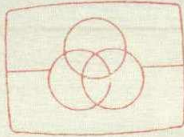


# STR-313L



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AEP Model  
UK Model



## FM-AM PROGRAM RECEIVER

### SPECIFICATIONS

#### GENERAL

- Power Requirements:** 240V ac, 50Hz(UK model)  
120V, 220V or 240V ac adjustable,  
50Hz(AEP model)
- Power Consumption:** 210W(UK model)  
180W(AEP model)
- Dimensions:** Approx. 410(w)x145(h)x310(d)mm  
16(w)x5 3/4 (h)x12 1/8 (d) inches  
including projecting parts and  
controls
- Weight:** Approx. 7.6kg, 16 lb 13 oz (net)  
Approx. 8.8kg, 19 lb 7 oz (in shipping carton)

#### FM SECTION

- Frequency Range:** 87.5–108MHz
- Antenna:** 300  $\Omega$  balanced  
75  $\Omega$  unbalanced
- Intermediate Frequency:** 10.7MHz
- Sensitivity at 50dB Quieting:** 3.5 $\mu$ V (10.7dB) (MONO)  
45 $\mu$ V (33dB) (STEREO)

- Sensitivity at 46dB Quieting:** 4 $\mu$ V (12dB) (MONO)  
(at 40kHz deviation) 50 $\mu$ V (34dB) (STEREO)
- Usable Sensitivity:** 1.8 $\mu$ V (5dB), IHF  
(at 40kHz deviation) 1.6 $\mu$ V (4dB), S/N=26dB

- S/N Ratio:** 75dB (MONO)  
70dB (STEREO)

- Harmonic Distortion:** At 100Hz  
0.2% (MONO)  
0.3% (STEREO)
- At 1kHz  
0.2% (MONO)  
0.3% (STEREO)
- At 10kHz  
0.3% (MONO)  
0.5% (STEREO)

- IM Distortion:** 0.2% (MONO)  
0.3% (STEREO)

- Separation:** 30dB at 100Hz  
45dB at 1 kHz  
35dB at 10kHz

- Frequency Response:** 40–12, 500Hz  $\pm 0.5$  dB  
30–15, 000Hz  $\pm 0.5$  dB

– Continued on page 2 –

#### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK  $\Delta$  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<sup>®</sup>

## SERVICE MANUAL

**Selectivity:** 60dB (400kHz)  
40dB (300kHz, S/N=26dB, 40kHz deviation)

**Capture Ratio:** 1.0dB

**AM Suppression Ratio:** 54dB

**Image Response Ratio:** 45dB

**IF Response Ratio:** 90dB

**Spurious Response Ratio:** 75dB

**RF Intermodulation:** 60dB

**Muting Threshold:** Approx. 5 $\mu$ V

**SW/MW/LW SECTION**

**Frequency Range:** SW: 5.8–15.8MHz  
MW: 530–1,605kHz  
LW: 150–350kHz

**Antenna:** SW/MW: External antenna terminal  
Attached antenna wire  
LW: Built-in Ferrite-rod antenna  
External antenna terminal

**Intermediate**

**Frequency:** 468kHz

**Usable Sensitivity:** SW: 30 $\mu$ V (29.5dB),  
external antenna (10MHz)  
MW: 100 $\mu$ V (40dB),  
external antenna (1,000kHz)  
LW: 500 $\mu$ V/m (53.8dB/m),  
built-in antenna  
100 $\mu$ V (40dB),  
external antenna (230kHz)

**S/N Ratio:** SW/MW: 52dB (5mV)  
LW: 52dB (50mV/m)

**Harmonic Distortion:** SW/MW: 0.3% (5mV, 400Hz)  
LW: 0.3% (50mV/m, 400Hz)

**Selectivity:** 28dB (9kHz)  
30dB (10kHz)

**AUDIO AMPLIFIER SECTION**

**Continuous RMS**

**Power Output:** Less than 0.5% THD, both channels  
driven simultaneously  
At 20–20,000Hz  
25W+25W (8  $\Omega$ )  
At 1kHz  
27W+27W (8  $\Omega$ )  
According to DIN 45500  
25W+25W (8  $\Omega$ )  
25W+25W (4  $\Omega$ , less than  
0.7% THD)

**Dynamic Power Output:** IHF constant power supply method  
90W (8  $\Omega$ )

**Power Bandwidth:** 10–40,000Hz, IHF

**Damping Factor:** 20 at 1kHz (8  $\Omega$ )

**Harmonic Distortion:** Less than 0.5% at rated output (8  $\Omega$ )  
Less than 0.7% at rated output (4  $\Omega$ )  
Less than 0.2% at 1W output (8  $\Omega$ )  
Less than 0.3% at 1W output (4  $\Omega$ )

**IM Distortion:** Less than 0.5% at rated output  
(60Hz: 7kHz=4:1) Less than 0.2% at 1W output

**Residual Noise:** Less than 0.08 $\mu$ W (at 8 $\Omega$ )

**Frequency Response:** PHONO:  
RIAA equalization curve  $\pm$ 1 dB  
TAPE:  
10–50,000 Hz  $\pm$ 1dB  
–3dB

**Inputs:**

	Sensitivity	Impedance	S/N	Weighting network
PHONO	2.5mV (–50dB)	50 k $\Omega$	70 dB	A
TAPE	150mV (–15.5dB)	100 k $\Omega$	90 dB	A

Measured with rated output power into 8  $\Omega$  loads  
(both channels driven simultaneously) at 1kHz.

**Outputs:**  
(with rated input)

	Voltage	Impedance
REC OUT	150mV (–15.5dB)	10 k $\Omega$

**Headphones:** Accepts all low or high impedance headphones

**Speaker:** 4–16  $\Omega$  speakers are suitable.

**Tone Controls:** BASS  $\pm$ 8dB at 100Hz  
TREBLE  $\pm$ 8dB at 10kHz

**Loudness Control:** +8dB at 100Hz  
(att. 30dB) +3dB at 10kHz

• **MODEL IDENTIFICATION**

– Rear Panel –

**AEP model**

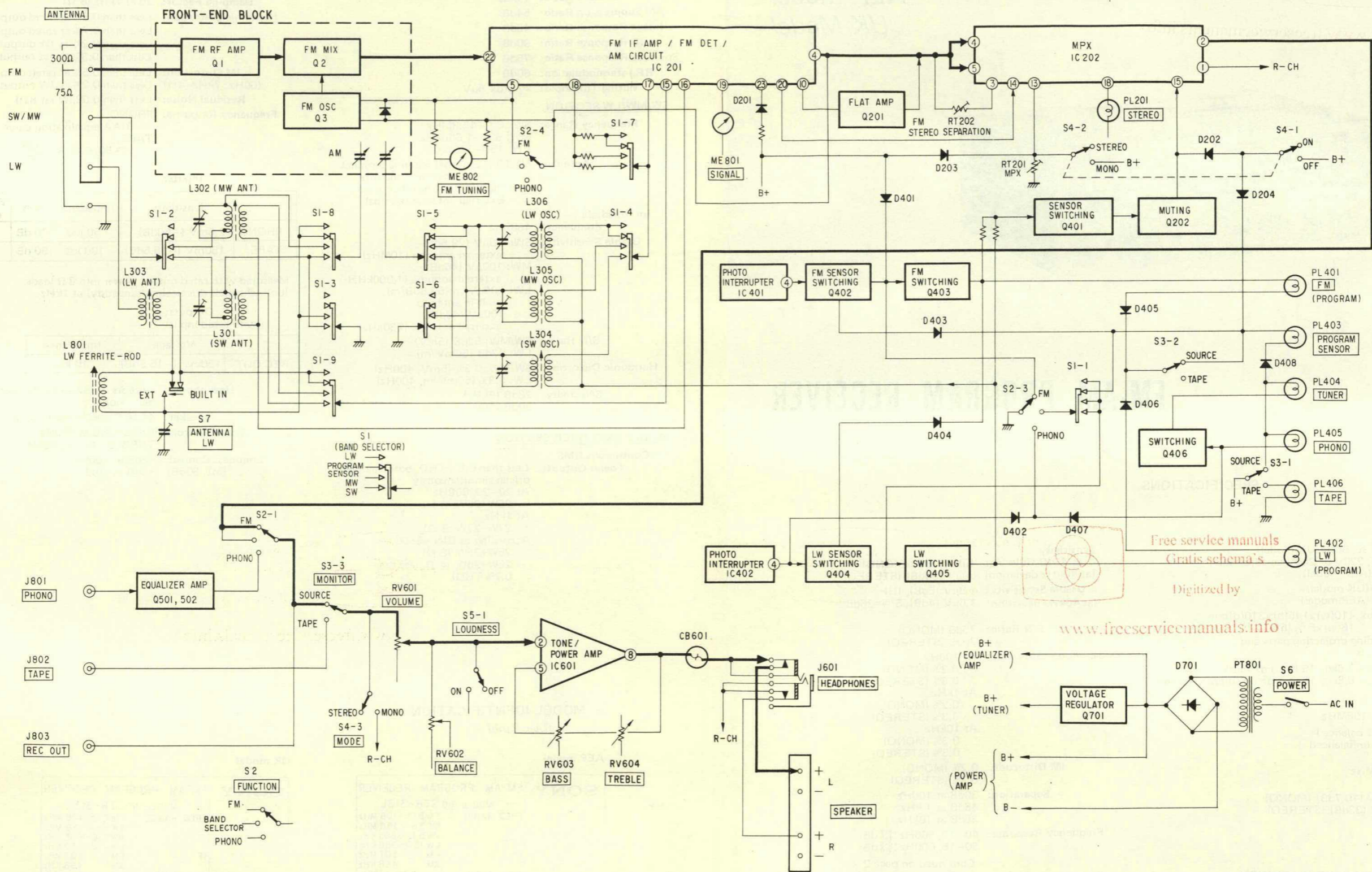
<b>SONY</b>	FM-AM PROGRAM RECEIVER
	MODEL NO. STR-313L
	FREQ RANGE : FM 87.5–108 MHz SW 5.8–15.8 MHz MW 530–1605 KHz LW 150–350 KHz
	IF : FM 1.07 MHz AM 468 KHz
AC: 220 V	$\sim$ 50 Hz 180 W
MADE IN	
SERIAL NO	

