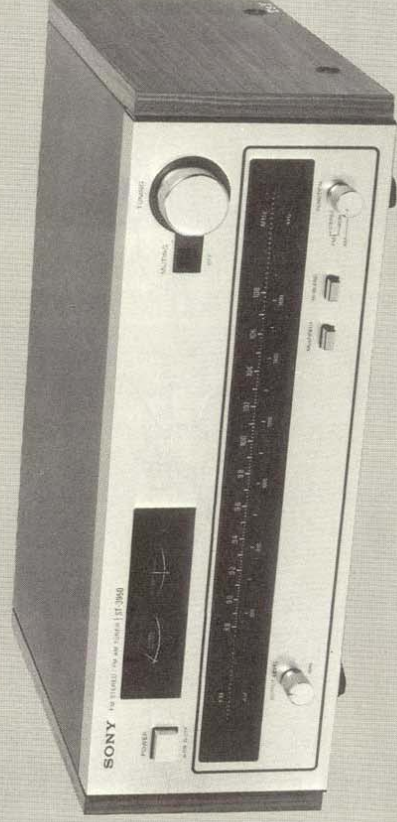


ST-3950

AEP Model

UK Model



FM STEREO/FM-AM TUNER

SPECIFICATIONS

GENERAL

Outputs:	FIXED: 750 mV, 10 k Ω VARIABLE: 0–1.5 V, 1.5 k Ω FM DISCRI: 150 mV, 2.5 k Ω	Harmonic Distortion: at 100 Hz, 1 kHz 0.15 % (MONO) 0.25 % (STEREO) at 10 kHz 0.2 % (MONO) 0.6 % (STEREO)
Power Requirements:	110, 127, 220 or 240 V ac selectable, 50/60 Hz	Stereo Separation: 35 dB at 100 Hz 40 dB at 1 kHz 35 dB at 10 kHz
Power Consumption:	29 W (UK model) 27 W (AEP model)	Frequency Response: 40 Hz – 12.5 kHz +0.3 dB –0.8 dB 19 kHz, 38 kHz Suppression: 60 dB
Dimensions:	Approx. 460 (w) x 170 (h) x 335 (d) mm 18 $\frac{1}{8}$ (w) x 6 $\frac{5}{8}$ (h) x 13 (d) inches including projecting parts and controls	Muting Level: Approx. 5 μ V
Weight:	Approx. 8.0 kg, 17 lb 10 oz (net) 9.8 kg, 21 lb 9 oz (in shipping carton)	

FM SECTION

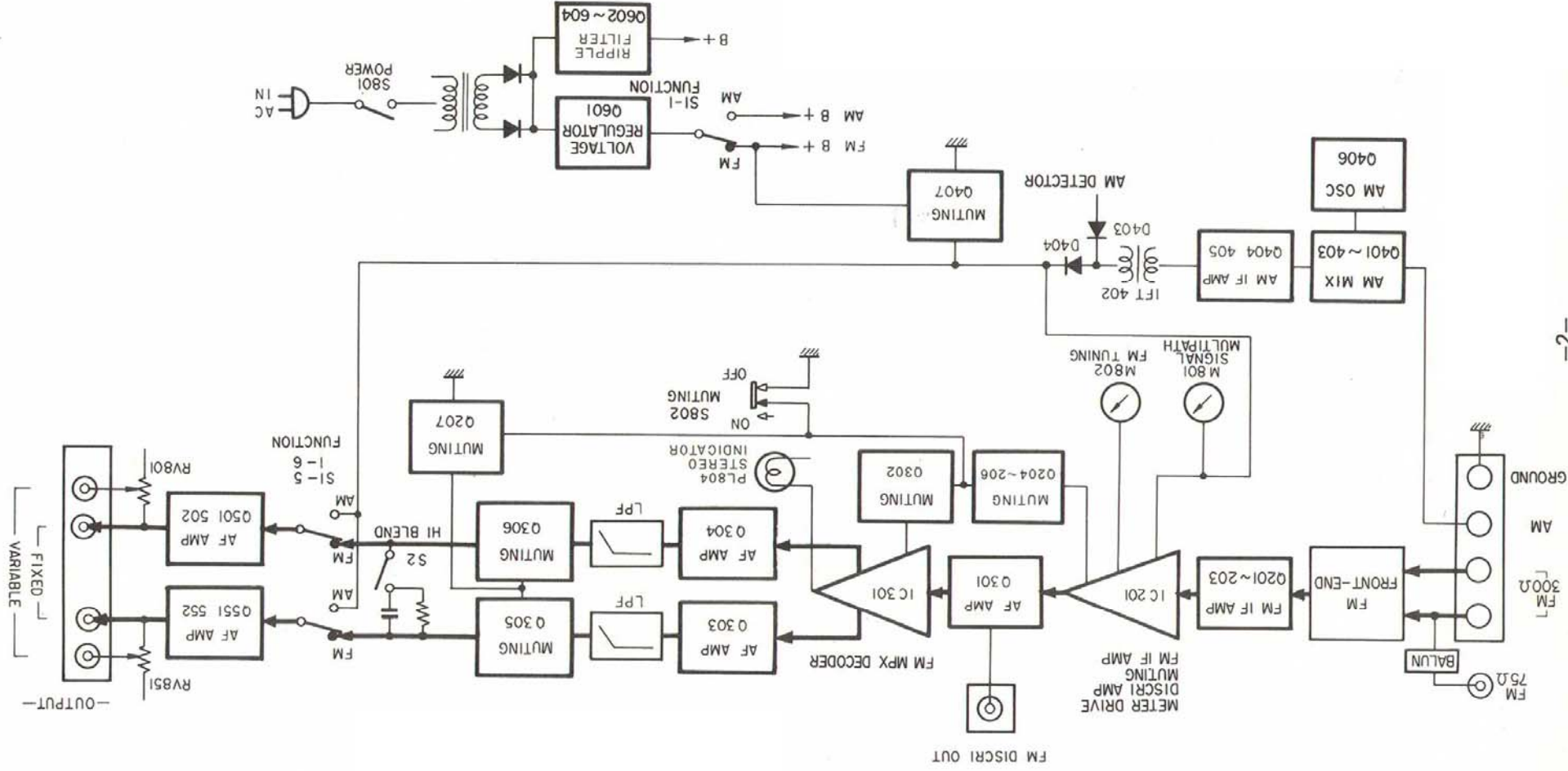
Tuning Range:	87.5 – 108 MHz	Tuning Range: 530 – 1,605 kHz
Antenna Terminals:	300 Ω balanced 75 Ω coaxial cable input	Antenna: Built-in ferrite-rod antenna and external antenna terminal
Intermediate Frequency:	10.7 MHz	Intermediate Frequency: 468 kHz
Usable Sensitivity:	1.7 μ V (MONO), 1HF 1.5 μ V, S/N = 26 dB (40 kHz deviation)	Usable Sensitivity: 250 μ V/m built-in antenna 100 μ V external antenna at 1,000 kHz
Sensitivity at 50 dB Quieting:	3.0 μ V (MONO) 40 μ V (STEREO)	Image Rejection: 40 dB at 1,000 kHz S/N Ratio: 50 dB at 50 mV/m
Sensitivity at 46 dB Quieting (40 kHz deviation):	40 μ V (STEREO)	Harmonic Distortion: 0.5 % at 50 mV/m, 400 Hz IF Rejection: 35 dB at 1,000 kHz
Image Rejection:	80 dB	
IF Rejection:	100 dB	
Spurious Rejection:	90 dB	
AM Suppression:	56 dB	
Capture Ratio:	1.0 dB	
Selectivity:	80 dB	
S/N Ratio:	75 dB (MONO) 70 dB (STEREO)	

