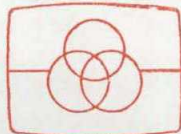


Service Manual

Tentative

QUARTZ Synthesizer
FM/AM Stereo Receiver



Free service manual
Gratis schematics

Digitized by

Colors

(S) Silver Type
(K) Black Type

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Color	Area
(S) (K)	[EX] ... Scandinavia and Switzerland
(S) (K)	[EH] ... Holland
(S)	[XA] ... Southeast Asia, Oceania, Africa, Middle Near East and Central South America
(S) (K)	[XL] ... Australia
(S)	[XM] ... Latin America

Please use this manual together with the service manual for Model No. SA-250 [M], Order No. HAD84022714C1.

English

SPECIFICATIONS

(DIN 45 500)

■ AMPLIFIER SECTION

1 kHz continuous power output	2 × 37W (8Ω)
both channels driven	
Total harmonic distortion	
half power at 1 kHz	0.02% (8Ω)
Intermodulation distortion	
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.5%
Power bandwidth	
both channels driven, -3 dB	10 Hz~40 kHz (8Ω)
Damping factor	30 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
CD/VIDEO/AUX, TAPE/EXT	150 mV/18kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power (8Ω)	
PHONO	70 dB (IHF, A: 72 dB)
CD/VIDEO/AUX, TAPE/EXT	88 dB (IHF, A: 95 dB)
Frequency response	
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
CD/VIDEO/AUX, TAPE/EXT	5 Hz~70 kHz (-3 dB)
Tone controls	
BASS	50 Hz, +10 dB~ -10 dB
TREBLE	20 kHz, +10 dB~ -10 dB
Loudness control (volume at -30 dB)	50 Hz, +9 dB
Output voltage	
TAPE/EXT (REC OUT)	150 mV
Channel balance, 250 Hz~6,300 Hz	±1 dB
Channel separation	55 dB
Headphones output level and impedance	420 mV/330Ω
Load impedance	
MAIN or REMOTE	8Ω~16Ω
MAIN and REMOTE	8Ω~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	65 dB
Capture ratio	1 dB
Image rejection at 98 MHz	50 dB
IF rejection at 98 MHz	75 dB
Spurious response rejection at 98 MHz	82 dB
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 μV
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	300Ω (balanced) 75Ω (unbalanced)

Technics

Matsushita Electric Trading Co., Ltd.

P.O. Box 288, Central Osaka Japan

Digitized in Heiloo, Holland.

■ AM TUNER SECTION

Frequency range	522~1611 kHz (9 kHz step)
Sensitivity (S/N 20 dB)	20 μ V, 300 μ V/m
Selectivity	55 dB
Image rejection at 999 kHz	40 dB
IF rejection at 999 kHz	60 dB



■ GENERAL

Power consumption	180W
Power supply	
For 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 kg (11 lb.)

Specifications are subject to change without notice for further improvement.

Deutsch

TECHNISCHE DATEN (DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 1 kHz beide Kanäle ausgesteuert	2 × 37W (8 Ω)
Gesamtklirrfaktor halbe Nennleistung bei 1 kHz	0,02% (8 Ω)
Intermodulationsfaktor Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,5%

Leistungsbandbreite beide Kanäle ausgesteuert bei -3 dB	10 Hz ~ 40 kHz (8 Ω)
--	------------------------------

Dämpfungsfaktor	30 (8 Ω)
-----------------	------------------

Eingangsempfindlichkeit und -impedanz	
---------------------------------------	--

Phono	2,5 mV/47 k Ω
-------	----------------------

CD/VIDEO/AUX, TAPE/EXT	150 mV/18 k Ω
------------------------	----------------------

Maximale TA-Eingangsspannung (1 kHz, eff.)	150 mV
--	--------

Geräuschabstand	
-----------------	--

Nennleistung (8 Ω)	
----------------------------	--

Phono	70 dB (nach IHF, A: 72 dB)
-------	----------------------------

CD/VIDEO/AUX, TAPE/EXT	
------------------------	--

	88 dB (nach IHF, A: 95 dB)
--	----------------------------

Frequenzgang	
--------------	--

Phono	RIAA-Standardkurve
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	$\pm 0,8$ dB (30 Hz ~ 15 kHz)
--	-------------------------------

CD/VIDEO/AUX, TAPE/EXT	5 Hz ~ 70 kHz (-3 dB)
------------------------	-----------------------

Klangregler	
-------------	--

Baßregler (BASS)	50 Hz, +10 dB ~ -10 dB
------------------	------------------------

Höhenregler (TREBLE)	20 kHz, +10 dB ~ -10 dB
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Gehörrichtige Lautstärkekorektur (Loudness)	
---	--

(bei -30 dB Ausgangsleistung)	50 Hz, +9 dB
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Ausgangsspannung	
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TAPE/EXT (REC OUT)	150 mV
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Kanalabweichung (250 Hz ~ 6300 Hz)	± 1 dB
------------------------------------	------------

Übersprechdämpfung	55 dB
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Kopfhörerpegel und -impedanz	420 mV/330 Ω
------------------------------	---------------------

Lautsprecherimpedanz	
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MAIN oder REMOTE	8 Ω ~ 16 Ω
------------------	--------------------------

MAIN und REMOTE	8 Ω ~ 16 Ω
-----------------	--------------------------

■ UKW-TUNERTEIL

Wellenbereich	87,50 ~ 108,00 MHz
Eingangsempfindlichkeit	
S/R 30 dB	1,9 μ V (300 Ω), 1,3 μ V (75 Ω)
S/R 26 dB	1,7 μ V (300 Ω), 1,2 μ V (75 Ω)
S/R 20 dB	1,5 μ V (300 Ω), 0,9 μ V (75 Ω)
Nutzempfindlichkeit nach IHF	1,9 μ V (nach IHF '58)

Stereoumschaltsschwelle bei 46 dB nach IHF	22 μ V/75 Ω
--	------------------------

Gesamtklirrfaktor	
-------------------	--

Mono	0,15%
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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	65 dB
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Einfangverhältnis	1 dB
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Spiegelfrequenz-Dämpfung bei 98 MHz	50 dB
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ZF-Dämpfung bei 98 MHz	75 dB
------------------------	-------

Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	82 dB
---	-------

MW-Unterdrückung	50 dB
------------------	-------

Übersprechdämpfung	
--------------------	--

1 kHz	40 dB
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10 kHz	30 dB
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Trägerrest	
------------	--

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

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

Kanalabweichung (250 Hz ~ 6300 Hz)	$\pm 1,5$ dB
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Begrenzereinsatz	1,2 μ V
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Bandbreite	
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ZF-Verstärker	180 kHz
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UKW-Demodulator	1000 kHz
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Antennenanschluß	300 Ω (symmetrisch)
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	75 Ω (unsymmetrisch)
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■ MW-TUNERTEIL

Wellenbereiche	522 ~ 1611 kHz (9-kHz-Schritte)
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Eingangsempfindlichkeit (S/R 20 dB)	20 μ V, 300 μ V/m
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Trennschärfe	55 dB
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Spiegelfrequenz-Dämpfung bei 999 kHz	40 dB
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ZF-Dämpfung bei 999 kHz	60 dB
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■ ALLGEMEINE DATEN

Leistungsaufnahme	180 W
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Netzspannung	
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Für Australien Wechselstrom	50Hz/60Hz, 240V
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Für Kontinentaleuropa	Wechselstrom 50 Hz/60 Hz, 220V
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Für andere Länder	Wechselstrom 50 Hz/60 Hz,
-------------------	---------------------------

	110V/120V/220V/240V
--	---------------------

Abmessungen (B×H×T)	430 × 97 × 243 mm
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Gewicht	5 kg
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Spezifikationen können infolge von Verbesserungen ohne Ankündigung geändert werden.

Français

CARACTERISTIQUES

(DIN 45 500)

SECTION AMPLIFICATEUR

Puissance de sortie continue à 1 kHz les deux canaux en circuit	2 × 37W (8Ω)
Distorsion harmonique totale à demi-puissance (1 kHz)	0,02% (8Ω)
Distorsion d'intermodulation à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,5%
Réponse de fréquences les deux canaux en circuit, -3 dB	10 Hz~40 kHz (8Ω)
Coefficient d'amortissement	30 (8Ω)
Sensibilité et impédance d'entrée PHONO	2,5 mV/47kΩ
CD/VIDEO/AUX, TAPE/EXT	150 mV/18kΩ
PHONO (tension d'entrée maximum, 1 kHz RMS)	150 mV
Signal/Bruit à puissance nominale (8Ω)	

PHONO	70 dB (IHF, A: 72 dB)
CD/VIDEO/AUX, TAPE/EXT (CD/VIDEO/AUX, TAPE/EXT)	88 dB (IHF, A: 95 dB)
Réponse de fréquence PHONO	Courbe nominale RIAA ±0,8 dB (30 Hz~15 kHz)
CD/VIDEO/AUX, TAPE/EXT (CD/VIDEO/AUX, TAPE/EXT)	5 Hz~70 kHz (-3 dB)
Réglage 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)	50 Hz, +9 dB

Tension de sortie TAPE/EXT (REC OUT)	150 mV
Equilibrage des canaux, 250 Hz~6,300 Hz	±1 dB
Séparation des canaux	55 dB
Niveau de sortie des casques et impédance	420 mV/330Ω
Impédance de charge PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE)	8Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE)	8Ω~16Ω

SECTION SYNTONISATEUR FM

Gamme de fréquence	87,50~108,00 MHz
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	
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	65 dB
Taux de capture	1 dB
Rejection d'image à 98 MHz	50 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)	±1,5 dB
Point de limite	1,2 μV
Largeur de bande	
Amplificateur FI	180 kHz
Démodulateur FM	1000 kHz
Bornes d'antenne	300Ω (symétrique) 75Ω (asymétrique)

SECTION SYNTONISATEUR AM

Gamme de fréquence	522~1611 kHz (par palier 9 kHz)
Sensibilité (S/B 20 dB)	20 μV, 300 μV/m
Sélectivité	55 dB
Réjection d'image à 999 kHz	40 dB
Réjection FI à 999 kHz	60 dB

DIVERS

Consommation	180W
Alimentation	
Pour Australien	CA 50Hz/60Hz, 240V
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 kg

Sujet à changement sans préavis.

Español

ESPECIFICACIONES

(DIN 45 500)

SECCION AMPLIFICADOR

Potencia continua de 1 kHz en ambos canales	2 × 37W (8Ω)
Distorsión armónica total mitad de potencia a 1 kHz	0,02% (8Ω)
Distorsión por intermodulación 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~40 kHz (8Ω)
Factor de amortiguamiento	30 (8Ω)
Sensibilidad e impedancia de entrada TOCADISC. (PHONO)	2,5 mV/47kΩ
CD/VIDEO/AUX., TAPE/EXT (CD/VIDEO/AUX, TAPE/EXT)	150 mV/18kΩ
Voltaje máximo de entrada de PHONO (1 kHz, RMS)	150 mV

Relación de señal a ruido potencia de régimen (8Ω)	
TOCADISC. (PHONO)	70 dB (IHF, A: 72 dB)
CD/VIDEO/AUX., TAPE/EXT (CD/VIDEO/AUX, TAPE/EXT)	88 dB (IHF, A: 95 dB)
Respuesta de frecuencia TOCADISC. (PHONO)	curva RIAA estándar ±0,8 dB (30 Hz~15 kHz)
CD/VIDEO/AUX., TAPE/EXT (CD/VIDEO/AUX, TAPE/EXT)	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)	50 Hz, +9 dB
Voltaje de salida TAPE/EXT (REC OUT)	150 mV
Equilibrio de canales, 250 Hz a 6,300 Hz	±1 dB
Separación de canales	55 dB
Impedancia y nivel de salida de los auriculares	420 mV/330Ω
Impedancia de carga MAIN o REMOTE	8Ω~16Ω
MAIN y REMOTE	8Ω~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)

BEFORE REPAIR AND ADJUSTMENT

- Turn off the power supply and short-circuit of power supply capacitors (C706, C707, 6800μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Do not short between C706 and C707 by screwdriver. It may damage the component.
- 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	50Hz	120 ~ 420mA	110 ~ 410mA	70 ~ 220mA	60 ~ 210mA
	60Hz	110 ~ 410mA	100 ~ 400mA	60 ~ 210mA	50 ~ 200mA

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	65 dB
Relación de captura	1 dB
Rechazo de imagen a 98 MHz	50 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 pasos)
Sensibilidad (Relación de señal a ruido de 20 dB)	20 μV, 300 μV/m
Selectividad	55 dB
Rechazo de imagen a 999 kHz	40 dB
Rechazo de F.I. a 999 kHz	60 dB

GENERAL

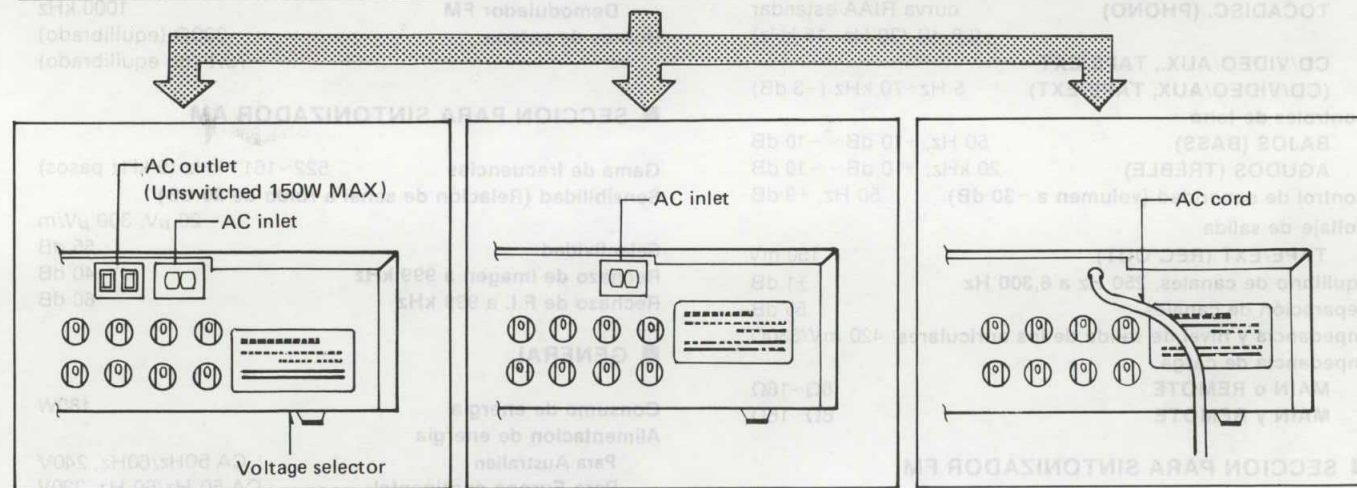
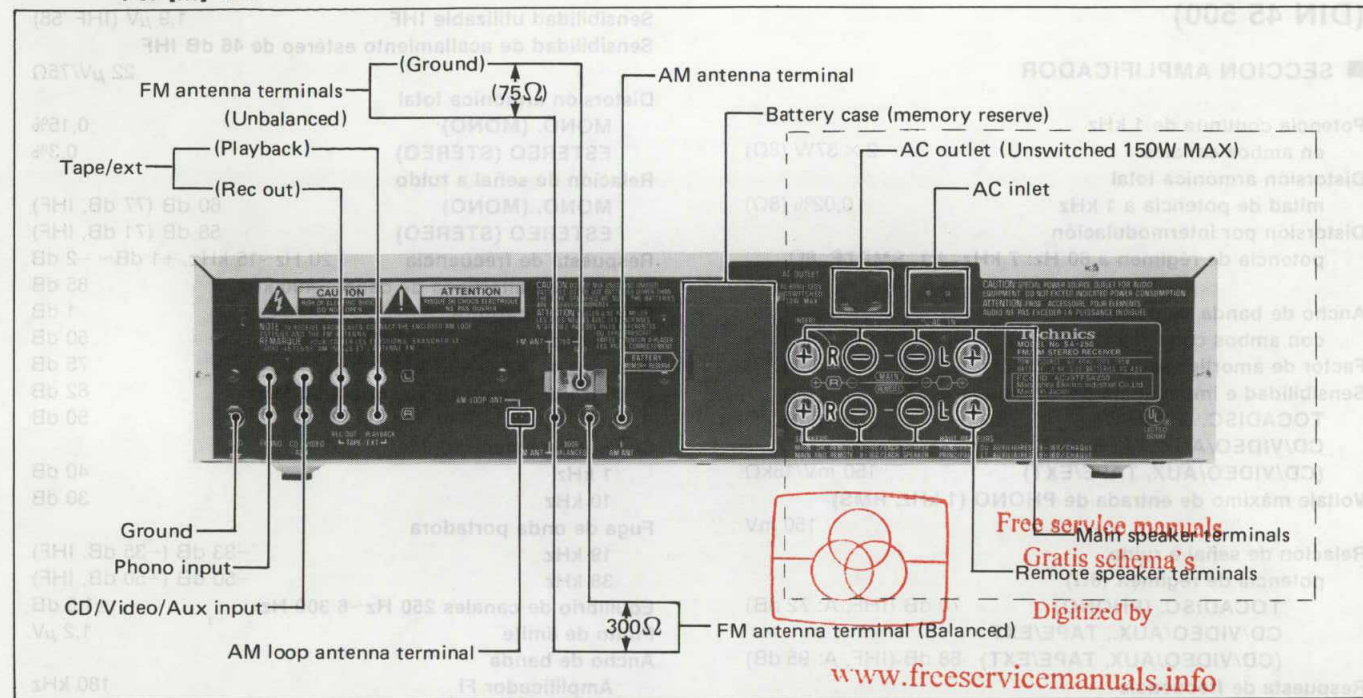
Consumo de energía	180W
Alimentación de energía	
Para Australien	CA 50Hz/60Hz, 240V
Para Europa continental	CA 50 Hz/60 Hz, 220V
Para otros países	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensiones (An.×Al.×Prof.)	430 × 97 × 243 mm
Peso	5 kg

Estas especificaciones están sujetas a cualquier cambio sin previo aviso.

