

Service Manual

Professional Digital Audio Tape Deck



SV-3900



Color

(H)... Gray Type

Area

Country Code	Area	Color
(PP)	U.S.A./Canada.	(H)

SPECIFICATIONS

Signal Format

Tape recording system: Rotary head type DAT
Sampling frequencies:
For recording: 48 kHz/44.1 kHz
 (analog/digital input)
 32 kHz (digital input only)
For playback: 48 kHz/44.1 kHz/32 kHz
 (selected automatically)
No. of quantizing bits: 16-bit linear
No. of channels: 2 (stereo)

Audio Parameters (Recording and Playback System)

Frequency response:
For 48 kHz: 10 Hz~22 kHz (± 0.5 dB)
For 44.1 kHz: 10 Hz~20 kHz (± 0.5 dB)
Signal to noise ratio: Greater than 92 dB, DIN audio
 (dynamic range) weighted
 (22.4 Hz to 22.4 kHz bandpass)
Total harmonic distortion: Less than 0.05% (1 kHz, +4 dBu)
 Less than 0.007% (1 kHz, +22 dBu)
Wow and flutter: Unmeasurable

General

Power supply: 120 V AC, 60 Hz
Power consumption: 35 W
External dimensions: 43×12.2×31.5 cm
 (W×H×D) (16 $\frac{7}{8}$ "×4 $\frac{3}{4}$ "×12 $\frac{3}{8}$ "")
Weight: 6.4 kg (14 $\frac{1}{8}$ pounds)

Input/Output Jacks

Analog
Input jacks: XLR-3 type
Nominal input level/ +4 dBu (-18 dB rec level)/
Input impedance: 10 k Ω balanced
Output jacks: XLR-3 type
Nominal output level/ +4 dBu/-10 dBu (switch selectable)/
Output impedance: 75 Ω balanced
Phones output: Max. 30 mW/32 Ω
 (matching impedance 8~600 Ω)

Digital (AES/EBU type)

Input jacks: XLR-3 type/100 Ω balanced
Output jacks: XLR-3 type/20 Ω balanced

Digital (IEC TYPE II)

Input jack: RCA phono type (coaxial)/75 Ω
Output jack: RCA phono type (coaxial)/75 Ω

Remote Control

Parallel remote: 8 pin DIN connector
 (43 functions available)
Serial remote: 9 pin D-sub connector×2
 (for Input and Output)
 Based on ES-bus and P-2 protocols
 (switchable)
 *Controller SH-MK390 (option) is
 available for ES-bus mode
Machine number setting: Zero thru No. 31 (available in ES-bus
 mode)

Mechanism

Heads: Amorphous ferrite composite type
Cylinder diameter: 30 mm
Cylinder rotation speed: 2000 r.p.m.
 (recording and playback)
Tape speed: 8.15 mm/sec., 12.225 mm/sec.
 (selected automatically)
Search speed: Up to 250 times normal playback
 speed
FF/Rewind speed: Up to 400 times normal playback
 speed
FF/Rewind time: Approx. 27 sec. (2 hours DAT tape)

Note:

Specifications subject to change without notice.
 Weight and dimensions shown are approximate.

Panasonic®

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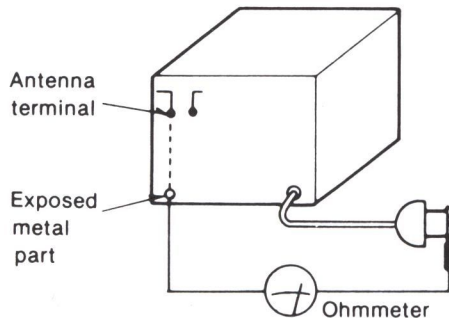
SAFETY PRECAUTION (This "safety precautions" is applied only in U.S.A.)

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

INSULATION RESISTANCE TEST

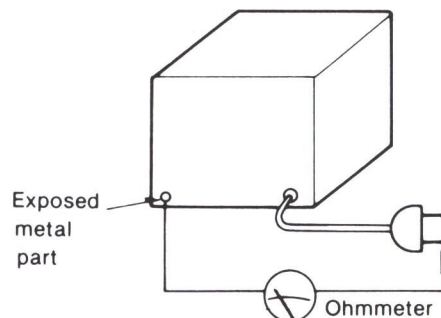
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ



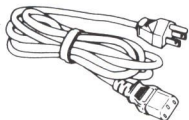
(Fig. B)

Resistance = Approx ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

ACCESSORIES

- AC power supply cord 1 (RJA0017-K)



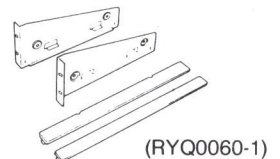
- Coaxial cable 1 (SJPD19-1E)



- Cleaning tape 1 (RT-RCLP)



- Rack mount kit 1 (RYQ0059-1)



- Screws 8 (XYN3 + F10FZ)



FEATURES

The SV-3900 is a fourth-generation Pro-DAT machine, designed specifically for professional applications. It features an enhanced dynamic range, with instrumentation-quality input and output analog interfaces for extended linearity and reduced distortion.

Analog-to-Digital Conversion:

One-bit A-to-D Converters offer dramatically improved performance and linearity when compared to conventional successive-approximation PCM converters. One-bit ADCs with 64-times oversampling filtering significantly reduce both signal and zero-cross distortion, producing cleaner, clearer audio signal at low as well as high recording levels. The result is enhanced accuracy in the spectral balance, ambient and "space" around instruments that form a vital part of natural musical sounds.

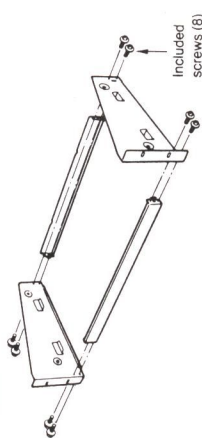
Digital-to-Analog Conversion:

High resolution D-to-A converter systems ensure optimum replay quality, by effectively removing zero-cross distortion and enhancing linearity at low signal levels.

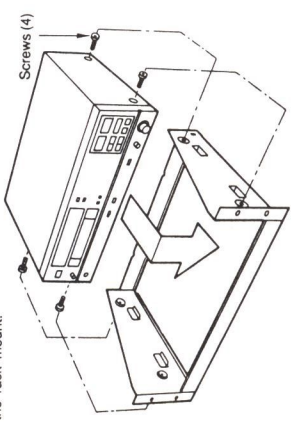
INSTALLATION

Installation of rack mount kit

1. Assemble the rack ears and panel, and tighten with included screws.

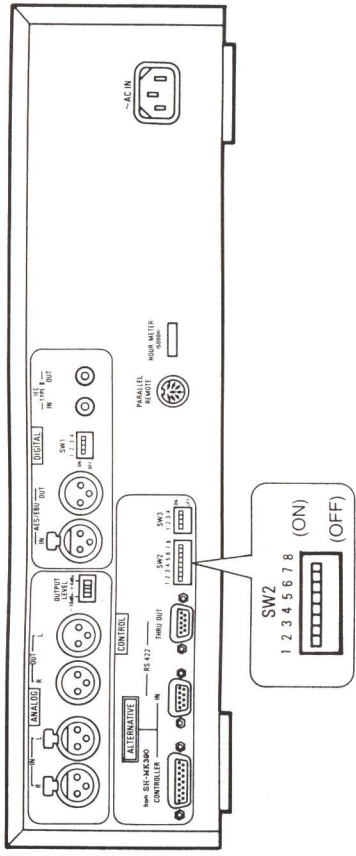


2. Remove the 4 screws on side enclosure, and attach the unit to the rack mount.



SETTING THE MACHINE NUMBER

Rear panel



For Network Control via ES Bus, the machine number of this deck can be set by using rear-panel DIP switch 2. The machine number is required to identify each deck when the RS-422 connectors of several SV-3900s are connected serially, and selected deck needs to be controlled in the ES bus mode. By using the optional SH-MK390 remote controller, a number of decks can be controlled via the ES bus.

Set the machine number using DIP switches 2-1 thru 2-5 while referring to the table at right.

CAUTION!

Do not specify the same machine number as that of another deck already connected to serial controller. Switch OFF the power before setting the machine number. If you set the machine number with the power ON, switch the power OFF then ON again to reset the machine value.

Checking the machine number

The SV-3900's machine number will appear on the counter display panel as shown below when either the cassette holder is opened, or the cassette holder is closed without loading a cassette tape.



(UP=ON=1, DOWN=OFF=0)

Machine No.	DIP SW2 settings				
	1	2	3	4	5
00	0	0	0	0	0
01	1	0	0	0	0
02	0	1	0	0	0
03	1	1	0	0	0
04	0	0	1	0	0
05	1	0	1	0	0
06	0	1	1	0	0
07	1	1	1	0	0
08	0	0	0	1	0
09	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1
31	1	1	1	1	1

The SV-3900 also features the following remote control functions:

Optional remote controller (SH-MK390)
A number of DATs can be controlled individually, with search, indexing, program edit and automatic operation available on each deck.

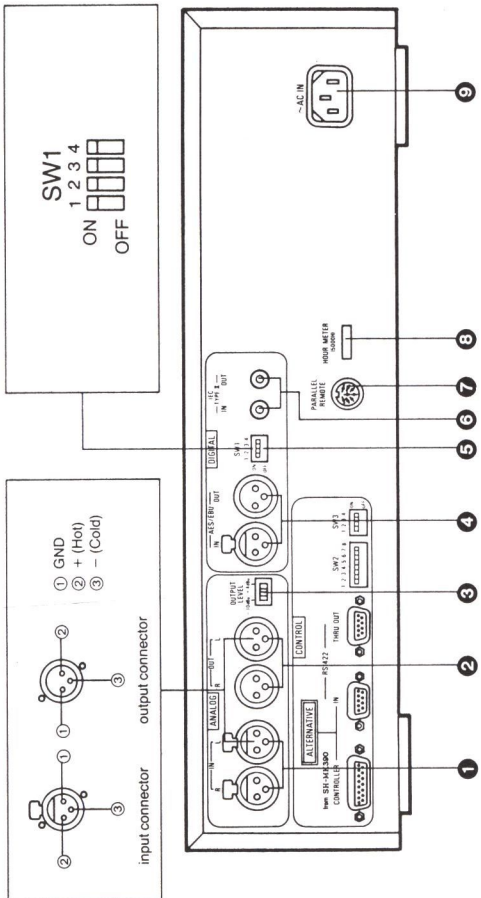
RS-422 serial remote control
Via suitable software, the user can perform sophisticated control tasks using the ES bus or the P2 protocol.

8-pin parallel input terminal
By developing simple software, the user can remotely control of 43 functions.

Notes on placement

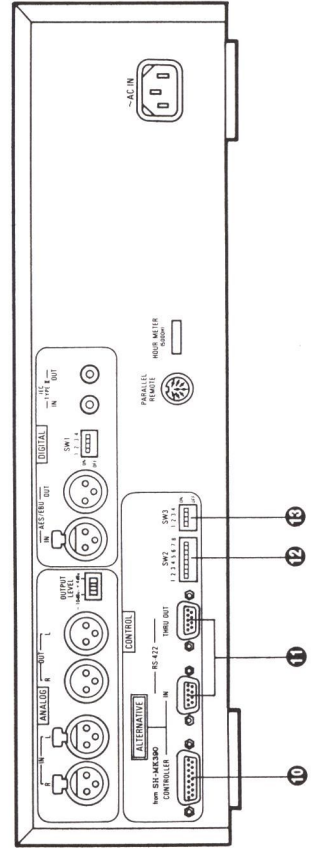
- This unit is a precision instrument. Be sure to place it on a flat surface, or mounted level in a rack.
- Avoid places such as the following:
 - Near any equipment or device that generates strong magnetic field.
 - On any heat-generating equipment or device, or in any place where the temperature is high (35°C/95°F or higher).
 - Extremely cold locations (5°C/41°F or below).
 - Near an AM/FM tuner or TV. (It may produce noise in the broadcast audio, or disturb the TV picture.)
- For long periods of time in direct sunlight.
- In dusty or smoky locations.
- In locations prone to vibrations.
- In locations where the rear panel is less than 10 cm (about 4") away from the wall or back of an audio rack.
- Do not place heavy objects, other than system components, on top of the unit.
- When carrying or storing the unit, handle it with care and do not subject to any strong bumps.
- To avoid problems due to vibration:
 - Do not place a book or similar object under this unit.
 - Do not route the connection cables (of this or other units) across the operation panel, across the top, or under the unit.

CONNECTIONS

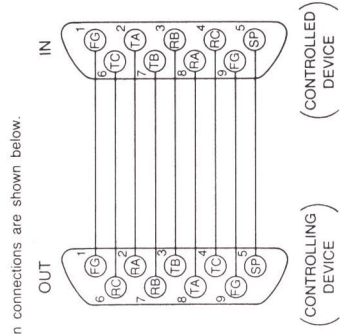


- 1 ANALOG IN terminals**
These are balanced analog audio XLR input connectors.
- 2 ANALOG OUT terminals**
These are balanced analog audio XLR output connectors.
- 3 OUTPUT LEVEL selector (+4 dBu/-10 dBu)**
Select the nominal output level corresponding to a peak level meter display of -18 dB.
- 4 AES/EBU terminals (IN/OUT)**
These terminals are for input or output of signals via the professional digital interface.
- 5 DIP switch settings (SW1)**
These are used for the following settings:
 - Digital Input Selection (IEC TYPE II or AES/EBU)
 - SCMS ID 6 Status for AES/EBU Input
 - Blank Skip Mode in Program Search Mode
 (For further details, see page 7.)
- 6 IEC TYPE II (IEC 958) jacks (IN/OUT)**
These terminals are for input or output of digital signals from/to a consumer unit.
- 7 REMOTE CONTROL jack (PARALLEL)**
See page 6.
- 8 Hour meter (5000H)**
Shows the number of hours of head usage in recording and playback.
- 9 AC IN jack**
Connect to the grounded AC outlet with the included AC power supply cord.

Rear panel



- 10 Dedicated remote controller connector**
This is a 15-pin serial connector used to connect an optional dedicated remote controller (SH-MK390).
- 11 Bus (RS-422) connectors**
These two 9-pin connectors are used to connect the deck to a serial bus, or a computer. Connect it using only an RS-422 type cable.
- 12 DIP switch settings (SW2)**
These are used for the following settings:
 - Machine Number Selection
 - Device Type Selection
 - Test Mode Selection
 (For further details, see page 7.)
- 13 DIP switch settings (SW3)**
These are used for the following settings:
 - Maximum Search Speed Selection
 - Protocol Selection
 - Data Transmission Speed Setting
 (For further details, see page 7.)



The pin connections are shown below.

- CONNECTOR PIN ASSIGNMENT**
- FC: Frame ground
- RA: Receive "A" common
- TB: Transmit "B"
- TA: Transmit "A"
- TC: Transmit-signal common
- SP: Spare
- RC: Receive-signal common
- RB: Receive "B"
- TA: Transmit "A"
- TC: Transmit-signal common
- SP: Spare

ES Bus

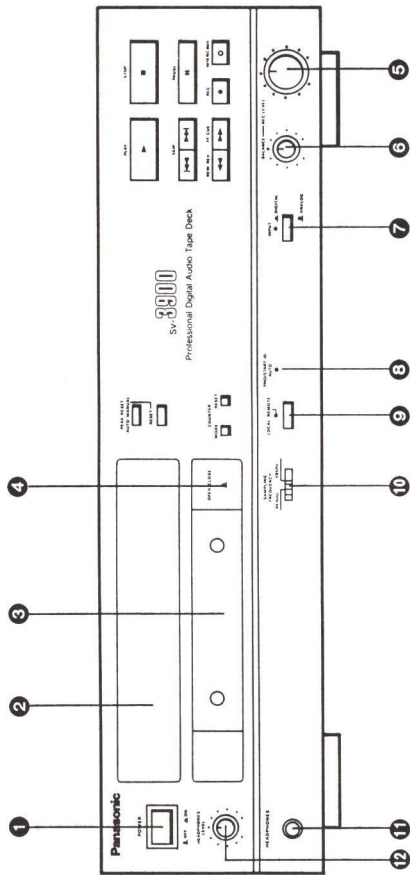
This format was developed jointly by the EBU (European Broadcasting Union) and the SMPTE (Society of Motion Picture & Television Engineers) for remote control of recording, production and broadcasting equipment. The controller sends control messages along a serial bus, hence the cable connection is simple. This enables various equipment connected to the bus to be selected and controlled individually or collectively. ES bus, Messages specific to a DAT (commands and responses) are not yet standardized. Hence the deck transmits messages in an escape mode in which messages specific to the deck can be defined. The mechanical and electrical interfaces of this deck are based on RS-422 D sub connector.

P-2 Serial

P-2 is an abbreviation of Protocol-2, which is a serial transmission protocol employing a 9-pin D sub connector. It is at present widely used as a control format between a VTR and a controller. In this format, one VTR is connected to a single control input/output connector (9-pin D sub connector) of the controller. ES bus and P-2 protocol can be selected by means of a DIP switch.

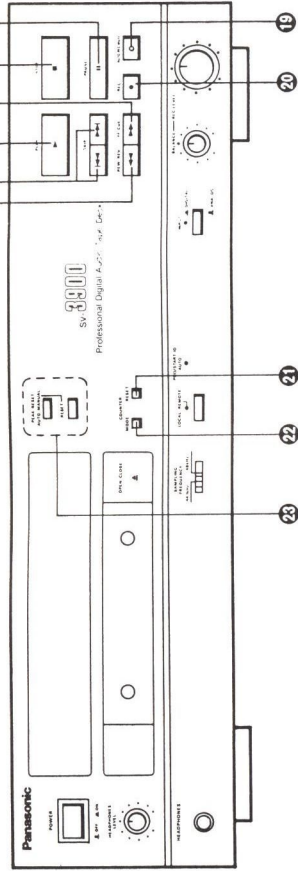
LOCATION OF CONTROLS

Front panel



- 1 POWER switch (POWER)**
- 2 Display panel**
See page 6.
- 3 Cassette holder**
- 4 OPEN/CLOSE button (▲ OPEN/CLOSE)**
Use to adjust the recording level of both left and right channels.
- 5 REC LEVEL control (REC LEVEL)**
Use to adjust recording balance between left and right channels.
- 6 REC BALANCE control (BALANCE)**
Use to adjust recording balance between left and right channels.
- 7 INPUT selector button/indicator (INPUT)**
Use to select digital or analog recording input.
- 8 PNO/START ID AUTO indicator (PNO/START ID AUTO)**
Indicates that the unit is set in the automatic mode for recording Program Number and Start ID.
The default mode on power up is set to off (manual recording mode).
- 9 LOCAL/REMOTE button (LOCAL/REMOTE)**
Use to select local or remote operating mode.
The default setting on power up is the remote mode.
- 10 SAMPLING FREQUENCY selector**
Select the sampling frequency when making analog recordings (44.1 kHz or 48 kHz).
- 11 Phones jack (HEADPHONES)**
A 1/4" connector for connecting standard stereo headphones.
- 12 Phone level control (HEADPHONES LEVEL)**
Use this control to adjust output level to the headphones.

Front panel

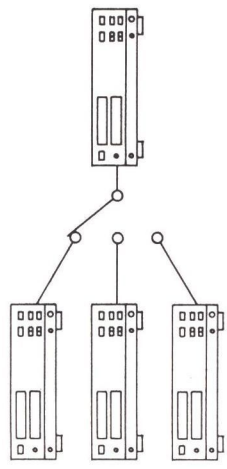


- 13 REW/REV button (◀◀ REW/REV)**
Use to rewind the tape, or for audible high-speed search in play mode (review).
- 14 SKIP buttons (◀◀◀ SKIP)**
Use the skip buttons to advance to the desired program. The ►►► button skips the program forward by one Start ID. The ◀◀◀ button skips the program backward by one Start ID. Repeated pressing of the Skip buttons causes the unit to skip forwards or backwards several IDs.
- 15 PLAY button/indicator (▶▶▶ PLAY)**
Use to initiate recording or playback mode.
Also used to record program numbers manually.
- 16 FF/CUE button (▶▶▶ FF/CUE)**
Use to advance the tape rapidly, or for audible high-speed search in play mode (cue).
- 17 STOP button (■ STOP)**
Use to stop all functions.
This button also clears the program memory.
- 18 PAUSE button/indicator (|| PAUSE)**
Use to temporarily interrupt playback or recording mode.
- 19 AUTO REC MUTE button (○ AUTO REC MUTE)**
Use to automatically insert a silent passage approximately four seconds long during a recording.
- 20 RECORD button/indicator (● REC)**
Use to place the unit in record standby mode.
- 21 COUNTER RESET button (COUNTER RESET)**
Use to reset the tape counter to "0000" (when the display mode is set to tape counter).
- 22 COUNTER MODE button (COUNTER MODE)**
Use to select the desired counter mode, between Absolute time, Program time, Time Remaining, TOC and Tape Counter.
- 23 PEAK RESET buttons (PEAK RESET AUTO/MANUAL/RESET)**
The AUTOMANUAL button is used to select the peak hold reset mode, auto or manual.
The peak level of the source is held and displayed for approximately one second before being extinguished.
MANUAL: The peak level of the source is held and displayed continuously until the RESET button is pressed.
The RESET button is used to reset the peak hold display in manual mode.
The default setting on power up is auto mode.

