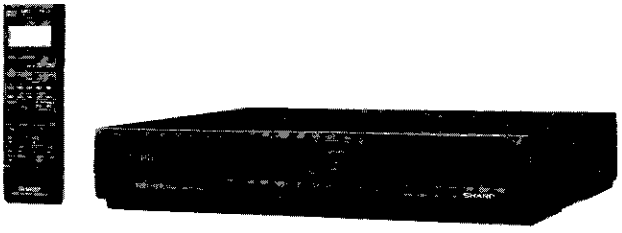
SHARP SERVICE MANUAL

S30Y7VC-A215H



VHS VIDEO CASSETTE RECORDER

MODELS VC-A215H VC-A215HM

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

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SHARP CORPORATION

SPECIFICATIONS

Format:	VHS PAL standard
Video recording system:	Two rotary head helical scan system
Video signal:	PAL colour and B/W signals, 625 lines
Recording playing time:	4 hours max. with SHARP E-240 tape (SP) 8 hours max. with SHARP E-240 tape (LP)
Tape width:	12.7 mm
Tape speed:	23.39 mm/sec. (SP), 11.70 mm/sec. (LP)
Antenna:	75 ohm unbalanced
Receiving channel:	UHF Channel 21 - 69
RF converter output signal:	UHF Channel 30 - 39. Preset to 36 Channel
Power requirement:	AC 240V, 50 Hz
Power consumption:	Approx. 25W
Operating temperture:	5°C to 40°C
Storage temperature:	- 20°C to 55°C
Weight:	6.0 kg
Dimensions:	430 mm (W) × 347 mm (D) × 82 mm (H)
VIDEO	
Input:	1.0 Vp-p, 75 ohm
Output:	1.0 Vp-p, 75 ohm
AUDIO	0 dB = 0.775 Vrms
Input:	Line: - 3.8 dB, more than 47k ohm
Output:	Line: - 3.8 dB, less than 1k ohm
Accessories included:	Antenna 75 ohm coaxial connector cable (plug provided) Operation Manual Infrared remote control Battery Warantee Card

As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice.

Note: The antenna must correspond to the new standard DIN 45325 (IEC 169 - 2) for combined UHF/VHF antenna with 75 ohm connector.

BEFORE RETURNING THE VIDEO CASSETTE RECORDER

In addition to the checks necessary as a result of a repair having been carried out, the following additional safety checks should also be made before returning the unit to the user.

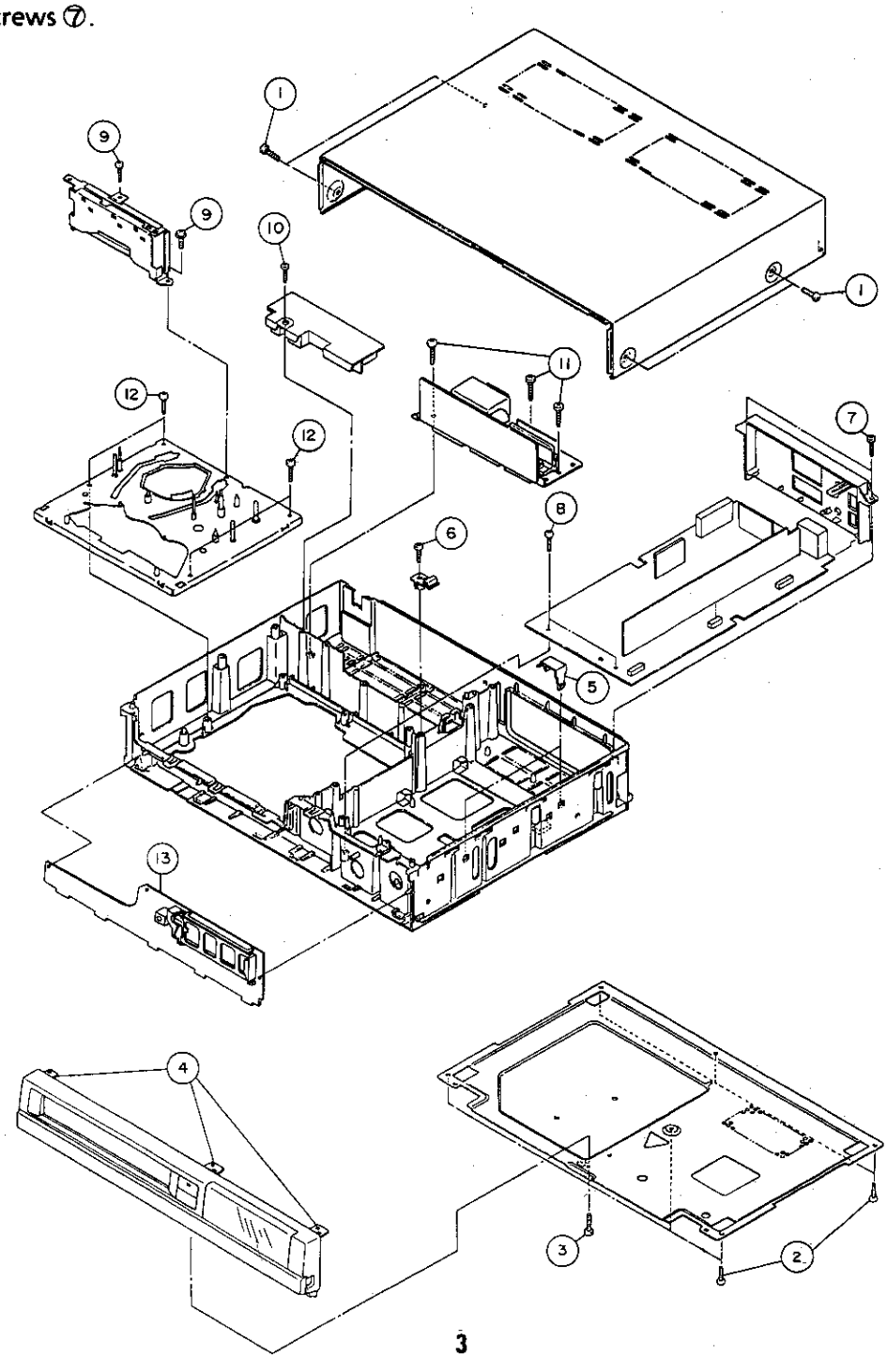
1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the Video cassette recorder.

2. Inspect all protective devices such as non-metallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacitor networks, mechanical insulators etc.

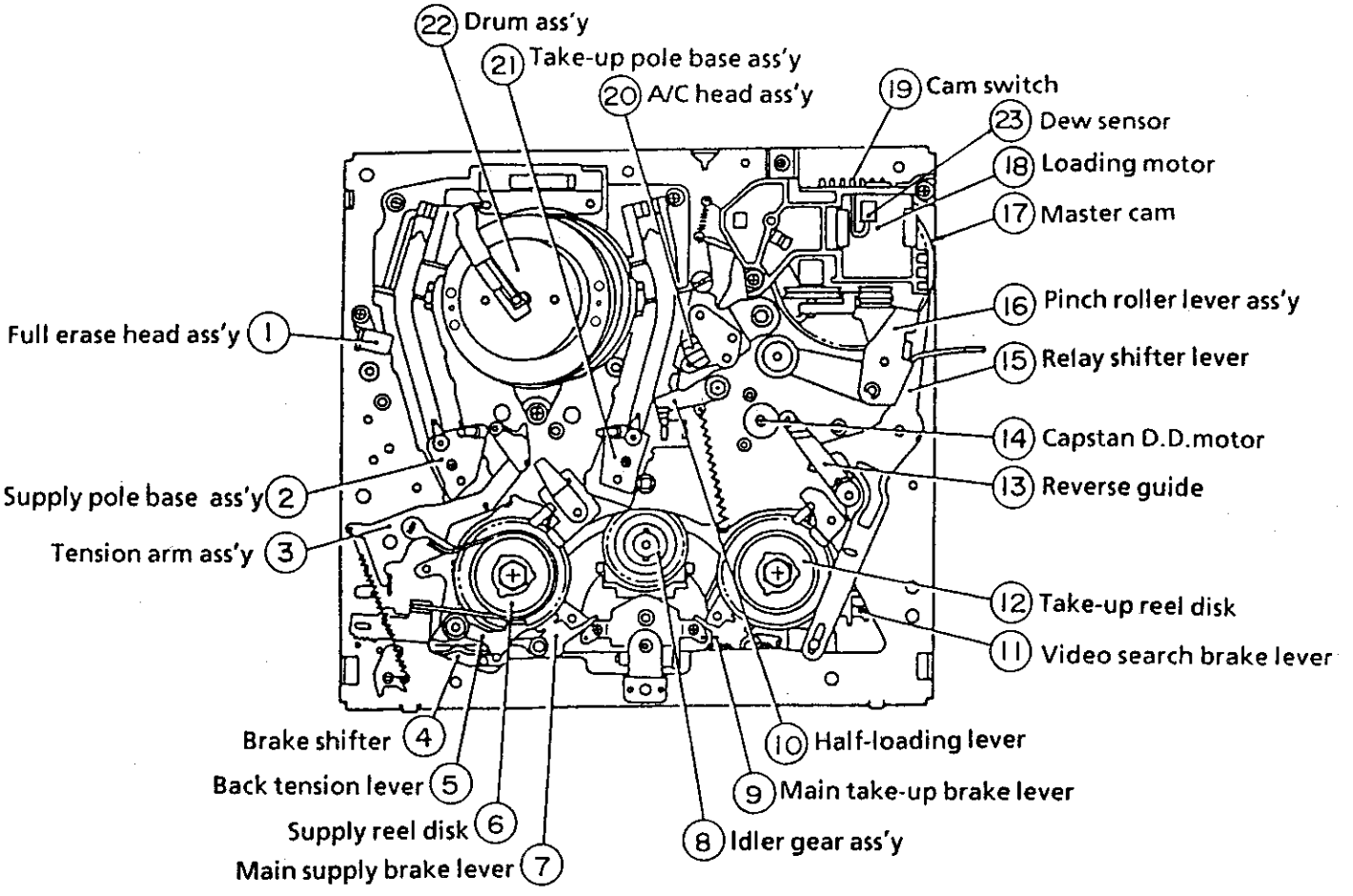
3. Apply test voltage of 3000 volts between live parts and accessible metal parts for 3 seconds.

DISASSEMBLY AND REASSEMBLY

1. Remove the four upper cabinet fastening screws ①.
2. Remove the six bottom panel fastening screws ②.
3. Remove the one front panel fastening screw ③.
4. Release the three clips ④ and remove the front panel.
5. Remove the two Y/C PWB holders ⑤ .
6. Remove the one holder fastening screw ⑥.
7. Remove the two antenna terminal cover fastening screws ⑦.
8. Remove the two main PWB fastening screw ⑧.
9. Remove the two head amp PWB fastening screws ⑨.
10. Remove the one holder fastening screw ⑩.
11. Remove the three power unit fastening screws ⑪
12. Remove the four mechanism chassis fastening screws ⑫
13. Release the timer operation PWB ⑬ fastening clips.

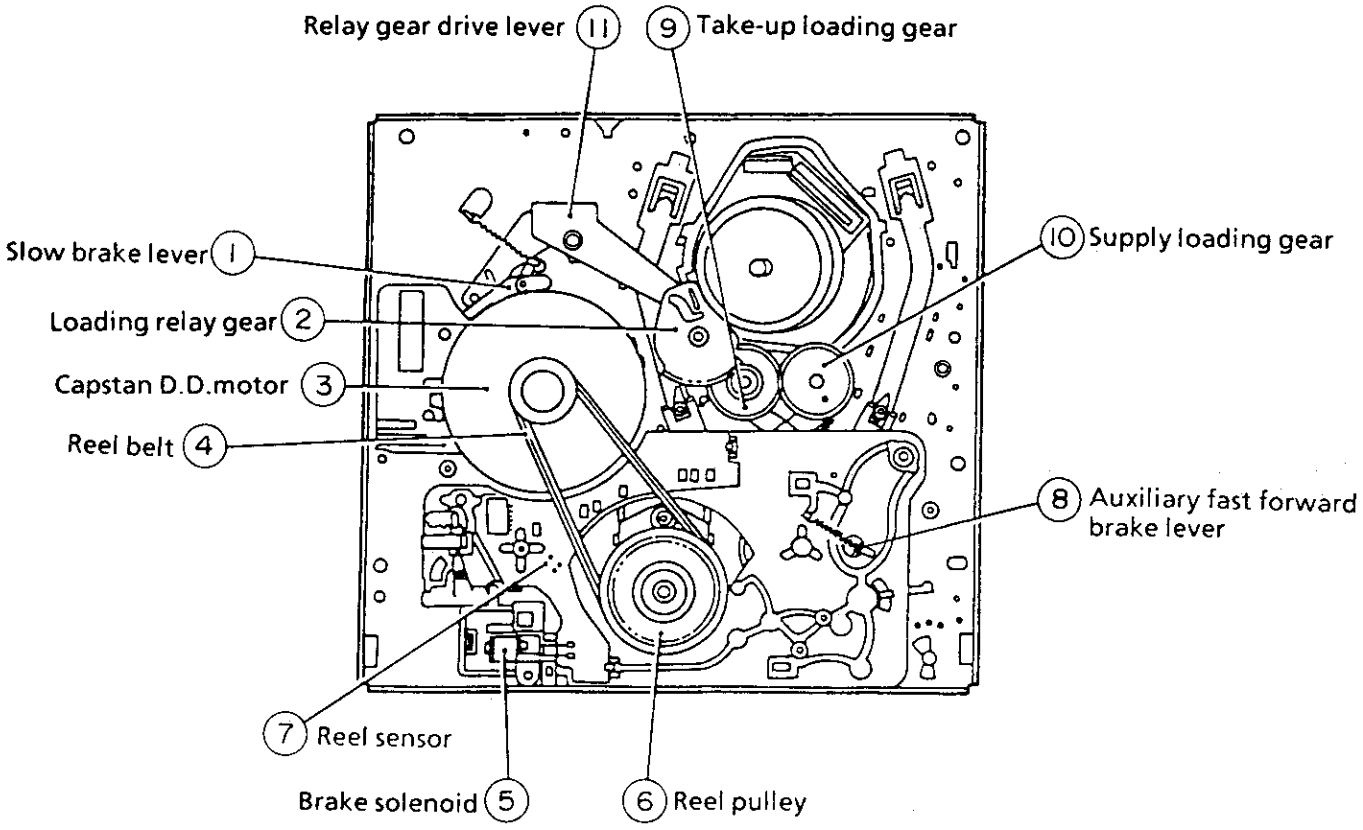


FUNCTION OF MAJOR MECHANICAL PARTS (TOP VIEW)



No.	Function	No.	Function
1.	Full erase head ass'y Erase the whole records on the tape in the recording mode.	13.	Reverse guide Pulls out the tape in the video search rewind mode, and controls the tape drive train height with the upper and lower guides.
3.	Tension arm ass'y Detects the tension of tape while running, and brakes the supply reel disk via the tension band.	15.	Relay shifter lever Transmits the operation of the master cam to the brake shifter, and operates the reverse guide.
4.	Brake shifter Set the position of brake or the like in accordance with the modes such as stop and playback. Back tension lever	16.	Pinch roller lever ass'y Press-fits the tape to the capstan during tape running. The right protrusion switches the clutch of the cassette housing control assembly in "tape eject", and makes the mechanism eject the tape.
5.	Back tension lever Bakes the supply reel disk to a certain degree to prevent tape slackening during "loading" and "shifting from playback to video search rewind".	17.	Master cam Turns clockwise during loading, and couterclockwise during unloading, and moves the shifter or the like in accordance with each mode.
7.	Main supply brake Brakes the supply reel disk to prevent tape slackening when the unit is stopped in fast forward or rewind mode.	18.	Loading motor A motive power which drives the mechanism. It transmits the power to the master cam and cassette housing control assembly via the belt.
9.	Main take-up brake Brakes the take-up reel disk to prevent tape slackening when the unit is stopped in fast forward or rewind mode.	19.	Cam switch Rotates synchronously with the master cam, and detects the position of each mode by means of the internal switch
10.	Half-loading lever Bring the tape in contact with the A/C head, putting it in half-loading state in the fast forward or rewind mode.	23.	Dew sensor Detects the generation of dew in the set. It stops the mechanical action of the set when finding any dew in the set.
11.	Video search brake lever It is in contact with the take-up reel disk normally, and brakes it to a certain degree. It applies larger brake in the video search rewind mode.		

FUNCTION OF MAJOR MECHANICAL PARTS (BOTTOM VIEW)



No.	Function	No.	Function
1.	Slow brake lever Gets in contact with the capstan D.D. motor linking to the master cam in the slow still mode, and brakes it to a certain degree.	7.	Reel sensor An element which sheds the light onto the reflection plate affixed to the bottom side of the reel disk, and detects the rotation of the reel disk through receiving the reflected light.
3.	Capstan D.D. motor A motive power which runs the tape. It transmits the power via the reel belt.	8.	Auxiliary fast forward brake lever Brakes the supply reel disk to a certain degree in the fast forward and rewind modes.
4.	Reel belt Transmits the power to run the tape to the reel pulley.	9.	Take-up loading gear Shifts the take-up pole base and guide roller via the loading relay gear, and applies the tape around the drum assembly, as well as transmits the power to the supply loading gear.
5.	Brake solenoid Adsorbs and holds the brake shifter in the fast forward and rewind modes, and releases it in the stop mode.	10.	Supply loading gear Shifts the supply pole base and guide roller via the take-up loading gear, and applies the tape around the drum assembly.
6.	Reel pulley Transmits the power of the capstan D.D. motor to the reel disk via the reel idler.	11.	Relay gear drive lever Transmits the movement of the master cam to the take-up loading gear via the loading relay gear.

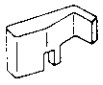
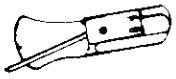
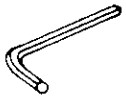
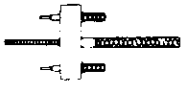
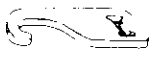
ADJUSTMENT, REPLACEMENT, AND ASSEMBLY OF MECHANICAL UNITS

Here we will describe a relatively simple service work in the field, not referring to the more complicated repairs which would require the use of special equipment and tools (drum assembly or replacement, for example).

We are sure that the easy-to-handle tools listed below would be more than handy for periodical maintenance to keep the machine in its original efficient condition.

TOOLS NECESSARY FOR ADJUSTING THE MECHANICAL UNITS

The following tools are required for proper service and satisfactory repair.

No.	Jig Item	Part No.	Code	Configuration	Remarks
1	Reel Disk Height Adjusting Jig	JiGRH0002	BR		These Jigs are used for checking and adjusting the reel disk height.
2	Master Plane Jig	JiGMP0001	BY		
3	A/C Head Tilt Adjusting Jig	JiGACH-F18	BU		This Jig is used for settimg the A/C head tilt.
4	Torque Gauge (90g)	JiGTG0090	CM		These Jigs are used for checking and adjusting the torque of take-up and supply reel disks.
	Torque Gauge (1.2 kg)	JiGTG1200	CN		
5	Gauge Head	JiGTH0006	AW		
6	Cassette Torque Meter	JiGVHT-063	CZ		This cassette torque meter is used for checking and adjusting the torque of take-up for measuring tape back tension.
7	Tension Gauge (300g)	JiGSG0300	BF		There are two Gauges used for the tension measurements, 300 g and 2.0 kg.
	Tension Gauge (2.0 kg)	JiGSG2000	BS		
8	Hex Wrench (0.9 mm)	JiGHW0009	AE		These Jigs are used for loosening or tightening special Hexagon type screws.
	Hex Wrench (1.2 mm)	JiGHW0012	AE		
	Hex Wrench (1.5 mm)	JiGHW0015	AE		
9	Alignment Tape (PAL)	VROCPSV	CK		This tape is especially used for electrical fine adjustment.
		VROUBZFS			
10	Drum Replacing Jig	JiGDT-0001	BG		This is used for replacement of the VCR's upper drum.
11	Tension Gauge Adapter	JiGADP003	BK		This Jig is used for the tension gauge. Rotary Transformer Clearance Adjusting Jig.

ADJUSTMENT, REPLACEMENT, AND ASSEMBLY OF MECHANICAL UNITS

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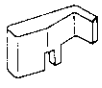
3	A/C Head Tilt Adjusting Jig	JiGACH-F18	BU		This Jig is used for settimg the A/C head tilt.
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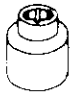
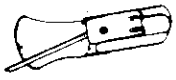
5	Gauge Head	JiGTH0006	AW		
6	Cassette Torque Meter	JiGVHT-063	CZ		This cassette torque meter is used for checking and adjusting the torque of take-up for measuring tape back tension.
7	Tension Gauge (300g)	JiGSG0300	BF		There are two Gauges used for the tension measurements, 300 g and 2.0 kg.
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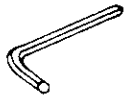
8	Hex Wrench (0.9 mm)	JiGHW0009	AE		These Jigs are used for loosening or tightening special Hexagon type screws.
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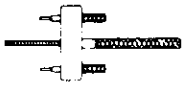
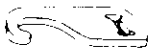
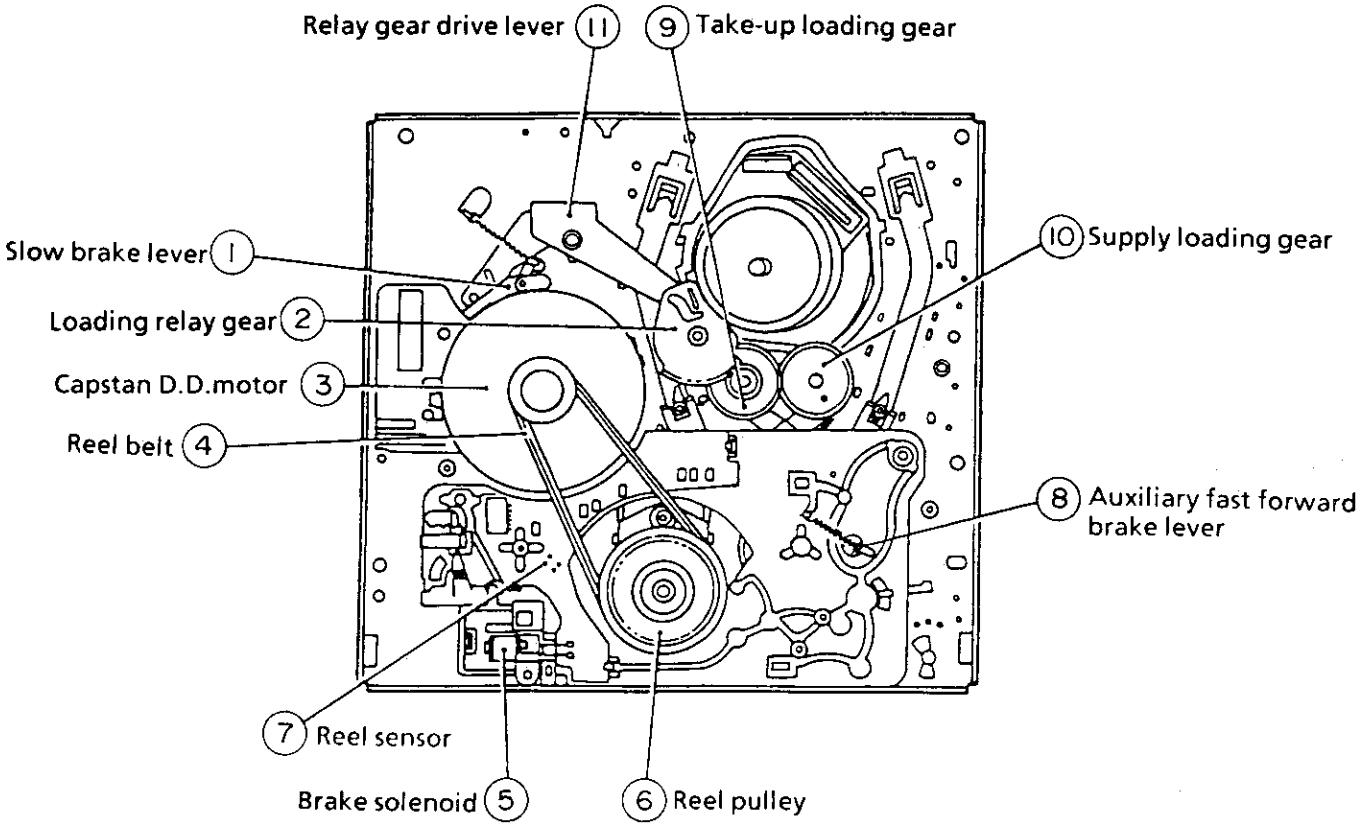
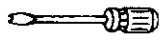
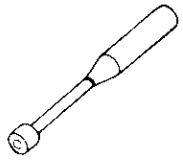
10	Drum Replacing Jig	JiGDT-0001	BG		This is used for replacement of the VCR's upper drum.
11	Tension Gauge Adapter	JiGADP003	BK		This Jig is used for the tension gauge. Rotary Transformer Clearance Adjusting Jig.

FUNCTION OF MAJOR MECHANICAL PARTS (BOTTOM VIEW)



No.	Function	No.	Function
1.	Slow brake lever Gets in contact with the capstan D.D. motor linking to the master cam in the slow still mode, and brakes it to a certain degree.	7.	Reel sensor An element which sheds the light onto the reflection plate affixed to the bottom side of the reel disk, and detects the rotation of the reel disk through receiving the reflected light.
3.	Capstan D.D. motor A motive power which runs the tape. It transmits the power via the reel belt.	8.	Auxiliary fast forward brake lever Brakes the supply reel disk to a certain degree in the fast forward and rewind modes.
4.	Reel belt Transmits the power to run the tape to the reel pulley.	9.	Take-up loading gear Shifts the take-up pole base and guide roller via the loading relay gear, and applies the tape around the drum assembly, as well as transmits the power to the supply loading gear.
5.	Brake solenoid Adsorbs and holds the brake shifter in the fast forward and rewind modes, and releases it in the stop mode.	10.	Supply loading gear Shifts the supply pole base and guide roller via the take-up loading gear, and applies the tape around the drum assembly.
6.	Reel pulley Transmits the power of the capstan D.D. motor to the reel disk via the reel idler.	11.	Relay gear drive lever Transmits the movement of the master cam to the take-up loading gear via the loading relay gear.

No.	Jig Item	Part No.	Code	Configuration	Remarks
12	Special Bladed Screwdriver	JiGDRiVERH-4	AP		This Screwdriver is used for adjusting the guide roller height and X-position.
13	Tension Band and Plate Adjusting Jig	JiGDRiVER-6	BM		This Jig is used for adjusting the tension band and tension plate.
14	Torque Driver	JiGTD1200	CB		This is used to screw down resin-made parts: the specified torque is 5 kg.
15	Box Driver	JiGDRiVER110-7	AS		This Jig is used for height adjustment of the A/C head.
		JiGDRiVER110-4	AV		This Jig is used for height adjustment of the retaining guide.
16	Retaining Guide Height Adjusting Jig	JiGGH-F18	BU		This Jig is used for height adjustment of the retaining guide.
17	Reverse Guide Height Adjusting Jig	JiGRVGH-F18	BU		This Jig is used for height adjustment of the reverse guide.

NOTE:
Current JiGMA0001 contains Master Plane (JiGMP0001) and Disk Height Adjusting Jig (JiGRH0001). Even though new Disk Height Adjusting Jig (JiGRH0002) covers greater height, this new Jig (JiGRH0002) can be used for current JiGRH0001, but current Jig (JiGRH0001) cannot be used as JiGHR0002.Master Plane (JiGMP0001)can be used with JiGRH0001 and JiGRH0002 as well.

MECHANICAL PARTS REQUIRING PERIODICAL INSPECTION

Use the following table as a guide to maintain the mechanical parts in good operating condition.

Parts \ Maintained	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.	3000 hrs.	Possible symptom encountered	Remarks
Guide roller ass'y	□	□	□	□	□	Lateral noises Head occasionally blocked	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller	□	□	□	□	□		
Supply impedance roller (inner hole and shaft)		□		□	□		Clean with pure high quality isopropyl alcohol.
Supply impedance roller flange B	□	□	□	□	□		Clean tape contact part with the specified cleaning liquid.
Retaining guide	□	□	□	□	□		
Slant pole	□	□	□	□	□		
Video head	□	○□	□	○□	○□	Poor S/N ratio, no colour	Clean tape contact area with the specified cleaning liquid.
Full-erase head	□	□	□	□	□	Poor colour, beating	
A/C head	□	□	□	□	□	Sound too small or distorted	
Capstan D.D. Motor	□	□	□	□	○	No tape running, uneven colour	
Pinch roller	□	□	□	□	○	No tape running, tape slack	Clean rubber and rubber contact area with the specified cleaning liquid.
Reel belt		□		○	□	No tape running, tape slack, no fast forward/rewind motion	
Loading belt		□		○	□	Cassette not loaded or unloaded	
Cassette loading belt		□		○	□		
Tension band ass'y					○	Lateral image swing	
Loading Motor					○	Cassette not loaded or unloaded	
Reel block*						See the chart below.	
•See the table below for servicing the reel block parts.							
Supply/take-up reel disks		□△		△○	□△	No tape running, tape slack	Clean with pure high quality isopropyl alcohol.
Video search brake lever				○			
Idler gear ass'y				○		No tape running	
Reel Pulley		□△		□○	□△		
Main supply/take-up brake levers				○		Tape slack	

NOTE: ○: Part replacement.
□: Cleaning (For cleaning, use a lint-free cloth dampened with pure isopropyl alcohol).
△: Oil refilling (The indicated point should be lubricated with high quality spindle oil every 1000 hrs).

If the reading is out of the specified value, clean or replace the part.

REMOVAL AND REASSEMBLY OF CASSETTE HOUSING CONTROL ASSEMBLY

- **Removal**

1. Set the cassette ejected condition in the cassette eject mode.
2. Unplug the recorder from the main source.
3. Follow the procedures below in the specified order.
   a) Remove the cassette loading belt ①.
   b) Disconnect the FFC (Full Flat Cable) ②.
   c) Remove the cassette housing installation screws ③.
   d) Slide and pull out the cassette housing control assembly upward ④.

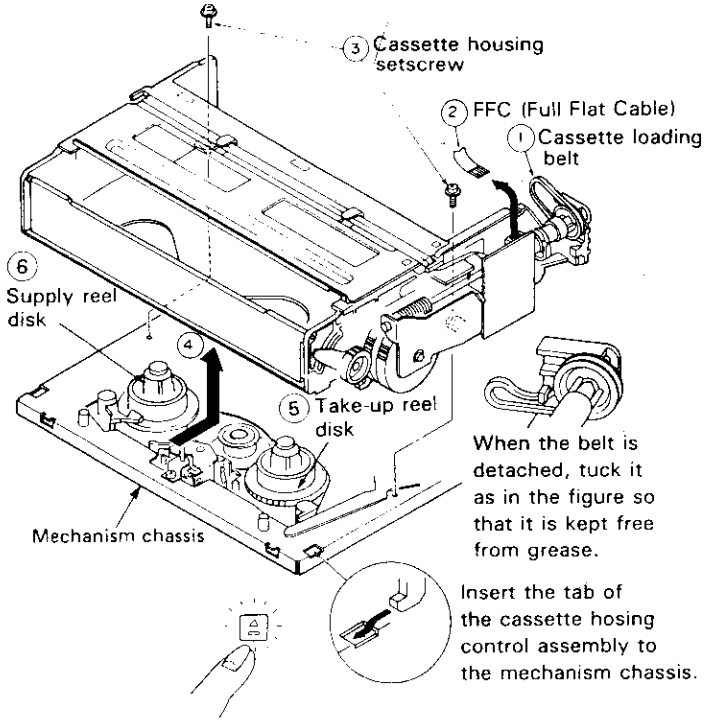


Figure 1-1.

- **Reassembly**

1. Before installation of the cassette housing control assembly, place the unit in the stop mode with the power on, then unplug the power cord. (The main body is placed in the eject mode.)
2. Follow the procedures for removal in the reverse order.

Notes:

1. Be sure to unplug the power cord in removal and reassembly.
2. Keep the cassette loading belt free from grease. In case of its adhesion, clean the belt.
3. In using a magnet screw driver, be sure to keep it away from the A/C head, FE (Full Erase) head, or the drum.
4. In removal and reassembly, take care not to hit the cassette housing control assembly or tools against the guide pin, drum, or the like thereabout.
5. Place the unit in the eject mode in removal or reassembly of the cassette housing control assembly.
6. Load the cassette once onto the cassette housing control assembly after reassembly. (If the cassette housing control assembly normally operates after this, the phases of mechanism and the cassette controller are accurately adjusted after ejection.)

MECHANICAL OPERATION CHECK WITHOUT CASSETTE

When power is on, the general operations of the mechanism can be checked without a cassette. Note the following points.

1. Check video search rewind and rewind, rotating the take-up reel disk ⑤ by hand (in either normal or reverse direction). If it is not rotated, the reel sensor works to shift the mechanism to the eject mode.
2. When the stop button is pressed, the mechanism does not stop at a normal stop position. It shifts to the eject mode and stops.
3. When the stop button is pressed in the playback, video search rewind, and video search forward modes, the supply reel disk ⑥ keeps on rotating for several seconds for elimination of tape slack in the course of shifting to the eject mode. In such a case, rotate the take-up reel disk ⑤ somewhat by hand, and the supply reel disk ⑥ stops, which can reduce the working time.

REPLACEMENT OF WORM WHEEL ASSEMBLY

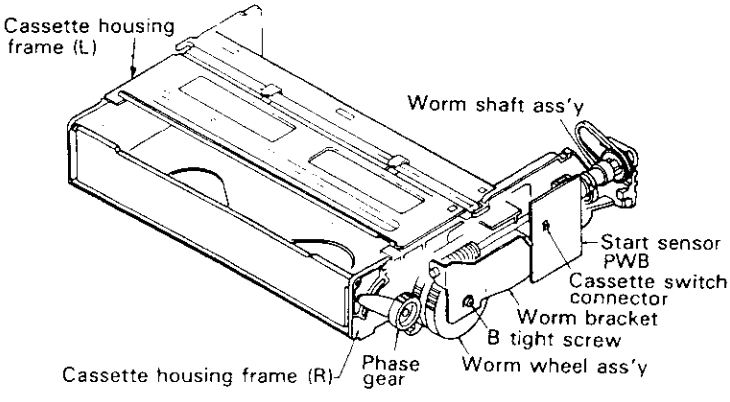
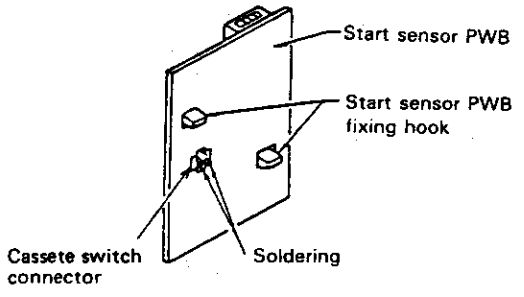


Figure 1-2.

- **Removal**

1. Unsolder the cassette switch connectors (No. 16, 17) from the start sensor PWB.



Figurer 1-3.

2. Lift the start sensor PWB pressing the two start sensor PWB fixing hooks inward.

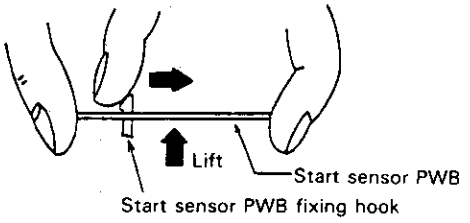


Figure 1-4.

3. Unscrew one B tight screw to detach the worm bracket.
   Note: The worm shaft bearing can easily come out of position. So be careful not to lose it.

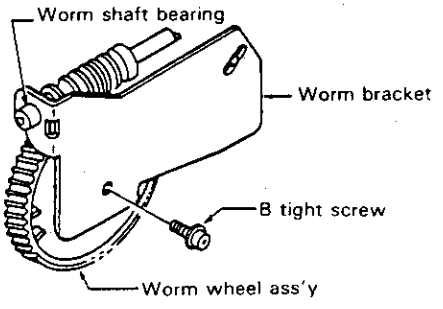


Figure 1-5.

4. Remove the worm shaft assembly, pulley, and cassette loading belt all from the cassette housing frame (R).

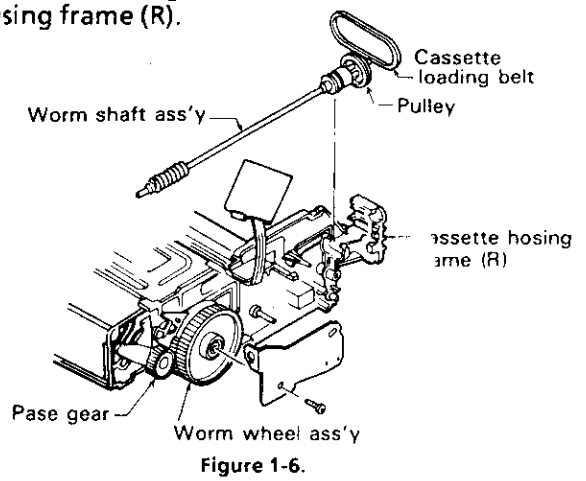


Figure 1-6.

5. Place the slider pin just above the worm wheel (Figure 1-7). (The retainer of the slider is locked at two positions hen. So unlock it as in the Figure 1-8.)
6. Pull out the worm wheel assembly toward you pressing the switch lever upward. (Figure 1-7)

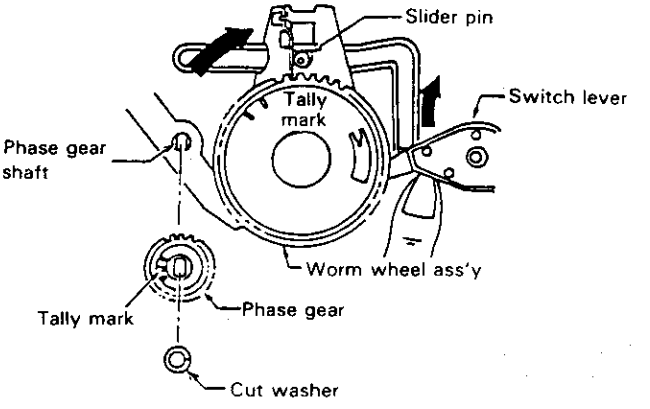


Figure 1-7.

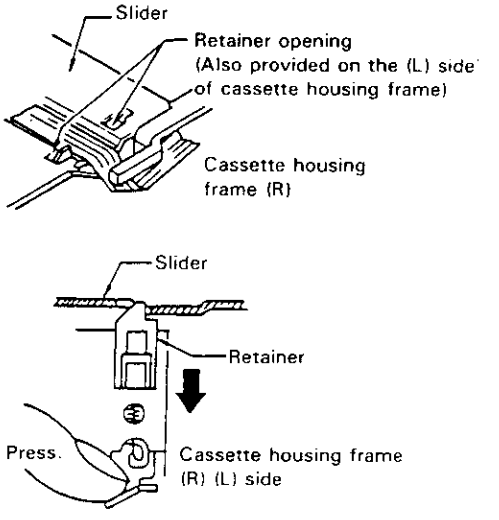
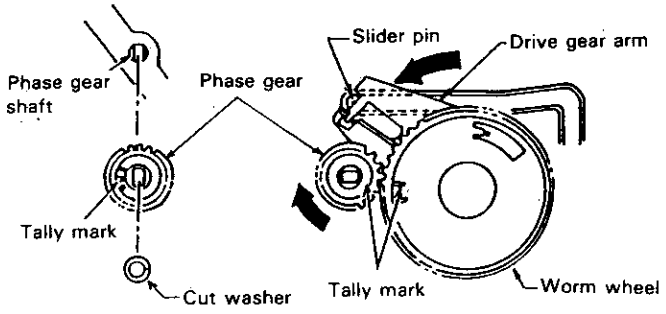


Figure 1-8.

- **Reassembly**

1. Turn the phase gear clockwise until the slider comes to a halt in the cassette insertion direction. (See the Figure 1-9.)
2. Insert the set up worm wheel gear assembly into the cassette housing frame (R), matching the mark on the phase gear with the mark on the worm wheel gear. Detach the cut washer on the phase gear assembly and the phase gear for easier installation of worm wheel assembly.
   Note: Make sure that the slider pin is in the groove of the drive gear arm.



(a) (b)

Figure 1-9.

3. Install the pulley and the cassette loading belt on the worm shaft assembly. Couple the clutch to the clutch lever. And mount them together in the cassette housing frame (R).
   Note: Keep in mind that the clutch switching lever should be in the correct position. The mechanism might malfunction if the lever is slightly out of position. (See page 12.)

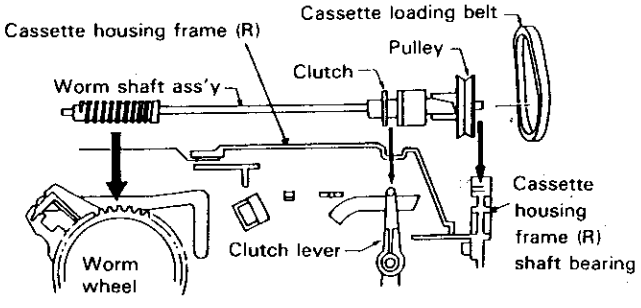


Figure 1-10.

4. Attach the worm bracket to the worm shaft assembly. Place them onto the boss on the cassette housing frame (R).
   Note: Insert ① before screwing into ② and ③.

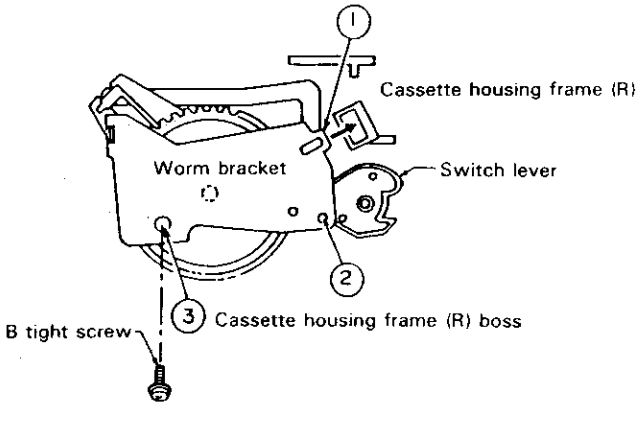
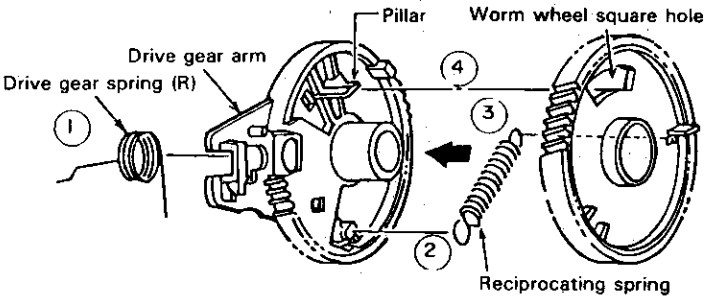


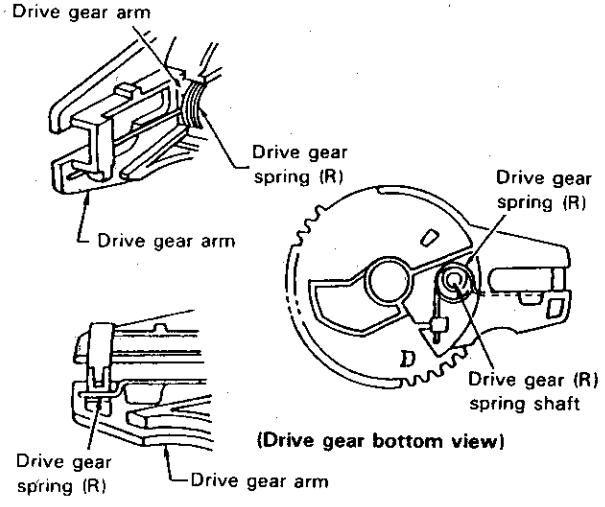
Figure 1-11.

5. Tighten one B tight screw.
   Note: Do not overtighten the B tight screw (no more than 5.0 ± 0.5 kg.cm), because the lower threads of the screw hole at the resin-mode boss can be broken.
6. Place the start sensor PWB on the cassette housing frame (R).
   Note: Check that the switch connectors (No. 16, 17) are in the cassette switch mounting hole.
7. Finally resolder the cassette switch connector to the start sensor PWB.

REASSEMBLY OF DRIVE GEAR



(a)



(b)

Figure 1-12.

1. Pass the tip of the drive gear spring (R) ① through the square hole of the drive gear (R) to hook the spring in position.
2. Hook one end ② of the reciprocating spring to the catch of the drive gear (R).
3. Hook the other end ③ of the reciprocating spring to the catch of the worm wheel.
4. Insert the pillar ④ of the drive gear (R) into the square hole of the worm wheel. Turn the worm wheel somewhat counterclockwise for insertion of the worm wheel to the drive gear (R), because the reciprocating spring is at work.

REPLACEMENT OF CASSETTE LOADING BELT

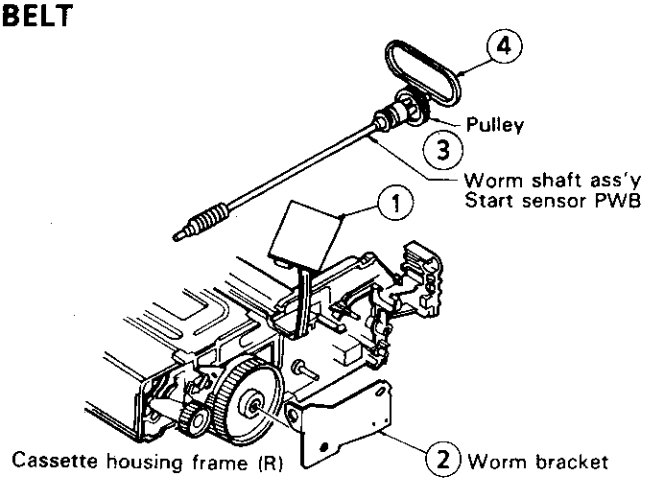


Figure 1-13.

1. Remove the start sensor PWB ① and worm bracket ② from the cassette housing frame (R).
2. Remoye the worm shaft assembly ③.
3. Replace the cassette loading belt ④ with a new one.

Notes:

1. Do not overtighten the B tight screw which holds the worm bracket in position. The specified torque is 5.0 ± 0.5 kg.cm.
2. Make sure that the cassette loading belt is free from grease. If stained with grease, clean the belt with the cleaning liquid.
3. Perform checking of the clutch switch lever for proper action.

CHECKING THE CLUTCH SWITCH LEVER

- **Checking**

Place the mechanism in the cassette eject mode when removing and attaching the cassette housing from and to the mechanism chassis.
Make sure enough that each part in the cassette housing such as the clutch switch lever is in position. If not, it causes malfunction.

Note:

Figure 1-14 shows the position of each part in the cassette eject mode.

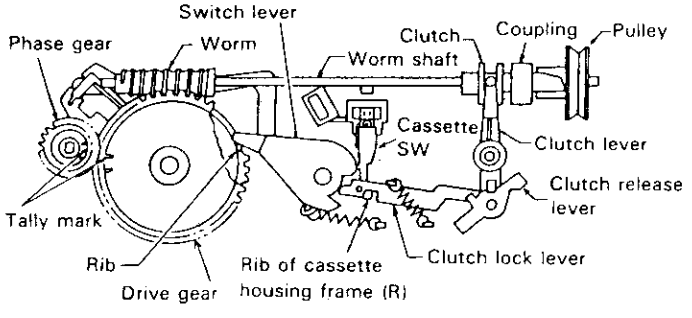
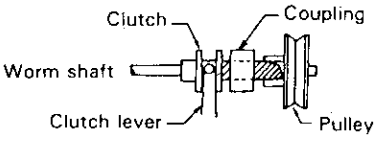


Figure 1-14.

1. First make sure that the tip of the switch lever is held at the rib of the drive gear (R).
2. Check that the rib of the cassette housing frame (R) and the concavity of the clutch lock lever are engaged.
3. Finally be sure that the relationship between the clutch lever and the clutch, as well as between the clutch and the pulley, are correct as in the Figure 1-15.



Check that the clutch is engaged with the pulley through the coupling.

Figure 1-15.

- **Resetting**

Take the following steps to reset the clutch if it is unlocked or if the switch lever and the clutch lock lever are unlocked.

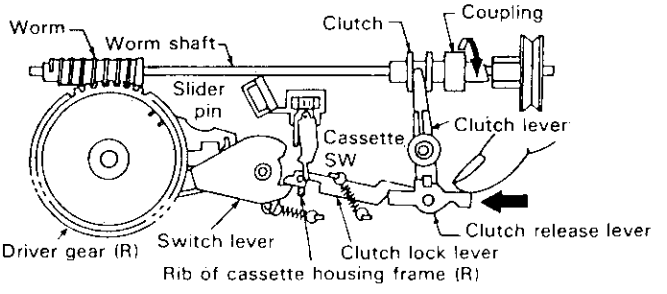


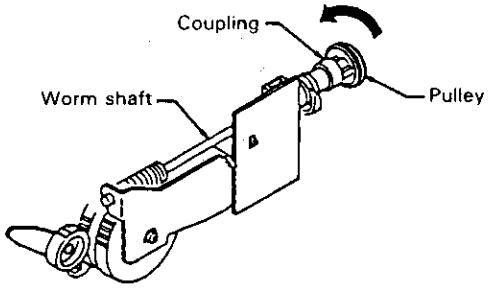
Figure 1-16.

1. Shift the slider by turning the coupling in the arrow direction (clockwise) until the slider pin is at the bottom of the slider groove as shown in the Figure 1-16. (The loading mode)
   Note: Note that the slider is equipped with a lock meachanism. Unlock the locks on cassette dousing frame (L) and (R) side before shifting the slider.
2. When the position is set as shown in the Figure 1-16, push the clutch release lever in the direction of the arrow by hand until the clutch lock lever becomes tightly locked by the rib of the cassette housing frame (R).
3. Then turn the coupling counterclockwise until the slider reaches the cassette insertion opening and the reciprocating spring is activated.
   Note: There is no need to unlock the slider when shifting the slider to the cassette insertion opening. Just keep shifting the slider.

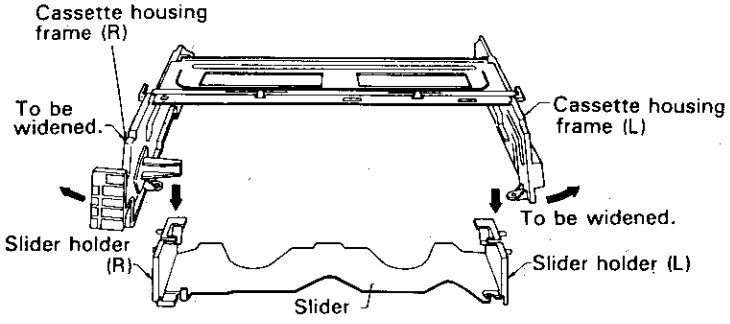
REPLACEMENT OF LOCK RELEASE LEVER

- **Removal**

1. Place the slider in the cassette down position. (Turn the coupling on the worm shaft clockwise until the slider is in the cassette down position.)
   Note: Before shifting, unlock the slider.
2. Slightly widen the cassette housing frames (R) and (L) to unhook the slider holders (R) and (L) of the slider assembly off the grooves of the cassette housing frames.



'a)



(b)

Figure 1-17.

3. Lift the slider holder (R) upward about 2mm off the slider by pressing two catches with a thin tip screw driver. Take care not to damage the catches.

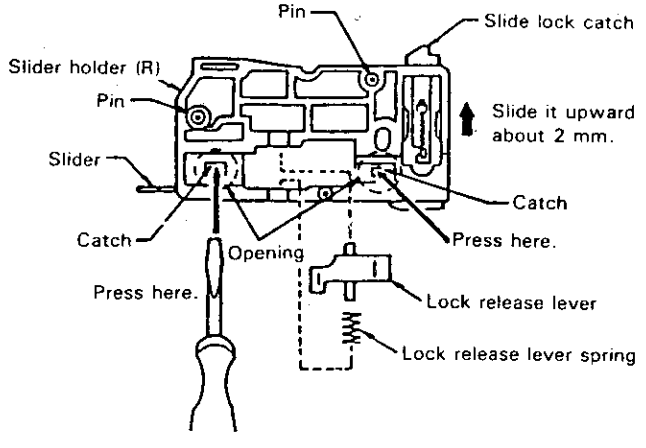


Figure 1-18.

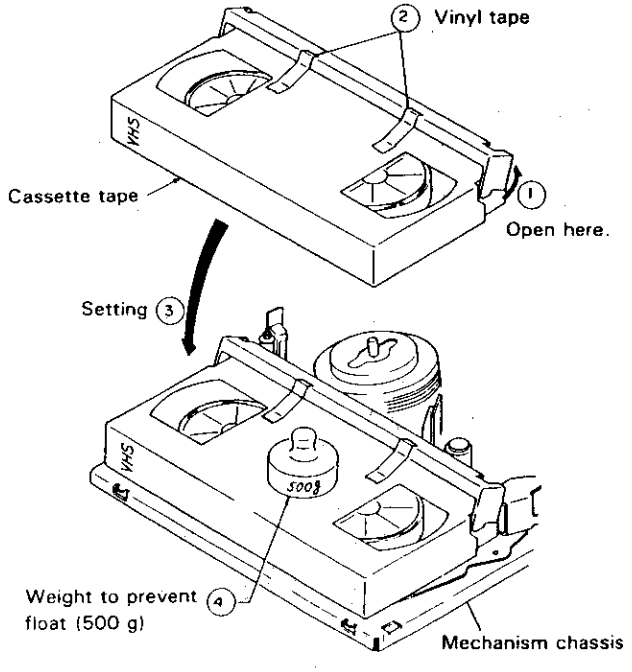
4. Remove the lock release lever from the slider holder (R)

- **Reassembly**

1. Follow the steps for removal in the reverse order. (See Figures 1-17 and 1-18.)
2. Attach the lock release lever to the slider holder (R).
3. Slide the slider holder (R) downward so that the two catches of the slider holder (R) fit the opening of the slider.
4. Slightly widen the cassette housing frames, and set the pins of slider holders (R) and (L) into the grooves of the cassette housing frames.
   Note: Check if the pins of the slider holders (R) and (L) fit the grooves of the cassette housing frames, and if the drive gear arm is sufficiently engaged with the slider holders.
5. Turn the coupling counterclockwise until the slider is at the cassette insertion opening.

TO RUN A TAPE WITHOUT THE CASSETTE HOUSING CONTROL ASSEMBLY

1. Plug in the power cord.
2. Turn on the power switch.
3. Open the lid ① of a cassette tape by hand.
4. Hold the lid with a piece of vinyl tape ②.
5. Set te cassette tape in the mechanism chassis.
6. Weight the cassette tape with a weight ④ to prevent float.
7. Perform running test.



Note: The weight should not be more than 500 g.

Figure 1-19.

REPLACEMENT AND HEIGHT CHECKING AND ADJUSTMENT OF REEL DISKS

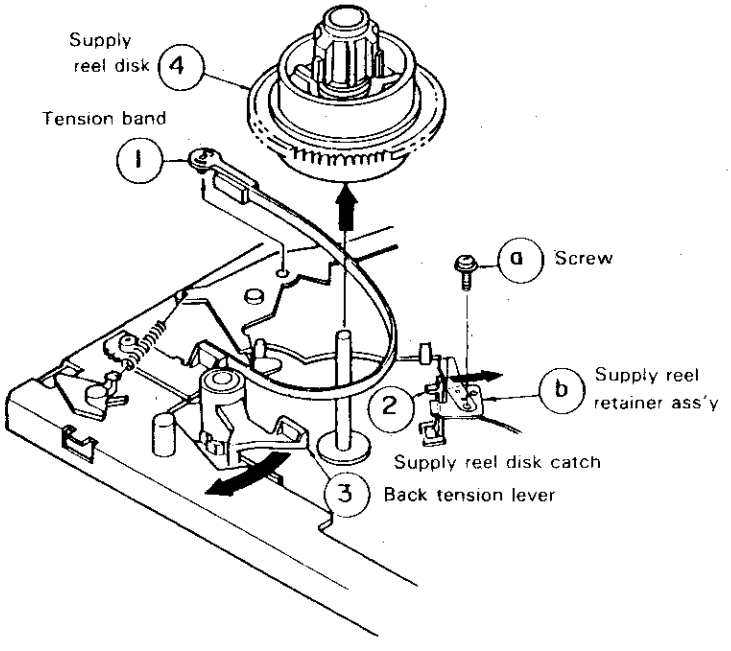
1. Remove the cassette housing control assembly.
2. Set the mechanism in the playback mode with no cassette tape in place. Unplug the power cord.
3. Set the idler gear in the center (neutral).

- **Removal (Supply reel disk)**

1. Remove the tension band ①. (Take care not to deform it.)
2. Unscrew the screw ⓐ and remove the supply reel retainer assembly ⓑ.
3. Release the supply reel disk catch and back tension lever ③.
4. Pull the supply reel disk upward.

Notes :

1. Take care not to deform the tension band.
2. Check and adjust the tension pole position. (See page 19.)
3. Be careful not to damage the gear and the idler gear on the supply reel disk.
4. Press the tension band in the direction of the arrow for removal (see Figure 1-20(b)).



(a)

Note: When the tension band is pressed in the direction of the arrow for removal, the catch is hard to be deformed.

(b)

Figure 1-20.

- **Removal (Take-up reel disk)**

1. Unscrew the screw ⓒ and remove the take-up reel retainer.
2. Release the take-up reel disk catch ①.
3. Pull the take-up reel disk ② upward.

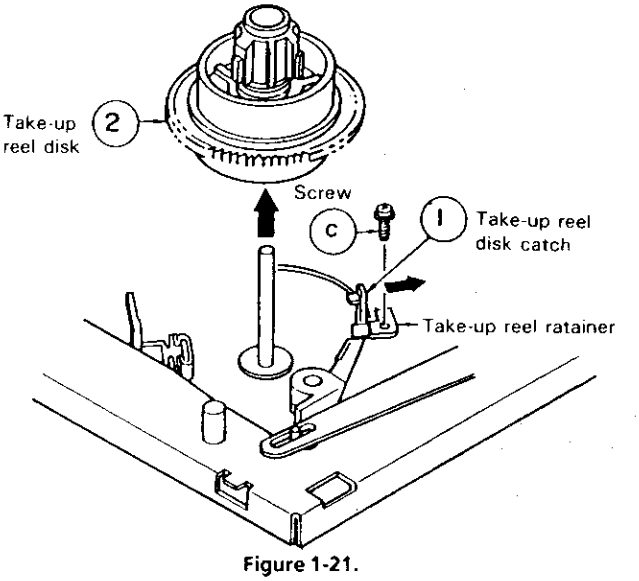


Figure 1-21.

- **Reassembly (Supply reel disk)**

1. Clean the reel disk shaft ① and apply oil to it.
2. Release the supply reel disk catch ② and back tension lever ③.
3. Install a new supply reel disk ④ onto the shaft.
4. Replace the tension band ⑤ around the supply reel disk, and insert it to the hole of the tension arm.
5. Replace the supply reel retainer assembly ⓑ in place, and tighten up the screw ⓐ.

Notes :

1. Take enough care not to deform the tension band during installation of the supply reel disk.
2. Be careful not to damage the supply reel disk gear, back tension lever, catch, or the like with tools.

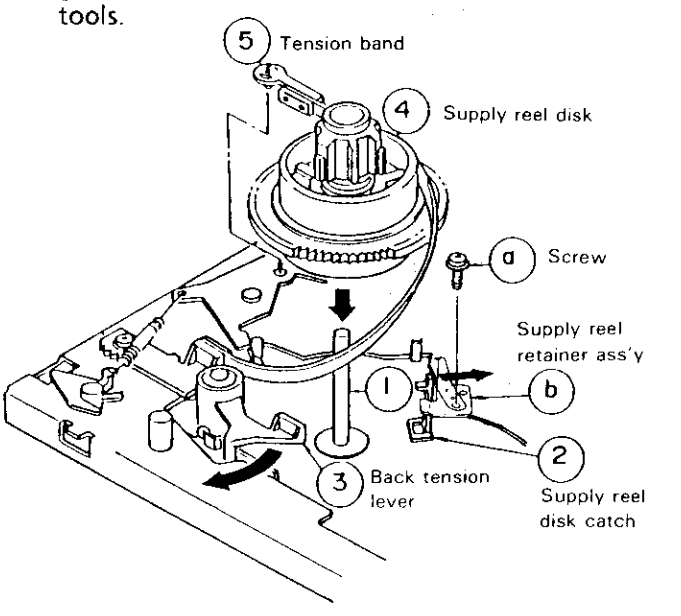


Figure 1-22.

