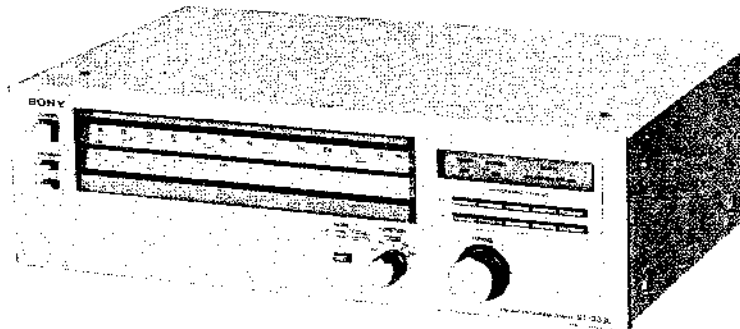


ST-333L

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 5 $\frac{1}{4}$ x 11 $\frac{1}{2}$ 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)

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 $\begin{matrix} +0.5 \\ -1 \end{matrix}$ dB 30 Hz–15 kHz $\begin{matrix} +0.5 \\ -2 \end{matrix}$ 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)

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.

SONY

SERVICE MANUAL

– Continued on page 2 –

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

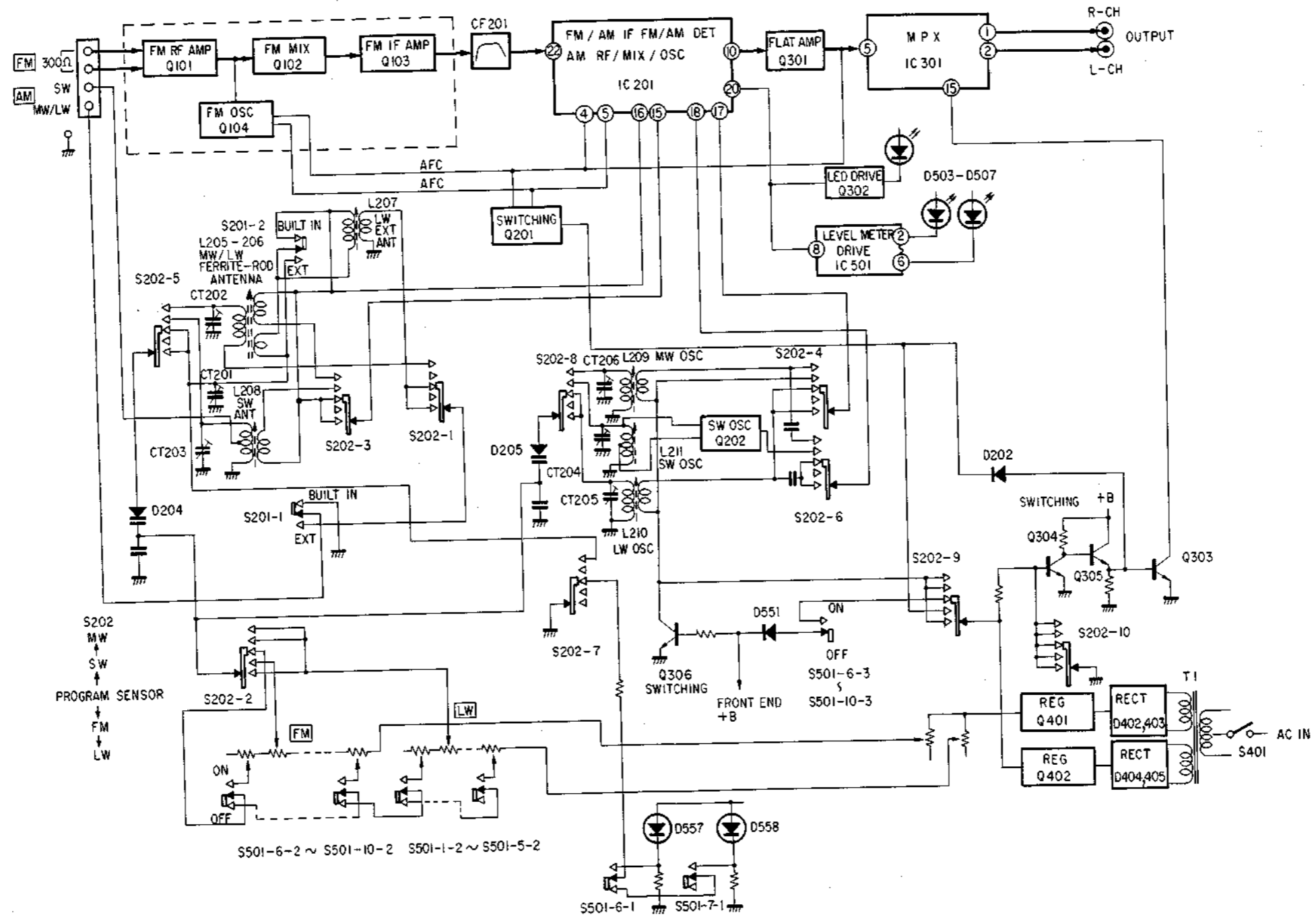
– Specification Label –

SONY [®]	FM-AM PROGRAM TUNER MODEL NO. ST-333L	
	FREQ. RANGE: FM 87.5-108 MHz SW 58-15.8 MHz MW 522-1602 kHz LW 150-350 kHz IF : FM 10.7 MHz AM 450 kHz	
	MADE IN JAPAN	
SERIAL NO		

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

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM

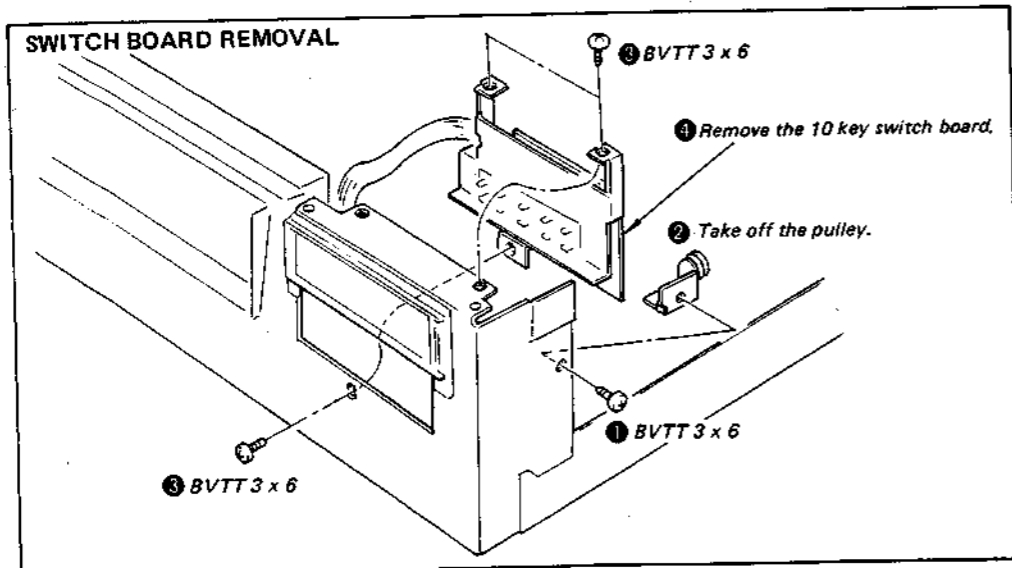
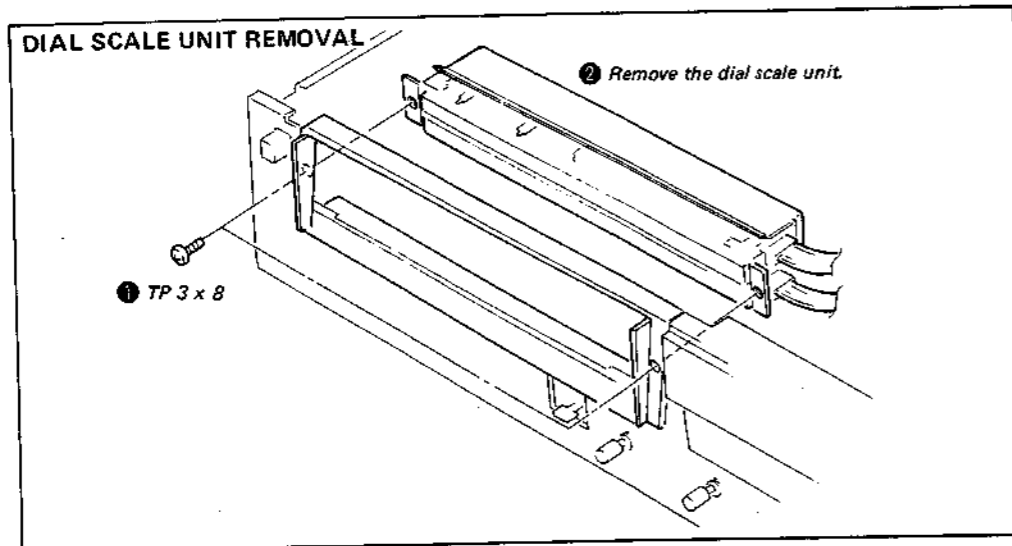
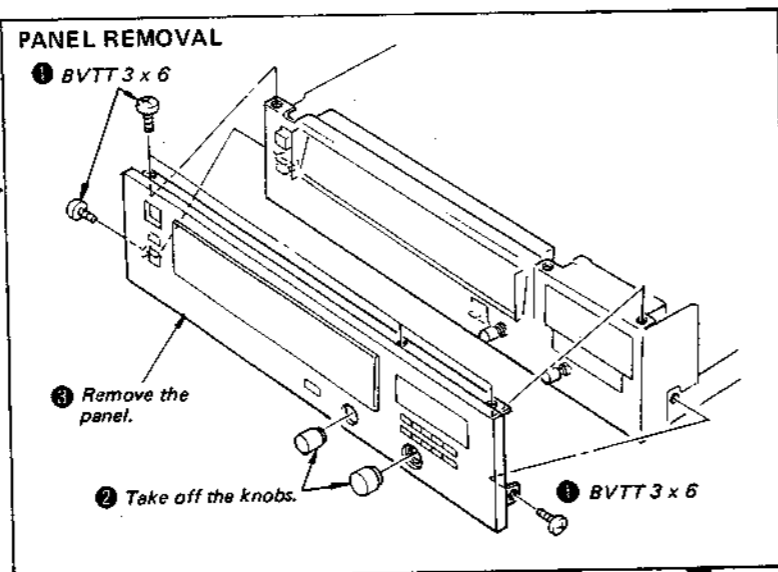


SECTION 2
DISASSEMBLY

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

Remove the case by taking off the six screws.