LOCATION OF CONTROLS

Change of the Rear Panel

For [M] area



- For [XA, XM] areas**
- 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, XM] areas is provided with voltage selector and AC outlets.
 - * 240V (50/60Hz) for Australia.
 - * 220V (50/60Hz) for Continental Europe.
 - * 110V/120V/220V/240V (50/60Hz) for other [XA, XM] areas.
 - * Phono input capacitance is about 150pF.
- For [EX, EH] areas**
- For [XL] area**

MEASUREMENTS AND ADJUSTMENTS

- Additional of FM mono distortion adjustment.

FM MONO DISTORTION ADJUSTMENT					
6	Connect FM-SG to FM antenna terminal. (Apply 60 dB to antenna terminal.)	100.00 MHz (100% Mod. with 400 Hz)	Connect DC VTVM between TP201 and TP202 through choke coil. (Refer to Fig. 10)	T202 (Discri. IFT)	1. Adjust T202 core so that voltage measured in signal mode is 0 mV in 300 mV range.
7			Connect distortion analyser to "OUTPUT" terminals.	T203 (Discri. IFT)	2. Adjust T203 core so that distortion of right and left channels are minimized.

MESSUNGEN UND JUSTIERUNGEN

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

AM (MW)-EINSTELLUNG

- Einstellungen und zu benutzende Geräte
- Elektronische Voltmeter für Wechselstrom (EVM).
- AM (MW)-Meßsender (AM-SG)
- Bereichsschalter AM (MW-Abgleich)
- Die Netzspannung auf ihren Sollwert einstellen.

- Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute Ablesung.
- Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.

AM (MW)-MESSENDER		ANZEIGE-FREQUENZ	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHsverfahren
ANSCHLUSS	FREQUENZ				
MW-HF-ABGLEICH					
1	AM-MO über 200pF-Kondensator an den anschließen, wie in Abb. 9 gezeigt. (Schwacher Eingang.)	610kHz (400Hz, Modulat. 30%)	610kHz	Wechselstrom-Voltmeter oder Oszilloskop an den Lautsprecheranschluß anschließen.	L201 (MW Ant. Spule) ● Auf max. Ausgang abgleichen. ● Den Ferritkern L201 mit einem Schraubendreher justieren.
2		1500kHz (400Hz, Modulat. 30%)	1500kHz	Wechselstrom Voltmeter oder Oszilloskop an den Lautsprecheranschluß anschließen.	CT201 (MW Osc. Trimmer) ● Auf max. Ausgang abgleichen. ● Die Schritte (1) und (2) wiederholen, bis die Frequenz genau mit der Skalanzeige übereinstimmt.

FM (UKW)-EINSTELLUNG

- Einstellungen und zu benutzenden Geräte
- UKW-Meßsender (FM-SG).
- Oszilloskop
- Elektronische Voltmeter für Wechsel- und Gleichstrom (EVM).
- Signalfrequenzmesser (meßbar für 19kHz und 108MHz).
- Den Bereichsschalter auf die "FM"-Position stellen.
- Den UKW-Betriebsart-Wahlschalter in die Position "off/mono" stellen.
- Die anderen Einstellungen sind gleich wie beim MW-Abgleich.

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

FM (UKW)-MESSENDER		ANZEIGE-FREQUENZ	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHsverfahren	
ANSCHLUSS	FREQUENZ					
UKW-ZF-ABGLEICH						
3	UKW-MO an UKW-antennenanschluß anschließen, wie in Abb.10 gezeigt. (60 dB an den Antenneneingang anlegen.)	100MHz (400Hz, Modulat. 100%)	100MHz	Ein Gleichstrom-Voltmeter zwischen TP201 (+) und TP202 (-) über eine Drosselspule anschließen (siehe Abb.10)	• Den Kern von T202 so justieren, daß die gemessene Spannung im signallosen Modus im 300mV Bereich 0mV beträgt.	
UKW-HF-ABGLEICH						
4	UKW-MO an UKW-antennenanschluß anschließen.	90MHz (400Hz, Modulat. 100%)	90MHz	Oszilloskop an den Lautsprecheranschluß anschließen.	• Auf max. Ausgang abgleichen. • Die Schritte (4) und (5) wiederholen, bis die Frequenz genau mit der Skalanzeige übereinstimmt.	
5		106MHz (400Hz, Modulat. 100%)	106MHz	Oszilloskop an den Lautsprecheranschluß anschließen.		CT101 (Ocs. Trimmer)
ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO						
6	UKW-MO an UKW Antennenanschluß anschließen. (60 dB an den Antenneneingang anlegen.)	100,00 MHz (400 Hz Modulat. 100%)	100,00 MHz	Ein Gleichstrom-Voltmeter zwischen TP201 und TP202 über eine Drosselspule anschließen.	T202 (Diskriminator FT)	Den Kern von T202 so justieren, daß die gemessene Spannung im signallosen modus im 300 mV Bereich 0 mV beträgt.
7				Klirrfaktor-Meßbrücke an den Lautsprecheranschluß anschließen.	T203 (Diskriminator FT)	Kern von T203 für minimale Verzerrung der rechten und linken Kanäle justieren.

UKW-STEREO-DEKODER-ABGLEICH

UNTER VERWENDUNG EINES ZÄHLERS		UNTER VERWENDUNG ALTERNATIVEN SYSTEMS	
1. Unmoduliertes Mono-Signal 100MHz, 60dB in das Gerät speisen. (siehe Abb. 11)		1. Stereosignal entweder von einem Stereogenerator, oder einem Sender in den Tuner einspeisen.	
2. Den UKW-Betriebsart-Wahlschalter auf "on/FM auto" stellen.		2. VR301 so einstellen, daß die Stereolampe aufleuchtet. Schließer von VR301 mit Lack sichern, wie in Abb. 12 gezeigt.	
3. Frequenzzähler über einen Widerstand von 100kOhm an TP301 anschließen.			
4. VR301 auf 19kHz±30Hz einstellen.			

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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.

RÉGLAGE DE MA

● Réglage et équipement utilisé						4. Conserver la tension du secteur à la tension nominale.
1. Voltmètres électroniques de courant alternatif (EVM)						5. La sortie du signal du générateur ne doit pas être plus élevée qu'il n'est nécessaire pour obtenir une lecture de sortie.
2. Générateur du signal MA (AM-SG).						6. Utiliser un tournevis non-métallique pour la réglage.
3. Sélecteur de gamme de réglage sur la position "AM"						
GÉNÉRA TEUR DU SIGNAL MA		FRÉQUENCE D'AFFI-CHAGE	PRÉPARATIFS	ÉLÉMENTS RÉGLÉS	PROCÉDURE DE RÉGLAGE	
BRANCHEMENT	FRÉQUENCE					
RÉGLAGE DE MA-RF						
1	Raccorder le générateur de signaux MA (modulation d'amplitude) à la borne d'antenne MA par l'intermédiaire d'un condensateur de 200pF, en se référant à la Fig. 9. (Entrée faible)	610kHz (modulé à 30% avec 400Hz)	610kHz	Branchez un voltmètre électronique à C.A. ou un oscilloscope à la borne du "haut-parleur" de l'appareil.	L201 (Bobine ANT)	1. Réglez pour un signal de sortie maximum. 2. Régler le noyau ferrite de L201 à l'aide d'un tournevis.
2		1500kHz (modulé à 30% avec 400Hz)	1500kHz	Branchez un voltmètre électronique à C.A. ou un oscilloscope à la borne du "haut-parleur" de l'appareil.	CT201 (Trimmer ANT)	1. Réglez pour un signal de sortie maximum. 2. Refaire les étapes (1) et (2) jusqu'à ce que la fréquence s'aligne correctement avec l'affichage de la fréquence.

RÉGLAGE DE FM

● Réglage et équipement utilisé.			* Préparatifs du générateur de signaux à Modulation de Fréquence (FM-SG)		
1. Générateur du signal FM (FM-SG).			L'entrée normale de l'appareil est de 60dB (1 mV), 400 Hz, modulation de 100%. (Du fait de l'atténuation, utiliser des câbles coaxiaux (IHF). La sortie du générateur de signaux devra être de plus de 6 dB. C'est-à-dire que lorsque l'entrée est de 60 dB, la sortie du générateur de signaux devra être de 66 dB).		
2. Oscilloscope.					
3. Voltmètres électroniques de courant continu (EVM).					
4. Compteur de fréquence (19kHz et 108MHz mesurable).					
5. Sélecteur de gamme de réglage sur la position "FM".					
6. Régler le sélecteur de mode d'exploration automatique/FM sur la position "off/mono".					
7. Les autres réglages sont les mêmes que pour la mise au point de l'amplitude modulée (AM).					
GÉNÉRATEUR DU SIGNAL FM		FREQUENCE D'AFFICHAGE	PRÉPARATIFS	ÉLÉMENTS RÉGLÉS	PROCÉDURE DE RÉGLAGE
BRANCHEMENT	FRÉQUENCE				
RÉGLAGE DE FI-FM					
3	Raccorder le générateur de signaux FM à la borne d'antenne FM en se référant à la Fig. 10. (Appliquer 60 dB à la borne d'antenne.)	100MHz (modulé à 100% avec 400Hz)	100MHz	Branchez le voltmètre électronique à C.C. entre TP201 et TP202 à travers la bobine de choc. (Voir la Fig. 10)	T202 (Transfo FI discr.)
RÉGLAGE DE RF-FM					
4	Raccorder le générateur de signaux FM à la borne d'antenne FM. (Entrée faible)	90MHz (modulé à 100% 400Hz)	90MHz	Branchez un oscilloscope sur les bornes du haut-parleur de l'appareil.	L105 (Bobine de OSC)
5		106MHz (Modulé à 100% avec 400Hz)	106MHz	Branchez un oscilloscope sur les bornes du haut-parleur de l'appareil.	CT101 (Trimmer de OSC)
RÉGLAGE DE LA DISTORSION FM EN MONO					
6	Raccorder le générateur de signaux FM à la borne d'antenne FM. (Appliquer 60dB à la borne d'antenne)	100,00 MHz (modulé à 100% par 400 Hz)	100,00 MHz	Branchez le voltmètre électronique à C.C. aux bornes TP201 et TP202 à travers la bobine de choc.	T202 (Transfo. FI discr.)
7				Branchez un mesureur de distorsion sur les bornes du haut-parleur de l'appareil.	T203 (Transfo. FI discr.)
RÉGLAGE PILOTE MULTIPLEX FM					
EN UTILISANT UN COMETEUR DE FRÉQUENCES			EN UTILISANT UNE VARIANTE		
8	1. Signal monophonique non modulé de 100MHz 60 dB appliqué à l'appareil. (Se référer à la Fig. 11) 2. Régler le sélecteur de mode d'exploration automatique/FM sur la position "on/auto". 3. Branchez le compteur de fréquences sur TP301 à travers une résistance (100kΩ). 4. Régler VR301 sur 19kHz±30Hz.			1. Appliquez à l'appareil un signal stéréo provenant d'un générateur ou de la station stéréo an dispositif d'accord. 2. Régler VR301 jusqu'à ce que l'indicateur de stéréophonie S'éclaire. Collez le curseur de VR301 comme indiqué sur la Fig. 12.	

MEDICIONES Y AJUSTE

Nota: La bobina de OSC AM (L202) y IFT AM (T201) han sido yos ajustada y no requieren ajuste.

AJUSTE DE AM

* Puesta y equipo usado					
1. Voltímetros electronicos de CA (EVM).			5. La salida de generador de señales no debe ser mayor que la necesaria para obtener una lectura de salida.		
2. Generador de señales AM (AM-SG)			6. Para el ajuste use un destornillador no metálico.		
3. Poner selector FM-AM en posición "AM".					
4. Mantener voltaje de línea a voltaje nominal.					
GENERADOR DE SEÑALES AM		FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE
CONEXION	FRECUENCIA				
AJUSTE RF-AM					
1	Conectar AM-SG a terminal de antena AM a través de capacitor 200pF refiriendo a Fig. 9. (Entrada débil)	610kHz (mod. 30% con 400Hz)	610kHz	L201 (Bobina ANT)	1. Ajustar para salida máxima. 2. Ajustar núcleo de ferrita de L201 con destornillador.
2		1500kHz (Mod. 30% con 400Hz)	1500kHz	CT201 (Trimer de ANT)	1. Ajustar par salida máxima. 2. Repetir pasos (1) y (2) hasta que la frecuencia se adapte correctamente a la presentación de frecuencia.

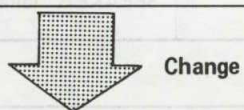
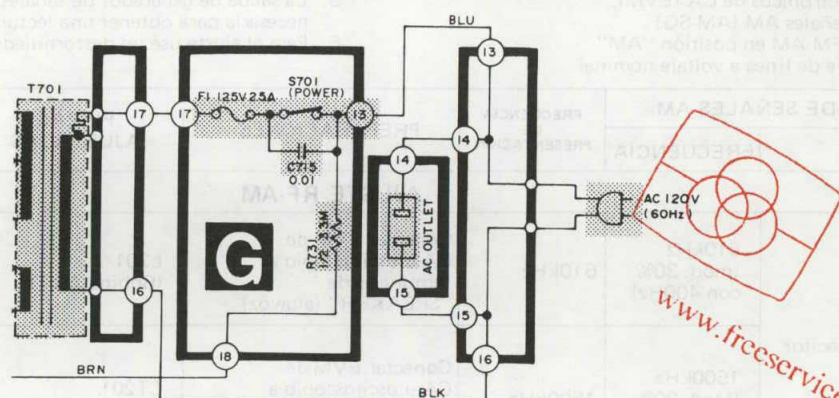
AJUSTE DE FM

* Puesta y equipo usado			* Preparación de generador de señales FM (FM-SG)		
1. 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.)		
2. Osciloscopio					
3. Voltímetros electrónicos de CC (EVM).					
4. Frecuencímetro (19kHz y 108MHz medibles).					
5. Poner selector de banda en posición "FM".					
6. Poner selector de exploración automática/modalidad FM en posición "off/mono".					
7. Otras puestas son las mismas que en ajuste AM.					
FM GENERADOR DE SEÑALES		FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE
CONEXION	FRECUENCIA				
AJUSTE IF-FM					
3	Conectar SG-FM a terminal de antenna FM refiriendo a Fig. 10. (Aplicar 60dB a terminal de antena)	100MHz (Mod. 100% con 400Hz)	100MHz	Conector EVM CC entre terminal TP201 y TP202 a través de bobina de choque. (Referir a Fig. 10).	T202 (Discri. IFT)
AJUSTE RF-FM					
4	Conectar SG-FM a terminal de antenna FM. (Entrada débil)	90MHz (Mod. 100% con 400Hz)	90MHz	Conectar osciloscopio a terminales "speaker" (altavoz)	L105 (Bobina OSC)
5		106MHz (Mod. 100% con 400Hz)	106MHz	Conectar osciloscopio a terminales "speaker" (altavoz)	CT101 (Trimer de OSC)
AJUSTE DE DISTORSION FM MONO					
6	Conectar SG-FM a terminal de antenna FM. (Aplicar 60 dB a terminal de antena)	100,00 MHz (Mod 100% con 400 Hz)	100,00 MHz	Conectar VTVM CC entre terminal TP201 y TP202 a través de bobina de choque.	T202 (Discri. IFT)
7				Conectar el analizador de distorsión a terminales de "speaker".	T203 (Discri. IFT)
AJUSTE DE (V.C.O.) PILOTO MPX de FM					
USANDO UN FRECUENCIMETRO			USANDO SISTEMA ALTERNATIVO		
8	1. Señal mono no modulada de 100. 10MHz 60dB aplicada al aparato. (Referir a Fig. 11) 2. Selector de exploración automática/modalidad FM en posición "on/auto". 3. Conectar frecuencímetro a TP301 a través de resistor (100kΩ). 4. Ajustar VR301 a 19kHz±30Hz.			1. Aplicar una señal estereofónica de generador o estación estereofónica a sintonizador. 2. Ajustar VR301 hasta que el indicador estereofónico se ilumina. Fijar brazo de VR301 como mostrado en la Fig. 12.	

