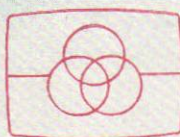


ST-10FL/10FBL



Free service manuals

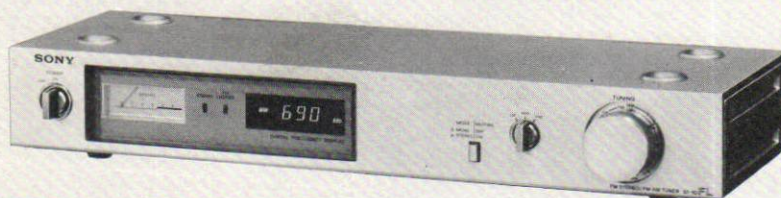
Gratis schema's

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www.freeservicemanuals.info

ST-10FL: Silver Type

ST-10FBL: Black Type

AEP Model

ST-10FL

STEREO TUNER

SPECIFICATION

GENERAL

Power Requirements: 220 V ac (or 240 V ac adjustable by authorized Sony personnel), 50/60 Hz

Power Consumption: 10W

Dimensions: Approx. 430 (w) x 70 (h) x 170 (d) mm
17 (w) x 2³/₄ (h) x 6³/₈ (d) inches
including projecting parts and controls

Weight: Approx. 3 kg, 6 lb 10 oz (net)

FM SECTION

Frequency 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)
(75 kHz deviation) 45 μ V, 38.3 dBf (STEREO)

Usable Sensitivity: IHF: 1.8 μ V, 10.3 dBf
DIN: 1.6 μ V (S/N = 26 dB, 40 kHz deviation)

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

Harmonic Distortion: 0.15% (MONO) at 1 kHz
0.3% (STEREO) at 1 kHz

IM Distortion: 0.15% (MONO)
0.3% (STEREO)

Separation: 45 dB at 1 kHz

Frequency Response: IHF: 30 Hz–15 kHz ^{+0.5}/_{–2.0} dB
DIN: 40 Hz–12.5 kHz ^{+0.5}/_{–1.0} dB

Alternate Channel Selectivity: IHF: 60 dB (400 kHz)
DIN: 55 dB (300 kHz)

Capture Ratio: 1.0 dB

AM Suppression Ratio: 54 dB

Image Response Ratio: 45 dB

Muting Threshold: Approx. 5 μ V

Output Level: 380 mV, 12 k Ω
(1 kHz, 40 kHz deviation)

— Continued on page 2 —

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®

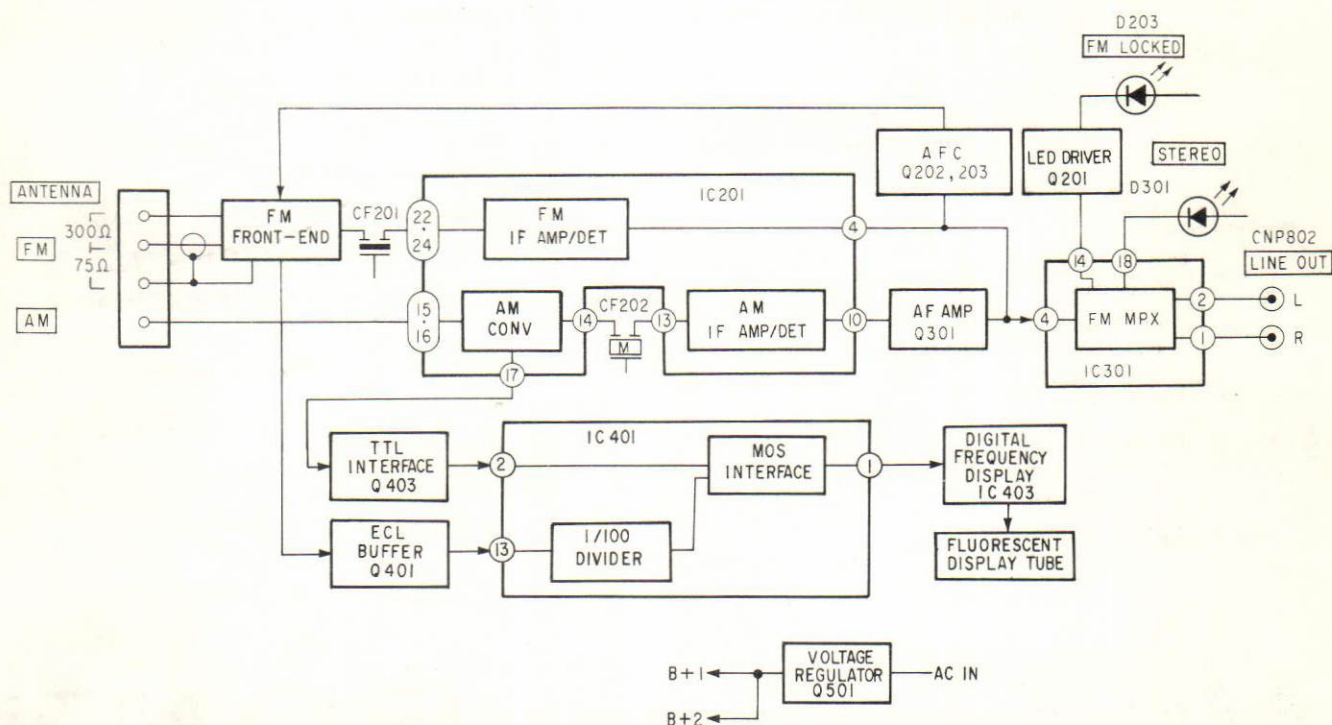
SERVICE MANUAL

MW/LW SECTION

	MW	LW
Frequency Range	522–1,602 kHz	150–350 kHz
Antennas	Ferrite-rod antenna, External antenna terminal	
Usable Sensitivity	250 $\mu\text{V/m}$ (ferrite-rod antenna)	500 $\mu\text{V/m}$ (ferrite-rod antenna)
S/N Ratio	52 dB	52 dB
Harmonic Distortion	0.3 % (400 Hz)	
Selectivity	50 dB (9 kHz)	
Intermediate Frequency	450 kHz	

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM

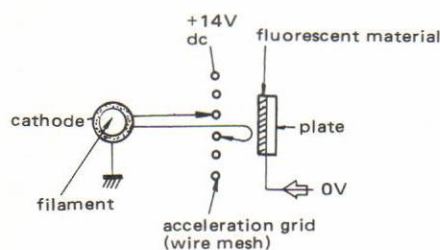


1-2. CIRCUIT DESCRIPTION

1) Fluorescent Digital Display Tube

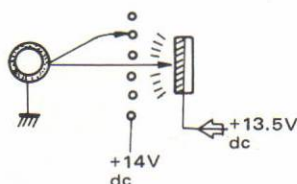
The Fluorescent Digital Display Tube is a triode which is used for Tuning Frequency Display. This tube consists of a filament, an acceleration grid, and a fluorescent plate. The filament is heated by 2.5V., 75mA. electrical current. The acceleration grid, is placed between the filament and the fluorescent plate. It is a wire mesh that is charged with +14V. This grid always attracts electrons from the filament. Behind the grid, a mosaic-like fluorescent plate is placed to which 0V (in non-display mode) or 13.5V (in display mode) is applied.

• Non Display Mode



When in non-display mode, the thermal electrons emitted by the filament are attracted by the acceleration grid. Some of these electrons are directly absorbed by the grid and some pass through the grid. But because of the low voltage potential at the fluorescent plate, the electrons that have passed the grid turn back to be absorbed by the grid as well.

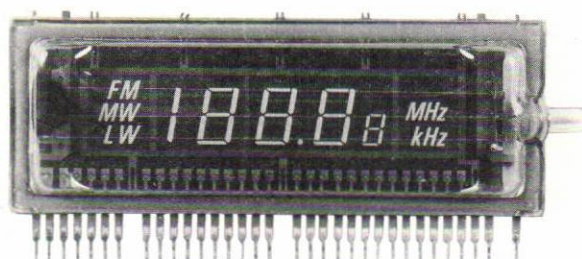
• Display Mode



When in display mode, all of the electrons that pass the grid are accelerated on toward the fluorescent plate. Upon striking the plate, their energy is converted into luminescence.

• Service Precaution

The filament of the display tube (25mA SF Type three parallel) is extremely sensitive and will burn out immediately if subjected to voltages higher than it is designed for (2.5V).



Fluorescent Display Tube

2) Digital Display of Receiving Frequency

The fluorescent display tube indicates the receiving frequency in 1kHz under LW/MW mode, and in 0.05MHz under FM mode. The following MSI and LSI, whose input is supplied by the output signal of the local oscillator, drive the fluorescent display tube.

IC401	MSL2318RS	frequency divider (1/100)
IC402	LC7253	LSI for digital display (DIP-type of CMOS: 42 pin)

3) Offset Frequency

In superheterodyne receivers, the receiving frequency (f_R) can be obtained by

$$(f_R = f_{Losc} \pm f_{IF})$$

f_{Losc} : local oscillator frequency

f_{IF} : intermediate frequency

In upperheterodyne systems, the receiving frequency (f_R) is as follows:

FM, AM mode

$$f_{Losc} - f_{IF} = f_R$$

The offset frequency is the same frequency as f_{IF} and its standard value is 455kHz for AM and 10.7MHz for FM.

