

Service Manual

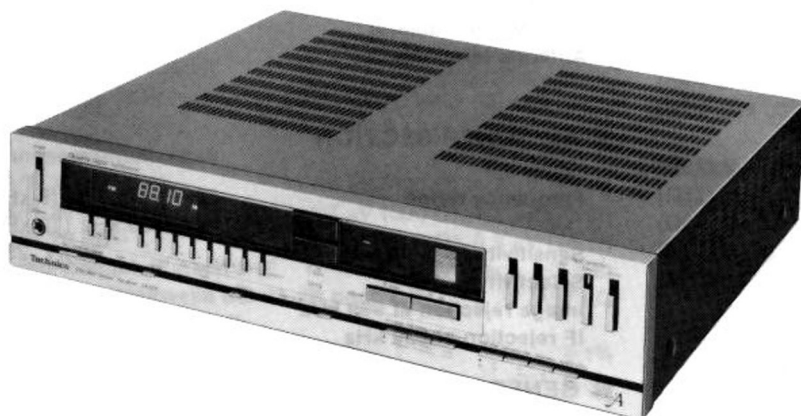
FM/AM Stereo Receiver

SA-515

[E],[EG],[XAL],
[XA],[XGH],[EB]

SA-515(K)

[E],[EG],[XGH]



- * 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

- * [E] and [EG] are available in Scandinavia and European except Belgium and Holland.
- * [XAL] is available in Australia.
- * [XA] is available in Asia, Latin America, Middle East and Africa.
- * [XGH] is available in Holland.
- * [EB] is available in Belgium.

TECHNICAL SPECIFICATIONS (DIN 45 500)

■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output both channels driven	2 × 55W (4Ω) 2 × 50W (8Ω)
40 Hz~16 kHz continuous power output both channels driven	2 × 55W (4Ω) 2 × 50W (8Ω)
1 kHz continuous power output both channels driven	2 × 65W (4Ω) 2 × 55W (8Ω)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.04% (4Ω) 0.02% (8Ω)
rated power at 40 Hz~16 kHz	0.04% (4Ω) 0.02% (8Ω)
rated power at 1 kHz	0.02% (4Ω) 0.02% (8Ω)
half power at 20 Hz~20 kHz	0.015% (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	0.04%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.02%
Power bandwidth	
both channels driven, -3 dB	5 Hz~35 kHz (4Ω) 5 Hz~40 kHz (8Ω)
Residual hum and noise	0.5 mV

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

Damping factor	15 (4Ω), 30 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
AUX	150 mV/27kΩ
TAPE 2	150 mV/27kΩ
TAPE 1 REC/PLAY	180 mV/33kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power (4Ω)	
PHONO	73 dB (80 dB, IHF '66, 8Ω)
AUX, TAPE	88 dB (98 dB, IHF '66, 8Ω)
-26 dB power (4Ω)	
PHONO	64 dB
AUX, TAPE	66 dB
50 mW power (4Ω)	
PHONO	60 dB
AUX, TAPE	60 dB
Frequency response	
PHONO	RIAA standard curve ±0.3 dB (30 Hz~15 kHz)
AUX, TAPE	5 Hz~70 kHz (-3 dB) ±0.5 dB (20 Hz~20 kHz)
Tone controls	
BASS	50 Hz, +10 dB~-10 dB
TREBLE	10 kHz, +10 dB~-10 dB
Subsonic filter	30 Hz, -6 dB/oct.
High-cut filter	7 kHz, -6 dB/oct.
Loudness control (volume at -30 dB)	50 Hz, +9 dB
Muting	-20 dB

Technics

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

Output voltage	
TAPE 1, 2 REC OUT	150 mV
TAPE 1 REC/PLAY	30 mV/82kΩ
Channel balance, AUX 250 Hz~6,300 Hz	±1.0 dB
Channel separation, AUX 1 kHz	55 dB
Headphones output level and impedance	470 mV/330Ω
Load impedance	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz (50 kHz step) 87.9~107.9 MHz (200 kHz step)
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 (normal)	
MONO	0.1%
STEREO	0.3%
S/N	
MONO	68 dB (74 dB, IHF)
STEREO	64 dB (68 dB, IHF)
Frequency response	20 Hz~15 kHz, +1 dB~-2 dB
Alternate channel selectivity	
normal, ±400 kHz	75 dB
narrow, ±300 kHz	75 dB
Capture ratio (normal)	1.2 dB
Image rejection at 98 MHz	75 dB
IF rejection at 98 MHz	90 dB
Spurious response rejection at 98 MHz	100 dB
AM suppression	55 dB

Stereo separation (normal)	
1 kHz	45 dB
10 kHz	35 dB
Carrier leak	
19 kHz	-30 dB (-38 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μV
Bandwidth (normal)	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	300Ω (balanced) 75Ω (unbalanced)

■ AM TUNER SECTION

Frequency range	522~1611 kHz (9 kHz step) 530~1620 kHz (10 kHz step)
Sensitivity (S/N 20 dB)	30 μV, 250 μV/m
Selectivity	55 dB
Image rejection at 999 kHz	50 dB
IF rejection at 999 kHz	40 dB

■ GENERAL

Power consumption	530W
Power supply	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 97 × 382 mm (16-15/16" × 3-13/16" × 15-1/32")
Weight	10.1 kg (22.27 lb.)

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

■ TECHNISCHE DATEN (DIN 45 500) (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz	
beide Kanäle ausgesteuert	2 × 55W (4 Ω) 2 × 50W (8 Ω)
Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz	
beide Kanäle ausgesteuert	2 × 55W (4 Ω) 2 × 50W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz	
beide Kanäle ausgesteuert	2 × 65W (4 Ω) 2 × 55W (8 Ω)
Gesamtklirrfaktor	
Nennleistung bei 20 Hz ~ 20 kHz	0,04% (4 Ω) 0,02% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz	0,04% (4 Ω) 0,02% (8 Ω)
Nennleistung bei 1 kHz	0,02% (4 Ω) 0,02% (8 Ω)
halbe Nennleistung bei 20 Hz ~ 20 kHz	0,015% (8 Ω)
halbe Nennleistung bei 1 kHz	0,005% (8 Ω)
-26 dB Leistung bei 1 kHz	0,1% (4 Ω)
50 mW Leistung bei 1 kHz	0,12% (4 Ω)
Intermodulationsfaktor	
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω	0,04%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,02%
Leistungsbandbreite	
beide Kanäle ausgesteuert bei -3 dB	5 Hz ~ 35 kHz (4 Ω) 5 Hz ~ 40 kHz (8 Ω)
Restbrumm und Geräusch	0,5 mV

Dämpfungsfaktor	15 (4 Ω), 30 (8 Ω)
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
Aux	150 mV/27 kΩ
Tape 2	150 mV/27 kΩ
Tape 1 Aufnahme/Wiedergabe (TAPE 1 REC/PLAY)	180 mV/33 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	150 mV
Geräuschabstand	
Nennleistung (4 Ω)	
Phono	73 dB (80 dB, nach IHF '66, 8Ω)
Aux, Tape	88 dB (98 dB, nach IHF '66, 8Ω)
-26 dB Leistung (4 Ω)	
Phono	64 dB
Aux, Tape	66 dB
50 mW Leistung (4 Ω)	
Phono	60 dB
Aux, Tape	60 dB
Frequenzgang	
Phono	RIAA-Standardkurve ±0,3 dB (30 Hz ~ 15 kHz)
Aux, Tape	5 Hz ~ 70 kHz (-3 dB) ±0,5 dB (20 Hz ~ 20 kHz)
Klangregler	
Baßregler (BASS)	50 Hz, +10 dB ~ -10 dB
Höhenregler (TREBLE)	10 kHz, +10 dB ~ -10 dB
Tiefenfilter	30 Hz, -6 dB/Okt.
Rauschfilter	7 kHz, -6 dB/Okt.
Gehörriichtige Lautstärkekorrektur (Loudness)	
(bei -30 dB Ausgangsleistung)	50 Hz, +9 dB
Tondämpfung	-20 dB

Ausgangsspannung	
Tape 1/2 Aufnahme (Tape 1, 2 REC OUT)	150 mV
Tape 1 Aufnahme/Wiedergabe (TAPE 1 REC/PLAY)	30 mV/82 kΩ
Kanalabweichung (Aux, 250 Hz ~ 6300 Hz)	±1,0 dB
Übersprechdämpfung (Aux, 1 kHz)	55 dB
Kopfhörerpegel und -impedanz	470 mV/330 Ω
Lautsprecherimpedanz	
MAIN oder REMOTE	4 Ω ~ 16 Ω
MAIN und REMOTE	8 Ω ~ 16 Ω

■ UKW-TUNERTEIL

Wellenbereich	
87,50 ~ 108,00 MHz (50 kHz step)	
87,9 ~ 107,9 MHz (200 kHz step)	
Eingangsempfindlichkeit	
S/R 30 dB	1,9 μV (300 Ω), 1,3 μV (75 Ω)
S/R 26 dB	1,7 μV (300 Ω), 1,2 μV (75 Ω)
S/R 20 dB	1,5 μV (300 Ω), 0,9 μV (75 Ω)
Nutzempfindlichkeit nach IHF	1,9 μV (nach IHF '58)
Stereoschaltsschwelle bei 46 dB nach IHF	22 μV/75 Ω
Gesamtklirrfaktor (normal)	
Mono	0,1%
Stereo	0,3%
Geräuschabstand	
Mono	68 dB (74 dB nach IHF)
Stereo	64 dB (68 dB nach IHF)
Frequenzgang	
20 Hz ~ 15 kHz (+1 dB ~ -2 dB)	
Trennschärfe bei Störsender	
normal, ±400 kHz	75 dB
schmal, ±300 kHz	75 dB
Einfangverhältnis (normal)	
	1,2 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	75 dB
ZF-Dämpfung bei 98 MHz	90 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	100 dB

AM-Unterdrückung	
	55 dB
Übersprechdämpfung (normal)	
1 kHz	45 dB
10 kHz	35 dB
Trägerrest	
19 kHz	-30 dB (-38 dB nach IHF)
38 kHz	-50 dB (-50 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	
	±1,5 dB
Begrenzereinsatz	
	1,2 μV
Bandbreite (normal)	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	
	300 Ω (symmetrisch)
	75 Ω (unsymmetrisch)

■ AM-TUNERTEIL

Wellenbereiche	
522 ~ 1611 kHz (9 kHz step)	
530 ~ 1620 kHz (10 kHz step)	
Eingangsempfindlichkeit (S/R 20 dB)	
	30 μV, 250 μV/m
Trennschärfe	
	55 dB
Spiegelfrequenz-Dämpfung bei 999 kHz	
	50 dB
ZF-Dämpfung bei 999 kHz	
	40 dB

■ ALLGEMEINE DATEN

Leistungsaufnahme	
	530 W
Netzspannung	
	Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V
Abmessungen (B×H×T)	
	430 × 97 × 382 mm
Gewicht	
	10,1 kg
Bemerkung:	
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.	

■ CARACTERISTIQUES TECHNIQUES (DIN 45 500) (Sujet à changement sans préavis.)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 20 Hz~20 kHz, les deux canaux en circuit	
	2 × 55W (4Ω)
	2 × 50W (8Ω)
Puissance de sortie continue de 40 Hz~16 kHz, les deux canaux en circuit	
	2 × 55W (4Ω)
	2 × 50W (8Ω)
Puissance de sortie continue à 1 kHz, les deux canaux en circuit	
	2 × 65W (4Ω)
	2 × 55W (8Ω)
Distorsion harmonique totale	
à puissance nominale (20 Hz~20 kHz)	0,04% (4Ω)
	0,02% (8Ω)
à puissance nominale (40 Hz~16 kHz)	0,04% (4Ω)
	0,02% (8Ω)
à puissance nominale (1 kHz)	0,02% (4Ω)
	0,02% (8Ω)
à demi-puissance (20 Hz~20 kHz)	0,015% (8Ω)
à demi-puissance (1 kHz)	0,005% (8Ω)
puissance de -26 dB à 1 kHz	0,1% (4Ω)
puissance de 50 mW à 1 kHz	0,12% (4Ω)
Distorsion d'intermodulation	
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω	0,04%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,02%
Réponse de fréquences	
les deux canaux en circuit, -3 dB	5 Hz~35 kHz (4Ω)
	5 Hz~40 kHz (8Ω)
Bruit et ronflement résiduels	
	0,5 mV
Coefficient d'amortissement	
	15 (4Ω), 30 (8Ω)

Sensibilité et impédance d'entrée	
PHONO	2,5 mV/47kΩ
AUX (AUX)	150 mV/27kΩ
BANDE 2 (TAPE 2)	150 mV/27kΩ
BANDE 1, ENREGISTREMENT/LECTURE (TAPE 1 REC/PLAY)	
	180 mV/33kΩ
PHONO (tension d'entrée maximum, 1 kHz RMS)	
Signal/Bruit	
à puissance nominale (4Ω)	
PHONO	73 dB (80 dB, IHF '66, 8Ω)
AUX, BANDE (AUX, TAPE)	88 dB (98 dB, IHF '66, 8Ω)
puissance de -26 dB (4Ω)	
PHONO	64 dB
AUX, BANDE (AUX, TAPE)	66 dB
puissance de 50 mW (4Ω)	
PHONO	60 dB
AUX, BANDE (AUX, TAPE)	60 dB
Réponse de fréquence	
PHONO	Courbe nominale RIAA
	±0,3 dB (30 Hz~15 kHz)
AUX, BANDE (AUX, TAPE)	5 Hz~70 kHz (-3 dB)
	±0,5 dB (20 Hz~20 kHz)
Régla de la tonalité	
BASSES (BASS)	50 Hz, +10 dB ~ -10 dB
AIGUS (TREBLE)	10 kHz, +10 dB ~ -10 dB
Filtre subsonique	
	30 Hz, -6 dB/oct.
Filtre coupe-hauts	
	7 kHz, -6 dB/oct.
Compensateur physiologique (volume à -30 dB)	
	50 Hz, +9 dB
Régla silencieux	
	-20 dB

Tension de sortie	
SORTIE ENREGISTREMENT BANDE 1, 2 (TAPE 1, 2 REC OUT)	150 mV
ENREGISTREMENT/LECTURE BANDE 1 (TAPE 1 REC/PLAY)	30 mV/82kΩ
Equilibrage des canaux, AUX 250 Hz~6 300 Hz	±1,0 dB
Séparation des canaux, AUX 1 kHz	55 dB
Niveau de sortie des casques et impédance	470 mV/330Ω
Impédance de charge	
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE)	4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE)	8Ω~16Ω

SECTION SYNTONISATEUR FM

Gamme de fréquence	87,50~108,00 MHz (50 kHz step) 87,9~107,9 MHz (200 kHz step)
Sensibilité	
S/B 30 dB	1,9 μV (300Ω), 1,3 μV (75Ω)
S/B 26 dB	1,7 μV (300Ω), 1,2 μV (75Ω)
S/B 20 dB	1,5 μV (300Ω), 0,9 μV (75Ω)
Sensibilité utilisable IHF	1,9 μV (IHF '58)
Sensibilité stéréo au seuil de 46 dB, IHF	22 μV/75Ω
Distorsion harmonique totale (normal)	
MONO	0,1%
STEREO	0,3%
Signal/Bruit	
MONO	68 dB (74 dB, IHF)
STEREO	64 dB (68 dB, IHF)
Réponse de fréquence	20 Hz~15 kHz, +1 dB~-2 dB
Sélectivité alternée par canal	
Normal, ±400 kHz	75 dB
Etroite, ±300 kHz	75 dB
Taux de capture (normal)	1,2 dB
Rejection d'image à 98 MHz	75 dB

Rejection FI à 98 MHz	90 dB
Rejection de réponse parasite à 98 MHz	100 dB
Suppression AM	55 dB
Séparation stéréophonique (normal)	
1 kHz	45 dB
10 kHz	35 dB
Fuite de porteuse	
19 kHz	-30 dB (-38 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Equilibrage de canaux (250 Hz~6,300 Hz)	±1,5 dB
Point de limite	1,2 μV
Largeur de bande (normal)	
Amplificateur FI	180 kHz
Démodulateur FM	1000 kHz
Bornes d'antenne	300Ω (symétrique) 75Ω (asymétrique)

SECTION SYNTONISATEUR AM

Gamme de fréquence	522~1611 kHz (9 kHz step) 530~1620 kHz (10 kHz step)
Sensibilité (S/B 20 dB)	30 μV, 250 μV/m
Sélectivité	55 dB
Réjection d'image à 999 kHz	50 dB
Réjection FI à 999 kHz	40 dB

DIVERS

Consommation	530W
Alimentation	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (L×H×Pr)	430 × 97 × 382 mm
Poids	10,1 kg

Remarque:

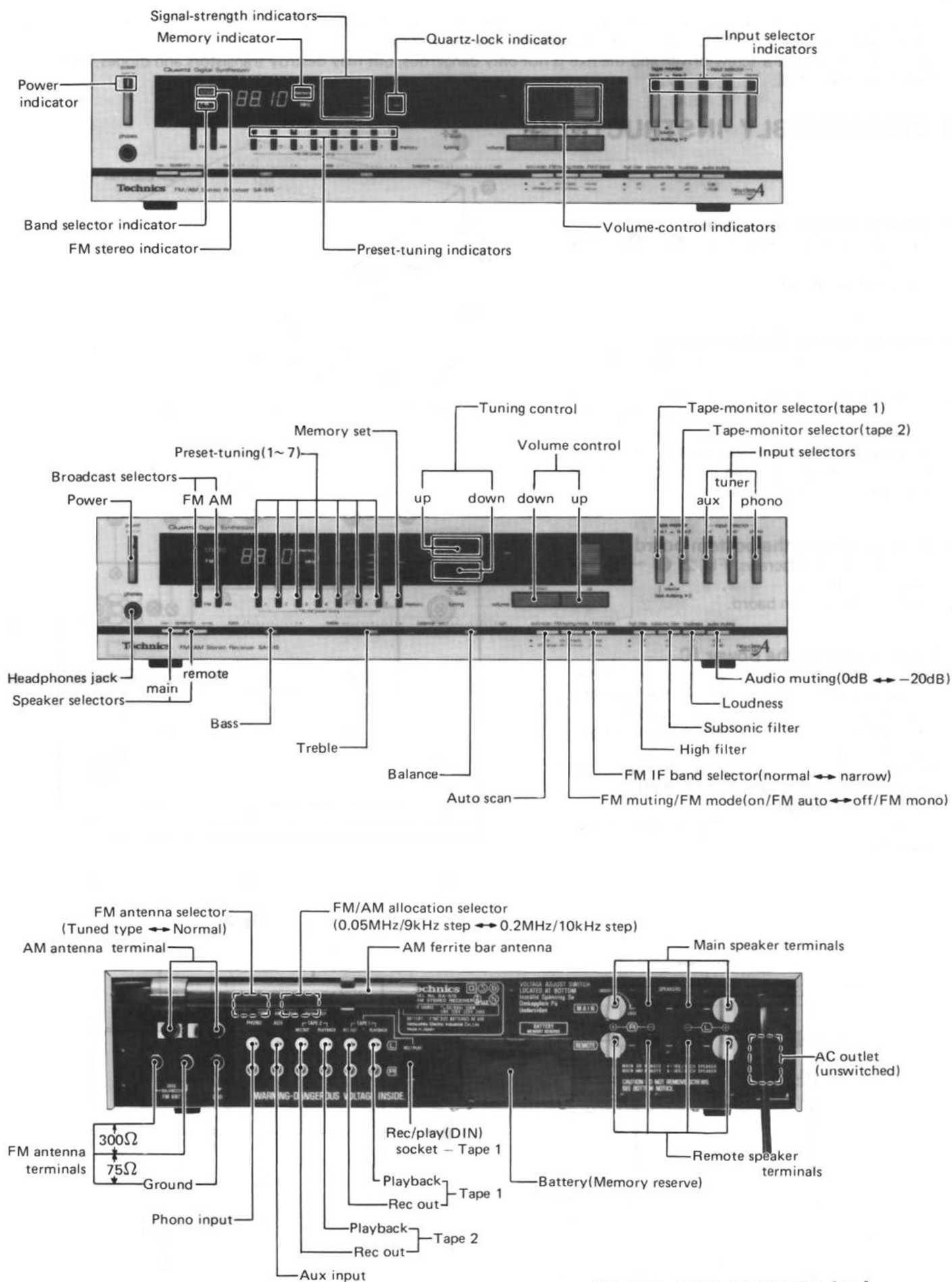
On mesure la distorsion harmonique totale au moyen d'un analyseur de spectre digital (Système H.P. 3045).

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LOCATION OF CONTROLS



● The products for destination [XA] is equipped with AC outlet.

BEFORE STARTING THE REPAIRING

Before adjusting or repairing, be sure to short-circuit opposite poles of the $8200\mu\text{F}$ capacitors (C703 and C704) with a resistor approximately of " 50Ω , 5W " for discharging the charged voltage.

Short-circuiting with a screw driver and the like is not only dangerous, but may destroy transistors and diodes, and should therefore be avoided.

DISASSEMBLY INSTRUCTIONS

How to remove the cabinet

1. Remove the 4 setscrews (Fig. 1: ① ~ ④) of the cabinet.
2. Remove the cabinet.

How to remove the front panel

1. Remove the 6 setscrews (Fig. 1: ⑤ ~ ⑩) of the front panel.
2. Slide the front panel in the direction of the arrow in Fig. 1 to detach the panel from the chassis.
3. As shown in Fig. 1, remove the 3 lugs to detach the LED indicator printed circuit boards from the back of the front panel.

How to remove the bottom board

1. Remove the 14 setscrews (Fig. 2: ⑪ ~ ⑳) of the bottom board.
2. Remove the bottom board.

How to remove the power IC

1. Remove the cabinet and bottom board. (Refer to the sections "How to remove the cabinet" and "How to remove the bottom board").
2. Unsolder of power IC for left channel or right channel. (Fig. 3)
3. Remove the 2 setscrews (Fig. 3: ⑳ ~ ㉑) (left) or ㉒ and ㉓ (right)) of the chassis.
4. Remove the heat-sink.
5. Remove the 2 setscrews (Fig. 4: ㉔) of the heat-sink.

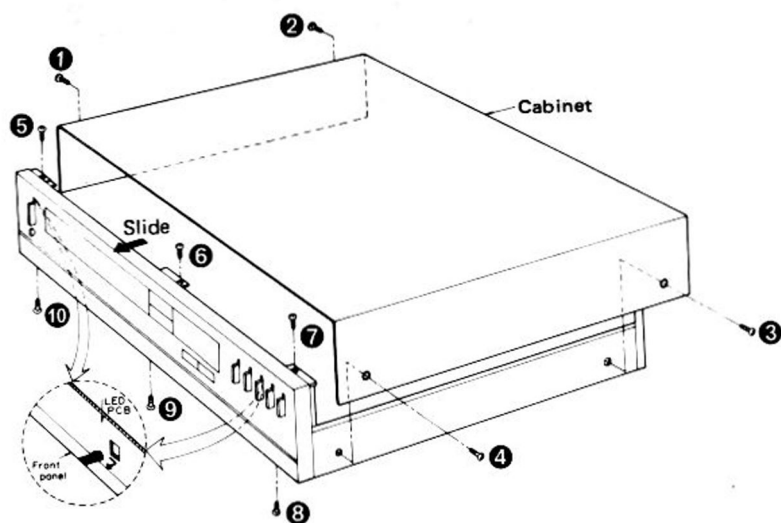


Fig. 1

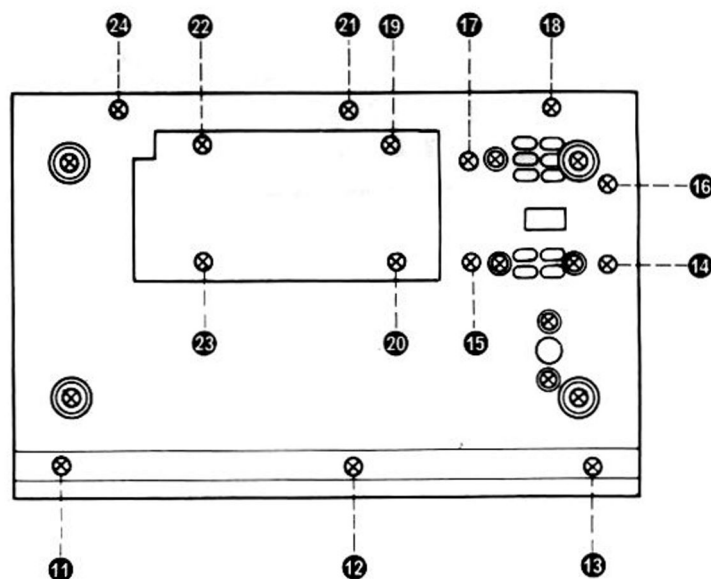


Fig. 2

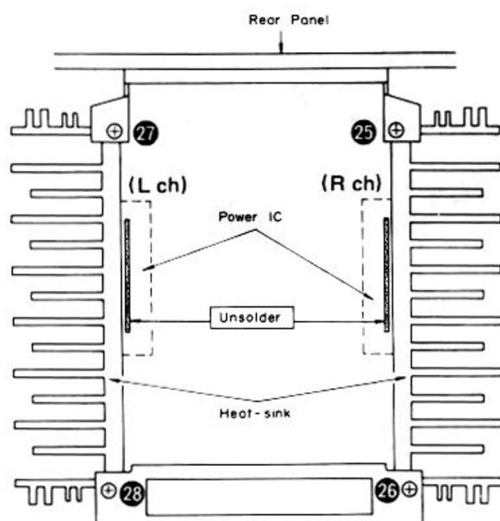


Fig. 3

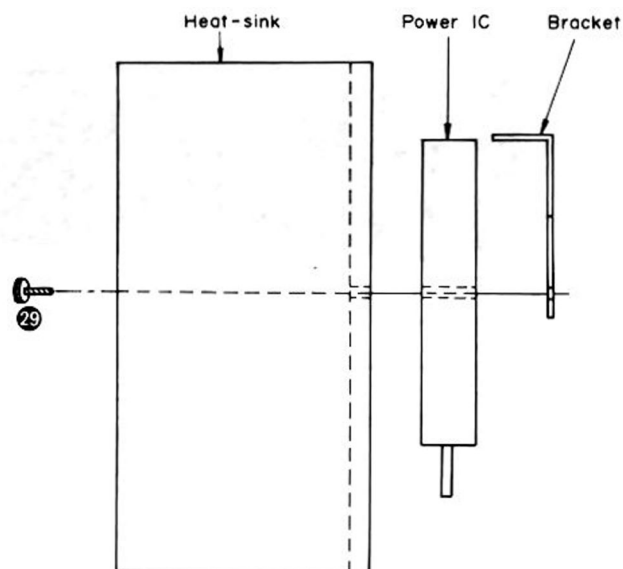


Fig. 4

• How to remove the motor (volume level control)

1. Remove the cabinet. (Refer to the section "How to remove the cabinet").
 2. Remove the 2 setscrews (Photo 1: 30 ~ 31) and 6 connectors (Photo 1: 32 ~ 37) of the equalizer printed circuit board.
 3. Remove the 2 setscrews (Photo 1: 38 and 39) of the chassis.
 4. Remove the equalizer printed circuit board in the direction of the arrow in Photo 1.
 5. Remove the 2 setscrews (Fig. 5: 40 and 41) of the film bracket.
 6. Slide the film bracket in the direction of the arrow in Fig. 5.
- Note**
How to remove the volume indicator lamp ———
This lamp can be removed by pressing and turning counterclockwise.
7. Slide the volume gear in the direction of the arrow in Fig. 6 to detach the volume gear from the motor assy.
 8. Remove the 1 nut (Fig. 6: 42) of the volume control.
 9. Unsolder of volume motor (Fig. 7: A ~ D).
 10. Remove the volume motor in the direction of the arrow in Fig. 7.

