

8750

## SERVICE MANUAL



# FISHER®

## Vol. 2

Issue Number 1

- Cabinet Disassembly
- Circuit Board Disassembly
- Electrical Adjustment
- Mechanical Disassembly
- Mechanical Adjustment
- Maintenance

# FVH-922

## Video Cassette Recorder

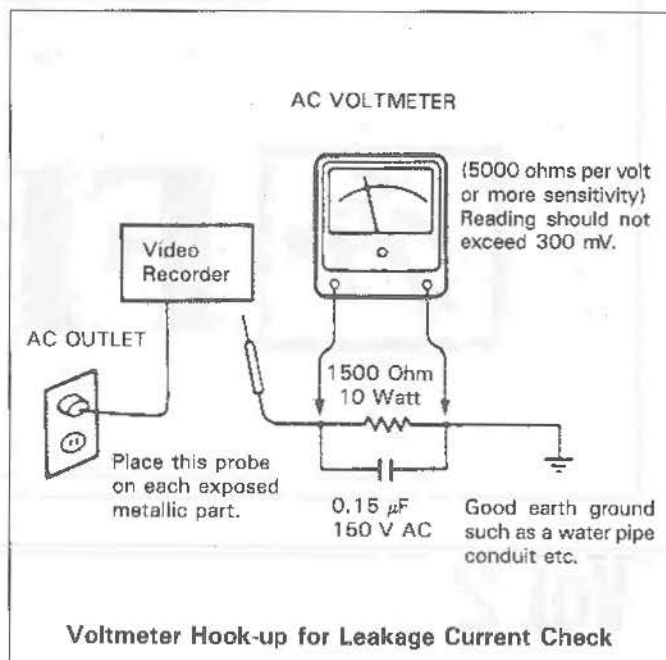


**THE FIRST NAME IN HIGH FIDELITY**

## SAFETY PRECAUTIONS

### LEAKAGE CURRENT CHECK

Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as terminals, screwheads, metal overlays, etc. to be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly into a 120 V AC outlet (do not use a line isolation transformer during this check.) Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner. Connect a 1500 ohm, 10 watt resistor, paralleled by a 0.15  $\mu$ F 150 V AC capacitor, between a known good earth ground (water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and 0.15  $\mu$ F capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part. The voltage measured must not exceed 300 mV RMS. This corresponds to 200  $\mu$ A AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



## SPECIFICATIONS

| General Specifications         |                                                                                                                                                          | Electrical Specifications |                                                                                                                                                                      |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Television system              | NTSC, standard color system                                                                                                                              | Video output level        | 1 Vp-p                                                                                                                                                               |
| Recording system               | Rotary two heads helical scan system                                                                                                                     | Video output impedance    | 75 $\Omega$                                                                                                                                                          |
| Format                         | VHS standard                                                                                                                                             | Audio output level        | 316 mV (-10 dBV)                                                                                                                                                     |
| Tape width                     | 1/2 inch (12.7 mm)                                                                                                                                       | Audio output impedance    | 600 $\Omega$                                                                                                                                                         |
| Tape speed                     | SP: 1.31 inch/sec. (33.35 mm/sec)<br>LP: 0.65 inch/sec. (16.67 mm/sec)<br>EP: 0.43 inch/sec. (11.12 mm/sec)                                              | Video input level         | 0.5 Vp-p - 2.0 Vp-p                                                                                                                                                  |
| Recording time                 | SP: 120 minutes with T-120 cassette<br>LP: 240 minutes with T-120 cassette<br>EP: 360 minutes with T-120 cassette<br>EP: 480 minutes with T-160 cassette | Video input impedance     | 75 $\Omega$                                                                                                                                                          |
| Tape loading system            | Automatic loading                                                                                                                                        | Audio input level         | 316 mV (-10 dBV)                                                                                                                                                     |
| Remote Control (RVR 930)       | 18 Function, wireless remote control                                                                                                                     | Audio input impedance     | 50 k $\Omega$                                                                                                                                                        |
| Tuner channel selection system | 111-channel, Digital Synthesizer Tuning system with UP & DOWN controls.                                                                                  | Video S/N ratio           | SP: More than 45 dB<br>LP: More than 42 dB<br>EP: More than 40 dB                                                                                                    |
| Tuner channels                 | VHF: #2 through #13<br>UHF: #14 through #83<br>29 Cable Channels                                                                                         | Audio S/N ratio           | SP: More than 43 dB<br>More than 50 dB (Dolby NR on)<br>LP: More than 41 dB<br>More than 49 dB (Dolby NR on)<br>EP: More than 40 dB<br>More than 48 dB (Dolby NR on) |
| RF converter                   | Built-in VHF converter                                                                                                                                   | Audio bandwidth           | SP: 50 Hz-10 kHz<br>LP: 60 Hz-7 kHz<br>EP: 60 Hz-5.5 kHz                                                                                                             |
| Converter output               | Channel 3 or 4 selectable                                                                                                                                | Other Specifications      | Power requirement                                                                                                                                                    |
| Time indication                | AM/PM 12-hour system                                                                                                                                     |                           | 120 V AC, 60 Hz                                                                                                                                                      |
| Timer                          | 14 days, 4 programs                                                                                                                                      |                           | Power consumption                                                                                                                                                    |
| Tape counter                   | Separate 4-digit electronic display                                                                                                                      | Dimensions (W x H x D)    | 32 Watts                                                                                                                                                             |
| Auto rewind system             | Activated at the end of the tape when the POWER switch is set to ON                                                                                      | Weight (Approx.)          | 440 mm x 117 mm x 365 mm<br>(17.32" x 4.61" x 14.37")<br>17.4 lbs.                                                                                                   |
| <b>Terminals</b>               |                                                                                                                                                          |                           |                                                                                                                                                                      |
| Antenna input                  | VHF: F type, UHF: screw x 2                                                                                                                              |                           |                                                                                                                                                                      |
| Antenna output                 | VHF: F type, UHF: screw x 2                                                                                                                              |                           |                                                                                                                                                                      |
| Video input/output             | RCA connector                                                                                                                                            |                           |                                                                                                                                                                      |
| Audio input/output             | RCA connector                                                                                                                                            |                           |                                                                                                                                                                      |
| Camera remote pause            | 2.5 mm $\phi$ jack                                                                                                                                       |                           |                                                                                                                                                                      |

Because its products are subject to continuous improvement, FISHER CORPORATION reserves the right to modify product designs and specifications without notice and without incurring any obligation.

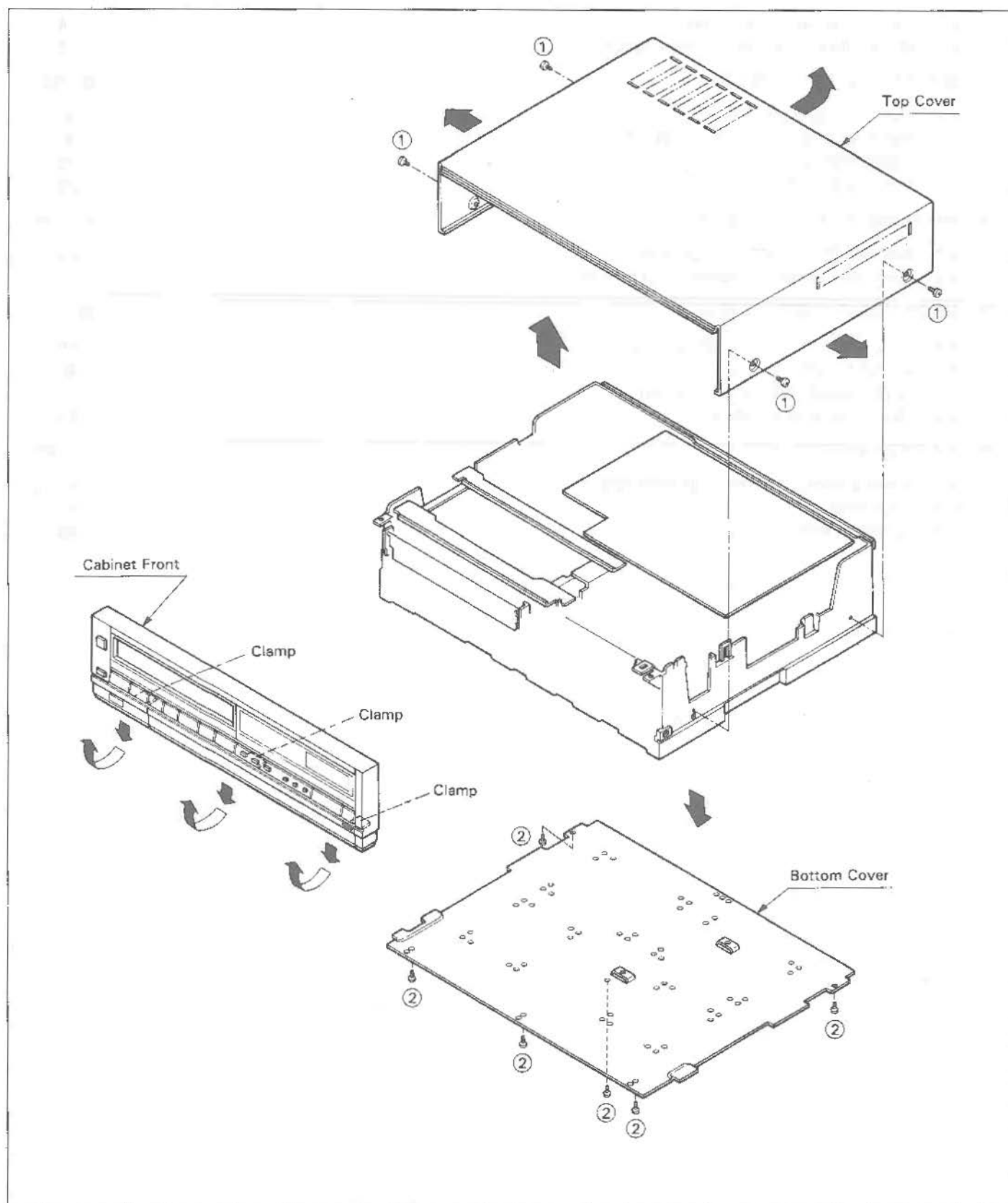
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## 1. CABINET DISASSEMBLY

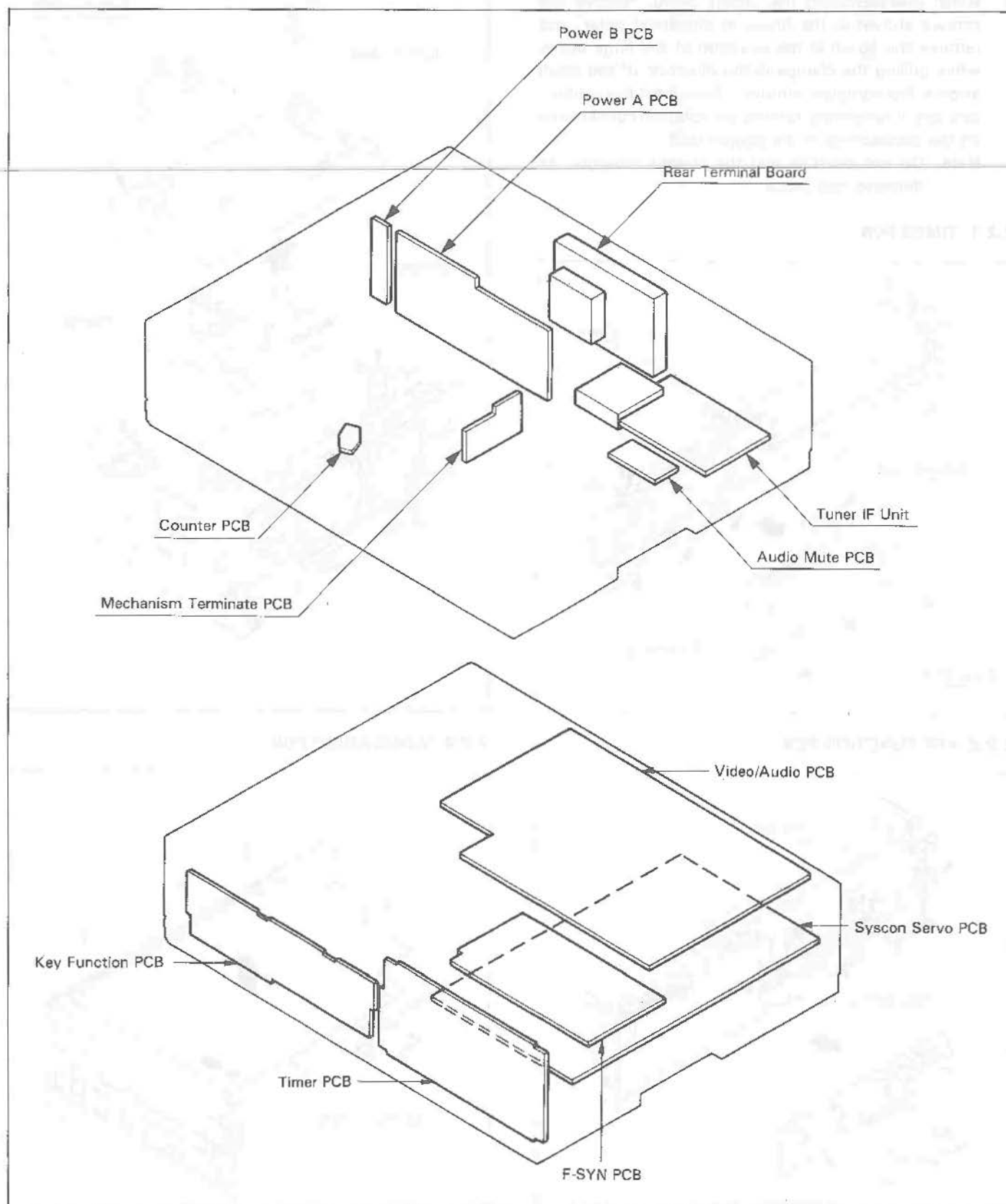
When disassembling the following parts, remove the screws shown in the figure in numerical order, and remove the parts in the direction of the arrow while pulling the clamps.

**Note:** Do not push or pull the clamps strongly, as damage may occur.



## 2. CIRCUIT BOARD DISASSEMBLY

### 2.1 CIRCUIT BOARD LOCATIONS

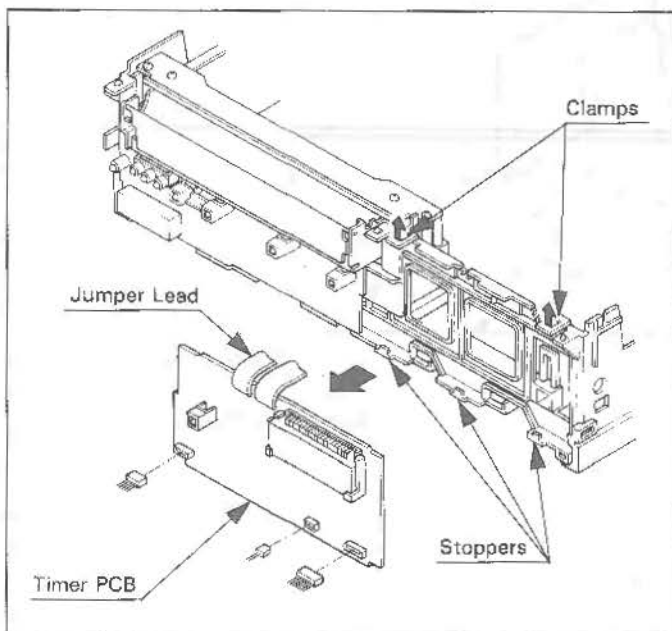


## 2.2 MAIN CIRCUIT BOARD DISASSEMBLY

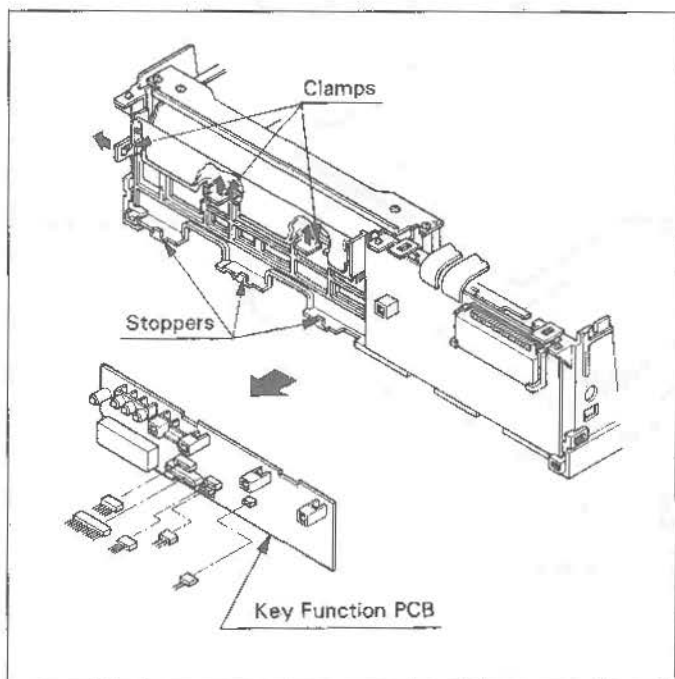
1. Be sure to disconnect the AC plug before doing the following procedures.
2. When disassembling the circuit board, remove the screws shown in the figure in numerical order, and remove the board in the direction of the large arrow while pulling the clamps in the direction of the small arrows. For complete removal, disconnect the connectors and, if necessary, remove the soldered connections on the connectors or the jumper lead.

**Note:** Do not push or pull the clamps strongly, as damage may occur.

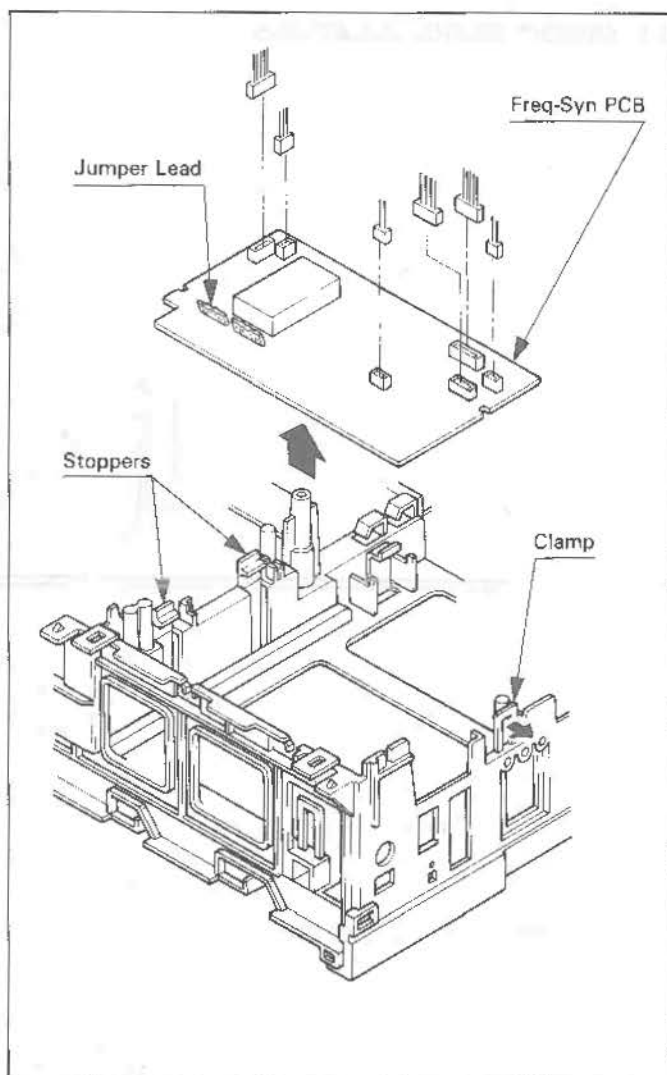
### 2.2.1 TIMER PCB



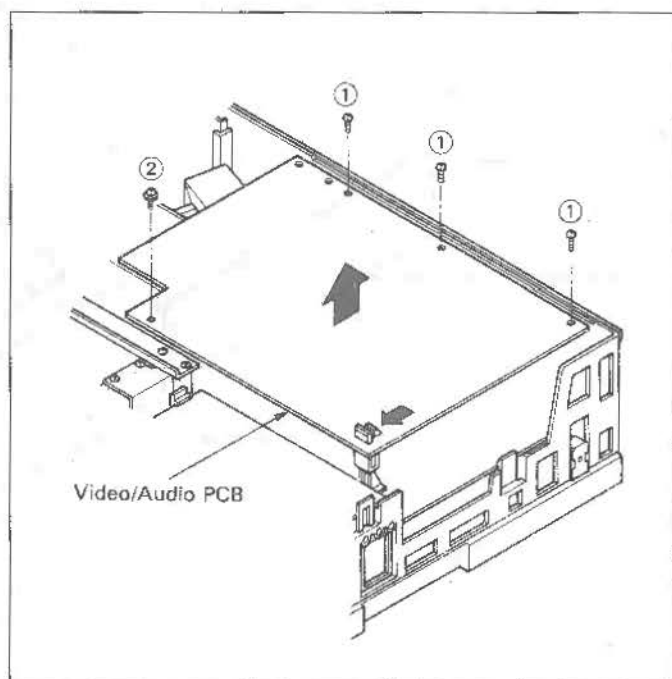
### 2.2.2 KEY FUNCTION PCB



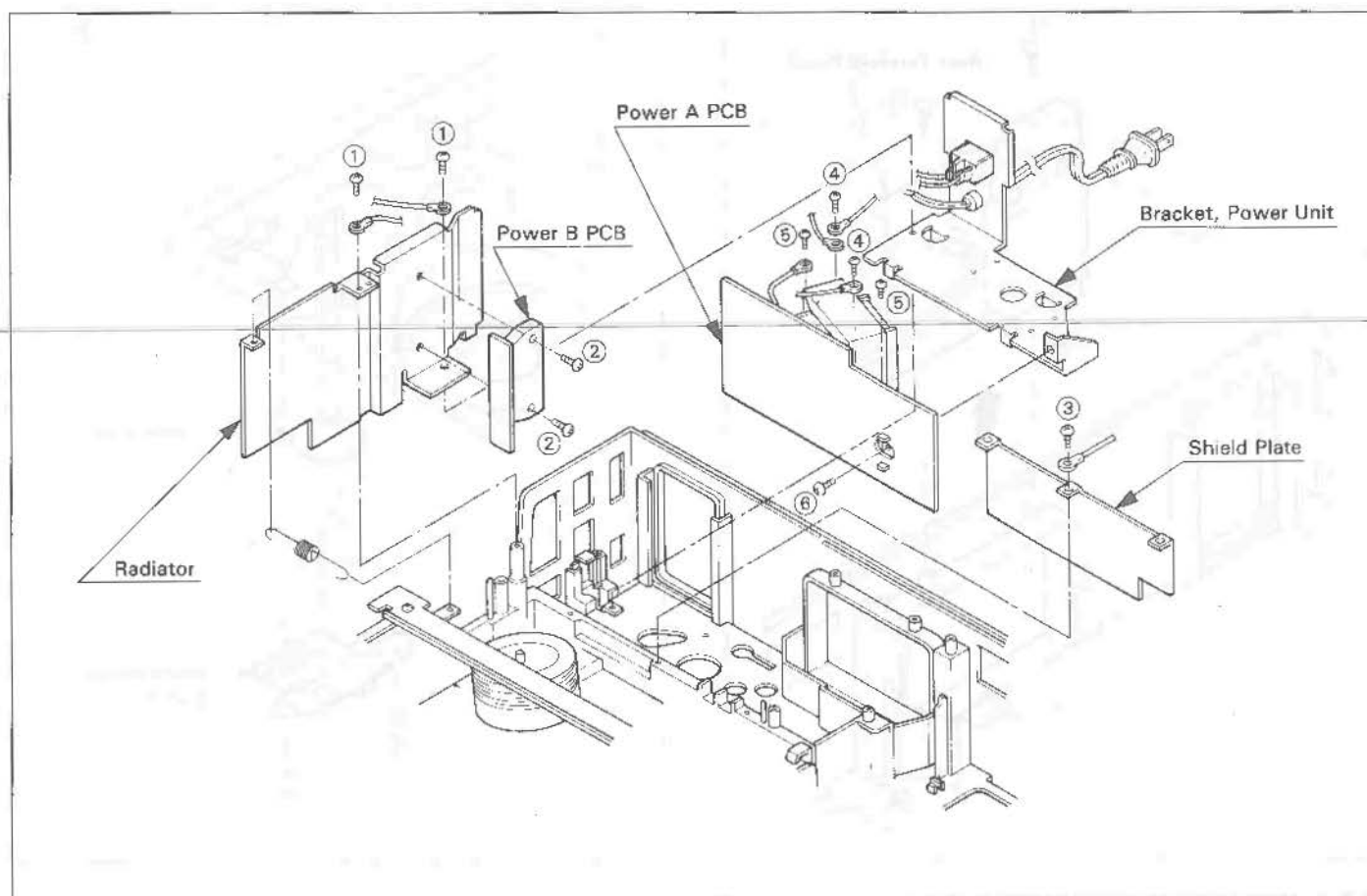
### 2.2.3 F-SYN (FREQUENCY SYNTHESIZER) PCB



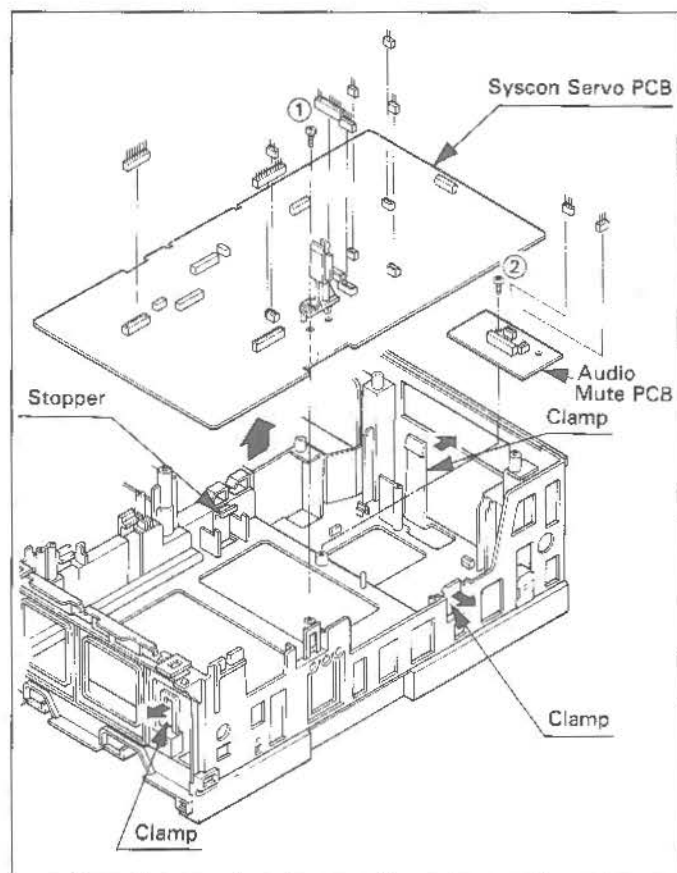
### 2.2.4 VIDEO/AUDIO PCB



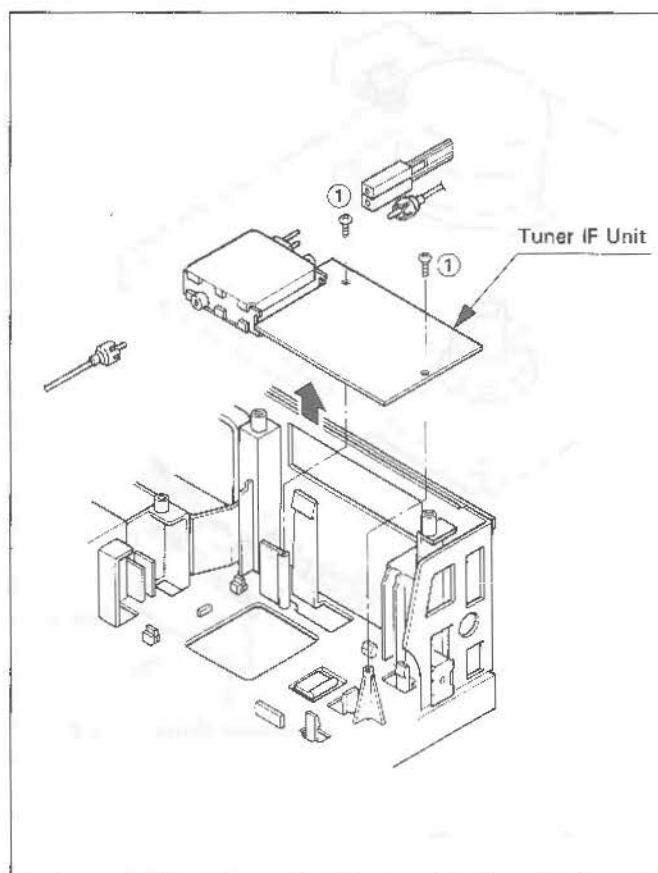
## 2.2.5 POWER PCB



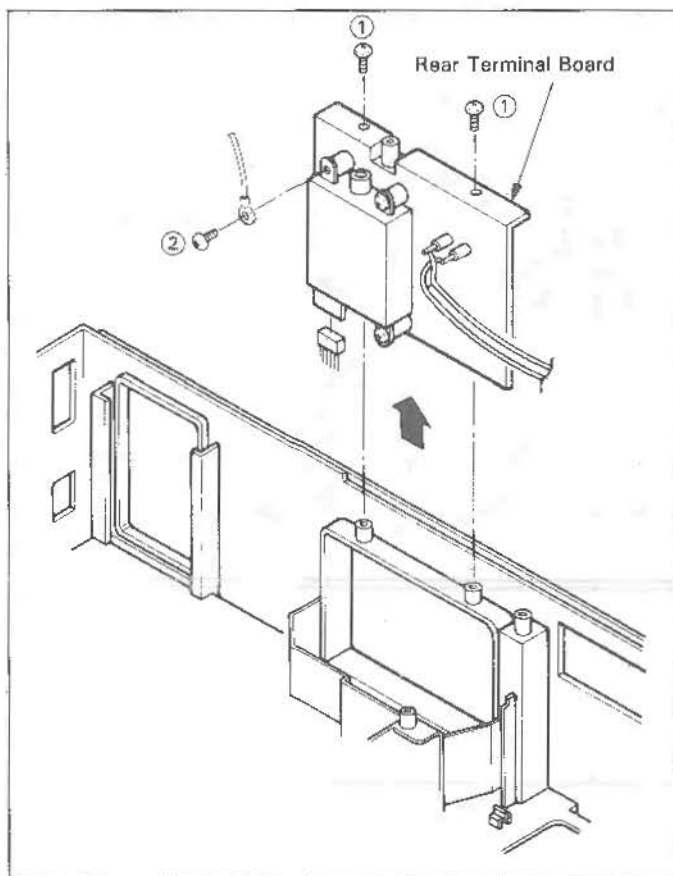
## 2.2.6 SYSCON SERVO AND AUDIO MUTE PCB



