

**GENERAL INFORMATION/SERVICE NOTES**

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## SAFETY PRECAUTIONS

1. **Before returning the instrument to the customer**, always make a safety check of the entire instrument, including, but not limited to, the following items:

- a. Be sure that no built-in protective devices are defective and/or have been defeated during servicing. (1) Protective shields are provided on this instrument to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience. (2) When reassembling the instrument, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. **Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning. Servicers who defeat safety features or fail to perform safety checks may be liable for any resulting damage, and may expose themselves and others to possible injury.**
- b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, (1) excessively wide cabinet ventilation slots, and (2) improperly fitted and/or incorrectly secured cabinet covers.
- c. **Leakage Cold Check** - With the instrument AC plug removed from any AC source, connect an electrical jumper across the two AC plug prongs. Place the instrument AC switch in the *on* position. Connect one lead of an ohmmeter to the AC plug prongs tied together and touch the other ohmmeter lead in turn to each push button/customer control, exposed metal screws, metallized overlays and to each cable connector. If the measured resistance is less than 1.0 megohm or greater than 5.2 megohm an abnormality exists that must be corrected before the instrument is returned to the customer. Repeat this test with the AC switch in the *off* position.

- d. **Leakage Current Hot Check**

On completely assembled instrument, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) *C101.1 Leakage Current for Appliances* and Underwriters Laboratories (UL) *1492 (Section 67)*. Measure for current from a known earth ground (metal waterpipe, conduit, etc.) to all exposed metal or conductive parts of the instrument (antenna connections, handle

bracket, metal cabinet, screwheads, metallic overlays, push-buttons, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the instrument power cord plug in the outlet and repeat the test.

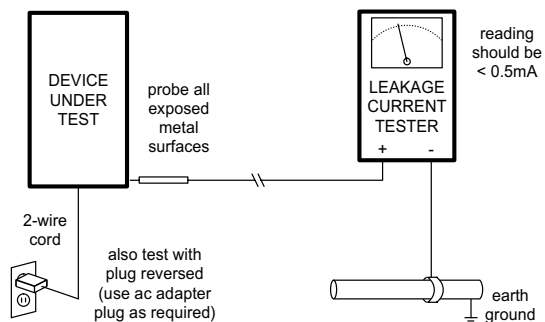
**ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER OR BEFORE CONNECTING TO ANTENNA OR ACCESSORIES.**

- e. **Interconnected Equipment AC Leakage Test**

Avoid shock hazards. The instrument, accessory, or cable(s) to which this instrument is connected should have the applicable sections of the leakage resistance cold check and the leakage current hot check performed. Do not connect this instrument to an antenna, cable or accessory that exhibits excessive leakage currents.

2. Read and comply with all caution and safety-related notes on or inside the instrument cabinet, and on the chassis.
3. **Design Alteration Warning** - *Do not* alter or add to the mechanical or electrical design of this instrument. Design alterations and additions, including, but not limited to, circuit modifications and the addition of items such as auxiliary audio output connections, cables and accessories, etc., might alter the safety characteristics of this instrument and create a hazard to the user. Any design alterations or additions will void the manufacturer's warranty and will make you, the servicer responsible for personal injury or property damage resulting therefrom.
4. Observe original lead dress. Take extra care to assure correct lead dress in the following areas: (a) near sharp edges, (b) near thermally hot parts - be sure that leads and components do not touch thermally hot parts, and (c) the AC supply. Always inspect in all areas for pinched, out-of-place, or frayed wiring. Do not change spacing between components and the printed-circuit board. Check AC power cord for damage.
5. Components, parts and/or wiring that appear to have overheated or are otherwise damaged should be replaced with components, parts or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

6. **PRODUCT SAFETY NOTICE** - Many electrical and mechanical parts have special safety-related characteristics, some of which are often not evident from visual inspection, nor can the protection they give be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified in this service data by a (Δ) on schematics and in the parts list. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part in this service data parts list might create shock, fire and/or other hazards. Product Safety is under review continuously and new instructions are issued whenever appropriate. For the latest information, always consult the appropriate current service literature.



## SPECIFICATIONS

ITEM	SPECIFICATION	1	2	3
Power	Source: 120V AC $\pm$ 10 %, 60 Hz $\pm$ 0.5 %	○	○	○
	Consumption: 18 watts 23 watts	○ -	○ -	- ○
Video	Head: 2 rotary heads helical scanning system 4 rotary heads helical scanning system	○ -	- ○	- ○
	Input level: VIDEO IN Jack (Phono type) 1.0 Vp-p 75 $\Omega$ unbalanced Output Level: VIDEO OUT Jack (Phono type) 1.0 Vp-p 75 $\Omega$ unbalanced Signal-to-Noise Ratio: SP: more than 43 dB LP/SLP: more than 41 dB Horizontal Resolution: Color/Monochrome: more than 230 lines	○	○	○
Audio	Head: Normal Mono: 1 stationary head Hi-Fi Stereo: 2 rotary heads	○ -	○ -	○ ○
	Input Level: AUDIO IN Jack (Phono type) -10 dBV 50k $\Omega$ unbalanced Output Level: AUDIO OUT Jack (Phono type) -8 dBV 600 $\Omega$ unbalanced AUDIO OUT Jack (Phono type) -8 dBV 1k $\Omega$ unbalanced	○ ○ -	○ ○ -	○ - ○
	Frequency Response: Normal Mono: SP: 100 Hz ~ 8 kHz LP: 100 Hz ~ 6 kHz SLP: 100 Hz ~ 5 kHz Hi-Fi Stereo: SP/LP/SLP: 20 Hz ~ 20 kHz	○ ○ ○ -	○ ○ ○ -	○ ○ ○ ○
	Signal-to-Noise Ratio: Normal Mono: SP: more than 42 dB LP/SLP: more than 40 dB Hi-Fi Stereo: SP/LP/SLP: more than 60 dB	○ ○ -	○ ○ -	○ ○ ○
	Wow and Flutter: Normal Mono: SP: Less than 0.2 % WRMS LP: Less than 0.3 % WRMS SLP: Less than 0.4 % WRMS Hi-Fi Stereo: Less than 0.015 % WRMS	○ ○ ○ -	○ ○ ○ -	○ ○ ○ ○
RF Out	CH 3/CH 4 switchable 72 dB $\mu$ (open voltage) 75 $\Omega$ unbalanced	○	○	○
Tuner	Broadcast Channels: VHF 2 ~ 13, UHF 14 ~ 69 CATV Channels: Midband A through I (14 ~ 22) Superband J through W (23 ~ 36) Hyperband AA ~ EEE (37 ~ 64) Lowband A-5 ~ A-1 (95 ~ 99) Special CATV channel 5A (01) Ultraband 65 ~ 94, 100 ~ 125	○	○	○
Video Signal	EIA Standard (525 lines, 60 fields) NTSC Color Signal	○	○	○
Tape Speed	SP: 1-5/16 i.p.s (33.35 mm/sec), LP: 21/32 i.p.s (16.67 mm/sec), SLP: 7/16 i.p.s (11.12 mm/sec) Record/Playback Time: 8 Hrs with 160 min. type tape used in SLP mode FF/REW Time: Less than 3 min. (120 min. type tape)	○	○	○
Tape Format	Tape width 1/2" (12.7 mm) high density tape	○	○	○
Operating Condition	41°F (5°C) ~ 104°F (40°C) (Temperature) 10 % ~ 75 % (Humidity)	○	○	○
Dimension	14-15/16" (380 mm) (W) x 3-2/3" (93 mm) (H) x 11-4/5" (300 mm) (D)	○	○	○
Weight	Approx. 7.5 lbs. (3.4 kg) Approx. 7.7 lbs. (3.5 kg)	○ -	○ -	- ○

