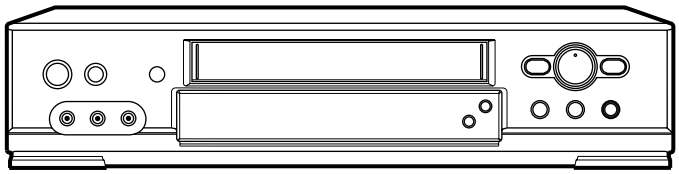
2003

MITSUBISHI ELECTRIC

Service Manual

VIDEO CASSETTE RECORDER

VHS



MODEL
HS-U449

Only cassettes marked VHS can be used with this video cassette recorder.

SPECIFICATIONS

Tape Format	:	VHS 1/2” high-density video cassette tape
Power Source	:	120 V AC ; 60 Hz
Power Consumption	:	Approx. 20 W (STBY 3 W)
Video Signal System	:	EIA standard ; NTSC color
Video Recording System	:	VHS standard
Luminance	:	Frequency modulation recording
Color Signal	:	Low frequency conversion sub-carrier phase shift recording
Hi-Fi Audio Recording System	:	VHS standard Azimuth helical scanning system
Linear Audio Track	:	1 track
Tape Speed	:	1-5/16 i.p.s (standard play) 7/16 i.p.s (extended play)
Record/Playback Time	:	120 min. with T-120 video cassette (SP mode) 360 min. with T-120 video cassette (EP mode)
Record/Playback System		
Video	:	4 heads
Hi-Fi Audio	:	2 heads
Monaural Audio Control	:	1 head
Erase	:	1 head

Video Input	:	0.5 - 2.0 V(p-p), 75 Ω unbalanced RCA Pin Jack
Audio Input	:	346 mV(rms), 47 kΩ unbalanced RCA Pin Jack
Video Output	:	1.0 V(p-p), 75 Ω unbalanced RCA Pin Jack
Audio Output	:	346 mV(rms), 1 kΩ unbalanced RCA Pin Jack
Tuner VHF	:	54 - 88 MHz, 174 - 216 MHz
UHF	:	470 - 806 MHz
CATV	:	54 - 88 MHz, 90 - 804 MHz
Operating Temperature	:	41 - 104°F
Relative Humidity	:	30 - 80%
RF Channel Output	:	Channel 3 or 4 switchable
Weight	:	Approx. 8.0 lbs. (3.6 kg)
Dimensions	:	16.7”(W) × 3.7”(H) × 11.9”(D) 425 (W) × 93 (H) × 302 (D) mm
Timer Program Capacity	:	1 month programmable / 8 programs
Deck	:	α Deck

• Weight and dimensions shown are approximate.
• Design and specifications are subject to change without notice.

MITSUBISHI DIGITAL ELECTRONICS AMERICA, INC.

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CONTENTS

CONTENTS

GLOSSARY OF ABBREVIATIONS

A/C : Audio/Control
A-PB : Audio Play Back
A-REC : Audio Recording
AE : Audio Erase
AENV : Audio Envelope
AFC : Automatic Frequency Control
AFF : Audio Flip Flop
AFTV : Auto Fine Tuning Voltage
ALC : Automatic Level Control
AMODE : Audio Mode
AMPC : Amplifier Alternating Current Ground
APC : Automatic Phase Control
ATFN : Auto Fine
ATT : Attenuator

BLMUTE : Blue Back Mute

C/N : Carrier/Noise Ratio
CCD : Charge Coupled Device
CG-CS : Character Generator-Chip Slect
CHSW : Channel Switch
CLKSEL : Clock Select
CNTR : Counter
COM : Comparator
CONV SW : Converter Switch
CP-FG : Capstan-Frequency Generator
CP-REV : Capstan-Reverse
CPMOTORV : Capstan Motor Voltage
CROT : Chroma Rotation
CSYNC : Composite Synchronizing Signal
CTL : Control

D.E. : Detail Enhancer
D-FF : Drum Flip Flop
DEMOD : Demodulator
DET : Detector
DLY : Delay
DOC : Drop Out Compensator
DOCSTOP : Drop Out Control Stop
DR-FG : Drum-Frequency Generator
DR-OUT : Drum Control Out
DR-PG : Drum-Phase Generator

EE : Electronic-Electronic
EMPH : Emphasis
EP : Extended Play
EQ : Equalizer
ES : End Sensor

FBC : Feed Back Clamp
FE : Full Erase
FF : Fast Forward
FG : Frequency Generator
FLDCS : Fluorescent Tube Driver Chip Slect
FM : Frequency Modulation
FS : Forward Search
FSC : Frequency of Color Subcarrier

G : Ground

HASW : Head Amplifier Switch
HFR400 : Hi-Fast Forward/Reverse Speed Search 400
HFRSS : Hi-Fast Forward/Reverse Speed Search
HSYNC : Horizontal Synchronizing Signal

I-LIMIT : I(Current)-Limitter

JSTCLK : Just Clock

LIN-IN : Linear Audio In
LIN-OUT : Linear Audio Out
LMUTE : Linear Mute
LP : Long Play

MOD : Modulator
MOTORV : Motor Voltage

NL : Non Linear

OSC : Oscillator

PB : Play Back
PC : Position Control
PCB : Printed Circuit Board
PG : Pulse Generator
PLL : Phase Locked Loop
PRT : Protect
PSAVE : Power Save
PSLED : Power Save Light Emitting Diode
PSYNC : Pretened Vartical Synchronizing Signal
PWSV : Power Save
PWV : ON/OFF Command to supply B + Power

QH : Cue Horizontal Signal
QV : Cue Vertical Signal

REC : Recording
REC2 : Record Command for the PB/REC Control Circuit
RECPBC : Record/Play Back Chroma Signal
RES : Reset
RESPCM : Reset Pulse Code Modulation
REW : Rewind
RIS : Record Inhibit Switch
RMSDET : Root Mean Square Detector
RS : Reverse Search
RXD : Read X Data

SAPIND : SAP carrier detect Indicator
SCLK : Serial Clock
SCR : Scramble
SI : Serial control data Input
SLD : Side Lock Detector
SP : Standard Play
SS : Start Sensor
SSVSYNC : Speed Search Vertical Synchronizing Signal
STRB : Strobe
SU-SENS : Supply Reel Sensor

TSREC : Tape Simulate Recording
TSSW : Tape Simulator Switch
TU-SENS : Take Up Reel Sensor

V-REF : Voltage Reference
VBUSY : VSET Busy
VCA : Voltage Control Amplifier
VCO : Voltage Controlled Oscillator
VENV : Video Envelope
VSETCLK : VSET Clock
VSETCS : VSET Chip Select

YNR : Y(Luminance) Signal Noise Reduction

SAFETY PRECAUTIONS

INTRODUCTION

This manual provides service information for the adjustments of mechanical and electrical operations.
Due to design modifications, the servicing procedures and data given in this manual are subject to possible change without prior notice.

WARNING : Many of the programs broadcast by television stations are protected by copyright and Federal law imposes strict penalties for copyright infringement. Some motion picture companies have taken the position that home recording for non-commercial purposes is an infringement of their copyrights. Until the courts have ruled on the proper interpretation of the law as applied to home video recording, this equipment, if used to record copyrighted material, should be operated at the user's own risk.

WARNING :
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.
This video cassette recorder should be used with AC 120V, 60Hz only.

SAFETY NOTICE

Before returning VCR to the customer a safety check of the entire VCR should be made. The service technician must be sure that no protective device built into the instrument by the manufacturer has become defective or inadvertently damaged during servicing. Observe all caution and safety related notes located on or inside the VCR cabinet.
WARNING : Alterations of the design or circuitry of this VCR should not be made. Any design alterations or additions, such as circuit modifications, auxiliary speaker jacks, switches, grounding, active or passive circuitry, etc., or use of unauthorized camera, cables, accessories, etc. may alter the safety characteristics of this VCR and potentially create a hazardous situation for the user. Any design alterations or unauthorized additions will invalidate the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting from them. Do not lubricate any motors. When reassembling the VCR, always be certain that all the protective devices are put back in place, such as non-metallic control knobs, shield plates, etc. When service is required, observe the original lead dress. Components that show evidence of overheating or other electrical or mechanical damage should be replaced.

WARNING : **Replace with same type 1.6A, 125V FUSE.**

LEAKAGE CURRENT CHECK

Before returning the VCR to the customer, it is recommended the leakage current be measured by the following methods.

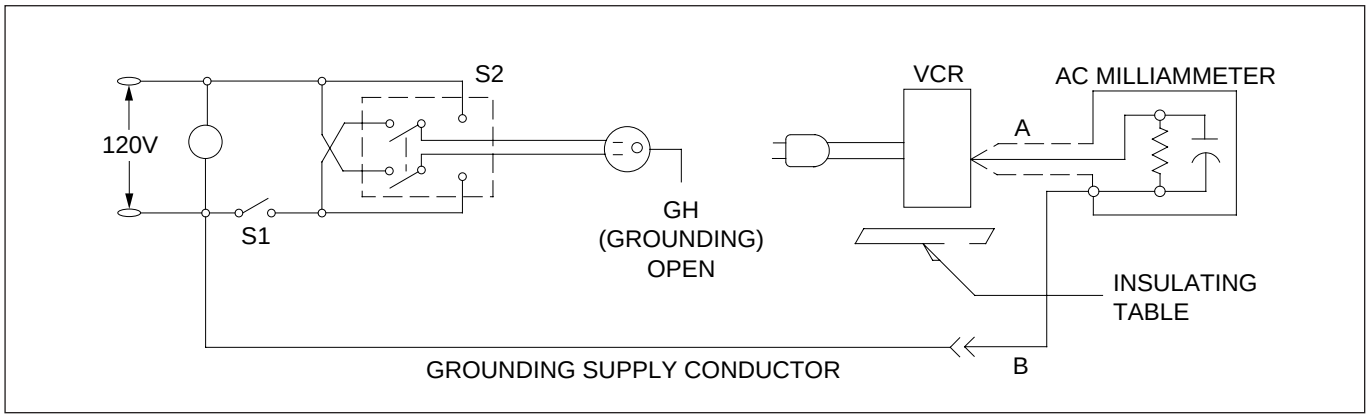
1. Cold Check
   With the AC plug removed from the 120V AC source, place a jumper across the two AC plug prongs. Turn the AC switch on. Using an ohmmeter, connect one lead to the AC plug with the jumper and touch the other lead to each exposed metal part (metal cabinet, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistance reading of 1 MΩ. Any resistance below this value indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

2. Hot Check

The test sequence, with reference to the measuring circuit in the figure is as follows:

(1) With switch S1 open, connect the VCR to the measuring circuit. Immediately after connection, measure the leakage current using both positions of switch S2 and with the switching devices in the VCR in all of their operating positions.

(2) Close switch S1, energizing the VCR, and immediately after closing the switch, measure leakage current using both positions of switch S2, and with the switching devices in the VCR in all of their operating positions. Repeat the current measurements of items (1) and (2) after the VCR has reached thermal stabilization. The leakage current should not be more than 0.5 mA.



AC Leakage Test

Avoid shock hazards. Do not connect this VCR to a TV antenna, cable or accessory that exhibits excessive leakage currents. If available, the television instrument or cable to which this VCR is connected should have the antenna cold check and leakage current hot check performed.

PRECAUTIONS

Handling and storage

- Avoid using the VCR in the following places:
  - extremely hot, cold or humid places,
  - dusty places,
  - near appliances generating strong magnetic fields,
  - places subject to vibration,
  - poorly ventilated areas.
- Be careful of moisture condensation.
- If you pour a cold liquid into a glass, water vapor in the air will condense on the surface of the glass. This is called moisture condensation.
- Moisture condensation on the head drum, one of the most critical parts of the VCR, will cause damage to the tape.
- The VCR is equipped with a moisture condensation prevention circuit. This circuit operates only when the unit is attached to an AC outlet.
- Handle the VCR carefully.
- Do not block the ventilation openings.
- Do not place anything heavy on the recorder.
- Do not place liquids on the top cover of the recorder.
- Use the Recorder in horizontal (flat) position only.
- Avoid violent shocks to the recorder during packing and transportation.
- Before packing, be sure to remove the cassette from the recorder.

CONNECTION

Connecting separate antennas (UHF/VHF)

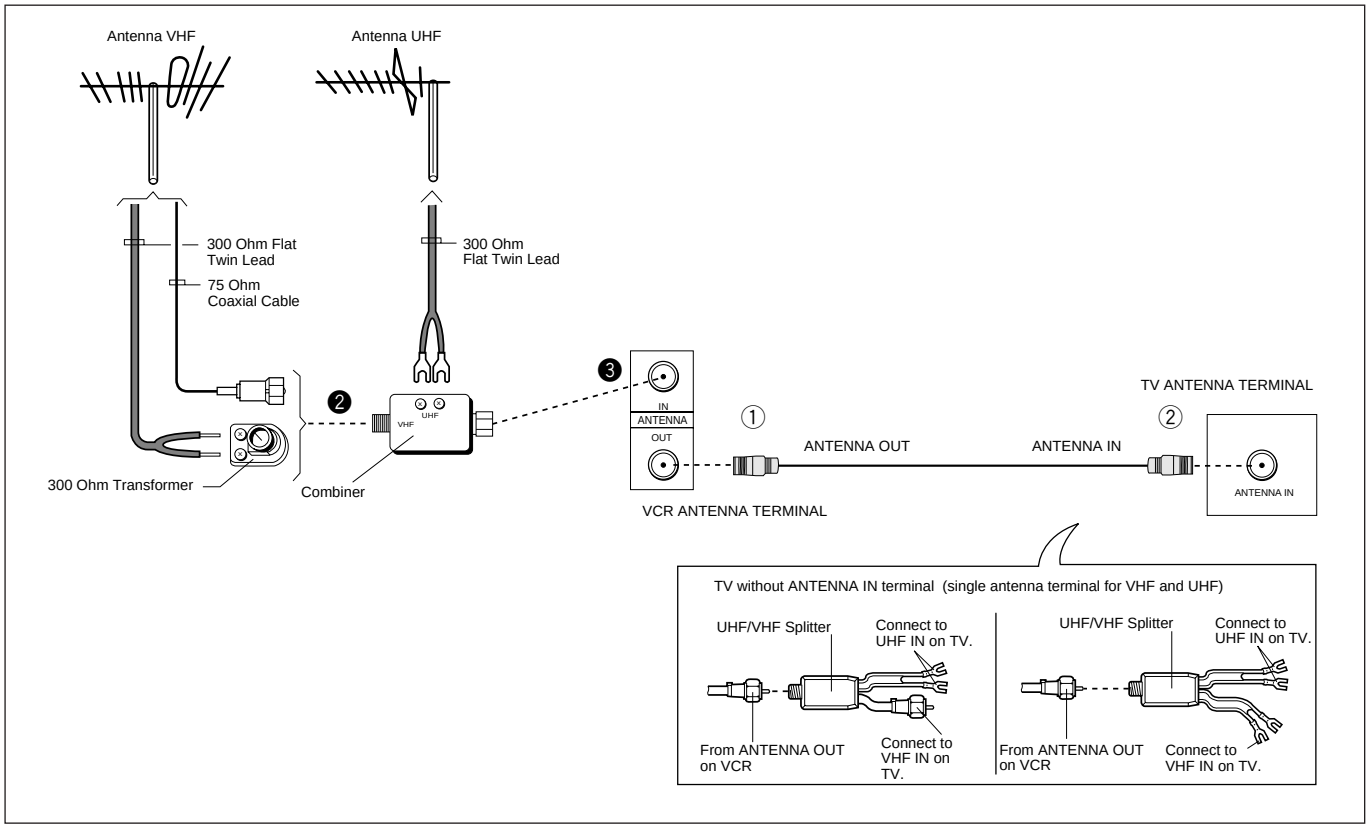
Connecting the Television

To connect separate UHF/VHF antennas to the VCR:

1. Disconnect the antennas from the back of your TV.
2. Connect the antenna leads to the combiner.
3. Screw or push the combiner onto the ANTENNA terminal on the VCR labeled ANTENNA IN.
4. When you are finished, refer to “Connecting the Television” to complete your connections.

Now that you’ve completed the antenna connections to your VCR, you’re ready to connect the VCR to the TV.
Because every television is different (especially older model TVs), your VCR may need to be connected in a variety of ways. See the Owner’s Manual for Instruction Information ON:

- **Determining if you need a splitter,**
- **Connecting TVs with audio and video inputs.**



Connecting a regular TV to the VCR

Before connecting the VCR to the TV, complete the cable or antenna connections to the VCR. (If you have not already done so.)

To connect a regular TV to the VCR:

1. Take the black cable that is supplied with your VCR (called a coaxial cable) and connect it to the ANTENNA terminal on the VCR labeled ANTENNA OUT.
2. Connect the other end of this cable to the terminal on your TV labeled ANTENNA IN. (This terminal may also be labeled VHF IN.) If you have an older TV without this kind of terminal, you will have to use a splitter and then connect the splitter to the television.

DISASSEMBLY

1. Removal of Top Cover

1. Remove the two Top Cover fastening screws (ⓐ) shown in Fig. 1 and remove the Top Cover in the direction shown by arrow.

2. Removal of Front Panel

1. Remove the Top Cover.
   (Refer to Para. 1 of the DISASSEMBLY.)
2. Unfasten the seven catches (ⓑ) shown in Fig. 1 and remove the Front Panel in the direction shown by arrows.

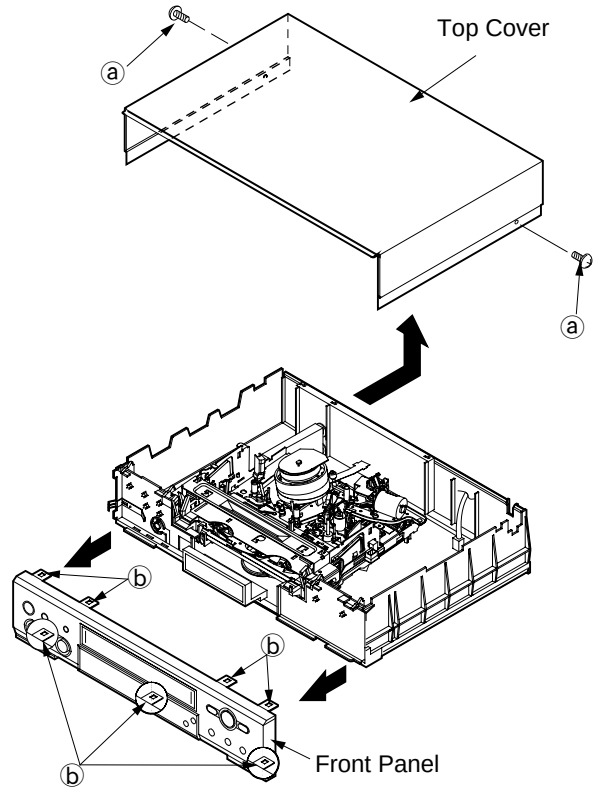


Fig. 1

3. Removal of Bottom Panel

1. Remove the Top Cover.
   (Refer to Para. 1 of the DISASSEMBLY.)
2. Remove the two fastening screws (ⓐ) shown in Fig. 2.
3. Turn the set upside down as shown in Fig. 3.
4. Slide and lift the Bottom Panel in the direction of the arrows paying attention to the five catches (ⓑ) to remove it.

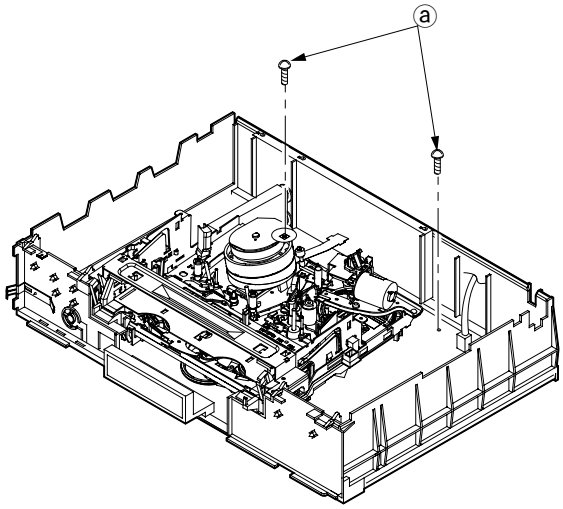


Fig. 2

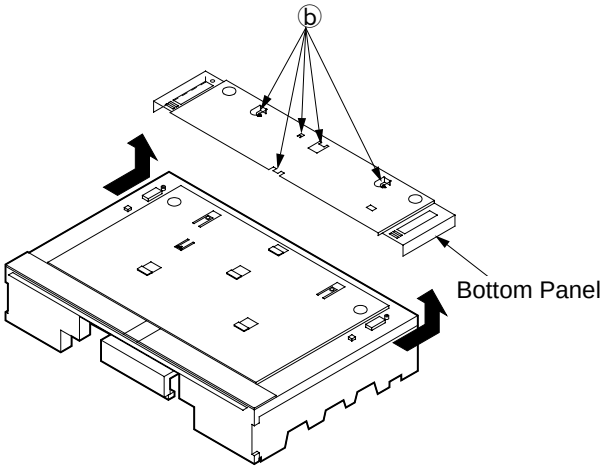


Fig. 3

4. Removal of DECK ASSY

1. Remove the Top Cover.
   (Refer to Para. 1 of the DISASSEMBLY.)
2. Remove the Front Panel.
   (Refer to Para. 2 of the DISASSEMBLY.)
3. Short-circuit the cathode side of D927 and the GND of the DECK ASSY using the jig shown below.

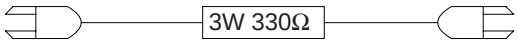
Note: The CAPSTAN MOTOR may be damaged without above short circuit.

4. Remove the two screws (ⓐ) shown in Fig. 4.
5. Remove the four screws (ⓑ) shown in Fig. 5.
6. Disconnect the Connectors MA, MD, MH and ML.
7. Release the two catches (ⓒ) shown in Fig.5 and raise the DECK ASSY to remove it.

Note1: Remove the DECK ASSY paying attention to the Connectors MC and MF under it.

Note2: Short-circuit the cathode side of D927 and the Shield Plate using the jig shown below before attaching the DECK ASSY.

Jig (Part No. : 859C548O10)



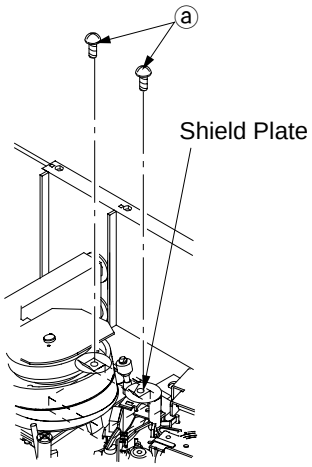


Fig. 4

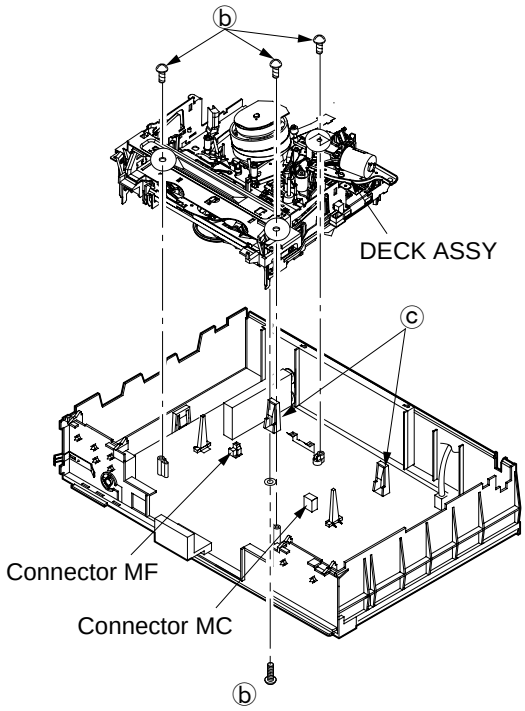


Fig. 5

HOW TO EXECUTE CIRCUIT BOARD SERVICE

CAUTION: BEFORE ATTEMPTING TO REMOVE OR REPAIR ANY PCB, UNPLUG THE POWER CORD FROM THE A.C. SOURCE.

LOCATION OF PRINT CIRCUIT BOARDS

Note :

- Take caution when removing flat cables to prevent any contact problem.
- Connect and disconnect the flat cables at right angles to the connector and make sure that it is completely secured.
- After servicing the PCB, restore the flat cable and leads to their former state.

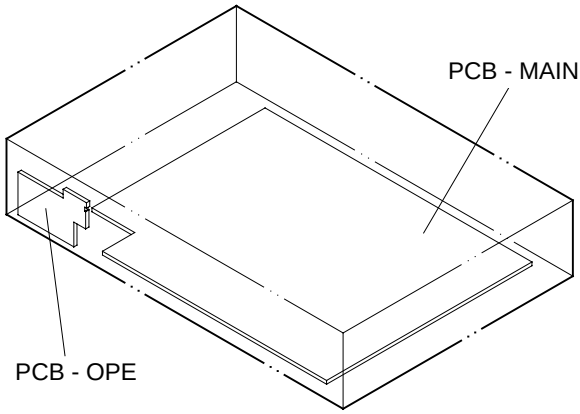


Fig. 6

1. PCB-OPE

1. Remove the Top Cover.
   (Refer to Para. 1 of the DISASSEMBLY.)
2. Remove the Front Panel.
   (Refer to Para. 2 of the DISASSEMBLY.)
3. Remove the Connector OS.
4. Remove the screw (ⓐ) shown in Fig. 7 to remove the PCB-OPE.

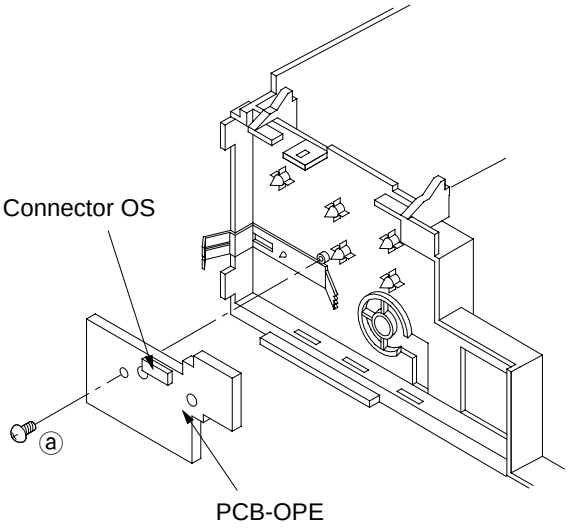


Fig. 7

2. PCB-MAIN

1. Remove the Bottom Panel.
   (Refer to Para. 3 of the DISASSEMBLY.)
2. Remove the DECK ASSY.
   (Refer to Para. 4 of the DISASSEMBLY.)
3. Remove the two screws (ⓐ) shown in Fig. 8.
4. Remove the Holder for the AC Power Cord from the Base Chassis shown in Fig. 9.
5. Remove the PCB-OPE.
   (Refer to Para. 1 of the HOW TO EXECUTE CIRCUIT BOARD SERVICE.)
6. Release the two fastening catches (ⓑ) shown in Fig. 8. Raise the PCB-MAIN to remove it.
7. Release the three catches (ⓒ) shown in Fig. 10 and remove the Antenna Cover.

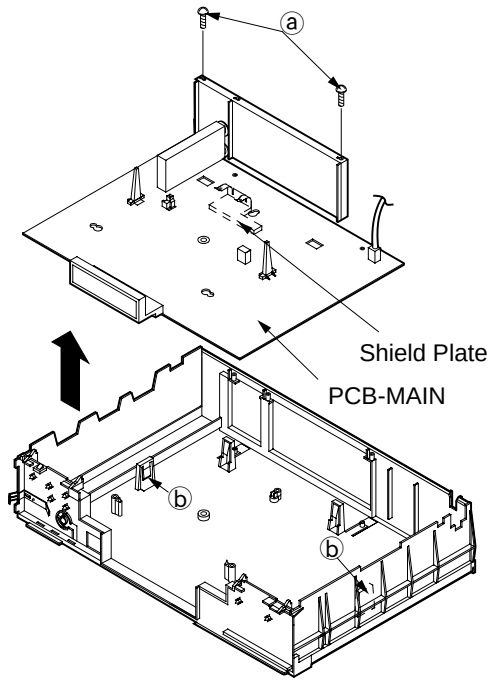


Fig. 8

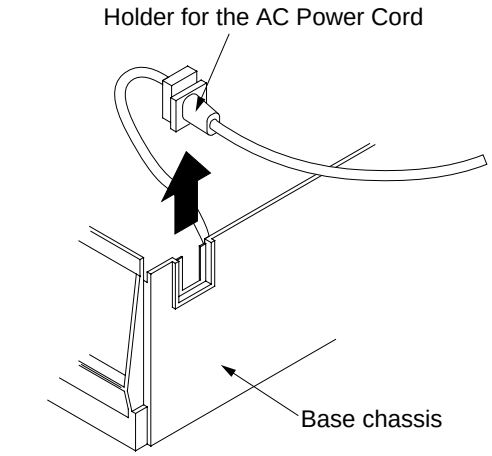


Fig. 9

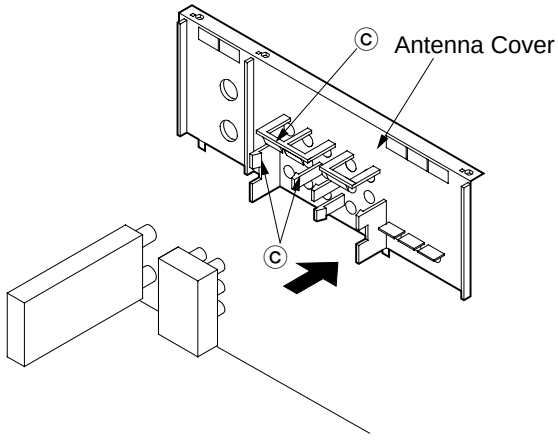


Fig. 10

◪ Service of PCB

- **Head Amp block**

1. Unsolder the four soldering points of the Shield Plate shown in Fig. 8 and remove it.

Note: Before checking the operation, mount the Shield Case and the Shield Plate on the original position. If not provided, beat or picture disturbance may appear.

CHIP PARTS REPLACEMENT

CHIP PARTS REPLACEMENT

Some resistors, shorting jumpers (0Ω resistor), ceramic capacitors, transistors and diodes are chip parts.
When replacing these parts, note the following cautions.

Cautions :

A. Use fine tipped, well insulated soldering pencil (iron), about 30 watts, and tweezers.
B. Melt the solder and remove the Chip Parts carefully not to tear off the copper foil of the printed circuit board.
C. Discard removed chips ; do not reuse them.
D. Do not apply heat for more than 3 seconds to new Chip Parts.
E. Avoid using a rubbing stroke when soldering.
F. Take care not to scratch, or damage the Chip Parts when soldering.
G. Supplementary cementing is not required.

1. Removal of Chip Parts (Resistors, capacitors, etc.)

A. Grasp the part with tweezers. Melt the solder at both sides alternately, remove one side of the part with a twisting motion.
B. Melt the solder at the other side and remove the part.

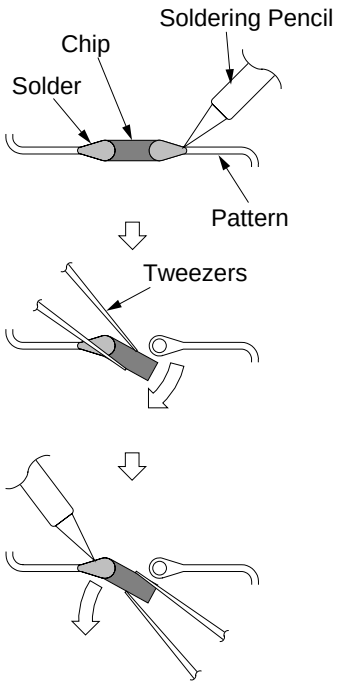


Fig. 1

2. Removal of Chip Parts (Transistors)

A. Melt the solder of one lead. Lift the side of that lead upward.
B. Simultaneously melt the solder of the two remaining leads and lift the part from the PCB.

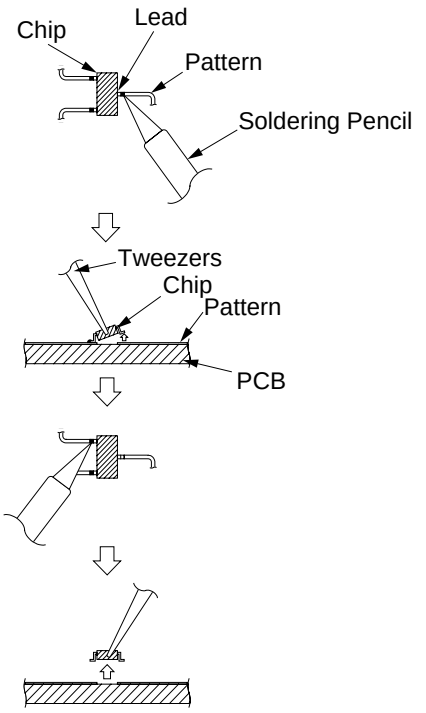


Fig. 2

3. Replacement

A. Presolder the contact points of the circuit pattern.
B. Press the part downward with tweezers and apply the soldering pencil as shown in Fig. 3.

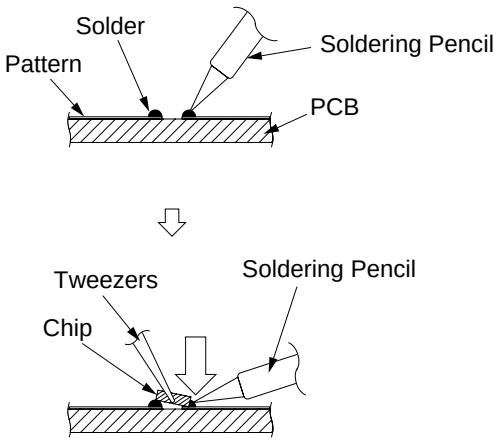


Fig. 3

MECHANICAL ADJUSTMENT AND REPLACEMENT

1. DECK Cleaning

The following parts require cleaning whenever serviced in order to maintain satisfactory performance.

1-1. VIDEO HEAD

1. Clean the VIDEO HEAD according to the following method. Dust and other foreign objects on the VIDEO HEAD disturb the normal PLAYBACK picture. To clean the VIDEO HEAD, hold a VIDEO HEAD cleaning cloth dampened with alcohol against the DRUM and slowly turn the DRUM counter-clockwise.

Note : Do not directly touch the HEADS attached to the UPPER DRUM ASSY. The HEADS are very hard but brittle to shock (especially to shock in the vertical direction) and are easily broken. Never apply force to it in the vertical direction.