4) LC7253 (IC402)

• Input Frequency

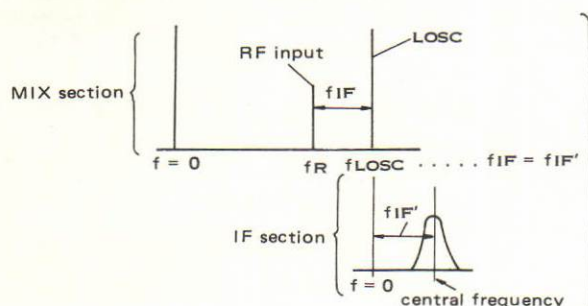
This IC is a CMOS LSI which can handle up to about 3MHz. The maximum AM signal is 2065 kHz (1610+455kHz) and can be therefore applied into the LSI, through buffer amplifier. But, since the maximum FM signal is 118.7MHz (108+10.7MHz), it cannot be applied directly into the LSI. It is therefore reduced by 1/100 frequency divider down within 2MHz before the LSI.

In the previous discussion, it has been assumed that the offset frequency may be freely adjusted. But the use of a ceramic filter instead of an IFT actually prohibits free adjustment.

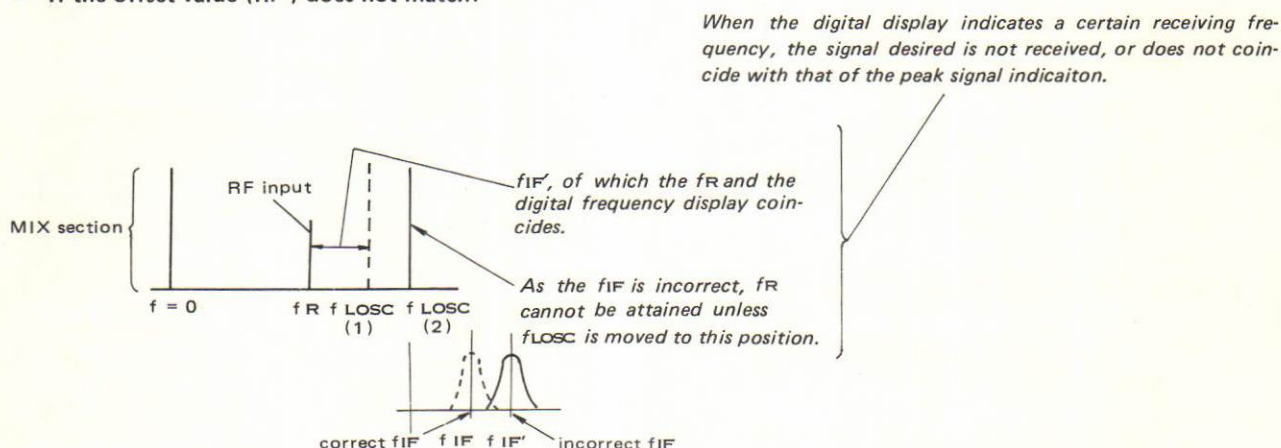
• The Importance of $f_{IF'}$ (Offset Frequency) Adjustment

With the digital display system, if the precalculated offset frequency of 455kHz or 10.7MHz does not exactly match the actual central frequency of IF section, the following phenomena will occur:

• When the offset value ($f_{IF'}$) matches:



• If the offset value ($f_{IF'}$) does not match:



• Offset Frequency of LC7253

The offset frequency is adjusted by combining the input terminal pins of LC7253 (pin ⑧, ⑨, ⑪, ⑫) in various ways.

Mode	Set input terminal (numbers circled are pin numbers)				Offset frequency
	AM/FM ⑫	S1 ⑧	S2 ⑪	S3 ⑨	
AM	0	X	0	0	-455kHz
	0	X	1	0	-469kHz
	0	0	X	1	-450kHz
FM	1	0	X	0	+10.7MHz
	1	1	X	0	-10.7MHz

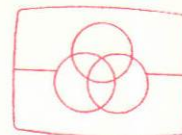
X: can be either 1 or 0

The digital display circuit and offset frequency is as shown below.

5) Digital Counter

The digital frequency display is basically counting the local frequency. Therefore, by presetting the offset frequency, the receiving frequency will be displayed.

The digital counter has an attached crystal oscillator which generates a prescribed frequency (4MHz in the LSI model) that controls the gate time of the counter.

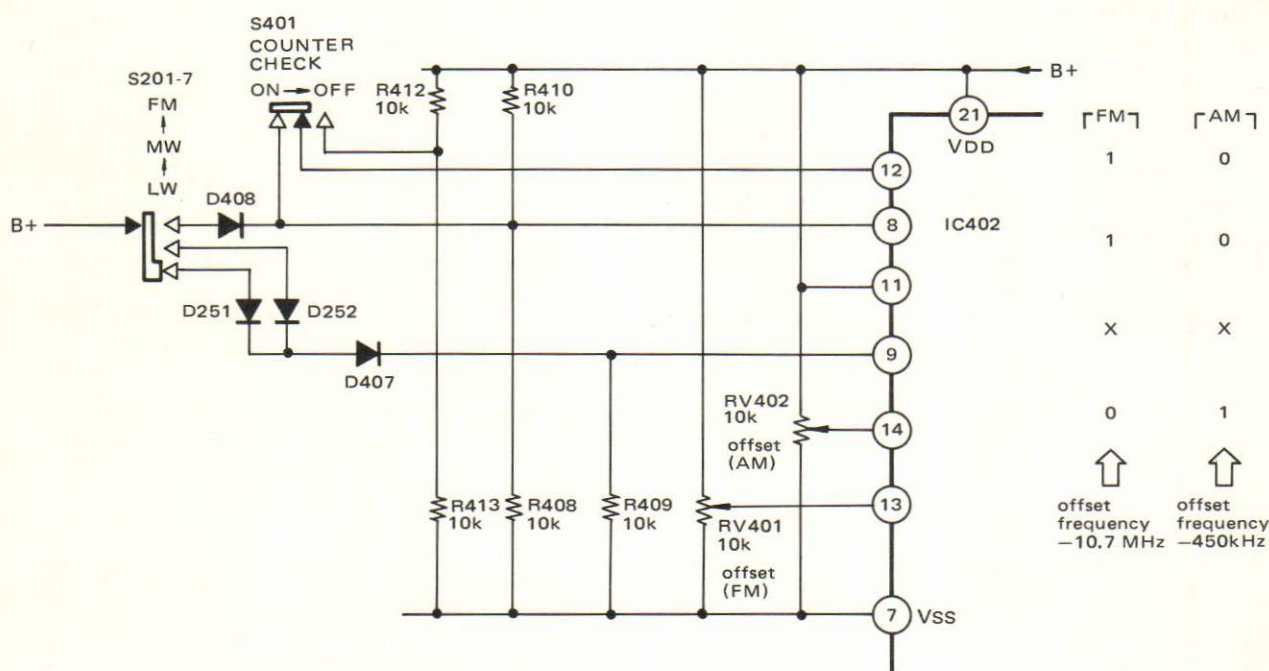


Free service manuals

Gratis schema's

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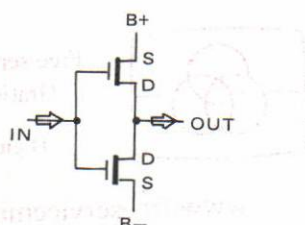
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6) Service Precautions

IC403

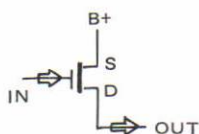
IC402, a type of CMOS has the same input gate as the former MOS types, and like them, the gate can be damaged by the contact with electrical charges. The biggest difference between CMOS and MOS is at their output as is shown in the diagram of the CMOS below:



When the output of the CMOS is "1", B+ is supplied to the output by the FET turning on. Similarly, B- is supplied to the output when the output is "0".

If the output terminals are connected with both B+ and B-, this IC will be damaged at the time B+ or B- is supplied. Terminal (19) is the output terminal. Be careful not to connect these terminals with B+ and B-.

The output for the fluorescent display tube (at pins (1) - (5), (24) - (42)) is an open drain system as shown below:



As the diagram shows, if the output terminal comes into contact with the B+ Line, no damage is caused, but if it comes into contact with "0" damage will ensue.

