WM-FX413/FX415

SERVICE MANUAL

US Model
WM-FX415
Canadian Model
WM-FX413
AEP Model
UK Model
E Model
WM-FX413/FX415

Photo : WM-FX415

Model Name Using Similar Mechanism	WM-FX28
Tape Transport Mechanism Type	MF-WMFX305-43

SPECIFICATIONS

Radio Frequency

FM : 87.5 – 108 MHz (0.1 MHz step) (US, Canadian Model)
: 87.5 – 108 MHz (0.05 MHz step) (AEP, UK Itarian, E, Saudi Arabia Model)
AM : 530 – 1,710 kHz (10 kHz step) (US, Canadian Model)
: 531 – 1,602 kHz (9 kHz step) (AEP, UK Itarian, E, Saudi Arabia Model)

Power Requirements

3 V DC Batteries AA (R6) × 2
External DC 3 V power sources

Battery Life

(approximate hours when using the batteries specified below)

Battery	Playback	Radio
Sony Alkaline AM3 (N)	8 hours	20 hours
Sony SUM-3 (NS)	4 hours	12 hours

Dimensions

116.5 x 86.3 x 34.6 mm ($4^5/_8$ x $3^1/_2$ x $1^3/_8$ in.) (w/h/d) incl. projecting parts

Mass 210 g (7.5 oz) incl. batteries

Supplied Accessories

- Stereo headphones (1)
- Belt clip (1)

Optional Accessories

- AC power adaptor AC-E30L
- Car battery cord DCC-E130L

FX415

Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.
"DOLBY" and the double-D symbol DD are trademarks of Dolby Laboratories Licensing Corporation.

Note

Use only the recommended AC-E30HG AC power adaptor (not supplied). Do not use any other AC power adaptor.

Polarity of the plug

Design and specifications are subject to change without notice.

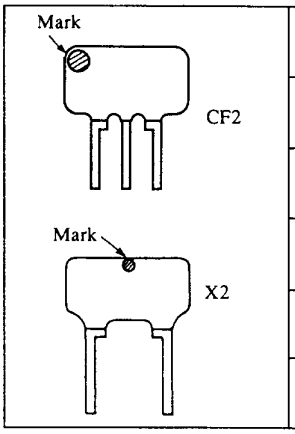
MICROFILM

RADIO CASSETTE PLAYER

SONY®

HOW TO CHANGED THE CERAMIC FILTERS

This model is used two ceramic filters of CF2 and X2.
You must used same type of color marked ceramic filters in order to meet same specifications.
Therefore, the ceramic filter must changed two pieces together since it's supply two pieces in one package as a spare parts.



mark	center frequency
red	10.70MHz
blue	10.67MHz
orange	10.73MHz
black	10.64MHz
white	10.76MHz

