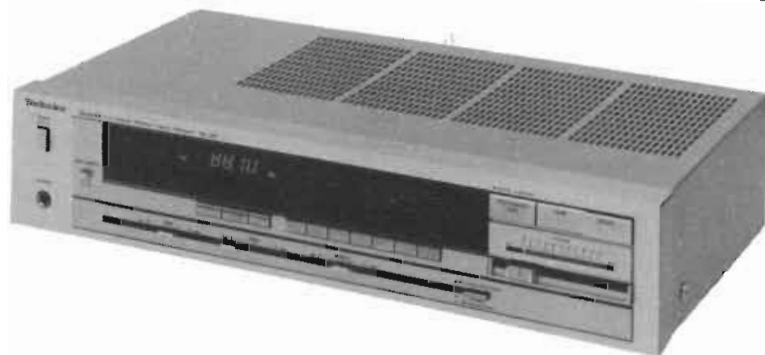


Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver



SA-210

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

SA-210(K)

[EX],[EH]

- The colors of this model included silver and black.
- The black type model is provided with (K) in the Service Manual.

Areas

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

Specifications

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

(DIN 45 500)

■ AMPLIFIER SECTION

40 Hz~20 kHz continuous power output both channels driven	2 × 25W (4Ω) 2 × 25W (8Ω)
40 Hz~16 kHz continuous power output both channels driven	2 × 25W (4Ω) 2 × 25W (8Ω)
1 kHz continuous power output both channels driven	2 × 27W (4Ω) 2 × 27W (8Ω)
Total harmonic distortion	
rated power at 40 Hz~20 kHz	0.8% (4Ω) 0.5% (8Ω)
rated power at 40 Hz~16 kHz	0.8% (4Ω) 0.5% (8Ω)
rated power at 1 kHz	0.5% (4Ω) 0.5% (8Ω)
half power at 1 kHz	0.05% (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	0.8%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.5%
Power bandwidth	
both channels driven, -3 dB	10 Hz~30 kHz (4Ω)
Damping factor	15 (4Ω), 30 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
TAPE/AUX	150 mV/18kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
Frequency response	
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
TAPE/AUX (Volume at max)	5 Hz~70 kHz (-3 dB)
Tone controls	
BASS	50 Hz, +10 dB~-10 dB
TREBLE	20 kHz, +10 dB~-10 dB

S/N

rated power (4Ω)	
PHONO	70 dB (IHF, A: 73 dB)
TAPE/AUX	88 dB (IHF, A: 95 dB)
-26 dB power (4Ω)	
PHONO	64 dB
TAPE/AUX	66 dB
50 mW power (4Ω)	
PHONO	62 dB
TAPE/AUX	62 dB
Loudness control (volume at -30 dB) (built in)	50 Hz, +5 dB
Output voltage and impedance	
TAPE REC OUT	150 mV
Channel balance, TAPE/AUX 250 Hz~6,300 Hz	±1 dB
Channel separation, TAPE/AUX 1 kHz	55 dB
Headphones output level and impedance	420 mV/330Ω
Load impedance	4Ω~16Ω

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz
Sensitivity	
S/N 30 dB	1.9 μV (300Ω), 1.3 μV (75Ω)
S/N 26 dB	1.7 μV (300Ω), 1.2 μV (75Ω)
S/N 20 dB	1.5 μV (300Ω), 0.9 μV (75Ω)
IHF usable sensitivity	1.9 μV (IHF '58)
IHF 46 dB stereo quieting sensitivity	22 μV/75Ω
Total harmonic distortion	
MONO	0.15%
STEREO	0.3%
S/N	
MONO	60 dB (77 dB, IHF)
STEREO	58 dB (71 dB, IHF)
Frequency response	20 Hz~15 kHz, ±1 dB~-2 dB
Alternate channel selectivity	400 kHz 70 dB
Capture ratio	1 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	75 dB
Spurious response rejection at 98 MHz	82 dB

Technics

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

AM suppression	50 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	-33 dB (-35 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μ V
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	
	300 Ω (balanced)
	75 Ω (unbalanced)

■ AM TUNER SECTION

Frequency range	522~1611 kHz (9 kHz-step)
	530~1620 kHz (10 kHz-step)

Sensitivity (S/N 20 dB)	20 μ V, 300 μ V/m
Selectivity	55 dB
Image rejection at 1,000 kHz	40 dB
IF rejection at 1,000 kHz	60 dB

■ GENERAL

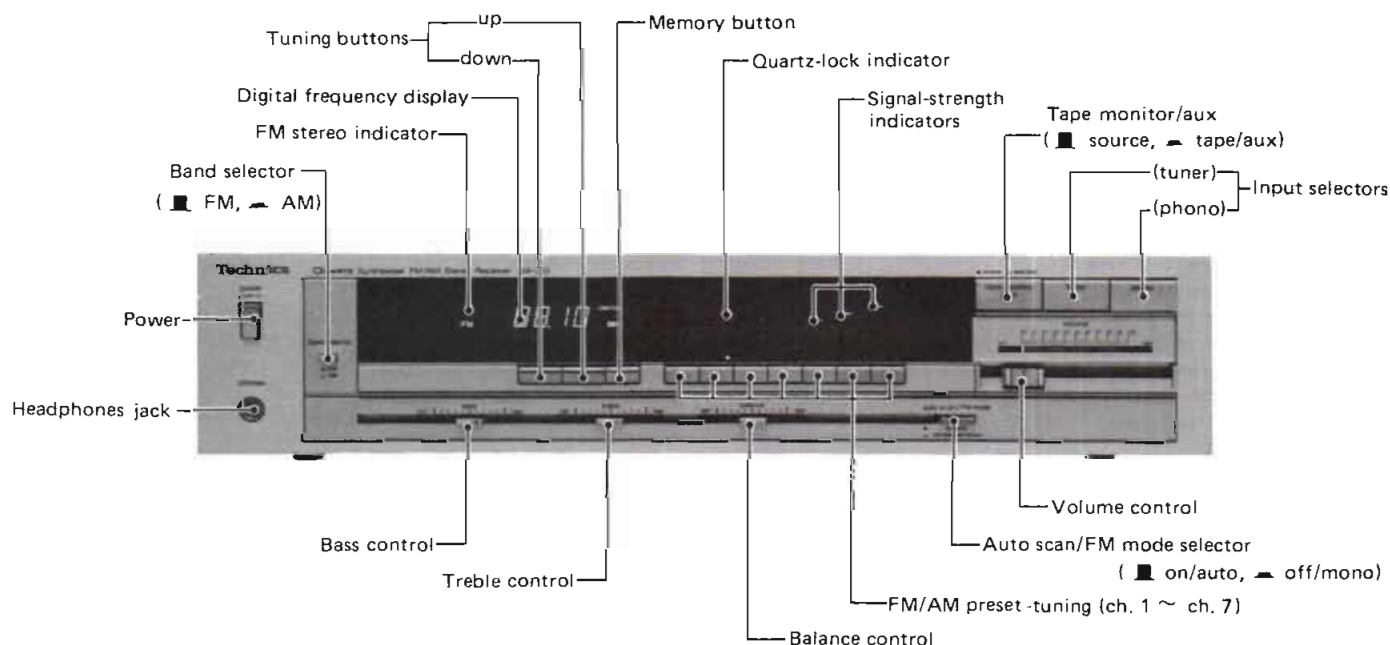
Power consumption	220W
Power supply	
For United Kingdom and Australia	AC 50 Hz/60 Hz, 240V
For continental Europe	AC 50 Hz/60 Hz, 220V
For others	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 97 × 243 mm
	(16-15/16" × 3-13/16" × 9-9/16")
Weight	5.1 kg
	(11.2 lb.)

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■ LOCATION OF CONTROLS



QUARTZ Synthesizer

FM/AM Stereo Receiver

SA-210/SA-210(K)

DEUTSCH

- This booklet contains the specifications and adjusting procedures for SA-210, written Germany, French and Spanish.
- File this manual together with the SA-210 service manual (Order No. SD83022407C8).
- Diese Broschüre enthält die technischen Daten und die Beschreibungen der Justiermethoden für SA-210 in deutscher, französischer und spanischer Sprache.
- Bewahren Sie das Büchlein zusammen mit der Bedienungsanleitung für SA-210 (Bestell-Nr. SD83022407C8) auf.
- Cette brochure contient les spécifications et les procédures de réglage pour le SA-210, écrites en allemand, en français et en espagnol.
- Classer ce manuel en même temps qu'avec le manuel de service du SA-210 (N° d'ordre: SD83022407C8).
- Este librito contiene las especificaciones y procedimientos de ajuste para SA-210, escritas en alemán, francés y español.
- Guardar este manual juntamente con el manual de servicio de SA-210 (Pedido N°. SD83022407C8).

DEUTSCH

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

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 40 Hz ~ 20 kHz	
beide Kanäle ausgesteuert	2 × 25W (4 Ω) 2 × 25W (8 Ω)
Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz	
beide Kanäle ausgesteuert	2 × 25W (4 Ω) 2 × 25W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz	
beide Kanäle ausgesteuert	2 × 27W (4 Ω) 2 × 27W (8 Ω)
Gesamtklirrfaktor	
Nennleistung bei 40 Hz ~ 20 kHz	0,8% (4 Ω) 0,5% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz	0,8% (4 Ω) 0,5% (8 Ω)
Nennleistung bei 1 kHz	0,5% (4 Ω) 0,5% (8 Ω)
halbe Nennleistung bei 1 kHz	0,05% (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	0,8%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,5%
Leistungsbandbreite	
beide Kanäle ausgesteuert bei -3 dB	10 Hz ~ 30 kHz (4 Ω) 15 (4 Ω), 30 (8 Ω)
Dämpfungsfaktor	
Eingangsempfindlichkeit und -impedanz	
Phono	2,5 mV/47 kΩ
Tape/Aux	150 mV/18 kΩ
Maximale TA-Eingangsspannung (1 kHz, eff.)	150 mV
Frequenzgang	
Phono	RIAA-Standardkurve ±0,8 dB (30 Hz ~ 15 kHz)
Tape/Aux (max. Lautstärke)	5 Hz ~ 70 kHz (-3 dB)
Klangregler	
Baßregler (BASS)	50 Hz, +10 dB ~ -10 dB
Höhenregler (TREBLE)	20 kHz, +10 dB ~ -10 dB

Geräuschabstand

Nennleistung (4 Ω)

Phono 70 dB (nach IHF, A: 73 dB)

Tape/Aux 88 dB (nach IHF, A: 95 dB)

-26 dB Leistung (4 Ω)

Phono 64 dB

Tape/Aux 66 dB

50 mW Leistung (4 Ω)

Phono 62 dB

Tape/Aux 62 dB

Gehörliche Lautstärkekorrektur (Loudness)

(bei -30 dB Ausgangsleistung) (eingebaut) 50 Hz, +5 dB

Ausgangsspannung und -impedanz

Tape Aufnahme (TAPE REC OUT) 150 mV

Kanalabweichung (Tape/Aux, 250 Hz ~ 6300 Hz) ±1 dB

Übersprechdämpfung (Tape/Aux, 1 kHz) 55 dB

Kopfhörerpegel und -impedanz 420 mV/330 Ω

Lautsprecherimpedanz 4 Ω ~ 16 Ω

■ UKW-TUNERTEIL

Wellenbereich 87,50 ~ 108,00 MHz

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)

Stereoschwellen bei 46 dB nach IHF 22 μV/75 Ω

Gesamtklirrfaktor

Mono 0,15%

Stereo 0,3%

Geräuschabstand

Mono 60 dB (77 dB nach IHF)

Stereo 58 dB (71 dB nach IHF)

Frequenzgang 20 Hz ~ 15 kHz (+1 dB ~ -2 dB)

Trennschärfe bei Störsender ±400 kHz 70 dB

Einfangverhältnis 1 dB

Spiegelfrequenz-Dämpfung bei 98 MHz 55 dB

ZF-Dämpfung bei 98 MHz 75 dB

Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz 82 dB

MW-Unterdrückung 50 dB

Übersprechdämpfung	
1 kHz	40 dB
10 kHz	30 dB
Trägerrest	
19 kHz	-33 dB (-35 dB nach IHF)
38 kHz	-50 dB (-50 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	
	±1,5 dB
Begrenzereinsatz	
	1,2 µV
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	
	300 Ω (symmetrisch)
	75 Ω (unsymmetrisch)

MW-TUNERTEIL

Wellenbereiche	522 ~ 1611 kHz (9 kHz-step)
	530 ~ 1620 kHz (10 kHz-step)
Eingangsempfindlichkeit (S/R 20 dB)	20 µV, 300 µV/m
Trennschärfe	55 dB
Spiegelfrequenz-Dämpfung bei 1000 kHz	40 dB
ZF-Dämpfung bei 1000 kHz	60 dB

ALLGEMEINE DATEN

Leistungsaufnahme	220 W
Netzspannung	
Für Kontinentaleuropa	Wechselstrom 50 Hz/60 Hz, 220V
Für andere Länder	Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V
Abmessungen (B×H×T)	430 × 97 × 243 mm
Gewicht	5,1 kg

MESSUNGEN UND JUSTIERUNGEN

Anmerkung: Die AM OSC-Spule (L202) und AM ZFT (T201) sind bereits justiert und benötigen keine Justierung.

