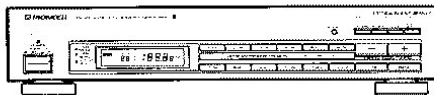


Service Manual



**ORDER NO.
ARP 1582**

FM/AM DIGITAL SYNTHESIZER TUNER

F-443L

F-443

F-443-S

F-X440L

F-443L, F-443, F-443-S, F-X440L AND F-X440 HAVE SIX VERSIONS:

Type	Applicable model					Power requirement	Export destination
	F-443L	F-443	F-443-S	F-X440L	F-X440		
HE	○	—	—	○	—	AC220V, 240V (switchable)*	European continent
HB	○	—	—	○	—	AC220V, 240V (switchable)*	United Kingdom
HEZ	—	○	○	—	○	AC220V, 240V (switchable)*	West Germany
SD	—	○	—	—	○	AC110V, 120V-127V, 220V, 240V (switchable)	Kingdom of Saudi Arabia and general market
SD/G	—	○	—	—	—	AC110V, 120V-127V, 220V, 240V (switchable)	U. S. Military
HIOX1B	—	○	—	—	○	AC220V, 240V (switchable)*	Italy

*Change the primary wiring

- This manual is applicable to the F-443L/HE, HB, F-443/HEZ, SD, SD/G, F-443-S/HEZ, F-X440L/HE and HB types.
- For the other types, refer to additional service manual.
- The F-443L and F-X440L cover the MW/LW bands while the F-443, F-443-S and F-X440 covers the MW only.
- Ce manuel pour le service comprend les explications en français de réglage. (p.21 - p.23).
- Este manual de servicio trata del método ajuste escrito en español. (p.24 - p.26).

CONTENTS

1. EXPLODED VIEW AND PARTS LIST	2	7. IC INFORMATION	27
2. PACKING.....	5	8. CIRCUIT DESCRIPTION	29
3. SCHEMATIC DIAGRAM	6	9. FOR F-443L/HB, F-443/SD, SD/G, F-X440L/HE AND HB MODELS	32
4. P.C. BOARDS CONNECTION DIAGRAM	9	10. FOR F-443/HEZ AND F-443-S/HEZ TYPES	35
5. ELECTRICAL PARTS LIST.....	16	11. SPECIFICATIONS	38
6. ADJUSTMENTS.....	18	12. PANEL FACILITIES	39
RÉGLAGE	21		
AJUSTE	24		

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan

PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.

PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 6B8 Canada TEL: [416] 479-4411

PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775 · 28 · 08

PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

1988 Printed in Japan

1. EXPLODED VIEW AND PARTS LIST

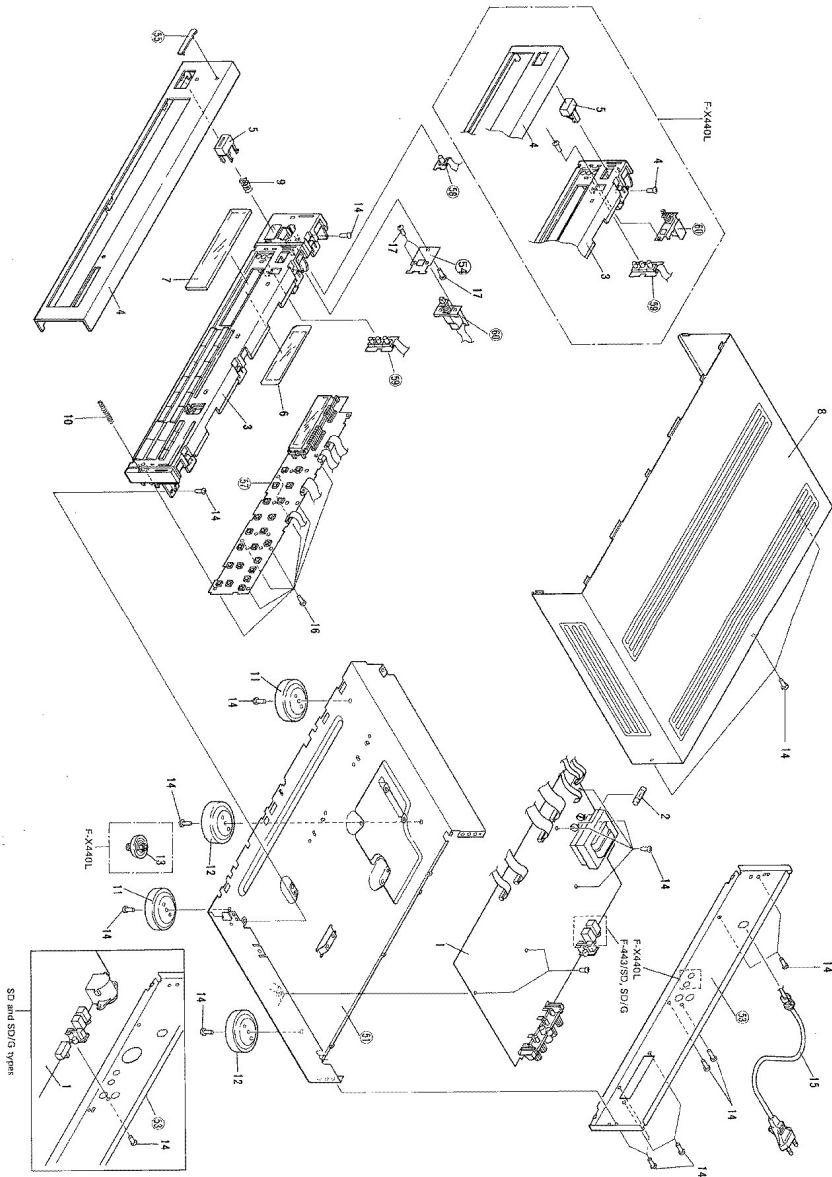
- NOTES:
- Parts without part number cannot be supplied.
 - The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
 - For your parts Stock Control, the fast moving items are indicated with the marks $\star\star$ and $\star$.
 - $\star\star$ GENERALLY MOVES FASTER THAN $\star$
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
 - Parts marked by "●" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

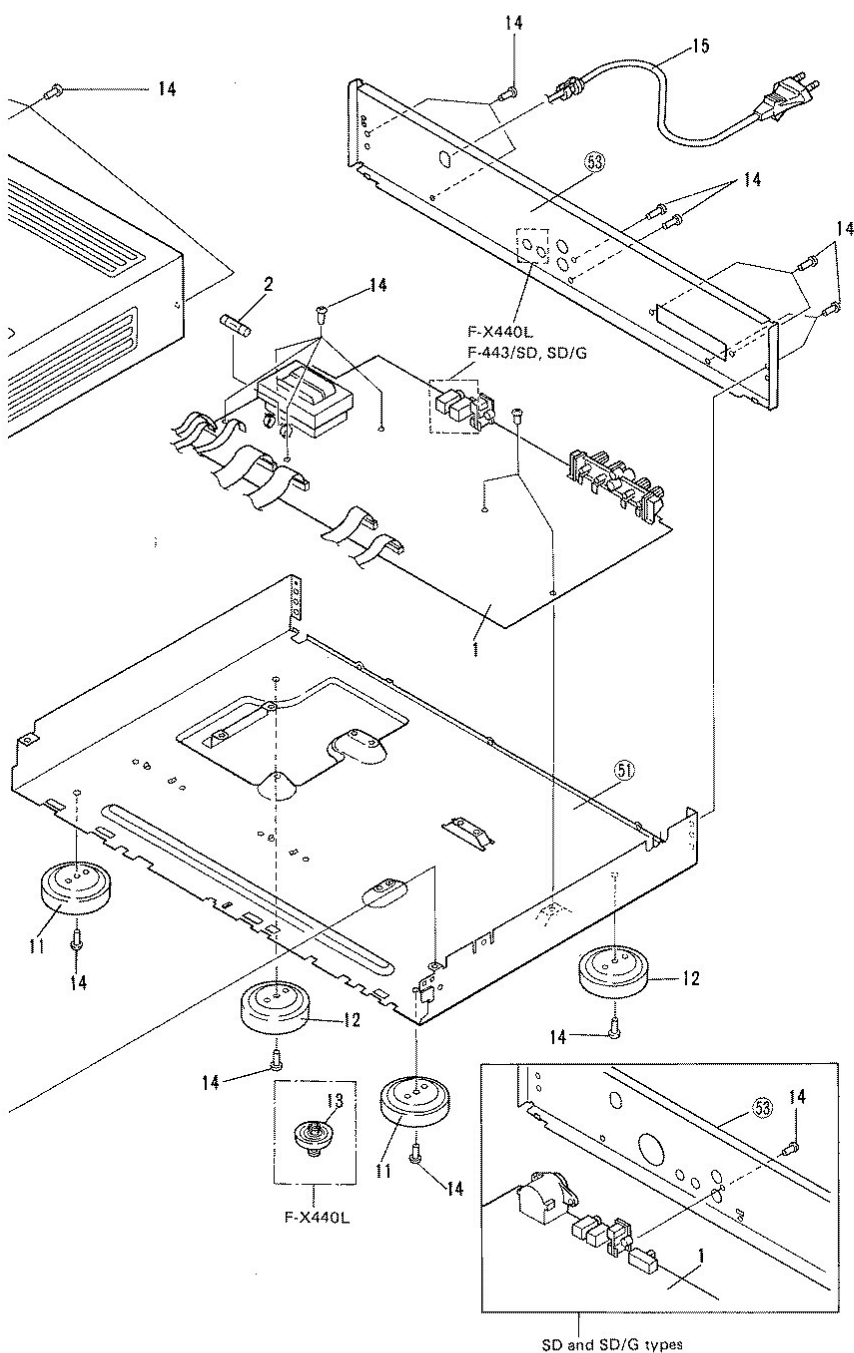
Parts List of F-443L/HE type

Mark	No.	Part No.	Description
Δ	1.	AWZ1928	Main assembly
	2.	AEK-407	Fuse (400mA/125V) (FU301)
	3.	AMD1026	Panel base assembly
	4.	ANB1202	Front panel assembly
	5.	AAD1343	Power knob
	6.	AAK1481	FL filter
	7.	AAK1516	Display panel
	8.	AZN1744	Bonnet
	9.	ABH1019	Coil spring
	10.	ABH1036	Coil spring
	11.	AMR1350	Insulator assembly
	12.	AMR1353	Insulator assembly
	13.	...	...
	14.	ABA-298	Screw
	15.	ADG1021	AC power cord
Δ	16.	BBZ26P080FMC	Screw
	17.	VMZ30P60FMC	Screw
	51.		Chassis assembly
	52.	...	...
	53.		Rear panel
	54.		Switch holder
	55.		Name plate
	56.		Label
	57.		Front panel assembly (P.C.B)
	58.		Power IND assembly
	59.		LED assembly
	60.		Power SW assembly

Parts List of F-X440L/HE type

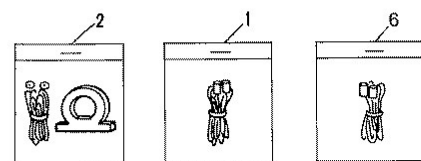
Mark	No.	Part No.	Description
Δ	1.	AWZ1824	Main assembly
	2.	AEK-407	Fuse (400mA/125V) (FU301)
	3.	AMD1025	Panel base assembly
	4.	ANB1184	Front panel
	5.	AAD1378	Power knob
	6.	AAK1481	FL filter
	7.	AAK1511	Display panel
	8.	AZN1632	Bonnet
	9.	...	...
	10.	ABH1036	Coil spring
	11.	...	...
	12.	...	...
	13.	AMR1285	Reg assembly
	14.	ABA-298	Screw
	15.	ADG1023	AC power cord
	16.	BBZ26P080FMC	Screw
	17.	VMZ30P60FMC	Screw
	51.		Chassis
	52.	...	...
	53.		Rear panel
	54.	...	...
	55.		Name plate
	56.		Label
	57.		Front panel assembly (P.C.B)
	58.	...	...
	59.		LED assembly
	60.		Power SW assembly



