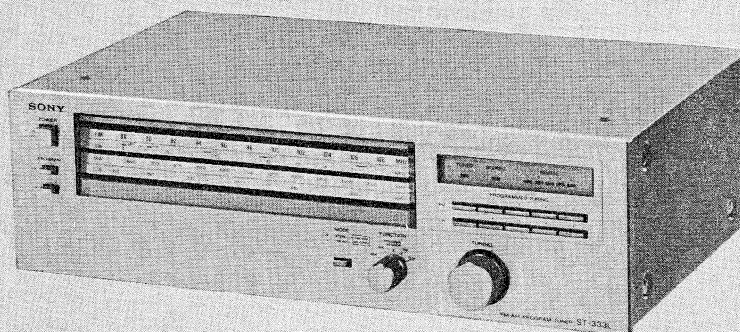


ST-333L

*AEP Model
UK Model
SCN Model*



FM-AM PROGRAM TUNER

SPECIFICATIONS

GENERAL

System:	Superheterodyne FM/AM tuner
Power Requirements:	UK model: 240 V ac (or 220 V ac adjustable by authorized Sony personnel), 50 Hz AEP, SCN model: 220 V ac (or 240 V ac adjustable by authorized Sony personnel), 50 Hz
Power Consumption:	10 W
Dimensions:	Approx. 430 x 135 x 290 mm (W/h/d) (17 x 5¼ x 11½ inches) incl. projecting parts and controls
Weight:	Approx. 4.5 kg (9 lb 15 oz) net Approx. 6.0 kg (13 lb 4 oz) in shipping carton

FM SECTION

Tuning Range:	87.5–108 MHz
Antenna Terminals:	300 Ω balanced 75 Ω unbalanced
Intermediate Frequency:	10.7 MHz
Sensitivity at 50 dB Quieting:	3.5 μ V, 16.1 dBf (mono) 45 μ V, 38.3 dBf (stereo)
Sensitivity at 46 dB Quieting (at 40 kHz deviation):	4.0 μ V (mono) 50 μ V (stereo)

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK  ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

Usable Sensitivity:	IHF 1.9 μ V, 10.8 dBf 1.6 μ V (S/N=26 dB, 40 kHz deviation)
Signal-to-noise Ratio:	75 dB (mono) 70 dB (stereo)
Harmonic Distortion:	0.15% (mono) 0.3% (stereo) at 1 kHz
IM Distortion:	0.15% (mono) 0.3% (stereo)
Separation:	45 dB at 1 kHz
Frequency Response:	40 Hz–12.5 kHz $\begin{smallmatrix} +0.5 \\ -1 \end{smallmatrix}$ dB 30 Hz–15 kHz $\begin{smallmatrix} +0.5 \\ -2 \end{smallmatrix}$ dB
Selectivity at 300 kHz (at 40 kHz Deviation, S/N=26 dB):	55 dB
Capture Ratio:	1.0 dB
AM Suppression Ratio:	54 dB
Image Response Ratio:	45 dB
Spurious Response Ratio:	75 dB
Muting Threshold:	Approx. 5 μ V
Output Level:	380 mV, 12 k Ω (40 kHz deviation)

– Continued on page 2 –

SONY®

SERVICE MANUAL

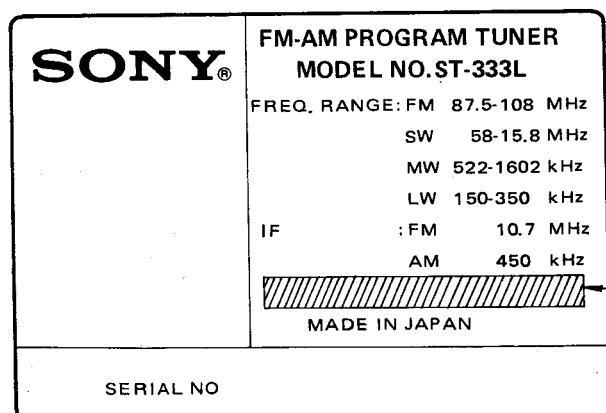
ST-333L

SW/MW/LW/ SECTION

	SW	MW	LW
Tuning range	5.8 MHz—15.8 MHz	522 kHz—1,602 kHz	150 kHz—350 kHz
Antenna	External antenna terminal	Built-in ferrite-rod antenna, External antenna terminal	
Intermediate frequency	450 kHz		
Usable sensitivity	30 μ V, external antenna (10 MHz)	250 μ V/m, built-in antenna (1,000 kHz) 100 μ V, external antenna (1,000 kHz)	500 μ V/m, built-in antenna (230 kHz) 100 μ V, external antenna (230 kHz)
Signal-to-noise ratio	52 dB (at 5 mV)	52 dB (at 50 mV/m)	52 dB (at 50 mV/m)
Harmonic distortion	0.3% (5 mV, 400 Hz)	0.3% (50 mV/m, 400 Hz)	0.3% (50 mV/m, 400 Hz)
Selectivity	50 dB (9 kHz)	50 dB (9 kHz)	50 dB (9 kHz)

MODEL IDENTIFICATION

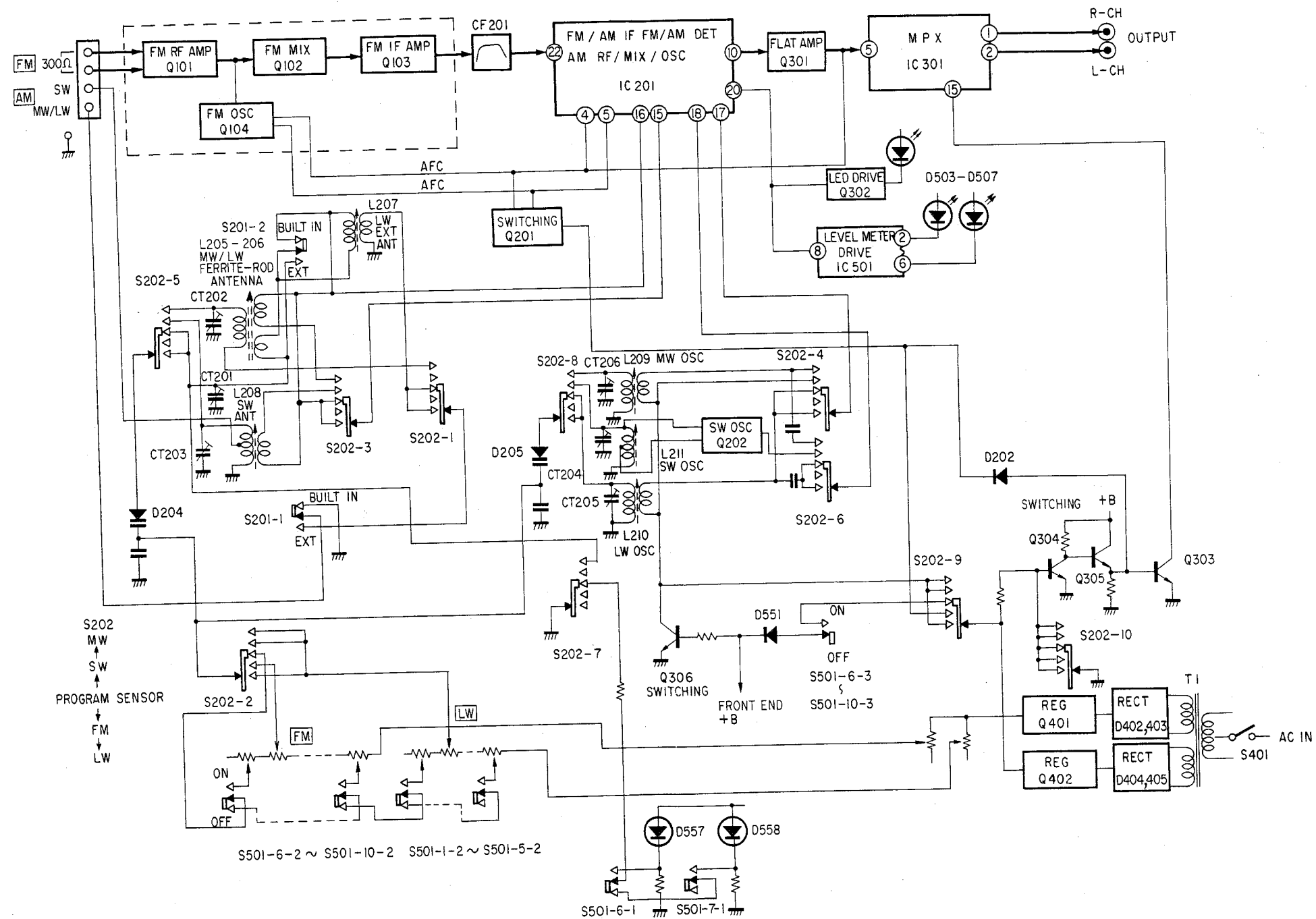
— Specification Label —



AEP, SCN model	AC: 220V~50Hz 10W
UK model	AC: 240V~50Hz 10W

SECTION 1 OUTLINE

1-1. BLOCK DIAGRAM



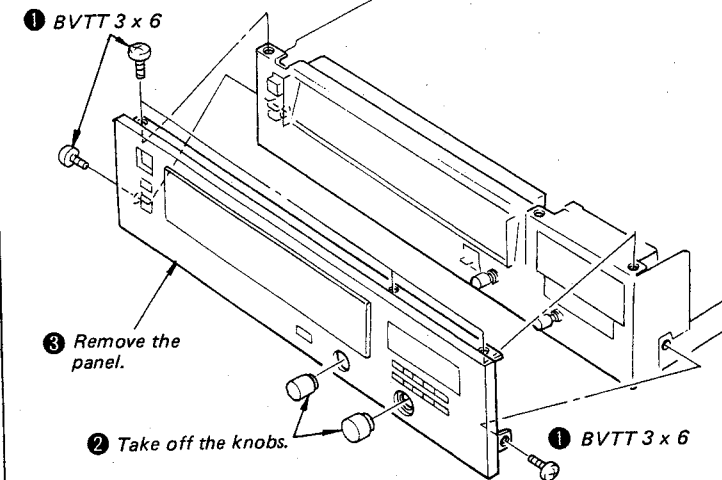
SECTION 2 DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

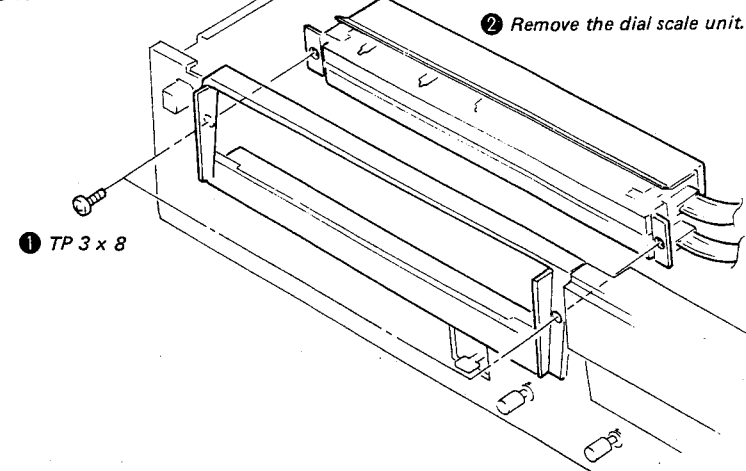
Remove the case by taking off the six screws.