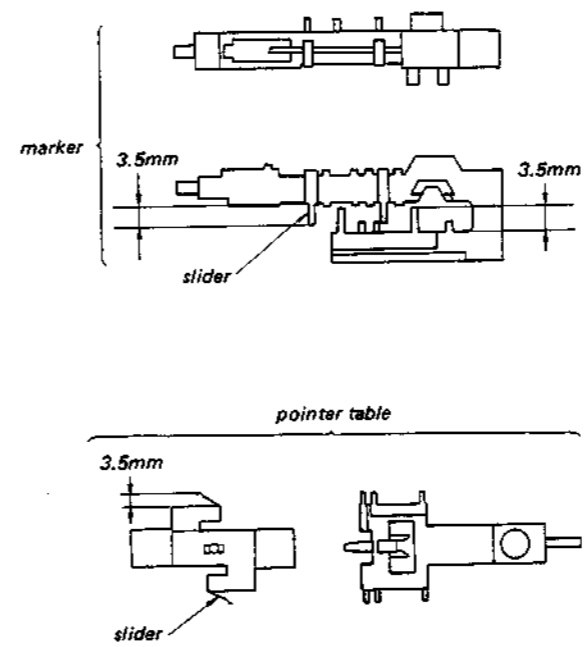
Remove the bottom plate by taking off the three screws. Then, Main circuit board can be checked.



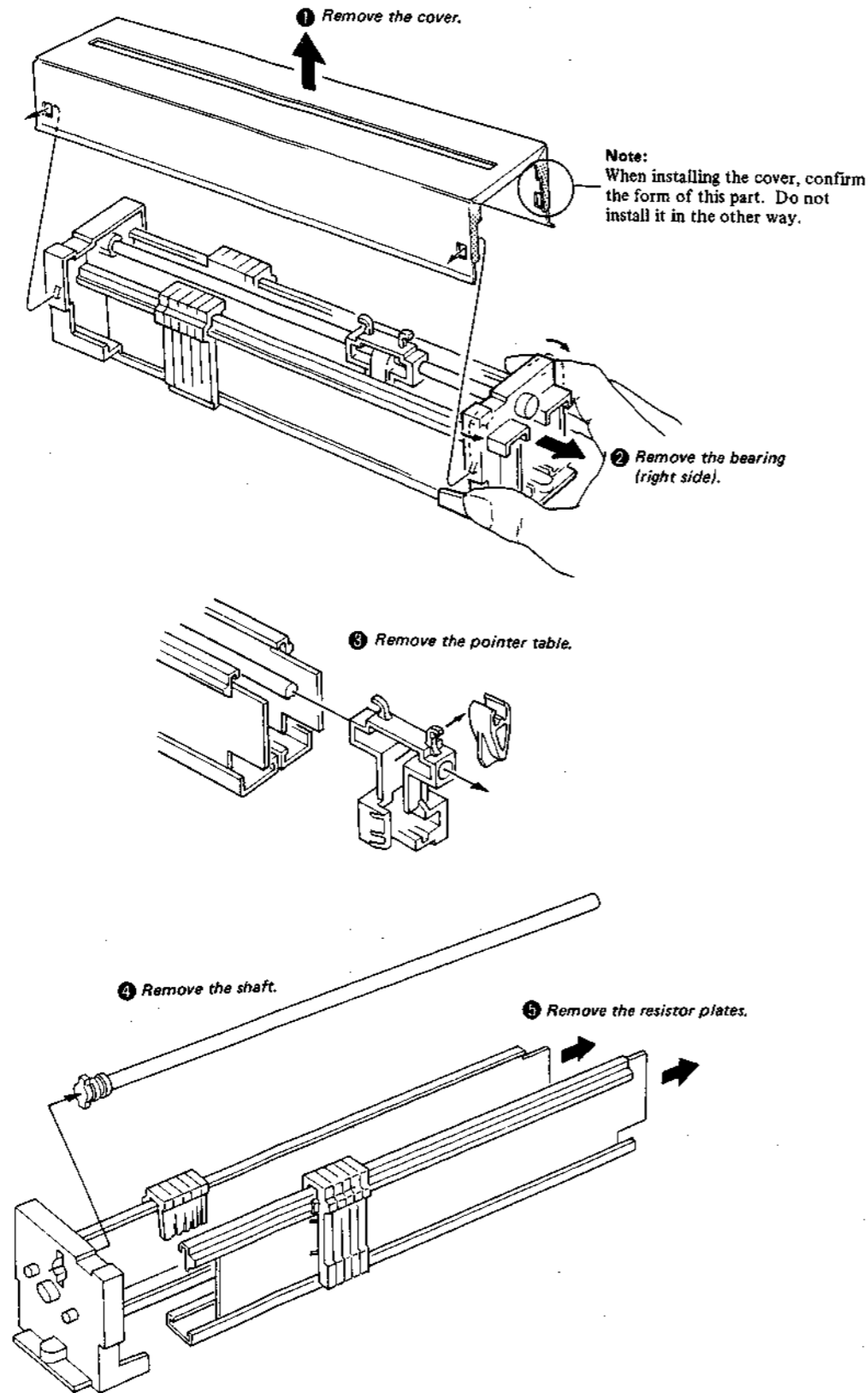
DIAL SCALE UNIT

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.

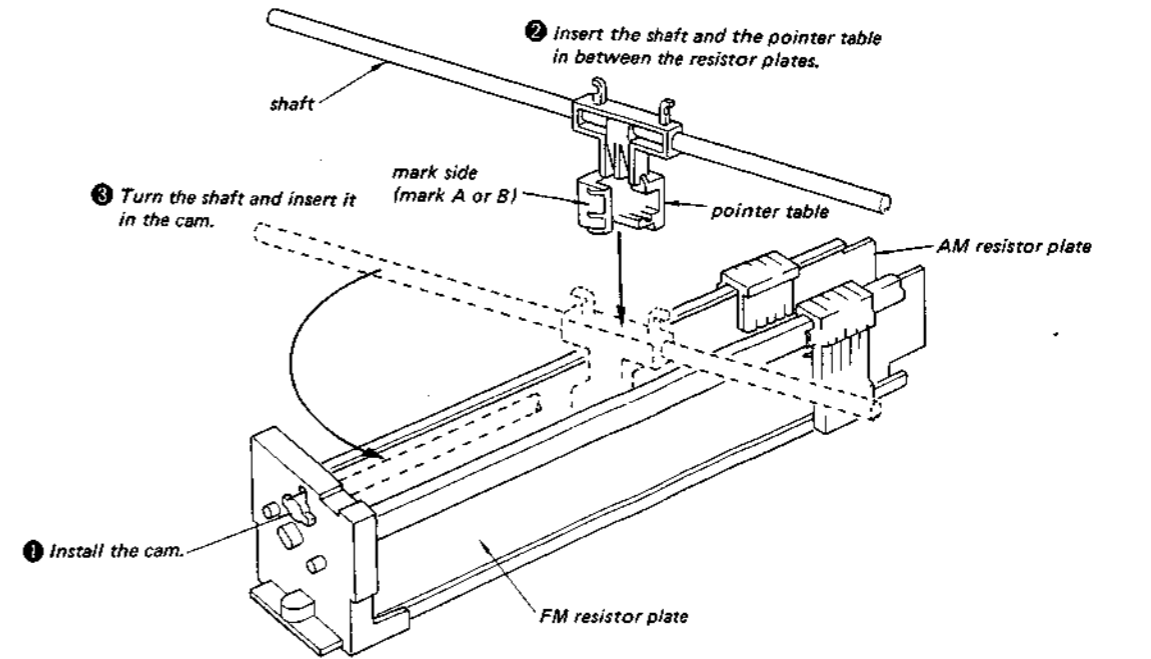
Take care not to damage the sliders shown below.



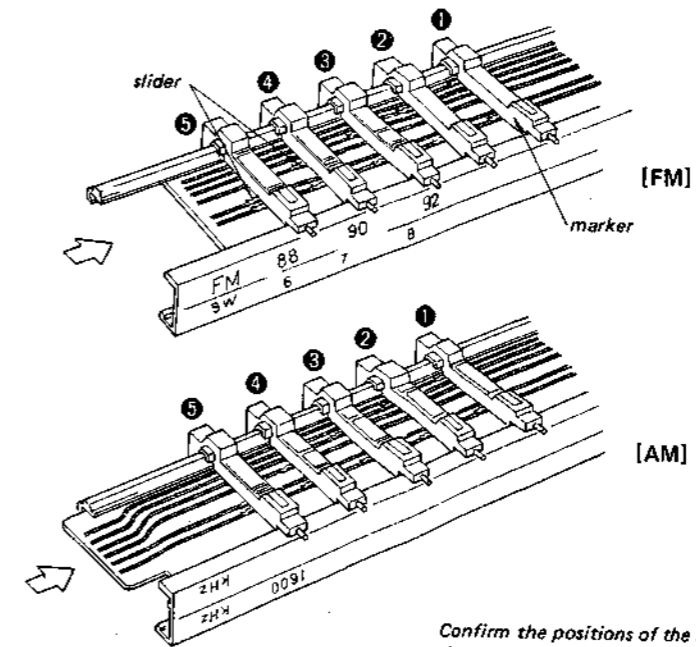
• Dial Scale Unit Disassembly



• Dial Scale Unit Installation

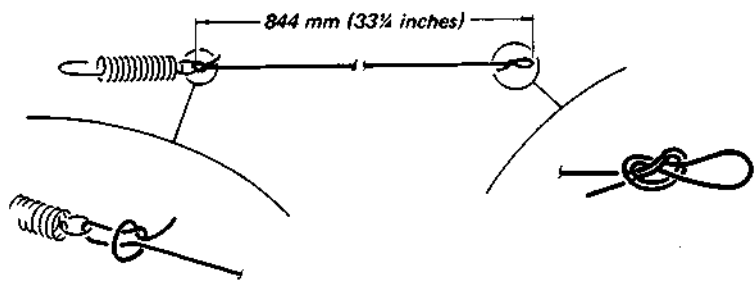


Note: The installation is performed in this way not to damage the sliders of the pointer table.