SONY®

SERVICE MANUAL

SECTION 1 OUTLINE

1-1. BLOCK DIAGRAM



1-2. DISASSEMBLY

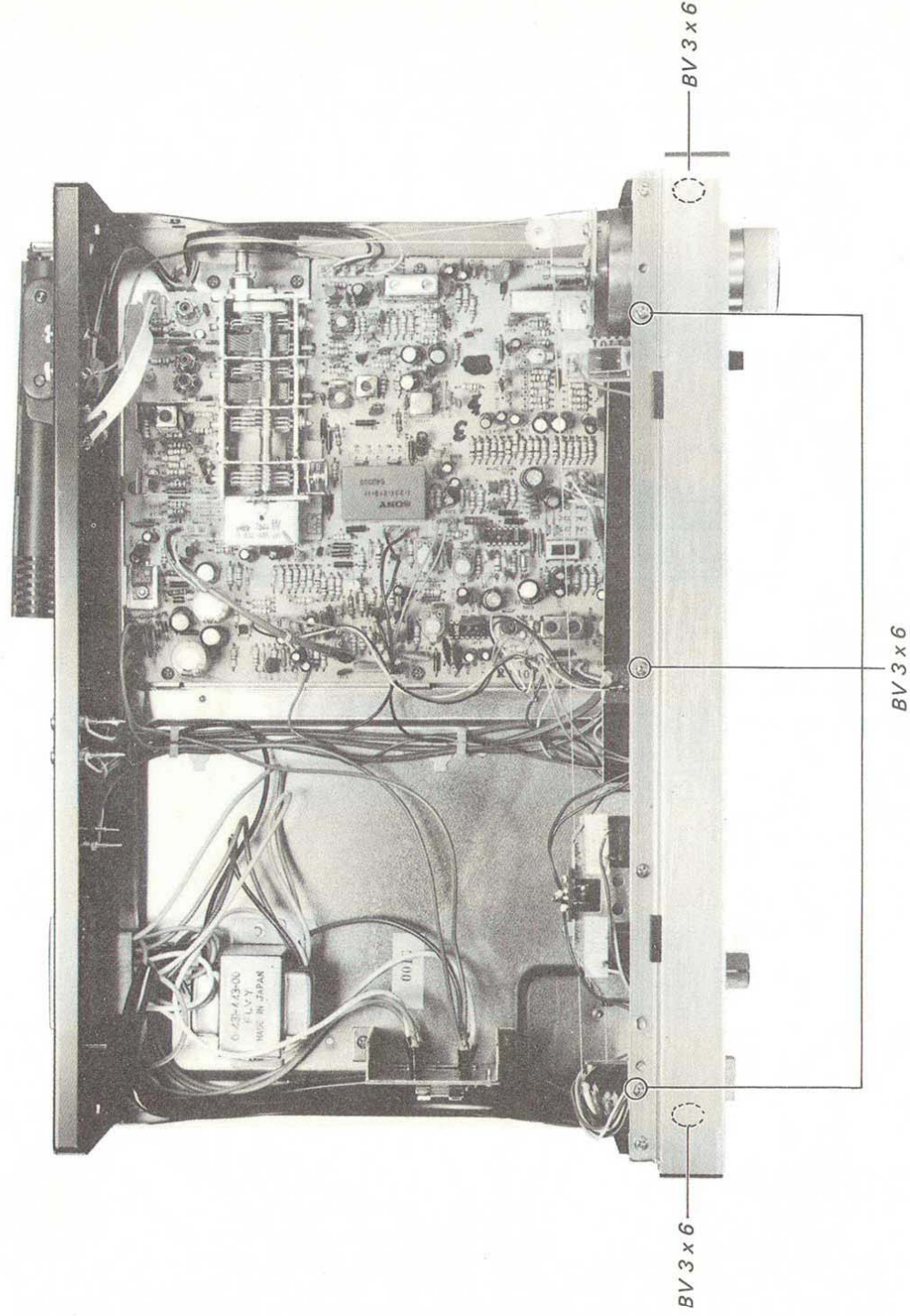
1) Top Cover

Remove four screws (\pm) BW 4 x 22 from both ornamental side boards. Remove both ornamental side boards and top cover.