Notes

How to install the volume film ———

1. Fully turn the volume gear clockwise, which is attached to the volume.
 2. Wind the volume film around the volume gear and pulley (see Fig. 5 and Fig. 6), then secure it with the film fixing plate.
- In this case, the volume film should be positioned so that the initial hole of the film is engaged with the gear. (Refer to Fig. 5)

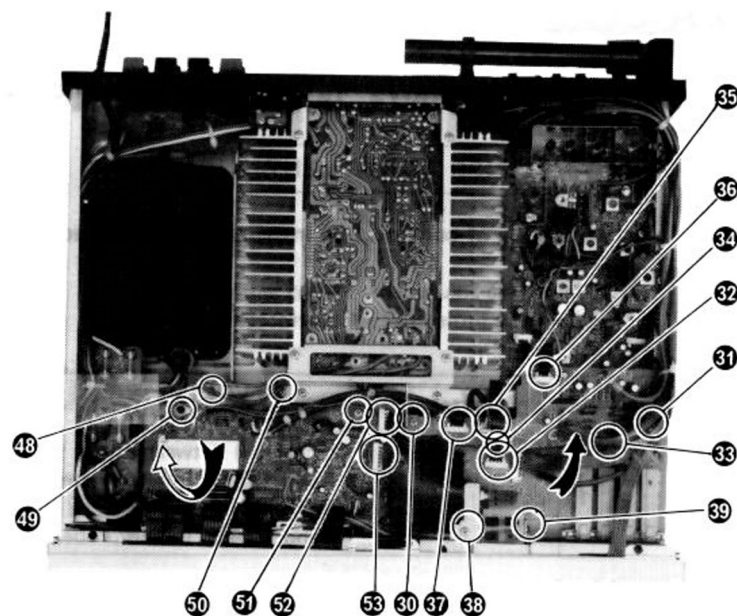


Photo 1

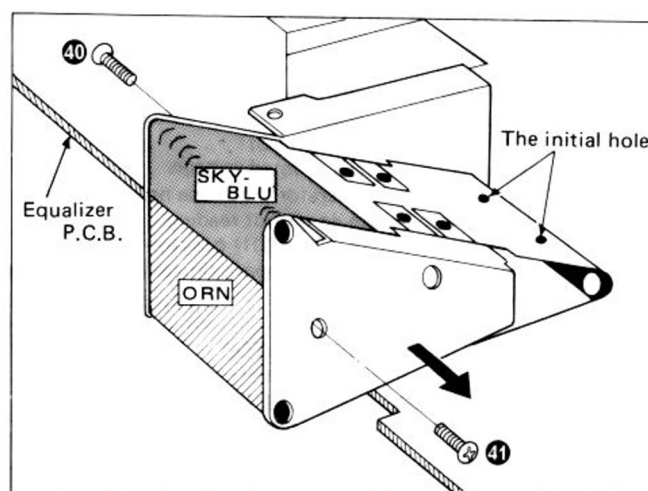


Fig. 5

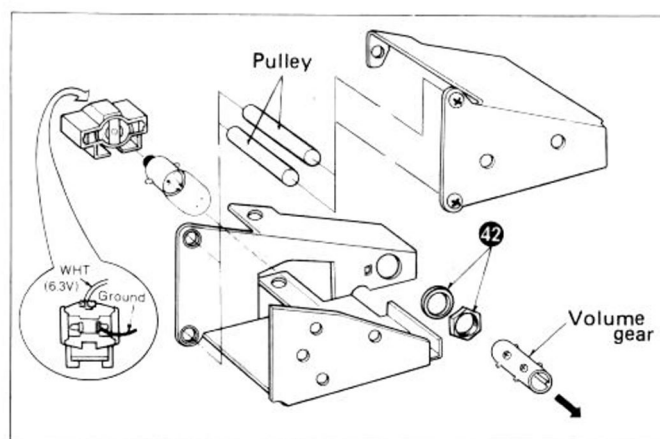


Fig. 6

• How to check the tone control printed circuit board

1. Remove the cabinet, bottom board and front panel. (Refer to the section "How to remove the cabinet", "How to remove the bottom board" and "How to remove the front panel").
2. Remove the 2 screws (Photo 1: 30 and 31) and 6 connectors (Photo 1: 32 ~ 37) of the equalizer printed circuit board.
3. Remove the 2 screws (Photo 1: 38 and 39) of the chassis.
4. Remove the equalizer printed circuit board in the direction of the arrow in Photo 1.
5. Remove the 2 screws (Photo 2: 43 and 44) of the fluorescent display tube ornament.
6. Remove the 3 screws (Photo 3: 45 ~ 47) and 4 screws (Photo 1: 48 and 51) of the logic printed circuit board.
7. Remove the 2 connectors (Photo 1: 52 and 53) of the logic printed circuit board, and then lift the circuit board in the direction of the arrow in Photo 1.
8. Remove the 4 screws (Photo 4: 54 ~ 57) of the shield plate.
9. Remove the shield plate.

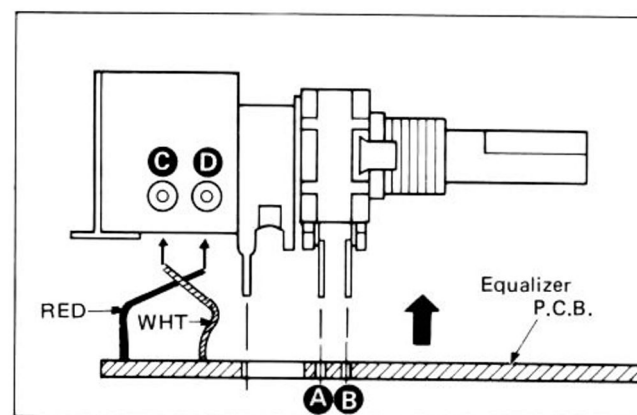


Fig. 7

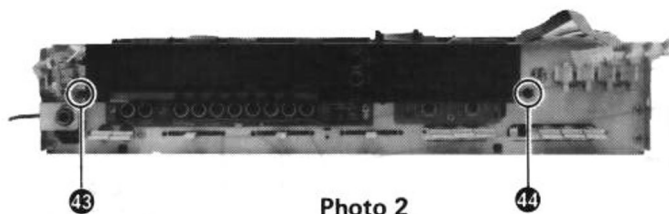


Photo 2

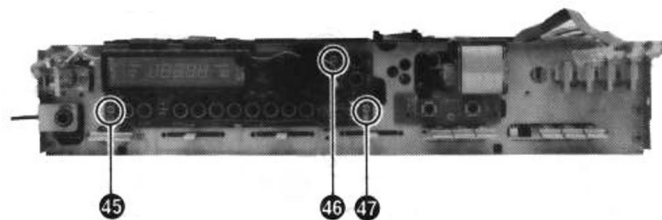


Photo 3

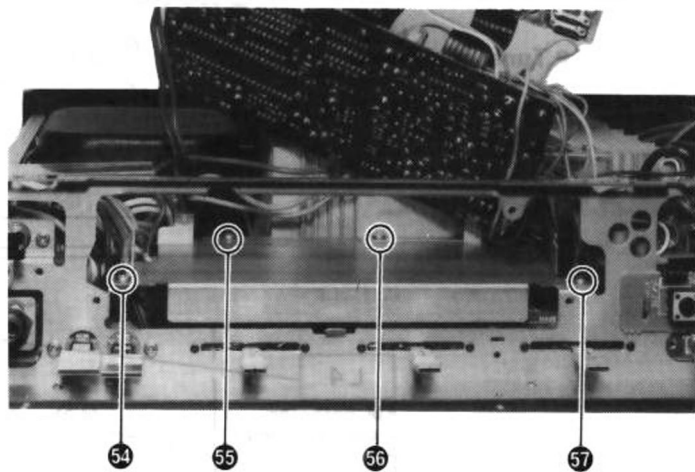


Photo 4

• Lead connector

1. To disconnect the lead wires from the lead connector, open the "lead holder" of the connector as shown in Fig. 8, and pull out the lead wires.
2. The lead wires are provided with identification colors or patterns as in Fig. 8. So, insert them into the connector in correct positions.
3. It is advisable to put pencil marks on both the leads and the connector beforehand for the convenience of insertion.

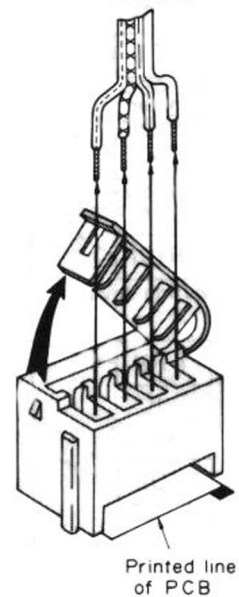
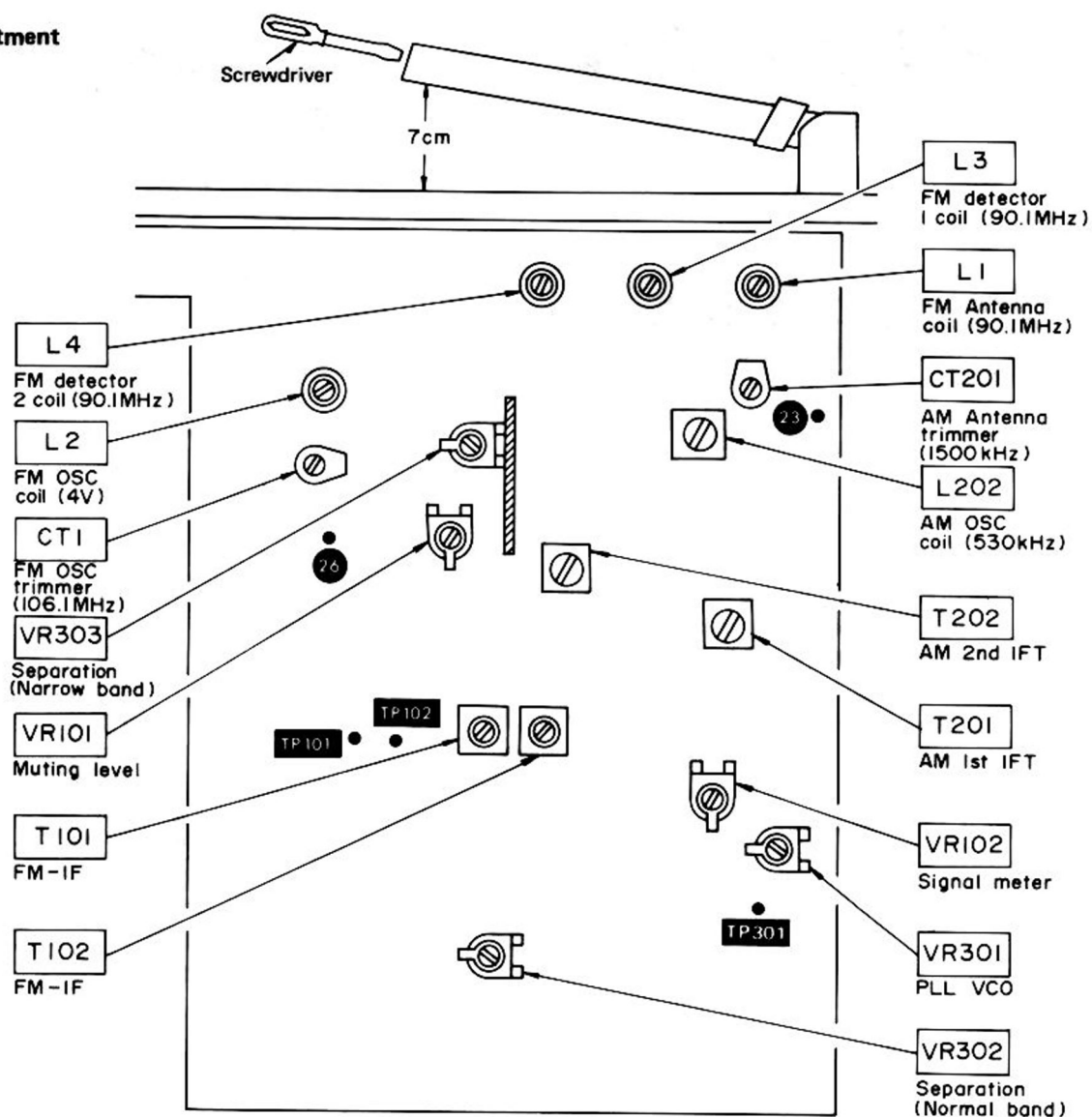


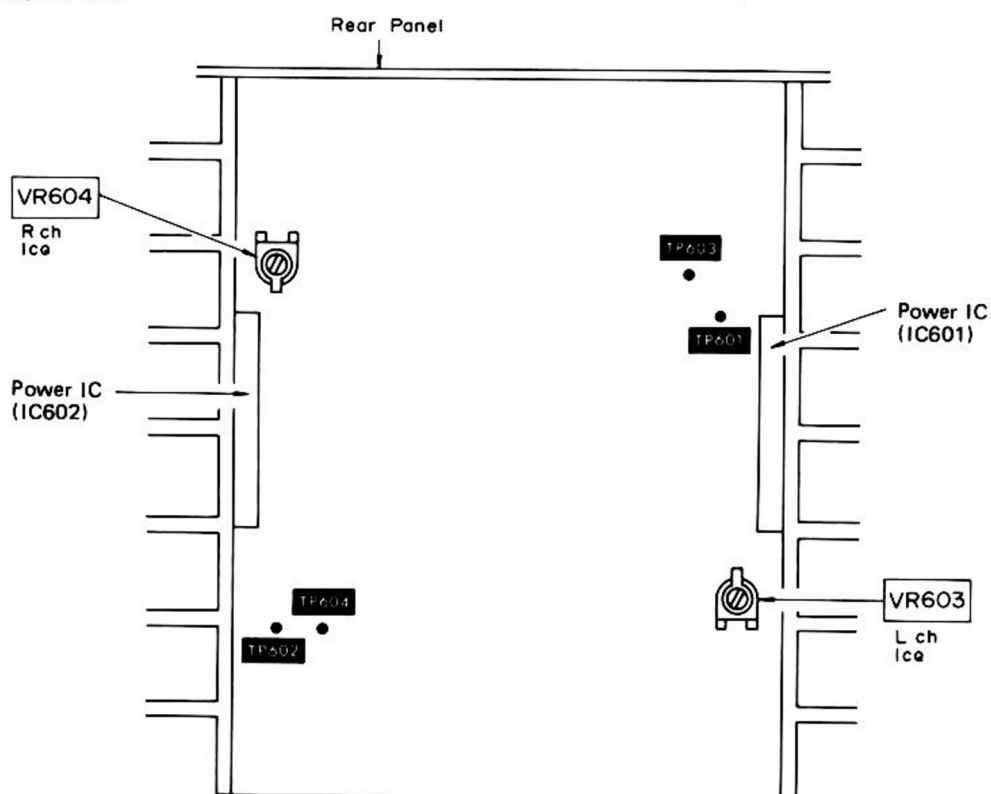
Fig. 8

ADJUSTMENT POINTS

• Tuner adjustment



• Amplifier adjustment



ADJUSTING INSTRUCTIONS

ENGLISH

AMPLIFIER ADJUSTMENT

● Setting of controls and instruments to be used

* Before the adjustment, VR603 and VR604 should be turned to counter-clockwise direction.

1. Speaker switch Main
2. Sound volume 0 (minimum)
3. DC voltmeter (capable to measure 5mV)

No.	ADJUSTMENTS	DC VOLTmeter CONNECTION	PARTS ADJUSTED	ADJUSTING PROCEDURE
1	Ica	(L channel) Between TP601 and TP603 (minus probe) (R channel) Between TP602 and TP604 (minus probe)	VR603 (L channel) VR604 (R channel)	* Adjust VR603 (L ch) and VR604 (R ch) to approx. 6mV after ten minutes warm-up time.

* Set FM/AM allocation selector to "FM 0.2MHz/AM 10kHz" position.

* Set antenna selector to "normal" position.

AM TUNER ADJUSTMENT

* Setting and Equipment used

1. AC and DC electronic voltmeters (VTVM)
2. AM signal generator (AM-SG)
3. Maintain line voltage at rated voltage.
4. Output of signal generator should be no higher than necessary to obtain an output reading.
5. Adjust the antenna coil (L201) position by using a screwdriver so that it is at approximately 7cm degrees to the rear panel.
6. Set input selector to "tuner" position.
7. Use a non-metal screwdriver for the adjustment.
8. Set FM muting/mode switch to "off/FM mono" position.
9. Set broadcast selector to "AM" position.
10. Set speaker selector to "main" position.

Step No.	AM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	CONNECTION	FREQUENCY				
	AM-IF ADJUSTMENT					
1	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Powerful input)	450kHz (30% Mod. with 400Hz)	Frequency of non-interference	Connect AC VTVM or scope to "Speaker" terminals of the set.	T201 (1st IFT) T202 (2nd IFT)	* Adjust the input frequency and adjustment points so that the output becomes maximum.
	AM-RF ADJUSTMENT					
2	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input)	530kHz (30% Mod. with 400Hz)	530kHz	Connect DC VTVM to ②3 terminal.	L202 (OSC Coil)	Adjust L202 to $1.1V \pm 0.05V$.
3		610kHz (30% Mod. with 400Hz)	610kHz	Connect AC VTVM to scope to "Speaker" terminals of the set.	L201 (ANT Coil)	1. Adjust for maximum output. 2. Adjust ferrite core of L201 by screwdriver.
4		1500kHz (30% Mod. with 400Hz)	1500kHz	Connect AC VTVM to scope to "Speaker" terminals of the set.	CT201(ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (3) and (4) until the frequency correctly matches the dial display.

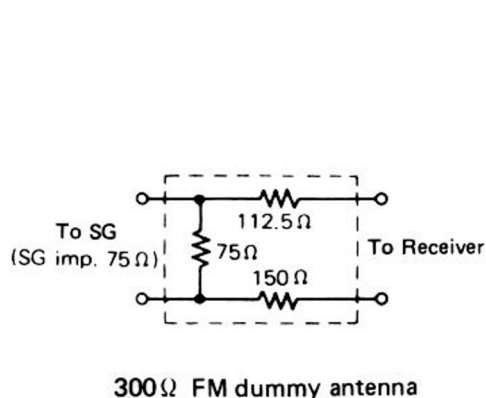


Fig. 9 (Abb. 9)

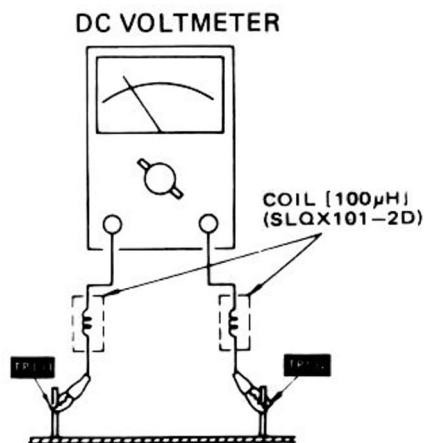
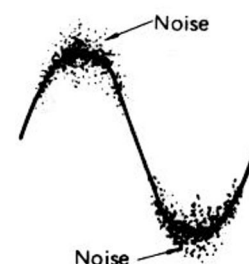


Fig. 10 (Abb. 10)



AF output wave form

Fig. 11 (Abb. 11)

FM TUNER ADJUSTMENT

* Equipment used

1. FM signal generator (FM-SG)
2. Stereo modulator
3. Distortion analyser
4. Oscilloscope
5. AC and DC electronic voltmeters (VTVM).
6. Frequency counter (19kHz and 108MHz measurable).
7. FM 300Ω dummy antenna (Fig. 9).

* 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. Set IF band selector to "normal" position.
2. Set broadcast selector to "FM" position.
3. Other setting are the same as in AM adjustment.

Step No.	FM SIGNAL GENERATOR		DISPLAY FREQUENCY	INDICATOR	ADJUSTMENT POINTS	REMARKS
	CONNECTION	FREQUENCY				
FM-IF ADJUSTMENT						
5	—	No-Signal	Frequency of non-interference	Connect DC VTVM between TP101 and TP102 through choke coil. (Refer to Fig. 10)	T101 (Discr. IFT)	Adjust T101 core so that voltage measured in signal mode is 0V in 300mV range.
FM RF ADJUSTMENT						
6	—	No-Signal	87.9MHz	Connect DC VTVM to 26 terminal.	L2 (OSC Coil)	Adjust L2 (OSC Coil) to 4.0V.
7	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna.	90.1MHz (100% Mod. with 400Hz) weak input	90.1MHz	Connect scope to "Speaker" terminals of the set.	L3 (RF DET Coil 1st) L4 (RF DET Coil, 2nd) L1 (ANT Coil) T1 (FM IFT)	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. (Refer to Fig. 11.) 3. Repeat the steps (7) and (8) until the frequency correctly matches the broadcasts frequency display.
8		106.1MHz (100% Mod. with 400Hz)	106.1MHz	Connect scope to "Speaker" terminals of the set.	CT1 (OSC Trimmer)	
FM MONO DISTORTION ADJUSTMENT						
9	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna. (Apply 60dB to antenna terminal)	100.1MHz (100% Mod. with 400Hz)	100.1MHz	Connect distortion analyser to "Speaker" terminals of the set.	T101, T102 (Discr. IFT)	1. Set the FM muting/FM mode switch to "on/auto" and then check step (5) in no signal mode. 2. If it is deflected, readjust of T101. 3. Adjust T102 core so that distortion of right and left channels are minimized.
FM MUTING LEVEL ADJUSTMENT						
10	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna. (Apply 12dB [product for [XA] only 10dB] to antenna terminal)	100.1MHz (100% Mod. with 400Hz)	100.1MHz	Connect AC VTVM or scope to "Speaker" terminals of the set.	VR101(Muting level)	1. Set the FM muting/FM mode switch to "off/mono". 2. With the FM muting/FM mode switch set to "on/auto", adjust VR101 so that the output is given with muting condition released.
SIGNAL METER LED (Light Emitting diode) INDICATOR ADJUSTMENT						
11	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna. (Apply 45dB to antenna terminal)	100.1MHz (100% Mod. with 400Hz)	100.1MHz	Signal meter LED	VR102 (Meter level)	Adjust VR102 while observing the signal meter LED so that the indicator at 5th is about to turn on.
FM MPX PILOT (VCO) ADJUSTMENT						
12	Connect FM-SG to FM antenna terminal through 300Ω FM dummy antenna. (Monaural signal)	100.1MHz (Non-modulated)	100.1MHz	Connect frequency counter to TP301 terminal.	VR301 (VCO)	1. Set the FM muting/FM mode switch to "on/auto". 2. Adjust VR301 to 19kHz ± 30Hz.

Step No.	FM SIGNAL GENERATOR		DISPLAY FREQUENCY	INDICATOR	ADJUSTMENT POINTS	REMARKS
	CONNECTION	FREQUENCY				
SEPARATION ADJUSTMENT (Normal IF band)						
13	Connect FM-SG to FM antenna terminal through 300 Ω FM dummy antenna. (Pilot 10% Mod. stereo signal)	100.1MHz (100% Mod. with 1kHz) (L or R mode)	100.1MHz	Connect AC VTVM to "Speaker" terminals of the set.	VR302 (Normal IF separation)	1. Set the IF band selector to "normal". 2. Set the FM muting/FM mode switch to "on/auto". 3. Adjust VR301 so that R output is minimized when stereo modulator is in L (L ch. modulation) mode and that L output is minimized in R mode.
SEPARATION ADJUSTMENT (Narrow IF band)						
14	Connect FM-SG to FM antenna terminal through 300 Ω FM dummy antenna. (Pilot 10% Mod. stereo signal)	100.1MHz (100% Mod. with 1kHz) (L or R mode)	100.1MHz	Connect AC VTVM to "Speaker" terminals of the set.	VR303 (Narrow IF separation)	1. Set the IF band selector to "narrow". 2. Set the FM muting/FM mode switch to "on/auto". 3. Adjust VR303 so that R output is minimized when stereo modulator is in L (L ch. modulation) mode and that L output is minimized in R mode.

EINSTELLUNGSANWEISUNGEN DEUTSCH

ICQ-EINSTELLUNG

- Vor der Abstimmung VR603 und VR604 bis zum Anschlag entgegen dem Uhrzeigersinn drehen.
- Einstellung der zu benutzenden Regler und Instrumente
 1. Lautsprecherschalter Hauptlautsprecher (main).
 2. Lautstärke "0" (Minimalstellung).
 3. Gleichstromvoltmeter 5mV Meßbereich erforderlich.

Nr.	Einstellungen	Gleichstromvoltmeter-verbindungen	Einstellungspunkte	Einstellungsvorgang
1	ICQ	L-Kanal. Zwischen TP601 und TP603 (Minustest) R-Kanal. Zwischen TP602 und TP604 (Minustest)	VR603 (L-Kanal) VR604 (R-Kanal)	*VR603 (L-Kanal) und VR604 (R-Kanal) auf ungefähr 6mV, nach 10 Minuten Anwärmezeit, einstellen.

- FM/AM Wellenverteilungs-Wahlschalter auf Position "FM 0.2MHz/AM 10kHz stellen.

AM (MW)-EINSTELLUNG

• Stellungen und zu benutzende Geräte

1. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
2. AM (MW)-Meßsender (AM-SG)
3. Netzspannung auf ihren Sollwerthalten.
4. Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute Ablesung.
5. Mittels eines Schraubenziehers die Stellung der Antennenspule (L201) so einstellen, daß, sie gegen die Rückenplatte einen Winkel von ca. 7cm macht.
6. Den Eingangswähler auf die "tuner"-Position stellen.
7. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.
8. FM Muting/Mode Schalter ... off/mono
9. Bereichsschalter ... AM
10. Lautsprecherschalter ... main

AM (MW)-MESSENDER		ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHsverfahren
ANSCHLUSS	FREQUENZ				
AM(MW)-ZF-ABGLEICH					
Nr. 1	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antenneneingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Starker Eingang)	450kHz (400Hz Modulat., 30%)	Kein Empfang	Oszilloskop oder Wechselstrom-Voltmeter über den Lautsprecher schließen.	T201 (1. IFT) T202 (2. IFT) Die Eingangsfrequenz und die Einstellungspunkte so adustieren, daß der Ausgang den maximalen Wert erreicht.

AM (MW)-MESSENDER		ANZEIGE FREQUENZ DURCH VOR- EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHsverfahren
ANSCHLUSS	FREQUENZ				
AM(MW)-HF-ABGLEICH					
Einen MW-Signal- generator über einen 200pF Kondensator mit dem MW-Anten- neneingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	530kHz (400Hz Modulat., 30%)	530kHz	Zwischen 23 und Erdung Gleichstrom- Voltmeter schließen.	L 202 (Osc. Spule)	L 202 so justieren, daß die vom Gleichstrom-Voltmeter gemessene. (1.1V±0.05V)
	610kHz (400Hz Modulat., 30%)	610kHz	Oszilloskop oder Wech- selstrom-Voltmeter über den Lautsprecher schließen.	L 201 (Ant. Spule)	1. Auf max. Ausgang abgleichen. 2. Den Ferritkern von L 201 mit einem Schraubendreher justieren.
	1500kHz (400Hz Modulat., 30%)	1500kHz	Oszilloskop oder Wech- selstrom-Voltmeter über den Lautsprecher schließen.	CT 201 (Ant. Trimmer)	1. Auf max. Ausgang abgleichen. 2. Die Schritte (3) und (4) wied- erholen, bis die Frequenz genau mit der Skalanzeige übereinstimmt.

FM (UKW)-EINSTELLUNG

- **Verwendete Einrichtungen**
 1. UKW-Meßsender (FM-SG)
 2. Stereo-Modulator (oder Trennmesser)
 3. Verzerrungsmesser
 4. Oszilloskop
 5. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
 6. Signalfrequenzmesser (meßbar für 19kHz und 108MHz)
 7. UKW 300-Ohm Kunstantenne (Abb. 9)

• **Zustand des Gerätes**

1. Den UKW-Antennenwahlschalter auf die "normal"-Stellung bringen.

• **Vorbereitung AM UKW-Messender (FM-SG)**

1. Stereo-Modulator an FM-SG anschließen.
2. SG-Ausgang über 300-Ohm UKW Kunstantenne an den Antenneneingang des Gerätes schließen.
3. Der normale Eingang des Gerätes beträgt 60dB (1mV), 400Hz 100% Modulation. (Wegen Verwendung der Kunstantenne muß der Signalausgang 12dB plus (IHF) sein: d.h. beim Eingang von 60dB soll der Signalausgang 72dB sein.)

2. Den Eingangswähler auf die "FM"-Position stellen.
3. Die anderen Einstellungen entsprechen den AM (MW)-Einstellungen.

FM (UKW) MESSENDER		ANZEIGE- FREQUENZ DURCH VOR- EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHsverfahren	
ANSCHLUSS	FREQUENZ					
UKW-ZF-ABGLEICH						
5	—	Kein Signal	Kein Empfang	Ein Gleichstromröhren-voltmeter zwischen TP101 und TP102 über eine Drosselspule verbinden. (Siehe Abb. 10)	T101 (Diskriminator FT) Den Kern von T101 so justieren, daß die gemessene Spannung im signallosen Modus 0V im 300mV Bereich beträgt.	
UKW-HF-ABGLEICH						
6	—	Kein Signal	87,9MHz	Zwischen 26 und Erdung Gleichstrom-Voltmeter schließen.	L2 (Osc. Spule) L2 so justieren, daß die vom Gleichstrom-Voltmeter gemessene Spannung 4,0V beträgt.	
7	Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen.	90,1MHz (400Hz Modulat., 100%)	90,1MHz	Oszilloskop über den Lautsprecher schließen.	L3 (HF Det. Spule 1) L4 (HF Det. Spule 2) L1 (Ant. Spule)	1. Einen schwachen Eingang geben, bei dem Geräusch in der Ausgangswellenform enthalten wird. 2. So einstellen, daß die Ausgangswellenform vertikal symmetrisch wird. (Abb. 11) 3. Die Einstellung von (7) und (8) wiederholen, bis die Frequenz mit der Skala übereinstimmt.
		106,1MHz (400Hz Modulat., 100%)	106,1MHz	Oszilloskop über den Lautsprecher schließen.	CT1 (Osc. Trimmer)	
ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO						
9	Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen	100,1MHz (400Hz Modulat., 100%)	100,1MHz	Klirrfaktor-Meßbrücke über den Lautsprecher schließen.	T101, T102 (Diskriminator FT) 1. Den UKW Muting/UKW-Betriebsartschalter auf "on/ auto" einstellen und dann Schritt (5) im signallosen Zustand prüfen. 2. Wenn Abweichung vorliegt (primäre Seite) von T101 wieder einstellen. 3. T102 Kern für minimale Verzerrung der rechten und linken Kanäle justieren.	