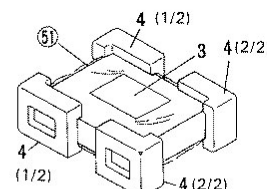


2. PACKING

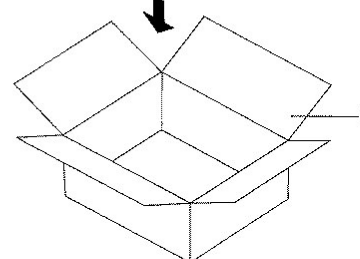
A



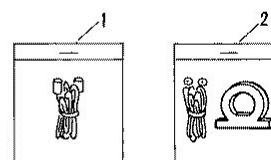
F-443/SD and SD/G types only



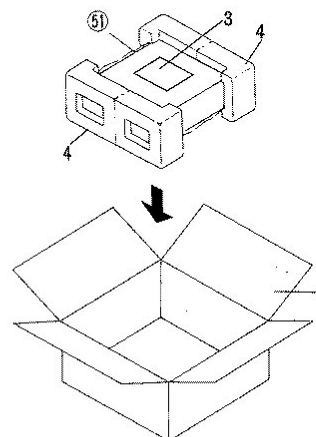
B



C



D



Parts List of F-443L/HE type

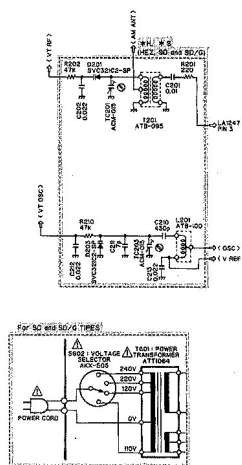
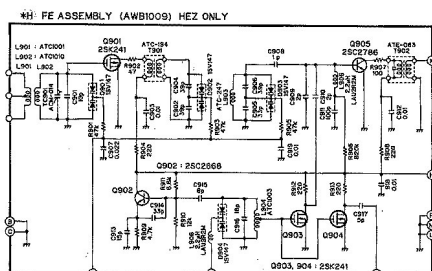
Mark	No.	Part No.	Description
	1.	ADE-044	Connection cable
	2.	AEA1002	Antenna set
	3.	ARE1079	Operating instructions (8L)
	4.	AHA1095	Front-rear pad
	5.	AHD1404	Packing case
	6.	ADE-085	Connection cable (SD, SD/G type only)
	51.		Polyethylene bag
	52.		Packing sheet

NOTE:
The F-443L uses the same front and rear packaging pads as the F-X440L.
When using the pads for the F-443L, spread the back and front pads apart at the center and attach them to the corners as shown in the figure.

Parts List of F-X440L/HE type

Mark	No.	Part No.	Description
	1.	ADE-045	Connection cable
	2.	AEA1002	Antenna set
	3.	ARE1078	Operating instructions (8L)
	4.	AHA1095	Front-rear pad
	5.	AHD1402	Packing case
	51.		Packing sheet

3. SCHEMATIC DIAGRAM

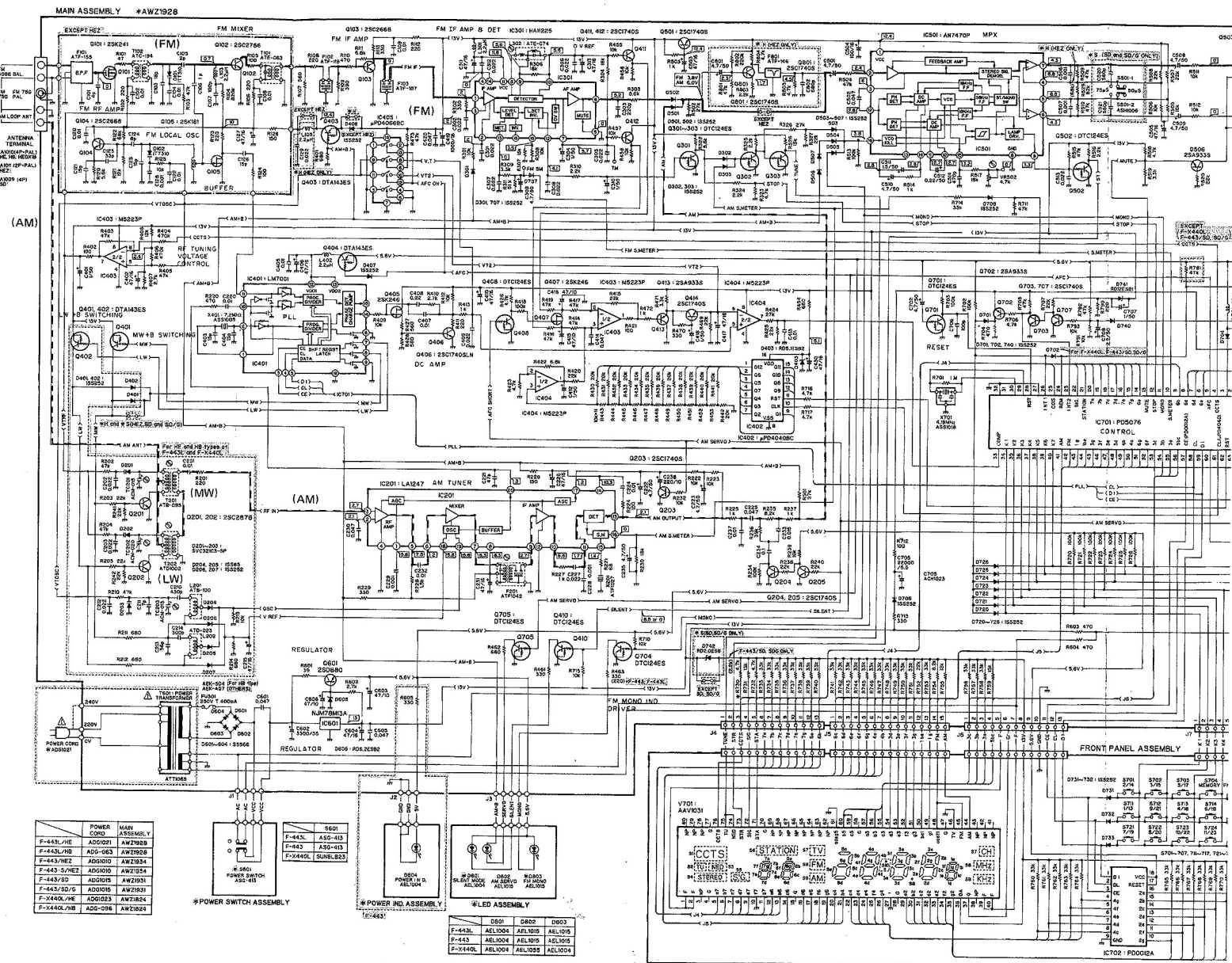


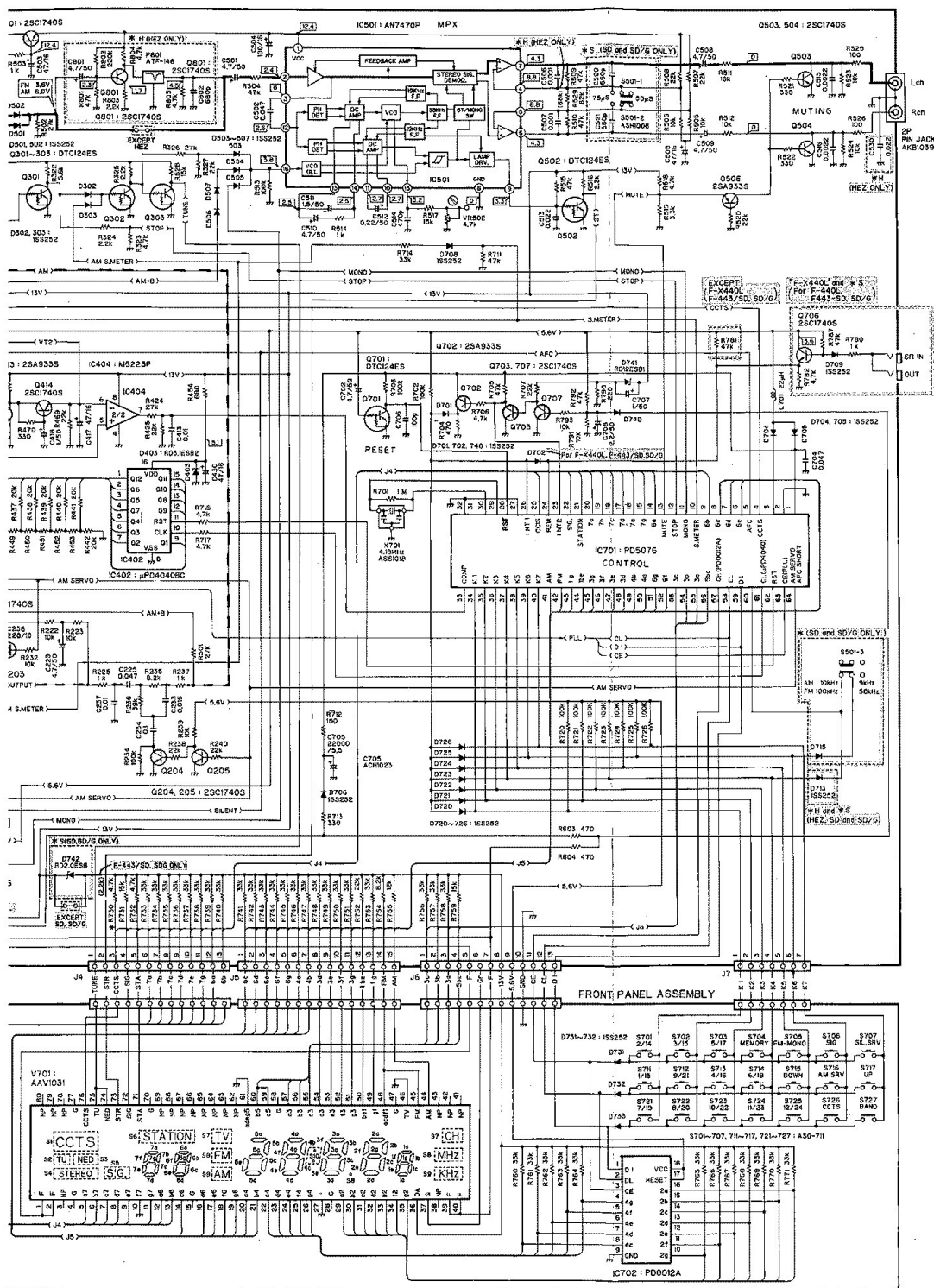
HE, HEZ and HB type Line Voltage Selection
Line voltage can be changed with following steps.

1. Disconnect the AC power cord.
2. Remove the top cover.
3. Change the connection of the MAIN Assembly primary pins.
4. Stick the line voltage label on the rear panel.

Part No.	Description
AAX-193	220V label
AAX-192	240V label

HE, HEZ 220V _____
HB 240V -----





- This circuit diagram is based on the HE and HB versions of the F-443L.
- Parts with an asterisk (*) are different from those prepared for the HE and HB versions of the F-443L. Refer to the comparison list in the circuit diagram.
- The parts specified as "F-443" are required for the F-443L/HE, HB, F-443/HEZ, SD, SD/G and F-443-S/HEZ.
- The parts specified as "F-X440L" are required for the F-X440L/HE and HB.
- The parts marked "*"H" are required for the F-443/HEZ and F-443-S/HEZ.
- The parts marked "*"S" are required for the F-443/SD and SD/G.
- Parts marked with "*"L" are not used in F-443/HEZ,SD,SD/G and F-443-S/HEZ.
- Parts marked "Except HEZ" are not used in F-443/HEZ and F-443-S/HEZ.
- Parts marked with "*"J" are shorted with a jumper on TYPES where they are not required.

- RESISTORS:**
Indicated in Ω , 1/4W, 1/6W and 1/8W, $\pm 5\%$ tolerance unless otherwise noted k; k Ω , M; M Ω , (F); $\pm 1\%$, (G); $\pm 2\%$, (K); $\pm 10\%$, (M); $\pm 20\%$ tolerance.
- CAPACITORS:**
Indicated in capacity (μ F) /voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.
- VOLTAGE, CURRENT:**
 - V: Signal voltage at 32W + 32W, 8 Ω output (1kHz).
 - DC voltage (V) at no input signal.
 - Value in () is DC voltage at rated power.
 - mA: DC current at no input signal.
 - mV: Signal voltage at FM 400Hz ± 75 Hz DEV.
- OTHERS:**
 - Signal route.
 - Adjusting point.