2. Allow the residual alcohol to dry thoroughly before running a tape. The residual alcohol on the HEADs may damage the tape if not dried completely.

UPPER DRUM ASSY cleaning

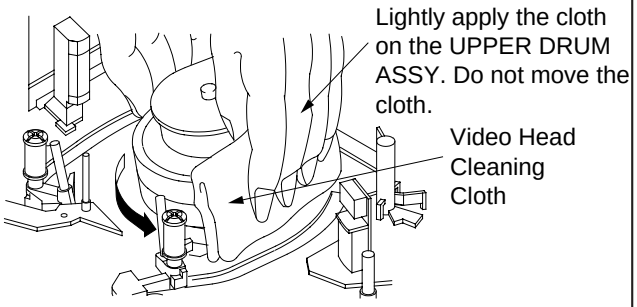


Fig. 1-1

1-2. Tape Running System

Clean the following parts of the Tape Running System.

1. TENSION PIN
2. F/E HEAD
3. SLANT POLE (SP)
4. SLANT POLE (TU)
5. A/C HEAD
6. GUIDE POLE (TU)
7. PINCH ROLLER
8. GUIDE PIN (TU)
9. GUIDE ROLLER (SP)
10. UPPER / LOWER DRUM ASSY
11. GUIDE ROLLER (TU)
12. CAPSTAN SHAFT

1. Clean the Tape Running System using a piece of gauze dampened with alcohol except for the GUIDE ROLLER (SP), GUIDE ROLLER (TU), and PINCH ROLLER which require to be cleaned with a piece of dry gauze.
2. Allow the residual alcohol to dry thoroughly before running the tape. The residual alcohol on the SYSTEM may damage the tape if not dried completely.

1-3. REEL DISK Drive System

1. Clean the BRAKE side and the REEL BELT of the REEL DISK Drive System.
2. Clean the REEL DISK Drive System using a piece of gauze dampened with alcohol except for the REEL BELT which requires cleaning with a piece of dry gauze.
3. Allow the residual alcohol to dry thoroughly before operation.

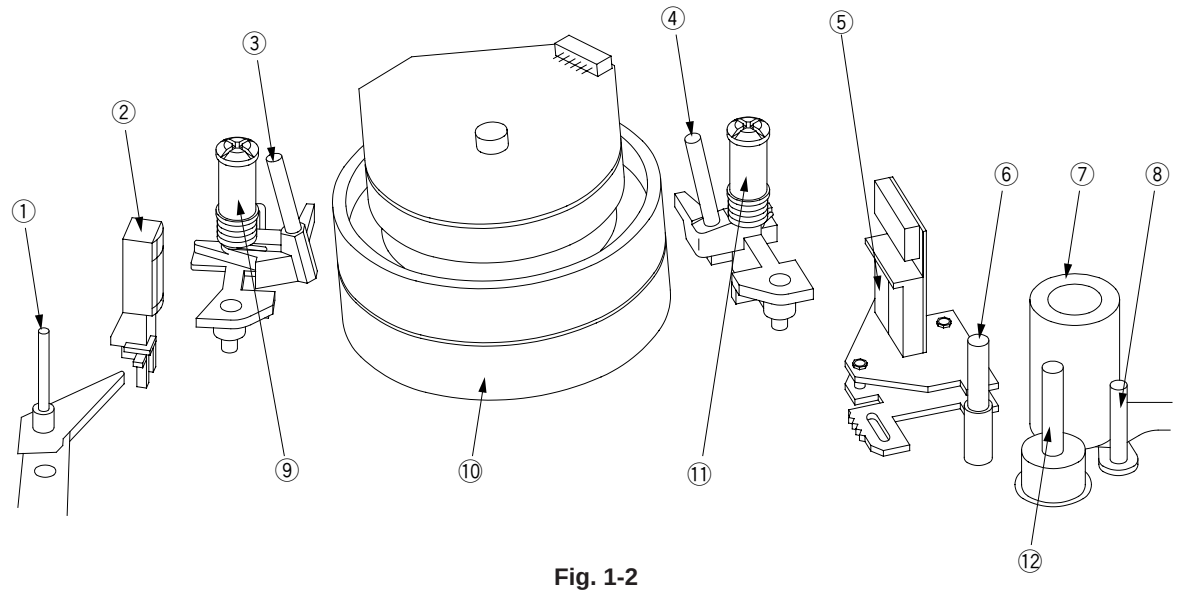


Fig. 1-2

2. Replacement of Major Parts

2-1. CLEANING ARM, FELT RING

SET POSITION : Normal

(Removal)

1. Release the two catches (ⓐ) of the CLEANING ARM shown in Fig. 2-1 to remove the CLEANING ARM.

(Installation)

1. Install the CLEANING ARM shown in Fig. 2-1.

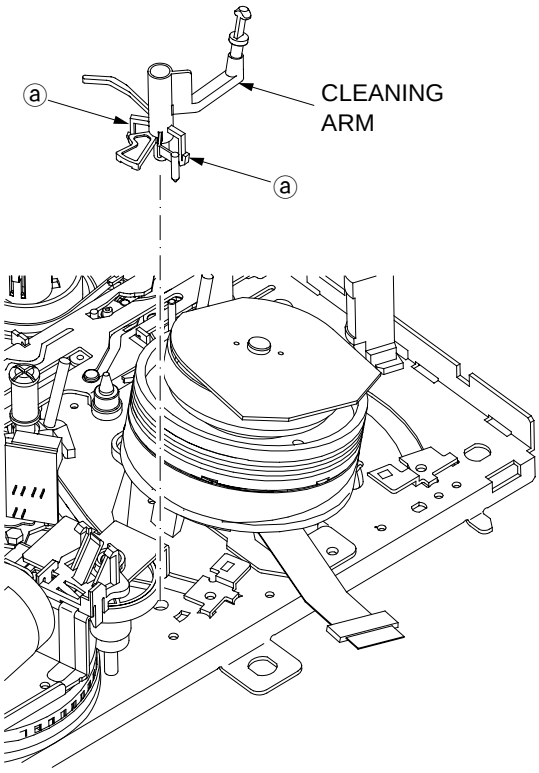


Fig. 2-1

2-2. STAY PLATE

SET POSITION : Normal

(Removal)

1. Remove the two screws (ⓐ) fastening the STAY PLATE shown in Fig. 2-2 to remove the STAY PLATE.

(Installation)

1. Install the STAY PLATE shown in Fig. 2-2.

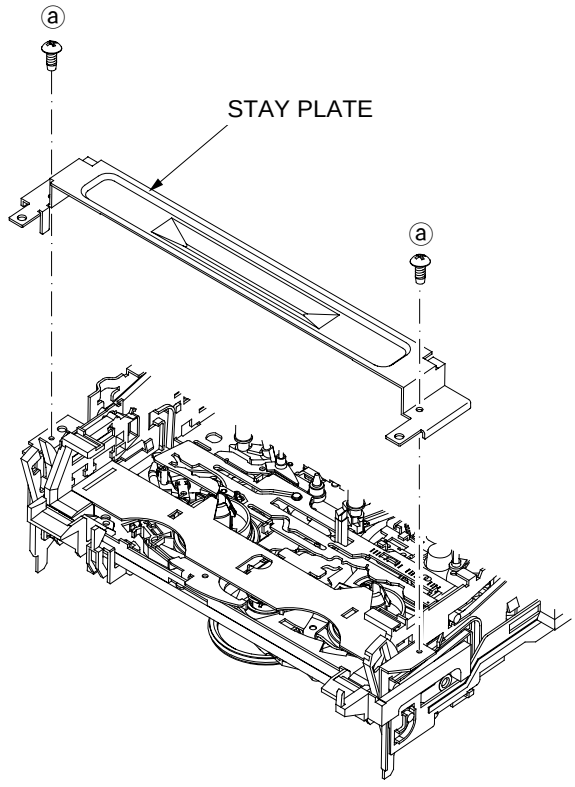


Fig. 2-2

2-3. BOTTOM ASSY

SET POSITION : Normal

Remove the following part before replacing the BOTTOM ASSY. Refer to the corresponding item to install it.

- STAY PLATE (Item 2-2)

(Removal)

1. Move the WORM WHEEL in Fig. 2-3-1 in the direction shown by arrow Ⓐ. And match the boss (ⓐ) of the BOTTOM ASSY with the hole in the MAIN PLATE ASSY.
2. Lift the BOTTOM ASSY in Fig. 2-3-1 in the direction shown by arrow Ⓑ and remove in the direction shown by arrow Ⓒ.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the grooves of the MAIN PLATE ASSY shown in Fig. 2-3-2.
2. Apply grease (MULTEMP AC-DM)[859D055O90] to the bosses of the BOTTOM ASSY shown in Fig. 2-3-2.
3. Rotate the WORM WHEEL shown in Fig. 2-3-1 so that the ARM (SP) stands vertically.
4. Insert the boss (ⓑ) of the BOTTOM ASSY shown in Fig. 2-3-2 in the upper groove of the MAIN PLATE and the boss (ⓒ) in the lower groove.
5. Insert the boss (ⓓ) of the BOTTOM ASSY to the upper groove through the hole in the MAIN PLATE ASSY shown in Fig. 2-3-1 and the boss (ⓔ) to the lower groove through the slot in the ARM (SP).

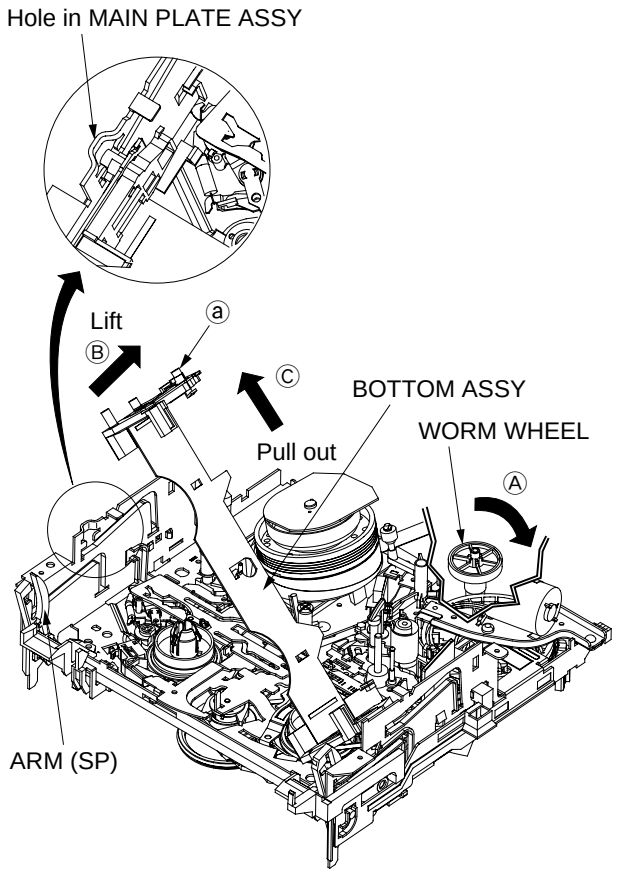


Fig. 2-3-1

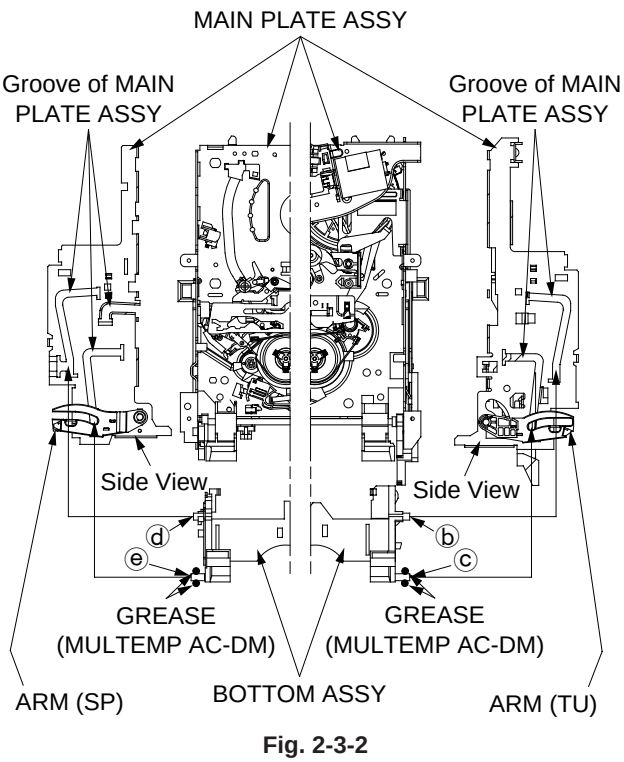


Fig. 2-3-2

2-4. INSERT GUIDE (TU)

DECK POSITION : Normal

Remove the following parts before replacing the INSERT GUIDE (TU). Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)

(Removal)

1. Remove the screw (ⓐ) fastening the INSERT GUIDE (TU) shown in Fig. 2-4 to remove the INSERT GUIDE (TU).

(Installation)

1. Install the INSERT GUIDE (TU) shown in Fig. 2-4.

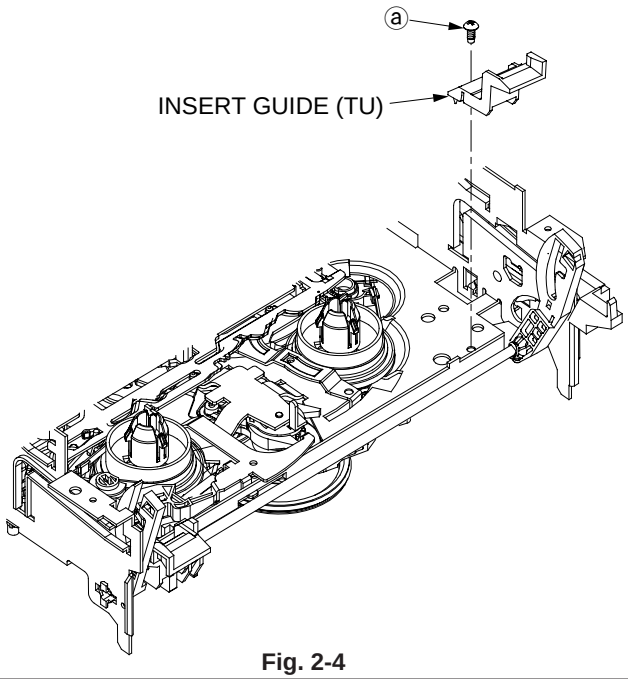


Fig. 2-4

2-5. INSERT GUIDE (SP)

DECK POSITION : Normal

Remove the following parts before replacing the INSERT GUIDE (SP). Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)

(Removal)

1. Remove the screw (ⓐ) fastening the INSERT GUIDE (SP) shown in Fig. 2-5 to remove the INSERT GUIDE (SP).

(Installation)

1. Install the INSERT GUIDE (SP) shown in Fig. 2-5.

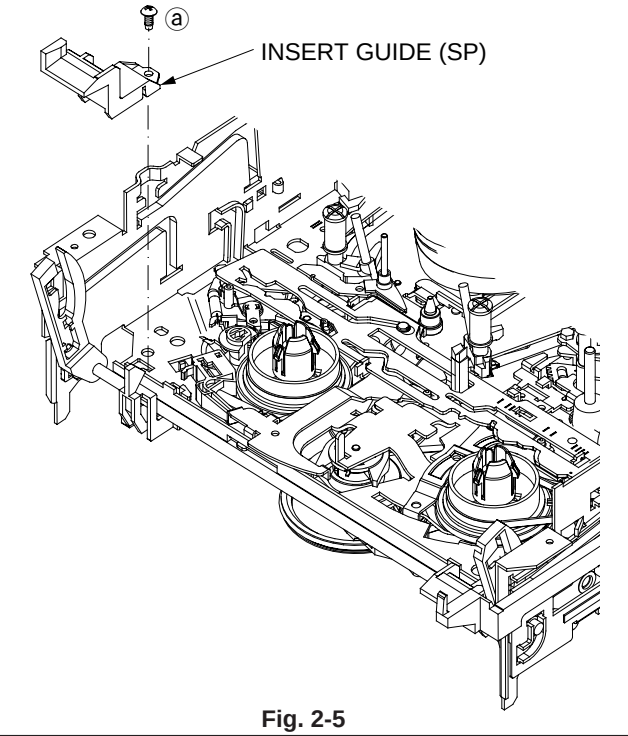


Fig. 2-5

2-6. REC HOLDER, REC LEVER, REC SPRING

DECK POSITION : Upside down

(Removal)

1. Remove the screw (ⓐ) fastening the REC HOLDER shown in Fig. 2-6 to remove the REC HOLDER.
2. Release the REC SPRING shown in Fig. 2-6 from the catch (ⓑ) of the REC HOLDER to remove the REC LEVER.
3. Release the two catches (ⓒ) of the REC LEVER shown in Fig. 2-6 to remove the REC SPRING.

(Installation)

1. Install the REC SPRING shown in Fig. 2-6 to the REC LEVER and hook the REC SPRING to the catches (ⓒ).
2. Install the REC LEVER shown in Fig. 2-6 to the REC HOLDER.
3. Hook the REC SPRING shown in Fig. 2-6 to the catch (ⓑ).
4. Install the REC HOLDER shown in Fig. 2-6.

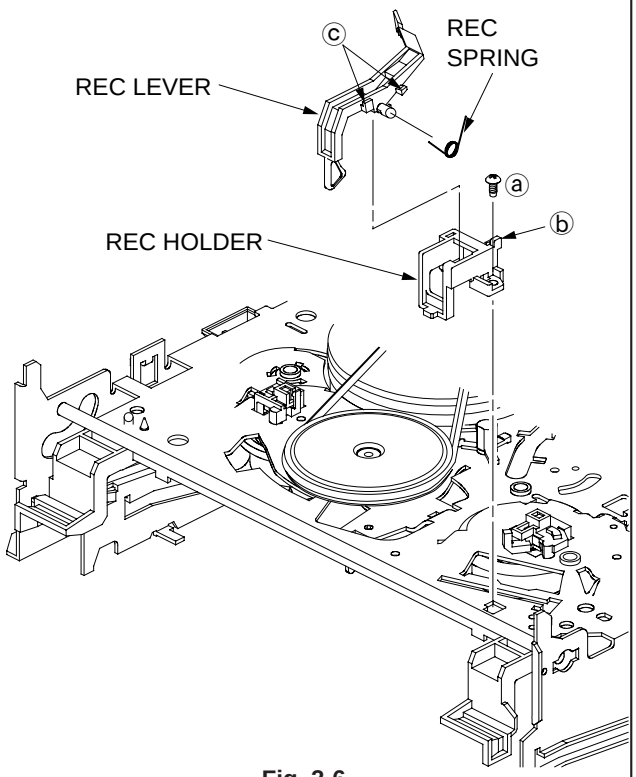


Fig. 2-6

2-7. F/L ARM ASSY, F/L BEARING

DECK POSITION : Normal

Remove the following parts before replacing the F/L ARM ASSY and F/L BEARING. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- INSERT GUIDE (TU) (Item 2-4)
- INSERT GUIDE (SP) (Item 2-5)
- REC HOLDER (Item 2-6)

(Removal)

1. Release the catch (ⓐ) of the F/L BEARING shown in Fig. 2-7 and pull out the F/L ARM ASSY in the direction shown by arrow Ⓐ.

Note : Do not pull the F/L ARM by force because it may break the catch (ⓐ) of the F/L BEARING.

2. Release the catch (ⓑ) of the F/L BEARING shown in Fig. 2-7 and rotate the F/L BEARING 90 degrees to remove it.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the groove of the MAIN PLATE ASSY shown in Fig. 2-7.
2. Apply grease (MULTEMP AC-DM)[859D055O90] to the boss of the ARM (SP) shown in Fig. 2-7.
3. Apply grease (MULTEMP AC-DM)[859D055O90] to the bosses of the ARM (TU) shown in Fig. 2-7.
4. Install the F/L BEARING shown in Fig. 2-7.
5. Insert the boss (ⓒ) of the F/L ARM ASSY shown in Fig. 2-7 into the groove (ⓓ) of the MAIN PLATE ASSY to install the F/L ARM ASSY.

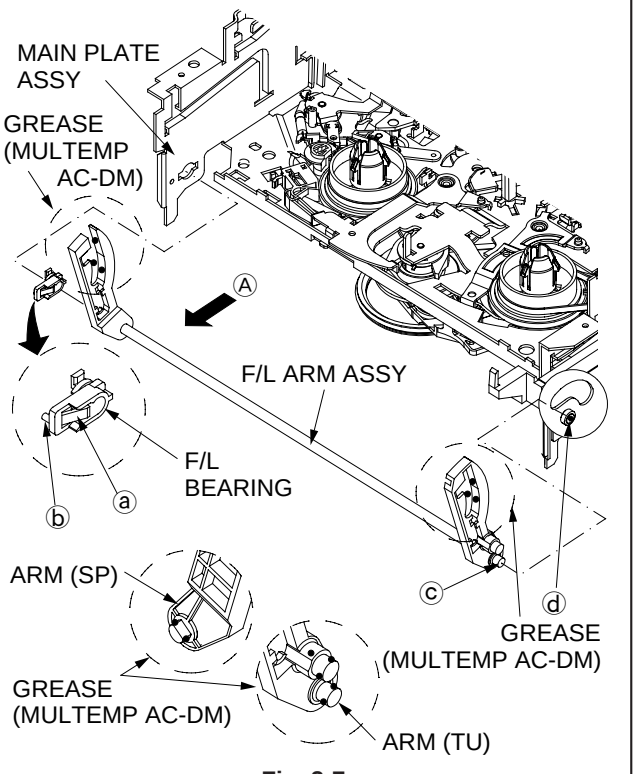


Fig. 2-7

2-8. A/C HEAD UNIT

DECK POSITION : Normal

(Removal)

1. Remove the LEAD CONNECTOR of the A/C HEAD UNIT shown in Fig. 2-8.
2. Remove the two screws (ⓐ) fastening the A/C HEAD UNIT shown in Fig. 2-8 to remove the A/C HEAD UNIT.

(Installation)

1. Install the A/C HEAD UNIT shown in Fig. 2-8.

Note : Never touch the head of the A/C HEAD UNIT shown in Fig. 2-8. Clean dirt on the head with alcohol, if necessary.

2. Install the LEAD CONNECTOR of the A/C HEAD UNIT shown in Fig. 2-8.
3. Perform “3-3. A/C HEAD Adjustment” and “3-4. Phase Adjustment” of “3. Interchangeability Adjustment of the Mechanism.”

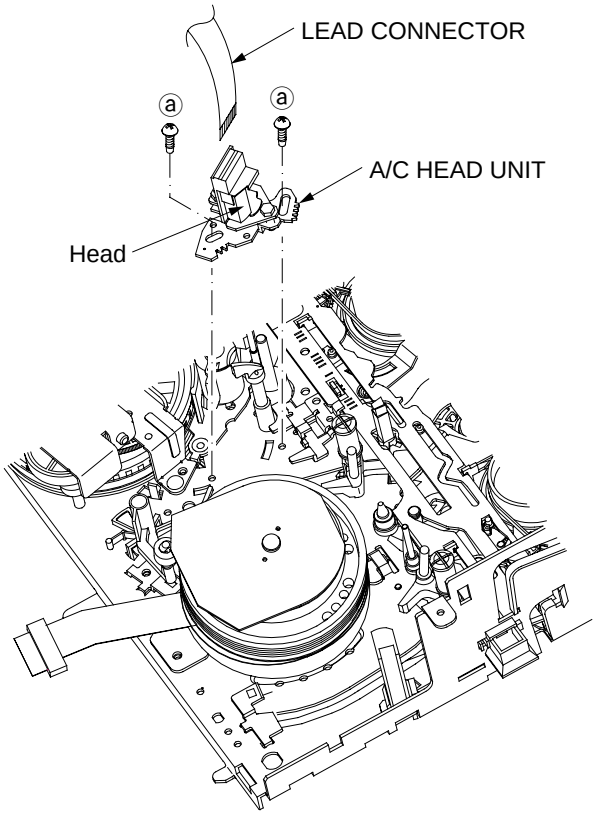


Fig. 2-8

2-9. F/E HEAD

DECK POSITION : Normal

(Removal)

1. Lift the F/E HEAD shown in Fig. 2-9-1 in the direction shown by arrow Ⓐ to remove it.

Note : Be sure to replace the removed F/E HEAD with a new one.

(Installation)

1. Install the F/E HEAD shown in Fig. 2-9-1.

Note : Never touch the head shown in Fig. 2-9-2. Clean it with alcohol, if necessary.

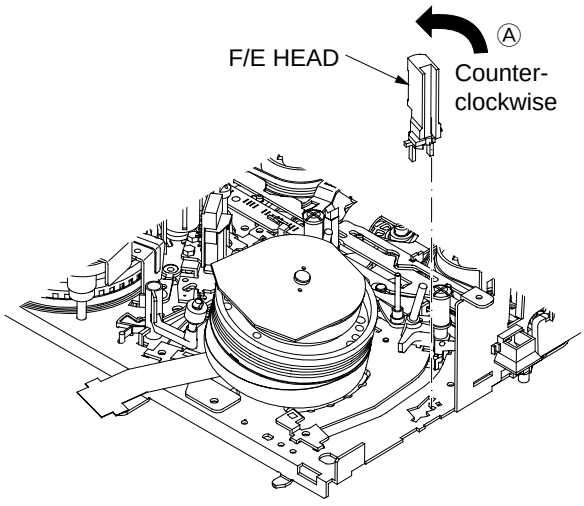


Fig. 2-9-1

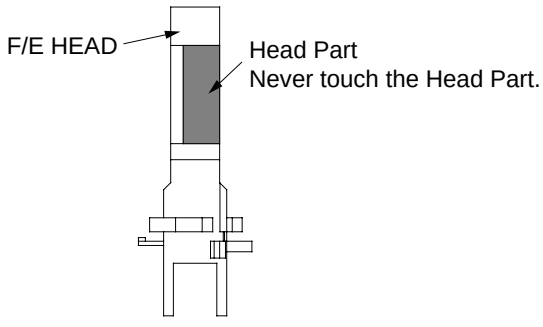


Fig. 2-9-2

2-10. SENSOR COVER (TU)

DECK POSITION : Normal

(Removal)

1. Release the catch (ⓐ) of the SENSOR COVER (TU) shown in Fig. 2-10 to remove the SENSOR COVER (TU).

(Installation)

1. Install the SENSOR COVER (TU) shown in Fig. 2-10.

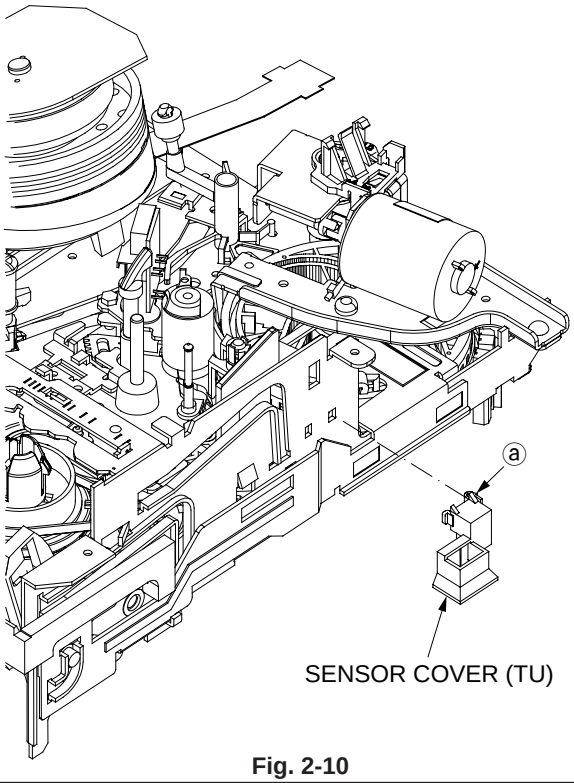


Fig. 2-10

2-11. SENSOR COVER (SP)

DECK POSITION : Normal

(Removal)

1. Remove the catch (ⓐ) of the SENSOR COVER (SP) shown in Fig. 2-11 to remove the SENSOR COVER (SP).

(Installation)

1. Install the SENSOR COVER (SP) shown in Fig. 2-11.

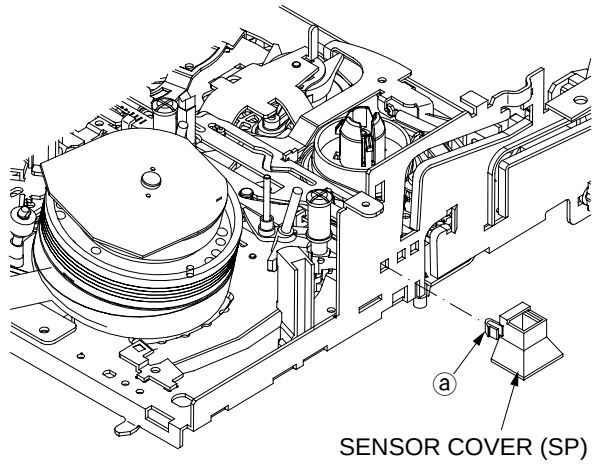


Fig. 2-11

2-12. REV UNIT (TU), REV UNIT (SP)

DECK POSITION : Upside down

(Removal)

1. Release the two catches (ⓐ) of the REV UNIT (TU) shown in Fig. 2-12 to remove the REV UNIT (TU).
2. Release the two catches (ⓑ) of the REV UNIT (SP) shown in Fig. 2-12 to remove the REV UNIT (SP).

(Installation)

1. Clean dirt on the transparent part of the REV UNIT (TU) with a VIDEO HEAD cleaning cloth.

Note : Never use solvent such as alcohol to clean the REV UNIT (TU).

2. Install the REV UNIT (TU) shown in Fig. 2-12.
3. Clean dirt on the transparent part of the REV UNIT (SP) with a VIDEO HEAD cleaning cloth.

Note : Never use solvent such as alcohol to clean the REV UNIT (SP).

4. Install the REV UNIT (SP) shown in Fig. 2-12.

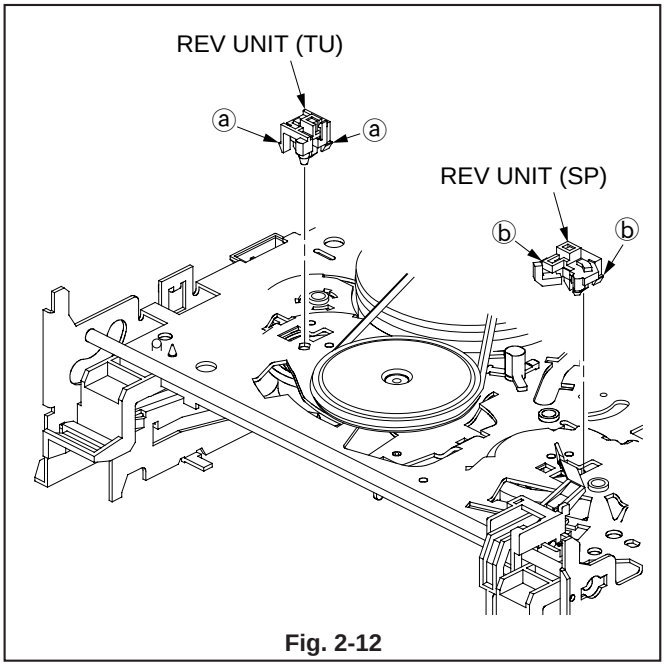


Fig. 2-12

2-13. MODE POSITION UNIT

DECK POSITION: Upside down

(Removal)

1. Release the two catches (ⓐ and ⓑ) of the MODE POSITION UNIT shown in Fig. 2-13 to remove the MODE POSITION UNIT.

(Installation)

1. Install the catch (ⓑ) of the MODE POSITION UNIT shown in Fig. 2-13.
2. Install the catch (ⓐ) of the MODE POSITION UNIT shown in Fig. 2-13.

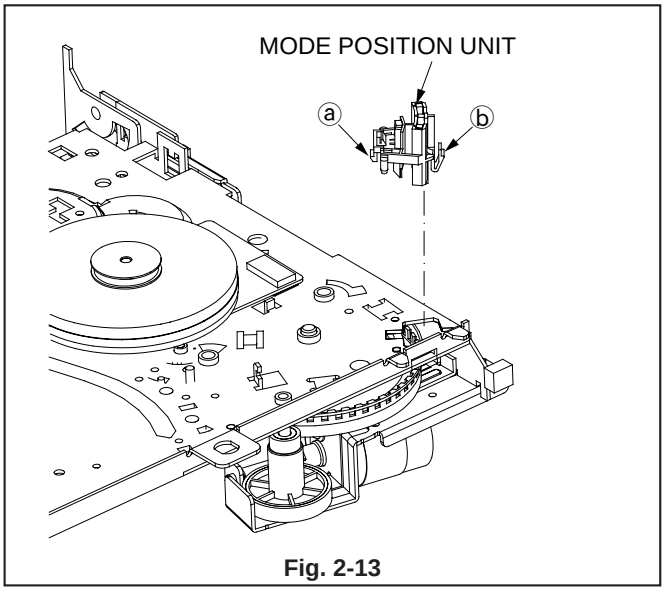


Fig. 2-13

2-14. REEL BELT, PULLEY BUSH, THRUST WASHER, BELT PULLEY, SHIFT SLIDER, PULLEY GEAR ASSY, SLIP GEAR, SLIP SPRING, SLIP WASHER, THRUST WASHER, SLIP ADJUSTER, IDLER 2 UNIT

DECK POSITION : Upside down

(Removal)

1. Remove the REEL BELT shown in Fig. 2-14-1.
2. Move the SHIFT SLIDER in Fig. 2-14-1 in the direction shown by arrow Ⓐ to remove the SHIFT SLIDER from the SHIFT LEVER.
3. Release the two catches (ⓐ) of the PULLEY BUSH shown in Fig. 2-14-1 to remove the PULLEY BUSH.

Note : Be sure to replace the removed PULLEY BUSH with a new one.

4. Remove the units from the THRUST WASHER to the IDLER 2 UNIT shown in Fig. 2-14-1.

(Installation)

Note : Be careful not to apply grease and oil to the felt side of the PULLEY GEAR ASSY or the grooved side of the SLIP GEAR shown in Fig. 2-14-4.

1. Apply oil (FLOIL 948P) [859D154O20] to the SHAFT for the IDLER 2 UNIT shown in Fig. 2-14-1.
2. Apply grease (PG-641) [859D055O30] to the specified parts on the IDLER 2 UNIT in Fig. 2-14-1.
3. Apply grease (MULTEMP AC-DM) [859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-14-1.
4. Apply grease (PG-641) [859D055O30] to the specified parts on the new SHIFT SLIDER in Fig. 2-14-2.
5. Apply grease (PG-641) [859D055O30] to the specified parts on the new SLIP ADJUSTER in Fig. 2-14-2.
6. Apply grease (PG-641) [859D055O30] to the specified parts on the new BELT PULLEY in Fig. 2-14-3.
7. Install the IDLER 2 UNIT shown in Fig. 2-14-1.
8. Install the SLIP ADJUSTER shown in Fig. 2-14-3, aligning the lug of the SLIP ADJUSTER with the center notch of the IDLER 2 UNIT.

