BM-850

SERVICE MANUAL

US Model
Canadian Model
AEP Model
UK Model

Model Name Using Similar Mechanism	NEW
Tape Transport Mechanism Type	MB-850

SPECIFICATIONS

Recording system	4-track 2-channel monaural (L channel for electronic index signals, R channel for sound signals)
Tape speed	2.4 cm/s (15/16 in./s), 1.2 cm/s (15/32 in./s)
Fast winding time	Approx. 1 min. 50 sec. (2.4 cm/s) with Sony microcassette MC-60BM
Frequency response	200 – 4,000 Hz (at 1.2 cm/s) 200 – 6,000 Hz (at 2.4 cm/s)
Speaker	Approx. 5.7 cm (2 1/4 inches) dia.
Power output	0.35 W (at 10% distortion)
Input	TELEPHONE PICKUP (minijack) Sensitivity 0.2 mV input impedance 10 kilohms
Output	EARPHONE (minijack) for 8 – 300-ohm earphones
CONTROL UNIT connector	For HU-80, FS-75
Power requirements	9 V DC DC IN 9V jack accepts the supplied AC power adaptor for use on 120 V AC, 60 Hz in US, Canada 220 V AC, 50 Hz in continental European countries 240 V AC, 50 Hz in U.K.
Power consumption	With the supplied AC power adaptor: 14 W (model for US, Canada) 13 W (model for U.K. and continental European countries)
Dimensions	Approx. 200 × 70.5 × 245 mm ($7^7/_8 \times 2^7/_8 \times 9^3/_4$ in.) (w/h/d) including projecting parts and controls
Mass	Approx. 1.2 kg (2 lb. 11 oz.)
Supplied accessory	AC power adaptor (1)

Design and specifications subject to change without notice.

Note

This appliance conforms with EEC Directive 87/308/EEC regarding interference suppression.

Note

You cannot use the HU-60 hand control unit with this unit.

Your dealer may not handle some of the above listed optional accessories. Please ask the dealer for detailed information.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS 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.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

MICROFILM

MICROCASSETTE DICTATOR/TRANSCRIBER

SONY

SECTION 1
SERVICING NOTES

TABLE OF CONTENTS

[NOTES FOR REPAIRING]

1. POWER (S101) Switch

   The POWER switch is not a switch for turn off the power source. Pay attention when repairing that the electricity is turned on even if the POWER switch is turned STANDBY position.

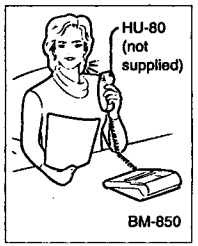
   - The states when turn STANDBY position of the POWER switch are as follows.
     a. LCD (ND901) display will be turned off.
     b. Motors (M901, 902) will be stopped.
     c. Plungers (PM901, 902) will be turned off.
     d. Any key input will be ignored.

   The above items from a to d are controlled by the microcomputer which makes the pin ㊳ of IC109 (microcomputer) become Low level.

Operation Flow Chart

For details, refer to the pages in ●.
[ ]: Necessary step
[ ]: Optional step

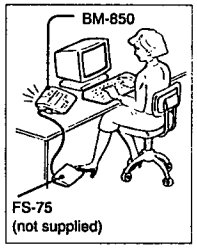
Dictating ⑭



- Connect the AC power adaptor to the unit and to a wall outlet. ⑪
- Connect the optional HU-80 hand control unit. ⑪
- Set the POWER switch to ON.
- Insert a cassette. ⑫
- Set the TAPE SPEED selector to 2.4 or 1.2.
- Press the RESET button to set the digital counters to zero.
- Set the function selector of the HU-80 to DICT. Speak into the microphone.
  - Record the SEC signal before giving instructions to the secretary. ⑮
  - For quick reviewing (playback) and correcting the dictated material
    Keep the function selector of the HU-80 pressed down toward B.SPACE to rewind the tape until the desired point on the tape is reached. Release the selector and playback of the dictating begins. When the reviewing is completed, set the function selector to DICT to proceed with the dictating.
  - Record the LTR signal at the end of each dictated material. ⑯

- Set the function selector of the HU-80 to STOP.
- Press the EJECT button to remove the cassette. ⑫
- Hand the cassette to your secretary or transcriptionist.

Transcribing ⑭

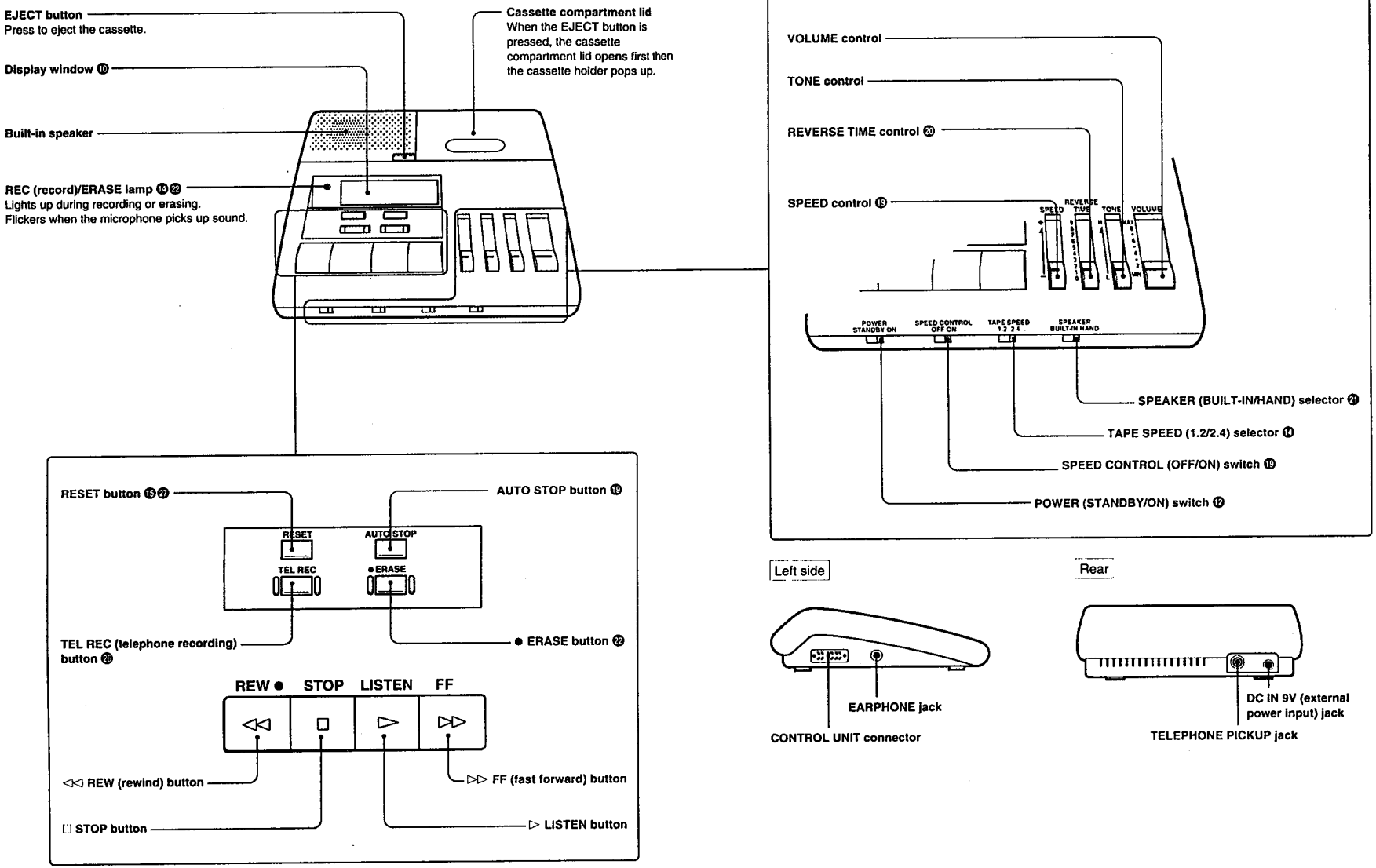


- Disconnect the HU-80 hand control unit (if it is connected).
- Connect the optional FS-75 foot control unit. ⑪
- Set the POWER switch to ON.
- Insert the dictated cassette. ⑫
- Set the SPEAKER selector to BUILT-IN ㉑ or connect the earphone (headphones). ㉑
- Press the AUTO STOP button to make the AUTO STOP indication disappear if the indication has appeared on the display window.
- Set the TAPE SPEED selector to the same position as that used in dictating.
- Press the ◁◁ REW button.
  When the beginning of the dictated cassette is reached, a beep tone is heard and the unit automatically shuts off.
- Press the RESET button to set the digital counters to zero.
- Keep the right side of the pedal depressed. ㉑
  (When the FS-75 is connected.)
  or
  Press the ▷ LISTEN button. ㉑
  (When the BM-850 is used for operation.)
- Adjust the VOLUME and TONE controls.
  - Adjust the starting point for playback with the use of the REVERSE TIME control. (When the FS-75 is used.)
  - Set the SPEED CONTROL switch to ON and adjust the tape speed with the SPEED control. ⑲
- After transcribing, stop the tape.
  Release the pedal. (When the FS-75 is used.) ㉑
  or
  Press the □ STOP button. (When the ▷ LISTEN button on the BM-850 is pressed to play back the tape.) ㉑
- Erase the tape. ㉒

This section is extracted from instruction manual.

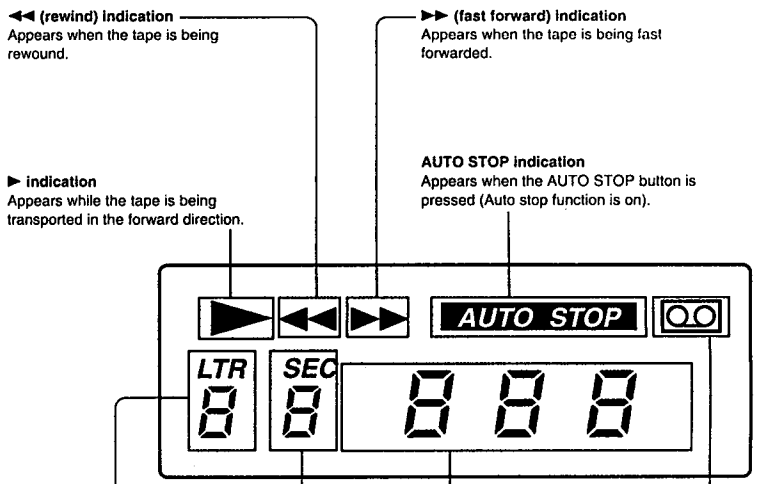
Location and Function of Controls

For details, refer to the pages indicated in ●.



Location and Function of Controls

Display window

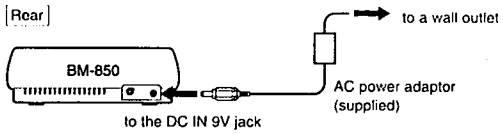


Note

Sometimes it may be difficult to read the LCD counter display because of your viewing angle.

Preparation

Connecting the Power Source



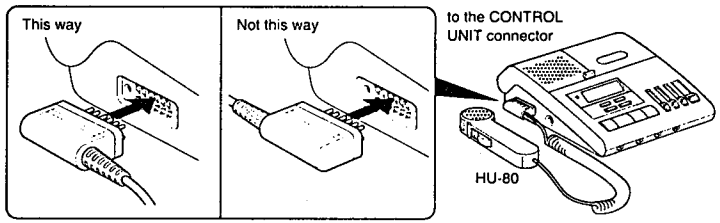
Note on the AC power adaptor

Use only the supplied AC power adaptor. Do not use any other AC power adaptor.

Polarity of the plug

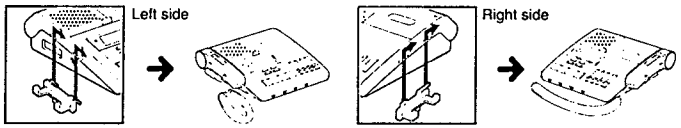
Connecting the HU-80 Hand Control Unit (not supplied)

For operation, refer to "Dictating" on page 14.



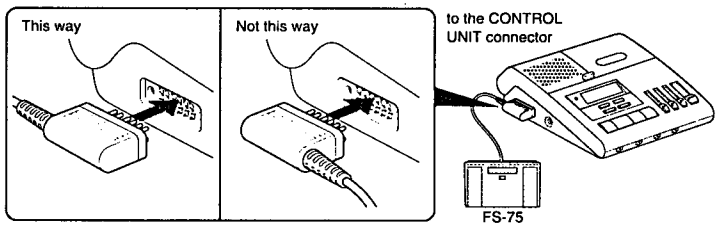
Attaching the cradle

Attach the cradle which is supplied to the HU-80 to the left or right side of the unit. Insert the cradle into the slots and slide to secure it, then connect the HU-80 to the BM-850. Place the HU-80 on the cradle while it is not in use.

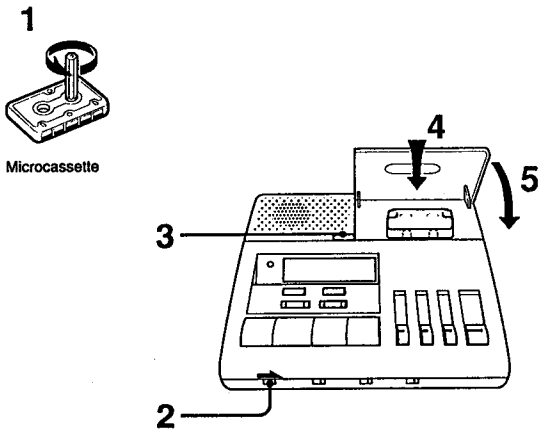


Connecting the FS-75 Foot Control Unit (not supplied)

For operation, refer to "Transcribing" on page 18.