The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation. * marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

4. P.C. BOARDS CONNECTION DIAGRAM

- This P.C. Boards Connection diagram is produced based on the HE and HB versions of the F-443L.
- The parts specified as "F-443" are required for the F-443L/HE, HB, F-443/HEZ, SD, SD/G and F-443-S/HEZ.
- The parts specified as "F-X440L" are required for the F-X440L/HE and HB.
- The parts marked "*H" are required for the F-443/HEZ and F-443-S/HEZ.
- The parts marked "*S" are required for the F-443/SD and SD/G.
- Parts marked with "*L" are not used in F-443/HEZ,SD,SD/G and F-443-S/HEZ.
- Parts marked "Except HEZ" are not used in F-443/HEZ and F-443-S/HEZ.
- Parts marked with "*J" are shorted with a jumper on TYPES where they are not required.

NOTE

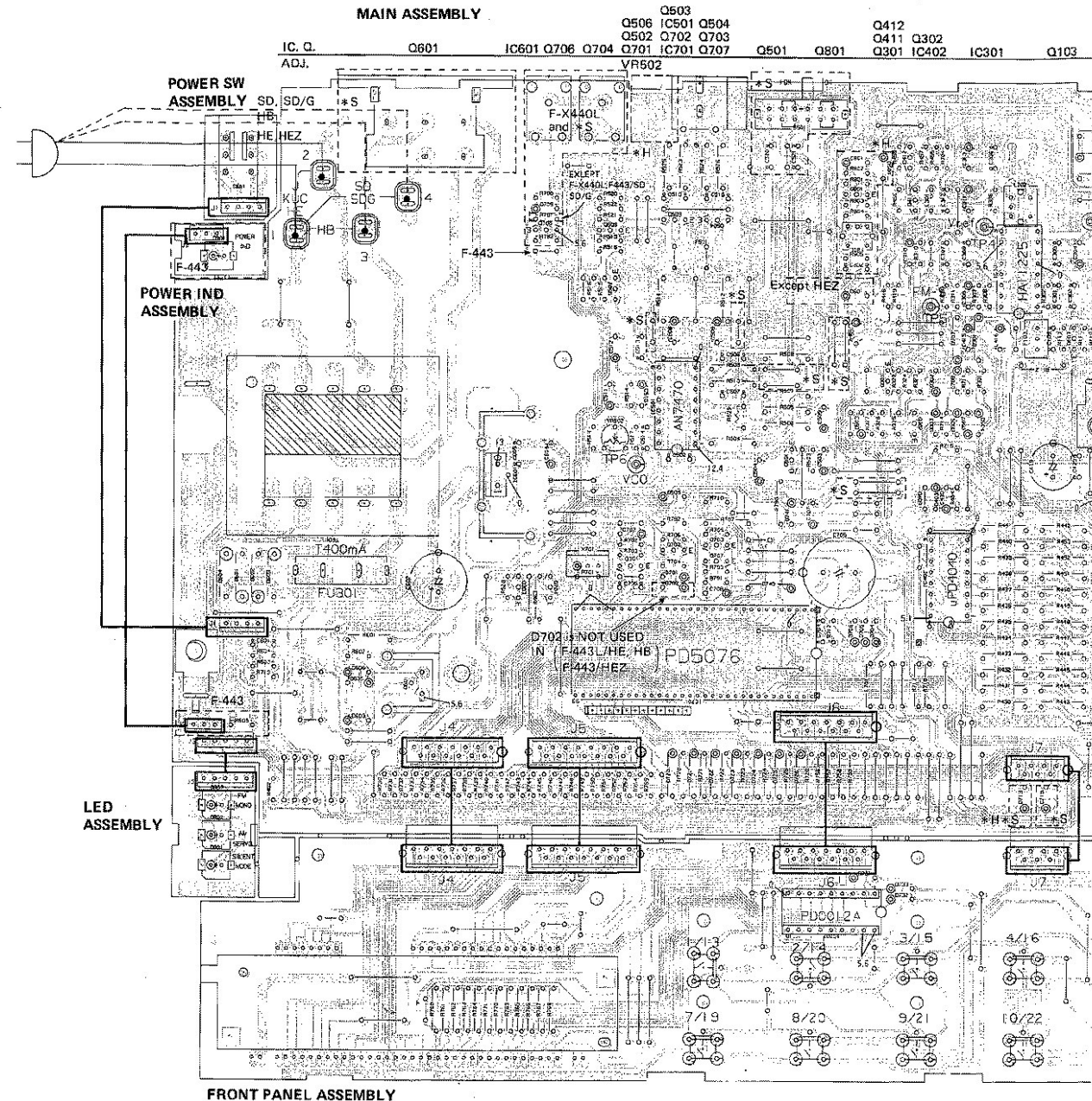
1. This P.C.B connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the following Table.

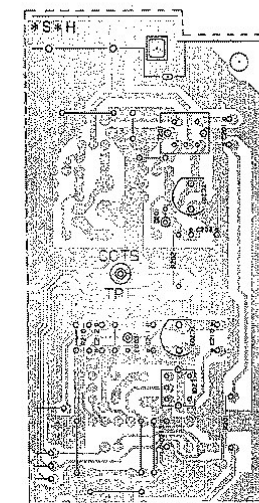
P.C.B. pattern diagram indication	Corresponding part symbol	Part Name
		Transistor
		Radiator type transistor
		Diode
		Resistor
		Capacitor (Polarity)
		Capacitor (Non-polarity)

Others

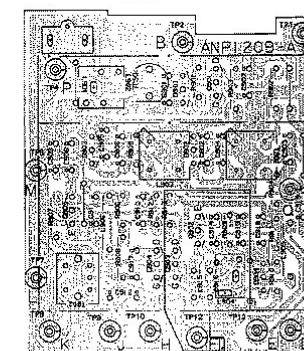
P.C.B. pattern diagram indication	Part Name
IC	IC
S	Switch
RY	Relay
L	Coil
F	Filter
VR	Variable resistor or Semi-fixed resistor

3. The capacitor terminal marked with @ (double circles) shows negative terminal.
4. The diode terminal marked with @ (double circles) shows cathode side.
5. The transistor terminal to which E is affixed shows the emitter.





	Q903	Q901
Q905	Q904	Q902
TC901		



C

5. ELECTRICAL PARTS LIST

NOTES

- Parts without part number cannot be supplied.
- Parts marked by "※" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.
- ★ ★ GENERALLY MOVES FASTER THAN ★
- This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 500 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

500Ω	50 × 10 ³	501		RDJ1HPS	□ □ □ J
47kΩ	47 × 10 ³	473		RDJ1HPS	□ □ □ J
0.5Ω	0.5	053		RN1H	□ □ □ K
1Ω	010	010		RS1F	□ □ □ K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.02kΩ	502 × 10 ¹	5021		RN14SR	□ □ □ □ F
--------	-----------------------	------	-------	--------	-----------

Miscellaneous Parts

Mark	Symbol & Description	Part No.	Mark	Symbol & Description	Part No.
	Main assembly	AWZ192B	★	D101, D102	ITT310
	Front panel assembly		★	D403	RD5.1ESB2
	Power IND assembly		★	D605	RD6.2ESB2
	LED assembly		★	D201 — D203	SVC32/C3-SP (SVC321D3-SP)
	Power SW assembly				
Δ ★	FU301 Fuse (400mA/125V)	AEK-407	★	D741	RD12ESB1
Δ	AC power cord	ADG1021	★	D601 — D604	S5566
			★	D206, D207, D301 — D303, D401, D402, D406, D407, D501 — D507, D701, D704 — D708, D720 — D726	S55252
			★	D204, D205	S5585

Main Assembly (AWZ192B)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★ ★	IC501	AN7470P
★ ★	IC301	HA11225
★ ★	IC201	LA1247
★ ★	IC401	LM7001
★ ★	IC403, IC404	M5223P
★ ★	IC601	NJM78M13A
★ ★	IC701	PD5076
★ ★	IC402	μPD4040BC
★ ★	IC405	μPD4066BC
★ ★	Q401 — Q404	DTA143ES
★	Q301 — Q303, Q406, Q410, Q502, Q701, Q704, Q705	DTC124ES
★ ★	Q413, Q506, Q702	2SA933S
★ ★	Q203 — Q205, Q411, Q412, Q414, Q501, Q503, Q504, Q703, Q707	2SC1740S
★ ★	Q406	2SC1740SLN
★ ★	Q103, Q104	2SC2668
★ ★	Q102	2SC2786
★ ★	Q201, Q202	2SC2878
★ ★	Q501	2SD880
★ ★	Q105	2SK161
★ ★	Q101	2SK241
★ ★	Q405, Q407	2SK246

TRANSFORMERS, COILS AND FILTERS

Mark	Symbol & Description	Part No.
	T201	ATB-095
	T102	ATC-194
	T202	ATD1002
	T101	ATE-063
Δ	T601 Power transformer	ATT1065
	L201	ATB-100
	L104	ATC1003
	L202	ATD-023
	L302	ATE-074
	L103, L301, L402	LAU2R2M
	L701	LAU220K
	F103	ATF-107
	F102	ATF-119
	F101	ATF-155
	F201	ATF-1042

CAPACITORS

Mark	Symbol & Description	Part No.
	TC201, TC203	ACM-015
	TC202	ACM-020
	C705	ACH1023
	C106	CCDCH010C50
	C105	CCDCH020C50

Mark	Symbol & Description	Part No.
	C213	CCDCH500J50
	C103	CCDRH180J50
	C303	CCDSL221J50
	C125	CCDTH150J50
	C101	CCMCH040C50
	C211	CCMCH070050
	C124	CCMCH080D50
	C121, C126, C403, C404	CCMCH150J50
	C123	CCMCH330J50
	C221	CCMCH470J50
	C107, C708	CCMSL101J50
	C512	CEASR22M50
	C304, C310, C401, C412, C418, C707	CEAS010M50
	C511	CEAS1R5M50
	C504	CEAS101M16
	C419	CEAS102M18
	C708	CEAS2R2M50
	C236	CEASR221M10
	C602	CEAS222M35
	C222, C223, C235, C309, C501, C508 — C510, C702	CEAS4R7M50
	C415, C416, C603, C606	CEAS470M10
	C127, C215, C226, C231, C311, C313, C402, C406, C410, C417, C430, C503, C505, C604	CEAS470M16
	C408	CFTXA224J50
	C237, C407	CKDYB103K50
	C102, C104, C108, C109, C120, C122, C201, C220, C224, C232, C405, C413	CKDYF103250
	C202, C203, C212, C227, C301, C302, C305 — C308, C312, C409, C513	CKDYF223250
	C230, C420, C502, C601, C605, C704	CKDYF473250
	C234	CKDYX104M25
	C233	CKDYX153M25
	C225, C414	CKDYX473M25
	C128, C229, C506, C507	CKMYB102K50
	C515, C516	CKDYB222K50
	C218	CKMYF102Z50
	C214	CGSA301J50
	C210	CGSA431J50
	C514	CGSA471J50

RESISTORS

Mark	Symbol & Description	Part No.
★	VR502 Semi-fixed (4.7kΩ)	VRTB6VS472
	R601 Fuseble	RFA14PS380J
	R430 — R453	RN14PQ□□□□F
	R136, R226, R228, R303, R401, R502, R504 — R508, R511, R512, R523 — R526	RD114PM□□□□J
	Other resistors	RD116PM□□□□J

OTHERS

Mark	Symbol & Description	Part No.
★	X201 Ceramic resonator	ATF1027
★	X401 Crystal resonator	ASS1005
★	X701 Ceramic resonator	ASS1018
	4P antenna terminal (PAL) 2P pin jack	AKA1010 AKB1039

Front panel Assembly
SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★ ★	IC702	PD0012A
★	D731 — D733	1SS252