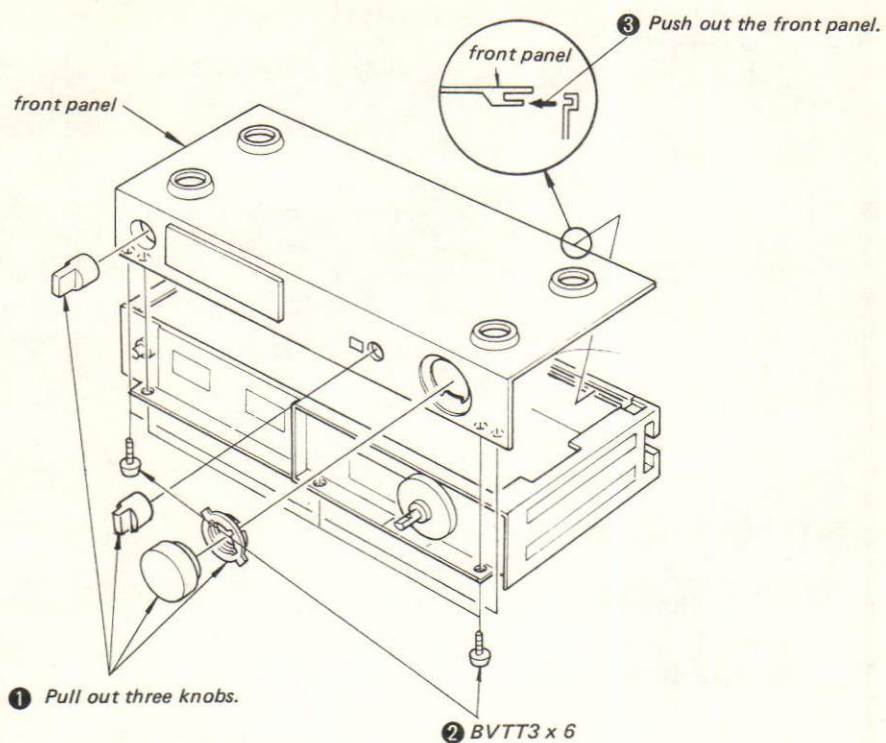
Note: In this case, "0" indicates the electric potential of pin (7).

SECTION 2

DISASSEMBLY

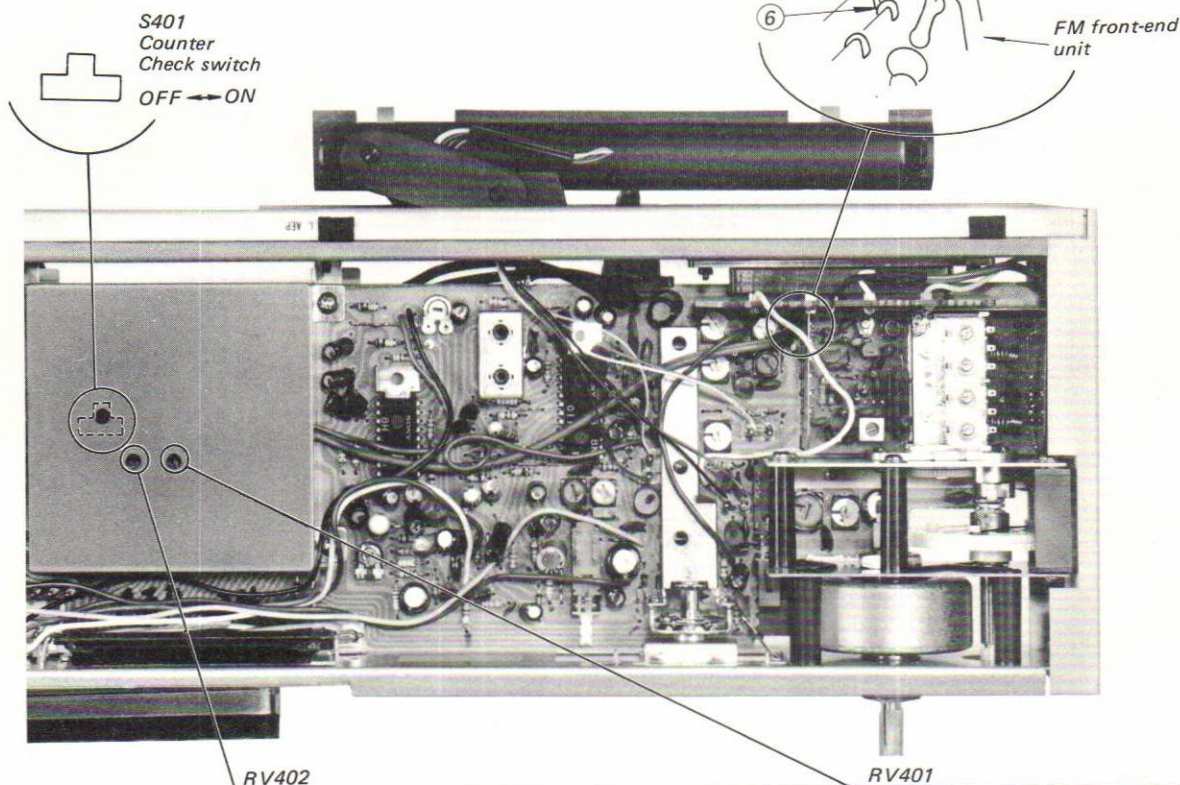
Note: Follow the disassembly procedure in the numerical order given.

FRONT PANEL REMOVAL



SECTION 3 ADJUSTMENTS

3-1. FM/AM Offset Adjustment

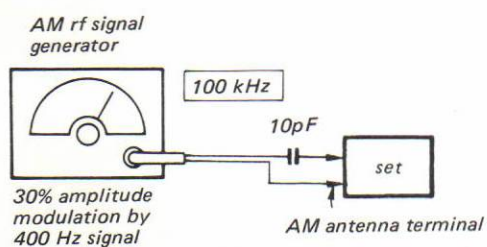


AM Offset Frequency Adjustment

Setting:

FUNCTION switch: MW

Procedure:



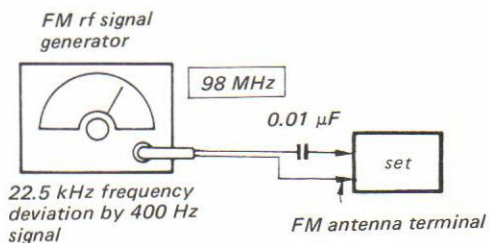
1. Turn the counter check switch (S401) off.
2. Adjust RV402 for 1000 kHz on the frequency counter.
The place where the blinking of the 1 kHz figure stops is the tuning point.
3. After the adjustment, turn the counter check switch on.

FM Offset Frequency Adjustment

Setting:

FUNCTION Switch: FM

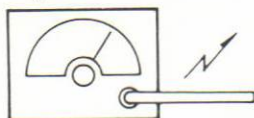
Procedure:



1. Short the AFC circuit as shown above.
2. Turn the counter check switch (S401) off.
3. Adjust RV401 for 98 MHz on the frequency counter. The place where the blinking of the 100 kHz figure stops is the tuning point.
4. After the adjustment, turn the counter check switch on and release step 1.

3-2. MW SECTION

AM rf signal
generator



30% amplitude
modulation by
400 Hz signal

Put the lead-wire
antenna close to
the set.

VOM ①
(range: 0.5–5 V ac)



LINE OUT

- 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

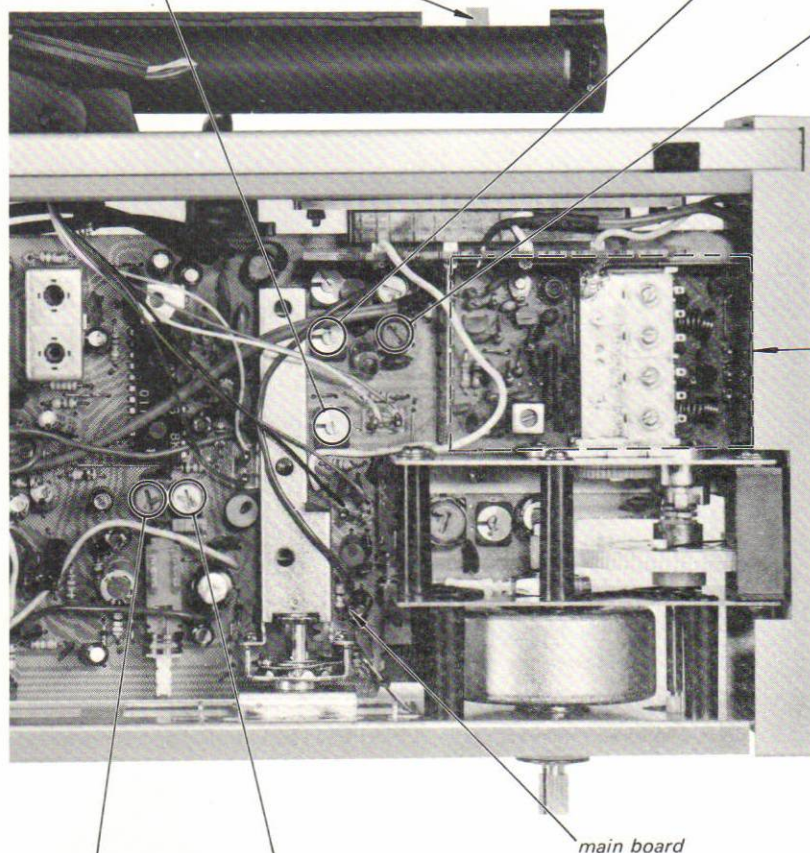
Adjust for a maximum reading
on VOM ①.

1,400 kHz	620 kHz
CT251	L251

MW FREQUENCY COVERAGE ADJUSTMENT

Adjust for a maximum reading
on VOM ①.

1,670 kHz	515 kHz
CT253	T252



FM front-end block

main board

IFT202 IFT201

450 kHz

Adjust for a maximum reading
on VOM ①.

