

Service Manual

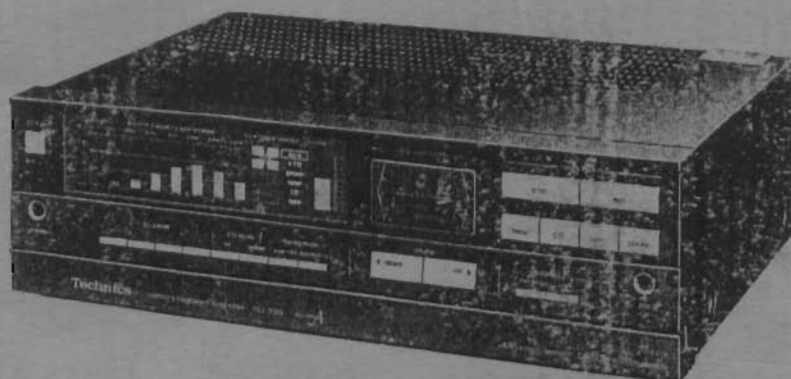
Stereo Integrated Amplifier

Amplifier

SU-X90

Color

(K)...Black Type
(S)...Silver Type



Color	Areas
(K) (S)	[EX].....Continental Europe
(K) (S)	[EF].....France.
(K) (S)	[Ei].....Italy.
(K) (S)	[EK].....United Kingdom.
(K) (S)	[EH].....Holland.
(K) (S)	[EGA].....F.R. Germany.
(K) (S)	[EB].....Belgium.
(K) (S)	[EW].....Switzerland.
(K) (S)	[XA].....Asia, Latin America, Africa, Middle Near East and Oceania.
(K) (S)	[XL].....Australia.

SPECIFICATIONS

(DIN 45 500)

■ AMPLIFIER SECTION

40 Hz~20 kHz continuous power output both channels driven	2 × 75W (8Ω)
1 kHz continuous power output both channels driven	2 × 80W (8Ω)
Total harmonic distortion	
rated power at 40 Hz~20 kHz	0.05% (8Ω)
half power at 1 kHz	0.01% (8Ω)
Damping factor	50 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
TUNER, AUX, CD, VTR	150 mV/22kΩ
TAPE	150 mV/22kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power (8Ω)	
PHONO	71 dB (IHF, A: 72 dB)
TUNER, AUX, TAPE, CD, VTR	86 dB (IHF, A: 89 dB)
Frequency response	
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
TUNER, AUX, TAPE, CD, VTR	10 Hz~60 kHz (-3 dB)
Graphic equalizer/spectrum analyzer frequency	63 Hz, 160 Hz, 400 Hz, 1 kHz, 2.5 kHz, 6.3 kHz, 12.5 kHz
Graphic equalizer range of variation	±10 dB
Spectrum analyzer dynamic range	26 dB

Output voltage

REC OUT	150 mV
Channel balance, AUX 250 Hz~6,300 Hz	±1.0 dB
Channel separation, AUX 1 kHz	55 dB
Headphones output level and impedance	590 mV/330Ω
MAIN	8Ω~16Ω
SURROUND	8Ω~16Ω

■ GENERAL

Power consumption	370W
Power supply	
For United Kingdom and Australia	AC 50 Hz/60 Hz, 240V
For continental Europe	AC 50 Hz/60 Hz, 220V
For others	AC 50 Hz/60 Hz, 110V/127V/220V/240V
Dimensions (W×H×D)	315 × 99 × 246 mm (12-13/32" × 3-29/32" × 9-11/16")
Weight	6.0 kg (13.2 lb.)

Note:

Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

Specifications are subject to change without notice.
Weight and dimensions shown are approximate.

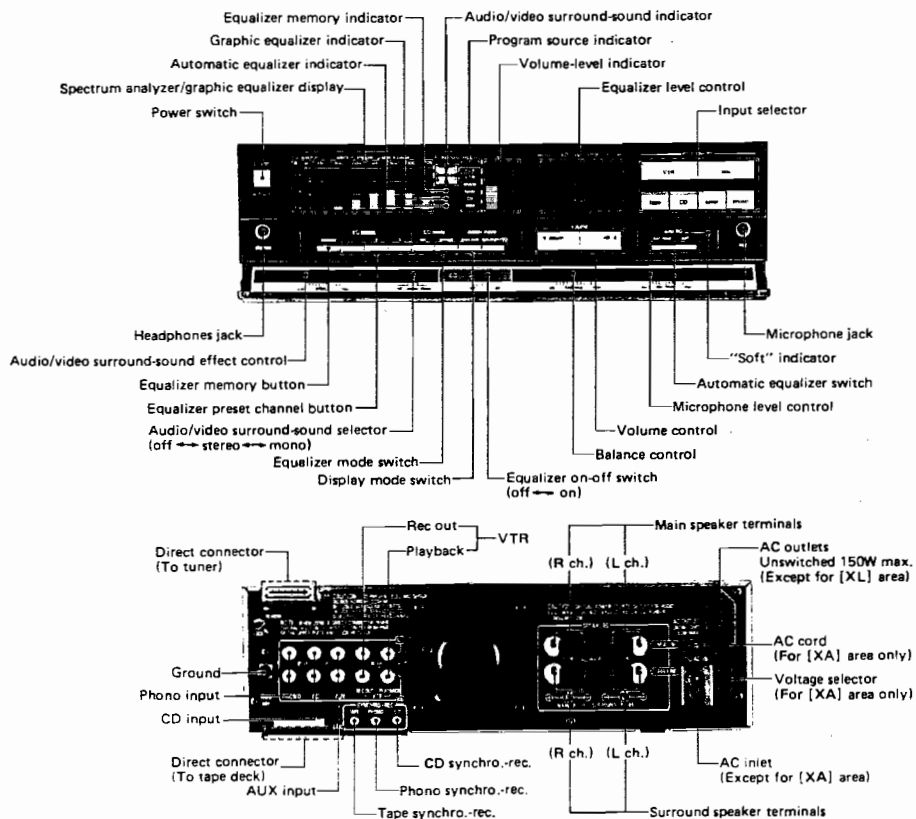
Technics

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

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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 (Separate service manual: Order No. HAD8507186C8-A) and the replacement parts list.
- * [XA] area is provided with voltage selector and AC cord.
- * 240V (50/60 Hz) for Australia and United Kingdom.
- * 220V (50/60 Hz) for Continental Europe.
- * 110V/127V/220V/240V (50/60 Hz) for other areas. ([XA])
- * Phono input capacitance is about 150pF.

HOW TO OPERATE

1 Power: "on" (I-)
The volume level will be automatically set to "1" when the power is switched ON.

2 Select the sound source.
VTR: Press this button to listen to sound from connected to the "VTR" terminals on the rear panel.
aux: Press this button to listen to equipment connected to the auxiliary input terminals ("AUX").
tape: Press this button to listen to tape.
CD: Press this button to listen to a compact disc player.
tuner: Press this button to listen to radio broadcasts.
phono: Press this button to listen to phono discs.

3 Follow the instructions accompanying your equipment for set-up and operation of the selected sound source.

4 Adjust the volume level.
Volume-level indicator
This indicator indicates the volume level.

Microphone (Suitable impedance: 400Ω - 1 kΩ) (option)

Adjust left/right volume balance.

When listening through headphones
 These are used when the surround-sound effect is desired.
 Sound from the speakers will not be heard when headphones are connected to this jack.
Note:
 Set volume control to minimum ("0") position before connecting headphones.

Microphone mixing
 These are used for adjustment of the tone quality.
Connect the microphone.
Begin the sound source (disc, tape, etc.).
Adjust the microphone volume level.

Notes:
 1. Before making connections, be sure to set the microphone volume control to the minimum ("0") position.
 2. Disconnect the microphone when not in use.
 3. If the microphone volume level is increased while the microphone is being used, a "howling" noise may be heard. If so, change the position or direction of the microphone, or reduce the microphone volume level.

PROTECTION CIRCUITRY

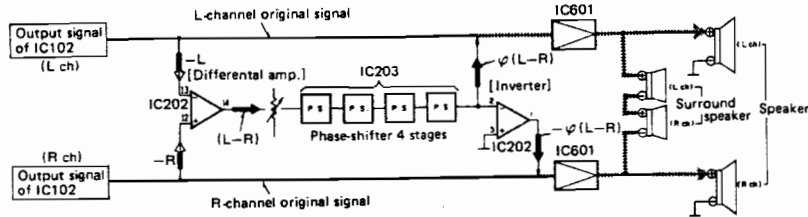
- The protection circuitry may have operated if either of the following conditions is noticed:
- No sound is heard when the power is turned on.
 - Sound stops during a performance.
- The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit is used.

- If this occurs, follow the procedure outlined below:
- Turn off the power.
 - Determine the cause of the problem and correct it
 - Turn on the power once again.

Note:
When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

■ AV SURROUND CIRCUIT

● Block diagram



● Circuit operation with AV surround "stereo" position.

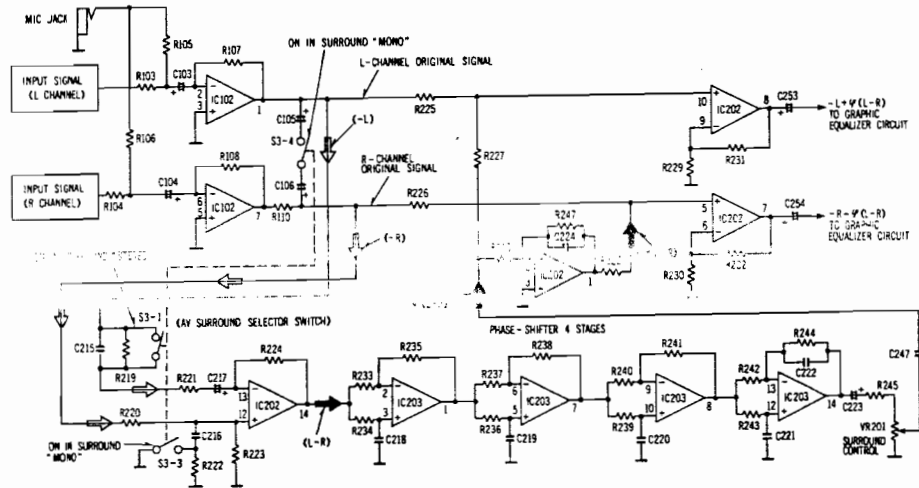
1. Output signal from mixing amp. (IC102) is passed through differential amp. (IC202) to make difference signal of (L-R).
2. Signal of (L-R) passes through the phase shifter of IC203 to turn into phase-deflected signal of φ (L-R). (One OP amp. of this phase shifter circuit is capable of phase shifting by 180 deg. max.)
3. The φ (L-R) signal is applied to the original signal of L channel. The signal component output from L channel speaker is $-\varphi$ (L-R).
4. The φ (L-R) signal is passed through the reverse amp. (IC202) to apply $-\varphi$ (L-R) to the original signal of R channel. The signal component output from R channel speaker is $R + \varphi$ (L-R).
5. The surrounded speaker is series-connected to the output line of R, and the difference signal between both channels is the output.

Difference signal between both channels:

$$\begin{aligned} &= L - \varphi(L-R) - [R + \varphi(L-R)] \\ &= L - R - 2\varphi(L-R) \\ &= (\text{Difference component of original signal}) + (\text{Reverberation effect}). \end{aligned}$$

● Circuit operation with AV surround "mono" position.

1. Output signal from L channel mixing amp. (IC102) is applied to IC202 through the low cut filter of R219 and C215.
2. Output signal from R channel mixing amp. (IC102) is applied to IC202 through the high cut filter of R222 and C216.
3. False stereo signal thus produced is taken out of IC202 as (L-R) signal.
4. After that, the signal is processed the same as for the above-mentioned "stereo" position.



■ BEFORE REPAIR AND ADJUSTMENT

- (1) Turn off the power supply. Using a 10 Ω , 5W resistor, short-circuit both ends of power supply capacitors (C801, 802) in order to discharge the voltage.
- (2) Before turning the power supply on, after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current at 60 Hz/50 Hz in no-signal mode is shown with respect to supply voltage 110V/127V/220V/240V.

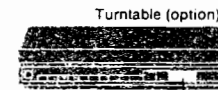
Power supply voltage		AC 110V	AC 127V	AC 220V	AC 240V
Consumed current	50 Hz	415 ~ 810mA	400 ~ 780mA	210 ~ 400mA	190 ~ 380mA
	60 Hz	400 ~ 780mA	390 ~ 770mA	200 ~ 390mA	180 ~ 365mA

■ DIRECT OPERATION

The direct operation function is a convenient feature which makes it possible to automatically switch the amplifier's input selectors from any of the various connected components (turntable, tuner, tape deck, compact disc player).

1. This feature can only be used for Technics tuners and tape decks which have direct connectors.
2. This feature can only be used for Technics turntables and compact disc players which have a synchro-recording terminal.

■ To listen to phono discs



• Press the "start" button.

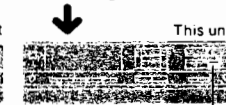


The "phono" button is selected automatically.

■ To listen to radio broadcasts

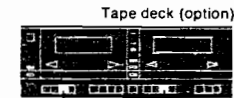


• Press one of the preset-tuning buttons.

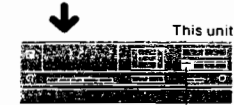


The "tuner" button is selected automatically.

■ To listen to tapes



• Press the "play" button.



The "tape" button is selected automatically.

■ To listen to compact-discs



• Press the "play" button.