- VR346
- VG4062/VR527/VR540
- VR624HF

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

## COMPONENT IDENTIFICATION

## IC, TRANSISTOR AND CHIP PART INFORMATION

**MAIN C.B.A.**

AN3476FBP, AN3962FB-V,  
MN101D01FTA, MN101D01FTB1,  
T47C216FF917

VCRS0215

ON3131-S.KT,  
ON3131-R.KT,  
PS2501-1-X

2SD2259,  
2SD1458

T4101,  
EIQ7QF018Q

2SD2159

UN2215 (R1=10K, R2=OPEN),  
UN5215 (R1=10K, R2=OPEN),  
DTC114TK (R1=10K, R2=OPEN),  
DTC114TU (R1=10K, R2=OPEN)

2SC5130LF608,  
2SC4533LP.KT, 2SD2375,  
2SD2396, 2SC3852

2SD1581

UN2115 (R1=10K, R2=OPEN),  
UN5115 (R1=10K, R2=OPEN),  
DTA114TK (R1=10K, R2=OPEN),  
DTA114TU (R1=10K, R2=OPEN)

2SD601, 2SD601A, MSD601/JRS,  
2SB709A, MSB709/JRS, 2SD1819A,  
MSD1819ARS, 2SC4081T106R, 2SC2412K1,  
2SA1037K146R, 2SB1218ARS, MSB1218ARS,  
2SA1576A106R, 2SD2097TV2R, 2SD235800A

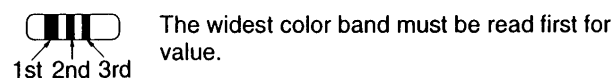
**GENERAL C.B.A./ASS'Y PARTS**

MN3885S, AN3361SB,  
AN3328S, AN3845SC,  
AN3809K, AN3371SB,  
CD4053BCM, UPD4053BG

## HOW TO READ THE IDENTIFICATION MARK OF CHIP COMPONENTS.

MARKING	PART NO.	MARKING	PART NO.
AR	MSB709/JRS	Z	2SD601A
B	2SB709A	Z	2SD1819A
B	2SC4081T106R	04	DTC114TK
B	2SB1218ARS	94	DTA114TK
F	2SA1037K146R	6E	UN2115
F	2SA1576A106R	6E	UN5115
Y	2SD601	8E	UN2215
YR	MSD601/JRS	8E	UN5215

## HOW TO READ THE VALUES OF THE CYLINDRICAL TYPE CHIP COMPONENTS.



## (a) RESISTOR

There are two types (ERD10LLJ... and ERD10TLJ...) of chip parts.

- 1) ERD10LLJ : Refer to above type.
- 2) ERD10TLJ : The narrow color band must be read first for value.

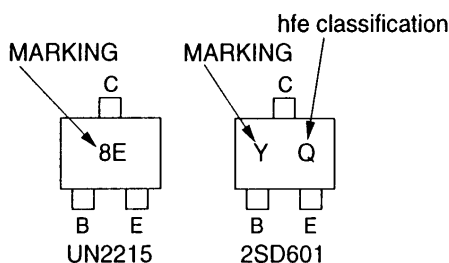
If this part is included in the parts list, be sure that the color band is read properly when servicing.

## (b) CAPACITOR

Because of the width of the color bands, the reading direction cannot be specified. However, the color band can be read on either side. Be sure to confirm the value using the schematic diagram.

## CAUTION :

Once chip parts are removed, they must not be reused. Always use a new part when installing a chip part.



## LEADLESS COMPONENT REMOVAL

### Replacement Procedure for Leadless (Chip) Removal

The following procedures are recommended for the replacement of the leadless components used in this unit.

1. Preparation for replacement
  - a. Soldering Iron  
Use a pencil-type soldering iron using less than 30 watts.
  - b. Solder  
Eutectic Solder (Tin 63%/Lead 37%) is recommended.
  - c. Soldering time  
Do not apply heat for more than 4 seconds.
  - d. Preheating  
Leadless capacitors must be preheated before installation. (130 degrees - 150 degrees C).

**Note:** a. Leadless component must not be reused after removal.  
b. Excessive mechanical stress and rubbing of the component electrode must be avoided.

### 2. Removing the leadless component

Grasp the leadless component body with tweezers and alternately apply heat to both electrodes. When the solder on both electrodes is melted, remove the leadless component with a twisting motion.

**Note:** a. Do not attempt to lift the component off the board until the component is completely disconnected from the board by a twisting action.  
b. Take care not to break the copper foil on the printed circuit board.

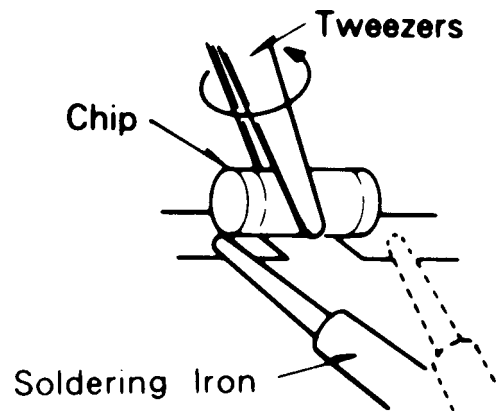


Fig. 1 - Leadless Component Removal

3. Installing the leadless component
  - a. Presolder the contact points of the circuit board.

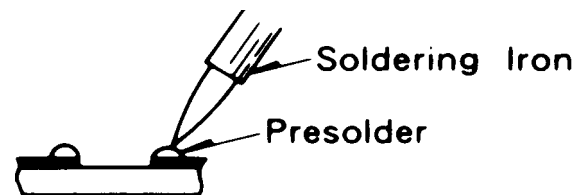


Fig. 2 - Leadless Component Installation

- b. Press the part downward with the tweezers and solder both electrodes as shown below.

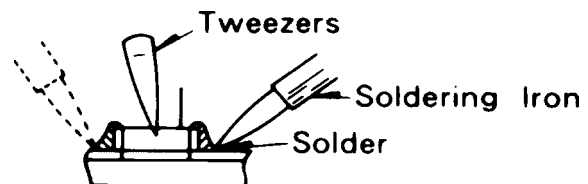


Fig. 3 - Leadless Component Installation

**Note:** Do not glue the replacement leadless component to the circuit board.

## MAINTENANCE CHART

The following chart indicates the schedule for the periodic maintenance which will prolong the life of the machine.  
Since the parts are keyed to the Inner Parts Location Diagram, when you replace the following parts, refer to the diagram.