SWITCHES

Mark	Symbol & Description	Part No.
★ ★	S701 — S707, S711 — S717, S721 — S727	ASG-711
	Tact switch SILENT SERVO, UP, DOWN, CCTS, BAND, SLG, AM SERVO, FM-MONO, MEMORY, 1/13 — 12/24	

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD118PM333J

OTHERS

Mark	Symbol & Description	Part No.
★	V701 Fluorescent tube	AAV1031

Power IND Assembly
SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D804 LED assembly	AEL1004

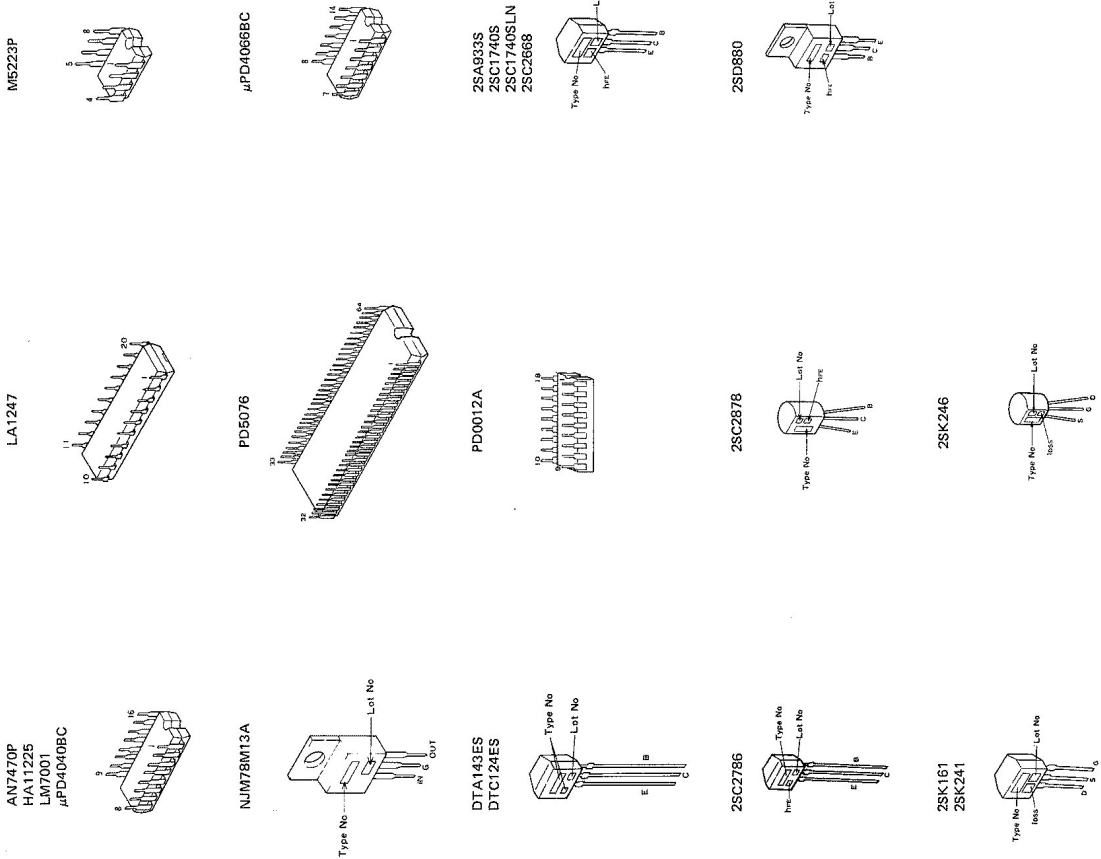
LED Assembly

Mark	Symbol & Description	Part No.
★	D801 LED assembly	AEL1004
★	D802, D803 LED assembly	AEL1015

Power SW Assembly
SWITCH

Mark	Symbol & Description	Part No.
★ ★	S601 Push switch (POWER)	ASG-413

ICs and Transistors



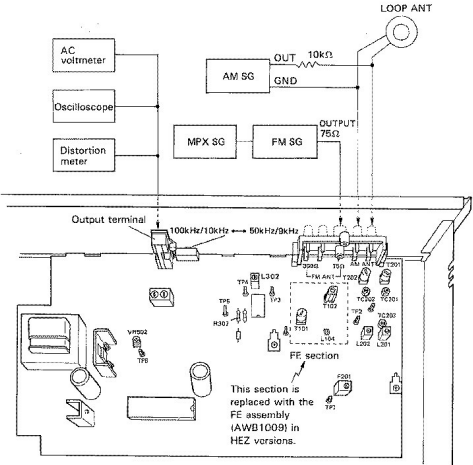


Fig. 6-1 Connection points and Adjustment points

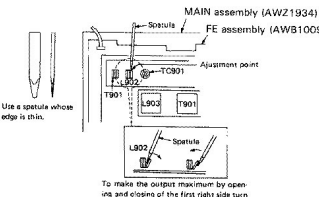


Fig. 6-2 Adjustment tuning coil L902

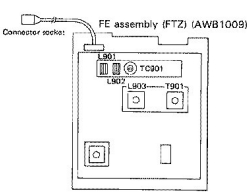


Fig. 6-3 Adjustment point of FE Assembly

6. RÉGLAGE

- Les raccordements et les points de réglages sont représentés à la Fig. 6-1.
- Lorsqu'un astérisque accompagne un "niveau dBμ", régler à un niveau (dBμ) tel que la tension soit à peu près la moitié de celle qui est présente entre TP5 et GND pour 60 dB.

6.1 Réglage du syntoniseur FM

- Placer le sélecteur FUNCTION sur la position "FM".
- Placer les interrupteurs "CCTS" et "SILENT SERVO" (face avant) sur la position "OFF".
- Régler le VCO après deux minutes (ou plus) de mise sous tension.

Etape N°	Items de réglage	FM SG (1kHz ± 75 kHz dev.)		F-443 & F-X440 Affichage de fréquence de réception	Réglage	
		Fréquence (MHz)	Niveau (dBμ)		Lieu de réglage	Caractéristiques
1	Vérification de la tension de commande de l'oscillateur local FM	Aucun signal	—	87,5 MHz	—	Vérifier que la tension entre TP2 et GND est égale à 3,4 V ± 1,5 V
				108 MHz	—	Vérifier que la tension continue entre TP2 et GND est égale à 8,5 V ± 1,5 V
2	Réglage destiné à améliorer la sensibilité	98,0	*	98,0 MHz	T101, T102	Régler de manière que la tension continue entre TP5 et GND soit maximale.
3	Réglage de la bobine de détection	98,0	60	98,0 MHz	T301	Régler de manière que la tension continue entre TP3 et TP4 soit nulle.
4	Répéter les réglages des opérations 3 et 4 jusqu'à ce que les valeurs indiquées soient obtenues dans les deux cas.					
5	Réglage du VCO	98,0 (sans modulation)	60	98,0 mHz	VR502	Régler de manière que la fréquence entre TP6 et GND soit égale à 76 kHz ± 0,1 kHz.

*1 Lorsque l'on procède au réglage de la version HEZ du syntoniseur FM pour laquelle le module FE (AWB1009) est utilisé, les opérations décrites en 2 diffèrent. Se reporter à la note *2.

R307: selon que R307 (15 kHz) est présente ou non, une modification du niveau d'entrée antenne provoque l'éclairement du témoin "TUNED". Si ce témoin ne s'éclaire pas, même lorsque le niveau d'entrée antenne est compris entre 30 et 40 dB, retirer R307.

6. ADJUSTMENTS

- For connections and points to be adjusted, refer to Fig. 6-1.
- Where an asterisk (*) is given for "level dBμ," set to the level (dBμ) at which the voltage is roughly half the voltage between TP5 and GND at 60dB.

6.1 FM TUNER SECTION ADJUSTMENT

- Set the FUNCTION selector to "FM".
- Set the "CCTS" and "SILENT SERVO" switches on the front panel to "OFF".
- Perform VCO adjustment two minutes or more after turning the power ON.

Step No.	Adjustment Title	FM SG (1kHz ± 75kHz dev.)		F-443 & F-X440 Reception Frequency Display	Adjustment Location	Specifications
		Frequency (MHz)	Level (dBμ)			
1	FM local oscillator control voltage check	No signal	—	87.5MHz	—	Confirm that DC voltage between TP2 and GND is 3.4 ± 1.5V.
				108MHz	—	Confirm that the DC voltage between TP2 and GND is 8.5 ± 1.5 V.
*1	Adjustment to improve sensitivity	98.0	*	98.0MHz	T101, T102	Adjust so that the DC voltage between TP5 and GND is maximum.
3	Detector coil T-meter adjustment	98.0	60	98.0MHz	T301	Adjust so that the DC voltage between TP3 and TP4 is 0 V.
4	Perform the adjustments in steps 3 and 4 repeatedly, until the specified values are obtained for both.					
5	VCO adjustment	98.0 (No modulation)	60	98.0MHz	VR502	Adjust so that the frequency between TP6 and GND is 76 ± 0.1 kHz.

*1 When adjusting the HEZ version FM Tuner in which the FE assembly (AWB1009) is used, the operation in step 2 differs from the above. For this operation, refer to Note *2.

R307: Depending on whether R307 (15kHz) is present or absent, a change in the ANT. input level will cause the "TUNED" indicator to light. If the indicator does not light even when the ANT. input level is between 30 - 40dB, remove R307.

*2 Adjustment of the FM Tuner (HEZ type) using the FE assembly (AWB1009) (for step 2 only)

Step No.	Adjustment Title	FM SG (1kHz ± 75kHz dev.)		F-443 & F-X440 Reception Frequency Display	Adjustment Location	Specifications
		Frequency (MHz)	Level (dBμ)			
1	Adjustment to improve sensitivity (For AWB1009).	90.0	*	90.0MHz	L902, L903, T901	Adjust so that the DC voltage between TP5 and GND is maximum.
2		106.0	*	106.0MHz	TC901, L903, T901	
3		90.0	*	90.0MHz	L902	
4	Perform the adjustments in steps 2-1 and 2-2 repeatedly until the specified values are obtained for both adjustments.					

6.2 AM (MW) Tuner Section Adjustment

- Set the FUNCTION selector to "MW".
- Figures in parentheses () are frequencies when the tuner is set to 10kHz steps.
- Set the "CCTS" and "AM SERVO" switches on the front panel to "OFF".

Step No.	Adjustment Title	AM (MW) SG (400Hz, 30% modulation)		F-443 & F-X440 Reception Frequency Display	Adjustment	
		Frequency (MHz)	Level (dBμ)		Adjustment Location	Specifications
1	AM (MW) local oscillator control voltage adjustment	No signal	--	531 kHz (530kHz)	L201	Adjust so that the DC voltage between TP2 and GND is 1.25 ± 0.1 V.
2				1602 kHz (1700 kHz)	TC203	Adjust so that the DC voltage between TP2 and GND is 10.0 ± 0.3 V.
3	Perform the adjustments in steps 1 and 2 repeatedly until the specified values are obtained for both.					
4	Adjustment to improve AM (MW) sensitivity	603 (600)	*	603 kHz (600 kHz)	T201	Adjust so that the DC voltage between TP7 and GND is maximum.
5		1395 (1400)	*	1395kHz (1400kHz)	TC201	
6	Perform the adjustments in steps 4 and 5 repeatedly until the specified values are obtained for both.					

6.3 AM (LW) Tuner Section Adjustment

- Set the FUNCTION selector to "LW".
- Set the "CCTS" and "AM SERVO" switches on the front panel to "OFF".

Step No.	Adjustment Title	AM (LW) SG (400Hz, 30% modulation)		F-443 & F-X440 Reception Fre- quency Display	Adjustment	
		Frequency (MHz)	Level (dBμ)		Adjustment Location	Specifications
1	AM (LW) local oscillator control voltage adjustment	No signal	--	281kHz	L202	Adjust so that the DC voltage between TP2 and GND is 5.1 ± 0.05 V.
2	Adjustment to improve AM (LW) sensitivity	164	*	164kHz	T202	Adjust so that the DC voltage between TP7 and GND is maximum.
3		254	*	254kHz	TC202	
4	Perform the adjustments in steps 2 and 3 repeatedly until the specified values are obtained for both.					

