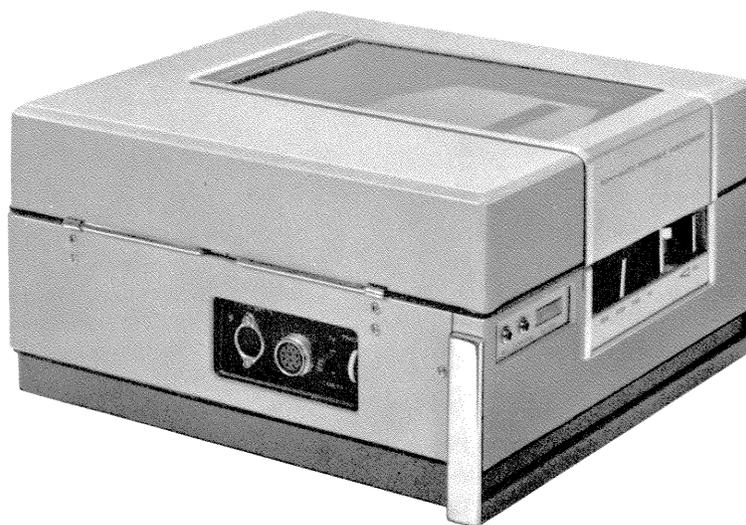


SONY®
SERVICE MANUAL

AV-3400
VIDEOCORDER



SONY CORPORATION

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SECTION 1

GENERAL DESCRIPTION

1-1. INTRODUCTION

The Model AV-3400 is a lightweight, compact, portable Videocorder with a built-in three-way power supply and may be operated from power, a BP-20 battery, or a car battery. The unit provides high-quality video/audio record and playback functions. Recorded material can be played back on the camera viewfinder screen, a video monitor connected with a VMC-1M cable or a conventional TV receiver, using the RF Unit.

Two dc motors are used, one for the head drum drive and the other for capstan servo, since both head drum and capstan servo systems are employed.

The recorded pattern on the magnetic tape conforms to EIAJ type 1 standards so that tape interchangeability between all EIAJ type 1 standard video tape recorders should be maintained.

1-2. SPECIFICATIONS

Video recording system: Rotary 2-head helical scan system, full field, composite video signal based on American TV standards (supplied from the AVC-3400 Video Camera or a monitor/receiver).

Track pattern: EIAJ type 1 standard.

Tape interchangeability: Interchangeable with all other tapes with EIAJ type 1 standard track pattern.

Recording time: 30 minutes continuously with a V-30H tape.

Tape speed: $7\frac{1}{2}$ ips $\pm 0.25\%$

Video input: 0.7 ~ 1.5 V(p-p), sync negative, 75 ohms, unbalanced.

Video output: 1.0 V(p-p), sync negative, 75 ohms.

RF output: 80 dB, 75 ohms (0 dB = $1\mu\text{V}$)

Resolution: More than 300 lines

S/N ratio: More than 40 dB

DC level supplied to viewfinder video input: DC 6V $\pm 0.5\text{V}$

Audio input (microphone jack): -65 dB, 3,600 ohms, AGC (0 dB = 0.775 V)

Audio output (earphone jack): -4 dB, 1 k ohms

Audio overall characteristics: 100 Hz ~ 10 kHz, S/N ratio 40 dB

Maximum record/playback time: Continuously with AC-3400 power supply or one hour with BP-20

Charging time: 6 hours to charge BP-20

Power requirements: DC, 12 V with BP-20, 12 W
AC, 117 V $\pm 10\%$ with AC-3400, 50 W

Dimensions: 11" (W) \times 6 $\frac{3}{16}$ " (H) \times 11 $\frac{5}{8}$ " (D)

Weight: 18 lb., 12 oz.

Accessories supplied: AC power adaptor AC-3400
Battery pack, BP-20
Tape, V-30H
Empty reel, RH-5E
Earphone, CE-3
Monitor connecting cable, VMC-1M
Polishing cloth
Splicing tape
Cleaning fluid
Shoulder bag

Accessories optional: RFU-53 W (with ANS-1)
RFU-54 W (with ANS-1)

1-3. LOCATION OF PARTS AND CONTROLS

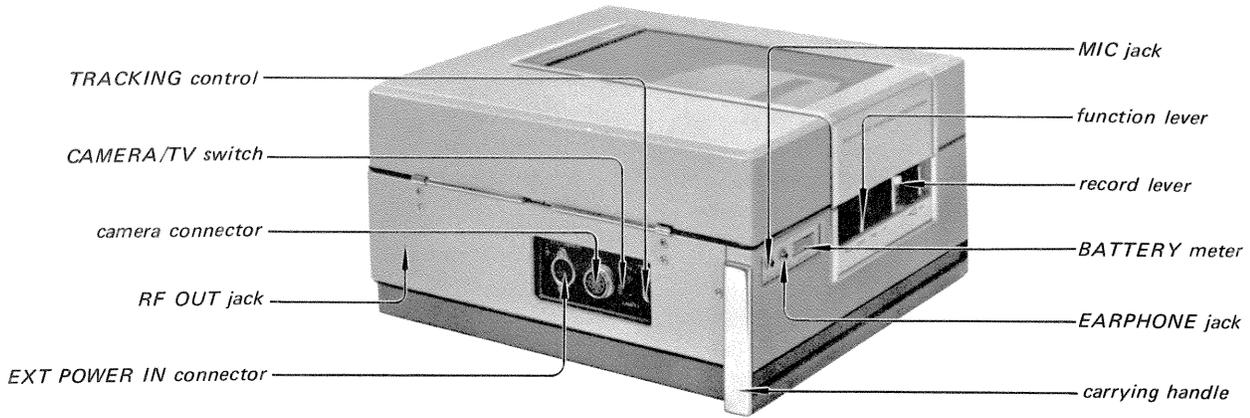


Fig. 1-1

TRACKING control: Video head tracking is controlled by shifting the control track pulse electronically in the playback mode in order to obtain tape interchangeability.

CAMERA/TV select switch: Set to the CAMERA position when using the AVC-3400 camera. A monitor may be

connected with a VMC-1M monitor connecting cable and the selector set to TV.

Camera connector: An AVC-3400 camera or CVM series monitor can be connected (with a VMC-1M cable). Fig. 1-4 shows the camera connections, Fig. 1-5 TV connections.

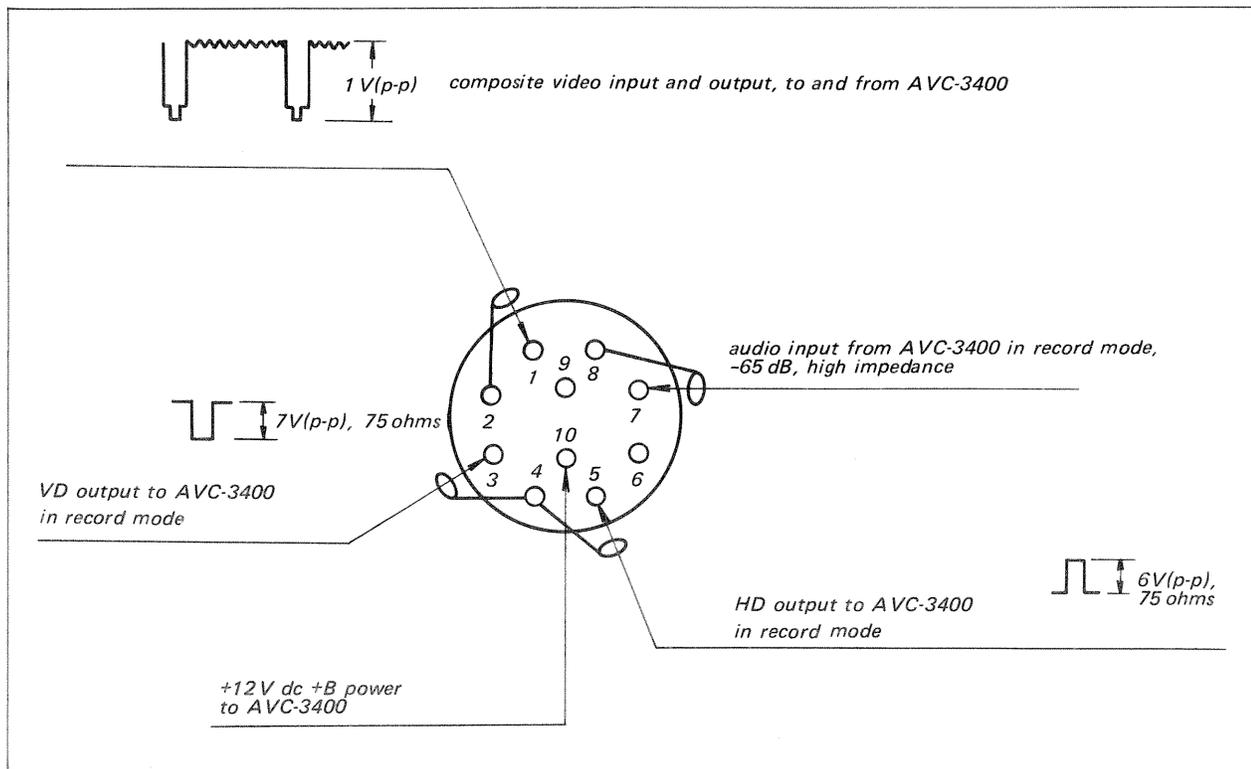


Fig. 1-2 Camera connections with videocorder

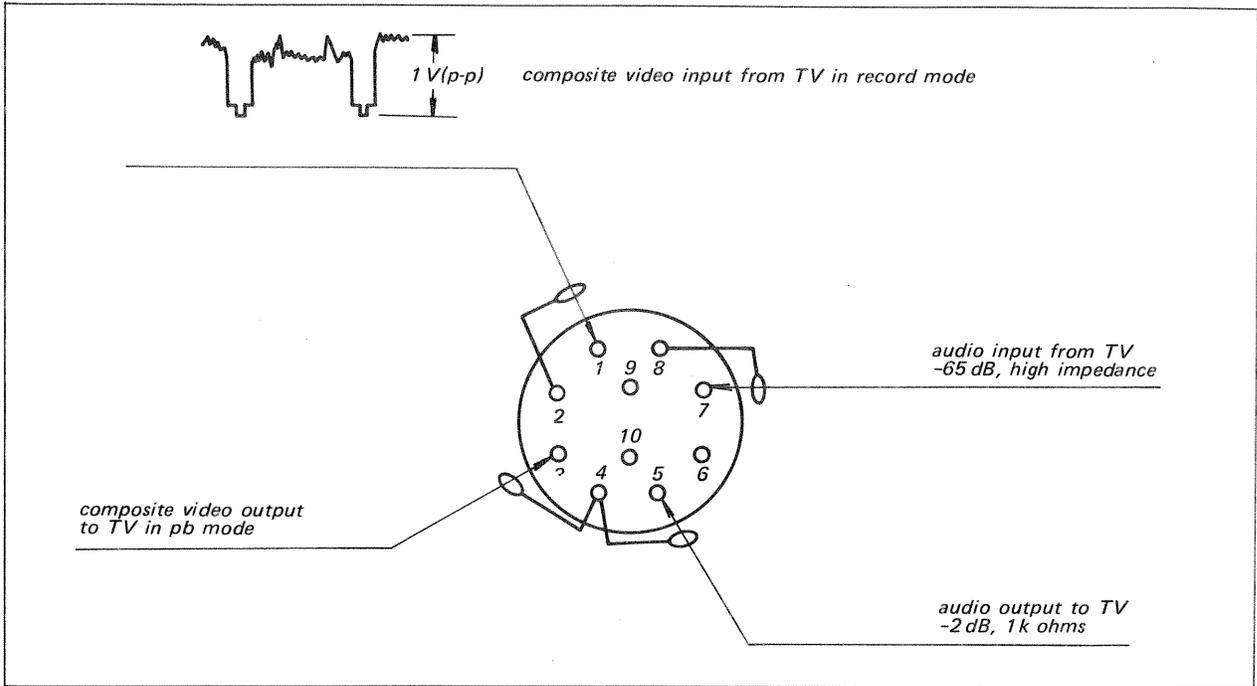


Fig. 1-3 TV connections with Videocorder

RF out jack; Output connector for the RF modulator unit (optional). The video output is converted to a VHF signal by the RF modulator and is fed to the TV antenna terminals.
80 dB, 75 ohms (0 dB = 1 μ V)

EXT. POWER IN connector: Accepts external power from the AC-3400 ac power supply.

MIC jack: Accepts an external microphone, -65 dB, 3,600 ohms

EARPHONE jack: Accepts an earphone for monitoring playback audio output. -4 dB, 1 k ohms.

BATTERY meter: Indicates battery terminal voltage in record and playback modes. The pointer reads between white and red areas when the voltage drops to 11 V dc.

RECORD lever: The video and servo systems are put into the record mode by actuating switches on the respective boards.

Function lever: Select the desired transport operation by setting the mechanical links, idlers, belts and pulleys.

Time counter: Indicates the elapsed time in minutes. Drive for this four-digit counter is taken from the capstan sub-roller.

Video head: SONY video head type H01-02

SOUND DUB knob: Puts the audio channel into the record mode while the video channel is in the playback mode.

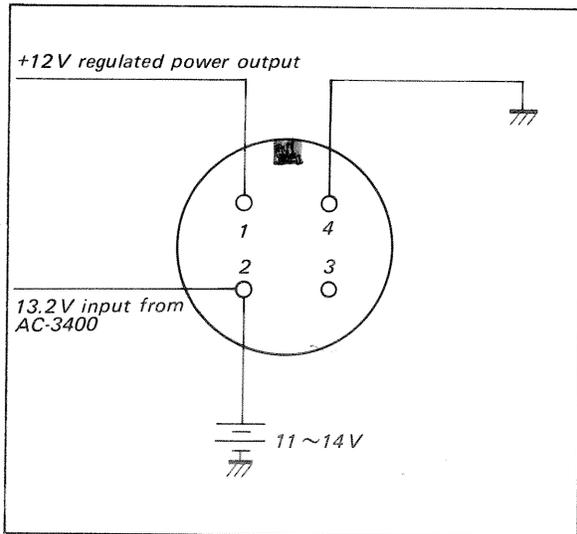


Fig. 1-4 AC-3400 connection

- STILL knob:** Releases the pinch roller from the capstan temporarily to produce a still-frame picture.
- Automatic shut-off switch:** Power to the VTR is shut off by a microswitch when tape slackens or runs out.

1-4. OPERATION

1-4-1. Power Source

The AV-3400 Videocorder operates from a built-in rechargeable battery pack. Ac power is supplied by connecting the AC-3400 ac Power Adaptor which also permits battery charging. Operation from a 12V car battery is also possible using the DCC-2400 Car Battery Cord (optional).

Battery installation

1. Open the battery compartment cover by turning the screw with a coin.
2. Plug the cord from the battery pack into the jack inside the battery compartment.

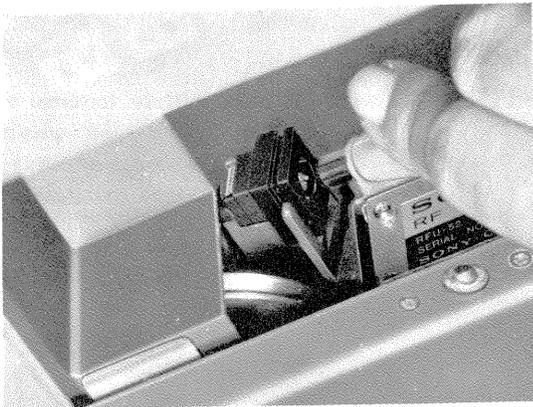


Fig. 1-5

3. Install the battery pack and close the compartment cover.

Battery life

A fully-charged battery allows approximately one hour of continuous operation of both Videocorder and camera. The pointer of the BATTERY meter shows battery condition when the Videocorder is turned on; a white-zone reading shows that the

battery is in good condition, a red-zone reading shows that the battery is discharged. The Videocorder and camera will not perform properly with a weak battery. If the pointer of the BATTERY meter is in the red zone, recharge the battery at once.

Note: The battery is fully charged when it leaves the factory. However, an idle battery will discharge slowly over a long period of time. Therefore, the battery may not yield a full hour of operation when it is first put into service. Full capacity will be restored, however, after the first recharge.

Car battery operation

Insert the cigarette-lighter plug of the car battery cord into the cigarette lighter socket in the car and male plug of the other end into the EXT POWER IN connector on the Videocorder. For further details, refer to the instruction manual included with the DCC-2400 Car Battery Cord.

Ac power operation

1. Plug the power cord of the AC-3400 ac Power Adaptor into an ac outlet.
2. Insert the round plug of the adaptor into the EXT POWER IN connector on the Videocorder.
3. Press the adaptor POWER switch on. The red Pilot Lamp will light and power will be supplied to the Videocorder.

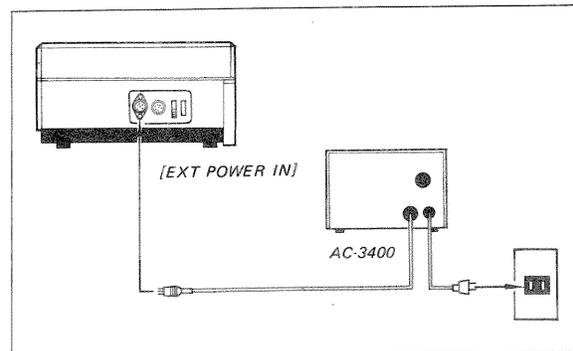


Fig. 1-6 AC-3400 connection

1-4-2. Tape Threading

1. Place an empty reel on the Take-Up Reel Spindle and a full reel on the Supply Reel Spindle.

- Unwind about 2 feet of tape and thread it onto the Take-Up Reel according to the direction of the arrow.

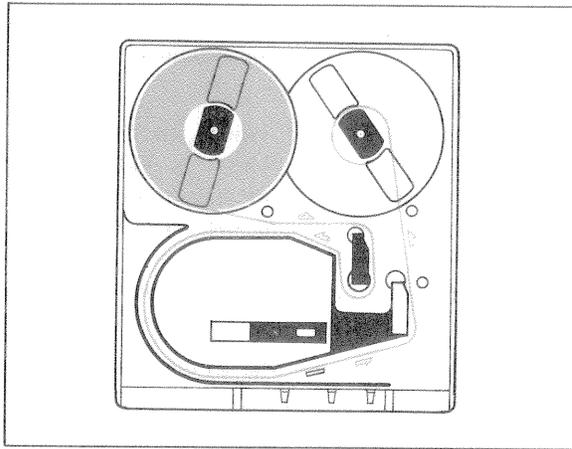


Fig. 1-7 Tape threading

- Turn the Take-Up Reel by hand to take up any excess slack in the tape path.

1-4-3. Recording with The Video Camera

- Insert the camera cable of the AVC-3400 into the Camera Connector of the Videocorder: Plug the 10-pin connector into the Camera Connector on the Videocorder by matching the slot in the plug with the guide pin on the receptacle. Turn the locking collar of the cable clockwise until the cable locks firmly into place.
- Set the CAMERA/TV switch to CAMERA.
- Press the Time Counter Reset Button to set the Time Counter to (000). This counter indicates recording time as well as the amount of the tape used. When you read the counter as a time indicator, read it as follows.
 - 13.5 13.5 minutes or 13 minutes 30 seconds
 - 0.9 0.9 minutes or 54 seconds
- First, set the Record Lever to the REC position and then the Function Lever to FWD (before releasing the Record Lever). The Record Lever will lock into place and the Videocorder and camera will remain in the Standby mode.
- Adjust the camera to obtain a satisfactory picture as displayed on the viewfinder.

- To start the recording, press the Grip Switch on the hand grip of the camera, or push the Start Button at the right side of the lens mount.
- To monitor the sound, plug the earphone into the EARPHONE jack on the control panel of the Videocorder. Sound picked up by the microphone built into the camera will be recorded simultaneously. Picture and sound levels are automatically adjusted by the SONY-MATIC recording system in the Videocorder and camera.
- To stop recording, press the Grip Switch on the hand grip or the Start Button again. At the end of the recording, set the Function Lever to STOP.

1-4-4. Recording TV Programs

- Connect the 8-pin connector on the SONY video monitor to the 10-pin Camera Connector on the Videocorder using a VMC-1M connecting cable (supplied).

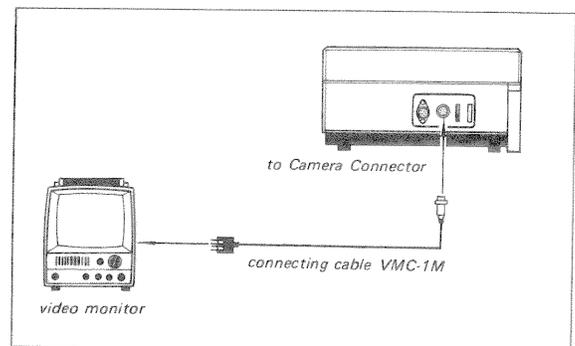


Fig. 1-8 Monitor connection

- Set the CAMERA/TV switch to TV.
- Set the Time Counter to (000).
- Turn on the monitor and set the TV/VTR switch on the monitor to VTR.
- Hold the Record Lever in the REC position to place the Videocorder in the E-to-E mode. Adjust the controls on the monitor for the best possible picture.
- Holding the Record Lever, set the Function Lever to FWD. Video and audio recording will start. No adjustment of video and audio signal levels is required.

- To stop recording, set the Function Lever to STOP.

Note: Television programs may be copyrighted. Recording of such material, particularly if for commercial purposes, may be contrary to provisions of the United States copyright laws.

1-4-5. Tape Playback

The playback picture can be viewed on the camera viewfinder screen, a monitor screen, or a conventional TV screen with appropriate accessories.

Note: When playing back a tape which has been interrupted during the Record mode, picture distortion may be observed during the transitions.

Playback on the viewfinder screen

Connect the AVC-3400 Camera to the Camera Connector of the Videocorder and set the Function Lever to FWD.

Playback on the monitor screen

Connect the monitor to the Camera Connector using the VMC-1M connecting cable and set the Function Lever to FWD.

Playback on a conventional TV screen

The output signal of the Videocorder is converted to an ordinary TV (rf) signal by an optional accessory RF Unit, which can be installed inside the battery compartment. The rf signal is fed to the antenna terminals of the TV set through the Antenna Selector ANS-1, supplied with the RF Unit.

The RF Unit is set to either channel 3 (RFU-53W) or channel 4 (RFU-54W). Choose an RF Unit whose preset channel is not in use in your area.

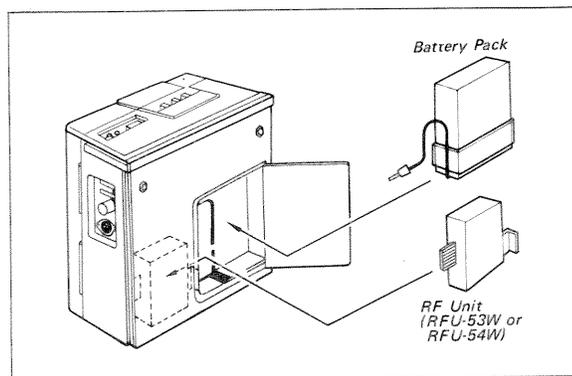


Fig. 1-9 Battery and RF pack installation

- Take the battery pack out of the battery compartment and insert the RF Unit.
- Replace the battery pack as before.
- Connect the feed wire of the Antenna Selector to the external antenna terminals (300 ohms) of the TV set.
- Set the ANT/VTR switch on the Antenna Selector to VTR. When the Videocorder is not in use, the TV set may be operated as a normal television receiver by setting the ANT/VTR switch to ANT position and connecting the 300-ohm external antenna to the antenna terminals of the Antenna Selector.
- Plug the cord from the Antenna Selector into the RF OUT jack on the Videocorder.
- Set the TV channel selector to the channel to which the RF Unit is set.

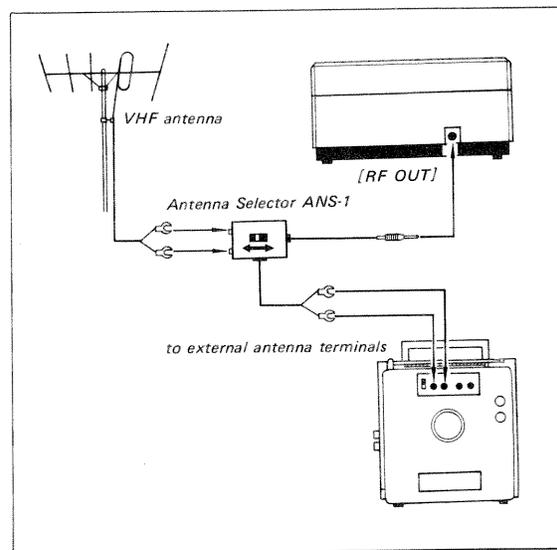


Fig. 1-10 Antenna connection

STILL playback

A stop-motion picture is obtained by pulling the STILL knob down in the direction of the arrow. To release the STILL mode, return the knob to its normal position.

TRACKING adjustment

When playing back a tape recorded on a different AV-Series Videocorder, adjust the TRACKING control should any noise appear in the picture. For normal playback, set the red mark on the knob to the center position.

1-4-6. Sound Dubbing

New sound (from a microphone, tape recorder, phonograph, radio, etc.) can be recorded on a prerecorded tape.

1. Connect the sound source to the MIC jack on the Videocorder.
2. Play back the prerecorded tape and watch the playback picture on the viewfinder, monitor, or television receiver.

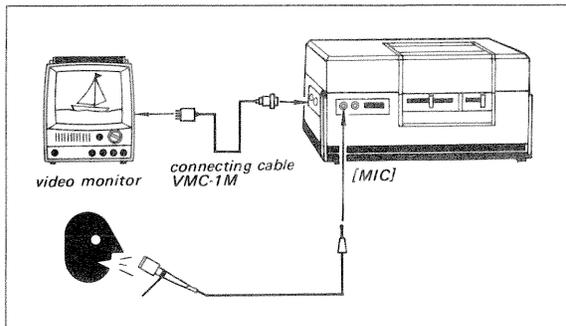


Fig. 1-11 Sound dubbing

3. When the desired position for dubbing sound is reached, set the Function Lever to STOP.
4. Pull the SOUND DUB knob in the direction of the arrow and then set the Function Lever to FWD.
5. When dubbing is complete, set the Function Lever to STOP.

1-4-7. Tape Erasing

Erasure of prerecorded tapes is accomplished automatically as the tape first passes the erase head then moves on to the video (recording) heads.

Should you desire to erase tape without recording, run the tape in the record mode with no signal source connected.

1-4-8. Battery Charging

The built-in battery pack can be recharged with or without removing it from the Videocorder.

Charging the battery pack inside the Videocorder

1. Connect the AC-3400 ac Power Adaptor to the Videocorder and to an ac outlet.
2. Press the POWER switch to turn on the adaptor. The red Pilot Lamp will light.
3. Set the Function Lever of the Videocorder to STOP. Charging will then be started and the Charging Meter on the adaptor will indicate charging condition. While charging, the pointer remains in the black zone (CHARGING). When the battery is completely charged, the pointer stops at the end of the red zone (FULL). About 6 hours is required for full charging.

Charging the battery pack outside the Videocorder

1. Take the battery pack out of the Videocorder.
2. Connect the AC-3400 adaptor to an ac outlet.
3. Insert the plug from the battery pack into the Charging Jack (BATT) on the adaptor.
4. Press the POWER switch to turn on the adaptor. Battery charging will start and the Charging Meter will indicate charging condition.

Note: Two battery packs can be recharged simultaneously, one inside and one outside the Videocorder.

When the Charging Meter stops at the FULL position, the two battery packs are fully charged. In this case, about 10 hours is required for full charging.

To check whether or not the battery is fully charged, turn off the power, then turn it on again. The pointer should swing down a little and in a few seconds swing back to the FULL position. This shows a completely charged battery.

SECTION 2 DISASSEMBLY

2-1. CABINET REMOVAL

The cabinet may be removed by taking out the eight screws indicated in Fig. 2-1 and Fig. 2-2. Keep the cabinet lid on when removing these screws.

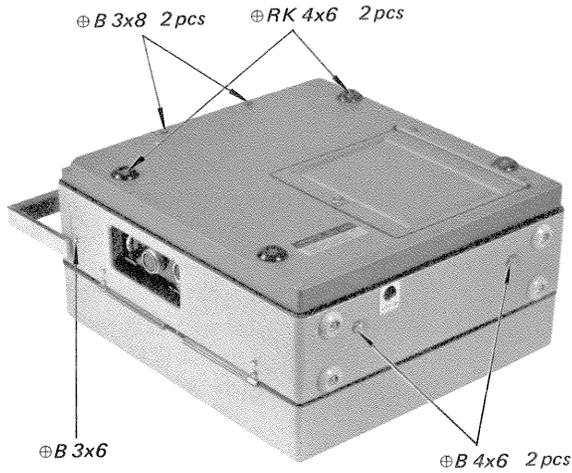


Fig. 2-1.

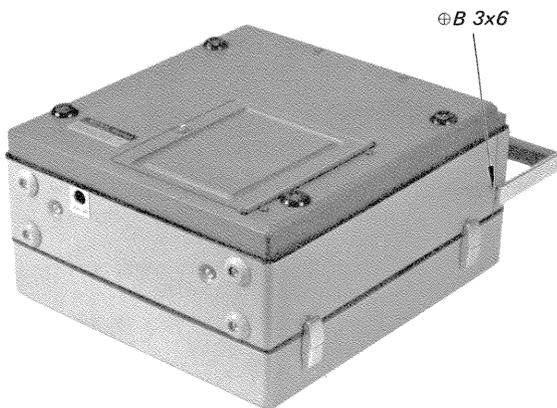


Fig. 2-2.

2-2. ELECTRICAL SERVICE

Video, audio, and servo circuits are exposed for service by removing the bottom reinforcement beam, RF unit housing, and insulation sheet.

1. Remove the two Phillips-head screws that secure the bottom reinforcement beam and remove the beam. See Fig. 2-3 (A).

2. Remove the four Phillips-head screws as indicated in Fig. 2-3 (B) and remove the RF unit housing and insulation sheet.

