

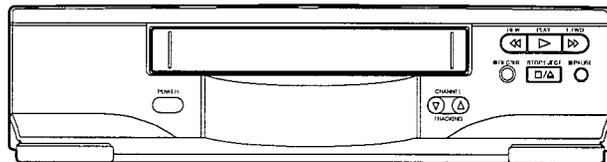
HITACHI

SERVICE MANUAL

TK

No. 4708E

VT-MX221AW
VT-MX421AW



V18362

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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.

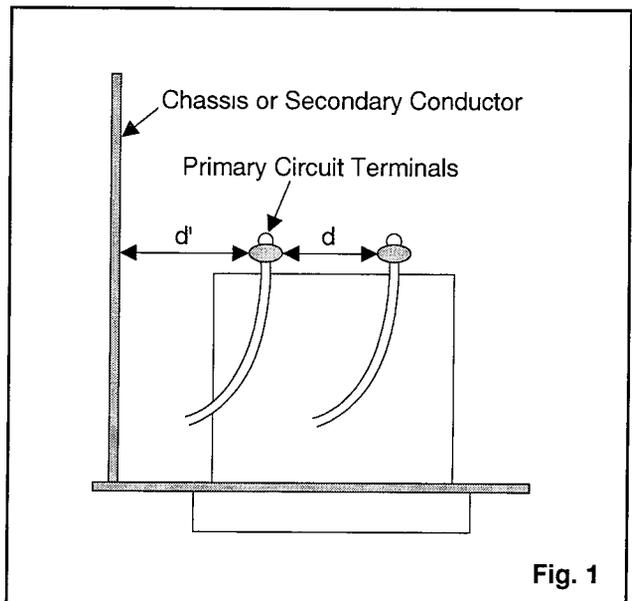


Fig. 1

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.

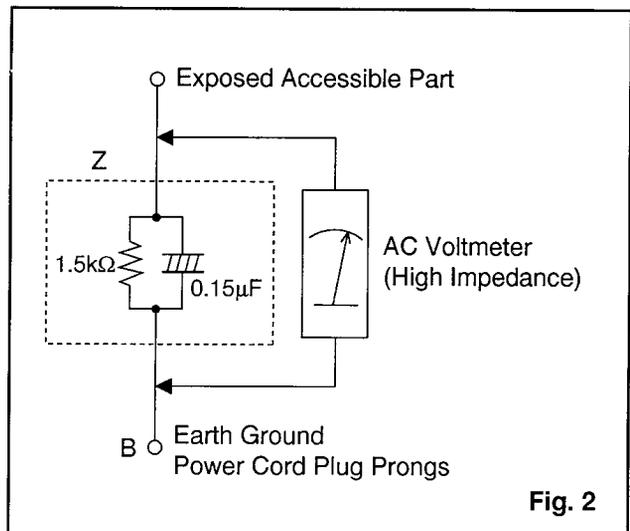


Fig. 2

Table 2 : Leakage current ratings for selected areas

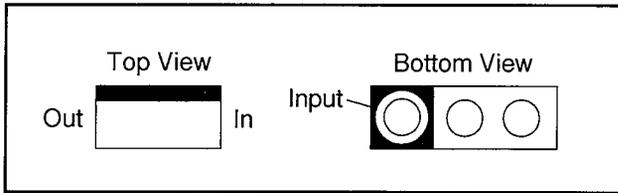
| AC Line Voltage | Load Z | Leakage Current (i) | Earth Ground (B) to: |
|-----------------|---|-------------------------|--------------------------|
| 120 V | 0.15μF CAP. & 1.5kΩ RES. Connected in parallel | $i \leq 0.5$ mA rms | Exposed accessible parts |

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

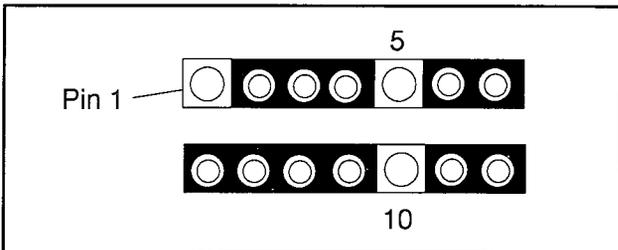
STANDARD NOTES FOR SERVICING

Circuit Board Indications

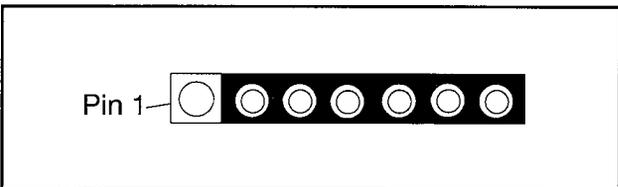
- a. The output pin of the 3 pin Regulator ICs is indicated as shown.



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

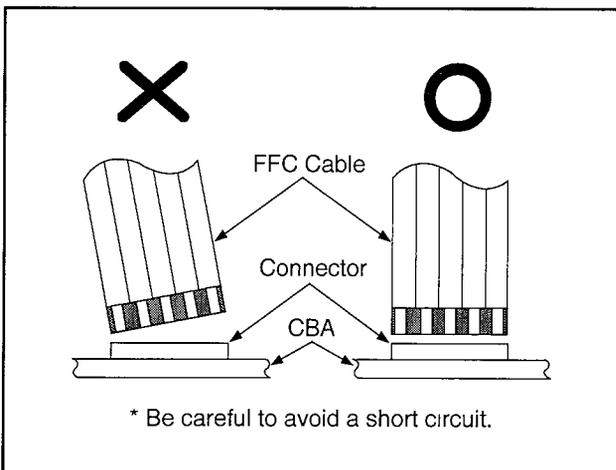


- c. The 1st pin of every male connector is indicated as shown.



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)

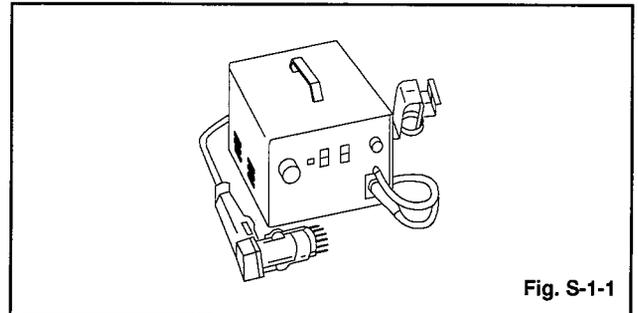


Fig. S-1-1

- (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.

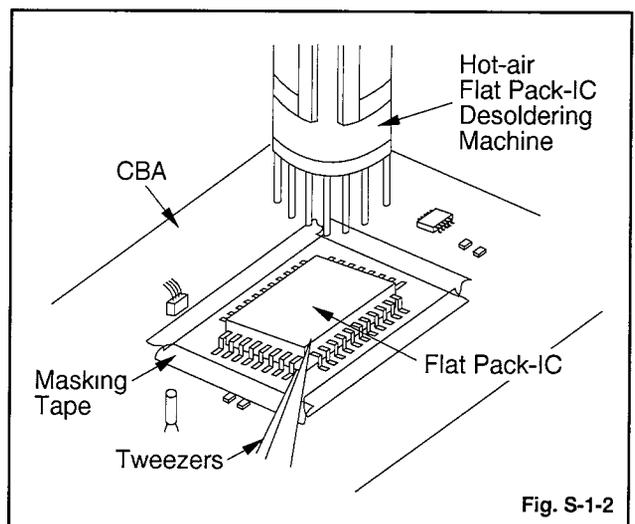
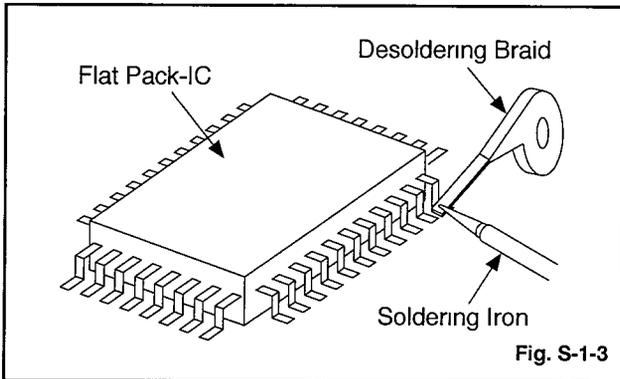


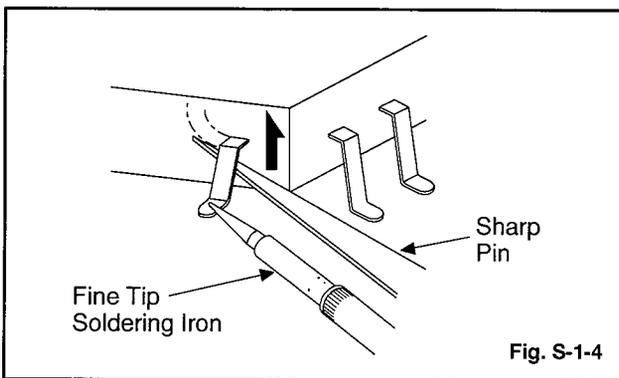
Fig. S-1-2

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)



- (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)



- (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:

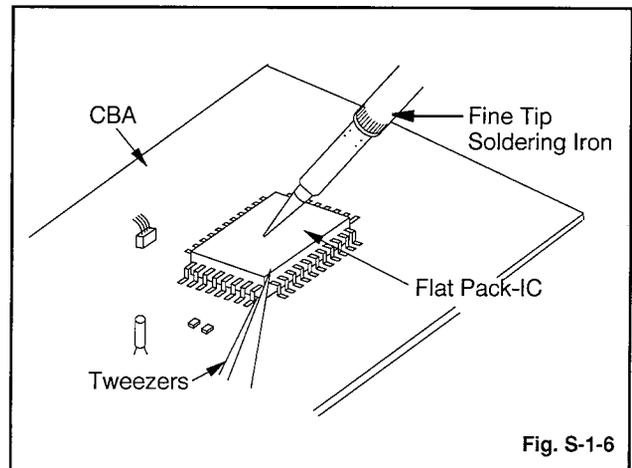
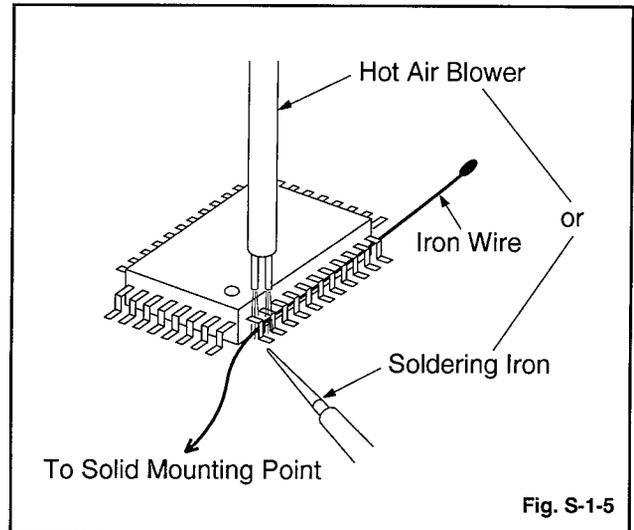
- (1) Using desoldering braid, remove the solder from all pins of the flat pack-IC. When you use solder flux which is applied to all pins of the flat pack-IC, you can remove it easily. (Fig. S-1-3)
- (2) Affix the wire to a workbench or solid mounting point, as shown in Fig. S-1-5.
- (3) While heating 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)

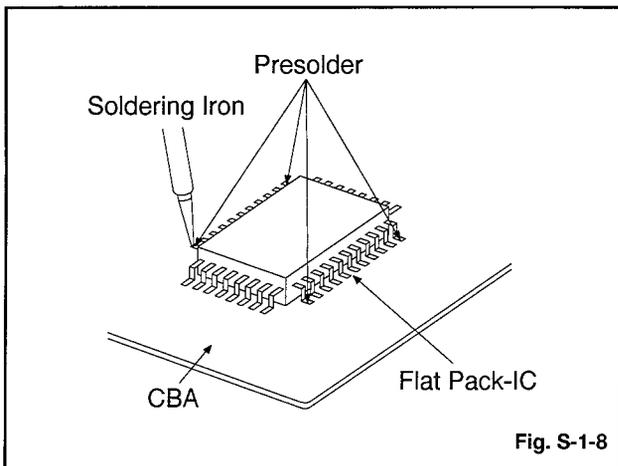
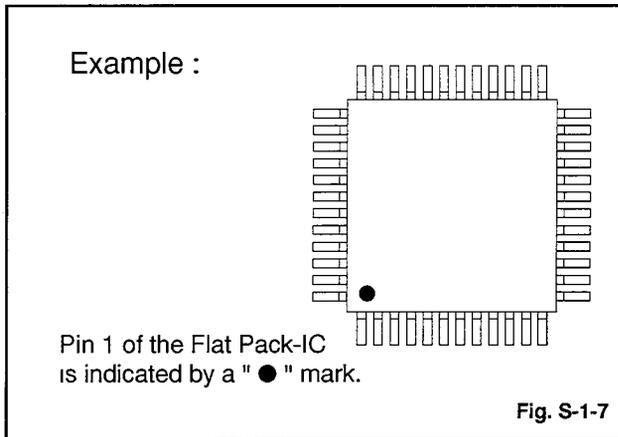
Note:

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.



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.



Instructions for Handling Semiconductors

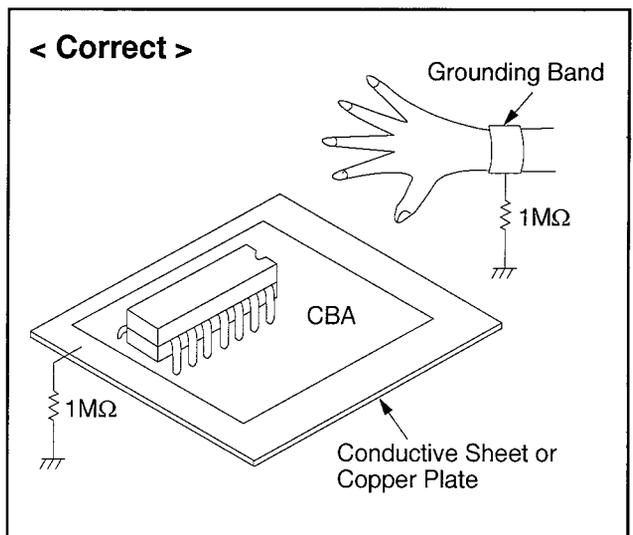
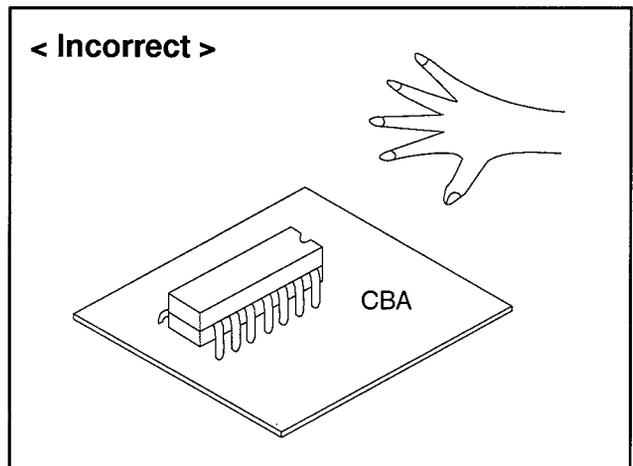
Electrostatic breakdown of the semiconductors may occur due to a potential difference caused by electrostatic charge during unpacking or repair work.

1. Ground for Human Body

Be sure to wear a grounding band ($1M\Omega$) 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 ($1M\Omega$) 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 |

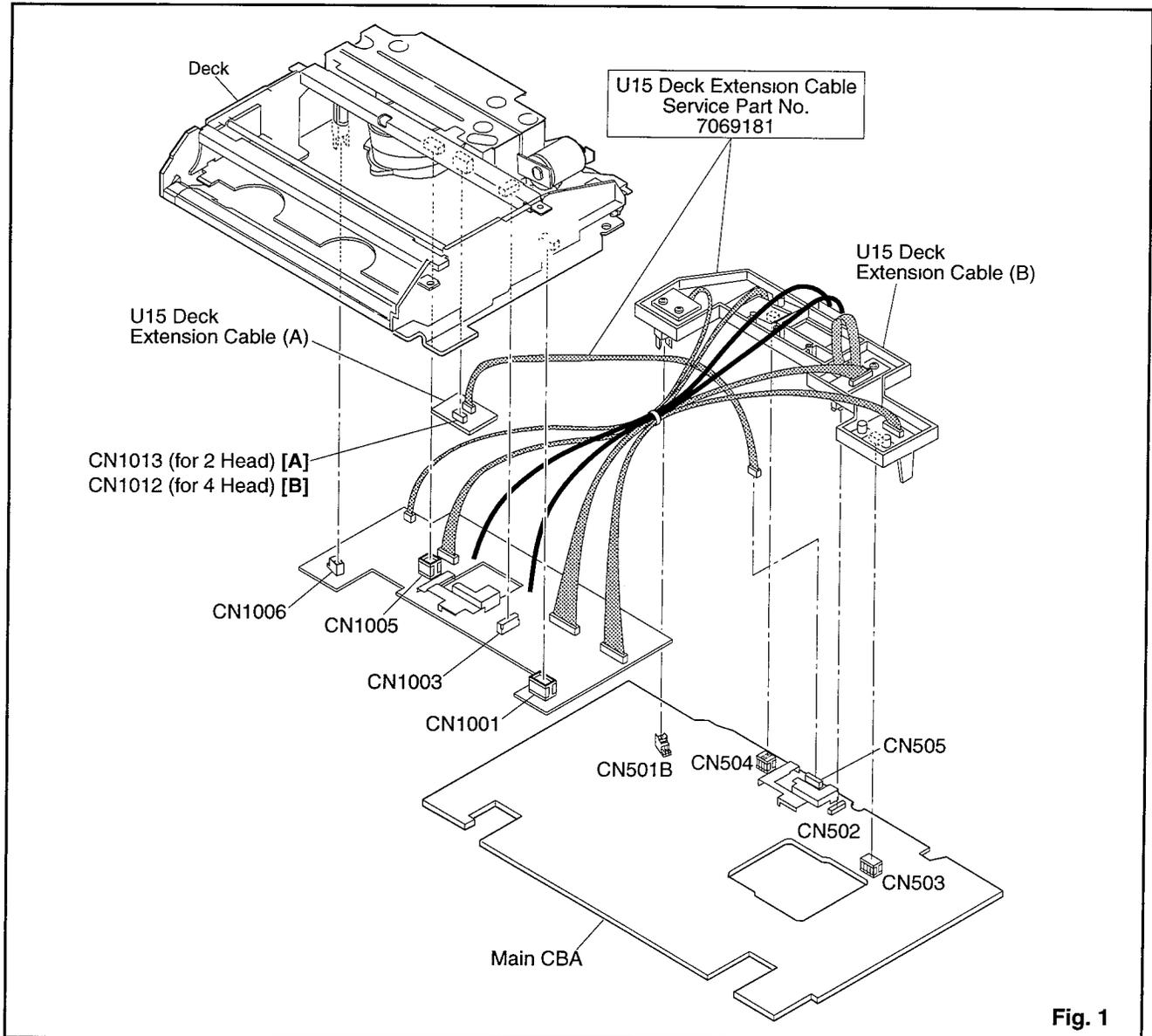


Fig. 1

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.

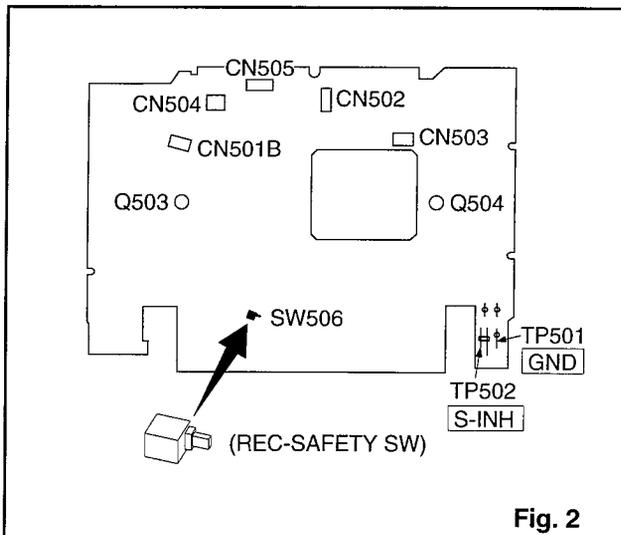
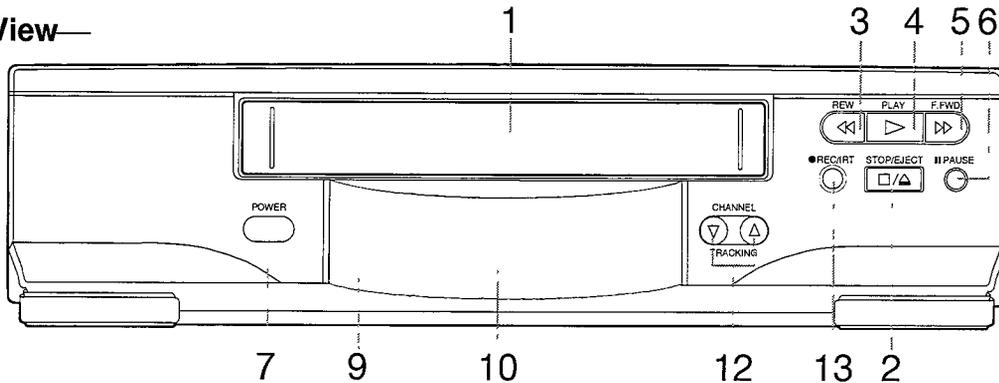


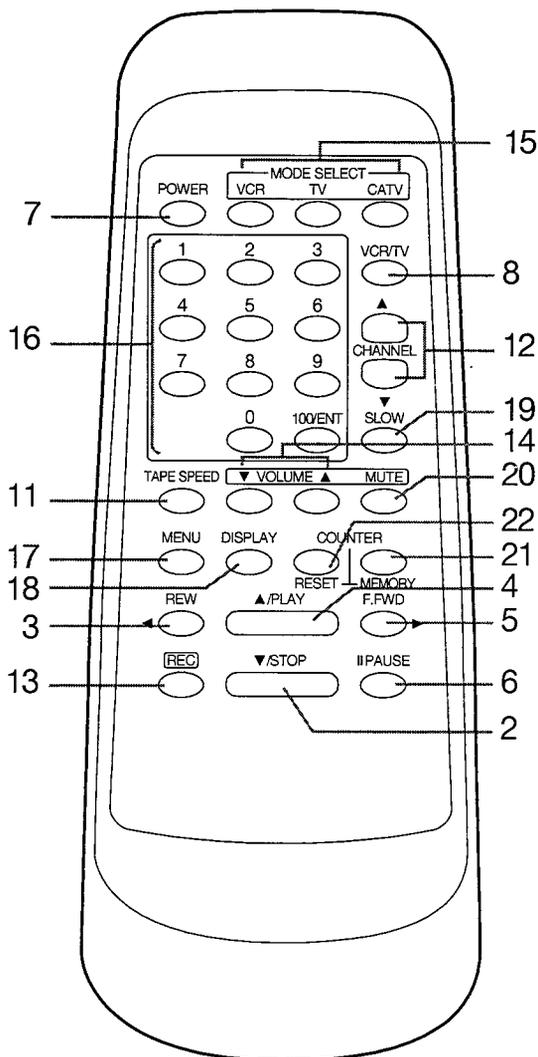
Fig. 2

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.