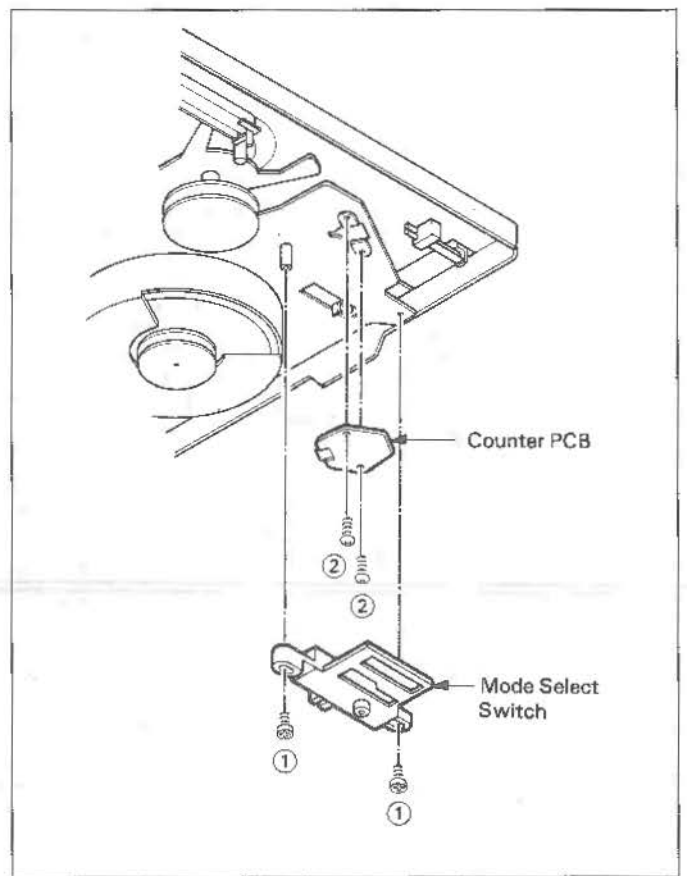
## 2.2.7 TUNER IF UNIT



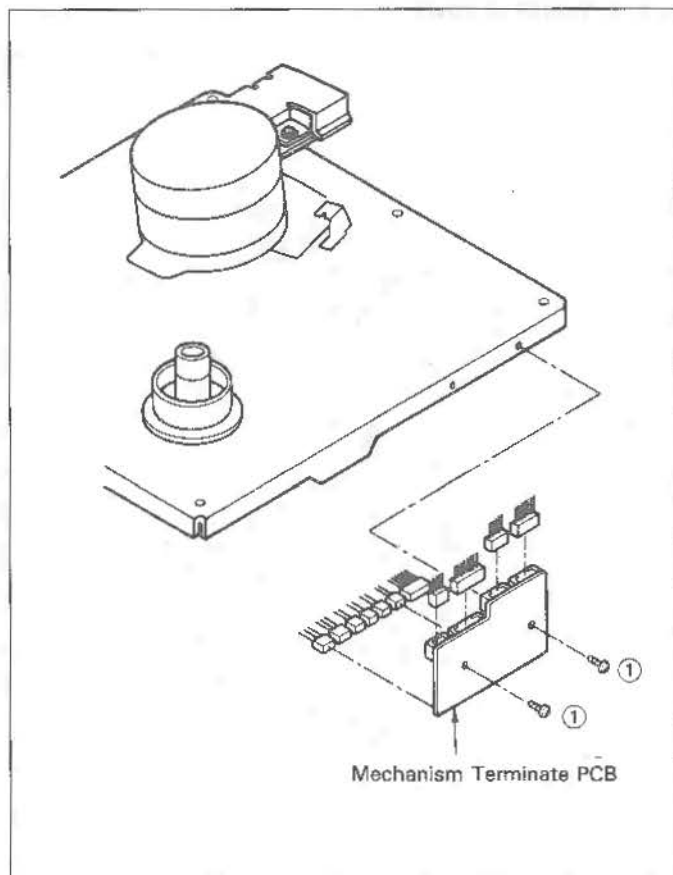
### 2.2.8 REAR TERMINAL BOARD



### 2.2.10 COUNTER PCB



### 2.2.9 MECHANISM TERMINATE PCB



### 3. ELECTRICAL ADJUSTMENT

#### 3.1 TUNER IF CIRCUIT

When any malfunction occurs in the Tuner IF circuit, the whole unit must be replaced.

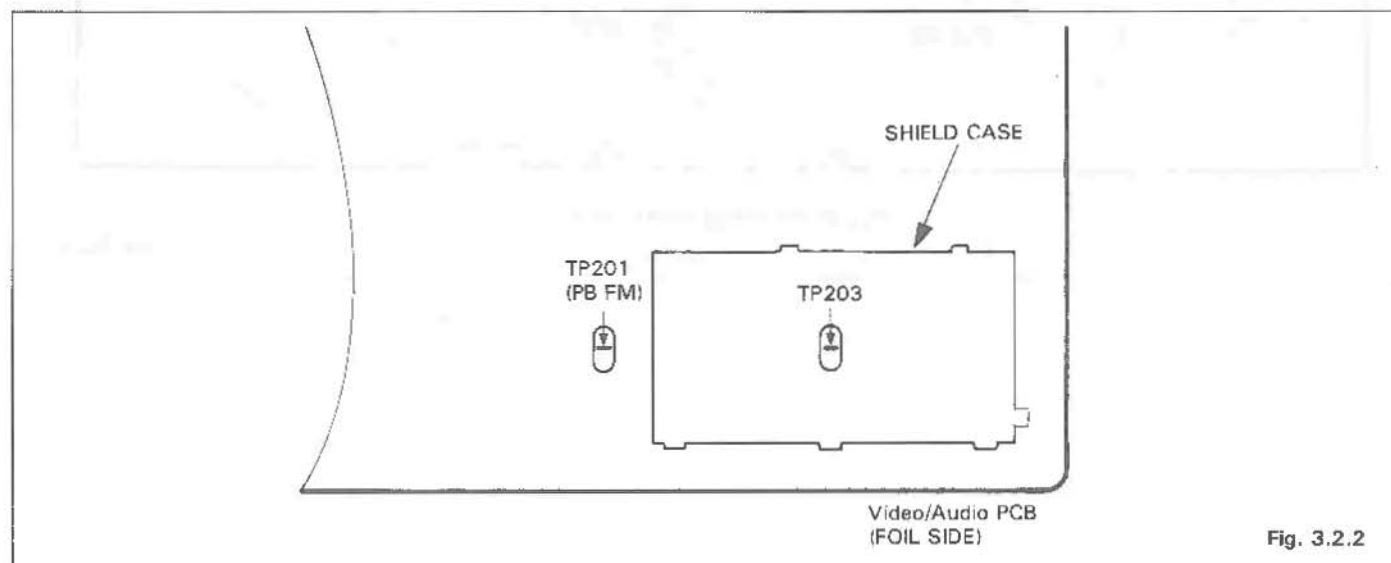
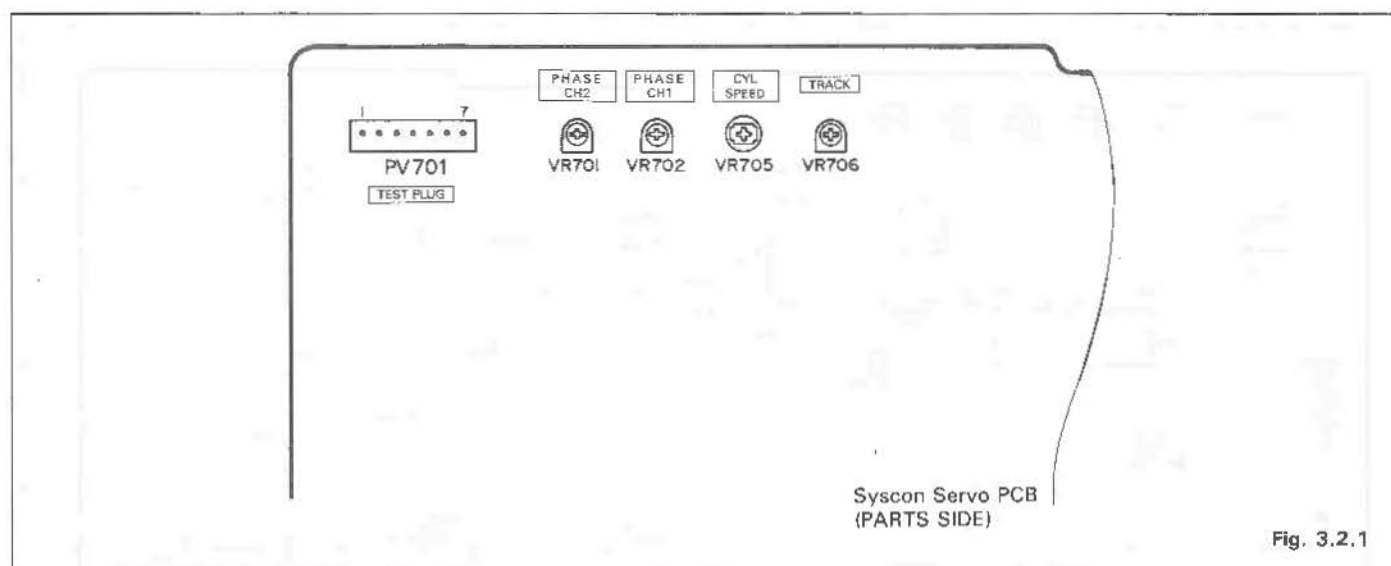
**Note:**

The Tuner IF unit does not need any adjustments, because precise adjustments have been performed before shipment.

#### 3.2 SYSTEM CONTROL SERVO CIRCUIT

1. These adjustments should be carried out upon completion of the tape transport adjustments.
2. If the tape transport adjustments (except the tilt adjustment) are carried out after these adjustments, follow the procedure again in Section 3.2.3 CH1 PHASE/CH2 PHASE.
3. Set the following switches to the positions indicated before making these adjustments.

| SWITCH       | POSITION        |
|--------------|-----------------|
| VCR/TV       | VCR             |
| INPUT SELECT | EXT VIDEO/AUDIO |



**CAUTION:** Be careful when replacing capstan motor.

There are two kinds of Capstan Motor and resistor R7020 combinations to keep good picture quality.

| Capstan Motor | R7020    |
|---------------|----------|
| with red mark | not used |
| no mark       | used     |

**Note:** Only Capstan Motors with red marks are supplied for servicing. (Refer to Fig. 3.2.3)

When you are replacing the Capstan Motor with a new one marked with red, take the following steps:

1. Confirm that R7020 (56 k $\Omega$ ) beside IC705 on the system control servo PCB is removed. (Refer to Fig. 3.2.4)

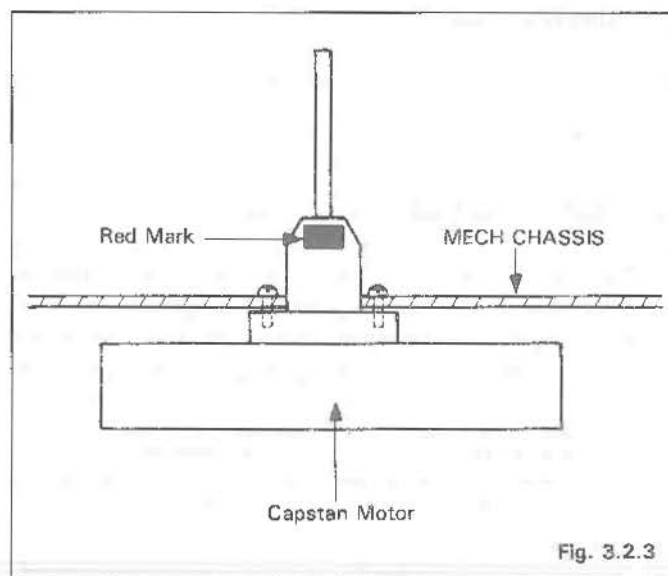


Fig. 3.2.3

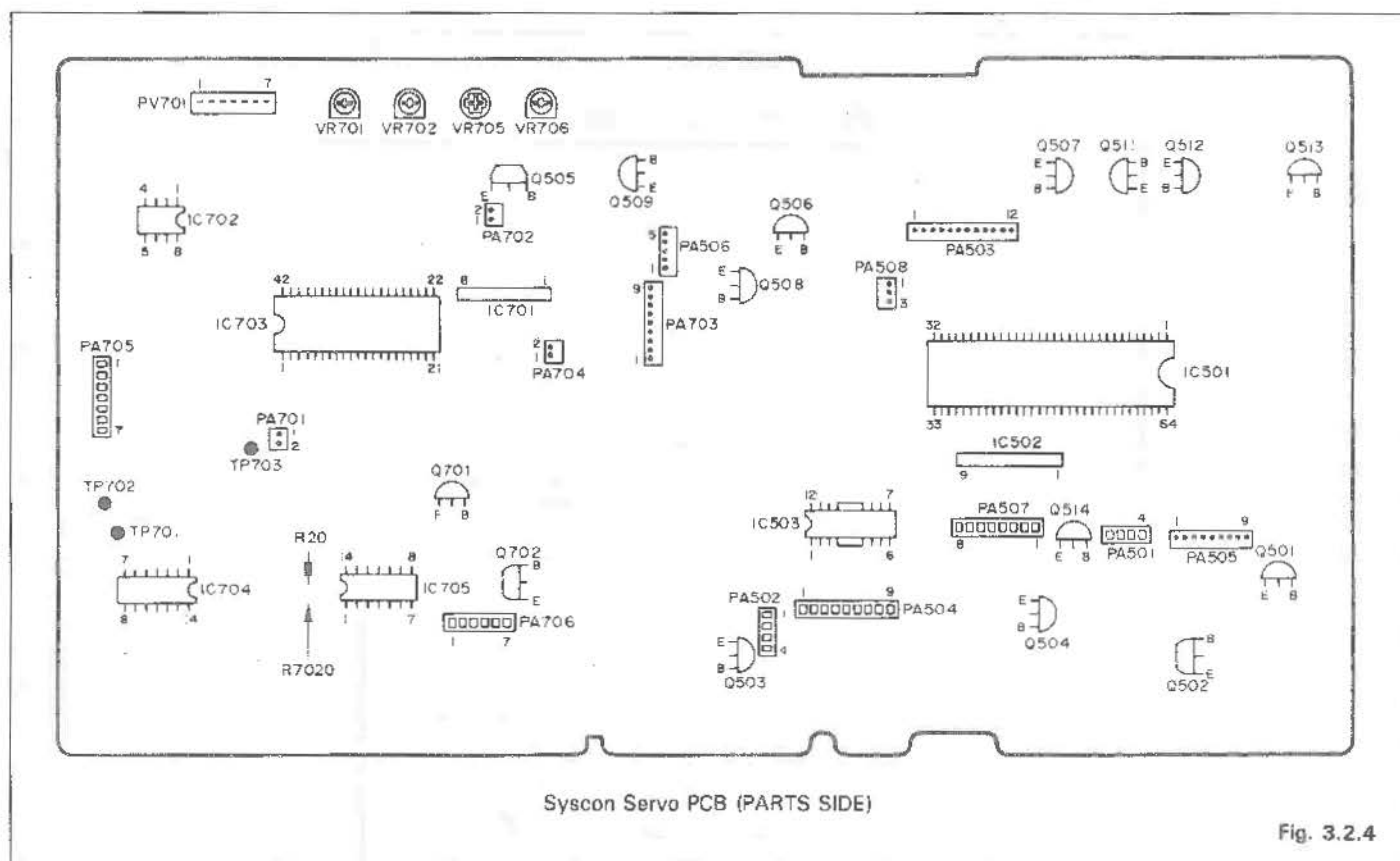
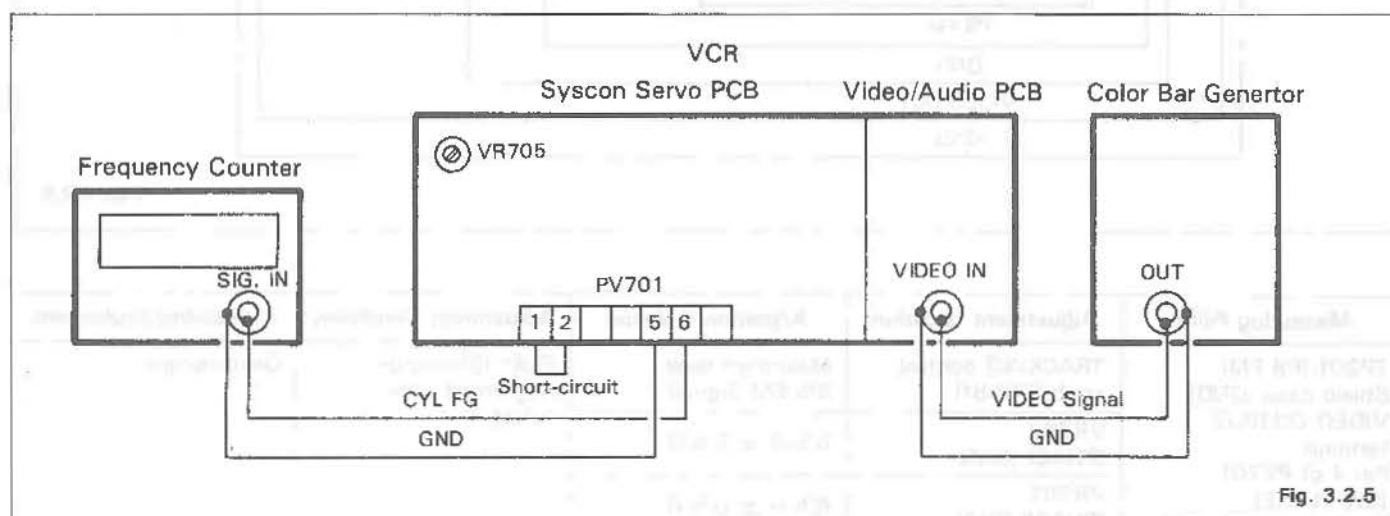


Fig. 3.2.4

### 3.2.1 EQUIPMENT AND JIGS REQUIRED

|                            |                                                                             |
|----------------------------|-----------------------------------------------------------------------------|
| Oscilloscope               | Dual trace with an external trigger terminal or not less than triple trace. |
| Frequency Counter          |                                                                             |
| Color Bar Signal Generator | Color bar signal with 100% white level (EIA color bar signal)               |
| Monitor TV                 |                                                                             |
| Alignment Tape             | SP mode: VNM-7 (SVJ-00027) EP mode: VNME0 (SVJ-00030)                       |
| Blank Tape                 | VHS-type cassette tape                                                      |

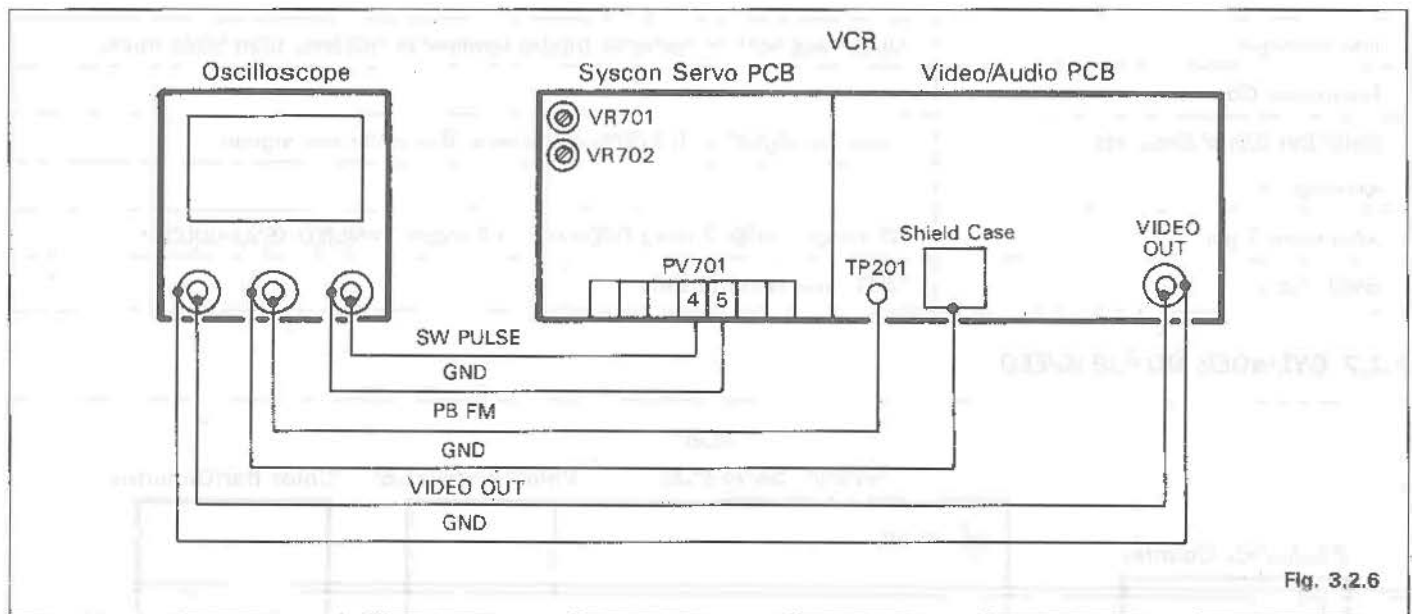
### 3.2.2 CYLINDER MOTOR SPEED



| Measuring Point                                 | Adjustment Location | Adjustment Value  | Adjustment Condition        | Measuring Equipment                      |
|-------------------------------------------------|---------------------|-------------------|-----------------------------|------------------------------------------|
| Pin 6 of PV701 (CYL FG)<br>Pin 5 of PV701 (GND) | VR705 (CYL SPEED)   | 749 Hz $\pm$ 2 Hz | REC (SP) mode<br>Blank tape | Color bar generator<br>Frequency counter |

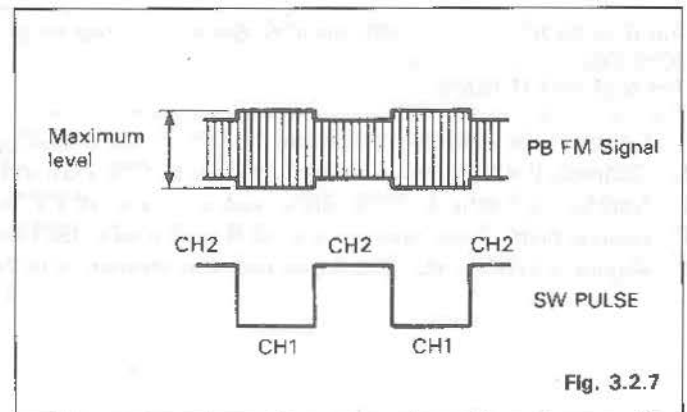
1. Connect the color bar generator (EIA color bar signal) to the VIDEO INPUT terminal.
2. Connect the frequency counter to pins 6 (CYL FG) and 5 (GND) of PV701. (Refer to Fig. 3.2.5)
3. Short-circuit pins 1 (FREE RUN) and 2 (+5 V) of PV701.
4. Load a blank tape, and set the VCR to the REC (SP) mode.
5. Adjust VR705 (CYL SPEED) so that the frequency is 749 Hz  $\pm$  2 Hz. (Refer to Fig. 3.2.1)

### 3.2.3 CH1 PHASE/CH2 PHASE (PLAY MODE)

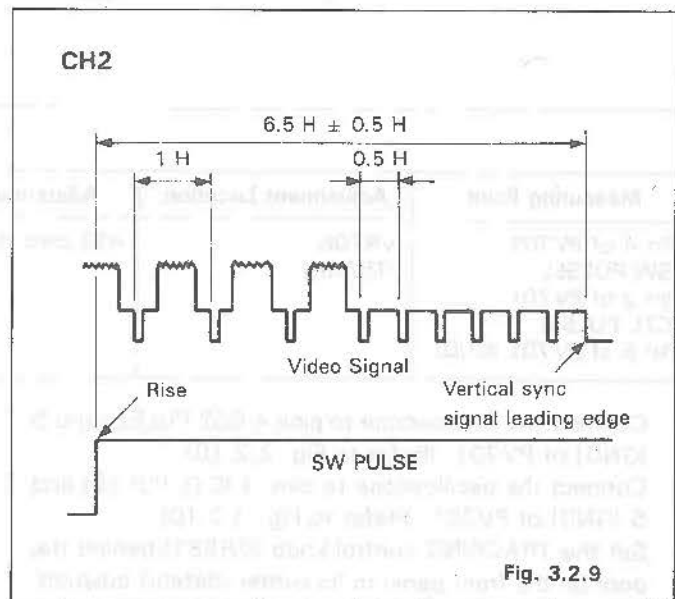
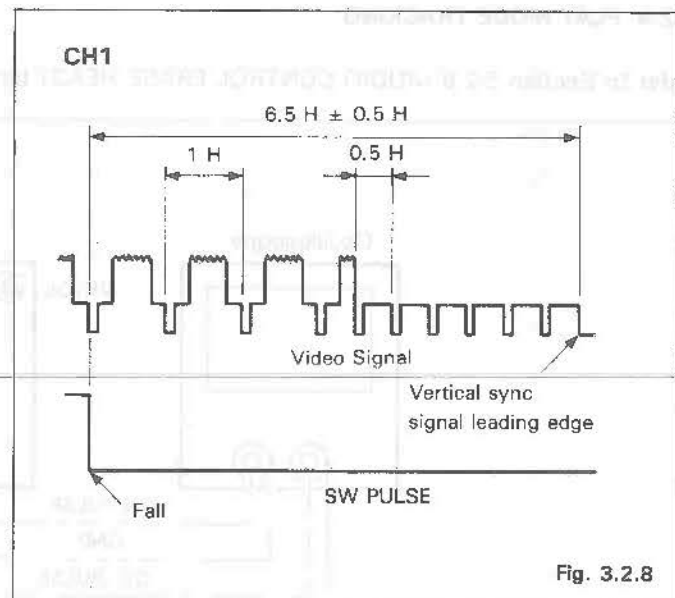


| Measuring Point           | Adjustment Location           | Adjustment Value                  | Adjustment Condition                     | Measuring Equipment |
|---------------------------|-------------------------------|-----------------------------------|------------------------------------------|---------------------|
| TP201 (PB FM)             | TRACKING control knob (VR581) | Maximum level (PB FM Signal)      | PLAY (SP) mode<br>Alignment tape (VNM-7) | Oscilloscope        |
| Shield case (GND)         | VR702 (PHASE CH1)             | $6.5 \text{ H} \pm 0.5 \text{ H}$ |                                          |                     |
| VIDEO OUTPUT terminal     | VR701 (PHASE CH2)             | $6.5 \text{ H} \pm 0.5 \text{ H}$ |                                          |                     |
| Pin 4 of PV701 (SW PULSE) |                               |                                   |                                          |                     |
| Pin 5 of PV701 (GND)      |                               |                                   |                                          |                     |

1. Connect the oscilloscope to TP201 (PB FM) and the shield case (GND). (Refer to Fig. 3.2.6)
2. Connect the oscilloscope to the VIDEO OUTPUT terminal.
3. Connect the oscilloscope to pins 4 (SW PULSE) and 5 (GND) of PV701. (Refer to Fig. 3.2.6)
4. Load the alignment tape (VNM-7), and set the VCR to the PLAY (SP) mode.
5. Apply the trigger at the SW PULSE.
6. Adjust the time base of the oscilloscope so that the PB FM Signal appears in two fields on the oscilloscope screen.
7. Adjust the TRACKING control knob (VR581) behind the door on the front panel so that the PB FM Signal is brought to its maximum level. (Refer to Fig. 3.2.7)



8. Apply the trigger at the fall of the SW PULSE.
9. Adjust VR702 (PHASE CH1) so that the displacement from the fall of the SW PULSE to the leading edge of the vertical sync signal in the video signal is  $6.5 H \pm 0.5 H$ . (Refer to Fig. 3.2.8)
10. Apply the trigger at the rise of the SW PULSE.
11. Adjust VR701 (PHASE CH2) so that the displacement from the rise of the SW PULSE to the leading edge of the vertical sync signal in the video signal is  $6.5 H \pm 0.5 H$ . (Refer to Fig. 3.2.9)



### 3.2.4 PLAY MODE TRACKING

Refer to Section 5.2.8 (AUDIO CONTROL ERASE HEAD) before making these adjustments.