AM IF ALIGNMENT

3-3. LW SECTION

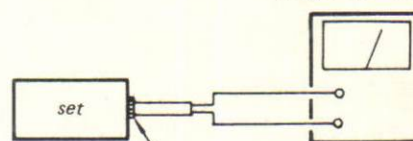
AM rf signal generator



30% amplitude modulation by 400 Hz signal

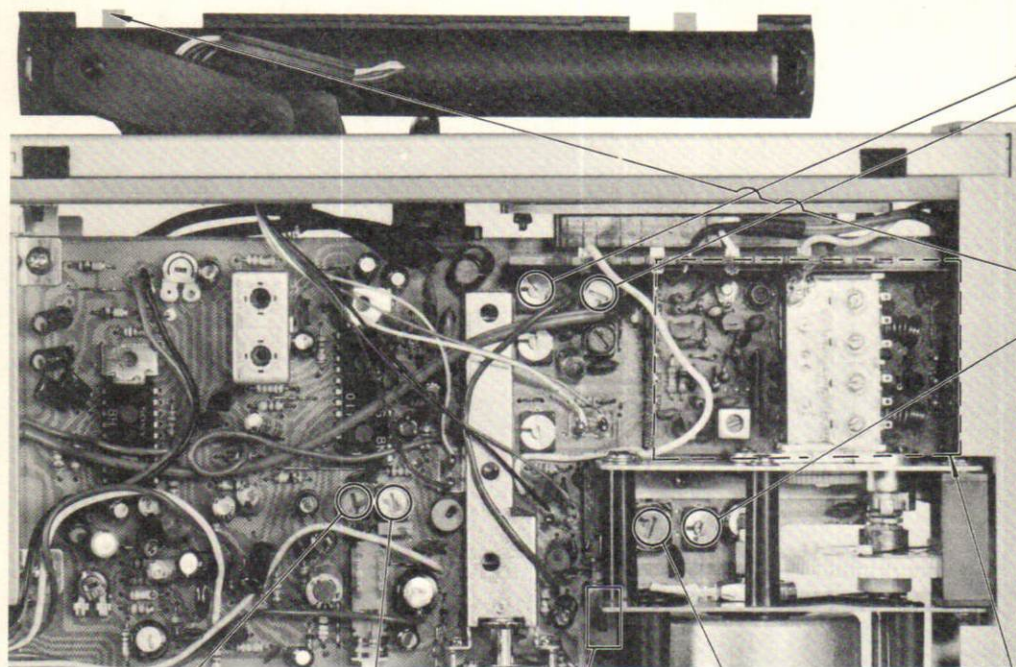
Put the lead-wire antenna close to the set.

VOM ①
(range: 0.5–5 V ac)



LINE OUT

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



CT254	365 kHz
T253	145 kHz
Adjust for a maximum reading on VOM ①.	
LW FREQUENCY COVERAGE ADJUSTMENT	

L251	170 kHz
CT252	310 kHz
• LW ANTENNA SELECT: FERRITE-ROD position. • Adjust for a maximum reading on VOM ①.	
LW TRACKING ADJUSTMENT	

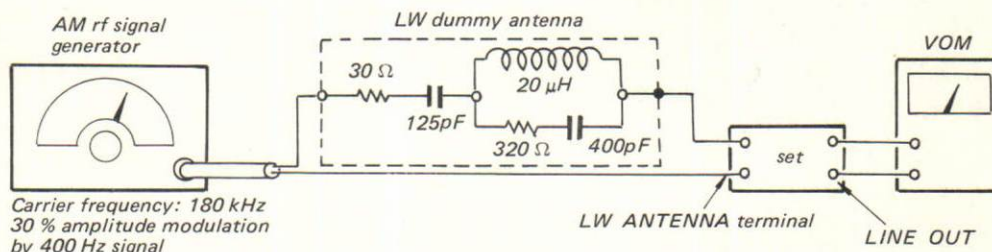
IFT202	IFT201
450 kHz	
Adjust for a maximum reading on VOM ①.	
AM IF ALIGNMENT	

LW ANTENNA SELECT switch (S251)
EXT
↑
FERRITE-ROD

T251

FM front-end

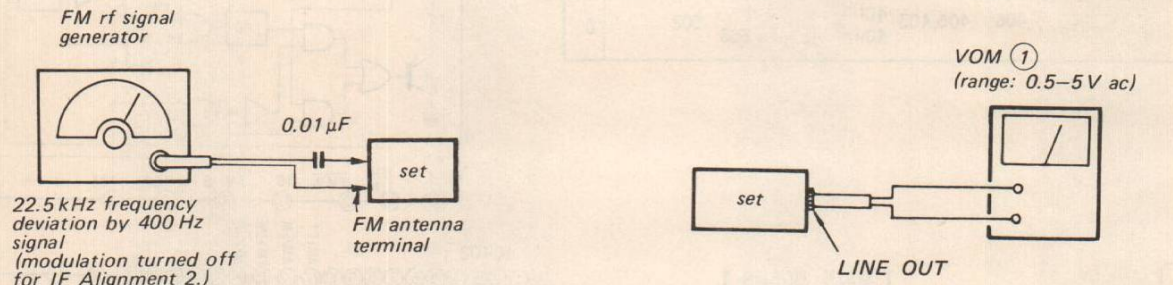
LW EXT Antenna Coil Adjustment



Carrier frequency: 180 kHz
30% amplitude modulation by 400 Hz signal

1. Set the LW ANTENNA SELECT switch to EXT position.
2. Tune the set to 180 kHz and adjust T251 for a maximum reading on VOM.

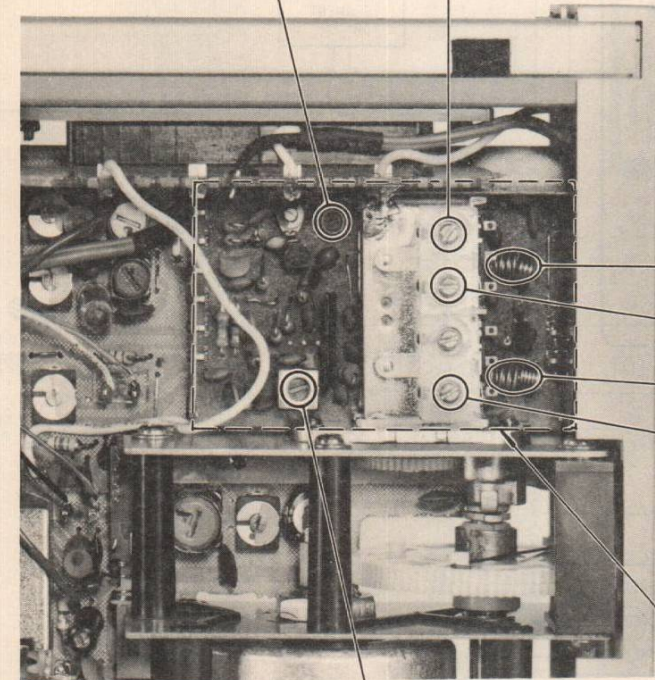
3-4. FM SECTION



- 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 ①.	
87.1 MHz (87.5 MHz)	108.5 MHz (108 MHz)
FM OSC coil	FM OSC trimmer (): in West Germany



FM TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM ①.	
FM rf coil	87.1 MHz (87.5 MHz)
FM antenna trimmer	108.5 MHz (108 MHz)
FM antenna coil	87.1 MHz (87.5 MHz)
FM antenna trimmer	108.5 MHz (108 MHz)

(): in West Germany

FM front-end block

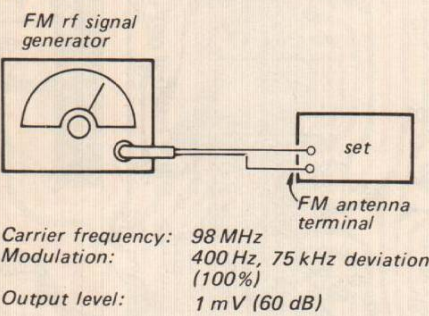
FM IFT
Adjust for a maximum reading on VOM ①.
FM IF ALIGNMENT (10.7 MHz with modulation)

The FM front-end section can not be repaired and it is only supplied as the FM front-end block.

76 kHz Adjustment

A) Regular Method

Procedure:

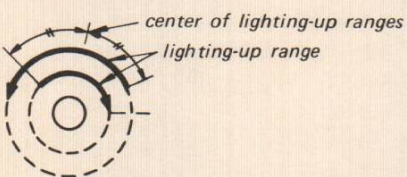


- Tune the set to 98 MHz.
- Adjust RV301 for 76 kHz on the counter.

B) Simple Method

Procedure:

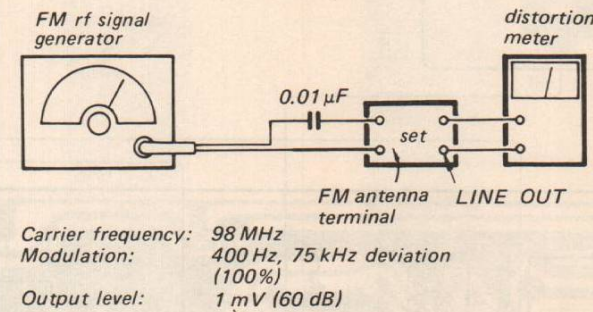
- Tune the set to the FM stereo broadcasting signal.
- Turn RV301 clockwise or counterclockwise and memorize the lighting-up range of the stereo lamp.
- Secure RV301 at the center of the lighting-up range of both turns as shown below.



