S	ECEA50Z1	Electrolytic,	50V,	1 μ F	
R513, 514	S	ERD25TJ473	Carbon,	1/4W,	47k Ω ,	$\pm 5\%$	C311, 312	S	ECCQ1H223JZ	Polyester,	50V,	0.022 μ F,	$\pm 1\%$
R515, 516	S	ERD25FJ122	Carbon,	1/4W,	1.2k Ω ,	$\pm 5\%$	C313	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R601, 602	S	ERD25FJ102	Carbon,	1/4W,	1k Ω ,	$\pm 5\%$	C314	S	ECEA50Z3R3	Electrolytic,	50V,	3.3 μ F	
R603, 604	S	ERD25TJ823	Carbon,	1/4W,	82k Ω ,	$\pm 5\%$	C401, 402	S	ECEA50M3R3R	Electrolytic,	50V,	3.3 μ F	
R605, 606	S	ERD25FJ271	Carbon,	1/4W,	270 Ω ,	$\pm 5\%$	C403, 404	S	ECCD1H101K	Ceramic,	50V,	100pF,	$\pm 1\%$
R607, 608	S	ERD25FJ222	Carbon,	1/4W,	2.2k Ω ,	$\pm 5\%$	C405, 406	S	ECEA1CS330	Electrolytic,	16V,	33 μ F	
R609, 610	S	ERD25FJ272	Carbon,	1/4W,	2.7k Ω ,	$\pm 5\%$	C407, 408	S	ECCQ1H223JZ	Polyester,	50V,	0.022 μ F,	$\pm 1\%$
R611, 612	S	ERD25TJ393	Carbon,	1/4W,	39k Ω ,	$\pm 5\%$	C409, 410	S	ECCQ1H682JZ	Polyester,	50V,	0.068 μ F,	$\pm 1\%$
R613, 614	S	ERD25TJ393	Carbon,	1/4W,	39k Ω ,	$\pm 5\%$	C411, 412	Δ	ECEA1HN0105	Non Polar Electrolytic,	50V,	1 μ F	
R615, 616	Δ	ERX2ANJR22	Mell Film,	2W,	0.22 Ω ,	$\pm 5\%$	C413	S	ECEA50ZRA7	Electrolytic,	50V,	0.47 μ F	
R617, 618	S	ERD25FJ222	Carbon,	1/4W,	2.2k Ω ,	$\pm 5\%$	C415	S	ECKD1H223ZF	Ceramic,	50V,	0.022 μ F,	$\pm 1\%$
R619, 620	S	ERD25TJ153	Carbon,	1/4W,	15k Ω ,	$\pm 5\%$	C417, 418	S	ECKD1H471KB	Ceramic,	50V,	470pF,	$\pm 1\%$
R621, 622	S	ERD25FJ102	Carbon,	1/4W,	10k Ω ,	$\pm 5\%$	C501, 502	S	ECKD1H331KB	Ceramic,	50V,	330pF,	$\pm 1\%$
R625, 626	S	ERD25FJ100	Carbon,	1/4W,	10 Ω ,	$\pm 5\%$	C503, 504	S	ECCQ1H104JZ	Polyester,	50V,	0.1 μ F,	$\pm 1\%$
R627, 628	Δ	ERDS1FJ331	Carbon,	1/2W,	33 Ω ,	$\pm 5\%$	C505, 506	S	ECCQ1H183JZ	Polyester,	50V,	0.018 μ F,	$\pm 1\%$
R629, 630	Δ	ERD25FJ101	Carbon,	1/4W,	100 Ω ,	$\pm 5\%$	C507, 508	S	ECCQ1H104JZ	Polyester,	50V,	0.1 μ F,	$\pm 1\%$
R701	S	ERG1ANJ152	Metal Oxide,	1W,	1.5k Ω ,	$\pm 5\%$	C509, 510	S	ECCQ1H223JZ	Polyester,	50V,	0.022 μ F,	$\pm 1\%$
R702	S	ERD25TJ393	Carbon,	1/4W,	39k Ω ,	$\pm 5\%$	C511, 512	S	ECEA1HS100	Electrolytic,	50V,	10 μ F	
R703	S	ERD25TJ184	Carbon,	1/4W,	180k Ω ,	$\pm 5\%$	C601, 602	S	ECEA50Z3R3	Electrolytic,	50V,	3.3 μ F	
R704, 705	S	ERD25FJ103	Carbon,	1/4W,	10k Ω ,	$\pm 5\%$	C603, 604	S	ECCD1H390K	Ceramic,	50V,	39pF,	$\pm 1\%$
R706	Δ	ERDS1FJ272	Carbon,	1/2W,	2.7k Ω ,	$\pm 5\%$	C605, 606	S	ECKD1H821KB	Ceramic,	50V,	820pF,	$\pm 1\%$
R709	S	ERD25TJ274	Carbon,	1/4W,	270k Ω ,	$\pm 5\%$	C607, 608	S	ECCD1H270K	Ceramic,	50V,	27pF,	$\pm 1\%$
R710	S	ERD25TJ473	Carbon,	1/4W,	47k Ω ,	$\pm 5\%$	C609, 610	S	ECCD1H1R5CC	Ceramic,	50V,	1.5pF	$\pm 1\%$
R711	S	ERD25FJ562	Carbon,	1/4W,	5.6k Ω ,	$\pm 5\%$	C611, 612	S	ECEA50Z3R3	Electrolytic,	50V,	3.3 μ F	
R712	S	ERD25FJ103	Carbon,	1/4W,	10k Ω ,	$\pm 5\%$	C615, 616	S	ECEA25Z4R7	Electrolytic,	25V,	4.7 μ F	
R713	Δ	ERD25FJ226	Carbon,	1/4W,	22 Ω ,	$\pm 5\%$	C617	S	ECEA1VS101	Electrolytic,	35V,	100 μ F	
R714	S	ERG1ANJ471	Metal Oxide,	1W,	470 Ω ,	$\pm 5\%$	C701, 702	S	ECEA1VS472U	Electrolytic,	35V,	4700 μ F	
R715	S	ERG1ANJ681	Metal Oxide,	1W,	680 Ω ,	$\pm 5\%$	C703, 704	S	ECEA1JS330	Electrolytic,	63V,	33 μ F	
R716, 717	S	ERD25FJ221	Carbon,	1/4W,	220 Ω ,	$\pm 5\%$	C705	S	ECEA50Z3R3	Electrolytic,	50V,	3.3 μ F	
R718	Δ	ERDS1FJ226	Carbon,	1/2W,	22 Ω ,	$\pm 5\%$	C706	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
R719	S	ERD25FJ391	Carbon,	1/4W,	390 Ω ,	$\pm 5\%$	C707	S	ECEA1ES470	Electrolytic,	25V,	47 μ F	
							C708	S	ECKD1H103ZF	Ceramic,	50V,	0.01 μ F,	$\pm 1\%$
							C710	S	ECEA1HS100	Electrolytic,	50V,	10 μ F	
							C1001	Δ	ECKDKC103PF	Ceramic,	250VAC		