Remove the bottom plate by taking off the three screws. Then, Main circuit board can be checked.

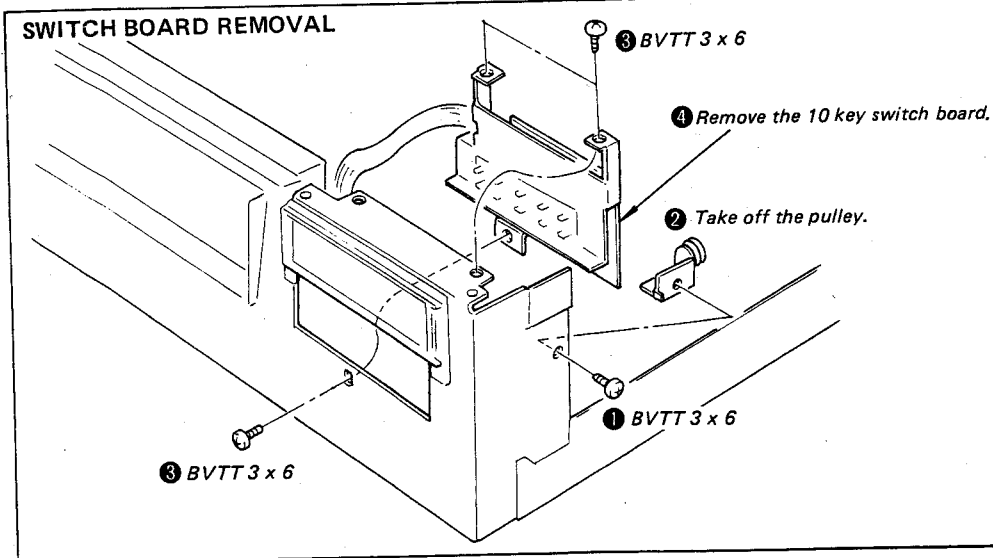
PANEL REMOVAL



DIAL SCALE UNIT REMOVAL



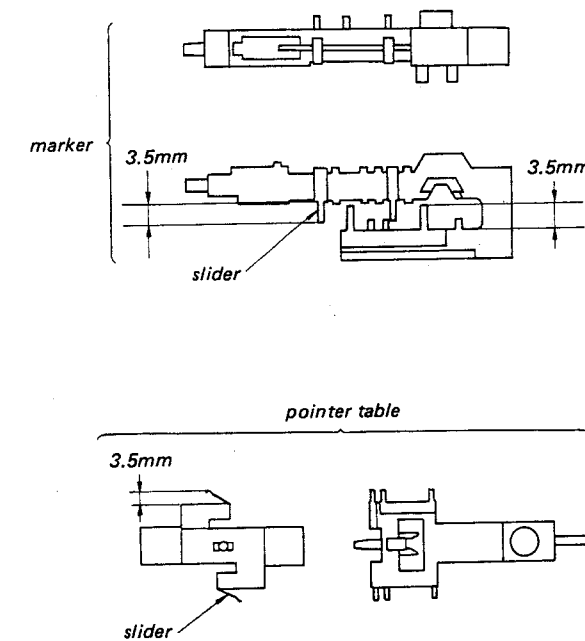
SWITCH BOARD REMOVAL



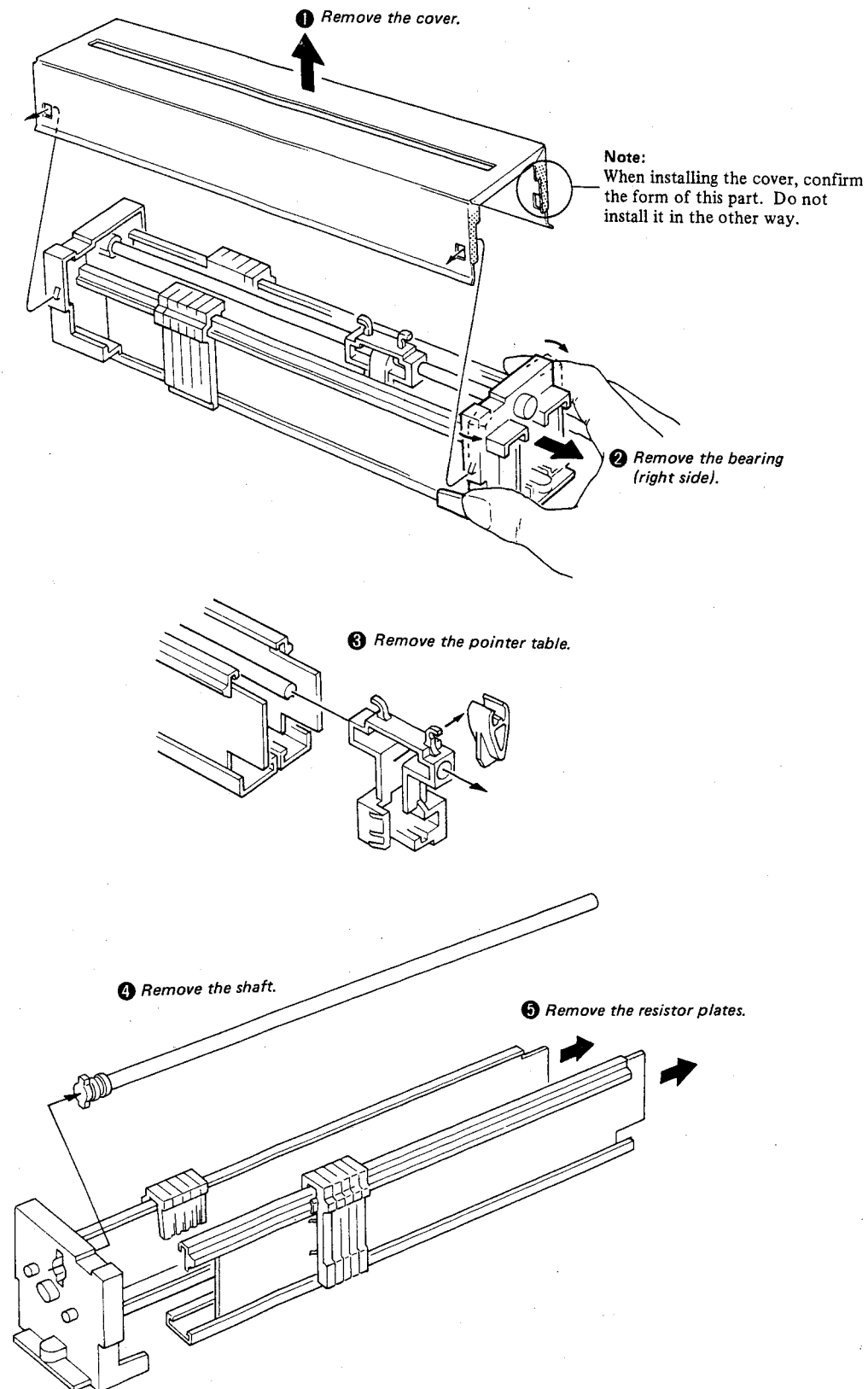
DIAL SCALE UNIT

This unit is tuned by moving the sliders of the dial scale unit along the carbon-coated lines of the resistor plates. The sliders should be moved very precisely. So, carefully perform the disassembly and the installation of the dial scale unit as follows. Only the marker and the pointer table are replaceable.