TABLE OF CONTENTS

Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

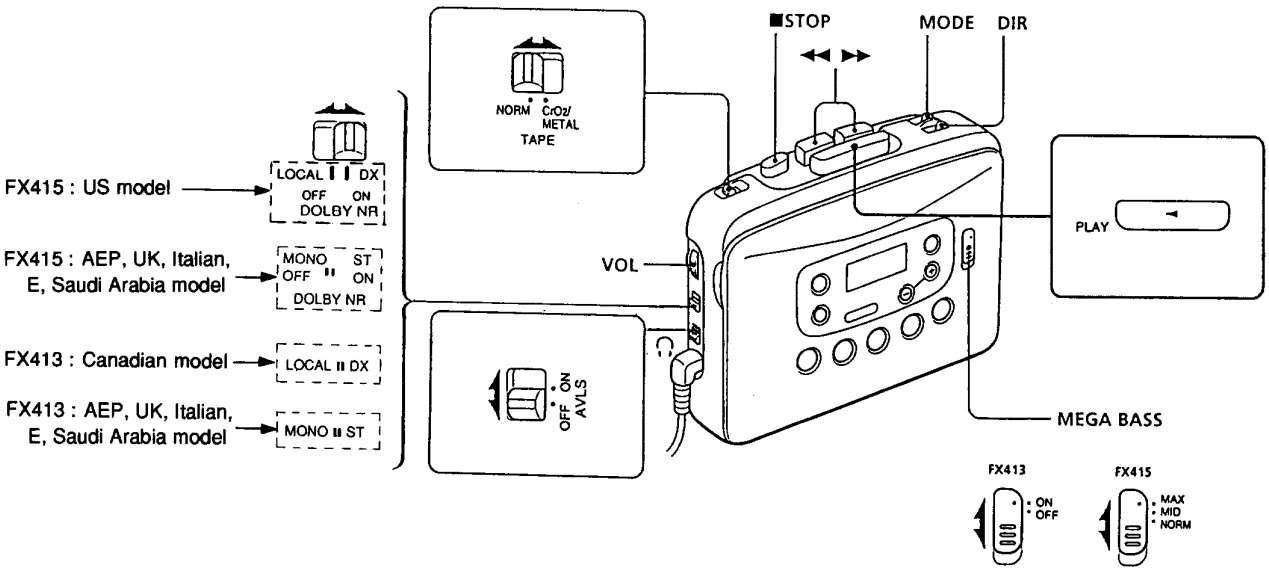
Flexible Circuit Board Repairing

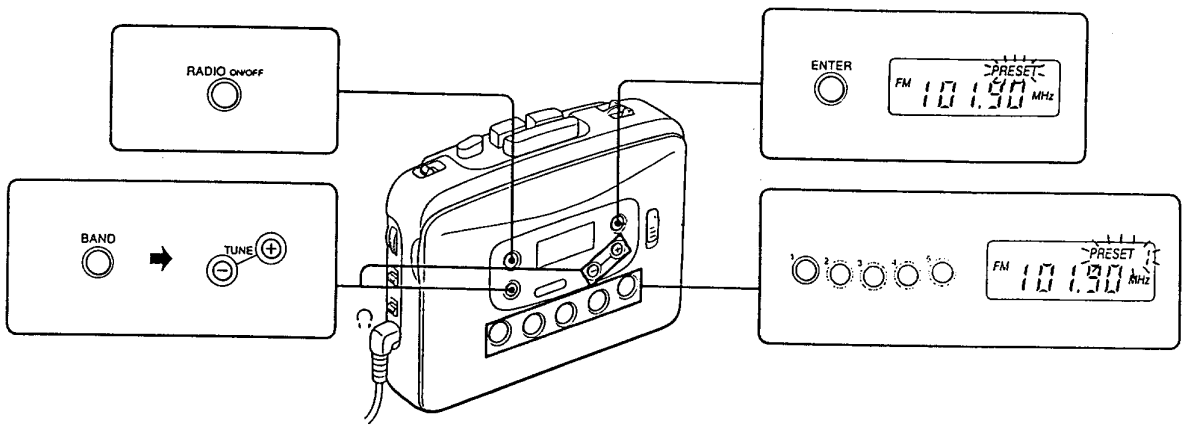
- Keep the temperature of the soldering iron around 270 °C during repairing.
- Do not touch the soldering iron on the same conductor ofthe circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

SECTION 1
GENERAL

This section is extracted from instruction manual.

Location and Function of Controls



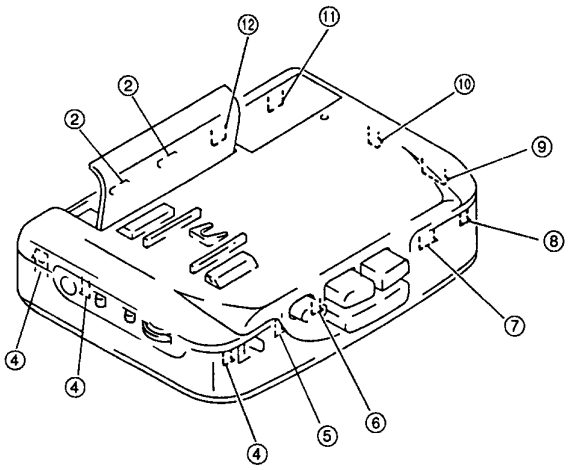


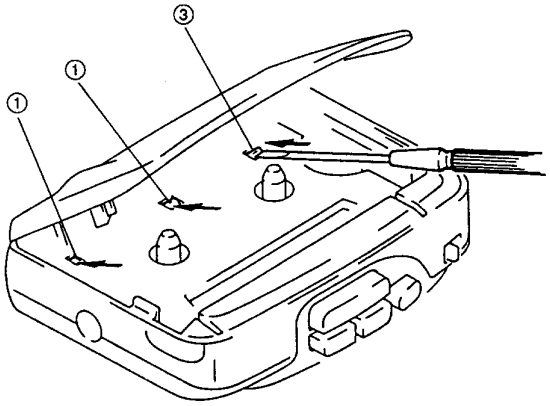
SECTION 2
DISASSEMBLY

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

2-1. CABINET (REAR) ASSEMBLY

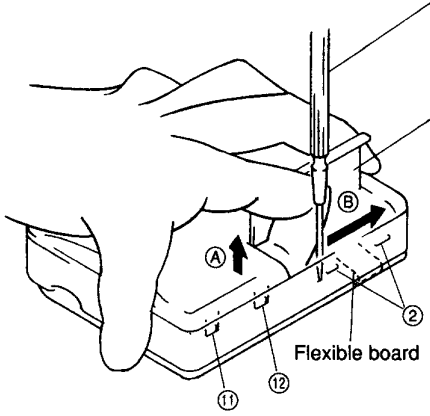
• The cabinet (REAR) assembly has numerious claws.
When removing it, check the positions of these claws as shown below.



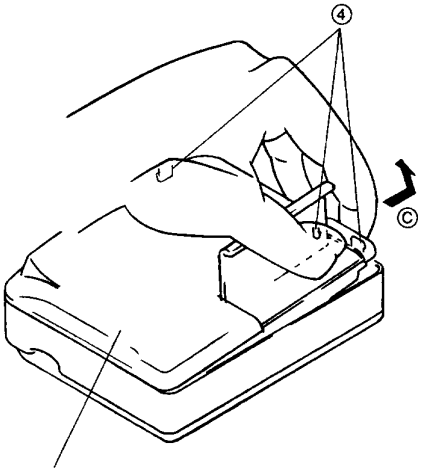


❸ Slide the screwdriver (flat-blade) in arrow Ⓑ direction to disconnect the two claws ②.
Note : Take note of the flexible board.

❶ Open the battery case lid.



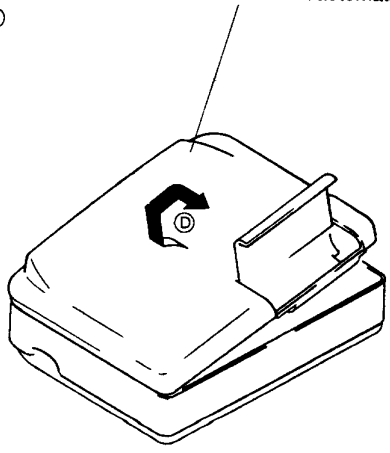
❷ Put your second finger in the battery case of the cabinet (REAR) assembly, pull in the arrow Ⓐ direction to disconnect claws ①, ⑪ and ⑫.