FM (UKW) MESSENDER		ANZEIGE FREQUENZ DURCH VOR- EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHsverfahren
ANSCHLUSS	FREQUENZ				
UKW-STUMMABSTIMMUNGS PEGELANZEIGER					
Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. (12dB in den Antenneneingang leiten.)	100.1MHz (400Hz Modulat., 100%)	100.1MHz	Oszilloskop oder Wechselstrom-Voltmeter über den Lautsprecher schließen.	VR101 (UKW-Muting)	1. Den UKW Muting/UKW-Betriebsartschalter auf "off/mono" einstellen. 2. "Muting" Schalter auf "on" stellen. VR101 so einstellen, daß der Ausgang unter Bewirken der Dämpfung gegeben wird.
ABGLEICHEN DES SIGNALMETER-LED (LICHTERZEUGENDE DIODE) – ANZEIGERS					
Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. Meßsender auf 45dB einstellen.	100.1MHz (400Hz Modulat., 100%)	100.1MHz	Signalmeter-LED	VR102 (Metervolumen)	Unter Beobachtung der Signalmeter-LED VR201 so justieren, daß der Anzeiger am 5. fast aufzuleuchten beginnt.
UKW-MPX-PILOTABGLEICH (VCO)					
Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. (Mono-Signal)	100.1MHz (Unmodulierte Welle)	100.1MHz	Signal frequenzmesser an TP301 schließen.	VR301 (VCO)	1. Den UKW Muting/UKW-Betriebsartschalter auf "on/auto" einstellen. 2. VR301 so abgleichen, daß Ausgangsfrequenz von TP301 19kHz±30Hz
TRENNUNG-ABGLEICH (Normal IF band)					
Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. (Stereo-Pilotsignal 10% moduliert.)	100.1MHz (400Hz Modulat., 100%) L- oder R-Betriebsart)	100.1MHz	Wechselstrom-Voltmeter über den Lautsprecher schließen.	VR302 (Normal IF Separation)	1. FM-ZF-Bandbreitenschalter ... normal 2. Den UKW Muting/UKW-Betriebsartschalter auf "on/auto" einstellen. 3. VR302 auf minimale Anzeige des R-Ausgangs bei Stereomodulator in L-(L-Kanalmodulation) Modus, und auf minimale Anzeige des L-Ausgangs in R-Modus abgleichen.
TRENNUNG-ABGLEICH (Narrow IF band)					
Meßsender über eine Kunstantenne an den UKW-Antenneneingang schließen. (Stereo-Pilotsignal 10% moduliert.)	100.1MHz (400Hz Modulat., 100%) L- oder R-Betriebsart)	100.1MHz	Wechselstrom-Voltmeter über den Lautsprecher schließen.	VR303 (Narrow IF Separation)	1. FM-ZF-Bandbreitenschalter ... narrow 2. Den UKW Muting/UKW-Betriebsartschalter auf "on/auto" einstellen. 3. VR302 auf minimale Anzeige des R-Ausgangs bei Stereomodulator in L-(L-Kanalmodulation) Modus, und auf minimale Anzeige des L-Ausgangs in R-Modus abgleichen.

INSTRUCTIONS DE REGLAGE — FRANÇAIS

REGLAGE DE ICQ

- Avant la mise au point, VR603 et VR604 devront être tournés dans la direction on inverse des aiguilles d'une montre.
- Réglage des commandes et instruments à utiliser
 - Commutateur du haut-par/eur Principal
 - Volume du son 0 (minimum)
 - Voltmètre CC (pouvant mesurer 5mV)

No.	Reglages	Connexions du voltmètre CC	Point de réglage	Procédé de réglage
1	ICQ	Canal G. Entre TP601 et TP603 (sonde au moins) Canal D. Entre TP602 et TP604 (sonde au moins)	VR603 (Canal G) VR604 (canal D)	Régle les VR603 (canal gauche) et VR604 (canal droit) sur env. 6mV après 10mn. de préchauffage.

- Régler le sélecteur d'attribution FM/AM sur la position "FM 0,2MHz/AM 10kHz".

REGLAGE DE AM

● Réglage et équipement utilisé

1. Voltmètres électronique de courant alternatif et de courant continu (VTVM)
2. Générateur du signal AM (AM-SG)
3. Conserve la tension du secteur à la tension nominale.
4. Le signal du générateur ne doit pas être plus élevé qu'il n'est nécessaire à obtenir une lecture en sortie.
5. Régler la position de la bobine (L201) de l'antenne en utilisant un tournevis de telle sorte qu'elle soit environ à 7cm de la plaque arrière.
6. Sélecteur d'entrée sur la position "tuner"
7. Utiliser un tournevis non-métallique pour le réglage.
8. Commutateur de silencieux/mode ... off/mono
9. Sélecteur de gamme ... AM
10. Commutateur du haut-parleur ... principal.

AM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE	
BRANCHEMENT	FREQUENCE					
REGLAGE DE FI-AM						
No. 1	Brancher le AM-SG à la borne de l'antenne AM par un condensateur de 200pF. Commun au châssis. (Entrée sous puissante)	450kHz (modulé à 30% par 400Hz)	Point sans signal	Brancher un c.a. voltmètre électronique ou un oscilloscope sur les bornes de haut-parleur de l'ampli-tuner.	T201 (1 transfo F1) T202 (2 transfo F1) Régler la fréquence d'entrée et les points de réglage de telle sorte que la sortie devienne maximale.	
REGLAGE DE RF-AM						
2	Brancher le AM-SG à la borne de l'antenne AM par un condensateur de 200pF. Commun au châssis. (Entrée faible)	530kHz (modulé à 30% par 400Hz)	530kHz	Brancher le voltmètre à courant continu entre 23 et la prise de terre.	L202 (Bobine OSC)	Régler L202 de telle sorte que le voltage mesuré par le voltmètre à courant continu, soit de 1.1V ± 0.05V.
3		610kHz (modulé à 30% par 400Hz)	610kHz	Brancher un c.a. voltmètre électronique ou un oscilloscope sur les bornes de haut-parleur de l'ampli-tuner.	L201 (Bobine Ant.)	1. Régler au maximum de signal de sortie. 2. Régler le noyau ferrite de L201 à l'aide d'un tournevis.
4		1500kHz (modulé à 30% par 400Hz)	1500kHz	Brancher un c.a. voltmètre électronique ou un oscilloscope sur les bornes de haut-parleur de l'ampli-tuner.	CT201 (Trimmer Ant.)	1. Régler au maximum de signal de sortie. 2. Refaire les étapes (3) et (4) jusqu'à ce que le fréquence s'aligne correctement avec l'affichage du cadran.

REGLAGE DE FM

● Equipement utilisé

1. Générateur du signal FM (FM-SG)
2. Commande de réglage stéréophonique (ou vu-mètre de séparation).
3. Jauge de distorsion.
4. Oscilloscope.
5. Voltmètres électronique de courant alternatif et de courant continu (VTVM).
6. Compteur de fréquence (19kHz et 108MHz mesurable).
7. Antenne fictive FM, 300 ohms (Fig. 9)

● Conditions de l'appareil

1. Placer le sélecteur de l'antenne FM sur la position "normal".
2. Sélecteur d'entrée sur la position "FM".
3. Les autres réglages sont les mêmes que les réglages de AM.

● Préparation du générateur de signal FM (FM-SG)

1. Brancher la commande de réglage stéréophonique à FM-SG.
2. Alimenter la sortie SG à la borne de l'antenne de l'appareil, par l'antenne fictive FM, 300 ohms.
3. L'entrée standard de l'appareil est de 60dB (1mV), 400Hz, 100% de modulation (à cause de l'utilisation de l'antenne fictive, la sortie SG doit être de plus 12dB (IHF). Ce qui signifie que quand l'entrée est de 60dB, la sortie SG doit être de 72dB.)

FM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE	
BRANCHEMENT	FREQUENCE					
REGLAGE DE FI-FM						
5	—	Sans Signal	Point sans signal	Brancher le voltmètre électronique a.c.c. aux bornes TP101 et TP102 . (Voir la Fig. 10)	T101 (Transfo FI discr.)	Régler le noyau T101 de telle sorte que le voltage mesuré dans le mode sans signal, soit de 0V dans la gamme des 300mV.
REGLAGE DE RF-FM						
6	—	Sans Signal	87.9MHz	Brancher le voltmètre à courant continu entre 26 et la prise de terre.	L2 (Bobin Osc.)	Régler L2 de telle sorte que le voltage mesuré par le voltmètre à courant continu soit de 4.0V.

FM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
BRANCHEMENT	FREQUENCE				
7 Branchez sur la prise d'antenne FM à travers une antenne fictive FM	90.1MHz (modulé à 100% par 400Hz)	90.1MHz	Branchez un oscilloscope sur les bornes de haut- parleur de l'amplifuner.	L3 (1er détecteur) L4 (2e détecteur) L1 (Bobin Ant.)	1. Appliquer une entrée faible de telle sorte que le parasite soit compris dans la forme de l'onde de sortie. 2. Faire le réglage de telle sorte que la forme de l'onde de sortie soit ver- ticalement symétrique. (Voir Fig. 11) 3. Refaire les réglages (7) et (8) jusqu'à ce que la fréquence corresponde cor- rectement avec l'échells du cadran.
	106.1MHz (modulé à 100% par 400Hz)	106.1MHz	Branchez un oscilloscope sur les bornes de haut- parleur de l'amplifuner.	CT1 (Trimmer Osc.)	
REGLAGE DE LA DISTORSION FM EN MONO					
9 Branchez sur la prise d'antenne FM à travers une antenne fictive FM.	100.1MHz (modulé à 100% par 400Hz)	100.1MHz	Branchez un distorsion mètre sur les bornes de haut-parleur de l'appareil.	T101, T102 (Transfo FI discrí.)	1. Placer la commutateur de réglage silencieux de FM/ mode de FM sur la position "on/auto" et vérifier l'étape (5) dans le mode sans signal. 2. S'il est déplacé, re-féglér (côté primaire) de T101. 3. Régler le noyau T102 de telle sorte que la distorsion des canaux droit et gauche soit la plus faible.
REGLAGE DU SEUIL DU SILENCIEUX D'ACCORD					
10 Branchez sur la prise d'antenne FM à travers une antenne fictive FM. (Appliquer 12dB à la borne de l'antenne.)	100.1MHz (modulé à 100% par 400Hz)	100.1MHz	Branchez un c.a. voltmètre électronique ou un oscilloscope sur les bornes de haut- parleur de l'amplifuner.	VR101	1. Placer le commutateur de réglage silencieux de FM/ mode FM sur "off/mono". 2. Avec le commutateur de mode/réglage silencieux "on/auto", régler le VR101 de telle sorte que la sortie fournie avec le réglage silencieux en position déclenchée.
ALIGNEMENT DE L'INDICATEUR DE SIGNAL DE LA DIODE A EMISSION DE LUMIERE (DEL)					
11 Branchez sur la prise d'antenne FM à travers une antenne fictive FM. Niveau de sortie du générateur 45dB	100.1MHz (modulé à 100% par 400Hz)	100.1MHz	DEL du compteur à signal de l'aiguille du cadran.	VR102 (Registor variable du compteur)	Réglez VR102 en observant la DEL du compteur à signal afin que l'indicateur au 5 ème est à presque tourner.
REGLAGE (VCO) PILOTE MULTIPLEX FM					
12 Branchez sur la prise d'antenne FM à travers une antenne fictive FM. (Signal monoscoust- tique)	100.1MHz Non modulé	100.1MHz	Brancher le compteur de fréquence à TP301	VR301	1. Placer le commutateur de réglage silencieux de FM/ mode FM sur "on/auto". 2. Régler VR301 de telle sorte que la fréquence de sortie de TP301 soit de 19kHz ±30Hz.
REGLAGE DE LA SEPARATION DES CANAUX (Normal IF band)					
13 Branchez sur la prise d'antenne FM à travers une antenne fictive FM. (Signal stéréo pilote à 10% de modulation)	100.1MHz (modulé à 100% par 400Hz) (Mode G ou D.)	100.1MHz	Branchez un oscilloscope sur les bornes de haut- parleur de l'amplifuner.	VR302 (Normal IF Separa- tion)	1. Interrupteur de gamme FM- IF ... normal. 2. Placer le commutateur de réglage silencieux de FM/ mode FM sur "on/auto". 3. Régler VR302 de telle sorte que la sortie droite soit mini- male quand la commande d'accord stéréophonique est dans le mode gauche (modulation du canal gauche) et que la sortie gauche soit minimale dans mode droit.

FM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
BRANCHEMENT	FREQUENCE				
REGLAGE DE LA SEPARATION DES CANAUX (Narrow IF band)					
Branchez sur la prise d'antenne FM à travers une antenne fictive FM. (Signal stéréo pilote à 10% de modulation)	100.1MHz (modulé à 100% par 400Hz) (Mode G ou D.)	100.1MHz	Branchez un oscilloscope sur les bornes de haut-parleur de l'amplificateur.	VR303 (Narrow IF Separation)	1. Interrupteur de gamme FM-IF ... narrow. 2. Placer le commutateur de réglage silencieux de FM/ mode FM sur "on/auto". 3. Régler VR303 de telle sorte que la sortie droite soit minimale quand la commande d'accord stéréophonique est dans le mode gauche (modulation du canal gauche) et que la sortie gauche soit minimale dans mode droit.

■ HOW TO REPLACE CHIPS

(RESISTOR, CAPACITOR AND JUMPER)

1. Remove solder from chip by using solder sucker.
2. Remove chip with tweezers by rotating it while removing solder as shown in fig. 12.
3. Solder circuit board first and then solder chip in the direction of the arrow as shown in fig. 13.

Notes:

1. Do not use chip again which is removed from printed circuit board.
2. Use lead wire with insulator for replacement instead of chip jumper.

Color	Original Parts Name
Black	Chip Resistor and Jumper
Brown, White or Green	Chip Capacitor

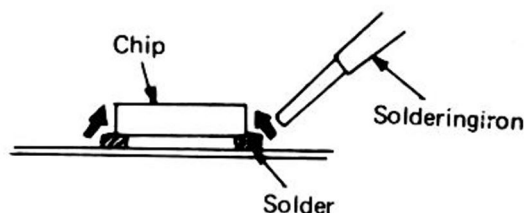


Fig. 13

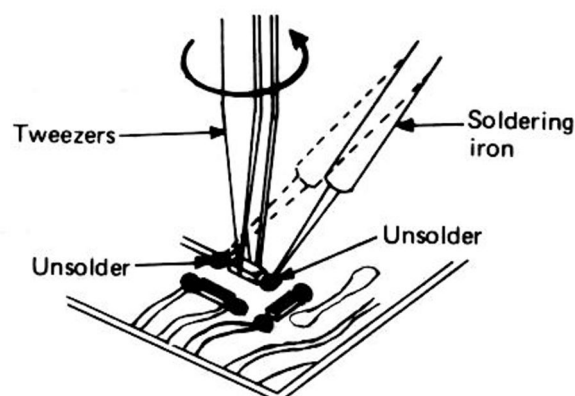


Fig. 12

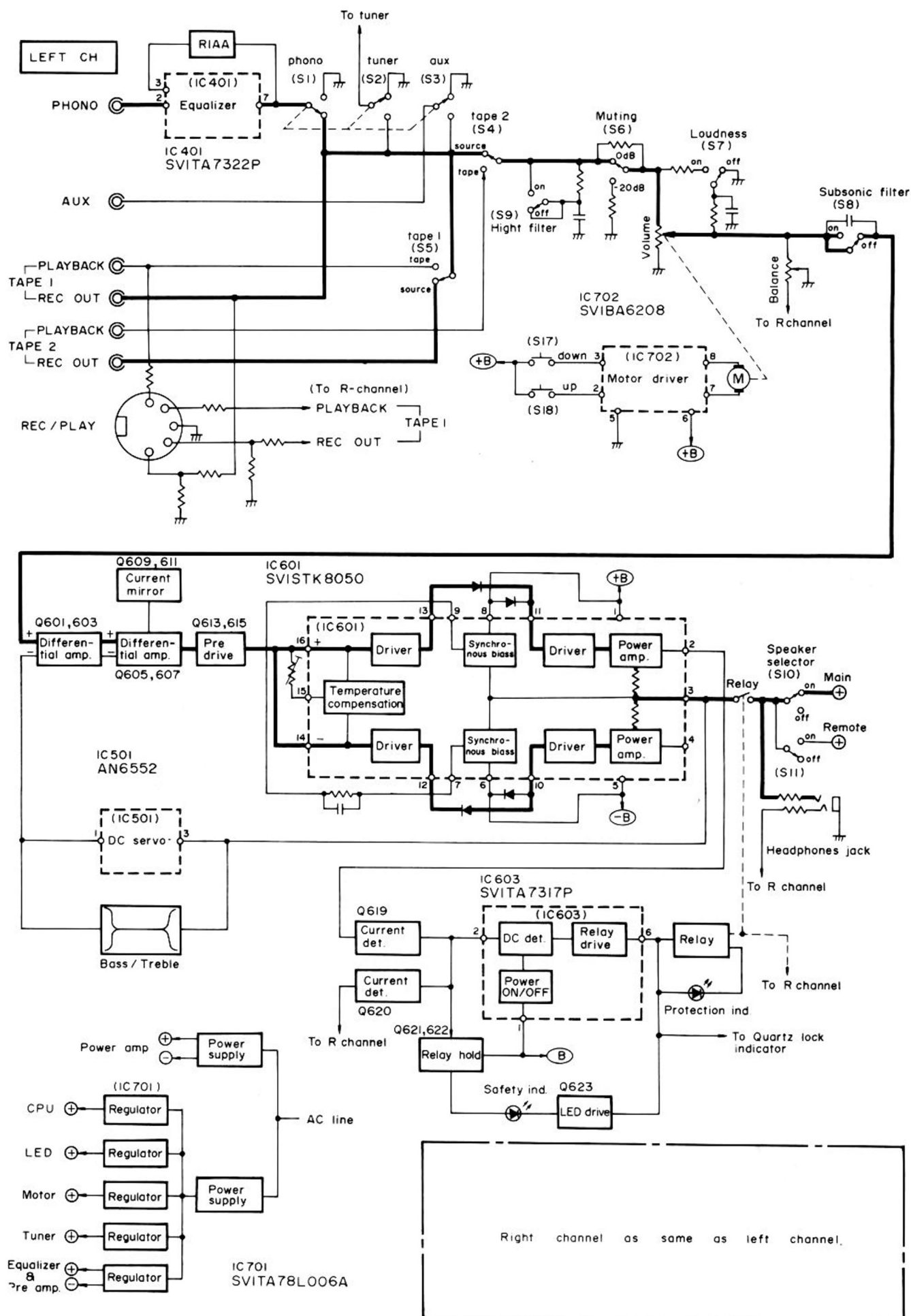
• Note for replacing chips

1. Do not heat chips more than three (3) seconds.
2. Be careful not to damage the electrode of chips.
3. Use soldering iron (less than 60W) and tweezers for replacing chips.

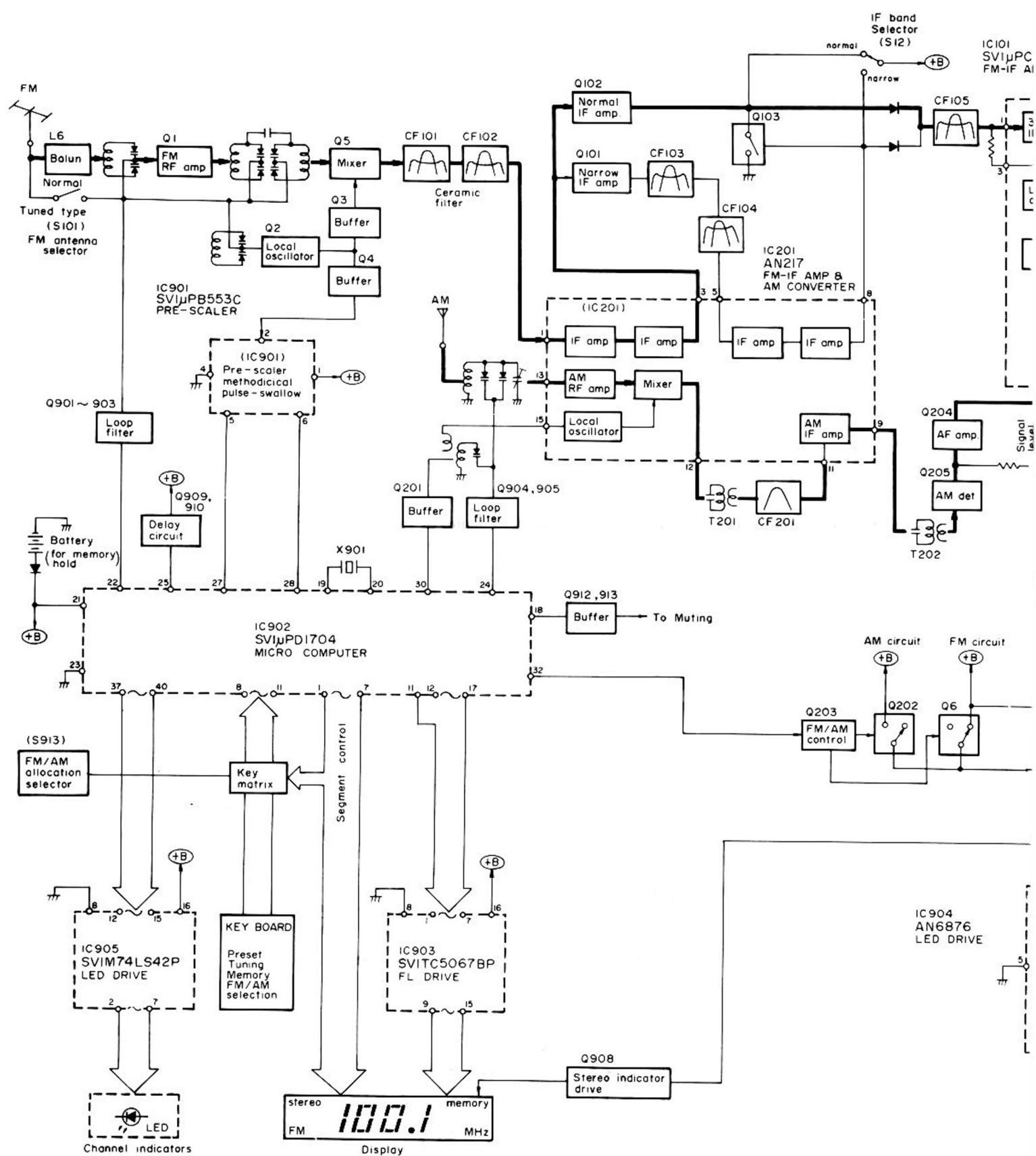
• Precautions for repair

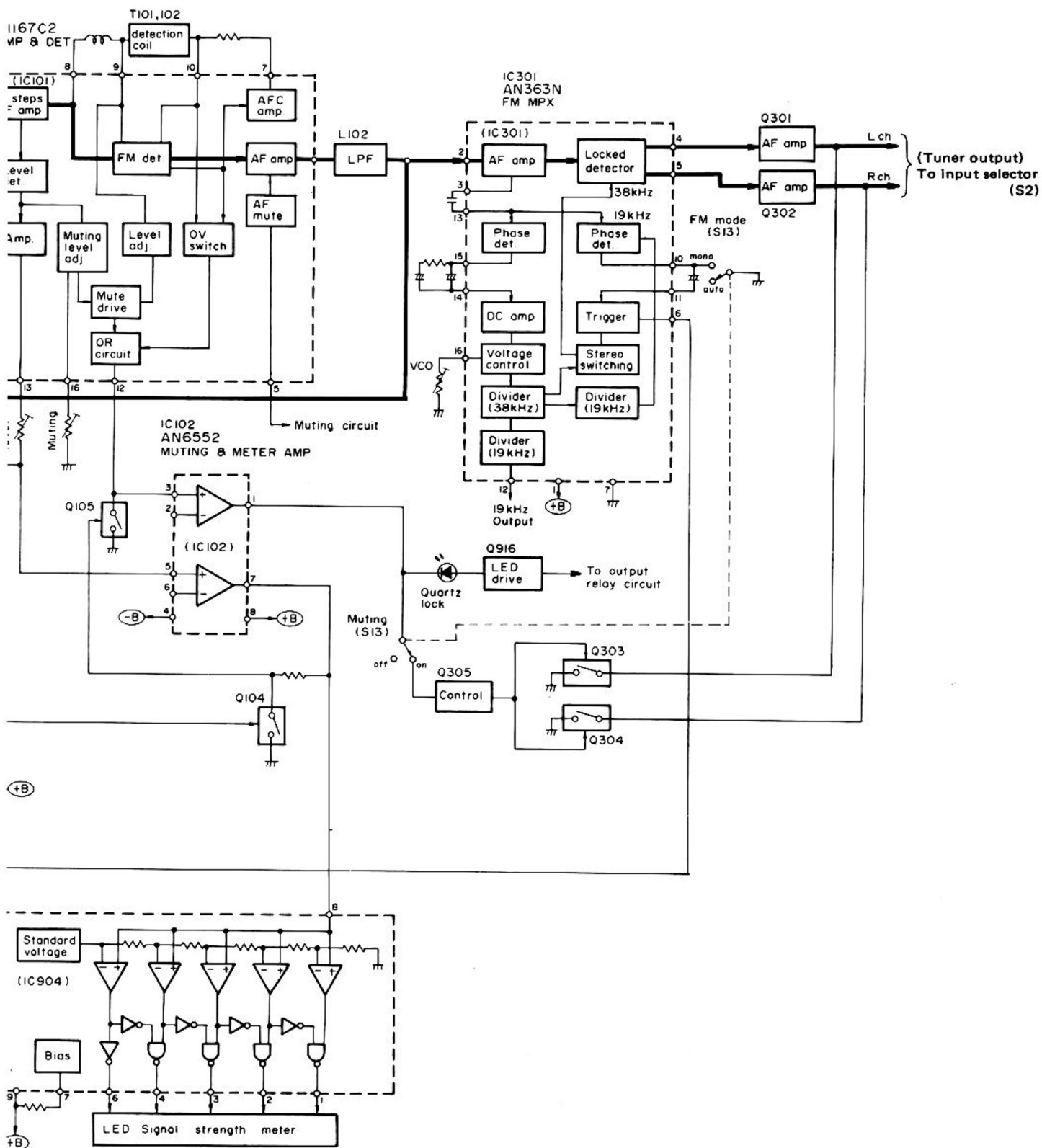
When frequency is not indicated, FL (display tube), FL driver, digit circuit, and micro-computer must be checked by oscilloscope. In this case, take care not to allow shortcircuit between IC terminals or application of voltage from measuring instrument to IC terminals.

BLOCK DIAGRAM (Amplifier and Tone control)



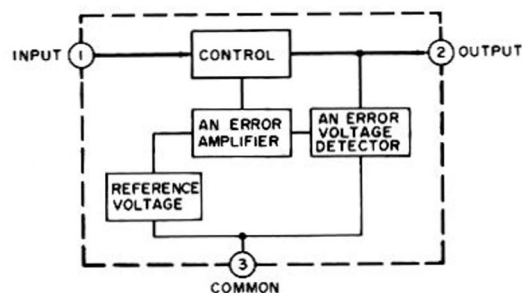
BLOCK DIAGRAM (Tuner and Display)





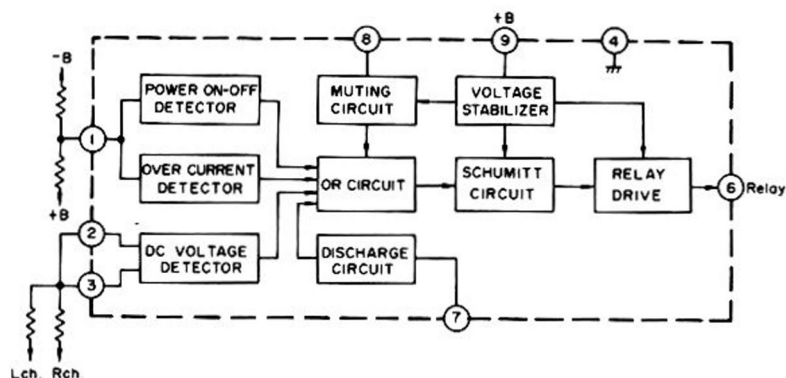
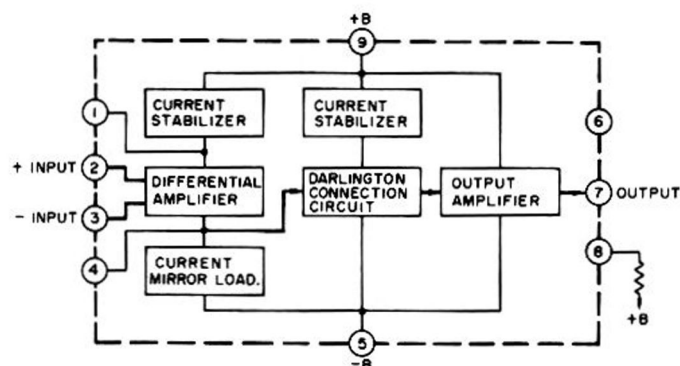
■ BLOCK DIAGRAM OF IC'S

This is the basic block diagram of the inside circuit of IC. In an actual circuit, there may be sometimes idle terminals or some different functions other than the basic circuit.