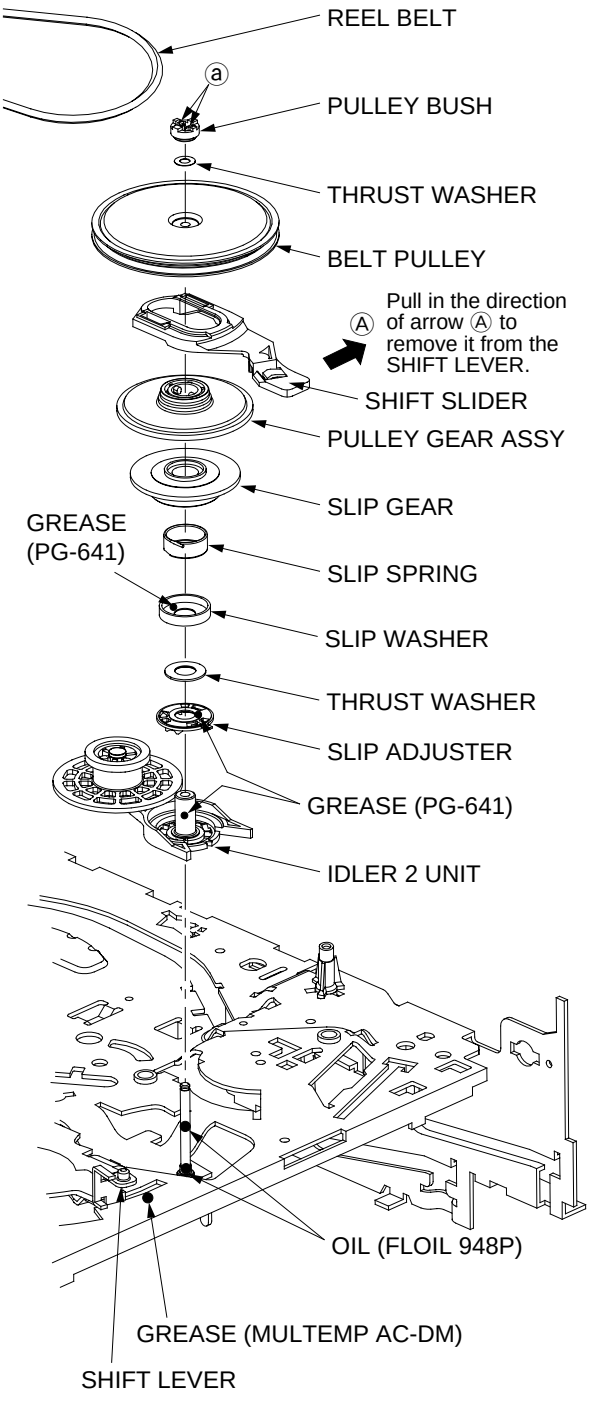


Fig. 2-14-1

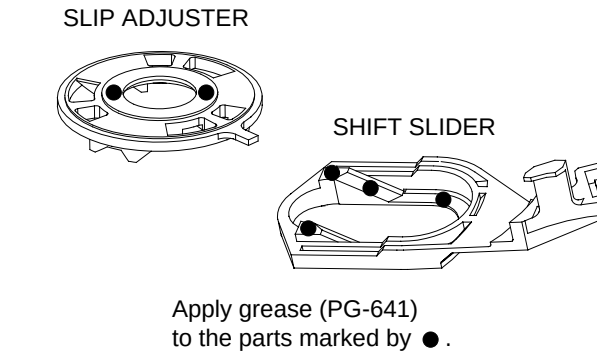


Fig. 2-14-2

9. Install the units from the SLIP WASHER to the REEL BELT shown in Fig. 2-14-1.

Note1 : Be sure to replace the removed PULLEY BUSH with a new one.

Note2 : Attach the SLIP SPRING with its straight end facing the SLIP GEAR side.

Note3 : Attach the SLIP WASHER in the orientation shown in Fig. 2-14-5.

Note4 : Apply grease (PG-641) [859D055O30] to the specified part on the SLIP WASHER in Fig. 2-14-5.

10. Install the SHIFT SLIDER to the SHIFT LEVER shown in Fig. 2-14-1.

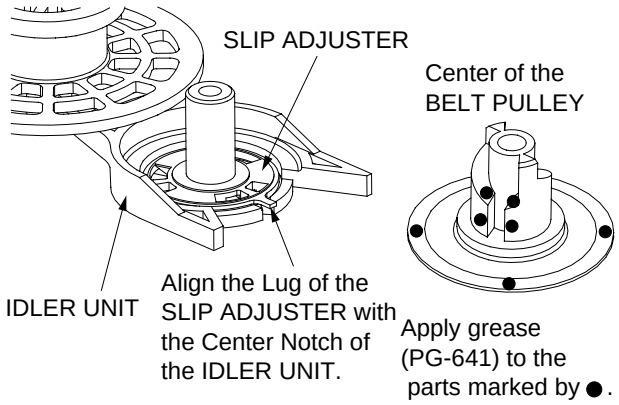


Fig. 2-14-3

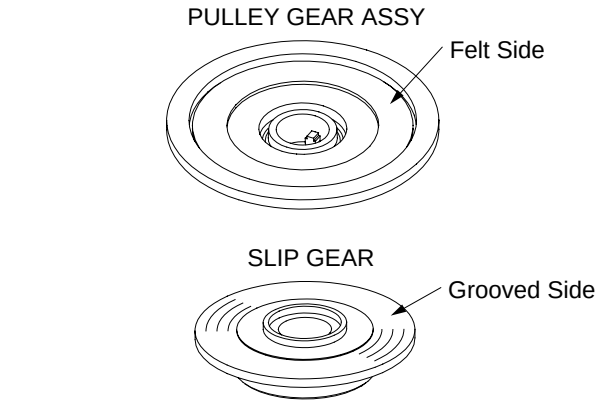


Fig. 2-14-4

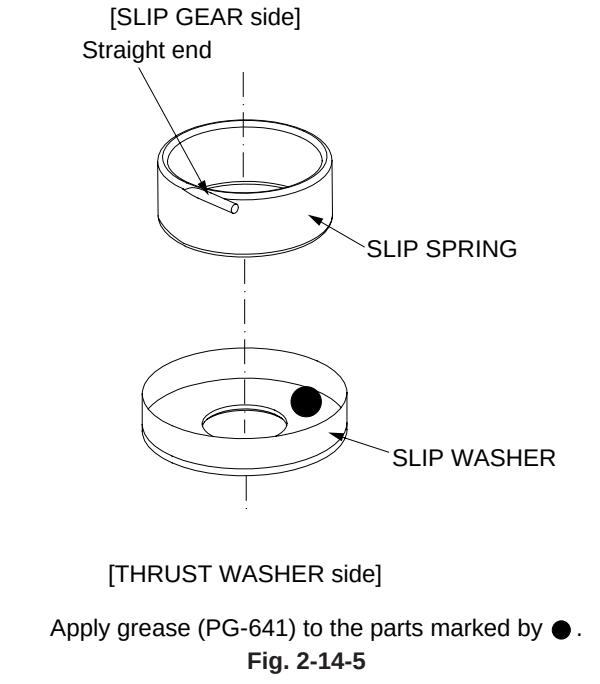


Fig. 2-14-5

2-15. CAPSTAN BRAKE SPRING, CAPSTAN BRAKE ASSY

DECK POSITION : Upside down

(Removal)

1. Remove the CAPSTAN BRAKE SPRING shown in Fig. 2-15.
2. Remove the catch (ⓐ) of the CAPSTAN BRAKE ASSY shown in Fig. 2-15 to remove the CAPSTAN BRAKE ASSY.

(Installation)

1. Install the CAPSTAN BRAKE ASSY shown in Fig. 2-15.
2. Install the CAPSTAN BRAKE SPRING shown in Fig. 2-15.

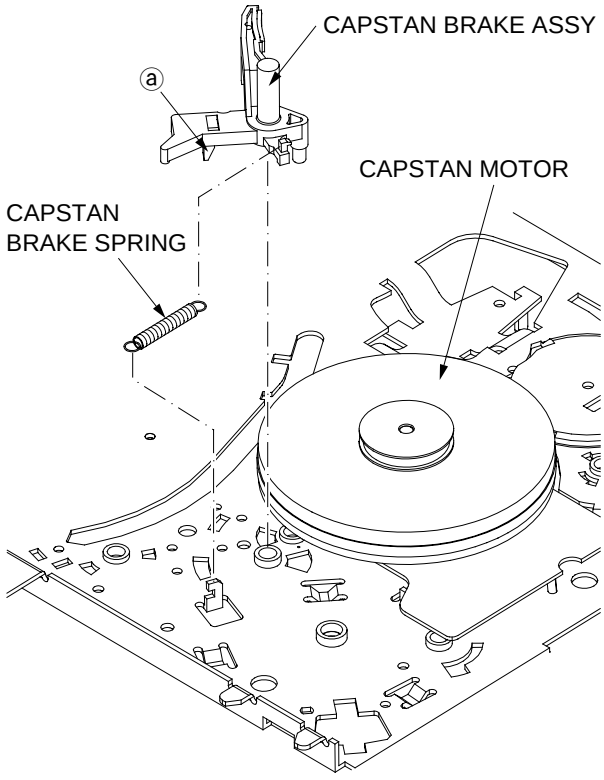


Fig. 2-15

2-16. FC HOLDER, MOTOR HOLDER, LOADING WORM, LOADING MOTOR ASSY, WORM WHEEL

DECK POSITION : Normal

(Removal)

1. Release the two catches (ⓐ) of the FC HOLDER shown in Fig. 2-16-1 to remove the FC HOLDER.
2. Remove the two screws (ⓑ) fastening the MOTOR HOLDER shown in Fig. 2-16-1 to remove the MOTOR HOLDER.
3. Remove the two screws (ⓒ) fastening the LOADING MOTOR ASSY shown in Fig. 2-16-1 to remove the LOADING MOTOR ASSY and LOADING WORM.
4. Remove the WORM WHEEL.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the LOADING WORM shown in Fig. 2-16-2.
2. Apply grease (MULTEMP AC-DM)[859D055O90] to the WORM WHEEL shown in Fig. 2-16-2.
3. Install the WORM WHEEL.
4. Install the LOADING WORM and LOADING MOTOR ASSY to the MOTOR HOLDER.

Note : Tighten the screw (ⓒ) shown in Fig. 2-16-1 after putting the LUG TERMINAL on the screw.

5. Install the MOTOR HOLDER.
6. Install the FC HOLDER.

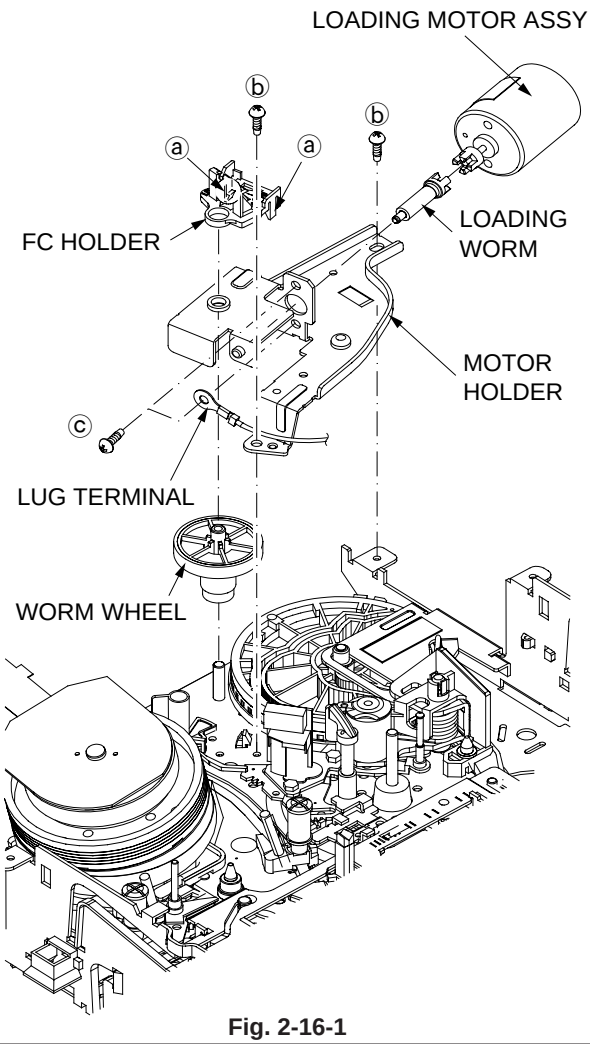
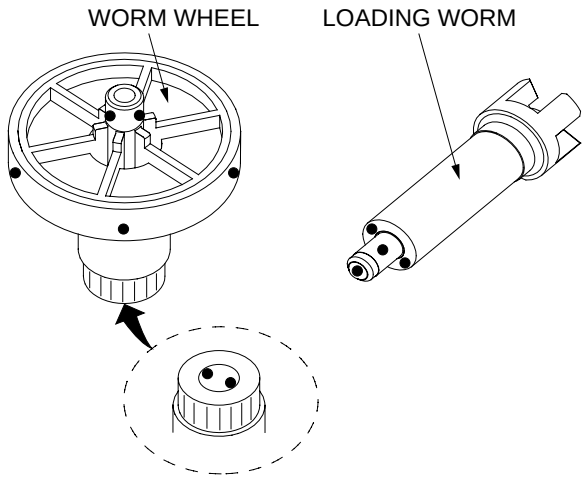


Fig. 2-16-1



Apply grease (MULTEMP AC-DM) to the parts marked by ● .

Fig. 2-16-2

2-17. PINCH ARM CAP, PINCH UNIT

DECK POSITION : Normal

(Removal)

1. Release the two catches (ⓐ) of the PINCH ARM CAP shown in Fig. 2-17 to remove the PINCH ARM CAP.
2. Remove the PINCH UNIT shown in Fig. 2-17.

(Installation)

1. Insert Part Ⓐ of the PINCH UNIT shown in Fig. 2-17 in the most external groove of the MAIN CAM.
2. Install the PINCH ARM CAP aligning Part Ⓑ of the PINCH ARM CAP with the rib of the MAIN PLATE ASSY.

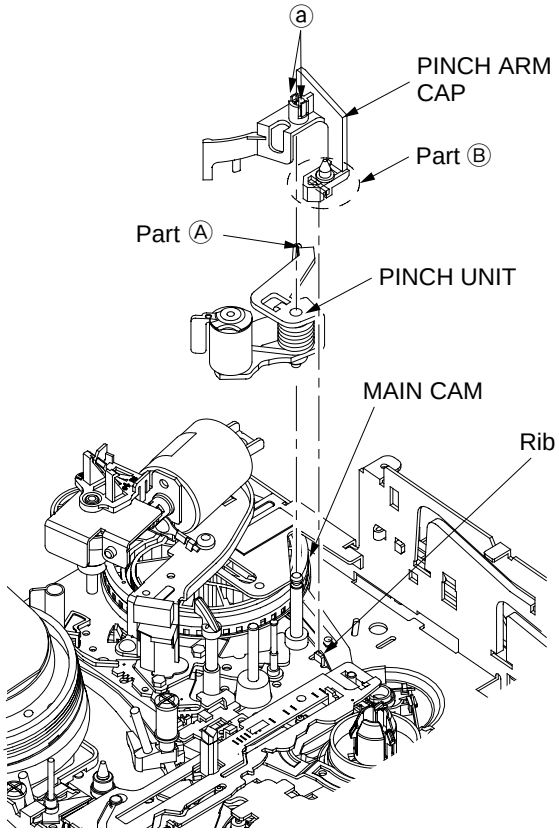


Fig. 2-17

2-18. F/L PLATE, DOOR ARM

DECK POSITION : Normal

Remove the following parts before replacing the F/L PLATE and DOOR ARM. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- SENSOR COVER (TU) (Item 2-10)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)

(Removal)

1. Slightly lift the back of the F/L PLATE (MAIN CAM side) shown in Fig. 2-18-1 to remove the F/L PLATE.
2. Remove the DOOR ARM.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the new F/L PLATE in Fig. 2-18-1.
2. Apply grease (MOLYKOTE G PASTE) [859D055O50] to the specified parts on the new F/L PLATE in Fig. 2-18-1.

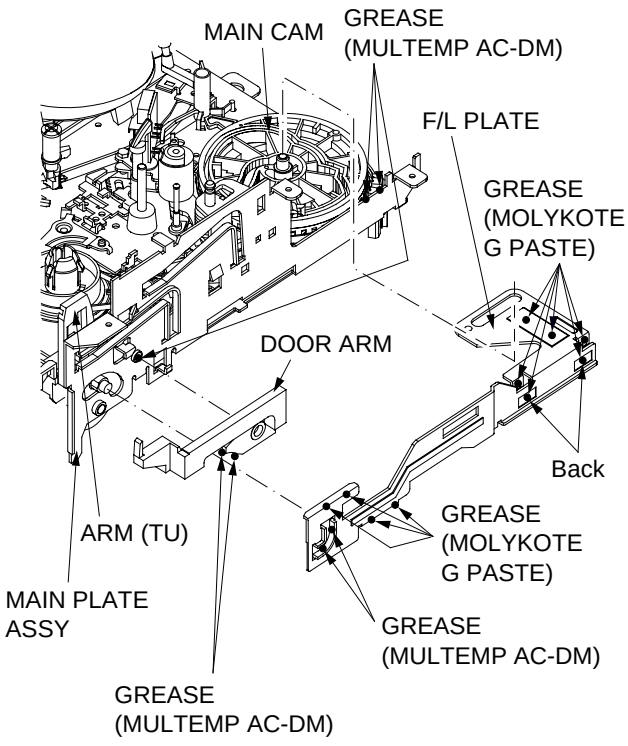


Fig. 2-18-1

3. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-18-1.
4. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the DOOR ARM in Fig. 2-18-1.
5. Install the DOOR ARM.
6. Align the hole in the MAIN CAM with the hole in the MAIN PLATE ASSY shown in Fig. 2-18-2.
7. Install the F/L PLATE shown in Fig. 2-18-1 from the front side (ARM (TU) side).
8. Insert the boss of the F/L PLATE shown in Fig. 2-18-2 into the groove of the MAIN CAM.

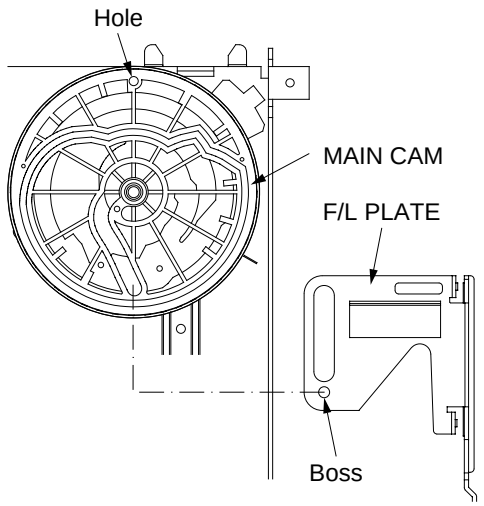


Fig. 2-18-2

2-19. BRAKE CAM PLATE

DECK POSITION : Normal

Remove the following parts before replacing the BRAKE CAM PLATE. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)

(Removal)

1. Release the boss of the F/L PLATE from the groove in the MAIN CAM by lifting the F/L PLATE shown in Fig. 2-18-2.
2. Rotate the MAIN CAM in Fig. 2-19-1 in the direction shown by arrow Ⓐ. Move the BRAKE CAM PLATE so that the three catches (ⓐ) of the MAIN PLATE ASSY can be released.
3. Remove the BRAKE CAM PLATE.

(Installation)

1. Apply grease (MOLYKOTE G PASTE) [859D055O50] to the specified parts on the BRAKE CAM PLATE in Fig. 2-19-2.
2. Hook the BRAKE SPRING shown in Fig. 2-19-3 to the catch of the BRAKE (TU).
3. Install the BRAKE CAM PLATE, inserting the six guide pins (ⓑ) shown in Fig. 2-19-1 into the slits of the BRAKE CAM PLATE.
4. Move the BRAKE SPRING in Fig. 2-19-3 in the direction shown by arrow Ⓒ to release the catch of the BRAKE (TU) and insert the BRAKE SPRING under the catch.

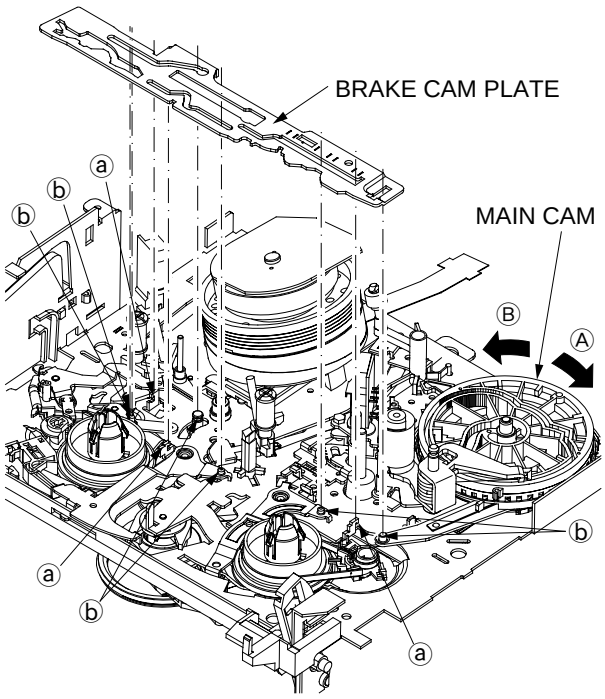
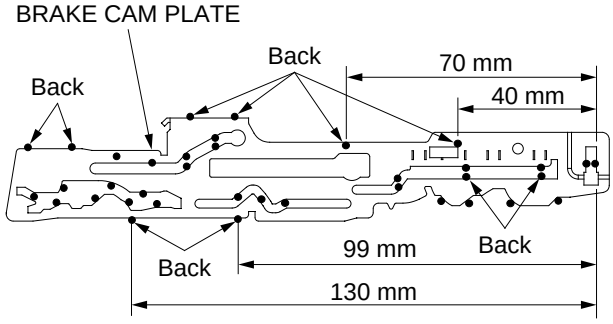


Fig. 2-19-1



Apply grease (MOLYKOTE G PASTE) to the points marked by ● .

Fig. 2-19-2

5. Rotate the MAIN CAM shown in Fig. 2-19-1 in the direction shown by arrow Ⓑ. Move the BRAKE CAM PLATE to hook it to the three catches (ⓐ) of the MAIN PLATE ASSY.
6. Put the boss of the F/L PLATE back into the groove in the MAIN CAM shown in Fig. 2-18-2.

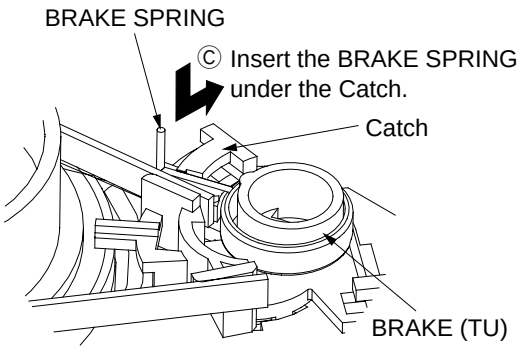


Fig. 2-19-3

2-20. GUIDE LAMP

DECK POSITION : Normal

Remove the following parts before replacing the GUIDE LAMP. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)

(Removal)

1. Release the catch (ⓐ) of the GUIDE LAMP shown in Fig. 2-20.
2. Rotate the GUIDE LAMP in the direction shown by arrow Ⓐ (counterclockwise when viewed from the bottom) to align the longest slit (ⓒ) of the MAIN PLATE ASSY with the longest arm (ⓑ) of the GUIDE LAMP shown in Fig. 2-20. Pull it out downward to remove it.

(Installation)

1. Clean dirt on the GUIDE LAMP with a VIDEO HEAD cleaning cloth.

Note: Never use solvent such as alcohol to clean the GUIDE LAMP.

2. Insert the GUIDE LAMP in Fig. 2-20, aligning the longest arm (ⓑ) of the GUIDE LAMP with the longest slit (ⓒ) of the MAIN PLATE ASSY.
3. Rotate the GUIDE LAMP in the direction shown by arrow Ⓑ (clockwise when viewed from the bottom) to align the arm (ⓐ) of the GUIDE LAMP shown in Fig. 2-20 with the longest slit (ⓒ) of the MAIN PLATE ASSY.

Note : If the GUIDE LAMP still has dirt after installation,

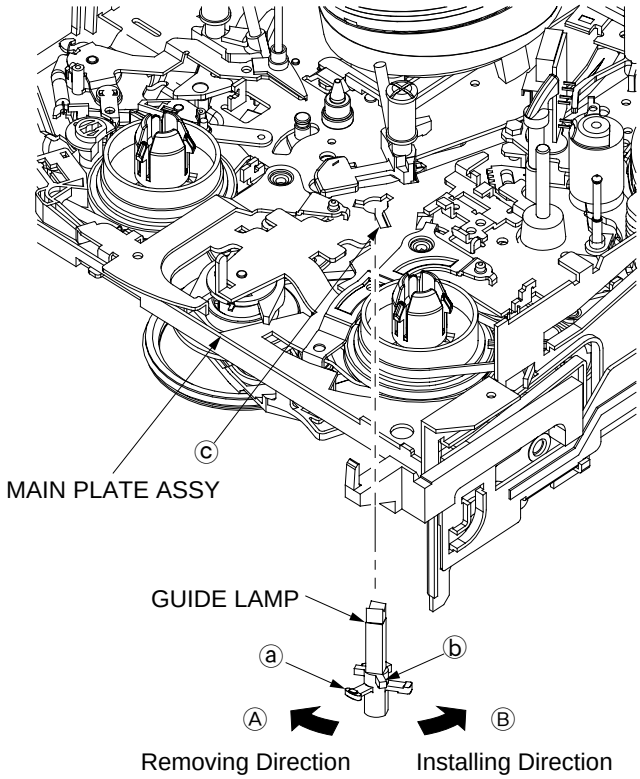


Fig. 2-20

2-21. MAIN CAM, GUIDE ARM (TU), BRAKE LEVER, LB PIN

DECK POSITION : Normal

Remove the following parts before replacing the MAIN CAM, GUIDE ARM (TU), and LEVER. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- SENSOR COVER (TU) (Item 2-10)
- MOTOR HOLDER (Item 2-16)
- WORM WHEEL (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- F/L PLATE (Item 2-18)
- BRAKE CAM PLATE (Item 2-19)

(Removal)

1. Remove the MAIN CAM shown in Fig. 2-21-1.
2. Remove the GUIDE ARM (TU) shown in Fig. 2-21-1.
3. Move the BRAKE LEVER in Fig. 2-21-1 in the direction shown by arrow Ⓐ and release the catch (ⓐ) to remove the BRAKE LEVER.
4. Remove the LB PIN shown in Fig. 2-21-1.

(Installation)

1. Install the LB PIN shown in Fig. 2-21-1.
2. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the new GUIDE ARM (TU) in Fig. 2-21-1.
3. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-21-1.
4. Install the GUIDE ARM (TU), aligning the hole in the GUIDE ARM (TU) shown in Fig. 2-21-2 with the hole in the MAIN PLATE ASSY.

Note : Install the GUIDE ARM (TU) so that the part specified with oblique lines of the GUIDE ARM (TU) is positioned under the shaft flange of the PINCH UNIT.

5. Install the BRAKE LEVER shown in Fig. 2-21-2 so that the hole in the BRAKE LEVER overlaps the hole in the MAIN PLATE ASSY.
6. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the new MAIN CAM in Fig. 2-21-3.
7. Install the MAIN CAM so that the hole in the MAIN CAM shown in Fig. 2-21-2 overlaps with the hole in the MAIN PLATE ASSY.

Note : Install the MAIN CAM, inserting the follower pins of the CAPSTAN BRAKE ASSY, GUIDE ARM (TU), and BRAKE LEVER into the grooves on the back of the MAIN CAM.

Set the Main Cam while pulling the follower pin of the CAPSTAN BRAKE ASSY in the direction shown by arrow Ⓑ (toward the deck front) using tweezers as shown in Fig. 2-21-1.

Be careful not to apply grease to the wall when applying it to the most external circle on the back of the MAIN CAM (4 parts) shown in Fig. 2-21-3.

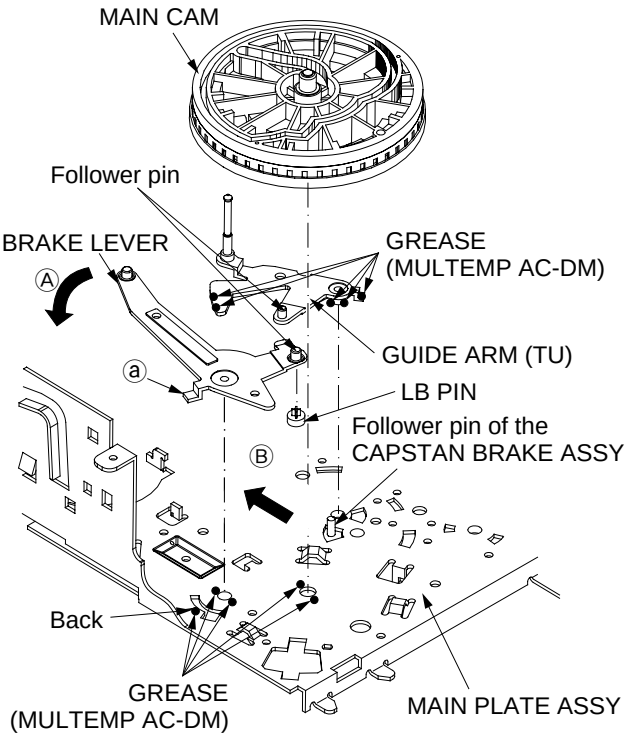


Fig. 2-21-1

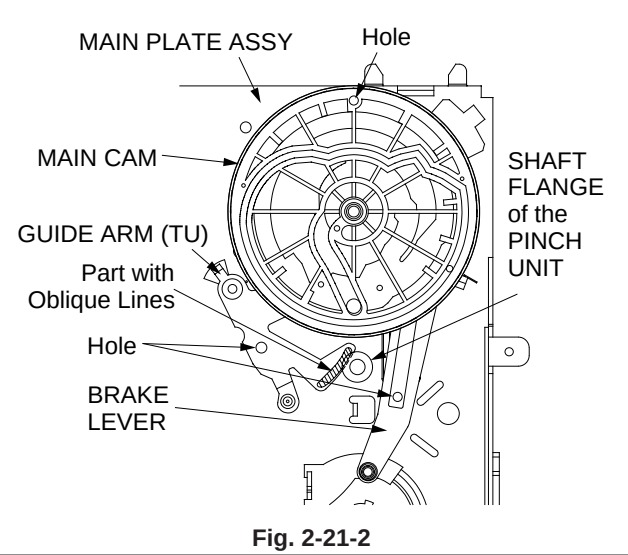


Fig. 2-21-2

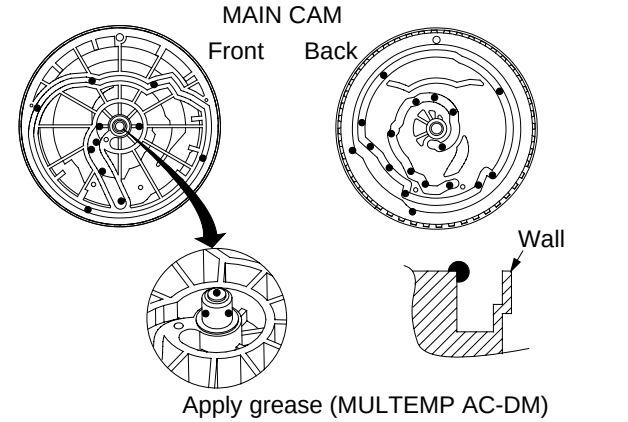


Fig. 2-21-3

2-22. L/D LOCK LEVER

DECK POSITION : Normal

Remove the following parts before replacing the L/D LOCK LEVER. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)

(Removal)

1. Remove the L/D LOCK LEVER shown in Fig. 2-22.

(Installation)

1. Install the L/D LOCK LEVER shown in Fig. 2-22.

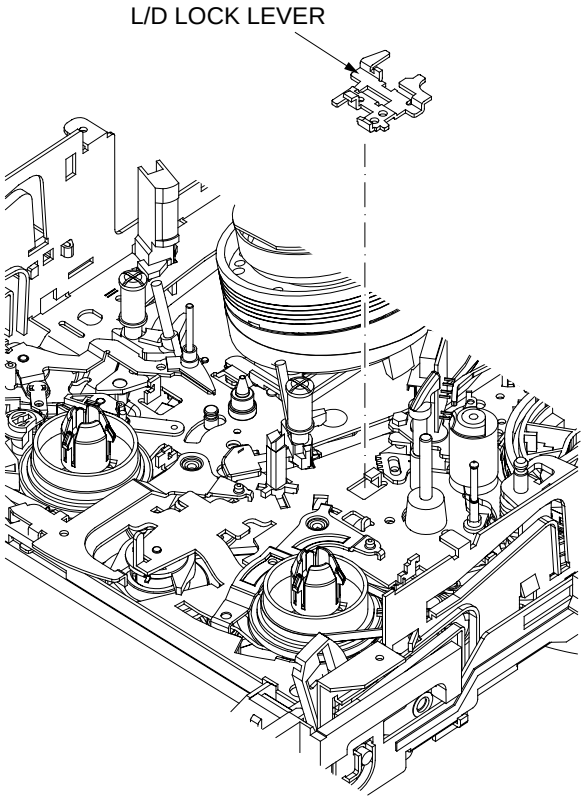


Fig. 2-22

2-23. BRAKE BELT (SP), BELT HOLDER

DECK POSITION : Normal

Remove the following parts before replacing the BRAKE BELT (SP) and BELT HOLDER. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)

(Removal)

1. Lift the BRAKE BELT (SP) shown in Fig. 2-23 to remove it from the REEL DISK (SP side).
2. Release the BRAKE BELT (SP) from the catch (ⓐ) of the BELT LEVER shown in Fig. 2-23.
3. Release the two catches (ⓑ) of the BELT HOLDER shown in Fig. 2-23 and separate the BELT HOLDER from the BRAKE BELT (SP).
4. Release the catch (ⓒ) of the BELT HOLDER shown in Fig. 2-23 to remove the BRAKE BELT (SP).