Cabinet (REAR) Assmbly

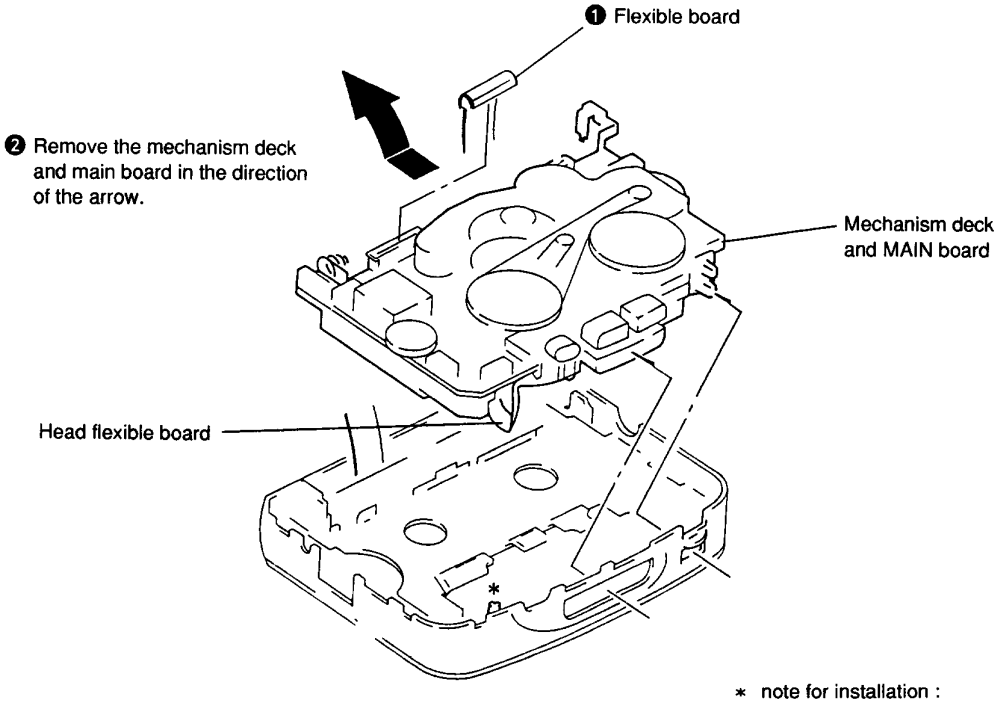
❹ Disconnect claw ③. As shown in the figure, lift up the cabinet (REAR) assembly, pull in arrow Ⓒ direction to disconnect the three claws ④.

❺ Lift the cabinet (REAR) assembly in the arrow Ⓓ direction. Claws ⑤ to ⑩ wii disconnect automatically.



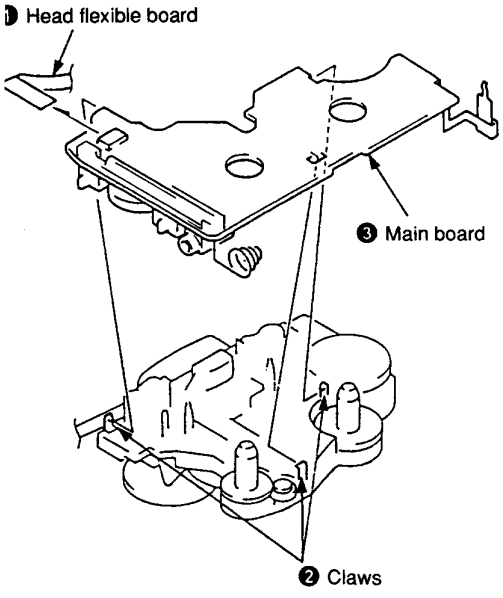
Lift the cabinet assembly, then twist across.

2-2. MECHANISM DECK AND MAIN BOARD

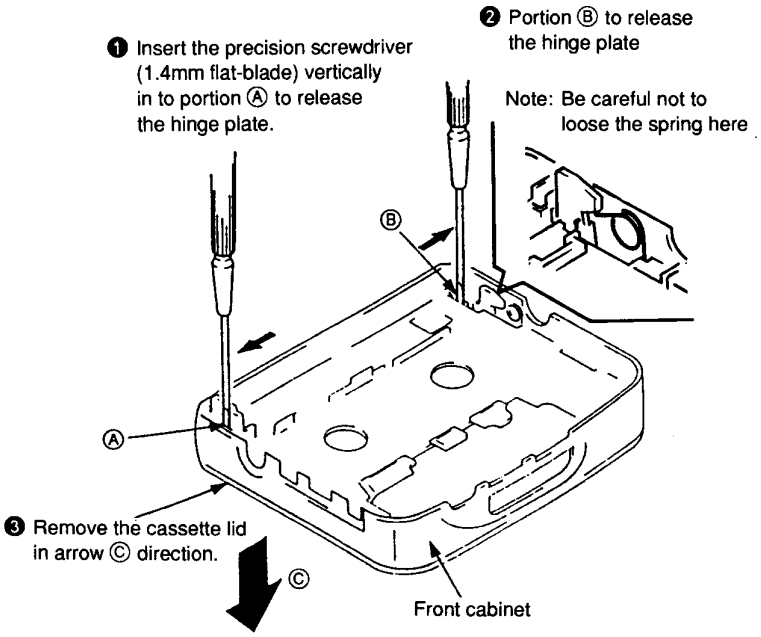


* note for installation :
Make sure to put the head flexible board to ditch before install the mechanism deck and MAIN board.