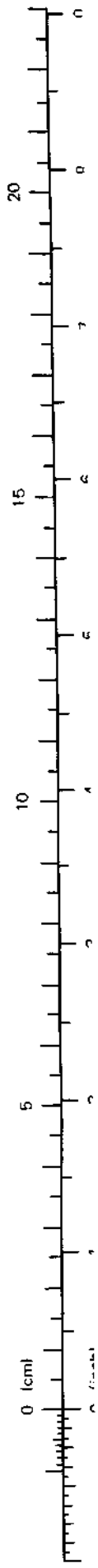
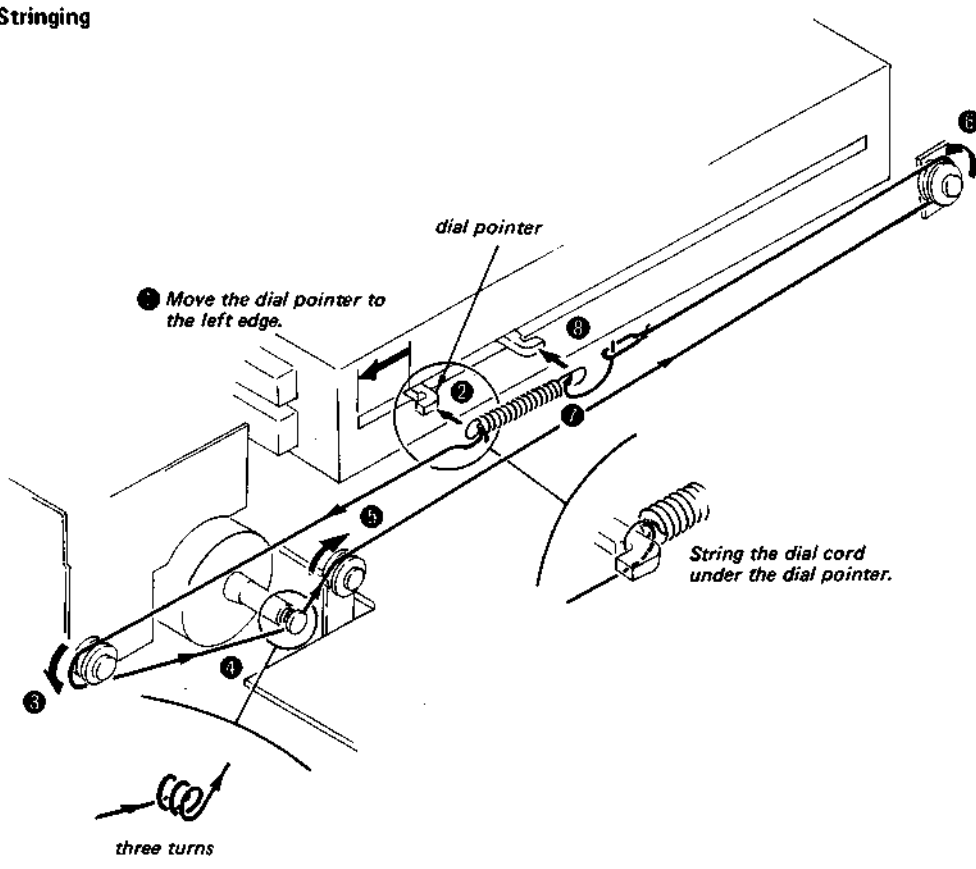


Confirm the positions of the sliders and install the markers in the numerical order given. If one of the markers is damaged, replace the five markers together to obtain the same brightness of them.

DIAL CORD STRINGING
1. Dial Cord Preparation



2. Dial Cord Stringing



T-333L

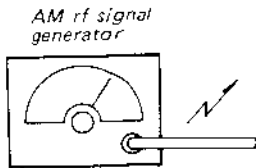
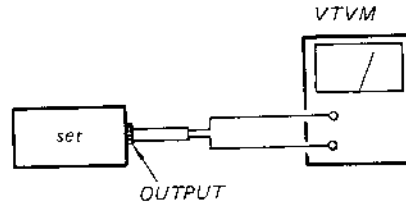
MEMO

[A series of horizontal dashed lines for writing a memorandum.]

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.

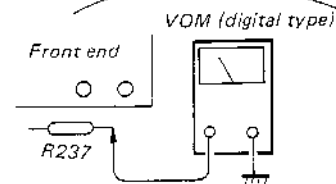
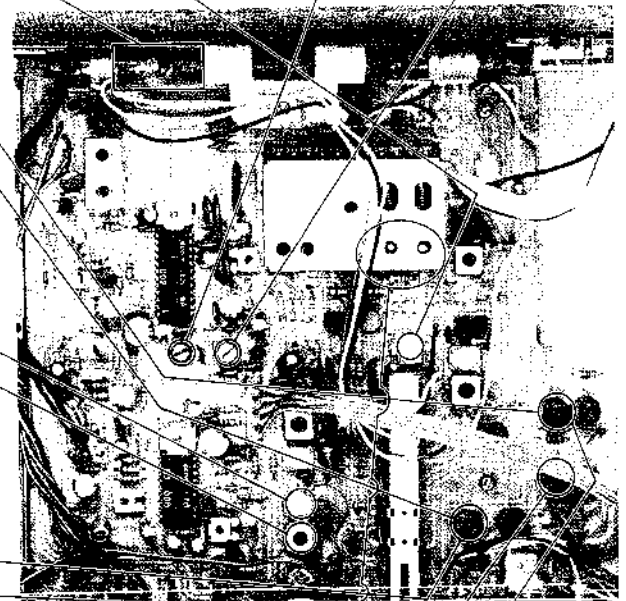
Modulation: 400Hz, 30%

- 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

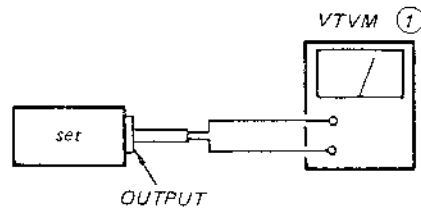
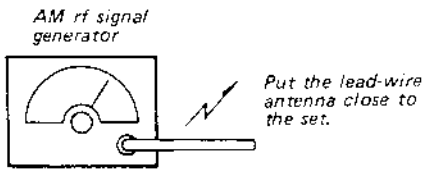
AM IF ALIGNMENT	
Adjust for a maximum reading on VTVM.	
450 kHz	
T 203	T 202

MW FREQUENCY COVERAGE ADJUSTMENT			
Tuning Control Voltage Adjustment	Dial Indication	VOM Reading	Adjustment Part
	minimum frequency	2V	RT 401
Adjustment	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.			



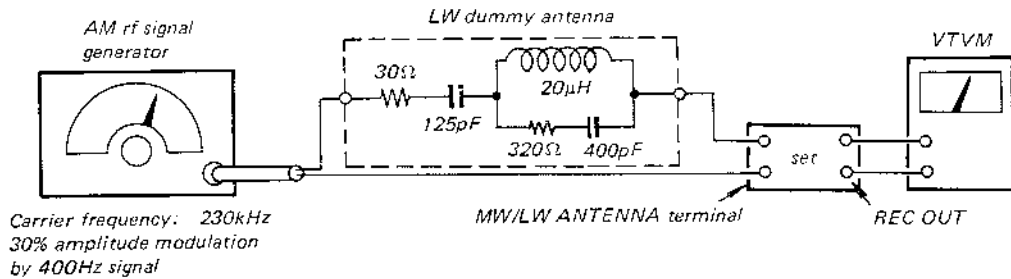
Measure this voltage with high-input impedance equipment.

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

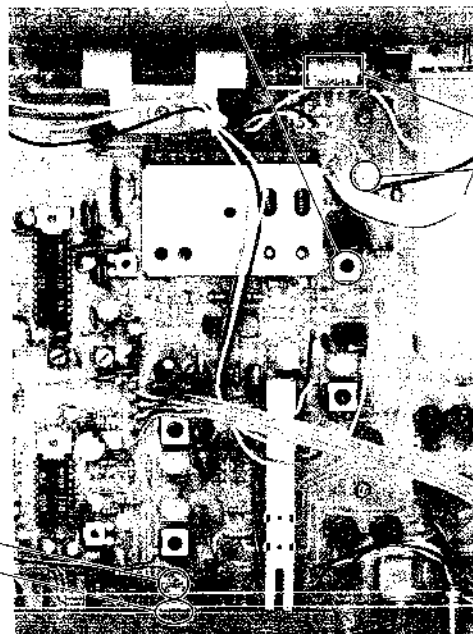


- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

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.



LW TRACKING ADJUSTMENT

Adjust for a maximum reading on VTVM ①.

L206	150kHz
CT201	310kHz

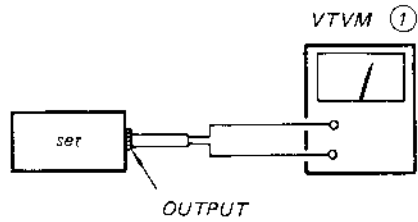
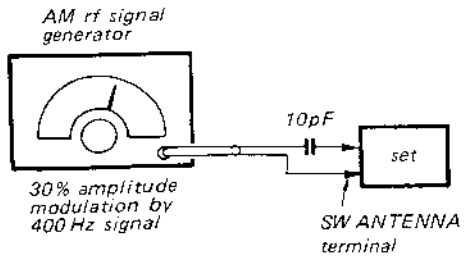
LW FREQUENCY COVERAGE ADJUSTMENT

Adjust for a maximum reading on VTVM ①.