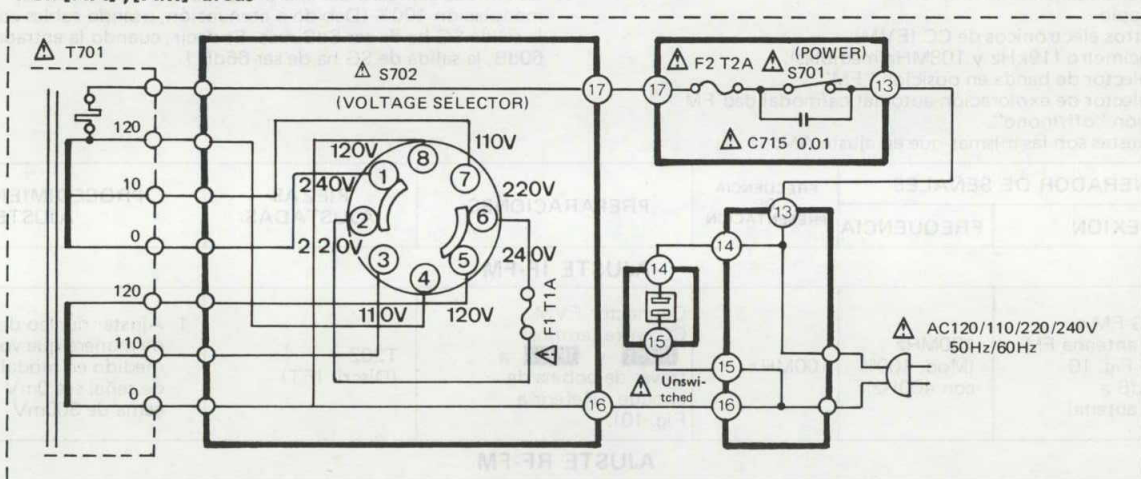
SCHEMATIC DIAGRAM

Change of power supply

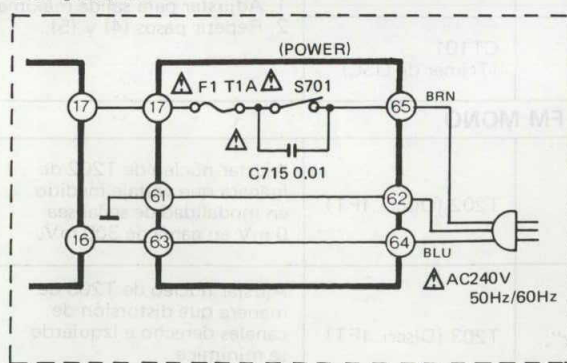
For [M] area



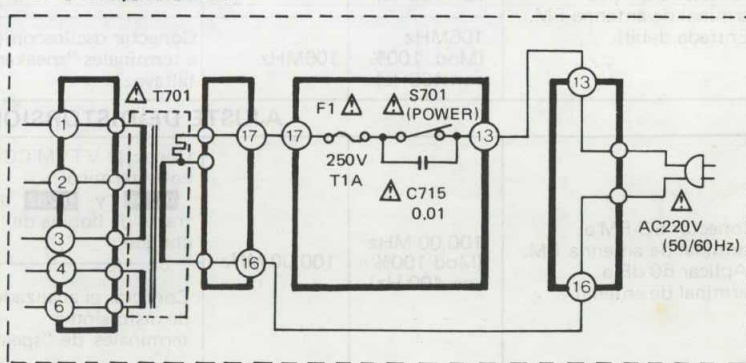
For [XA], [XM] areas



For [XL] area



For [EX], [EH] areas

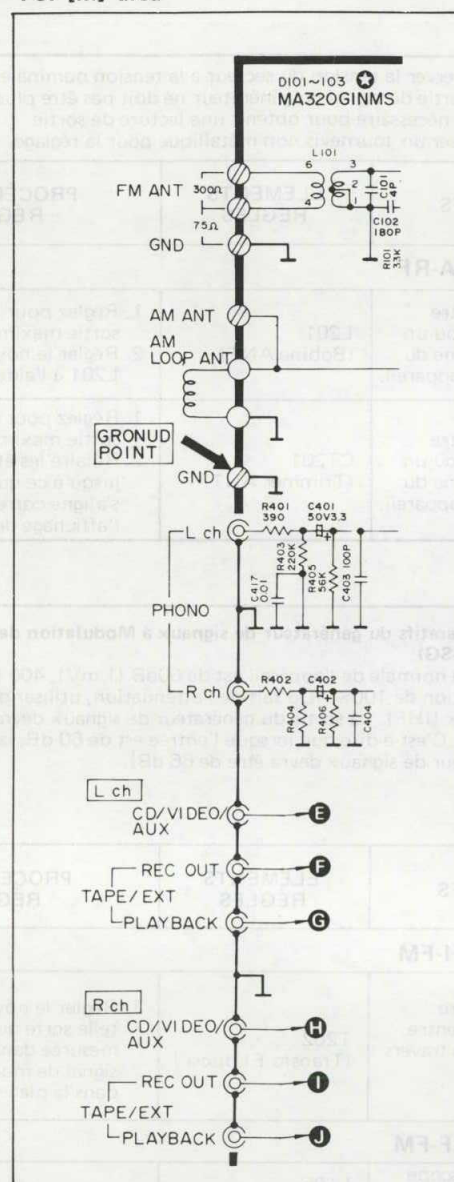


Important safety notice:

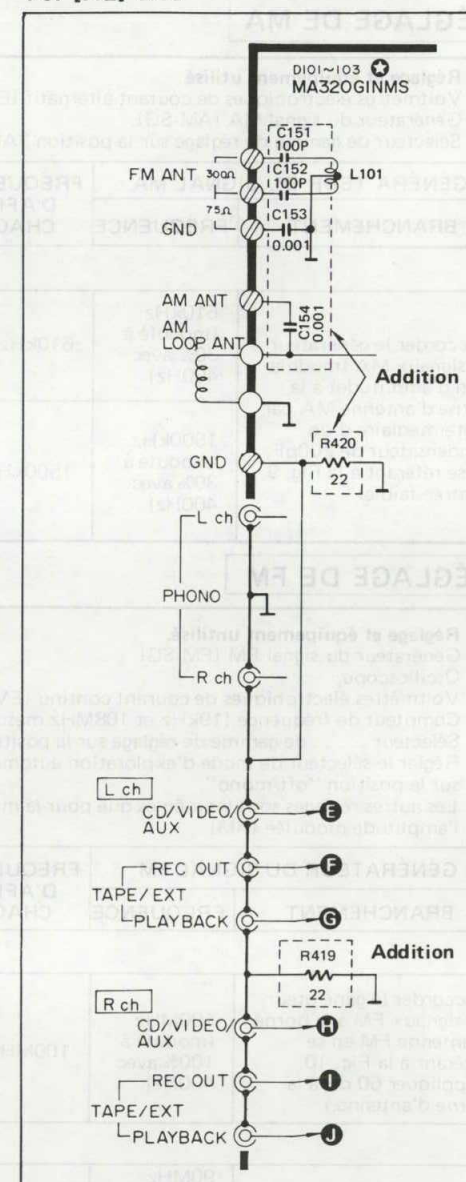
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Change of the antenna, input circuit

For [M] area



For [XL] area



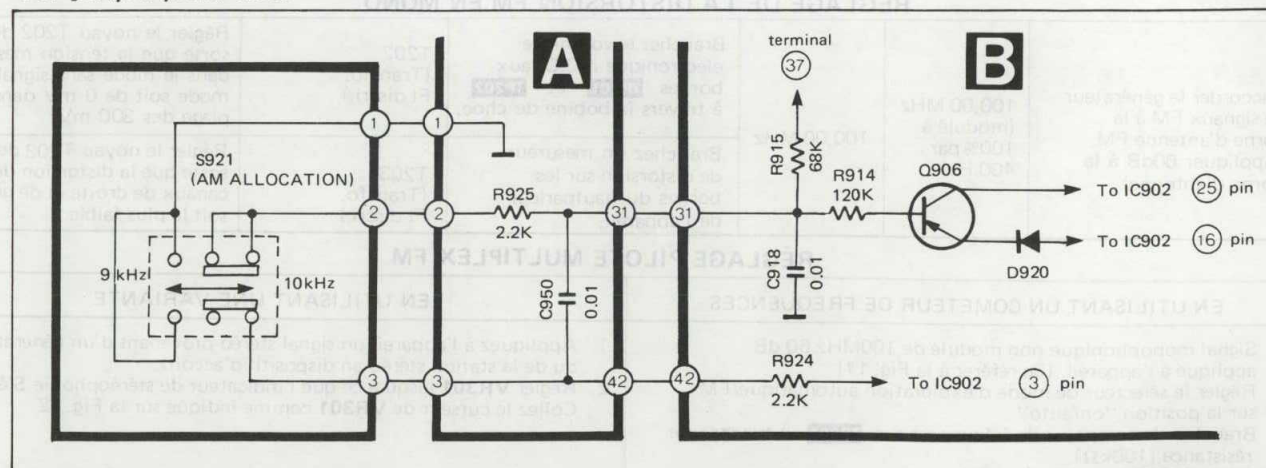
Change



Addition

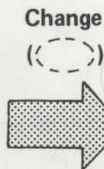
Change of AM allocation switch

For [XA], [XL], [XM] areas

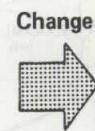


Notes:

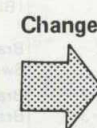
1. Mentioned in this parts list are only those changed in Model No. SA-250 for destination [M] area.
2. – marked parts are used for black type only, while – marked parts are for silver type only.
3. Part other than – and – marked are used for both black and silver type.
4. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.



For [EX, EH] areas



For [EX, EH, XA, XL, XM] areas



Ref. No.	Change of Part No.		Areas Color	Part Name & Description
	SA-250 [M]	SA-250/(K) [EX, EH, XA, XL, XM]		
C305, 306	ECQM1H183KV	ECQM1H153KV		Polyester, 50V, 0.015μF
C599	Addition	ECKD1H103ZF		Ceramic, 50V, 0.01μF (S)
C621, 622	ECKD1H473ZF	ECQM1H104KV	[XL, XA, XM]	Polyester, 50V, 0.1μF
C918	Addition	ECBT1C103ZYY	[XL, XA, XM]	
C950	Addition	ECKD1H103ZF	[XL, XA, XM]	Ceramic, 50V, 0.01μF (S)
C999	Addition	ECKD1H223ZF		Ceramic, 50V, 0.022μF (S)
CABINET and CHASSIS PARTS				
1	SGWA250—SM	SGWA250—SM	○	Front Panel Ass'y (Silver Type) (1)
		SGWA250—KE	⊗	Front Panel Ass'y (Black Type) (1)
4	SDLA250—SM	SDLA250—SM	○	Cover, Indication Transparent (Silver Type) (1)
		SDLA250—KE	⊗	Cover, Indication Transparent (Black Type) (1)
6	SGXA250—SM	SGXA250—SE	○	Front Sub Panel Ass'y (Silver Type) (1)
		SGXA250—KE	⊗	Front Sub Panel Ass'y (Black Type) (1)
7	SGX7669	SGX7669	○	Ornament (Silver Type) (1)
		SGX7669—1	⊗	Ornament (Black Type) (1)
8	SBD96	SBD96	○	Knob, Volume (Silver Type) (1)
		SBD96—1	⊗	Knob Volume (Black Type) (1)
9	SBE295	SBE295A		Spacer, Volume Knob (1)
18	SBD97	SBD97	○	Knob, Tone, Balance (Silver Type) (3)
		SBD97—1	⊗	Knob, Tone, Balance (Black Type) (3)
20	SGX7668	SGX7668	○	Ornament, Tone, Balance (Silver Type) (1)
		SGX7668—1	⊗	Ornament, Tone, Balance (Black Type) (1)
22	SBC565—1T	SBC565—3		Button (3)
26	SBC483—6T	SBC483—6T	○	Button, Speaker (Silver Type) (2)
		SBC483—8T	⊗	Button, Speaker (Black Type) (2)
29	SJT345	SJT347		Holder, Fuse (2)
30	SMC1140	SMC1140—1		Shield Cover (1)
31	SKC1191S1	SKC1191S1	○	Cabinet (Silver Type) (1)
		SKC1191BB1	⊗	Cabinet (Black Type) (1)
35	SKUA250—SM	SKUA150—SE	[EX][EH] [XL]	Bottom Board
		SKUA150—SX	[XA]	Bottom Board (1)
38	SGP6160B	SGP6160—6A	[EX][EH]	Rear Panel (1)
		SGP6160—9A	[XA][XM]	Rear Panel (1)
		SGP6160-10A	[XL]	Panel (1)
43	SJS9232A	_____	[EX][EH] [XL]	_____ (0)
		SJS9232A	[XA][XM]	AC Outlet (1)
44	SJS9231A	SJS9231A	[EX][EH] [XA][XM]	Socket, Inlet (1)
		_____	[XL]	_____ (0)

Part. No.	Change of Part No.		Areas Color	Part Name & Description	
	SA-250 [M]	SA-250/(K) [EX, EH, XA, XL, XM]			
49	Addition	SJS9231B	[EX][EH] [XA][XM] only	Socket, Inlet	△ (1)
50	Addition	SJS9232B	[XA][XM] only	AC Outlet	△ (1)
51	Addition	SHR131	[XL] only	Cord Bushing	(1)
52	Addition	QFC1207MA	[XL] only	Cord, AC Power Source	(1)
53	Addition	SMX763-1	[XE][EH] [XL] only	Insulation Sheet	(1)
54	Addition	SHR415	[EX][EH] [XL] only	Lock Pin	(1)
SCREWS					
N6	SNE2095-4	SNE2095-4	○	(Silver Type)	(2)
		SNE2095-5	⊗	(Black Type)	(2)
N7	XTB3+8BFN	XTB3+8BFN	○	Tapping, ⊕ 3 x 8 (Silver Type)	Ⓢ (3)
		XTB3+8BFZ	⊗	Tapping, ⊕ 3 x 8 (Black Type)	Ⓢ (3)
N20	Addition	XTBS3+6FFZ1		Tapping, ⊕ 3 x 6	(1)
N21	Addition	XSN3+8BVS	[XA, XM] only	⊕ 3 x 8	Ⓢ (1)
N22	Addition	XSN26+5FZ	[XA, XM, XL] only	⊕ 3.6 x 5	(2)
WASHERS					
N30	Addition	XWA3B	[XA, XM] only	Spring, # 3 x 6	Ⓢ (1)
N31	Addition	XWG3	[XA, XM] only	Plain, #3	Ⓢ (1)
N32	Addition	SHW40L150	[XA, XM] only		(1)
N33	Addition	XWA26BFZ	[XA, XM, XL] only	Spring, #2.6	(2)

REPLACEMENT PARTS LIST

- Notes:**
- Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
 - 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.
 - ⊗ —marked parts are used for black only, while ○ —marked parts are for silver type only.
 - Part other than ⊗ — and ○ —marked are used for both black and silver type.
 - Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
 - The “Ⓢ” mark is service standard parts and may differ from production parts.
 - The parenthesized numbers in the column of description stand for the quantity per set.

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC201	AN278	FM IF Amp.
IC202	AN7273A	FM IF Det. & AM Converter
IC301	SVIUPC1161C3	AM AF Amp. FM MPX Equalizer
IC401	SVINJ4559DDM	Tone Amplifier
IC501	SVINJ4558DSM	Power Amplifier
IC601	STK4152-2M	Power Amplifier
IC901	SVIUPB553AC	Pre-Scaler
IC902	SVID1703C544	PLL Controller (Micro-Computer)
IC903	AN6873N	FL Drive
TRANSISTORS		
Q101	2SK241-GR	FM RF Amp.
Q102	2SC1674-M	FM Mixer
Q103, 104	2SC1675-L	FM Oscillator, Buffer
Q201, 202, 204, 205, 702, 706, 707	2SC1815-Y	Buffer, Switching, Muting, Regulator
Q203, 701	2SA1015-Y	Switching
Q703, 704	2SA992	Over Load Det.
Q705	2SD1265-O	Regulator

Ref. No.	Part No.	Part Name & Description
DIODES		
Q901, 902, 907	2SD636	L.P.F., FL Drive
Q903, 904, 905, 906	2SB641R	Switching
D101, 102, 103	MA320G1-N	FM Variable Capacitor
D201	SVDKV1236Z	AM Variable Capacitor
D202	MA27W-A	Switching
D203, 204, 205, 702, 703, 704, 799	SVD1S2473	
D206, 301	LN846RP	L. E. D.
D701	SVDS1SR35200A	Rectifier
D705, 706	MA162A	Switching
D707-710	SVDS2V20	Rectifier
D711	MA1062M	Zener, 6.2V
D712, 715	RD16EB	Zener, 16V
D713	MA1220L	Zener, 22V
D714	MA1068M	Zener, 6.8V
D901-904, 907-916	SVD1S2473	Switching
D905, 906	MA162A	Switching
D918	SVD1S2473	Switching

Ref. No.	Part No.	Part Name & Description
COILS		
L101	SLA4N41	FM Antenna Choke
L102, 104	ELEPK1R2MA	FM Detector
L103	SLD4P87	FM OSC
L105	SL04N27-P	AM Antenna
L201	SLA2B1-P	AM OSC
L202	SL02B7-P	Choke
L601, 602	SLQY07G-30	
TRANSFORMERS		
T201	SLI2B101-M	AM IFT
T202	SLI4B511-Z	FM IFT
T203	SLI4B513-Z	FM IFT
T701 [EX, EH] △	SLT5M397-W	Power Source
T701 [XL] △	SLT5M399-W	Power Source
T701 [XA, XM] △	SLT5M401-W	Power Source

Area	
[EX] ...	Scandinavia and Switzerland
[EH] ...	Holland
[XA] ...	Southeast Asia, Oceania, Africa, Middle Near East and Central South America
[XL] ...	Australia
[XM] ...	Latin America

Black type model No. SA-250(K)

Ref. No.	Part No.	Part Name & Description
CERAMIC FILTERS		
CF201, 202	SVFE107MS8A	FM 10.7MHz (Red)
	SVFE107MS8B	FM 10.68MHz (Blue)
	SVFE107MS8C	FM 10.72MHz (Orange)
(Use pair ranks as same as CF201 and CF202)		
CF203	SVFSFZ450F7L	AM 450KHz
VARIABLE RESISTORS		
VR301	EVNE4AA00B53	FM MPX VCO Adjustment, 5kΩ (B)
VR501, 502	EWANA6X05C15	Tone, 100kΩ (C)
VR601	EWANF5X05G15	Balance, 100kΩ (G)
VR602	EWAPBA05B15	Volume, 100kΩ (B)
VARIABLE CAPACITORS		
CT101	ECRHA007A11	FM OSC
CT201	ECRHA010A11	AM Antenna
COMPONENT COMBINATIONS		
Z301, 302	EXRP181K473C	180pF, 47kΩ
Z901	EXBP87104M	100kΩ (×7)
CRYSTAL		
X901	SVQ43U452-D	4.5MHz
FLUORESCENT DISPLAY TUBE		
FL	SAD7BT05A	
LAMP		
PL701	△ XAMS6Q17	12V, 110mA
FUSES		
F1	△ XBA2C12TR0	250V, T1.2A
F2	△ XBA2C25TR0	250V, T2.5A
SWITCHES		
S201	SSH1160	FM/AM Band Selector
S202	SSH179	FM Mode
S501-504	SSH478	Input Selector
S601, 602	SSH2087	Speakers Selector
S603	SSH1005	Loudness
S701	△ SSH1071	Power Source
S702 [XA, XM] only	ESE37219	Voltage Selector
S901-910	SSG13	Preset Tuning, Tuning, Memory
S921 [XL, XA, XM] only	SSS43	AM Allocation
CABINET and CHASSIS PARTS		
1	○ SGWA250-SM	Front Panel Ass'y (Silver Type) (1)
1	⊗ SGWA250-KE	Front Panel, Ass'y (Black Type) (1)
2	SBC573-IT	Button, Input Selector (4)
3	SGU409	Transparent Cover (1)
4	○ SDLA250-SM	Cover, Indication Transparent (Silver Type) (1)
4	⊗ SDLA250-KE	Cover, Indication Transparent (Black Type) (1)
5	SBC627	Button, Power (1)