- **Reassembly (Take-up reel disk)**

1. Clean the reel disk shaft ① and apply oil to it.
2. Release the take-up reel catch ② and video search brake lever ③.
3. Install a new take-up reel disk ④ onto the shaft.
4. Replace the take-up reel retainer ⑤ in position and tighten up the screw ⓒ

Note :
Take care not to damage the video search brake lever.

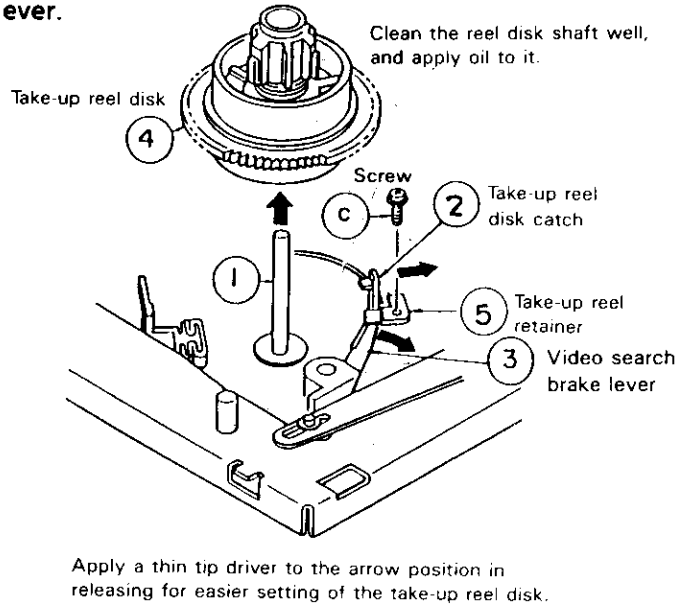


Figure 1-23.

* After reassembly, check the video search rewind back tension (see page 18), and check the brake torque (see page 20).

- **Height checking and adjustment**

Note:
Place the master plane onto the mechanism unit, taking care not to hit the drum (see Figure 1-24)

1. For height adjustment, press the reel disk with a finger, and turn it right and left with a screwdriver (see Figure 1-26 (a)).

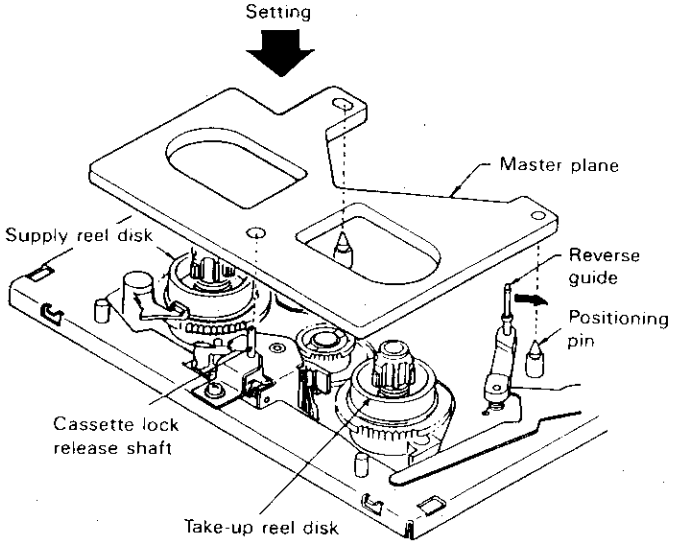


Figure 1-24.

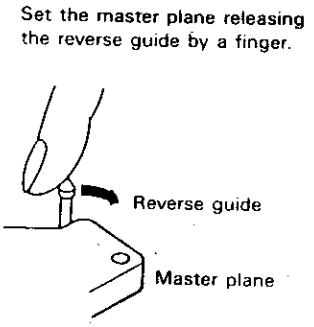
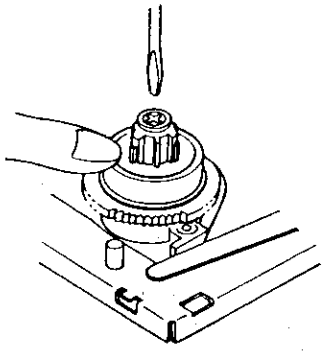


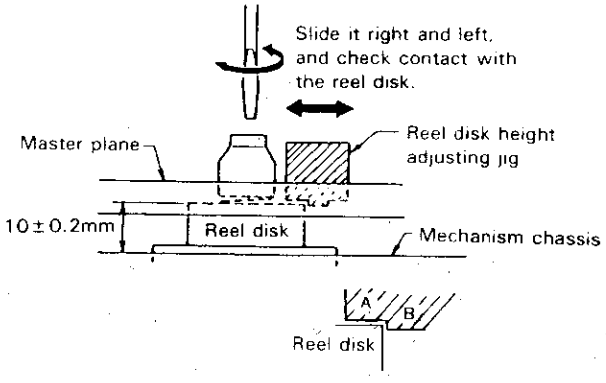
Figure 1-25.

2. Check that the reel disk is lower than part A but higher than part B. If the height is not correct, adjust the height adjusting screw (see Figure 1-26 (b)).

Note :
Whenever replacing the reel disk, perform the height checking and adjustment.



(a)



(b)

Figure 1-26.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN FAST FORWARD MODE

- Remove the cassette housing control assembly.
- **Setting**

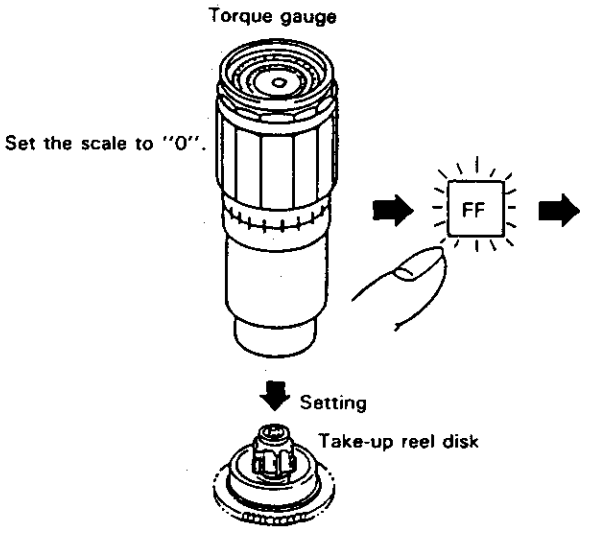


Figure 1-27.

- **Checking**

Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by hand in the take-up direction

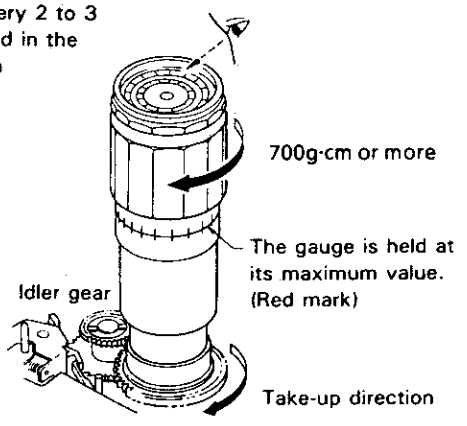


Figure 1-28.

- **Adjustment**

1. If the take-up torque is outside the range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.
2. If the take-up torque is still out of range, replace the reel belt.

Notes :

1. Hold down the torque gauge so that it may not fly off.
2. When checking the take-up torque, do not keep the reel disk locked for a longer time.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN REWIND MODE

- Remove the cassette housing control assembly.
- **Setting**

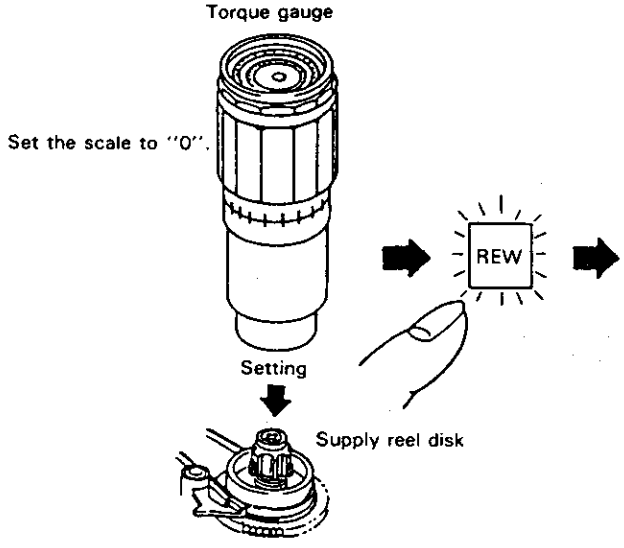


Figure 1-29.

- **Checking**

Turn the torque gauge slowly (one rotation every 2 to 3 seconds) by band in the take-up direction

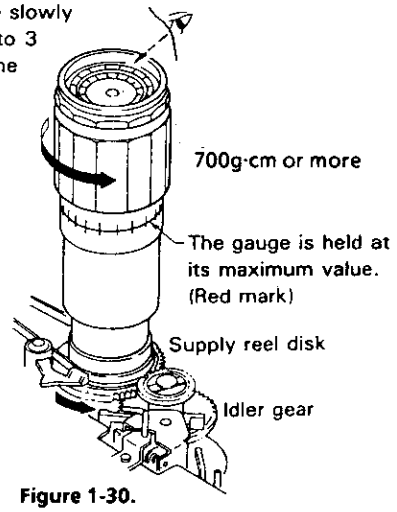


Figure 1-30.

- **Adjustment**

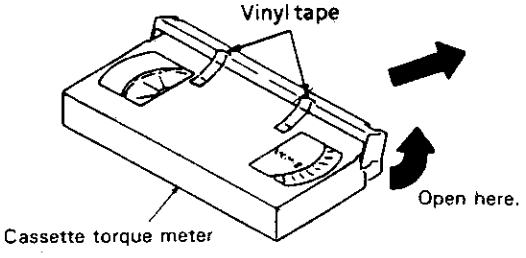
1. If the take-up torque is outside the range, clean the capstan D.D. motor pulley, reel belt and reel pulley with cleaning liquid, then recheck the torque.
2. If the take-up torque is still out of range, replace the reel belt.

Notes :

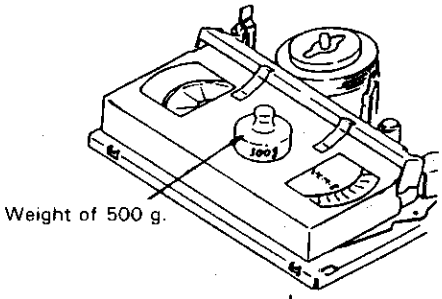
1. Hold down the torque gauge so that it may not fly off.
2. When checking the take-up torque, do not keep the reel disk locked for a longer time.

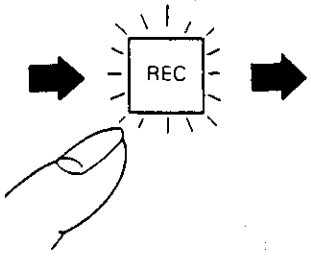
CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN PLAYBACK MODE

1. Remove the cassette housing control assembly.
2. Open the lid of the cassette torque meter, and hold it with a piece of vinyl tape.



Load a cassette torque meter into the unit.





Set value SP 95 ± 30 g.cm

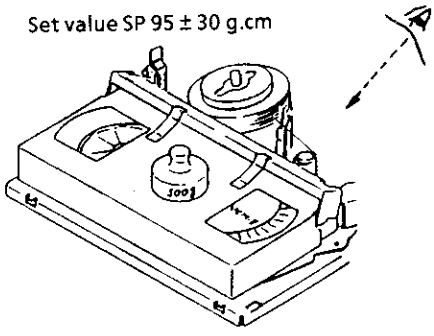


Figure 1-31.

- **Checking**

1. Check that the torque is in the range of 95 ± 30 g.cm.
2. The torque fluctuates due to the rotational deviation of the reel drive unit. Use the center of the fluctuation as the value.
3. Place the unit in the SP record mode, and check that the take-up torque is within the range.

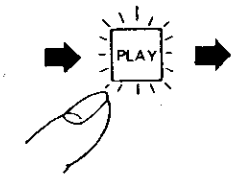
- **Adjustment**

If the take-up torque in the playback mode is outside the range, replace the take-up reel disk.

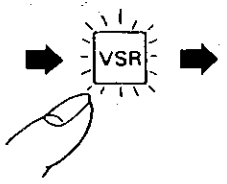
Note : Weight the cassette torque meter to prevent float.

CHECKING AND ADJUSTMENT OF TAKE-UP TORQUE IN VIDEO SEARCH REWIND MODE

- Remove the cassette housing control assembly.
- **Checking**



Push the play button to place the unit in the playback mode.



Push the video search rewind button to place the unit in the video search rewind mode.

Torque gauge

Place the torque gauge on the supply reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within the set value 170 ± 40 g·cm.

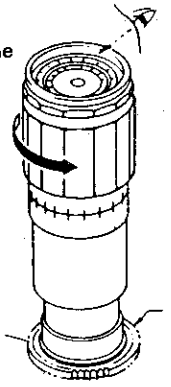


Figure 1-32.

Note :
Set the torque gauge securely on the supply reel disk. If the torque gauge is not securely set on the reel disk, measurement will be incorrect.

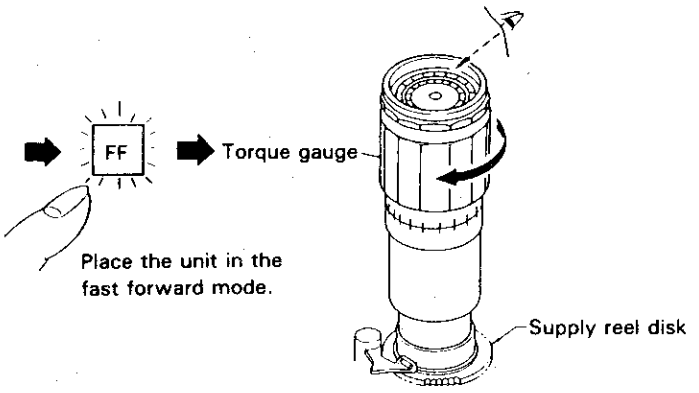
- **Adjustment**

If the take-up torque in video search rewind mode is outside the range, replace the supply reel disk.

Note : The torque fluctuates due to the rotational deviation of the supply reel disk. Use the center of the fluctuation at the value.

CHECKING THE FAST FORWARD BACK TENSION

- Remove the cassette housing control assembly.
- Checking



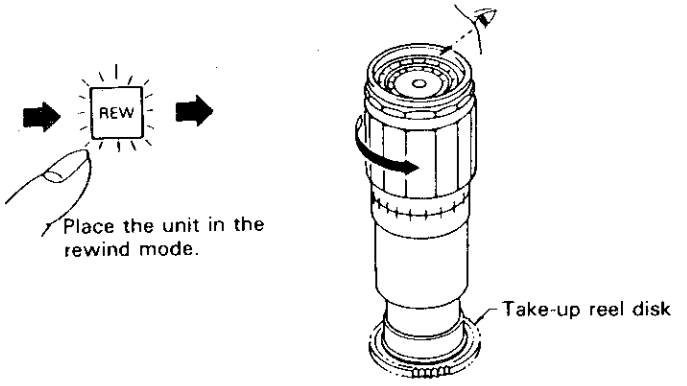
Place the torque gauge on the supply reek disk, and turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 15 ± 5 g·cm

Figure 1-33.

Note :
Set the torque gauge securely on the supply reel disk. If the torque gauge is not securely set on the reel disk, measurement will be incorrect.

CHECKING THE REWIND BACK TENSION

- Remove the cassette housing control assembly.
- Checking



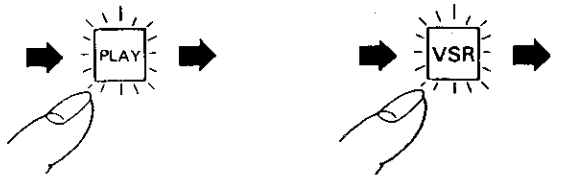
Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 15 ± 5 g·cm.

Figure 1-34.

Note :
Set the torque gauge securely on the take-up reel disk. If it is not secure, the measurement will be incorrect.

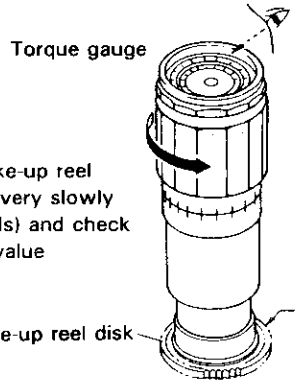
CHECKING THE VIDEO SEARCH REWIND BACK TENSION

- Remove the cassette housing control assembly.
- Checking



Push the play button to place the unit in the playback mode.

Push the video search rewind button to place the unit in the video search rewind mode.



Place the torque gauge on the take-up reel disk, and turn it couterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within the set value 45 ± 20 g·cm.

Figure 1-35.

Note :
Set the torque gauge securely on the take-up reel disk. If it is not secure, the measurement will be incorrect.

CHECKING THE PINCH ROLLER PRESSURE

- Remove the cassette housing control assembly.

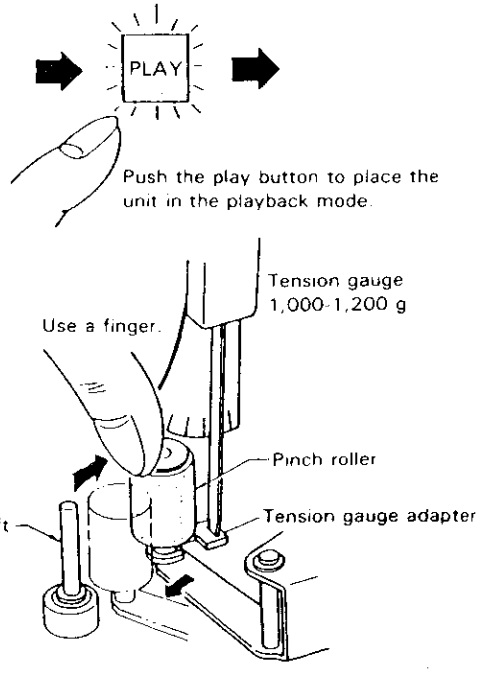


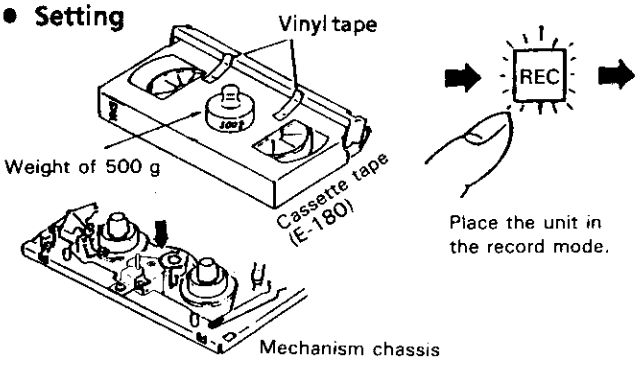
Figure 1-36.

1. Detach the pinch roller from the capstan shaft.
2. Set the tension gauge by hooking the tension gauge adapter onto the pinch roller shaft.
3. Gradually release the pressure to allow the pinch roller to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge.
4. Check that the reading of the tension gauge is in the range of 1000 to 1200 g.

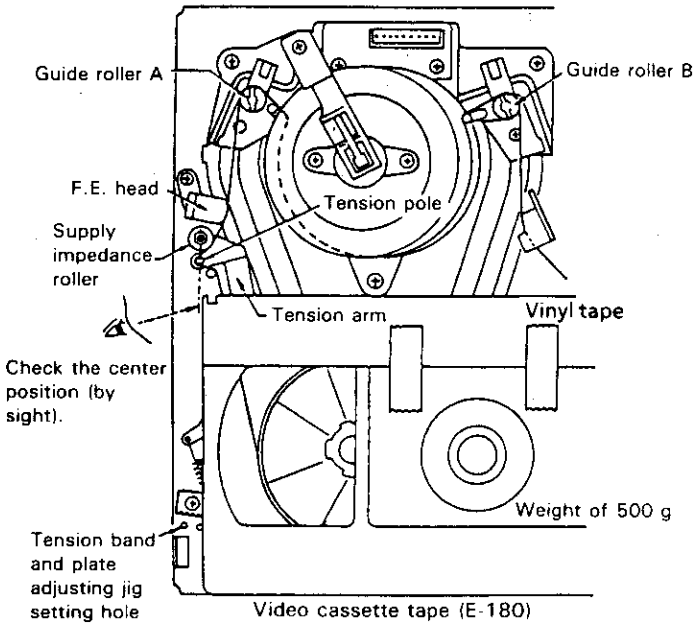
CHECKING AND ADJUSTMENT OF TENSION POLE POSITION

- Remove the cassette housing control assembly.

- **Setting**



(a)



(b)

Figure 1-37.

- **Checking**

1. The guide rollers (A, B) operate to bring the tape outside the cassette tape and simultaneously the tension pole moves to the left, loading the tape. At that time (loading completed), check the position of the tension pole.
2. At the beginning of the tape (E-180), check that the tension pole's center is aligned with the supply impedance roller's center by sight.
3. Check that the end of the tape is neither curled against the flange of the supply impedance roller nor over it.
4. During the video search rewind mode with no cassette tape in place, check that the supply reel disk is free from the tension band.

- **Position adjustment (record mode)**

When the tension pole is at the right of the supply impedance roller's center:

Untighten the tightening screw, and shift the tension band adjustment bracket in the direction of the arrow using a tension band and plate adjusting jig until it is in the set value range (center). The secure it with the tightening screw.

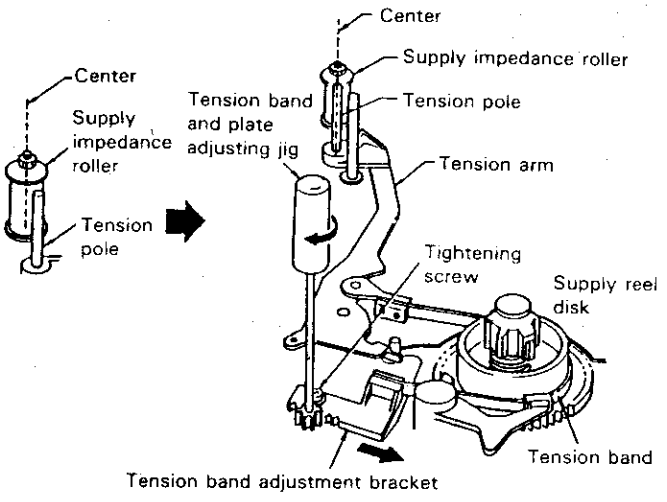


Figure 1-38.

- **Position adjustment (record mode)**

When the tension pole is at the left of the supply impedance roller's center:

Untighten the tightening screw, and shift the tension band adjustment bracket in the direction of the arrow using a tension band and plate adjusting jig until it is in the set value range (center). The secure it with the tightening screw.

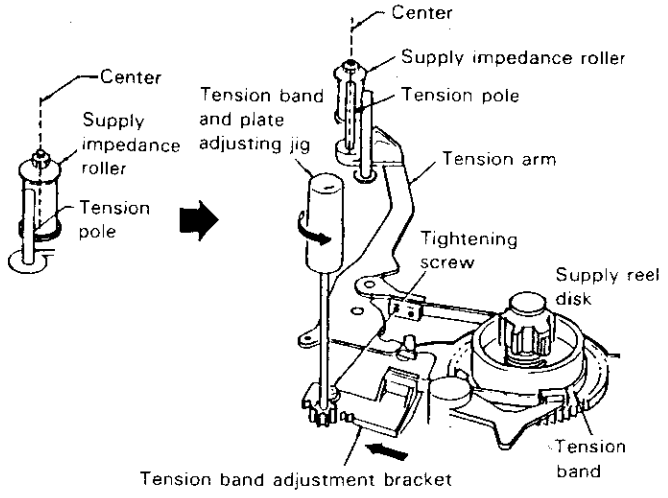


Figure 1-39.

CHECKING AND ADJUSTMENT OF RECORD / PLAYBACK BACK TENSION

- Remove the cassette housing control assembly.
- **Checking**

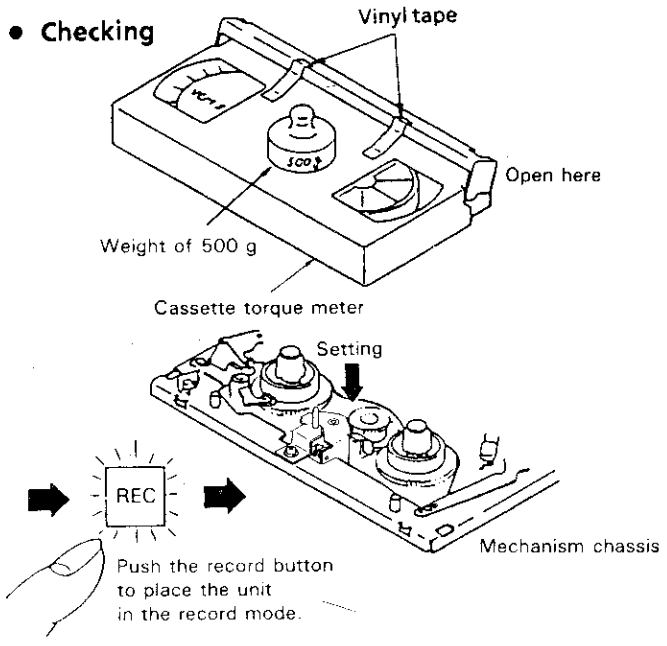


Figure 1-40.

1. Put a cassette torque meter into the unit.
2. Push the record button to place the unit in the record mode.
3. Check that the back tension indicated by the gauge is within the set range 23 to 28 g.cm.

Notes :

1. Make sure that the video cassette tape is over the retaining guide.
2. Make sure that the tape is not slack nor damaged at either end.

- **Adjustment**

1. If the reading of the cassette torque meter is less than specified, move the tip of the tension spring hook plate toward the hole A.
2. If the reading of the cassette torque meter is more than specified, move the tip of the tension spring hook plate toward the hole B.

* Put a thin screw driver (–) in the shaft hole, lean it toward you, and turn it for easer shift of the tension spring hook plate in the direction of A or B.

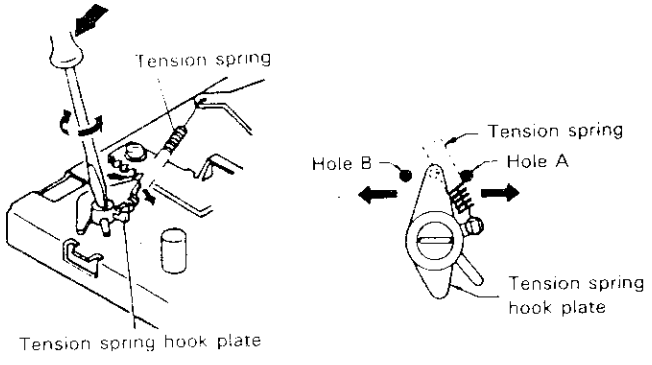


Figure 1-41.

Figure 1-42. Not used.

CHECKING THE BRAKE TORQUE

- **Checking the brake torque at the supply side**

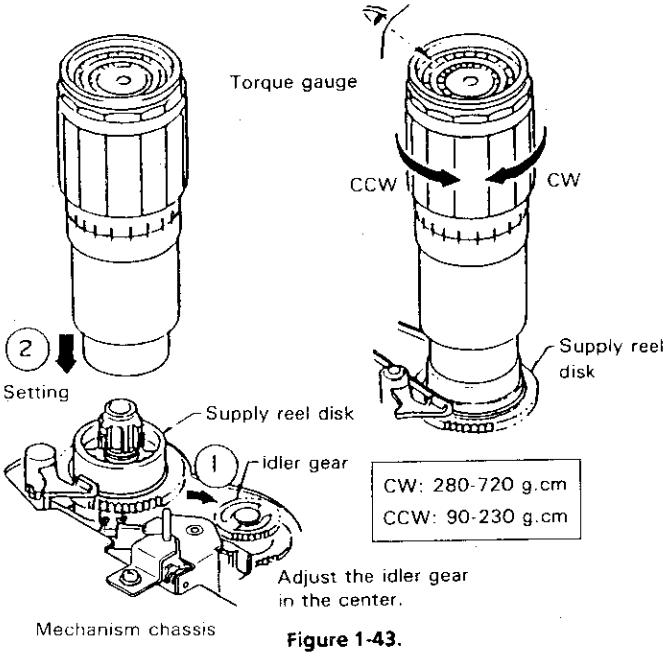


Figure 1-43.

1. Remove the cassette housing control assembly.
2. Place the mechanism in the stop mode by unplugging the power cord in the fast forward or rewind mode.
3. Slowly rotate the torque gauge in the clockwise (CW) direction and counterclockwise (CCW) direction of the supply brake so that the reel disk and the indicator of the torque gauge rotate at an equal rate. Check that the values are within the range of CW direction = 280 to 720 g. cm, CCW direction = 90 to 230 g.cm, and that the brake torque in the CW direction is at least twice as high as that in the CCW direction.

- **Checking the brake torque at the take-up side**

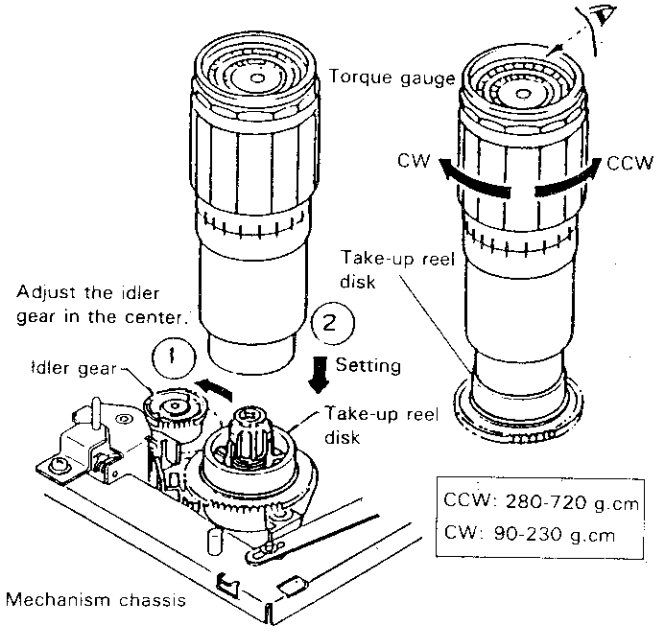


Figure 1-44.

1. Remove the cassette housing control assembly.
2. Slowly rotate the torque gauge in the clockwise (CW) direction and counterclockwise (CCW) direction of the take-up brake so that the reel disk and the indicator of the torque gauge rotate at an equal rate. Check that the values are within the range of CCW direction = 280 to 720 g. cm, CW direction = 90 to 230 g.cm, and that the brake torque in the CCW direction is at least twice as high as that in the CW direction.

- **Adjustment of the brake torque at the supply side and the take-up side**

1. If the supply or take-up brake torque is outside the range, clean the supply or take-up reel disk break lever felt, then recheck the torque.
2. If the supply or take-up brake torque is still outside the range, replace the main brake or the main brake spring.

REPLACEMENT OF MAIN BRAKE

1. Remove the reel belt and the reel block FFC.
2. Remove the cut washer ① off the brake shifter.
3. Unscrew the four screws ② and then the take-up reel retainer.
4. Remove the reel block assembly Ⓐ downward.
5. Remove the cut washer ③ first and then the reel pulley.
6. Unscrew the two screws ④ and detach the idler assembly.
7. Unhook the back tension lever spring ⑤ and remove the back tension lever ⑥. (Undo the hook under the reel chassis.)
8. Open the shifter latch ⑦ and remove the brake shifter assembly ⑧.
9. Release the reel disk catches ⑬ and then remove the left and right reel disk assemblies ⑨ and ⑩.
10. Finally remove the main brake levers ⑪ and main brake spring ⑫.

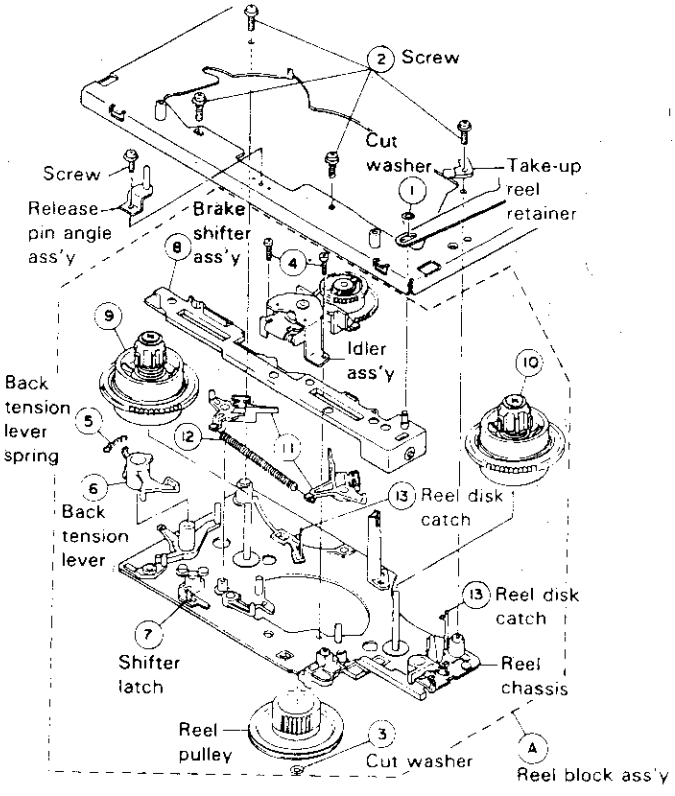


Figure 1-45.

Note :
When the main brake is replaced, perform the height checking and adjustment (see page 15), and the brake torque checking (see page 20).

REPLACEMENT OF A/C (Audio/Control) HEAD

1. Remove the cassette housing control assembly.
2. Place the unit in the unloading mode, and unplug the power cord.

- **Removal**

1. Loosen the tilt adjusting screw ①.
2. Remove the azimuth adjusting screw ②.
3. Remove the A/C head screw ③.
4. Unsolder the A/C head PWB soldered to the A/C head assembly.

Note :

1. After replacement, be sure to perform the adjustment of the tape drive train (see page 24). Under any circumstances, avoid touching the head. Clean the head, if touched with your finger, with alcohol.
2. Take care that the azimuth spring does not fly off when removing the A/C head screw.

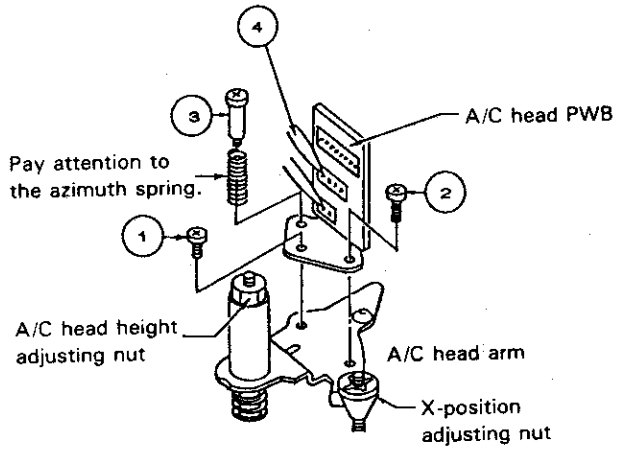


Figure 1-46.

- **Replacement**

1. Solder the removed A/C head PWB onto a new A/C head assembly.
2. The A/C head assembly is attached so that the A/C head arm and A/C head plate are roughly parallel to each other.

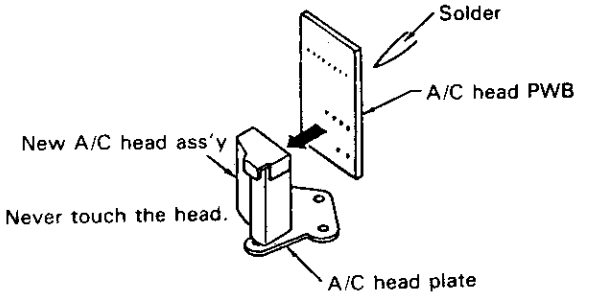


Figure 1-47.

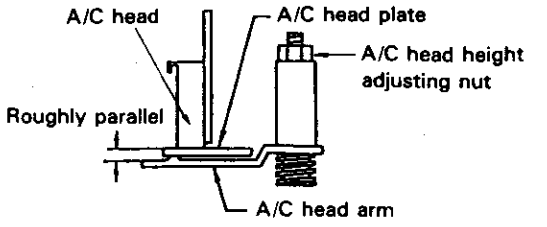
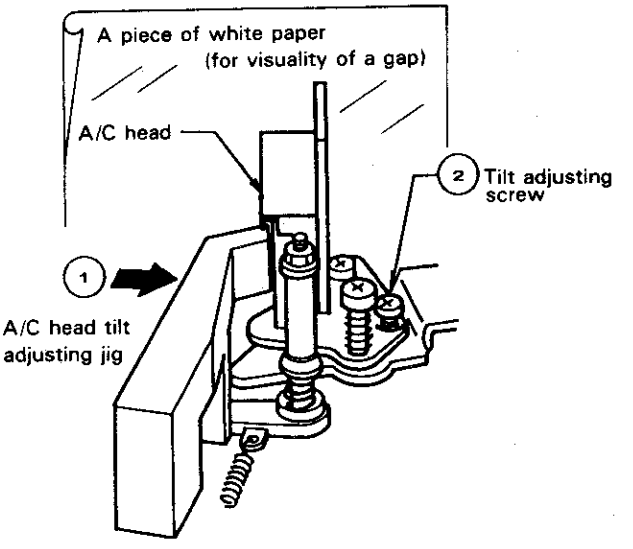


Figure 1-48.

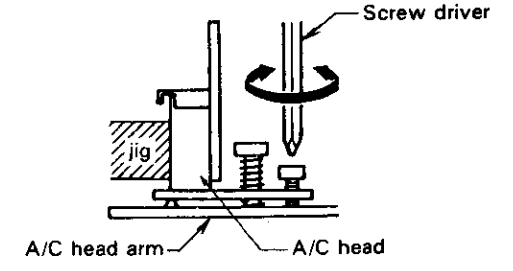
- **Adjustment**

[A/C head tilt angle]

1. Set the mechanism to the loading mode.
2. Place the A/C head tilt adjusting jig.
3. Slowly turn the tilt adjusting screw with a screw driver until there is no gap between the jig and the A/C head.



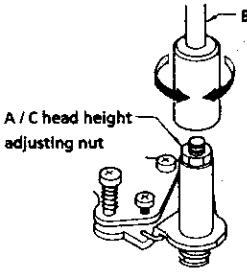
(a)



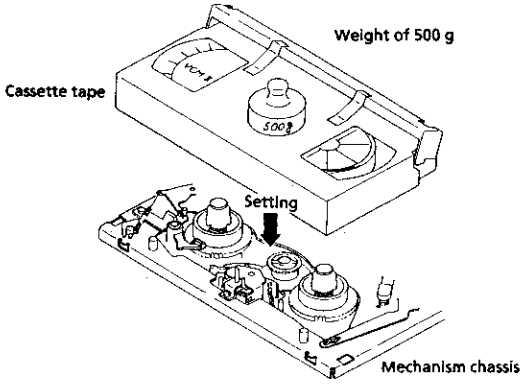
(b)

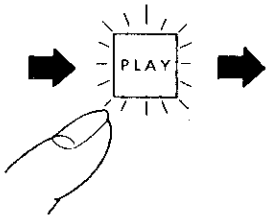
Figure 1-49.

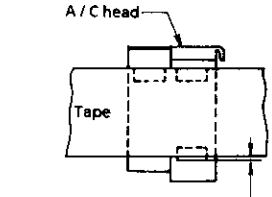
[A/C head height rough adjustment]



Roughly adjust the height of the A/C head by turning the A/C head adjusting hexagon nut with the specialized box driver until the tape is in the position shown below.







Adjust the nut visually so that the control head is visible 0.3 to 0.5 mm below the bottom of the tape.

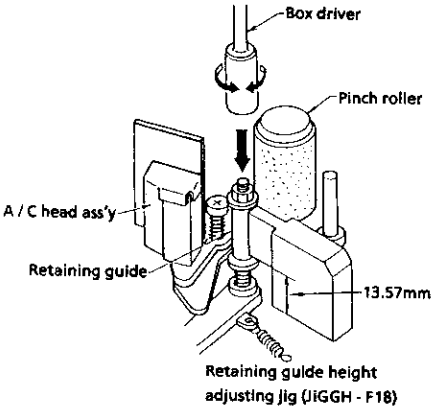
Figure 1-50.

HEIGHT ADJUSTMENT OF RETAINING GUIDE AND REVERSE GUIDE

Note :

Before the rough adjustment of the tape drive train, check that the retaining guide height is within the value in Figure 1-51 by using the special jigs.

[Height adjustment of retaining guide]



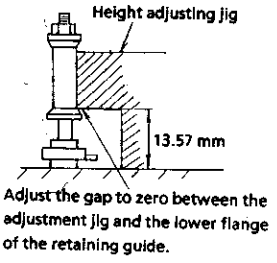
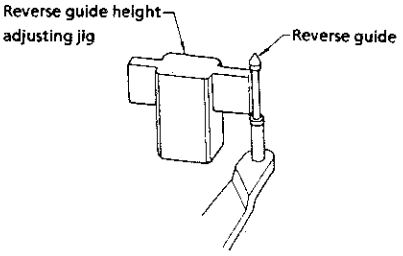
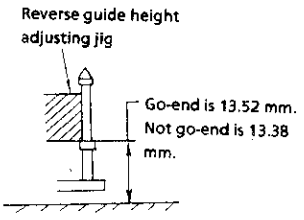


Figure 1-51.

[Height adjustment of reverse guide]





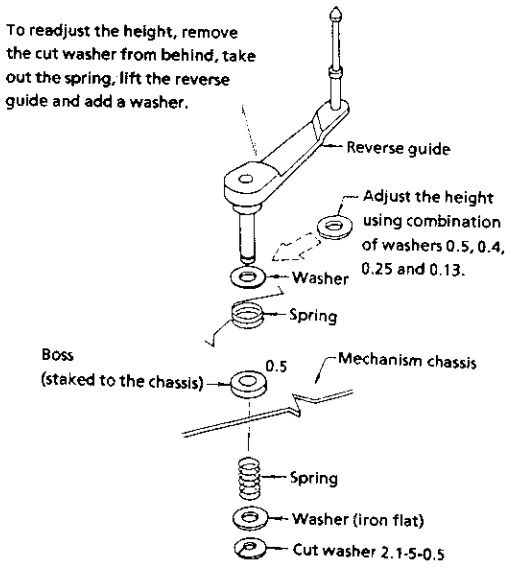


Figure 1-52.

ADJUSTMENT OF TAPE DRIVE TRAIN

1. Remove the cassette housing control assembly.
2. Check and adjust the position of the tension pole. (See page 19.)
3. Check and adjust the video search rewind back tension. (See page 18.)
4. Set the tilt angle of the A/C head. (See page 22.)
5. Rough adjustment of tape drive train.
   a) Connect the oscilloscope to the test point for PB CHROMA envelope output (TP501). Set the synchronism of the oscilloscope to EXT. The PB CHROMA signal is to be triggered by the head switching jpulse (TP502).
   b) Loosen the setscrew at the lower part of the guide roller, and adjust it with an adjusting screw driver (JIGDRIVERH-4) so that the guide roller turns smoothly. (Do not overloosen the setscrew, which causes insecurity of the guide roller.) (See Figure 1-53.)
   c) Set the alignment tape (VROCPSV) on the reel disk, and place the unit in the playback mode. (Place a 400 to 500 g. weight on the cassette tape to prevent float of the cassette tape.)

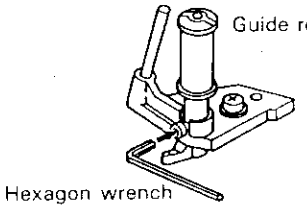


Figure 1-53.

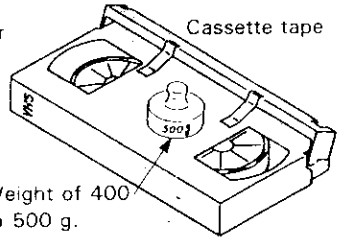


Figure 1-54.

   d) Change the envelope waveform from MAX to MIN, and MIN to MAX by pushing the (+) or (–) tracking button, and check a flat response is obtained on the waveform.
   e) If a flat response cannot be obtained, roughly adjust the guide rollers on the supply side and take-up side using an adjusting screw driver until a flat response can be obtained.
   f) Turn the A / C head tilt adjusting screw with a screwdriver to prevent the tape from wrinkling at the upper and lower flanges of the fixed guide.
      1) Wrinkles at the upper flange : Turn the above adjusting screw clockwise, as shown in Fig. 1 - 55 (a)
      2) Wrinkles at the lower flange : Turn the above adjusting screw counterclockwise, as shown in Fig. 1 - 55 (b)

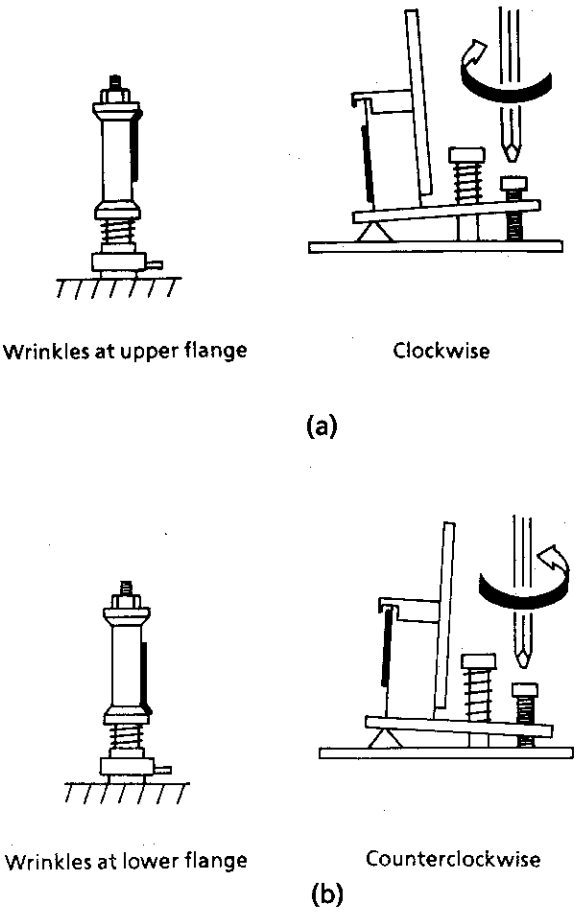


Figure 1-55.

Notes:

1. Place the tracking control in the center position, and adjust the X-position adjusting nut so that the PB CHROMA envelop becomes maximum for easier rough adjustment of the tape drive train.
2. In the rough adjustment, pay particular attention to the outlet side.

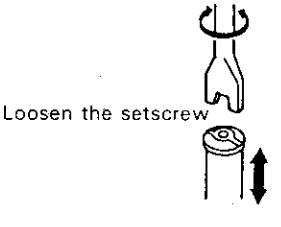


Figure 1-56.

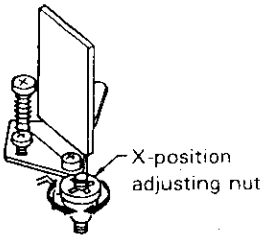


Figure 1-57.

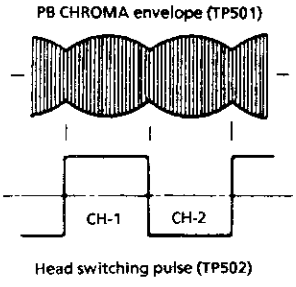


Figure 1-58.

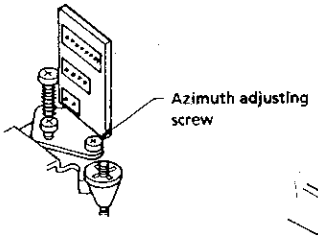


Figure 1-59.

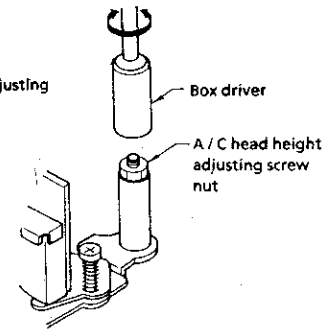


Figure 1-60.

6. Adjustment of A/C head height and azimuth
   a) Connect an oscilloscope to the audio output terminal.
   b) Use the alignment tape and play back its audio 6 kHz signal (monoscope pattern for video signal). Adjust the azimuth adjusting screw to obtain the maximum audio output on an oscilloscope. (See Figure 1-59.)
   c) Use the alignment tape and play back its audio 1 kHz signal (color bar for video signal) and slowly rotate the A/C head height adjusting nut with the special box driver to obtain the maximum audio output.
   d) Perform the adjustment in b) again.
   e) After this adjustment, apply glyptal to the screws and nuts to fix them.

7. Adjustment of tape drive train and X-Position.
   - Use the alignment tape (VROUBZFS).

   a) Connect the oscilloscope to the test points (TP501) for PB CHROMA envelope output. Set the synchronism of the oscilloscope to EXT. The PB CHROMA signal is to be triggered by the head switching pulse (TP502).
   b) Play back the tape drive train alignment tape.
   C) Push the (+) or (–) button to change the envelope waveform from MAX to MIN, and MIN to MAX. Adjust the guide roller's height on the supply and take-up sides with an adjusting screw driver, to obtain an envelope waveform that is as flat as possible.
   d) If the tape is above or below the helical lead, the PB CHROMA waveform will take the shape shown in Figure 1-61.
   e) Adjust for maximum flatness of the envelope as the step 5, e) in page 24.

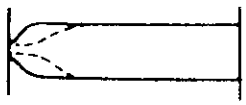
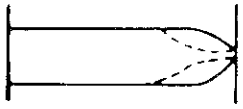
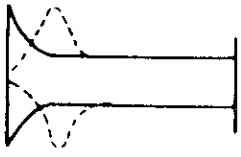
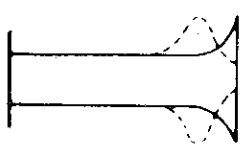
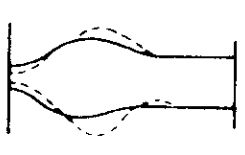
	When the tape is above the helical lead.		When the tape is below the helical lead.	
	Supply side	Take-up side	Supply side	Take-up side
				
				
Adjustment	Supply side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope.	Take-up side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope.	Supply side guide roller rotated in counterclockwise direction (raises guide roller) to make the tape float above the helical lead. The supply side guide roller is then rotated in the clockwise direction to flatten the envelope.	Take-up side guide roller rotated in counterclockwise direction (raises guide roller) to make the tape float above the helical lead. The take-up side guide roller is then rotated in the clockwise direction to flatten the envelope.

Figure 1-61.

f) Push the (+) or (–) tracking button to check that a flat response is obtained on the envelope waveform.
g) Secure the guide roller by tightening the guide roller setscrew in the unloading mode.
h) Play back the tape drive train alignment tape to check that the envelope waveform does not change.

8. Adjustment of A/C head X-position.
   - Use the alignment tape (VROUBZFS).

a) Push the (+) and (–) tracking buttons at the same time to the preset mode.
b) Rotate the X-position adjusting nut with an adjusting screw driver, and adjust the A/C head position for maximum head switching pulse low side envelope.
c) Adjust the playback switching point.
d) Check the flatness of the envelope waveform and sound by playing back a recorded tape.

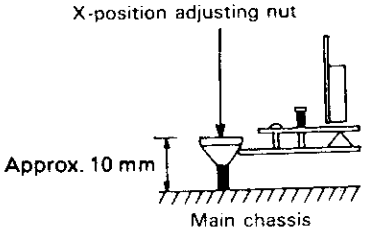


Figure 1-62.

REPLACEMENT OF THE CAPSTAN D.D. (DIRECT DRIVE) MOTOR

- Remove the cassette housing control assembly.
- **Removal (Follow the order of indicated numbers.)**

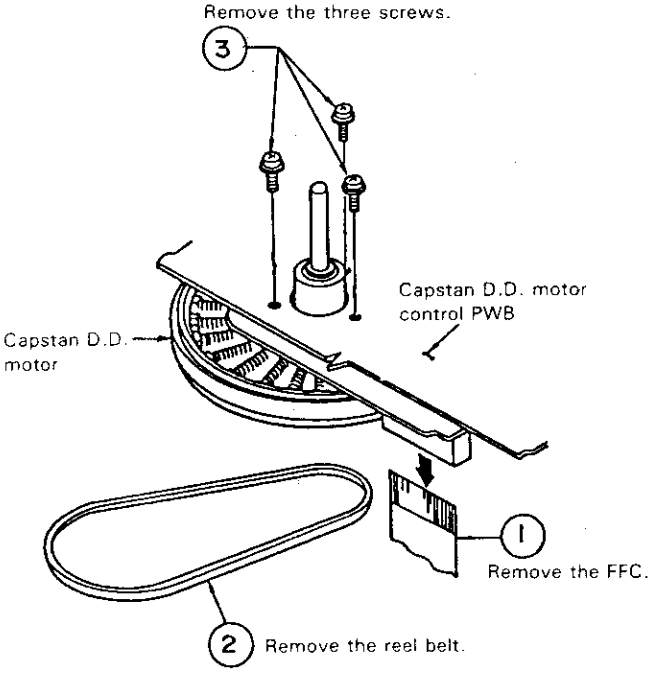


Figure 1-63.

- **Reassembly**

1. Mount the capstan motor on the mechanism chassis making sure not to allow the capstan shaft to hit the mechanism chassis, and attach it with the three screws.
2. Insert the FFC into the capstan D.D. motor control PWB.
3. Attach the reel belt.

Notes :

1. After installing the capstan D.D. motor, be sure to rotate the copstan D.D. motor and check the morement.
2. Check and adjust the servo circuit.

REMOVAL AND REASSEMBLY OF THE LOADING GEAR BLOCK

Notes : The following explanation is based on 4-head models. (The slow brake spring and slow brake lever are not provided on 2-head models.)

1. Remove the cassette housing control assembly.
2. Remove the reel belt.
3. Remove the reel block.

- **Removal**

Notes :

1. Use care not to deform the parts hooked to the slow brake shaft cap, take-up loading gear, and supply loading gear as shown in Figure 1-64.

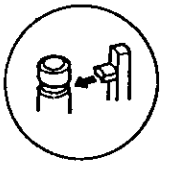


Figure 1-64.

2. In removing the loading gear, secure the guide roller with a rubber band or the like beforehand for easier reassembly.

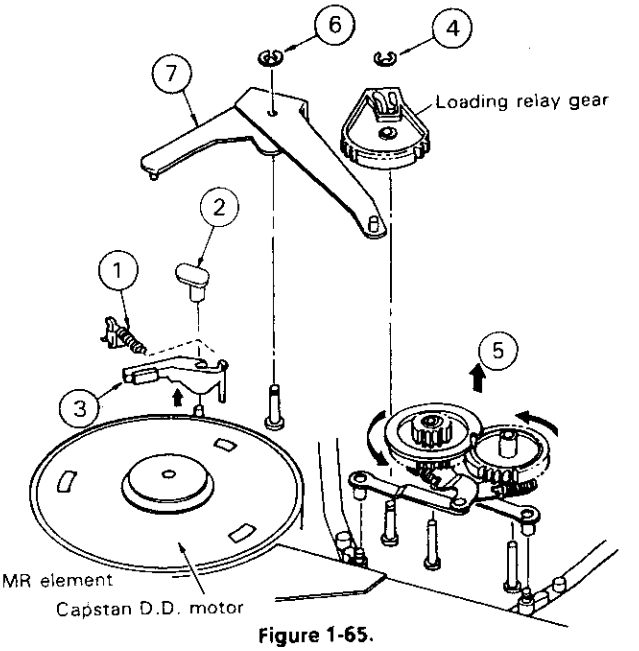


Figure 1-65.

1. Remove the slow brake spring ①.
2. Remove the slow brake shaft cap ②.
3. Remove the slow brake lever ③.
4. Remove the E ring ④.
5. Rotate the take-up loading gear, take-up loading arm assembly, supply loading gear and supply loading arm assembly slightly in the loading direction, and take them ⑤ all out.
6. Remove the E ring ⑥.
7. Remove the relay gear drive lever ⑦.

- **Reassembly**

Reverse the procedure. Be sure to match the tally marks on the gears.

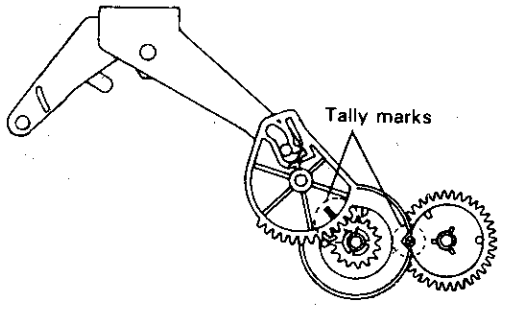


Figure 1-66.

Notes :

1. When reassembling, apply specified grease to the following points; all the gear teeth, all the gear shafts and the cam groove of loading relay gear.
2. Be careful not the deform the supply/take-up loading arms.
3. Be careful to keep clean the slow brake lever felt.
4. Be also careful to keep the outer surface of the capstan D.D. motor free from dust and dirt. (If stained, the MR (Magnet Resistor) element might be damaged.)
5. Take care not to deform the anti-fall hooks of the slow brake shaft cap and supply/take-up loading gears more than required.

REMOVAL AND REASSEMBLY OF LOADING BLOCK

- **Removal**

1. Remove the leads ①.
2. Remove the cassette loading belt ②.
3. Unscrew the three screws ③.
4. Pull the loading block upward.

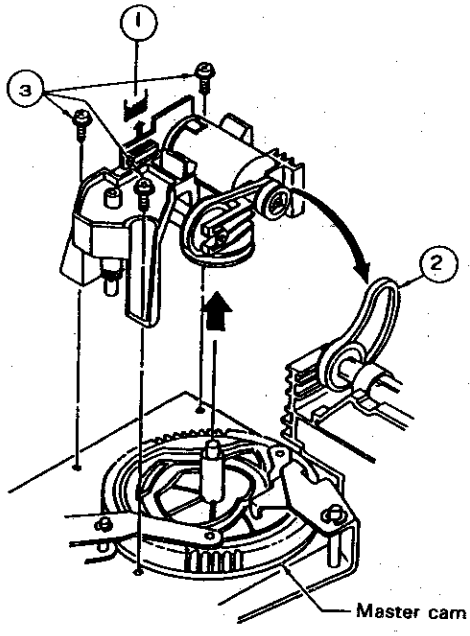


Figure 1-67.

Note :

When using a magnetic screw driver in removal of three screws, do not allow the magnetic driver to hit the A/C head or drums.

- **Reassembly**

1. Turn the master cam all the way counter-clockwise.
2. Match the tally mark on the cam switch with the mating mark. Fit the loading block and the master cam with each other. Tighten up the three screws.

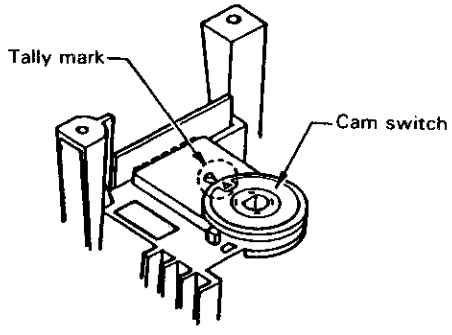


Figure 1-68.

3. Finally connect the leads and apply the cassette loading belt.

Notes:

1. Be careful not to scratch the gear.
2. Be careful not to stain the belt. If dirty, clean it up with the specified cleaning liquid.

REPLACEMENT OF LOADING MOTOR

1. Set the cassette ejected condition by placing the unit in the cassette eject mode.
2. Unplug the power cord.
3. Remove the loading block in accordance with the statements and drawings above.