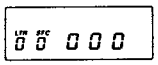


Inserting a Cassette



1 **Take up any slack in the tape.**

2 **Set the POWER switch to ON.**



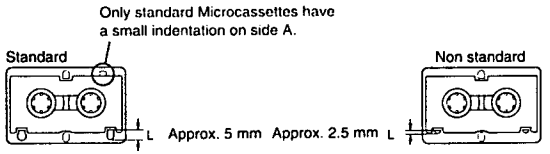
3 **Press the EJECT button to open the cassette compartment lid.**
The cassette holder pops up.

4 **Insert a cassette into the cassette holder with the side to be recorded or played back facing upward.**
Push the cassette into the holder completely.

5 **Close the cassette compartment lid.**

Notes on the microcassette

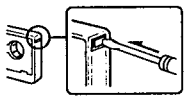
Use only standard Microcassettes. Non standard cassettes cannot be used because their "L" dimension (see illustration) are different.



The use of microcassettes longer than 60 minutes (tape speed: 2.4 cm/s) is not recommended.

To protect recorded cassettes from accidental erasure

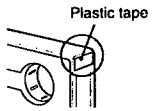
When a recording is made, the previous recording is automatically erased. To prevent accidental erasure, break off the cassette tabs.



Break off and remove the tab.

To reuse a cassette

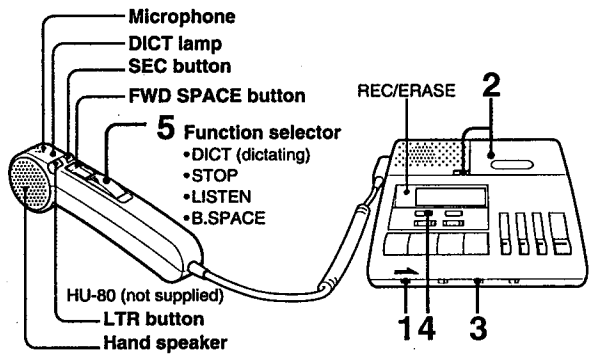
To record on a cassette with removed tabs, cover each slot with a piece of plastic tape.



Dictating

To use the unit as a dictating machine, connect the HU-80 hand control unit (not supplied). For the connection instructions, see page 11.

Operation



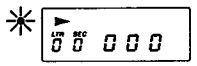
1 **Set the POWER switch to ON.**

2 **Insert a cassette. (See page 12.)**

3 **Set the TAPE SPEED selector to 2.4 or 1.2 (cm/sec.).**

4 **Press the RESET button to set the digital counters to zero.**

5 **Set the function selector to DICT.**
Recording starts. Speak into the microphone.
The DICT lamp (HU-80) lights up and the REC/ERASE lamp (BM-850) flickers when the microphone picks up the sound.
At the same time, the ► indication appears on the display window.

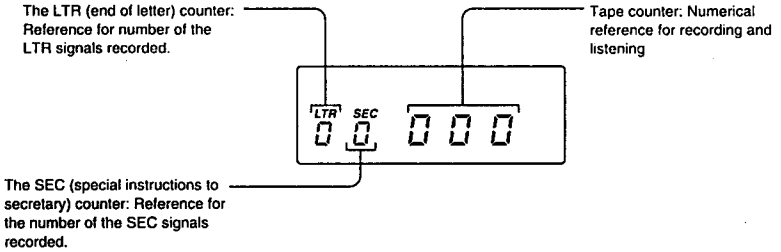


To stop the tape
Set the function selector to STOP.

Note
Keep the HU-80 away from the BM-850 during recording. If not, some noise may be recorded.

How to use the TAPE SPEED selector
Choose 2.4 for optimum sound recording (recommended for normal use). A 60-minute recording can be made using both sides of the 60 minute microcassette.
Choose 1.2 for longer recording. A 120-minute recording can be made using both sides of the 60 minute microcassette.

Digital Counters



To reset the counters to zero
Press the RESET button for about a second.

We recommend to reset the counters to zero before you start dictating.

Note
The digital counters are memorized even if the POWER switch is set to STANDBY or a cassette is being removed.

Tips for More Efficient Dictating

Before you start dictating
- Organize your thoughts.
- Make notes or an outline of what you want to dictate.
- Check that the tape is erased. (See page 22.)

When you start dictating
- Identify yourself. (Name, department, phone number, etc.)
- Indicate the type of dictating. (Memo, letter, etc.)
- Give transcribing instructions. (Type of stationery, number of copies, envelopes, etc.)
- Specify distribution. (Name, addresses, etc.)

While dictating
- Relax and speak clearly at normal speed.
- Short sentences are best.
- Include punctuation.
- Spell difficult or unusual words.
- Correct your mistakes. (Review and redictate, or use the SEC signals to alert the transcriptionist for changes or corrections.) (See page 16 or 17.)
- At the end of each dictated material, record an LTR signal. (See page 16.)

Dictating

Useful Functions

■ Recording the LTR (end of letter) and SEC (special instructions to secretary) signals

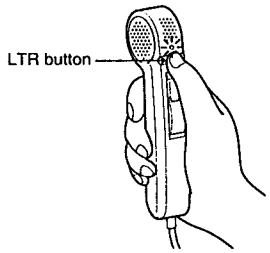
You can record electronic index signals on a tape with the HU-80 while the unit is set in the recording (dictating), telephone recording, stop or playback mode.

LTR (letter = end of letter) signal: Record this signal at the end of each recorded material.
SEC (secretary = special instructions to secretary) signal: Record this signal before giving instructions to the secretary.

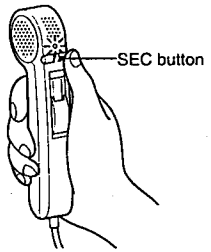
When the Auto stop function (page 19) is activated, the tape automatically stops at each index signal when it is rewound or fast forwarded.
Recorded materials and instructions can be located without the user's having to listen to the entire tape.

Before dictating, press the RESET button to reset the counters to zero.

To record the LTR signal
Press the LTR button on the HU-80.
Each time the button is pressed, the number on the LTR (end of letter) counter increases by one and the "LTR" indication flashes for approximately three seconds.



To record the SEC signal
Press the SEC button on the HU-80.
Each time the button is pressed, the number on the SEC (special instructions to secretary) counter increases by one and the "SEC" indication flashes for approximately three seconds.



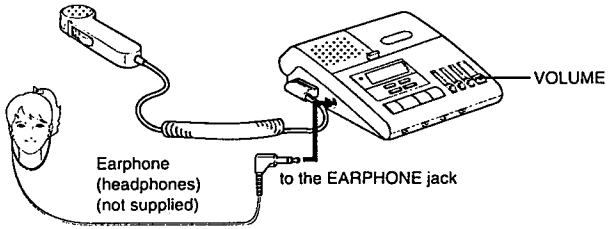
Up to nine signals each can be recorded. If more than nine signals are recorded, the "E" indication will appear on the counter.

Notes

- The LTR or SEC signal should be recorded with intervals of more than six seconds.
- Playback sound is muted when either the LTR or SEC button is pressed.
- If either the LTR or SEC button is pressed with the SPEED CONTROL switch set to ON, the tape will run at the normal tape speed.

■ Monitoring while dictating

The recording sound can be monitored through the earphone (headphones). Connect the Sony earphone DE-35, DE-36 or headphones MDR-U10M (not supplied) to the EARPHONE jack located on the left side of the unit. Adjust the VOLUME control if necessary.



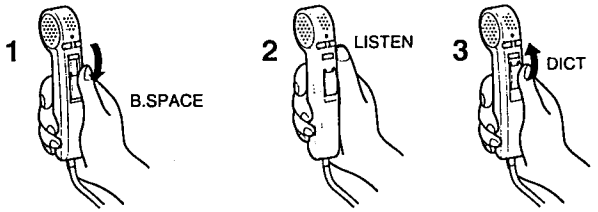
■ Quick reviewing (playback) and correcting the dictated material

You can easily play back the dictated material and correct it if necessary.

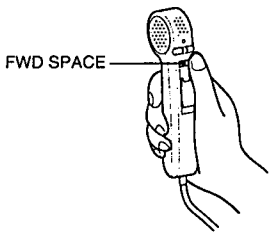
1 Keep the function selector of the HU-80 pressed down toward B.SPACE to rewind the tape.

2 Release the selector. Playback of the dictating begins.

3 When the reviewing is completed, set the function selector to DICT to proceed with the dictating.



To fast forward the tape, keep the FWD SPACE button of the HU-80 pressed until the desired section is located.



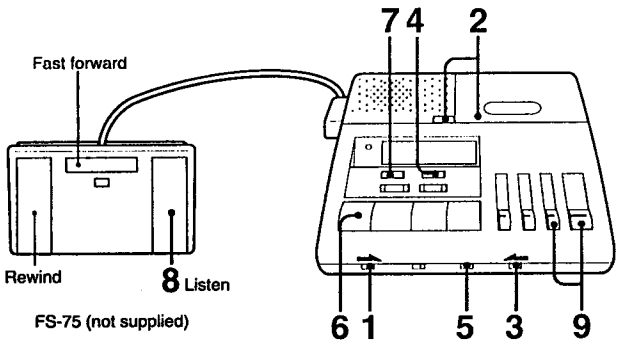
■ When you have finished dictating

Hand the cassette to your secretary without rewinding the tape.

Transcribing

To use the unit as a transcribing machine, connect the FS-75 foot control unit (not supplied). For the connection instructions, see page 11.

Operation



1 **Set the POWER switch to ON.**

2 **Insert the dictated cassette. (See page 12.)**

3 **Set the SPEAKER selector to BUILT-IN.**

4 **Press the AUTO STOP button to make the AUTO STOP indication disappear (Auto stop function is off). (See page 19.)**

5 **Set the TAPE SPEED selector to the same position as that used in dictating.**

6 **Press the ◁◁ REW button to rewind the tape.**
When the tape reaches the beginning of the dictated cassette, a beep tone is heard and the unit automatically shuts off.

7 **Press the RESET button to set the digital counters to zero.**

8 **Keep the right side of the pedal of the FS-75 depressed to play back the tape.**

9 **Adjust the VOLUME and TONE controls.**

To stop the tape
Release the pedal of the FS-75.

To rewind the tape
Keep the left side of the pedal of the FS-75 depressed.

To fast forward the tape
Keep the center top of the pedal of the FS-75 depressed.

Useful Functions

■ Using the Auto stop function

With this function, you can locate the recorded materials and instructions while the unit is in the rewind or fast forward mode without listening to the entire tape.
To activate this function, you need to record the LTR or SEC signal while the unit is in the dictating mode (see page 16 for more information about recording the LTR or SEC signal).

1 Press the AUTO STOP button so that the AUTO STOP indication appears on the display window (Auto stop function is on).
2 Press the ◁◁ REW or ▷▷ FF button or keep the left side or the center top of the pedal of the FS-75 depressed to rewind or fast forward the tape.
- When the LTR signal is detected, the LTR (end of letter) counter number increases or decreases and the "LTR" indication flashes for approximately three seconds, and a beep tone is heard. The tape stops automatically.
- When the SEC signal is detected, the SEC (special instructions to secretary) counter number increases or decreases and the "SEC" indication flashes for approximately three seconds, and a beep tone is heard. The tape stops automatically.

Note

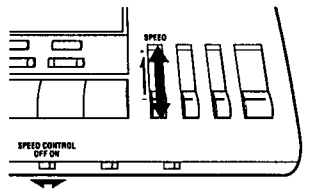
The tape does not stop at the LTR or SEC signal even if the Auto stop function is on while the ▷▷ FF or the ◁◁ REW button is continuously pressed.

When the Auto stop function is off

The tape does not stop even if the LTR or SEC signal have been previously recorded. However, the number on the LTR or SEC counter increases or decreases and the "LTR" or "SEC" indication flashes for approximately three seconds when the LTR or SEC signal is detected.

■ Controlling the speed

Set the SPEED CONTROL switch* to ON to adjust the tape speed with the SPEED control.
The tape can be played back at a speed faster or slower than normal. Set the SPEED CONTROL switch to OFF to transcribe the dictated material at the normal speed.



*Tape speed can be changed in the range of approximately −10% to +50% with the use of the SPEED control.

Tips on Transcribing

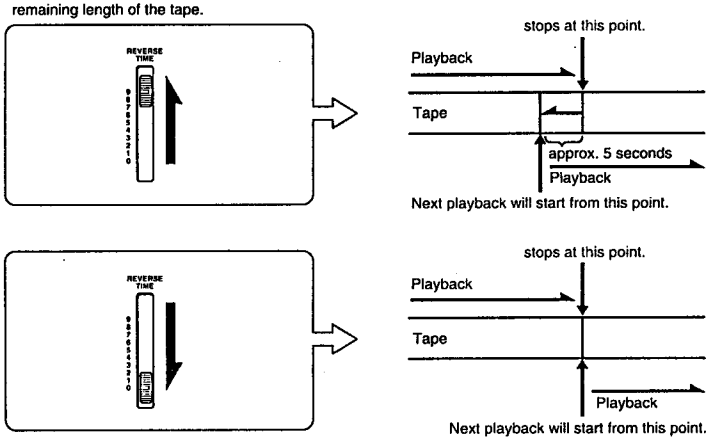
- Before typing, check the number of the LTR and SEC signals and review the contents using the Auto stop function.
- Erase the tape when transcribing is finished.