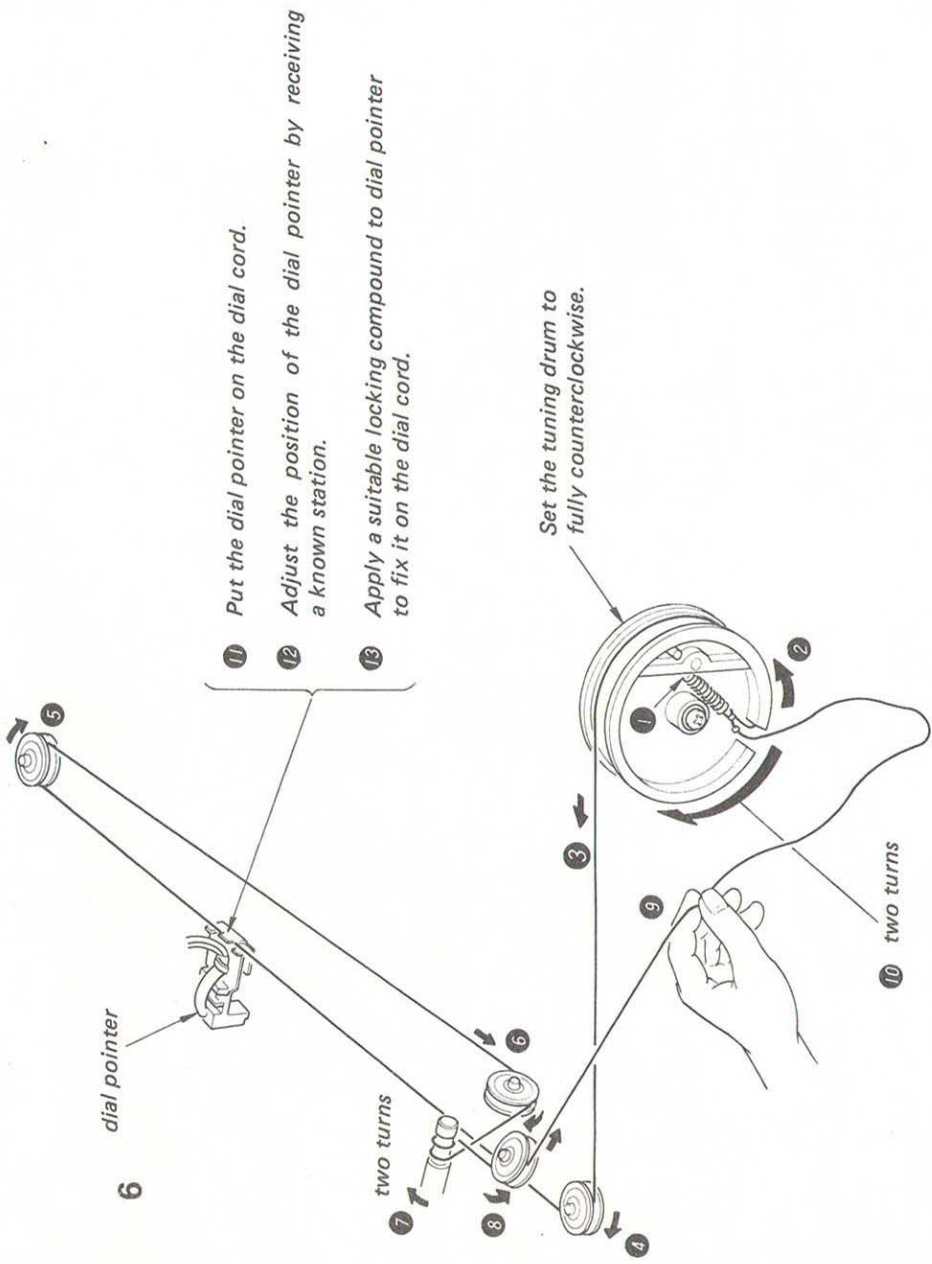
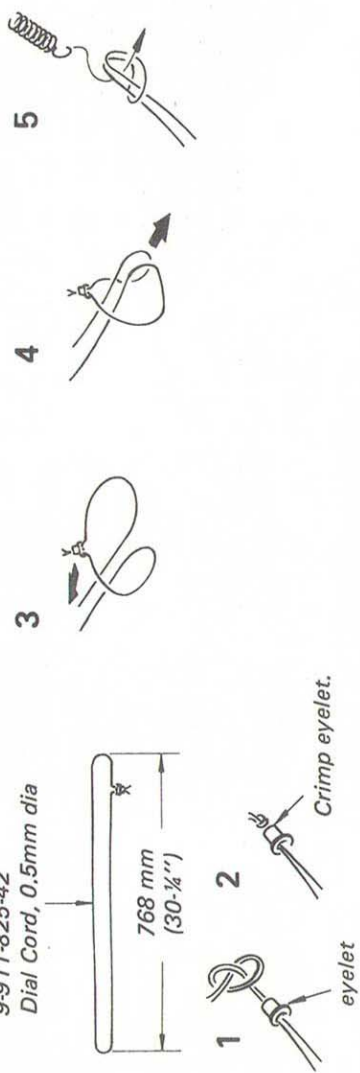
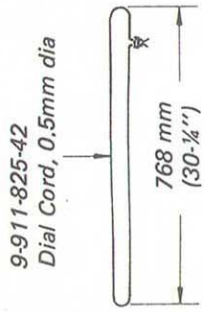
2) Front Panel

Pull off FUNCTION and OUTPUT LEVEL knobs. Remove TUNING knob by loosening the knob screw.

Remove five screws BV 3 x 6 from top and both sides of the front panel.



1-3. DIAL CORD STRINGING



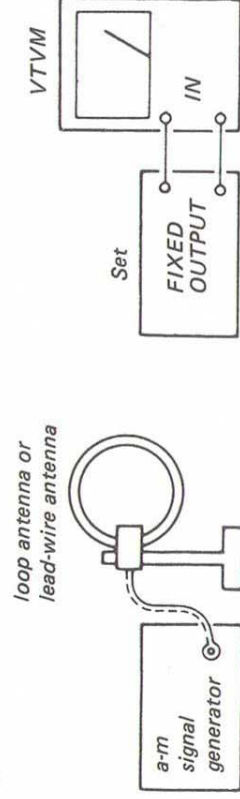
SECTION 2 ADJUSTMENTS

2-1. FM FREQUENCY COVERAGE AND TRACKING ADJUSTMENTS

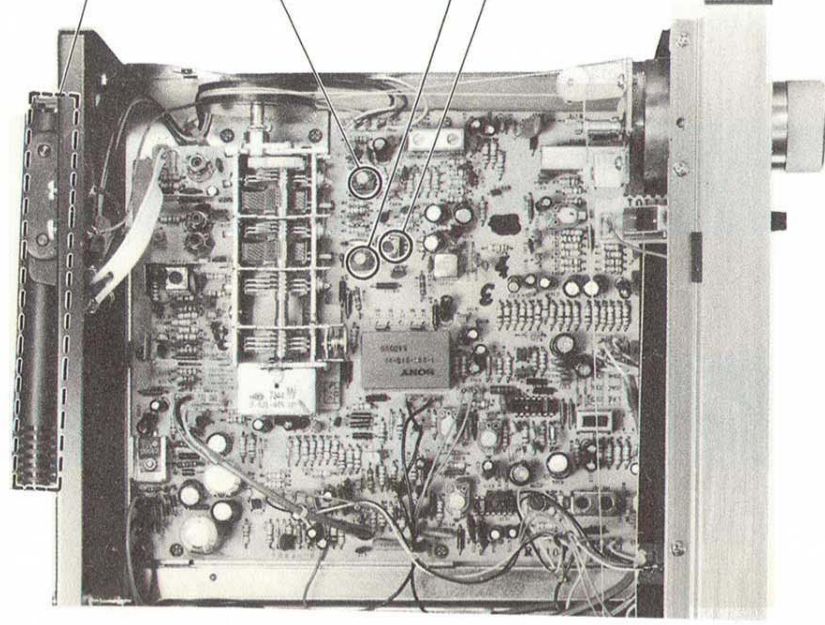
Never attempt alignment of the fm front-end section for the fm frequency coverage and tracking adjustment. If the fm frequency coverage adjustment is required, replace the fm front-end ass'y. In the case of tracking alignment, ask your nearest SONY Service Station to send your unit to the Factory Service Center.

2-2. AM FREQUENCY COVERAGE AND TRACKING ADJUSTMENTS

Test setup:



Adjust for maximum reading.