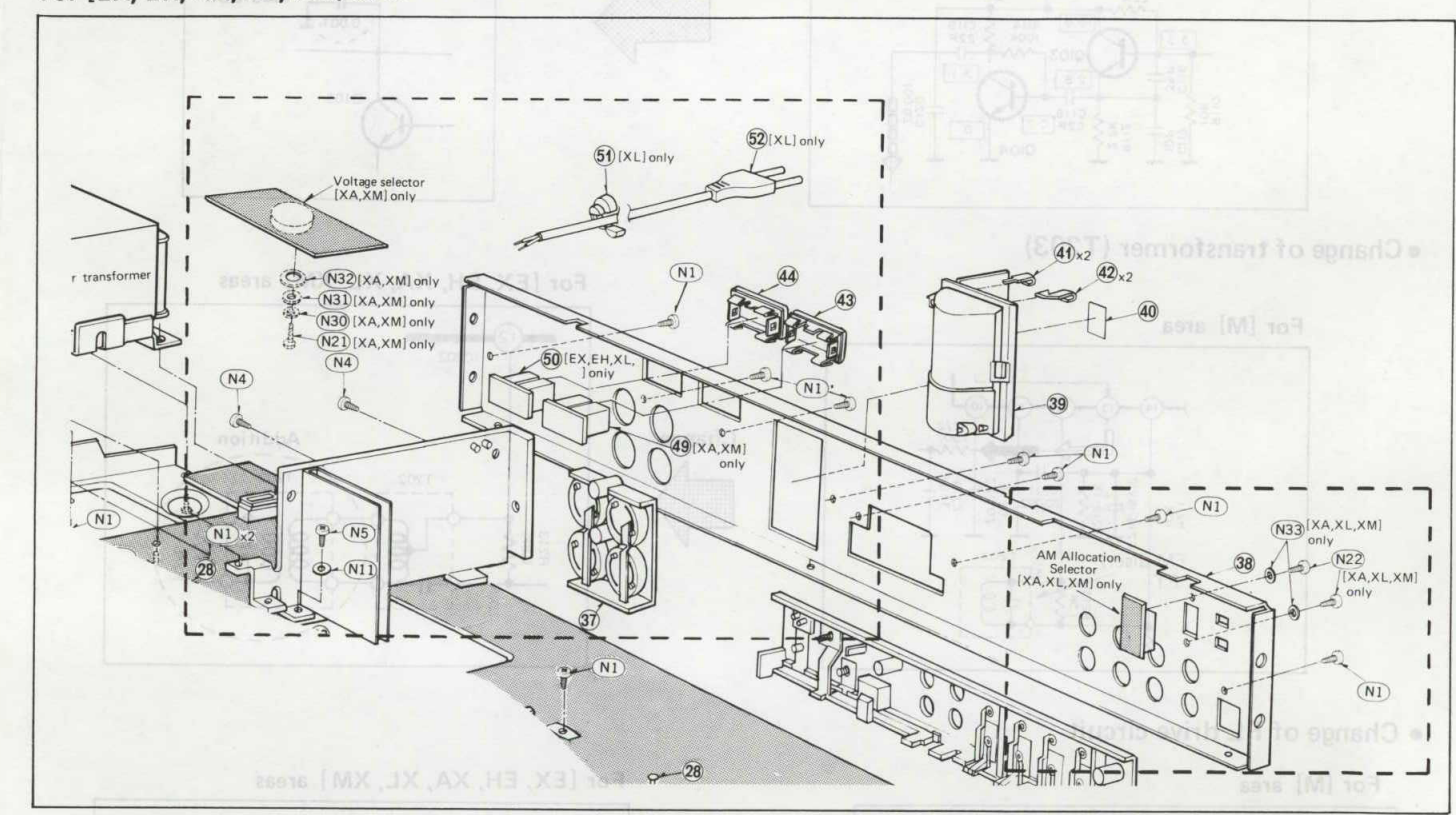
Ref. No.	Part No.	Part Name & Description
CABINET and CHASSIS PARTS		
6	○ SGXA250-SE	Front Sub Panel, Ass'y (Silver Type) (1)
6	⊗ SGXA250-KE	Front Sub Panel, Ass'y (Black Type) (1)
7	○ SGX7669	Ornament (Silver Type) (1)
7	⊗ SGX7669-1	Ornament (Black Type) (1)
8	○ SBD96	Knob, Volume (Silver Type) (1)
8	⊗ SBD96-1	Knob, Volume (Black Type) (1)
9	SBE295A	Spacer, Volume Knob (1)
10	SHR5274	Spacer, Volume Knob (1)
11	SNE92	Bracket (1)
12	SUG183	Rod, Slider (2)
13	SHR9723	Slider, Volume Knob (1)
14	SHR322	Spacer (1)
15	SUS191-1	Spring, Button (4)
16	SHR9724	Holder (4)
17	SJT231	Terminal (1)
18	○ SBD97	Knob, Tone, Balance (Silver Type) (3)
18	⊗ SBD97-1	Knob, Tone, Balance (Black Type) (3)
19	SBJ9018	Holder, Knob (3)
20	○ SGX7668	Ornament (Silver Type) (1)
20	⊗ SGX7668-1	Ornament (Black Type) (1)
21	SUS257	Spring, Button (5)
22	SBC565-3	Button (3)
23	SMP373	Holder, L.E.D. (1)
24	SMN1910	Bracket, FL Holder (2)
25	SJJ71B	Jack, Head phones (1)
26	○ SBC483-6T	Button, Speaker (Silver Type) (2)
26	⊗ SBC483-8T	Button, Speaker (Black Type) (2)
27	SMP377	Holder, Lamp (1)
28	SHR415	Lock Pin (8)
29	SJT347	Holder, Fuse (2)
30	SMC1140-1	Shield Cover (1)
31	○ SKC1191S1	Cabinet (Silver Type) (1)
31	⊗ SKC1191BB1	Cabinet (Black Type) (1)
32	SUW2832	Bracket (1)
33	SME103-2	Switch P.C.B. (1)
34	SME103-3	Bracket, P.C.B. (1)
35 [EX, EH, XL]	SKUA150-SE	Bottom Board (1)
35 [XA, XM]	SKUA150-SX	Bottom Board (1)
35-1	(SKL245-2)	Foot (4)
36	SJF8037-15N	Terminal Board (1)
37	SJF4815-2	Terminal Board, Speaker (1)
38 [EX, EH]	SGP6160-6A	Rear Panel (1)
38 [XA, XM]	SGP6160-9A	Rear Panel (1)
38 [XL]	SGP6160-10A	Rear Panel (1)
39	SJB3005-1	Battery Cover (1)
40	SGK1569-1	Label (1)
41	SJC7	Terminal, Battery (2)
42	SJC9	Terminal, Battery (2)

Ref. No.	Part No.	Part Name & Description
43 [XA, XM] only	SJS9232A	Case, AC Outlett (1)
44 [EX, EH, XA, XM] only	SJS9231A	Case, Inlet (1)
45	SHR301	Clamper (2)
46	SJT3319	Post (3pin) (1)
46	SJT3611	Post (6pin) (1)
46	SJT3213	Post (2pin) (1)
47	SJS5331	Socket (3pin) (1)
47	SJS5629	Socket (6pin) (1)
47	SJS5215	Socket (2pin) (1)
48	SJT783	Terminal (1)
49 [XA, XM] △ only	SJS9232B	Socket, AC Outlet (1)
50 [EX, EH, XA, XM] △ only	SJS9231B	Socket, Inlet (1)
51 [XL] only	SHR131	Bushing, AC Cord (1)
52 [XL] only △	QFC1207MA	Cord, AC Power (1)
53 [EX, EH, XL] only	SMX763-1	Source Insulation Sheet (1)
54 [EX, EH, XL] only	SHR415	Lock Pin (1)
SCREWS		
N1	XTBS3+8BFZ1	Tapping with Detent, ⊕ 3×8 (2)
N2	Ⓢ XSN3+6S	⊕ 3×6 (2)
N3	Ⓢ XTB3+8BFN	Tapping, ⊕ 3×8 (1)
N4	Ⓢ XTB3+14BFN	Tapping, ⊕ 3×14 (2)
N5	Ⓢ XTN3+8B	Tapping, ⊕ 3×8 (1)
N6	○ SNE2095-4	Silver Type (2)
N6	⊗ SNE2095-5	Black Type (2)
N7	Ⓢ XTB3+8BFN	Tapping, ⊕ 3×8 (3)
N7	Ⓢ XTB3+8BFZ1	Tapping, ⊕ 3×8 (3)
N20	Ⓢ XTB3+6FFZ1	Tapping, ⊕ 3×6 (1)
N21 [XA, XM] only	XSN3+8BVS	⊕ 3 x 8 (1)
N22 [XA, XM, XL] only	XSN26+5FZ	⊕ 2.6 x 5 (2)
WASHERS		
N10	Ⓢ XWA3B	Spring, #3 (4)
N11	Ⓢ XWG3	Plain, #3 (1)
N12	XWE3E13	Plain, #3 (1)
N30 [XA, XM] only	Ⓢ XWA3B	Spring, #3 (1)
N31 [XA, XM] only	Ⓢ XWG3	Plain, #3 (1)
N32 [XA, XM] only	SHW40L150	Plain (1)
N33 [XA, XM, XL] only	XWA26BFZ	Spring, #2.6 (2)
ACCESSORIES		
A1 [EX, EH] △	SJA155	AC Cord (1)
A1 [XA, XM] △	SJA168	AC Cord (1)
A2	SSA902	Loop Antenna (1)
A3	SMA231	Holder (1)
A4	SMA233-1	Holder (1)
A5	XTN3+10AFZ	Screw, Loop Antenna Holder (2)
A6	SSA269	Cord, FM Antenna (1)
A7 [EX, EH]	SQF12100	Instruction Book (1)
A7 [XM, XA]	SQF12101	Instruction Book (1)
A7 [XL]	SQF12102	Instruction Book (1)
A8 [XA, XM] △ only	SJP5213-1	Plug Adaptor (1)
A9 [XA, XM] △ only	SJP5215	Plug Adaptor (1)
PACKING PARTS		
P1	○ SPP699	Polyethylene Bag, (Silver type) (1)
P1	⊗ SPP649	Polyethylene Bag, (Black type) (1)

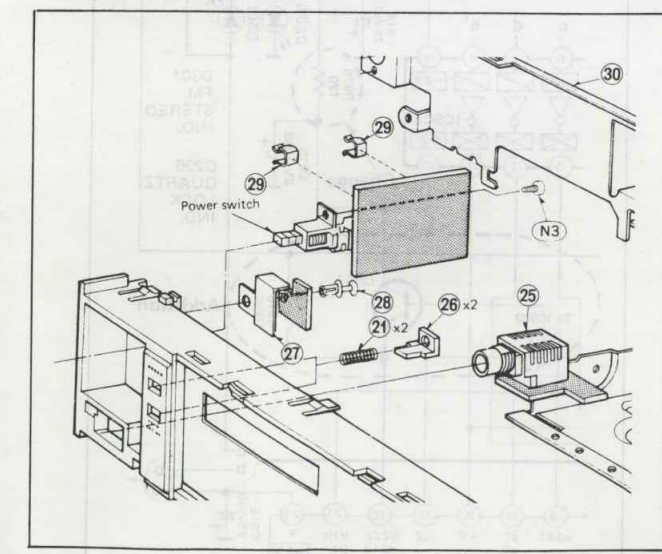
Ref. No.	Part No.	Part Name & Description
P2 [XL] only	SPS4432-1	Pad, Left Side (1)
P2 other areas	SPS4432	Pad, Left Side (1)
P3 [XL] only	SPS4433-1	Pad, Right Side (1)
P3 other areas	SPS4433	Pad, Right Side (1)
P4 [XL] only	SPG4894	Carton Box (1)
P4 other areas	SPG4893	Carton Box (1)
P5	⊗ SGK1413	Label (Black Type only) (2)

Change of the exploded view

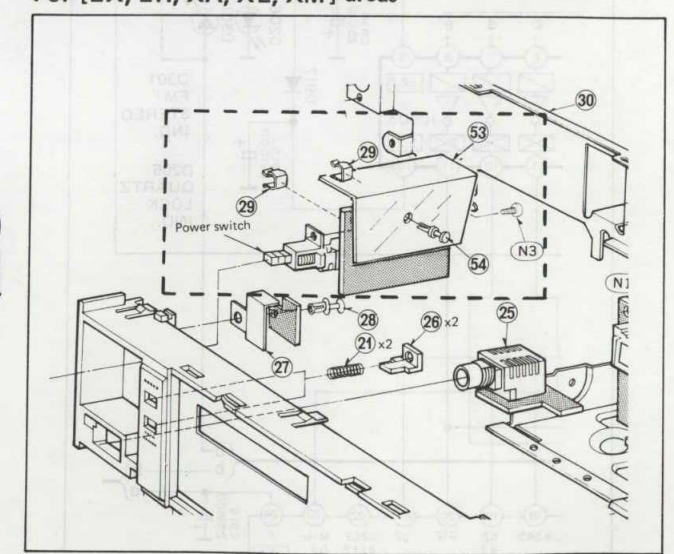
For [EX, EH, XA, XL, XM] areas



For [M] area



For [EX, EH, XA, XL, XM] areas

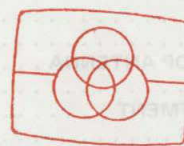


Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver

SA-250

[M], [MC]



Free service manuals
Gratis schema's

Digitized by

www.freeservicemanuals.info

Areas

- * [M] is available in the U.S.A.
- * [MC] is available in Canada.

Specifications

Specifications are subject to change without notice for further improvement.
Weights and dimensions shown are approximate.

(IHF '78)

■ AMPLIFIER SECTION

Rated minimum sine wave RMS power output
20 Hz~20 kHz both channels driven
0.07% total harmonic distortion

35W per channel (8 ohms)

1 kHz continuous power output
both channels driven
0.07% total harmonic distortion

37W per channel (8 ohms)

Dynamic headroom 1.2 dB (8 ohms)

Total harmonic distortion
rated power at 20 Hz~20 kHz 0.07% (8 ohms)
rated power at 1 kHz 0.02% (8 ohms)

SMPTE intermodulation distortion 0.07% (8 ohms)

Frequency response

PHONO RIAA standard curve ± 0.8 dB

CD/VIDEO/AUX, TAPE/EXT 5 Hz~70 kHz, -3 dB

Input sensitivity

PHONO 0.45 mV (2.5 mV, IHF '66)

CD/VIDEO/AUX, TAPE/EXT 25 mV (150 mV, IHF '66)

S/N (IHF, A)

PHONO 74 dB (72 dB, IHF '66)

CD/VIDEO/AUX, TAPE/EXT 80 dB (95 dB, IHF '66)

Maximum input voltage

PHONO 150 mV (160 mV, 1 kHz)

Input impedance

PHONO 47 kilohms

CD/VIDEO/AUX, TAPE/EXT 22 kilohms

Tone controls

BASS 50 Hz, +10 dB~-10 dB

TREBLE 20 kHz, +10 dB~-10 dB

Loudness control (volume at -30 dB) 50 Hz, +9 dB

Low frequency damping factor 30 (8 ohms)

Load impedance

MAIN or REMOTE 8~16 ohms

MAIN and REMOTE 8~16 ohms

■ FM TUNER SECTION

Frequency range 87.9~107.9 MHz

Sensitivity 10.8 dBf (1.9 μ V, IHF '58)

50 dB quieting sensitivity

MONO 16.1 dBf (3.5 μ V IHF '58)

STEREO 38.3 dBf (45 μ V IHF '58)

Total harmonic distortion

100 Hz 0.15% (MONO), 0.3% (STEREO)

1 kHz 0.15% (MONO), 0.3% (STEREO)

6 kHz 0.3% (MONO), 0.3% (STEREO)

S/N

MONO 77 dB

STEREO 71 dB

Frequency response 20 Hz~15 kHz, +1 dB, -2 dB

Alternate channel selectivity 65 dB

Capture ratio 1 dB

Image rejection at 98 MHz 50 dB

IF rejection at 98 MHz 75 dB

Spurious response rejection at 98 MHz 82 dB

AM suppression 50 dB

Stereo separation

1 kHz 40 dB

10 kHz 30 dB

Carrier leak

19 kHz -35 dB

38 kHz -50 dB

Antenna terminals

300 ohms (balanced)

75 ohms (unbalanced)

Technics

Matsushita Engineering
and Service Company
50 Meadowland Parkway,
Secaucus,
New Jersey 07094

Panasonic Hawaii, Inc.
91-238 Kauhū St., Ewa Beach
P.O. Box 774
Honolulu, Hawaii 96808-0774

Matsushita Electric
of Canada Limited
5770 Ambler Drive, Mississauga,
Ontario, L4W 2T3

Panasonic Sales Company
Division of Matsushita Electric
of Puerto Rico, Inc.
Ave. 65 De Infantería, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

■ AM TUNER SECTION

Frequency range	530~1620 kHz
Sensitivity	20 μ V, 300 μ V/m
Selectivity	55 dB
Image rejection at 1000 kHz	40 dB
IF rejection at 1000 kHz	60 dB

■ GENERAL

Power consumption	165W
Power supply	AC 120V, 60 Hz
Dimensions (W×H×D)	430 × 97 × 243 mm (16-15/16" × 3-13/16" × 9-9/16")
Weight	4.8 kg (10.6 lb.)