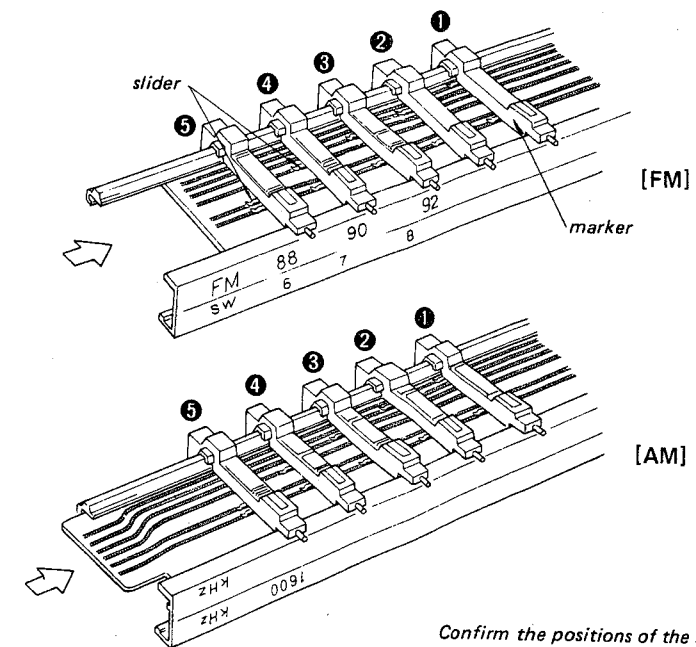
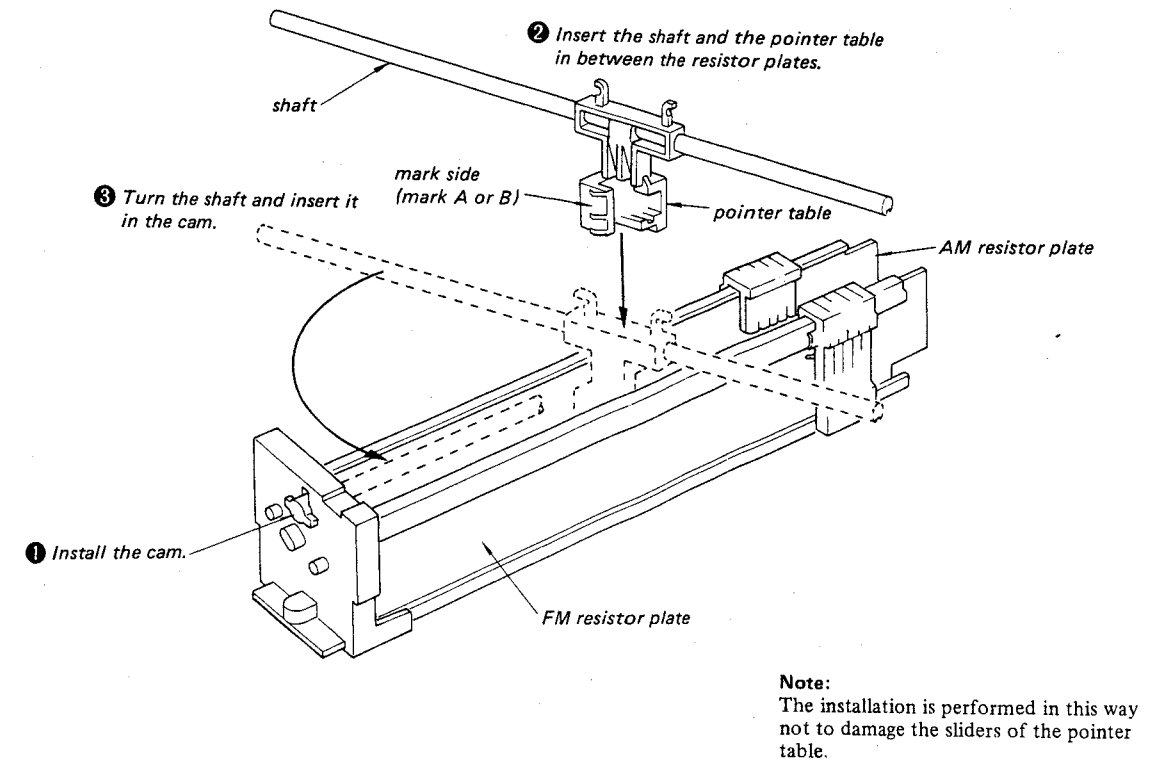
Take care not to damage the sliders shown below.



• Dial Scale Unit Disassembly



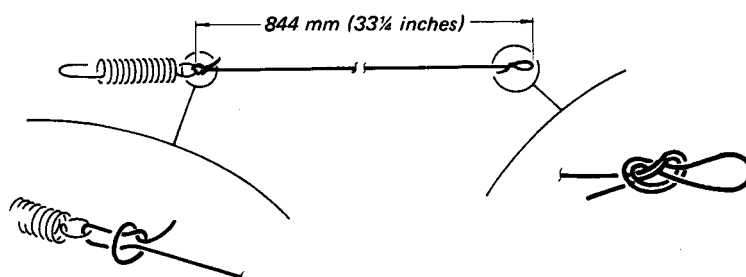
• Dial Scale Unit Installation



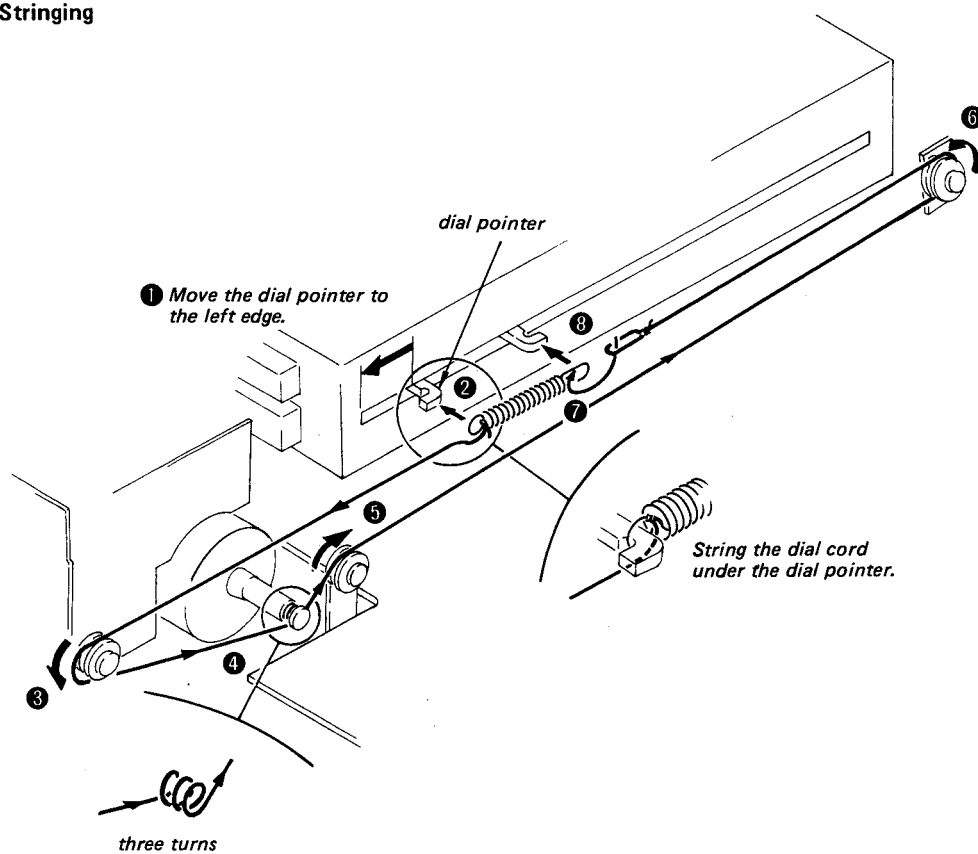
Confirm the positions of the sliders and install the markers in the numerical order given. If one of the markers is damaged, replace the five markers together to obtain the same brightness of them.

DIAL CORD STRINGING

1. Dial Cord Preparation



2. Dial Cord Stringing



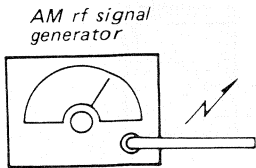
MEMO

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

SECTION 3
ADJUSTMENTS

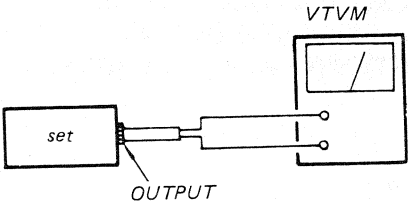
3-1. AM SECTION

Setting: FUNCTION switch: TUNER
Band Selector switch: MW
ANTENNA switch: BUILT IN



Put the lead-wire antenna close to the set.

Modulation: 400Hz, 30%



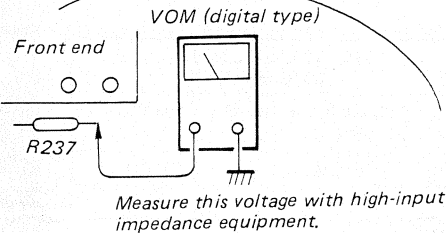
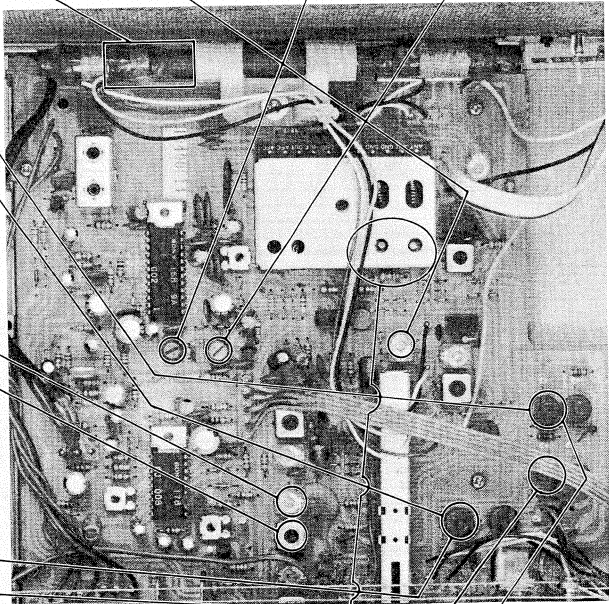
- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

MW TRACKING ADJUSTMENT	
Adjust for a maximum reading on VTVM.	
600 kHz	1,400 kHz
L 205	CT 202

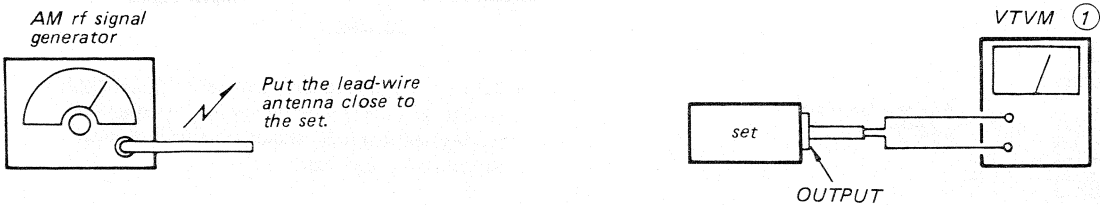
AM IF ALIGNMENT	
Adjust for a maximum reading on VTVM.	
450 kHz	
T 203	T 202

MW FREQUENCY COVERAGE ADJUSTMENT			
Tuning Control Voltage Adjustment	Dial Indication	VOM Reading	Adjustment Part
	minimum frequency	2V	RT 401
	maximum frequency	25V	RT 403
	Adjust for a specified reading on VOM.		
Local Oscillator Frequency Adjustment	Dial Indication	AM Rf Signal Generator Frequency	Adjustment Part
	maximum frequency	1660kHz	CT 206
	minimum frequency	515kHz	L 209
	Adjust for a maximum reading on VTVM.		
Dial Pointer Setting	Dial Indication	AM Rf Signal Generator Frequency	Adjustment Part
	600kHz	600kHz	RT 403
	1000kHz	1000kHz	RT 402
	1400kHz	1400kHz	RT 401
	Adjust for a maximum reading on VTVM.		

Note:
Be sure to perform the LW and the SW frequency coverage adjustments after the tuning control voltage adjustment.