AM (MW)-EINSTELLUNG

• Stellungen und zu benutzende Geräte

1. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
2. AM (MW)-Meßsender (AM-SG)
3. Bereichsschalter AM
4. AM (MW) Wellenverteilungs-Wahlschalter auf Position "9kHz" stellen.

5. Netzspannung auf ihren Sollwerthalten.
6. Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute ablesung.
7. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.

Nr.	AM (MW)-MESSENDER		ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICH-SPUNKTE	ABGLEICHsverFAHREN
	ANSCHLUSS	FREQUENZ				
MW-HF-ABGLEICH						
1	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antennen-eingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. {Schwacher Eingang}	612kHz (400Hz Modul., 30%)	612kHz	Oszilloskop oder Wechselstrom-Voltmeter über den Lautsprecher schließen	L201 {Ant. Spule}	1. Auf max. Ausgang abgleichen. 2. Den Ferritkern von L201 mit einem Schraubendreher justieren.
2		1503kHz (400Hz Modul., 30%)	1503kHz		CT201 {Ant. Trimmer}	1. Auf max. Ausgang abgleichen. 2. Die Schritte (1) und (2) wiederholen, bis die Frequenz genau mit der Skalenanzeige übereinstimmt.

FM (UKW)-EINSTELLUNG

• Stellungen und zu benutzenden Geräte

1. UKW-Meßsender (FM-SG)
2. Verzerrungsmesser
3. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
4. Signalfrequenzmesser innerer für 19kHz und 108MHz
5. Bereichsschalter FM
6. Den UKW-Betriebsartenschalter auf die "mono"-position stellen.
7. Die anderen Einstellungen sind gleich wie bei der MW-Justierung.
8. Stereo-Modular (oder Trennmesser)

* Vorbereitung des UKW-Meßoszillators (UKW-MO)

1. Die Normal-Eingangsleistung dieses Gerätes beträgt 60dB (1mV, 400Hz, 100% Modulation). (Wegen der Dämpfung bei Verwendung von Koaxialkabeln, muß die MO-Ausgangsleistung 6dB oder mehr (IHF) betragen; d. h. wenn die Eingangsleistung 60dB beträgt, muß der MO-Ausgang 66dB betragen.)

Nr.	FM (UKW) MESSENDER		ANZEIGE- FREQUENZ DURCH VOR- EINSTELLUNG	VORBEREITUNG	ABGLEICH- SPUNKTE	ABGLEICHVERFAHREN
	ANSCHLUSS	FREQUENZ				
ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO						
3	FM-SG an der FM-Antennenanschluß entsprechend Abb. 17. (60dB an den Antennenanschluß legen.)	100.1MHz (400Hz Modulat., 100%)	100.1MHz	Ein Gleichstromröhren-voltmeter zwischen TP203 und TP204 über eine Drosselspule verbinden. (Siehe Abb. 17)	T202 (Diskriminator FT)	1. Den Kern von T202 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
4		100.1MHz (400Hz Modulat., 100%)	100.1MHz	Klirrfaktor-Meßbrücke über den Lautsprecher schließen	T203 (Diskriminator FT)	1. T203 Kern für minimale Verzerrung der rechten und linken Kanäle justieren.

UKW-STEREO-DEKODER-ABGLEICH

UNTER VERWENDUNG EINES ZAHLES

1. Unmoduliertes Mono-Signal 100.1MHz in das Gerät speisen.
2. FM muting/mode-Schalter auf "on/FM auto" stellen.
3. Zähler über einen Widerstand 100k ohm an **TP301** schließen.
4. **VR301** auf 19 kHz ± 30 Hz einstellen.

ALTERNATIV-MEB METHODE

1. Stereosignal entweder von einem Stereogenerator. Oder einem Sender einspeisen.
2. **VR301** so einstellen, bis die Stereolampe auf leuchtet. Schleifer von **VR301** sichern, wie in Abb. 19 gezeigt.

FRANÇAIS

■ CARACTERISTIQUES

(Sujet à changement sans préavis.)

(DIN 45 500)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 40 Hz~20 kHz,
les deux canaux en circuit $2 \times 25W (4\Omega)$
 $2 \times 25W (8\Omega)$

Puissance de sortie continue de 40 Hz~16 kHz,
les deux canaux en circuit $2 \times 25W (4\Omega)$
 $2 \times 25W (8\Omega)$

Puissance de sortie continue à 1 kHz
les deux canaux en circuit $2 \times 27W (4\Omega)$
 $2 \times 27W (8\Omega)$

Distorsion harmonique totale
à puissance nominale (40 Hz~20 kHz) 0,8% (4 Ω)
0,5% (8 Ω)

à puissance nominale (40 Hz~16 kHz) 0,8% (4 Ω)
0,5% (8 Ω)

à puissance nominale (1 kHz) 0,5% (4 Ω)
0,5% (8 Ω)

à demi-puissance (1 kHz) 0,05% (8 Ω)
puissance de -26 dB à 1 kHz 0,1% (4 Ω)
puissance de 50 mW à 1 kHz 0,12% (4 Ω)

Distorsion d'intermodulation
à puissance nominale à 250 Hz: 8 kHz=4:1, 4 Ω 0,8%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8 Ω 0,5%

Réponse de fréquences
les deux canaux en circuit, -3 dB 10 Hz~30 kHz (4 Ω)
Coefficient d'amortissement 15 (4 Ω), 30 (8 Ω)

Sensibilité et impédance d'entrée

PHONO 2,5 mV/47k Ω

BANDE/AUX (TAPE/AUX) 150 mV/18k Ω

PHONO (tension d'entrée maximum, 1 kHz RMS) 150 mV

Signal/Bruit

à puissance nominale (4 Ω)

PHONO 70 dB (IHF, A: 73 dB)

BANDE/AUX (TAPE/AUX) 88 dB (IHF, A: 95 dB)

puissance de -26 dB (4 Ω)

PHONO 64 dB

BANDE/AUX (TAPE/AUX) 66 dB

puissance de 50 mW (4 Ω)

PHONO 62 dB

BANDE/AUX (TAPE/AUX) 62 dB

Réponse de fréquence

PHONO

Courbe nominale RIAA

$\pm 0,8$ dB (30 Hz~15 kHz)

BANDE/AUX (TAPE/AUX) (volume au maximum)

5 Hz~70 kHz (-3 dB)

Régage de la tonalité

BASSES (BASS)

50 Hz, +10 dB~-10 dB

AIGUS (TREBLE)

20 kHz, +10 dB~-10 dB

Compensateur physiologique (volume à -30 dB) (Incorporé)

50 Hz, +5 dB

Tension de sortie et impédance

SORTIE ENREGISTREMENT/BANDE

(TAPE REC OUT)

150 mV

Equilibrage des canaux, TAPE/AUX 250 Hz~6 300 Hz ± 1 dB

Séparation des canaux, TAPE/AUX 1 kHz 55 dB

Niveau de sortie des casques et impédance 420 mV/330 Ω

Impédance de charge 4 Ω ~16 Ω

■ SECTION SYNTONISATEUR FM

Gamme de fréquence 87,50~108,00 MHz

Sensibilité

S/B 30 dB 1,9 μ V (300 Ω), 1,3 μ V (75 Ω)

S/B 26 dB 1,7 μ V (300 Ω), 1,2 μ V (75 Ω)

S/B 20 dB 1,5 μ V (300 Ω), 0,9 μ V (75 Ω)

Sensibilité utilisable IHF 1,9 μ V (IHF '58)

Sensibilité stéréo au seuil de 46 dB, IHF 22 μ V/75 Ω

Distorsion harmonique totale

MONO 0,15%

STEREO 0,3%

Signal/Bruit

MONO 60 dB (77 dB, IHF)

STEREO 58 dB (71 dB, IHF)

Réponse de fréquence 20 Hz~15 kHz, ± 1 dB~-2 dB

Sélectivité alternée par canal ± 400 kHz 70 dB

Taux de capture 1 dB

Rejection d'image à 98 MHz 55 dB

Rejection FI à 98 MHz 75 dB

Rejection de réponse parasite à 98 MHz 82 dB

Suppression AM 50 dB

Séparation stéréophonique

1 kHz 40 dB

10 kHz 30 dB

Fuite de porteuse

19 kHz -33 dB (-35 dB, IHF)

38 kHz -50 dB (-50 dB, IHF)

Equilibrage de canaux (250 Hz~6,300 Hz) $\pm 1,5$ dB

Point de limite 1,2 μ V

Largeur de bande

Amplificateur FI 180 kHz

Démodulateur FM 1000 kHz

Bornes d'antenne 300 Ω (symétrique)

75 Ω (asymétrique)

■ SECTION SYNTONISATEUR AM

Gamme de fréquence 522~1611 kHz (9 kHz-step)

530~1620 kHz (10 kHz-step)

Sensibilité (S/B 20 dB) 20 μ V, 300 μ V/m

Sélectivité 55 dB

Réjection d'image à 1,000 kHz 40 dB

Réjection FI à 1,000 kHz 60 dB

■ DIVERS

Consommation 220W

Alimentation

Pour l'Europe CA 50 Hz/60 Hz, 220V

Autres CA 50 Hz/60 Hz, 110V/120V/220V/240V

Dimensions (L×H×Pr) 430 × 97 × 243 mm

Poids 5,1 kg

MEDICIONES Y AJUSTES

Note: Bobina AM OSC (L202) y AM IFT (T201) han sido ya ajustados.

AJUSTE DE AM

• Puesta y Uso de equipo

1. Voltímetros electrónicos de CA y CC (VTVA).
2. Generador de señales AM (AM-SG).
3. Poner selector FM-AM en posición "AM".
4. Poner selector de asignación AM en posición "9kHz step".
5. Mantener voltaje de línea a voltaje nominal.
6. La salida de generador de señales no debe ser mayor que la necesaria para obtener una lectura de salida.
7. Para el ajuste use un destornillador no metálico.

Nº.

AM GENERADOR DE SEÑALES		A FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE
CONEXION	FRECUENCIA				
AJUSTE RF-AM					
Conector AM-SG a terminal de antena AM a través de capacitor 200pF. Común a chasis. (Entrada débil)	612kHz (Mod. 30% (con 400Hz)	612kHz	Conectar VTVM de CA u osciloscopio a terminales de "SPEAKER" (altavoz).	L201 (Bobina ANT AM)	1. Ajustar para salida máxima. 2. Ajustar núcleo de ferrita de L201 con destornillador.
	1503kHz (Mod. 30% (con 400Hz)	1503kHz	Conectar VTVM de CA u osciloscopio a terminales de "SPEAKER" (altavoz).	CT201 (Trimer de ANT AM)	1. Ajustar para salida máxima. 2. Repetir pasos (1) y (2) hasta que la frecuencia se adapte correctamente a la escala del cuadrante.

AJUSTE DE FM

• Equipo usado

1. Generador de señales FM (FM-SG)
2. Analizador de distortion.
3. Osciloscopio.
4. Voltímetros electrónicos de CA y CC (VTVM).
5. Frecuencímetro (19kHz y 108MHz medibles).
6. Poner selector FM-AM en posición "FM"
7. Poner el interruptor de modalidad FM en la posición "MONO".
8. Otras puestas son las mismas que en ajuste AM.

* Preparación de generador de señales FM (FM-SG)

1. La entrada standard del aparato es 60dB (1mV), 400Hz, modulación 100% (Debido a atenuación usando cables coaxiales La salida SG ha de ser 6dB más. Es decir, cuando la entrada 60dB, la salida de SG ha de ser 66dB.)