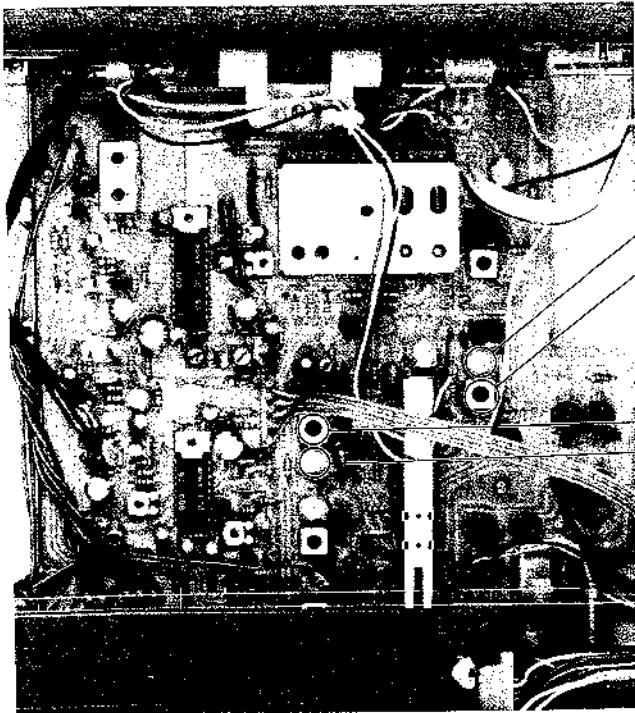
365kHz	CT205
145kHz	L210

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

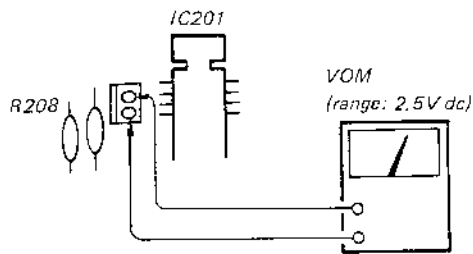
FM DISCRIMINATOR ALIGNMENT 1

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

Procedure:

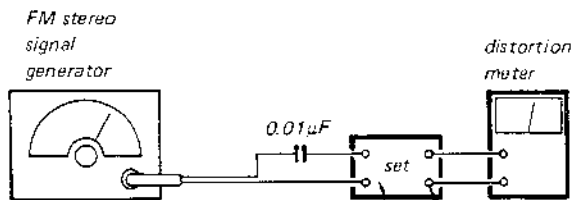
Adjust the black core (primary-side) of T201 for 0V reading on VOM.

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

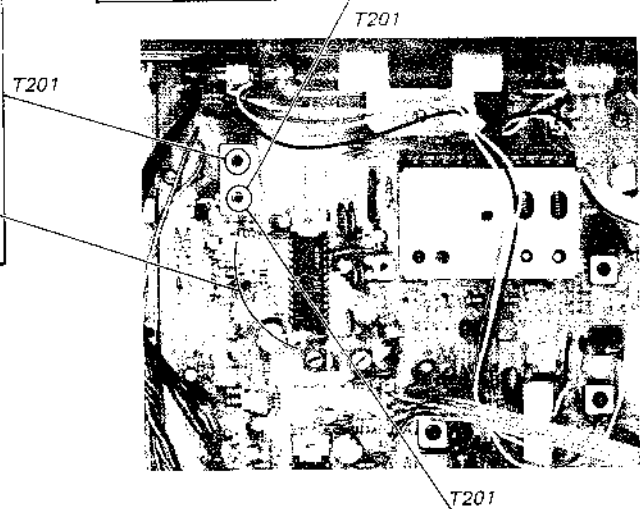


FM ANTENNA OUTPUT
 75Ω

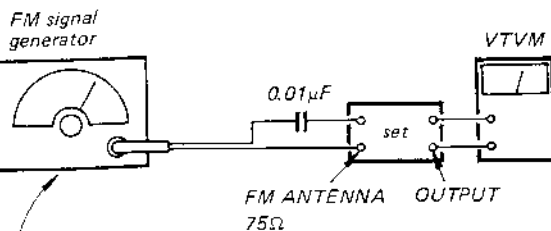
Carrier frequency: 98 MHz
 Output level: 1 mV (60 dB)
 Modulation: 400 Hz, 40 kHz deviation (100%)

Procedure:

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



FM IF ALIGNMENT



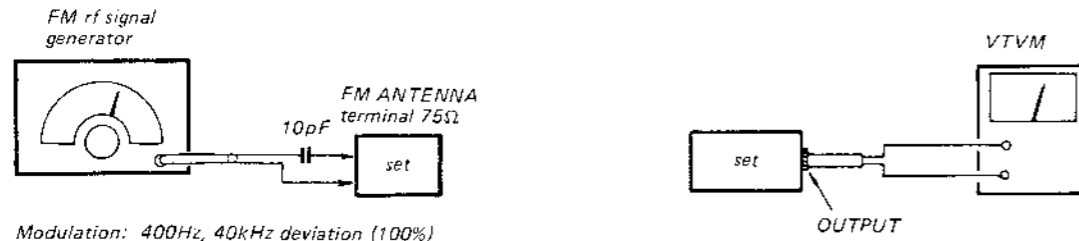
Carrier frequency: 98 MHz
 Output level: 12.5 µV (22 dB)
 Modulation: 400 Hz, 40 kHz deviation (100%)

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.

MUTING LEVEL ADJUSTMENT

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

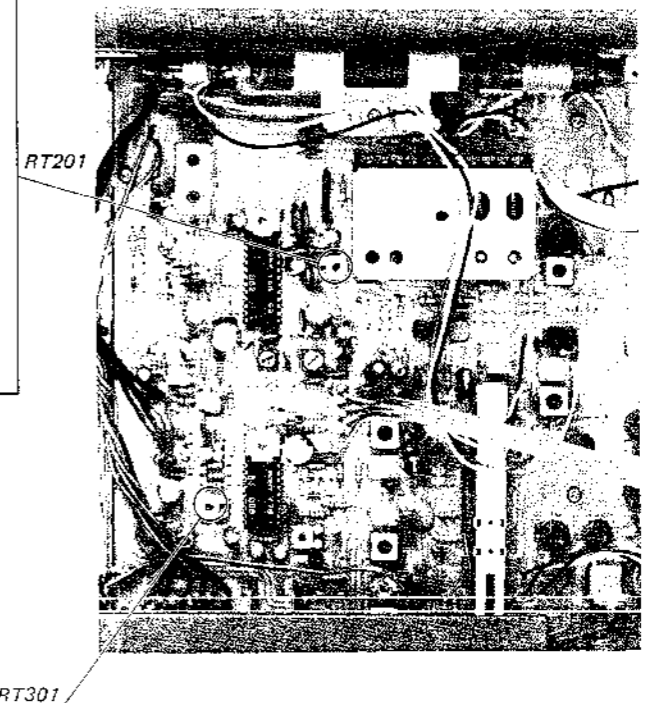
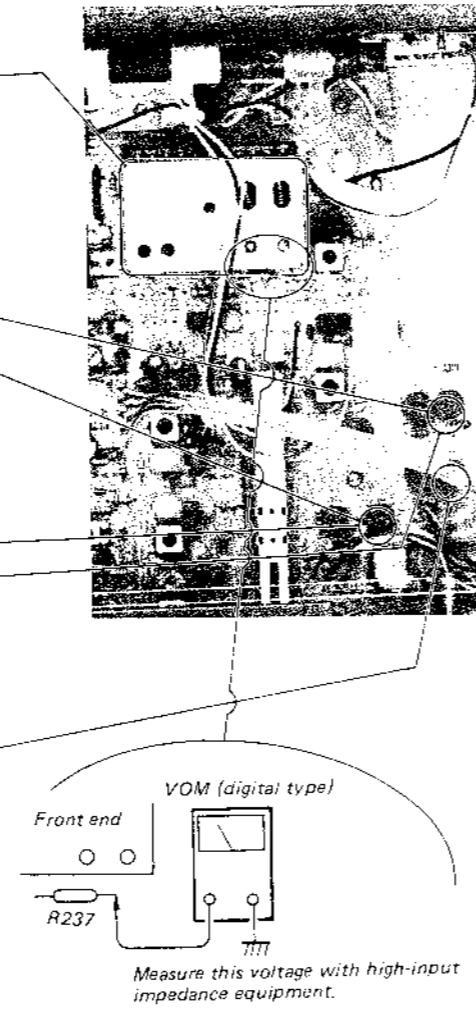
Procedure:

Carrier frequency: 98 MHz
 Modulation: 400 Hz, 40 kHz deviation (100%)
 Output: 16 μV (22 dB)

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

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	86 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.			



FM STEREO SEPARATION ADJUSTMENT

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

Procedure:

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%)

FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	(A)
R-CH	L-CH	(B)
R-CH	R-CH	(C)
L-CH	R-CH	(D)

Adjust RT 301 resistor for minimum reading.

Adjust RT 301 resistor for minimum reading.

L-CH Stereo separation: (A) - (B)
 R-CH Stereo separation: (C) - (D)

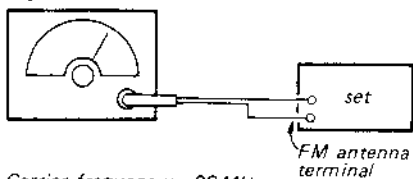
The separations of both channels should be equal.

76 kHz Adjustment

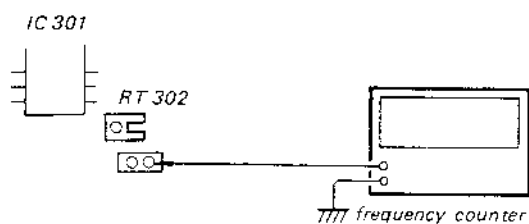
A) Regular Method

Procedure:

FM rf signal
generator



Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation
(100%)

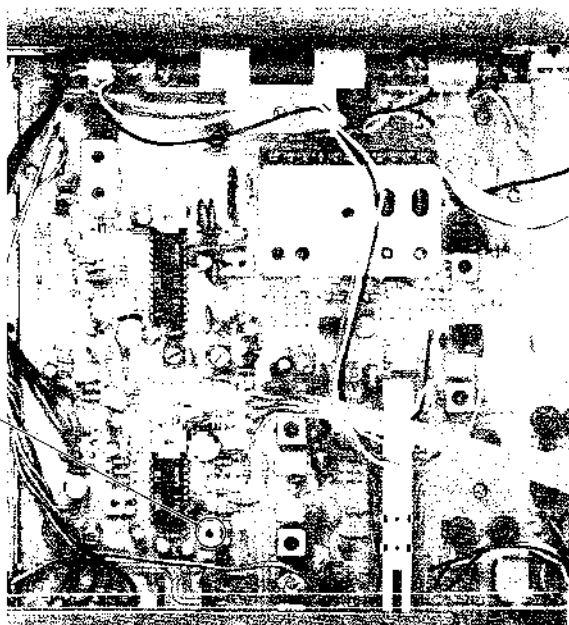
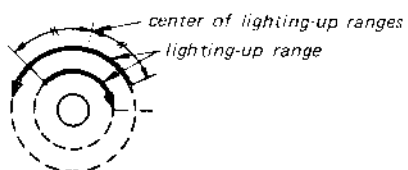