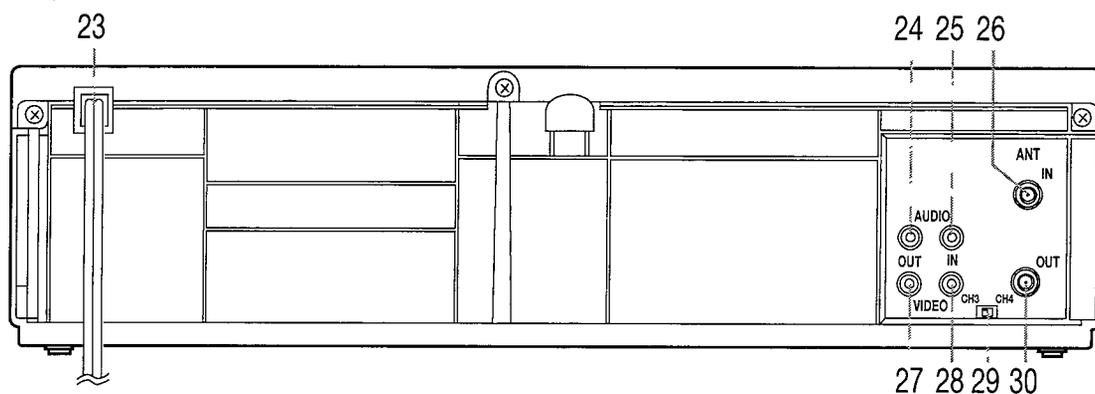
8. VCR/TV button— Press to select TV or VCR mode.

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.

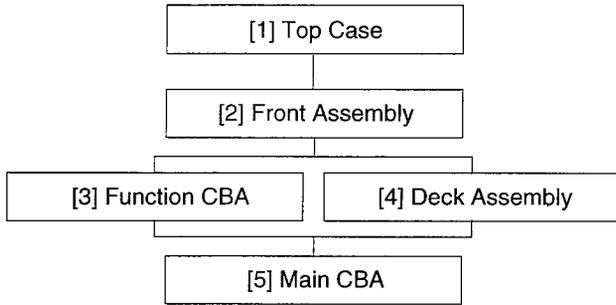
29. CH3/CH4 selector switch— Use to select a video output channel (3 or 4) for playback from the VCR.

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.



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.

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: 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."

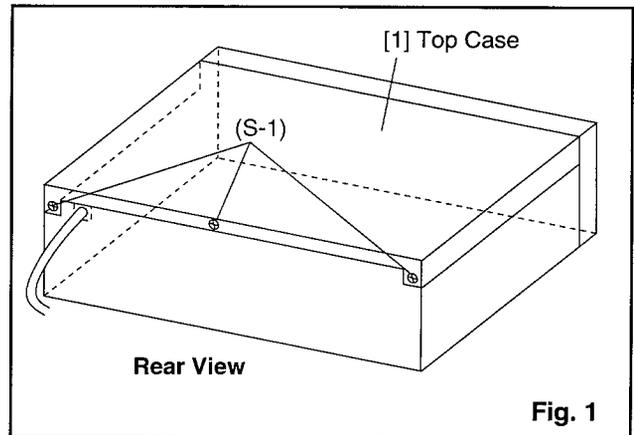


Fig. 1

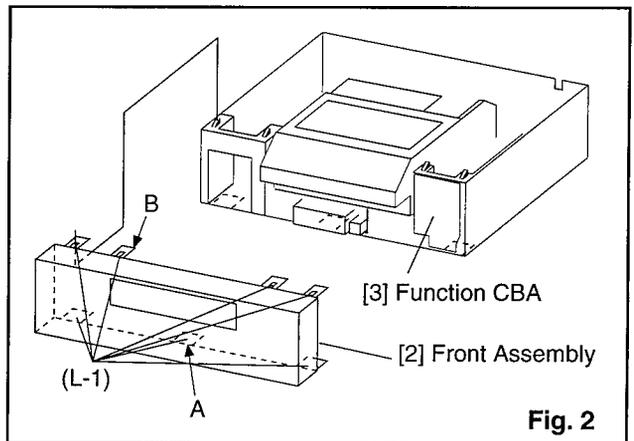


Fig. 2

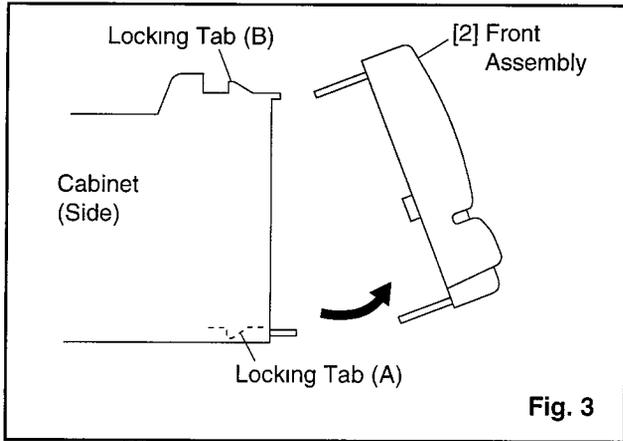


Fig. 3

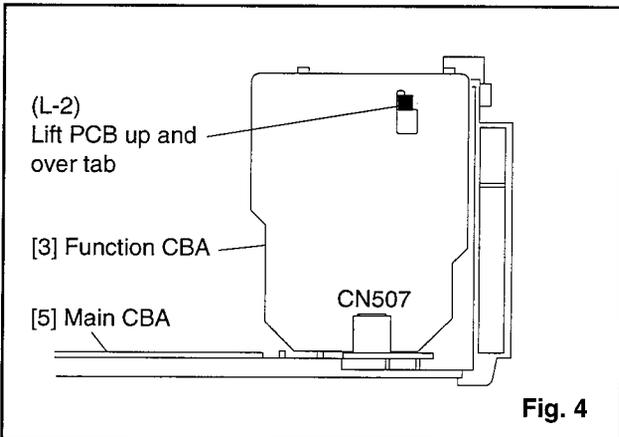


Fig. 4

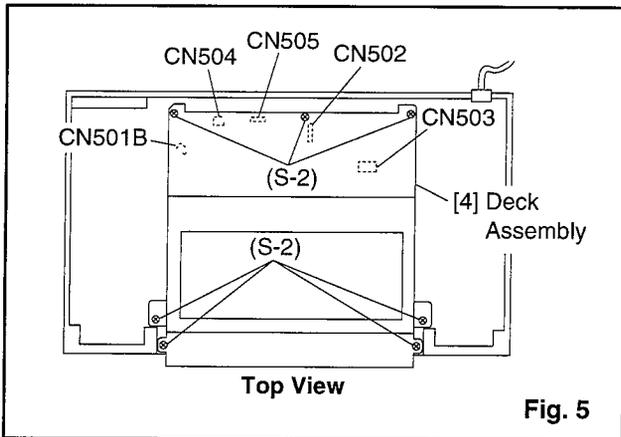


Fig. 5

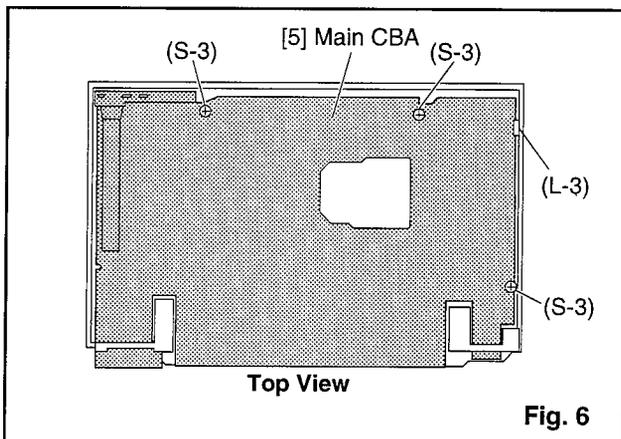


Fig. 6

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

- Oscilloscope: Dual-trace with 10:1 probe, V-Range: 0.001~50V/Div., F-Range: AC~DC-20MHz
- 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

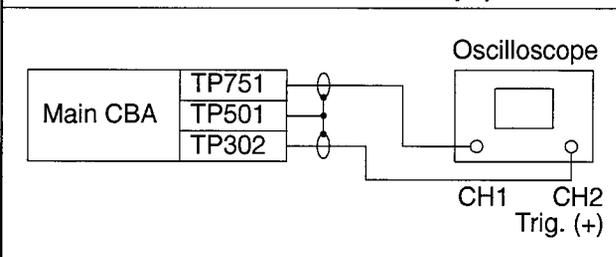
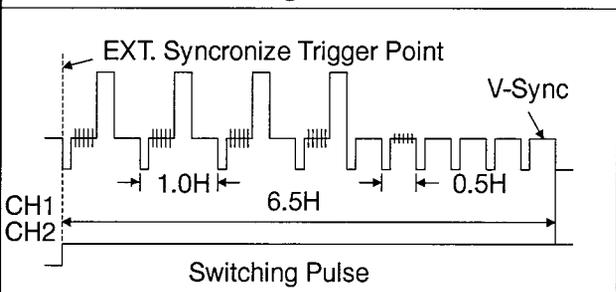


Figure 1

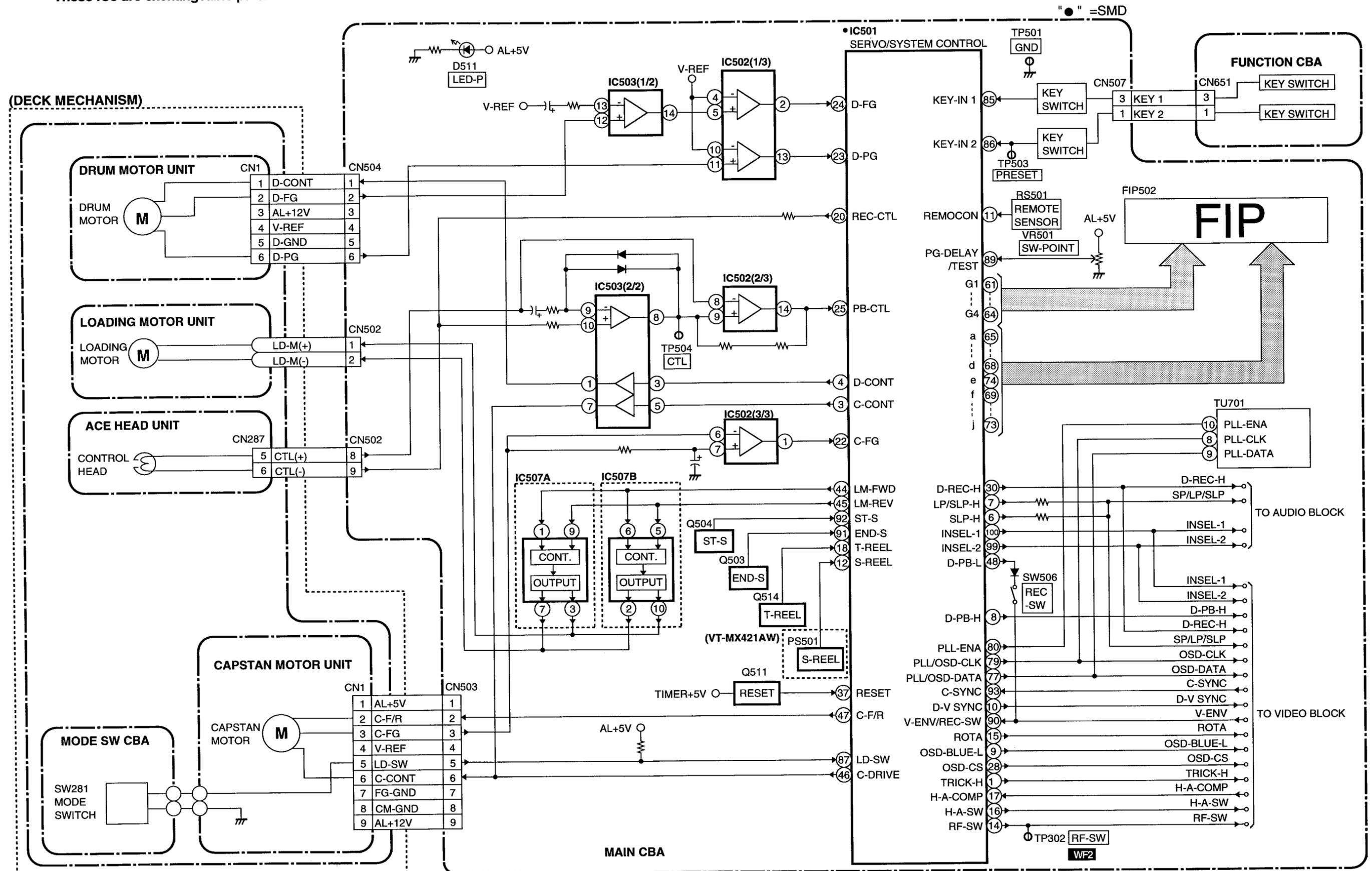


Reference Notes: Play back the Alignment tape and adjust VR501 so that the V-sync front edge of the CH1 video output waveform is out the 6.5H(412.7µs) delayed position from the rising edge of the CH2 head switching pulse waveform.

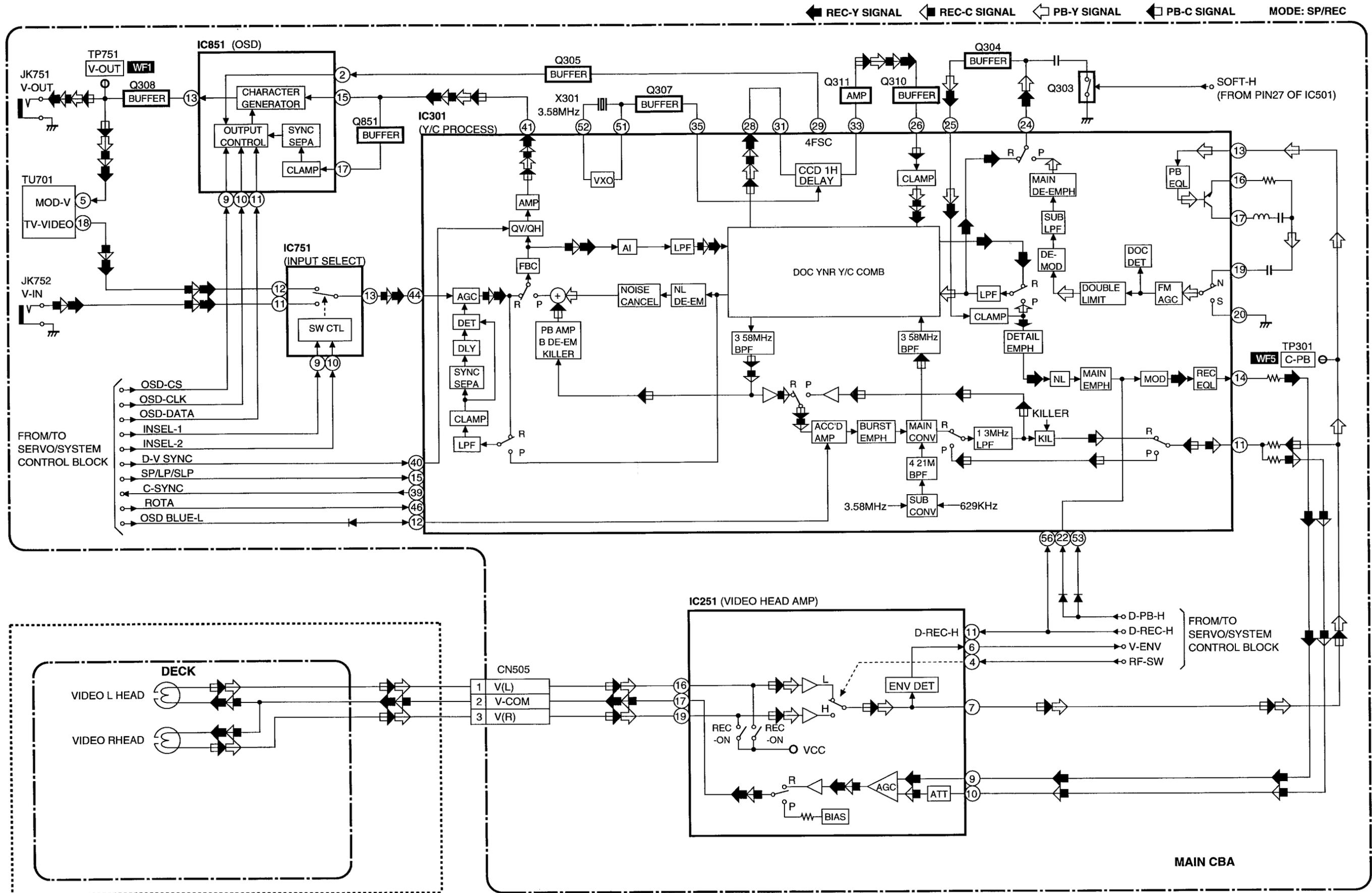
Servo/System Control Block Diagram

BLOCK DIAGRAMS

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



Video Block Diagram (VT-MX221AW)

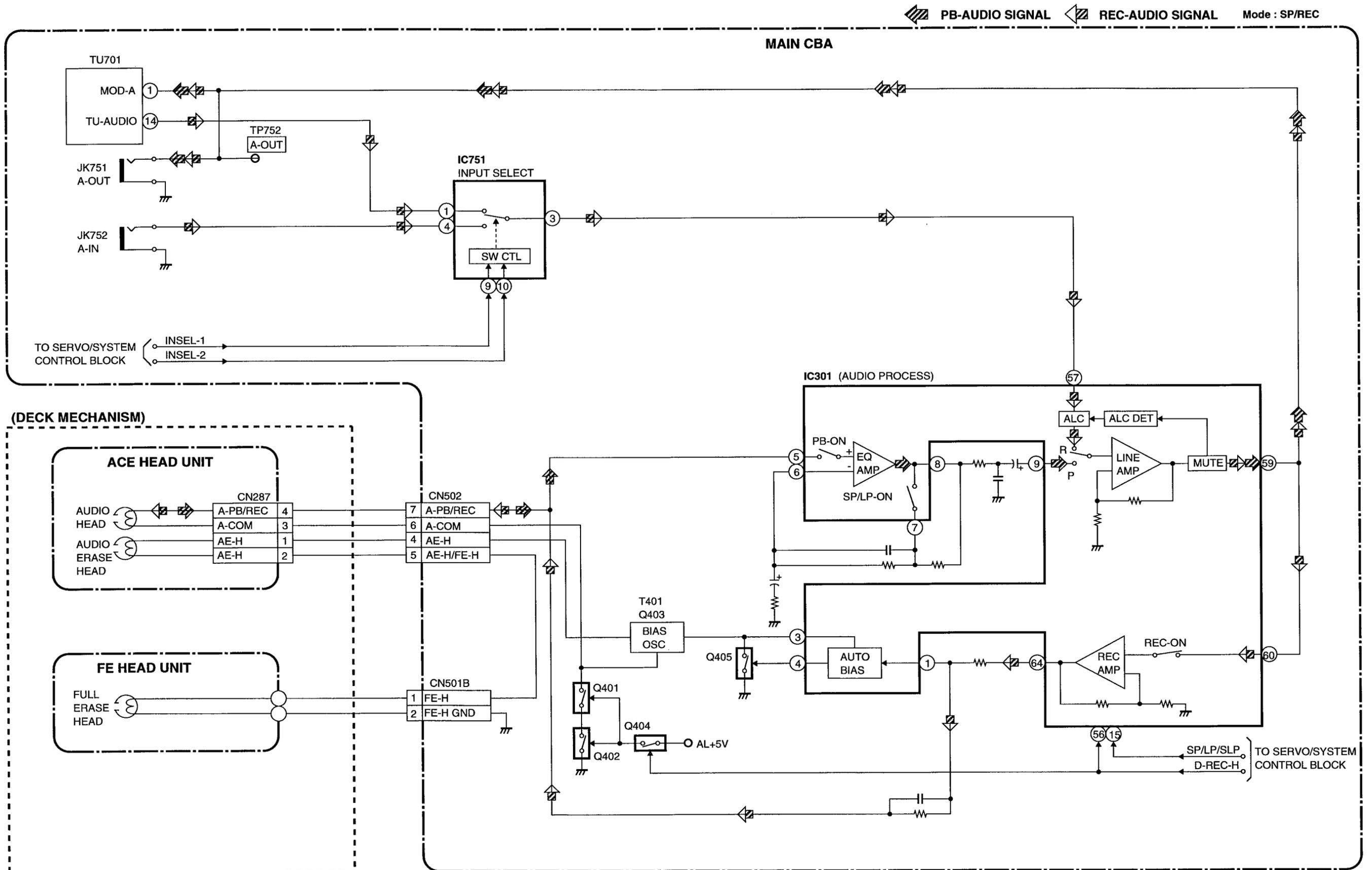


REC-Y SIGNAL REC-C SIGNAL PB-Y SIGNAL PB-C SIGNAL MODE: SP/REC

- FROM/TO SERVO/SYSTEM CONTROL BLOCK
- OSD-CS
 - OSD-CLK
 - OSD-DATA
 - INSEL-1
 - INSEL-2
 - D-V SYNC
 - SP/LP/SLP
 - C-SYNC
 - ROTA
 - OSD BLUE-L

- FROM/TO SERVO/SYSTEM CONTROL BLOCK
- D-PB-H
 - D-REC-H
 - V-ENV
 - RF-SW

Audio Block Diagram



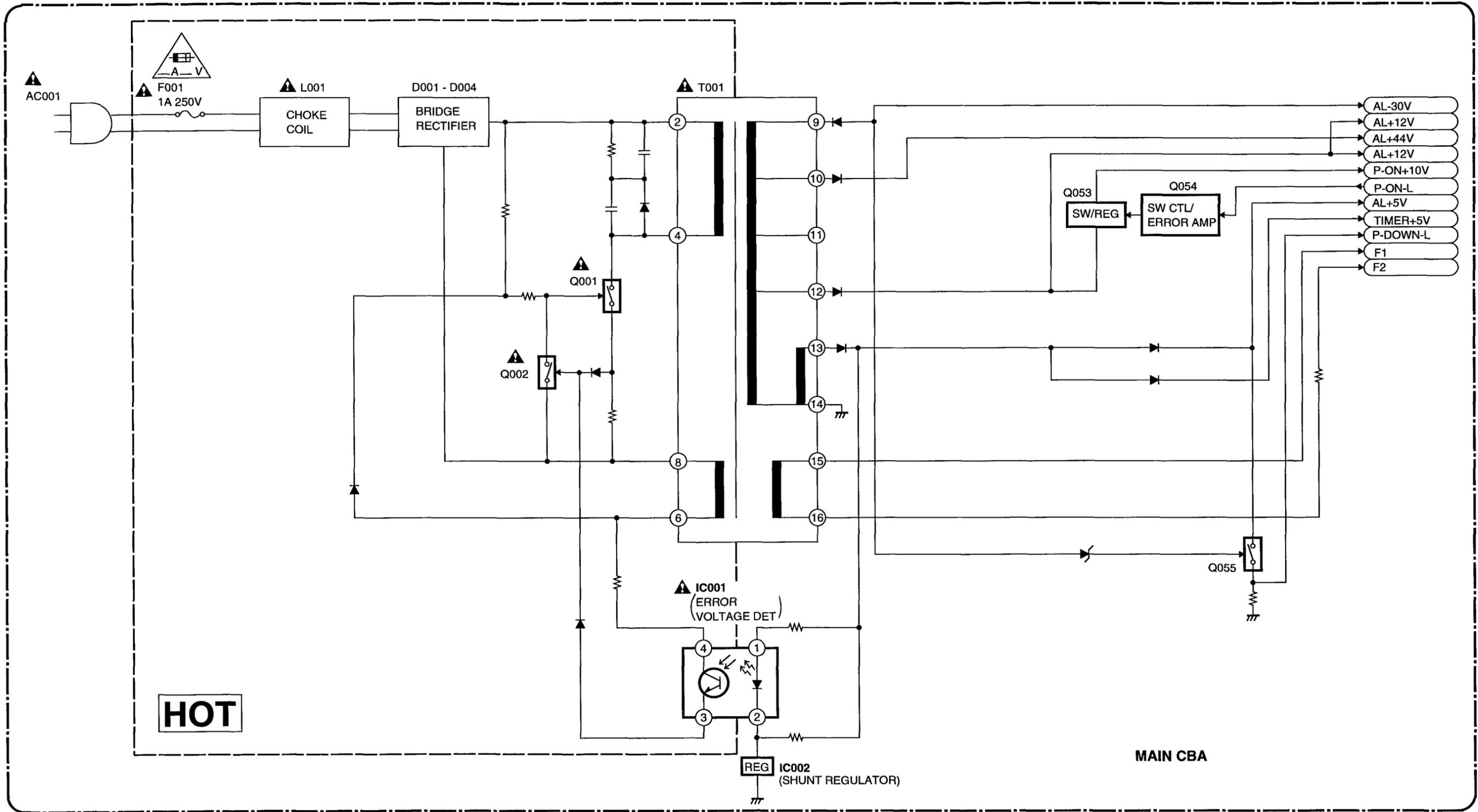
Power Supply Block Diagram

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 RISQUES
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

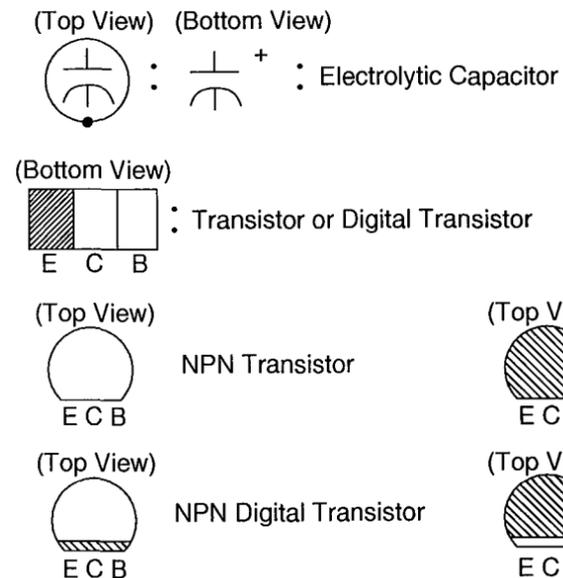
Many electrical and mechanical parts in this chassis have special characteristics. These characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special 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 |

Capacitors and transistors are represented by the following symbols.