Transcribing

■ Using the Auto backspace function

This function operates only when the FS-75 foot control unit is connected. With the use of the REVERSE TIME control, the tape is rewound a little each time it is stopped. Then, the last few recorded words can be reviewed when you resume playback. Adjust the REVERSE TIME control to determine the length of the tape to be rewound. At the "9" position, the tape is rewound so that the dictated material can be reviewed for approximately 5 seconds*. At the "0" position, the tape stops without being rewound at all.

*Measured at some point near the middle of the tape. The reverse time will vary in accordance with the remaining length of the tape.



Set the REVERSE TIME control to the desired position and keep the right side of the pedal of the FS-75 depressed to play back the tape.

Note

If the LTR or SEC signal is detected while the tape is being rewound with this function, the length of the reverse time may be longer than the setting you have selected.

■ Tape transport operation

	BM-850	HU-80	FS-75
Rewind	Press the ◁◁ REW button.	Keep the function selector pressed down toward B.SPACE.	Keep the left side of the pedal depressed.
Stop	Press the □ STOP button.	Set the function selector to STOP.	Release the pedal.
Listen	Press the ▷ LISTEN button.	Set the function selector to LISTEN.	Keep the right side of the pedal depressed.
Fast forward	Press the ▷▷ FF button.	Keep the FWD SPACE button pressed.	Keep the top center of the pedal depressed.

Notes

- When a button is pressed while the LTR or SEC signal is being detected during playback, the switching time of the operation modes may be delayed.
- When a cassette which was not recorded with a Sony Professional Dictating Machine (BM-531, 560, 570, 820, 850, 880 etc.) is played back or wound rapidly (in the fast forward or rewind mode), the switching time of the operation modes may be delayed. In this case, set the unit to the Electronic "Index OFF" mode. (See page 27.)

■ Private listening

Connect the Sony earphone DE-35, DE-36 or headphones MDR-U10M (not supplied) to the EARPHONE jack.
The sound will be heard through the earphone (headphones) and the speaker will be disconnected.

■ Selecting the speaker

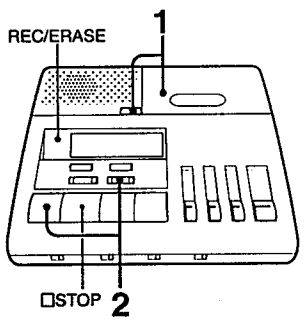
You can play back the dictated material through the built-in speaker or the speaker on the HU-80 by setting the SPEAKER selector on the BM-850 to BUILT-IN or HAND.
BUILT-IN: When listening from the built-in speaker on the BM-850
HAND: When listening from the speaker on the HU-80

Notes

- The E-INDEX signal of the Sony conventional models BM-531 and so on corresponds to the LTR signal of the BM-850.
- The LTR/SEC signals do not correspond to the cue signals used for a consumer type tape recorder.

Erasing

The recording can be erased rapidly.



1 Insert the cassette with the side to be erased facing upward.
Be sure not to rewind the tape after transcribing. The end portion of the dictated material to be erased should be positioned at the recording head.

2 Keep the ● ERASE button pressed, then press the ◁◁ REW button.
The REC/ERASE lamp lights up and the ◀◀ indication appears on the display window. The section of the tape being rewound is erased.

To stop the tape
Press the □ STOP button.

For easier and quicker erasure of the entire tape
Use the Sony BE-9H cassette eraser (not supplied).

Alarm System

The alarm system is activated in the following situations.

Alarm system	Situation	To release the alarm system
When one of the TEL REC, LTR, SEC and ERASE button is pressed or the function selector is set to DICT BEEP ⊠ flashes.	The cassette tabs have been removed.	Release the button then insert a new cassette or cover the slot with a piece of plastic tape.
When the unit shuts off (long beep) BEEP ⊠ flashes.	• The end of the tape has been reached. • The tape is torn while being rewound.	• Rewind the tape. • Insert a new cassette.
When the unit shuts off (short beep) BEEP "LTR" or "SEC" flashes three times.	The LTR or SEC signal is being detected while the tape is wound rapidly (in the fast forward or rewind mode) when the Auto stop function is on.	(The "LTR" or "SEC" indication stops flashing automatically.)
When you set the function selector (HU-80) to DICT BEEP	The unit is in the fast forward, rewind, erase or telephone recording mode.	Set the unit in the stop mode and start again.
When you press the TEL REC button BEEP	The unit is in the fast forward, rewind, erase, recording (dictating) or playback mode.	Set the unit in the stop mode and start again.
When you press the TEL REC button BEEP BEEP BEEP	Telephone recording adaptor etc. is not connected to the TELEPHONE PICKUP jack properly.	Connect it properly.
"E" appears on the LTR or SEC counter	The number of the LTR or SEC signal exceeds 9.	Do not press the LTR or SEC button more than 9 times.

Examples of Dictating and Transcribing

Example of Dictating

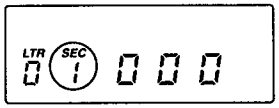
Set the function selector of the HU-80 to DICT.

⇩

Press the SEC button.

"This is a letter. Type it up and send it by express."
"Today's date is January 17, 1994.
This letter is for Mr. Alan R. Jefferson
Pyrene House, Sunbury on Thames,
Middlesex, TW16 7AT, U.K.

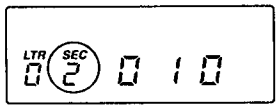
Dear Sir,
We received your order for"



⇩

Press the SEC button.

"under line
POI-L-5049-D3581", "quantity 270,000 today.
Shipment can be made within two weeks by Air.
Please accept our thanks for your order.
Faithfully yours,
John S. Smith
Sales Manager
U.K.G. Ltd."

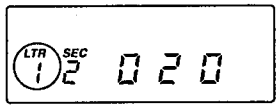


⇩

Press the LTR button.

⇩

Set the function selector of the HU-80 to STOP.



Example of Transcribing

Insert the dictated cassette.

⇩

Press the AUTO STOP button to make the AUTO STOP indication disappear.

⇩

Press the ◁◁ REW button to rewind the tape.

When the tape reaches the beginning, a beep tone is heard and the unit automatically shuts off.

⇩

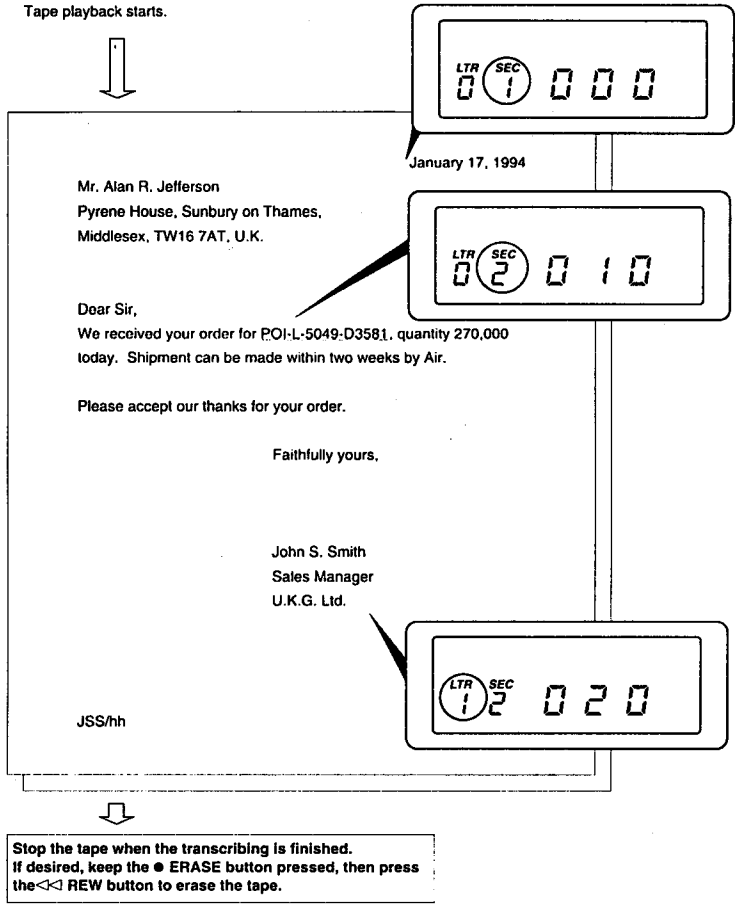
Press the RESET button.

⇩

Keep the right side of the pedal of the FS-75 depressed.

Tape playback starts.

⇩



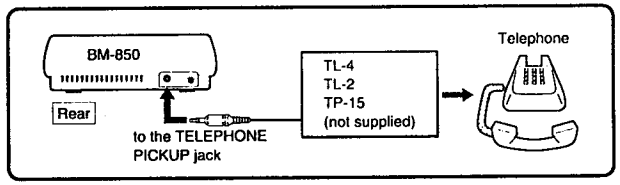
⇩

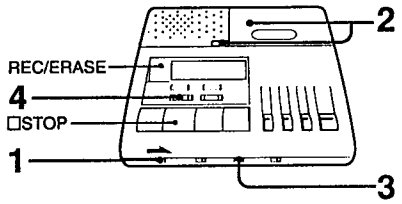
Stop the tape when the transcribing is finished.
If desired, keep the ● ERASE button pressed, then press the◁◁ REW button to erase the tape.

Other Useful Functions

Telephone Recording

To record a telephone conversation, connect the TL-4* telephone recording adaptor, the TL-2* message coupler or the TP-15* telephone pickup (not supplied) to the TELEPHONE PICKUP jack. For further details, refer to the instruction manual of the telephone recording device.





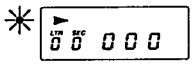
* TL-4, TL-2 and TP-15 cannot be used on some telephones.

1 **Set the POWER switch to ON.**

2 **Insert a cassette. (See page 12.)**

3 **Set the TAPE SPEED selector to 2.4 or 1.2 (cm/sec.).**

4 **Press the TEL REC button until the ► indication appears on the display window.**
Telephone recording begins. The REC/ERASE lamp flickers when the sound through the telephone is recorded.



To stop the tape
Press the □ STOP button.

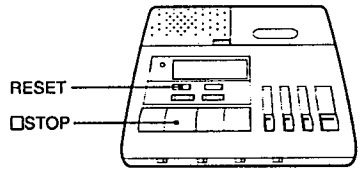
At the beginning of telephone recording
The LTR signal is automatically recorded for about three seconds and the telephone recording begins at the same time.
While the LTR signal is being recorded (for about three seconds), the unit cannot be stopped even though the □ STOP button is pressed.

During telephone recording
Only the LTR button, the SEC button (HU-80) and the □ STOP button (BM-850) are operative.

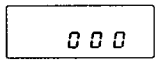
Note
If the TEL REC button is pressed when the telephone recording adaptor etc. is not connected, the beep tone will be heard and the recording will not start.

Transcribing a Tape Recorded with a Dictator Other than a Sony Dictating Machine

If you transcribe a tape which was not recorded with a Sony Professional Dictating Machine, set the unit to the Electronic "Index OFF" mode.



In the stop mode, keep both the RESET and □ STOP buttons pressed for more than two seconds.
Only the tape counter indication is displayed and the number is reset to "000".
The unit is in the Electronic "Index OFF" mode.



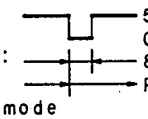
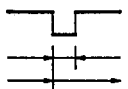
■ To return the unit to the Electronic "Index ON" mode
In the stop mode, keep both the RESET and □ STOP buttons pressed for more than two seconds.

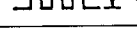
Notes
- In the Electronic "Index OFF" mode
  — the LTR or SEC signal is not recorded even if you press the LTR or SEC button.
  — the Auto stop function does not work even if the AUTO STOP button is pressed.
- If you play back in the Electronic "Index ON" mode and the tape was not recorded with a Sony Professional Dictating Machine (BM-531, 560, 570, 820, 850, 880 etc.), neither the operation buttons, the LTR and SEC counters nor the auto backspace function will work correctly.