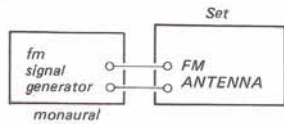
AM TRACKING	
L801	600kHz(modulated)
CT401	1,400kHz(modulated)

AM FREQUENCY COVERAGE	
CT402	1,605kHz(modulated)
L402	530kHz(modulated)

2-3. FM ADJUSTMENTS

SIGNAL METER ADJUSTMENT

Test setup:

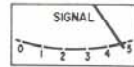


FM Signal Generator Setting:

Carrier frequency: 98 MHz
 Modulation: 400 Hz, 75 kHz deviation (100 %)
 Output level: 1 mV (60 dB)

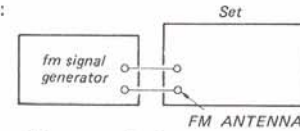
Procedure:

Tune the tuner to 98MHz and adjust RT202 for the pointer deflection of 4.6 (See figure below.) on the SIGNAL meter.



MUTING ADJUSTMENT

Setup:



FM Signal Generator Setting:

Carrier frequency: 98 MHz
 Modulation: 400 Hz,
 75 kHz deviation (100 %)
 Output level: 1 mV (60 dB)

Procedure:

1. Turn the MUTING switch ON.
2. Adjust RT203 so that the muting circuit begins to operate at the symmetrical deflection point of TUNING meter when detuning the tuner to higher or lower frequencies than 98 MHz.

DISCRIMINATOR ALIGNMENT

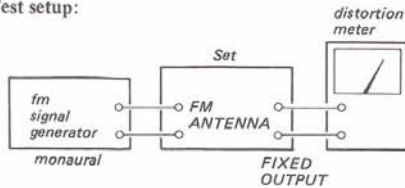
Procedure:

1. Detune the tuner.
2. Adjust the secondary-side core (blue) of IFT201 for zero center on the TUNING meter.



MONAURAL DISTORTION ADJUSTMENT

Test setup:



FM Signal Generator Setting:

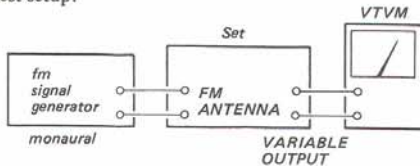
Carrier frequency: 98 MHz
 Modulation: 400 Hz, 75 kHz deviation (100 %)
 Output level: 1 mV (60 dB)

Procedure:

Tune the tuner to 98MHz and adjust the primary-side core (black) of IFT201 for minimum reading on the distortion meter.

FM OUTPUT LEVEL ADJUSTMENT

Test setup:



FM Signal Generator Setting:

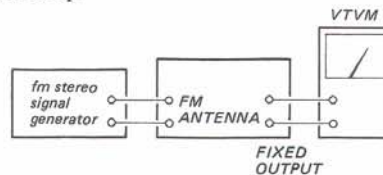
Carrier frequency: 98 MHz
 Modulation: 400 Hz, 75 kHz deviation (100 %)
 Output level: 1 mV (60 dB)

Procedure:

Set OUTPUT LEVEL control to max and adjust RT201 for 1.6V (6dB) on the VTVM.

FM STEREO SEPARATION ADJUSTMENT

Test setup:



FM Stereo Signal Generator Setting:

Carrier frequency: 98 MHz
 Mode: Stereo
 Audio (400 Hz) Mod: 67.5 kHz (90 %)
 Pilot (19 kHz) Mod: 7.5 kHz (10 %)

Procedure:

1. Tune the tuner to 98 MHz.
2. Adjust RT501 for maximum output on the VTVM at the left channel, and record the output level.
3. Record the residual signal level when the stereo signal generator input selector is to the right.

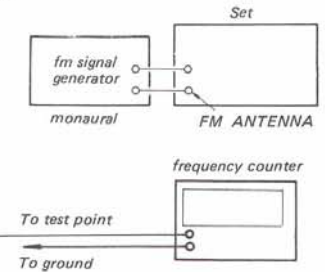
Note: The output level to residual-level ratio represents the separation.

4. Measure the separation at the right channel.
5. Readjust RT501 for minimum difference between left and right channel separation.

19 kHz ADJUSTMENT

A) With Frequency Counter

Setup:



FM Signal Generator Setting:

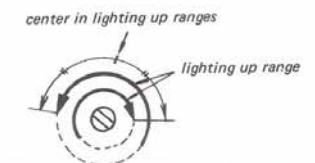
Carrier frequency: 98 MHz
 Modulation: 400 Hz,
 75 kHz deviation (100 %)
 Output level: 1 mV (60 dB)

Procedure:

1. Tune the set to 98 MHz.
2. Adjust RT301 for 19kHz \pm 100Hz on the counter.

B) Without Frequency Counter

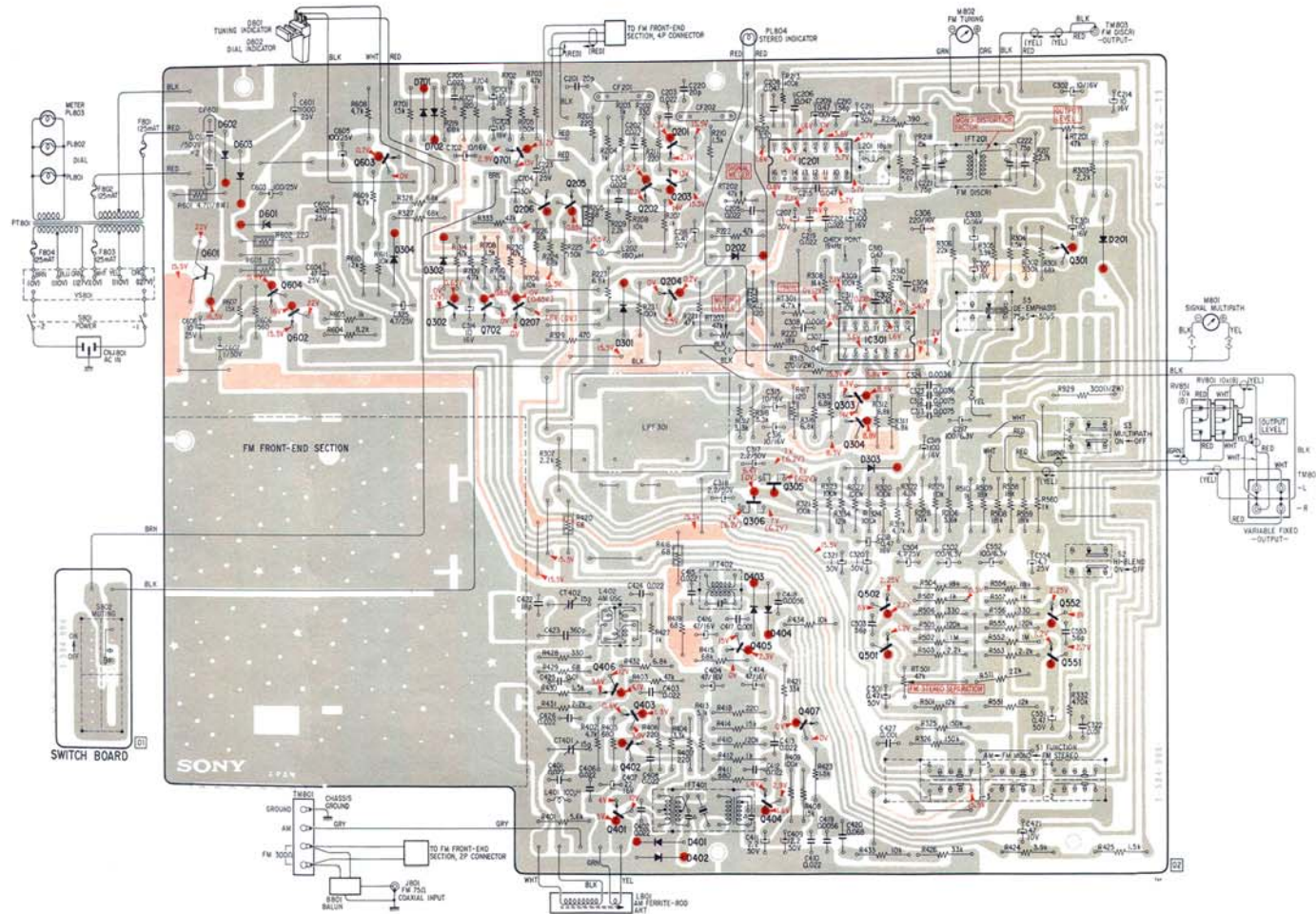
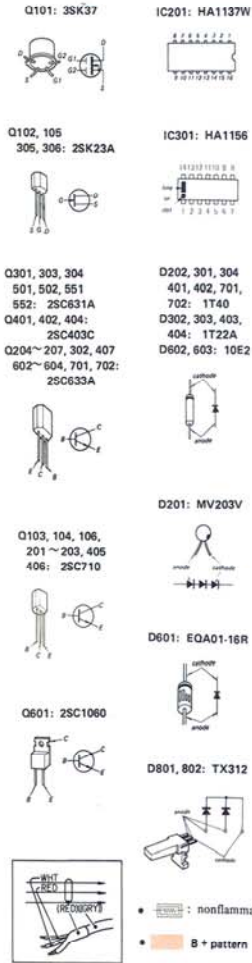
1. Tune the set to FM stereo signals.
2. Turn RT301 clockwise or counterclockwise and secure RT301 at the center in lighting-up range of stereo lamp as shown below.



SECTION 3 DIAGRAMS

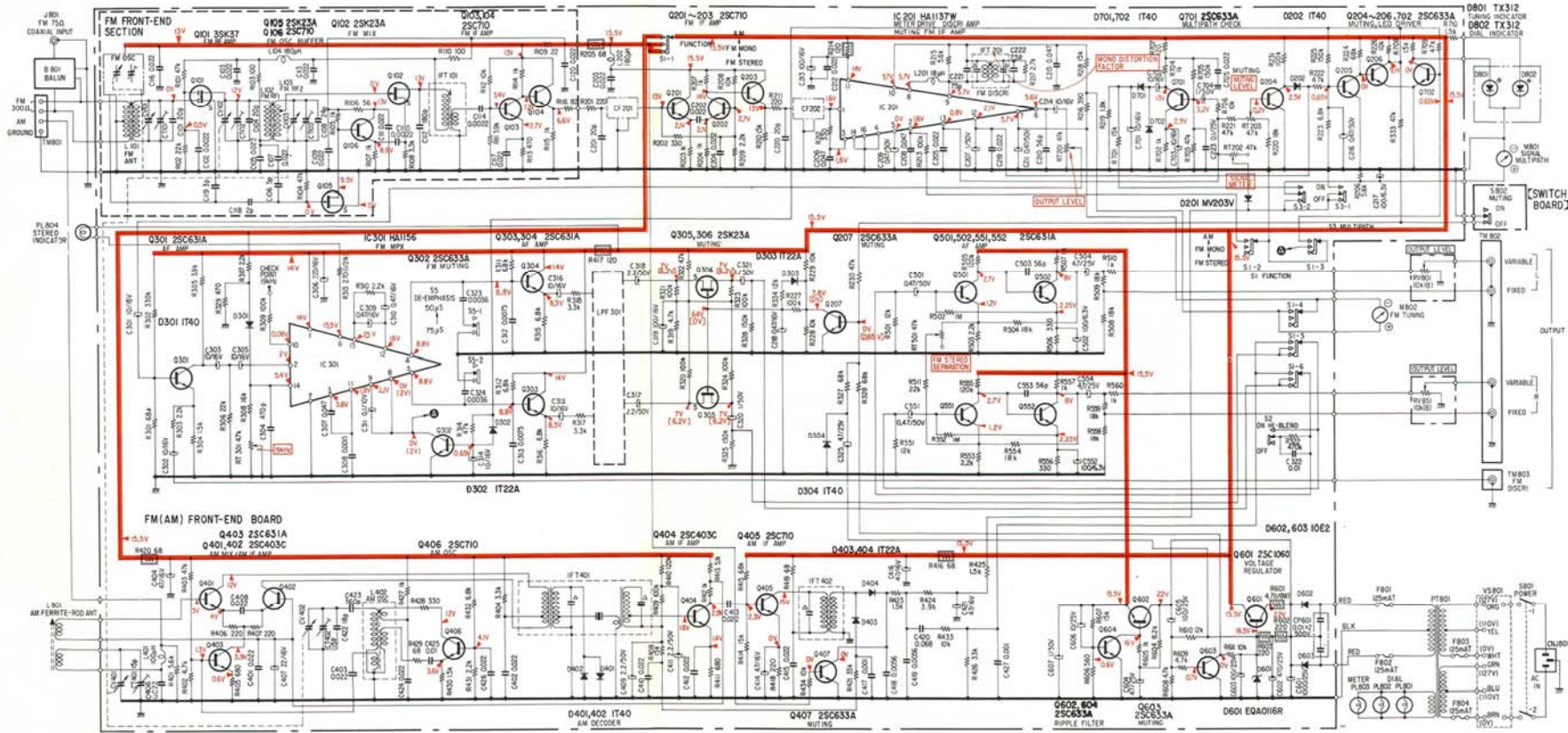
3-1. MOUNTING DIAGRAM

— Conductor Side —



Q,IC	D
	701 702
	603 602
	201
	302
	301
	304
	601
	303
	604 305
	702 203
	204
	301
	IC301
	303
	304
	305
	306
	502
	403 404
	552
	405 501
	501
	403
	407
	402
	404
	401
	402