6. AJUSTE

- Para las conexiones y puntos de ajuste, refiérase a la Fig. 6-1.
- Donde un asterisco (*) represente el "nivel dBμ", ajuste al nivel (dBμ) en el que la tensión sea aproximadamente la mitad de la tensión entre TP5 y GND a 60 dB.

6.1 Ajuste de la sección del sintonizador de FM

- Ajuste el selector FUNCTION a la posición "FM".
- Ajuste los interruptores "CCTS" y "SILENT SERVO" del panel frontal a la posición "OFF".
- Realice el ajuste VCO dos minutos o más después de conectar la alimentación.

Nº. de paso	Ítems de ajuste	FM SG (1kHz ± 75 kHz dev.)		F-443 & F-X440 Frecuencímetro de recepción	Ajuste	
		Frecuencia (MHz)	Nivel (dBμ)		Lugar de ajuste	Especificaciones
1	Comprobación de la tensión de control del oscilador local de FM	Ninguna señal	—	87,5 MHz	—	Compruebe que la tensión de CC entre TP2 y GND sea de 3,4 ± 1,5 V
				106 MHz	—	Compruebe que la tensión de CC entre TP2 y GND sea de 8,5 V ± 1,8 V
2	Ajuste para mejorar la sensibilidad	98,0	*	98,0 MHz	T101, T102	Ajuste de manera que la tensión de CC entre TP5 y GND sea la máxima.
3	Ajuste del medidor T de la bobina detectora	98,0	60	98,0 MHz	T301	Ajuste de manera que la tensión de CC entre TP3 y TP4 sea de 0V.
4	Realice repetidamente los ajustes de los pasos 3 y 4 hasta que se obtengan los valores especificados para ambos ajustes.					
5	Ajuste VCO	98,0 (sin modulación)	60	98,0 mHz	VR502	Ajuste de manera que la frecuencia entre TP5 y GND sea de 76 ± 0,1 kHz.

*1 Cuando ajuste un sintonizador de FM de la versión HEZ, en el que se utiliza el conjunto FE (AWB1009), el contenido del paso 2 difiere del anterior. Para este paso, refiérase a la nota *2.

R307: Según si está incorporado el R307 (15K) o no, un cambio en el nivel de entrada ANT. provocará que el indicador "TUNED" se encienda. Si el indicador no se enciende incluso cuando el nivel de entrada ANT. se encuentra entre 30 — 40dB, saque el R307.

*2 Ajuste del sintonizador de FM (versión HEZ) que utiliza un conjunto FE (AWB1009) (sólo para el paso 2)

Nº. de paso	Ítems de ajuste	FM SG (1kHz ± 75 kHz dev.)		F-443 & F-X440 Frecuencímetro de recepción	Ajuste	
		Frecuencia (MHz)	Nivel (dBμ)		Lugar de ajuste	Especificaciones
2	Ajuste para mejorar la sensibilidad (Para AWB1009).	90,0	*	90,0 MHz	L902, L903, T901	Ajuste de manera que la tensión de CC entre TP5 y GND sea la máxima.
		106,0	*	106,0 MHz	TC901, L903, T901	
		90,0	*	90,0 MHz	L902	
4	Realice repetidamente los ajustes de los pasos 2-1 y 2-2 hasta que se obtengan los valores especificados para ambos ajustes.					

6.2 Ajuste de la sección del sintonizador de AM (OM)

- Ajuste el selector FUNCTION a la posición "MW".
- Las figuras entre paréntesis () son las frecuencias del sintonizador cuando está ajustado a saltos de 10kHz.
- Ajuste los interruptores "CCTS" y "AM SERVO" del panel frontal a la posición "OFF".

Nº. de paso	Ítems de ajuste	AM (MW) SG (400 Hz, 30 % modulación)		F-443 & F-X440 Frecuencímetro de recepción	Ajuste	
		Frecuencia (MHz)	Nivel (dBμ)		Lugar de ajuste	Especificaciones
1	Ajuste de la tensión de control del oscilador local de AM (OM)	Ninguna señal	—	531 kHz (530 kHz)	L201	Ajuste de manera que la tensión de CC entre TP2 y GND sea de 1,25 ± 0,1 V.
2				1602 kHz (1700 kHz)	TC203	Ajuste de manera que la tensión de CC entre TP2 y GND sea de 10,0 ± 0,3 V.
3	Realice repetidamente los ajustes de los pasos 1 y 2 hasta que se obtengan los valores especificados para ambos ajustes.					
4	Ajuste para mejorar la sensibilidad de AM (OM)	603 (600)	*	603 kHz (600 kHz)	T201	Ajuste de manera que la tensión de CC entre TP7 y GND sea la máxima.
5		1395 (1400)	*	1395 kHz (1400 kHz)	TC201	
6	Realice repetidamente los ajustes de los pasos 4 y 5 hasta que se obtengan los valores especificados para ambos ajustes.					

6.3 Ajuste de la sección del sintonizador de AM (OL)

- Ajuste el selector FUNCTION a la posición "LW".
- Ajuste los interruptores "CCTS" y "AM SERVO" del panel frontal a la posición "OFF".

Nº. de paso	Ítems de ajuste	AM (MW) SG (400 Hz, 30 % modulación)		F-443 & F-X440 Frecuencímetro de recepción	Ajuste	
		Frecuencia (MHz)	Nivel (dBμ)		Lugar de ajuste	Especificaciones
1	Ajuste de la tensión de control del oscilador local de AM (OL)	Ninguna señal	—	281 kHz	L202	Ajuste de manera que la tensión de CC entre TP2 y GND sea de 5,1 ± 0,05 V.
2	Ajuste para mejorar la sensibilidad AM (OL)	164	*	164 kHz	T202	Ajuste de manera que la tensión de CC entre TP7 y GND sea la máxima.
3		254	*	254 kHz	TC202	
4	Realice repetidamente los ajustes de los pasos 2 y 3 hasta que se obtengan los valores especificados para ambos ajustes.					

*2 Réglage du syntoniseur FM (version HEZ) pourvu du module FE (AWB1009) (opération 2 uniquement)

Étape N°	Items de réglage	FM SG (1MHz ± 75 kHz dév.)		F-443 & F-X440 Affichage de fréquence de réception	Réglage	
		Fréquence (MHz)	Niveau (dBμ)		Lieu de réglage	Caractéristiques
1	Réglage destiné à améliorer la sensibilité (pour AWB1009)	90,0	*	90,0 MHz	L902, L903, T901	Régler de manière que la tension continue entre TP5 et GND soit maximale.
2		106,0	*	106,0 MHz	TC901, L903, T901	
3		90,0	*	90,0 MHz	L902	
4	Répéter les réglages des opérations 2-1 et 2-2 jusqu'à ce que les valeurs indiquées soient obtenues dans les deux cas.					

6.2 Réglage du syntoniseur AM (PO)

- Placer le sélecteur FUNCTION sur la position "MW".
- Les valeurs entre parenthèses () représentent des fréquences lorsque le syntoniseur est réglé pour s'accorder par pas de 10 kHz.
- Placer les interrupteurs "CCTS" et "AM SERVO" (face avant) sur la position "OFF".

Etape N°	Items de réglage	AM (MW) SG (400 Hz, 30 % modulation)		F-443 & F-X440 Affichage de fréquence de réception	Réglage	
		Fréquence (MHz)	Niveau (dBμ)		Lieu de réglage	Caractéristiques
1	Réglage de la tension de commande de l'oscillateur local AM (PO)	Aucun signal	—	531 kHz (530 kHz)	L201	Régler de manière que la tension continue entre TP2 et GND soit égale à 1,25 V ± 0,1 V.
2				1602 kHz (1700 kHz)	TC203	Régler de manière que la tension continue entre TP2 et GND soit égale à 10,0 V ± 0,3 V.
3	Répéter les réglages des opérations 1 et 2 jusqu'à ce que les valeurs indiquées soient obtenues dans les deux cas.					
4	Réglage destiné à améliorer la sensibilité AM (PO)	603 (600)	*	603 kHz	T201	Régler de manière que la tension continue entre TP7 et GND soit maximale.
5		1395 (1400)	*	1395 kHz (1400 kHz)	TC201	
6	Répéter les réglages des opérations 4 et 5 jusqu'à ce que les valeurs indiquées soient obtenues dans les deux cas.					

6.3 Réglage du syntoniseur AM (GO)

- Placer le sélecteur FUNCTION sur la position "LW".
- Placer les interrupteurs "CCTS" et "AM SERVO" (face avant) sur la position "OFF".

Etape N°	Items de réglage	AM (MW) SG 1400 Hz, 30 % modulation)		F-443 & F-X440 Affichage de fréquence de réception	Réglage	
		Fréquence (MHz)	Niveau (dBμ)		Lieu de réglage	Caractéristiques
1	Réglage de la tension de commande de l'oscillateur local AM (GO)	Aucun signal	—	281 kHz	L202	Régler de manière que la tension continue entre TP2 et GND soit égale à 5,1 V ± 0,05 V.
2	Réglage destiné à améliorer la sensibilité AM (LW)	164	*	164 kHz	T202	Régler de manière que la tension continue entre TP7 et GND soit maximale.
3		254	*	254 kHz	TC202	
4	Répéter les réglages des opérations 2 et 3 jusqu'à ce que les valeurs indiquées soient obtenus dans les deux cas.					

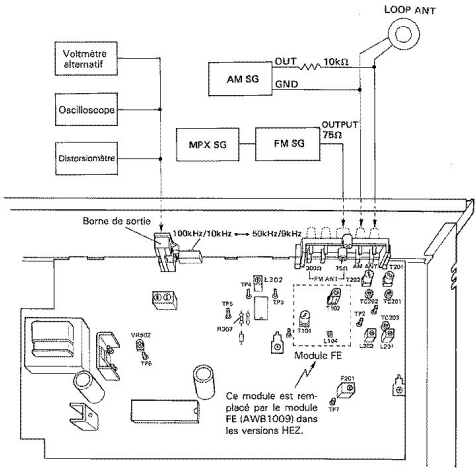


Fig. 6-1 Points de raccordement et de réglage

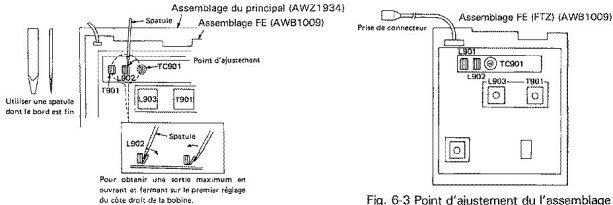


Fig. 6-2 Réglage du self d'accord L902

Fig. 6-3 Point d'ajustement du l'assemblage FE

No.	Pin Name	I/O	Functions	Active
41	P1-7	O	FL AM	H
42	P1-6	O	FL FM	H
43	P1-5	O	FL 1g	H
44	P1-4	O	FL 1be	H
45	P1-3	O	FL 3g	H
46	P1-2	O	FL 3f	H
47	P1-1	O	FL 3e	H
48	P1-0	O	FL 3d	H
49	P0-7	O	FL 4h	H
50	P0-6	O	FL 4a	H
51	P0-5	O	FL 6g	H
52	P0-4	O	FL 6f	H
53	P0-3	O	FL 3c	H
54	P0-2	O	FL 3b	H
55	P0-1	O	FL 3a	H
56	P0-0	O	FL 5bc	H
57	P2-7	O	Key strobe output, PD0012	CE output L/L
58	P2-6	O	Key strobe output, PD0012, LM7001	CL output L/
59	P2-5	O	Key strobe output, PD0012, LM7001	DATA output L/
60	P2-4	O	Different version select output	L
61	P2-3	O	TC4040	CL output L
62	P2-2	O	TC4040	RST output H
63	P2-1	O	LM7001	CE output H
64	P2-0	O	AM SERVO-ON output, AFC OFF	H/L

Note:
In ACTIVE column L shows Low, H shows High, and $\overline{\text{L}}$ shows rising edge.