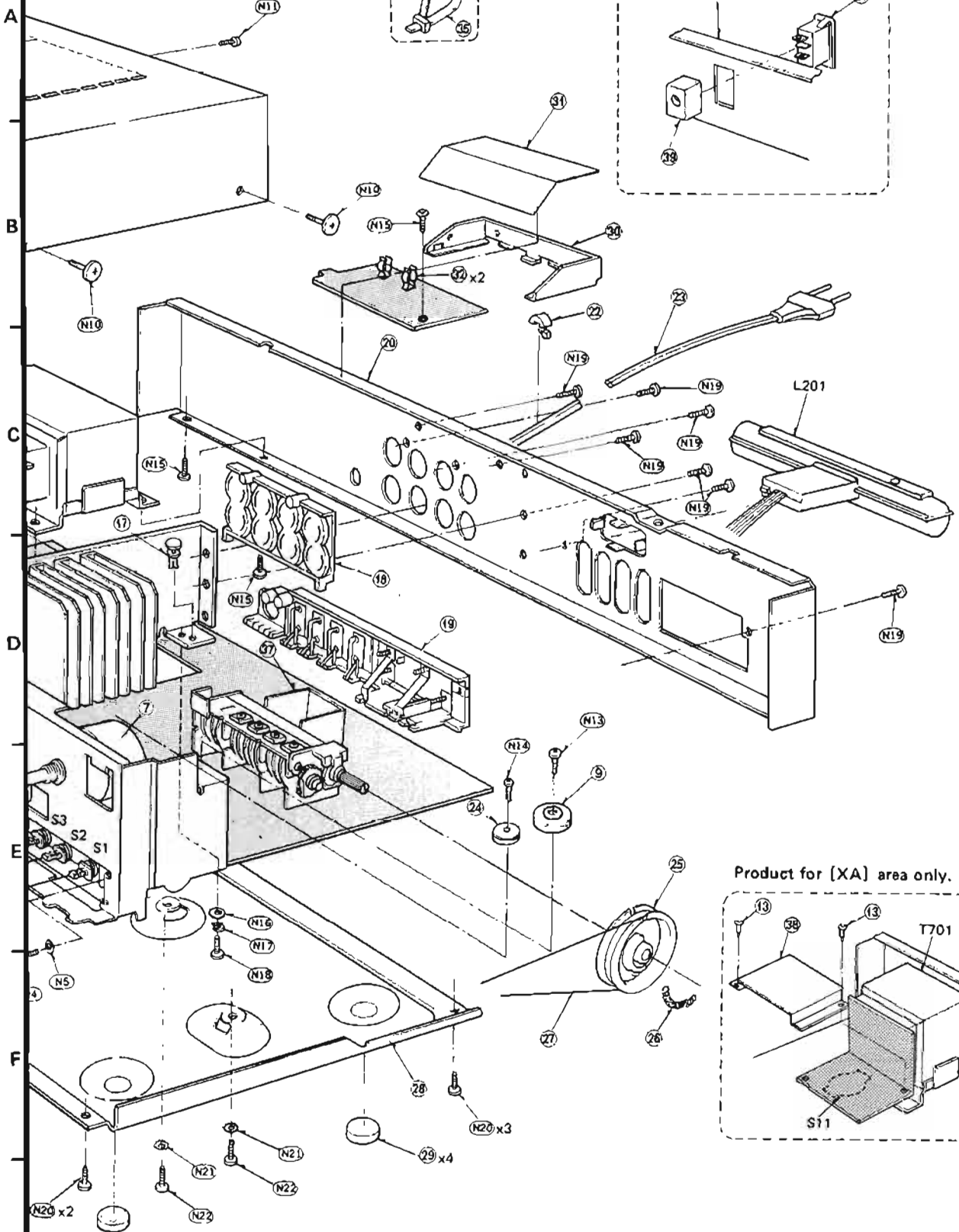
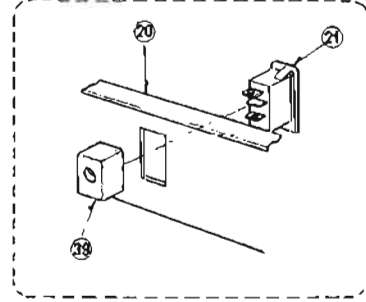
EXPLODED VIEW