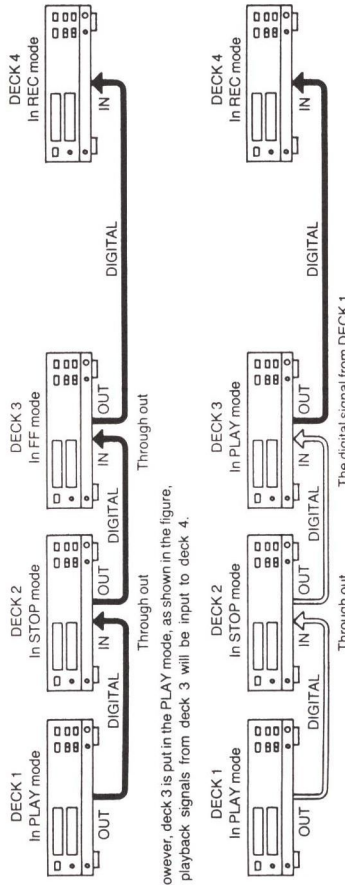
DIGITAL THROUGH PUT FUNCTION

Note: This function will not work unless the decks are connected digitally.

A special function provided on the SV-3900 Pro-DAT enables up to five machines to be connected together in a serial mode, whereby the digital output from any single machine on the network can be recorded onto a master SV-3900. In this way, a network array can be set up for digital dubbing and insert-editing between several replay DATs and a master recorder. For such applications as automated replay for broadcast or permanent-sound systems, a series of SV-3900s can be controlled from an external computer or SH-MK390 Remote Controller, to form a multi-machine replay system with a common digital or analog output. The digital input to any machine in the network that has been set to Digital Through Put mode will be automatically routed to its digital output. In replay mode, however, the selected SV-3900 will output directly onto the digital buss, and hence to the master or replay unit.



The attached figure shows a typical set up. Machine #1 is connected via its AES/EBU digital output to the AES/EBU input of machine #2, and so. The last machine on the network, designated here as Machine #4, is set to Record Standby mode, with its input also set to AES/EBU digital I/O. The output from any low-numbered machine will be overridden by a machine that is connected between it and the master SV-3900 deck.



If, however, deck 3 is put in the PLAY mode, as shown in the figure, the playback signals from deck 3 will be input to deck 4.

Notes:
 • The digital through put function is not activated when the SV-3900 is first powered up.
 • When selecting the digital through put function, use the AES/EBU ports to connect digital signals. A maximum of five decks can be connected serially in this way.

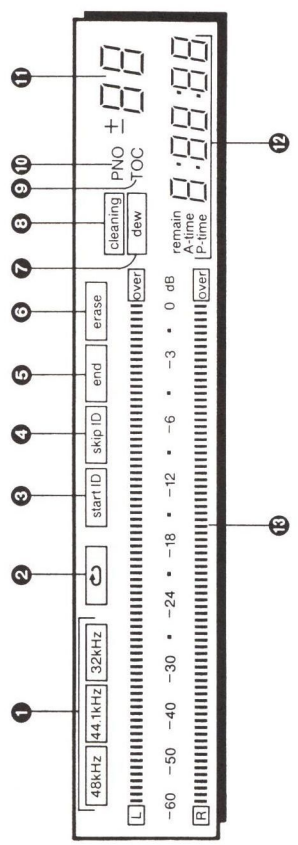
To cancel the Digital Through Put Function

- 1 Open the cassette drawer (select Local mode if necessary).
- 2 Press the AUTO REC MUTE button.
The Sampling Frequency indicator will now cease to flash, indicating the digital Through Put mode has been cancelled.

To initiate the Digital Through Put Function

- 1 Open the cassette drawer (select Local mode if necessary).
- 2 Press the RECORD button.
The Sampling Frequency indicator will now flash, indicating the digital Through Put mode has been established. The SV-3900 will continue to respond normally to all transport controls. If the Play button is pressed, however, the output of the selected SV-3900 will pass directly via the Network Digital Buss to the master machine.

Display panel



- 1 Sampling frequency indicators**
Displays sampling frequency of digital signals during recording or playback.
Changes automatically depending on input or output signal.
- 2 Repeat indicator**
This indicator is used for repeat loop-play function.
Indicates that all programs or memorized programs can be played back repeatedly (REPEAT).
- 3 start ID indicator**
Indicates that a Start ID is being or has been recorded.
- 4 skip ID indicator**
Indicates that a Skip ID is being or has been recorded.
- 5 end indicator**
Indicates that an End Mark is being or has been recorded.
- 6 erase indicator**
Indicates that a Start ID or Skip ID is being erased.
- 7 dew indicator**
Indicates the formation of dew within the unit.
- 8 Cleaning indicator**
Indicates that the DAT head assembly needs cleaning.
(See page 10.)
- 9 TOC (table of contents) indicator**
Indicates the total program count and tape length of a commercial tape onto which the TOC information has been recorded.
- 10 PNO (program number) indicator**
Indicates the number of the current program.
- 11 Program number display**
Displays either the TOC information (when TOC indicator appears) or the number of the program (when PNO indicator appears).
- 12 Counter display panel**
The following are displayed according to the setting of the counter mode button:
1) Absolute time
2) Program time (elapsed time since the last Start ID was encountered)
3) Remaining time (approximate time, in hours and minutes to the end of the DAT cassette)
4) TOC information
5) Tape counter
- 13 Peak level meter**
Recording and playback levels are indicated by a bar graph. Standard I/O level of +4/-10 dBu is shown at -18 dB.

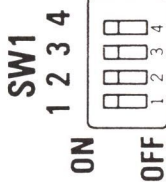
(ON=0, OFF=1)

(ON=0, OFF=1)

LOCATION OF CONTROLS

DIP SWITCH SETTINGS

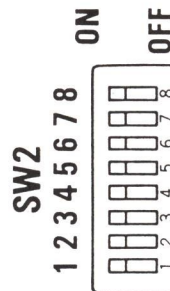
DIP Switches on the Rear Panel



The following settings can be made by using DIP switch 1.

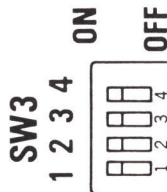
Switch Setting	Function
1 Digital Input/Output Selection	ON = IEC 958 OFF = AES/EBU
2 SCMS ID6 Status for AES/EBU Input	SW2 SW3 OFF OFF 00 Copy Free ON OFF 10 No further copies ON ON 11 One copy allowed
4 Blank Skip Mode in Program Search	ON = 1 OFF = 0 SV-3900 will advance to the next selection during Program Play mode, if approximately two seconds of silence are encountered.

Note: IEC 958 is shown as IEC TYPE II on the rear panel of SV-3900.



The following settings can be made by using DIP switch 2.

Switch Setting	Function
1 Machine Number	For details on how to set the machine number, see page 10.
6 Device Type Setting	SW6 SW7 OFF OFF SV-3900 OFF ON MI VCR ON ON SONY VCR
8 Test Mode	OFF = Normal mode ON = Test mode



The following Settings can be made by using DIP switch 3.

Switch Setting	Function
1 Maximum Search Speed	OFF = Max. 250 times search speed possible ON = Max. 400 times search speed possible
2 Serial Protocol	OFF = ES BUS ON = P2
3 Data Transmission Speed	SW3 SW4 OFF OFF 38.4 kbps ON OFF 9600 bps OFF ON 4800 bps ON ON 2400 bps

SCMS Copy Protection

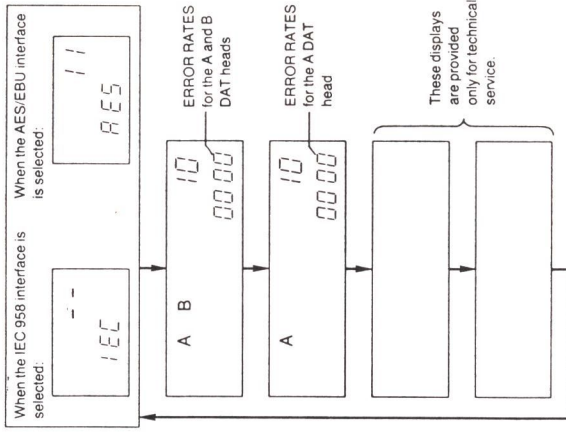
The Serial Copy Management System (SCMS) is designed to control digital-to-digital DAT copying that a consumer can perform on various digital audio material, including Compact Discs, pre-recorded DAT tapes, and other material via IEC 958 "consumer use" digital audio interfaces (also commonly referred to as "SP DIF" and EIAJ CP-340). SCMS does not affect the ability to make copies using a DAT recorder's analog inputs and outputs, nor does it apply to digital-to-digital copies made via the AES/EBU professional digital audio interface.

Only one serial (or generational) digital-to-digital copy can be made from a copyright protected source, such as a commercial CD or pre-recorded DAT. Serial Copy Management System labels are generated onto tape each time an SCMS-equipped consumer DAT machine records an audio signal to tape, no matter whether the source is from the analog or digital inputs.

Technically, the SCMS labels for DAT are encoded into the SubCode sections of the main digital data area, specifically "ID6". The SV-3900's rear-panel DIP switches allow the user to preset the SCMS status bits of ID6 onto the DAT recording. For legal reasons, the ID6 bits are only modified if the source input is the AES/EBU Digital I/O; during digital copying via the IEC "consumer use" input, the SV-3900 simply copies across the current status of SCMS codes indicated by the Channel Status. To prevent a master DAT tape being copied on a consumer deck, for example, the user might select switch setting for "ID6=10", which would prevent any further digital copying of this copyrighted cassette via a consumer DAT. Alternatively, you might select "ID6=00", so that any number of digital copies could be made on a consumer deck. Selection of "ID6=11" will designate a final copyright protected pre-recorded product, which would behave the same way on consumer SCMS-equipped DAT decks as a normal commercial release.

DISPLAYING SCMS STATUS AND ERROR RATES
The SCMS status of a DAT recording can be displayed on the SV-3900 by simultaneously pressing the front-panel COUNTER MODE, RESET and PAUSE buttons. Now shown within the normal Time Display window will be the type of digital interface that has been selected via the rear-panel DIP switch—AES/EBU or IEC 958 "consumer use"—while the PNO display now shows the ID6 value of the recording: 00, 10 or 11. If the COUNTER MODE button is pressed for a second time, the SV-3900 will display ERROR RATES; the mode can be cancelled by hitting the RESET button.

Each time the COUNTER MODE button is pressed, the display changes as follows:



Note: The display scheme described above will not be shown, when the machine number is being displayed.

REMOTE CONTROL

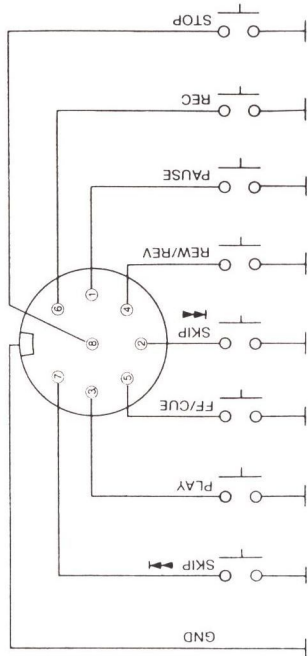
The parallel input terminals have two methods of control:

- 1) By wired remote control. Any one of the 8 terminals are grounded via contact closures, controlling the basic transport functions.
- 2) By parallel data from a computer. The codes shown in the table below access additional control functions.

This unit has three systems for remote control operation, using the optional SH-MK390 remote controller, the RS-422 serial remote control, and the 8-pin parallel input terminal.

Parallel Input Terminals

By connecting the following circuits, the SV-3900 can be operated by remote control using normal switches. This remote control operation functions in the Local mode only.



Expansion function

Connected via the Parallel Input Terminal to computer, the signals shown in the table below can be used to control the following 43 functions.

FUNCTION	DIN Jack Number								FUNCTION	DIN Jack Number								
	3	2	1	5	8	7	4	6		1	3	2	1	5	8	7	4	6
PAUSE	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0	1	0	0
REC	1	1	1	1	1	0	1	0	1	0	0	1	0	0	0	1	0	0
REW	1	1	1	1	0	1	1	0	1	0	0	1	0	0	1	0	1	0
FWD SKIP	1	1	1	0	1	1	1	1	0	0	1	0	1	1	1	0	1	1
STOP/CLEAR	1	1	0	1	1	1	1	1	0	0	1	0	1	1	0	1	0	0
FF	1	1	0	1	1	1	1	1	0	0	1	0	1	1	0	1	0	1
REV SKIP	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	1
PLAY	0	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0
(NO. KEY)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OPEN/CLOSE	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0	1	0	1
AUTO REC/MUTE	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0	1	0	0
FADE IN	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	1	0	0
FADE OUT	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	1	0	0
COUNTER RESET	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	1
COUNTER MODE	0	0	0	0	1	1	1	1	0	0	1	0	0	0	1	0	0	1
MEMORY	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
END SEARCH	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
REPEAT	0	0	0	0	1	0	1	1	0	0	1	0	0	0	1	1	0	0
START-ID	0	0	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0
SKIP-ID	0	0	0	1	1	0	1	0	1	0	0	1	0	0	1	0	0	1
END-ID	0	0	0	0	1	1	1	0	0	0	1	1	0	0	1	0	1	0
ID-WRITE	0	0	0	0	1	1	1	1	0	0	1	0	1	0	1	0	1	1

(ON=0, OFF=1)

(ON=0, OFF=1)

OPERATION NOTES

Condensation

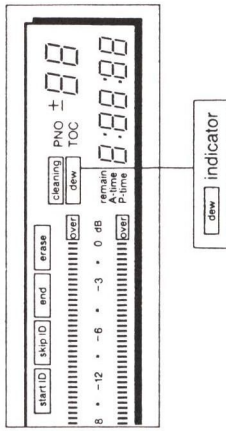
In winter, moisture droplets may form on the window panes of a heated room. This phenomenon is called condensation. Condensation may occur with this unit or with cassette tape in the following situations.

- in a room where a heater has just been turned on
- in a room where steam or excessive moisture are present
- when the unit is brought in suddenly from a cold place to a warm room
- when the unit is directly in the path of cold air from an air conditioner, etc.

In such cases, the unit will not operate correctly, and even if it does operate, the tape may be damaged. In particular, if moisture condenses on the rotating heads, the tape will stick. This will prevent the tape from running properly, and might damage it.

If Condensation Occurs

To protect the tape, this unit contains a built-in device so that when condensation occurs, the indicator on the display panel flashes. While the indicator is flashing, apart from the OPEN/CLOSE function, buttons on the unit will not operate.



If a cassette tape is loaded in the unit, remove it and leave the power switched on. Wait until the indicator goes out. The time required for moisture to evaporate will vary according to the environment, but it may be 60 minutes or longer if humidity is high. Condensation usually sets in gradually, so the indicator may not flash for the first 10~15 minutes. If room temperature or humidity changes abruptly, therefore, wait for about 20 minutes before switching on power to check that the indicator is not flashing.

Unloading Function

If the unit is in the stop, pause or record standby modes for more than 12 hours the cassette tape will be released automatically from the rotating head mechanism.

SV-3900 DAT MAINTENANCE CHART

• REGULAR MAINTENANCE

The purpose of periodic maintenance as recommended is to keep the equipment in the best possible operating condition throughout its useful life. Observance of this maintenance schedule ensures that maximum performance and reliability is obtained from the machine.

Regular maintenance is necessary because the DAT Recorder is a high-technology piece of equipment, containing DC motors, head cylinder assemblies, and a complex mechanism. These components deteriorate over time. Dust and dirt can clog the head gap, which affects the sound. In light of this, it is very important that overall maintenance be performed according to the maintenance chart to avoid problems resulting from heavy image. Maintenance should also be performed after any repairs on the equipment.

Maintenance is particularly recommended for DAT Recorders used in commercial and broadcast applications for several reasons. Installation and application are frequently under less than ideal conditions, such as long usage times and poor environmental conditions. All of this adversely affects the life span and performance of the machine. Regular maintenance assures that the purchaser obtains maximum value for this expenditure.

Note: Refer to the hour meter to know when to perform the maintenance.

Part Name	Part Number	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
Upper Cylinder	VEH0460	○	●	○	●	○	●	○	●	○	●
Cylinder Unit	VEG0752	○	○	○	○	○	○	○	○	○	●
S. Load Arm Ass'y	RXL0052										●
T. Load Arm Ass'y	RXL0054										●
Load Cam	RDK0006-1						●				
Capstan Unit	REM0001	○	○	○	○	○	○	○	○	○	●
Post Roller	RXP0008	○	○	○	○	○	○	○	○	○	●
Guide Roller	RXP0027	○	○	○	○	○	○	○	○	○	●
Pinch Roller	1NB0001ZA	○	○	○	○	○	●	○	○	○	○
S. Reel Ass'y	RXR0006										●
T. Reel Ass'y	RXR0007										●
BT Lever	RXL0048										●
Tension Band Ass'y	RXL0036						●				
S. Brake Ass'y	RXL0049						●				
T. Brake Ass'y	RXL0050						●				
Idler Gear	RDG0071										●
Mode Motor Ass'y	REM0009								●		
Mode Cam	RDK0007-1										●
M Gear B	RDG0067										●
Drive Gear Ass'y	RXG0011						●				
Idler Gear (F)	RDG0069										●
Idler Gear (P)	RDG0068										●
Mode SW Ass'y	RES0002						●				
Load SW Ass'y	RES0001										●
Cassette SW	EVQWR4002										●
Earth Terminal	RUS740ZA										●
Loading Motor	MMN-6FBRC8S										●
Belt	SMQ20025										●
Leaf SW	SSPD18										●

● Replacement, ○ Cleaning

• **DAT Head and Tape Transport Cleaning**

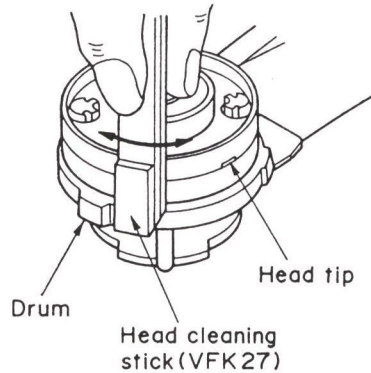
Through normal usage of any tape machine, dirt and debris from the tape accumulates on the heads, which eventually causes performance problems. By using a cleaning cassette regularly, dirt buildup can be minimized, prolonging the life of the tape heads, and also keeping tape posts, tape guides, and the pinch roller clean.

• **CLEANING**

1. Play the cleaning cassette (Panasonic Part No. RT-RCLP) for 15-20 seconds.
2. Do not use the same part of the cleaning tape more than once.
3. Clean all tape contact surface, including A/C head upper and lower drum, thoroughly with a soft cloth soaked in alcohol.
4. Clean both heads by gently rubbing in a horizontal direction, as depicted, using a head cleaning stick (VFK27) or a lint free cloth moistened with alcohol.
5. Wipe all tape contact surfaces, including upper and lower drum, with a dry soft cloth to ensure that all residual moisture is removed from the tape contact surfaces.

Note:

1. When cleaning the upper drum, hold it secure with your finger tips.
2. Use solvents sparingly, excess alcohol will dilute and remove the bearing lubricant in the capstan motor and rotary guides.



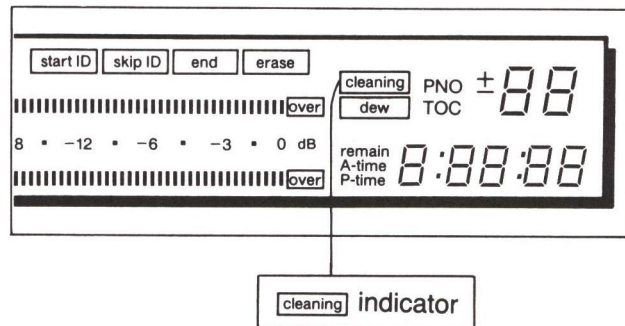
• **IMPORTANT**

After cleaning the head and tape contact surfaces, check the error rate using the error rate reference tape (Part No. RD-ER01). Target error rate is less than 50. A unit with a new head cylinder should be capable of producing error rates below 10, as long as the reference tape is in good condition. For information on how to display the error rate, see page 84.