3.2. SCHEMATIC DIAGRAM



- Notes:
- All capacitors are in μF unless otherwise noted. 50 or less working volts are omitted except for electrolytic type. $p = \mu\text{F}$
 - All resistors are in Ω , $\text{k}\Omega$, M , unless otherwise noted. $k = 1,000$, $M = 1,000,000$
 - \square indicates nonflammable resistor.
 - \triangle indicates internal components.
 - --- indicates chassis ground.
 - --- indicates B+ circuit.
 - Voltages are DC with respect to ground unless otherwise noted. Readings are taken under no-signal conditions with a VOM (20k Ω/V).
 - no mark: common
 - () : STEREO
 - --- : MUTING ON
 - Voltage variations may be noted due to normal production tolerances.
 - Switch Model

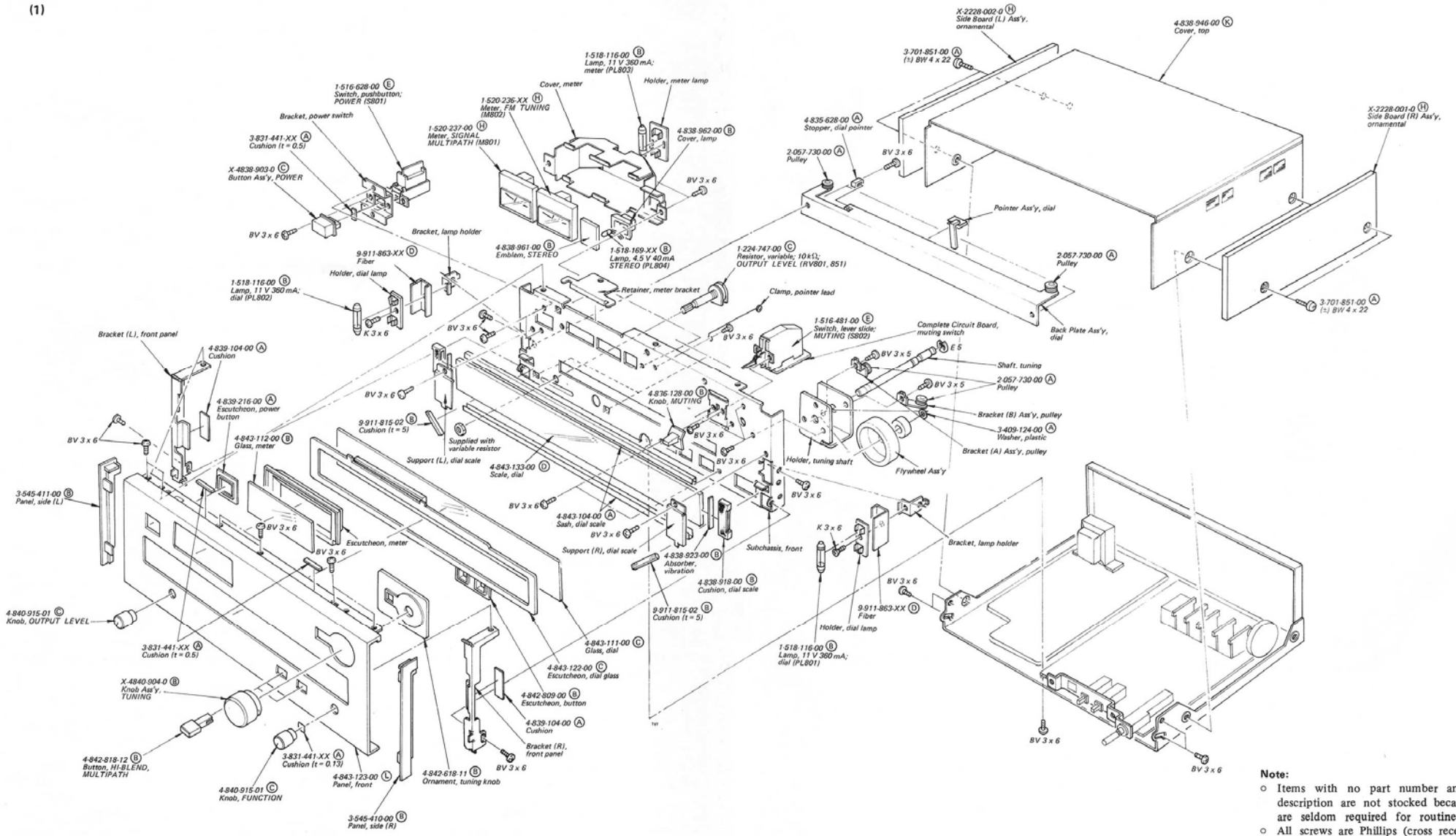
Ref. No.	Switch	Position
S1-1 ~ 6	FUNCTION	FM STEREO
S2	HI-BLEND	OFF
S3-1, 2	MULTIPATH	OFF
S5	DE-EMPHASIS	50 μs
S801	POWER	OFF
S802	MUTING	OFF