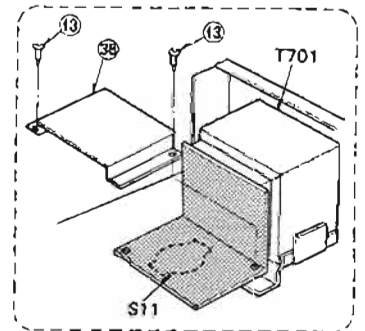
Lead wire clamper
(an example)



Product for [XA] area only.



Product for [XA] area only.



REPLACEMENT PARTS LIST . . . Cabinet & Chassis Parts

- Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 2. Important safety notice:
 Components identified by Δ mark have special characteristics important for safety.
 When replacing any of these components use only manufacturer's specified parts.
 3. $\square$ -marked parts are used for black only, while $\circ$ -marked parts are for silver type only.
 4. Parts other than $\square$ and $\circ$ -marked are used for both black and silver types.
 5. The "S" mark is service standard parts and may differ from production parts.
 6. Bracketed indications in Ref. No. columns specify the area.
 Parts without these indications can be used for all areas.

Black type model No. : SA-104 (K)

Areas

- * [EX] is available in Switzerland and Scandinavia.
- * [EH] is available in Holland.
- * [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
- * [XL] is available in Australia.