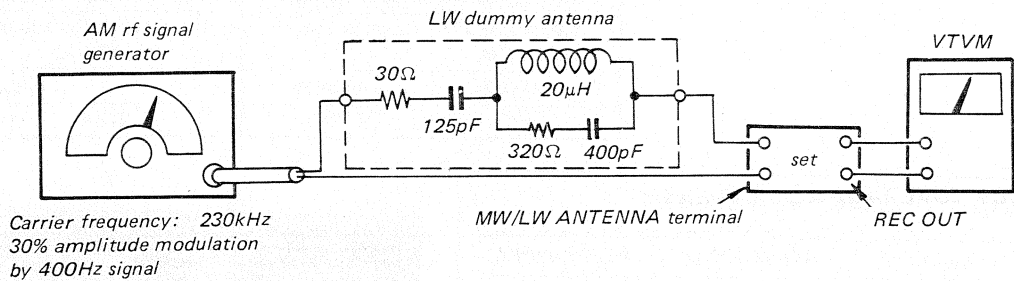


Setting: FUNCTION switch TUNER
Band Selector switch: LW
ANTENNA switch: BUILT IN



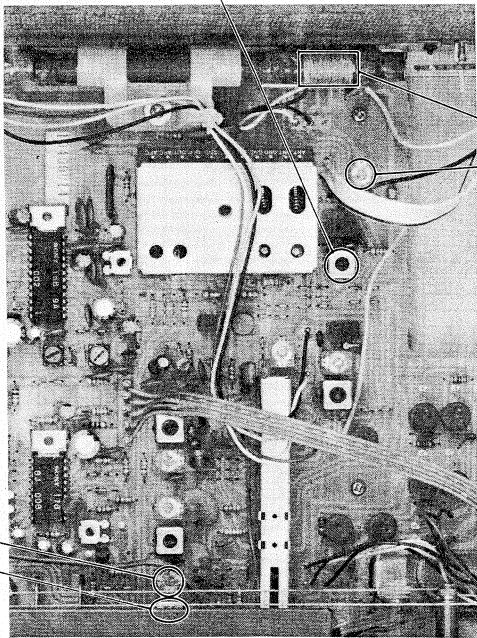
- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

MW/LW EXT ANTENNA COIL ADJUSTMENT



1. Set the ANTENNA switch to EXT position.
2. Tune the set to 230kHz and adjust L207 for a maximum reading on VTVM.

L207



LW TRACKING ADJUSTMENT

Adjust for a maximum reading on VTVM ① .

L206	150kHz
CT201	310kHz

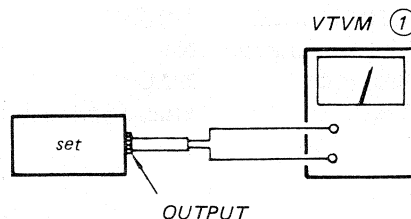
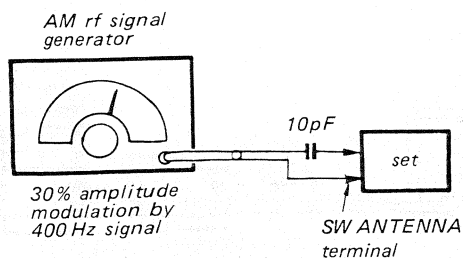
LW FREQUENCY COVERAGE ADJUSTMENT

Adjust for a maximum reading on VTVM ① .

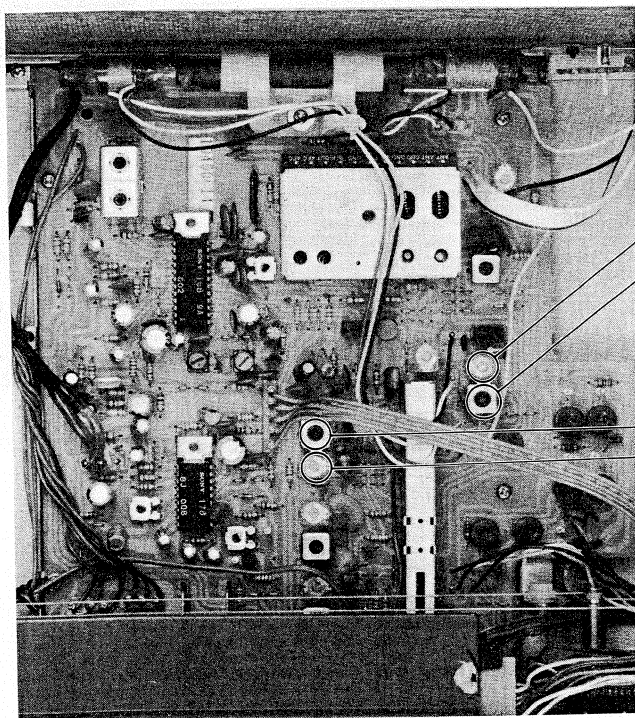
365kHz	CT205
145kHz	L210

Note:
Before this adjustment, perform the MW frequency coverage adjustment.

Setting: FUNCTION switch: TUNER
Band Selector switch: SW



- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.



SW TRACKING ADJUSTMENT

Adjust for a maximum reading on VTVM (1).

CT203	15 MHz
L208	6MHz

SW FREQUENCY COVERAGE ADJUSTMENT

Adjust for a maximum reading on VTVM (1).

L211	5.5 MHz
CT204	16.1 MHz

Note:

Before this adjustment, perform the MW frequency coverage adjustment.

3-2. FM SECTION

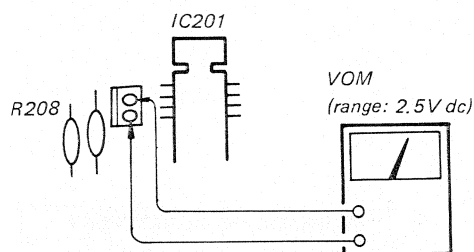
FM DISCRIMINATOR ALIGNMENT 1

Setting: FUNCTION switch: TUNER
 Band Selector switch: FM
 MODE switch: MONO
 TUNING: Detuned position

Procedure:

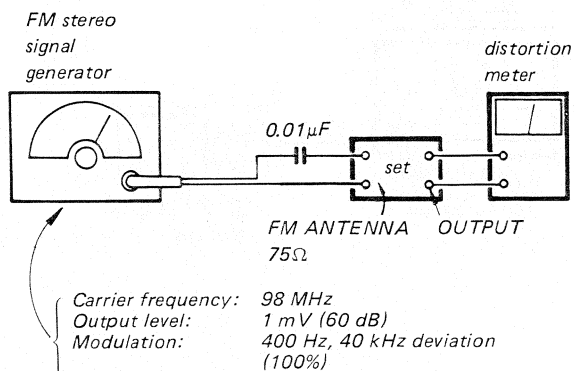
Adjust the black core (primary-side) of T201 for 0V reading on VOM.

Note: When replacing the ceramic filter (CF-201), perform this alignment.



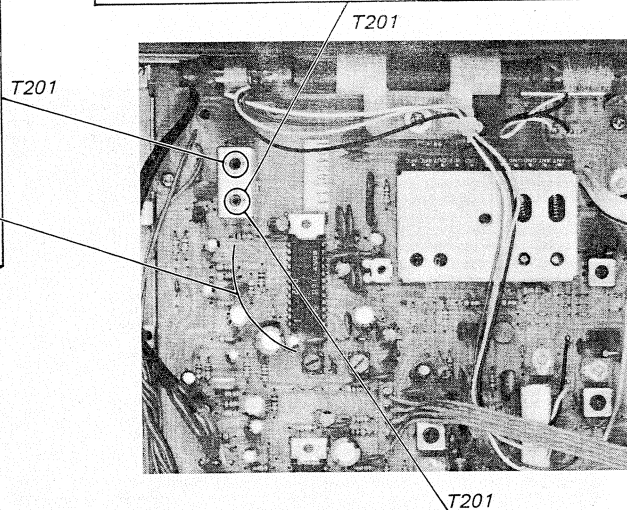
FM DISCRIMINATOR ALIGNMENT 2

Setting: FUNCTION switch: TUNER
 Band Selector switch: FM
 MODE switch: MONO

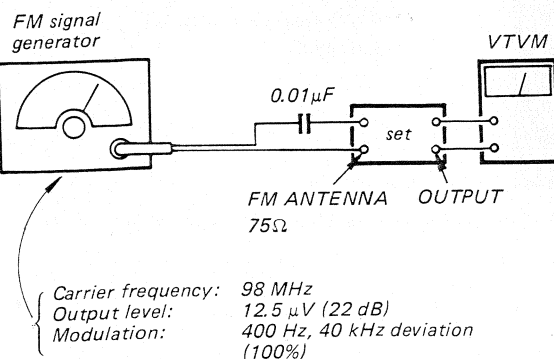


Procedure:

Adjust the red core (secondary side) of T201 for a minimum distortion.



FM IF ALIGNMENT

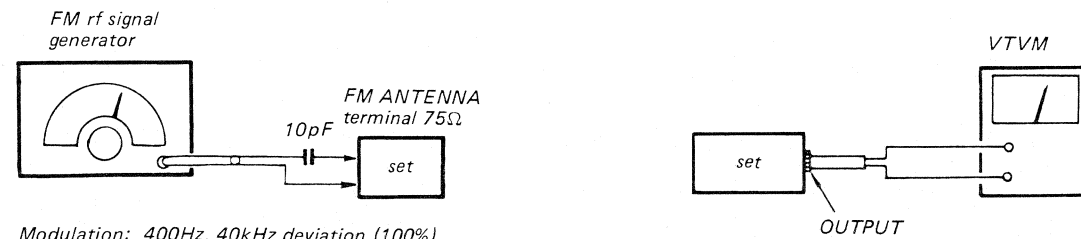


Setting: FUNCTION switch: TUNER
 Band Selector switch: FM
 MODE switch: MONO

Procedure:

Adjust the red core (secondary side) of T201 for a maximum reading on VTVM.

Setting: FUNCTION switch: TUNER
Band Selector switch: FM
MODE Selector: MONO



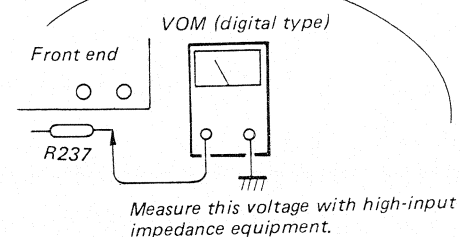
Modulation: 400Hz, 40kHz deviation (100%)

- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

Front-end
(The inside of the Front-end has been already adjusted. So, you need not adjust it.)