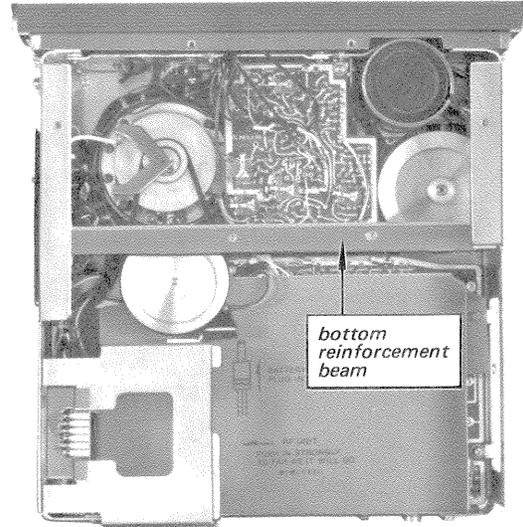


Fig. 2-3 (A)

The video, audio, and servo boards are mounted on hinges. Remove four screws at the corners to release the board so that both sides are accessible. See Fig. 2-4.

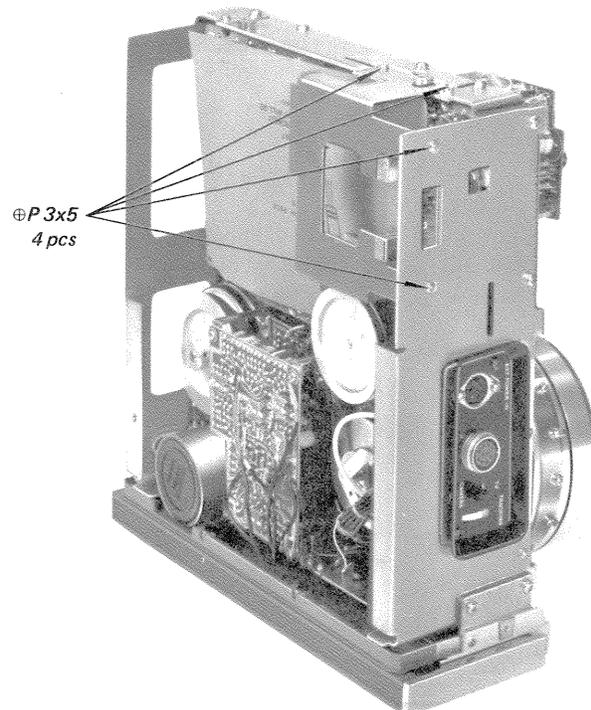


Fig. 2-3 (B)

2.3. TAPE TRANSPORT SERVICE

The tape transport mechanism is exposed for service by removing the reel panel. Loosen the screws indicated in Fig. 2-5, and remove the reel panel.

The front control panel with carrying handle can be removed by taking off the four Phillips-head screws at the ends of the control panel.

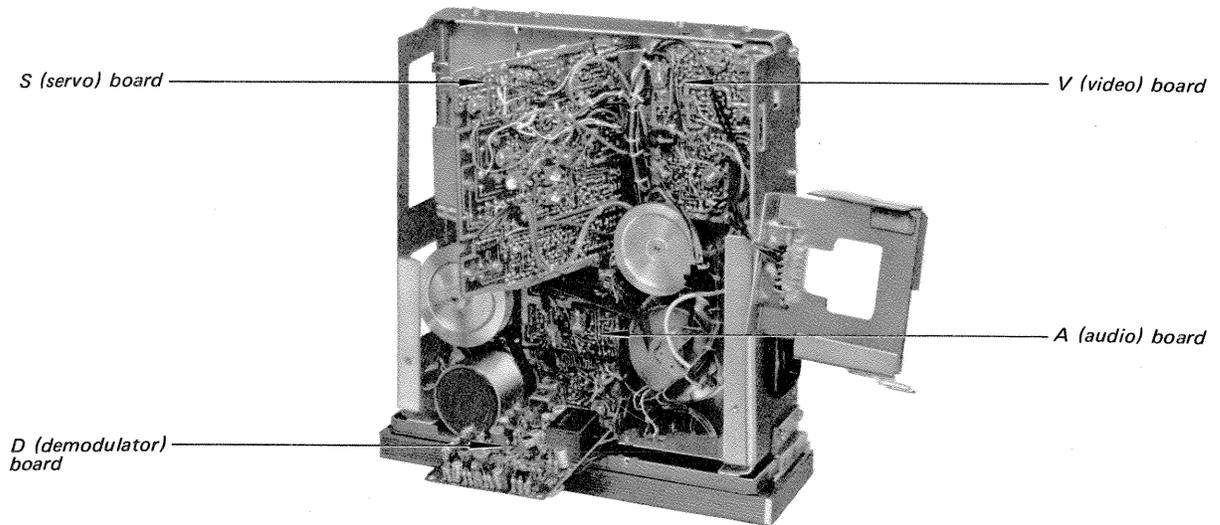


Fig. 2-4

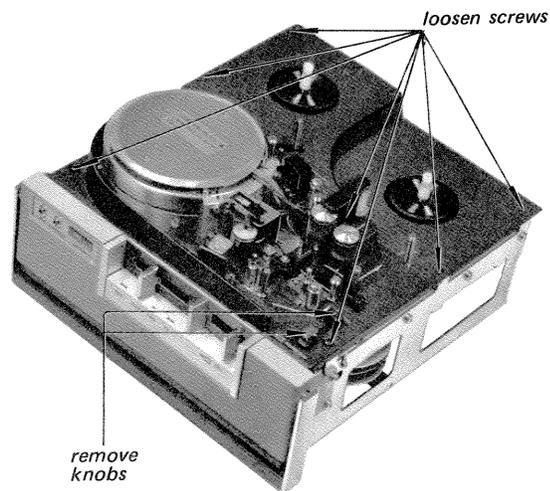


Fig. 2-5

SECTION 3 POWER SUPPLY ALIGNMENT

3-1. POWER SUPPLY ADJUSTMENT

Test Point: Q88 emitter
Adjust for: +9V dc
Adjustment: R907

Procedure:

1. Connect VOM to Q88 collector.
2. Check that the input voltage is 12V ~ 13.5V dc.
3. Reconnect VOM to Q88 emitter.
4. Adjust R907 for 9V dc.

3-2. BATTERY METER CALIBRATION

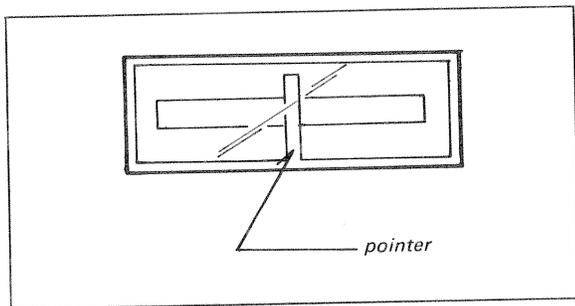


Fig. 3-1

Test Point: Q88 collector
Adjust for: Meter pointer reads between the red and white region when power supply is 11V dc
Adjustment: R912

Procedure:

1. Disassemble AC-3400 and connect it to VTR.
2. Connect VOM to Q88 collector of VTR.
3. Adjust AC-3400 output adjustment (R105) for an 11V dc reading.
4. Adjust R912 so that the battery meter reads between the red and white regions of the scale. Readjust AC-3400 (R105) for original setting of 14.6V output.

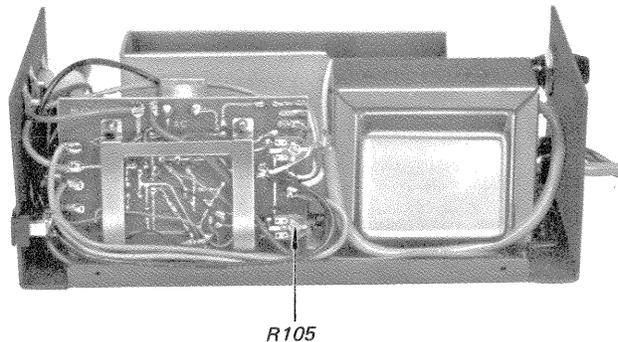


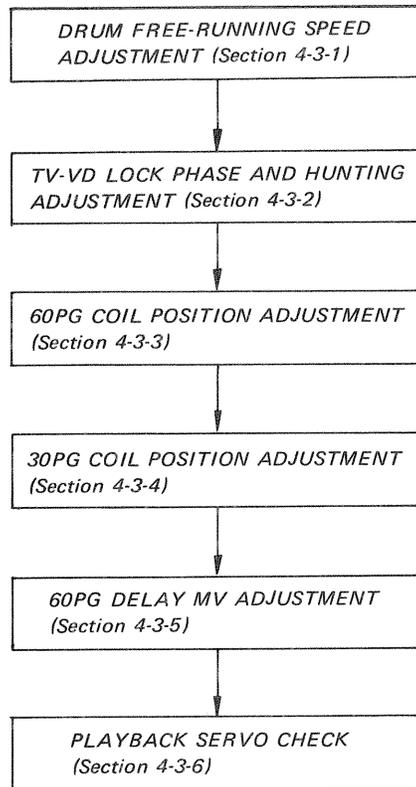
Fig. 3-2 AC-3400

SECTION 4 SERVO SYSTEM ALIGNMENT

4.1. ALIGNMENT SEQUENCE

The servo system alignment sequence is shown in Chart 4-1. All procedures are shown in short form in Charts 4-2 and 4-3.

TV record mode servo (Section 4-3)



Camera record mode servo (Section 4-4)

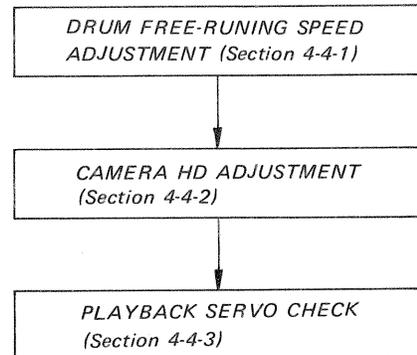


Chart 4-1 Servo system alignment

4.2. EQUIPMENT REQUIRED

Monitor:	SONY CVM-51UW/UWP
Frequency counter:	Hewlett-Packard 5223L or equivalent
or sync generator:	60-Hz scope calibrator or SONY CG-1
Oscilloscope:	Tektronix 561 or equivalent
TV camera:	SONY model AVC-3400 camera
Monitor connection cable:	SONY model VMC-1M cable
Power supply:	AC-3400 or BP-20

4.3. TV RECORD MODE SERVO ADJUSTMENT

In TV record mode, the servo should lock to the TV vertical sync signal. The free-running speed of the head drum is 15,330 Hz.

4-3-1. Drum Free-Running Speed Adjustment

Test Point:	TP-10 for Procedure A, TP-16 for Procedure B
Adjust for:	15,330 Hz \pm 10 Hz
Adjustment:	R527
Signal source:	None

Equipment Required:

1. Frequency Counter for Procedure A or
2. Sync Generator CG-1 and Oscilloscope for Procedure B

Procedure A: (if frequency counter is available)

1. Disconnect cable from TV-CAMERA connector at the monitor.
2. Set TV-CAMERA Select switch to TV.
3. Thread tape on VTR.
4. Check for +9V +B voltage.
5. Connect frequency counter to TP-10 of the servo board.
6. Set up the record mode and check the frequency counter reading.
7. Adjust R527 so that the frequency counter reading is $15,330 \text{ Hz} \pm 10 \text{ Hz}$.

Procedure B: (if frequency counter is not available)

1. Disconnect cable from TV-CAMERA connector at the monitor.
2. Set TV-CAMERA Select switch to TV.
3. Thread tape on VTR.
4. Connect the scope CH-1 probe to CG-1 composite sync pulse output, or to the 60-Hz calibrator output of the scope. Sync scope on CH-1 only.
5. Check for +9V +B voltage.
6. Connect the scope CH-2 probe to TP-16 of the servo board.
7. Set the scope for a horizontal time base of 5ms/cm.
8. Sync the scope externally from CG-1 vertical sync output or a power-line sample from the scope calibrator.
9. As the scope is triggered externally by CG-1, the CH-2 signal will start to move to the right or left with respect to the CH-1 waveform on the scope. Time the interval required for 20 pulses to pass the end of the trace.
10. Adjust R527 so that 20 pulses cross the end of the trace (from left to the right) in 11 to 14 seconds. Turning R527 cw will slow down the speed of pulses.

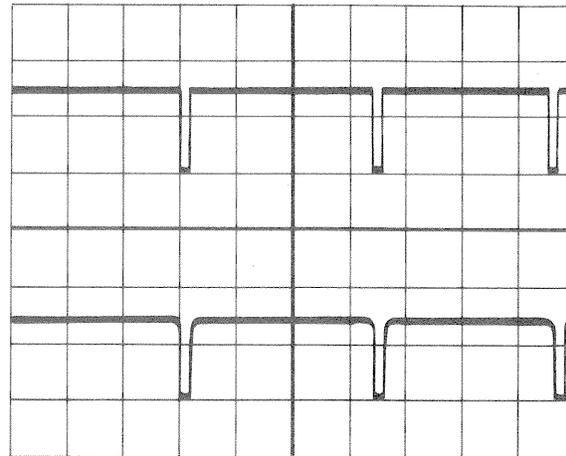


Fig. 4-1

4-3-2. TV-VD Lock Phase Adjustment and Hunting Adj.

Test Point: TP-15 Servo board
Adjust for: Correct servo lock phase
Adjustment: R644 (lock phase), R645 (hunting)
Signal source: Telecast signal

Equipment Required:

1. Oscilloscope
2. Monitor

Procedure:

1. Connect the monitor with a VMC-1M cable.
2. Set the TV-CAMERA Select switch to TV.
3. Connect scope to TP-15; set up the 2V/cm, 5 ms/cm range.

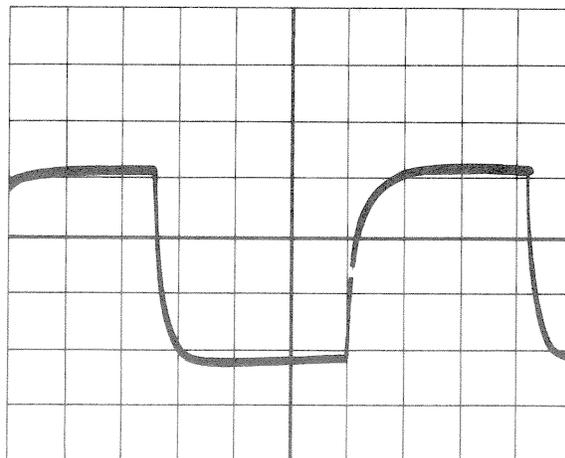


Fig. 4-2

4. Thread the tape and set up the record mode.
5. Adjust R644 so that the PG pulse appears midway between the positive and negative peaks. See Fig. 4-2.
6. Stop the VTR. Pull the REC Lever and measure the time required to stop the PG pulse on the rectangular pulse. If it takes more than 6 seconds, adjust R645. ✓

4-3-3. 60 PG Coil Position Adjustment

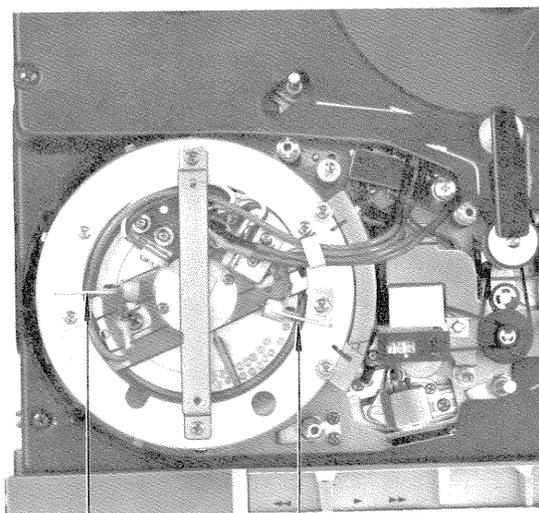
Test Point: TP-16 (CH-1), TP-7 (CH-2)
 Adjust for: 60PG pulse at the center of channel overlap.
 Adjustment: 60PG Coil
 Signal source: None

Equipment Required:

1. Video Alignment Tape or Prerecorded Tape
2. Oscilloscope

Procedure:

1. Thread a SONY video alignment tape or any prerecorded tape that is recorded by a correctly-aligned VTR.
2. Connect the scope CH-1 probe to TP-16 and the CH-2 probe to TP-7. TP-16 is on the Servo board and TP-7 is on the Demodulator board.



60PG coil

30PG coil

Fig. 4-3

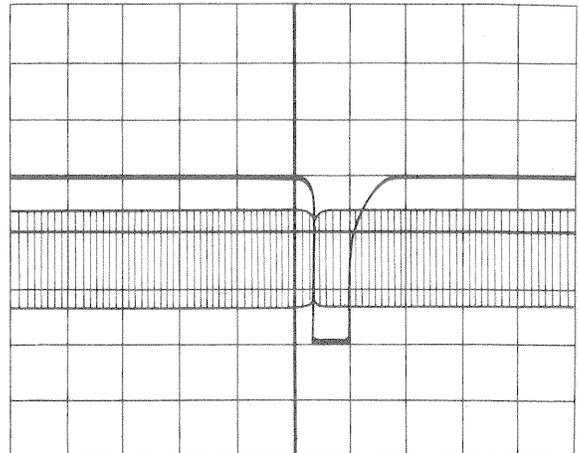


Fig. 4-4

3. Set the scope horizontal time base to 5 ms/cm. Sync on CH-1 only.
4. Set up the playback mode.
5. Adjust scope controls to observe both signals. Then set the scope MODE SWITCH to the CHOP position. Pull out the 5X magnifier and adjust the HORIZONTAL POSITION to observe the vertical blanking interval.
6. Bend the tip of the 60PG coil with pliers and adjust the coil position so that maximum rf output is obtained in the overlap period. See Fig. 4-3 and Fig. 4-4. ✓

4-3-4. 30PG Coil Position Adjustment

Test Point: TP-26 (CH-1), TP-16 (CH-2)
 Adjust for: 60PG leads VD by 7H
 Adjustment: 30PG coil
 Signal source: TV telecast signal

Equipment Required:

1. Oscilloscope
2. Monitor TV

Procedure:

1. Connect scope CH-1 probe to TP-26 on the "D" board and CH-2 probe to TP-16 on "S" board. Set scope time base to 5 ms/cm. Sync the scope externally from TP-14.
2. Connect monitor.
3. Set TV-CAMERA Select switch to TV.

4. Set up record mode.
5. Set the scope MODE SELECT switch to the CHOP position. Pull out the 5X magnifier and adjust HORIZONTAL POSITION to observe the vertical blanking interval.
6. Adjust the 30PG coil so that the 60PG pulse leads the VD pulse by $7H \pm 1H$. See Fig. 4-5.

4-3-5. 60PG Delay MV Adjustment

Test Point: TP-13 (CH-1), TP-21 (CH-2)
 Adjust for: VD and PG are in phase.
 Adjustment: R723
 Signal source: TV telecast signal

Equipment Required:

1. Oscilloscope
2. Monitor

Procedure:

1. Connect scope CH-1 probe to TP-13 (0.5V/cm range) and CH-2 probe to TP-21 (2V/cm range). Set the scope time base to 2ms/cm. Sync the scope externally from TP-14.
2. Connect monitor.

3. Set the TV-CAMERA Select switch to TV.
4. Set up record mode.
5. Set the scope MODE SELECT switch to CHOP position. Pull out the 5X magnifier and adjust HORIZONTAL CONTROL to observe the vertical blanking interval.
6. Adjust R723 so that the VD and PG pulses are in phase. See Fig. 4-5.
7. Connect AVC-3400 instead of the monitor.
8. Set the TV-CAMERA Select switch to CAMERA.
9. Set up record mode and check the viewfinder picture.
10. If vertical jitter is present on the viewfinder screen, adjust R723 slightly CCW to remove vertical jitter.

4-3-6. Playback Servo Check

Test Point: TP-15
 Check for: Servo locks in center of pull-in range.
 Adjustment: None
 Signal source: None

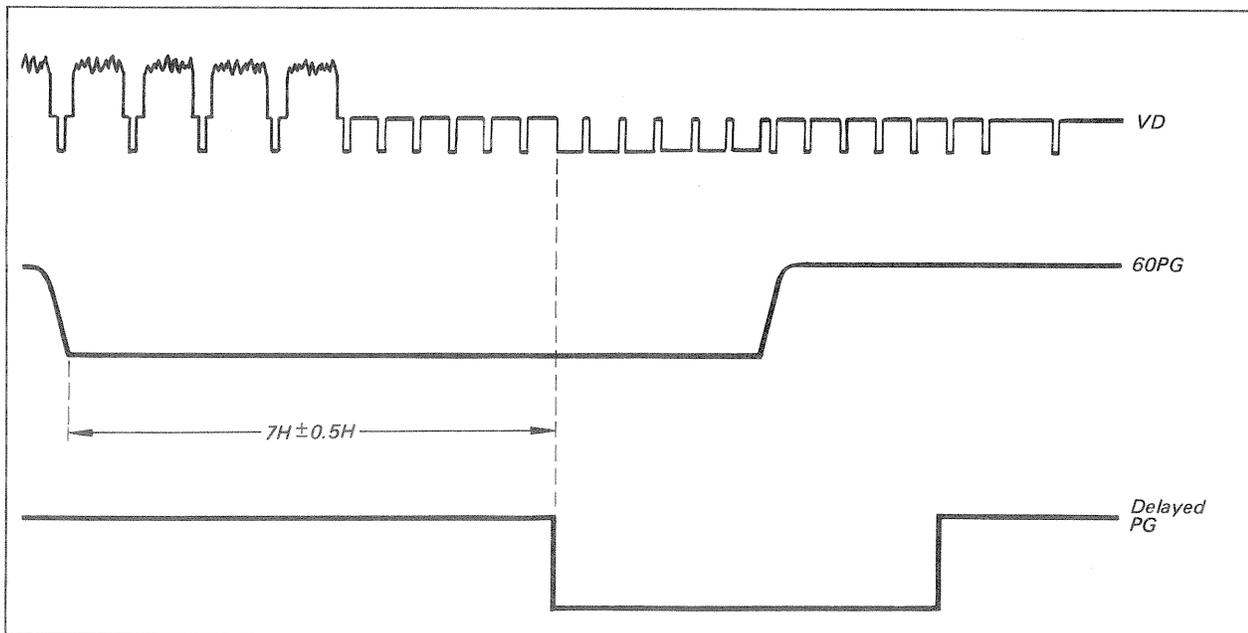


Fig. 4-5

Equipment Required:

1. Video Alignment tape or prerecorded tape
2. Oscilloscope

Procedure:

1. Connect scope to TP-15. Set up the 2 V/cm, 2 ms/cm ranges.
2. Thread the alignment tape.
3. Set up the playback mode.
4. Check to see that the PG pulse locks in the center of the trailing edge of the rectangular pulse. If not, perform Sec. 4-4-1. Camera record mode speed adjustment.

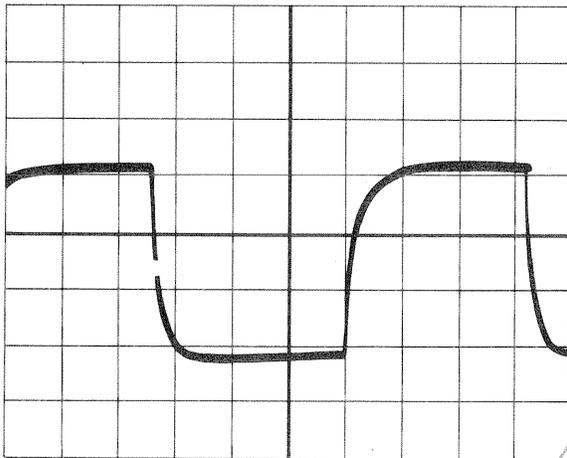


Fig. 4-6

4-4. CAMERA RECORD MODE SERVO ADJUSTMENT

In camera record mode, the servo controls the head rotating speed, capstan rotating speed and horizontal camera drive signal frequency.

4-4-1. Drum Free-Running Speed Adjustment

Test Point: TP-10
Adjust for: 15,745 Hz \pm 10 Hz
Adjustment: R525
Signal source: Video camera AVC-3400

Equipment Required:

1. Frequency Counter for Procedure A or

2. Sync Generator CG-1 or 60-Hz scope calibrator and Oscilloscope for Procedure B.

Procedure A: (if frequency counter is available)

1. Set the TV-CAMERA Select switch to CAMERA.
2. Thread a blank tape on the VTR.
3. Connect a frequency counter to TP-10.
4. Set up record mode.
5. Adjust R525 to obtain 15,745 Hz \pm 10 Hz.

Procedure B: (if frequency counter is not available)

1. Set the TV-CAMERA Select switch to CAMERA.
2. Thread a blank tape.
3. Connect scope CH-1 probe to CG-1 composite sync output or the scope 60-Hz calibrator. Set the scope to sync from CH-1 only.
4. Connect scope CH-2 probe to TP-10. Sync the scope externally to the CG-1 or to the scope 60-Hz calibrator output.
5. Adjust R525 so that two signals are stationary on the scope screen.

4-4-2. Camera HD Adjustment

Test Point: Camera viewfinder
Adjust for: Stable picture
Adjustment: R738
Signal source: Video camera AVC-3400

Equipment Required:

1. Video camera AVC-3400

Procedure:

1. Connect the video camera.
2. Thread a blank tape.
3. Select TV-CAMERA switch to CAMERA.
4. Set up the record mode.
5. Observe the viewfinder screen. Turn R738 CW until lines are seen in the picture. Then turn R738 CCW until break-up is seen at the edge of the raster. Set R738 between the two points noted above.

4-4-3. Playback Servo Check

Test Point: TP-15
 Check for: Stable servo lock
 Adjustment: None
 Signal source: Video alignment tape

Equipment Required:

1. Video camera AVC-3400
2. Video alignment tape

Procedure:

1. Connect scope to TP-15. Set up the 2V/cm, 2ms/cm ranges.
2. Thread the video alignment tape.
3. Set up the playback mode.
4. Check to see that the PG pulse locks in the center of the rectangular pulse.

SERVO ALIGNMENT SUMMARY

Adjustment	TP	Mode	Component	Input Signal	Adjust for
DRUM FREE-RUNNING SPEED IN TV MODE	TP-16	TV-REC	R527	no signal	15,330 ± 10 Hz
TV-VD LOCK-PHASE AND HUNTING	TP-15	TV-REC	R644 R645	TV telecast	lock in center, minimum hunting
60PG COIL POSITION	TP-16/TP-7	PB	60PG COIL	standard tape	switching in the center of overlap
30PG COIL POSITION	TP-26/TP-16	TV-REC	30PG COIL	TV signal	60PG leads VD by 7H
60PG DELAY MV	TP-13/TP-21	TV-REC	R723	TV signal	VD and PG are in phase
PLAYBACK SERVO CHECK	TP-15	PB	NONE	no signal	lock in the center of range

Chart 4-2 TV record mode servo adjustment

Adjustment	TP	Mode	Component	Input Signal	Adjust for
DRUM FREE-RUNNING SPEED IN CAMERA MODE	TP-10	CAMERA-REC	R525	AVC-3400 video camera	15,745 ± 10 Hz
CAMERA HD	VIEW-FINDER	CAMERA-REC	R738	AVC-3400 video camera	stable picture on VF
PLAYBACK SERVO CHECK	TP-15	PB	NONE	NONE	lock in center of range

Chart 4-3 Camera record mode servo adjustment

SECTION 5 VIDEO SYSTEM ALIGNMENT

The video system alignment procedure is shown in Charts 5-1 and 5-2.

5-1. EQUIPMENT REQUIRED

1. Monitor TV: CVM-51 UW/UWP
2. Monitor Connecting cable: VMC-1M
3. Oscilloscope: Tektronix 561 or equivalent
4. Video Camera: AVC-3400
5. Tape: SONY video alignment and blank tape

5-2. ALIGNMENT SEQUENCE

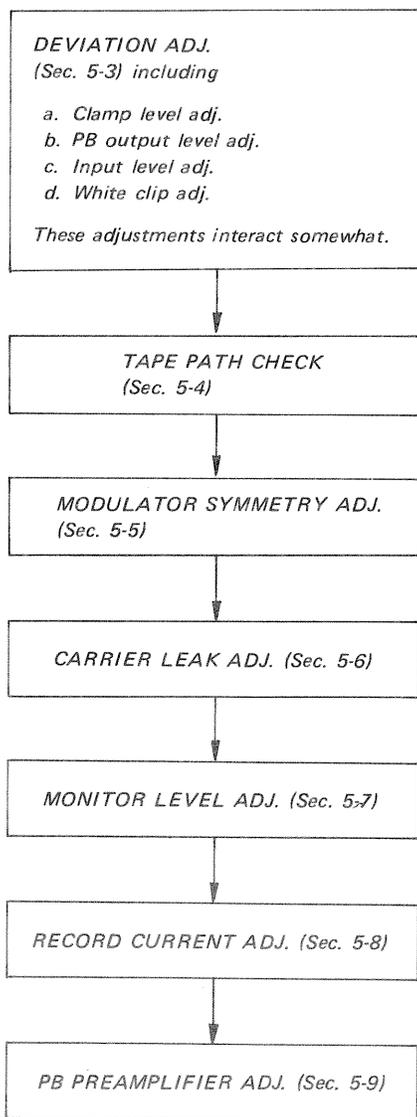


Chart 5-1

5-3. DEVIATION ADJUSTMENT

(including 1. Clamp level adj. 2. PB output level adj. 3. Input level adj. 4. White clip adj.)

Test Points and Adjustments:	TP-5 (clamp level) R129
	TP-9 (PB output level)
 R341
	TP-1 (Video input level)
 R105
	TP-3 (White clip level)
 R144

Adjust for: 3.2 MHz to 4.6 MHz maximum deviation clipped at 40% over white peak.

Signal source: Telecast signal

Equipment Required:

1. Oscilloscope
2. Monitor TV
3. SONY video alignment tape or any prerecorded tape that has been recorded on a VTR known to be in good condition.