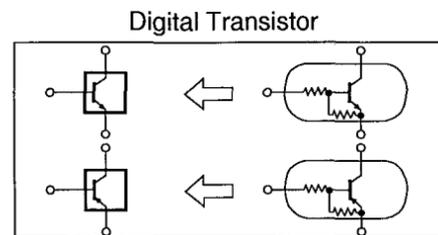
CBA Symbols



Note:

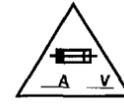
- Do not use the part number shown on these drawings for ordering. The correct part number is shown in the parts list, and may be slightly different or amended since these drawings were prepared.
- All resistance values are indicated in ohms ($K=10^3$, $M=10^6$).
- Resistor wattages are 1/4W or 1/6W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

Schematic Diagram Symbols



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 RISQUES 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:

- 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.
- 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.

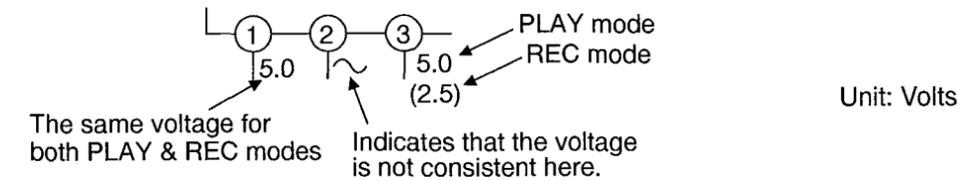
4. Wire Connectors

- Prefix symbol "CN" means "connector." (Can disconnect and reconnect)
- Prefix symbol "CL" means "wire-solder holes of the PCB." (Wire is soldered directly.)

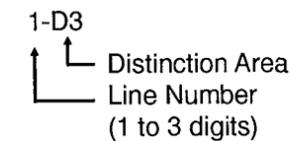
5. Note: Mark "•" is a leadless (chip) component.

6. Mode: SP/REC

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

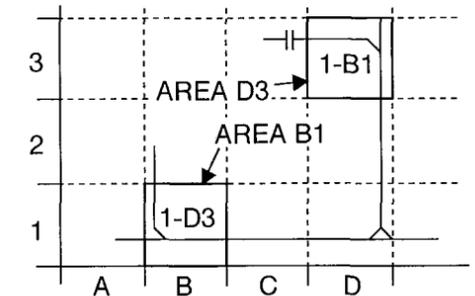


8. How to read converged lines



Examples:

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

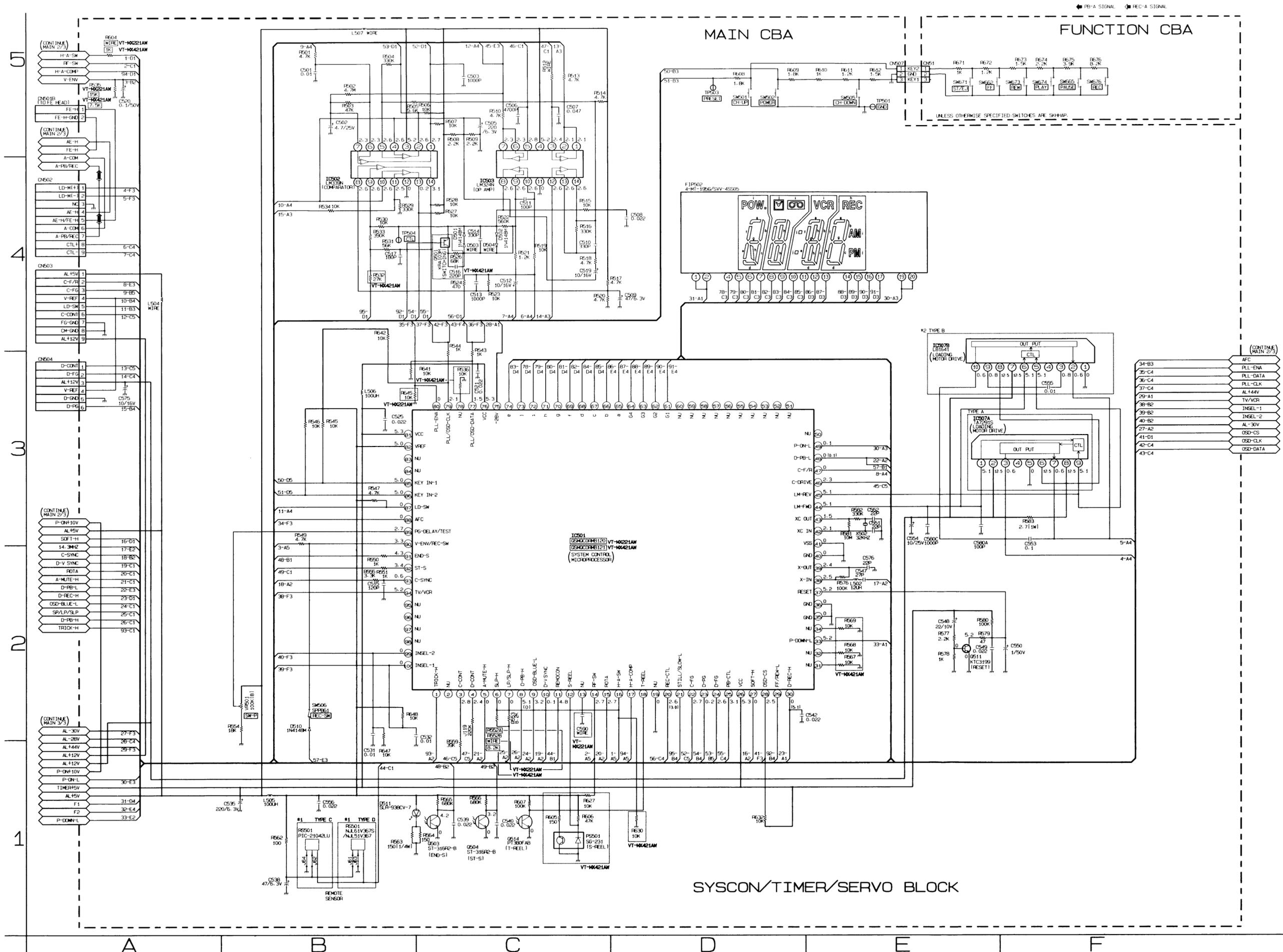
Main 1/3 Schematic Diagram

* 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.

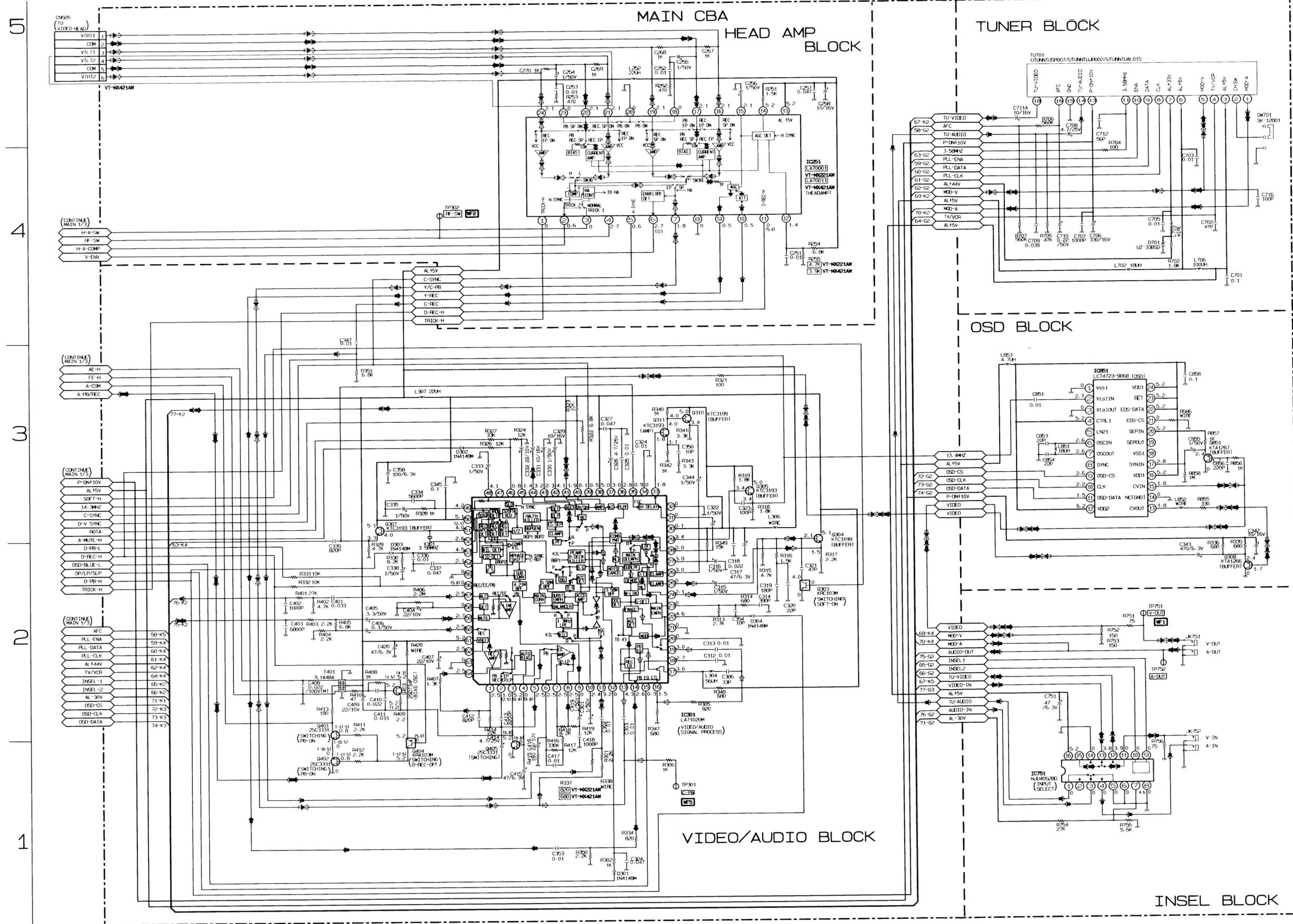
| | RS501 | J61 | J62 | J63 | J64 |
|--------|-------------------------|----------|----------|----------|----------|
| Type C | PIC-21042LU | Not Used | WIRE | Not Used | WIRE |
| Type D | NJL61V367S NJL51V367 | WIRE | Not Used | WIRE | Not Used |

* 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 |

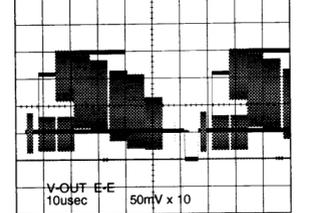


▶ PB-A SIGNAL ◀ REC-A SIGNAL ◀ PB-Y SIGNAL ◀ PB-C SIGNAL ◀ REC-Y SIGNAL ◀ REC-C SIGNAL

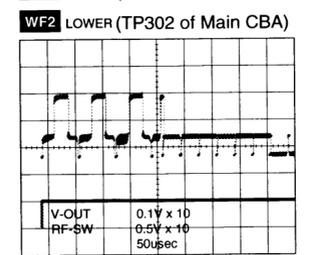


WAVEFORMS

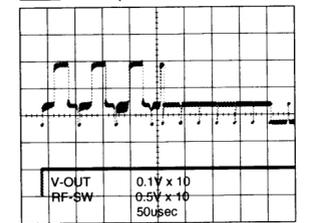
WF1 (TP751 of Main CBA)



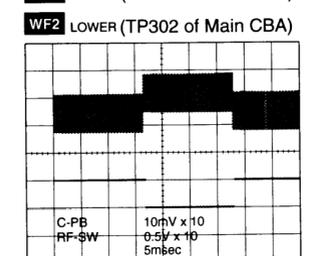
WF1 UPPER (TP751 of Main CBA)



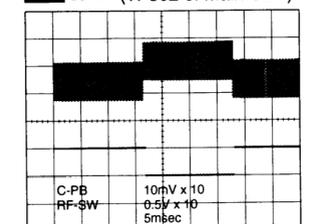
WF2 LOWER (TP302 of Main CBA)



WF5 UPPER (TP301 of Main CBA)

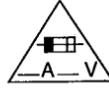


WF2 LOWER (TP302 of Main CBA)



Main 3/3 Schematic Diagram

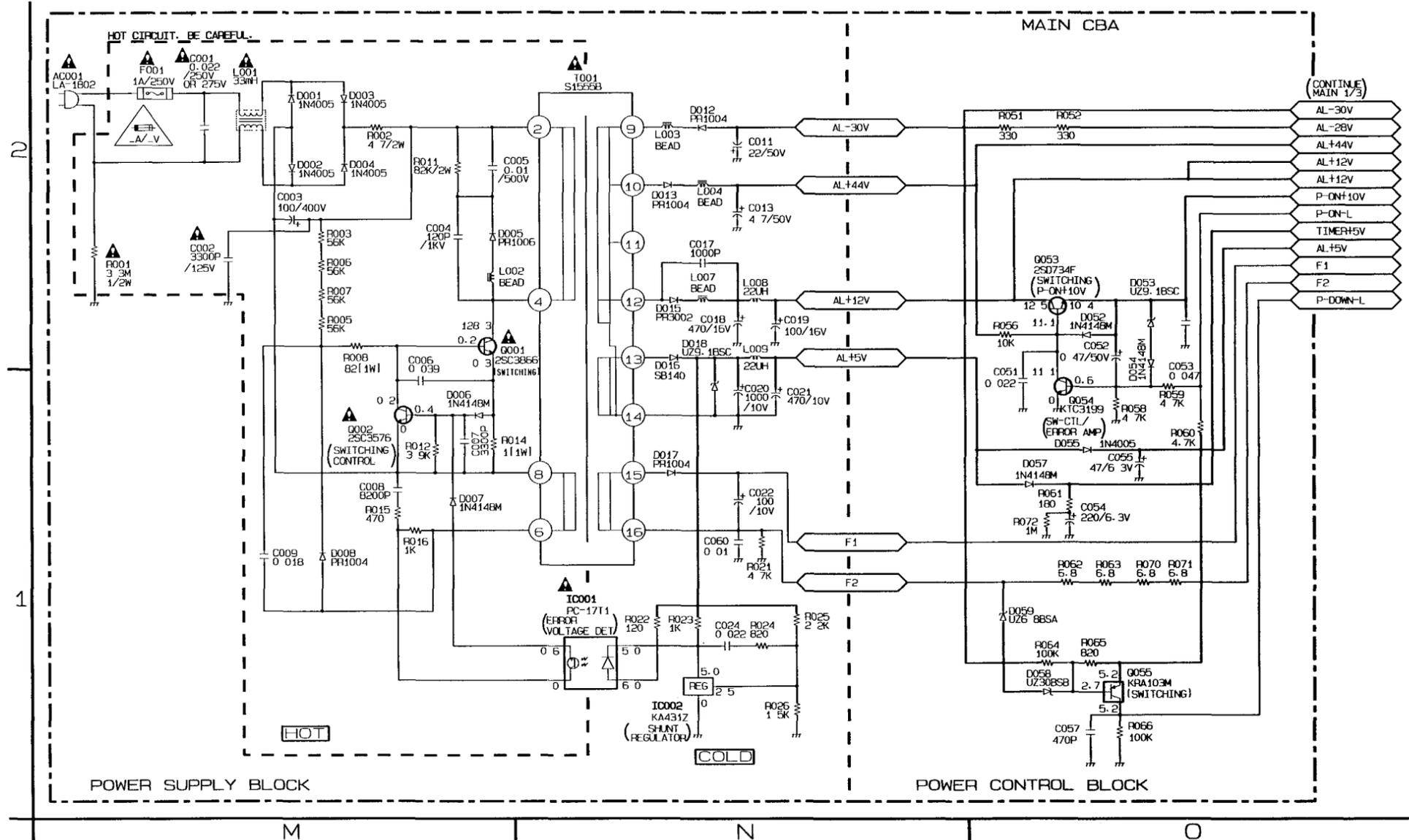
NOTE .
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



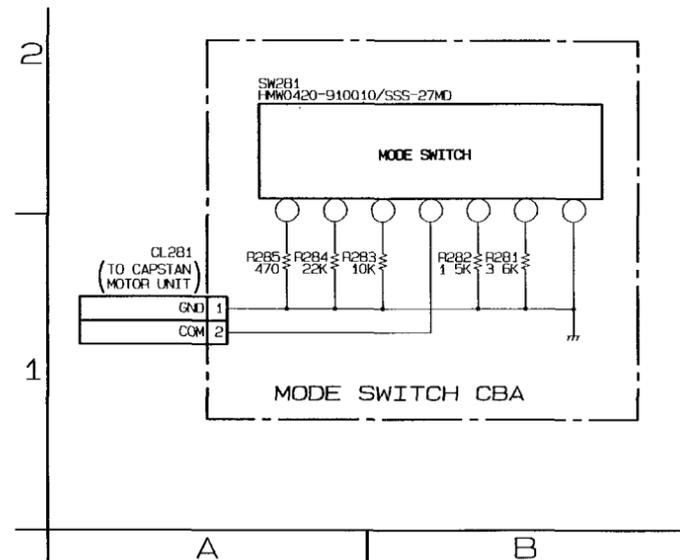
CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD,
REPLACE ONLY WITH THE SAME TYPE FUSE.
ATTENTION : POUR UNE PROTECTION CONTINUE LES RISQUES
D'INCELE N'UTILISER QUE DES FUSIBLE DE MEMO TYPE.
RISK OF FIRE-REPLACE FUSE AS MARKED.

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

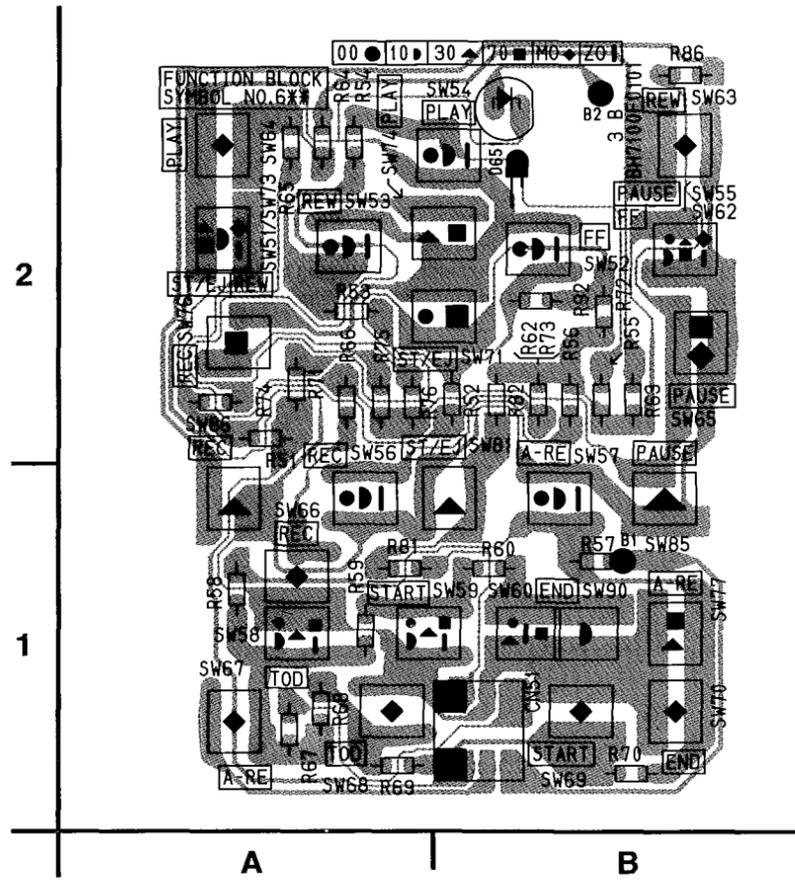
CAUTION !
Fixed voltage (or Auto voltage selectable) power supply circuit is used in this unit
If Main Fuse (F001) is blown, check to see that all components in the power supply
circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in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