(Installation)

Note : Install the BRAKE BELT (SP) so that its felt side touches the REEL DISK (SP side). Grease applied to the BRAKE CAM PLATE and MAIN PLATE ASSY shall not adhere to the felt side of the BRAKE BELT (SP).

1. Hook the BRAKE BELT (SP) shown in Fig. 2-23 to the catch (ⓒ) of the BELT HOLDER.
2. Install the BELT HOLDER shown in Fig. 2-23.
3. Hook the BRAKE BELT (SP) shown in Fig. 2-23 to the catch (ⓐ) of the BELT LEVER.
4. Hook the BRAKE BELT (SP) shown in Fig. 2-23 to the REEL DISK (SP side).

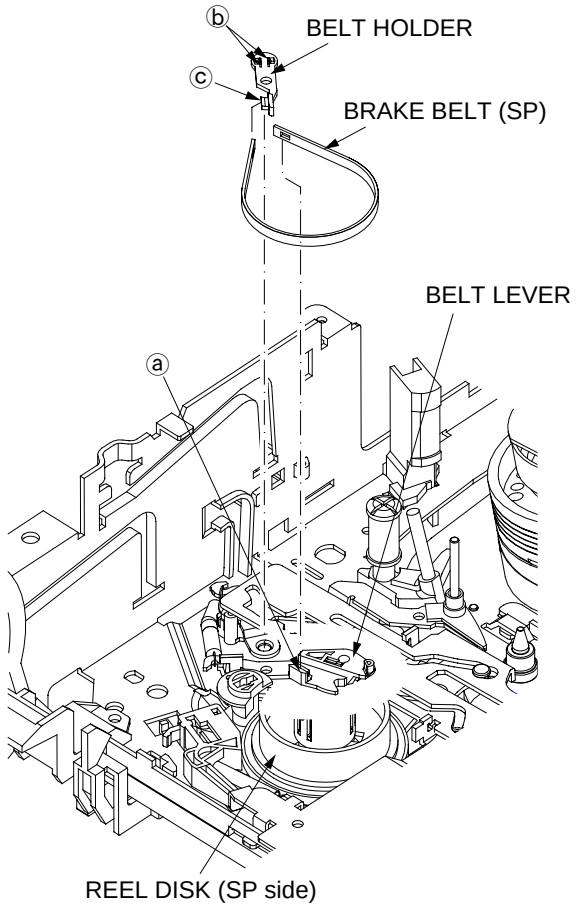


Fig. 2-23

2-24. BELT LEVER, BELT ADJUSTER

DECK POSITION : Normal

Remove the following parts before replacing the BELT LEVER and BELT ADJUSTER. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)
- BRAKE BELT (SP) (Item 2-23)
- BELT HOLDER (Item 2-23)

(Removal)

1. Release the catch (ⓐ) of the BELT LEVER shown in Fig. 2-24 to remove the BELT LEVER.
2. Remove the BELT ADJUSTER shown in Fig. 2-24.

(Installation)

1. Install the BELT ADJUSTER shown in Fig. 2-24.
2. Install the BELT LEVER shown in Fig. 2-24.

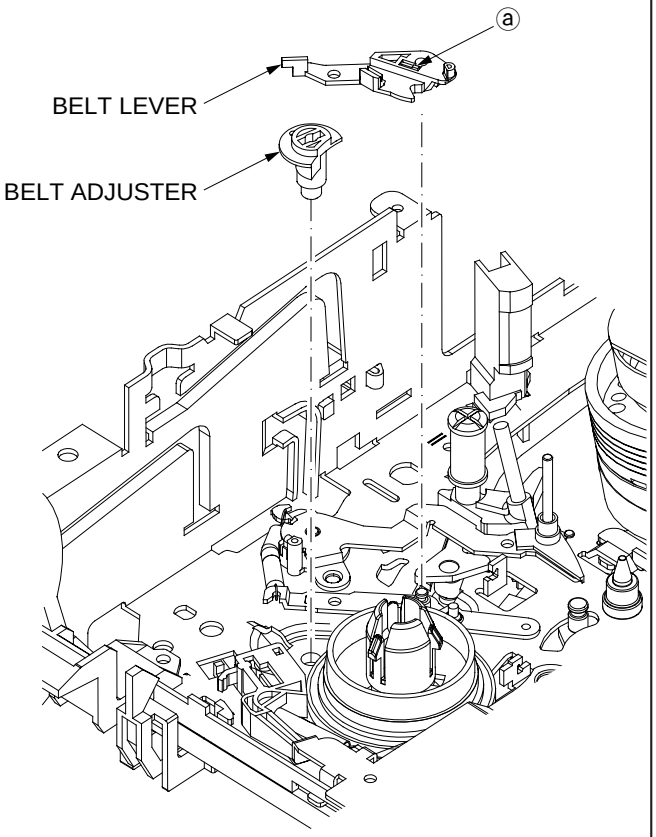


Fig. 2-24

2-25 TENSION ARM, TENSION LEVER, TENSION SPRING, TENS AXIS HOLDER, REEL DISK (SP side)

DECK POSITION : Normal

Remove the following parts before replacing the above-mentioned components. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)
- BRAKE BELT (SP) (Item 2-23)
- BELT HOLDER (Item 2-23)
- BELT LEVER (Item 2-24)

(Removal)

1. Remove the TENSION SPRING shown in Fig. 2-25.
2. Release the catch (ⓐ) of the TENS AXIS HOLDER shown in Fig. 2-25 to remove the TENSION ARM.
3. Remove the TENSION LEVER shown in Fig. 2-25.
4. Release the catch (ⓑ) of the TENS AXIS HOLDER shown in Fig. 2-25. Move the TENS AXIS HOLDER in the direction shown by arrow Ⓐ to remove it.
5. Remove the REEL DISK (SP side).

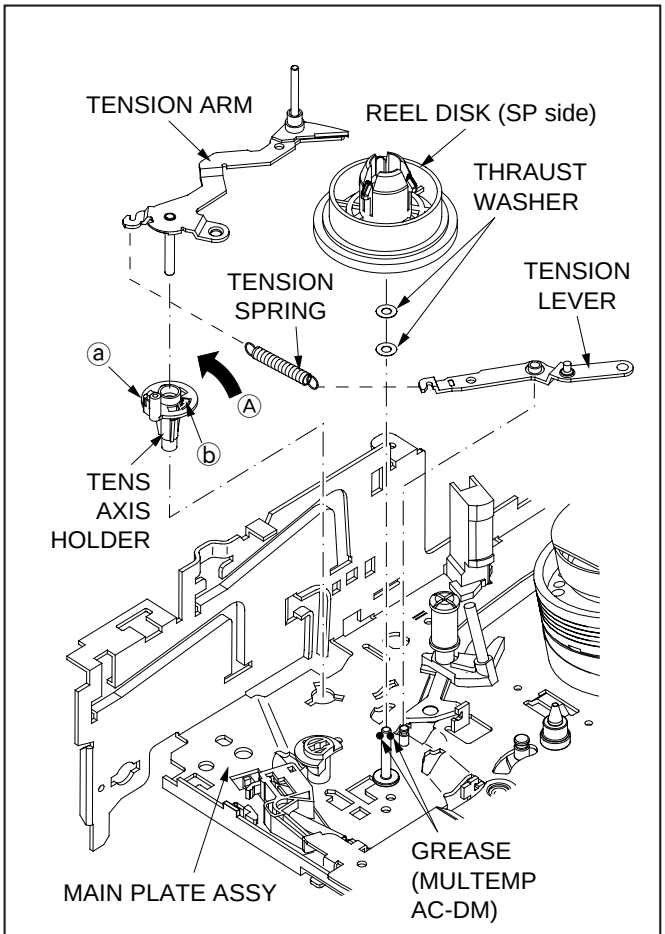


Fig. 2-25

(Installation)

1. Apply grease (MULTEMP AC-DM) [859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-25.
2. Install the REEL DISK (SP side).
3. Install the TENS AXIS HOLDER.

Note : Install the TENS AXIS HOLDER so that the catch (ⓐ) for the TENSION ARM is positioned on the front (F/L ARM ASSY side).

4. Install the TENSION LEVER.
5. Install the TENSION ARM.
6. Install the TENSION SPRING.

Note : Install the longer hook of the TENSION SPRING to the TENSION ARM.

2-26. BRAKE BELT (TU)

DECK POSITION : Normal

Remove the following parts before replacing the BRAKE BELT. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)

(Removal)

1. Lift the BRAKE BELT (TU) shown in Fig. 2-26 to remove it from the REEL DISK (TU side).
2. Release the two catches (ⓐ) of the BRAKE (TU) shown in Fig. 2-26 to remove the BRAKE BELT (TU).

(Installation)

1. Install the BRAKE BELT (TU) shown in Fig. 2-26 to the BRAKE (TU).
2. Hook the BRAKE BELT (TU) shown in Fig. 2-26 to the REEL DISK (TU side).

Note : Install the BRAKE BELT (TU) so that its felt side touches the REEL DISK (TU side).

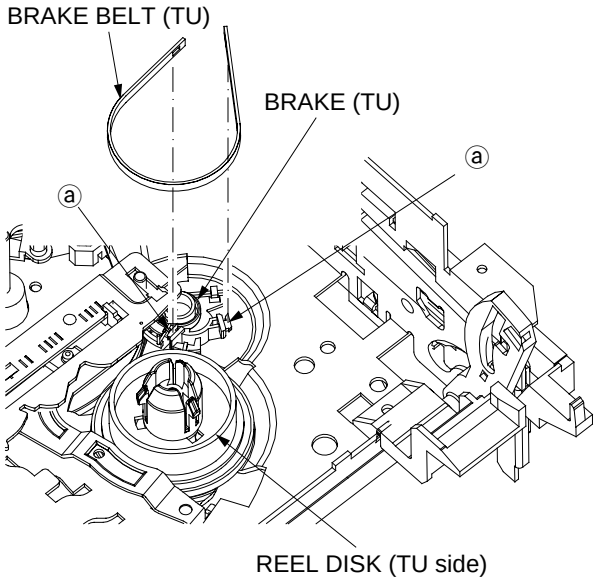


Fig. 2-26

2-27. BRAKE (TU), REEL DISK (TU side)

DECK POSITION : Normal

Remove the following parts before replacing the BRAKE (TU) and REEL DISK (TU side). Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)

(Removal)

1. Move the BRAKE (TU) in Fig. 2-27 in the direction shown by arrow Ⓐ to remove it.
2. Remove the BRAKE BELT (TU) from the BRAKE (TU).
3. Remove the REEL DISK (TU).

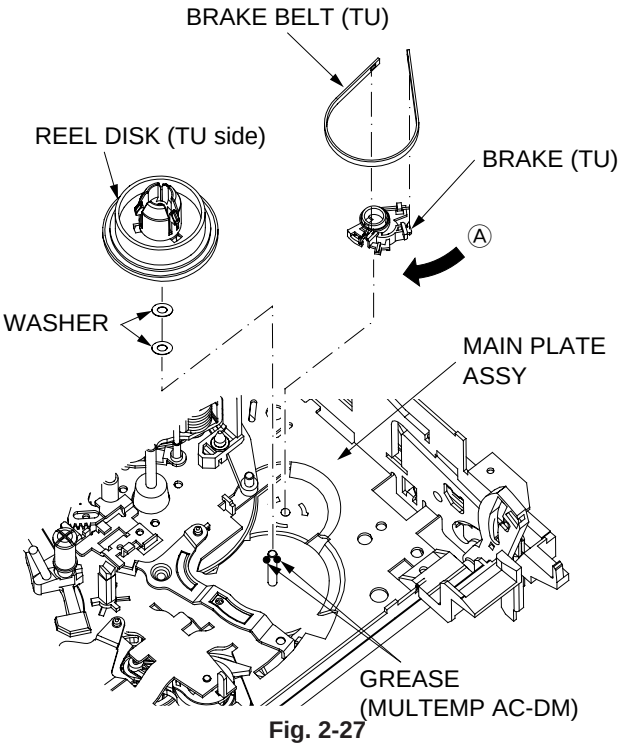


Fig. 2-27

(Installation)

Note : Install the BRAKE BELT (TU) so that its felt side touches the REEL DISK (TU side).
The grease applied to the BRAKE CAM PLATE and the MAIN PLATE ASSY shall not adhere to the felt side of the BRAKE BELT (SP).

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-27.
2. Install the REEL DISK (TU side).
3. Install the BRAKE BELT (TU) to the BRAKE (TU).
4. Install the BRAKE (TU).
5. Hook the BRAKE BELT (TU) to the REEL DISK (TU side).

2-28. SHIFT LEVER

DECK POSITION : Normal

Remove the following parts before replacing the SHIFT LEVER. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)
- BRAKE (TU) (Item 2-27)
- REEL DISK (TU side) (Item 2-27)

(Removal)

1. Move the SHIFT SLIDER in Fig. 2-28 in the direction shown by arrow Ⓐ to release it from the SHIFT LEVER.
2. Move the SHIFT LEVER in Fig. 2-28 in the direction shown by arrow Ⓑ to remove it.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the new SHIFT LEVER in Fig. 2-28.
2. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-28.
3. Install the SHIFT LEVER so that Part (ⓐ) shown in Fig. 2-28 is positioned under the MAIN PLATE ASSY.
4. Install the SHIFT SLIDER to the SHIFT LEVER.

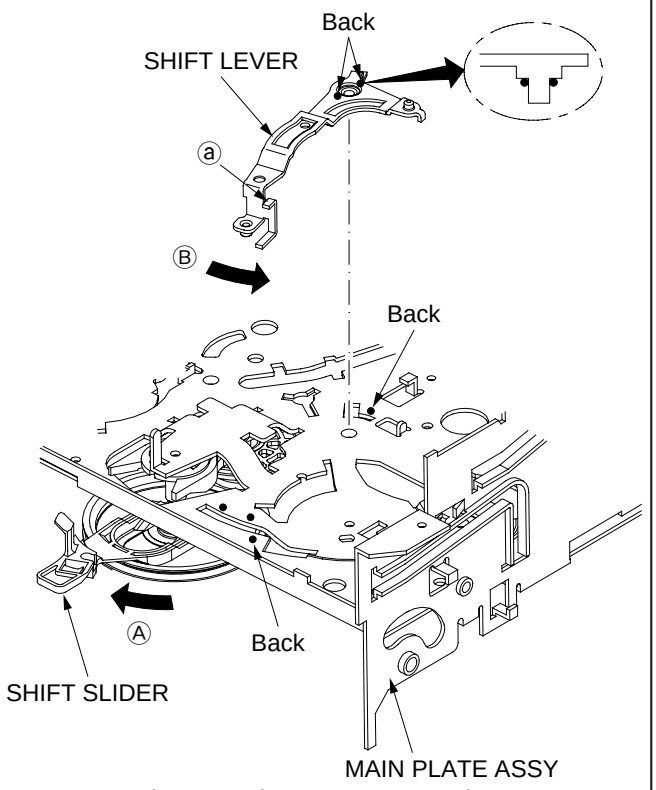


Fig. 2-28

2-29. CHARGE SPRING, SWING LEVER, CHARGE ASSY

DECK POSITION : Normal

Remove the following parts before replacing the CHARGE SPRING, SWING LEVER, and CHARGE ASSY. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)

(Removal)

1. Remove the CHARGE SPRING shown in Fig. 2-29 from the SWING LEVER.
2. Remove the SWING LEVER shown in Fig. 2-29.
3. Release Part ⓐ of the CHARGE ASSY shown in Fig. 2-29 from Part ⓑ of the MAIN PLATE ASSY to remove the CHARGE ASSY.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-29.
2. Install the CHARGE ASSY.
3. Install the SWING LEVER, inserting Part ⓒ of the SWING LEVER in Fig. 2-29 into the groove in the MAIN PLATE ASSY.
4. Install the CHARGE SPRING to the SWING LEVER.

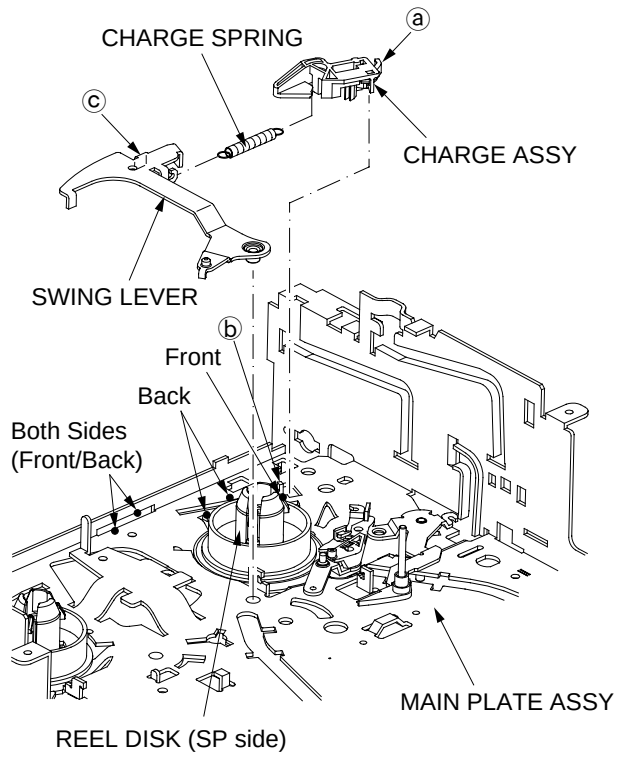


Fig. 2-29

2-30. SPACER PLATE, LOADING ARM ASSY (SP), LOADING ARM ASSY (TU)

DECK POSITION : Upside down

(Removal)

1. Release the catch (ⓐ) of the LOADING ARM ASSY (SP) shown in Fig. 2-30-1 to remove the LOADING ARM ASSY (SP).

Note : Be sure to replace the removed LOADING ARM ASSY (SP) with a new one.

2. Remove the screw (ⓑ) fastening the SPACER PLATE shown in Fig. 2-30-1 to remove the SPACER PLATE.
3. Remove the LOADING ARM ASSY (TU) shown in Fig. 2-30-1.

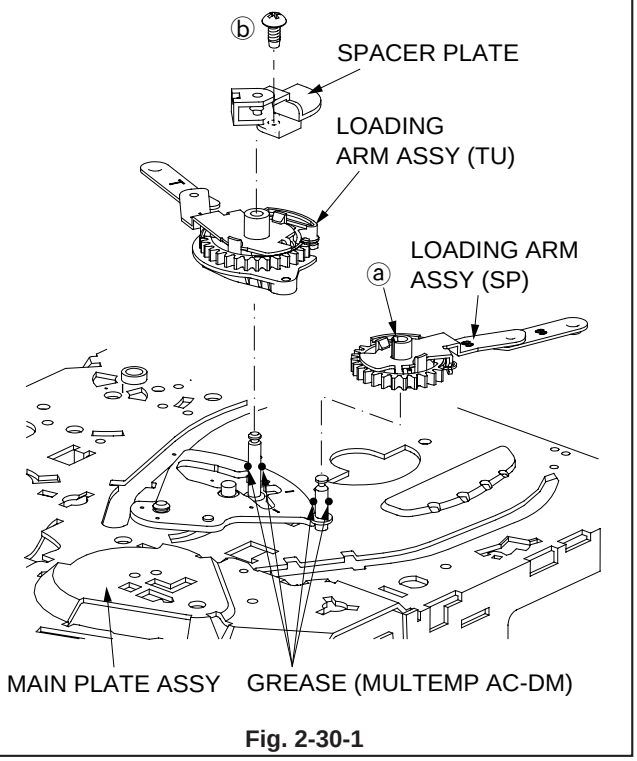


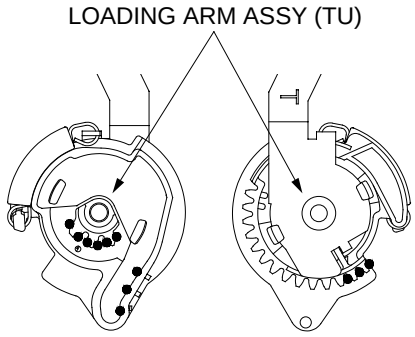
Fig. 2-30-1

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-30-1.
2. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the LOADING ARM ASSY (TU) in Fig. 2-30-2.
3. Install the LOADING ARM ASSY (SP) and LOADING ARM ASSY (TU) so that the marks on both the units are aligned each other as shown in Fig. 2-30-3.

Note : Be sure to replace the removed LOADING ARM ASSY (SP) with a new one.

4. Install the SPACER PLATE shown in Fig. 2-30-1.



Apply grease (MULTEMP AC-DM) to the parts marked by ● .

Fig. 2-30-2

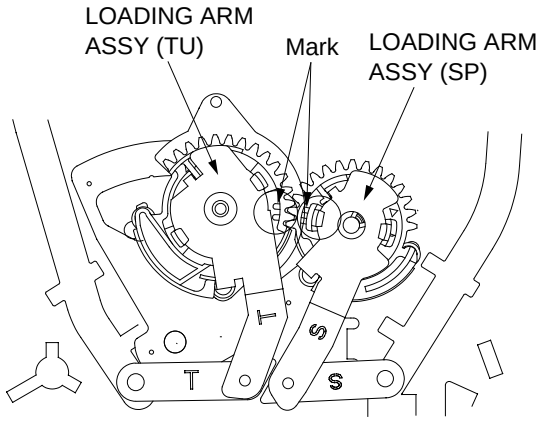


Fig. 2-30-3

2-31. A/L LEVER

DECK POSITION: Upside down

Remove the following parts before replacing the A/L LEVER. Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)
- LOADING ARM ASSY (SP) (Item 2-30)
- LOADING ARM ASSY (TU) (Item 2-30)

(Removal)

1. Remove the CUT WASHER and WASHER shown in Fig. 2-31-1. Then, remove the A/L LEVER.

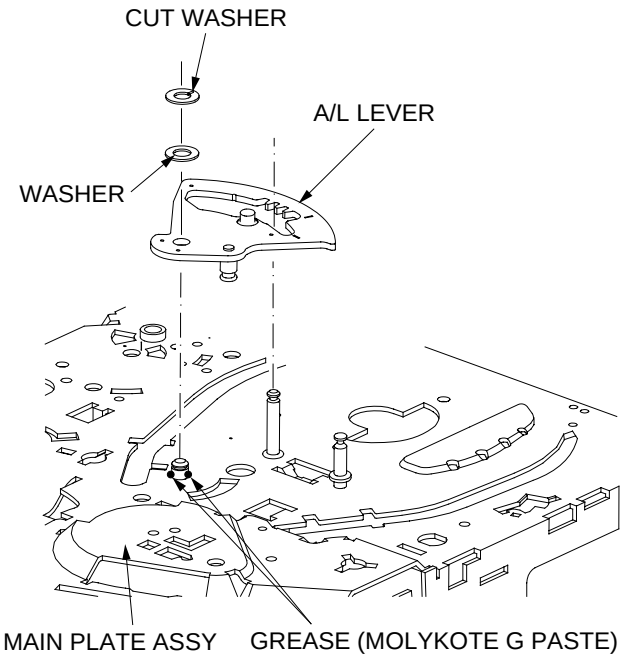


Fig. 2-31-1

(Installation)

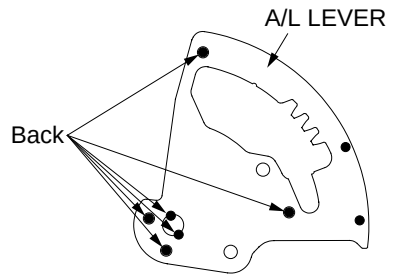
Note : Install the LOADING ARM ASSY (TU) and LOADING ARM ASSY (SP) in accordance with the following procedure after installing the A/L LEVER.

1. Apply grease (MOLYKOTE G PASTE) [859D055O50] to the specified parts on the MAIN PLATE ASSY in Fig. 2-31-1.
2. Apply grease (MOLYKOTE G PASTE) [859D055O50] to the specified parts on the A/L LEVER in Fig. 2-31-2.
3. Install the A/L LEVER so that the mark on the A/L LEVER faces to the flange of the LOADING ARM ASSY (SP) as shown in Fig. 2-31-3.

Note : The part specified with oblique lines on the A/L LEVER shall be positioned under the flange of the LOADING ARM ASSY (SP).

4. Install the LOADING ARM ASSY (TU) so that the marks on the LOADING ARM ASSY (TU) and the A/L LEVER are aligned each other as shown in Fig. 2-31-4.
5. Install the LOADING ARM ASSY (SP) so that the ▲ mark on the LOADING ARM ASSY (SP) and the reinforcement rib of the LOADING ARM ASSY (TU) are aligned each other as shown in Fig. 2-31-4.

Note : Be sure to replace the removed LOADING ARM ASSY (SP) with a new one.



Apply grease (MOLYKOTE G PASTE) to the parts marked by ● .

Fig. 2-31-2

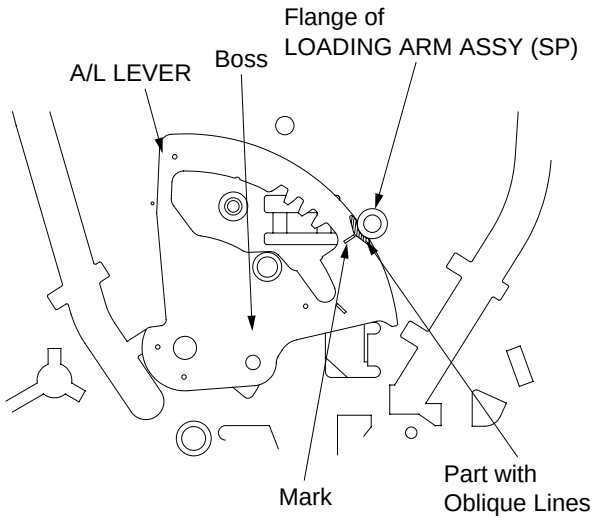


Fig. 2-31-3

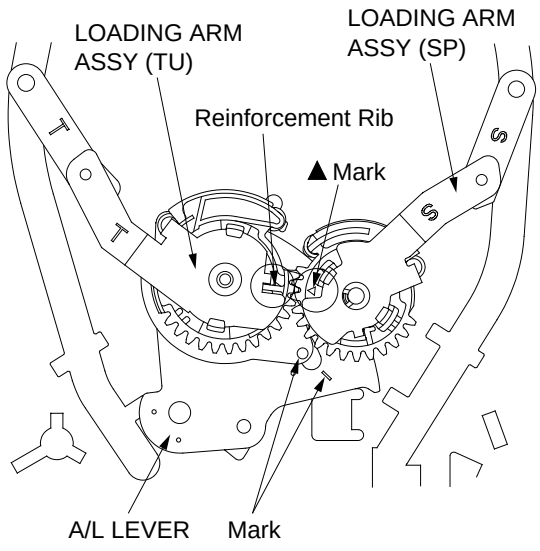


Fig. 2-31-4

2-32. TAPE GUIDE ASSY (SP), TAPE GUIDE ASSY (TU)

DECK POSITION : Normal

Remove the following parts before replacing the TAPE GUIDE ASSY (SP) and (TU). Refer to the corresponding items to install them.

- STAY PLATE (Item 2-2)
- BOTTOM ASSY (Item 2-3)
- MOTOR HOLDER (Item 2-16)
- PINCH ARM CAP (Item 2-17)
- PINCH UNIT (Item 2-17)
- BRAKE CAM PLATE (Item 2-19)
- BRAKE BELT (SP) (Item 2-23)
- BELT HOLDER (Item 2-23)
- BELT LEVER (Item 2-24)
- TENSION ARM (Item 2-25)
- SPACER PLATE (Item 2-30)
- LOADING ARM ASSY (TU) (Item 2-30)
- LOADING ARM ASSY (SP) (Item 2-30)
- A/L LEVER (Item 2-31)

(Removal)

1. Loosen the TAPE GUIDE ASSY (SP) shown in Fig. 2-32-1 (turn it fully in the unloading direction) to remove it.
2. Loosen the TAPE GUIDE ASSY (TU) shown in Fig. 2-32-1 (turn it fully in the unloading direction) to remove it.

(Installation)

1. Apply grease (MULTEMP AC-DM)[859D055O90] to the specified parts on the MAIN PLATE ASSY in Fig. 2-32-2.
2. Install the TAPE GUIDE ASSY (SP) shown in Fig. 2-32-1.
3. Install the TAPE GUIDE ASSY (TU) shown in Fig. 2-32-1.
4. Perform from “3-2-1. GUIDE ROLLER Adjustment Check” to “3-2-5. Flatness Check of FM Waveform” of “3. Interchangeability Adjustment of the Mechanism.”

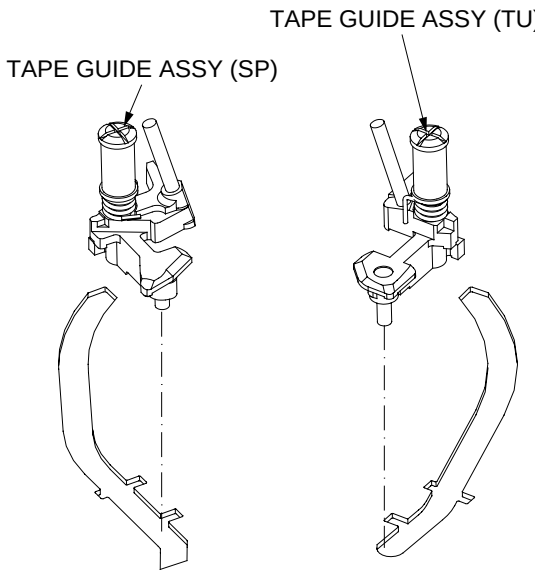


Fig. 2-32-1

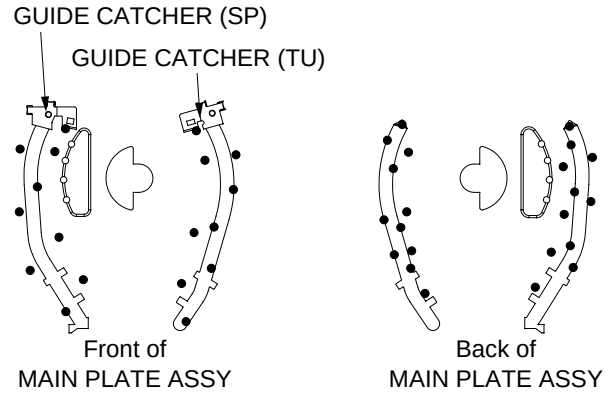


Fig. 2-32-2

2-33. DRUM CLAMPER, DRUM ASSY

DECK POSITION : Normal

(Removal)

1. Disconnect the LEAD CONNECTOR of the DRUM ASSY shown in Fig. 2-33-1.
2. Remove the two screws (ⓐ and ⓑ) fastening the DRUM CLAMPER shown in Fig. 2-33-1 to remove the DRUM ASSY with the DRUM CLAMPER.
3. Rotate the DRUM CLAMPER in Fig. 2-33-2 in the direction shown by arrow Ⓐ to remove it from the DRUM ASSY.

(Installation)

1. Install the DRUM CLAMPER in Fig. 2-33-2 to the DRUM ASSY by rotating it in the direction shown by arrow Ⓑ.
2. Hook the catch of the DRUM CLAMPER shown in Fig. 2-33-3 to the reference pin.
3. Fasten the screw (ⓑ) while pushing Part Ⓐ in the direction shown by arrow Ⓒ (clockwise when viewed from the top) as shown in Fig. 2-33-3.

Note : Make sure that the catch of the DRUM CLAMPER touches the side of the reference pin.

4. Fasten the screw (ⓐ) shown in Fig. 2-33-3.

Note : Make sure that the catch of the DRUM CLAMPER touches the side of the reference pin.

5. Connect the LEAD CONNECTOR of the DRUM ASSY with the DRUM CLAMPER shown in Fig. 2-33-1.
6. Perform “3. Interchangeability Adjustment of the Mechanism.”
7. Perform the Playback Switching Point adjustment referring to the Circuit Adjustment section.
8. Clean the DRUM ASSY shown in Fig. 2-33-1 with alcohol.

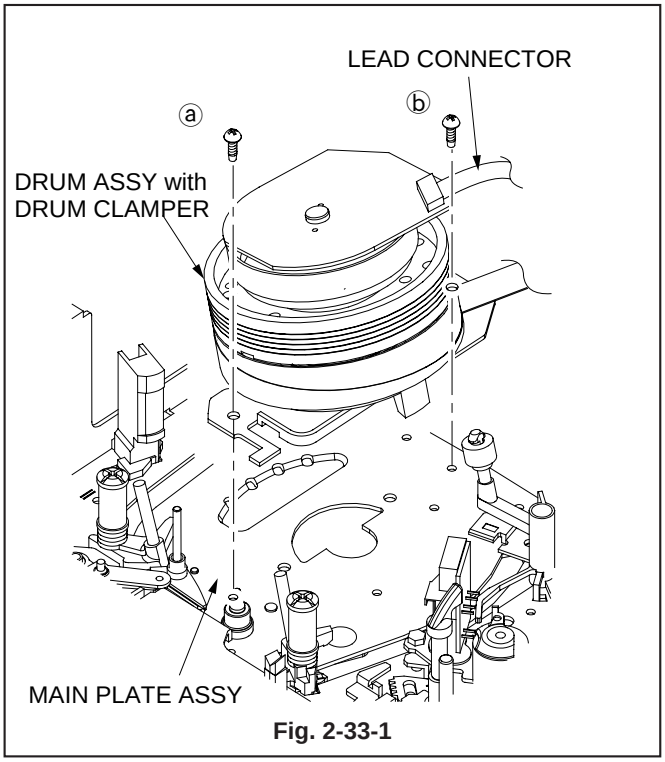


Fig. 2-33-1

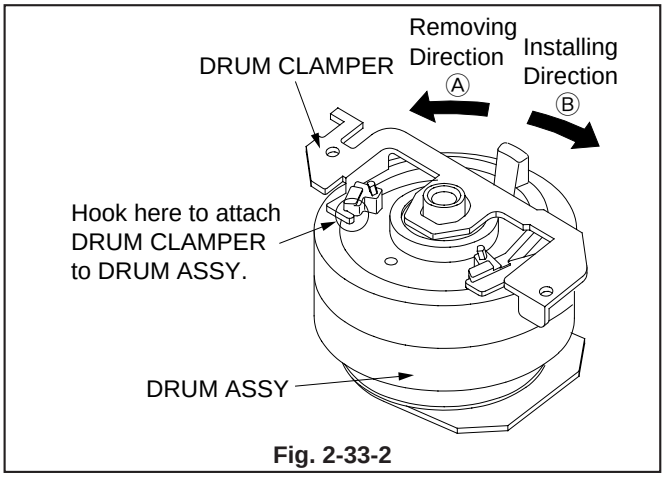


Fig. 2-33-2

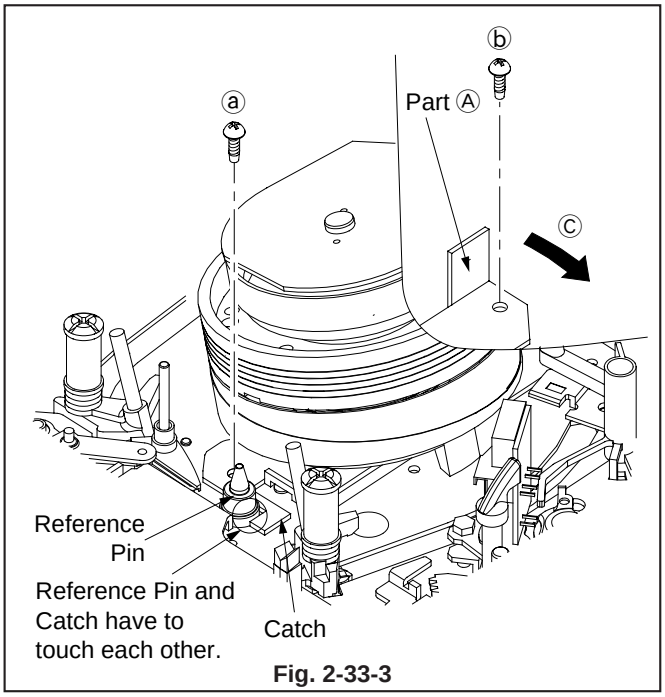


Fig. 2-33-3

2-34. DRUM MOTOR STATOR, BRUSH SPRING, SPACER, ROTOR CASE, END RING, BRUSH, UPPER DRUM ASSY

DECK POSITION : Normal

(Removal)

1. Disconnect the LEAD CONNECTOR of the DRUM ASSY shown in Fig. 2-34-1.
2. Remove the two screws (ⓐ) fastening the DRUM MOTOR STATOR shown in Fig. 2-34-1 to remove the DRUM MOTOR STATOR.
3. Remove the two screws (ⓑ) fastening the ROTOR CASE shown in Fig. 2-34-1 to remove the ROTOR CASE.