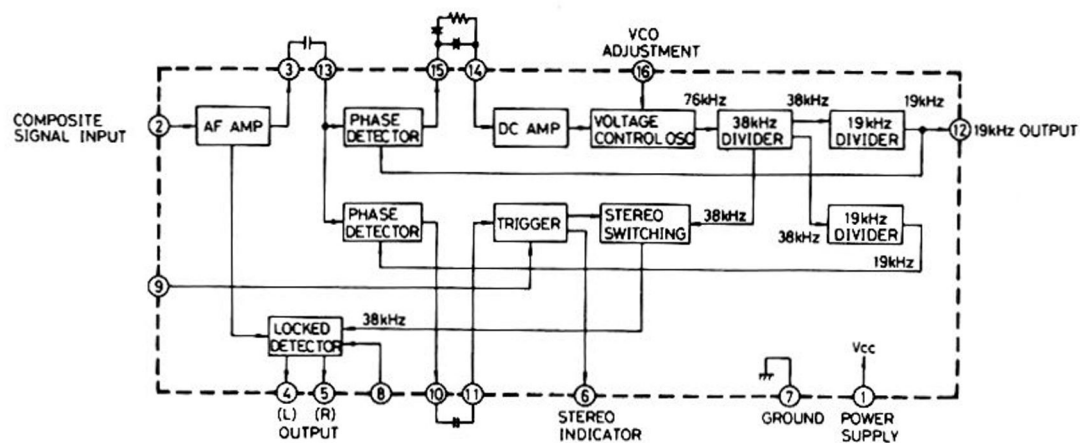
IC701 (SVITA78L006A)
Voltage regulator

IC401, 402 (SVITA7322P)
Equalizer amp.



IC603 (SVITA7317P)
Speakers protection

IC301 (AN363N)
FM Multiplex



■ VOLUME SWITCH (S17 and S18)

● 2-step tact switch

The switch (volume up/down switch) used in the motor volume circuit of this unit is a 2-step tact switch. This switch has a common terminal and terminals 1, 2, 3 as shown in Fig. 14.

When the switch is lightly pressed, the common terminal is connected to terminals 1 and 3 (Fig. 15).

When the switch is strongly pressed, the common terminal is connected to terminals 1, 2 and 3 (Fig. 16).

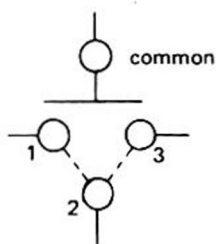


Fig. 14

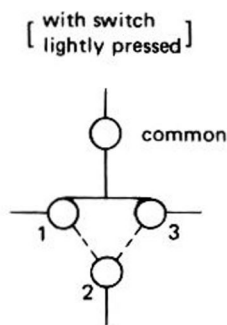


Fig. 15

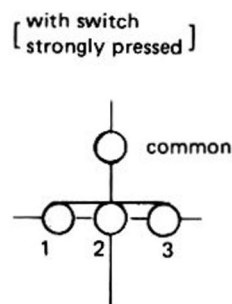


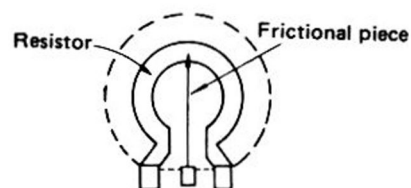
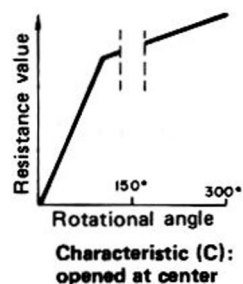
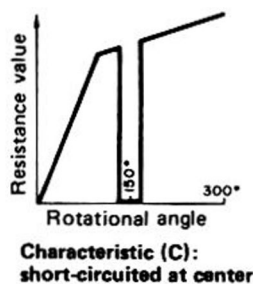
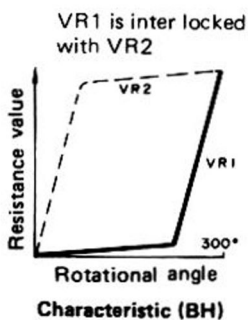
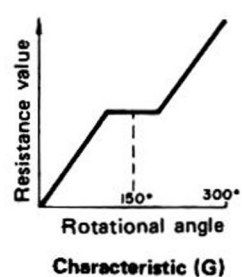
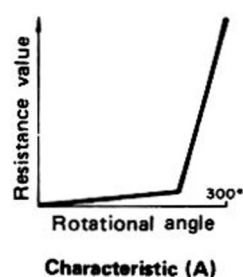
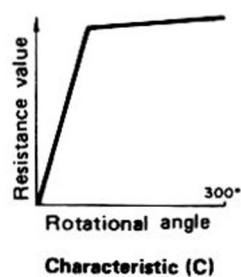
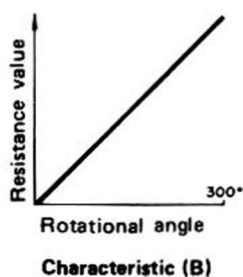
Fig. 16

■ VARIABLE RESISTORS

● Alteration of resistance values according to the rotational angles of variable resistors

Alteration characteristics as shown below are often used for sets. All are intended to keep the frequency response of the set at optimum levels, and are used according to the types of circuits. For example, characteristic (B) is used for sound volume adjustment; (A) and (C) are for bass and treble sound quality adjustment; (G) is for medium sound quality adjustment; and (BH) is for the adjustment of sound balance between the right and left.

In the case of this unit, variable resistor with characteristic (C) which is short-circuited between its ends at rotational angle of 150° (center) is used for bass adjustment. Also, variable resistor with characteristic (C) whose resistance is zero at rotational angle of 150° (center) is used for treble adjustment. And characteristic (BH) in which two variable resistors are interlocked with characteristics (C) and (A) combined is used for the adjustment of sound level balance.



REPLACEMENT PARTS LIST Electrical Parts

- Notes:** 1. Part numbers are indicated on most mechanical parts. Please use this part number of parts orders.
 2. Δ indicates that only parts specified by the manufacturer be used for safety.
 3. Bracket indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Areas

- * [E] and [EG] are available in Scandinavia and European.
 * [XAL] is available in Australia.
 * [XA] is available in Asia, Latin America, Middle East and Africa.
 * [XGH] is available in Holland.
 * [EB] is available in Belgium.

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUIT		
IC101	SVIUPC1167C2	IC, FM IF Amp. & EM Detector
IC102	AN6552F	IC, Muting & Meter Amplifier
IC201	AN217P-BB	IC, AM & FM IF Amplifier
IC301	AN363N	IC, FM Multiplex
IC401, 402	SVITA7322P	IC, Equalizer Amplifier
IC501	AN6552F	IC, Tone Amplifier
IC601, 602	SVISTK8050	IC, Synchronous, Bias Circuit and Power Amplifier
IC603	SVITA7317P	IC, Speakers Protection
IC701	SVITA78L006A	IC, Regulator
IC702	SVIBA6208	IC, Motor Driver
IC901	SVIUPB553C-E	IC, Pre-Scaler
IC902	SVIUPD1704CL	IC, Micro-Computer
IC903	SVITC5067BP	IC, FL Driver
IC904	AN6876	IC, LED Driver
IC905	SVIM74LS42P	IC, Decoder
TRANSISTORS		
Q1	3SK74-L1	Transistor, FM RF Amplifier [FET]
Q2~4	2SC2295	Transistor, FM Oscillator & Buffer (Chip)
Q5	2SC2404	Transistor, FM Mixer (Chip)
Q6, 202, 301, 302, 305, 910, 912, 914, 915, 916	2SB709	Transistor, Switching, AF Amplifier, Buffer & Driver (Chip)
Q7, 103, 104, 105, 203, 204, 906, 907, 909, 913	2SD601	Transistor, Switching & Driver (Chip)
Q101, 102, 201	2SC2778	Transistor, FM IF Amplifier & Buffer (Chip)
Q205, 918	2SC1684-R	Transistor, Switching (Use in ranks R or S)
Q303, 304	2SD601	Transistor, Mute Switching (Chip)
Q601~604	2SC2320L-F	Transistor, Differential Amplifier (Use in ranks F or G)
Q605~608	2SC2631-R	Transistor, Differential (Use in ranks R, S or T)
Q609~612	2SA666AI-R	Transistor, Current Mirror (Product Part No. 2SA564-Q or R)
Q613, 614	2SA921-T	Transistor, Pre-Driver (Use in ranks Q, R or S)
Q615, 616, 711	2SA1124-R	Transistor, Pre-Driver (Use in ranks R, S or T)
Q617, 618	2SC2632-R	Transistor, Constant Current (Use in ranks R, S or T)
Q619, 620, 622, 623	2SC1845	Transistor, Current Detector & LED Driver
Q621	2SA992	Transistor, Relay Hold
Q701, 712	2SA1015-Y	Transistor, Regulator (Use in ranks Y or O)
Q702	2SD880-Y	Transistor, Regulator
Q703	2SK34-D1	Transistor, Current Stabilizer [FET]
Q705, 708	2SC1815-Y	Transistor, Regulator & Switching (Use in ranks Y or O)
Q706, 710	2SC2632-R	Transistor, Regulator
Q707	2SD762-O	Transistor, Regulator (Use in ranks O or P)
Q709	2SC1509-R	Transistor, Switching (Use in ranks Q, R or S)
Q901~905	2SD601A	Transistor, Loop Filter (Chip)
Q908	2SB709A	Transistor, Buffer (Chip)
DIODES		
D1~4	SVDBB204	Diode, Variable Capacitor (for FM)
D101~105, 202~204, 206, 301, 603, 604, 616	MA162A	Diode, Switching, AGC & Detector (Product Part No. MA150)
D201	SVDBB113	Diode, Variable Capacitor (for AM)
D205	2-0A90	Diode, AM Detector
D401~403	LN224RP	Light Emitting Diode, Green
D404, 405	LN424YP	Light Emitting Diode, Yellow
D601, 602	MA162A	Diode
D605~612	2-0A90	Diode, Synchronous Bias
D613, 614, 617	MA162A	Diode, Detector & Relay Pulse Killer
D615	SVDSR1K2	Rectifier
D618	LN417YP	Light Emitting Diode, Yellow
D619	LN217RP	Light Emitting Diode, Red
D701~704	SVDS3V40	Rectifier
D705, 706, 709, 710, 713, 716, 718, 915	SVDSR1K2	Rectifier
D707, 708	SVDMZ318B	Diode, 18V Zener

Ref. No.	Part No.	Part Name & Description
D712, 715, 719, 720	SVDMZ316A	Diode, 16V Zener
D714	SVDEQA0113RA	Diode, 13V Zener (Product Part No. MA1130A)
D717	SVDMZ307C1	Diode, 8V Zener
D721	SVDMZ304A	Diode, 4V Zener
D901, 904~914, 916, 918~926, 940, 943, 945~947	MA162A	Diode (Product Part No. MA150)
D902	SVDMZ303A	Diode, 3V Zener
D903	2-0A99	Diode
D917	RVDRD6R2EB	Diode, 6.2V Zener (Product Part No. MA1062A)
D927~933, 939	LN217RP	Light Emitting Diode, Red
D934~938	LN417YP	Light Emitting Diode, Yellow
D942	LN224RP	Light Emitting Diode, Red
D944	SVDMZ327B	Diode, 27V Zener
COILS and TRANSFORMERS		
L1	SLA4P43	Coil, FM Antenna
L2	SLO4P67-P	Coil, FM Local Oscillator
L3, 4	SLD4P35-P	Coil, FM RF Detector
L5	ELQ5A77	Coil, Choke
L6	SLAA4W1-3	Coil, FM Antenna Balun
L101	SLQW270-1K	Coil, Choke
L102	SLM1C61-P	Coil, Choke
L201	SLF2D69-1	Coil, AM Ferrite Bar Antenna
L202	SLO2C25-P	Coil, AM Local Oscillator
L601, 602	SLQY15G-30	Coil, Choke
L701, 702	SLQX391-P	Coil, Choke
L901	RLQY25S5-0	Coil, Choke
T101	SLI4C511-K	Transformer, FM IF Discriminator
T102	SLI4C513-K	Transformer, FM IF Discriminator
T201	SLI2C127	Transformer, AM IF
T202	SLI2C413R	Transformer, AM IF
T701	SLT5P201	Transformer, Power Source
CERAMIC FILTERS		
CF101, 102, 103, 105	SVFE107MM-A	Ceramic Filter, 10.7MHz (Red)
	SVFE107MM-B	Ceramic Filter, 10.68MHz (Blue)
	SVFE107MM-C	Ceramic Filter, 10.72MHz (Orange)
CF104	SVFE107M22-A	Ceramic Filter, 10.7MHz (Red)
	SVFE107M22-B	Ceramic Filter, 10.675MHz (Blue)
	SVFE107M22-C	Ceramic Filter, 10.725MHz (Orange)
		(Use pair ranks as same as CF101~104 and 105)
CF201	SVFSP450HT	Ceramic Filter, AM 450kHz
CRYSTAL		
X901	SVQ43U452	Crystal, Counter Oscillator (4.5MHz)
VARIABLE RESISTORS		
VR1-1, 1-2	EUWMCB063BF5	Volume Control (with motor)
VR2	EVBV35C20C15	Bass Control, 100k Ω (C)
VR3	EVBV37C20C15	Treble Control, 100k Ω (C)
VR4	EVAV32C20G25	Balance Control, 250k Ω (G)
VR101	EVTS3MA00B34	Muting Level Adjustment, 30k Ω (B)
VR102	EVTS3MA00B24	Signal LED Meter Adjustment, 20k Ω (B)
VR301	EVTS3MA00B53	PLL MPX Adjustment, 5k Ω (B)
VR302	EVTS3MA00B14	Normal Separation Adjustment, 10k Ω (B)
VR303	EVTS0AA00B14	Narrow Separation Adjustment, 10k Ω (B)
VR603, 604	EVNM4AA00B53	ICQ Adjustment, 5k Ω (B)
VARIABLE CAPACITORS		
CT1	ECV1ZW06X32E	Trimmer, FM Local Oscillator
CT201	ECV1ZW10X32	Trimmer, AM Antenna
THERMISTERS		
TH101, 102	ERTD2FHL103S	Thermistor, Thermal Compensation, 10k Ω
TH601, 602	ERTD2FHL103S	Thermistor, Thermal Compensation, 10k Ω
FUSES		
F1	XBA2C40TR0	Fuse, Power Source (T4.0A, 250V)
F2	XBA2C20TR0	Fuse, Power Source (T2.0A, 250V)
F3, 4	XBA2C10TR0	Fuse, Power Source (T1.0A, 250V)

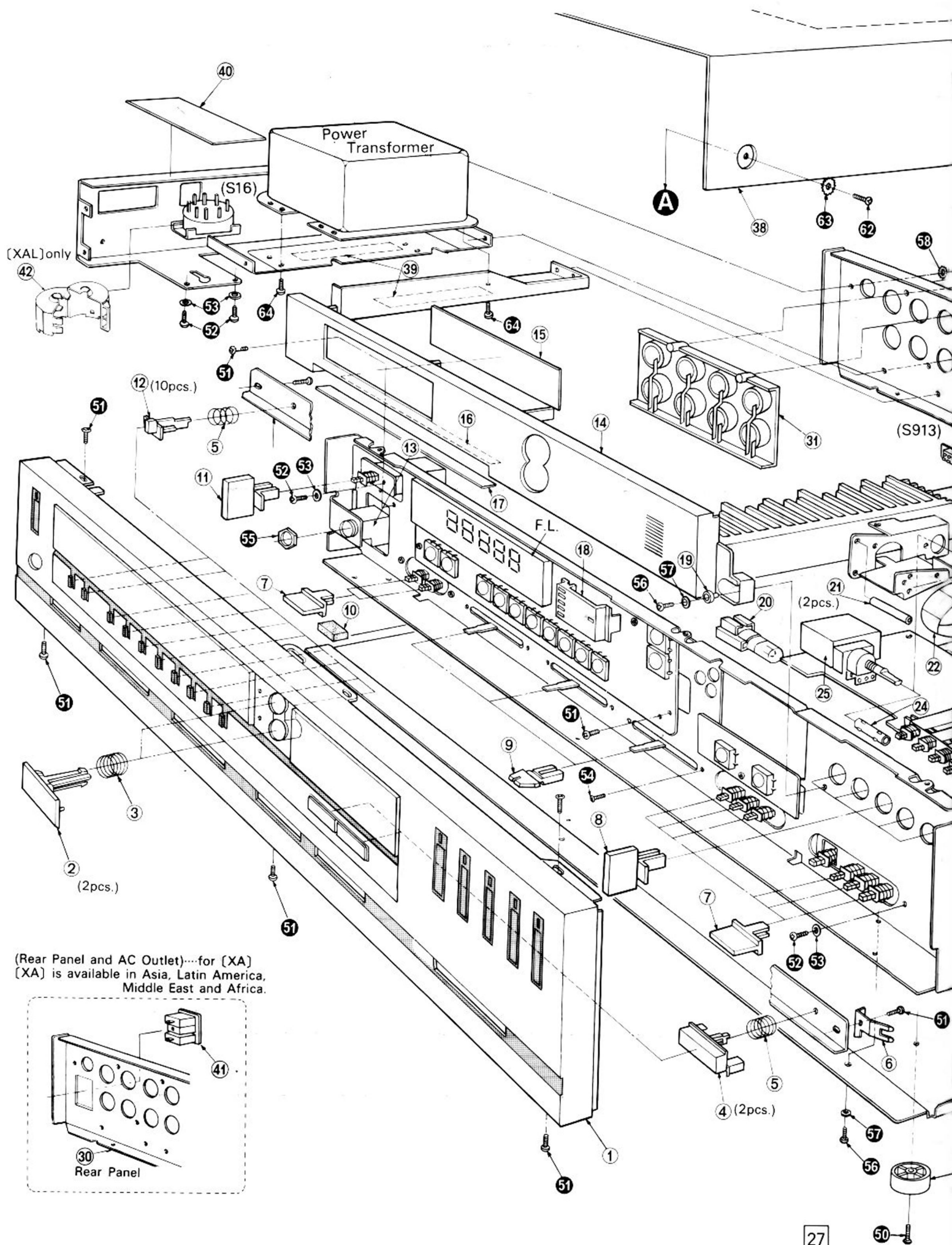
Ref. No.	Part No.	Part Name & Description
LAMP		
PL1	△ XAMR53S	Lamp, 6.3V 250mA
COMPONENT COMBINATIONS		
Z601, 602 Z701~705 Z901, 902 Z903, 904	△ ECQJ0517 EXRFS2032S EXBP87104K EXFP7331M	Component Combination, 10Ω & 0.047μF Component Combination, 0.01μF (x2) Component Combination, 100kΩ (x7) Component Combination, 330pF (x7)
FLUORESCENT DISPLAY TUBE		
FL	SAD7MT09ZA	Fluorescent Display Tube
RELAY		
RLY1	△ SSY69	Relay, Speaker Protection
SWITCHES		
S1~5 S6~9, 12~14	SSH527 SSH707	Switch, Input Selector & Tape Monitor Switch, Audio Muting/Loudness/Subsonic Filter/High Filter/FM IF Band/FM Muting/ Auto Scan
S10, 11 S15 S16 S17, 18 S101, 913	△ SSH289 SSH119 ESE37200 SSG5 ESD14116	Switch, Speaker Selector Switch, Power Source Switch, Voltage Adjustment Switch, Volume "up" and "down" Switch, FM Antenna & FM/AM Allocation Selector
S901~912	SSG1	Switch, Memory/Preset/FM-AM/Manual
RESISTOR		
R1	ERD25TJ104	Carbon, 100kΩ, 1/4W, ±5%
R2, 3	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R4	RRD18XX223	Chip, 22kΩ, 1/8W, ±10%
R5	RRD18XX563	Chip, 56kΩ, 1/8W, ±10%
R6	ERD25FJ100	Carbon, 10Ω, 1/4W, ±5%
R7	RRD18XX223	Chip, 22kΩ, 1/8W, ±10%
R8	ERD10TJ470	Carbon, 47Ω, 1/8W, ±5%
R9	RRD18XX333	Chip, 33kΩ, 1/8W, ±10%
R10	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R11	RRD18XX122	Chip, 1.2kΩ, 1/8W, ±10%
R12	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R13	RRD18XX473	Chip, 47kΩ, 1/8W, ±10%
R14, 15	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R16	RRD18XX221	Chip, 220Ω, 1/8W, ±10%
R17	RRD18XX472	Chip, 4.7kΩ, 1/8W, ±10%
R18	RRD18XX333	Chip, 33kΩ, 1/8W, ±10%
R19	RRD18XX822	Chip, 8.2kΩ, 1/8W, ±10%
R20	RRD18XX221	Chip, 220Ω, 1/8W, ±10%
R21	RRD18XX332	Chip, 3.3kΩ, 1/8W, ±10%
R22	RRD18XX333	Chip, 33kΩ, 1/8W, ±10%
R23	RRD18XX821	Chip, 820Ω, 1/8W, ±10%
R24	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R25	RRD18XX821	Chip, 820Ω, 1/8W, ±10%
R27	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R28	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R29	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R31	ERD25TJ563	Carbon, 56kΩ, 1/4W, ±5%
R32	ERD25TJ184	Carbon, 180kΩ, 1/4W, ±5%
R33	ERD25TJ104	Carbon, 100kΩ, 1/4W, ±5%
R101	RRD18XX681	Chip, 680Ω, 1/8W, ±10%
R102	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R103, 104	RRD18XX331	Chip, 330Ω, 1/8W, ±10%
R105	RRD18XX152	Chip, 1.5kΩ, 1/8W, ±10%
R106	RRD18XX391	Chip, 390Ω, 1/8W, ±10%
R107	RRD18XX152	Chip, 1.5kΩ, 1/8W, ±10%
R108	RRD18XX331	Chip, 330Ω, 1/8W, ±10%
R109	RRD18XX221	Chip, 220Ω, 1/8W, ±10%
R110	RRD18XX562	Chip, 5.6kΩ, 1/8W, ±10%
R111	RRD18XX223	Chip, 22kΩ, 1/8W, ±10%
R112	RRD18XX562	Chip, 5.6kΩ, 1/8W, ±10%
R113	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R114	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R115	RRD18XX331	Chip, 330Ω, 1/8W, ±10%
R116	RRD18XX824	Chip, 820kΩ, 1/8W, ±10%
R117	RRD18XX153	Chip, 15kΩ, 1/8W, ±10%
R118	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R119	ERD10TJ472	Carbon, 4.7kΩ, 1/8W, ±5%
R120	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R121	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R122	ERD10TJ470	Carbon, 47Ω, 1/8W, ±5%
R123	ERD25FJ472	Carbon, 4.7kΩ, 1/4W, ±5%
R124	ERD25CKF5601	Metal Film, 5.6kΩ, 1/4W, ±1%
R125	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R127	RRD18XX223	Chip, 22kΩ, 1/8W, ±10%
R128	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%

