

JVC

SERVICE MANUAL

TV/VCR COMBO

TV-20F242

VHS
SQPB
4 HEAD



CONTENTS

■ SPECIFICATIONS	2
★ OPERATING INSTRUCTIONS (APPENDED)	
■ SAFETY PRECAUTIONS	3
■ SPECIFIC SERVICE INSTRUCTIONS	4
■ SERVICE ADJUSTMENTS	18
■ GUIDE FOR REPAIRING	30
★ STANDARD CIRCUIT DIAGRAM (APPENDED)	
■ PARTS LIST	53

SPECIFICATIONS

TELEVISION

Picture Tube:	20" (measured diagonally)
Tuner Type:	Quartz PLL Frequency Synthesized
Receiving Channels:	VHF 2-13 UHF 14-69 CATV 14-36 (A)-(W) 37-59 (AA)-(WW) 60-85 (AAA)-(ZZZ) 86-94 (86)-(94) 95-99 (A-5)-(A-1) 100-125 (100)-(125) 01 (5A)
Antenna Input:	VHF/UHF In 75 ohms coaxial
Speaker:	3", 8 ohms x 2
Audio Output Power:	1.5 + 1.5 W

VCR

Video System:	VHS ,4 Rotary Heads Helical scanning System
Video Signal:	NTSC Color
Cassette Tape:	VHS
Video Head:	4 Head
Audio Track:	Hi-Fi Sound - 2 Tracks MONO Sound - 1 Tracks
Tape Speed:	SP:33.35mm/sec EP:11.12mm/sec
F.FWD/REW Time:	Approx. 1 minutes and 48 seconds (T-120 Cassette)
Speed Search:	SP 3&5 X Normal Speed EP 9&15 X Normal Speed

GENERAL

Power Source:	AC 120V 60Hz
Power Consumption:	115 Watts
Dimensions:	W 19-3/4" x D 19" x H 20-1/4"
Weight:	55.2 lbs
Inputs/Outputs:	Video: In (RCA) 1Vp-p 75 ohm Out (RCA) 1Vp-p 75 ohm Audio: In (RCA) 300 mV/50K ohm Out (RCA) 300 mV/1K ohm
Headphone Jack:	3.5mm Stereo mini-jack
Storage Temperature	-20 °C ~ 60 °C
Operating Temperature	5 °C ~ 40 °C

Accessories:

Remote Control X 1
Batteries (AA) X 2

Design & specification are subject to change without notice.

SAFETY PRECAUTIONS

Operating the receiver outside of its cabinet or with its back removed involves a shock hazard. Work on these models should only be performed by those who are thoroughly familiar with precautions necessary when working on high voltage equipment.

Exercise care when servicing this chassis with power applied. Many B plus and high voltage RF terminals are exposed which, if carelessly contacted, can cause serious shock or result in damage to the chassis. Maintain interconnecting ground lead connections between chassis, escutcheon, picture tube dag and tuner cluster when operating the chassis.

These receivers have a "polarized" AC line cord. The AC plug is designed to fit into standard AC outlets in one direction only. The wide blade connects to the "ground side" and the narrow blade connects to the "hot side" of the AC line. This assures that the TV receiver is properly grounded to the house wiring. If an extension cord must be used, make sure it is of the "polarized" type.

Since the chassis of this receiver is connected to one side of the AC supply during operation, service should not be attempted by anyone not familiar with the precautions necessary when working on these types of equipment.

When it is necessary to make measurements or tests with AC power applied to the receiver chassis, an Isolation Transformer must be used as a safety precaution and to prevent possible damage to transistors. The Isolation Transformer should be connected between the TV line cord plug and the AC power outlet.

Certain HV failures can increase X-ray radiation. Receivers should not be operated with HV levels exceeding the specified rating for their chassis type. The maximum operating HV specified for the chassis used in these receivers is 32kV 1.0kV at zero beam current with a line voltage of 120V AC. Higher voltage may also increase the possibility of failure in the HV supply.

It is important to maintain specified values of all components in the horizontal and high voltage circuits and anywhere else in the receiver that could cause a rise in high voltage, or operating supply voltages. No changes should be made to the original design of the receiver.

Components shown in the shaded areas on the schematic diagram and/or identified by Δ in the replacement parts list should be replaced only with exact factory recommended replacement parts. The use of unauthorized substitute parts may create shock, fire, X-ray radiation, or other hazards.

To determine the presence of high voltage, use an accurate high impedance HV meter connected between the second anode lead and the CRT dag grounding device. When servicing the High Voltage System, remove static charges from it by connecting a 10k ohm resistor in series with an insulated wire (such as a test probe) between the picture tube dag and 2nd anode lead (have AC line cord disconnected from AC supply).

The picture tube used in this receiver employs integral implosion protection. Replace with a tube of the same type number for continued safety. Do not lift picture tube by the neck. Handle the picture tube only when wearing shatterproof goggles and after discharging the high voltage completely. Keep others without shatterproof goggles away.

When removing springs or spring mounted parts from the tuner, tuner cluster or chassis, shatterproof goggles must be worn. Keep others without shatterproof goggles away.

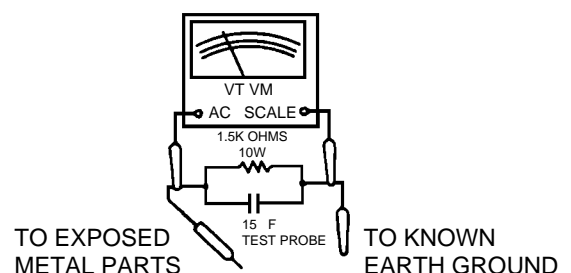
Before returning the receiver to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the receiver.
2. Replace all protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators, etc.
3. To be sure that no shock hazard exists, a check for the presence of leakage current should be made at each exposed metal part having a return path to the chassis (antenna, cabinet metal, screw heads, knobs and/or shafts, escutcheon, etc.) in the following manner.

Plug the AC line cord directly into a 120V AC receptacle. (Do not use an Isolation Transformer during these checks.) All checks must be repeated with the AC line cord plug connection reversed. (If necessary, a nonpolarized adapter plug must be used only for the purpose of completing these checks.)

If available, measure current using an accurate leakage current tester. Any reading of 0.35mA or more is excessive and indicates a potential shock hazard which must be corrected before returning the receiver to the owner.

If a reliable leakage current tester is not available, this alternate method of measurement should be used. Using two clip leads, connect a 1500 ohm, 10 watt resistor paralleled by a 0.15 F capacitor in series with a known earth ground, such as a water pipe or conduit and the metal part to be checked. Use a VTVM or VOM with 1000 ohms per volt, or higher, sensitivity to measure this AC voltage drop across the resistor. Any reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected before returning the receiver to the owner.



SPECIFIC SERVICE INSTRUCTIONS

DISASSEMBLY INSTRUCTIONS

1. REMOVAL OF MECHANICAL PARTS AND P.C. BOARDS

1-1: BACK CABINET (Refer to Fig. 1-1)

1. Remove the 6 screws ①.
2. Remove the 2 screws ② which are used for holding the Back Cabinet.
3. Remove the AC cord from the AC cord hook ③.
4. Remove the Back Cabinet in the direction of arrow.

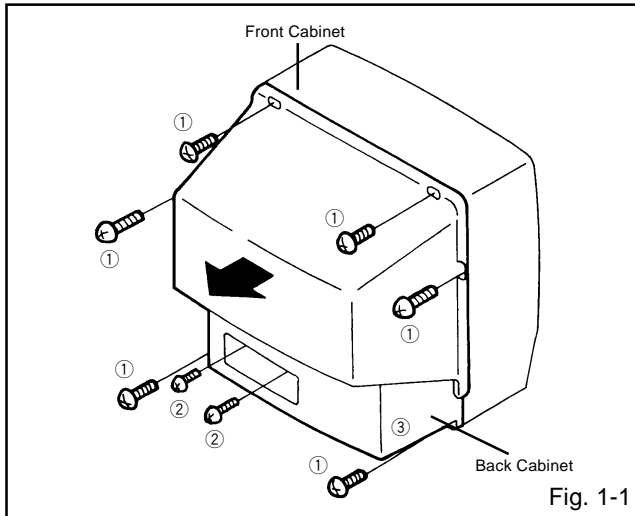


Fig. 1-1

1-2: CRT PCB (Refer to Fig. 1-2)

CAUTION: BEFORE REMOVING THE ANODE CAP, DISCHARGE ELECTRICITY BECAUSE IT CONTAINS HIGH VOLTAGE. BEFORE ATTEMPTING TO REMOVE OR REPAIR ANY PCB, UNPLUG THE POWER CORD FROM THE AC SOURCE.

1. Remove the Anode Cap.
(Refer to REMOVAL OF ANODE CAP)
2. Disconnect the following connectors:
(CP802 and CP805).
3. Remove the CRT PCB in the direction of arrow.

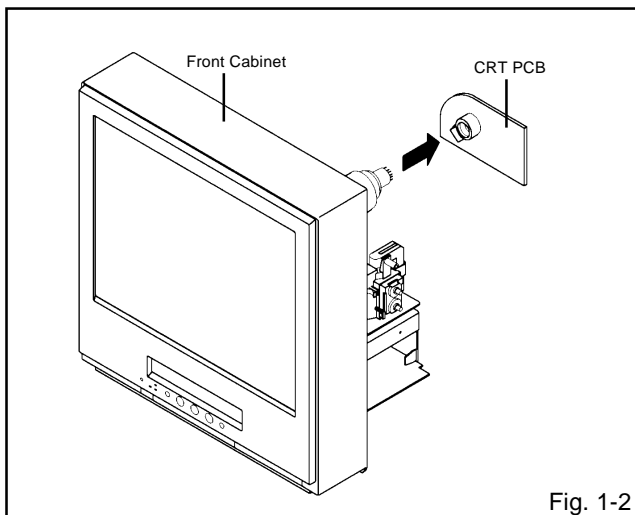


Fig. 1-2

1-3: TV/VCR BLOCK (Refer to Fig. 1-3)

1. Remove the 2 screws ①.
2. Disconnect the following connectors:
(CP401, CP502, CP4201 and CP4202).
3. Unlock the support ②.
4. Remove the TV/VCR Block in the direction of arrow.

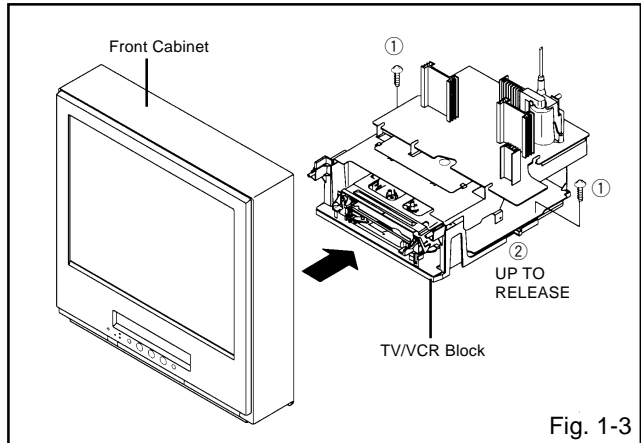


Fig. 1-3

1-4: MAIN PCB (Refer to Fig. 1-4)

1. Remove the screw ①.
2. Remove the Main PCB Holder.
3. Remove the 2 screws ②.
4. Remove the 3 screws ③.
5. Disconnect the following connectors:
(CP810 and CP820).
6. Remove the Main PCB in the direction of arrow.

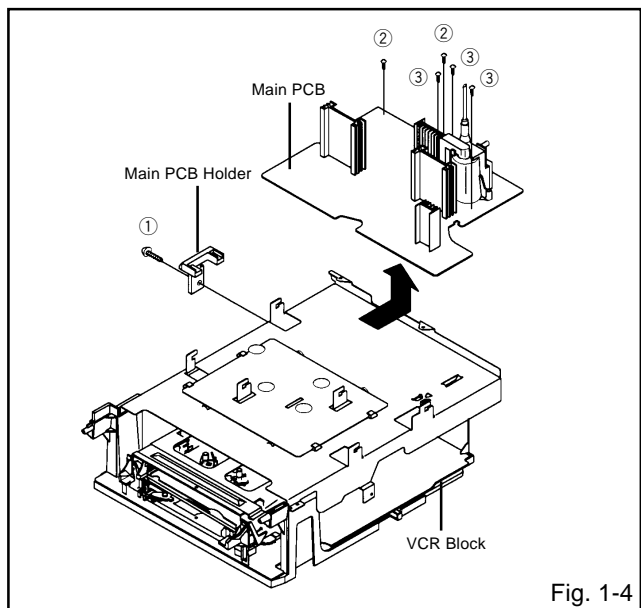


Fig. 1-4

1-5: DECK SHIELD PLATE (Refer to Fig. 1-5)

1. Remove the 2 screws ①.
2. Remove the screw ②.
3. Remove the Deck Shield Plate in the direction of arrow.

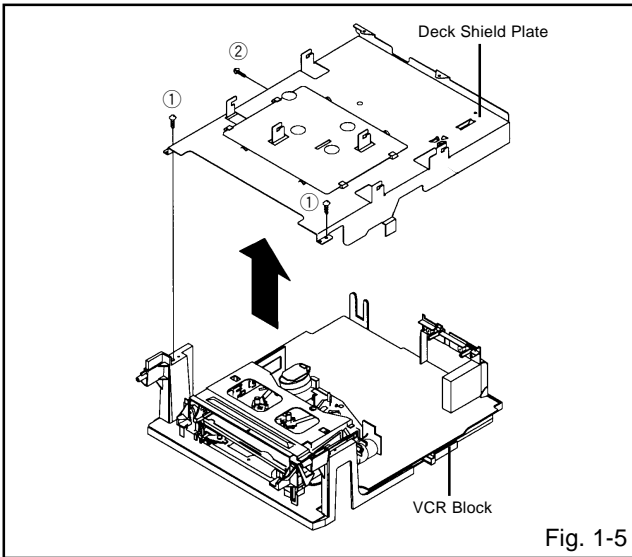


Fig. 1-5

1-6: DECK CHASSIS (Refer to Fig. 1-6)

1. Remove the 3 screws ①.
2. Disconnect the following connectors:
(CP1004, CP1005, CP1006, CP4001, CP4002 and CP4003).
3. Remove the Deck Chassis in the direction of arrow.

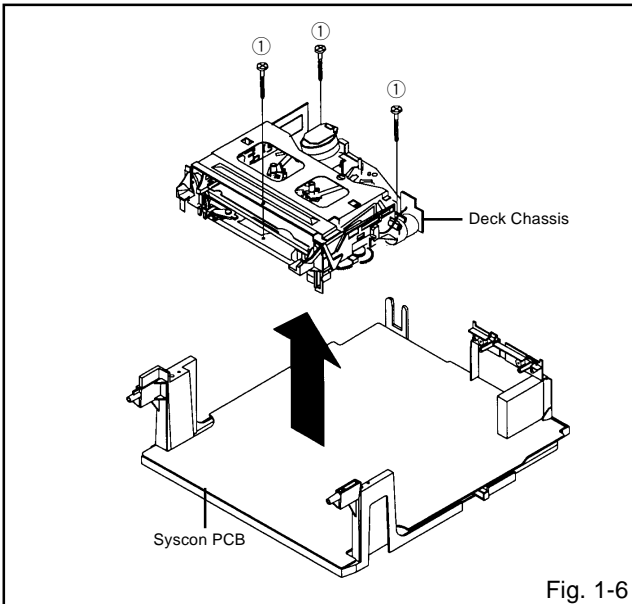


Fig. 1-6

1-7: JACK PLATE AND SYSCON PCB (Refer to Fig. 1-7)

1. Remove the screw ①.
2. Remove the Syscon PCB in the direction of arrow (A).
3. Remove the 2 screws ②.
4. Remove the nut ③.
5. Remove the washer ④.
6. Unlock the 2 supports ⑤.
7. Remove the Jack Plate in the direction of arrow (B).

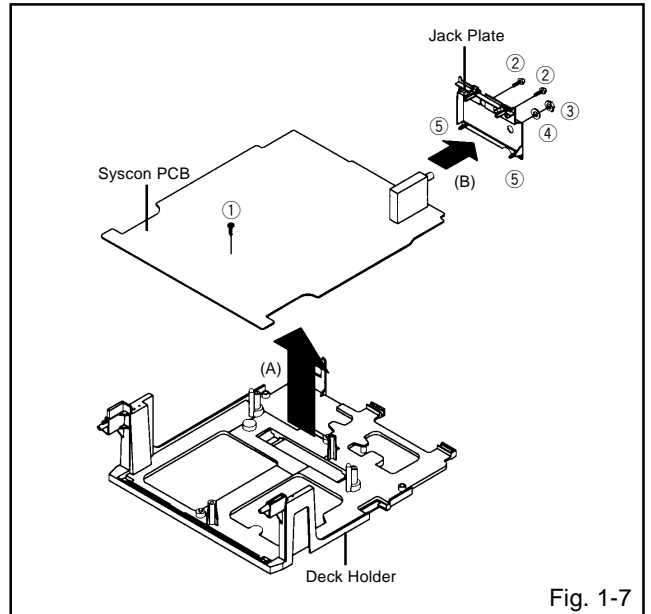


Fig. 1-7

2. REMOVAL OF DECK PARTS

2-1: TOP BRACKET (Refer to Fig. 2-1)

1. Remove the 2 screws ①.
2. Slide the 2 supports ② and remove the Top Bracket.

NOTE

When you install the Top Bracket, install the screw (1) first, then install the screw (2).

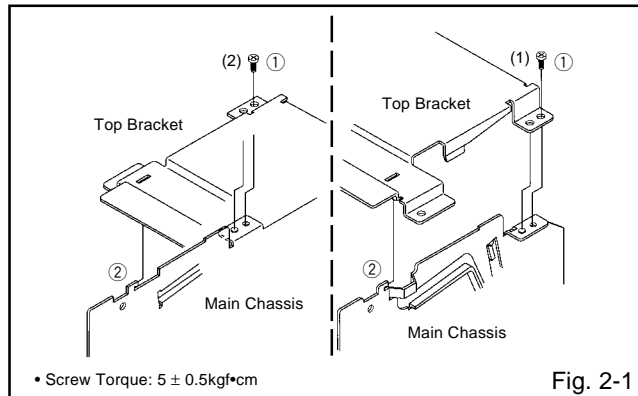


Fig. 2-1

2-2: FLAP LEVER/TAPE GUIDE R (Refer to Fig. 2-2)

1. Move the Cassette Holder Ass'y to the back side.
2. Remove the Polyslider Washer ①.
3. Remove the Flap Lever.
4. Unlock the 3 supports ② and remove the Tape Guide R.

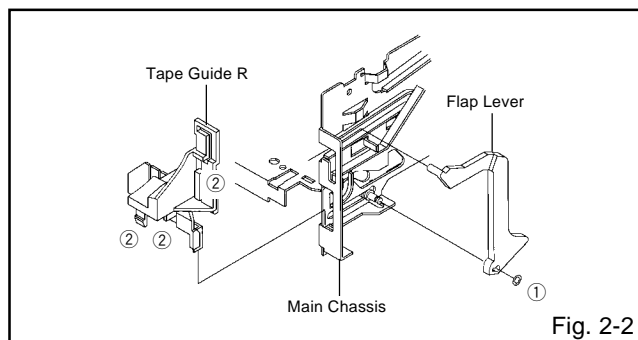


Fig. 2-2

2-3: TAPE GUIDE L (Refer to Fig. 2-3-A)

1. Move the Cassette Holder Ass'y to the back side.
2. Unlock the 2 supports ① and remove the Tape Guide L.
3. Remove the REC Lever.