Note : Mark the END RING and the UPPER DRUM ASSY shown in Fig. 2-34-1 for ensuring correct positioning in re-assembly.

4. Loosen the hexagon screw (ⓒ) fastening the END RING shown in Fig. 2-34-1 to remove the END RING.
5. Remove the BRUSH SPRING shown in Fig. 2-34-1.
6. Remove the BRUSH shown in Fig. 2-34-1.
7. Remove the UPPER DRUM ASSY shown in Fig. 2-34-1.
8. Remove the SPACER shown in Fig. 2-34-1.

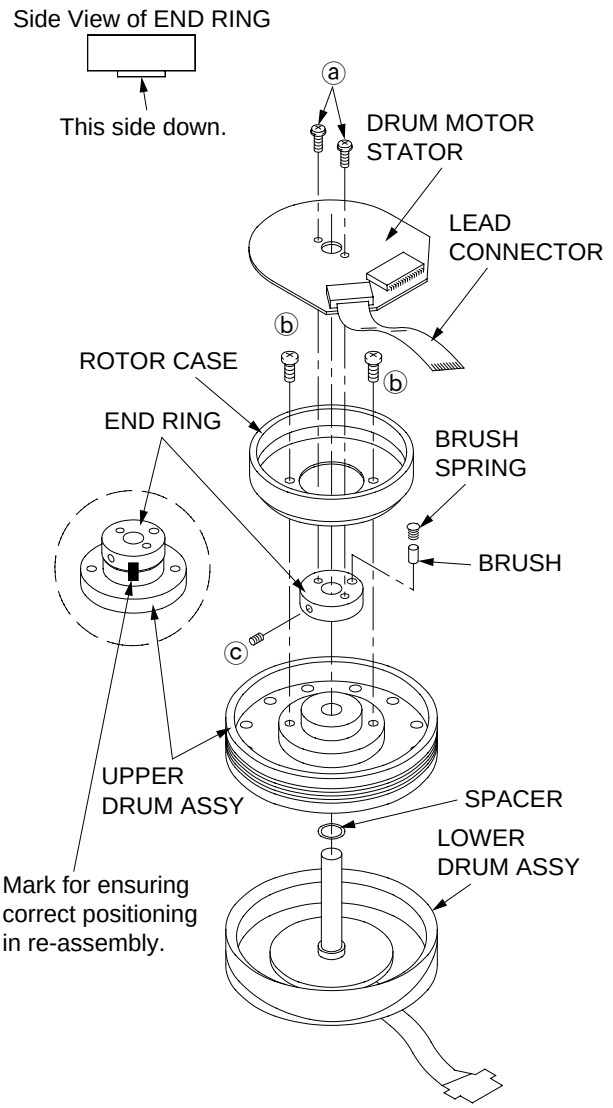


Fig. 2-34-1

(Installation)

1. Install the SPACER shown in Fig. 2-34-1.

Note : Be sure to use a new SPACER supplied with the new UPPER DRUM ASSY.

2. Install the UPPER DRUM ASSY shown in Fig. 2-34-1.
3. Install the END RING so that the reference hole (Ⓐ) of the END RING shown in Fig. 2-34-2 is positioned in parallel with the rear line of the MAIN PLATE ASSY. (The reference hole (Ⓐ) shall be on the right when viewed from the bottom.)
4. Apply the screw-sealing agent to the hexagon screw (ⓒ) fastening the END RING shown in Fig. 2-34-1.
5. Install the ROTOR CASE shown in Fig. 2-34-3, aligning its holes with the three reference holes (Ⓑ) of the UPPER DRUM ASSY.
6. Install the BRUSH shown in Fig. 2-34-1.
7. Install the BRUSH SPRING shown in Fig. 2-34-1.
8. Install the DRUM MOTOR STATOR shown in Fig. 2-34-1.
9. Connect the LEAD CONNECTOR of the DRUM ASSY shown in Fig. 2-34-1.
10. Perform “3. Interchangeability Adjustment of the Mechanism.”
11. Perform the Playback Switching Point adjustment referring to the Circuit Adjustment section.
12. Clean the DRUM ASSY with alcohol.

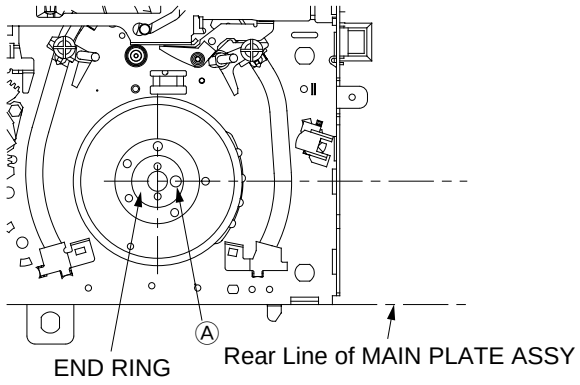


Fig. 2-34-2

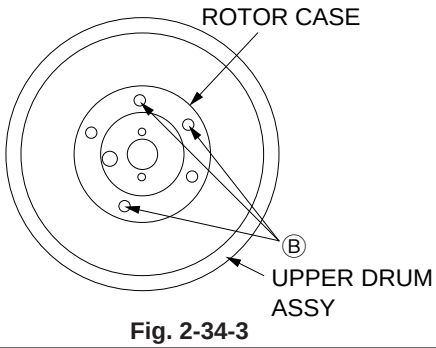


Fig. 2-34-3

2-35. CAPSTAN MOTOR

DECK POSITION : Normal

Remove the following part before replacing the CAPSTAN MOTOR. Refer to the corresponding item to install it.

- REEL BELT (Item 2-14.)

(Removal)

1. Rotate the WORM WHEEL in Fig. 2-35-1 in the direction shown by arrow Ⓐ to release the hooks of the BOTTOM ASSY from the locks of the STAY PLATE.

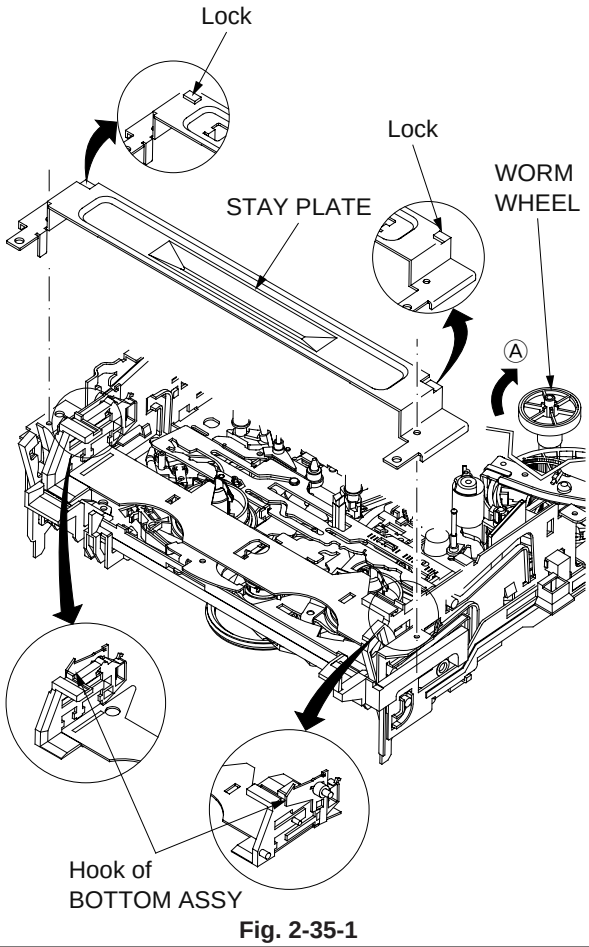


Fig. 2-35-1

2. Rotate the WORM WHEEL in Fig. 2-35-2 in the direction shown by arrow Ⓐ so that the GUIDE ARM (TU) moves in the direction of arrow Ⓑ and expose the three screws (ⓐ) fastening the CAPSTAN MOTOR.
3. Remove the three screws (ⓐ) fastening the CAPSTAN MOTOR shown in Fig. 2-35-2 to remove the CAPSTAN MOTOR.

(Installation)

1. Apply silicon compound (SC102) [859D164O10] to the specified parts on the MAIN PLATE ASSY in Fig. 2-35-3.
2. Install the CAPSTAN MOTOR.

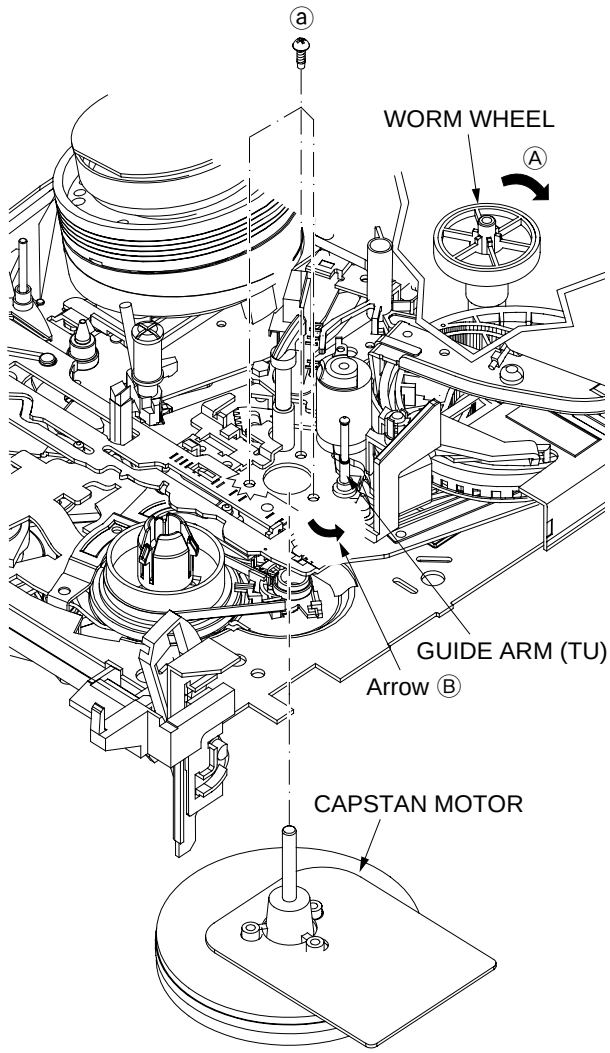


Fig. 2-35-2

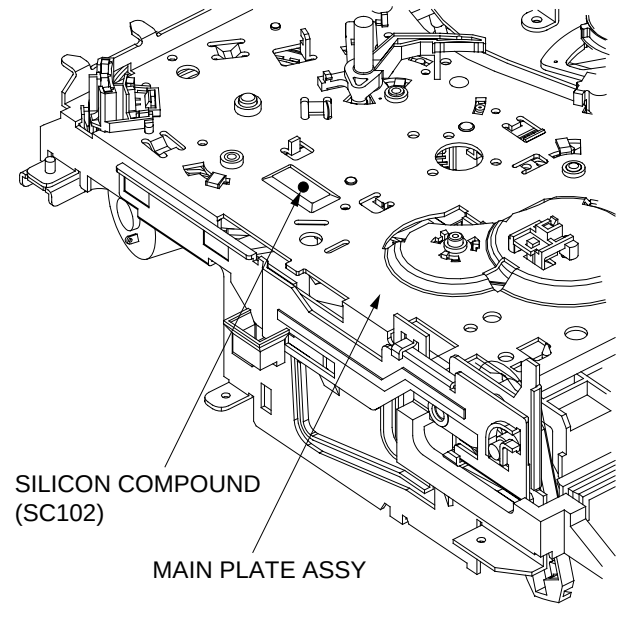


Fig. 2-35-3

3. Interchangeability Adjustment of the Mechanism

Note 1 : Tracking may need to be preset during interchangeability adjustment of the mechanism. Digital tracking is preset by short circuiting TP5A and TP5B on the PCB-MAIN.

Note 2 : When performing the adjustments in the PLAYBACK mode, use the staircase signal of an alignment tape, unless otherwise specified. Connect an oscilloscope with TP2A (FM waveform) and externally trigger from TP2H.

3-1. Adjustment of BACK TENSION and TENSION POLE's Position

Run a blank tape for several minutes to break in the REEL DISKs and the Tape Running System before the adjustment.

1. Play back a dummy Tape.
2. Confirm that "A", the distance between the holes in the TENSION ARM and the MAIN PLATE ASSY shown in Fig. 3-1-1, is 0.3±0.3 mm.
3. If "A" is not 0.3±0.3 mm, move the hole in the BELT ADJUSTER in Fig. 3-1-2 within the range shown by arrow Ⓐ to set "A" to 0.3±0.3 mm.
4. Set the BACK TENSION measuring jig (code: 859C345O80) and play back the tape.
5. Confirm that "A" shown in Fig. 3-1-1 is 0.0±0.5 mm.
6. If "A" is not 0.0±0.5 mm, repeat this adjustment from the beginning.
7. Make sure that the indicated value of the BACK TENSION measuring jig is within 5.4±0.59 mNm.

Note 1 : Check the indicated value of the BACK TENSION measuring jig after the tape running condition becomes steady.

Note 2 : Replace the TENSION SPRING if the indicated value exceeds the specified value.

8. While the tape is running steadily, check visually that the vibration range of the TENSION POLE is 1 mm or less. If the vibration range exceeds 1 mm, replace the REEL DISK.

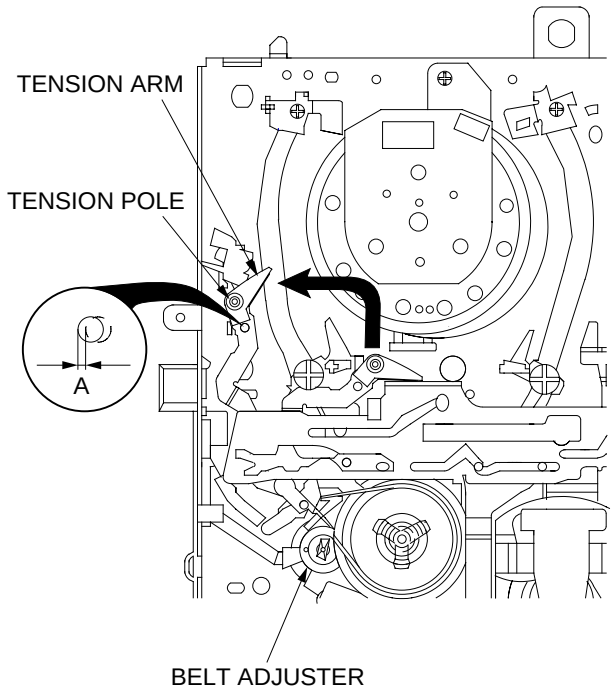


Fig. 3-1-1

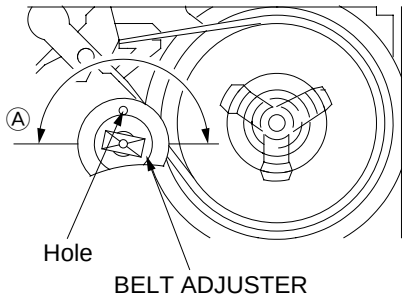


Fig. 3-1-2

3-2. Check and Adjustment of the FM Envelope

3-2-1. GUIDE ROLLER Adjustment Check

1. Play back an alignment tape (NM6KE2 : 859C339O90).
2. Preset the tracking.
3. Make sure that the FM waveform is flat as shown by Waveform (A).
4. Perform “3-2-2. Height Adjustment of GUIDE ROLLER (SP)” if the leading edge (the DRUM entry side) of the FM waveform is not flat as shown by Waveform (B) and (C). Perform “3-2-3. Height Adjustment of GUIDE ROLLER (TU)” if the trailing edge (the DRUM exit side) is not flat as shown by Waveform (D) and (E)

3-2-2. Height Adjustment of GUIDE ROLLER (SP)

1. Loosen the height adjustment screw at the top of the GUIDE ROLLER (SP) so that the GUIDE ROLLER (SP) rotates smoothly.
2. Check the leading edge (DRUM entry side) of the FM waveform. If it looks like Waveform (B), the GUIDE ROLLER may be positioned too low. If it looks like Waveform (C), the GUIDE ROLLER may be positioned too high. To make the FM waveform flat as shown by Waveform (A), turn the height adjustment screw at the top of the GUIDE ROLLER (SP).
   - Turn the screw counter-clockwise if the position of the GUIDE ROLLER is lower than specified.
   - Turn the screw clockwise if the position of the GUIDE ROLLER is higher than specified.
3. Perform “3-2-4. Coarse Adjustment of Phase.”

3-2-3. Height Adjustment of GUIDE ROLLER (TU)

1. Loosen the height adjustment screw at the top of the GUIDE ROLLER (TU) so that the GUIDE ROLLER (TU) rotates smoothly.
2. Check the trailing edge (DRUM exit side) of the FM waveform. If it looks like Waveform (D), the GUIDE ROLLER may be positioned too low. If it looks like Waveform (E), the GUIDE ROLLER may be positioned too high. To make the FM waveform flat as shown by Waveform (A), turn the height adjustment screw at the top of the GUIDE ROLLER (TU)
   - Turn the screw counter-clockwise if the position of the GUIDE ROLLER is too low.
   - Turn the screw clockwise if the position of the GUIDE ROLLER is too high.
3. Perform “3-2-4. Coarse Adjustment of Phase.”

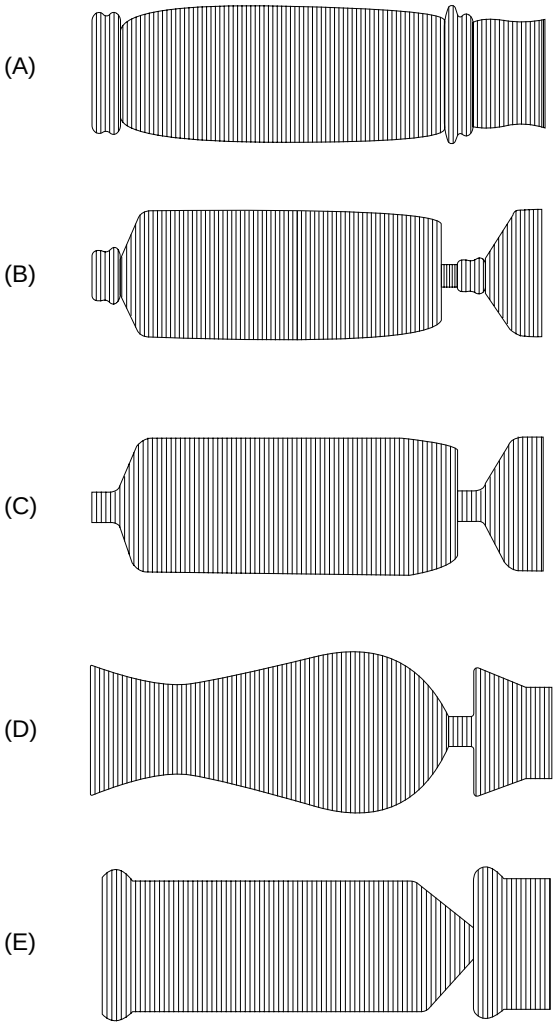


Fig. 3-2-1

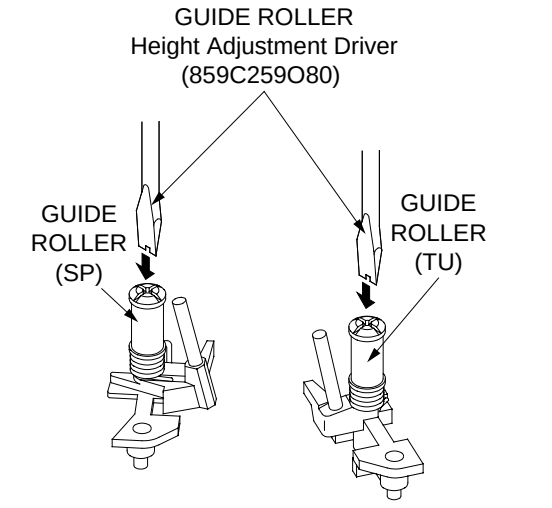


Fig. 3-2-2

3-2-4. Coarse Adjustment of Phase

1. Play back an alignment tape (NM6KE2 : 859C339O90).
2. Preset the tracking.
3. Check the FM waveform after performing “3-2-1. GUIDE ROLLER Adjustment Check.”
4. If the amplitude level of the FM waveform is low as shown by Waveform (F) in Fig. 3-2-4, set it to maximum as shown by Waveform (G) using the following procedure. Loosen the screws D and E. Insert a Phillips screwdriver into the hole in the MAIN PLATE ASSY (Part A) and move the A/C PLATE from side to side to set the amplitude level to maximum.
5. Tighten the screws D and E.

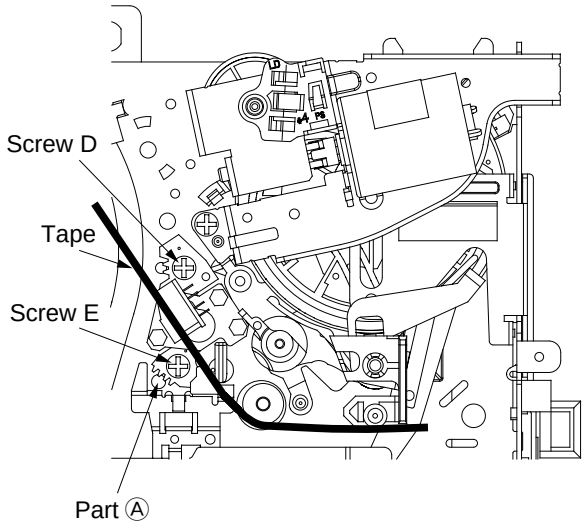


Fig. 3-2-3

3-2-5. Flatness Check of FM Waveform

1. Play back an alignment tape (NM6KE2 : 859C339O90).
2. Adjust the tracking and confirm that the amplitude of the FM signal remains flat.

Note : Press the tracing (+)and (–) button during play back to adjust tracking.

3. Adjust the tracking so that the amplitude level of the FM waveform is at maximum. Set the oscilloscope so that the amplitude level of the FM waveform is 5 divisions on the oscilloscope.
4. Adjust the tracking so that the peak of the FM output waveform is 4 divisions. Make sure that FM Waveforms (B), (C), (D), and (E) are within the range of the specified values in Fig. 3-2-5.
5. If the waveforms are out of the specified ranges, repeat “3-2. Check and Adjustment of the FM Envelope” from the beginning.

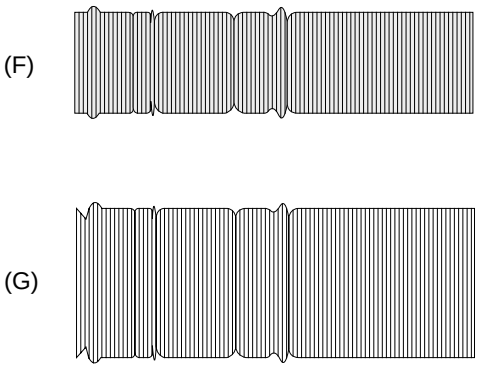
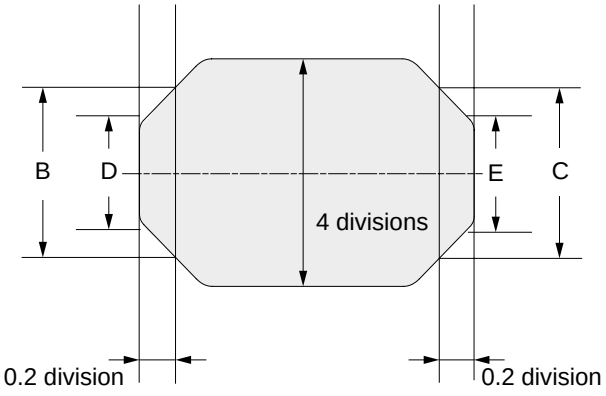


Fig. 3-2-4



	In VHS mode
B, C	2.5 divisions or more
D, E	1.0 division or more

Fig. 3-2-5

3-2-6. Tape Running Condition at the GUIDE ROLLERs (Check 1)

1. Play back an Alignment Tape. [NM6KE2: 859C339O90]
2. Check visually that there is a space between the tape and the lower flange of the GUIDE ROLLER (SP) and the GUIDE ROLLER (TU).
3. If no space is confirmed, replace the TAPE GUIDE ASSY (SP) and the TAPE GUIDE ASSY (TU) in accordance with “2-32. TAPE GUIDE ASSY (SP), TAPE GUIDE ASSY (TU).”
4. Repeat loading and unloading the tape several times and make sure that the FM waveform remains flat.
5. If flatness of the FM waveform varies, check the position of the A/C HEAD. If the A/C HEAD UNIT is incorrectly installed, reinstall it referring to “2-8. A/C HEAD UNIT” and perform “3-2-4. Coarse Adjustment of Phase.”

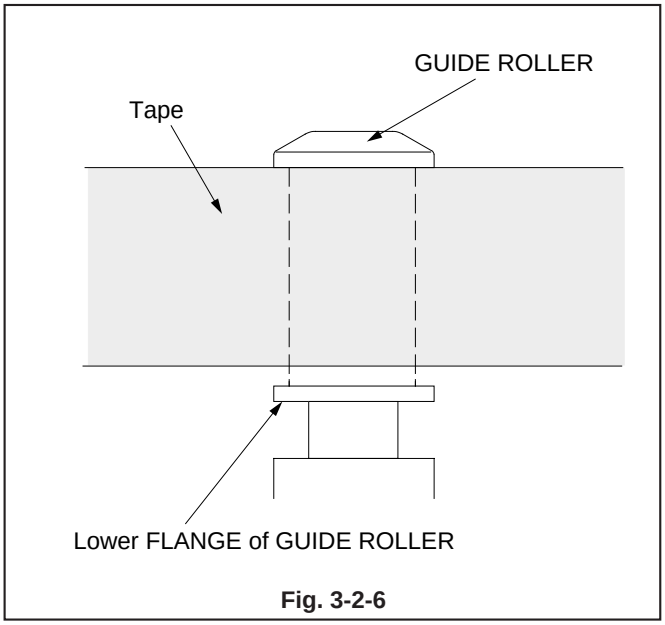


Fig. 3-2-6

3-2-7. Tape Running Condition at the GUIDE ROLLERs (Check 2)

1. Play back an alignment tape (NM6KE2 : 859C339O90).
2. Make sure that the FM waveform is restored to the previous level immediately after the tops of the GUIDE ROLLER (SP) and the GUIDE ROLLER (TU) are pressed lightly and then released.
3. If the FM waveform isn't restored immediately, replace the TAPE GUIDE ASSY (SP) and the TAPE GUIDE ASSY (TU) in accordance with “2-32. TAPE GUIDE ASSY (SP), TAPE GUIDE ASSY (TU).”

3-3. A/C HEAD Adjustment

3-3-1. Slant Adjustment of A/C HEAD

1. Play back a blank tape.
2. Slowly turn Screw C shown in Fig. 3-3-1 counter-clockwise to slightly crease the bottom of the tape at the lower flange of the GUIDE POLE (TU).
3. Slowly turn Screw C clockwise to remove the crease.
4. Slowly turn Screw C counter-clockwise again and stop just before the tape is creased.

3-3-2. Azimuth and Height Adjustment of A/C HEAD

1. If the height of the CONTROL HEAD is different from the specified value shown in Fig. 3-3-2, realign it with Screw A, B, and C in Fig. 3-3-1.
2. After realigning Screw A, B, and C, repeat “3-3-1. Slant Adjustment of A/C HEAD.”
3. Connect the oscilloscope to the audio output terminal.
4. Play back an alignment tape (NM6KE2 : 859C339O90).
5. Turn Screw B for the azimuth adjustment shown in Fig. 3-3-1 to set the audio output level to maximum as shown in Fig. 3-3-3. After the adjustment, remove the screwdriver and make sure that the audio output level is 4.6 or over on the oscilloscope with the maximum audio output level set to 5. If the audio output level is less than 4.6, repeat this adjustment from the beginning.
6. Make sure that the audio output level doesn't vary when the A/C HEAD is pushed in the horizontal direction (or in the direction shown by the A-A' line in Fig. 3-3-1) and released. (Do not push the A/C HEAD before the audio output level drops to 3/4 or less of its maximum level.)
7. Make sure that the audio output level varies by 2 dB or less in the PLAYBACK mode.
8. If the variation in the audio output level exceeds 2 dB, repeat “3-3-1. Slant Adjustment of A/C HEAD.”
9. If the height of the CONTROL HEAD isn't set to the specified value, replace the TAPE GUIDE ASSY (SP) and the TAPE GUIDE ASSY (TU) in accordance with “2-32. TAPE GUIDE ASSY (SP), TAPE GUIDE ASSY (TU).”

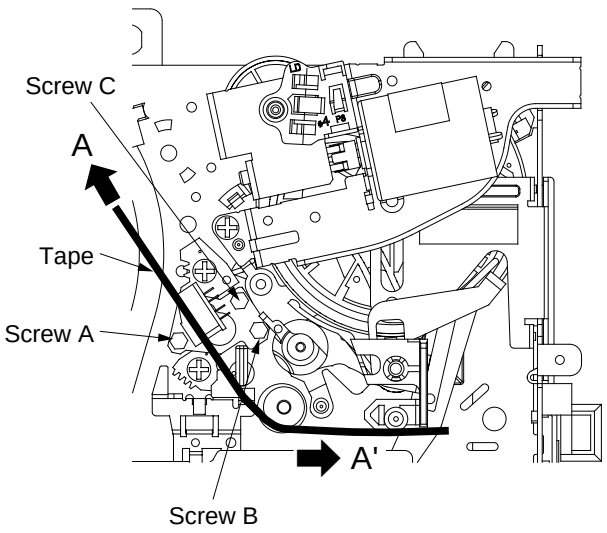


Fig. 3-3-1

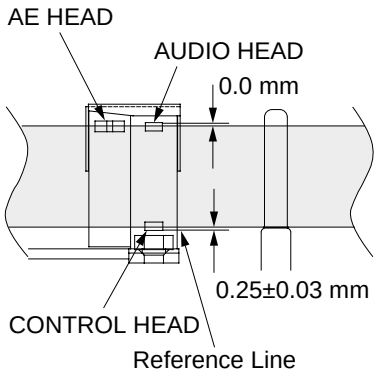


Fig. 3-3-2

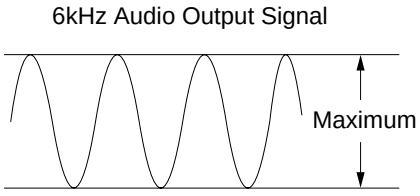


Fig. 3-3-3

3-4. Phase Adjustment

1. Play back an alignment tape (NC1KS : 859C339O80).
2. Preset the tracking.
3. Loosen Screw D and E shown in Fig. 3-4-1. Insert a Phillips screwdriver into the hole in the MAIN PLATE ASSY (Part Ⓐ) and move the A/C PLATE form side to side to set the amplitude level of the FM waveform to maximum. (Adjust the FM waveform to maximum when the waveform at TP2H is high.
4. Tighten Screw D and E.
5. Play back an alignment tape [NMX : 859C568O60].
6. Make sure that the missing portions of the FM waveform and the audio waveform appear as shown in Fig. 3-4-2.
7. If the missing portions are different from those shown in Fig. 3-4-2, repeat from step 3.
8. Adjust the tracking so that the amplitude level of the FM waveform is at maximum. Set the oscilloscope so that the waveform is 5 divisions on the oscilloscope.
9. Preset the tracking.
10. Make sure that the FM waveform on the oscilloscope is 4.8 divisions or over.
11. If the FM waveform is below 4.8 divisions, preset the tracking and repeat steps 3 to 10.
12. Make sure that the amplitude of the FM waveform doesn't vary when the A/C HEAD is pushed in the horizontal direction (or in the direction shown by the A-A' line in Fig. 3-4-1) and then released.
13. If the amplitude of the FM waveform varies, check the fixing position of the A/C HEAD. If the A/C HEAD UNIT is incorrectly installed, reinstall it referring to “3-8. A/C HEAD UNIT” and “3-3. A/C HEAD Adjustment” and repeat “3-4. Phase Adjustment” from the beginning.
14. Repeat loading and unloading the tape several times and make sure that the amplitude of the FM waveform doesn't vary.

3-5. Tape wrinkle check

1. Make sure that there is no wrinkle occurring at the lower edge of the T-160 tape under the GUIDE POLE (TU) throughout the operation in the PB/FS mode.
2. Make sure that there is no wrinkle occurring at the upper edge of the T-160 tape under the GUIDE POLE (TU) throughout the operation in the PB/FS mode.