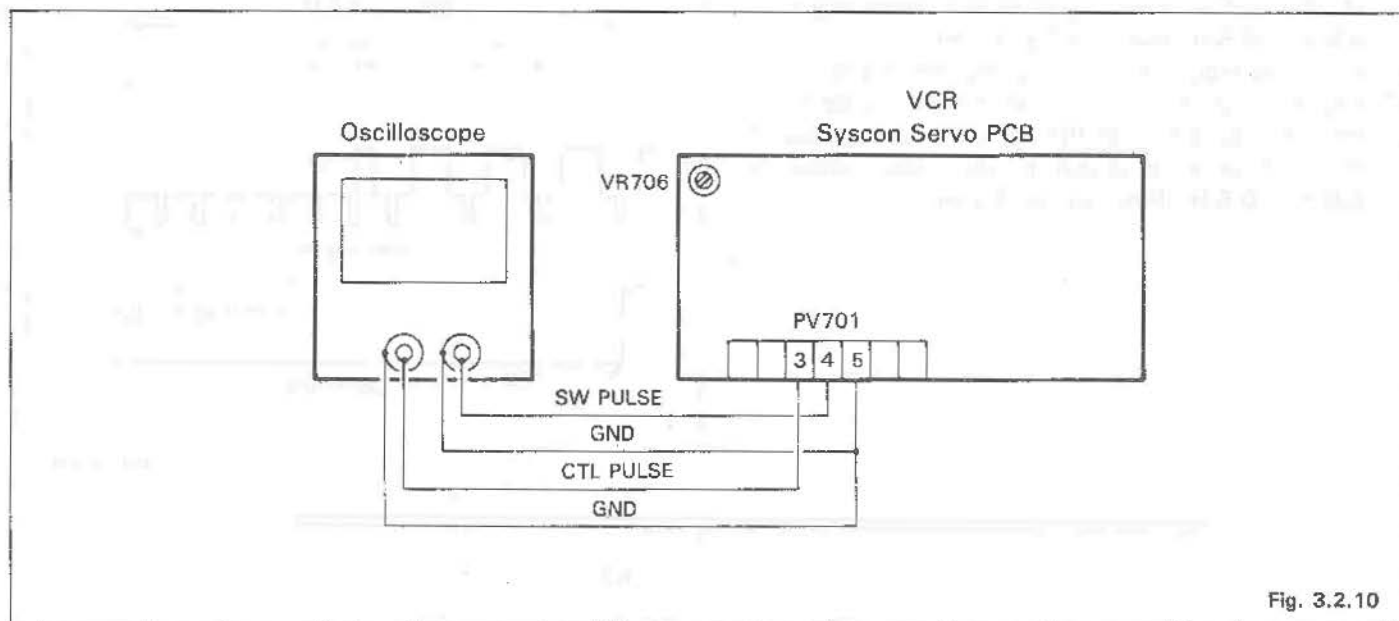


Fig. 3.2.10

| Measuring Point                                                                       | Adjustment Location | Adjustment Value                          | Adjustment Condition                        | Measuring Equipment |
|---------------------------------------------------------------------------------------|---------------------|-------------------------------------------|---------------------------------------------|---------------------|
| Pin 4 of PV701<br>(SW PULSE)<br>Pin 3 of PV701<br>(CTL PULSE)<br>Pin 5 of PV701 (GND) | VR706<br>(TRACK)    | $410 \mu\text{sec} \pm 200 \mu\text{sec}$ | PLAY (SP) mode<br>Alignment tape<br>(VNM-7) | Oscilloscope        |

1. Connect the oscilloscope to pins 4 (SW PULSE) and 5 (GND) of PV701. (Refer to Fig. 3.2.10)
2. Connect the oscilloscope to pins 3 (CTL PULSE) and 5 (GND) of PV701. (Refer to Fig. 3.2.10)
3. Set the TRACKING control knob (VR581) behind the door on the front panel to its center (detent) position.
4. Load the alignment tape (VNM-7), and set the VCR to the PLAY (SP) mode.
5. Apply the trigger at the fall of the SW PULSE.
6. Adjust VR706 (TRACK) so that the displacement from the fall of the SW PULSE to the rise of the CTL PULSE is  $410 \mu\text{sec} \pm 200 \mu\text{sec}$ . (Refer to Fig. 3.2.11)

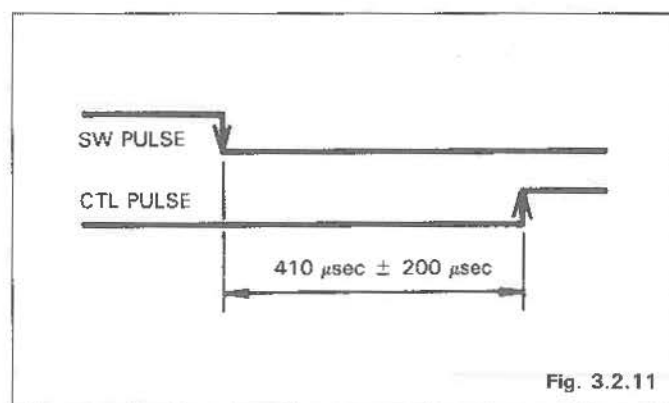


Fig. 3.2.11

### 3.2.5 X VALUE

Refer to Section 5.2.8 (AUDIO CONTROL ERASE HEAD) before making these adjustments.

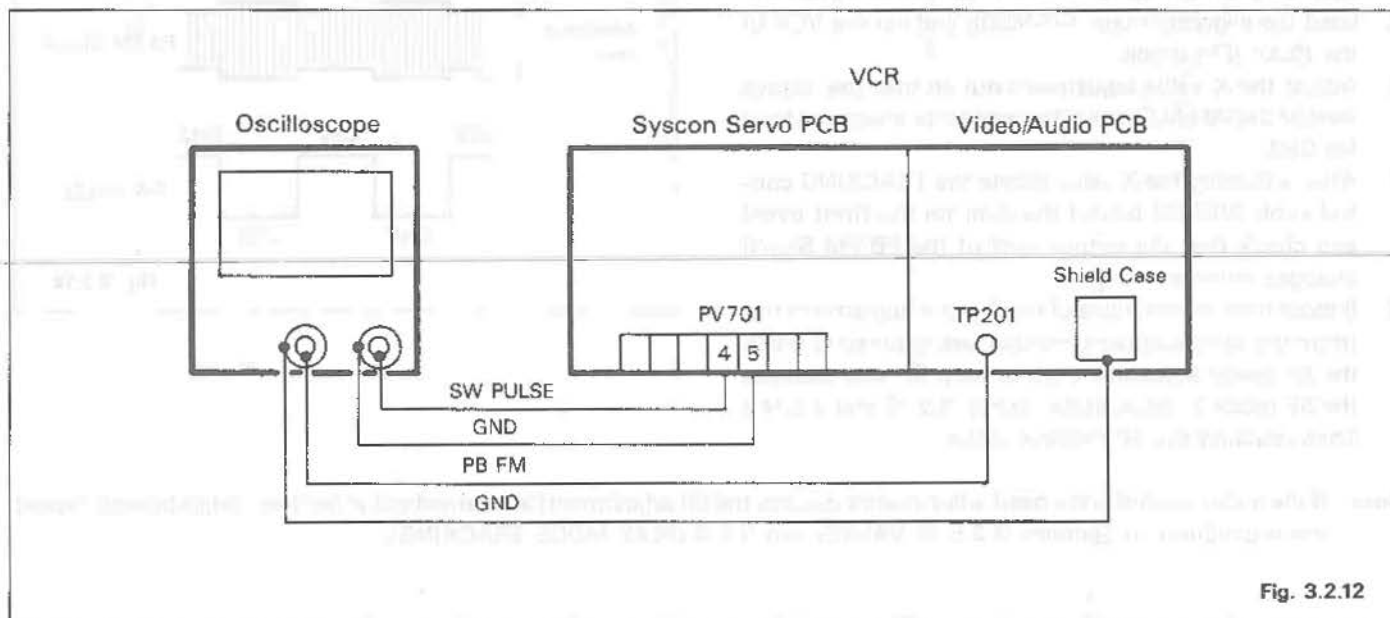


Fig. 3.2.12

| Measuring Point                                                                            | Adjustment Location       | Adjustment Value                    | Adjustment Condition                                                                       | Measuring Equipment |
|--------------------------------------------------------------------------------------------|---------------------------|-------------------------------------|--------------------------------------------------------------------------------------------|---------------------|
| TP201 (PB FM)<br>Shield case (GND)<br>Pin 4 of PV701<br>(SW PULSE)<br>Pin 5 of PV701 (GND) | X value adjustment<br>nut | Maximum level<br>(CH1 PB FM Signal) | PLAY (SP) mode<br>Alignment tape<br>(VNM-7)<br>PLAY (EP) mode<br>Alignment tape<br>(VNME0) | Oscilloscope        |

#### (A) TEST EQUIPMENT CONNECTIONS

1. Connect the oscilloscope to TP201 (PB FM) and the shield case (GND). (Refer to Fig. 3.2.12)
2. Connect the oscilloscope to pins 4 (SW PULSE) and 5 (GND) of PV701. (Refer to Fig. 3.2.12)
3. Apply the trigger at the SW PULSE.
4. Adjust the time base of the oscilloscope so that the PB FM Signal appears in two fields on the oscilloscope screen.

#### (B) SP MODE

1. Set the TRACKING control knob (VR581) behind the door on the front panel to its center (detent) position.
2. Load the alignment tape (VNM-7), and set the VCR to the PLAY (SP) mode.
3. Adjust the X value adjustment nut so that the output level of the PB FM Signal is brought to its maximum level for CH1.
4. After adjusting the X value, rotate the TRACKING control knob (VR581) behind the door on the front panel. Check that the output level of the PB FM Signal changes symmetrically. (Refer to Fig. 3.2.13 and Fig. 3.2.14)

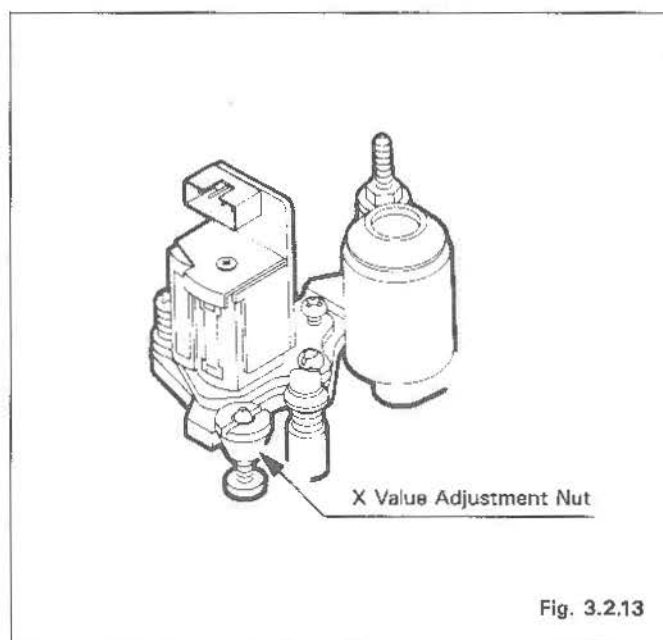
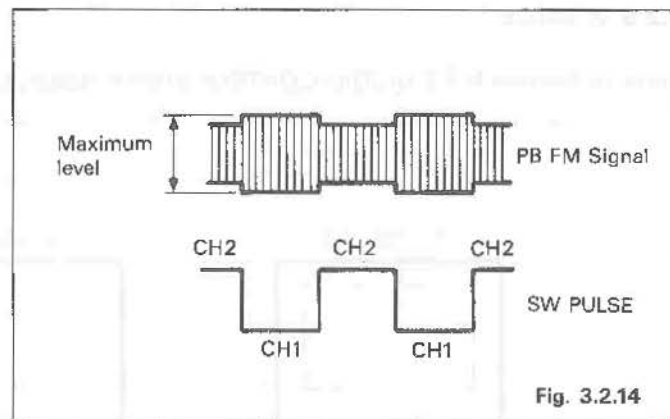


Fig. 3.2.13

### (C) EP MODE

1. Set the TRACKING control knob (VR581) behind the door on the front panel to its center (detent) position.
2. Load the alignment tape (VNME0), and set the VCR to the PLAY (EP) mode.
3. Adjust the X value adjustment nut so that the output level of the PB FM Signal is brought to its maximum level for CH1.
4. After adjusting the X value, rotate the TRACKING control knob (VR581) behind the door on the front panel and check that the output level of the PB FM Signal changes symmetrically.
5. If more than 1.5 rotations of the X value adjustment nut (from the SP adjustment position) are required to make the EP mode adjustment, go to step (B) and readjust the SP mode X value. (Refer to Fig. 3.2.13 and 3.2.14.) Then readjust the EP mode X value.



**Note:** If the audio control erase head adjustments (except the tilt adjustment) are carried out after these adjustments, repeat the procedures in Sections 3.2.5 (X VALUE) and 3.2.4 (PLAY MODE TRACKING).

### 3.3 VIDEO CIRCUIT

1. Before making the following adjustments, the MECHANICAL and SYSTEM CONTROL SERVO CIRCUIT adjustments should be completed.
2. Prior to these adjustments, set the variable resistors to the mechanical center of their adjustment ranges.

**WARNING:**

A hybrid IC is used in the video and audio circuit boards. Its electrical characteristics are precisely adjusted within the IC, so that it may be used with any other hybrid IC with satisfactory results. When handling the video PCB, note the following precautions:

- 1) The device substrate is composed of alumina. Be sure to isolate the PCB assembly from physical vibration or impact. Take care not to drop it on the floor.
- 2) When handling the hybrid IC, wear cotton gloves or fingerstalls. Do not handle it with bare hands.
- 3) Protect the internal components of the hybrid IC from heat (soldering irons, etc.).
- 4) Do not attempt to replace any internal parts of the hybrid IC. If the IC is found to be faulty, replace the entire device.

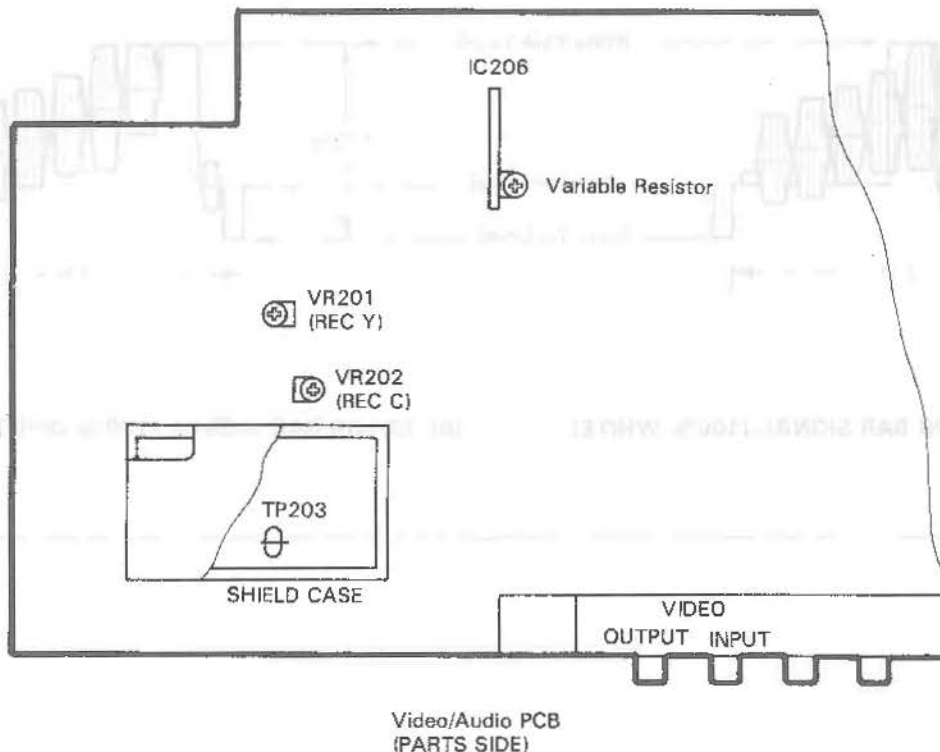


Fig. 3.3.1

### 3.3.1 EQUIPMENT AND JIGS REQUIRED

|                            |                                                                                                                                |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Color Bar Signal Generator | Color bar signal with 100% white level. (EIA color bar signal)<br>(Signal waveform is described below. Refer to Fig. 3.3.2)    |
| Oscilloscope               | Vertical sensitivity: 5 mV/DIV, easy trigger<br>Roll-off frequency: more than 10 MHz                                           |
| Blank Tape                 | VHS-tape cassette tape                                                                                                         |
| Monitor TV                 | Used to monitor all adjustments                                                                                                |
| Probe                      | Input capacity: less than 25 pF (10:1)<br>less than 40 pF (1:1)<br>Covering frequency: DC ~ 40 MHz (10:1)<br>DC ~ 30 MHz (1:1) |

### 3.3.2 NTSC TV TEST SIGNAL

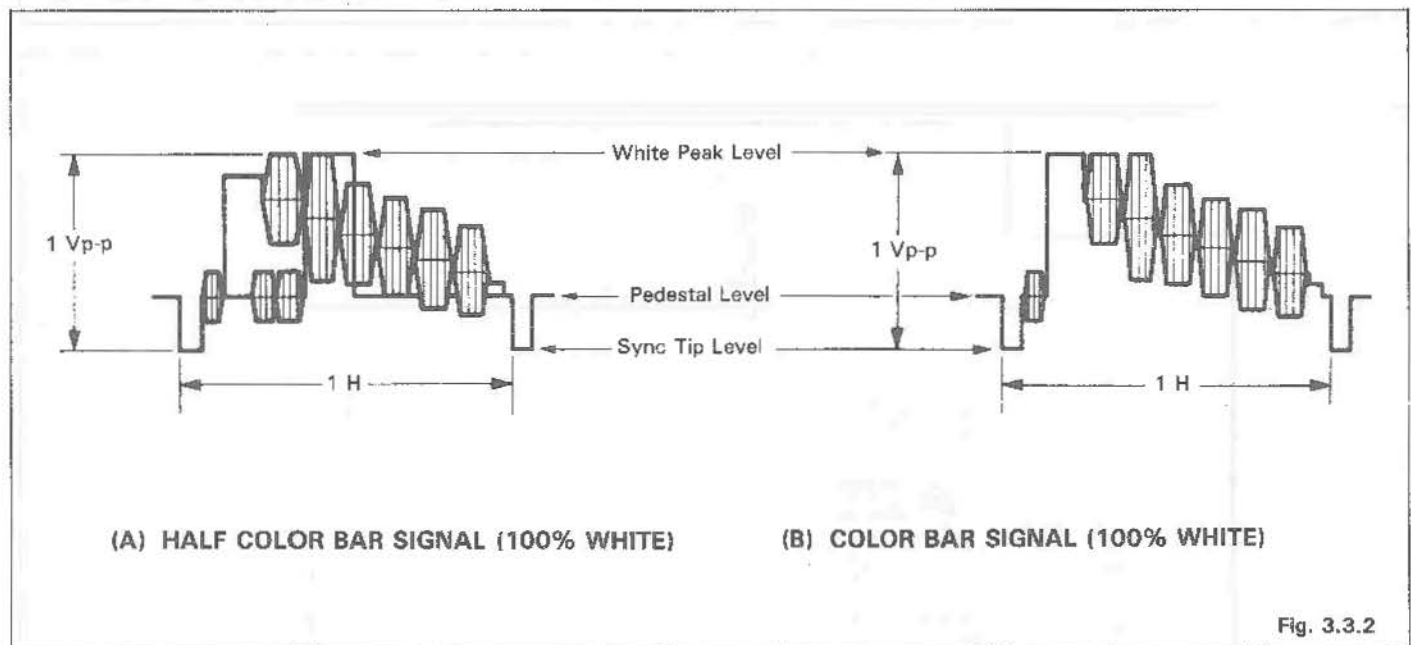


Fig. 3.3.2

### 3.3.3 E-E LEVEL

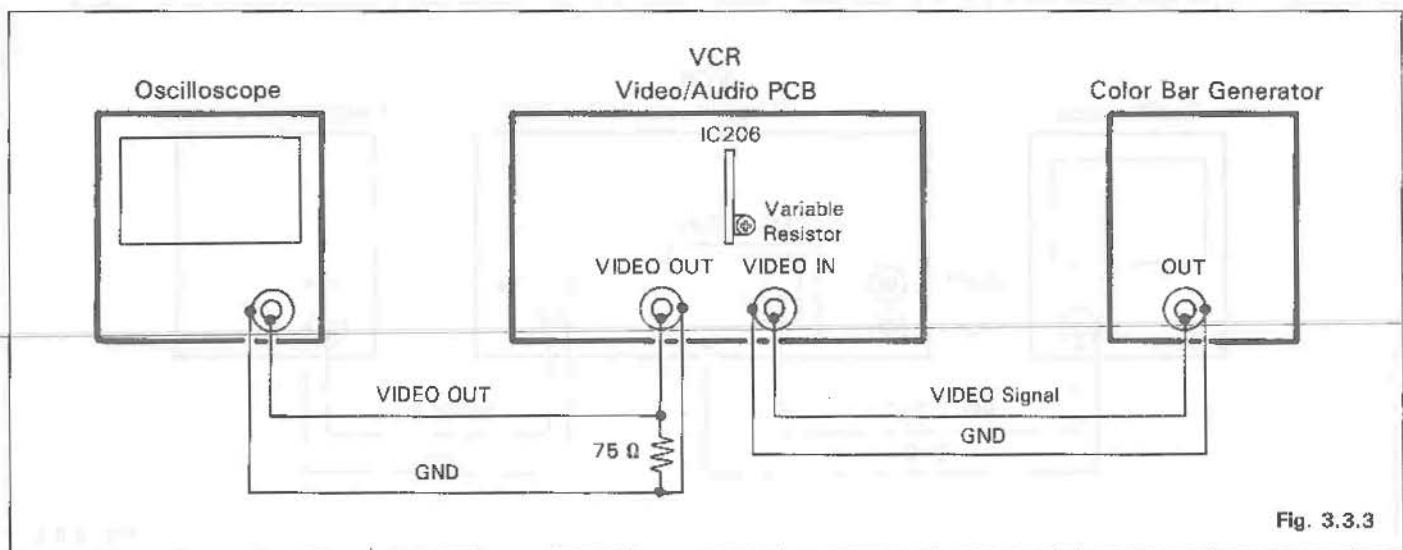


Fig. 3.3.3

| Measuring Point       | Adjustment Location                    | Adjustment Value                        | Adjustment Condition         | Measuring Equipment                              |
|-----------------------|----------------------------------------|-----------------------------------------|------------------------------|--------------------------------------------------|
| VIDEO OUTPUT terminal | Variable Resistor on IC206 (hybrid IC) | $1.0 \text{ Vp-p} \pm 50 \text{ mVp-p}$ | E-E mode<br>75 Ω termination | Color bar generator<br>Oscilloscope (10:1 probe) |

1. Connect the color bar generator (EIA color bar signal) to the VIDEO INPUT terminal. (Refer to Fig. 3.3.3)
2. Terminate the VIDEO OUTPUT terminal with a 75 Ω resistor.
3. Connect the oscilloscope as shown in Fig. 3.3.3.
4. Adjust Variable Resistor on IC206 so that the video signal level is  $1.0 \text{ Vp-p} \pm 50 \text{ mVp-p}$ . (Refer to Fig. 3.3.4)

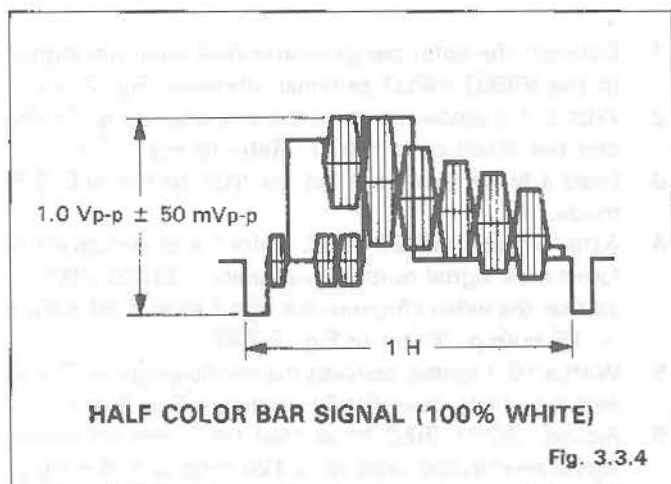
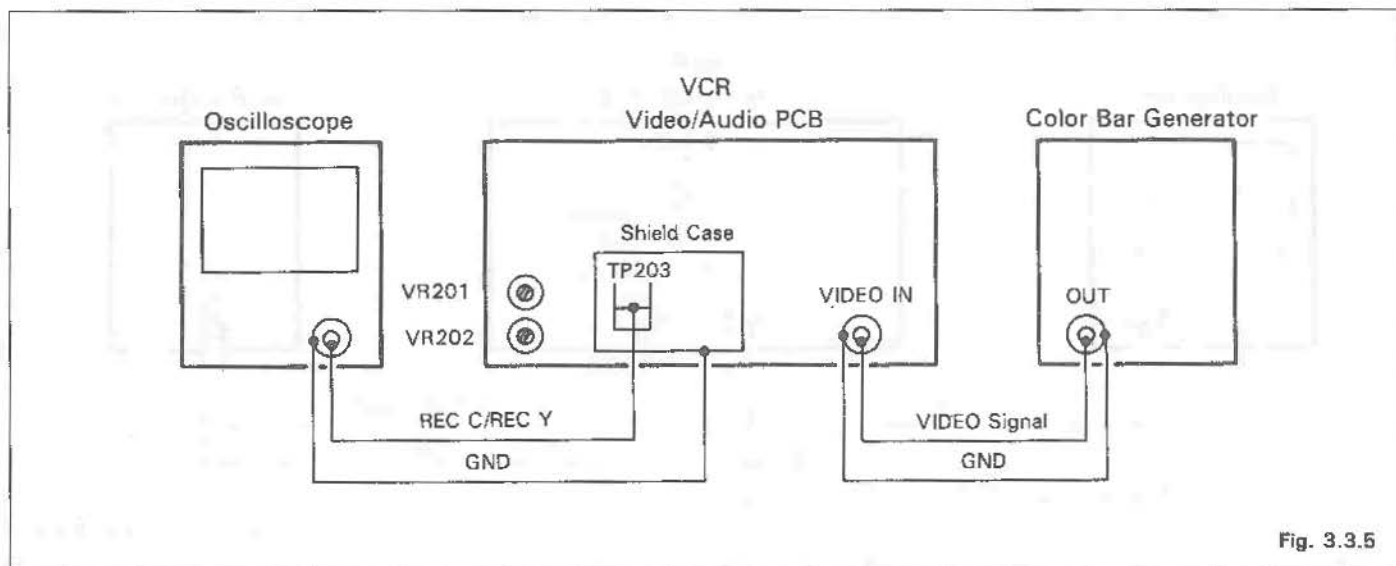