FM FREQUENCY COVERAGE ADJUSTMENT

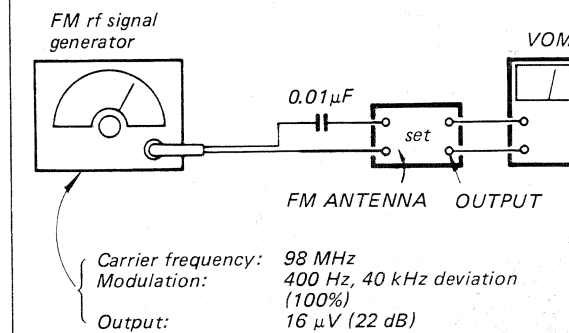
Tuning Control Voltage Adjustment	Dial Indication	VOM Reading	Adjustment Part
	minimum frequency	2.7 V	RT 404
	maximum frequency	22 V	RT 406
	Adjust for a specified reading on VOM.		
Local Oscillator Frequency Adjustment	Dial Indication	FM Rf Signal Generator Frequency	Adjustment Part
	maximum frequency	108 MHz	RT 406
	minimum frequency	88 MHz	RT 404
	Adjust for a maximum reading on VTVM.		
Dial Pointer Setting	Dial Indication	FM Rf Signal Generator Frequency	Adjustment Part
	98 MHz	98 MHz	RT 405
	Adjust for a maximum reading on VTVM.		



MUTING LEVEL ADJUSTMENT

Setting: FUNCTION switch: TUNER
Band Selector switch: FM
MODE switch: STEREO/FM-AM MUTING

Procedure:



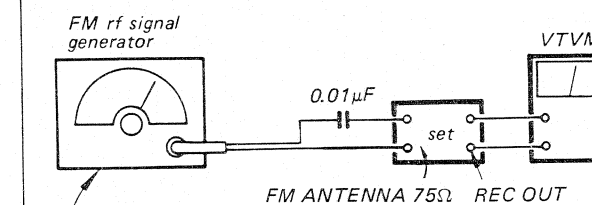
Turn RT201 and stop it just when the VOM indication suddenly decreases.

RT201

RT301

FM STEREO SEPARATION ADJUSTMENT

Setting: FUNCTION switch: TUNER
Band Selector switch: FM
MODE switch: STEREO/FM-AM MUTING



Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Modulation:
Audio (400 Hz): 20 kHz deviation (50%)
Pilot (19 kHz): 6.3 kHz deviation (16%)
Sub channel (38 kHz): 20 kHz deviation (50%)

Procedure:

FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ [Ⓐ] Adjust RT301 resistor for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ [Ⓒ] Adjust RT301 resistor for minimum reading.

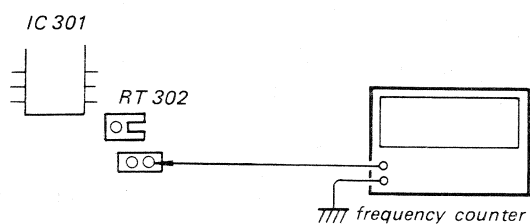
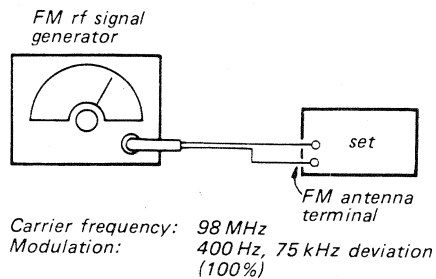
L-CH Stereo separation: Ⓐ - Ⓑ[Ⓐ]
R-CH Stereo separation: Ⓒ - Ⓓ[Ⓒ]

The separations of both channels should be equal.

76 kHz Adjustment

A) Regular Method

Procedure:

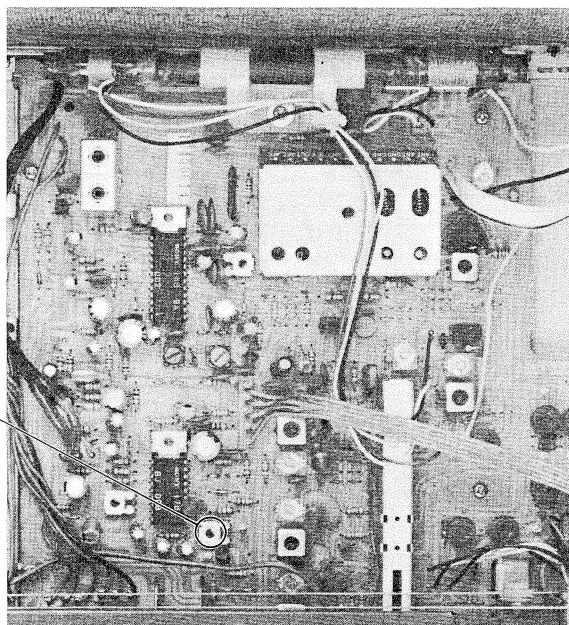
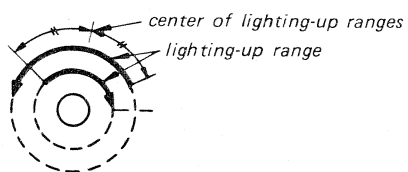


1. Tune the set to 98 MHz.
2. Adjust RT302 for 76kHz $\pm$ 30 Hz on the counter.

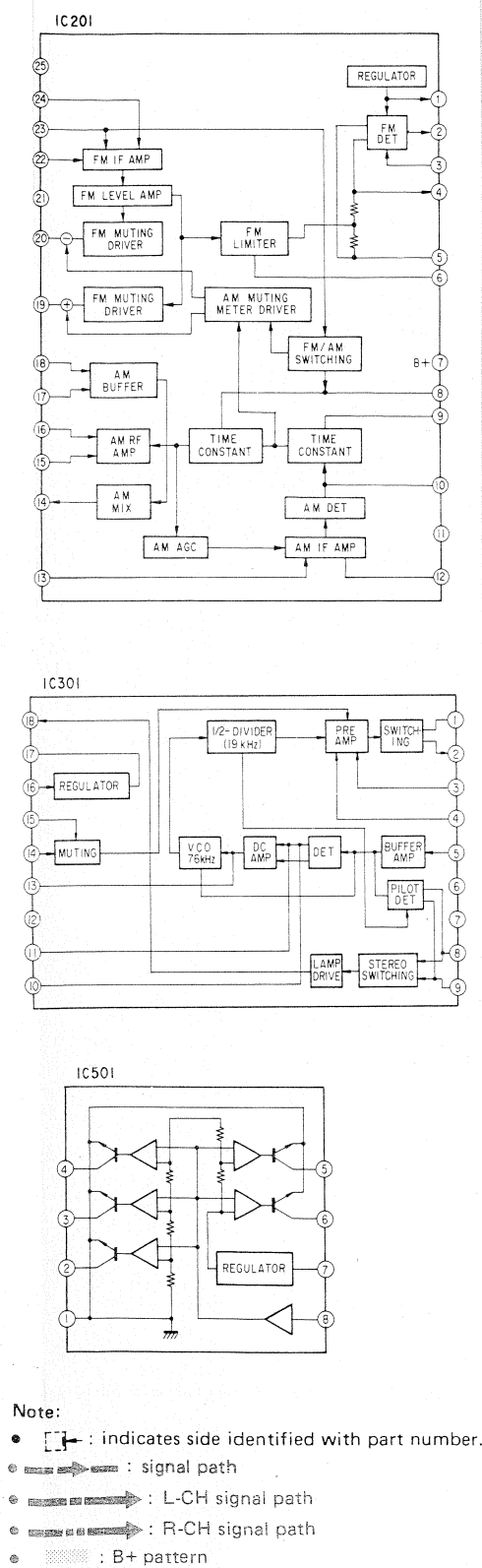
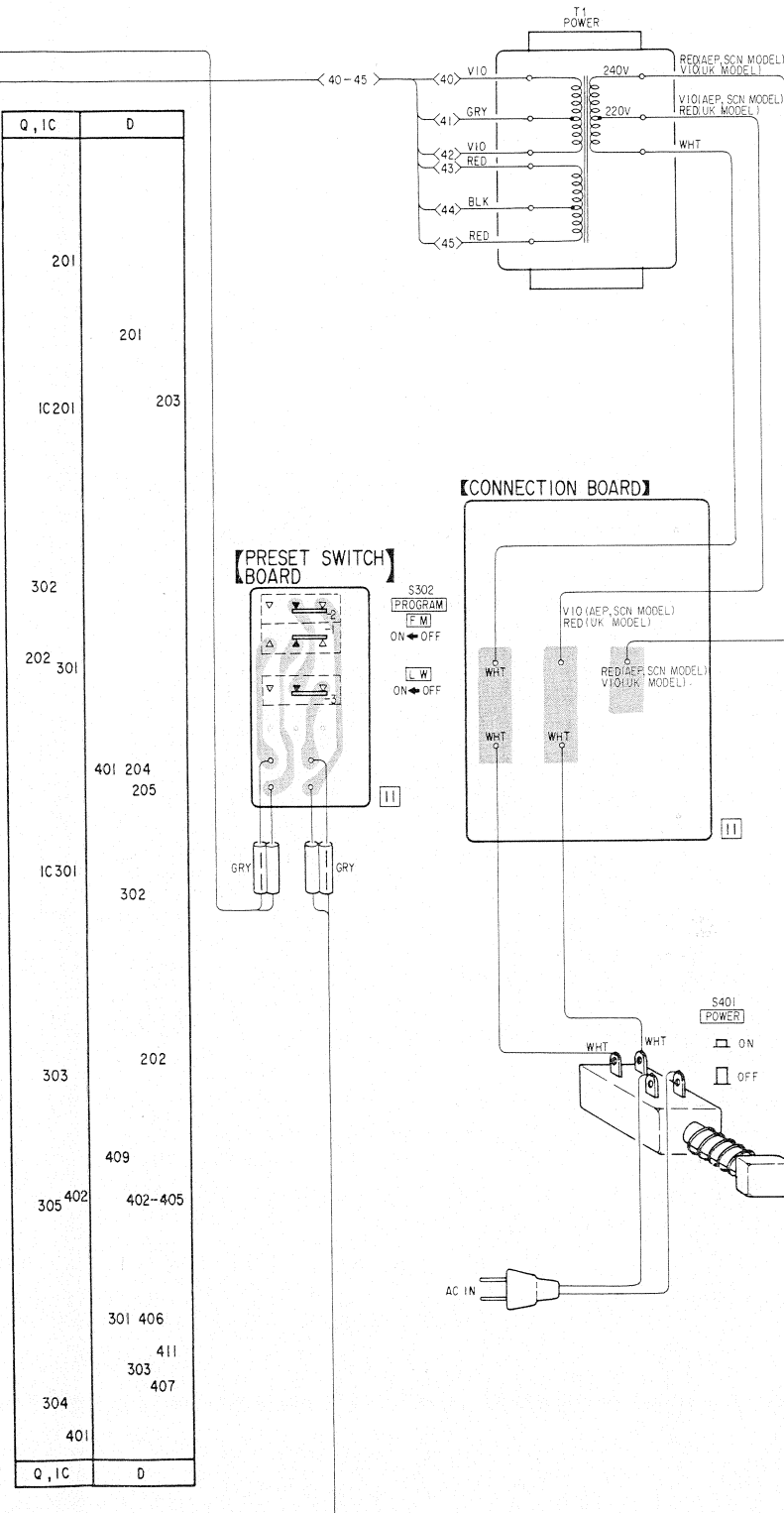
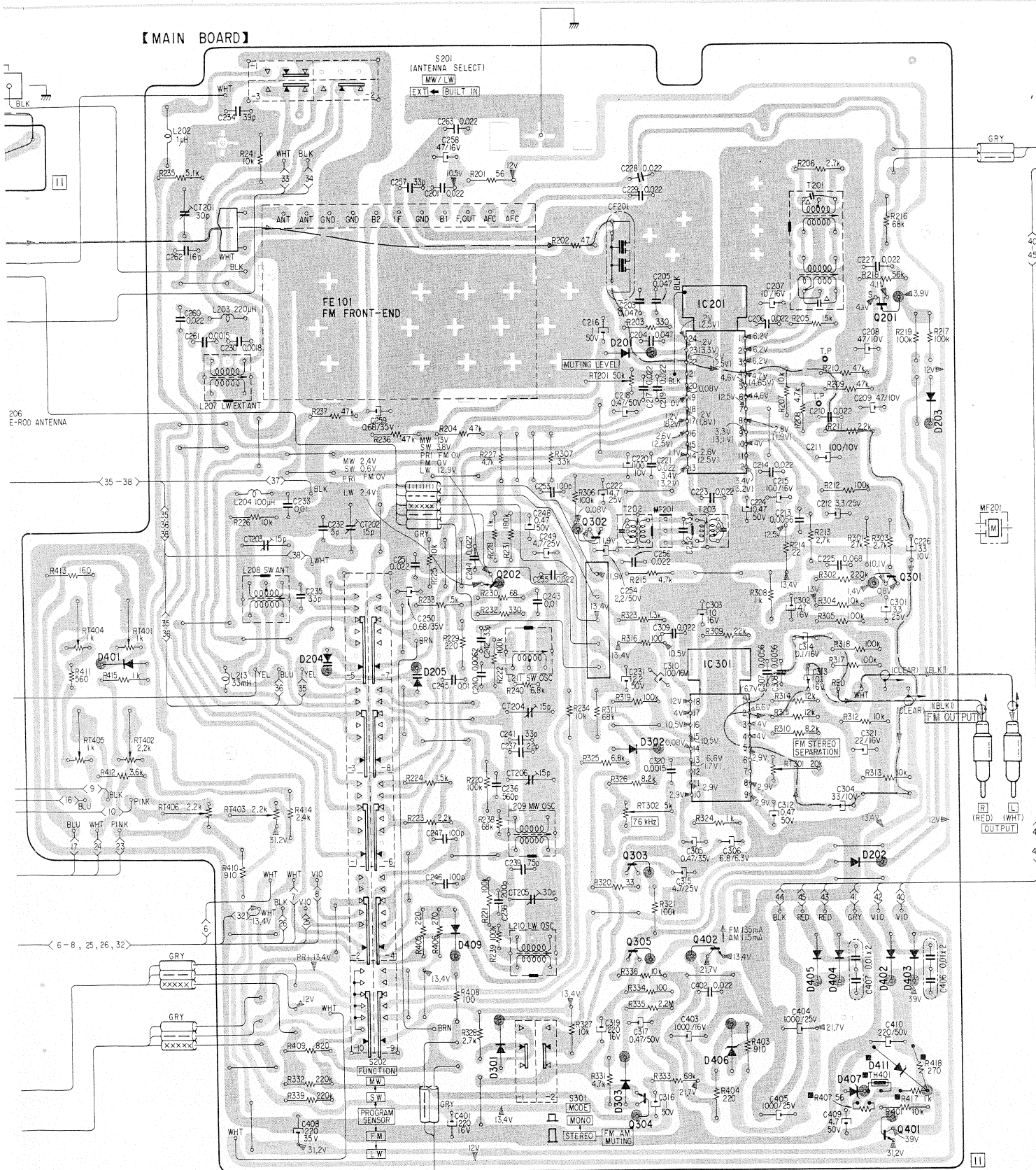
B) Simple Method