- **Removal**

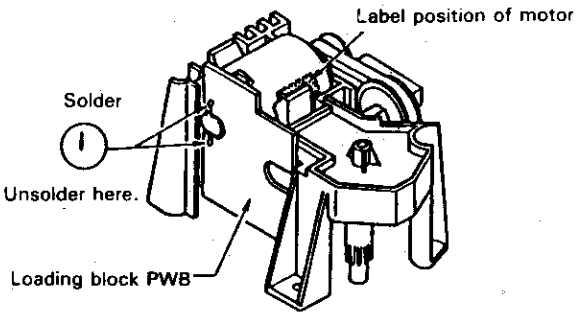


Figure 1-69.

1. Unsolder the leads ① from the loading motor.
2. Unlock the left and right catches ② of the cam switch off the loading block. Take out the cam switch and loading block PWB (See Figure 1-70).

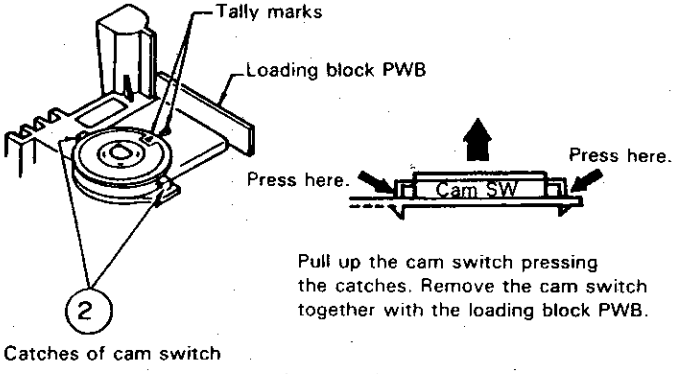


Figure 1-70.

3. Take out the loading belt ③.
4. Pry up the back end of the loading motor with a screw driver or the like as in Figure 1-71 and take out the motor.

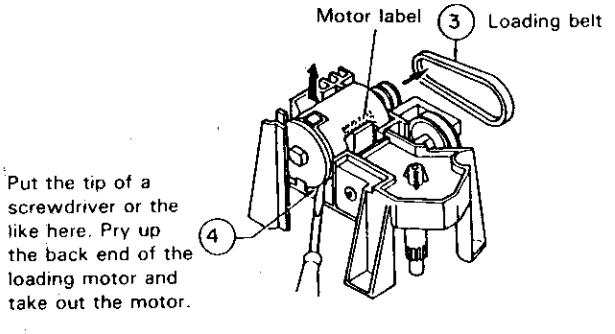


Figure 1-71.

- **Reassembly**

1. Remove the loading motor, and mount a new loading motor as in Figure 1-72.
2. Place the loading motor so that its label is visible as shown in Figure 1-72. Make sure that the screw hole at the motor shaft, protuberance on the loading block, and the motor's back end marked with the arrow are mated with each other.

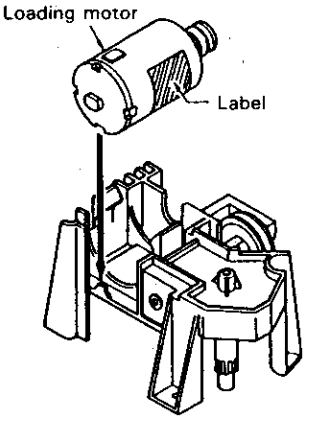
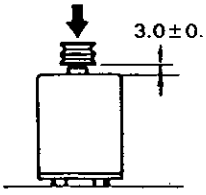


Figure 1-72.



Note:
When press-fitting the loading motor pulley, keep the pressure less than 5 kg, and the gap between the motor and pulley should be 3.0±0.1 mm.

Figure 1-73.

3. Set the lading block PWB and the cam switch in position.
4. Resolder the leads to the loading motor.
5. Finally place the loading block (See page 27).
6. Attach the loading belt.

REPLACEMENT OF MASTER CAM

- **Removal**

1. Remove the E ring ①.
2. Remove the half-loading drive lever ②.
3. Remove the E ring ③.
4. Remove the pinch roller lever ④.
5. Pull out the master cam upward ⑤.

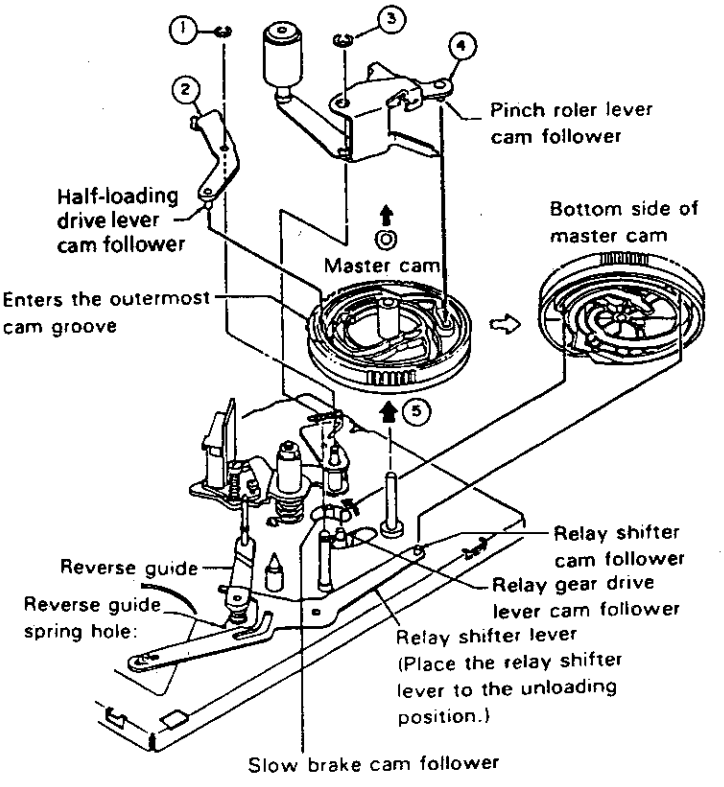


Figure 1-74.

- **Reassembly**

1. Place the relay gear drive lever in the unloading state.
2. Place the relay shifter so that it is in contact with the reverse guide spring hole in the mechanism chassis. Release the slow brake lever with a finger to bring it away from the capstan. (in the direction of arrow). Then place the master cam so that the D cut-off part of the master cam faces the direction of arrow.
3. Place the half- loading reciprocating lever's cam follower so that it fits in the master cam's circumferential cam groove (marked with arrow), mount the half-loading reciprocating lever, then attach the E ring.
4. Turn the master cam somewhat clockwise until the pinch roller lever's cam follower goes into the master cam's groove (marked with arrow), mount the pinch roller lever, then attach the E ring.
5. Rotate the master cam by hand to make sure all the four levers (relay gear drive lever, half-loading reciprocating lever, pinch roller lever, and relay shifter lever) are in the cam grooves in place.
6. Mount the loading block. (See page 27.)

Notes :

1. Be careful not to scratch the teeth and grooves of the master cam.
2. After installation of the master cam, be sure to rotate the master cam by hand before installing the loading block. If the levers are in wrong position, the master cam and the levers may get damaged when the motor stares.
3. Apply specified grease to the master cam's grooves and teeth.

REPLACEMENT OF UPPER DRUM

Note :

The gap between the lower drum and the upper drum is very accurate, in the order of microns, and care should be paid to their replacement. Even a slight amount of foreign material will affect the accuracy of their reassembly.

- **Replacement (Follow the order of the indicated numbers.)**

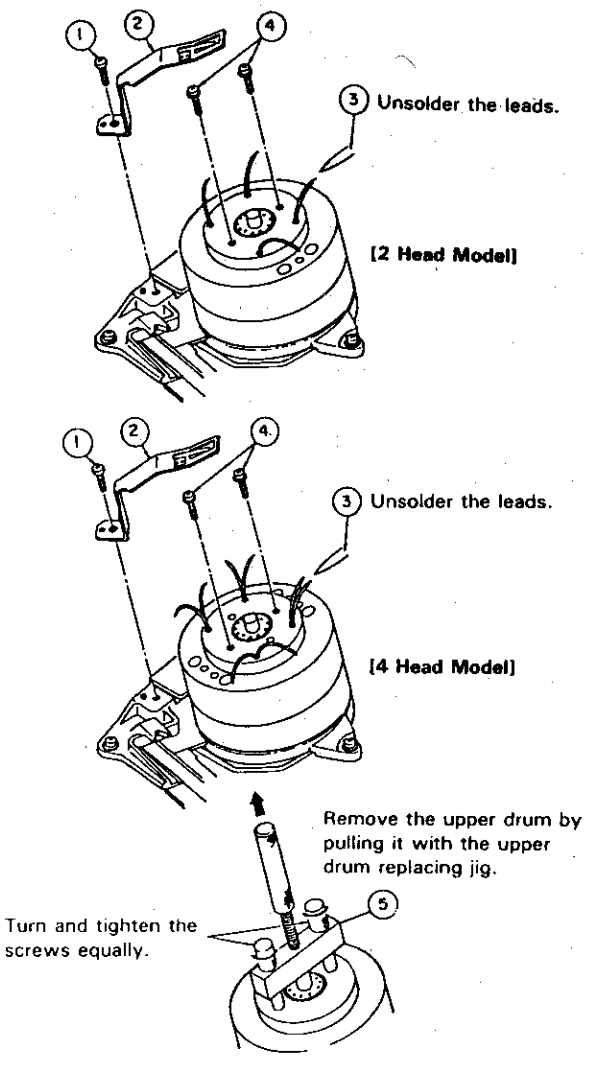


Figure 1-75.

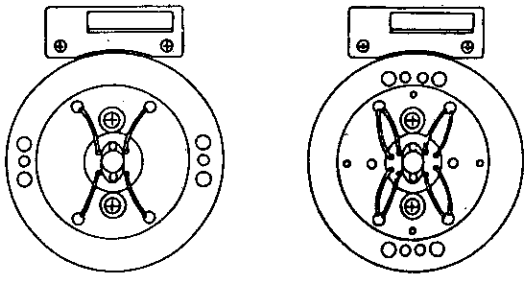
Notes :

1. Avoid touching the drum surface with bare hands.
2. Pull out the upper drum with care so that it may not be tilted, and replace it with the upper drum replacing jig using care not to damage the disk circumference.
3. Do not hit the screws when tightening them.

- **Reassembly**

Notes :

1. Before setting the drum, check that there are no scratches or dust on the edge of the surface and circumference of the disk.
2. Before setting the drum, check that there are no scratches or dust on the internal surface and edge of the surface of the upper drum.
3. On assembling these parts, insert the upper drum onto the disk with care, so that the upper drum is not tilted.
4. When assembling these parts, do not allow dust or dirt come between the disk and the upper drum.
5. Do not use excessive force when driving in the screws.



[2 Head Model] [4 Head Model]

Figure 1-76.

1. Set the new drum.
2. Fasten the upper drum in place with the two screws.
3. Solder the leads.
   Note: Soldering should be performed quickly and carefully without touching adjacent patterns.
4. After replacement, be sure to check the tape drive train adjustment (see page 24.) and the following electric adjustments.

- Adjustment of the playback switching point.
- Checking and adjustment of the X-position
- Adjustment of SP and LP slow tracking preset. (Only 4 Head model)

REPLACEMENT OF D.D. MOTOR

1. Put the unit in the cassette eject position.
2. Unplug the power cord.

- **Removal (Reverse the order in reassembly.)**

1. Remove the FFC ①.
2. Remove the two D.D. rotor assembly setscrews ②.
3. Pull out the D.D. rotor ③.
4. Remove the three D.D. strator setscrews ④.
5. Remove the D.D. strator assembly ⑤.

Notes :

1. When removing the D.D. rotor assembly or D.D. strator assembly, use care not to hit the loading relay gear.
2. Secure the D.D. rotor assembly so that the installation positioning holes in the D.D. rotor assembly and lower drum assembly match.
3. Be careful not to damage the upper drum or the video head.
4. Be sure that the hall device and the D.D. strator assembly are not damaged by the D.D. rotor assembly or other parts.
5. After installation, adjust the playback switching point.

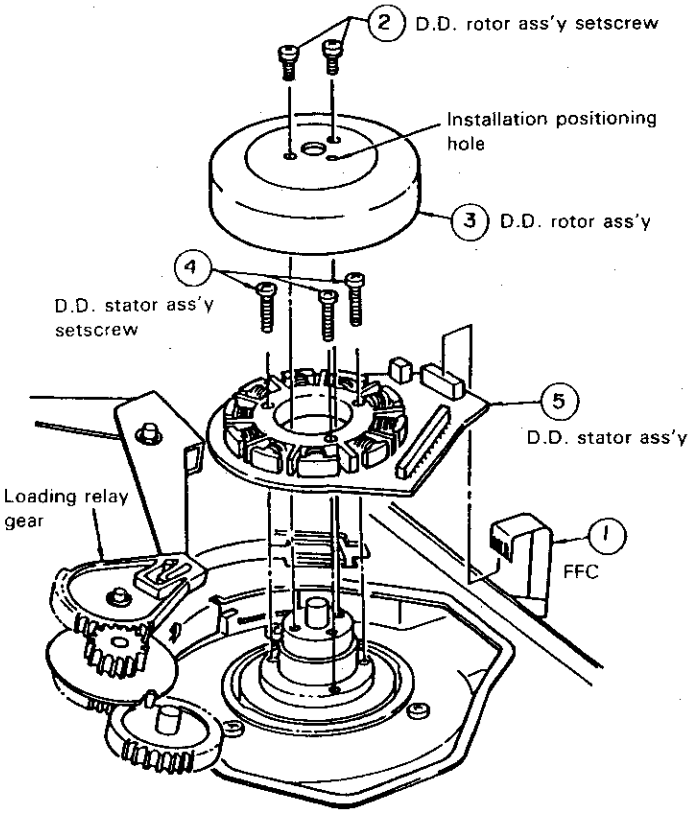


Figure 1-77.

ADJUSTMENT OF THE ELECTRICAL CIRCUITRY

Prior to the adjustment:

In most cases, necessity for electrical circuits will arise from replacement of mechanical parts including the video head. Before starting adjustment of electrical circuits, check that mechanical operation of the equipment is complete (the mechanism are adjusted completely).

If the equipment fails electrically, locate a defect or defects first of all using instruments. Then repair or replace parts and make adjustment by the procedures described below.

When required instruments are not available, do not move conrols indiscriminately.

- **Instruments**
  - Colour monitor TV
  - Oscilloscope
  - Colour bar generator
  - Frequency counter
  - DC regulated power supply
  - Audio generator
  - Alignment tape
  - Blank video tape(VHS)
  - VTVM

ADJUSTMENT OF MAIN (SERVO, SYSTEM CONTROL, TUNER) CIRCUIT

- **Test points layout**

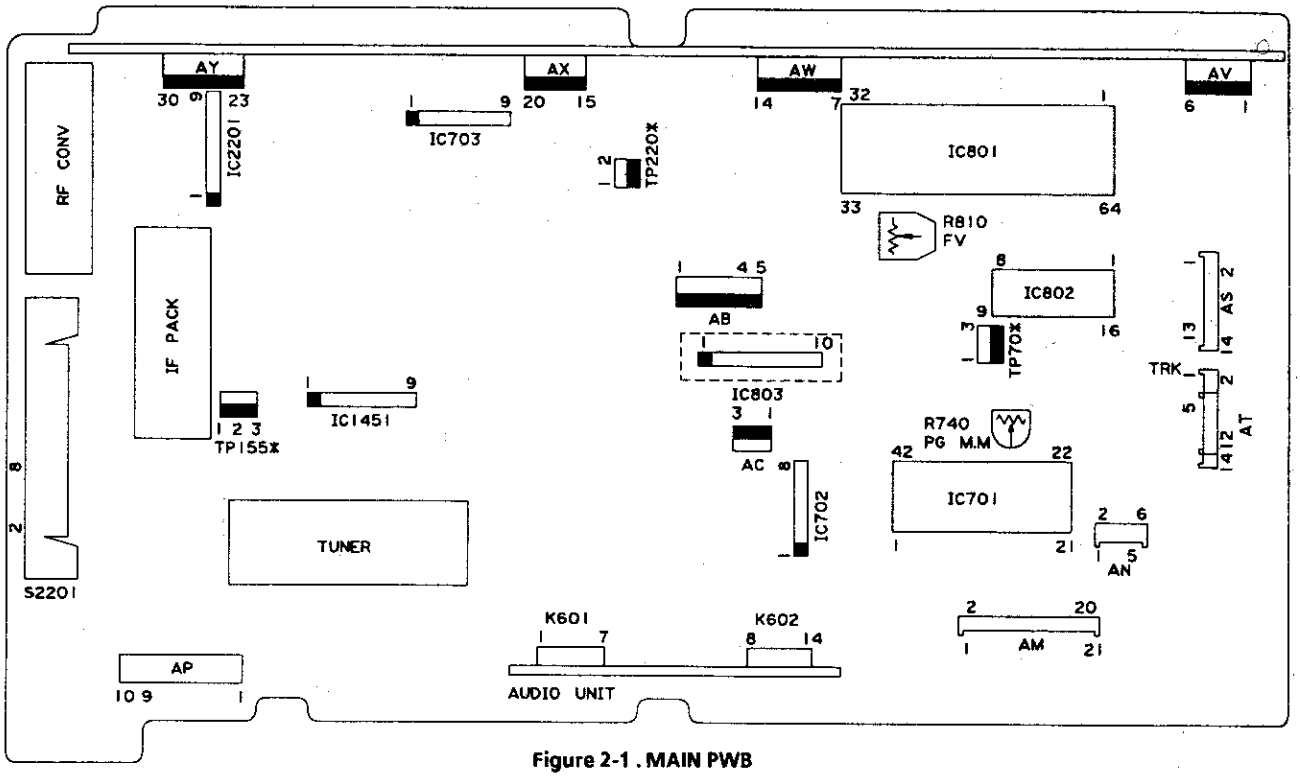


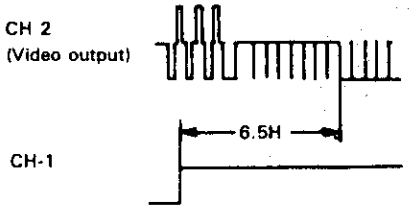
Figure 2-1 . MAIN PWB

■ ADJUSTMENT OF SERVO CIRCUIT

Adjustment of playback switching point

Measuring instrument	Oscilloscope
Mode	Playback Tracking button at center
Tape used	Alignment tape (VROCPSV)
Test point	CH-1; TP701 CH-2; Video output terminal (CH-1 trigger slope switch at (+), Internal trigger at CH-1 side)
Adjusting point	R740 (phase generator MM control)
Specification	6.5 ± 0.5H

1. Insert the alignment tape (VROCPSV) and put the unit in playback mode.
2. Set the tracking button to the center position.
3. Adjust R740 (phase generator MM control) so that the waveform on the oscilloscope screen be as shown in Figure 2-2.



CH-1; 2V/div 50 µsec/div
CH-2; 1V/div 50 µsec/div

Figure. 2-2.

Adjustment of still picture vertical sync (FV)

Measuring instrument	Monitor TV
Mode	Still picture playback
Tape used	Self-recording tape
Test point	Monitor screen
Adjusting point	R810 (still picture vertical sync control)
Specification	No vertical jitter

1. Play back the tape self-recorded in the SP mode.
2. Press the pause/still button to reproduce the recording in the still mode.
3. Observing the monitor screen, adjust R810 (still picture vertical sync control) until the vertical jitter disappears form the screen.

Precaution in adjusting the X-position

Measuring instrument	Oscilloscope
Mode	Playback
Tape used	Alignment tape (VROCPSV)
Test point	CH1: TP701 (Head Switching Pulse) CH2: TP702 (Playback Control) (CH1 OscilloscopeTrigger S)
Adjusting point	————
Specification	T = 0.42msec.

1. Insert the alignment tape (VROCPSV) and put the unit in the playback mode.
2. Set the tracking button to the center position.
3. Make sure that the waveform on the oscilloscope screen be as shown in Figure 2-3.

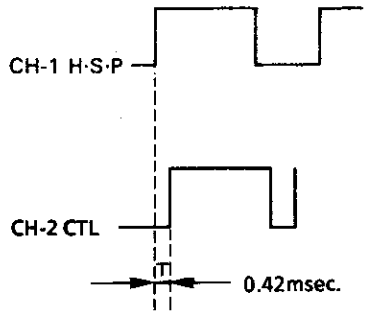


Figure. 2-3

ADJUSTMENT OF Y/C CIRCUIT

- **Test point layout**

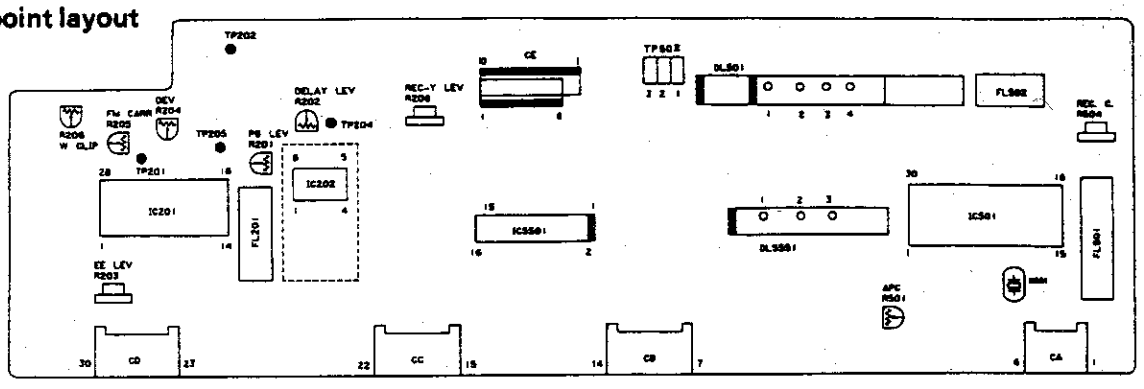


Figure 2-5. Y/C PWB

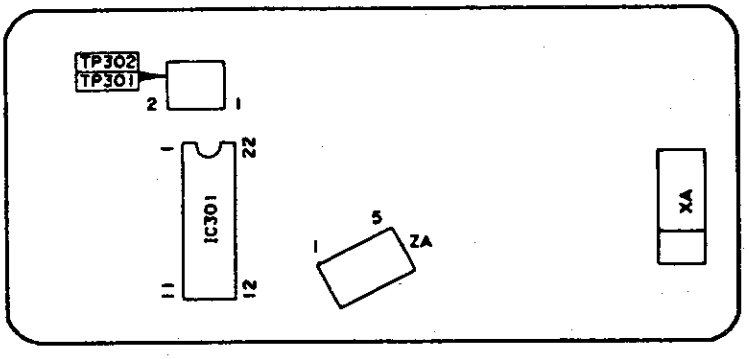


Figure 2-6. HEAD AMP PWB

■ ADJUSTMENT OF Y/C RECORDING CIRCUIT

Adjustment of EE level

Measuring instrument	Oscilloscope
Mode	Recording
Input signal	Standard colour bar (stair-case waveform)
Test point	Pin (25) of connector CD
Adjusting point	R203 (EE level control)
Specification	2.0 ± 0.1 Vp-p

1. Set the unit in record mode.
2. Feed the colour bar signal (stair-case waveform) to the video input terminal. Observe the voltage of pin ㉕ of connector CD on the oscilloscope screen, adjust R203 (EE level control) to obtain the value indicated in Figure 2-7.

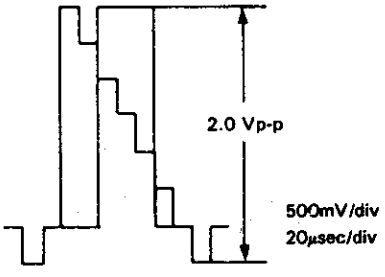


Figure 2-7.

Adjustment of FM 3.8 MHz and 4.8 MHz

Measuring instrument	Frequency counter	Oscilloscope
Mode	Recording	Self-recording / playback
Input signal	External input (no signal)	Standard colour bar (stair-case waveform)
Test point	TP301 (Sig) TP302 (GND)	Video Signal
Adjusting point	R205 (FM carrier control)	R204 (deviation control)
Specification	3.8 MHz	1.0 ± 0.04 Vp-p

Note. 1:
Carry out this adjustment only when IC201 has been replaced or when the carrier setting (3.8 MHz) or the deviation (4.8 MHz) is found apparently out of specification.
Make this adjustment after the EE level has been completely adjusted.

Note. 2:
The video output terminal should be terminated with a 75-ohm impedance.

1. First make sure that the EE video signal level is at the specified level.
2. Place the unit in the record mode and get it ready for external input.
   Note:
   Do not connect anything to the external input terminal.
3. Hook up the frequency counter to TP301 and TP302. Adjust R205 (FM carrier control) so that the counter reading be 3.8 MHz.
   Note:
   Make sure the white clip control is not now applied to the waveform.
4. Feed the colour bar signal (stair-case waveform) and make self-recording and playback.
5. Observe the video output terminal voltage (across the terminal resistor) on the oscilloscope screen. If the playback video signal level is above 1.0 Vp-p, turn R204 (deviation control) clockwise. If below 1.0 Vp-p, turn the control counter-clockwise. Now make self-recording and playback again.
6. Repeat the above step 5 to finally get the playback video signal level at 1.0 ± 0.04 Vp-p.

Adjustment of white clip

Measuring instrument	Oscilloscope
Mode	Recording
Input signal	Standard colour bar (stair-case waveform)
Test point	TP201
Adjusting point	R206 (white clip control)
Specification	80 ± 4%

1. Place the unit to the record mode.
2. Feed the colour bar (stair-case waveform) signal.
3. Turn R205 clockwise to maximum position.
4. Observing the output at TP201, adjust R206 (white clip control) so that the white peak overshoot be 80 ± 4%.
5. Make sure that the dark peak overshoot is 50 ± 10%.

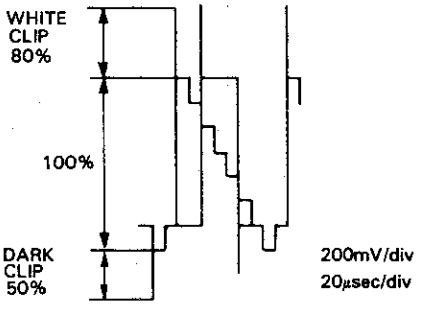


Figure 2-8.

Adjustment of recording current

Measuring instrument		Oscilloscope
Mode		Recording
Input signal		Standard colour bar (stair-case waveform)
Test point		TP301 (GND at TP302) External trigger (video output terminal)
Adjusting point	R208 (recording Y control)	R504 (recording chroma control)
Specification	Sync tip level 130 ± 10 mVp-p	Red level 24 ± 2mVp-p

Note:
TP301 and TP302 are located on the head amp PWB.

1. Place the unit to the record mode.
2. Feed the colour bar (stair-case waveform) signal.
3. Observing the waveform on the oscilloscope screen (external trigger at video output terminal), take the following steps.
   a) Connect the oscilloscope's GND and SIG leads to TP302 and TP301, respectively.
   b) Turn R208 (recording Y control) to minimum.
   c) Adjust R504 (recording chroma control) so that the red level be 24 ± 2mVp-p as shown in Figure 2-9.
4. Adjust R208 (recording Y control) so that the sync tip be 130 ± 10 mVp-p as shown in Figure 2-10.

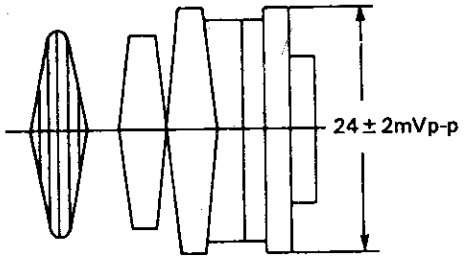


Figure 2-9.

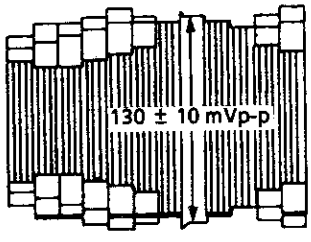


Figure.2-10.

■ ADJUSTMENT OF THE Y/C PLAYBACK CIRCUIT

Adjustment of playback video signal level

Measuring instrument	Oscilloscope
Mode	Playback
Tape used	Alignment tape (stair-case waveform)
Test point	Pin ㉘ of connector CD
Adjusting point	R201 (playback level control)
Specification	2.0 ± 0.1Vp-p

1. Insert the alignment tape (stair-case waveform) and place the unit to the playback mode.
2. Hook up the oscilloscope to video output terminal. Adjust R201 (playback level control) so that the on-screen waveform be 2.0 ± 0.1Vp-p as shown in Figure 2-11.

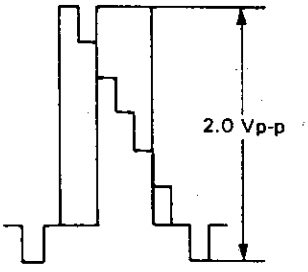


Figure 2-11.

Adjustment of delay level

Measuring instrument	Dual-beam oscilloscope
Mode	Playback
Tape used	Alignment tape (colour bar signal)
Test point	CH-1; TP204 CH-2; TP205
Adjusting point	R202 (delay level control)
Specification	CH-2 level = CH-1 level

1. Insert the alignment tape (colour bar signal) and play it.
2. Adjust R202 (delay level control) so that the levels of CH-1 and CH-2 are the same as shown in Figure 2-12.

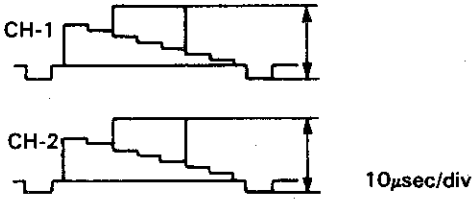


Figure 2-12.

Adjustment of the APC

Measuring instrument	Frequency counter
Mode	Playback
Tape used	Alignment tape (VROCPSV)
Test point	Pin ⑪ of connector CB
Adjusting point	R501 (APC control)
Specification	4.433619MHz ± 50Hz

1. Insert the alignment tape (VROCPSV) and place the unit to the playback mode.
2. Connect the frequency counter to pin ⑪ of CB connector. Adjust R501 (APC control) so that the counter reading be 4.433619MHz ± 50Hz.

■ ADJUSTMENT OF AUDIO CIRCUIT

- **Test point layout**

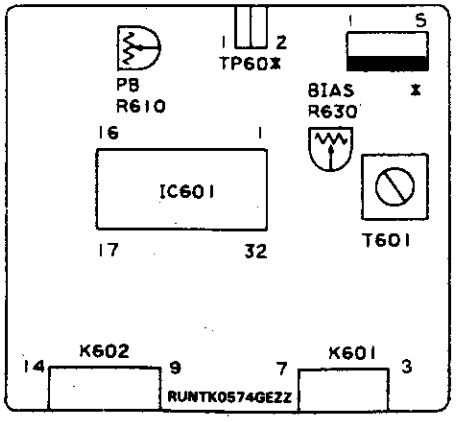


Figure 2-13 AUDIO PWB

Adjustment of playback level

Measuring instrument	VTVM
Mode	Playback
Input signal	Alignment tape (VROCPSV) (1-kHz level control signal)
Test point	Audio output signal
Adjusting point	R610 (palyback level control)
Specification	-9 ± 1 dBs

1. Play back the alignment tape (1-kHz level control signal).
2. Hook up the VTVM to the audio output terminal.
3. Adjust R610 (playback level control) so that the output level be -9 ± 1 dBs.

Checking of erase voltage and oscillation frequency

Measuring instrument	Oscilloscope
Mode	Recording
Input signal	———
Test point	Both ends of the full-erase head
Adjusting point	———
Specification	Erase voltage; Over 40 Vp-p Oscillation frequency; 70 ± 5kHz

1. Place the unit to the record mode.
2. Hook up the oscilloscope to both ends of the full-erase head.
3. Make sure the erase voltage is over 40 Vp-p.
4. Be sure that the oscillation frequency is 70 ± 5kHz.

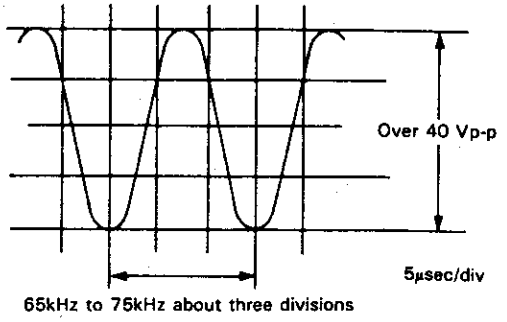


Figure 2-14.

Adjustment of bias current

Measuring instrument	VTVM
Mode	Recording
Input signal	———
Test point	TP601 (SIG), TP602 (GND)
Adjusting point	R630 (bias current control)
Specification	260 ± 10μA

1. Place the unit to the record mode.
2. Connect the VTVM to TP601 (SIG) and TP602 (GND).
3. Adjust R630 (bias current control) so that the bias current be 260 ± 10μA (2.6 ± 0.1mV).

Checking of recording level

Measuring instrument	VTVM
Mode	Self-recording/playback
Input signal	1 kHz / –8 dBs
Test point	Audio output terminal
Adjusting point	———
Specification	-8 ± 3 dBs

1. Feed 1 kHz, -8 dBs signal to the audio input terminal. Make self-recording and playback of the signal.
2. Make sure the output at the audio output terminal is -8 ± 3 dBs.
3. If out of spec, readjust the playback level and the bias current.

■ ADJUSTMENT OF THE IF CIRCUIT

- **Test point layout**

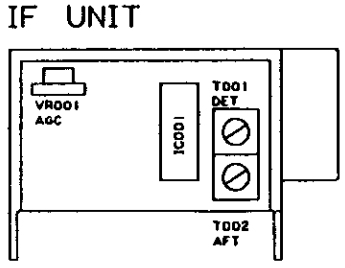


Figure 2-15. IF PWB

Adjustment of the RF AGC

Measuring instrument	Oscilloscope Signal generator
Mode	———
Input signal	Colour bar signal
Test point	TP1551 (GND) TP1552 (Video Output)
Adjusting point	VR001 (AGC control)

1. Receive the colour bar signal (input field strength: 80 dbμ).
2. Observe the video output terminal waveform on the oscilloscope. Adjust VR001 (AGC control) in the IF pack until the noise disappears from the oscilloscope screen and the waveform nearly comes into sync.

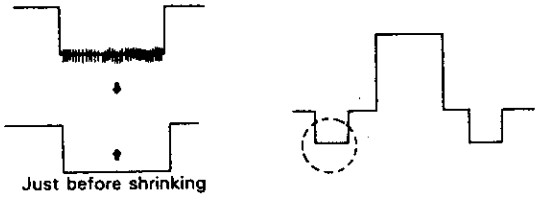


Figure 2-16.

Adjustment of the AFT

Measuring instrument	Oscilloscope Signal generator
Mode	———
Input signal	PIF frequency uniwave Colour bar signal (70 dBμ)
Test point	TP1551 (GND) TP1552 (Video Output)
Adjusting point	T002(AFT coil)
Specification	———

1. Receive the colour bar signal (input field strength: 70 dBμ).
2. Using the signal generator, feed the PIF frequency (*) signal (sine wave) to the tuner IF output terminal.
3. Set the tuning switch to the VHF or UHF position. Keep the tuning button (+) or (−) depressed until the beating on the oscilloscope screen be minimum.
4. Set the tuning switch on the normal position. Adjust T002 (AFT coil) so that beating on the oscilloscope screen be minimum.

***PIF Frequency**

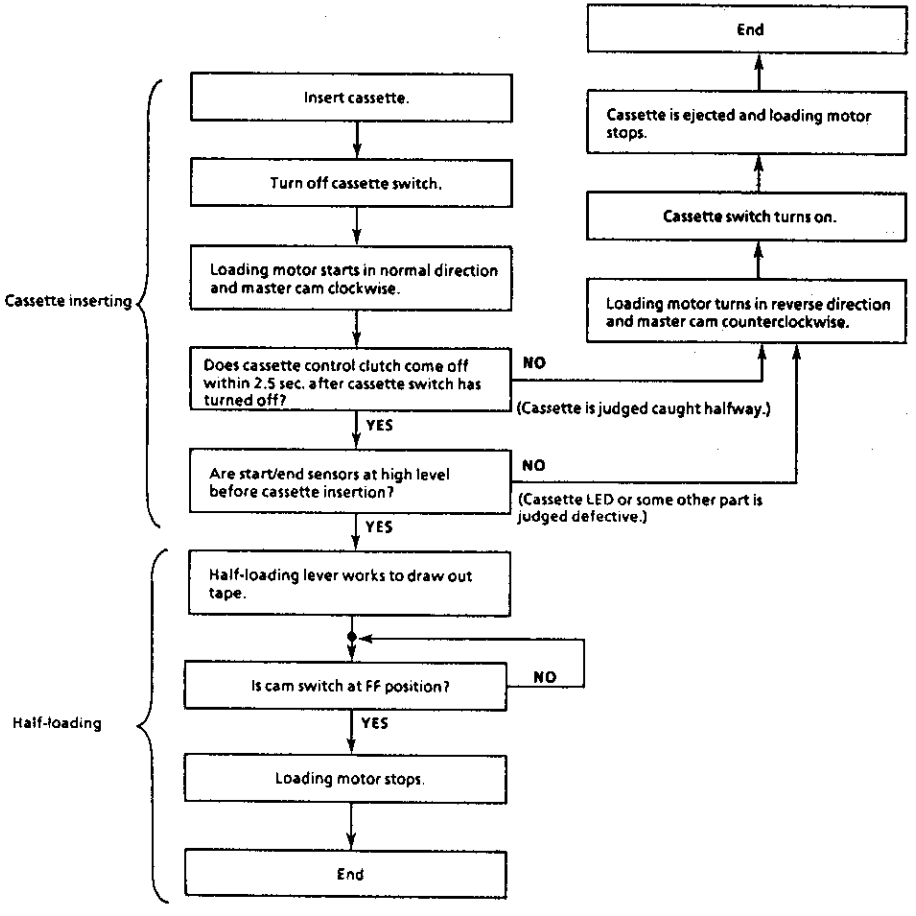
Version	Frequency (MHz)
G,S,N,NZ,E,B	38.9
X	36.875
H,W,K	39.5
D	38.0

TROUBLESHOOTING FLOWCHART

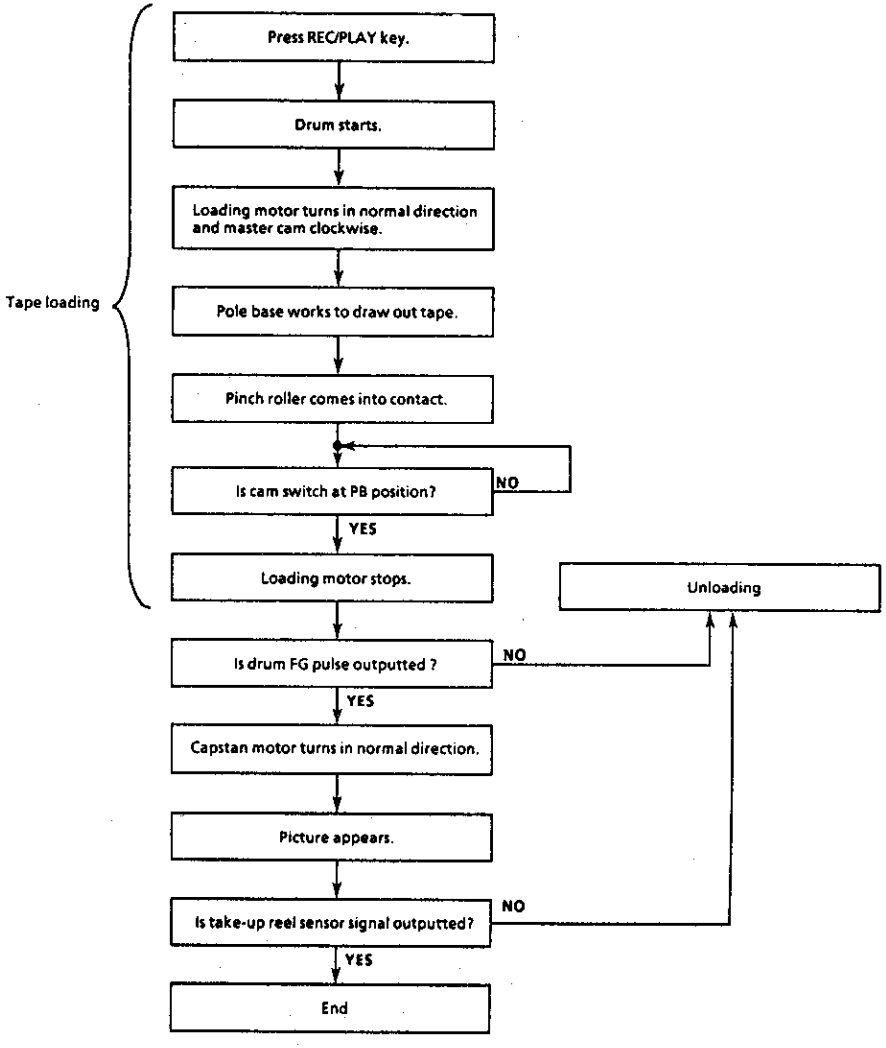
MECHANISM OPERATION FLOWCHART

- This flowchart describes the outline of the mechanism's operation, but does not give its details.
- For cam switch positions, see Fig. 3-2.

CASSETTE INSERTION → STOP



STOP → REC/PLAY

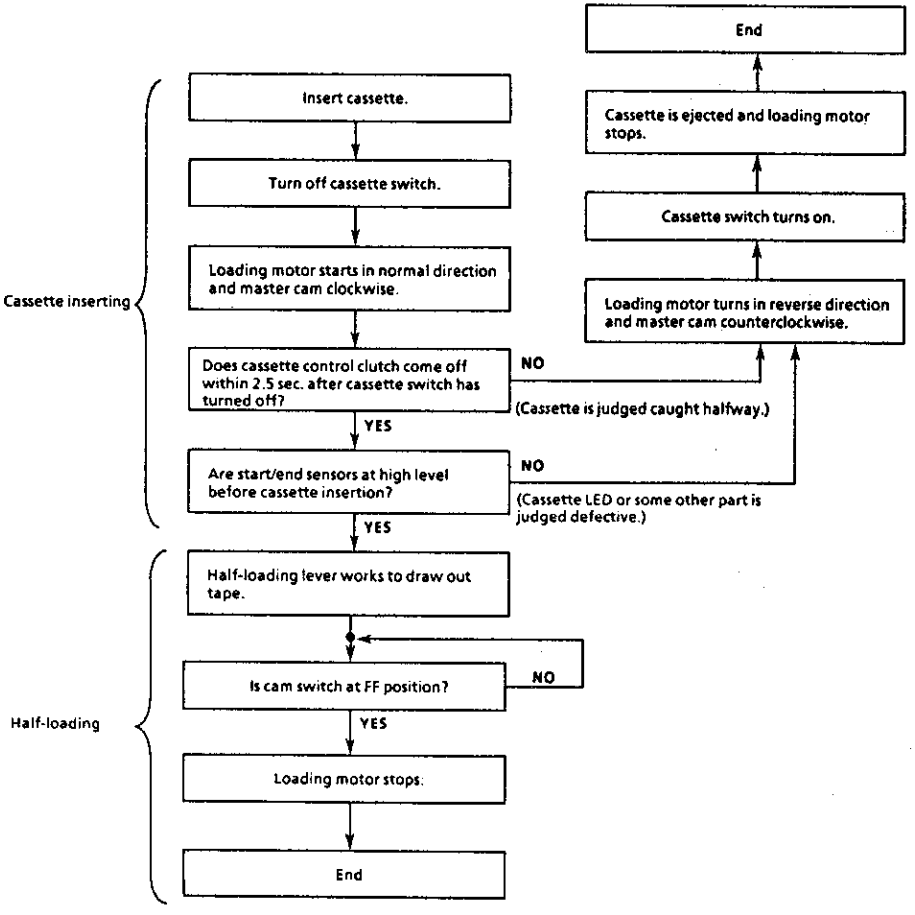


TROUBLESHOOTING FLOWCHART

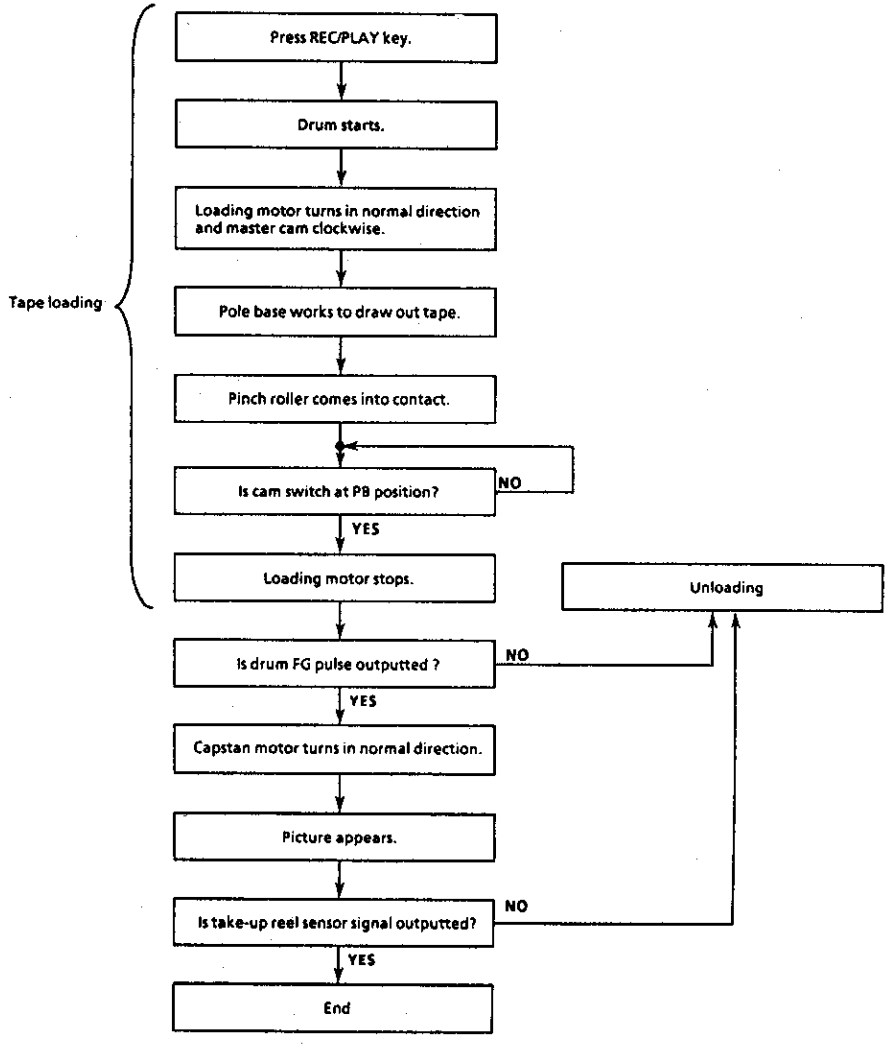
MECHANISM OPERATION FLOWCHART

- This flowchart describes the outline of the mechanism's operation, but does not give its details.
- For cam switch positions, see Fig. 3-2.

CASSETTE INSERTION → STOP



STOP → REC/PLAY



■ ADJUSTMENT OF THE IF CIRCUIT

- **Test point layout**

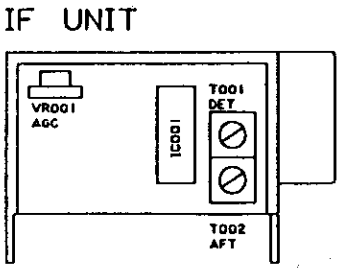


Figure 2-15. IF PWB

Adjustment of the RF AGC

Measuring instrument	Oscilloscope Signal generator
Mode	———
Input signal	Colour bar signal
Test point	TP1551 (GND) TP1552 (Video Output)
Adjusting point	VR001 (AGC control)

1. Receive the colour bar signal (input field strength: 80 dbμ).
2. Observe the video output terminal waveform on the oscilloscope. Adjust VR001 (AGC control) in the IF pack until the noise disappears from the oscilloscope screen and the waveform nearly comes into sync.

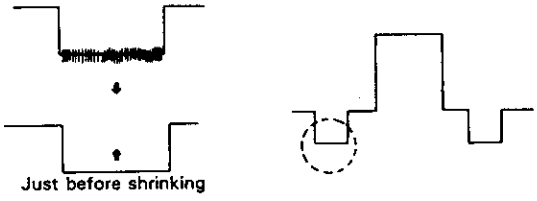


Figure 2-16.

Adjustment of the AFT

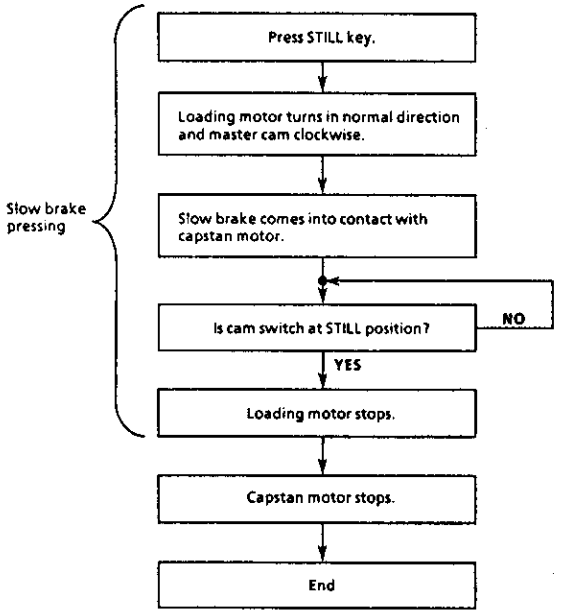
Measuring instrument	Oscilloscope Signal generator
Mode	———
Input signal	PIF frequency uniwave Colour bar signal (70 dBμ)
Test point	TP1551 (GND) TP1552 (Video Output)
Adjusting point	T002(AFT coil)
Specification	———

1. Receive the colour bar signal (input field strength: 70 dBμ).
2. Using the signal generator, feed the PIF frequency (*) signal (sine wave) to the tuner IF output terminal.
3. Set the tuning switch to the VHF or UHF position. Keep the tuning button (+) or (−) depressed until the beating on the oscilloscope screen be minimum.
4. Set the tuning switch on the normal position. Adjust T002 (AFT coil) so that beating on the oscilloscope screen be minimum.

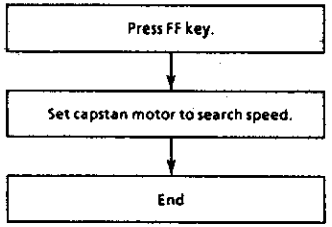
***PIF Frequency**

Version	Frequency (MHz)
G,S,N,NZ,E,B	38.9
X	36.875
H,W,K	39.5
D	38.0

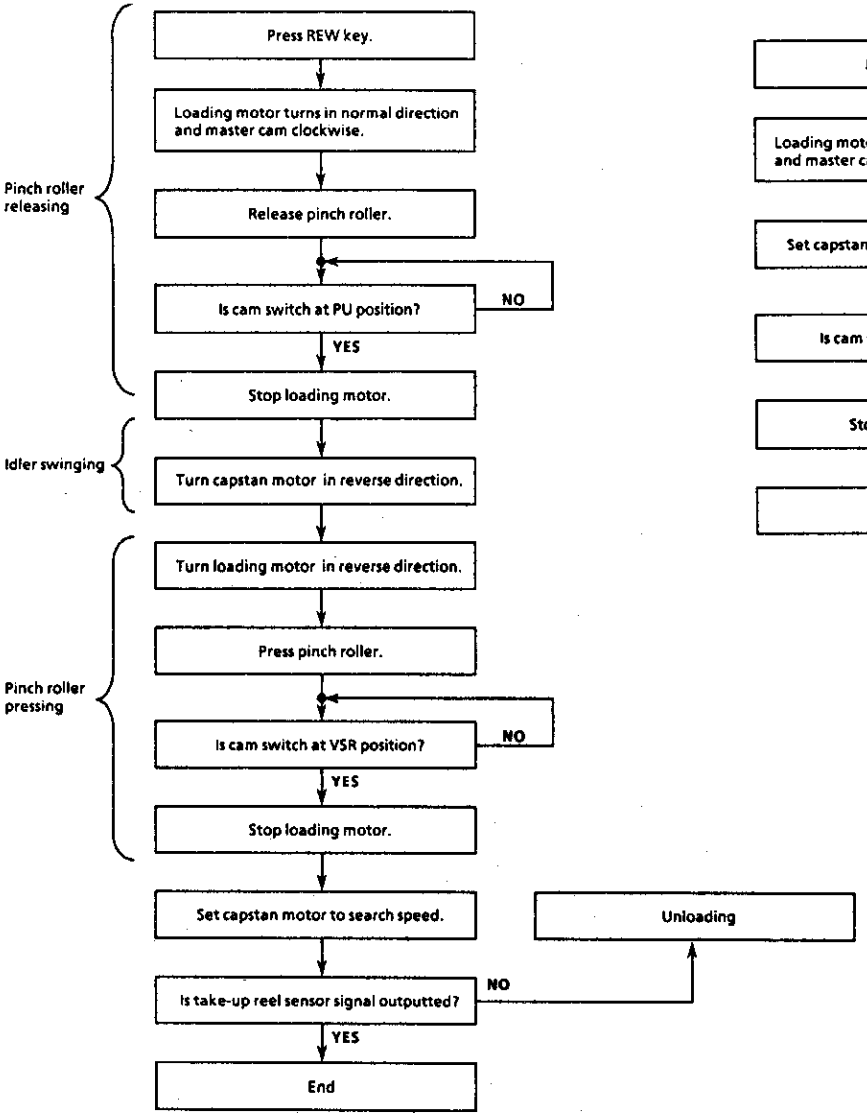
PLAY → STILL



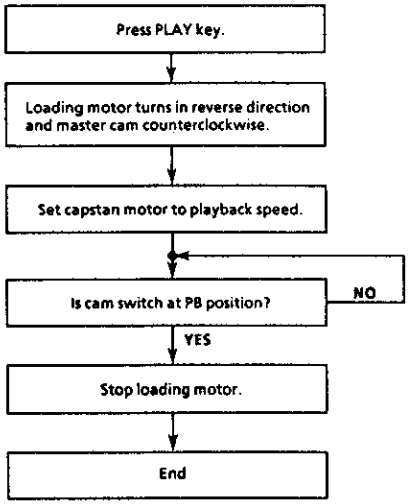
PLAY → VSF



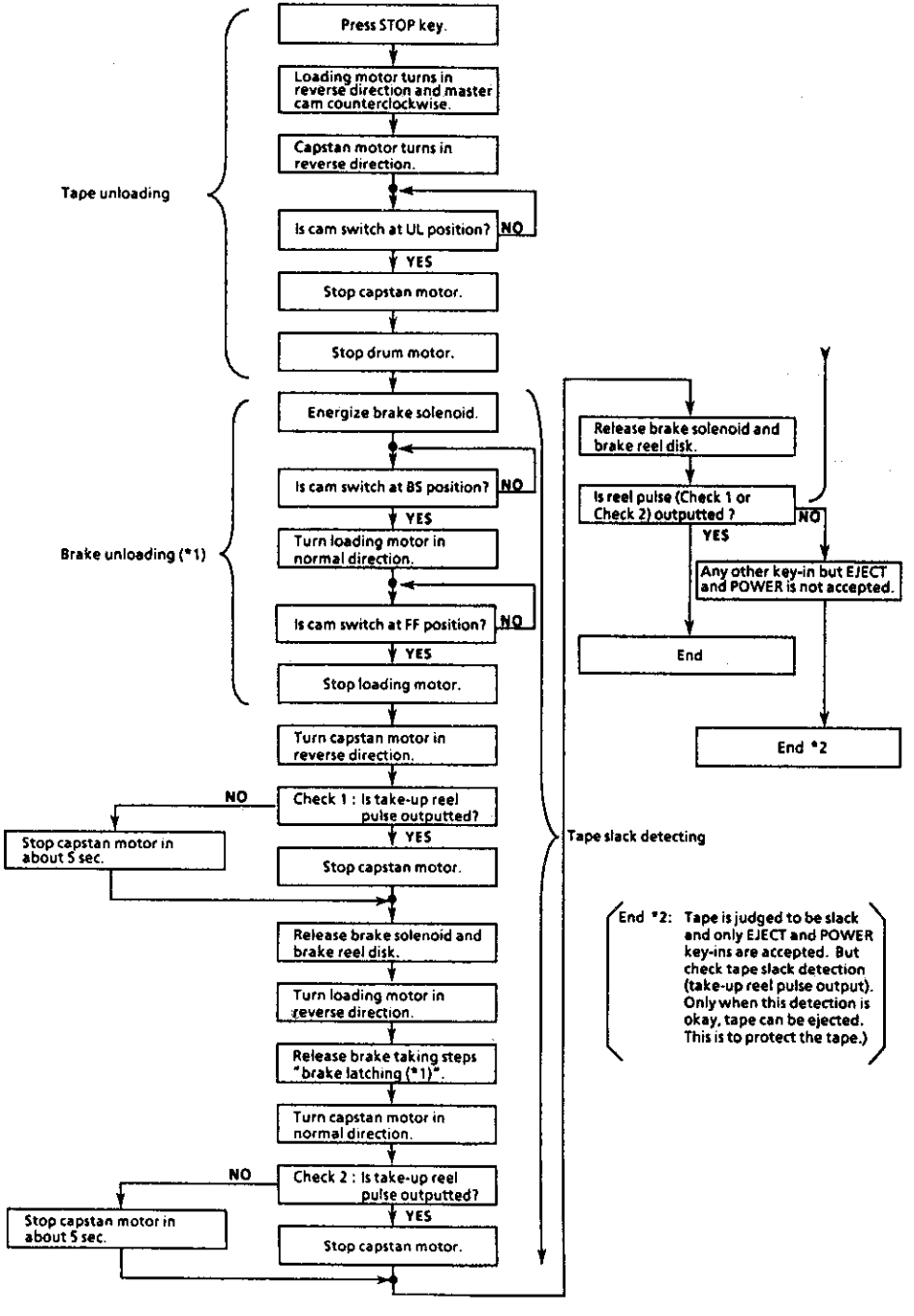
PLAY → VSR



VSR → PLAY

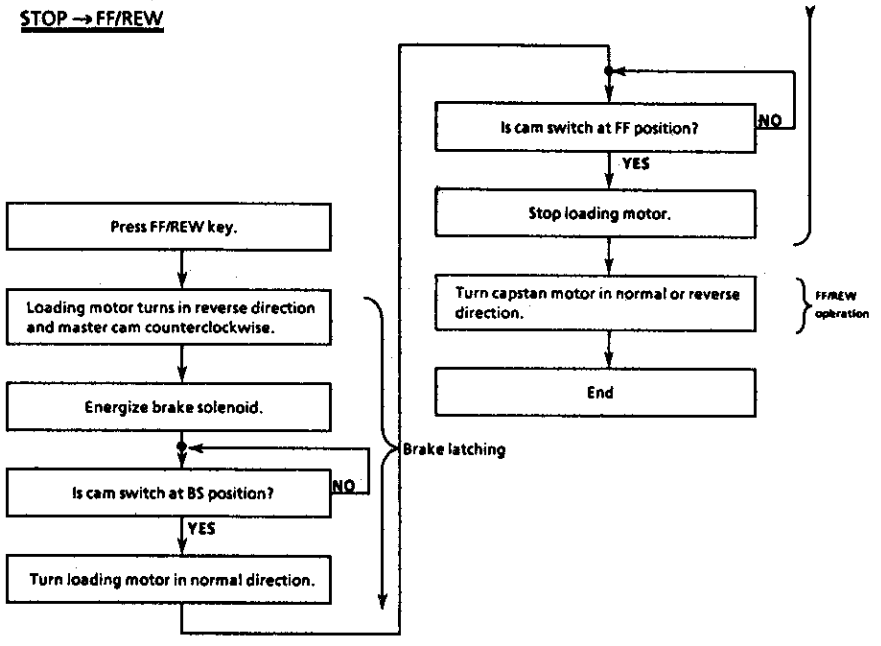


REC/PLAY → STOP

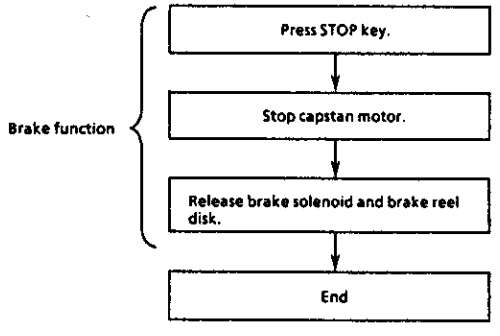


End *2: Tape is judged to be slack and only EJECT and POWER key-ins are accepted. But check tape slack detection (take-up reel pulse output). Only when this detection is okay, tape can be ejected. This is to protect the tape.)

