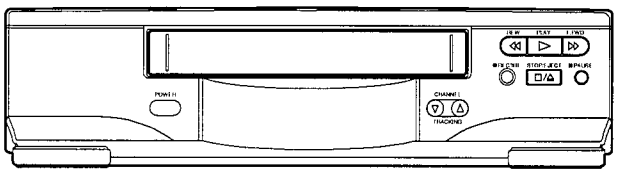
HITACHI

SERVICE MANUAL

TK | No. 4708E

VT-MX221AW
VT-MX421AW



V18362

CONTENTS

VHS

This video deck is VHS type video recorder. For proper operation, only the VHS type cassette must be used.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

May 1997 Image & Information Media Systems Division, Tokai

MAIN SECTION

VIDEO CASSETTE RECORDER

VT-MX221AW / VT-MX421AW

MAIN SECTION

- **Specifications**
- **Preparation for Servicing**
- **Adjustment Procedures**
- **Schematic Diagrams**
- **CBA' s**

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SPECIFICATIONS

Description	Unit	Minimum	Nominal	Maximum	Condition
1. Video					
1-1 Video Output (R/P)	Vp-p	0.8	1.0	1.2	
1-2 Video S/N Y (R/P)	dB	42	48		SP Mode
1-3 Video Color S/N AM (R/P)	dB	35	44		SP Mode
1-4 Video Color S/N PM (R/P)	dB	31	38		SP Mode
1-5 Resolution (PB)	Line	210	230		SP Mode
2. Servo					
2-1 Jitter Low (R/P)	µsec		0.04	0.12	SP Mode
2-2 Wow & Flutter (R/P)	%		0.2	0.5	SP Mode
3. Normal Audio					
3-1 Output (R/P)	dBV	-10	-5	-2	SP Mode
3-2 S/N (R/P)	dB	41	47		SP Mode (JIS A)
3-3 Distortion (R/P)	%		1.5	4.0	SP Mode
3-4 Freq. response (R/P) at 200Hz	dB	-6.0	-3.0	+5.0	SP Mode
(-20dB ref. 1kHz) at 8kHz	dB	-6.0	-2.0	+5.0	SP Mode
4. Tuner					
4-1 Video Output	Vp-p	0.8	1.0	1.2	E-E Mode
4-2 Video S/N	dB	40	45		E-E Mode
4-3 Audio Output	dBV	-9	-6	-3	E-E Mode
4-4 Audio S/N	dB	40	50		JIS A

Note: Nominal specs represent the design specs. All units should be able to approximate these – some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; In no case should a unit fail to meet limit specs.

IMPORTANT SAFETY PRECAUTIONS

Product Safety Notice

Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by a ⚠ on schematics and in parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might create shock, fire, and/or other hazards. The Product's Safety is under review continuously and new instructions are issued whenever appropriate. Prior to shipment from the factory, our products are carefully inspected to confirm with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

Precautions during Servicing

A. Parts identified by the ⚠ symbol are critical for safety. Replace only with part number specified.

B. In addition to safety, other parts and assemblies are specified for conformance with regulations applying to spurious radiation. These must also be replaced only with specified replacements.

Examples: RF converters, RF cables, noise blocking capacitors, and noise blocking filters, etc.

C. Use specified internal wiring. Note especially:

1) Wires covered with PVC tubing
2) Double insulated wires
3) High voltage leads

D. Use specified insulating materials for hazardous live parts. Note especially:

1) Insulation tape
2) PVC tubing
3) Spacers
4) Insulators for transistors

E. When replacing AC primary side components (transformers, power cord, etc.), wrap ends of wires securely about the terminals before soldering.

F. Observe that the wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).

G. Check that replaced wires do not contact sharp edges or pointed parts.

H. When a power cord has been replaced, check that 5 - 6 kg of force in any direction will not loosen it.

I. Also check areas surrounding repaired locations.

J. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

K. Crimp type wire connector

The power transformer uses crimp type connectors which connect the power cord and the primary side of the transformer. When replacing the transformer, follow these steps carefully and precisely to prevent shock hazards.

Replacement procedure

1) Remove the old connector by cutting the wires at a point close to the connector.

Important: Do not re-use a connector. (Discard it.)

2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

4) Use a crimping tool to crimp the metal sleeve at its center. Be sure to crimp fully to the complete closure of the tool.

L. When connecting or disconnecting the internal connectors, first, disconnect the AC plug from the AC outlet.

Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts, and wires have been returned to their original positions. Afterwards, do the following tests and confirm the specified values to verify compliance with safety standards.

1. Clearance Distance

When replacing primary circuit components, confirm specified clearance distance (d) and (d') between soldered terminals, and between terminals and surrounding metallic parts. (See Fig. 1)

Table 1 : Ratings for selected area

AC Line Voltage	Clearance Distance (d) (d')
120 V	≥ 3.2 mm (0.126 inches)

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.

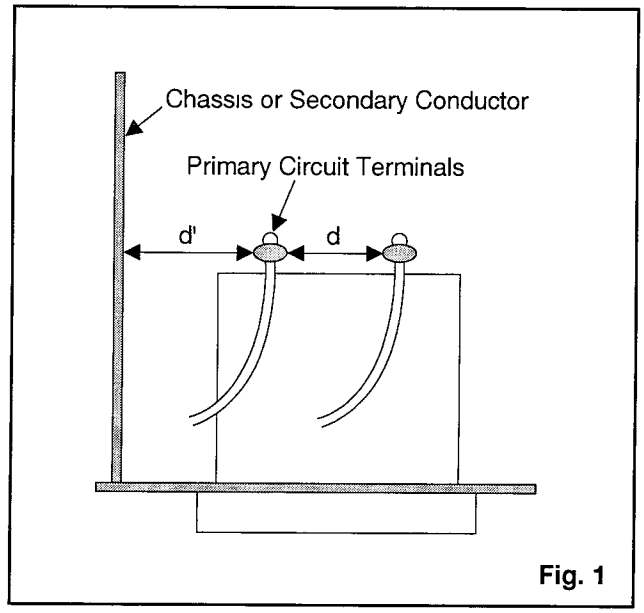


Fig. 1

2. Leakage Current Test

Confirm the specified (or lower) leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.) is lower than or equal to the specified value in the table below.

Measuring Method (Power ON) :

Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across the terminals of load Z. See Fig. 2 and the following table.

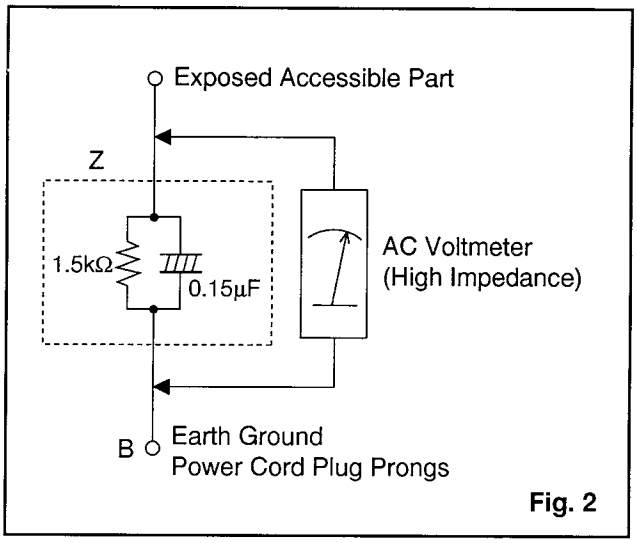


Fig. 2

Table 2 : Leakage current ratings for selected areas

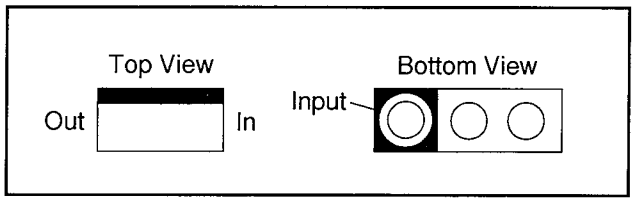
AC Line Voltage	Load Z	Leakage Current (i)	Earth Ground (B) to:
120 V	0.15μF CAP. & 1.5kΩ RES. Connected in parallel	i ≤ 0.5mA rms	Exposed accessible parts

Note: This table is unofficial and for reference only. Be sure to confirm the precise values.

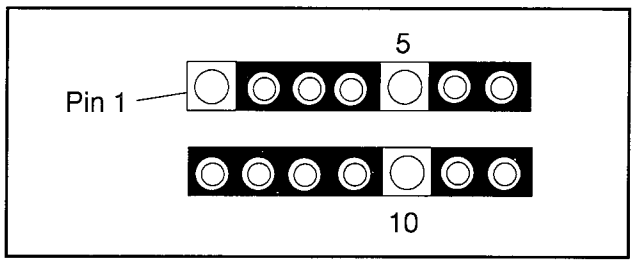
STANDARD NOTES FOR SERVICING

Circuit Board Indications

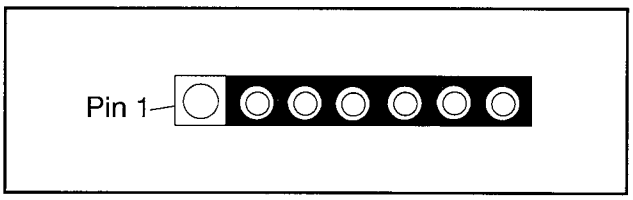
a. The output pin of the 3 pin Regulator ICs is indicated as shown.



b. For other ICs, pin 1 and every fifth pin are indicated as shown.

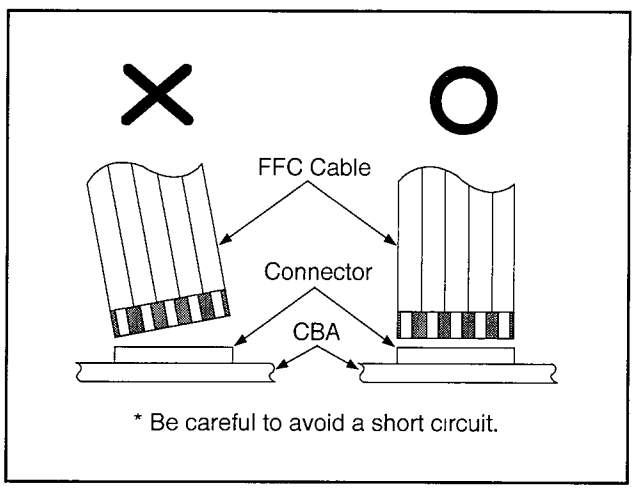


c. The 1st pin of every male connector is indicated as shown.



Instructions for Connectors

1. When you connect or disconnect the FFC (Flexible Foil Connector) cable, be sure to first disconnect the AC cord.
2. FFC (Flexible Foil Connector) cable should be inserted parallel into the connector, not at an angle.



How to Remove / Install Flat Pack-IC

1. Removal

With Hot-Air Flat Pack-IC Desoldering Machine:

(1) Prepare the hot-air flat pack-IC desoldering machine, then apply hot air to the Flat Pack-IC (about 5 to 6 seconds). (Fig. S-1-1)

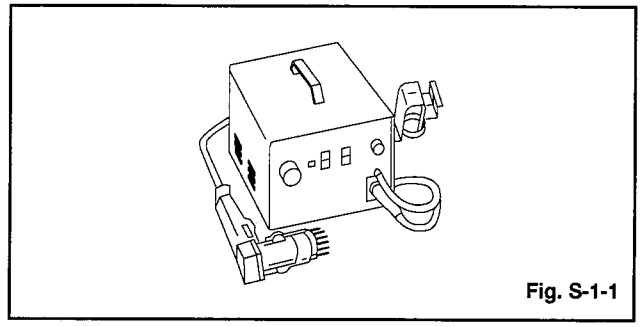


Fig. S-1-1

(2) Remove the flat pack-IC with tweezers while applying the hot air.

(3) Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)

(4) Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

Caution:

1. Do not supply hot air to the chip parts around the flat pack-IC for over 6 seconds because damage to the chip parts may occur. Put masking tape around the flat pack-IC to protect other parts from damage. (Fig. S-1-2)
2. The flat pack-IC on the CBA is affixed with glue, so be careful not to break or damage the foil of each pin or the solder lands under the IC when removing it.

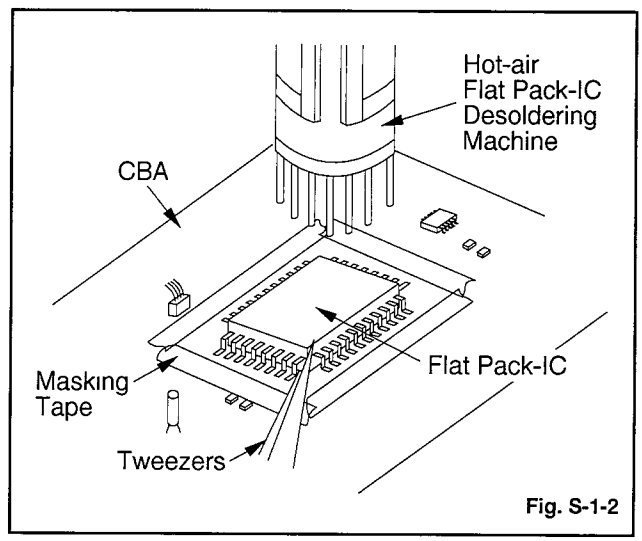


Fig. S-1-2

With Soldering Iron:

(1) Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)

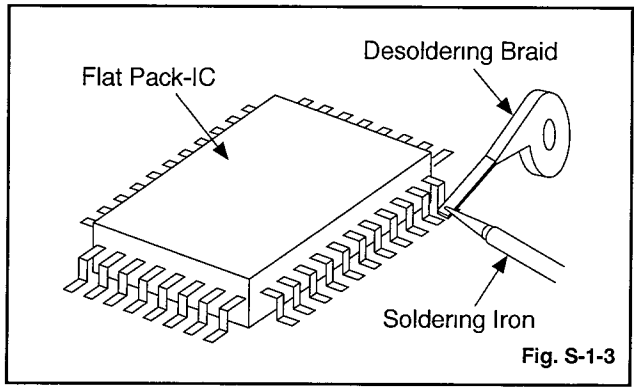


Fig. S-1-3

(2) Lift each lead of the flat pack-IC upward one by one, using a sharp pin or wire to which solder will not adhere (iron wire). When heating the pins, use a fine tip soldering iron or a hot air desoldering machine. (Fig. S-1-4)

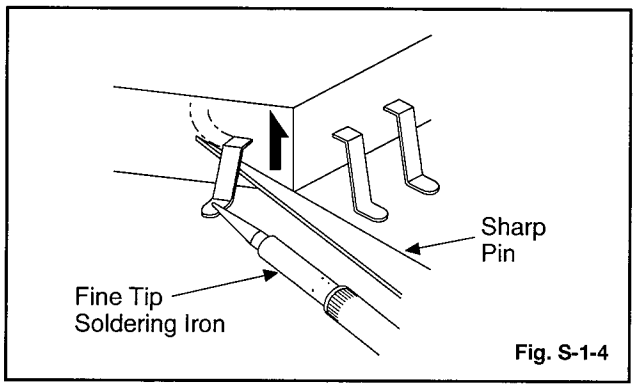


Fig. S-1-4

(3) Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-8)

(4) Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

With Iron Wire:

(1) Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)

(2) Affix the wire to a workbench or solid mounting point, as shown in Fig. S-1-5.

(3) While heating the pins using a fine tip soldering iron or hot air blower, pull up the wire as the solder melts so as to lift the IC leads from the CBA contact pads as shown in Fig. S-1-5.

(4) Bottom of the flat pack-IC is fixed with glue to the CBA; when removing entire flat pack-IC, first apply soldering iron to center of the flat pack-IC and heat up. Then remove (glue will be melted). (Fig. S-1-6)

(5) Release the flat pack-IC from the CBA using tweezers. (Fig. S-1-6)

Note:

When using a soldering iron, care must be taken to ensure that the flat pack-IC is not being held by glue. When the flat pack-IC is removed from the CBA, handle it gently because it may be damaged if force is applied.

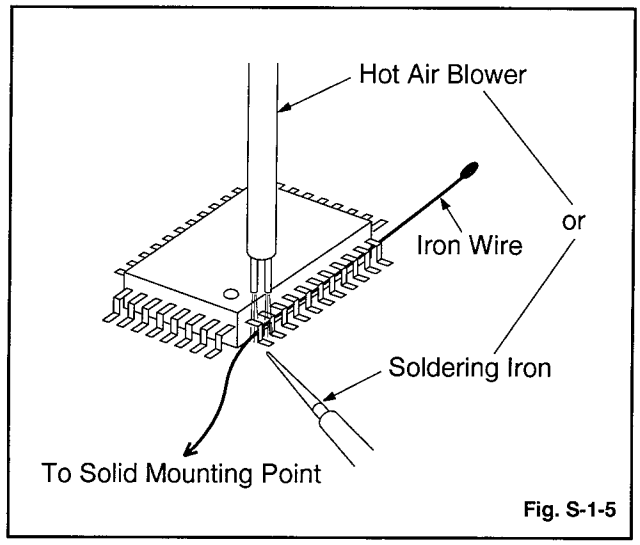


Fig. S-1-5

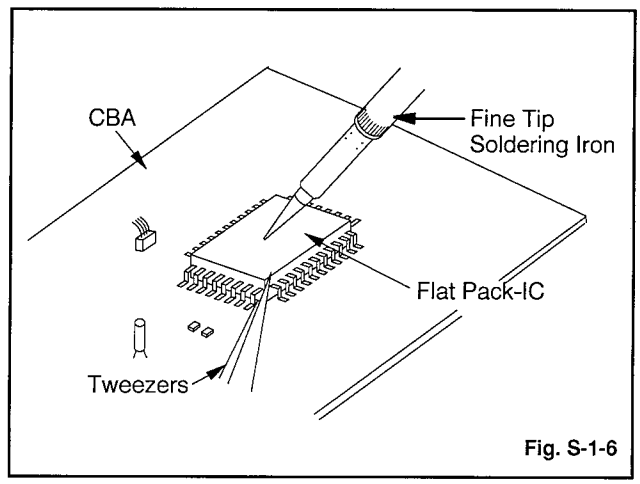


Fig. S-1-6

2. Installation

(1) Using desoldering braid, remove the solder from the foil of each pin of the flat pack-IC on the CBA so you can install a replacement flat pack-IC more easily.

(2) The " ● " mark on the flat pack-IC indicates pin 1. (See Fig. S-1-7.) Be sure this mark matches the 1 on the PCB when positioning for installation. Then pre- solder the four corners of the flat pack-IC. (See Fig. S-1-8.)

(3) Solder all pins of the flat pack-IC. Be sure that none of the pins have solder bridges.

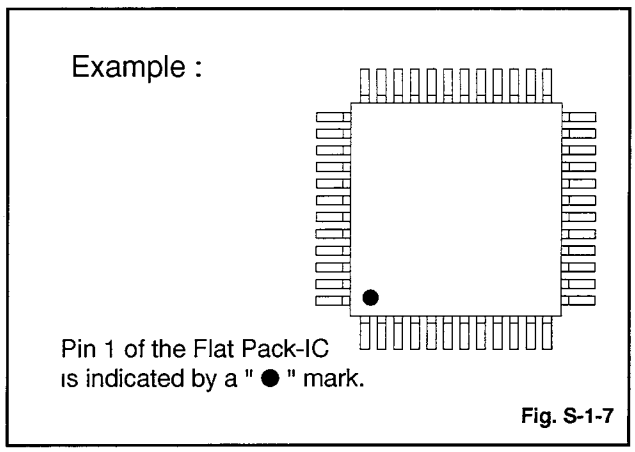


Fig. S-1-7

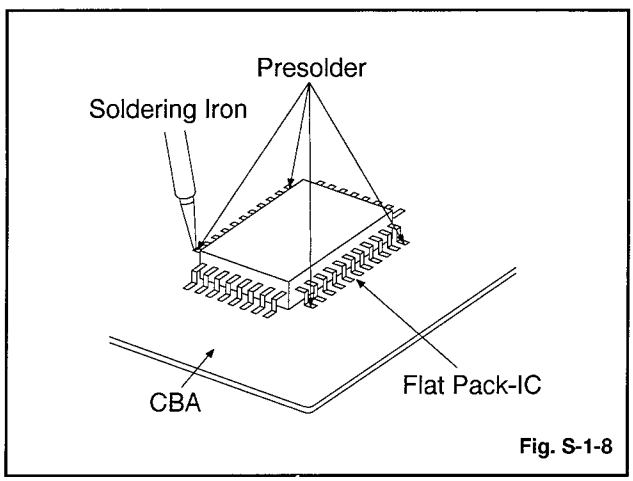


Fig. S-1-8

Instructions for Handling Semiconductors

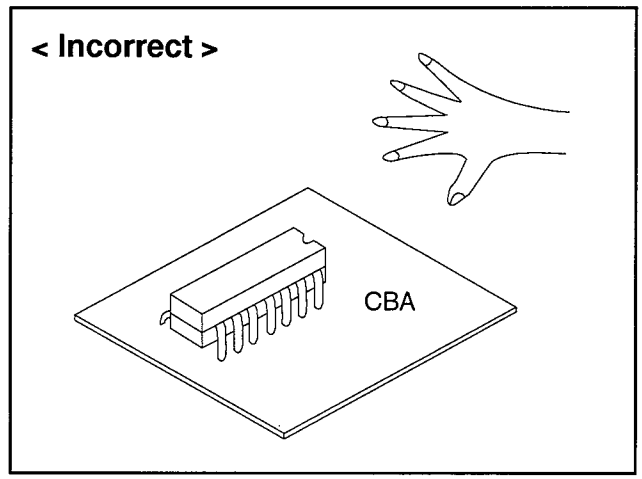
Electrostatic breakdown of the semiconductors may occur due to a potential difference caused by electrostatic charge during unpacking or repair work.

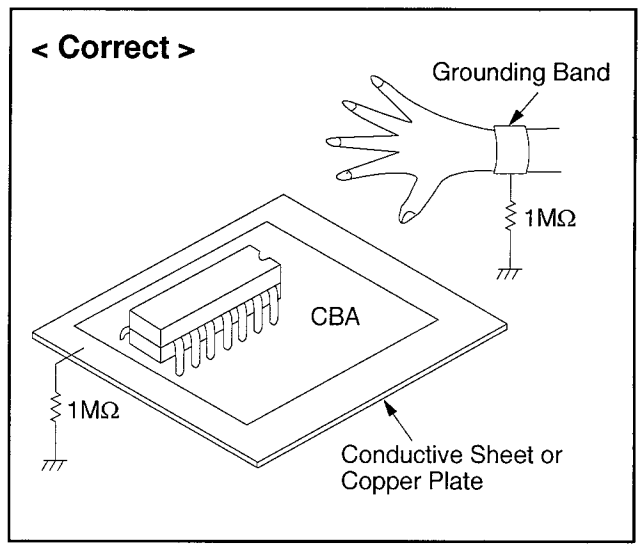
1. Ground for Human Body

Be sure to wear a grounding band (1MΩ) that is properly grounded to remove any static electricity that may be charged on the body.

2. Ground for Workbench

Be sure to place a conductive sheet or copper plate with proper grounding (1MΩ) on the workbench or other surface, where the semiconductors are to be placed. Because the static electricity charge on clothing will not escape through the body grounding band, be careful to avoid contacting semiconductors with your clothing.





PREPARATION FOR SERVICING

How to Use U15 Deck Extension Cable

(1) Remove the Deck Mechanism Assembly. If needed, remove the Main CBA from the chassis. Refer to "Disassembly Instructions" on pg. 1-6-1.

(2) Connect Main CBA and Deck with U15 Deck Extension Cable (A) as shown in Fig. 1. And connect Main CBA and Deck with U15 Deck Extension Cable (B) as shown in Fig. 1.
(U15 Deck Extension Cable: 7069181)

Note: There are 3 types of U15 Deck Extension Cable (A). They are for 2 Head, 4 Head, and Hi-Fi. Use a connector indicated as shown. Be careful not to let the unused connector contact other parts.

Note: Some noise will be present in the playback picture when the extension cable is used.

Comparison Chart of Models and Marks

MODEL	MARK
VT-MX221AW	A
VT-MX421AW	B

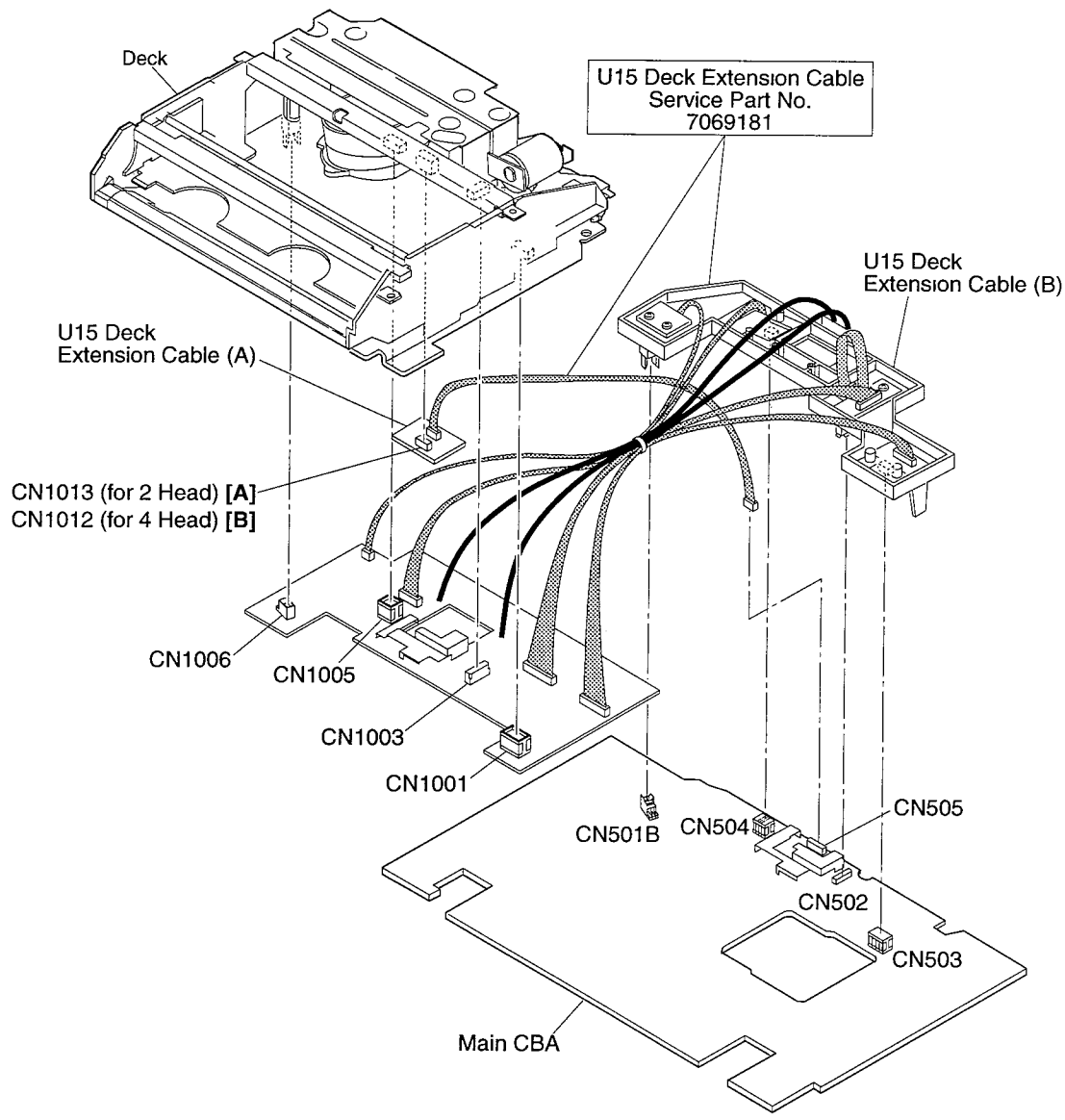


Fig. 1

How to Enter the Service Mode

Note: When the unit is set in the service mode, the display will keep blinking.

About Optical Sensors

Caution:

An optical sensor system is used for the Tape Start and End Sensors on this equipment. Carefully read and follow the instructions below. Otherwise the unit may operate erratically.

What to do for preparation

Insert a tape into the Deck Mechanism Assembly and press the PLAY button. The tape will be loaded into the Deck Mechanism Assembly. Make sure the power is on, connect TP502 (SENSOR INHIBITION) to TP501 (GROUND). This will stop the function of Tape Start Sensor, Tape End Sensor and Reel Sensors. (If these TPs are connected before plugging in the unit, the function of the sensors will stay valid.) See Fig. 2.

Note: Because the Tape End Sensors are inactive, do not run a tape all the way to the start or the end of the tape to avoid tape damage.

About REC-Safety Switch

Caution:

The REC-Safety Switch is directly mounted on the Main CBA. When the Deck Mechanism Assembly is removed from the Main CBA for servicing, this switch does not work automatically.

What to do for preparation

In order to record, press the Rec button while pushing REC-SAFETY SW on the Main CBA. See Fig. 2.

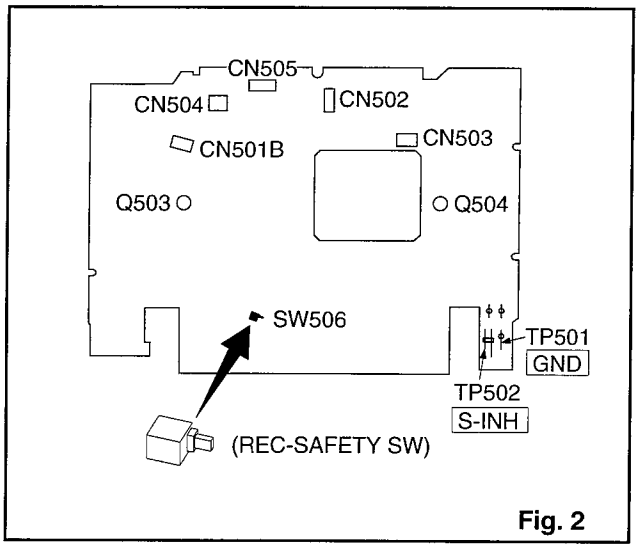
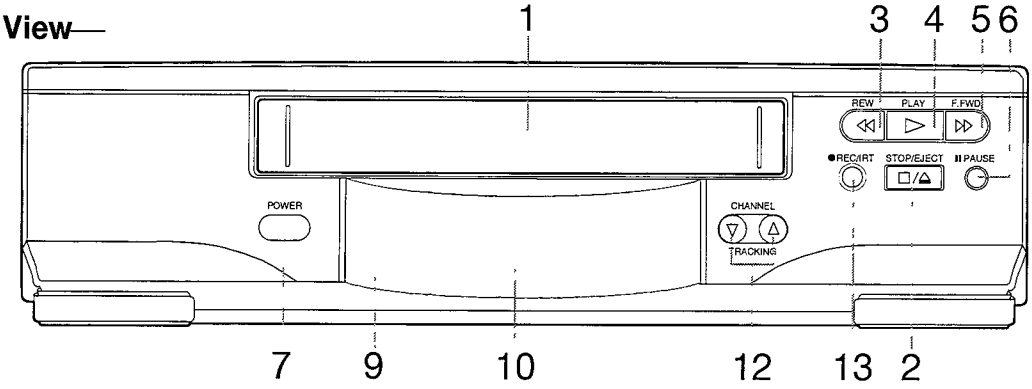


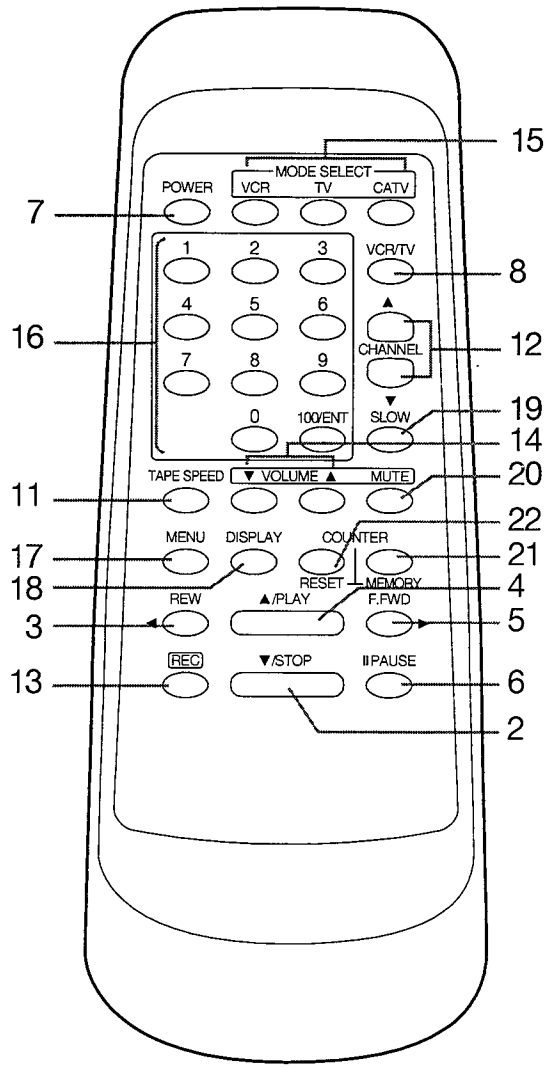
Fig. 2

OPERATING CONTROLS AND FUNCTIONS

—Front View—



—Remote Control View—



1. **Cassette Compartment**
2. **STOP button–** Press to stop the tape motion.