REGARDING THE CLEANING INDICATOR...

The cleaning indicator will illuminate when the error rate remains higher than 1000 for more than 10 seconds.

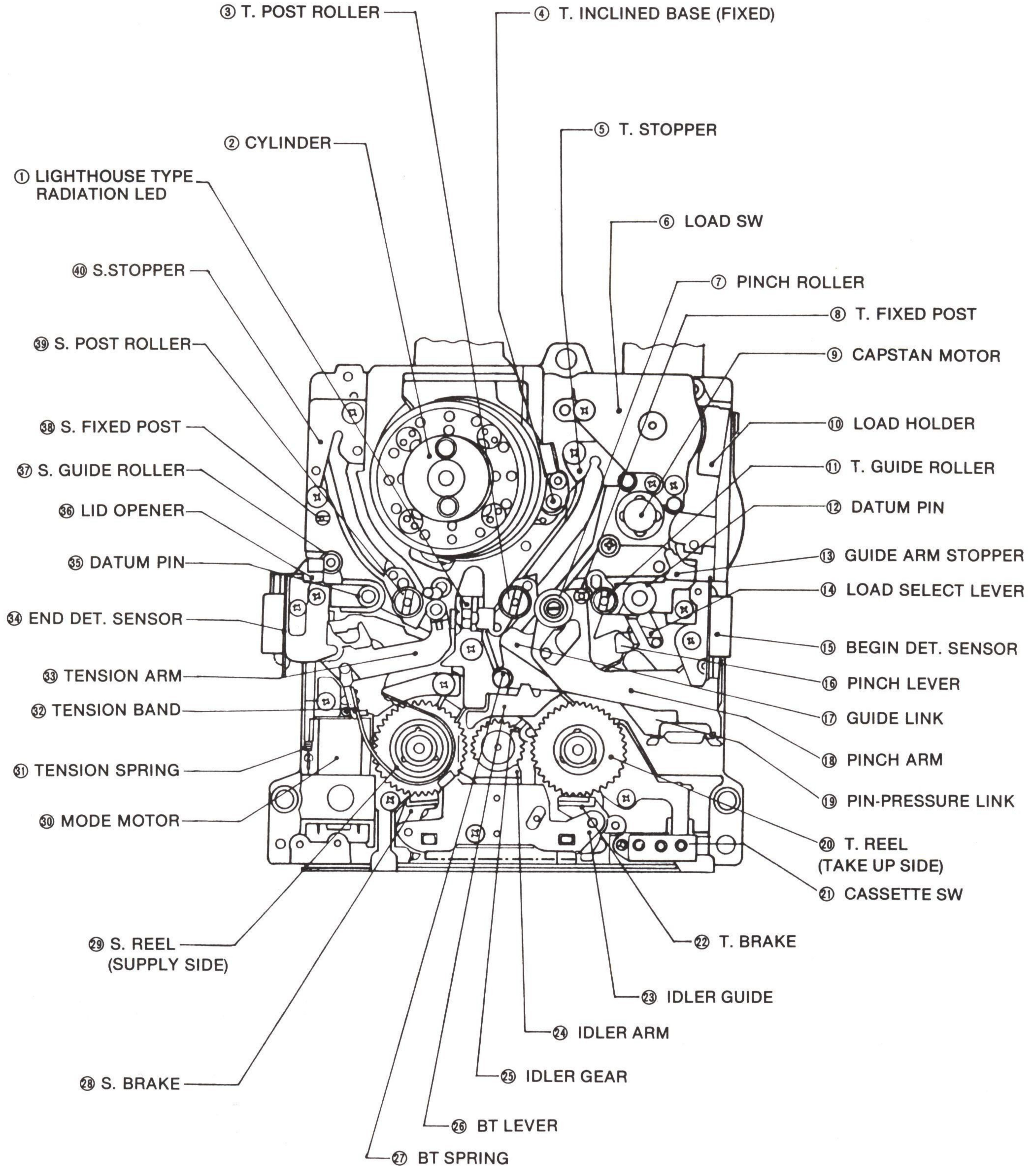
Although dirt and debris are the most common cause of an elevated error rate, there are other conditions that may cause it. Therefore, do not assume that a cleaning indication means that the head is dirty.



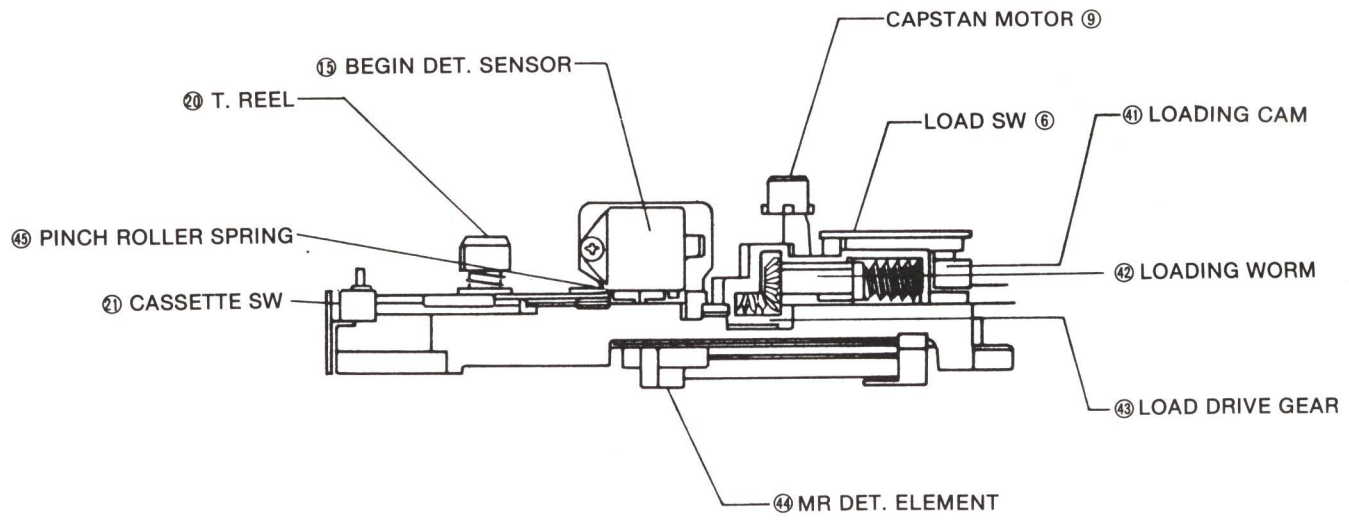
EAR

• MECHANISM COMPONENT LAYOUT

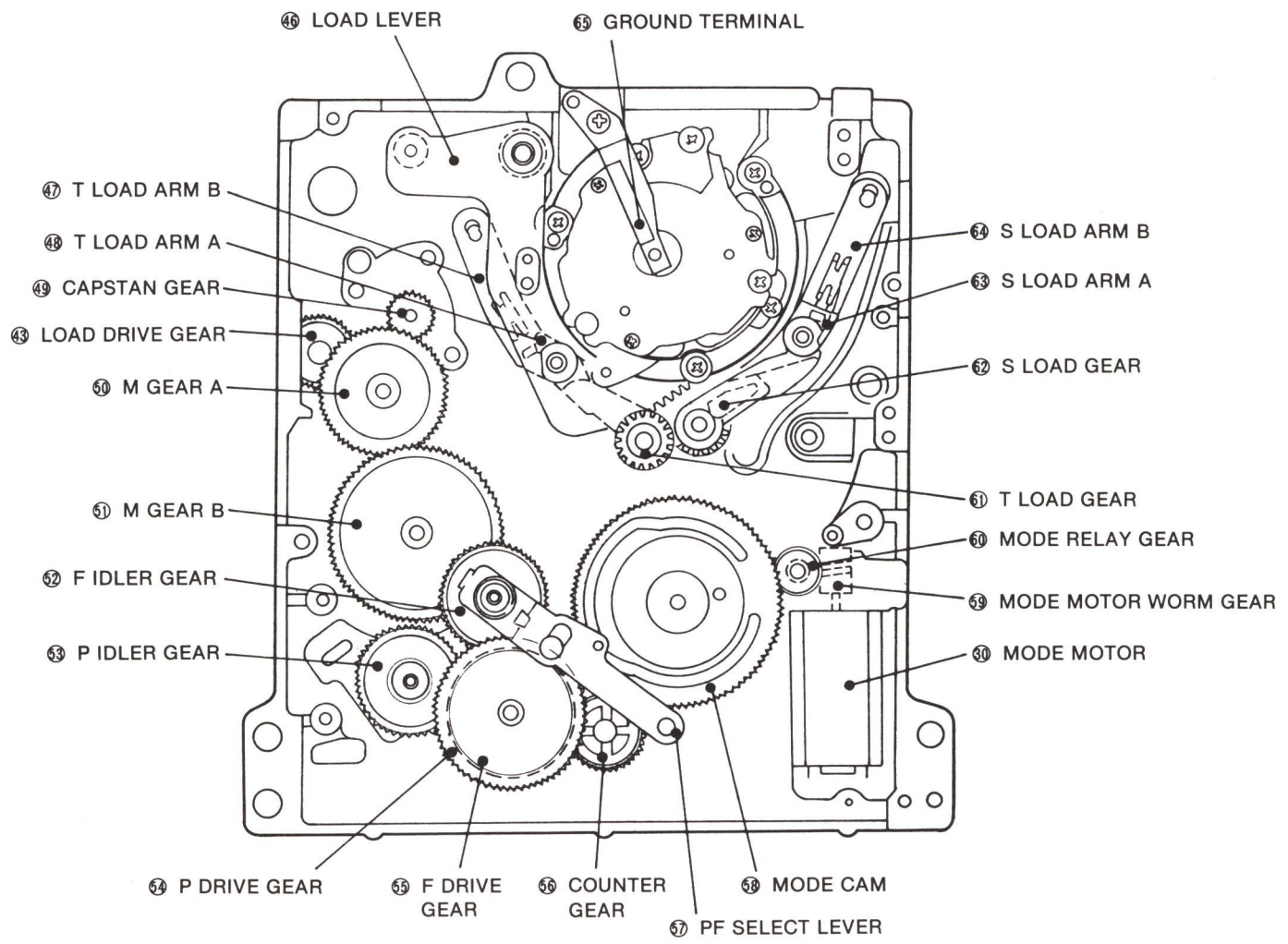
• Top view



• Side view



• Bottom view

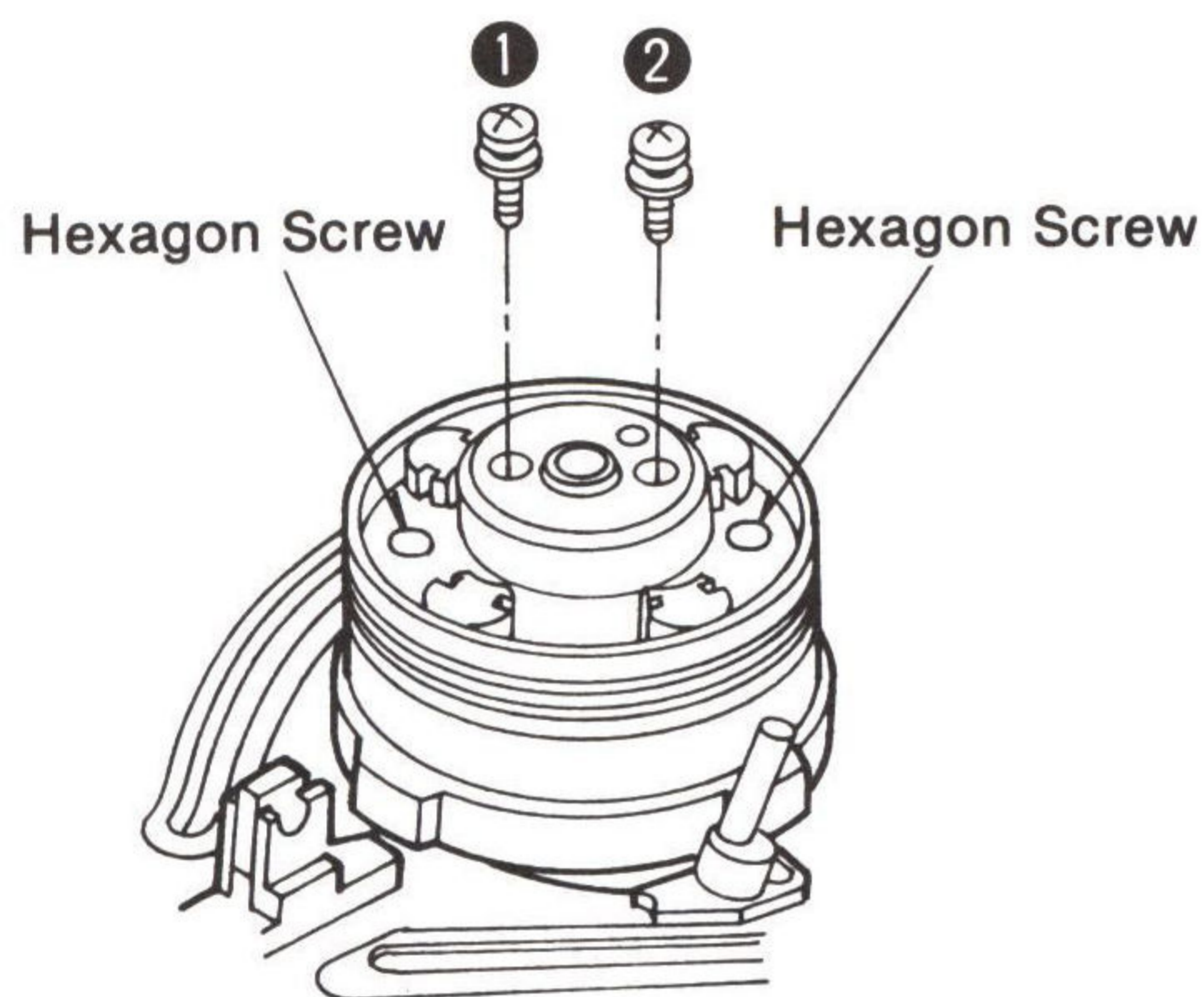


• MECHANISM CONTROLS AND FUNCTIONS

① LIGHT HOUSE TYPE RADIATION LED	Lighthouse-shaped, LEDs blink at start and end of tape.	②⑤ IDLER GEAR	Transmits movement to S and T reels in accordance with mode.
② CYLINDER	30mm in diameter, 40 FG pulses, maintains specified speed of 1000 to 3000rpm.	②⑥ BT LEVER	Applies back tension to T reel during review.
③ T. POST ROLLER	Regulates tape travel position (upper edge).	②⑦ BT SPRING	Provides pressure for back tension lever.
④ T. INCLINED BASE (FIXED)	Regulates angle (90°) at which tape is wound around cylinder (stationary).	②⑧ S. BRAKE	Presses brake shoe against S reel base gear to perform braking.
⑤ T. STOPPER	Determines position of T post roller base during loading.	②⑨ S. REEL (SUPPLY SIDE)	Supply reel base, 64 FG pulses.
⑥ LOAD SW	Two-bit rotary switch, detects loading position.	③⑩ MODE MOTOR	6.5V DC motor, switches mode by forward and reverse revolution.
⑦ PINCH ROLLER	Presses against tape during play and review.	③⑪ TENSION SPRING	Provides back tension force of tension regulator.
⑧ T. FIXED POST	Regulates tape travel position.	③⑫ TENSION BAND	Mounted to tension regulator, applies back tension to S reel base.
⑨ CAPSTAN MOTOR	1.5mm in diameter, 290 FG pulses.	③⑬ TENSION ARM	Detects tape condition and applies back tension during play and review.
⑩ LOAD HOLDER	Contains loading drive gear and worm gear, engages and disengages M gear A.	③⑭ END DET. SENSOR	Light-receiving element for LED (detection at end of tape).
⑪ T. GUIDE ROLLER	Regulates tape travel position (top edge).	③⑮ DATUM PIN	Regulates width and height (left side) during loading of cassette tape.
⑫ DATUM PIN	Regulates width and height (right side) during loading of cassette tape.	③⑯ LID OPENER	Opens cassette lid during loading of tape.
⑬ GUIDE ARM STOPPER	Determines position of T guide roller base K during loading.	③⑰ S. GUIDE ROLLER	Regulates tape travel position (bottom edge).
⑭ LOAD SELECT LEVER	Switches engagement and disengagement of loading gear in accordance with loading conditions.	③⑱ S. FIXED POST	Regulates tape travel (bottom edge).
⑮ BEGIN DET. SENSOR	Light-receiving element for LED (detection at start of tape).	③⑲ S. POST ROLLER	Regulates tape travel position (top edge).
⑯ PINCH LEVER	Presses pinch roller against tape during play and review.	④① S. STOPPER	Determines position of S post roller base during loading.
⑰ GUIDE LINK	Links T post roller base and guide roller base.	④② LOADING CAM	Uses movement transmitted from loading worm to move loading lever.
⑱ PINCH ARM	Comprised of pinch roller and T holding post, presses against the capstan.	④③ LOADING WORM	Transmits movement of loading drive gear and loading cam.
⑲ PIN-PRESSURE LINK	Connected by the pin pressure spring and the pinch arm.	④④ LOAD DRIVE GEAR	Transmits movement of M gear A and loading worm, engages and disengages in accordance with mode.
⑳ T. REEL (TAKE UP SIDE)	Take-up reel base, 64 FG pulses.	④⑤ MR DET. ELEMENT	Detects magnetic changes (290 pulses) of flywheel.
㉑ CASSETTE SW	Detects cassette information (mistaken erasure, cassette detection).	④⑥ PINCH ROLLER SPRING	Mounted to the pinch arm, returns the pinch roller.
㉒ T. BRAKE	Presses brake gear against reel base gear to perform braking.	④⑦ LOAD LEVER	Transmits movement of load cam and load gear.
㉓ IDLER GUIDE	Holding cover for idler arm and S and T brakes.	④⑧ T LOAD ARM B	Uses movement transmitted from T load gear to play loading.
㉔ IDLER ARM	Moves left or right in accordance with mode condition, transmits movement of counter gear to S and T reels.	④⑨ T LOAD ARM A	
		④⑩ CAPSTAN GEAR	Uses movement transmitted from capstan motor to move M gear A.