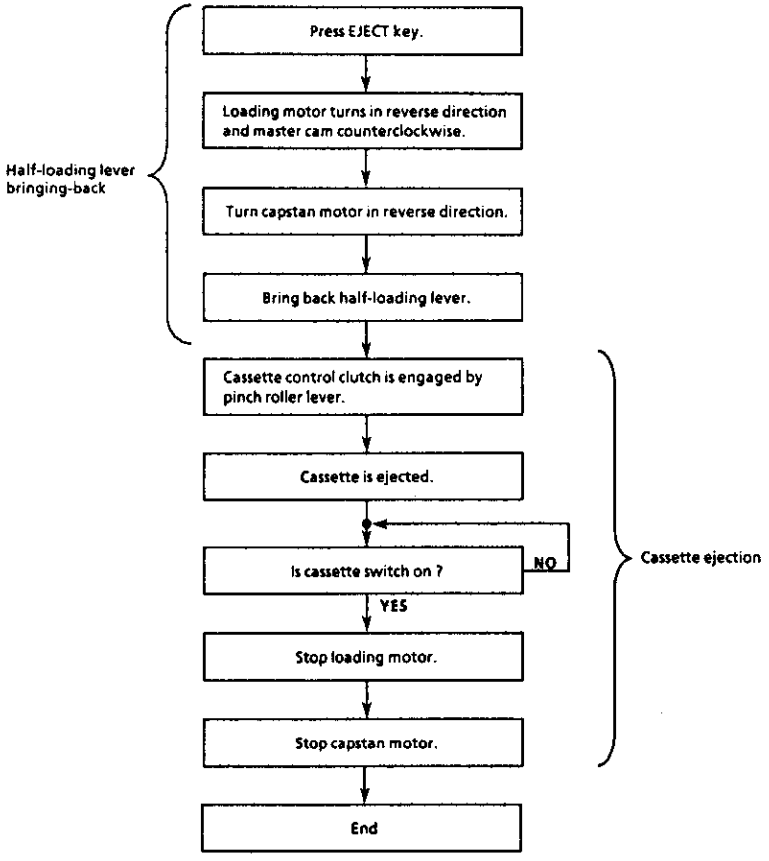
STOP → FF/REW



FF/REW → STOP



STOP → CASSETTE EJECT



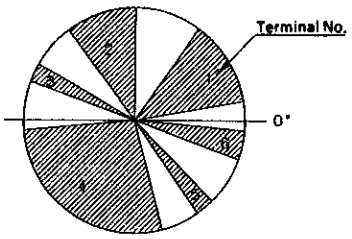


Fig. 3-1 cam switch pattern

* The cam switch has the pattern as shown in Fig. 3-1. The circuit turns on when the signal comes on the shaded zones on the switch. The six pattern signals are judged to be on or off by the system controller in order to detect the mechanism modes.

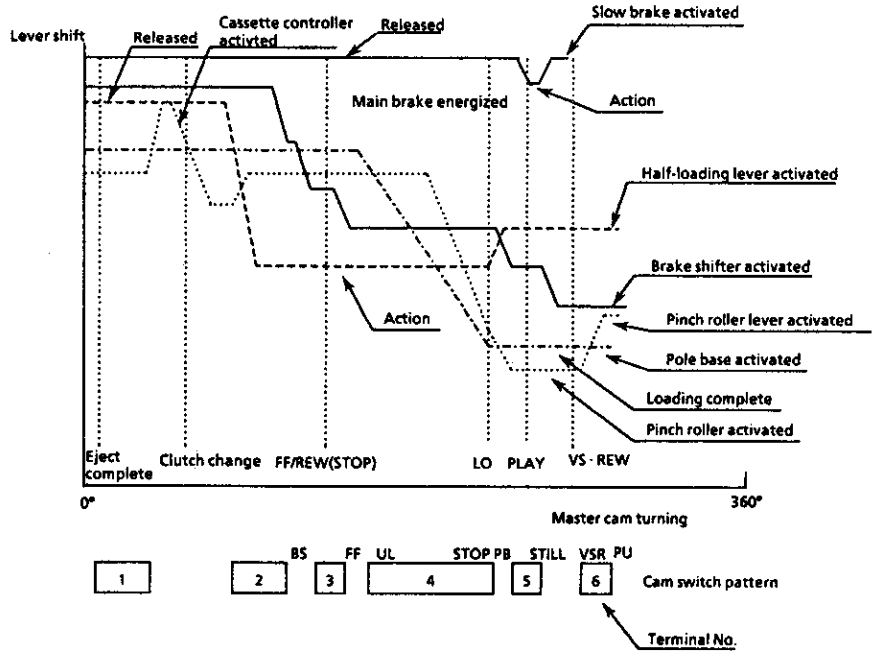
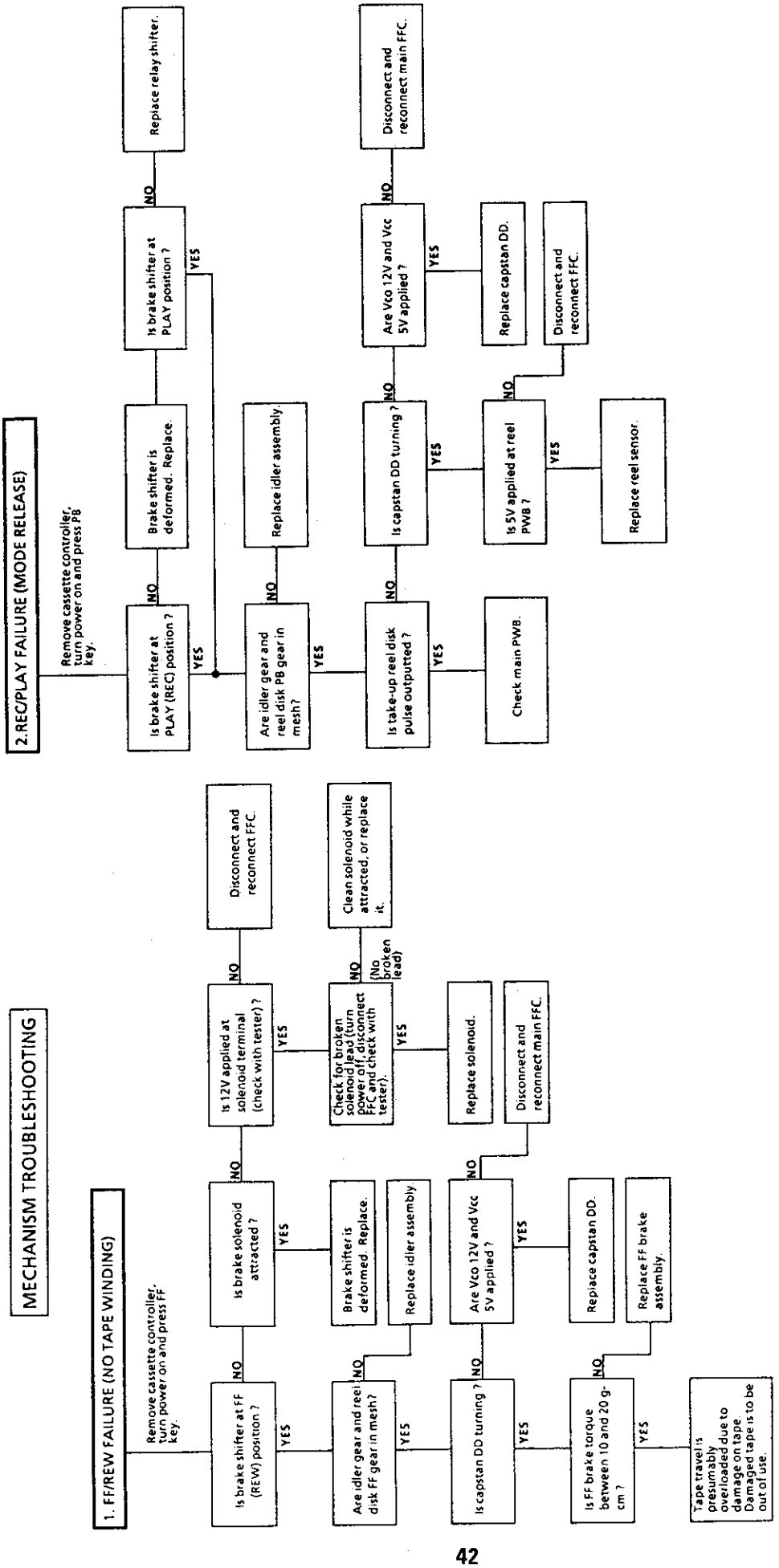
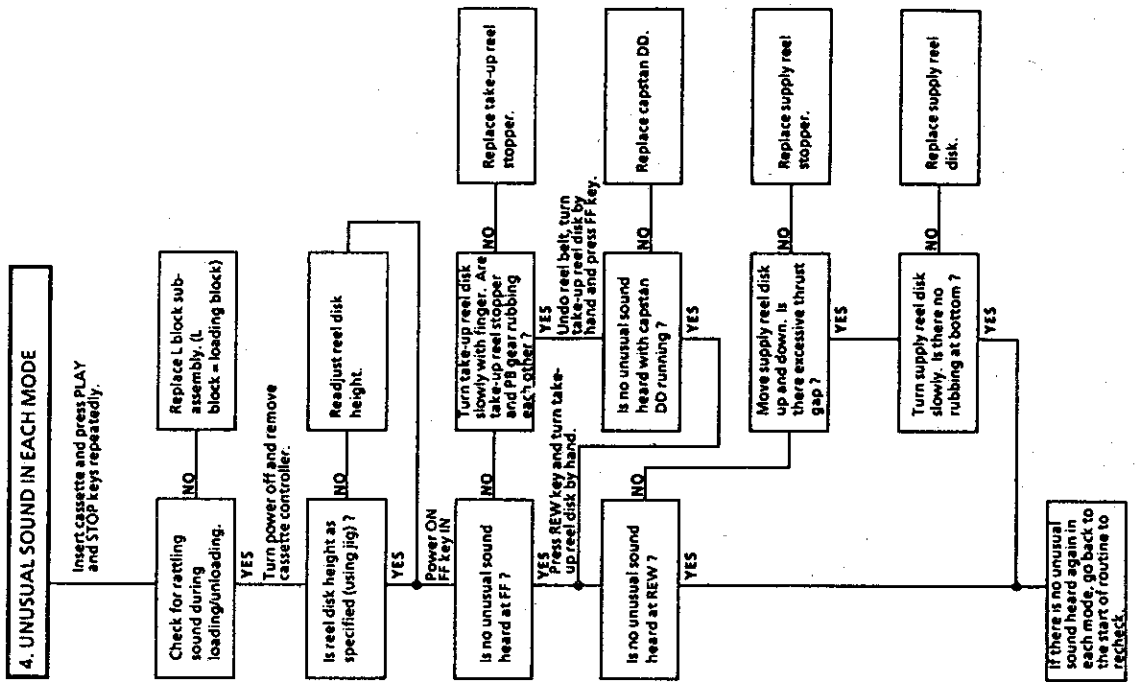


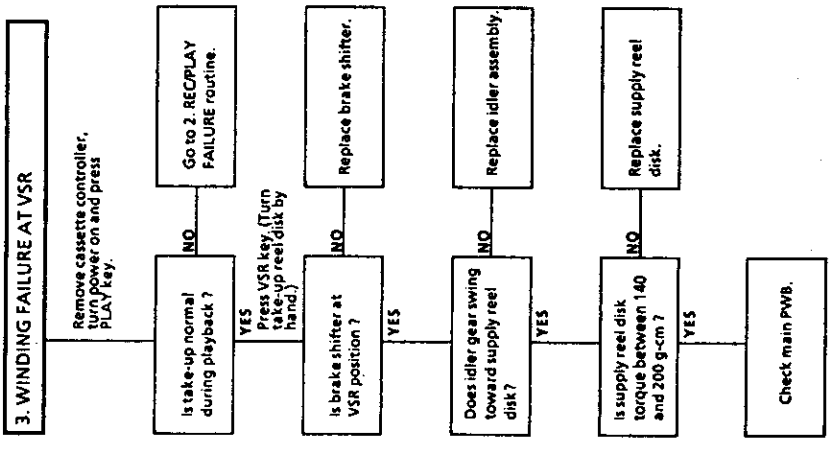
Fig. 3-2 Relationship between cam switch positions and mechanism movement

The relationship between the cam switch positions and the mechanism movement is shown in Fig. 3-2.

MECHANISM TROUBLESHOOTING

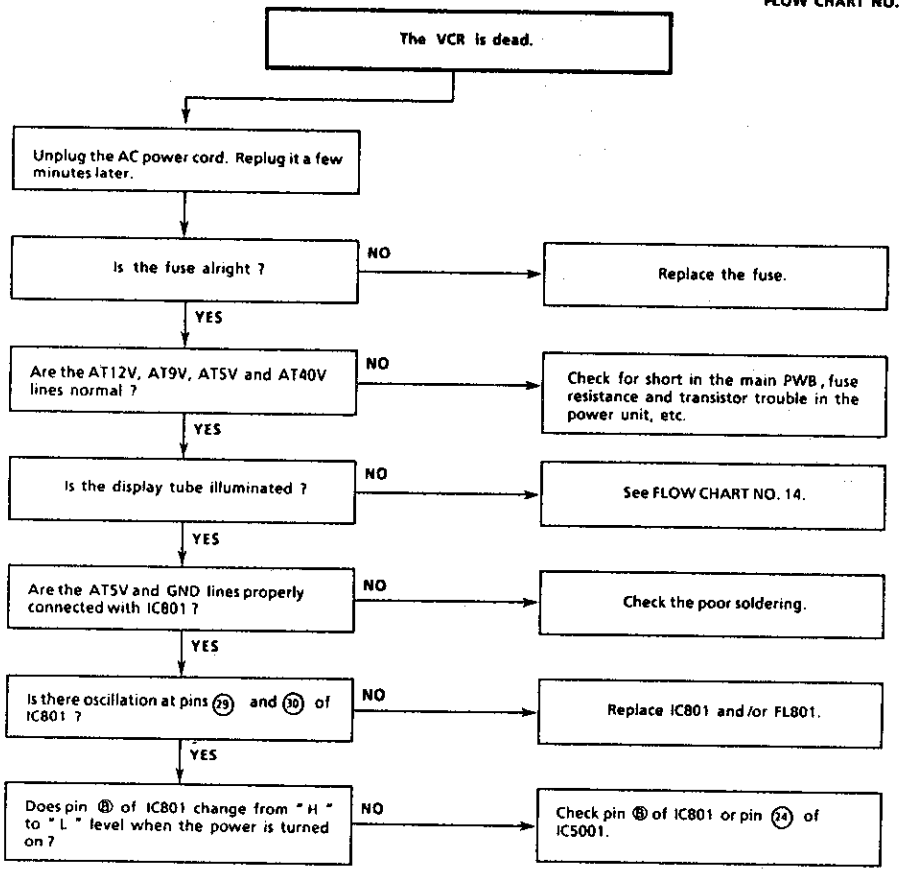



4. UNUSUAL SOUND IN EACH MODE
Insert cassette and press PLAY and STOP keys repeatedly.
Check for rattling sound during loading/unloading.
NO
Replace L block sub-assembly. (L block = loading block)
YES
Turn power off and remove cassette controller.
Is reel disk height as specified (using jig) ?
NO
Readjust reel disk height.
YES
Power ON FF key IN
Is no unusual sound heard at FF ?
NO
Turn take-up reel disk slowly with finger. Are take-up reel stopper and PB gear rubbing each other ?
NO
Replace take-up reel stopper.
YES
Press REW key and turn take-up reel disk by hand.
Undo reel belt, turn take-up reel disk by hand and press FF key.
Is no unusual sound heard at REW ?
NO
Is no unusual sound heard with capstan DD running ?
NO
Replace capstan DD.
YES
Move supply reel disk up and down. Is there excessive thrust gap ?
NO
Replace supply reel stopper.
YES
Turn supply reel disk slowly. Is there no rubbing at bottom ?
NO
Replace supply reel disk.
YES
If there is no unusual sound heard again in each mode, go back to the start of routine to recheck.


3. WINDING FAILURE AT VSR
Remove cassette controller, turn power on and press PLAY key.
Is take-up normal during playback ?
NO
Go to 2. REC/PLAY FAILURE routine.
YES
Press VSR key. (Turn take-up reel disk by hand.)
Is brake shifter at VSR position ?
NO
Replace brake shifter.
YES
Does idler gear swing toward supply reel disk?
NO
Replace idler assembly.
YES
Is supply reel disk torque between 140 and 200 g-cm ?
NO
Replace supply reel disk.
YES
Check main PWB.

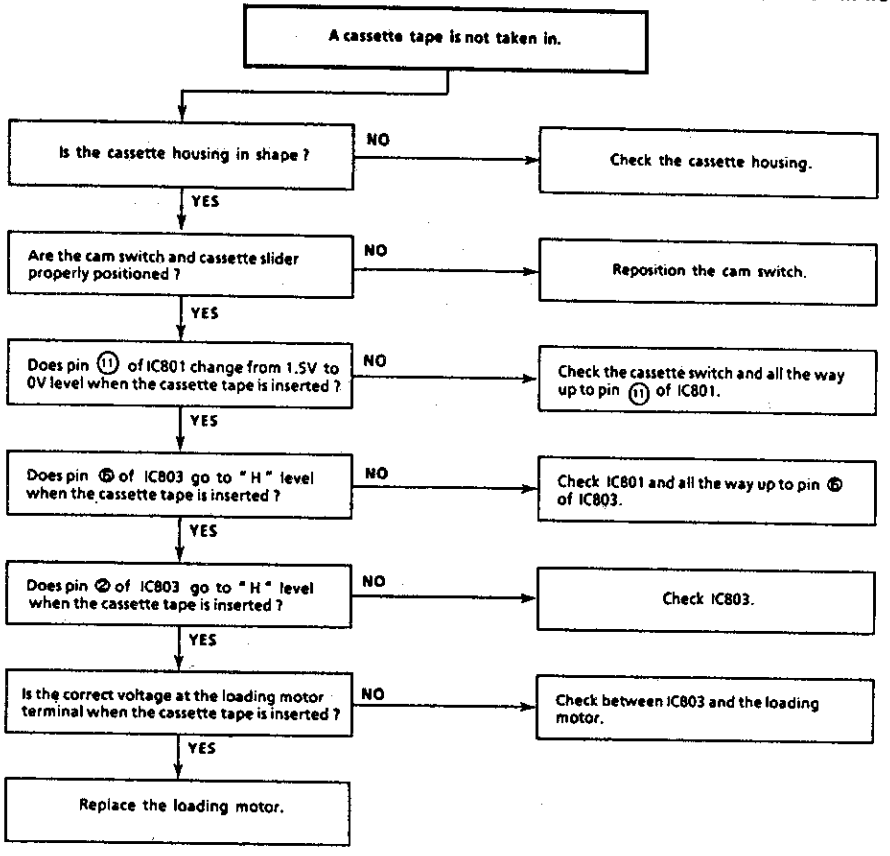
POWER TROUBLESHOOTING

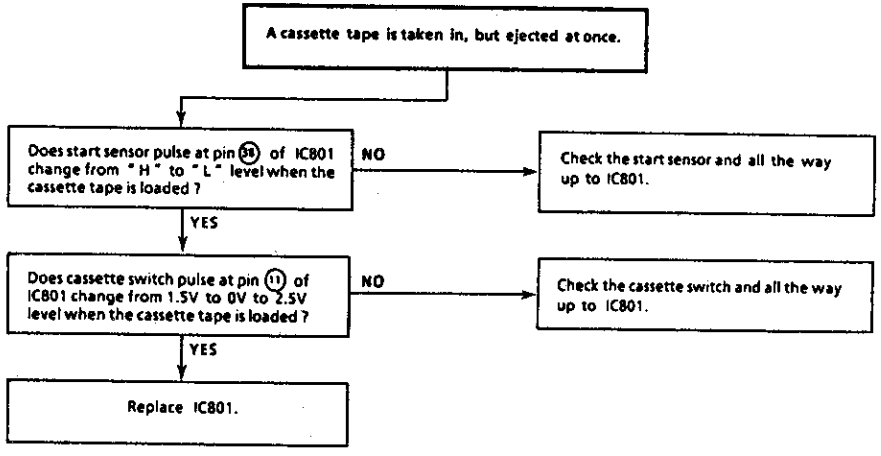
FLOW CHART NO. 1



CASSETTE CONTROL TROUBLESHOOTING

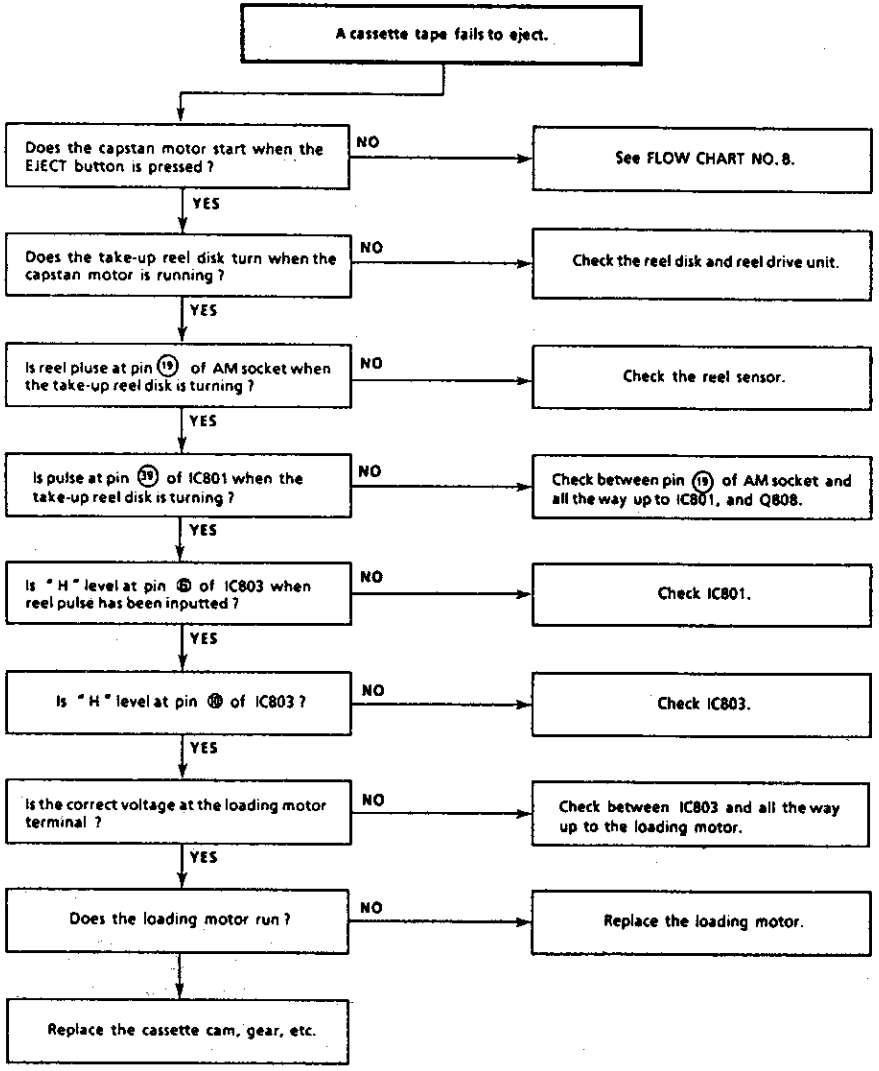
FLOW CHART NO. 2





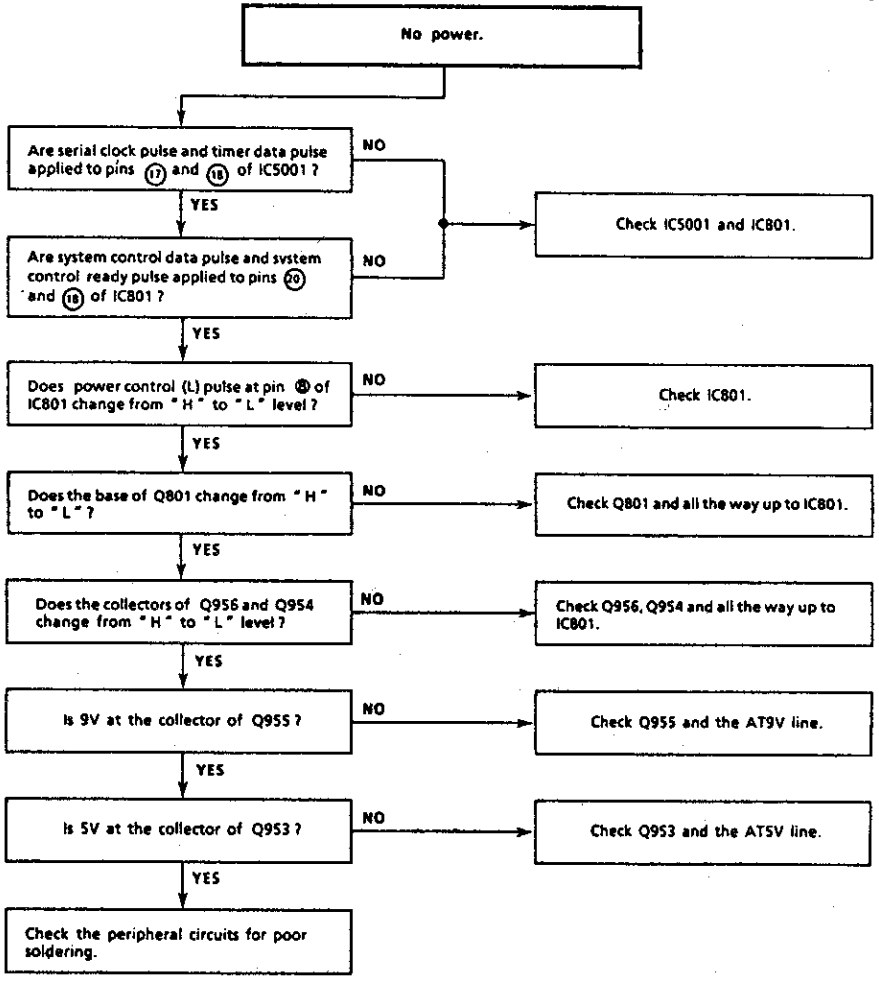
LOADING MOTOR AND EJECT TROUBLESHOOTING

FLOW CHART NO. 3



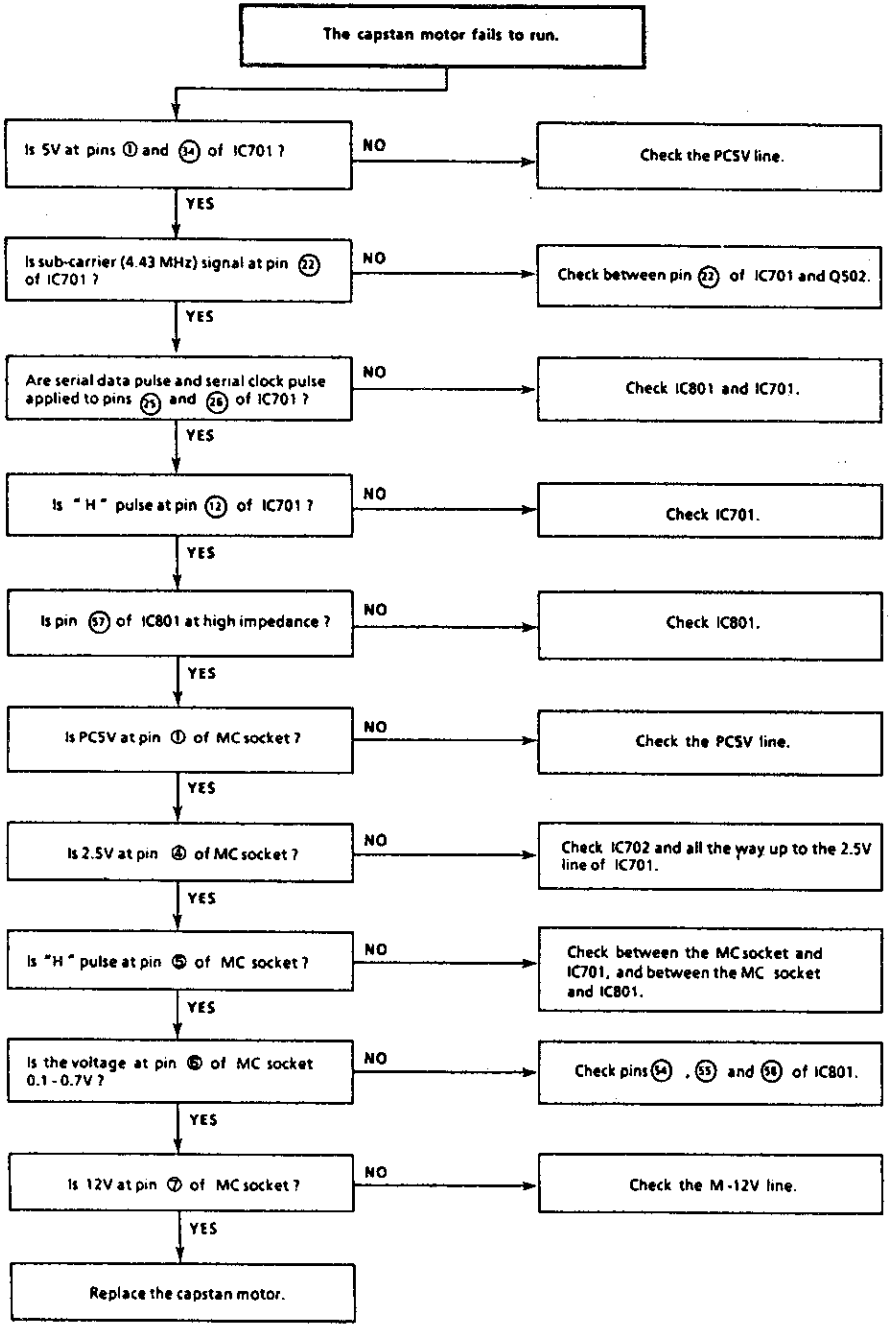
SYSTEM CONTROL TROUBLESHOOTING

FLOW CHART NO. 4



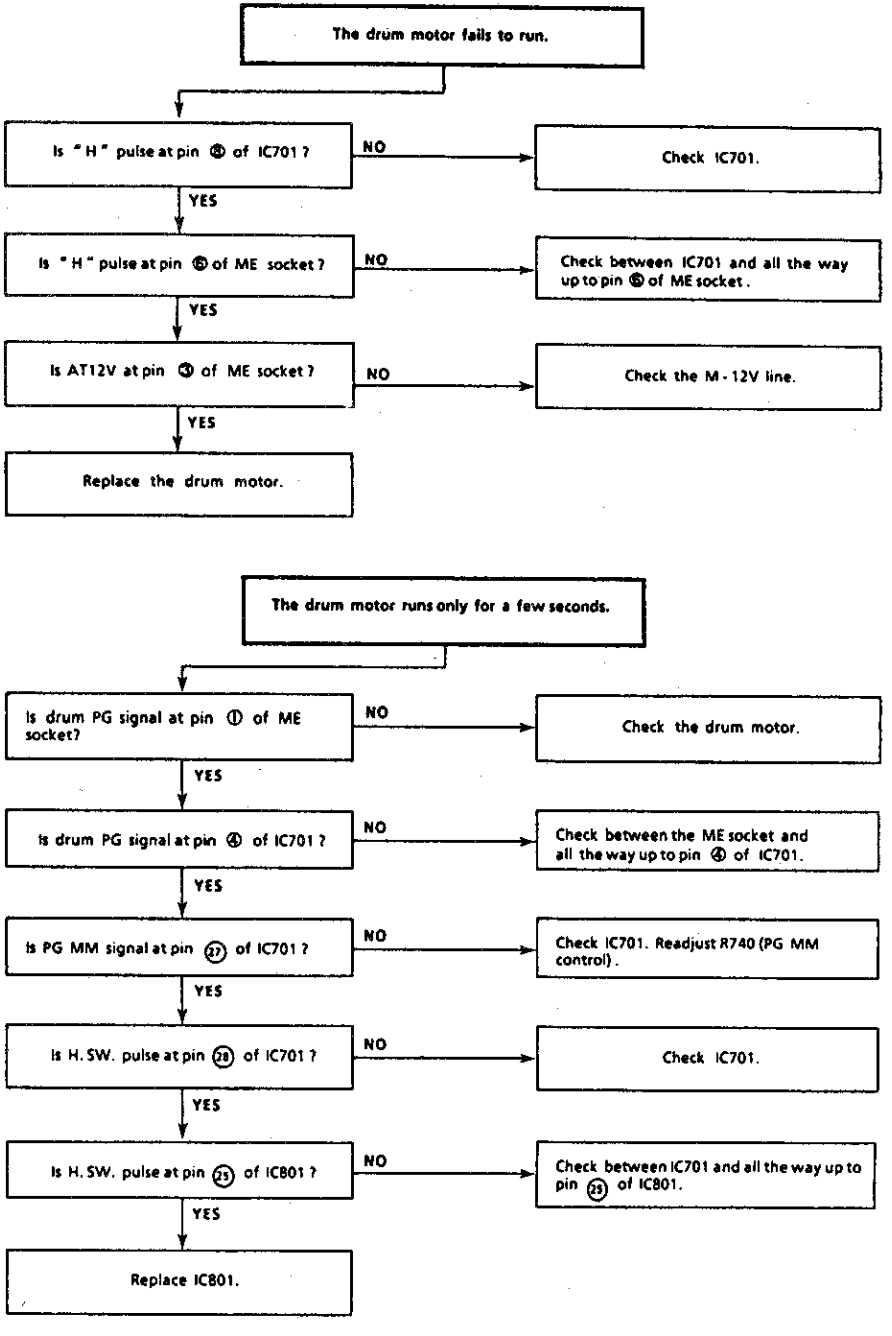
CAPSTAN MOTOR TROUBLESHOOTING

FLOW CHART NO. 5



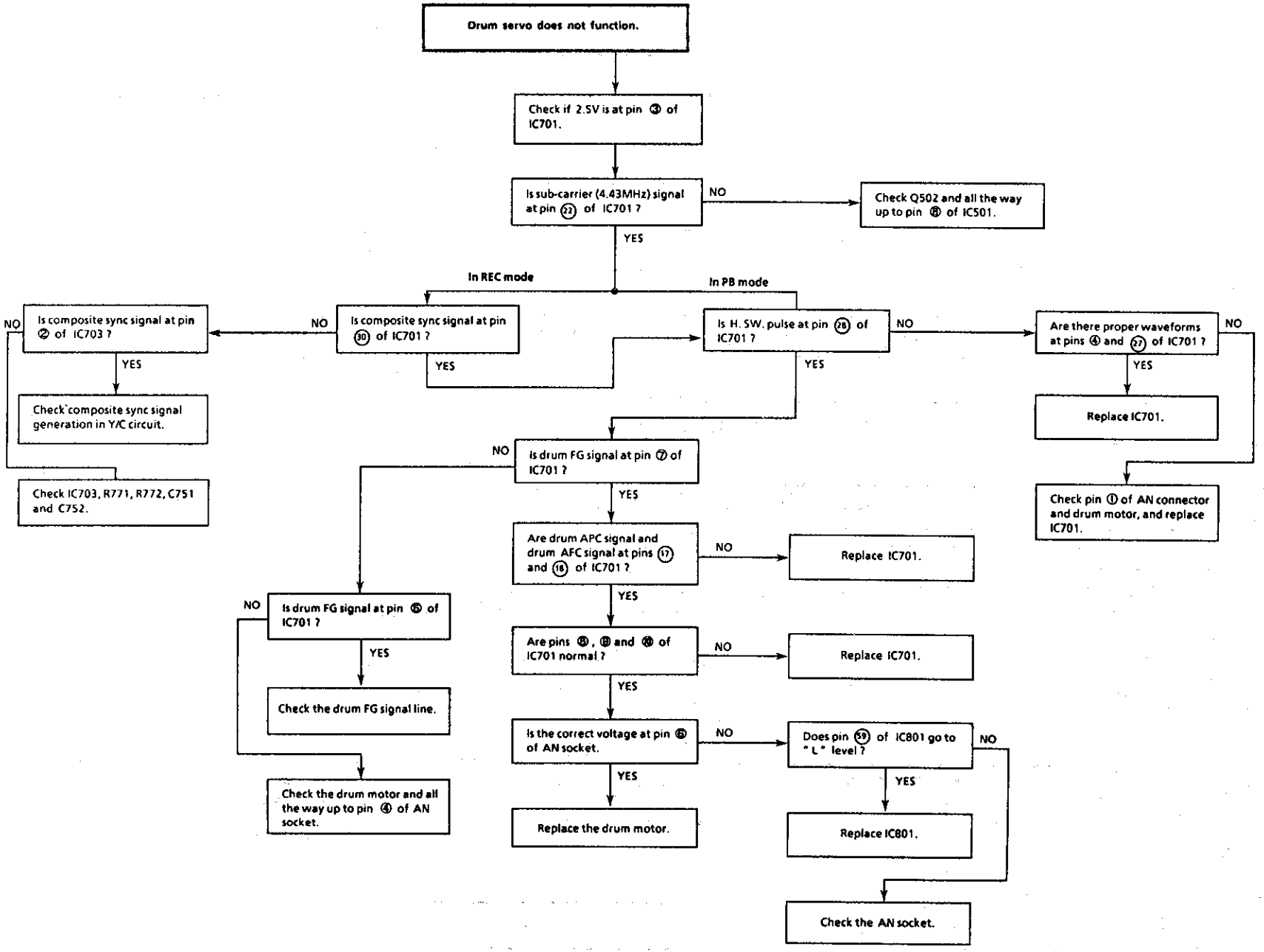
DRUM MOTOR TROUBLESHOOTING

FLOW CHART NO. 6



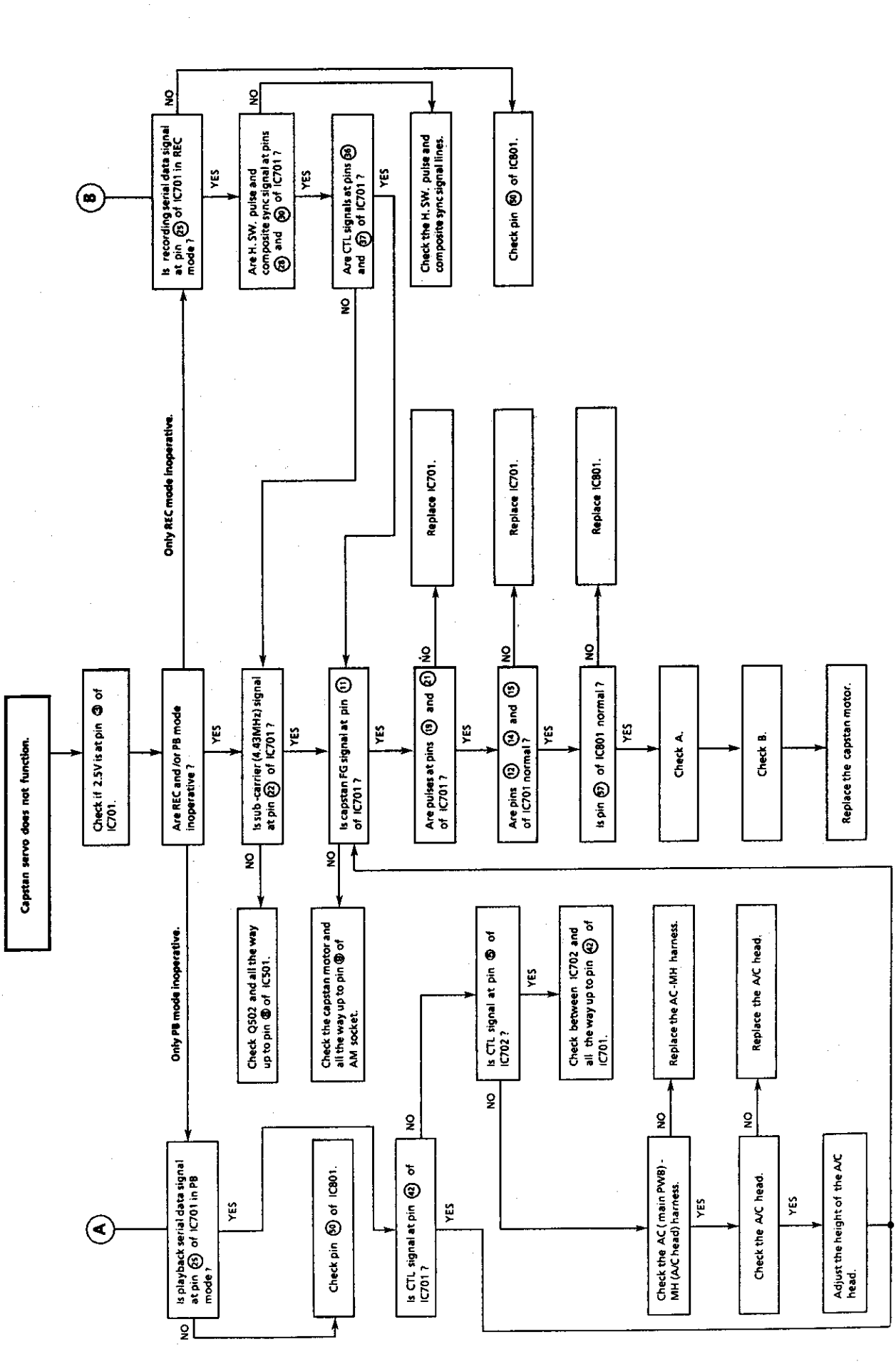
DRUM SERVO TROUBLESHOOTING

FLOW CHART NO. 7



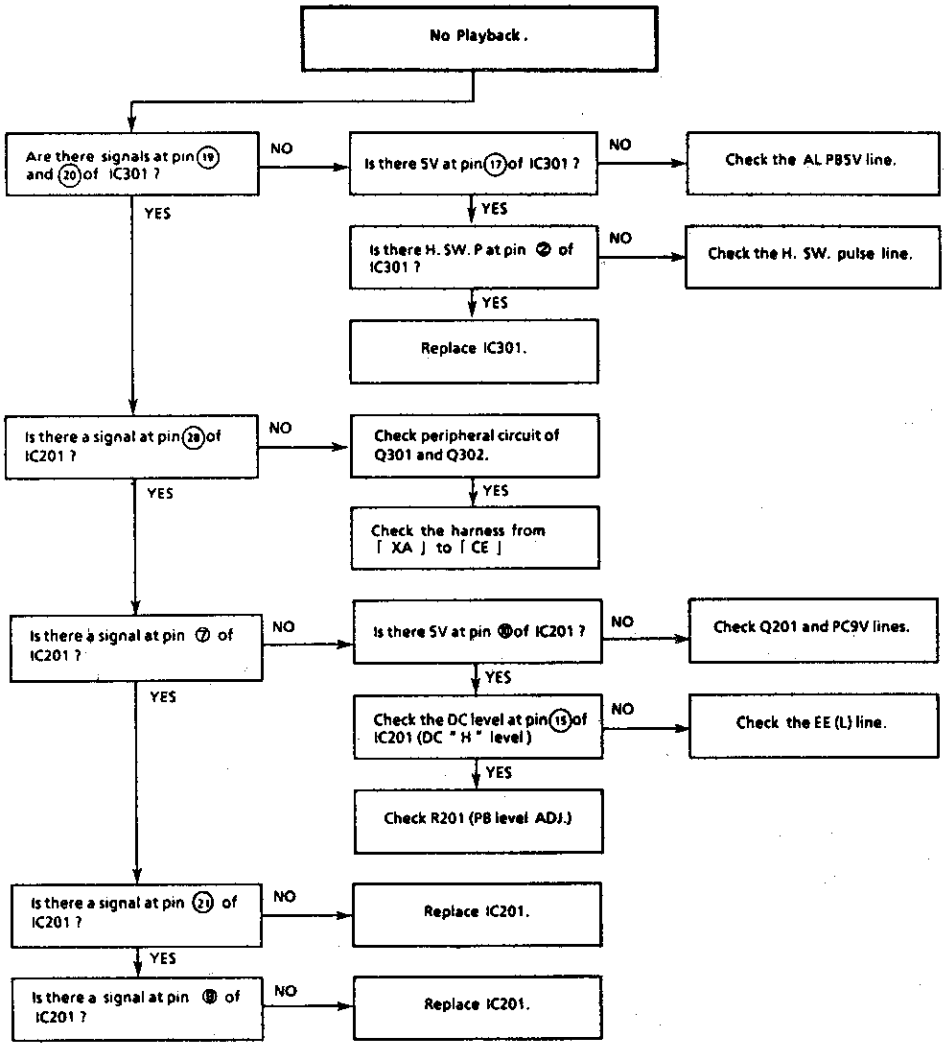
FLOW CHART NO.8

CAPSTAN SERVO TROUBLESHOOTING



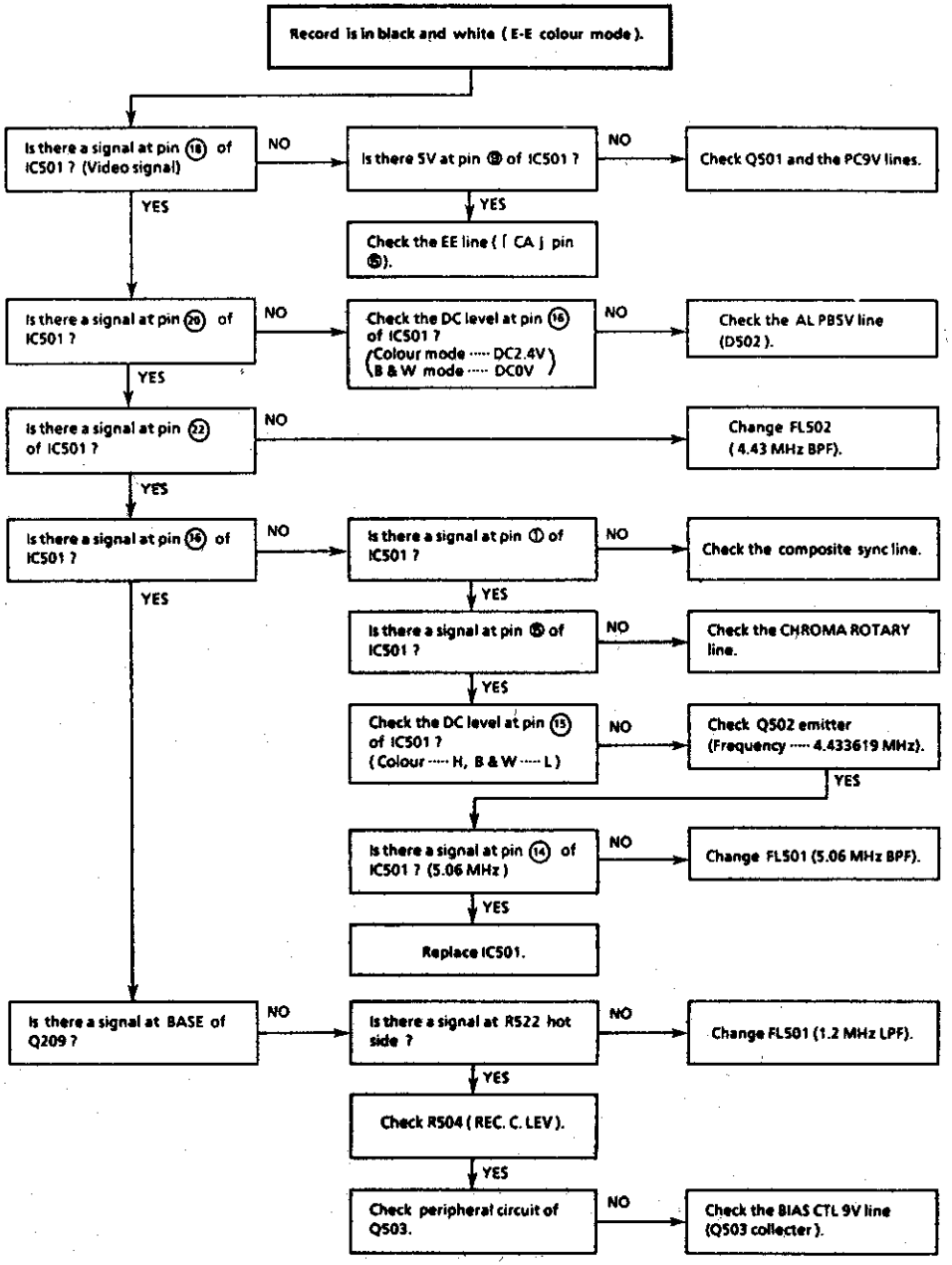
PLAYBACK MODE (LUMINANCE) TROUBLESHOOTING

FLOW CHART NO. 9



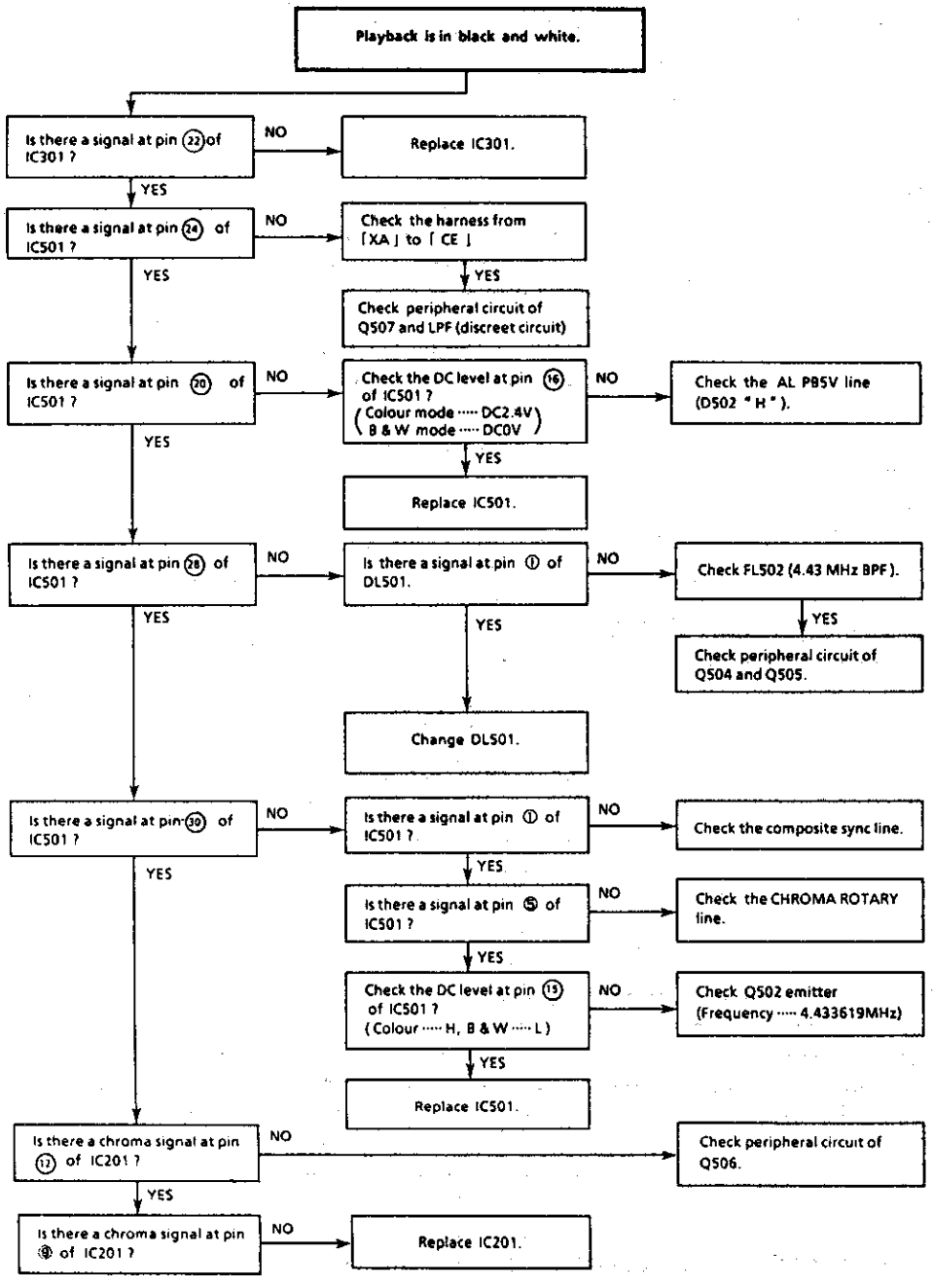
RECORDING MODE (CHROMA) TROUBLESHOOTING

FLOW CHART NO. 10



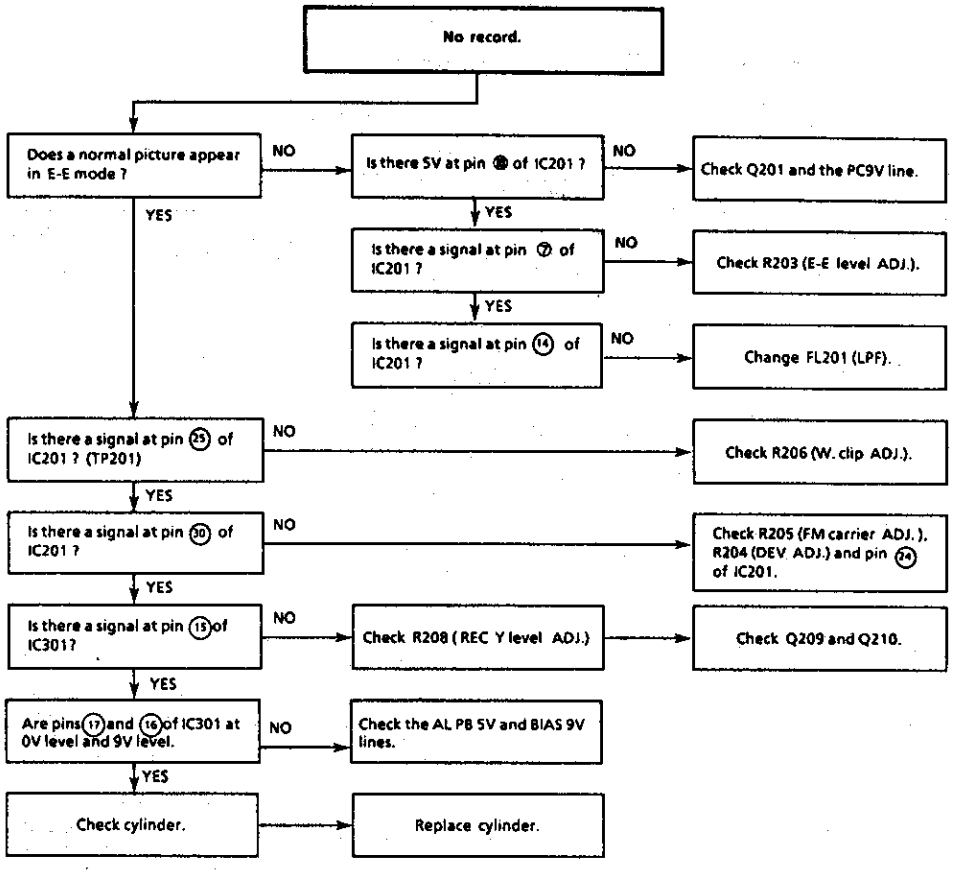
PLAYBACK MODE (CHROMA) TROUBLESHOOTING

FLOW CHART NO. 11



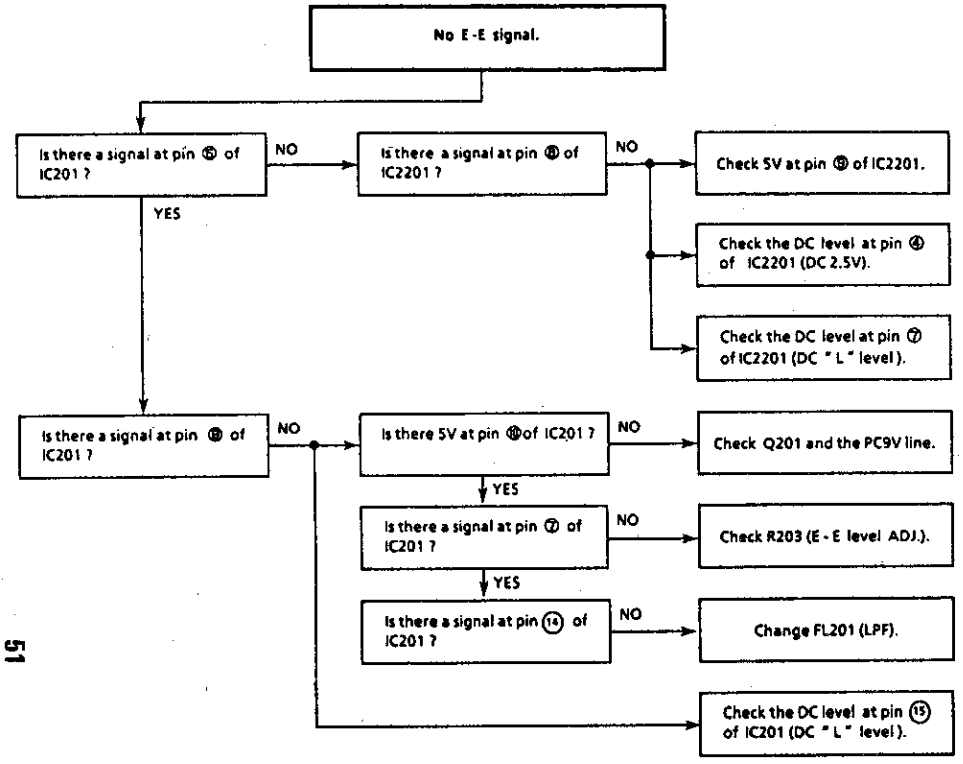
RECORDING MODE (LUMINANCE)TROUBLESHOOTING

FLOW CHART NO. 12



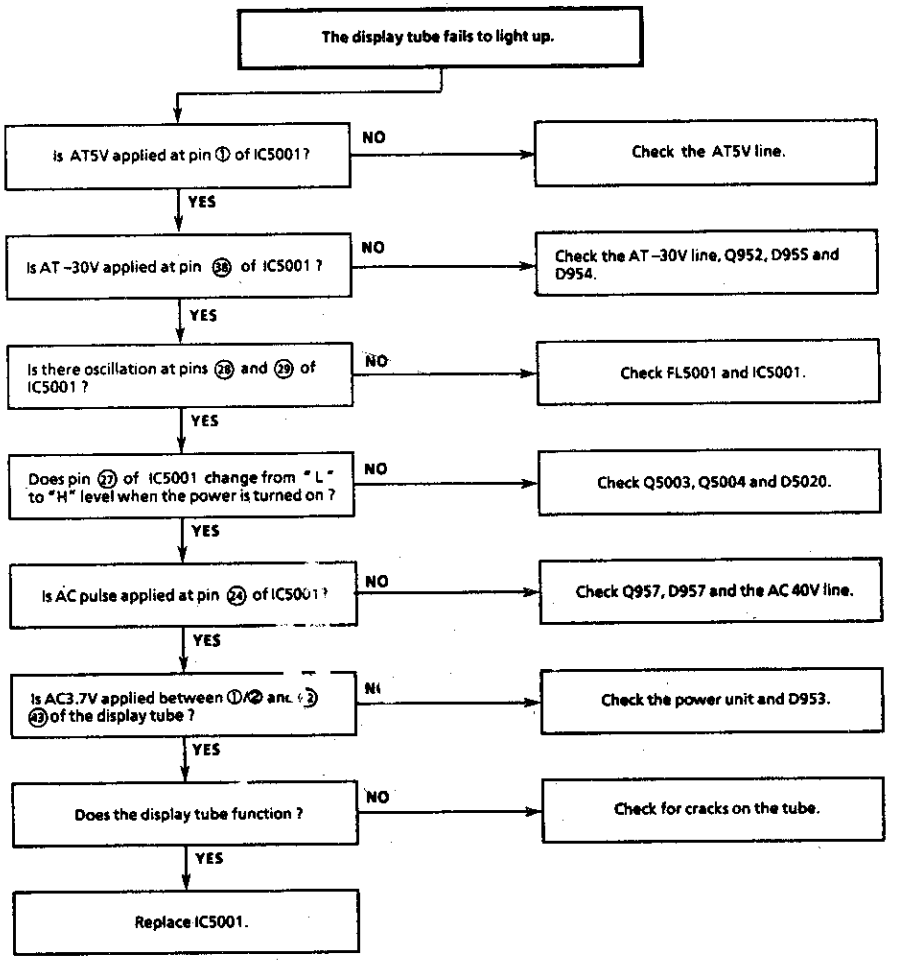
E - E MODE TROUBLESHOOTING

FLOW CHART NO. 13



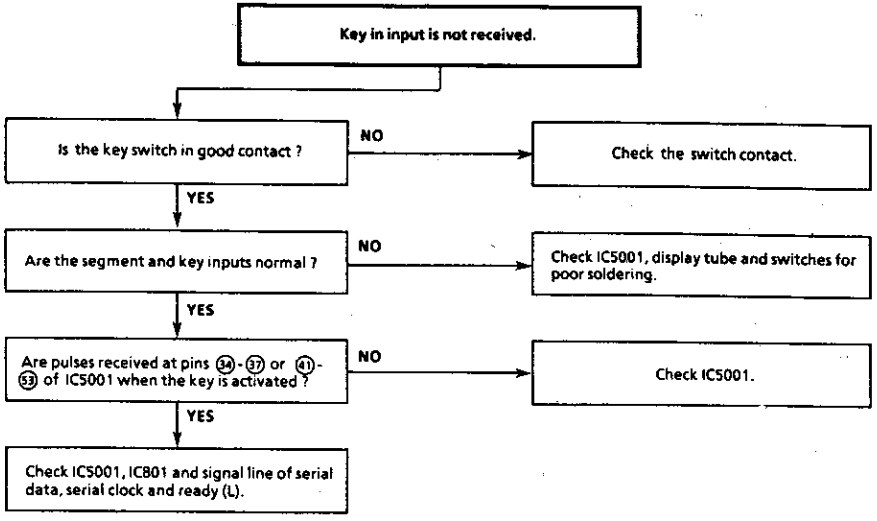
TIMER (1) TROUBLESHOOTING

FLOW CHART NO. 14



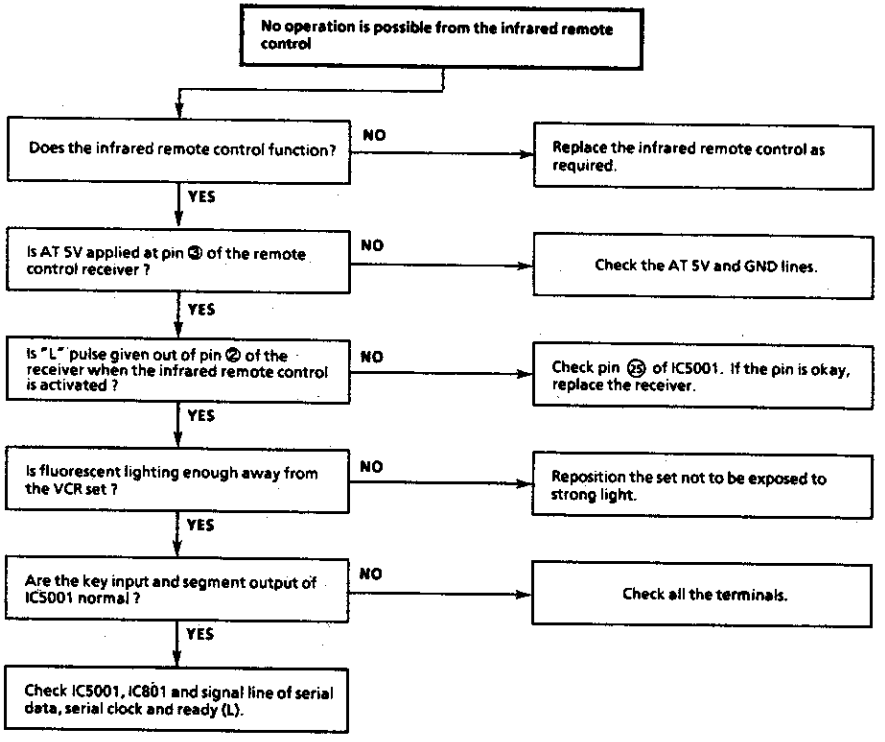
TIMER (2) TROUBLESHOOTING

FLOW CHART NO. 15



INFRARED R/C TROUBLESHOOTING

FLOW CHART NO. 16



SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:
BE SURE TO USE GENUINE PARTS FOR SECURING THE SAFETY AND RELIABILITY OF THE SET.
PARTS MARKED WITH "⚠" AND PARTS SHADED (IN BLACK) ARE ESPECIALLY IMPORTANT FOR MAINTAINING THE SAFETY AND PROTECTING ABILITY OF THE SET.
BE SURE TO REPLACE THEM WITH PARTS OF SPECIFIED PART NUMBER.