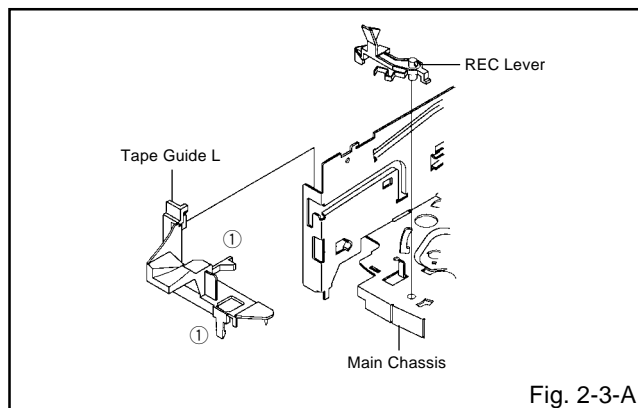


Fig. 2-3-A

NOTE

When you install the Tape Guide L, install as shown in the circle of Fig. 2-3-B. (Refer to Fig. 2-3-B)

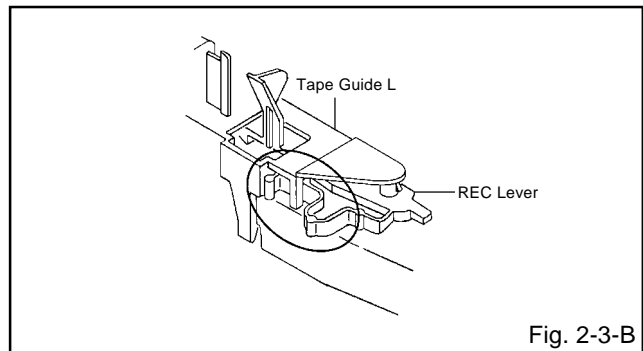


Fig. 2-3-B

2-4: CASSETTE HOLDER ASS'Y (Refer to Fig. 2-4)

1. Move the Cassette Holder Ass'y to the front side.
2. Push the Locker R to remove the Cassette Side R.
3. Remove the Cassette Side L.

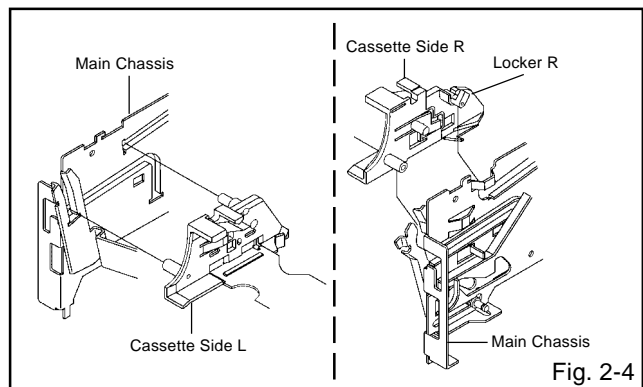


Fig. 2-4

2-5: CASSETTE SIDE L/R (Refer to Fig. 2-5)

1. Unlock the 4 supports ① and then remove the Cassette Side L/R.

NOTE

When you install the Cassette Side R, be sure to move the Locker R after installing.

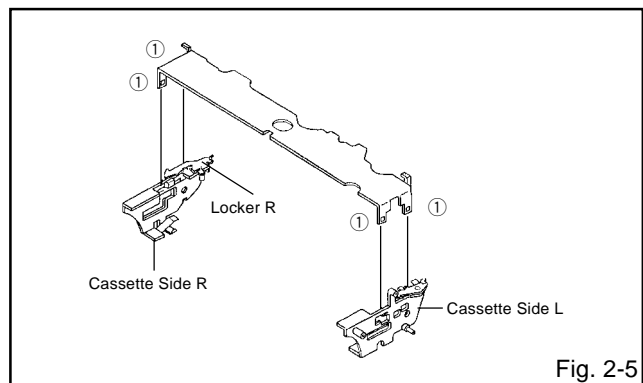
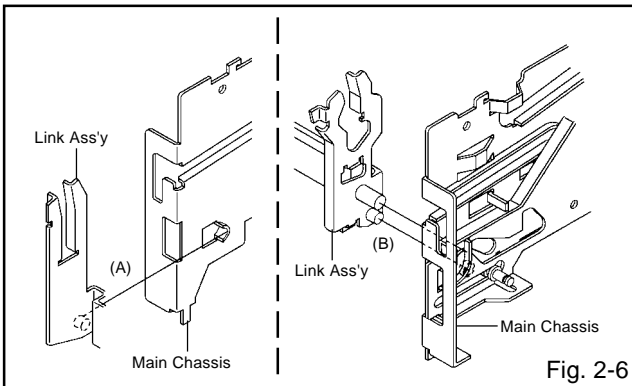


Fig. 2-5

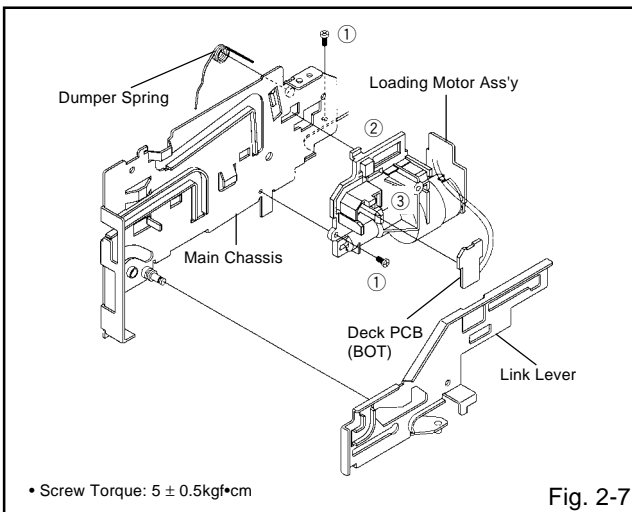
2-6: LINK ASS'Y (Refer to Fig. 2-6)

1. Set the Link Ass'y to the Eject position.
2. Remove the (A) side of the Link Ass'y first, then remove the (B) side.



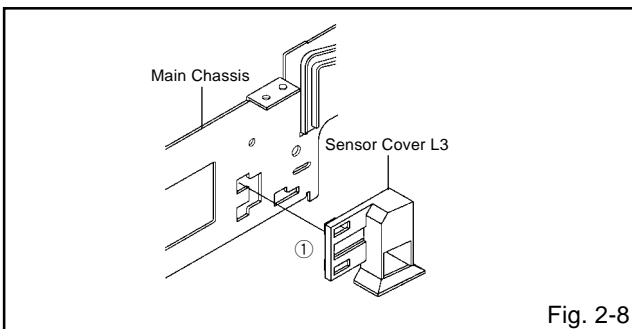
2-7: LOADING MOTOR ASS'Y (Refer to Fig. 2-7)

1. Remove the Link Lever.
2. Remove the Dumper Spring.
3. Remove the 2 screws ①.
4. Unlock the support ② and remove the Loading Motor Ass'y.
5. Unlock the 2 supports ③ and remove the Deck PCB (BOT).



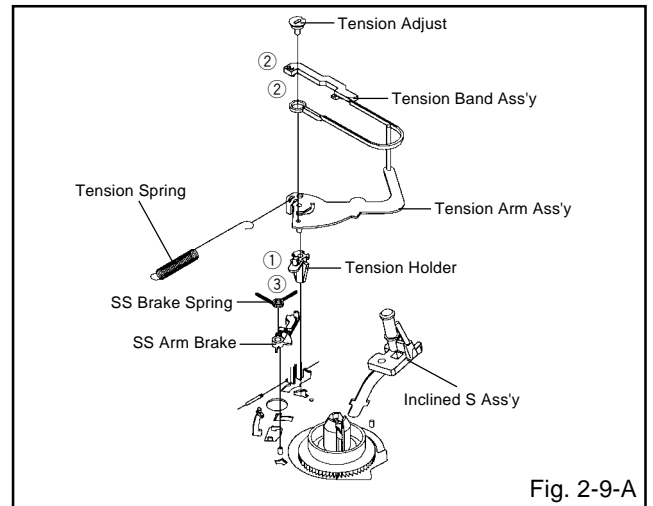
2-8: SENSOR COVER L3 (Refer to Fig. 2-8)

1. Unlock the support ① and remove the Sensor Cover L3.



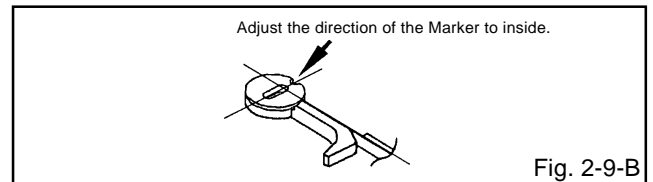
2-9: TENSION ASS'Y (Refer to Fig. 2-9-A)

1. Move the Inclined S Ass'y to the back side.
2. Remove the Tension Spring.
3. Unlock the support ① and remove the Tension Arm Ass'y.
4. Remove the Tension Adjust.
5. Unlock the 2 supports ② and remove the Tension Band Ass'y.
6. Unlock the support ③ and remove the Tension Holder.
7. Remove the SS Brake Spring.
8. Remove the SS Arm Brake.



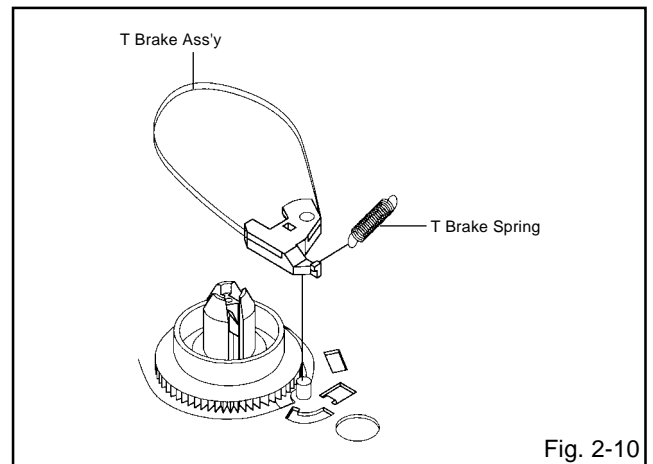
NOTE

When you install the Tension Adjust, install as shown in Fig. 2-9-B. (Refer to Fig. 2-9-B)



2-10: T BRAKE ASS'Y (Refer to Fig. 2-10)

1. Remove the T Brake Spring.
2. Remove the T Brake Ass'y.



2-11: S REEL/T REEL (Refer to Fig. 2-11)

1. Remove the S Reel and T Reel.
2. Remove the 2 Polyslider Washers ①.

NOTE

1. Take care not to damage the gears of the S Reel and T Reel.
2. The Polyslider Washer may be remained on the back of the reel.
3. Take care not to damage the shaft.
4. Do not touch the section "A" of S Reel and T Reel. (Use gloves.) (Refer to Fig. 2-11) Do not adhere the stains on it.
5. When you install the reel, clean the shaft and oil it (FL OIL #6115). (If you do not oil, noise may be heard in FF/REW mode.)
6. After installing the reel, adjust the height of the reel. (Refer to MECHANICAL ADJUSTMENT)

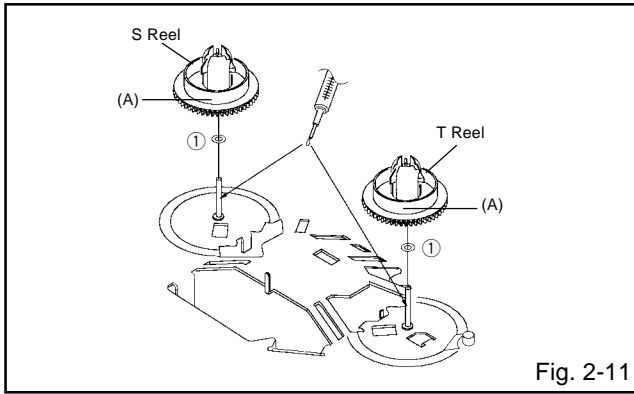


Fig. 2-11

2-12: PINCH ROLLER BLOCK/P5-3 ARM ASS'Y (Refer to Fig. 2-12-A)

1. Remove the P5 Spring.
2. Remove the screw ①.
3. Unlock the 2 supports ② and remove the Cassette Opener.
4. Remove the Pinch Roller Block, Pinch Roller Arm Spring, Pinch Roller Lever Ass'y and P5-3 Arm Ass'y.

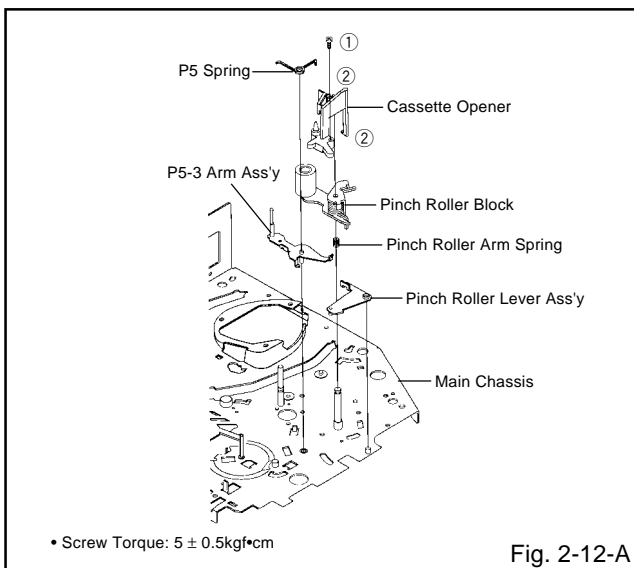


Fig. 2-12-A

NOTE

1. Do not touch the Pinch Roller. (Use gloves.)
2. When you install the Pinch Roller Block, install as shown in the circle of Fig. 2-12-B. (Refer to Fig. 2-12-B)

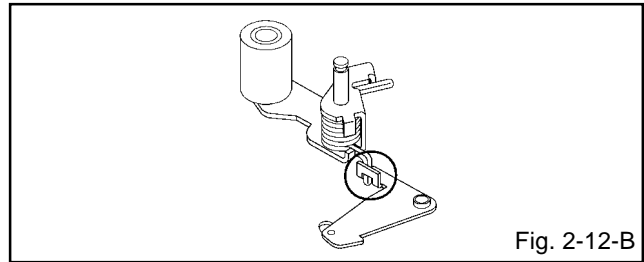


Fig. 2-12-B

2-13: A/C HEAD (Refer to Fig. 2-13-A)

1. Remove the screw ①.
2. Remove the A/C Head Base.
3. Remove the 3 screws ②.
4. Remove the A/C Head and A/C Head Spring.

NOTE

1. Do not touch the A/C Head. (Use gloves.)
2. When you install the A/C Head Spring, install as shown in Fig. 2-13-B. (Refer to Fig. 2-13-B)
3. When you install the A/C Head, tighten the screw (1) first, then tighten the screw (2), finally tighten the screw (3).

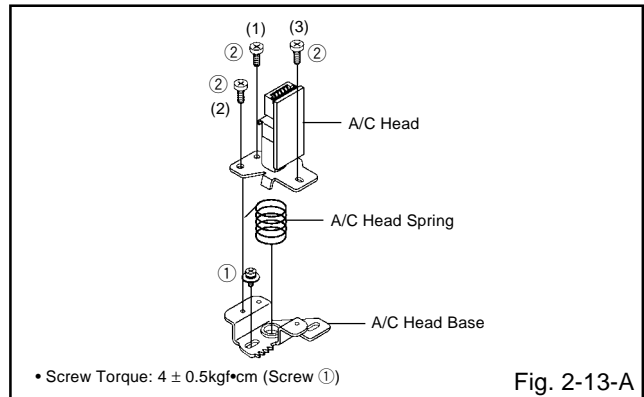


Fig. 2-13-A

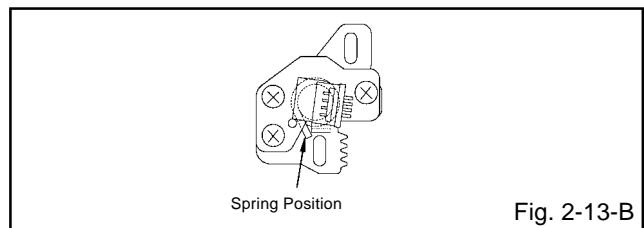


Fig. 2-13-B

2-14: FE HEAD (Refer to Fig. 2-14)

1. Remove the screw ①.
2. Remove the FE Head.

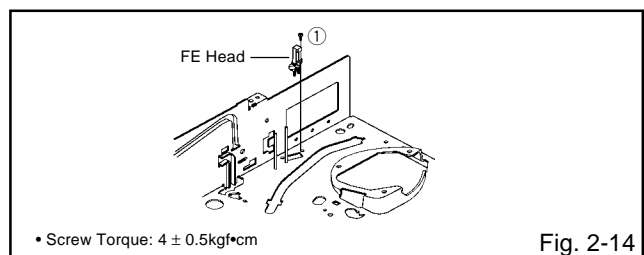


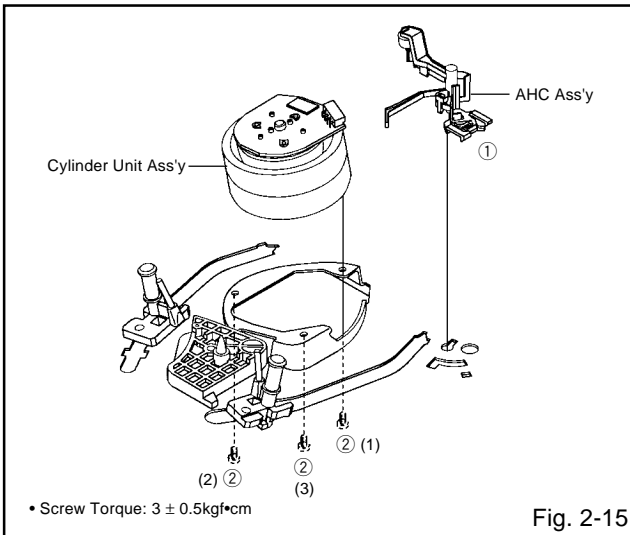
Fig. 2-14

**2-15: AHC ASS'Y/CYLINDER UNIT ASS'Y
(Refer to Fig. 2-15)**

1. Unlock the support ① and remove the AHC Ass'y.
2. Remove the 3 screws ②.
3. Remove the Cylinder Unit Ass'y.

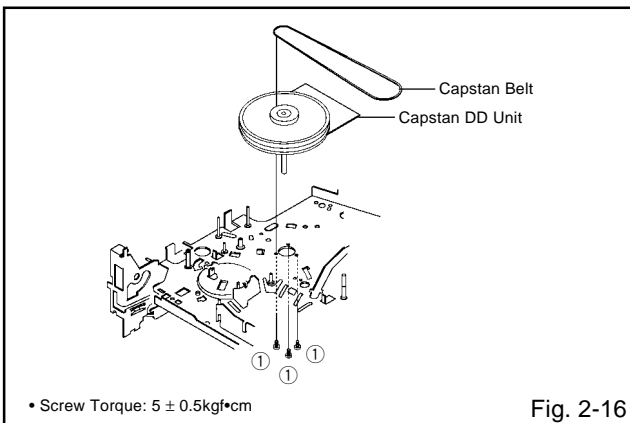
NOTE

When you install the Cylinder Unit Ass'y, tighten the screws from (1) to (3) in order while pulling the Ass'y toward the left front direction.