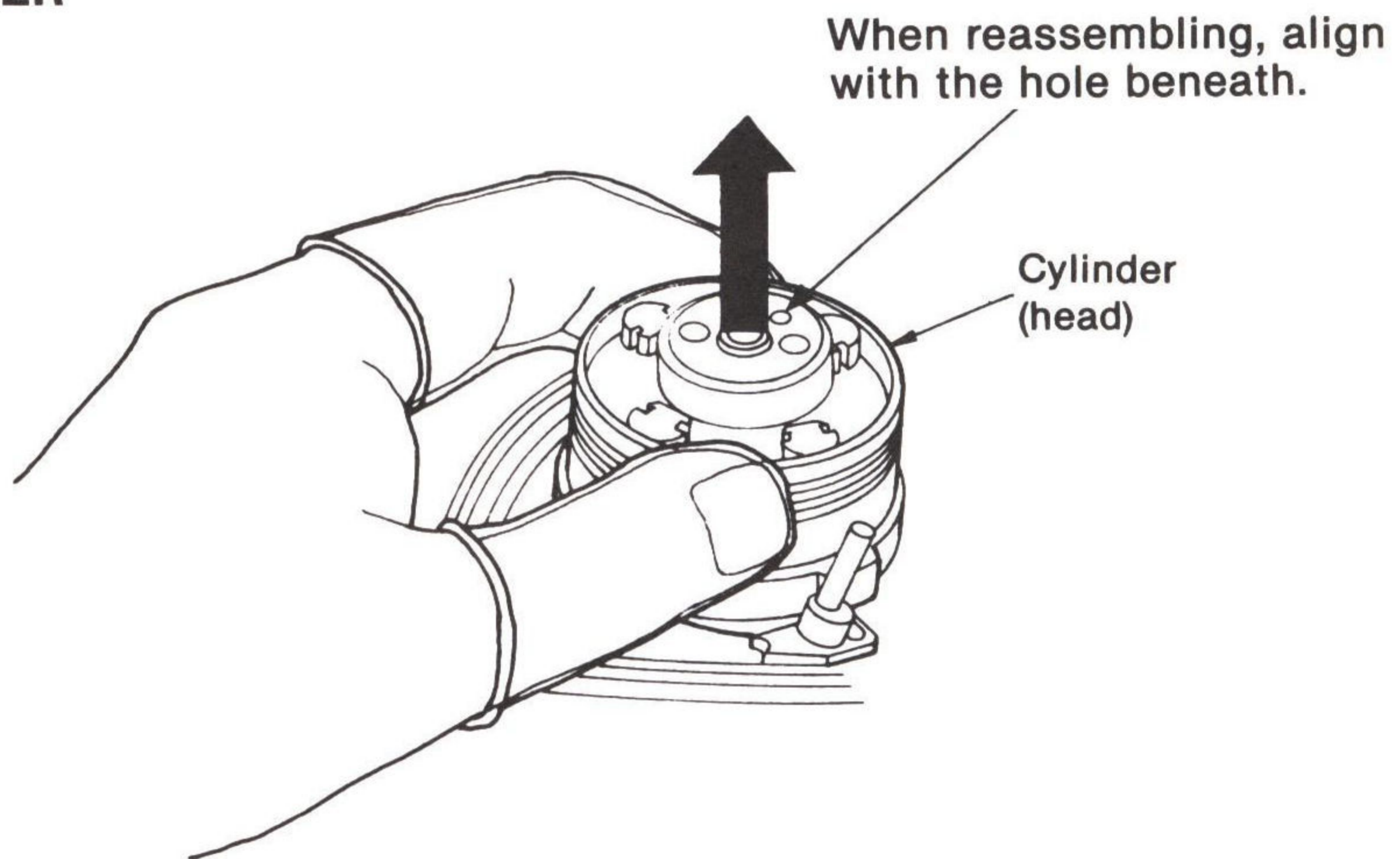
⑤⑩ M GEAR A	Transmits movement of capstan gear and load drive gear.	⑤⑧ MODE CAM	Uses movement transmitted from mode relay gear to detect mode positions.
⑤⑪ M GEAR B	Transmits movement of M gear A and F (R) idler gear, engages and disengages in accordance with mode.	⑤⑨ MODE MOTOR WORM GEAR	Transmits movement of mode motor and mode relay gear.
⑤⑫ F IDLER GEAR	Transmits movement of M gear B and F drive gear.	⑥⑩ MODE RELAY GEAR	Transmits movement of mode motor worm gear and mode cam.
⑤⑬ P IDLER GEAR	Transmits movement of M gear B and P drive gear.	⑥⑪ T LOAD GEAR	Transmits movement of load lever and S load gear.
⑤⑭ P DRIVE GEAR	Transmits movement of P idler gear and counter gear.	⑥⑫ S LOAD GEAR	Transmits movement of T load gear and S load arm A (B).
⑤⑮ F DRIVE GEAR	Transmits movement of F idler gear and counter gear.	⑥⑬ S LOAD ARM A	Uses movement transmitted from S load gear to play loading.
⑤⑯ COUNTER GEAR	Transmits movement of F (P) drive gear and idler gear, engages and disengages in accordance with mode.	⑥⑭ S LOAD ARM B	
⑤⑰ PF SELECT LEVER	Switches engagement and disengagement of F (P) idler gear in accordance with mode conditions.	⑥⑮ GROUND TERMINAL	Ground terminal for cylinder motor.

• REMOVAL OF THE UPPER CYLINDER



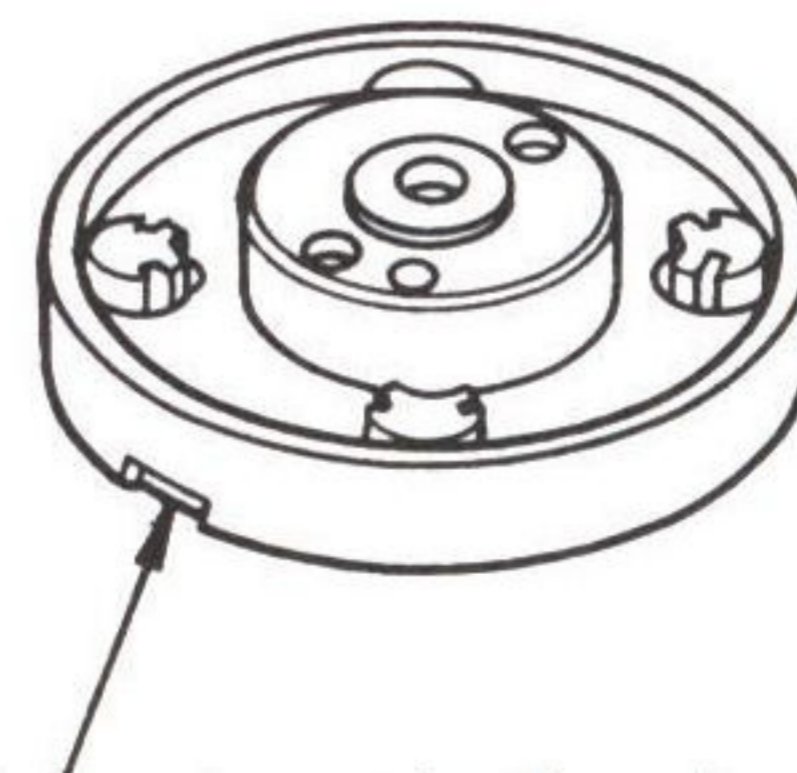
1. Remove the 2 screws (①, ②).

Caution: Please do not touch Hexagon screws.



2. Remove the cylinder (head) in the direction of the arrow.

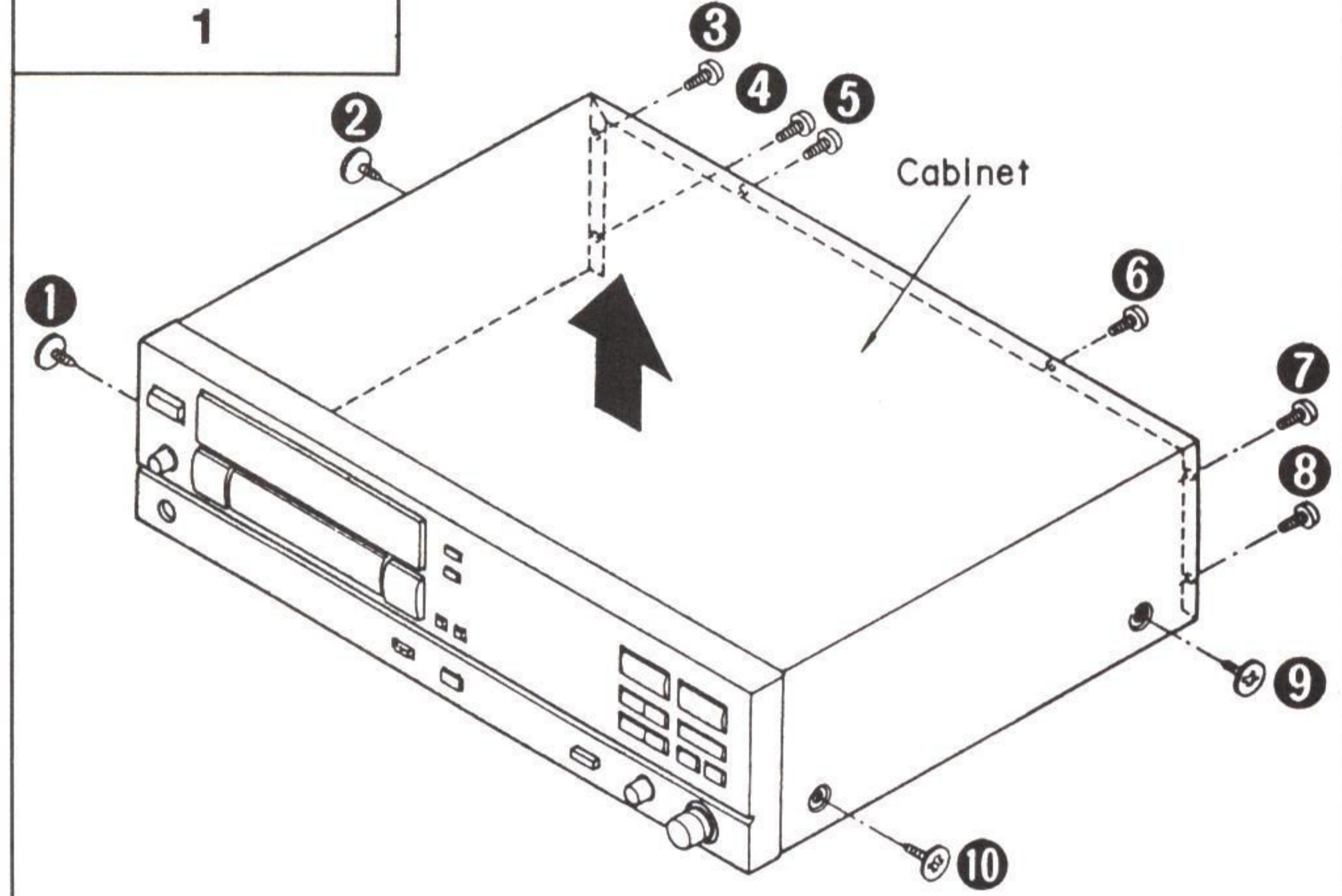
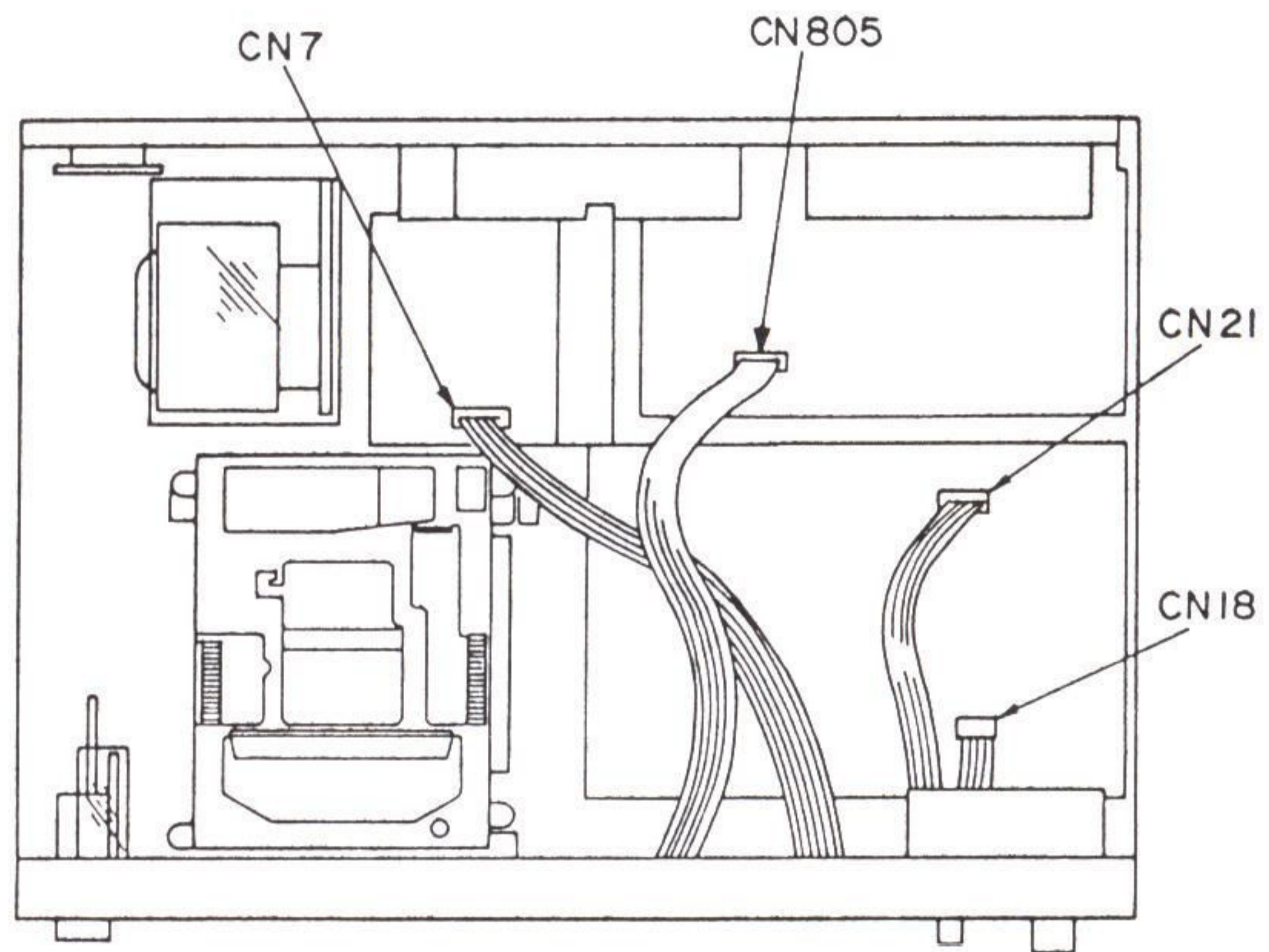
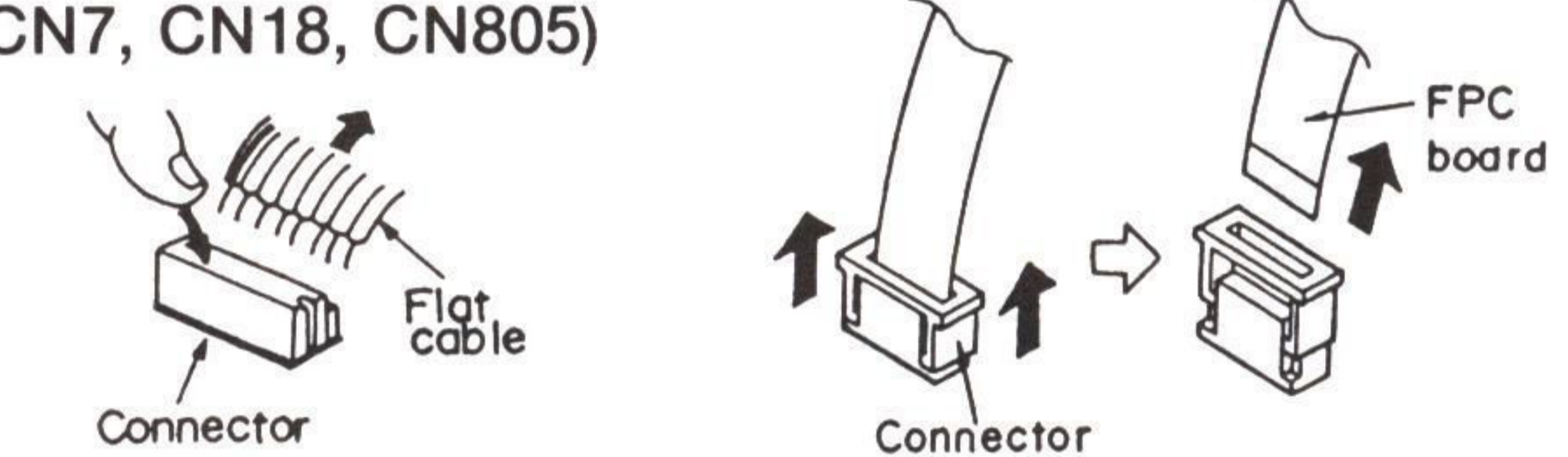
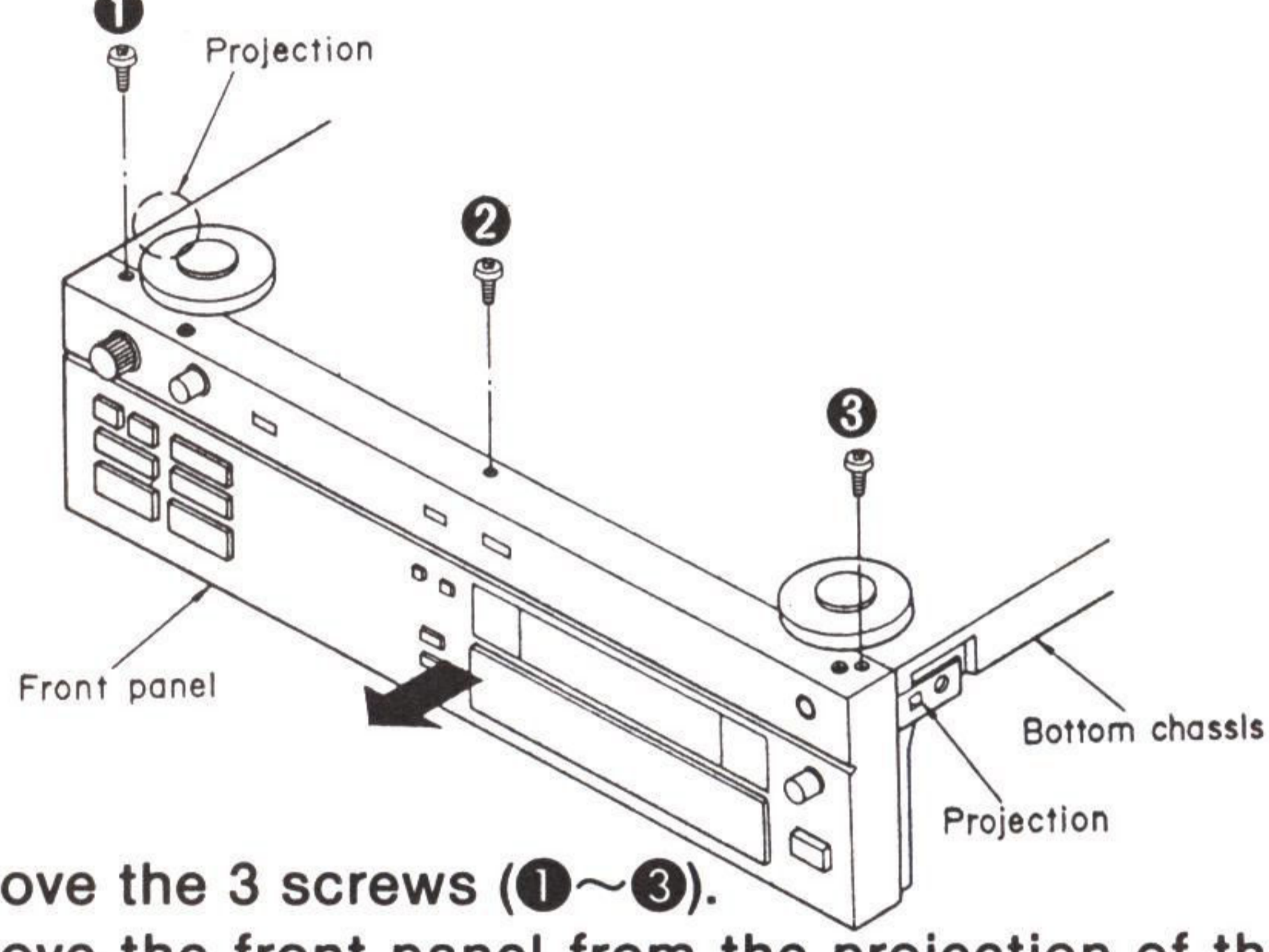
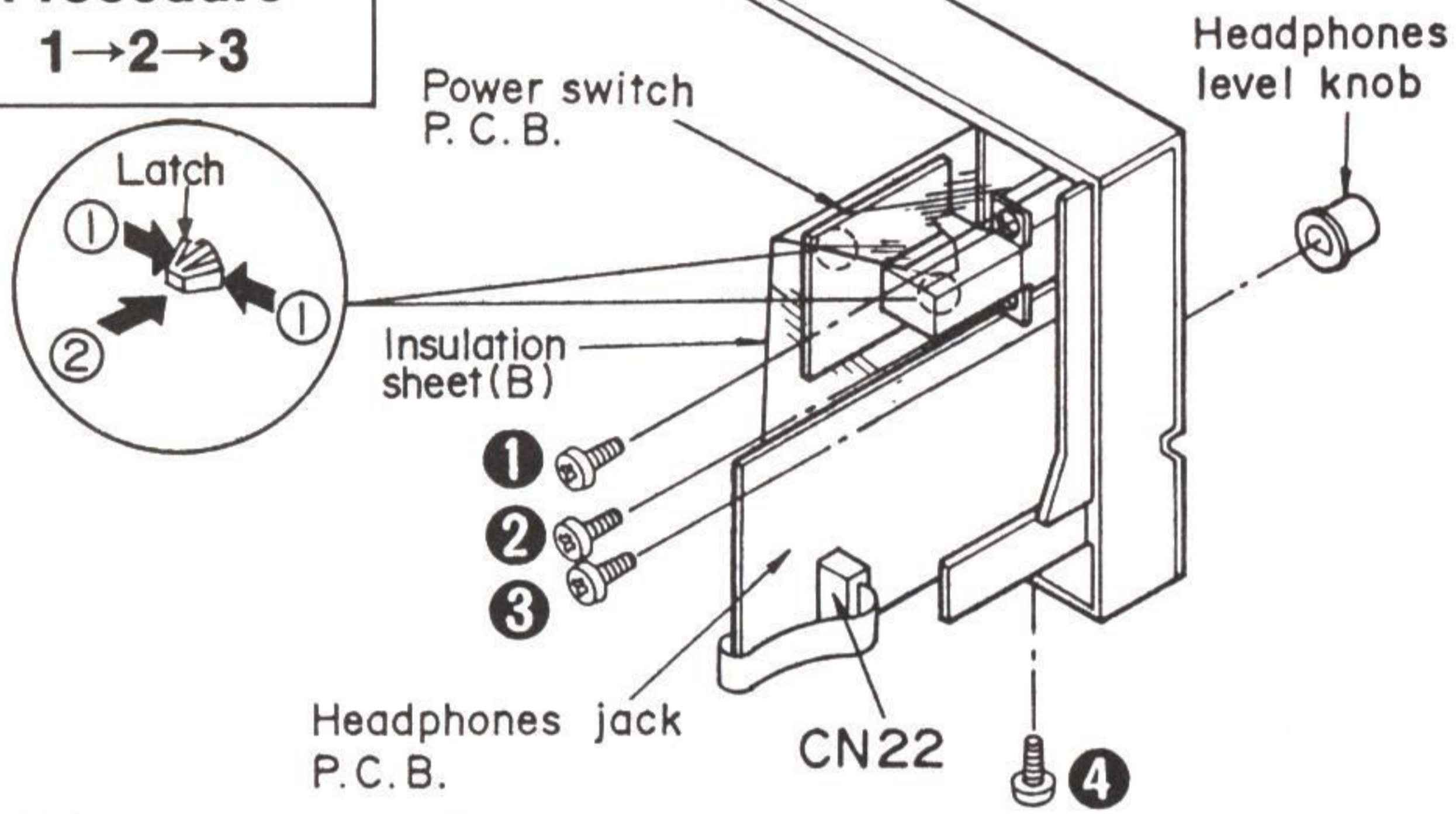
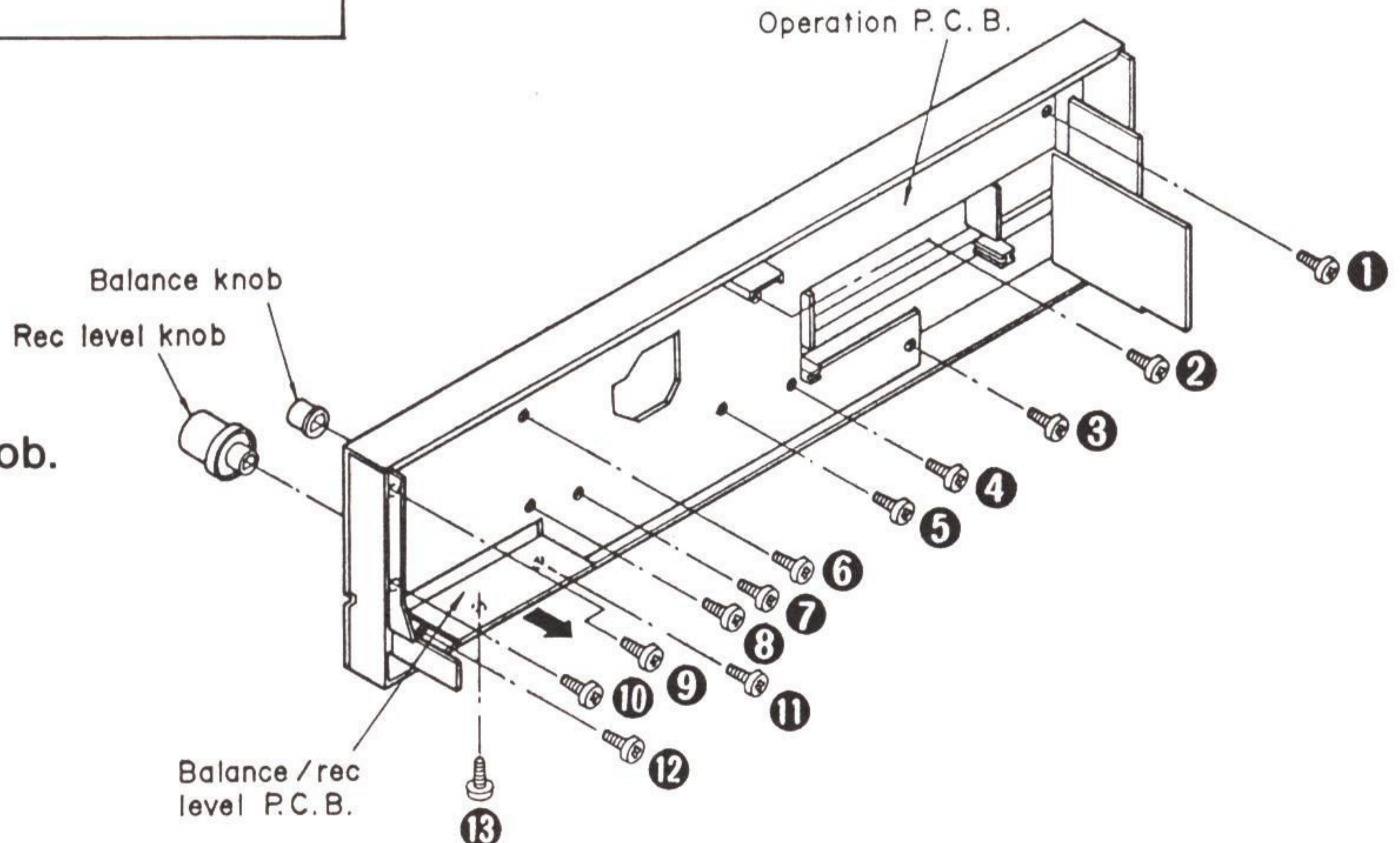
Note: Do not touch the cylinder (head) with your bare hand; always be sure to wear a glove or other protection.