**UK model**

<b>SONY</b>	FM-AM PROGRAM RECEIVER
	MODEL NO. STR-313L
	FREQ RANGE : FM 87.5–108 MHz SW 5.8–15.8 MHz MW 530–1605 KHz LW 150–350 KHz
	IF : FM 1.07 MHz AM 468 KHz
AC: 240 V	$\sim$ 50 Hz 210 W
MADE IN	
SERIAL NO	

SECTION 1  
OUTLINE

1-1. BLOCK DIAGRAM



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**1-2. CIRCUIT DESCRIPTION (See Fig. 1)**

**Program Sensor**

When the band selector switch (S1) and FUNCTION switch (S2) are set to PROGRAM position and band selector position respectively and the pointer matches with a station marker, FM or LW station is automatically selected through optical detection. (Fig. 2)

**1) When the pointer matches only with the FM station marker:**

- a) The light of IC401 (Photo Interrupter) is intercepted by the marker, bias voltage is applied to the base of Q402 through R405, and Q402 is turned on.
- b) The collector voltage of Q402 reduces and D401 is turned on.
- c) The terminal (23) of IC201 is grounded through D201, R204, D401, Q402 and D403.
- d) FM circuit operates (The terminal (23) of IC201 serves as a switch).

Note: When B + voltage is applied to the terminal (23) of IC201 through R401, R204 and D201, the receiver is in AM mode. At the same time, as Q403 is on, PL401 (FM indicator lamp) lights.

**2) When the pointer matches only with the LW station marker:**

- a) As the light of IC401 is not intercepted, Q402 and D401 are turned off. As a result, B + voltage is applied to the terminal (23) of IC201 through R401 and R204. On the other hand, the light of IC402 is intercepted by the LW station marker.
- b) Q404 and Q405 are turned on.
- c) B + voltage is applied to L306 (LW oscillator coil).
- d) LW circuit operates. When Q405 is on, PL402 (LW indicator lamp) simultaneously lights.

**3) When the pointer matches simultaneously with both the FM and LW station markers:**

- a) Q402 and Q403 are turned on by intercepting the light of IC401. On the other hand, the light of IC402 is also intercepted and the bias voltage is applied to the base of Q404, but because the collector voltage of Q403 is high, D404 is turned off. The emitter voltage of Q404 rises and B + voltage is not applied to L306 (LW oscillator coil) and PL402. Consequently, only the FM station signal is received.

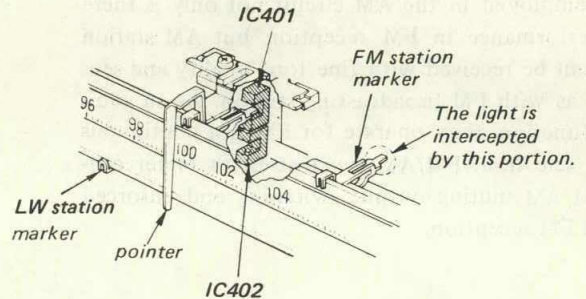


Fig. 2

**Q202 and 401**

Q401 operates to improve the rise time of PL401 (FM indicator lamp) or PL402 (LW indicator lamp) when tuning the receiver, and at the same time Q401 switches Q202. Q202 serves as a high-speed-muting switch which is turned on or off as soon as the station signal is tuned or detuned.

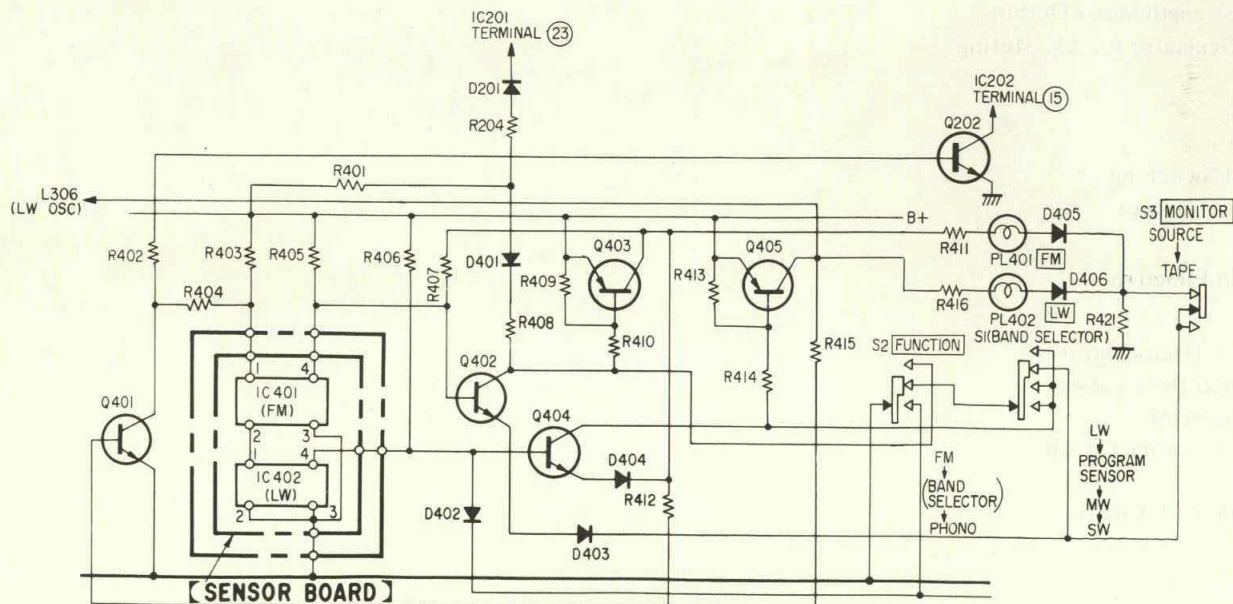


Fig. 1

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**IC201 (CX168), IC202 (CX178)**

These two ICs form a system. Both of them are bipolar-linear-ICs. CX168 integrates 343 elements and CX178 integrates 260 elements. They include many functions and are improved upon the degree of integration now available as a linear-ICs for tuner use. They have high performance in FM reception and form a muting system having an FM muting attenuation of 90dB. In addition, because a muting circuit is newly employed in the AM circuit not only is there high performance in FM reception but AM station signal can be received with fine tone quality and sensitivity as with FM broadcasting station. As an additional function, they operate for FM/AM continuous station selection, FM/AM signal-strength meter output, FM/AM muting output switching and enforced AGC at FM reception.

**CX168 Main Function**

<FM>

- IF Amplifier
- Quadrature detector
- Signal-strength Meter Output
- Muting Signal Output
- AFC Output for Converter
- Multipath Signal Output
- Bandpass Control Circuit

<AM>

- RF Attenuator
- Mixer
- Oscillator
- IF Amplifier and AGC
- AM Detector
- Signal-Strength Meter Output
- Signal Generator for AM Muting

<General>

- Regulator
- FM/AM Switching
- Regulator Output

**CX178 Main Function**

<FM Stereo Demodulator>

- FM Stereo Demodulator
- Phase Detector
- Stereo Indicating Circuit
- VCO
- VCO ON/OFF Circuit

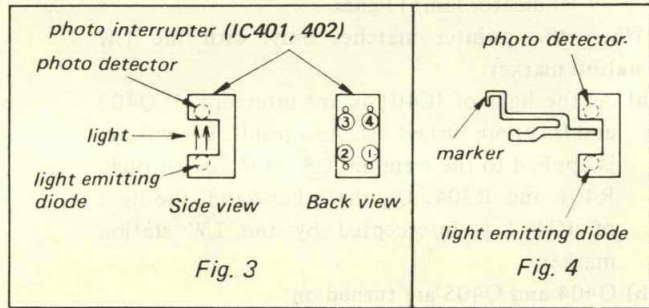
<General>

- Muting Gate
- Regulator
- Muting Canceler Circuit
- Pop-noise Canceler
- Hysteresis Circuit