Procedure:

1. Set the TV-CAMERA Select switch to the TV position.
2. Connect scope to TP-5.
3. Thread a blank tape.
4. Set up the record mode with no input signal.
5. Adjust R129 for 16 pulses as indicated on the scope screen. 16 pulses can be measured as follows.
 - a. Adjust scope time base for 0.5 μ s per division (calibrated).
 - b. Set scope controls to obtain a stable trace. Set R129 to produce 16 complete cycles in ten divisions.
6. Connect scope to the arm of R129 (movable slider of R129).
7. Adjust sync tip clamp level as follows.
 - a. Set scope input to DC, horizontal time base to 10 μ s/cm and vertical deflection to 1 V/cm.
 - b. Confirm that the VTR is in the record mode.
 - c. Adjust scope STABILITY to observe a horizontal trace, and VERTICAL POSITION so that the trace is positioned on the second division from the bottom.

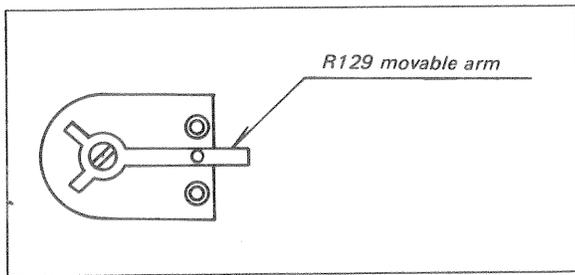


Fig. 5-1

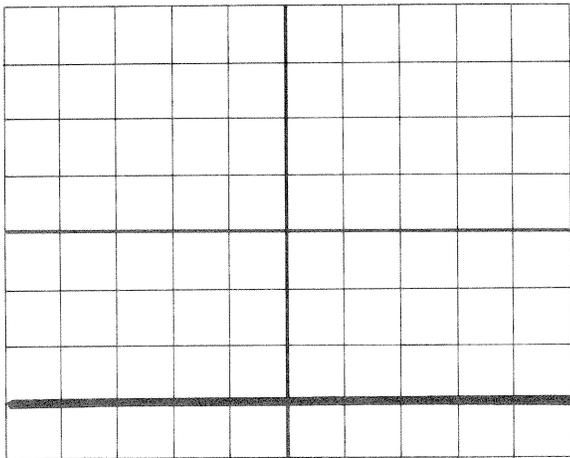


Fig. 5-2

- d. Connect a monitor set up to receive an off-the-air telecast signal.
- e. Check to see that the sync tip of the composite signal sinks below the second division (See Fig. 5-2) by approx. 0.5V. Measure the exact voltage by which the sync tip sinks below the clamp reference level set in Step 7-c (Fig. 5-2). See Fig. 5-3.

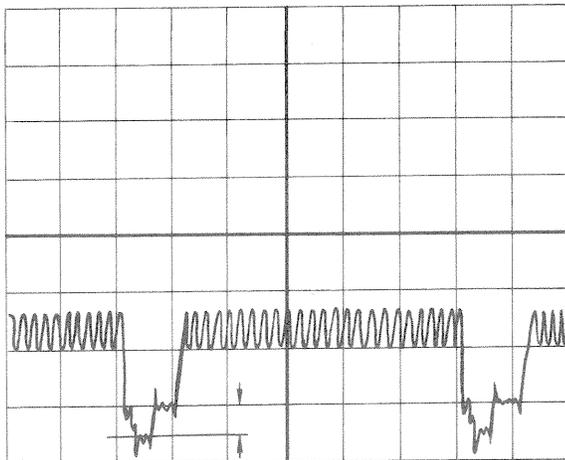


Fig. 5-3 Sync tip level shift

- f. Disconnect the monitor. Keep the VTR in the record mode.
- g. Adjust scope STABILITY to observe a horizontal trace on the same position as seen on Fig. 5-2.
- h. Adjust R129 so that the horizontal trace on the scope moves up by the voltage measured in Step 7-e (Fig. 5-3). See Fig. 5-4.

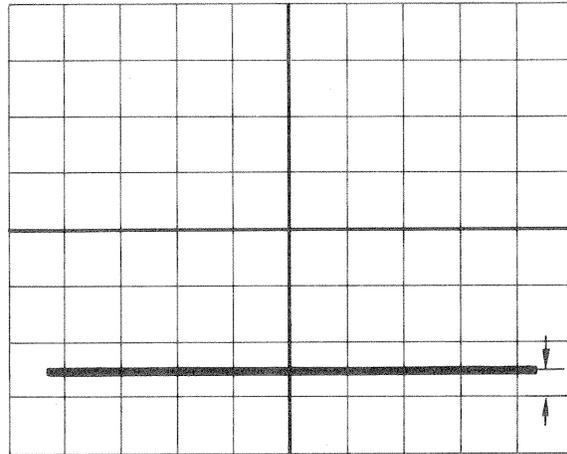


Fig. 5-4 Clamp level

8. Connect scope to TP-5. Set time base to $0.5\mu\text{s}/\text{cm}$, and check that approx. 19 rectangular pulses per 10 divisions is seen on the scope. Sync tip clamp level is now set to 3.2 MHz.

Note: No-signal frequency is about 3.8 MHz (19 cycles) as a result of these adjustments, but sync tip frequency will be set correctly to 3.2 MHz.

9. Connect scope to TP-9. Set up 5 ms/cm range.
10. Connect a monitor.
11. Play back the video alignment tape.
12. Adjust R341 (video output level) for 1.0V(p-p). Output level is now set to 1.0V(p-p).
13. Thread a blank tape instead of the alignment tape.
14. Record a telecast signal for approx. 15 seconds.
15. Play back the tape and check the video level.
16. If video level is other than 1V(p-p), adjust R105. Turn R105 slightly CW if the video level is less than 1.0V(p-p).
17. Record the telecast signal again and check the video level. Readjust R105 until video level is 1.0V(p-p). This completes maximum deviation adjustments (3.2 MHz to 4.6 MHz).

18. Set up the record mode using a telecast signal.
19. Connect scope to TP-3.
20. Adjust R144 (white clip) so that the extreme white peaks of the waveform are clipped at 40% of "A" volts as shown in Fig. 5-5.

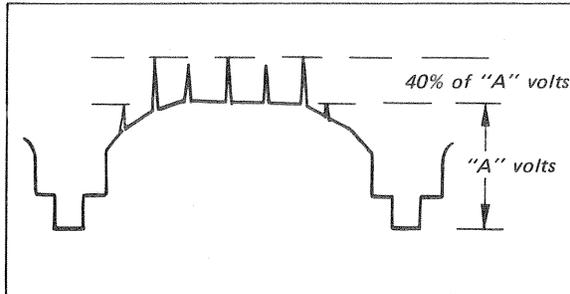


Fig. 5-5 White clip

5-4. TAPE PATH CHECK

CAUTION

Do not try to adjust any components that affect the tape path. Serious deficiencies in performance, such as poor interchangeability, will result if tape path is set improperly. If checks show adjustments are required, return the unit to a SONY FACTORY SERVICE BRANCH.

1. Thread a blank tape.
2. Set up the playback mode.
3. Check the following:
 - a. The tape should run in the center of tape guides, the sub-pinch roller and pinch roller without curling or buckling.
 - b. The core of the Erase Head and Audio/CTL Head must extend an equal amount above and below the tape.
 - c. The tape should ride flush against the Tape Guide Band.
 - d. The tape path in the fast forward and rewind modes should be the same as in the playback mode.
4. Make a recording and play back the tape.
5. Connect the scope to TP-7. Sync the scope externally by TP-16. Check that a reasonably flat rf envelope is observed. If the rf envelope decreases by more than a factor of 2 at every-other vertical field, clean the video heads or replace the video head assembly.

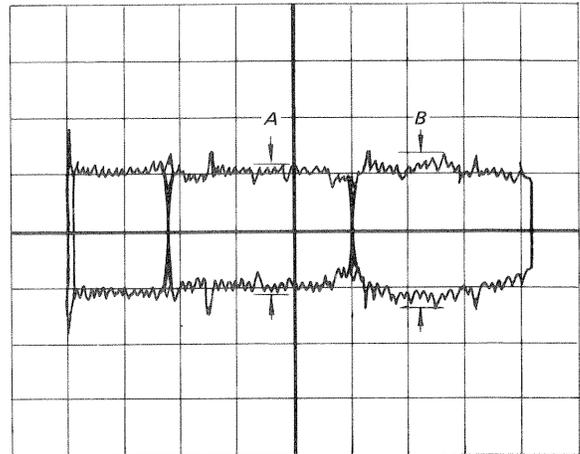


Fig. 5-6

5-5. MODULATOR SYMMETRY ADJUSTMENT

Test Point: TP-4
 Adjust for: Waveform symmetry
 Adjustment: R138 and C115
 Signal source: None

Equipment Required:

1. Dual-trace Oscilloscope

Procedure:

1. Connect both scope probes (CH-1 and CH-2) to TP-4. Set mode selector to ALTER. Invert polarity of channel 1. Set time base to $0.5\mu\text{s}$ and expand sweep to display 2 or 3 square waves.
2. Set up record mode with no input signal.
3. Adjust scope VERTICAL POSITION to overlap the two signals.
4. Adjust for equal pulse width with C115 and for waveshape symmetry with R138.

5-6. CARRIER LEAK ADJUSTMENT

Test Point: Monitor
 Adjust for: Minimum carrier leak
 Adjustment: R315 and R337
 Signal source: Video alignment tape or test pattern

Equipment Required:

1. Monitor
2. Video alignment tape or a video camera

Procedure:

1. Connect monitor
2. Set TV-CAMERA Select switch to TV.
3. Play back the video alignment tape. (If video alignment tape is not available, record a test pattern and make a prerecorded tape to be used as a video alignment tape.)
4. Adjust R315 and R337 for minimum carrier leak.

5-7. MONITOR LEVEL ADJUSTMENT

Test Point: TP-26
Adjust for: 1V(p-p)
Adjustment: R117
Signal source: Telecast signal

Equipment Required:

1. Monitor

Procedure:

1. Set up record mode using telecast signal.
2. Connect scope to TP-1 and check that the video signal is approx. 1V(p-p).
3. Reconnect scope to TP-26.
4. Adjust R117 for 1V(p-p).

5-8. RECORD CURRENT ADJUSTMENT

Test Point: TP-7
Adjust for: Maximum rf output in pb mode
Adjustment: R201
Signal source: Test pattern

Equipment Required:

1. Oscilloscope
2. Video camera AVC-3400
3. Earphone

Procedure:

1. Connect video camera, and thread a blank tape.
2. Connect the scope to TP-5.
3. Set up the record mode using a video camera, microphone and test pattern.

4. Adjust R201 to obtain 2.0V(p-p) and call out the voltage reading into the microphone.
5. Adjust R201 clockwise slowly while observing the scope. Set the recording level to each of the following values.

3.0V	3.5V	4.0V	4.5V
5.0V	5.5V	6.0V	6.5V
7.0V			

At each increment, call out the voltage reading into the microphone.

6. Rewind the tape.
7. Connect an earphone to the earphone jack.
8. Connect the scope to TP-7.
9. Play back the tape. Note the voltage level (as indicated by the voice recording) at which output is greatest.
10. Reconnect the scope to TP-5.
11. Set up the record mode again.
12. Adjust R201 for the reading that gave maximum output indication during playback.

5-9. PLAYBACK PREAMPLIFIER FREQUENCY RESPONSE ADJUSTMENT

Test Point: TP-7
Adjust for: Correct frequency response
Adjustment: C205, C206, R211, R212, R305
Signal source: Video alignment tape

Equipment Required:

1. Oscilloscope
2. Video alignment tape

Procedure:

1. Connect scope to TP-7. Scope controls should be as follows:
Horizontal timebase: 2ms/cm
Vertical deflection: 0.2V/cm
2. Sync the scope externally from TP-16.
3. Play back the rf sweep portion of the video alignment tape.
4. Check to see that the sweep signal of Fig. 5-7 is obtained on the scope. If the sweep signal differs from Fig. 5-7, adjust as follows:

AV-3400 CORRECTED PAGES

- a. Select values of C205 and C206 to obtain maximum amplitude at 4.5 MHz.
- b. Adjust R211, R212, and R305 to obtain the response shown in Fig. 5-7.

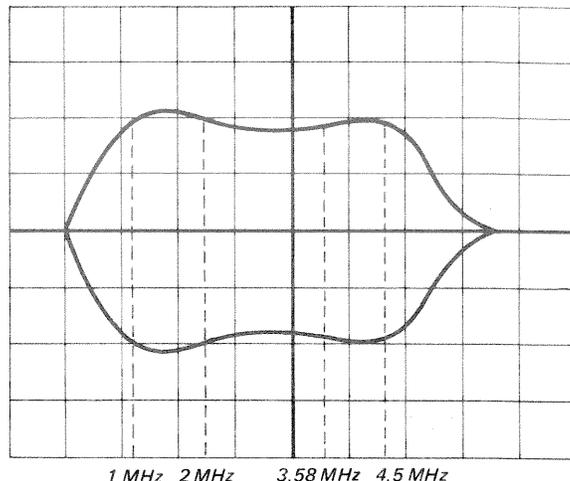


Fig. 5-7 Rf sweep envelope

VIDEO ALIGNMENT SUMMARY

Adjustment	TP	Mode	Component	Input Signal	Adjust for
CLAMP LEVEL	TP-5	REC	R129	no signal	3.2 MHz
PB OUT LEVEL	TP-9	PB	R341	align't tape	1V(p-p)
DEVIATION	TP-26	REC	R105	telecast	3.2 MHz to 4.6 MHz
WHITE CLIP	TP-3	REC	R144	telecast	clip at 50%
OSCILLATOR WAVE SHAPE	TP-4	REC	R138 C115	no signal	symmetrical wave shape
CARRIER LEAK	MINITOR	PB	R337	align't tape	minimum carrier leak
MONITOR LEVEL	TP-26	REC	R117	telecast	1V(p-p)
REC CURRENT	-	REC/PB	R201, R207	camera	maximum pb output
PB PRE-AMP	TP-7	PB	C205, C206, R211, R212, R305	align't tape	flat to 4.5 MHz

Chart 5-2

SECTION 6 AUDIO SYSTEM ALIGNMENT

6-1. ALIGNMENT SEQUENCE

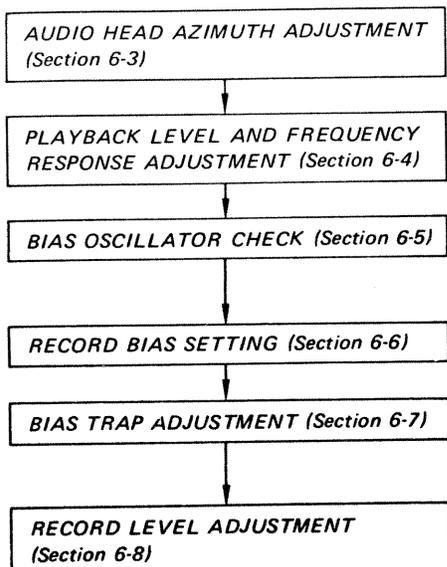


Chart 6-1

Audio system alignment sequence is shown in Chart 6-1. A summary of the alignment procedures is shown in Chart 6-2.

6-2. EQUIPMENT REQUIRED

Audio oscillator: Heath IGW-72 or equivalent
 Audio attenuator:
 VTVM: Heath IMW-21 or equivalent
 Shielded cable with earphone plug: SONY model RK-36
 SONY alignment Tape, 5" reel.

6-3. AUDIO HEAD AZIMUTH ADJUSTMENT

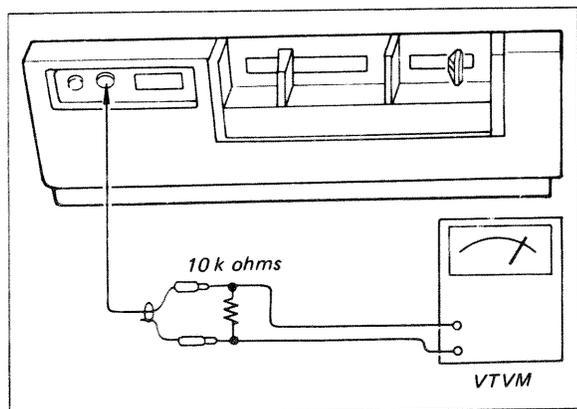


Fig. 6-1 Audio output level check

Test Point: EARPHONE jack (audio output)
 Adjust for: Maximum output reading on VTVM
 Adjustment: Head azimuth adjustment screw
 Signal source: SONY alignment Tape, 5" reel.

Procedure:

1. Play back 7-kHz portion of the SONY audio alignment tape.
2. Connect VTVM as shown in Fig. 6-1.
3. Adjust head azimuth for maximum VTVM reading. See Fig. 6-2.

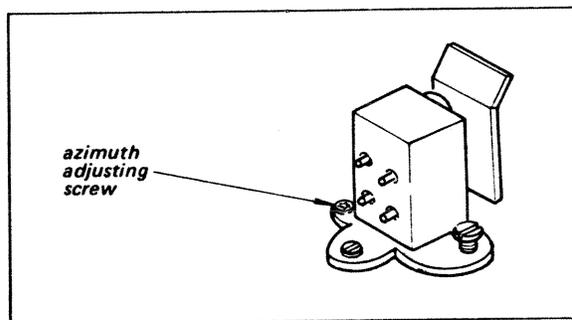


Fig. 6-2 Audio head azimuth adjustment

6-4. PLAYBACK LEVEL AND FREQUENCY RESPONSE ADJUSTMENT

Test Point: EARPHONE jack (audio output)
 Adjust for: 0.61 V (-2 dB) for 1 kHz,
 0.43 V (-5 dB) for 7 kHz
 Adjustment: R814 (1 kHz level),
 R809 (7 kHz level)
 Signal Source: Audio alignment tape

Procedure:

1. Connect VTVM as shown in Fig. 6-1.
2. Play back 1-kHz portion of the audio alignment tape.
3. Adjust R814 for 0.61 V (-2 dB) reading on VTVM.
4. Play back 7-kHz portion of the audio alignment tape.
5. Adjust R809 for 0.43 V (-5 dB) reading on VTVM.

6-5. BIAS OSCILLATOR CHECK

Test Point: TP-25
 Check for: 90 to 110V rms
 Adjustment: None
 Signal source: No signal

Procedure:

1. Set up record mode with no input signal.
2. Connect VTVM to TP-25
3. Check for 90 to 110V rms reading on VTVM.

6-6. RECORD BIAS SETTING

Test Point: Across head terminals
 Adjust for: 36 V rms \pm 0.5 V rms
 Adjustment: C829 (normal record mode)
 L803 (audio dub mode)
 Signal source: No input signal

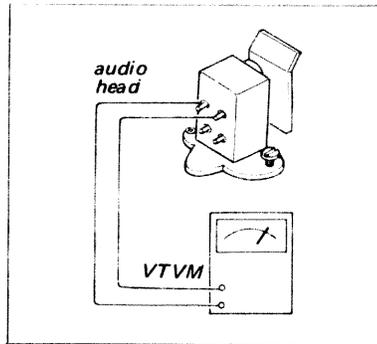


Fig. 6-3 Bias setting

Procedure:

1. Connect VTVM across head terminals.
2. Set up record mode with no signal.

3. Adjust C829 for 36 V rms reading on VTVM.
4. Set up then audio dub mode.
5. Adjust L803 for the same 36 V rms reading on VTVM.

6-7. BIAS TRAP ADJUSTMENT

Test Point: EARPHONE jack (audio output)
 Adjust for: Minimum bias leakage
 Adjustment: L801
 Signal source: No signal

Procedure:

1. Connect VTVM as shown in Fig. 6-1.
2. Set up record mode.
3. Adjust for minimum reading on VTVM.

6-8. RECORD LEVEL ADJUSTMENT

Test Point: EARPHONE jack (audio output)
 Adjust for: 0.50V (-4 dB)
 Adjustment: R826
 Signal source: 1 kHz, -65 dB

Procedure:

1. Connect audio oscillator and attenuator to MIC input jack to provide 1 kHz signal at -65 dB.
2. Connect VTVM as shown in Fig. 6-1.
3. Adjust R826 for 0.50V (-4 dB) reading on VTVM.

Adjustment	TP	Mode	Component	Input Signal	Adjust for
HEAD AZIMUTH	OUTPUT	PB	head	alignment tape	maximum pb output
PB LEVEL	OUTPUT	PB	R814	alignment tape	0.61V across 10k Ω
FREQ. RESP.	OUTPUT	PB	R809	alignment tape	0.43V across 10k Ω
BIAS OSC	TP-25	REC	-	no signal	90 to 110V rms
REC BIAS SET	across head	REC	C829	no signal	36V \pm 0.5V rms
REC LEVEL	OUTPUT	REC	R826	-65 dB, 1 kHz signal	0.50V across 10k Ω

SECTION 7 MECHANICAL SYSTEM MAINTENANCE

7-1. INTRODUCTION

Machine compatibility (interchangeability of tapes between machines) depends upon very close mechanical tolerances in the tape path. The tape path is factory-adjusted and should not require realignment under normal circumstances. Do not attempt adjustment of the tape guides, tapered guides and tape guide-band. They should be adjusted with use of adjustment jigs. If mechanical damage requires replacement and/or adjustment of the guides in the tape path, return the machine to a SONY FACTORY SERVICE CENTER for repair.

Visual Check:

Visual check on the unit helps to locate the trouble.

- | | |
|---|---|
| 1. Capstan does not rotate. | a. Capstan belt drops from pulley.
b. Capstan belt slips. Needs replacement. |
| 2. Tape is not wound onto take-up reel or supply reel in respective mode. | a. Sub-belt drops from the pulley.
b. Sub-belt slips. Needs replacement.
c. Take-up belt slips due to accumulation of oil, dust etc. Needs cleaning or replacement. See Sec. 7-8 and 7-9. |
| 3. Tape runs too fast in record and/or playback. | a. Insufficient pinch-roller pressure, (See Sec. 7-6) or requires cleaning and replacement.
b. Record servo readjustment. (See Sec. 4) |
| 4. Tape slackens when stopping tape. | a. Brake system readjustment. (See Sec. 7-5) |
| 5. Too much tape tension. | a. Tape back tension readjustment. (See Sec. 7-7) |
| 6. Record mode cannot be set-up. | a. RECORD/PLAYBACK Select switch on each circuit board does not function properly. Needs brake link readjustment. (See Sec. 2-3) |

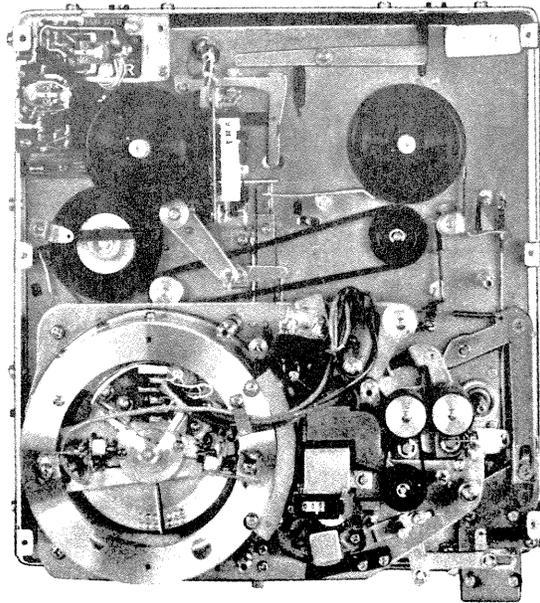


Fig. 7-1

7-2. CLEANING HEADS AND SLIP-RINGS

Noise in the picture during playback is usually caused by an accumulation of debris in the video heads. In some cases, half the picture may be noisy (split-screen); in severe cases, video output may be lost.

To clean the heads, stop the machine, remove the tape and move one of the heads to the front. See Fig. 7-2.

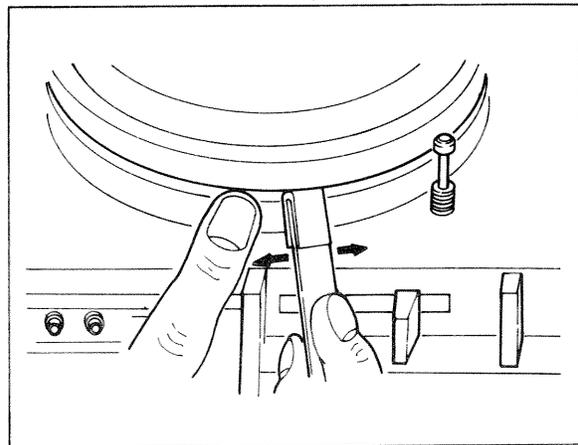


Fig. 7-2 Head cleaning

CAUTION

NEVER TRY TO CLEAN HEADS WITH THE MOTOR RUNNING.

Saturate a cleaning tip (accessory X-36090-19-0) with SONY cleaning fluid (accessory Y-20310-01-0) or methanol (spray cleaner, such as M/S-brand magnetic head cleaner.) Rub the cleaning tip across the head tip from side to side. Avoid vertical motion which might damage the video head.

Clean the erase and audio/control heads with SONY cleaning fluid, if necessary. Move the cleaning tip vertically across that part of the head surface that normally contacts the tape.

Noisy slip rings cause intermittent dark horizontal lines in the playback picture. To clean the slip rings, remove the upper drum cover on the top of the rotary-head drum assembly. Remove the tape from the tape path. Apply a few drops of SONY cleaning fluid to the slip rings. Turn on the motor for 10 to 20 seconds. Carefully wipe the excess fluid from the tape path around the rotary head-drum assembly. If slip ring noise persists, clean the slip rings directly with a head-cleaning tip saturated with SONY cleaning fluid. Rotate the

head assembly to keep the cleaning tip away from brushes.

Head degaussing:

Through constant use, the heads may become magnetized resulting in a noisy picture. Bring the tip of the degausser (SONY model HE-2) as close as possible to the head tip without contacting the head. Then remove the degausser very slowly at least three feet from the head, before turning off the degausser.

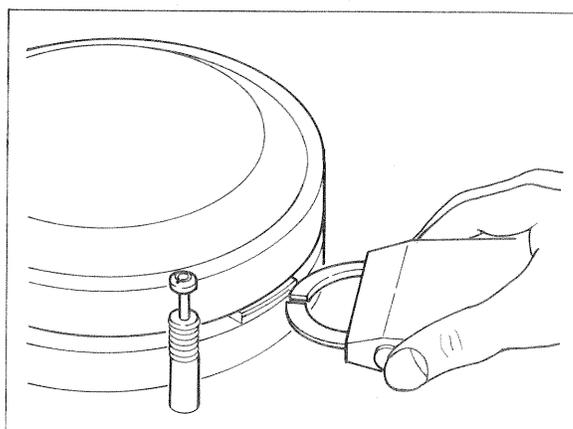


Fig. 7-3 Head degaussing

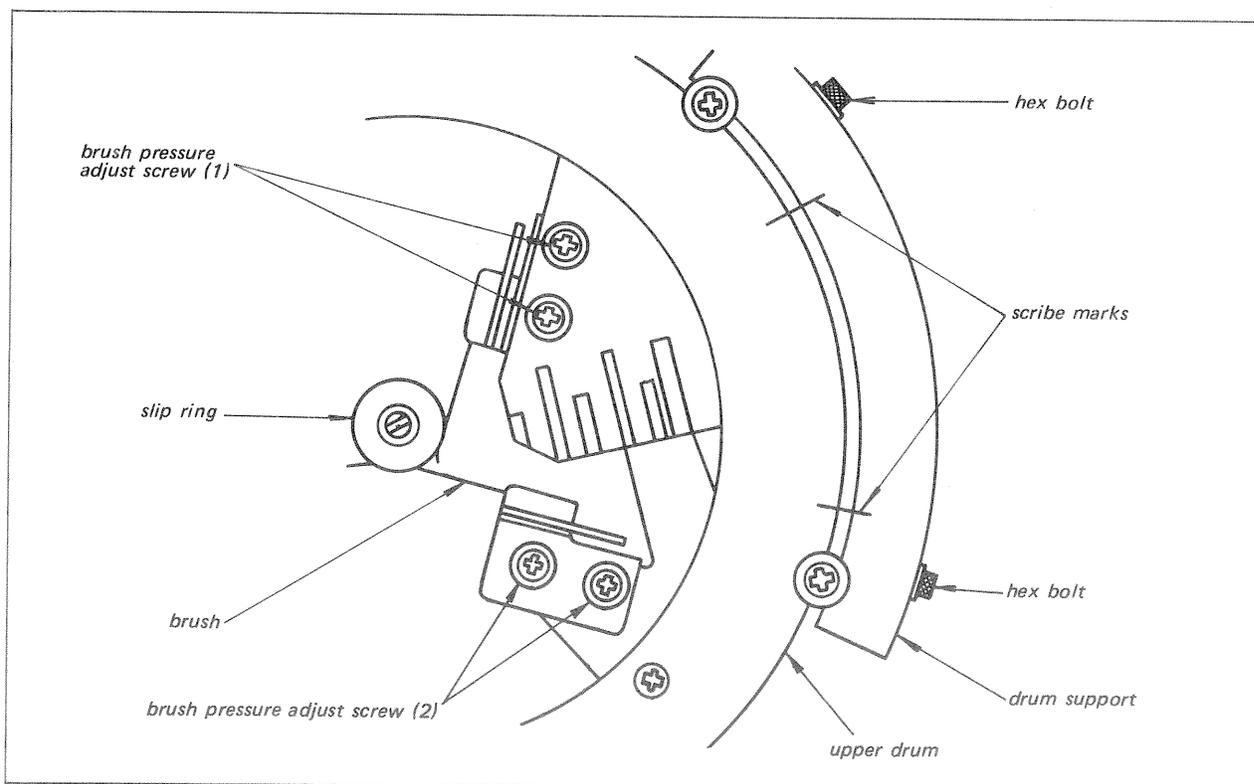


Fig. 7-4

CAUTION

THE HEAD DEGAUSSER SHOULD NOT BE ALLOWED TO TOUCH THE VIDEO HEAD.

7-3. VIDEO HEAD REPLACEMENT

Video head replacement is required when the heads are damaged, worn or have open coils. Check the video head output as indicated in Sec. 5-4-5.

CAUTION

THE VIDEO HEAD ASSEMBLY AND THE SURROUNDING MACHINED PARTS ARE VERY PRECISELY MADE. USE UTMOST CARE WHEN PERFORMING ANY WORK ON THE ROTARY HEAD-DRUM ASSEMBLY.