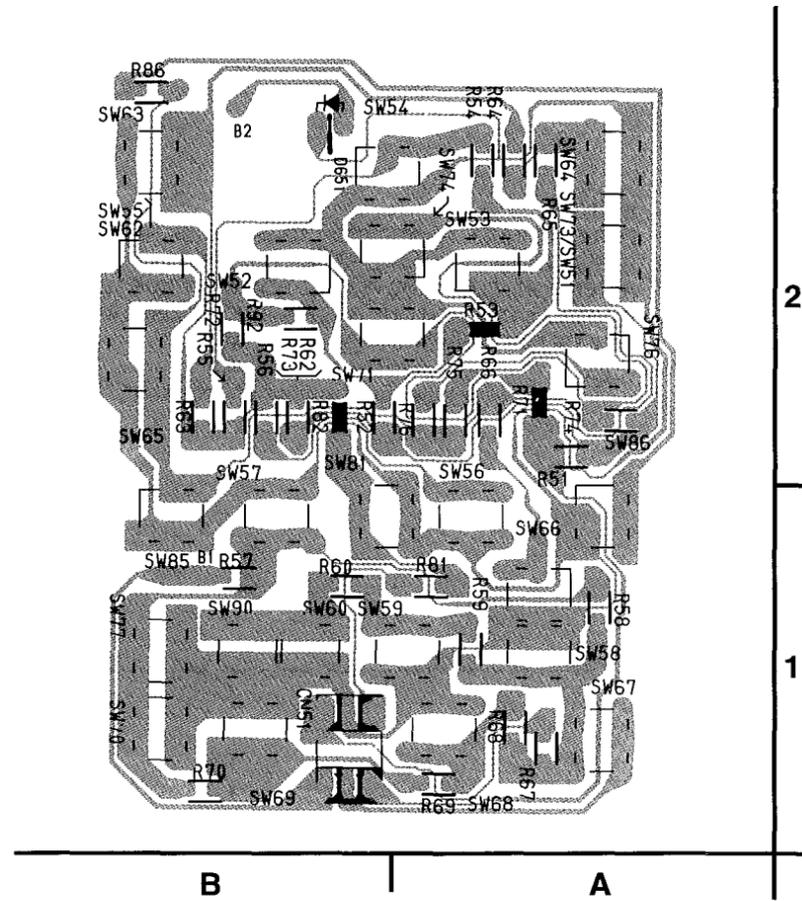
Mode Switch Schematic Diagram



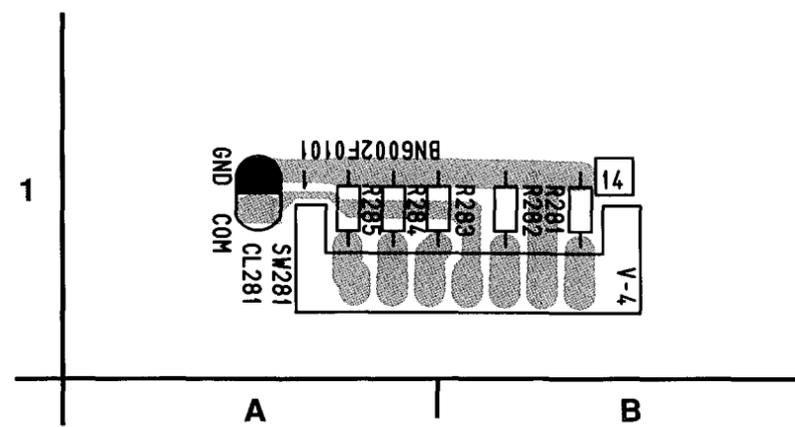
Function CBA Top View



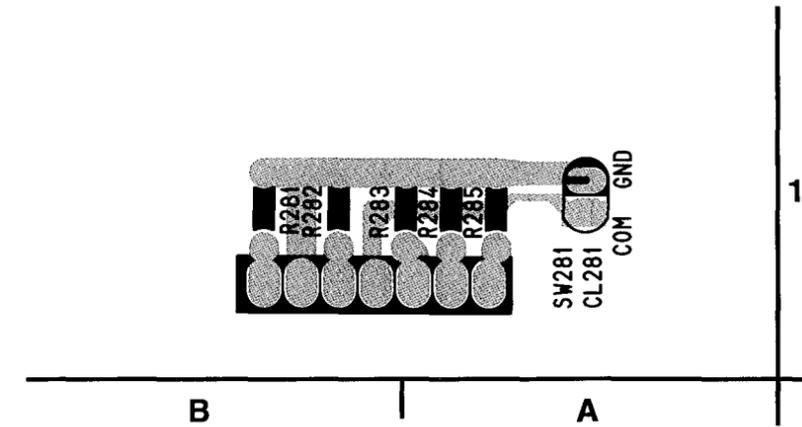
Function CBA Bottom View



Mode Switch CBA Top View



Mode Switch CBA Bottom View



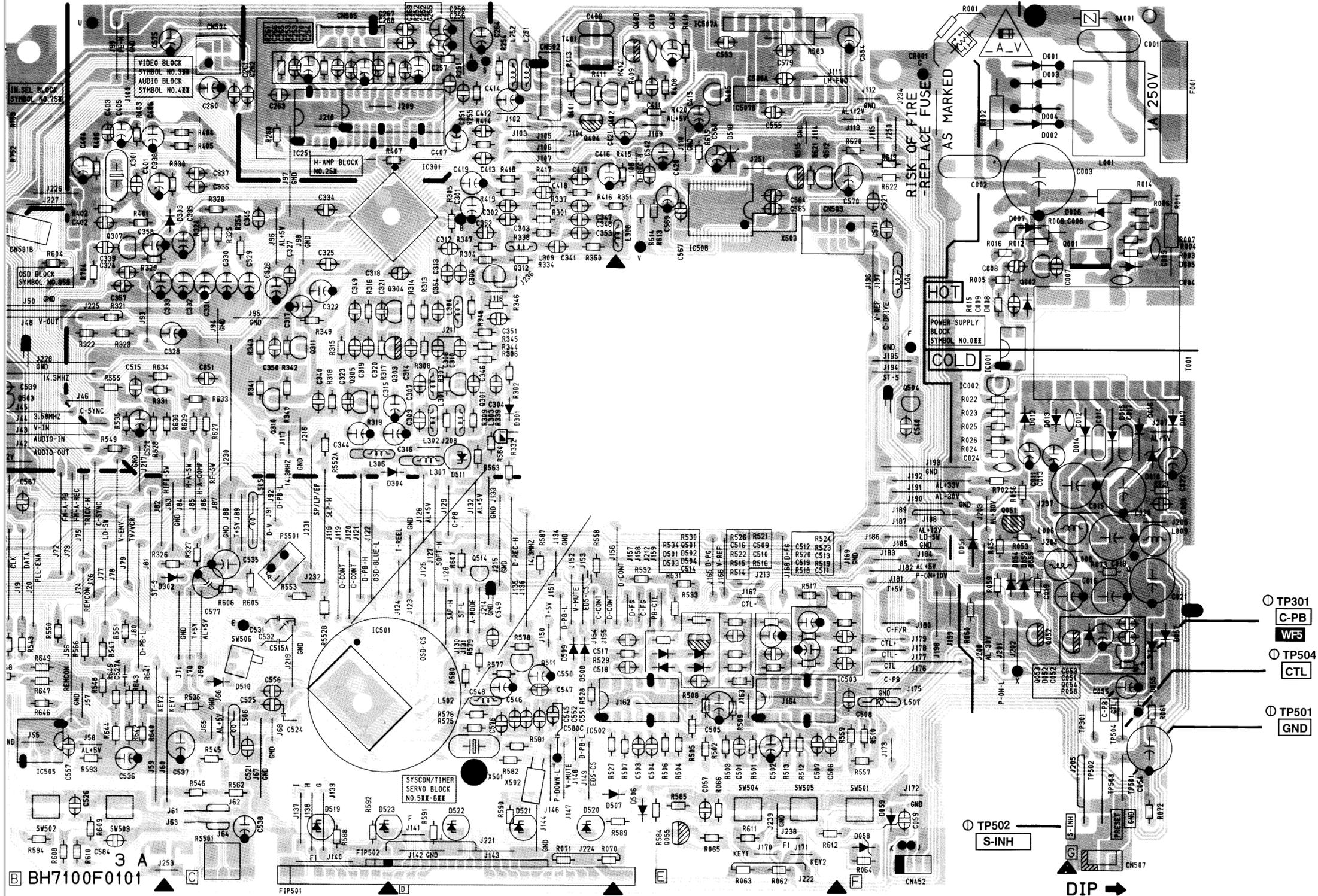
Resistance for parts in hot circuit is measured using a common terminal.



CAUTION
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 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.



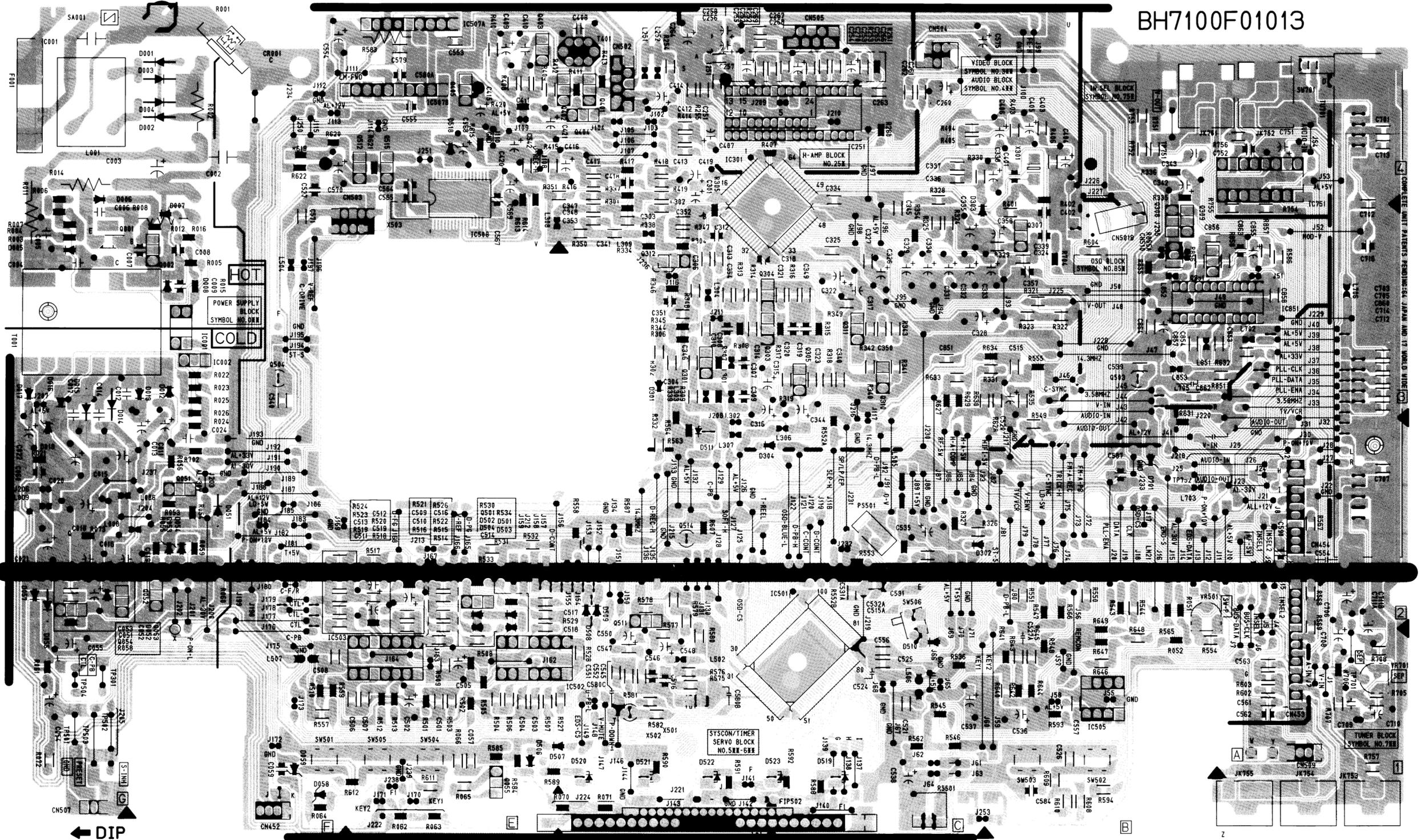
NOTE :
The voltage for parts in hot circuit is measured using hot GND as a common terminal.



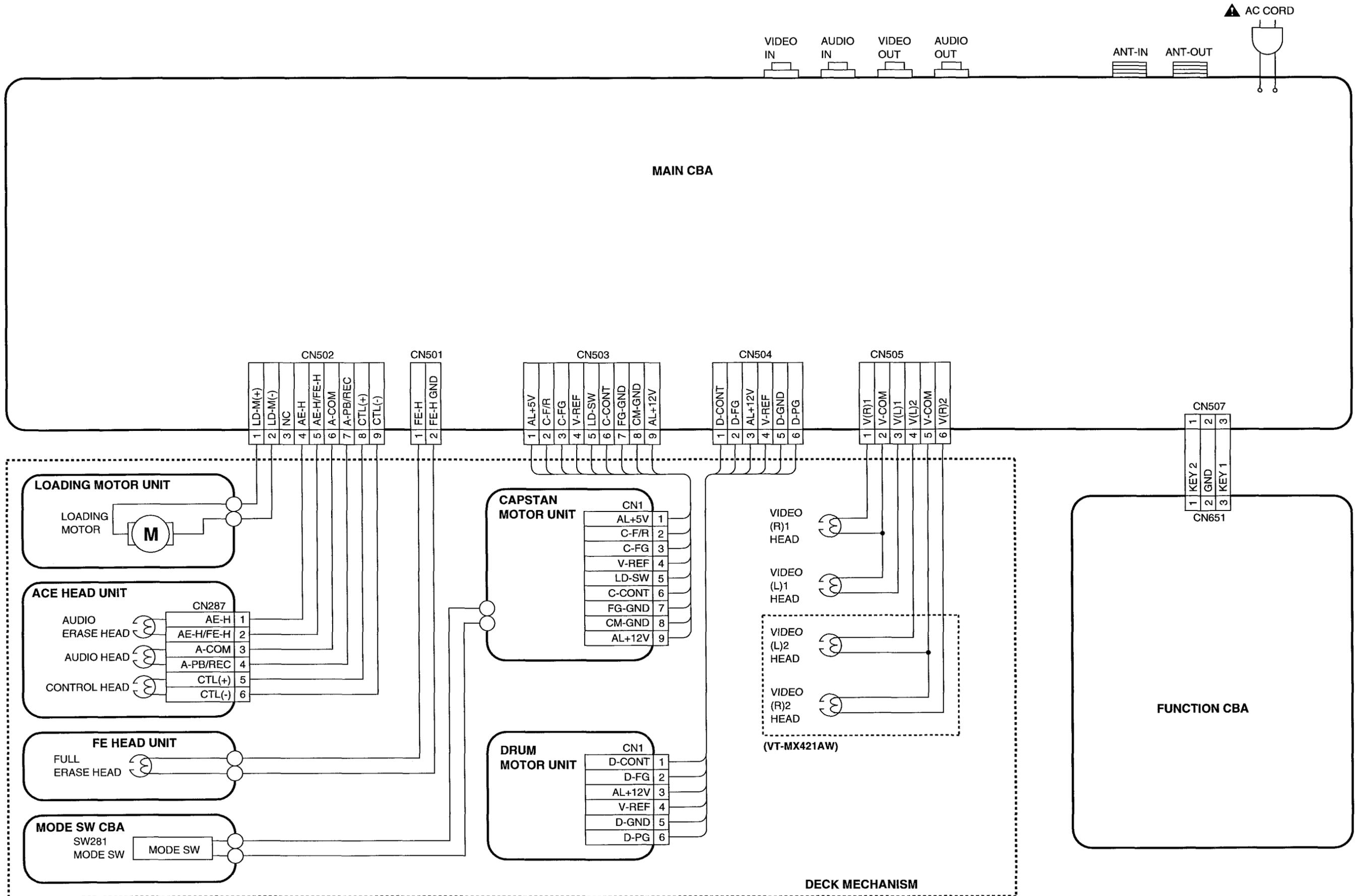
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If Main Fuse (F001) is blown, check to see that all components in the power supply
circuit are not defective before you connect the AC plug to the AC power supply.
Otherwise it may cause some components in the power supply circuit to fail.

BH7100F01013



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")

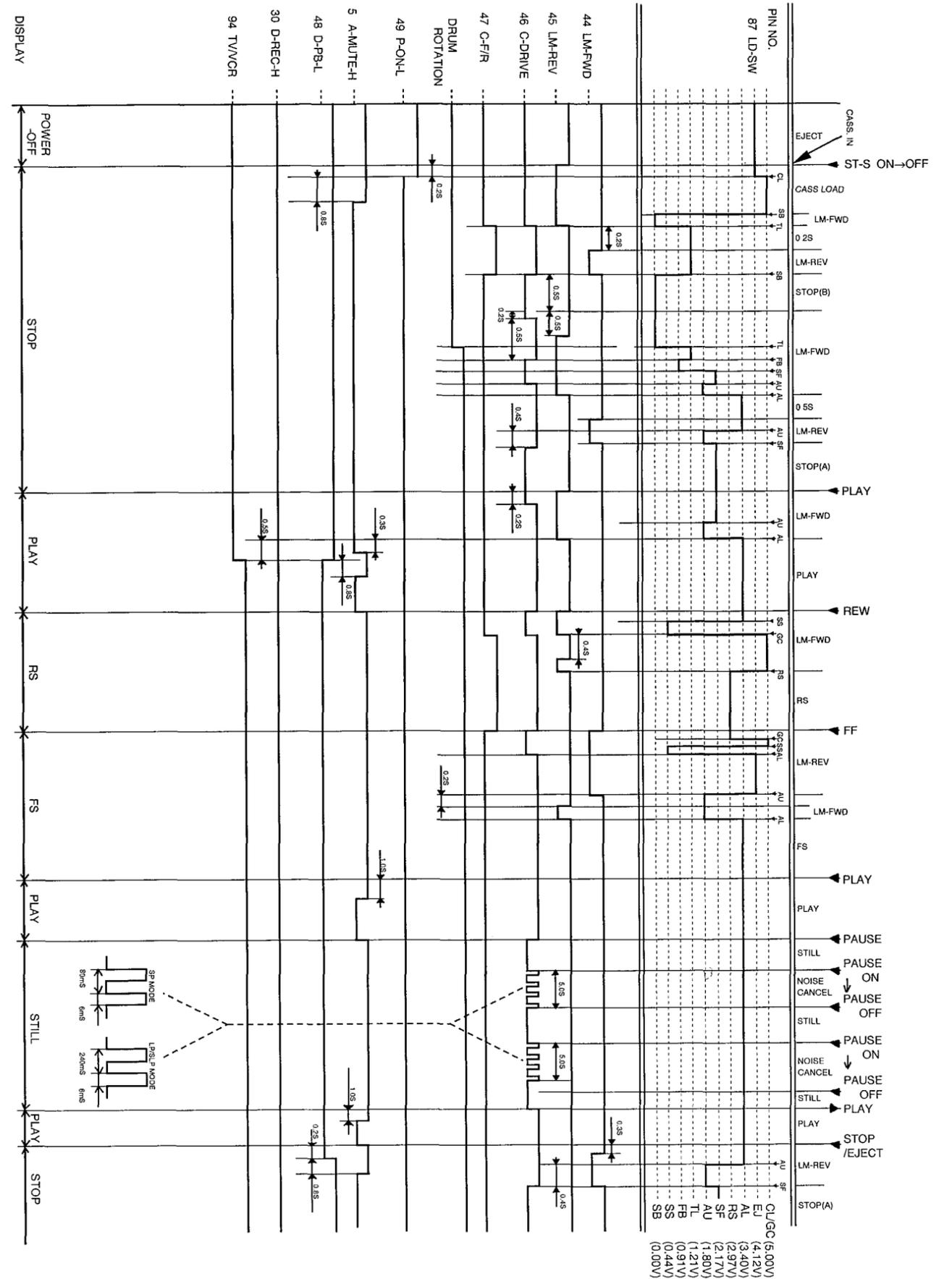
RS → EJ : Loading REV (LM-FWD "L", LM-REV "H")