	Parts Name	Unit or Part No.	Hour									
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000
1	Cylinder Unit	VEGS0395R VEGS0399R	●	◎	●	◎	●	◎	●	◎	●	●
2	Audio Control Head Unit	VEHS0559R	●	●	●	●	●	●	●	◎	●	●
3	FG Head	VBKS0040	●	●	●	●	●	●	●	◎	●	●
4	Pinch Arm Unit	VXLS1078	●	●	◎	●	●	◎	●	●	◎	●
5	S Reel Table	VDRS0056	●	●	●	●	●	●	●	◎	●	●
6	T Reel Table	VDRS0057	●	●	●	●	●	●	●	◎	●	●
7	S Reel Shaft	_____				○				○		
8	T Reel Shaft	_____				○				○		
9	Capstan Rotor Unit	_____										◎
10	Capstan Shaft	_____	●	●	●	●	●	●	●	●	●	●
11	SS Brake Arm Unit	VXLS1070				◎				◎		
12	T Brake Unit	VXLS1062				◎				◎		
13	Motor Block Ass'y	VXKS0867				△				◎		
14	Tape Transport	_____	●	●	●	●	●	●	●	●	●	●
15	Loading Post Base Unit	VXDS0198 VXDS0195				△				△		
16	Main Cam Gear	VDGS0430				△				△		
17	Capstan Belt	VDVS0087				◎				◎		
18	Tension Arm Unit	VXLS1074				◎				◎		

## ※ NOTE

Symbol	Maintenance	Requirement	Remark
●	Cleaning	Ethanol or Cleaning Liquid (Purchased Locally)	Wipe dirt from the parts using soft cloth impregnated with Ethanol. Note : When cleaning rubber parts, avoid using excessive alcohol since it may accelerate deterioration of these parts. After cleaning with alcohol, wipe the alcohol away quickly and thoroughly.
◎	Replacement	_____	_____
○	Lubrication	High Quality Spindle Oil (Purchased Locally)	Supply one or two drops of oil.
△	Greasing	FLOIL G5A	Wipe away the old grease and apply new grease.

## TOOLS/TEST EQUIPMENT

### Dual-Trace Triggered Oscilloscope

Lo-Cap (X10) and Direct Probes.

Response: DC-20MHz

Sensitivity: 5mV/div.

Max. Sweep Rate: 0.1 micro sec./div.

### Frequency Counter

7 digits

Sensitivity: 25mV-5V

Range: 50Hz-100MHz

### DVM

Range: 0.1VDC-1000VDC

Accuracy: 0.5%

**NTSC Video Signal Generator**—Must provide 1Vp-p negative sync video across a 75 ohm load and produce standard NTSC 75% saturated color bars with a 100% white window.

### DC Power Supply

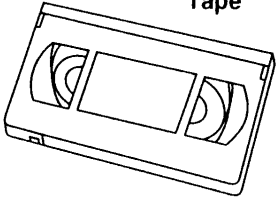
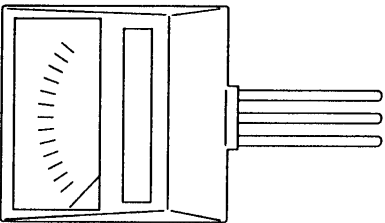
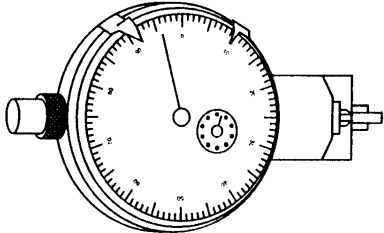
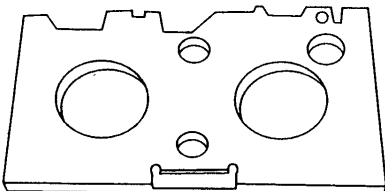


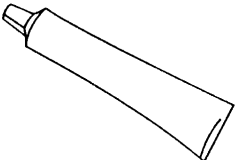
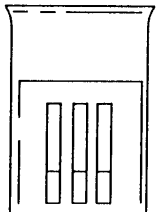
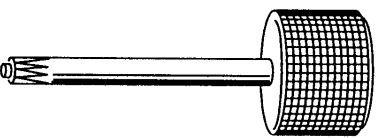
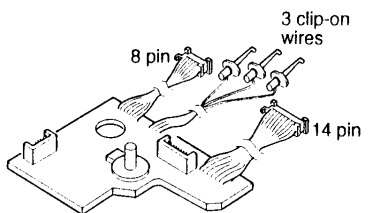
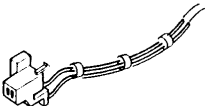
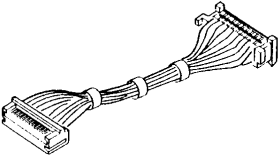
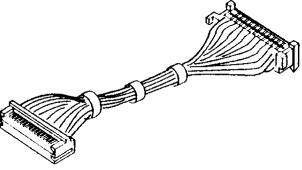
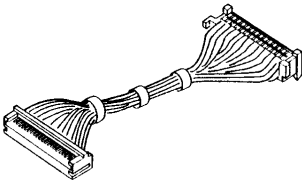
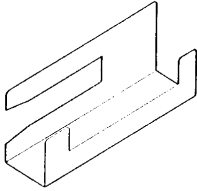
Range: 0-50V/2A well filtered.

**Temperature Controlled Soldering Station**—Grounded tip  
(Tip temperature: 500 degrees F-600 degrees F).

**Note:** 500 degrees F Maximum for leadless components.

**AC Variac**—Continuously variable.

## SERVICE FIXTURES/JIGS/EXTENSION CABLES

<b>VFMS0003H6</b> <b>VHS Alignment Tape</b>  <div> <div>Video</div> <div>Audio</div> <div>Color Bar &amp; Monoscope</div> <div>6kHz(MONO)</div> </div>	<b>Back Tension Meter</b> <b>(Made in USA., Purchase Locally)</b> 	<b>VFKS0009</b> <b>Reel Table Height Fixture</b> 
<b>VFKS0010</b> <b>Post Adjustment Plate</b> 	<b>VFKS0081</b> <b>Grease</b> 	<b>VFK0329</b> <b>Post Adjustment Driver</b> 
<b>VFK1301</b> <b>Silicon Grease</b> 	<b>VFK27</b> <b>Head Cleaning Stick</b> 	<b>VFK0330</b> <b>H-Position Adjustment Driver</b> 
<div> <div> <b>VUZS0002</b>  <b>Mode Select Ass'y</b>  <b>(VUVS0001)</b>   </div> <div> <b>Extension Cable -1</b>  <b>(VUVS0002)</b>   </div> </div> <div> <div> <b>Extension Cable -2</b>  <b>(VUVS0005) for 2 Head Model</b>   </div> <div> <b>Extension Cable -2</b>  <b>(VUVS0004) for 4 Head Model</b>   </div> <div> <b>Extension Cable -2</b>  <b>(VUVS0003) for Hi-Fi Model</b>   </div> </div>		<b>VSCS2534</b> <b>Main C.B.A. Holder</b> 

## SERVICE NOTES

### Cleaning Procedure For Upper Cylinder Unit (Fig. 1)

1. Position one of the video heads to permit easy access for cleaning, and hold the upper cylinder to keep it from turning while cleaning.
2. Gently rub the video head in the direction of tape travel with a head cleaning stick (stock no. 182581), moistened with Freon TF.
3. Repeat steps 1 and 2 for all other video heads.

**Note:** **DO NOT** rub vertically or apply pressure to the video heads. If contaminant does not rub off immediately, continue wiping gently.

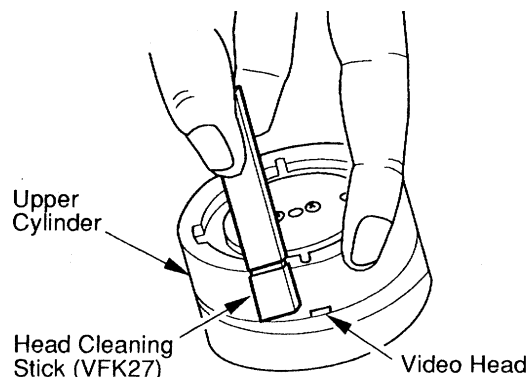


Fig. 1 - Upper Cylinder Cleaning

### Service Position (1) (Fig. 2)

Service position (1) is used for checking and replacing mechanical parts, mechanical adjustment and electrical adjustment.