**Photo Interrupter (IC401, 402)**

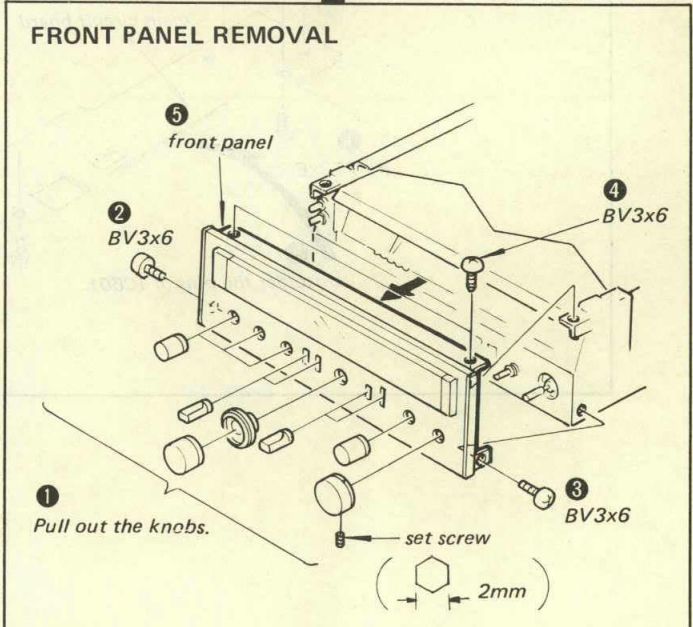
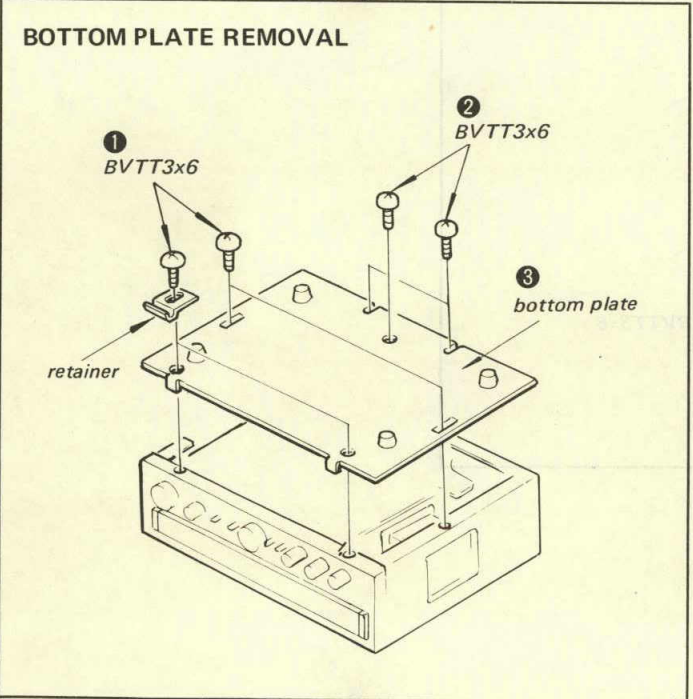
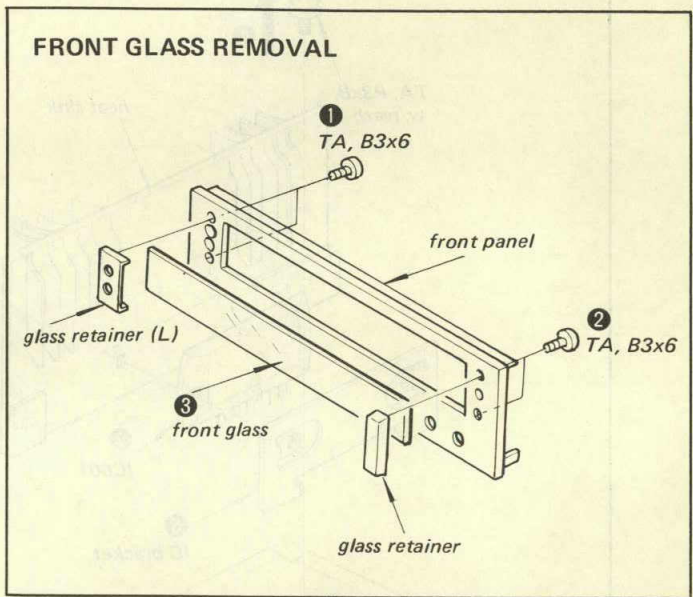
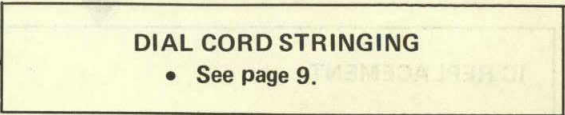
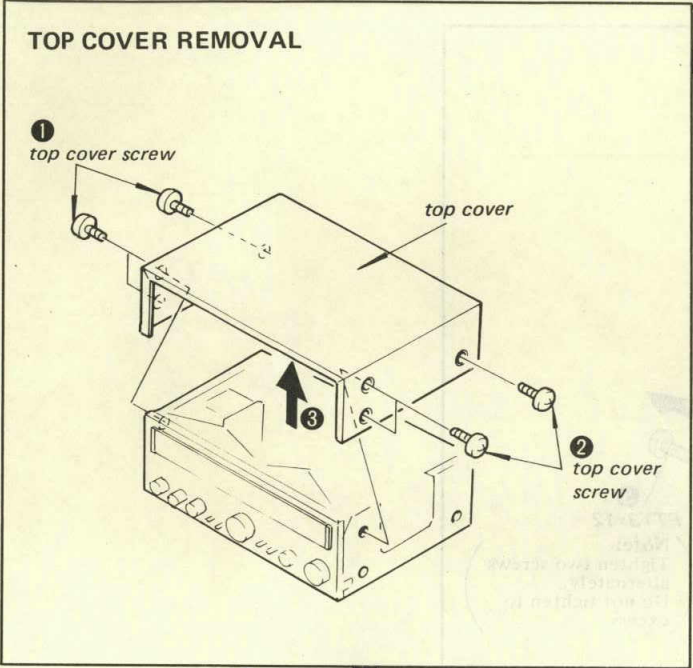
The terminals (1) and (2) of the photo interrupter operate as the light emitting diode. On the other hand, the terminals (3) and (4) operate as the photo detector. When the photo detector receives the light as shown in Fig. 3, the terminal between terminals (3) and (4) is a low-impedance. When light is intercepted by the marker, as shown in Fig. 4, it becomes high-impedance.

When the photo detector receives the light      When light is intercepted



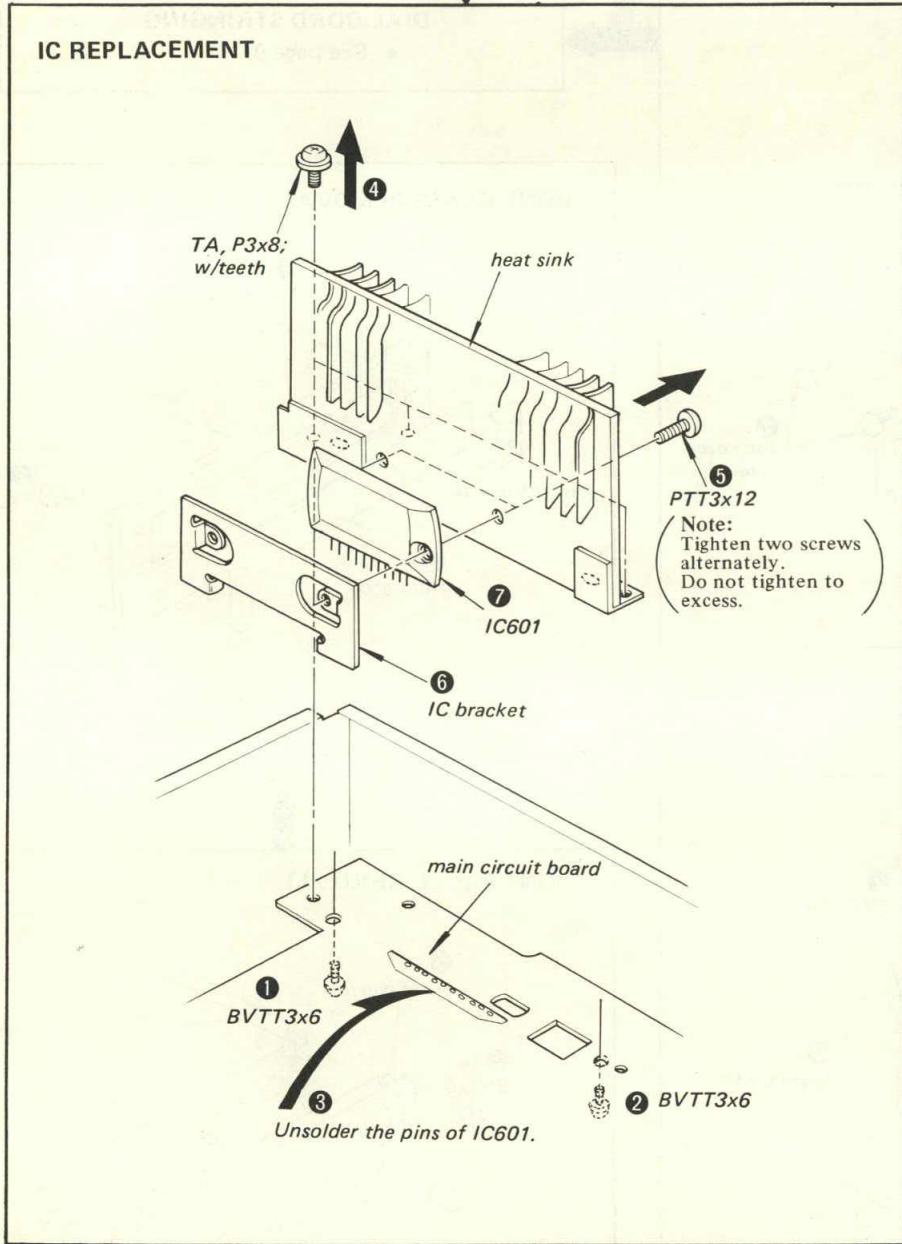
# SECTION 2 DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.