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) |



Model No, : VT-MX421AW

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

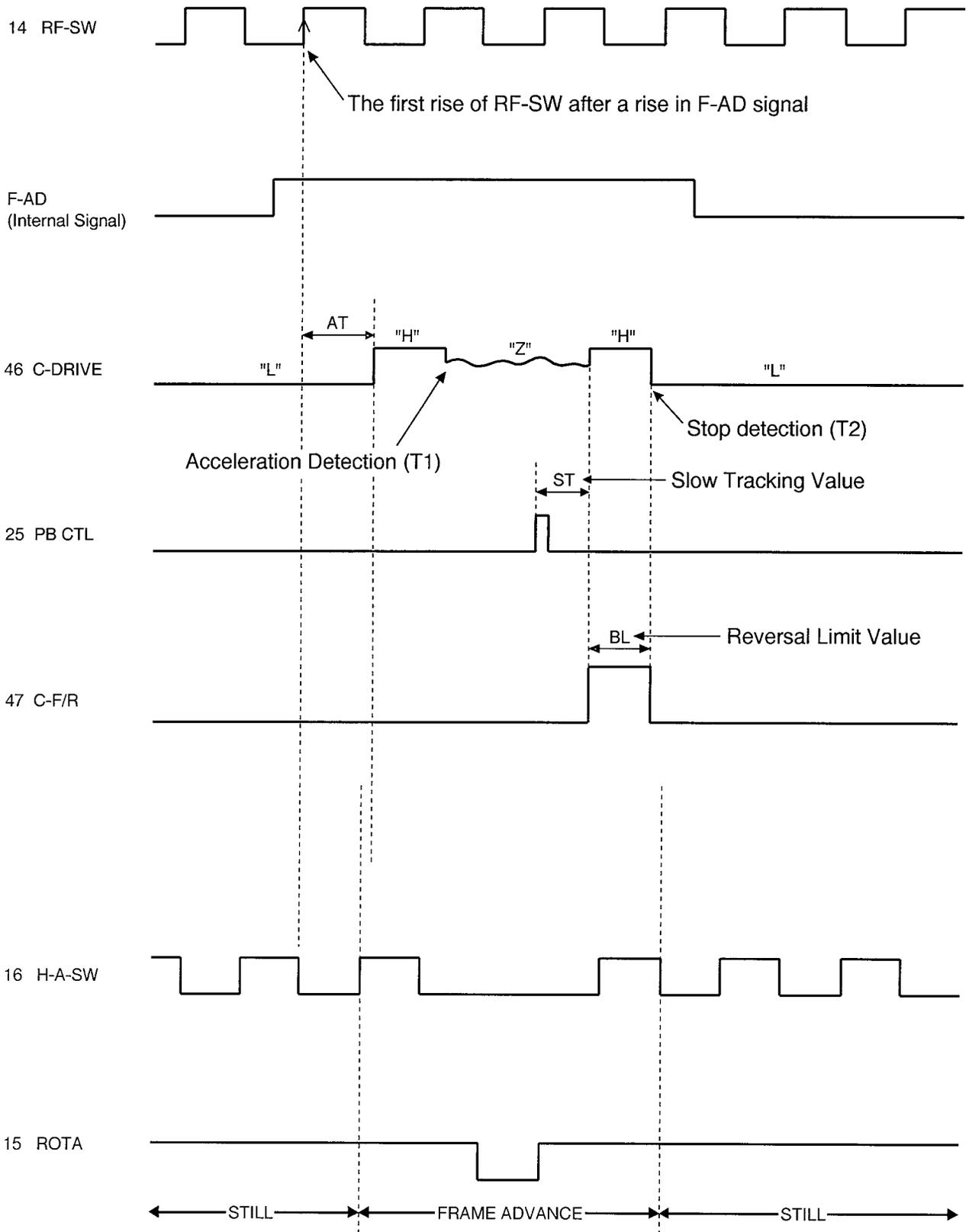


Fig.1

2) LP/SLP MODE

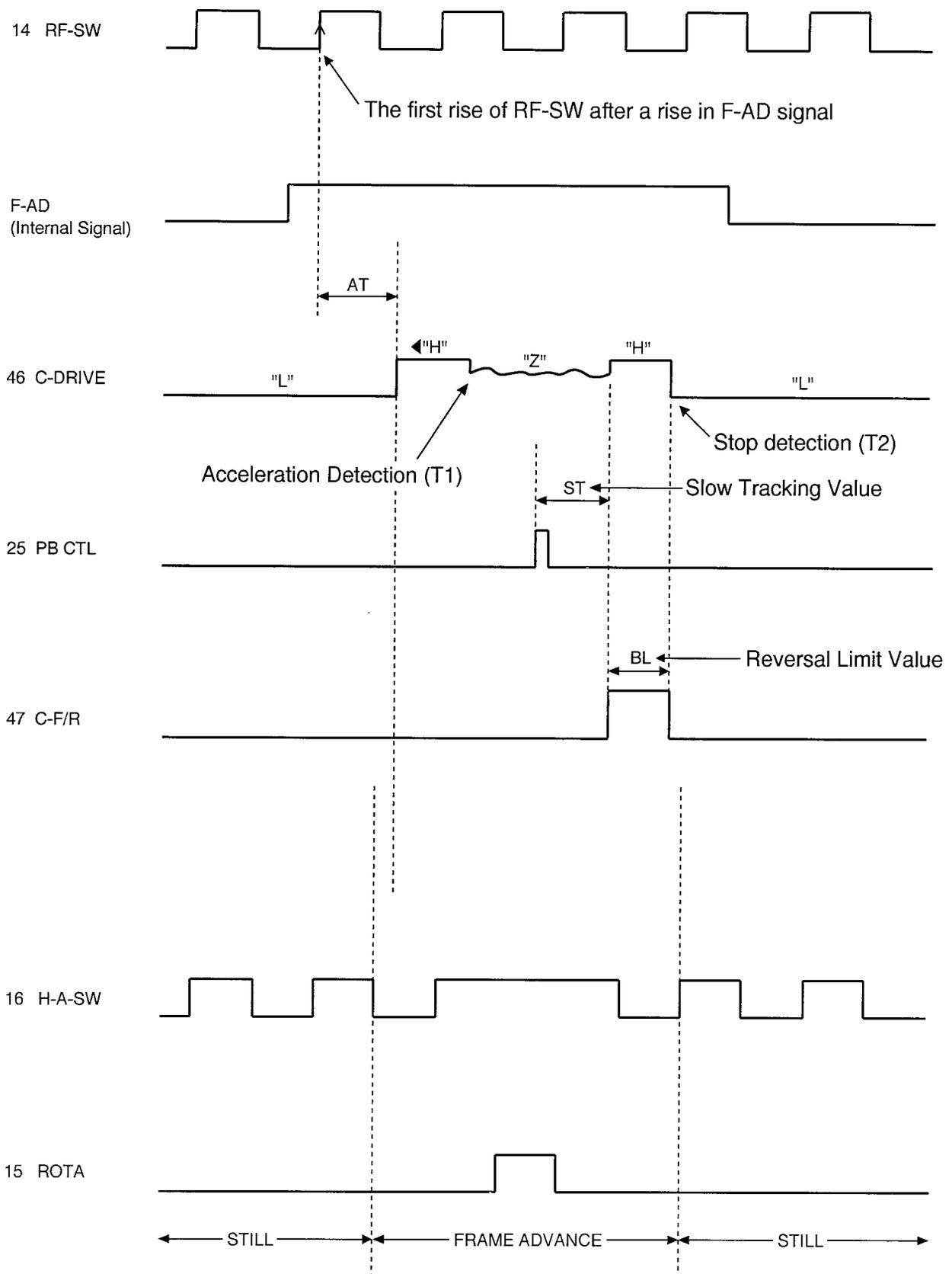


Fig.2

2. STOP (A) → FF → STOP (A) → REW → STOP (A) → REC → PAUSE → PAUSE or REC → STOP (A) → EJECT

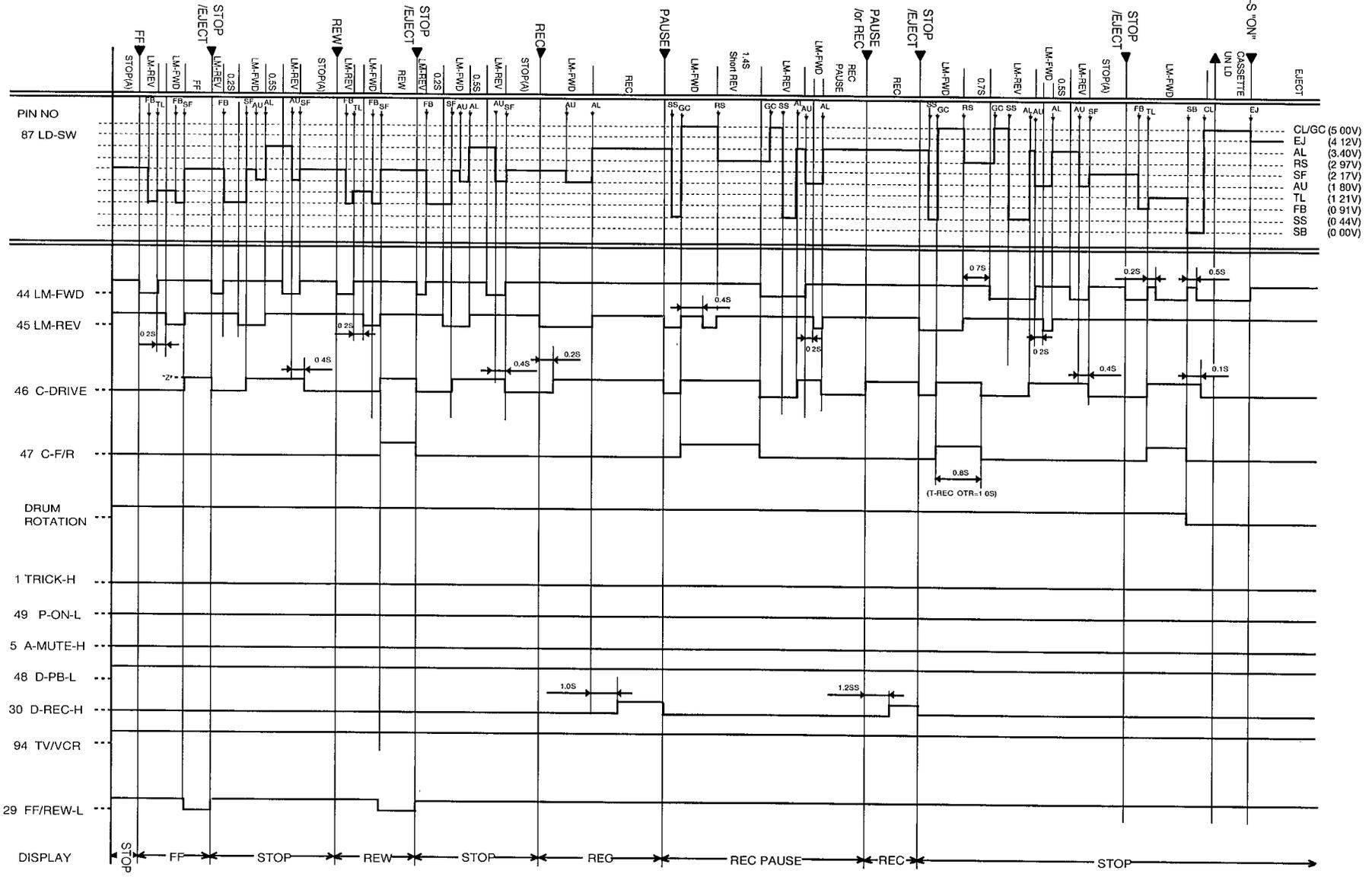


Fig.4

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 |

| Pin No. | IN/ OUT | Signal Name | Function | Active Level |
|---------|---------|-------------|---|--------------|
| 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 |

| Pin No. | IN/OUT | Signal Name | Function | Active Level |
|---------|--------|-----------------|---|--------------|
| 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:

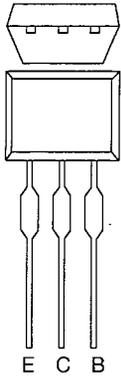
Abbreviation for Active Level

PWM ----- Pulse Wide Modulation

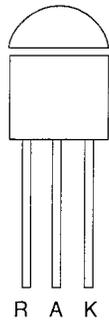
A/D ----- Analog - Digital Converter

LEAD IDENTIFICATIONS

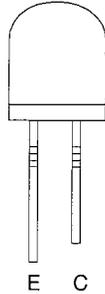
KSA1175 (Y, G)
KSR2203



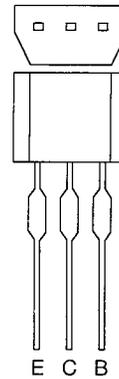
KA431Z
KIA431



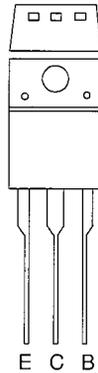
SLR-938CV-A
SLR-938CV-7
PT380FAB



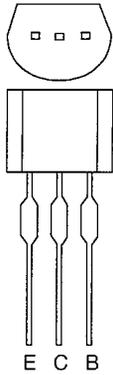
2SC3400
2SA1317 (S, T)
2SA1346
2SA608SP (E, F, G)
2SC2839 (E, F)
2SC3576
2SC536SP (E, F, G)
KRA103M
KRC103M
KSC2785(Y, G, L)
KSR1203
KTA1266 (Y, GR)
KTA1267 (Y, GR)
KTC3193 (Y)
KTC3199 (Y, GR, BL)



2SC3866MR
2SC3866
2SC4517



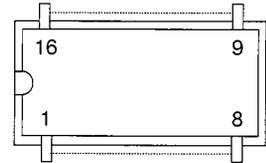
2SC3331 (T, U)
2SC4204
2SD734F-NP-AQ
2SD734G-NP-AQ



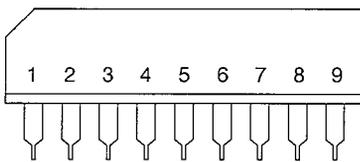
PC17T1
PC817 (B, AB, A)
PS2501-1(D, H, L, M, W)
TLP521-1 (GR)



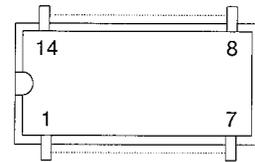
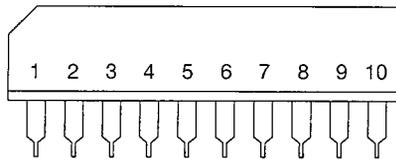
HCF4052BEY
NJU4052BD
TC4052BP
UPD4052BC



TA7291S

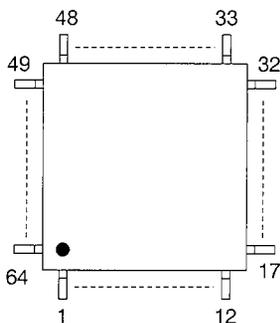


LB1641

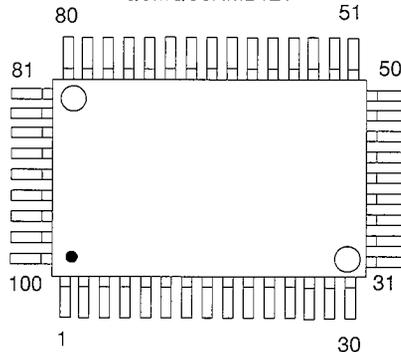


LM324N
LM339N
KIA339P
NJM2901N
NJM324D

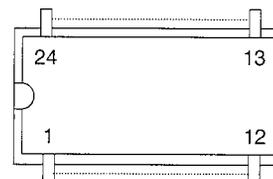
LA71020M



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

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| Fixture and Tape for Adjustment | 2-2-1 |
| Mechanical Alignment Procedures | 2-3-1 |
| Disassembly / Assembly Procedures of Deck Mechanism | 2-4-1 |
| Front Loading Assembly | 2-4-8 |
| Alignment Procedures of Mechanism | 2-4-10 |

STANDARD MAINTENANCE

Service Schedule of Components

H: Hours O: 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

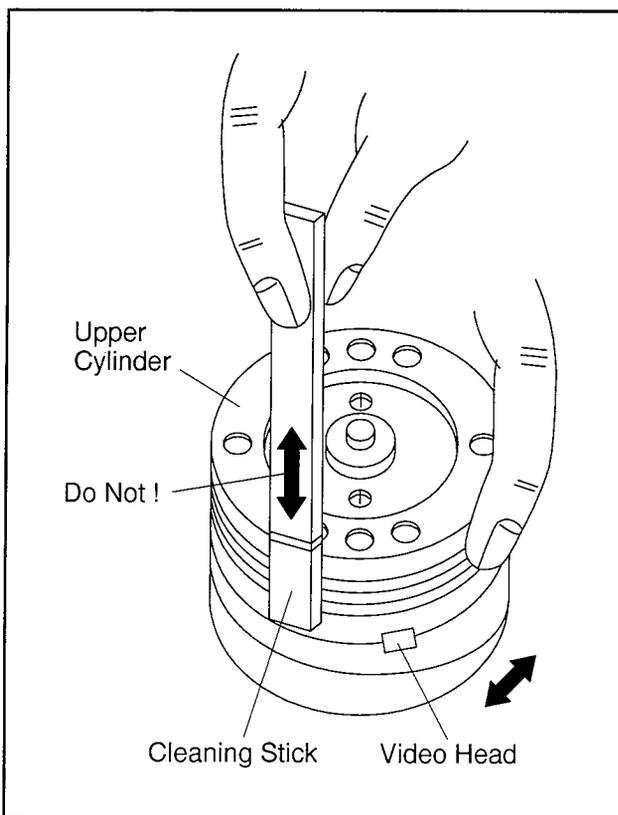
Clean the head with a head cleaning stick or chamois cloth.

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

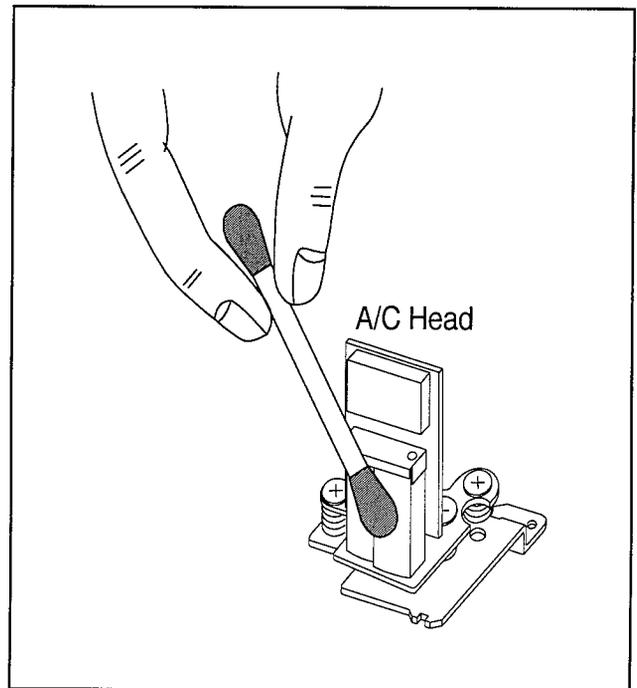
Clean the head with a cotton swab.

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:

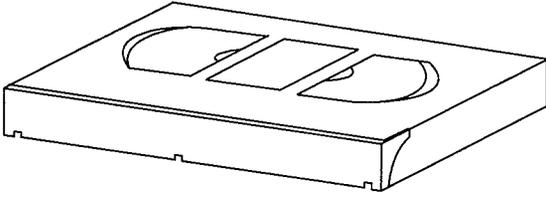
1. Avoid cleaning the audio control head vertically.
2. Wait for the cleaned part to dry thoroughly before operating the unit or damage may occur.



FIXTURE AND TAPE FOR ADJUSTMENT

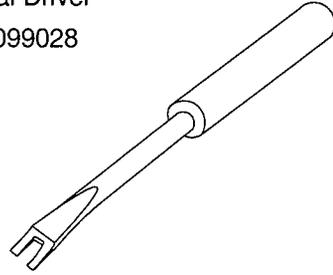
1. Alignment Tape

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



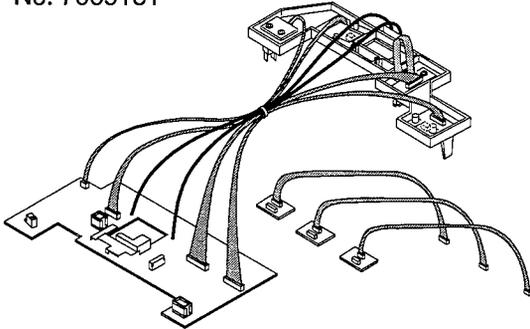
2. Special Driver

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 | <ul style="list-style-type: none"> ● Head Switching Point ● Tape Interchangeability Alignment |
| 2 | Special Driver | 7099028 | <ul style="list-style-type: none"> ● Guide Roller |
| 3 | U15 Deck Extension Cable | 7069181 | <ul style="list-style-type: none"> ● 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.

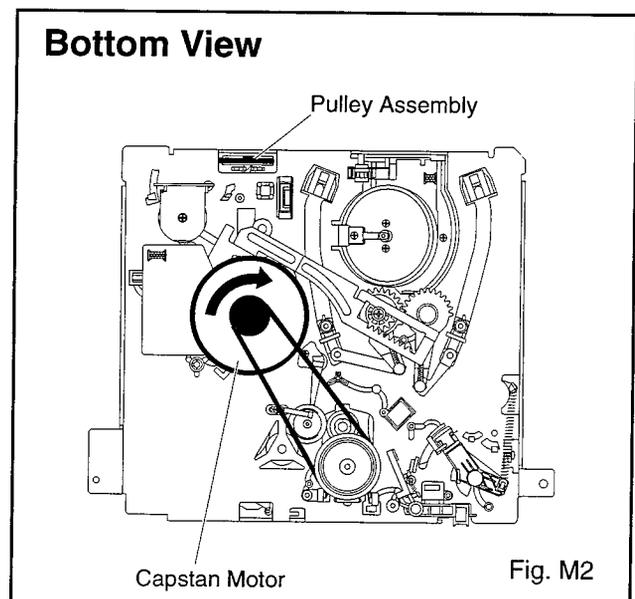
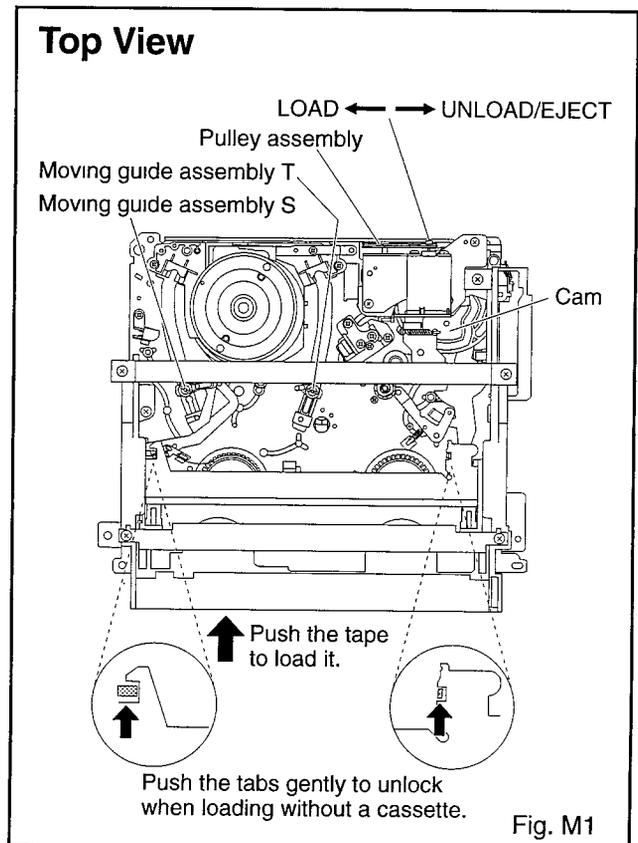
To unload a cassette tape manually:

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.



1. Tape Interchangeability Alignment

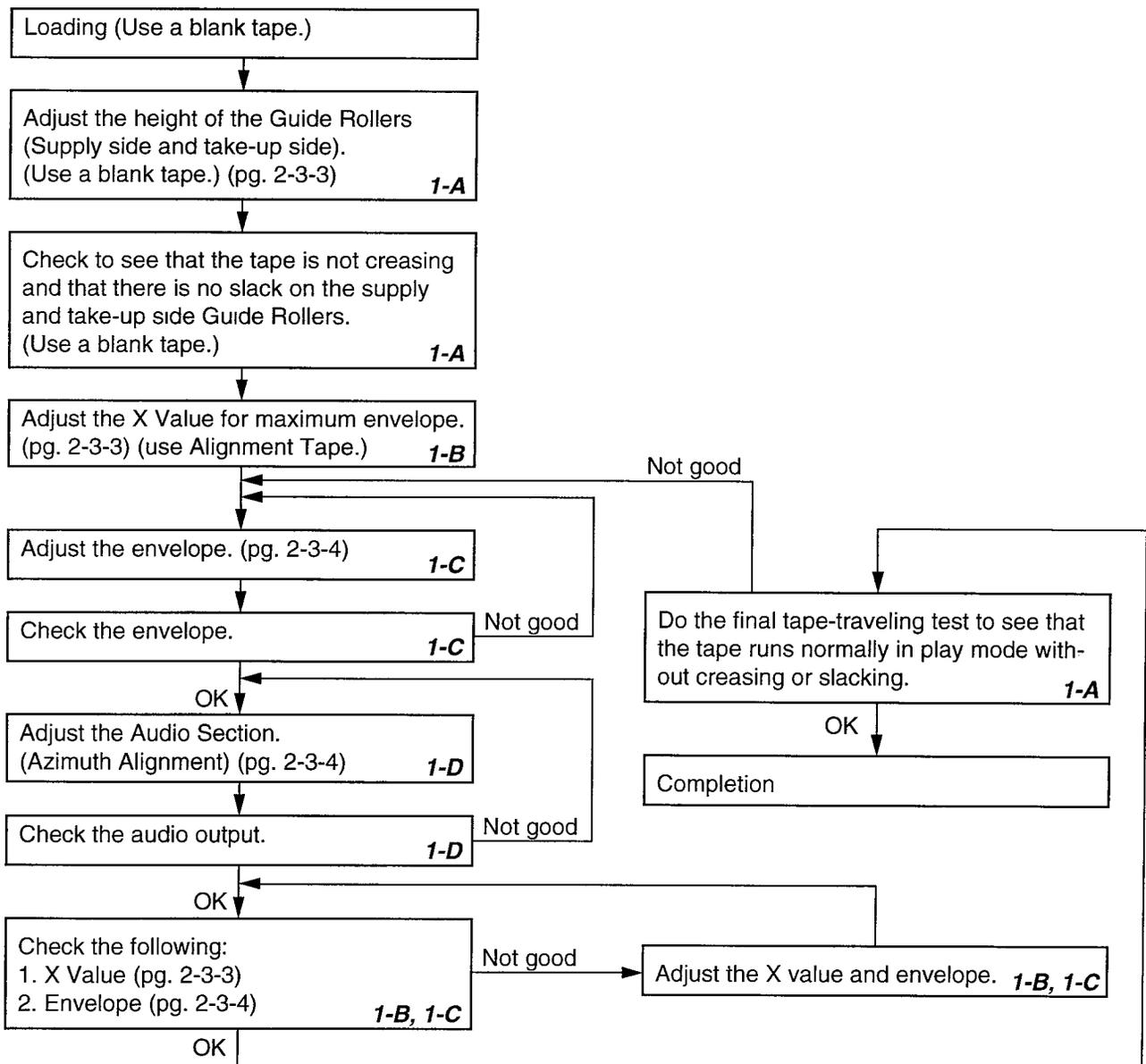
Note: To do these alignment procedures, make sure that the Tracking Control Circuit is set to the center position every time a tape is loaded or unloaded. (Refer to page 2-3-4, procedure 1-C, step 2.)

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.

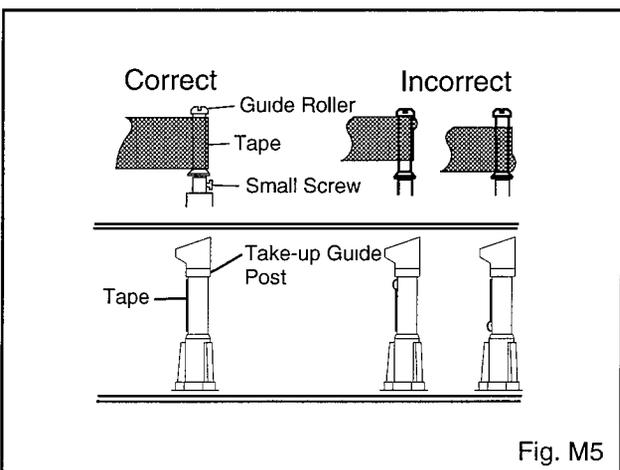
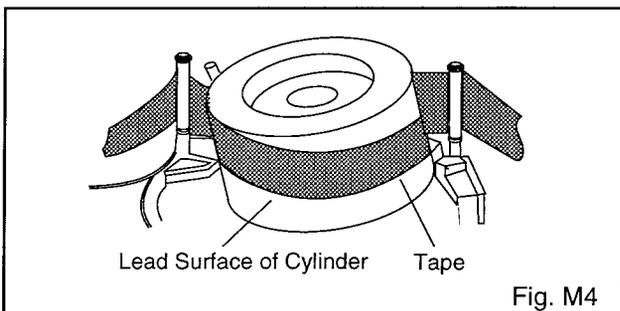
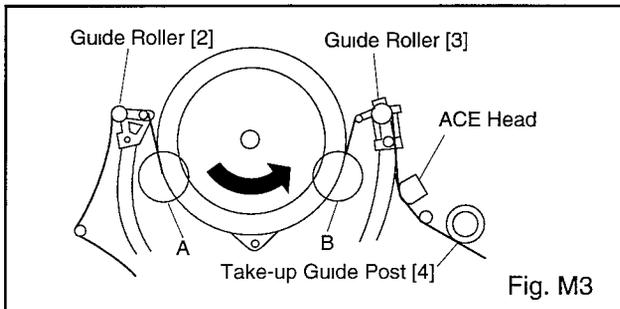
Symptom of Misalignment:

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.