SECTION 3
CIRCUIT DESCRIPTION

[MICROCOMPUTER μPD75308GF-K63-3B9 (IC109)]

1. Terminal Description

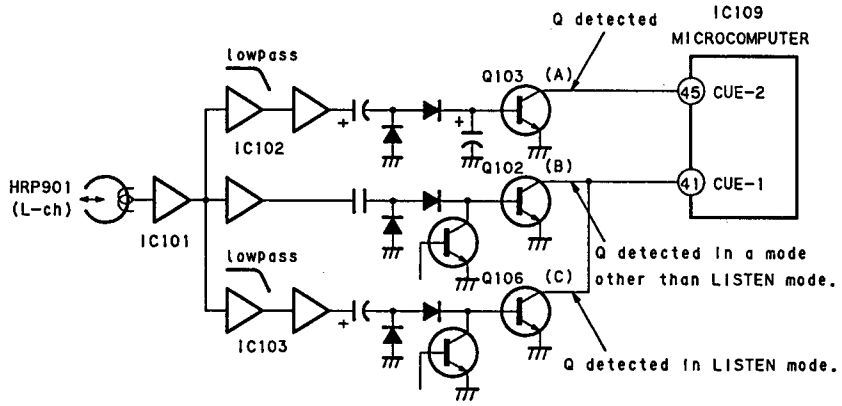
Pin No.	Pin Name	Usage	Voltage, Remarks
1	S12	LCD segment output	
2	S13	LCD segment output	
3	S14	LCD segment output	
4	S15	LCD segment output	
5	S16	LCD segment output	
6	S17	LCD segment output	
7	S18	LCD segment output	
8	S19	LCD segment output	
9	S20	LCD segment output	
10	S21	LCD segment output	
11	S22	LCD segment output	
12	S23	LCD segment output	
13	KOUT 0	Key scan output	3.8V
14	KOUT 1	Key scan output	3.8V
15	KOUT 2	Key scan output	3.8V
16	KOUT 3	Key scan output	3.8V
17	——	Not used	Open
18	HU-MIC-OUT	HU-MIC output	At DICT : 5.2V At the other : 0V
19	TEL-MIC-OUT	TEL-MIC output	At TEL-REC : 5.2V At the other : 0V
20	——	Not used	Open
21	COM 0	LCD common output	
22	COM 1	LCD common output	
23	COM 2	LCD common output	
24	——	Not used	Open
25	LCD-BIAS	Output for LCD outer resistance	5.2V
26	V_{LCD0}	Power source for LCD drive	2.6V
27	V_{LCD1}	Power source for LCD drive	1.7V
28	V_{LCD2}	Power source for LCD drive	0.8V
29	ERASE-OUT	Erase control output	At Fast-Erase, DICT and TEL-REC : 0V At the other : 5.8V
30	BIAS-OUT	Bias control output	At DICT and TEL-REC : 0V At the other : 5.8V
31	FWD-PG-OUT	FWD solenoid output	At FWD : 0V At the other : 5.8V
32	FWD-PG-KICK-OUT	FWD solenoid kick output	In an instant of FWD :  At the other : 5.8V At the other mode
33	VSS	GND	0V
34	BRK-PG-OUT	Brake solenoid output	Finish the FF/REW :  At the other : 5.8V FF/REW mode At the other mode
35	REW-MOTOR-OUT	REW-motor-output	At REW : 0V At the other : 5.8V
36	FF-MOTOR-OUT	FF-motor-output	At FF : 0V At the other : 5.8V

Pin No.	Pin Name	Usage	Voltage, Remarks
37	A-OFF-OUT	Motor Auto-off output	Motor Auto-off (after three minutes after STOP) : 2.1V At the other : 0V
38	POWER SW-IN	POWER switch input	At ON : 5.2V At STANDBY : 0V
39	TAB-IN	TAB (erase proof) detection switch input	Cassette with TAB : 0V Cassette without TAB : 5.2V
40	——	Not used	Open
41	CUE-1-IN	CUE-1 input	Refer to page 16 for LTR/SEC Detection.
42	EAR-J-IN	EAR JACK input	With a EARPHONE plug : 5.2V Without a EARPHONE plug : 0V
43	TR	T reel signal input	Refer to page 19 for Detection of T Reel.
44	DICT-IN	HU-DICT key input	At DICT key input of the hand control unit (HU-80) : 0V At the other : 5.2V
45	CUE-2 IN	CUE-2 input	Refer to page 16 for LTR/SEC Detection.
46	LTR-OUT	LTR signal output	At LTR oscillating :  5.2V Output 20Hz for three seconds. At SEC oscillating :  5.2V Output 750Hz for three seconds. At the other : 5.2V
47	REC-OUT	DICT, TEL-REC control output	At DICT, TEL-REC, LTR : 5.2V At the other : 0V
48	HU-LED-OUT	HU-LED control output	At DICT : 5.2V At the other : 0V
49	ALM-OUT	Alarm output	At alarm oscillating :  5.2V 2.05kHz
50	KIN 0	key scan input	5.2V
51	KIN 1	key scan input	5.2V
52	KIN 2	key scan input	5.2V
53	KIN 3	key scan input	5.2V
54	VDD	Positive power source terminal of the microcomputer	5.2V
55	TEL-J-IN	TEL JACK input	With a TEL plug : 5.2V Without a TEL plug : 0V
56	——	Not used	Open
57	NC	Not used	Connected to VDD
58	X 1	Input for clock oscillation	 4.5Vp-p 4.19MHz
59	X 2	Input for clock oscillation	 5.5Vp-p 4.19MHz
60	HU-LIS-IN	HU-LISTEN key input	At LISTEN key-in of the hand control unit (HU-80) : 0.1V At the other : 5.1V
61	BS-IN	HU-BS key input	At BS key in of the hand control unit (HU-80) : 0.1V At the other : 5.1V
62	PB-OUT	Playback control output	At LISTEN : 5.2V At the other : 0V
63	MUTE-OUT	Amplifier mute output	At LISTEN : 5.2V With a EARPHONE at DICT and TEL mode : 5.2V At the other : 0V
64	FS-IN	HU-FS key input	At FS key input of the hand control unit (HU-80) : 0.1V At the other : 5.1V
65	PR-IN	Foôt switch LISTEN key input	At LISTEN key input of the foot control unit (FS-75) : 0.1V At the other : 5.1V
66	SEC-IN	HU-SEC key input	At SEC key input of the hand control unit (HU-80) : 0.1V At the other : 5.1V
67	LTR-IN	HU-LTR key input	At LTR key input of the hand control unit (HU-80) : 0.1V At the other : 5.1V

Pin No.	Pin Name	Usage	Voltage, Remarks
68	RESET	Microcomputer reset input	Normal : 5.2V RESET : 0V
69	S 0	Not used	Open
70	S 1	Not used	Open
71	S 2	Not used	Open
72	S 3	Not used	Open
73	S 4	Not used	Open
74	S 5	Not used	Open
75	S 6	Not used	Open
76	S 7	Not used	Open
77	S 8	Not used	Open
78	S 9	LCD segment output	
79	S 10	LCD segment output	
80	S 11	LCD segment output	

• LTR/SEC Detection

1. Detection Circuit



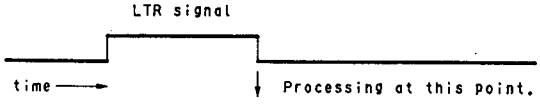
2. Discrimination Between LTR and SEC

	At LISTEN				At FF/REW			
(A) CUE-2	(L)	H	L	H	L	H	(L)	H
(B or C) CUE-1	(L)	L	H	H	L	L	(H)	H
	↓	↓	↓	↓	↓	↓	↓	↓
Judgement by microcomputer	(LTR)	LTR	SEC	no signal	LTR	SEC	(LTR)	no signal

- L(Low) and H(High) levels are input levels to the microcomputor CUE-1 and CUE-2.
- For the modes surrounded by pararenthese, their level combinations do not exit by hardware but they are the LTR modes by software.

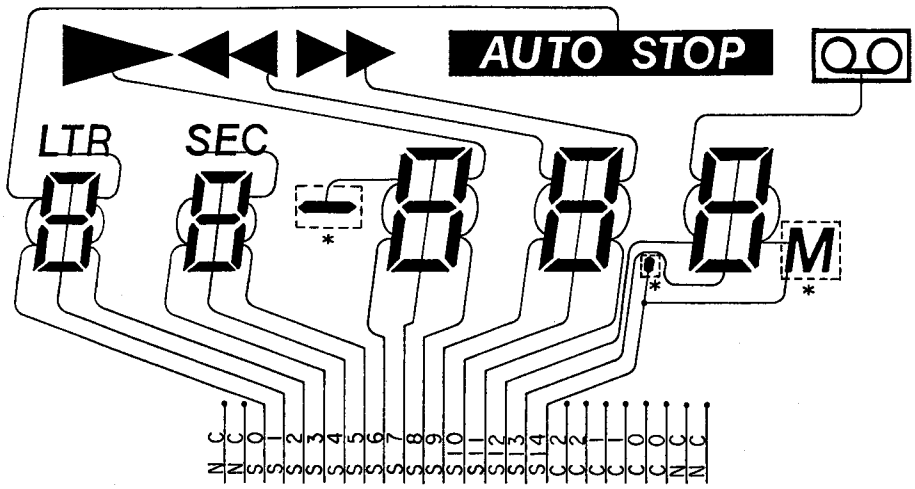
3. After discrimination, LTR/SEC processing will be perfomed when the LTR/SEC signal disappears.

ex.)

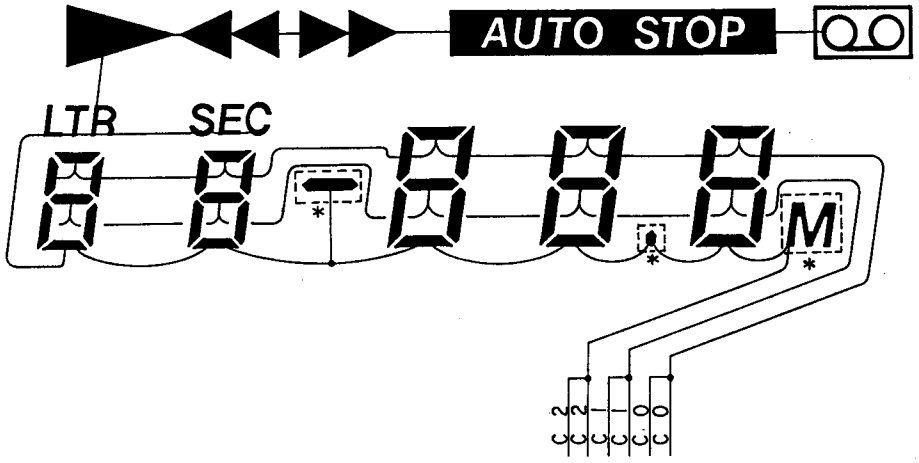


• **LCD (ND901) Connection Diagram**

SEGMENT



COMMON



Note)

* : For BM-850, these segments are not used.

• LCD Check Method

This unit has LCD all lighting mode in order to check LCD.

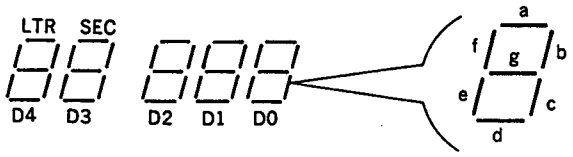
1. In order to perform LCD all lighting.
   - Press the three buttons of RESET, TEL REC and ERASE at the same time.
     LCD is all lighting.

Note) For BM-850, a portion (Refer to page 17.) of segments are not used, so they are not lit in all lighting mode.

2. In order to release LCD all lighting.
   - Turn STANDBY position of the POWER switch once.

• LCD Display Map

* Segment output



IC109 Pin No.	Pin Name*	COM 0	COM 1	COM 2
12	S23 (S14)	Counter D0-b	Counter D0-c	"●" (dot) and "M"
11	S22 (S13)	Counter D0-a	Counter D0-g	Counter D0-d
10	S21 (S12)	Counter D0-f	Counter D0-e	⊂⊃
9	S20 (S11)	Counter D1-b	Counter D1-c	▶▶(FF)
8	S19 (S10)	Counter D1-a	Counter D1-g	Counter D1-d
7	S18 (S9)	Counter D1-f	Counter D1-e	◀◀(REW)
6	S17 (S8)	Counter D2-b	Counter D2-c	▶(FWD)
5	S16 (S7)	Counter D2-a	Counter D2-g	Counter D2-d
4	S15 (S6)	Counter D2-f	Counter D2-e	▬ (minus sign)
3	S14 (S5)	Counter D3-b	Counter D3-c	"SEC"
2	S13 (S4)	Counter D3-a	Counter D3-g	Counter D3-d
1	S12 (S3)	Counter D3-f	Counter D3-d	(not used)
80	S11 (S2)	Counter D4-b	Counter D4-c	"LTR"
79	S10 (S1)	Counter D4-a	Counter D4-g	Counter D4-d
78	S9 (S0)	Counter D4-f	Counter D4-e	"AUTO STOP"

* The segment name in parenthesis represents that of ND901.

• Key-scan • Matrix

The pin No. and the pin name stand for those of the microcomputer (IC109).

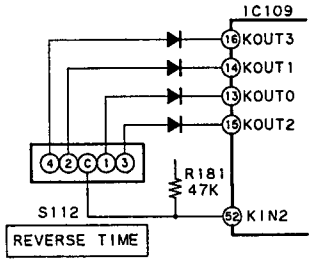
Input \ Output		(Pin No.) 13	14	15	16
		(Pin Name) KOUT 0	KOUT 1	KOUT 2	KOUT 3
(Pin No.)	(Pin Name)				
50	KIN 0	RESET (S111)	ERASE (S110)	TEL REC (S108)	Not used
51	KIN 1	FF (S107)	REW (S106)	LISTEN (S105)	STOP (S104)
52	KIN 2	REVERSE TIME			
		(Pin ① of S112)	(Pin ② of S112)	(Pin ③ of S112)	(Pin ④ of S112)
53	KIN 3	not used	not used	AUTO STOP (S109)	TAPE SPEED 1.2/2.4 (S113)

- Hard is controlled by Low active (Low is input with turning on each switch.)
- TAPE SPEED is 2.4cm/s at Low.

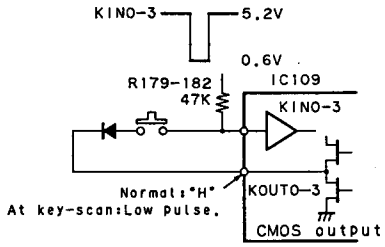
Refer to the following figure for the key matrix of S112.

S112 position O:ON

	0	1	2	3	4	5	6	7	8	9
Between C and 1		○		○		○		○		○
Between C and 2			○	○			○	○		
Between C and 3					○	○	○	○		
Between C and 4									○	○



Key-scan is controlled by Low active.



- **Detection of T Reel**

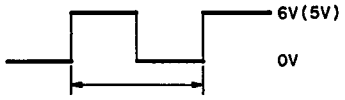
  Pin ② of IC111 (Pin ㊸ of IC109): T reel

Waveform condition:

- Tape MC-60 is used.
- The period is different by the tape position.
- ( ): Voltage of IC109 port.