   EJECT button– Press to remove a tape from the VCR. (only on the VCR)

   ▼ button– Press to enter digits when setting program (for example: setting clock or timer program). Press to select setting modes from on screen menu. (only on the remote control)
3. **REW button–** Press to rewind the tape, or to view the picture rapidly in reverse during the playback mode. (Rewind Search)

   ◄ button– Press to cancel a setting of timer program. Press to correct digits when setting program (for example: setting clock or timer program). (only on the remote control)
4. **PLAY button–** Press to begin playback.

   ▲ button– Press to enter digits when setting program (for example: setting clock or timer program). Press to select setting modes from on screen menu. (only on the remote control)
5. **F.FWD button–** Press to rapidly advance the tape, or view the picture rapidly in forward during playback. (Forward Search)

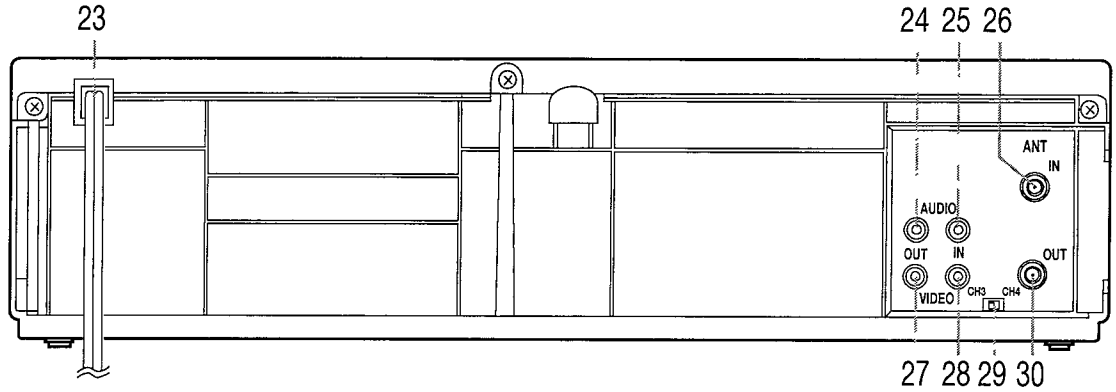
   ► button– When setting program (for example: setting clock or timer program), press to determine your selection and proceed to a next step you want to input. Press to determine setting modes from on screen menu. (only on the remote control)
6. **PAUSE button–** Press to temporarily stop the tape during recording or to view a still picture during playback.

   Frame Advance function– Press to advance the picture by one frame during the still mode.
7. **POWER button–** Press to turn VCR on and off. Press to activate a timer recording.
8. **VCR/TV button–** Press to select TV or VCR mode.

   VCR position: to view playback, to monitor video recordings or watch TV using the VCR tuner.

   TV position: to watch TV or to view one program while recording another.
9. **Remote sensor window–** Receives the infrared signals from the remote control.

—Rear View—



10. **Digital display–**

11. **TAPE SPEED button–** Press to set desired recording speed : SP/LP/SLP.

12. **CHANNEL buttons–** Press to select desired channels for viewing or recording.

    Tracking function– Press to minimize video 'noise' (lines or dots on screen) during playback or slow mode. (only on the VCR)

    Press to stabilize the picture in the Still mode when the picture begins to vibrate vertically.

13. **REC button–** Press to begin manual recording.

    IRT button– Press to activate Instant Recording Timer. (only on the VCR)

14. **VOL button–** Press to adjust the desired TV's volume level by using either ▲ or ▼ button.

15. **Mode Select buttons**

    CATV button–

    TV button–

    VCR button–

16. **NUMBER buttons–** Press to select desired channels for viewing or recording. To select channels from 1 to 9, first press "0" button then 1 to 9.

    100/ENT button– When selecting cable channels which are more than 100, press this button first, then press the last two digits. (To select channel 125, first press "100/ENT" button then press "2" and "5").

17. **MENU button–** Press to display menus on the TV screen. (only on the remote control)

18. **DISPLAY button–** Press to display the remain, the counter, or the current channel number and current time on the TV screen. (only on the remote control)

19. **SLOW button–** Press to reduce the playback speed. Slow speed can be controlled by pressing F.FWD button (faster) or REW button (slower).

20. **MUTE button–** Press to mute the TV's sound. Press it again to resume the sound.

21. **COUNTER MEMORY button–** Press to set counter memory on and off.

22. **COUNTER RESET button–** Press to reset counter to 0:00:00. Press to add or delete channel numbers during channel preset.

23. **Power cord–** Connect to a standard AC outlet (120V/60Hz).

24. **AUDIO OUT jack–** Connect to the audio input jack of your audio equipment or another VCR.

25. **AUDIO IN jack–** Connect to the audio output jack of your audio equipment or another VCR.

26. **ANT. IN terminal–** Connect to an antenna or CATV.

27. **VIDEO OUT jack–** Connect to a video input jack of your video camera or another VCR.

28. **VIDEO IN jack–** Connect to a video output jack of your video camera or another VCR.

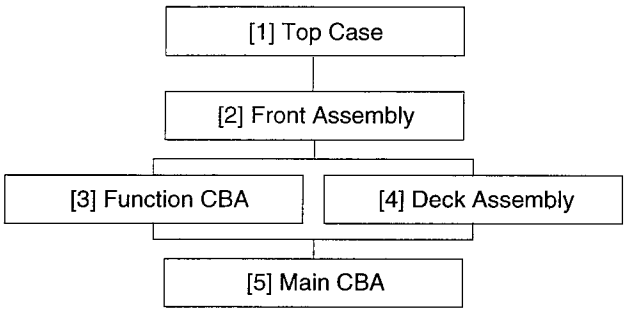
29. **CH3/CH4 selector switch–** Use to select a video output channel (3 or 4) for playback from the VCR.

30. **ANT. OUT terminal–** Connect to an antenna input terminal of your TV.

CABINET DISASSEMBLY INSTRUCTIONS

1. Disassembly Flowchart

This flowchart indicates the disassembly steps to gain access to item(s) to be serviced. When reassembling, follow the steps in reverse order. Bend, route, and dress the cables as they were originally.



Disassembly Method

ID/ LOC. No.	PART	REMOVAL		
		Fig. No.	REMOVE/ *UNHOOK/UNLOCK/ RELEASE/UNPLUG/ DESOLDER	Note
[1]	Top Case	1	3(S-1)	-
[2]	Front Assembly	2, 3	*7(L-1)	1
[3]	Function CBA	2, 4	*(L-2), (CN507)	2
[4]	Deck Assembly	5	7(S-2), (CN501B, CN502, CN503, CN504, CN505)	3
[5]	Main CBA	4, 6	3(S-3), *(L-3)	4
↓ ①	↓ ②	↓ ③	↓ ④	↓ ⑤

①: Identification (location) No. of parts in the figures

②: Name of the part

③: Figure Number for reference

④: Identification of parts to be removed, unhooked, unlocked, released, unplugged, unclamped, or desoldered.
P=Spring, L=Locking Tab, S=Screw,
CN=Connector
*=Unhook, Unlock, Release, Unplug, or Desolder
e.g. 2(S-2) = two Screws (S-2),
2(L-2) = two Locking Tabs (L-2)

⑤:Refer to "Reference Notes."

Reference Notes

CAUTION: Locking Tabs (L-1) are fragile. Be careful not to break them.

1. Release 7 Locking Tabs (L-1). To do this, first release three Locking Tabs (A) at the bottom, and then four Locking Tabs (B) at the top. (Fig. 2, 3)
2. Disconnect Connector (CN507) to remove Function CBA. Hold Main CBA while pulling up Function CBA. (Fig. 4)
3. Remove 7 Screws (S-2). Then slowly lift Deck Assembly up. Lifting Deck Assembly disconnects 5 Connectors (CN501B, CN502, CN503, CN504, CN505). (Fig. 5)
4. Always reinstall screws (S-3) when reassembling the unit. These screws are critical for proper shielding of the Main CBA.

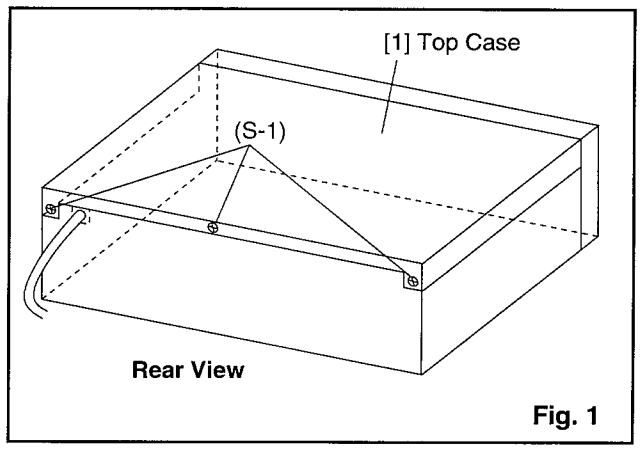


Fig. 1

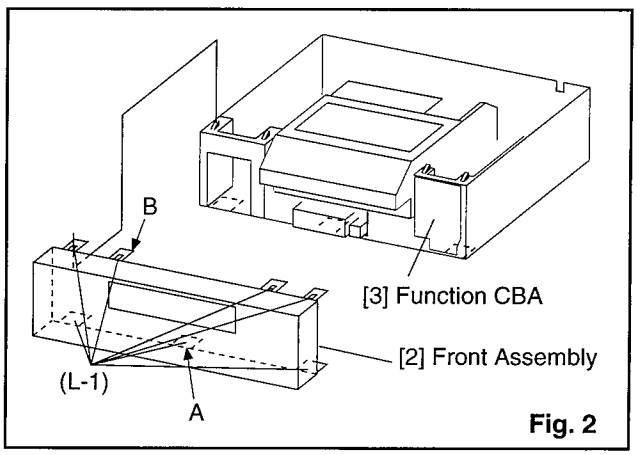


Fig. 2

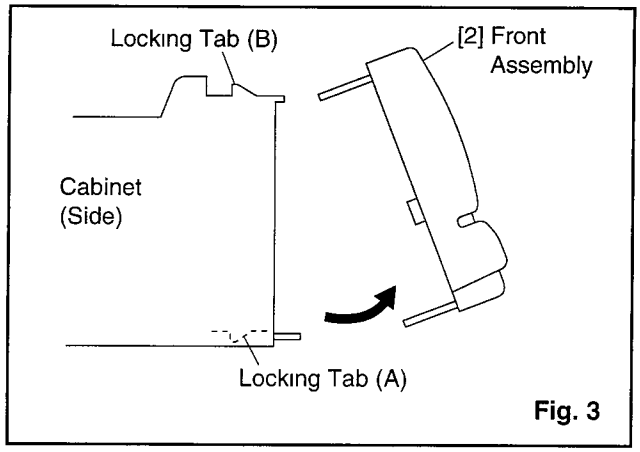


Fig. 3

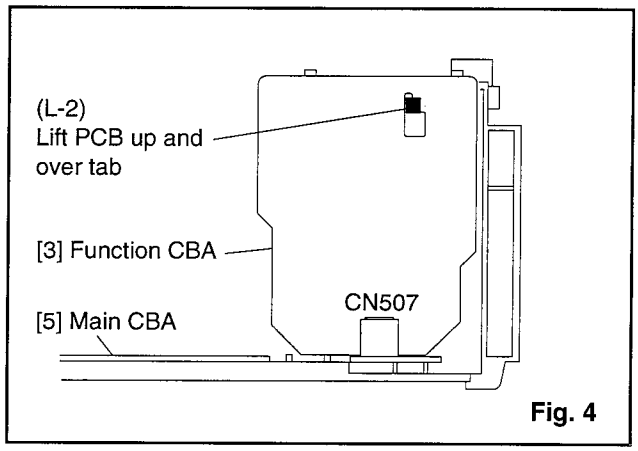


Fig. 4

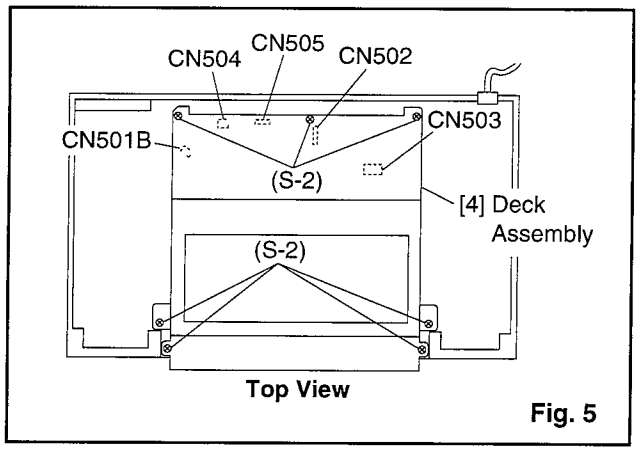


Fig. 5

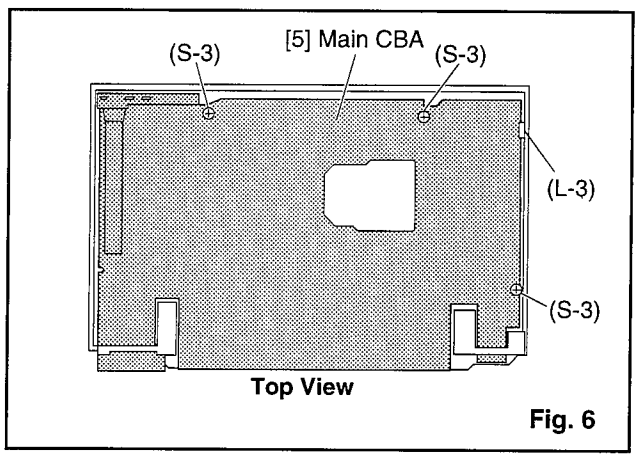


Fig. 6

ELECTRICAL ADJUSTMENT INSTRUCTIONS

General Note: "CBA" is an abbreviation for "Circuit Board Assembly".

NOTE: Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to do these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

Test Equipment Required

1. Oscilloscope: Dual-trace with 10:1 probe, V-Range: 0.001~50V/Div., F-Range: AC~DC-20MHz
2. Alignment Tape (MH-1)

Head Switching Position Adjustment

Purpose: To determine the Head Switching point during playback.

Symptom of Misadjustment: May cause Head Switching noise or vertical jitter in the picture.

Test Point	Adj. Point	Mode	Input
TP751(V-OUT) TP302(RF-SW) TP501(GND)	VR501 (Switching Point) (MAIN CBA)	PLAY (SP)	---
Alignment Tape	**Measurement Equipment**	**Spec.**	
MH-1	Oscilloscope	6.5H±1H (412.7μs±60μs)	

Connections of Measurement Equipment

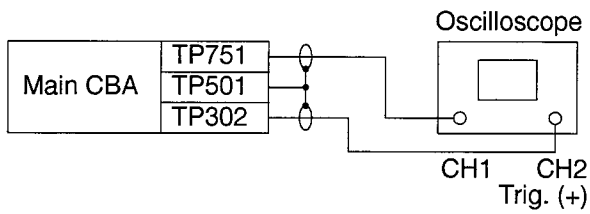
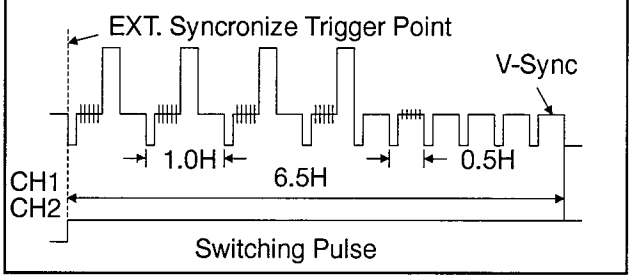


Figure 1

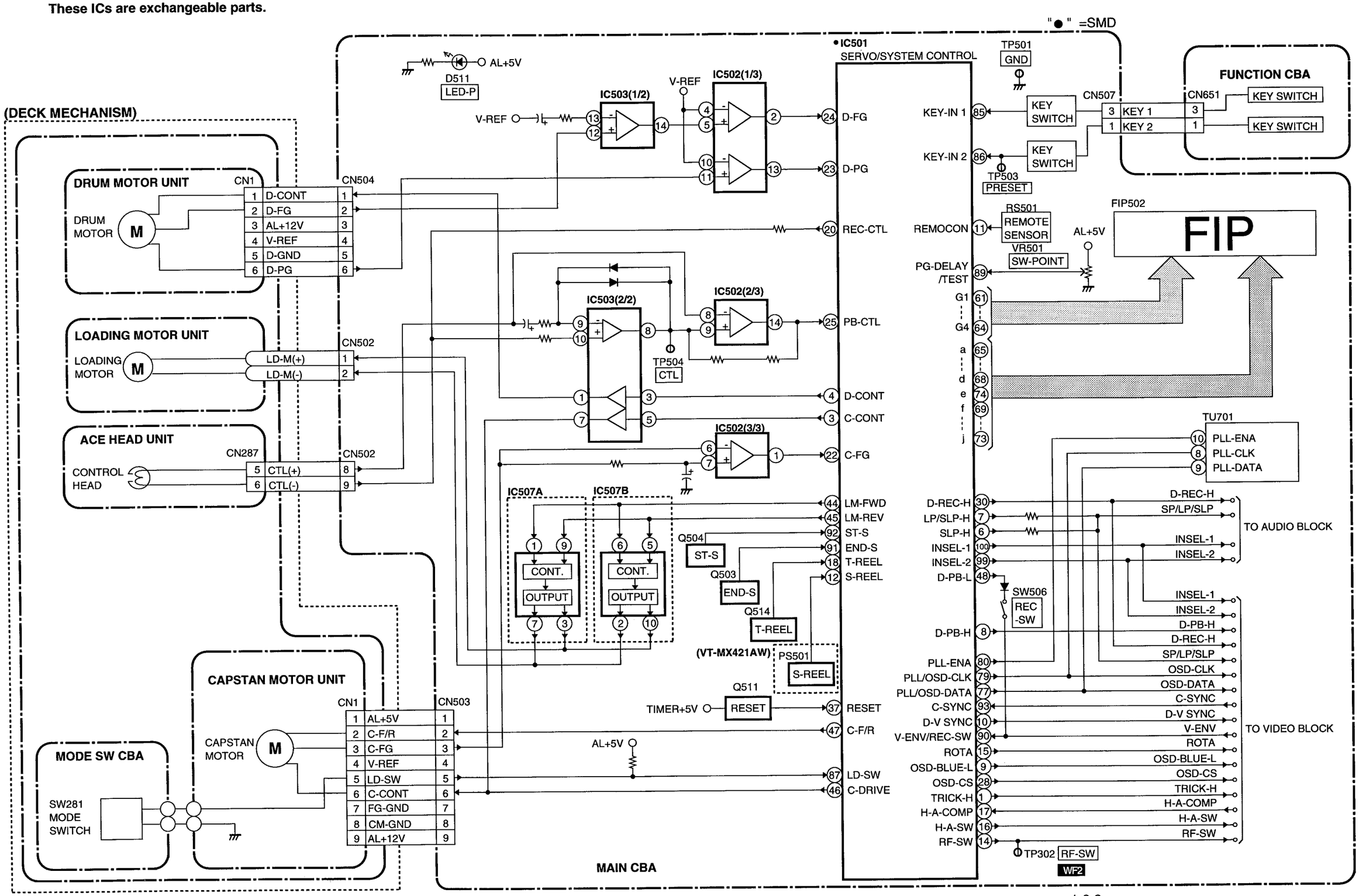


Reference Notes: Play back the Alignment tape and adjust VR501 so that the V-sync front edge of the CH1 video output waveform is out the 6.5H(412.7μs) delayed position from the rising edge of the CH2 head switching pulse waveform.

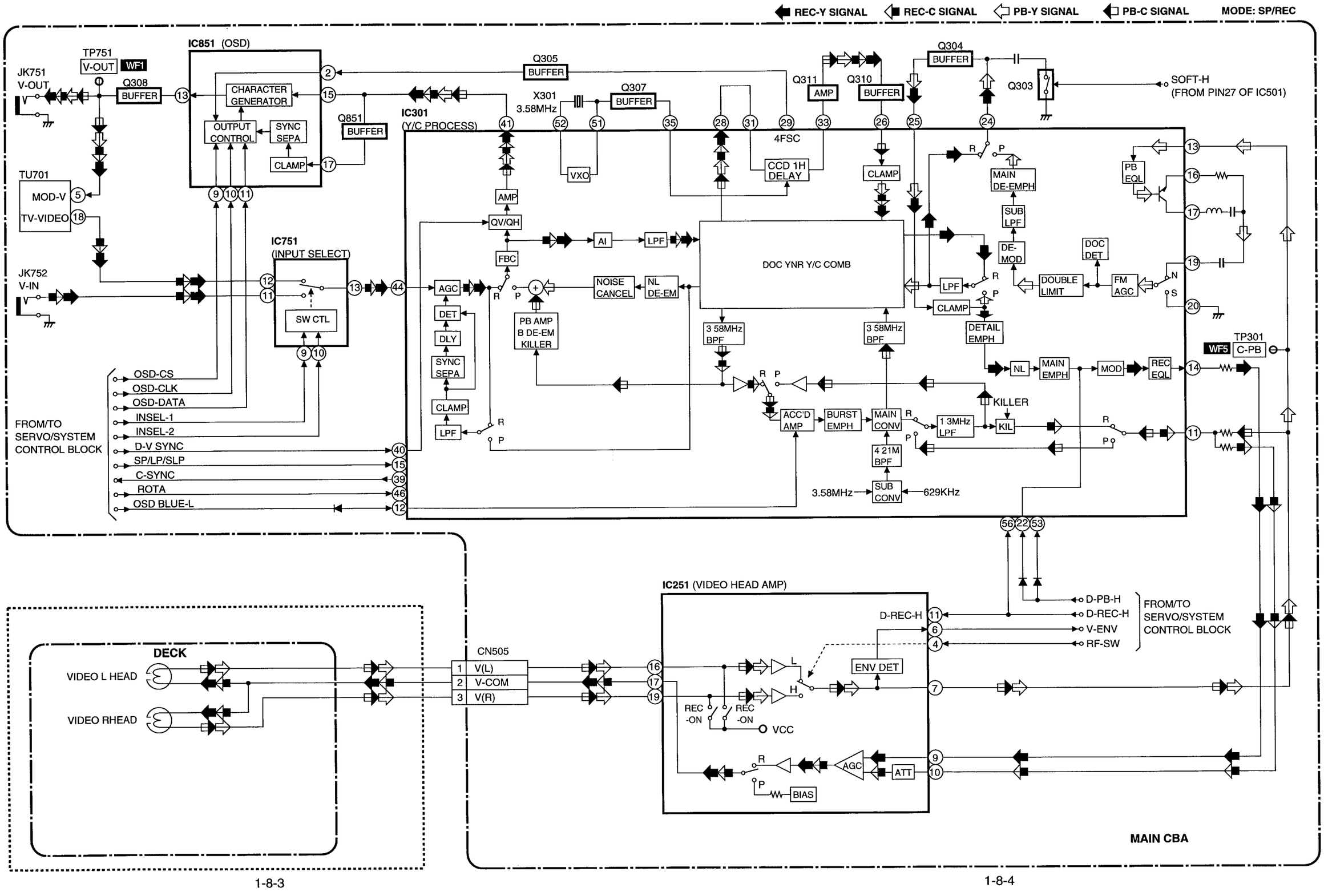
BLOCK DIAGRAMS

Servo/System Control Block Diagram

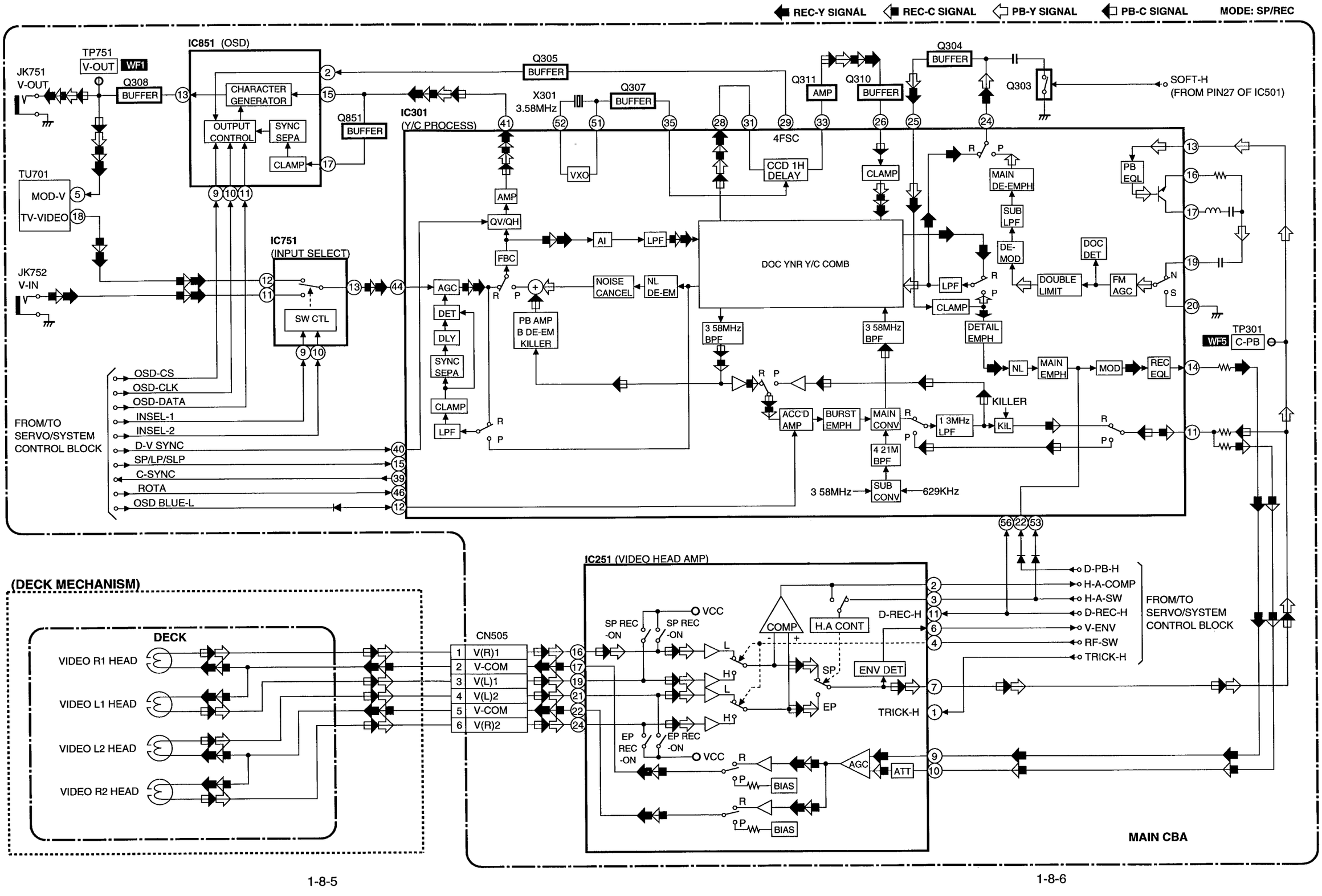
**NOTE: The loading motor drive IC is either IC507A (TA7291S) or IC507B (LB1641).
These ICs are exchangeable parts.**



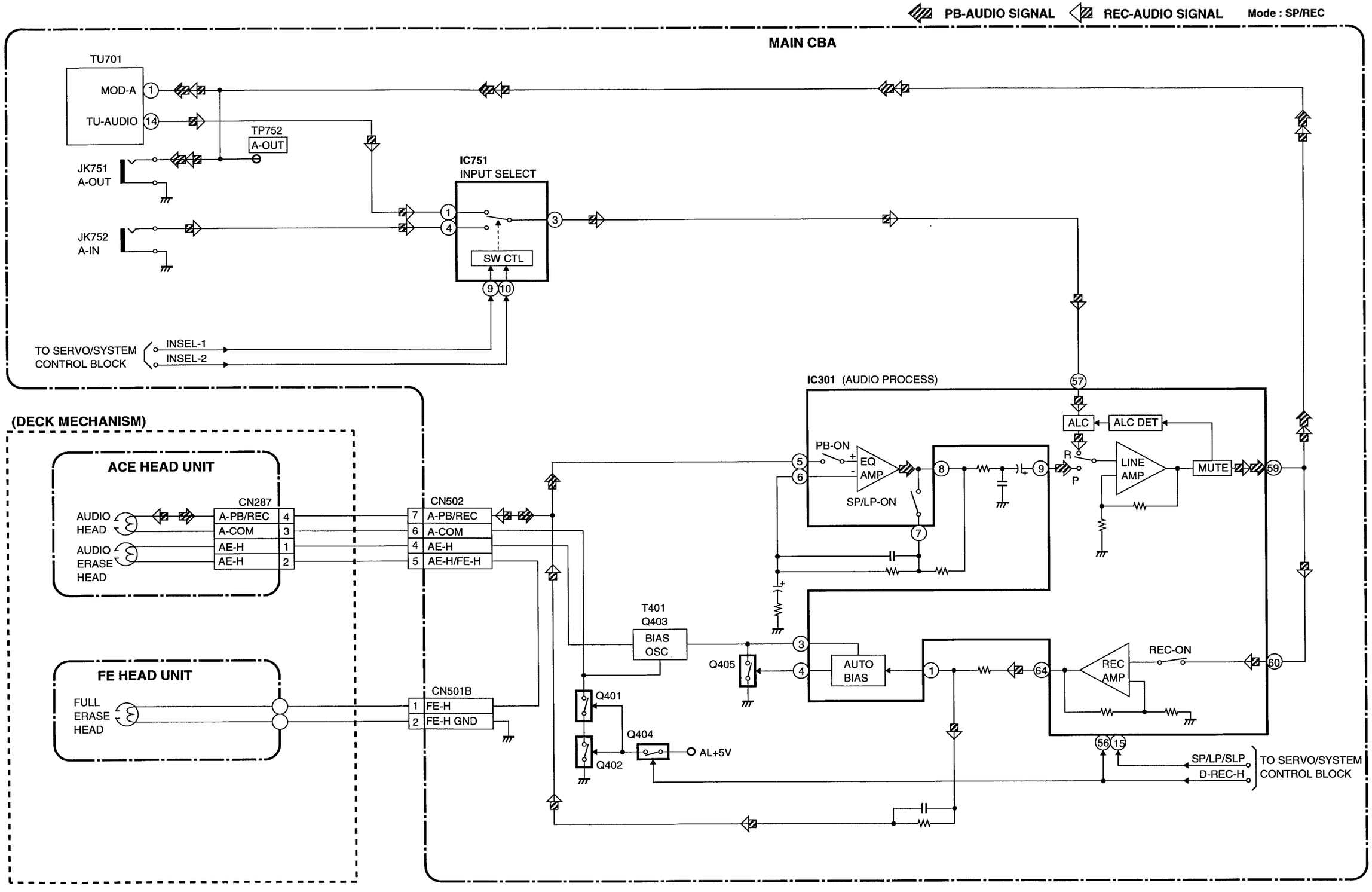
Video Block Diagram (VT-MX221AW)



Video Block Diagram (VT-MX421AW)



Audio Block Diagram

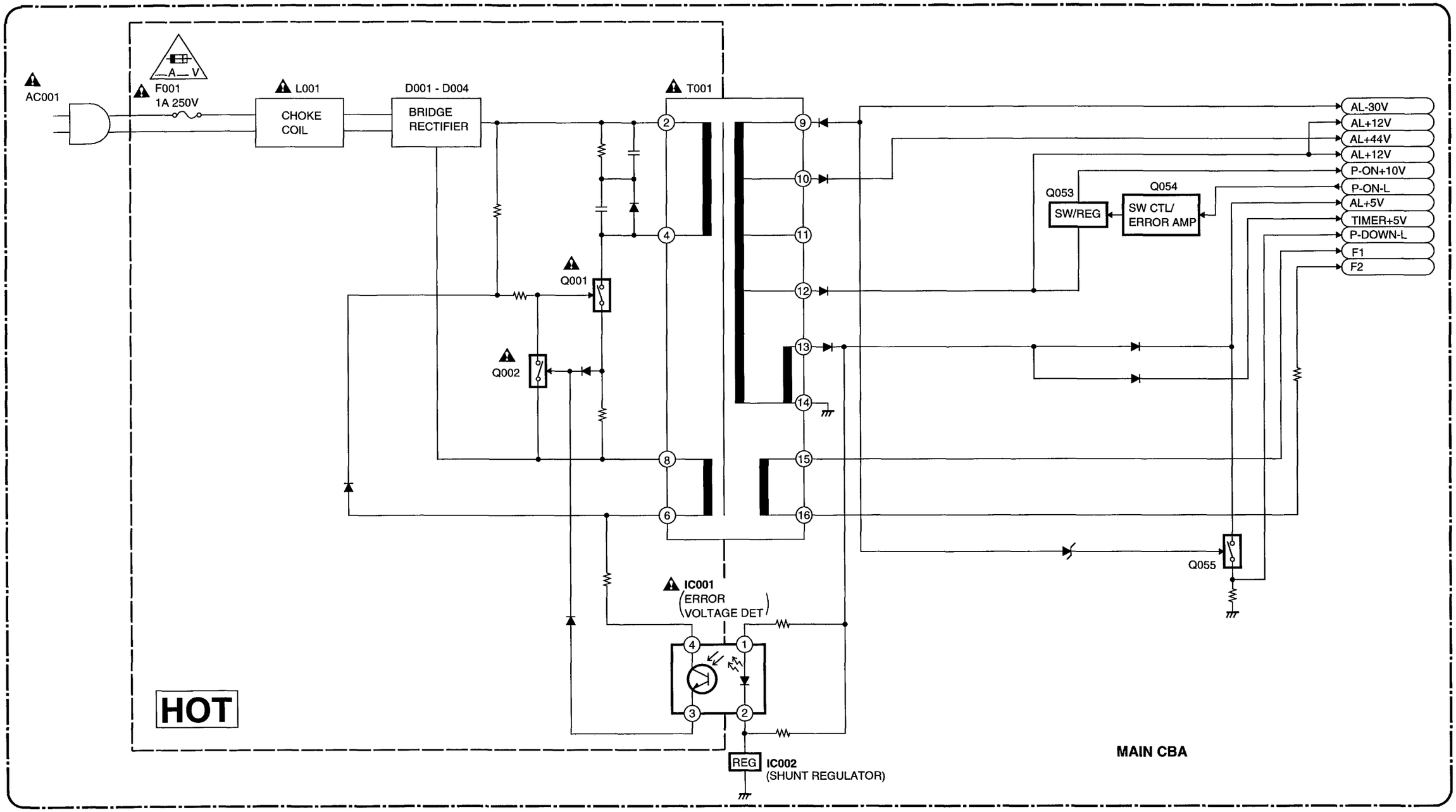


Power Supply Block Diagram

NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE FUSE.
ATTENTION : POUR UNE PROTECTION CONTINUE LES RISQES D'INCELE N'UTILISER QUE DES FUSIBLE DE MEMO TYPE.
RISK OF FIRE-REPLACE FUSE AS MARKED.
"This symbol means fast operating fuse."
"Ce symbole représente un fusible à fusion rapide."