MEMO

SECTION 4 EXPLODED VIEWS

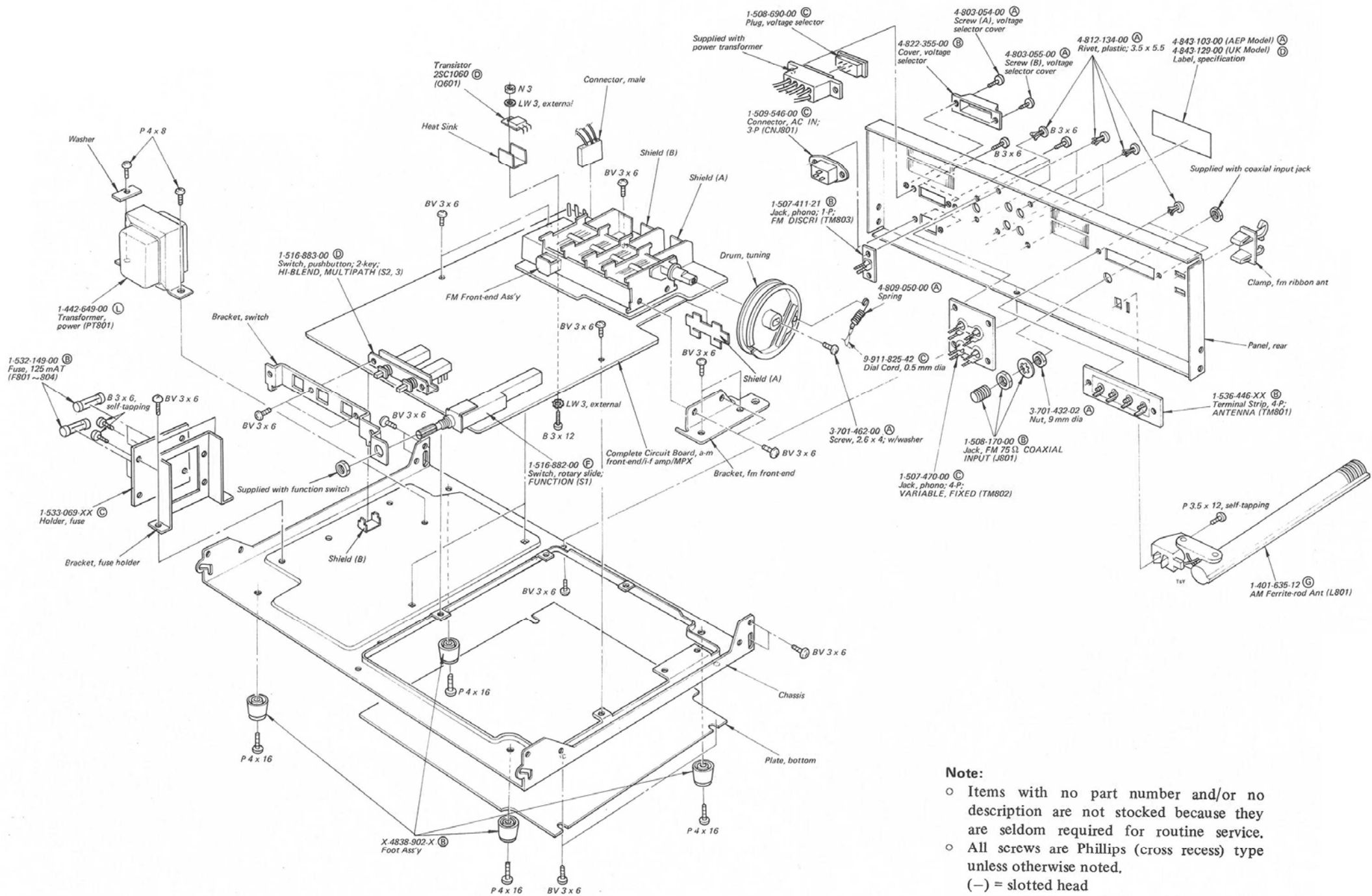
A B C D E F G H

(1)



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
- (-) = slotted head
- The circled letters (A) to (Z) are applicable for European models only.



Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
- (-) = slotted head
- The circled letters (A to Z) are applicable for European models only.

Note: The circled letters (A) to (Z) are applicable for European models only.

SECTION 5 ELECTRICAL PARTS LIST

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
SEMICONDUCTORS		
Transistors		
Q101	(E) 3SK37	
Q102	(C) 2SK23A	
Q103, 104	(B) 2SC710	
Q105	(C) 2SK23A	
Q106	(B) 2SC710	
Q201 ~ 203	(B) 2SC710	
⇒Q204 ~ 207	(B) 2SC634A	
⇒Q301	(B) 2SC632	
⇒Q302	(B) 2SC634A	
⇒Q303, 304	(B) 2SC632	
Q305, 306	(C) 2SK23A	
Q401, 402	(B) 2SC403C	
⇒Q403	(B) 2SC632	
Q404	(B) 2SC403C	
Q405, 406	(B) 2SC710	
Q407	(B) 2SC634A	
Q501, 551	(B) 2SC632A	
Q502, 552		
Q601	(D) 2SC1060	
Q602 ~ 604	(B) 2SC634A	
Q701, 702	(B) 2SC634A	
ICs		
IC201	(H) HA1137W	
IC301	(J) HA1156	
Diodes		
D201	MV203V	
⇒D202	(B) 1S1555	
⇒D301	(B) 1S1555	
D302, 303	1T22A	
⇒D304	(B) 1S1555	
⇒D401, 402	(B) 1S1555	
D403, 404	(B) 1T22A	
D601	(B) EQA0116R	
D602, 603	(B) 10E2	
⇒D701, 702	(B) 1S1555	
D801, 802	(H) TX312	

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
COILS		
L101	1-401-662-00	(B) FM Antenna
L102	1-425-925-00	(B) FM RF
L103	1-425-926-00	(B) FM RF
L104	1-407-172-XX	(A) Microinductor, 180 μ H
L201	1-459-152-00	(B) Microinductor, 18 μ H
L202	1-407-172-XX	(A) Microinductor, 180 μ H
L401	1-407-169-XX	(A) Microinductor, 100 μ H
L402	1-405-656-00	(B) AM Osc
L801	1-401-635-12	(G) AM Ferrite-rod Ant
TRANSFORMERS		
B801	1-417-014-21	(A) Balun
IFT101	1-403-295-00	(B) FM IFT
IFT201	1-404-029-00	(C) FM Discriminator
IFT401	1-404-014-21	(D) AM IFT
IFT402	1-403-149-00	(B) AM IFT
PT801	1-442-649-00	(L) Power
CF201, 202	1-527-248-00	(H) Ceramic, 10.7 MHz
LPF301	1-231-219-00	(D) Low-pass
FILTERS		
CAPACITORS		
All capacitors are in μ F and of ceramic unless otherwise noted. (p = μ μ F, elect = electrolytic) 50 or less working volts are omitted except for electrolytic type.		
C101	1-101-981-11	(A) 20p
C102	1-102-257-11	(A) 0.0022
C103	1-101-924-11	(A) 0.022
C104	1-101-981-11	(A) 20p
C105	1-101-924-11	(A) 0.022
C106	1-102-864-11	(A) 5p
C107	1-101-924-51	(A) 0.022
C108	1-102-642-11	(A) 24p
C109	1-101-924-11	(A) 0.022
C110	1-101-919-11	(A) 0.0022
C111	1-101-924-11	(A) 0.022
C112	1-102-848-11	(A) 180p
C113	1-101-924-11	(A) 0.022
C114	1-101-919-11	(A) 0.0022
C116, 117	1-101-924-11	(A) 0.022

⇒ Due to replacement parts, the values are different from the diagrams.