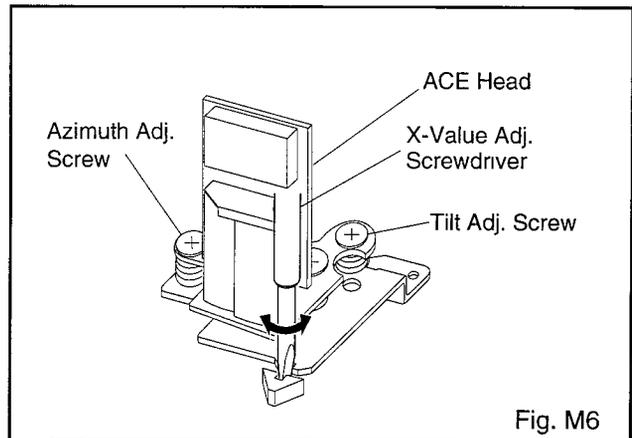
1. Play back a blank cassette tape and check to see that the tape runs without creasing at Guide Rollers [2] and [3], and at points A and B on the lead surface. (Refer to Fig M3 and M4.)
2. If creasing is apparent, align the height of the guide rollers by turning the top of Guide Rollers [2] and [3] 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)



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 possible. 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.

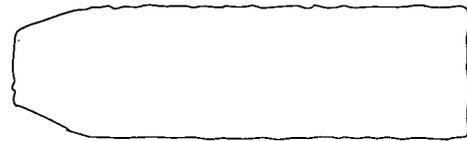


Fig. M7

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.

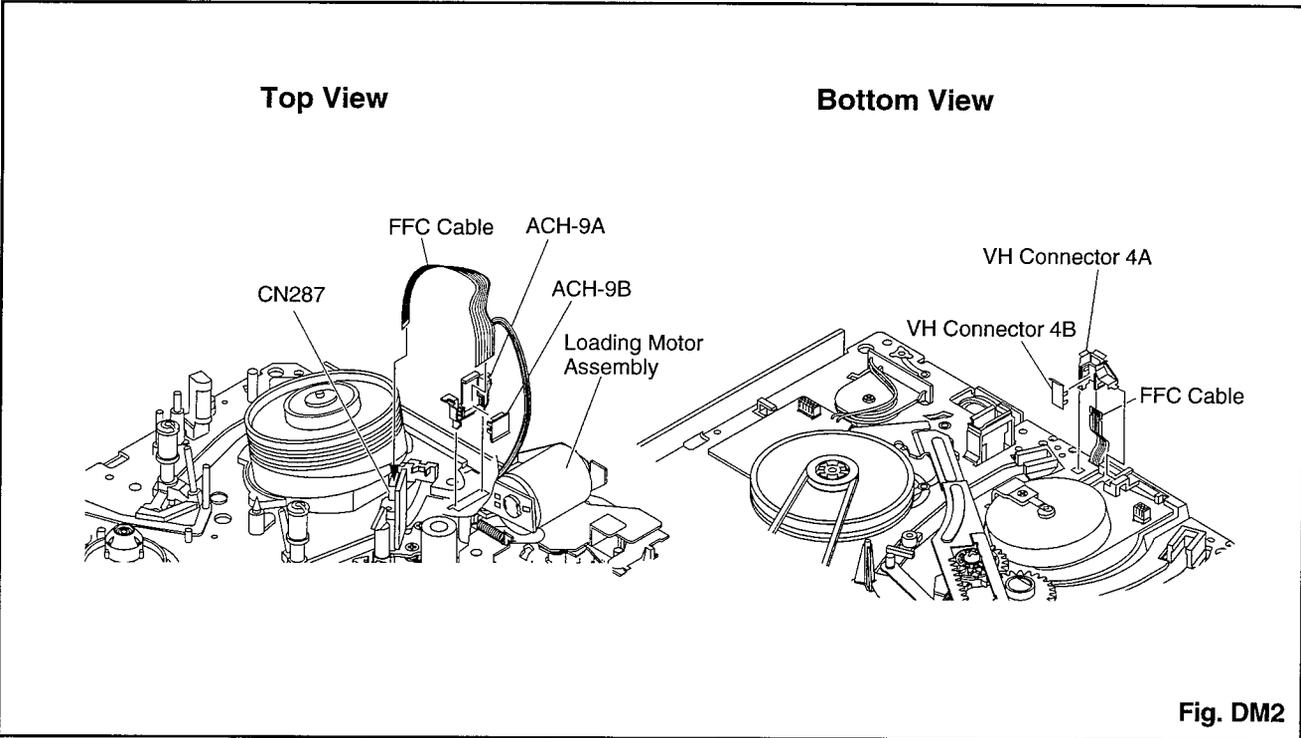
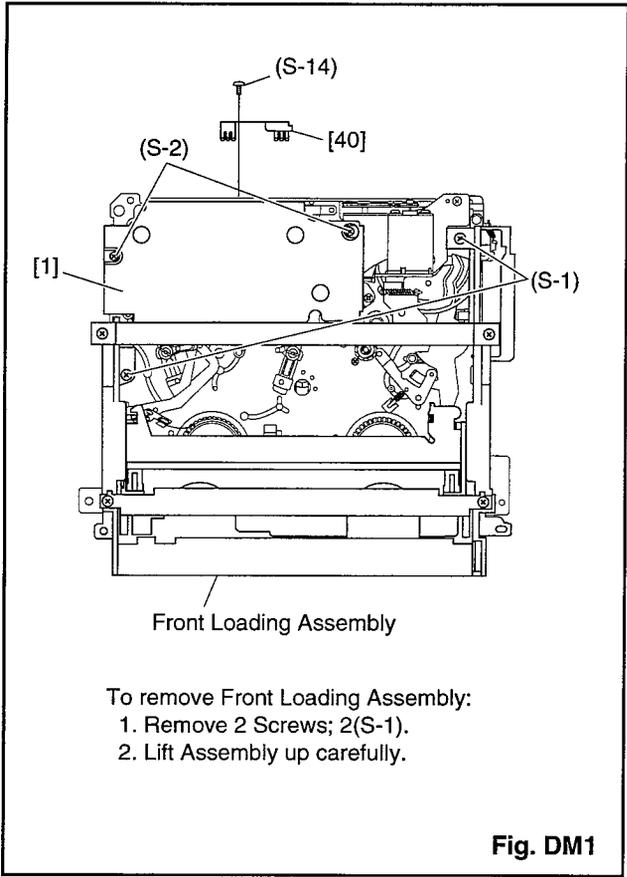
| STEP /LOC. No. | START-ING No. | PART | | REMOVAL | | INSTALLATION |
|----------------|---------------|-------------------------------|---|--------------------|---|---|
| | | | | Fig. No. | REMOVE/*UNHOOK/ UNLOCK/RELEASE/ UNPLUG/DESOLDER | ADJUSTMENT CONDITION |
| [1] | [1] | Shield Plate | T | DM1 | 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



Top View

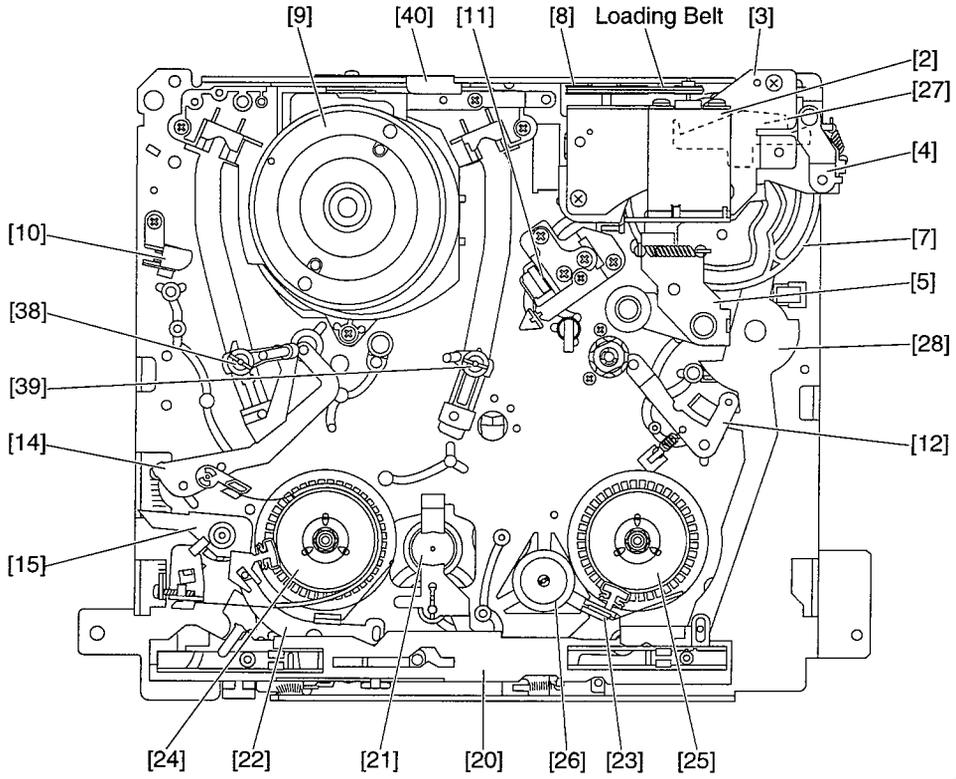
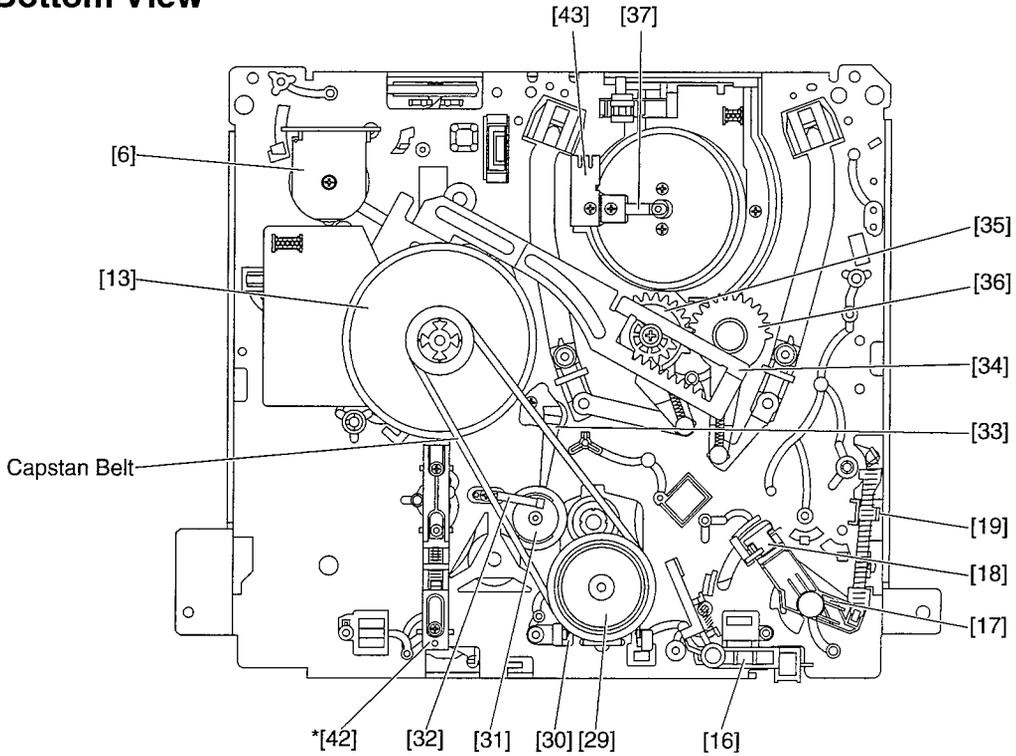


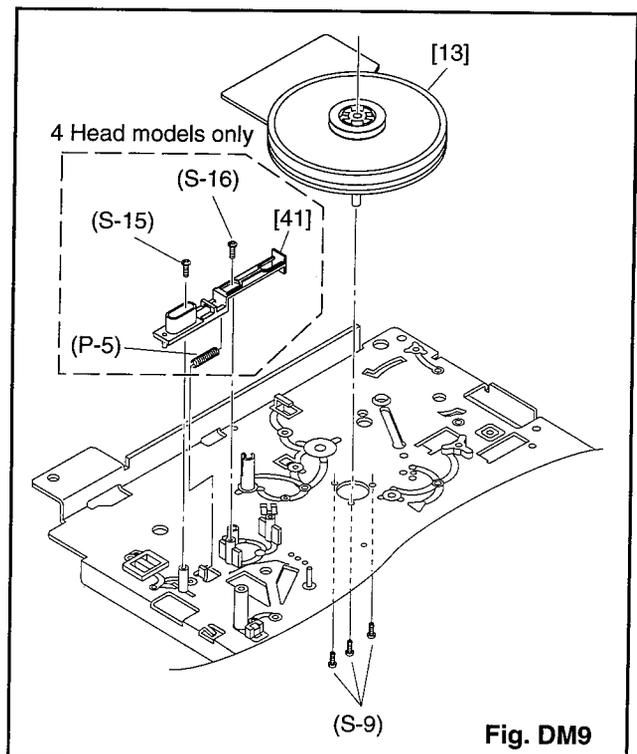
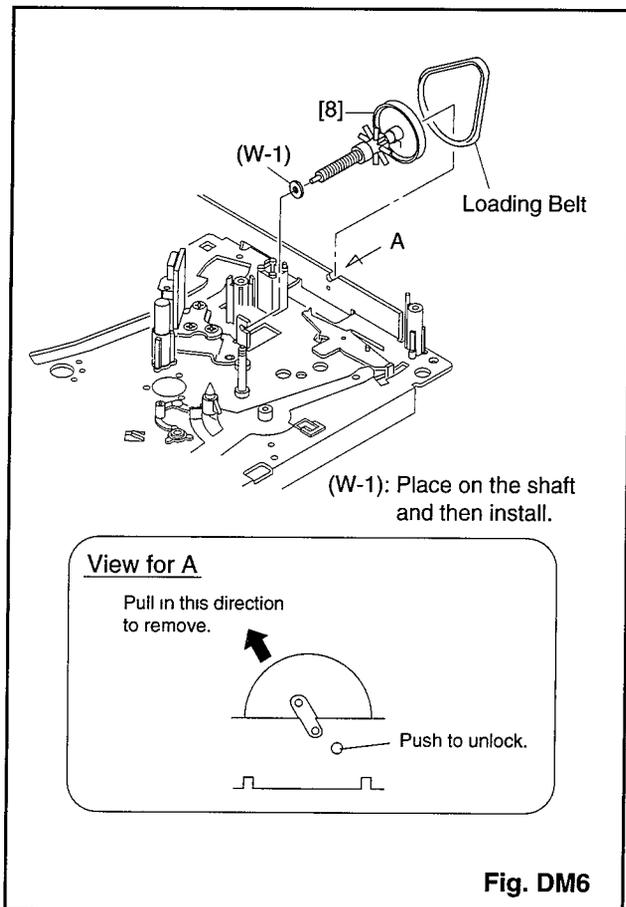
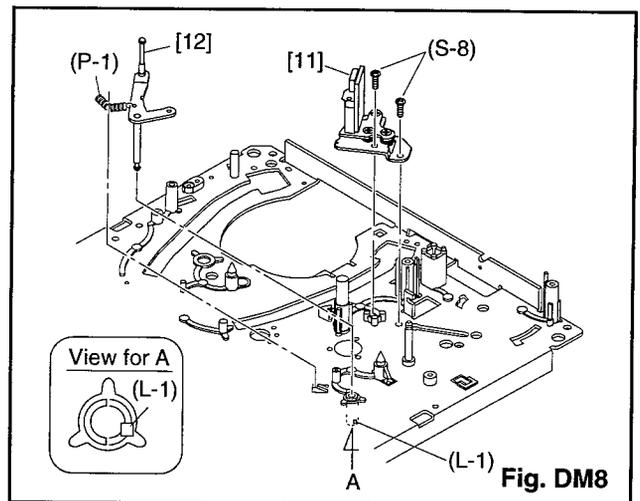
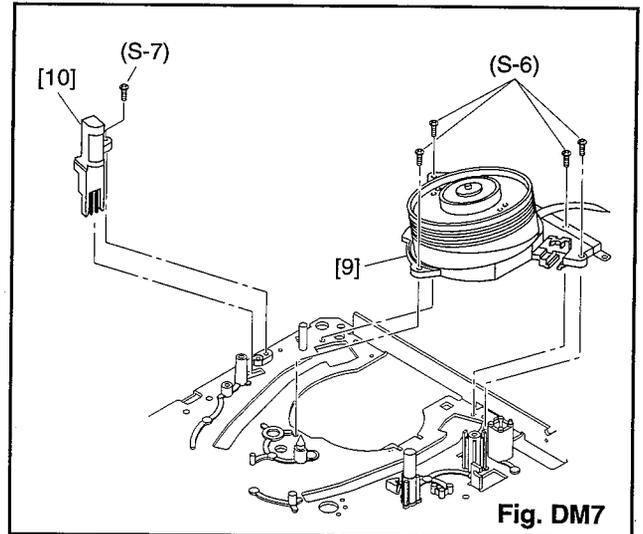
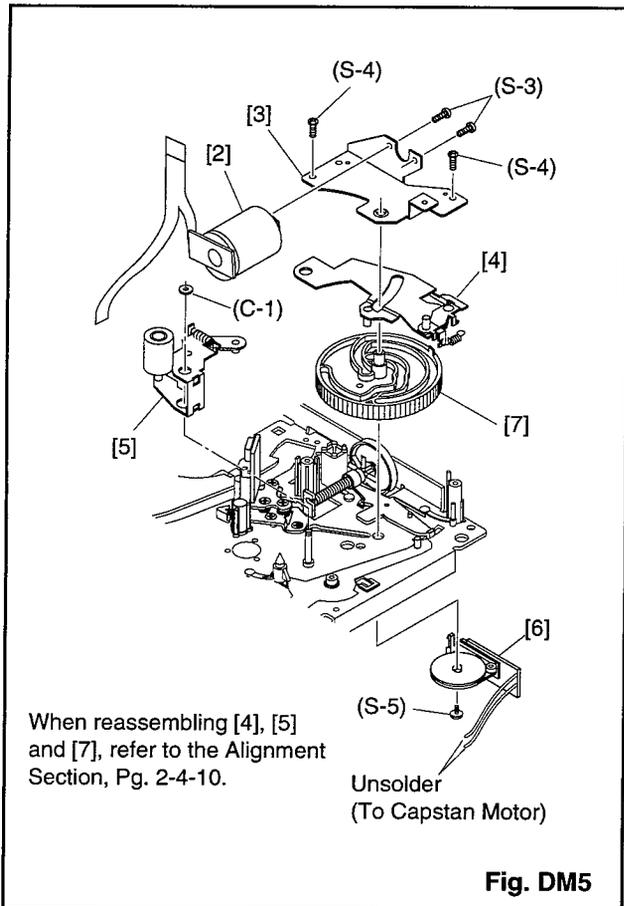
Fig. DM3

Bottom View



*[42] 4 Head models only

Fig. DM4



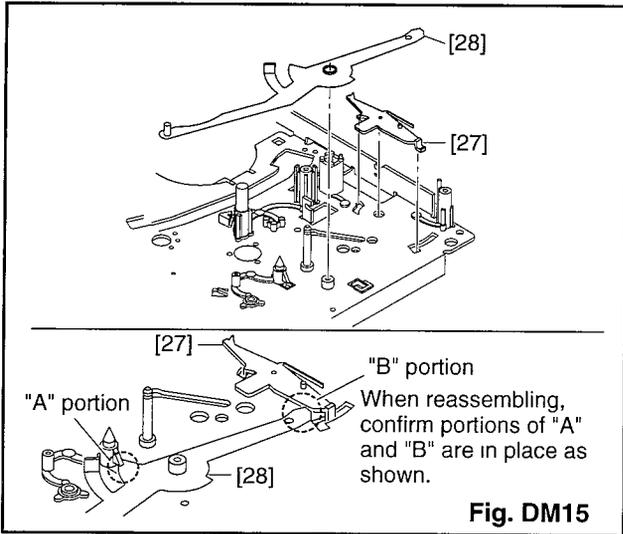


Fig. DM15

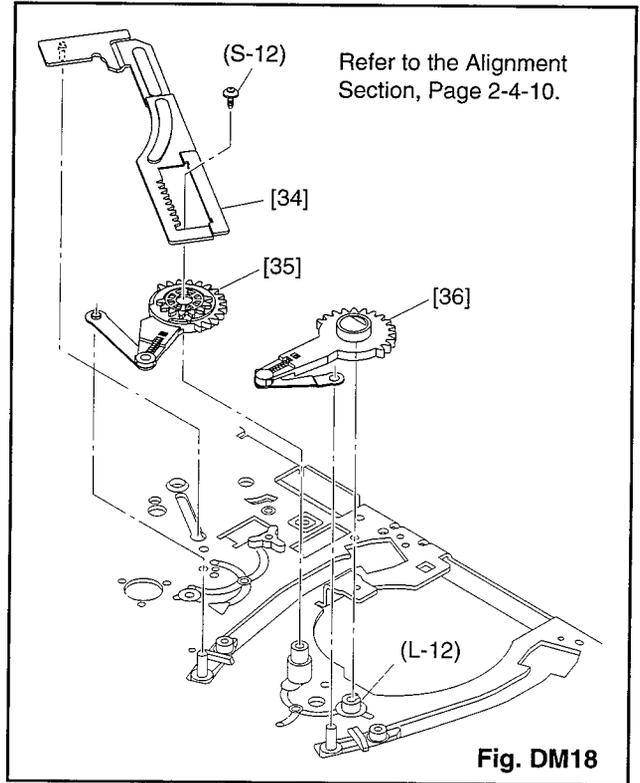


Fig. DM18

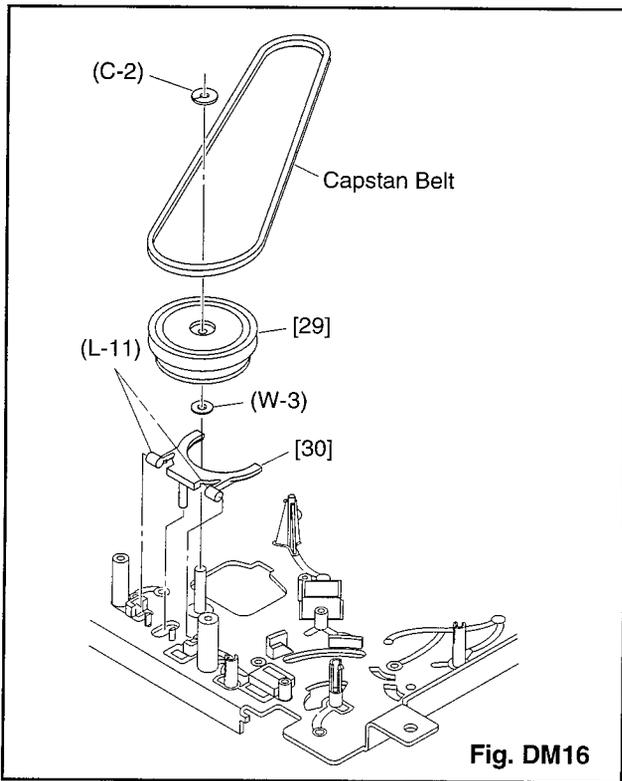


Fig. DM16

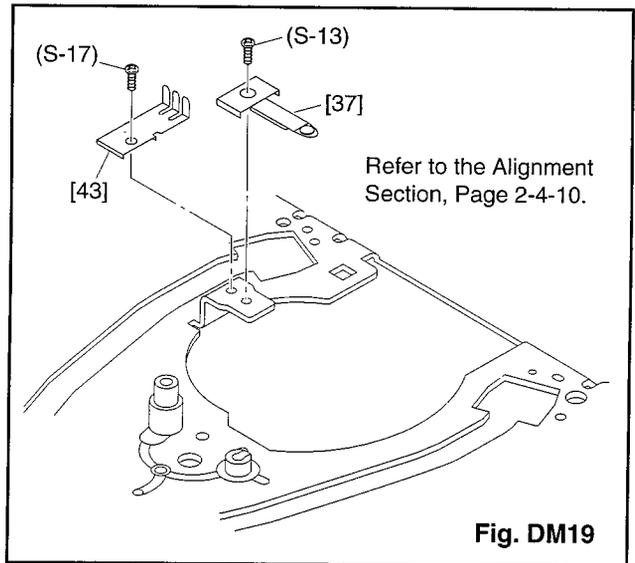


Fig. DM19

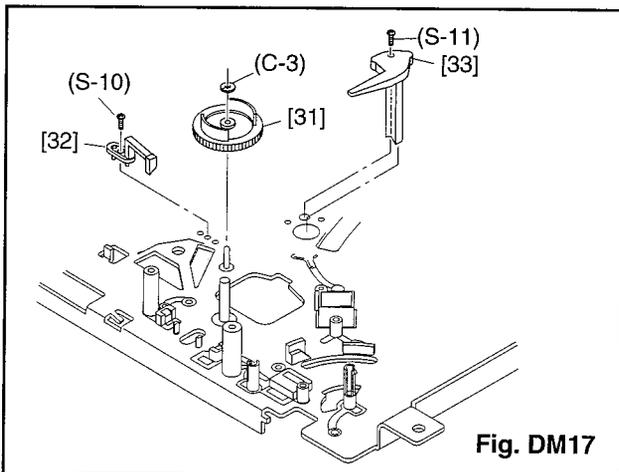
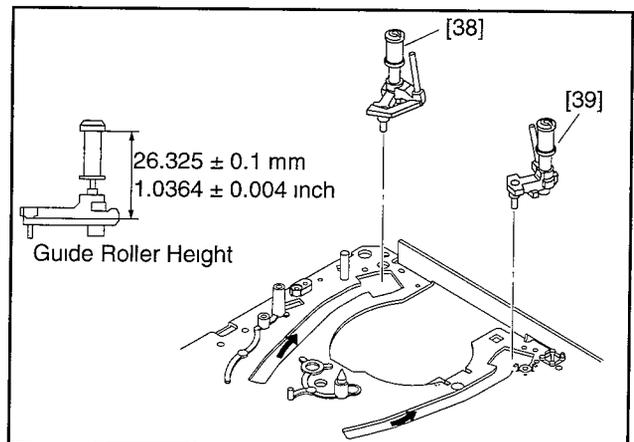


Fig. DM17



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 | T | DM21 DM22 DM23 | *2(L-3), 4(S-1), 2(S-2), Eject Spring B | |
| | | [3b] Cassette Holder Assembly | | | | |
| | | [3c] Guide Holder B | | | | |
| | | [3d] Guide Holder F | | | | |
| | | [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 | R | DM23 | | |
| | | [7b] Mirror L | L | | | |
| [8] | [8] | LDG Plate | R | DM23 | 2(S-3) | |

↓
①

↓
②

↓
③

↓
④

↓
⑤

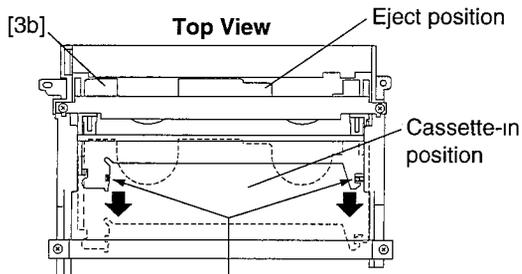
↓
⑥

↓
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.