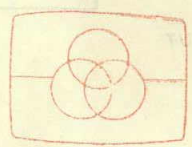
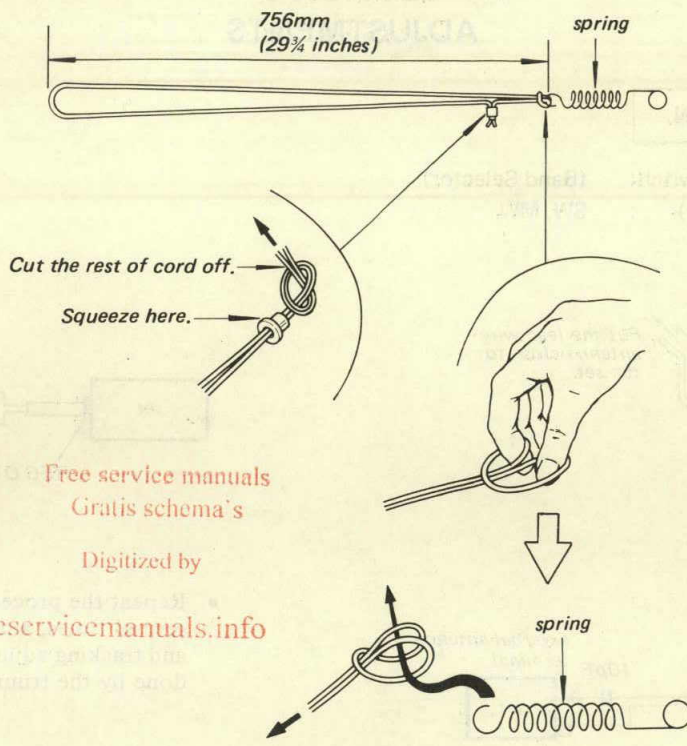
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SECTION 3  
DISASSEMBLY



### DIAL CORD STRINGING

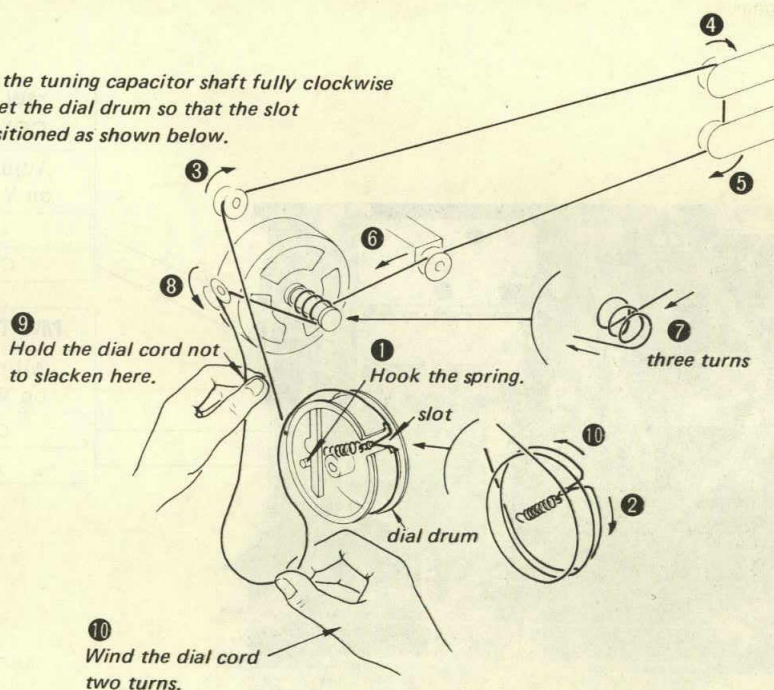
#### 1) Preparation



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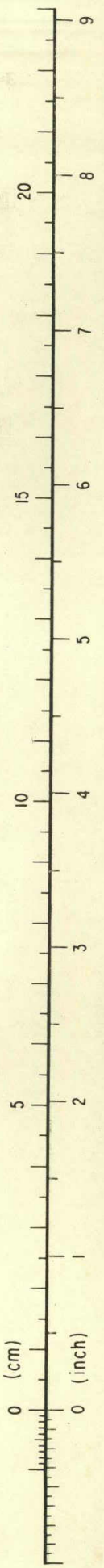
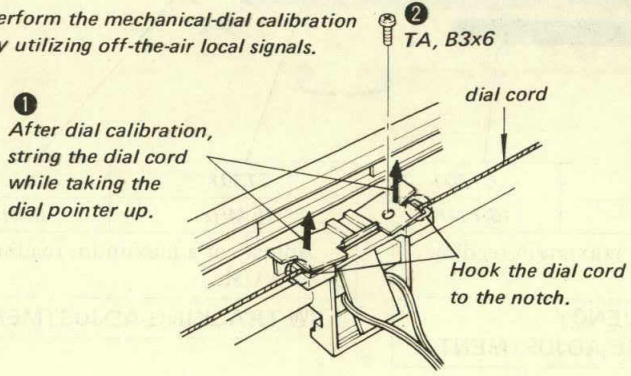
#### 2) Stringing

Turn the tuning capacitor shaft fully clockwise and set the dial drum so that the slot is positioned as shown below.



#### 3) Dial Pointer Installation

Perform the mechanical-dial calibration by utilizing off-the-air local signals.

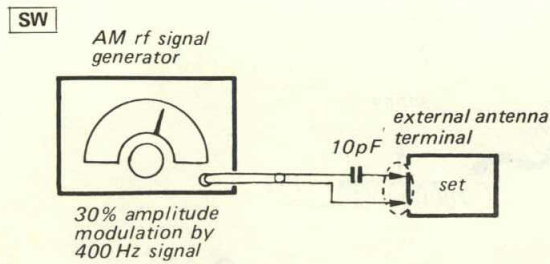
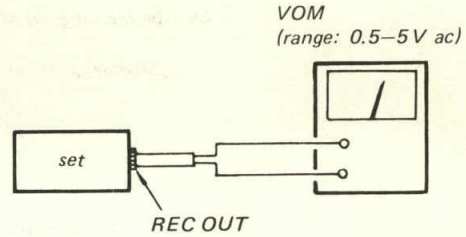
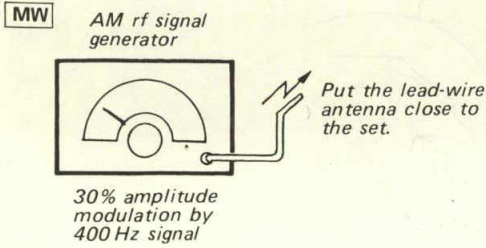




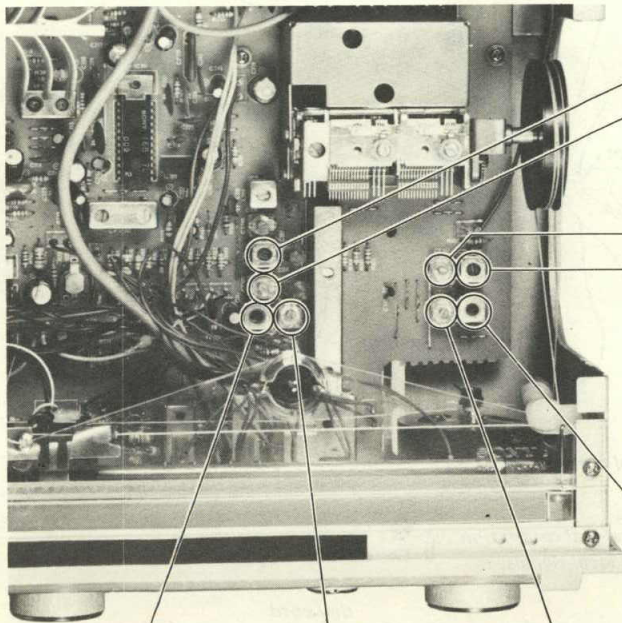
## SECTION 3 ADJUSTMENTS

### 3-1. SW, MW SECTION

Setting: FUNCTION switch: (Band Selector)  
(Band Selector) : SW, MW



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



#### MW FREQUENCY COVERAGE ADJUSTMENT

Adjust for a maximum reading on VOM.

L305	520 kHz
CT305	1680 kHz

#### MW TRACKING ADJUSTMENT

Adjust for a maximum reading on VOM.

CT302	1400 kHz
L302	600 kHz

L304	CT304
5.5 MHz	16.1 MHz

Adjust for a maximum reading on VOM.

#### SW FREQUENCY COVERAGE ADJUSTMENT

CT301	L301
15 MHz	6 MHz

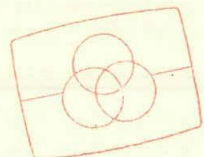
Adjust for a maximum reading on VOM.

#### SW TRACKING ADJUSTMENT

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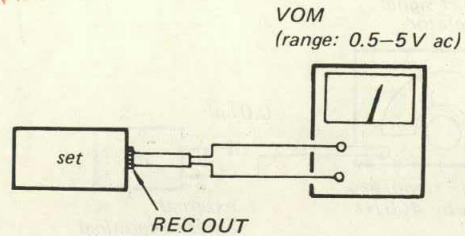
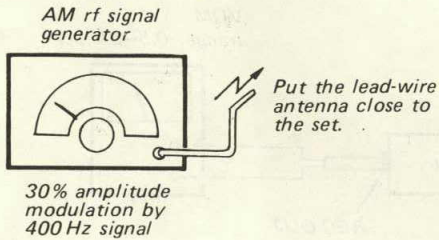
**3-2. LW SECTION**

Setting: FUNCTION switch: (Band Selector)  
 (Band Selector): LW  
 ANTENNA LW switch: BUILT IN



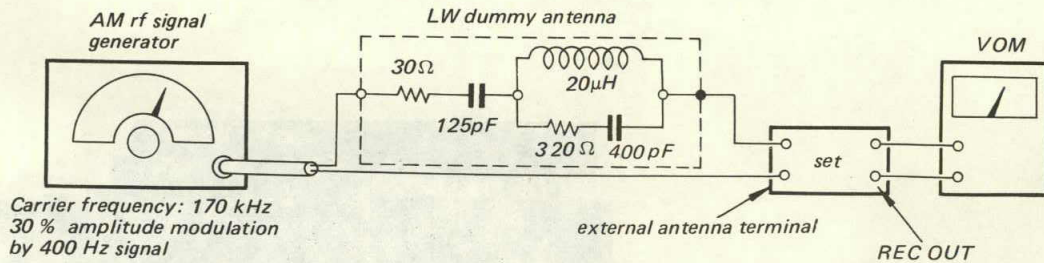
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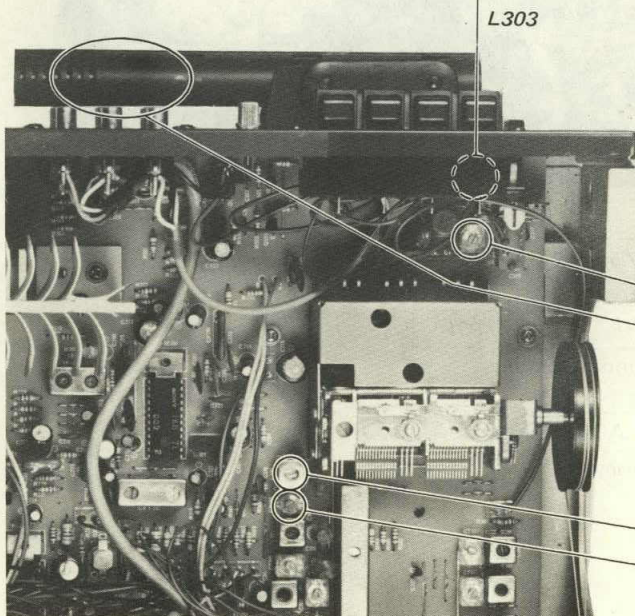


- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

**LW EXT ANTENNA COIL ADJUSTMENT**



1. Set the ANTENNA LW switch to EXT position.
2. Tune the set to 170 kHz and adjust L303 for a maximum reading on VOM.



**LW TRACKING ADJUSTMENT**

Adjust for a maximum reading on VOM.