FM GENERADOR DE SEÑALES		A FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE
CONEXION	FRECUENCIA				
AJUSTE DE DISTORSION FM MONO					
Conectar SG-FM a terminal de antenna FM refiriendo a Fig. 17. (Aplicar 60dB a terminal de antena)	100.10MHz (Mod. 100% con 400Hz)	100.10MHz	Conector VTVM CC entre terminal TP203 y TP204 a través de bobina de choque. (Referir Fig. 17).	T202 (Discr. IFT)	1. Ajustar núcleo de T202 de manera que voltaje medido en modalidad de señal se 0mV en gama de 300mV.
	100.10MHz (Mod. 100% con 400Hz)	100.10MHz	Conectar osciloscopio a terminal "speaker" (altavoz)	T203 (Discr. IFT)	1. Ajustar núcleo de T203 de manera que distorsión de canales derecho e izquierdo se minimice.

AJUSTE DE V.C.O. MPX de FM

USANDO UN FRECUENCIMETRO

USANDO SISTEMA ALTERNATIVO

5

1. Señal mono no modulada de 100.10MHz 60dB aplicada al aparato.
2. Interruptor de modalidad/silenciador FM a "auto FM".
3. Conectar frecuencímetro a TP301 a través de resistor (100kΩ). (Vea la Fig. 18.)
4. Ajustar VR301 a 19kHz ± 30Hz.

1. Aplicar una señal estereofónica al aparato o recibir una emisión estereofónica.
2. Ajustar VR301 y fijar el contacto deslizante de VR301 en el medio de la gama-ON del indicador estereofónico. (Vea la Fig. 19.)

MESURAGES ET RÉGLAGES

Nota: La bobine de l'oscillateur de la modulation d'amplitude (L202) et le transformateur de fréquence intermédiaire de modulation d'amplitude (T201) ont déjà été ajustés et ne nécessitent plus de réglage.

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. Sélecteur de gamme AM
4. Régler le sélecteur d'attribution AM sur la position "9kHz step"
5. Conserver la tension du secteur à la tension nominale.
6. Le signal du générateur ne doit pas être plus élevé qu'il n'est nécessaire à obtenir une lecture en sortie.
7. Utiliser un tournevis non-métallique pour la réglage.

AM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
BRANCHEMENT	FREQUENCE				
REGLAGE DE RF-AM					
Raccorder le générateur de signaux AM (modulation d'amplitude) à la borne d'antenne AM par l'intermédiaire d'un condensateur de 200 pF, en se référant à la Fig. 7. (Entrée faible)	612kHz (modulé à 30% par 400Hz)	612kHz	Branchez un c.a. voltmètre électronique ou un oscilloscope sur les bornes de haut-parleur.	L201 (Bobine Ant.)	1. Régler au maximum de signal de sortie. 2. Régler le noyau ferrite de L201 à l'aide d'un tournevis.
	1503kHz (modulé à 30% par 400Hz)	1503kHz		CT201 (Trimmer Ant.)	1. Régler au maximum de signal de sortie. 2. Refaire les étapes (1) et (2) jusqu'à ce que la fréquence s'aligne correctement avec l'affichage du cadran.

REGLAGE DE FM

• Réglage et équipement utilisé

1. Générateur du signal FM (FM-SG)
2. Jauge de distorsion.
3. Oscilloscope.
4. Voltmètres électronique de courant alternatif et de courant continu (VTVM).
5. Compteur de fréquence (19kHz et 108MHz mesurable).
6. Sélecteur d'entrée sur la position "FM".
7. Placer le sélecteur de mode FM sur la position "mono".
8. Les autres réglages sont les mêmes que pour la mise au point de l'amplitude modulée (AM).

* Préparatif du générateur de signaux à Modulation de Fréquence (FM-SG)

1. L'entrée normale de l'appareil est de 60dB (1mV), 400Hz, modulation de 100%. (Du fait de l'atténuation, utiliser des câbles coaxiaux. La sortie du générateur de signaux devra être de plus de 60dB (IHF). C'est-à-dire que lorsque l'entrée est de 60dB, la sortie du générateur de signaux devra être de 66dB).

FM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
BRANCHEMENT	FREQUENCE				
REGLAGE DE LA DISTORSION FM EN MONO					
Raccorder le générateur de signaux FM à la borne d'antenne FM en se référant à la Fig. 17. (Appliquer 60dB à la borne d'antenne.)	100.1MHz (modulé à 100% par 400Hz)	100.1MHz	Branchez le voltmètre électronique a.c.c. aux bornes TP203 et TP204. (Voir la Fig. 17)	T202 (Transfor FI discr.)	1. Régler le noyau T202 de telle sorte que le voltage mesuré dans le mode sans signal, soit de 0mV dans la gamme des 300mV.
	100.1MHz (modulé à 100% par 400Hz)	100.1MHz	Branchez un distorsionmètre sur les bornes de haut-parleur de l'appareil	T203 (Transfor FI discr.)	1. Régler le noyau T203 de telle sorte que la distorsion des canaux droit et gauche soit la plus faible.
REGLAGE PILOTE MULTIPLEX FM					
AVEC UN FREQUENCIMÈTRE			PAR UN AUTRE SYSTÈME		
1. Signal mono 100.1MHz non modulé appliqué à l'appareil. 2. Commutateur de silencieux sur "on/FM auto". 3. Branchez le fréquencimètre sur TP301 à travers une. 4. Régler VR301 sur 19kHz ± 30Hz.			1. Appliquez à l'appareil un signal stéréo provenant d'un générateur ou de la réception d'un émetteur. 2. Régler VR301 jusqu'à ce que l'indicateur de stéréo-phonie s'allume. Collez le curseur le VR301 comme indiqué sur la fig. 19.		

ESPAÑOL

ESPECIFICACIONES

(Estas especificaciones están sujetas a cualquier cambio sin previo aviso.)

(DIN 45 500)

■ SECCION AMPLIFICADOR

Potencia continua de 40 Hz~20 kHz en ambos canales	2 × 25W (4Ω) 2 × 25W (8Ω)
Potencia continua de 40 Hz~16 kHz en ambos canales	2 × 25W (4Ω) 2 × 25W (8Ω)
Potencia continua de 1 kHz en ambos canales	2 × 27W (4Ω) 2 × 27W (8Ω)
Distorsión armónica total	
potencia de régimen a 40 Hz~20 kHz	0,8% (4Ω) 0,5% (8Ω)
potencia de régimen a 40 Hz~16 kHz	0,8% (4Ω) 0,5% (8Ω)
potencia de régimen a 1 kHz	0,5% (4Ω) 0,5% (8Ω)
mitad de potencia a 1 kHz	0,05% (8Ω)
-26 dB de potencia a 1 kHz	0,1% (4Ω)
50 mW de potencia a 1 kHz	0,12% (4Ω)
Distorsión por Intermodulación	
potencia de régimen a 250 Hz: 8 kHz=4:1, 4Ω	0,8%
potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,5%
Ancho de banda de potencia con ambos canales, -3 dB	10 Hz~30 kHz (4Ω)
Factor de amortiguamiento	15 (4Ω), 30 (8Ω)
Sensibilidad e impedancia de entrada	
TOCADISC. (PHONO)	2,5 mV/47kΩ
GRAB./AUX. (TAPE/AUX)	150 mV/18kΩ
Voltaje máximo de entrada de PHONO (1 kHz, RMS)	150 mV
Relación de señal a ruido	
potencia de régimen (4Ω)	
TOCADISC. (PHONO)	70 dB (IHF, A: 73 dB)
GRAB./AUX. (TAPE/AUX)	88 dB (IHF, A: 95 dB)
-26 dB de potencia (4Ω)	
TOCADISC. (PHONO)	64 dB
GRAB./AUX. (TAPE/AUX)	66 dB
50 mW de potencia (4Ω)	
TOCADISC. (PHONO)	62 dB
GRAB./AUX. (TAPE/AUX)	62 dB
Respuesta de frecuencia	
TOCADISC. (PHONO)	curva RIAA estándar ±0,8 dB (30 Hz~15 kHz)
GRAB./AUX. (TAPE/AUX) (volumen al máximo)	5 Hz~70 kHz (-3 dB)
Controles de tono	
BAJOS (BASS)	50 Hz, +10 dB~-10 dB
AGUDOS (TREBLE)	20 kHz, +10 dB~-10 dB
Control de sonoridad (volumen a -30 dB) (incorporado)	50 Hz, +5 dB
Voltaje e impedancia de salida	
GRAB. SAL. GRAB.(TAPE REC OUT)	150 mV
Equilibrio de canales, TAPE/AUX 250 Hz~6 300 Hz	±1 dB
Separación de canales, TAPE/AUX 1 kHz	55 dB
Impedancia y nivel de salida de los auriculares	420 mV/330Ω
Impedancia de carga	4Ω~16Ω

■ SECCION PARA SINTONIZADOR FM

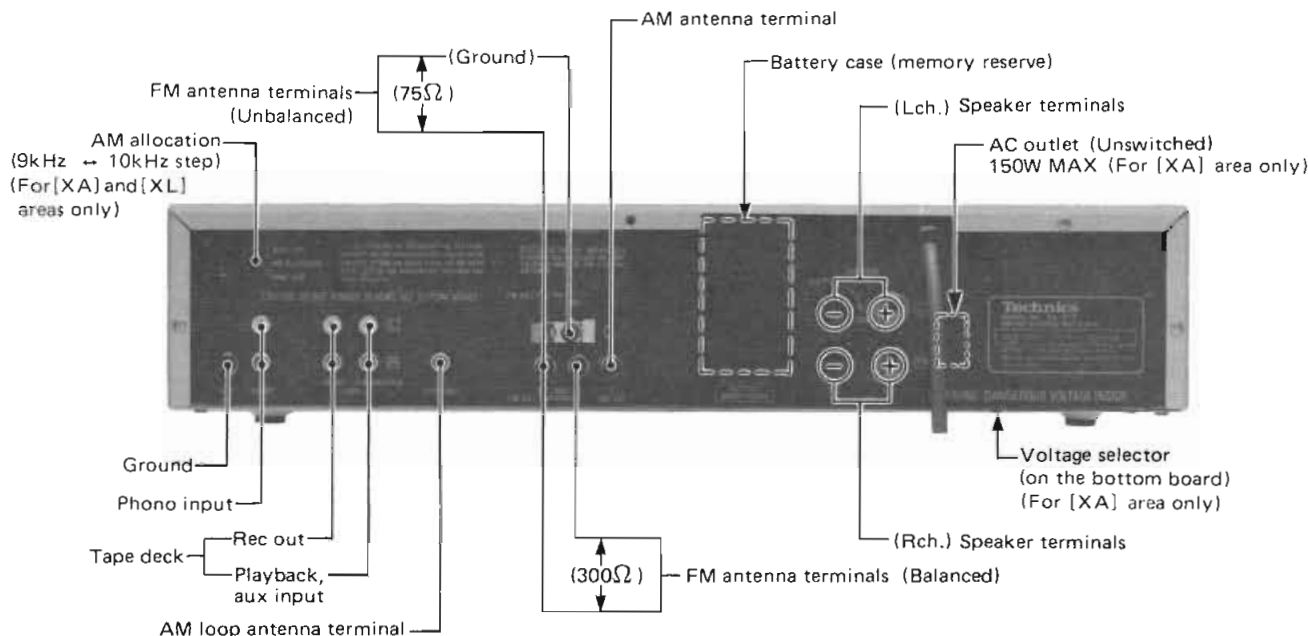
Gama de frecuencias	87,50~108,00 MHz
Sensibilidad	
Señal a ruido 30 dB	1,9 μV (300Ω), 1,3 μV (75Ω)
Señal a ruido 26 dB	1,7 μV (300Ω), 1,2 μV (75Ω)
Señal a ruido 20 dB	1,5 μV (300Ω), 0,9 μV (75Ω)
Sensibilidad utilizable IHF	1,9 μV (IHF '58)
Sensibilidad de acallamiento estéreo de 46 dB IHF	22 μV/75Ω
Distorsión armónica total	
MONO. (MONO)	0,15%
ESTEREO (STEREO)	0,3%
Relación de señal a ruido	
MONO. (MONO)	60 dB (77 dB, IHF)
ESTEREO (STEREO)	58 dB (71 dB, IHF)
Respuesta de frecuencia	20 Hz~15 kHz, +1 dB~-2 dB
Selectividad alternada de canal	±400 kHz 70 dB
Relación de captura	1 dB
Rechazo de imagen a 98 MHz	55 dB
Rechazo de F.I. a 98 MHz	75 dB
Rechazo de respuesta espuria a 98 MHz	82 dB
Supresión AM	50 dB
Separación estereofónica	
1 kHz	40 dB
10 kHz	30 dB
Fuga de onda portadora	
19 kHz	-33 dB (-35 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Equilibrio de canales 250 Hz~6 300 Hz	±1,5 dB
Punto de limite	1,2 μV
Ancho de banda	
Amplificador FI	180 kHz
Demodulador FM	1000 kHz
Bornes de antena	300Ω (equilibrado) 75Ω (no equilibrado)

■ SECCION PARA SINTONIZADOR AM

Gama de frecuencias	522~1611 kHz (9 kHz-step) 530~1620 kHz (10 kHz-step)
Sensibilidad (Relación de señal a ruido de 20 dB)	20 μV, 300 μV/m
Selectividad	55 dB
Rechazo de imagen a 1.000 kHz	40 dB
Rechazo de F.I. a 1.000 kHz	60 dB

■ GENERAL

Consumo de energía	220W
Alimentación de energía	
Para Europa continental	CA 50 Hz/60 Hz, 220V
Para otros países	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensiones (An.XAl.XProf.)	430 × 97 × 243 mm
Peso	5,1 kg



- The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different. So, refer to the circuit diagram and the replacement parts list.
- * [XA] area is provided with voltage selector and AC outlet.
- * 240V (50/60Hz) for Australia.
- * 220V (50/60Hz) for Continental Europe.
- * 110V/120V/220V/240V (50/60Hz) for other [XA] area.
- * [XA] and [XL] areas are provided with AM allocation switch.
- * Phono input capacitance is about 150pF.

PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker with an impedance less than the indicated rated impedance of the amplifier are used.

If this occurs, follow the procedure outlined below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again

Note:

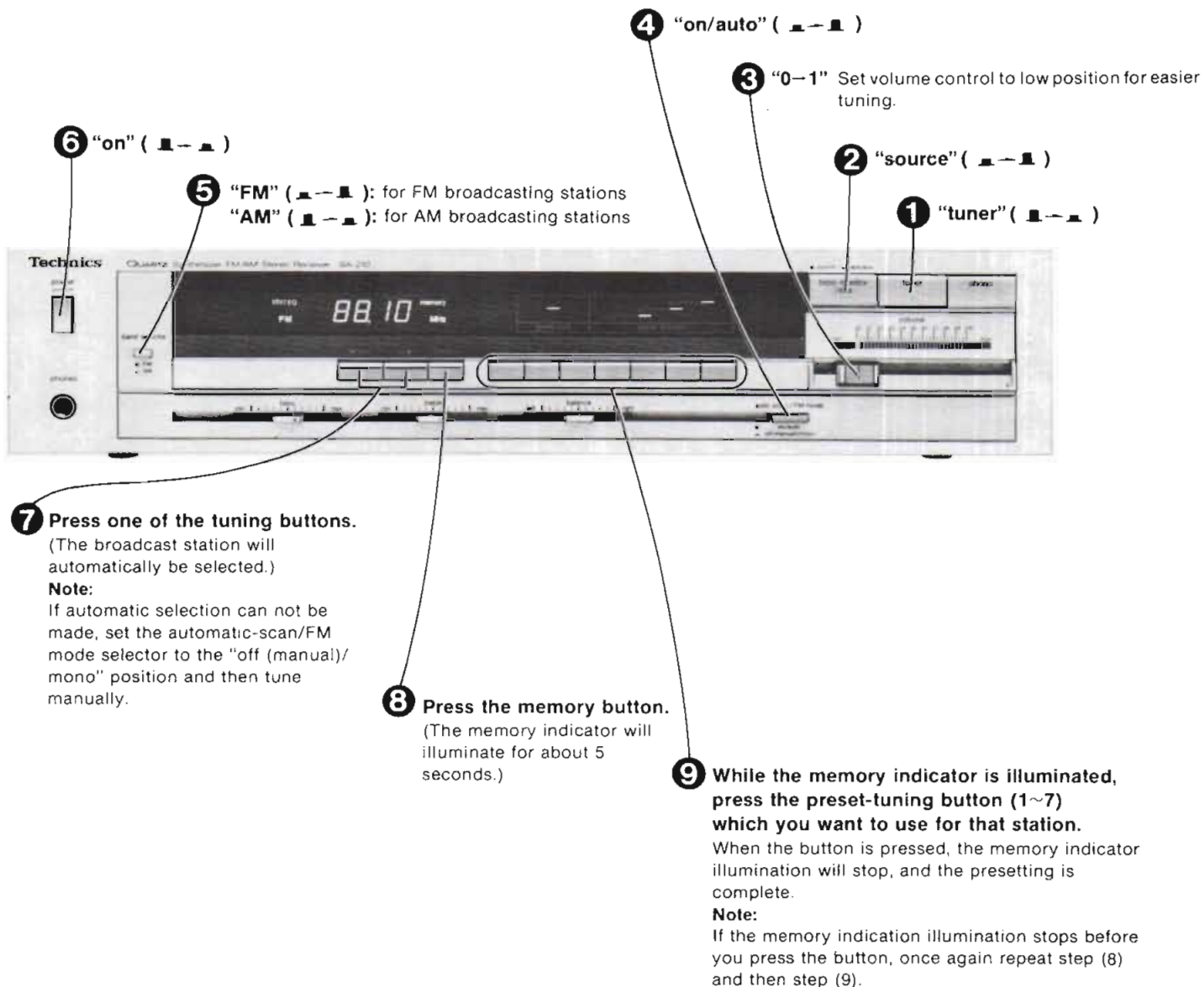
When the protection circuitry functions the unit will not operate unless the power is first turned off and then on again.

BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit of the power supply capacitors (C702, C703, 4700μF) with a resistor (about 10Ω, 5W) to discharge the charged voltage. Do not short both ends of C702 and C703 with a screwdriver. It may damage the component.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current is free of abnormality. The consumed current at 60Hz/50Hz in no signal mode is shown below with respect to supply voltage 110V/120V/220V/240V.

Power supply voltage		AC110V	AC120V	AC220V	AC240V
Consumed current	50 Hz	120 ~ 420mA	110 ~ 410mA	60 ~ 210mA	50 ~ 200mA
	60 Hz	110 ~ 410mA	100 ~ 400mA	50 ~ 200mA	40 ~ 190mA

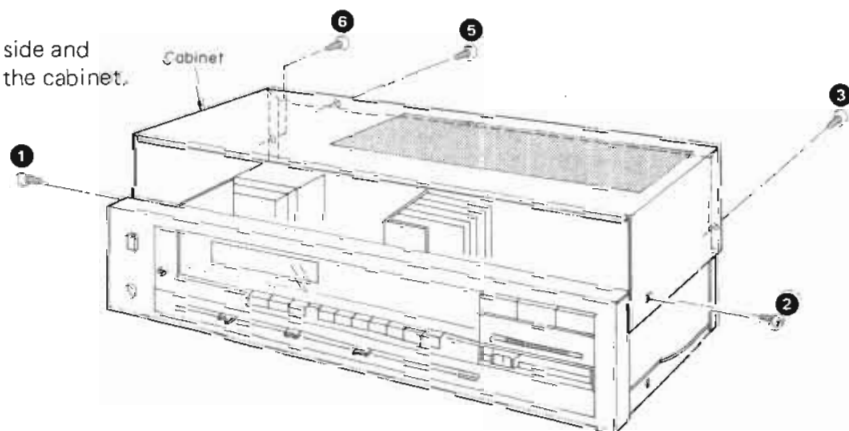
HOW TO PRESET RADIO BROADCAST FREQUENCIES



DISASSEMBLY INSTRUCTIONS

How to remove the cabinet

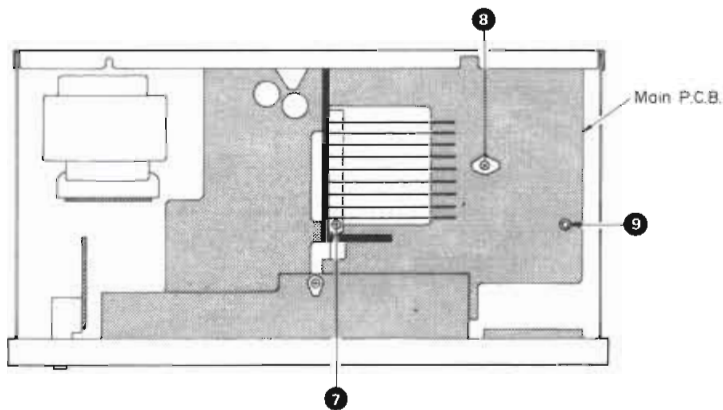
1. Remove the 2 setscrews (Fig. 1: **1** **2**) on the side and 3 setscrews (Fig. 1: **3** **5** **6**) on the back of the cabinet.
2. Remove the cabinet upward.



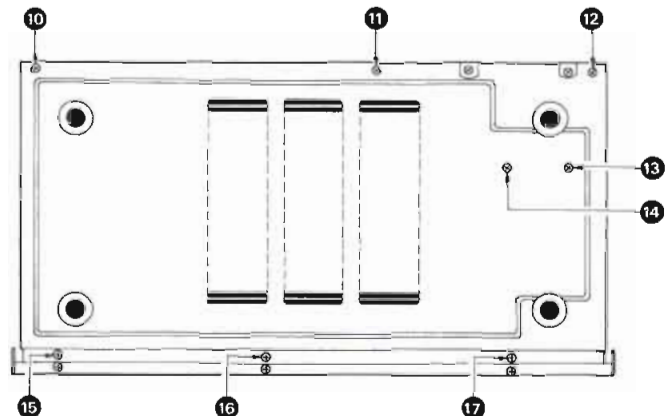
[Fig. 1]

• How to remove the bottom board

1. Remove the 2 setscrews (Fig. 2: ⑦ ⑧) and lock pin (Fig. 2: ⑨) which secure the main P.C.B. from inside the set.
2. Remove the 8 setscrews (Fig. 3: ⑩ ~ ⑰) of the bottom board.
3. Remove the bottom board.



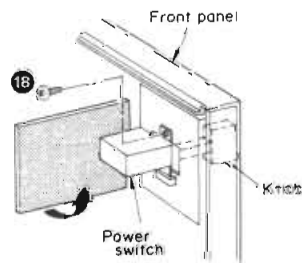
[Fig. 2]



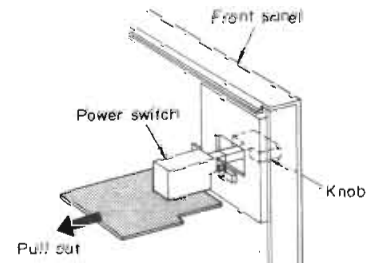
[Fig. 3]

• How to remove the power switch.

1. Remove the setscrew (Fig. 4: ⑱) of the power switch.
2. Next, lay down the power switch P.C.B. as shown in Fig. 5, and remove the power switch from the front panel.