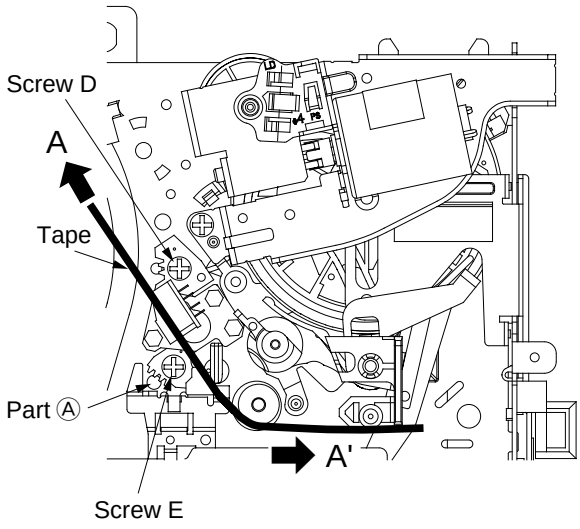


Fig. 3-4-1

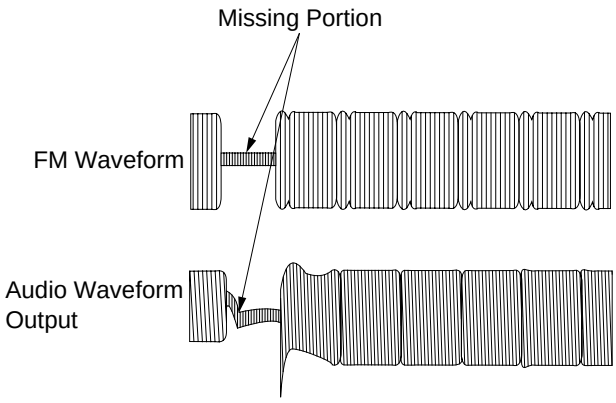


Fig. 3-4-2

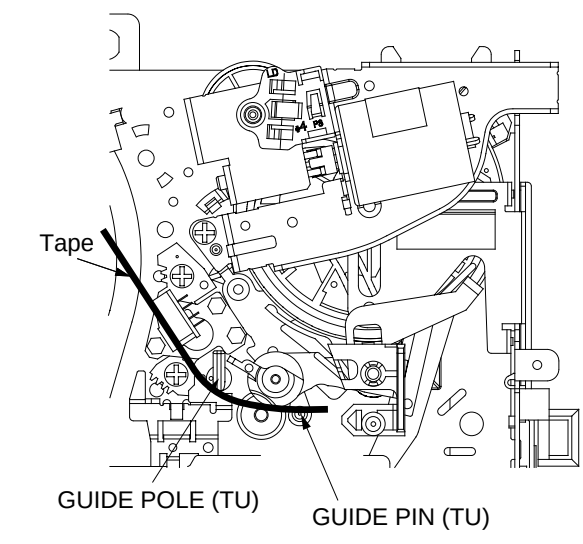


Fig. 3-5

4. Servicing for Tape Jam during the Loading Process

If the mechanism shall be locked because of tangled tape, remove the tape by rotating the WORM WHEEL of the LOADING MOTOR shown in Fig. 4 in the direction shown by arrow Ⓐ.

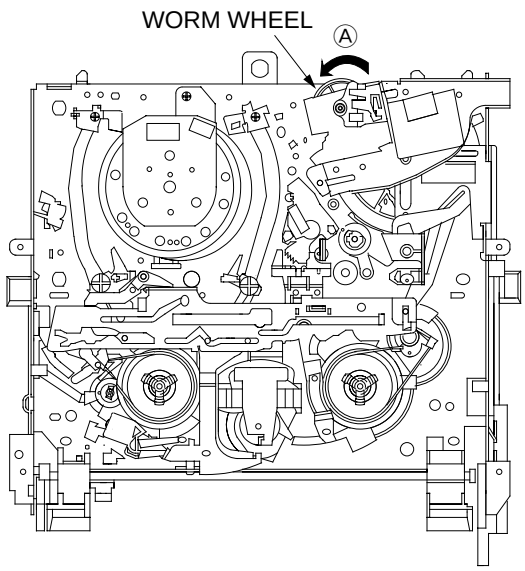


Fig. 4

SERVICE CAN BE EXECUTED WITH THE EE PICTURE DISPLAYED

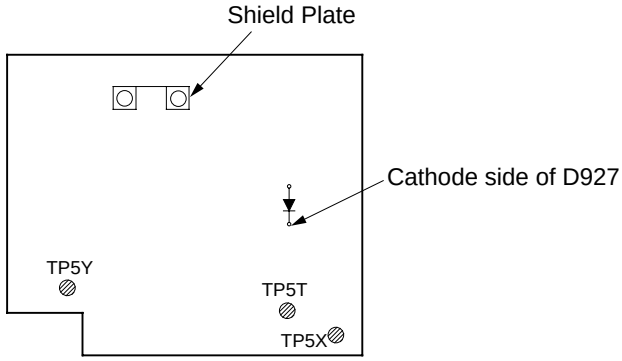
1. Short-circuit the cathode side of D927 and the GND of the DECK ASSY using the jig shown in Fig. 2.
2. Remove the DECK ASSY.
3. Connect TP5X and TP5Y with a jumper.

Note1: Short-circuit the test points before turning on the power.

Note2: Short-circuit the Shield Plate and the cathode side of D927 using the jig shown in Fig. 2 before attaching the DECK ASSY.

PCB-MAIN (Component side)

[Rear Side]



[Front Side]

Fig. 1

Jig (Part No. : 859C548O10)

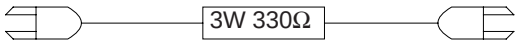


Fig. 2

DECK OPERATION CHECK

Check the DECK position and the operation of the Tape Running System, according to the following procedure.

1. Short-circuit TP5T and TP5Y shown in the Fig. 1.
2. Initialize the E^2PROM.
3. Check the operation of the Tape Running System by pressing the FF button, REW button on the PCB-MAIN.
   FF button : For forward rotation of the CAPSTAN MOTOR
   REW button : For reverse rotation of the CAPSTAN MOTOR
4. Check the DECK position by pressing the CH-UP button, CH-DOWN button on the PCB-MAIN.
   CH-UP button : DECK operation in the Loading direction
   CH-DOWN button : DECK operation in the Unloading direction

HOW TO INITIALIZE THE E²PROM

A replacement E²PROM is not initialized before shipping, so the E²PROM must be initialized when replaced.

Initialize the E²PROM by following the steps below.

1. Press and hold the POWER button on the set for 8 seconds.
2. E²PROM initial setting is completed.

WHEN REPLACING IC5A0

When replacing IC5A0, be sure to press the RESET button after turning on the power.

ELECTRICAL ADJUSTMENTS

Perform only the alignments required. If proper equipment is not available, do not attempt an alignment.

❑ PRE-ADJUSTMENT SETTINGS

- Set the PerfecTape™ to “MANUAL” mode.

❑ TEST EQUIPMENT

- Oscilloscope (10:1 probe unless 1:1 specified.)
- Miscellaneous electrical tools

❑ ALIGNMENT TAPES

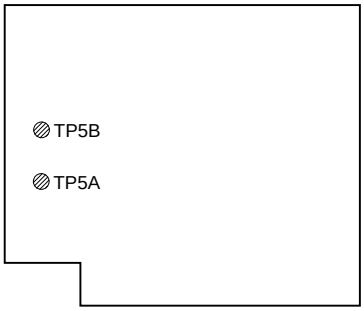
- NS1.....Part No.859C339O00
  Stair step, Color Bars, RF, 1kHz audio (SP)
- NM6KE2.....Part No.859C339O90
  Monoscope, 6kHz audio (SP)
- NM3KE6.....Part No.859C339O50
  Monoscope, 3kHz audio (EP)
- NMX.....Part No.859C568O60
  Monoscope, 3kHz audio (SP)

[Servo circuit] 1. Playback Switching Point	**Adjustment purpose**	Video switch over timing during playback.
	Symptom when incorrectly adjusted	Switching noise or jitter in the playback picture.

Measuring instrument and condition		**VCR set up condition**	
– – –		**Input signal**	– – –
Test point	– – –	**Using tape**	Alignment Tape (NS1, stair step)
EXT trigger	– – –	**VCR condition**	Playback
Measurement range	– – –	**Using Jig**	– – –

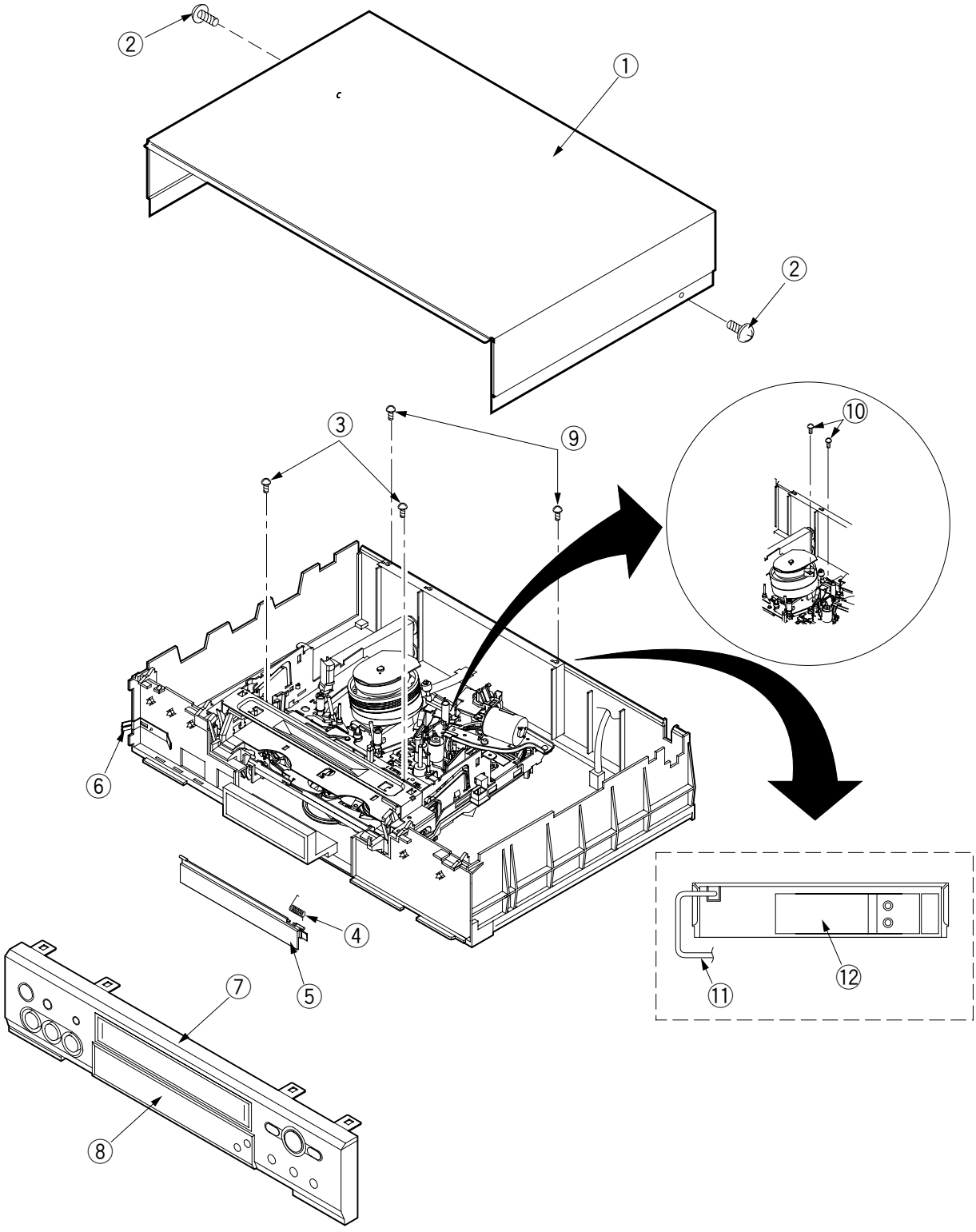
1. Play back an Alignment Tape. (NS1, stair step)
2. Short-circuit TP5A to TP5B.
3. Push the channel up/down buttons at the same time.
4. Confirm that the values 55 to 75 are displayed on the fluorescent display after approx 6 seconds.

PCB-MAIN (Component side)



PARTS LIST

1. CABINET ASSEMBLY

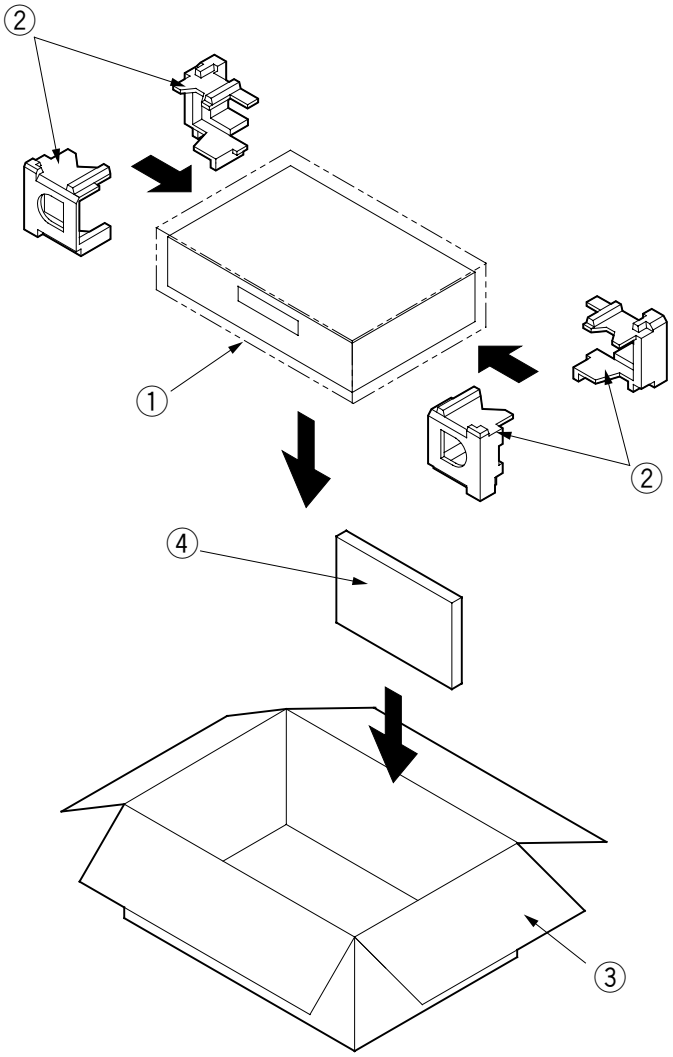


1. CABINET ASSEMBLY

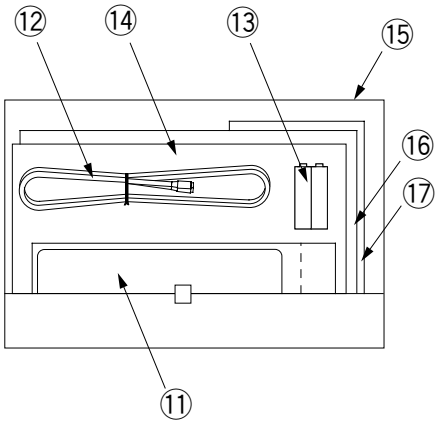
: Critical Component

ITEM NO.	PARTS NO.	PARTS NAME	DESCRIPTION
		CABINET ASSEMBLY	
1	968C049O06	TOP COVER ASSY	
2	669D501O10	SCREW	3 × 10
3	669D221O40	SCREW	4 × 12 46LA005
4	572D385O10	F/L SPRING	
5	752C678O40	CASSETTE DOOR ASSY	
6	573D078O10	FRONT EARTH SPRING	
7	701B456O50	FRONT UNIT	
8	752C676O40	TIMER PANEL	
9	669D500O30	SCREW	3 × 10
10	669D229O90	SCREW	M3.0 × 4 46LA005
11	246C324O10	AC POWER CORD	
12	761B393O10	ANTENNA COVER	

2. PACKING PARTS



ACCESSORY



2. PACKING PARTS

ITEM NO.	PARTS NO.	PARTS NAME	DESCRIPTION
		PACKING PARTS	
1	831D190O30	PACKING SHEET	800X800
2	803A585O10	CUSHION	
3	802B827O40	PACKING CASE	
4	– – – – – – –	ACCESSORY	
		ACCESSORY	
11	939P755O20	REMOTE HAND UNIT	
12	243C273O30	CABLE	RF
13	– – – – – – –	BATTERY	
14	– – – – – – –	ACCESSORY BOARD	
15	831D337O10	PACKING BAG	
16	872C247O40	INSTRUCTION BOOK	
17	– – – – – – –	REGISTRATION CARD	

3. ELECTRICAL PARTS

: Critical Components

SYMBOL No.	PARTS No.	PARTS NAME	DESCRIPTION
	INTEGRATED CIRCUITS		
IC2A0	270P785O10	IC	HA118217NF
IC3A0	275P410O10	IC	AN3662FBP
IC5A0	275P599O20	IC	M37760MCH4D2GP
IC5A1	263D003O30	MOS IC	CAT24WC04J-TE13
IC5A4	272P235O10	IC	TA7291S
IC8A0	275P701O10	MOS IC	PT6958
IC901	272P500O20	IC	HA17431PA
	TRANSISTORS		
Q2C0	260P560O40	TRANSISTOR	2SA933S-S
Q351	261P056O10	TRANSISTOR	2SD734F
Q352	260P629O60	TRANSISTOR	2SC3331-T
Q353	260P629O60	TRANSISTOR	2SC3331-T
Q355	260P562O40	TRANSISTOR	2SA952-K
Q901	261P035O20	TRANSISTOR	2SC5130
Q903	260P629O60	TRANSISTOR	2SC3331-T
Q904	261P036O10	TRANSISTOR	2SB1548
Q905	260P559O50	TRANSISTOR	2SC1740S-E
Q906	260P630O10	TRANSISTOR	2SD2012
Q907	260P559O50	TRANSISTOR	2SC1740S-E
Q909	260P559O50	TRANSISTOR	2SC1740S-E
Q910	260C560O10	TRANSISTOR	2SA933S-R,S
	DIODES		
D3A2	264P568O30	DIODE	1SS254
D5A2	264P568O30	DIODE	1SS254
D5A9	264P795O20	LIGHT EMITTING DIODE	SID1050CMMTP5
D5B4	264P795O20	LIGHT EMITTING DIODE	SID1050CMMTP5
D5B5	264P795O20	LIGHT EMITTING DIODE	SID1050CMMTP5
D5C0	264P795O20	LIGHT EMITTING DIODE	SID1050CMMTP5
D5D0	264P342O70	DIODE	HZ4C2
D5R0	264P568O30	DIODE	1SS254
D8A4	264P568O30	DIODE	1SS254
D8A5	264P568O30	DIODE	1SS254
D8A6	264P568O30	DIODE	1SS254
D8B0	264P568O30	DIODE	1SS254
D8B1	264P568O30	DIODE	1SS254
D901	264P508O70	DIODE	S1WB(A)60F4072
D902	264P687O20	DIODE	AG01
D903	264P568O30	DIODE	1SS254
D905	264P772O50	DIODE	MTZJ3.0A
D907	264P695O80	DIODE	RK36
D908	264P695O70	DIODE	RK39
D910	264P687O20	DIODE	AG01
D913	264P783O60	DIODE	MTZJ30D
D917	264P452O30	DIODE	HZ5C3
D918	264P568O30	DIODE	1SS254
D919	264P568O30	DIODE	1SS254
D920	264P500O20	DIODE	EM01Z
D921	264P568O30	DIODE	1SS254
D926	264P488O90	DIODE	RD16FB
D927	264P695O70	DIODE	RK39
D931	264P568O30	DIODE	1SS254

SYMBOL No.	PARTS No.	PARTS NAME	DESCRIPTION
	FILTERS		
L901	351P172O10	LINE FILTER	SS11V-10062
	COILS		
L01	325C472O50	PEAKING COIL	100µH-J
L03	325C471O70	PEAKING COIL	22µH-J
L04	325C472O50	PEAKING COIL	100µH-J
L2A0	325C167O30	PEAKING COIL	68µH-J
L2A1	325C166O40	PEAKING COIL	12µH-J
L2A3	325C472O50	PEAKING COIL	100µH-J
L2A5	325C472O50	PEAKING COIL	100µH-J
L2A8	325C472O70	PEAKING COIL	150µH-J
L2V6	325C472O50	PEAKING COIL	100µH-J
L301	321C114O80	RF COIL	8200µH-J
L350	325C472O50	PEAKING COIL	100µH-J
L3A0	325C472O50	PEAKING COIL	100µH-J
L3A1	325C472O50	PEAKING COIL	100µH-J
L3A2	325C472O50	PEAKING COIL	100µH-J
L5A0	325C472O50	PEAKING COIL	100µH-J
L8A0	325C471O90	PEAKING COIL	33µH-J
L902	321C141O90	RF COIL	33µH-K
L903	321C141O30	RF COIL	10µH-K
L904	321C141O90	RF COIL	33µH-K
T350	409P880O30	BIAS OSCILLATOR COIL	
	TRANSFORMERS		
T901	350P717O80	POWER TRANSFORMER	
	VARIABLE RESISTORS		
R901	109C010O50	SOLID RESISTOR	1/2W 2.2MΩ-K(UL)
R930	109C010O10	SOLID RESISTOR	1/2W 1MΩ-K
	CAPACITORS AND TRIMMERS		
C03	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C09	181P711O90	ELECTROLYTIC CAPACITOR	04W 6.3V 220µF-M
C12	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C2F1	181P718O70	ELECTROLYTIC CAPACITOR	04W 50V 3.3µF-M
C2F2	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C2F3	181P718O50	ELECTROLYTIC CAPACITOR	04W 50V 1µF-M
C2F4	181P718O60	ELECTROLYTIC CAPACITOR	04W 50V 2.2µF-M
C2F5	181P718O50	ELECTROLYTIC CAPACITOR	04W 50V 1µF-M
C2F6	181P718O50	ELECTROLYTIC CAPACITOR	04W 50V 1µF-M
C2F8	181P718O80	ELECTROLYTIC CAPACITOR	04W 50V 4.7µF-M
C2F9	181P718O60	ELECTROLYTIC CAPACITOR	04W 50V 2.2µF-M
C2G0	181P350O50	ELECTROLYTIC CAPACITOR	04W 6.3V 470µF-M
C2G1	181P718O70	ELECTROLYTIC CAPACITOR	04W 50V 3.3µF-M
C2G2	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C2G3	181P711O80	ELECTROLYTIC CAPACITOR	04W 6.3V 100µF-M
C2G4	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C2G5	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C2G6	181P711O80	ELECTROLYTIC CAPACITOR	04W 6.3V 100µF-M
C2G7	181P718O40	ELECTROLYTIC CAPACITOR	04W 50V 0.47µF-M
C2H4	181P714O80	ELECTROLYTIC CAPACITOR	04W 16V 100µF-M
C310	181P718O80	ELECTROLYTIC CAPACITOR	04W 50V 4.7µF-M
C311	181P714O50	ELECTROLYTIC CAPACITOR	04W 16V 22µF-M

: Critical Components

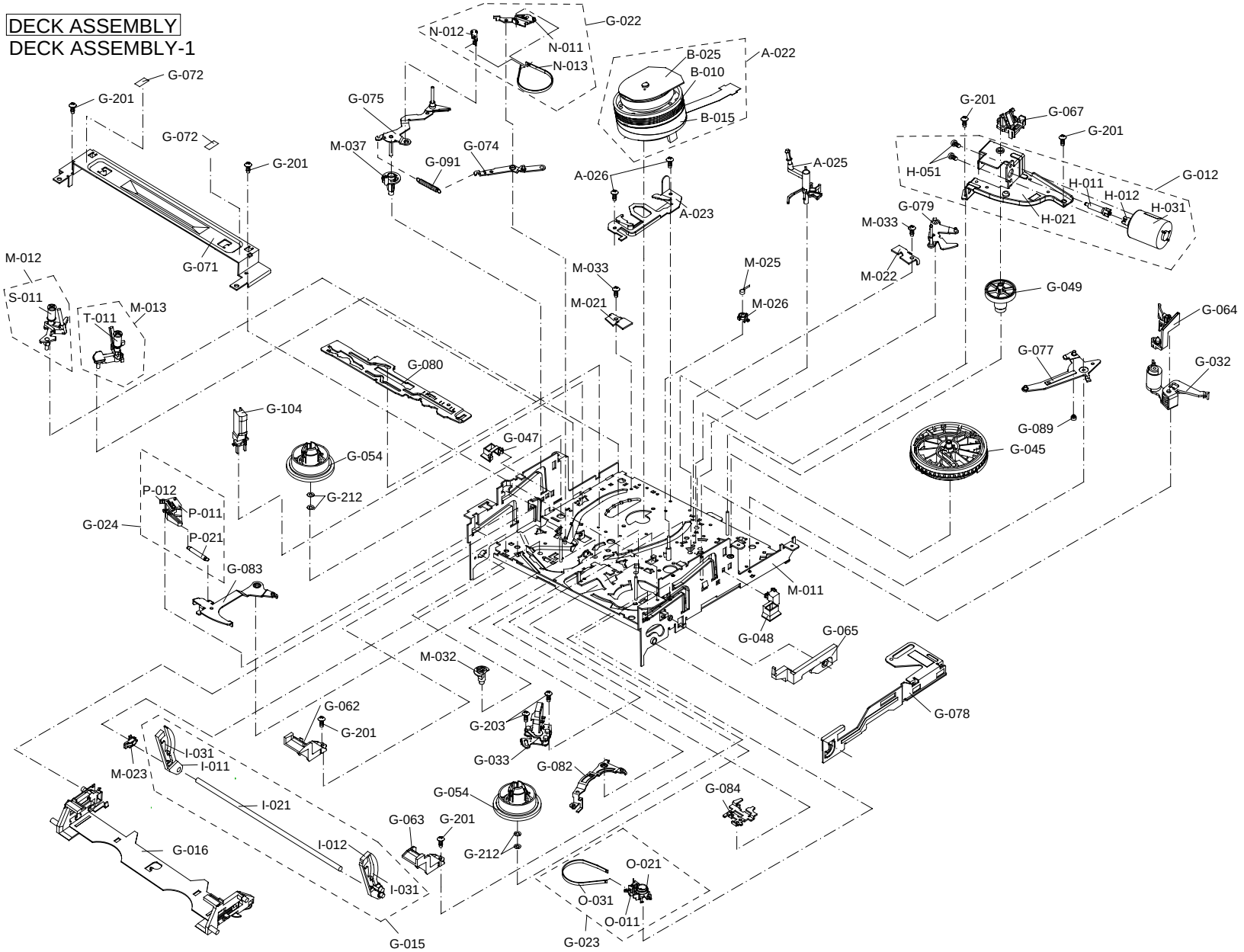
SYMBOL No.	PARTS No.	PARTS NAME	DESCRIPTION
C312	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C313	181P718O80	ELECTROLYTIC CAPACITOR	04W 50V 4.7µF-M
C314	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C315	181P714O50	ELECTROLYTIC CAPACITOR	04W 16V 22µF-M
C316	181P718O80	ELECTROLYTIC CAPACITOR	04W 50V 4.7µF-M
C317	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C379	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C3A3	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3A4	181P718O80	ELECTROLYTIC CAPACITOR	04W 50V 4.7µF-M
C3A7	181P718O80	ELECTROLYTIC CAPACITOR	04W 50V 4.7µF-M
C3B2	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C3B5	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3B6	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3C5	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3C6	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3C7	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C3C8	181P727O30	ELECTROLYTIC CAPACITOR	04C 35V 4.7µF-M
C3D0	181P718O70	ELECTROLYTIC CAPACITOR	04W 50V 3.3µF-M
C3D3	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C3D5	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3D6	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3D7	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C3D8	181P714O50	ELECTROLYTIC CAPACITOR	04W 16V 22µF-M
C3E0	181P714O70	ELECTROLYTIC CAPACITOR	04W 16V 47µF-M
C3E3	181P728O70	ELECTROLYTIC CAPACITOR	04C 50V 3.3µF-M
C3E5	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C3F1	181P718O60	ELECTROLYTIC CAPACITOR	04W 50V 2.2µF-M
C3F3	181P724O40	ELECTROLYTIC CAPACITOR	04C 16V 10µF-M
C3F4	181P718O50	ELECTROLYTIC CAPACITOR	04W 50V 1µF-M
C5A0	181P350O60	ELECTROLYTIC CAPACITOR	CE04W 6.3V 1000µF-M
C5A2	181P711O90	ELECTROLYTIC CAPACITOR	04W 6.3V 220µF-M
C5A9	181P711O90	ELECTROLYTIC CAPACITOR	04W 6.3V 220µF-M
C5E1	181P711O80	ELECTROLYTIC CAPACITOR	04W 6.3V 100µF-M
C5S2	181P711O70	ELECTROLYTIC CAPACITOR	04W 6.3V 47µF-M
C5S8	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C5T3	181P714O70	ELECTROLYTIC CAPACITOR	04W 16V 47µF-M
C5T7	181P717O60	ELECTROLYTIC CAPACITOR	04W 35V 33µF-M
C5T8	181P717O40	ELECTROLYTIC CAPACITOR	04W 35V 10µF-M
C8A0	181P711O90	ELECTROLYTIC CAPACITOR	04W 6.3V 220µF-M
C901	189P193O30	C-M-P-AC	AC125V 0.068µF-M
C902	189P193O30	C-M-P-AC	AC125V 0.068µF-M
C907	181P355O50	ELECTROLYTIC CAPACITOR	04W 50V 10µF-M
C908	189P215O90	AC CERAMIC CAPACITOR	AC250V E2200pF-M
C910	172P262O50	C-M-P	50V 0.1µF-J
C912	181P742O10	ELECTROLYTIC CAPACITOR	04W 10V 1000µF-M
C914	172P263O00	C-M-P	50V 0.2µF-J
C915	181P355O10	ELECTROLYTIC CAPACITOR	04W 50V 1µF-M
C916	181P743O60	ELECTROLYTIC CAPACITOR	04W 16V 680µF-M
C918	181P355O60	ELECTROLYTIC CAPACITOR	04W 50V 22µF-M
C921	181P350O40	ELECTROLYTIC CAPACITOR	6.3V 330µF-M
C926	181P352O30	ELECTROLYTIC CAPACITOR	16V 47µF-M
C927	181P352O30	ELECTROLYTIC CAPACITOR	16V 47µF-M
C929	181P352O80	ELECTROLYTIC CAPACITOR	04W 16V 1000µF-M
C930	181P746O60	ELECTROLYTIC CAPACITOR	04W 35V 330µF-M
C936	181P351O50	ELECTROLYTIC CAPACITOR	10V 220µF-M
C9Y1	189P215O90	AC CERAMIC CAPACITOR	AC250V E2200pF-M
C9Y2	189P215O90	AC CERAMIC CAPACITOR	AC250V E2200pF-M

SYMBOL No.	PARTS No.	PARTS NAME	DESCRIPTION
	SWITCHES		
S810	432P203O30	KEY BOARD SWITCH	EJ
S811	432P203O30	KEY BOARD SWITCH	POWER
S812	432P203O30	KEY BOARD SWITCH	SP/EP
S8A0	432P203O30	KEY BOARD SWITCH	REC
S8A1	432P203O30	KEY BOARD SWITCH	FF
S8A2	432P203O30	KEY BOARD SWITCH	PAUSE
S8A3	432P203O30	KEY BOARD SWITCH	PB
S8A4	432P203O30	KEY BOARD SWITCH	STOP
S8A5	432P203O30	KEY BOARD SWITCH	REW
S8A6	432P203O30	KEY BOARD SWITCH	CH-UP
S8A7	432P203O30	KEY BOARD SWITCH	CH-DOWN
	MISCELLANEOUS		
	939P662O20	PREAMP UNIT	GP1U293Q
	621C525O10	LED HOLDER	(D5B4)
	243C193O50	CARD LEAD WIRE	(MA DA) 7PIN L=160
	243C193O30	CARD LEAD WIRE	(MD DD) 7PIN L=120
	243C156O30	CARD LEAD WIRE	(MS OS) 11PIN L=120
	621C564O10	LED HOLDER R	(Q5A0)
	621C564O10	LED HOLDER R	(Q5A1)
	621C527O10	PHOTO HOLDER	(Q5A2)
F901	283D130O30	FUSE	S1.6A 125V
J2A1	440B134O10	PIN JACK BOARD	6PIN
J801	451C234O20	RCA PIN JACK	
J802	451C227O30	RCA PIN JACK	WHITE
J803	451C227O20	RCA PIN JACK	RED
PC901	268D024O30	PHOTO COUPLER	ON3131-R
Q5A0	268P076O20	PHOTO TRANSISTOR	SPS-1119C-BC-T
Q5A1	268P076O20	PHOTO TRANSISTOR	SPS-1119C-BC-T
Q5A2	268P076O20	PHOTO TRANSISTOR	SPS-1119C-BC-T
Q5A6	268P092O10	PHOTO TRANSISTOR	PT492FK1
Q5A7	268P092O10	PHOTO TRANSISTOR	PT492FK1
Q5A8	268P076O20	PHOTO TRANSISTOR	SPS-1119C-BC-T
Q5A9	268P076O20	PHOTO TRANSISTOR	SPS-1119C-BC-T
Q5B0	268P076O20	PHOTO TRANSISTOR	SPS-1119C-BC-T
RV901	265P100O20	VARISTOR	ERZV10D271CS
TU01	295P515O10	TUNER	VD025AW
V8A0	262P067O10	LED DISPLAY	
X2A0	285P147O60	CRYSTAL RESONATOR	3.579545MHz
X5A0	285P054O10	CRYSTAL RESONATOR	32.768kHz
X5A1	285P368O40	CRYSTAL RESONATOR	12.000MHz
	PRINTED CIRCUIT BOARD ASSY'S		
	928D651O01	MAIN PCB ASSY	
	928D652O01	OPE PCB ASSY	