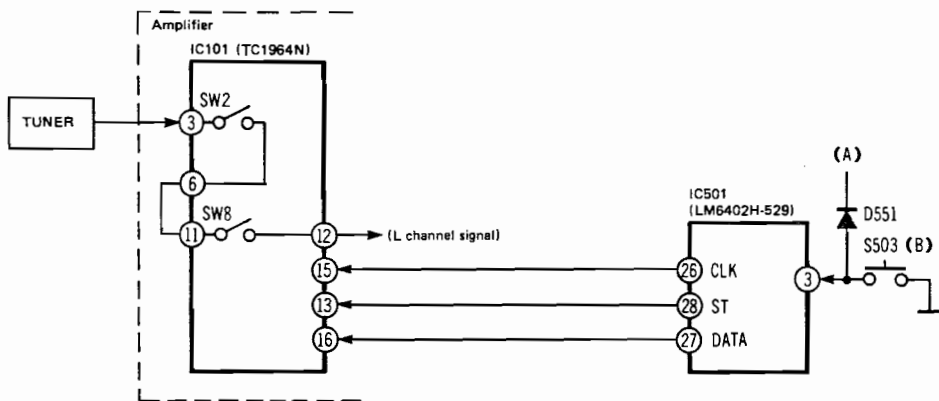
The "CD" button is selected automatically.

Notes:

1. Do not switch the tuner on by using a disc or tape, or while tape recording. This operation will cause the "tuner" input selector to be automatically selected.
2. The synchro-recording connection cord must be connected from the synchro-recording terminal.
3. Do not switch to another sound source during recording, because to do so will cause the recorded sound to be interrupted.

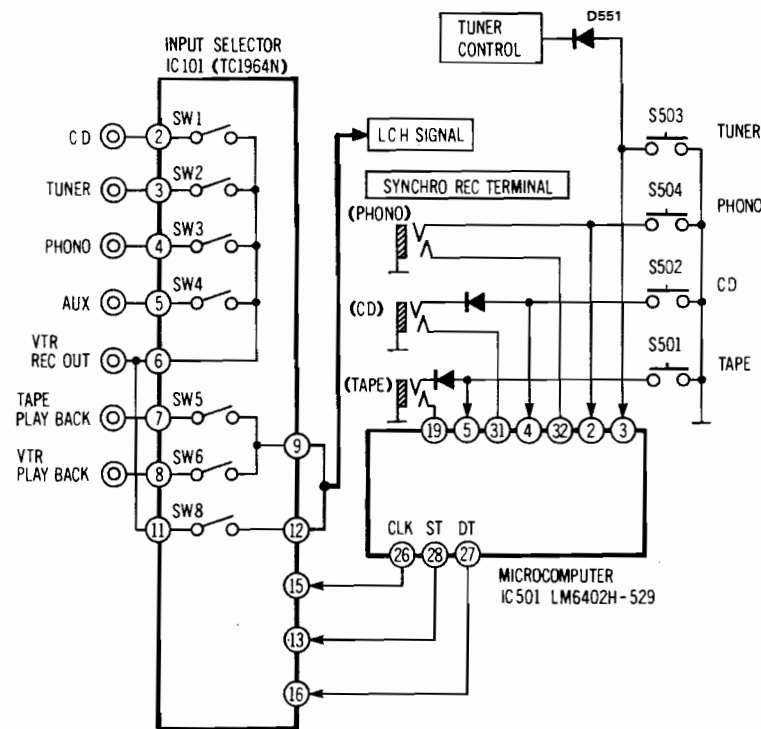
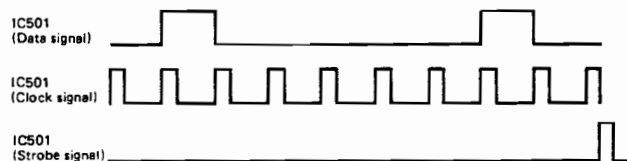
■ CIRCUIT OPERATION OF ELECTRONIC SELECTOR

- For input selector, select the input of amplifier by electronic selector of IC101.



- For example, the output signal (L-ch.) of tuner is connected to pin 3 of IC101. So, when both SW2 and SW8 are ON in the circuit of IC101, then tuner signal can be taken out of pin 12.
- To turn SW2 and SW8 ON, command signal must be given to pins 15, 13, 16. Each pin is input terminal as follows:
Pin 13 is *strobe signal input terminal (ST).
Pin 15 is clock signal input terminal (CLK).
Pin 16 is data signal input terminal (DATA).
- Input select command signal of IC101 is controlled with the signal from IC501 (LM6402H).
*Strobe signal is a pulse signal that specifies the execution time for a certain operation.
- IC501 is an IC that controls the input selector.
- IC501 pin 3 is the input terminal for input select signal.
When input selector S503 (tuner) is turned ON, "L" is input to terminal 3. Therefore, signals to control IC101 are output from terminals 26, 27, 28.
(A) (Control signal from tuner)
(B) (Tuner)
- As "direct operation function", control signal "L" level is applied to the minus (-) side of D551 when the preset tuning button on the tuner side is pressed. So, the input is changed over for direct operation as the input is switched by operation on the tuner side without turning ON S503 of the amplifier.
- The output signals at "tuner positions" of IC501 pins 26, 27, 28 are shown.
- Signal data changes depending on each position.

Inside switch of IC101	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Inside switch and positions	CD	TUNER	PHONO	AUX	TAPE	VTR		"1"



■ REPAIR CHECK PROCEDURE

1. No "direct operation" in any positions.

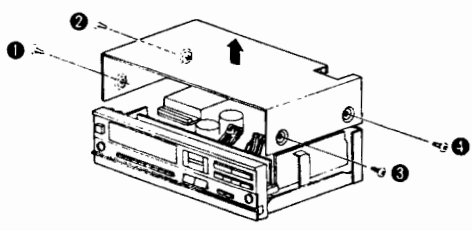
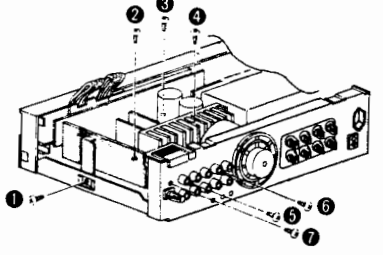
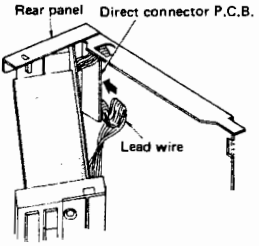
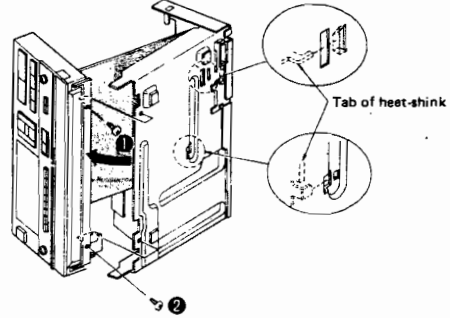
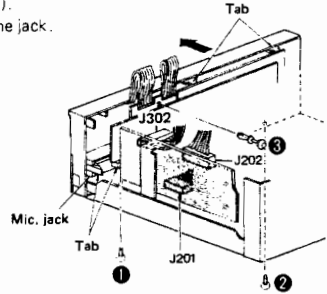
- Step 1**
- Check the output signal of terminals 26, 27, 28 of IC501.
→NG → IC501 is defective.
- Step 2**
- If it is OK, check the connection up to terminals 13, 15, 16 of IC101.
↓
If it is OK, check IC101.

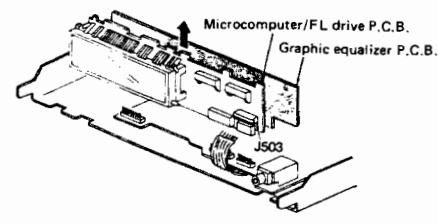
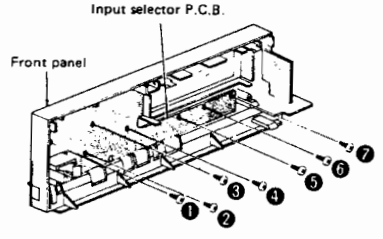
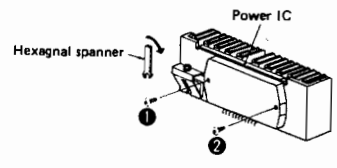
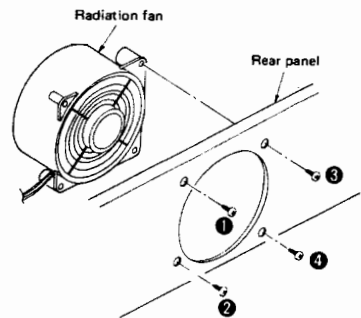
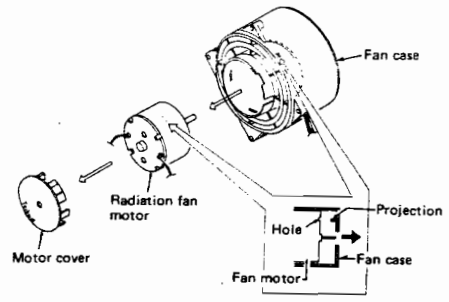
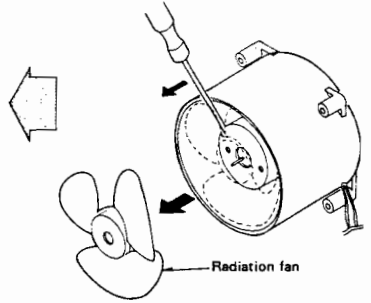
2. No "direct operation" in specific positions.

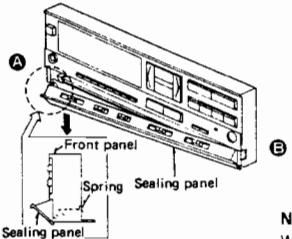
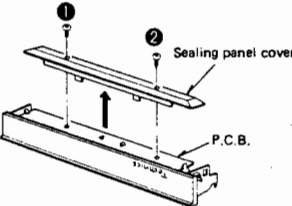
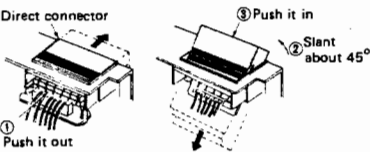
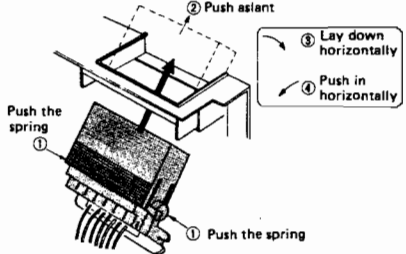
For example, "direct operation" in "tuner" position is defective.

- Step 1**
- Turn ON the input switch (S503) of amplifier to check if it works.
→ In case of OK, check D551 and tuner control signal level ("L").
- Step 2**
- In case of NG, check IC501 pin 3 and pins 26, 27, 28.
- Step 3**
- Check the input terminals 13, 15, 16 of IC101.
- Step 4**
- Check the output signal terminal of tuner.
- Step 5**
- Check for conduction of terminals 3, 6, 11 of IC101.

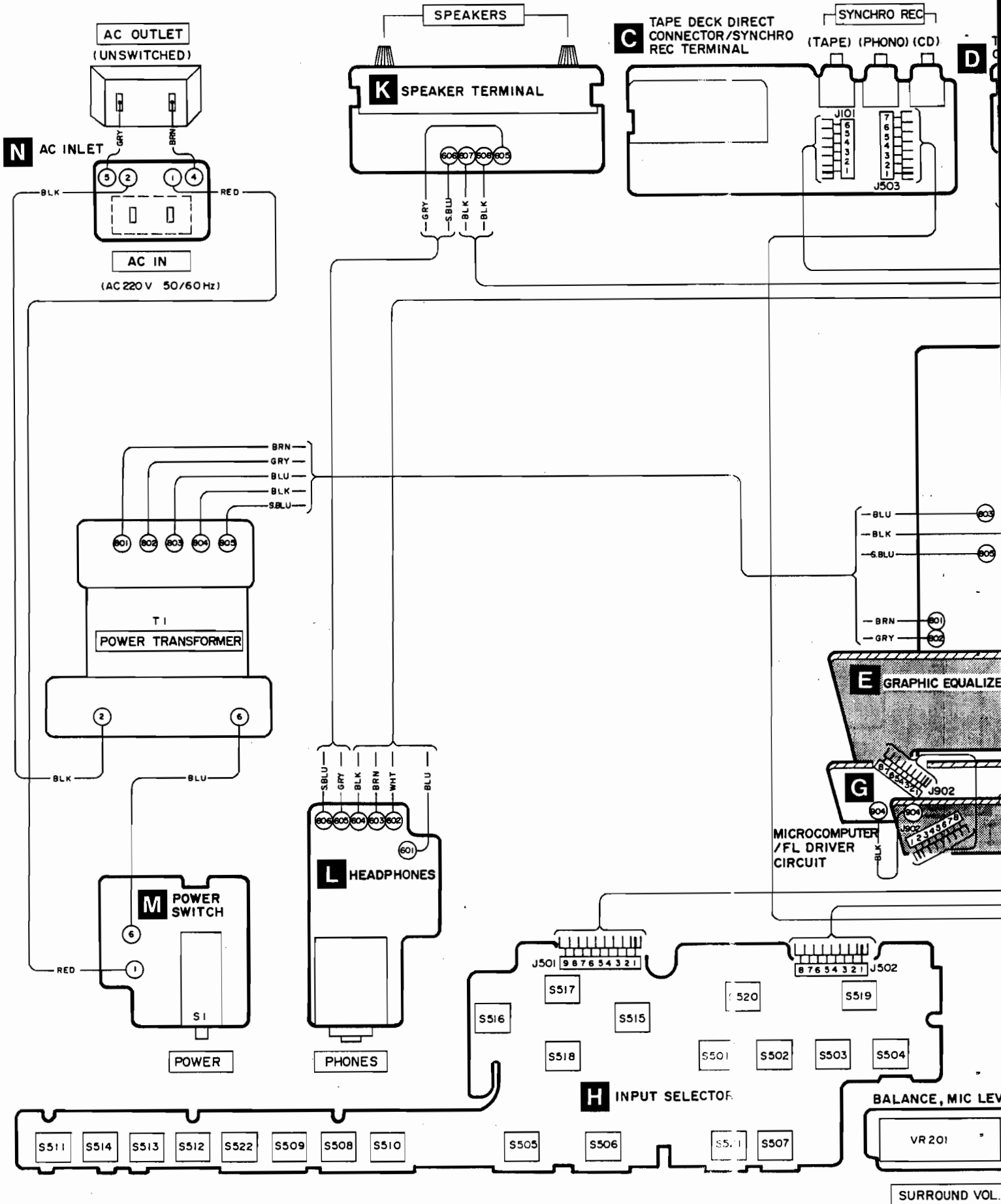
■ DISASSEMBLY INSTRUCTIONS

Ref. No. 1	How to remove the cabinet	Ref. No. 2	How to remove the main P.C.B.
Procedure 1	1. Remove the 4 screws (① ~ ④).	Procedure 1 → 2	1. Remove the 7 screws (① ~ ⑦).
			