Port No.	P5-0	P5-1	P5-2	P5-3	P5-4	P5-5	P5-6
* P2-4 (Different version select)	FM STEP 100k	MW STEP 10k	JAPAN-BAND	Without LW	Silent inhibit width	—	—
P2-5	BAND	CCTS	ST12	ST11	ST10	ST8	ST7
P2-6	UP	AM SERVO	DOWN	ST6	ST4	ST9	ST1
P2-7	SILENT	SIG.	FM MONO	MEMORY	ST5	ST3	ST2

* Different version select:
This is read out whenever a key is scanned, and if the data is different from the current setting, all data will be initialized.

Port No. Type Symbol	P5-0	P5-1	P5-2	P5-3	P5-4	P5-5	P5-6	Frequency Range
HE, HB	H	H	H	H	H	H	H	87.5 — 108.0 (FM) 531 — 1602 (MW) 153 — 281 (LW)
HI, HE02	H	H	H	L	H*	H	H	87.5 — 108.0 (FM) 531 — 1602 (MW) Without LW
KUC	L*	L	H	L	H	H	H	87.5 — 108.0 (FM) 530 — 1700 (MW)
J	L*	H	L	L	H	H	H	76.0 — 90.0 (FM) 522 — 1629 (MW)
SD	H	L/H	H	L	H*	H	H	87.5 — 108.0 (FM) 530 — 1700 531 — 1602

* When P5-0 is set to high, "76.00" lights steadily.
* When P5-4 is set to low, Silent does not function between 87.50 and 87.95 MHz and between 107.50 and 108.00 MHz.

8. CIRCUIT DESCRIPTION

SILENT SERVO CIRCUIT

In the PLL synthesizer tuner, since a clock frequency oscillator (which supplies the frequency to be used as the reference frequency for circuit operation) is provided for each PLL section and microcomputer section (system control microcomputer), beats may occur between the harmonic components of the clock frequencies and the frequency being received, and this may affect the sound quality, etc.
Also, in the PLL circuit, ripple (leakage of the reference frequency) may occur because of the charge pump output, and this may affect the signal-to-noise ratio or sound quality.
Because of this, the Silent Servo circuit is provided to stop the clock and PLL circuit operation after the required frequency is received, so that the sound quality is improved during the reception of broadcasts.

• Clock stop method in microcomputer section
The function to turn the clock oscillation ON/OFF is provided in the microcomputer IC701 (PD5076) itself. When the tuner status is changed, when any controls are activated immediately after turning the power ON or when any of the station preset keys is pressed to tune to a required frequency, the clock oscillator is activated to generate the clock frequency to control each function. After the required control is completed, the clock oscillator is interrupted and enters the STOP mode (standby mode) until the microcomputer status is changed.

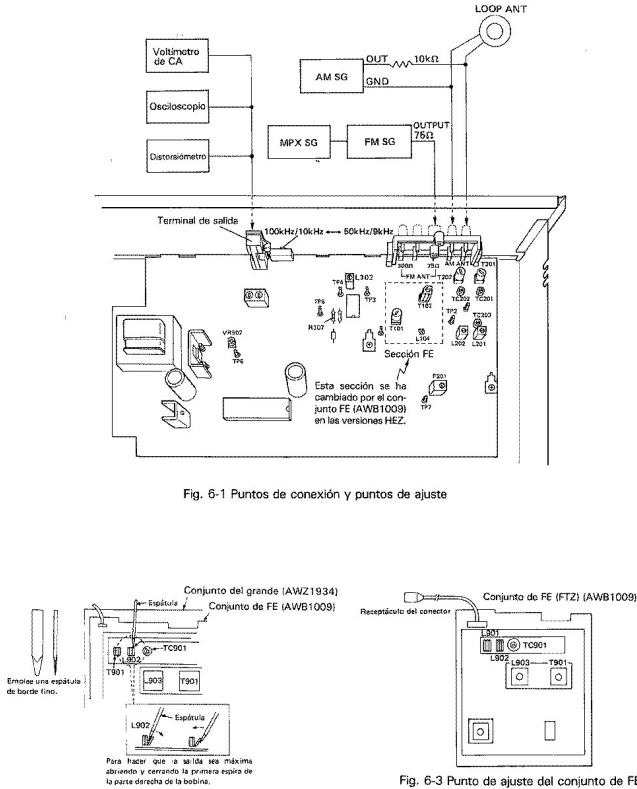
• PLL section clock stop method
(This functions in the FM mode.)
The clock oscillator operation is stopped by turning the power supply to the PLL section OFF. In the PLL section, the varicap control voltages "Vr-osc" and "Vr-rf" are generated to tune to the required frequency. However, since "Vr-osc" varies when the PLL clock is stopped, it is necessary to maintain the "Vr" voltage value even after the clock has stopped.
In the following section, the circuit operations to accommodate changes in reception conditions caused by temperature changes, etc. are described after the required frequency is tuned to using clock oscillations, the "Vr-osc" and "Vr-rf" voltages are maintained until the clock is stopped.
(With the FUNCTION selector set to "FM", and the Silent Servo switch set to "ON".)

- Press the front panel station preset key corresponding to the desired FM frequency.
- When a key is pressed, the IC701 (PD5076) clock oscillator in the microcomputer section starts oscillating. At the same time, the microcomputer detects the key that was pressed.
- Pin 5 of IC701 is inverted from high to low.
 - Q404 (DTA143ES) is turned ON. Power is supplied to IC401 (LM7001).
 - The switch between pins 10 and 11 of IC405 (uPD4066BC) is turned OFF.
 - The switch between pins 1 and 2 of IC405 is turned OFF, and the switch between pins 9 and 15 is turned ON.
 - Q410 (DTC124ES) is turned OFF. The SILENT indicator does not light.
- In the same way as in a normal synthesizer tuner, the frequency fosc (local oscillator output) applied to pin 11 of IC401 (in the FM mode) is phase-compared to the internal reference oscillator frequency fref, and the result is output from pin 14. This output signal is converted into a DC voltage by the charge pump circuit consisting of Q405 (2SK246) and Q406 (2SC1740SLN). This voltage is used as control voltage "Vr-osc" of the local oscillator (variable capacitance diode: D102). By applying a voltage within a range of ± 0.25 V to "Vr-osc" by the C.C.T.S., it is also used as control voltage "Vr-rf" for the RF tuning circuit (variable capacitance diode: D101).
- Voltage "Vr-osc" is varied until there is no phase difference between frequency "fosc" controlled by "Vr-osc" and reference frequency "fref", to tune to the required (broadcasting) frequency.

7. IC INFORMATION

PD5076

No.	Pin Name	I/O	Functions	Active
1	Vcc	—	+ 5 V power supply	
2	AVss	—	GND for A/D and D/A converters	
3	Vref	I	Reference voltage of A/D and D/A converters	
4	D/A	O	VT adding voltage for CCTS	
5	PWM	O	AFC "ON": High; AFC "OFF" (SILENT): Low; PLL power supply "OFF"	L
6	P6-3	O	FL 6e	H
7	P6-7	O	FL 6d	H
8	P6-1	O	FL 6c	H
9	P6-0	O	FL 6b	H
10	P4-7 (AND)	I	Signal meter input	
11	P4-6	O	FM MONO indicator and FM $\rightarrow$ MONO	H
12	P4-5	I	FM AUTO STOP input	H
13	P4-4	O	MUTE output	H
14	P4-3	O	FL 6a	H
15	P4-2	O	FL 7g	H
16	P4-1	O	FL 7e	H
17	P4-0	O	FL 7d	H
18	P3-7	O	FL 7c	H
19	P3-6	O	FL 7b	H
20	P3-5	O	FL 7a	H
21	P3-4	O	FL STATION	H
22	P3-3	O	FL SIG.	H
23	P3-2 (INTZ)	I	Wake up on POWER ON	$\overline{\text{L}}$
24	P3-1	I	Remote control input	SR
25	P3-0	O	FL CCTS	H
26	INT1	I	Wake up on KEY IN, REM IN, and POWER OFF	$\overline{\text{L}}$
27	CNVss	—	Connected to VSS (0 V)	
28	RESET	I	RESET input (Boot on POWER ON)	$\overline{\text{L}}$
29	Xin	I	4.19 MHz ceramic resonator connection pin	
30	Xout	O		
31	ϕ	O	Timing output (Not used)	
32	Vss	—	OV.	
33	P5-7	I	Comparator input of successive approximation A/D converter for SILENT	L
34	P5-6			L
35	P5-5			L
36	P5-4			L
37	P5-3	I	Key matrix input	L
38	P5-2			L
39	P5-1			L
40	P5-0			L



9. FOR F-443L/HB, F-443/SD, SD/G, F-X440L/HE AND HB MODELS

- NOTES:
- Parts without part number cannot be supplied.
 - The Δ mark found on some component parts indicates the importance of the supply factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
 - For your parts Stock Control, the fast moving items are indicated with the marks Δ and $\star$.
 - $\star$ **GENERALLY MOVES FASTER THAN $\star$**
 - This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
 - Parts marked by $\star$ are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

• Contrast of Miscellaneous Parts
The F-443L/HB, F-443/SD, SD/G, F-X440L/HE and HB types are the same as the F-443L/HE type with the exception of the following sections.

Mark	Symbol & Description	Part No.						Remarks
		F-443L/HE	F-443L/HB	F-443/SD	F-443/SD/G	F-X440L/HE	F-X440L/HB	
	Main assembly	AWZ1928	AWZ1928	AWZ1931	AWZ1931	AWZ1924	AWZ1924	
	LED assembly	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	
	Power SW assembly	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	
	Power IND assembly	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	NON SUPPLY	
	AC power cord	ADG1021	ADG 063	ADG1015	ADG1016	ADG1023	ADG-096	
Δ $\star$	FU301 Fuse	AEK-407	AEK-504	AEK-407	AEK-407	AEK-407	AEK-504	
	Front panel assembly	ANB1202	ANB 1202	ANB1203	ANB1203	...	...	
	Front panel	...	...	...	...	ANB184	ANB184	
	Panel base assembly	AMD1026	AMD1026	AMD1026	AMD1026	AMD1030	AMD1030	
	Insulator assembly	AMR1350	AMR1350	AMR1350	AMR1350	...	...	
	Insulator assembly	AMR1353	AMR1353	AMR1353	AMR1353	...	...	
	Reg assembly	...	...	...	...	AMR1285	AMR1285	
	Power knob	ADD1343	ADD1343	ADD1343	ADD1343	ADD1378	ADD1378	
	Display panel	AAK1516	AAK1516	AAK1517	AAK1517	AAK1511	AAK1511	
	FL filter	AAK1481	AAK1481	AAK1574	AAK1574	AAK1481	AAK1481	
	Cable spring	ABH1019	ABH1019	ABH1019	ABH1019	...	...	
	Connection cord	ADE-044	ADE-044	ADE-044	ADE-044	ADE-045	ADE-045	
	Packing case	AHD1404	AHD1404	AHD1405	AHD1443	AHD1402	AHD1402	
	Mini plug connection cord	...	ADE-085	ADE-085	ADE-085	...	...	
	Bonnet	AZN1744	AZN1744	AZN1744	AZN1744	AZN1632	...	
	Operating instructions (8L)	ARE1078	...	ARE1078	...	...	...	
	Operating instructions (English)	...	ARB1131	ARB1131	ARB1131	...	ARB1127	
	Operating instructions (Spanish)	...	...	ARC1105	...	...	...	