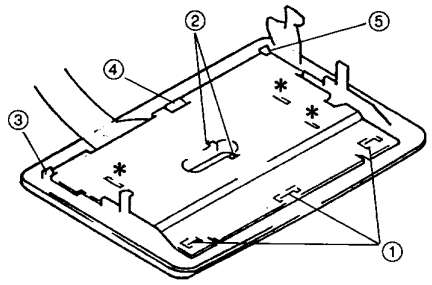
2-3. MAIN BOARD



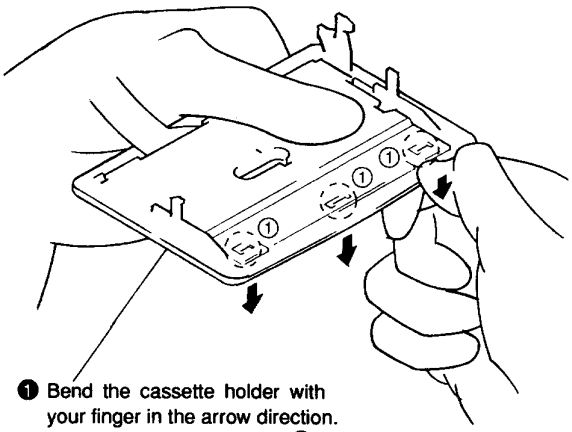
2-4. CASSETTE LID



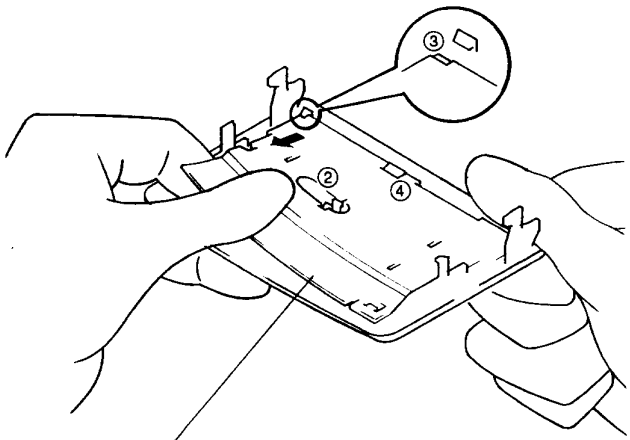
2-5. DISPLAY BOARD



Note : The * claws will disconnect automatically when this procedure is performed.



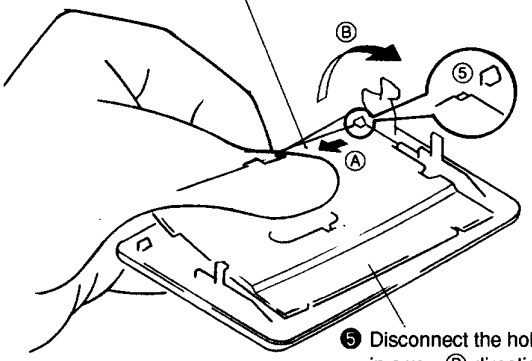
❶ Bend the cassette holder with your finger in the arrow direction. Disconnect the three claws ①.



❷ Put your second finger below the holder cover and disconnect the two claws ②.

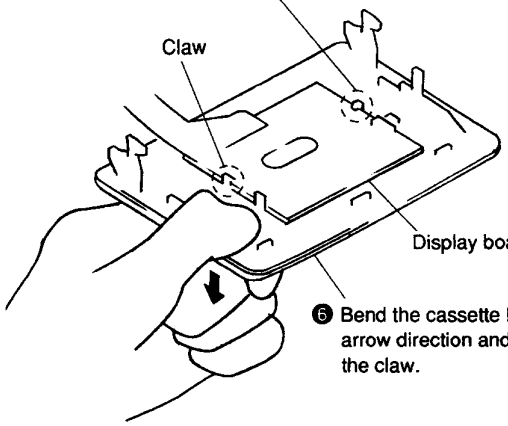
❸ Pull the holder cover in the arrow direction and remove claw ③, claw ④ will be disconnected automatically when claw ③ is disconnected.

❹ As shown in the figure, hold the holder cover, pull the holder cover in the arrow Ⓐ direction, and disconnect claw ⑤.



❺ Disconnect the holder cover in arrow Ⓑ direction

Note: When removing the display board, take this claw breaks easily

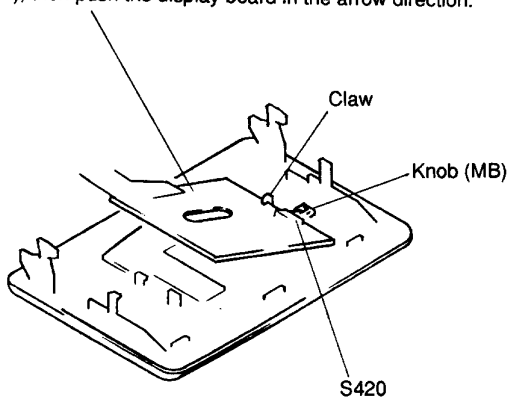


❻ Bend the cassette holder in arrow direction and disconnect the claw.

2-6. NOTE FOR INSTALLATION

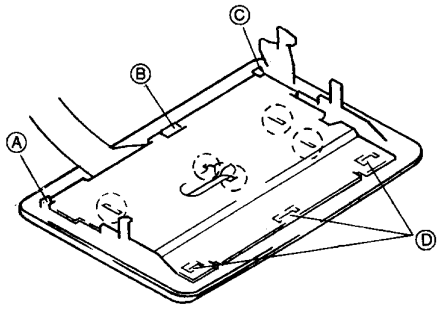
• DISPLAY BOARD

Engage the display board with the claw and align S420 with the knob (MB), then push the display board in the arrow direction.