1. Tune the set to 98 MHz.
2. Adjust RT302 for 76kHz \pm 30 Hz on the counter.

B) Simple Method

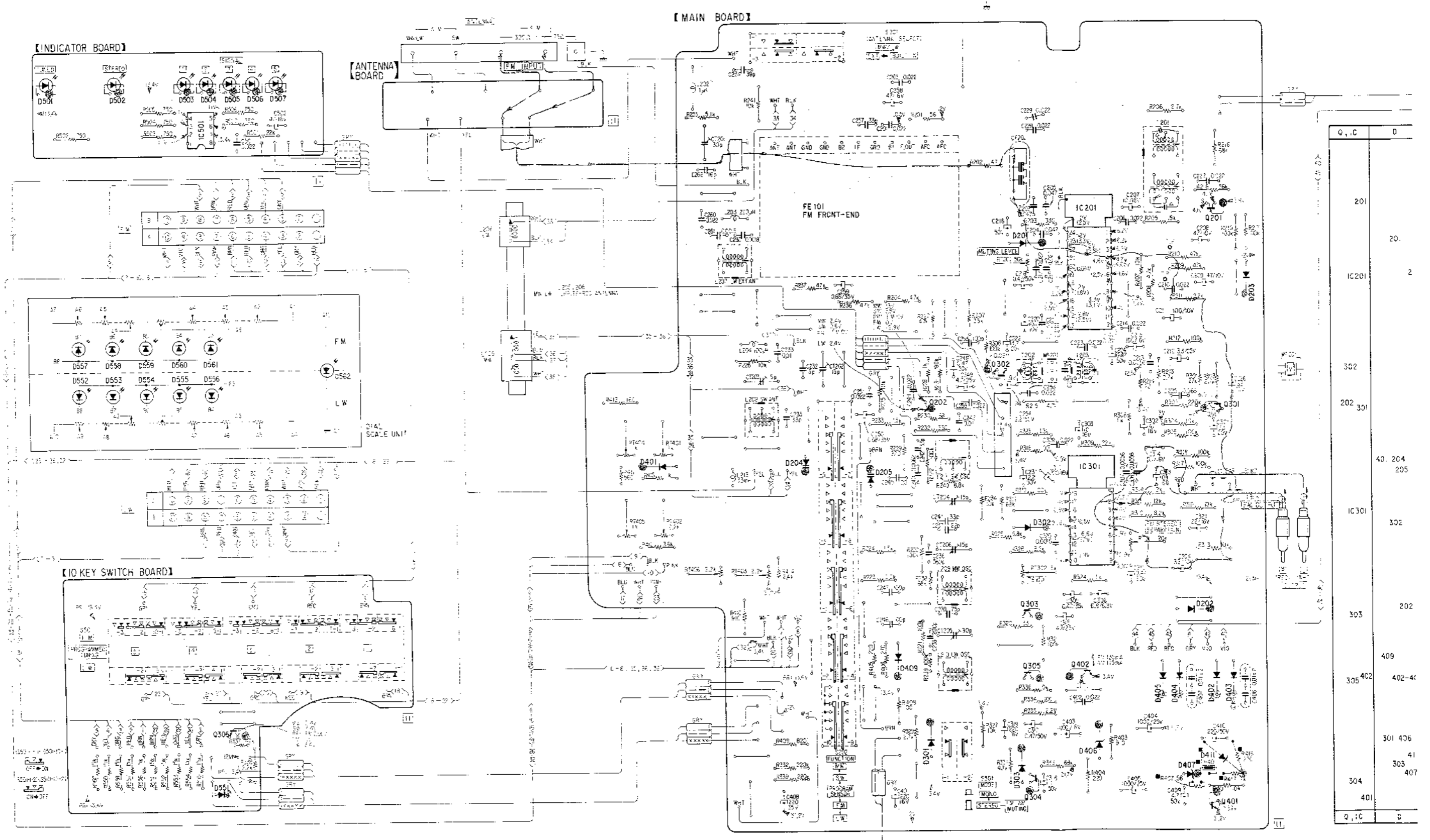
Procedure:

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.

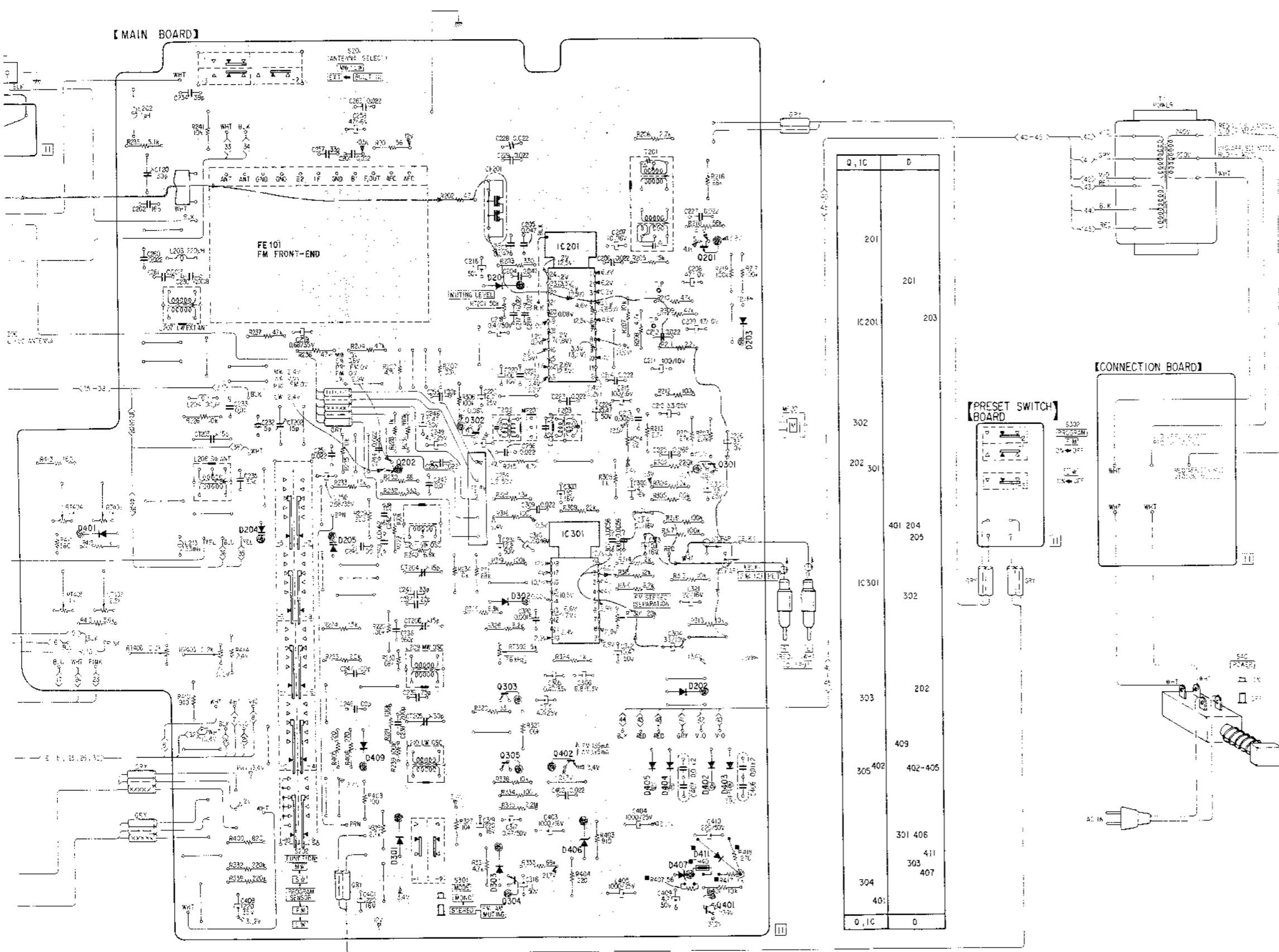


SECTION 4
DIAGRAMS

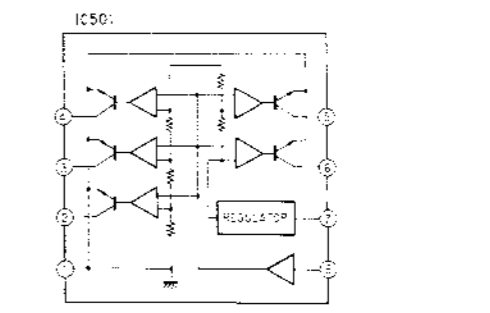
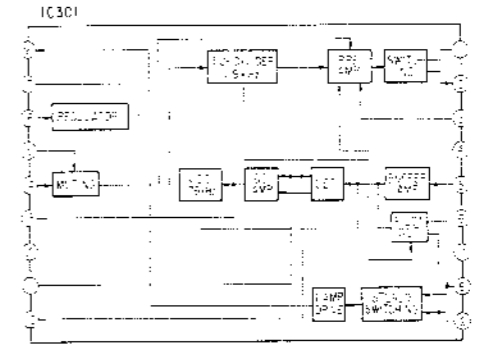
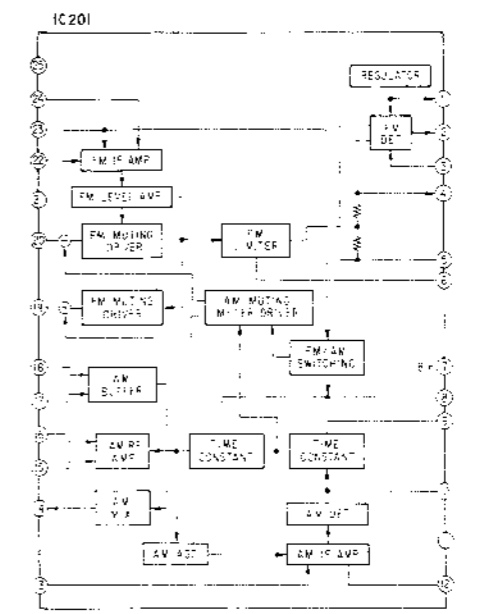
4.1. MOUNTING DIAGRAM - Conductor Side -



Q, C	D
201	
20	
IC 201	2
302	
202	301
40	204
	205
IC 301	302
303	
	202
	409
305	402-41
	301
	406
	41
304	303
	407
401	
Q, C	D