CT303	310 kHz
L801	170 kHz

**LW FREQUENCY COVERAGE ADJUSTMENT**

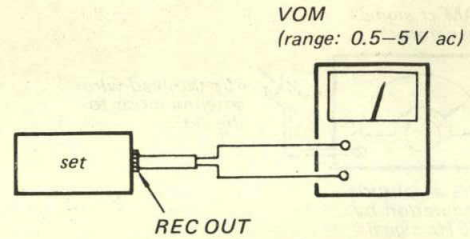
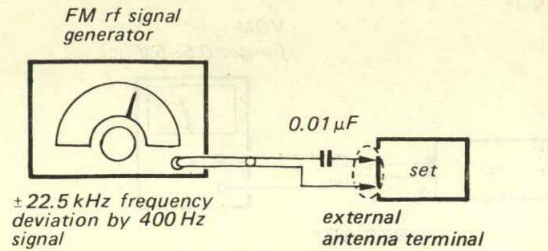
Adjust for a maximum reading on VOM.

L306	145 kHz
CT306	365 kHz

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### 3.3. FM SECTION

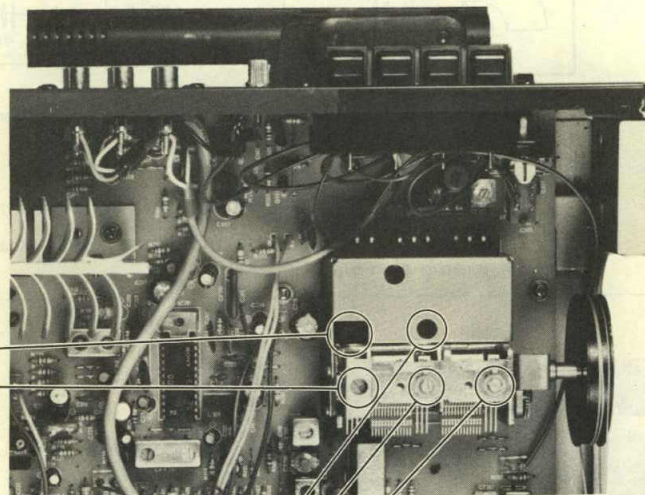
Setting: FUNCTION switch: FM



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

FM FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM.	
87.1 MHz (87.5 MHz)	L3
108.5 MHz (108 MHz)	TC3

( ) : in West Germany



87.1 MHz (87.5 MHz)	L2
108.5 MHz (108 MHz)	TC2
	TC1
Adjust for a maximum reading on VOM.	
FM TRACKING ADJUSTMENT	

( ) : in West Germany

### FM DISCRIMINATOR ALIGNMENT 2

**Procedure:**

Carrier frequency: 10.7 MHz  
Output level: 1mV (60 dB)  
Modulation: 400 Hz, 75 kHz deviation (100%)

- Set MODE switch to MONO.
- Turn the core (secondary side) of IFT201 for a minimum distortion reading on the distortion meter.

### FM DISCRIMINATOR ALIGNMENT 1

**Procedure:**

- Detune the set.
- Turn the core (primary side) of IFT201 for null-point reading on the FM TUNING meter.

### FM STEREO SEPARATION ADJUSTMENT

**Procedure:**

Carrier frequency: 98 MHz  
Output level: 1mV (60 dB)  
Mode: Stereo  
Modulation: Audio (400 Hz): 67.5 kHz deviation (90%)  
Pilot (19 kHz): 7.5 kHz deviation (10%)

### FM IF ALIGNMENT

**FM Signal Generator Setting:**

Carrier frequency: 98 MHz  
Modulation: 400 Hz, 75 kHz deviation (100%)  
Output level: 12 μV (21.5dB)

**Procedure:**

Tune the set to 98 MHz and adjust IFT1 for a maximum reading on the VTVM.

### MPX ADJUSTMENT

**A) Regular Method**

**Procedure:**

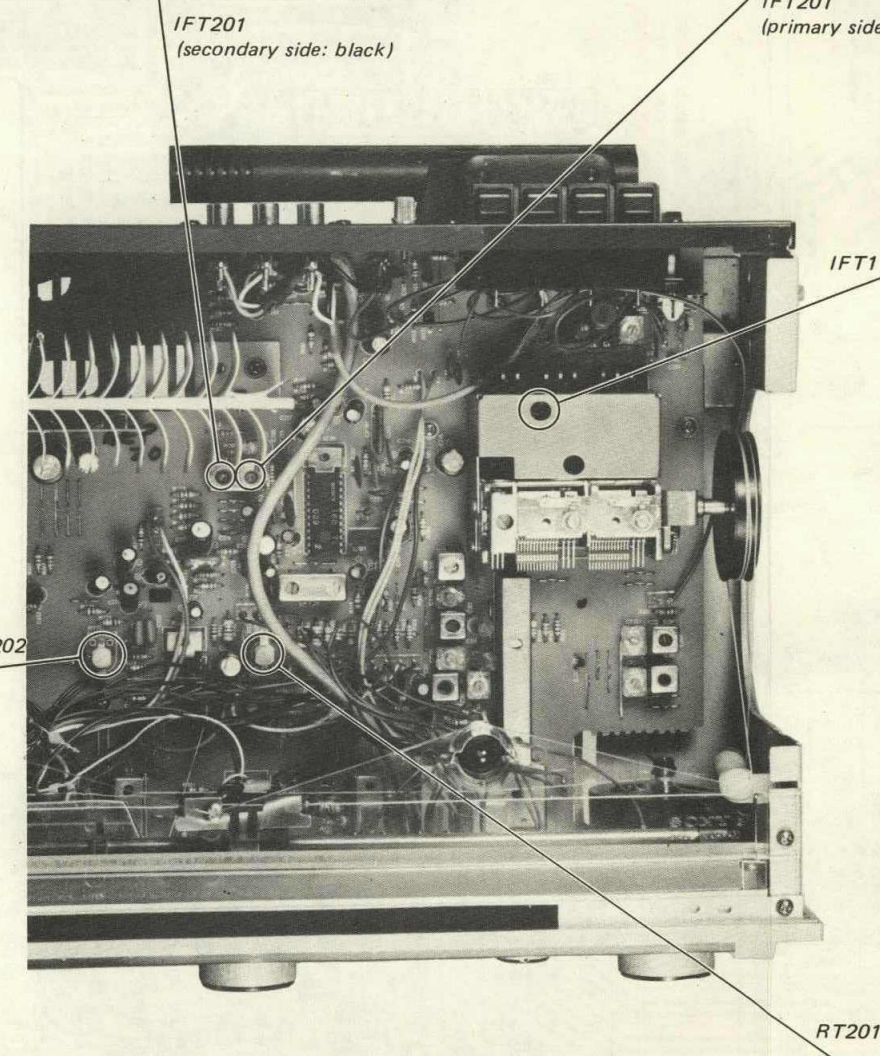
Carrier frequency: 98 MHz  
Modulation: no modulation  
Output level: 1 mV (60 dB)

**B) Simple Method**

**Procedure:**

- Tune the set to the FM stereo broadcasting signal.
- Turn RT201 clockwise or counterclockwise and memorize the lighting-up range of STEREO lamp.
- Secure RT201 at the center in lighting-up range of both turns as shown below.

- Tune the set to 98 MHz.
- Adjust RT201 for 76 kHz ±100Hz on the counter.