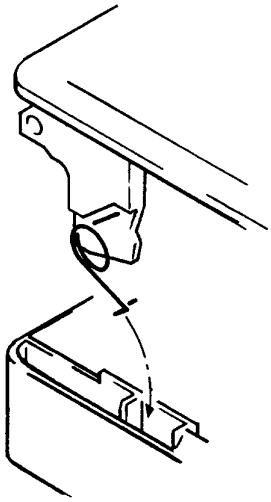
• HOLDER COVER

Insert the claws Ⓐ, Ⓑ and Ⓒ before hand, set the remaining five claws after setting the three claws of Ⓓ.



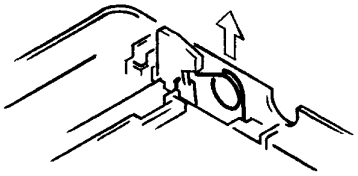
• TORSION SPRING

❶ Attach the torsion spring as shown in the figure.



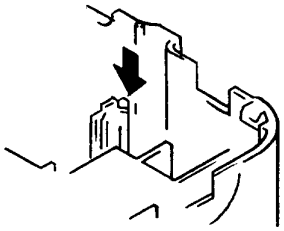
❷ Insert the torsion spring in the hole as shown in the figure.

❸ Lift the torsion spring in the arrow direction and hook it properly.



• MAIN BOARD

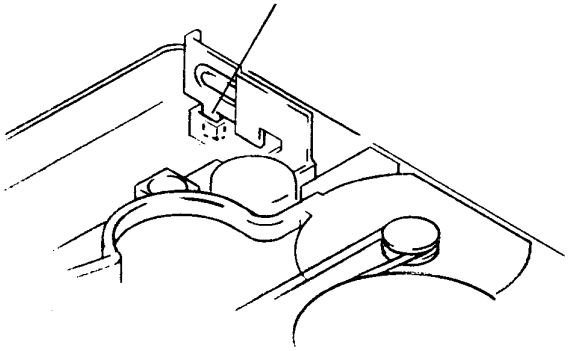
When mounting the main board, insert the head flexible board in the space indicated by the arrow.



• BATTERY TERMINAL

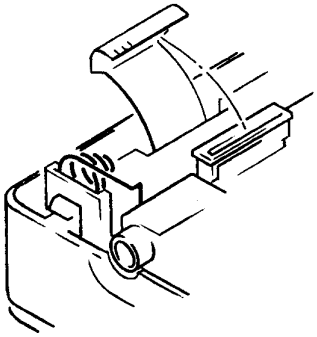
Attach the battery (+) as shown in the figure.

Note: Be sure to insert this claw.



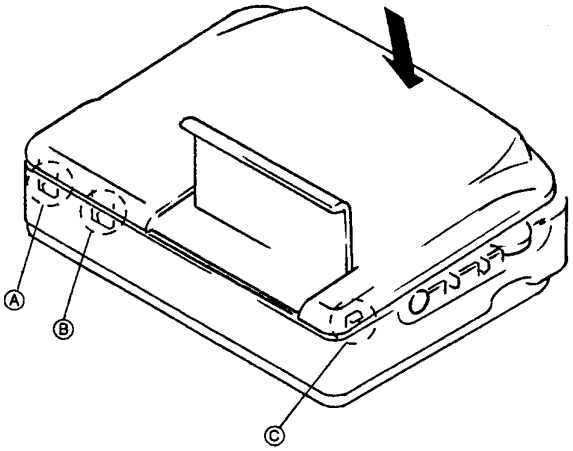
• TUNER FLEXIBLE BOARD

Attach the tuner flexible board as shown in the figure.



• CABINET (REAR) ASSEMBLY

After pushing claws Ⓐ to Ⓒ and locking them. Push the cabinet (REAR) assembly in the arrow direction, and lock the order claws.



SECTION 3
ADJUSTMENTS

3-1. MECHANICAL ADJUSTMENTS

PRECAUTION

1. Clean the following parts with a denatured-alcohol-moistened swab :
   playback head pinch roller
   capstan rubber belts
2. Demagnetize the playback head with a head demagnetizer.
3. Do not use a magnetized screwdriver for the adjustments.
4. After the adjustments, apply suitable locking compound to the parts adjusted.
5. The adjustments should be performed with the rated power supply voltage (2.5V) unless otherwise noted.

Torque Measurement

Mode	Torque meter	Meter reading
FWD	CQ-102C	20 — 42 g • cm (0.28 — 0.58 oz • inch)
FWD Back tension		less than 3 g • cm (less than 0.04 oz • inch)
FF, REW	CQ-201B	more than 60 g • cm (more than 0.83 oz • inch)

3-2. ELECTRICAL ADJUSTMENTS

PRECAUTION

- Supplied voltage : 2.5V
- Switch and control position
  TAPE switch : NORM
  MODE switch : ST...EXCEPT US/ Canadian
  SENS switch : DX...US/ Canadian
  VOLUME CONTROL : maximun
  MEGA BASS switch : NORM
  AVLS switch : OFF