Discriminator Adjustment

A) Secondary Side

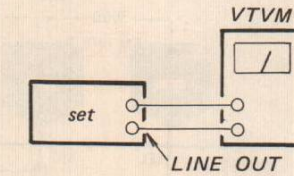
Procedure:



- Turn the core (secondary side: black) of IFT203 for minimum distortion reading on the distortion meter.

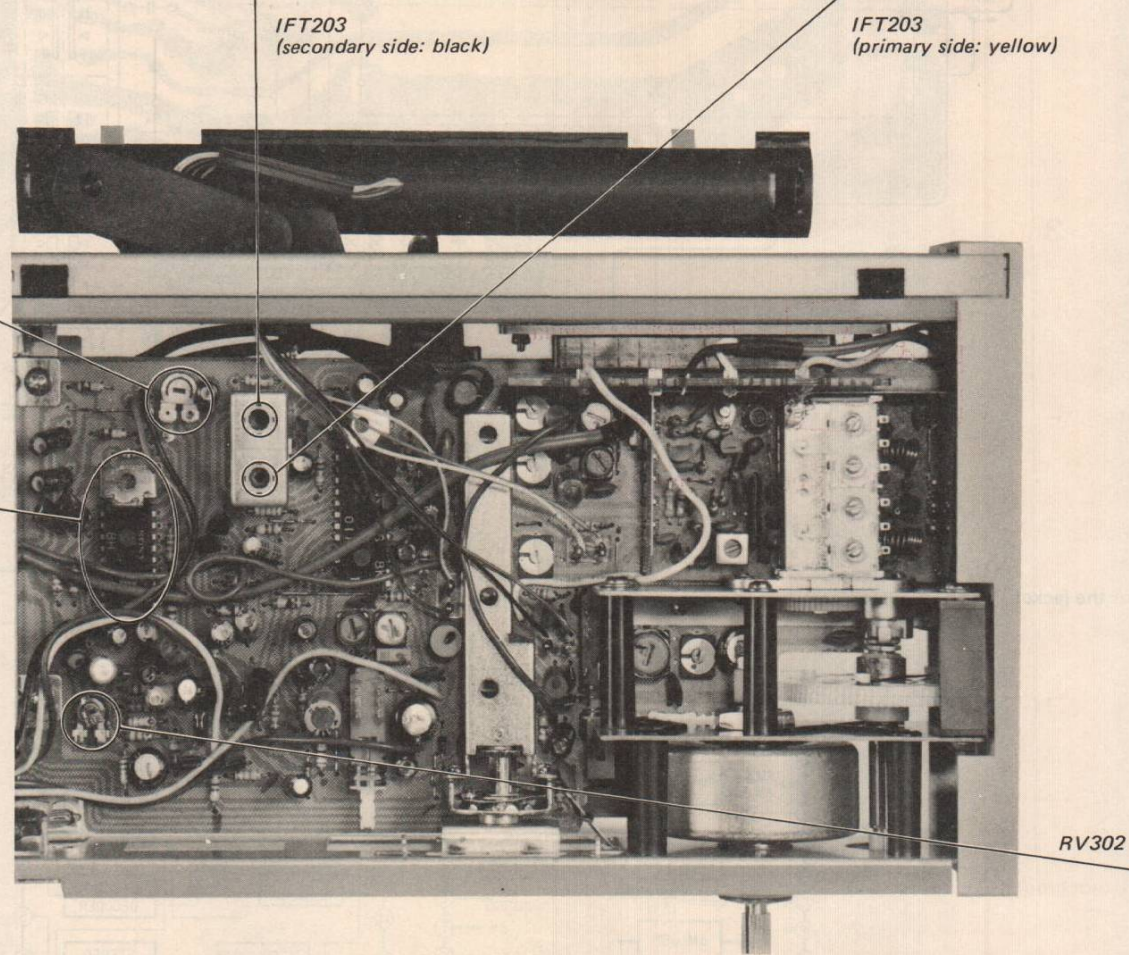
B) Primary Side

- Connect the VTVM as shown below.



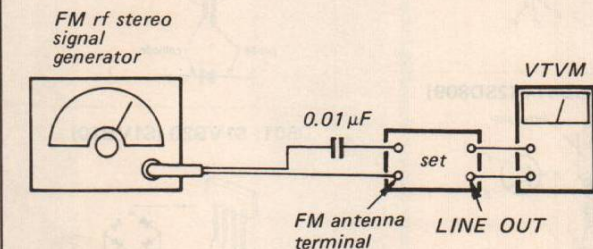
- Detune the set.
- Turn the core (primary side: yellow) of IFT203 for maximum reading on VTVM.

Note When the ceramic filter is replaced, these adjustments should be made. Repeat the secondary side and primary side adjustments several times.



FM Stereo Separation Adjustment

Procedure:



FM stereo signal generator output channel	VTVM connection	VTVM reading (dB)
L-CH	L-CH	(A)
R-CH	L-CH	(B) Adjust RV302 for minimum reading.
R-CH	R-CH	(C)
L-CH	R-CH	(D) Adjust RV302 for minimum reading.

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

The separations of both channels should be equal.

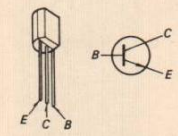
SECTION 4 DIAGRAMS

4-1. MOUNTING DIAGRAM — Conductor Side —

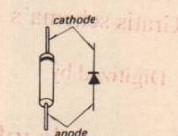
Replacement Semiconductors

For replacement, use semiconductors except in ().

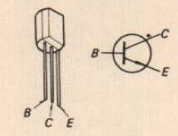
Q201-203, Q301: 2SC1364 (2SC1815)



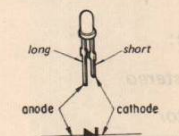
D201, 202, 251, 252, D302, 401, D403-408: 1S1555



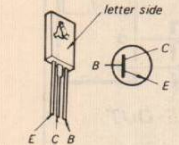
Q401, 403: 2SC710-15 (2SC710)



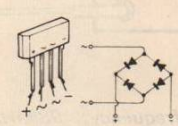
D203: SLB26YY
D301: SLB26UR



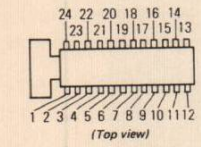
Q501: 2SD414 (2SD809)



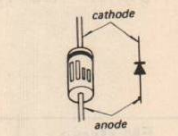
D501: S1VB20 (S1VB10)



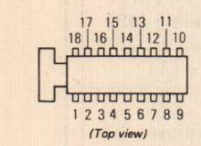
IC201: CX168



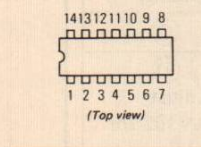
D502: EQB01-15 (EQA01-15R)
D503: EQB01-08 (EQA01-08R)