CAUTION !
Fixed voltage power supply circuit is used in this unit.
If Main Fuse (F001) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.



SCHEMATIC DIAGRAMS / CBA'S AND TEST POINTS

Standard Notes

Warning

Many electrical and mechanical parts in this chassis have special characteristics. These characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in this manual and its supplements; electrical components having such features are identified by the mark " ⚠ " in the schematic diagram and the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts that do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

Capacitor Temperature Markings

Mark	Capacity change rate	Standard temperature	Temperature range
(B)	±10%	20°C	-25~+85°C
(F)	+30 -80%	20°C	-25~+85°C
(SR)	±15%	20°C	-25~+85°C
(Z)	+30 -80%	20°C	-10~+70°C

Note:

1. Do not use the part number shown on these drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since these drawings were prepared.
2. All resistance values are indicated in ohms ($K=10^3$, $M=10^6$).
3. Resistor wattages are 1/4W or 1/6W unless otherwise specified.
4. All capacitance values are indicated in μF ($P=10^{-6}\mu F$).
5. All voltages are DC voltages unless otherwise specified.

Capacitors and transistors are represented by the following symbols.

CBA Symbols

(Top View) (Bottom View)

: : Electrolytic Capacitor

(Bottom View)

: Transistor or Digital Transistor

E C B

(Top View)

NPN Transistor

E C B

(Top View)

PNP Transistor

E C B

(Top View)

NPN Digital Transistor

E C B

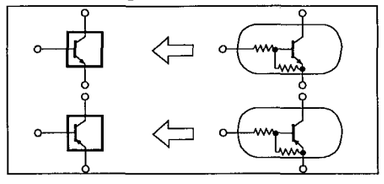
(Top View)

PNP Digital Transistor

E C B

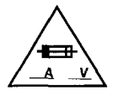
Schematic Diagram Symbols

Digital Transistor



LIST OF CAUTION, NOTES, AND SYMBOLS USED IN THE SCHEMATIC DIAGRAMS ON THE FOLLOWING PAGES:

1. **CAUTION:**



FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQES D'INCELE N'UTILISER QUE DES FUSIBLE DE MEMO TYPE.
RISK OF FIRE-REPLACE FUSE AS MARKED.

2. **CAUTION:**

This symbol means fast operating fuse
Ce symbole représente un fusible à fusion rapide

Fixed Voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F001) is blown, first check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply. Otherwise it may cause some components in the power supply circuit to fail.

3. **Note:**

(1) Do not use the part number shown on the drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since the drawings were prepared.

(2) To maintain original function and reliability of repaired units, use only original replacement parts which are listed with their part numbers in the parts list section of the service manual.

4. Wire Connectors

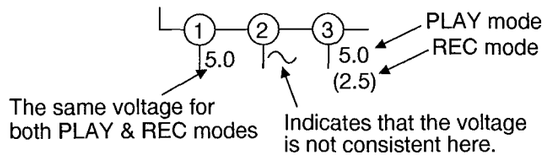
(1) Prefix symbol "CN" means "connector." (Can disconnect and reconnect)

(2) Prefix symbol "CL" means "wire-solder holes of the PCB." (Wire is soldered directly.)

5. Note: Mark "•" is a leadless (chip) component.

6. Mode: SP/REC

7. Voltage indications for PLAY and REC modes on the schematics are as shown below:



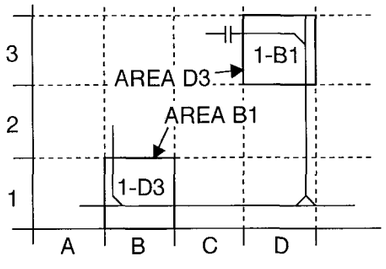
Unit: Volts

8. How to read converged lines

1-D3
Distinction Area
Line Number
(1 to 3 digits)

Examples:

1. "1-D3" means that line number "1" goes to area "D3".
2. "1-B1" means that line number "1" goes to area "B1".



9. Test Point Information

: Indicates a test point with a jumper wire across a hole in the PCB.

: Used to indicate a test point with a component lead on foil side.

: Used to indicate a test point with no test pin.

: Used to indicate a test point with a test pin.

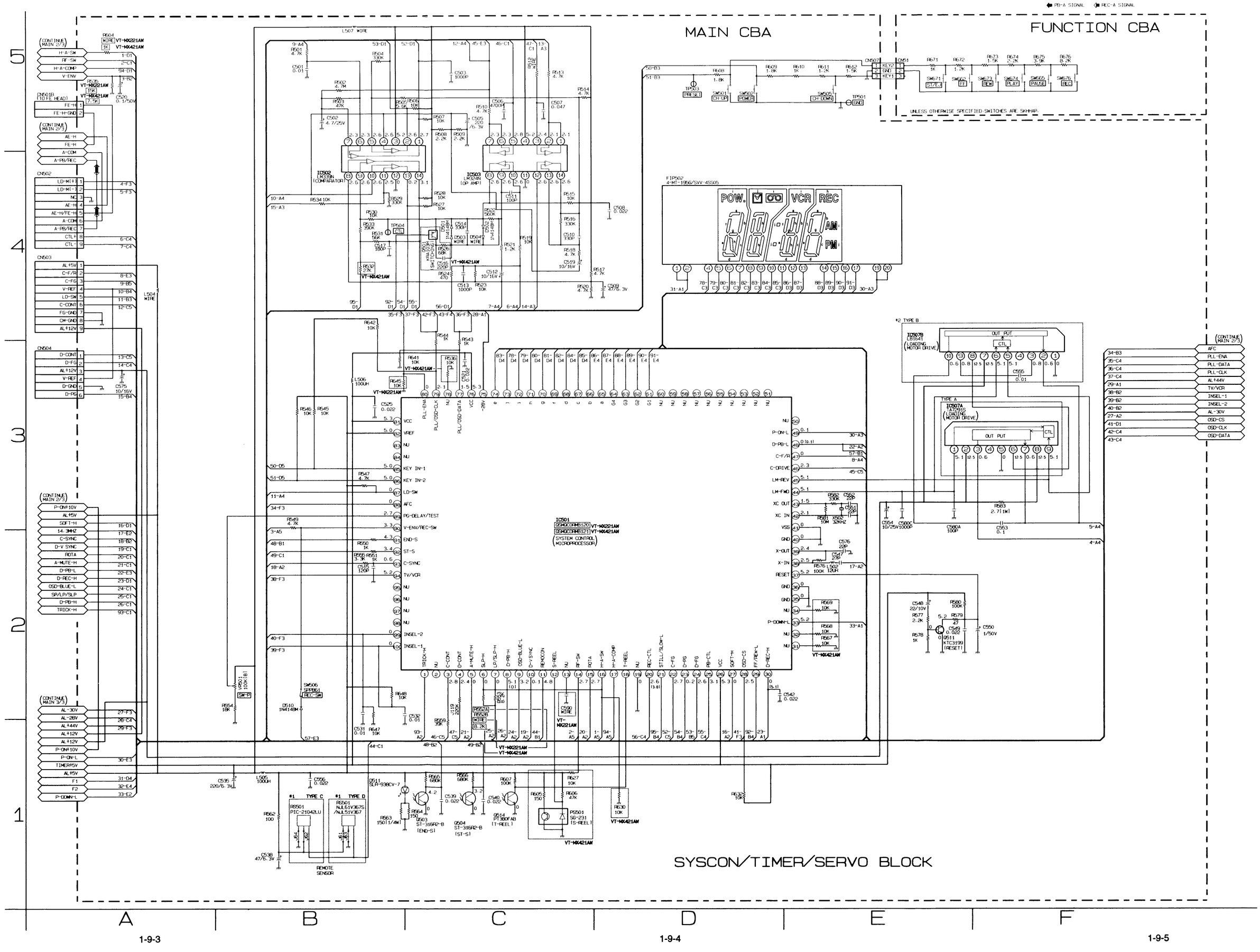
Main 1/3 Schematic Diagram

＊1 Note: The remote receiver is either type C or type D.
These two types are exchangeable and can be equally used whichever the model is.
The difference between type C and type D is shown in the table below.

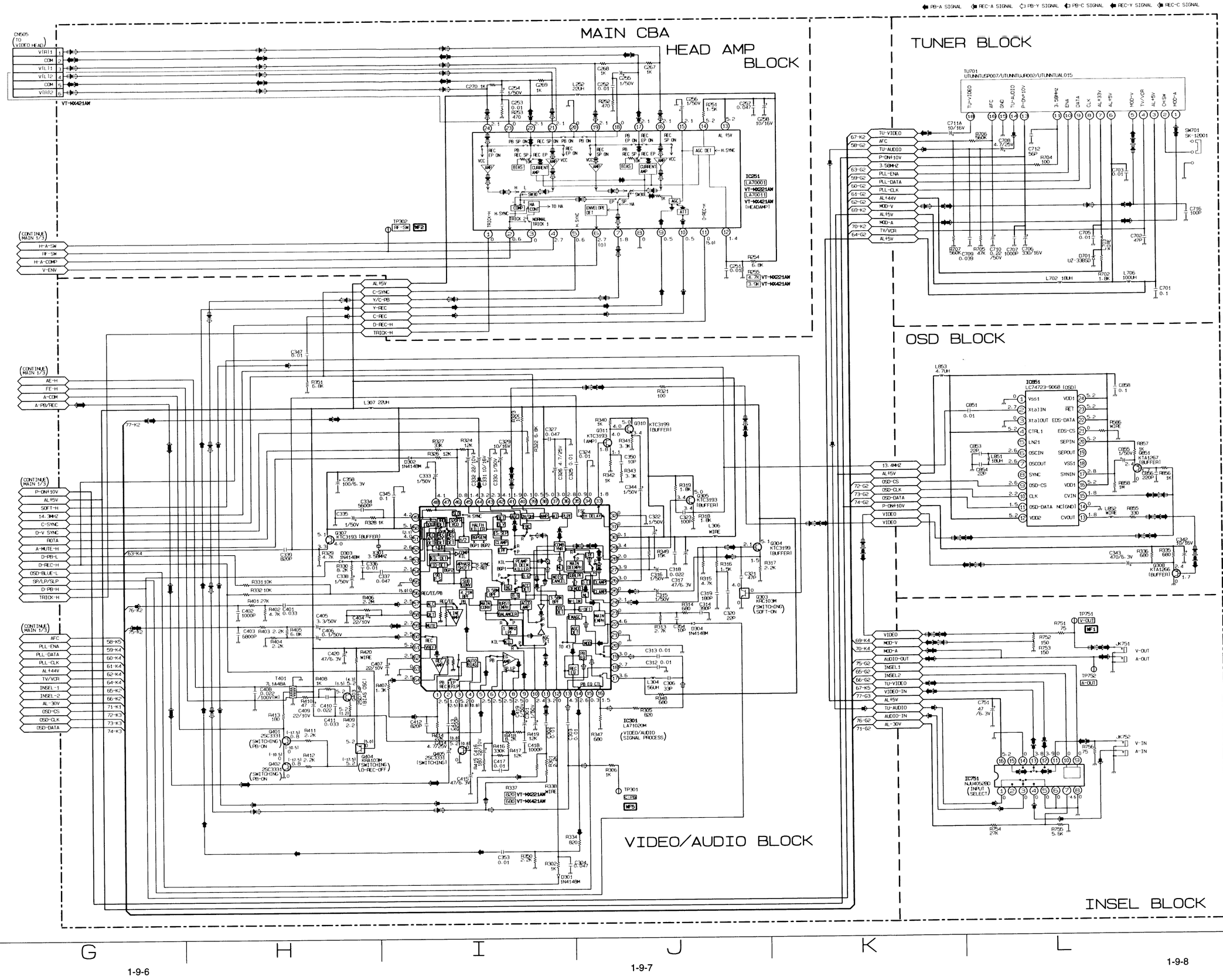
	RS501	J61	J62	J63	J64
Type C	PIC-21042LU	Not Used	WIRE	Not Used	WIRE
Type D	NJL61V367S NJL51V367	WIRE	Not Used	WIRE	Not Used

＊2 Note: The loading motor drive IC is either type A or type B.
These two types are exchangeable and can be equally used whichever the model is. The difference between type A and type B is shown in the table below.

	IC507A	IC507B	C555
Type A	TA7291S	Not Used	Not Used
Type B	Not Used	LB1641	0.01uF

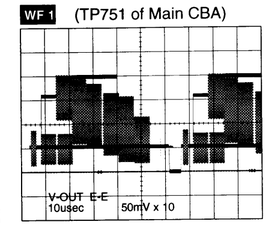


Main 2/3 Schematic Diagram

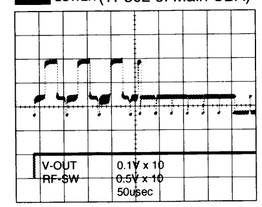


WAVEFORMS

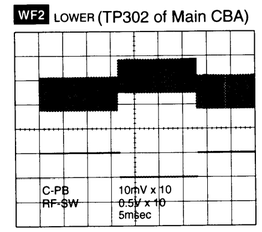
WF1 (TP751 of Main CBA)



WF1 UPPER (TP751 of Main CBA)
WF2 LOWER (TP302 of Main CBA)



WF5 UPPER (TP301 of Main CBA)
WF2 LOWER (TP302 of Main CBA)

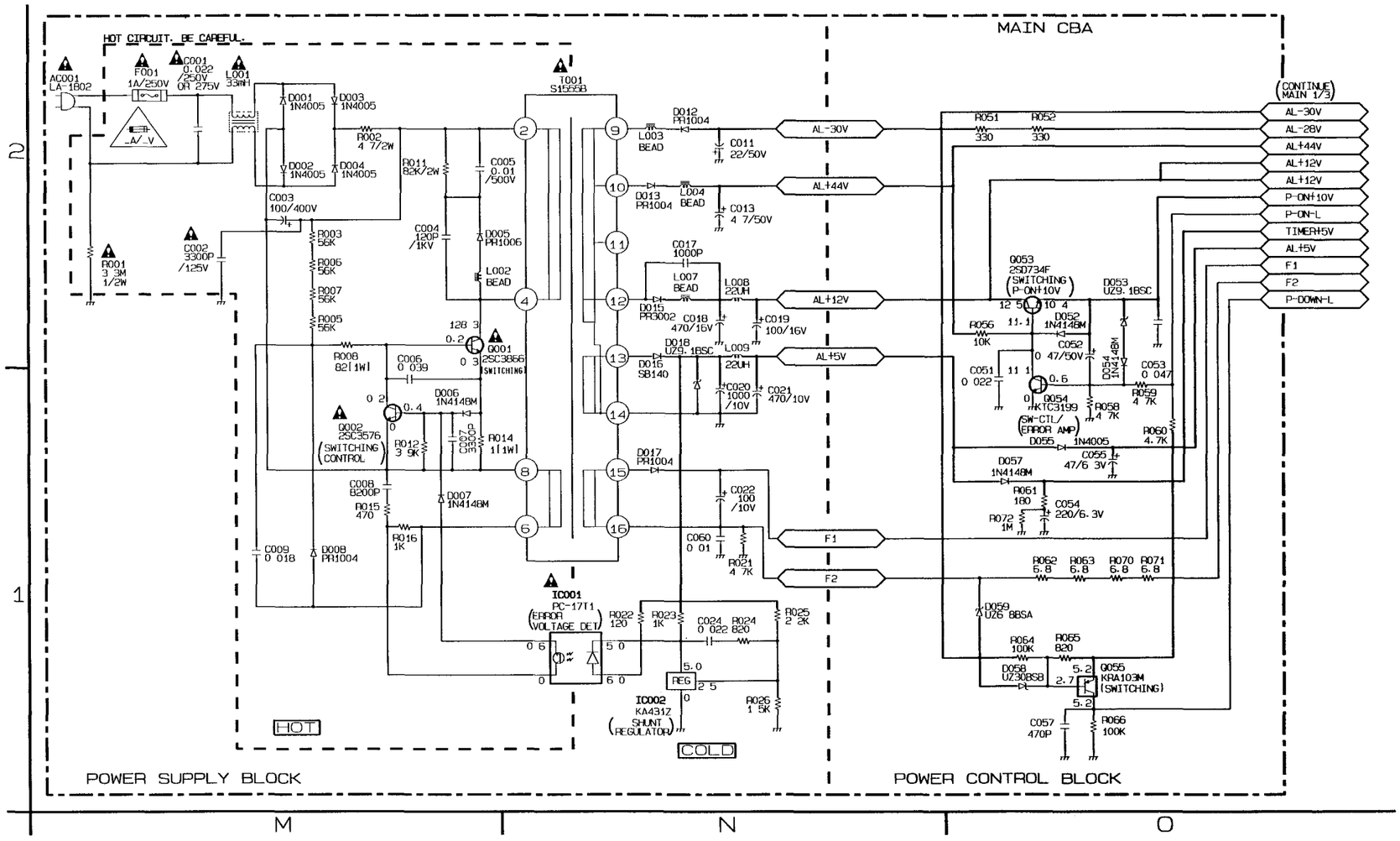


Main 3/3 Schematic Diagram

NOTE .
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

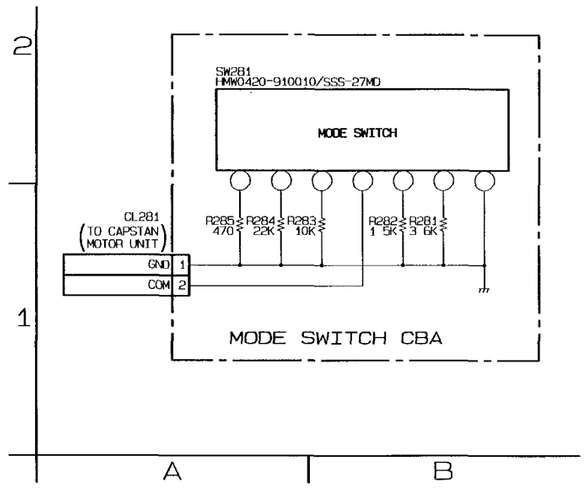
CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE FUSE.
ATTENTION : POUR UNE PROTECTION CONTINUE LES RISQES D'INCELE N'UTILISER QUE DES FUSIBLE DE MEMO TYPE.
RISK OF FIRE-REPLACE FUSE AS MARKED.
"This symbol means fast operating fuse."
"Ce symbole repròsente un fusible à fusion rapide."

CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit
If Main Fuse (F001) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.



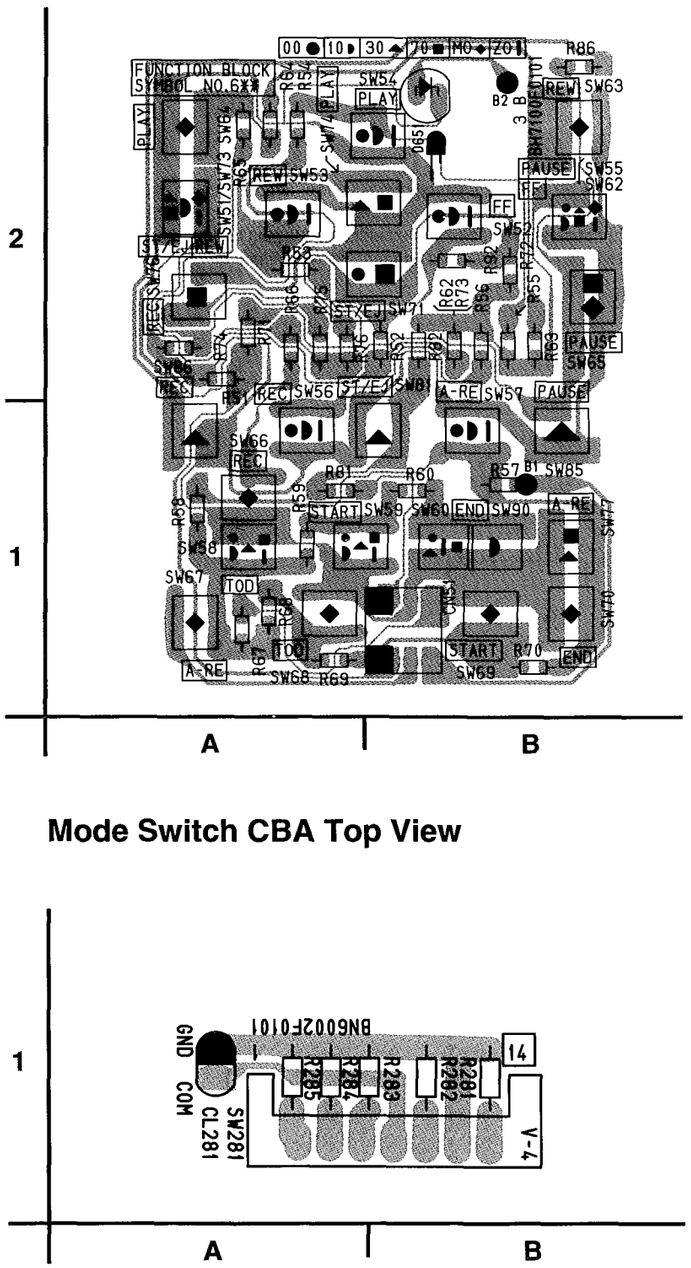
1-9-9

Mode Switch Schematic Diagram

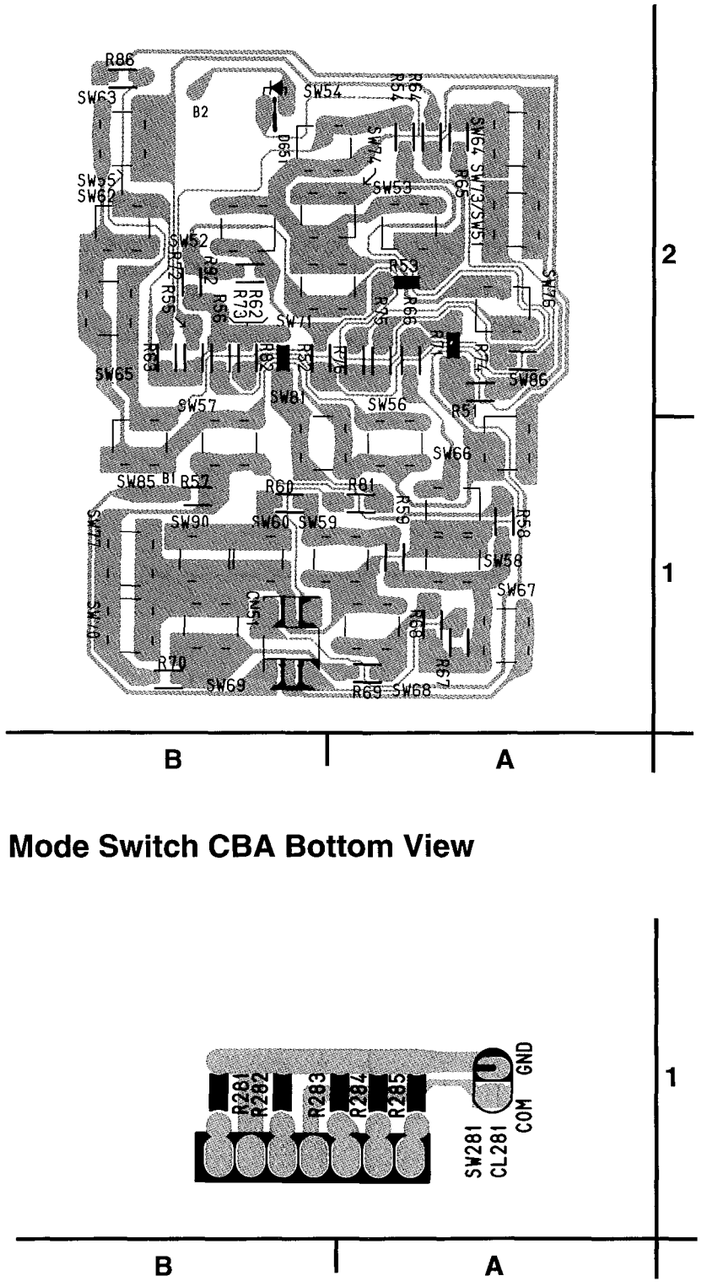


1-9-10

Function CBA Top View



Function CBA Bottom View



Mode Switch CBA Top View

Mode Switch CBA Bottom View

NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE FUSE.
ATTENTION : POUR UNE PROTECTION CONTINUE LES RISQES D'INCELE N'UTILISER QUE DES FUSIBLE DE MEMO TYPE.
RISK OF FIRE-REPLACE FUSE AS MARKED.
"This symbol means fast operating fuse."
"Ce symbole represente un fusible à fusion rapide."

CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F001) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.

TP751
V-OUT
WF1

BH7100F01013

TP752
A-OUT

TP302
RF-SW
WF2

VR501
SW-P

TP301
C-PB
WF5

TP504
CTL

TP501
GND

TP502
S-INH

B BH7100F0101

DIP

Main CBA Bottom View

NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.

CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD,
REPLACE ONLY WITH THE SAME TYPE FUSE.
ATTENTION : POUR UNE PROTECTION CONTINUE LES RISQES D'INCELE N'UTILISER QUE DES FUSIBLE DE MEMO TYPE.
RISK OF FIRE-REPLACE FUSE AS MARKED.
"This symbol means fast operating fuse."
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CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit.
If Main Fuse (F001) is blown, check to see that all components in the power supply circuit are not defective before you connect the AC plug to the AC power supply.
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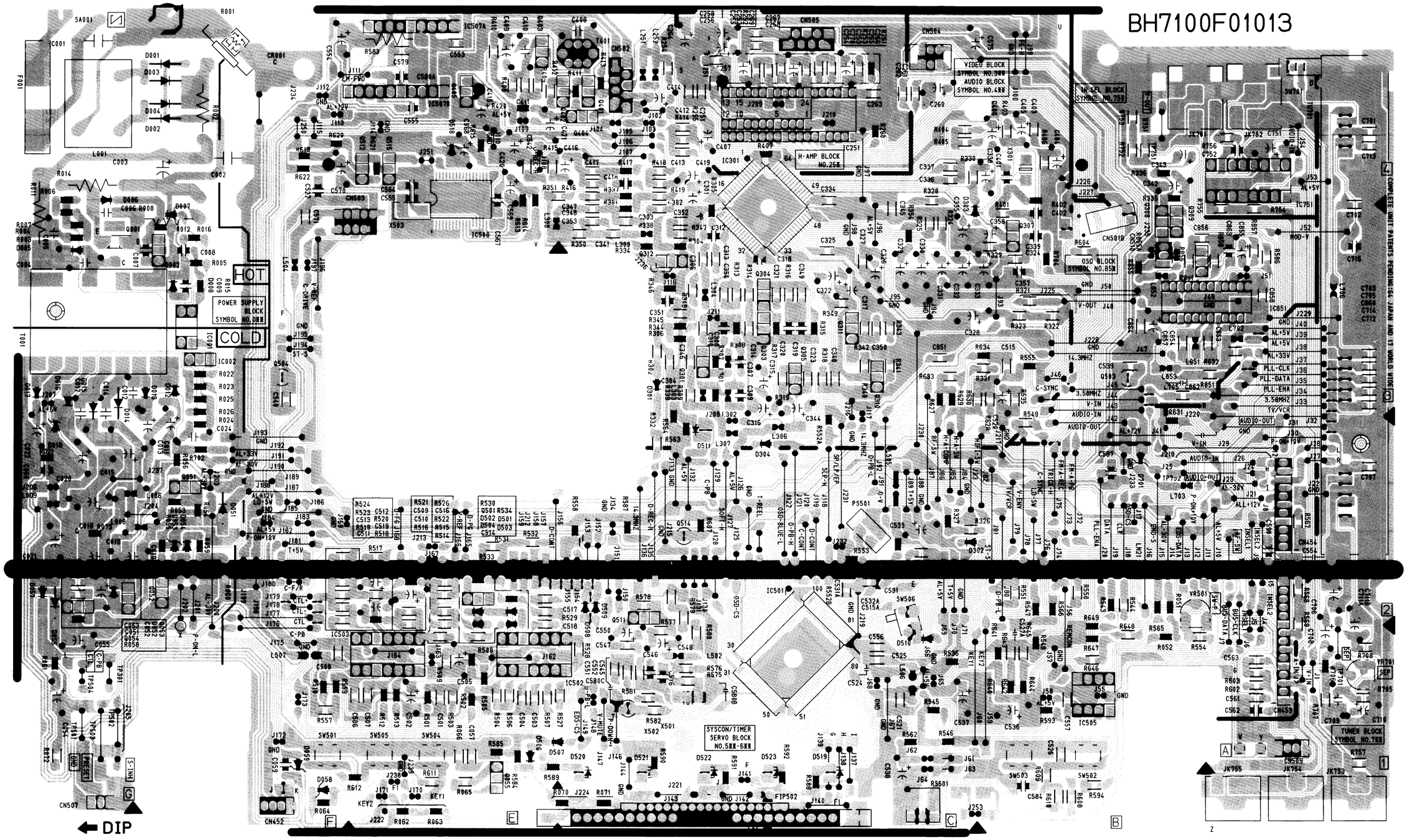
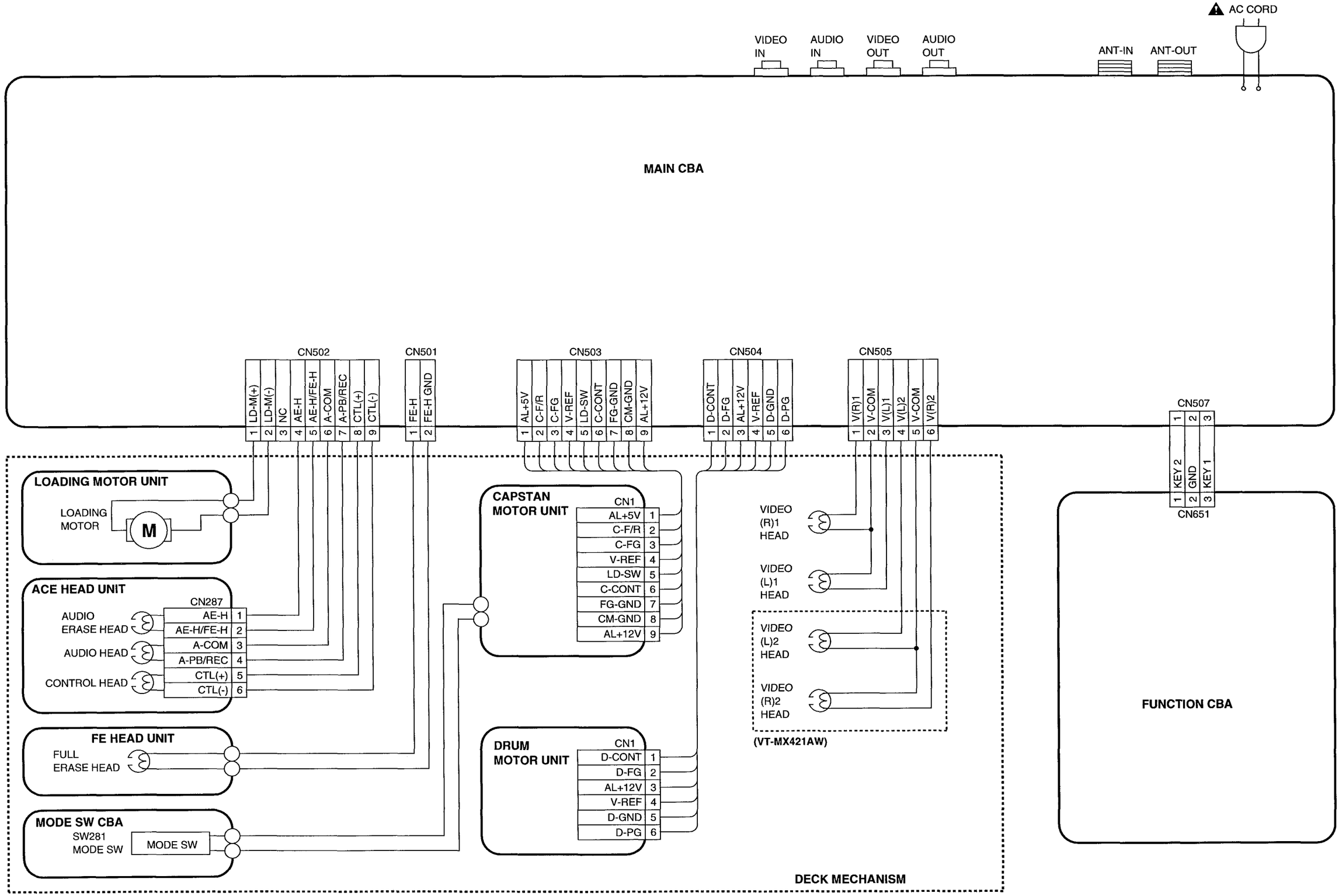


WIRING DIAGRAM



SYSTEM CONTROL TIMING CHARTS

Model No, : VT-MX221AW

Mode SW : LD-SW

LD-SW Position detection A/D Input voltage Limit (Calculated voltage)	Symbol
3.76V~4.50V (4.12V)	EJ
4.51V~5.00V (5.00V)	CL
0.00V~0.25V (0.00V)	SB
1.06V~1.50V (1.21V)	TL
0.66V~1.05V (0.91V)	FB
1.99V~2.60V (2.17V)	SF
1.51V~1.98V (1.80V)	AU
3.20V~3.75V (3.40V)	AL
4.51V~5.00V (5.00V)	GC
2.61V~3.19V (2.97V)	RS

Note:

EJ ⟶ RS : Loading FWD (LM-FWD "H", LM-REV "L")

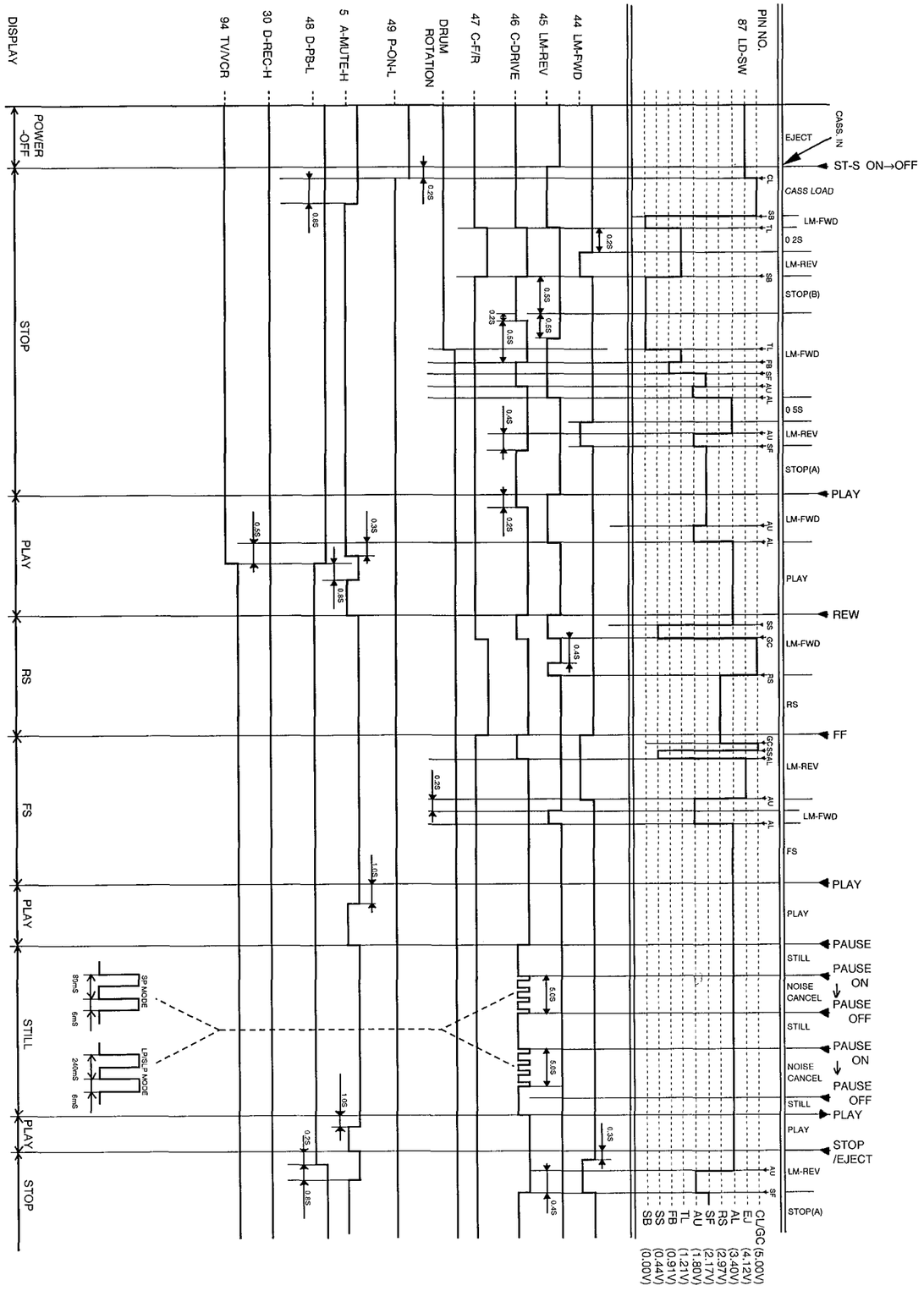
RS ⟶ EJ : Loading REV (LM-FWD "L", LM-REV "H")

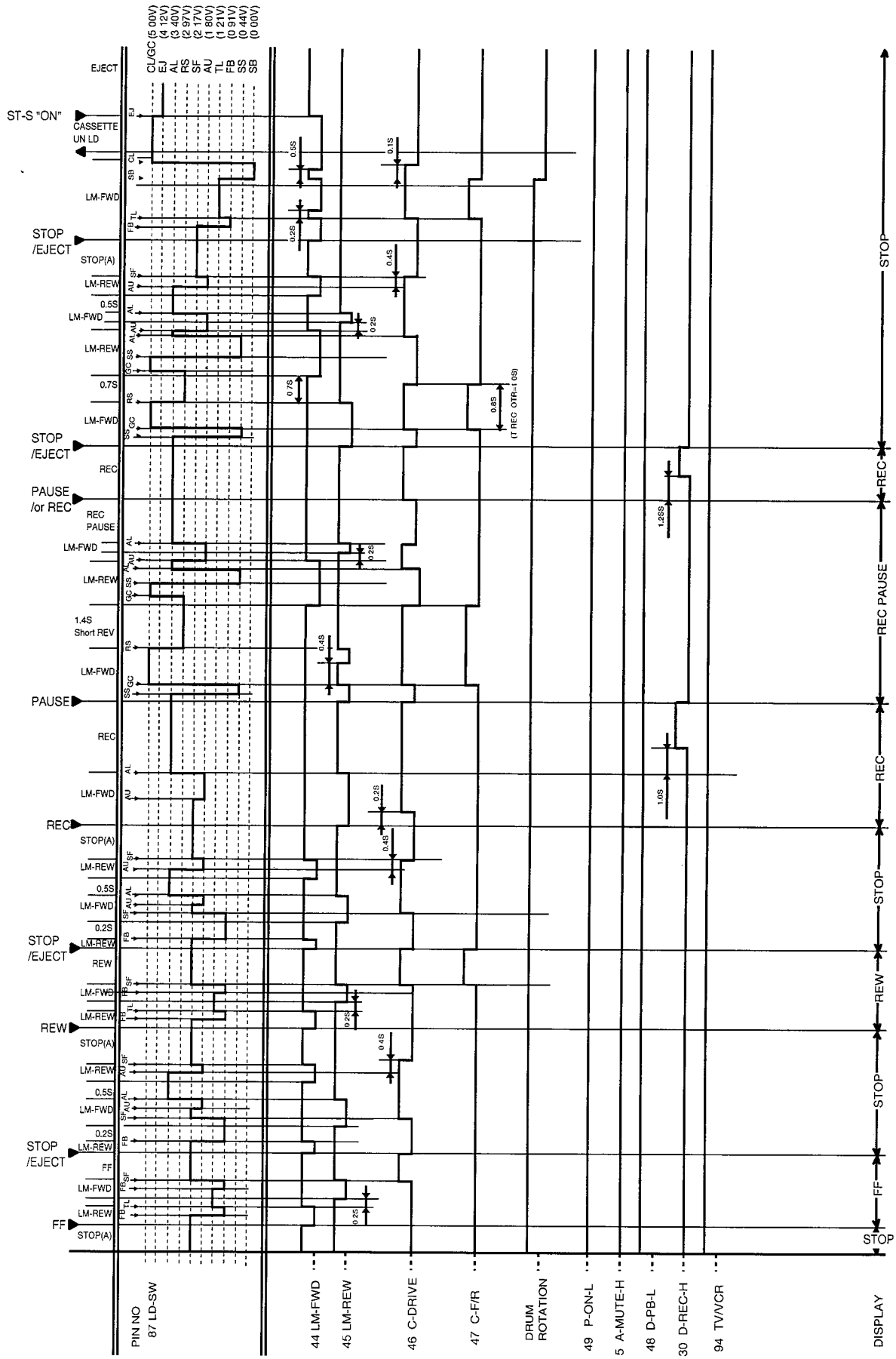
Stop (A) = Loading

Stop (B) = Unloading

Note :

Symbol	Loading Status
EJ	Eject
CL	Eject ~ REW Reel
SB	REW Reel ~ Stop(B)
TL	Stop(B) ~ Brake Cancel
FB	Brake Cancel ~ FF / REW
SF	FF / REW ~ Stop(A)
AU	Stop(A) ~ Play / REC
AL	Play / REC ~ Still / Slow
GC	Capstan Reversal ~ RS (REW Search)
RS	RS (REW Search)




CL/GC (5.00V)
EJ (4.12V)
AL (3.40V)
RS (2.97V)
SF (2.17V)
AU (1.80V)
TL (1.21V)
FB (0.91V)
SS (0.44V)
SB (0.00V)
EJECT
ST-S "ON"
CASSETTE UN LD
LM-FWD
STOP /EJECT
STOP(A)
LM-REW
0.5S
0.7S
1.4S Short REV
PAUSE /or REC
REC PAUSE
REC
REW
FF
0.1S
0.2S
0.4S
0.8S
(T REC OTR=1.0S)
1.2SS
1.0S
PIN NO
87 LD-SW
44 LM-FWD
45 LM-REW
46 C-DRIVE
47 C-F/R
DRUM ROTATION
49 P-ON-L
5 A-MUTE-H
48 D-PB-L
30 D-REC-H
94 TV/VCR
DISPLAY
STOP
REC
REC PAUSE
STOP
REC
STOP
REW
STOP
FF
STOP

Mode SW : LD-SW

LD-SW Position detection A/D Input voltage Limit (Calculated voltage)	Symbol
3.76V~4.50V (4.12V)	EJ
4.51V~5.00V (5.00V)	CL
0.00V~0.25V (0.00V)	SB
1.06V~1.50V (1.21V)	TL
0.66V~1.05V (0.91V)	FB
1.99V~2.60V (2.17V)	SF
1.51V~1.98V (1.80V)	AU
3.20V~3.75V (3.40V)	AL
0.26V~0.65V (0.44V)	SS
4.51V~5.00V (5.00V)	GC
2.61V~3.19V (2.97V)	RS

Note:

EJ ⟶ RS : Loading FWD (LM-FWD "H", LM-REV "L")

RS ⟶ EJ : Loading REV (LM-FWD "L", LM-REV "H")

Stop (A) = Loading

Stop (B) = Unloading

Note :

Symbol	Loading Status
EJ	Eject
CL	Eject ~ REW Reel
SB	REW Reel ~ Stop(B)
TL	Stop(B) ~ Brake Cancel
FB	Brake Cancel ~ FF / REW
SF	FF / REW ~ Stop(A)
AU	Stop(A) ~ Play / REC
AL	Play / REC ~ Still / Slow
SS	Still / Slow ~ Capstan Reversal
GC	Capstan Reversal ~ RS (REW Search)
RS	RS (REW Search)

Still/Slow Control

Frame Advance Timing Chart

1) SP MODE

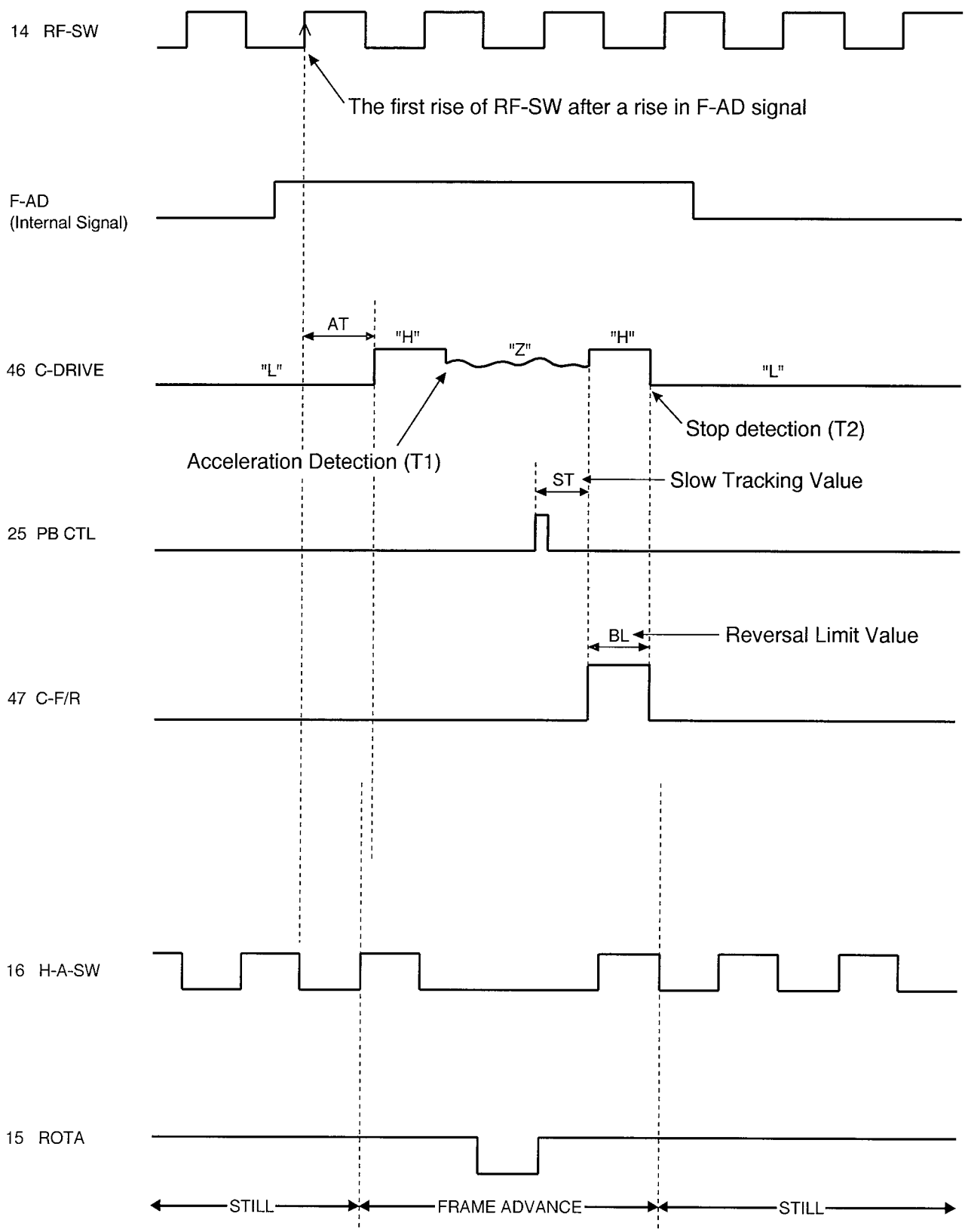


Fig.1

2) LP/SLP MODE

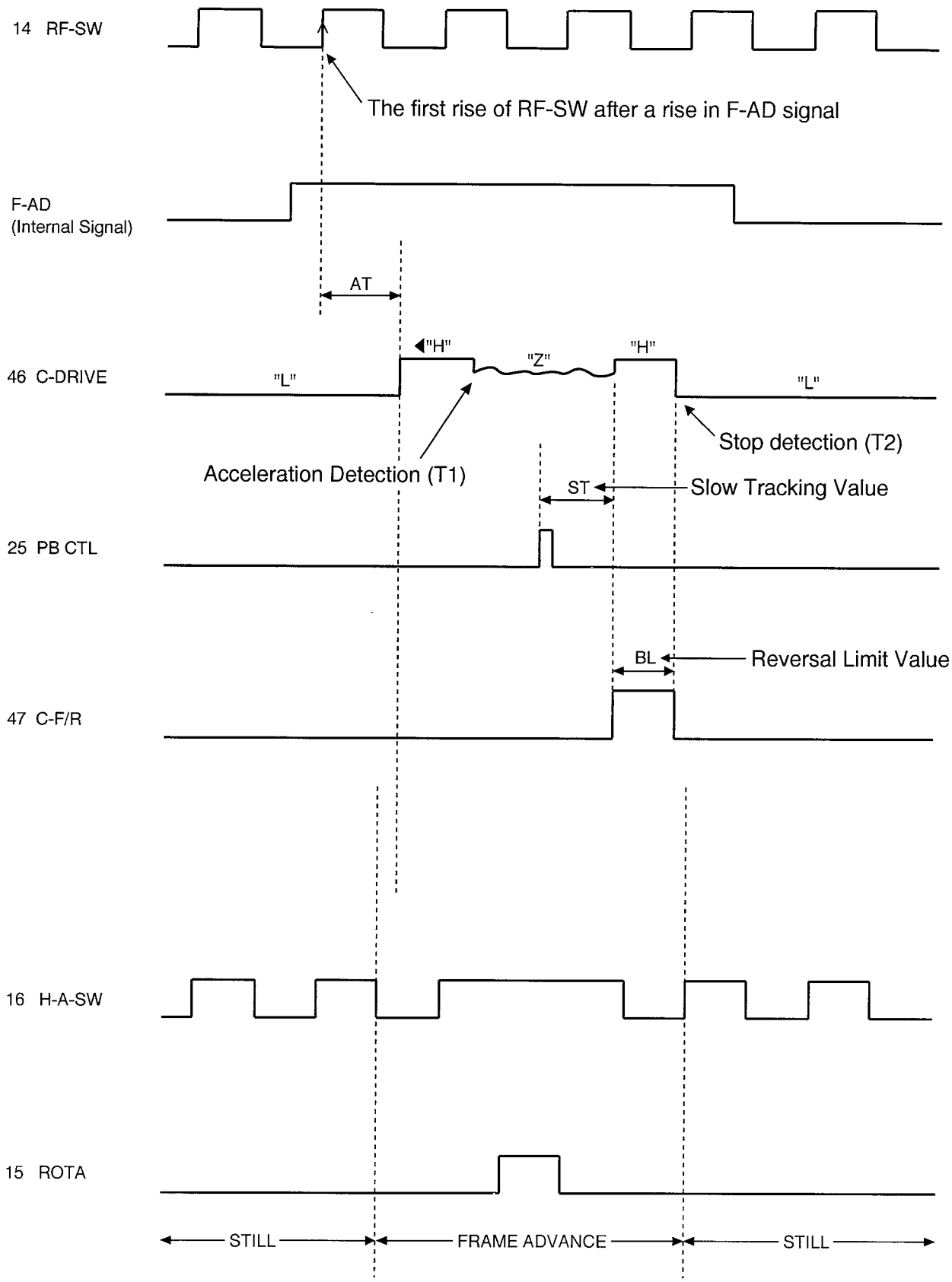


Fig.2

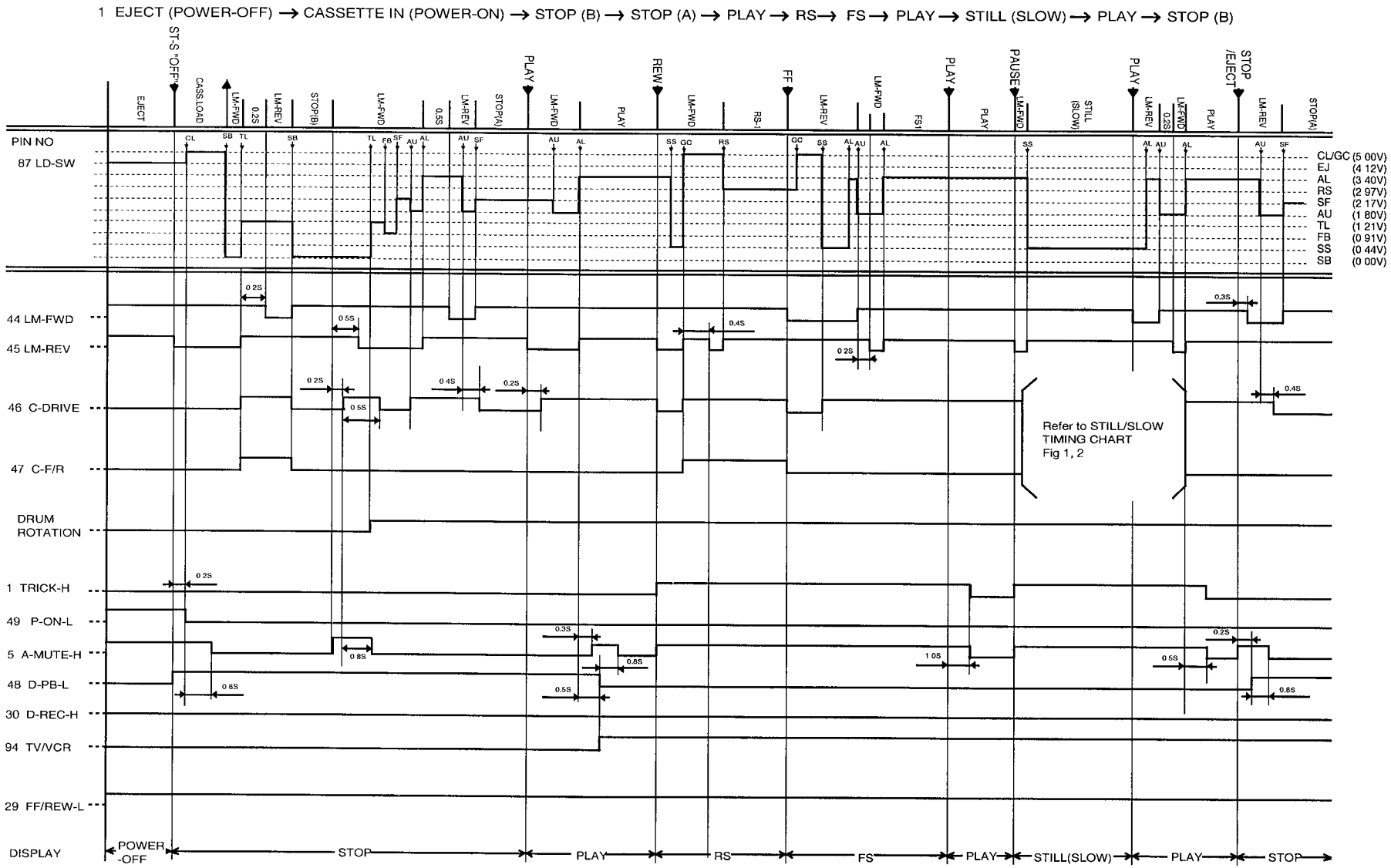

1 EJECT (POWER-OFF) → CASSETTE IN (POWER-ON) → STOP (B) → STOP (A) → PLAY → RS → FS → PLAY → STILL (SLOW) → PLAY → STOP (B)
ST-S "OFF"
EJECT
CASS LOAD
LM-FWD
0.2S
LM-REV
STOP(B)
LM-FWD
0.5S
LM-REV
STOP(A)
PLAY
LM-FWD
PLAY
REW
LM-FWD
RS
FF
LM-REV
LM-FWD
FS
PLAY
PLAY
PAUSE
LM-FWD
STILL (SLOW)
PLAY
LM-REV
0.2S
LM-FWD
PLAY
STOP /EJECT
LM-REV
STOP(A)
PIN NO
87 LD-SW
CL/GC (5 00V)
EJ (4 12V)
AL (3 40V)
RS (2 97V)
SF (2 17V)
AU (1 80V)
TL (1 21V)
FB (0 91V)
SS (0 44V)
SB (0 00V)
44 LM-FWD
45 LM-REV
46 C-DRIVE
47 C-F/R
DRUM ROTATION
1 TRICK-H
49 P-ON-L
5 A-MUTE-H
48 D-PB-L
30 D-REC-H
94 TV/VCR
29 FF/REW-L
DISPLAY
POWER -OFF
STOP
PLAY
RS
FS
PLAY
STILL(SLOW)
PLAY
STOP
Refer to STILL/SLOW TIMING CHART Fig 1, 2

Fig.3

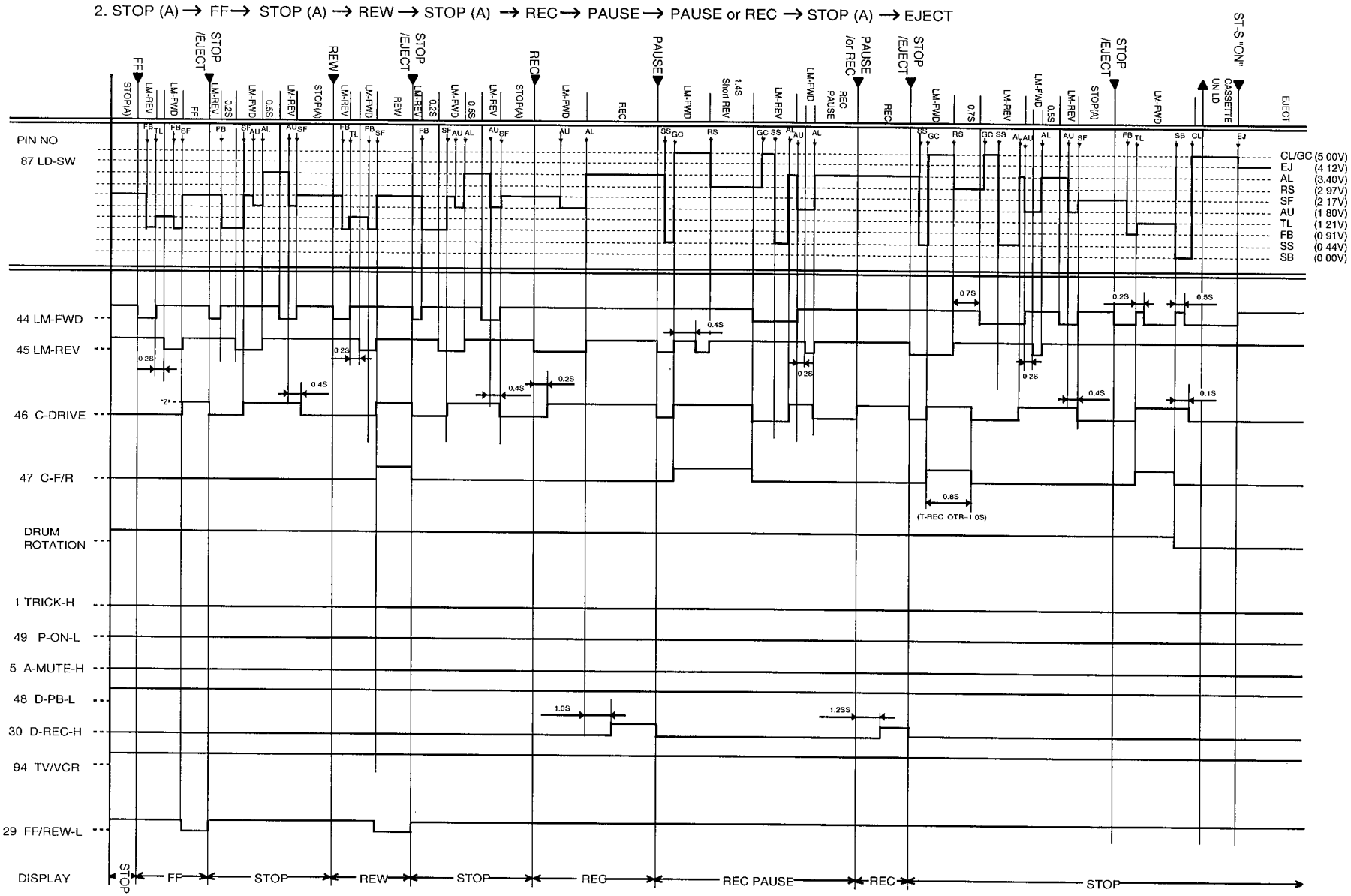

2. STOP (A) → FF → STOP (A) → REW → STOP (A) → REC → PAUSE → PAUSE or REC → STOP (A) → EJECT
ST-S "ON"
PIN NO
87 LD-SW
CL/GC (5 00V)
EJ (4 12V)
AL (3.40V)
RS (2 97V)
SF (2 17V)
AU (1 80V)
TL (1 21V)
FB (0 91V)
SS (0 44V)
SB (0 00V)
44 LM-FWD
45 LM-REV
46 C-DRIVE
47 C-F/R
DRUM ROTATION
1 TRICK-H
49 P-ON-L
5 A-MUTE-H
48 D-PB-L
30 D-REC-H
94 TV/VCR
29 FF/REW-L
DISPLAY
STOP
FF
STOP
REW
STOP
REC
REC PAUSE
REC
STOP
0.8S
(T-REC OTR=1 0S)