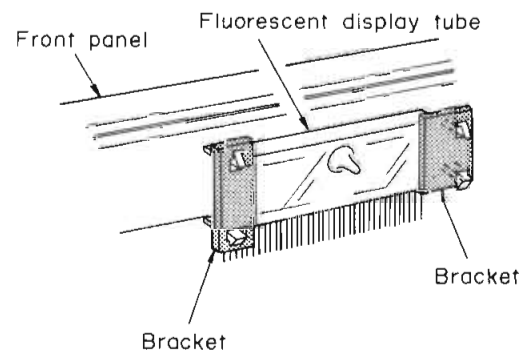
[Fig. 4]



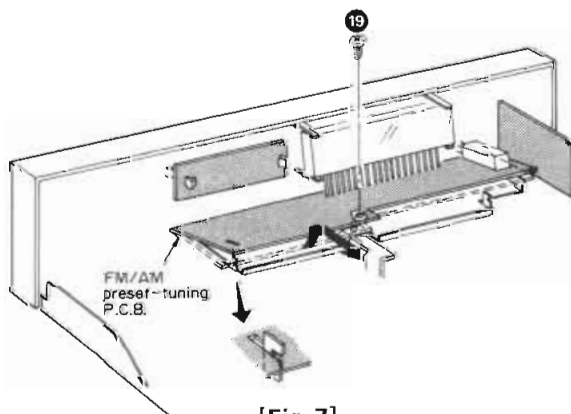
[Fig. 5]

• How to remove the front panel

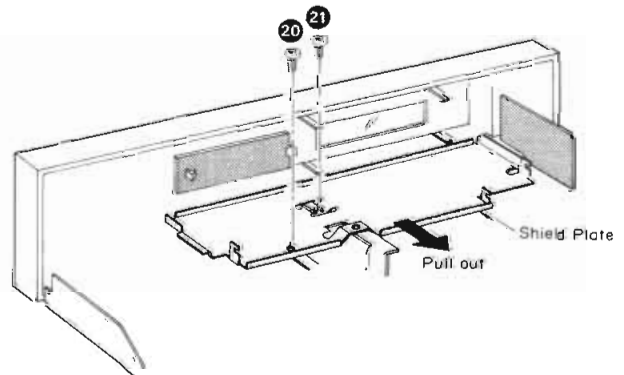
1. Remove the cabinet.
2. Remove the 2 brackets (Fig. 6) of the fluorescent display tube.
3. Remove the setscrew (Fig. 7: ⑲) of the FM/AM preset-tuning P.C.B., and then detach the FM/AM preset-tuning P.C.B.
4. Remove the 2 setscrews (Fig. 8: ⑳ ㉑) of the shield plate, and then detach the shield plate.
5. Remove the 3 input selector knobs by pushing them from inside the front panel by use of a screwdriver or the like. (Refer to Fig. 9)
6. Remove the 3 setscrews (Fig. 3: ⑮ ~ ⑰) which secure the front panel from the bottom.
7. Next, release the side claws of the front panel to pull out the front panel toward you. (Fig. 10)



[Fig. 6]



[Fig. 7]



[Fig. 8]

FM ADJUSTMENT

* Setting and Equipment used

1. FM signal generator (FM-SG)
2. Oscilloscope.
3. Distortion analyser.
4. DC electronic voltmeters (VTVM).
5. Frequency counter (19kHz and 108MHz measurable).
6. Set band selector to "FM" position.
7. Set Automatic-scan/FM mode selectot to "off/mono" position.
8. Other setting are the same as in AM adjustment.

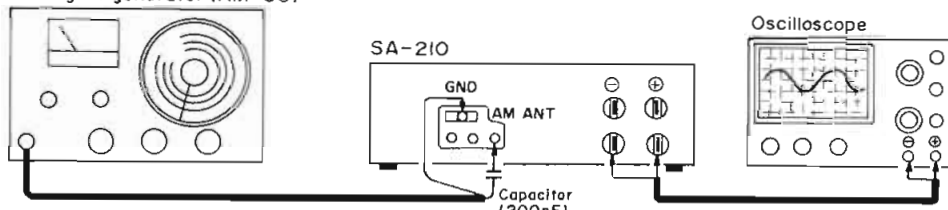
* Preparation of FM signal generator (FM-SG)

1. The standard input of the set is 60dB(1mV), 400Hz 100% modulation.
(Because of attenuation, using coaxial cables, SG output must be 6dB plus (1HF). That is, when input 60dB, SG output is to be 66dB.)

Step
No.

FM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
CONNECTION	FREQUENCY				
FM MONO DISTORTION ADJUSTMENT					
Connect FM-SG to FM antenna terminal referring to Fig. 17. (Apply 60dB to antenna terminal)	100.10 MHz (100% Mod. with 400 Hz)	100.10 MHz	Connect DC VTVM to between TP203 and TP204 through choke coil. (Refer to Fig. 17)	T202 (Discri. IFT)	1. Adjust T202 core so that voltage measured in signal mode is 0mV in 300mV range. 2. Adjust T203 core so that distortion of right and left channels are minimized.
	100.10 MHz (100% Mod. with 400 Hz)	100.10 MHz	Connect distortion analyser to "speaker" terminal of the set.	T203 (Discri. IFT)	
FM MPX PILOT (VCO) ADJUSTMENT					
USING A FREQUENCY COUNTER			USING ALTERNATE SYSTEM		
1. 100.10MHz 60 dB Non-modulated mono signal applied to set. (Refer to Fig. 18) 2. Set Automatic-scan/FM mode selector to "on/auto" position. 3. Connect frequency counter to TP301 through resistor (100k Ω). 4. Adjust VR301 to 19kHz $\pm$ 30Hz.			1. Apply stereo signal from generator or stereo station to tuner. 2. Adjust VR301 until stereo indicator lights up. Cement arm of VR301 as shown in Fig. 19.		

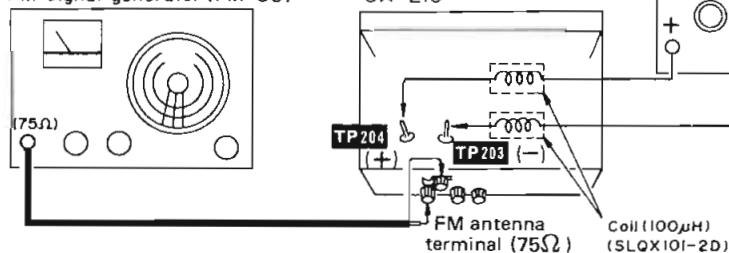
AM signal generator (AM-SG)



[Fig. 16]

AM-RF adjustment

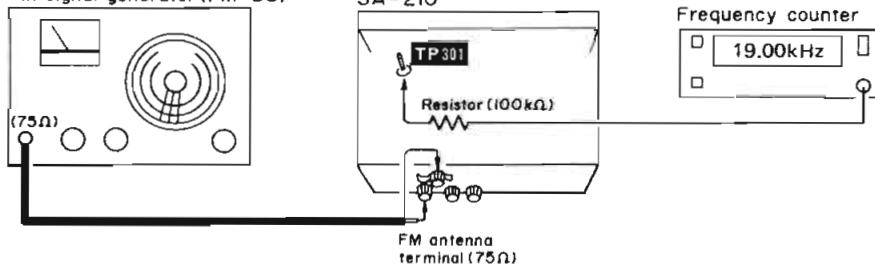
FM signal generator (FM-SG)



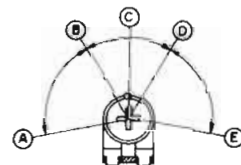
[Fig. 17]

FM-IF adjustment

FM signal generator (FM-SG)



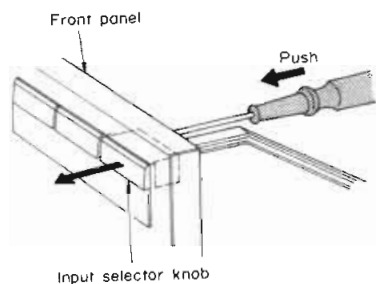
[Fig. 18] FM MPX PILOT (VCO) adjustment



VR301

- A—B, D—E Stereo OFF Position.
B—D Stereo ON Position.
(indicator Lighting)
C Adjust Point of Pilot Circuit.

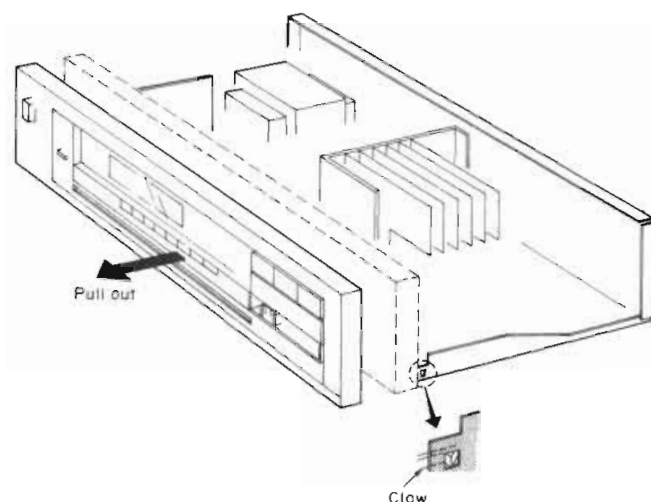
[Fig. 19]



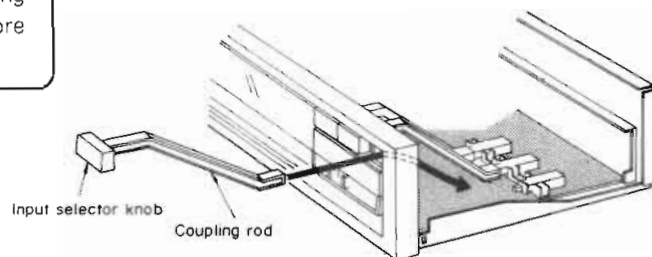
[Fig. 9]

NOTE

To set the input selector knob, fit the knob to the coupling rod as in Fig. 11, and set it through the front panel before attaching it to the switch.



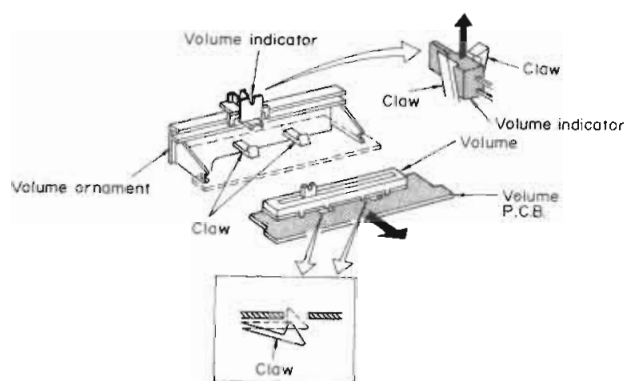
[Fig. 10]



[Fig. 11]

• How to remove the volume P.C.B. and volume indicator

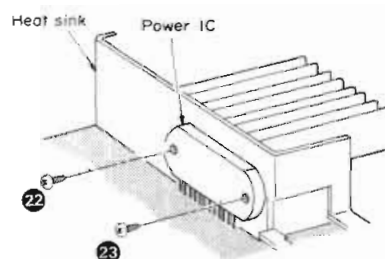
1. The volume P.C.B. is secured with the 2 claws projected from the volume ornament. So, release the claws with a screwdriver, and pull out the volume P.C.B. as shown in Fig. 12.
2. When removing the volume indicator, release the 2 claws which secure the volume indicator, and then remove the indicator upward. In this case, do not bend the claws excessively.



[Fig. 12]

• How to remove the power amplifier IC

1. Remove the cabinet and bottom board.
2. Unsolder of power IC.
3. Remove the 2 setscrews (Fig. 13: 22 23) used to secure the power IC on the heat sink, and then pull the power IC.
4. When mounting the power IC, apply silicone compound or equivalent heat diffuser to the rear side of power IC, and then follow the steps 1~4 reversely.



[Fig. 13]

• How to replace chips (resistors)

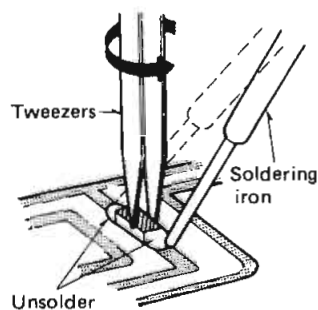
1. Unsolder from chip by using solder sucker.
2. Remove chip with tweezers by rotating it while removing solder as shown in Fig. 14.
3. Solder circuit board first and then solder chip in the direction of the arrow as shown in Fig. 15.

Notes:

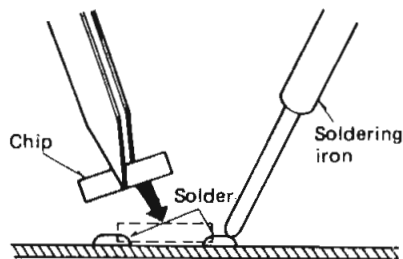
1. Do not use chip again which is removed from printed circuit board.
2. Use lead wire with insulator for replacement instead of chip jumper.

• 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.



[Fig. 14]



[Fig. 15]

MEASUREMENTS AND ADJUSTMENTS

Note: AM OSC coil (L202) and AM IFT (T201) have been already adjusted, and require no adjustment.