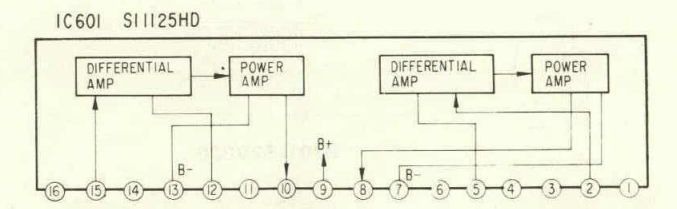
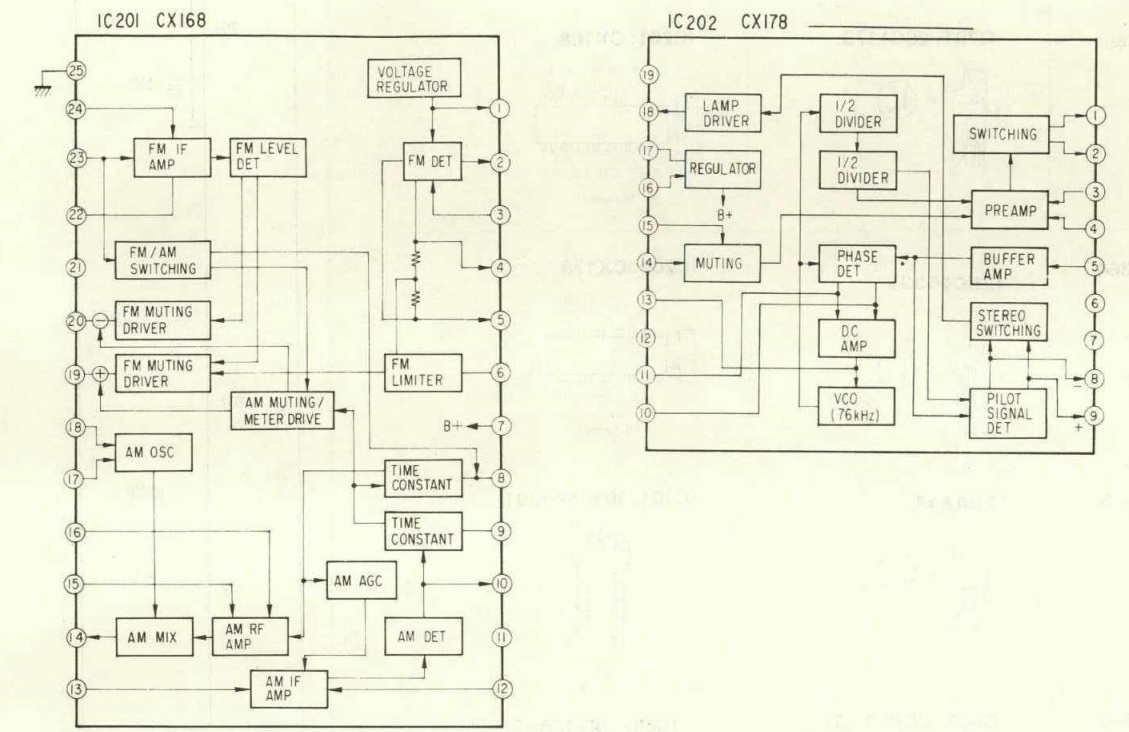
MODE switch: STEREO

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

Adjust RT202 for minimum reading.

L-CH Stereo separation: (A) - (B)  
R-CH Stereo separation: (C) - (D)  
The separations of both channels should be equal.

IC Block Diagram

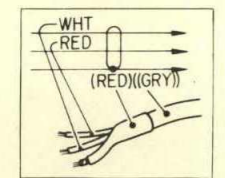


SECTION 4  
DIAGRAMS

- 4-1. MOUNTING DIAGRAM**  
— Conductor Side —
- IC Block Diagram: See page 15.
  - Replacement Semiconductors  
For replacement, use semiconductors except in ( ).

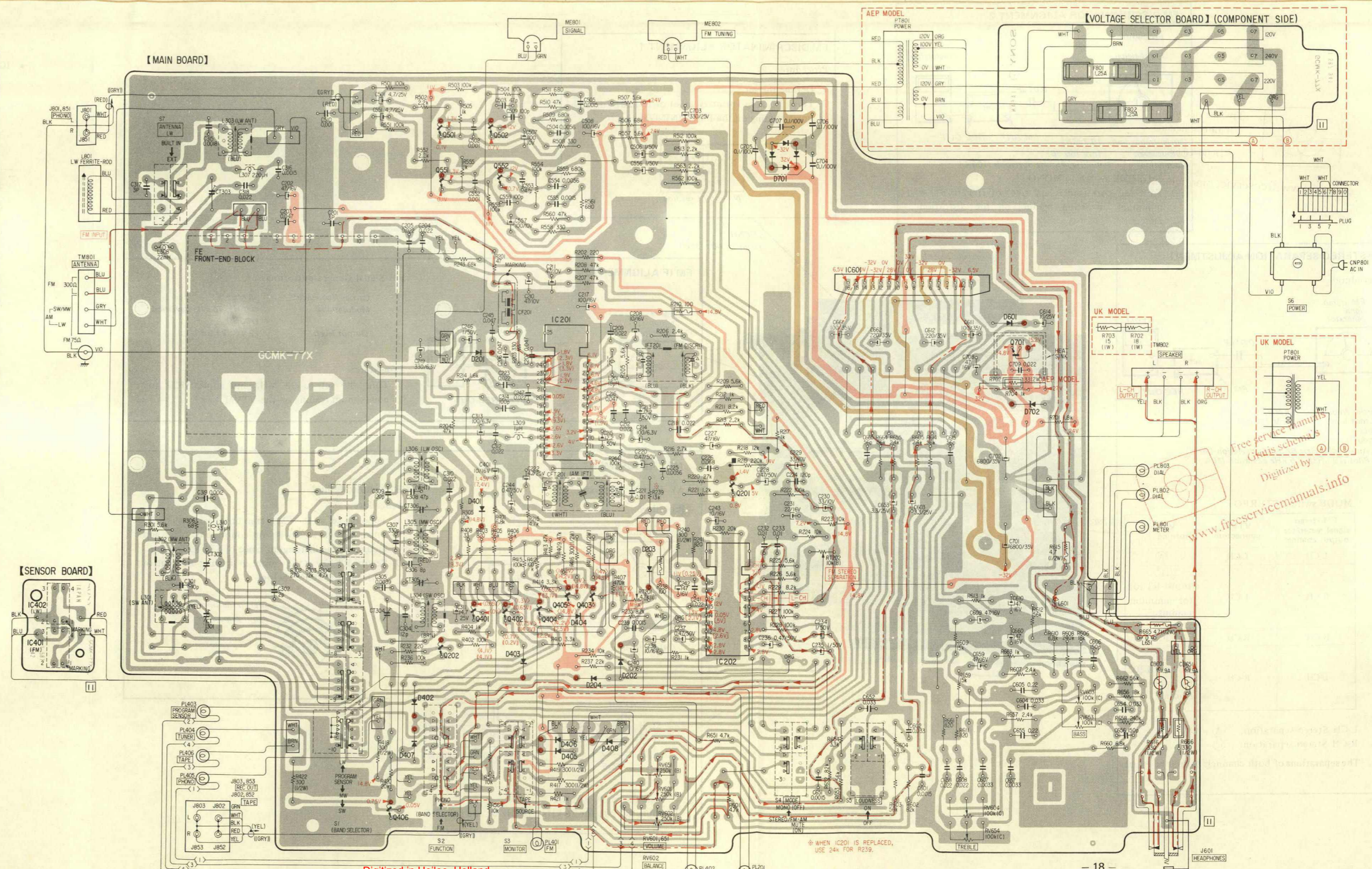
<p><b>Q201</b> Q501, 502: 2SC1345 Q551, 552</p>	<p><b>Q701: 2SC1173</b></p>	<p><b>IC201: CX168</b></p>
<p><b>Q202</b> Q401, 402: 2SC1364 Q404, 406</p>	<p><b>(2SC1633)</b></p>	<p><b>IC202: CX178</b></p>
<p><b>Q403, 405: 2SA678</b></p>	<p><b>(2SA844)</b></p>	<p><b>IC401, 402: SPI 201</b></p>
<p><b>D201-204: 1S1555</b> D401-408</p>	<p><b>D601: EQB01-07 (EQA01-07R)</b> <b>D702: EQB01-15 (EQA01-15R)</b></p>	<p><b>IC601: S11125HD</b></p>
<p><b>D701: S2VB20</b></p>		

- Note**
- : indicates side identified with part number.
  - : part mounted on the conductor side.
  - Color code of sleeving over the end of the jacket.