Be sure not to touch the head part.

* When reassembling the cylinder (head), be sure that the direction is correct. (If it is assembled in the wrong direction, data read errors will occur.)

DISASSEMBLY INSTRUCTIONS

<p>Ref. No. 1</p>	<p>Removal of the cabinet</p>	<p>Ref. No. 2</p>	<p>Removal of the front panel</p>
<p>Procedure 1</p>	 <p>• Remove the 10 screws (1~10).</p>	<p>Procedure 1→2</p>	<p>1. Remove the flat cables (CN7, CN18, CN805). 2. Remove the FPC board (CN21).</p> 
<p>Ref. No. 3</p>	<p>Removal of the power switch P.C.B. and headphones jack P.C.B.</p>	<p>• Pull out the flat cable while pressing the connector.</p> <p>1. Lift the connector. 2. Pull out the FPC board.</p>   <p>3. Remove the 3 screws (1~3). 4. Remove the front panel from the projection of the bottom chassis.</p>	
<p>Procedure 1→2→3</p>	 <p>■ Power switch P.C.B.</p> <ol style="list-style-type: none"> Remove the 2 screws (1, 2). Remove the latch. Remove the insulation sheet (B). <p>■ Headphones jack P.C.B.</p> <ol style="list-style-type: none"> Remove the headphones level knob. Remove the FPC board (CN22). Remove the 2 screws (3, 4). 		
<p>Ref. No. 4</p>	<p>Removal of the operation P.C.B. and balance/rec level P.C.B.</p>	<p>■ Operation P.C.B.</p> <ol style="list-style-type: none"> Remove the 10 screws (1~10). <p>■ Balance/rec level P.C.B.</p> <ol style="list-style-type: none"> Pull out the balance knob and rec level knob. Remove the 3 screws (11~13). 	
<p>Procedure 1→2→4</p>			

Ref. No. 5
Removal of the loading unit

Procedure
1→2→5

1. Remove the FPC board (CN43).
2. Remove the connectors (CN10, CN41).
3. Remove the 4 screws (①~④).

Ref. No. 6
Removal of the main P.C.B.

Procedure
1→6

1. Remove the connectors (CN11, CN12, CN41).
2. Remove the flat cables (CN6, CN13, CN18, CN23, CN28, CN29).
3. Remove the FPC boards (CN21, CN43).
4. Remove the 4 screws (①~④).

Ref. No. 7
Removal of the servo P.C.B.

Procedure
1→2→5→7

1. Remove the connectors (CN45, CN51, CN56, CN57, CN58).
2. Remove the 2 screws (①, ②).

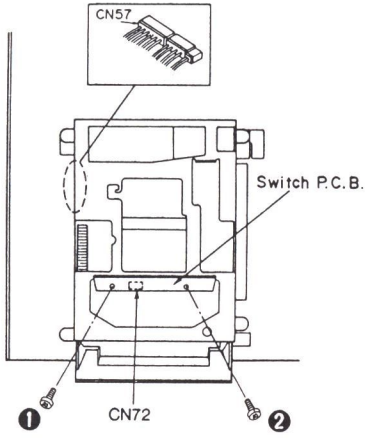
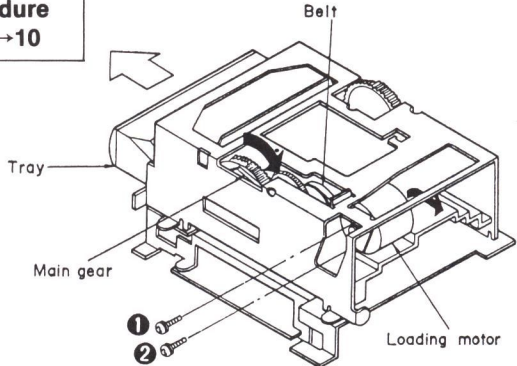
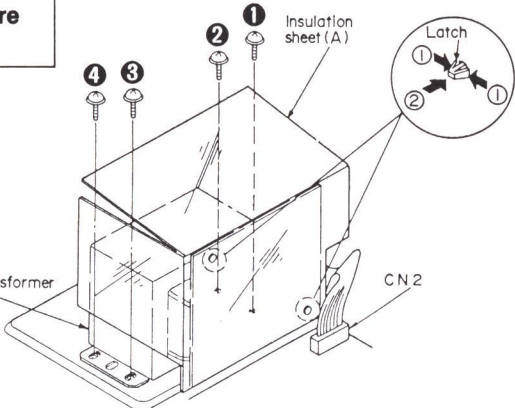
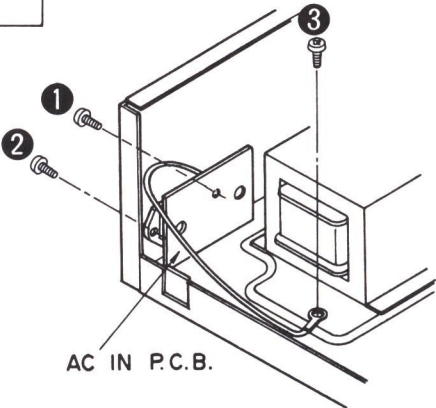
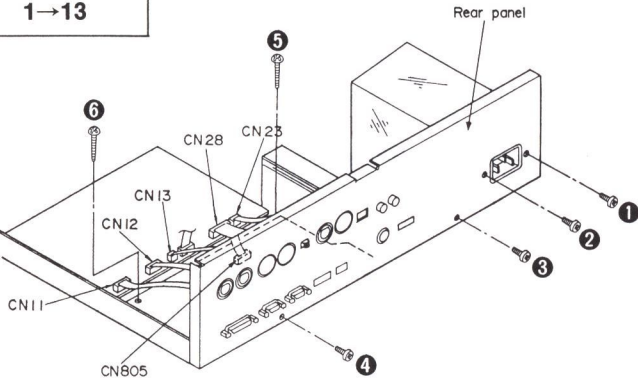
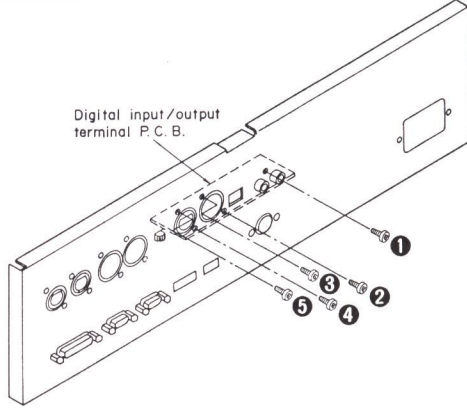
3. Remove the servo P.C.B. in the direction of the arrow.
4. Remove the FPC boards (CN52, CN53, CN54).

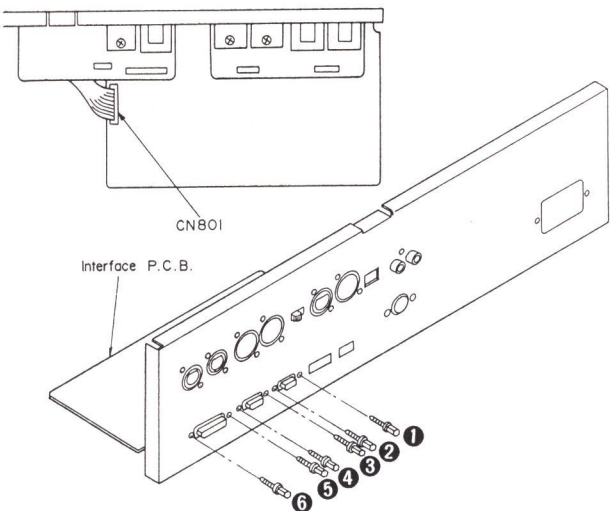
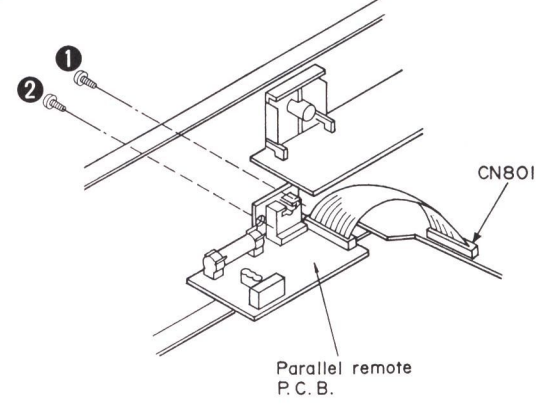
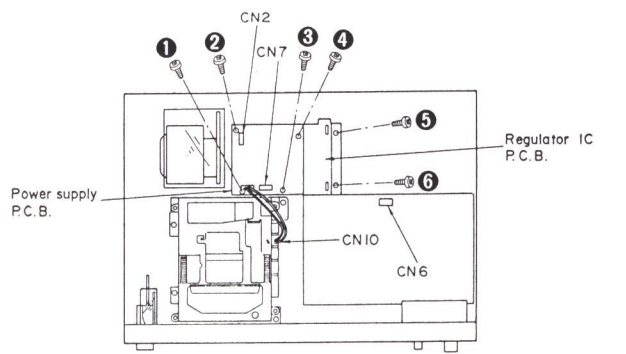
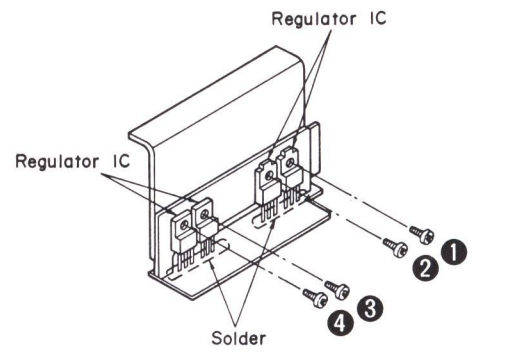
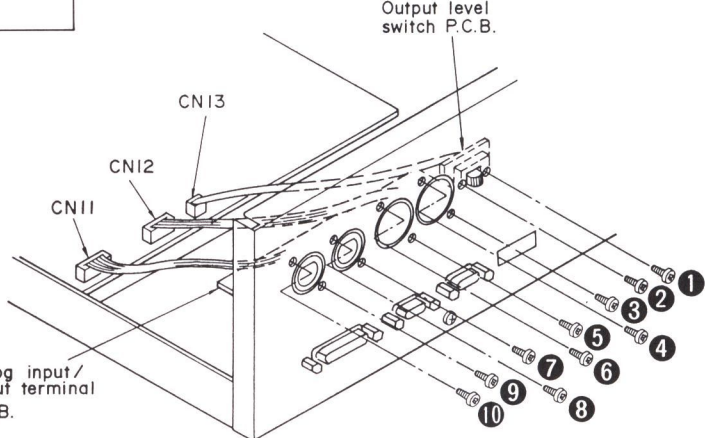
Ref. No. 8
Removal of the RF P.C.B.

Procedure
1→2→5→8

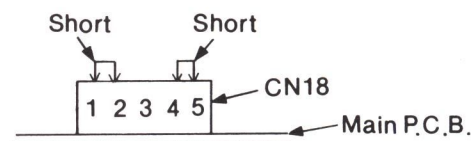
1. Remove the 4 screws (①~④).
2. Remove the loading frame.
3. Remove the connector (CN57).

4. Unsolder the shield plate.
5. Remove the FPC board (CN62).
6. Remove the connectors (CN45, CN51).

Ref. No. 9	Removal of the switch P.C.B.	Ref. No. 10	Removal of the loading motor
Procedure 1→2→9	 <ol style="list-style-type: none"> 1. Remove the 2 screws (①, ②). 2. Remove the connectors (CN57, CN72). 	Procedure 1→2→10	 <ol style="list-style-type: none"> 1. Roll the main gear in the direction of the arrow, and draw out the tray. 2. Remove the belt. 3. Remove the 2 screws (①, ②). 4. Remove the loading motor in the direction of the arrow.
Ref. No. 11	Removal of the power transformer	Ref. No. 12	Removal of the AC IN P.C.B.
Procedure 1→11	 <ol style="list-style-type: none"> 1. Remove the flat cable (CN2). 2. Remove the 4 screws (①~④). 3. Remove the latch. 4. Remove the insulation sheet (A). 	Procedure 1→12	 <ul style="list-style-type: none"> • Remove the 3 screws (①~③).
Ref. No. 13	Removal of the rear panel	Ref. No. 14	Removal of the digital input/output terminal P.C.B.
Procedure 1→13	 <ol style="list-style-type: none"> 1. Remove the connectors (CN11, CN12). 2. Remove the flat cables (CN13, CN23, CN28, CN805). 3. Remove the 6 screws (①~⑥). 	Procedure 1→13→14	 <ul style="list-style-type: none"> • Remove the 5 screws (①~⑤).

<p>Ref. No. 15</p>	<p>Removal of the interface P.C.B.</p>	<p>Ref. No. 16</p>	<p>Removal of the parallel remote P.C.B.</p>
<p>Procedure 1→13→15</p>	<p>1. Remove the flat cable (CN801). 2. Remove the 6 screws (①~⑥).</p>	<p>Procedure 1→13→16</p>	
		 <p>1. Remove the flat cable (CN801). 2. Remove the 2 screws (①, ②).</p>	
<p>Ref. No. 17</p>	<p>Removal of the power supply P.C.B. and regulator IC P.C.B.</p>	<p>Ref. No. 18</p>	<p>Removal of the regulator IC</p>
<p>Procedure 1→13→17</p>		<p>Procedure 1→13→17→18</p>	<p>1. Unsolder the regulator IC. 2. Remove the 4 screws (①~④).</p>
 <p>1. Remove the connector (CN10). 2. Remove the flat cables (CN2, CN6, CN7). 3. Remove the 6 screws (①~⑥).</p>		 <p>•When mounting the regulator IC, apply silicone compound (SZZ0L15 or equivalent) to the rear of the regulator IC.</p>	
<p>Ref. No. 19</p>	<p>Removal of the output level switch P.C.B. and analog input/output terminal P.C.B.</p>		
<p>Procedure 1→19</p>			
<p>■ Output level switch P.C.B.</p> <p>1. Remove the 2 screws (①, ②). 2. Remove the flat cable (CN13).</p> <p>■ Analog input/output terminal P.C.B.</p> <p>1. Remove the 8 screws (③~⑩). 2. Remove the flat cables (CN11, CN12).</p>			

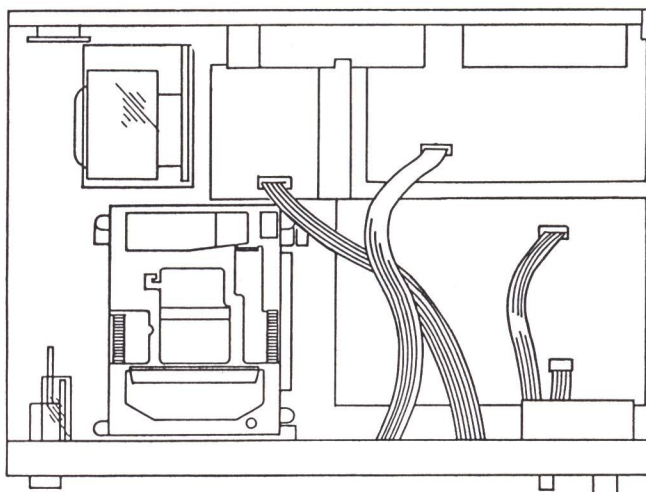
Ref. No. 20	How to check the main P.C.B.
Procedure 20	
<p>To gain access to the bottom of the main P.C.B., disconnect CN18 and CN21 in order to turn the board upward.</p> <p>Connect a jumper wire between pins 1 & 2 and between pins 4 & 5 of CN18 when operating the unit in this condition.</p>	



MEASUREMENTS AND ADJUSTMENTS

• PREPARATION

- (1) Remove the cabinet
(Refer to Procedure 1 under "Disassembly Instructions").