SAFETY NOTES:

1. *DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.*
2. *SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.*

NOTES:

1. *The unit of resistance "ohm" is omitted (k = 1000 ohm, M = 1 Meg ohm).*
2. *All resistors are 1/8 watt, unless otherwise noted.*
3. *The unit of capacitance "F" is omitted (μ = μF, p = μμF).*
4. *The values in parentheses are the ones in the PB mode; the values without parentheses are the ones in the REC mode.*

VOLTAGE MEASUREMENT CONDITIONS:

1. *DC voltages are measured between points indicated and chassis ground by VTVM, with AC240V/50Hz supplied to unit and all controls are set to normal viewing picture unless otherwise noted.*
2. *Voltages are measured with 10000μV B & W or colour signal.*

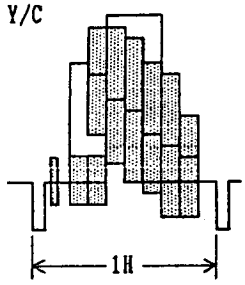
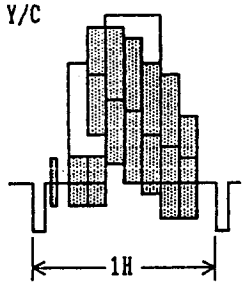
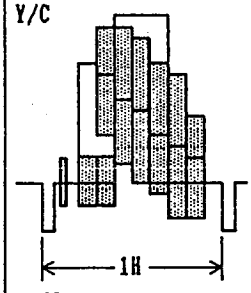
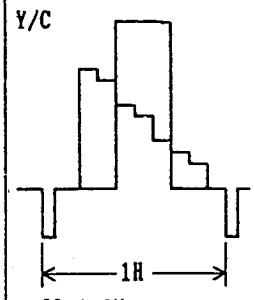
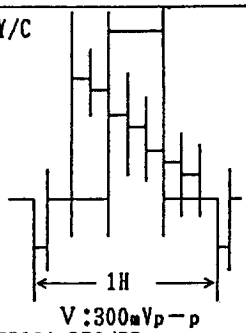
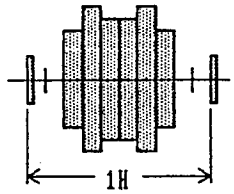
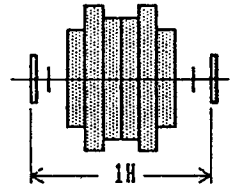
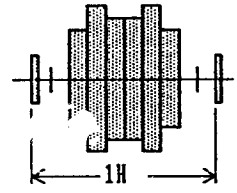
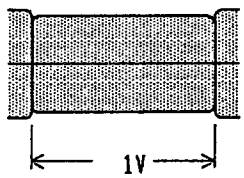
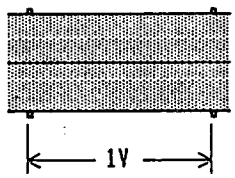
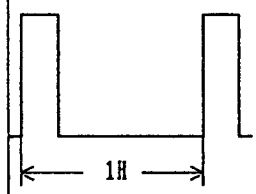
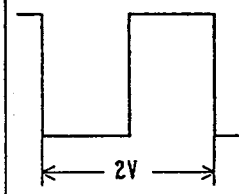
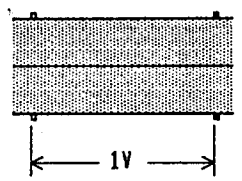
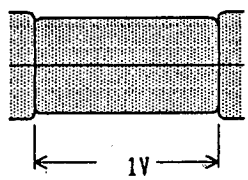
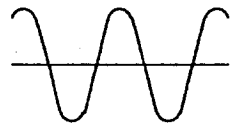
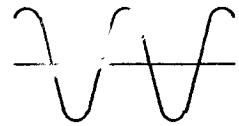
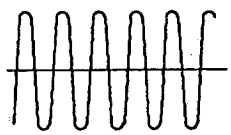
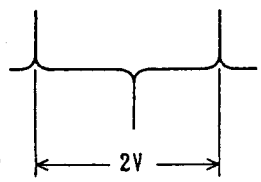
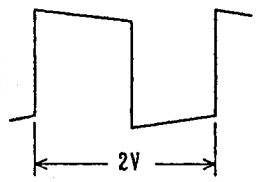
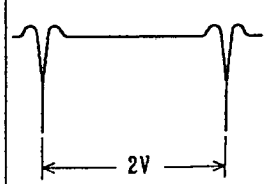
WAVEFORM MEASUREMENT CONDITIONS:

10000μV 87.5 percent modulated colour ber signal is fed into tuner.

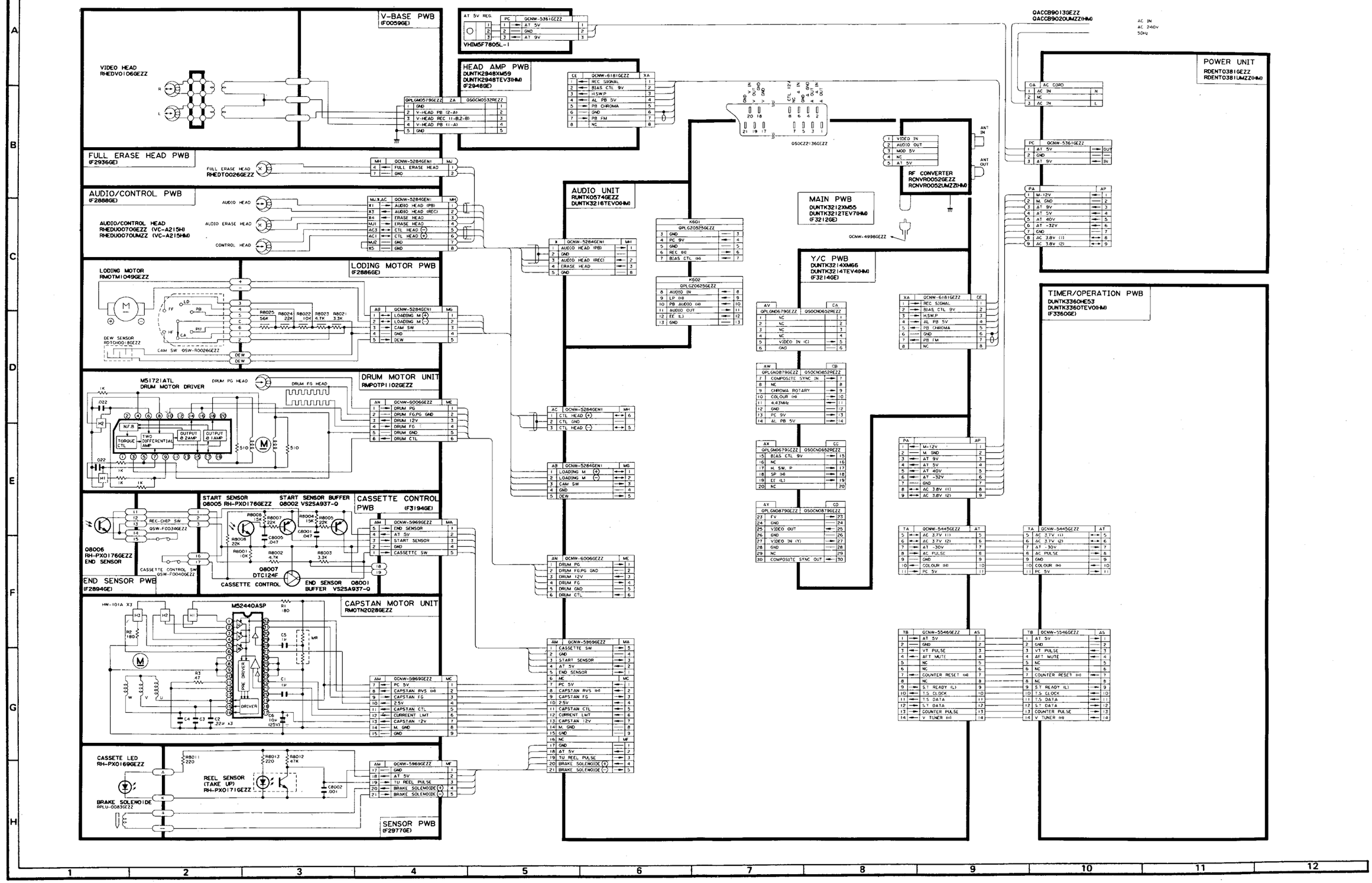
CAUTION:

This circuit diagram is original one. Therefore there may be a slight difference from yours.

WAVE FORMS

Y/C  V:1.0Vp−p IC201 PIN5 REC/EE	Y/C  V:2.0Vp−p IC201 PIN9 REC/EE	Y/C  V:2.0Vp−p IC201 PIN5 PB	Y/C  V:1.0Vp−p IC201 PIN21 PB
Y/C  V:300mVp−p TP201 REC/EE	Y/C  V:180mVp−p IC501 PIN22 REC	Y/C  V:1.4Vp−p IC501 PIN16 REC	Y/C  V:700mVp−p IC501 PIN30 PB
Y/C  V:350mVp−p IC201 PIN28 PB	Y/C  V:180mVp-p CE CONNECTOR PIN1 REC	Y/C  V:5.0Vp−p IC201 PIN1 COMPOSITE SYNC.	Y/C  V:5.0Vp−p HEAD SWITCHING PULSE TP701
H/A  V:4.2 Vp-p IC301 PIN8 REC	H/A  V:200mVp-p IC301 PIN 22 PB	AUDIO  H:1KHZ V:29mVp−p K602 PIN14 REC/EE	AUDIO  H:1KHZ V:1mVp−p K601 PIN1 PB
AUDIO  H:70±5KHz V:7.5mVp−p TP601(+),TP602(−) REC	SERVO  V:1.2Vp-p IC701 PIN42 PB	SERVO  V:4.6 Vp-p IC701 PIN 33 PB	SERVO  V:0.6Vp-p IC701 PIN4 PB

OVERALL DIAGRAM



MAIN CIRCUIT 1

D-ERR Drum Error Voltage

D-PG Drum Phase Comparison Signal

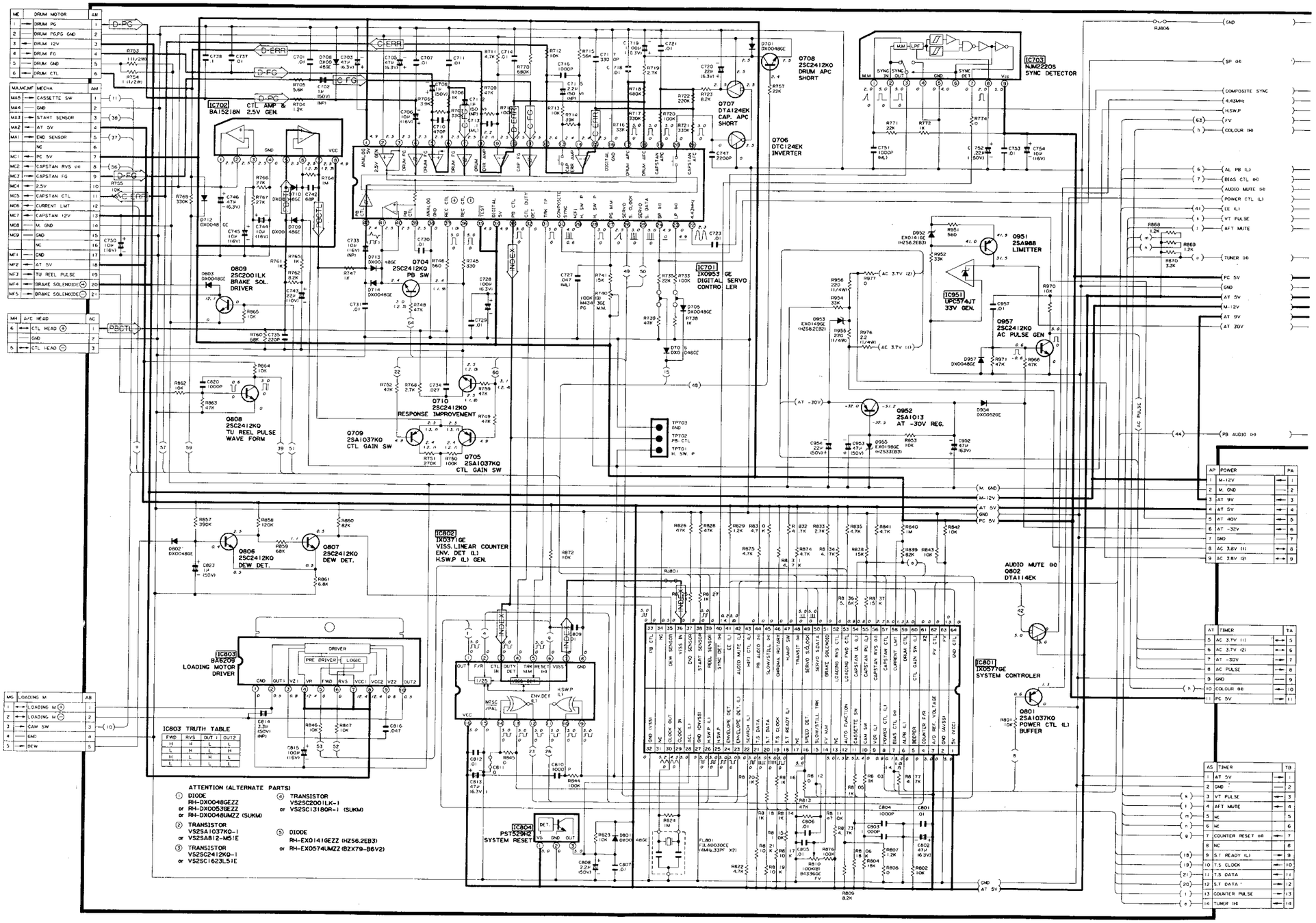
C-FG Capstan Frequency Comparison Signal

INDEX Index Signal

D-FG Drum Frequency Comparison Signal

C-ERR Capstan Error Voltage

PBCTL Playback Control Comparison Signal



* VOLTAGE MEASUREMENT MODE

PB ..... Parentheses ( )

REC ..... Without Parentheses

MAIN CIRCUIT 2

PB-C Playback Chrominance Signal

PB-Y Playback Luminance Signal

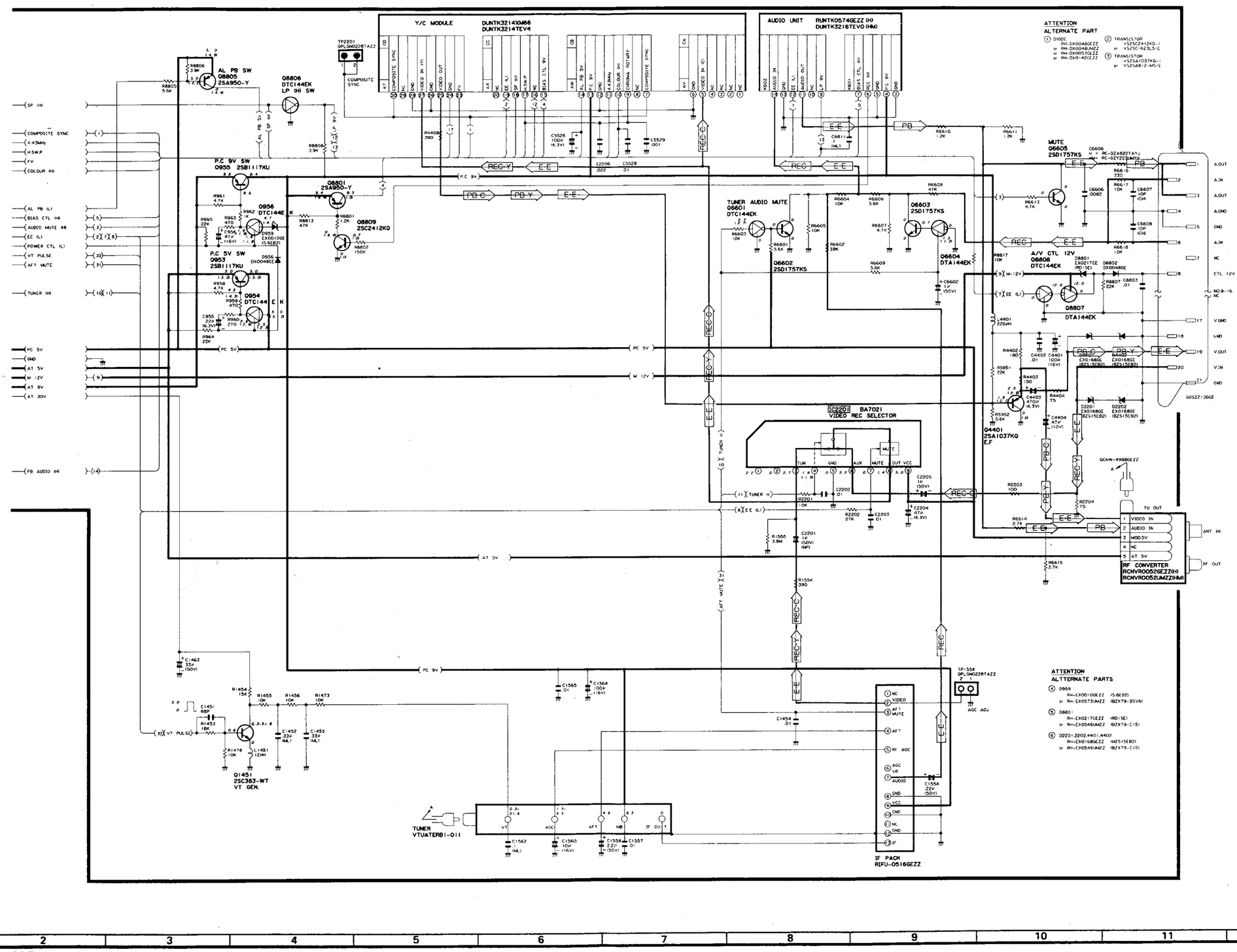
PB Audio Playback Signal

E-E E-E Signal (Video) (Audio)

REC-C Recording Chrominance Signal

REC-Y Recording Luminance Signal

REC Audio Recording Signal



* VOLTAGE MEASUREMENT MODE

PB ..... Parentheses ( )

REC ..... Without Parentheses

Y/C CIRCUIT

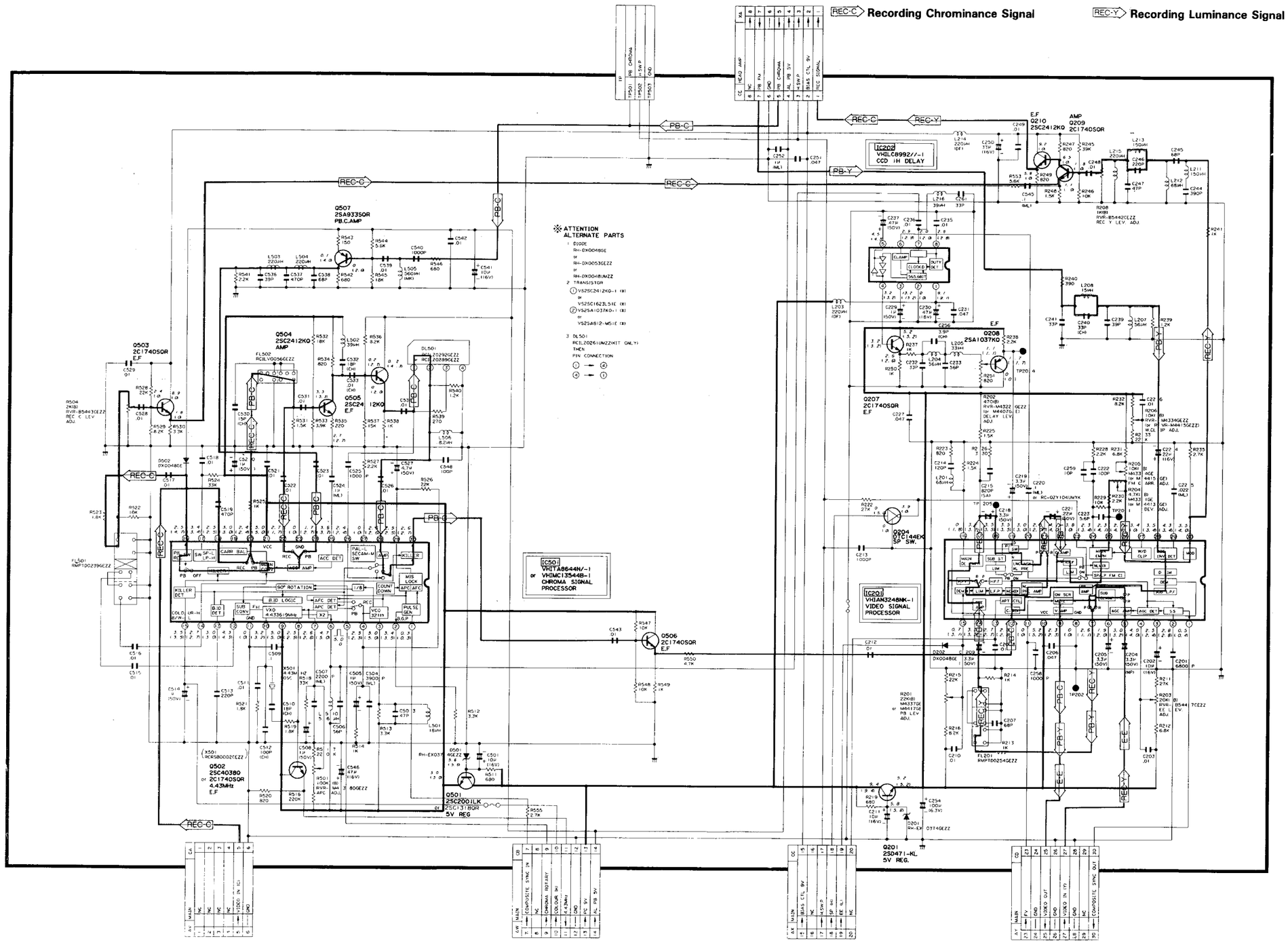
PB-C Playback Chrominance Signal

PB-Y Playback Luminance Signal

E-E E-E Signal (Video)

REC-C Recording Chrominance Signal

REC-Y Recording Luminance Signal

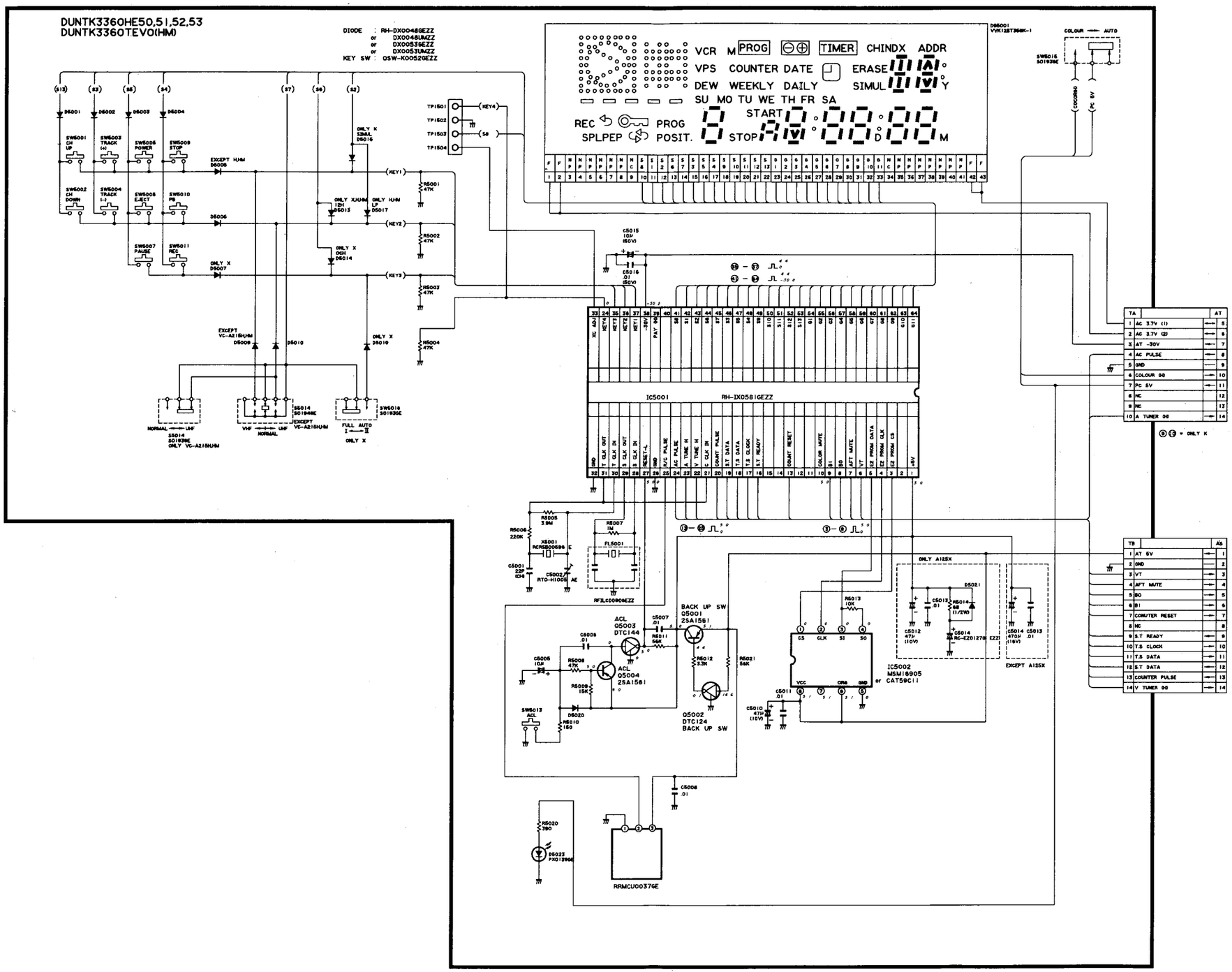


*** VOLTAGE MEASUREMENT MODE**

PB ..... Parentheses ( )

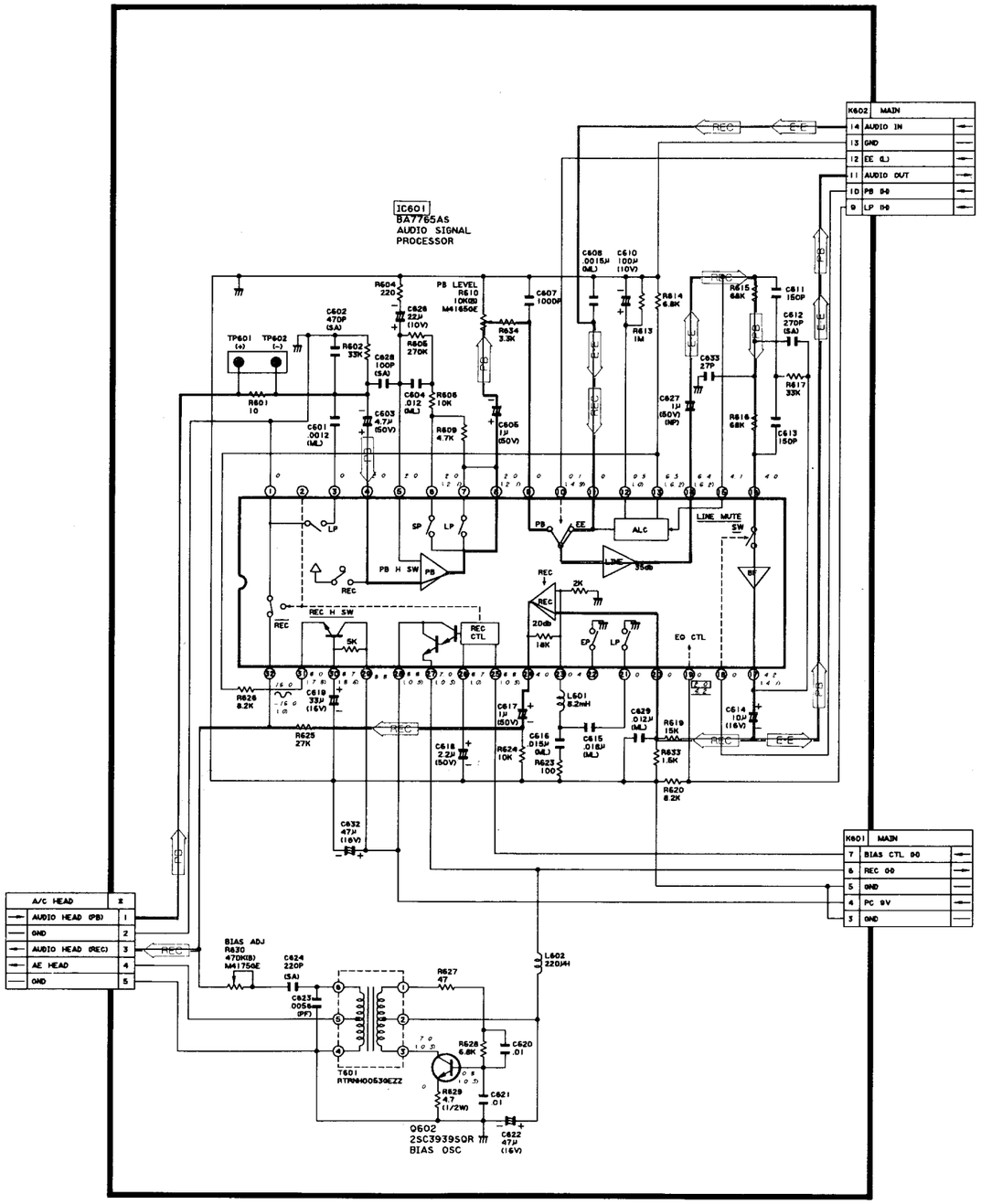
REC ..... Without Parentheses

TIMER OPERATION CIRCUIT



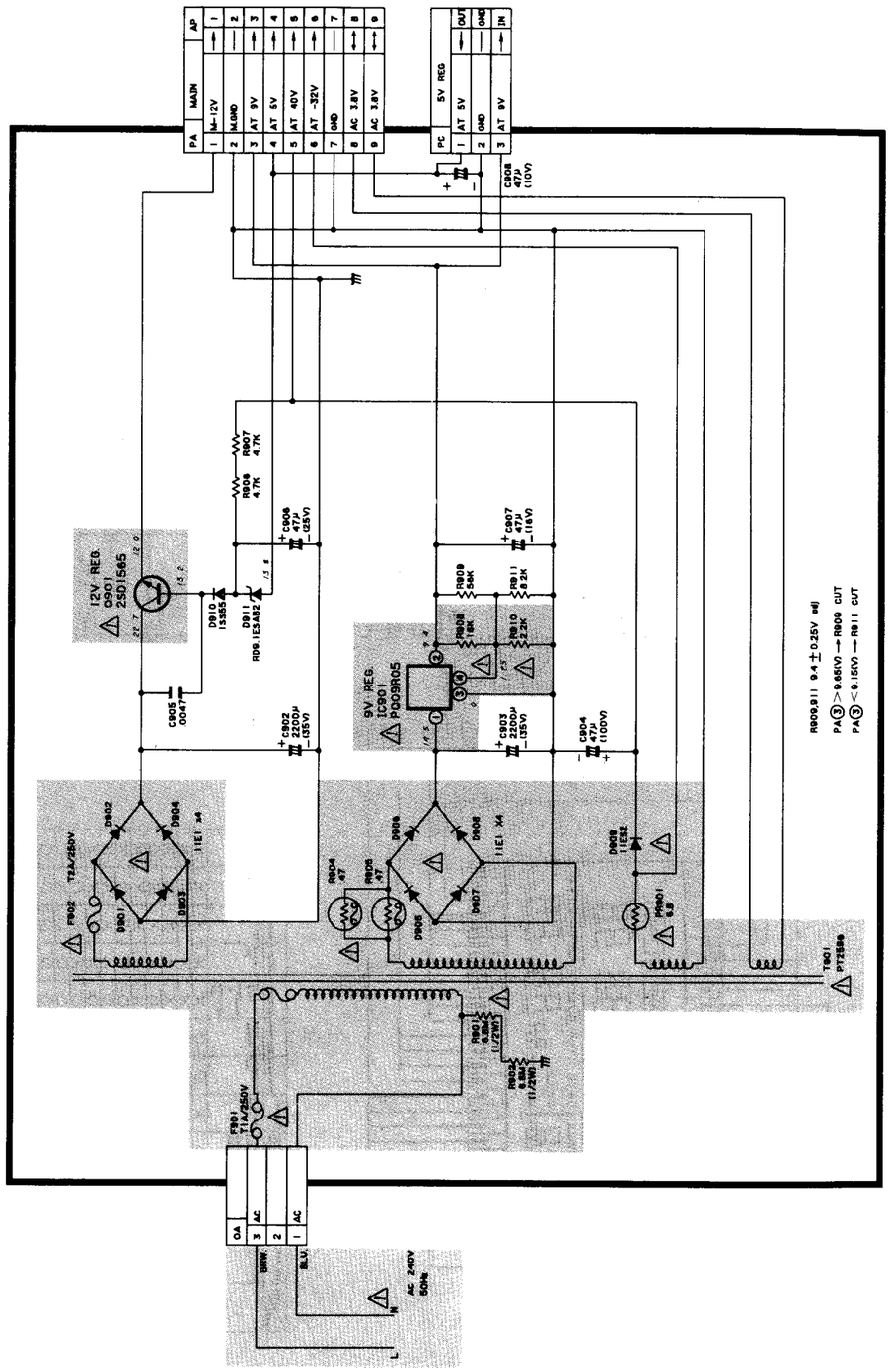
AUDIO CIRCUIT

PB Audio Playback Signal REC Audio Recording Signal E-E E-E Signal (Audio)

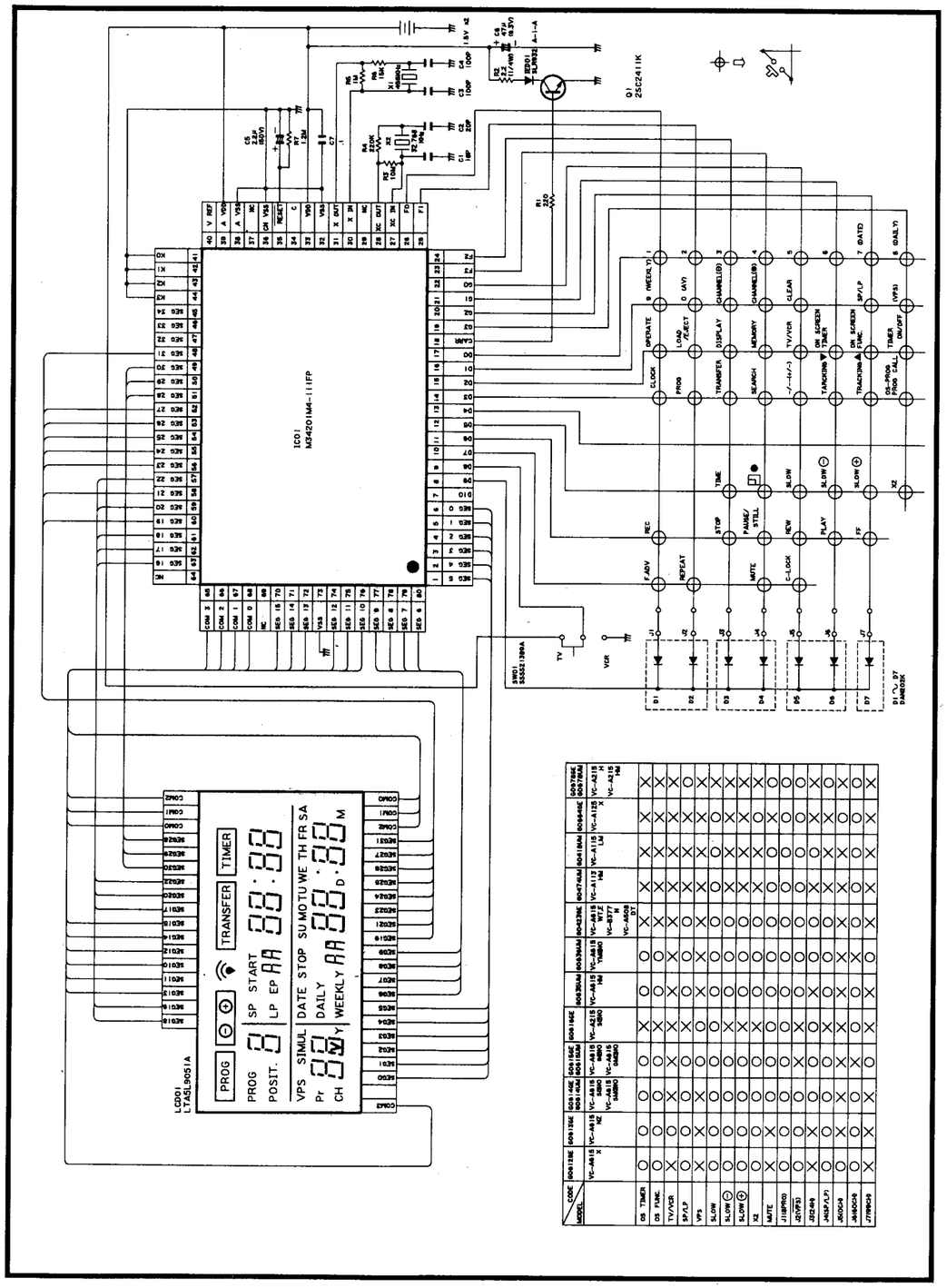


* VOLTAGE MEASUREMENT MODE
PB ..... Parentheses ( )
REC ..... Without Parentheses

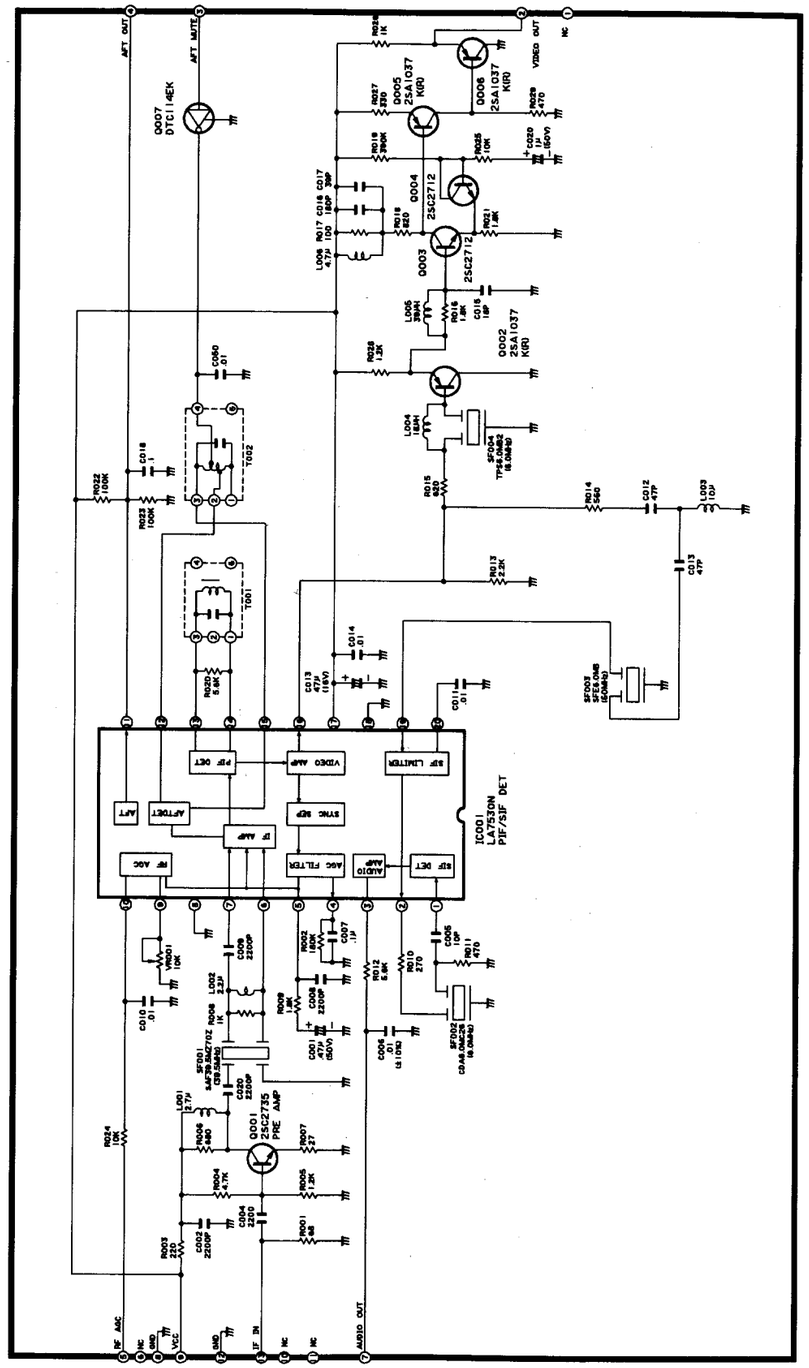
POWER CIRCUIT



INFRARED REMOTE CONTROL CIRCUIT



IF PACK



★ MARK: SPARE PARTS-DELIVERY SECTION

REPLACEMENT PARTS LIST

PARTS REPLACEMENT

Many electrical and mechanical parts in video cassette recorder have special safety-related characteristics.
These characteristics are often not evident from visual inspection nor can be protection afforded by them necessarily obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have special safety characteristics are identified in this manual, electrical components having such features are identified by ⚠ and shaded areas in the Replacement Parts Lists and Schematic Diagrams.
The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION
5. CODE

⚠ MARK: SAFETY RELATED PARTS

PWB ASSEMBLY IS NOT REPLACEMENT ITEM

REF. NO.	PART NO.	★	DESCRIPTION	CODE
MAIN (SERVO, SYSTEM CONTROL, TUNER) CIRCUIT				
	DUNTK3212XM55		Main Board Assembly (VC-A215H)	—
	DUNTK3212TEV7		Main Board Assembly (VC-A215HM)	—
TRANSISTORS				
Q704, 708, 710, 806, 807, 808, 957, 8809	VS2SC2412KQ-1 or VS2SC1623L51E		2SC2412KQ 2SC1623(L5)	AA AB
Q705, 709, 801, 4401	VS2SA1037KQ-1 or VS2SA812-M51E		2SA1037KQ 2SA812(M5)	AA AC
Q706	VSDTC124EK/-1		DTC124EK	AB
Q707	VSDTA124EK/-1		DTA124EK	AB
Q802	VSDTA114EK/-1		DTA114EK	AB
Q809	VS2SC2001LK-1		2SC2001LK(VC-A215H)	AA
Q809	VS2SC1318QR-1	U	2SC1318QR (VC-A215HM)	AC
Q951	VS2SA988///1E		2SA988	AB
Q952	VS2SA1013//1E		2SA1013	AD
Q953, 955	VS2SB1117KU1E		2SB1117KU	AE
Q954, 956, 6601, 8806, 8808	VSDTC144EK/-1		DTC144EK	AB
Q1451	VS2SC383-WT-1		2SC383-WT	AE
Q6602, 6603, 6605	VS2SD1757KS-1		2SD1757KS	AC
Q6604, 8807	VSDTA144EK/-1		DTA144EK	AC
Q8801, 8805	VS2SA950-Y/1E		2SA950-Y	AD
INTEGRATED CIRCUITS				
IC701	RH-iX0953GEZZ			AR
IC702	VHiBA15218N-1			AD
IC703	VHiNJM2220S-1			AG
IC801	RH-iX0577GEZZ			AW
IC802	RH-iX0371GEZZ			AL
IC803	VHiBA6209//1E			AG
IC804	VHiPST529H2-1			AD
IC951	VHiUPC574JT-1			AC
IC2201	VHiBA7021//-1			AE
DIODES				
D701, 705, 706, 708, 709, 710, 712, 713, 714, 801, 802, 803, 956, 957, 8802	RH-DX0048GEZZ or RH-DX0053GEZZ RH-DX0048UMZZ or RH-DX0053UMZZ	 U U	1N4531 (VC-A215H) (VC-A215HM) 	AA AA AC AC
D952	RH-EX0141GEZZ		HZS6.2EB3 (VC-A215H)	AB
D952	RH-EX0574UMZZ	U	(VC-A215HM)	AA
D953	RH-EX0149GEZZ		HZS8.2EB2	AA
D954	RH-DX0052GEZZ		ERA15-02	AB
D955	RH-EX0198GEZZ		HZS33EB3	AB
D959	RH-EX0010GEZZ		RD5.6EB2 (VC-A215H)	AB
D959	RH-EX0573UMZZ	U	(VC-A215HM)	AA
D2201, 2202, 4401, 4402	RH-EX0168GEZZ		HZS15EB2 (VC-A215H)	AA
D2201, 2202, 4401, 4402	RH-EX0546UMZZ	U	(VC-A215HM)	AA
D8801	RH-EX0217CEZZ		RD15E (VC-A215H)	AB
D8801	RH-EX0546UMZZ	U	(VC-A215HM)	AA
CONTROLS				
R740	RVR-M4343GEZZ		100k(B) Playback Phase Generator MM Adj.	AB
R810	RVR-B4336GEZZ		100k(B) False Vertical Sync Adj.	AD

REF. NO.	PART NO.	★	DESCRIPTION	CODE
COILS AND FILTER				
L1451	VP-XF120K0000		12μH	AB
L4401	VP-MK221K0000		220μH	AB
FL801	RFiLA0030CEZZ		Filter	AD
CAPACITORS				
C702, 712, 2201	VCE9EA1HW105M		1μF, 50V, 20%, Electrolytic (N.P.)	AC
C713, 1562, 6611	RC-QZZ104UMYK	U	0.1μF, 50V, Mylar (VC-A215HM)	AB
C715	VCE9EA1HW225M		2.2μF, 50V, 20%, Electrolytic (N.P.)	AB
C719, 728	VCEAGA0JW107M		100μF, 6.3V, 20%, Electrolytic	AB
C733	VCE9EA1CW106M		10μF, 16V, 20%, Electrolytic (N.P.)	AC
C738	RC-KZ0011GEZZ		0.1μF, Ceramic	AA
C751	RC-QZA102TAYJ		1000pF, 50V, 5%, Mylar	AB
C814	VCE9EA1HW335M		3.3μF, 50V, 20%, Electrolytic (N.P.)	AB
C815	VCEAGA1CW107M		100μF, 16V, 20%, Electrolytic	AB
C816	RC-KZ0017GEZZ		0.047μF, Ceramic	AA
C1452, 1453	RC-QZZ334UMYK	U	0.33μF, 50V, Mylar	AC
C1564, 4401	VCEAEA1CW107M		100μF, 16V, 20%, Electrolytic	AC
C4403	VCEA2A0JW477M		470μF, 6.3V, 20%, Electrolytic	AB
C5526	VCEAEA0JW107M		100μF, 6.3V, 20%, Electrolytic	AB
C6606	RC-QZA822TAYJ		8200pF, 50V, 5%, Mylar (VC-A215H)	AB
C6606	RC-QZY223UMYK	U	8200pF, 50V, 5%, Mylar (VC-A215HM)	AA
RESISTORS				
R766, 767	VRN-RA2BK273F		27k, 1/8W, Metal Film	AA
MISCELLANEOUS				
	RiFU-0516GEZZ		IF Pack	AY
	VTUATERB1-011		Tuner	AY
	RCNVR0052GEZZ		RF-Converter (VC-A215H)	BA
	RCNVR0052UMZZ	U	RF-Converter (VC-A215HM)	BB
	QPLGN0228TAZZ		Plug, 2 pin (TP2201—2202)	AB
	QPLGN0328TAZZ		Plug, 3 pin (P701—703, AC)	AD
	QPLGN0528TAZZ		Plug, 5 pin (AB)	AB
	QPLGN0679GEZZ		Plug, 6 pin (AV, AX)	AB
	QPLGN0879GEZZ		Plug, 8 pin (AW, AY)	AB
	QSōCN0694GEZZ		Socket, 6 pin (AN) (VC-A215H)	AB
	QSōCN0694UMZZ	U	Socket, 6 pin (AN) (VC-A215HM)	AB
	QSōCN0794GEZZ		Socket, 7 pin (AT) (VC-A215H)	AB
	QSōCN0794UMZZ	U	Socket, 7 pin (AT) (VC-A215HM)	AB
	QSōCN0922REZZ		Socket, 9 pin (AP)	AC
	QSōCN1494GEZZ		Socket, 14 pin (AS) (VC-A215H)	AC
	QSōCN1494UMZZ	U	Socket, 14 pin (AS) (VC-A215HM)	AD
	QSōCN2194GEZZ		Socket, 21 pin (AM) (VC-A215H)	AD
	QSōCN2194UMZZ	U	Socket, 21 pin (AM) (VC-A215HM)	AD
	QSōCZ2136GEZZ		Socket, 21 pin	AE
Y/C CIRCUIT				
	DUNTK3214XM66		Y/C Board Assembly (VC-A215H)	—
	DUNTK3214TEV4		Y/C Board Assembly (VC-A215HM)	—
TRANSISTORS				
Q201	VS2SD471-KL1E		2SD471-KL	AC
Q204	VSDTC144EK/-1		DTC144EK	AB
Q207, 209, 503, 506	VS2C1740SQR1E	U	2SC1740SQR	AC
Q208	VS2SA1037KQ-1		2SA1037KQ	AA
	or			
	VS2SA812-M51E		2SA812(M5)	AC
Q210, 504, 505	VS2SC2412KQ-1		2SC2412KQ	AA
	or			
	VS2SC1623L51E		2SC1623(L5)	AB
Q501	VS2SC1318QR-1	U	2SC1318QR	AC
	or			
	VS2SC2001LK-1		2SC2001LK	AA
Q502	VS2SC4038Q/1E		2SC4038Q	AB
	or			
	VS2C1740SQR1E	U	2SC1740SQR	AC
Q507	VS2SA933SQR1E		2SA933SQR	AB
INTEGRATED CIRCUITS				
IC201	VHiAN3248NK-1	U		AP
IC202	VHiLC8992//-1			AK
IC501	VHiTA8644N/-1			AP
	or			
	VHiMC13544B-1			AN
DIODES AND CRYSTAL				
D201, 501	RH-EX0374GEZZ			AA
D202, 502	RH-DX0048GEZZ		1N4531 (VC-A215H)	AA
	or			
	RH-DX0053GEZZ			AA
D202, 502	RH-DX0048UMZZ	U	(VC-A215HM)	AC
	or			
	RH-DX0053UMZZ	U		AC
X501	RCRSB0002CEZZ		Crystal	AM

REF. NO.	PART NO.	★	DESCRIPTION	CODE
CONTROLS				
R201	RVR-M4337GEZZ		22k(B) Playback Level Adj.	AB
	or			
	RVR-M4417GEZZ	U		AB
R202	RVR-M4322GEZZ		470(B) Delay Level Adj.	AB
	or			
	RVR-M4407GEZZ	U		AB
R203	RVR-B5447CEZZ		20k(B) EE Level Adj.	AB
R204	RVR-M4331GEZZ		4.7k(B) Deviation Adj.	AC
	or			
	RVR-M4413GEZZ	U		AB
R205, 206	RVR-M4334GEZZ		10k(B) FM Carrier Adj.	AB
	or		10k(B) White Clip Adj.	
	RVR-M4415GEZZ	U		AB
R208	RVR-B5442CEZZ		1k(B) Record Y Level Adj.	AB
R501	RVR-M4380GEZZ		100k(B) APC Adj.	AC
R504	RVR-B5443CEZZ		2k(B) Record Chroma Level Adj.	AB
COILS AND FILTERS				
L201, 212	VP-XF680K0000		68μH	AB
L203, 214	VP-DF221K0000		220μH	AB
L204, 207	VP-XF560K0000		56μH	AB
L205	VP-XF330K0000		33μH	AB
L208	VP-XF150K0000		15μH	AB
L211, 213	VP-XF151K0000		150μH	AB
L215, 503	VP-XF221K0000		220μH	AB
L216	VP-XF390J0000		39μH	AB
L501	VP-XF180K0000		18μH	AB
L502	VP-XF390K0000		39μH	AB
L504	VP-MK221K0000		220μH	AB
L505	VP-MK561K0000		560μH	AB
L506	VP-XF8R2K0000		8.2μH	AB
L510	VP-XF5R6K0000		5.6μH	AB
DL501	RCiLZ0289GEZZ		Delay Line (VC-A215H)	AP
	or			
	RCiLZ0292GEZZ			AP
DL501	RCiLZ0261UMZZ	U	Delay Line (VC-A215HM)	AP
FL201	RMPTD0254GEZZ		Filter	AG
FL501	RMPTD0239GEZZ		Filter	AG
FL502	RCiLV0056GEZZ		Filter	AF
CAPACITORS				
C204	VCE9EA1HW335M		3.3μF, 50V, 20%, Electrolytic (N.P.)	AB
C220, 252, 524, 545	RC-QZY104UMYK	U	0.1μF, Mylar (VC-A215HM)	AA
C225	RC-QZA223TAYZ		0.022μF, 50V, 5%, Mylar	AB
C254	VCEAEA0JW107M		100μF, 6.3V, 20%, Electrolytic	AB
C504	RC-QZA392TAYZ		3900pF, 50V, 5%, Mylar (VC-A215H)	AA
C504	RC-QZA392UMYK	U	3900pF, 50V, 5%, Mylar (VC-A215HM)	AA
C507	RC-QZA222TAYJ		2200pF, 50V, 5%, Mylar	AB
C509	RC-KZ0011GEZZ		0.1μF, Ceramic	AA
MISCELLANEOUS				
	QPLGN0329TAZZ		Plug, 3 pin (TP501—503)	AB
	QPLGN0878GEZZ		Plug, 8 pin (CE)	AC
	QSōCN0652REZZ		Socket, 6 pin (CA, CC)	AB
	QSōCN0852REZZ		Socket, 8 pin (CB)	AB
	QSōCN0879GEZZ		Socket, 8 pin (CD)	AC
TIMER OPERATION CIRCUIT				
	DUNTK3360HE50		Timer Operation Board Assembly (VC-A215H)	—
	DUNTK3360TEVO		Timer Operation Board Assembly (VC-A215HM)	—
TRANSISTORS				
Q5001, 5004	VS2SA1561Q/1E		2SA1561	AC
Q5002	VSDTC124ELT-1		DTC124EL	AA
Q5003	VSDTC144ELT-1		DTC144EL	AB
INTEGRATED CIRCUITS				
IC5001	RHiX0581GEZZ			AX
IC5002	VHiCAT59C11-1			AL
DIODES AND CRYSTAL				
D5001	RH-DX0048GEZZ		1N4531	AA
|	or			
5004, 5006, 5010, 5013, 5017, 5020	RH-DX0053GEZZ			AA
D5023	RH-PX0139GEZZ			AB
X5001	RCRSB0059GEZZ		Crystal	AD
FILTER				
FL5001	RFiLC0090GEZZ		Filter	AD
CAPACITOR				
C5014	VCEADA1AW477M		470μF, 16V, 20%, Electrolytic	AD
TRIMMER				
C5002	RTō-H1005AEZZ			AC