1. Remove the top cover and the front panel as described in the "Disassembly Section" of this service manual.
2. Position the unit as shown in Fig. 2 to access the areas requiring service.

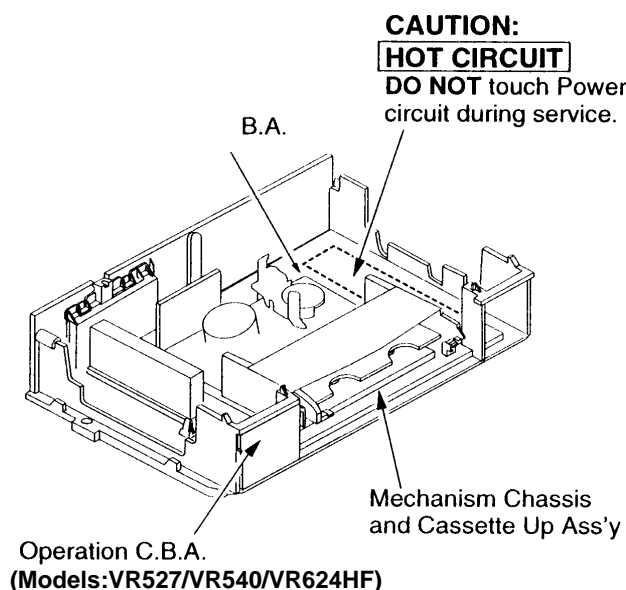


Fig. 2 - Service Position 1 (Bottom Cover Removal)

### Service Position (2) (Fig. 3)

Service position (2) is used for checking and replacing the Main circuit board.

1. Remove the top cover and the front panel as described in the "Disassembly Section" of this service manual.
2. Remove the VCR chassis unit from the frame as described in the "Disassembly Section" of this service manual.
3. Position the VCR chassis unit as shown in Fig. 3 to access the areas requiring service.

**Caution:** **HOT CIRCUIT** (Primary circuit) exists on the Main circuit board. Use extreme care when servicing to prevent electrical shock. Refer to Fig. 4 for suggested safety procedure.

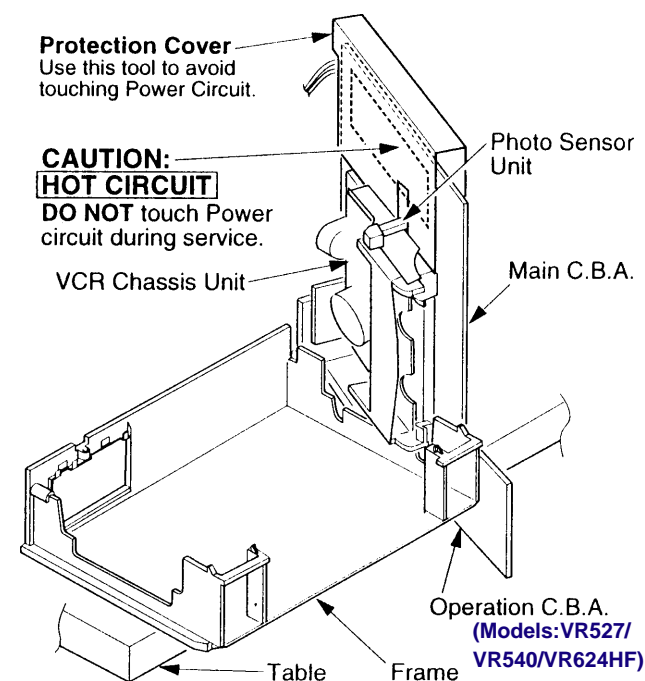


Fig. 3 - Service Position (2)

### Hot Chassis Safety Cover (Fig. 4)

Using a cassette tape cover, cut and fashion it to the specifications shown in Fig. 4. After preparing the tool from the cassette cover, place it over the power supply section on the Main circuit board to prevent accidentally touching the power supply.

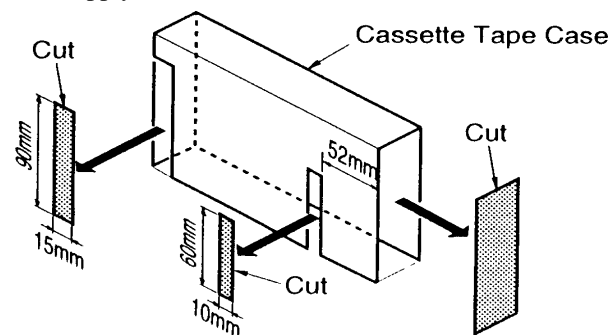


Fig. 4 - Hot Chassis Safety Cover

**SERVICE NOTES (Continued)****Service Position (3) (Figs. 5, 6, 7)**

Service position (3) is used for checking the bottom areas of the unit with the power on.

1. Remove the top cover and the front panel as described in the "Disassembly Section" of this service manual.
2. Remove the VCR chassis unit from the frame as described in the "Disassembly Section" of this service manual.
3. Position the VCR chassis unit as shown in Fig. 6 and connect the extension cables as described below.

- Extension Cable -1: Full Erase Head Connector on the Mechanism Chassis Unit ~ P4001 on the Main C.B.A.  
**Note:** No change in performance if pins are reversed.
- Extension Cable -2: P3501 on the Head Amp C.B.A. ~ P3001 on the Main C.B.A.
- Mode Select SW. Ass'y: a) 3 Clip-on Wires ~ Test Points on the Main C.B.A.  

Red Wire	~ TP6017
Orange Wire	~ TP6018
Yellow Wire	~ TP6019

 b) 8 Pin Connector ~ P6002 on the Main C.B.A.  
 c) 14 Pin Connector ~ P6201 on the Main C.B.A.  
 d) Set Mode Select SW. on the Mode Select SW. Ass'y to EJECT position and install onto Mechanism Chassis