Fig.4

IC PIN FUNCTION DESCRIPTIONS

IC501 (SERVO / SYSTEM CONTROL IC)

"H" ≥ 4.5V, "L" ≤ 1.0V

Pin No.	IN/ OUT	Signal Name	Function	Active Level
1	OUT	TRICK-H	Special Play Back "H" Output	H
2	–	N.U.	Not used	–
3	OUT	C-CONT	Capstan Motor Control Signal	PWM
4	OUT	D-CONT	Drum Motor Control Signal	PWM
5	OUT	A-MUTE-H	Audio Mute Signal Output	H
6	OUT	SLP-H	SLP-H Output	H/L
7	OUT	LP/ SLP-H	LP/EP-H Output	H/L
8	OUT	D-PB-H	D-PB-H Output	H
9	OUT	OSD-BLUE-L	Blue Back Control Signal Output (ON= "L")	L
10	OUT	D-V SYNC	Dummy V-Sync Output	H/Hi-Z
11	IN	REMOC-ON	Remote Control Input Signal	L
12	IN	S-REEL	Supply Reel Rotation Input Signal	PULSE
13	–	N.U.	Not used	–
14	OUT	RF-SW	Video Head Switching Pulse	H/L
15	OUT	ROTA	Color Phase Rotary Changeover Signal	H/L
16	OUT	H-A-SW	H-A-SW Output	H/L
17	IN	H-A-COMP	Head Amp Comparator Input	H/L
18	IN	T-REEL	Take Up Reel Rotation Input Signal	PULSE
19	–	N.U.	Not used	–
20	OUT	REC-CTL	Capstan Motor Control Pulse Output at Rec Mode	H/L
21	OUT	STILL / SLOW-L	STILL/SLOW "L" Output	H/L
22	IN	C-FG	Capstan Frequency Generator Signal Input	PULSE
23	IN	D-PG	Drum Pulse Generator Input	PULSE
24	IN	D-FG	Drum Frequency Generator Input	PULSE
25	IN	PB-CTL	Capstan Motor Control Pulse Input at Playback Mode	PULSE
26	–	Vcc	Vcc	–
27	OUT	SOFT-H	* Rental Position Mode Switching Signal (Rental Position = "H"	H
28	OUT	OSD-CS	On Screen Display IC Control Chip Select Signal	L
29	OUT	FF/REW-L	FF/REW "L" Output	L
30	OUT	D-REC-H	D-REC Output	H
31	–	N.U.	Not used	–
32	–	N.U.	Not used	–
33	IN	P-DOWN-L	Power Down Detection Input	L
34	–	N.U.	Not used	–
35	–	GND	–	–
36	–	GND	–	–
37	IN	RESET	System Reset Signal (Usually= "H"/Reset= "L")	L
38	–	X-IN	Main Clock 14.31818MHz	–
39	–	X-out	Main Clock	–
40	–	GND	–	–
41	–	Vss	Vss	–
42	–	XC IN	Sub Clock 32 KHz	–
43	–	XC OUT	Sub Clock 32 KHz	–
44	OUT	LM-FWD	Loading Motor Forward Control Output	H
45	OUT	LM-REV	Loading Motor Reverse Control Output	H
46	OUT	C-DRIVE	Capstan Drive Output	H/Hi-Z
47	OUT	C-F/R	Capstan F/R Output	H/L

---- This function enables you to improve the picture quality when playing back worn cassettes such as those rented from a video shop.

Pin No.	IN/ OUT	Signal Name	Function	Active Level
48	OUT	D-PB-L	D-PB-L Output	L
49	OUT	P-ON-L	Power-ON Control Signal	L
50	–	N.U.	Not used	–
51	–	N.U.	Not used	–
52	–	N.U.	Not used	–
53	–	N.U.	Not used	–
54	–	N.U.	Not used	–
55	–	N.U.	Not used	–
56	–	N.U.	Not used	–
57	–	N.U.	Not used	–
58	–	N.U.	Not used	–
59	–	N.U.	Not used	–
60	–	N.U.	Not used	–
61	OUT	G1	Display Digit Output	H
62	OUT	G2	Display Digit Output	H
63	OUT	G3	Display Digit Output	H
64	OUT	G4	Display Digit Output	H
65	OUT	a	Display Digit Output	H
66	OUT	b	Display Digit Output	H
67	OUT	c	Display Digit Output	H
68	OUT	d	Display Segment Output	H
69	OUT	f	Display Segment Output	H
70	OUT	g	Display Digit Output	H
71	OUT	h	Display Segment Output	H
72	OUT	i	Display Segment Output	H
73	OUT	j	Display Segment Output	H
74	OUT	e	Display Segment Output	H
75	–	-28V	-28V	–
76	–	Vcc	Vcc	–
77	OUT	PLL/ OSD-DATA	Tuner Control Signal (Data)/On-Screen IC Control(Data)	H/L
78	–	N.U.	Not used	–
79	OUT	PLL/ OSD-CLK	Tuner Control Signal (Clock)/On-Screen IC Control(Clock)	H/L
80	OUT	PLL-ENA	Tuner Control Signal (Enable)	H
81	–	Vcc	Vcc	–
82	–	VREF	Servo Reference Voltage	–
83	–	N.U.	Not used	–
84	–	N.U.	Not used	–
85	IN	KEY IN-1	A/D Key Data Signal Input	A/D
86	IN	KEY IN-2	A/D Key Data Signal Input	A/D
87	IN	LD-SW	Loading SW A/D Input	A/D
88	IN	AFC	Tuner AFC Voltage Signal Input	A/D
89	IN	PG-DELAY / TEST	RF-SW Signal Delay Adjust Voltage Input	A/D
90	IN	V-ENV / REC-SW	Video DC Envelope Voltage Input /Recording Safety SW Detect	A/D
91	IN	END-S	Tape End Position Detect	A/D
92	IN	ST-S	Tape Start Position Detect	A/D
93	IN	C-SYNC	Composite Sync Signal Input	PULSE
94	OUT	TV/VCR	RF Conv. ON/OFF Signal	H/L
95	–	N.U.	Not used	–
96	–	N.U.	Not used	–
97	–	N.U.	Not used	–
98	–	N.U.	Not used	–
99	OUT	INSEL-2	Input Selector Control Signal 2	H/L
100	OUT	INSEL-1	Input Selector Control Signal 1	H/L

Notes:

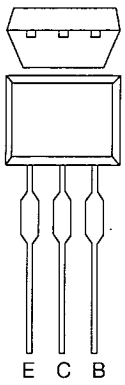
Abbreviation for Active Level

PWM ---------- Pulse Wide Modulation

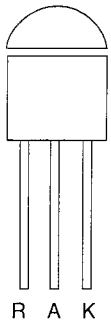
A/D ---------- Analog - Digital Converter

LEAD IDENTIFICATIONS

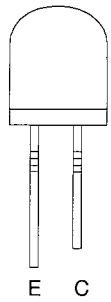
KSA1175 (Y, G)
KSR2203

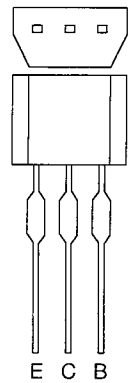


KA431Z
KIA431

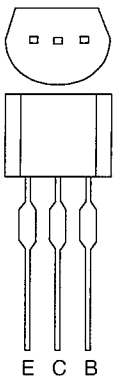


SLR-938CV-A
SLR-938CV-7
PT380FAB



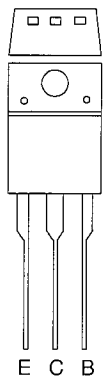


2SC3400
2SA1317 (S, T)
2SA1346
2SA608SP (E, F, G)
2SC2839 (E, F)
2SC3576
2SC536SP (E, F, G)
KRA103M
KRC103M
KSC2785(Y, G, L)
KSR1203
KTA1266 (Y, GR)
KTA1267 (Y, GR)
KTC3193 (Y)
KTC3199 (Y, GR, BL)



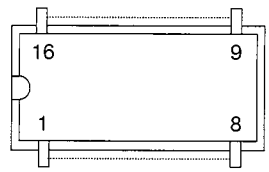
2SC3331 (T, U)
2SC4204
2SD734F-NP-AQ
2SD734G-NP-AQ

2SC3866MR
2SC3866
2SC4517

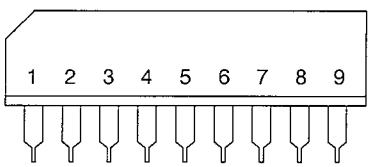


PC17T1
PC817 (B, AB, A)
PS2501-1(D, H, L, M, W)
TLP521-1 (GR)

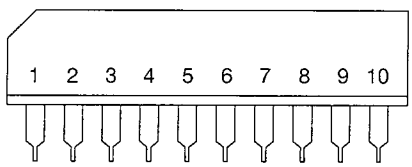
HCF4052BEY
NJU4052BD
TC4052BP
UPD4052BC

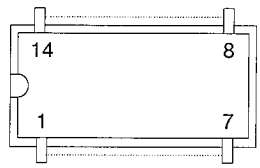


TA7291S



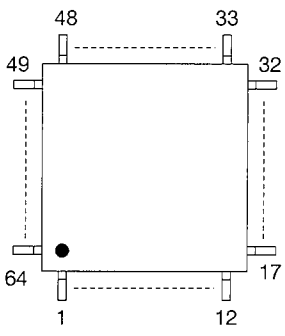
LB1641



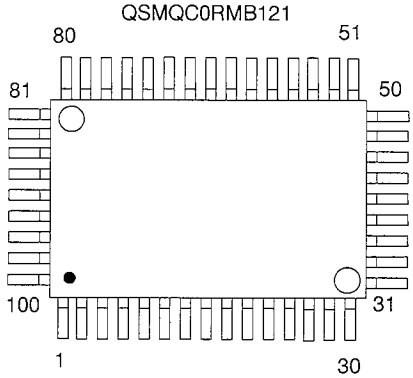


LM324N
LM339N
KIA339P
NJM2901N
NJM324D

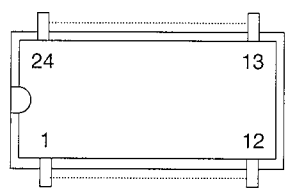
LA71020M



QSMQC0RMB120
QSMQC0RMB121



LA70001
LA70011
LC74723-9068



Note:
A: Anode
K: Cathode
E: Emitter
C: Collector
B: Base
R: Reference

DECK MECHANISM SECTION

VIDEO CASSETTE RECORDER

VT-MX221AW / VT-MX421AW

DECK MECHANISM SECTION

- **Standard Maintenance**
- **Mechanical Alignment Procedures**
- **Disassembly/Assembly of Mechanism**
- **Alignment for Mechanism**

TABLE OF CONTENTS

STANDARD MAINTENANCE

Service Schedule of Components

H: Hours ○: Check ●: Change

Deck		Periodic Service Schedule			
Ref. No.	Part Name	1,000 H	2,000 H	3,000 H	4,000 H
B2	Cylinder Assembly	○	●	○	●
B3	Loading Motor Assembly			●	
B8	Pulley Assembly		●		●
B21	Loading Belt		●		●
B27	Tension Lever Assembly		●		●
B31	ACE Head Assembly			●	
B32, B339	Reel Base Assembly			●	
B37	Capstan Motor		●		●
B52	Capstan Belt		●		●
B54	Spring Plate Assembly			●	
*B73	FE Head CBA			●	
B132	Clutch Assembly		●		●
B133	Idler Assembly		●		●
B410	Pinch Roller Arm Assembly		●		●
B413	Main Brake T Assembly		●		●
B414	Main Brake S Assembly		●		●

Notes:

1. Clean all parts for the tape transport (Upper Drum with Video Head / Pinch Roller / Audio Control Head / Full Erase Head) using 90% Isopropyl Alcohol.
2. After cleaning the parts, do all DECK ADJUSTMENTS.
3. For the reference numbers listed above, refer to Deck Exploded Views.

   * B73 ------ VCR Model only

Cleaning

Cleaning of Video Head

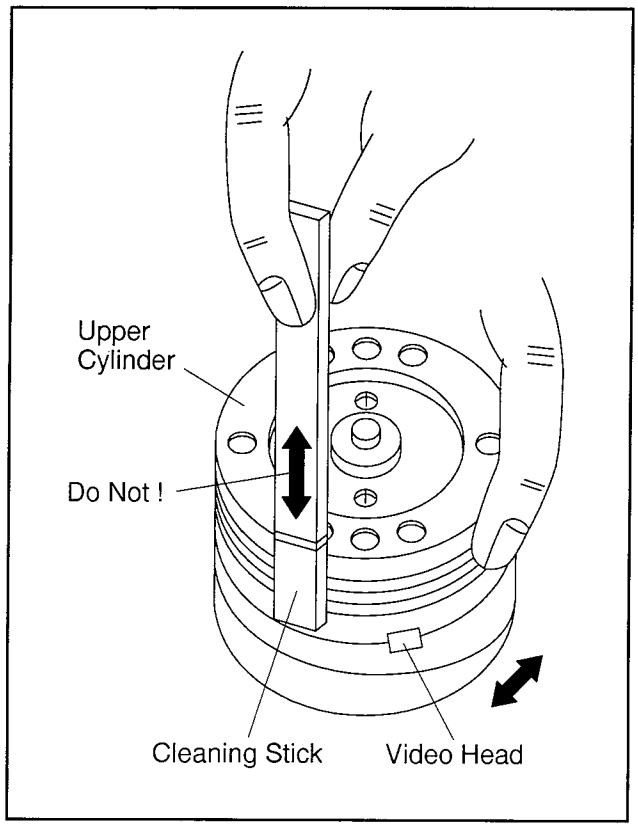
Clean the head with a head cleaning stick or chamois cloth.

Procedure

1. Remove the top cabinet.
2. Put on a glove (thin type) to avoid touching the upper and lower drum with your bare hand.
3. Put a few drops of 90% Isopropyl alcohol on the head cleaning stick or on the chamois cloth and, by slightly pressing it against the head tip, turn the upper drum to the right and to the left.

Notes:

1. The video head surface is made of very hard material, but since it is very thin, avoid cleaning it vertically.
2. Wait for the cleaned part to dry thoroughly before operating the unit.
3. Do not reuse a stained head cleaning stick or a stained chamois cloth.



Cleaning of Audio Control Head

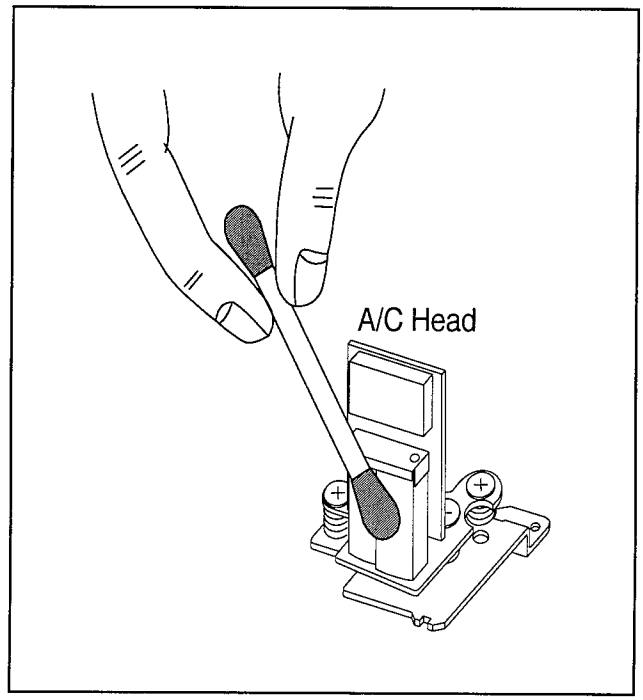
Clean the head with a cotton swab.

Procedure

1. Remove the top cabinet.
2. Dip the cotton swab in 90% isopropyl alcohol and clean the audio control head. Be careful not to damage the upper drum and other tape running parts.

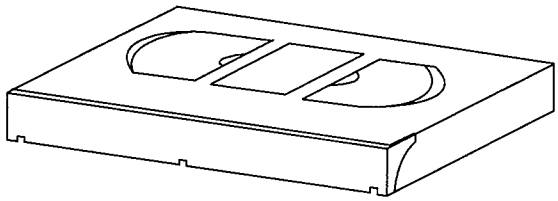
Notes:

1. Avoid cleaning the audio control head vertically.
2. Wait for the cleaned part to dry thoroughly before operating the unit or damage may occur.

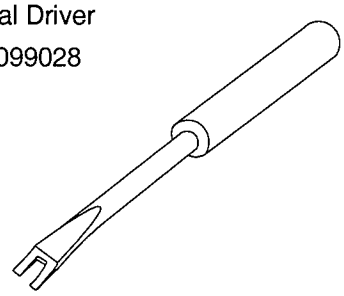


FIXTURE AND TAPE FOR ADJUSTMENT

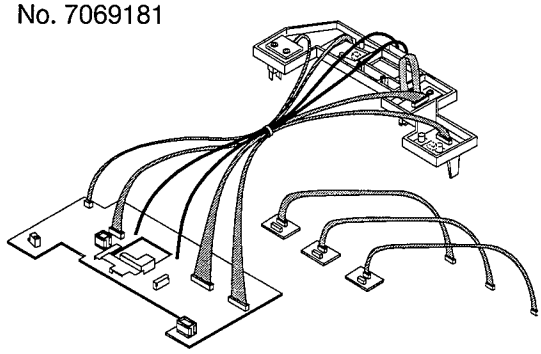
1. Alignment Tape
   No. 7099046 (MH-1)
   No. 7099089 (30HMP2-1)



2. Special Driver
   No. 7099028



3. U15 Deck Extension Cable
   No. 7069181



How To Use The Fixtures And Tape

Item No.	Name	Part No.	How to used
1	Alignment Tape	7099052	● Head Switching Point ● Tape Interchangeability Alignment
2	Special Driver	7099028	● Guide Roller
3	U15 Deck Extension Cable	7069181	● All Mechanical and Electrical Adjustments

MECHANICAL ALIGNMENT PROCEDURES

Explanation of alignment for the tape to correctly run starts on the next page. Refer to the information below on this page if a tape gets stuck, for example, in the mechanism due to some electrical trouble of the unit.

Service Information

A. Method for Manual Tape Loading/Unloading

To load a cassette tape manually:

1. Disconnect the AC plug.
2. Remove the Top Cover.
3. Insert a cassette tape. Though the tape will not be automatically loaded, make sure that the cassette tape is all the way in at the inlet of the Cassette Holder. To confirm this, lightly push the cassette tape further in and see if the tape comes back out, by a spring motion, just as much as you have pushed in.
4. Turn the Pulley Assembly in the appropriate direction shown in Fig. M1 until the cassette tape is fully loaded. By turning the Pulley Assembly, you are turning the cam indicated in this figure. However, movement of the cam will be very slow. Allow a minute or two to complete this task.

To unload a cassette tape manually:

1. Disconnect the AC plug.
2. Remove the Top Cover.
3. Turn the Pulley Assembly in the appropriate direction shown in Fig. M1 to unload the cassette tape. When turning the Pulley Assembly, please be aware that this is a long process and the cassette will not start getting unloaded instantaneously. Within this long process, before the cassette actually starts getting unloaded, there is a time period during which the moving guide assemblies slide back to their original positions shown in Fig. M1. However, the tape will be left wound around the cylinder. To put the tape back into the cassette, gently turn the Capstan Motor in the direction shown in Fig. M2. Make sure that the tape is completely placed back in the cassette before the cassette starts getting unloaded. Otherwise the tape hanging out will be caught and damaged by the lid of the cassette when it closes.
   By turning the Pulley Assembly, you are turning the cam indicated in Fig. M1. As stated, movement of the cam will be very slow. Allow a minute or two to complete this task.

B. Method to place the Cassette Holder in the tape-loaded position without a cassette tape

1. Disconnect the AC Plug.
2. Remove the Top Cover.
3. Turn the Pulley Assembly in the appropriate direction shown in Fig. M1. Release the locking tabs shown in Fig. M1 and continue turning the Pulley Assembly until the Cassette Holder comes to the tape-loaded position. Allow a minute or two to complete this task.

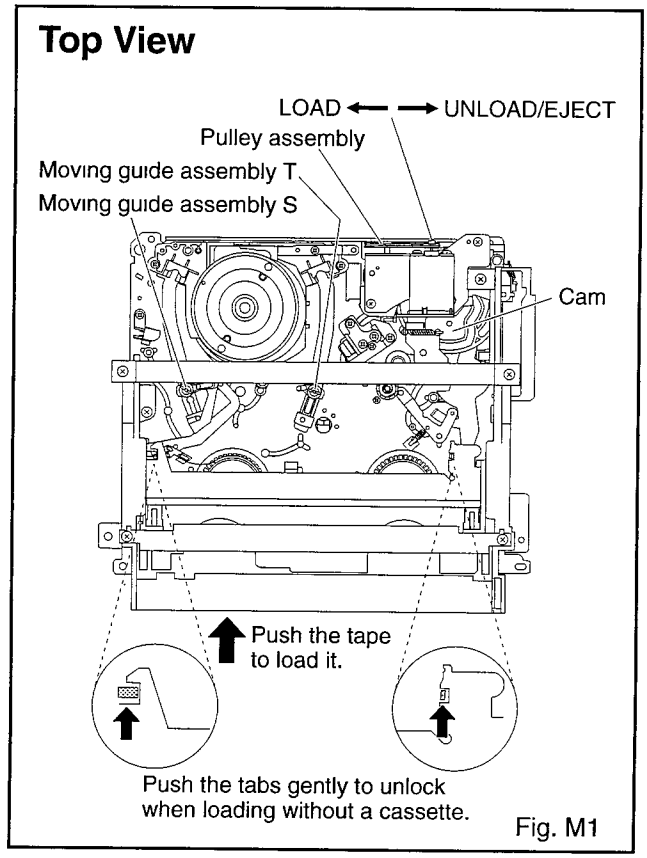


Fig. M1

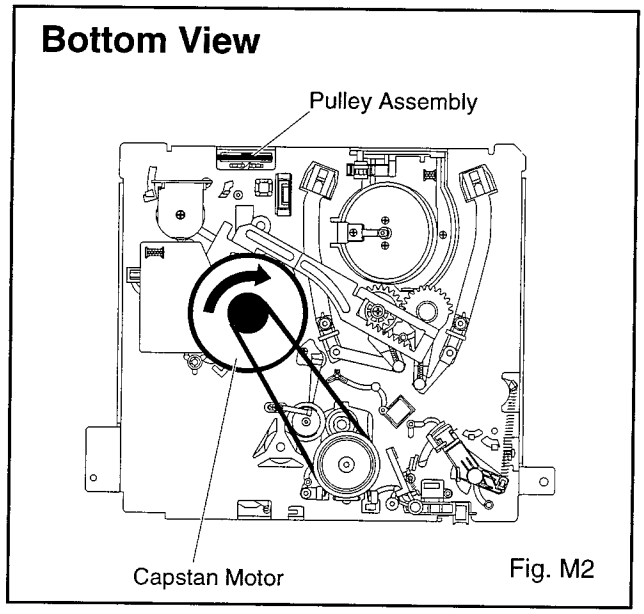


Fig. M2

1. Tape Interchangeability Alignment

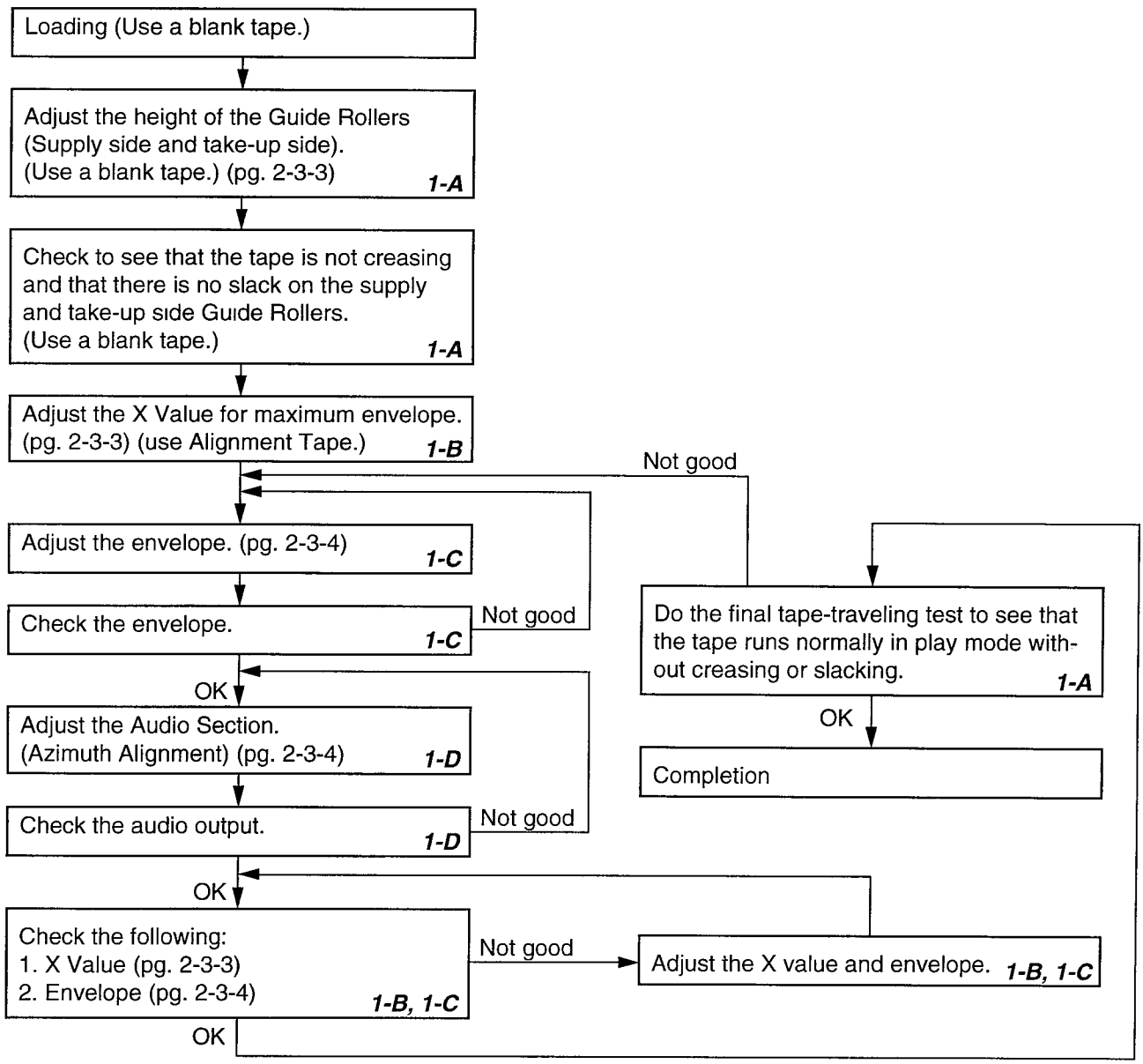
Note: To do these alignment procedures, make sure that the Tracking Control Circuit is set to the center position every time a tape is loaded or unloaded. (Refer to page 2-3-4, procedure 1-C, step 2.)

Equipment required:

Dual Trace Oscilloscope
VHS Alignment Tape (30HMP2-1 or MH-1)
Guide Roller Adj. Screwdriver
X-Value Adj. Screwdriver

Note: Before starting this Mechanical Alignment, do all Electrical Adjustment procedures.

Flowchart of Alignment for tape traveling



1-A. Preliminary/Final Checking and Alignment of Tape Path

Purpose:

To make sure that the tape path is well stabilized.

Symptom of Misalignment:

If the tape path is unstable, the tape will be damaged.

Note: Do not use an Alignment Tape for this procedure. If the unit is not correctly aligned, the tape may be damaged.