DECK ASSEMBLY

DECK ASSEMBLY

DECK ASSEMBLY-1



DECK ASSEMBLY-1

* Settled Service Parts

ITEM	PARTS NO.	*	ADDRESS		PARTS NAME	DESCRIPTION	Qt.
A-022	948B432O01		G-1		DRUM ASSY		1
A-023	592B552O10		F-2		DRUM CLAMPER		1
A-025	641B903O10	○	H-2		CLEANING ARM		1
A-026	669D556O10	○	F-2		SCREW	2.6 × 4	2
B-010	925B115O13	○	G-1		UPPER DRUM ASSY		1
B-015	927B955O06	○	G-1		LOWER DRUM ASSY		1
B-025	288P158O30	○	G-1		DRUM MOTOR		1
G-012	928D472O11	○	K-2		LOADING MOTOR ASSY		1
G-015	948D088O03		D-8		F/L ARM ASSY		1
G-016	948B406O03	○	B-8		F/L BOTTOM ASSY		1
G-022	948D095O01		F-1		TENSION BELT ASSY		1
G-023	948D096O01		F-8		BRAKE ASSY (TU)		1
G-024	948D097O02	○	A-5		CHARGE ASSY		1
G-032	594C260O50	○	K-4		PINCH UNIT		1
G-033	460C007O10	○	E-7		A/C HEAD UNIT		1
G-045	621C769O20	○	I-4		MAIN CAM		1
G-047	621C783O10	○	E-4		SENSER COVER (SP)	SUPPLY	1
G-048	621C784O10	○	G-6		SENSER COVER (TU)	TAKE UP	1
G-049	621C794O10	○	J-3		WROM WHEEL		1
G-054	640C181O20	○	D-4	D-7	REEL DISK		2
G-062	621C789O10	○	C-6		INSERT GUIDE (SP)	SUPPLY	1
G-063	621C790O10	○	D-7		INSERT GUIDE (TU)	TAKE UP	1
G-064	641B902O10	○	K-3		PINCH ARM CAP		1
G-065	641B908O10	○	H-6		DOOR ARM		1
G-067	621C804O10		J-1		FC HOLDER		1
G-071	592B549O10	○	B-3		STAY PLATE		1
G-072	640D852O20		B-1	B-2	SPACER		2
G-074	594C217O10	○	E-2		TENSION LEVER		1
G-075	594C218O10	○	D-1		TENSION ARM		1
G-077	594C222O10	○	I-3		BRAKE LEVER		1
G-078	594C223O10	○	I-6		F/L PLATE		1
G-079	594C224O20	○	H-2		GUIDE ARM (TU)		1
G-080	594C225O30	○	D-4		BRAKE CAM PLATE		1
G-082	594C229O10	○	E-7		SHIFT LEVER		1
G-083	594C230O10	○	C-5		SWING LEVER		1
G-084	597D866O10	○	G-7		L/D LOCK LEVER		1
G-089	622D829O10		I-4		LB PIN		1
G-091	572D974O10	○	D-2		TENSION SPRING		1
G-104	460D018O10	○	C-4		F/E HEAD		1
G-201	669D224O90	○	A-1 D-7 J-2	C-2 I-1	SCREW	2.6 × 5	6
G-203	669D476O30	○	E-7		SCREW	2.6 × 6	2
G-212	552C017O30	○	C-5	E-8	THRUST WASHER	2.5 × 6.0 × 0.13	4
H-011	621C758O10	○	J-2		LOADING WORM		1
H-012	622D788O10		J-2		COUPLING WORM		1
H-021	594C216O10		J-2		MOTOR HOLDER		1
H-031	288P090O10		J-2		LOADING MOTOR		1
H-051	669D173O80	○	H-2		SCREW	M3 × 0.5-4	2
I-011	641B913O20	○	B-7		ARM (SP)		1
I-012	641B911O30	○	C-8		ARM (TU)		1
I-021	631D823O10	○	C-7		F/L SHAFT		1
I-031	573D004O10	○	B-7	D-8	ARM SPRING		2
M-011	948B403O01		G-5		MAIN PLATE ASSY		1

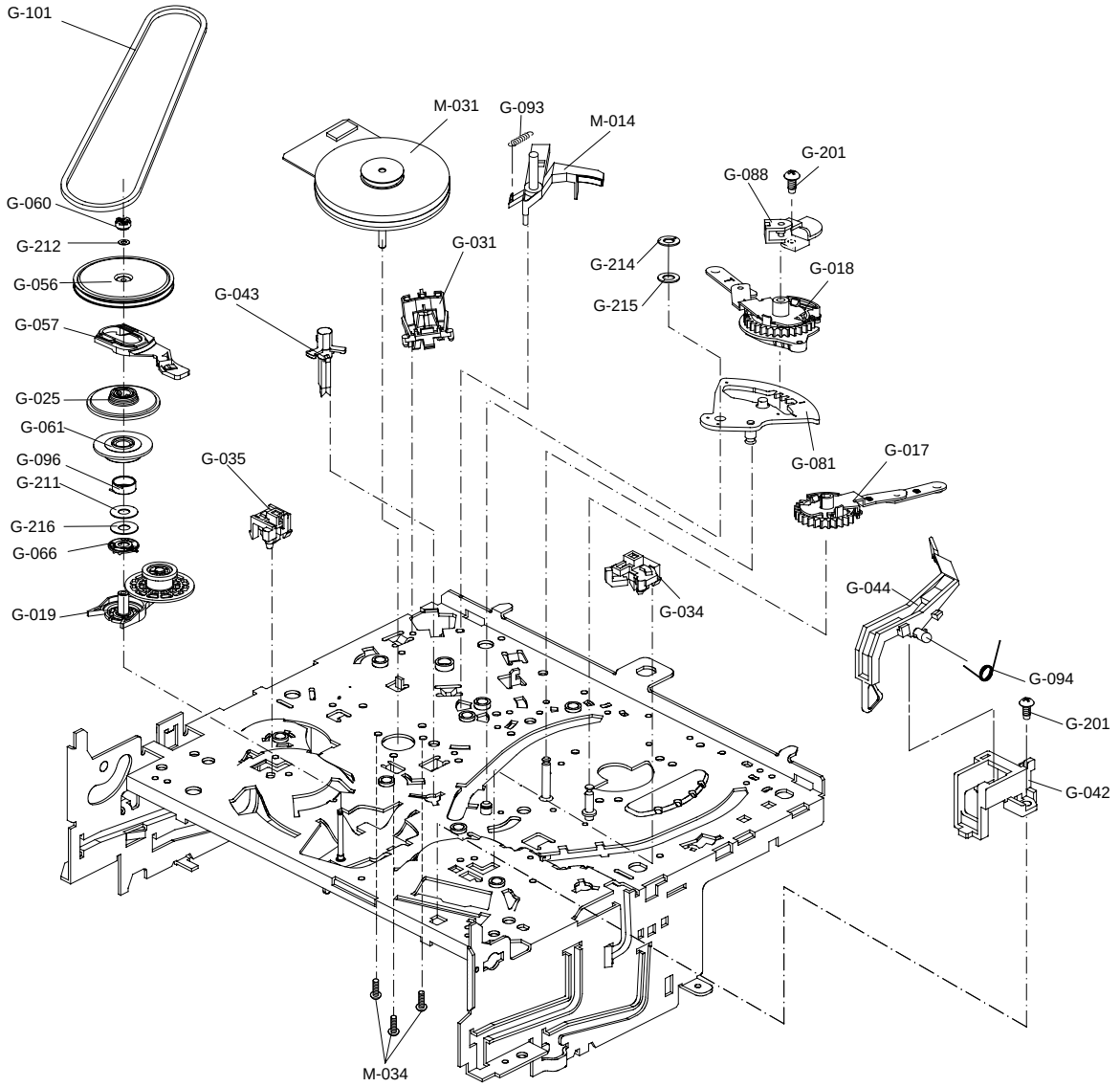
DECK ASSEMBLY-1

* Settled Service Parts

ITEM	PARTS NO.	*	ADDRESS		PARTS NAME	DESCRIPTION	Qt.
M-012	948D084O01	○	A-3		TAPE GUIDE ASSY (SP)	SUPPLY	1
M-013	948D086O01	○	B-3		TAPE GUIDE ASSY (TU)	TAKE UP	1
M-021	594C258O10		F-3		GUIDE CATCHER (SP)	SUPPLY	1
M-022	594C259O10		H-3		GUIDE CATCHER (TU)	TAKE UP	1
M-023	622D799O10	○	B-7		F/L BEARING		1
M-025	622D820O10	○	G-3		GUIDE PIN COVER		1
M-026	621C944O10	○	G-3		GUIDE PIN COVER 2		1
M-032	622D791O10	○	D-6		BELT ADJUSTER		1
M-033	669D224O90	○	F-3	H-2	SCREW	M2.6 × 5	2
M-037	622D792O10	○	C-2		TENS AXIS HOLDER		1
S-011	522B061O10	○	A-3		GUIDE ROLLER (SP)	SUPPLY	1
T-011	522B061O10	○	B-3		GUIDE ROLLER (TU)	TAKE UP	1
N-011	621C759O10	○	E-1		BELT LEVER		1
N-012	622D790O10	○	D-1		BELT HOLDER		1
N-013	554D103O10	○	E-1		BRAKE BELT (SP)		1
O-011	621C760O10	○	F-8		BRAKE (TU)		1
O-021	572D975O10	○	F-8		BRAKE SPRING		1
O-031	554D103O10	○	F-8		BRAKE BELT (TU)		1
P-011	640C187O10		B-5		CHARGE BASE		1
P-012	640C188O20		B-5		CHARGE TIP		1
P-021	572D983O20		B-5		CHARGE SPRING		1

DECK ASSEMBLY

DECK ASSEMBLY-2

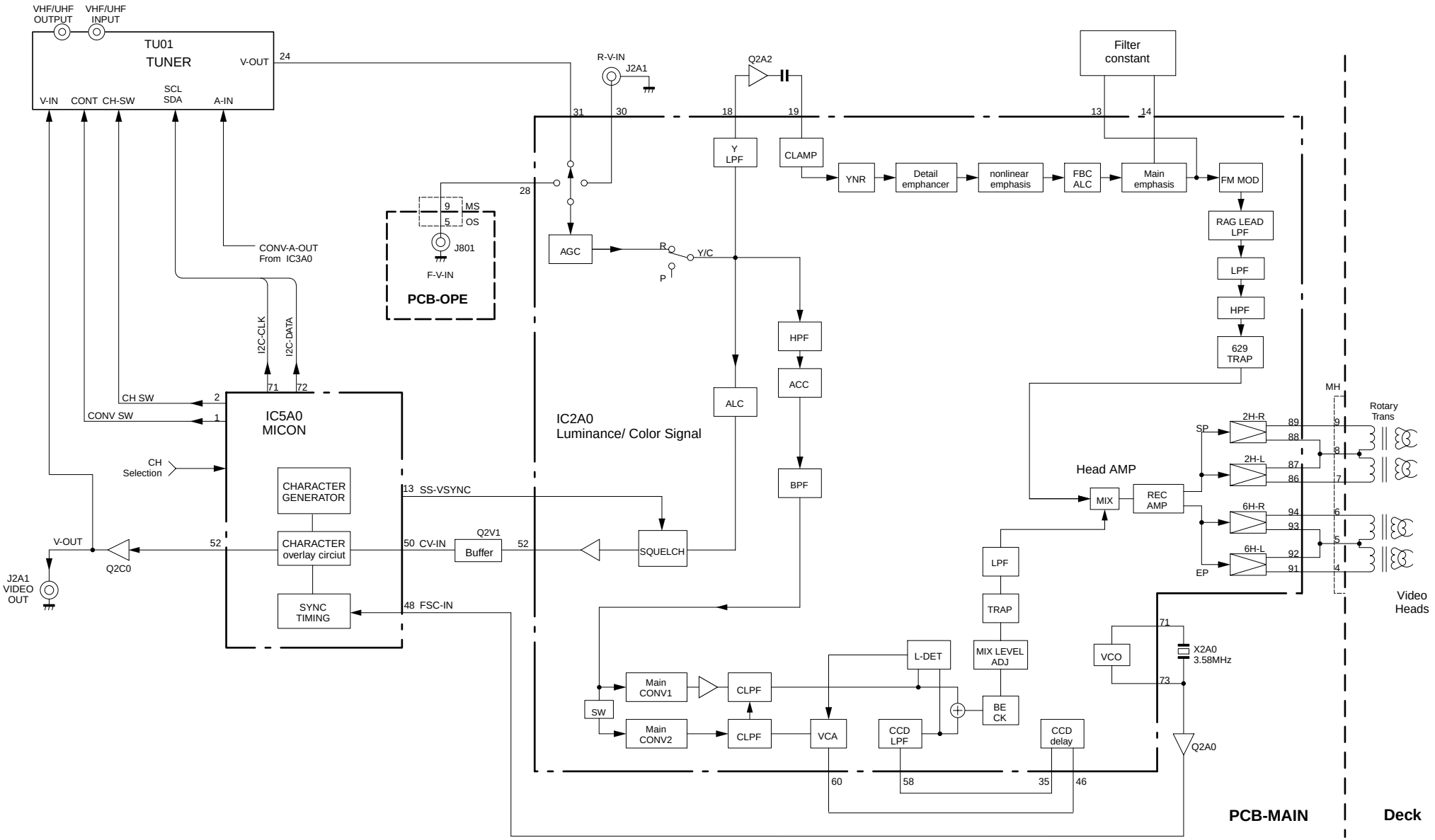


DECK ASSEMBLY-2

* Settled Service Parts

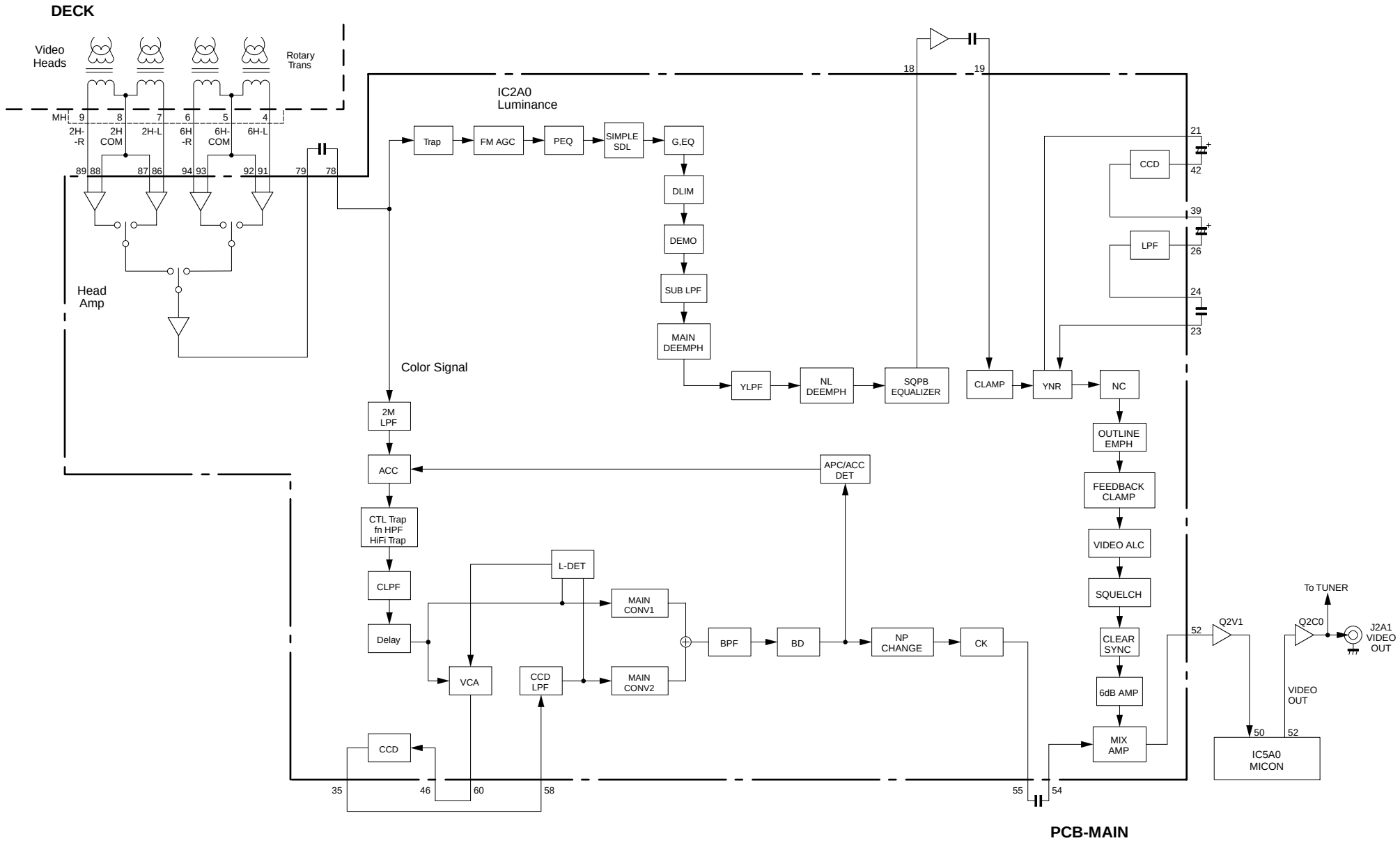
ITEM	PARTS NO.	*	ADDRESS		PARTS NAME	DESCRIPTION	Qt.
G-017	948D089O01	○	H-4		LOADING ARM ASSY (SP)	SUPPLY	1
G-018	948D090O01	○	G-3		LOADING ARM ASSY (TU)	TAKE UP	1
G-019	622D916O20	○	B-5		IDLER 2 UNIT		1
G-025	948D098O03	○	B-4		PULLEY GEAR ASSY		1
G-031	622D800O10	○	E-3		MODE POSITION UNIT		1
G-034	622D801O10	○	F-5		REV UNIT (SP)	SUPPLY	1
G-035	622D802O10	○	C-4		REV UNIT (TU)	TAKE UP	1
G-042	621C807O10		I-6		REC HOLDER		1
G-043	621C765O10	○	C-3		LAMP GUIDE		1
G-044	621C766O20	○	H-5		REC LEVER		1
G-056	640C185O30	○	B-3		BELT PULLEY		1
G-057	640C186O10	○	B-3		SHIFT SLIDER		1
G-060	640D948O10	○	B-2		PULLEY BUSH		1
G-061	640D949O10	○	B-4		SLIP GEAR		1
G-066	640C189O20	○	B-5		SLIP ADJUSTER		1
G-081	594C228O10	○	G-4		A/L LEVER		1
G-088	594C304O10	○	G-2		SPACER PLATE		1
G-093	572D976O10	○	E-2		CAPSTAN BRAKE SPRING		1
G-094	572D977O10	○	I-6		REC SPRING		1
G-096	573D073O10	○	B-4		SLIP SPRING		1
G-101	521D102O10	○	B-1		REEL BELT		1
G-201	669D224O90	○	G-2	I-6	SCREW	2.6 × 5	2
G-211	597D997O10	○	B-4		SLIP WASHER 2		1
G-212	552C017O30	○	B-3		THRUST WASHER	2.5 × 6.0 × 0.13	1
G-214	552C022O10		F-3		CUT WASHER	4.0 × 8.0 × 0.5	1
G-215	680P140O10		F-3		WASHER		1
G-216	552C012O50		B-5		THRUST WASHER	5.6 × 9.5 × 0.2	1
M-014	948D094O01	○	F-2		CAPSTAN BRAKE ASSY		1
M-031	288P213O30	○	E-2		CAPSTAN MOTOR	F2QSB31	1
M-034	669D285O10		D-8		SCREW	M2.6 × 6	3

Luminance Record, Chroma Record HS-U449

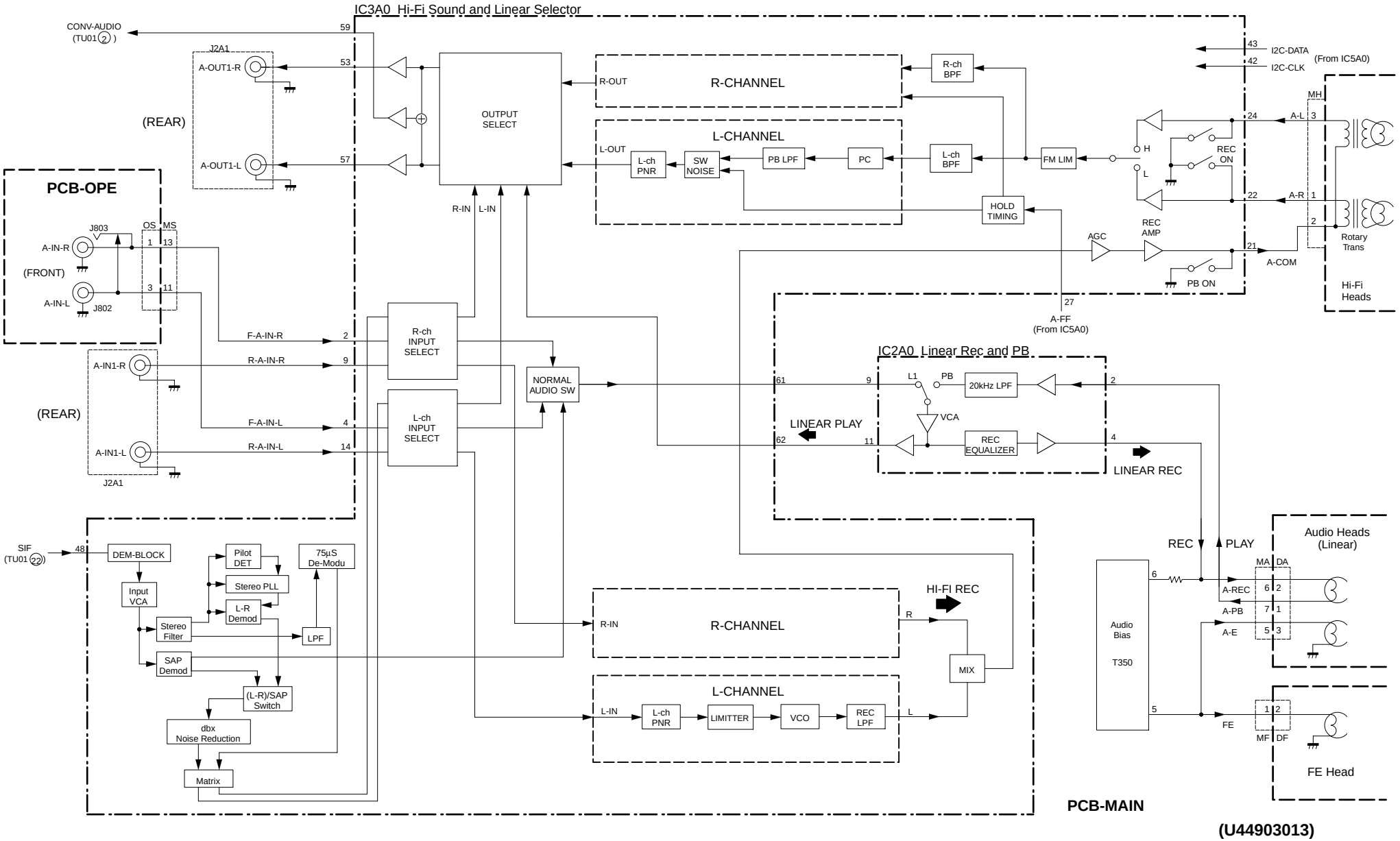


B-1

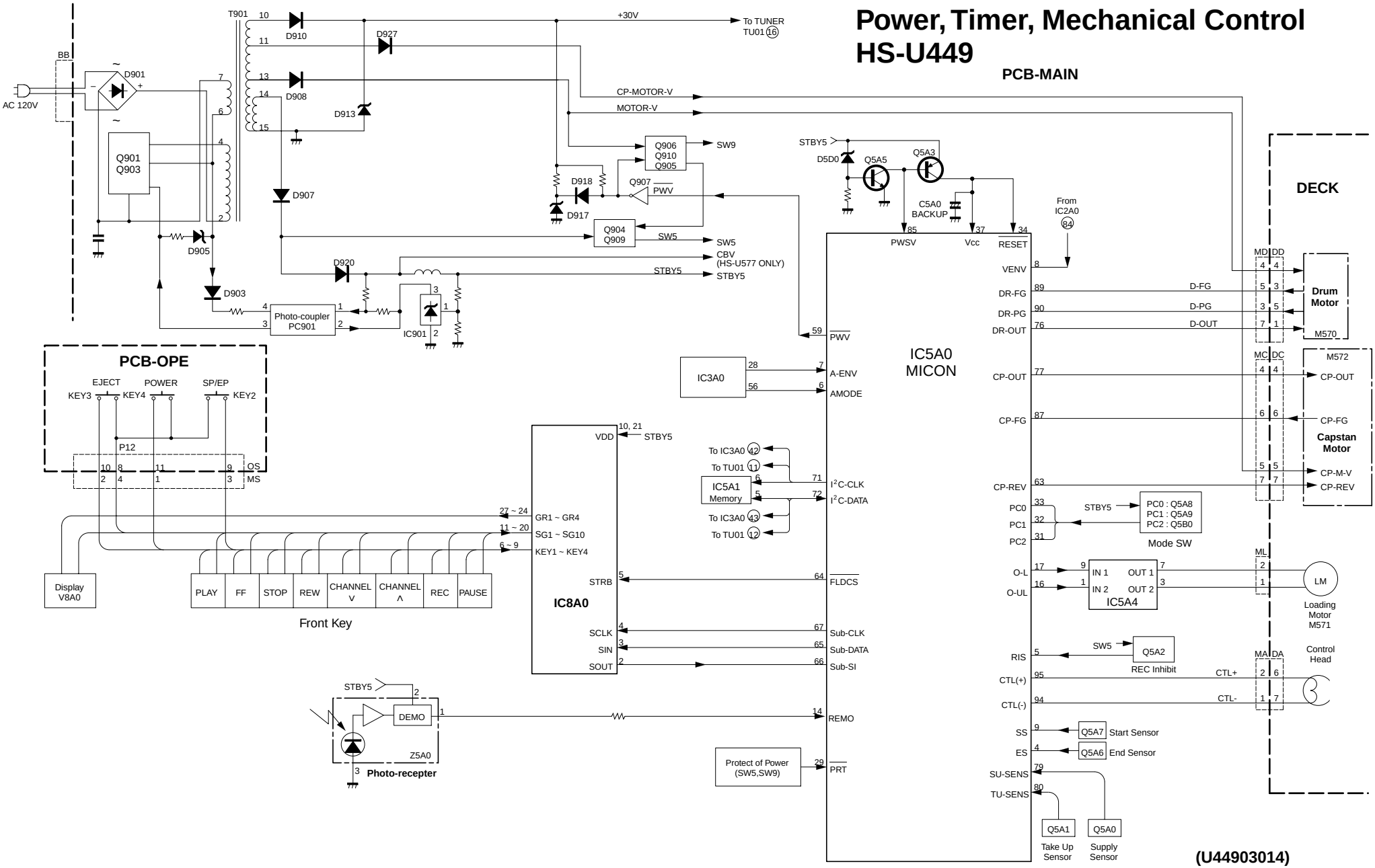
Luminance Playback, Chroma Playback HS-U449



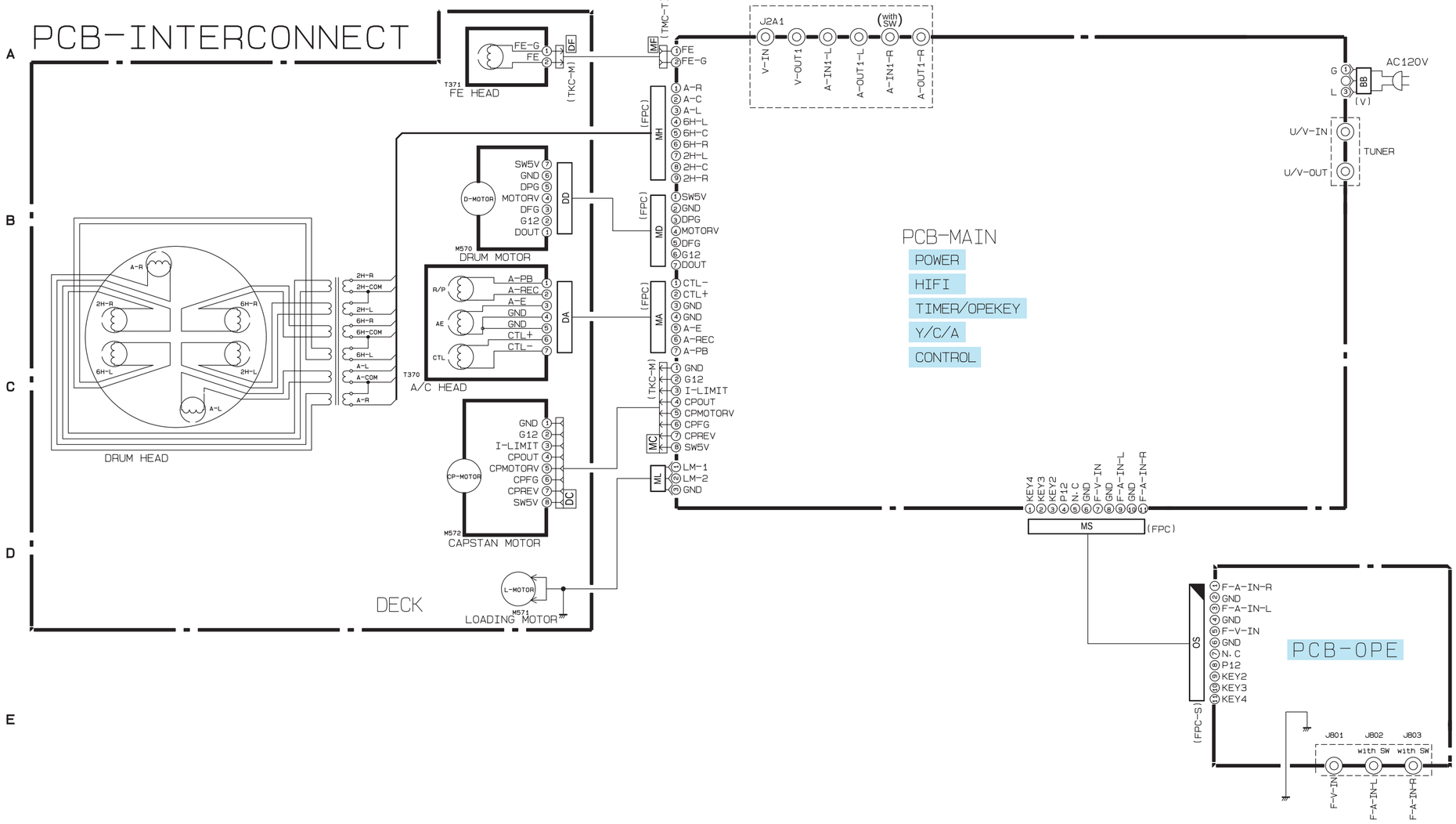
Hi-Fi and Linear Sound HS-U449



Power, Timer, Mechanical Control
HS-U449



PCB-INTERCONNECT



CONTENTS

NOTE

1. Each voltage should be within ± 20% of the DC voltages measured with a digital voltmeter.
2. The voltages parenthesised on SP recording mode.
   While those without parenthesised on SP play back mode.
3. Waveforms were taken with standard color bar signal.
4. TP6A, etc. show Test Points.
5. Capacitors

Value	Not indicated	pF, for numbers more than 1 μF, for numbers less than 1	
Dielectric Strength	Not indicated : 50V		
Tolerance	Not indicated = ±10%	(No Tolerance is indicated for electrolytic capacitors and ± 20%)	
	G = ± 2%	N = ± 30%	Q = + 30% – 10%	C = ± 0.25pF
	J = ± 5%			D = ± 0.5pF
	K = ± 10%	P = + 100% – 0%	Z = + 80% – 20%	F = ± 1pF
	M = ± 20%			G = ± 2pF

Sort	I Parts except for chips	Not indicated	: Ceramic capacitor
		(MF)	: Polyester capacitor
		(PP)	: Polypropylene film capacitor
		(ALM)	: Aluminus electrolytic capacitor
		(TF)	: Twin film capacitor
		(SC)	: Semiconductor ceramic capacitor
		(MP)	: Metalized paper capacitor
		(MPP)	: Metalized plastic film capacitor
		(MMF)	: Metalized polyester capacitor
		(MF,PP)	: Polyester polypropylene film capacitor
		(PS)	: Styrol capacitor
		(TAN) or (TANT)	: Tantalum capacitor
		⊣‖⊢	: Electrolytic capacitor
		(BP) or (NP)	: Non polarized electrolytic capacitor
	II Chips	Not indicated	: Ceramic capacitor chip
		⊣‖⊢	: Electrolytic capacitor chip
		(BP) or (NP)	: Non polarized electrolytic capacitor chip
Characteristic (only ceramic capacitor)	Not indicated : F or B (high dielectric percentage) CH,SL,etc : Temperature compensating types		

6. Resistors

Value	Not indicated = Ω K = kΩ (1000Ω) M = MΩ (1000kΩ)		
Wattage	Parts except for chips	Not indicated = 1/4W or 1/6W	
	Chips	Not indicated = 1/10W	
Tolerance	Not indicated = ± 5% D = ± 0.5% F = ± 1% J = ± 5% K = ± 10%		
Sort	I Parts except for chips	Not indicated	: Carbon resistor
		(S)	: Fixed composition resistor
		(MB)	: Metal oxide film resistor (type B)
		(CE)	: Cemented resistor
		(W)	: Wire wound resistor
		(M)	: Metal film resistor
		(MPC)	: Metal plate cement resistor
		(ML)	: Metal liner resistor
	II Chips	Not indicated	: Chip resistor

7. This is basic schematic diagram.
   Some sets may be subject to modification according to engineering imporovement.

SPECIFIC SYMBOL

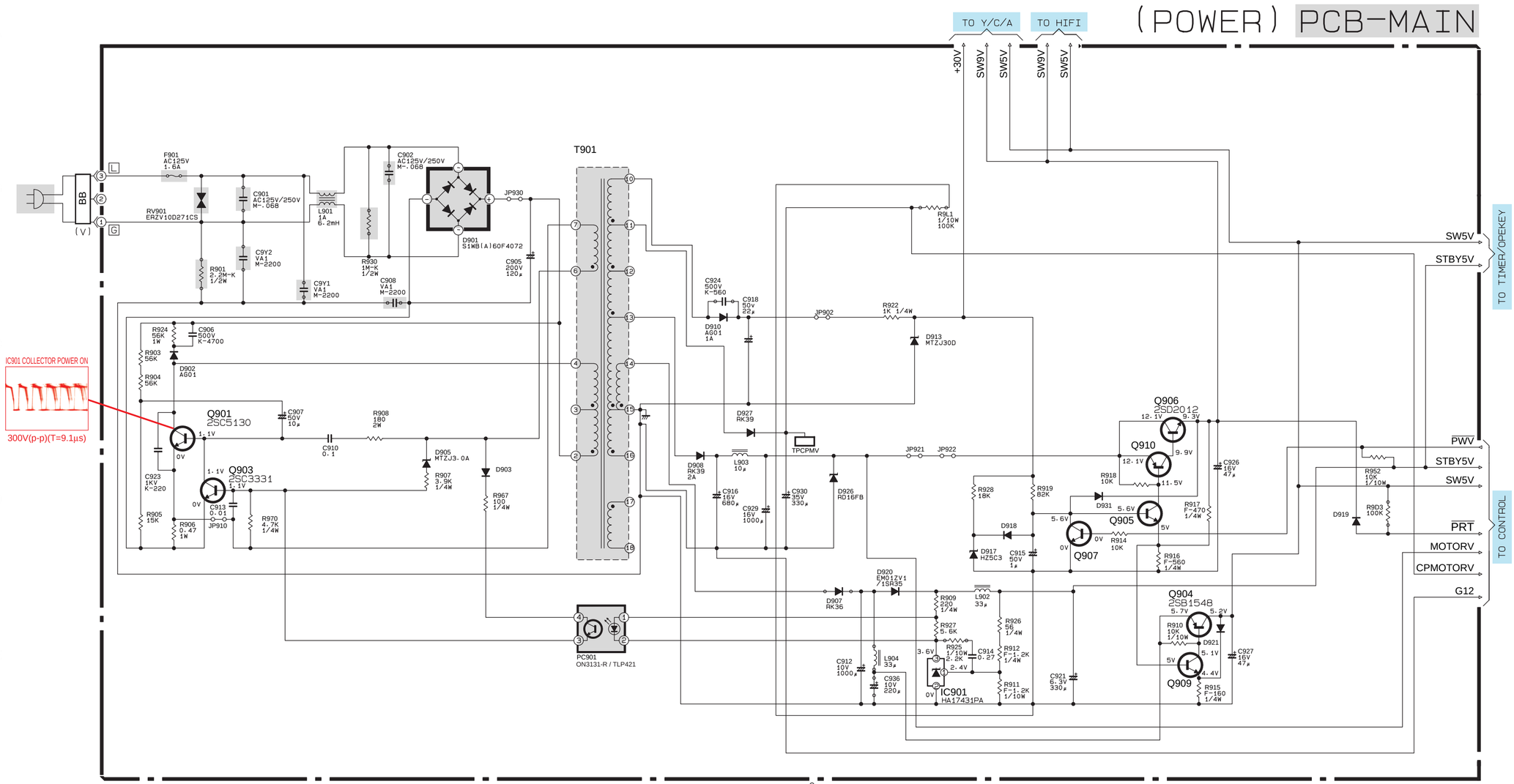
- Zener Diode
- Varicap
- Positive Thermistor
- Thermistor
- Photo Diode
- LED
- Fusible Resistor
- Crystal unit
- Air Gap
- Part (resistor) attached on the copper-foil side of PCB
- Ceramic filter

8. Correspondence of the units in the Schematic Diagrams to the SI units.

	Schematic Diagram	SI
Kiro	K	k
Hertz	HZ	Hz
Pico	P	p

SHADED COMPONENTS HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY. BEFORE REPLACING ANY OF THESE COMPONENTS READ CAREFULLY THE PRODUCT SAFETY NOTICE IN THE SERVICE MANUAL.
DON'T DEGRADE THE SAFETY OF THE RECEIVERS THROUGH IMPROPER SERVICING.