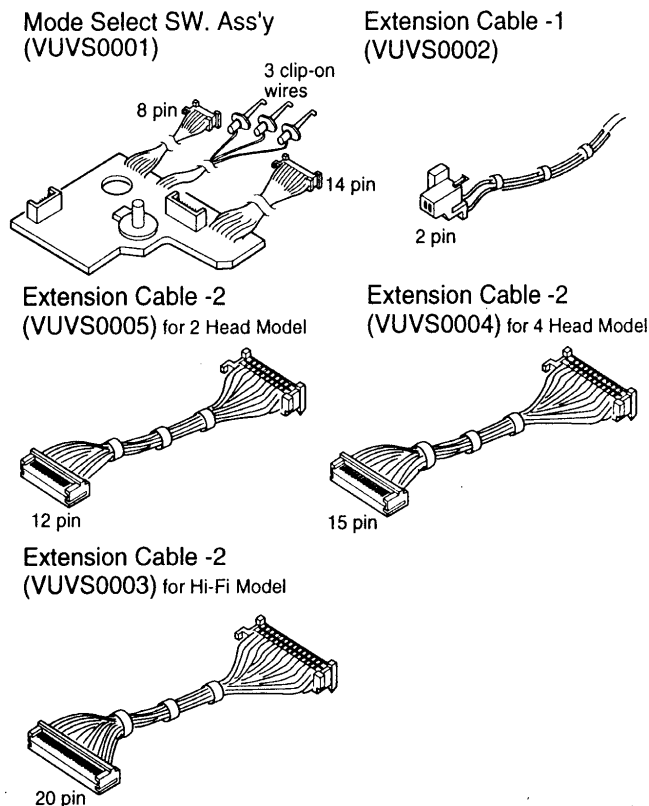


Fig. 5 - Extension Cable Kit

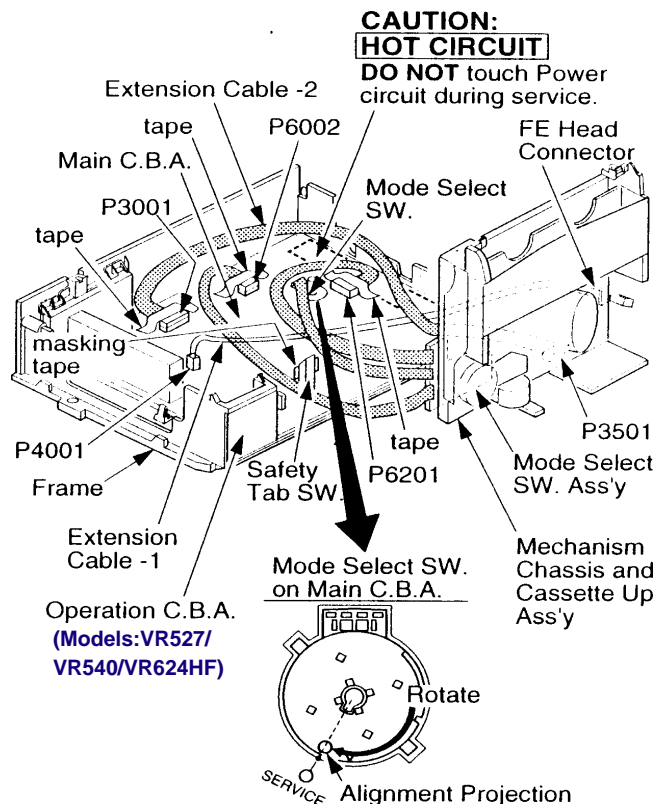


Fig. 6 - Service Position 3

4. Secure the extension cables with tape to avoid damaging the connectors. When recording, cover the safety tab switch with masking tape to turn the switch on.
5. Set the mode select switch on the main circuit board to the service position.
6. Plug the AC plug into the AC outlet and insert a cassette tape. The power will come on, the tape will fully load and the unit will then go into the stop mode.
7. Set the *Energy Saver* to OFF using the remote hand unit.
8. Place a jumper between TP6001 and ground to place the unit in the service mode.
9. Press the *Stop/Eject* button to eject the tape.

**Note:** When inserting a cassette again, remove the jumper between TP6001 and ground and insert the cassette tape. Then, reconnect the jumper.

10. After servicing is complete, remove the jumper to release the unit from the service mode.

**Caution:** **HOT CIRCUIT** (Primary Circuit) exists on the Main circuit board. Use extreme care to prevent accidental shock when servicing.

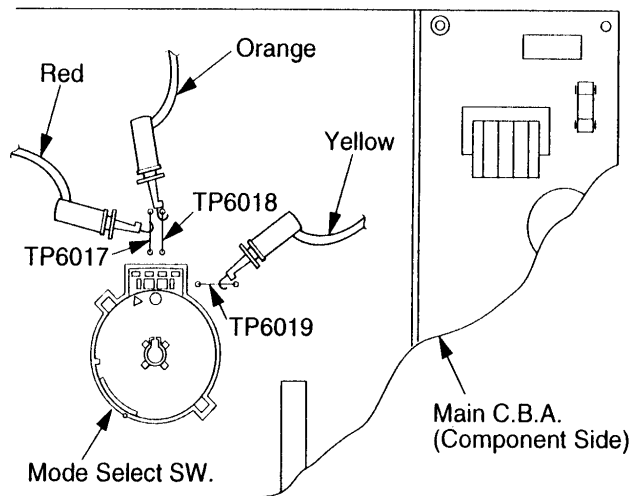
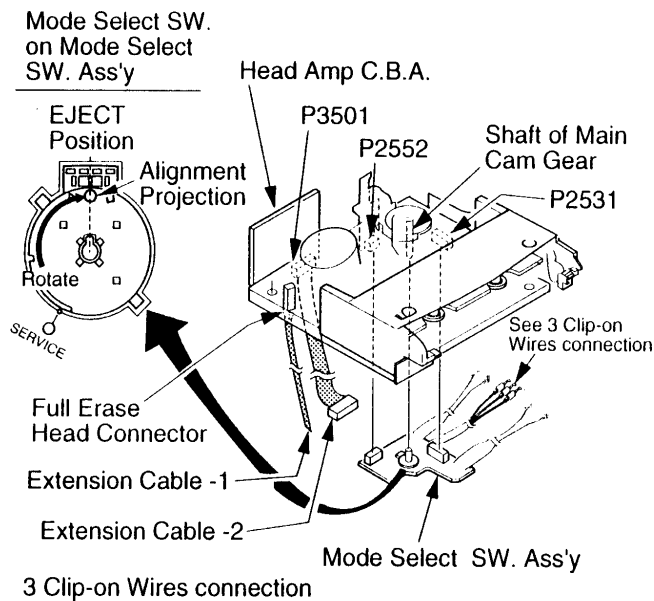
**SERVICE NOTES (Continued)**

Fig. 7 - Connecting the Extension Cables

**Service Position (4) (Figs. 8, 9)**

1. Remove the top cover and the front panel as described in the "**Disassembly Section**" of this service manual.
2. Remove the VCR chassis unit from the frame as described in the "**Disassembly Section**" of this service manual.

**Caution:** **HOT CIRCUIT** (Primary Circuit) exists on the Main circuit board. Use extreme care to prevent accidental shock when servicing.

3. Position the VCR chassis unit as shown in Fig. 6 and connect the extension cables as described below.
4. Secure the extension cables with tape to avoid damaging the connectors. When recording, cover the safety tab switch with masking tape to turn the switch on.
5. Position the Main circuit board as shown in Fig. 9 using the Main circuit board holder shown in Fig. 8.
6. Cover the Power Supply section on the Main circuit board with the **Hot Chassis Safety Cover** (Fig. 4.) to prevent electrical shock when servicing.

• Extension Cable -1: Full Erase Head Connector on the Mechanism Chassis Unit ~ P4001 on the Main C.B.A.

**Note:** No change in performance if pins are reversed.

• Extension Cable -2: P3501 on the Head Amp C.B.A. ~ P3001 on the Main C.B.A.

• Mode Select SW. Ass'y: a) 3 Clip-on Wires ~ Test Points on the Main C.B.A.

Red Wire ~ TP6017  
Orange Wire ~ TP6018  
Yellow Wire ~ TP6019

b) 8 Pin Connector ~ P6002 on the Main C.B.A.

c) 14 Pin Connector ~ P6201 on the Main C.B.A.

d) Set Mode Select SW. on the Mode Select SW. Ass'y to EJECT position and install onto Mechanism Chassis

7. Set the mode select switch on the main circuit board to the service position.
8. Plug the AC plug into the AC outlet and insert a cassette tape. The power will come on, the tape will fully load and the unit will then go into the stop mode.
9. Set the *Energy Saver* to OFF using the remote hand unit.
10. Place a jumper between TP6001 and ground to place the unit in the service mode.
11. Press the *Stop/Eject* button to eject the tape.