<ul style="list-style-type: none"> When installing the main P.C.B., push the lead wires in the space under the direct connector board. 		<p>2. Remove the 2 screws (①, ②).</p> 	
Ref. No. 3	How to remove the front panel		
Procedure 1 → 3	<p>1. Remove the 2 screws (①, ②) and the 1 lock pin (③).</p> <p>2. Release the 2 tabs from the front panel and microphone jack.</p> <p>3. Remove the 3 connectors (J201, J202, J302).</p>		
 <p>Note: When removing the connector, be sure to hold the connector. Holding the lead wires may cause them to be disconnected.</p>			

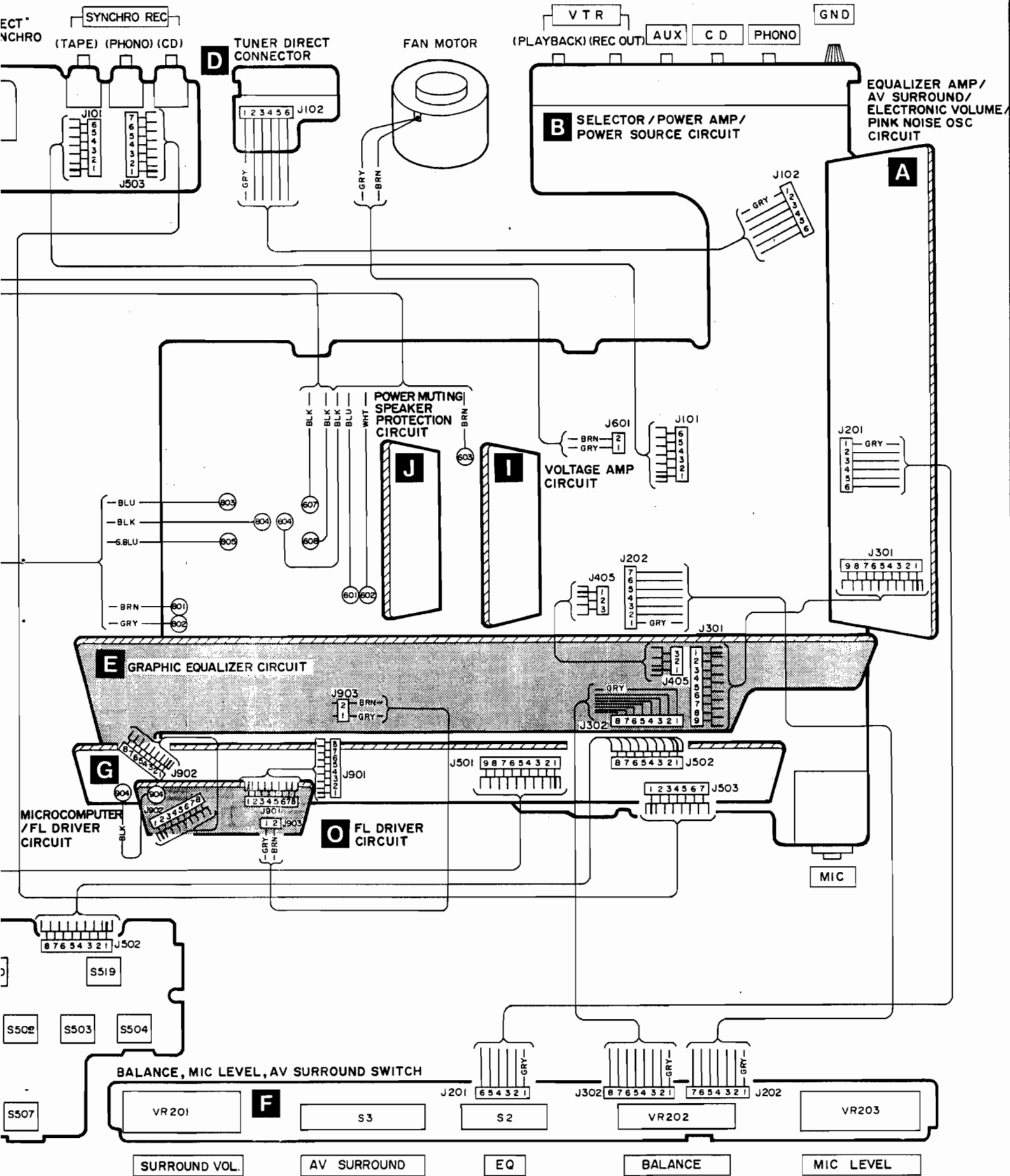
Ref. No. 4	How to remove the microcomputer/FL drive P.C.B. and graphic equalizer P.C.B.	Ref. No. 5	How to remove the input selector P.C.B.
Procedure 1 → 3 → 4	<p>1. Remove the 1 lead wire (J503).</p> <p>2. Remove the P.C.B. in the direction of the arrow.</p>	Procedure 1 → 3 → 5	1. Remove the 7 screws (① ~ ⑦).
			
Ref. No. 6	How to remove the power IC	Ref. No. 7	How to remove the fan motor
Procedure 1 → 2 → 6	<p>1. Unsolder the power IC.</p> <p>2. Remove the 2 screws (①, ②).</p> <ul style="list-style-type: none"> When mounting the power amplifier IC, apply silicon compound (SZZ0L15) to the rear of the power amplifier IC. 	Procedure 1 → 2 → 7	1. Remove the 4 screws (① ~ ④).
			
<p>3. Remove the motor cover. Then the fan motor can be removed.</p>  <ul style="list-style-type: none"> When fitting the fan motor, match the projection of fan cause with the hole in the fan motor. 		<p>2. Remove the fan by use of a screwdriver.</p> 	

<p>Ref. No. 8</p>	<p>How to remove the sealing panel and P.C.B.</p>	
<p>Procedure 8</p>	<p>1. Remove the sealing panel and press it down at side A. 2. Remove the 2 screws (1, 2) to remove the P.C.B.</p>	
		<p>Note: When fitting the sealing panel, remove the sealing panel cover, and first set the B side and make sure the spring is in contact with the sealing panel, then set the A side.</p>
<p>Ref. No. 9</p>	<p>How to remove the direct connector</p>	
<p>Procedure 1 → 9</p>	<p>1. Remove the direct connector as shown in [Fig. A]. 2. When fitting, do it as shown in [Fig. B].</p>	
 <p>[Fig. A]</p>	 <p>[Fig. B]</p>	

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

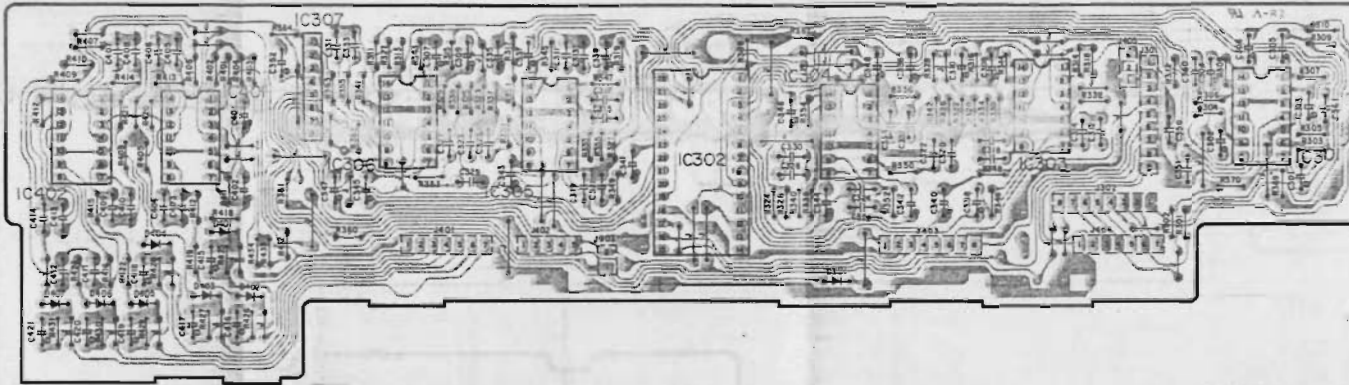


SU-X90 SU-X90



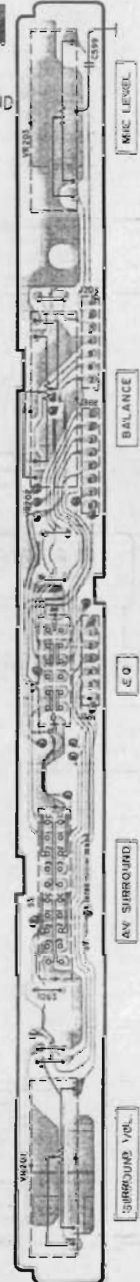
PRINTED CIRCUIT BOARDS

E GRAPHIC EQUALIZER CIRCUIT

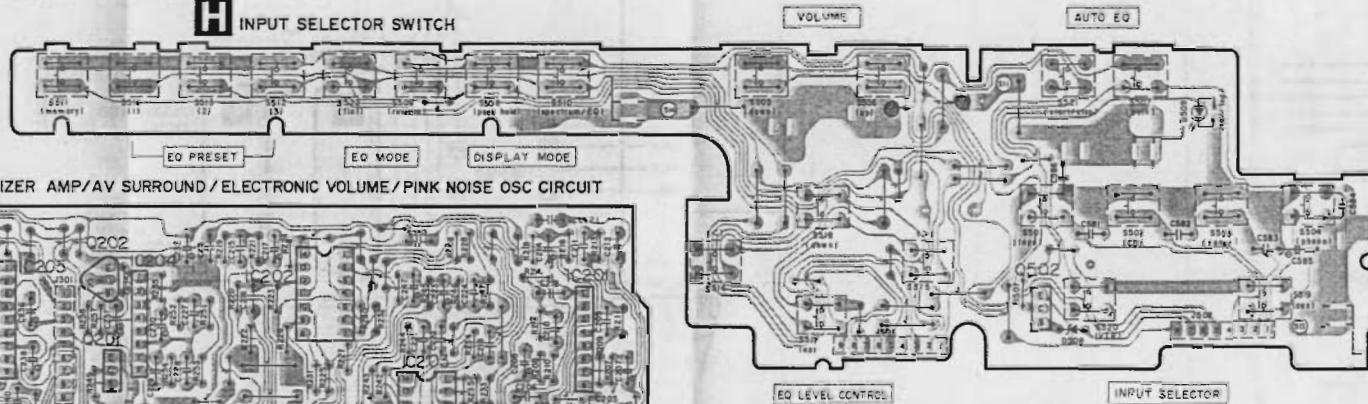


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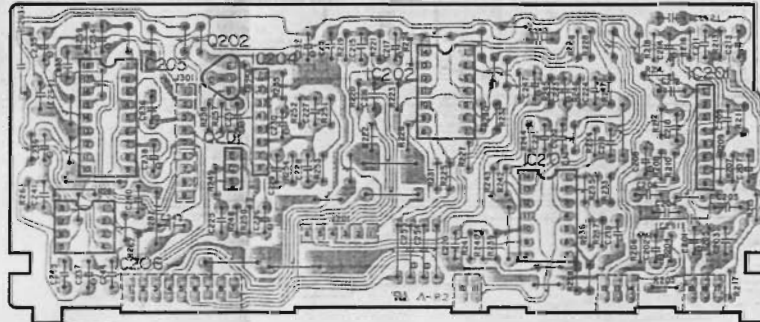
BALANCE, MIC LEVEL, AV SURROUND SWITCH



H INPUT SELECTOR SWITCH

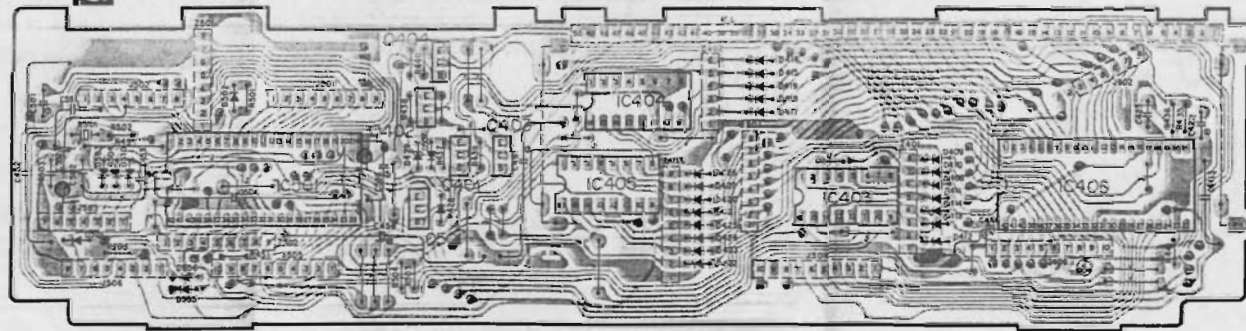


A EQUALIZER AMP/AV SURROUND/ELECTRONIC VOLUME/PINK NOISE OSC CIRCUIT

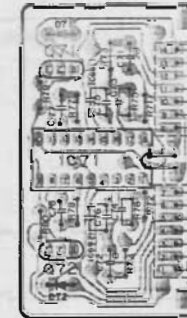


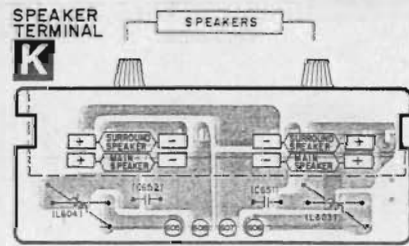
() indicates ref. No. ora for (ESA) areas.