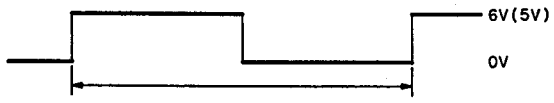
FWD:

T reel at the tape TOP:



At 2.4cm/S:approx.75mS
At 1.2cm/S:approx.150mS

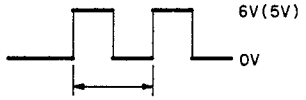
T reel at the tape END:



At 2.4cm/S:approx.170mS
At 1.2cm/S:approx.340mS

REW:

T reel at the tape TOP:



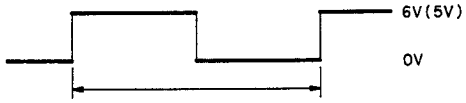
At 2.4cm/S:approx.3mS
At 1.2cm/S:approx.6mS

T reel at the tape END:

At 2.4cm/S:approx.13mS
At 1.2cm/S:approx.26mS

FF:

Nearly constant regardless of the tape position:



At 2.4cm/S:approx.6.5mS
At 1.2cm/S:approx.13mS

SECTION 4
MECHANICAL ADJUSTMENTS

PRECAUTION

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

Torque Measurement

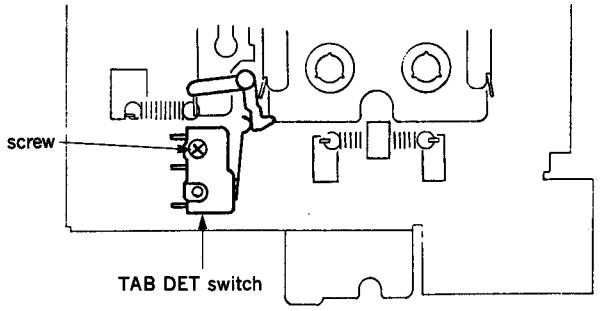
Mode	Micro cassette type torque meter	Meter reading
Forward	CQ-103M	5 to 16g•cm (0.069 to 0.222oz•inch)
Fast Forward, Rewind	CQ-201M	35 to 100g•cm (0.49 to 1.39 oz•inch)

Tape Tension Measurement

Micro cassette type tension meter	Meter reading
CQ-403M	more than 30g (more than 1.06oz)

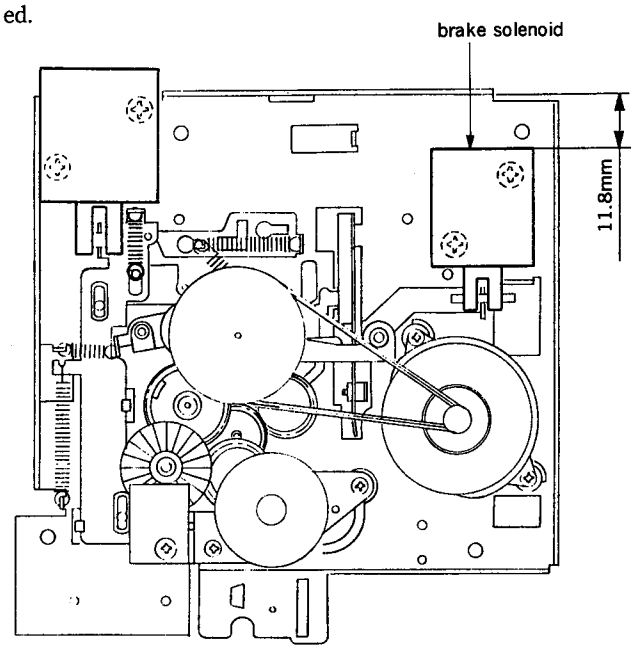
TAB DET Switch Position

Adjust the screw for following position.
When inserting the cassette with the tab ·····ON
When inserting the cassette without the tab ·····OFF



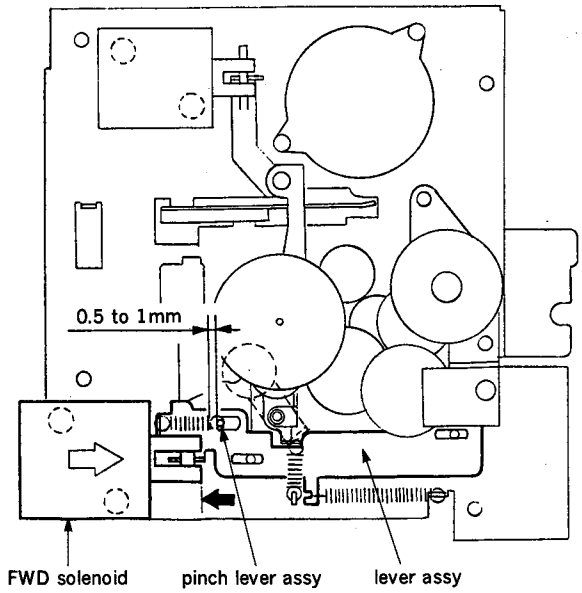
Brake Solenoid Position Adjustment

Adjust the screw so that clearance between the brake solenoid and the chassis is approximately 11.8mm as illustrated.



FWD Solenoid Position Adjustment

1. When pulling FWD solenoid fully with the hand, adjust the FWD solenoid installing screw so that clearance between pinch lever assy and lever assy is approximately 0.5 to 1mm.
2. After adjustment, confirm that the pinch roller press against the capstan in FWD mode.



SECTION 5
ELECTRICAL ADJUSTMENTS

PRECAUTION

1. Demagnetize the record/playback head with a head demagnetizer.
2. Do not use a magnetized screwdriver for the adjustment.
3. After the parts adjustments, apply suitable locking compound to the parts adjusted.
4. The adjustments should be perfomed with the rated power supply voltage unless otherwise noted.
5. The adjustments should be performed in the order given in this service manual. (As a rule, playback circuit adjustment should be completed before performing recording circuit adjustment.)

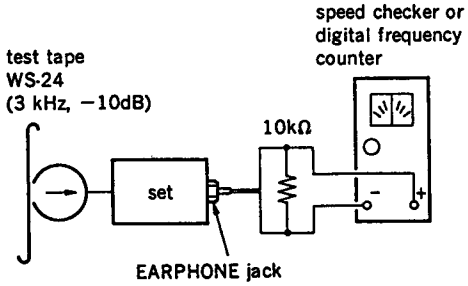
- Switches and controls should be set as follows unless otherwise specified.

POWER switch : ON
SPEED CONTROL switch : OFF
AUTO STOP switch : Light off the AUTO STOP display on LCD
SPEAKER switch : BUILT-IN
TONE control : max.(+)
TAPE SPEED switch : 2.4

Tape Speed Adjustment

Setup :

Mode : playback (LISTEN)



Procedure :

1. SPEED CONTROL switch : OFF
   TAPE SPEED switch : 2.4
   Adjust RV105 for specified reading on speed checker or digital frequency counter.

Adjustment Values :

Speed checker	Digital frequency counter
0 to +1%	3,000 to 3,030Hz

2. SPEED CONTROL switch : OFF
   TAPE SPEED switch : 1.2
   Adjust RV104 for specified reading on speed checker or digital frequency counter.

- Perform 2.4cm/s normal speed adjustment before 1.2cm/s normal speed adjustment.

Adjustment Values :

Speed checker	Digital frequency counter
0 to +1%	1,500 to 1,515Hz

3-1. SPEED CONTROL switch : ON
   TAPE SPEED switch : 2.4
   SPEED control : max. (+)
   Adjust RV106 for specified reading on speed checker or digital frequency counter.

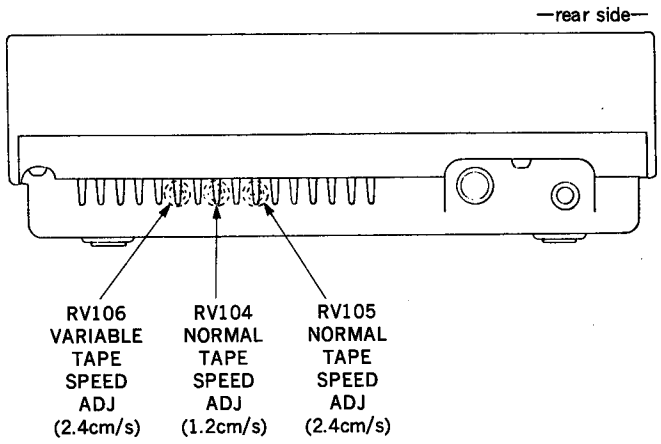
Adjustment Values :

Speed checker	Digital frequency counter
+63.3 to +66.7%	4,900 to 5,000Hz

3-2. Confirm that the reading on digital frequency counter is specification value as shown below.

SPEED control (RV103)	TAPE SPEED (S113)	Frequency counter
max.	2.4cm	more than 4,500Hz
	1.2cm	more than 2,250Hz
min.	2.4cm	less than 2,700Hz
	1.2cm	less than 1,350Hz

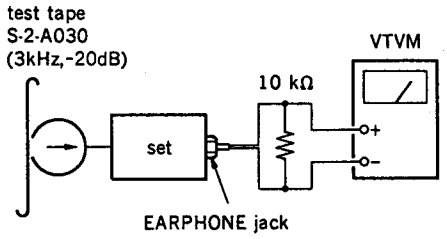
Adjustment Location : main board



Record/playback Head Azimuth Adjustment

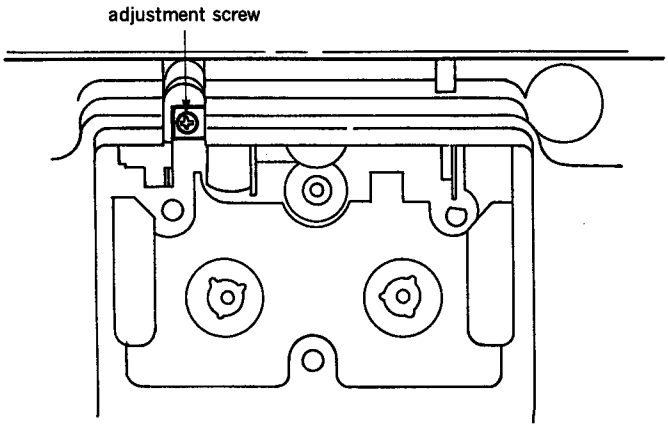
Procedure :

1. Mode : Playback (LISTEN)



2. Turn the adjustment screw to obtain the maximum reading on VTVM.
   Adjustment should be finished with the screw in tightening direction.
3. After the adjustment, lock the adjustment screw with suitable locking compound.

Adjustment Location : record/playback head

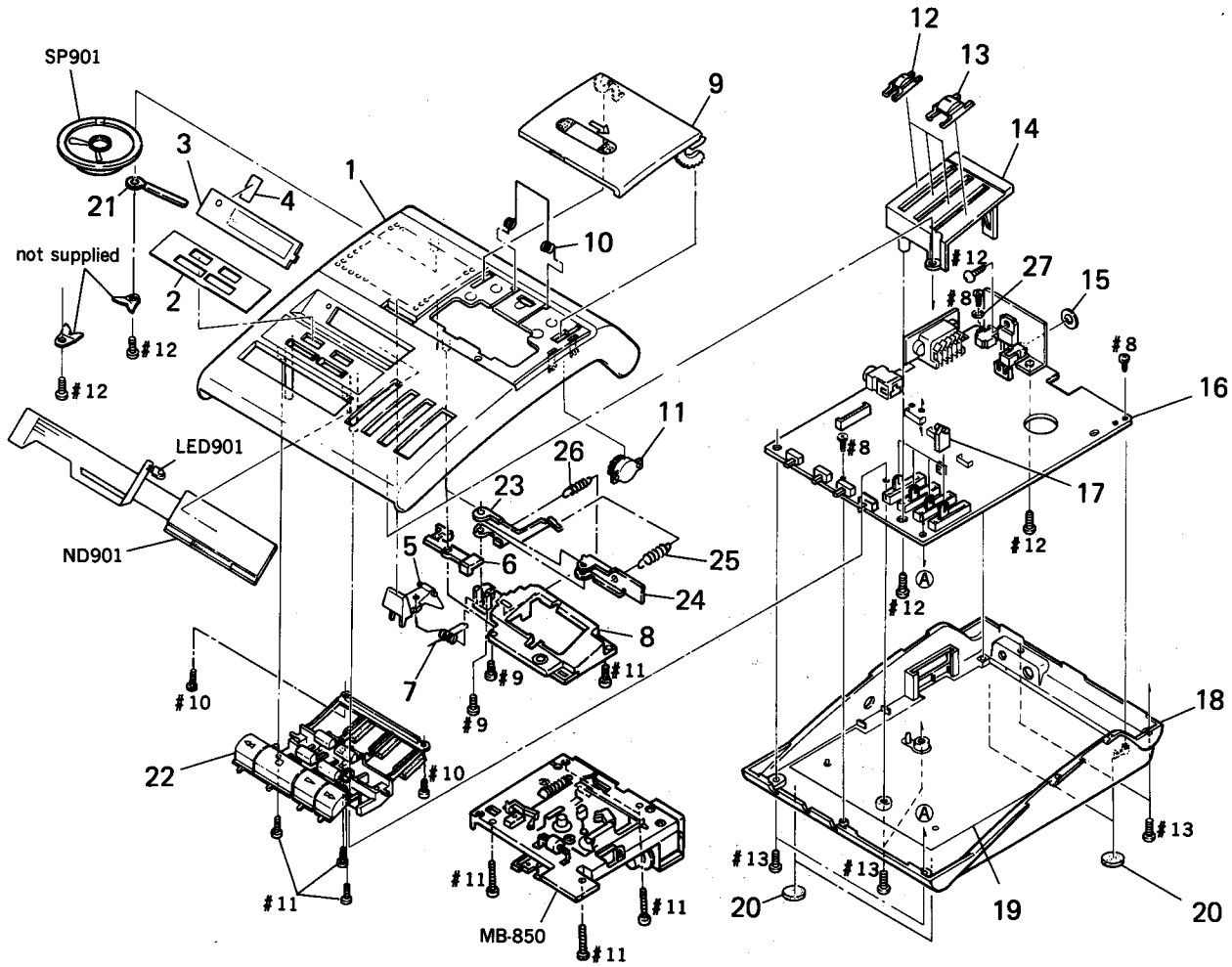


SECTION 7
EXPLODED VIEWS

NOTE:

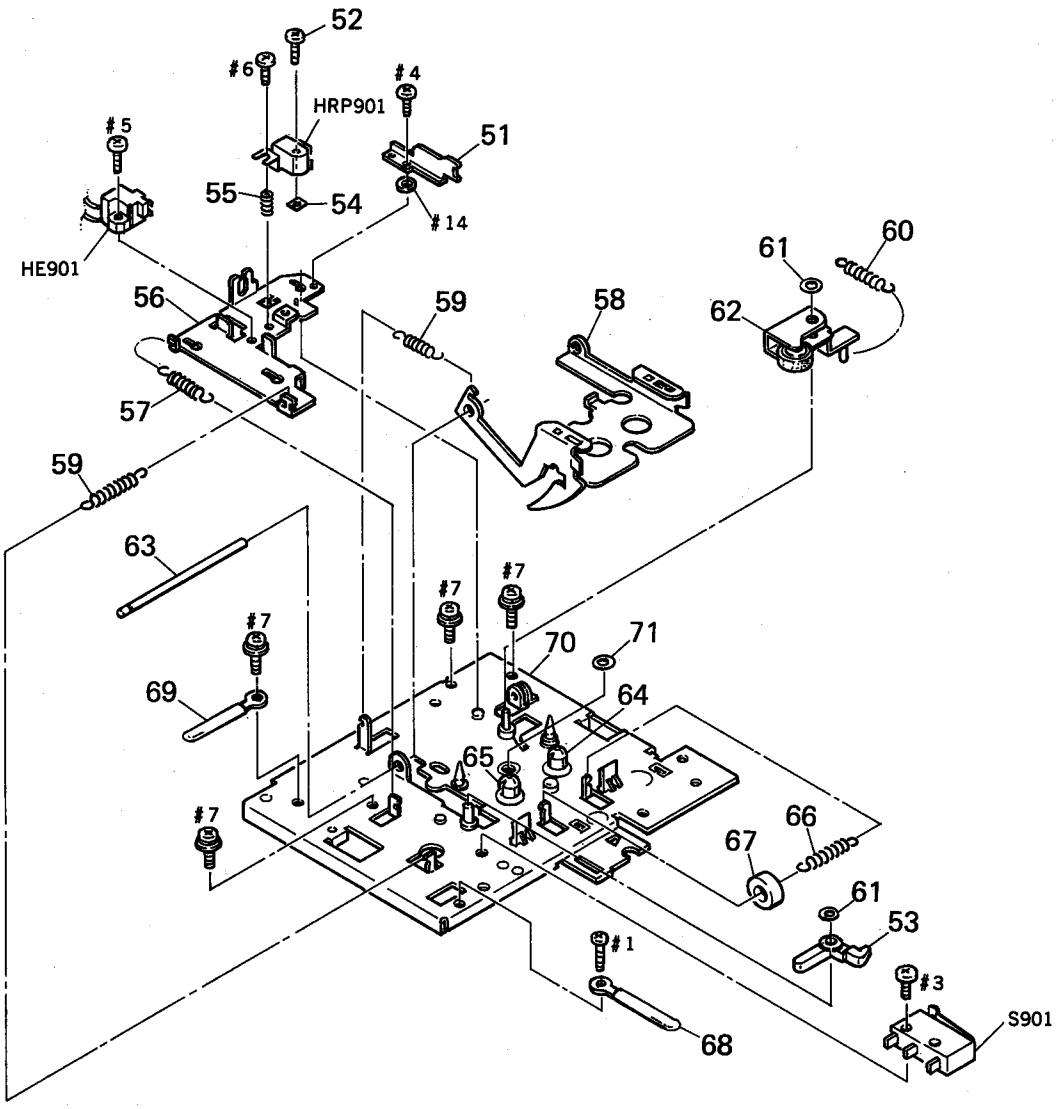
- The mechanical parts with no reference number in the exploded views are not supplied.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- Color Indication of Appearance Parts
  Example :
  KNOB, BALANCE (WHITE)... (RED)
  ↑ ↑
  Parts Color Cabinet's Color
- Hardware (# mark) list is given in the last of this parts list.

7-1. CABINET SECTION



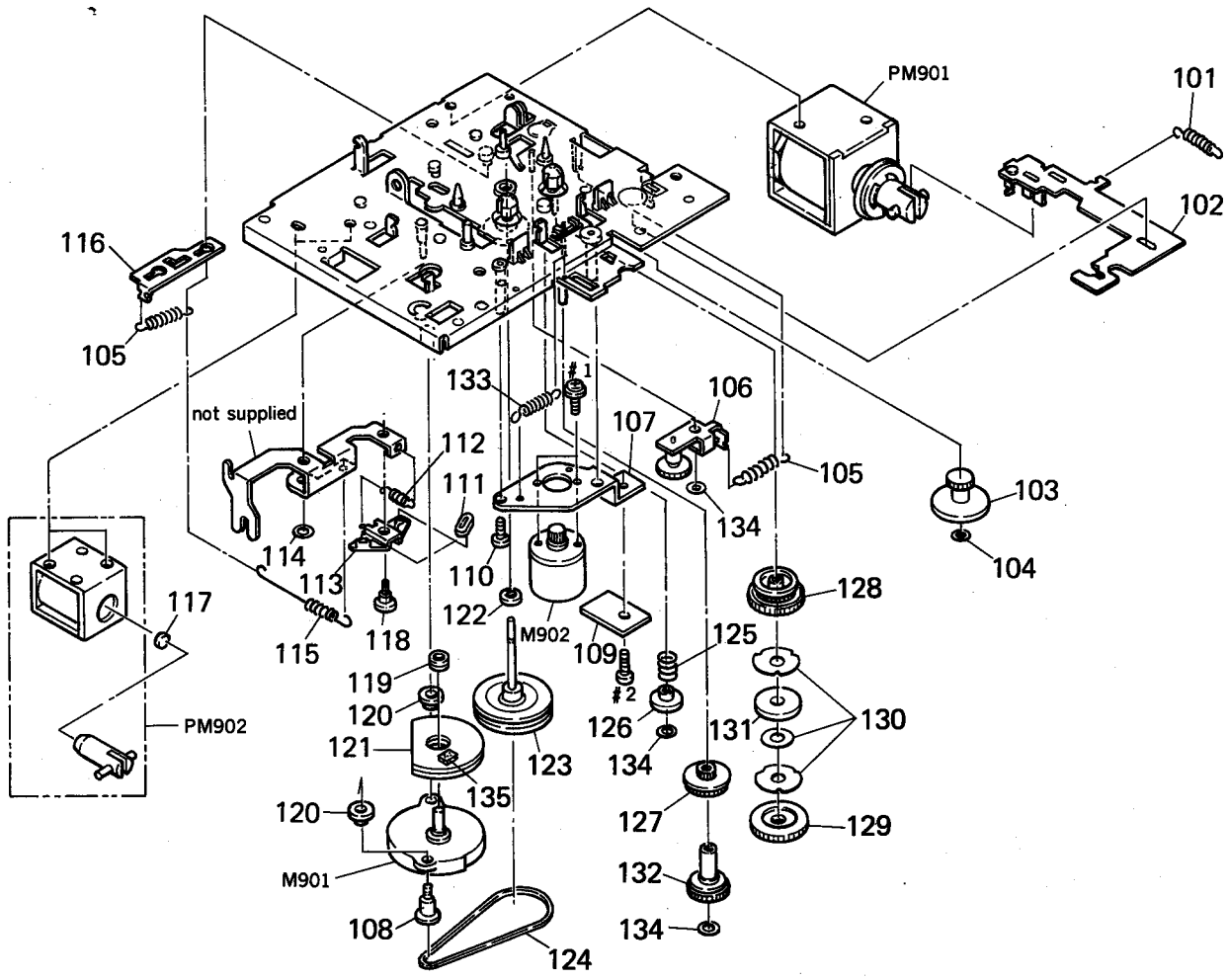
Ref. No.	Part No.	Description	Remark
1	3-389-207-11	CABINET (UPPER)	
2	3-905-964-01	PANEL	
3	3-905-965-01	WINDOW, LCD	
4	3-906-000-01	ILLUMINATOR	
5	3-905-966-01	BUTTON (EJECT)	
6	3-905-962-01	LEVER, CASSETTE LID LOCK	
7	3-905-982-01	SPRING (EJECT), TORSION	
8	3-907-827-01	BLIND, MD	
* 9	A-3042-240-A	LID (CASSETTE) COMPLETE ASSY	
10	3-905-999-01	SPRING (CASSETTE LID), TORSION	
11	3-343-248-01	DAMPER (P), SMALL	
12	X-3323-536-1	KNOB ASSY (SPEED, REVERSE TIME, TONE)	
13	X-3323-535-1	KNOB ASSY (VOLUME)	
14	3-359-104-01	GUIDE, KNOB	
* 15	3-323-680-01	COVER, JACK	
* 16	A-3016-479-A	MAIN BOARD, COMPLETE	
* 17	3-323-679-01	BUSHING	
18	3-389-208-11	CABINET (LOWER)	
19	3-389-247-01	PAPER, SHIELD	
20	3-343-250-01	CUSHION	
* 21	3-701-822-01	HOLDER, WIRE	
22	3-905-980-01	BUTTON BLOCK	
23	3-907-828-01	ARM (EJECT) (A)	
24	3-907-829-01	ARM (EJECT) (B)	
25	3-907-830-01	SPRING, TENSION	
26	3-907-831-01	SPRING, TENSION	
27	7-623-205-22	SW2, TYPE2	
LED901	8-719-984-02	LED BR4371F (REC/ERASE)	
ND901	1-810-090-11	DISPLAY PANEL, LIQUID CRYSTAL	
SP901	1-504-172-11	SPEAKER	

7-2. MECHANISM DECK SECTION (1) (MB-850)



Ref. No.	Part No.	Description	Remark
* 51	3-353-957-01	GUIDE, TAPE	
52	3-318-201-01	SCREW (B) (1.4X3), TAPPING	
* 53	3-335-167-01	LEVER, ERASING PROTECTION	
54	3-578-138-01	SHIM	
54	3-578-138-11	SHIM	
54	3-578-138-21	SHIM	
55	3-375-311-01	SPRING, COMPRESSION	
* 56	X-3367-465-1	BASE ASSY, HEAD	
57	3-353-964-01	SPRING, TENSION	
58	X-3335-109-3	HOLDER COMPLETE ASSY, CASSETTE	
59	3-907-842-01	SPRING, TENSION	
60	3-353-953-01	SPRING, TENSION	
61	3-578-242-11	WASHER	
62	X-3353-906-1	PINCH LEVER ASSY	
* 63	3-353-960-01	PIN, PARALLEL	
64	X-3335-103-1	CLAW ASSY, T REEL	
65	X-3335-104-1	CLAW ASSY, S REEL	
66	3-353-956-01	SPRING, TENSION	
* 67	3-335-116-01	ROLLER, EMP	
* 68	2-277-426-01	CLAMP	
* 69	3-701-822-01	HOLDER, WIRE	
* 70	X-3367-463-1	CHASSIS ASSY, MECHANICAL	
71	3-570-615-00	POLY-WASHER (DIA. 1.2)	
HE901	1-543-899-11	HEAD, MAGNETIC (ERASE)	
HRP901	1-543-725-11	HEAD, MAGNETIC (RECORD/PLAYBACK)	
S901	1-554-385-00	SWITCH, MICRO (TAB DET)	

7-3. MECHANISM DECK SECTION (2) (MB-850)



Ref. No.	Part No.	Description	Remark
101	3-353-954-01	SPRING, TENSION	
* 102	X-3353-908-1	LEVER ASSY, PLAY	
103	X-3367-464-1	GEAR (REFLECTOR) ASSY	
104	3-701-436-11	WASHER, 1.6 POLYETHYLENE	
105	3-353-955-01	SPRING, TENSION	
106	X-3353-907-1	GEAR ASSY, IDLER	
107	3-907-849-01	BRACKET (FR MOTOR)	
108	3-353-961-01	SCREW (M1.4), STEP	
* 109	1-650-105-11	SENSOR BOARD	
110	3-342-759-41	SCREW (B1.7X4), TAPPING	
111	3-905-985-01	RUBBER, BRAKE	
112	3-907-846-01	SPRING, TENSION	
113	3-907-844-01	SHOE, BRAKE	
114	3-907-840-01	WASHER	
115	3-907-847-01	SPRING, TENSION	
* 116	3-353-950-01	LEVER (SAFETY)	
117	3-323-645-01	STOPPER	
118	3-907-845-01	SCREW, STEP	
119	3-353-972-01	RUBBER, BUSHING	
* 120	3-335-208-01	CUSHION, MOTOR	
* 121	3-375-326-01	PLATE, MOTOR	

Ref. No.	Part No.	Description	Remark
122	3-701-436-01	WASHER, 1.6	
123	X-3353-910-1	WHEEL ASSY, CAPSTAN	
124	3-554-106-00	BELT	
125	3-335-230-01	SPRING, COMPRESSION	
126	3-335-121-01	GEAR, FR	
127	X-3335-135-1	LIMITER ASSY, FR	
128	X-3367-471-1	LIMITER (A) ASSY, FWD	
129	X-3335-107-1	LIMITER (B) ASSY, FWD	
130	3-335-123-01	SPACER (M)	
130	3-335-123-11	SPACER (M)	
130	3-335-123-21	SPACER (M)	
131	3-335-126-01	PLATE, MAGNET	
132	3-907-857-01	GEAR (REEL)	
133	3-907-848-01	SPRING, TENSION	
134	3-578-242-11	WASHER	
135	9-911-839-XX	CUSHION, MOTOR	
M901	1-541-332-11	MOTOR (NBL-32R)	
M902	X-3367-201-1	MOTOR (F/R) ASSY	
PM901	1-454-604-11	SOLENOID, PLUNGER (FWD)	
PM902	1-454-662-11	SOLENOID, PLUNGER (BRAKE)	

MAIN

SECTION 8
ELECTRICAL PARTS LIST

NOTE:
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms.
  METAL:Metal-film resistor.
  METAL OXIDE: Metal oxide-film resistor.
  F:nonflammable
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u:μ, for example:
  uA..: μA.. uPA..: μPA..
  uPB..: μPB.. uPC..: μPC.. uPD..: μPD..
- CAPACITORS
  uF: μF
- COILS
  uH: μH

When indicating parts by reference number, please include the board.