Procedure:

1. Tune the set to the FM stereo broadcasting signal.
2. Turn RT302 clockwise or counterclockwise and memorize the lighting-up range of the stereo lamp.
3. Secure RT302 at the center of the lighting-up range of both turns as shown below.



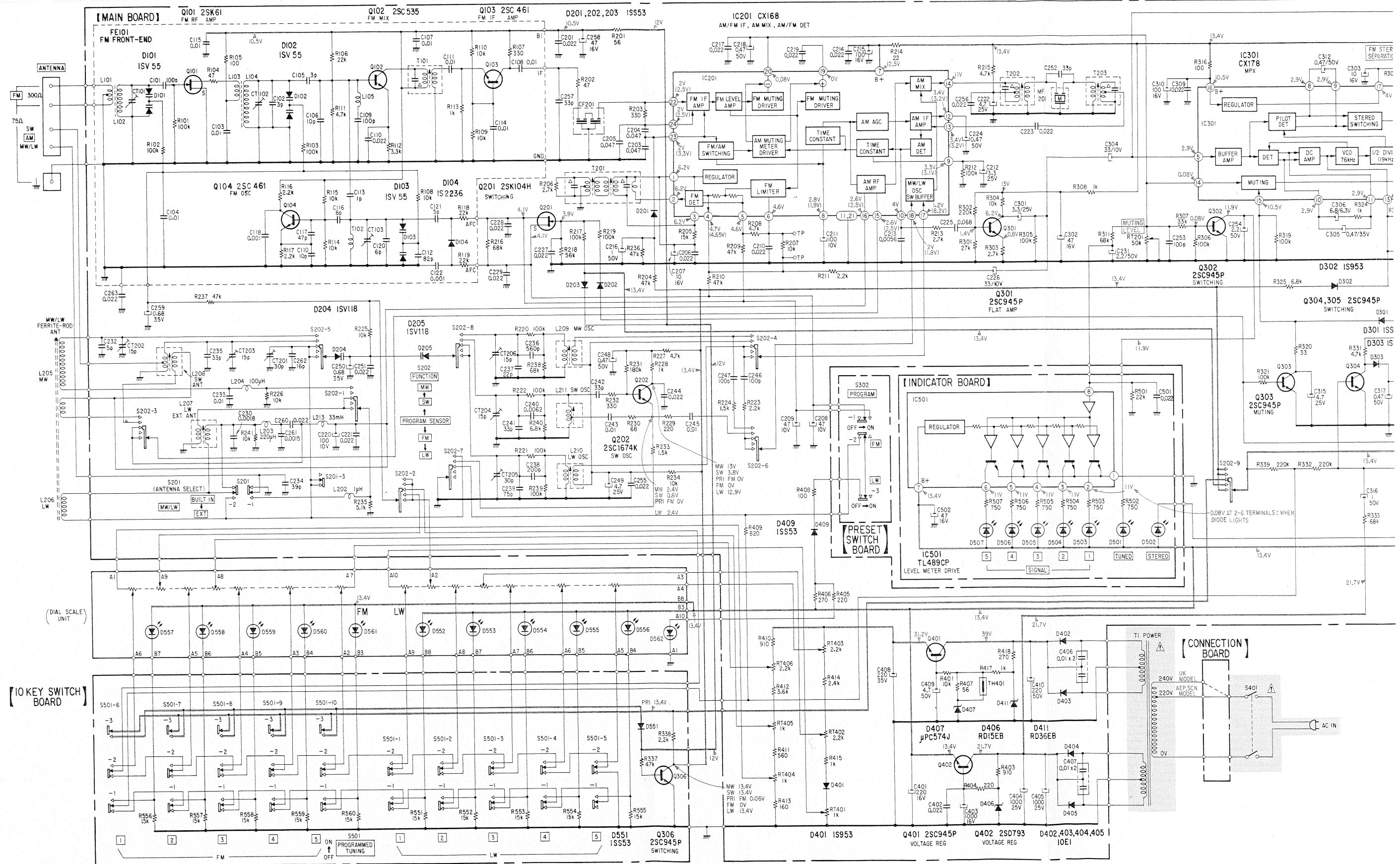
Q, IC	D
201	201
IC201	201
302	
202 301	401 204 205
IC301	302
303	202
305 402	409 402-403
304	301 406 407
401	
Q, IC	D



Note:

- [Symbol] : indicates side identified with part number.
- [Symbol] : signal path
- [Symbol] : L-CH signal path
- [Symbol] : R-CH signal path
- [Symbol] : B+ pattern

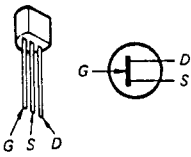
4-2. SCHEMATIC DIAGRAM



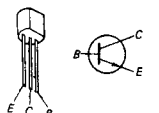
Replacement Semiconductors

For replacement, use semiconductors except in ().