G MICROCOMPUTER/FL DRIVER CIRCUIT

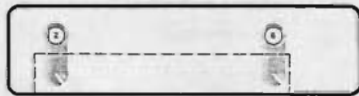


I VOLTAGE AMP CIRCUIT





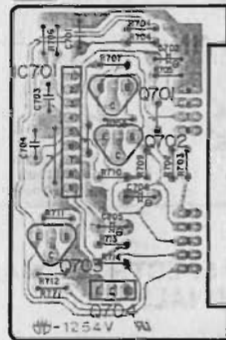
() indicates ref. No. are for (EGA) areas.



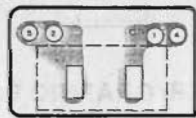
F1 POWER TRANSFORMER



J POWER MUTING, SPEAKER PROTECTION CIRCUIT

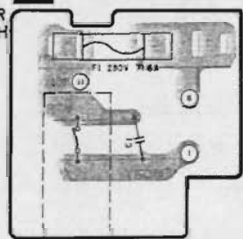


N AC INLET

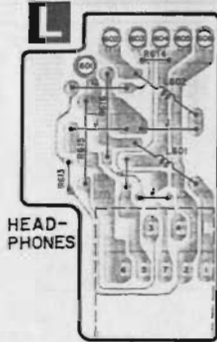


AC IN
1AC 220V 50/60Hz

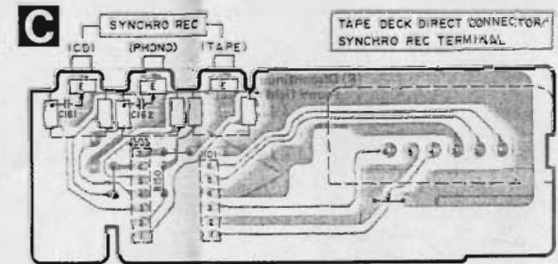
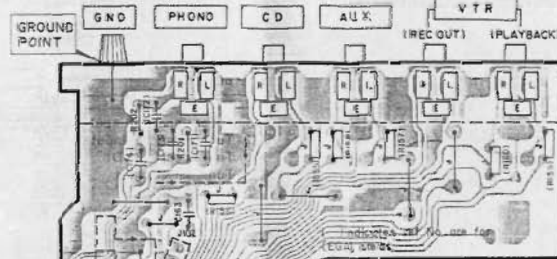
M POWER SWITCH



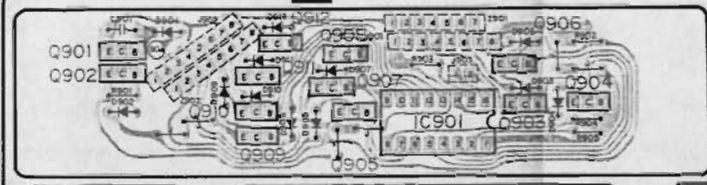
POWER



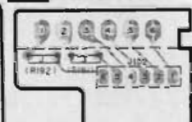
PHONES



O FL DRIVER CIRCUIT



D TUNER DIRECT CONNECTOR



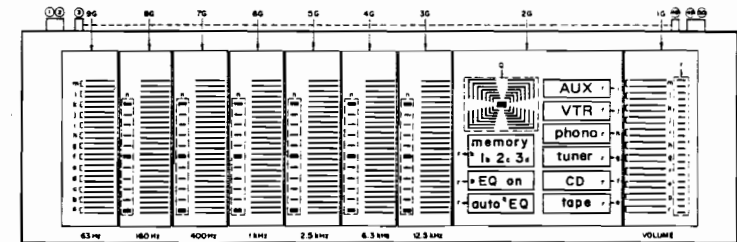
() indicates ref. No. are for (EGA) areas.

B SELECTOR/POWER AMP/POWER SOURCE CIRCUIT

■ TERMINAL GUIDE OF TRANSISTORS, IC'S AND DIODES

<table border="1"> <tr><td>AN7062</td><td rowspan="2">18 pin</td></tr> <tr><td>MN6632</td></tr> <tr><td>TC9164N</td><td rowspan="2">28 pin</td></tr> <tr><td>LC7520</td></tr> <tr><td>AN6552F</td><td rowspan="5">8 pin</td></tr> <tr><td>AN6553F</td></tr> <tr><td>SVINJM2043DD</td></tr> <tr><td>AN6554F</td></tr> <tr><td>AN6554N</td></tr> <tr><td>MN4051B</td><td rowspan="4">14 pin</td></tr> <tr><td>MN4021B</td></tr> <tr><td>SVITA7612AP</td></tr> <tr><td>LC7565</td></tr> <tr><td>LM6402H-529</td><td>42 pin</td></tr> </table>	AN7062	18 pin	MN6632	TC9164N	28 pin	LC7520	AN6552F	8 pin	AN6553F	SVINJM2043DD	AN6554F	AN6554N	MN4051B	14 pin	MN4021B	SVITA7612AP	LC7565	LM6402H-529	42 pin		DTA114ESTP.	DTC114ESTP
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<table border="1"> <tr><td>UN1211, UN4211</td><td rowspan="2"> </td> <td>UN1111</td><td rowspan="2"> </td> <td>SVDPR5533K</td><td rowspan="2"> </td> <td>M5218L</td><td rowspan="2"> </td> </tr> <tr><td>SV12004A</td><td>SVITA7317P</td><td>SVDS3V20</td><td>2SA1123, 2SC1815 2SA1015, 2SA921 2SA992, 2SA684NC 2SC1845</td></tr> </table>	UN1211, UN4211		UN1111		SVDPR5533K		M5218L		SV12004A	SVITA7317P	SVDS3V20	2SA1123, 2SC1815 2SA1015, 2SA921 2SA992, 2SA684NC 2SC1845	<table border="1"> <tr><td>2SD1265, 2S8941</td><td>2SK301</td><td>MA4030M, MA4082M MA4240M, MA4150M MA4300M, MA4062M MA4075M</td><td>OA90, MA162, MA165</td></tr> </table>	2SD1265, 2S8941	2SK301	MA4030M, MA4082M MA4240M, MA4150M MA4300M, MA4062M MA4075M	OA90, MA162, MA165					
UN1211, UN4211			UN1111				SVDPR5533K			M5218L												
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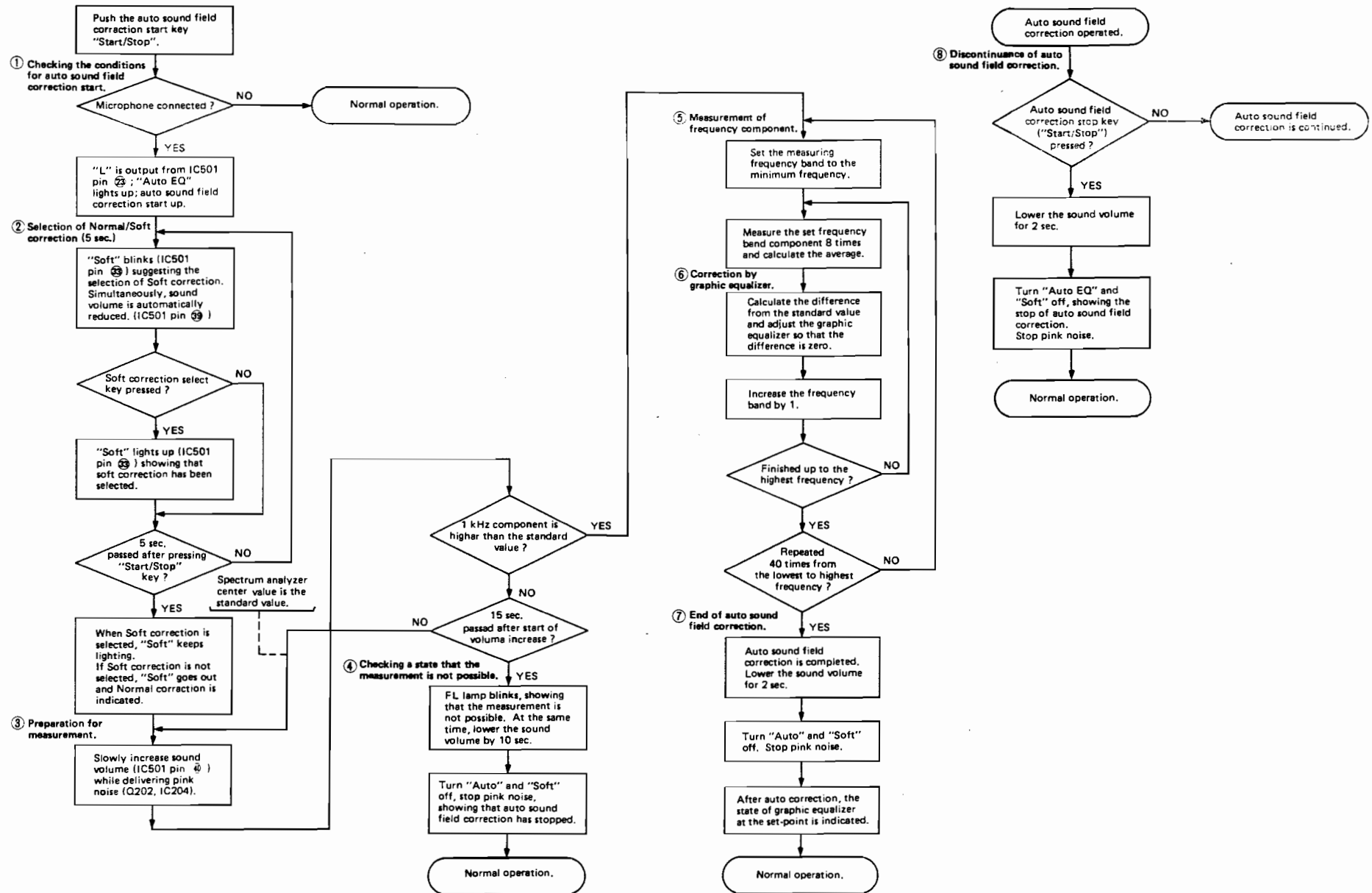
■ NAME OF SPECTRUM ANALYZER/GRAPHIC EQUALIZER INDICATION (FL) TERMINALS



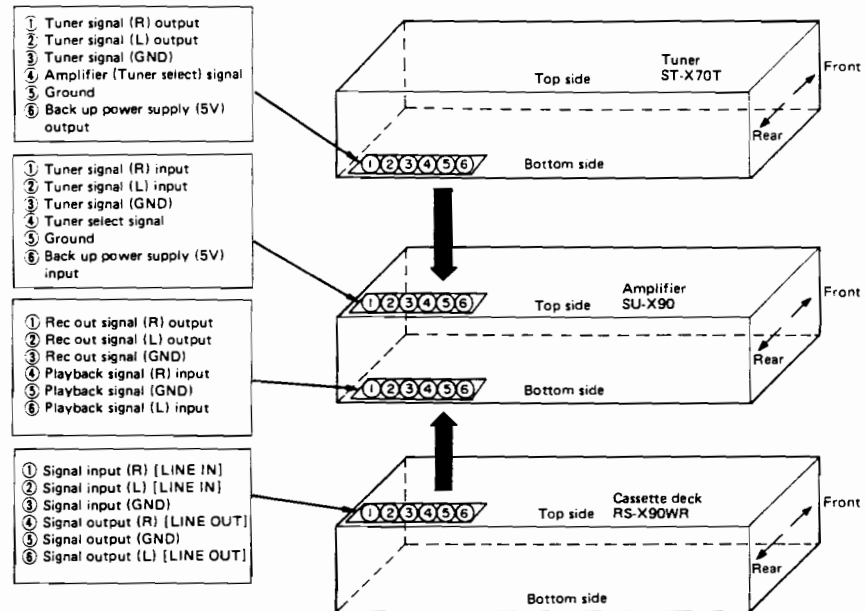
Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50										
Terminal name	F	F	NP	G	G	NP	G	G	NP	G	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G	13G	14G	15G	16G	17G	18G	19G	20G	21G	22G	23G	24G	25G	26G	27G	28G	29G	30G	31G	32G	33G	34G	35G	36G	37G	38G	39G	40G	41G	42G	43G	44G	45G	46G	47G	48G	49G	50G

F : Filament a ~ r : Segment terminal
 NP : Terminal not used Q : Surround display segment terminal
 1G ~ 9G : Grid terminal

■ AUTOMATIC SOUND FIELD CORRECTION FLOW CHART



FUNCTION OF DIRECT CONNECTOR



FUNCTION OF TERMINAL (IC501) Input selector/automatic sound field correction control IC.

Pin No.	Mark	Description of terminals
1	EX. OSC	Ext. oscillator resistor, capacitor, ceramic oscillator (400 kHz) connection terminals.
42		
2	PHONO	Input select signal input terminal. "L" is input when input selector is set to "phono".
3	TUNER	Input select signal input terminal. "L" is input when input selector is set to "tuner".
4	CD	Input select signal input terminal. "L" is input when input selector is set to "CD".
5	TAPE	Input select signal input terminal. "L" is input when input selector is set to "tape".
6	NC	Not used in this unit.
7	RESET	Reset signal input terminal. Input terminal to reset at start of micro-computer.
8	K0	Input terminals of key return signals from external key matrix.
9	K1	
10	K2	
11	K3	
12	S0	
13	S1	Output terminals of key return signals from external key matrix.
14	S2	
15	S3	

Key Matrix				
	K0	K1	K2	K3
S3	AUX	VTR	Start/Stop	FLAT/BACK
S2	FREQ. SHIFT UP	FREQ. SHIFT DWN	GEQ. UP	GEQ. DWN
S1	MEMORY	M1	M2	M3
S0	SOFT ON	PEAK HOLD	REVERSE	SPEANA/GEQ.