Removal

1. Loosen the screws that hold the head-drum cover. Lift off the head-drum cover.

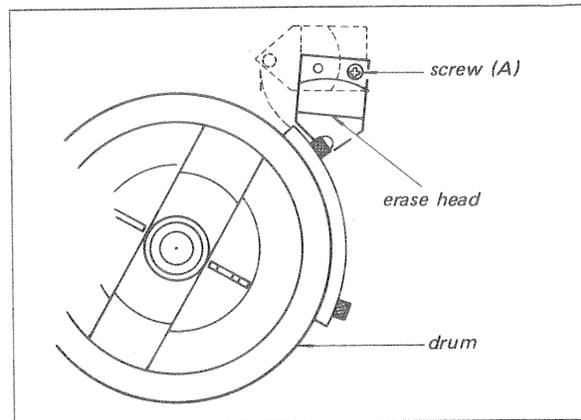


Fig. 7-5

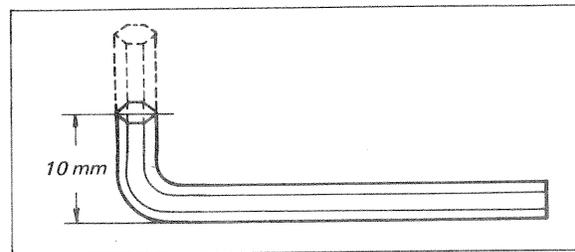


Fig. 7-6 4 mm Allen wrench

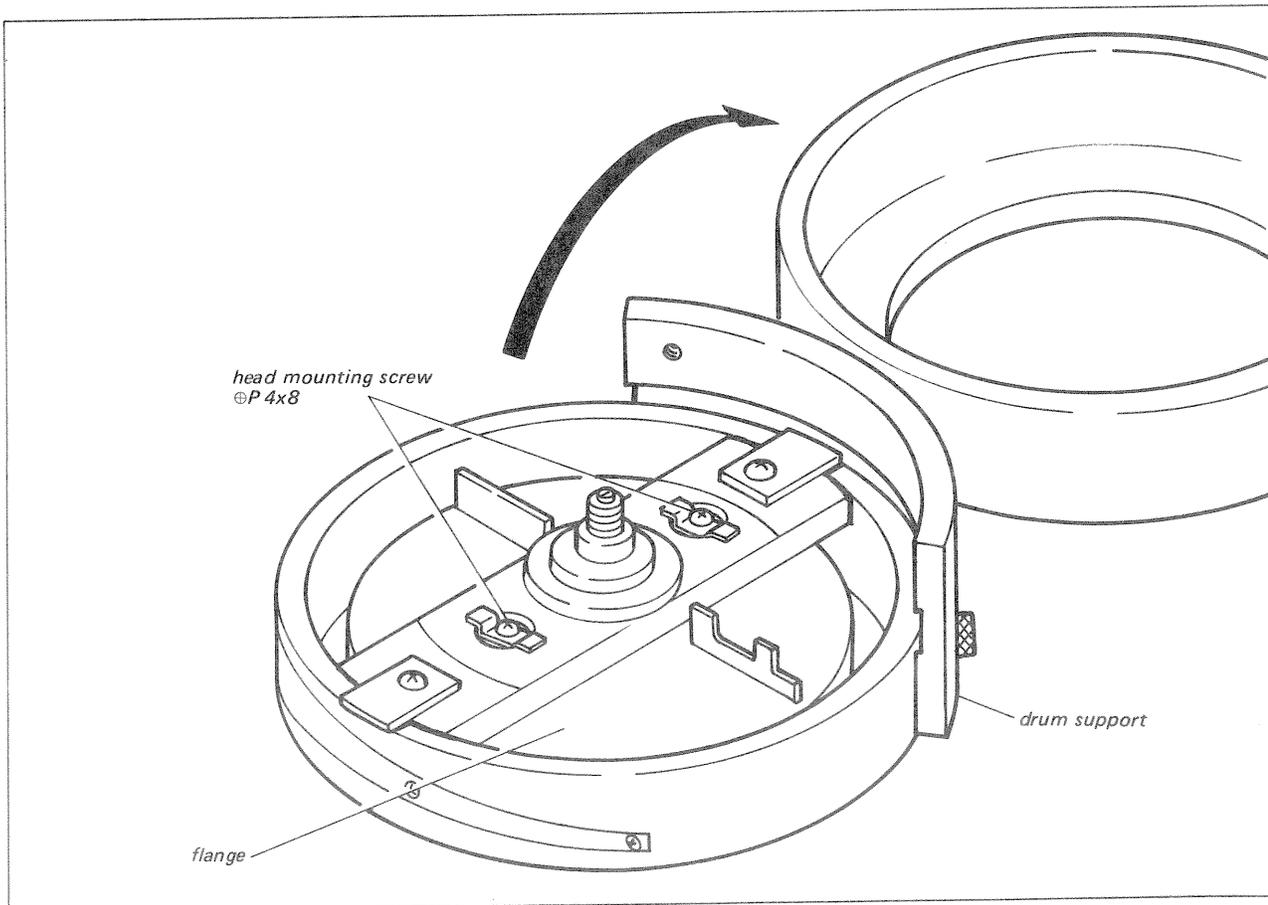


Fig. 7-7 Upper drum removal

2. Remove the two 3 mm screws that hold down the cover plate. Remove the cover plate.
3. Loosen the four brush pressure adjusting screws (1) and (2) as shown in Fig. 7-4 and move the brushes away from the slip rings.
4. Put a reference mark on the upper drum using a scribe and straight edge as shown in Fig. 7-4.
5. Remove the upper two Hexagon Socket Head Bolts 5 x 20 and washers as shown in Fig. 7-4 using a special 4 mm Allen wrench as shown in Fig. 7-6 or removing the erase head as shown in Fig. 7-5. Hold the upper drum with one hand so that it does not fall as you withdraw the two screws.
6. Carefully lift the top of the drum assembly and fold it back. Place the drum top carefully on the reel panel. See Fig. 7-7.

CAUTION

DO NOT TOUCH THE PG POLE PIECES.

Position the rotary head platform as shown in Fig. 7-7 by touching the aluminum beam on which the heads are mounted. Slight pressure on the pole pieces can affect pole piece alignment.

7. Hold the video head assembly to keep the platform from rotating. Loosen the two P 4 x 8 screws that hold the head assembly to the platform. See Fig. 7-7. Do not exert too much downward pressure on these screws. Remove the screws and washers.
8. Using both hands, carefully lift the video head assembly off the platform. If a spacer is found between the video head and aluminum beam, leave the spacer on the beam.

Replacement

9. Clean the bottom of the new video head, type H01-12 (SONY Part No. 8-946-912-00). This head is commonly used in all AV series VTRs. Early production of AV-3400 VTRs had used a type H03-12 head that is not interchangeable. See service bulletin to install H01-12 replacement head in place of type H03-12. The type H03-12 head is identified by a small brass cap on top of the head slip ring.

10. Position the platform as shown in Fig. 7-8 so that the 30PG pole piece is at the 3 o'clock position and the 60PG pole piece is at the 9 o'clock position.
11. Carefully place the new video head assembly on the platform with the B head at the 6 o'clock position and A head at the 12 o'clock position. See Fig. 7-8. The head assembly should fit down snugly against the platform without using force.

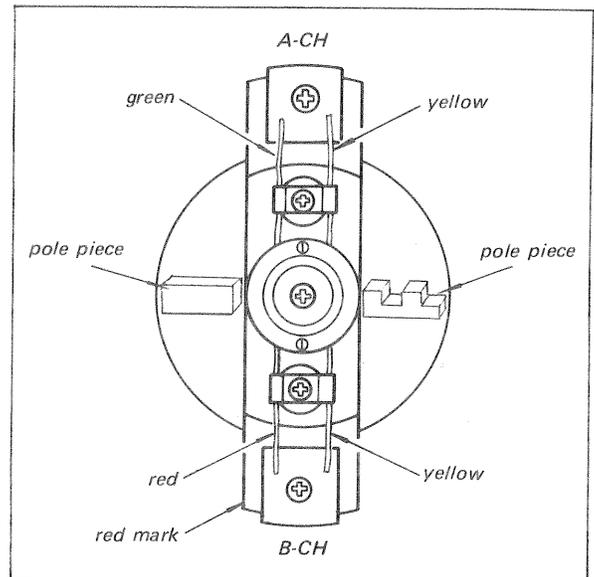


Fig. 7-8 Head mount

12. Install the two Pan head 4 x 8 mm screws and washers. Rotate the head assembly gently to the left and right until it is approximately in the center of the angular "play" permitted by the mounting screws. Tighten the screws alternately, applying torque gradually until the screws are tight.
13. Carefully swing the top of the upper drum back into place, support the top with one hand while inserting the two Hexagon-socket Head bolts and washers. Do not tighten the screws all the way.
14. Grasp the top of the upper drum to push it back and down against the drum holder so that the top surface of the upper drum is even with that of the drum holder. Align the scribe marks.
15. Tighten the two bolts alternately, applying torque gradually until all are tight.

16. Tighten the brush pressure adjusting screws to obtain a 2 mm bend (approximately) as shown in Fig. 7-9.

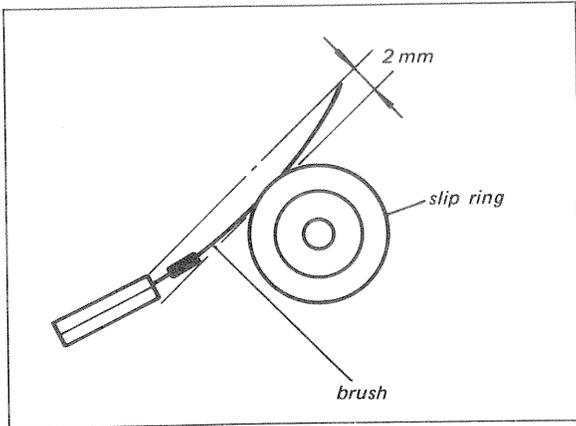


Fig. 7-9 Brush pressure

17. Inspect the brush and slip-ring assembly to make sure that the brushes are centered in the slip rings. If the brushes are not centered, loosen the brush position adjusting screws in Fig. 7-9 and apply drops of head cleaning fluid onto the slip-rings. Set up the playback mode to rotate the video heads. Adjust the position of the brushes so that they are centered in the slip-rings and tighten the brush-position adjusting screws.

18. If the erase head had been temporarily removed, install it in original position.

PG Check

19. After a new video head assembly has been installed, it is necessary to check PG outputs and their relative positions. See Sec. 4-3-3 and 4-3-4.

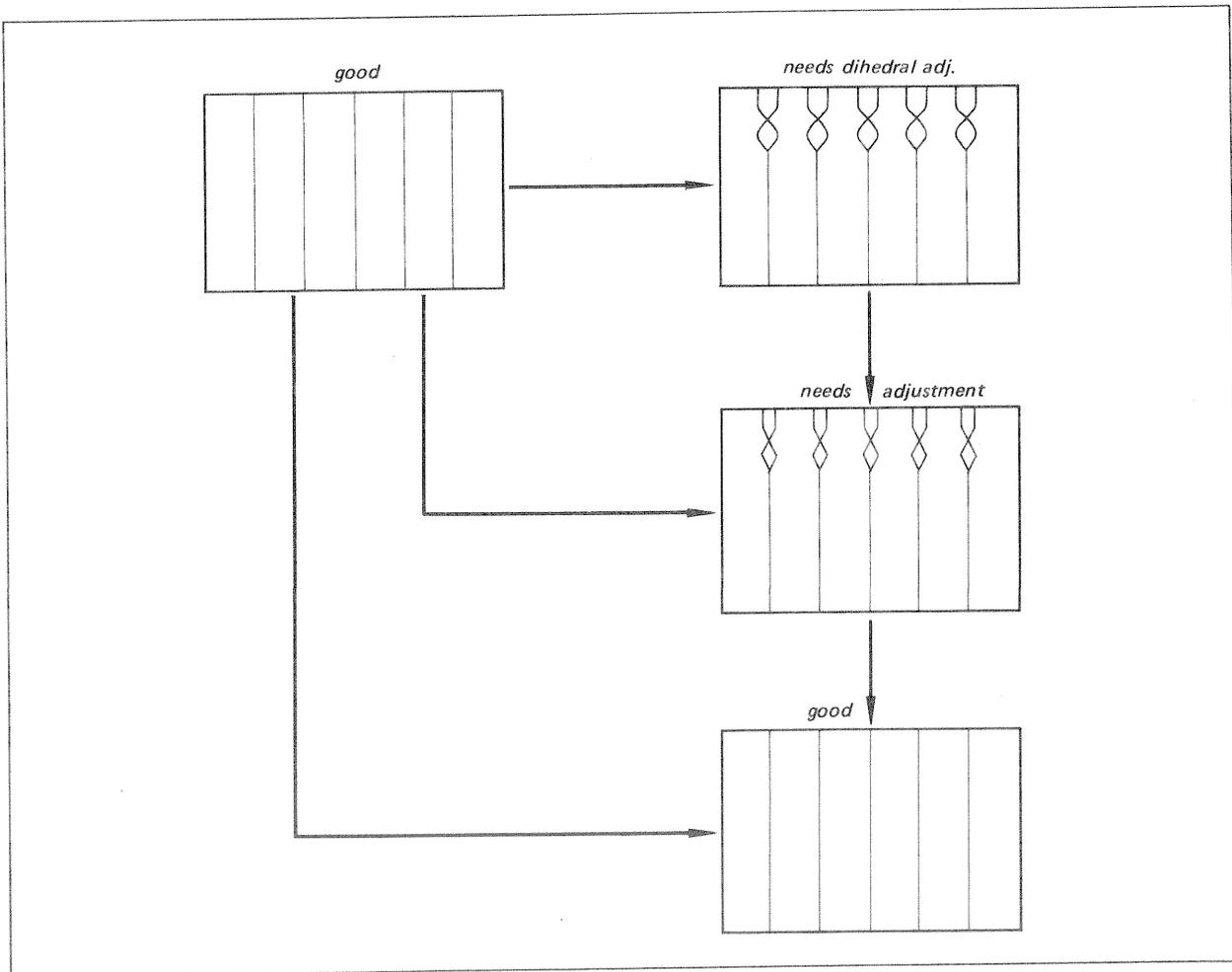


Fig. 7-10 Head dihedral adjustment

Preamplifier Check

20. It is also necessary to check the frequency response of the preamplifiers. See Sec. 5-9.

Dihedral Check

The two video heads should be positioned exactly 180 degrees apart. The relative angle can be measured by observing the monitor screen.

21. Play back the alignment tape.

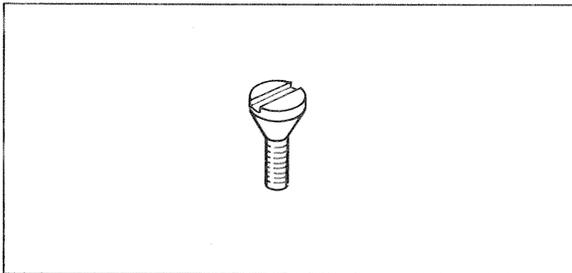


Fig. 7-11 Head dihedral adjust screw

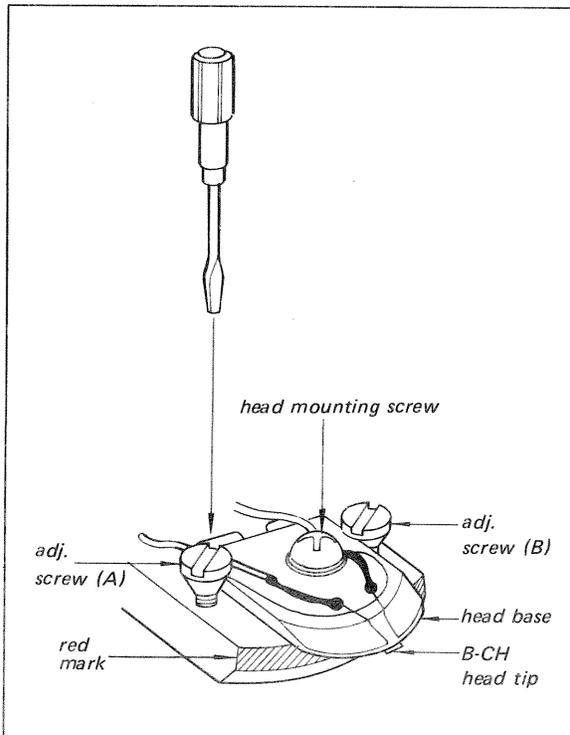


Fig. 7-12 Dihedral adjustment (1)

22. Observe the monitor screen, especially on the top edge, to see if there is any sync displacement as shown in Fig. 7-10. If this condition observed on the top, proceed to Step. 23.
23. Position the video head assembly as shown in Fig. 7-13. Install four angle adjustment screws (SONY Part No. 3-618-904-00) shown in Fig. 7-11 into both heads as shown in Fig. 7-12. Thread them in until slightly snug. Do not exert force.

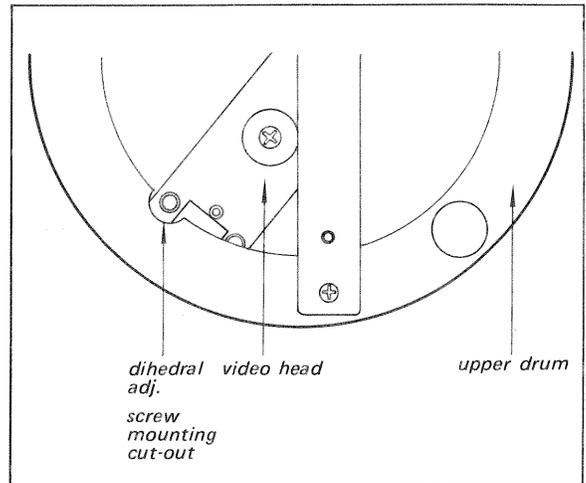


Fig. 7-13 Dihedral adjustment (2)

CAUTION

DO NOT TOUCH HEAD MOUNTING SCREW.
See. Fig. 7-12.

24. Position B head (with red paint on the tip) to the adjusting position.
25. Turn (a) screw in Fig. 7-12 CCW $\frac{1}{4}$ turn and (b) screw CW $\frac{1}{4}$ turn.
26. Play back the video alignment tape again and observe the top of the picture. If the amount of displacement has decreased, repeat Step 25 until the displacement is invisible. If the amount of displacement has increased, proceed to Step 27.
27. Turn (a) screw in Fig. 7-12 CW by $\frac{1}{4}$ turn and (b) screw CCW by $\frac{1}{4}$ turn. Repeat Steps 26 and 27 until displacement becomes invisible.
28. Remove the four adjusting screws.

7.4. AUDIO/CONTROL HEAD REPLACEMENT

Replace audio/control head when it is worn, has open coils or is damaged. The head (model PP30-2102A) has the audio record/playback portion at the top, and the control-signal record/playback portion at the bottom.

1. Unsolder the leads at the rear of the head.
2. Remove the screws A and B in Fig. 7-14. Do not loosen the screws in the long slots.
3. Lift the head assembly off the mounting plate.

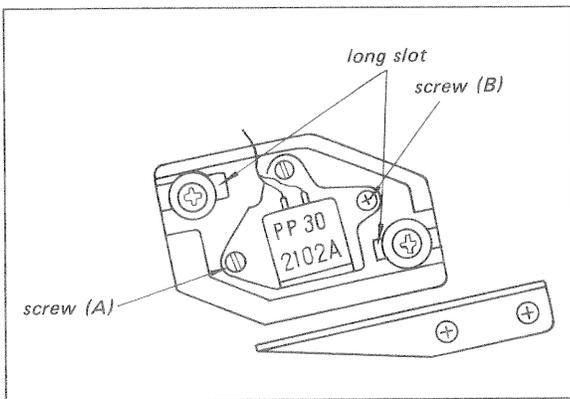


Fig. 7-14 Audio/CTL head (1)

4. Place the new head assembly on the mounting plate and install the two screws from the bottom.
5. Install the head mounting plate assembly using the original screws A and B in Fig. 7-14.
6. Play the tape and check that the core of the head extends 0.1 mm above and 0.25 mm below the edges of the tape. See Fig. 7-15. The height can also be adjusted by inserting spacers.
7. Connect a VTVM to the EARPHONE jack.
8. Play back the 7 kHz section of the alignment tape.

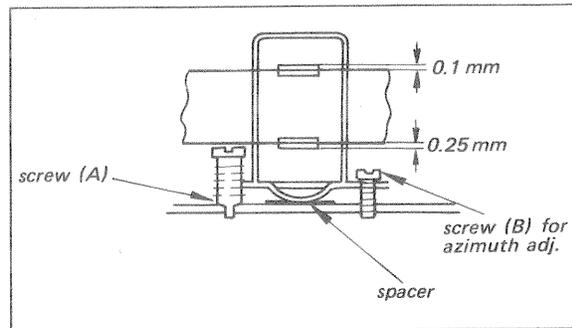


Fig. 7-15 Audio/CTL head (2)

9. Adjust the azimuth adjustment screw in Fig. 7-15 to obtain maximum VTVM reading.
10. Play back video alignment tape. Check the monitor picture for signal-to-noise ratio.
11. Adjust TRACKING control to obtain best picture. If S/N is poor, proceed to Step 12.
12. Connect scope to TP-7. Sync the scope externally from TP-19.
13. Play back video alignment tape. Loosen the screws in the long slots shown in Fig. 7-14.
14. Move the head slightly to the right or left until maximum output is obtained on scope.
15. Tighten the screws.

7.5. STOP BRAKE ADJUSTMENT

The tape should not slacken when the VTR is stopped from all other modes of operation, e.g. play, fast forward and rewind.

1. Remove reel panel.
2. Set the function lever to fast forward.
3. Check for 0.9 ± 0.1 mm clearance between the reel table and brake shoe. Bend (A) or (B) portion for correct clearance. See Fig. 7-16.

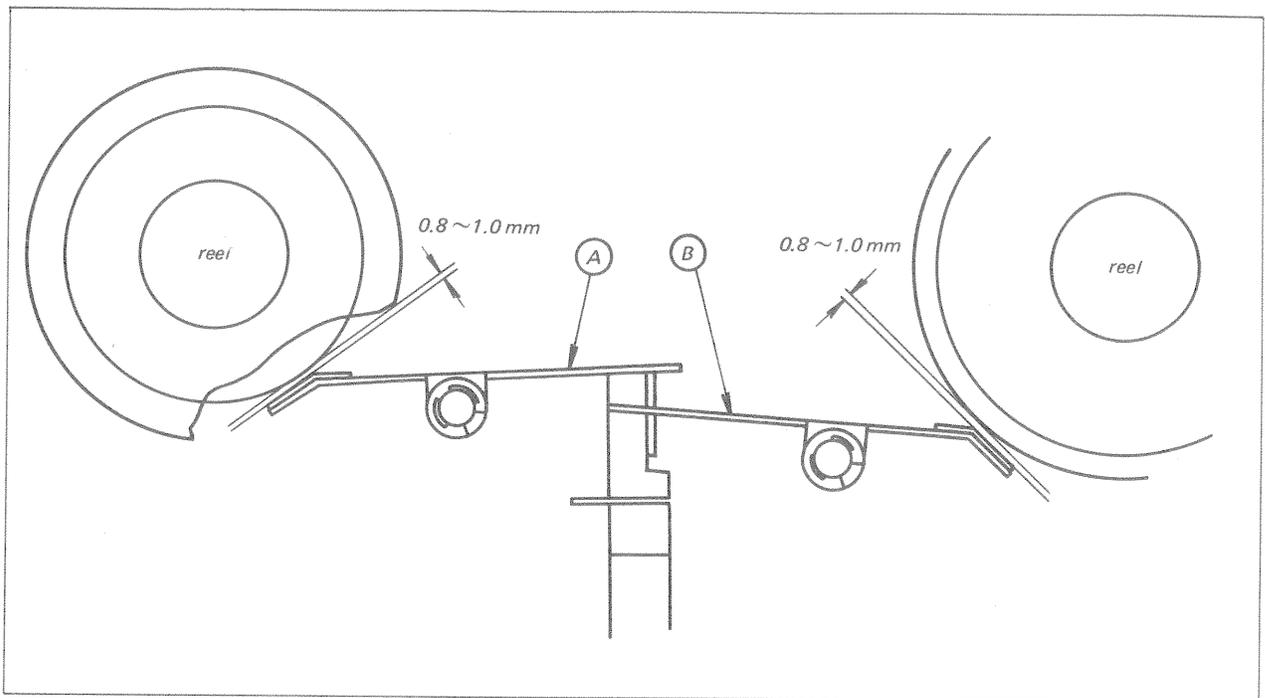


Fig. 7-16 Brake adjustment

7-6. PINCH ROLLER PRESSURE ADJUSTMENT

1. Make a loop in a piece of string and attach the spring scale around the base of the pinch roller shaft. See Fig. 7-17. Use 4 kg spring scale (SONY Part No. 9-911-042-01).

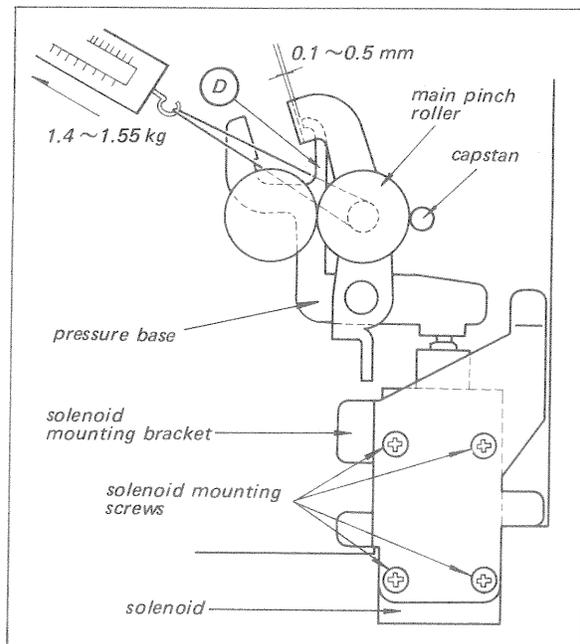


Fig. 7-17 Pinch roller adjustment

2. Set up playback mode.
3. Pull the scale in the direction indicated by the arrow in Fig. 7-17. Check the reading when the pinch roller leaves the capstan. It should be in between 1.4 kg and 1.55 kg. If not, proceed to Step 4.
4. Loosen four screws in Fig. 7-17. Move the solenoid downwards when the reading is too low. Tighten the screws.
5. Check for 0.1 ~ 0.5 mm clearance between the pressure base and pinch roller base. If not, bend **D** with pliers.

7-7. TAPE TENSION BRAKE CHECK

This adjustment corrects the back tension applied by the tension brake servo to the supply reel.

1. Place a full reel of tape on the supply reel table.
2. Make a loop in the tape and attach a spring scale as shown in Fig. 7-18. Use 400 g tension gauge (SONY Part No. 9-911-042-00).
3. Thread the tape in the path shown in Fig. 7-19.
4. Set up the playback mode (power off).

5. Pull the scale in the direction indicated in Fig. 7-19. A steady pull at approximately the correct speed should give a reading of $45 \text{ g} \pm 5 \text{ g}$.

6. If tape tension is other than $45 \text{ g} \pm 5 \text{ g}$, bend the spring stay shown Fig. 7-19.

7. Repeat Steps 5 and 6 until the tape tension is $45 \text{ g} \pm 5 \text{ g}$.

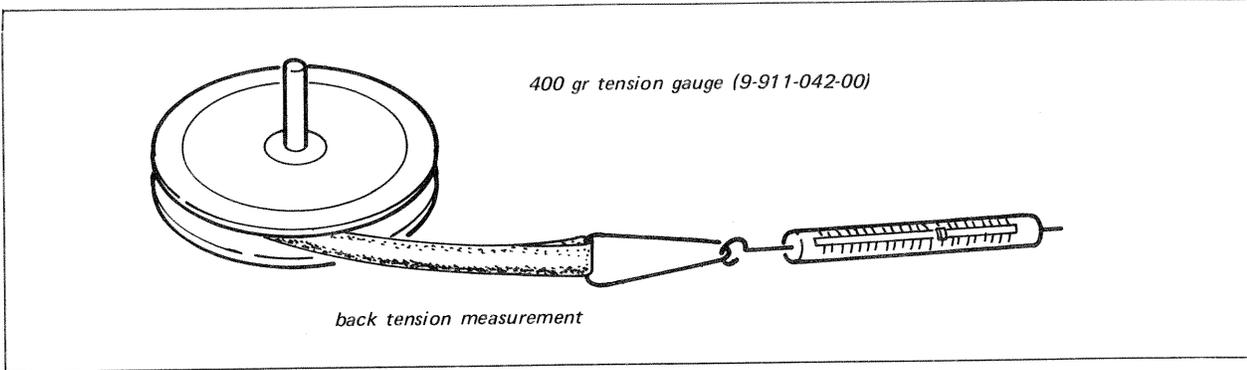


Fig. 7-18

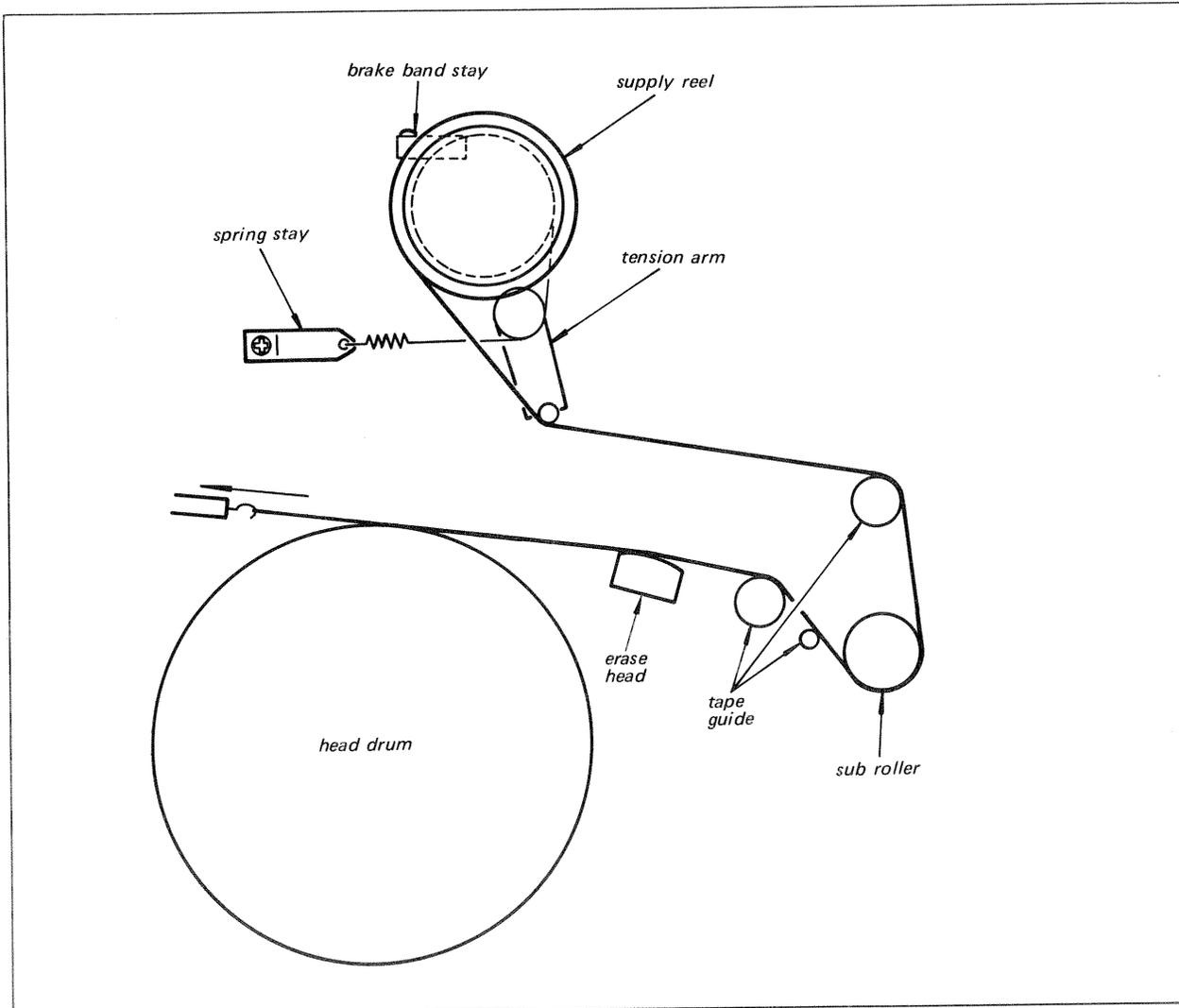


Fig. 7-19 Back tension measurement

7-8. FAST FORWARD PULLEY ADJUSTMENT

If fast forward cannot be set up correctly, adjust pulley position as follows.