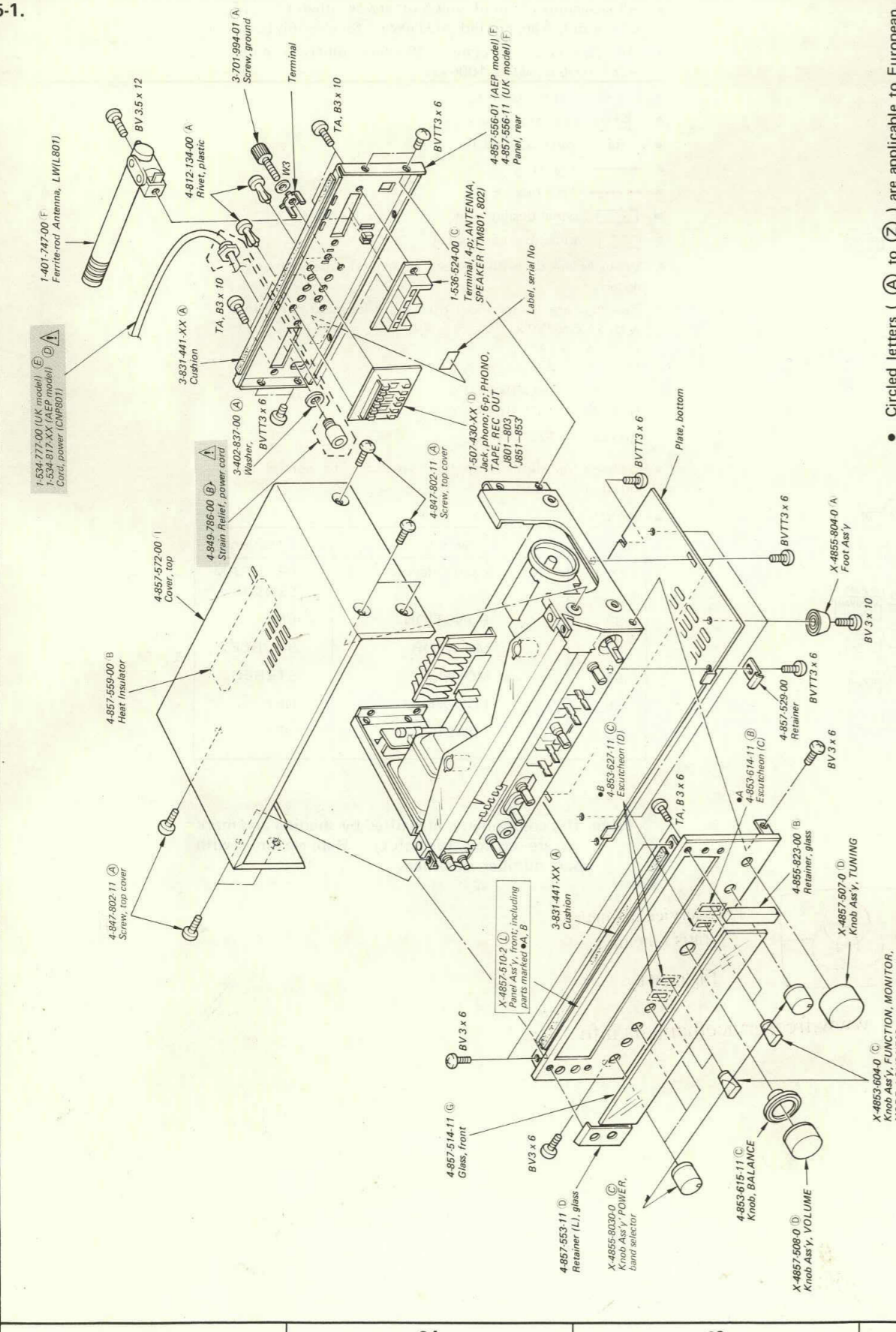
- : B + pattern
  - : B - pattern
  - : Signal Path
  - : L-CH
  - : R-CH
- Readings are taken under no signal (detuned) conditions with a VOM (20 kΩ/V).
- ( ) : AM  
[ ] : FM STEREO  
< > : PROGRAM FM  
( ( ) ) : PROGRAM LW  
no mark : FM

D	Q, IC
1	501, 502
1	701
1	551, 552
2	IC601
2	601
2	701
2	702
3	201
3	401
3	203
4	405, 403
4	IC402
4	404
4	401, 402
4	IC202
4	202
4	IC401
4	202
4	402
5	406, 408
5	405
5	406



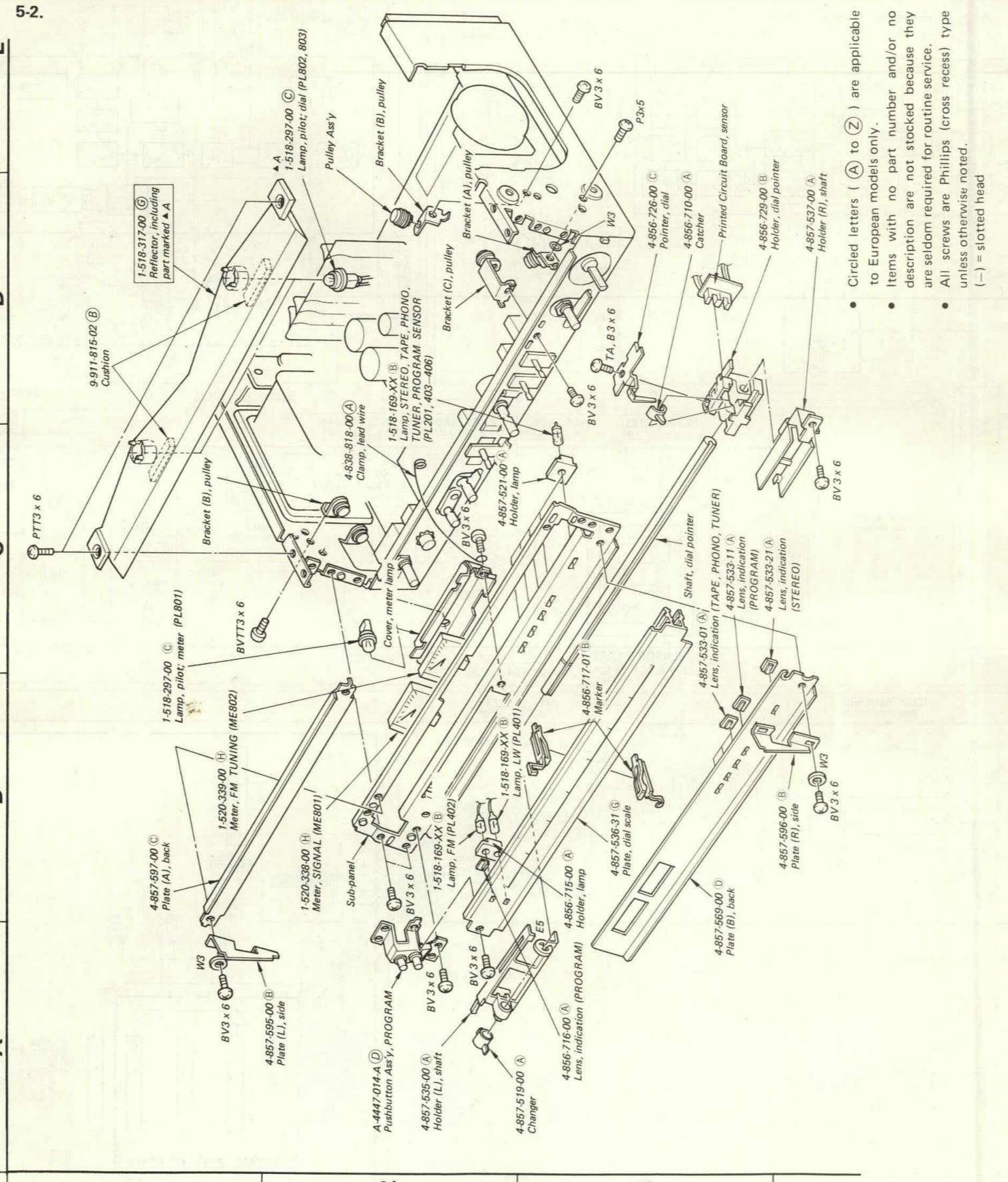
Free service manuals  
GK's schematics  
Digitized by  
www.freesevicemanuals.info

SECTION 5  
EXPLODED VIEWS



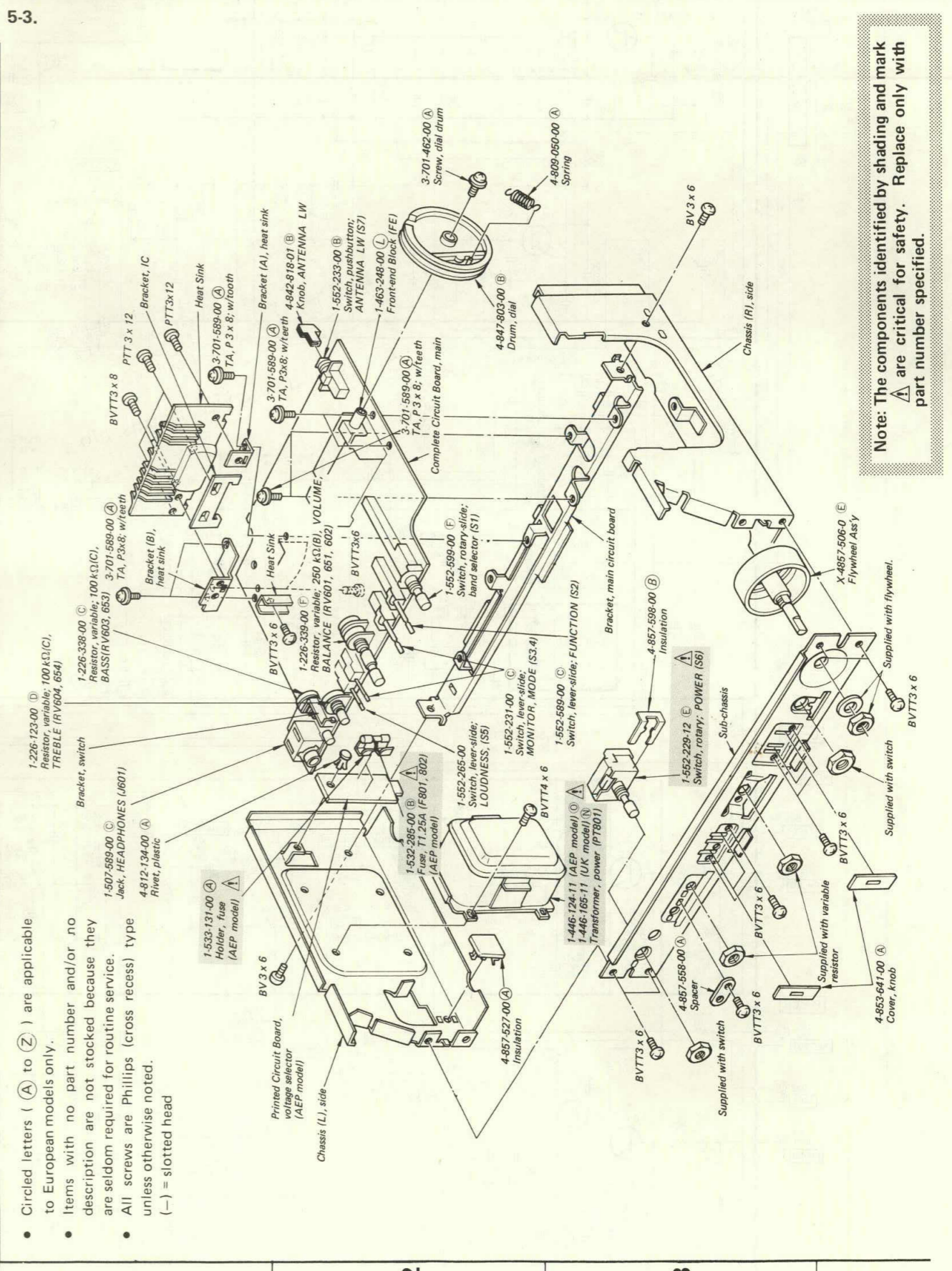
• Circled letters (A) to (Z) are applicable to European models only.  
• Items with no part number and/or no description are not stocked because they are seldom required for routine service.  
• All screws are Phillips (cross recess) type (-) = slotted head.