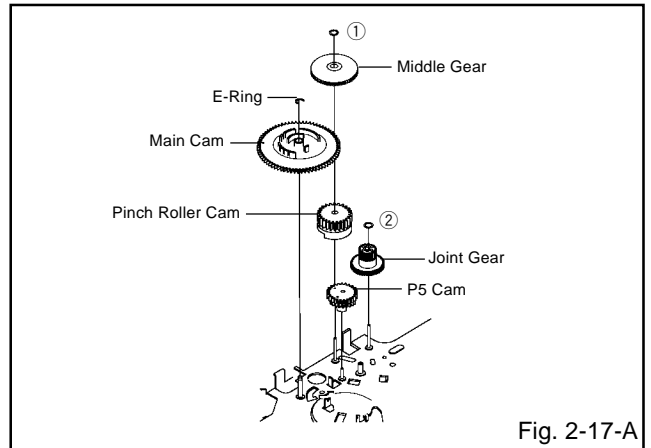
2-16: CAPSTAN DD UNIT (Refer to Fig. 2-16)

1. Remove the Capstan Belt.
2. Remove the 3 screws ①.
3. Remove the Capstan DD Unit.



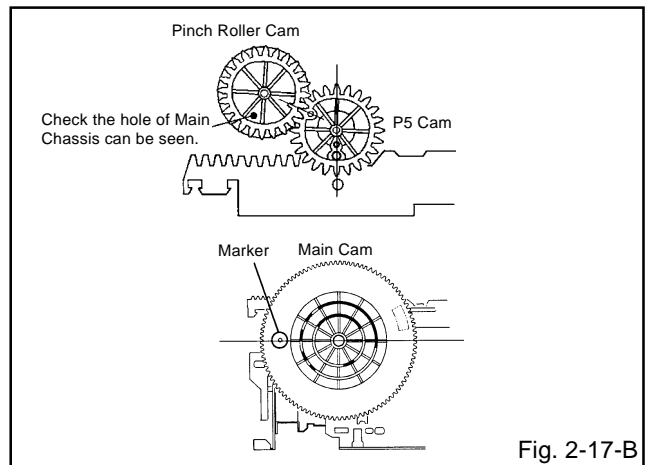
2-17: MIDDLE GEAR/MAIN CAM (Refer to Fig. 2-17-A)

1. Remove the Polyslider Washer ①, then remove the Middle Gear.
2. Remove the E-Ring, then remove the Main Cam, P5 Cam and Pinch Roller Cam.
3. Remove the Polyslider Washer ②, then remove the Joint Gear.



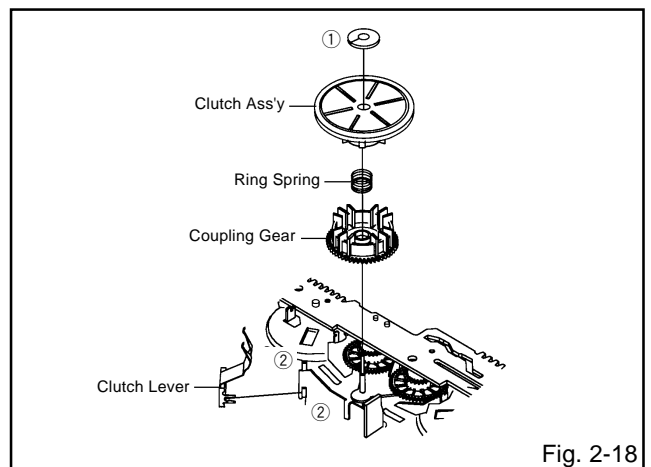
NOTE

When you install the Pinch Roller Cam, P5 Cam and Main Cam, align each marker. (Refer to Fig. 2-17-B)



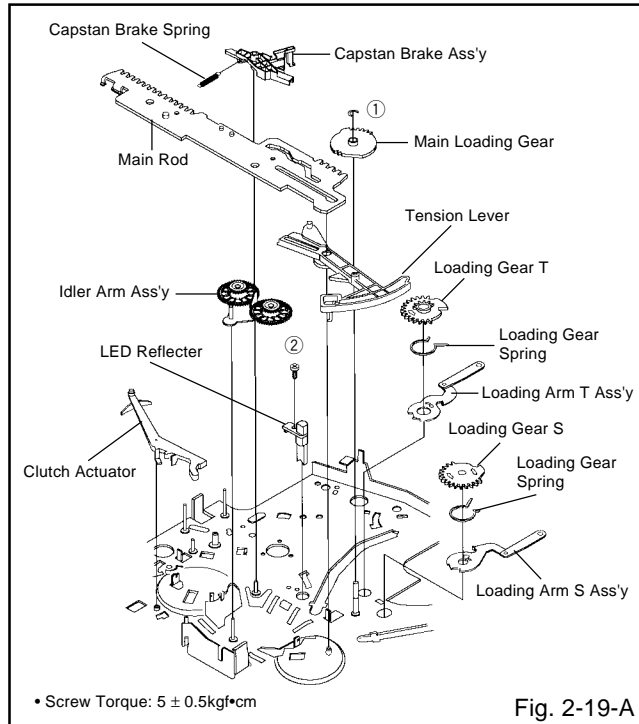
2-18: CLUTCH ASS'Y (Refer to Fig. 2-18)

1. Remove the Polyslider Washer ①.
2. Remove the Clutch Ass'y, Ring Spring and Coupling Gear.
3. Unlock the 2 supports ② and remove the Clutch Lever.



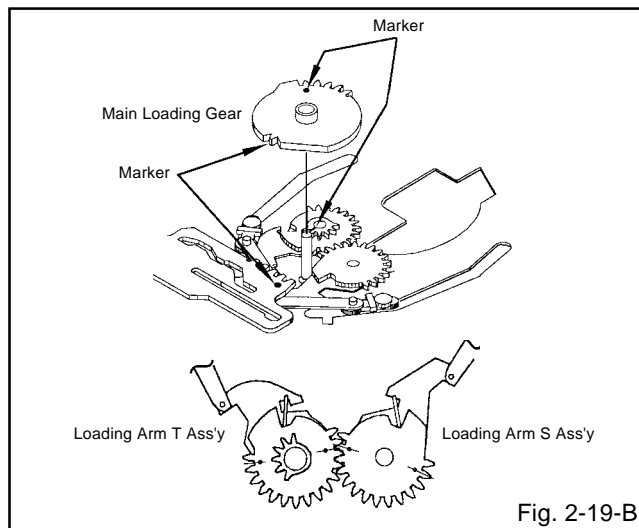
2-19: LOADING GEAR S/T ASS'Y (Refer to Fig. 2-19-A)

1. Remove the E-Ring ① and remove the Main Loading Gear.
2. Remove the Capstan Brake Spring.
3. Slide the Main Rod and remove the Capstan Brake Ass'y.
4. Remove the Main Rod, Tension Lever, Clutch Actuator, Idler Arm Ass'y.
5. Remove the screw ②.
6. Remove the LED Reflector.
7. Remove the Loading Arm S Ass'y and Loading Arm T Ass'y.
8. Remove the Loading Gear S and Loading Gear T.
9. Remove the Loading Gear Spring.

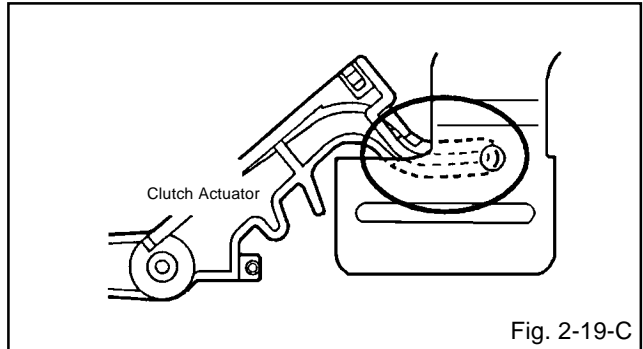


NOTES

1. When you install the Loading Arm S Ass'y, Loading Arm T Ass'y and Main Loading Gear, align each marker. (Refer to Fig. 2-19-B)



2. When you install the Clutch Actuator, install as shown in the circle of Fig. 2-19-C. (Refer to Fig. 2-19-C)

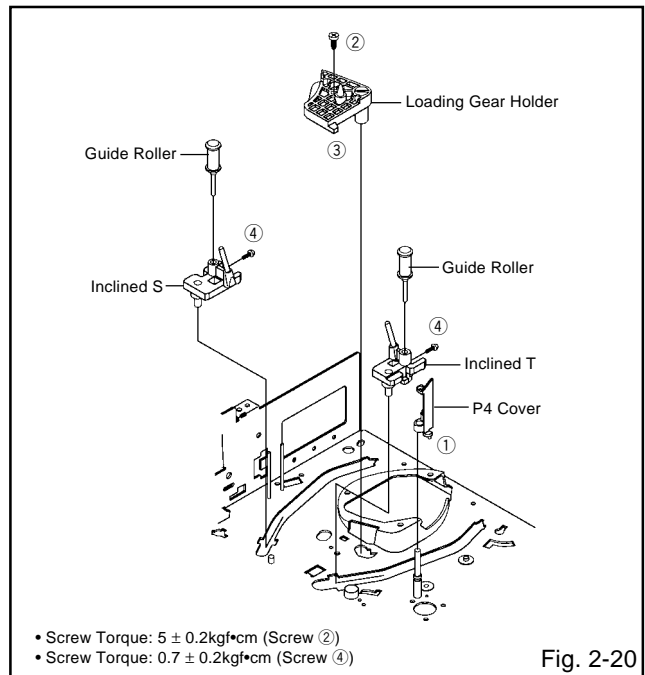


2-20: INCLINED S/T ASS'Y (Refer to Fig. 2-20)

1. Unlock the support ① and remove the P4 Cover.
2. Remove the screw ②.
3. Unlock the support ③ and remove the Loading Gear Holder.
4. Remove the Inclined S.
5. Remove the Inclined T.
6. Remove the 2 screws ④, then remove the Guide Roller.

NOTE

Do not touch the roller of Guide Roller.



3. REMOVAL OF ANODE CAP

Read the following **NOTED** items before starting work.

- * After turning the power off there might still be a potential voltage that is very dangerous. When removing the Anode Cap, make sure to discharge the Anode Cap's potential voltage.
- * Do not use pliers to loosen or tighten the Anode Cap terminal, this may cause the spring to be damaged.

REMOVAL

1. Follow the steps as follows to discharge the Anode Cap. **(Refer to Fig. 3-1.)**
Connect one end of an Alligator Clip to the metal part of a flat-blade screwdriver and the other end to ground. While holding the plastic part of the insulated Screwdriver, touch the support of the Anode with the tip of the Screwdriver. A cracking noise will be heard as the voltage is discharged.

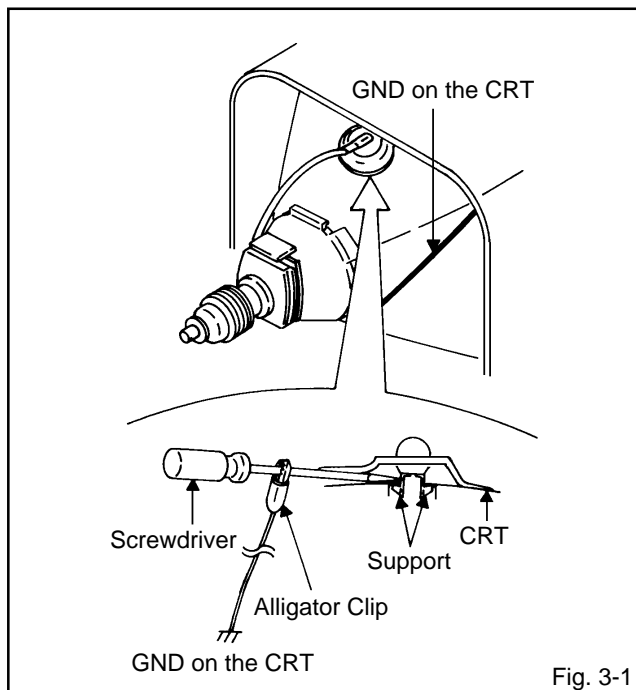


Fig. 3-1

2. Flip up the sides of the Rubber Cap in the direction of the arrow and remove one side of the support. **(Refer to Fig. 3-2.)**

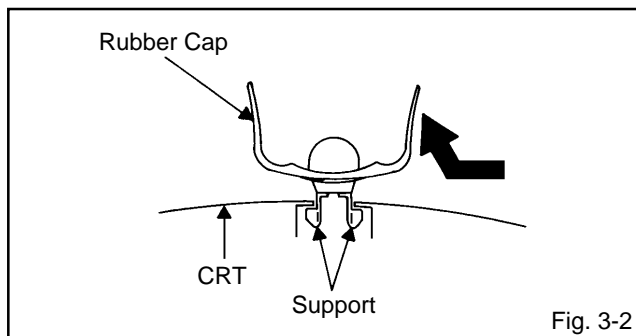


Fig. 3-2

3. After one side is removed, pull in the opposite direction to remove the other.

NOTE

Take care not to damage the Rubber Cap.

INSTALLATION

1. Clean the spot where the cap was located with a small amount of alcohol. **(Refer to Fig. 3-3.)**

NOTE

Confirm that there is no dirt, dust, etc. at the spot where the cap was located.

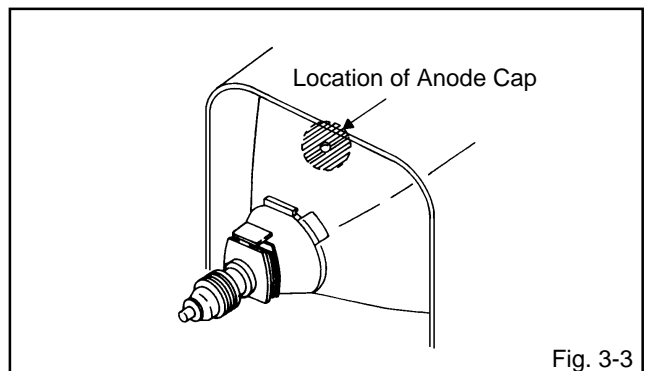


Fig. 3-3

2. Arrange the wire of the Anode Cap and make sure the wire is not twisted.
3. Turn over the Rubber Cap. **(Refer to Fig. 3-4.)**

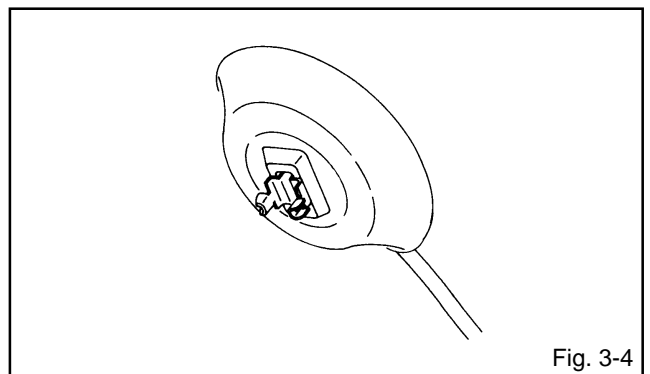


Fig. 3-4

4. Insert one end of the Anode Support into the anode button, then the other as shown in Fig. 3-5.

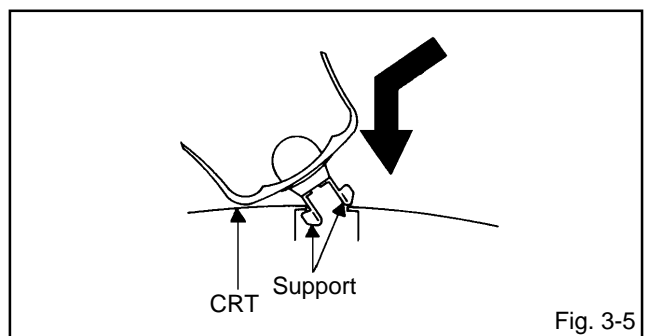


Fig. 3-5

5. Confirm that the Support is securely connected.
6. Put on the Rubber Cap without moving any parts.

KEY TO ABBREVIATIONS

A	A/C	: Audio/Control	H.SW	: Head Switch
	ACC	: Automatic Color Control	Hz	: Hertz
	AE	: Audio Erase	I IC	: Integrated Circuit
	AFC	: Automatic Frequency Control	IF	: Intermediate Frequency
	AFT	: Automatic Fine Tuning	IND	: Indicator
	AFT DET	: Automatic Fine Tuning Detect	INV	: Inverter
	AGC	: Automatic Gain Control	K KIL	: Killer
	AMP	: Amplifier	L L	: Left
	ANT	: Antenna	LED	: Light Emitting Diode
	A.PB	: Audio Playback	LIMIT AMP	: Limiter Amplifier
	APC	: Automatic Phase Control	LM, LDM	: Loading Motor
	ASS'Y	: Assembly	LP	: Long Play
	AT	: All Time	L.P.F	: Low Pass Filter
	AUTO	: Automatic	LUMI.	: Luminance
	A/V	: Audio/Video	M M	: Motor
B	BGP	: Burst Gate Pulse	MAX	: Maximum
	BOT	: Beginning of Tape	MINI	: Minimum
	BPF	: Bandpass Filter	MIX	: Mixer, mixing
	BRAKE SOL	: Brake Solenoid	MM	: Monostable Multivibrator
	BUFF	: Buffer	MOD	: Modulator, Modulation
	B/W	: Black and White	MPX	: Multiplexer, Multiplex
C	C	: Capacitance, Collector	MS SW	: Mecha State Switch
	CASE	: Cassette	N NC	: Non Connection
	CAP	: Capstan	NR	: Noise Reduction
	CARR	: Carrier	O OSC	: Oscillator
	CH	: Channel	OPE	: Operation
	CLK	: Clock	P PB	: Playback
	CLOCK (SY-SE)	: Clock (Syscon to Servo)	PB CTL	: Playback Control
	COMB	: Combination, Comb Filter	PB-C	: Playback-Chrominance
	CONV	: Converter	PB-Y	: Playback-Luminance
	CPM	: Capstan Motor	PCB	: Printed Circuit Board
	CTL	: Control	P. CON	: Power Control
	CYL	: Cylinder	PD	: Phase Detector
	CYL-M	: Cylinder-Motor	PG	: Pulse Generator
	CYL SENS	: Cylinder-Sensor	P-P	: Peak-to Peak
D	DATA (SY-CE)	: Data (Syscon to Servo)	R R	: Right
	dB	: Decibel	REC	: Recording
	DC	: Direct Current	REC-C	: Recording-Chrominance
	DD Unit	: Direct Drive Motor Unit	REC-Y	: Recording-Luminance
	DEMOD	: Demodulator	REEL BRK	: Reel Brake
	DET	: Detector	REEL S	: Reel Sensor
	DEV	: Deviation	REF	: Reference
E	E	: Emitter	REG	: Regulated, Regulator
	EF	: Emitter Follower	REW	: Rewind
	EMPH	: Emphasis	REV, RVS	: Reverse
	ENC	: Encoder	RF	: Radio Frequency
	ENV	: Envelope	RMC	: Remote Control
	EOT	: End of Tape	RY	: Relay
	EQ	: Equalizer	S S. CLK	: Serial Clock
	EXT	: External	S. COM	: Sensor Common
F	F	: Fuse	S. DATA	: Serial Data
	FBC	: Feed Back Clamp	SEG	: Segment
	FE	: Full Erase	SEL	: Select, Selector
	FF	: Fast Forward, Flipflop	SENS	: Sensor
	FG	: Frequency Generator	SER	: Search Mode
	FL SW	: Front Loading Switch	SI	: Serial Input
	FM	: Frequency Modulation	SIF	: Sound Intermediate Frequency
	FSC	: Frequency Sub Carrier	SO	: Serial Output
	FWD	: Forward	SOL	: Solenoid
G	GEN	: Generator	SP	: Standard Play
	GND	: Ground	STB	: Serial Strobe
H	H.P.F	: High Pass Filter	SW	: Switch

S	SYNC	:	Synchronization
	SYNC SEP	:	Sync Separator, Separation
T	TR	:	Transistor
	TRAC	:	Tracking
	TRICK PB	:	Trick Playback
	TP	:	Test Point
U	UNREG	:	Unregulated
V	V	:	Volt
	VCO	:	Voltage Controlled Oscillator
	VIF	:	Video Intermediate Frequency
	VP	:	Vertical Pulse, Voltage Display
	V.PB	:	Video Playback
	VR	:	Variable Resistor
	V.REC	:	Video Recording
	VSF	:	Visual Search Fast Forward
	VSR	:	Visual Search Rewind
	VSS	:	Voltage Super Source
	V-SYNC	:	Vertical-Synchronization
	VT	:	Voltage Tuning
X	X'TAL	:	Crystal
Y	Y/C	:	Luminance/Chrominance

SERVICE MODE LIST

This unit provided with the following SERVICE MODES so you can repair, examine and adjust easily.