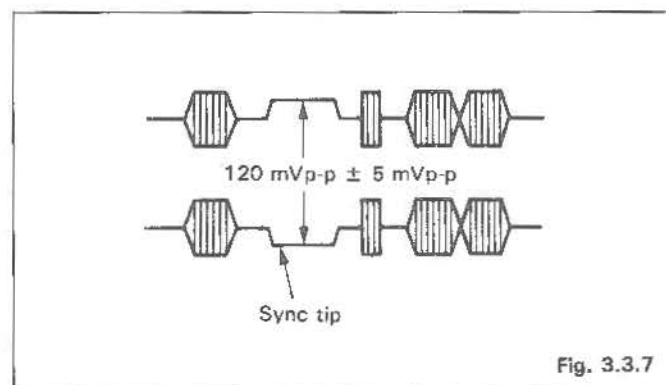
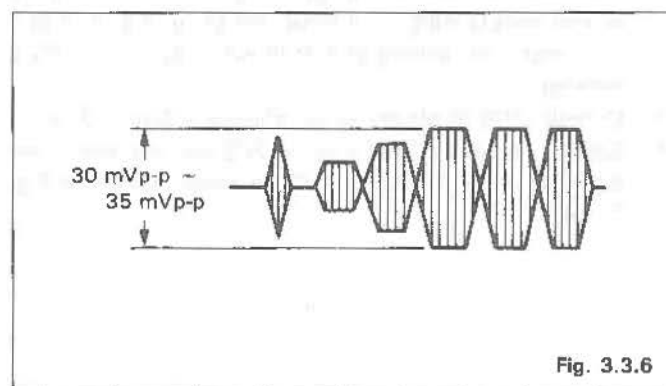
Fig. 3.3.4

### 3.3.4 REC C LEVEL/REC Y LEVEL



| Measuring Point            | Adjustment Location | Adjustment Value        | Adjustment Condition        | Measuring Equipment                                                            |
|----------------------------|---------------------|-------------------------|-----------------------------|--------------------------------------------------------------------------------|
| TP203<br>Shield case (GND) | VR202 (REC C)       | 30 mVp-p ~ 35 mVp-p     | REC (EP) mode<br>Blank tape | Color bar generator<br>Oscilloscope<br>(1:1 probe REC C)<br>(10:1 probe REC Y) |
|                            | VR201 (REC Y)       | 120 mVp-p $\pm$ 5 mVp-p |                             |                                                                                |

1. Connect the color bar generator (EIA color bar signal) to the VIDEO INPUT terminal. (Refer to Fig. 3.3.5)
2. With a 1:1 probe, connect the oscilloscope to TP203 and the shield case (GND). (Refer to Fig. 3.3.5)
3. Load a blank tape, and set the VCR to the REC (EP) mode.
4. After adjusting VR201 (REC Y) for the minimum video luminance signal output level, adjust VR202 (REC C) so that the video chrominance signal level is 30 mVp-p ~ 35 mVp-p. (Refer to Fig. 3.3.6)
5. With a 10:1 probe, connect the oscilloscope to TP203 and the shield case (GND). (Refer to Fig. 3.3.5)
6. Adjust VR201 (REC Y) so that the video luminance signal level in the sync tip is 120 mVp-p  $\pm$  5 mVp-p. (Refer to Fig. 3.3.7)



### 3.4 AUDIO CIRCUIT

1. Prior to these adjustments, mechanism adjustments (especially, the TAPE GUIDE height and the AUDIO CONTROL ERASE HEAD height adjustments) should be carried out, so that the tape traveling between the loading guide pole and the AUDIO CONTROL ERASE HEAD runs without fluttering, twisting or curling.
2. Prior to these adjustments (except the AUDIO CONTROL ERASE HEAD adjustments), VIDEO and SYSTEM CONTROL/SERVO circuit adjustments should be carried out.
3. Set the following switches to the positions indicated before making these adjustments.

| SWITCH       | POSITION                           |
|--------------|------------------------------------|
| OUTPUT MODE  | ST                                 |
| INPUT SELECT | EXT VIDEO/AUDIO<br>or<br>EXT AUDIO |
| DOLBY NR     | OFF                                |

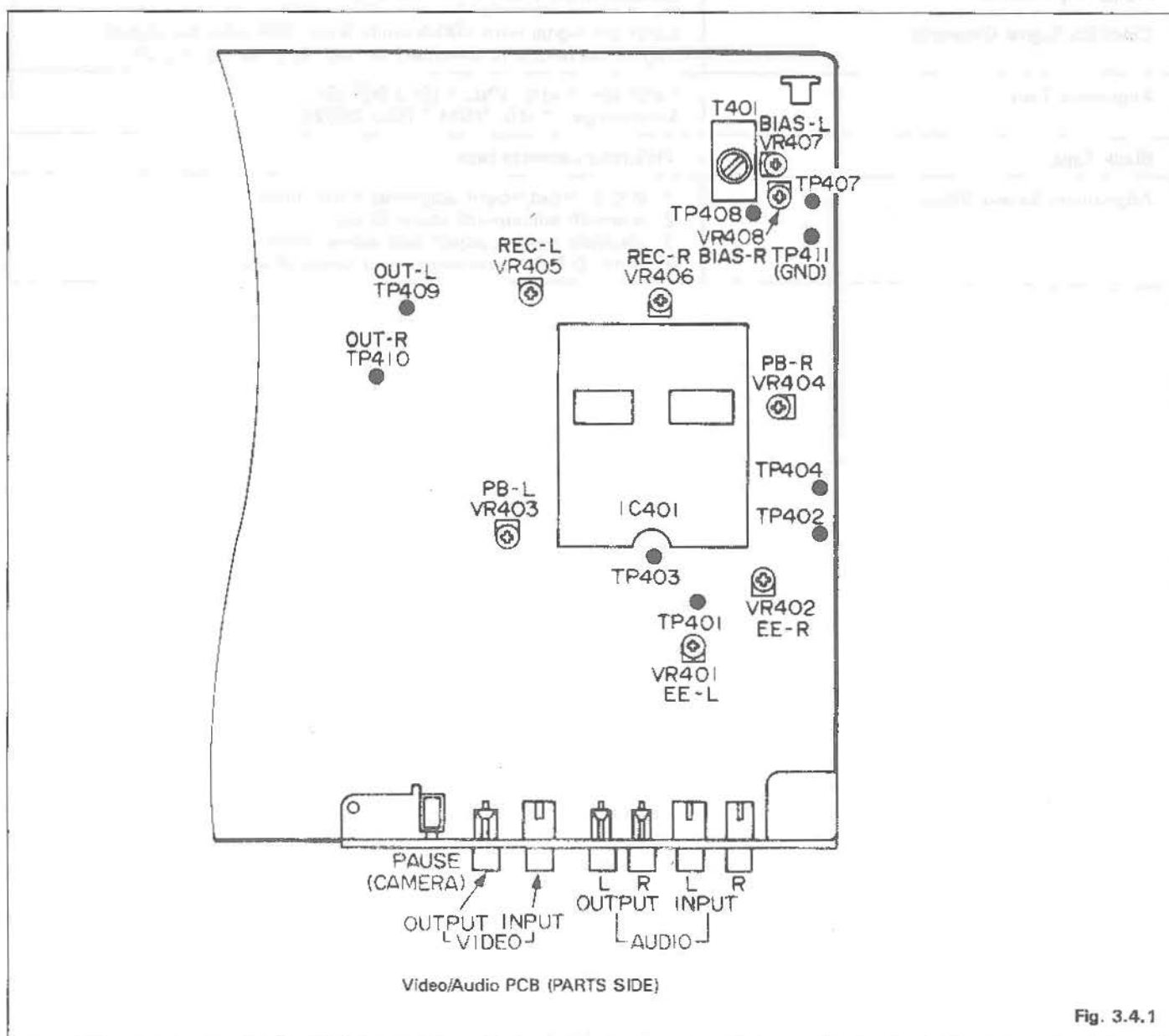


Fig. 3.4.1

### 3.4.1 EQUIPMENT AND JIGS REQUIRED

|                                |                                                                                                                                                                                                                                                                  |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard Signal Generator (SG) | Output frequency: 10 Hz ~ 100 kHz<br>Output level: more than 1 Vrms<br>Output impedance: 600 $\Omega$<br>Distortion ratio: less than 0.1%<br>Output in use<br>SG1: frequency 1 kHz, 7 kHz (switchable)<br>level -30 dBV<br>SG2: frequency 1 kHz<br>level -10 dBV |
| Oscilloscope                   | Vertical sensitivity: 10 mV/DIV<br>Dual trace with external trigger<br>Roll-off frequency: more than 30 MHz                                                                                                                                                      |
| AC Voltmeter                   | Effective value indication and dual channel<br>Input frequency: 10 Hz ~ 100 kHz<br>Input impedance: more than 1 M $\Omega$<br>Measurement level: 1 mV (full scale)                                                                                               |
| Frequency Counter              | Input frequency 20 Hz ~ 100 kHz                                                                                                                                                                                                                                  |
| Color Bar Signal Generator     | Color bar signal with 100% white level. (EIA color bar signal)<br>(Signal waveform is described before. Refer to Fig. 3.3.2)                                                                                                                                     |
| Alignment Tape                 | Color bar, 1 kHz: VNC-1 (SVJ-00028)<br>Monoscope, 7 kHz: VNM-7 (SVJ-00027)                                                                                                                                                                                       |
| Blank Tape                     | VHS-type cassette tape                                                                                                                                                                                                                                           |
| Adjustment Screw Drivers       | 1. A.C.E. Head height adjustment box driver<br>2. Azimuth adjustment screw driver<br>3. Variable resistor adjustment screw driver<br>4. Core (O.S.C trans) adjustment screw driver                                                                               |

### 3.4.2 ACE HEAD HEIGHT/ACE HEAD TILT

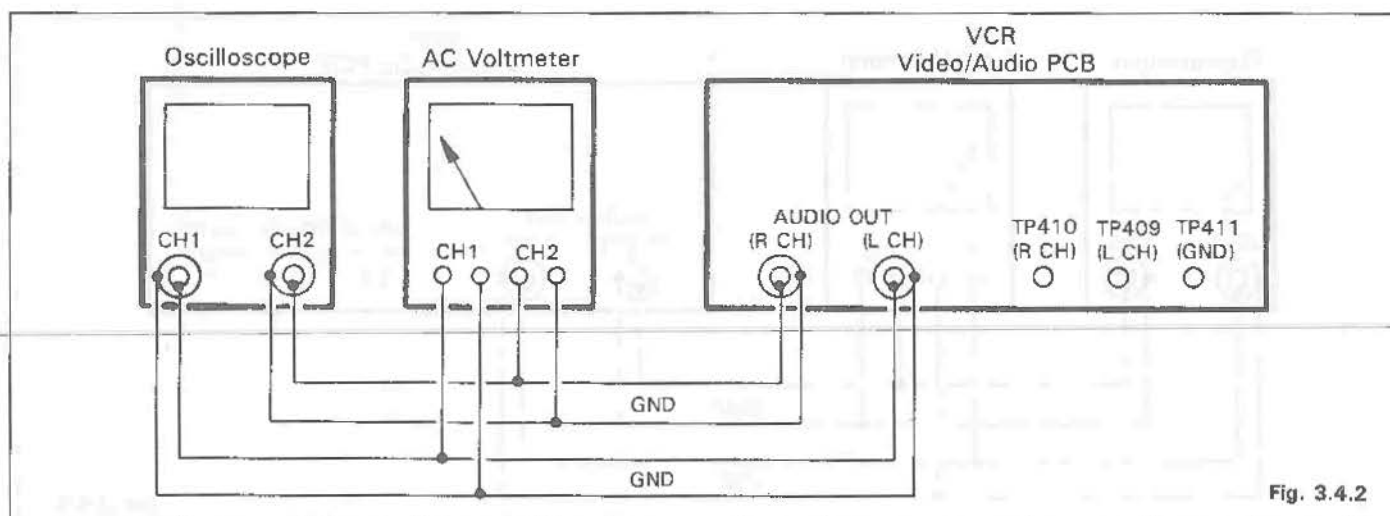


Fig. 3.4.2

| Measuring Point                                                     | Adjustment Location                                                        | Adjustment Value              | Adjustment Condition                     | Measuring Equipment                                |
|---------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------|------------------------------------------|----------------------------------------------------|
| CH1: AUDIO OUTPUT terminal (L)<br>or<br>TP409 (L CH)<br>TP411 (GND) | Height adjustment nut<br>Tilt adjustment screw<br>Azimuth adjustment screw | Maximum levels (AC voltmeter) | PLAY (SP) mode<br>Alignment tape (VNC-1) | AC voltmeter (CH1, CH2)<br>Oscilloscope (CH1, CH2) |
| CH2: AUDIO OUTPUT terminal (R)<br>or<br>TP410 (R CH)<br>TP411 (GND) |                                                                            |                               |                                          |                                                    |

1. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to the AUDIO OUTPUT terminals (L, R), or connect the AC voltmeter (CH1, CH2) and the oscilloscope to TP409 (L CH), TP410 (R CH) and TP411 (GND). (Refer to Fig. 3.4.2)
2. Load the alignment tape (VNC-1), and set the VCR to the PLAY (SP) mode.
3. Confirm that the tape running between the guide roller and ACE head, has no slack. If the tape has slack, take it up by turning the tilt adjustment screw. Then readjust the GUIDE ROLLER HEIGHT (Refer to Section 5.2.6) and the X VALUE (Refer to Section 3.2.5).
4. After confirming on the oscilloscope that a 1 kHz sine wave is being output, adjust the height adjustment nut so that the AC voltmeter's readings are brought to their maximum levels on both the L and R channels. (Refer to Fig. 3.4.3)
5. Confirm that the output levels on the L and R channels do not fluctuate more than 1 dB. If the levels on both channels fluctuate, or if only the level on the R channel fluctuates more than 1 dB, turn the tilt adjustment screw clockwise. Then perform the adjustments in steps 3 and 4 again.  
If only the level on the L channel fluctuates more than 1 dB, turn the tilt adjustment screw counterclockwise. Then perform the adjustments in steps 3 and 4 again.
6. Adjust the azimuth adjustment screw so that the AC voltmeter's readings are brought to their maximum levels on both the L and R channels. (Refer to Fig. 3.4.3)

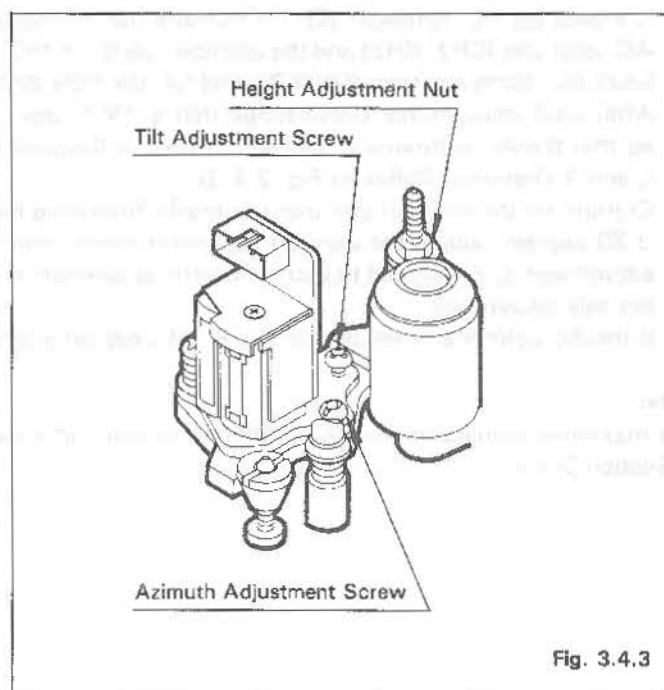


Fig. 3.4.3

7. If the AC voltmeter's reading on the L or R channel increased more than 1 dB after step 6, perform step 4 again. Step 5 need not be rechecked.

#### Note:

The maximum reading on the AC voltmeter obtained in steps 4 and 6 is approximately -10 dBV.

### 3.4.3 ACE HEAD AZIMUTH

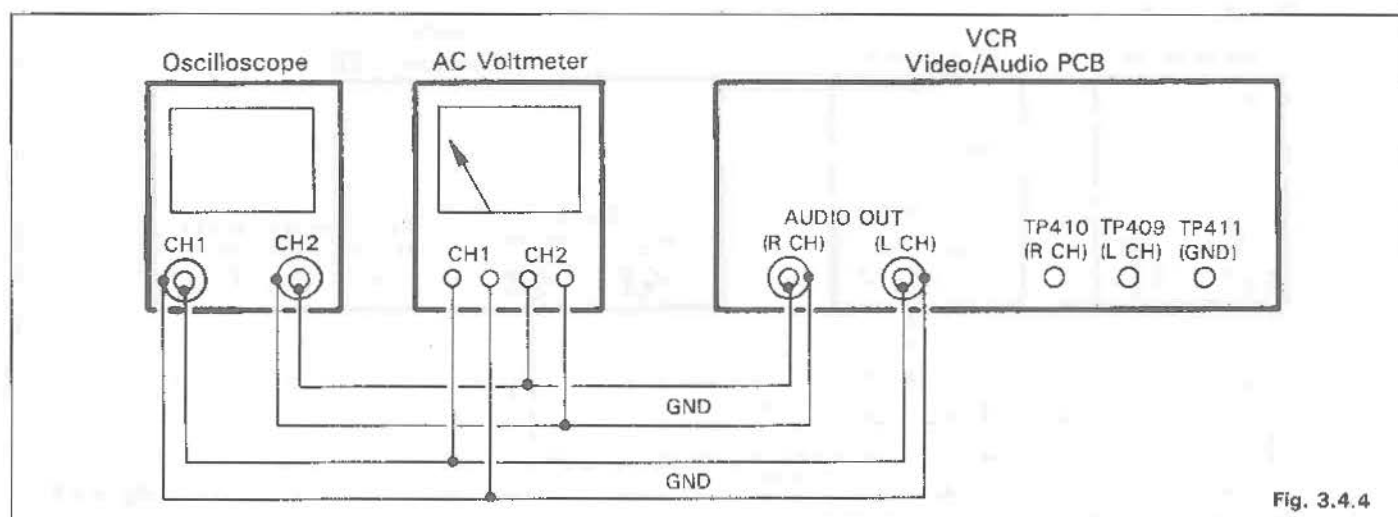


Fig. 3.4.4

| Measuring Point                                                                                                                            | Adjustment Location    | Adjustment Value              | Adjustment Condition                     | Measuring Equipment                                |
|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------|------------------------------------------|----------------------------------------------------|
| CH1: AUDIO OUTPUT terminal (L)<br>or<br>TP409 (L CH)<br>TP411 (GND)<br>CH2: AUDIO OUTPUT terminal (R)<br>or<br>TP410 (R CH)<br>TP411 (GND) | Azimuth adjustment nut | Maximum levels (AC voltmeter) | PLAY (SP) mode<br>Alignment tape (VNM-7) | AC voltmeter (CH1, CH2)<br>Oscilloscope (CH1, CH2) |

1. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to the AUDIO OUTPUT terminals (L, R), or connect the AC voltmeter (CH1, CH2) and the oscilloscope to TP409 (L CH), TP410 (R CH) and TP411 (GND). (Refer to Fig. 3.4.4)
2. Load the alignment tape (VNM-7), and set the VCR to the PLAY (SP) mode.
3. After confirming on the oscilloscope that a 7 kHz sine wave is being output, adjust the azimuth adjustment screw so that the AC voltmeter's readings or the oscilloscope waveform are brought to their maximum levels on both the L and R channels. (Refer to Fig. 3.4.3)
4. Confirm on the oscilloscope that the phase difference between the channels is less than  $\pm 30$  degrees. If it exceeds  $\pm 30$  degrees, adjust the azimuth adjustment screw until the phase difference is less than  $\pm 30$  degrees. The azimuth adjustment screw should be turned as little as possible (clockwise or counterclockwise, whichever is less) when making this adjustment.
5. If the AC voltmeter's reading on the R or L channel drops more than 2 dB after step 4, perform steps 3 and 4 again.

#### Note:

The maximum reading on the AC voltmeter obtained in step 3 should not be more than  $-5$  dB below the value given in Section 3.4.2.

### 3.4.4 E-E LEVEL

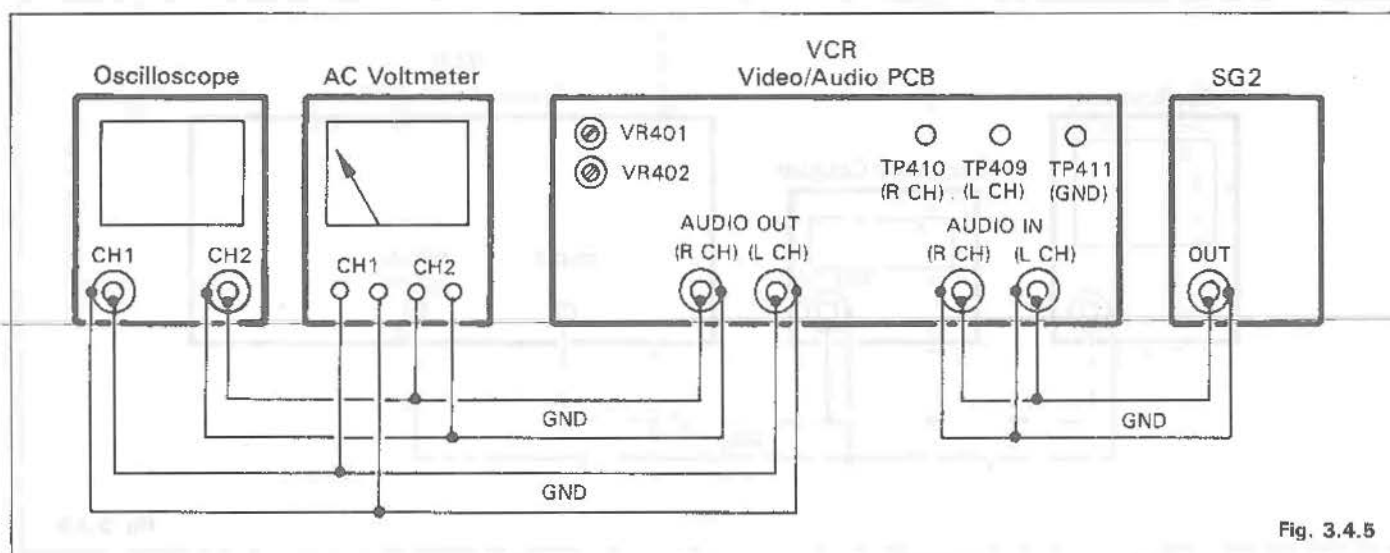
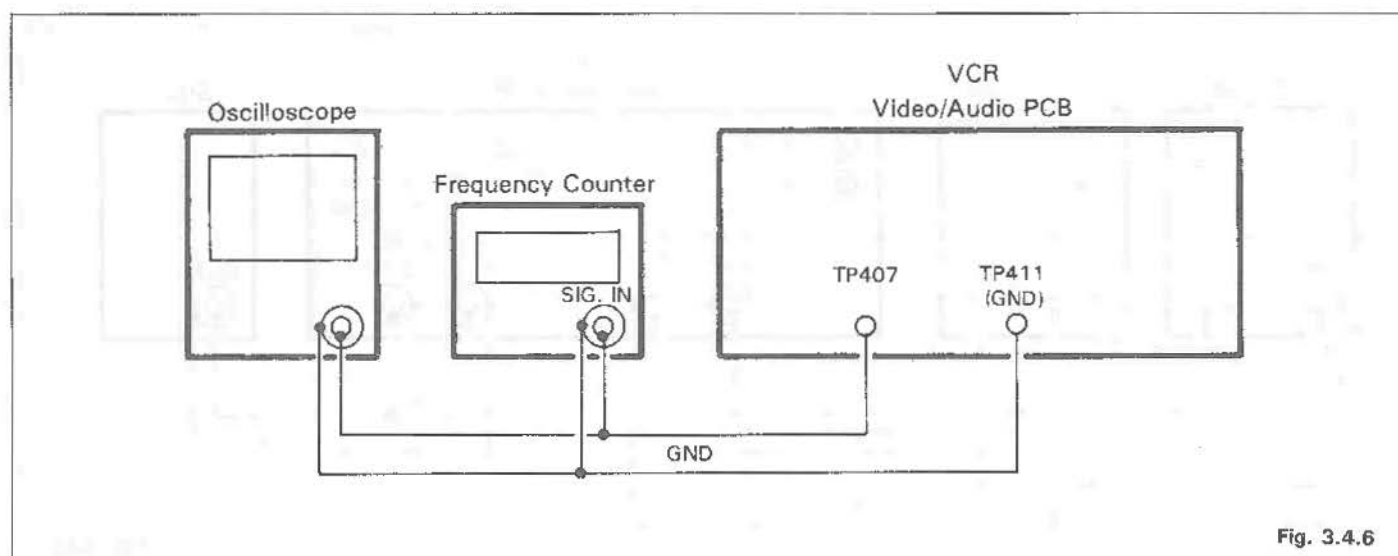


Fig. 3.4.5

| Measuring Point                                                     | Adjustment Location | Adjustment Value                       | Adjustment Condition | Measuring Equipment                                                          |
|---------------------------------------------------------------------|---------------------|----------------------------------------|----------------------|------------------------------------------------------------------------------|
| CH1: AUDIO OUTPUT terminal (L)<br>or<br>TP409 (L CH)<br>TP411 (GND) | VR401 (E-E LCH)     | $-10 \text{ dBV} \pm 0.5 \text{ dB}$   | STOP mode            | Signal generator (SG2)<br>AC voltmeter (CH1, CH2)<br>Oscilloscope (CH1, CH2) |
| CH2: AUDIO OUTPUT terminal (R)<br>or<br>TP410 (R CH)<br>TP411 (GND) | VR402 (E-E RCH)     | $-0.5 \text{ dB} \sim +0.5 \text{ dB}$ |                      |                                                                              |

1. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to the AUDIO OUT terminals (L, R), or connect the AC voltmeter (CH1, CH2) and the oscilloscope to TP409 (L CH), TP410 (R CH) and TP411 (GND). (Refer to Fig. 3.4.5)
2. Connect the signal generator (Condition: SG2) to the AUDIO INPUT terminals (L, R). (Refer to Fig. 3.4.5)
3. After confirming on the oscilloscope that a 1 kHz sine wave is being output, adjust VR401 (E-E L CH) so that the AC voltmeter's reading (CH1) is  $-10 \text{ dBV} \pm 0.5 \text{ dB}$ . (Refer to Fig. 3.4.1)
4. Adjust VR402 (E-E R CH) so that the difference between the AC voltmeter's readings for the L channel and R channel signals is within  $\pm 0.5 \text{ dB}$ .

### 3.4.5 OSCILLATION FREQUENCY



| Measuring Point      | Adjustment Location | Adjustment Value   | Adjustment Condition        | Measuring Equipment               |
|----------------------|---------------------|--------------------|-----------------------------|-----------------------------------|
| TP407<br>TP411 (GND) | T401                | 70 kHz $\pm$ 2 kHz | REC (SP) mode<br>Blank tape | Frequency counter<br>Oscilloscope |

1. Connect the frequency counter and the oscilloscope to TP407 and TP411 (GND). (Refer to Fig. 3.4.6)
2. Load a blank tape, and set the VCR to the REC (SP) mode.
3. After confirming on the oscilloscope that a distortion-free 70 kHz sine wave is being output, adjust T401 until the oscillation frequency is 70 kHz  $\pm$  2 kHz.