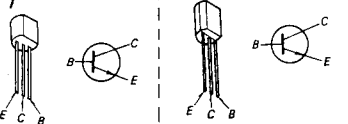
Q201: 2SK104H



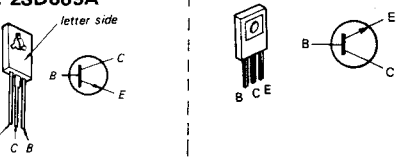
Q202: 2SC1364 (2SC1674K)



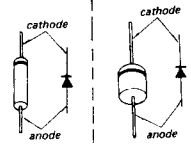
Q301-306 : 2SC1364 (2SC945P)
Q401



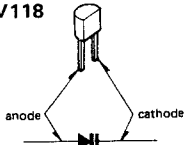
Q402: 2SD669A (2SD793)



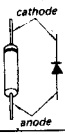
D201-203 : 1S1555 (1SS53)
D301, 303
D409, 551



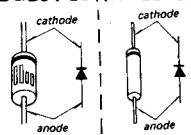
D204, 205: 1SV118



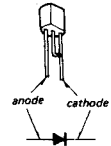
D302, 401: 1S1555 (1S953)
D402-405: 10E-2 (10E-1)



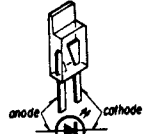
D406: EOB01-15 (RD15EB)
D411: EOB01-35 (RD36EB)



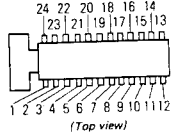
D407: μ PC574J



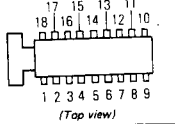
D501: GL9NG21
D502: GL9PR21
D503-507: GL9NG31



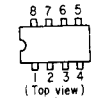
IC201: CX168



IC301: CX178

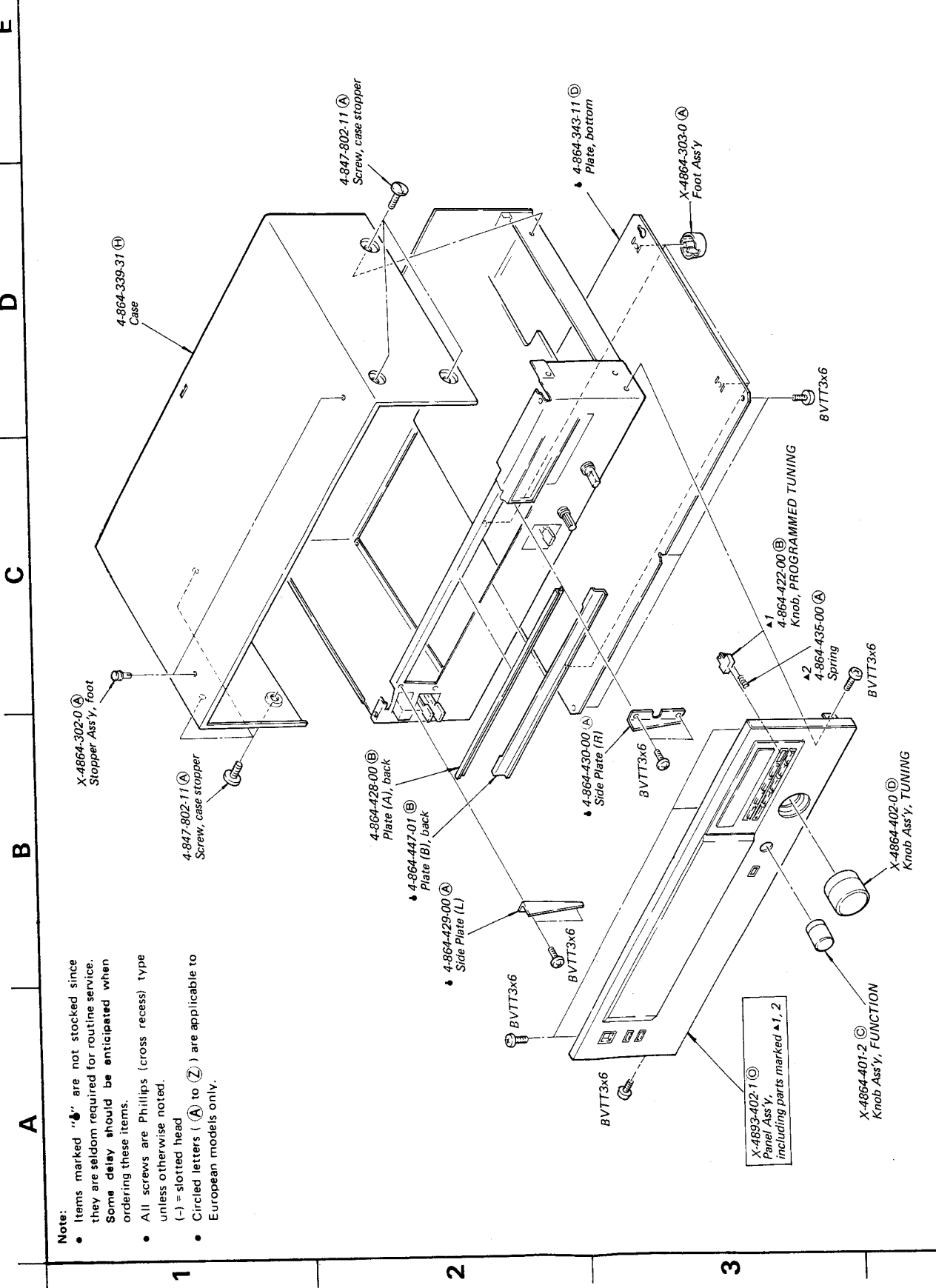


IC501: TL489CP



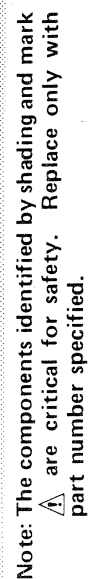
SECTION 5
EXPLODED VIEWS

5-1.

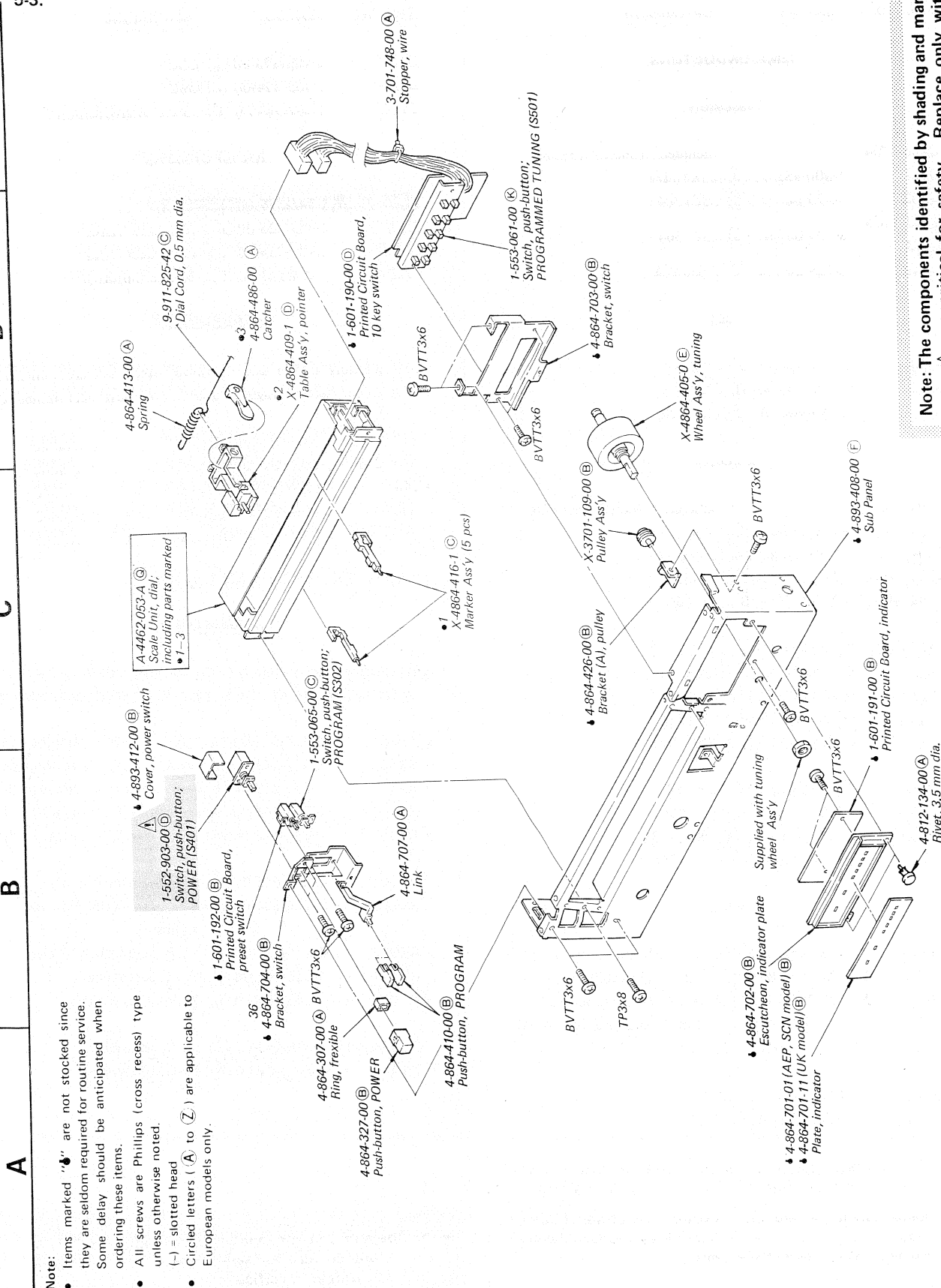


- Note:
- Items marked "A" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
 - All screws are Phillips (cross recess) type unless otherwise noted.
 - (-) = slotted head
 - Circled letters (A) to (Z) are applicable to European models only.

- Items marked “” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All screws are Phillips (cross recess) type unless otherwise noted.
(-) = slotted head
- Circled letters () are applicable to European models only.



5.3.



Note: The components identified by shading and mark **A** are critical for safety. Replace only with part number specified.