To enter SERVICE MODE, unplug AC cord till lost actual clock time. Then press and hold Vol (-) button of main unit and remocon key simultaneously.

The both pressing of set key and remote control key will not be possible if clock has been set. To reset clock, either unplug AC cord and allow at least 5 seconds before Power On.

Set Key	Remocon Key	Operations
VOL. (-) MIN	0	Releasing of V-CHIP PASSWORD.
VOL. (-) MIN	1	Initialization of the factory. NOTE: Do not use this for the normal servicing.
VOL. (-) MIN	2	Horizontal position adjustment of OSD. NOTE: Also can be adjusted by using the Adjustment MENU. Refer to the "ELECTRICAL ADJUSTMENT" (OSD HORIZONTAL).
VOL. (-) MIN	3	Adjust the SWITCHING POINT automatically. Refer to the "ELECTRICAL ADJUSTMENT" (PG SHIFTER).
VOL. (-) MIN	4	Adjust the SWITCHING POINT manually. Refer to the "ELECTRICAL ADJUSTMENT" (PG SHIFTER).
VOL. (-) MIN	5	Adjusting of the Tracking to the center position. NOTE: Also can be adjusted by pressing the ATR button for more than 2 seconds during PLAY.
VOL. (-) MIN	6	POWER ON total hours and PLAY/REC total hours are displayed on the screen. Refer to the "PREVENTIVE CHECKS AND SERVICE INTERVALS" (CONFIRMATION OF USING HOURS). Can be checked of the INITIAL DATA of MEMORY IC. Refer to the "NOTE FOR THE REPLACING OF MEMORY IC".
VOL. (-) MIN	8	Writing of EEPROM initial data. NOTE: Do not use this for the normal servicing.
VOL. (-) MIN	9	Display of the Adjustment MENU on the screen. Refer to the "ELECTRICAL ADJUSTMENT" (On-Screen Display Adjustment).

Method	Operations
Press the ATR button on the remote control for more than 2 seconds during PLAY.	Adjusting of the Tracking to the center position. Refer to the "MECHANICAL ADJUSTMENT" (GUIDE ROLLER) and "ELECTRICAL ADJUSTMENT" (SWITCHING POINT).
Make the short circuit between the test point of SERVICE and the GND.	The EOT/BOT/Reel sensor do not work at this moment. Refer to the "PREPARATION FOR SERVICING"

PREVENTIVE CHECKS AND SERVICE INTERVALS

The following standard table depends on environmental conditions and usage. Unless maintenance is properly carried out, the following service intervals may be quite shortened as harmful effects may be had on other parts. Also, long term storage or misuse may cause transformation and aging of rubber parts.

Time Parts Name	500 hours	1,000 hours	1,500 hours	2,000 hours	3,000 hours	Notes
Audio Control Head	■	■	■	■	■	Clean those parts in contact with the tape.
Full Erase Head (Recorder only)	■	■	■	■	■	
Capstan Belt			■	■	●	Clean the rubber, and parts which the rubber touches.
Pinch Roller	■	■	■	■	■ ●	
Capstan DD Unit					●	
Loading Motor					●	
Tension Band					●	
Capstan Shaft	■	■	■	■	■	
Tape Running Guide Post	■	■	■	■	■	Replace when rolling becomes abnormal.
Cylinder Unit	■	■	■	■	●	Clean the Head

■ : Clean
● : Replace

CONFIRMATION OF USING HOURS

POWER ON total hours and PLAY/REC total hours can be checked on the screen. Total hours are displayed in 16 system of notation.

NOTE: The confirmation of using hours will not be possible if clock has been set. To reset clock, either unplug AC cord and allow at least 5 seconds before Power On.

1. Set the VOLUME to minimum.
2. While holding down VOLUME button on front cabinet, press key 6 on remote control simultaneously.
3. After the confirmation of using hours, turn off the power.

INIT 00 83	Initial setting content of MEMORY IC.
POWER ON 0010	POWER ON total hours.
PLAY/REC 0003	PLAY/REC total hours.

(16 x 16 x 16 x thousands digit value) + (16 x 16 x hundreds digit value) + (16 x tens digit value) + (ones digit value)

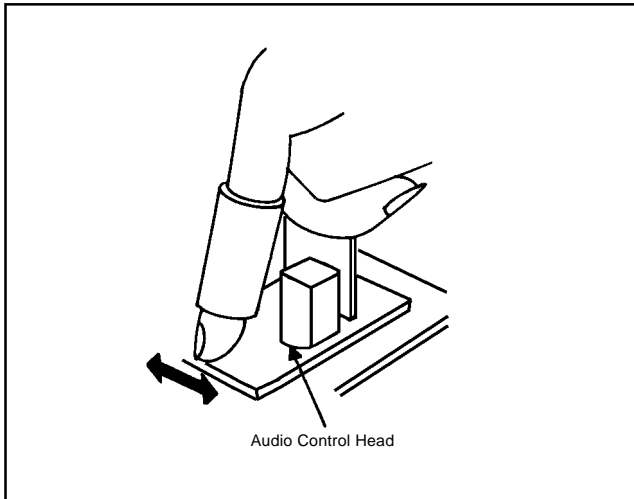
CLEANING

NOTE

After cleaning the heads with isopropyl alcohol, do not run a tape until the heads dry completely. If the heads are not completely dry and alcohol gets on the tape, damage may occur.

1. AUDIO CONTROL HEAD

Wrap a piece of chamois around your finger. Dip it in isopropyl alcohol and clean the audio control head by wiping it horizontally. Clean the full erase head in the same manner. **(Refer to the figure below.)**



2. TAPE RUNNING SYSTEM

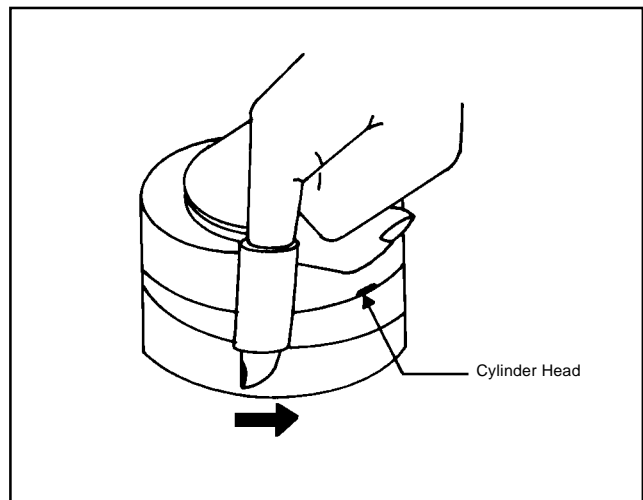
When cleaning the tape transport system, use the gauze moistened with isopropyl alcohol.

3. CYLINDER

Wrap a piece of chamois around your finger. Dip it in isopropyl alcohol. Hold it to the cylinder head softly. Turn the cylinder head counterclockwise to clean it (in the direction of the arrow). **(Refer to the figure below.)**

NOTE

Do not exert force against the cylinder head. Do not move the chamois upward or downward on the head. Use the chamois one by one.



NOTE FOR THE REPLACING OF MEMORY IC

If a service repair is undertaken where it has been required to change the MEMORY IC, the following steps should be taken to ensure correct data settings while making reference to TABLE 1.

NOTE: Initial Data setting will not be possible if clock has been set. To reset clock, either unplug AC cord and allow at least 5 seconds before Power On.

ADDRESS	DATA	ADDRESS	DATA	ADDRESS	DATA	ADDRESS	DATA	ADDRESS	DATA
00	88	0A	DC	14	27	1E	0E	28	01
01	79	0B	02	15	00	1F	03	29	35
02	A2	0C	63	16	90	20	BA		
03	47	0D	0D	17	05	21	05		
04	C3	0E	17	18	80	22	79		
05	23	0F	0A	19	89	23	05		
06	34	10	8C	1A	A9	24	3E		
07	1B	11	68	1B	22	25	2A		
08	59	12	5C	1C	05	26	39		
09	B2	13	53	1D	39	27	00		

Table 1

1. Enter DATA SET mode by setting VOLUME to minimum.
2. While holding down VOLUME button on front cabinet, press key 6 on remote control simultaneously. ADDRESS and DATA should appear as FIG 1.

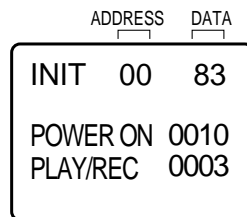
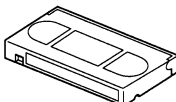
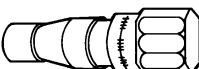
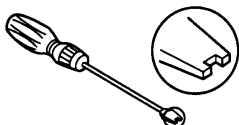
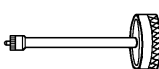
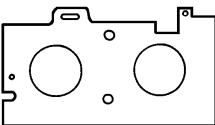
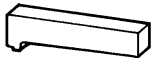
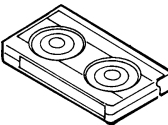
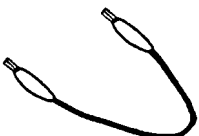
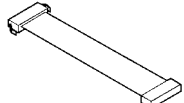
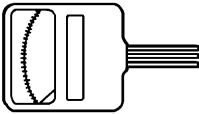


Fig. 1

3. ADDRESS is now selected and should "blink". Using the SET + or - keys on the remote, step through the ADDRESS until required ADDRESS to be changed is reached.
4. Press ENTER to select DATA. When DATA is selected, it will "blink".
5. Again, step through the DATA using SET + or - until required DATA value has been selected.
6. Pressing ENTER will take you back to ADDRESS for further selection if necessary.
7. Repeat steps 3 to 6 until all data has been checked.
8. When satisfied correct DATA has been entered, turn POWER off (return to STANDBY MODE) to finish DATA input. The unit will now have the correct DATA for the new MEMORY IC.

SERVICE ADJUSTMENT

SERVICING FIXTURES AND TOOLS

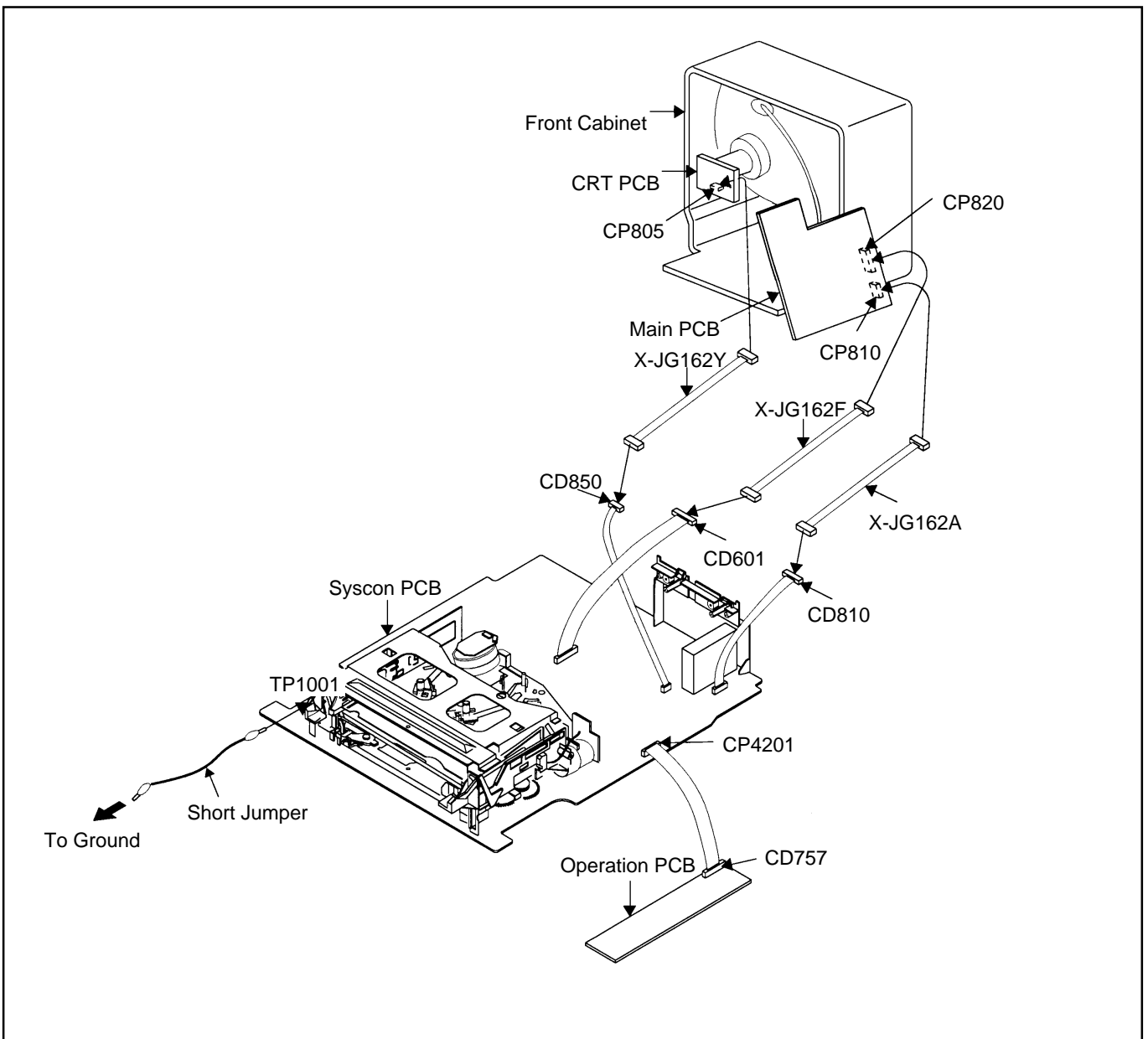
(For 4 heads model) VHS Alignment Tape MHP 	Torque Gauge 	PTU94002 Roller Driver 	X-JG153 X Value Adjustment Screwdriver 
Master Plane 	Reel Disk Height Adjustment Jig 	Torque Tape 	Short Jumper 
X-JG162A Cable (8 Pins) X-JG162F Cable (13 Pins) X-JG162Y Cable (5 Pins) 	Tentelometer 		

Part No.	Remarks
MHP	Monoscope (For 4 heads model)
	Color Bar, 1KHz (For 4 heads model)
	Hi-Fi Audio (For 4 heads Hi-Fi model)
MHP	X Value Adjustment
	VSR Torque, Brake Torque (S Reel/T Reel Ass'y)
	Brake Torque (T Reel Ass'y)
	VSR Torque, Brake Torque (S Reel)
PTU94002	Guide Roller Adjustment
X-JG153	X Value Adjustment
	Reel Disk Height Adjustment
	Playback Torque, Back Tension Torque During Playback
Short Jumper	Used to connect the TP1001 and GROUND
X-JG162A/X-JG162F	Used to connect the Syscon PCB and Main PCB
X-JG162Y	Used to connect the Syscon PCB and CRT PCB

PREPARATION FOR SERVICING

Basic Servicing Position (In case of needing to check on all blocks)

1. Unplug the connector CP502, CP4201 and CP4202, then remove the TV/VCR Block from the set.
2. Unplug the connector CP810, CP820 and CP805, then remove the Main PCB from the VCR Block.
3. Connect as shown in the below figure using the Service Fixture.
 - Connect the Syscon PCB to the Main PCB with the cable X-JG162A and X-JG162F.
 - Connect the Syscon PCB to the CRT PCB with the cable X-JG162Y.
4. Remove the Operation PCB from the set, then connect it with the Syscon PCB.
If necessary, connect CP4202 (Front A/V Jack Input Terminal)
5. Short circuit between **TP1001** and **Ground** with the Short Jumper.
The EOT, BOT and Reel Sensor do not work at this moment.
6. At that time, the STOP/EJECT button is available to insert and eject the Cassette Tape.



MECHANICAL ADJUSTMENTS

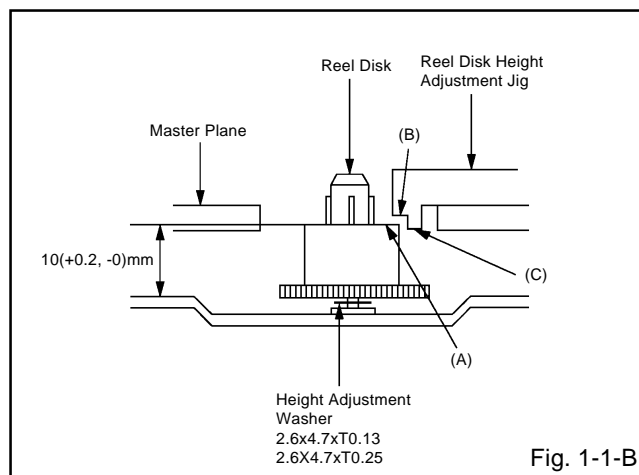
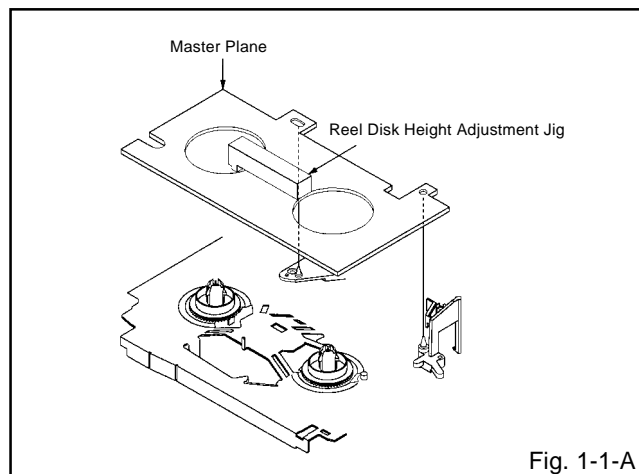
1. CONFIRMATION AND ADJUSTMENT

Read the following NOTES before starting work.

- Place an object which weighs between 450g~500g on the Cassette Tape to keep it steady when you want to make the tape run without the Cassette Holder. (Do not place an object which weighs over 500g.)
- When you activate the deck without the Cassette Holder, short circuit between TP1001 and GND. (Refer to **ELECTRICAL ADJUSTMENT PARTS LOCATION GUIDE**) In this condition the BOT/EOT/Reel Sensor will not function.