**Note:** The core (TP401) should not extend too far out of its case.

### 3.4.6 PLAY MODE LEVEL

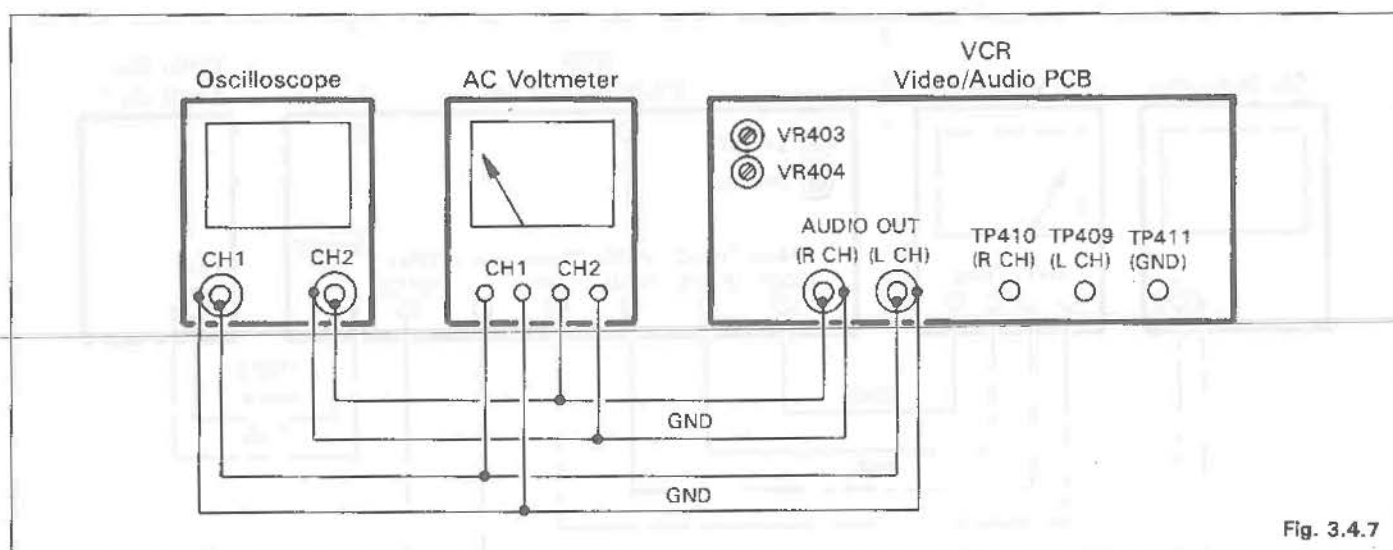


Fig. 3.4.7

| Measuring Point                                                     | Adjustment Location | Adjustment Value                       | Adjustment Condition                     | Measuring Equipment                                |
|---------------------------------------------------------------------|---------------------|----------------------------------------|------------------------------------------|----------------------------------------------------|
| CH1: AUDIO OUTPUT terminal (L)<br>or<br>TP409 (L CH)<br>TP411 (GND) | VR403 (PB LCH)      | $-10 \text{ dBV} \pm 0.5 \text{ dB}$   | PLAY (SP) mode<br>Alignment tape (VNC-1) | AC voltmeter (CH1, CH2)<br>Oscilloscope (CH1, CH2) |
| CH2: AUDIO OUTPUT terminal (R)<br>or<br>TP410 (R CH)<br>TP411 (GND) | VR404 (PB RCH)      | $-0.5 \text{ dB} \sim +0.5 \text{ dB}$ |                                          |                                                    |

1. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to the AUDIO OUTPUT terminals (L, R), or connect the AC voltmeter (CH1, CH2) and the oscilloscope to TP409 (L CH), TP410 (R CH) and TP411 (GND). (Refer to Fig. 3.4.7)
2. Load the alignment tape (VNC-1), and set the VCR to the PLAY (SP) mode.
3. After confirming on the oscilloscope that a 1 kHz sine wave is being output, adjust VR403 (PB LCH) so that the AC voltmeter's reading for the L CH is  $-10 \text{ dBV} \pm 0.5 \text{ dB}$ . (Refer to Fig. 3.4.1)
4. Adjust VR404 (PB RCH) so that the difference between the AC voltmeter's readings for the L channel and R channel signals is within  $\pm 0.5 \text{ dB}$ .

### 3.4.7 BIAS LEVEL

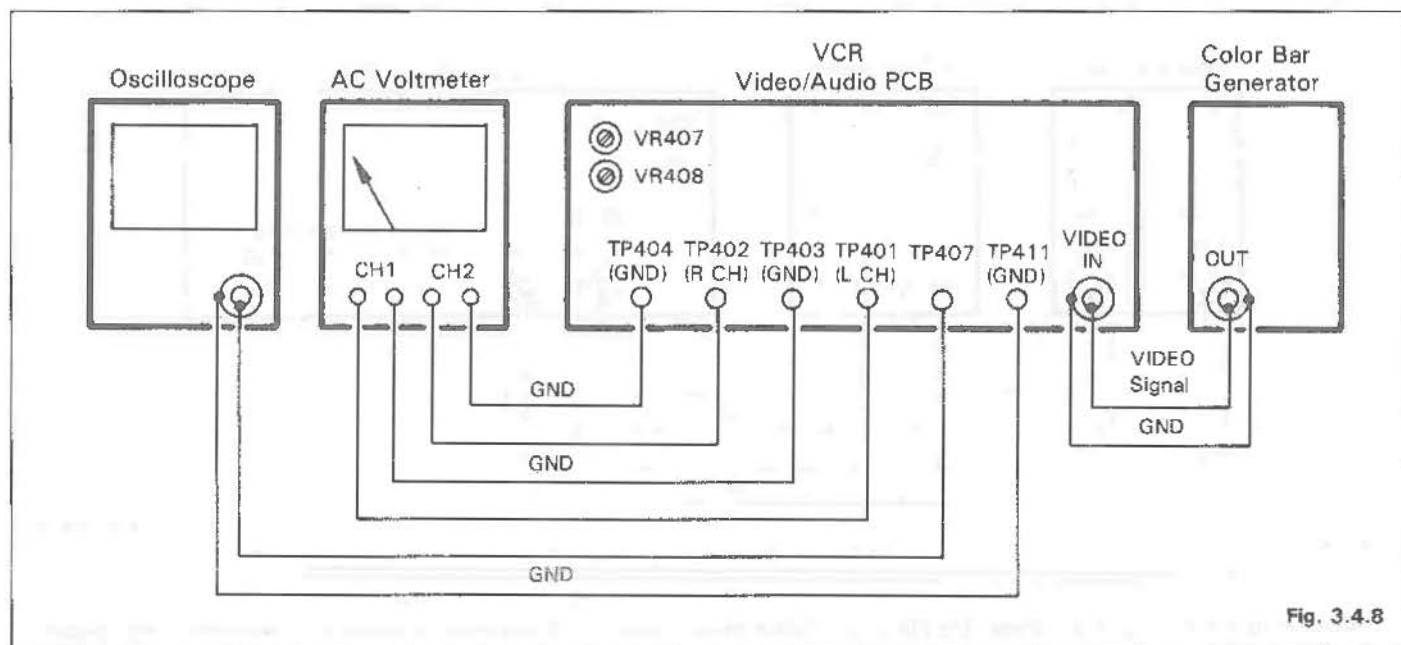
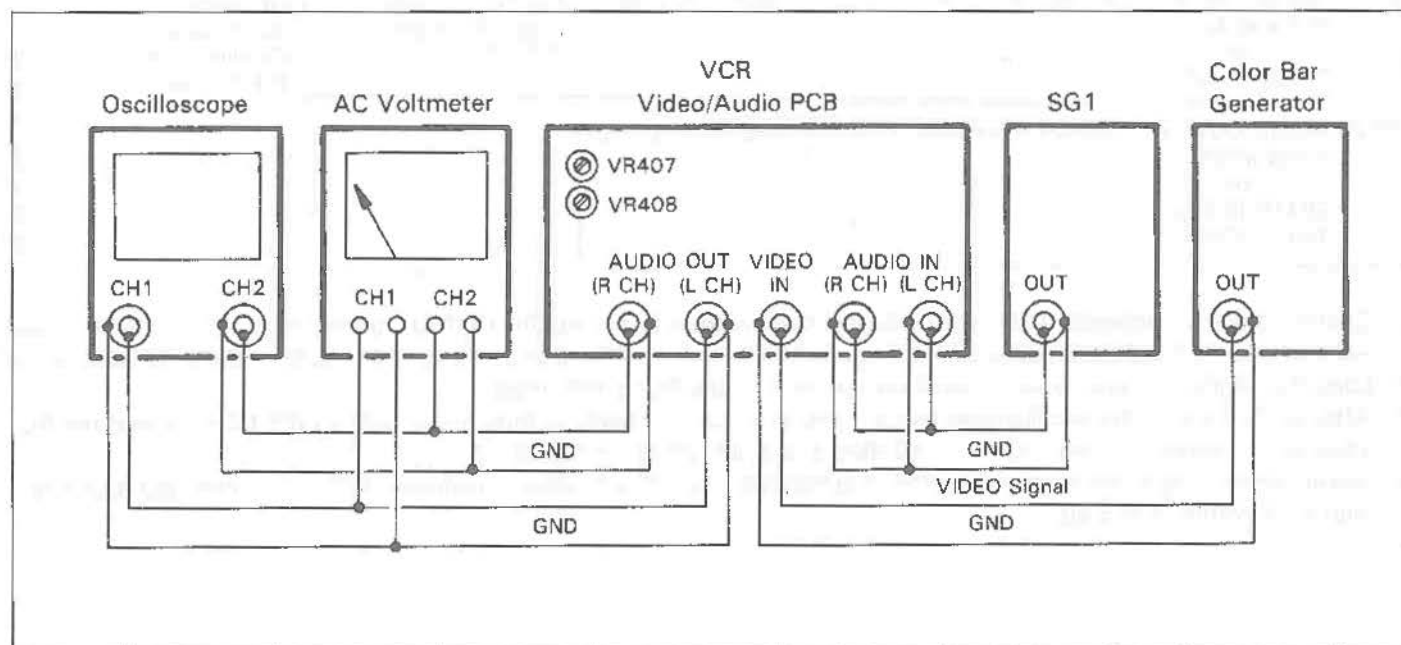


Fig. 3.4.8

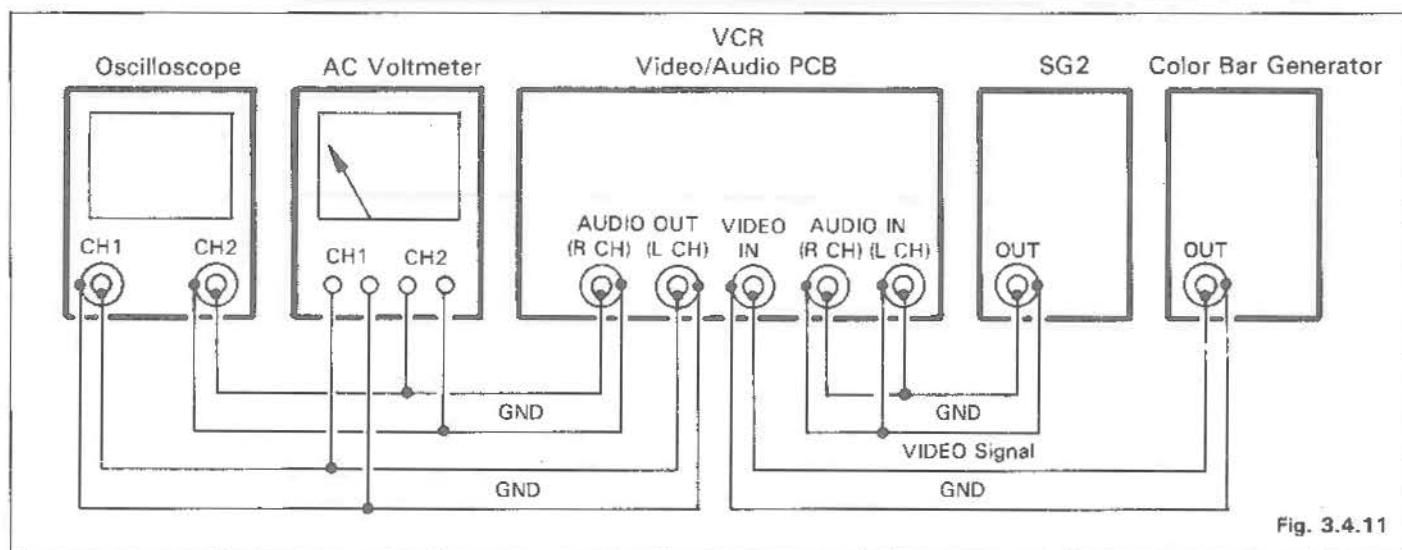
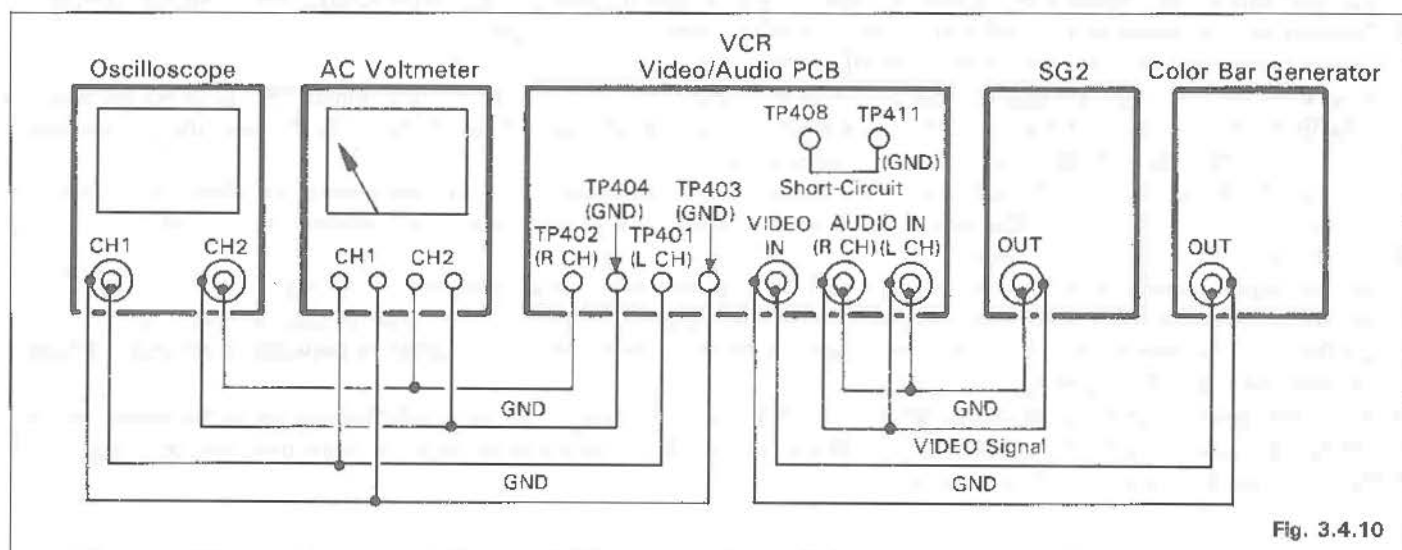


| Measuring Point                                                                              | Adjustment Location                  | Adjustment Value                              | Adjustment Condition                          | Measuring Equipment                                                                                           |
|----------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| CH1: TP401 (L CH)<br>TP403 (GND)<br>CH2: TP402 (R CH)<br>TP404 (GND)<br>TP407<br>TP411 (GND) | VR407 (BIAS LCH)<br>VR408 (BIAS RCH) | 2.9 mVrms<br>± 0.1 mVrms                      | REC (SP) mode<br>Blank tape                   | AC voltmeter<br>(CH1, CH2)<br>Oscilloscope<br>(CH1, CH2)<br>Signal generator<br>(SG-1)<br>Color bar generator |
| CH1: AUDIO OUTPUT<br>terminal (L)<br>CH2: AUDIO OUTPUT<br>terminal (R)                       |                                      | 0 dB ~ +2.5 dB<br>between<br>1 kHz and 10 kHz | REC (SP) mode<br>PLAY (SP) mode<br>Blank tape |                                                                                                               |

1. Connect the color bar generator (EIA color bar signal) to the VIDEO INPUT terminal.
2. Connect the AC voltmeter (CH1, CH2) to TP401, TP403 (GND), TP402 and TP404 (GND). (Refer to Fig. 3.4.8)
3. Connect the oscilloscope to TP407 and TP411 (GND). (Refer to Fig. 3.4.8)
4. Load a blank tape, and set the VCR to the REC (SP) mode.
5. After confirming on the oscilloscope that a  $70 \text{ kHz} \pm 2 \text{ kHz}$  sine wave is being output, adjust VR407 (BIAS LCH) and VR408 (BIAS RCH) so that the AC voltmeter's readings are  $2.9 \text{ mVrms} \pm 0.1 \text{ mVrms}$  on both the L and R channels.
6. Disconnect the connections made in steps 2 through 3.
7. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to the AUDIO OUTPUT terminals (L, R). (Refer to Fig. 3.4.9)
8. Connect the signal generator (Condition: SG1) to the AUDIO INPUT terminals (L, R). (Refer to Fig. 3.4.9)
9. Set the VCR to the REC (SP) mode.
10. Set the signal generator frequency to 1 kHz and 10 kHz, and record each frequency's signals.
11. Set the VCR to the PLAY (SP) mode and play back the signals recorded on the cassette tape in step 10.
12. Confirm that the difference of AC voltmeter's readings for the 1 kHz and 10 kHz signals is **between 0 dB and +2.5 dB** on both the L and R channels.
13. If the difference is under 0 dB, rotate VR407 (BIAS LCH) or VR408 (BIAS RCH) slightly clockwise to adjust. If the difference is over +2.5 dB, rotate VR407 (BIAS LCH) or VR408 (BIAS RCH) slightly counterclockwise to adjust.
14. Repeat steps 9 through 13 if necessary.



### 3.4.8 REC LEVEL

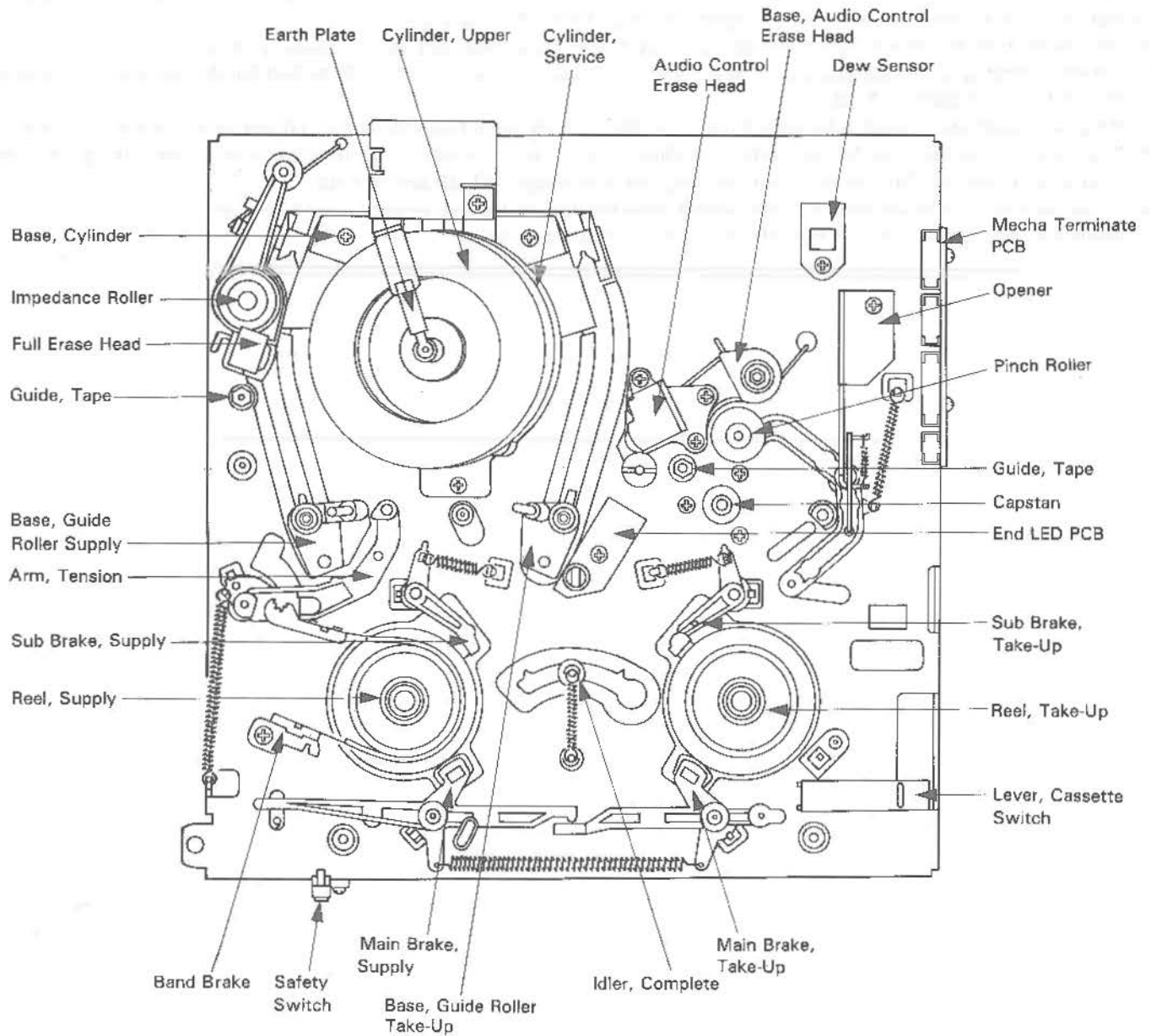


| Measuring Point                                                      | Adjustment Location                | Adjustment Value                                                                                                              | Adjustment Condition                              | Measuring Equipment                                                                                 |
|----------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| CH1: TP401 (L CH)<br>TP403 (GND)<br>CH2: TP402 (R CH)<br>TP404 (GND) | VR405 (REC LCH)<br>VR406 (REC RCH) | $220 \mu\text{Vrms} \pm 10 \mu\text{Vrms}$                                                                                    | REC (SP) mode<br>Blank tape                       | AC voltmeter (CH1, CH2)<br>Oscilloscope (CH1, CH2)<br>Signal generator (SG2)<br>Color bar generator |
| CH1: AUDIO OUTPUT terminal (L)<br>CH2: AUDIO OUTPUT terminal (R)     |                                    | $-10 \text{ dBV} \pm 1 \text{ dB}$<br>AC voltmeter's reading of CH1<br>$-1 \text{ dB} \sim +1 \text{ dB}$ between CH1 and CH2 | REC (SP) mode and<br>PLAY (SP) mode<br>Blank tape |                                                                                                     |

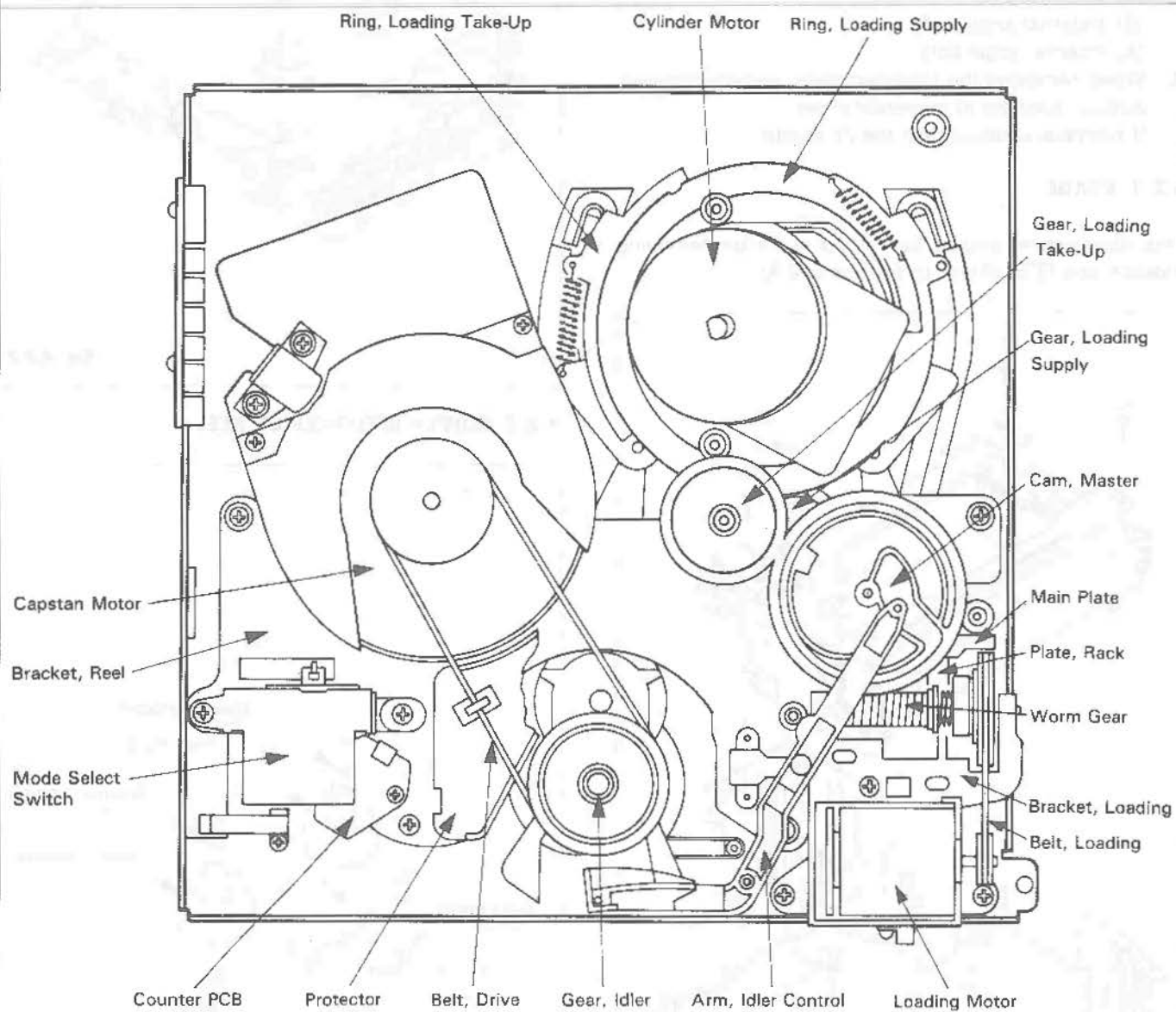
1. Connect the color bar generator (EIA color bar signal) to the VIDEO INPUT terminal.
2. Connect the signal generator (Condition: SG2) to the AUDIO INPUT terminals (L, R). (Refer to Fig. 3.4.10)
3. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to TP401, TP403 (GND), TP402 and TP404 (GND). (Refer to Fig. 3.4.10)
4. Short-circuit TP408 and TP411 (GND). (Refer to Fig. 3.4.10)
5. Load a blank tape, and set the VCR to the REC (SP) mode.
6. After confirming on the oscilloscope that a 1 kHz sine wave is being output, adjust VR405 (REC LCH) and VR406 (REC RCH) so that the AC voltmeter's readings are  $220 \mu\text{Vrms} \pm 10 \mu\text{Vrms}$  on both the L and R channels.
7. Disconnect the connections made in steps 3 through 4.
8. Connect the AC voltmeter (CH1, CH2) and the oscilloscope to the AUDIO OUTPUT terminals (L, R). (Refer to Fig. 3.4.11)
9. Set the VCR to the REC (SP) mode. Record the 1 kHz frequency signal.
10. Set the VCR to the PLAY (SP) mode and play back the signal recorded on the cassette tape in step 9.
11. After confirming on the oscilloscope that a 1 kHz sine wave is being output, confirm that the AC voltmeter's reading for CH1 is  $-10 \text{ dBV} \pm 1 \text{ dB}$ .
12. If the AC voltmeter's reading for CH1 is not  $-10 \text{ dBV} \pm 1 \text{ dB}$ , adjust VR405 (REC LCH) and repeat steps 9 through 11.
13. After confirming that the AC voltmeter's reading for CH1 is  $-10 \text{ dBV} \pm 1 \text{ dB}$ , confirm that the difference in the voltmeter's readings for the CH1 and CH2 signals is between  $+1 \text{ dB}$  and  $-1 \text{ dB}$ .
14. If the difference is more than  $\pm 1 \text{ dB}$ , adjust VR406 (REC RCH) and repeat steps 9 through 10.
15. Repeat steps 13 and 14 until the difference is less than  $\pm 1 \text{ dB}$ .