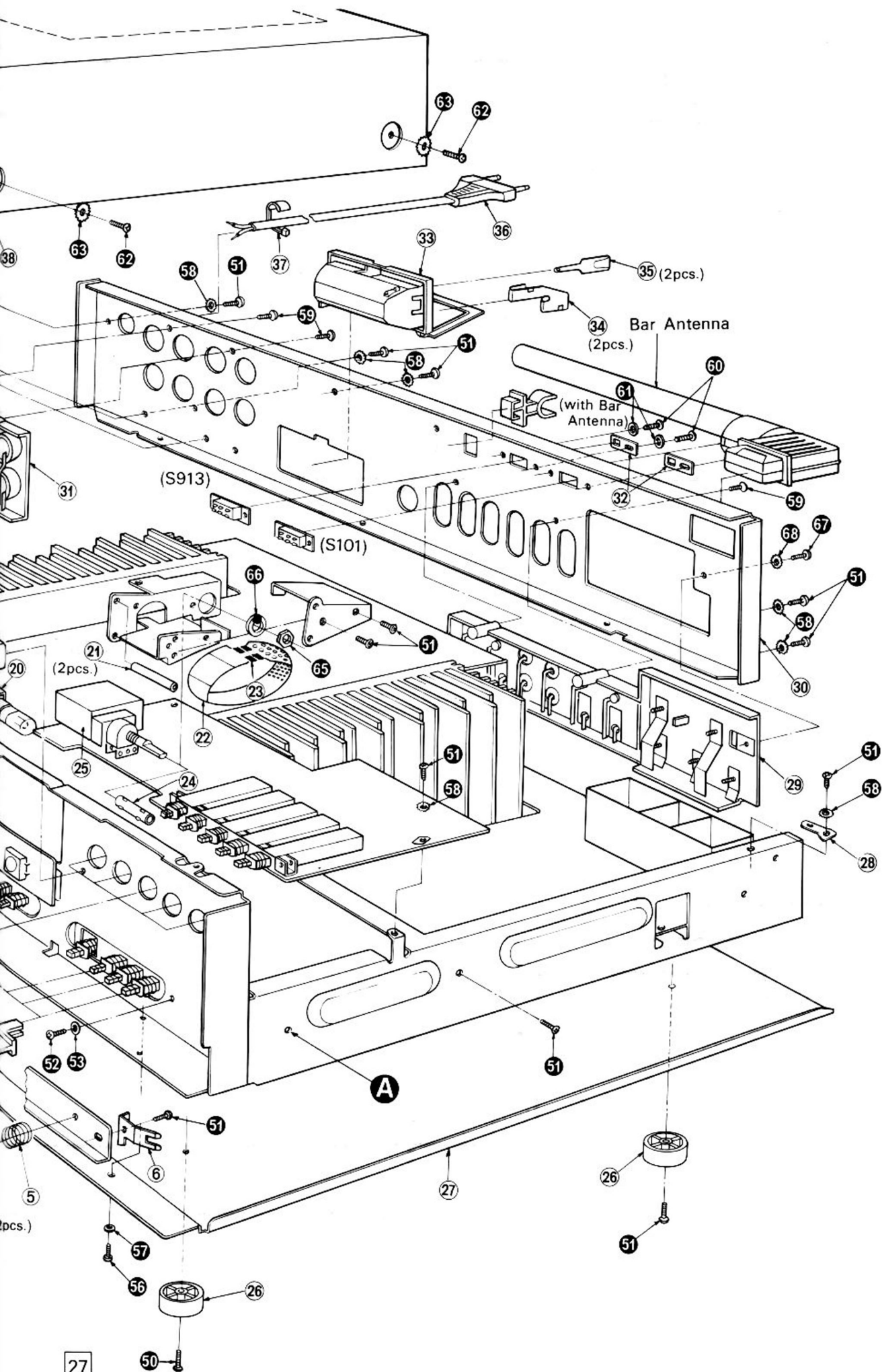
Ref. No.	Part No.	Part Name & Description
R129	RRD18XX473	Chip, 47kΩ, 1/8W, ±10%
R130	RRD18XX332	Chip, 3.3kΩ, 1/8W, ±10%
R131	RRD18XX333	Chip, 33kΩ, 1/8W, ±10%
R132	RRD18XX824	Chip, 820kΩ, 1/8W, ±10%
R133	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R134	RRD18XX153	Chip, 15kΩ, 1/8W, ±10%
R135	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R136	RRD18XX334	Chip, 330kΩ, 1/8W, ±10%
R137	RRD18XX473	Chip, 47kΩ, 1/8W, ±10%
R138	ERD25TJ104	Carbon, 100kΩ, 1/4W, ±5%
R139	RRD18XX183	Chip, 18kΩ, 1/8W, ±10%
R140	ERD25TJ823	Carbon, 82kΩ, 1/4W, ±5%
R141	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R143	RRD18XX473	Chip, 47kΩ, 1/8W, ±10%
R144 145	RRD18XX100	Chip, 10Ω, 1/8W, ±10%
R202	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R203	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R205	ERD10TJ562	Carbon, 5.6kΩ, 1/8W, ±5%
R206	RRD18XX333	Chip, 33kΩ, 1/8W, ±10%
R207	RRD18XX822	Chip, 8.2kΩ, 1/8W, ±10%
R208	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R209	RRD18XX151	Chip, 560Ω, 1/8W, ±10%
R210	RRD18XX151	Chip, 150Ω, 1/8W, ±10%
R211	RRD18XX332	Chip, 3.3kΩ, 1/8W, ±10%
R212	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R213	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R214	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R215	RRD18XX473	Chip, 47kΩ, 1/8W, ±10%
R216, 217	RRD18XX333	Chip, 33kΩ, 1/8W, ±10%
R218	RRD18XX394	Chip, 390kΩ, 1/8W, ±10%
R219	RRD18XX392	Chip, 3.9kΩ, 1/8W, ±10%
R220	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R221	RRD18XX471	Chip, 470Ω, 1/8W, ±10%
R222	RRD18XX562	Chip, 5.6kΩ, 1/8W, ±10%
R223	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R224	RRD18XX154	Chip, 150kΩ, 1/8W, ±10%
R225	RRD18XX273	Chip, 27kΩ, 1/8W, ±10%
R226	RRD18XX472	Chip, 4.7kΩ, 1/8W, ±10%
R227	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R228	ERD10TJ473	Carbon, 47kΩ, 1/8W, ±5%
R230	ERD10TJ332	Carbon, 3.3kΩ, 1/8W, ±5%
R231	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R232	ERD10TJ472	Carbon, 4.7kΩ, 1/8W, ±5%
R233	ERD10TJ473	Carbon, 47kΩ, 1/8W, ±5%
R301	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R302	RRD18XX153	Chip, 15kΩ, 1/8W, ±10%
R303	RRD18XX101	Chip, 100Ω, 1/8W, ±10%
R304	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R306	RRD18XX101	Chip, 100Ω, 1/8W, ±10%
R307	RRD18XX102	Chip, 1kΩ, 1/8W, ±10%
R308	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R309, 310	RRD18XX392	Chip, 3.9kΩ, 1/8W, ±10%
R311, 312	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R313, 314	RRD18XX103	Chip, 10kΩ, 1/8W, ±10%
R315, 316	RRD18XX474	Chip, 470kΩ, 1/8W, ±10%
R317, 318	RRD18XX471	Chip, 470Ω, 1/8W, ±10%
R319, 320	RRD18XX392	Chip, 3.9kΩ, 1/8W, ±10%
R321, 322	RRD18XX224	Chip, 220kΩ, 1/8W, ±10%
R323	RRD18XX104	Chip, 100kΩ, 1/8W, ±10%
R324	RRD18XX222	Chip, 2.2kΩ, 1/8W, ±10%
R401, 402	ERD25TJ104	Carbon, 100kΩ, 1/4W, ±5%
R403, 404	ERD10TJ221	Carbon, 220Ω, 1/8W, ±5%
R405, 406	ERD25TJ823	Carbon, 82kΩ, 1/4W, ±5%
R407, 408	ERD10TJ151	Carbon, 150Ω, 1/8W, ±5%
R409, 410	ERD10TJ332	Carbon, 3.3kΩ, 1/8W, ±5%
R411, 412	ERD25CKF6801	Metal Film, 6.8kΩ, 1/4W, ±1%
R413, 414	ERD25CKF1003	Metal Film, 100kΩ, 1/4W, ±1%
R415, 416	ERD10TJ471	Carbon, 470Ω, 1/8W, ±5%
R417, 418	ERD25TJ563	Carbon, 56kΩ, 1/4W, ±5%
R419, 420	ERD25TJ563	Carbon, 56kΩ, 1/4W, ±5%
R421, 422	ERD10TJ221	Carbon, 220Ω, 1/8W, ±5%
R423, 424	RRD18XX824	Chip, 820kΩ, 1/8W, ±10%
R425, 426	RRD18XX824	Chip, 820kΩ, 1/8W, ±10%
R427, 428	ERD10TJ472	Carbon, 4.7kΩ, 1/8W, ±5%
R429, 430	ERD10TJ472	Carbon, 4.7kΩ, 1/8W, ±5%
R431, 432	ERD25TJ394	Carbon, 390kΩ, 1/4W, ±5%
R433, 434	RRD18XX124	Chip, 120kΩ, 1/8W, ±10%
R435, 436	ERD25TJ184	Carbon, 180kΩ, 1/4W, ±5%
R437, 438	ERD10TJ472	Carbon, 4.7kΩ, 1/8W, ±5%
R439, 440	ERD25TJ824	Carbon, 820kΩ, 1/4W, ±5%
R441, 442	ERD25TJ104	Carbon, 100kΩ, 1/4W, ±5%
R443, 444	ERD10TJ103	Carbon, 10kΩ, 1/8W, ±5%
R445, 446	ERD10TJ393	Carbon, 39kΩ, 1/8W, ±5%

Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
R447, 448	ERD25TJ104	Carbon, 100k Ω , 1/4W, $\pm 5\%$	R719	ERD10TJ151	Carbon, 150 Ω , 1/8W, $\pm 5\%$
R449, 450	ERD25TJ824	Carbon, 820k Ω , 1/4W, $\pm 5\%$	R720	ERD10TJ151	Carbon, 150 Ω , 1/8W, $\pm 5\%$
R451, 452	ERD10TJ122	Carbon, 1.2k Ω , 1/8W, $\pm 5\%$	R721, 722	ERD10TJ151	Carbon, 150 Ω , 1/8W, $\pm 5\%$
R453	ERD10TJ102	Carbon, 1k Ω , 1/8W, $\pm 5\%$	R723	ERD10TJ682	Carbon, 6.8k Ω , 1/8W, $\pm 5\%$
R501, 502	ERD10TJ822	Carbon, 8.2k Ω , 1/8W, $\pm 5\%$	R724	ERD10TJ822	Carbon, 8.2k Ω , 1/8W, $\pm 5\%$
R503, 504	ERD10TJ102	Carbon, 1k Ω , 1/8W, $\pm 5\%$	R725	ERD25FJ100	Carbon, 10 Ω , 1/4W, $\pm 5\%$
R505, 506	ERD25FJ682	Carbon, 6.8k Ω , 1/4W, $\pm 5\%$	R901, 902	RRD18XK102	Chip, 1k Ω , 1/8W, $\pm 10\%$
R507, 508	ERD25TJ223	Carbon, 22k Ω , 1/4W, $\pm 5\%$	R903	RRD18XK103	Chip, 10k Ω , 1/8W, $\pm 10\%$
R509, 510	ERD25TJ334	Carbon, 330k Ω , 1/4W, $\pm 5\%$	R904	RRD18XK223	Chip, 22k Ω , 1/8W, $\pm 10\%$
R511, 512	ERD10TJ153	Carbon, 15k Ω , 1/8W, $\pm 5\%$	R905	RRD18XK682	Chip, 6.8k Ω , 1/8W, $\pm 10\%$
R513, 514	ERD10TJ223	Carbon, 22k Ω , 1/8W, $\pm 5\%$	R906	RRD18XK822	Chip, 8.2k Ω , 1/8W, $\pm 10\%$
R515, 516	ERD10TJ272	Carbon, 2.7k Ω , 1/8W, $\pm 5\%$	R907	RRD18XK393	Chip, 39k Ω , 1/8W, $\pm 10\%$
R517, 518	ERD10TJ182	Carbon, 1.8k Ω , 1/8W, $\pm 5\%$	R908	RRD18XK104	Chip, 100k Ω , 1/8W, $\pm 10\%$
R519, 520	ERD10TJ100	Carbon, 10 Ω , 1/8W, $\pm 5\%$	R909	RRD18XK563	Chip, 56k Ω , 1/8W, $\pm 10\%$
R521, 522	ERD10TJ223	Carbon, 22k Ω , 1/8W, $\pm 5\%$	R910	RRD18XK104	Chip, 100k Ω , 1/8W, $\pm 10\%$
R523, 524	ERD25TJ564	Carbon, 560k Ω , 1/4W, $\pm 5\%$	R912	RRD18XK332	Chip, 3.3k Ω , 1/8W, $\pm 10\%$
R525, 526	ERD10TJ223	Carbon, 22k Ω , 1/8W, $\pm 5\%$	R913	RRD18XK152	Chip, 1.5k Ω , 1/8W, $\pm 10\%$
R527, 528	ERD10TJ223	Carbon, 22k Ω , 1/8W, $\pm 5\%$	R914	RRD18XK682	Chip, 6.8k Ω , 1/8W, $\pm 10\%$
R601, 602	ERD10TJ152	Carbon, 1.5k Ω , 1/8W, $\pm 5\%$	R915	RRD18XK153	Chip, 15k Ω , 1/8W, $\pm 10\%$
R603, 604	ERD25TJ104	Carbon, 100k Ω , 1/4W, $\pm 5\%$	R916	RRD18XK333	Chip, 33k Ω , 1/8W, $\pm 10\%$
R605, 606	ERD10TJ222	Carbon, 2.2k Ω , 1/8W, $\pm 5\%$	R917	RRD18XK100	Chip, 10 Ω , 1/8W, $\pm 10\%$
R607, 608	ERD25TJ184	Carbon, 180k Ω , 1/4W, $\pm 5\%$	R918	RRD18XK102	Chip, 1k Ω , 1/8W, $\pm 10\%$
R609, 610	ERD10TJ183	Carbon, 18k Ω , 1/8W, $\pm 5\%$	R919	RRD18XK824	Chip, 820k Ω , 1/8W, $\pm 10\%$
R611, 612	ERD10TJ183	Carbon, 18k Ω , 1/8W, $\pm 5\%$	R920	RRD18XK104	Chip, 100k Ω , 1/8W, $\pm 10\%$
R613, 614	ERD10TJ682	Carbon, 6.8k Ω , 1/8W, $\pm 5\%$	R921	RRD18XK101	Chip, 100 Ω , 1/8W, $\pm 10\%$
R615, 616	ERD10TJ221	Carbon, 220 Ω , 1/8W, $\pm 5\%$	R924	RRD18XK103	Chip, 10k Ω , 1/8W, $\pm 10\%$
R617, 618	ERD25FJ101	Carbon, 100 Ω , 1/4W, $\pm 5\%$	R925	ERD25CKF3302	Metal Film, 33k Ω , 1/4W, $\pm 1\%$
R619, 620	ERD25FJ101	Carbon, 100 Ω , 1/4W, $\pm 5\%$	R926	RRD18XK333	Chip, 33k Ω , 1/8W, $\pm 10\%$
R621, 622	ERD10TJ272	Carbon, 2.7k Ω , 1/8W, $\pm 5\%$	R927	RRD18XK152	Chip, 1.5k Ω , 1/8W, $\pm 10\%$
R623, 624	ERD10TJ272	Carbon, 2.7k Ω , 1/8W, $\pm 5\%$	R928	RRD18XK223	Chip, 22k Ω , 1/8W, $\pm 10\%$
R625, 626	ERD25FJ330	Carbon, 33 Ω , 1/4W, $\pm 5\%$	R929	RRD18XK333	Chip, 33k Ω , 1/8W, $\pm 10\%$
R627, 628	ERD25TJ683	Carbon, 68k Ω , 1/4W, $\pm 5\%$	R930	RRD18XK104	Chip, 100k Ω , 1/8W, $\pm 10\%$
R629, 630	ERD10TJ473	Carbon, 47k Ω , 1/8W, $\pm 5\%$	R931	ERD25TJ104	Carbon, 100k Ω , 1/4W, $\pm 5\%$
R631, 632	ERD25FJ271	Carbon, 270 Ω , 1/4W, $\pm 5\%$	R932	RRD18XK331	Chip, 330 Ω , 1/8W, $\pm 10\%$
R633, 634	ERD25FJ330	Carbon, 33 Ω , 1/4W, $\pm 5\%$	R934	RRD18XK333	Chip, 33k Ω , 1/8W, $\pm 10\%$
R635, 636	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, $\pm 5\%$	R935	RRD18XK223	Chip, 22k Ω , 1/8W, $\pm 10\%$
R637, 638	ERD10TJ332	Carbon, 3.3k Ω , 1/8W, $\pm 5\%$	R936	RRD18XK333	Chip, 33k Ω , 1/8W, $\pm 10\%$
R639, 640	ERD25FJ222	Carbon, 2.2k Ω , 1/4W, $\pm 5\%$	R937	RRD18XK473	Chip, 47k Ω , 1/8W, $\pm 10\%$
R641, 642	ERD10TJ333	Carbon, 33k Ω , 1/8W, $\pm 5\%$	R938	ERD10TJ473	Carbon, 47k Ω , 1/8W, $\pm 5\%$
R643, 644	ERD10TJ222	Carbon, 2.2k Ω , 1/8W, $\pm 5\%$	R939	ERD10TJ333	Carbon, 33k Ω , 1/8W, $\pm 5\%$
R645, 646	ERD50FJ562	Carbon, 5.6k Ω , 1/2W, $\pm 5\%$	R940	ERD10TJ182	Carbon, 1.8k Ω , 1/8W, $\pm 5\%$
R647, 648	ERD50FJ562	Carbon, 5.6k Ω , 1/2W, $\pm 5\%$	R941	ERD10TJ332	Carbon, 3.3k Ω , 1/8W, $\pm 5\%$
R649, 650	ERD50FJ100	Carbon, 10 Ω , 1/2W, $\pm 5\%$	R942	RRD18XK184	Chip, 180k Ω , 1/8W, $\pm 10\%$
R651, 652	ERD25FJ100	Carbon, 10 Ω , 1/4W, $\pm 5\%$	R943	ERD10TJ102	Carbon, 1k Ω , 1/8W, $\pm 5\%$
R653	ERD25FJ100	Carbon, 10 Ω , 1/4W, $\pm 5\%$	R944	ERD25FJ152	Carbon, 1.5k Ω , 1/4W, $\pm 5\%$
R655, 656	ERD25FJ391	Carbon, 390 Ω , 1/4W, $\pm 5\%$	R945	RRD18XK102	Chip, 1k Ω , 1/8W, $\pm 10\%$
R657, 658	ERD25TJ104	Carbon, 100k Ω , 1/4W, $\pm 5\%$	R946, 947	RRD18XK100	Chip, 10 Ω , 1/8W, $\pm 10\%$
R659, 660	ERD10TJ272	Carbon, 2.7k Ω , 1/8W, $\pm 5\%$	R948	RRD18XK100	Chip, 10 Ω , 1/8W, $\pm 10\%$
R661, 662	ERD25TJ104	Carbon, 100k Ω , 1/4W, $\pm 5\%$	R949	RRD18XK102	Chip, 1k Ω , 1/8W, $\pm 10\%$
R663	ERD10TJ333	Carbon, 33k Ω , 1/8W, $\pm 5\%$	R950, 951	RRD18XK100	Chip, 10 Ω , 1/8W, $\pm 10\%$
R664	ERD25FJ100	Carbon, 10 Ω , 1/4W, $\pm 5\%$	R955	RRD18XK101	Chip, 100 Ω , 1/8W, $\pm 10\%$
R665	ERD10TJ223	Carbon, 22k Ω , 1/8W, $\pm 5\%$	R958, 959	RRD18XK100	Chip, 10 Ω , 1/8W, $\pm 10\%$
R666	ERD10TJ153	Carbon, 15k Ω , 1/8W, $\pm 5\%$	CAPACITOR		
R667	ERD10TJ103	Carbon, 10k Ω , 1/8W, $\pm 5\%$	C1	ECUX1H103MD	Chip, 0.01 μ F, 50V, $\pm 20\%$
R668	ERD10TJ822	Carbon, 8.2k Ω , 1/8W, $\pm 5\%$	C2, 3	ECKD1H102MD	Ceramic, 0.001 μ F, 50V, $\pm 20\%$
R669	ERD10TJ473	Carbon, 47k Ω , 1/8W, $\pm 5\%$	C3	ECUX1H102ZF	Chip, 0.001 μ F, 50V, $\pm 20\%$
R670	ERG1ANJ122	Metal Oxide, 1.2k Ω , 1W, $\pm 5\%$	C4	ECUX1H010CC	Chip, 1pF, 50V, $\pm 0.25\%$
R671	ERD25TJ224	Carbon, 220k Ω , 1/4W, $\pm 5\%$	C6	ECUX1H040DC	Chip, 4pF, 50V, $\pm 0.25\%$
R672	ERD25FJ100	Carbon, 10 Ω , 1/4W, $\pm 5\%$	C7	ECUX1H102ZF	Chip, 0.001 μ F, 50V, $\pm 20\%$
R673	ERD10TJ102	Carbon, 1k Ω , 1/8W, $\pm 5\%$	C8	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 20\%$
R674, 675	ERD10TJ103	Carbon, 10k Ω , 1/8W, $\pm 5\%$	C10	ECUX1H050DC	Chip, 5pF, 50V, $\pm 0.25\%$
R676	ERD25TJ124	Carbon, 120k Ω , 1/4W, $\pm 5\%$	C11, 12	ECKD1H102MDA	Ceramic, 0.001 μ F, 50V, $\pm 20\%$
R677	ERD25TJ153	Carbon, 15k Ω , 1/4W, $\pm 5\%$	C13	ECUX1H030DC	Chip, 3pF, 50V, $\pm 0.25\%$
R678	ERG2ANJ331	Metal Oxide, 330 Ω , 2W, $\pm 5\%$	C14	ECGN5R22K	Ceramic, 0.22pF, 500V, $\pm 10\%$
R679	ERD50FJ182	Carbon, 1.8k Ω , 1/2W, $\pm 5\%$	C15	ECUX1H390KC	Chip, 39pF, 50V, $\pm 10\%$
R681, 682	ERG2ANJ331	Metal Oxide, 330 Ω , 2W, $\pm 5\%$	C16	ECUX1H102ZF	Chip, 0.001 μ F, 50V, $\pm 20\%$
R690	ERD25TJ123	Carbon, 12k Ω , 1/4W, $\pm 5\%$	C17, 18	ECUX1H070DC	Chip, 7pF, 50V, $\pm 0.5\%$
R695	ERD25TJ473	Carbon, 47k Ω , 1/2W, $\pm 5\%$	C20	ECUX1H030DC	Chip, 3pF, 50V, $\pm 0.25\%$
R701	ERD25FJ331	Carbon, 330 Ω , 1/4W, $\pm 5\%$	C21	ECUX1H102ZF	Chip, 0.001 μ F, 50V, $\pm 20\%$
R702, 703	ERD50FJ222	Carbon, 2.2k Ω , 1/2W, $\pm 5\%$	C22	ECUX1H020CC	Chip, 2pF, 50V, $\pm 0.25\%$
R704	ERG1ANJ681	Metal Oxide, 680 Ω , 1W, $\pm 5\%$	C23, 24	ECUX1H050DC	Chip, 5pF, 50V, $\pm 0.25\%$
R705	ERD10TJ103	Carbon, 10k Ω , 1/8W, $\pm 5\%$	C25	ECUX1H020CC	Chip, 2pF, 50V, $\pm 0.25\%$
R706	ERD50FJ220	Carbon, 22 Ω , 1/2W, $\pm 5\%$	C26	ECUX1H102ZF	Chip, 0.001 μ F, 50V, $\pm 20\%$
R707	ERD10TJ151	Carbon, 150 Ω , 1/8W, $\pm 5\%$	C27	ECUX1H050DC	Chip, 5pF, 50V, $\pm 0.25\%$
R708	ERD10TJ122	Carbon, 1.2k Ω , 1/8W, $\pm 5\%$	C28	ECUX1H181K	Chip, 180pF, 50V, $\pm 10\%$
R709	ERD10TJ332	Carbon, 3.3k Ω , 1/8W, $\pm 5\%$	C29, 30	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 20\%$
R710	ERD10TJ471	Carbon, 470 Ω , 1/8W, $\pm 5\%$	C31	ECKD1H102MD	Ceramic, 0.001 μ F, 50V, $\pm 20\%$
R711	ERG1ANJ150	Metal Oxide, 15 Ω , 1W, $\pm 5\%$	C40	ECCD1H220KC	Ceramic, 22pF, 50V, $\pm 10\%$
R714	ERD10TJ100	Carbon, 10 Ω , 1/8W, $\pm 5\%$	C101, 102	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 20\%$
R715	ERD10TJ680	Carbon, 68 Ω , 1/8W, $\pm 5\%$	C103	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 20\%$
R716	ERD10TJ390	Carbon, 39 Ω , 1/8W, $\pm 5\%$			
R717	ERD10TJ100	Carbon, 10 Ω , 1/8W, $\pm 5\%$			
R718	ERD10TJ472	Carbon, 4.7k Ω , 1/8W, $\pm 5\%$			

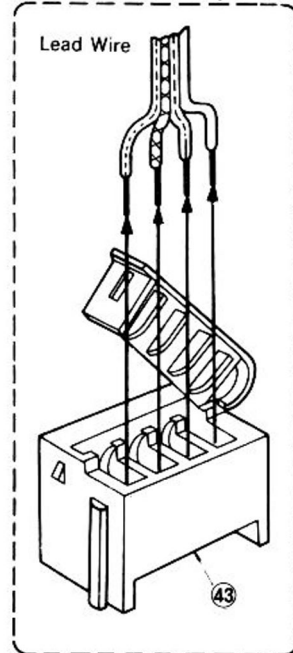
Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
C104	ECUX1H560KC	Chip, 56pF, 50V, $\pm 10\%$	C503, 504	ECQM1H223KZ	Polyester, 0.022 μ F, 50V, $\pm 10\%$
C105, 106	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C505, 506	ECQM1H123JZ	Polyester, 0.012 μ F, 50V, $\pm 5\%$
C107, 108	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C507, 508	ECQM1H104KZ	Polyester, 0.1 μ F, 50V, $\pm 10\%$
C109, 110	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C509, 510	ECEA1CS330	Electrolytic, 33 μ F, 16V
C111	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C511, 512	ECEA2524R7	Electrolytic, 4.7 μ F, 25V
C112	ECEA50Z1	Electrolytic, 1 μ F, 50V	C513, 514	ECCD1H020C	Ceramic, 2pF, 50V, $\pm 0.25\text{pF}$
C113, 114	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C515, 516	ECEA1AS221	Electrolytic, 220 μ F, 10V
C115	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C517, 518	ECEA50Z3R3	Electrolytic, 3.3 μ F, 50V
C116	ECUX1H101K	Chip, 100pF, 50V, $\pm 10\%$			
C117	ECEA50Z1	Electrolytic, 1 μ F, 50V	C519, 520	ECQS1271JZ	Polypropylene, 270pF, 125V, $\pm 5\%$
C118	ECEA50Z2R2	Electrolytic, 0.22 μ F, 50V	C521, 522	ECQM1H332KZ	Polyester, 0.0033 μ F, 50V, $\pm 10\%$
C119	ECEA1HS100	Electrolytic, 10 μ F, 50V	C601, 602	ECEA50M3R3R	Electrolytic, 3.3 μ F, 50V
C120	ECEA50Z4R7	Electrolytic, 0.47 μ F, 50V	C603, 604	ECCD1H101K	Ceramic, 100pF, 50V, $\pm 10\%$
C121, 122	ECKD1H223ZF	Ceramic, 0.022 μ F, 50V, $\pm 8\%$	C605, 606	ECCD1H680K	Ceramic, 68pF, 50V, $\pm 10\%$
C123	ECUX1H470K	Chip, 47pF, 50V, $\pm 10\%$	C607, 608	ECKD1H821KB	Ceramic, 820pF, 50V, $\pm 10\%$
C124, 125	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C609, 610	ECCD2H180K	Ceramic, 18pF, 500V, $\pm 10\%$
C126	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C611, 612	ECEA2AS3R3	Electrolytic, 3.3 μ F, 100V
C127	ECEA50Z2R2	Electrolytic, 2.2 μ F, 50V	C613, 614	ECCD1H270K	Ceramic, 27pF, 50V, $\pm 10\%$
C128	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C615, 616	ECCD1H220K	Ceramic, 22pF, 50V, $\pm 10\%$
C130	ECEA50Z3R3	Electrolytic, 3.3 μ F, 50V	C621, 622	ECEA1HN3R3S	Non-polar Electrolytic, 3.3 μ F, 50V
			C623	ECEA1CN101S	Non-polar Electrolytic, 100 μ F, 16V
C135	ECKD1H223ZF	Ceramic, 0.022 μ F, 50V, $\pm 20\%$	C624	ECEA50Z2R2	Electrolytic, 2.2 μ F, 50V
C201	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C625	ECEA50Z1	Electrolytic, 1 μ F, 50V
C202	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, $\pm 10\%$	C626	ECEA2AS100	Electrolytic, 10 μ F, 100V
C203	ECUX1H100KC	Chip, 10pF, 50V, $\pm 10\%$	C627	ECEA1CS330	Electrolytic, 33 μ F, 16V
C204	ECQP1241JZ	Polypropylene, 240pF, 100V, $\pm 5\%$	C628	ECEA50Z4R7	Electrolytic, 0.47 μ F, 50V
C205	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C701, 702	ECKDKC103PF	Ceramic, 0.01 μ F, 400VAC, $\pm 100\%$
C206	ECUX1H390KC	Chip, 39pF, 50V, $\pm 10\%$	C703, 704	ECETS1HV822U	Electrolytic, 8200 μ F, 50V
C207	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C705	ECEA1VS221	Electrolytic, 220 μ F, 35V
C208	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C706	ECEA1JS221	Electrolytic, 220 μ F, 63V
C209	ECUX1H103MD	Chip, 0.01 μ F, 50V, $\pm 20\%$			
C210, 211	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C707	ECEA1VS101	Electrolytic, 100 μ F, 35V
C212	ECEA1JS4R7	Electrolytic, 4.7 μ F, 63V	C708	ECEA1JS101	Electrolytic, 100 μ F, 63V
C213	ECUX1H470KC	Chip, 47pF, 50V, $\pm 10\%$	C710	ECKD1H103ZF	Ceramic, 0.01 μ F, 50V, $\pm 8\%$
C214	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C711	ECEA1ES101	Electrolytic, 100 μ F, 25V
C215	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$	C712	ECEA1VS331	Electrolytic, 330 μ F, 35V
C216, 217	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C713	ECEA1ES101	Electrolytic, 100 μ F, 25V
C218	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$	C714, 715	ECKD1H103ZF	Ceramic, 0.01 μ F, 50V, $\pm 8\%$
C219	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, $\pm 10\%$	C716	ECEA1ES101	Electrolytic, 100 μ F, 25V
C220	ECEA50Z1	Electrolytic, 1 μ F, 50V	C717	ECEA1VS471	Electrolytic, 470 μ F, 35V
C231	ECKD1H102MD	Ceramic, 0.001 μ F, 50V, $\pm 20\%$	C718	ECEA1VS221	Electrolytic, 220 μ F, 35V
[XAL] only					
C301	ECQP1471JZ	Polypropylene, 470pF, 100V, $\pm 5\%$	C719	ECEA1AS221	Electrolytic, 220 μ F, 10V
C302	ECEA1CS221	Electrolytic, 220 μ F, 16V	C720	ECEA1CS471	Electrolytic, 470 μ F, 16V
C303	ECEA50M4R7R	Electrolytic, 4.7 μ F, 50V	C721	ECEA1ES101	Electrolytic, 100 μ F, 25V
C304	ECEA50Z2R2	Electrolytic, 0.22 μ F, 50V	C722, 723	ECEA1ES101	Electrolytic, 100 μ F, 25V
C305	ECEA50Z4R7	Electrolytic, 0.47 μ F, 50V	C724, 725	ECKD1H103ZF	Ceramic, 0.01 μ F, 50V, $\pm 8\%$
C306	ECEA1CS471	Electrolytic, 470 μ F, 16V	C726	ECKD1H103ZF	Ceramic, 0.01 μ F, 50V, $\pm 8\%$
C307	ECEA50Z4R7	Electrolytic, 0.47 μ F, 50V	C727	ECEA1CN100S	Non-polar Electrolytic, 10 μ F, 16V
C308	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, $\pm 10\%$	C728, 729	ECKY2H102WE5	Ceramic, 0.001 μ F, 100V, $\pm 200\%$
C309, 310	ECQM1H123JZ	Polyester, 0.012 μ F, 50V, $\pm 5\%$	C901	ECEA1HS101	Electrolytic, 100 μ F, 50V
C311, 312	ECEA50Z1	Electrolytic, 1 μ F, 50V	C902	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$
C313, 314	ECQM1H272JZ	Polyester, 0.0027 μ F, 50V, $\pm 5\%$	C903	ECEA50M2R2R	Electrolytic, 2.2 μ F, 50V
C315, 316	ECUX1H471MD	Chip, 470pF, 50V, $\pm 20\%$	C904, 905	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$
C317, 318	ECQM1H222KZ	Polyester, 0.0022 μ F, 50V, $\pm 10\%$	C906	ECEA50MR33R	Electrolytic, 0.33 μ F, 50V
C319, 320	ECEA50Z1	Electrolytic, 1 μ F, 50V	C907	ECEA1AS221	Electrolytic, 220 μ F, 10V
C321	ECEA50Z4R7	Electrolytic, 0.47 μ F, 50V	C908	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$
C401, 402	ECEA50M3R3R	Electrolytic, 3.3 μ F, 50V	C909	ECEA1AS101	Electrolytic, 100 μ F, 10V
C403, 404	ECCD1H101K	Ceramic, 100pF, 50V, $\pm 10\%$	C910	ECEA1HS100	Electrolytic, 10 μ F, 50V
C405, 406	ECKD1H331KB	Ceramic, 330pF, 50V, $\pm 10\%$	C911	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$
C407, 408	ECEA1AS101	Electrolytic, 100 μ F, 10V	C912	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$
C409, 410	ECKD1H222MD	Ceramic, 0.0022 μ F, 50V, $\pm 20\%$	C913	ECQM1H333KZ	Polyester, 0.033 μ F, 50V, $\pm 10\%$
C411, 412	ECQP1103GZ	Polypropylene, 0.01 μ F, 100V, $\pm 2\%$	C914	ECEA1CS330	Electrolytic, 33 μ F, 16V
C413, 414	ECQM1H102JZ	Polyester, 0.001 μ F, 50V, $\pm 5\%$	C915	ECUX1H220KC	Chip, 22pF, 50V, $\pm 10\%$
C415, 416	ECQP1393GZ	Polypropylene, 0.039 μ F, 100V, $\pm 2\%$	C916	ECUX1H180KC	Chip, 18pF, 50V, $\pm 10\%$
C417, 418	ECEA1HN47S	Non-polar Electrolytic, 0.47 μ F, 50V	C917	ECI'X1H080DC	Chip, 8pF, 50V, $\pm 0.5\text{pF}$
C419, 420	ECQM1H222KZ	Polyester, 0.0022 μ F, 50V, $\pm 10\%$	C918	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$
C421, 422	ECEA50Z1	Electrolytic, 1 μ F, 50V	C919	ECEAQS102	Electrolytic, 1000 μ F, 6.3V
C423	ECKD1H333MD	Ceramic, 0.033 μ F, 50V, $\pm 20\%$	C920	ECEA1HS470	Electrolytic, 47 μ F, 50V
C425, 426	ECCD1H820K	Ceramic, 82pF, 50V, $\pm 10\%$	C921	ECEA1AS102	Electrolytic, 1000 μ F, 10V
C427, 428	ECQM1H472KZ	Polyester, 0.0047 μ F, 50V, $\pm 10\%$	C922	ECUX1H223ZF	Chip, 0.022 μ F, 50V, $\pm 8\%$
C429, 430	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, $\pm 10\%$	C923	ECKD1H223ZF	Ceramic, 0.022 μ F, 50V, $\pm 8\%$
C431, 432	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, $\pm 10\%$			
C501, 502	ECQM1H152KZ	Polyester, 0.0015 μ F, 50V, $\pm 10\%$	C925, 926	ECEA1HS100	Electrolytic, 10 μ F, 50V
			C927	ECEA50Z3R3	Electrolytic, 3.3 μ F, 50V
			C928	ECUX1H103ZF	Chip, 0.01 μ F, 50V, $\pm 8\%$
			C936	ECKD1H223ZF	Ceramic, 0.022 μ F, 50V, $\pm 8\%$