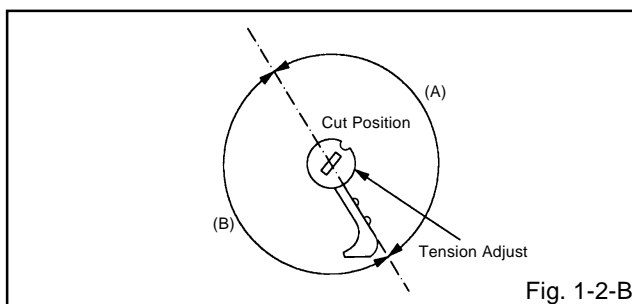
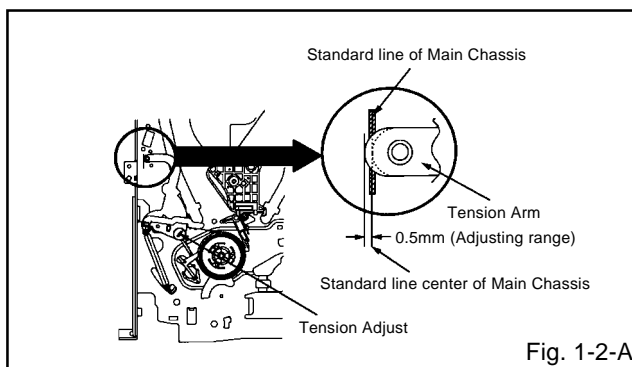
1-1: CONFIRMATION AND ADJUSTMENT OF REEL DISK HEIGHT

1. Turn on the power and set to the STOP mode.
2. Set the master plane and reel disk height adjustment jig on the mechanism framework, taking care not to scratch the drum, as shown in **Fig. 1-1-A**. Confirm that "A" of the reel disk is lower than "B" of the reel disk height adjustment jig, and is higher than "C".
3. If it is not enough height, adjust to $10(+0.2, -0)$ mm with the height adjustment washer.
4. Adjust the other reel in the same way.



1-2: CONFIRMATION AND ADJUSTMENT OF TENSION POST POSITION

1. Set to the PLAY mode.
2. Adjust the Tension Adjust until the edge of the Tension Arm is positioning within 0.5mm range from the standard line center of Main Chassis. After this adjustment, confirm that the cut position is located in "A" area as shown in **Fig. 1-2-B**. If it is located in "B" area, adjust again.
3. While turning the S Reel clockwise, confirm that the edge of the Tension Arm is located in the position described above.

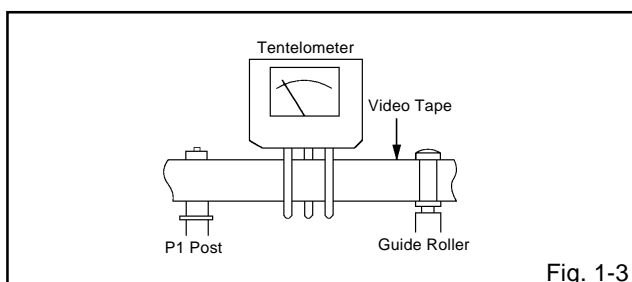


1-3: CONFIRMATION OF PLAYBACK TORQUE AND BACK TENSION TORQUE DURING PLAYBACK

1. Load a video tape (T-120) recorded in standard speed mode. Set the unit to the PLAY mode.
2. Install the tentelometer as shown in **Fig. 1-3**. Confirm that the meter indicates 20 ± 2 gf in the beginning of playback.

• USING A CASSETTE TYPE TORQUE TAPE

1. After confirmation and adjustment of Tension Post position (Refer to item 1-2), load the cassette type torque tape and set to the PLAY mode.
2. Confirm that the right meter of the torque tape indicates 60~110gf•cm during playback in SP mode.
3. Confirm that the left meter of the torque tape indicates 25~40gf•cm during playback in SP mode.



1-4: CONFIRMATION OF VSR TORQUE

1. Operate within 4~5 seconds after the reel disk begins to turn.
2. Install the Torque Gauge on the S Reel. Set to the Rewind mode. **(Refer to Fig.1-4)**
3. Then, confirm that it indicates 120~180gf•cm.

NOTE

Install the Torque Gauge on the reel disk firmly. Press the REW button to turn the reel disk.

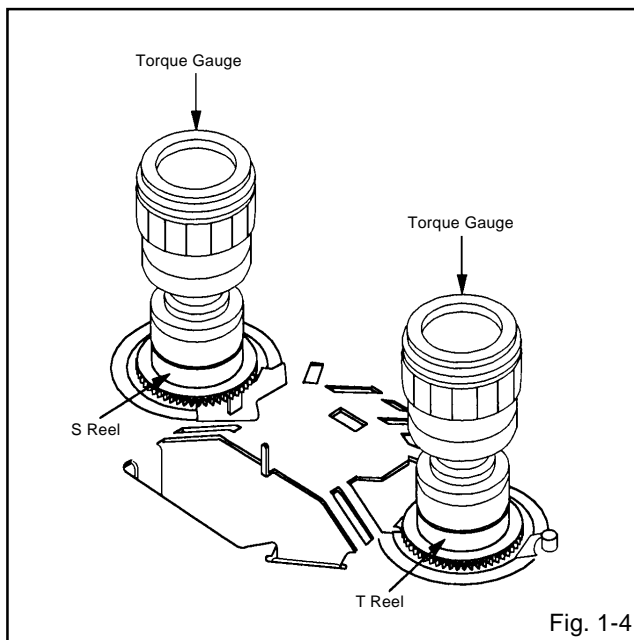
1-5: CONFIRMATION OF REEL BRAKE TORQUE

(S Reel Brake) **(Refer to Fig. 1-4)**

1. Set to the STOP mode.
2. Move the Idler Ass'y from the S Reel.
3. Install the Torque Gauge on the S Reel. Turn the Torque Gauge clockwise.
4. Then, confirm that it indicates 60~100gf•cm.

(T Reel Brake) **(Refer to Fig. 1-4)**

1. Set to the STOP mode.
2. Move the Idler Ass'y from the T Reel Ass'y.
3. Install the Torque Gauge on the T reel. Turn the Torque Gauge counterclockwise.
4. Then, confirm that it indicates 45~70gf•cm.



NOTE

If the torque is out of the range, replace the following parts.

Check item	Replacement Part
1-4	Idler Ass'y/Clutch Ass'y
1-5	T Brake Spring/Tension Spring

2. CONFIRMATION AND ADJUSTMENT OF TAPE RUNNING MECHANISM

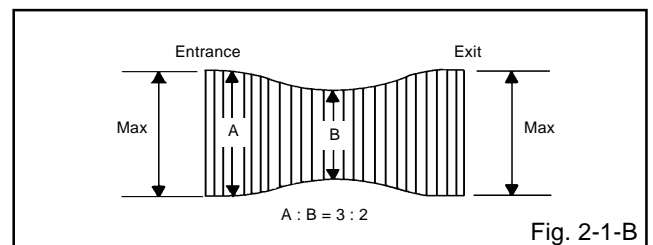
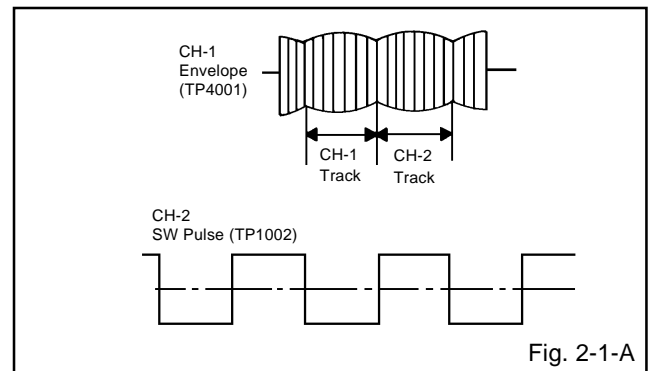
Tape Running Mechanism is adjusted precisely at the factory. Adjustment is not necessary as usual. When you replace the parts of the tape running mechanism because of long term usage or failure, the confirmation and adjustment are necessary.

2-1: GUIDE ROLLER

1. Playback the Alignment Tape **(MHP)**.
2. Connect CH-1 of the oscilloscope to **TP4001 (Envelope)** and CH-2 to **TP1002 (SW Pulse)**.
3. Press and hold the TRACKING-AUTO button on the remote control more than 2 seconds to set tracking to center.
4. Trigger with SW Pulse and observe the envelope. **(Refer to Fig. 2-1-A)**
5. When observing the envelope, adjust the Roller Driver (PTU94002) slightly until the envelope will be flat. Even if you press the Tracking Button, adjust so that flatness is not moved so much.
6. Adjust so that the A : B ratio is better than 3 : 2 as shown in **Fig. 2-1-B**, even if you press the Tracking Button to move the envelope (The envelope waveform will begin to decrease when you press the Tracking Button).
7. Adjust the Switching Point during playback. **(Refer to the ELECTRICAL ADJUSTMENTS)**

NOTE

After adjustment, confirm and adjust A/C head. **(Refer to item 2-2)**



2-2: CONFIRMATION AND ADJUSTMENT OF AUDIO/CONTROL HEAD

When the Tape Running Mechanism does not work well, adjust the following items.

1. Playback the Alignment Tape (**MHP**).
2. Confirm that the reflected picture of stamp mark is appeared on the tape prior to P4 Post as shown in **Fig. 2-2-A**.
 - a) When the reflected picture is distorted, turn the screw ① clockwise until the distortion is disappeared.
 - b) When the reflected picture is not distorted, turn the screw ① counterclockwise until little distortion is appeared, then adjust the a).
3. Turn the screw ② to set the audio level to maximum.
4. Confirm that the bottom of the Audio/Control Head and the bottom of the tape is shown in **Fig. 2-2-C**.
 - c) When the height is not correct, turn the screw ③ to adjust the height. Then, adjust the 1~3 again.

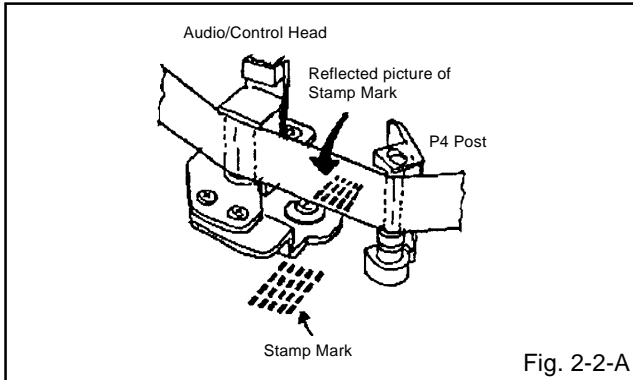


Fig. 2-2-A

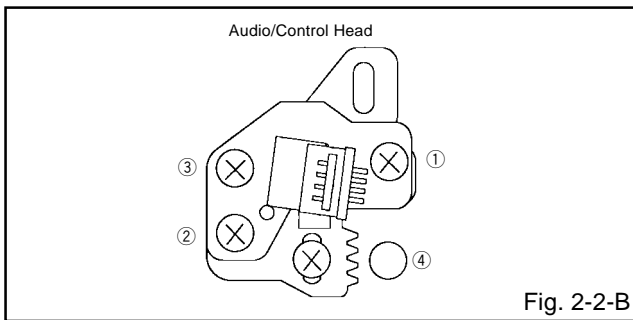


Fig. 2-2-B

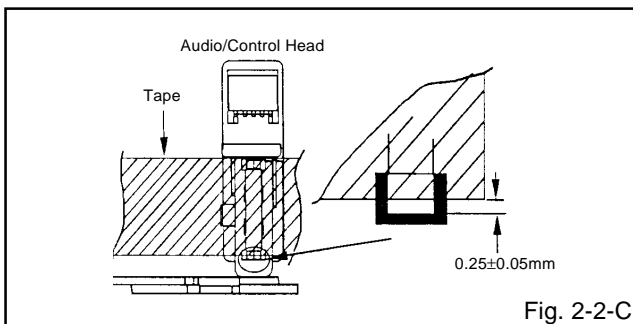


Fig. 2-2-C

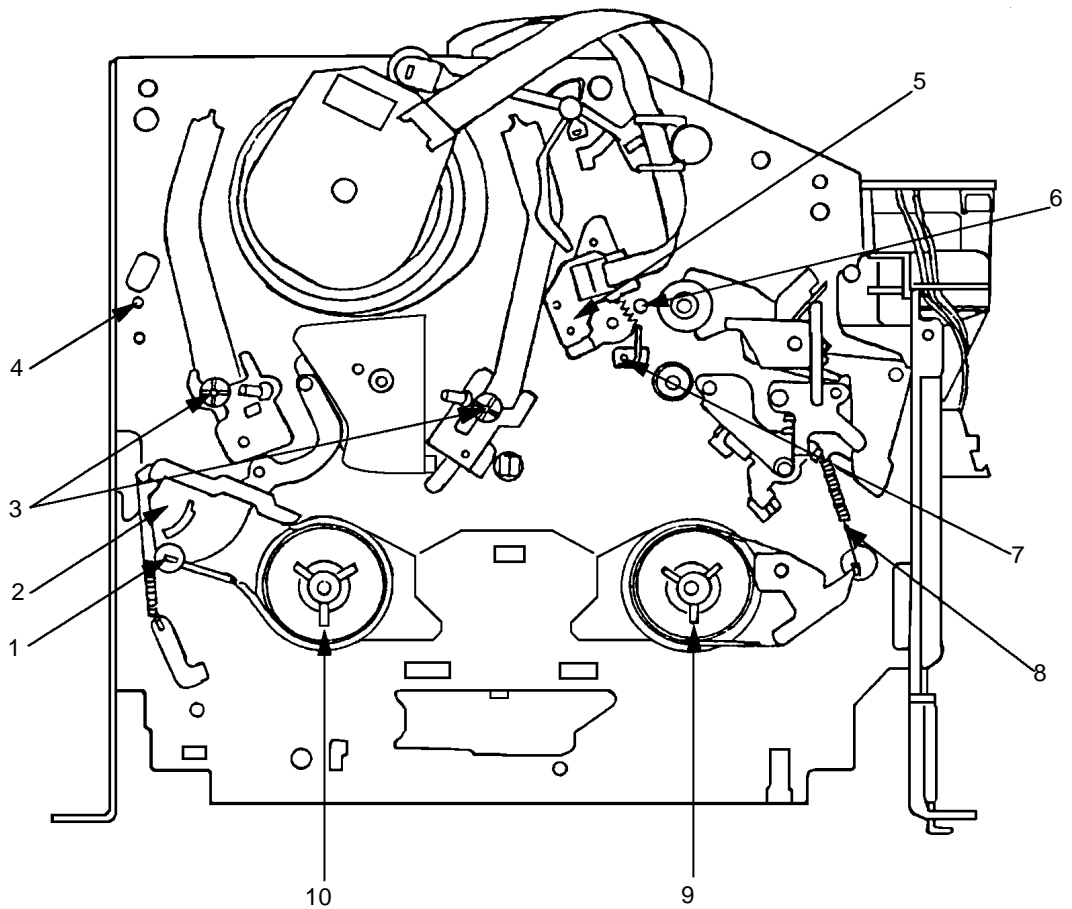
2-3: TAPE RUNNING ADJUSTMENT (X VALUE ADJUSTMENT)

1. Confirm and adjust the height of the Reel Disk. (**Refer to item 1-1**)
2. Confirm and adjust the position of the Tension Post. (**Refer to item 1-2**)
3. Adjust the Guide Roller. (**Refer to item 2-1**)
4. Confirm and adjust the Audio/Control Head. (**Refer to item 2-2**)
5. Connect CH-1 of the oscilloscope to **TP4001**, CH-2 to **TP1002** and CH-3 to **HOT side of Audio Out Jack**.
6. Playback the Alignment Tape (**MHP**).
7. Press and hold the TRACKING-AUTO button on the remote control more than 2 seconds to set tracking to center.
8. Set the X Value adjustment driver (**X-JG153**) to the ④ of **Fig. 2-2-B**. Adjust X value so that the envelope waveform output becomes maximum.

2-4: CONFIRM HI-FI AUDIO

1. Connect CH-1 of the oscilloscope to **TP4001**, CH-2 to **TP1002** and CH-3 to the **Hi-Fi Audio Out Jack**.
2. Playback the VHS Alignment Tape. (**Refer to SERVICING FIXTURE AND TOOLS**)
3. Press and hold the Tracking-Auto button on the remote control more than 2 seconds to set tracking to center.
4. Press the Tracking Up button and count number of steps which the audio output is changed from Hi-Fi to MONO.
5. Press the Tracking Down button and count number of steps which the audio output is changed from Hi-Fi to MONO.
6. Confirm that the difference between these counted steps number in the above items are within 2 steps. If the difference are more than 3 steps, do Tape Running Adjustment again. (**Refer to item 2-3**)

3. MECHANISM ADJUSTMENT PARTS LOCATION GUIDE



- | | |
|-----------------------|-----------------------------------|
| 1. Tension Adjust | 6. X value adjustment driver hole |
| 2. Tension Arm | 7. P4 Post |
| 3. Guide Roller | 8. T Brake Spring |
| 4. P1 Post | 9. T Reel |
| 5. Audio/Control Head | 10. S Reel |

1. ADJUSTMENT PROCEDURE

Read and perform these adjustments when repairing the circuits or replacing electrical parts or PCB assemblies.

CAUTION

- Use an isolation transformer when performing any service on this chassis.
- Before removing the anode cap, discharge electricity because it contains high voltage.
- When removing a PCB or related component, after unfastening or changing a wire, be sure to put the wire back in its original position.
Inferior silicon grease can damage IC's and transistors.
- When replacing IC's and transistors, use only specified silicon grease.
Remove all old silicon before applying new silicon.

On-Screen Display Adjustment

1. Unplug the AC plug for more than 5 seconds to set the clock to the non-setting state. Then, set the volume level to minimum.
2. Press the VOL. DOWN button on the set and the channel button (9) on the remote control simultaneously to display adjustment mode on the screen as shown in Fig. 1-1.

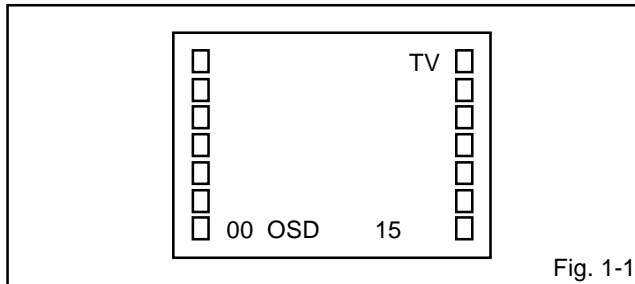


Fig. 1-1

3. Use the Channel UP/DOWN button or Channel button (0-9) on the remote control to select the options shown in Fig. 1-2.
4. Press the MENU button on the remote control to end the adjustments.

NO.	FUNCTION	NO.	FUNCTION
00	OSD H	13	BRIGHTNESS
01	CUT OFF	14	CONTRAST
02	RF DELAY	15	COLOR
03	VIF VCO	16	TINT
04	H VCO	17	SHARPNESS
05	H PHASE	18	FM LEVEL
06	V SIZE	19	LEVEL
07	V SHIFT	20	SEPARATION 1
08	R DRIVE	21	SEPARATION 2
09	B DRIVE	22	TEST MONO
10	R CUT OFF	23	TEST STEREO
11	G CUT OFF	24	X-RAY TEST
12	B CUT OFF		

Fig. 1-2

2. BASIC ADJUSTMENTS

(VCR SECTION)

2-1: PG SHIFTER

1. Connect CH-1 on the oscilloscope to TP1002 and CH-2 to TP4201.
2. Playback the alignment tape.
3. Press and hold the Tracking-Auto button on the remote control more than 2 seconds to set tracking to center.
4. Press the VOL. DOWN button on the set and the channel button (3) on the remote control simultaneously until the indicator REC disappears. If the indicator REC disappears, adjustment is completed.