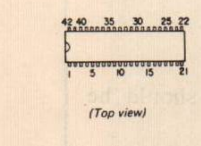
IC301: CX178



IC401: MSL2318RS

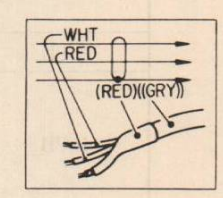


IC402: LC7253

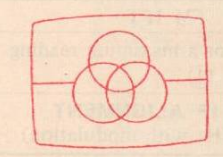
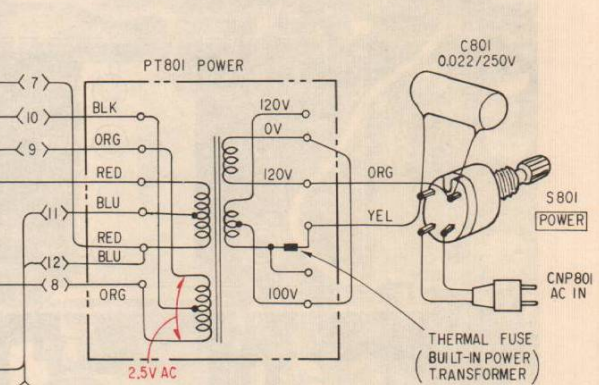
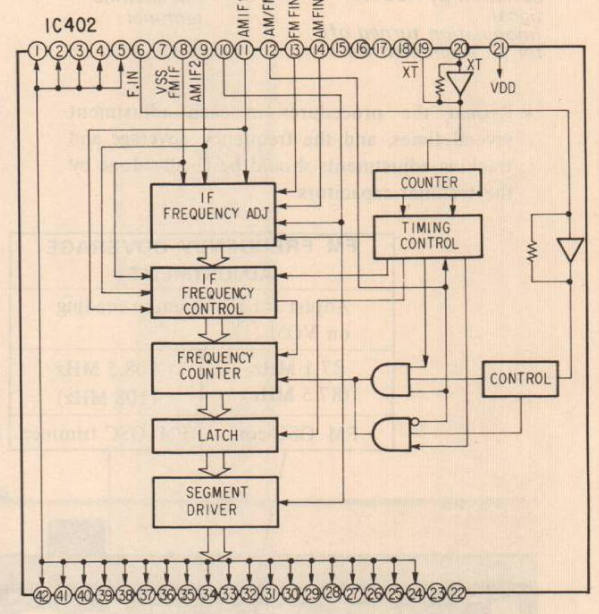
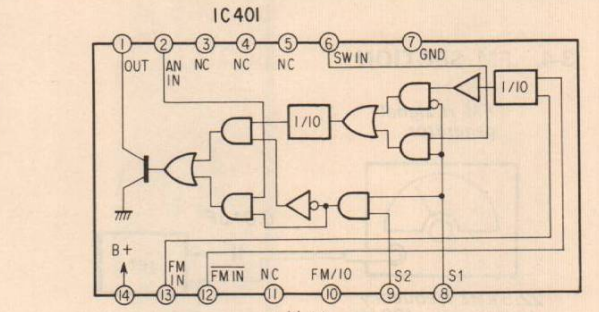
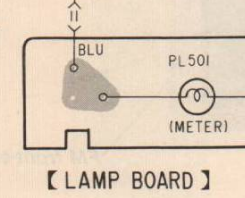
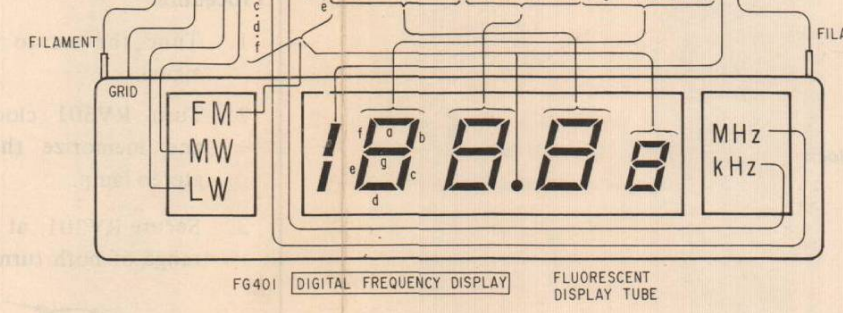
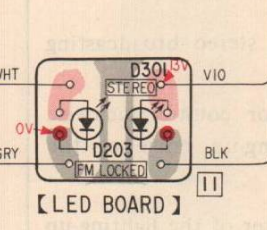
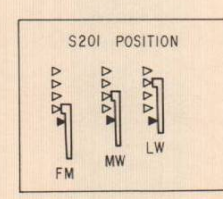
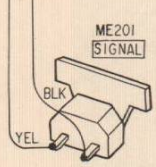
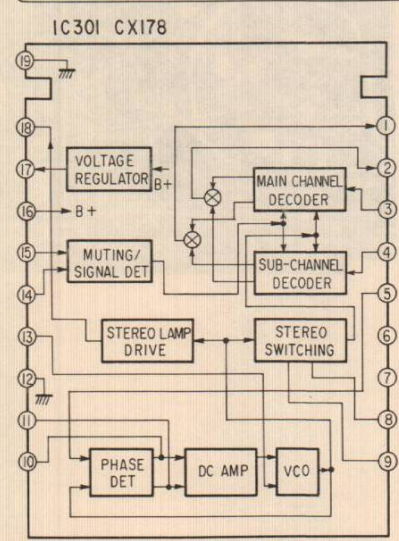
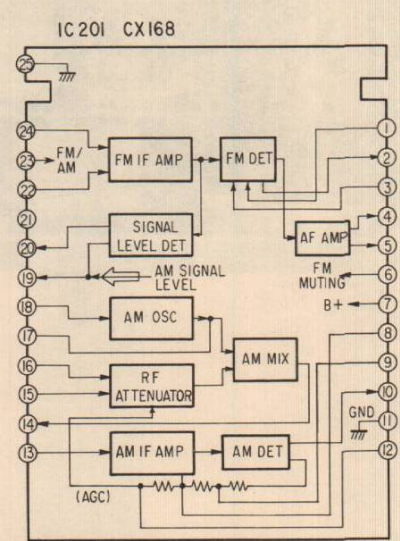
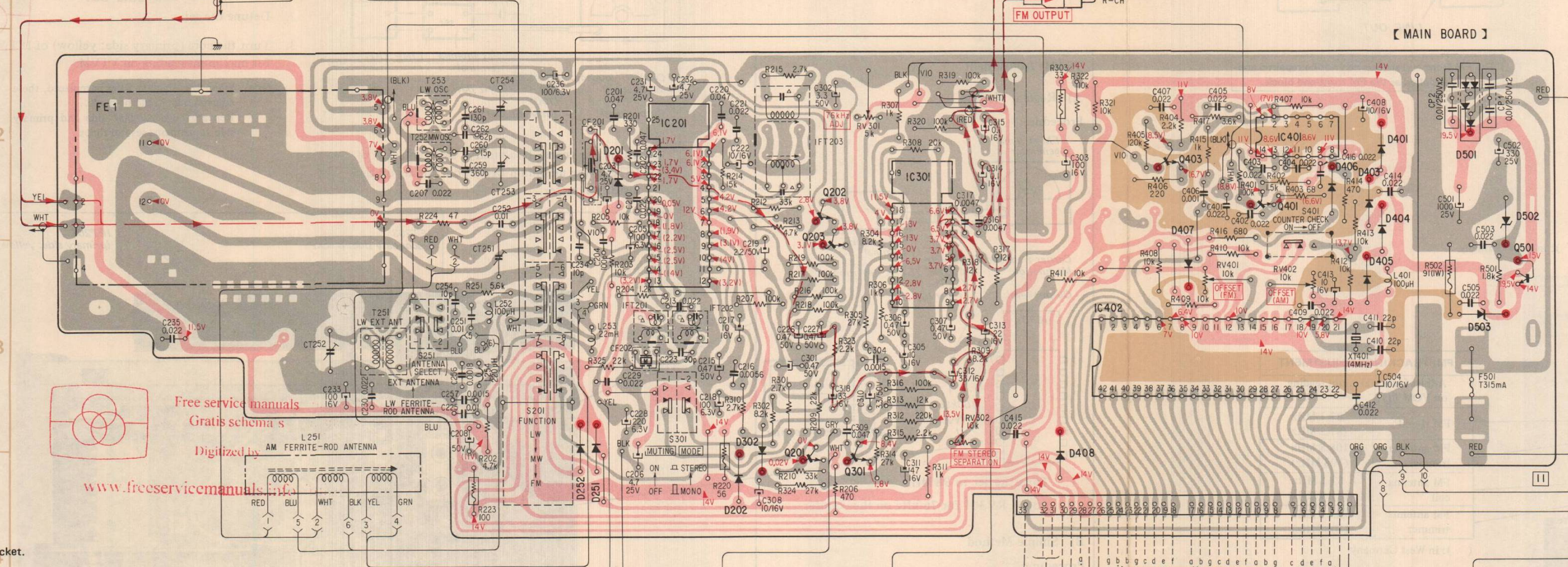
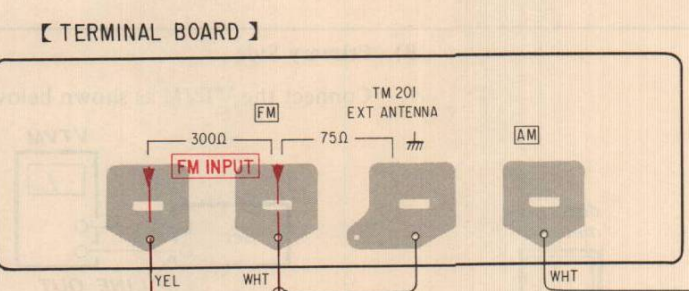


Note:

- Color code of sleeving over the end of the jacket.