EXPLODED VIEWS





Lead wire connector (an example)



REPLACEMENT PARTS LIST Cabinet and Chassis Parts

- Notes:** 1. Parts numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 2. Δ indicates that only parts specified by the manufacturer be used for safety.
 3. $\square$ -marked parts are used for black type 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. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Black type model No. SA-515 (K)

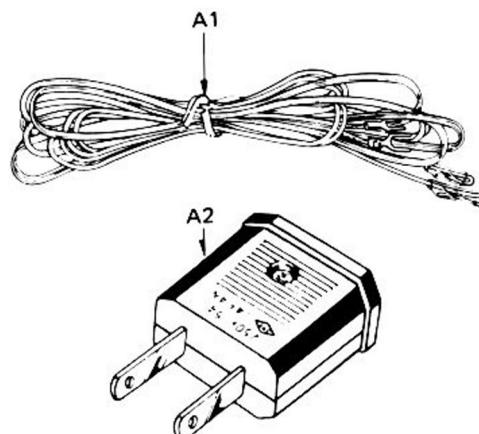
Ref. No.	Part No.	Part Name & Description
CABINET and CHASSIS PARTS		
1	$\square$ SGWA515E	Panel, Front Ass'y
1	$\square$ SGWA515KE	Panel, Front Ass'y (Black)
2	SBC299	Button, Tuning Up/Down Switch
3	SUS221	Spring, Tuning Up/Down Switch
4	SBC297	Button, Volume Up/Down Switch
5	SUS163	Spring, Push Switches
6	SUS185-1	Spring, Earth
7	SBC303	Button, Push Switches
7	$\square$ SBC303-1	Button, Push Switches (Black)
8	$\square$ SBC301-2	Button, Selector and Tape Switches
8	$\square$ SBC301-3	Button, Selector and Tape Switches (Black)
9	$\square$ SBC305	Button, Balance, Treble and Bass
9	$\square$ SBC305-1	Button, Balance, Treble and Bass (Black)
10	SHG1537	Rubber Cushion, Front Panel
11	$\square$ SBC301	Button, Power Switch
11	$\square$ SBC301-1	Button, Power Switch (Black)
12	SBC295	Button, FM, AM, Preset tuning and Memory Switches
13	XCJ6P21B-A1	Jack, Headphones
14	$\square$ SGX6847	Ornament, Fluorescent Display Tube
14	$\square$ SGX6847-1	Ornament, Fluorescent Display Tube (Black)
15	SDU29-1	Filter, Display Window
16	SHP9333	Paper, Ornament Indicator Window
17	SHP9331	Paper, Ornament Indicator Window
18	SHR9519	Cover, Signal Level Indicator
19	SHR9339	Spacer, F.L. Ornament M'tg
20	SJS2103	Socket, Pilot Lamp
21	SUB49	Pulley, Volume Level Film
22	SBU45	Film, Volume Level
23	SHR9521	Hinge, Volume Level Film Lock
24	SDG9001	Gear, Volume
25	SMC835	Cover, Volume
26	SKL227	Foot, Set
27	SKU8830	Bottom Board
28	RJT202B	Terminal, Ground
29	SJF8029-2N	Terminal, Antenna and Input
30 [E]	SGP2410-3A	Rear Panel
30 [XA]	SGP2410-4N	Rear Panel
30 [XAL]	SGP2410-5N	Rear Panel
30 [EG, EB, XGH]	SGPA515E	Rear Panel, SGP2410-3A with Name Plate (SGT229901)
31	SJF4813	Terminal, Speakers
32	SHR5073-1	Stopper, FM Antenna/Allocation Selector
33	SJB3005	Case, Battery
34	SJC9	Terminal, Battery Case
35	SJC7	Terminal, Battery Case
36	Δ SJA88	AC Cord
36 [XAL] only	Δ QFC1207M	AC Cord

Ref. No.	Part No.	Part Name & Description
37	SHR127	Bushing, AC Cord
37 [XAL] only	$\square$ SHR131	Bushing, AC Cord
38	$\square$ SKC550H1	Cabinet
38	$\square$ SKC550B1	Cabinet (Black)
39	SHS2457	Fiber
40	SMX367	Cover, Fuse P.C.B.
41 [XA] only	Δ SJS466-2	Socket, AC Outlet
42 [XAL] only	SUV453	Cover, Voltage Adjuster
43	SJS5327	Connector, Lead Wire, 3 pin
43	SJS5421	Connector, Lead Wire, 4 pin
43	SJS5627	Connector, Lead Wire, 6 pin
43	SJS5519	Connector, Lead Wire, 5 pin
SCREWS, WASHERS and NUTS		
51	XTB3+8BFZ	Screw, Tapping, $\pm$ 3x8
52	XSN3+6S	Screw, $\pm$ 3x6
53	XWA3B	Washer, Spring, ϕ 3
54	XSN2+4BVS	Screw, $\pm$ 2x4
55	XNS12	Nut, M12 (Headphone Jack)
56	XTV3+8BFN	Screw, Tapping, $\pm$ 3x8
57	XWG3	Washer, Plain, ϕ 3
58	XWC3B	Washer, External Toothed Lock, ϕ 3
59	XTB3+10BFZ	Screw, Tapping, $\pm$ 3x10
60	XSN3+6BVS	Screw, $\pm$ 3x6
61	$\square$ XWA3BFZ	Washer, Spring, ϕ 3
62	$\square$ XTB4+8BFN	Screw, Tapping, $\pm$ 4x8 (Cabinet)
63	$\square$ XTB4+8BFZ	Screw, Tapping, $\pm$ 4x8 (Cabinet)
64 [XAL] only	$\square$ XWC4B	Washer, External Toothed Lock, ϕ 4
65	$\square$ XTB4+8BFN	Screw, Tapping, $\pm$ 4x8 (Transformer & Bottom Board)
66	XNS8	Nut, M8
67	XWV8	Washer, Spring, ϕ 8
68 [XAL] only	XTB3+8BFZ	Screw, Tapping, $\pm$ 3 x 8
69	XSTS3+8Z	Screw, $\pm$ 3 x 8
70	XWC3B	Washer, External Toothed Lock, ϕ 3
ACCESSORIES		
A1	SSA267	Cord, FM Indoor Antenna
A2 [XA] only	Δ SJP5213-1	Plug Adapter, AC Power
PACKING PARTS		
P1	SPP651	Polyethylene Bag
P2	SPS2839	Pad, Left Side
P2 [XAL] only	SPS2839-1	Pad, Left Side
P3	SPS2841	Pad, Right Side
P3 [XAL] only	SPS2841-1	Pad, Right Side
P4	SPG2723	Carton Box
P4 [XAL] only	SPG2725	Carton Box
P5	SQF10601	Instructions Book, Printed Matter
P5 [XA] only	SQF10605	Instructions Book, Printed Matter

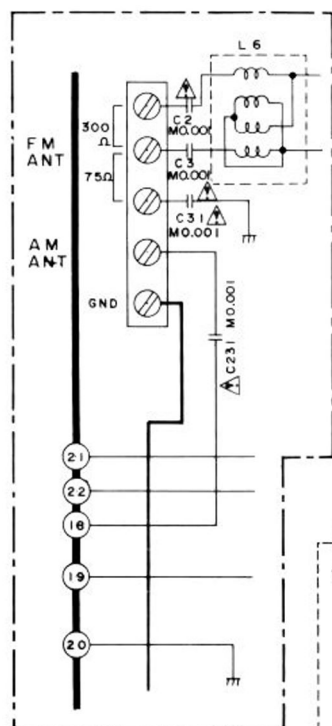
Areas

- * [E] and [EG] are available in Scandinavia and European.
- * [XAL] is available in Australia.
- * [XA] is available in Asia, Latin America, Middle East and Africa.
- * [XGH] is available in Holland.
- * [EB] is available in Belgium.