■ If the loading unit is to be removed for adjustment, note the following.

(PREPARATIONS)

- (1) Remove the loading unit. (With the underside facing up.)
(Refer to Procedure 5 under "Disassembly Instructions." However, leave the flat cable and the connector as they are.)
- (2) Open the cassette holder.
- (3) Move the slider opening/closing plate of the removed loading unit in the direction indicated by the arrow in Fig. 1, and hook it above the prong of the reinforcement plate.
Caution: The slider opening/closing plate will be deformed if it is left as is.
- (4) Place a tape with the slider lock released in the mechanism.
- (5) Switch on the power and check the loading operation.

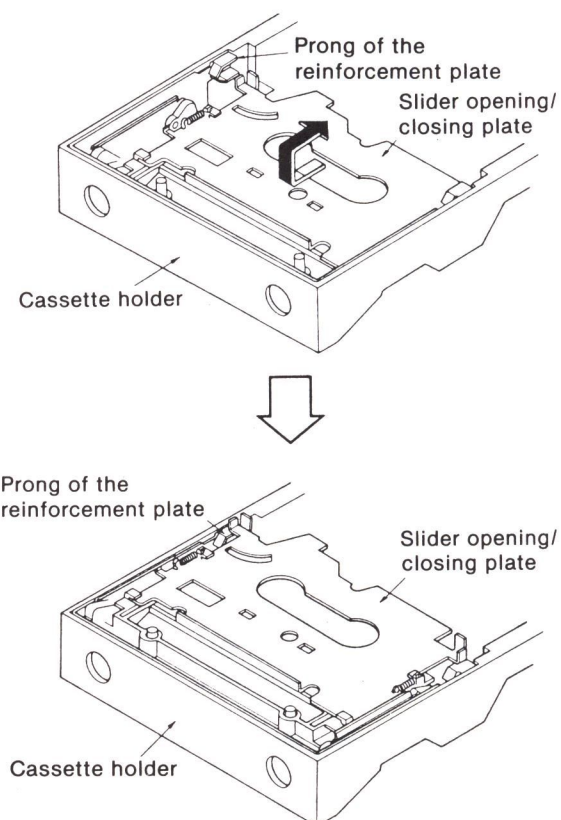
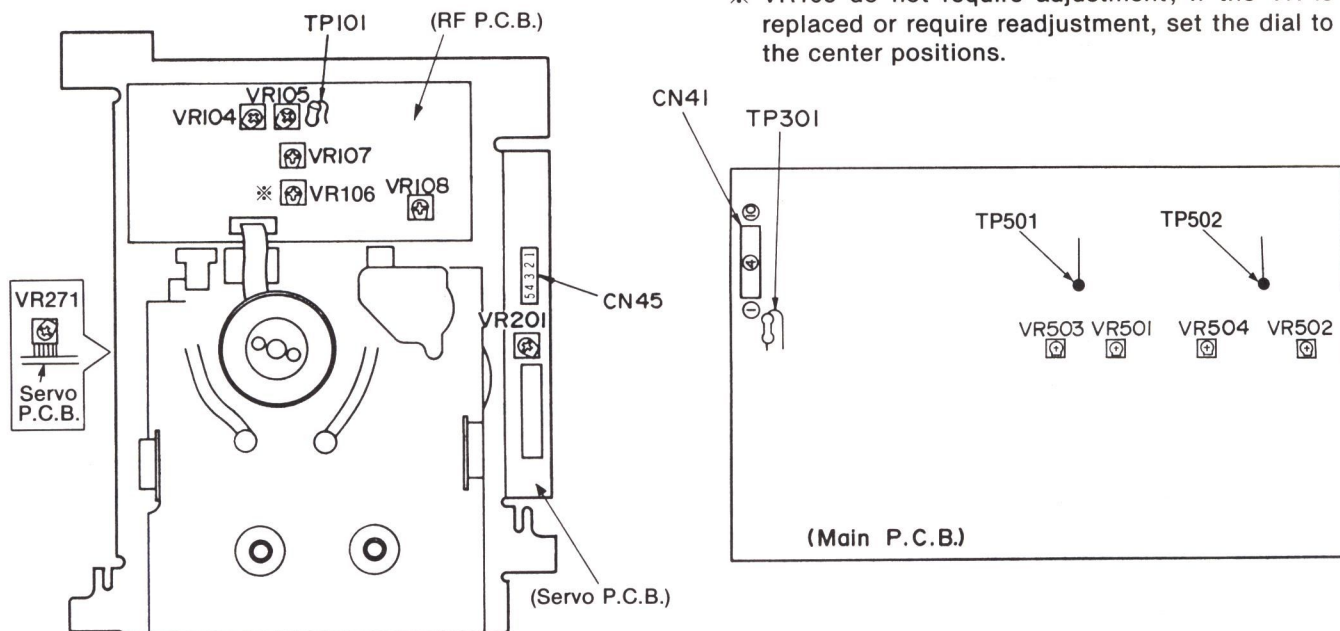


Fig. 1

• ELECTRICAL ADJUSTMENT

• Adjustment points

※ VR106 do not require adjustment; if the VR is replaced or require readjustment, set the dial to the center positions.

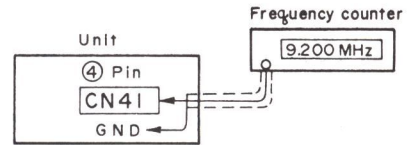


Equipment and Tools

- 2-channel 30MHz oscilloscope with external trigger and dual time base
 - 2 oscilloscope probes (10 : 1)*
 - Frequency counter
 - AF oscillator (OSC)
 - Distortion analyser
 - DC electronic voltmeter (EVM)
 - Post roller adjustment screwdriver
: SZZV1102C
 - Standard test tapes
: RD-PG01 (PG reference tape)
: RD-ER01 (Error rate tape)
: RD-LR02 (Linearity adjustment tape)
 - Blank DAT cassette for recording and playback
: RT-R60P, RT-R90P, RT-R120P
 - Standard electrical tools and equipment
- * **NOTE:** The oscilloscope voltage settings in the charts and the waveform examples assume use of the specified 10: 1 probes.

1. PLL Free Run Adjustment

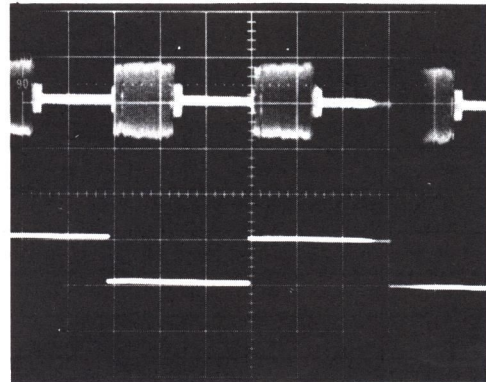
1. Connect the frequency counter as shown in figure.
2. Set the power switch to "ON".
3. Open the cassette holder drawer.
4. Adjust **VR108** as required until the frequency counter reads 9.2 ± 0.2 MHz.



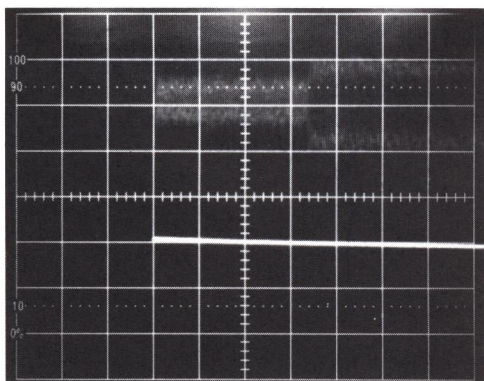
2. PG Phase Adjustment

1. Set up the oscilloscope and connect as shown below.

	CH-1	CH-2
Test point	TP101 (RPRF)	TP301 (R3CP)
Volts/Div.	50mV	0.5V
Time/Div.	5msec.	
Delay Time/Div.	50μsec.	
Trig.	CH-2	
AC-GND-DC	AC	DC
Adjustment point	VR201	

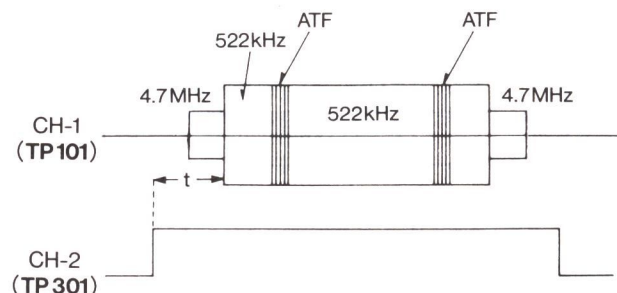
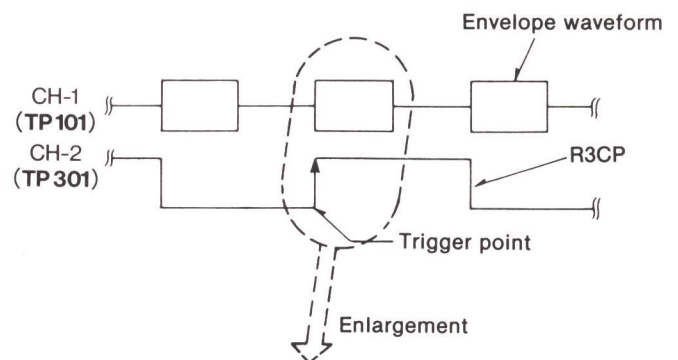


2. Note the "t" time indicated on the PG reference tape (RD-PG01), then load and play the tape.
3. While the tape is being played, the waveform shown on the right should appear.
4. Adjust the delay time for the dual time base to display the leading edge of the CH-2 (R3CP) waveform.
5. The time from the leading edge of R3CP to the leading edge of the 522kHz portion of the RF waveform must be within $\pm 40\mu\text{sec}$ of the time indicated on the PG reference tape. Adjust **VR201** as required, so that the time "t" (in the figure below), falls within specified limits.



Note:

If the output levels of heads A and B are not equal, the "ATF RF Recording Level Adjustment" described in procedure 4 might be made improperly. Adjust the ATF RF Recording Level by following procedure 4 and then check the output level of the heads again. (At this time, it is not necessary to make adjustment described in procedure 2.)



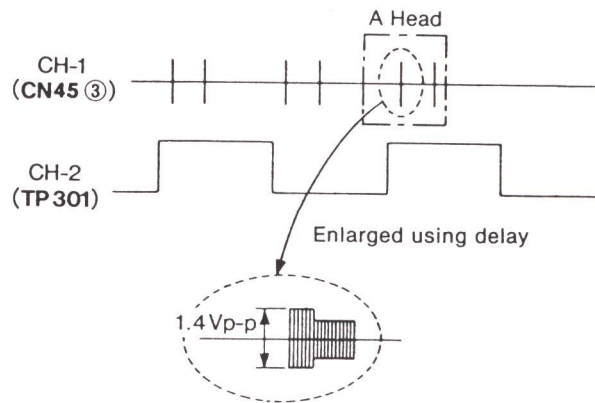
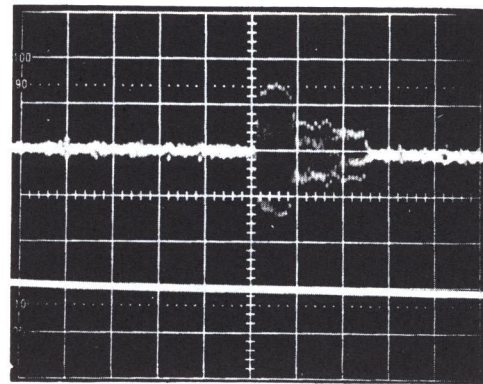
t: Value (μsec) indicated on the standard tape $\pm 40\mu\text{sec}$.

3. ATF Gain Adjustment

1. Set up the oscilloscope and connect as shown below.

	CH-1	CH-2
Test point	CN45 ③ (PILOT)	TP301 (R3CP)
Volts/Div.	50mV	0.5V
Time/Div.	5msec.	
Delay	0.1msec.	
Trig.	CH-2	
AC-GND-DC	AC	DC
Adjustment point	VR107	

2. Load and play the error rate tape (RD-ER01).
3. Adjust the delay time for the dual time base to select and display the PILOT signal with the largest amplitude.
4. Adjust VR107 so that the amplitude of the PILOT signal is $1.4 \pm 0.2 \text{ Vp-p}$. Check the amplitudes of the other PILOT signals to insure that they are a minimum of 1.2 Vp-p . If not optimize the adjustment of VR107 for the minimum signal level.



4. ATF RF Recording Level Adjustment

NOTE: This adjustment should only be made after confirming the playback "ATF Gain Adjustment" in step 3 above. Failing to do so will invalidate this adjustment.

1. Make a "0" level recording:
 - (a) Load a blank tape (RT-R60P etc.) into the unit.
 - (b) Put the unit into RECORD mode.
 - (c) Run the tape, recording for a minimum of 20 to 30 seconds.
 - (d) Rewind the tape to the beginning of the "0" level signal recording.
2. Connect and set up the oscilloscope as follows:

	CH-1	CH-2
Test point	CN45 ③ (PILOT)	TP301 (R3CP)
Volts/Div.	50mV	0.5V
Time/Div.	2msec.	
Delay Time/Div.	0.2msec.	
Trig.	CH-2	
AC-GND-DC	AC	DC
Adjustment point	VR104: Head A, VR105: Head B	

3. While playing back the blank signal portion of the tape, verify that the signal amplitude falls in the range of $1.4 \pm 0.2 \text{ Vp-p}$.

Standard value: $1.4 \pm 0.2 \text{ Vp-p}$

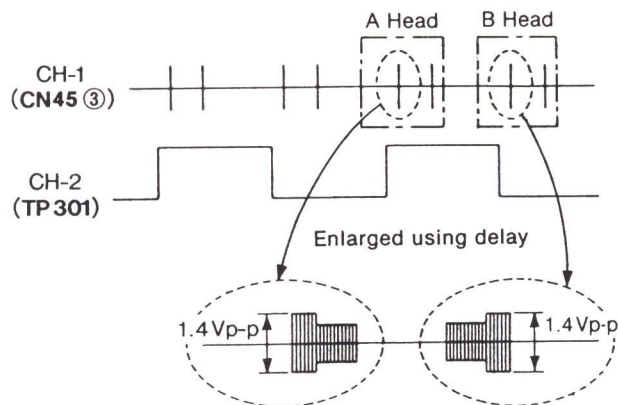
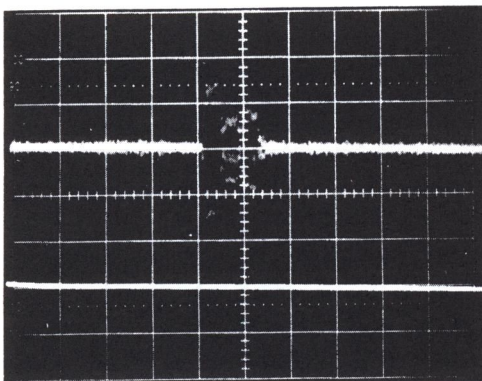
4. If the ATF signal is not within specification press the stop button and adjust VR104 and VR105 accordingly. Making finer adjustments as the trials approach the specified level.

LEVEL/HEAD	A: VR104	B: VR105
More than 1.6V	Turn ⤴	Turn ⤴
Less than 1.4V	Turn ⤵	Turn ⤵

After making the adjustment, make another blank signal recording, on a different portion of the tape (use the END SEARCH feature), for 20 to 30 seconds. Rewind the tape to the beginning of the new recording and repeat from step 3 until the specification is met.

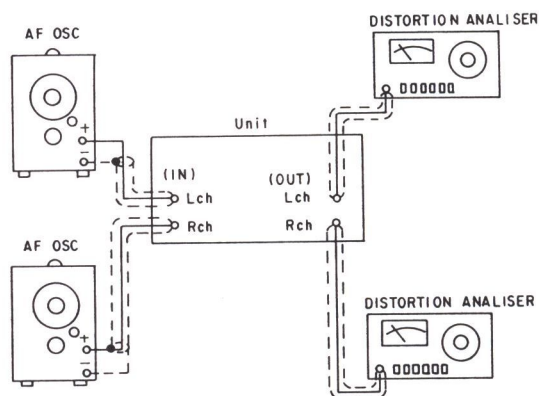
Note:

It is necessary to use a different portion of the tape for each trial because DAT does not erase the original signal, it "over writes" the new signal. Using a new portion of the tape will prevent maladjustment due to incomplete "over write" of the previously recorded signal.



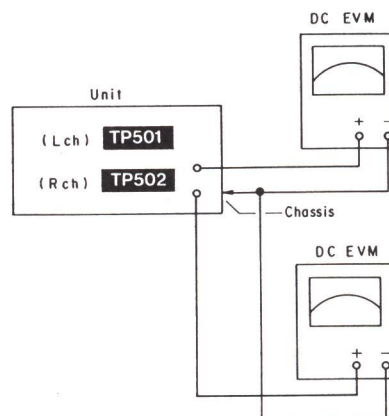
5. DAC Output Balance Adjustment

1. Load a blank tape for recording.
2. Use a signal generator to feed a 1 kHz signal to ANALOG IN.
3. Set the recorder to the record mode and adjust **INPUT VR** so that the level meter moves to **-20dB**.
4. Adjust **VR501 (Lch)** and **VR502 (Rch)** to minimize the distortion rate. (Reference distortion rate of about 0.05%)
5. After adjustment, check that the playback output is **-20dB ± 0.2dB** with respect to 0dB at 1 kHz.



6. DAC Offset Adjustment

1. Set the recorder to DIGITAL IN in the stop mode.
2. Connect a digital voltmeter to **TP501 (Lch)** and **TP502 (Rch)**.
3. Adjust **VR503 (Lch)** and **VR504 (Rch)** so that the voltage at the test point above is **0 ± 1 mV**.



7. BOT/EOT Detection Sensitivity Verification and Adjustment

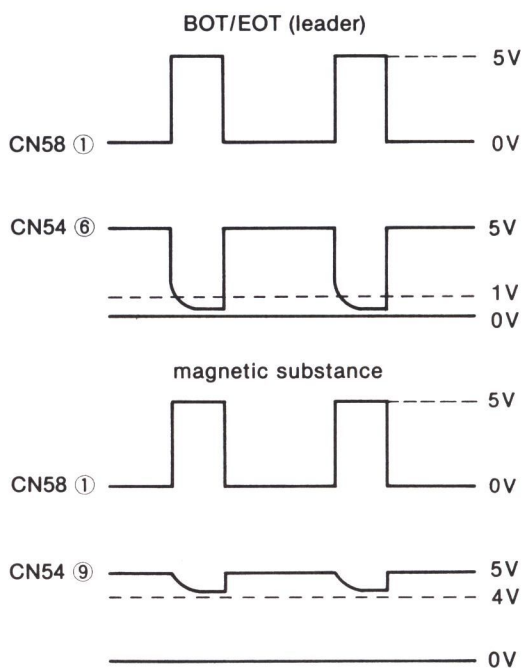
1. Make sure that the tape stops with the leader portion (the beginning and ending portion).

※ If the tape does not stop at the leader, make adjustment by following procedure outlined below.

- ① Insert a blank tape into the tape compartment of the set and press the playback button at the end of the tape.
- ② Set up the oscilloscope and connect as shown below.