• Main Assembly
The Main Assembly (AWZ1931) and Main Assembly (AWZ1824) are the same as the Main Assembly (AWZ1928) with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		AWZ1928	AWZ1931	AWZ1824	
$\star$ $\star$	Q201, Q202	2SC2878	...	...	
$\star$ $\star$	Q402	DTA143ES	...	...	
$\star$ $\star$	Q706	...	2SC1740S	2SC1740S	
$\star$	D201, D203	SVC321C3 (SVC321D3)	SVC321C2 (SVC321U2)	SVC321C3 (SVC321D3)	
$\star$	D202	SVC321C3 (SVC321D3)	...	SVC321C3 (SVC321D3)	
$\star$	D204, D205	1SS85	...	1SS85	
$\star$	D206, D207, D401, D402, D408	1SS262	...	1SS252	
$\star$	D702, D709	...	1SS252	1SS252	
$\star$	D713, D715	...	...	...	
$\star$	D804	AEL1004	...	AEL1004	
$\star$	D/42	...	RD2.0ESB	...	
$\star$ $\star$	S601	...	ASH1006	...	
$\star$ $\star$	S602	...	AKX-505	...	
	T202	ATD1002	...	ATD1002	
	T601	ATT1065	ATT 1064	ATT1065	
	L202	ATD-023	...	ATD-023	
	TC202	ACM-020	...	ACM-020	
	C203	CKDYF223250	...	CKDYF223250	
	C213	CCDC05H60J50	CKDYF223250	CCDC05H60J50	
	C214	CEAS30J150	...	CEAS30J150	
	C215	CEAS470M16	...	CEAS470M16	
	C520, C521	...	CKMYB561K50	...	
	R203, R205, R241, R242	RD18PM223J	...	RD18PM223J	
	R211, R212, R214	RD18PM681J	...	RD18PM681J	
	R204	RD18PM473J	...	RD18PM473J	
	R213	RD18PM102J	...	RD18PM102J	
	R463	RD18PM221J	RD18PM221J	RD18PM531J	
	R730	RD18PM472J	...	...	
	R605	RD18PM331J	...	...	
	R780	RD18PM102J	...	RD18PM102J	
	R782	RD18PM472J	...	RD18PM472J	
	4P antenna terminal (PAL)	AKA1010	...	AKA1010	
	4P antenna terminal	...	AKA1009	...	
	Mini pin jack	...	AKN-207	AKN-207	

- ⑥ When the required station is received, the C.C.T.S. circuit functions and a voltage varying from 0 V to 5 V is output from pin 4 of IC701 (PD5076). This voltage output from pin 4 is maintained at 2.5 V until the C.C.T.S. starts operation, and is then maintained at the optimum value when the C.C.T.S. is operating. This is because the output voltage from pin 4 which is variable from 0 V to 5 V is converted to a voltage having a variable range from -0.25 V to +0.25 V, and the resultant voltage is used as the center voltage of the "Vr-osc" required to operate the C.C.T.S. circuit.
- Also, since the 2.5 V bias voltage is applied to pin 5 of IC403-2/2 via R405 (47 kohms), the voltage "Vr-osc" output from pin 7 of IC403-2/2 (M5223-2/2) becomes 0 V when the voltage output from pin 4 of IC701 is 2.5 V.
- In this condition, when "Vr-osc" is applied to pin 5 of IC403-2/2 via R405 (47 kohms), "V1-osc" is output from pin 7 of IC403-2/2 as it is. And when the output from IC701 pin 4 is varied from 0 V to 5 V, a "Vr-osc" of ± 0.25 V with the voltage compressed by a factor of 10 is output from pin 7 because of the 1:10 ratio of R403 (4.7 kohms) and R404 (47 kohms). This voltage is used as "Vr-osc".
- ⑦ The voltage output from IC701 pin 4, which is obtained when the voltage input to IC701 pin 10 (the output voltage for the signal meter) becomes maximum by varying from 0 V to 5 V, is maintained as the optimum value. This voltage remains even after the microcomputer clock stops.
- ⑧ To enter the Silent Servo operation mode, voltages having the same value as "Vr-osc" and "Vr-osc" should be generated by and supplied from another circuit. However, since "Vr-osc" is generated using "Vr-osc" in the above operation, it is only necessary to generate a voltage having the same value as "Vr-osc".
- This voltage is called "Vr2" in the subsequent description.
- The voltage "Vr2" is generated by increasing the voltage from 0 V while comparing it with the reference voltage "Vr-osc" in a high-sensitivity voltage comparator, and this is maintained when there is no difference with "Vr-osc".
- In the actual circuit, since the voltage comparison must be done precisely and quickly, the operation is performed twice.
- ⑨ In the first voltage comparison, the reset pulse is output from pin 62 of IC701 to reset IC402. Then, the clock frequency is output at high speed from pin 61 to count up IC402 (μ PD4040). The result counted up with this clock is output to Q1 through Q12 in binary code. The resultant output signal is converted into an analog voltage by the ladder circuit consisting of resistors R430 through R453.
- ⑩ Since the above analog voltage can be only be varied from 0 V to 5 V, it is amplified by IC404-1/2 (M5223-1/2) so that the variable range is from 0 V to 12 V.
- ⑪ This amplified voltage is input to pin 3 of IC403-1/2 (M5223-1/2). At this time, since R407 is set to "ON", the same voltage as that of the input is output from pin 1 of IC403-1/2. This output voltage is used as "Vr2" after passing through the ripple filter consisting of Q414 (2SA933S) and Q413 (2SC1740S).

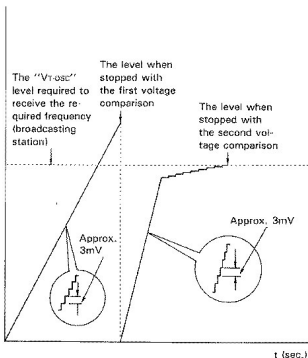


Fig. 8-1

- ⑫ "Vr2" generated as described above is compared with "Vr-osc" in IC403-1/2 (M5223-1/2) which is in the super high-gain state without negative feedback. Since IC403-1/2 is in the super high-gain state, it functions as a high-performance comparator which can detect very small errors.
- ⑬ Since the level of "Vr2" is lower than that of "Vr-osc" when the voltage comparison begins, the output of IC404-2/2 pin 7 (voltage comparator) is set to 12 V.
- The level is raised and at the instant when it reaches the level of "Vr-osc" or is higher, the voltage output from pin 7 of IC404-2/2 drops from 12 V to 0 V.

- ⑭ This voltage change is detected by pin 33 of IC701 to stop the clock output from pin 61.
- However, as the clock frequency has been output at ultrahigh speed, the clock frequency is still output even when the IC404-2/2 pin 7 output becomes 0 V from the time IC701 pin 33 detects the voltage change till the clock output stops. As a result, the level of "Vr2" becomes higher than that of "Vr-osc". (See Fig. 8-1.)
- ⑮ For this, another voltage comparison is performed. In the second voltage comparison, since the number of clock oscillations output after the first voltage comparison before the clock stops is stored in memory, the extra clock count corresponding to the number of clock pulses output after the voltage change can be calculated. Therefore, the number of clocks pluses (close to the voltage "Vr-osc"), from which an additional count of about 100 is subtracted, is output at ultrahigh speed.
- Then, the clock is output at lower speed so that there will be no error in the number of clock pulses after the output from IC404-2/2 pin 7 (voltage comparator) becomes 0 V.
- After this, at the instant when the level of "Vr2" becomes the same as "Vr-osc", the output of clock pulses is stopped, to generate an accurate "Vr2" voltage.
- This "Vr2" is maintained even after IC701 enters the stop mode since the last data is kept in Q1 - Q12 of IC402.
- ⑯ After pins 5 and 64 are inverted from low to high, IC701 enters the Silent Servo operating status (the stop mode in which the clock output is stopped). Since pins 5 and 64 go high, the following operations will be performed:
- Q404 turns "OFF".
 - ... Thus IC401's power is turned "OFF". (PLL clock stops.)
 - In IC405 (μ PD406BC):
 - The switch between pins 10 and 11 is turned "ON".
 - The switch between pins 1 and 2 is turned "ON".
 - The switch between pins 9 and 15 is turned "OFF".
 - Therefore, "Vr-osc" is switched to "Vr2".
 - Q407 is turned "OFF".
 - ... Thus, the tuning meter output voltage from pins 7 and 10 of IC301 (HA11225) is input to IC403-2/2. When the reception condition is changed (drifts) due to temperature changes, etc., the level of "Vr2" is varied to cancel the drift.

10.2 ELECTRICAL PARTS LIST OF F-443/HEZ TYPE

Miscellaneous Parts

Mark	Symbol & Description	Part No.
	Main assembly	AWZ1934
	Front panel assembly	
	Power IND assembly	
	LED assembly	
	Power SW assembly	
	FE assembly	
		AWB1009
Δ	* FU301 Fuse (400mA/125V)	AEK-407
Δ		ADG1010

Main Assembly (AWZ1934)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
**	IC501	AN7470P
**	IC301	HA11225
**	IC201	LA1247
**	IC401	LM7001
**	IC403, IC404	M5223P
**	IC801	NJM78M13A
**	IC701	PD5076
**	IC402	μPD4040BC
**	IC405	μPD4066BC
**	Q401, Q403, Q404	DTA143ES
**	Q301 — Q303, Q408, Q410, Q502, Q701, Q704, Q705	DTC124ES
**	Q413, Q505, Q702	2SA833S
**	Q203 — Q205, Q411, Q412, Q414, Q501, Q503, Q504, Q703, Q707, Q801	2SC1740S
**	Q406	2SC1740SLN
**	Q103	2SC2688
**	0R01	250890
**	Q405, Q407	2SK246
*	D403	RD5.1ES82
*	D605	RD6.2ES82
*	D201, D203	SVC321C2
*	D601 — D604	(SVC321D2) S5566
*	D301 — D303, D407, D501 — D507, D701, D704 — D708, D713, D720 — D726, D740	ISS252
*	D741	RD12ES81

TRANSFORMERS, COILS AND FILTERS

Mark	Symbol & Description	Part No.
	T201	ATB-095
	T601 Power transformer	ATT1065
	L201	ATB-100
	L302	ATB-074
	L105, L301, L402	LAU2R2M
	L701	LAU220K
	F103	ATF-107
	F102	ATF-119
	F801	ATF-146
	F201	ATF1042

CAPACITORS

Mark	Symbol & Description	Part No.
	TC201, TC203	ACM-019
	C705	ACH1023
	C303	CCDSL221J50
	C211	CCMCH070D50
	C403, C404	CCMCH150J50
	C221	CCMCH470J50
	C708	CCMSL101J50
	C512	CEASR22M50
	C304, C310, C401, C412, C418, C707	CEAS010M50
	C511	CEAS1R5M50
	C504	CEAS101M16
	C419	CEAS102M16
	C706	CEAS2R2M50
	C236	CEAS221M10
	C802	CEAS332M35
	C222, C223, C235, C309, C501, C508 — C510, C702, C801	CEAS4R7M50
	C415, C416, C603, C506	CEAS470M10
	C226, C231, C311, C313, C402, C406, C410, C417, C430, C503, C505, C604	CEAS470M16
	C408	CFTXA224J50
	C237, C407	CKDYB103K50
	C109, C201, C220, C224, C232, C405, C413	CKDYF103Z50
	C129, C202, C212, C213, C227, C301, C302, C305 — C308, C312, C409, C513, C530	CKDYF223Z50
	C230, C420, C502, C601, C605, C704	CKDYF473Z50
	C234	CKDYX104M25
	C233	CKDYX153M25
	C225, C414	CKDYX473M25
	C229, C506, C507	CKMYB102K50
	C802	CKMYB651K50
	C228	CKMYF102Z50
	C210	CGSA431J50
	C514	CGSA471J50

RESISTORS

Mark	Symbol & Description	Part No.
*	VR502 Semi-fixed (4-7kΩ)	VRTB6V5472
	R601 Fuseble	RF/A1/4P5390J
	R430 — R453	RN1/4PQ□□□□F
	R228, R239, R303, R401, R502, R504 — R508, R511, R512, R523 — R526	RD1/4PMD□□□□
	Other resistors	RD1/8PMD□□□□

OTHERS

Mark	Symbol & Description	Part No.
*	X401 Crystal resonator	ASS1005
*	X701 Ceramic resonator	ASS1015
*	X201 Ceramic resonator	ATF1027
	2P antenna terminal (PAL)	AKA1011
	2P pin jack	AKB1039

Front panel Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
**	IC702	PD0012A
*	D731 — D733	1SS252

SWITHES

Mark	Symbol & Description	Part No.
**	S701 — S707, S711 — S717, S721 — S727	ASG-711
	Tact switch SILENT SERVO, UP, DOWN, CCTS, BAND, SIG, AM SERVO, FM-MONO, MEMORY, 1/13 — 12/24	

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/8PM333J

OTHERS

Mark	Symbol & Description	Part No.
*	V701 Fluorescent tube	AAV1031

Power IND Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
*	D804 LED assembly	AEL1004