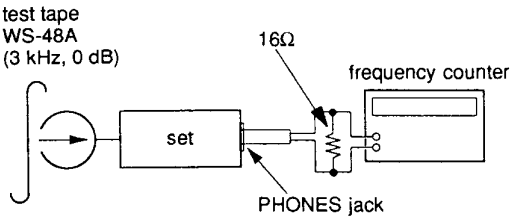
Test Tape

Type	Signal	Used for
WS-48A	3 kHz, 0 dB	Tape Speed Adjustment

TAPE SECTION

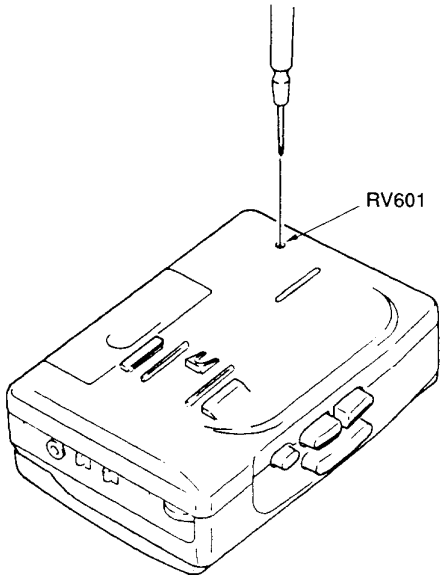
Tape speed adjustment

Procedure :



Play back WS-48A (tape center portion) in FWD mode. Adjust the RV601 so that the frequency counter reads 3,000Hz ± 15 Hz.

Adjustment Location :

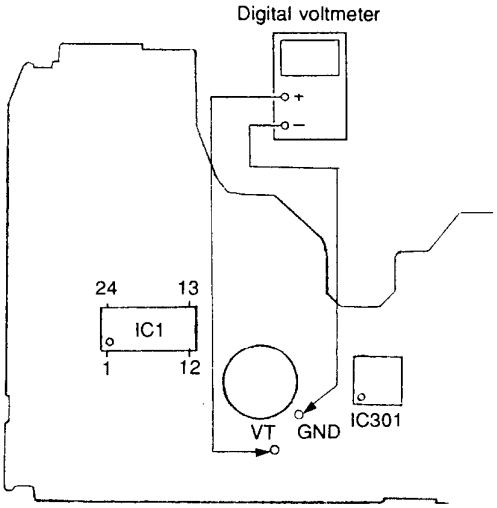


TUNER SECTION

FM SECTION

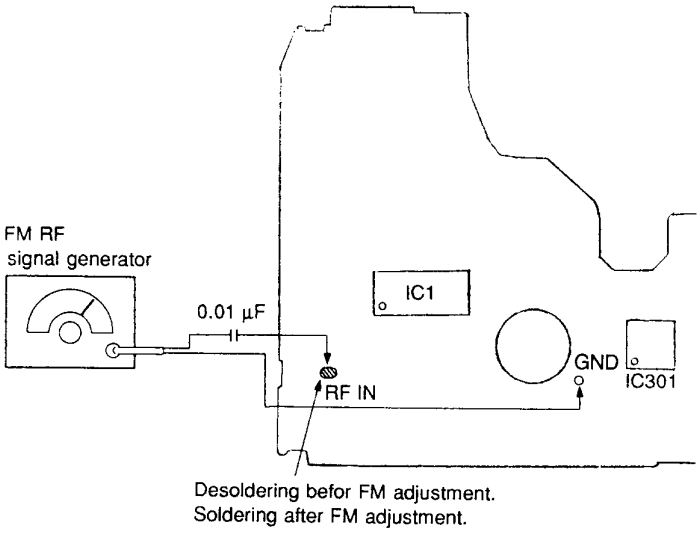
setting :
FUNCTION switch : RADIO
BAND switch : FM

FM TUNING VOLTAGE ADJUSTMENT

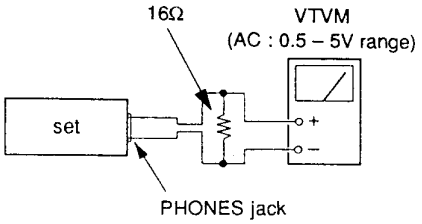


FM TUNING VOLTAGE ADJUSTMENT
Adjust for a 2.4 ± 0.1 Vdc reading on Digital voltmeter
L3
87.5 MHz

FM TRACKING ADJUSTMENT



Modulation : 400 Hz, 22.5 kHz dev.
Output level : as low as possible.



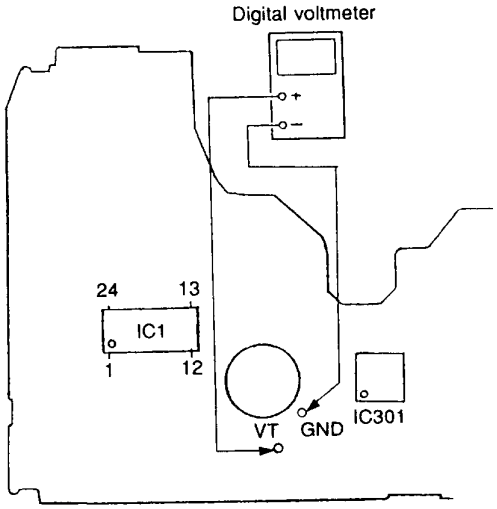
- Repeat the procedures in each adjustment several times, and the tracking adjustment should be finally done by the trimmer capacitors.