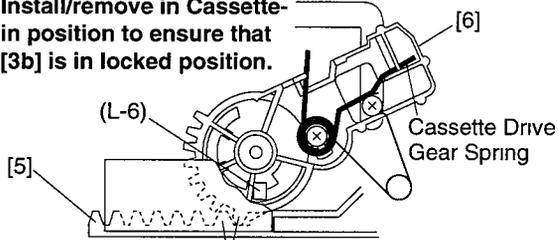
Before removing Parts [3], [4], [5], or [6], shift [3b] to Cassette-in position.



Pull these tabs gently to unhook [3b] from Eject position.

Fig. DM21

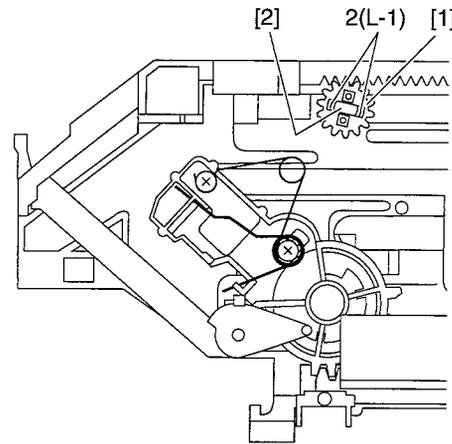
Install/remove in Cassette-in position to ensure that [3b] is in locked position.



When reassembling, set these teeth as shown.

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

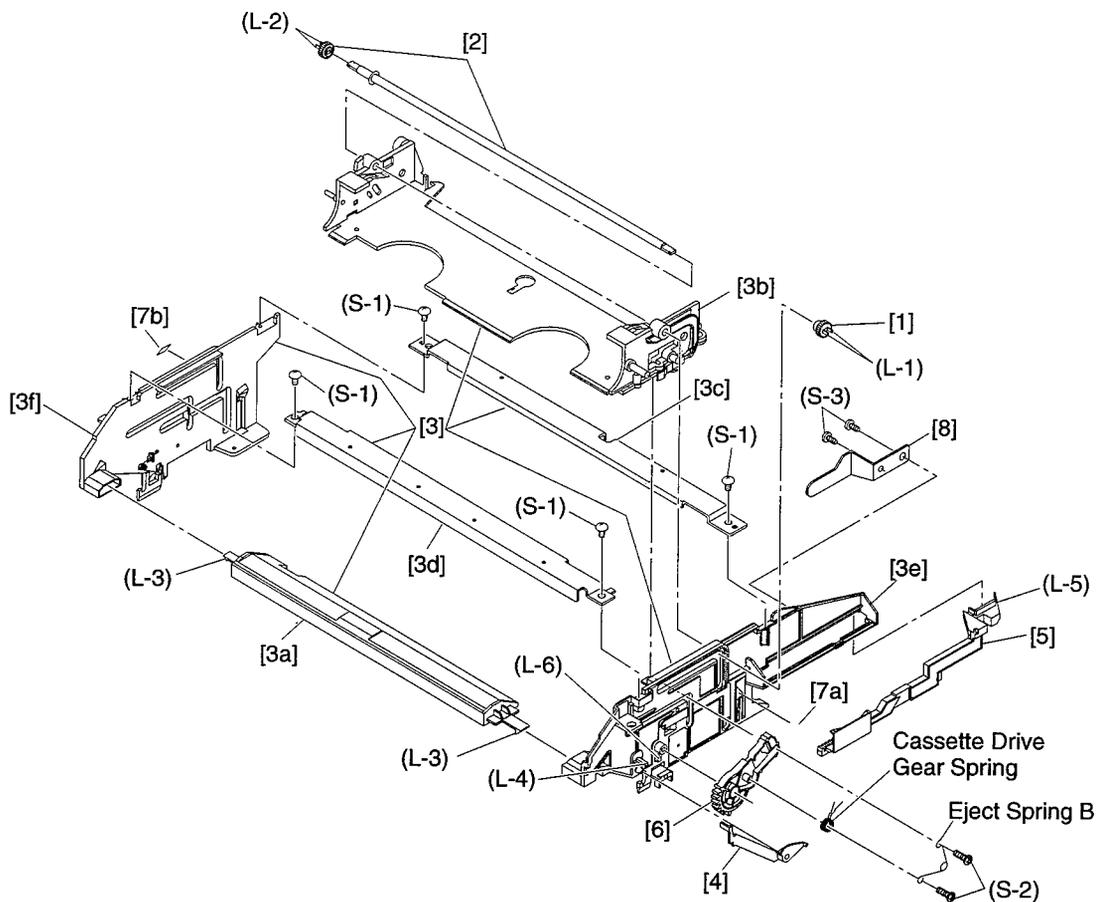


Fig. DM23

ALIGNMENT PROCEDURES OF MECHANISM

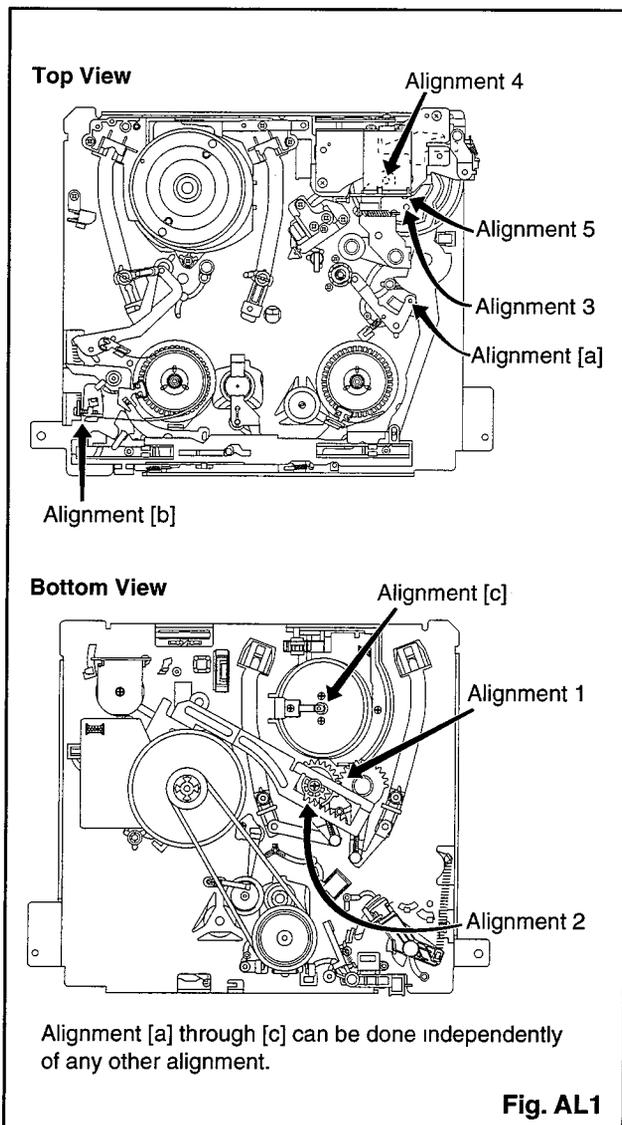
The following procedures describe how to align the individual gears and levers that make up the tape loading/unloading mechanism. Since information about the state of the mechanism is provided to the System Control Circuit only through the Mode Switch, it is essential that the correct relationship between 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 1

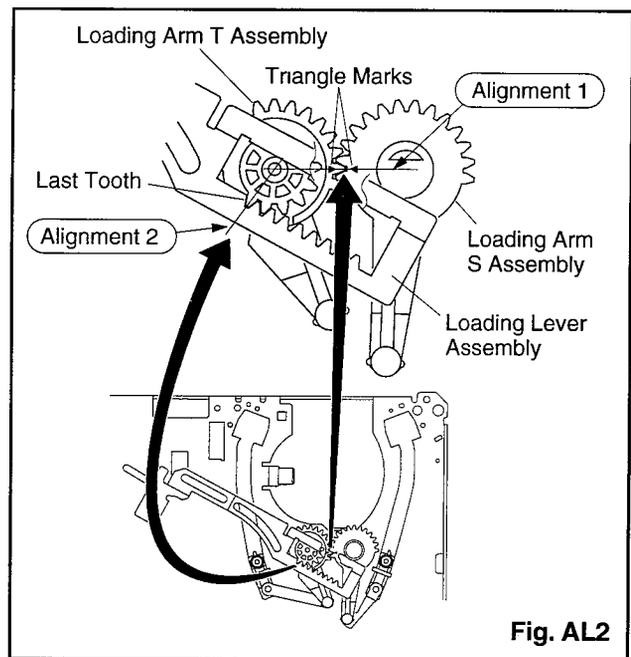
Loading Arm, S and T Assembly

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

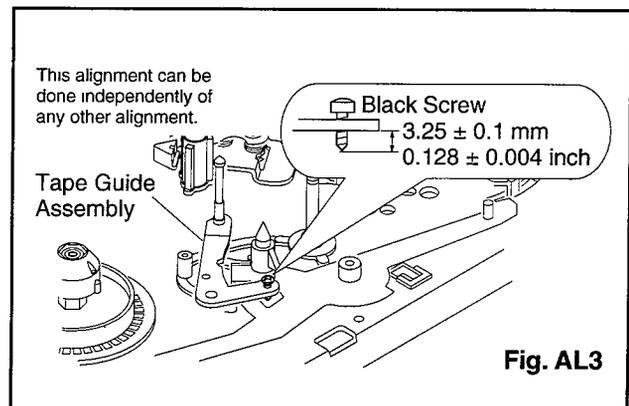
1. Keeping the two triangles pointing at each other, install the Loading Arm T Assembly so that the last tooth of the gear meets the most inside teeth of the Loading Lever Assembly. See Fig. AL2.



Alignment [a]

Tape Guide Assembly

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



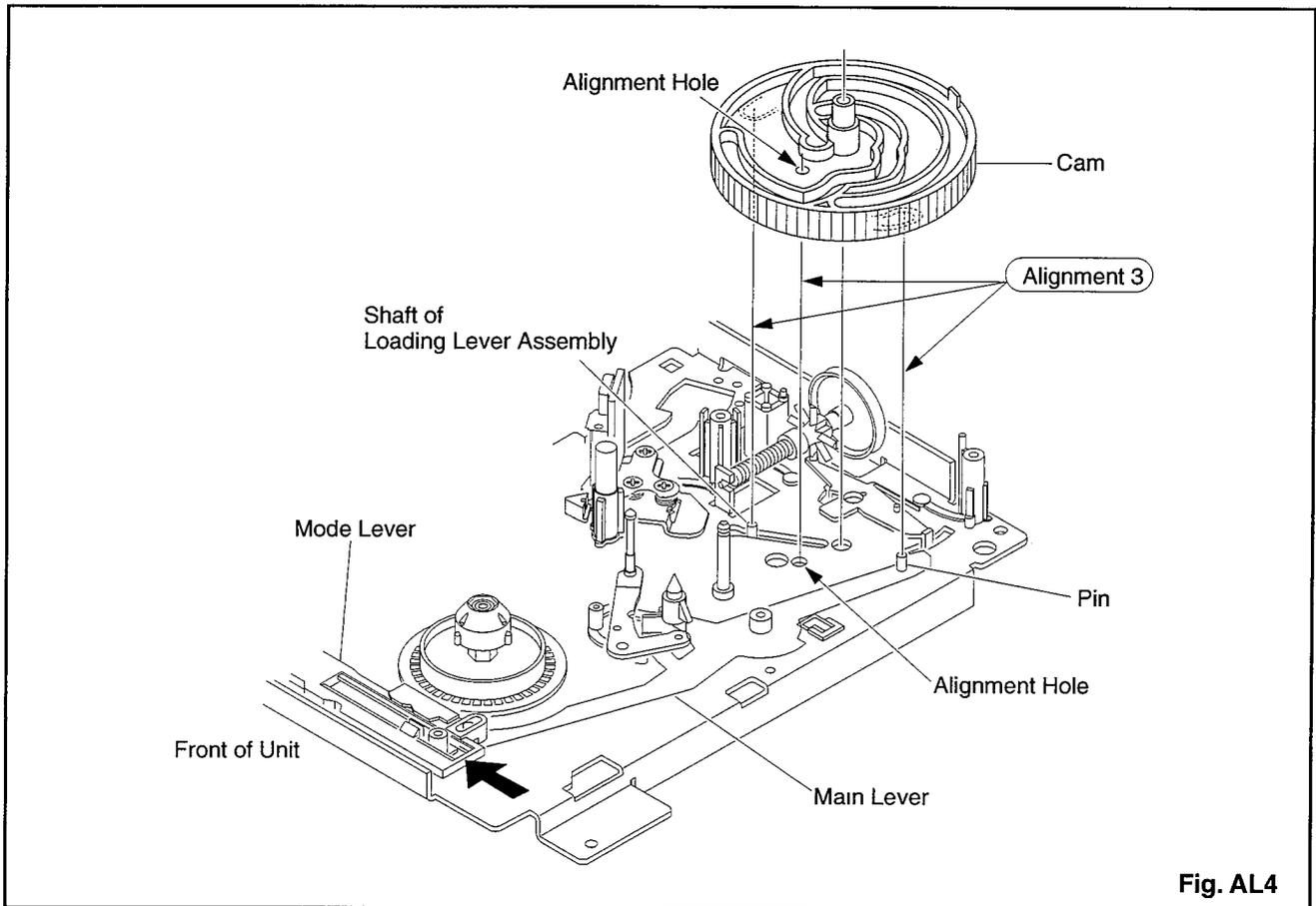


Fig. AL4

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.

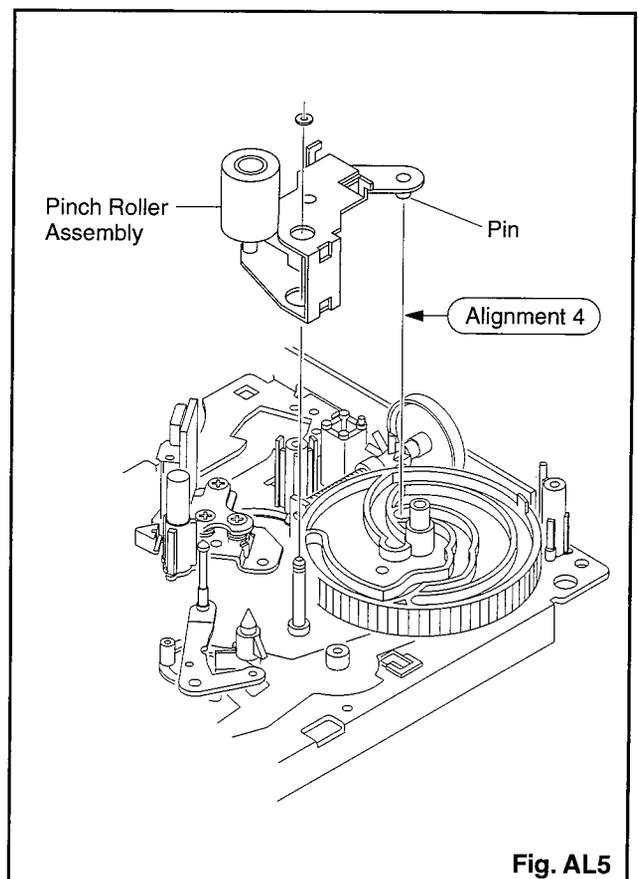
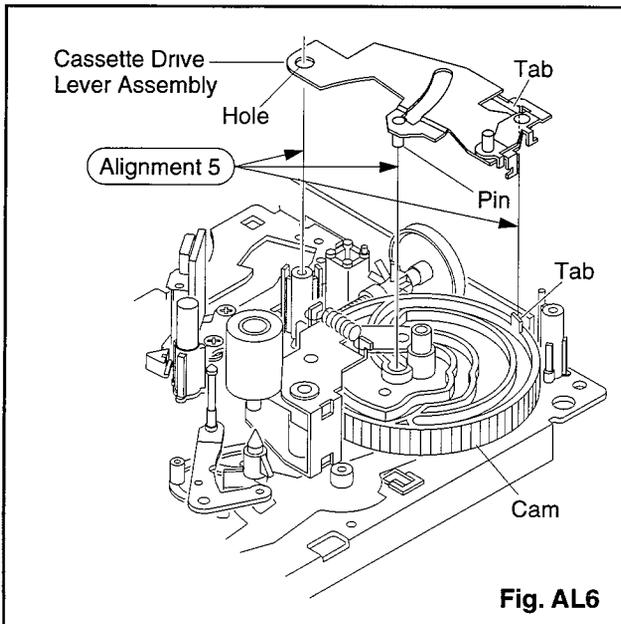


Fig. AL5

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.



Alignment [b]

This alignment can be performed independently of any other alignment.

Band Brake Assembly

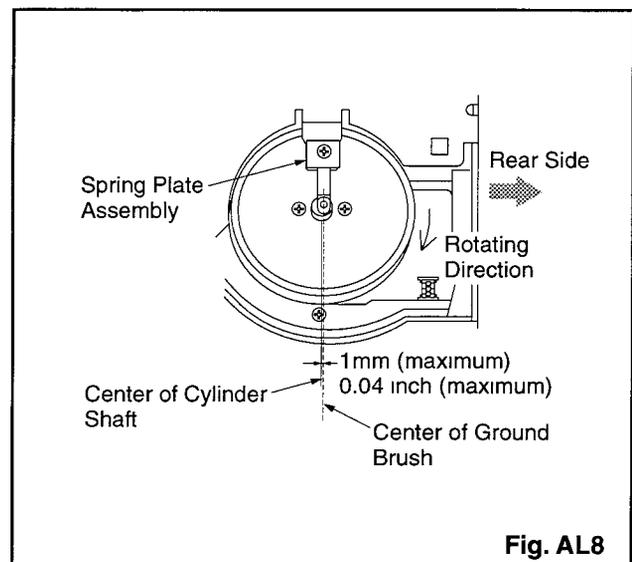
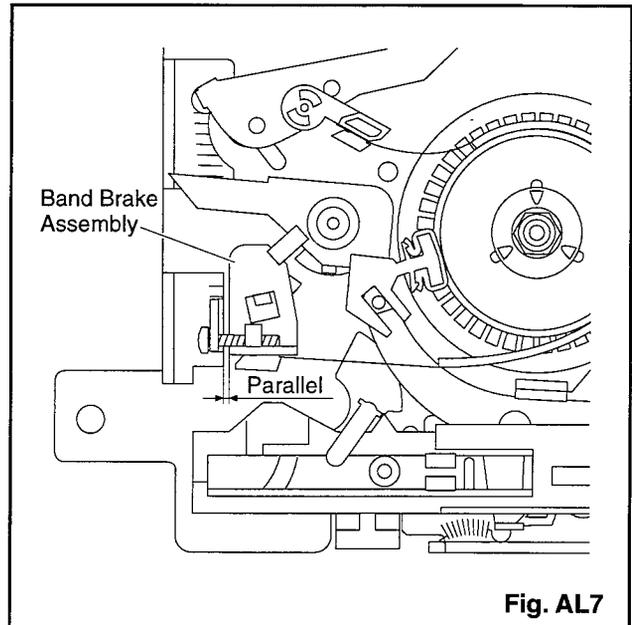
1. Ensure that Band Brake Assembly is positioned parallel to the chassis' notch as shown in Fig. AL7. This measurement can be made by eye.

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.