■ CONTENTS

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LOCATION OF CONTROLS	3	PRINTED CIRCUIT BOARDS	11 ~ 13
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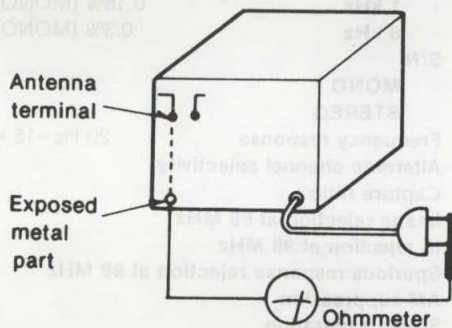
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

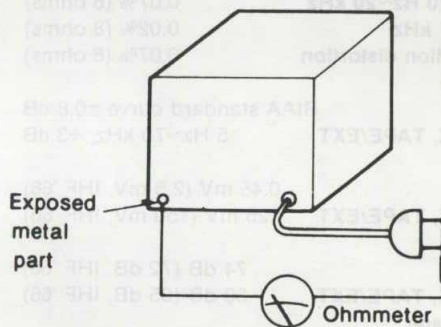
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3M Ω and 5.2M Ω to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3M Ω —5.2M Ω

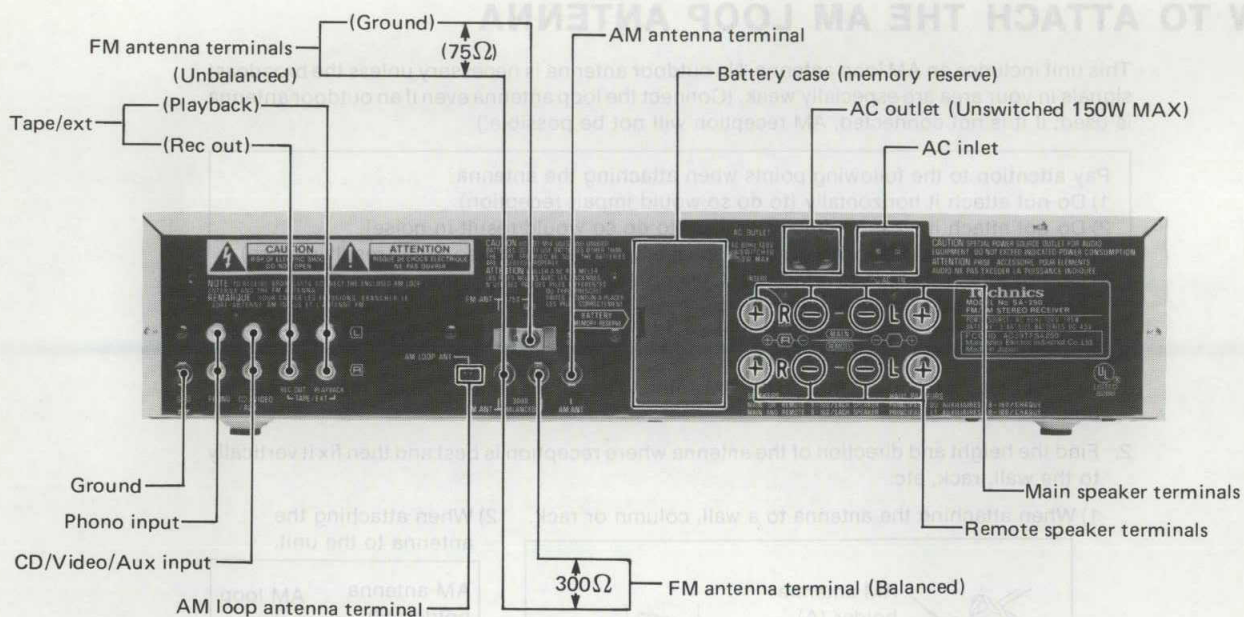
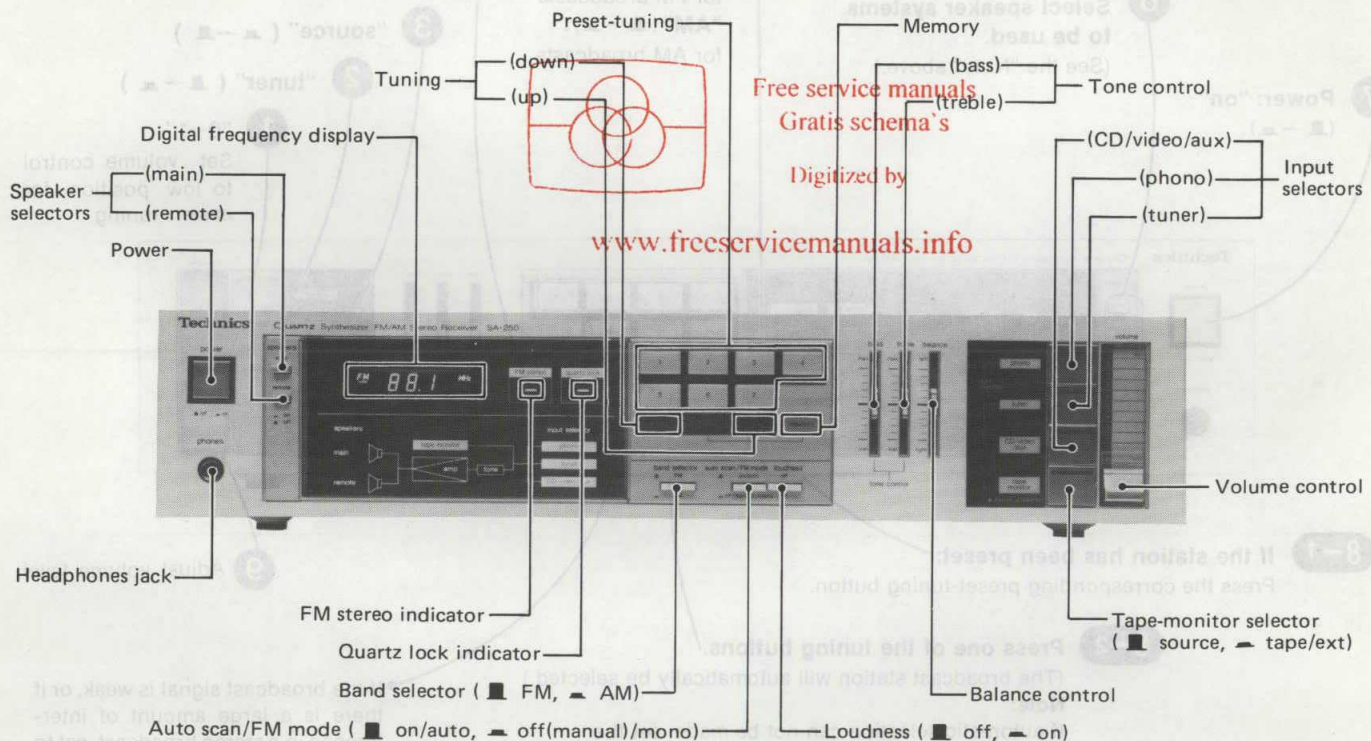


(Fig. B)

Resistance = Approx ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

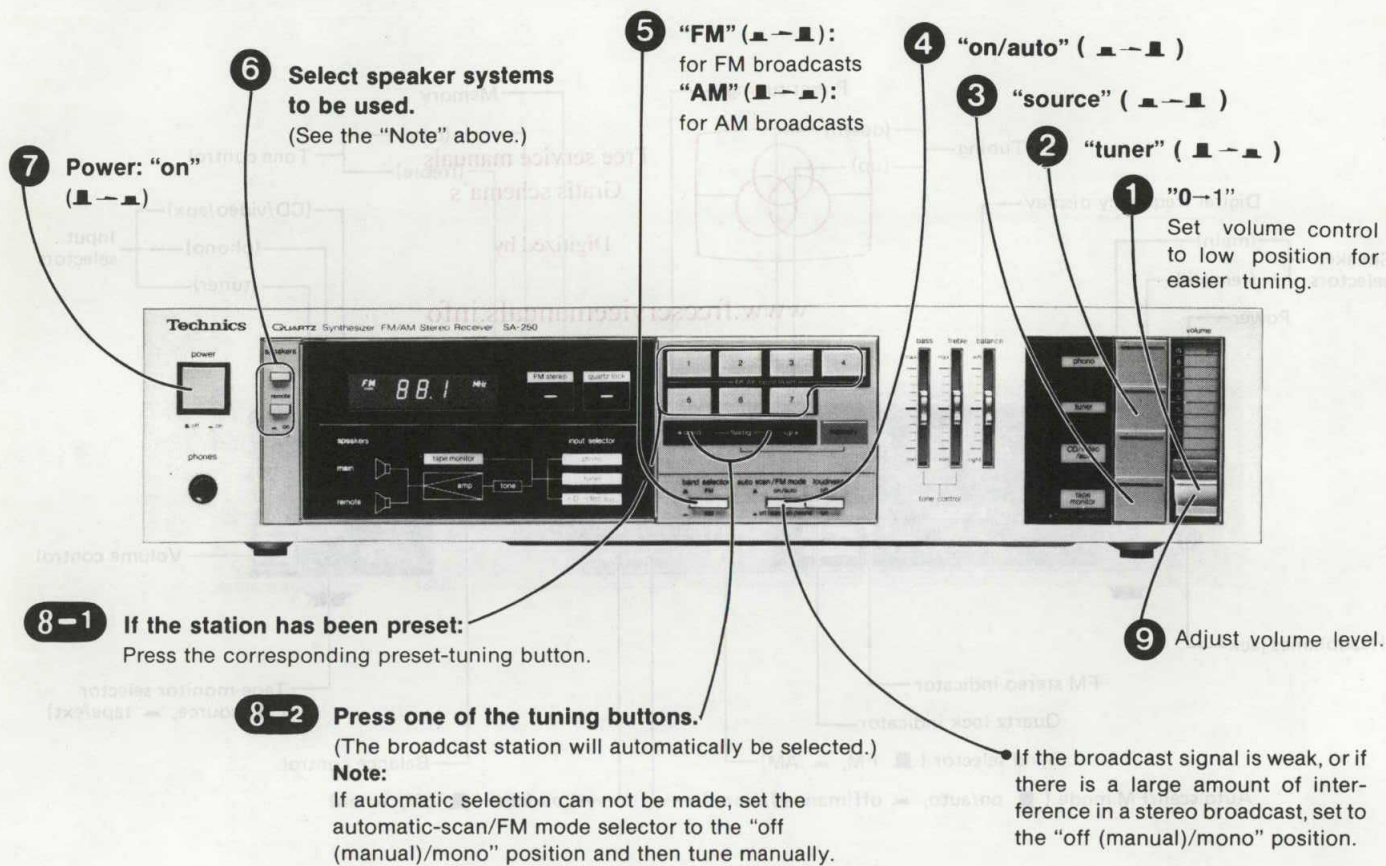
LOCATION OF CONTROLS



- Phono input capacitance is about 150pF.
- Series connection method is employed for the main and remote speaker connections of this set. Therefore, if both speaker changeover switches (main and remote) are turned "on" with the speaker unit connected only to main or remote speaker terminal, then no output signal will be delivered from the speaker unit.

OPERATION

- To listen to radio broadcasts



HOW TO ATTACH THE AM LOOP ANTENNA

This unit includes an AM loop antenna. No outdoor antenna is necessary unless the broadcast signals in your area are especially weak. (Connect the loop antenna even if an outdoor antenna is used; if it is not connected, AM reception will not be possible.)

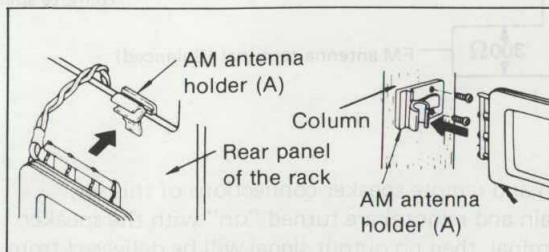
Pay attention to the following points when attaching the antenna.

- Do not attach it horizontally (to do so would impair reception).
- Do not attach it close to metal surfaces (to do so would result in noise).
- Do not attach it close to power cords, speaker wires, etc. (to do so would result in noise).
- Do not attach it close to a tape deck (when the tape deck is being used, chirping or beeping sounds may be received).

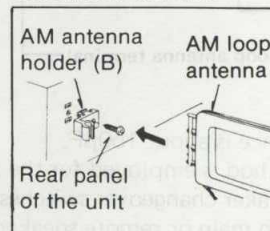
Steps

- Connect the AM loop antenna to the AM antenna terminals located on the rear panel of the unit.
- Find the height and direction of the antenna where reception is best and then fix it vertically to the wall, rack, etc.

1) When attaching the antenna to a wall, column or rack.



2) When attaching the antenna to the unit.



Note:

The installation of the antenna to the unit may cause impaired reception or result in signal noise. If possible, attach the antenna to the rack, a wall, or a column.

- Move the antenna toward the right or left to find the point of best reception.

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.

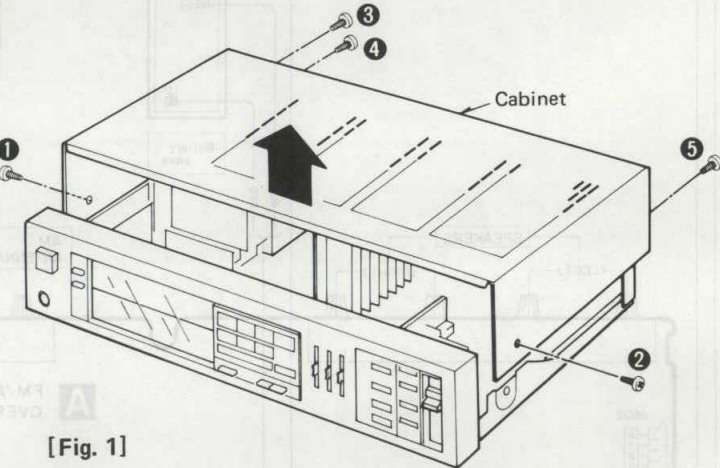
BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit of the power supply capacitors (C706, C707, 6800μF) with a resistor (about 10Ω, 5W) to discharge the charged voltage. Do not short both ends of C706 and C707 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 at 120V, 60Hz in no-signal mode is 100 ~ 400mA.

DISASSEMBLY INSTRUCTIONS

How to remove the cabinet

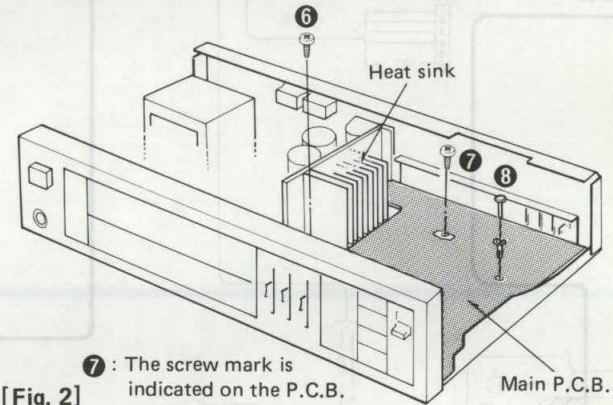
1. Remove the 2 setscrews (Fig. 1: ①, ②) on the side and 3 setscrews (Fig. 1: ③ ~ ⑤) on the back of the cabinet.
2. Remove the cabinet upward.



[Fig. 1]

How to remove the bottom board

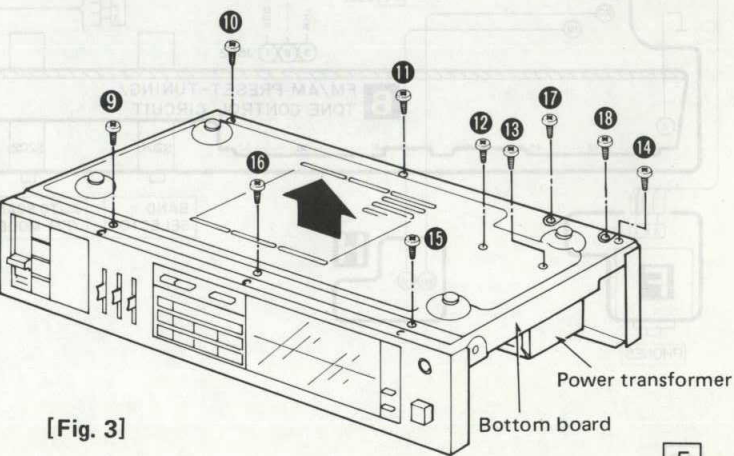
1. Remove the 2 setscrews (Fig. 2: ⑥, ⑦) and 1 lock pin (Fig. 2: ⑧) of the main P.C.B. and heat sink.
2. Remove the 8 setscrews (Fig. 3: ⑨ ~ ⑯) of the bottom board.
3. Remove the bottom board upward.



[Fig. 2]

How to remove the power amplifier IC

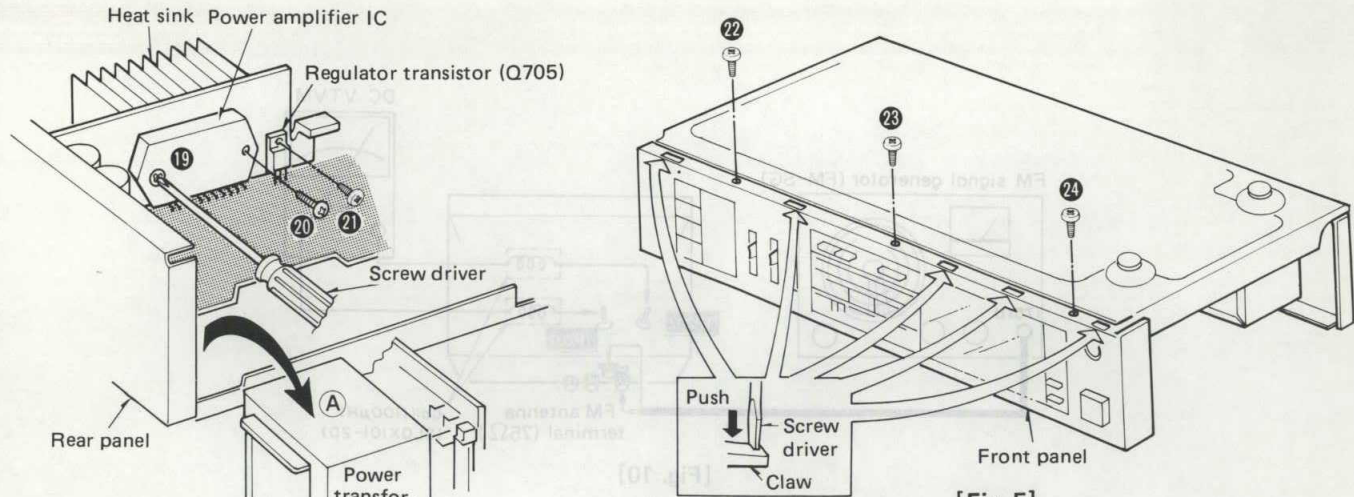
1. Remove the cabinet and bottom board.
2. Remove the 2 setscrews (Fig. 3: ⑰, ⑱) of the power transformer.
3. Detach the power transformer from rear panel in the direction of arrow (A) (Fig. 4).
4. Unsolder of power amplifier IC.
5. Remove the 2 setscrews (Fig. 4: ⑲, ⑳) used to secure the power amplifier IC on the heat sink, and then pull the power amplifier IC.
6. When mounting the power amplifier IC, apply silicone compound (SZZ0L15) to the rear side of power amplifier IC, and then follow the steps 1 ~ 5 reversely.