**Note:** When inserting a cassette again, remove the jumper between TP6001 and ground and insert the cassette tape. Then, reconnect the jumper.

12. After servicing is complete, remove the jumper to release the unit from the service mode.

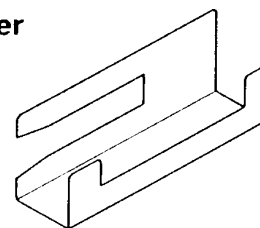
**Main C.B.A. Holder (VSCS2534)**

Fig. 8 - Main Circuit Board Holder



## SERVICE NOTES (Continued)

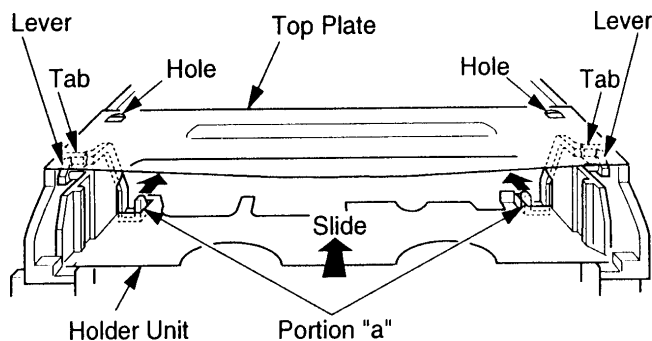


Fig. 12 - Manual Loading/Unloading of the Mechanism

*Electrical Method*

**Caution:** If loading does not start within approximately two (2) seconds after DC power is applied, **DO NOT** continue to apply DC power. Perform the manual procedure for removing a jammed tape.

1. Remove the solder as shown in Fig. 13 and connect the positive lead of a 10.0VDC power supply to point (a). Connect the negative lead of the power supply to point (c).
2. Turn on the power supply and allow the unit to operate until the loading posts reach the fully unloaded position, then remove the power supply immediately.

**Note:** Make sure that the DC power supply ground does not touch the chassis ground. This could cause damage to the loading motor drive IC (IC2501). Also, take care to connect the leads to the points on the loading motor correctly. Reversing the leads while applying power will damage IC2501.

3. Rewind the tape into the cassette by turning the center clutch unit counterclockwise.
4. Eject the cassette by applying 10.0VDC to the loading motor again.
5. After completing the removal procedure, resolder points (a) and (b).

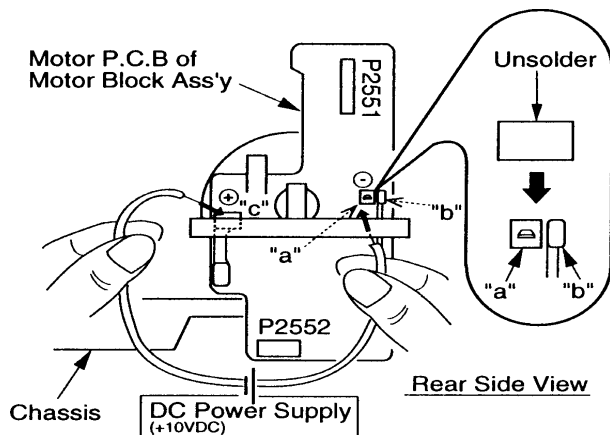


Fig. 13 - Electrical Method (1)

**Removing a Jammed Tape** (Figs. 14, 15, 16, 17, 18, 19)

When a tape jam has occurred, confirm the tape loading condition and use the following procedure to remove the jammed tape.

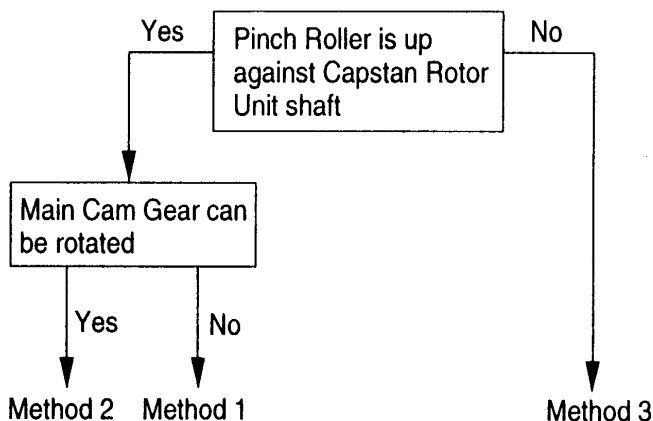


Fig. 14 - Removing A Jammed Tape

*Manual Method (1)*

1. While releasing two (2) locking tabs (A) on the opener piece, pull the opener piece up as far as it will go (Fig. 15).
2. Move the pin of the pinch arm unit out of the groove in the main cam gear so that the pinch roller is separated from the shaft of the capstan rotor unit.
3. Remove the tape from the tape path.
4. Rewind the tape into the cassette by rotating the center clutch unit clockwise.
5. Unhook spring (A) of the drive rack unit (Fig. 16).
6. Remove screw (A).
7. Lift the drive rack unit up so that the slot clears the guide tab, while pulling the drive rack unit out far enough so that it clears the drive rack arm.
8. Slide the drive rack unit as indicated by the arrow to remove the cassette tape from the cassette-up assembly.
9. Confirm the cause of the mechanical failure and repair the unit. After repairing, confirm mechanical operation and confirm all mechanical alignments. Refer to the "**Mechanical Adjustment Section**" in this service manual.

*Manual Method (2)*

1. Rotate the main cam gear using needlenose pliers so that the pinch roller is separated from the shaft of the capstan rotor unit. Refer to Fig. 11 for needlenose pliers positioning.
2. Perform steps three (3) through nine (9) of Manual Method (1) procedure above.

*Manual Method (3)*

Perform steps three (3) through nine (9) of Manual Method (1) procedure above.