Pin No.	Mark	Description of terminals
16	DIG SEL A	FL grid select signal output terminal for graphic equalizer auto sound field correction.
17	DIG SEL B	
18	DIG SEL C	
19	SYNCHRO REC	Synchro record signal output terminal. Synchro record signal "L" is output.
20	TEST	IC test terminal. Connected to ground.
21	V _{SS}	Connected to ground.
22	MUTE IN	Input terminal for amplifier protection circuit operation detection. "L" is input when protection circuit is operated.
23	PINK ON	Output terminal of pink noise ON/OFF select signal during graphic equalizer auto sound field correction.
24	W DECK	Usually "H", "L" with Tape switch ON.
25	GEQ. SCALE	Output terminal for indication of graphic equalizer scale when FL is graphic equalizer.
26	CL	Output terminals for analog switch control strobe, data, clock signal output and graphic equalizer IC (IC302), FL driver IC (IC406) control data, clock signal.
27	DT	
28	ST	
29	MUTE	Muting signal output terminal.
30	POWER	Power "ON" detection terminal.
31	CD SYNCHRO	CD synchro record input terminal. "L" is input when CD is started.
32	PH SYNCHRO	Player synchro record input terminal. "L" is input when player is started.
33	SOFT ON	Output terminal for Normal/Soft selection during auto sound field correction. "H" is output in Normal mode, and "L" in Soft mode.
34	MIC	Microphone connection detection terminal used in graphic equalizer auto sound field correction. "L" is input when graphic equalizer switch (S2) is turned ON and microphone is connected.
35	LATCH	Graphic equalizer auto sound field correction terminals.
36	CLK	
37	DATA	
38	S/P	
39	VOL. DOWN	Electronic volume control terminal.
40	VOL. UP	
41	VDD	Power supply terminal

■ FUNCTION OF TERMINAL (IC302) Graphic equalizer control IC

Pin No.	Mark	Description of terminals
1 (28)	IN1	Audio signal input terminal.
2 (27)	IN2	Audio signal input terminal.
3 (20) 9 (26)	f7 f1	Band filter connection terminals.
10	VDD	Power supply terminal. (Audio signal power)
11	S	Not used in this unit.
12	Vref	Power supply terminal. (Logic drive power)

Pin No.	Mark	Description of terminals
13	Vcc	Connected to ground.
14	TEST 1	IC test terminal.
15	TEST 2	IC test terminal.
16	CLK	Input terminal for clock signal from micro-computer (IC501).
17	DI	Input terminal for data signal from micro-computer (IC501).
18	V _{SS}	Connected to ground.
19	VEE	Power supply terminal. (Audio signal power)

() The parenthesized are the terminal No. of L channel.

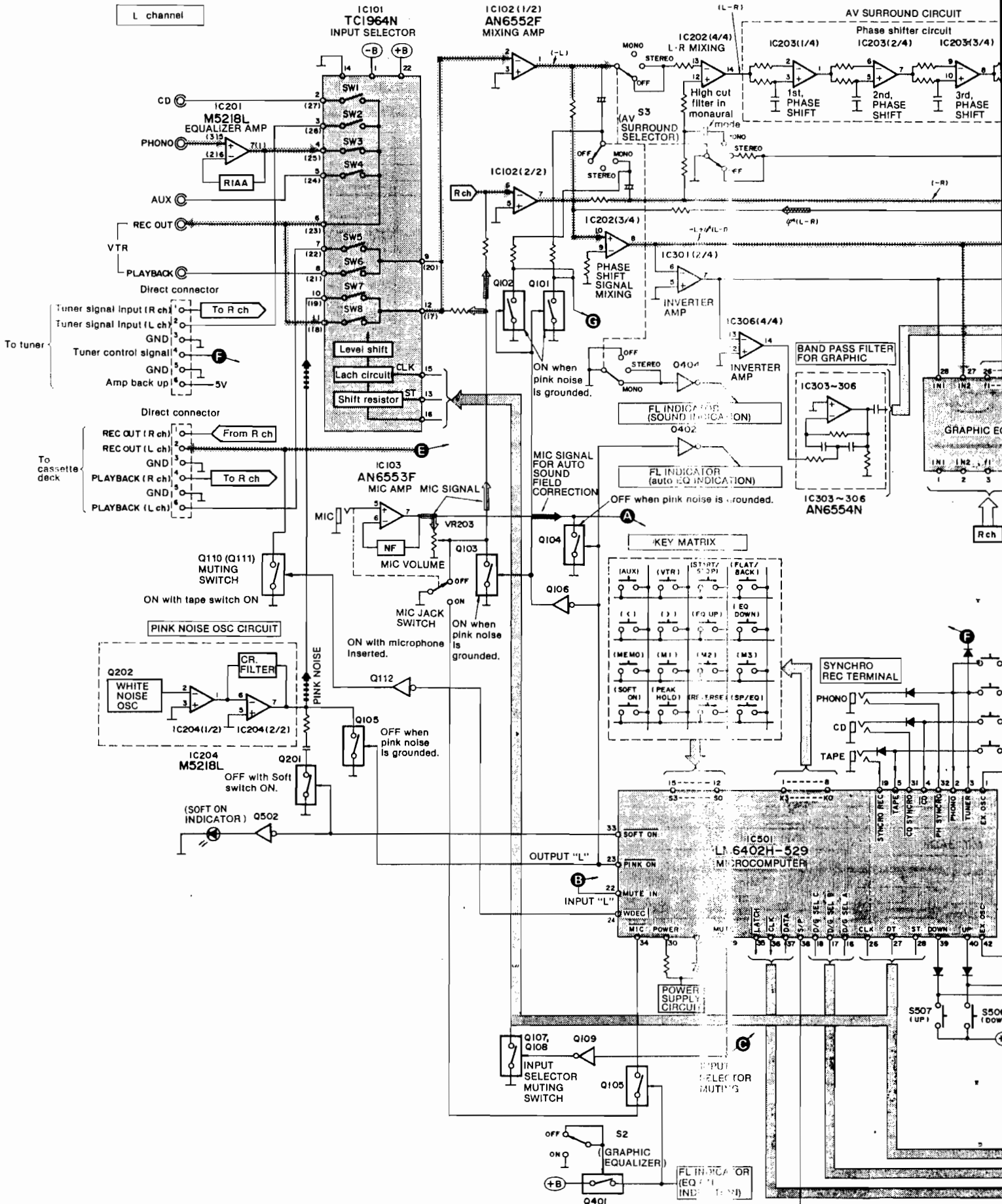
■ FUNCTION OF TERMINAL (IC406) FL control/drive IC

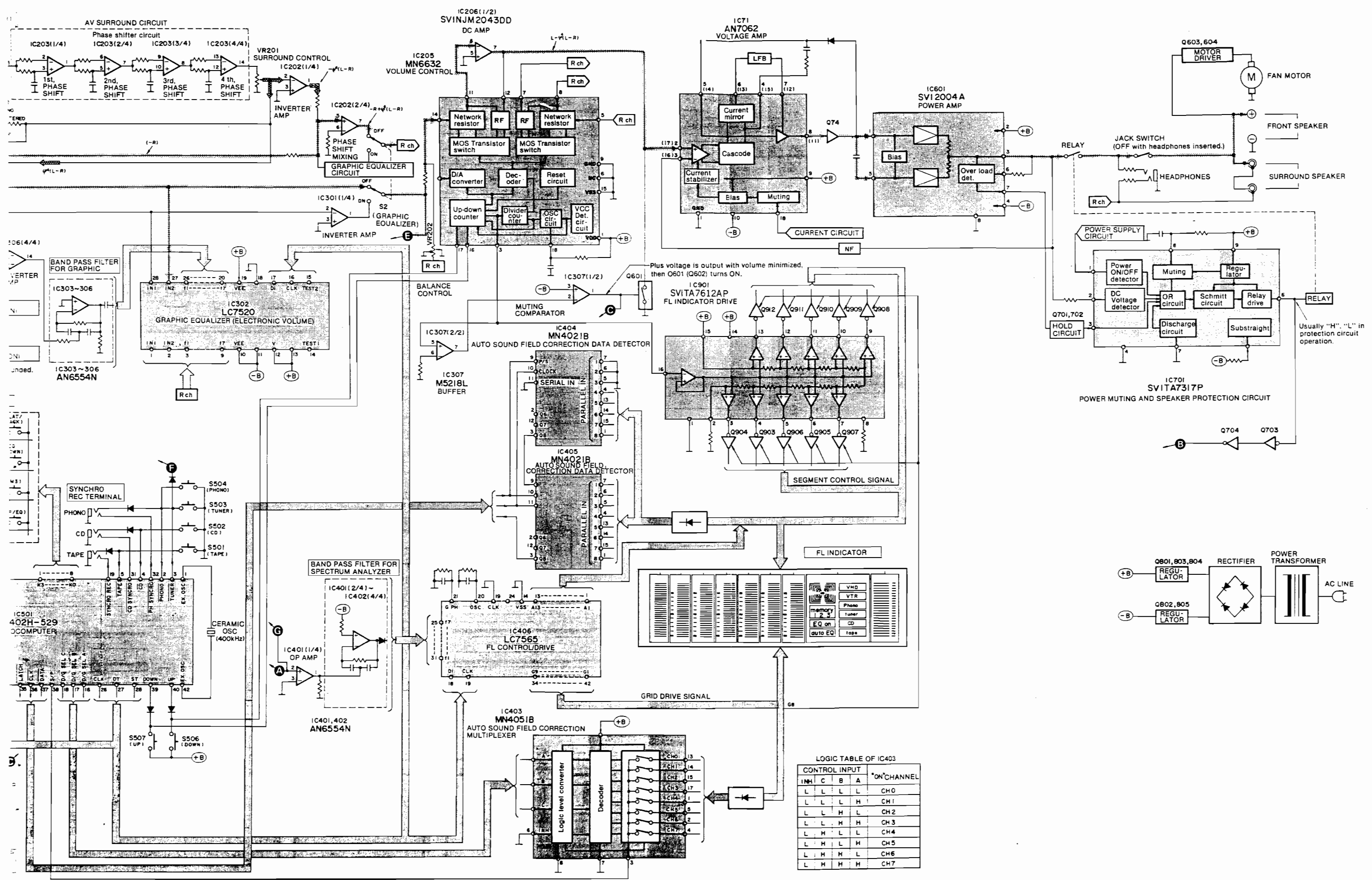
Pin No.	Mark	Description of terminals
1	TEST 2	IC test terminal.
2 14	A1 A13	Segment drive output terminals.
15	S1	Selection terminals for multiple chips.
16	S2	
17	DI	Input terminal for data signal from micro-computer (IC501).
18	CLK	Input terminal for clock signal from micro-computer (IC501).
19	V _{SS}	Grounding terminal.
20	OSC	Ext. resonance circuit terminal for internal clock oscillation. Resonance circuit for CR oscillation is connected.
21	G. PH	C.R. connection terminal for peak hold reset time setting of graphic equalizer spectrum analyzer indications.
22	T. PH	C.R. connection terminal for peak hold reset time setting of total indication.
23	TEST 1	IC test terminal.
24	T	Audio signal rectifying voltage input terminals.
25 31	f7 f1	
32	DIM	
33 41	G9 G1	Grid drive output terminals.
42	VDD	Power supply terminal.

■ SWITCH OF OPERATION (IC101)

MODE	SWITCH							
	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
PHONO	—	—	ON	—	—	—	—	ON
TUNER	—	ON	—	—	—	—	—	ON
CD	ON	—	—	—	—	—	—	ON
AUX	—	—	—	ON	—	—	—	ON
VTR	—	—	—	—	—	ON	—	—
TAPE	—	—	—	—	ON	—	—	—

BLOCK DIAGRAM





SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

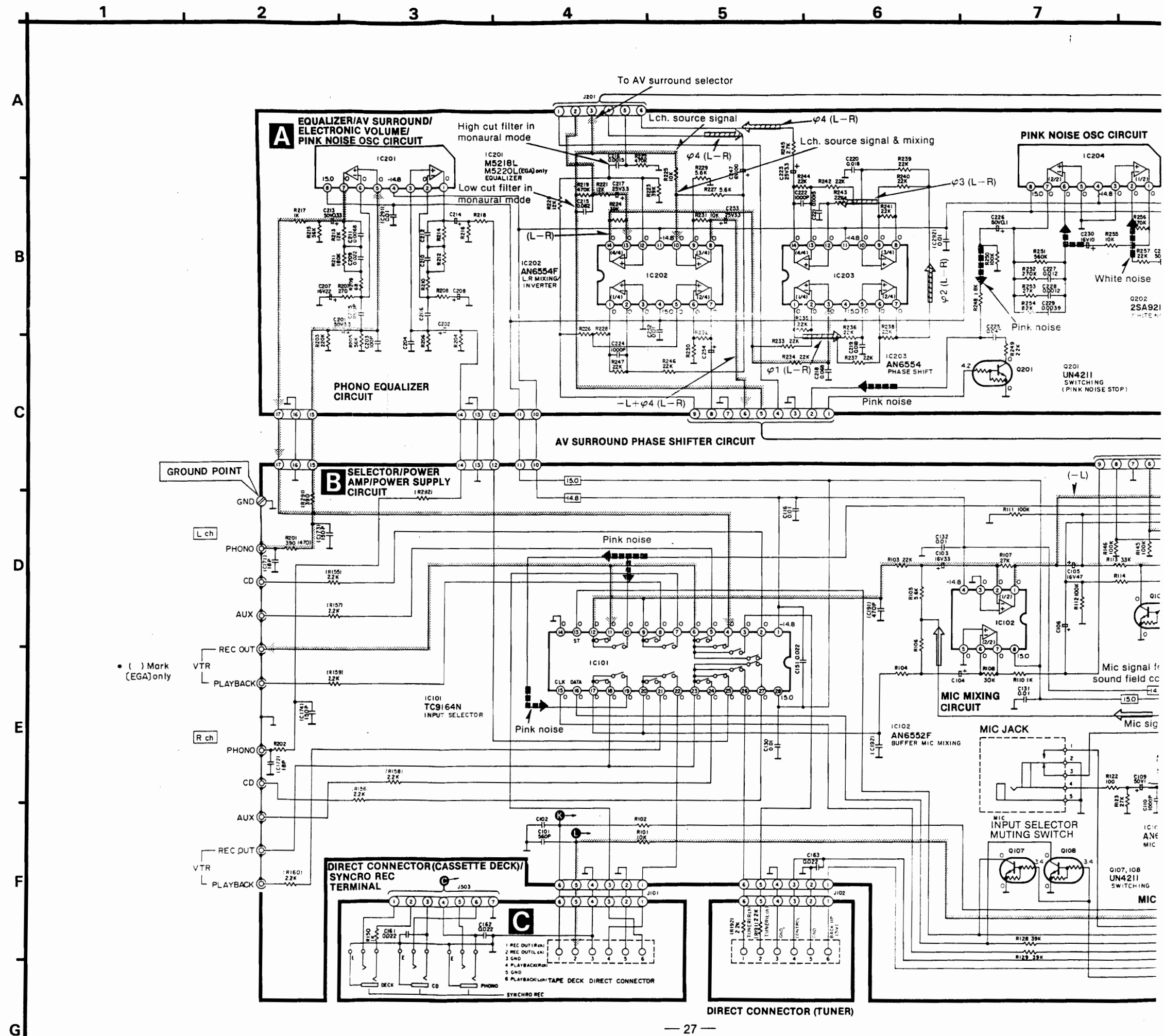
The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with a star mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