(If the above adjustments doesn't work well:)

5. Press the VOL. DOWN button on the set and the channel button (3) on the remote control simultaneously until the indicator REC disappears.
6. When the REC indicator is blinking, press both VOL. DOWN button on the set and the channel button (4) on the remote control simultaneously and adjust the Tracking +/- button until the arising to the down of Head Switching Pulse becomes $6.5 \pm 0.5H$.
(Refer to Fig. 2-1-A, B)
7. Press the Tracking Auto button.

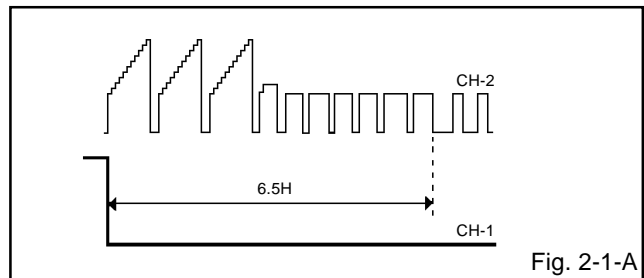


Fig. 2-1-A

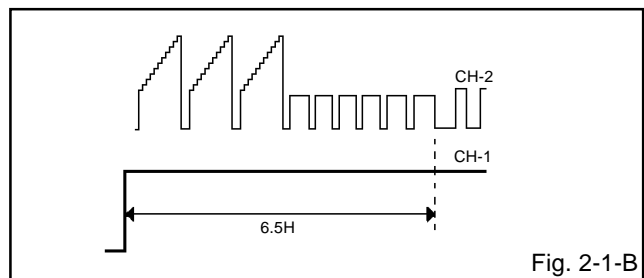


Fig. 2-1-B

2-2: VCO FREERUN

1. Place the set with Aging Test for more than 10 minutes.
2. Connect the digital voltmeter between the pin 7 of CP602 and the pin 1 (GND) of CP602.
3. Activate the adjustment mode display of Fig. 1-1 and press the channel button (03) on the remote control to select "VIF VCO".
4. Press the VOL. UP/DOWN button on the remote control until the digital voltmeter is 2.5V.

2-3: RF AGC

1. Receive the VHF HIGH (70dB).
2. Connect the digital voltmeter between the **pin 5 of CP602** and the **pin 1 (GND) of CP602**.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(02)** on the remote control to select "RF DELAY".
4. Press the VOL. UP/DOWN button on the remote control until the digital voltmeter is $2.6 \pm 0.05V$.

2-4: STEREO SEPARATION

1. Receive the stereo signal. (L=2KHz, R=400Hz)
2. Connect the AC voltmeter to **AUDIO OUT L/R** through stereo filter (L=400Hz, R=2KHz).
3. Press the AUDIO SELECT button on the remote control to set to the stereo mode.
4. Adjust by the **VR6001** so that the difference between with the stereo filter and without the stereo filter is more than 23dB.

(TV SECTION)

2-5: CONSTANT VOLTAGE

1. Connect the digital voltmeter to the **FUSE HOLDER of FH503**.
2. Set condition is AV MODE without signal.
3. Adjust the **VR502** until the DC voltage is $111 \pm 0.5V$.

2-6: OSD HORIZONTAL

1. Activate the adjustment mode display of **Fig. 1-1**.
2. Press the VOL. UP/DOWN button on the remote control until the difference of A and B becomes minimum. (**Refer to Fig. 2-3**)

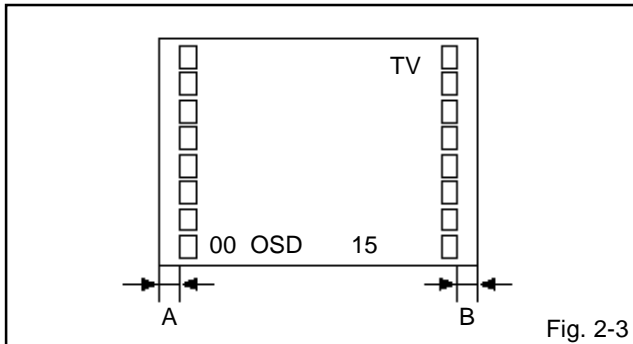


Fig. 2-3

2-7: CUT OFF

1. Adjust the unit to the following settings.
R CUT OFF=128, G CUT OFF=128, B CUT OFF=128,
R DRIVE=64, B DRIVE=64, BRIGHTNESS=128,
CONTRAST=100
2. Place the set with Aging Test for more than 15 minutes.
3. Set condition is AV MODE without signal.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(01)** on the remote control to select "CUT OFF".
5. Adjust the **Screen Volume** until a dim raster is obtained.

2-8: WHITE BALANCE

NOTE: Adjust after performing CUT OFF adjustment.

1. Place the set with Aging Test for more than 15 minutes.
2. Receive the color bar pattern.
3. Using the remote control, set the brightness and contrast to normal position.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(10)** on the remote control to select "R CUT OFF".
5. Using the VOL. UP/DOWN button on the remote control, adjust the R CUT OFF.
6. Press the CH. UP/DOWN button on the remote control to select the "R DRIVE", "B DRIVE", "G CUT OFF" or "B CUT OFF".
7. Using the VOL. UP/DOWN button on the remote control, adjust the R DRIVE, B DRIVE, G CUT OFF or B CUT OFF.
8. Perform the above adjustments 6 and 7 until the white color is looked like a white.

2-9: FOCUS

1. Receive the monoscope pattern.
2. Turn the Focus Volume fully counterclockwise once.
3. Adjust the **Focus Volume** until picture is distinct.

2-10: HORIZONTAL PHASE

1. Receive the monoscope pattern.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(05)** on the remote control to select "H PHASE".
4. Press the VOL. UP/DOWN button on the remote control until the SHIFT quantity of the OVER SCAN on right and left becomes minimum.

2-11: HORIZONTAL SIZE

NOTE: Adjust after performing adjustments in section 2-10.

1. Receive the monoscope pattern.
2. Adjust the **VR401** until the SHIFT quantity of the OVER SCAN on right and left becomes $10 \pm 2\%$.

2-12: VERTICAL SIZE

NOTE: Adjust after performing adjustments in section 2-11.

1. Receive the cross hatch signal from the Pattern Generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(06)** on the remote control to select "V SIZE".
4. Press the VOL. UP/DOWN button on the remote control until the rectangle on the center of the screen becomes square.
5. Receive a broadcast and check if the picture is normal.

2-13: VERTICAL SHIFT

NOTE: Adjust after performing adjustments in section 2-12.

1. Receive the center cross signal from the Pattern Generator.
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(07)** on the remote control to select "V SHIFT".
4. Press the VOL. UP/DOWN button on the remote control until the horizontal line becomes fit to the notch of the shadow mask.

2-14: SUB BRIGHTNESS

1. Receive the black pattern*. (RF Input)
2. Using the remote control, set the brightness and contrast to normal position.
3. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(13)** on the remote control to select "BRIGHTNESS".
4. Press the VOL. UP/DOWN button on the remote control until the screen begin to shine.
5. Receive the black pattern*. (Audio Video Input)
6. Press the INPUT button on the remote control to set to the AV mode. Then perform the above adjustments 2~4.

*The Black Pattern means the whole black raster signal. Select the "RASTER" of the pattern generator, set to the OFF position for each R, G and B.

2-15: SUB CONTRAST

1. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(14)** on the remote control to select "CONTRAST".
2. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "86"
3. Press the INPUT button on the remote control to set to the AV mode.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(14)** on the remote control to select "CONTRAST".
5. Press the VOL. UP/DOWN button on the remote control until the contrast step No. becomes "89"

2-16: SUB TINT

1. Receive the color bar pattern. (RF Input)
2. Using the remote control, set the brightness, contrast, color and tint to normal position.
3. Connect the synchro scope to **TP806**.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(16)** on the remote control to select "TINT".
5. Press the VOL. UP/DOWN button on the remote control until the section "A" becomes a straight line. **(Refer to Fig. 2-4)**
6. Increase the step numbers "3" steps with the VOL. UP button on the remote control.
7. Receive the color bar pattern. (Audio Video Input)
8. Press the INPUT button on the remote control to set to the AV mode. Then perform the above adjustments 2~6.

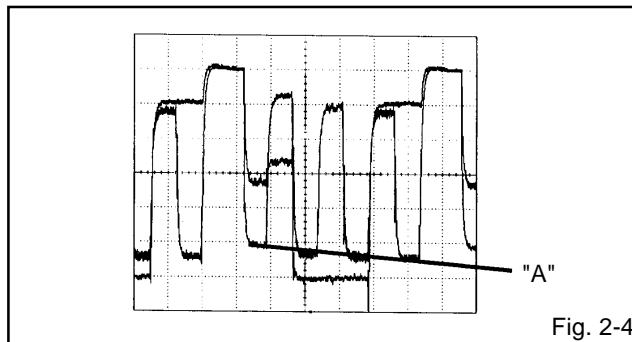


Fig. 2-4

2-17: SUB COLOR

1. Receive the color bar pattern. (RF Input)
2. Using the remote control, set the brightness, contrast, color and tint to normal position.
3. Connect the synchro scope to **TP804**.
4. Activate the adjustment mode display of **Fig. 1-1** and press the channel button **(15)** on the remote control to select "COLOR".
5. Adjust the VOLTS RANGE VARIABLE knob of the oscilloscope until the range between white 100% and 0% is set to 4 scales on the screen of the oscilloscope.
6. Press the VOL. UP/DOWN button on the remote control until the red color level is adjusted to $125 \pm 5\%$ of the white level. **(Refer to Fig. 2-5)**
7. Receive the color bar pattern. (Audio Video Input)
8. Press the INPUT button on the remote control to set to the AV mode. Then perform the above adjustments 2~6.

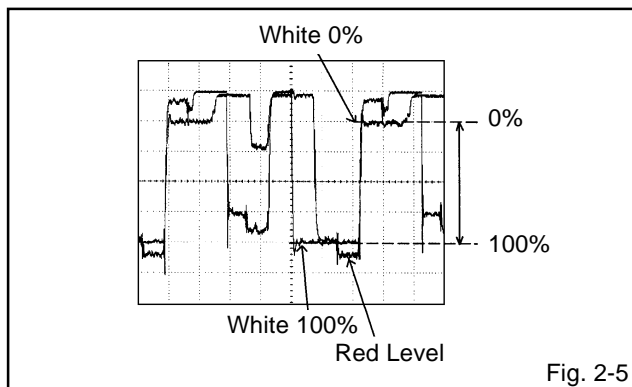
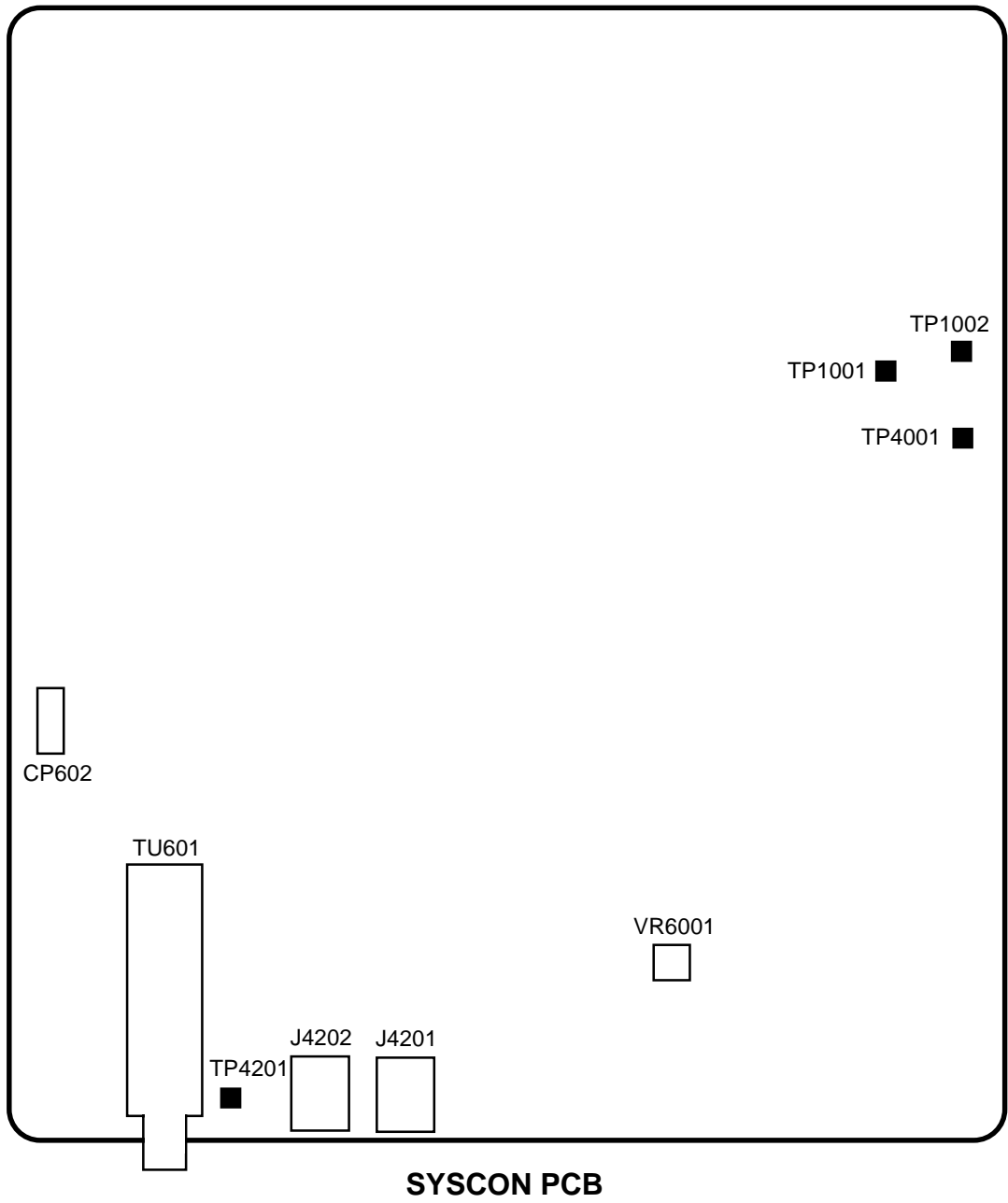


Fig. 2-5

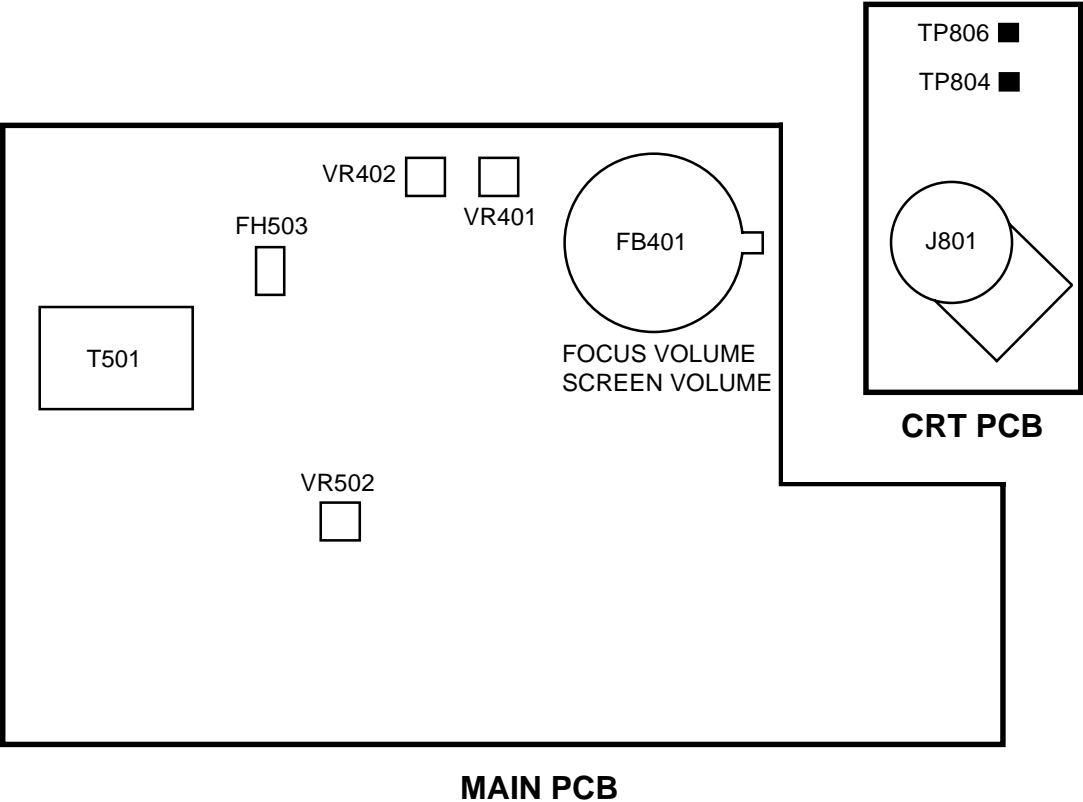
2-18: PIN CUSHION (PCC)

1. Receive the color bar pattern.
2. Using the remote control, set the brightness and contrast to normal position.
3. Adjust the **VR402** until the right and left vertical line becomes straight.

3. ELECTRICAL ADJUSTMENT PARTS LOCATION GUIDE (VCR SECTION)



(TV SECTION)



4. PURITY AND CONVERGENCE ADJUSTMENTS

NOTE

1. Turn the unit on and let it warm up for at least 30 minutes before performing the following adjustments.
2. Place the CRT surface facing east or west to reduce the terrestrial magnetism.
3. Turn ON the unit and demagnetize with a Degauss Coil.

4-1: STATIC CONVERGENCE (ROUGH ADJUSTMENT)

1. Tighten the screw for the magnet. Refer to the adjusted CRT for the position. **(Refer to Fig. 4-1)**
If the deflection yoke and magnet are in one body, untighten the screw for the body.
2. Receive the green raster pattern from the color bar generator.
3. Slide the deflection yoke until it touches the funnel side of the CRT.
4. Adjust center of screen to green, with red and blue on the sides, using the pair of purity magnets.
5. Switch the color bar generator from the green raster pattern to the crosshatch pattern.
6. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
7. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.
8. Adjust the crosshatch pattern to change to white by repeating steps 6 and 7.

4-2: PURITY

NOTE

Adjust after performing adjustments in section 4-1.

1. Receive the green raster pattern from color bar generator.
2. Adjust the pair of purity magnets to center the color on the screen.
Adjust the pair of purity magnets so the color at the ends are equally wide.
3. Move the deflection yoke backward (to neck side) slowly, and stop it at the position when the whole screen is green.
4. Confirm red and blue colors.
5. Adjust the slant of the deflection yoke while watching the screen, then tighten the fixing screw.

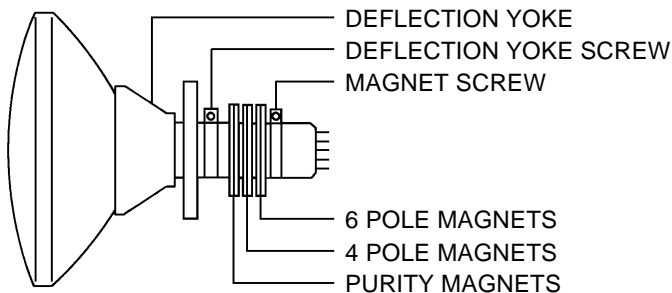


Fig. 4-1

4-3: STATIC CONVERGENCE

NOTE

Adjust after performing adjustments in section 4-2.