[Fig. 3]

How to remove the regulator transistor (Q705)

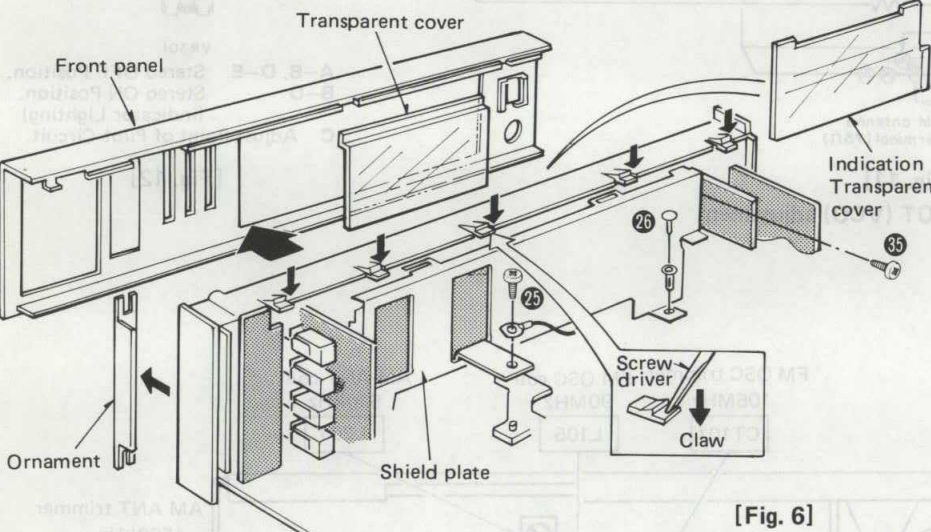
1. Remove the cabinet and bottom board.
2. Unsolder of regulator transistor (Q705).
3. Remove the 1 setscrews (Fig. 4: ㉑).
4. When mounting the regulator transistor, apply silicone compound (SZZ0L15) to the rear side of regulator transistor, and the follow the steps 1 ~ 3 reversely.



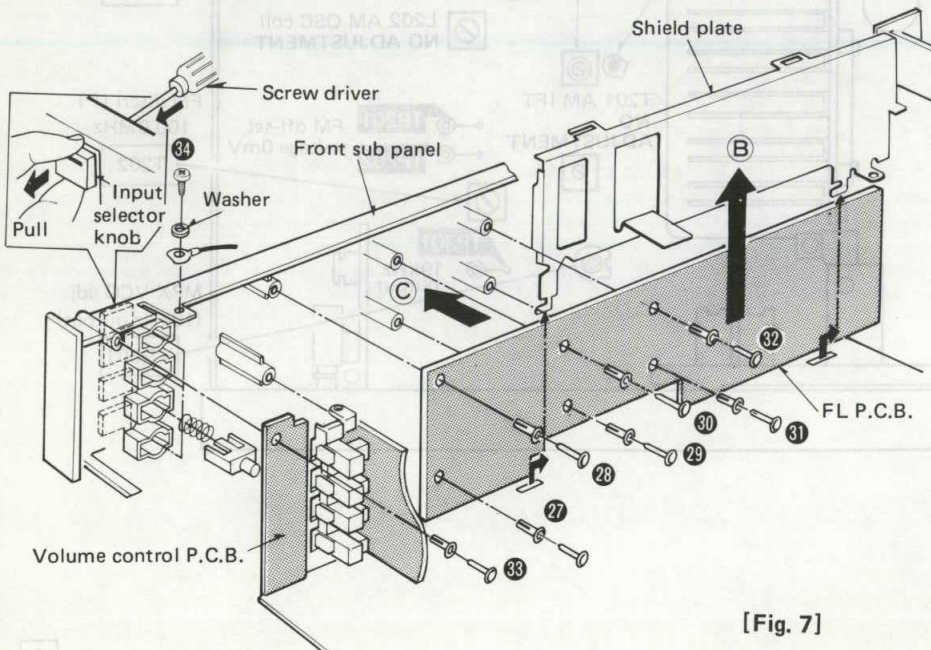
[Fig. 4]

How to remove the front panel

1. Remove the cabinet.
2. Remove the 3 setscrews (Fig. 5: ㉒ ~ ㉔) of the front panel.
3. Release the 5 claws (Fig. 5) at the under of the front panel grille and 5 claws (Fig. 6) at the top of the front panel grille, and then remove the front panel.



[Fig. 6]



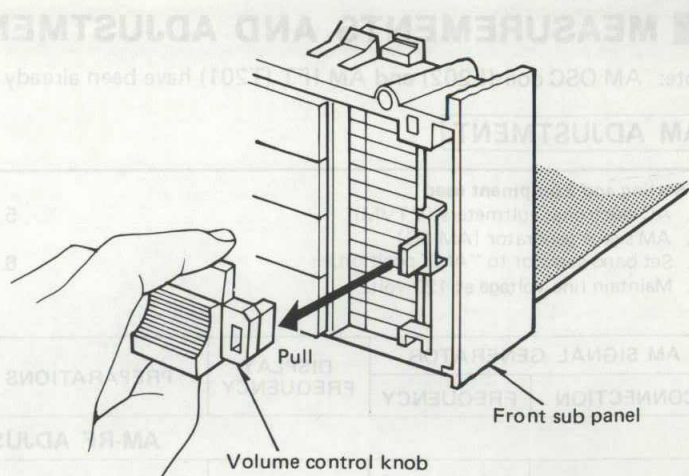
[Fig. 7]

How to remove the front sub panel

1. Remove the cabinet and front panel.
2. Remove the 2 setscrews (Fig. 6: ㉕, ㉖) and 1 lock pin (Fig. 6: ㉗).
3. Remove the shield plate in the direction of the arrow (B) (Fig. 7).
4. Remove the 6 lock pins (Fig. 7: ㉘ ~ ㉚) of the FL P.C.B.
5. Remove the 1 lock pin (Fig. 7: ㉛) of the volume control P.C.B.
6. Remove the 4 knobs (Fig. 7).
7. Remove the 1 setscrew (Fig. 7: ㉜) at the top of the front sub panel grille.
8. Remove the front sub panel in the direction of the arrow (C) (Fig. 7).

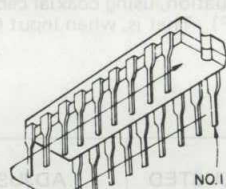
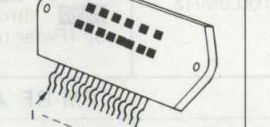
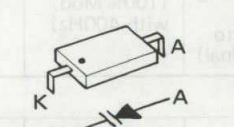
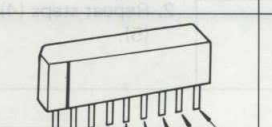
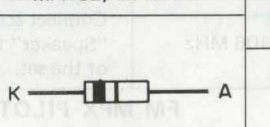
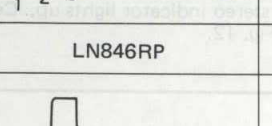
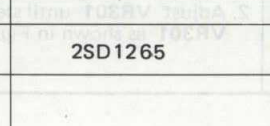
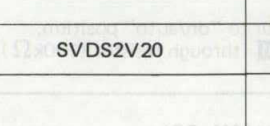
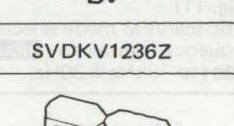
How to remove the volume control knob

1. Remove the cabinet and front panel.
2. Pull out the volume control knob (Fig. 8).



[Fig. 8]

TERMINAL GUIDE OF TRANSISTORS, DIODES AND IC'S

 NO.1		<table><tr><td>AN6873N</td><td>18pin</td></tr><tr><td>AN7273A</td><td>18pin</td></tr><tr><td>SVID1703C544</td><td>28pin</td></tr><tr><td>SVIμ PB553C-E</td><td>8pin</td></tr><tr><td>SVINJ4559DDM</td><td>8pin</td></tr><tr><td>SVINJ4558DSM</td><td>8pin</td></tr><tr><td>SVIμ PC1161C3</td><td>16pin</td></tr></table>		AN6873N	18pin	AN7273A	18pin	SVID1703C544	28pin	SVIμ PB553C-E	8pin	SVINJ4559DDM	8pin	SVINJ4558DSM	8pin	SVIμ PC1161C3	16pin	<table><tr><td>2SK241</td><td> D S G</td></tr></table>		2SK241	 D S G
AN6873N	18pin																				
AN7273A	18pin																				
SVID1703C544	28pin																				
SVIμ PB553C-E	8pin																				
SVINJ4559DDM	8pin																				
SVINJ4558DSM	8pin																				
SVIμ PC1161C3	16pin																				
2SK241	 D S G																				
<table><tr><td>SVDIS2473</td><td>MA27W-A</td></tr></table>		SVDIS2473	MA27W-A	<table><tr><td>SVDISR35200A, MA1062M, MA1160M MA1220L, MA1068M</td></tr></table>		SVDISR35200A, MA1062M, MA1160M MA1220L, MA1068M	<table><tr><td>STK4152-2M</td></tr></table> 		STK4152-2M	<table><tr><td>MA320G1NMS</td></tr></table> 		MA320G1NMS									
SVDIS2473	MA27W-A																				
SVDISR35200A, MA1062M, MA1160M MA1220L, MA1068M																					
STK4152-2M																					
MA320G1NMS																					
<table><tr><td>AN278</td></tr></table> 		AN278	<table><tr><td>2SB641</td></tr></table> 		2SB641	<table><tr><td>MA162, MA150</td></tr></table> 		MA162, MA150	<table><tr><td>2SA1015, 2SA992 2SC1674, 2SC945 2SC1815, 2SC1675</td></tr></table> 		2SA1015, 2SA992 2SC1674, 2SC945 2SC1815, 2SC1675										
AN278																					
2SB641																					
MA162, MA150																					
2SA1015, 2SA992 2SC1674, 2SC945 2SC1815, 2SC1675																					
<table><tr><td>LN846RP</td></tr></table> 		LN846RP	<table><tr><td>2SD1265</td></tr></table> 		2SD1265	<table><tr><td>SVDS2V20</td></tr></table> 		SVDS2V20	<table><tr><td>SVDKV1236Z</td></tr></table> 		SVDKV1236Z										
LN846RP																					
2SD1265																					
SVDS2V20																					
SVDKV1236Z																					

MEASUREMENTS AND ADJUSTMENTS

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

AM ADJUSTMENT

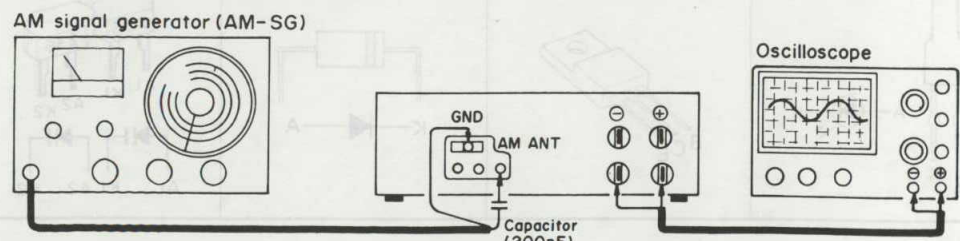
- * Setting and Equipment used**
1. AC electronic voltmeters (VTVM)
 2. AM signal generator (AM-SG)
 3. Set band selector to "AM" position.
 4. Maintain line voltage at 120 volts.
 5. Output of signal generator should be no higher than necessary to obtain an output reading.
 6. Use a non-metal screwdriver for the adjustment.

AM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
CONNECTION	FREQUENCY				
AM-RF ADJUSTMENT					
Connect AM-SG to AM antenna terminal through 200pF capacitor referring to Fig. 9.. (Weak input)	610kHz (30% Mod. with 400Hz)	610kHz	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 screw-driver.
	1500kHz (30% Mod. with 400Hz)	1500kHz	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.

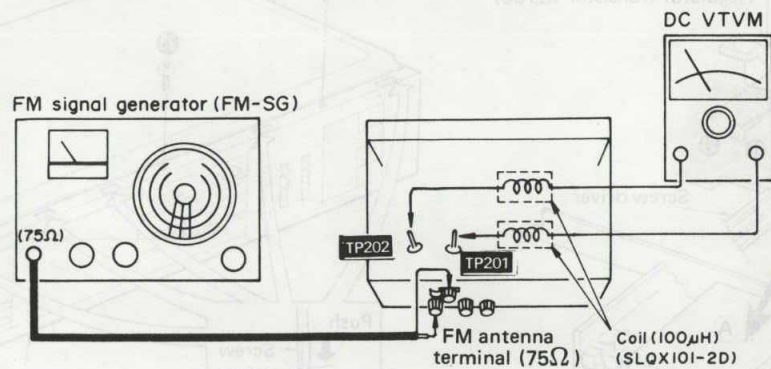
FM ADJUSTMENT

- * Setting and Equipment used**
1. FM signal generator (FM-SG)
 2. Oscilloscope.
 3. DC electronic voltmeters (VTVM).
 4. Frequency counter (19kHz and 108MHz measurable).
 5. Set band selector to "FM" position.
 6. Set automatic-scan/FM mode selectot to "off/mono" position.
 7. 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.)

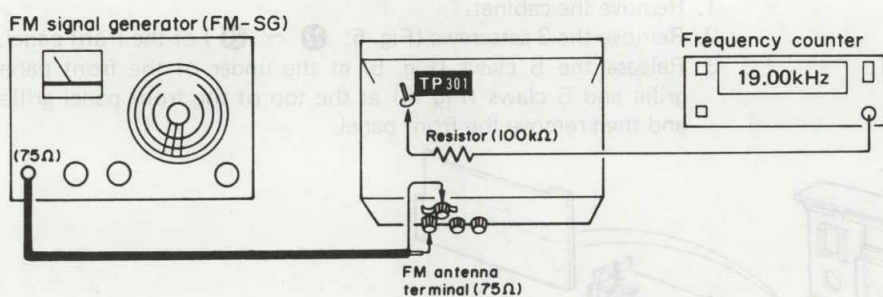
FM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
CONNECTION	FREQUENCY				
FM-IF ADJUSTMENT					
Connect FM-SG to FM antenna terminal referring to Fig. 10. (Apply 60dB to antenna terminal)	100.0MHz (100% Mod. with 400Hz)	100.0MHz	Connect DC VTVM to between TP201 and TP202 through choke coil (Refer to Fig. 10)	T202 (Discr. IFT)	1. Adjust T202 core so that voltage measured in signal mode is 0mV in 300mV range.
FM-RF ADJUSTMENT					
Connect FM-SG to FM antenna terminal. (Weak input)	90 MHz (100% Mod. with 400 Hz)	90 MHz	Connect scope to "Speaker" terminals of the set.	L105 (OSC Coil)	1. Adjust for maximum output 2. Repeat steps (4) and (5).
	106 MHz (100% Mod. with 400 Hz)	106 MHz	Connect scope to "Speaker" terminals of the set.	CT101 (OSC Trimmer)	
FM MPX PILOT (VCO) ADJUSTMENT					
USING A FREQUENCY COUNTER			USING ALTERNATE SYSTEM		
1. 100.0 MHz 60 dB Non-modulated mono signal applied to set. (Refer to Fig. 11) 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. 12.		