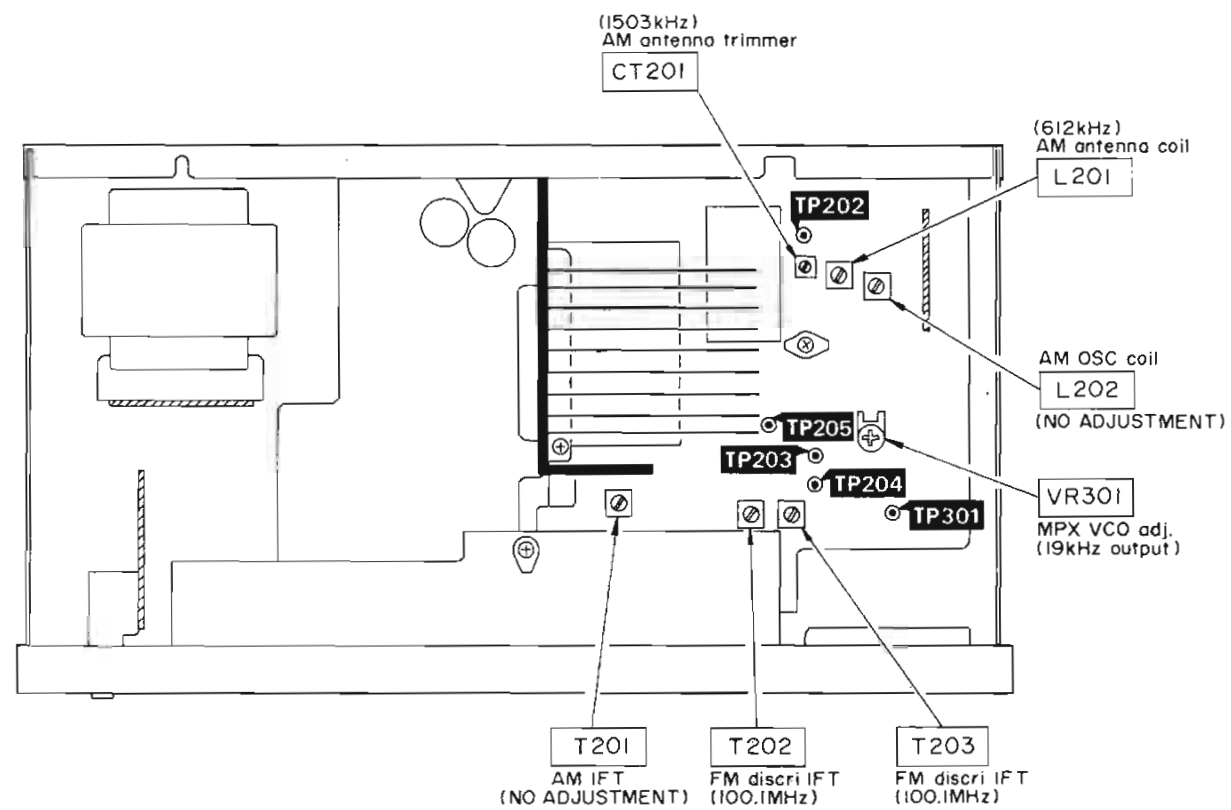
AM ADJUSTMENT

* Setting and Equipment used

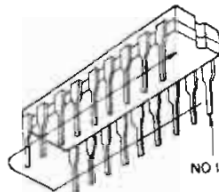
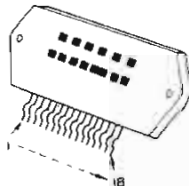
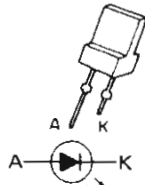
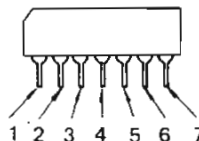
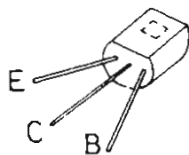
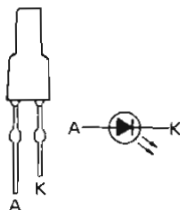
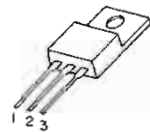
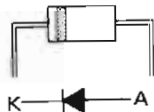
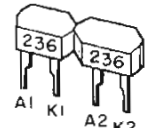
1. AC electronic voltmeters (VTVM)
2. AM signal generator (AM-SG)
3. Set Band selector to "AM" position.
4. Maintain line voltage at rated voltage.
5. Output of signal generator should be no higher than necessary to obtain an output reading.
6. Use a non-metal screwdriver for the adjustment.
7. Set AM allocation selector to "AM 9kHz step" position. (For [XA], [XL] areas only)

step no.	AM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	CONNECTION	FREQUENCY				
AM-RF ADJUSTMENT						
1	Connect AM-SG to AM antenna terminal through 200pF capacitor referring to Fig. 16. (Weak input)	612kHz (30% Mod. with 400Hz)	612kHz	Connect AC VTVM or scope to "speaker" terminal of the set.	L201 (ANT Coil)	1. Adjust for maximum output. 2. Adjust core of L201 by screwdriver.
2		1503kHz (30% Mod. with 400Hz)	1503kHz	Connect AC VTVM or scope to "speaker" terminal of the set.	CT201 (ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2) until the frequency correctly matches the frequency display.

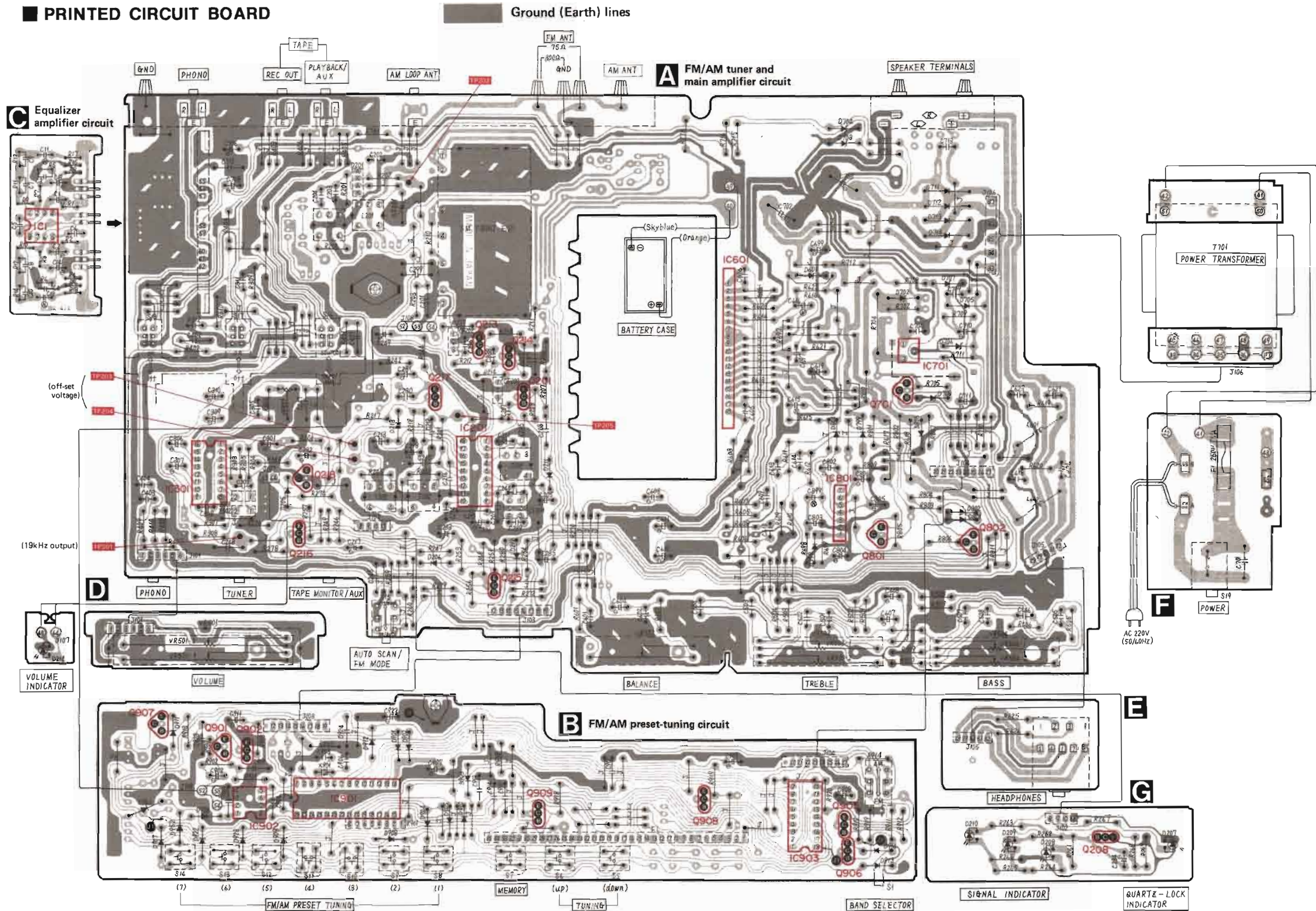
• Adjustment points



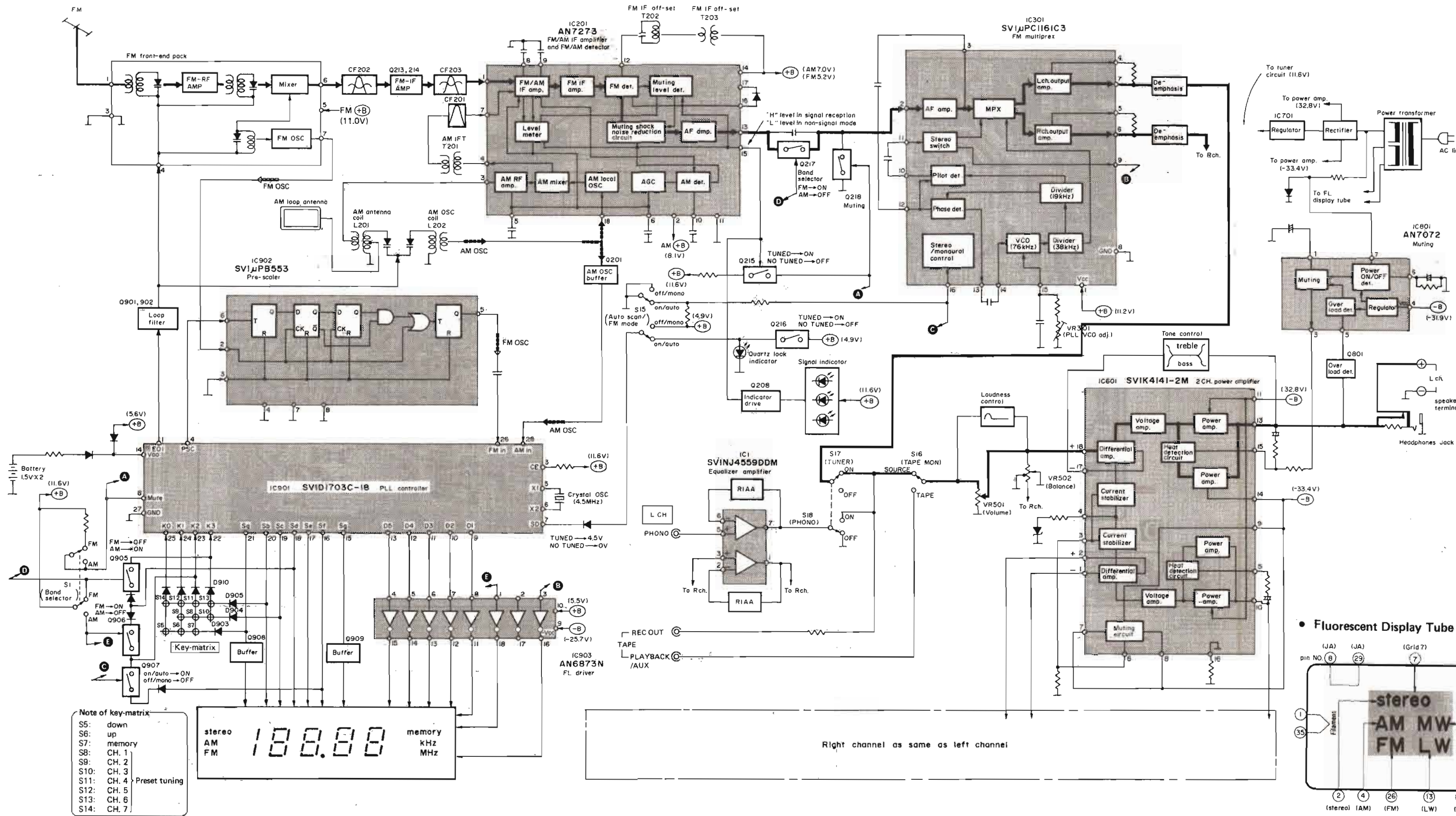
■ TERMINAL GUIDE OF TRANSISTORS, DIODES AND IC'S