Ref. No.	Part No.	Part Name & Description
CABINET and CHASSIS PARTS		
1	$\circ$ SYWA104M	Front Panel Ass'y (Silver)
1	$\square$ SYWA104KEX	Front Panel Ass'y (Black)
	MSA	(Made in Singapore)
2	SBN1103	Knob, Bass, Treble & Balance
3	SBN1105	Knob, Volume
4	SBN1107	Knob, Tuning
5	SBC337-1	Button, Power
6	SBC339	Button, Speakers, Loudness, FM muting
		/mode, Tape Monitor, Band Selector & Input Selector
7	SDT8095-1	Shaft, Tuning
8	$\circ$ SKC890S1	Cabinet (Silver)
8	$\square$ SKC890B61	Cabinet (Black)
9	RDR8-1	Pulley, Dial
10	SUR143	Bracket, Pulley
11	SMP325	Bracket, Lamp
13	SHR401-1	Latch, LED P.C.B. & Cover
14	SJ160-1	Jack, Headphone
15	SDP1167	Pointer, Dial
16	SHF59	Slider, Pointer
17	SHR411	Latch, Heat-sink
18	SJF4815	Terminal, Speakers
19	SJFA035-1N	Terminal, Input & Antenna
19 [XL] only	SJF8035-3N	Terminal, Input & Antenna
20 [EX, EH]	MSA	SGP2910-1A
20 [XA]	JPN	SGP2910-3A
20 [XL]	JPN	SGP2910-4A
21 [XA] only	Δ	SJS9221
22	SHR127	Bushing, AC Cord
22 [XL] only		SHR131
23	Δ SJA88	AC Cord, Power Source
23	Δ QFC1207M	AC Cord, Power Source
24	SDR3	Pulley, Dial
25	SDD38-1	Drum, Variable Capacitor
26	SDSA4121	Spring, Drum
27	SD7051-2	Cord, Dial (1 gm)
28	SYUA104EX	Bottom Board, W/Feet
28 [XA] only		SYUA104XA
29	SKL245-2	Foot, Set
30	SMN1823	Bracket, Fuse PCB
31	SMX435	Cover, AC Outlet
32	SJT347	Clip, Fuse
34	SHS6111-1	Fiber, Cabinet
35	SHR301	Clamper, Lead Wire
36	SMXA65	Cover, Line Capacitor
37	SMCA69-2	Cover, Shield
38 [XA] only	SMX611	Cover, Voltage Adjuster PCB
39 [XA] only	SMX13-1	Cover, AC Outlet

Ref. No.	Part No.	Part Name & Description
SCREWS, NUTS and WASHERS		
N1	S	XTS3+8RFZ
N2	S	XSN3+6SFZ
N3	S	XWA3BFZ
N4	S	XSN3+6S
N5	S	XWA3B
N6	S	SNE4021-1
N7	S	XTBS3+8BFZ1
N8	S	XNS11
N9	S	WD118
N10	$\circ$	SNE2095-2
N10	$\square$	SNE2095-3
N11	$\circ$	XTB3+8BFN
N11	$\square$	XTB3+8BFZ
N12	S	XTB3+16BFZ
N13	S	SHD3X1F-1
N14	S	SHD3X21F-1
N15	S	XTB3+8BFZ
N16	S	XWG3EBFN
N17	S	XWA3BFN
N18	S	XTB3+10BFN
N19	S	XTBS3+8BFZ1
N20	S	XTB3+8BFN
N21	S	XWC3B
N22	S	XSN3+8S
N23	S	XTBS3+8BFZ1
PACKING PARTS		
P1 [EX, EH]	MSA	SPG3791
P1 [XA]	JPN	SPG3793
P1 [XL]	JPN	SPG3795
P2 [EX, EH]	$\circ$	SGK1411
P3		SPS3515
P3 [XL] only		SPS3515-1
P4		SPS3517
P4 [XL] only		SPS3517-1
P5		SPF699
ACCESSORIES		
A1 [EX, EH]		SQF11187
A1 [XA]		SQF11189
A1 [XL]		SQF11193
A2		SSA267
A3 [XA] only	Δ	SJP5213-1
A4 [XA] only	Δ	SJP5215
Instructions Book, Printed Matter		
Instructions Book, Printed Matter		
Instructions Book, Printed Matter		
Cord, FM Indoor Antenna		
Plug Adaptor, Power Source		
Plug Adaptor, Power Source		

- * We have a two production country for this model.
 One of a made by Japan and other one is made by Singapore.
 The made by Singapore unit was we has different parts number.

JPN: Made in Japan

MSA: Made in Singapore

Accessories