(POWER) PCB-MAIN



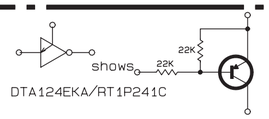
NOTE

UNLESS OTHERWISE SPECIFIED.

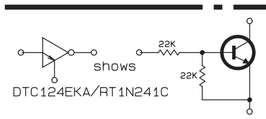
ALL DIODES ARE 1SS254/1SS133.

ALL NPN TRANSISTORS ARE 2SC1740S-E/2SC5395-G.

ALL PNP TRANSISTORS ARE 2SA933S-R,S/2SA1993-E,F.



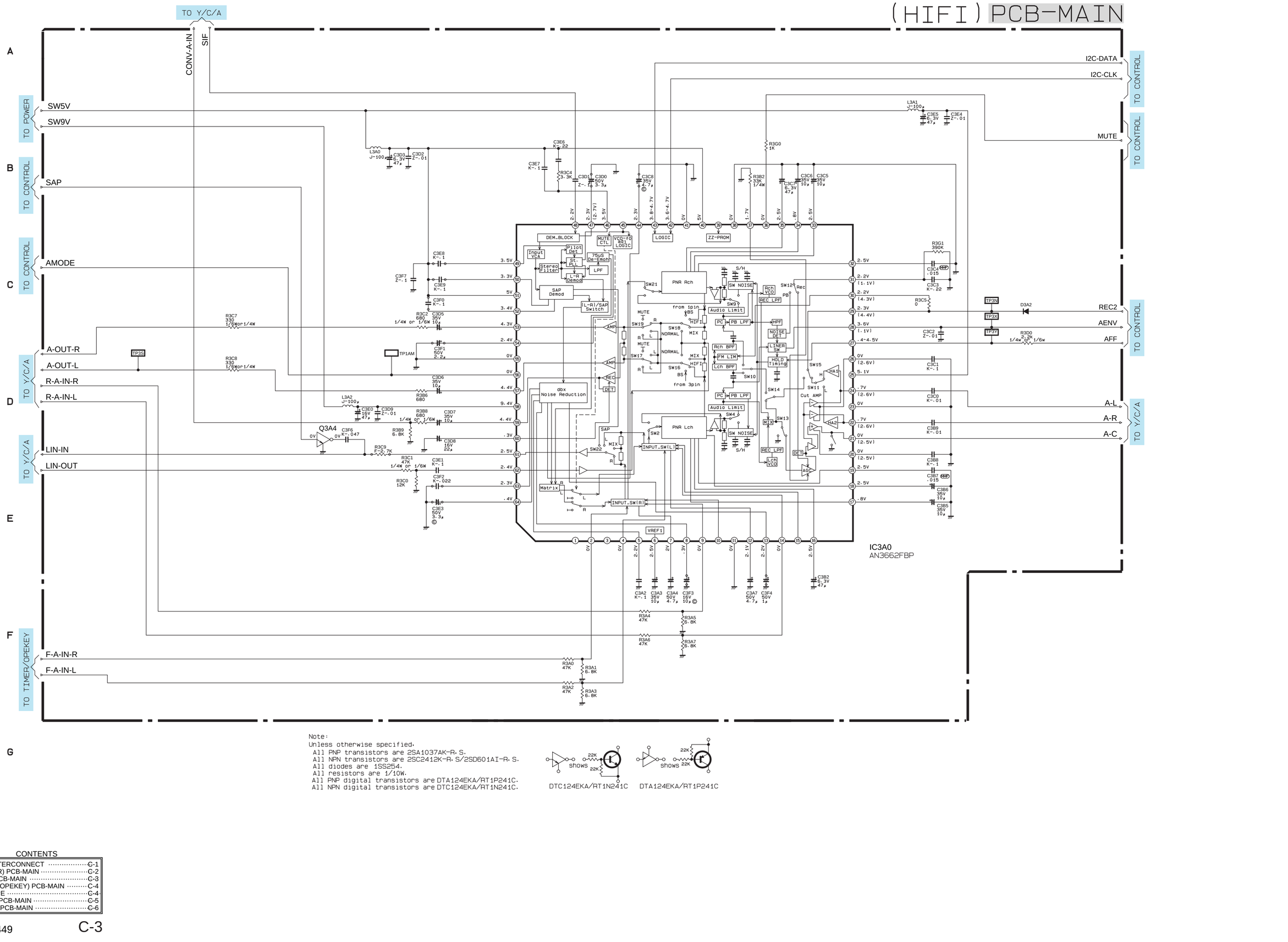
DTA124EKA/RT1P241C



DTC124EKA/RT1N241C

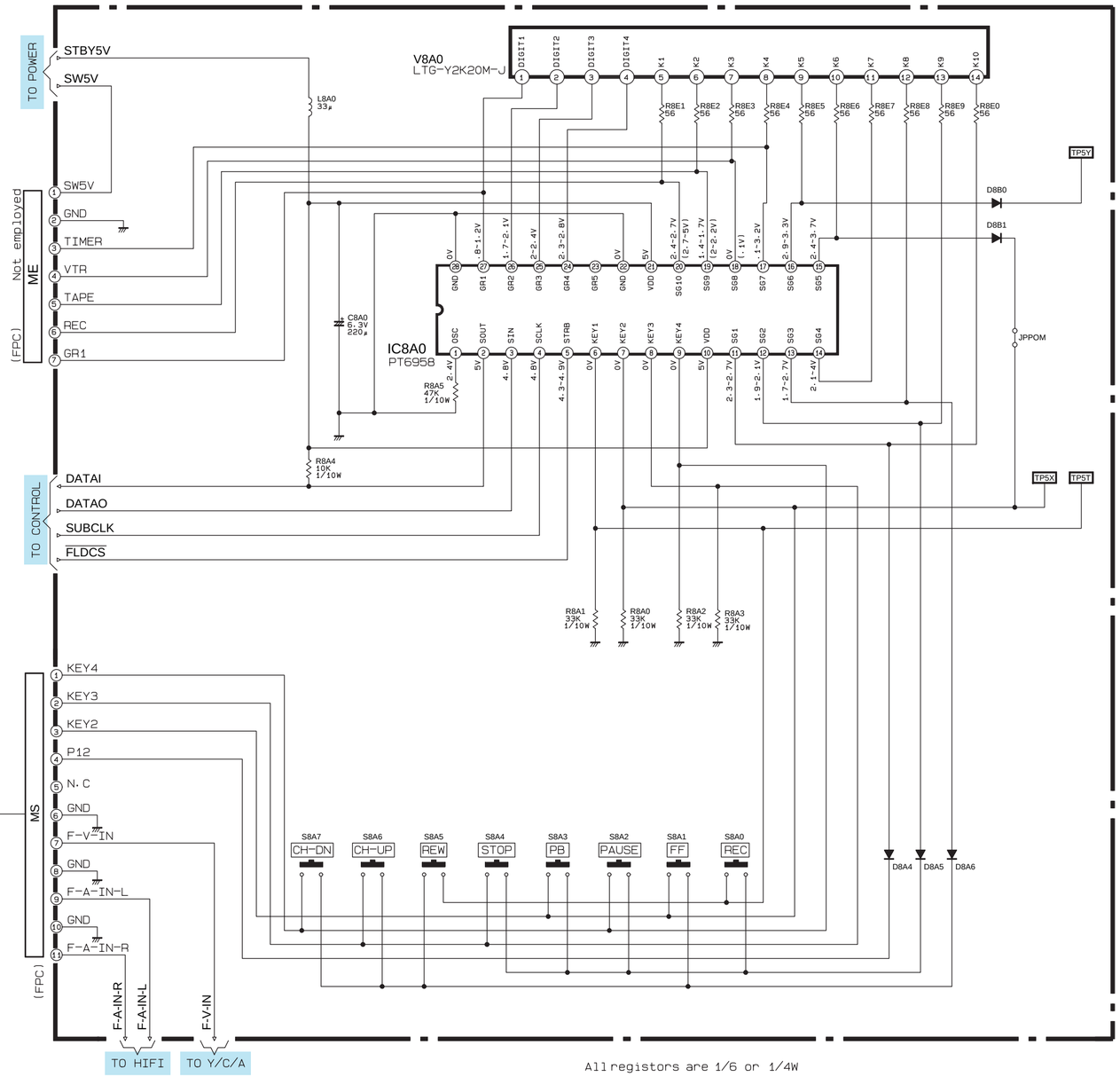
CONTENTS

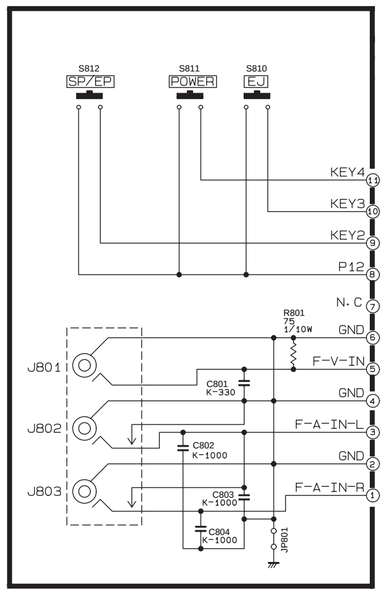
(HIFI) PCB-MAIN

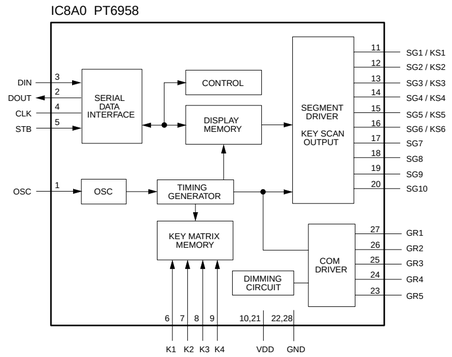


CONTENTS

(TIMER/OPEKEY) PCB-MAIN



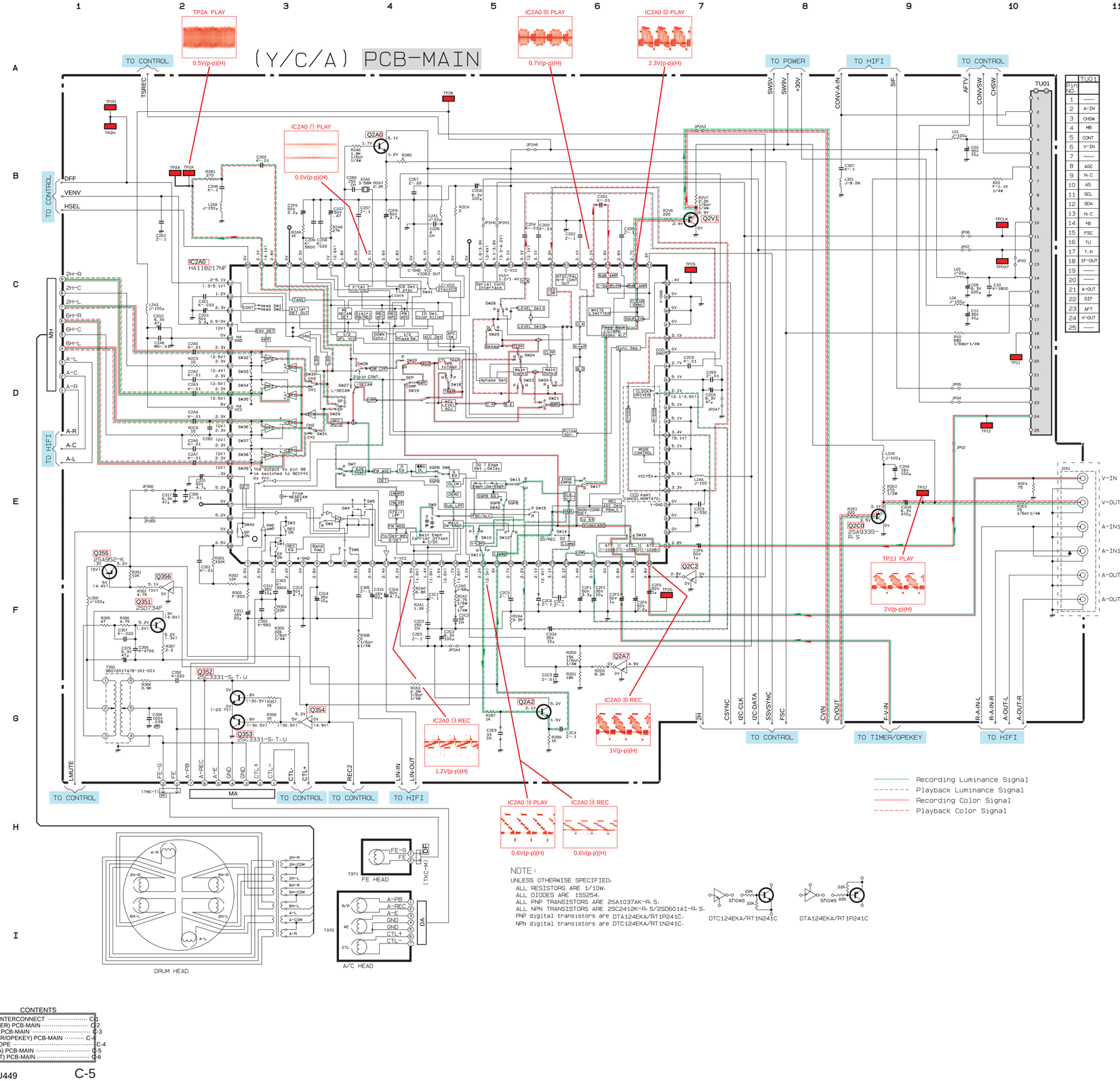




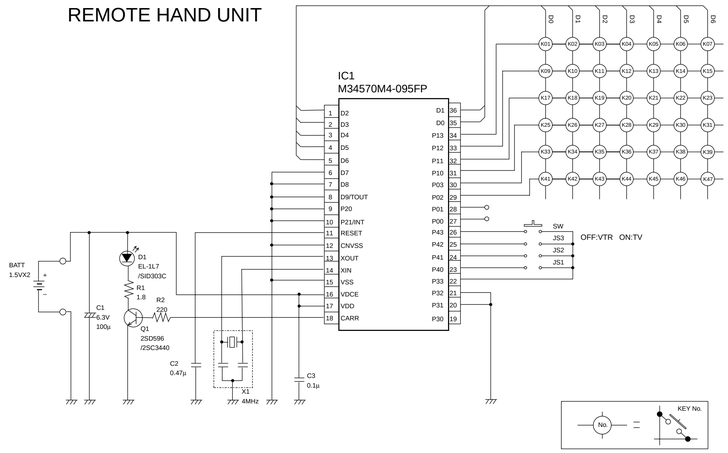
All registors are 1/6 or 1/4W
unless otherwise specified.
All diodes are 1SS254
unless otherwise specified.

CONTENTS

(Y/C/A) PCB-MAIN



REMOTE HAND UNIT



KEY NO.	FUNCTION
K01	VCR POWER
K02	EJECT
K03	CH ∧
K04	CH ∨
K05	VOL ∨
K06	VOL ∧
K07	TV POWER
K08	
K09	1
K10	4
K11	5
K12	2
K13	6
K14	3
K15	MUTE
K16	
K17	7
K18	QUICK PROGRAM
K19	PLAY
K20	8
K21	10
K22	9
K23	INPUT X2
K24	

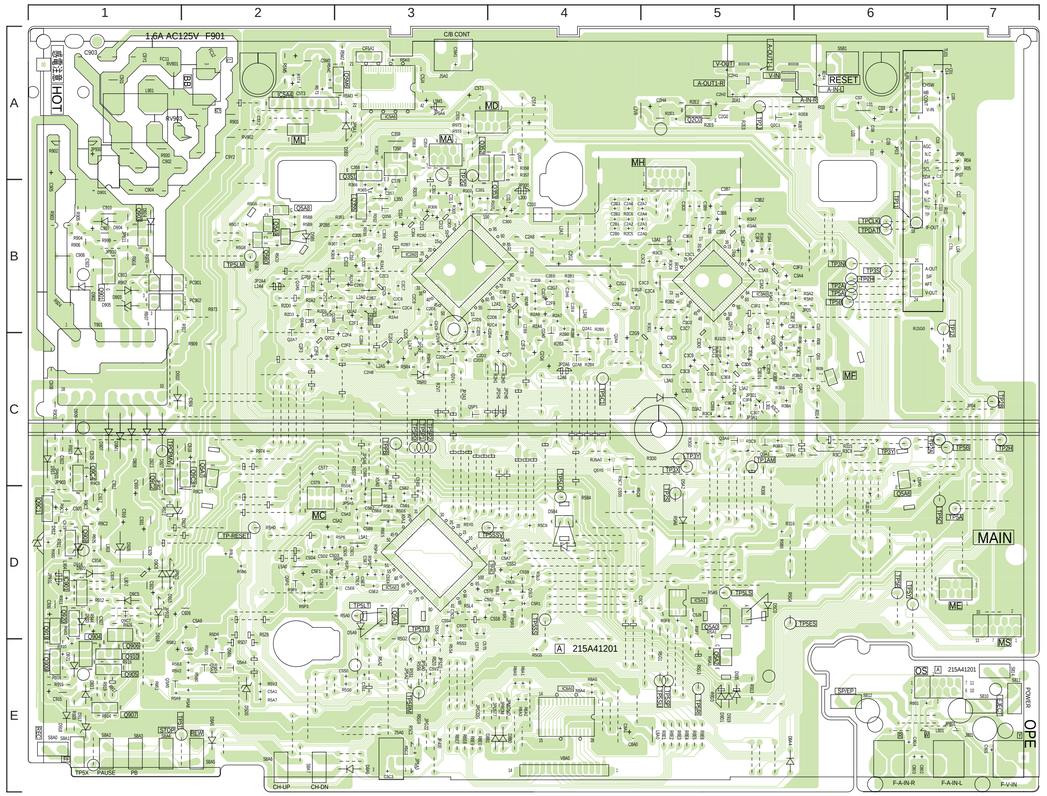
KEY NO.	FUNCTION
K25	REC
K26	REW
K27	PAUSE
K28	STOP
K29	DISPLAY
K30	FF
K31	X2
K32	
K33	AUDIO/VIDEO
K34	CANCEL ◀◀
K35	INDEX –
K36	ADJ +
K37	INDEX +
K38	ENTER ▶▶
K39	MENU
K40	
K41	VCR/TV
K42	
K43	
K44	ADJ –
K45	
K46	
K47	SP/EP
K48	

CONTENTS

(CONTROL) PCB-MAIN

NOTE:
All registors are 1/6 or 1/4W unless otherwise specified.
All diodes are 1SS254 unless otherwise specified.
All NPN transistors are 2SC2412K-R,S/2SD601AI-R,S unless otherwise specified.
All PNP transistors are 2SA1037AK-R,S unless otherwise specified.
All PNP digital transisrors are DTA124EKA/RT1P241C unless otherwise specified.
All NPN digital transisrors are DTC124EKA/RT1N241C unless otherwise specified.

CONTENTS



PCB-MAIN

SYMBOL NO.	ADDRESS
BB	A – 1
C01	A – 6
C02	A – 6
C03	A – 6
C04	A – 6
C05	A – 6
C08	A – 6
C09	A – 6
C10	A – 6
C11	B – 6
C12	B – 6
C13	B – 6
C14	A – 6
C15	B – 5
C16	C – 5
C17	A – 6
C18	A – 6
C2A0	B – 4
C2A2	B – 4
C2A3	B – 4
C2A4	B – 4
C2A6	B – 4
C2A7	B – 4
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C2E6	B – 3
C2E7	B – 3
C2E9	B – 3
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C2F2	B – 2
C2F3	B – 2
C2F4	B – 2
C2F5	B – 2
C2F6	B – 2
C2F7	B – 3
C2F8	B – 4
C2F9	B – 4
C2G0	A – 5
C2G1	B – 4
C2G2	B – 4
C2G3	B – 2
C2G4	C – 3
C2G5	B – 3
C2G6	C – 4
C2G7	B – 4
C2G8	B – 4
C2G9	B – 4
C2H1	A – 5
C2H2	A – 5
C2H4	A – 4
C2H6	B – 4
C2H8	C – 3
C300	B – 3
C301	A – 3
C302	A – 3
C303	B – 3
C304	B – 3
C305	B – 2
C306	B – 3
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C310	B – 3
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C312	B – 3
C313	B – 3
C314	B – 3
C315	B – 3
C316	B – 2
C317	B – 3
C350	A – 3
C357	A – 3
C358	A – 3
C359	A – 3
C379	A – 3
C3A2	B – 5
C3A3	B – 5
C3A4	B – 5
C3A7	B – 5
C3B2	B – 5
C3B5	B – 5
C3B6	B – 5
C3B7	A – 5
C3B8	B – 5
C3B9	B – 5
C3C0	B – 5
C3C1	B – 5
C3C2	B – 4
C3C3	B – 4
C3C4	B – 4
C3C5	C – 4
C3C6	B – 4
C3C7	B – 4
C3C8	C – 5
C3C9	C – 5
C3D0	B – 5
C3D1	C – 5
C3D2	B – 5
C3D3	C – 5
C3D4	C – 5
C3D5	C – 5
C3D6	C – 5
C3D7	B – 5
C3D8	B – 5
C3D9	C – 5
C3E0	C – 5
C3E1	B – 5
C3E2	B – 5
C3E3	B – 5
C3E4	B – 5
C3E5	B – 5
C3E6	C – 5
C3E7	C – 5
C3E8	C – 5
C3E9	C – 5
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C3F1	B – 5
C3F2	B – 5
C3F3	B – 5
C3F4	B – 5
C3F6	C – 5
C3F7	B – 5
C5A0	D – 1
C5A1	E – 2
C5A2	D – 2
C5A3	D – 2
C5A6	D – 3
C5A7	D – 3
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C5B2	C – 3
C5B3	C – 3
C5B5	C – 3
C5B6	C – 3
C5B7	C – 3
C5B8	D – 3
C5B9	D – 3
C5C1	D – 4
C5C3	E – 3
C5C5	D – 3
C5D0	D – 2
C5D1	D – 2
C5D2	D – 2
C5D3	D – 2
C5D4	D – 2
C5E0	D – 2
C5E1	D – 2
C5E2	D – 3
C5E3	D – 3
C5E4	D – 3
C5E5	D – 2
C5E6	D – 2
C5E7	D – 2
C5J4	A – 3
C5J9	D – 5
C5L0	D – 3
C5M1	A – 3
C5M3	A – 2
C5P0	C – 6
C5R1	D – 4
C5S0	E – 2
C5S1	E – 2
C5S2	D – 3
C5S3	D – 3
C5S4	D – 3
C5S5	C – 4
C5S6	D – 3
C5S7	D – 3
C5S8	D – 3
C5S9	D – 3
C5T0	A – 3
C5T1	A – 3
C5T2	A – 2
C5T3	A – 2
C5T4	A – 4
C5T5	D – 3
C5T6	D – 3
C5T7	C – 2
C5T8	D – 3
C5T9	C – 2
C5V2	E – 3
C801	E – 7
C802	E – 6
C803	E – 6
C804	E – 6
C8A0	E – 4
C8A1	E – 4
C901	A – 1
C902	A – 1
C903	A – 1
C904	A – 1
C905	A – 1
C906	B – 1
C907	B – 1
C908	C – 0
C910	B – 1
C912	C – 1
C913	B – 1
C914	D – 1
C915	E – 0
C916	D – 1
C917	C – 1
C918	C – 1
C919	D – 1
C920	C – 1
C921	D – 1
C922	C – 1
C923	B – 1
C924	C – 1
C925	C – 1
C926	D – 1
C927	D – 1
C929	D – 1
C930	C – 1
C931	D – 1
C935	D – 1
C936	D – 0
C9Y1	A – 1
C9Y2	A – 2
CF5A1	A – 3
D3A2	C – 5
D5A2	D – 5
D5A9	D – 3
D5B4	D – 4
D5B5	B – 2
D5C0	D – 5
D5D0	E – 2
D5E0	A – 2
D5R0	C – 3
D8A4	E – 5
D8A5	E – 2
D8A6	E – 2
D8B0	E – 3
D8B1	E – 3
D901	A – 1
D902	B – 1
D903	B – 1
D904	B – 1
D905	B – 1
D907	C – 1
D908	C – 1
D909	C – 1
D910	C – 1
D911	C – 0
D912	D – 0
D913	D – 1
D914	D – 1
D915	D – 1
D916	D – 1
D917	E – 1
D918	E – 1
D919	E – 5
D920	D – 1
D921	E – 1
D923	C – 1
D924	B – 1
D926	D – 1
D927	C – 1
D931	E – 1
D933	D – 1
D935	E – 5
D9C5	D – 1
D9C6	D – 1
D9D1	E – 5
D9M1	C – 1

PCB-OPE

SYMBOL NO.	ADDRESS
FC11	A – 1
FC12	A – 2
IC2A0	B – 3
IC3A0	B – 5
IC5A0	D – 3
IC5A1	D – 5
IC5A4	A – 2
IC5A6	A – 3
IC8A0	E – 4
IC901	D – 1
J2A1	A – 5
J5A0	A – 3
J801	E – 6
JP02	C – 6
JP03	A – 6
JP04	C – 7
JP05	B – 5
JP06	A – 6
JP07	A – 6
JP2A3	C – 3
JP2A4	B – 2
JP2A6	C – 4
JP2A7	B – 3
JP2B5	B – 2
JP2H0	C – 3
JP2H1	C – 3
JP300	A – 3
JP301	C – 5
JP3A1	C – 5
JP400	E – 3
JP5A0	D – 3
JP5A1	A – 2
JP5A2	D – 3
JP5A3	E – 3
JP5A4	A – 3
JP5A5	C – 2
JP5A6	C – 2
JP5Z0	D – 3
JP801	E – 6
JP901	C – 0
JP902	C – 1
JP903	C – 1
JP910	B – 1
JP911	B – 1
JP921	D – 1
JP922	D – 1
JP930	A – 0
JP931	D – 1
JPG22	E – 3
JPG22G	E – 3
JPMONO	E – 3
JPROM	E – 3
JPU577	E – 3
L01	A – 6
L03	A – 6
L04	B – 6
L2A0	B – 3
L2A1	B – 3
L2A3	B – 4
L2A4	B – 2
L2A5	C – 3
L2A6	C – 4
L2A7	C – 3
L2A8	B – 4
L2V6	A – 4
L300	A – 4
L301	C – 5
L350	A – 3
L3A0	C – 5
L3A1	B – 4
L3A2	C – 5
L5A0	D – 2
L5A1	D – 3
L5M1	A – 3
L801	E – 6
L8A0	E – 4
L901	A – 1
L902	D – 1
L903	D – 1
L904	D – 1
MA	A – 3
MC	C – 2
MD	A – 3
ME	D – 6
MF	C – 6
MH	A – 4
ML	A – 2
MS	D – 7
OS	E – 6
PC901	B – 1
PC902	B – 1
Q01	C – 5
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Q2A1	B – 4
Q2A2	B – 2
Q2A4	B – 4
Q2A5	B – 2
Q2A6	B – 2
Q2A7	B – 2
Q2A8	C – 4
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Q2C0	A – 5
Q2C1	A – 5
Q2C2	B – 2
Q2V1	C – 3
Q351	A – 3
Q352	A – 3
Q353	A – 3
Q354	A – 3
Q355	A – 2
Q356	B – 3
Q3A0	C – 5
Q3A1	C – 5
Q3A2	C – 5
Q3A4	C – 5
Q5A0	D – 5
Q5A1	D – 3
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Q5A8	B – 2
Q5A9	B – 2
Q5B0	B – 2
Q5B1	D – 2
Q5L0	D – 4
Q5M6	A – 2
Q5P0	D – 2
Q5P1	C – 3
Q5Y0	C – 4
Q901	B – 1
Q903	B – 1
Q904	D – 1
Q905	E – 1
Q906	D – 1
Q907	E – 1
Q908	D – 1
Q909	D – 1
Q910	D – 1
Q919	D – 0
Q920	D – 1
Q9C1	C – 0
Q9C2	C – 1
Q9C3	C – 1
Q9C4	C – 1
Q9C7	D – 1
R03	A – 6
R04	A – 6
R05	A – 6
R06	B – 5
R07	B – 5
R08	B – 5
R09	C – 5
R10	B – 6
R2A0	B – 3
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R2A3	B – 3
R2A4	B – 3
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R3C9	C – 5
R3D0	C – 5
R3G0	C – 5
R3G1	B – 4
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R5A1	D – 5
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R5A5	D – 5
R5A6	D – 5
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R5A8	E – 1
R5A9	E – 1
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R5S6	E – 3
R5S7	C – 2
R5S8	C – 2
R5T3	A – 2
R5T4	A – 2
R5T5	A – 3
R5T6	A – 3
R5V2	E – 1
R5V3	E – 2
R5Y0	D – 3
R5Z0	E – 3
R5Z8	D – 2
R801	E – 6
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R8A4	E – 4
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R8E6	E – 5
R8E7	E – 3
R8E8	E – 3
R8E9	E – 3
R901	A – 2
R902	A – 1
R903	B – 1
R904	B – 1
R905	B – 1
R906	B – 1
R907	B – 1
R908	B – 1
R909	B – 2
R910	D – 1
R911	D – 1
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R914	E – 1
R915	E – 1
R916	E – 1
R917	E – 1
R918	E – 1
R919	E – 1
R920	D – 0
R921	D – 1
R922	D – 1
R923	C – 1
R924	B – 1
R925	D – 1
R926	D – 1
R927	B – 1
R928	E – 1
R930	A – 1
R943	D – 1
R944	D – 1
R952	E – 1
R967	B – 1
R970	B – 1
R973	B – 2
R974	C – 2
R999	B – 1
R9C1	D – 1
R9C2	D – 1
R9C3	C – 1
R9C6	C – 1
R9C7	D – 1
R9D1	C – 0
R9D3	E – 5
R9L1	D – 2
RJ1G0	B – 6
RJ2A0	C – 6
RJ2A9	B – 2
RJ3Z0	B – 5
RJ5A0	C – 4
RV901	A – 1
RV902	A – 2
RV903	A – 1
S5B1	A – 6
S810	E – 7
S811	E – 7
S812	E – 6
S814	E – 7
S8A0	E – 0
S8A1	E – 1
S8A2	E – 1
S8A3	E – 1
S8A4	E – 1
S8A5	E – 1
S8A6	E – 2
S8A7	E – 2
T350	A – 3
T901	C – 1
TP-RESET	D – 2
TP11	B – 6
TP12	B – 6
TP1AM	C – 5
TP2A	B – 6
TP2B	C – 7
TP2G	A – 3
TP2H	B – 6
TP2J	A – 5
TP2S	C – 5
TP3N	B – 6
TP3S	B – 6
TP3X	C – 5
TP3Y	C – 5
TP4C	D – 3
TP5A	B – 6
TP5B	B – 6
TP5C	C – 6
TP5C1	C – 4
TP5ES	D – 5
TP5F	D – 6
TP5LC	C – 4
TP5LM	B – 2
TP5LS	D – 5
TP5LT	D – 2
TP5P0	C – 3
TP5P1	C – 3
TP5P2	C – 3
TP5RI	E – 5
TP5RM	E – 3
TP5SP	E – 4
TP5SS	D – 4
TP5SSV	D – 3
TP5SU	E – 4
TP5T	E – 1
TP5TU	D – 3
TP5X	E – 1
TP5Y	D – 6
TPCLK	B – 6
TPCPMV	C – 1
TPDAT	B – 6
TPPB	C – 3
TU01	A – 6
V8A0	E – 4
X2A0	B – 4
X5A0	C – 3
X5A1	D – 3
Z5A0	E – 3