## 4. MECHANICAL DISASSEMBLY

### 4.1 MECHANICAL PARTS LOCATIONS



(TOP VIEW)



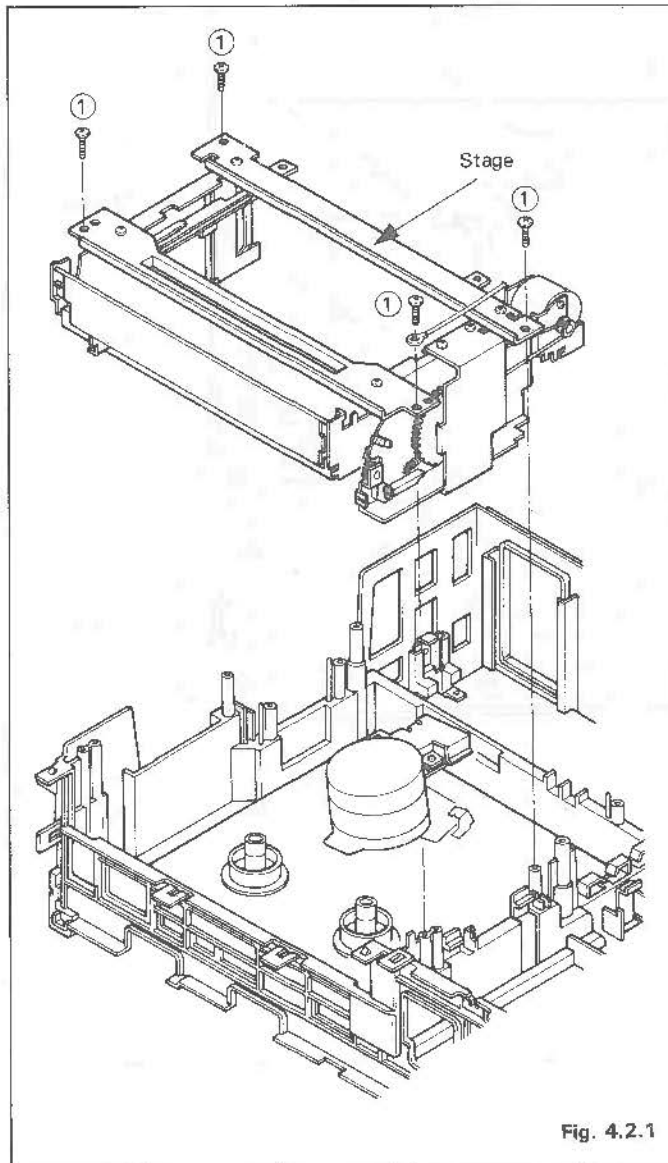
(BOTTOM VIEW)

## 4.2 MAIN MECHANICAL PARTS DISASSEMBLY

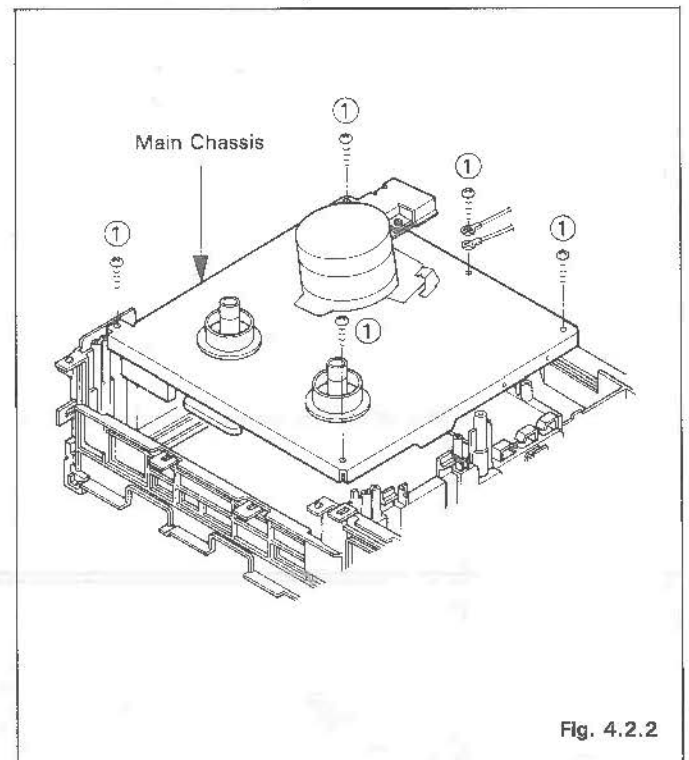
1. When disassembling the unit, making replacements or adjustments, or cleaning parts, set the power switch to OFF before proceeding.
2. The following parts were secured after having been adjusted at the manufacturing plant with precision jigs. These parts should not be removed or adjusted since this will make the tape running adjustments more difficult to perform.
  - (1) Cylinder base
  - (2) Catcher pole
  - (3) External angle pole
  - (4) Internal angle pole
3. When removing the following parts, remove screws, nuts or washers in numerical order.  
If necessary, disconnect the connectors.

### 4.2.1 STAGE

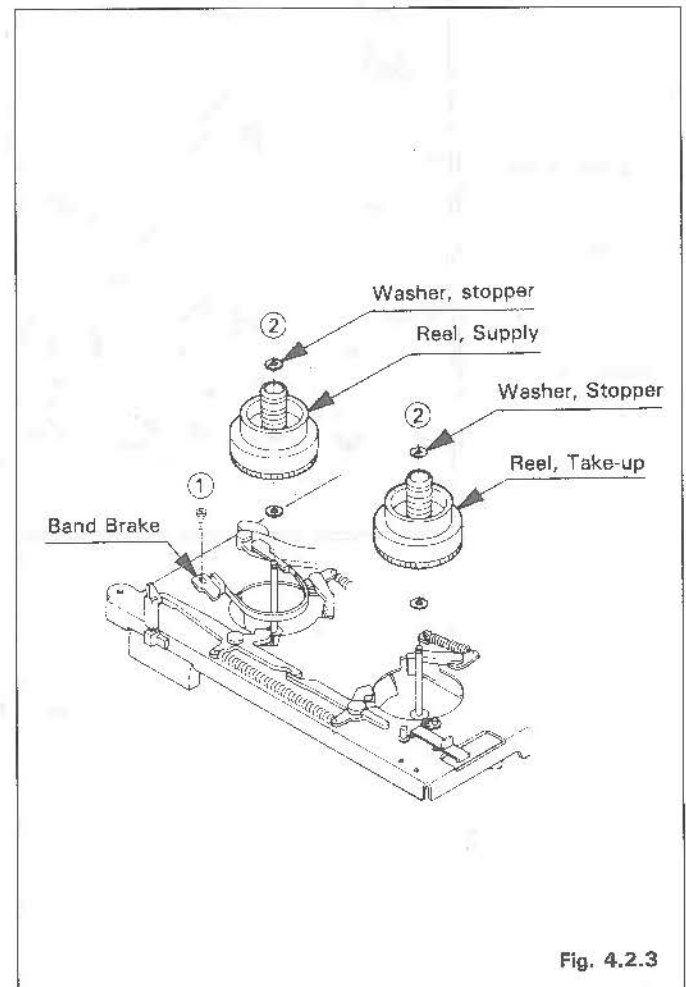
This disassembly should be carried out after removing Video/Audio PCB. (Refer to Section 2.2.4)



### 4.2.2 MAIN CHASSIS

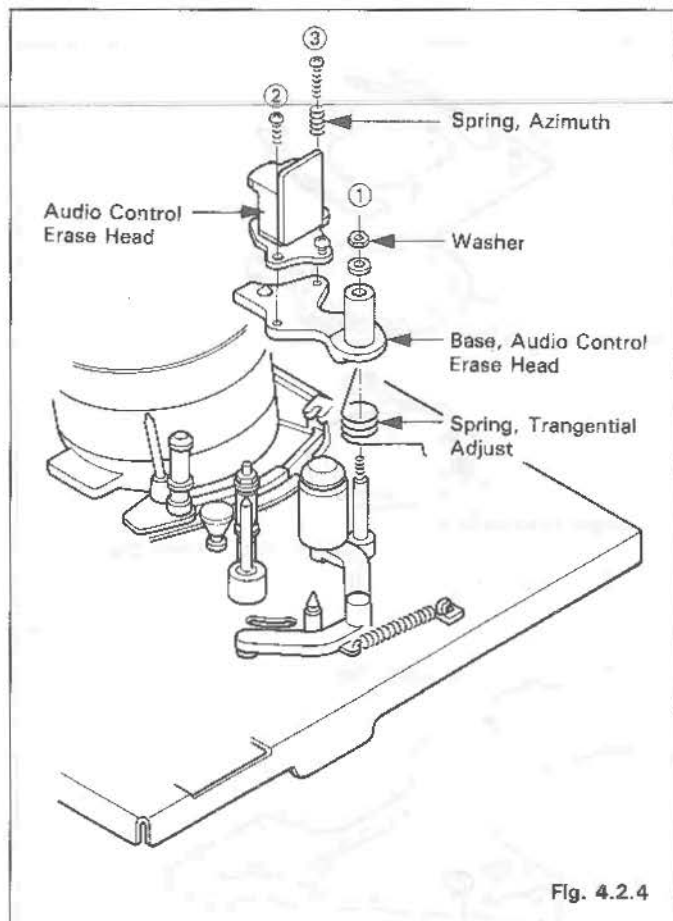


### 4.2.3 SUPPLY REEL/TAKE-UP REEL



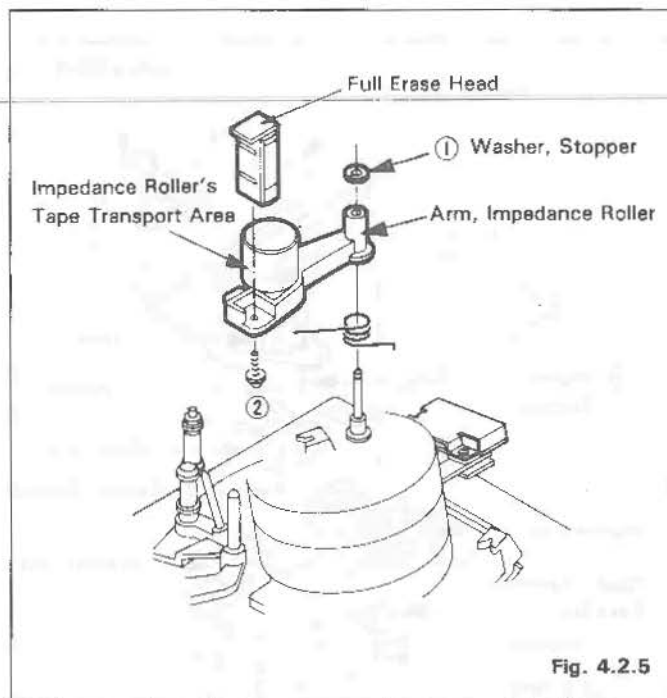
#### 4.2.4 AUDIO CONTROL ERASE HEAD

**Note:** To prevent deformation when the audio control erase head is installed, it should be reinstalled with the screws and the nuts in the order ③, ②, ①. (Refer to Fig. 4.2.4)

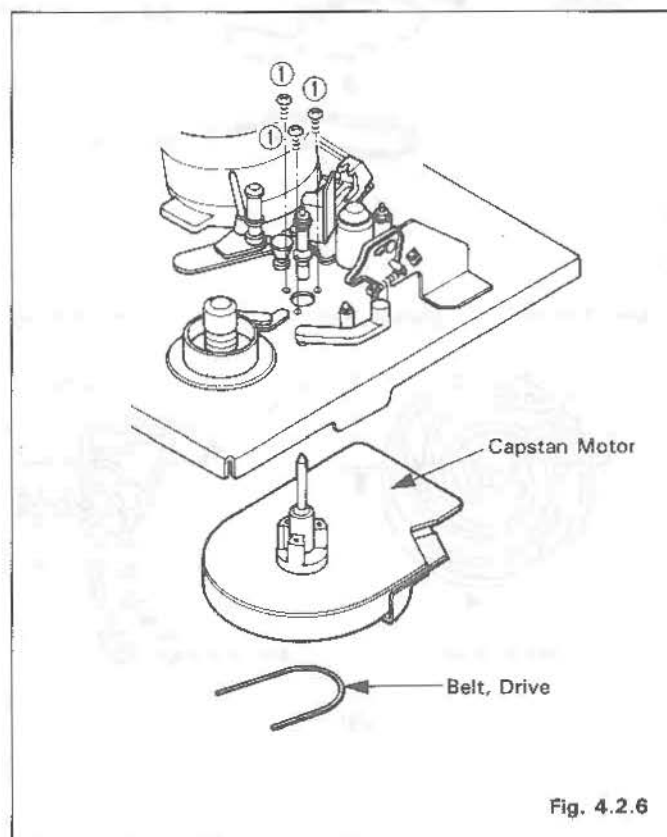


#### 4.2.5 FULL ERASE HEAD

**Note:** Do not touch the tape transport area of the impedance roller with bare hands. If you do, clean it with cleaning fluid and chamois.



#### 4.2.6 CAPSTAN MOTOR



#### 4.2.7 IDLER/IDLER GEAR

1. This disassembly should be carried out after removing the capstan motor.
2. When reassembling, install so that the tension arm is properly aligned with the master cam and the pinch roller are properly aligned with the actuator cam as illustrated. (Refer to Fig. 4.2.7.B)
3. Make sure that the cams and gears are reinstalled in the appropriate positions. (Refer to Fig. 4.2.7.C.D.E)

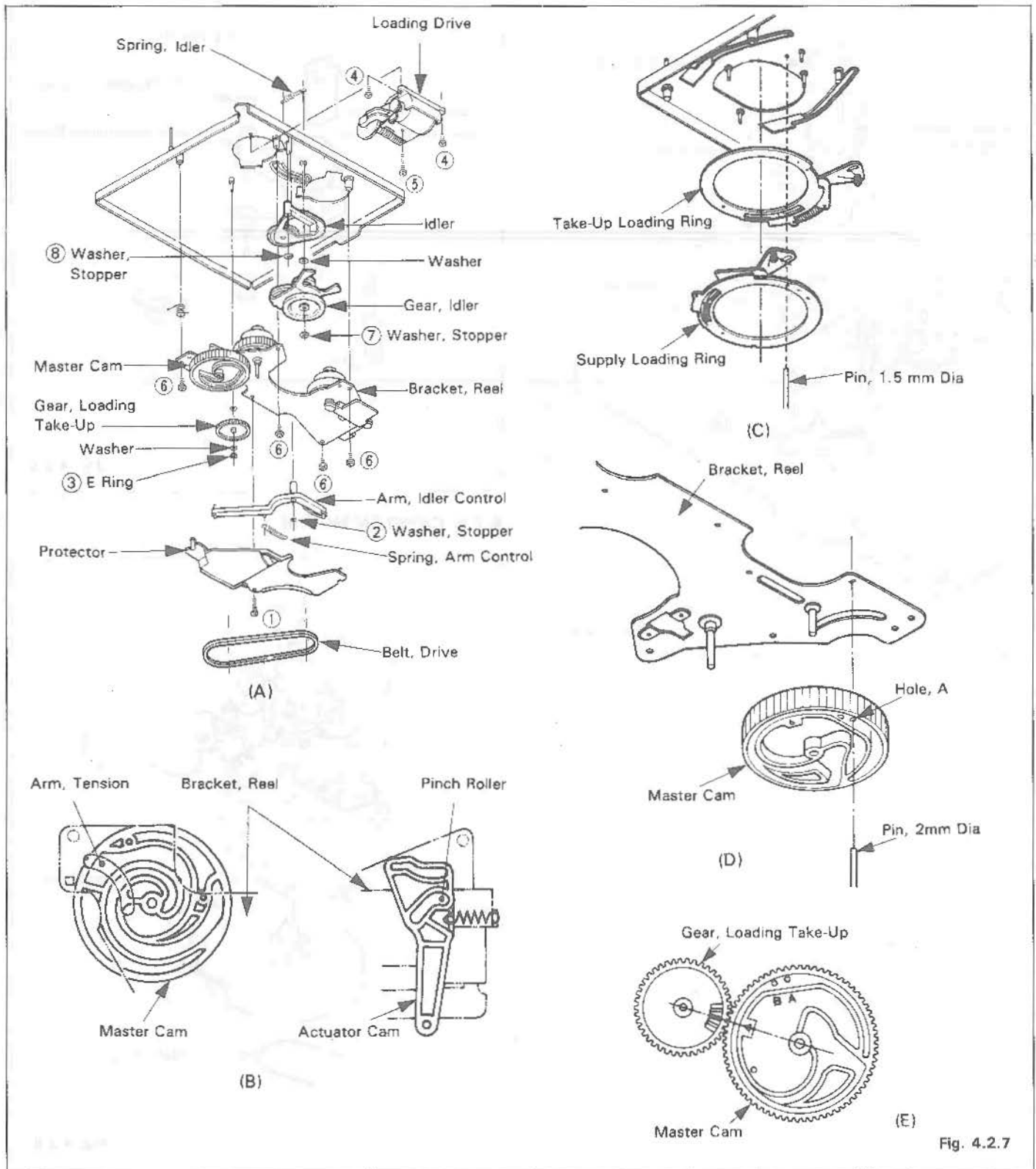
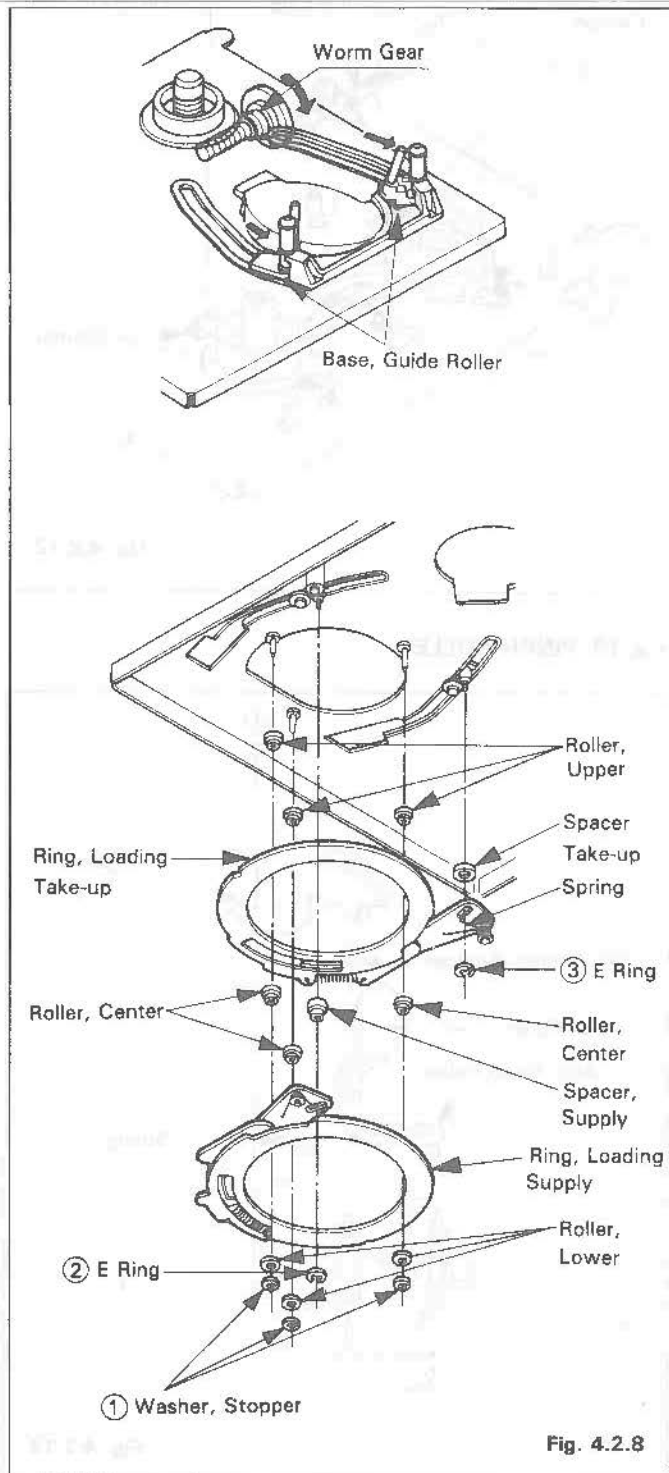


Fig. 4.2.7

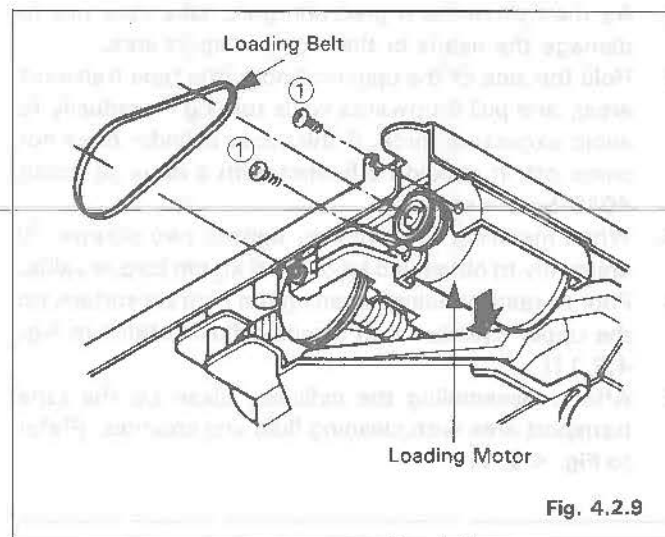
#### 4.2.8 LOADING RING

1. Move the base guide roller in the direction of the small arrows by rotating the worm gear in the direction of the large arrow.
2. This disassembly should be carried out after removing the drive belt, the protector and the take-up loading gear. (Refer to Fig. 4.2.7.A)
3. When reassembling, make sure that the loading rings are reinstalled in the appropriate positions. (Refer to Fig. 4.2.7.B)

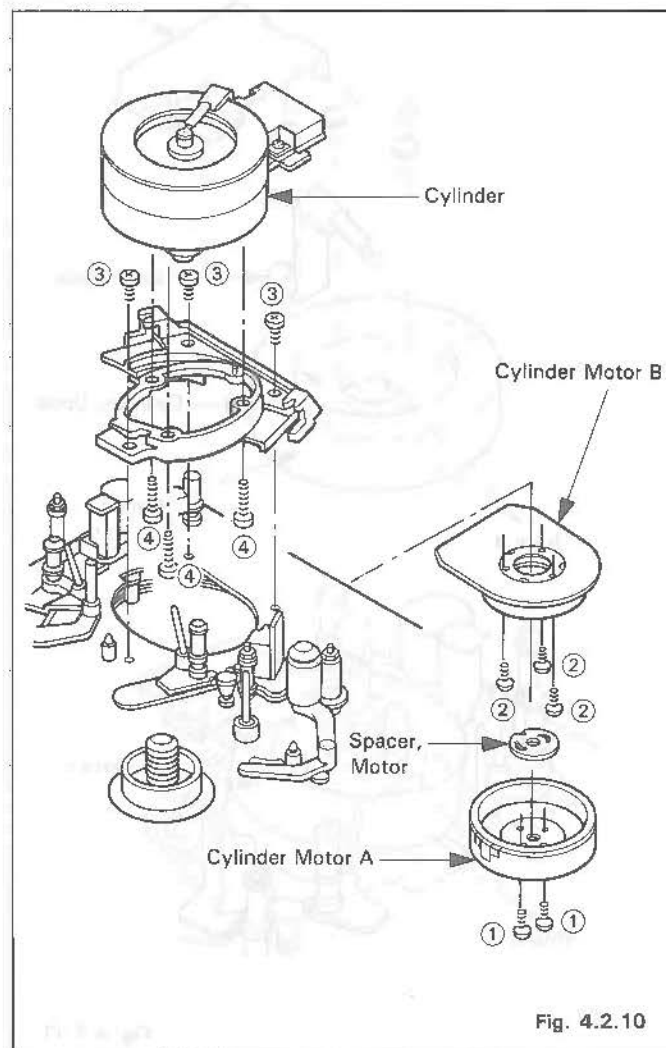


#### 4.2.9 LOADING MOTOR

This disassembly should be carried out after removing the main chassis.



#### 4.2.10 CYLINDER



#### 4.2.11 UPPER CYLINDER

Prior to removing the upper cylinder, remove the soldered connection of the four lead wires inside the upper cylinder.

##### Notes:

1. As the cylinder is a precision part, take care not to damage the heads or the tape transport area.
2. Hold the side of the upper cylinder (the tape transport area), and pull it upwards while turning it gradually to avoid excessive force. If the upper cylinder does not come off, it should be heated with a dryer to about 40°C before removal.
3. When installing the cylinder, tighten two screws ③ uniformly to obtain a 5 kg-cm to 6 kg-cm torque value.
4. Prior to reassembling, clean up the contact surface on the upper cylinder with cleaning fluid. (Refer to Fig. 4.2.11)
5. After reassembling the cylinder, clean up the tape transport area with cleaning fluid and chamois. (Refer to Fig. 4.2.11)

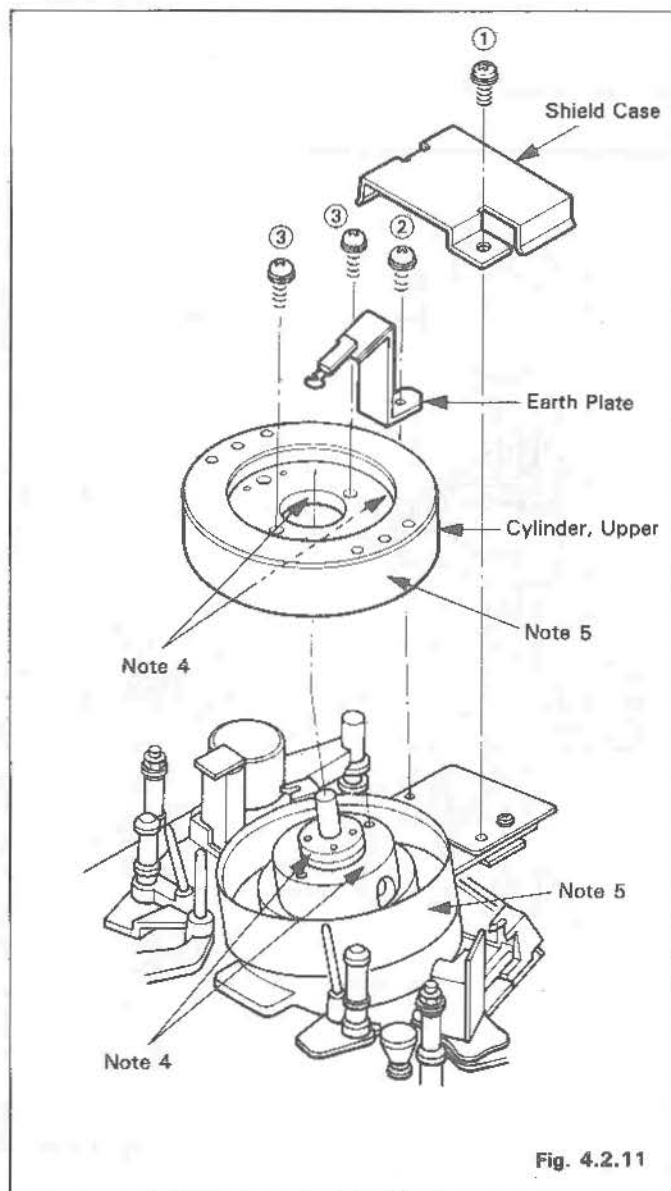


Fig. 4.2.11

#### 4.2.12 MAIN BRAKE/SUB BRAKE

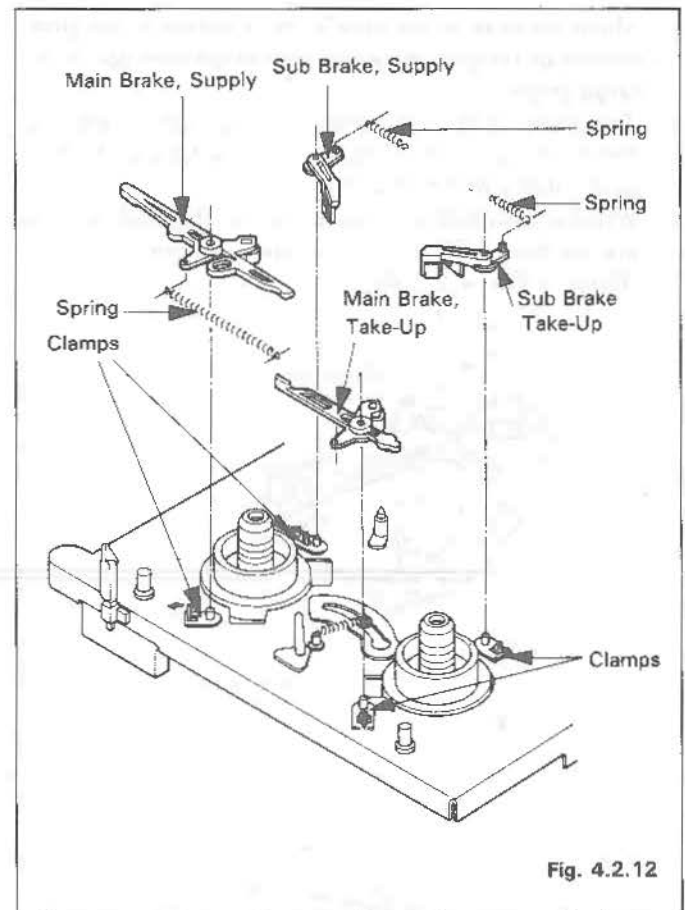


Fig. 4.2.12

#### 4.2.13 PINCH ROLLER

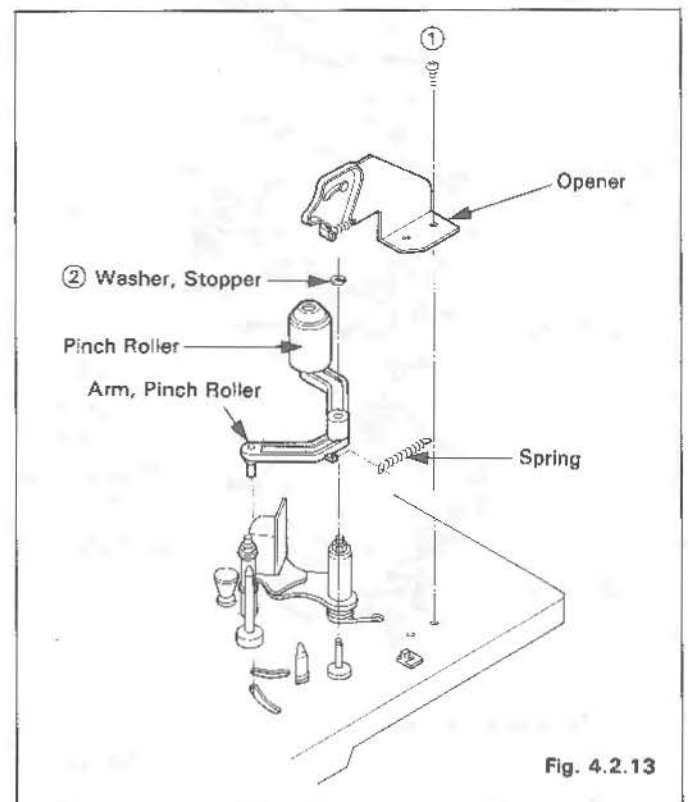
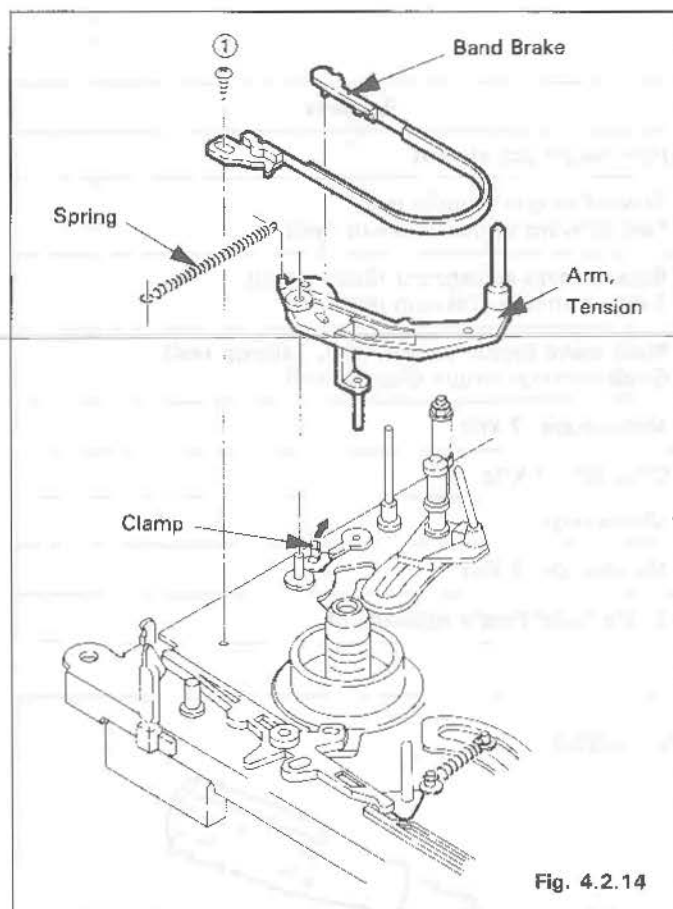