1. Set up fast forward mode and check by hand how tightly the tape is wound onto the take-up reel.

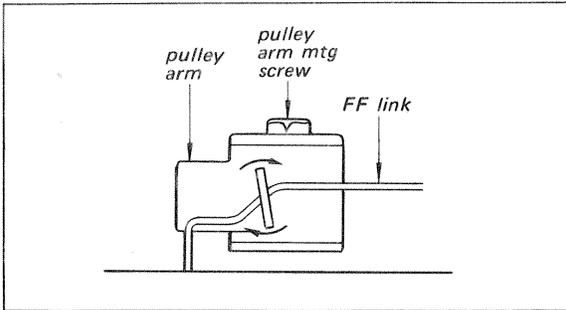


Fig. 7-21 Detail A

2. If the tape pack is too loose, bend the pulley arm in the direction indicated by arrow in Fig. 7-21. Use pliers.

7-9. TAKE-UP TORQUE ADJUSTMENT

If take-up torque is weak in the record and playback modes, adjust it as follows.

1. Place a full reel of tape on the supply reel table. Set up the fast forward mode so that almost all tape is wound onto the take-up reel.
2. Set up the playback mode and check the take-up torque.
3. If take-up torque is weak, turn the pulley pressure adjusting nut shown in Fig. 7-21 CW 2 to 3 turns.

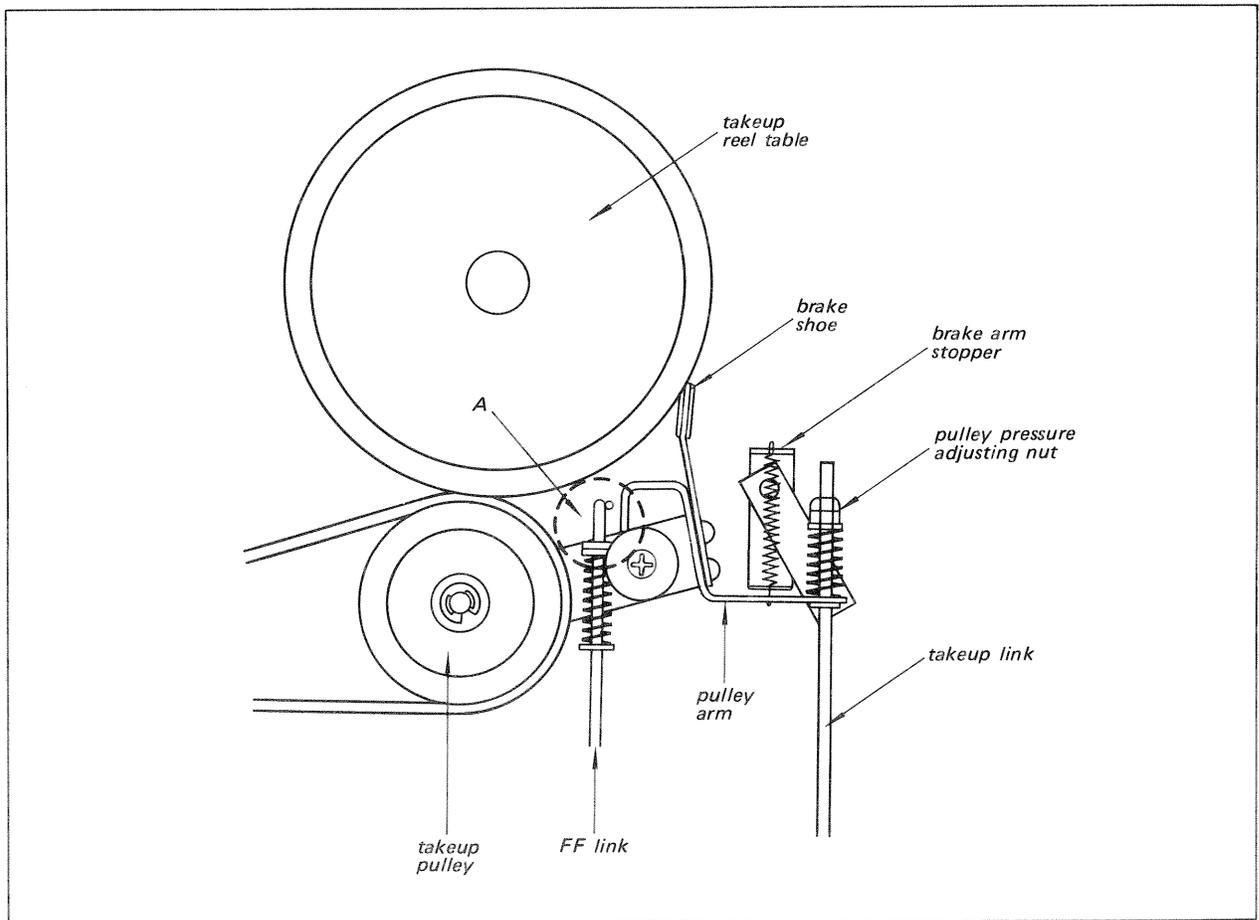


Fig. 7-20 Takeup pulley

7-10. SUB-MOTOR REPLACEMENT

1. Remove the cabinet. See Sec. 2-1.
2. Remove the front control panel by removing four screws shown in Fig. 7-22.

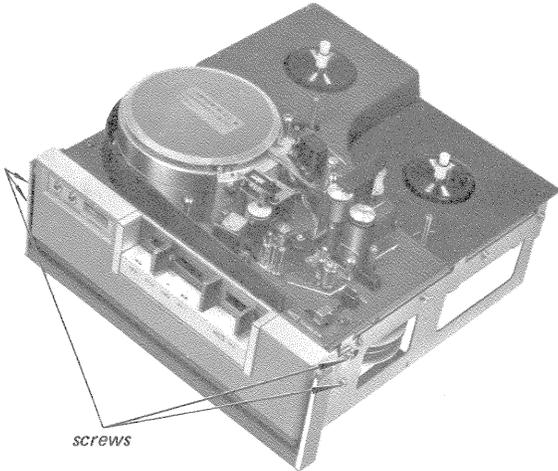


Fig. 7-22

3. Remove "V" circuit board. See Sec. 2-2.
4. Remove the sub-motor belt and capstan belt from pulley.
5. Remove screws in Fig. 7-23 to take out the sub-motor assembly.
16. Remove (a) spacer for reel table, (b) sub-motor bracket and (c) sub-roller from sub-motor as shown in Fig. 7-23.
7. Prepare a new sub-motor. Apply ¼ drop of BONDMASTER (contact cement) inside the hole of sub-roller.
8. Insert the sub-roller into the shaft of the sub-motor. Check the clearance between the motor and roller. It should be 0.3 mm to 0.5 mm.
9. Wipe off excess BONDMASTER from the motor shaft.

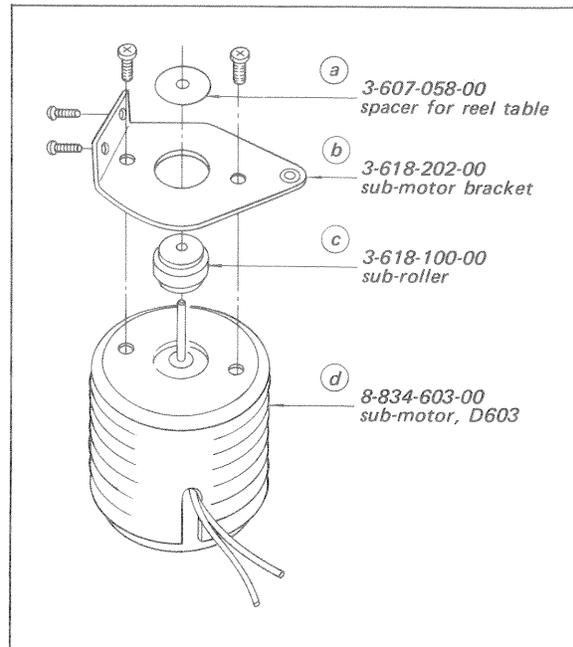


Fig. 7-23 Sub-motor assembly

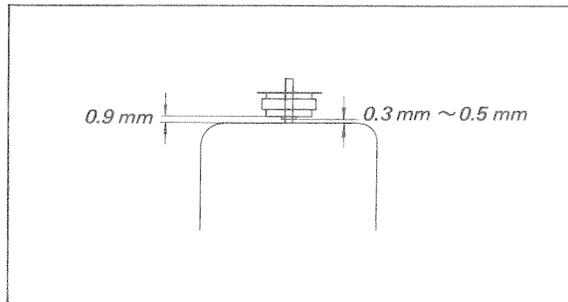


Fig. 7-24

10. Install the spacer and the bracket shown in Fig. 7-23, and the belt.
11. Reinstall the sub-motor assembly into the chassis.
12. Reinstall the capstan belt.
13. Reinstall the "V" circuit board and the front control panel.
14. Reinstall the cabinet.

SECTION 8 CIRCUIT DESCRIPTION

8-1. VIDEO CIRCUIT

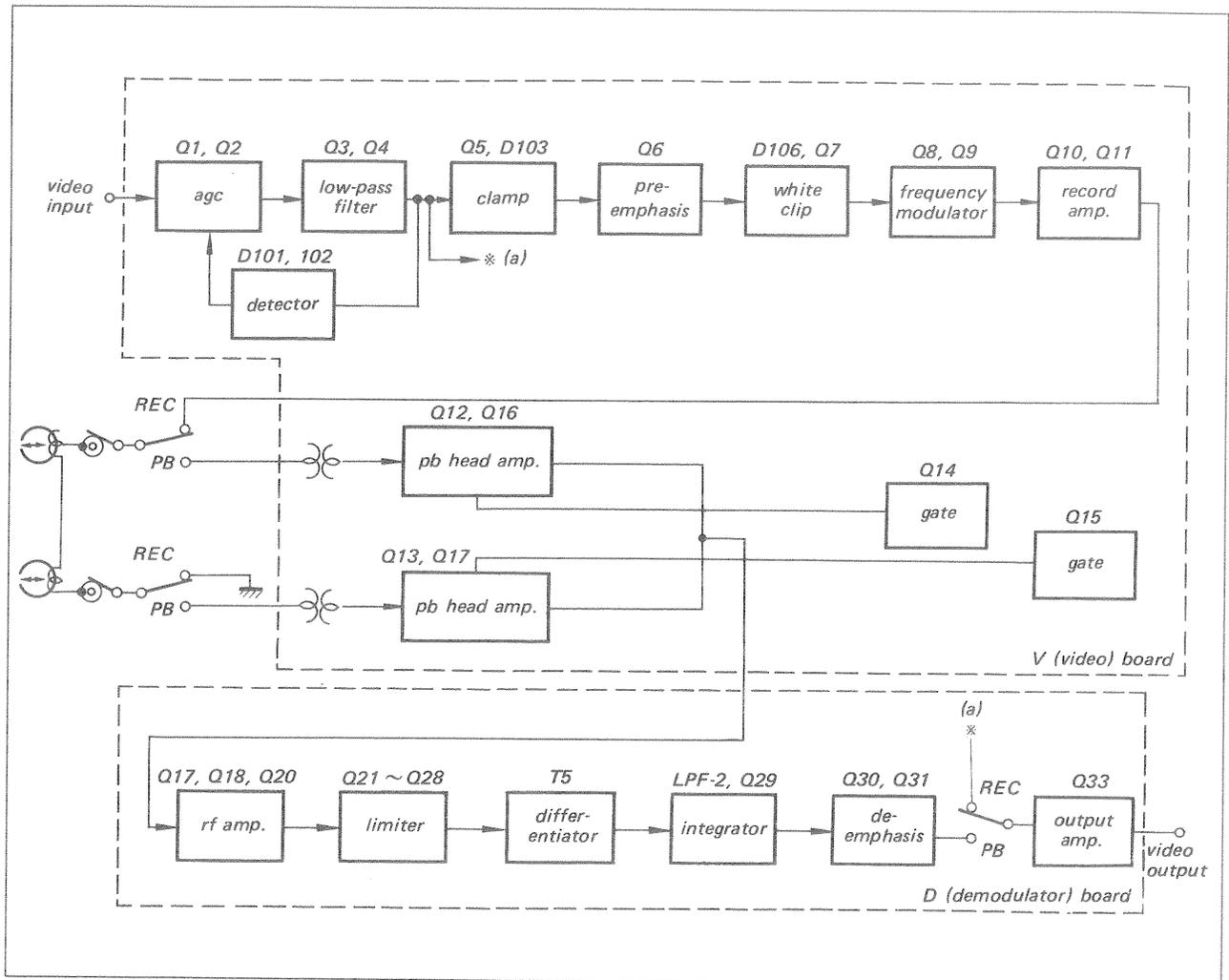


Fig. 8-1 Video system, block diagram

Video input and AGC
Q1 and Q2

The input video signal amplitude is held constant by an AGC system. Output from Q4 is sampled and detected by D101 and D102 in order to control the conduction of FET Q1. Q1 acts as a variable resistor.

Low-pass filter
L191, L192,
L193, C191

The 3.58 MHz color sub-carrier, 4.5 MHz sound carrier and other high frequency components are removed by this filter.

Video amplifier
Q3, Q4

The amplified video is supplied to three outputs, the FM modulator, AGC detector, and monitor output. Since the

Clamp
D103, C110

AV-3400 has no E-to-E mode, record video is monitored at the output of Q4.

The video signal is clamped by this circuit. Clamp level is adjusted by R129.

Differential amplifier
Q5, Q6
Pre-emphasis
C112, R112, R123

The video signal, including the d-c level, is amplified by the differential amplifier with pre-emphasis provided for high frequencies.

White clip
D106

D106 clips the white peaks (overshoot) produced by the pre-emphasis network.

Frequency modulator Q8, Q9 This is a symmetrical free-running multivibrator acting as a frequency modulator. The oscillating frequency varies from 3.2 MHz to 4.6 MHz in AV-Series Videocorders.

Coupling Xformer T1 T1 couples the modulator output to the record amplifiers.

Record amplifier Q10, Q11 This is a power amplifier to feed record current to the video heads. R201 adjusts record current. R207 adjusts the frequency response characteristic.

Video heads A slip-ring and brush assembly couples recording current to the video heads.

Head amplifiers and switchers Q12 ~ Q17 The playback video head outputs are amplified and alternately gated on by the 30PG signal to provide a flat, noise-free output.

Video amplifier Q18 ~ Q20 The PB video head outputs are mixed in the base circuit of emitter follower Q18. The output of Q18 feeds a two stage video amplifier that provides high-frequency peaking.

Limiters Q21 ~ Q28 The PB signal is amplitude-limited by four diode pairs with transistors supplying interstage amplification.

Demodulator D309, D310 The input to the demodulator from Q28 is differentiated by R335 and the primary wiring of T5. The push-pull output of T5 is applied to the pair pulse detectors (demodulator) D309 and D310. These diodes produce two negative output pulse per one input pulse. Thus, the carrier frequency is effectively doubled and placed outside the video band.

Low-pass filter LPF-2 The output of D309 and D310 is amplified by Q29 and fed to a low-pass filter to obtain a video output that is proportional to the pulse frequency.

Video amplifier Q30, Q31 Video output from the low-pass filter is amplified by Q30 and Q31. R346 and C324 reduce high frequency gain to provide de-emphasis.

8-2. SERVO CIRCUIT

The AV-3400 has both a head-drum (scanner) servo and a capstan servo system. Section 8-2-1 describes the camera-record mode where the head drum servo free-runs at 15,750 Hz with the capstan servo disabled. Section 8-2-2 describes the TV-record mode where the capstan servo is locked to the external TV signal. Section 8-2-3 describes the playback mode where the capstan servo is locked to the playback control-track signal and the head drum servo runs at 15,750 Hz.

8-2-1. Camera-Record Mode Servo

In the camera record mode the servo system acts as a simple speed regulator to make the scanner turn at 30 rps. The reference for the system is a multivibrator having a constant pulse width.

Variations in speed, as detected by variations in the output frequency of the tone (feedback) generator, alter the duty cycle of this multivibrator to produce a dc correction voltage that controls motor speed. A belt linkage to the capstan drive pulley provides tape driving power. The capstan servo is not operative in the camera record mode.

When using the AVC-3400, the Videocorder free-runs at a constant speed, and supplies vertical and horizontal drive signals to the camera. The head drum contains a dc servo motor with a 15,750 Hz frequency generator beneath it. Faster rotation of the head produces a generator output higher than 15,750 Hz which lowers the dc motor drive current and thus slows the head rotational speed.

15,750 Hz Frequency Generator FG The head drum contains a frequency generator coil that produces 525 Hz output pulses per single revolution of the video head. The head rotates at 30 rps, so that the frequency generator coil produces a

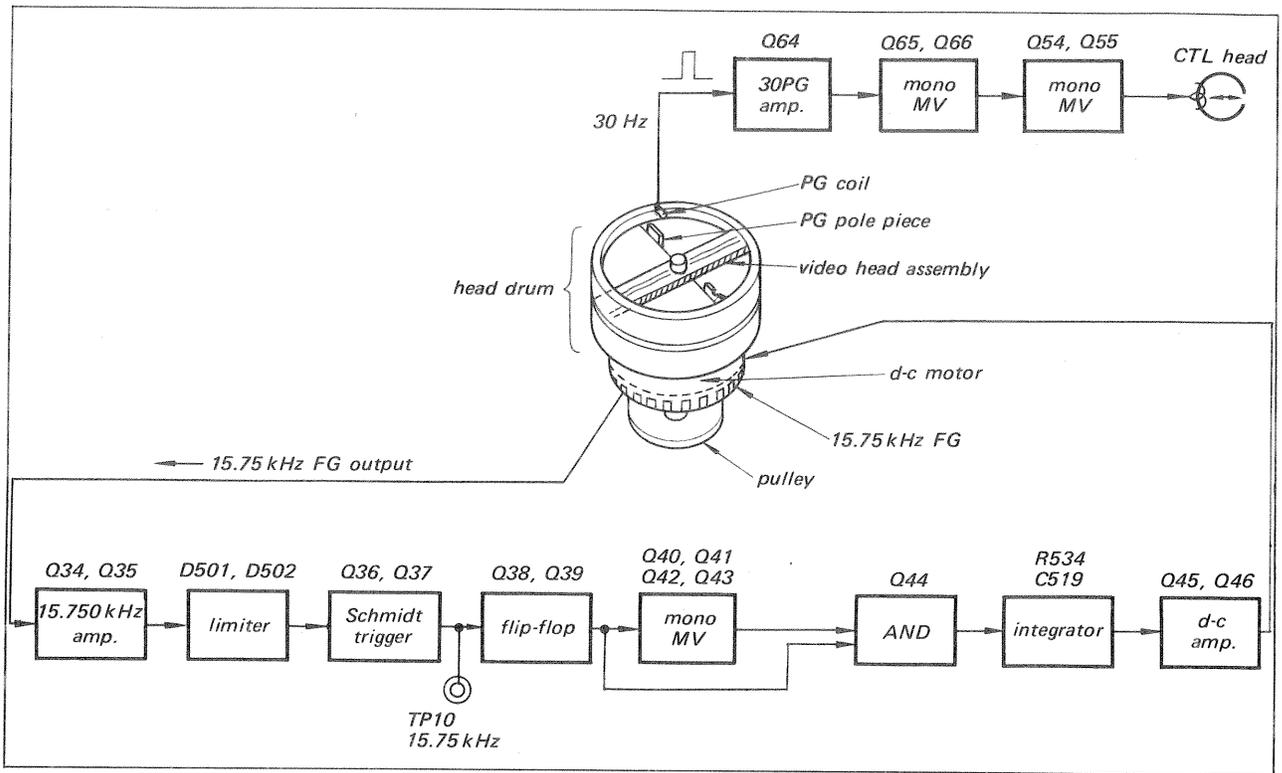


Fig. 8-2 Camera record mode, block diagram

15,750 Hz output. Faster rotation increases FG frequency output and slower rotation decreases frequency output.

FG amplifier (Q34, Q35) and limiter (D501, D502)

The 15,750 Hz FG output is amplified and then amplitude-limited so that it can drive the following Schmidt trigger circuit.

Schmidt trigger Q36, Q37

Q36 and Q37 comprise a Schmidt trigger circuit that converts FG output to rectangular pulses.

Flip-Flop Q38, Q39

The flip-flop is triggered by the negative slope of the Schmidt output so that the 15,750 Hz frequency is halved to 7,875 Hz rectangular pulses.

Monostable MV Q40 ~ Q43

The positive slope of the monostable multivibrator is triggered by the negative slope of the flip-flop output. The negative slope of the multivibrator is determined by potentiometer R525 so that the ON period of the multivibrator is always held constant by R525. Since the ON period of the flip-flop varies with the head rotational speed whereas the ON period of the multivibrator is always held constant, the error signal is obtained by comparing the flip-flop output and multivibrator output.

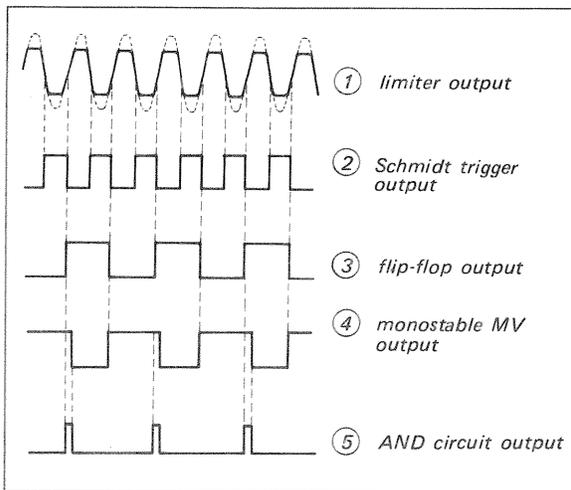


Fig. 8-9. Servo waveforms

AND gate
Q44

The monostable multivibrator output (Fig. 8-9-4) and the flip-flop output (Fig. 8-9-3) are fed to an AND gate, Q44, that conducts only when the monostable multivibrator and the flip-flop are ON at the same time. The duration of the AND gate output pulse depends on the speed of head rotation.

If head rotation is too fast, the flip-flop output pulse will have a short period as compared with the constant monostable multivibrator output pulse. The AND gate output will then have a long pulse duration.

Integrator
R534, C519

The AND gate output is converted to a dc level by the integrator circuit.

8-2-2. TV Record Mode Servo

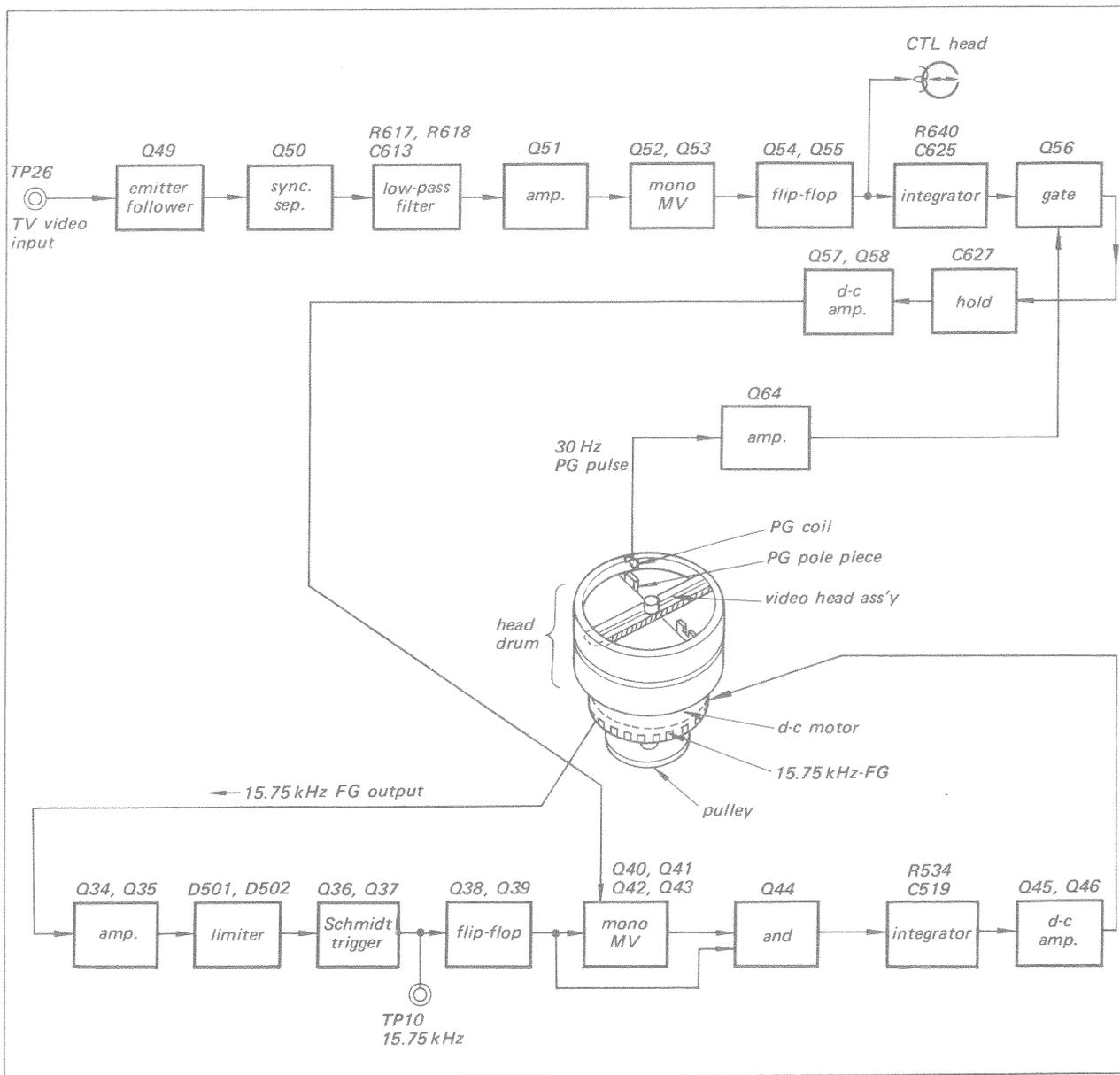


Fig. 8-10 TV record mode servo, block diagram

In the TV record mode the same servo system is used to drive the scanner except that the pulse width of the reference multivibrator is made variable. Pulse width is controlled by the timing error between the arrival of vertical sync and the 30PG feedback pulse that signals the beginning of an A-head scan. The capstan servo is not operative in the TV record mode.

Sync separator Q50 This is a conventional sync separator with a short time constant bias network (R613 & C609) to remove impulse-type noise.

Low-pass filter R617, R618, C613 Removes horizontal, sync pulses from the vertical sync interval.

Monostable multivibrator Q52, Q53 This is a noise-reject multivibrator so that noise in the output of Q51 will not trigger flip-flop Q54, Q55.

Flip-flop Q54, Q55 Divides the 60 Hz vertical sync pulse to a 30 Hz rectangular pulse.

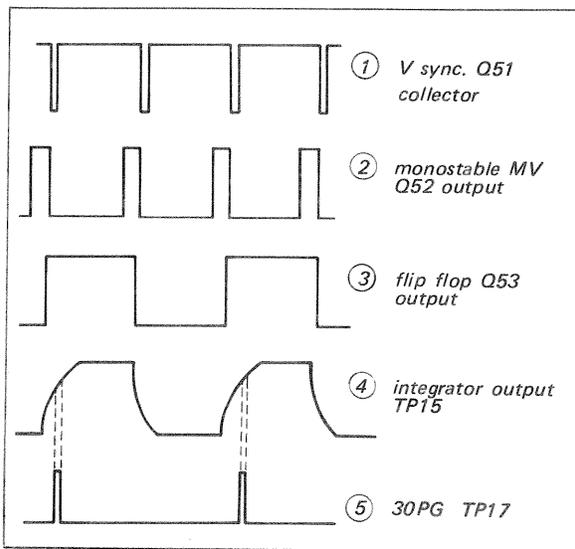


Fig. 8-11 Servo waveforms

Integrator R640, C625 The rectangular pulse is integrated so that both positive and negative edges have a slope determined by the RC time constant.