LED Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
*	D801 LED assembly	AEL1004
*	D802, D803 LED assembly	AEL1015

Power SW Assembly

SWITCH

Mark	Symbol & Description	Part No.
**	S601 Push switch (POWER)	ASG-413

FE Assembly (AWB1009)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
**	Q902	2SC2688
**	Q905	2SC2786
**	Q901, Q903, Q904	2SK241
*	D901 — D904	1SV147-4

TRANSFORMERS AND COILS

Mark	Symbol & Description	Part No.
	T901	ATC-184
	T902	ATE-063
	L903	ATC-247
	L901	ATC1001
	L904	ATC1003
	L902	ATC1010
	L905, L906	LAU2R2M

CAPACITORS

Mark	Symbol & Description	Part No.
	TC901	ACM-014
	C908	CCDCH010C50
	C909, C910	CCDCH020C50
	C917	CCDCH050C50
	C915	CCDCH080D50
	C913	CCDCH150J50
	C914	CCDCH330J50
	C901	CCDRH1000J50
	C905	CCDRH330J50
	C902, C904, C906	CCDRH390J50
	C911	CCDSL101J50
	C916	CCDTH180J50
	C903, 912, C918, C919	CKDYF103Z50
	C907	CKDYF223Z50

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/8PM□□□□

• LED Assembly

The LED Assembly (F-X440L) is the same as the LED Assembly (F-443L) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		LED Assembly (F-443L)	LED Assembly (F-X440L)	
*	D802	AEL1015	AEL1065	
*	D803	AEL1015	AEL1004	

• Power SW Assembly

The Power SW Assembly (F-X440L) is the same as the Power SW Assembly (F-443L) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		Power SW Assembly (F-443L)	Power SW Assembly (F-X440L)	
**	S601 (Power SW)	ASG-413	SUN6LB2S	

10.FOR F-443/HEZ AND F-443-S/HEZ TYPES

10.1 CONTRAST OF MISCELLANEOUS PARTS

NOTES:

- Parts without part number cannot be supplied.
- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your parts Stock Control, the fast moving items are indicated with the marks ** and *.
- ** GENERALLY MOVES FASTER THAN *
- This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- Parts marked by "●" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

The F-443/HEZ and F-443-S/HEZ types are the same as the F-443L/HE type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		F-443L/HE	F-443/HEZ	F-443-S/HEZ	
Δ	Main assembly	AWZ1938	AWZ1931	AWZ1931	
	FE assembly		AWB1009	AWB1009	
	AC power cord	ADG1021	ADG1010	ADG1010	
	Front panel assembly	ANB1202	ANB1203	ANB1209	
	Panel base assembly	AMD1026	AMD1026	AMD1027	
	Power knob	AAD1343	AAD1343	AAD1344	
	Bonnet	AZN1744	AZN1745	AZN1803	
	Antenna set	AEA1002	...	...	
	FM antenna assembly	...	ADH1002	ADH1002	
	Loop antenna assembly	...	ATB-102	ATB-102	
	Packing case	AHD1404	AHD1405	AHD1410	
	Screw	...	BBT30P080F2K	...	
	Screw	...	ABA1035	ABA1035	
	Screw	...	...	ABA-274	
	Operating instructions (BL)	ARE1079	...	...	
	Operating instruction (Spanish)	...	ARC1104	ARC1104	

11. SPECIFICATIONS

[F-443-F-443L]	
FM Tuner Section	
Frequency range	87.5 MHz to 108 MHz
Usable Sensitivity	14.2 dBf, IHF (1.4µV/75Ω)
50 dB Quieting Sensitivity	Stereo: 38.2 dBf, IHF (17.7µV/75Ω)
Sensitivity (DIN)	Mono: 0.9µV/75Ω
	Stereo: 50µV/75Ω
Signal-to-Noise Ratio (SILENT SERVO ON)	Mono: 80 dB (at 80 dBf)
Signal-to-Noise Ratio (DIN)	Stereo: 78 dB (at 80 dBf)
(SILENT SERVO ON)	Mono: 66 dB
	Stereo: 60 dB
Distortion	0.4% (1 kHz)
Alternate Channel Selectivity	65 dB (400 kHz)
Stereo Separation	45 dB (1 kHz)
Frequency Response	30 Hz to 15 kHz ±1 dB
Antenna Input	300Ω balanced 75Ω unbalanced

MW Tuner Section	
Frequency range	531 kHz to 1,602 kHz
Sensitivity (IHF, Loop antenna)	300µV/m
Selectivity	20 dB
Signal-to-Noise Ratio	50 dB
Antenna	Loop Antenna

[F-X440-F-X440L]	
FM Tuner Section	
Frequency range	87.5 MHz to 108 MHz
Usable Sensitivity	14.2 dBf, IHF (1.4µV/75Ω)
50 dB Quieting Sensitivity	Stereo: 36.2 dBf, IHF (17.7µV/75Ω)
Sensitivity (DIN)	Mono: 0.9µV/75Ω
	Stereo: 50µV/75Ω
Signal-to-Noise Ratio (SILENT SERVO ON)	Mono: 80 dB (at 80 dBf)
Signal-to-Noise Ratio (DIN)	Stereo: 76 dB (at 80 dBf)
(SILENT SERVO ON)	Mono: 66 dB
	Stereo: 60 dB
Distortion	0.4% (1 kHz)
Alternate Channel Selectivity	65 dB (400 kHz)
Stereo Separation	45 dB (1 kHz)
Frequency Response	30 Hz to 15 kHz ±1 dB
Antenna Input	300Ω balanced 75Ω unbalanced

MW Tuner Section	
Frequency range	531 kHz to 1,602 kHz
Sensitivity (IHF, Loop antenna)	300µV/m
Selectivity	20 dB
Signal-to-Noise Ratio	50 dB
Antenna	Loop Antenna

LW Tuner Section (F-443L only)	
Frequency range	153 kHz to 281 kHz
Sensitivity (IHF, loop antenna)	1,000µV/m
Antenna	Loop Antenna

Audio Section	
Output	
FM (100% MOD)	650 mV/5.1 kΩ
AM (30% MOD)	150 mV/5.1 kΩ

Miscellaneous	
Power Requirements	a.c. 220 Volts ~, 50/60 Hz
Power Consumption	10 W
Dimensions	420 (W)×85.5 (H)×318 (D) mm
Weight (without package)	3.5 kg

Furnished Parts	
FM T-type Antenna	1
AM Loop Antenna	1
Pin plug connecting cord	1
Operating instructions	1

LW Tuner Section (F-X440L only)	
Frequency range	153 kHz to 281 kHz
Sensitivity (IHF, loop antenna)	1,000µV/m
Antenna	Loop Antenna

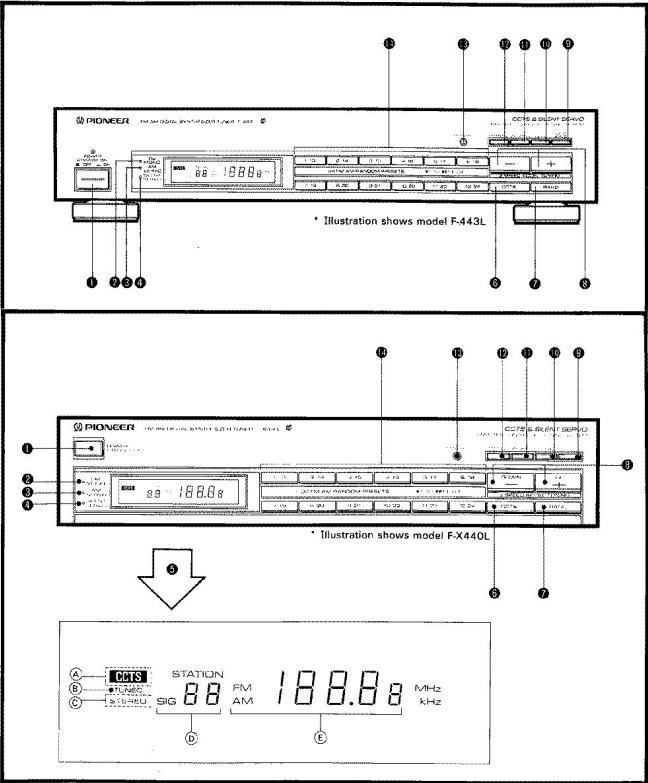
Audio Section	
Output	
FM (100% MOD)	650 mV/5.1 kΩ
AM (30% MOD)	150 mV/5.1 kΩ

Miscellaneous	
Power Requirements	a.c. 220 Volts ~, 50/60 Hz
Power Consumption	10 W
Dimensions	360 (W)×75 (H)×333 (D) mm
Weight (without package)	3.2 kg

Furnished Parts	
FM T-type Antenna	1
AM Loop Antenna	1
Pin plug and Miniplug connecting cord	1
Operating instructions	1

NOTE:
Specifications and design subject to possible modification without notice due to improvements.

12. PANEL FACILITIES



1 SIGNAL switch

When this switch is pressed, the operation display will show a digital number "0" - "9". The size of the number corresponds to the strength of the reception signal, "9" representing the strongest, and "0" when there is no signal. In this way, this function can be used when installing an antenna to allow orientation of the antenna for optimum reception.

2 AM SERVO switch

When this switch is on (as confirmed by the AM SERVO indicator), the AM SERVO circuit operates to minimize distortion on the AM (MW or LW) band.

3 FM MONO switch

Normally, when receiving an FM stereo broadcast, leave this switch OFF. If the broadcast station is distant, or if you are in a poor reception area, the input signals will be weak, and during stereo reception, noise will be prominent, making the broadcast difficult to hear. In such a case, press ON this switch. The broadcast will be reproduced in monaural, however noise will be reduced, enabling the broadcast to be heard more clearly.

NOTE:

- This switch does not function when you are listening to an AM (MW or LW) broadcast.
- The ON or OFF status of the FM MONO switch will be memorized when you preset a station in the STATION CALL switch. By using the PRESETTING FM AND AM (MW or LW) STATIONS function, you can receive an FM broadcast at any time in the same mode.

4 MEMORY switch

This is used to memorize stations.

5 STATION CALL switches

These are used to preset and recall broadcasting stations.

1 POWER (STANDBY/ON) switch

When this switch is set to the on position, power is supplied to the tuner's main circuits. The POWER unit's switch is geared to selecting the transformer's secondary so that even in STANDBY position, the unit's circuitry will work as long as the power cord is connected to a power outlet. Disconnect the power cord from the power outlet when you do not plan to use the unit for a long period of time.

NOTE:

- The memory will be backed up so long as the power cord is not unplugged.
- If the power cord is unplugged, the memory will be retained for several days.

2 FM MONO indicator (During FM reception)

This lights when the FM MONO switch is turned on.

3 AM SERVO indicator (During AM reception)

This lights when the AM SERVO switch is turned on.

4 SILENT SERVO indicator (During FM reception)

This lights when the SILENT SERVO switch is turned on.

5 DISPLAY SECTION

- A CCTS indicator
This lights when the CCTS switch is turned on.
- B TUNED indicator
This lights to confirm fine tuning.
- C STEREO indicator (FM)
This lights to confirm reception of an FM stereo broadcast.
- D STATION/SIGNAL display
Shows preset station number (1-24). Shows signal strength (0-9) when the SIGNAL switch is pressed.
- E Frequency display

6 CCTS switch

(Computer controlled tuning system)
When this switch is set to ON (the CCTS indicator lights), the unit's built-in microcomputer automatically performs the optimum tuning for the station received.

7 BAND switch

Each time this switch is pressed, FM, AM (MW or LW) reception is selected alternately.
FM and MHz light: FM reception.
AM and kHz light: AM (MW or LW) reception.

8 TUNING switches (DOWN -, UP +)

These are used to locate stations. Push the "DOWN -" switch to locate a station broadcasting on a lower frequency and the "UP +" switch to locate a station broadcasting on a higher frequency.

9 SILENT SERVO switch (Operates only during FM reception.)

When this switch is on (as confirmed by the SILENT SERVO indicator), the SILENT SERVO circuit operates after tuning has been completed, cutting out spurious high frequency clock signal harmonics in order to minimize intermodulation (beat) distortion, improve the signal-to-noise ratio, and elevate sound quality.