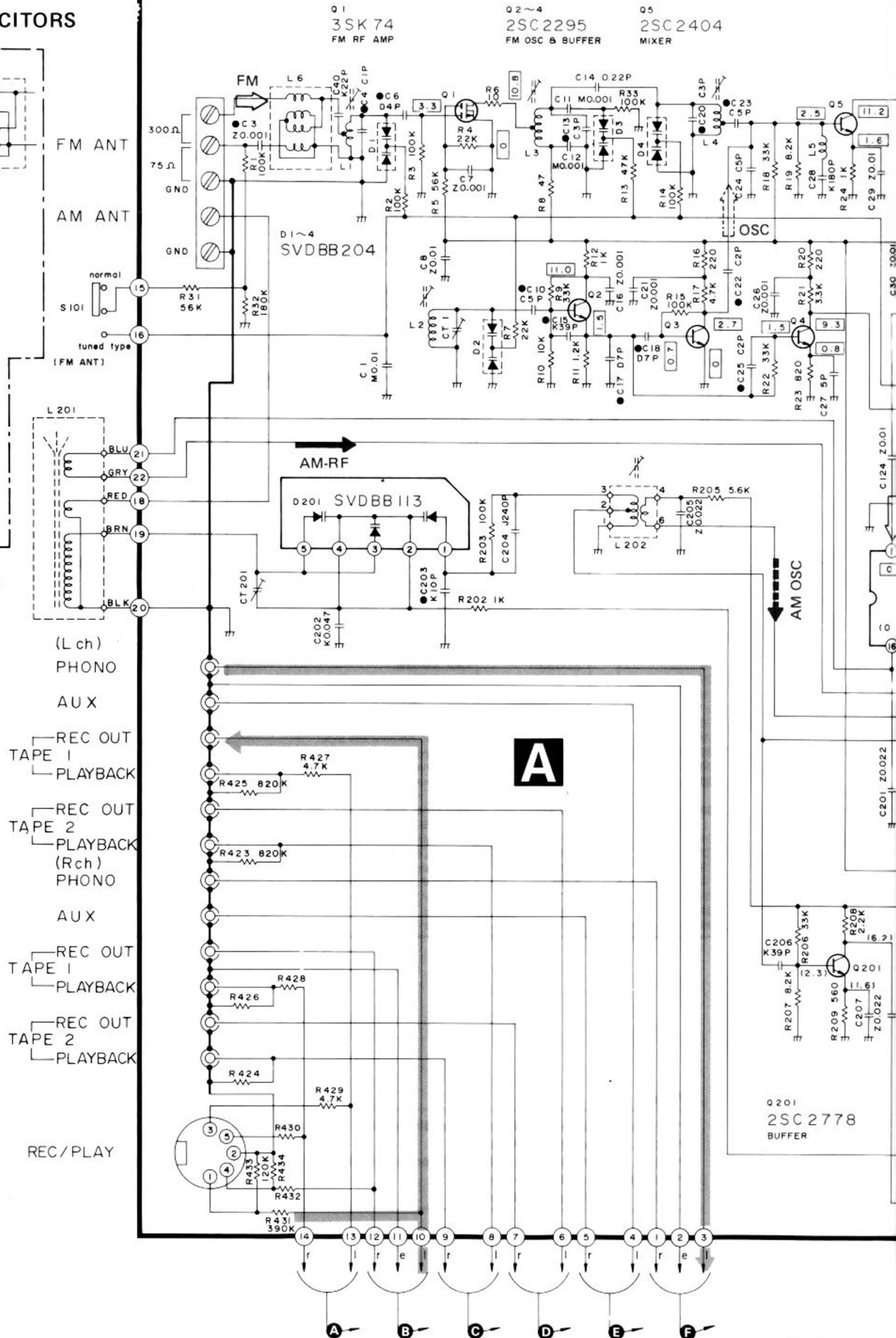
Accessories

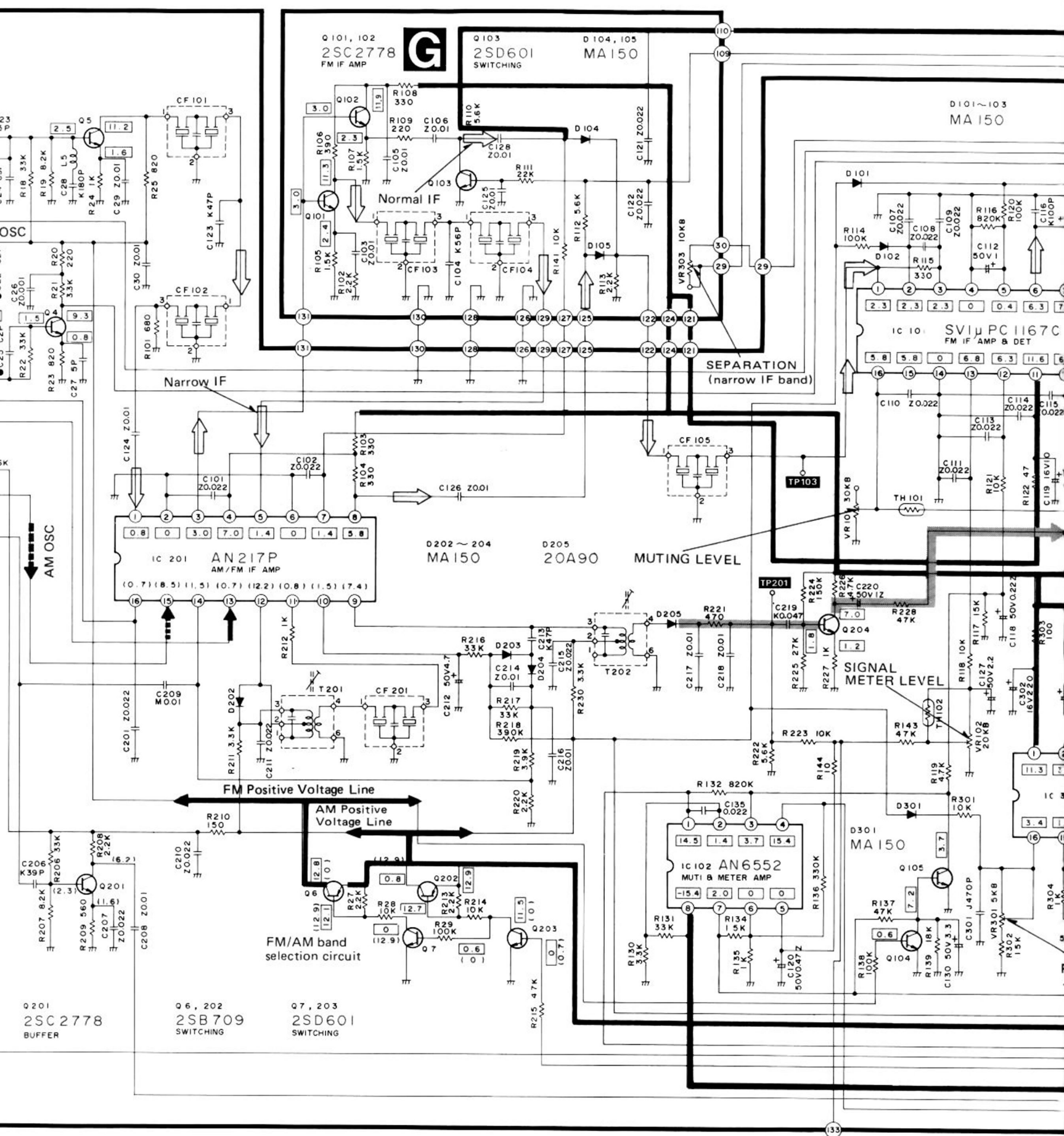


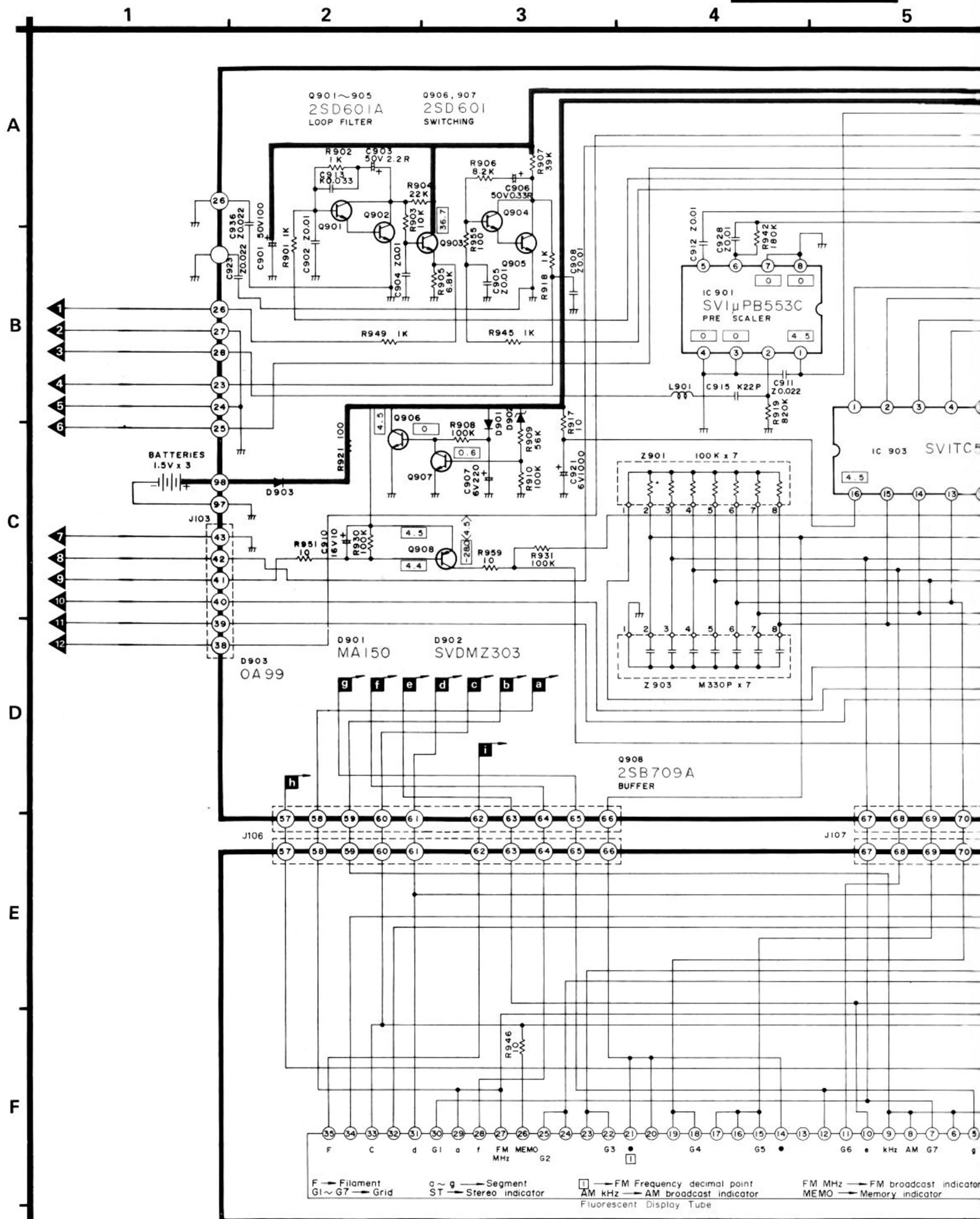
ANTENNA CAPACITORS

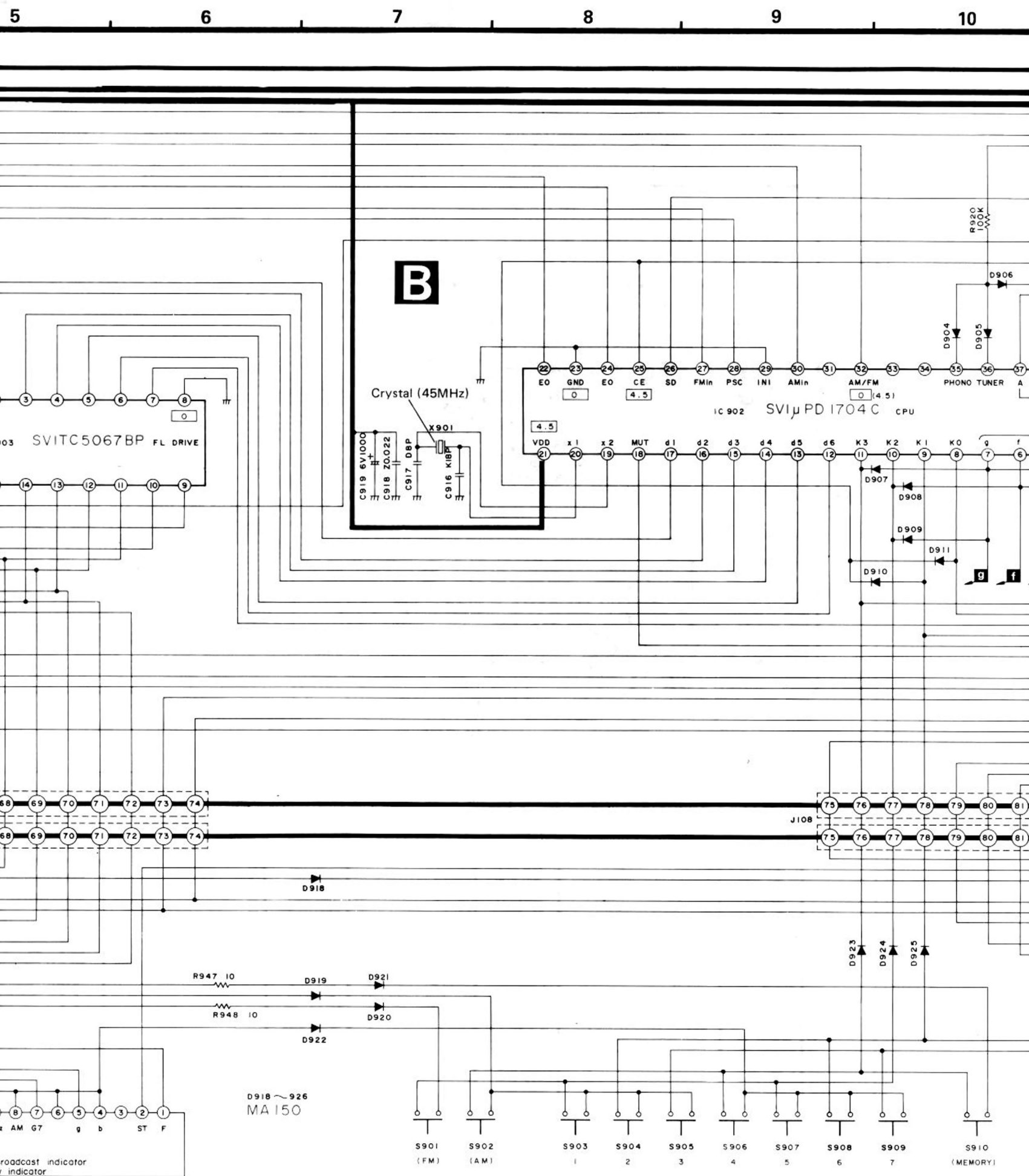


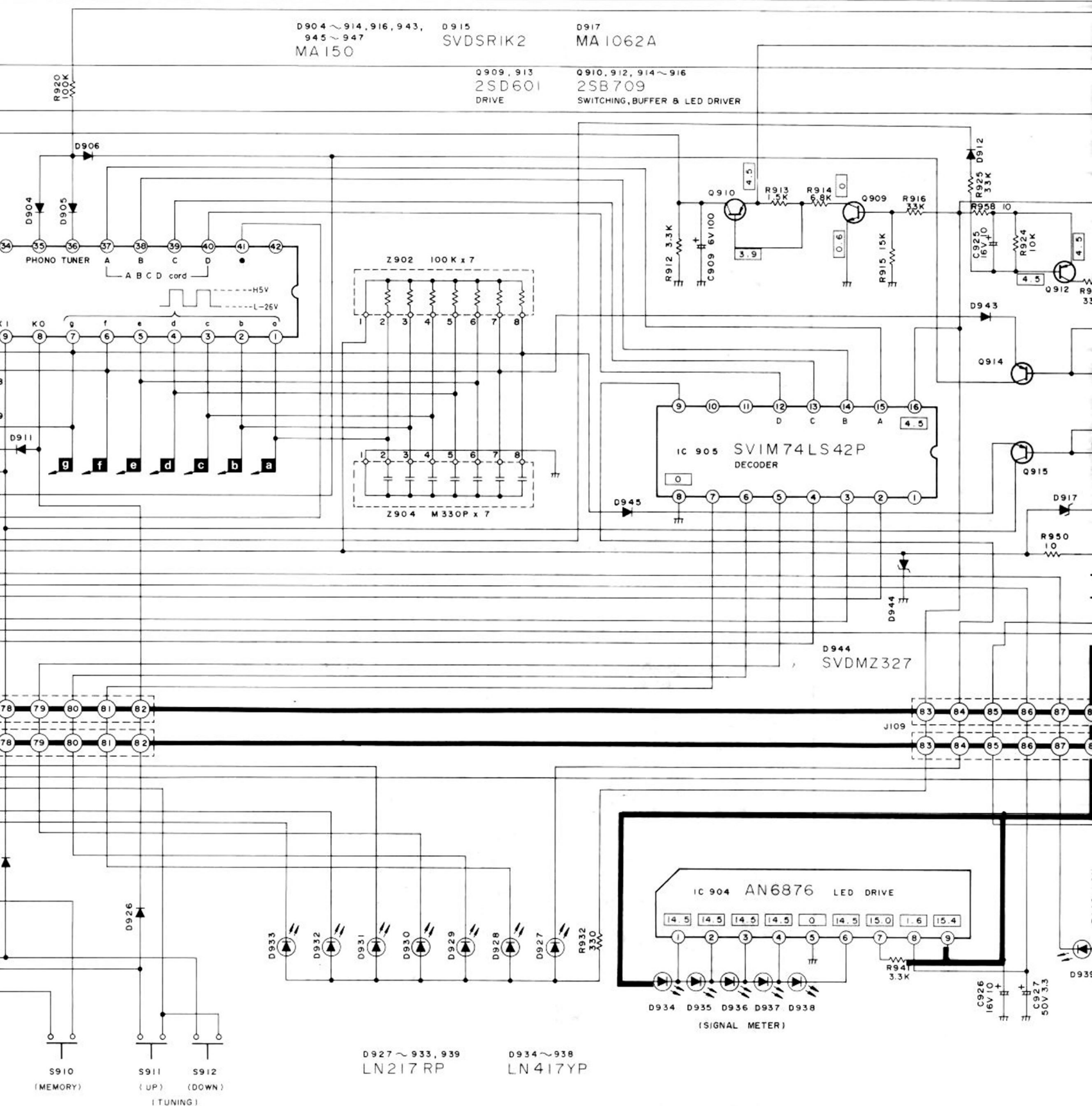
• Product for Australia [XAL] only

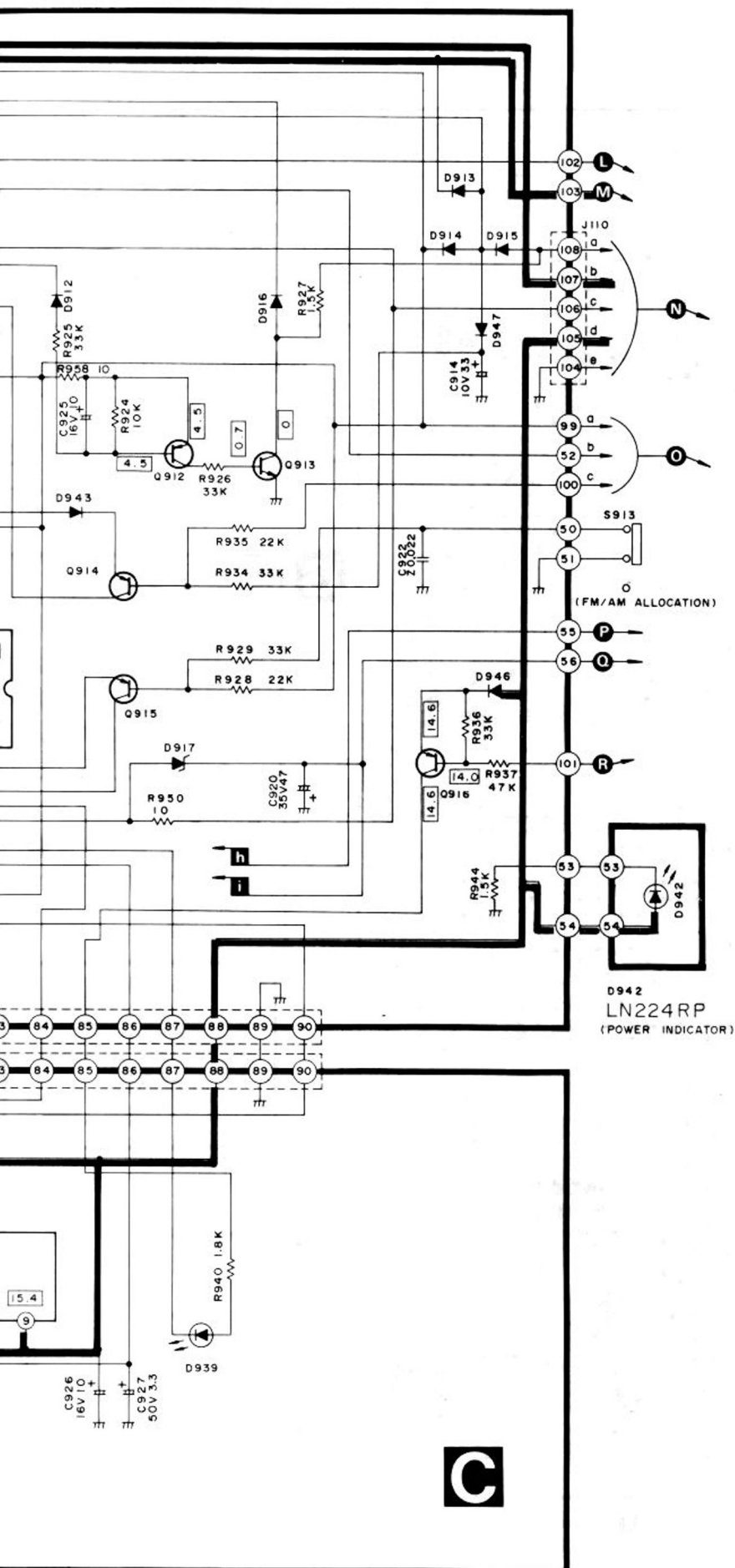






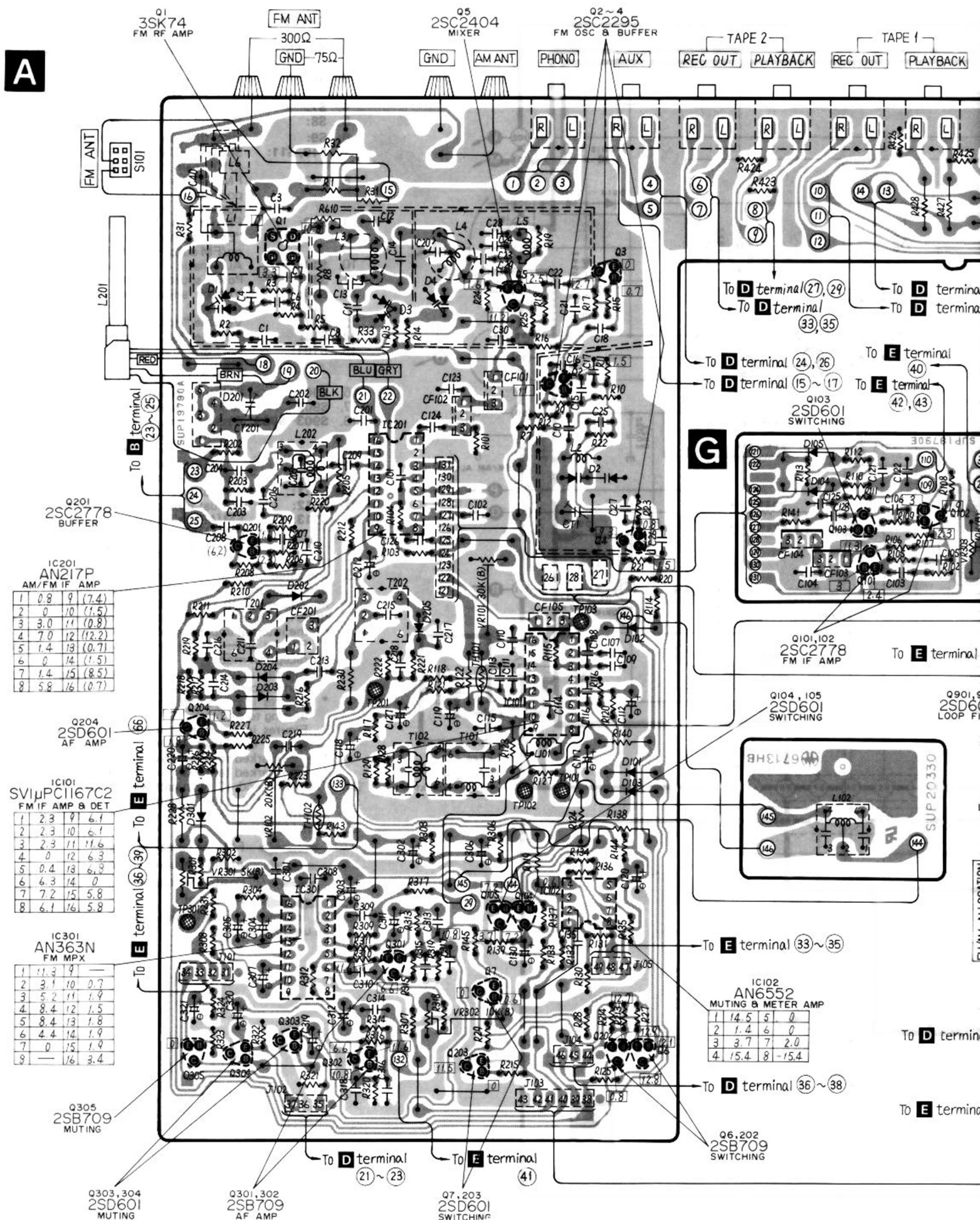






Notes:

1. **S1~S3:** Input selector switch in "tuner" position. (S1: phono, S2: tuner, S3: AUX.)
2. **S4, S5:** Tape monitor switch in "Source" position. (S4: Tape 2, S5: Tape 1)
3. **S6:** Audio muting switch in "0dB" position. 0dB ↔ -20dB
4. **S7:** Loudness switch in "off" position.
5. **S8:** Subsonic filter switch in "off" position.
6. **S9:** High filter switch in "off" position.
7. **S10, S11:** Speaker selector switch in "main" position. (S10: main, S11: remote)
8. **S12:** FM IF band selector switch in "normal" position. normal ↔ narrow
9. **S13:** FM muting/FM mode selector switch in "on/FM auto" position. on/FM auto ↔ off/FM mono
10. **S14:** Automatic — scan switch in "on" position.
11. **S15:** Power source switch in "on" position.
12. **S16:** Voltage adjustment switch in "240V" position.
13. **S17:** Volume "down" switch.
14. **S18:** Volume "up" switch.
15. **S101:** FM antenna selector switch in "normal" position. normal ↔ tuned type
16. **S901:** FM tuner selector switch.
17. **S902:** AM tuner selector switch.
18. **S903~S909:** Preset tuning switch. S903 — 1ch, S904 — 2ch, S905 — 3ch, S906 — 4ch, S907 — 5ch, S908 — 6ch, S909 — 7ch
19. **S910:** Memory set switch.
20. **S911:** Manual tuning "up" switch.
21. **S912:** Manual tuning "down" switch.
22. **S913:** FM/AM allocation selector switch in "FM 0.05MHz/AM 9KHz" step position. FM 0.2MHz/AM 10KHz ↔ FM 0.05MHz/AM 9KHz
23. Indicated voltage values are the standard values for the unit measured by 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.
 - * Figures in □ stand for DC voltage in FM/AM signal reception mode.
 - * Figures in < > stand for DC voltage in FM stereo signal reception mode.
 - * Figures in ▭ stand for DC voltage in FM (no signal) muting to on mode.
 - * Figures in () stand for DC voltage with the FM/AM selector circuit set at AM.
 - * □ marked terminal: 5V or 0V output.
 - * ▭ marked terminal: 5V or -26V output.
24. Transistor and IC terminals which carry no voltage indication emit 5V pulse waveforms or are subject to change according to the frequency or input signal levels.
25. Signal lines
 - FM/AM composite signal
 - Audio frequency signal
 - Positive voltage lines
 - /← AM signal
26. ⚠ indicates that only parts specified by the manufacturer be used for safety.



A

Tuner circuit

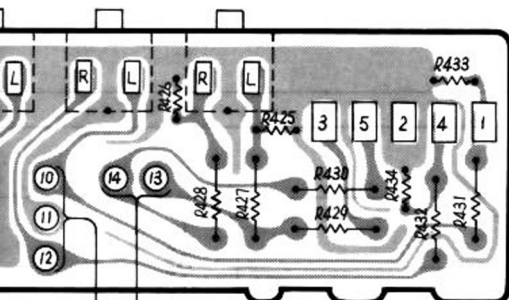
B

Logic control circuit

G

FM IF amp. circuit

TAPE 1
ACK REC OUT PLAYBACK REC/PLAY



B

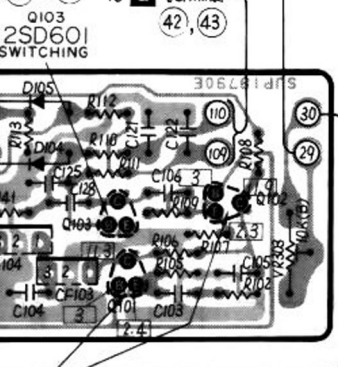
IC901
SVI μ PB553C
PRE SCALER

To power transformer
(Secondary) 0V

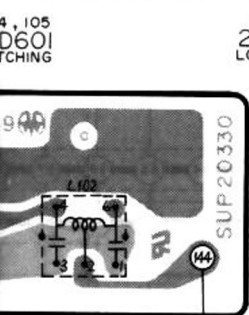
To power transformer
(Secondary) AC 3.0V

To D terminal (30), (32)
To D terminal (18)~(20)

To E terminal (40)
To E terminal (42), (43)

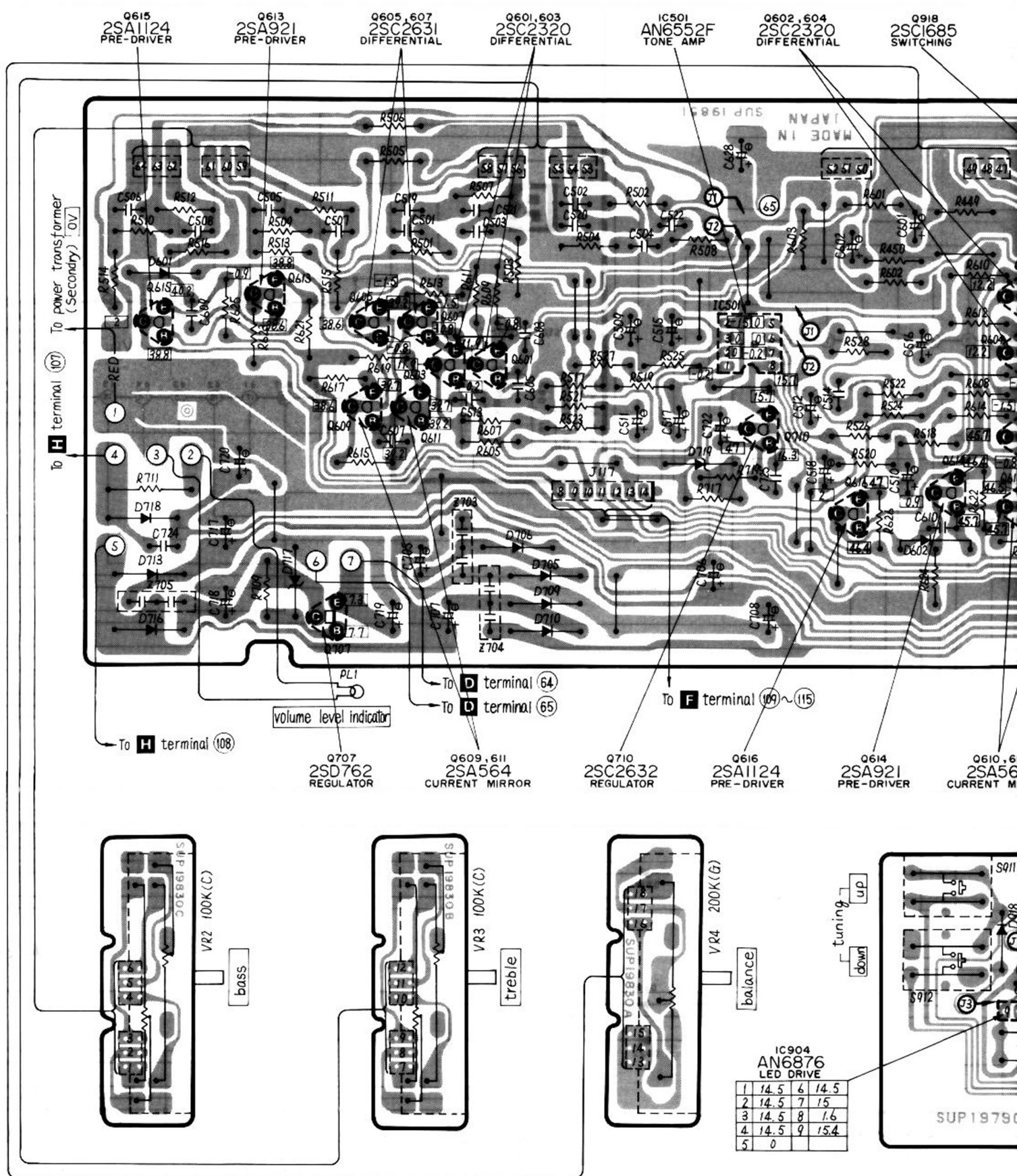


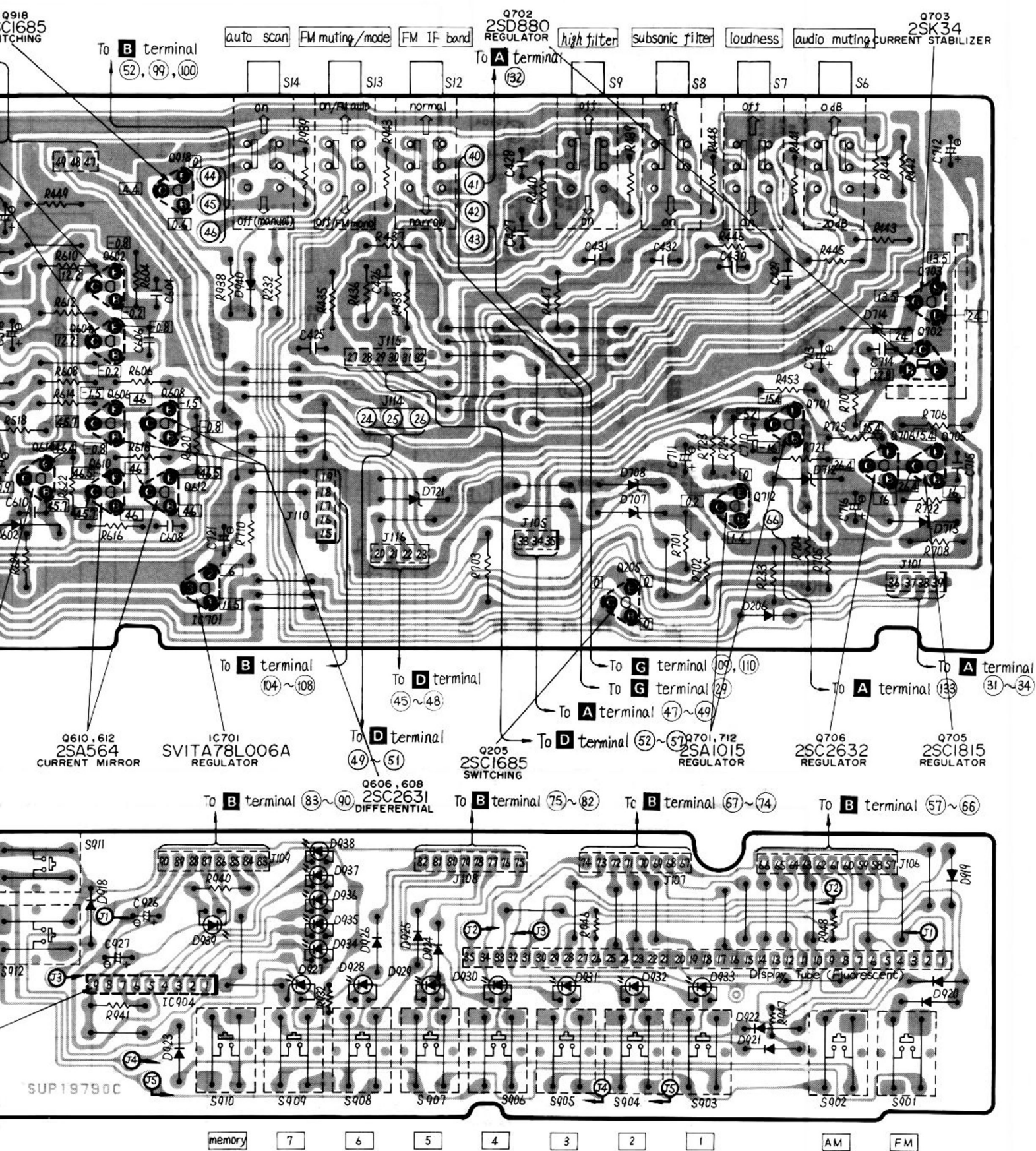
To E terminal (46)