FM TRACKING ADJUSTMENT
Adjust for a maximum reading on VTVM.
L2
108 MHz

AM SECTION

setting :
FUNCTION switch : RADIO
BAND switch : AM

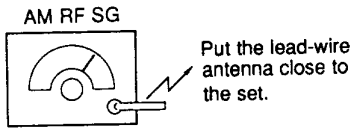
AM TUNING VOLTAGE ADJUSTMENT



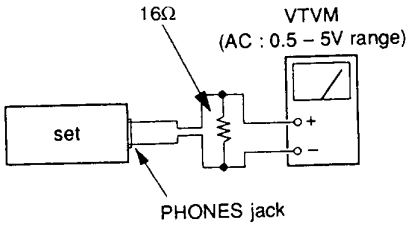
AM TUNING VOLTAGE ADJUSTMENT
Adjust for a 1.5 ± 0.1 Vdc reading on Digital voltmeter
L4
530 (531) kHz

( ) : EXCEPT US, Canadian model

AM IF ADJUSTMENT, AM TRACKING ADJUSTMENT



Modulation : 400Hz 30%
Ooutput level : as low as possible.



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

AM IF ADJUSTMENT
Adjust for a maximum reading on VTVM.
T1
1000 (999) kHz

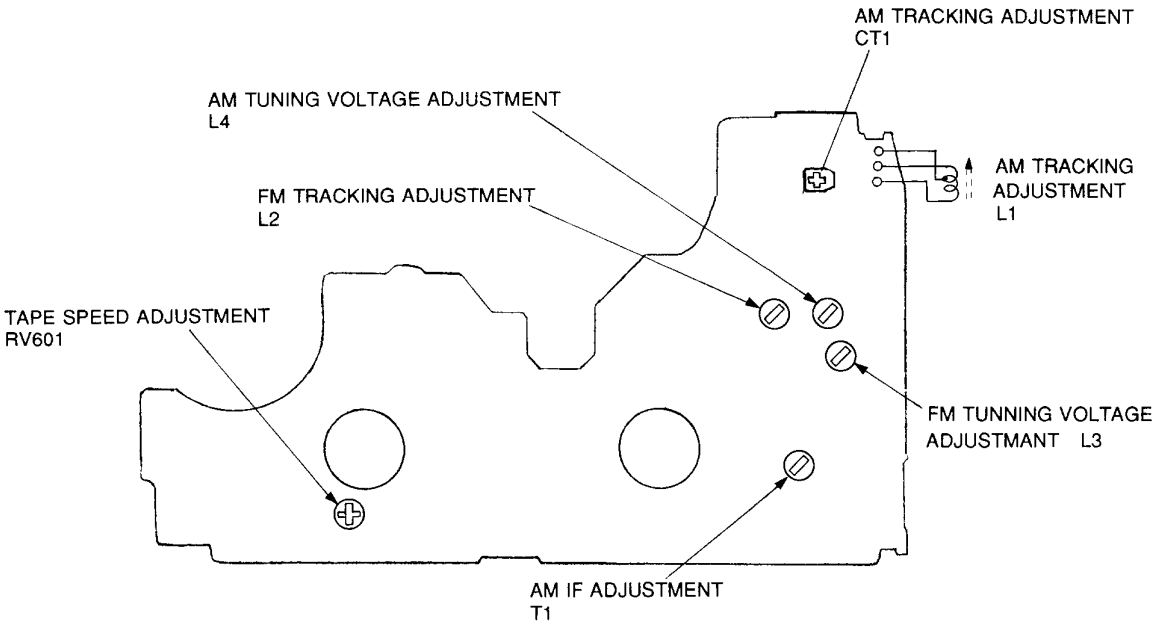
( ) : EXCEPT US, Canadian model

AM TRACKING ADJUSTMENT	
Adjust for a maximum reading on VTVM.	
L1 (BAR ANTENNA)	CT1
620 (621) kHz	1400 (1404) kHz

( ) : EXCEPT US, Canadian model

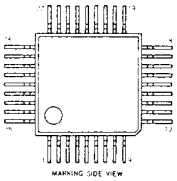
Adjustment Part Location Diagram :

[MAIN BOARD]

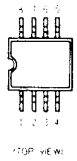


4-2. SEMICONDUCTOR LEAD LAYOUTS

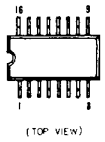
LA4582CM-TLM



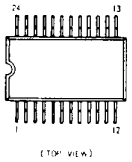
MM1038CFF



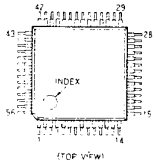
NJM2063AM



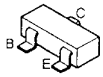
TA8122AF



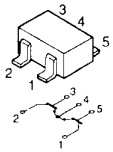
µPD1724GB-693-1A7



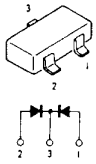
DTA114YK
DTC114EKA
DTC114YKA
DTC144EKA
2SA1162-G
2SB624-BV345
2SC1623-L5L6
2SC2223-F13