REF. NO.	PART NO.	★	DESCRIPTION	CODE
MISCELLANEOUS				
DG5001	VVK12BT35GK-1		Fluorescent Display Tube	AX
	RRMCU0037GEZZ		Remote Control Receiver	AL
	QPLGN0428TAZZ		Plug, 4 pin (TP1501–1504)	AB
	QSōCN0795GEZZ		Socket, 7 pin (TA)	AB
	QSōCN1495GEZZ		Socket, 14 pin (TB)	AC
SW5001,	QSW-K0052GEZZ		Switch, Channel Up	AB
5002,			Switch, Channel Down	
5003,			Switch, Tracking (+)	
5004,			Switch, Tracking (–)	
5005,			Switch, Power	
5006,			Switch, Eject	
5007,			Switch, Pause	
5009,			Switch, Stop	
5010,			Switch, Playback	
5011,			Switch, Record	
5013			Switch, All Clear	
SW5014,	QSW-S0193GEZZ		Switch, Normal/UHF	AC
5015			Switch, Colour Mode	
HEAD AMP. CIRCUIT				
	DUNTK2948XM59		Head Amp. Board Assembly (VC-A215H)	–
	DUNTK2948TEV3		Head Amp. Board Assembly (VC-A215HM)	–
TRANSISTORS				
Q301	VS2SC2059KN1E		2SC2059K	AC
Q302	VS2SC2412KQ-1		2SC2412	AA
INTEGRATED CIRCUIT				
IC301	VHiBA7252S/-1			AH
COILS				
L302	VP-XF180J0000		18μH	AB
L303	VP-DF101K0000		100μH	AB
L304	VP-XF680K0000		68μH	AB
L305	VP-XF330K0000		33μH	AB
L306,	VP-XF220K0000		22μH	AB
307				
L309	VP-XF151K0000		150μH	AB
CAPACITORS				
C302,	RC-QZZ104UMYK	U	0.1μF, 63V, Mylar (VC-A215HM)	AC
305				
C309	RC-QZZ473UMYK	U	0.047μF, 63V, Mylar (VC-A215HM)	AC
MISCELLANEOUS				
	QPLGN0229TAZZ		Plug, 2 pin (TP301–302)	AB
	QPLGN0880GEZZ		Plug, 8 pin (XA)	AC
	QSōCN0532REZZ		Socket, 5 pin (ZA)	AB
FB301,	RBLN-0013GEZZ		Ferrite Bead	AB
302				
AUDIO CIRCUIT				
	RUNTK0574GEZZ		Audio Board Assembly (VC-A215H)	–
	RUNTK3216TEV0		Audio Board Assembly (VC-A215HM)	–
TRANSISTOR				
Q602	VS2C3939SQR-1		2SC3939SQR	AD
	or			
	VS2SC1509R/-1		2SC1509	AD
INTEGRATED CIRCUIT				
IC601	VHiBA7765AS/ /		BA7765AS (VC-A215H)	AM
IC601	VHiBA7765AS-1		(VC-A215HM)	AL
CONTROLS				
R610	RVR-M4165GEZZ		10k(B) Playback Level Adj.	AB
R630	RVR-M4175GEZZ		470k(B) Bias Level Adj.	AB
COILS AND TRANSFORMER				
L601	VP-YF822J0000		8.2mH	AC
L602	VP-CF221K0000		220μH	AB
T601	RTRNH0053GEZZ		Oscillator	AE
CAPACITORS				
C601	RC-QZA122TAYJ		1200pF, 50V, 5%, Mylar	AB
C604	RC-QZA123TAYJ		0.012μF, 50V, 5%, Mylar	AB
C608	RC-QZA152TAYJ		1500pF, 50V, 5%, Mylar	AB
C610	VCEAGA1AW107M		100μF, 10V, 20%, Electrolytic	AB
C615	RC-QZA183TAYJ		0.018μF, 50V, 5%, Mylar	AB
C616	RC-QZA153TAYJ		0.015μF, 50V, 5%, Mylar	AB
C623	VCQPSA2AA562J		5600pF, 100V, 5%, Polypro Film	AC
C627	VCE9AA1HA105M		1μF, 50V, 20%, Electrolytic (N.P.)	AB
C629	RC-QZY123UMYK	U	0.012μF, Mylar (VC-A215HM)	AA
MISCELLANEOUS				
	QPLGN0229TAZZ		Plug, 2 pin (TP601–602)	AB
	QPLGN0528TAZZ		Plug, 5 pin (*)	AB
	QPLGZ0525GEZZ		Plug, 5 pin (K601)	AB
	QPLGZ0625GEZZ		Plug, 6 pin (K602)	AC

REF. NO.	PART NO.	★	DESCRIPTION	CODE
POWER CIRCUIT				
	RDENT0381GEZZ		Power Board Assembly (VC-A215H)	—
	RDENT0381UMZZ		Power Board Assembly (VC-A215HM)	—
TRANSISTOR				
⚠Q901	95KUAD0088AC		2SD1565	AF
INTEGRATED CIRCUIT				
⚠IC901	95KUCB0029AZ		PQ09R05	AK
DIODES				
⚠D901	95KUBC0112AZ		11E1	AB
⚠ 908				
⚠D909	95KUBC0150BZ		11ES2	AB
D910	95KUBA0005AZ		1SS55	AB
D911	95KUBDAC9R1C		RD9.1ESAB2	AB
TRANSFORMER				
⚠T901	95K116035088		Power Transformer (PT2596)	BD
CAPACITORS				
C902	95KUGZ0671ZZ		2200μF, 35V, Electrolytic	AG
C903	95KUGZ0618ZZ		2200μF, 35V, Electrolytic	AH
C904	95KUGAJ470BU		47μF, 100V, Electrolytic	AD
RESISTORS				
⚠R901,	95KUECC685AB		6.8M ohm, 1/2W, Solid	AB
⚠ 902				
⚠R904,	95KUEBBR47AF		0.47 ohm, Fuse Resistor	AC
⚠ 905				
⚠R908	95KUES1802AB		18k ohm, 1/4W, Carbon	AA
⚠R910	95KUES2201AB		2.2k ohm, 1/4W, Carbon	AA
⚠PR901	95KUEZ0403ZZ		6.8 ohm, Thermistor	AE
MISCELLANEOUS				
⚠	QACCB9013GEZZ		AC Cord, AC240V/50Hz	AL
⚠F901	95KPJCTB1001		Fuse, T1A, 250V	AD
⚠F902	95KPJCTB2001		Fuse, T2A, 250V	AD
	95KPKZ0194ZZ		Plug, 3 pin (OA)	AC
	95KEFB0014ZZ		Flat Cable, 9 pin (PA)	AD
	95KECB7383ZZ		Plug, 3 pin (PC)	AT
INFRARED REMOTE CONTROL CIRCUIT				
	RRMCG0678GESA		Infrared Remote Control Unit (VC-A215H)	BE
	RRMCG0678UMSA		Infrared Remote Control Unit (VC-A215HM)	BF

REF. NO.	PART NO.	★	DESCRIPTION	CODE
TRANSISTOR				
Q1	92P3TSN0005T		2SC2411K	AB
INTEGRATED CIRCUIT				
IC01	92P3SQ00147		M34201M4-111FP	AV
DIODES AND CRYSTALS				
IED01	92P3QH00019		SLR932A-1-A	AC
D1	92P3TSD0007T		DAN-202K	AK
7				
X1	92P3EF00002		Crystal	AK
X2	92P3EQ00010			AK
MISCELLANEOUS				
	92P3ETFA9701		Battery Terminal (+)	AA
	92P3ETFA9801		Battery Terminal (−)	AA
SW01	92PSSSS22388A		Slide Switch	AC
CABINET PARTS				
1	92PFA11D6810		Cabinet-Top	AM
2	92PFA11E1701		Cabinet-Bottom	AF
3	92PFA11D2101		Cabinet	AC
4	92PFA58A6601		Filter	AC
5	92PFA42B2441		Contact Rubber	AV
6	92PFA62B1767		Marking Plate (A) (VC-A215H)	AV
6	92PFA62B1769	U	Marking Plate (A) (VC-A215HM)	—
7	92PFA62A9709		Marking Plate (B)	AD
9	92P3ELFA048		LCD	AR
10	92PFA23A5001		Spacer	AA
11	92P3ECFA0011		Connector	AD
12	92P3ETFA9602		Terminal (C)	AA
13	92P2A391060		Screw	AA
14	92P2A502100		Screw	AA
15	92P3ETFA9701		Terminal (A)	AA
16	92P3ETFA9801		Terminal (B)	AA
17	92PFA61A8806		Knob	AB
18	92PFA42B0205		Contact Rubber	AH
THE OTHER PARTS				
	QCNW-2702GEZZ		Connecting Cord (VC-A215H)	AK
	QCNW-3741UMZZ	U	Connecting Cord (VC-A215HM)	AL
	TINS-1514GEZZ		Operation Manual (VC-A215H)	AW
	TINS-1531UMZZ	U	Operation Manual (VC-A215HM)	AG
	TGAN-1024CEZZ		Guarantee Card (VC-A215H)	AB
	TGAN-A037WRR0	U	Guarantee Card (VC-A215HM)	AA

MECHANISM CHASSIS PARTS

REF. NO.	PART NO.	★	DESCRIPTION	CODE
1	PGi DS0023GEFW		Retaining Guide	AE
2	MSPRC0142GEFJ		Retaining Guide Spring	AA
3	MLEVC0022GEZZ		Half-Loading Lever	AF
4	MSPRT0270GEFJ		Half-Loading Lever Spring	AA
5	MLEVF0284GEFW		Half-Loading Drive Lever	AC
6	MSPRT0269GEFJ		Half-Loading Reciprocating Spring	AA
7	MLEVF0283GEZZ		Half-Loading Reciprocating Lever	AB
8	MSPRC0144GEFJ		Azimuth Spring	AA
9	RHEDU0070GEZZ		Audio/Control Head Ass'y	AS
10	PCAPS1015GEZZ		Retaining Guide Cap	AA
11	QPWBF2888GEZZ		Audio/Control Head PWB	AB
12	MLEVF0292GEZZ		Audio/Control Head Arm	AD
13	MSPRD0087GEFJ		Audio/Control Head Arm Spring	AA
14	LHLDZ1606GEZZ		Loading Block Holder Ass'y	AC
15	QPRBF2886GEZZ		Loading Block PWB	AD
16	RMōTM1049GEZZ		Loading Motor	AM
17	QPLGN0529TAZZ		Plug, 5 pin (MG)	AB
18	QSW-R0026GEZZ		Cam Switch	AE
19	NGERW1032GEZZ		Worm Wheel	AC
20	NPLYV0133GEZZ		Loading Motor Pulley	AC
21	NBLTK0058GE00		Loading Belt	AA
22	NGERW1031GEZZ		Worm Ass'y	AC
23	NSFTG0045GEFJ		Worm Shaft	AB
24	NGERH1129GEZZ		Master Cam	AC
25	MLEVF0281GEZZ		Pinch Roller Lever Ass'y	AN
26	MLEVF0290GEZZ		Relay Shifter Lever	AE
27	MLEVC0023GEZZ		Reverse Guide	AG
28	MSPRD0086GEFJ		Reverse Guide Spring	AA
29	RMōTN2028GEZZ		Capstan D.D. Motor	AZ
30	MLEVP0136GEZZ		Slow Brake Lever	AA
31	MSPRT0276GEFJ		Slow Brake Spring	AA
32	MSPRC0151GEFJ		Reverse Guide Spring	AA
33	MLEVF0289GEZZ		Relay Gear Drive Lever	AE
34	MSLiF0043GEZZ		Brake Shifter	AK
35	NSFTZ0068GEFD		Brake Lock Shaft	AC
36	MSPRC0143GEFJ		Absorber Plate Spring	AB
37	MSPRT0274GEFJ		Video Search Spring	AB
38	MLEVP0181GEZZ		Video Search Brake Lever	AA
39	MLEVP0131GEZZ		Video Search Reciprocating Lever	AC
40	RPLU-0083GEZZ		Brake Solenoid Ass'y	AF
41	NDAiV1046GEZZ		Take-Up Reel Disk Ass'y	AG
42	NGERH1128GEZZ		Idler Gear Ass'y	AN
43	NPLYV0134GEZZ		Reel Pulley	AC
44	MSPRD0085GEFJ		Shifter Spring	AB
45	PCōVP1018GEZZ		Shifter Spring Cover	AC
46	LHLDP1092GEZZ		Cassette LED Holder	AE
47	RH-PX0180GEZZ		Cassette LED	AD
48	QPWBF2977GEZZ		Reel Sensor PWB	AK
49	RH-PX0171GEZZ		Reel Sensor	AE
50	LCHSS0016GEZZ		Reel Block Chassis	AL
51	MLEVP0134GEZZ		Tension Adjusting Lever	AC
52	MLEVP0133GEZZ		Tension Release Lever	AC
53	MLEVP0132GEZZ		Back Tension Lever	AC
54	MSPRT0273GEFJ		Back Tension Lever Spring	AB
55	NDAiV1047GEZZ		Supply Reel Disk Ass'y	AH
56	MSPRT0272GEFJ		Main Brake Spring	AC
57	MLEVP0135GEZZ		Intermediate Lever	AC
58	MLEVP0129GEZZ		Main Take-Up Brake Lever	AE
59	MLEVP0128GEZZ		Main Supply Brake Lever	AE
60	NGERH1121GEZZ		Loading Relay Gear	AA
61	MSPRT0271GEFJ		Loading Reciprocating Spring	AA
62	NGERH1120GEZZ		Take-Up Loading Gear	AA
63	MLEVF0304GEZZ		Take-Up Loading Arm Ass'y	AC
64	NGERH1119GEZZ		Supply Loading Gear	AA
65	MLEVF0303GEZZ		Supply Loading Arm Ass'y	AC
66	LCHSM0091GEZZ		Main Chassis Ass'y	AR
67	LBNDK1002GEZZ		Tension Band Ass'y	AD
68	LHLDZ1607GEZZ		Tension Spring Hook Plate	AA
69	MSPRT0275GEFJ		Tension Spring	AA
70	MLEVF0291GEZZ		Tension Arm Ass'y	AF
72	MSLiF0049GEFW		Take-Up Pole Base Slider	AB
73	LPōLM0037GEZZ		Take-Up Pole Base Ass'y	AG
74	NRōLP0062GEZZ		Guide Roller Ass'y	AE
75	MSLiF0048GEFW		Supply Pole Base Slider	AB
76	LPōLM0036GEZZ		Supply Pole Base Ass'y	AG
77	PGiDM0066GEZZ		Take-Up Loading Rail	AB
78	PGiDM0067GEZZ		Supply Loading Rail	AB
79	NSFTL0563GEFW		Supply Impedance Roller Innor	AC
80	PGiDH0031GEFW		Supply Impedance Roller Flange	AA
81	NRōLP0056GEZZ		Supply Impedance Roller	AD
82	RHEDT0026GEZZ		Full Erase Head Ass'y	AK
83	QPWBF2936GEZZ		Full Erase Head PWB	AA
84	LANGA0054GEZZ		Supply Reel Retainer Ass'y	AD
85	NBLTK0059GE00		Reel Belt	AB
86	MLEVP0146GEZZ		Auxiliary Fast-Forward Brake Lever	AE
87	MSPRT0282GEFJ		Auxiliary Fast-Forward Brake Spring	AB
89	DDRMU0002HE36		Upper Drum Ass'y	BC
90	PGiDC0039GEFW		Drum Base	AL
91	DDRML0012HE01		Lower Drum Ass'y	BB
92	QBRSK0021GEZZ		Earth Brush Ass'y	AC
93	RMōTP1102GEZZ		Drum D.D. Motor Ass'y	AW
94	LANGT9105GEFW		Heater Angle	AC
95	VHiM5F7805L-1		3-terminal Regulator	AE
97	QCNW-5969GEZZ		Full Flat Cable (Capstan D.D. Motor and Drum D.D. Motor)	AM
99	RDTCH0018GEZZ		Dew Sensor	AG
100	QSōCN0534REZZ		Socket, 5 pin (MF)	AC
101	VRS-TW2ED221J		220 ohm, 1/4W, 5%, Oxide Film	AA
102	VCKYTV1HB102K		0.001μF, 50V, 10%, Ceramic	AA
103	VRS-TV1JD473J		47k ohm, 1/16W, 5%, Oxide Film	AA
105	LANGA0051GEFW		Take-Up Reel Disk Catch Holder	AB
106	PGiDS0027GEZZ		Supply Impedance Roller Flange L	AA
110	PCAPS1018GEZZ		Slow Brake Shaft Cap	AA
111	LANGF7061GEZZ		Release Pin Angle Ass'y	AC
120	CCHSS0018GE02		Reel Block Ass'y	AZ

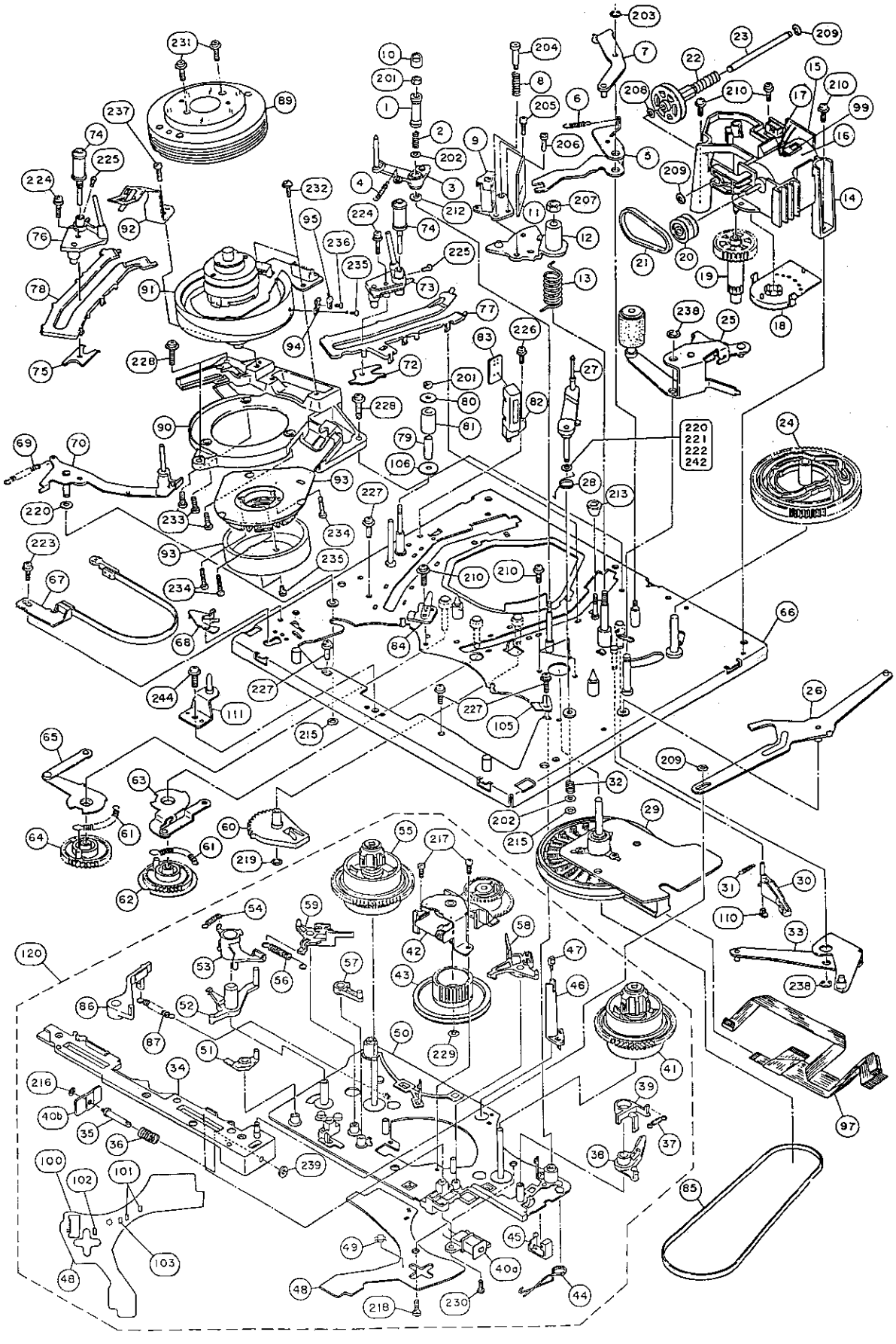
REF. NO.	PART NO.	★	DESCRIPTION	CODE
CASSETTE HOUSING CONTROL PARTS				
	CHLDX3050GE99		Cassette Housing Control Assembly (Excludes the Cassette Cover)	AY
301	HDECQ0546GESA		Cassette Cover	AF
302	PGi DM0069GE00		Down Guide	AC
303	QSW-F0034GEZZ		Cassette Erase Protection Switch	AC
304	LHLDX1008GE00		Cassette Housing Frame (Right)	AF
305	MARMP0038GE00		Cassette Cover Arm	AA
306	NGERW1036GEZZ		Phase Gear	AA
307	MSPRD0088GEFJ		Drive Gear Spring (Right)	AA
308	NGERW1034GEZZ		Drive Gear (Right)	AB
309	MSPRT0277GEFJ		Reciprocating Spring	AA
310	NGERW1033GEZZ		Worm Wheel Gear	AB
311	MLEVP0142GE00		Open Lever	AA
312	MSPRD0091GEFJ		Open Lever Spring	AA
313	MLEVP0141GEZZ		Switching Lever	AA
314	MSPRT0280GEFJ		Switching Lever Spring	AA
315	QSW-F0040GEZZ		Cassette Switch	AD
316	LANGF9355GEFW		Worm Bracket	AB
317	NBRGP0013GEZZ		Bearing	AA
318	NSFTD0016GEZZ		Worm Shaft Ass'y	AE
319	MLEVP0140GEZZ		Clutch Lock Lever	AA
320	MSPRT0279GEFJ		Clutch Lock Lever Spring	AA
321	MLEVP0139GEZZ		Clutch Release Lever	AA
322	MSPRD0092GEFJ		Clutch Release Lever Spring	AA
323	MLEVP0138GEZZ		Clutch Lever	AA
324	NPLYV0135GEZZ		Pulley	AA
325	NBLTK0060GE00		Cassette Loading Belt	AB
326	LANGF9354GEFW		Upper Plate	AD
327	LHLDX1011GE00		Slider Holder (Left)	AB
328	MSPRP0097GEFJ		Cassette Spring	AA
329	LANGF9357GEFW		Slider Lock (Left)	AA
330	MSPRT0281GEFJ		Slider Lock Spring	AA
331	MSLi F0044GEFW		Slider	AF
332	MLEVP0137GE00		Lock Release Lever	AA
333	MSPRD0093GEFJ		Lock Release Lever Spring	AA
334	MLEVP0143GE00		Slider Lock Cover	AA
335	LANGF9356GEFW		Slider Lock (Right)	AA
336	LHLDX1010GE00		Slider Holder (Right)	AB
337	NGERW1035GEZZ		Drive Gear (Left)	AB
338	MSPRD0089GEFJ		Drive Gear Spring (Left)	AA
339	LHLDX1009GE00		Cassette Housing Frame (Left)	AF
340	NSFTD0015GEFD		Main Shaft	AD
341	MSPRD0090GEFJ		Cassette Cover Spring	AA
342	QPWBF3194GEZZ		Start Sensor PWB	AC
343	QPWBF2894GEZZ		End Sensor PWB	AB
344	RH-PX0176GEZZ		Phototransistor	AE
345	VS2SA937-Q/-1		Transistor	AC
346	QSöCN0595GEZZ		Socket, 5 pin	AB
347	VRD-RA2BE153J		15k ohm, 1/8W, 5%, Carbon	AA
348	VRD-RA2BE223J		22k ohm, 1/8W, 5%, Carbon	AA
349	VRD-RA2BE332J		3.3k ohm, 1/8W, 5%, Carbon	AA
350	VRD-RA2BE472J		4.7k ohm, 1/8W, 5%, Carbon	AA
351	VRD-RA2BE103J		10k ohm, 1/8W, 5%, Carbon	AA
352	RC-KZ0028GEZZ		0.047μF, 16V, 20%, Ceramic	AA
353	VSDTC124F//-1		Transistor, DTC124F	AC
401	LX-WZ1020GE00		Cut Washer (4.2W-6.0-0.5)	AA
402	LX-HZ3046GEFD		Screw (B Tight BTN3P+6S)	AA
SCREWS, NUTS, AND WASHERS				
201	XNFSD20-16000		Adjusting Nut	AA
202	XWHSD26-05060		Washer W2.6S-6-0.5	AA
203	XRESJ20-04000		E Ring-2	AA
204	LX-BZ3095GEFD		AC Head Screw	AA
205	XBPSD26P06000		Azimuth Adjusting Screw	AA
206	LX-BZ3096GEFD		Tilt Adjusting Screw	AA
207	XNFSD40-31000		Adjusting Nut (A/C Head)	AB
208	XWHJZ31-05054		Washer W3.1-5.4-0.5	AA
209	LX-WZ1041GE00		Washer W2.6-6-0.5 (LM)	AA
210	XHPSD26P06WS0		Screw C2.6P+6S	AA
211	XRESJ30-06000		E Ring-3	AA
212	XWHJZ45-02060		Washer PSW4.6-6-0.25	AA
213	LX-NZ3043GEFW		Adjusting Nut	AB
215	LX-WZ1003GE00		Washer CW2.1-5-0.5	AA
216	XRESJ12-03000		E Ring-1.2	AA
217	XHPSD26P06WS0		Screw S2.6P+6S	AA
218	XHPSD20P03000		Screw S2P+3S	AA
219	XRESJ25-04000		E Ring-2.5	AA
220	XWHJZ25-05050		Washer W2.6-5-0.5	AA
221	XWHJZ25-01050		Washer W2.6-5-0.13	AA
222	XWHJZ25-02050		Washer W2.6-5-0.25	AA
223	LX-HZ3043GEZZ		Screw W2.6+6S	AA
224	LX-BZ3099GEZZ		Screw WSW2P+11S (W5)	AB
225	LX-XZ3030GEFD		Screw M2x4	AC
226	XHPSD26P08WS0		Screw C2.6P+8S	AA
227	XJPSD26P08WS0		B Tight Screw C2.6P+8S	AA
228	XHPSD30P08WS0		Screw C3P+8S	AA
229	LX-WZ1040GE00		Washer CW2.5-6-0.5	AA
230	XJBSD20P06000		B Tight Screw 2P+6S	AA
231	LX-BZ3039GEFN		Screw W3P+9S-Ni	AA
232	LX-HZ3056GEFD		Screw WSW3P+8S	AA
233	LX-BZ3039GEFN		Screw SW3P+9S-Ni	AA
234	XBPSD26P12J00		Screw SW2.6P+12S	AA
235	XBPSD30P05J00		Screw SW3P+5S	AA
236	XBPSD30P06J00		Screw SW3P+6S	AA
237	XHPSD30P06000		Screw S3P+6S	AA
238	LX-RZ3001AEZZ		E Ring (Curl)	AA
239	LX-WZ1042GE00		Washer CW2.7-7-0.5	AA
242	XWHJZ25-04050		Washer W2.6-5-0.4	AA
244	XHPSD30P04WS0		Screw C3P+4S	AA
MECHANICAL PARTS				
601	CCABB1079GE01		Main Frame Asss'y (VC-A215H)	AR
601	CCABB1079TEV0	U	Main Frame Ass'y (VC-A215HM)	AV
601-1	PFLT-0069GEZZ		Felt, Pad	AA
602	CCABA3046GESM		Top Cabinet Ass'y (VC-A215H)	AR
602	CCABA3046TEV1	U	Top Cabinet Ass'y (VC-A215HM)	AU

REF. NO.	PART NO.	★	DESCRIPTION	CODE
603	GBDYU3052GEZZ		Bottom Plate (VC-A215H)	AG
603	GBDYU3052UMZZ	U	Bottom Plate (VC-A215HM)	AK
604	GCōVA1511GEZZ		Antenna Terminal Cover (VC-A215H)	AE
604	GCōVA1511UMZZ	U	Antenna Terminal Cover (VC-A215HM)	AF
607	LHLDZ1609GEZZ		Y/C PWB Holder (VC-A215H)	AA
607	LHLDZ1609UMZZ	U	Y/C PWB Holder (VC-A215HM)	AB
608	QEARP0276GEFW		Earth Plate, Upper (VC-A215H)	AA
608	QEARP0276UMFW	U	Earth Plate, Upper (VC-A215HM)	AB
609	MSPRC0145GEFJ		Spring, Power (VC-A215H)	AA
609	MSPRC0145UMFJ	U	Spring, Power (VC-A215HM)	AA
610	XEBSD30P12000		Screw	AA
611	XHPSD30P06WS0		Screw	AA
612	XEBSD40P12000		Screw	AA
614	LX-HZ3040GEFF		Screw, Top Cabinet	AA
615	LHLDP1013GE00		LED Holder	AB
617	LHLDZ1614GEZZ		Holder, Fluorescent Display Tube	AC
619	TLABM1939GEZZ		Model Label	AC
620	PSPAZ0202GEZZ		Spacer	AC
622	LHLDZ1624GEZZ		Holder	AD
623	LX-HZ3047GEFF		Screw, Bottom Plate	AA
624	LHLDZ1616GEZZ		Audio PWB Holder	AA
625	PSPAZ0046GEZZ		Spacer (VC-A215H only)	AA

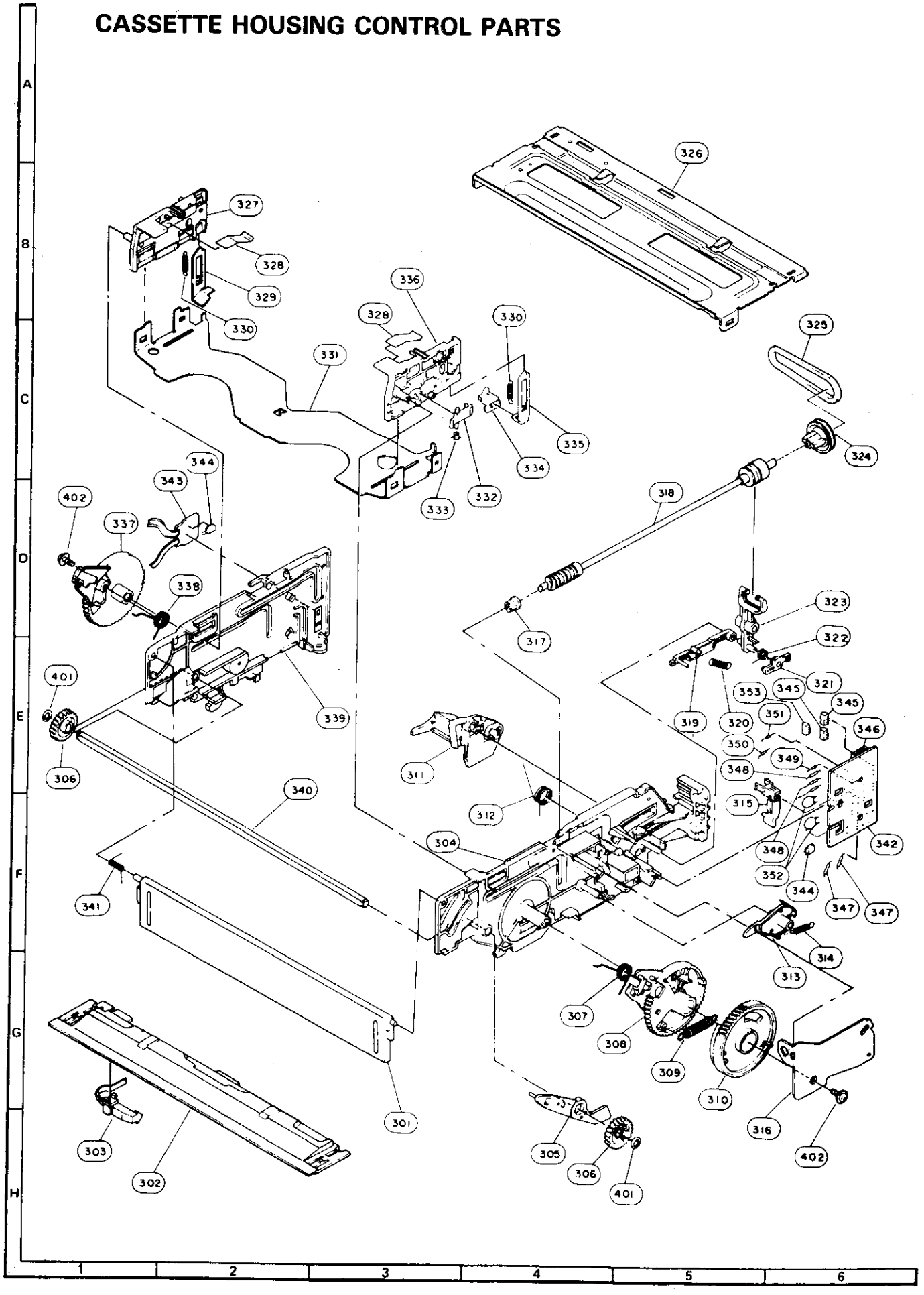
FRONT PANEL PARTS

REF. NO.	PART NO.	★	DESCRIPTION	CODE
501	CPNLC1542GE17		Front Panel Ass'y (VC-A215H)	AZ
501	CPNLC1542TEVF	U	Front Panel Ass'y (VC-A215HM)	AY
501-1	HDECQ0538GESA		Front Decoration Cover (VC-A215H)	AK
501-1	HDECQ0538UMSA	U	Front Decoration Cover (VC-A215HM)	AH
501-2	JBTN-2227GESA		Button, Record (VC-A215H)	AA
501-2	JBTN-2227UMSA	U	Button, Record (VC-A215HM)	AF
501-3	QEARP0272GEFW		Earth (VC-A215H)	AC
501-3	QEARP0272UMFW	U	Earth (VC-A215HM)	AA
501-4	PCōVU9135GESB		Display Filter (VC-A215H)	AF
501-5	LHLDS1010GEZZ		Door Latch (VC-A215H)	AA
501-5	LHLDS1010UMZZ	U	Door Latch (VC-A215HM)	AB
501-6	GCōVA1522GESA		Cover, Power LED (VC-A215H)	AD
501-6	GCōVA1522UMSA	U	Cover, Power LED (VC-A215HM)	AF
501-7	JBTN-2236GESD		Button, Power (VC-A215H)	AE
501-7	CBTN-2236TEV2	U	Button, Power (VC-A215HM)	AE
501-8	GCōVA1425GEZZ		Cover, Remote Control (VC-A215H)	AC
501-8	GCōVA1425UMZZ	U	Cover, Remote Control (VC-A215HM)	AB
501-9	JBTN-2237GESD		Button, Eject (VC-A215H)	AE
501-9	JBTN-2237UMSC	U	Button, Eject (VC-A215HM)	AE
501-10	Hi NDP1738GESA		Indication Plate, inside the door (VC-A215H)	AH
501-10	Hi NDP1738UMSA	U	Indication Plate, inside the door (VC-A215HM)	AH
501-11	LANGF9407GE00		Angle, Door (VC-A215H)	AF
501-12	GDōRF1763GESA		Door (VC-A215H)	AH
501-12	GDōRF1775UMSA	U	Door (VC-A215HM)	AH
501-16	TLABH0449GEZZ		Label (inside the door) (VC-A215H)	AA
501-16	TLABH0449UMZZ	U	Label (inside the door) (VC-A215HM)	AA

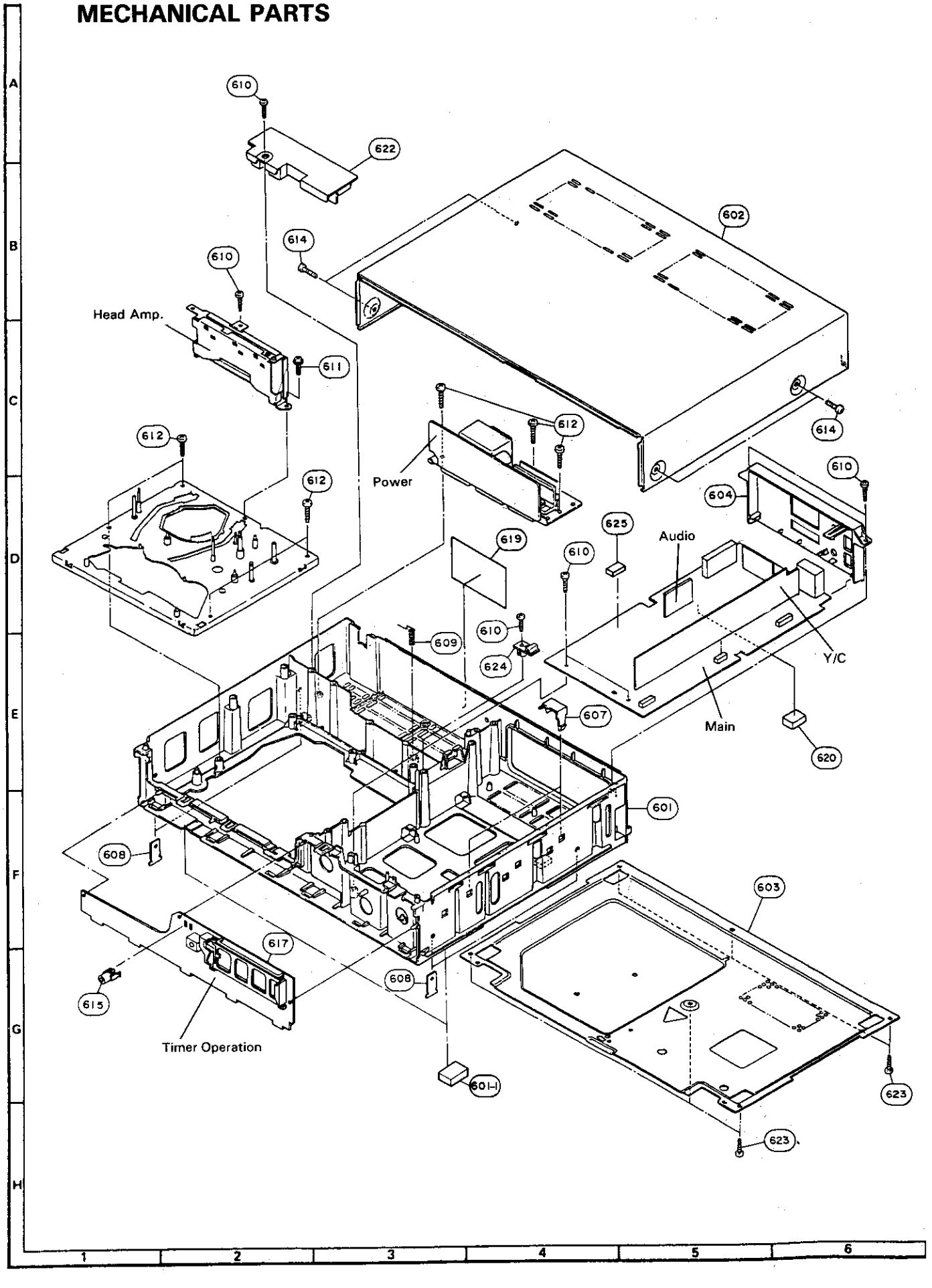
MECHANISM CHASSIS PARTS



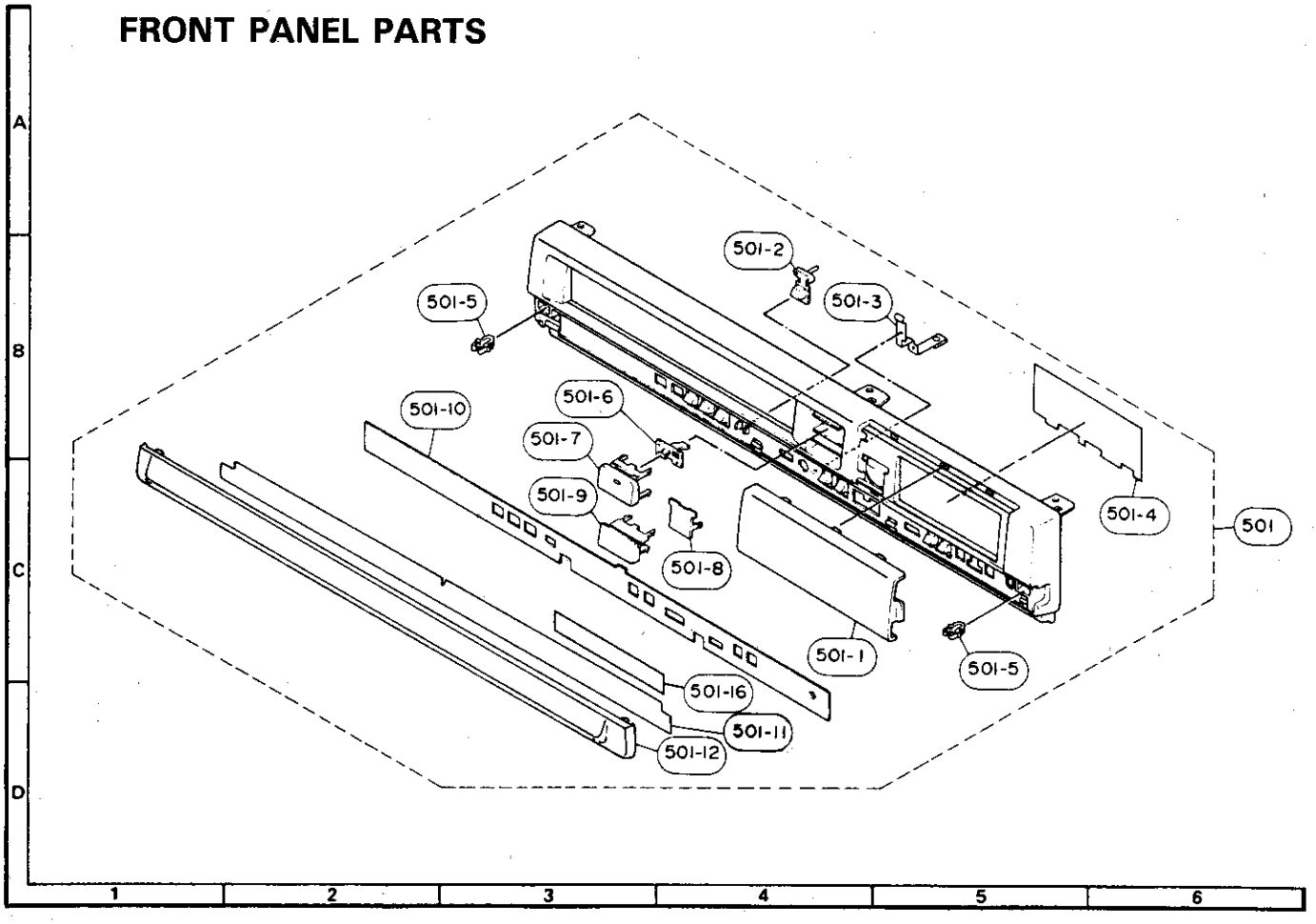
CASSETTE HOUSING CONTROL PARTS



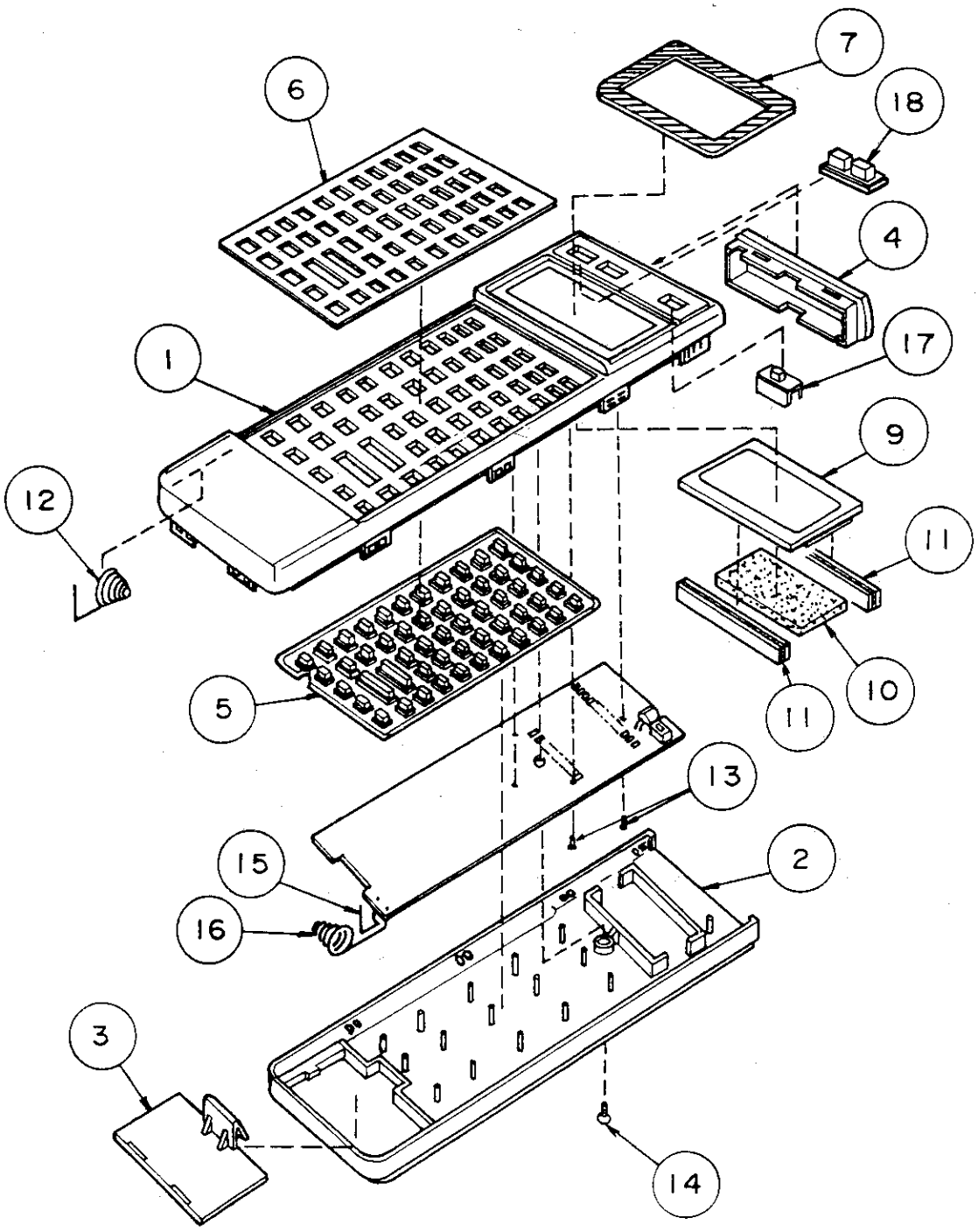
MECHANICAL PARTS



FRONT PANEL PARTS



INFRARED REMOTE CONTROL UNIT



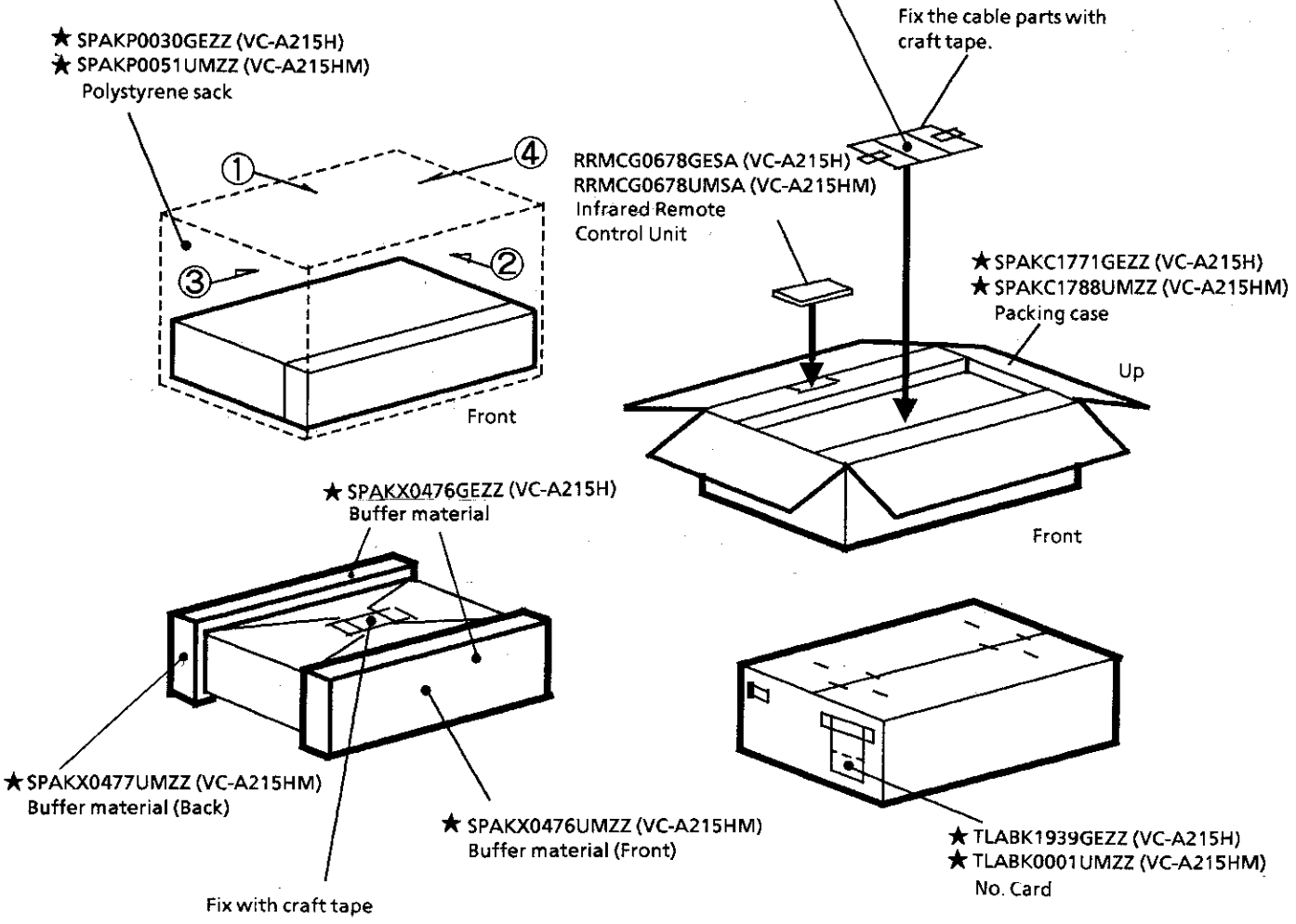
PACKING OF THE SET

● Setting position of the Knobs

Colour mode	at "AUTO" position	RF converter output	at "36" channel
Band selector	at "Normal" position	Test signal	at "OFF" position

★ Accessories

★QCNW-2702GEZZ (VC-A215H) Antenna cord
★QCNW-3741UMZZ (VC-A215HM)
★TiNS-1514GEZZ (VC-A215H) Operation manual
★TiNS-1531UMZZ (VC-A215HM)
★TGAN-1024GEZZ (VC-A215H) Guarantee card
★TGAN-A037WRR0 (VC-A215HM)
★ Dry battery



MARK ★Not Replacement Items

T7389-S

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SHARP TECHNICAL MANUAL

T09P3VC-A615X

VHS VIDEO CASSETTE RECORDER

(PAL SYSTEM)

SERIES	MODEL NO.	VIDEO HEAD
VC-A103 Series	VC-A103R(BK), Q(BK), GV(BK), VC-A106GVM(BK)	2-head system
VC-A116 Series	VC-A116S(BK), B, K, E, W, VC-B322N	
VC-A125 Series	VC-A125X	
VC-A215 Series	VC-A215S(BK)	
VC-A118 Series	VC-A118D	
VC-A508 Series	VC-A508DT	Double azimuth 4-head system
VC-A615 Series	VC-A615G(BK), S(BK), GM(BK), SM(BK), YM(BK), HM, X, WT, NZ, VC-B377N, NT	
VC-T620 Series	VC-TN623QM(BK)	
VC-A215 Series	VC-A215H	2-head LP system

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4. TIMING CHART 49
5. TIMER CIRCUIT 56
6. AUTOMATIC VOLTAGE SYNTHESIZER CIRCUIT 67
7. Y/C CIRCUIT 74
8. BLOCK DIAGRAM 79

SHARP CORPORATION

1. MECHANISM

OUTLINE

This VTR is a low-profile, shelf-mount type working on the VHS system. Many newly developed mechanisms have been adopted to make this model thinner, more reliable and power-saving compared to the conventional models.
Main features include:

1) Use of a single-cam system which can cope with various modes
2) A newly developed thin capstan DD (Direct Drive) motor
3) Appropriate torques achieved by a geared reel drive system
4) Newly developed loading system for systemization of the cassette control and loading mechanisms

CONFIGURATION

The mechanism of this model can be roughly divided into the following sections.
System sections

1) Tape drive train system
2) Loading mechanism
3) Cassette tape take-up mechanism
4) PAD (Power Assist Drive) mechanism
5) Cam switch
6) Cassette control mechanism

These sections are discussed one by one as follows.

1-1. Tape Drive Train System

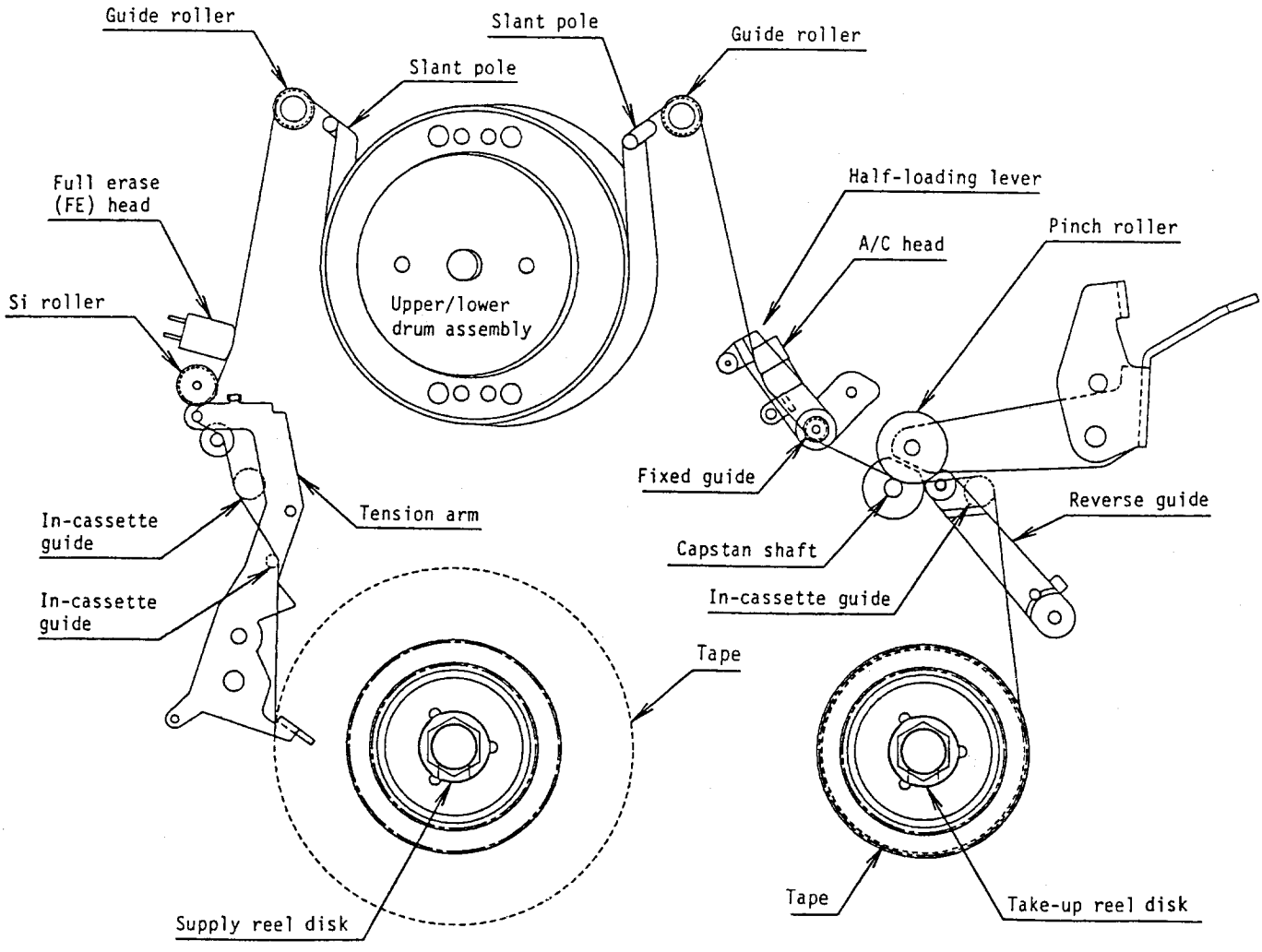


Figure 1-1. Tape Travel System

Features

1) Miniaturized Si (Supply impedance) roller from 16 mm to 7 mm dia.; much smaller mechanism realized.
2) Fixed erasing head; simple design.
3) Enlarged guide roller from 6 mm to 7 mm dia.; reduces the number of revolutions in high-speed video search operation.
4) Miniaturized pinch roller from 18 mm to 14 mm dia.; subcompact mechanism accomplished.
5) The reverse guide works in Video search (VS) and rewind (REW) modes only, reducing the risk of tape damage.

1-2. Loading Mechanism

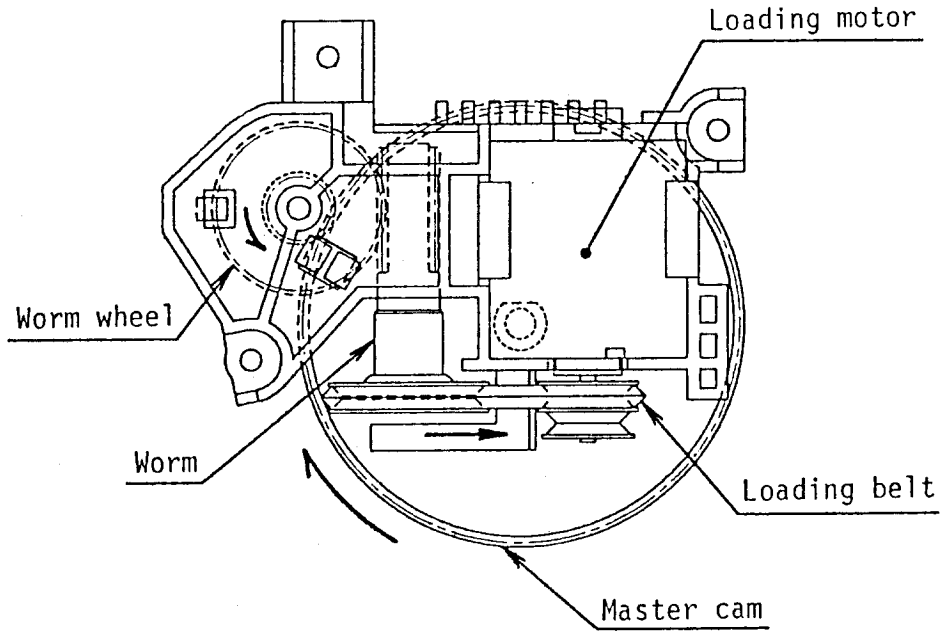


Figure 1-2. Loading Mechamism (Upper stage)

Features

1) The mechanism is driven by the loading motor.
2) The loading motor is intended to drive the mechanism and the cassette housing.
   (Refer to the description on the clutch shifting mechanism on page 17.)
3) The four-cam system which used to control the operation of the whole transport mechanism has been combined into a single master cam.