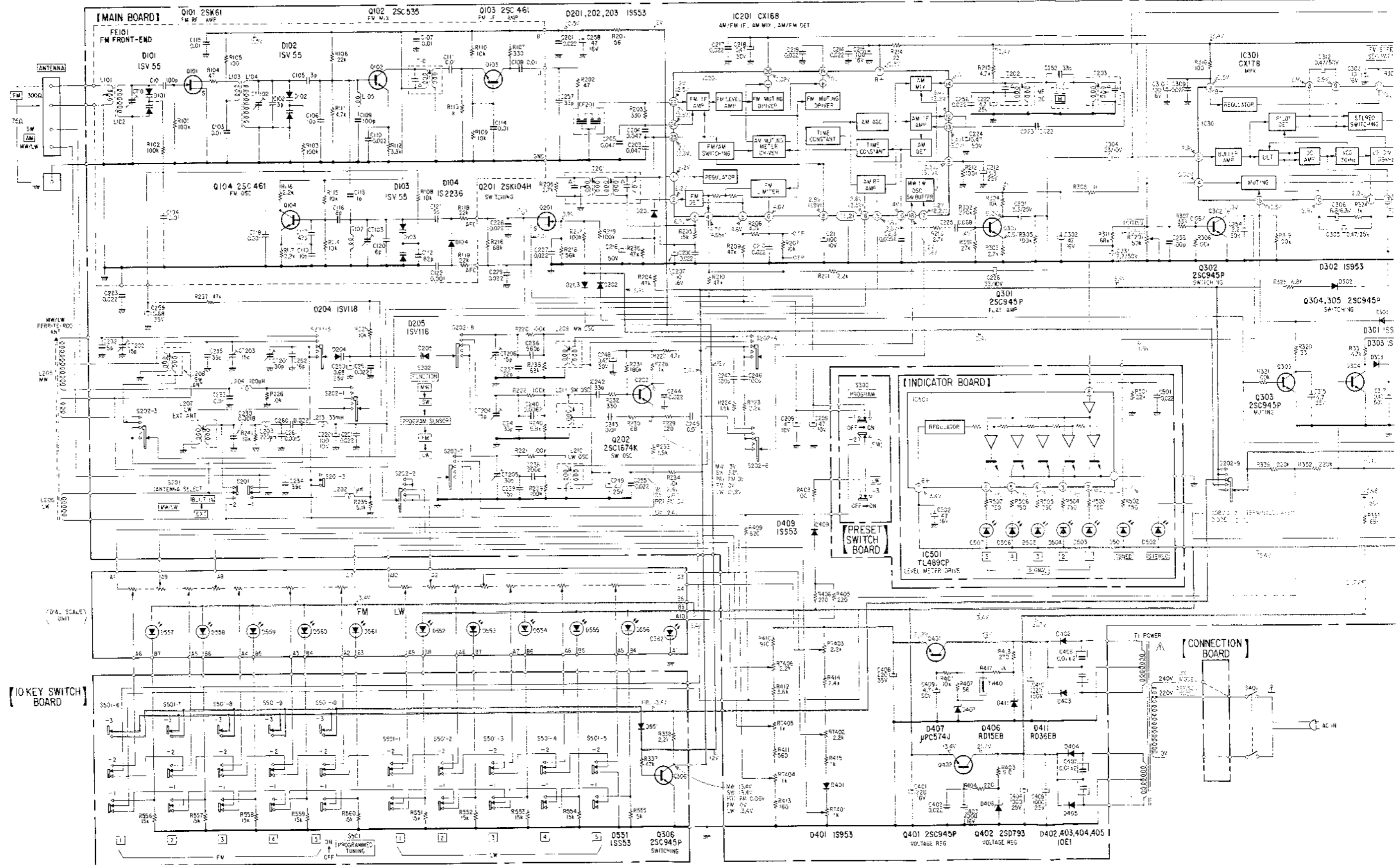


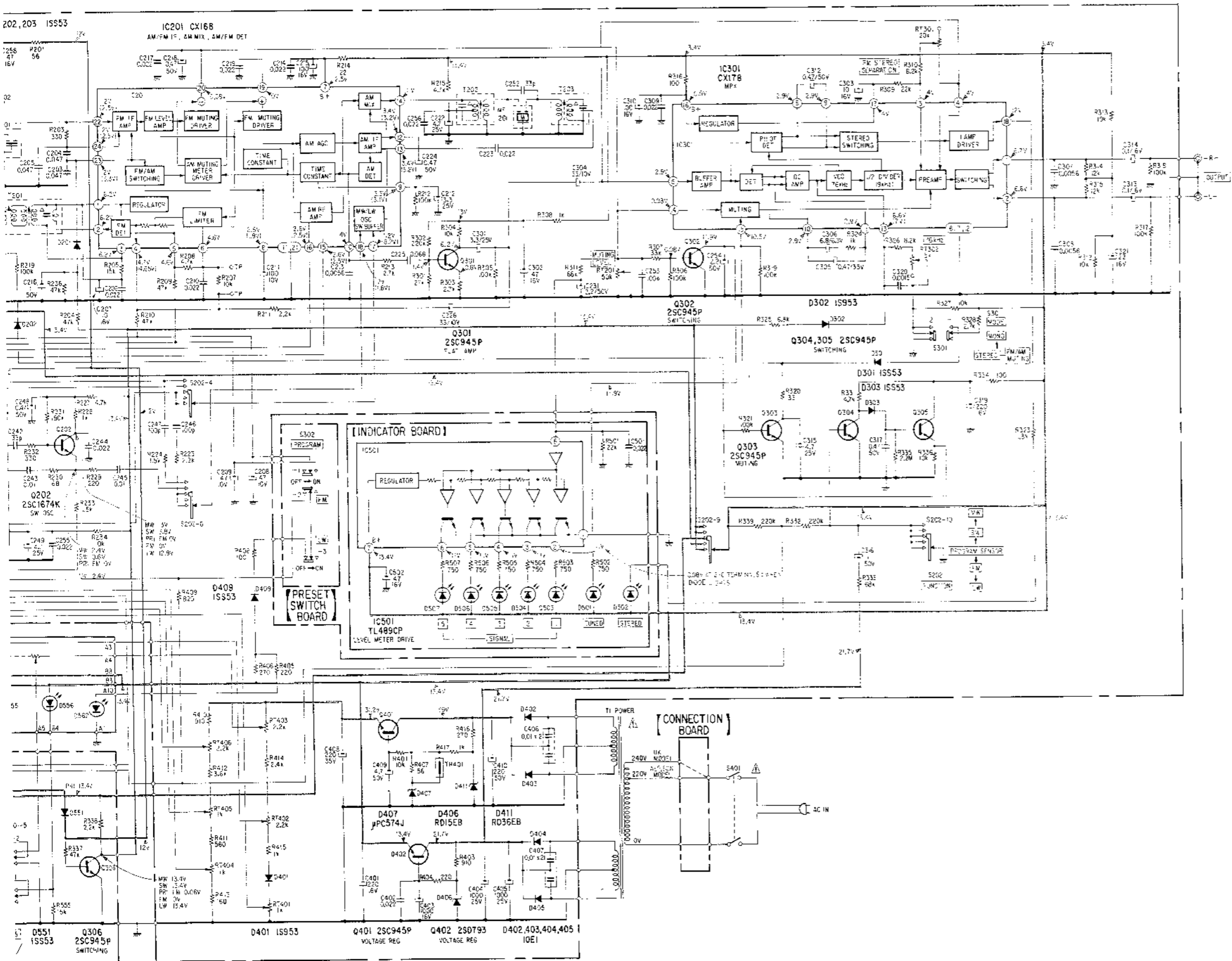
Q, IC	D
201	201
IC 201	203
302	301
202	301
401	204
205	205
IC 301	302
303	202
409	409
305	402-405
301	406
411	411
303	407
401	401
0, IC	0



- Note:
- [] : indicates side identified with part number.
 - ① : signal path
 - ② : L-CH signal path
 - ③ : R-CH signal path
 - c : B+ pattern

4-2. SCHEMATIC DIAGRAM





- Note:**
- All capacitors are in μF unless otherwise noted. pF : μF 50WV or less are not indicated except for electrolytics and tantalums.
 - All resistors are in ohms, $\text{k}\Omega$: 1000 Ω , $\text{M}\Omega$: 1000 $\text{k}\Omega$
 - (N) : low-noise resistor.
 - Voltage variations may be noted due to normal production tolerances.
 - Readings are taken under no-signal (detuned) conditions with a VOM (20 $\text{k}\Omega/\text{V}$).
 - : panel designation.
 - : adjustment for repair.
 - Transistor base-emitter voltages are measured on the 2.5 V range.
 - : B+ bus.
 - Switch

Ref. No.	Switch	Position
S201	MW/LW FUNCTION	BUILT IN
S202	PROGRAM SENSOR	STEREO
S301	MODE	OFF
S302	PROGRAM	OFF
S401	POWER	OFF
S501	PROGRAMMED TUNING	OFF

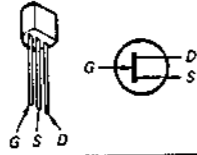
Note: The components identified by shading and mark are critical for safety. Replace only with part number specified.

SECTION 5
EXPLODED VIEWS

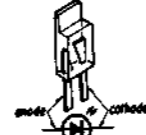
Replacement Semiconductors

For replacement, use semiconductors except in ().

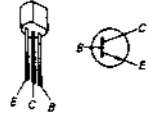
Q201: 2SK104H



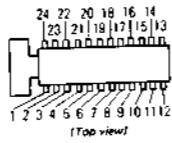
D501: GL9NG21
D502: GL9PR21
D503-507: GL9NG31



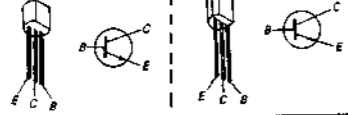
Q202: 2SC1364 (2SC1674K)



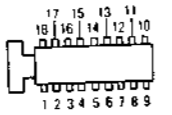
IC201: CX168



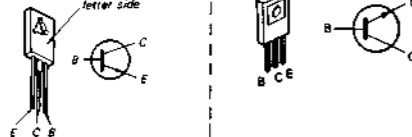
Q301-306 : 2SC1364 (2SC945P)
Q401



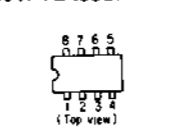
IC301: CX178



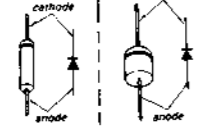
Q402: 2SD669A (2SD793)



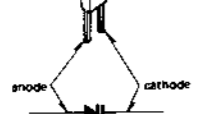
IC501: TL489CP



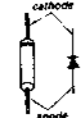
D201-203 : 1S1555 (1SS53)
D301, 303 : 1S1555 (1SS53)
D409, 551



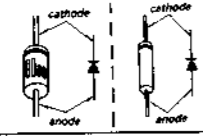
D204, 205: 1SV118



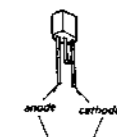
D302, 401: 1S1555 (1S953)
D402-405: 10E-2 (10E-1)