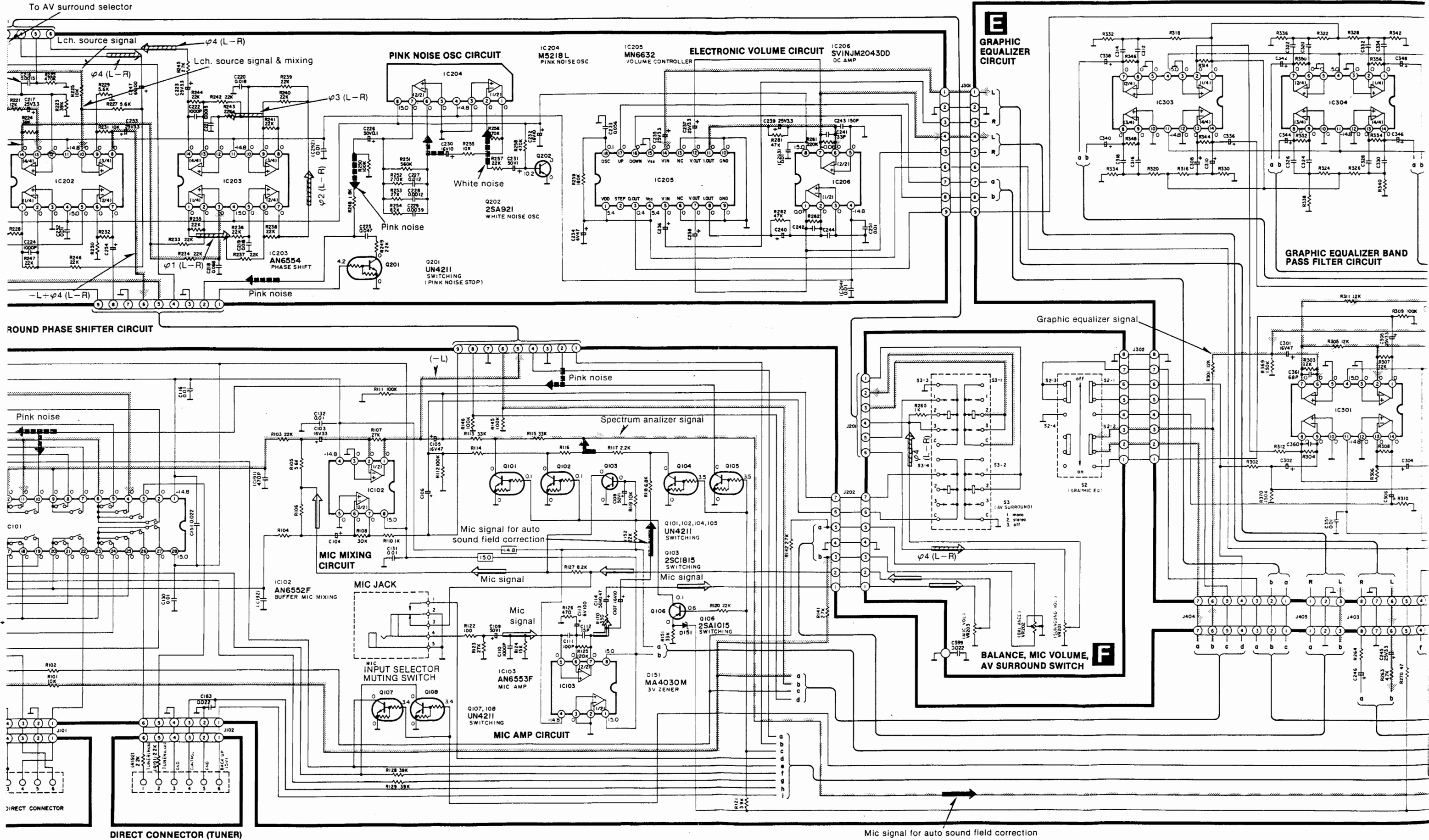
Note :

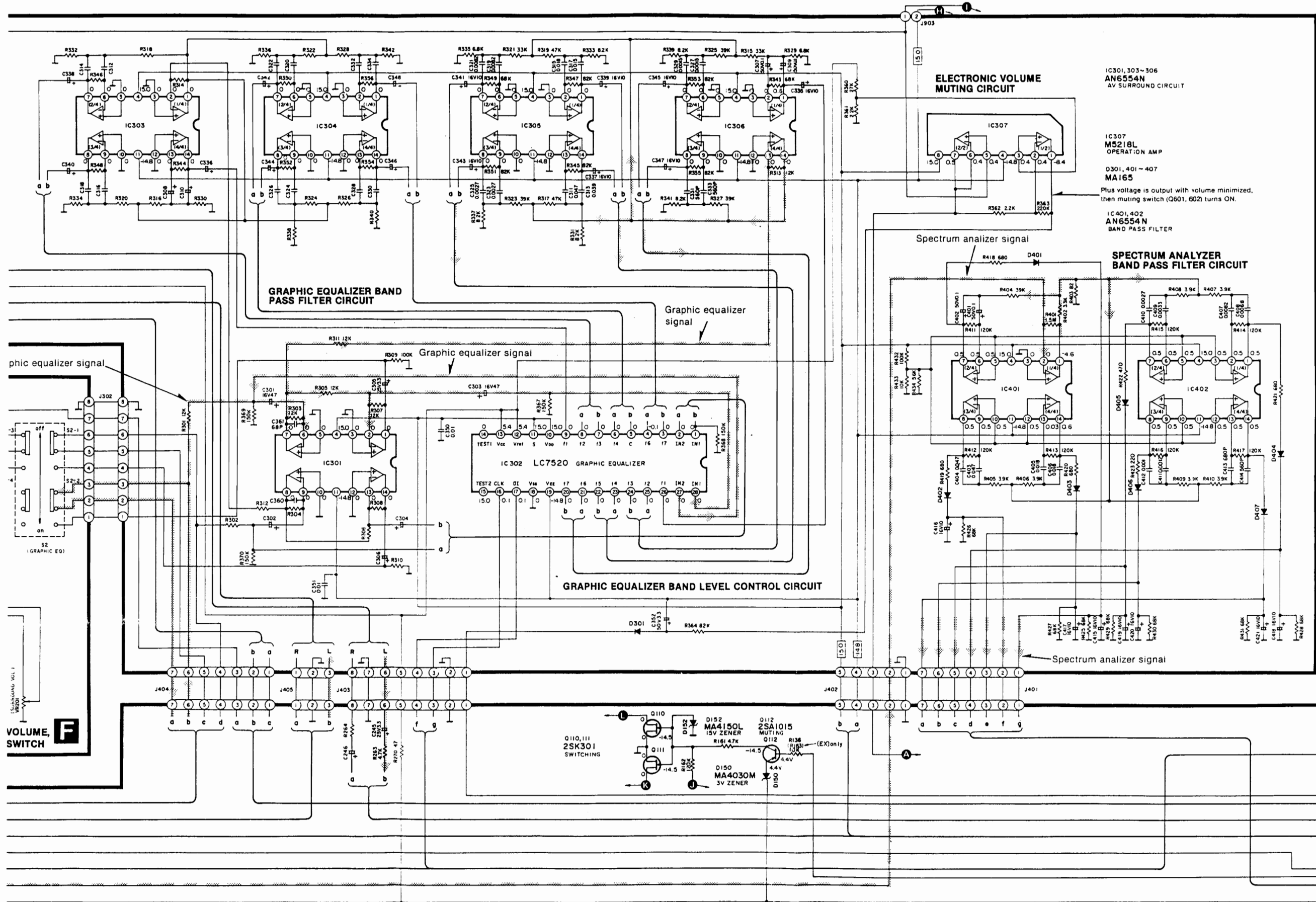
1. S1 : Power switch in "on" position.
2. S2 : Equalizer ON/OFF switch in "off" position.
3. S3 : AV surround selector in "stereo" position.
off → stereo → mono
4. S4 [XA] only : Voltage selector in "240V" position.
110V → 127V → 240V → 220V
5. S501 ~ S504, S519, S520 : Input selector in "phono" position.
[S501 — tape S504 — phono]
[S502 — CD S519 — aux]
[S503 — tuner S520 — VTR]
6. S505, S506 : Volume control switch
[S505 — volume down]
[S506 — volume up]
7. S507, S521 : Auto EQ switch.
[S507 — soft, S521 — start/stop]
8. S508, S510 : Display mode switch.
[S508 — peak hold, S510 — spectrum/EQ]
9. S509, S522 : EQ mode switch.
[S509 — reverse, S522 — flat]
10. S511 : EQ memory switch.
11. S512 ~ S514 : EQ preset switch.
[S512 — memory 3, S513 — memory 2,]
[S514 — memory 1]
12. S515 ~ S518 : EQ level control switch.
[S515 →, S516 ←, S517 — up, S518 — down]
13. Important safety notice:
Components identified by a triangle mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
14. All voltage values shown in circuitry are the standard values for the DC electronic 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.
15. Phono signal (Lch.). Pink noise signal.
 Microphone signal. Microphone signal for auto sound field correction.
 Phase shift signal.
16. Positive voltage lines and Negative voltage lines.
17. This is the basic circuit diagram (For continental Europe) and related areas [EK], [XL], [XA], [EGA], [EW] refer to the separate service manual (Order No. HAD8507186C8-A).

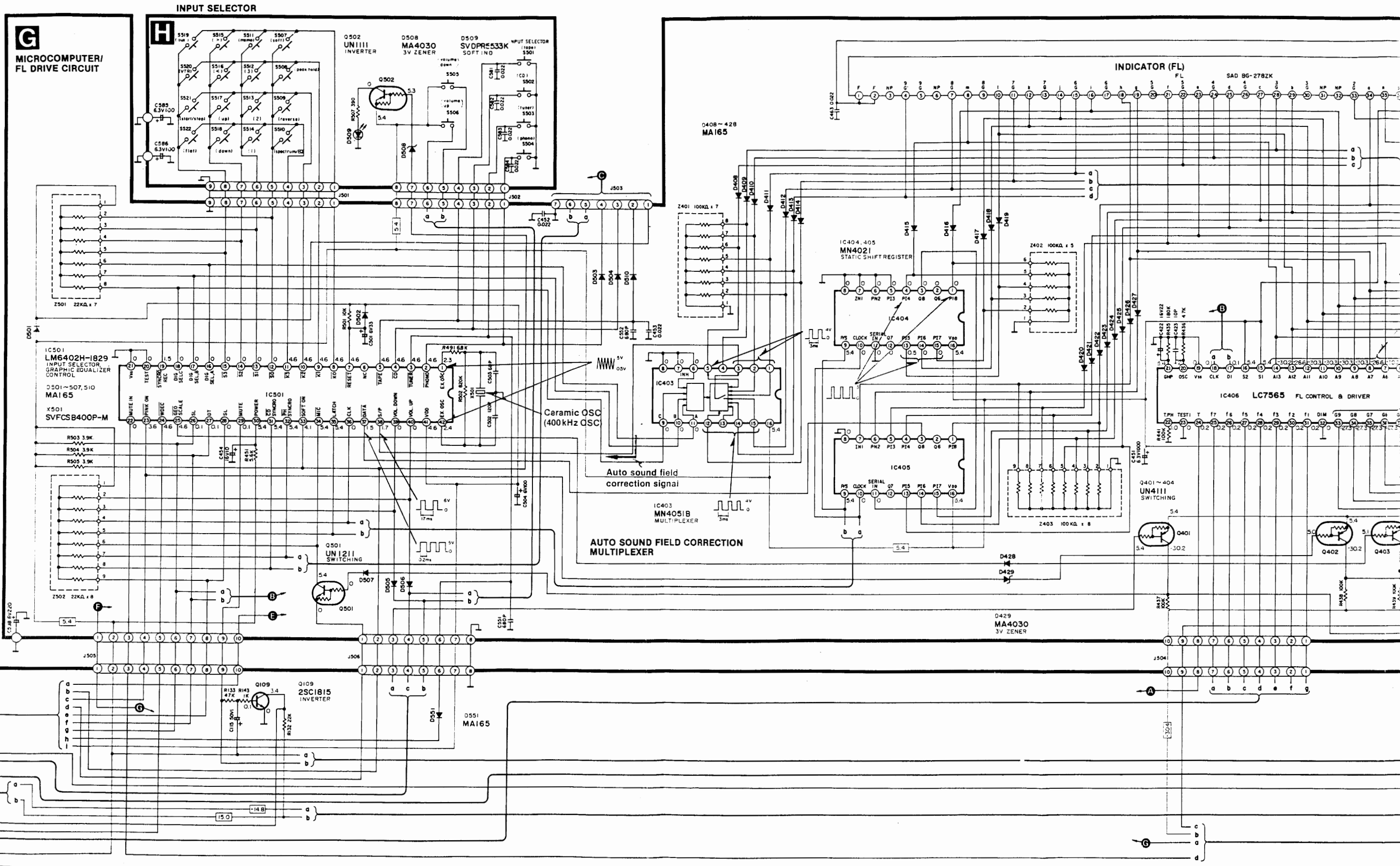
* Caution !