1. Play back a blank cassette tape and check to see that the tape runs without creasing at Guide Rollers [2] and [3], and at points A and B on the lead surface. (Refer to Fig M3 and M4.)
2. If creasing is apparent, align the height of the guide rollers by turning the top of Guide Rollers [2] and [3] with a Guide Roller Adj. Screwdriver. (Refer to Fig. M3 and M5.)
   Note: Beneath each Guide Roller, there is a small screw. (Refer to Fig. M5.) This screw works to apply adequate torque to the shaft of each Guide Roller so that the Guide Roller turns properly. Even when adjusting the height of the Guide Roller(s), do not touch these two small screws.
3. Check to see that the tape runs without creasing at Take-up Guide Post [4] or without snaking between Guide Roller [3] and ACE Head. (Fig. M3 and M5)
4. If creasing or snaking is apparent, adjust the Tilt Adj. Screw of the ACE Head. (Fig. M6)

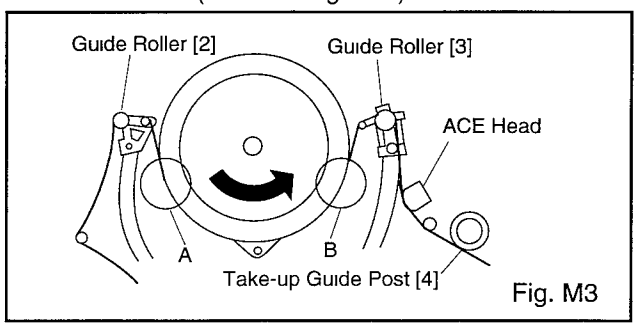


Fig. M3

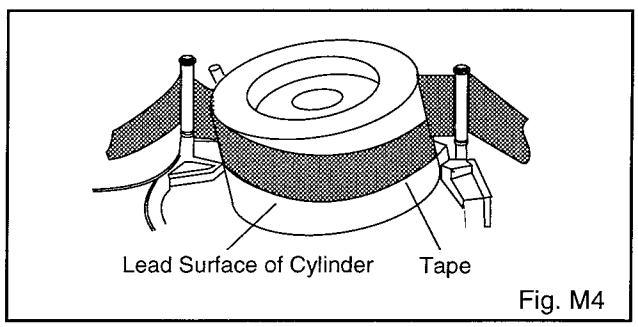


Fig. M4

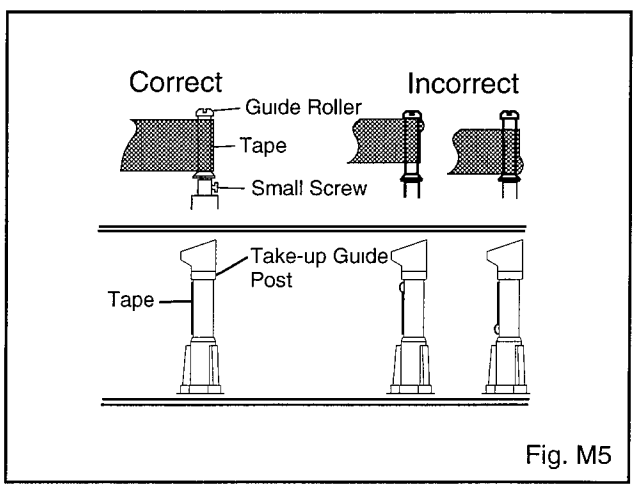


Fig. M5

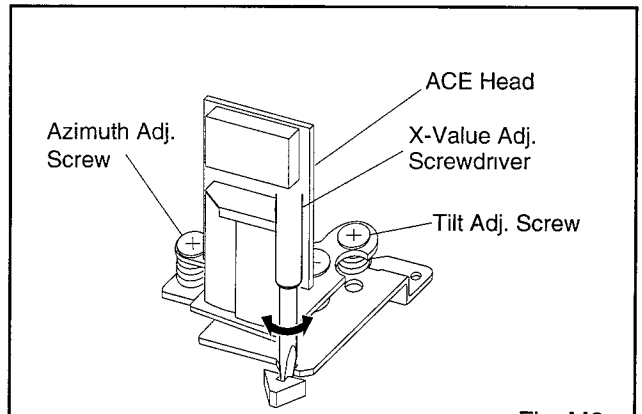


Fig. M6

1-B. X Value Alignment

Purpose:

To align the Horizontal Position of the Audio/Control/Erase Head.

Symptom of Misalignment:

If the Horizontal Position of the Audio/Control/Erase Head is not properly aligned, maximum envelope cannot be obtained at the Neutral position of the Tracking Control Circuit.

1. Connect the oscilloscope to TP301 (C-PB) and TP504 (CTL) on the Main CBA. Use TP302 (RF-SW) as a trigger.
2. Play back the Gray Scale of the Alignment Tape (30HMP2-1 or MH-1) and confirm that the PB FM signal is present.
3. Set the Tracking Control Circuit to the center position by pressing CH UP and DOWN buttons on VCR simultaneously. (Refer to note on bottom of page 2-3-4.)
4. Use the X-Value Adj. Screwdriver so that the PB FM signal at TP301 (C-PB) is maximum. (Fig. M6)
5. Press CH UP button on VCR until CTL waveform is shifted by approx. +2msec. Make sure that the envelope is simply attenuated (shrinks in height) during this process so that you will know the envelope has been at its peak.

6. Press CH DOWN button on VCR until CTL waveform is shifted from its original position (not the position achieved in step 5 of just above, but the position of CTL waveform in step 4) by approximately -2msec. Make sure that the envelope is simply attenuated (shrinks in height) once CTL waveform passes its original position and is further brought in the minus direction.
7. Set the Tracking Control Circuit to the center position by pressing CH UP and DOWN buttons on VCR simultaneously.

1-C. Checking/Adjustment of Envelope Waveform

Purpose:

To achieve a satisfactory picture and precise tracking.

Symptom of Misalignment:

If the envelope output is poor, noise will appear in the picture. The tracking will then lose precision and the playback picture will be distorted by any slight variation of the Tracking Control Circuit.

1. Connect the oscilloscope to TP301 (C-PB) on the Main CBA. Use TP302 (RF-SW) as a trigger.
2. Play back the Gray Scale on the Alignment Tape (30HMP2-1 or MH-1). Set the Tracking Control Circuit to the center position by pressing both CH UP and DOWN buttons on VCR simultaneously. Adjust the height of Guide Rollers [2] and [3] (Fig. M3, Page 2-3-3) watching the oscilloscope display so that the envelope becomes as flat as possibile. To do this adjustment, turn the top of the Guide Roller with the Guide Roller Adj. Screwdriver.
3. If the envelope is as shown in Fig. M7, adjust the height of Guide Roller [2] (Refer to Fig. M3) so that the waveform looks like the one shown in Fig. M9.
4. If the envelope is as shown in Fig. M8, adjust the height of Guide Roller [3] (Refer to Fig. M3) so that the waveform looks like the one shown in Fig. M9.
5. When Guide Rollers [2] and [3] (Refer to Fig.M3) are aligned properly, there is no envelope drop either at the beginning or end of track as shown in Fig. M9.

Note: Upon completion of the adjustment of Guide Rollers [2] and [3] (Refer to Fig. M3), check the X Value by pushing the Tracking Control Up or Down buttons alternately, to check the symmetry of the envelope. Check the number of pushes to ensure center position. The number of pushes UP to achieve 1/2 level of envelope should match the number of pushes DOWN from center. If required, redo the "X Value Alignment."

1-D. Azimuth Alignment of Audio/Control/ Erase Head

Purpose:

To correct the Azimuth alignment so that the Audio/Control/Erase Head meets tape tracks properly.

Symptom of Misalignment:

If the position of the Audio/Control/Erase Head is not properly aligned, the Audio S/N Ratio or Frequency Response will be poor.

1. Connect the oscilloscope to the audio output jack on the rear side of the deck.
2. Play back the alignment tape (30HMP2-1 or MH-1) and confirm that the audio signal output level is 8 kHz.
3. Adjust Azimuth Adj. Screw so that the output level on the AC Voltmeter or the waveform of the oscilloscope is at maximum. (Fig. M6)

Dropping envelope level at the beginning of track.

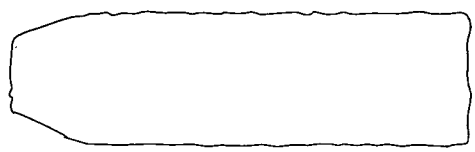


Fig. M7

Dropping envelope level at the end of track.

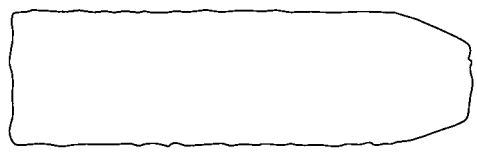


Fig. M8

Envelope is adjusted properly. (No envelope drop)

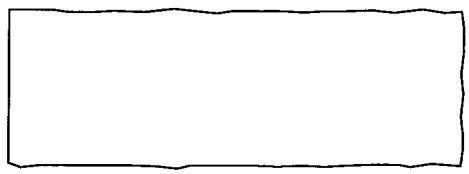


Fig. M9

DISASSEMBLY/ASSEMBLY PROCEDURES OF DECK MECHANISM

Main Mechanism

Before following the procedures described below, be sure to:

1. Remove the deck assembly from the cabinet.
   (Refer to CABINET DISASSEMBLY INSTRUCTIONS on page 1-6-1.)
2. Remove Front Loading Assembly from the main mechanism of the deck assembly. (See Fig. DM1.)
3. First remove Step/Loc. No. [40], and start to remove other parts. (See Fig. DM1.)
4. Before Step/Loc. No. [2] and [9] first remove ACH-9A, ACH-9B, VH Connector 4A, and VH Connector 4B. (See Fig. DM2.)

All the following procedures, including those for adjustment and replacement of parts, should be done in Eject mode; see the positions of [38] and [39] in Fig. DM3 on page 2-4-4. When reassembling, follow the steps in reverse order.

STEP /LOC. No.	START-ING No.	PART		REMOVAL		INSTALLATION
				Fig. No.	REMOVE/*UNHOOK/ UNLOCK/RELEASE/ UNPLUG/DESOLDER	ADJUSTMENT CONDITION
[1]	[1]	Shield Plate	T	DM1	2(S-2)	
[2]	[2]	Loading Motor Assembly	T	DM2 DM3 DM5 DM6	2(S-3), Loading Belt	
[3]	[2]	Motor Holder	T	DM3 DM5	2(S-4)	
[4]	[2]	Cassette Drive Lever Assembly	T	DM3 DM5		(+) Refer to Alignment Sec. Pg. 2-4-10
[5]	[2]	Pinch Roller Assembly	T	DM3 DM5	(C-1)	Refer to Alignment Sec. Pg. 2-4-10
[6]	[6]	Mode SW CBA	B	DM4 DM5	(S-5), Unsolder	
[7]	[2]	Cam	T	DM3 DM5		(+) Refer to Alignment Sec. Pg. 2-4-10
[8]	[2]	Pulley Assembly	T	DM3 DM6	(W-1), Loading Belt	(+)
[9]	[9]	Cylinder Assembly	T	DM2 DM3 DM7	4(S-6), *VH Connectors 4A and 4B, Deck Grounding Plate	
[10]	[10]	FE Head	T	DM3 DM7	(S-7)	
[11]	[11]	ACE Head	T	DM2 DM3 DM8	2(S-8)	
[12]	[12]	Tape Guide Assembly	T	DM3 DM8	*(P-1), *(L-1)	
[13]	[12]	Capstan Motor	B	DM4 DM9 DM16	3(S-9), Capstan Belt, *Mode SW	
[14]	[14]	Tension Lever Assembly	T	DM3 DM10	*(L-2), *(L-3), *(P-2)	
[15]	[14]	M Brake S Assembly	T	DM3 DM10	*(L-4)	
[16]	[16]	Rec Arm	B	DM4 DM11	*(L-5)	
[17]	[17]	BT Arm	B	DM4 DM10 DM11	*(L-6), *(P-2)	
[18]	[17]	Holder Kick Arm	B	DM4 DM11	*(P-3)	
[19]	[17]	Tension Plate	B	DM4 DM11		
[20]	[17]	Mode Lever	T	DM3 DM12	*4(L-7), *(L-8), *Fixed Pin	

STEP /LOC. No.	START-ING No.	PART		REMOVAL		INSTALLATION
				Fig. No.	REMOVE/*UNHOOK/ UNLOCK/RELEASE/ UNPLUG/DESOLDER	ADJUSTMENT CONDITION
[21]	[21]	Idler Assembly	T	DM3 DM13	*(L-9)	
[22]	[14]	S Brake Lever Assembly	T	DM3 DM13	*(P-4)	
[23]	[17]	M Brake T Assembly	T	DM3 DM13	*(P-5)	
[24]	[14]	Reel Base Assembly S	T	DM3 DM14	Poly Slider Washer	(+) Base has slots.
[25]	[17]	Reel Base Assembly T	T	DM3 DM14	Poly Slider Washer	(+)
[26]	[26]	M Gear	T	DM3 DM14	*2(L-10), (W-2)	
[27]	[2]	M Lever Holder	T	DM3 DM15		
[28]	[2]	Main Lever Assembly	T	DM3 DM15		
[29]	[29]	Clutch Assembly	B	DM4 DM16	(C-2), (W-3), Capstan Belt	(+)
[30]	[29]	FF Arm	B	DM4 DM16	*2(L-11)	
[31]	[31]	Sensor Gear	B	DM4 DM17	(C-3)	
[32]	[32]	Prism T	B	DM4 DM17	(S-10)	
[33]	[33]	Prism	B	DM4 DM17	(S-11)	
[34]	[12]	Loading Lever Assembly	B	DM4 DM18	(S-12)	(+) Refer to Alignment Sec. Pg. 2-4-10
[35]	[34]	Loading Arm T Assembly	B	DM4 DM18		(+) Refer to Alignment Sec. Pg. 2-4-10
[36]	[34]	Loading Arm S Assembly	B	DM4 DM18	*(L-12)	(+) Refer to Alignment Sec. Pg. 2-4-10
[37]	[37]	Spring Plate Assembly	B	DM4 DM19	(S-13)	Refer to Alignment Sec. Pg. 2-4-10
[38]	[2]	Moving Guide S Preparation	T	DM3 DM20	Slide to rear to remove	
[39]	[2]	Moving Guide T Preparation	T	DM3 DM20	Slide to rear to remove	
[40]	[40]	Deck Grounding Plate	T	DM1 DM3	(S-14)	
*[42]	[42]	F Brake Guide	B	DM4 DM9	(S-15), (S-16), (P-5)	
[43]	[43]	Grounding Plate D	B	DM4 DM19	(S-17)	
↓ ①	↓ ②	↓ ③	↓ ④	↓ ⑤	↓ ⑥	↓ ⑦

①: Follow steps in sequence. When reassembling, follow the steps in reverse order.
These numbers are also used as Identification (location) No. of parts in the figures.

②: Indicates the part to start disassembling with in order to disassemble the part in column (1).

③: Name of the part

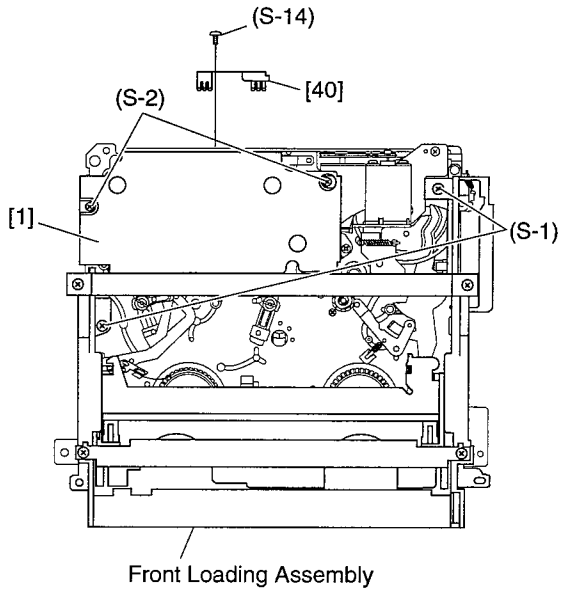
④: Location of the part: T=Top B=Bottom R=Right L=Left

⑤: Figure Number

⑥: Identification of parts to be removed, unhooked, unlocked, released, unplugged, unclamped, or desoldered.
P=Spring, W=Washer, C=Cut Washer, S=Screw, *=Unhook, Unlock, Release, Unplug, or Desolder
e.g., 2(L-2) = two Locking Tabs (L-2).

⑦: Adjustment Information for Installation
(+): Refer to Deck Exploded Views for lubrication.

*[42] 4 Head models only



To remove Front Loading Assembly:
1. Remove 2 Screws; 2(S-1).
2. Lift Assembly up carefully.

Fig. DM1

Top View

Bottom View

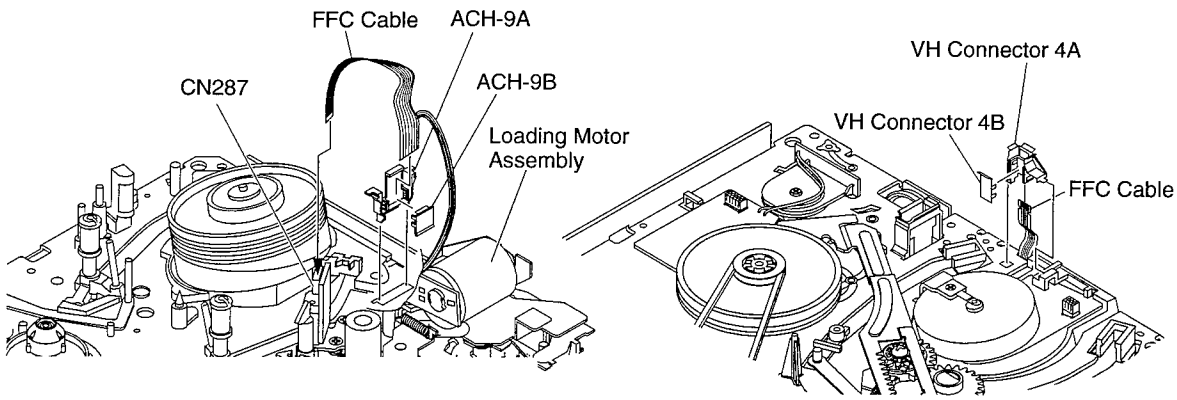


Fig. DM2

Top View

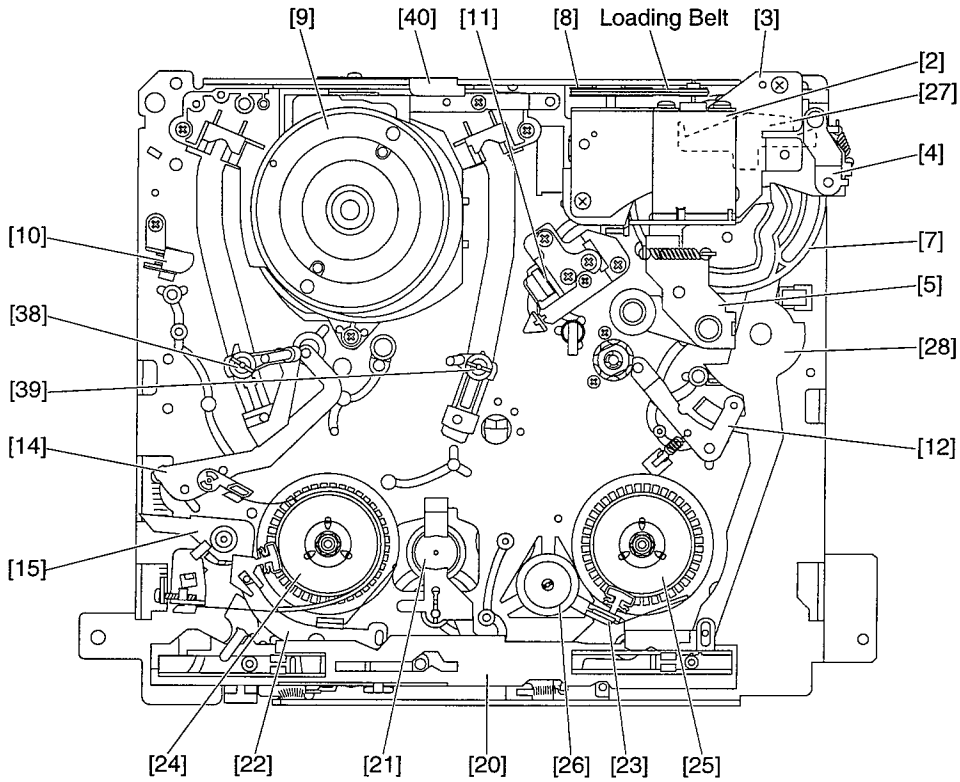
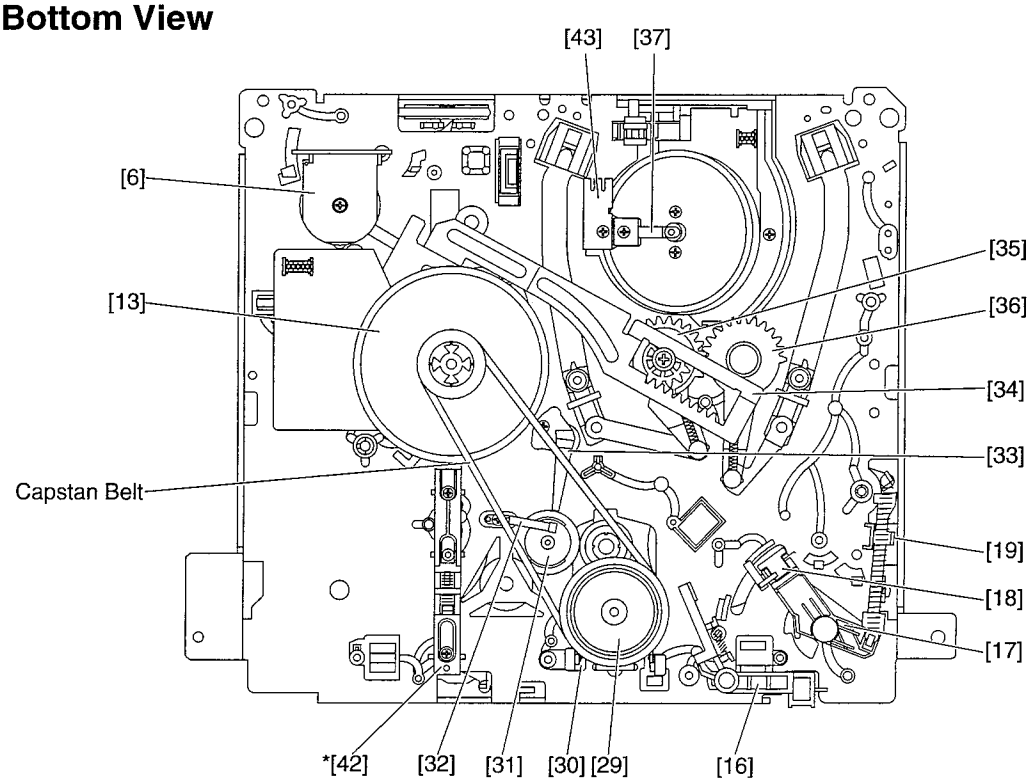


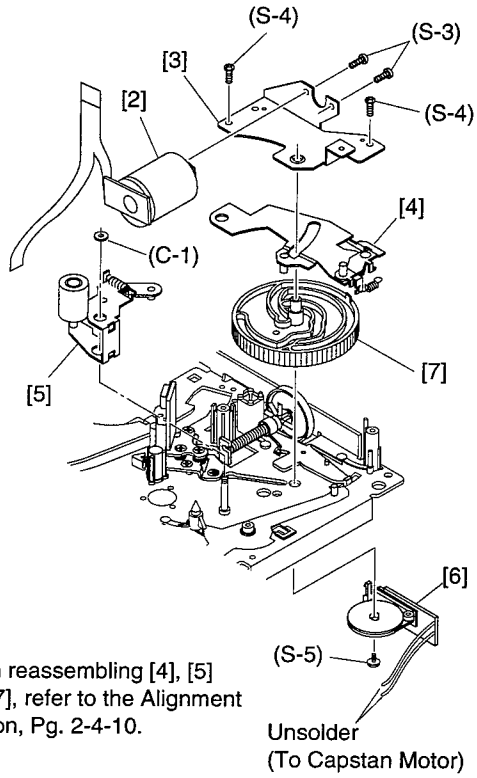
Fig. DM3

Bottom View



*[42] 4 Head models only

Fig. DM4



When reassembling [4], [5] and [7], refer to the Alignment Section, Pg. 2-4-10.

Fig. DM5

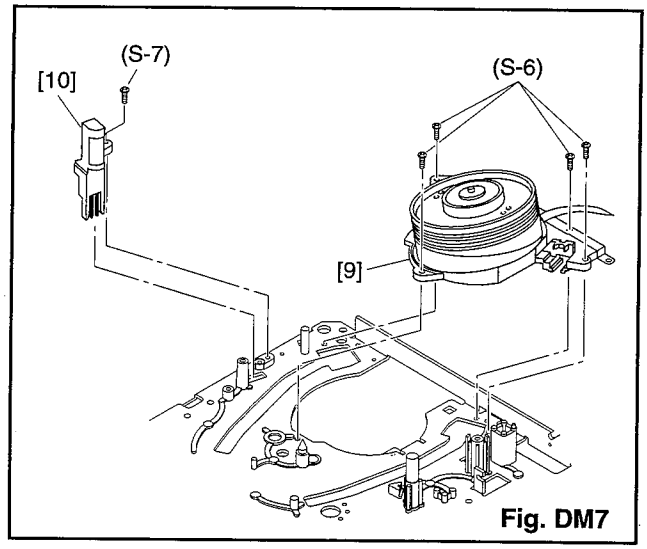


Fig. DM7

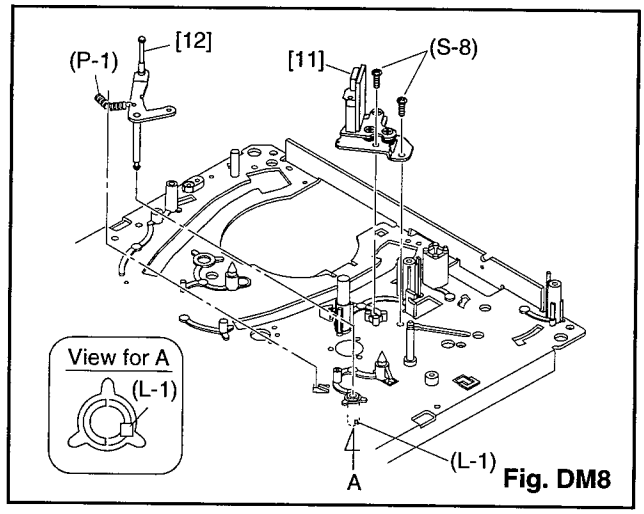
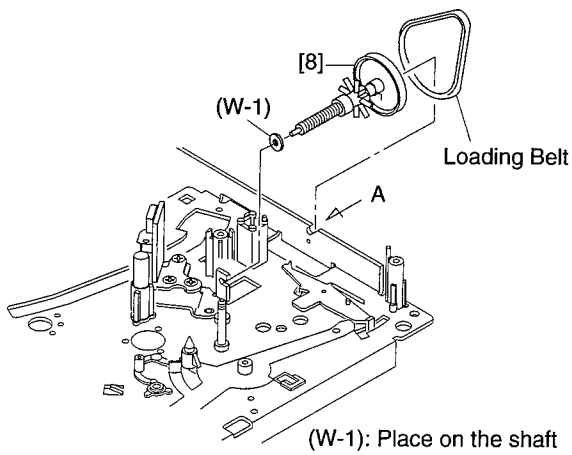


Fig. DM8



(W-1): Place on the shaft and then install.

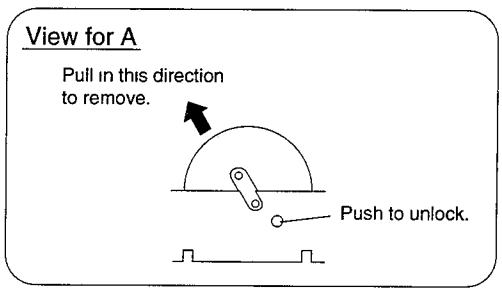


Fig. DM6

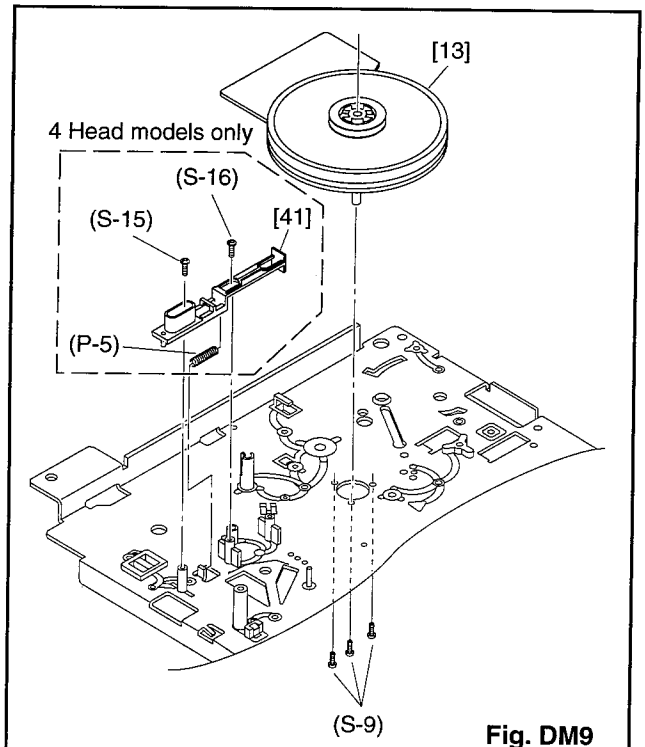


Fig. DM9

When reassembling, refer to the Alignment Section, Pg. 2-4-12.

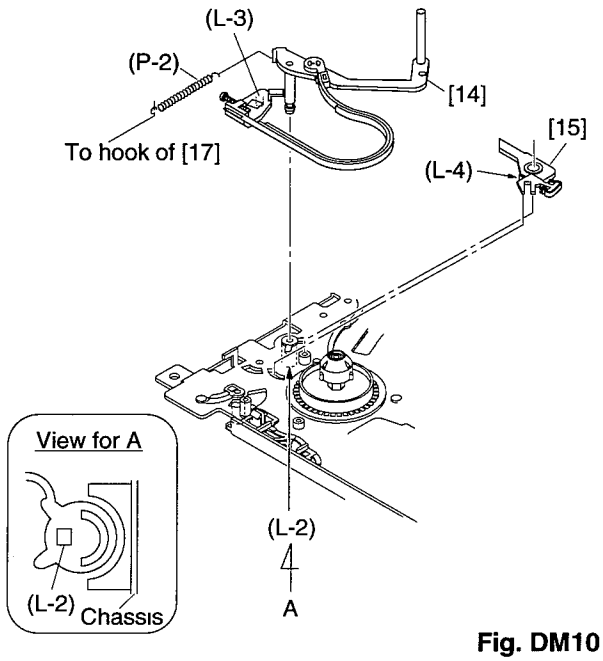
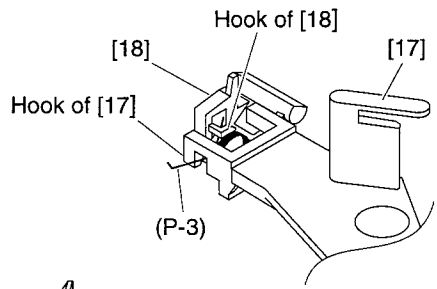


Fig. DM10

View for A

Reassembly [17], [18] and (P-3).



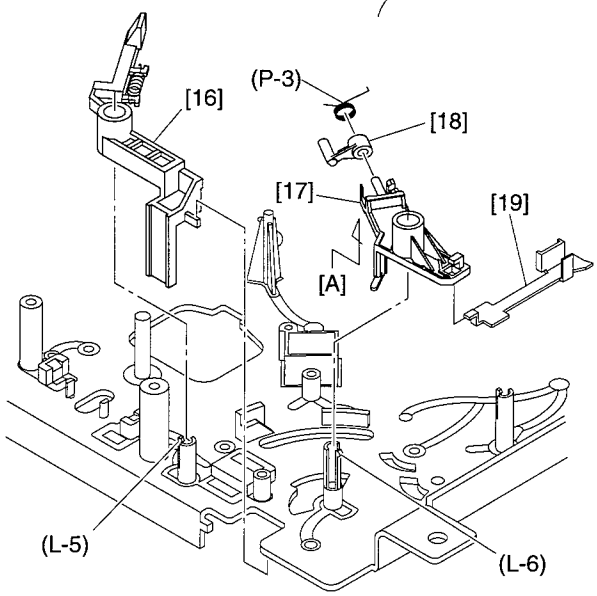
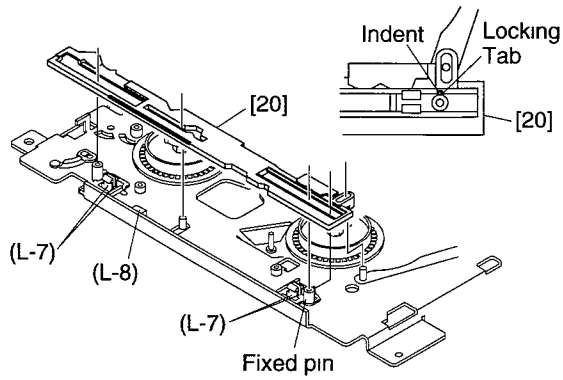


Fig. DM11

Turn [8] counterclockwise to move [20] to the right.
Align the indent of [20] with Locking Tab.