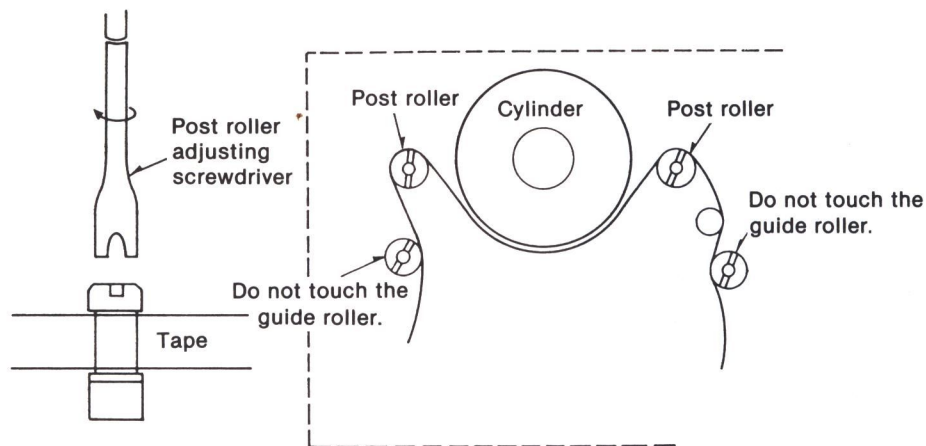
	CH-1	CH-2
Test point	CN54 ⑥ (BOT/EOT) ⑨ (magnetic substance)	CN58 ①
Volts/Div.	0.2V	0.2V
Time/Div.	2msec.	
Delay	—	
Trig.	CH-2	
AC-GND-DC	AC	DC
Adjustment point	VR271	

- ③ Adjust the amplitude of waveform to less than 1V at the magnetic substance and more than 4V at the leader on VR271.



8. Linearity Adjustment

CAUTION: ONLY THE POST ROLLERS ARE USED FOR THE LINEARITY ADJUSTMENT. DO NOT ADJUST THE GUIDE ROLLERS.
THIS ADJUSTMENT IS VERY CRITICAL AND AFFECTS COMPATIBILITY WITH OTHER DAT RECORDERS.



1. Connect and set up the oscilloscope as follows:

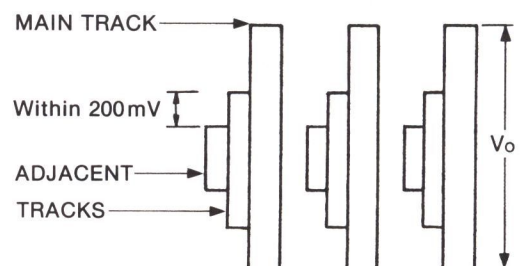
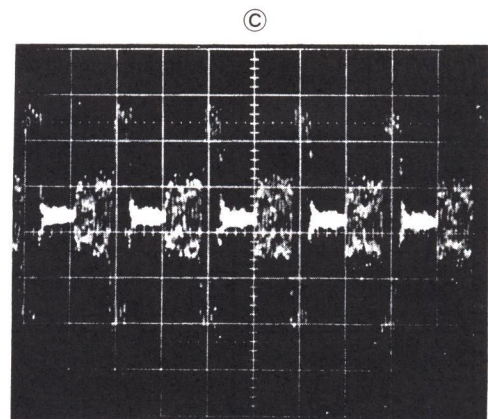
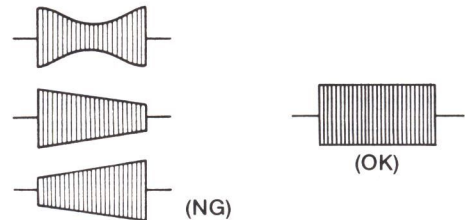
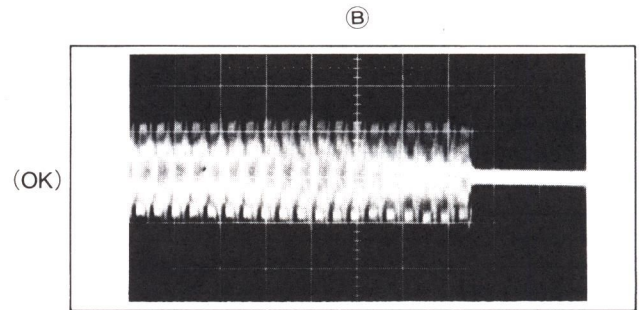
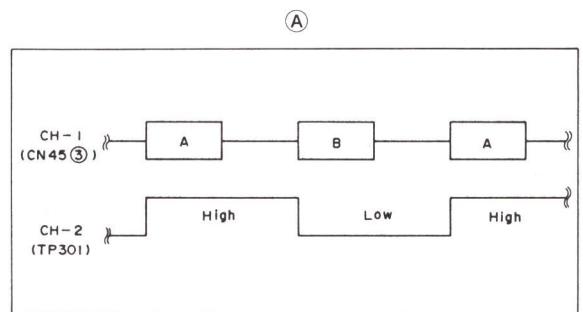
	CH-1	CH-2
Test point	CN45 ③ (PILOT)	TP301 (R3CP)
Volts/Div.	0.2V	2.0V
Time/Div.	Ⓐ 5msec. Ⓑ 1msec. Ⓒ 0.2msec.	
Delay Time/Div.	—	
Trig.	CH-2	
AC-GND-DC	AC	DC
Adjustment point	Post rollers (only)	

2. Load and play the linearity adjustment tape (RD-LR02). Please use the recorded signal portion on tape (after 600 count from beginning of tape)
3. Use the leading edge of the CH-2 (R3CP) waveform to trigger the oscilloscope to monitor the head "A" side of the RF signal envelope.
4. While the tape is playing, gradually adjust the height of the POST ROLLERS until the RF envelope (B) is rectangular.

CAUTION 1:
ADJUSTMENTS MUST BE MADE VERY GRADUALLY.

CAUTION 2:
DO NOT "OVER ADJUST" the POST ROLLERS. It is unlikely that the POST ROLLERS will require more than a QUARTER of a turn in either direction to make the waveform rectangular.

5. Adjust **VR107** so that the amplitude (V_0) of the PILOT waveform ③ is **1.0Vp-p**.
6. On the PILOT signal waveform ③, verify that the amplitude difference between adjacent tracks falls **within 200mV** (See figure below). If not, adjust the post rollers.
7. Play the standard test tape (RD-ER01), and do "PG Phase adjustment" and "ATF gain adjustment" again.



TERMINAL FUNCTION OF IC'S

• IC101 (AN7030SE2): RF AMP.

Pin No.	Mark	I/O Division	Function
1	V _{CC} 1	I	Power supply terminal
2	ACH FB	O	Playback feed back signal (Ach)
3	ACH IN	I	Playback amp. signal (Ach)
4	GND 1	—	GND terminal
5	BCH IN	I	Playback amp. signal (Bch)
6	BCH FB	O	Playback feed back signal (Bch)
7	AREC PCM	I	RF recording level adj. terminal
8	AREC PLT		
9	AREC ATF		
10	BREC ATF		
11	BREC PLT		
12	BREC PCM		
13	REC CNT 1	I	Track pitch signal
14	REC CNT 2	I	ATF area det. signal
15	SRRF IN	I	Recording signal
16	GND 2	—	GND terminal
17	VREF	O	Reference voltage terminal (Not used, open)
18	AREC OUT	O	Recording signal (Ach)
19	BREC OUT	O	Recording signal (Bch)
20	BTL REC	O	Recording control signal
21	V _{CC} 2	I	Power supply terminal
22	REC ON	O	Recording drive terminal (REC: "H")
	PLAY ON	O	Playback drive terminal (PLAY: "H")

Pin No.	Mark	I/O Division	Function
24	HSW	I	Head switching signal
25	AR/RSEL	I	Not used, connected to power supply
26	R/PSEL	I	Recording/playback select signal (REC: "H", PLAY: "L")
27	EQ OUT	O	Equalization signal
28	EQ IN 3	I	Equalization amp. signal
29	EQ IN 2		
30	EQ IN 1		
31	BF REQ	I	Equalization amplitude drive terminal (Bch)
32	B PHASE	I	Equalization phase drive terminal (Bch)
33	B GAIN	I	Equalization gain drive terminal (Bch)
34	AF REQ	I	Equalization amplitude drive terminal (Ach)
35	A PHASE	I	Equalization phase drive terminal (Ach)
36	A GAIN	I	Equalization gain drive terminal (Ach)
37	SV RF	O	Playback signal
38	GND 3	—	GND terminal
39	A INT	I	Playback amp. signal (Ach)
40	B INT	I	Playback amp. signal (Bch)
41	B INT IN	O	Playback amp. signal (Bch)
42	A INT IN	O	Playback amp. signal (Ach)

• IC801 (M37450M4-356): Microcomputer for interface

Pin No.	Mark	I/O Division	Function
1	NAESDO	I	D I/O select terminal ("L": AES/EBU)
2	NHMTR	O	Hour meter control
3	TXD/ 422 OUT	O	Transceiver drive terminal
4	RXD/ 422 IN	I	
5 8	DSW11 DSW8	I	DIP switch setting terminal

Pin No.	Mark	I/O Division	Function
9 16	DTIN7 DTIN0	I	S/P data input terminal
17	SDEN	O	Parallel data enable terminal ("H": enable)
18	PDEN	O	
19	OUTCONT	O	Transceiver drive enable terminal ("H": enable)
20	NC	—	Not used, open

Pin No.	Mark	I/O Division	Function
21	NCCLR	O	Full det. counter clear terminal ("L": clear)
22	RGFUL	I	S/P register full signal ("H" full)
23	BRK	I	Break det. terminal ("L": break)
24	NPRDY1	O	Ready signal ("L": ready)
25	R/W	O	Not used, open
26	SYNC		
27	GND	—	GND terminal
28	NRST2	I	Reset terminal ("L": reset)
29	XIN	I	Crystal OSC terminal (9.83 MHz)
30	XOUT	O	
31	BRKCLK	O	Break det. clock signal
32	GND	—	GND terminal

Pin No.	Mark	I/O Division	Function
33 } 40	DINC1 } DINC8	I	DIN input signal
41 } 48	DSW7 } DSW0	I	DIP switch setting terminal
49 } 56	DTOUT7 } DTOUT0	O	P/S data signal
57 } 59	AN2 } AN0	—	Not used, connected to GND
60 • 61	DA2 • DA1	O	Not used, open
62	VREF	—	GND terminal
63	AVSS		
64	VCC	I	Power supply terminal

• IC202 (MN53020SDQ): ATF

Pin No.	Mark	I/O Division	Function
1	NSNCOK	O	SYNC det. monitor terminal
2	SVAL	I	ATF select terminal
3	PCMOK	I	PCM playback monitor terminal
4	SPE	O	Starting pulse of counter track lock
5	SP 2	O	Sampling pulse signal for pilot signal of adjacent track
6	SP 1		
7	DCYLPG	I	Cylinder PG signal
8	DCAPFG 1	I	Capstan FG signal
9	DCAPFG 2		
10	DRLFMT	I	Take-up reel FG signal
11	DCYLFG	I	Cylinder FG signal
12	SYNC	I	ATF sync. det. terminal
13	NRST	I	Reset signal
14	R3CP	I	Timing signal for RF envelope signal control
15	ENVT		
16	FCH	I	System clock signal (9.408 MHz)
17	V _{DD}	I	Power supply terminal
18	V _{SS}	—	GND terminal
19	MODE 1	I	SYNC det. select terminal (Not used, connected to GND)
20	HFCH	I	Clock signal for PLL off-set data
21	PLLOFS	I	PLL off-set data signal

Pin No.	Mark	I/O Division	Function
22	TEST 6	—	Not used, connected to GND
23	P MODE	I	Pulse width select terminal
24 } 28	TEST 1 } TEST 5	I	Test terminal (Not used, connected to GND)
29	SPHT	—	Not used, open
30	HSWS	O	Head switching signal (33.33 Hz)
31	HSWR		
32	SEL A	I	CAPFGTU signal select terminal
33	SEL B	I	R3TU signal select terminal
34	PLL 0	O	Output signal after decoded 4 bit parallel data of PLLOFS
35	PLL 1		
36	PLL 2		
37	PLL 3		
38	MODE 2	—	Not used, open
39	V _{SS} 2	—	GND terminal
40	V _{DD} 2	I	Power supply terminal
41	R3TU	O	Building-up edge signal of R3CP/DRLFMT
42	CAPFGTU	O	Capstan FG signal/Take-up reel FG signal
43	CAPER	O	Capstan rotative direction control signal
44	NLNROK	O	Track linearity monitor terminal

• IC201 (MN6742SDR): Servo processor

Pin No.	Mark	I/O Division	Function
1	OP10A	O	Cylinder rotative stop signal
2	SCK	I	Serial clock signal
3	SDA	I/O	Serial data signal
4	OSC 1	I	System clock (8MHz) signal
5	OSC 2	O	
6	NRST	I	Reset signal
7	NC	—	Not connection
8	OP20A	O	SSP ready signal
9	NC	—	Not connection
10	V _{SS}	—	GND terminal
11	VHS	—	Not used, open
12	OP 101	O	CAPFG/RLFGT select signal
13	TP 2	O	R3CP/RLFGT select signal
14	TP 3	I	PLL off-set/parallel data signal
15	TP 4		
16	TP 5		
17	TP 6		
18	TP 7	I	PLL off-set/data effective flag terminal
19	TP 8	I	Not used, connected to power supply
20	MOS	I	Serial port/strobe signal
21	TST	I	Test mode terminal (Normal, connected to GND)
22	ENC	—	Connected to GND terminal
23	NC	—	Not connection
24	NC		
25	V _{DD}	I	Power supply terminal
26	NC	—	Not connection
27	RSW	—	Not used, open
28	HAS	O	A/D input select signal
29	AVM	—	Not used, connected to GND
30	VLP	—	Not used, open
31	STM	I	R3TU or RLFGT (64 P/R) signal
32	STR	I	Comparator reference signal of STM input

Pin No.	Mark	I/O Division	Function
33	CAE	O	Capstan velocity control signal
34	CYE	O	Cylinder velocity control signal
35	END	I	VREF or ATFTER voltage signal
36	VSY	I	CYLP $\overline{\text{G}}$ signal
37	ASH 1	I	Capstan FG or RLFGT signal after EXOR
38	NC	—	Not connection
39	AFB 1	O	Inverter amp. signal of ATFTER input (Not used, open)
40	NC	—	Not connection
41	AFG 1	I	ATF tracking error voltage terminal
42	ASH 2	O	Not used, connected to GND
43	AFB 2	O	Not used, open
44	NC	—	Not connection
45	AFG 2	I	Reference voltage terminal
46	VDA	I	Power supply terminal
47	VSA	—	GND terminal
48	ORE	O	Reference voltage terminal
49	IRE	I	
50	GND	—	GND terminal
51	IPL	O	Not used, open
52	NC	—	Not connection
53	CLP	I	Not used, connected to GND
54	CP 1	O	Not used, open
55	CP 2	I	Supply reel FG signal
56	NC	—	Not connection
57	NC		
58	CN 1	O	Not used, open
59	CN 2	I	Not used, connected to GND
60	CTL	O	Not used, open
61	PFG	I	Cylinder FG signal
62	PGM	I	Not used, connected to GND
63	CUL	O	Capstan rotative direction signal
64	NC	—	Not connection

• IC102 (AN7035SCE2): Playback PLL

Pin No.	Mark	I/O Division	Function
1	LPF	O	Buffer amp. 1 reference terminal
2	GND 1	—	GND terminal
3	ENVC	O	ENV time constant setting terminal
4	ENVR	I	ENV threshold voltage adj. terminal
5	RSENV	O	RF envelope signal
6	RSENV C	O	RSENV time constant setting terminal
7	RSRF	I	RF signal
8	DELOUT	O	RF signal
9	DELIN 1	I	Delay (45°) signal
10	DELIN 2	I	Delay (90°) signal
11	PDOUT	O	Phase comparator signal
12	VREF 1	I	V/I converter reference voltage terminal
13	VCOV	I	OSC frequency control terminal
14	R/P	I	Recording/playback select terminal (Not used, connected to GND)
15	VCOR	I	OSC frequency adj. terminal

Pin No.	Mark	I/O Division	Function
16	V _{CC} 1	I	Power supply terminal
17	VCOC 1	O	VCO terminal
18	VCOC 2	O	VCO terminal
19	V _{CC} 2	I	Power supply terminal
20	PLL CP 1	O	Clock (2CK) signal (Not used, open)
21	PLL CP 2	O	Clock (CK) signal
22	DEMCOD	O	NRZI demodulated signal for playback signal with PLL
23	SVSYNC	O	ATF sync. signal
24	GND 2	—	GND terminal
25	OP OUT 3	O	ATF 3 signal
26	OP IN 3	I	ATF 3 signal
27	OP OUT 2	O	ATF 2 signal
28	OP IN 2	I	ATF 2 signal
29	OP OUT 1	O	ATF 1 signal
30	OP IN 1	I	ATF 1 signal
31	VREF 2	I	Reference voltage terminal
32	COMP 1	I	Output amp. 1 (+) signal

• IC405 (AK5326-VP): A/D converter

Pin No.	Mark	I/O Division	Function
1	AGND	—	Analog GND terminal
2	AINL	I	L ch analog signal input terminal
3	ZEROL	I	L ch zero level input terminal
4	VA +	I	Analog power supply terminal
5	VA -	I	Analog power supply terminal
6	APD	I	Analog power down terminal
7	ACAL	I	Analog calibration terminal
8	NC	—	Not connected
9	DCAL	O	Digital calibration terminal
10	DPD	I	Digital power down terminal
11	TST 1	I	Test terminal (Connected to GND)
12	TST 2		
13	TST 3		
14	L/ \bar{R}	I	Input channel select terminal

Pin No.	Mark	I/O Division	Function
15	SCLK	I	Serial data output clock terminal
16	SDATA	O	Serial data output terminal
17	VD1+	I	Digital power supply terminal
18	VD2+		
19	DGND	—	Digital GND terminal
20	DCLKA	I	Digital system clock terminal
21	NC	—	Not connected
22	ACLKA	O	Analog system clock terminal
23	CLKIN	I	Master clock terminal
24	LGND	—	Digital GND terminal
25	VL+	I	Digital power supply terminal
26	ZEROR	I	R ch zero level input terminal
27	AINR	I	R ch analog signal input terminal
28	VREF	O	Reference voltage terminal

• IC203 (AN8320NFA): Linear servo

Pin No.	Mark	I/O Division	Function
1	FG1 AO	O	Capstan FG signal
2	FG1 AI	I	Capstan FG (-) signal
3	FG1 FI	—	Frequency characteristic setting terminal
4	CYL PG	O	Cylinder PG signal
5	PGVR	—	PG delay time adj. terminal
6	CYPGI	I	PG schmidt comparator terminal
7	GND	—	GND terminal
8	SVRF	I	ATF terminal
9	CPD	—	Det. capacity connection terminal
10	CCI	O	Full-wave rectification buffer terminal
11	CCO	I	Clamp circuit terminal
12	SP 1	I	SP 1 terminal
13	SP 2	I	SP 2 terminal
14	VSPE	—	SPE setting terminal
15	SPE	I	SPE terminal
16	CSH	I	Hold capacity connection terminal
17	ATFTER	O	ATF control command signal
18	CFB	—	Phase compensation terminal
19	V _{CC}	I	Power supply terminal
20	ATFON	I	ATF ON terminal (Not used, connected to power supply)
21	PTBIA	—	Photo-transistor bias terminal (Not used, open)
22	VREF	O	Reference voltage terminal
23	LEDR 1	I	Bias voltage terminal
24	LEDH 1	—	Constant current terminal (Not used, open)
25	LEDR 2	I	Bias voltage terminal

Pin No.	Mark	I/O Division	Function
26	LEDH 2	—	Constant current terminal (Not used, open)
27	CYL FG	O	Cylinder FG signal
28	CYF GSI	I	Cylinder schmidt comparator terminal
29	CYF GAO	O	Cylinder op. amp. terminal
30	CYF GAI	I	Cylinder op. amp. (-) terminal
31	NST BY	I	STAND BY signal (Not used, connected to power supply)
32	TF GAI	I	Take-up reel op. amp. (-) terminal
33	TF GAO	I	Take-up reel op. amp. terminal
34	TF GSI	I	Take-up reel schmidt comparator terminal
35	RLFGT	O	Take-up reel FG signal
36	RLFGS	O	Supply reel FG signal
37	SF GSI	I	Supply reel schmidt comparator terminal
38	SF GAO	O	Supply reel op. amp. terminal
39	SF GAI	I	Supply reel op. amp. terminal
40	V _{CC}	I	Power supply terminal
41	FG 2FI	—	Frequency characteristic setting terminal
42	FG 2AI	I	Capstan FG (-) signal
43	FG 2AO	O	Capstan FG signal
44	FG 2SI	I	Capstan FG schmidt comparator terminal
45	CPFG 2	O	Capstan FG signal
46	FILSLD	I	Frequency characteristic DOWN terminal
47	CPFG 1	O	Capstan FG signal
48	FG 1SI	I	Capstan FG schmidt comparator terminal