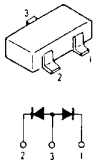
XN1215
XN1501



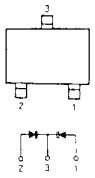
DAN202K



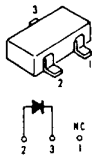
DAP202K



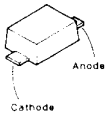
KV1520TL00



RB411D



1T363



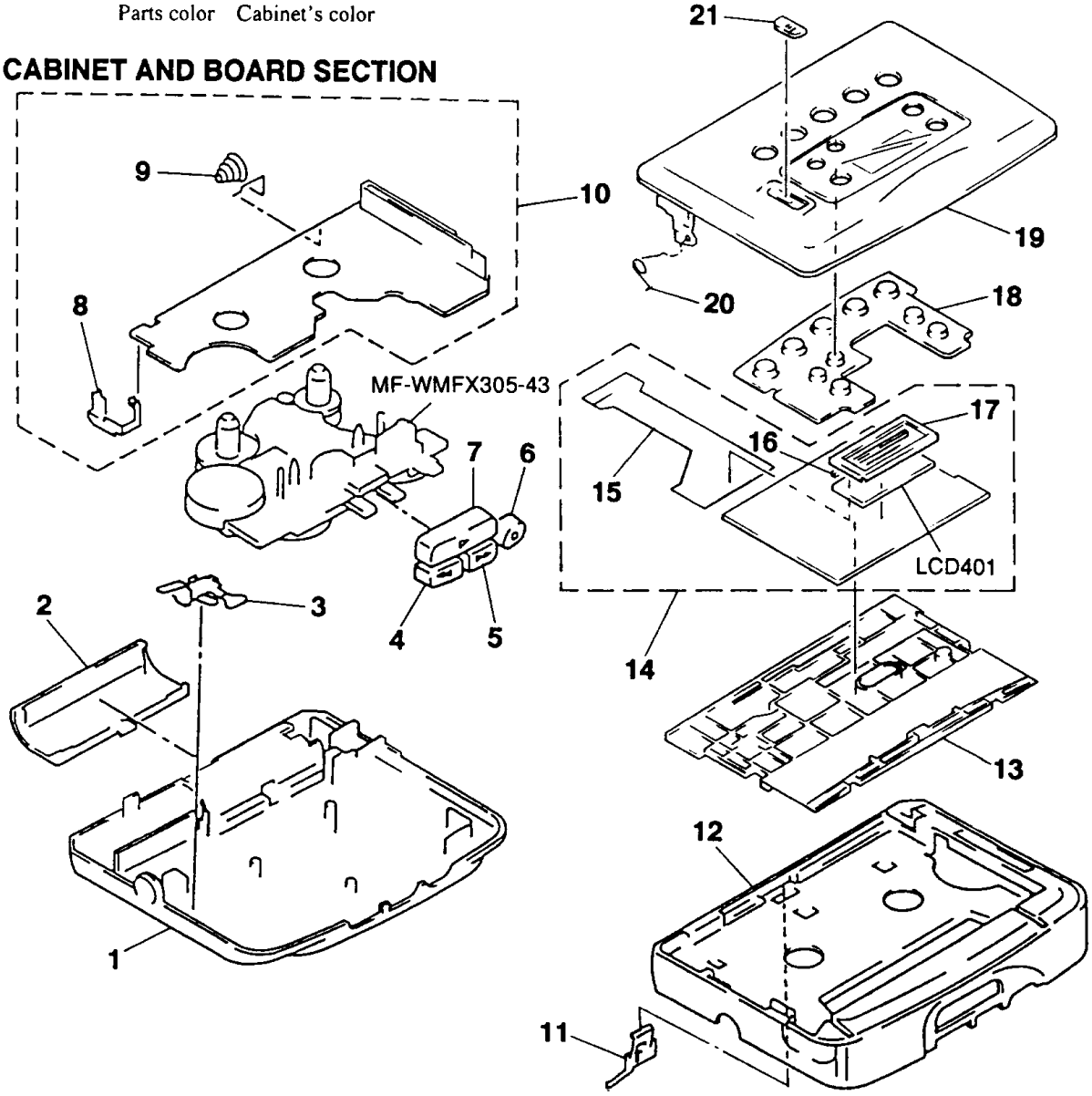
4-5. IC PIN FUNCTION

- **IC401 Tuner Controller/LCD Drive (μPD1724GB)**

Pin No.	Pin Name	I/O	Function
1 to 10	LCD10 to 1	O	LCD segment signal output
11	NC	–	Not used. (GND)
12 to 14	COM3 to COM1	O	LCD common signal output
15	VSS3	–	Connected to the doubler circuit capacitor for generating LCD drive voltage.
16	CAP2	–	
17	CAP1	–	
18	VSS2	–	
19	$\overline{\text{MUTE}}$	O	Generates a 1.12 kHz pulse when used as VDP.
20	BEEP	O	Beep signal output
21	NC	–	Not used. (GND)
22	VDD	–	Internal reset is on when a voltage is applied from 0V to 1.5V.
23	TV OSC IN	–	GND
24	FM OSC IN	I	Local oscillating frequency input (pulse swallow) (Pulled down when CE is "L".)
25	AM OSC IN	I	
26	VSS1	–	GND
27	E01	O	Outputs "H" when a value obtained by dividing the local oscillating frequency is higher than a reference frequency. Outputs "L" when lower than the reference frequency. Becomes high-impedance when the value matches the reference frequency.
28	E02	O	
29	CE	I	Internal reset is on when "L" is changed to "H".
30	XO	O	Connected to the crystal oscillator.
31	XI	I	Oscillates the 75 kHz crystal.
32	VSS4	–	Connected to the regulator circuit capacitor.
33	SD	I	DATA from Tuner IC
34	STEREO	I	Stereo/monaural control
35	TAPE ON	I	Tape voltage detection
36	KEY INIT	O	Initialize
37	RADIO POWER ON	I	Radio voltage detection
38	FM/$\overline{\text{AM}}$	O	FM/AM selection
39	PB1	O	Not used.
40	PB0	O	
41	PC3	O	Function key output
42	PC2	O	Not used.
43	PC1	O	Function key output
44	PC0	O	
45	KEY3	I	Function key input
46	KEY2	I	
47	KEY1	I	
48	KEY0	I	
49, 50	NC	–	Not used. (GND)
51 to 56	LCD16 to 11	O	LCD segment signal output

Parts color Cabinet's color EA : Saudi Arabia model

5-1. CABINET AND BOARD SECTION



5-2. MECHANISM SECTION (MF-WMFX305-43)