Position of Mode Lever when installed

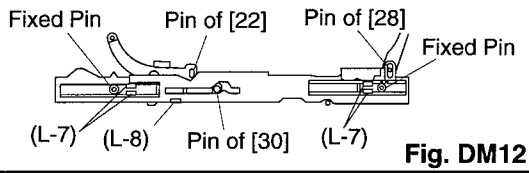


Fig. DM12

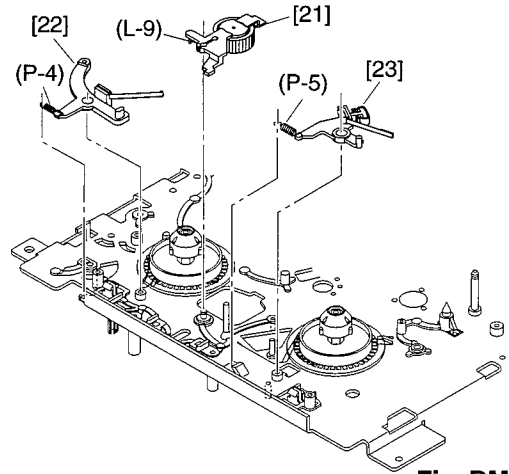


Fig. DM13

If the alignment height is not correct, it is acceptable to use one more Poly Slider Washer to raise the height. (Poly Slider Washer is 0.1 mm/0.004 inch in thickness.)

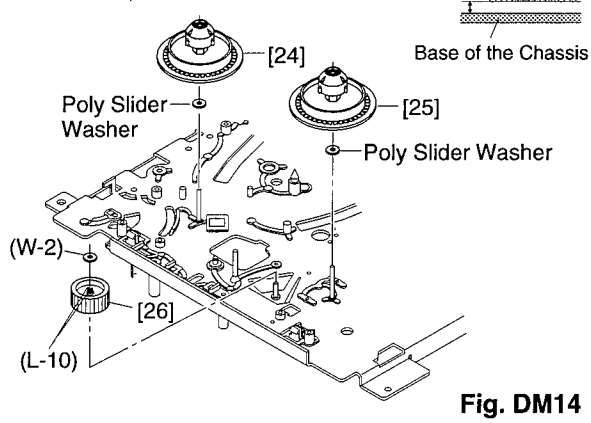


Fig. DM14

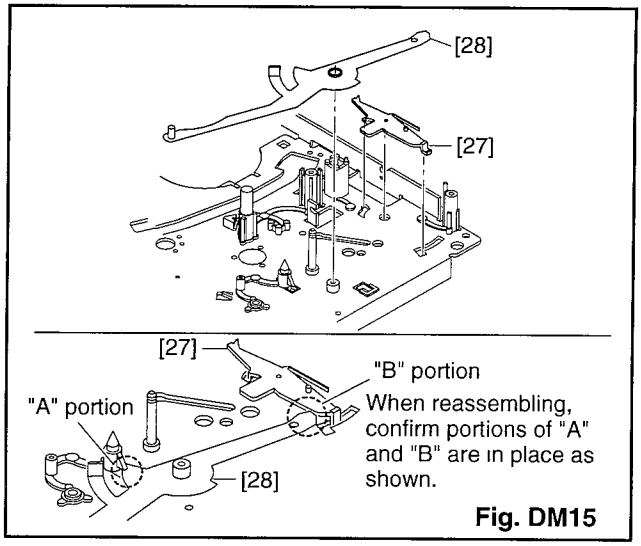


Fig. DM15

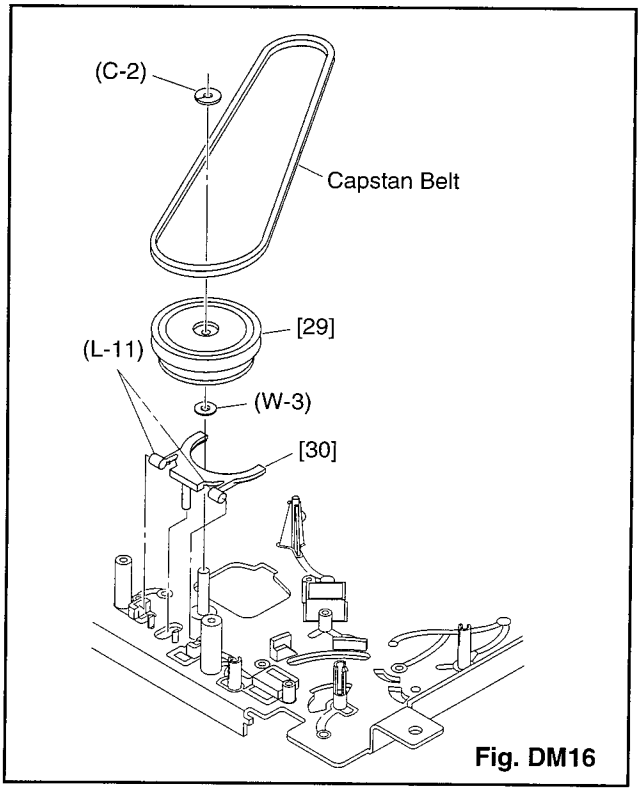


Fig. DM16

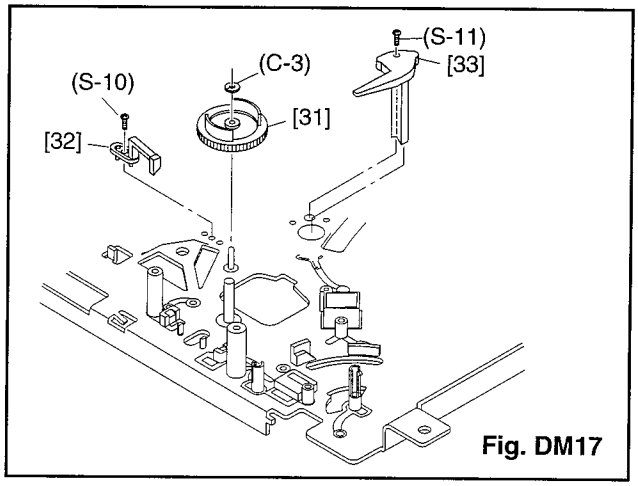


Fig. DM17

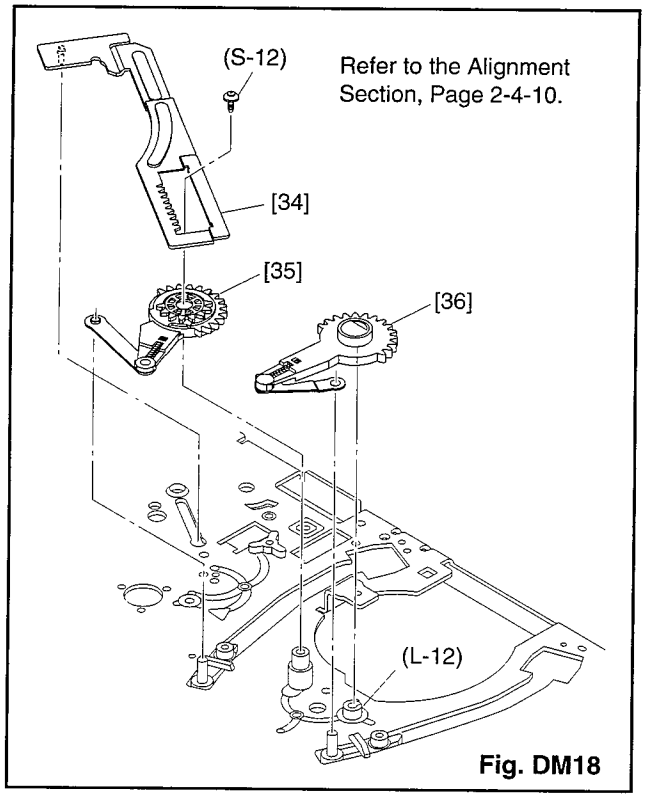


Fig. DM18

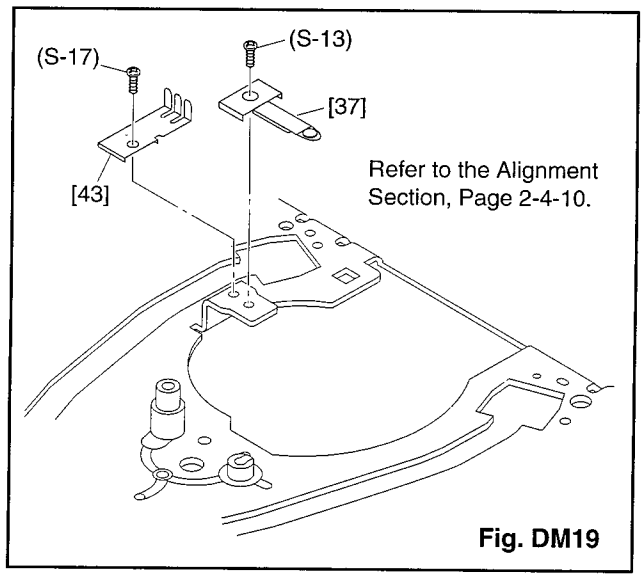
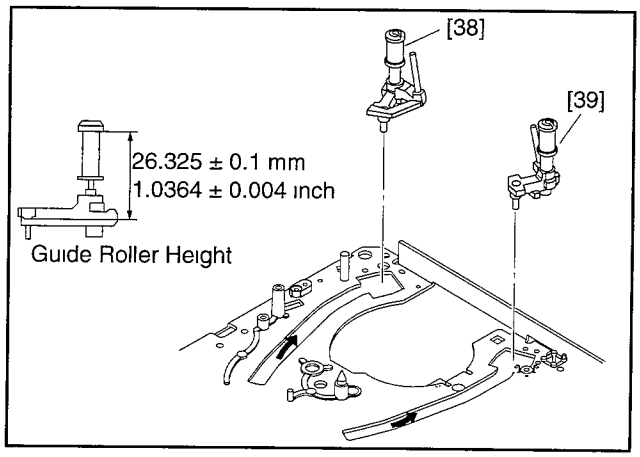


Fig. DM19



Front Loading Assembly

Before following the procedures described below, be sure to remove Front Loading Assembly from the main mechanism of the deck assembly. (See Fig. DM1.) When reassembling, start with the unit in Cassette-in mode and follow the steps in reverse order.

STEP /LOC. No.	START-ING No.	PART		REMOVAL		INSTALLATION
				Fig. No.	REMOVE/*UNHOOK/ UNLOCK/RELEASE/ UNPLUG/DESOLDER	ADJUSTMENT CONDITION
*[1]	[1]	Slider Gear	R (or L)	DM23 DM24	*2(L-1)	(+)
*[2]	[1]	Slider Gear	L (or R)	DM23 DM24	*2(L-2)	(+)
		Slider Shaft	T			Install in Eject position.
[3]	[1]	[3a] Front Guide [3b] Cassette Holder Assembly [3c] Guide Holder B [3d] Guide Holder F	T	DM21 DM22 DM23	*2(L-3), 4(S-1), 2(S-2), Eject Spring B	
		[3e] Cassette Guide R	R			(+)
		[3f] Cassette Guide L	L			(+)
[4]	[4]	Front Door Opener	R	DM21 DM22 DM23	*(L-4)	
[5]	[4]	Rack	R	DM21 DM22 DM23	*(L-5)	
[6]	[5]	Cassette Drive Gear	R	DM21 DM22 DM23	*(L-6), Cassette Drive Gear Spring	(+)
[7]	[7]	[7a] Mirror R [7b] Mirror L	R L	DM23		
[8]	[8]	LDG Plate	R	DM23	2(S-3)	
↓ ①	↓ ②	↓ ③	↓ ④	↓ ⑤	↓ ⑥	↓ ⑦

①: Follow steps in sequence. When reassembling, follow the steps in reverse order.
These numbers are also used as Identification (location) No. of parts in the figures.

②: Indicates the part to start disassembling with in order to disassemble the part in column (1).

③: Name of the part

④: Location of the part: T=Top B=Bottom R=Right L=Left

⑤: Figure Number

⑥: Identification of parts to be removed, unhooked, unlocked, released, unplugged, unclamped, or desoldered.
P=Spring, W=Washer, C=Cut Washer, S=Screw, *=Unhook, Unlock, Release, Unplug, or Desolder
e.g., 2(L-2) = two Locking Tabs (L-2).

⑦: Adjustment Information for Installation
(+): Refer to Deck Exploded Views for lubrication.

*[1], *[2]: Slider Gear in Step [1] and that in Step [2] are identical. However, they are divided into two steps because, before reassembling Slider Shaft, one Slider Gear must be preinstalled at either end of Slider Shaft.

Before removing Parts [3], [4], [5], or [6], shift [3b] to Cassette-in position.

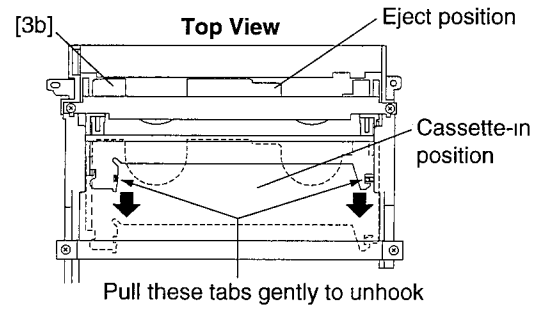


Fig. DM21

Install/remove in Cassette-in position to ensure that [3b] is in locked position.

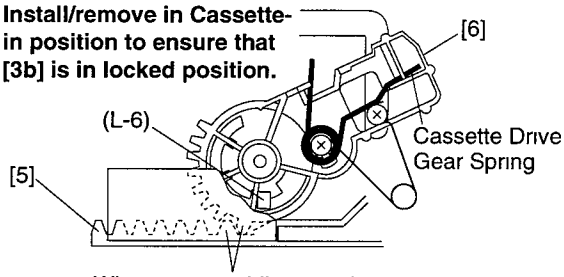
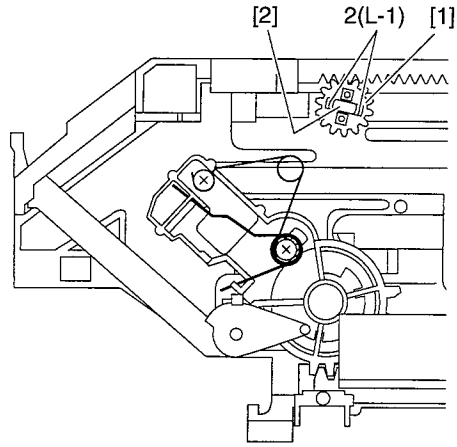


Fig. DM22

View before disassembling [1] and [2] (Installation of Slider Shaft and Slider Gear)



Install [1] and [2] in Eject position.
(When disassembling, [1] and [2] can be removed either in Eject position or Cassette-in position.)

- This figure shows where [1], [2] and other parts are in Eject position.

Fig. DM24

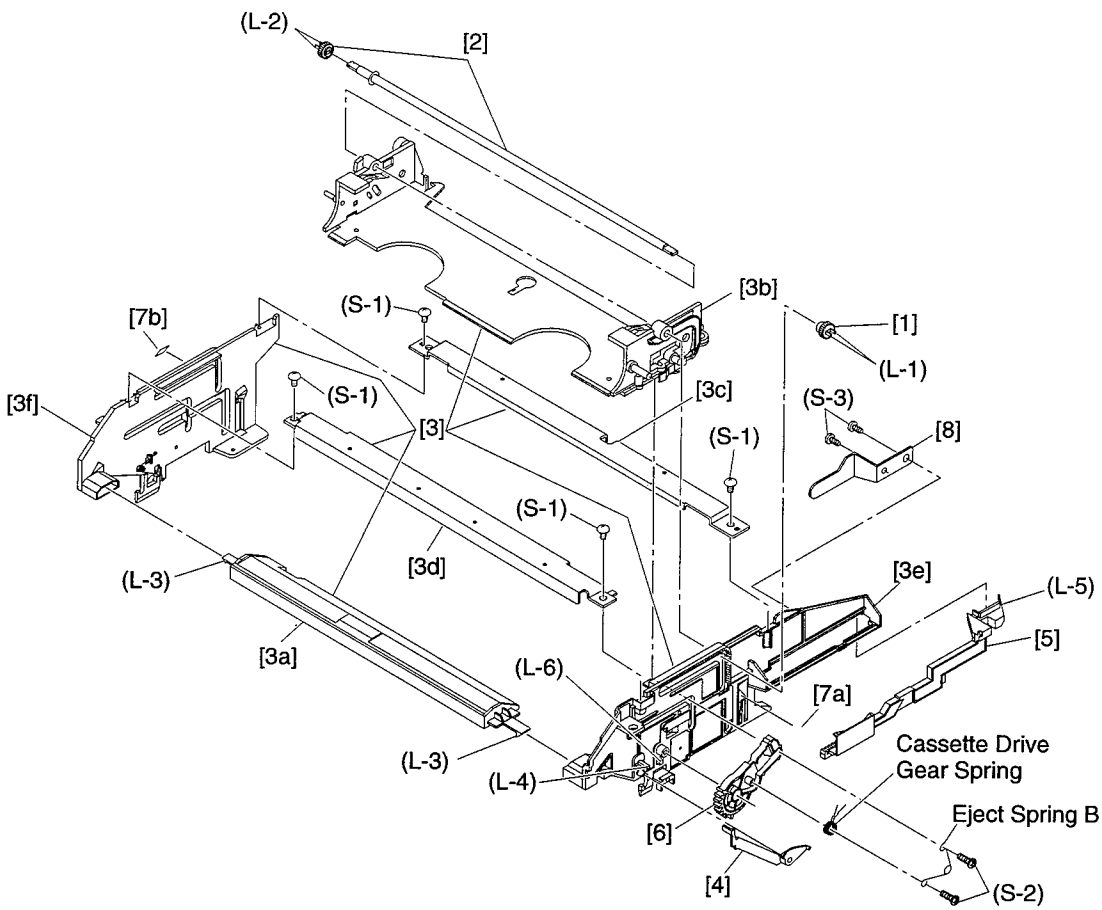


Fig. DM23

ALIGNMENT PROCEDURES OF MECHANISM

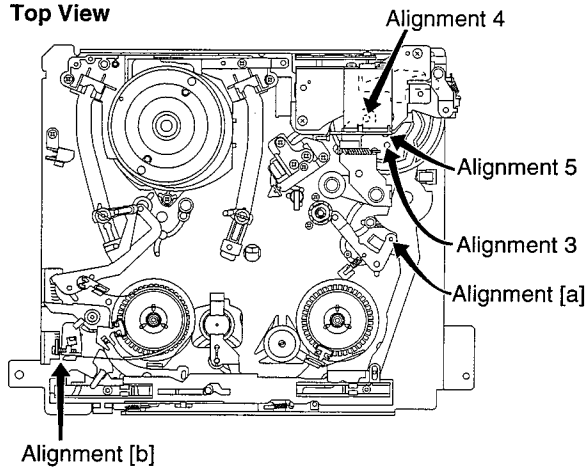
The following procedures describe how to align the individual gears and levers that make up the tape loading/unloading mechanism. Since information about the state of the mechanism is provided to the System Control Circuit only through the Mode Switch, it is essential that the correct relationship between individual gears and levers be maintained.

All alignments are to be performed with the mechanism in Eject mode, in the sequence given. Each procedure assumes that all previous procedures have been completed.

IMPORTANT:

If any one of these alignments is not performed properly, even if off by only one tooth, the unit will unload or stop and it may result in damage to the mechanical or electrical parts.

Alignment points in Eject Position



Alignment [a] through [c] can be done independently of any other alignment.

Fig. AL1

Alignment 1

Loading Arm, S and T Assembly

1. Install Loading Arm S and T Assembly so that their triangle marks point to each other as shown in Fig. AL2.

Alignment 2

Loading Lever Assembly

1. Keeping the two triangles pointing at each other, install the Loading Arm T Assembly so that the last tooth of the gear meets the most inside teeth of the Loading Lever Assembly. See Fig. AL2.

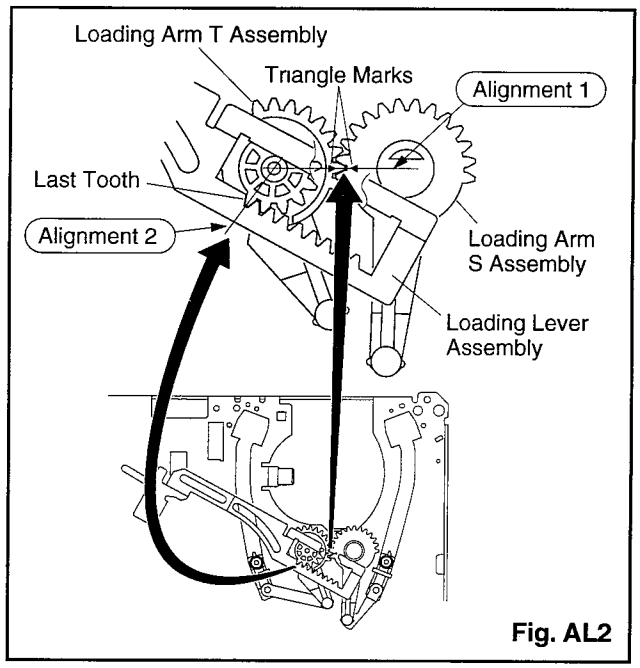


Fig. AL2

Alignment [a]

Tape Guide Assembly

1. Measurement of the black screw must be as specified in Fig. AL3.

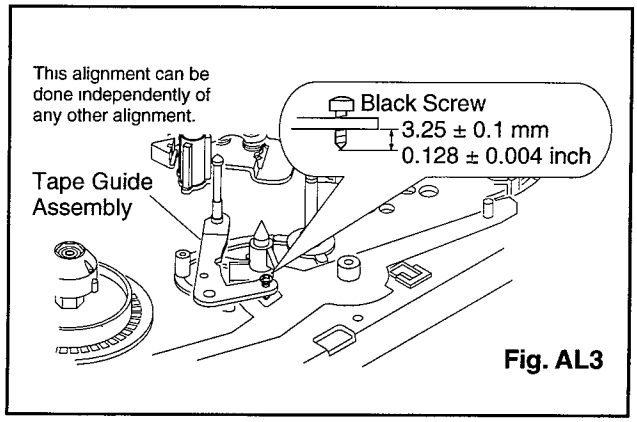


Fig. AL3

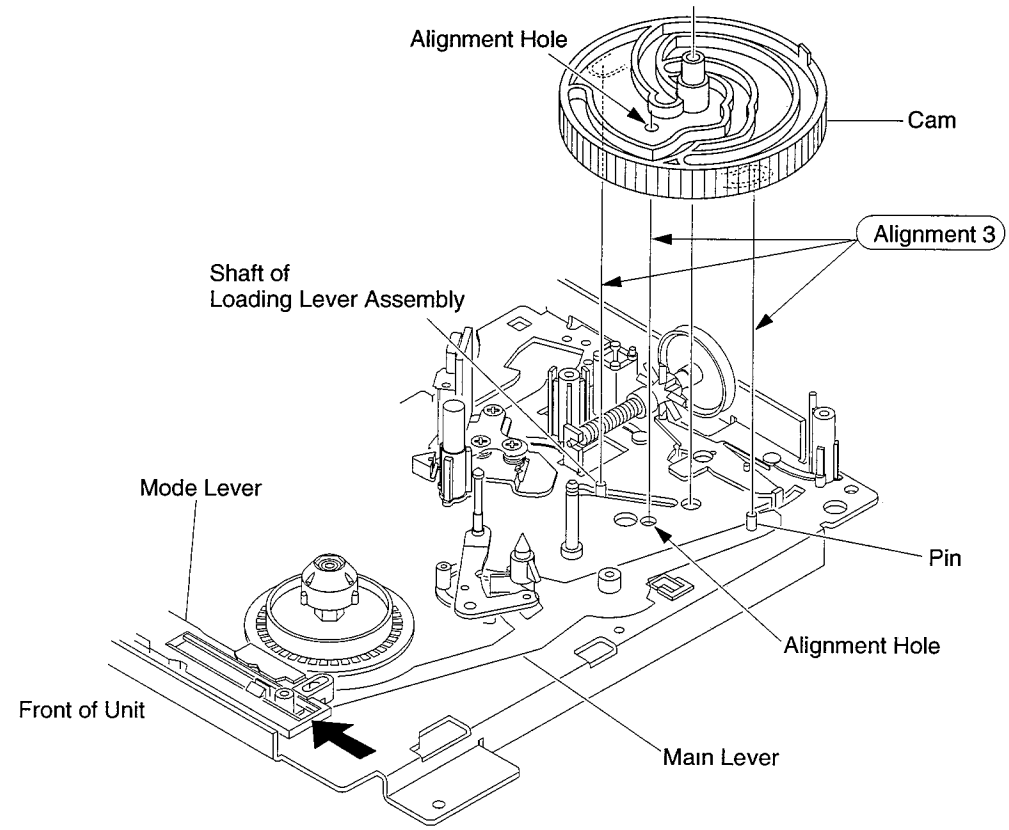


Fig. AL4

Alignment 3

Cam

1. Make sure that the mechanism is in Eject mode so that the shaft of Loading Lever Assembly is in the position shown in Fig. AL4.
2. Align the alignment hole of the Cam with the alignment hole of the base, holding the Cam just above the base.
3. Carefully keeping these two holes aligned, push Mode Lever in the direction of the arrow to install the Cam. The Mode Lever must be pushed to make the pin on the Main Lever fit in the proper groove in the lower Cam.
4. After installing the Cam, make sure that the alignment hole of the Cam is still aligned with the base hole and that the pin on the Main Lever and the shaft of the Loading Lever Assembly are inserted into the proper grooves of the lower Cam as specified in Fig. AL4.

Alignment 4

Pinch Roller Assembly

1. Ensure that the pin of the Pinch Roller Arm Assembly is positioned in the end of the groove of the upper Cam as shown in Fig. AL5.

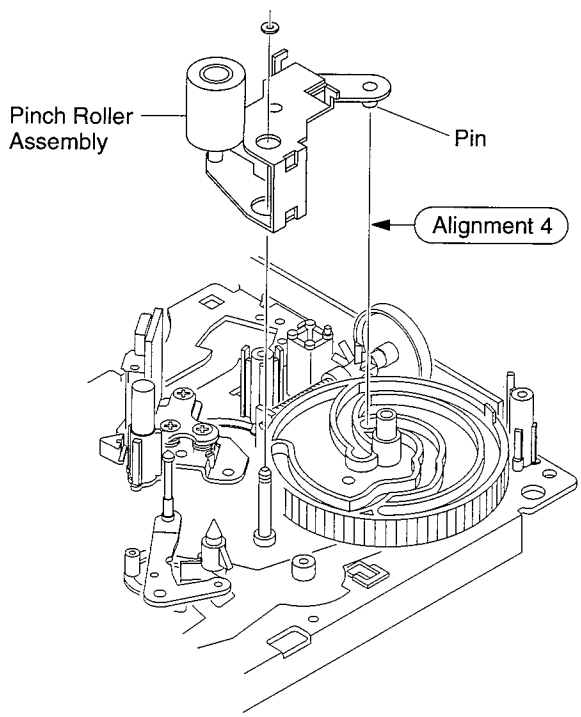


Fig. AL5

Alignment 5

Cassette Drive Lever Assembly

1. Ensure that the pin of the Cassette Drive Lever Assembly is positioned in the groove of the upper Cam and that the hole of that is positioned as shown in Fig. AL6. Then, make sure that the tab of the Cassette Drive Lever Assembly is within the tab of the Cam.

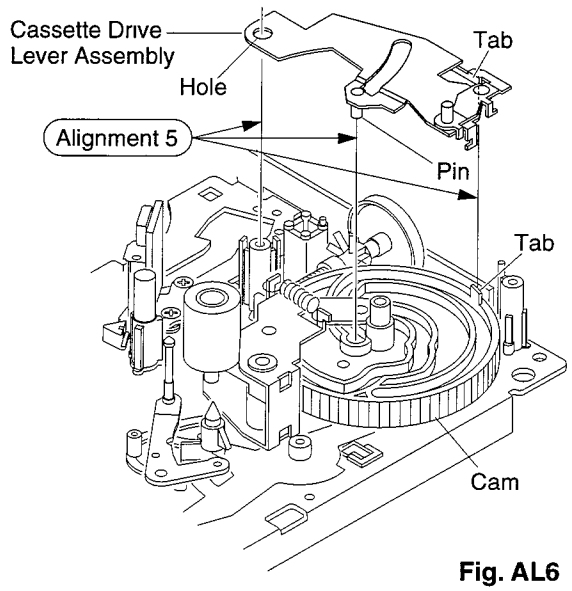


Fig. AL6

Alignment [b]

This alignment can be performed independently of any other alignment.

Band Brake Assembly

1. Ensure that Band Brake Assembly is positioned parallel to the chassis' notch as shown in Fig. AL7. This measurement can be made by eye.

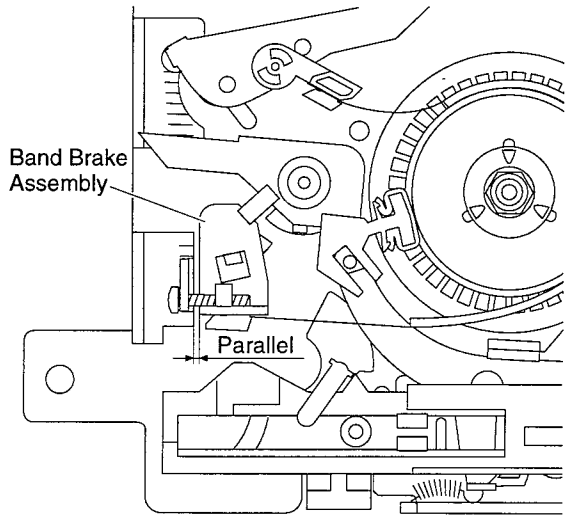


Fig. AL7

Alignment [c]

This alignment can be performed independently of any other alignment.

Spring Plate Assembly

1. Check to see if the Spring Plate Assembly is properly set in a position equal to or just less than 1mm (0.04 inch) (but never more than 1 mm or 0.04 inch), as measured from the center of the brush to the center of the Cylinder Shaft as shown in Fig. AL8.

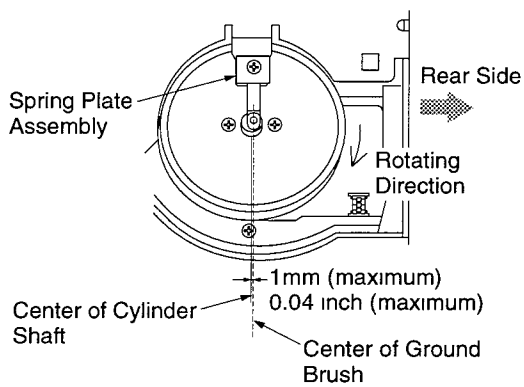


Fig. AL8

2. If this measurement exceeds 1mm (0.04 inch), loosen and refasten the screw of the Spring Plate Assembly. If this is not enough and further adjustment is necessary, loosen and refasten the three screws of Cylinder Assembly. These three screws are shown in Fig. DM7 in DISASSEMBLY/ASSEMBLY PROCEDURES OF DECK MECHANISM (page 2-4-5).

Note: DO NOT install the Spring Plate Assembly in the opposite position (on the left side of the center of the Cylinder shaft), but always within a maximum of 1mm (0.04 inch) to the right side of the center of this shaft.