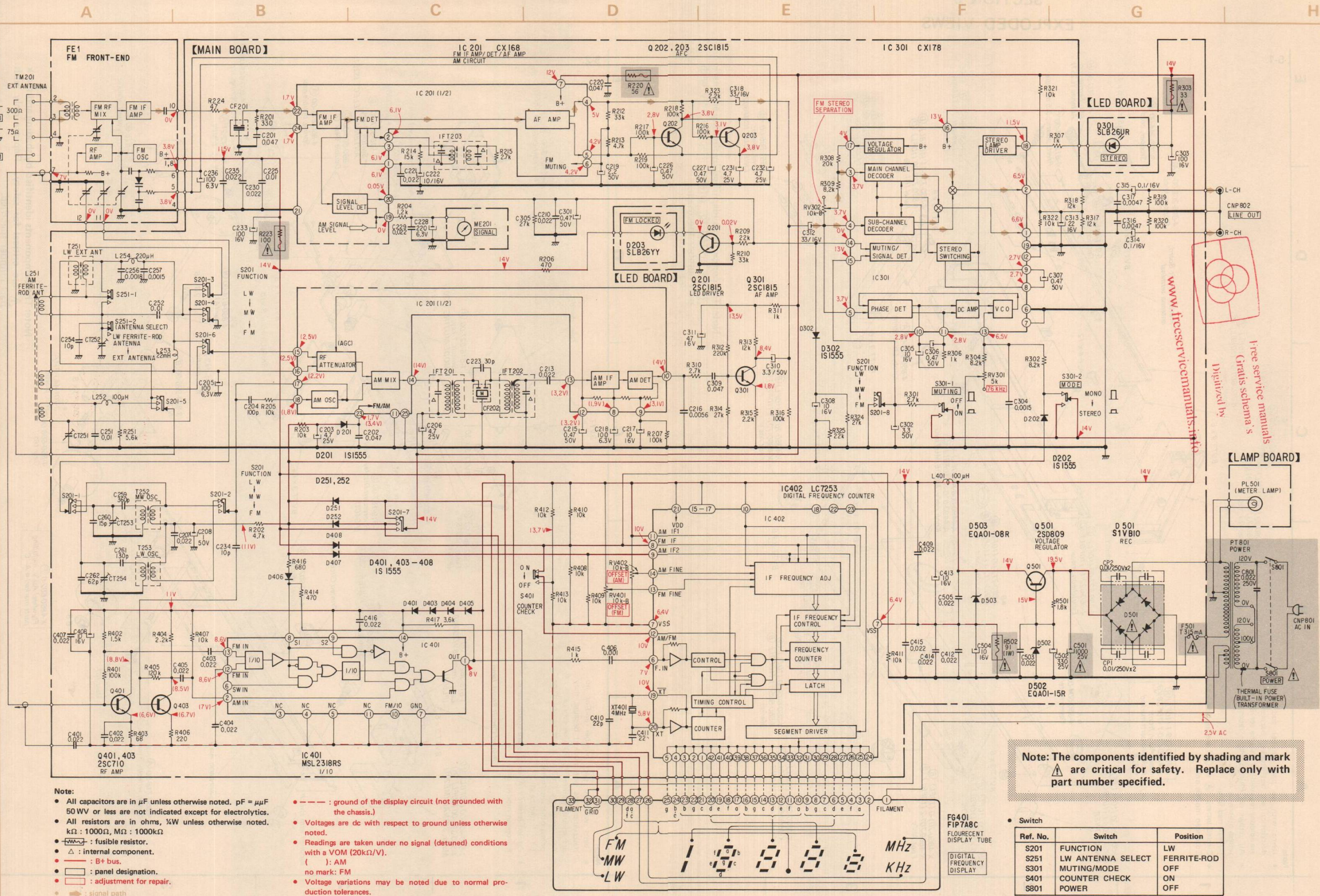


- B+ pattern
- ground of the display circuit (not grounded with the chassis)
- signal path
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no signal (detuned) conditions with a VOM (20kΩ/V).
- (): AM
- no mark: FM
- part mounted on the conductor side.



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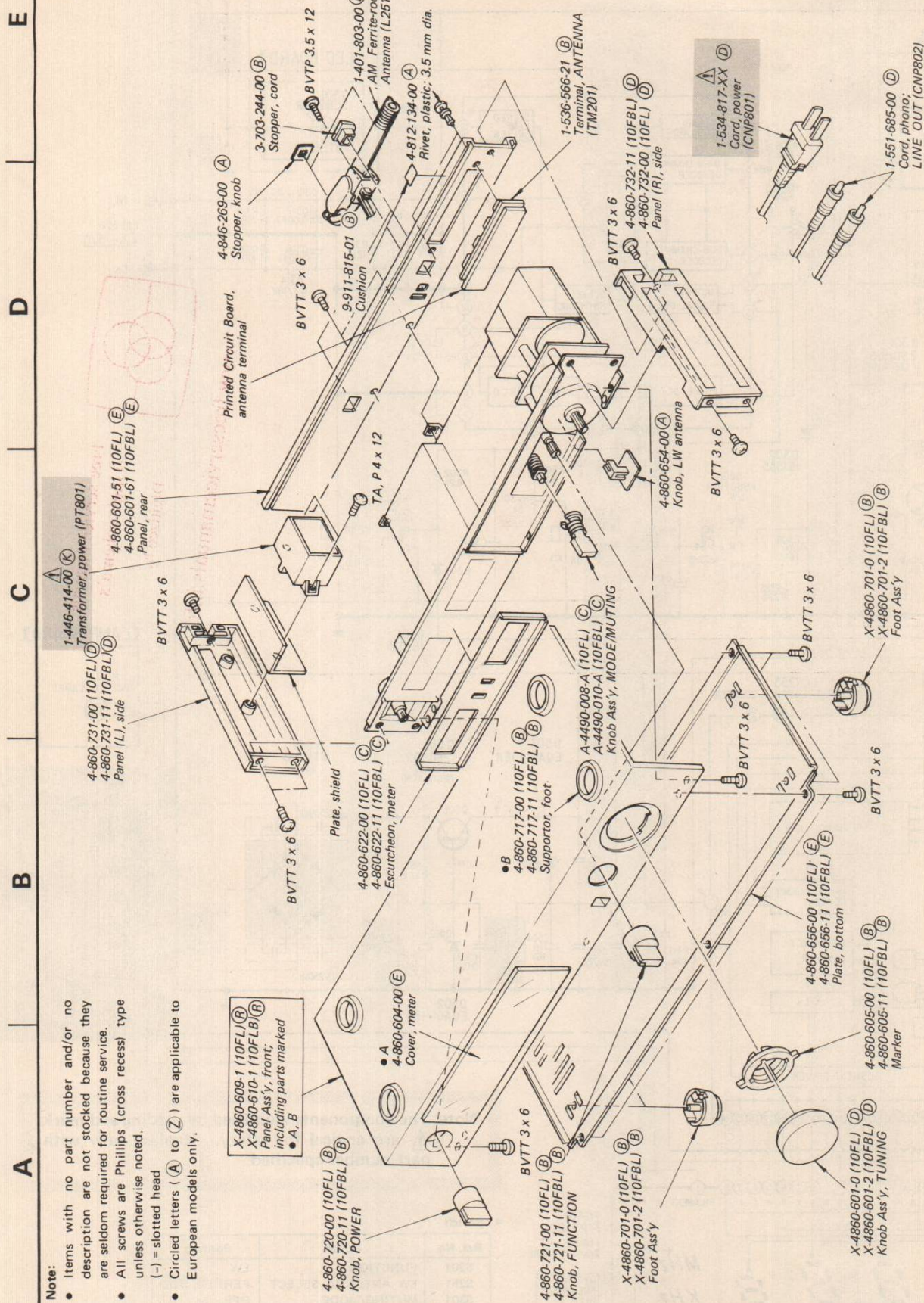
www.freerice.com manuals.info



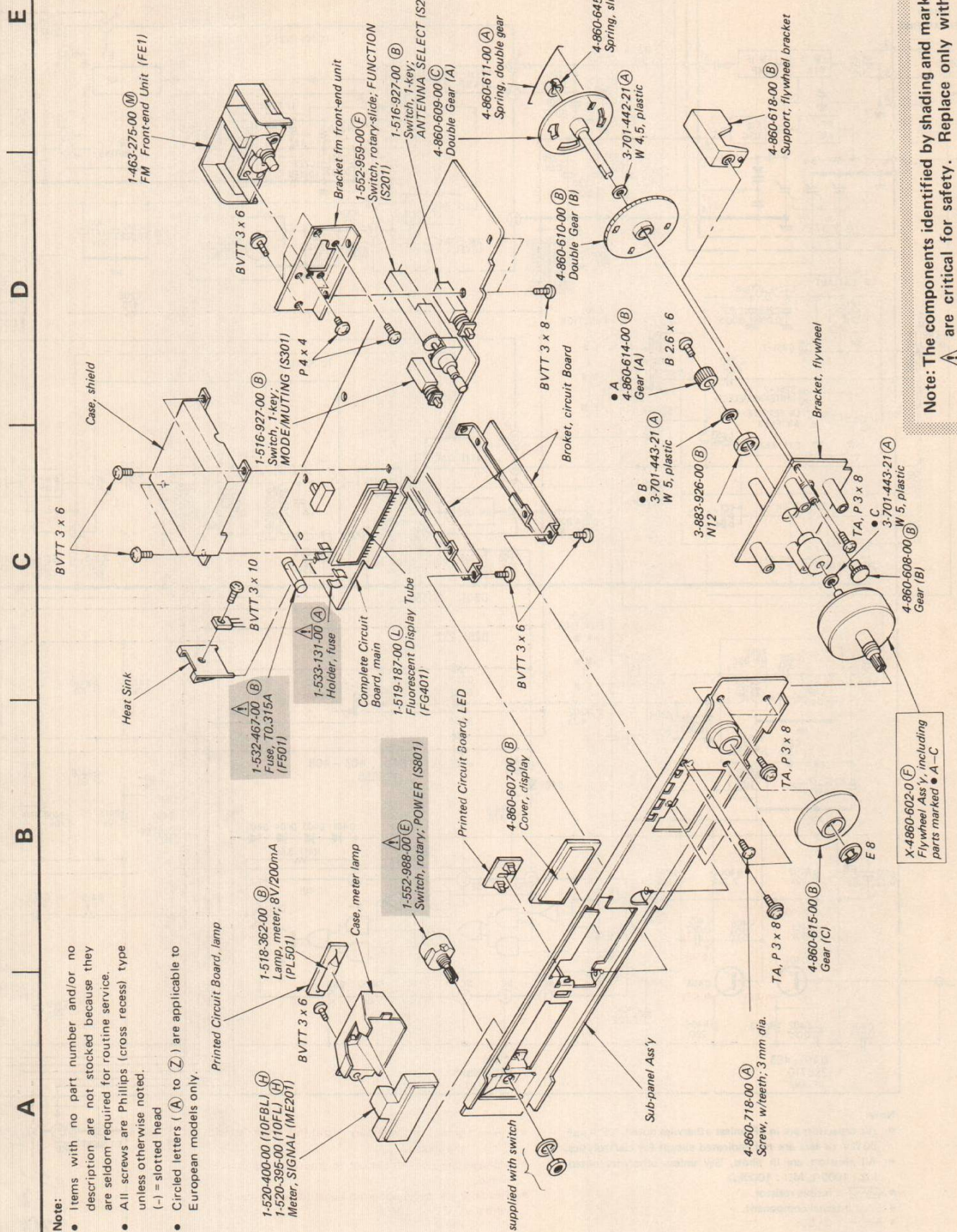
SECTION 5

EXPLODED VIEWS

5-1.