Gate Q56 The integrator output is gated by the 30PG pulse to obtain the servo error signal.

Dc amplifier Q57, Q58

The error signal is amplified by Q57 and Q58, and fed to the monostable multivibrator (Q40 ~ Q43) so that the error signal can vary the time constant of the monostable multivibrator.

8-2-3. Playback Mode Servo

In the playback mode, both the scanner and capstan servo systems are operative. The scanner servo functions in the same way as it does in the Camera record mode; it is a simple speed regulator. However, the capstan is servo driven to ensure correct tape position as the head begins its pass across the tape. To do this the arrival of the CTL pulse is compared with the arrival of the feedback 30PG pulse. The resulting dc error voltage drives the capstan sub motor to speed up or retard tape motion.

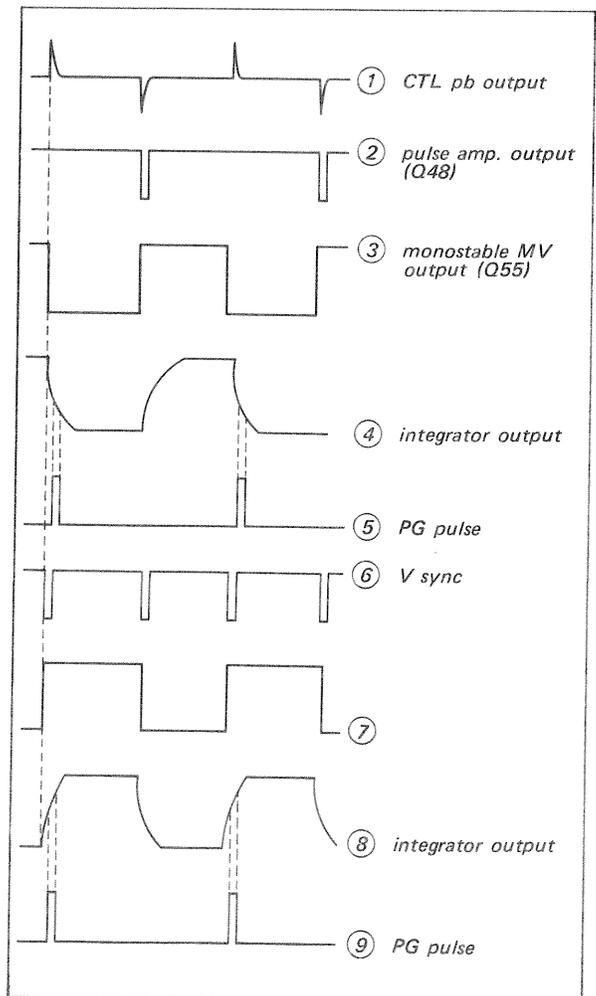


Fig. 8-13 Playback servo waveforms

Pulse amplifier
Q47, Q48

Negative-going pulses from the CTL head are amplified by Q47 and Q48.

Monostable Multivibrator
Q54, Q55

This multivibrator is triggered by the negative slope of the playback CTL signal.

Dc amplifier
Q57, Q59~Q62

This push-pull amplifier is connected in a Darlington configuration to supply either accelerating or braking current to the motor in playback.

8-3. AUDIO CIRCUIT

This section describes audio record, playback, and sound dub circuits.

8-3-1. Record Mode Audio Circuit

Audio recording level is maintained by the AGC circuit. The audio recording may be monitored at the EARPHONE jack only in the TV record mode.

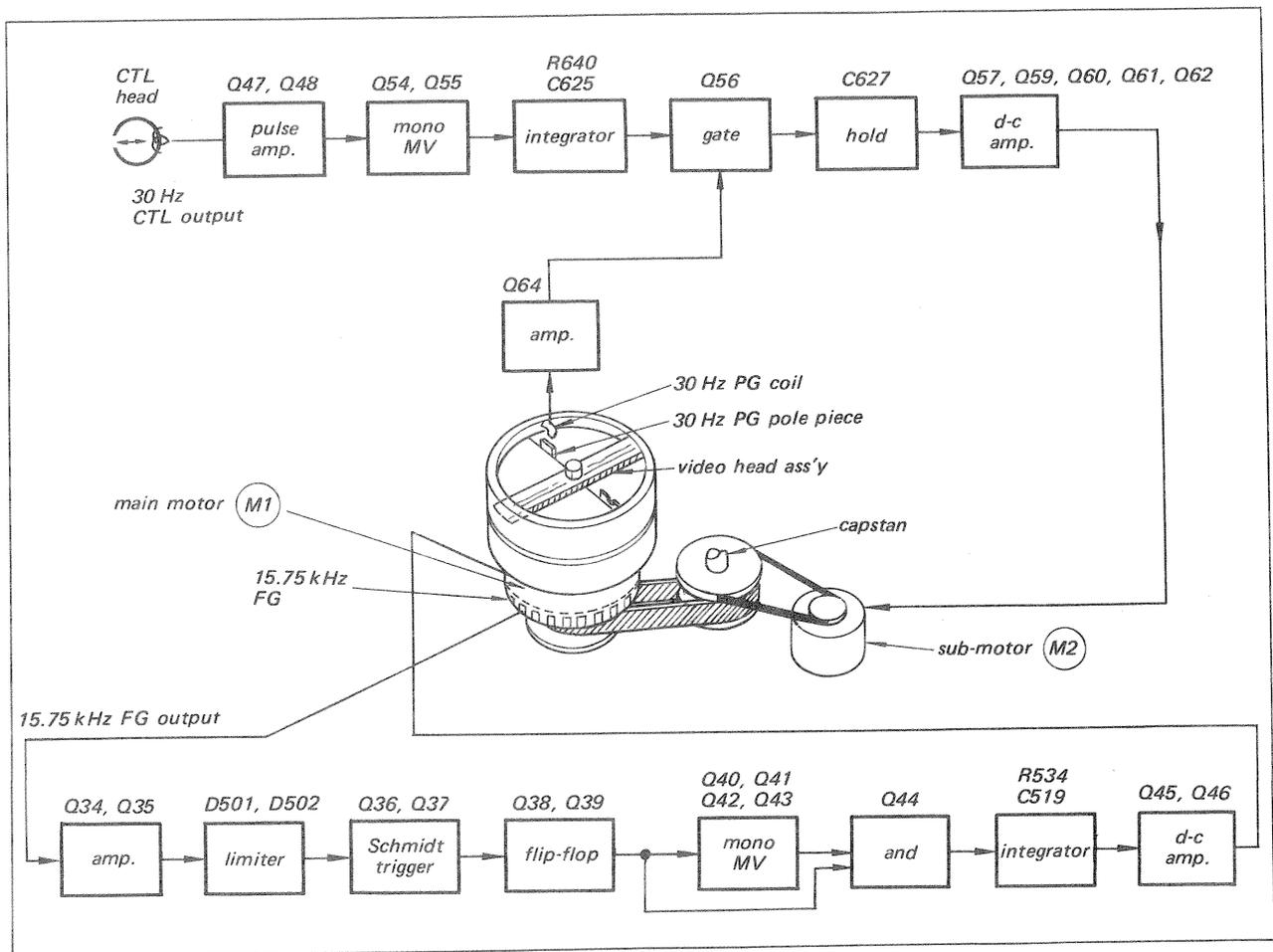


Fig. 8-12 Playback mode servo

Audio input from either the microphone or the TV is amplified by Q76 and Q77 with negative-feedback equalization. The output of Q77 is again amplified by Q78 and fed then to the audio record/playback head through a bias trap. The agc circuit consists of Q79, Q80, and Q82 to detect and supply negative feedback to Q77.

8-3-2. Playback Mode Audio Circuit

Playback audio output is supplied to the RF modulator and the monitor/TV in the TV mode, while it is supplied to only the RF modulator in the camera mode.

The playback signal from the audio head is amplified by Q76, Q77, Q79 and Q80, and then supplied to the audio output. C806 and R809 provide negative feedback.

8-3-3. Audio Dub Mode Circuit

In the audio dub mode, the video circuits remain in the playback mode while the audio circuit is in record. The erase current normally fed to the video heads is by-passed to a dummy load L803 so that an equal amount of erase current is fed to the audio erase head in both normal record and audio dub modes.

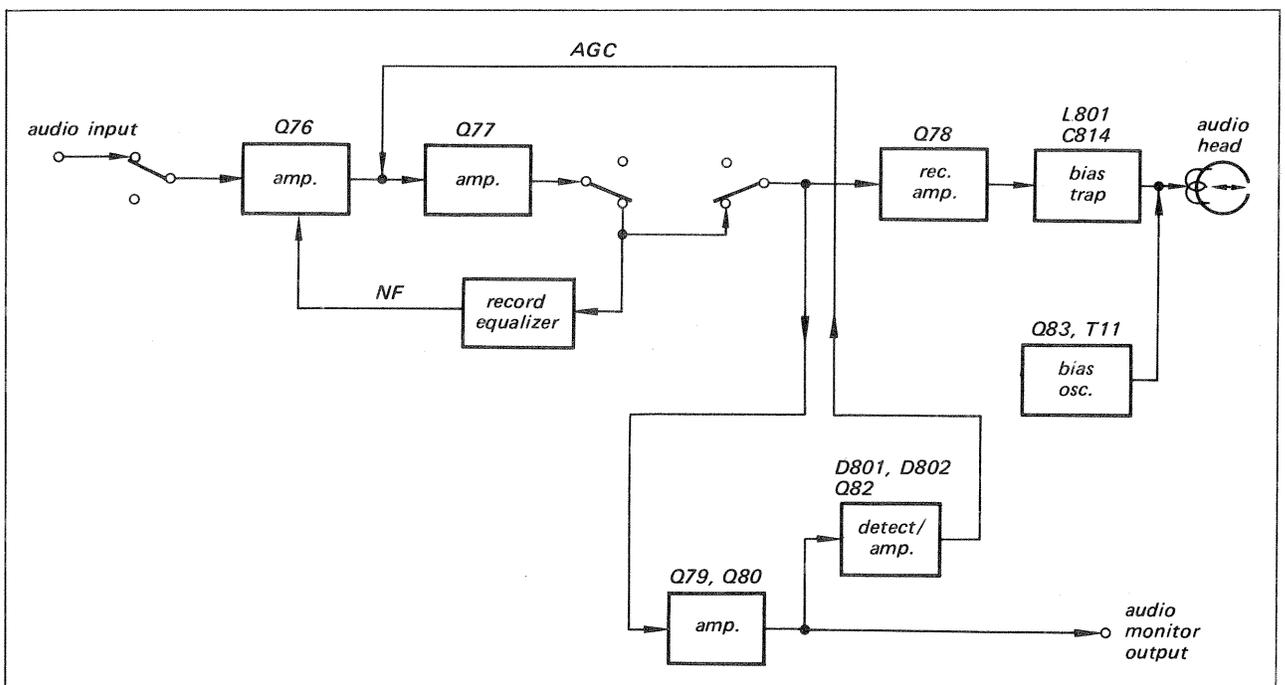


Fig. 8-14

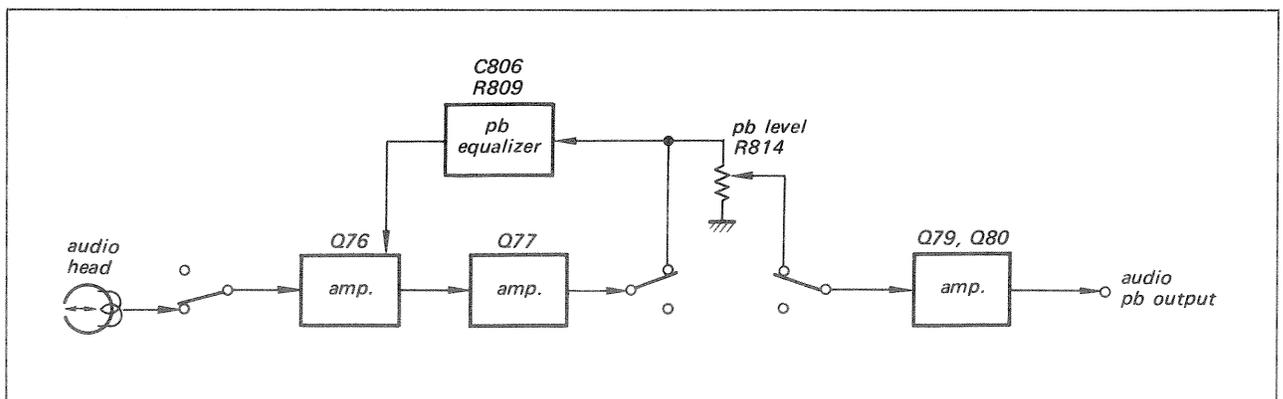


Fig. 8-15 Playback mode audio circuit

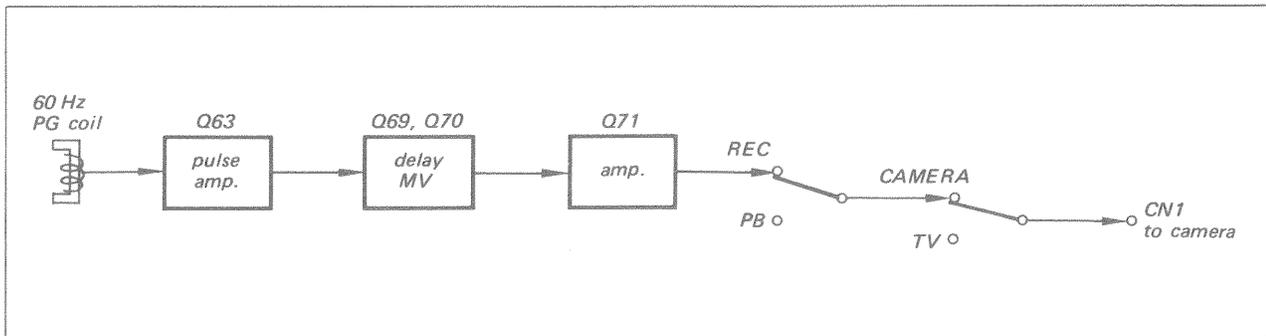


Fig. 8-16 VD generating circuit

8-4. POWER SUPPLY

The internal BP-20 battery or an external power supply (AC-3400) supplies dc power of 12V ~ 13V between Pin 2 (hot) and Pin 4 (ground) of CN3. Current passes through a 3A fuse, automatic shut-off switch S8, and a series regulator power supply (Q87 ~ Q89) to provide a B+ of 9V dc.

The battery meter is connected between +12V dc and +9V dc. The meter pointer stays in the boundary region between red and white areas when +12V input drops to +11V dc.

8-5. CAMERA REMOTE CONTROL CIRCUIT

The Videocorder has a camera remote control circuit consisting of Q84, Q85, and Q86 that is connected to the AVC-3400 trigger lever microswitch through camera connector CN1.

8-6. CAMERA DRIVE SYNC SIGNAL GENERATOR

Horizontal and vertical drive generating circuits is then supplied to the AVC-3400 camera deflection system.

8-6-1. Vertical Drive Generating Circuit

The 60 Hz signal from the 60PG coil is amplified by Q63, delayed by Q69 and Q70, and amplified by Q71. Negative pulses are grounded by D706 so that only positive pulses are amplified and supplied to the camera.

8-6-2. Horizontal Drive Generating Circuit

The 15,750 Hz output from the 15,750 Hz FG coil is amplified and amplitude-limited to trigger the Schmidt trigger circuit. The Schmidt trigger output is then supplied to the video camera AVC-3400 deflection system.

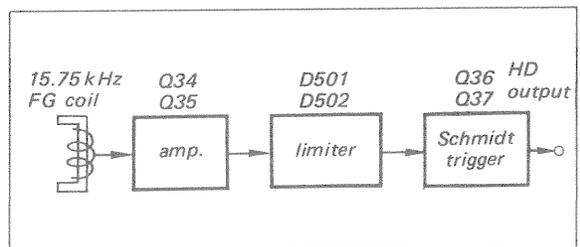


Fig. 8-17 HD generating circuit

SECTION 9 TAPE TRANSPORT DESCRIPTION

9-1. TAPE PATH

The tape path is shown in Fig. 9-1.

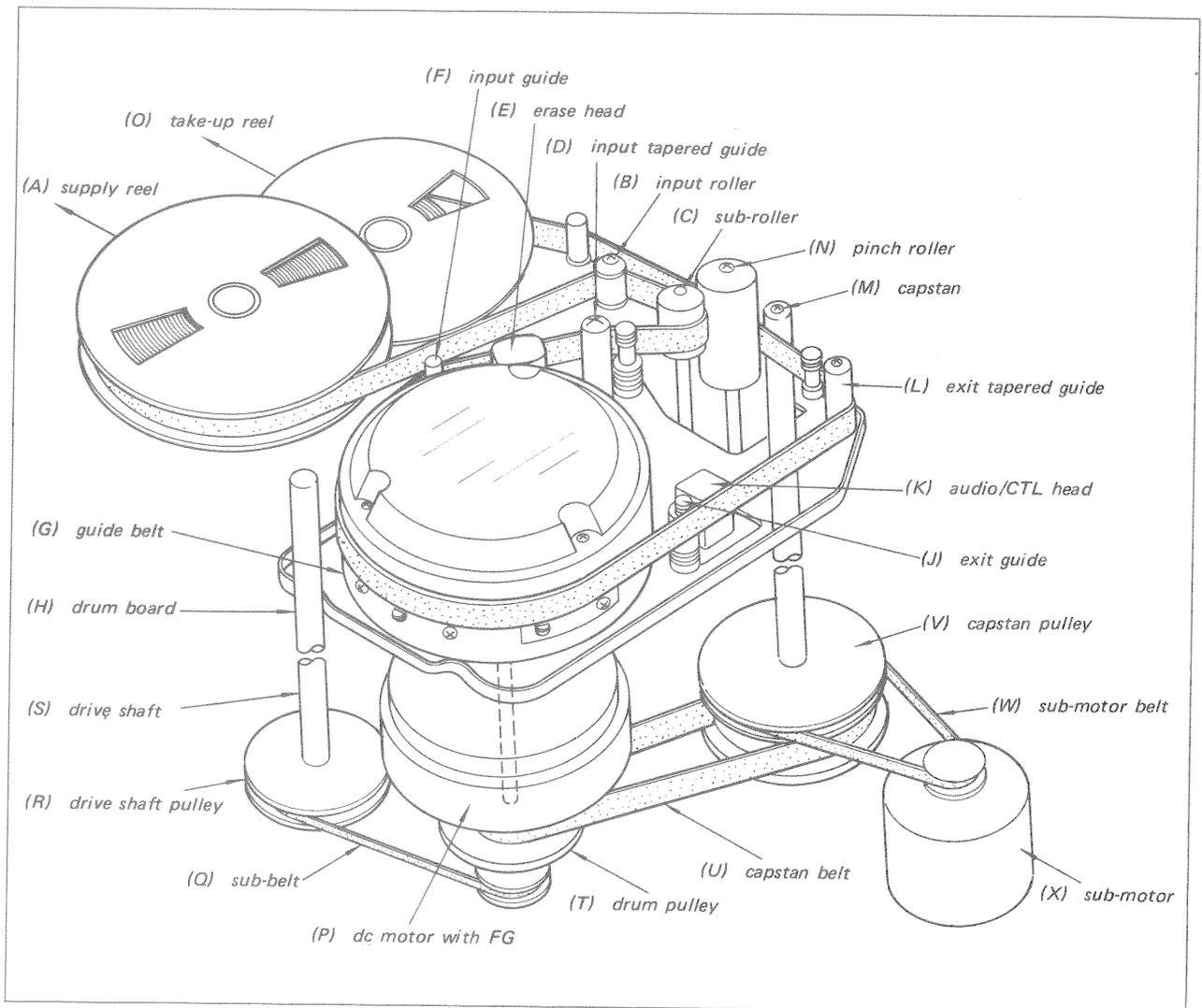


Fig. 9-1 Tape path

The tape, placed on the Supply Reel Table (A), takes a path as shown in Fig. 9-1 and is wound onto the Tape-Up Reel Table (O).

The tape on the Supply Reel Table (A), is first fed to the Input Roller (B) and Sub-roller (C) where the approximate height of tape is determined. The tape is then slanted by about 3 degrees by Input Tapered Guide (D). The tape then contacts the full-track erase head. The Input Guide (F) determines the tape height precisely. The tape runs around the circumference of the head drum 180

degrees along the Guide Belt (G). The Exit Guide (J) also determines the tape height. The audio signal is recorded and played back by the upper core of the audio/CTL head (K). The control track signal is recorded and played back by the lower core. The tape is again slanted by the Exit Tapered Guide (L), and squeezed by the Capstan (M) and the Pinch Roller (N) before it is wound onto the Take-up Reel Table (O).

The Head Drum has a built-in dc motor that provides torque to rotate both the Video Head and the Capstan. The Video Head assembly is connected to the shaft of the dc motor. Torque is transmitted to the Capstan (M) via Drum Pulley (T) and the Capstan Belt (V). Torque is also used to drive the Take-up Reel Table (O) via the Drive Pulley (R) and the Drive Shaft (S). The Sub-motor (X) and the Sub-Motor Belt (W) are used in the playback mode for the capstan servo system.

The Head Drum also has a built-in 15,750 Hz frequency generator coil, 30PG coil, and 60PG coil. The relative position of the video heads and the PG coils is shown in Fig. 9-2. Two output pulses from the 60PG coil, 1 pulse from the 30PG coil, and 525 cycles from the 15,750 Hz FG coil are obtained for each revolution of the video heads; 60 Hz, 30 Hz and 15,750 Hz are obtained at 30 revolutions per second.

9-2. TAPE TRANSPORT IN PLAYBACK MODE

The tape transport in the playback mode is

described in four sections: Brake System (See 9-2-1), Pinch Roller Mechanism (See 9-2-2), Tape Take-Up System (See 9-2-3) and Tension Control System (See 9-2-4).

9-2-1. Brake System

The brakes applied to the Supply and Take-Up Reel Tables in the stop mode are released in the play mode. See Fig. 9-3.

Setting the function lever from stop to play rotates the Function Select Cam counterclockwise. The pin shown at (A) pushes the Brake Release Slide Plate in the direction indicated by the arrow, actuating the two Brake Levers to release Supply and Take-Up Reel Table braking.

9-2-2. Pinch Roller Mechanism

Pinch Roller pressure is applied against the Capstan when the Solenoid is energized. Refer to Fig. 9-3. When power is applied to the Solenoid,

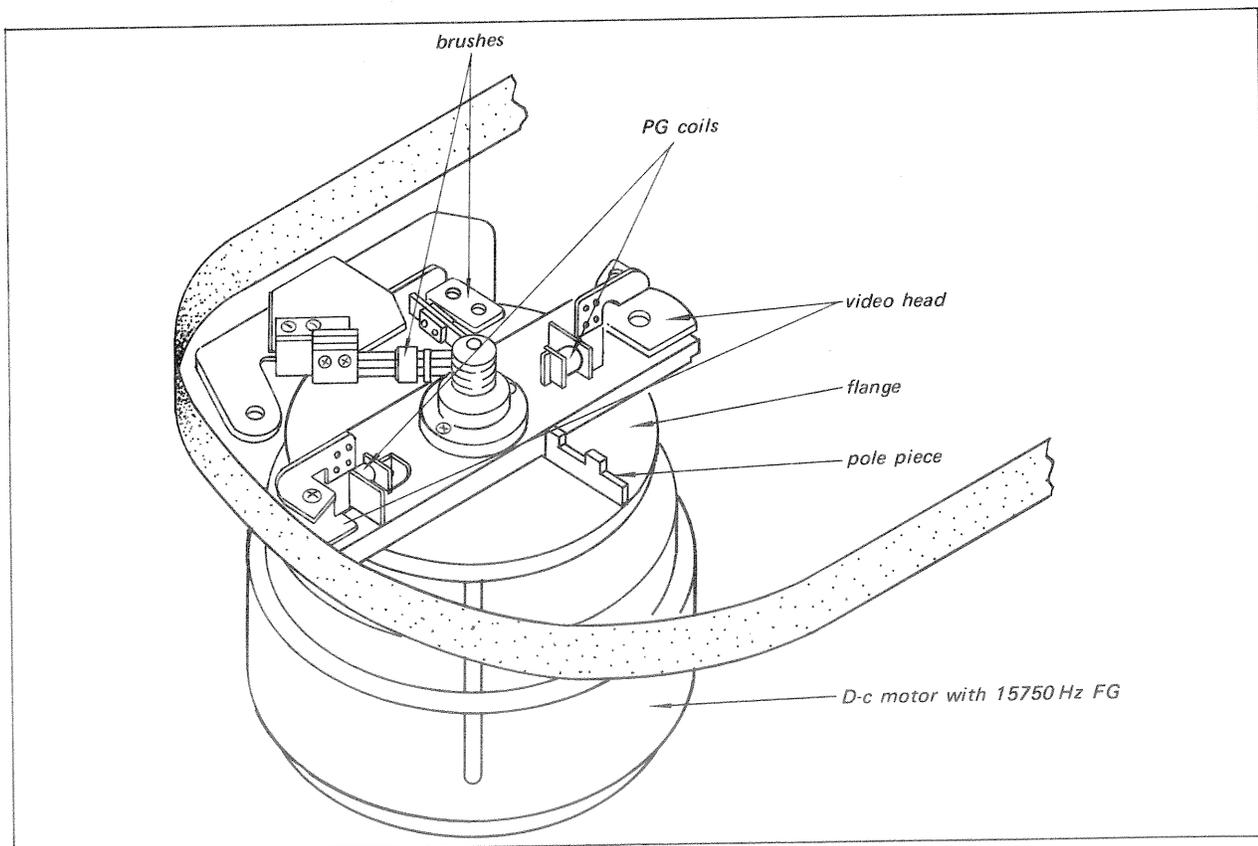


Fig. 9-2 FG and PGs

the plunger moves in the direction indicated by the arrow, rotating the Pinch Roller Pressure Plate clockwise and thus compressing the Pressure Spring. This causes Pinch Roller Lever (A) to rotate clockwise, forcing the Pinch Roller against the Capstan.

9-2-3. Tape Take-Up System

Drive is transmitted from the Head Motor to the Take-Up Reel as described below. Refer to Fig. 9-1. The Sub-Belt transfers drive from the Drum Pulley on the Head Motor to a Drive Shaft Pulley on the Drive Shaft. The Take-Up Belt and Take-Up Pulley couple drive torque to the Take-Up Reel.

9-2-4. Tension Control System

A simple mechanical servo is employed to provide tape tension control. See Fig. 9-3.

Tape passes around the outside of the Tension Arm. A Band Brake, anchored at the pivot of the Tension Arm by a screw, contacts the Supply Reel Table to exert a force inversely proportional to that applied at the Tension Arm. Thus, with no tape on the machine (no force applied to the Tension Arm), the Tension Arm is in its fully clockwise position and full band braking is applied to the Supply Reel Table.

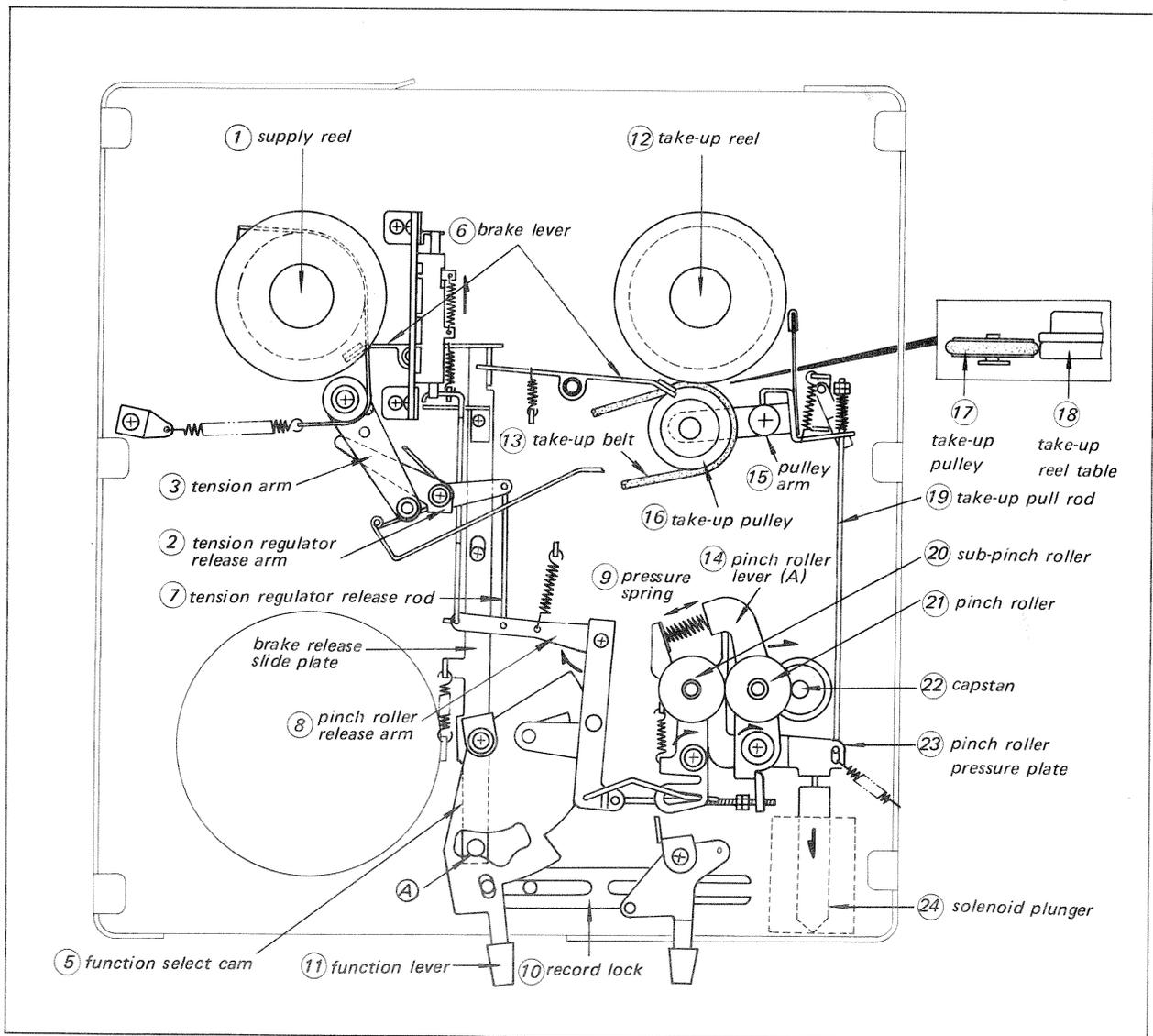


Fig. 9-3 Forward mode tape transport

9-3. INSTANT STOP MECHANISM

Instant stop in the playback mode is obtained by releasing the Pinch Roller from the Capstan. See Fig. 9-4.