EXPLODED VIEWS AND PARTS LIST SECTION

VIDEO CASSETTE RECORDER

VT-MX221AW / VT-MX421AW

EXPLODED VIEWS AND PARTS LIST SECTION

- **Exploded views**
- **Parts List**

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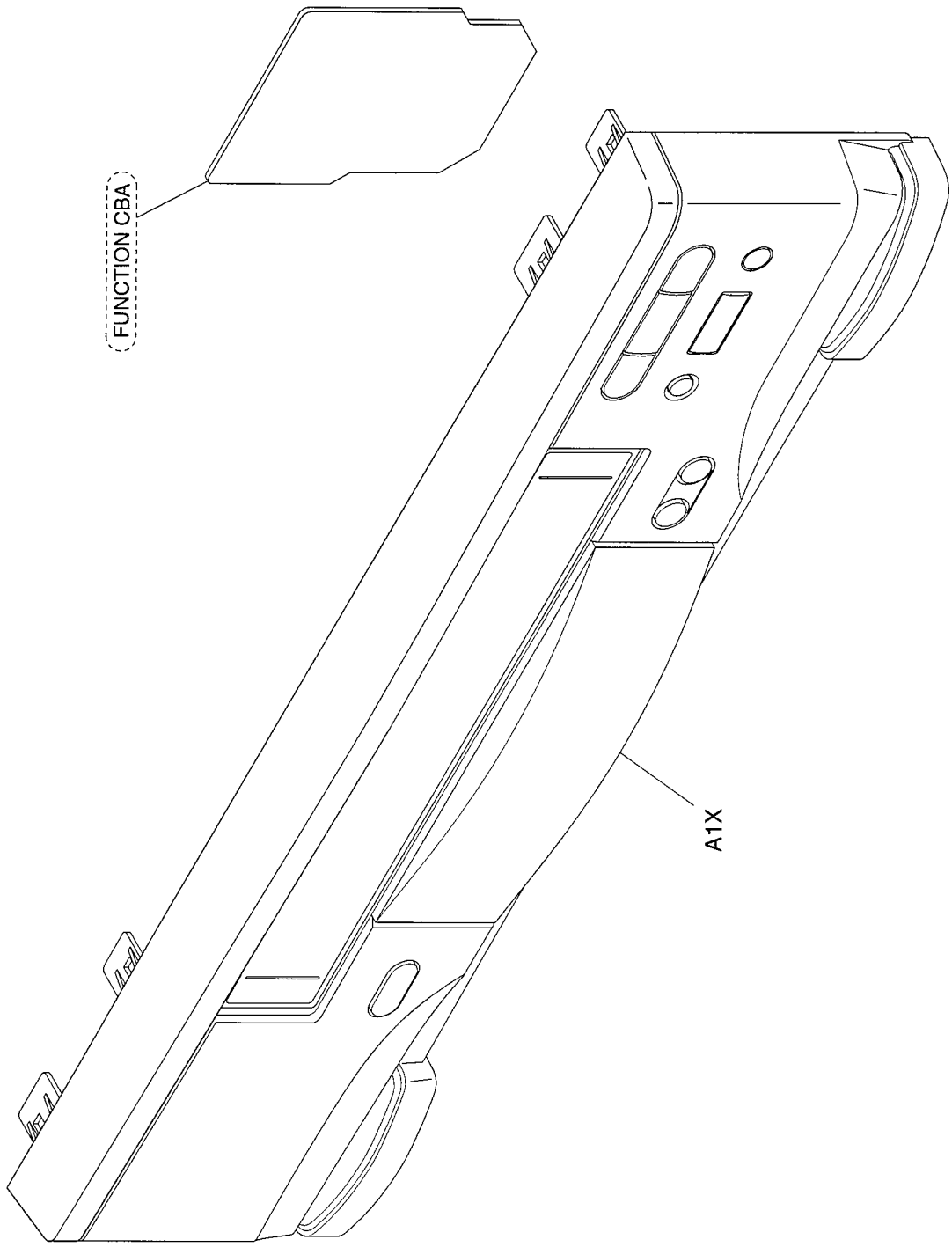
EXPLODED VIEWS

Front Panel

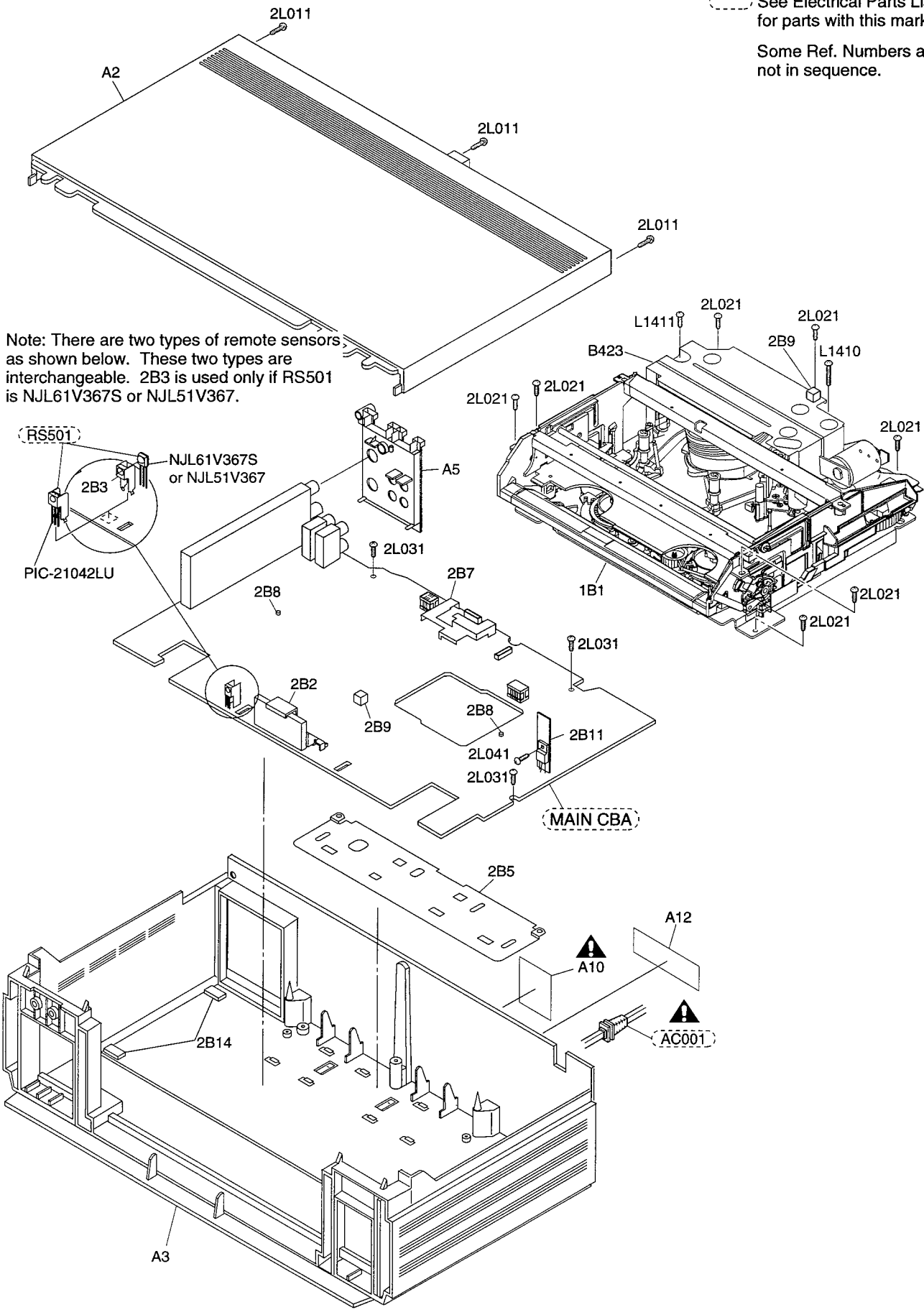
See Electrical Parts List for parts with this mark.



Cabinet

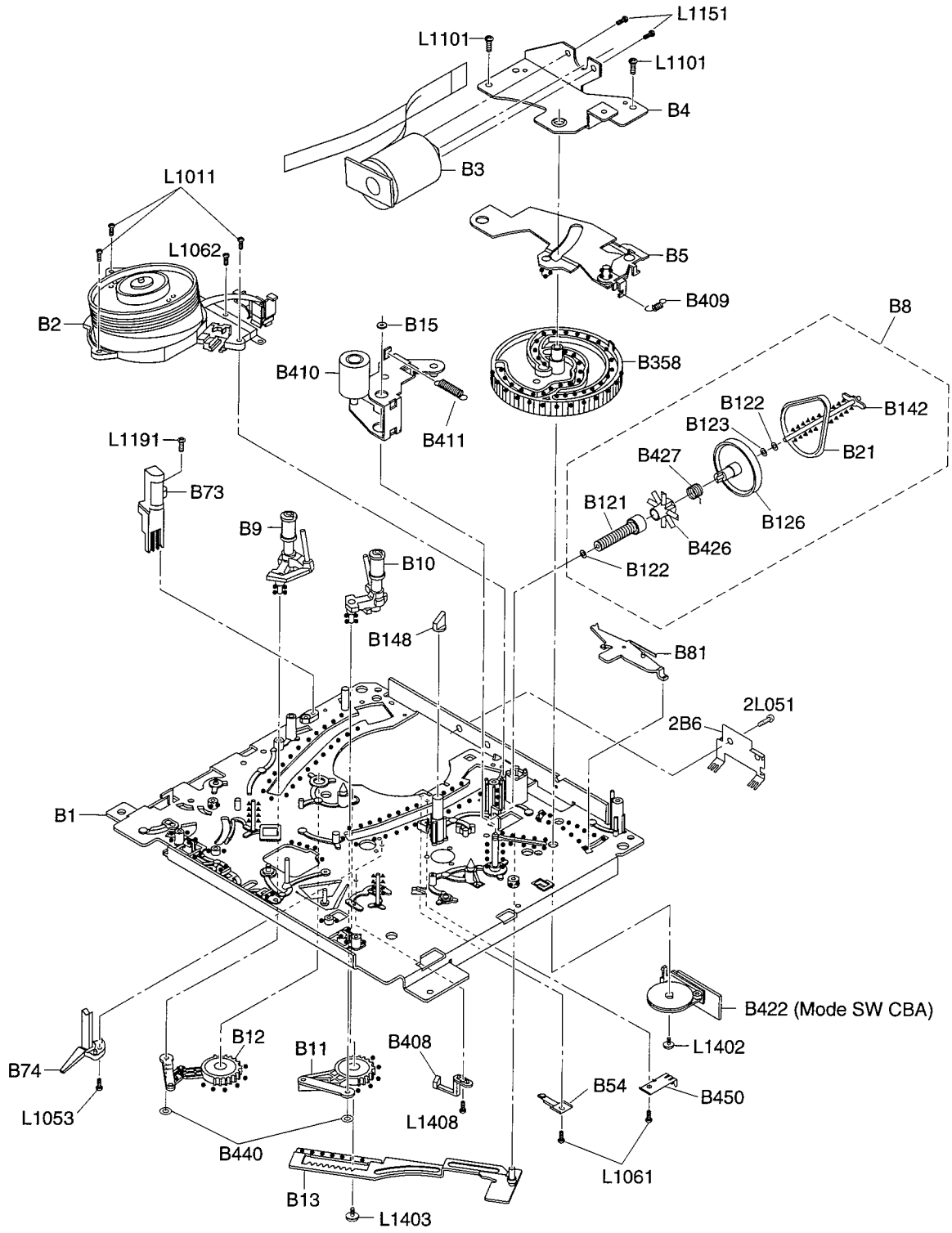
(RS501) See Electrical Parts List for parts with this mark.

Some Ref. Numbers are not in sequence.



Deck Mechanism View 1

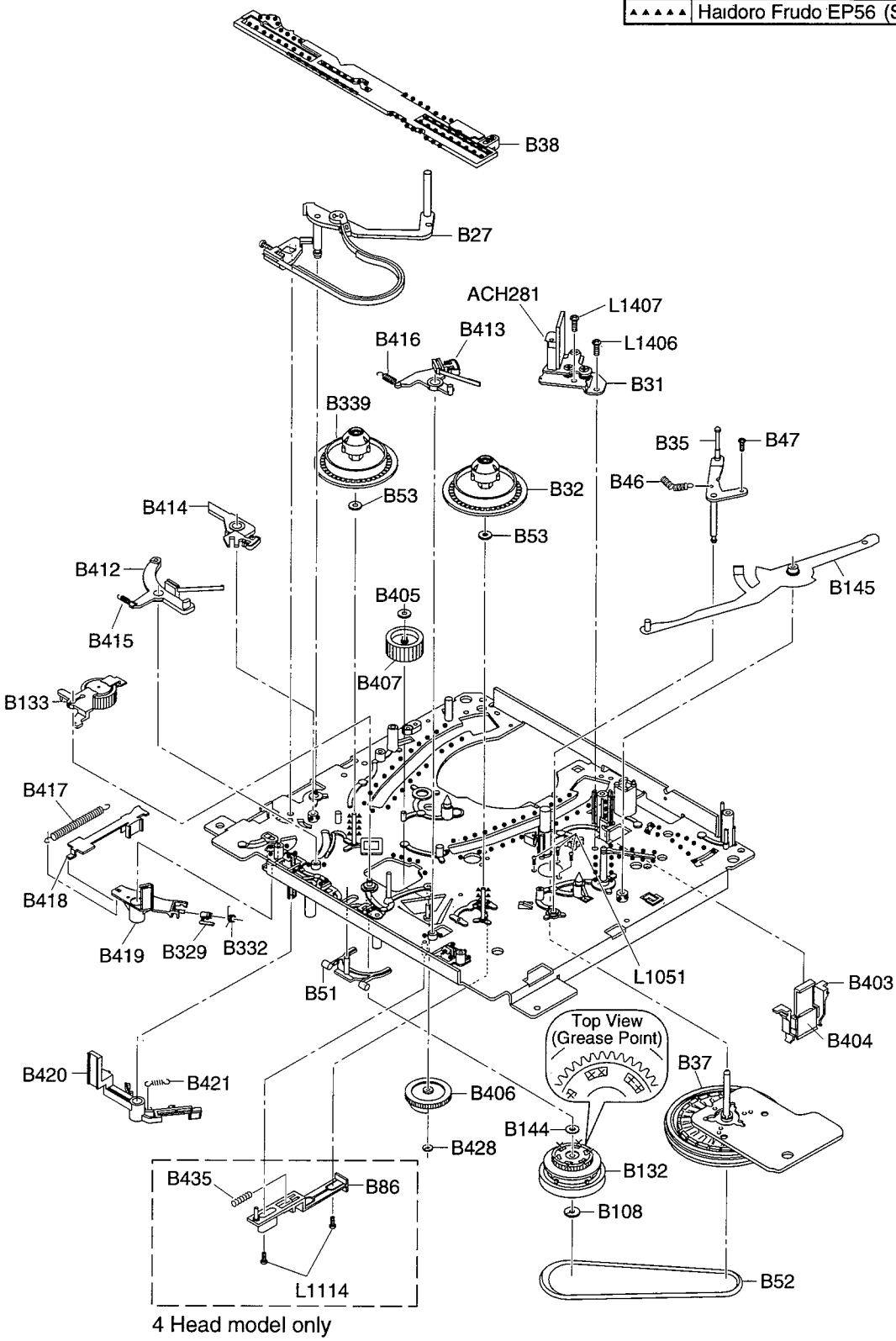
Mark	Description
●●●●●	Floil G-374G (Blue grease)
▲▲▲▲▲	Haidoro Frudo EP56 (Spindle oil)



Some Ref. Numbers are not in sequence.

Deck Mechanism View 2

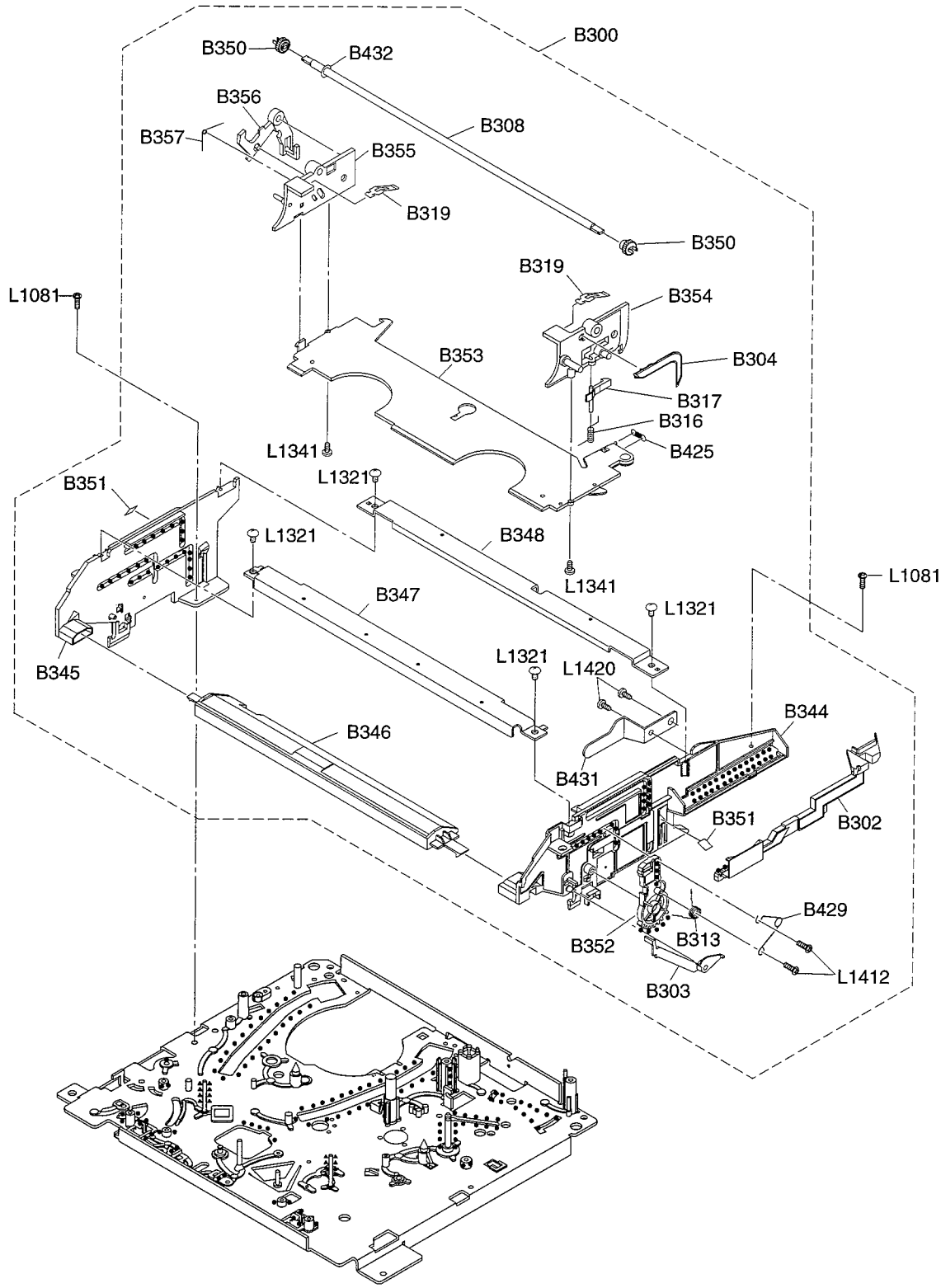
Mark	Description
×××××	Sankohl FG-84M (White grease)
●●●●●	Floil G-374G (Blue grease)
▲▲▲▲▲	Haidoro Frudo EP56 (Spindle oil)



Some Ref. Numbers are not in sequence.

Deck Mechanism View 3

Mark	Description
●●●●●	Floil G-374G (Blue grease)
▲▲▲▲▲	Haidoro Frudo EP56 (Spindle oil)



Some Ref. Numbers are not in sequence.

MECHANICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
2B 2	TE12383	HOLDER
2B 3	TE12616	HOLDER
2B 5	TE12378	PLATE SHIELD
2B 6	TJ13458	DECK EARTH PLATE
2B 7	TE12617	SHIELD
2B 8	TE12453	BUSH
2B 9	TE12422	CUSHION
2B 11	TE12599	HEATSINK
2B 14	TE12615	CUSHION
2L 011	TJ12534	SCREW (3X12)
2L 021	TJ12534	SCREW (3X12)
2L 031	TJ12535	SCREW (3X8)
2L 041	TE12602	SCREW (M3X10)
2L 051	TJ12536	SCREW (M3X5)
A1X	TE12601	FRONT PANEL [VT-MX421AW]
A1X	TE12591	FRONT PANEL [VT-MX221AW]
A 2	TE12352	CASE TOP
A 5	TE12357	JACK BOARD
⚠AC 001	TE11946	AC CORD
ACH281	TJ13442	ACE HEAD
B 2	TC10906	CYLINDER ASSEMBLY[VT-MX421AW]
B 2	TC10908	CYLINDER ASSEMBLY[VT-MX221AW]
B 3	TE12427	LOADING MOTOR ASSEMBLY
B 4	TE12396	MOTOR HOLDER
B 5	TE12445	CASSETTE DRIVE LEVER
B 8	TJ13443	PUULEY
B 9	TE12446	MOVING GUIDE (S)
B 10	TE12447	MOVING GUIDE (T)
B 11	TE12438	LOADING ARM (T)
B 12	TE12437	LOADING ARM (S)
B 13	TE12442	LOADING LEVER
B 15	TJ10155	WASHER
B 21	TE12409	LOADING BELT
B 27	TE12436	TENSION
B 31	TE12434	AC HEAD ASSEMBLY
B 32	TE12449	REEL BASE
B 35	TE12435	TAPE GUIDE
B 37	TC10873	CAPSTAN MOTOR
B 38	TE12354	MODE LEVER
B 46	TE12404	SPRING
B 47	TJ10222	SCREW
B 51	TE12392	FF ARM
B 52	TE12408	CAPSTAN BELT
B 53	TJ10228	WASHER
B 54	TE12441	SPRING
B 73	TJ13444	FE HEAD
B 74	TE12366	PRISM
B 81	TE12363	M LEVER HOLDER
B 86	TE12486	BRAKE[VT-MX421AW]
B 108	TJ10228	WASHER
B 121	TE12385	WORM
B 122	TJ10165	WASHER
B 123	TJ10166	WASHER
B 126	TE12384	PULLEY
B 132	TJ13445	CLUTCH
B 133	TE12439	IDLER
B 142	TJ10173	SHAFT LOCK
B 144	TJ10234	WASHER
B 145	TE12613	MAIN LEVER
B 148	TE12387	TG CAP
B 300	TE12426	FL ASSEMBLY
B 302	TE12459	RACK
B 303	TE12374	DOOR OPENER
B 304	TE12373	DOOR OPENER
B 308	TE12397	SLIDER SHAFT
B 313	TE12398	SPRING
B 316	TJ12658	SPRING
B 317	TE12411	LOCK ARM
B 319	TJ13446	SPRING
B 329	TJ12627	HOLDER KICK ARM
B 332	TE12614	SPRING
B 339	TE12448	REEL BASE
B 344	TE12362	CASSETTE GUIDE (R)
B 345	TE12361	CASSETTE GUIDE (L)
B 346	TE12369	FRONT GUIDE
B 347	TE12376	GUIDE HOLDER (F)
B 348	TE12377	GUIDE HOLDER (R)
B 350	TE12395	SLIDER GEAR
B 351	TE12412	MIRROR
B 352	TE12372	CASSETTE DRIVE GEAR
B 353	TE12444	CASSETTE PLATE
B 354	TE12356	SLIDER (R)
B 355	TE12355	SLIDER (L)
B 356	TE12375	LOCK LEVER
B 357	TE12415	SPRING
B 358	TE12351	CAM
B 403	TE12368	ACH-9A
B 404	TE12394	ACH-9B
B 405	TJ12633	WASHER
B 406	TE12389	SENSOR GEAR
B 407	TE12388	M GEAR
B 408	TE12391	PRISM
B 409	TE12402	SPRING
B 410	TE12428	PINCH ROLLER
B 411	TE12403	SPRING
B 412	TE12432	S BRAKE LEVER
B 413	TE12431	M BRAKE (T)
B 414	TE12433	M BRAKE (S)
B 415	TE12399	SPRING
B 416	TE12405	SPRING
B 417	TE12406	SPRING
B 418	TE12416	TENSION PLATE
B 419	TE12365	BT ARM
B 420	TE12364	REC ARM
B 421	TE12407	SPRING
B 422	TE12443	MODE SW CBA
B 423	TE12358	SHIELD PLATE
B 425	TE12413	SPRING
B 426	TE12386	KICK PULLEY
B 427	TE12401	SPRING
B 428	TJ12633	WASHER
B 429	TE12418	SPRING
B 431	TJ13449	LDG PLATE
B 432	TJ13451	WASHER
B 435	TC10907	SPRING
B 440	TE12619	CS RING
B 450	TE12604	PLATE,EARTH
L 1011	TJ10174	SCREW (M3X9)
L 1051	TJ13452	SCREW (M2.6X6)
L 1053	TJ13452	SCREW (M2.6X6)
L 1061	TE12417	SCREW
L 1062	TJ13014	SCREW (M2.6X8)
L 1081	TJ10176	SCREW (3X6)
L 1101	TJ13453	SCREW (3X10)
L 1114	TJ13454	SCREW (M2X6)[VT-MX421AW]
L 1151	TJ10178	SCREW (M3X4)
L 1191	TJ13016	SCREW (M2.6X12)

SYMBOL-NO	P-NO	DESCRIPTION
L 1321	TJ12535	SCREW (3X6)
L 1341	TJ12687	SCREW (M2.6X8)
L 1402	TJ13454	SCREW (M2X6)
L 1403	TJ10119	SCREW (3X10)
L 1406	TJ13455	SCREW (M2.6X4)
L 1407	TJ13014	SCREW (M2.6X8)
L 1408	TJ12636	SCREW (M2.6X6)
L 1410	TJ13441	SCREW (M3X25)
L 1411	TJ10176	SCREW (M3X6)
L 1412	TJ12687	SCREW (M2.6X8)
L 1420	TJ12535	SCREW (M3X8)
		FOR ACCESSARIES
X 1	TC10876	REMOTE CONTROL UNIT[VT-MX221AW]
X 1	TE12483	REMOTE CONTROL UNIT[VT-MX421AW]
X 3	5857952	RF CABLE

SYMBOL-NO	P-NO	DESCRIPTION

ELECTRICAL PARTS LIST

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		SEMI-CONDUCTORS
D 001	TC10752	DIODE 1N4005
D 002	TC10752	DIODE 1N4005
D 003	TC10752	DIODE 1N4005
D 004	TC10752	DIODE 1N4005
D 005	TC10909	DIODE PR1006
D 006	TC10754	DIODE 1N4148M
D 007	TC10754	DIODE 1N4148M
D 008	TC10753	DIODE PR1004
D 012	TC10753	DIODE PR1004
D 013	TC10753	DIODE PR1004
D 015	TC10757	DIODE PR3002
D 016	TC10877	DIODE SB140
D 017	TC10753	DIODE PR1004
D 018	TC10759	ZENER DIODE UZ-9.1BSC
D 052	TC10754	DIODE 1N4148M
D 053	TC10759	ZENER DIODE UZ-9.1BSC
D 054	TC10754	DIODE 1N4148M
D 055	TC10752	DIODE 1N4005
D 057	TC10754	DIODE 1N4148M
D 058	TC10787	ZENER DIODE UZ-30BSB
D 059	TC10758	ZENER DIODE UZ-6.8BSA
D 301	TC10754	DIODE 1N4148M
D 302	TC10754	DIODE 1N4148M
D 303	TC10754	DIODE 1N4148M
D 304	TC10754	DIODE 1N4148M
D 501	TC10754	DIODE 1N4148M
D 502	TC10754	DIODE 1N4148M
D 510	TC10754	DIODE 1N4148M
D 511	TC10886	LED SLR-938CV-7
D 701	TC10762	ZENER DIODE UZ-33BSD
⚠IC 001	TC10763	PHOTOCOUPLER PC-17T1
IC 002	TC10764	IC KA431Z
IC 251	TC10889	IC LA70001[VT-MX221AW]
IC 251	TC10901	IC LA70011[VT-MX421AW]
IC 301	TC10888	IC LA71020M
IC 501	TC10892	IC SY/M37779M5A109GP[VT-MX221AW]
IC 501	TC10902	IC SY/M37779M5A111GP[VT-MX421AW]
IC 502	TC10768	IC LM339N
IC 503	TC10769	IC LM324N
IC507A	TC10771	IC TA7291S
IC507B	TC10772	IC LB1641
IC 751	TC10773	IC HCF4052BEY
IC 851	TC10774	IC LC74723-9068
⚠Q 001	TC11051	TRANSISTOR 2SC3866MR
⚠Q 002	TC10775	TRANSISTOR 2SC3576
Q 053	TC10777	TRANSISTOR 2SD734F-NP-AQ
Q 054	TC10778	TRANSISTOR KTC3199(Y)
Q 055	TC10779	TRANSISTOR KRA103M
Q 303	TC10779	TRANSISTOR KRC103M
Q 304	TC10778	TRANSISTOR KTC3199(Y)
Q 305	TC10783	TRANSISTOR KTC3193(Y)
Q 307	TC10783	TRANSISTOR KTC3193(Y)
Q 308	TC10784	TRANSISTOR KTA1266(Y)
Q 310	TC10778	TRANSISTOR KTC3199(Y)
Q 311	TC10783	TRANSISTOR KTC3193(Y)
Q 401	TC10785	TRANSISTOR 2SC3331(T)
Q 402	TC10785	TRANSISTOR 2SC3331(T)
Q 403	TC10777	TRANSISTOR 2SD734F-NP-AQ
Q 404	TC10779	TRANSISTOR KRA103M
Q 405	TC10785	TRANSISTOR 2SC3331(T)
Q 501	TC10779	TRANSISTOR KRA103M[VT-MX421AW]
Q 503	TC10862	PHOTO TRANSISTOR ST-316R2-B
Q 504	TC10862	PHOTO TRANSISTOR ST-316R2-B
Q 511	TC10778	TRANSISTOR KTC3199(BL)
Q 514	TC10785	PHOTO TRANSISTOR PT380FAB
Q 851	TC10782	TRANSISTOR KTA1267(Y)
		TRANSFORMERS
⚠T 001	TC11058	PULSE TRANS
T 401	TA12565	COIL, OSC
		COILS
⚠L 001	TA12553	COIL 33MH
L 002	TA12575	CORE
L 003	TA12554	CORE
L 004	TA12554	CORE
L 007	TA12554	CORE
L 008	TA12555	COIL 22UH
L 009	TA12555	COIL 22UH
L 252	5121289	COIL 22UH
L 304	TA12574	COIL 56UH
L 307	TA13031	COIL 22UH
L 502	TA12562	COIL 12UH
L 505	TA12561	COIL 100UH
L 506	TA12561	COIL 100UH
L 507	TA12561	COIL 100UH
L 702	TA13033	COIL 18UH
L 705	TA12556	COIL 15UH
L 706	TA12561	COIL 100UH
L 851	TA13032	COIL 18UH
L 853	TA12563	COIL 4.7UH
		CRYSTALS
X 301	TA12551	X'TAL 3.579545MHZ
X 502	TA12552	X'TAL 32KHZ
		MISCELLANEOUS
CL 281	TC10899	PARALLEL WIRE 2P
CN 287	TE12457	CONNECTOR
CN 501B	TJ13456	CONNECTOR
CN 502	TE12458	CONNECTOR
CN 503	TE12455	CONNECTOR
CN 504	TE12454	CONNECTOR
CN 505	TE12456	CONNECTOR
CN 507	TE11939	CONNECTOR
CN 651	TE11958	CONNECTOR
⚠F 001	TE11947	FUSE 1A/250V
FH 001	TE11948	FUSE HOLDER
FH 002	TE11948	FUSE HOLDER
FIP502	TC10895	LCD DISPLAY SVV-4SS05
PS501	TE11953	SENSOR SG231[VT-MX421AW]
⚠SA 001	TJ13459	SURGE ABSORBER JVR-10N471K
RS 501	TC10904	REMOTE RECEIVER NJL61V367S
TU 701	TC10897	TUNER UNIT TMLH2-009A
SW 281	TC10894	MODE SWITCH
SW 501	TE11957	SWITCH
SW 502	TE11957	SWITCH
SW 505	TE11957	SWITCH
SW 506	TE11941	SWITCH
SW 662	TE11957	SWITCH
SW 665	TE11957	SWITCH
SW 671	TE11957	SWITCH
SW 673	TE11957	SWITCH

SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
SW 674	TE11957	SWITCH			
SW 676	TE11957	SWITCH			
SW 701	TE11942	SWITCH			

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