5-2.



SECTION 6

ELECTRICAL PARTS LIST

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

Ref. No. Part. No. Description

SEMICONDUCTORS

Transistors

⇒ Q201-203 8-729-663-47 (C) 2SC1364
 ⇒ Q301
 ⇒ Q401, 403 8-729-671-15 (B) 2SC710-15
 ⇒ Q501 8-729-141-43 (B) 2SD414

ICs

IC201 8-751-680-01 (I) CX168
 IC301 8-751-780-00 (G) CX178
 IC401 8-759-923-18 (J) MSL2318RS
 IC402 8-759-872-53 (M) LC7253

Diodes

D201, 202 8-719-815-55 (B) 1S1555
 D203 8-719-902-61 (B) SLB26YY
 D251, 252 8-719-815-55 (B) 1S1555
 D301 8-719-902-62 (B) SLB26UR
 D302
 D401 8-719-815-55 (B) 1S1555
 D403-408
 ⇒ D501 8-719-511-20 (C) S1VB20
 ⇒ D502 8-719-931-15 (B) EQB01-15
 ⇒ D503 8-719-931-08 (B) EQB01-08

COILS

L251 1-401-803-00 (H) AM Ferrite-rod Ant
 L252 1-407-169-XX (A) 100μH, microinductor
 L253 1-408-221-00 (B) 22mH, microinductor
 L254 1-407-173-XX (A) 220μH, microinductor
 L401 1-407-169-XX (A) 100μH, microinductor
 T251 1-401-709-00 (C) LW Ant
 T252 1-405-847-00 (B) AM Osc
 T253 1-405-872-00 (B) LW Osc

TRANSFORMERS

IFT201 1-409-323-00 (B) AM IFT
 IFT202 1-409-324-00 (B) AM IFT

Ref. No. Part No. Description

IFT203 1-404-167-00 (D) FM IFT
 PT801 1-446-414-00 (K) Power

CAPACITORS

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

C201, 202 1-101-006-00 (A) 0.047
 C203 1-123-328-00 (A) 4.7 25V elect
 C204 1-102-973-00 (A) 100p
 C205 1-123-295-00 (A) 100 6.3V elect
 C206 1-123-328-00 (A) 4.7 25V elect
 C207 1-101-005-00 (A) 0.022
 C208 1-123-352-00 (A) 1 50V elect
 C210 1-101-005-00 (A) 0.022
 C213 1-101-005-00 (A) 0.022
 C215 1-123-351-00 (A) 0.47 50V elect
 C216 1-108-355-00 (A) 0.0056 mylar
 C217 1-123-316-00 (A) 10 16V elect
 C218 1-123-295-00 (A) 100 6.3V elect
 C219 1-123-353-00 (A) 2.2 50V elect
 C220 1-101-006-00 (A) 0.047
 C221 1-101-005-00 (A) 0.022
 C222 1-123-316-00 (A) 10 16V elect
 C223 1-102-962-00 (A) 30p
 C225 1-101-004-00 (A) 0.01
 C226, 227 1-123-351-00 (A) 0.47 50V elect
 C228 1-123-296-00 (A) 220 6.3V elect
 C229, 230 1-101-005-00 (A) 0.022
 C231, 232/ 1-123-328-00 (A) 4.7 25V elect
 C233 1-123-320-00 (A) 100 16V elect
 C234 1-102-947-00 (A) 10p
 C235 1-101-005-00 (A) 0.022
 C236 1-123-295-00 (A) 100 6.3V elect
 C251, 252 1-101-004-00 (A) 0.01
 C254 1-102-947-00 (A) 10p
 C256 1-102-120-00 (A) 0.0018
 C257 1-102-119-00 (A) 0.0015

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

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
C259	1-104-066-00 (A) 360p	polystyrol
C260	1-102-251-00 (A) 15p	
C261	1-103-704-00 (A) 130p	polystyrol
C262	1-102-697-00 (A) 62p	
C301	1-123-351-00 (A) 0.47	50V elect
C302	1-123-354-00 (A) 3.3	50V elect
C303	1-123-320-00 (A) 100	16V elect
C304	1-104-081-00 (A) 0.0015	polystrol
C305	1-123-316-00 (A) 10	16V elect
C306, 307	1-123-351-00 (A) 0.47	50V elect
C308	1-123-316-00 (A) 10	16V elect
C309	1-108-246-00 (A) 0.047	mylar
C310	1-123-354-00 (A) 3.3	50V elect
C311	1-123-319-00 (A) 47	16V elect
C312	1-123-318-00 (A) 33	16V elect
C313	1-123-317-00 (A) 22	16V elect
C314, 315	1-131-451-00 (A) 0.1	16V tantalum
C316, 317	1-108-234-00 (A) 0.0047	mylar
C318	1-123-318-00 (A) 33	16V elect
C401-405	1-101-005-00 (A) 0.022	
C406	1-101-918-00 (A) 0.001	
C407	1-101-005-00 (A) 0.022	
C408	1-123-316-00 (A) 10	16V elect
C409	1-101-005-00 (A) 0.022	
C410, 411	1-102-959-00 (A) 22p	
C412	1-101-005-00 (A) 0.022	
C413	1-123-316-00 (A) 10	16V elect
C414-416	1-101-005-00 (A) 0.022	
C501	(A) 1-123-337-00 (B) 1000	25V elect
C502	1-123-335-00 (B) 330	25V elect
C503	1-101-005-00 (A) 0.022	
C504	1-123-316-00 (A) 10	16V elect
C505	1-101-005-00 (A) 0.022	
C801	(A) 1-130-267-00 (C) 0.022	250V film
CT251-254	1-141-213-00 (B)	trimmer

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

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
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RESISTORS

All resistors are in ohms. Common 1/4W carbon resistors are omitted. Check schematic diagram for values.

R220	(A) 1-212-875-00 (A) 56	1/4W fusible
R223	(A) 1-217-399-00 (B) 100	1/4W fusible
R303	(A) 1-217-393-00 (B) 33	1/4W fusible
R502	(A) 1-213-083-00 (A) 91	1W fusible

RV301	1-226-235-00 (A)	5k-B, adjustable; 76kHz
RV302	1-226-236-00 (A)	10k-B, adjustable;
RV401,402		FM stereo separation, offset

SWITCHES

S201	1-552-959-00 (F)	Rotary-slide, FUNCTION
S251	1-516-927-00 (B)	1 key, LW ANTENNA SELECT
S301	1-516-927-00 (B)	1 key, MODE/MUTING
S401	1-552-370-00 (B)	Slide, COUNTER CHECK
S801	(A) 1-552-988-00 (E)	Rotary, POWER

MISCELLANEOUS

CF201	1-527-277-91 (F)	Filter, solid state; 10.7MHz
CF202	1-527-403-00 (C)	Filter, mechanical
CNP801	(A) 1-534-817-XX (D)	Cord, power
CNP802	1-551-685-00 (D)	Cord, phono; LINE OUT
CP1, 2	1-102-394-00 (A)	Capacitor, ceramic; 0.01/250V x 2
F501	(A) 1-532-467-00 (B)	Fuse, T0.315A
FE1	1-463-275-00 (M)	FM Front-end Unit
M201	1-520-395-00 (H)	Meter, SIGNAL (10FL)
	1-520-400-00 (H)	Meter, SIGNAL (10FBL)
PL501	1-518-362-00 (B)	Lamp, meter; 8V/200mA
XT401	1-527-533-00 (D)	Crystal Oscillator
	1-519-187-00 (L)	Fluorescent Display Tube
(A) 1-533-131-00 (A)	Holder, fuse	
1-536-566-21 (B)	Terminal, ANTENNA	

ACCESSORIES AND PACKING MATERIAL

<u>Part No.</u>	<u>Description</u>
3-770-683-11 (J)	Manual, instruction; GG-10F/10FB
4-860-646-00 (A)	Sheet, protection
4-860-648-00 (C)	Cushion
4-860-661-00 (D)	Carton (10FL)
4-860-662-00 (D)	Carton (10FBL)

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