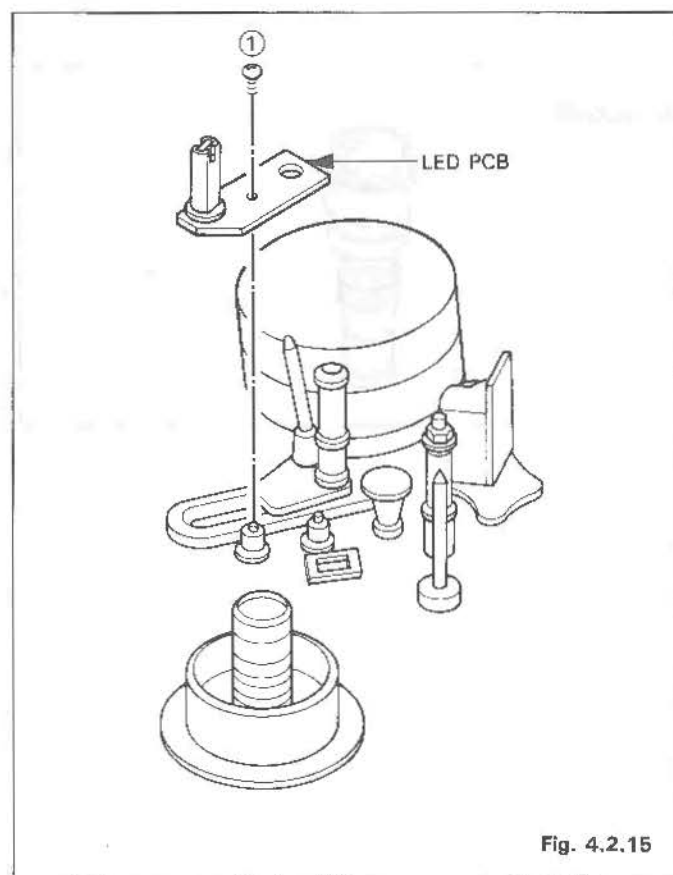
Fig. 4.2.13

#### 4.2.14 TENSION ARM/BAND BRAKE



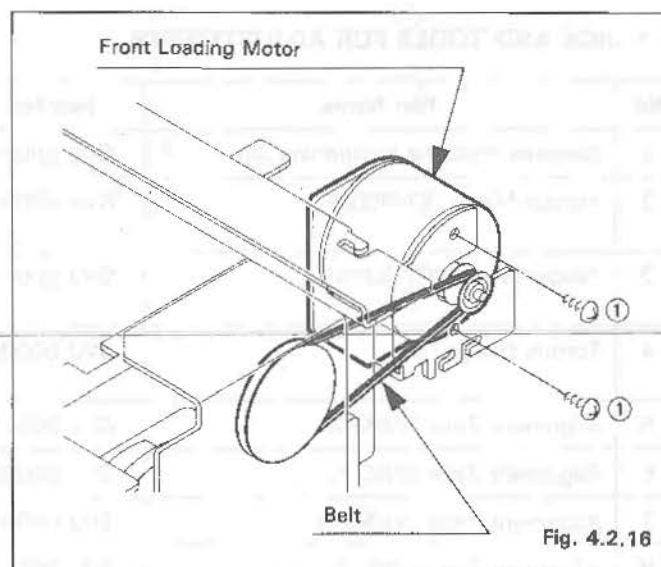
**Fig. 4.2.14**

#### 4.2.15 END LED PCB



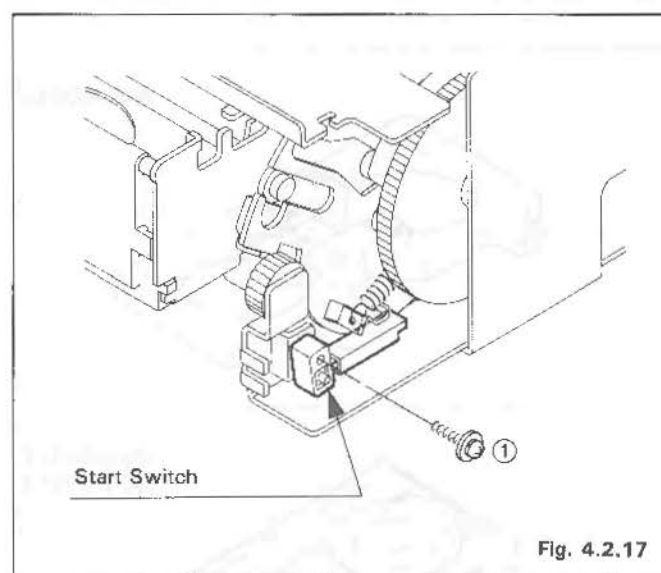
**Fig. 4.2.15**

#### 4.2.16 FRONT LOADING MOTOR



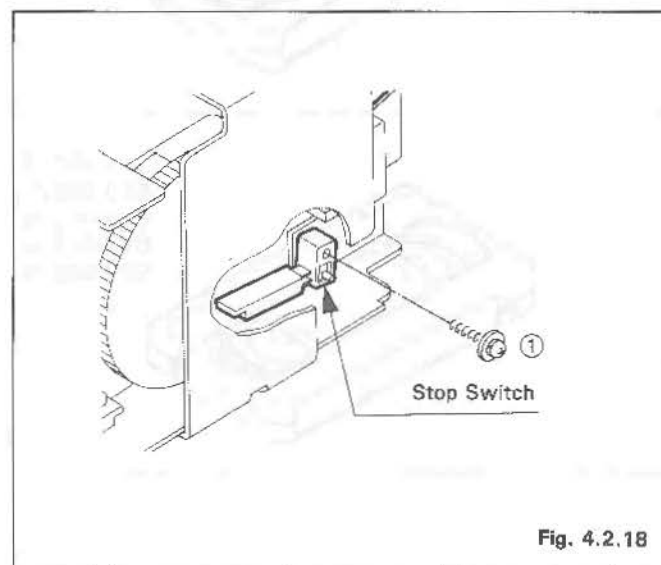
**Fig. 4.2.16**

#### 4.2.17 START SWITCH



**Fig. 4.2.17**

#### 4.2.18 STOP SWITCH

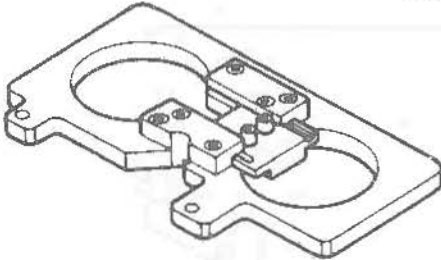
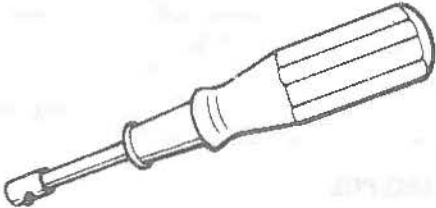
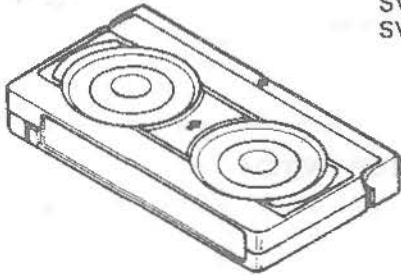
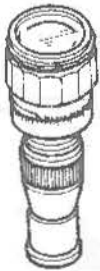
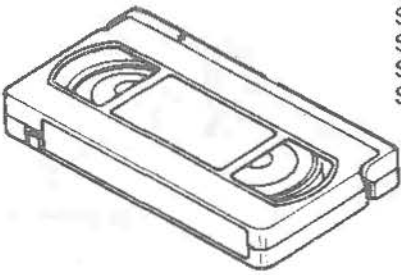


**Fig. 4.2.18**

## 5. MECHANICAL ADJUSTMENT

### 5.1 JIGS AND TOOLS FOR ADJUSTMENTS

| No. | Part Name                        | Part No.  | Remarks                                                                             |
|-----|----------------------------------|-----------|-------------------------------------------------------------------------------------|
| 1   | Cassette Housing Positioning Jig | SVJ-00010 | Reel height adjustment                                                              |
| 2   | Torque Meter (KT-300FF)          | SVJ-00011 | Rewind torque (Supply reel)<br>Fast forward torque (Take-up reel)                   |
| 3   | Torque Meter (KT-300NV)          | SVJ-00012 | Back tension adjustment (Supply reel)<br>Take-up torque (Take-up reel)              |
| 4   | Torque Gauge                     | SVJ-00020 | Main brake torque (Supply reel, Take-up reel)<br>Slack removal torque (Supply reel) |
| 5   | Alignment Tape (VNM-7)           | SVJ-00027 | Monoscope, 7 kHz                                                                    |
| 6   | Alignment Tape (VNC-1)           | SVJ-00028 | Color Bar, 1 kHz                                                                    |
| 7   | Alignment Tape (VNME0)           | SVJ-00030 | Monoscope                                                                           |
| 8   | Alignment Tape (VNL-7)           | SVJ-00034 | Monoscope, 7 kHz                                                                    |
| 9   | Adjustment Driver                | SVJ-00040 | Guide Roller height adjustment                                                      |

|                                                                                                                                                              |                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|  <p>SVJ-00010</p>                                                          |  <p>SVJ-00040</p>   |
|  <p>SVJ-00011<br/>SVJ-00012</p>                                           |  <p>SVJ-00020</p> |
|  <p>SVJ-00017<br/>SVJ-00027<br/>SVJ-00028<br/>SVJ-00030<br/>SVJ-00034</p> |                                                                                                        |

## 5.2 ADJUSTMENTS

### 5.2.1 REEL HEIGHT

1. Mount the cassette housing positioning jig and slide the gauge on the jig in the directions marked by the arrows. (Refer to Fig. 5.2.1.(A))
2. The reel height is adjusted by changing the thickness of the washer.
3. Adjust the reel height so that the reel slides under surface A of the gauge but is stopped by surface B. (Refer to Fig. 5.2.1.(B))
4. If the reel does not slide under surface A, change the washer thickness by using POLYSLIDER washer 0.5 or 0.3. The POLYSLIDER washer 0.4 is inserted at the factory.
5. Perform the same adjustment for the other reel.

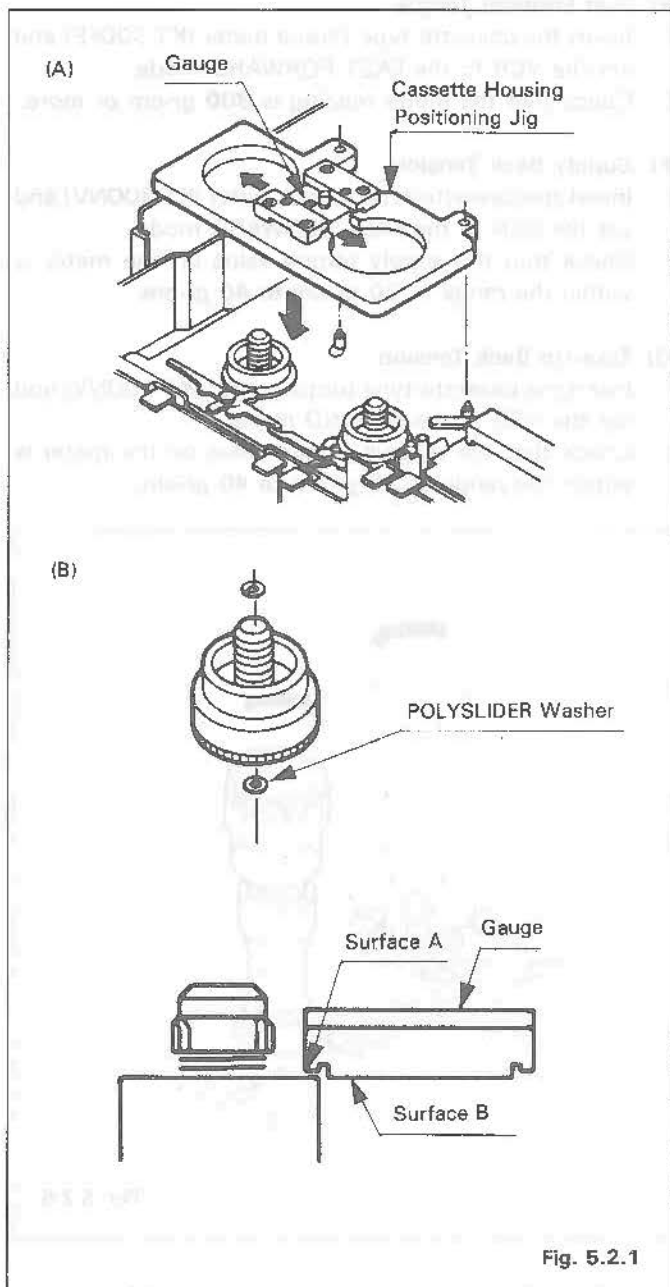


Fig. 5.2.1

### 5.2.2 BACK TENSION

1. Insert the torque meter (KT-300NV).
2. Set the VCR to the PLAY mode.
3. Measure the tension on the supply reel with a cassette-type torque meter (KT-300NV). The tension should be **35 gr-cm to 45 gr-cm**.
4. If necessary, loosen the back tension adjustment screw, and adjust the position of the band brake to obtain the required tension value. (Refer to Fig. 5.2.2)
5. Retighten the screw when the required tension has been obtained.

**Note:** The VCR should be placed horizontally for the back tension measuring procedure.

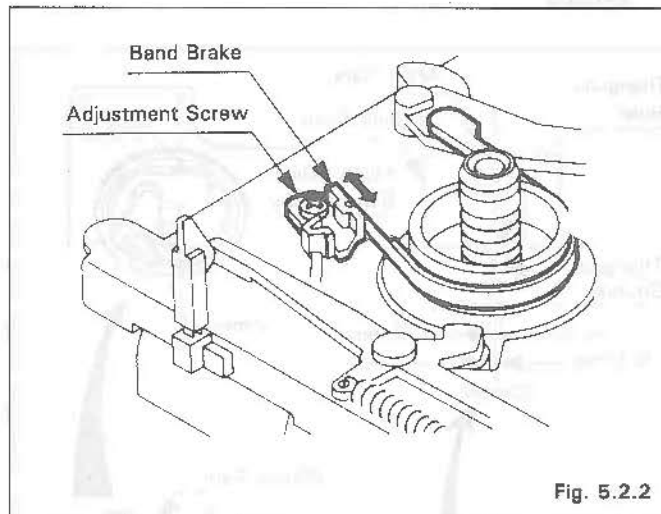


Fig. 5.2.2

### 5.2.3 PINCH ROLLER POSITION

1. Set the VCR to the RECORD PAUSE mode.
2. Measure the clearance between the capstan and the pinch roller. It should be **0.8 mm  $\pm$  0.2 mm**. (Refer to Fig. 5.2.3)
3. If necessary, adjust the clearance by turning the main plate adjustment screw.

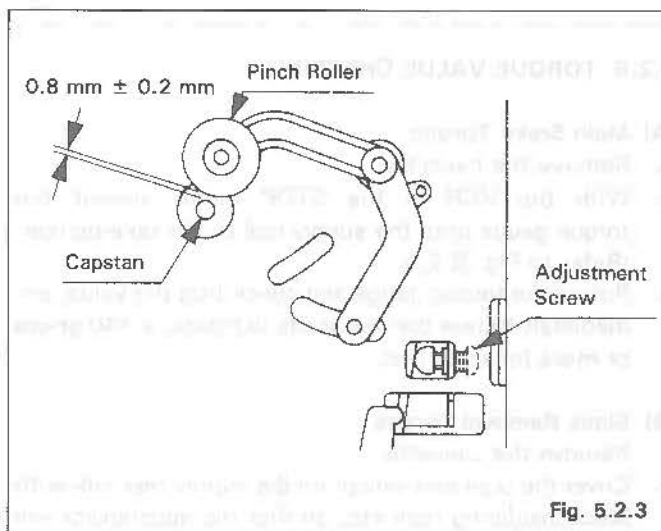


Fig. 5.2.3

#### 5.2.4 MODE SELECT SWITCH POSITION

1. Match the 2 mm dia. hole A on the master cam and the oval hole on the reel bracket. (Refer to Fig. 5.2.4)
2. Insert the pin (2 mm dia.) through the two holes to secure the master cam and the reel bracket in place.
3. Loosen the two screws securing the mode select switch.
4. Adjust the switch body so that the triangular hole on the slide knob matches the triangular groove on the switch body. (Refer to Fig. 5.2.4)
5. After confirming that the distance between the slide knob and the center of the triangular mark on the switch body is less than 0.2 mm, retighten the two mounting screws.

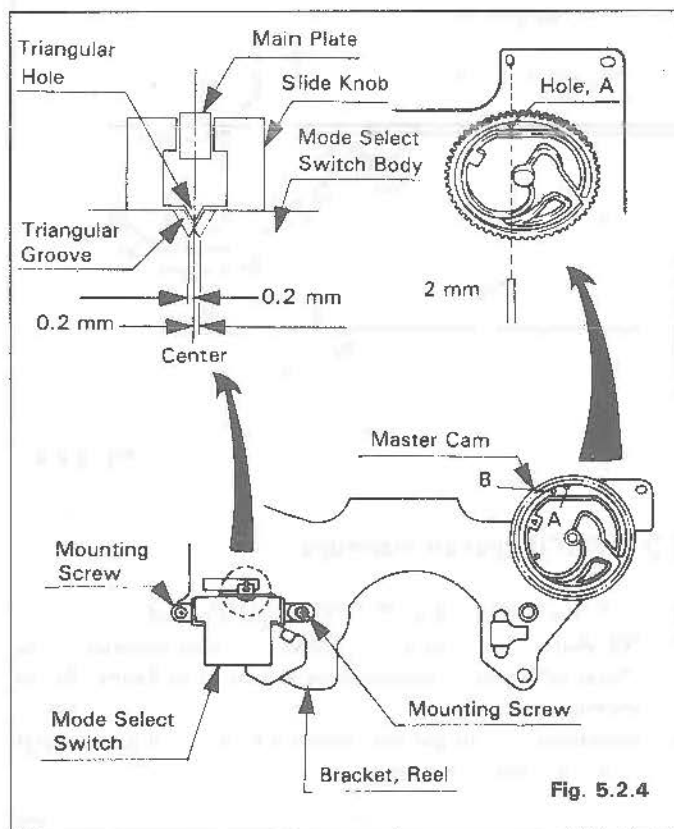


Fig. 5.2.4

#### 5.2.5 TORQUE VALUE CHECKING

##### (A) Main Brake Torque

1. Remove the cassette.
2. With the VCR in the STOP mode, mount the torque gauge onto the supply reel or the take-up reel. (Refer to Fig. 5.2.5)
3. Rotate the torque gauge and check that the value, immediately before the reel starts to rotate, is 140 gr-cm or more for each reel.

##### (B) Slack Removal Torque

1. Remove the cassette.
2. Cover the tape end sensor on the supply reel side with black insulating tape etc., so that the mechanism will operate without inserting a cassette.

3. Set the VCR to the PLAY mode and mount the torque gauge onto the supply reel.
4. Press the STOP button and check that the value (until unloading is completed), is within the range of 110 gr-cm to 180 gr-cm.

##### (C) Rewind Torque

1. Insert the cassette-type torque meter (KT-300FF) into the stage and set the VCR to the REWIND mode.
2. Check that the reading on the meter is 800 gr-cm or more.

##### (D) Take-Up Torque

1. Insert the cassette-type torque meter (KT-300NV) and set the VCR to the PLAY mode.
2. Check that the take-up torque value on the meter is within the range of 100 gr-cm to 200 gr-cm.

##### (E) Fast Forward Torque

1. Insert the cassette-type torque meter (KT-300FF) and set the VCR to the FAST FORWARD mode.
2. Check that the meter reading is 800 gr-cm or more.

##### (F) Supply Back Tension

1. Insert the cassette-type torque meter (KT-300NV) and set the VCR to the FAST FORWARD mode.
2. Check that the supply torque value on the meter is within the range of 20 gr-cm to 40 gr-cm.

##### (G) Take-Up Back Tension

1. Insert the cassette-type torque meter (KT-300NV) and set the VCR to the REWIND mode.
2. Check that the take-up torque value on the meter is within the range of 20 gr-cm to 40 gr-cm.

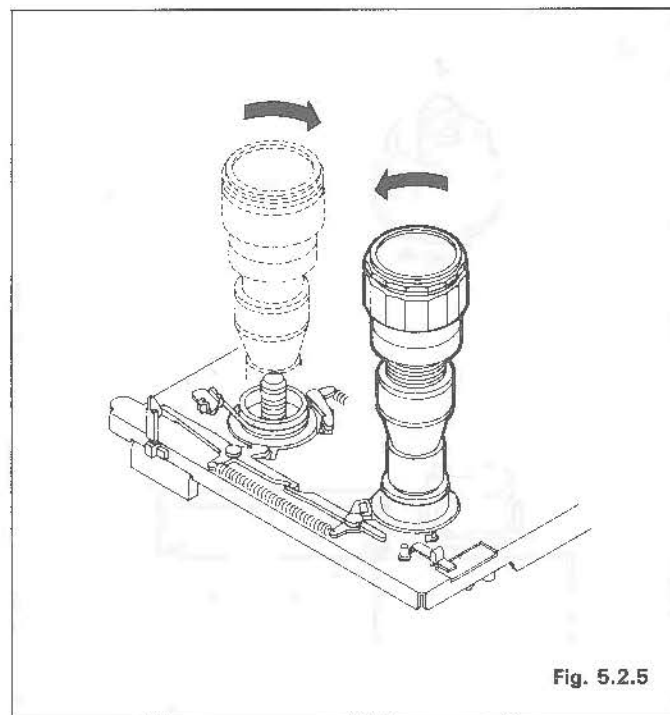
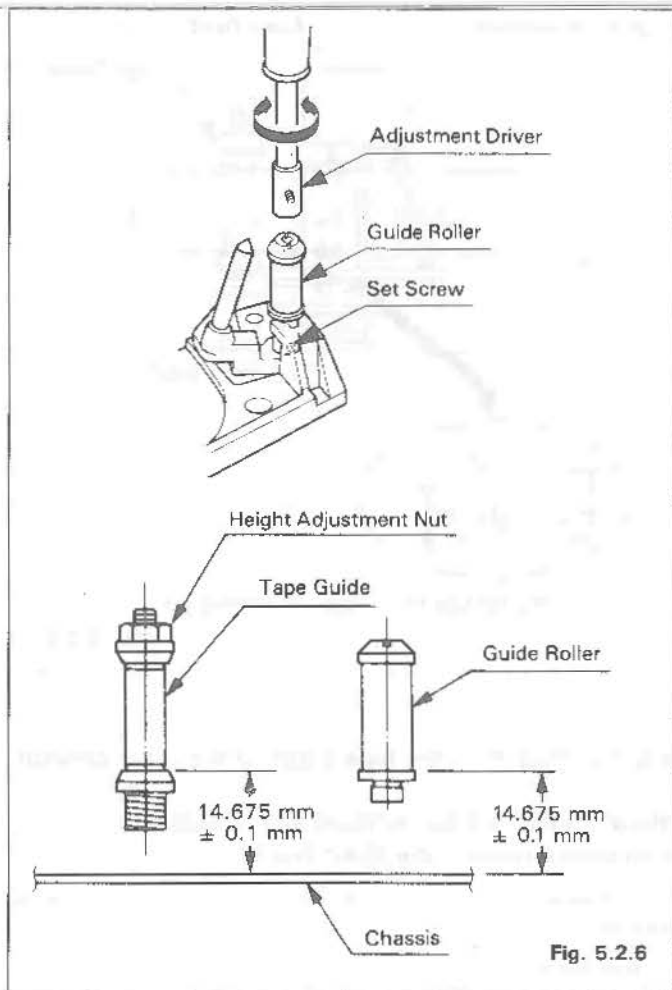


Fig. 5.2.5

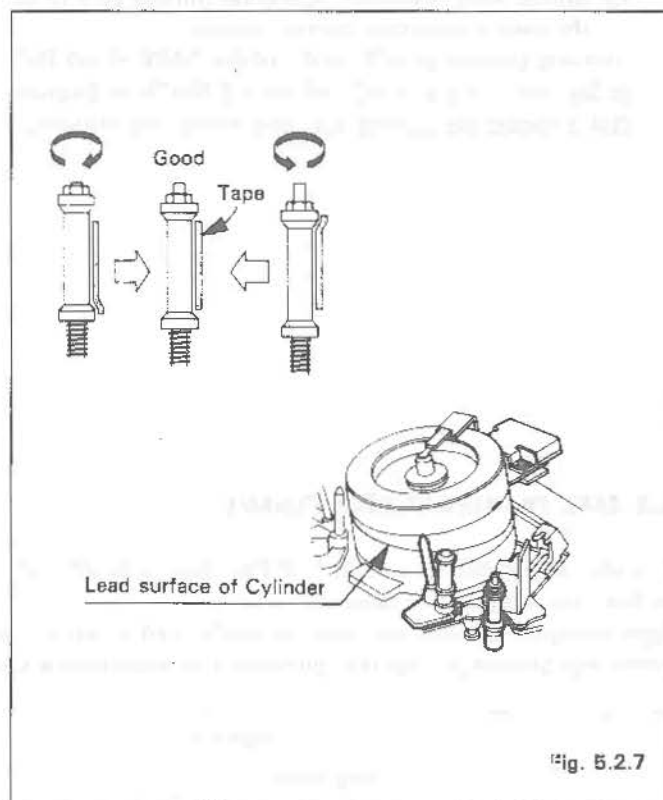
### 5.2.6 GUIDE ROLLER/TAPE GUIDE HEIGHT

1. Insert the Adjustment Driver into the top of the guide roller. Adjust the height of each of the two guide rollers by turning the Adjustment Driver slightly. Adjust for a Guide Roller height of  $14.675 \text{ mm} \pm 0.1 \text{ mm}$  from the upper surface of the chassis. (Refer to Fig. 5.2.6)
2. Adjust the height of each of the two tape guides using the Height Adjustment Nuts. Adjust for a Tape Guide height of  $14.675 \text{ mm} \pm 0.1 \text{ mm}$  from the upper surface of the chassis. (Refer to Fig. 5.2.6)



### 5.2.7 TAPE CURL

1. Set up and start running a blank tape (T-160 type) in the PLAY mode.
2. Make sure that the tape does not develop a curl in the guide roller and the tape guide area (perform a visual inspection), by adjusting the height. (Refer to Fig. 5.2.7)
3. The height adjustment shall be made in the following order.
  - (1) Tape Guide (entrance side)
  - (2) Guide Roller (entrance side)
  - (3) Guide Roller (exit side)
  - (4) Tape Guide (exit side)
4. Adjust the guide rollers (step 3) so that the tape runs along the leader edge on the cylinder.
5. If the proper tape running position has not been obtained, repeat steps 3 through 4.