When the Instant Stop Knob is pulled in the direction indicated by the arrow, the Instant Stop Slide Plate is pulled down, rotating the Instant Stop Lever clockwise about its pivot. The end of the Instant Stop Lever operates a pin on Pinch Roller lever (A) which forces Pinch Roller Lever (A), with the Pinch Roller, to pivot slightly counterclockwise away from the Capstan.

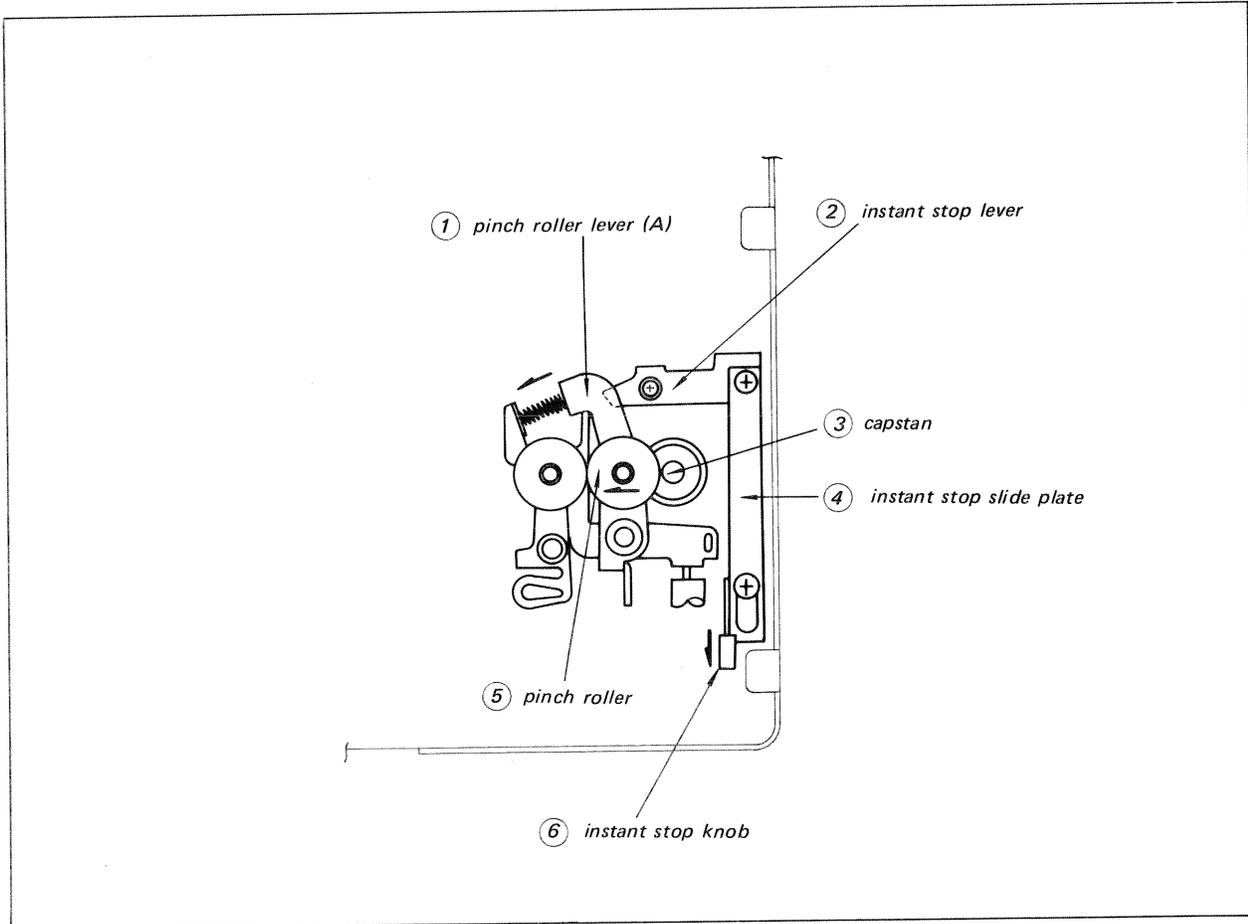


Fig. 9-4 Instant stop mode mechanism

9-4. TAPE TRANSPORT IN THE RECORD MODE

The tape transport operates the same in the record mode as it does in the play mode except that the record switches on the audio, video and servo boards are actuated. Refer to Fig. 9-5.

The Record Lever actuates the Record Plate on the audio board (at **A** in Fig. 9-5) and also the Record Link Rod, which pivots the Record Link Arm slightly clockwise. This permits two Record Link Levers, both under tension from a common spring, to pivot in opposite directions, thus actuating the slide switches on the servo and video boards (at **B** and **C**, respectively).

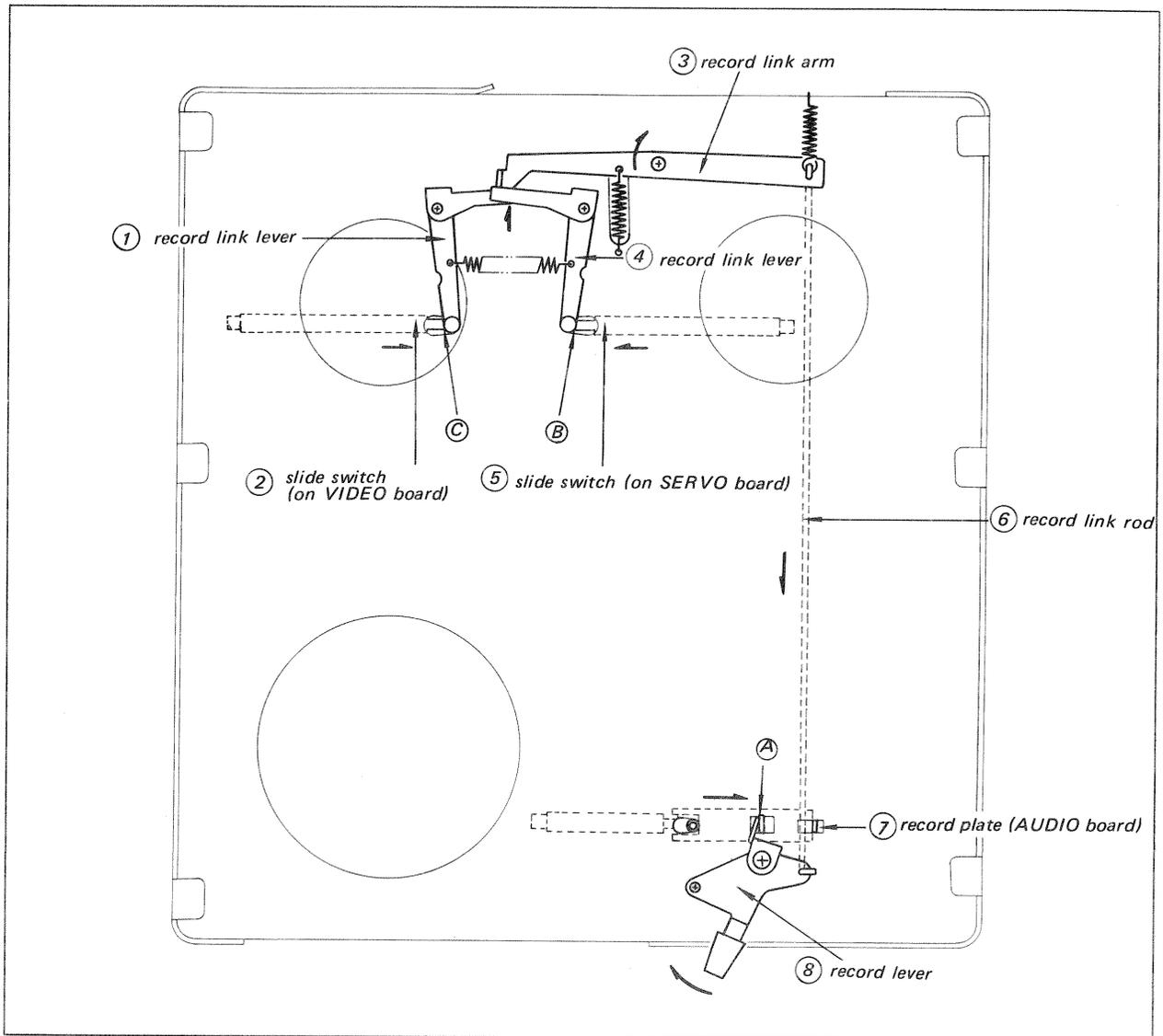


Fig. 9-5 Record mode mechanism

9-5. AUDIO DUB MECHANISM

The audio dub mechanism may be operated only in the play mode. See Figs. 9-3 and 9-5.

The Audio Dub Knob pushes the Audio Dub Slide Plate in the direction indicated by the arrow, rotating the Audio Dub Lever clockwise to actuate the Record Plate at (A). The Audio Dub Slide Plate also switches S5 via the Audio Dub Rod. (S5 switches dummy coil L803 in place of the full-track erase head.)

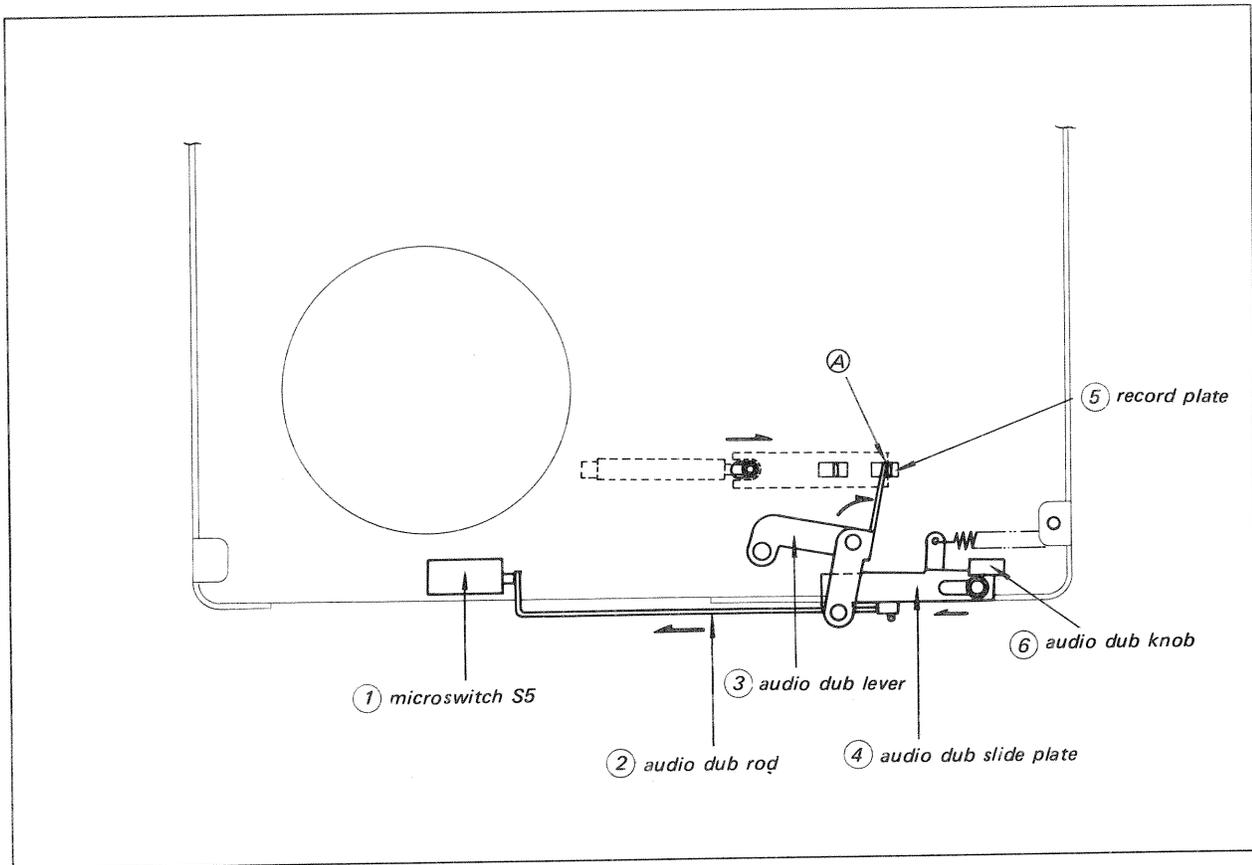


Fig. 9-6 Audio dub mechanism

9-6. TAPE TRANSPORT IN THE FAST-FORWARD MODE

In the fast-forward mode full take-up torque is applied to the Take-Up Reel Table and the Tape Tension Servo is released. The fast-forward mode is shown in Fig. 9-7.

9-6-1. Take-Up Reel Table Drive

When the function lever is set to fast forward, the Function Select Cam is turned to its fully counterclockwise position, pushing the FF Push Rod in the direction indicated by the arrow. The end of the FF Push Rod pushes up the Pulley Arm so that the Take-Up Pulley supplies drive to the Take-Up Reel Table.

9-6-2. Tape Tension Servo Release

When the Function Select Cam is rotated fully counterclockwise, as above, the FF Sub Cam is rotated counterclockwise, rotating the Pinch Roller Release Arm counterclockwise at (B). The Tension Regulator Release Rod, connected at the center of the Pinch Roller Release Arm, is pulled down, pivoting the Tension Regulator Release Arm slightly clockwise. This rotates the Tension Arm counterclockwise at (C), thus releasing the Band Brake. The Switch Push Rod, connected at the end of the Pinch Roller Release Arm, is pulled down at the same time and actuates S4.

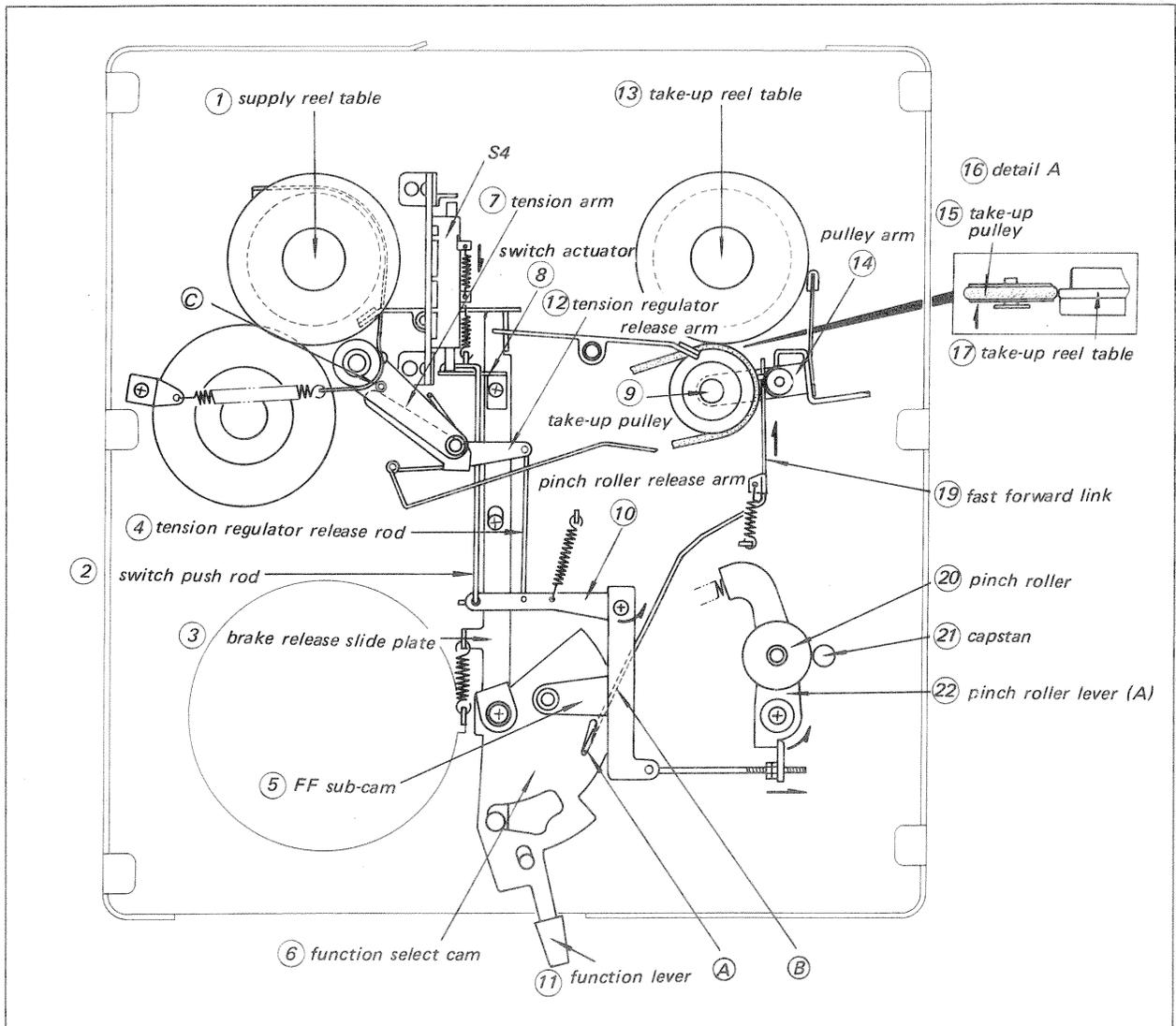


Fig. 9-7 Fast forward mode tape transport

9-7. TAPE TRANSPORT IN THE REWIND MODE

Full torque is applied to the Supply Reel Table to rewind the tape. The Stop Brakes are released from both the Supply and Take-Up Reel Tables. See Fig. 9-8.

Setting the function selector to the rewind mode rotates the Function Select Cam to its fully clockwise position. Rewind Release Lever (1) is rotated clockwise as it follows the detent of the FF Sub Cam at (A), pulling the Rewind Release Rod in the direction indicated by the arrow, to rotate Rewind Release Lever (2) clockwise. This releases the Rewind Slide Plate and allows a rewind idler to contact the Take-Up Belt (at (C)) and the Take-Up Reel Table (at (D)) to transmit driving torque.

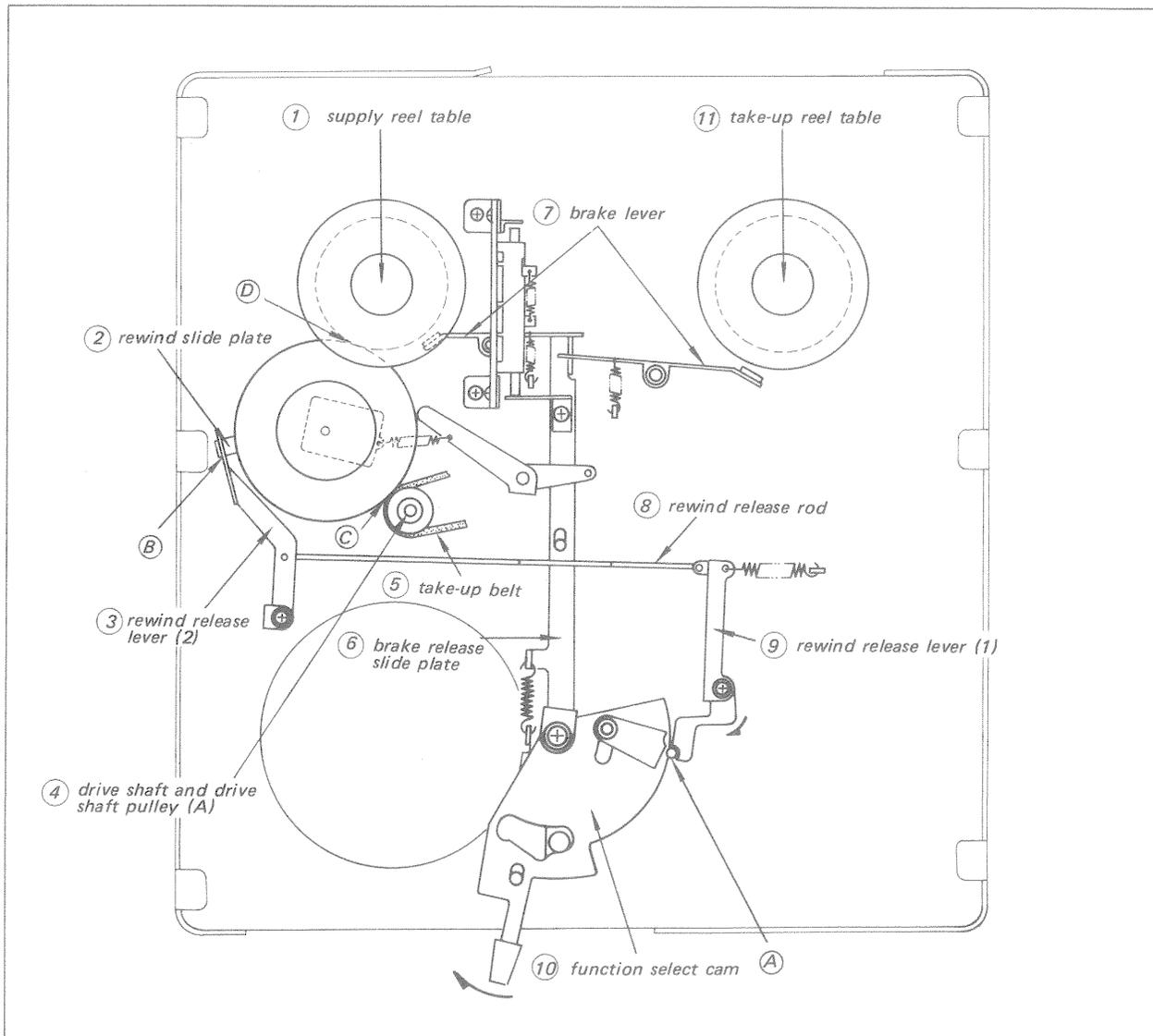


Fig. 9-8 Rewind mode tape transport

SECTION 10

SCHEMATICS AND EXPLODED VIEWS

PRECAUTIONS

1. Do not attempt complete disassembly of any of the subassemblies. Disassembly should never go beyond that shown in the exploded views. Replacement of the parts without part numbers calls for precision work which should not be attempted in the field.
2. Assemblies with defects in parts other than those shown in the exploded views as replaceable should be replaced by new assemblies.
3. If mechanical damage requires replacement and/or adjustment of the guides in the tape path, return the unit to a SONY FACTORY SERVICE CENTER for repair.

Hardware Nomenclature

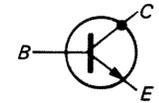
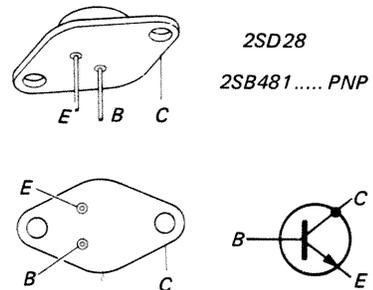
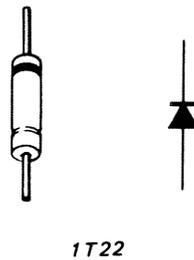
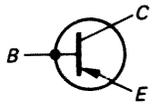
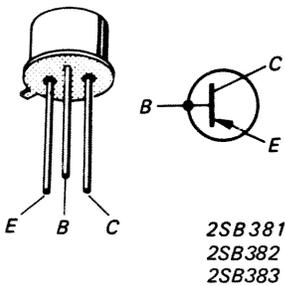
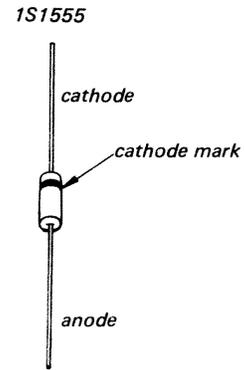
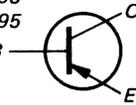
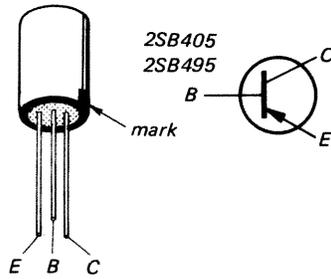
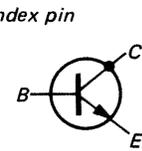
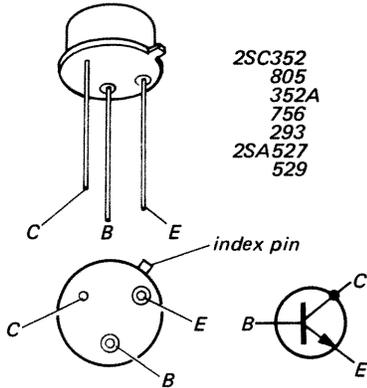
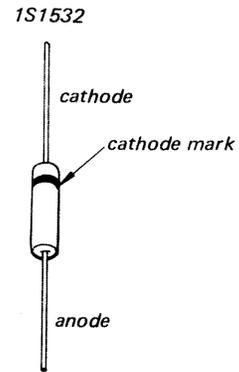
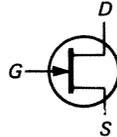
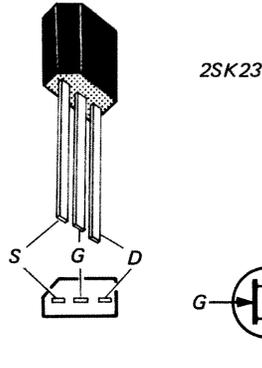
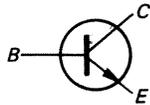
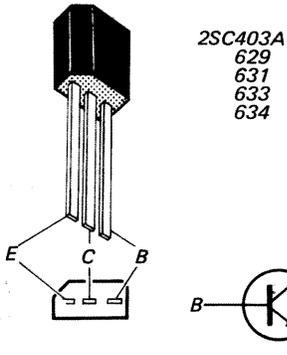
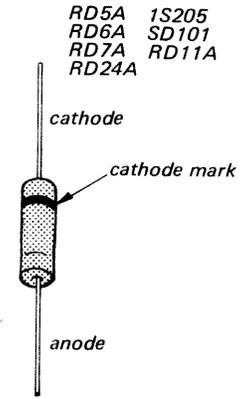
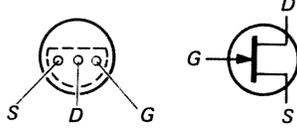
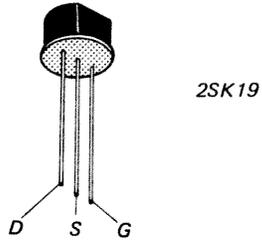
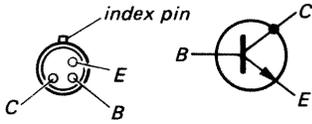
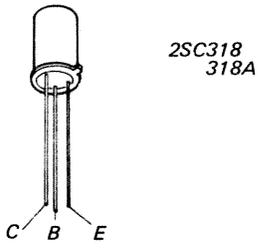
P	Pan Head Screw		
PS	Pan Head Screw with Spring Washer		
K	Flat Countersunk Head Screw		
B	Binding Head Screw		
RK	Oval Countersunk Head Screw		
T	Truss Head Screw		
R	Round Head Screw		
F	Flat Fillister Head Screw		
SC	Set Screw		
E	Retaining Ring (E Washer)		
	W - Washer		
	SW - Spring Washer		
	LW - Lock Washer		
	N - Nut		
- Example -			
	Type of Slot		
	P 3x10		
	Length in mm (L)		
	Diameter in mm (D)		
	Type of Head		