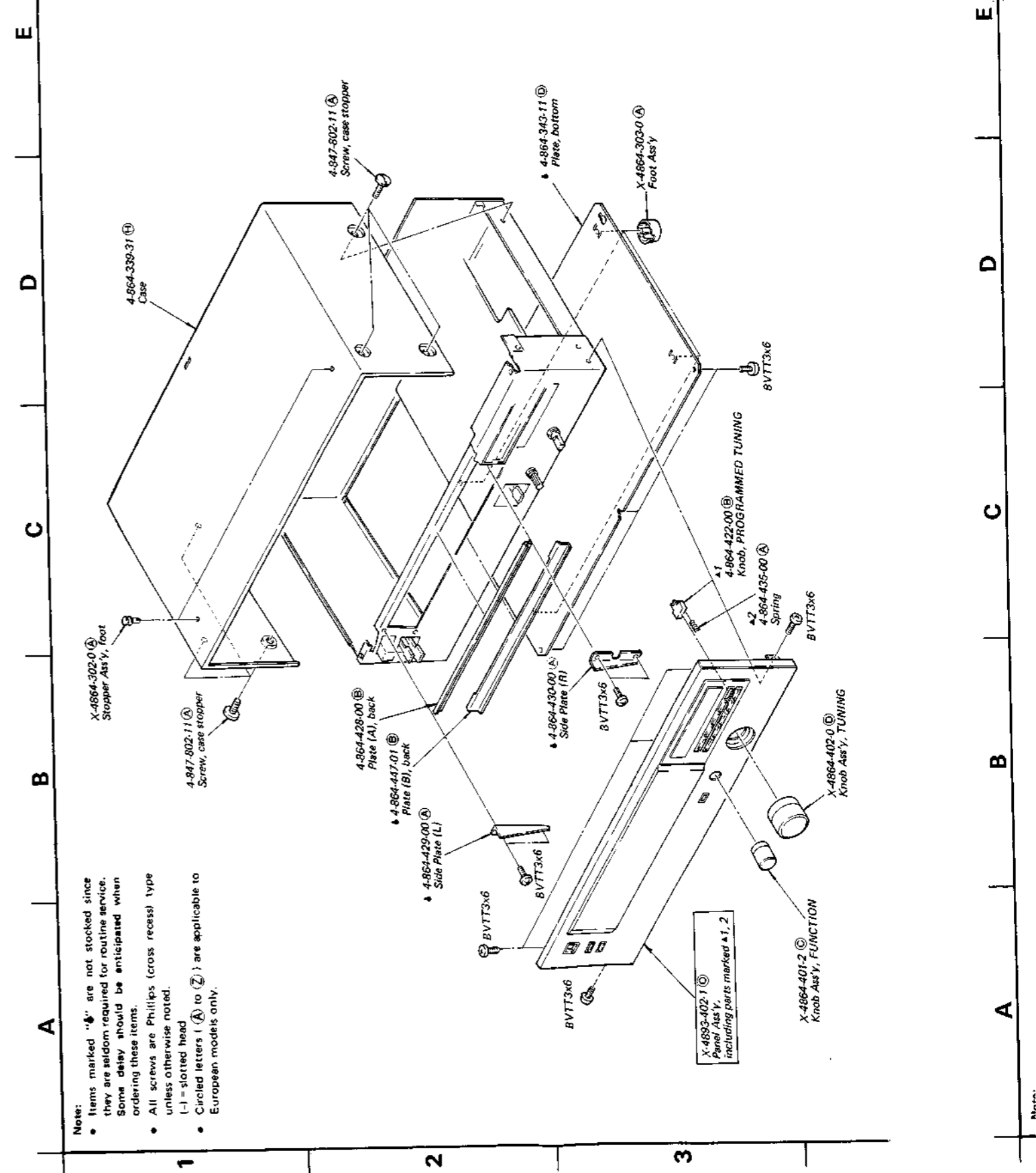
D406: EQB01-15 (RD15EB)
D411: EQB01-35 (RD36EB)



D407: μPC574J



5-1.

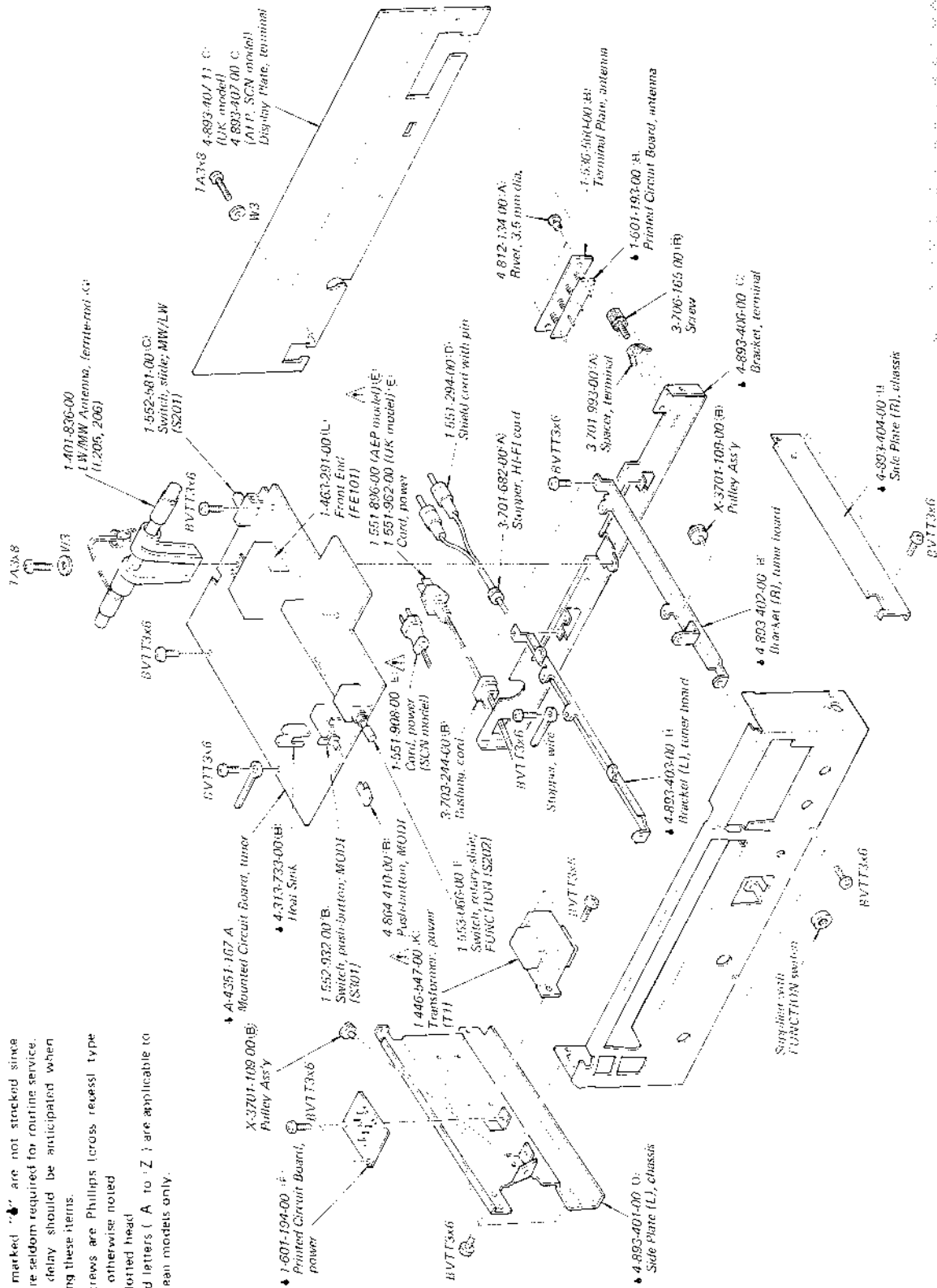


- Note:
- Items marked "Ⓢ" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
 - All screws are Phillips (cross recess) type unless otherwise noted.
 - (-1) = slotted head
 - Circled letters (A) to (Z) are applicable to European models only.

A B C D E

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.



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

5.3.