### 5.2.8 AUDIO CONTROL ERASE HEAD

These adjustments should be carried out prior to the adjustment of the PLAY MODE TRACKING in Section 3.2.4 and the X VALUE adjustment in Section 3.2.5.

1. Load a recorded tape and set the VCR to the PLAY mode.
2. Adjust the height of the edge of the audio track on the audio control erase head, using the Height Adjustment Nut and the Tilt Adjustment Screw, so that the tape transport is smooth at the take-up tape guide. Align the audio control erase head height. (Refer to Fig. 5.2.8) Do not turn the Tilt Adjustment Screw more than  $90^\circ$ .
3. The fine adjustment is not required at this time. The following conditions are sufficient:
  - a) Proper tape transport between the audio control erase head and the take-up side tape guide.
  - b) Stable SERVO system operation (proper pickup of the tape's recorded control signal).

The Adjustments of ACE HEAD HEIGHT/ACE HEAD TILT in Section 3.4.2 and ACE HEAD AZIMUTH in Section 3.4.3 should be carried out after these adjustments.

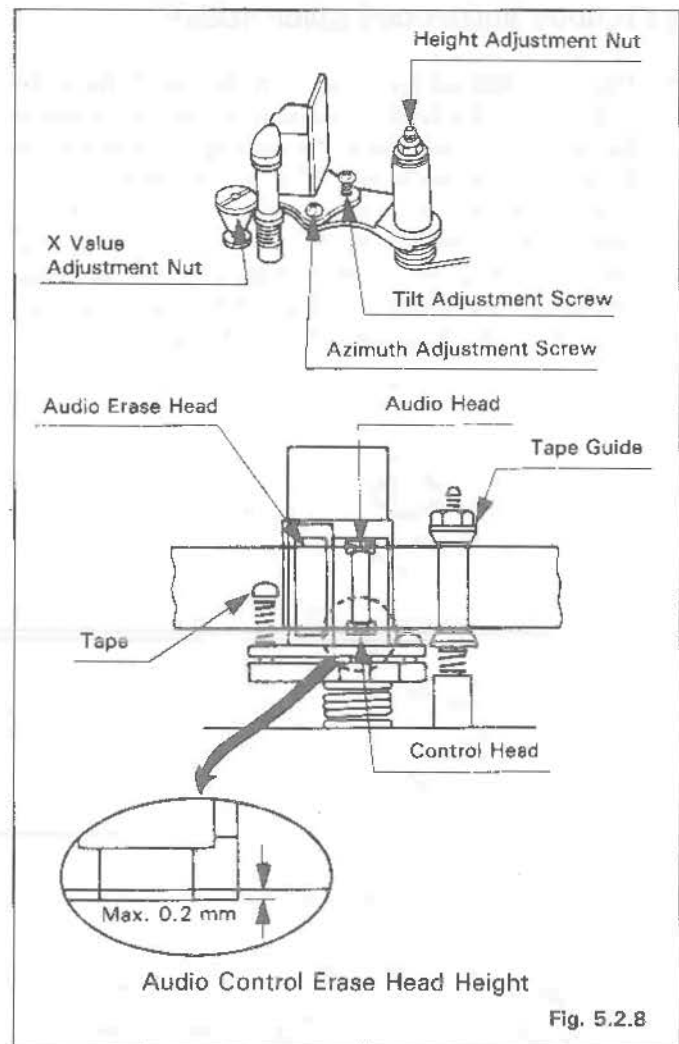


Fig. 5.2.8

### 5.3 TAPE TRANSPORT ADJUSTMENT

It is very important for a VCR that the tape runs without creasing or curling, from the tape outlet of the video cassette to the tape inlet of the cassette.

Tape transport adjustment must be performed when the parts shown in Fig. 5.3 are removed and refitted. When adjustment is required, perform it in accordance with the sequence given in the chart below:

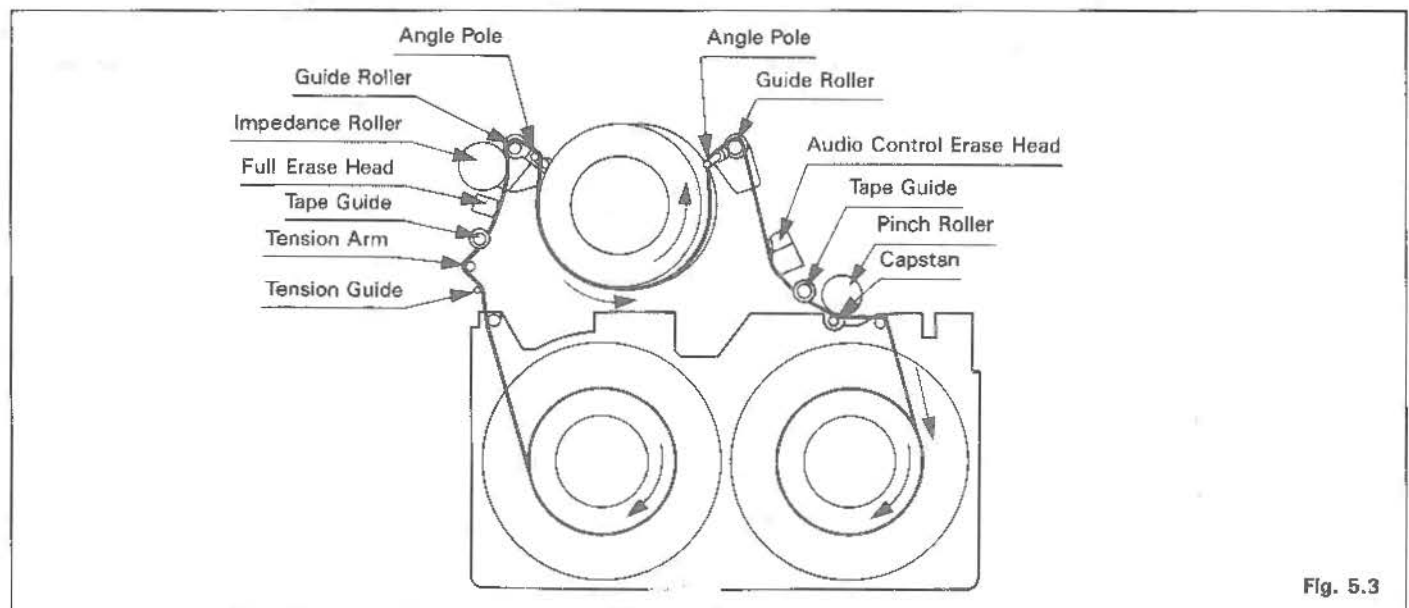
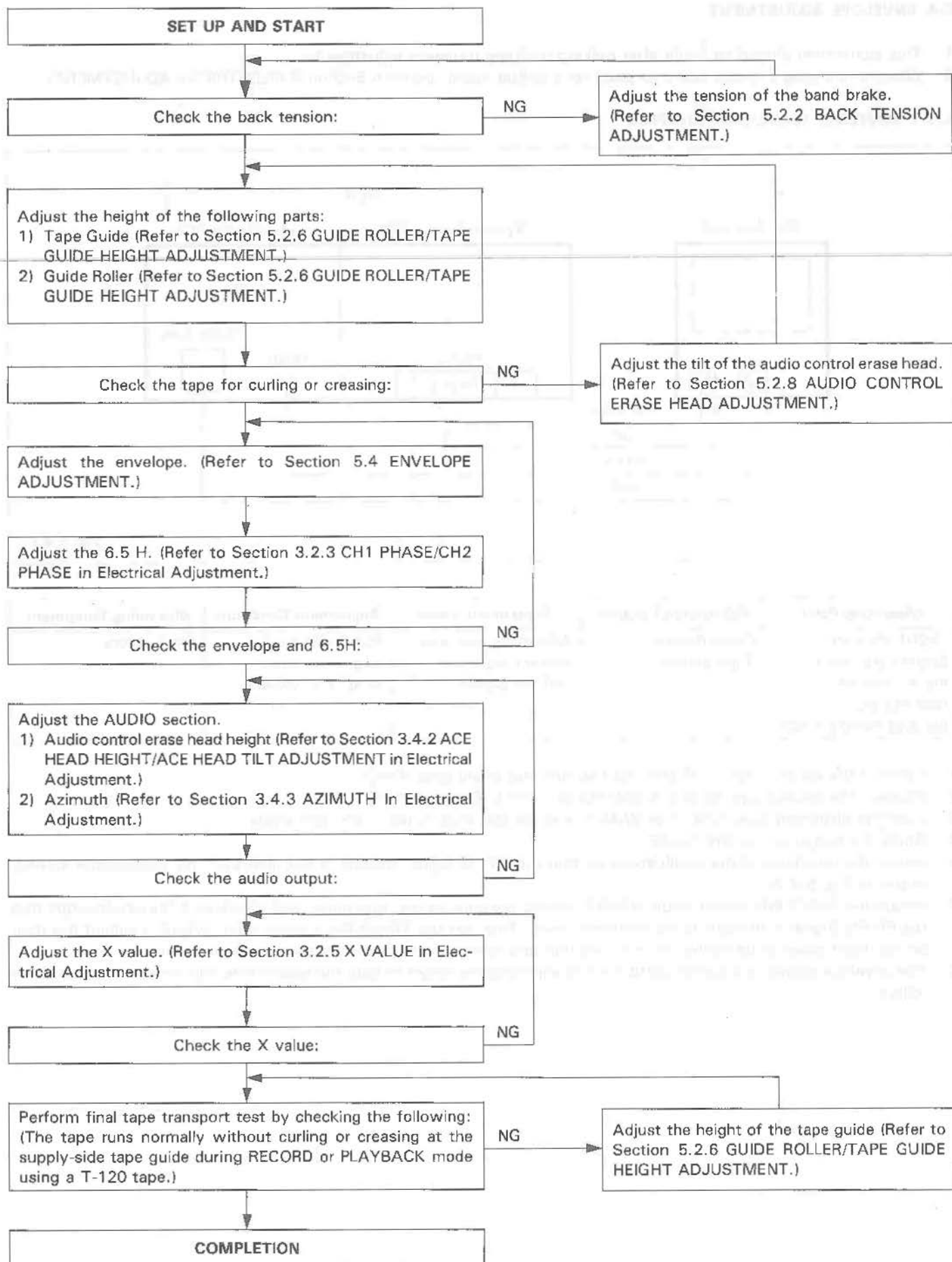


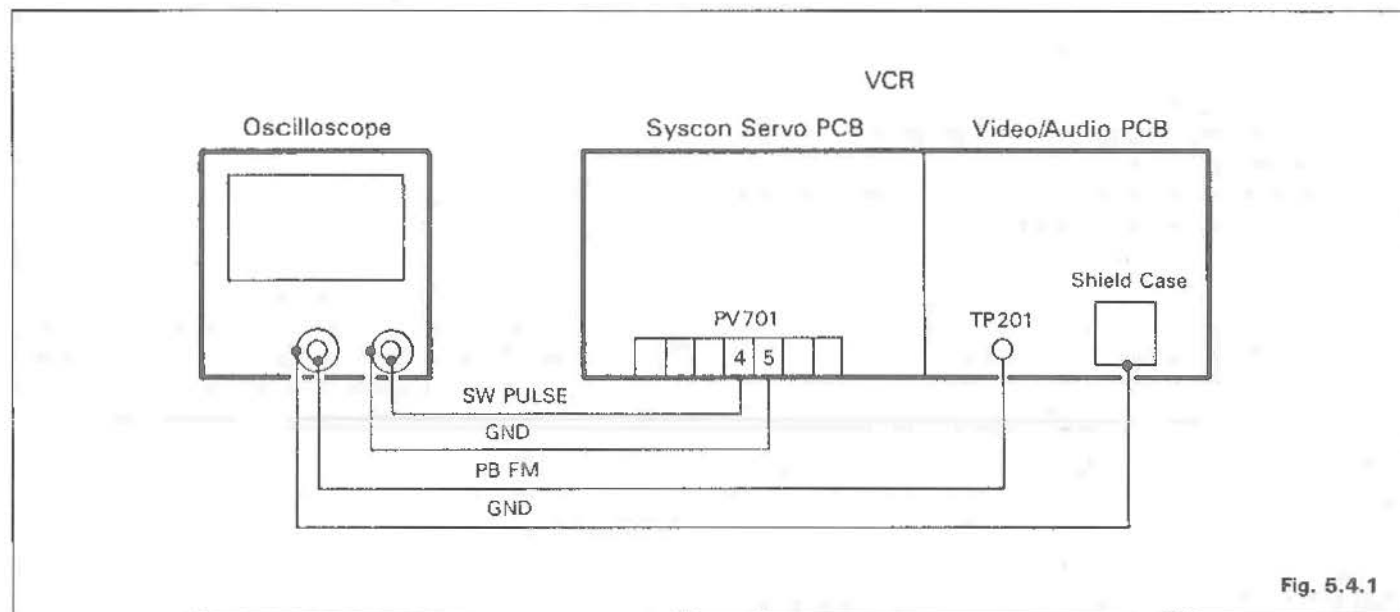
Fig. 5.3



## 5.4 ENVELOPE ADJUSTMENT

1. This adjustment should be made after making the tape transport adjustments.
2. When exchanging a circuit board or parts on a circuit board, perform Section 3 (ELECTRICAL ADJUSTMENT).

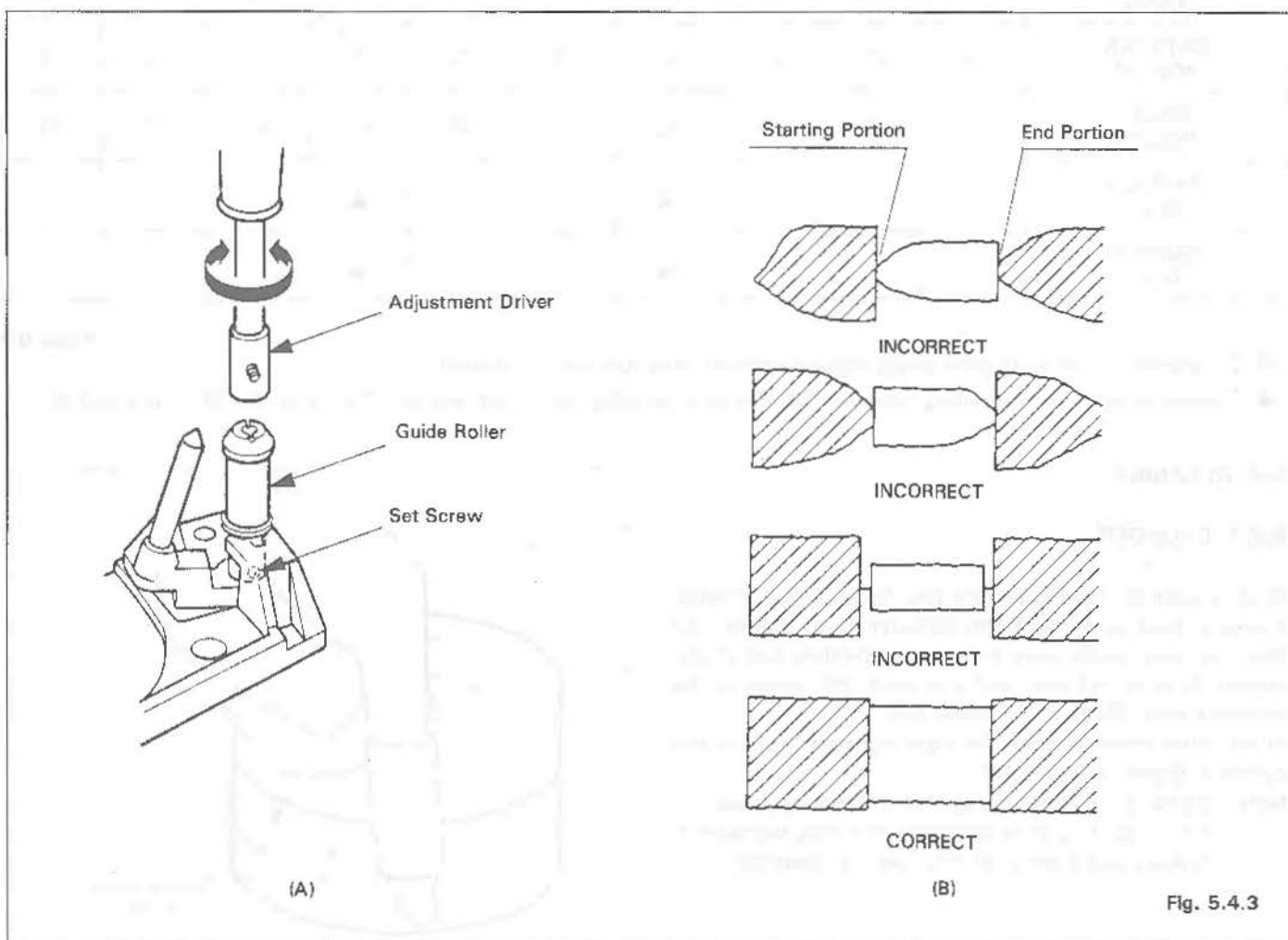
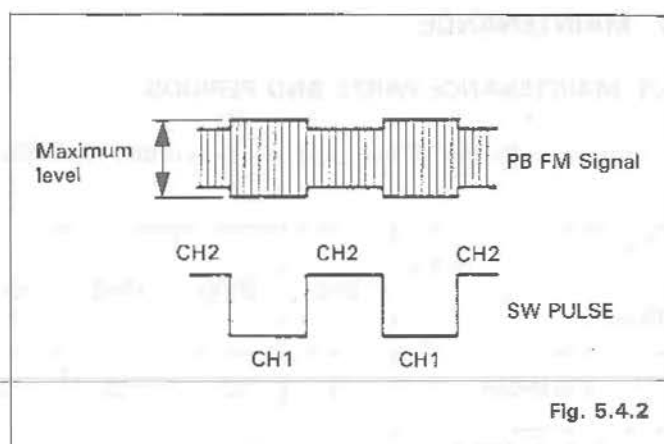
### 5.4.1 ENVELOPE WAVEFORM SHAPING



| Measuring Point                                                                            | Adjustment Location          | Adjustment Value                                        | Adjustment Condition                                 | Measuring Equipment |
|--------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------|------------------------------------------------------|---------------------|
| TP201 (PB FM)<br>Shield case (GND)<br>Pin 4 of PV701<br>(SW PULSE)<br>Pin 5 of PV701 (GND) | Guide Rollers<br>Tape Guides | Maximum level and<br>correct waveform<br>(PB FM Signal) | PLAY (SP) mode<br>Alignment tape<br>(VNL-7 or VNM-7) | Oscilloscope        |

1. Connect the oscilloscope to TP201 (PB FM) and the shield case (GND).
2. Connect the oscilloscope to pins 4 (SW PULSE) and 5 (GND) of PV701.
3. Load the alignment tape (VNL-7 or VNM-7) and set the VCR to the PLAY (SP) mode.
4. Apply the trigger at the SW PULSE.
5. Adjust the time base of the oscilloscope so that the PB FM Signal appears in two fields on the oscilloscope screen. (Refer to Fig. 5.4.2)
6. Rotate the TRACKING control knob (VR581) behind the door on the front panel, and check with the oscilloscope that the PB FM Signal is brought to its maximum level. Then set the TRACKING control knob (VR581) behind the door on the front panel to its center (detent) position and confirm that a nearly maximum level is obtained.
7. The envelope adjustment can be performed by adjusting the height of both the supply side and the take-up side guide rollers.

8. The starting portion of the waveform can be adjusted by adjusting the supply side guide roller height. (Refer to Fig. 5.4.3.(A))  
Adjust the supply side guide roller height so that a flat continuous large waveform is obtained as shown in Fig. 5.4.3.(B).
9. Adjust the end portion of the waveform by adjusting the take-up side guide roller height so that the waveform as shown in Fig. 5.4.3.(A) is obtained.
10. After adjustment, rotate the TRACKING control knob (VR581) behind the door on the front panel to the left and right, and check that the waveform changes symmetrically.
11. Check the tape curl, referring to Section 5.2.7 (TAPE CURL).



**Note:** After the adjustment of Section 5.4.1 ENVELOPE WAVEFORM SHAPING, check the items described in the following table. If necessary, readjust them.

|   |                                   |                        |
|---|-----------------------------------|------------------------|
| 1 | CH1 PHASE/CH2 PHASE               | Refer to Section 3.2.3 |
| 2 | ACE HEAD HEIGHT/<br>ACE HEAD TILT | Refer to Section 3.4.2 |
| 3 | AZIMUTH                           | Refer to Section 3.4.3 |
| 4 | X VALUE                           | Refer to Section 3.2.5 |

## 6. MAINTENANCE

### 6.1 MAINTENANCE PARTS AND PERIODS

In order to keep the VCR in peak working order, maintain the parts indicated in Table 6.1 at the periods given.

| Parts \ Hours               | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 |
|-----------------------------|-----|------|------|------|------|------|------|------|------|------|
| CYLINDER                    | ○   | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    |
| AUDIO CONTROL<br>ERASE HEAD | ○   | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    |
| FULL ERASE<br>HEAD          | ○   | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    |
| CAPSTAN<br>MOTOR            | ○   | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    |
| PINCH<br>ROLLER             | ○   | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    |
| TAKE-UP<br>REEL             |     |      |      | ▲    |      |      | ▲    |      |      |      |
| SUPPLY<br>REEL              |     |      |      | ▲    |      |      | ▲    |      |      |      |

Table 6.1

○ : Cleaning ... Freon (fluorine-based organic solvent), Absolute methyl alcohol

▲ : Lubrication ... Oil containing corrosion resistive and oxidizing prevention agents. (Turbionol No. 64 or equivalent)

### 6.2 CLEANING

#### 6.2.1 CYLINDER

Wrap a piece of chamois around your finger. Dip it in head-cleaning fluid and clean the cylinder head. Move the chamois horizontally several times (in the direction of the arrow). Another cylinder head is located 180° away on the opposite side. Clean it the same way.

In the same manner clean the tape transport area of the cylinder. (Refer to Fig. 6.2.1)

**Note:** Do not push forcefully against the cylinder head. Do not move it up or down since this may damage it. Always use a piece of chamois for cleaning.

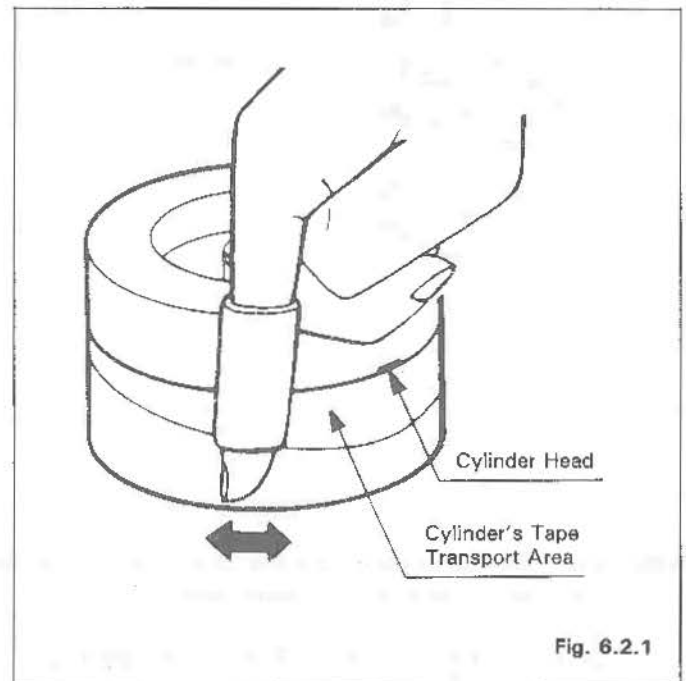
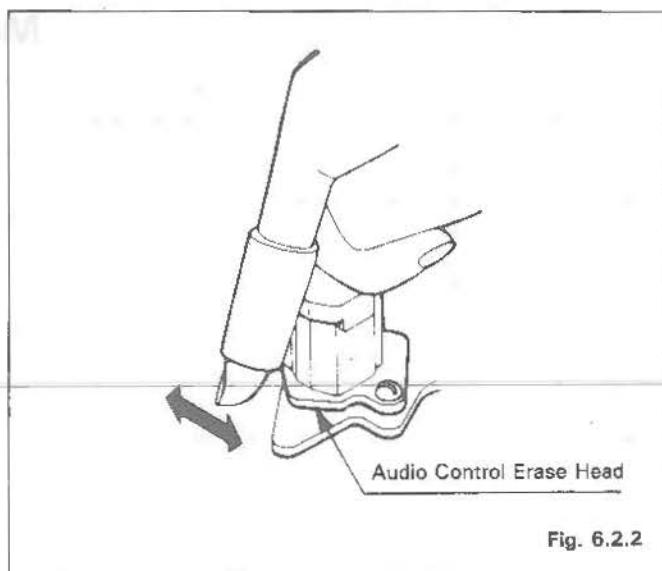


Fig. 6.2.1

### 6.2.2 AUDIO CONTROL ERASE HEAD

Wrap a piece of chamois around your finger. Dip it in head-cleaning fluid and clean the audio control erase head, wiping it horizontally.

Clean the FULL ERASE HEAD, the CAPSTAN MOTOR and the PINCH ROLLER in the same manner. (Refer to Fig. 6.2.2)



## 6.3 LUBRICATION

### 6.3.1 LUBRICATING PARTS

The following parts should be lubricated with oil (Turbionol No. 64) every 2000 hours.

- (1) Supply reel
- (2) Take-up reel

### 6.3.2 LUBRICATING PROCEDURE

1. Detach both of the reel stopper washers. (Refer to Fig. 6.3.1)
2. Remove the supply and take-up reels.
3. Apply oil to the top at the axes.
4. Replace the supply reel and take-up reel, then replace the reel stopper washers in position.

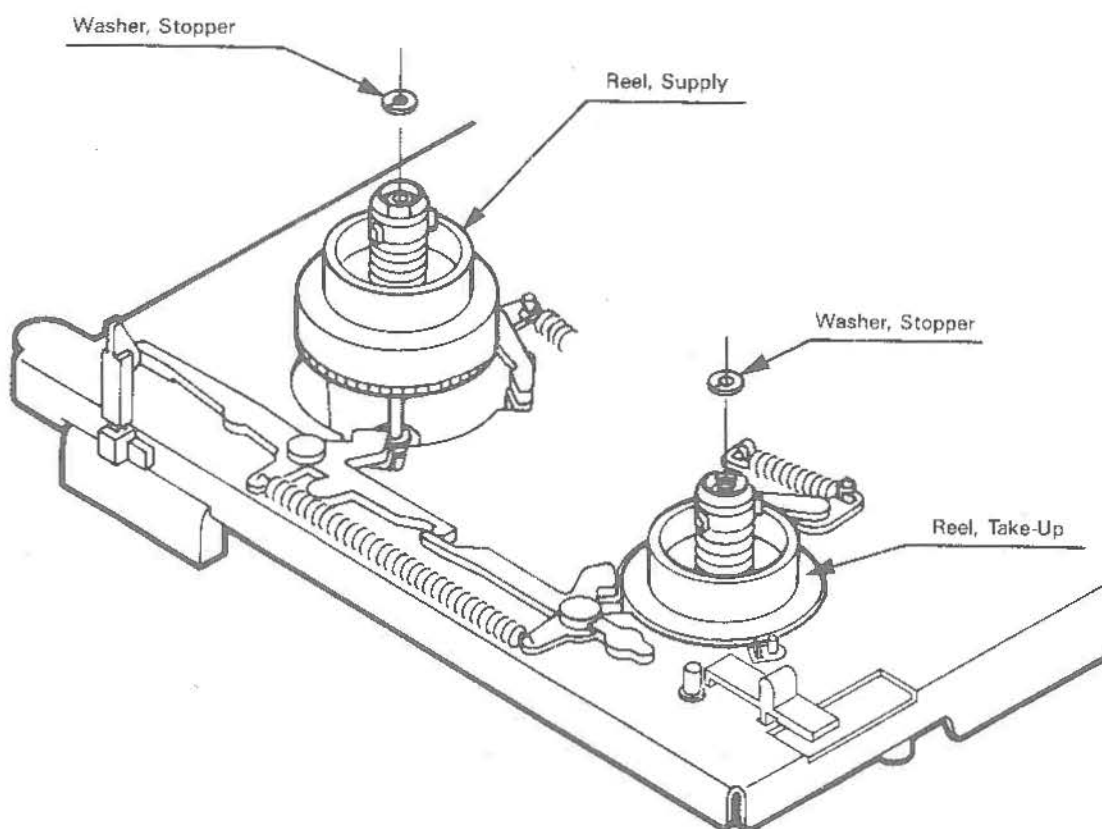


Fig. 6.3.1

# MEMO

11/15/75  
11/15/75  
11/15/75

FISHER



FISHER CORPORATION

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U.S.A.

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