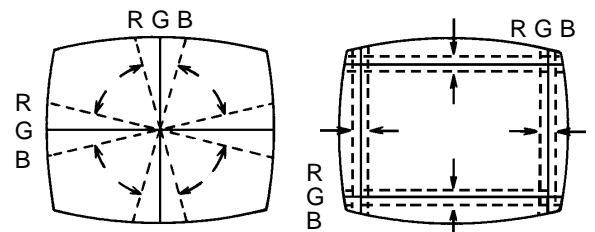
1. Receive the crosshatch pattern from the color bar generator.
2. Combine red and blue of the 3 color crosshatch pattern on the center of the screen by adjusting the pair of 4 pole magnets.
3. Combine red/blue (magenta) and green by adjusting the pair of 6 pole magnets.

4-4: DYNAMIC CONVERGENCE

NOTE

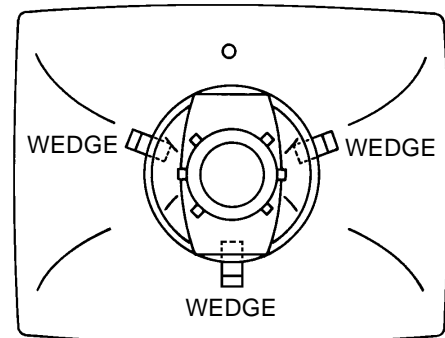
Adjust after performing adjustments in section 4-3.

1. Adjust the differences around the screen by moving the deflection yoke upward/downward and right/left. **(Refer to Fig. 4-2-a)**
2. Insert three wedges between the deflection yoke and CRT funnel to fix the deflection yoke. **(Refer to Fig. 4-2-b)**



UPWARD/DOWNWARD SLANT RIGHT/LEFT SLANT

Fig. 4-2-a



WEDGE POSITION

Fig. 4-2-b

GUIDE FOR REPAIRING

IC DESCRIPTION

SYSCON PCB OEC7043C (IC1001)

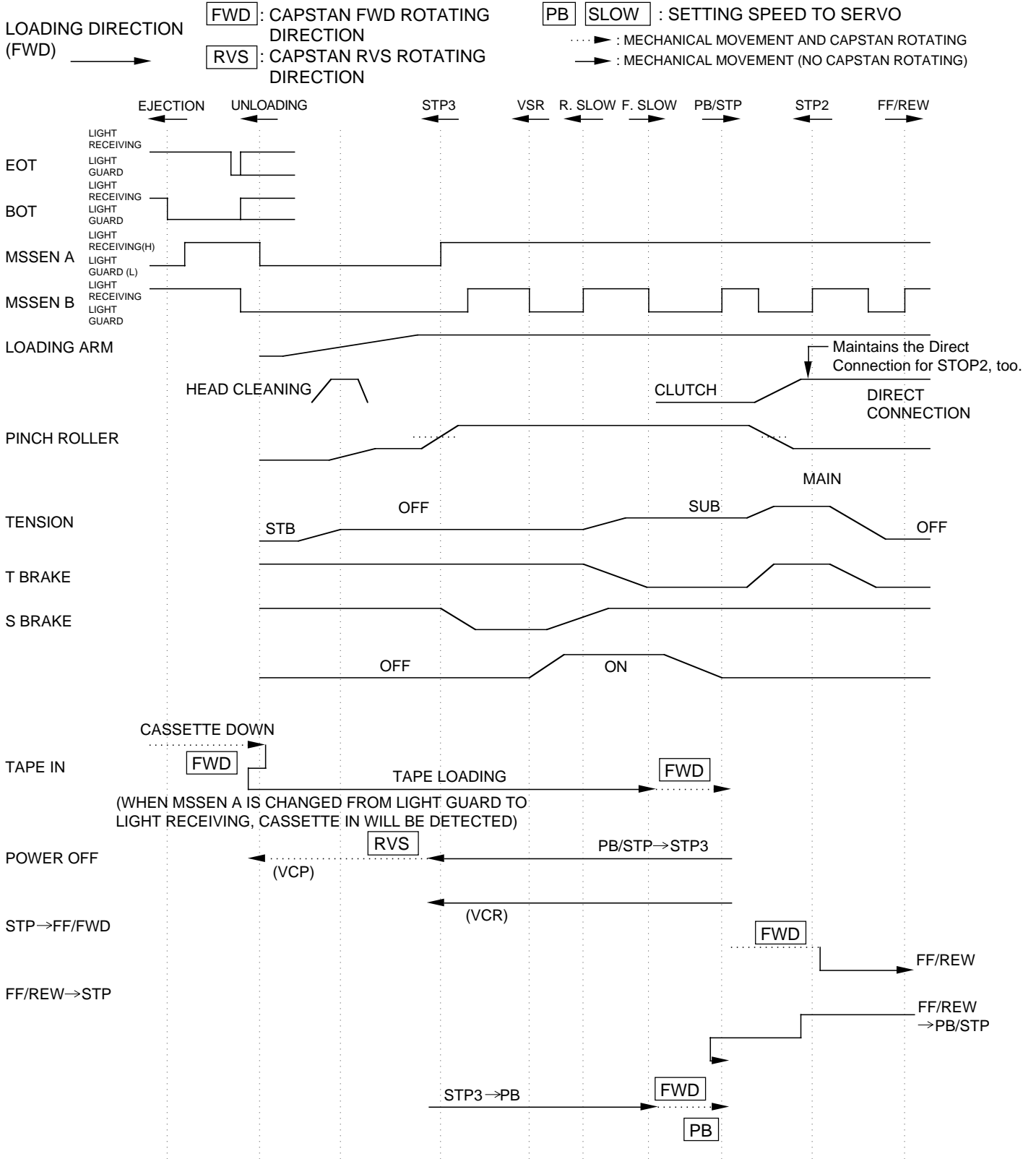
PIN NO.	PIN NAME	I/O	DESCRIPTION
1	MSSEN A	I	Input terminal of mecha state sensor.
2	MSSEN B	I	
3	EOT	I	Tape end sensor input signal.
4	BOT	I	Tape start sensor input signal.
5	HI-FI ENV	I	Input terminal of Hi-Fi RF envelope.
6	VIDEO ENV	I	Input terminal of video RF envelope.
7	AFT	I	Input terminal of AFT.
8	X-RAY	I	X-RAY detection input.
9	KEY 1	I	Main unit key input.
10	KEY 2	I	
11	CAPSTAN FWD	O	Capstan forward and backward command. (forward "L" output)
12	CAPSTAN LIMIT	O	Switch the maximum output current of the Capstan Motor.
13	DUMMY V.SYNC	O	Virtual V Pulse output.
14	REMOCON IN	I	Receive the remote control signal.
15	COLOR ROTARY	O	Color Rotary Control output.
16	HEAD AMP.SW	O	Switching output of Head Amp SW on 4 heads.
17	ENV COMP IN	I	Comparison results input of Playback Envelope level ON SP/LP heads (4heads)
18	VIDEO HEAD SW	O	Output terminal of Head SW to Y/C/A and Head Amp.
19	HI-FI HEAD SW	O	Output terminal of audio Head SW to Y/C/A and Head Amp.
20	LDM RVS	O	Output signal to control the rotation direction of the loading motor.
21	LDM FWD	O	
22	DEGAUSS-H	O	Degauss control output
23	MSSENS CTL	O	MSSEN sensor LED.
24	SP-H	O	Output HIGH at tape speed SP.
25	IIC OFF	I	When input "L" the I2CBUS communication is stopped.
26	EXT MUTE	O	Mute signal of external video mute.
27	VCR POWER	O	VCR power output.
28	TV POWER	O	TV power output.
29	T-REC LED	O	T-REC indication LED output.
30	REC LED	O	REC indication LED output.
31	ON TIMER LED	O	ON-TIMER indication LED output.
32	OTPB LED	O	OTPB indication LED output.
33	INPUT SELECT	O	Output terminal for internal/external switching control.
34	RESET	I	RESET will be done when the voltage goes to HIGH after the reset signal.
35	XCIN	I	Subclock pulse (32kHz)
36	XCOUT	O	
37	VCC	-	5V
38	XIN	I	Connect the main crystal (10MHz)
39	XOUT	O	
40	VSS	-	Ground.
41	X-RAY TEST	O	X-RAY test output
42	CS REC LED	O	CS REC indication LED output.
43	CLKSEL	I	5V
44	OSC IN	I	Terminal to connect the OSD circuit.
45	OSC OUT	O	Terminal to connect the OSD circuit.
46	NUB	-	Ground.
47	AV 1	O	Not used.
48	AV 2	O	Not used.
49	OSD VSS	-	Ground.
50	TAB SW	I	Input terminal for judge the tape if it has TAB or not.
51	SERVICE	I	Input terminal for Service Mode.
52	SD IN	I	Not used.

SYSCON PCB OEC7043C (IC1001)

PIN NO.	PIN NAME	I/O	DESCRIPTION
53	OSD VCC	-	5V
54	HLF	-	Filter connection for HLF.
55	VHOLD	-	Condenser connection for VHOLD.
56	CVIN	I	Composite Video input terminal.
57	NUA	-	Ground.
58	H SYNC	I	Input terminal for H-SYNC.
59	V SYNC	I	Input terminal for V-SYNC.
60	OSD OUT 1	O	Blanking output terminal of OSD.
61	REC-H/EE-M/PB-L	O	Output terminal for Y/C IC control.
62	B	O	Color signal blue output.
63	G	O	Color signal green output.
64	R	O	Color signal red output.
65	CAPSTAN FULL	O	Output the HIGH during the acceleration force of capstan motor at SLOW mode.
66	V REC START H	O	On control of A/V recording (Whole width erase) circuit.
67	YC DOC/XO CTL	O	DOC/XO switching terminal of Y/C.
68	CENTER LED	O	CENTER indication LED output.
69	TRICK PB/EE-H	O	Special effect playback.(CUE/REVIEW/STILL/SLOW etc)
70	TRICK PB-H	O	
71	CLK 1	O	CLOCK terminal for I2C BUS communication.
72	DATA 1	I/O	DATA terminal for I2C BUS communication.
73	FF/REW-L	O	The output terminal of to that switches the frequency characteristic of CTL by the circuit bill outside.
74	JUST CLOCK	I	Input terminal for JUST CLOCK.
75	AGC	O	Not used.
76	CAPSTAN PWM	O	PWM output of Capstan control.
77	DRUM PWM	O	PWM output of Cylinder control.
78	PLAY LED	O	PLAY indication LED output.
79	REEL S	I	Input terminal of reel sensor supply.
80	REEL T	I	Input terminal of reel sensor take up.
81	VCR MUTE	O	Mute signal of audio mute. (VCR)
82	TV MUTE	O	Mute signal of audio mute. (TV)
83	SP-L/LP-M/EP-H	O	Output terminal for tape speed control at playback and recording.
84	CA/MA SEL	O	Not used.
85	POWER FAIL	I	Input for the detection of power interruption.
86	CPFGAMP OUT	O	Output terminal for CAPSTAN FG signal detection.
87	CAPSTAN FG	I	Input terminal for CAPSTAN FG signal detection.
88	AMP VSS	-	Ground.
89	DRUM FG	I	Input terminal for DRUM FG signal detection.
90	DRUM PG	I	Input terminal for DRUM PG signal detection.
91	AMP VREFOUT	O	Condenser connection for AMP-VREFOUT.
92	AMP VREFIN	I	Condenser connection for AMP-VREFIN.
93	C	I	Condenser connection for C.
94	CTL-	I/O	Input and output terminal of Control Head.
95	CTL+	I/O	Input terminal of Control Head.
96	AMP C	-	Condenser connection for AMP C.
97	CTL AMP OUT	O	Output terminal for amp out.
98	AMPVCC	-	5V
99	ANALOG VCC	-	5V
100	DEW(mono)	I	Input terminal for the detection with the dew of the cylinder.
100	STEREO SEL(HiFi)	I	Input terminal for the judgement of voice reception condition.

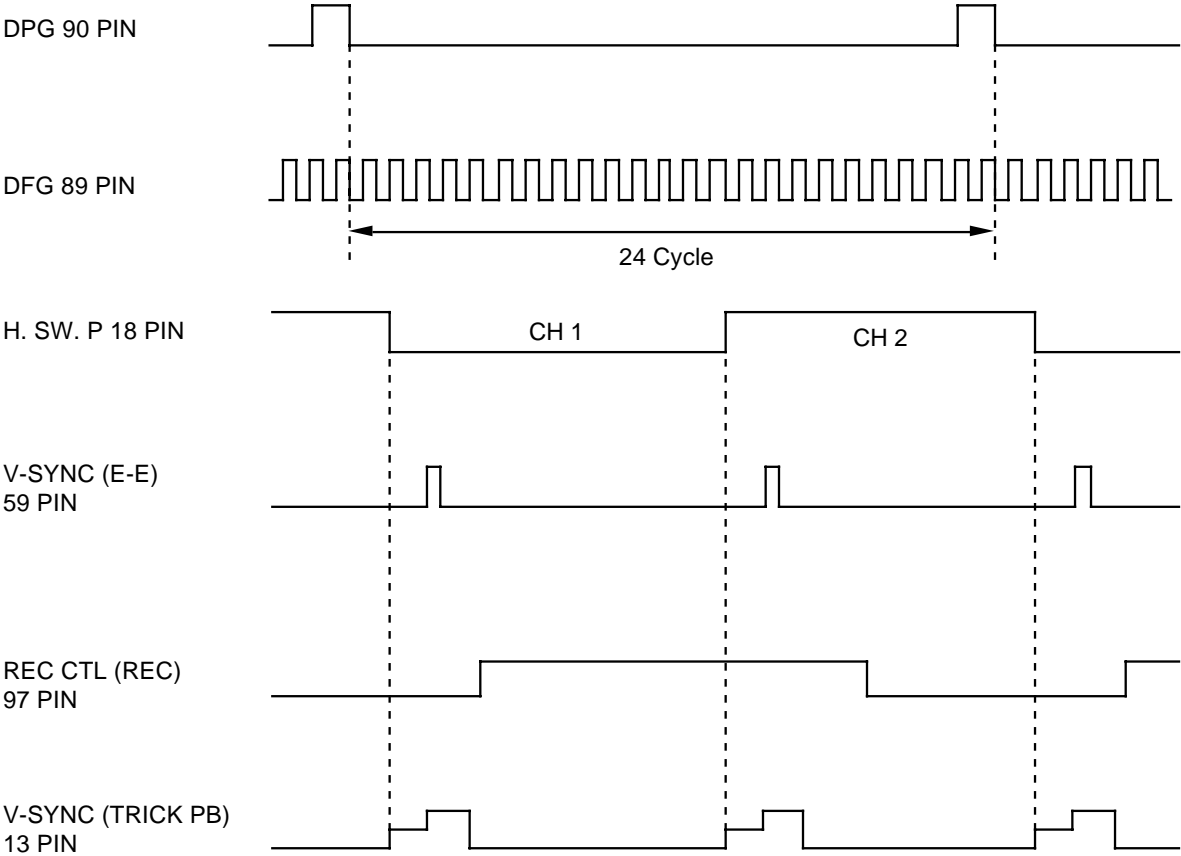
- The assignment for Pin 100 is varies according to the SET which is MONO or Hi-Fi.
It is used for DEW terminal in MONO and STEREO SEL terminal in Hi-Fi.

MECHANISM TIMING CHART



SERVO TIMING CHART

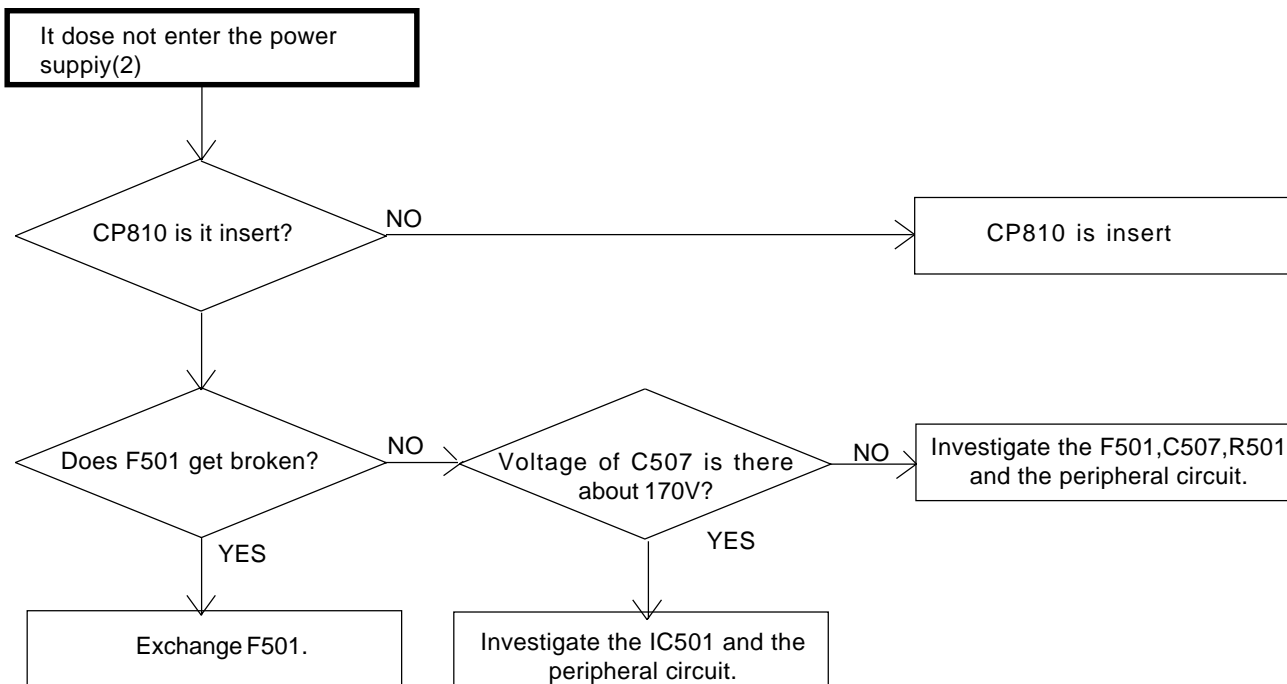
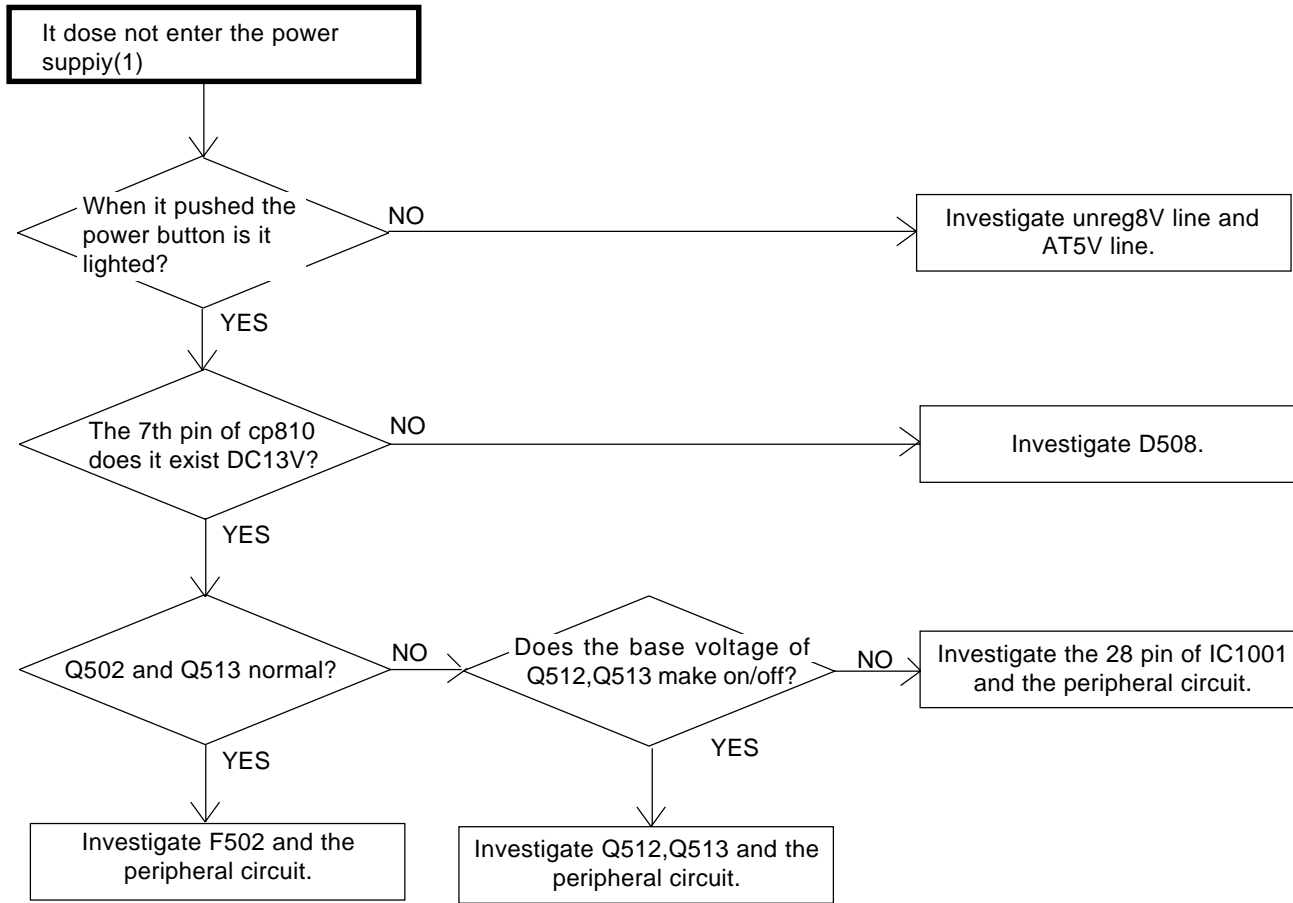
SYSCON PCB IC1001 (OEC7043C)