Note: Circled letters (A to Z) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
SWITCHES		
S201	1-552-581-00	(C) Slide, MW/LW
S202	1-553-066-00	(F) Rotary-slide, FUNCTION
S301	1-552-932-00	(B) Push-button, MODE
S302	1-553-065-00	(C) Push-button, PROGRAM
S401	⚠ 1-552-903-00	(D) Push-button, POWER
S501	1-553-061-00	(K) Push-button, PROGRAMMED TUNING

MISCELLANEOUS

CF201	1-527-534-XX	(D) Filter, solid state
CF202	1-527-403-00	(C) Mechanical filter
FE101	1-463-291-00	(L) Front End
	1-536-560-00	(B) Terminal Plate, antenna
	1-551-294-00	(D) Shield cord with pin
	⚠ 1-551-896-00	(E) Cord, power (AEP model)
	⚠ 1-551-908-00	(E) Cord, power (SCN model)
	⚠ 1-551-962-00	(E) Cord, power (UK model)

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
♣ A-4351-167-A		Mounted Circuit Board, tuner
♣ 1-601-190-00	(D)	Printed Circuit Board, 10 key switch
♣ 1-601-191-00	(B)	Printed Circuit Board, indicator
♣ 1-601-192-00	(B)	Printed Circuit Board, preset switch
♣ 1-601-193-00	(B)	Printed Circuit Board, antenna
♣ 1-601-194-00	(F)	Printed Circuit Board, power

ACCESSORIES AND PACKING MATERIALS

<u>Part No.</u>	<u>Description</u>
1-501-184-00	(C) Antenna, feeder
1-501-193-00	(B) Antenna
1-551-966-00	(G) Cord, power
3-701-630-00	(A) Bag, plastic
3-770-975-11	(C) Manual, instruction
3-794-598-11	(B) Card for operation
4-864-354-00	(B) Sheet, plastic
4-864-361-00	(B) Cushion
4-893-413-00	(A) Carton

- Items marked "♣" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTROLYTIC CAPACITORS

Note: Circled letter (A to Z) are applicable to European models only.

CAP. (μF)	RATING → : Use the high voltage rated one.					
	6.3 VOLT.	10 VOLT.	16 VOLT.	25 VOLT.	35 VOLT.	50 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.47					→	1-121-726-00 (A)
1.0					→	1-121-391-00 (A)
2.2					→	1-121-450-00 (A)
3.3	→	→	→	1-121-392-00 (A)	→	1-121-393-00 (A)
4.7	→	→	→	1-121-395-00 (A)	→	1-121-396-00 (A)
10	→	→	1-121-651-00 (A)	1-121-398-00 (A)	→	1-121-738-00 (A)
22	→	→	1-121-479-00 (A)	1-121-480-00 (A)	1-121-662-00 (A)	1-121-152-00 (A)
33	→	→	1-121-403-00 (A)	1-121-404-00 (A)	1-121-652-00 (B)	1-121-405-00 (A)
47	→	1-121-352-00 (A)	1-121-409-00 (A)	1-121-410-00 (A)	1-121-653-00 (B)	1-121-411-00 (A)
100	→	1-121-414-00 (A)	1-121-415-00 (A)	1-121-416-00 (A)	1-121-357-00 (B)	1-121-417-00 (B)
220	1-121-419-00 (B)	1-121-420-00 (B)	1-121-421-00 (A)	1-121-422-00 (B)	1-121-261-00 (C)	1-121-423-00 (B)
330	1-121-751-00 (B)	1-121-805-00 (B)	1-121-521-00 (C)	1-121-654-00 (B)	1-121-655-00 (D)	1-121-656-00 (C)
470	1-121-424-00 (B)	1-121-425-00 (C)	1-121-426-00 (C)	1-121-733-00 (B)	1-121-361-00 (E)	1-121-810-00 (D)
1000	—	1-121-736-00 (C)	1-121-245-00 (D)	1-121-657-00 (D)	1-121-388-00 (E)	1-123-061-00 (F)
2200	1-121-658-00 (B)	1-121-659-00 (C)	1-121-660-00 (D)	1-123-067-00 (F)	1-121-984-00 (F)	—
3300	1-121-661-00 (D)	1-123-075-00 (E)	1-123-071-00 (F)	—	—	—

CAP. (μF)	100 VOLT.	160 VOLT.	250 VOLT.	350 VOLT.
	PART No.	PART No.	PART No.	PART No.
0.47	—	—	—	—
1.0	1-123-249-00 (A)	1-123-252-00 (A)	1-123-003-00 (B)	1-121-168-00 (B)
2.2	1-123-250-00 (A)	1-123-026-00 (B)	—	1-123-028-00 (B)
3.3	1-121-995-00 (A)	—	1-123-004-00 (B)	1-123-006-00 (C)
4.7	1-123-255-00 (A)	1-121-246-00 (B)	1-121-759-00 (B)	1-123-007-00 (D)
10	1-121-126-00 (B)	1-121-999-00 (B)	1-123-254-00 (C)	1-123-008-00 (D)
22	1-121-996-00 (C)	1-123-253-00 (C)	1-123-005-00 (D)	1-123-022-00 (D)
33	1-121-997-00 (C)	1-121-757-00 (C)	—	—
47	1-123-251-00 (C)	1-121-919-00 (C)	—	—
100	1-123-084-00 (E)	—	—	—

CERAMIC CAPACITORS (A)

RATING							
CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (μF)	50 VOLT.
	PART No.		PART No.		PART No.		PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001μF = 1,000pF

CERAMIC (SEMICONDUCTOR) CAPACITORS (A)

RATING → : Use the high voltage rated one.					
CAP. (μF)	25 VOLT.	50 VOLT.	CAP. (μF)	25 VOLT.	50 VOLT.
	PART No.	PART No.		PART No.	PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

MYLAR CAPACITORS (A)

Note: Circled letters (A) to (Z) are applicable to European models only.

RATING											
CAP. (μF)	50 VOLT.	100 VOLT.	200 VOLT.	CAP. (μF)	50 VOLT.	100 VOLT.	200 VOLT.	CAP. (μF)	50 VOLT.	100 VOLT.	200 VOLT.
	PART No.	PART No.	PART No.		PART No.	PART No.	PART No.		PART No.	PART No.	PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	—	—
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	—	—
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	—	—
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	—	—
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				



TANTALUM CAPACITORS

RATING							
→ : Use the high voltage rated one.							
CAP. (μF)	3.15 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	25 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.01					→	→	1-131-396-00 (B)
0.015					→	→	1-131-397-00 (B)
0.022					→	→	1-131-398-00 (B)
0.033					→	→	1-131-399-00 (B)
0.047					→	→	1-131-400-00 (B)
0.068					→	→	1-131-401-00 (B)
0.1					→	→	1-131-402-00 (B)
0.15					→	→	1-131-403-00 (B)
0.22					→	→	1-131-404-00 (B)
0.33					→	1-131-409-00 (B)	1-131-405-00 (B)
0.47	—	—	—	—	1-131-412-00 (B)	→	1-131-406-00 (B)
0.68	—	—	—	1-131-415-00 (B)	→	1-131-410-00 (B)	1-131-407-00 (B)
1.0	—	—	1-131-418-00 (B)	—	1-131-413-00 (B)	→	1-131-408-00 (B)
1.5	—	1-131-421-00 (B)	—	1-131-416-00 (B)	→	1-131-411-00 (B)	1-131-348-00 (B)
2.2	1-131-424-00 (B)	—	1-131-419-00 (B)	—	1-131-414-00 (B)	1-131-355-00 (B)	1-131-349-00 (B)
3.3	—	1-131-422-00 (B)	—	1-131-417-00 (B)	1-131-362-00 (B)	1-131-356-00 (B)	1-131-350-00 (B)
4.7	1-131-425-00 (B)	—	1-131-420-00 (B)	1-131-369-00 (B)	1-131-363-00 (B)	1-131-357-00 (B)	1-131-351-00 (C)
6.8	—	1-131-423-00 (B)	1-131-376-00 (B)	1-131-370-00 (B)	1-131-364-00 (B)	1-131-358-00 (C)	1-131-352-00 (C)
10	1-131-426-00 (B)	1-131-383-00 (B)	1-131-377-00 (B)	1-131-371-00 (B)	1-131-365-00 (C)	1-131-359-00 (C)	1-131-353-00 (D)
15	1-131-390-00 (B)	1-131-384-00 (B)	1-131-378-00 (B)	1-131-372-00 (B)	1-131-366-00 (C)	1-131-360-00 (D)	—
22	1-131-391-00 (B)	1-131-385-00 (B)	1-131-379-00 (C)	1-131-373-00 (C)	1-131-367-00 (D)		
33	1-131-392-00 (B)	1-131-386-00 (C)	1-131-380-00 (C)	1-131-374-00 (D)			
47	1-131-393-00 (C)	1-131-387-00 (C)	1-131-381-00 (D)	—			
68	1-131-394-00 (B)	1-131-388-00 (C)	—	—			
100	1-131-395-00 (D)	—	—	—			



TANTALUM CAPACITORS

RATING						
CAP. (μF)	3 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.033						1-131-273-00 (E)
0.047						1-131-274-00 (E)
0.068						1-131-275-00 (E)
0.1						1-131-276-00 (D)
0.15						1-131-277-00 (D)
0.22			—	—	1-131-262-00 (D)	1-131-278-00 (D)
0.33			—	—	1-131-263-00 (D)	1-131-279-00 (D)
0.47			1-131-169-00 (D)	—	1-131-264-00 (D)	1-131-280-00 (D)
0.68			—	1-131-258-00 (D)	1-131-265-00 (D)	1-131-281-00 (D)
1.0			1-131-254-00 (D)	—	1-131-266-00 (D)	1-131-282-00 (D)
1.5		1-131-250-00 (D)	—	—	1-131-267-00 (D)	1-131-283-00 (E)
2.2		—	—	1-131-259-00 (D)	1-131-268-00 (D)	1-131-284-00 (E)
3.3		—	1-131-255-00 (D)	—	1-131-269-00 (D)	—
4.7		1-131-251-00 (E)	1-131-171-00 (D)	—	1-131-270-00 (D)	—
6.8		—	—	1-131-260-00 (D)	1-131-271-00 (E)	—
10	—	—	1-131-256-00 (D)	—	1-131-272-00 (E)	—
15	—	1-131-252-00 (D)	—	1-131-261-00 (E)		
22	—	—	1-131-257-00 (E)	—		
33	1-131-176-00 (D)	1-131-253-00 (E)	1-131-173-00 (C)	—		
47	1-131-288-00 (F)	1-131-174-00 (D)	—	—		
100	1-131-177-00 (D)	—	—	—		

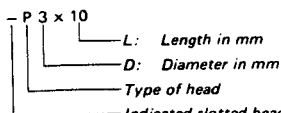
1/4 WATT CARBON RESISTORS [Ⓐ]

Note: Circled letter [Ⓐ] is applicable to European models only.

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00

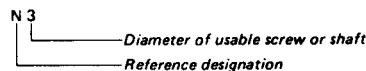
HARDWARE NOMENCLATURE

Screw:



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

Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
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	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

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	

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