1-3. Cassette Tape Take-up Mechanism

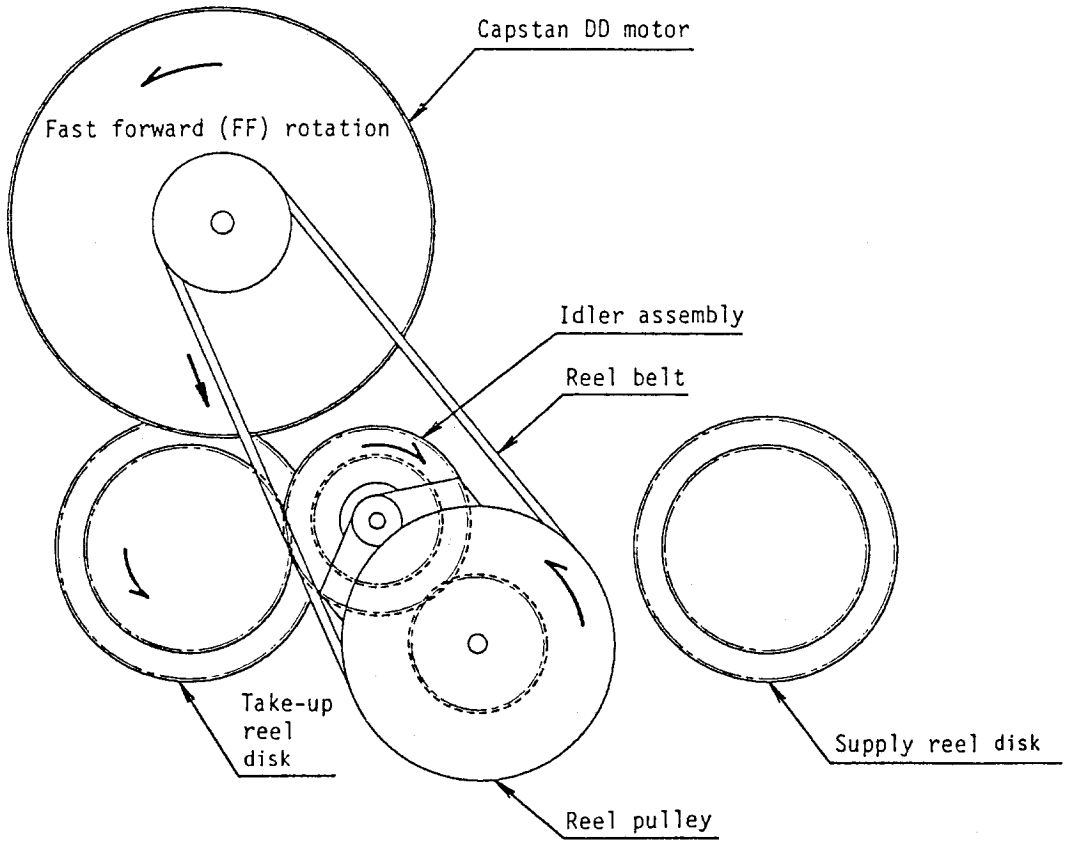


Figure 1-3. Cassette Tape Take-up Mechanism 1 (Lower stage)

Features

1) The reel disk to be driven by the idler assembly is switched by changing the rotational direction of the capstan DD motor.
2) The reel pulley and the idler assembly are always engaged with each other, and the rotation of the capstan DD motor is transmitted through the reel belt to the supply or take-up reel disk.
3) The idler assembly consists of a large and a small gear in a monoblock construction and mounted in the mechanism to allow vertical slide operation.
4) Each reel disk incorporates a slip mechanism to take up the tape without any slack and at an appropriate take-up torque in recording, playback and trick play operations. (large gear)

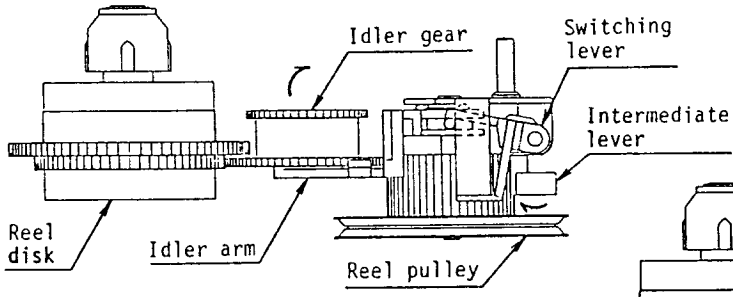


Figure 1-4. Gear Engagement in Fast Foward and Rewind Operations

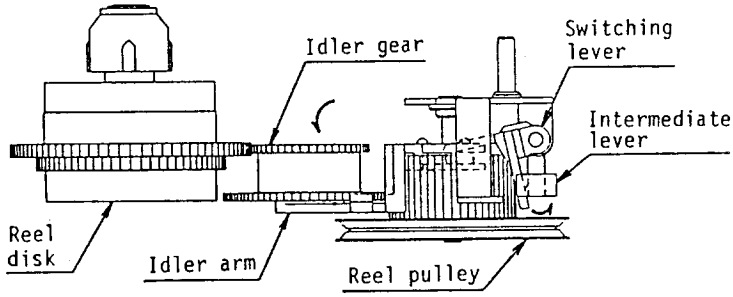


Figure 1-5. Gear Engagement in Recording, Playback and Trick Play Operations

5) In the fast forward and rewind modes, the large idler gear engages with the small gear of the reel disk, not through the torque limiter built in the reel disk. They work as a simple gear mechanism to transfer the revolving motion to the reel disk. (Figure 1-4.)
6) In the recording, playback and trick play modes, the idler arm moves to the lower position so that the small idler gear engages with the large gear of the reel disk. In this case, the rotation of the idler assembly is transmitted through the torque limiter built in the reel disk to the reel disk. (Figure 1-5.)

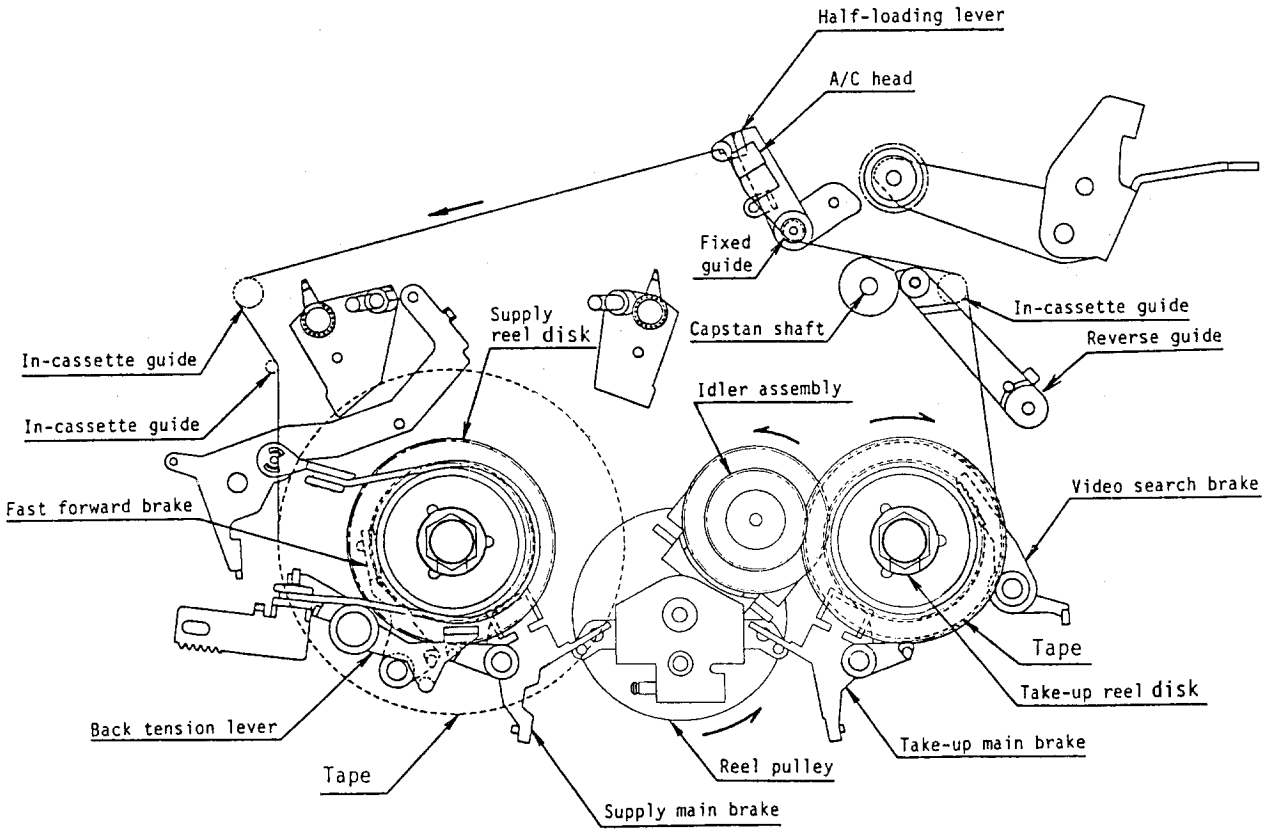


Figure 1-6. Cassette Tape Take-up Mechanism 2 (Upper stage)
Fast forward operation

7) In fast forward and rewind operations, a back tension is provided by the fast forward brake and video search brakes. (Figures 1-6. and 1-7.)
8) The idler gear is positioned as shown in Figure 1-5. when tape loading is completed. The limiter gear of the take-up reel disk then goes into an operating condition, and its sliding motion absorbs the change in tape diameter while the tape is being wound in order to compensate the reel's revolving speed. (Figures 1-5. and 1-8.)
9) In playback and recording operations, a back tension is provided by a combined force of the tension band, tension arm and tension spring at the supply reel disk. (Figure 1-8.)
10) The back tension in the VS and REW modes is given by the video search brake for the take-up reel disk. (Figure 1-9.)

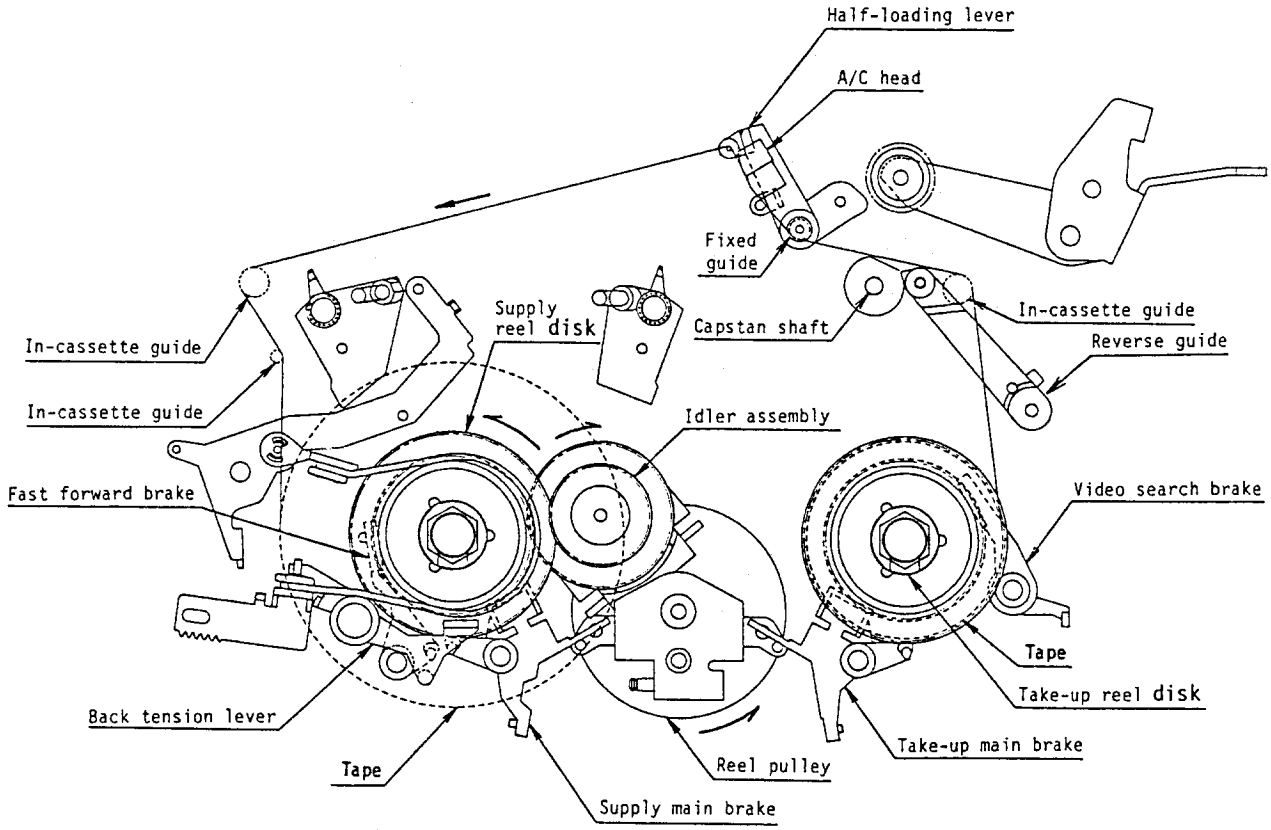


Figure 1-7. Cassette Tape Take-up Mechanism 3 (Upper stage)
Rewind operation

11) In the VS and REW modes, the tension release lever slackens the tension band so that only the brake of the back tension lever acts on the supply reel disk. (Figure 1-9.)
12) The reverse guide works in the VS and REW modes in order to stabilize tape drive train during reverse running. (Figure 1-9.)

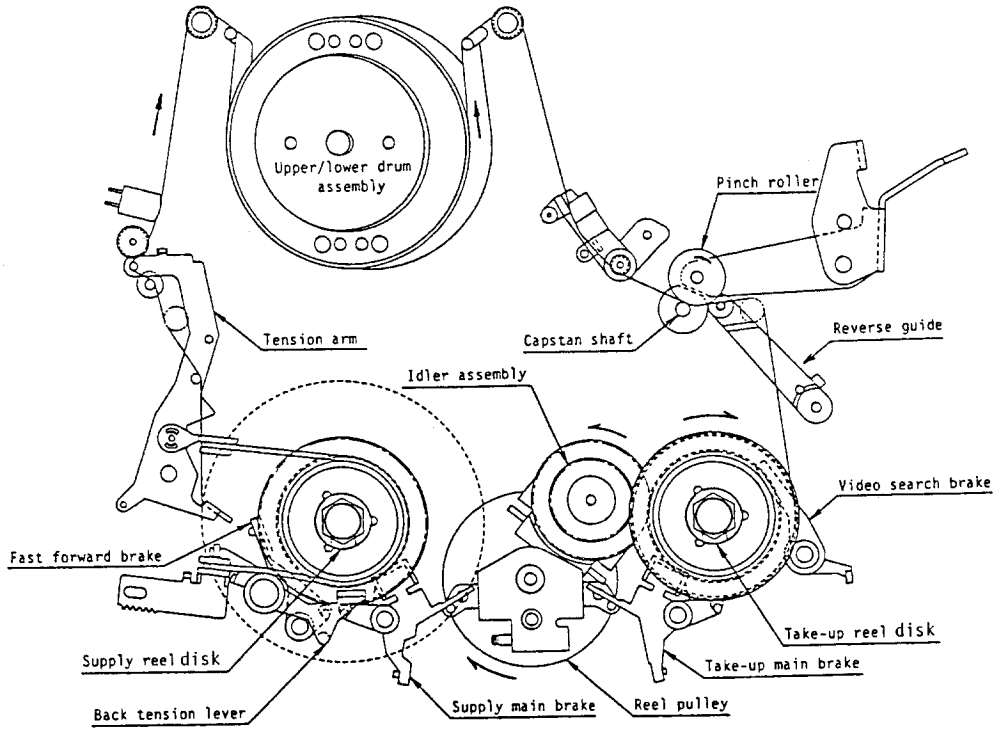


Figure 1-8. Cassette Tape Take-up Mechanism 4 (Upper stage)
Recording and playback opertions

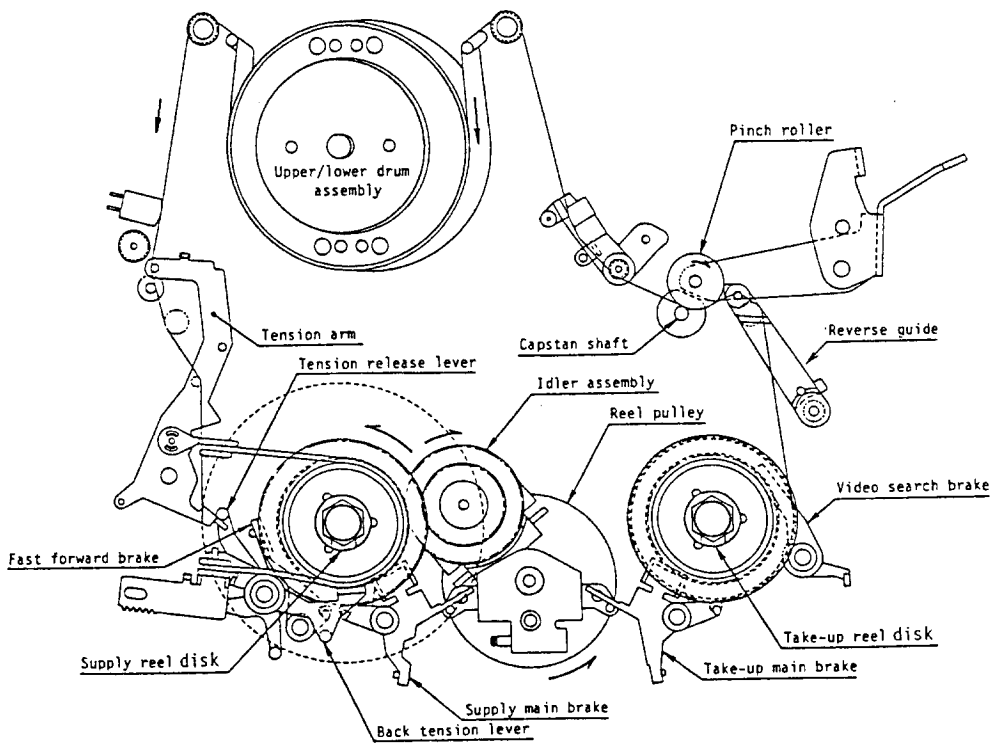
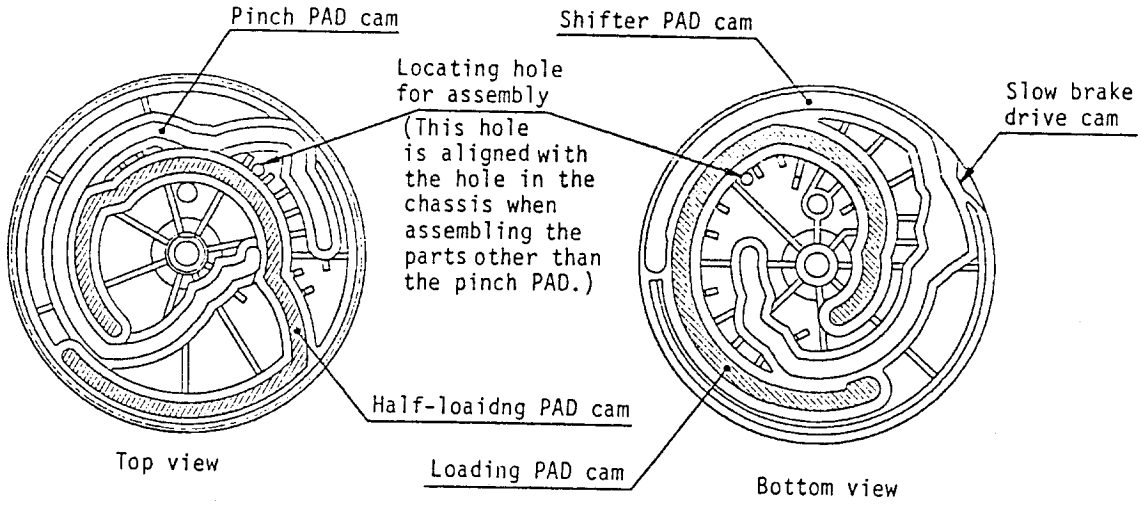


Figure 1-9. Cassette Tape Take-up Mechanism 5 (Upper stage)
VS and REW operations

1-4. PAD (Power Assist Drive) Mechanism

1) Master cam grooves

As shown in Figure 1-10., the single master cam has some grooves on its both sides to bring the mechanism in various modes. The control levers are guided along these grooves. Precise switching is also guaranteed with the interlocking of this cam and the cam switch.



Figue 1-10.

2) Positional relation and operation of loading gears

The loading gear S is aligned with the loading gear T so that the locating mark 1 (round projection) of the former gear engages with the notch on the circumference of the latter gear. See Fig. 1-11.

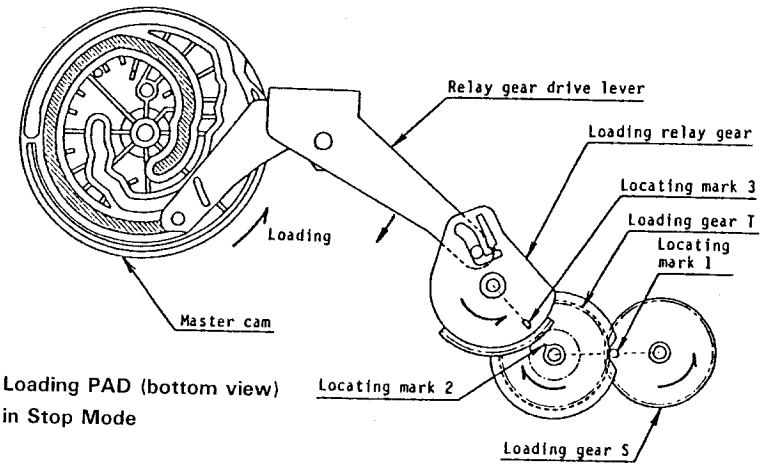


Figure 1-11. Loading PAD (bottom view) in Stop Mode

Next, the locating mark 2 of the small gear of the loading gear T is aligned with the locating mark 3 of the loading relay gear.
Figure 1-11. and Figure 1-12. show the positional relation in Stop and Play mode, respectively. Note the difference in the position of the relay gear drive lever with respect to the master cam groove between two modes.

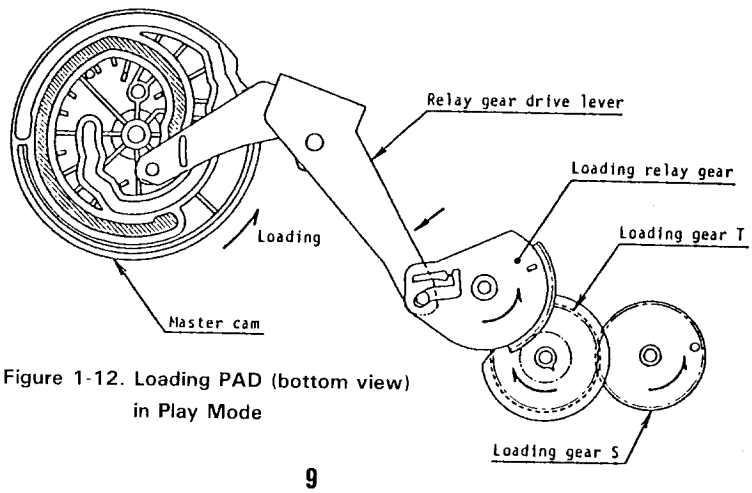


Figure 1-12. Loading PAD (bottom view) in Play Mode

3) Positional relation and operation of pinch roller lever
(other than in eject operation)

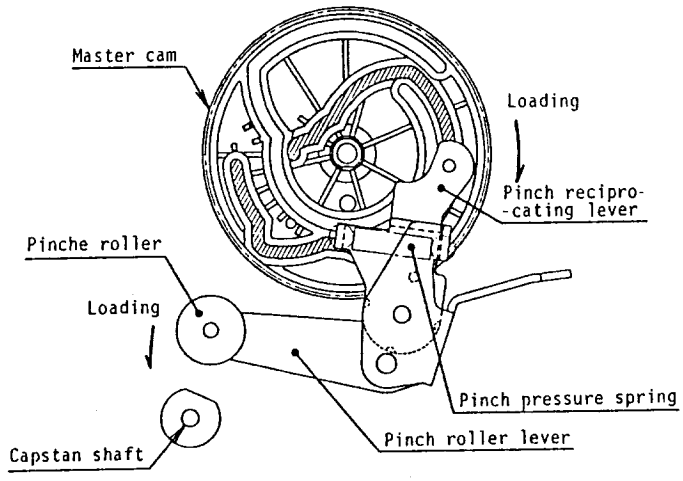


Figure 1-13. Stop Mode (FF/REW)

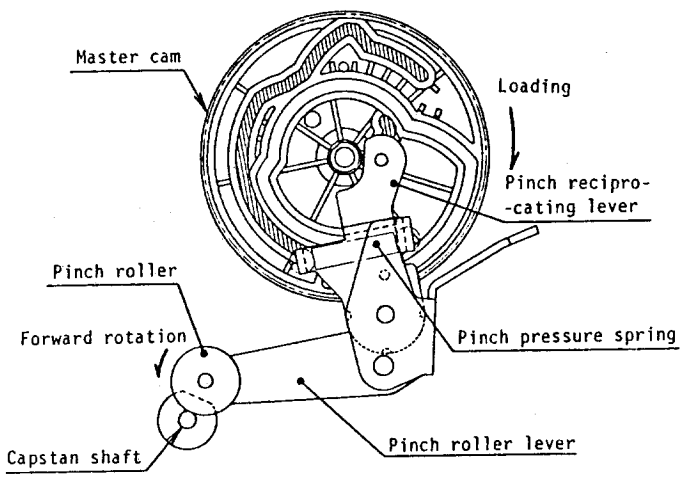


Figure 1-14. Playback Mode

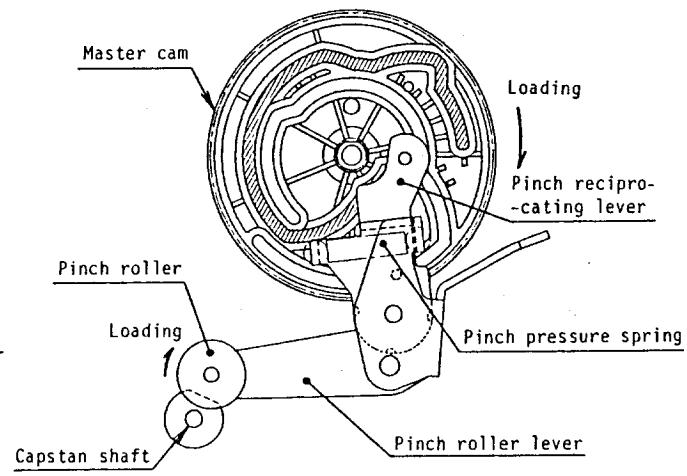


Figure 1-15. Positioning in Pause Mode

When the pinch roller has been pressed against the capstan shaft, the master cam rotates to the position shown in Figure 1-14. Then, the pinch pressure spring gives a necessary pressure (1,000 - 1,200 g) to feed the tape.
Just before going to the video search rewind mode or at short rewind operation in the REC/PAUSE mode, the master cam once rotates to the position shown in Figure 1-15. to slightly release the pinch roller pressure; this is just to allow the capstan to feed the tape while the idler assembly is shifting toward the supply reel disk. Then, it reverts to the position shown in Figure 1-14. and feeds the tape in the reverse direction to ensure stable tape reversing.

4) Operation of half-loading lever

- The cassette is loaded in the normal position only in the FF and REW modes by the master cam and released in the other modes.
- The half-loading lever is always kept at a fixed position by the half-loading reciprocating lever, half-loading reciprocating spring and half-loading drive lever.

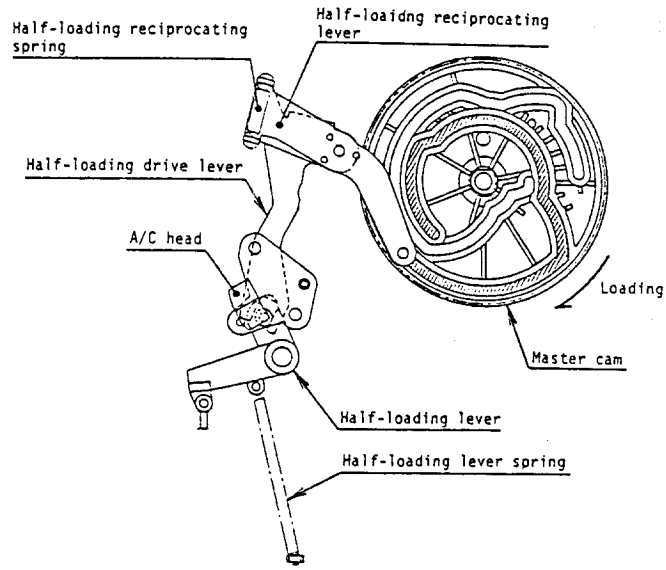


Figure 1-16. Eject Mode

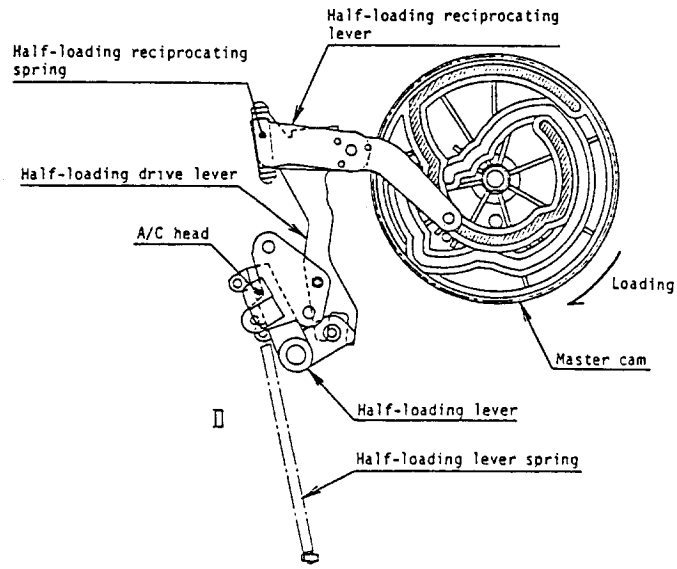


Figure 1-17. Stop Mode (FF/REW)

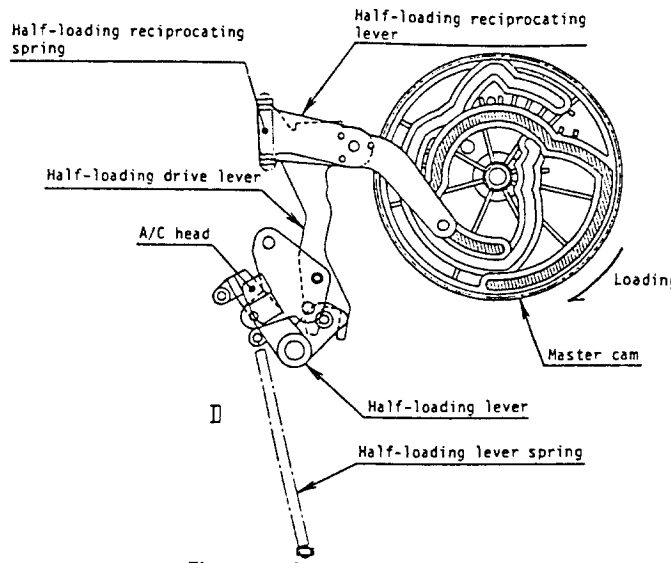


Figure 1-18. Recording and Playback Modes

5) Operation of brake shifter

The relay shifter transfers the driving force of the master cam to the brake shifter to cause a linear motion of the brake shifter as shown in Figure 1-19.

The brake shifter performs the following operations:

- Activation and Releasing of the main brake
- Vertical movement of the idler lever
- Activation and Releasing of the fast forward brake
- Activation and Releasing of the back tension brake
- Switching of the driving force of the video search brake
- Releasing of the tension arm

Further, the relay shifter performs activation and releasing of the reverse guide.

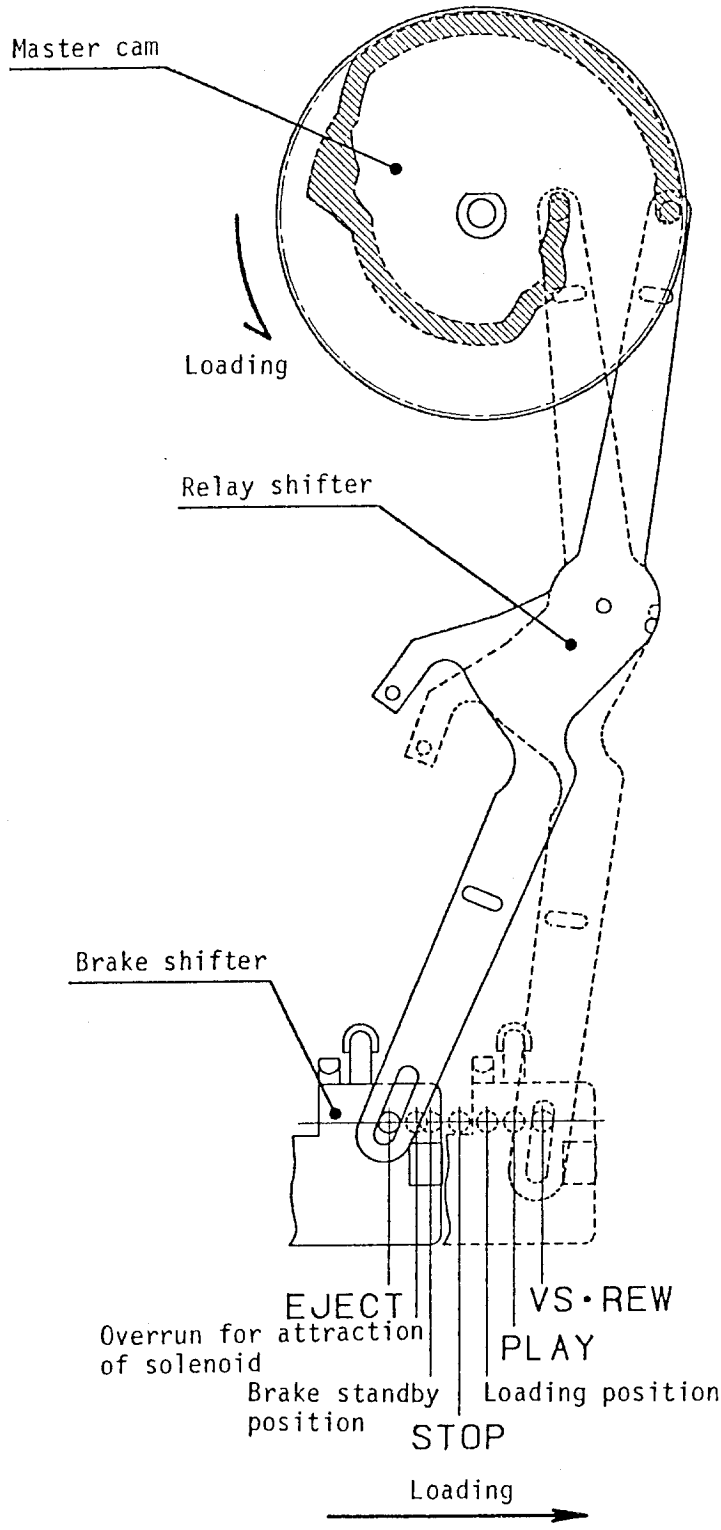


Figure 1-19.

1-5. Cam Switch

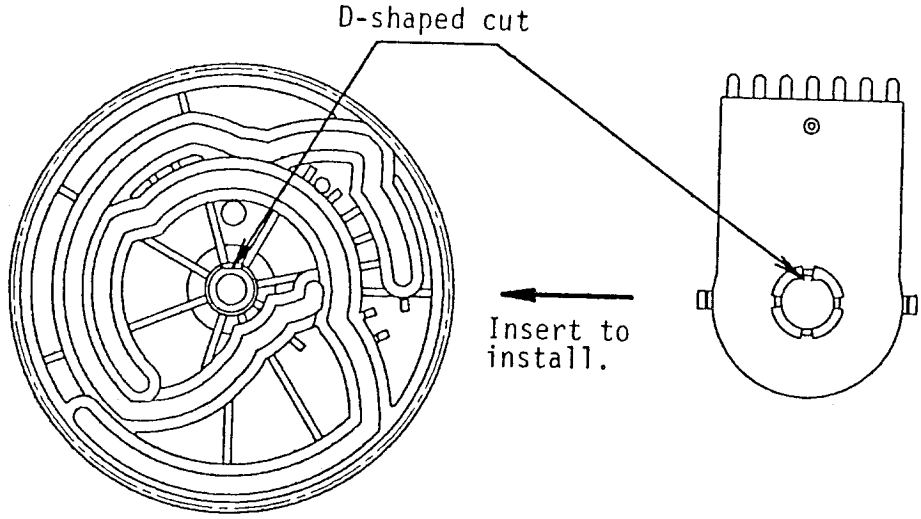


Figure 1-20. Cam Switch Alignment

The cam switch is installed with its D-shaped cut aligned with the D-shaped cut of the master cam. (The specially devised cam switch allows its alignment irrespective of the angle of rotation.)

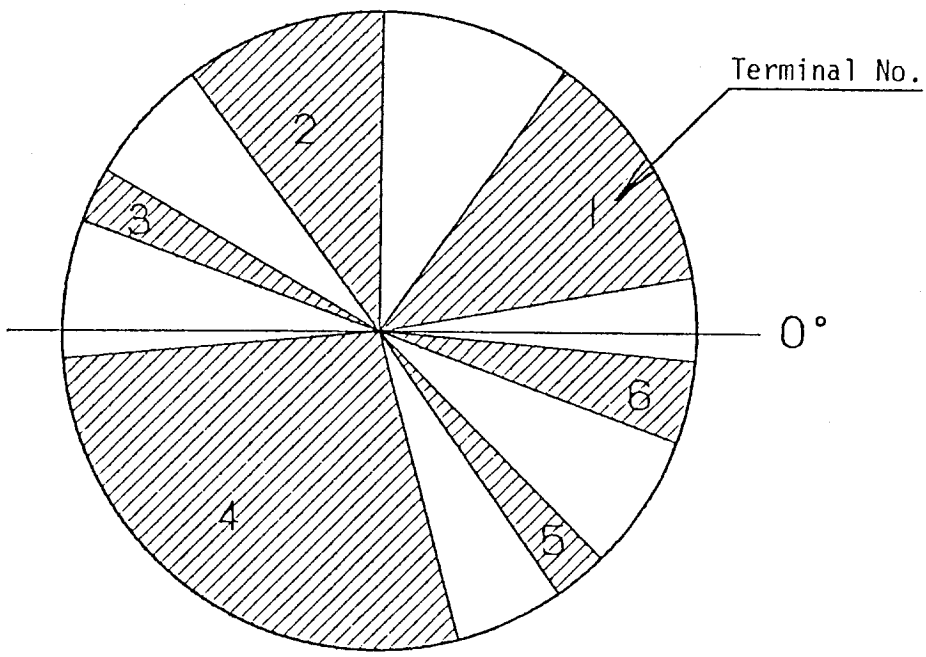


Figure 1-21. Structure of Cam Switch

The cam switch has an internal pattern as shown in Figure 1-21. and turns on the circuit at the shaded sectors. The system controller determines the mode of the mechanism by detecting turning on and off of the electric signal as the six shaded sectors make and break the circuit.

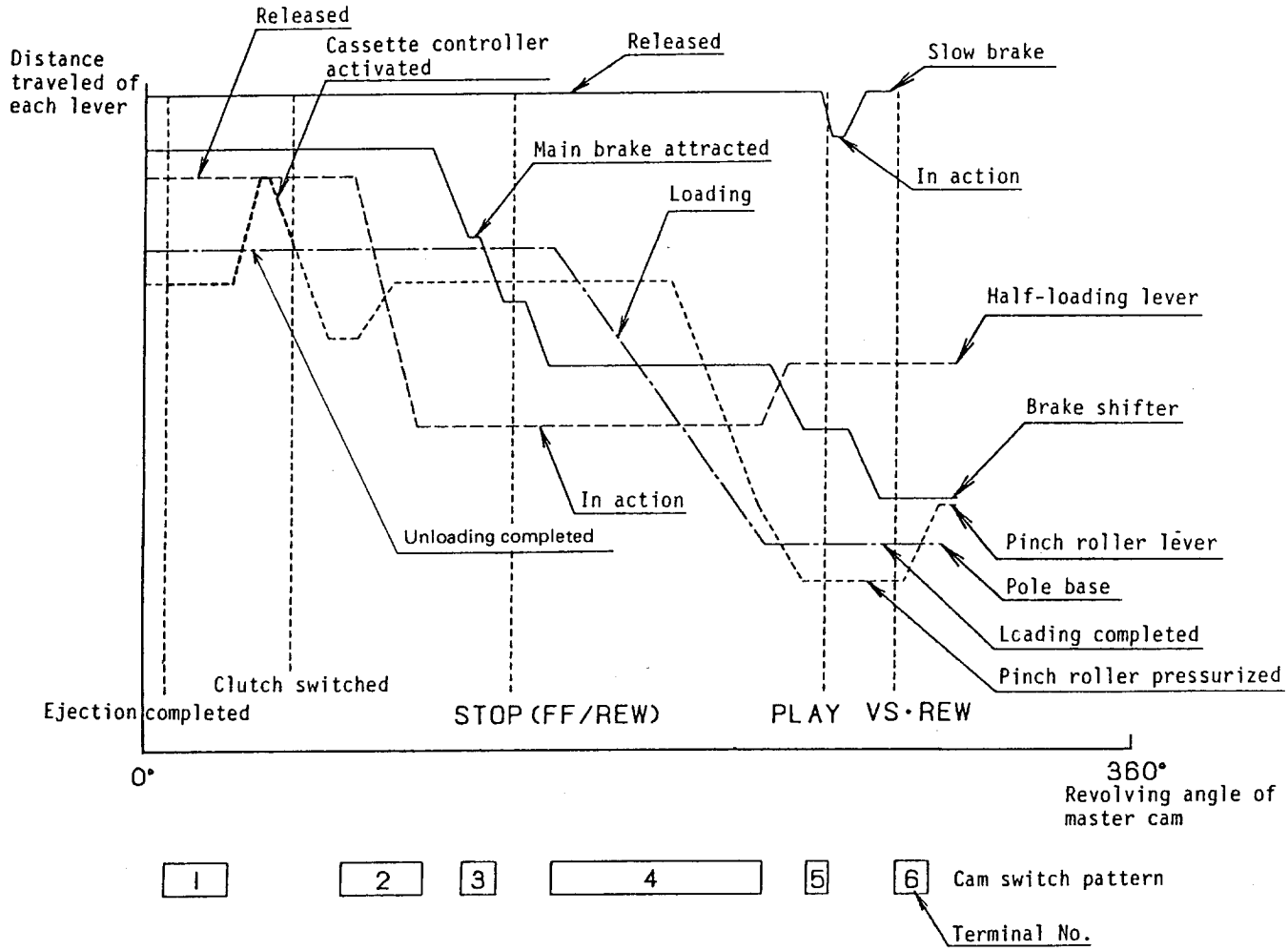


Figure 1-22. Relation between Cam Switch and Mechanism

Figure 1-22. shows the relation between the cam switch position and the actions of the individual components.

1-6. Cassette Control Mechanism

1) Cassette controller drive mechanism

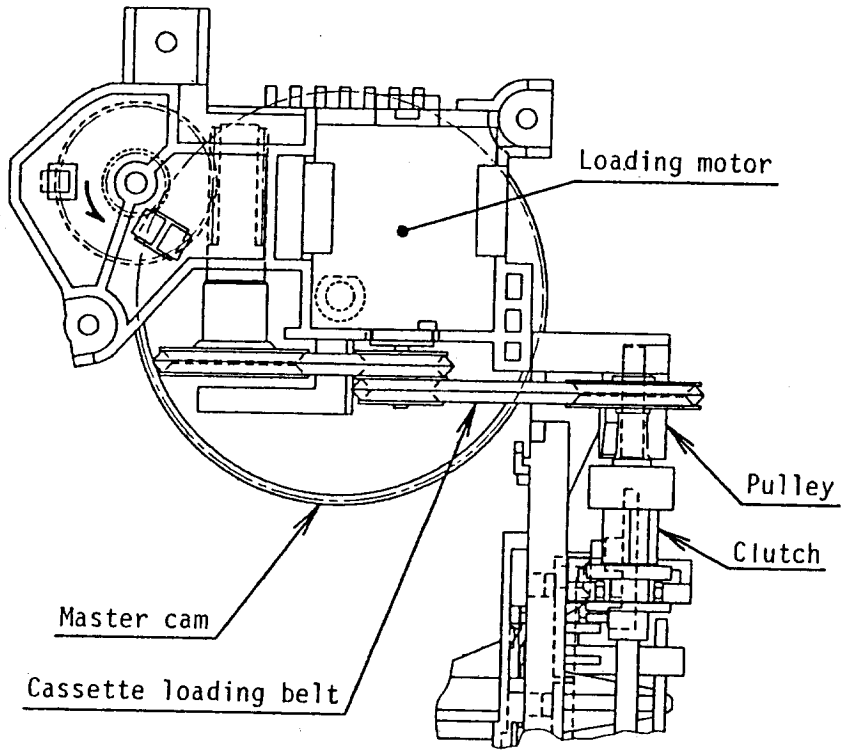


Figure 1-23. Cassette Controller Drive Mechanism

Feature

The driving force of the loading motor is always transmitted to the pulley of the cassette controller by the cassette loading belt as shown in Figure 1-23.

2) Configuration of cassette control mechanism

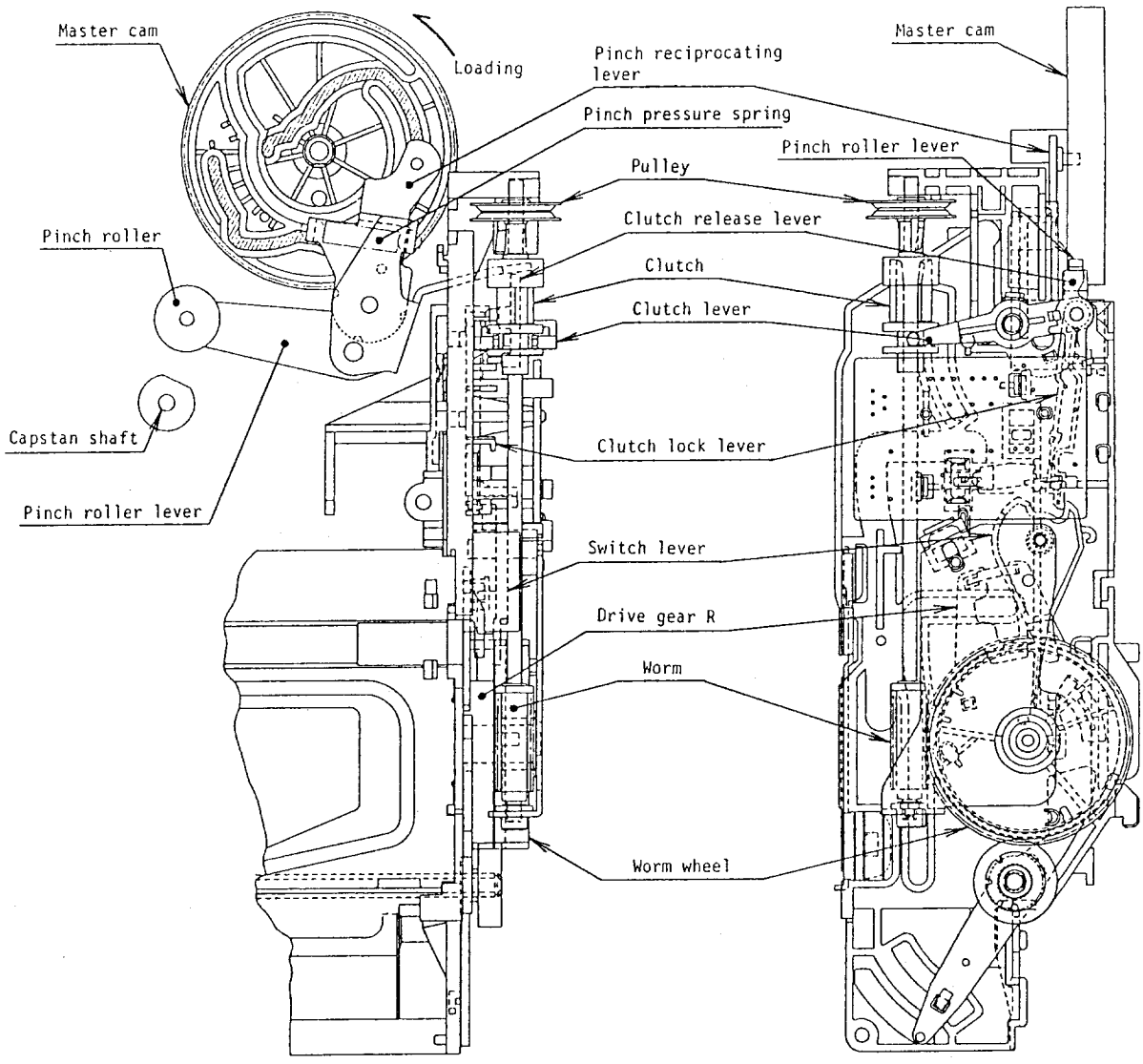


Figure 1-24. Relation between Pinch Roller Lever and Cassette Controller

The master cam acts on the pinch roller while the latter is positioned within the range where the pressurization of the pinch roller is not affected. The driving force of the loading motor is transmitted to the worm through the pulley.

1-7. Clutch Shifting Mechamism

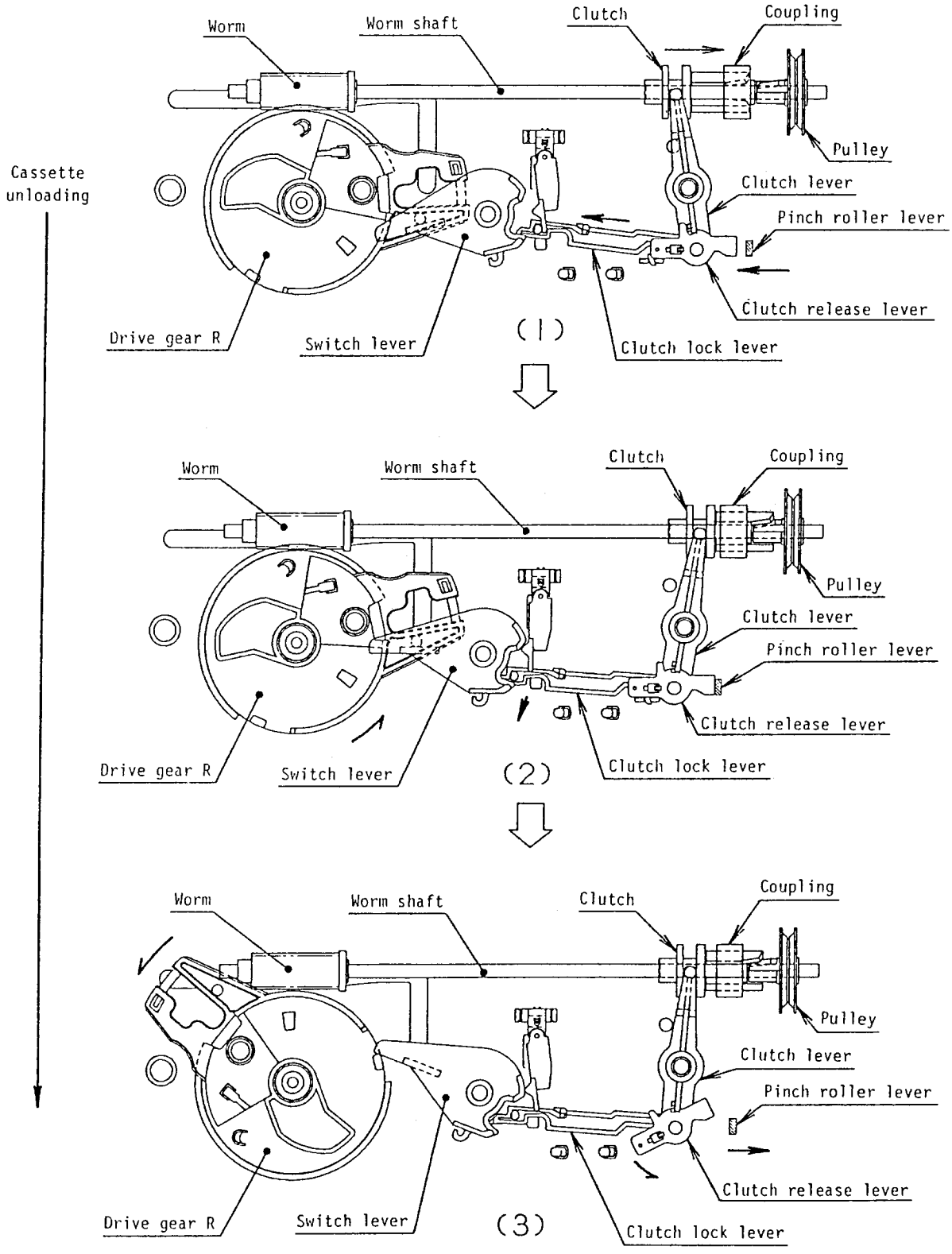


Figure 1-25. Cluch Shifting Sequence during Cassette Unloading

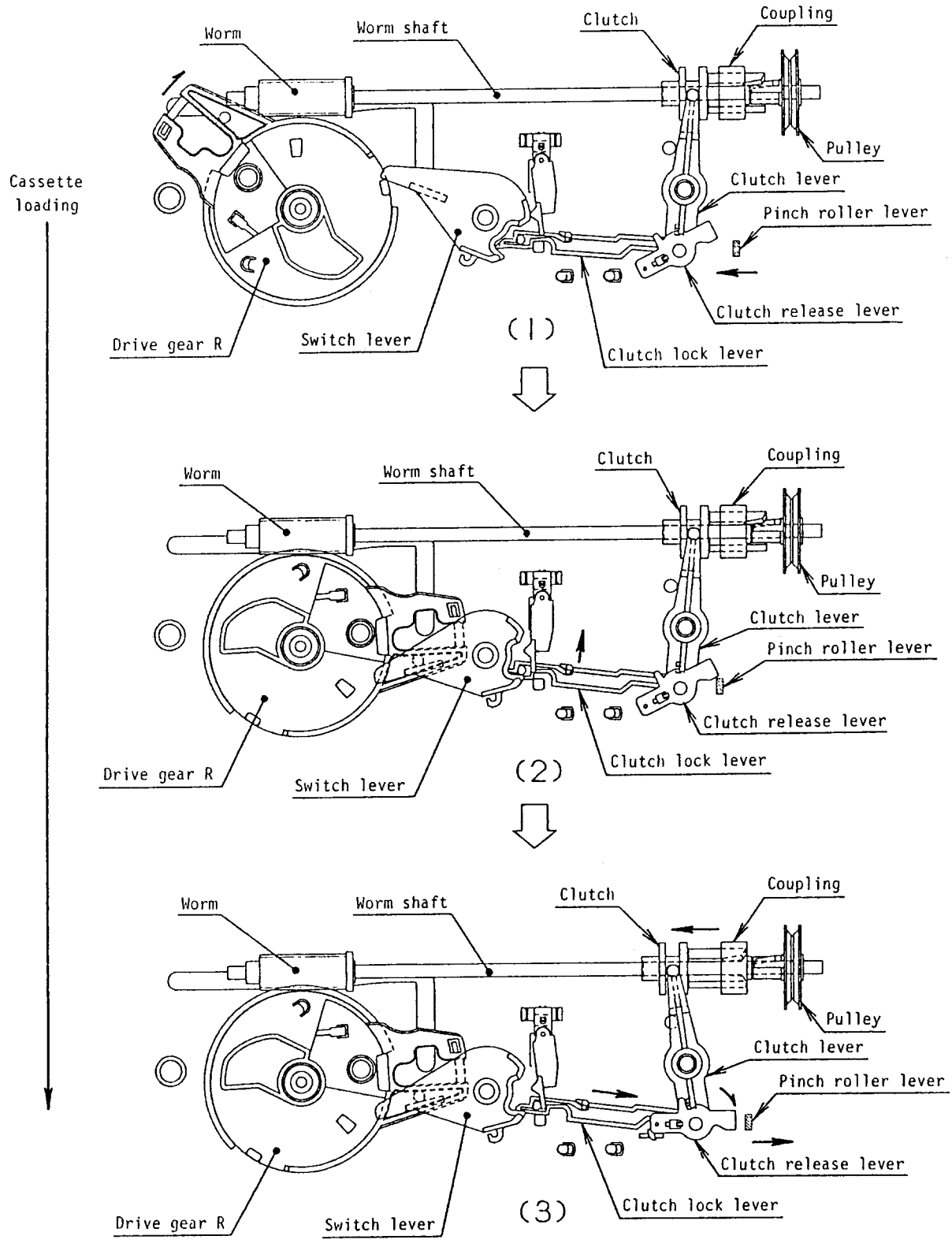


Figure 1-26. Clutch Shifting Sequence during Cassette Loading

1) Clutch Shifting Sequence during Cassette Unloading

The clutch is located as shown in Figure 1-25.(1) when the cassette has been loaded. In this condition the driving force of the pulley is not transmitted to the worm. As the pinch roller lever moves in the direction of arrow (a), the clutch, clutch lock lever and clutch release lever move in the directions (b), (c) and (d), respectively, bringing the positional relation in Figure 1-25.(2).
Now the driving force of the pulley is transmitted through the clutch and the coupling to the worm, which starts the drive gear R to unload the cassette.
At this time, the clutch lock lever is released from the switch lever and then fixed to the projection on the frame. By this the clutch is kept at a position even when the pinch roller lever comes to the position shown in Figure 1-25.(3).
When the drive gear R rotates to the position shown in Figure 1-25.(3), the switch lever turns on the switch and the motor stops. Now the cassette has been completely unloaded.

2) Clutch Shifting Sequence during Cassette Loading

Before a cassette is inserted, the clutch is positioned as shown in Figure 1-26.(1), where the driving force of the pulley is transmitted to the worm through the coupling.
When the cassette is inserted in this condition, the drive gear R starts turning by the reciprocating mechanism. Then the switch is released from the switch lever and the pulley starts turning to move the cassette in the loading direction. When the mechanism reaches a position just before completion of loading as shown in Figure 1-26.(2), the drive gear R forces the switch lever to rotate. Consequently, the clutch lock lever moves in the direction of arrow (e), releasing the clutch and turning on the switch at a time. Now the mechanism has loaded the cassette in position (Figure 1-26.(3)). The pulley remains running idle, and even when the loading motor is running, its force is not transmitted to the cassette controller.

2. SERVO CIRCUIT

Digital servo LSI (RH-IX0431GEZZ)

The digital servo LSI is of single-chip type and has the following functions.

- Drum speed and phase control.
- Capstan speed and phase control.
- Gain control for recording speeds (SP/LP).
- Automatic tape speed detection in playback mode.
- Head switching pulse generation in 1 PG system.
- X-value compensation in double-azimuth 4-head fine slow motion.
- Drum compensation and tracking shift in trick play mode (slow, still, frame advance, etc.).
- Amplification of record control signal.
- Others.

Below discussed are the names and functions of the pins of RH-IX0431GEZZ.

Pin No.	Name	Input/Output	Function
1	Vcc (for Analog circuit)	——	Power input terminal for analog amplifier (5 ± 0.5V).
2	Bias (+) (VREF (+))	Input	Reference bias voltage (2.5 V) settomg for analog amplifier and analog switch. Internally connected to the voltage follower input composed of C-MOS amplifier. 2.5 V reference voltage fed.
3	Bias (−) (VREF (−))	Output	Voltage follower output of the reference voltage fed at bias (+) (pin ②). Bias voltage of each amplifier inside the IC also connected to this pin.
4	Drum PG	Input	Negative drum phase generator pulse input. Threshold voltage is -70 mVp-p (TYP). Hysteresis is 60 mVp-p (TYP). (Positive square wave generated by the internal Schmitt amplifier)
5	Drum FG AMP	Input	Inverted input for inversion C-MOS amplifier of drum frequency generator. Bias preset at pin ② connected to this pin.
6	Drum FG AMP output	Output	Output terminal for inversion C-MOS amplifier of drum frequency generator.
7	Drum FG input	Input	Drum frequency generator Schmitt amplifier input terminal. Threshold voltage is 80 mVp-p (TYP). Hysteresis is 80 mVp-p (TYP).
8	Drum additional AMP output	Output	Additional amplifier output terminal for drum rotational control (C-MOS).
9	Drum additional AMP negative input	Input	Additional amplifier negative input terminal for drum rotational control (C-MOS).