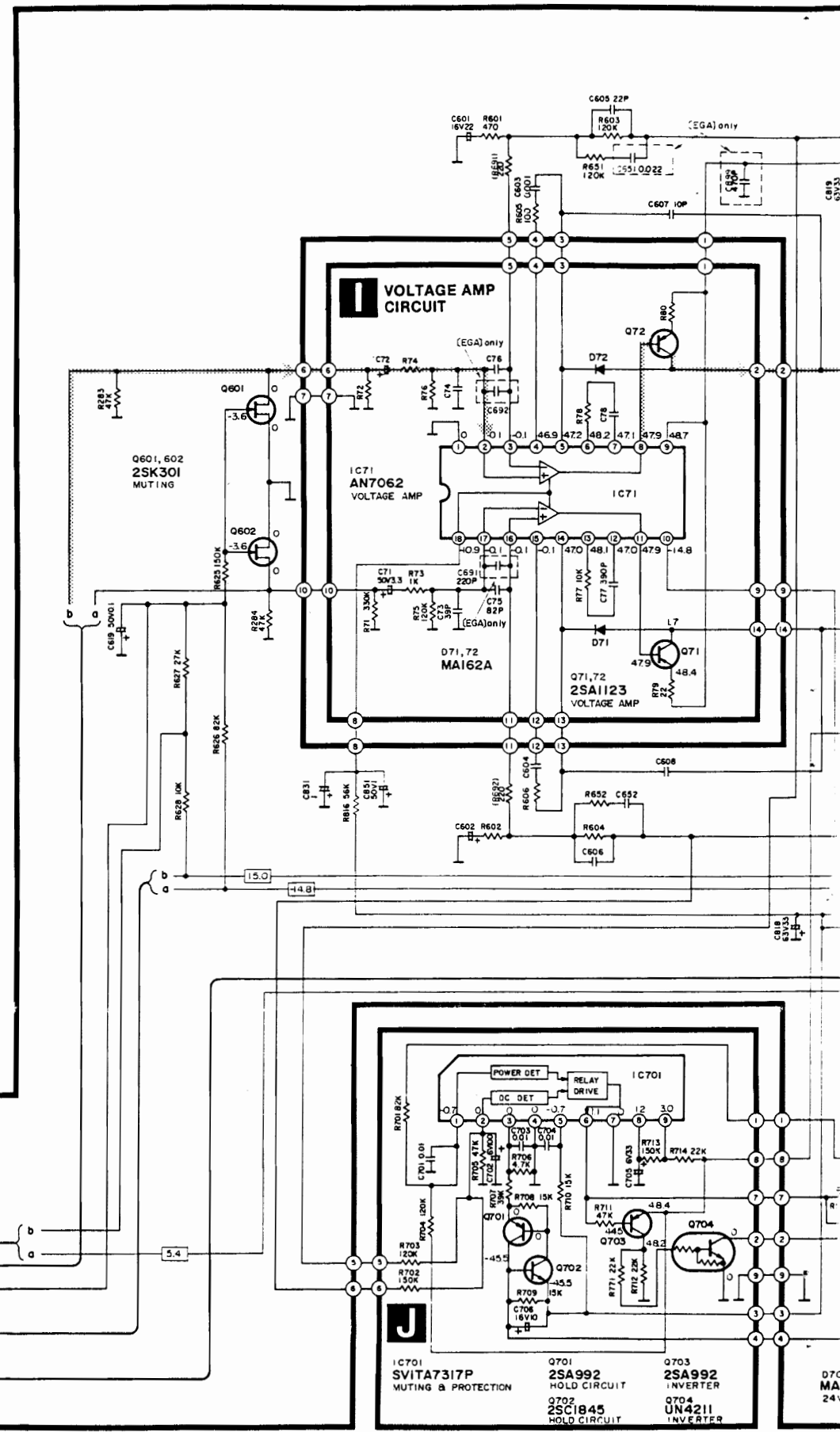
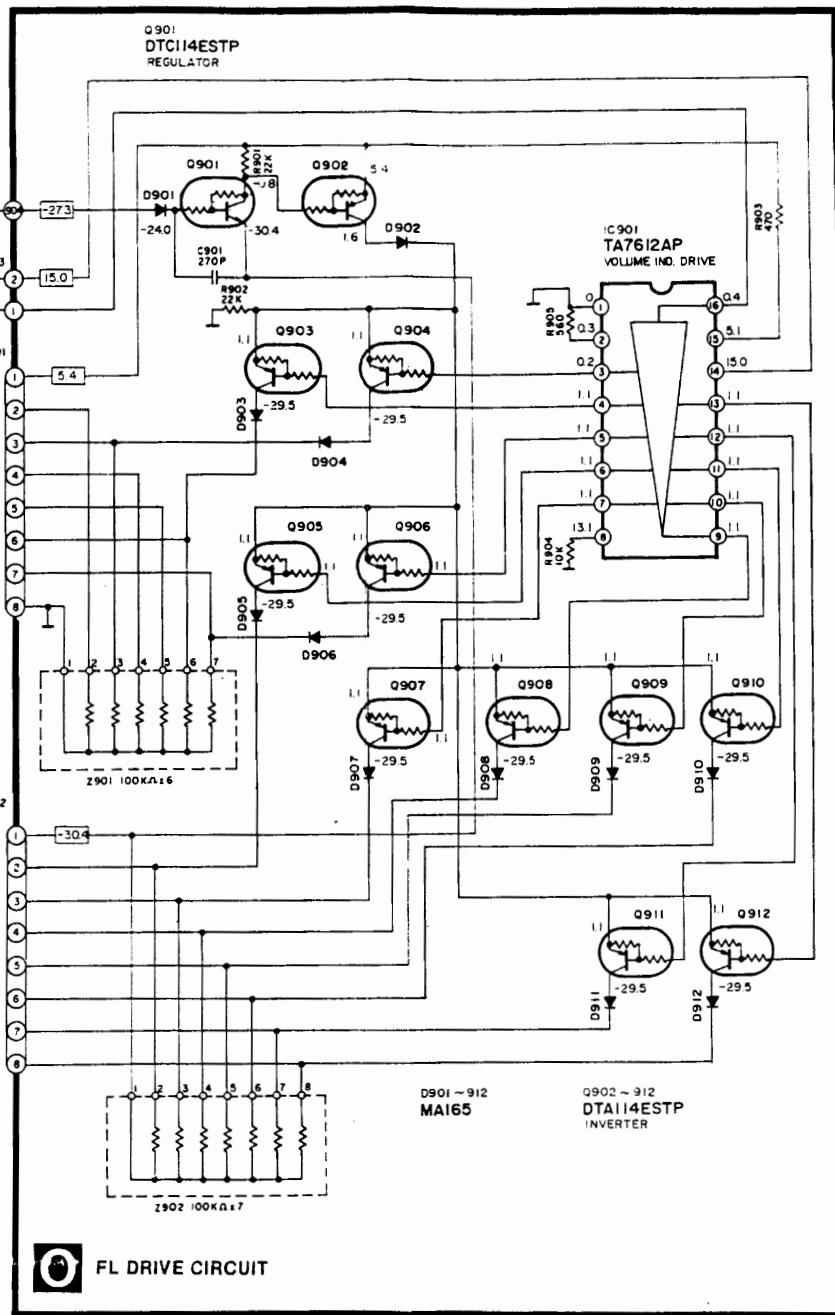
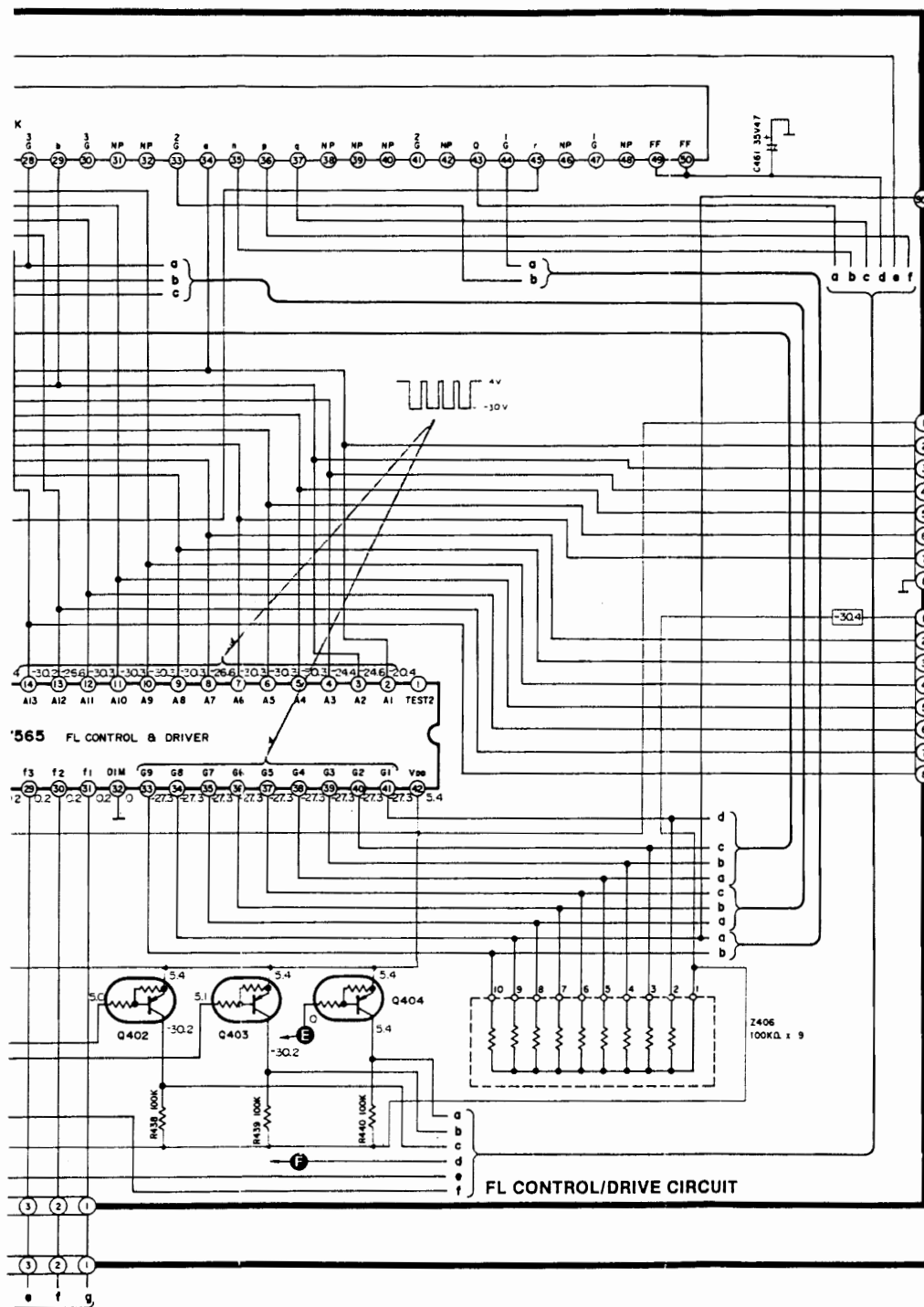
- IC and LSI are sensitive to static electricity.
- Secondary trouble can be prevented by taking care during repair.
- * Cover the parts boxes made of plastics with aluminum foil.
- * Ground the soldering iron.
- * Put a conductive mat on the work table.
- * Do not touch the legs of IC or LSI with the fingers directly.