The components identified by mark ⚠ or dotted line with mark. ⚠ are critical for safety.
Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

Ref. No.	Part No.	Description		Remark
*	A-3016-479-A	MAIN BOARD, COMPLETE **********		
*	3-323-680-01	COVER, JACK		
	7-685-646-79	SCREW +BVTP 3X8 TYPE2 N-S		
		< CAPACITOR >		
C101	1-162-637-11	CERAMIC CHIP	0.47uF	16V
C102	1-163-059-91	CERAMIC CHIP	0.01uF 10%	50V
C103	1-164-004-11	CERAMIC CHIP	0.1uF 10%	25V
C104	1-163-213-00	CERAMIC CHIP	0.0022uF 5%	50V
C105	1-163-059-91	CERAMIC CHIP	0.01uF 10%	50V
C106	1-126-157-11	ELECT	10uF 20%	16V
C107	1-163-135-00	CERAMIC CHIP	560PF 5%	50V
C108	1-164-004-11	CERAMIC CHIP	0.1uF 10%	25V
C109	1-163-087-00	CERAMIC CHIP	4PF	50V
C110	1-124-584-00	ELECT	100uF 20%	10V
C111	1-126-160-11	ELECT	1uF 20%	50V
C112	1-164-004-11	CERAMIC CHIP	0.1uF 10%	25V
C113	1-124-257-00	ELECT	2.2uF 20%	50V
C114	1-126-160-11	ELECT	1uF 20%	50V
C115	1-163-037-91	CERAMIC CHIP	0.022uF 10%	25V
C116	1-126-157-11	ELECT	10uF 20%	16V
C117	1-163-009-11	CERAMIC CHIP	0.001uF 10%	50V
C118	1-124-464-11	ELECT	0.22uF 20%	50V
C119	1-163-135-00	CERAMIC CHIP	560PF 5%	50V
C120	1-124-464-11	ELECT	0.22uF 20%	50V
C121	1-126-157-11	ELECT	10uF 20%	16V
C122	1-124-257-00	ELECT	2.2uF 20%	50V
C123	1-163-809-11	CERAMIC CHIP	0.047uF 10%	25V
C124	1-126-157-11	ELECT	10uF 20%	16V
C125	1-164-161-11	CERAMIC CHIP	0.0022uF 10%	100V
C126	1-126-157-11	ELECT	10uF 20%	16V
C127	1-164-232-11	CERAMIC CHIP	0.01uF	50V
C128	1-126-157-11	ELECT	10uF 20%	16V
C129	1-126-153-11	ELECT	22uF 20%	6.3V
C130	1-124-465-00	ELECT	0.47uF 20%	50V
C131	1-162-625-11	CERAMIC CHIP	0.0047uF 5%	50V
C132	1-163-117-00	CERAMIC CHIP	100PF 5%	50V
C133	1-163-117-00	CERAMIC CHIP	100PF 5%	50V
C134	1-163-135-00	CERAMIC CHIP	560PF 5%	50V
C135	1-163-018-00	CERAMIC CHIP	0.0056uF 5%	50V
C136	1-126-157-11	ELECT	10uF 20%	16V
C137	1-164-232-11	CERAMIC CHIP	0.01uF	50V
C138	1-162-638-11	CERAMIC CHIP	1uF	16V
C139	1-124-584-00	ELECT	100uF 20%	10V
C140	1-124-584-00	ELECT	100uF 20%	10V
C141	1-124-635-00	ELECT	220uF 20%	6.3V
C142	1-126-154-11	ELECT	47uF 20%	6.3V
C143	1-124-472-11	ELECT	470uF 20%	10V
C144	1-126-154-11	ELECT	47uF 20%	6.3V
C145	1-162-638-11	CERAMIC CHIP	1uF	16V
C146	1-163-037-91	CERAMIC CHIP	0.022uF 10%	25V
C147	1-126-157-11	ELECT	10uF 20%	16V
C148	1-163-009-11	CERAMIC CHIP	0.001uF 10%	50V
C149	1-126-157-11	ELECT	10uF 20%	16V
C150	1-163-007-11	CERAMIC CHIP	680PF 10%	50V
C151	1-164-004-11	CERAMIC CHIP	0.1uF 10%	25V
C152	1-124-635-00	ELECT	220uF 20%	6.3V
C153	1-164-157-11	CERAMIC CHIP	0.068uF 10%	25V
C154	1-162-638-11	CERAMIC CHIP	1uF	16V
C155	1-163-205-00	CERAMIC CHIP	0.001uF 5%	50V
C156	1-126-157-11	ELECT	10uF 20%	16V
C157	1-163-117-00	CERAMIC CHIP	100PF 5%	50V
C158	1-162-638-11	CERAMIC CHIP	1uF	16V
C159	1-163-020-00	CERAMIC CHIP	0.0082uF 10%	50V
C160	1-106-343-00	MYLAR	1000PF 5%	200V
C161	1-126-157-11	ELECT	10uF 20%	16V
C162	1-163-019-00	CERAMIC CHIP	0.0068uF 10%	50V
C163	1-164-232-11	CERAMIC CHIP	0.01uF	50V
C164	1-162-638-11	CERAMIC CHIP	1uF	16V
C165	1-126-157-11	ELECT	10uF 20%	16V
C166	1-124-472-11	ELECT	470uF 20%	10V
C167	1-163-038-00	CERAMIC CHIP	0.1uF	25V
C168	1-163-038-00	CERAMIC CHIP	0.1uF	25V
C169	1-125-691-11	DOUBLE LAYER	0.022F	5.5V
C170	1-163-038-00	CERAMIC CHIP	0.1uF	25V
C171	1-163-038-00	CERAMIC CHIP	0.1uF	25V
C172	1-124-898-11	ELECT	4700uF 20%	16V
C173	1-163-038-00	CERAMIC CHIP	0.1uF	25V
C174	1-163-059-91	CERAMIC CHIP	0.01uF 10%	50V

Ref. No.	Part No.	Description			Remark
C175	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C176	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C177	1-124-584-00	ELECT	100uF	20%	10V
C178	1-126-154-11	ELECT	47uF	20%	6.3V
C179	1-163-059-91	CERAMIC CHIP	0.01uF	10%	50V
C180	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C181-187					
	1-163-059-91	CERAMIC CHIP	0.01uF	10%	50V
C188	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C189	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C190	1-163-239-11	CERAMIC CHIP	33PF	5%	50V
C191	1-163-037-91	CERAMIC CHIP	0.022uF	10%	25V
C192	1-163-077-00	CERAMIC CHIP	0.1uF	10%	25V
C193	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C194	1-124-635-00	ELECT	220uF	20%	6.3V
C195	1-126-154-11	ELECT	47uF	20%	6.3V
C196	1-124-257-00	ELECT	2.2uF	20%	50V
C197	1-126-157-11	ELECT	10uF	20%	16V
C198	1-124-257-00	ELECT	2.2uF	20%	50V
C199	1-126-154-11	ELECT	47uF	20%	6.3V
C200	1-124-257-00	ELECT	2.2uF	20%	50V
C201	1-126-154-11	ELECT	47uF	20%	6.3V
C202	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C203	1-124-584-00	ELECT	100uF	20%	10V
C204	1-124-257-00	ELECT	2.2uF	20%	50V
C205	1-162-625-11	CERAMIC CHIP	0.0047uF	5%	50V
C206	1-163-081-00	CERAMIC CHIP	0.22uF		25V
		< CONNECTOR >			
CN101	1-506-472-11	PIN, CONNECTOR 7P			
* CN102	1-564-001-11	PIN, CONNECTOR 2P			
CN103	1-506-468-11	PIN, CONNECTOR 3P			
CN104	1-506-467-11	PIN, CONNECTOR 2P			
CN105	1-564-005-11	PIN, CONNECTOR 6P			
CN106	1-506-469-11	PIN, CONNECTOR 4P			
CN107	1-563-598-11	CONNECTOR, FLEXIBLE 21P			
		< DIODE >			
D101	8-719-914-42	DIODE	DA204K		
D102	8-719-914-42	DIODE	DA204K		
D103	8-719-914-42	DIODE	DA204K		
D104	8-719-914-42	DIODE	DA204K		
D105	8-719-914-43	DIODE	DAN202K		
D106	8-719-820-05	DIODE	1SS181		
D107	8-719-820-05	DIODE	1SS181		
D108	8-719-938-78	DIODE	SB10-05PCP		
D109	8-719-820-05	DIODE	1SS181		
D110	8-719-914-43	DIODE	DAN202K		

Ref. No.	Part No.	Description		Remark
D111	8-719-914-43	DIODE	DAN202K	
D112	8-719-914-43	DIODE	DAN202K	
D113	8-719-914-43	DIODE	DAN202K	
D114	8-719-914-43	DIODE	DAN202K	
D115	8-719-914-43	DIODE	DAN202K	
D116	8-719-045-99	DIODE	RD2.2M-T1B	
D117	8-719-914-42	DIODE	DA204K	
D118	8-719-019-00	DIODE	U1GC44	
D119	8-719-019-00	DIODE	U1GC44	
D120	8-719-914-43	DIODE	DAN202K	
		< IC >		
IC101-103				
	8-759-700-43	IC	NJM4558M	
IC104	8-759-230-04	IC	TA7628HP	
IC105	8-759-143-54	IC	UPC1330HA	
IC106	8-759-148-79	IC	UPC2406HF	
IC107	8-759-008-67	IC	MC14066BF	
IC108	8-759-008-67	IC	MC14066BF	
IC109	8-759-188-57	IC	uPD75308GF-K63-3B9	
IC110	8-759-801-12	IC	LA5523	
IC111	8-759-232-16	IC	TC74HC14AF	
IC112	8-759-008-67	IC	MC14066BF	
IC113	8-759-209-69	IC	TC4S11F	
		< JACK >		
J101	1-566-891-21	JACK (TELEPHONE PICKUP)		
J102	1-568-727-31	JACK, DC (DC IN 9V)		
J103	1-566-891-21	JACK (EARPHONE)		
J104	1-750-568-11	SOCKET, CONNECTOR (CONTROL UNIT)		
		< JUMPER RESISTOR >		
JP301	1-216-296-00	METAL CHIP	0 5% 1/8W	
		< IC LINK >		
⚠PS101-103				
	1-576-122-11	LINK, IC (UK)		
		< TRANSISTOR >		
Q101	8-729-112-97	TRANSISTOR	FA1L4M-L31	
Q102	8-729-230-49	TRANSISTOR	2SC2712-YG	
Q103	8-729-230-49	TRANSISTOR	2SC2712-YG	
Q104	8-729-112-97	TRANSISTOR	FA1L4M-L31	
Q105	8-729-120-28	TRANSISTOR	2SC1623-L5L6	
Q106	8-729-230-49	TRANSISTOR	2SC2712-YG	
Q107	8-729-800-37	TRANSISTOR	2SD1048-X7	
Q108-111				
	8-729-805-91	TRANSISTOR	2SA1563	
Q112	8-729-800-37	TRANSISTOR	2SD1048-X7	

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MAIN

Ref. No.	Part No.	Description	Remark
Q113	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q114	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q115	8-729-805-91	TRANSISTOR 2SA1563	
Q116	8-729-805-94	TRANSISTOR 2SC4047	
Q117	8-729-120-28	TRANSISTOR 2SC1623-L5L6	
Q118	8-729-120-28	TRANSISTOR 2SC1623-L5L6	
Q119	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q120	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q121	8-729-101-07	TRANSISTOR 2SB798-DL (EXCEPT UK)	
⚠Q121	8-729-924-92	TRANSISTOR 2SB1370-E (UK)	
Q122	8-729-120-28	TRANSISTOR 2SC1623-L5L6	
Q123	8-729-805-41	TRANSISTOR 2SC3398	
Q124	8-729-140-75	TRANSISTOR 2SD999-CLCK	
Q125	8-729-101-07	TRANSISTOR 2SB798-DL	
Q126	8-729-805-91	TRANSISTOR 2SA1563	
Q127	8-729-805-41	TRANSISTOR 2SC3398	
Q128	8-729-805-91	TRANSISTOR 2SA1563	
Q129	8-729-140-75	TRANSISTOR 2SD999-CLCK	
Q130	8-729-805-91	TRANSISTOR 2SA1563	
Q131	8-729-101-07	TRANSISTOR 2SB798-DL	
Q132	8-729-140-75	TRANSISTOR 2SD999-CLCK	
Q133	8-729-101-07	TRANSISTOR 2SB798-DL	
Q134	8-729-140-75	TRANSISTOR 2SD999-CLCK	
Q135	8-729-805-94	TRANSISTOR 2SC4047	