Note: The circled letters (A) to (Z) are applicable for European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
C118	1-102-406-11	(A) 2p	C409	1-121-450-11	(A) 2.2 50V elect
C119	1-102-503-11	(A) 3p	C410	1-101-924-11	(A) 0.022
C120	1-101-924-11	(A) 0.022	C411	1-121-450-11	(A) 2.2 50V elect
C201	1-101-974-11	(A) 20p	C412, 413	1-101-924-11	(A) 0.022
C202 ~ 205	1-101-924-11	(A) 0.022	C414	1-121-409-11	(A) 47 16V elect
C206	1-101-925-11	(A) 0.047	C415	1-101-924-11	(A) 0.022
C207	1-121-391-11	(A) 1 50V elect	C416	1-121-409-11	(A) 47 16V elect
C208	1-101-925-11	(A) 0.047	C417	1-108-227-12	(A) 0.001 mylar
C209	1-121-726-11	(A) 0.47 50V elect	C418, 419	1-108-355-12	(A) 0.0056 mylar
C210	1-101-884-11	(A) 56p	C420	1-108-249-12	(A) 0.068 mylar
C211	1-121-726-11	(A) 0.47 50V elect	C421	1-121-352-11	(A) 47 10V elect
C212	1-101-924-11	(A) 0.022	C422	1-102-953-11	(A) 18p
C213	1-121-415-11	(A) 100 16V elect	C423	1-103-714-11	(A) 360p 50V polystyrol
C214	1-121-651-11	(A) 10 16V elect	C424	1-101-924-11	(A) 0.022
C215	1-101-925-11	(A) 0.047	C425	1-108-239-12	(A) 0.01 mylar
C216	1-121-726-11	(A) 0.47 50V elect	C426	1-101-924-11	(A) 0.022
C217	1-121-413-11	(A) 100 6.3V elect	C427	1-108-227-12	(A) 0.001 mylar
C218	1-127-204-11	(B) 0.47 16V solid aluminum	C501, 551	1-121-726-11	(A) 0.47 50V elect
C219	1-101-924-11	(A) 0.022	C502, 552	1-121-413-11	(A) 100 6.3V elect
C220	1-101-974-11	(A) 20p	C503, 553	1-101-884-11	(A) 56p
C221, 222	1-102-732-11	(A) 75p	C504, 554	1-121-395-11	(A) 4.7 25V elect
C223	1-161-038-11	(A) 0.1 25V ceramic (boundary layer)	C601	1-123-066-11	(B) 1000 25V elect
C301 ~ 303	1-121-651-11	(A) 10 16V elect	C602	1-121-940-11	(B) 470 25V elect
C304	1-103-717-11	(A) 470p polystyrol	C603	1-121-416-11	(A) 100 25V elect
C305	1-121-651-11	(A) 10 16V elect	C604	1-121-410-11	(B) 47 25V elect
C306	1-121-421-11	(B) 220 16V elect	C605	1-121-416-11	(A) 100 25V elect
C307	1-108-246-12	(A) 0.047 mylar	C606	1-121-398-11	(A) 10 25V elect
C308	1-108-228-12	(A) 0.0015 mylar	C607	1-121-391-11	(A) 1 50V elect
C309, 310	1-127-204-11	(B) 0.47 16V solid aluminum	C701 ~ 703	1-121-651-11	(A) 10 16V elect
C311	1-127-019-11	(A) 0.1 10V solid aluminum	C704	1-121-391-11	(A) 1 50V elect
C312, 313	1-106-022-12	(A) 0.0075 mylar	C705	1-101-924-11	(A) 0.022
C314 ~ 316	1-121-651-11	(A) 10 16V elect	CP601	1-102-355-11	(A) (0.01 500V) x 2
C317, 318	1-121-450-11	(A) 2.2 50V elect	CT401, 402	1-141-147-11	(A) Trimmer, 15p
C319	1-121-415-11	(A) 100 16V elect	RESISTORS		
C320, 321	1-121-391-11	(A) 1 50V elect	All resistors are in ohms. Regular-type 1/4W carbon resistors are omitted.		
C322	1-108-239-12	(A) 0.01 mylar	Check the schematic diagram for the resistance values.		
C323, 324	1-108-568-12	(A) 0.0036 mylar	k = 1000, M = 1000k		
C325	1-121-395-11	(A) 4.7 25V elect	R205	1-211-518-11	(A) 68 1/4W carbon (nonflammable)
C401 ~ 403	1-101-924-11	(A) 0.022	R214	1-211-524-11	(A) 120 1/4W carbon (nonflammable)
C404	1-121-409-11	(A) 47 16V elect			
C406	1-101-924-11	(A) 0.022			
C407	1-121-479-11	(A) 22 16V elect			
C408	1-101-924-11	(A) 0.022			

Note: The circled letters (A) to (Z) are applicable for European models only.

Ref. No. Part No. Description

R313	1-202-559-11	(A) 270	½W	composition
R416	1-211-518-11	(A) 68	¼W	carbon (nonflammable)
R417	1-211-524-11	(A) 120	¼W	carbon (nonflammable)
R420	1-211-518-11	(A) 68	¼W	carbon (nonflammable)
R601	1-211-401-11	(A) 4.7	1/8W	composition (nonflammable)
R602, 603	1-211-538-11	(A) 470	¼W	carbon (nonflammable)
RT201~203	1-224-647-XX	(B) 47k		adjustable
RT301	1-224-644-XX	(B) 4.7k		adjustable
RT501	1-224-647-XX	(B) 47k		adjustable
RV801, 851	1-224-747-00	(C) 10k		variable, OUTPUT LEVEL

SWITCHES

S1	1-516-882-00	(F) Rotary Slide, FUNCTION
S2, 3	1-516-883-00	(D) Pushbutton, 2-key; HI-BLEND, MULTIPATH
S5	1-513-298-00	(B) Slide, de-emphasis
S801	1-516-628-00	(E) Pushbutton, POWER
S802	1-516-481-00	(E) Lever Slide, MUTING

MISCELLANEOUS

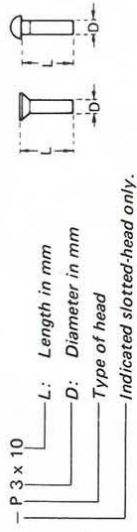
CNJ801	1-509-546-00	(C) Connector, AC IN; 3-p
F801 ~804	1-532-149-00	(B) Fuse, 125mA
J801	1-508-170-00	(B) Jack, FM 75Ω COAXIAL INPUT
M801	1-520-237-00	(H) Meter, SIGNAL/MULTIPATH
M802	1-520-236-XX	(H) Meter, FM TUNING
PL801~803	1-518-116-00	(B) Lamp, 11V 360mA; dial, meter
PL804	1-518-169-XX	(B) Lamp, 4.5V 40mA; STEREO
TM801	1-536-446-XX	(B) Terminal Strip, 4-p; ANTENNA
TM802	1-507-470-00	(C) Jack, phono; 4-p; VARIABLE, FIXED
TM803	1-507-411-21	(B) Jack, phono; 1-p; FM DISCRI
	1-508-690-00	(C) Plug, voltage selector
	1-533-069-XX	(C) Holder, fuse

ACCESSORIES AND PACKING MATERIALS

	<u>Part No.</u>	<u>Description</u>
	X-4490-002-2	(B) Cloth Ass'y, polishing
	1-501-161-00	(F) Ribbon Antenna, fm
	1-508-482-00	(C) Plug, coaxial input jack
	1-534-049-61	(E) Cord, connection; RK-74
	1-534-819-11	(E) Cord, power (UK Model)
	3-429-126-00	Bag, polyethylene
	3-780-851-11	(B) Manual, instruction
	4-838-952-00	Cushion
	4-843-134-00	Carton

HARDWARE NOMENCLATURE

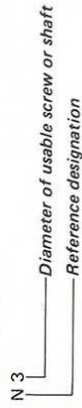
Screw:



Indicated slotted-head only.

Unless otherwise indicated, it means cross-recessed head (Phillips type).

Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self-tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	
F		flat-fillister-head screw	
RF		fillister-head screw	binding-head (B) screw for replacement
BV		braizer-head screw	