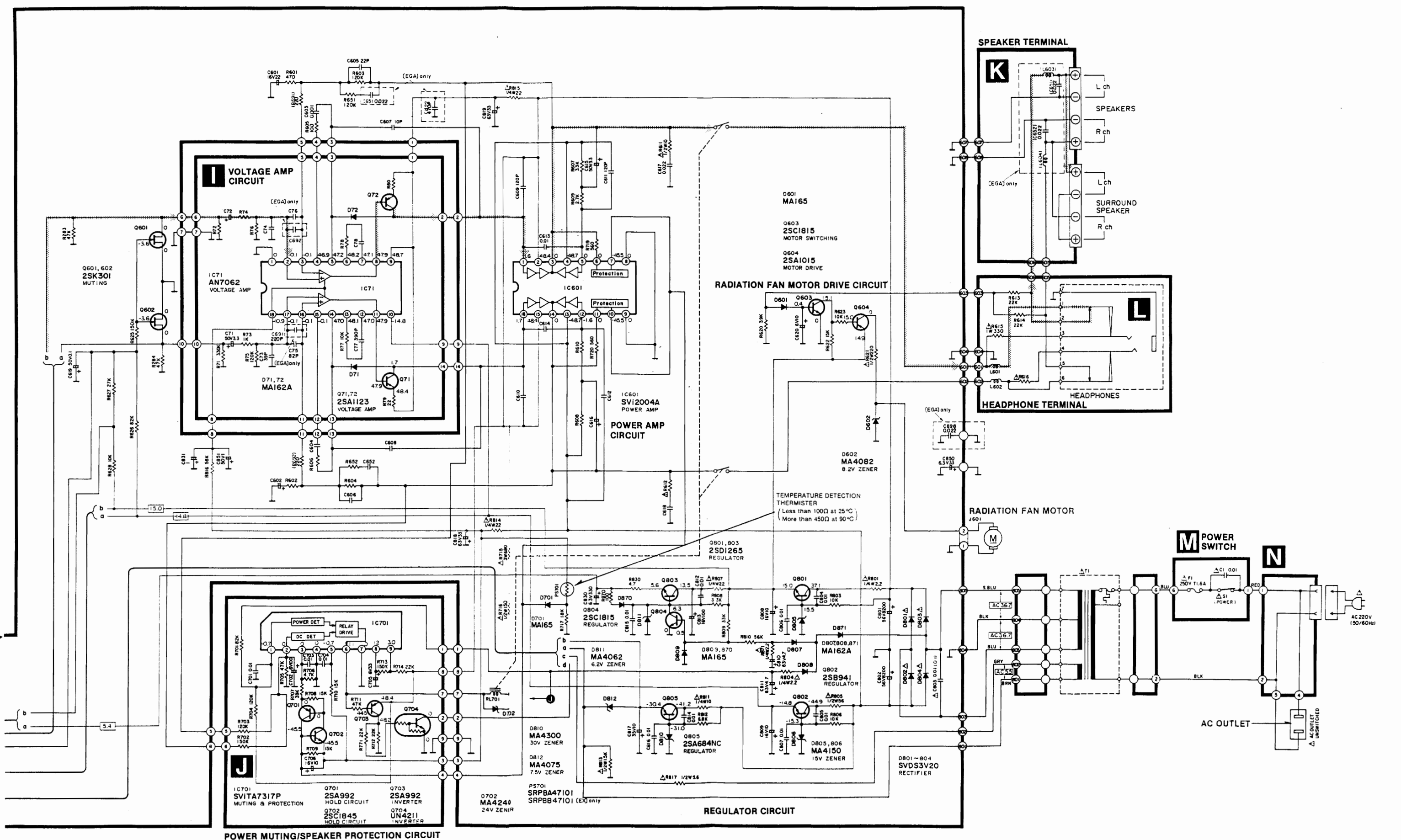








POWER MUTING/SPEAKER PROTECTION CIRCUIT



RESISTORS AND CAPACITORS

- 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. The "S" mark is service standard parts and may differ from production parts.

- 4. The unit of resistance is Ω (ohm). K = 1000 Ω, M = 1000K Ω. 5. The unit of capacitance is μF (microfarad). P = 10^-6 μF. 6. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all area.

Numbering System of Resistor

Table showing resistor numbering examples: ERD 25 F J 101, Type: Type Wattage Shape Tolerance Value.

Table showing Resistor Type, Wattage, and Tolerance: ERD Carbon, ERO Metal Film, ERG Metal Oxide, ERC Solid.

ERD10TLJ□□□□ → Chip type carbon, ERO10MKG□□□□ → Chip type metal film

Numbering System of Capacitor

Table showing capacitor numbering examples: ECKD 1H 102 Z F, Type: Type Voltage Value Tolerance Peculiarity.

Table showing Capacitor Type, Voltage (ECEA Type, Other), and Tolerance: ECEA Electrolytic, ECCD Ceramic, ECKD Ceramic, ECOM Polyester, ECOP Polypropylene, ECET Electrolytic, ECEA...N Non Polar Electrolytic.

RESISTORS

Main table of resistors with columns for Ref. No., Part No., and Value. Includes various resistor types and values.

CAPACITORS

Main table of capacitors with columns for Ref. No., Part No., and Value. Includes various capacitor types and values.

REPLACEMENT PARTS LIST

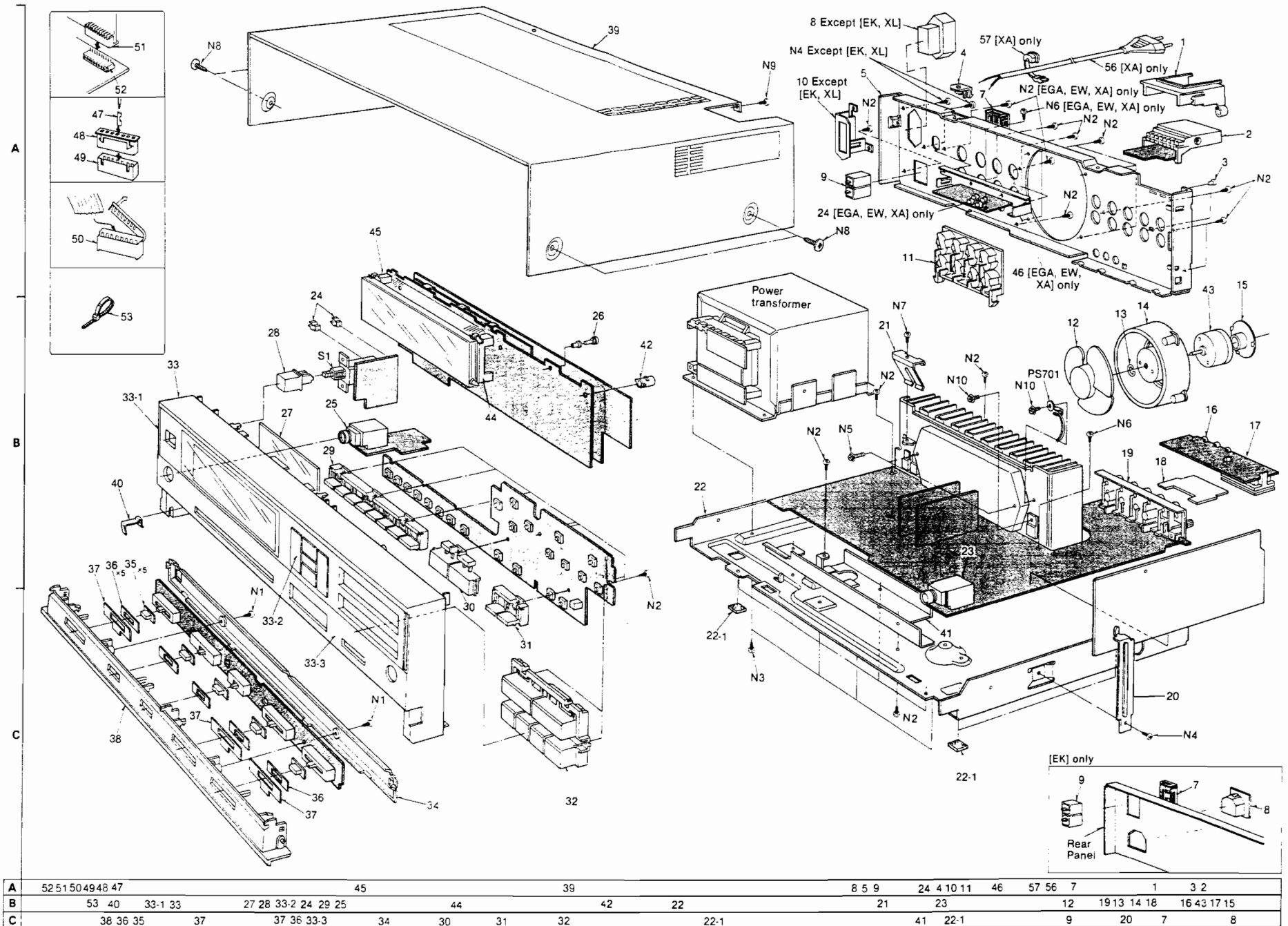
- Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders. 2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. 3. Bracketed indications 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. 5. The parenthesized numbers in the column of description stand for the quantity per set.

Table showing replacement parts list with columns for Color, Area, and Description. Includes codes like (K) (S), (EX) [.....], etc.

Main replacement parts list table with columns for Ref. No., Part No., and Description. Includes categories like INTEGRATED CIRCUITS, TRANSISTORS, DIODES, CABINET and CHASSIS PARTS, etc.

SU-X90 SU-X90

EXPLODED VIEW



Stereo Integrated Amplifier

SU-X90

REPRODUCTION

- This booklet includes the specifications of Model SU-X90 (Order No. HAD8507186C8) written in German, French and Spanish, and the circuits to be changed according to areas.
File this booklet together with the service manual of Model SU-X90.
- Dieses Büchlein umfaßt die technischen Daten für Modell SU-X90 (Bestell Nr. HAD8507186C8) in den Sprachen Deutsch, Französisch und Spanisch, sowie die entsprechend dem Gebiet zu ändernden Schaltungen.
Bewahren Sie dieses Büchlein zusammen mit dem Service-Handbuch für Modell SU-X90 auf.
- Cette brochure comprend les spécifications du Modèle SU-X90 (N° d'ordre HAD8507186C8) écrites en allemand, en français et en espagnol, et explique les circuits devant être modifiés selon les régions.
Classer cette brochure en même temps qu'avec le manuel de service du Modèle SU-X90.
- Este librito incluye las especificaciones de Modelo SU-X90 (Pedido N° HAD8507186C8) escritas en alemán, francés y los circuitos a cambiarse según las áreas.
Guardar este librito juntamente con el manual de servicio de Modelo SU-X90.

DEUTSCH

■ TECHNISCHE DATEN

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerion-Ausgangsleistung bei 40 Hz ~ 20 kHz beide Kanäle ausgesteuert	2 × 75W (8 Ω)
Dauerion-Ausgangsleistung bei 1 kHz beide Kanäle ausgesteuert	2 × 80W (8 Ω)
Gesamtklirrfaktor	
Nennleistung bei 40 Hz ~ 20 kHz	0,05% (8 Ω)
halbe Nennleistung bei 1 kHz	0,01% (8 Ω)
Dämpfungsfaktor	50 (8 Ω)
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
Tuner, Aux, CD, VTR	150 mV/22 kΩ
Tape	150 mV/22 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	150 mV
Geräuschspannungsabstand	
Nennleistung (8 Ω)	
Phono	71 dB (nach IHF, A, 72 dB)
Tuner, Aux, Tape, CD, VTR	
	86 dB (nach IHF, A, 89 dB)
Frequenzgang	
Phono	RIAA-Standardkurve. ±0,3 dB (30 Hz ~ 15 kHz)
Tuner, Aux, Tape, CD, VTR	10 Hz ~ 60 kHz (-3 dB)
Equalizer/Spektralanalysator-Frequenz	63 Hz, 160 Hz, 400 Hz, 1 kHz, 2,5 kHz, 6,3 kHz, 12,5 kHz
Einstellbereich des Equalizers	±10 dB
Dynamikbereich des Spektralanalysators	26 dB

Ausgangsspannung	150 mV
Aufnahmeausgang (REC OUT)	±1,0 dB
Kanalabweichung (Aux, 250 Hz ~ 6300 Hz)	55 dB
Übersprechdämpfung (Aux, 1 kHz)	590 mV/330 Ω
Kopfhörerpegel und -impedanz	8 Ω ~ 16 Ω
MAIN	8 Ω ~ 16 Ω
RAUMKLANGREGLER	8 Ω ~ 16 Ω

■ ALLGEMEINE DATEN

Leistungsaufnahme	370 W
Netzspannung	
Für Kontinentaleuropa	Wechselstrom 50 Hz/60 Hz, 220V
Für andere Länder	Wechselstrom 50 Hz/60 Hz, 110V/127V/220V/240V
Abmessungen (B×H×T)	315 × 99 × 246 mm
Gewicht	6,0 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

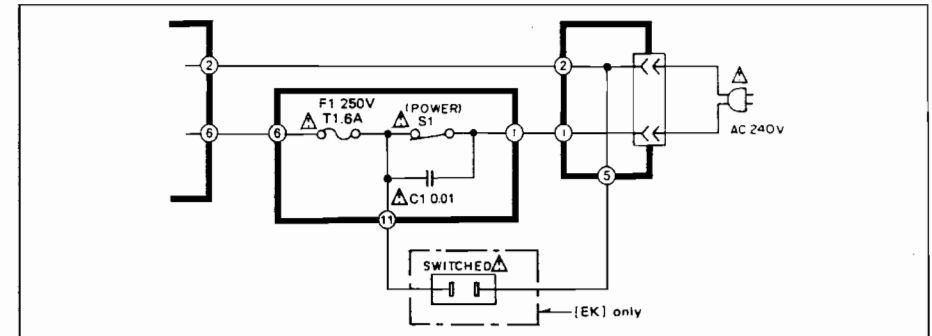
(Die technischen Daten können infolge von Verbesserungen ohne Ankündigung geändert werden.)

■ CIRCUITS TO BE CHANGED AND THE AREAS

• Power supply circuits

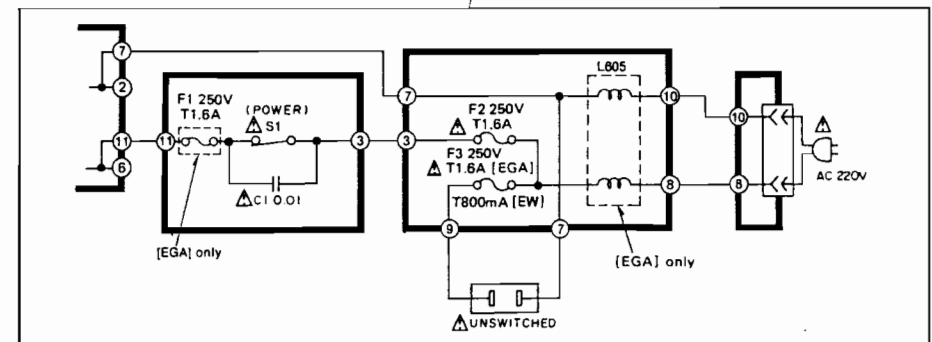
For [EK] and [XL] areas

[XL]... Australia, [EK]... United Kingdom



For [EW] and [EGA] areas

[EW]... Switzerland, [EGA]... F.R. Germany



For [XA] area

[XA]... Asia, Oceania, Africa, Middle Near East and Latin America