 NO 1		<table><tr><td>AN6873N</td><td>18pin</td></tr><tr><td>AN7273A</td><td>28pin</td></tr><tr><td>SVID1703C018</td><td>8pin</td></tr><tr><td>SVIμPB553C-E</td><td>16pin</td></tr><tr><td>SVINJ4559DDM</td><td></td></tr><tr><td>SVIμPC1161C3</td><td></td></tr></table>	AN6873N	18pin	AN7273A	28pin	SVID1703C018	8pin	SVIμPB553C-E	16pin	SVINJ4559DDM		SVIμPC1161C3		MA150TA		MA27WA	
AN6873N	18pin																	
AN7273A	28pin																	
SVID1703C018	8pin																	
SVIμPB553C-E	16pin																	
SVINJ4559DDM																		
SVIμPC1161C3																		
SVIK4141-2M		LN224RP		AN7072N														
																		
2SA564A, 2SA992, 2SC829, 2SC945, 2SC1685		LN346GR, LN846RP, LN446YP,		AN7812														
																		
				1. Voltage in 2. GND 3. Voltage out														
																		
																		
																		

■ PRINTED CIRCUIT BOARD



BLOCK DIAGRAM



Operational description of IC (IC801) for muting (with power on/off, overload)

- 1. Muting operation with power ON.
With power turned ON, AC voltage is applied to terminal ⑦ of IC801. Then, condenser C604 connected to terminal ① is charged, and the voltage of terminal ① gradually rises. When the voltage reaches about -4V (about 5 sec. after power ON), the muting circuit turns off, and then -30.6V is generated at terminal ③. The voltage of terminal ③ is supplied to the voltage amplifier circuit of IC601, thus operating power IC.
- 2. Muting operation with power OFF.
With power turned OFF, condenser C604 connected to terminal ① is discharged, causing the voltage of C604 to drop, and then the muting circuit in IC turns ON. With the muting circuit turned ON, the voltage of terminal ③ becomes 0V, and then power supply to the voltage amplifier circuit of IC601 is discontinued.
- 3. Muting operation with power amplifier over-loaded.
With speaker terminals short-circuited, a large quantity of current flows into R617 (R618); causing the voltage rise. The voltage causes Q801 (Q802) to turn ON, and then overload detecting signal is applied to terminal ⑤. When the potential difference between terminals ④ and ⑤ reaches about 0.7V, condenser C604 is discharged the same as for muting operation with power OFF. As a result, the muting circuit turns ON and the voltage of terminal ③ becomes 0V.

NOTE

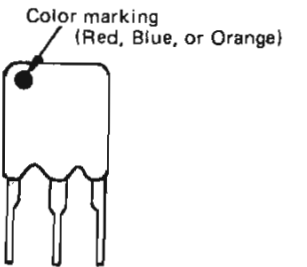
Use of ceramic filters in pairs

The ceramic filters (CF202, CF203) for FM-IF circuit are available in three ranks. For this machine, be sure to use the ceramics of the same rank in a pair.

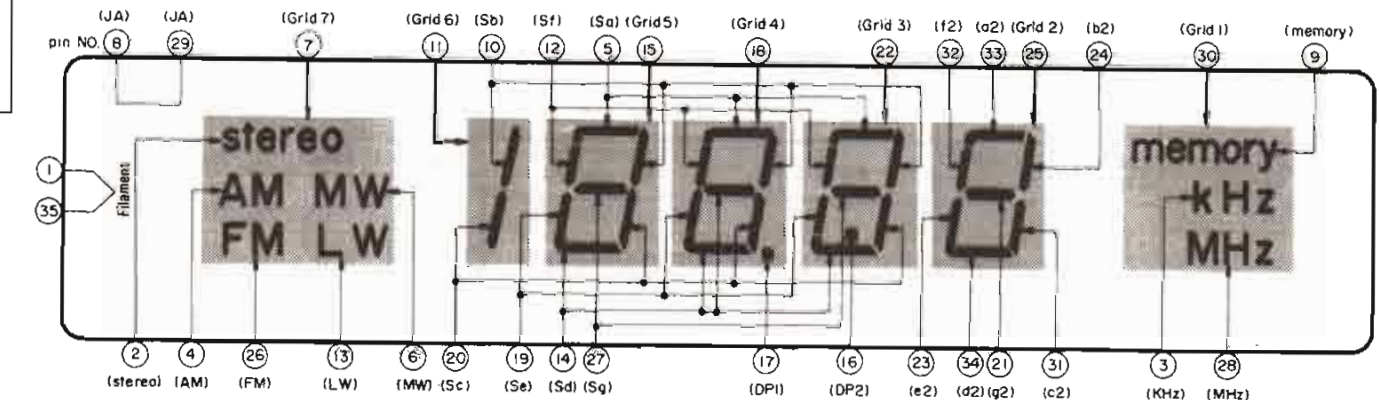
At repairing and replacement, pay close attention to the diodes (D907, D908) for use as different diodes must be used depending on each rank of the ceramic filters.

RANK (color)	D907	D908	CENTER FREQUENCY
Red	X	X	10.70 MHz
Orange	X	O	10.73 MHz
Blue	O	O	10.67 MHz

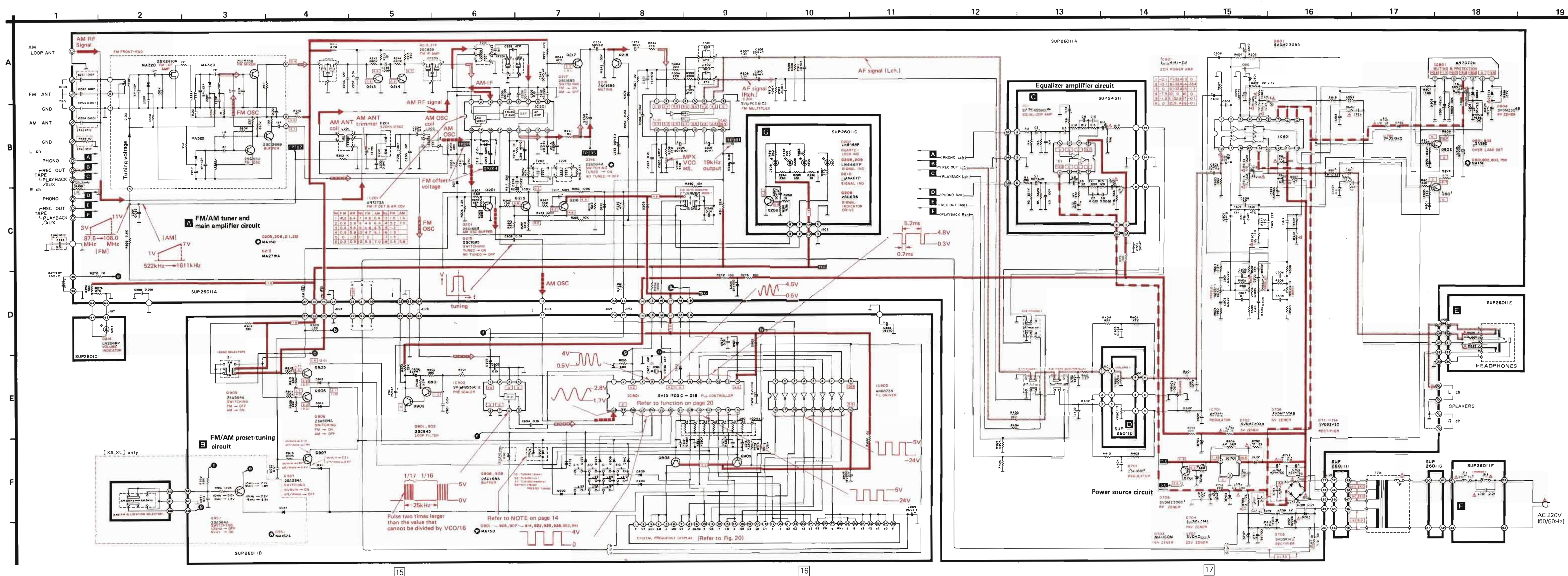
Notes: O Mark Diode is used.
X Mark Diode is not used.



Fluorescent Display Tube (FL)



[Fig. 20]



SCHEMATIC DIAGRAM

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

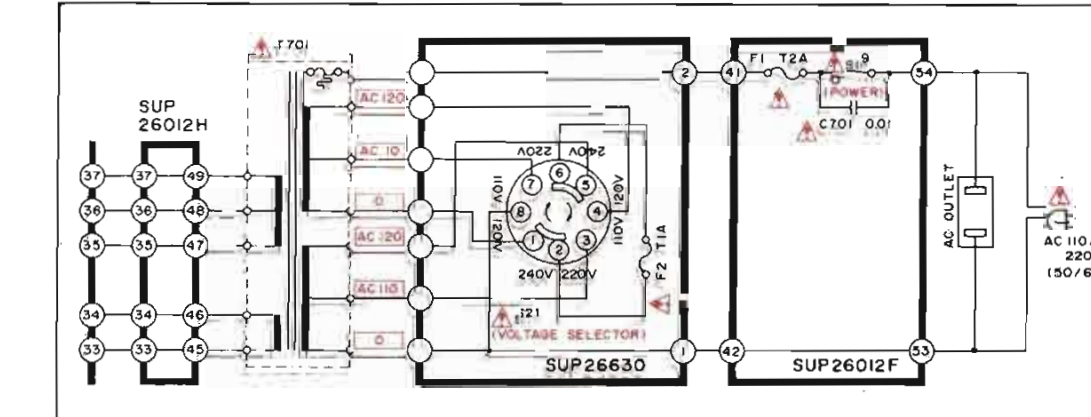
*The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement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

Notes:

- S1:** Band selector switch in "FM" position.
FM ↔ AM
- S5, 6:** Tuning switch
[S5 - down (tuning to lower frequency)]
[S6 - up (tuning to higher frequency)]
- S7:** Memory switch. (manual ↔ auto)
- S8 ~ 14:** Preset tuning switch.
[S8 - CH. 1 S11 - CH. 4 S14 - CH. 6]
[S9 - CH. 2 S12 - CH. 5]
[S10 - CH. 3 S13 - CH. 6]
- S15:** Automatic-scan/FM mode selector switch in "on/auto" position.
on/auto ↔ off (manual)/mono
- S16:** Tape monitor/aux selector switch in "source" position.
source ↔ tape/aux
- S17, 18:** Input selector switch in "tuner" position.
[S17 - tuner]
[S18 - phono]
- S19:** Power source switch in "on" position.
- S20 [XA, XL] only:** AM allocation selector switch in "10kHz step" position.
9kHz step ↔ 10kHz step
(Other areas are 9kHz step.)
- S21 [XA] only:** Voltage selector switch in "240V" position.
110V ↔ 120V ↔ 240V ↔ 220V
- Important safety notice:
Components identified by mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
- 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 signal mode.
* Figures in stand for DC voltage in FM stereo signal reception mode.
* Figures in stand for DC voltage in AM signal reception mode.

- Positive voltage lines AF signal lines
- FM signal FM IF
- AM signal AM IF
- Negative voltage lines

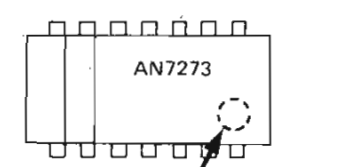
• Power source circuit For [XA] area



NOTE

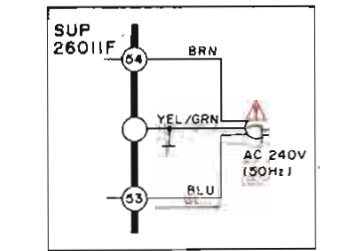
AN 7273 (IC201) is available in A rank (AN7273A) and B rank (AN7273B). Either rank can be used for this unit, but the suitable resistor must be used according to the rank as shown in the table below. So, keep this point in mind when repairing or replacing the unit.

RANK	A	B
Ref.No.		
R211	4.7kΩ	1.8kΩ
R280	560kΩ	470kΩ



"A" painted in this position or red mark on main body stands for A rank, and similarly, "B" or green mark stands for B rank.