< RESISTOR >

R101	1-216-049-00	METAL CHIP	1K	5%	1/10W
R102	1-216-073-00	METAL CHIP	10K	5%	1/10W
R103	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R104	1-216-117-00	METAL CHIP	680K	5%	1/10W
R105	1-216-097-00	METAL CHIP	100K	5%	1/10W
R106	1-216-097-00	METAL CHIP	100K	5%	1/10W
R107	1-216-099-00	METAL CHIP	120K	5%	1/10W
R108	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R109	1-216-025-00	METAL CHIP	100	5%	1/10W
R110	1-216-073-00	METAL CHIP	10K	5%	1/10W
R111	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R112	1-216-219-00	METAL GLAZE	7.5K	5%	1/8W
R113	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R114	1-216-094-00	METAL GLAZE	75K	5%	1/10W
R115	1-216-246-91	METAL GLAZE	100K	5%	1/8W
R116	1-216-081-00	METAL CHIP	22K	5%	1/10W
R117	1-216-109-91	METAL GLAZE	330K	5%	1/10W
R118	1-216-025-00	METAL CHIP	100	5%	1/10W
R119	1-216-081-00	METAL CHIP	22K	5%	1/10W
R120	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R121	1-216-097-00	METAL CHIP	100K	5%	1/10W
R122	1-216-096-00	METAL GLAZE	91K	5%	1/10W
R123	1-216-121-00	METAL CHIP	1M	5%	1/10W

Ref. No.	Part No.	Description			Remark
R124	1-216-246-91	METAL GLAZE	100K	5%	1/8W
R125	1-216-113-00	METAL CHIP	470K	5%	1/10W
R126	1-216-061-00	METAL CHIP	3.3K	5%	1/10W
R127	1-216-025-00	METAL CHIP	100	5%	1/10W
R128	1-216-097-00	METAL CHIP	100K	5%	1/10W
R129	1-216-222-00	METAL GLAZE	10K	5%	1/8W
R130	1-216-077-00	METAL CHIP	15K	5%	1/10W
R131	1-216-049-00	METAL CHIP	1K	5%	1/10W
R132	1-216-057-91	METAL GLAZE	2.2K	5%	1/10W
R133	1-216-057-91	METAL GLAZE	2.2K	5%	1/10W
R134	1-216-198-91	METAL GLAZE	1K	5%	1/8W
R135	1-216-097-00	METAL CHIP	100K	5%	1/10W
R136	1-216-049-00	METAL CHIP	1K	5%	1/10W
R137	1-216-111-00	METAL CHIP	390K	5%	1/10W
R138	1-216-057-91	METAL GLAZE	2.2K	5%	1/10W
R139	1-216-041-00	METAL CHIP	470	5%	1/10W
R140	1-216-027-00	METAL CHIP	120	5%	1/10W
R141	1-216-109-91	METAL GLAZE	330K	5%	1/10W
R142	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R143	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R144	1-216-037-00	METAL CHIP	330	5%	1/10W
R145	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R146	1-216-105-00	METAL CHIP	220K	5%	1/10W
R147	1-216-085-00	METAL CHIP	33K	5%	1/10W
R148	1-216-029-00	METAL CHIP	150	5%	1/10W
R149	1-216-084-00	METAL CHIP	30K	5%	1/10W
R150	1-216-222-00	METAL GLAZE	10K	5%	1/8W
R151	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R152	1-216-184-00	METAL GLAZE	270	5%	1/8W
R153	1-216-067-00	METAL CHIP	5.6K	5%	1/10W
R154	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R155	1-216-073-00	METAL CHIP	10K	5%	1/10W
R156	1-216-047-00	METAL CHIP	820	5%	1/10W
R157	1-216-047-00	METAL CHIP	820	5%	1/10W
R158	1-216-109-91	METAL GLAZE	330K	5%	1/10W
R159	1-216-037-00	METAL CHIP	330	5%	1/10W
R160	1-216-234-00	METAL GLAZE	33K	5%	1/8W
R161	1-216-188-00	METAL GLAZE	390	5%	1/8W
R162	1-216-202-00	METAL GLAZE	1.5K	5%	1/8W
R163	1-216-085-00	METAL CHIP	33K	5%	1/10W
R164	1-216-049-00	METAL CHIP	1K	5%	1/10W
R165	1-216-017-00	METAL CHIP	47	5%	1/10W
R166	1-216-017-00	METAL CHIP	47	5%	1/10W
R167	1-216-152-00	METAL GLAZE	12	5%	1/8W
R168-170					
	1-216-073-00	METAL CHIP	10K	5%	1/10W
R171	1-216-083-00	METAL CHIP	27K	5%	1/10W
R172	1-216-081-00	METAL CHIP	22K	5%	1/10W
R173	1-216-089-91	METAL GLAZE	47K	5%	1/10W

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Ref. No.	Part No.	Description			Remark
R174	1-216-097-00	METAL CHIP	100K	5%	1/10W
R175	1-216-080-00	METAL CHIP	20K	5%	1/10W
R176-178					
	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R179	1-216-238-91	METAL GLAZE	47K	5%	1/8W
R180-182					
	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R183	1-216-097-00	METAL CHIP	100K	5%	1/10W
R184	1-216-238-91	METAL GLAZE	47K	5%	1/8W
R185	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R186	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R187	1-216-238-91	METAL GLAZE	47K	5%	1/8W
R188	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R189	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R190	1-216-238-91	METAL GLAZE	47K	5%	1/8W
R191	1-216-073-00	METAL CHIP	10K	5%	1/10W
R192	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R193	1-216-254-00	METAL GLAZE	220K	5%	1/8W
R194	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R195	1-216-198-91	METAL GLAZE	1K	5%	1/8W
R196-198					
	1-216-049-00	METAL CHIP	1K	5%	1/10W
R199	1-216-198-91	METAL GLAZE	1K	5%	1/8W
R200	1-216-049-00	METAL CHIP	1K	5%	1/10W
R201	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R202	1-216-059-00	METAL CHIP	2.7K	5%	1/10W
R203	1-216-081-00	METAL CHIP	22K	5%	1/10W
R204	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R205	1-216-097-00	METAL CHIP	100K	5%	1/10W
R206	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R207	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R208	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R209	1-216-089-91	METAL GLAZE	47K	5%	1/10W
⚠R210	1-215-907-11	METAL OXIDE	22	5%	3W F
R211	1-216-041-00	METAL CHIP	470	5%	1/10W
R212	1-216-097-00	METAL CHIP	100K	5%	1/10W
R213	1-216-190-00	METAL GLAZE	470	5%	1/8W
R214	1-216-190-00	METAL GLAZE	470	5%	1/8W
R215	1-216-097-00	METAL CHIP	100K	5%	1/10W
R216	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R217	1-216-049-00	METAL CHIP	1K	5%	1/10W
R218	1-216-049-00	METAL CHIP	1K	5%	1/10W
R219	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R220	1-216-198-91	METAL GLAZE	1K	5%	1/8W
R221	1-216-198-91	METAL GLAZE	1K	5%	1/8W
R222	1-216-041-00	METAL CHIP	470	5%	1/10W
R223	1-216-073-00	METAL CHIP	10K	5%	1/10W
R224	1-216-072-00	METAL CHIP	9.1K	5%	1/10W
R225	1-216-085-00	METAL CHIP	33K	5%	1/10W
R226	1-216-039-00	METAL CHIP	390	5%	1/10W
R227	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R228	1-216-222-00	METAL GLAZE	10K	5%	1/8W
R229	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R230	1-216-045-00	METAL CHIP	680	5%	1/10W
R231	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R232	1-216-041-00	METAL CHIP	470	5%	1/10W
R233	1-216-081-00	METAL CHIP	22K	5%	1/10W
R234	1-216-089-91	METAL GLAZE	47K	5%	1/10W
R235-237					
	1-216-073-00	METAL CHIP	10K	5%	1/10W
R238	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R239	1-216-089-91	METAL GLAZE	47K	5%	1/10W
		< VARIABLE RESISTOR >			
RV101	1-230-564-11	RES, VAR, SLIDE 10K (TONE)			
RV102	1-230-564-11	RES, VAR, SLIDE 10K (VOLUME)			
RV103	1-237-364-11	RES, VAR, SLIDE 100K (SPEED)			
RV104	1-230-496-11	RES, ADJ, CARBON 10K			
RV105	1-230-496-11	RES, ADJ, CARBON 10K			
RV106	1-230-497-11	RES, ADJ, CARBON 20K			
		< SWITCH >			
S101	1-572-251-11	SWITCH, SLIDE (POWER)			
S102	1-572-251-11	SWITCH, SLIDE (SPEED CONTROL)			
S103	1-572-251-11	SWITCH, SLIDE (SPEAKER)			
S104	1-554-303-21	SWITCH, TACTILE (STOP □)			
S105	1-554-303-21	SWITCH, TACTILE (LISTEN ▷)			
S106	1-554-303-21	SWITCH, TACTILE (REW ● ◁◁)			
S107	1-554-303-21	SWITCH, TACTILE (FF ▷▷)			
S108	1-554-303-21	SWITCH, TACTILE (TEL REC)			
S109	1-554-303-21	SWITCH, TACTILE (AUTO STOP)			
S110	1-554-303-21	SWITCH, TACTILE (● ERASE)			
S111	1-554-303-21	SWITCH, TACTILE (RESET)			
S112	1-570-361-11	SWITCH, SLIDE (DIGITAL CORD) (REVERSE TIME)			
S113	1-572-251-11	SWITCH, SLIDE (TAPE SPEED)			
		< TRANSFORMER >			
T101	1-433-251-00	TRANSFORMER, BIAS OSCILLATOR			
		< THERMISTOR(POSITIVE) >			
THP101	1-810-371-11	THERMISTOR, POSITIVE			
		< VIBRATOR >			
X101	1-577-273-11	OSCILLATOR, CERAMIC (4.19MHz)			

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SENSOR

Ref. No.	Part No.	Description	Remark
*	1-650-105-11	SENSOR BOARD	
		**********	
		< PHOTO INTERRUPTER >	
PH901	8-719-939-23	PHOTO INTERRUPTER GP-2S09-C	
		**********	
		MISCELLANEOUS	
		**********	
HE901	1-543-899-11	HEAD, MAGNETIC (ERASE)	
HRP901	1-543-725-11	HEAD, MAGNETIC (RECORD/PLAYBACK)	
LED901	8-719-984-02	LED BR4371F (REC/ERASE)	
M901	1-541-332-11	MOTOR (NBL-32R)	
M902	X-3367-201-1	MOTOR (F/R) ASSY	
ND901	1-810-090-11	DISPLAY PANEL, LIQUID CRYSTAL	
PM901	1-454-604-11	SOLENOID, PLUNGER (FWD)	
PM902	1-454-662-11	SOLENOID, PLUNGER (BRAKE)	
S901	1-554-385-00	SWITCH, MICRO (TAB DET)	
SP901	1-504-172-11	SPEAKER	
		**********	
		ACCESSORIES & PACKING MATERIALS	
		**********	
⚠	1-465-393-11	ADAPTOR, AC (AC-980) (US, Canadian)	
⚠	1-465-428-11	ADAPTOR, AC (AC-980) (UK)	
⚠	1-465-429-11	ADAPTOR, AC (AC-980) (AEP)	
*	3-359-174-01	CUSHION (L)	
*	3-359-175-01	CUSHION (R)	
	3-757-398-11	MANUAL, INSTRUCTION (ENGLISH, FRENCH, GERMAN, SPANISH, DUTCH) (Canadian, AEP, UK)	
	3-757-398-21	MANUAL, INSTRUCTION (ENGLISH) (US)	
		**********	

Ref. No.	Part No.	Description	Remark
		**********	
		HARDWARE LIST	
		**********	
#1	7-621-255-15	SCREW +P 2X3	
#2	7-621-255-25	SCREW +PTT 2X4 (S)	
#3	7-621-257-55	SCREW +P 2.3X8	
#4	7-627-552-18	SCREW, PRECISION +P 1.7X1.6	
#5	7-627-552-48	SCREW, PRECISION +P 1.7X4	
#6	7-627-552-97	SCREW, PRECISION +P 1.7X6	
#7	7-682-946-09	SCREW +PSW 3X5	
#8	7-685-104-19	SCREW +P 2X6 TYPE2 NON-SLIT	
#9	7-685-133-19	SCREW +P 2.6X6 TYPE2	
#10	7-685-134-19	SCREW +P 2.6X8 TYPE2 NON-SLIT	
#11	7-685-135-19	SCREW +P 2.6X10 TYPE2 NON-SLIT	
#12	7-685-646-79	SCREW +BVTP 3X8 TYPE2 N-S	
#13	7-685-648-79	SCREW +BVTP 3X12 TYPE2 N-S	
#14	7-688-001-03	W 2, SMALL	

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