• IC271 (MN17541SDN2): Mechanism control

Pin No.	Mark	I/O Division	Function
1	NSBOA	O	Serial data signal
2	NRST	I	Reset signal
3	NSYNC	—	Not used, open
4	X 2		
5	X 1		
6	V _{SS}	—	GND terminal
7	OSC 2	—	Not used, open
8	OSC 1	I	Clock signal
9	V _{DD}	I	Power supply terminal
10	NTC1B	I	Supply reel FG signal
11	NIRQ 0	I	Take-up reel FG signal
12	NIRQ 1	I	Transfer strobe signal of system control
13	P00 (MSTB)		
14	P 01 (MRDY)	O	Transfer ready signal of system control
15	P 02 (NSSTB)	O	Transfer strobe signal
16	P 03 (NSRDY)	I	Transfer ready signal
17	P 10 (ATFGT)	O	ATF gain (× 1/2) select terminal
18	P 11 (REWGT)	O	REW FG · PG gain select terminal
19	P 12 (LPMOD)	—	Not used, open
20	P 13 (MODMT0)	O	Mode motor control signal
21	P 20 (MODMT1)		
22	P 21 (MODMT2)		
23	P 22	—	Not used, open
24	P23 (PLG)	O	Plunger control signal
25	P 30	—	Not used, open
26	P 31		
27	P 32 (LOAD 1)	O	Tray motor control (+) terminal
28	P 33 (LOAD 2)	O	Tray motor control (−) terminal
29	P 40	—	Not used, open
30	P 41 (DEW)	I	Dew sensor det. signal
31	P 42 (EOT)	I	Tape end det. signal
32	P 43 (BOT)	I	Tape begin det. signal
33	P 50 (OPEN)	I	Cassette open det. signal

Pin No.	Mark	I/O Division	Function
34	P 51 (CLOSE)	I	Cassette close det. signal
35	P 52 (LOADS)	I	Loading start det. signal
36	P 53 (LOAD E)	I	Loading stop det. signal
37	P 60 (SW 2)	O	Test terminal
38 } 40	P 61 (MMOD 0) P 63 (MMOD 2)	I	Tape mode det. signal
41 } 44	P 70 (MBUS 0) P 73 (MBUS 3)	I/O	Transfer bus terminal of system control
45	P 80 (RCC)	—	Not used, open
46	P 81 (FIL)	O	FILTER select signal
47	P 82 (ATFON)	—	Not used, open
48	P 83 (NSTBY)	—	Not used, open
49	P 90 (NSRST)	O	Reset signal
50	P 91 (LEDDRV)	O	Tape begin/end LED control signal
51	P 92 (PCMOK)	I	PCM playback det. signal
52	P 93 (SVAL 0)	I	ATF effective position setting terminal
53	NEXPS	I	Not used, connected to power supply
54	PA 0 (NSNCOK)	I	ATF sync. det. terminal
55	PA 1 (NLNOK)	I	Track linearity det. terminal
56	PA 2 (CAPER)	I	Capstan rotative direction command signal
57	PA 3	—	Not used, open
58 59	PB 0 (TH 1) PB 1 (TH 2)	I	Tape hall det. signal
60	NSBTB	I	Muting det. signal
61 62	NSBIB NSBOB	I	Test terminal
63	NSBTA (SCLK)	I	Serial transfer clock signal
64	NSBIA (SDAT)	I/O	Serial transfer data signal

• IC301 (MN188161SDL): System control

Pin No.	Mark	I/O Division	Function
1	V _{DD}	I	Power supply terminal
2 } 9	P 67 (SPDT 7) } P 60 (SPDT 0)	I/O	Signal processor transfer address and data bus terminal
10	P 57 (SPRDY)	I	Signal processor data transfer command signal
11	P 56 (PBLANK)	I	Blank skip select ("H": no skip, "L": skip)
12	P 55 (R3CP)	I	Frame sync. signal
13	P 54 (PMID6B)	—	Main ID6 select terminal
14	P 53 (PMID6A)		
15	P 52	I	Not used, connected to resistor
16	P 51	I	Not used, connected to resistor
17	P 50 (PDIOSEL)	I	D I/O select terminal ("H": AES/EBU, "L": IEC)
18	EXI	—	Not used, connected to GND
19	EXO	—	Not used, open
20	NRST 1	I	Reset signal ("L": RESET)
21	P 47 (NSERVERST)	O	Reset signal to servo block
22	P 46	—	Not used, open
23	P 45	—	
24	P 44	—	
25	P 43 (SLAD)	O	DIGITAL IN PLL/crystal select terminal ("L": PLL, "H": crystal)
26	P 42 (XCK32)	O	32kHz OSC control ("H": OSC, "L": STOP)
27	P 41 (XCK44)	O	44.1kHz OSC control ("H": OSC, "L": STOP)
28	P 40 (XCK48)	O	48kHz OSC control ("H": OSC, "L": STOP)
29	P 27 (NPRDY)	I	Transfer ready signal from panel control
30	OSC 1	I	Crystal OSC terminal
31	OSC 2	O	
32	V _{SS}	—	GND terminal
33	XI	—	Not used, open
34	XO	—	
35	P 26	—	Not used, connected to power supply
36	P 25 (RF ENV)	I	RF envelope signal

Pin No.	Mark	I/O Division	Function
37	P 37 (FLGCLK)	O	Clock signal of flag counter
38	P 36 (FLGDT)	O	Data signal of flag counter
39	P 35 (TP)	O	Track pitch signal ("L": normal)
40	P 34 (UNLOCK)	O	DIGITAL-IN PLL unlock signal ("L": det.)
41	P 33	—	Not used, open
42	P 32 (DISCHG)	O	DIGITAL-IN PLL discharge signal
43	P 31 (DINPLINH)	O	DIGITAL-IN PLL prohibition signal ("H": prohibition)
44	P 30 (ANRST)	O	Reset signal ("H": RESET) to DAC
45	P 21 (HSW)	I	Head switching pulse signal
46	P 20 (NMRDY)	I	Transfer command signal from mechanism control
47	P 01	—	Not used, open
48	P 00	—	
49	P 17 (PTXD)	O	Serial data transmission terminal
50	P 16 (PRXD)	I	Serial data reception terminal
51	P 15 (PCLK)	O	Serial data transmission/reception clock signal
52	P 14	—	Not used, open
53 } 56	P 13 (MDT 3) } P 10 (MDT 0)	I/O	Transfer data bus of mechanism control
57	P 77	—	Not used, open
58	P 76 (NDEMP)	O	de-emphasis signal
59	P 75 (SGMTG)	O	Muting signal
60	P 74 (DOUTTH)	O	Digital out through select ("H": through)
61	P 73 (NRST 2)	O	Reset signal
62	P 72 (MSTB)	O	Transfer command terminal of mechanism control
63	P 71 (SPSTB)	O	Signal processor strobe signal
64	P 70 (SPAW)	O	Signal processor address setting signal

• IC351 (MN6624): Digital signal processor

Pin No.	Mark	I/O Division	Function	Pin No.	Mark	I/O Division	Function
1	PCMCIF	O	Flag counter terminal	40	V _{DD}	I	Power supply terminal
2	IDPP			41	XO 1	O	Crystal OSC terminal
3	IDP	O	Test terminal	42	XI 1	I	
4	V _{DD}	I	Power supply terminal	43	V _{SS}	—	GND terminal
5	TESTS	—	Not used, connected to GND	44	PC OUT	—	Not used, open
6	V _{SS}	—	GND terminal	45	RAD 0	O	RAM address bus terminal
7	CKIO FS	—	Not used, open	46	RAD 1		
8	CKIO 128	O	Test terminal	47	RAD 2		
9	CKIO 512	—	Not used, open	48	RAD 3		
10	NDALOAD	—	Not used, open	49	RAD 4		
11	DADAT	O	DA data signal	50	RAD 5		
12	DALRCK	O	LR discrimination signal	51	RAD 6		
13	DABCK	O	Serial bit clock signal	52	RAD 7		
14	DAMCK	—	Not used, open	53	V _{DD}	I	Power supply terminal
15	V _{DD}	I	Power supply terminal	54	TEST 2	—	Not used, connected to GND
16	TEST 6	—	Not used, open	55	V _{SS}	—	GND terminal
17	V _{SS}	—	GND terminal	56	RAD C	O	RAM address bus terminal
18	ADDAT	I	AD data signal	57	RAD E		
19	ADLRCK	O	LR discrimination signal	58	NWE	O	Write enable for memory
20	ADBCK	O	Serial bit clock signal	59	RAD D	O	RAM address bus terminal
21	ADMCK	O	External clock signal	60	RAD 8		
22	TX	O	Digital signal	61	RAD 9		
23	RX	I		62	RAD B		
24	VCOS L32	—	Not used, open	63	NOE	O	Output enable for memory
25	VCOS L44						
26	VCOS L48						
27	DIO REF	O	Digital signal (PLL control)	64	RAD A	O	RAM address bus terminal
28	DIO VAR	O		65	V _{DD}	I	Power supply terminal
29	V _{DD}	I	Power supply terminal	66	NCS	O	Chip select terminal for memory
30	DI 512	I	Digital signal (512FS)	67	V _{SS}	—	GND terminal
31	V _{SS}	—	GND terminal	68	RDT 7	I/O	RAM data bus terminal
32	XO 4	—	Not used, open	69	RDT 6		
33	XI 4	I	Crystal terminal (32kHz × 512)	70	RDT 5		
34	TEST 0	—	Not used, connected to GND	71	RDT 4		
35	XO 3	—	Not used, open	72	RDT 3		
36	XI 3	I	Crystal terminal (44.1kHz × 512)	73	RDT 2		
37	TEST 1	—	Not used, connected to GND	74	RDT 1		
38	XO 2	—	Not used, open	75	RDT 0		
39	XI 2	I	Crystal terminal (48kHz × 512)	76	V _{SS}	—	GND terminal
				77	TEST 3	—	Not used, connected to GND
				78	V _{DD}	I	Power supply terminal

Pin No.	Mark	I/O Division	Function
79	SPDT 7	I/O	Address and data bus terminal
80	SPDT 6		
81	SPDT 5		
82	SPDT 4		
83	SPDT 3		
84	SPDT 2		
85	SPDT 1		
86	SPDT 0		
87	V _{SS}	—	GND terminal
88	TEST 4	—	Not used, connected to GND
89	V _{DD}	I	Power supply terminal
90	SPAW	I	Signal processor address setting terminal
91	SPSTB	I	Signal processor strobe signal
92	SPRDY	O	Data transfer command signal
93	UNLOK	O	PLL unlock signal
94	DISYND	—	Not used, open
95	NSTBY	I	Not used, connected to power supply
96	NRST	I	Reset signal
97	M7CK	—	Master clock signal (Not used, open)
98	R6CP/ (ENVT)	O	Timing signal for RF envelope signal control
99	R3CP		
100	V _{SS}	—	GND terminal
101	SRRF	O	Recording signal

Pin No.	Mark	I/O Division	Function
102	V _{DD}	I	Power supply terminal
103	SRPR	O	Recording/playback select signal (REC: "H", PLAY: "L")
104	SRWND 2	O	ATF area det. signal
105	SRWND 1	O	Track pitch signal
106	PBDT	I	Playback signal
107	PBCK	I	Playback envelope signal
108	RFMSK	O	Not used, open
109	PLLOFS	O	PLL off-set information signal
110	HFCH	O	System clock signal
111	VFPLFS	O	PLL OFS effective information signal
112	EXFCH	—	Not used, connected to GND
113	EEMD	—	Not used, connected to GND
114	V _{SS}	—	GND terminal
115	SL NRZI	—	Not used, connected to GND
116	SELF CH0		
117	SELF CH1		
118	V _{DD}	I	Power supply terminal
119	M9CP	O	Master clock signal
120	HSW	I	Head switching signal
121	NR TRST	—	Not used, connected to power supply
122	SUBWND	—	Not used, open
123	IPF	O	Output terminal for flag counter
124	SUBC 1		

• IC501 (YM3404B): Digital filter

Pin No.	Mark	I/O Division	Function
1	SHL	O	1 DAC (ST="L"): Lch Deglitcher signal 2 DAC (ST="H"): L/Rch Deglitcher signal
2	X 0	O	Clock output
3	X 1	I	Clock input
4	VDD 2	I	Power supply terminal
5	BCI	I	Bit clock signal
6	SDSY	I	R/L signal
7	SDI	I	Data input
8	VCC 1	I	Power supply terminal

Pin No.	Mark	I/O Division	Function
9	DLO	O	1 DAC (ST="L"): L/Rch data output terminal 2 DAC (ST="H"): Lch data output terminal
10	RDO	O	Rch data output (Not used, open)
11	WCO	O	Output data word clock
12	BCO	O	Bit clock signal
13	VSS	I	GND terminal
14	ST	I	1 DAC/2 DAC selector terminal
15	FEN	I	System clock selector terminal
16	SHR	O	1 DAC (ST="L"): R ch deglitch signal

• IC502 (MN53010PEH): Serial/Parallel converter

Pin No.	Mark	I/O Division	Function
1	WCO	O	Output data word clock (DALO, DBLO, DARO, DBRO)
2	DARO	O	Rch data output, (+) terminal
3	DBRO	O	Rch data output, (-) terminal
4	RST	I	Reset terminal, input data to "0"
5	SVDD	I	Power supply terminal
6	SVSS	I	GND terminal
7	F2DAC	I	"H": 2DAC 18-bit "L": 2DAC 17-bit
8	FLOAT	I	"H": 4DAC 18-bit "L": 4DAC 17-bit
9	PHASE	I	"H": Phase inversion "L": Normal mode
10	LRCK	I	Inverter input
11	NLRCK	O	LRCK signal inverter output
12	SIN	I	Data input
13	WCI	I	Input data word clock
14	BCI	I	Input data bit clock
15	VSS	I	GND terminal
16	NC	—	Not connected
17	VDD2	I	Power supply terminal
18	SHR	I	Rch Deglitcher signal

Pin No.	Mark	I/O Division	Function			
19	SHL	I	Lch Deglitcher signal			
20 }	NC	—	Not connected			
31						
			NORMAL MODE delay: 180ms	TEST MODE delay: 1.45ms	TEST MODE delay: 0.73ms	TEST MODE delay: 0ms
32	NTEST 1	I	H	L	H	L
33	NTEST 2	I	H	H	L	L
34	NTEST 3	I	"H": Normal mode "L": Reset			
35	DALO	O	Lch data output, (+) terminal			
36	DBLO	O	Rch data output, (-) terminal			
37	VDD	I	Power supply terminal			
38	VSS2	I	GND terminal			
39	NC	—	Not connected			
40	GAIN	O	Gain selector signal [H: 0~ -12dB L: below -12dB]			
41	SH	O	Deglitch signal [H: sample L: Hold]			
42	BCO	O	Output data bit clock			

• IC503~IC506 (PCM56P-J): D/A converter

Pin No.	Mark	I/O Division	Function
1	-VS	I	Power supply terminal
2	DG	—	GND terminal
3	+VL	I	Power supply terminal
4	NC	—	Not connection
5	CLK	I	Clock signal
6	LE	I	Latch enable control signal
7	DATA	I	Data signal
8	-VL	I	Power supply terminal
9	V OUT	O	Voltage output terminal

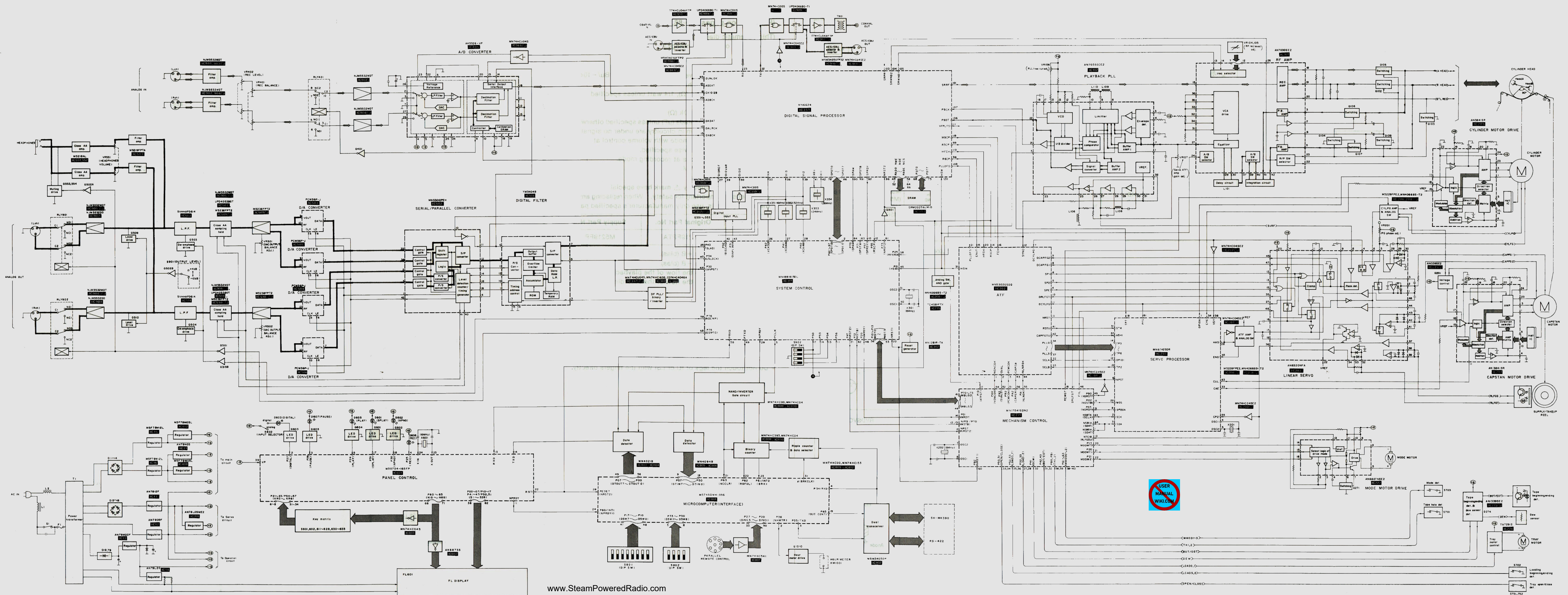
Pin No.	Mark	I/O Division	Function
10	RF	O	Data signal
11	SJ	I	Operation amp. supply terminal
12	A • G	—	GND terminal
13	I OUT	O	Current output terminal
14	MSB	I	MSB adj. terminal (Not used, open)
15	R IN	—	Not used, open
16	+VS	I	Power supply terminal

• IC601 (M50754-165FP): Panel control & FL drive

Pin No.	Mark	I/O Division	Function
1	V _{SS}	—	GND terminal
2	P 27	O	Input select signal (DIGITAL↔ANALOG)
3	P 26	O	LED display drive terminal (PAUSE)
4	P 25	O	LED display drive terminal (REC)
5	P 24	O	LED display drive terminal (PLAY)
6 } 8	P 23 } P 21	I	Key return signal
9	P 20	O	Buffer control signal
10	NC	—	Not connection
11	NPRDY	O	Ready signal
12	NTRCLK	I/O	Serial data transmission/reception clock signal
13	RXD	O	Serial data transmission signal
14	TXD	I	Serial data reception signal
15	P 33	—	Not connection
16	P 32		
17	P 31	O	LED display drive terminal (S. PLAY)
18	P 30	O	LED display drive terminal (A. PNO)
19	INT 1	I	Remote control signal
20	INT 2	I	Not used, connected to power supply
21	CNV _{SS}	—	GND terminal
22	RST	I	Reset signal ("L": RESET)
23	NC	—	Not connection
24	X IN	I	Master clock terminal (6MHz)
25	X OUT	O	
26	NC	—	Not connection
27	X CIN	—	Not used, connected to GND
28	X COUT	—	Not used, open
29	V _{SS}	—	GND terminal
30	NC	—	Not connection
31	P 57	I	Key return signal
32	P 56		

Pin No.	Mark	I/O Division	Function
33	P 55	I	Key return signal
34	P 54		
35	VP	I	Power supply terminal for FL drive
36	P 51	O	Segment signal for FL drive
37	P 50		
38 } 45	P 17 } P 10		
46	NC		
47	P 07	O	Segment signal for FL drive
48	P 06		
49	P 05		
50	P 04		
51	P 03		
52	P 02		
53	P 01		
54	P 00		
55	P 47		
56	P 46		
57	P 45		
58	P 44		
59	P 43		
60	P 42		
61	P 41		
62	P 40		
63	V _{CC}		
64	V _{CC}		
65	V _{SS}	—	GND terminal
66	P 65	O	Digit signal for FL drive and key scan signal
67	P 64		
68	P 63		
69	P 62		
70	P 61		
71	P 60		
72	NC		

BLOCK DIAGRAM



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Note)

- Playback signal
- Recording signal