For [XL] area

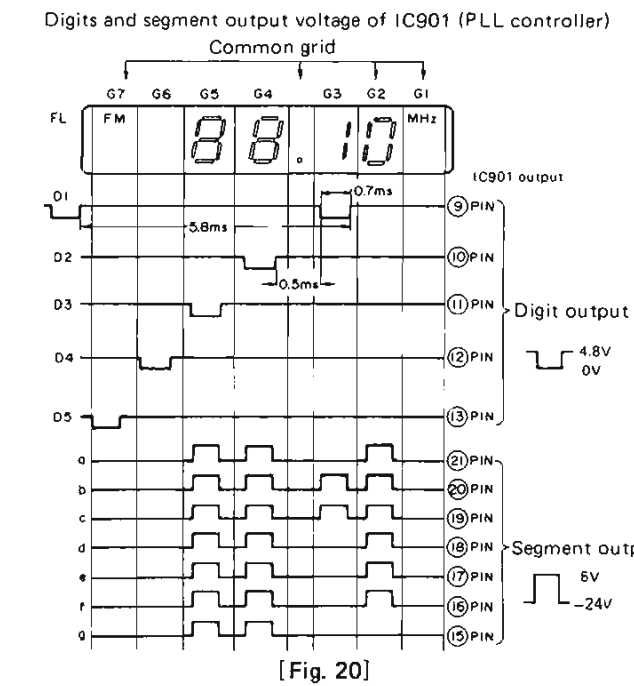


* [XL] is available in Australia.

* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.

FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

Terminal No.	Terminal	Description of terminal
1	E01 (Error out)	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (OV) output is delivered. When they coincide, it results in floating.
2	E02 (Error out)	
3	CE (Chip Enable)	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D5) terminals are off, but the memory is held.
4	PSC (Prescaler Control)	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (26) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16.
5	X1 (Crystal)	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
6	X2 (Crystal)	
7	SD (Station Detector)	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
8	MUT (Muting)	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level.
9	D1 (Digit Outputs) 13 D5	Digit signal output terminal for display. (Refer to Fig. 20)
14	VDD	Power supply terminal of the device.
15	a (Segment Outputs) 13 g	Segment signal output terminal for display. (Refer to Fig. 20)
22	K3 (Key Return) 25 K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source.



RESISTORS & CAPACITORS

- Notes:
- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 - Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
 - The "S" mark is service standard parts and may differ from production parts.
 - The unit of resistance is Ω . (ohm). K = 1000 Ω , M = 1000K Ω .
 - The unit of capacitance is μ F. (microfarad). P = 10⁻⁶ μ F.
 - Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Numbering System of Resistor

Example	Resistor Type	Wattage	Tolerance
ERD	Carbon	10 : 1/8W	G : $\pm 2\%$
ERO	Metal Film	12 : 1/2W	J : $\pm 5\%$
ERX	Metal Film	25 : 1/4W	
R26	Metal Oxide	1 : 1W	
ERC	Solid	2 : 2W	

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

Numbering System of Capacitor

Example	Capacitor Type	Value	Tolerance
ECKD	Electrolytic	1H 102	Z
Type	Voltage	Value	Peculiarity
ECEA	50	M	R47
Type	Voltage	Peculiarity	Value
			Special use

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
RESISTORS											
R1, 2	ERD10TLJ391U	390	R401, 402	ERD25FJ222	2.2K	C201, 202	ECEA50M3R3R	3.3	C611, 612	ECEA1E5470	47
R3, 4	ERO10MKG221K	221K	R403, 404	ERD25FJ331	330	C3, 4	ECBT1H101K	100P	C613, 614	ECOD1H220K	22P
R5, 6	ERO10MKG562Z	562K	R405, 406	ERD25TJ684	680K	C5, 6	ECOD1H473K	470P	C615, 616	ECEA1E100S	10
R7, 8	ERD10TLJ271U	270	R407, 408	ERD25TJ473	47K	C7, 8	ECQM1H223J	0.0022	C618	ECQM1H104J2	0.1
R9, 10	ERD10TLJ680U	68	R409, 410	ERD25TJ823	82K	C9, 10	ECQM1H682J2	0.0068	C619	ECEA1HS101	100
R11, 12	ERD10TLJ184U	180K	R411, 412	[XL] only		C11, 12	ECEA1H010S1	1	C621	ECQM1H104J2	0.1
R13, 14	ERD10TLJ123U	12K	R501, 502	ERD25FJ222	2.2K	C13, 14	ECEA1CS330	33	C623, 624	ECQM1H104J2	0.1
R15, 16	ERD10TLJ563U	56K	R503, 504	ERD25FJ561	560	C201	ECBT1C223YV1	0.022	C627	ECOD1H1032F	0.01
R17, 18	ERD10TLJ102U	1K	R505, 506	ERD25TJ124	120K	C202	ECQM1H473J2	0.047	C699	ECEA1HS470	47
R201	ERD25TJ104	100K	R507, 508	ERD25TJ183	18K	C203	ECOD1H100K	100	C701	ECCKDCK103PF2	0.01
R202	ERD25FJ102	1K	R509, 510	ERD25FJ222	2.2K	C204	ECQP147J1J2	470P	C702, 703	ECES24V472U	4700
R203	ERD25FJ562	5.6K	R601, 602	ERD25FJ102	1K	C205	ECEA1AS101	10	C704	ECOD1H1032F	0.01
R204	ERD25FJ681	680	R603, 604	ERD25TJ393	39K	C206	ECEA502R3R	0.022	C706	ECEA1E5470	47
R205	ERD25FJ102	10K	R605, 606	ERD25TJ123	12K	C207	ECBT1C223YV1	0.022	C707	ECEA502R3R	0.022
R206	ERD25FJ222	2.2K	R607, 608	ERD25TJ473	47K	C208	ECOD1H180K	18P	[XA,XL] only		
R207	ERD25FJ562	5.6K	R609, 610	ERD5FJ122	1.2K	C208, 209	ECBT1C1032YV1	0.01	C708	ECEA1E5470	47
R208	ERD25TJ684	680K	R611, 612	ERD25TJ153	15K	C210	ECBT1C223YV1	0.022	C709	ECOD1H1032F	0.01
R210	ERD25FJ470	47K	R613, 614	ERD5FJ122	2.2K	C211	ECEA1HS100	10	C710	ECEA1E54101	100
R211	ERD25FJ102	4.7K	R615, 616	ERD5FJ122	2.2K	C212	ECBT1C1032YV1	0.01	C711	ECEA1ES101	100
R212	ERD25TJ684	680K	R617, 618	ERX2ANJ4R2	0.22	C213	ECEA502R1	0.022	C712	ECBT1C1032YV1	0.01
R213	ERD25FJ102	1K	R619, 620	ERD5FJ100	10	C214	ECOD1H223F	0.022	C713	ECQE1104KN	0.1
R214	ERD25FJ102	330	R621	ERD5FJ101	10	C215	ECBT1H133KB	330P	[EX,WH] only		
R215	ERD25TJ684	680K	R622	ERGIANJ512	1.5K	C216	ECBT1C223YV1	0.022	C801	ECEA1HS101	100
R216	ERD25FJ391	390	R623	ERD5FJ100	10	C217	ECEA502R1	0.022	C802, 803	ECEA502R3R	3.3
R217	ERD25FJ331	330	R625, 626	ERD5FJ101	330	C218	ECEA1HS100	10	C804	ECEA1E5470	47
R218	ERD25FJ102	1K	R697	ERD5FJ470	47	C230	ECQM1H183J2	0.018	C805	ECEA1HS101	100
R219	ERD25FJ472	4.7K	R698	ERD25FJ103	10K	C231	ECEA502R2	2.2	C899	ECCEA1EN220S	22
R240	ERD25FJ102	4.7K	R699	ERD25FJ102	2.7K	C232	ECEA502R1	1	C901	ECBT1C1032YV1	0.01
R241	ERD25FJ104	100K	R702	ERD5FJ390	39	C233	ECEA502R3R	3.3	C902	ECEA25M47R	47
R242	ERD25TJ272	2.7K	R703	ERD5FJ102	1K	C234	ECEA502R2	2.2	C903, 904	ECBT1C1032YV1	0.01
R243	ERD25TJ104	100K	R704	ERX2ANJ391	390	C235	ECEA1ES101	100	C905	ECOD1H180K	18P
R244	ERD25TJ473	47K	R705	ERD25FJ681	680	C236	ECOD1H330K	33P	C906	ECOD1H150K	15P
R245	ERD25FJ272	2.7K	R707	ERD5FJ162	1.5K	C237	ECBT1C1032YV1	0.01	C907	ECEA50J52	1000
R246	ERD25FJ103	10K	R708	ERD5FJ122	1.2K	C238	ECBT1C1032YV1	0.01	C908	ECEA50J102	1000
R247	ERD25TJ333	33K	R709	ERD5FJ102	1K	C239	ECOD1H470K	470P	C909	ECEA25A47	4.7
R248	ERD25TJ334	330K	R710	ERD5FJ390	39	C240	ECOD1H080K	8P	C911	ECEA1E5470	47
R251	ERD25FJ561	560	R711	ERD5FJ470	470	C245	ECBT1C1032YV1	0.01	C912, 913	ECBT1H2331KB	330P
R253	ERD25FJ103	10K	R712	ERD5FJ688	6.8	C246	ECBT1C1032YV1	0.01	C914, 915	ECBT1H331KB	330P
R254	ERD25TJ124	120K	R715	ERD5FJ101	100	[XA] only			C922	ECEA1HS100	100
R255	ERD25TJ683	68K	R716	ERD5FJ221	22K	C247	ECBT1C1032YV1	0.01	C923, 924	ECCEA1H1032YV1	0.01
R256	ERD5FJ104	100K	R731	ERD5FJ101	100	C249	ECEA502R47	0.47	C951	ECBT1C1032YV1	0.01
R257	ERD25FJ222	2.2K	R801, 802	ERD25FJ331	330	C252	ECKDHS101MB	100P	[XA,XL] only		
R259	ERD25TJ473	47K	R803, 804	ERD25TJ163	15K	[XL] only					
R260	ERD5FJ101	10K	R805, 806	ERD25TJ273	27K	C253, 254	ECKDHS102MD	0.001			
R261	ERD25FJ561	560	R909	ERD25TJ154	150K	[XL] only					
R262	ERD25FJ561	150	R909	ERD25TJ383	38K	[EX,WH] only					
R263	ERD25FJ270	27	R810	ERD5FJ102	33	C301	ECEA1CS471	470			
R264	ERD25FJ221	220	R901	ERD25FJ330	1K	C305	ECQP147J1J2	470P			
R265	ERD25FJ121	120	R902	ERD25FJ561	560	C306	ECOD1H470K	47P			
R266	ERD25FJ102	1K	R903	ERD25TJ223	22K	C307	ECEA502R47	0.47			
R267	ERD25FJ271	270	R908	ERD25FJ220	22	C308	ECEA502R1	0.022			
R268	ERD25FJ102	1K	R909, 910	ERD25TJ683	68K	C308	ECQM1H473J2	0.047			
R269	ERD25FJ682	6.8K	R911, 912	ERD25TJ124	120K	C309, 310	ECEA25A47R	4.7			
R270	ERD25FJ101	10K	R913	ERD25TJ104	100K	C311, 312	ECQM1H533J2	0.015			
R272, 273	ERD25FJ102	100	R914	ERD25FJ561	560	C401, 402	ECBT1H183KB	330P			
R274	ERD25FJ561	560	R918, 919	ERD25TJ104	100K	C403	ECQM1H333J2	0.033			
R276	ERD25FJ271	270				C404	ECEA1H223J2	0.022			
R277	ERD25TJ473	47K	R920	ERD25FJ152	1.5K	R501, 502	ECQM1H223J2	0.0022			
R278, 279	ERD25FJ562	5.6K	R930	ERD25TJ335	3.3K	C603, 604	ECQM1H223J2	0.0022			
R280	ERD25TJ684	560K	R951	ERD25TJ124	120K	C605, 506	ECQM1H183J2	0.018			
R301	ERD25FJ220	22	[XA,XL] only			C607, 508	ECQM1H333J2	0.018			
			R951	ERD25TJ683	68K	R601, 802	ECOD1H101K	100P			
			[XA,XL] only			C603, 604	ECEA502R2	2.2			
						C605, 606	ECOD1H223J2	220P			
						C607, 608	ECEA1HS100	10			
						R609, 610	ECOD1H0500P	5P			