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



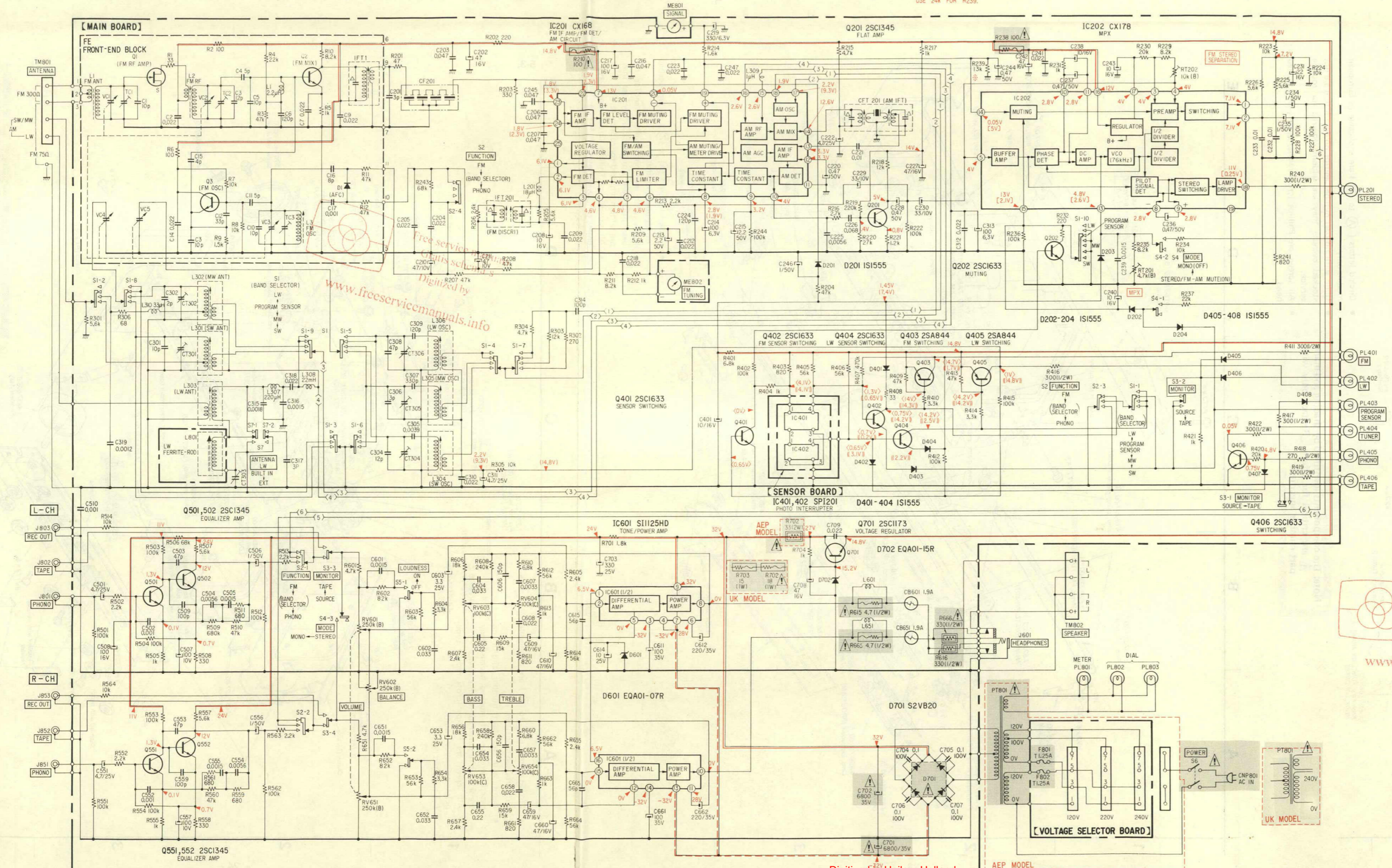
• Circled letters (A) to (Z) are applicable to European models only.  
• Items with no part number and/or no description are not stocked because they are seldom required for routine service.  
• All screws are Phillips (cross recess) type unless otherwise noted.  
• (—) = slotted head

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



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

4-2. SCHEMATIC DIAGRAM



- All capacitors are in  $\mu F$  unless otherwise noted.  $pF = \mu\mu F$ . 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms,  $\frac{1}{4} W$  unless otherwise noted.  $k\Omega : 1000 \Omega ; M\Omega : 1000 k\Omega$
- : fusible resistor.
- : nonflammable resistor.
- (N) : low-noise resistor.
- : B+ bus.
- : B- bus.
- : panel designation.
- : adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal (detuned) conditions with a VOM (20 k $\Omega/V$ ).  
 ( ) : AM  
 [ ] : FM STEREO  
 < > : PROGRAM FM  
 ( ( ) ) : PROGRAM LW  
 no mark : FM
- Voltage variations may be noted due to normal production tolerances.

Ref. No.	Switch	Position
S1	Band Selector	PROGRAM SENSOR
S2	FUNCTION	FM
S3	MONITOR	SOURCE
S4	MODE	STEREO
S5	LOUDNESS	OFF
S6	POWER	OFF

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

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

ACCESSORIES AND PACKING MATERIALS

Table with columns: Part No., Description. Items include antenna ribbon, antenna wire, bags, manual, cushions, and carton.

Table for 1/4 WATT CARBON RESISTORS (A). Columns include Ohm values and Part No. for various resistance values from 1.0 to 91k.

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

Description

Table with columns: Ref. No., Part No., Description. Items include metal oxide, fusible, and adjustable components.

SWITCHES

Table with columns: Ref. No., Part No., Description. Items include rotary-slide, lever-slide, and pushbutton.

MISCELLANEOUS

Table with columns: Ref. No., Part No., Description. Items include circuit breaker, filter, cord, fuse, FM Front End, jack, meter, lamp, terminal, reflector, and holder.

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

HARDWARE NOMENCLATURE

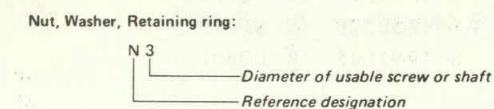
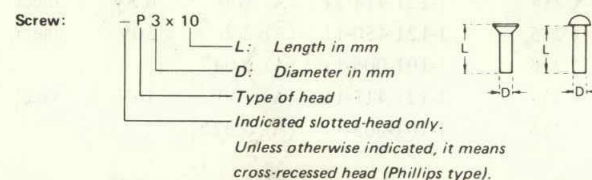


Table for SCREWS. Columns: Reference Designation, Shape, Description, Remarks. Includes pan-head, truss-head, and braizer-head screws.

Table for NUT, WASHERS, and RETAINING RINGS. Columns: Reference Designation, Shape, Description, Remarks. Includes set screws, hexagon-socket set screws, flat washers, spring washers, and retaining rings.



SECTION 6  
ELECTRICAL PARTS LIST

STR-313L STR-313L

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

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

Ref. No. Part No. Description

SEMICONDUCTORS

Transistors

Table with 3 columns: Ref. No., Part No., Description. Includes transistors Q201, Q202, Q401,402, Q403, Q404, Q405, Q406, Q501,551, Q502,552, Q701.

ICs

Table with 3 columns: Ref. No., Part No., Description. Includes ICs IC201, IC202, IC401,402, IC601.

Diodes

Table with 3 columns: Ref. No., Part No., Description. Includes diodes D201-204, D401-408, D601, D701, D702.

COILS

Table with 3 columns: Ref. No., Part No., Description. Includes coils L201, L301, L302, L303, L304, L305, L306, L308, L801.

Ref. No. Part No. Description

TRANSFORMERS

Table with 3 columns: Ref. No., Part No., Description. Includes transformers CFT201, IFT201, PT801.

CAPACITORS

All capacitors are in μF and ceramic unless otherwise noted. 50WV or less are not indicated except for electrolytics. pF = μμF, elect = electrolytic

Table with 3 columns: Ref. No., Part No., Description. Includes capacitors C201, C202, C203, C204,205, C206,207, C208, C209, C210,211, C212, C213, C214, C215, C216, C217, C218, C219, C220, C221, C222, C223, C224, C225, C226, C227, C228, C229,230, C231.

Ref. No. Part No. Description

Table with 3 columns: Ref. No., Part No., Description. Includes capacitors C232,233, C234,235, C236,237, C238, C239, C240, C241, C242, C243, C244, C245, C246, C247, C301, C302, C304, C305, C306, C307, C308, C309, C310, C311, C312, C313, C314, C315, C316, C317, C318, C319, C401, C501,551, C502,552, C503,553, C504,554, C505,555, C506,556.

Ref. No. Part No. Description

Table with 3 columns: Ref. No., Part No., Description. Includes capacitors C507,557, C508, C509,559, C510, C601,651, C602,652, C603,653, C604,654, C605,655, C606,656, C607,657, C608,658, C609,659, C610,660, C611,661, C612,662, C614, C615,665, C701,702, C703, C704,707, C708, C709, CT301-306, R210,238, R240, R411, R416,417, R418, R419,422, R615,665, R616,666.

RESISTORS

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

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

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

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