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

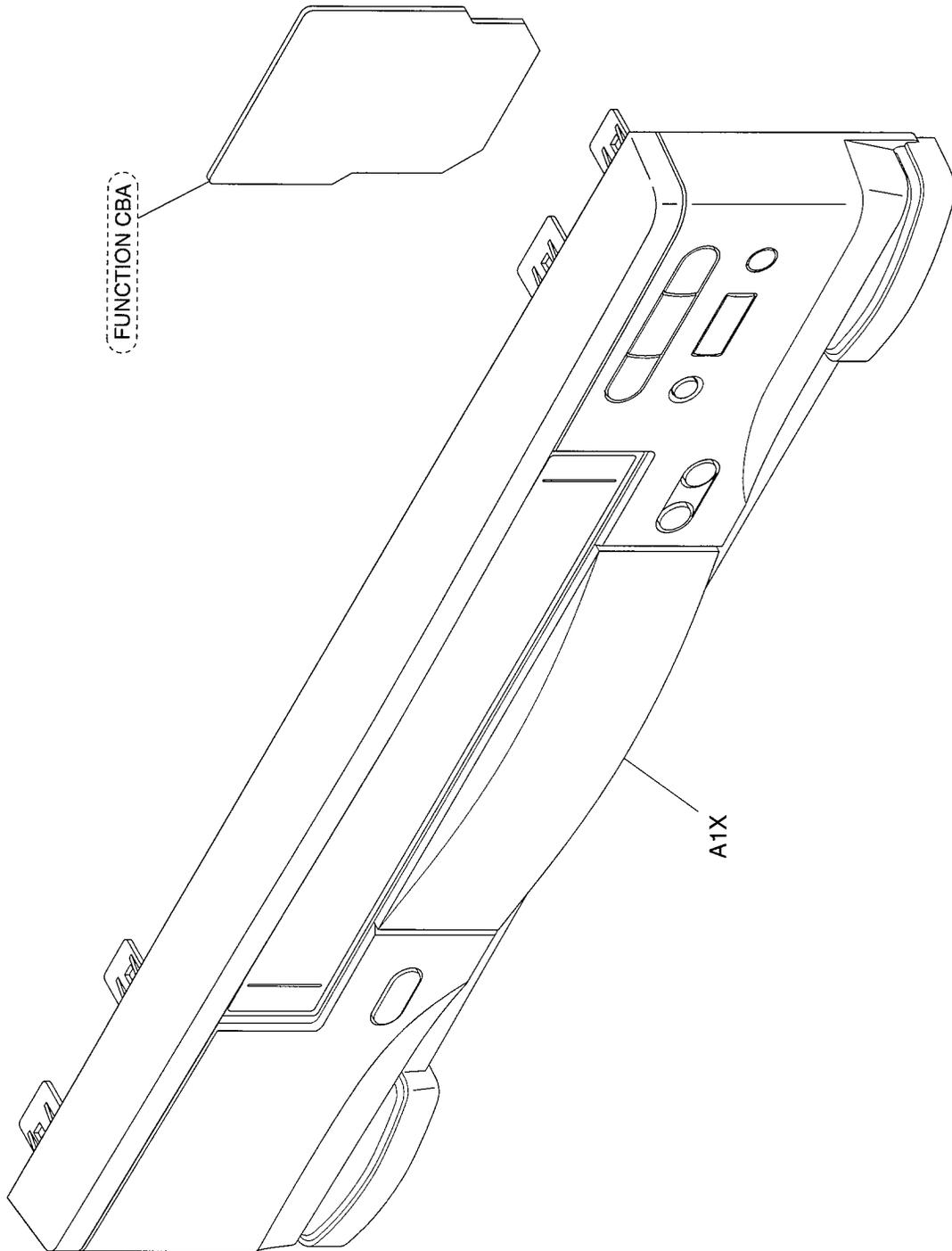
TABLE OF CONTENTS

| | |
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| Exploded Views | 3-1-1 |
| Mechanical Parts List..... | 3-2-1 |
| Electrical Parts List | 3-3-1 |

EXPLODED VIEWS

Front Panel

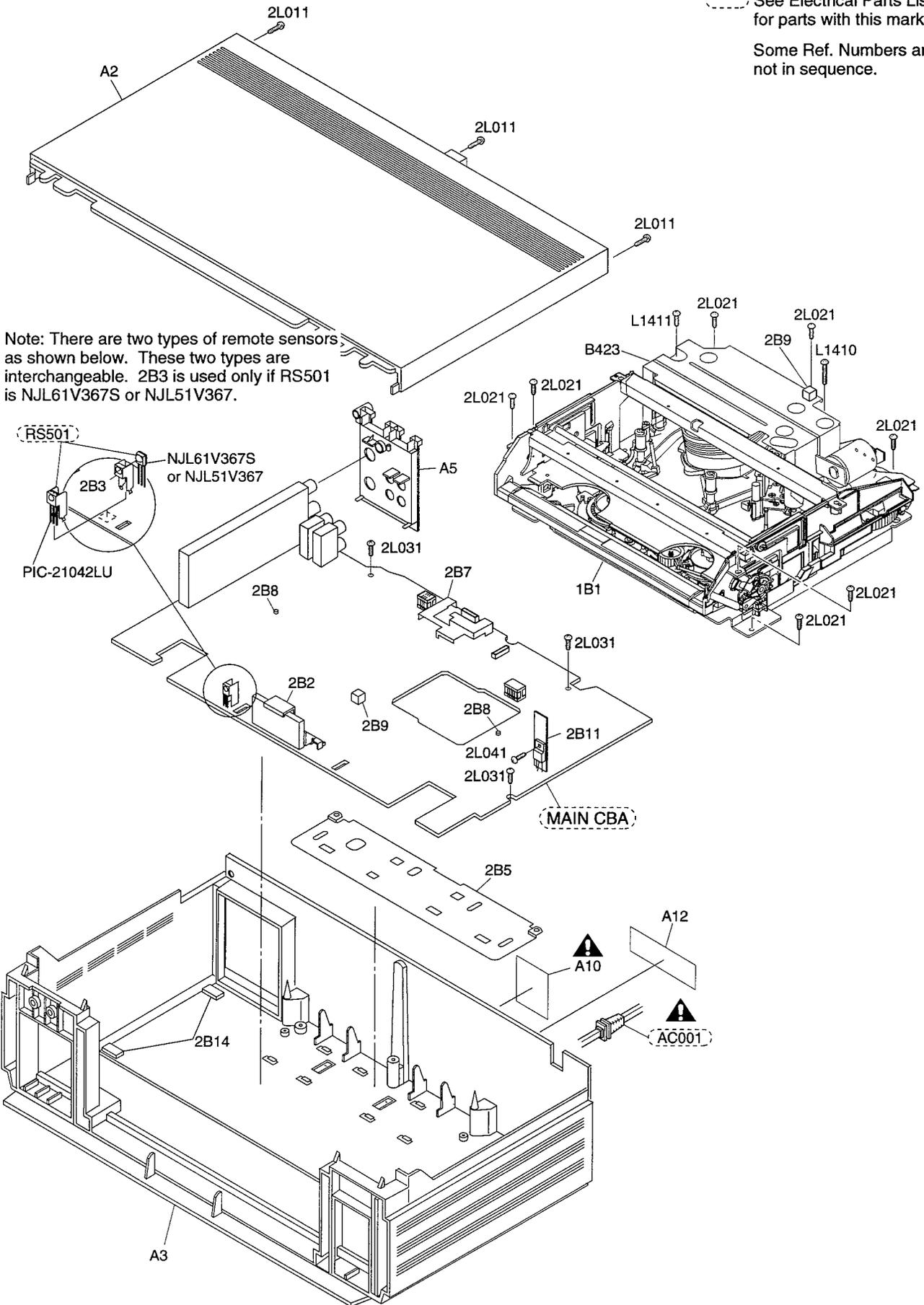
 See Electrical Parts List
for parts with this mark.



Cabinet

 See Electrical Parts List for parts with this mark.

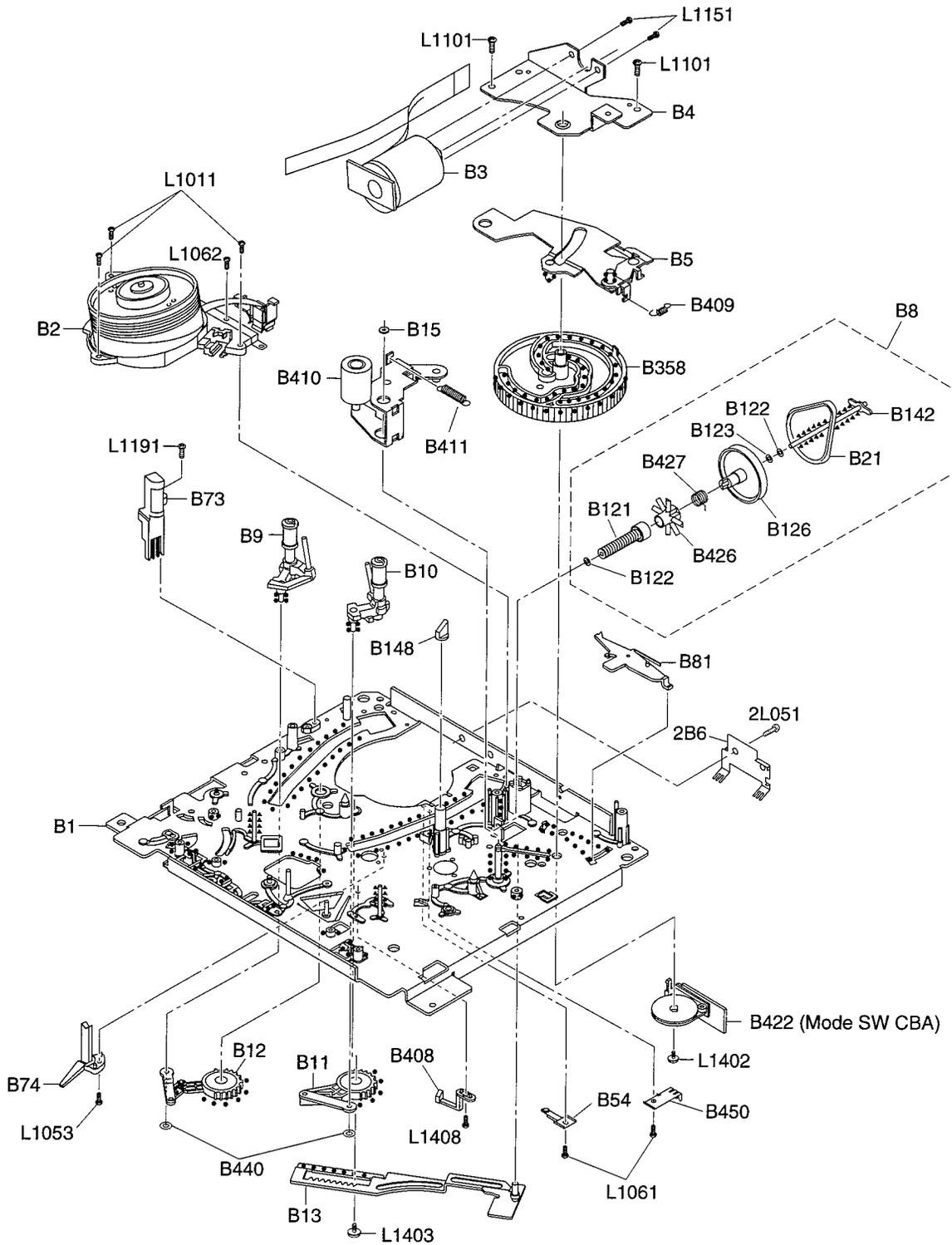
Some Ref. Numbers are not in sequence.



Note: There are two types of remote sensors, as shown below. These two types are interchangeable. 2B3 is used only if RS501 is NJL61V367S or NJL51V367.

Deck Mechanism View 1

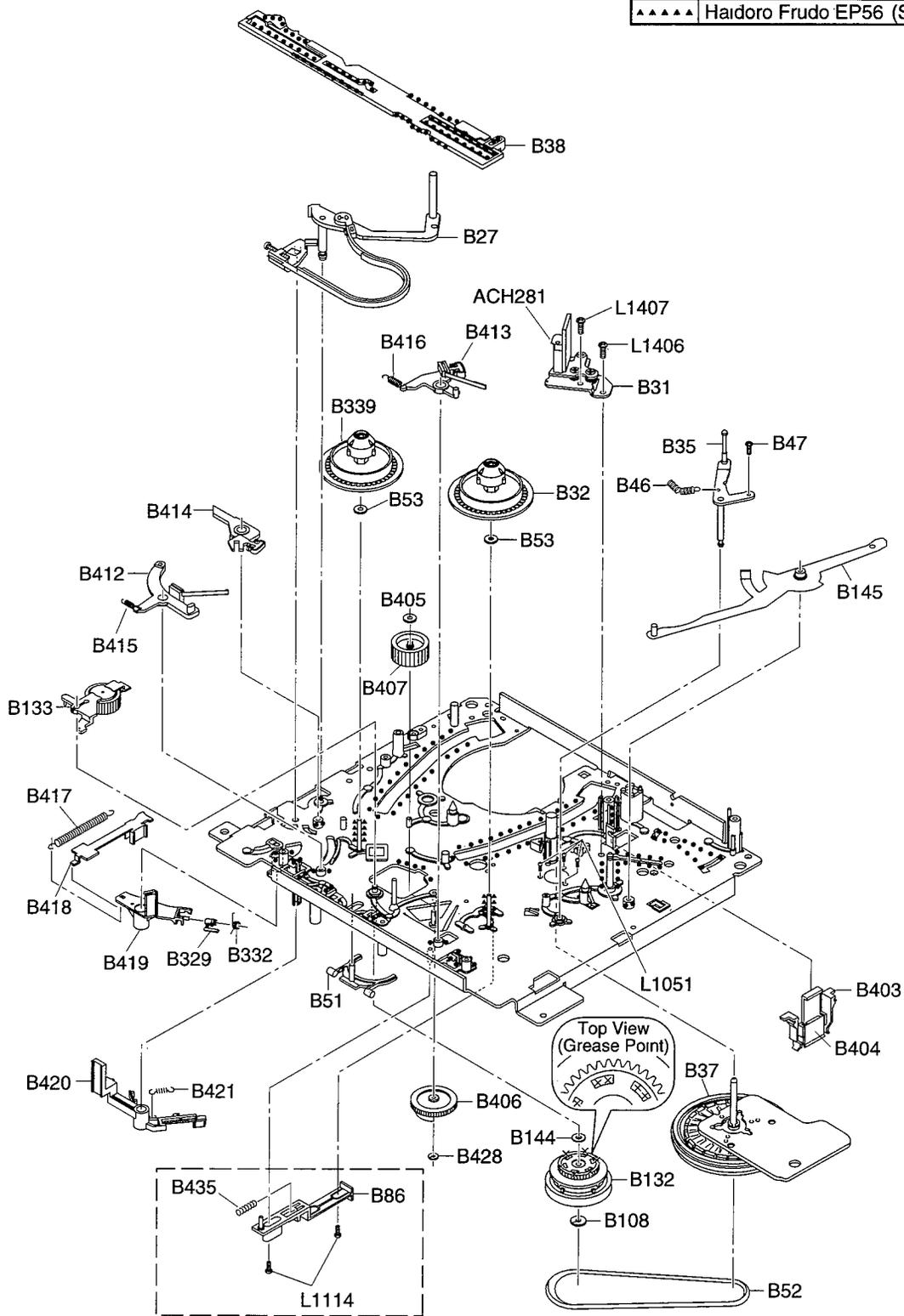
| Mark | Description |
|-------|----------------------------------|
| ••••• | Floil G-374G (Blue grease) |
| ▲▲▲▲▲ | Haidoro Frudo EP56 (Spindle oil) |



Some Ref. Numbers are not in sequence.

Deck Mechanism View 2

| Mark | Description |
|-------|----------------------------------|
| xxxxx | SankohI FG-84M (White grease) |
| ••••• | Fioil G-374G (Blue grease) |
| ▲▲▲▲▲ | Haidoro Frudo EP56 (Spindle oil) |

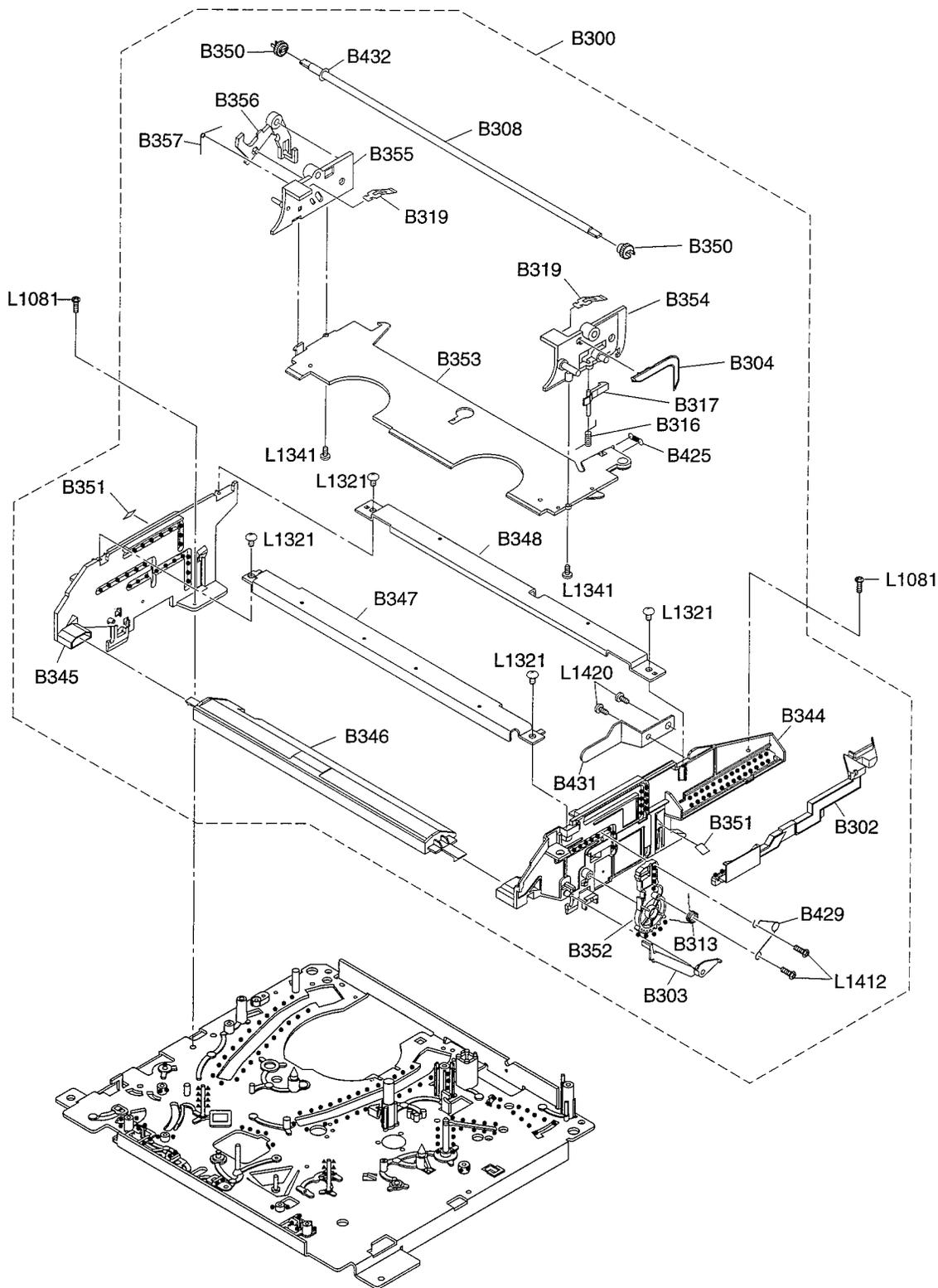


4 Head model only

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

| SYMBOL-NO | P-NO | DESCRIPTION | 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 | | | |

ELECTRICAL PARTS LIST

| SYMBOL-NO | P-NO | DESCRIPTION | SYMBOL-NO | P-NO | DESCRIPTION |
|-----------------|---------|-----------------------------------|---------------|---------|-----------------------------|
| SEMI-CONDUCTORS | | | 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) |
| D 001 | TC10752 | DIODE 1N4005 | TRANSFORMERS | | |
| D 002 | TC10752 | DIODE 1N4005 | ▲ T 001 | TC11058 | PULSE TRANS |
| D 003 | TC10752 | DIODE 1N4005 | T 401 | TA12565 | COIL, OSC |
| D 004 | TC10752 | DIODE 1N4005 | COILS | | |
| D 005 | TC10909 | DIODE PR1006 | ▲ L 001 | TA12553 | COIL 33MH |
| D 006 | TC10754 | DIODE 1N4148M | L 002 | TA12575 | CORE |
| D 007 | TC10754 | DIODE 1N4148M | L 003 | TA12554 | CORE |
| D 008 | TC10753 | DIODE PR1004 | L 004 | TA12554 | CORE |
| D 012 | TC10753 | DIODE PR1004 | L 007 | TA12554 | CORE |
| D 013 | TC10753 | DIODE PR1004 | L 008 | TA12555 | COIL 22UH |
| D 015 | TC10757 | DIODE PR3002 | L 009 | TA12555 | COIL 22UH |
| D 016 | TC10877 | DIODE SB140 | L 252 | 5121289 | COIL 22UH |
| D 017 | TC10753 | DIODE PR1004 | L 304 | TA12574 | COIL 56UH |
| D 018 | TC10759 | ZENER DIODE UZ-9.1BSC | L 307 | TA13031 | COIL 22UH |
| D 052 | TC10754 | DIODE 1N4148M | L 502 | TA12562 | COIL 12UH |
| D 053 | TC10759 | ZENER DIODE UZ-9.1BSC | L 505 | TA12561 | COIL 100UH |
| D 054 | TC10754 | DIODE 1N4148M | L 506 | TA12561 | COIL 100UH |
| D 055 | TC10752 | DIODE 1N4005 | L 507 | TA12561 | COIL 100UH |
| D 057 | TC10754 | DIODE 1N4148M | L 702 | TA13033 | COIL 18UH |
| D 058 | TC10787 | ZENER DIODE UZ-30BSB | L 705 | TA12556 | COIL 15UH |
| D 059 | TC10758 | ZENER DIODE UZ-6.8BSA | L 706 | TA12561 | COIL 100UH |
| D 301 | TC10754 | DIODE 1N4148M | L 851 | TA13032 | COIL 18UH |
| D 302 | TC10754 | DIODE 1N4148M | L 853 | TA12563 | COIL 4.7UH |
| D 303 | TC10754 | DIODE 1N4148M | CRYSTALS | | |
| D 304 | TC10754 | DIODE 1N4148M | X 301 | TA12551 | X' TAL 3.579545MHZ |
| D 501 | TC10754 | DIODE 1N4148M | X 502 | TA12552 | X' TAL 32KHZ |
| D 502 | TC10754 | DIODE 1N4148M | MISCELLANEOUS | | |
| D 510 | TC10754 | DIODE 1N4148M | CL 281 | TC10899 | PARALLEL WIRE 2P |
| D 511 | TC10886 | LED SLR-938CV-7 | CN 287 | TE12457 | CONNECTOR |
| D 701 | TC10762 | ZENER DIODE UZ-33BSD | CN 501B | TJ13456 | CONNECTOR |
| ▲ IC 001 | TC10763 | PHOTOCOUPLER PC-17T1 | CN 502 | TE12458 | CONNECTOR |
| IC 002 | TC10764 | IC KA431Z | CN 503 | TE12455 | CONNECTOR |
| IC 251 | TC10889 | IC LA70001 [VT-MX221AW] | CN 504 | TE12454 | CONNECTOR |
| IC 251 | TC10901 | IC LA70011 [VT-MX421AW] | CN 505 | TE12456 | CONNECTOR |
| IC 301 | TC10888 | IC LA71020M | CN 507 | TE11939 | CONNECTOR |
| IC 501 | TC10892 | IC SY/M37779M5A109GP [VT-MX221AW] | CN 651 | TE11958 | CONNECTOR |
| IC 501 | TC10902 | IC SY/M37779M5A1116P [VT-MX421AW] | ▲ F 001 | TE11947 | FUSE 1A/250V |
| IC 502 | TC10768 | IC LM339N | FH 001 | TE11948 | FUSE HOLDER |
| IC 503 | TC10769 | IC LM324N | FH 002 | TE11948 | FUSE HOLDER |
| IC507A | TC10771 | IC TA7291S | FIP502 | TC10895 | LCD DISPLAY SVV-4SS05 |
| IC507B | TC10772 | IC LB1641 | PS501 | TE11953 | SENSOR SG231 [VT-MX421AW] |
| IC 751 | TC10773 | IC HCF4052BEY | ▲ SA 001 | TJ13459 | SURGE ABSORBER JVR-10N471K |
| IC 851 | TC10774 | IC LC74723-9068 | RS 501 | TC10904 | REMOTE RECEIVER NJL61V367S |
| ▲ Q 001 | TC11051 | TRANSISTOR 2SC3866MP | TU 701 | TC10897 | TUNER UNIT TMLH2-009A |
| ▲ Q 002 | TC10775 | TRANSISTOR 2SC3576 | SW 281 | TC10894 | MODE SWITCH |
| Q 053 | TC10777 | TRANSISTOR 2SD734F-NP-AQ | SW 501 | TE11957 | SWITCH |
| Q 054 | TC10778 | TRANSISTOR KTC3199(Y) | SW 502 | TE11957 | SWITCH |
| Q 055 | TC10779 | TRANSISTOR KRA103M | SW 505 | TE11957 | SWITCH |
| Q 303 | TC10779 | TRANSISTOR KRC103M | SW 506 | TE11941 | SWITCH |
| Q 304 | TC10778 | TRANSISTOR KTC3199(Y) | SW 662 | TE11957 | SWITCH |
| Q 305 | TC10783 | TRANSISTOR KTC3193(Y) | SW 665 | TE11957 | SWITCH |
| Q 307 | TC10783 | TRANSISTOR KTC3193(Y) | SW 671 | TE11957 | SWITCH |
| Q 308 | TC10784 | TRANSISTOR KTA1266(Y) | SW 673 | TE11957 | SWITCH |
| 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 | | | |

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