## SERVICE NOTES (Continued)

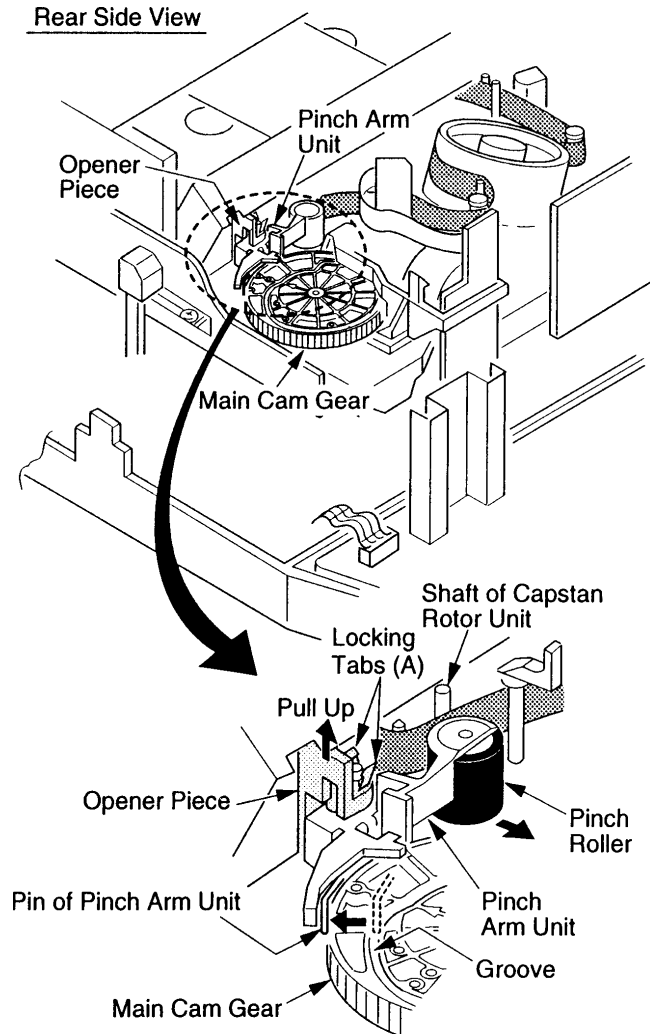
Rear Side View

Fig. 15 - Removing A Jammed Tape

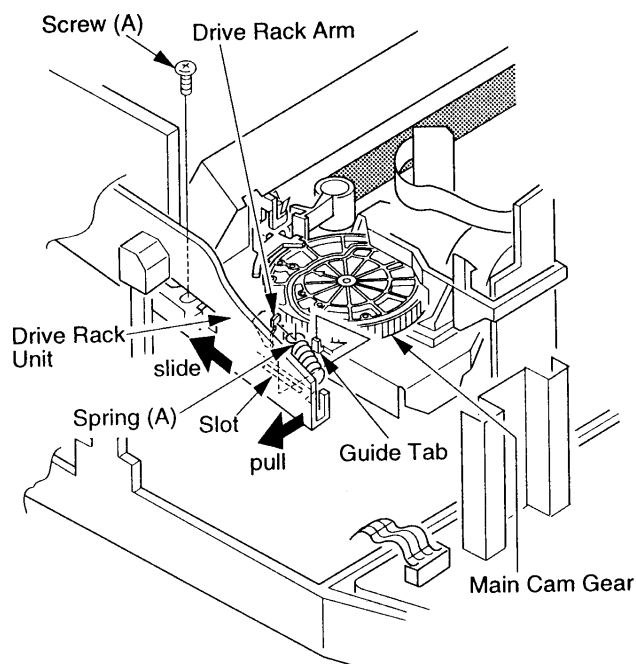


Fig. 16 - Removing A Jammed Tape

*Electrical Method (1)*

The electrical method of removing a jammed tape can only be performed when the mechanism is moved by rotating the main cam gear.

**Note:** If loading does not start within approximately two (2) seconds after DC power is applied, **DO NOT** continue to apply DC power. Perform the manual procedure for removing a jammed tape.

1. Remove the solder as shown in Fig. 17 and connect the positive lead of a 10.0VDC power supply to point (c). Connect the negative lead of the power supply to point (a).
2. Turn on the power supply and allow the unit to operate until the loading posts reach the fully unloaded position, then remove the power supply immediately.

**Note:** Make sure that the DC power supply ground does not touch the chassis ground. This could cause damage to the loading motor drive IC (IC2501). Also, take care to connect the leads to the points on the loading motor correctly. Reversing the leads while applying power will damage IC2501.

3. Rewind the tape into the cassette by turning the center clutch unit counterclockwise.
4. Eject the cassette by applying 10.0VDC to the loading motor again.
5. After completing the removal procedure, resolder points (a) and (b).

*Electrical Method (2)*

1. Locate the jumper (J6004) on the system control section of the Main circuit board and cut it near the center (Fig. 18).
2. Supply 10.0VDC to the jumpers (positive lead to point (a) and the negative lead to point (b) shown in Fig 19). When the loading posts reach the fully unloaded position, remove the power supply.

**Note:** Make sure that the DC power supply ground does not touch the chassis ground. This could cause damage to the loading motor drive IC (IC2501). Also, take care to connect the leads to the points on the J6004 correctly. Reversing the leads while applying power will damage IC2501.

3. Rewind the tape into the cassette by turning the center clutch unit counterclockwise.
4. Eject the cassette by applying 10.0VDC to the loading motor again.
5. After completing the removal procedure, resolder J6004.

## SERVICE NOTES (Continued)

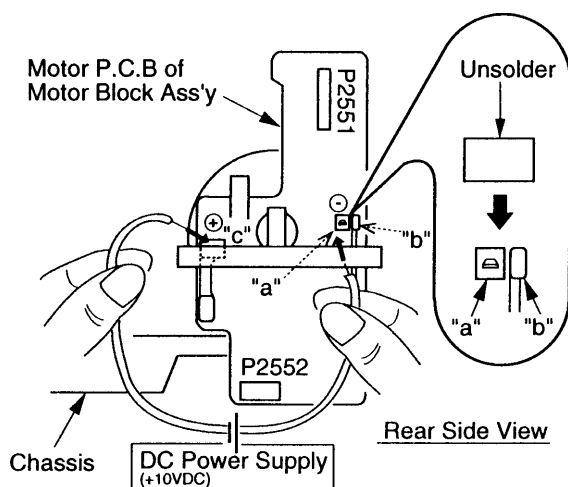


Fig 17 - Electrical Method (1)

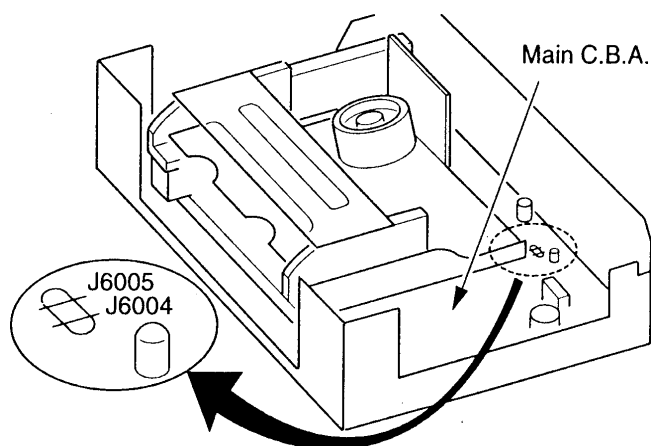


Fig 18 - Electrical Method (2)

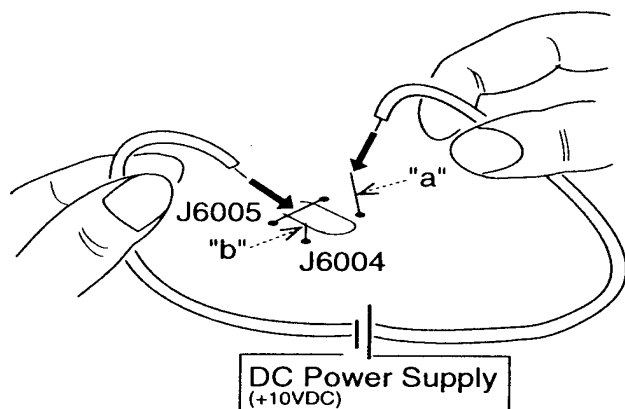


Fig 19 - Electrical Method (2)

Simplified Fault Finding Data (Models Without F.I.P)  
(Figs. 20, 21, 22)

Simplified Self-Diagnostic System facilitates finding the cause of a failure. When a failure occurs, the simplified fault finding data is stored for approximately twelve hours. When the failure data is displayed, the *Record LED* and/or the *Timer LED* will flash. This data is cleared after it is displayed and then the *Power* button is pressed (power on). To display the failure code perform the following steps.