E

D

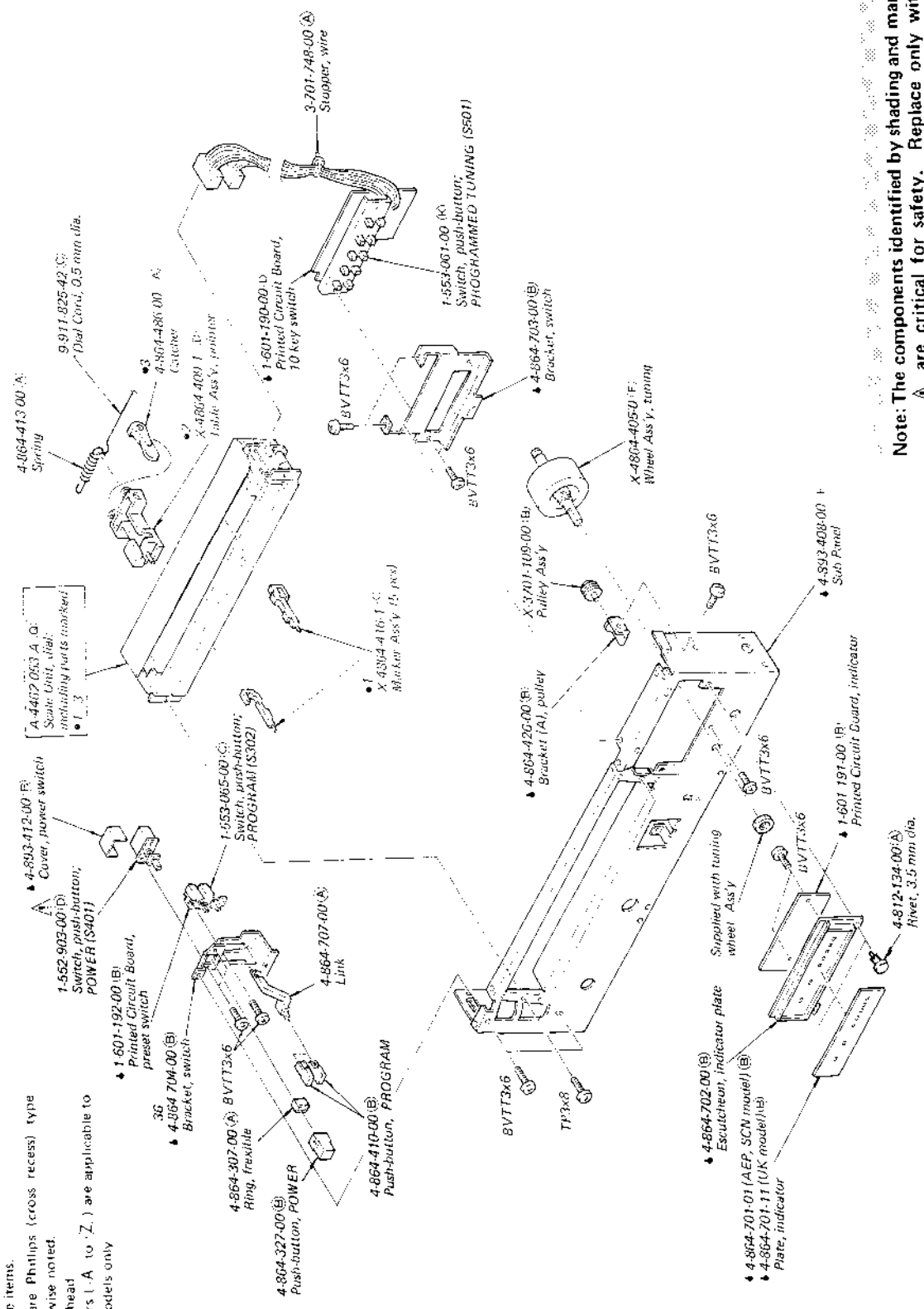
C

B

A

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 Philips (cross recess) type unless otherwise noted.
- Circled letters (A to Z) are applicable to European models only



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

1

2

3

**SECTION 6
ELECTRICAL PARTS LIST**

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

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
SEMICONDUCTORS		
Transistors		
Q101-104		Included in the Front End
Q201	1-800-982-11 (B)	2SK104H
⇒Q202	8-729-663-47 (B)	2SC1364
⇒Q301-306	8-729-663-47 (B)	2SC1364
⇒Q401		
⇒Q402	8-729-306-92 (C)	2SD669A
ICs		
IC201	8-751-680-01 (J)	CX168
IC301	8-751-780-00 (H)	CX178
IC501	8-759-904-87 (D)	TL489CP
Diodes		
D101-104		Included in the Front End
⇒D201-203	8-719-815-55 (B)	1S1555
D204, 205	8-719-100-81 (D)	1SV118
⇒D301, 303	8-719-815-55 (B)	1S1555
⇒D302, 401	8-719-815-55 (B)	1S1555
⇒D402-405	8-719-200-02 (B)	10F2
⇒D406	8-719-931-15 (B)	EQB01-15
D407	8-759-157-40 (C)	μPC574J
⇒D409	8-719-815-55 (B)	1S1555
⇒D411	8-719-931-35 (B)	EQB01-35
D501	8-719-909-22 (B)	GL9NG21
D502	8-719-909-21 (B)	GL9PR21
D503-507	8-719-909-31 (B)	GL9NG31
⇒D551	8-719-815-55 (B)	1S1555
COILS		
L202	1-408-105-00 (B)	1 μH, microinductor
L203	◆ 1-407-754-00 (B)	220 μH, microinductor
L204	◆ 1-407-750-00 (B)	100 μH, microinductor
L205, 206	1-401-836-00 (G)	LW/MW Antenna, ferrite-rod
L207	1-401-834-00 (B)	Coil
L208	1-401-822-00 (B)	ANT
L209	1-405-892-00 (B)	OSC

⇒ : Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

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

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
L210	1-405-893-00 (B)	OSC
L211	1-405-894-00 (B)	OSC
L213	1-407-964-00 (B)	33 μH, microinductor

TRANSFORMERS

T1	▲ 1-446-547-00 (K)	Power
T201	1-409-323-00 (B)	Mechanical filter
T202	1-409-324-00 (B)	Mechanical filter
T203	1-404-167-00 (D)	FM discriminator

CAPACITORS

All capacitors are in μF. Common capacitors are omitted. Refer to the lists on page 30 and 31 for their part numbers.

C237	1-102-516-00 (A)	27 p	ceramic
C241, 242	1-102-518-00 (A)	53 p	ceramic
C257	1-102-518-00 (A)	33 p	ceramic
C262	1-102-516-00 (A)	27 p	ceramic
C406, 407	1-102-394-00 (B)	0.01 250 V	ceramic

CV201-206 1-141-171-XX (B) trimmer

RESISTORS

All resistors are in ohms. Common 1/4W carbon resistors are omitted. Refer to the list on page 32 for their part numbers.

R410	1-214-131-00 (A)	910	1/4W	metal-oxide
R412	1-214-145-00 (A)	3.6 k	1/4W	metal-oxide
R413	1-214-113-00 (B)	160	1/4W	metal-oxide
R414	1-214-141-00 (A)	2.4 k	1/4W	metal-oxide
R415	1-214-132-00 (A)	1 k	1/4W	metal-oxide

RT201 1-226-685-00 (B) 50 k, adjustable; muting level
RT301 1-226-684-00 (B) 20 k, adjustable; FM stereo separation

RT302 1-226-235-00 (B) 5 k-B, adjustable; 76 kHz
RT401 1-226-663-00 (B) 1 k-G, adjustable
RT402, 403 1-226-664-00 (B) 2.2 k-G, adjustable

RT404, 405 1-226-663-00 (B) 1 k-G, adjustable
RT406 1-226-664-00 (B) 2 k-G, adjustable

Note: The components identified by shading and mark ▲ 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	(A) 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
	(A) 1-551-896-00	(E) Cord, power (AEP model)
	(A) 1-551-908-00	(E) Cord, power (SCN model)
	(A) 1-551-962-00	(E) Cord, power (UK model)

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
	▲ 1-4551-167-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 (A) 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)	1-121-798-00 (A)		1-121-733-00 (A)
22			1-121-479-00 (A)	1-121-480-00 (A)	1-121-662-00 (A)	1-121-132-00 (A)
33			1-121-403-00 (A)	1-121-404-00 (A)	1-121-672-00 (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	1-121-752-00 (B)	1-121-905-00 (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)	1-121-753-00 (B)	1-121-381-00 (D)	1-121-810-00 (E)
1000		1-121-736-00 (C)	1-121-245-00 (D)	1-121-657-00 (D)	1-121-338-00 (E)	1-123-061-00 (E)
2200	1-121-858-00 (B)	1-121-679-00 (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	1-123-199-00 (A)	1-123-252-00 (A)	1-123-003-00 (B)	1-121-163-00 (D)
2.2	1-123-253-00 (A)	1-123-026-00 (A)		1-123-028-00 (B)
3.3	1-121-995-00 (A)		1-123-001-00 (B)	1-123-006-00 (C)
4.7	1-123-254-00 (A)	1-121-246-00 (B)	1-121-754-00 (B)	1-123-007-00 (D)
10	1-121-726-00 (B)	1-121-994-00 (B)	1-123-234-00 (C)	1-123-008-00 (D)
22	1-121-996-00 (C)	1-123-255-00 (C)	1-123-905-00 (D)	1-123-002-00 (D)
33	1-121-997-00 (C)	1-121-757-00 (C)		
47	1-123-251-00 (C)	1-121-979-00 (C)		
100	1-123-084-00 (D)			

CERAMIC CAPACITORS (A)

CAP. (pF)	RATING							
	50 VOLT.		50 VOLT.		50 VOLT.		50 VOLT.	
	PART No.	CAP. (pF)	PART No.	CAP. (pF)	PART No.	CAP. (pF)	PART No.	
0.5	1-101-827-00	22	1-102-950-00	250	1-101-361-00	0.001	1-102-074-00	
0.75	1-101-586-00	34	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	1-102-925-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00	
3	1-102-935-00	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	450	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	0.012	1-101-005-00	
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.017	1-101-306-00	
13	1-102-950-00	91	1-102-972-00	600	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	1-102-954-00	130	1-101-081-00					

0.001µF = 1,000pF

CERAMIC (SEMICONDUCTOR) CAPACITORS (A)

CAP. (µF)	RATING → : Use the high voltage rated one.					
	25 VOLT.		50 VOLT.		50 VOLT.	
	PART No.	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	1-161-020-00	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)

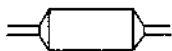
Note: Circled letters ((A) to (Z)) are applicable to European models only.

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)	-	-	1-131-407-00 (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)
2.2	1-131-424-00 (B)	-	1-131-419-00 (B)	-	1-131-414-00 (B)	-	1-131-355-00 (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

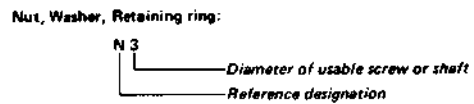
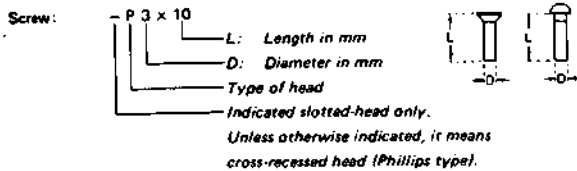
RATING						
CAP. (μF)	3 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.033	-	-	-	-	-	1-131-273-00 (E)
0.047	-	-	-	-	-	1-131-274-00 (E)
0.068	-	-	-	-	-	1-131-275-00 (E)
0.1	-	-	-	-	-	1-131-276-00 (E)
0.15	-	-	-	-	-	1-131-277-00 (D)
0.22	-	-	-	-	1-131-262-00 (D)	1-131-278-00 (D)
0.33	-	-	-	-	1-131-263-00 (E)	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 (D)	-
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 (E)	-	-	-	-	-

1/4 WATT CARBON RESISTORS ^(A)

Note: Circled letter ^(A) is applicable to European models only.

Ω	Part No.	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	1.0M	1-246-545-00
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	1.1M	1-210-814-00
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	1.2M	1-210-815-00
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	1.3M	1-210-816-00
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	1.5M	1-210-817-00
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	1.6M	1-210-818-00
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	1.8M	1-210-819-00
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	2.0M	1-210-820-00
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	2.2M	1-210-821-00
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	2.4M	1-244-754-00
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	2.7M	1-244-755-00
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	3.0M	1-244-756-00
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	3.3M	1-244-757-00
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	3.6M	1-244-758-00
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	3.9M	1-244-759-00
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	4.3M	1-244-760-00
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	4.7M	1-244-761-00
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	5.1M	1-244-762-00
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



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-filister-head screw	
RF		filister-head screw	
BV		brazer-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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