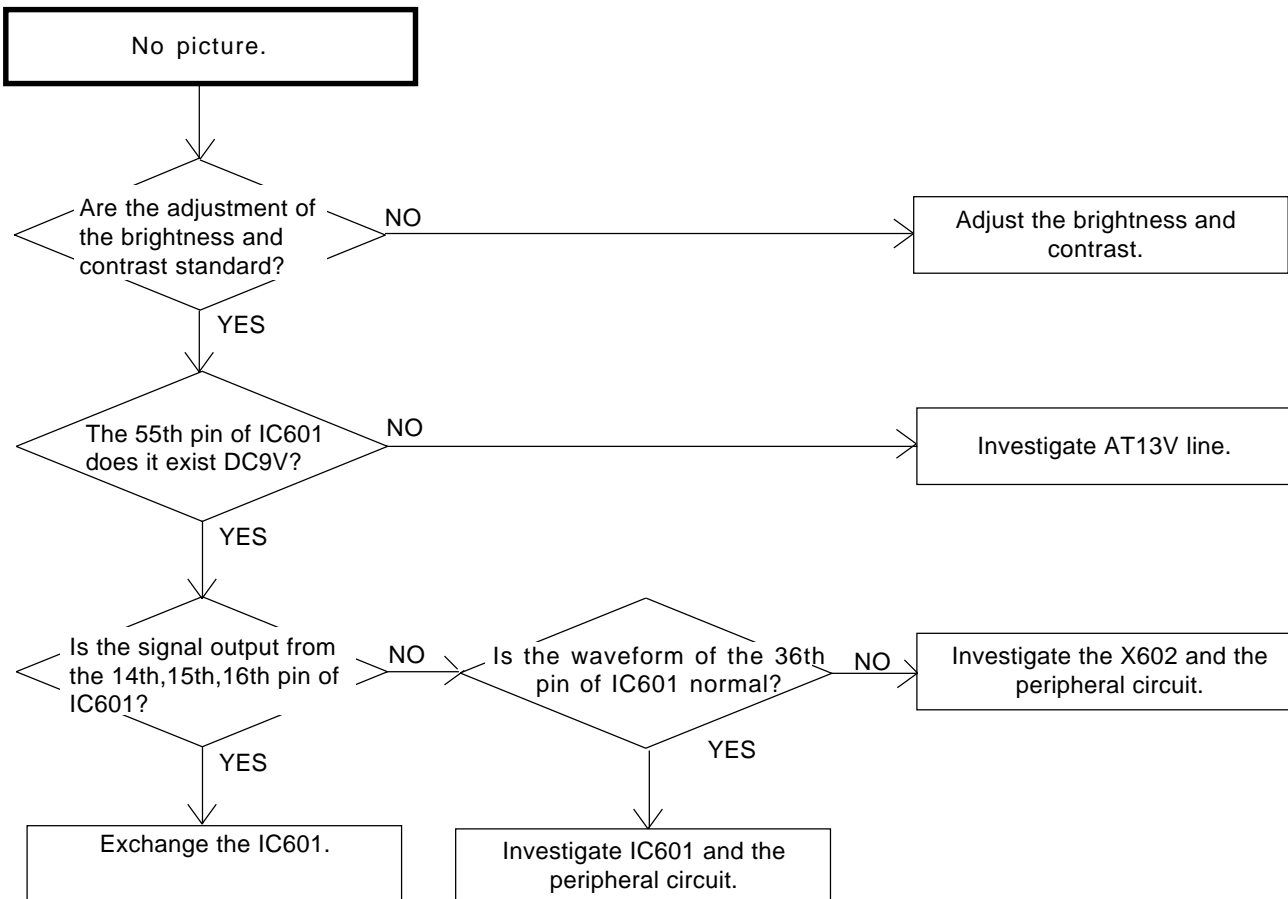
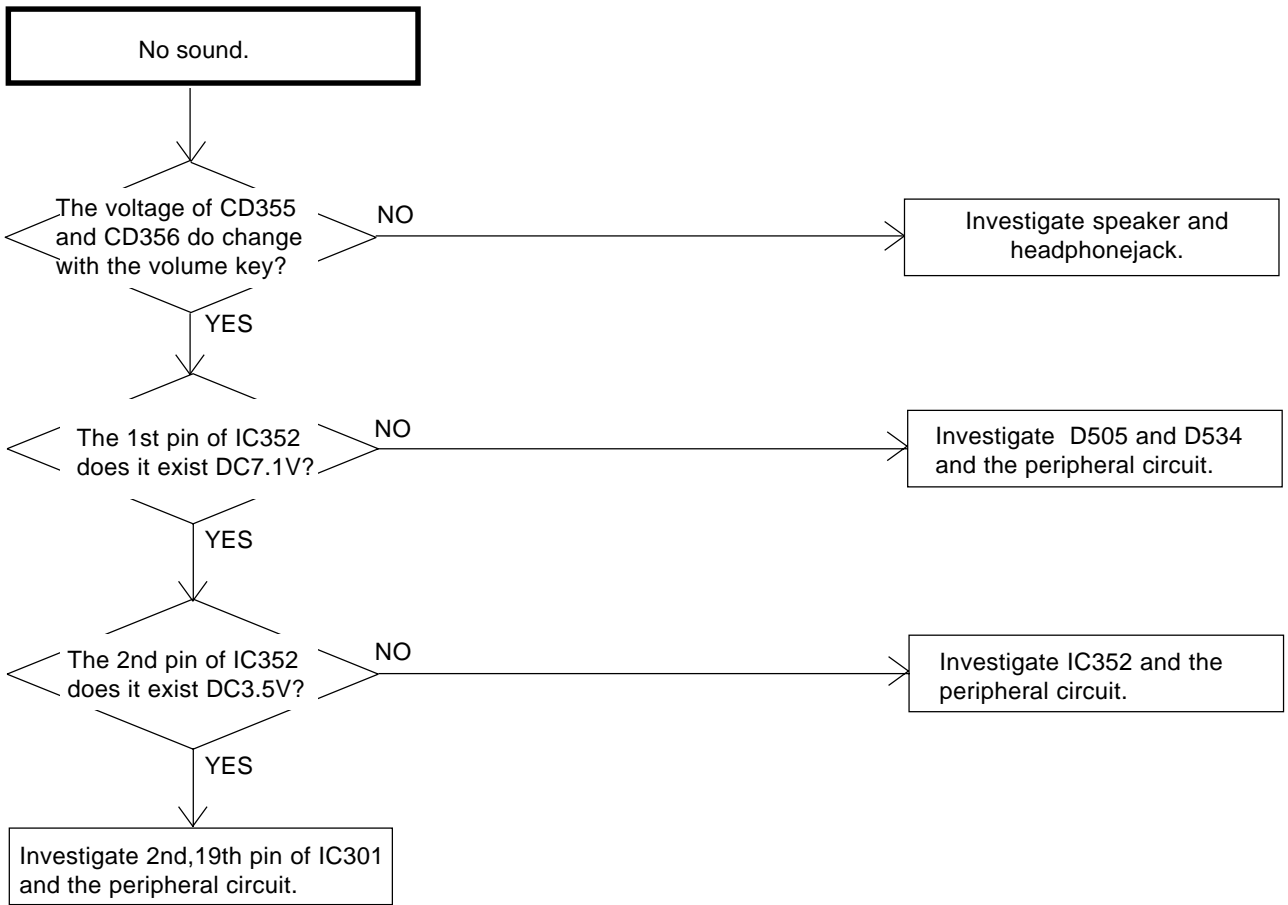


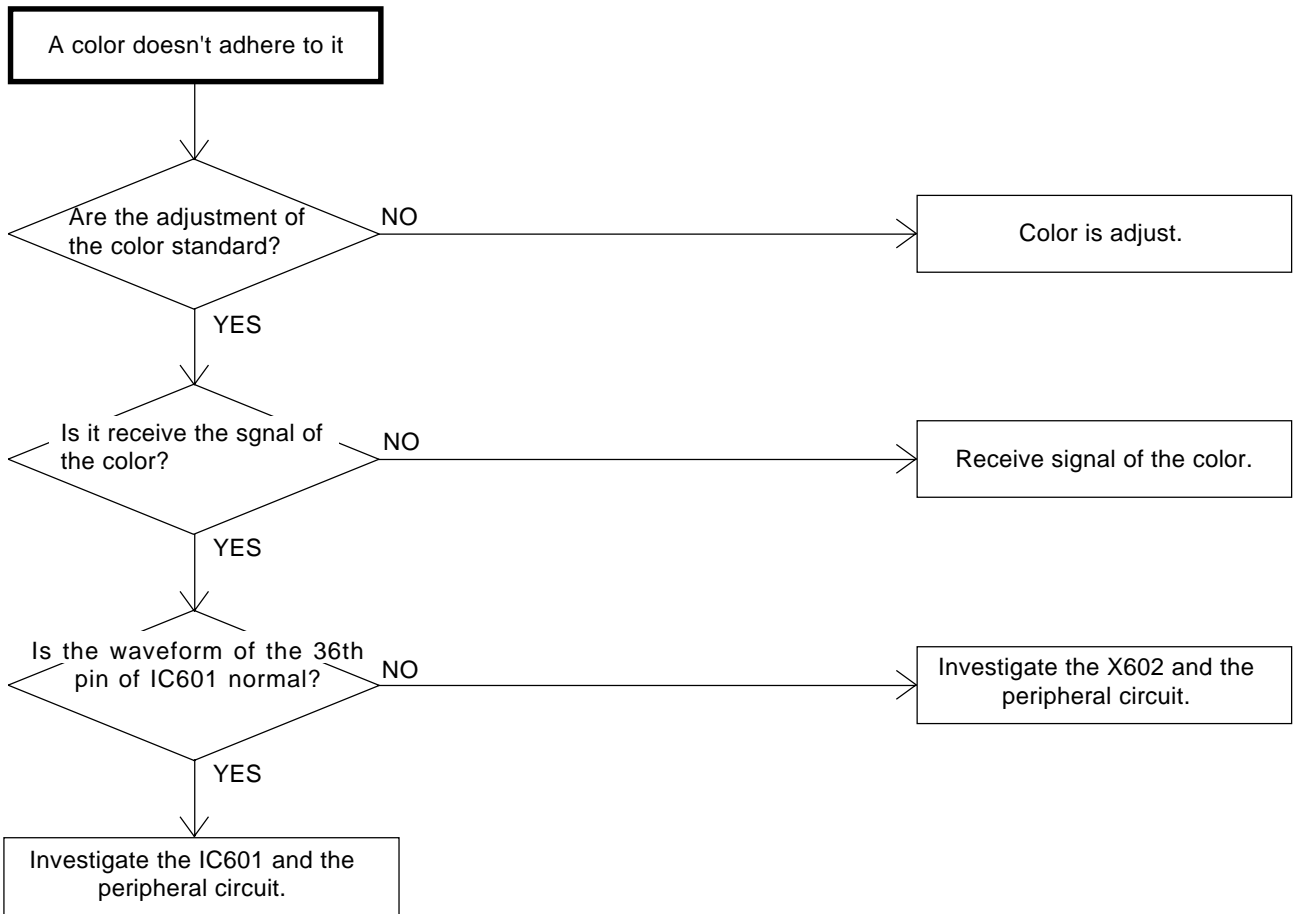
• WAVEFORM CHANGES DEPENDED ON THE TAPE SPEED

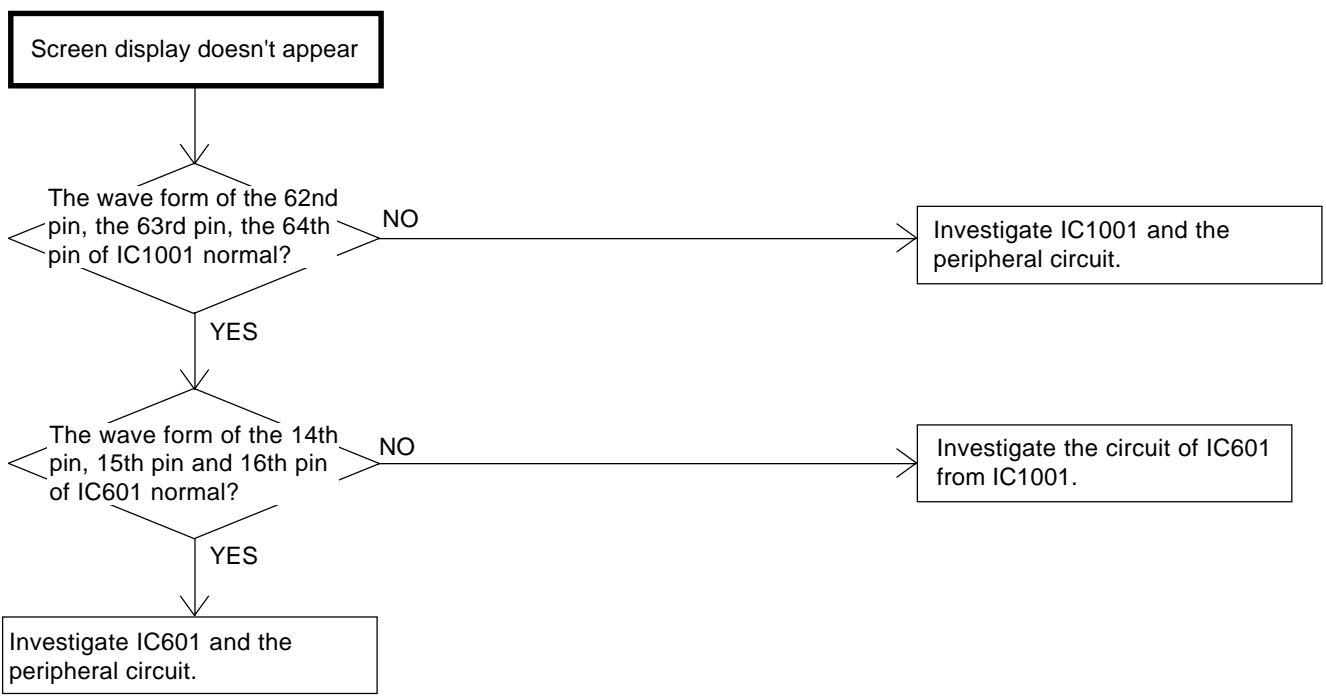
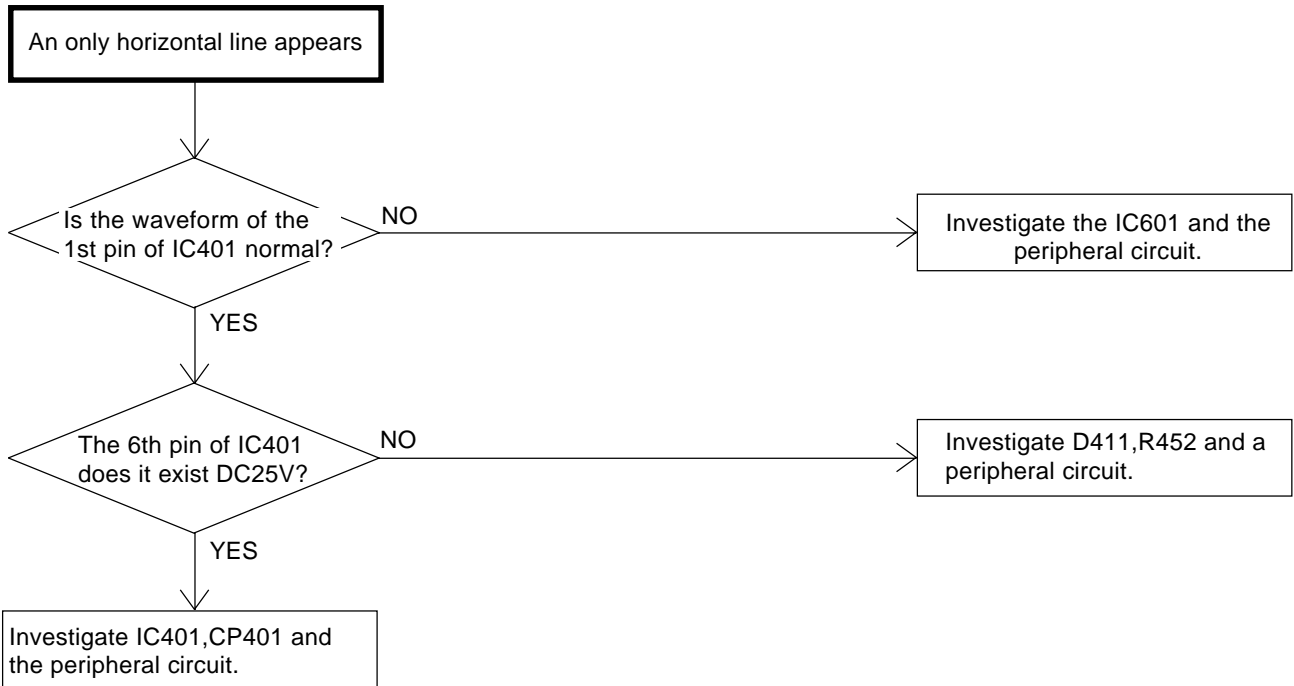
TROUBLESHOOTING GUIDE

(Television division)









(Video division)