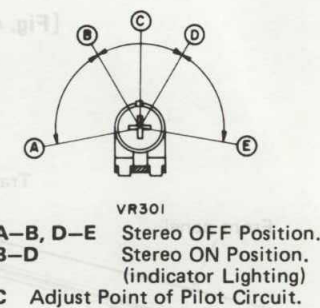
[Fig. 9]
AM-RF adjustment



[Fig. 10]
FM-IF adjustment

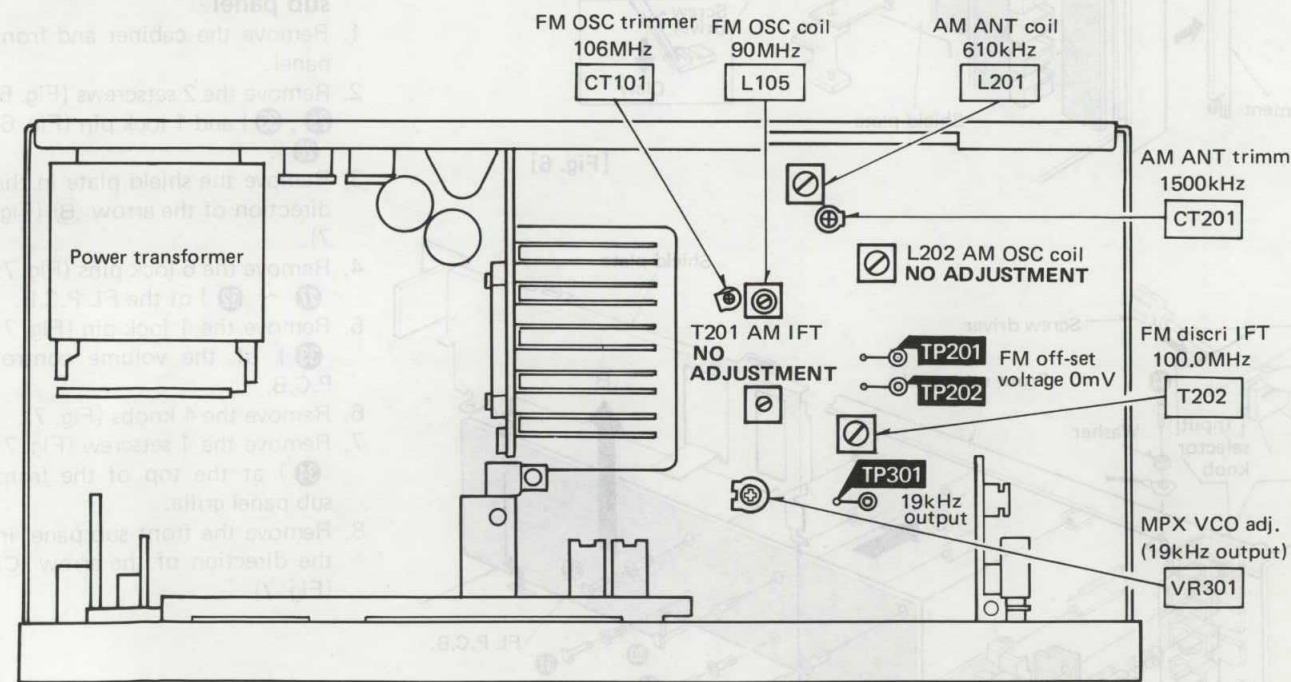


[Fig. 11]
FM MPX PILOT (VCO) adjustment

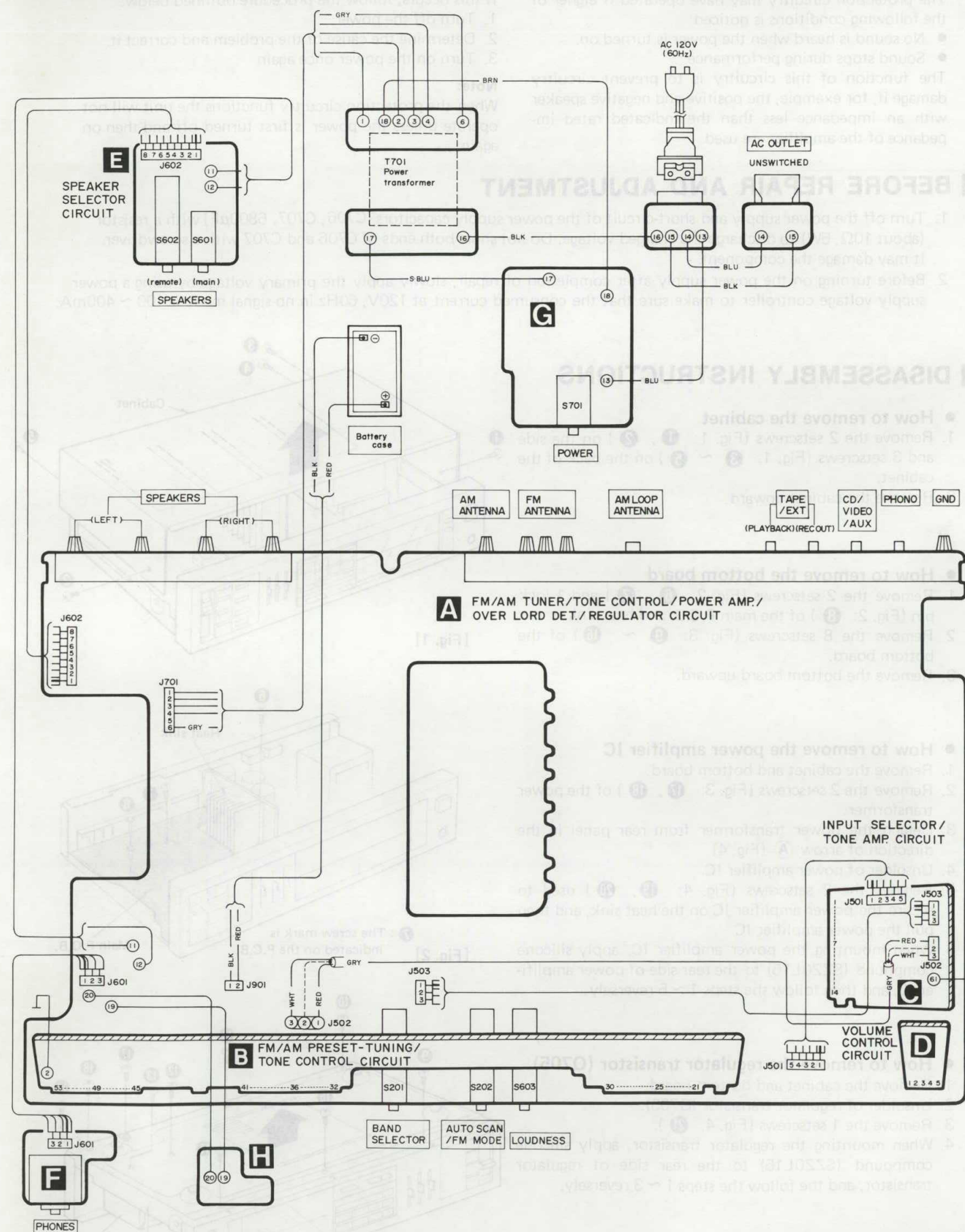


[Fig. 12]

Adjustment points

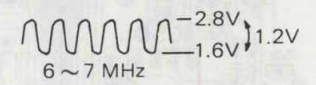
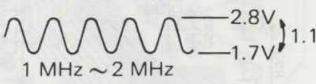


WIRING CONNECTION DIAGRAM (Top View)

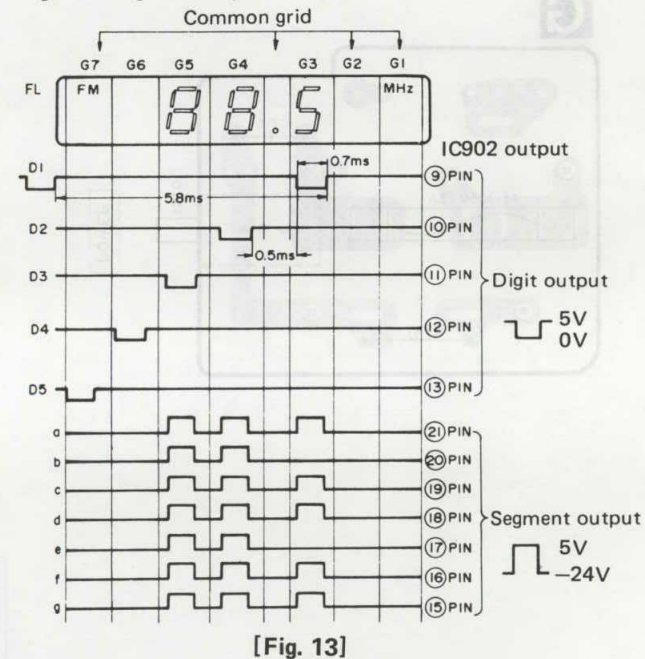


FUNCTION OF TERMINAL (PLL CONTROLLER IC902)

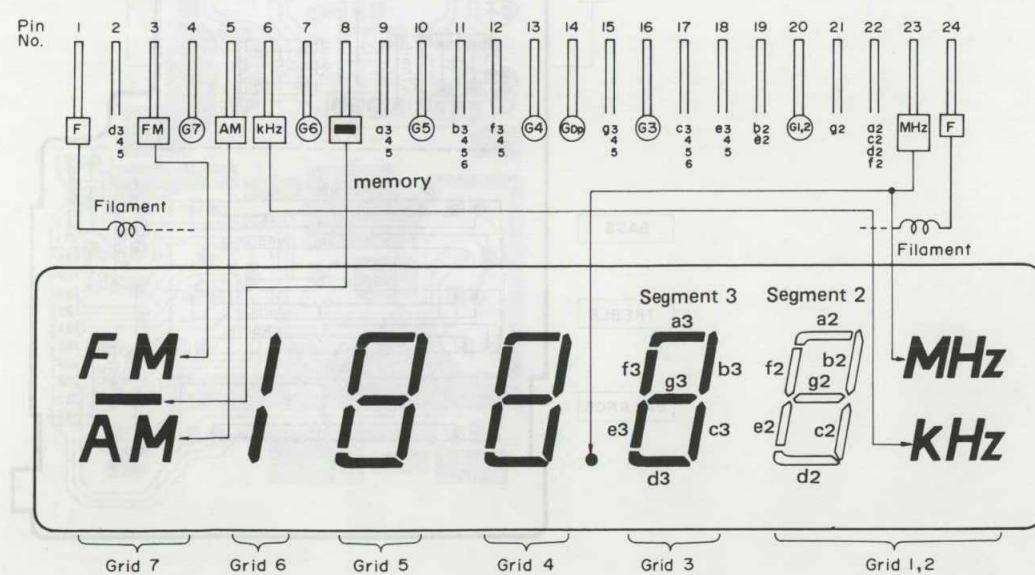
Terminal No.	Terminal	Description of terminal
1	E01 (Error out)	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
2	E02 (Error 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.
6	X2 (Crystal)	The crystal connected is at 4.5 MHz.
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)	Digit signal output terminal for display. (Refer to Fig. 19)
13	D5	
14	VDD	Power supply terminal of the device.
15	a (Segment Outputs)	Segment signal output terminal for display. (Refer to Fig. 13)
21	g	
22	K3 (Key Return Signal Inputs)	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.
25	K0	

Terminal No.	Terminal	Description of terminal
26	FM (Pulse swallow oscillation input)	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler. 
27	E (Ground)	Ground terminal
28	AM (Direct oscillation input)	Input terminal for AM OSC output. 

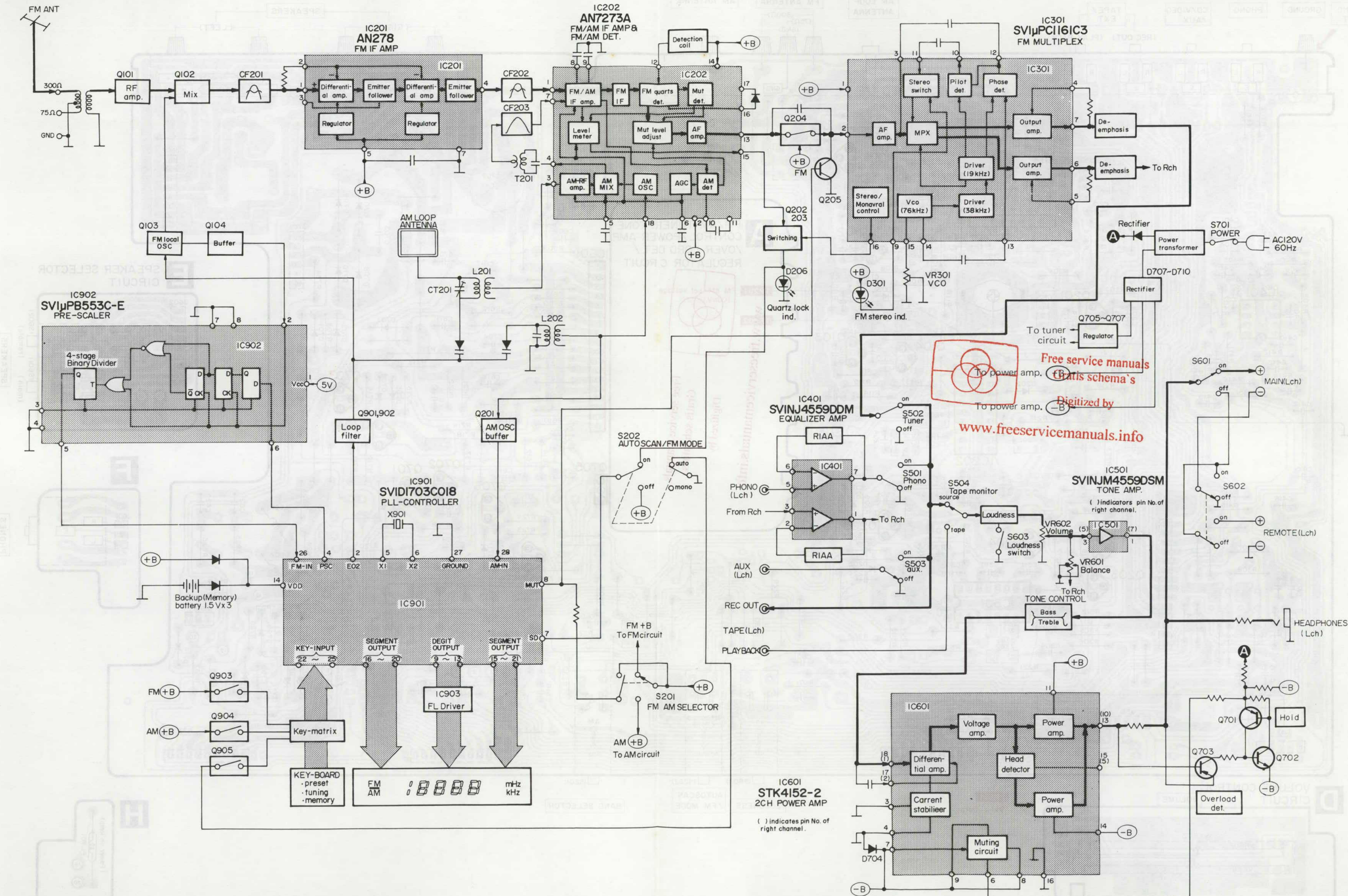
Digits and segment output voltage of IC902 (PLL controller)



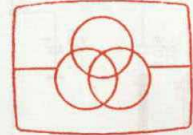
Fluorescent display tube (FL)



BLOCK DIAGRAM

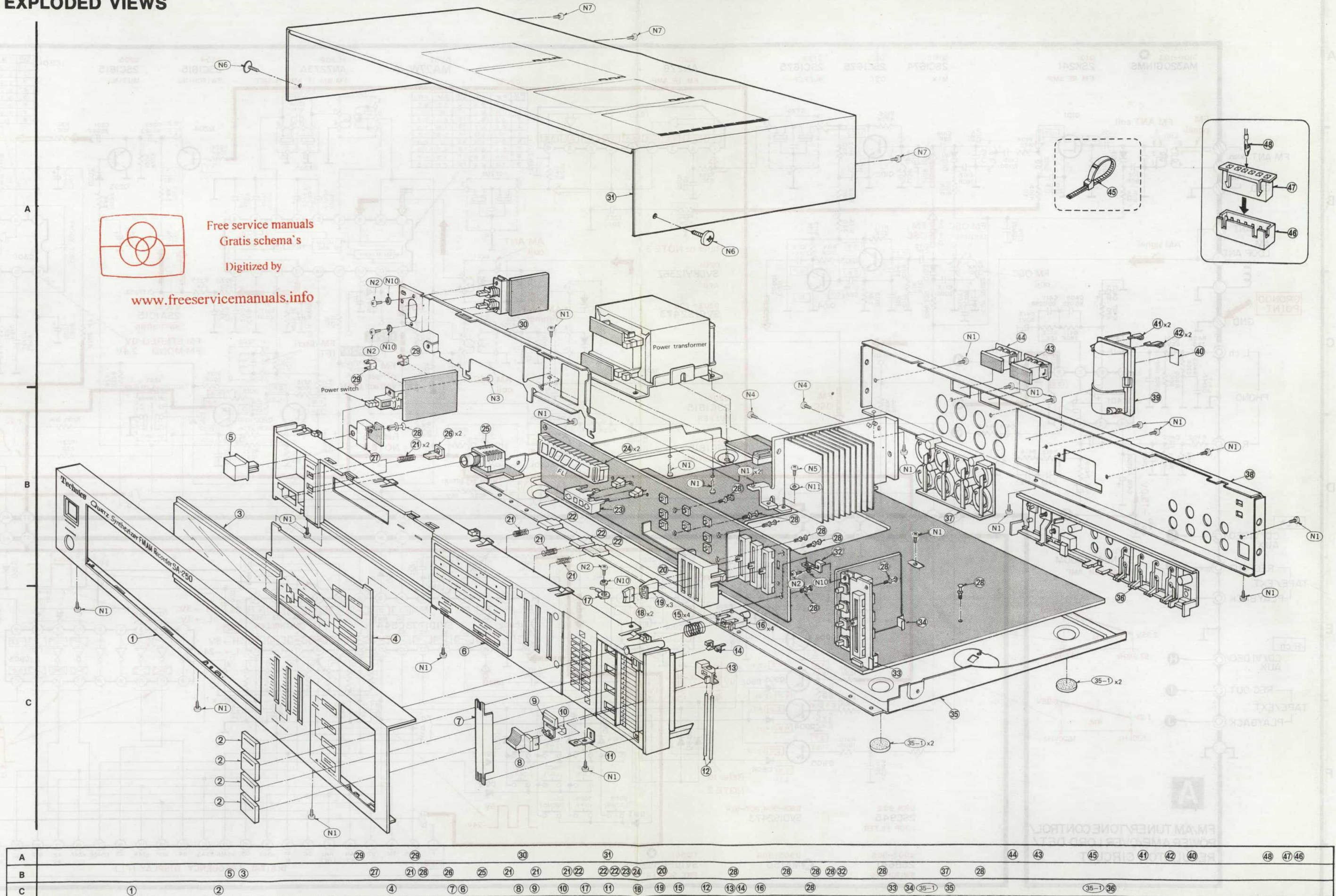
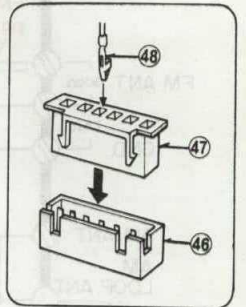


EXPLODED VIEWS



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RESISTORS & CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

3. The "S" mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω (ohm),
K = 1000 Ω , M = 1000K Ω .
5. The unit of capacitance is μ F (microfarad).
P = 10⁻⁶ μ F
6. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Resistor Type	Wattage	Tolerance
ERD : Carbon	25 : 1/4W	J : $\pm$ 5%
ERG : Metal Oxide	1 : 1W	K : $\pm$ 10%
ERX : Metal Film	2 : 2W	
ERC : Solid	S1 : 1/2W	
	12 : 1/2W	

Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA : Electrolytic	0J : 6.3V	1H : 50V	C : $\pm$ 0.25pF
ECCD : Ceramic	1A : 10V	KC : 400V AC	J : $\pm$ 5%
ECKD : Ceramic	1C : 16V		K : $\pm$ 10%
ECQM : Polyester	1E : 25V		Z : +80%, -20%
ECET : Electrolytic	1H : 50V		P : +100%, -0%
ECEA . . N : Non Polar Electrolytic	25 : 25V		
ECQP : Polypropylene	45 : 45V		
ECBT : Electrolytic	1J : 63V		

RESISTORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
R101	(S) ERD25TJ333	33K	R219	(S) ERD25TJ274	270K	R503, 504	(S) ERD25TJ474	470K	R711, 712	(S) ERD25TJ123	12K
R102	(S) ERD25TJ104	100K	R220	(S) ERD25FJ681	680	R505, 506	(S) ERD25FJ102	1K	R713, 714	(S) ERD25FJ222	2.2K
R103	(S) ERD25FJ151	150	R221	(S) ERD25FJ103	10K	R507, 508	(S) ERD25FJ332	3.3K	R715, 716	(S) ERD25TJ153	15K
R104	(S) ERD25FJ471	470	R222	(S) ERD25FJ151	150	R509, 510	(S) ERD25TJ223	22K	R717, 718	(S) ERX2ANJR22	0.22
R105	(S) ERD25TJ333	33K	R223	(S) ERD25FJ103	10K	R511, 512	(S) ERD25FJ392	3.9K	R720	(S) ERDS1FJ270	27
R106	(S) ERD25TJ474	470K	R224	(S) ERD25TJ104	100K	R513, 514	(S) ERD25TJ223	22K	R721	(S) ERDS1FJ152	1.5K
R107	(S) ERD25FJ391	390	R225	(S) ERD25FJ562	5.6K	R601, 602	(S) ERD25FJ393	39K	R722	(S) ERD25FJ821	820
R108, 109	(S) ERD25FJ221	220	R226	(S) ERD25TJ104	100K	R603, 604	(S) ERD25TJ183	18K	R723	(S) ERD25FJ681	680
R110	(S) ERD25FJ103	10K	R227	(S) ERD25FJ392	3.9K	R605, 606	(S) ERD25FJ272	2.2K	R724	(S) ERD25FJ272	2.7K
R111	(S) ERD25TJ223	22K	R228	(S) ERD25TJ473	47K	R607, 608	(S) ERD25FJ102	1K	R725	(S) ERD25FJ392	3.9K
R112	(S) ERD25FJ222	2.2K	R229, 230	(S) ERD25FJ103	10K	R609, 610	(S) ERD25TJ393	39K	R726, 727	(S) ERDS1FJ152	1.5K
R113	(S) ERD25FJ331	330	R231	(S) ERD25FJ271	270	R611, 612	(S) ERD25FJ182	1.8K	R728	(S) ERD25FJ221	220
R114	(S) ERD25TJ104	100K	R232	(S) ERD25FJ561	560	R613, 614	(S) ERD25TJ393	39K	R729	(S) ERDS1FJ122	1.2K
R115	(S) ERD25FJ332	3.3K	R233	(S) ERD25FJ471	470	R615, 616	(S) ERD25FJ222	2.2K	R730	(S) ERD25FJ221	220
R116	(S) ERD25FJ562	5.6K	R299	(S) ERD25FJ680	68	R617, 618	(S) ERD25FJ272	2.7K	R731	(S) ERC122GK335	3.3M
R201	(S) ERD25FJ331	330	R301	(S) ERD25FJ103	10K	R621	(S) ERD25FJ820	82	R732	(S) ERDS1FJ271	270
R202	(S) ERD25FJ122	1.2K	R302	(S) ERD25FJ470	47	R622	(S) ERD25FJ470	47	R733	(S) ERDS1FJ330	33
R203	(S) ERD25FJ102	1K	R303, 304	(S) ERD25TJ223	22K	R623, 624	(S) ERDS1FJ100	10	R734	(S) ERDS1FJ2R2	2.2
R204	(S) ERD25FJ562	5.6K	R305, 306	(S) ERD25FJ392	3.9K	R625, 626	(S) ERDS1FJ181	180	R901	(S) ERD25FJ181	180
R205	(S) ERD25TJ684	680K	R307, 308	(S) ERD25TJ104	100K	(M)only			R902	(S) ERD25TJ223	22K
R206	(S) ERD25TJ104	100K	R309	(S) ERD25TJ274	270K	R627, 628	(S) ERDS1FJ100	10	R903	(S) ERD25FJ561	560
R207	(S) ERD25FJ681	680	R310	(S) ERD25TJ153	15K	(MC)only			R904	(S) ERC14GK335	3.3M
R208	(S) ERD25FJ102	1K	R311	(S) ERD25FJ681	680	R629, 630	(S) ERG1ANJ331	330	R905	(S) ERD25FJ102	1K
R209	(S) ERD25FJ222	2.2K	R312	(S) ERD25TJ123	12K	R701	(S) ERD25FJ470	47	R906	(S) ERD25TJ124	120K
R210	(S) ERD25TJ824	820K	R401, 402	(S) ERD25FJ391	390	R702	(S) ERG1ANJ152	1.5K	R907	(S) ERD25TJ683	68K
R211	(S) ERD25FJ103	10K	R403, 404	(S) ERD25TJ124	220K	R703	(S) ERD25TJ104	100K	R908	(S) ERD25TJ104	100K
R212	(S) ERD25FJ102	1K	R405, 406	(S) ERD25TJ563	56K	R704	(S) ERD25TJ154	150K	R909	(S) ERD25TJ683	68K
R213	(S) ERD25FJ152	1.5K	R407, 408	(S) ERD25FJ271	270	R705	(S) ERD25TJ184	180K	R910, 911	(S) ERD25TJ104	100K
R214	(S) ERD25FJ331	330	R411, 412	(S) ERD25TJ184	180K	R706	(S) ERD25TJ473	47K	R912	(S) ERD25TJ683	68K
R215	(S) ERD25TJ104	100K	R413, 414	(S) ERD25TJ123	12K	R707	(S) ERD25TJ123	12K	R913	(S) ERD25FJ681	680
R216	(S) ERD25TJ333	33K	R415, 416	(S) ERD25TJ563	56K	R708	(S) ERD25FJ562	5.6K			
R217	(S) ERD25TJ104	100K	R417, 418	(S) ERD25FJ102	1K	R709	(S) ERD25FJ470	47			
R218	(S) ERD25TJ473	47K	R501, 502	(S) ERD25TJ474	470K	R710	(S) ERD25TJ223	22K			

CAPACITORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
C101	(S) ECCD1H040CC	4P	C112	(S) ECKD1H223ZF	0.022	C199	(S) ECKD1H103ZF	0.01	C212	(S) ECQP1471JZ	470P
C102	(S) ECCD1H181K	180P	C113	(S) ECKD1H102ZF	0.001	C201, 202	(S) ECKD1H103ZF	0.01	C213	(S) ECEA1CU100	10
C103	(S) ECCD1H100KC	10P	C114	(S) ECCD1H010CC	1P	C203	(S) ECCD1H080CC	8P	C214	(S) ECCD1H180K	18P
C104, 105	(S) ECKD1H102ZF	0.001	C115	(S) ECCD1H070CC	7P	C204	(S) ECKD1H470K	47P	C215	(S) ECEA1HU010	1
C106	(S) ECCD1H050CC	5P	C116	(S) ECCD1H390KC	39P	C205	(S) ECEA0JU101	100	C216	(S) ECEA1CU100	10
C107	(S) ECCD1H181K	180P	C117	(S) ECCD1H100KC	10P	C206	(S) ECEA1EU4R7	4.7	C217, 218	(S) ECKD1H103ZF	0.01
C108	(S) ECCD1H020CC	2P	C118	(S) ECCD1H020CC	2P	C207, 208	(S) ECKD1H103ZF	0.01	C219	(S) ECKD1H331KB	330P
C109	(S) ECCD1H180KC	18P	C119	(S) ECKD1H103ZF	0.01	C209	(S) ECKD1H103ZF	0.01	C220	(S) ECEA1HUR47	0.47
C110	(S) ECCD1H181K	180P	C120	(S) ECKD1H102ZF	0.001	C210	(S) ECQM1H473KV	0.047	C221	(S) ECKD1H103ZF	0.01
C111	(S) ECKD1H103ZF	0.01	C121	(S) ECKD1H223ZF	0.022	C211	(S) ECCD1H100KC	10P	C222	(S) ECQM1H183KV	0.018

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
C223	ECEA1HU2R2	2.2	C413, 414	ECEA1HU010	1	C611, 612	ECEA1JU100	10	C710	ECEA1CU100	10
C224	ECEA1EU3R3	3.3	C415	ECEA1CU221	220	C613, 614	ECEA1CU220	22	C711, 712	(S) ECKD1H103ZF	0.01
C225	ECEA1HU010	1	C416	ECEA1CU101	100	C615, 616	(S) ECCD1H050CC	5P	C713, 714	(S) ECKD1H103ZF	0.01
C226	(S) ECKD1H103ZF	0.01	C417	(S) ECKD1H473ZF	0.047	C617	(S) ECEA1HU470	47	C715	(S) ECKDKC103PF	0.01
C301	ECEA1EU4R7	4.7	C499	(S) ECKD1H103ZF	0.01	C618	(S) ECKD1H103ZF	0.01	C799	ECEA1CU100	10
C302	ECEA1CU101	100	C501, 502	ECEA1HU3R3	3.3	C619	ECEA1HU330	33	C901	ECEA1EU101	100
C303, 304	ECEA1EU4R7	4.7	C503, 504	(S) ECCD1H101K	100P	C621, 622	(S) ECKD1H473ZF	0.047	C902	(S) ECEA25M4R7R	4.7
C305, 306	ECQM1H183KV	0.018	C505, 506	(S) ECCD1H101K	100P	(M)only			C903, 904	ECBT1C103ZY	0.01
C307	ECKD1H473KV	0.047	C507, 508	(S) ECCD1H390K	39P	C621, 622	ECQM1H104KV	0.1	C905	ECBT1C103ZY	0.01
C308	ECEA1HU010	1	C509, 510	ECEA1HU010	1	(MC)only			C906	(S) ECCD1H180KC	18P
C309	ECQP1471JZ	470P	C511, 512	ECQM1H333KV	0.033	C623, 624	ECQM1H104KV	0.1	C907	(S) ECCD1H150KC	15P
C310	ECEA1HUR47	0.47	C513, 514	ECQM1H104KV	0.1	(MC)only			C908, 909	ECBT1H331KBY	330P
C311	ECEA1HU010	1	C515, 516	ECQM1H332KV	0.0033	C627	(S) ECKD1H103ZF	0.01	C910, 911	ECBT1H331KBY	330P
C312	(S) ECKD1H103ZF	0.01	C517, 518	ECQM1H183KV	0.018	C701, 702	ECEA1HU330	33	C912	ECBT1H103ZY	0.01
C401, 402	ECEA1HU3R3	3.3	C519	(S) ECKD1H103ZF	0.01	C703	ECEA1CU100	10	C913	ECEA0JU102	1000
C403, 404	(S) ECCD1H101K	100P	C601, 602	ECQM1H563KV	0.056	C704	(S) ECEA1HN3R3S	3.3	C914	ECEA1EU100	10
C405, 406	(S) ECKD1H471KB	470P	C603, 604	(S) ECKD1H331KB	330P	C705	(S) EDQE1104KN	0.1	C915	ECEA0JU102	1000
C407, 408	ECEA0JU330	33	C605, 606	(S) ECCD1H101K	100P	C706, 707	(S) ECETS45V682U	6800	C916	ECEA1EU101	100
C409, 410	ECQM1H223KV	0.022	C607, 608	ECEA1CU100	10	C708	ECEA1EU101	100	C917	ECEA1CU100	10
C411, 412	ECQM1H682KV	0.0068	C609, 610	(S) ECKD1H221KB	220P	C709	(S) ECKD1H103ZF	0.01			

REPLACEMENT PARTS LIST

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2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The "S" mark is service standard parts and may differ from production parts.
4. Bracketed indications in Ref. No. columns specify the area.
5. The parenthesized number in the column of description stand for the quantity per set.

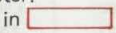
Ref. No.			Part No.			Part Name & Description		
INTEGRATED CIRCUITS								
IC201			AN278			FM IF Amp.		
IC202			AN7273A			FM IF Det. & AM Converter		
IC301			SVIUPC1161C3			AM AF Amp. FM MPX		
IC401			SVINJ4559DDM			Equalizer		
IC501			SVINJ4558DSM			Tone Amplifier		
IC601			STK4152-2M			Power Amplifier		
IC901			SVIUPB553AC			Pre-Scaler		
IC902			SVID1703C544			PLL Controller (Micro-Computer)		
IC903			AN6873N			FL Drive		
TRANSISTORS								
Q101			2SK241-GR			FM RF Amp.		
Q102			2SC1674-M			FM Mixer		
Q103, 104			2SC1675-L			FM Oscillator, Buffer		
Q201, 202, 204, 205, 702, 706, 707			2SC1815-Y			Buffer, Switching, Muting, Regulator		
Q203, 701			2SA1015-Y			Switching		
Q703, 704			2SA992			Regulator		
Q705			2SD1265-O			L. P. F.		
Q901, 902			2SC945-Q			Switching		
Q903, 904, 905			2SB641R					
DIODES								
D101, 102, 103			MA320G1-N			FM Variable Capacitor		
D201			SVDKV1236Z			AM Variable Capacitor		
D202			MA27W-A			Switching		
D203, 204, 205, 702, 703, 704			SVD1S2473					
D206, 301			LN846RP			L. E. D.		
D701			SVD1SR35200A			Rectifier		
D705, 706, 799			MA162A			Switching		
DIODES								
D707~710			SVDS2V20			Rectifier		
D711			MA1062M			Zener, 6.2V		
D712, 715			RD16EB			Zener, 16V		
D713			MA1220L			Zener, 22V		
D714			MA1068M			Zener, 6.8V		
D901~904, 907~917			SVD1S2473			Switching		
D905, 906			MA162A			Switching		
COILS								
L101			SLA4N41			FM Antenna		
L102, 104			ELEPK1R2MA			Choke		
L103			SLD4P87			FM Detector		
L105			SL04N27-P			FM OSC		
L201			SLA2B1-P			AM Antenna		
L202			SL02B7-P			AM OSC		
L601, 602			SLQY07G-30			Choke		
TRANSFORMERS								
T201			SLI2B101-M			AM IFT		
T202			SLI4B519-P			FM IFT		
T701(M)only			SLT5M369-W			Power Source		
T701(MC)only			SLT5M371-W			Power Source		
CERAMIC FILTERS								
CF201, 202			SVFE107MS8A			FM 10.7MHz (Red)		
			SVFE107MS8B			FM 10.68MHz (Blue)		
			SVFE107MS8C			FM 10.72MHz (Orange)		
(Use pair rancks as same as CF201 and CF202)								
CF203			SVFSFZ450F7L			AM 450KHz		
VARIABLE RESISTORS								
VR301			EVNE4AA00B53			FM MPX VCO Adjustment, 5kΩ (B)		
VR501, 502			EWANA6X05C15			Tone, 100kΩ(C)		
VR601			EWANF5X05G15			Balance, 100kΩ(G)		
VR602			EWAPBAX05B15			Volume, 100kΩ(B)		
VARIABLE CAPACITORS								
CT101			ECRHA007A11			FM OSC		
CT201			ECRHA010A11			AM Antenna		
COMPONENT COMBINATIONS								
Z301, 302			EXRP181K473C			180pF, 47kΩ		
Z901			EXBP87104M			100kΩ(×7)		
CRYSTAL								
X901			SVQ43U452-D			4.5MHz		
FLUORESCENT DISPLAY TUBE								
FL			SAD7BT05A					
LAMP								
PL701			XAMS6Q17			12V, 110mA		
FUSE								
F1			XBA1F30NU14			125V, 3A		
SWITCHES								
S201			SSH1160			FM/AM Band Selector		
S202			SSH179			FM Mode		
S501~504			SSH478			Input Selector		
S601, 602			SSH2087			Speakers Selector		
S603			SSH1005			Loudness		
S701			SSH1071			Power Source		
S901~910			SSG13			Preset Tuning, Tuning, Memory		

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 parts, please use the part No. in the replacement parts list.

NOTE 1

- S201** : Band selector switch in "FM" position.
( FM,  AM)
- S202** : Auto scan/FM mode selector switch in "on/auto" position.
( on/auto,  off (manual)/mono)
- S501 ~ S503** : Input selectors switch in "tuner" position.
(**S501**: phono, **S502**: tuner, **S503**: CD/video/aux)
- S504** : Tape monitor selector switch in "source" position.
( source,  tape/ext)
- S601** : Speaker selector (main) switch in "on" position.
( off,  on)
- S602** : Speaker selector (remote) switch in "off" position.
( off,  on)
- S603** : Loudness switch in "off" position.
( off,  on)
- S701** : Power switch in "on" position.
( off,  on)
- S901 ~ S907** : Preset-tuning switch.
S901: FM/AM-1CH, **S902**: FM/AM-2CH, **S903**: FM/AM-3CH, **S904**: FM/AM-4CH,
S905: FM/AM-5CH, **S906**: FM/AM-6CH, **S907**: FM/AM-7CH
- S908, 909** : Tuning switch.
(**S908** — down, **S909** — up)
- S910** : Memory switch.
(manual ↔ auto)
- 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 (monaural) reception 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 (+B) voltage lines
 AF signal lines
 FM signal
 AM signal
 Negative (-B) voltage lines
 FM OSC
 AM OSC

IMPORTANT SAFETY NOTICE

The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards.

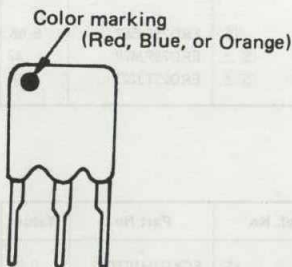
When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

NOTE 2

• Use of ceramic filters in pairs

The ceramic filters (CF201, CF202) for FM-IF circuit are available in two 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 (D905, D906) for use as different diodes must be used depending on each rank of the ceramic filters.



RANK (Color)	D905	D906	CENTER FREQUENCY
Red	X	X	10.70 MHz
Orange	X	○	10.73 MHz
Blue	○	○	10.67 MHz

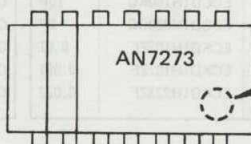
Notes: ○ Mark Diode is used.

X Mark Diode is not used.

NOTE 3

AN7273 (IC202) 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 Ref.No.	A	B
R202	1.2kΩ	820Ω
R220	680Ω	560Ω



"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.