1. With the power turned off, press the *Play* button on the VCR for more than three (3) seconds (Fig. 20).
2. The failure code will be displayed as shown in Fig. 21. Refer to Fig. 22 to determine the cause of failure.

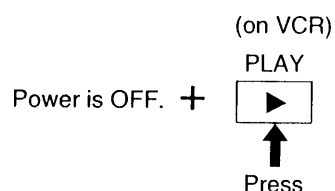


Fig. 20 - Simplified Fault Finding Data

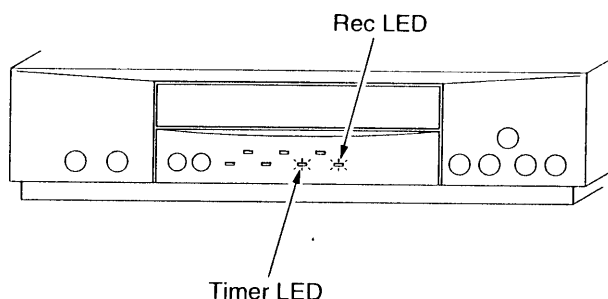


Fig. 21 - Simplified Fault Finding Data

Information	LED
Takeup Reel Lock	Timer LED lights up
Cylinder Lock	Rec LED lights up
Exceeds Loading/Unloading Time	Timer and Rec LED lights up
Exceeds Cassette Loading/Unloading Time	Timer and Rec LED flash

Fig. 22 - Simplified Fault Finding Data

**SERVICE NOTES (Continued)****Simplified Fault Finding Data (Models With F.I.P)**

(Figs. 23, 24, 25, 26, 27, 28)

Simplified Self-Diagnostic System facilitates finding the cause of a failure. A four (4) digit fault code will be displayed on F.I.P. The simplified fault finding data is stored for approximately twelve hours. The data is cleared when the *Power* button is pressed after the data is displayed. To display the failure code perform the following steps.

1. With the power turned off, press the *Play* button on the VCR for more than three (3) seconds (Fig. 23).
2. The failure code will be displayed as shown in Fig. 24.

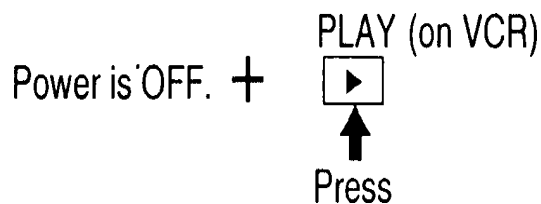


Fig. 23 - Simplified Fault Finding Data

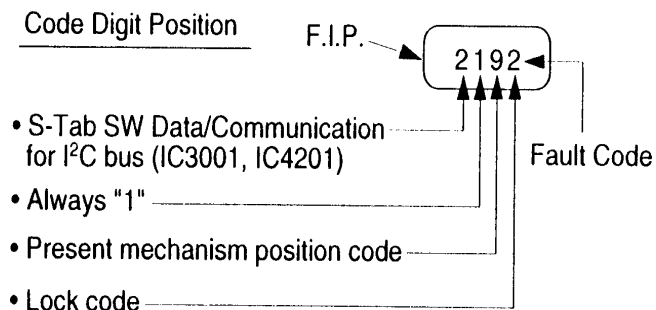


Fig. 24 - Simplified Fault Finding Data

3. Refer to Fig. 25 (Explanation of Fault Codes) and Fig. 27 (Mode Select Switch/Mechanism Position Codes) to determine the cause of failure.

**Note:** When 1 through 4 appears in the lock code position of the fault code, the VCR goes into shut-off condition. The VCR stops and all VCR function buttons (except power) become nonfunctional.

4. To check for "key detection" press the Play button with the power off and press any key (except power) on the instrument or the remote hand unit. The first digit of the fault code will change to zero (0) only if a key is detected (Fig. 28). ■

Explanation of Codes	Code No.			
S-Tab SW. Data/Communication check for I²C bus (IC3001, IC 4201)	1 8			
Not applicable		1		
Present Mechanism Position Code			1 2 3 4 5 6 7 8 9 A B C D	
Mechanism Position is indicated.				
Lock Code				0 1 2 3
• VCR is not in shut-off condition.				
• Reel lock.				
• Cylinder lock.				
• Exceeds loading/unloading time. (Mechanism Lock)				
• Exceeds Cassette loading/unloading time. (Cassette Lock)				
Tape Unloading (direction)		1		4
Tape Loading (direction)		2		4

Fig. 25 - Explanation of Fault Code

S-Tab SW. condition	Communication check for I²C bus (IC6001 ↔ IC3001)	Communication check for I²C bus (IC6001 ↔ IC4201)	Code No.
ON	OK	OK	1
	OK	NG	2
	NG	OK	3
	NG	NG	4
OFF	OK	OK	5
	OK	NG	6
	NG	OK	7
	NG	NG	8

**Note:** For Normal Audio models, only even code No.s will be displayed in F.I.P. because IC4201 (Hi-Fi Audio IC) is not used.

Fig. 26 - Explanation of Fault Code

## SERVICE NOTES (Continued)

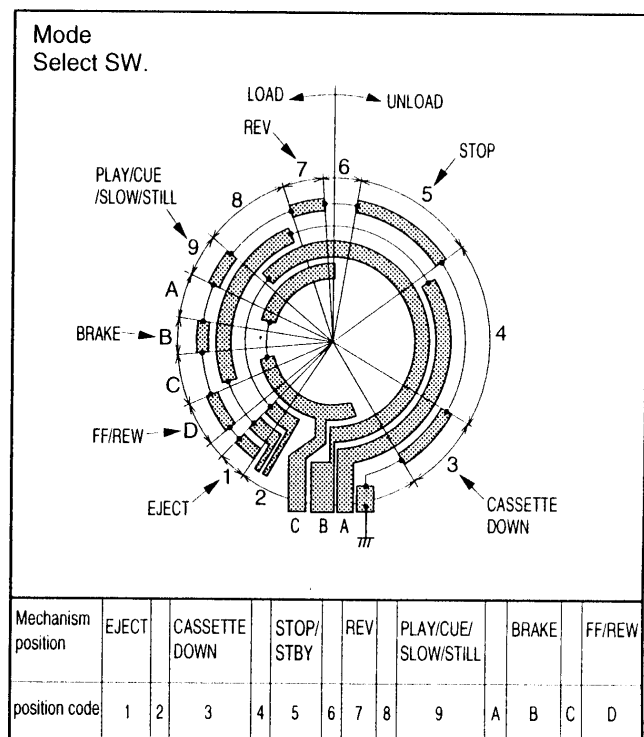


Fig. 27 - Explanation of Position Fault Code

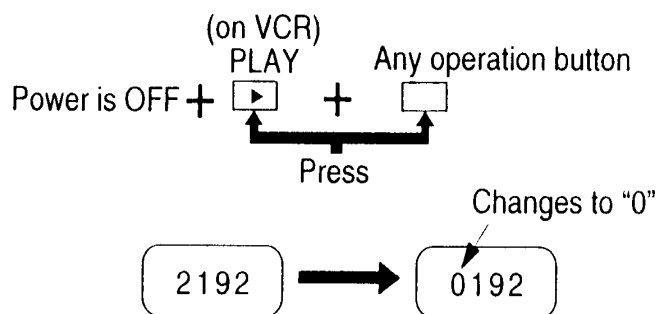


Fig. 28 - Key Detection