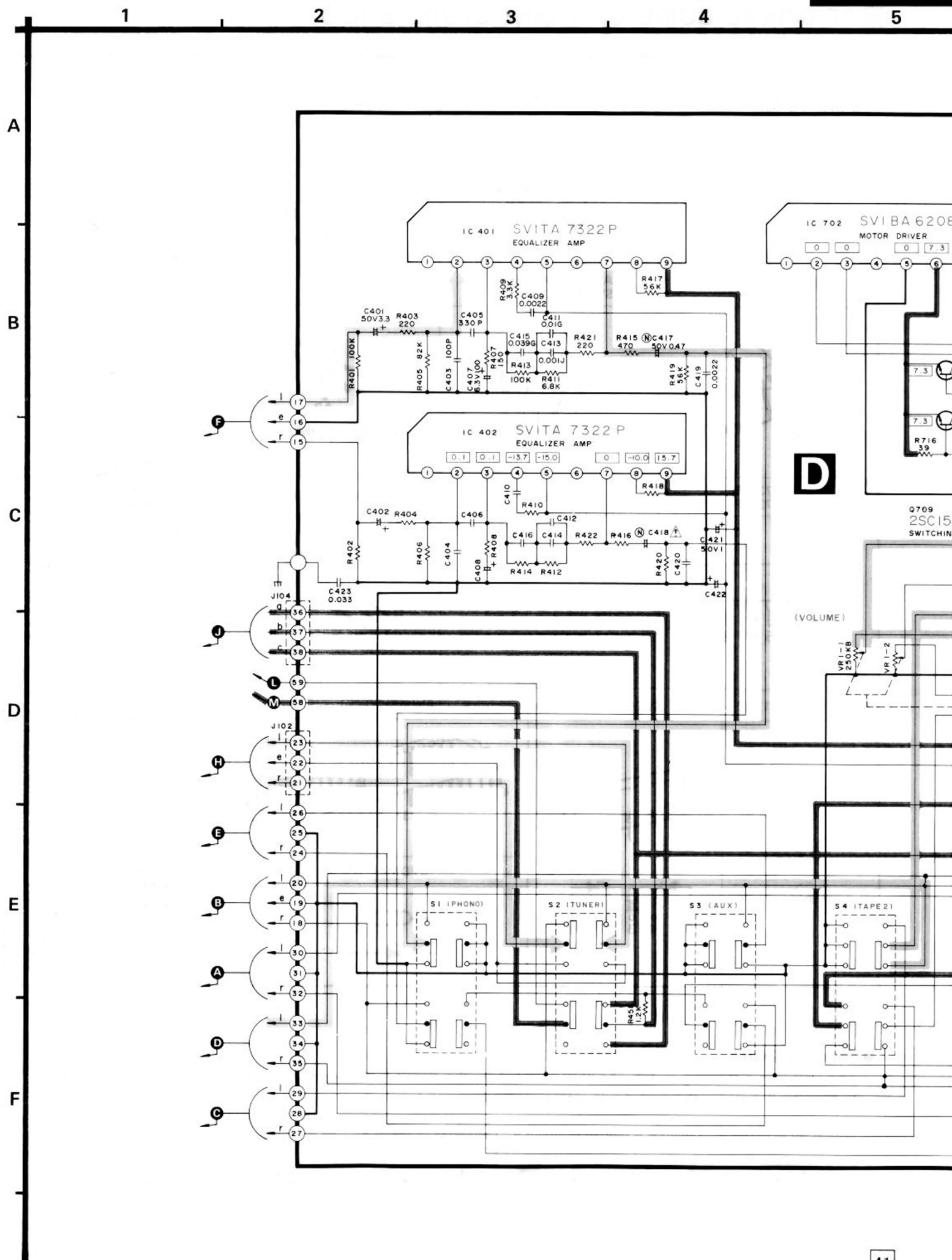




Tone control & pre-drive circuit







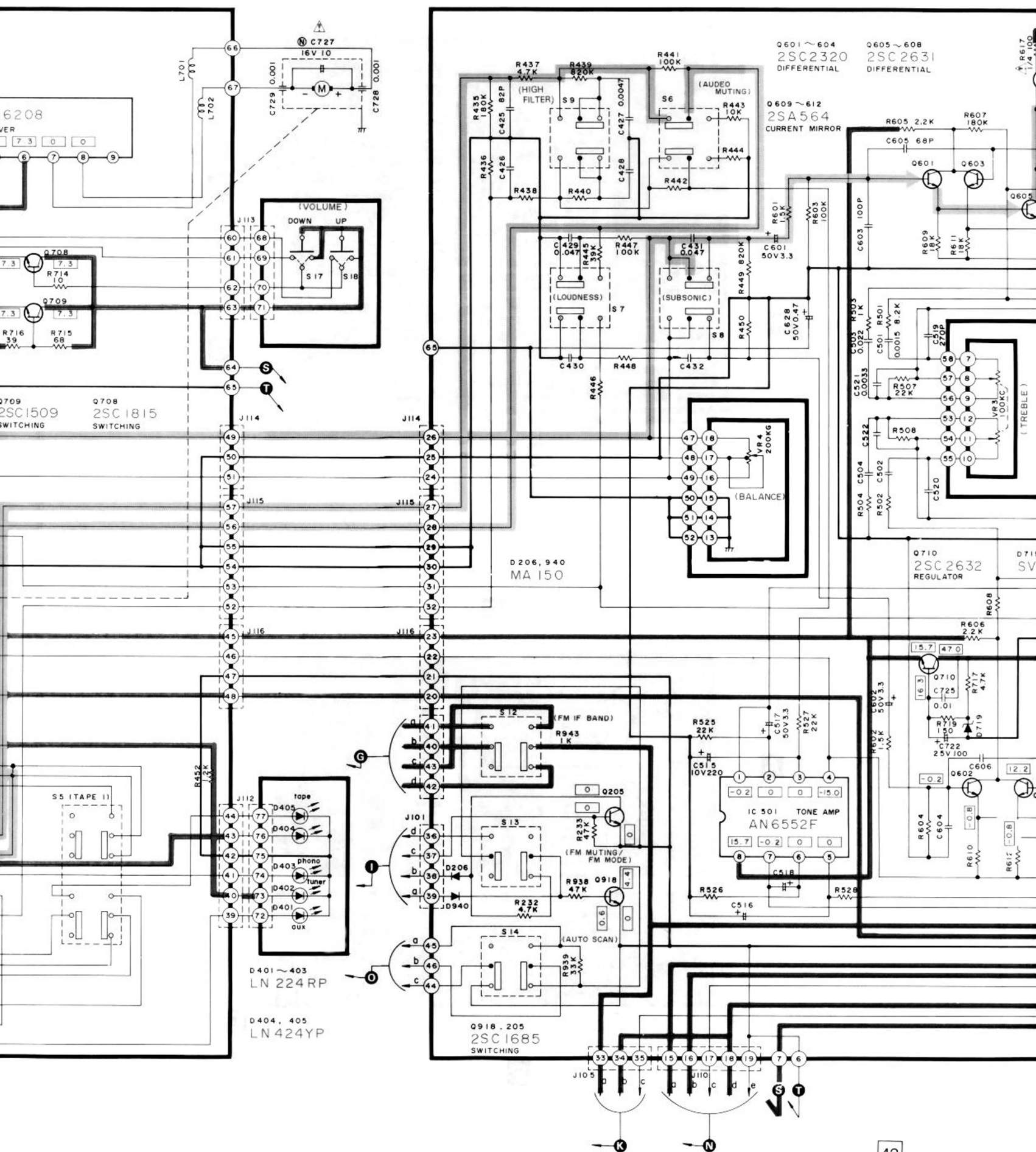
6

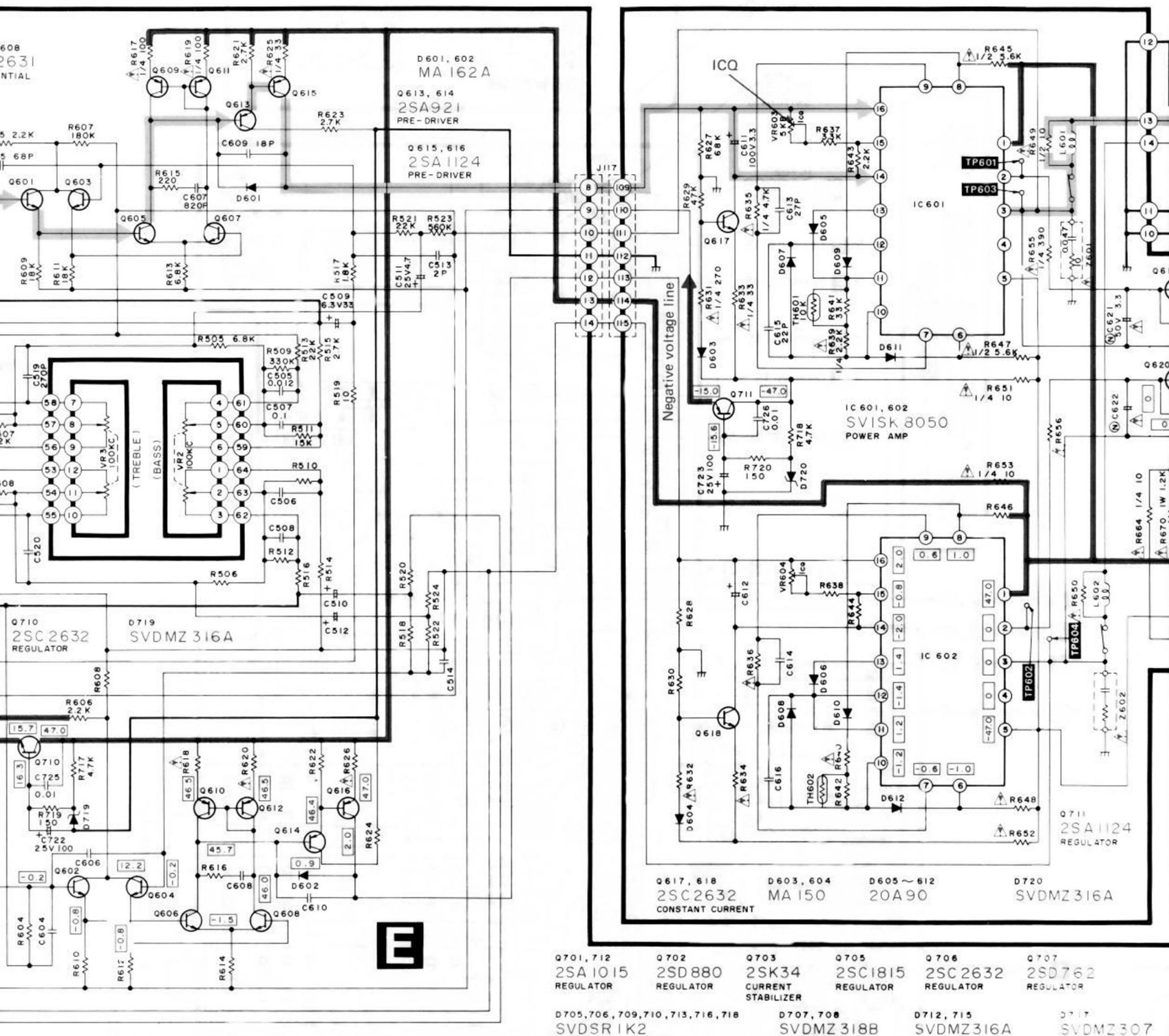
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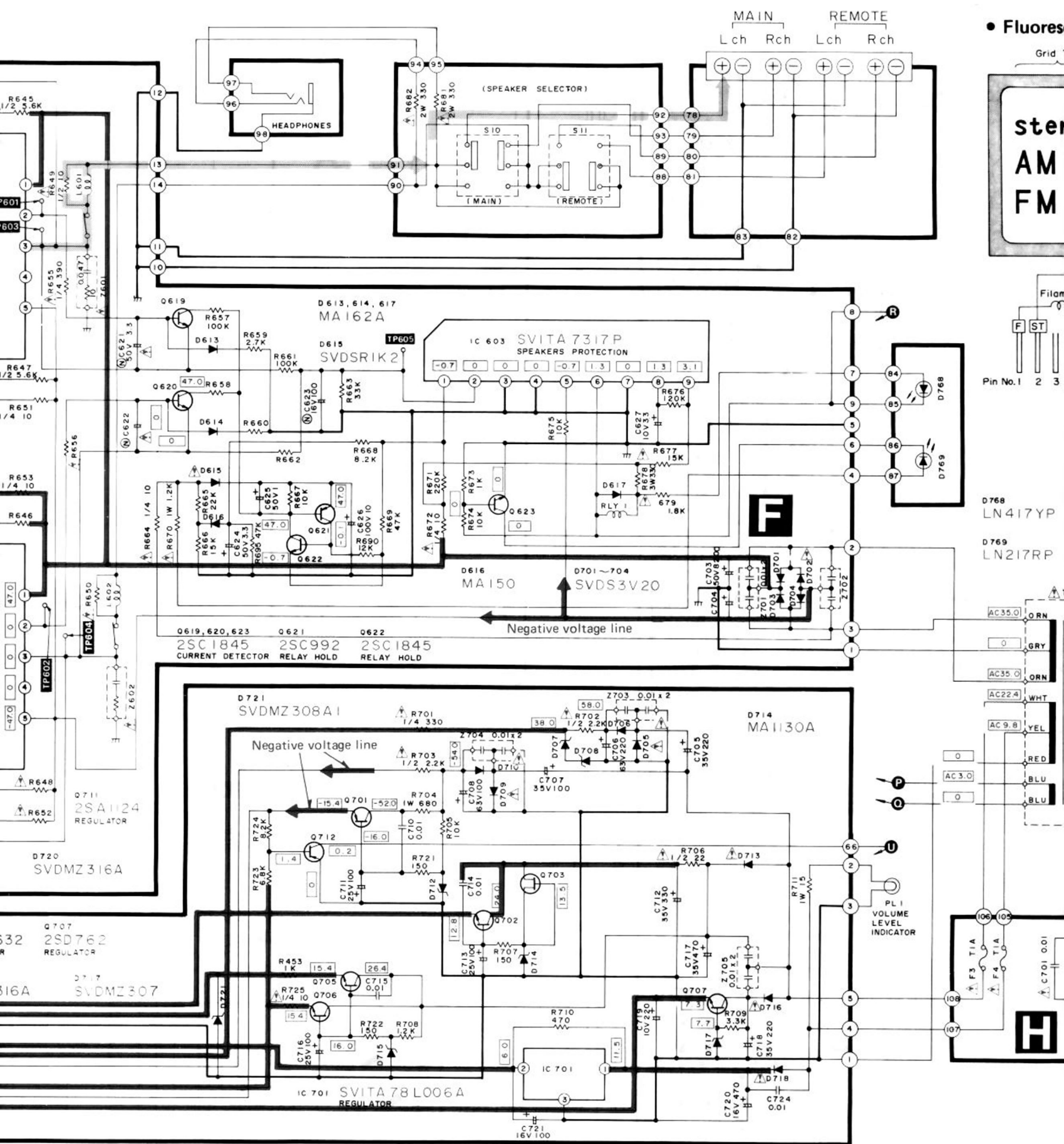
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9

10



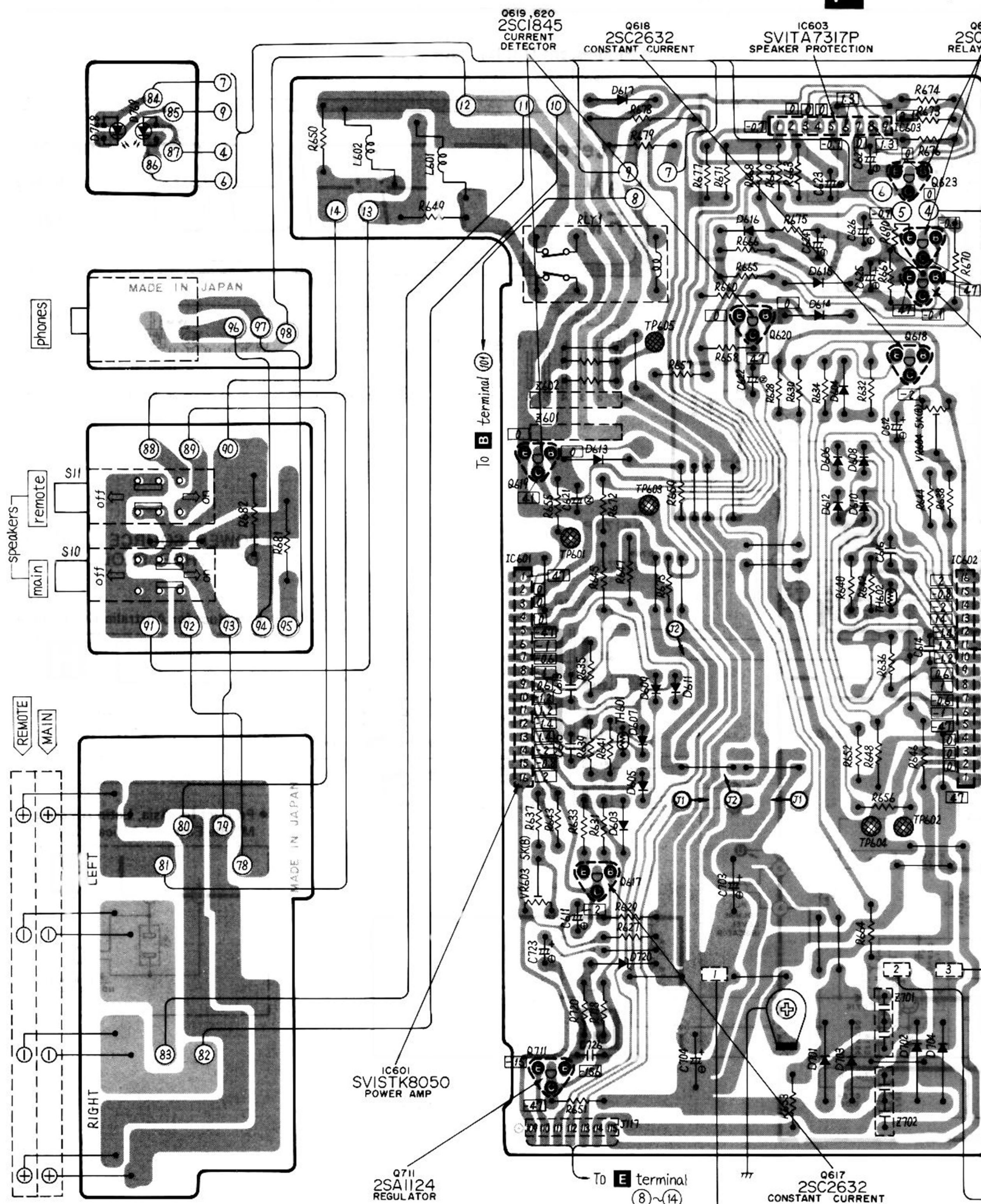




PRINTED CIRCUIT BOARD

Ground (Earth) lines

F Main amp &



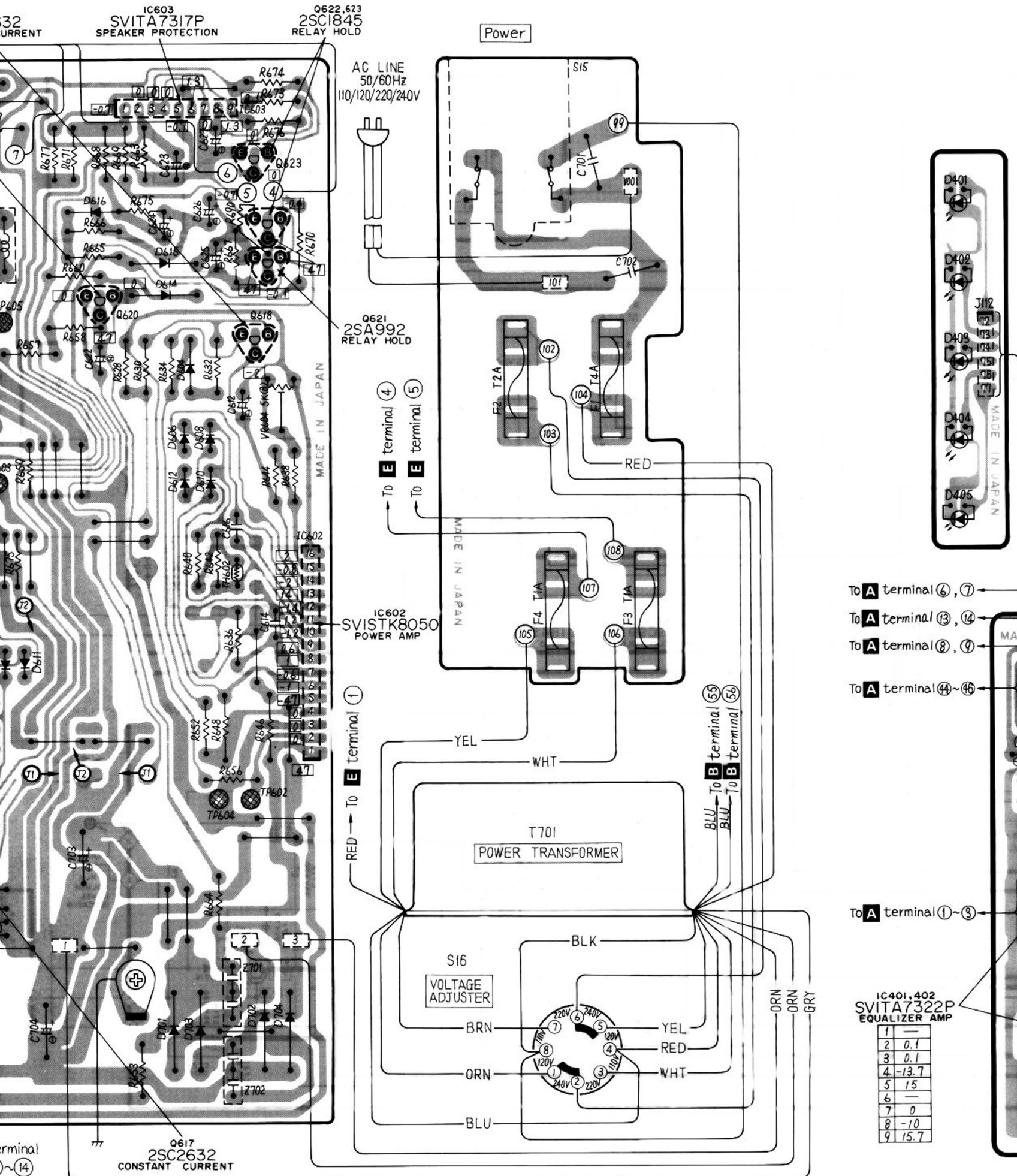
(Earth) lines

F

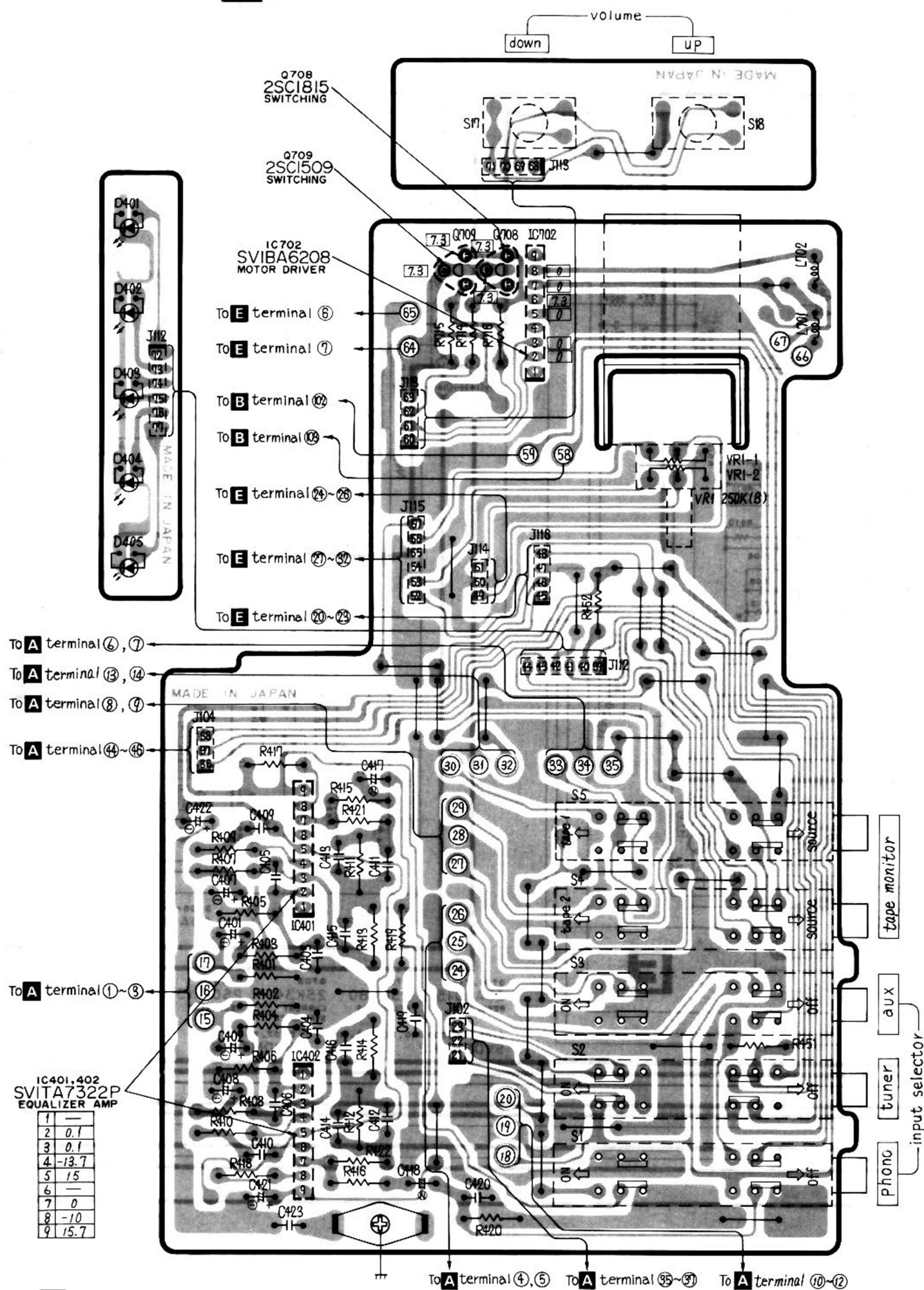
Main amp & power source circuit

H

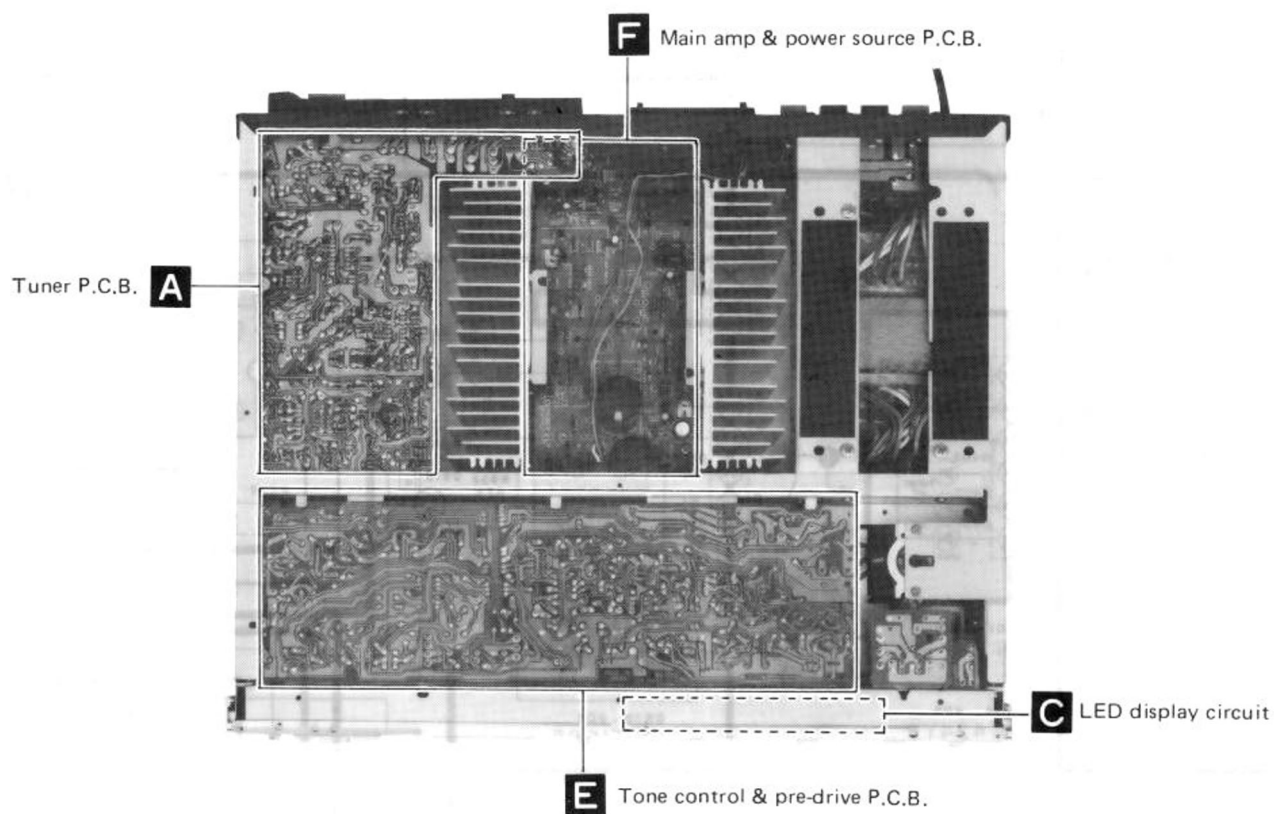
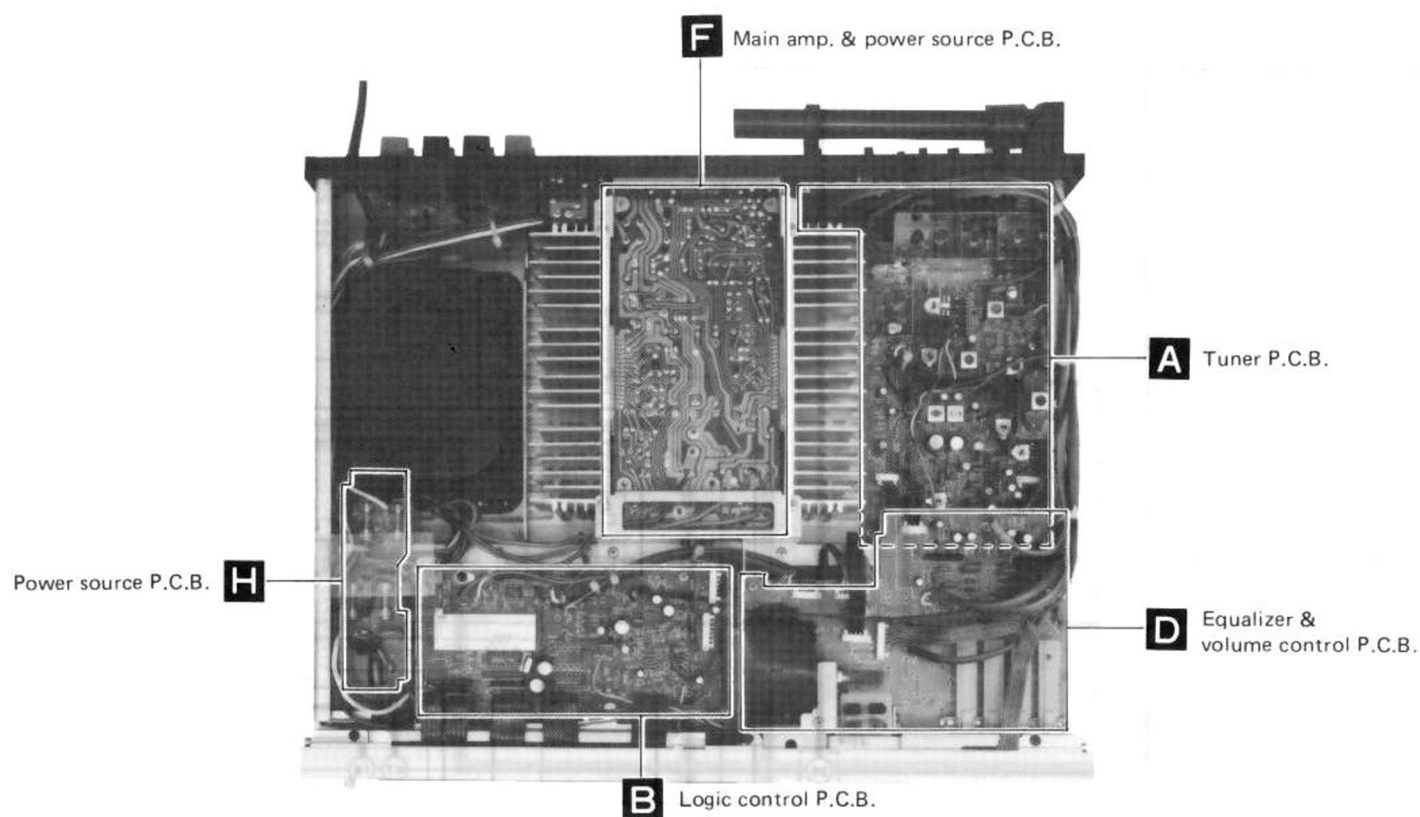
Power source circuit



D Equalizer & volume control circuit.

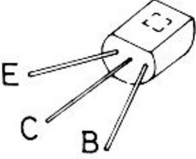
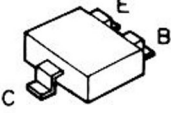
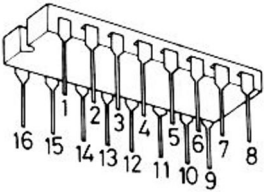
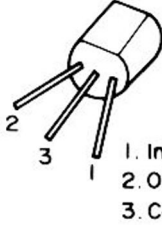
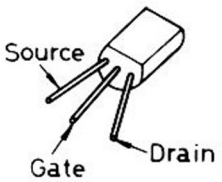
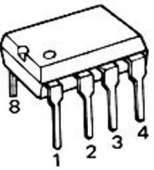
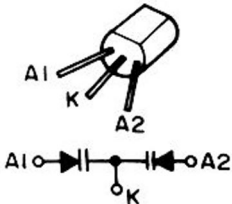
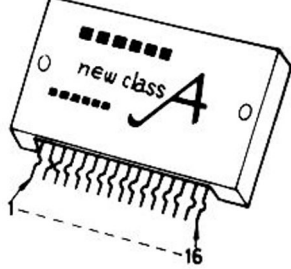
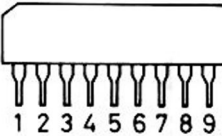
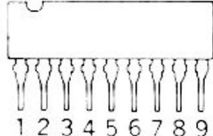
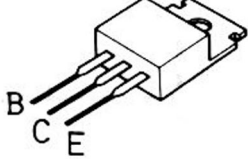
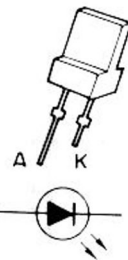
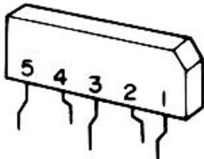
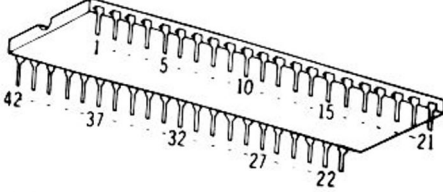
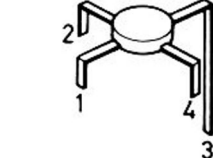
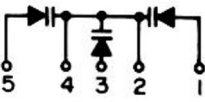
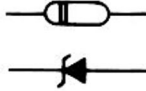
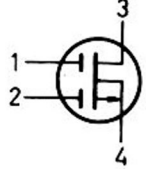


LOCATION OF P.C.B.



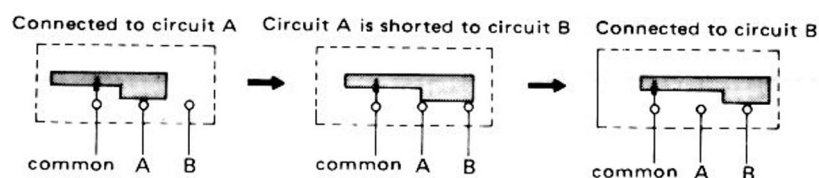
Bottom view

■ TERMINAL GUIDE OF TRANSISTORS & IC'S

2SC2320L, 2SC1815, 2SA666A1, 2SA1015, 2SA1124, 2SC1684, 2SA1123, 2SC2631, 2SC1845, 2SC2632, 2SC1509	2SC2295, 2SC2404, 2SB709, 2SD601, 2SC2778, 2SD601, 2SD601A, 2SB709A	SVI μ PC1167C2, AN217PBB, AN363N, SVITC5067BP, SVIM74LS42P	SVITA78L006A
			
2SK34-D1	AN6552, AN6552F, SVI μ PB553C-E	SVDBB204	SVISTK8050
			
SVITA7322P, SVITA7317P	SVIBA6208	2SD880, 2SD762	3SK74-L1
			
LN417YP, LN217RP	SVDBB113	SVI μ PD1704CL	
			
			

● Shorting Switch

This unit uses a shorting switch. As illustrated below, the circuit is shorted to the next circuit without being opened. In the circuit diagram, the shaded area represents the common terminal.



An example of circuit diagram