All screws conform to ISO standards, unless otherwise noted

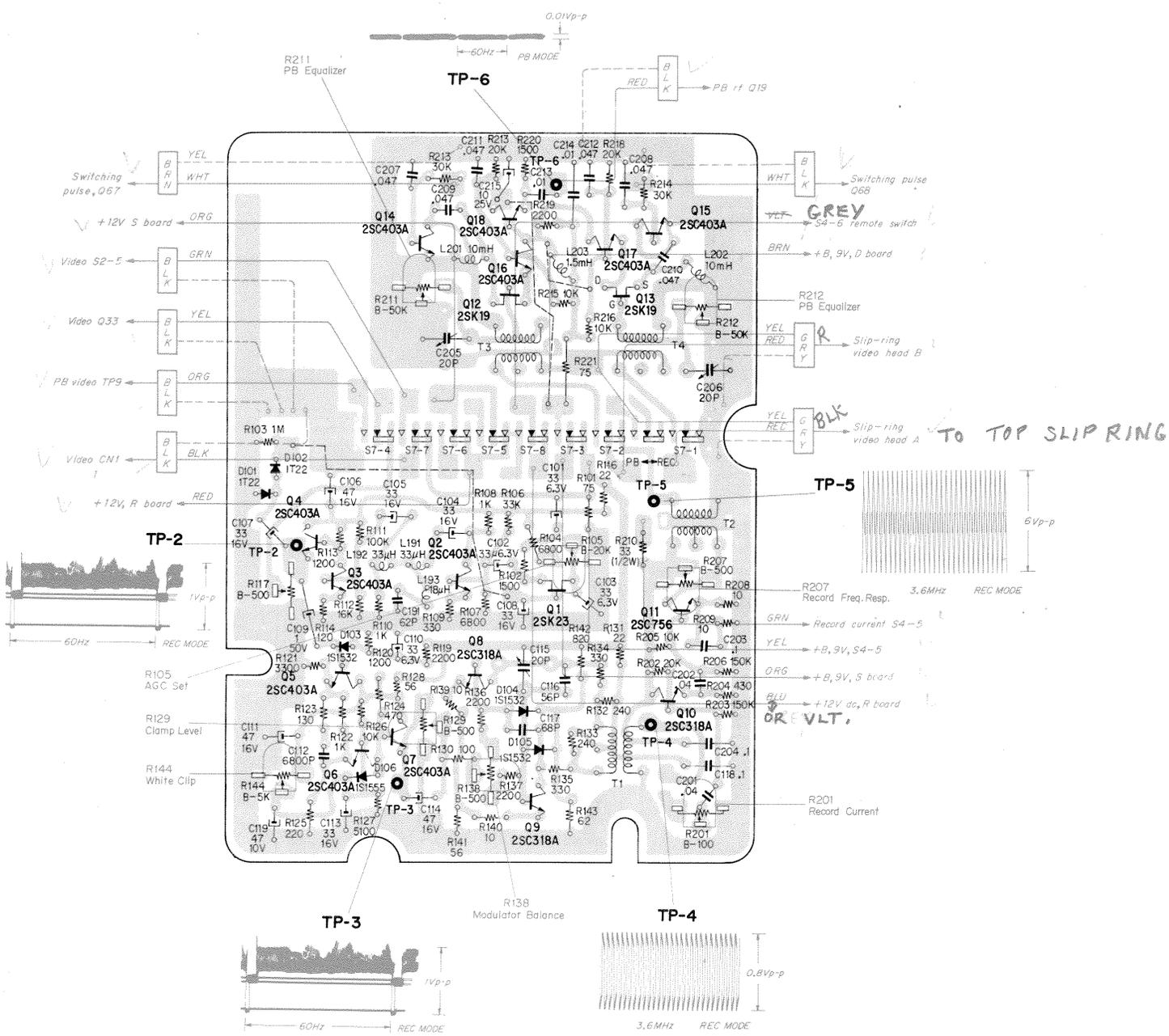
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 1 inch

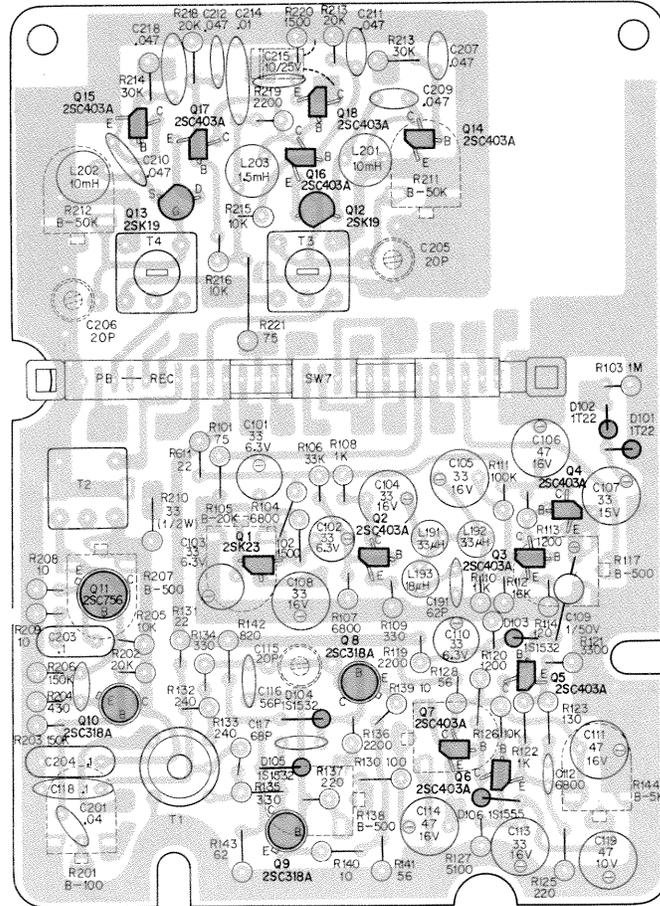
Semiconductor Electrodes



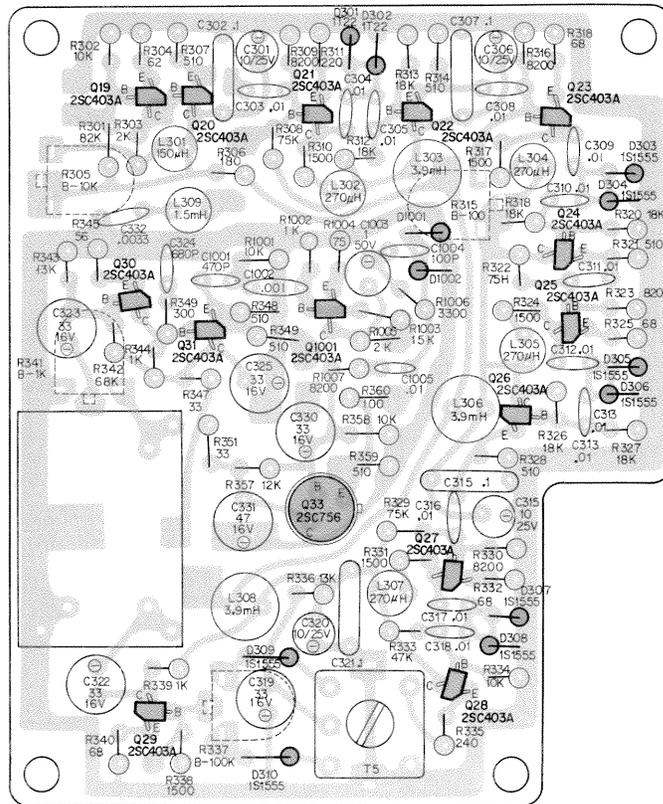
"V" (VIDEO) PRINTED CIRCUIT BOARD



"V" (VIDEO) PRINTED CIRCUIT BOARD

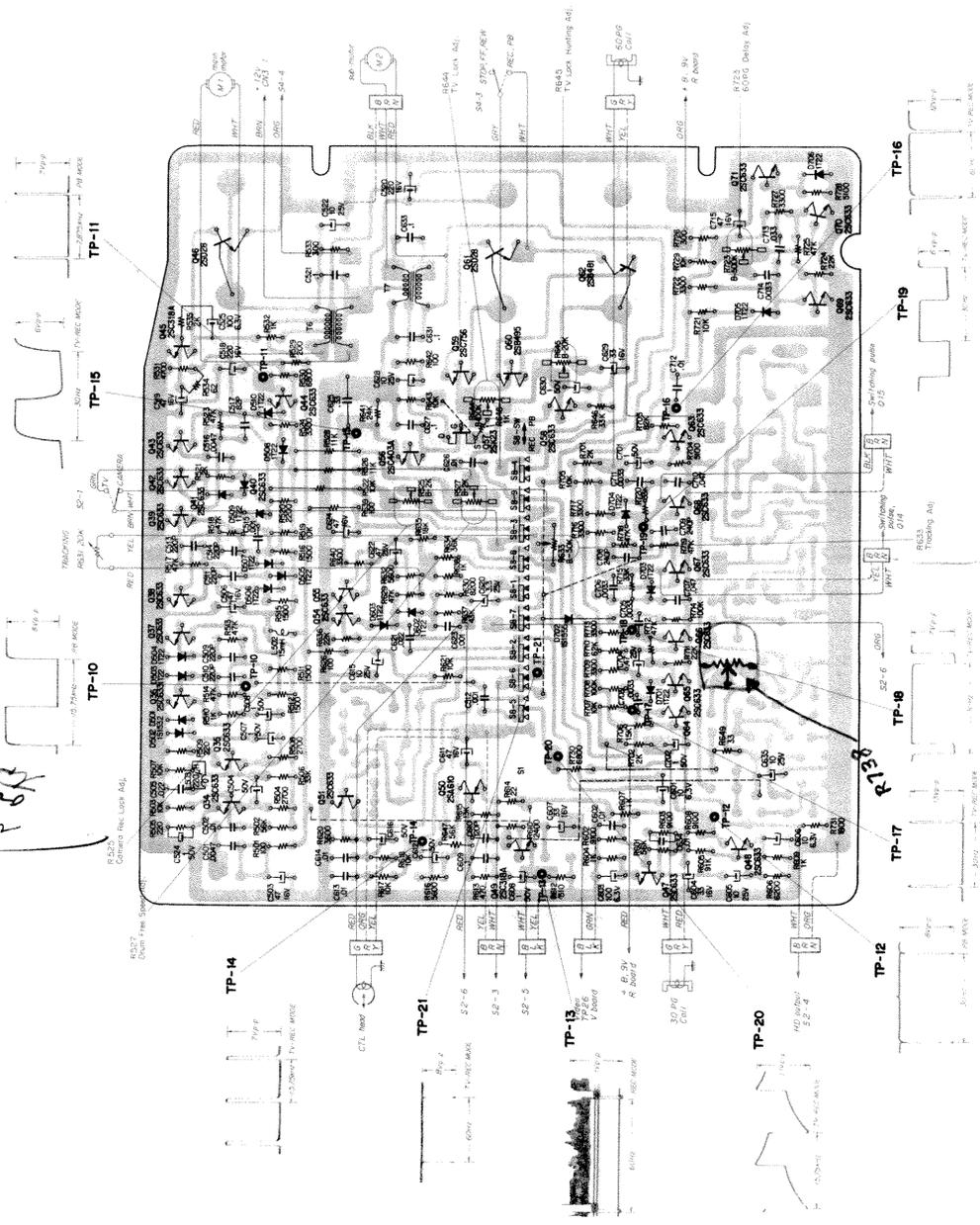


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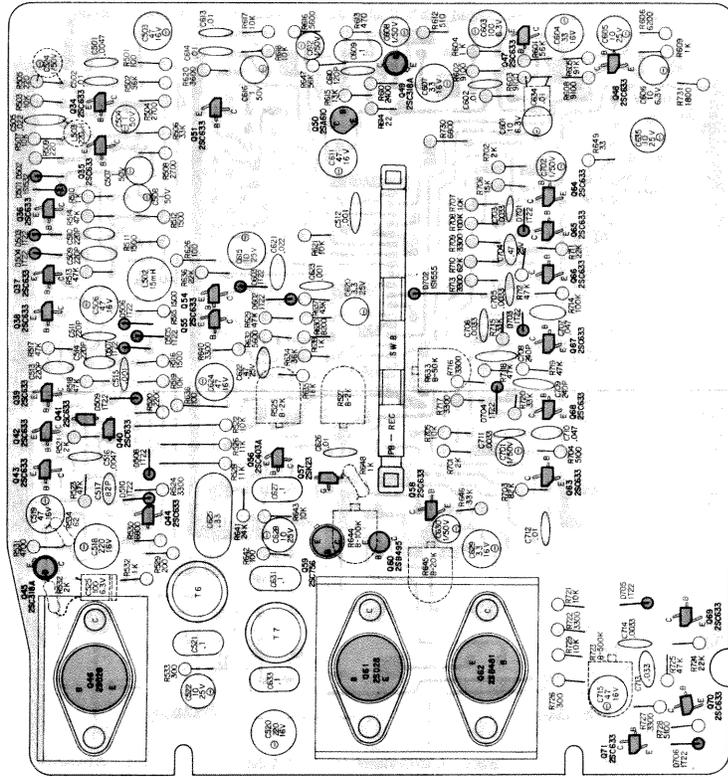


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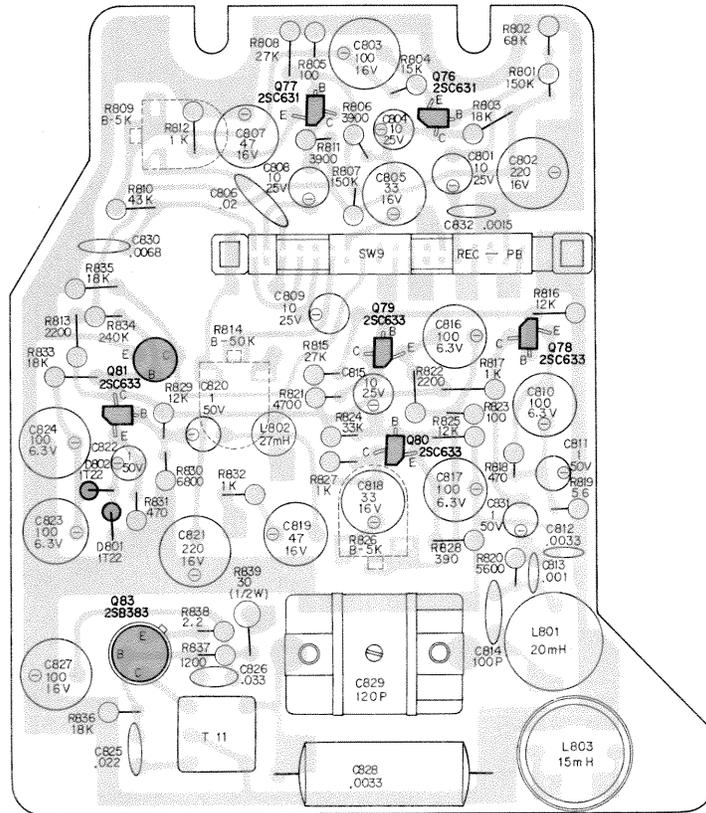
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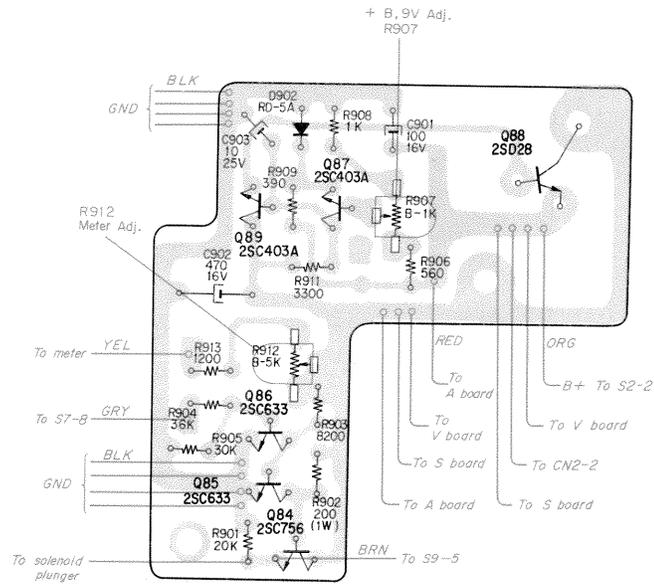
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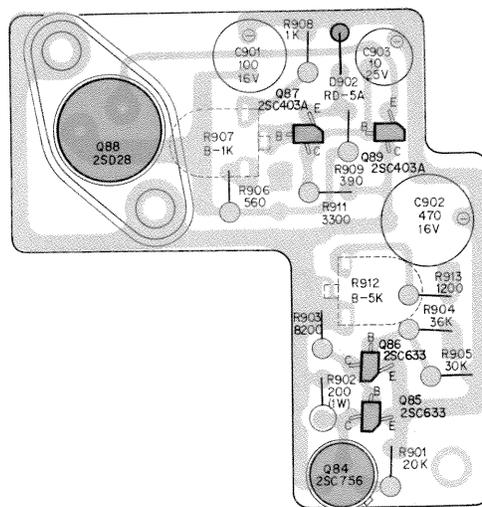
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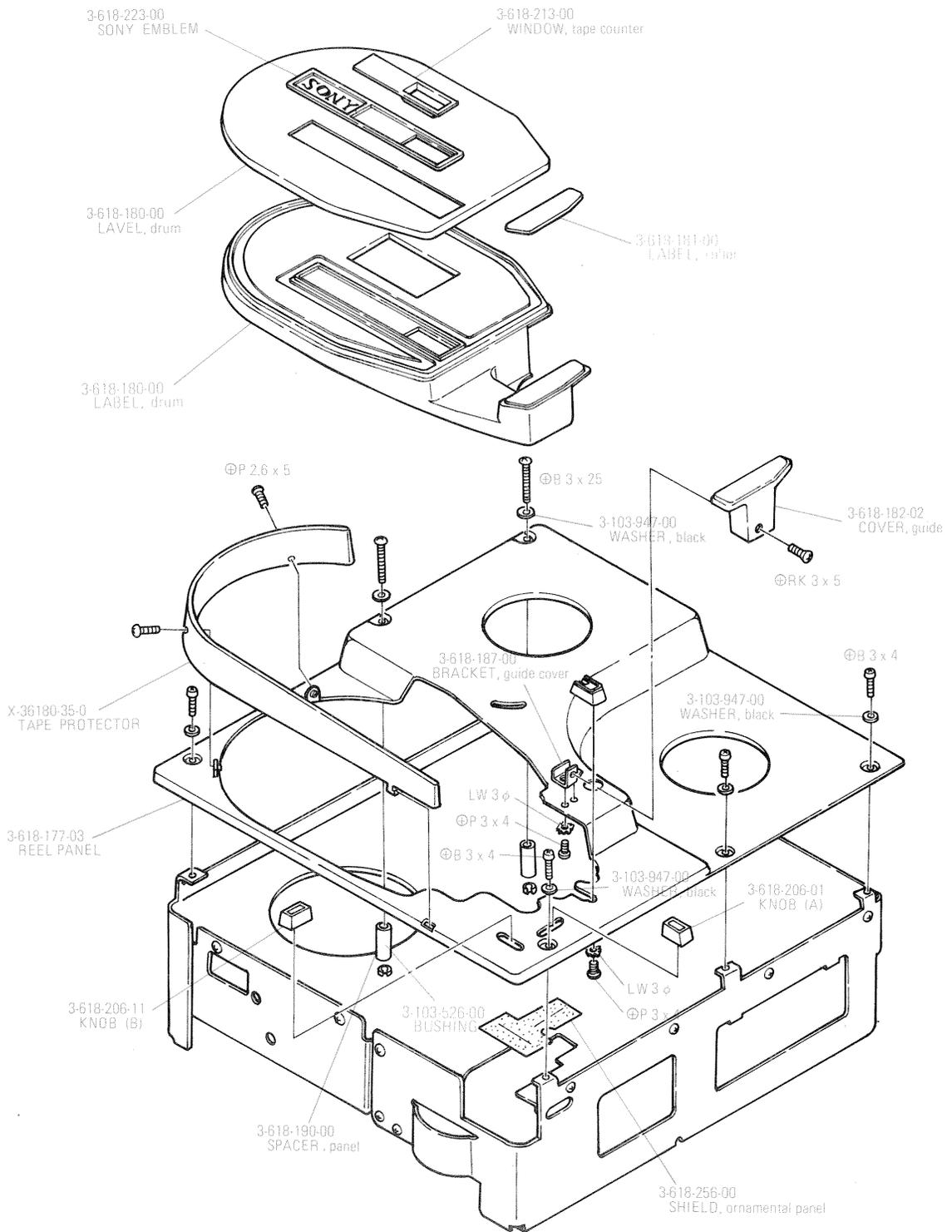
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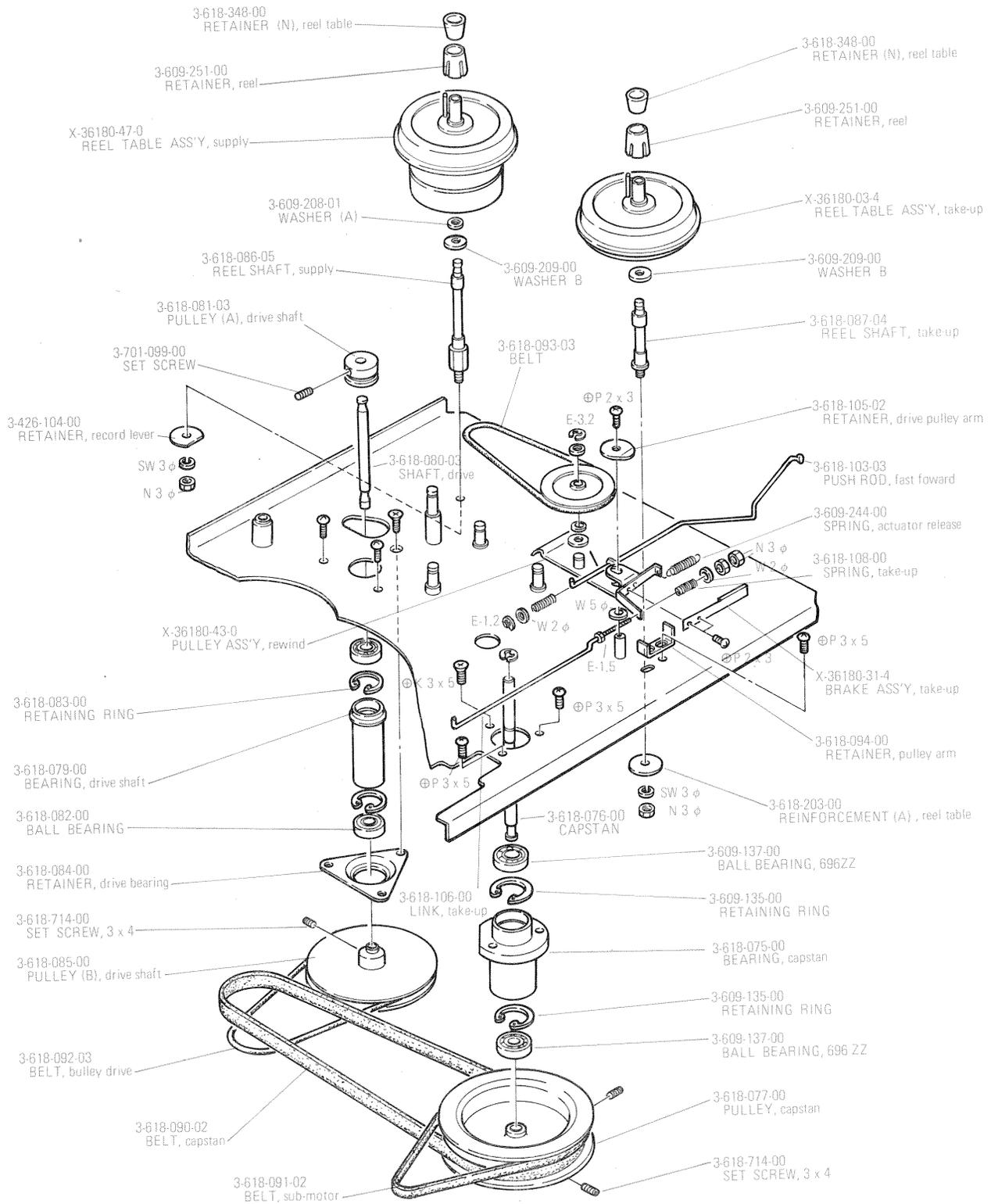


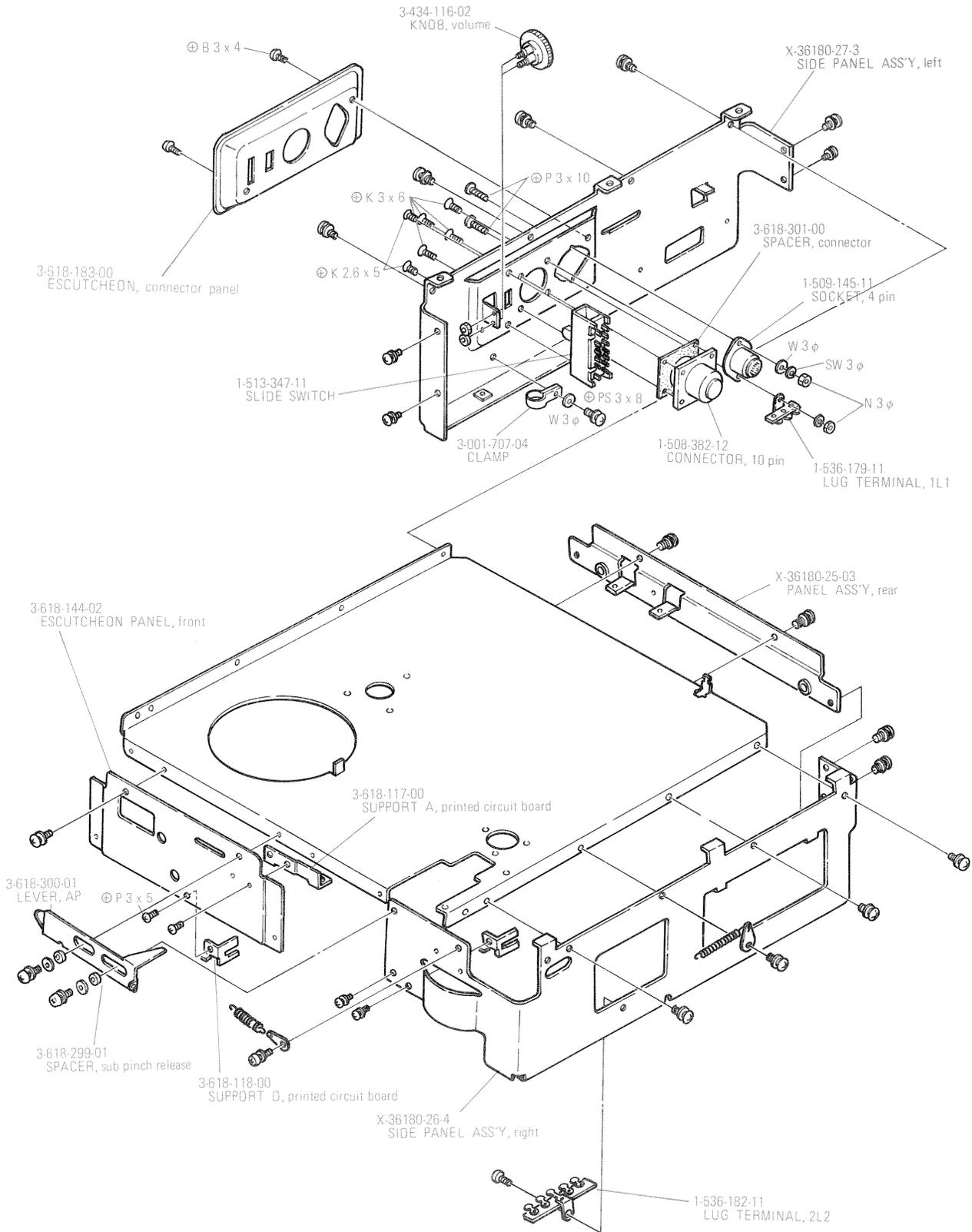
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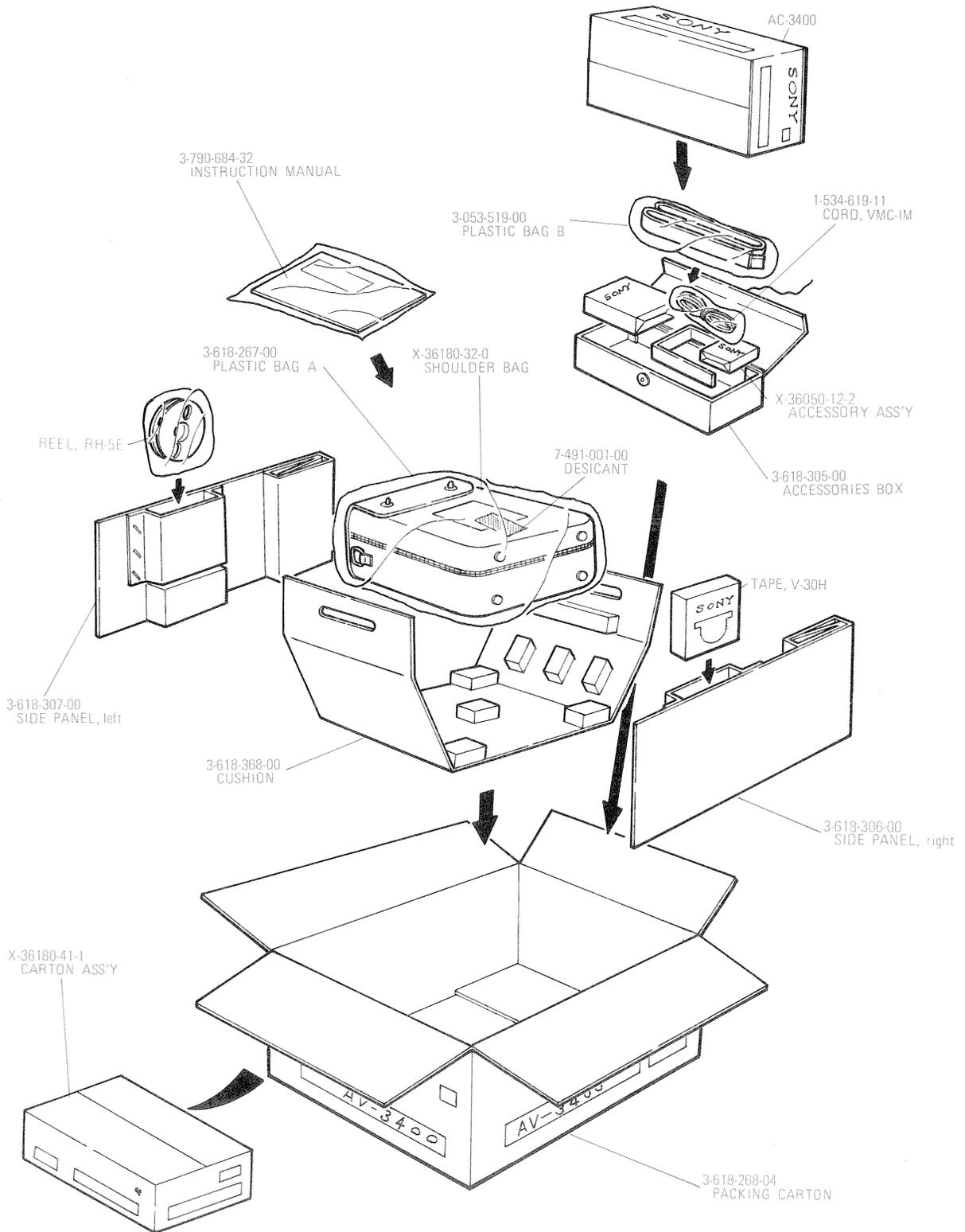


EXPLODED VIEWS









C



C



C