Pin No.	Name	Input/Output	Function
10	Drum additional AMP positive input	Input	Addtional amplifier positive input terminal for drum rotational control (C-MOS).
11	Capstan FG input	Input	Capstan frequency generator Schmitt amplifier input terminal. Both threshold voltage and hysteresis are 80 mVp-p (TYP).
12	Capstan additional AMP output	Output	Additional amplifier output terminal for capstan rotational control (C-MOS).
13	Analog SW2	——	Built-in analog switch turns on at the servo serial data D18 = "1" and off at D18 = "0". Internally connected with capstan additional amplifier output to control the additional amplifier gain and to short-circuit the phase compensating capacitor. Slow, still, FF/REW and capstan stop modes brought on at D18 = "1".
14	Capstan additional AMP negative input	Input	Additional amplifier negative input terminalfor capstan rotational control (C-MOS).
15	Capstan additional AMP positive input	Input	Additional amplifier positive input terminal for capstan rotational control (C-MOS). (capstan speed and phase error voltages fed in)
16	GND (for Digital Circuit)	——	Ground for digital signal processing.
17	Drum phase error output (drum AFC)	Output	Drum phase error pulse width modulation (PWM) output terminal. Output at PWM repeated frequency $fsc/2^6 \fallingdotseq 69$ kHz. PWM duty stretched toward "H" due to phase delay. • Drum phase PWM output fixed at 50% duty if the drum frequency generator input frequency comes without about ±5% of the specified frequency.
18	Drum speed error output (drum AFC)	Output	Drum speed error PWM output terminal. Output at PWM repeated frequency $fsc/2^6 \fallingdotseq 69$ kHz. PWM duty stretched toward "H" due to speed (rpm) delay.
19	Capstan phase error output (capstan APC)	Output	Capstan phase error PWM output terminal. Output at PWM repeated frequency $fsc/2^6 \fallingdotseq 69$ kHz. PWM duty stretched toward "H" due to phase delay. Each capstan phase PWM output fixed at 50% duty in the following cases: 1) Drum frequency generator frequency out of about ±10% of the specified frequency.

<table>
<tr><th>Pin No.</th><th>Name</th><th>Input/Output</th><th>Function</th></tr>
<tr><td></td><td></td><td></td><td>2) Capstan frequency generator frequency out of about ±5% of the specified frequency.
3) No control pulse.
4) In serial data input mode for FF/REW, slow, short rewind (ASB*REV).</td></tr>
<tr><td>20</td><td>Analog SW 1</td><td>Output</td><td>Built-in analog switch turns on at the servo serial data D18 = ''1'' and off at D18 = ''0''. Bias voltage fed out of pin ③ when the switch turns on. Slow, still, FF/REW and capstan stop modes brought on at D18 = ''1''.</td></tr>
<tr><td>21</td><td>Capstan spped error output (capstan AFC)</td><td>Output</td><td>Capstan speed error PWM output terminal. Output at PWM repeated frequency fsc/2^6≒69 kHz. PWM duty stretched toward ''H'' due to speed down.</td></tr>
<tr><td>22</td><td>fsc (4.43 MHz) input</td><td>Input</td><td>4.43 MHz sub-carrier input terminal (C-MOS). Minimum operating compensation level at over 200 mVp-p. Inverting amplifier built-in.</td></tr>
<tr><td>23</td><td>LP mode (H)</td><td>Output</td><td rowspan="2">Tape speed detection logic output terminals for LP and SP modes (C-MCS output).
<table><tr><th>Output terminal \ Tape speed</th><th>LP</th><th>SP</th></tr><tr><td>LP (H) : PIN ㉓</td><td>H</td><td>L</td></tr><tr><td>SP (H) : PIN ㉔</td><td>L</td><td>H</td></tr></table></td></tr>
<tr><td>24</td><td>SP mode (H)</td><td>Output</td></tr>
<tr><td>25</td><td>Servo serial data input</td><td>Input</td><td rowspan="2">Servo LSI operation mode is set by these input terminals. 21-bit serial clock provided. Internal mode is set by identifying data bit ''1'' or ''0''; data bit ''1'' and ''0'' at serial data with ''H''and ''L'', respectively, at rising edge of serial clock. Serial transfer made with shift register. Internal transfer of 21-bit data made at serial data ''H'' at falling edge of serial clock. (See Servo Process Block Diagram (Fig. 3-19).)</td></tr>
<tr><td>26</td><td>Servo serial clock input</td><td>Input</td></tr>
<tr><td>27</td><td>PG mono-multi</td><td>Input</td><td>Mono-multi terminal for video/audio head switching pulse output timing. (Drum frequency generator and phase generator input signals, internally shaped into square wave, are used to generate phase generator mono-multi trigger pulse. By this pulse, the time constant of resistor and capacitor externally added is activated for time adjustment.)</td></tr>
</table>

Pin No.	Name	Input/Output	Function
28	Video H-SW-P output	Output	Video head switching pulse output terminal. 1. Double-azimuth 4-head switching: Video head switching pulse output timing in SP mode delayed by 2H (≒128 μsec.) compared to that in LP mode. (Actual video heads are set up by 2H difference.)
29	Hi-Fi H-SW-P output	Output	Hi-Fi head switching pulse output terminal. 1. 2-head switching: Head switching pulse output 90° behind the video head switching pulse. 2. Double-azimuth 4-head switching: Head switching pulse 60° behind the video head switching pulse. (Not used on the models of this series.)
30	Vertical sync. input	Input	Composite sync. input detected for vertical sync. by the internal logic. Vertical sync. is distinguished from horizontal sync. by the pulse width.
31	Tracking monitor output	Output	Internal tracking delay time point monitored for digital tracking. • Monitor output stretched toward "H" duty when tracking data (servo serial data D0 thru D5 — 6 bits — used) is raised. (The center value is 20.0 msec. inside the IC; 14.78 msec. at this pin, however.)
32	Control pulse duty detection output	Output	Control pulse duty identify output terminal. "L" level when control pulse "H" duty (time from positive pulse to negative pulse) is long (about 60%). "H" level when it is short (about 27.5%). Control pulse identify duty fixed at 40% (TYP) in the IC.
33	Control pulse Schmitt output	Output	Output terminal of the control signal that has been fed through Schmitt amplifier and converted into square wave. "H" level square wave made with positive pulse and "L" one with negative pulse. Internal control pulse square wave inverted and put out when tape travel is reversed.
34	Vcc (for Digital Circuit)	——	Supply voltage input terminal for digital circuit (5 ± 0.5 V).
35	$\overline{\text{TEST}}$	Input	"H" input to make the servo IC in TEST mode. Usually at "H" level.

<table>
<tr><th>Pin No.</th><th>Name</th><th>Input/Output</th><th>Function</th></tr>
<tr><td>36</td><td>Record control (−)</td><td>Output</td><td>Terminal to apply voltage to negative pole of control head in record mode.
(High impedance in playback mode)
• "L" level duty 27.5% at servo serial data D17="1" and 60% at D17="0".</td></tr>
<tr><td>37</td><td>Record control (+)</td><td>Output</td><td>Terminal to apply voltage to positive pole of control head in playback mode.
(High impedance in playback mode)
• "H" level duty 27.5% at servo serial data D17="1" and 60% at D17="0".</td></tr>
<tr><td>38</td><td>GND (for Analog Circuit)</td><td>——</td><td>Ground terminal for analog amplifier.</td></tr>
<tr><td>39</td><td>AMP (+)</td><td>Input</td><td>C-MOS amplifier positive input terminal.
Pulled with 37 kΩ (TYP) up to bias voltage at pin ③ inside the IC.</td></tr>
<tr><td>40</td><td>AMP (−)</td><td>Input</td><td>C-MOS amplifier negative input terminal.</td></tr>
<tr><td>41</td><td>AMP output</td><td>Output</td><td>C-MOS amplifier output terminal.
C-MOS amplifier composed at pins ㊴ and ㊵.
(Not used)</td></tr>
<tr><td>42</td><td>Control pulse Schmitt input</td><td>Input</td><td>Control pulse Schmitt amplifier input.
Threshold voltage of schmitt amplifier system is controlled by the servo serial data D19 "0", "1" and slow/still mode as shown below, and control pulse is given out from schmitt output (pin ㉝).
<table>
<tr><th>Mode / Spec</th><th>D19 "0"</th><th>D19 "1"</th><th>Slow/still</th></tr>
<tr><td>Hysteresis</td><td>330mVp-p</td><td>650mVp-p</td><td>45mVp-p</td></tr>
<tr><td>Center level</td><td>0 mV</td><td>0 mV</td><td>110 mV</td></tr>
</table>
Notes:
1) The hysteresis of both the positive and negative pulses of control pulse are used at D19="0" or "1", in any other modes than slow/still.
In slow/still mode, only the positive pulse peak is detected.
2) D19="1" is in FF/REW and video search modes.
3) D19="0" is in the other modes than above.</td></tr>
</table>

3. SYSTEM CONTROLLER LSI

- 2-head system: RH-iX0571GEZZ, RH-iX0577GEZZ
- 4-head system: RH-iX0572GEZZ, RH-iX0574GEZZ

3-1. System Controller Terminal Allocation.

I/O	Terminal Name	Name	No.
O(C-MOS)	GND CTL	P20	64
O(3S)	FV	P21	63
O(C-MOS)	FV CTL	P22	62
O(C-MOS)	X2	P23	61
O(C-MOS)	CTL GAIN SW (L)	P24	60
O(3S)	DRUM CTL	P25	59
O(3S)	CURRENT LMT	P26	58
O(3S)	CAPSTAN CTL	P27	57
O(N-CH)	CAPSTAN RVS (H)	P00	56
O(N-CH)	CAPSTAN PU (L)	P01	55
O(N-CH)	CAPSTAN UL (L)	P02	54
O(N-CH)	LOADING FWD CTL	P03	53
O(N-CH)	LOADING RVS CTL	P04	52
O(N-CH)	BRAKE SOLENOID	P05	51
O(N-CH)	SERVO S DATA	P06	50
O(N-CH)	SERVO S CLOCK	P07	49
O(N-CH)	TRANSIT (H)	P10	48
O(N-CH)	H. AMP SW	P11	47
O(N-CH)	CHROMA ROTARY	P12	46
O(N-CH)	SLOW/STILL (H)	P13	45
O(N-CH)	PB AUDIO (H)	P14	44
O(N-CH)	HiFi CTL	P15	43
O(N-CH)	AUDIO MUTE (L)	P16	42
O(N-CH)	EE (L)	P17	41
I	$\overline{\text{SYNC}}$ DET (H)	P50	40
I	REEL SENSOR	P51	39
I	START SENSOR	P52	38
I	END SENSOR	P53	37
I	INDEX IN	P54	36
I	DEW SENSOR	P55	35
I	NC	P56	34
I	PB CTL	P57	33

RH-iX0571GEZZ, RH-iX0572GEZZ, RH-iX0574GEZZ, RH-iX0577GEZZ

No.	Name	Terminal Name	I/O
1	V_{CC}	5V	
2	AV_{SS}	GND	
3	V_{ref}	A/D REF, VOLTAGE	
4	D-A	COUNTER F/R	O(C-MOS)
5	PWM	BEEPER	O(N-CH)
6	P63	AL PB (L)	O(N-CH)
7	P62	BIAS CTL (H)	O(N-CH)
8	P61	POWER CTL (L)	O(N-CH)
9	P60	VCR (L)	O(N-CH)
10	AN7	CAM SW	I (A/D)
11	AN6	CASSETTE SW	I (A/D)
12	AN5	AUTO FUNCTION	I (A/D)
13	AN4	NC	I (A/D)
14	AN3	FV M.M.	I (A/D)
15	AN2	SLOW/STILL TRK	I (A/D)
16	P41	SPEED DET	I
17	P40	NC	O(N-CH)
18	S_{RDY}	S.T READY (L)	O(N-CH)
19	CLK	T.S CLOCK	I
20	S_{OUT}	S.T DATA	O(N-CH)
21	S_{IN}	T.S DATA	I
22	CNTR	SEARCH (L)	O(N-CH)
23	INT2	ENVELOPE DET (L)	I
24	P31	ENVELOPE DET	I
25	P30	H.SW.P	I
26	INT1	H.SW.P (L)	I
27	CNV_{SS}	GND	
28	ACL	ACL (L)	I
29	X_{IN}	CLOCK IN	I
30	X_{OUT}	CLOCK OUT	O
31	Ø	NC	O
32	V_{SS}	GND	

Figure 3-1. Bottom View

Note: On RH-iX0571GEZZ (for 2-head models) and RH-iX0577GEZZ (for 2-head LP models), pins 23, 24, 46 and 47 are not connected.

3-2. TERMINAL DESCRIPTION (2-/4-HEAD SYSTEM)

Pin No.	Control Signal	Specifications
1	5V	Vdd terminal
2	GND	AVss terminal (GND) To be connected to GND
3	A/D REF VOLTAGE	Reference voltage for A/D converting
4	COUNTER F/R	It is a control signal offering the tape running direction to the timer IC. (1) Counter CTL = "H" : Reverse turn Counter CTL = "L" : Positive turn (2) Other than the model below should be identical to the capstan motor direction. Namely, in case of capstan reverse turn-"H", counter CTL = "H" is applied. • Cue sound countermeasures for FF/REW-Stop, etc. (Idler neck swing) • Idler neck swing • Inversion brake time for VS release (3) In the mode below, the following are to be taken to adjust to the tape running direction. (For use of real time counter) • At loading ..... Counter CTL = "L" • Eject position/Stop position ..... Counter CTL = "L"
5	BEEPER	This output shows the time of confirmation sound output when the operating key is pressed. • Confirmation sound "ON time" = "H" • Confirmation sound "OFF time" = "L" **[System controller]** (1) The time of outputting a confirmation sound is 47 msec. (2) The timing of outputting a confirmation sound is to be at receiving of keys below. • Power key • TV/VCR key • Eject key • Stop key • FF key • PB key • REC key • Pause key • REW key • Slow key • Double speed key • At INDEX writing (optional writing) **[Timer]** (However, the confirmation sound output is only when the timer serial data takes buzzer request.) (1) The time of outputting a confirmation sound is 47 msec. and 1 sec. (2) To output the 47 msec. confirmation sound, it is done when 47 msec. short sound buzzer 1 is present with the timer serial data. (Refer to the timer ref. material for the operating key outputting a short sound buzzer request.) • For the time of confirmation sound, it is shorter than the above value at Slow/Still.
6	AL PB (L)	A signal to select REC mode with PB mode (1) In case of PB-system mode (PB, Still, Slow, VS-F/R, double speed) at PB. REC position, AL PB (L) = "L" is applied. (2) When the PB-system mode is released, it should be AL PB (L) = "H".

Pin No.	Control Signal	Specifications
7	BIAS CTL (H)	A signal to control start/end of recording of video/audio signal
8	POWER CTL (L)	A signal to control the power (supply) (controlling a driving-system power) (1) When the Power key is pressed at Power "OFF", it should be PCON (L)="L". However, in case of timer stand-by, the Power key should be in-effective. (2) When the Power key is pressed in ON mode, it should be PCON (L)="H". However, during mecha-operation, PCON (L)="L" is continued, and PCON (L)="H" is applied at the next mecha-position. • Stop position • Slider Up position (3) At timer stand-by, if the timer start data of timer serial data is detected, it should be PCON (L)="L", making REC display. (Timer recording start) (4) At timer stand-by, it should be PCON (L)="H". However, in VPS Interrupt mode, PCON (L)="L" is applied. (5) For driving of loading motor, cassette motor or capstan motor, if PCON (L)="H" is present, it should be made PCON (L)="L", and after driving, it is made PCON (L)="H". (6) In case of EE (L)="L" and PCON (L)="L", if weak electric field (L) input="L" continues for 30 min., it is automatically to be PCON (L)="H", allowing the mis-power-OFF preventive function to be effected.
9	VCR (L)	Control signal to switch on and off the signal to come to the RF converter. (1) Signal from the video tuner or playback signal from the video tape fed in with VCR (L) signal at "L". (2) Antenna input (VHF) signal fed through in with VCR (L) signal at "H". (3) VCR (L) signal at "H" with power control (L) signal at "H". (4) With power control (L) signal at "L", the TV/VCR selector key switches VCR (L) signal: • From "H" to "L". • From "L" to "H". (5) When the Stop key is pressed during playback mode, the following are obtained. i) If the VTR mode (L)="L" at output of playback screen, VTR mode (L)="L" is continued. ii) If the VTR mode (L)="H" at output of playback screen, VTR mode (L)="H" is continued.
10	CAM SW	
11	CASSETTE SW/REC TIP	This terminal has the A/D converting function of 6-resolution for analog voltage by the comparator (IC built-in) and D/A converter. (5 to 8)
12	AUTO FUNCTION	
13	NC	To be connected to Vdd or GND
14	FV M.M	It is intended to adjust the delay amount from the edge of H.SW.P to the generation of false vertical synchronous signal.

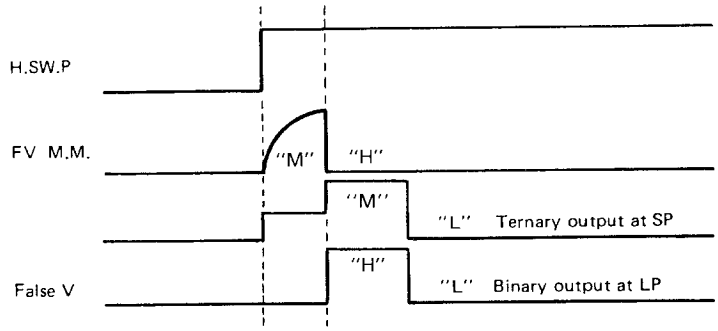
<table>
<tr><th>Pin No.</th><th>Control Signal</th><th>Specifications</th></tr>
<tr><td></td><td></td><td>(1) Normally, "L" is outputted.
(2) After detection of H.SW.P edge, the terminal is made to be "Z" (High impedance) and the mono-multi input taken. When recognized as "H", the mono-multi input is stopped and the terminal to be "L".
 

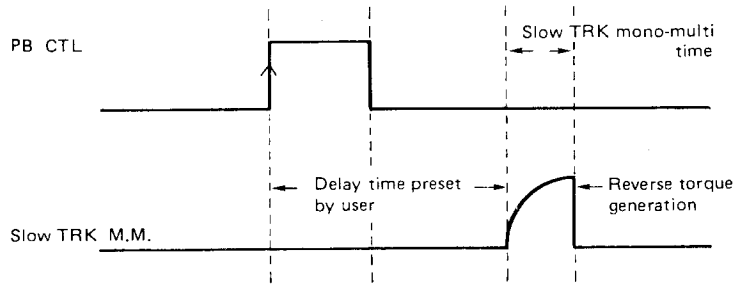
Figure 3-2.</td></tr>
<tr><td>15</td><td>SLOW/STILL TRK</td><td>It is intended to adjust the reverse torque generating timing at Slow/Frame advance.
The preset is inputted to this terminal.
(1) Normally, "L" is outputted.
(2) At frame advance, when it detects the rising edge of PBCTL signal, it allows the delay time preset by user to pass by. Then, the terminal is selected to "Z" (High impedance) and such a mono-multi input started. When recognized as "H", the mono-multi input is stopped and the terminal to be "L".
 

Figure 3-3.</td></tr>
<tr><td>16</td><td>SPEED DET</td><td>Switches shown corresponding to A-F keys of D/A converting circuit
<table>
<tr><th>Input terminal / Key</th><th>Mecha-posi. SW input</th><th>Speed detection input</th><th>Function selection input</th></tr>
<tr><td>A</td><td>CA SW</td><td rowspan="2">SP mode</td><td>Variable speed VS/Auto OFF</td></tr>
<tr><td>B</td><td>HF SW</td><td>Variable speed VS/Auto Repeat</td></tr>
<tr><td>C</td><td>FF SW</td><td rowspan="6">LP mode</td><td>Fixed Vs/Auto OFF</td></tr>
<tr><td>D</td><td>LD SW</td><td>Fixed VS/Auto Repeat</td></tr>
<tr><td>E</td><td>PB SW</td><td>Not used</td></tr>
<tr><td>F</td><td>PU SW</td><td>Not used</td></tr>
<tr><td>ALL SW "OFF"</td><td>SW OFF mode</td><td>Not used</td></tr>
</table>
Auto Power OFF: Auto power OFF function
Auto Repeat: Auto repeat playback function
Table 3-1.</td></tr>
</table>

Pin No.	Control Signal	Specifications

[Cassette controller SW]

Refer to cassette controller circuit. (Fig. 3-4)

SW \ Type	Cassette controller/Auto cassette controller	Specifications
A	Cassette controller SW (Insertion start detection)	ON: Cassette insertion start OFF: Other than above
B	Auto load SW (Cassette fit-in state detection)	ON: Cassette fit-in state OFF: Non-auto load cassette controller or cassette not fitted in
C	REC. Tip SW (Mis-erasing preventive tab detection)	ON: Preventive tab broken OFF: Preventive tab present
D	(CAS. Unit fit-in state detection)	• D-SW to be always "ON" at unit fit-in state • All SWs to be "OFF" without unit

Table 3-2.

D/A Converting circuit (Main body SW/CAM. SW/Function selecting SW/Cassette controller SW)

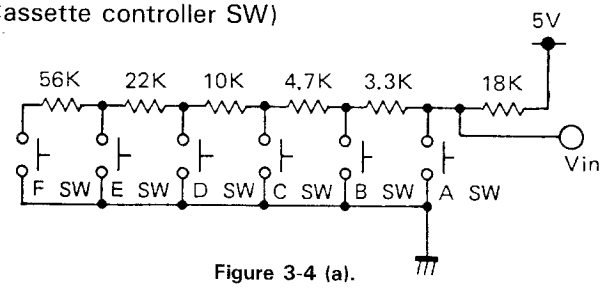
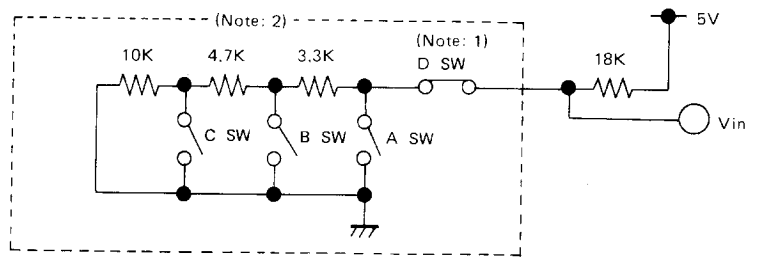


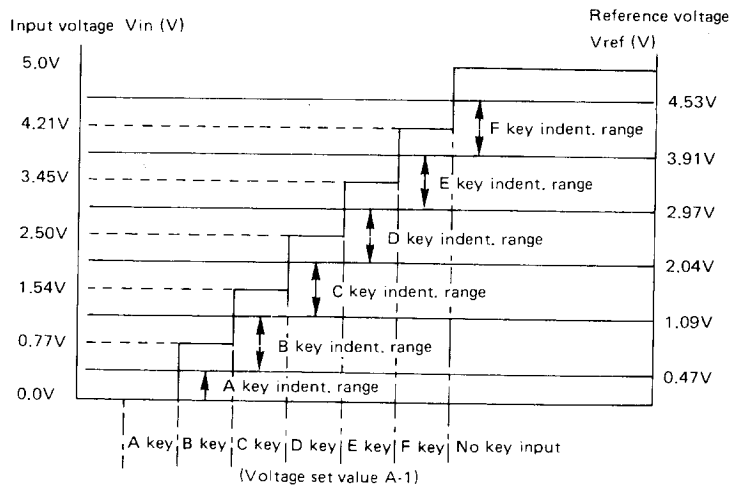
Figure 3-4 (a).



Cassette control circuit

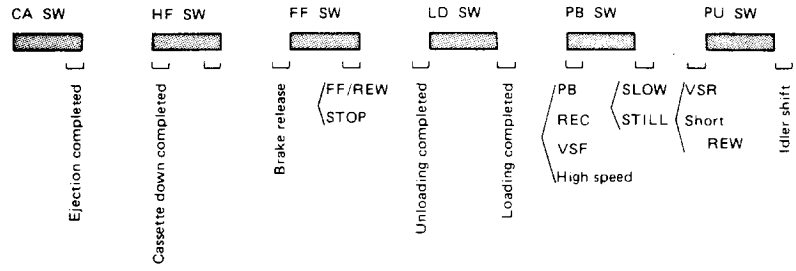
Note 1: The D switch is kept on all the time.
Note 2: The block framed with broken line is the cassette controller unit.

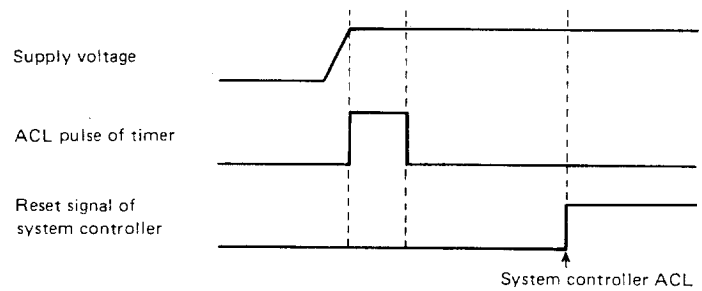
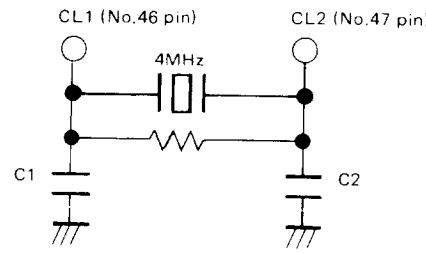
Figure 3-4 (b).



Input voltage (Vin) VS. reference voltage (Vref) with each switch.

Figure 3-4 (c).

Pin No.	Control Signal	Specifications
		 Figure 3-4 (d). **(CAM SW input)** • Refer to Fig. 3-4 for L-mecha. mecha-posi. and mode. **(Cassette control SW/REC Tip input)** • Timing of cassette insertion/Detection of REC. Tip state **(Cassette controller SW)** (1) SW A detects start of cassette insertion in slider UP condition. (2) SW B is intended for Auto load cassette controller and "ON" when the cassette is fitted in slider UP condition. For normal-type cassette controller, it is always "OFF". (3) SW D is conceptual and always "ON" when the CAS. unit is fitted in. **(REC Tip SW)** (1) It is "ON" at REC Tip broken and "OFF" at REC Tip present. (2) It takes Eject immediately, if the "REC/timer REC" mode is to be started at REC Tip broken. (Tab-broken cassette/Auto-Eject function) **(Speed detection input)** Input to detect a tape speed data of 4H/2H (1) Refer to the preceding para. of "A/D terminal description" for the relation between the recording mode and the voltage level to be inputted. (2) The data inputted is transferred to the timer IC as below. i) In Stop/REC mode, the data of speed detection input is made ineffective, and the data of recording mode selected by timer is made to be a serial signal, transferred and displayed. ii) At replay by PAL 2HEAD, the following codes are trasferred to the servo IC, instructed by "Audio 8CH spec. treatment" from the timer. • SP mode (Speed identification permitted) at Audio 8CH spec. treatment • SP fixed (Speed identification prohibited) at Audio 8CH spec. no-treatment
17	NC	NC Terminal: Terminal should to be open.
18	S.T READY (L)	Refer to Page 43.
19	T.S CLOCK	It is a control signal intended for serial transfer between the timer IC and the system controller IC. (1) It should be timer READY (L)="L" every 23.4 msec., and 8 bit x 5 byte transferring is taken. (2) For serial transfer, after timer READY (L)="L" has been made, the system controller serial data is set by trailing edge of serial clock from timer IC, and the timer serial data is inputted by rising edge of serial clock. And then, after input of 8 bit data, it should be timer READY (L)="H". (3) The time of timer READY (L)="H" is 1.3 msec. min. (4) For serial data, refer to page 42.
20	S.T DATA	
21	T.S DATA	

Pin No.	Control Signal	Specifications
22	SEARCH (L)	It is a control signal for selecting the gain of PB CTL signal. (1) In Video-Search F/R mode, it should be Search (L)="L".
23	ENVELOPE DET (L) (4-head only)	Reference signal for head amplifier/chroma rotary switching output. To be given out of the head amplifier module. (1) Used to control the head amplifier/chroma rotary switching output with the envelope comparison signal input as reference in each mode.
24	ENVELOPE DET (4-head only)	
25	H.SW.P.	Sensor input intended to detect the state of the drum to be rotated. (1) Head switching pulse to detect if the drum is running. (2) Drum remains running with drum speed-up at "Z" (high impedance) from loading start to unloading end. (3) If head switching pulse input stays in the state (2) above for 1.6 seconds, the head is stopped. It is the reference signal of FV output in trick mode (VSF/R, x 2, STILL/SLOW). (1) In trick mode, FV output is taken at the rising and trailing edges of HSW.P input (HSW.P). (2) A signal allowing start of frame advance.
26	H.SW.P.(L)	
27	GND	CNVss terminal (GND) To be connected to GND
28	ACL (L)	It is an initial resetting terminal of microcomputer, and allows the microcomputer to be initial-reset by applying the low voltage. In addition, with system controller reset signal, initial resetting is possible by connecting such a signal to the ACL terminal by the timer microcomputer. The timing of system controller reset signal on timer microcomputer is shown Fig. 3-5.  **Figure 3-5.**
29 30	CLOCK IN CLOCK OUT	The system clock generating circuit of microcomputer is built in, and the clock signal (4 MHz) is obtained by connecting the ceramic resonator shown Fig. 3-6.  **Figure 3-6.**
31	NC	NC terminal: Terminal should to be open.

Pin No.	Control Signal	Specifications
32	GND	Vss terminal (GND) To be connected to GND
33	PB CTL	Reference signal taking playback blue mute (1) Unless PB CTL rising edge can be detected during 120 msec. in PB mode, a blue mute request is taken to the timer IC. (2) Ref. signal for determining a time (61 ± 2 pulses) of "INDEX signal writing" (3) Detection signal for identifying a recorded tape (tab broken cassette) in Full Auto function • A signal causing reverse torque generation at frame advance
34	NC	To be connected to Vdd or GND.
35	DEW SENSOR	An input terminal to detect any dew situation (1) When the dew sensor is equal to "H", it identifies as dew situation and prohibits any mecha. actuation. However, the following keys should be effective regardless of dew situation. • Power • Eject/Insertion • TV/VTR (2) When the dew sensor is equal to "H", the mecha. position is moved to Eject position and done as follows: PCON (L)="L" ..... Drum mute (L)="H" PCON (L)="H" ..... Drum mute (L)="L" (3) When the dew sensor is equal to "L", the mecha. position is moved to Stop position.
36	INDEX IN	This input is to detect cue signal in INDEX mode. (1) "H" is inputted on cue recording section. (H to be 20 msec. min.) (2) By timer operation, Intro search (Interval search) and Index search are set. i) Setting of Intro search (Interval search) When the FF/REW key is pressed, it is shifted to Intro search. When the cue signal input "H" is detected during FF/REW mode, it comes to be PB mode during 7 sec. and is re-shifted to the FF/REW mode, continuing the cue signal input. ii) Release of Intro search (Interval search) When the mode is cleared by the timer, Intro search is released at once, continuing the current mode. When the mode key (STOP/FF/REW/PB/REC/SLOW/double speed key) is pressed during Intro search, the Intro search mode is released, allowing mode shifting. iii) Index search When the number of skips is set by Index search, the INDEX signal is detected, and then it is transmitted to the timer IC by the system controller SIO.
37	END SENSOR	A signal to detect a tape end (1) For detection of rising edge of end sensor input: i) In case of ON mode with cassette IN, auto-rewinding is taken. ii) During timer REC, Eject is taken after leader tape winding. (2) If in Stop mode, the tape is rewound and the leader tape wound until the end sensor input is "L". However, unless the end sensor input is "L" even after continuous rewinding for 5 sec., stop processing is taken.

<table>
<tr><th>Pin No.</th><th>Control Signal</th><th>Specifications</th></tr>
<tr><td></td><td></td><td>(3) Cassette-down is judged by the end sensor input and the next start sensor input as follows:
(Cassette controller down). ((<u>End sensor</u>) + (<u>Start sensor</u>))="H"
In such a case, cassette-down is recognized.</td></tr>
<tr><td>38</td><td>START SENSOR</td><td>A signal to detect a tape start
(1) For detection of rising edge of start sensor input:
i) In case of REW mode, stop processing is taken.
ii) If during REC/PAUSE short rewinding, short rewinding is interrupted.
(2) If is Stop mode, the tape is rapidly advanced and the leader tape wound until the start sensor input is "L". However, unless the start sensor input is "L" regardless of continous rapid-advance for 5 sec., stop processing is taken.
(3) The start sensor input is utilized for cassette-down recognition. Refer to the paragraph of end sensor input.</td></tr>
<tr><td>39</td><td>REEL SENSOR</td><td>It is a sensor input intended to detect the reel stand situation when it is to be turned.
(1) The situation subject to a reel stand turn is as follows:
i) For loading completion:
• PB
• REC
• VSF
• VSR
• Double-speed
ii) For unloading completion:
• FF
• REW
(2) In such conditions, unless the reel sensor input changes within the time of each mode shown below, stop processing is taken.
<table>
<tr><th>Mode</th><th>Shut-Off Time</th></tr>
<tr><td>SP-PB/SP-REC/FF/REW/Double-speed/1.5-time speed</td><td>5.0 sec.</td></tr>
<tr><td>LP-PB/LP-REC</td><td>10.0 sec.</td></tr>
<tr><td>Video Search Rewind/Video Search Reverse</td><td>1.2 sec.</td></tr>
</table>
Table 3-3.
(3) For processing of tape slack detection, the edge of reel pulse to be inputted utilizing the reel sensor is to be counted.</td></tr>
<tr><td>40</td><td><u>SYNC DET</u> (H)</td><td>It is an identifying terminal for weak electric field, being a signal to be outputted from the external Sync Det circuit for Hsync existence of input video signal.
(1) For Hsync presence, it is weak electric field (L)="L".
For Hsync not present, it is weak electric field (L)="H".
(2) Input of weak electric field (L) is effective in case of EE (L)="H".
(3) In case of EE (L)="L" (EE screen), if the weak electric field (L)="H" continues for 120 ms., it is to be a blue screen applied. (The timer IC takes OSD for application. However, that is only when the blue back ON/OFF SW is "ON".)
(4) In Stop condition with PCON (L)="L", if the weak electric field (L)="H" continues for about 30 min., PCON (L)="H" is applied. (However, unless any execution instruction (T36) from timer IC is done, it is ineffective. At selection of Full Auto, T36="1".)</td></tr>
</table>

<table>
<tr><th>Pin No.</th><th>Control Signal</th><th>Specifications</th></tr>
<tr><td>41</td><td>EE (L)</td><td>A signal of selecting between EE screen and playback screen
(1) The EE signal is intended to select the signal, i.e. the video/audio output is to be EE or PB, and thus in case of EE (L)="L" it selects to the signal (EE screen) to be transmitted from the tuner, and also at EE (L)="L" it selects to the signal (PB screen) to be transmitted from the video head.
(2) At PB. REC position, if it is PB-system mode and EE (L)="L", EE (L)="H" is applied about 1 sec. after positive turn of capstan motor.
(3) If the PB-system mode is released, it should be EE (L)="L".</td></tr>
<tr><td>42</td><td>AUDIO MUTE (L)</td><td>A signal to stop any audio output
(1) At Power CTL (L)="H", it should be Audio mute (L)="L" at any time.
(2) For Power "ON":
 

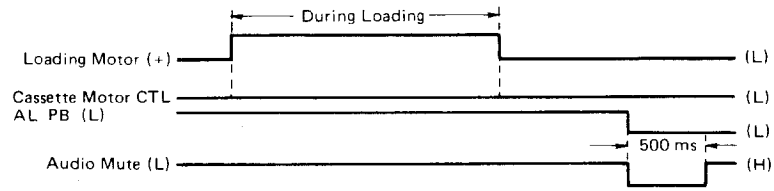
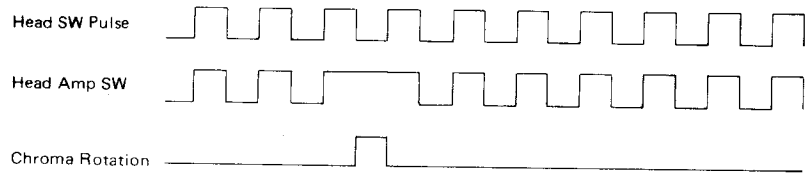
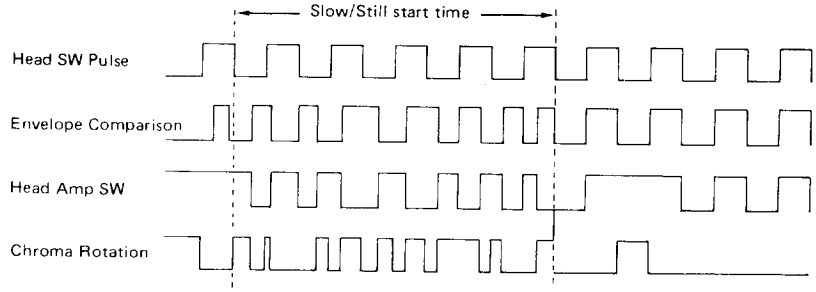
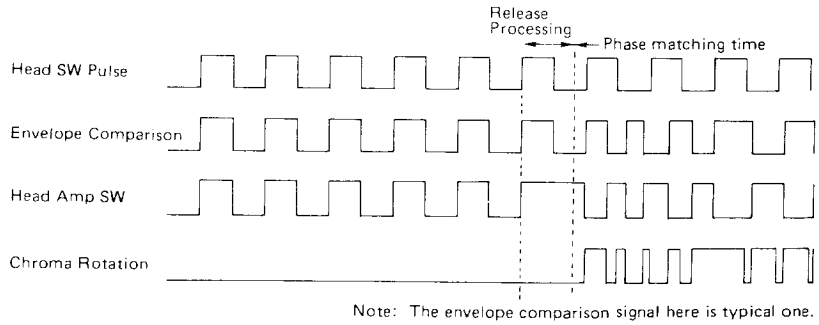
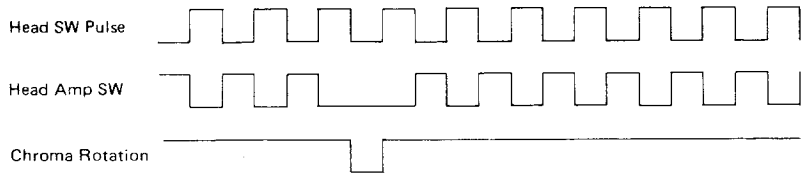
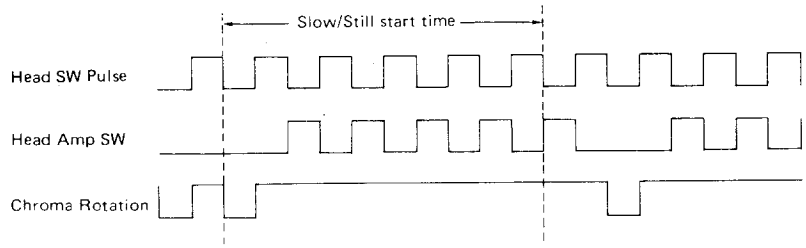
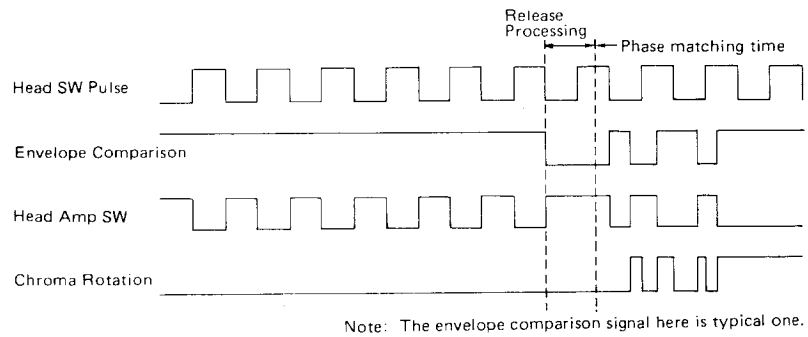
Figure 3-7.
(3) After PB loading end:
 

Figure 3-8.
(4) In PB mode, when the trick playback (Still, Slow, VSF, VSR & double speed) key is turned "ON", A mute (L)="L" is applied immediately, shifting to trick playback.
(5) When trick playback is released, it is moved to the mecha-posi. of PB mode, and then after about 1,000 ms, A mute (L)="H" is applied.
(6) When the PB mode is released with EE (L)="H" condition, A mute (L) should be ="L" for 500 msec.</td></tr>
<tr><td>43</td><td>HiFi CTL</td><td>Not used.</td></tr>
<tr><td>44</td><td>PB AUDIO (H)</td><td>Audio muting at PB Audio (H) → "H"
At EE (L) → "L"
<table><tr><th>Pin ㊵ $\overline{\text{SYNC DET}}$ (H)</th><th>PB AUDIO (H)</th></tr><tr><td>H</td><td>H</td></tr><tr><td>L</td><td>L</td></tr></table>Table 3-4.
At EE (L) → "H"
<table><tr><th>Pin ㊷ FV CTL</th><th>PB AUDIO (H)</th></tr><tr><td>H</td><td>H</td></tr><tr><td>L</td><td>L</td></tr></table>Table 3-5.</td></tr>
</table>

Pin No.	Control Signal	Specifications
45	SLOW/STILL (H)	"H" at Slow/Still Not used
46	CHROMA ROTARY (4-head only)	Terminal to select chroma. (1) Right channel: "H" (6° azimuth head side). (2) EXOR logic for head switching pulse and head amplifier switching signal.
47	H.AMP SW (4-head only)	Output to select between SP and LP heads. (1) SP mode: "H" LP mode: "L" (2) Head amplifier switching control signal at "L" in LP mode. (3) Inverted envelope comparison input signal (pin ㉔) to be outputted at VS-F/R in SP mode. (4) Signal to be outputted according to record mode of each step during slow/frame advance. **(SP mode)** • This signal remains in phase with head switching pulse during frame advance.  **Figure 3-9.** • This signal remains in anti-phase with envelope comparison signal at the start of slow/still mode.  Note: The envelope comparison signal here is typical one. **Figure 3-10.** • The envelope comparison signal is inverted after the slow/still mode is cleared.  Note: The envelope comparison signal here is typical one. **Figure 3-11.**

Pin No.	Control Signal	Specifications
		(LP mode) • This signal remains in anti-phase with head switching pulse during frame advance.  **Figure 3-12.** • The following timing is set up at the start of slow/still mode.  **Figure 3-13.** • The envelope comparison signal is inverted after the slow/still mode is cleared.  Note: The envelope comparison signal here is typical one. **Figure 3-14.**
48	TRANSIT (H)	When transferring from VS FWD and VS RVS modes to PB mode, it continues to be "H" for approx. 1,400 ms. Used to cope with colour dislocation
49	SERVO S. CLOCK	(1) The following are the method of data transfer to servo IC. The servo IC outputs the data of 21 bits to latch the servo/display serial data at rising edge of servo/display serial clock. Then, the serial output is completed by making servo/display serial data="H" at the final clock trailing edge. (2) For mode and data, refer to page 41.
50	SERVO S. DATA	
51	BRAKE SOLENOID	It is a signal for controlling the brake solenoid ON/OFF. (1) This signal is intended to control the brake solenoid ON/OFF, and in case of brake solenoid="H", the brake solenoid is made to be attracted. (2) When the REW key is pressed at FF.REW position, REW display is made, and it makes loading motor positive-turn CTL="L" and loading motor reverseturn="H", and after movement to brake release posi., brake solenoid="H" is applied.

<table>
<tr><th>Pin No.</th><th>Control Signal</th><th>Specifications</th></tr>
<tr><td></td><td></td><td>(3) When the FF key is pressed at FF.REW position, FF display is made and then the same brake release processing as (2) is taken.
(4) If the cassette is already inserted and end sensor="H" or start sensor="H" is present, the same brake release processing as (2) is taken.
(5) In tape slack detection, it takes such a brake release processing identical to (2).
(6) When the REW key is pressed in case of EE (L)="H" at PB.REC posi., VSR display is made and brake solenoid="H" made, shifting to the VSR position. After shifting, brake solenoid="L" is applied.
Then, when the VSR mode is released, it makes brake solenoid="H" after stopping of tape running, and then upon shifting to PB.REC position, brake solenoid="H" is made.
(7) In the item of (2), (3) and (4) of capstan UL, brake solenoid="L" is made immediately before capstan UL (L)="H".
(8) It makes brake solenoid="L" immediately before release of FF/REW.</td></tr>
<tr><td>52</td><td>LOADING RVS CTL</td><td>(1) It is an output terminal for controlling the rotating direction of loading motor.</td></tr>
<tr><td>53</td><td>LOADING FWD CTL</td><td>Given below is the relevant combination.
<table>
<tr><th>Control Signal / Mode</th><th>Loading motor positive-turn CTL</th><th>Loading motor reverse-turn CTL</th></tr>
<tr><td>Loading motor Stop</td><td>L</td><td>L</td></tr>
<tr><td>Loading motor positive-turn</td><td>H</td><td>L</td></tr>
<tr><td>Loading motor reverse-tur</td><td>H</td><td>H</td></tr>
</table>
Table 3-6.
(2) For stopping condition of mecha. actuation:
• Loading motor positive-turn CTL="L"
• Loading motor reverse-turn CTL="L"
(3) The following functions are provided so as to prevent any over-current to the loading motor.
• 2.0 sec. shut-off at cassette controller actuation
• 7.0 sec. shut-off at loading arm actuation
(4) For shut-off, there should be loading motor positive-turn CTL="L" and loading motor reverse-turn CTL="L", and the loading motor is stopped, and then stoppage is continued at that position until the operating key input has any change.
However, if during positive-turn of cassette controller, the motor is reversely turned and the cassette is ejected at once.
(5) Actuation of cassette controller
i) In cassette insertion, unless the cassette controller moves to the cassette controller down-posi. within 2 sec., it is actuated in Eject direction immediately, and further if not moved to the cassette controller up-posi. within 2 sec., it takes shut-off.
ii) For cassette controller Eject, unless the cassette controller moves to the cassette controller up-posi. within 2 sec., it is actuated in the cassette inserting direction, and if not moved to the cassette controller down-posi. within 2 sec., it takes shut-off.</td></tr>
</table>

<table>
<tr><th>Pin No.</th><th>Control Signal</th><th>Specifications</th></tr>
<tr><td>54</td><td>CAPSTAN UL (L)</td><td>A signal to control a reel rotating torque
(1) The capstan UL is a torque control voltage to be applied to the capstan motor, and to be "L" during unloading, at start of FF/REW or at tape-winding at Eject.
i) If the Stop/FF/REW mode is obtained at PB. REC position, the loading motor is reversely turned, and after about 500 msec., capstan UL (L)="L" is made, and the capstan motor is reversely turned, stopping the capstan motor and capstan UL (L)="H" at brake release position.
ii) When the FF key is pressed at FF. REW position, FF display is made, and after brake release, capstan UL (L)="L" is made, and the capstan motor is positive-turned and about 500 msec. later, capstan UL (L)="H" is applied.
iii) When the REW key is pressed at FF. REC position, REW display is made, and after brake release, capstan UL (L)="H" is made, and the capstan motor is reversely turned and about 500 msec. later, capstan UL (L)="H" is applied.
(2) In tape slack detection or leader tape-winding processing, for start of tape running, about 500 msec. capstan UL (L)="L" is to be applied. However, if the above processing is completed within 500 ms., capstan UL (L)="H" is made immediately.
(3) Idler move at start of loading action.
(4) Loose-tape winding processing upon cassette insertion (300 msec.)
(5) Loose-tape winding processing during Eject actuation.
(6) Countermeasure for tape slack at FF→Stop</td></tr>
<tr><td>55</td><td>CAPSTAN PU (L)</td><td>A signal to control a reel rotating torque
(1) The capstan PU is a signal for controlling the torque control voltage of capstan motor, and outputs at the following timing.
i) At transfer from PB. REC posi. to VSR posi.
ii) At return from VSR posi. to PB/REC posi.
iii) At idler move (Neck swing processing)
iv) Idler move from tape-winding upon cassette insertion
v) Idler move at REC—REC. Pause</td></tr>
<tr><td>56</td><td>CAPSTAN RVS (H)</td><td>It is a control signal for determining the rotating direction of capstan motor.
(1) The mode is made by combining the terminal ⑤⑦ with forced acceleration.
<table><tr><th>Control signal / Mode</th><th>Forced acceleration</th><th>Capstan motor reverse turn</th></tr><tr><td>Capstan motor stop</td><td>L</td><td>L</td></tr><tr><td>Capstan motor positive turn</td><td>H</td><td>L</td></tr><tr><td>Capstan motor reverse turn</td><td>H</td><td>H</td></tr></table>Table 3-7.</td></tr>
<tr><td>57</td><td>CAPSTAN CTL
(Forced acceleration)</td><td>It is an output accelerating (stopping) the rotation speed to the capstan motor.
(1) For Slow/Still:
i) At Still (still image) replay→Forced acceleration="H"
ii) At Slow/Frame advance→Refer to a frame advance timing chart.
2) Other than Slow/Still
i) Capstan motor rotation: Forced acceleration="Z"
ii) Capstan motor stop: Forced acceleration="L"</td></tr>
</table>

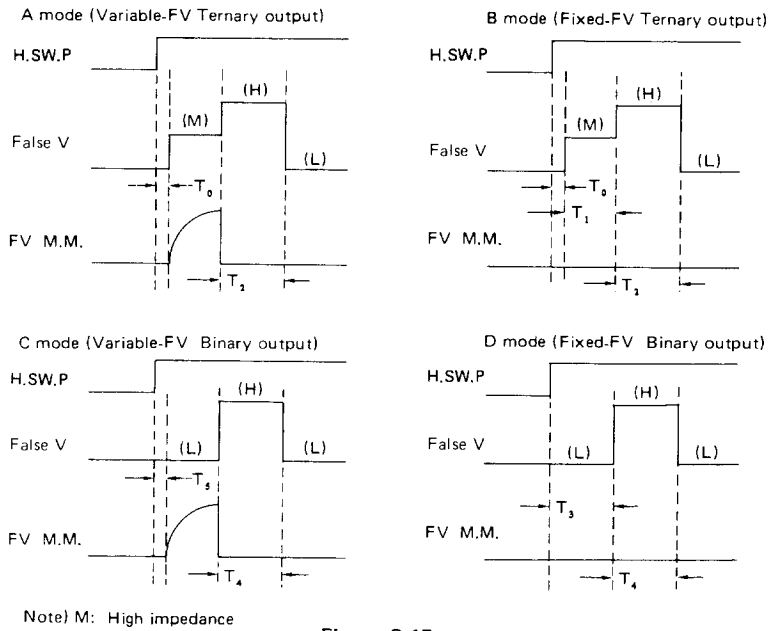
Pin No.	Control Signal	Specifications
58	CURRENT LMT	It is an output offering a torque (current) limit to the capstan motor. (1) In case of Power CTL (L)="L", current limit="L" is outputted. (2) For Power CTL (L)="L": i) At Still (still image) replay→Current limit="Z" ii) At Slow/Frame advance→Refer to frame advance timing chart. iii) For other than above, current limit="H" is outputted.
59	DRUM CTL	This signal is to control the drum motor rotation, and stops the drum motor in case of drum mute (L)="L". (1) If PB, VSR, VSF, Still, Slow, double speed or REC display is obtained at FF/REW position, drum mute (L)="Z" is applied, and after 500 ms, loading is started. (2) If Stop, FF or REW is obtained at PB/REC position, unloading is started, and after completion, drum mute (L)="L" is applied. (3) Lateral swing acceleration at Slow/Still→Refer to a frame advance timing chart.
60	CTL GAIN SW (L)	It is a gain selecting output of PB-CTL amp. at FF/REW. (1) At FF/REW→CTL gain selecting CTL="H" output Other than above→CTL gain selecting CTL="L" output
61	X2 (H)	At double speed → "H" Not used
62	FV CTL	It is a control signal for APC correction of drum in trick mode. (1) In case of trick="H", drum correction is done. (2) At VS-F/R, double speed, slow & Still mode, trick="H" is made. (3) The timing of trick="L" is to be 1 sec. after phasing term after PB mode shifting.
63	FV	In trick mode (VS-F/R), it generates FV/FH and applies the synchronization. (1) Such a FV is generated in VS-F/R mode, mecha. shift time of PB→VS-R, mecha. shift time at VS-R release, mode holding time of VS-F/R release Slow/Still, and in the case of Head 2 giving no double speed. (2) The generation timing waveform is as shown below. (Note: H.SW.P applies to both rising and trailing.)  Note) M: High impedance

Figure 3-15.

<table>
<tr><th>Pin No.</th><th>Control Signal</th><th>Specifications</th></tr>
<tr><td></td><td></td><td>(3) Modes and output waveforms are listed below
<table>
<tr><th rowspan="2">Mode</th><th rowspan="2">Recording Mode</th><th colspan="2">Head SW Pulse</th></tr>
<tr><th>Rising</th><th>Trailing</th></tr>
<tr><td rowspan="3">VS-Forward/Reverse</td><td>2-head (SP)</td><td>D mode</td><td>D mode</td></tr>
<tr><td rowspan="2">4-head (SP)
(LP)</td><td>B mode</td><td>B mode</td></tr>
<tr><td>D mode</td><td>D mode</td></tr>
<tr><td rowspan="3">Still/Slow</td><td>2-head (SP)</td><td>D mode</td><td>C mode</td></tr>
<tr><td rowspan="2">4-head (SP)
(LP)</td><td>A mode</td><td>B mode</td></tr>
<tr><td>D mode</td><td>C mode</td></tr>
<tr><td rowspan="3">Double Speed</td><td>2-head (SP)</td><td>B mode</td><td>A mode</td></tr>
<tr><td rowspan="2">4-head (SP)
(LP)</td><td>A mode</td><td>B mode</td></tr>
<tr><td>D mode</td><td>C mode</td></tr>
</table>
Table 3-8.</td></tr>
<tr><td>64</td><td>GND CTL</td><td>It controls the (−) terminal of CTL head.
(1) 100 ms after bias CTL (L)="L", it should be GND CTL="L". (At REC)
(2) It should be bias CTL (H)="H", together with GND CTL="H".
(3) Normally, it should be "H".</td></tr>
</table>

3-3. Data Transmission Specification of Mechanism Controller Corresponding to Serial Mode Servo

- Data is transmitted with the following format.

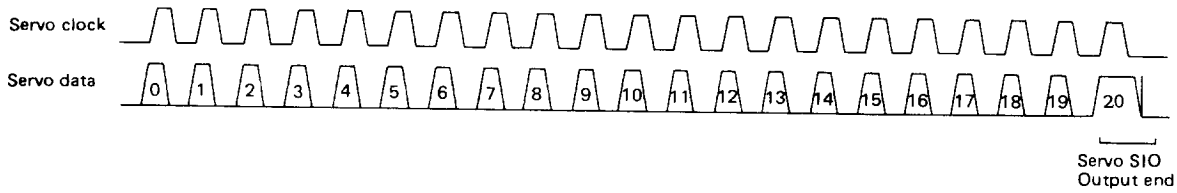


Figure 3-16.

(1) 21 bit data is outputted to the servo IC through the 2-line system consisting of servo clock (SCK) and servo data (SI).
(2) The servo data latches at the tail edge of servo clock. Servo SIO ends when the servo data is set to "H" at the servo clock tail.

1. Relation between Modes and Service Data

(The servo IC corresponds to RH-IX0431GEZZ)

Mode	Serial Data															
	0~5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
POWER OFF	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Serial transmission stop
POWER ON STOP	*1)	1	1	0	1	1	0	0	1	*2)		1	0	1	0	0	(FF2)
For 2.0S after FF start	*1)	1	1	0	1	1	0	0	0	*2)		1	0	0	1	0	(FF1)
FF subsequent	*1)	1	1	0	1	1	0	0	1	*2)		1	0	0	1	0	(FF2)
For 2.0S after REW start	*1)	1	1	1	1	1	0	0	0	*2)		1	0	0	1	0	(REW1)
REW subsequent	*1)	1	1	1	1	1	0	0	1	*2)		1	0	0	1	0	(REW2)
PB SP mode	*1)	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	(PB)
LP mode	*1)	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	(PB)
SP fixed mode	*1)	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	(PB)
VSF (M)	*1)	1	1	0	1	0	0	0	0	*2)		1	0	0	1	0	(SER2) SP: *5, LP: *5
(H)	*1)	1	1	0	1	0	0	1	0	*2)		1	0	0	1	0	(SER3) SP: *7, LP: *7
VSR (M)	*1)	1	1	1	1	0	0	0	0	*2)		1	0	0	1	0	(SER2/R) SP: *5, LP: *5
(H)	*1)	1	1	1	1	0	0	1	0	*2)		1	0	0	1	0	(SER3/R) SP: *7, LP: *7
SLOW	*1)	1	1	0	1	1	1	0	0	1	1	1	0	1	0	0	(SLOW)
STILL	*1)	1	1	0	0	0	0	0	0	1	1	1	0	1	0	0	(SLOW)
High speed	*1)	1	1	0	0	1	1	0	0	*2)		1	0	0	0	0	(*2)
REC SP mode	*1)	0	0	0	0	0	0	0	0	1	0	1	*3)	0	0	0	(REC)
LP mode	*1)	0	0	0	0	0	0	0	0	0	1	1	*3)	0	0	0	(REC)
SP fixed mode	*1)	0	0	0	0	0	0	0	0	0	0	1	*3)	0	0	0	(REC)
REC/pause	*1)	0	1	0	0	0	0	0	0	*2)		1	0	1	0	0	(REC · ASB)
Loading	*1)	0	1	0	0	0	0	0	0	*2)		1	0	1	0	0	(REC · ASB)
Unloading	*1)	1	1	0	1	1	0	0	1	*2)		1	0	0	0	0	(FF2)
Short loading	*1)	1	1	0	1	0	0	0	0	*2)		1	0	0	1	0	(SER1) / (*2)
Short unloading	*1)	1	1	0	0	0	0	0	0	*2)		1	0	1	0	0	(PB)
Trick cancel	*1)	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	(PB)
Short rewinding	*1)	0	1	0	0	0	0	0	0	*2)		1	0	0	0	0	(REC · ASB)
Phase matching	*1)	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	(REC · ASB)

Note *1 : Tracking delay time
D0 to D5 = "1 0 0 0 0 0" only in REC mode
In other modes the preceding data remains.

Note *2 : SP : 1 0
LP : 0 1
SP fixed : 0 0
Holding : 1 1

Note *3 : Only when writing the VISS signal: "1"
In other cases: "0"

Table 3-9.

2. Serial data D0 to D5

Serial Data						Tracking Delay time (msec)
0	1	2	3	4	5	
0	0	0	0	0	0	5.22
		↓				↓
0	1	1	1	0	1	18.62
		↓				↓
1	0	0	0	0	0	20.00
		↓				↓
1	1	1	0	1	0	32.01
		↓				↓
1	1	1	1	1	1	34.32

Note: The output from pin (31) of the servo IC (RH-IX0431GEZZ) is delayed by 5.22 msec.

Table 3-10.

3. Serial data D14 to D15

Serial Data		Speed Data
14	15	
1	0	SP
0	1	LP
0	0	SP fixed
1	1	Holding

Table 3-11.

4. Serial data D16 to D20

D16	Head Selection
0	D/A 4 Head
1	2 Head

D17	REC / DUTY Selection
0	REC · CTL 27.5%
1	REC · CTL 60 %

D18	CAP / SERVO SW
0	ANALOG SW ON
1	ANALOG SW OFF

D19	Hysteresis Width
0	300mVpp
1	600mVpp

D20	REC / CTL Selection
0	High-Z
1	GND

Table 3-12.

3-4. Serial Transmission Format between System Controller and Timer

1. Format of Data Transmitted from System Controller to Timer

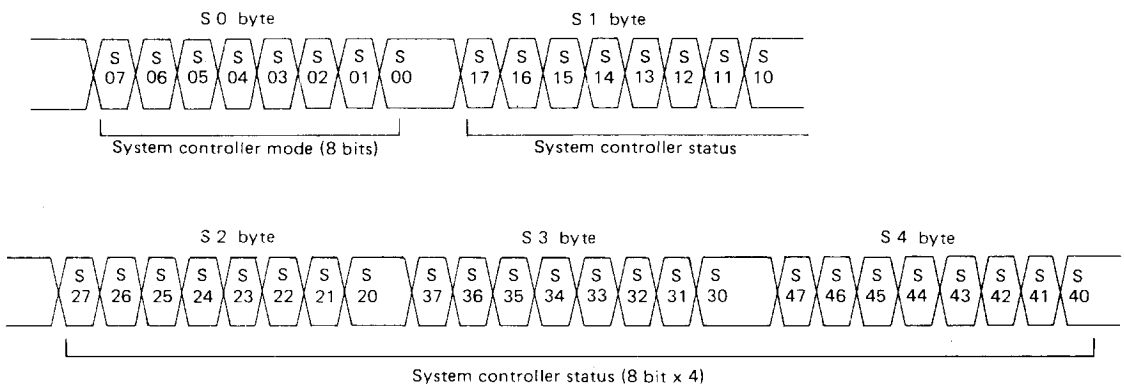


Figure 3-17.

(1) 5-byte data is transmitted by one transmission sequence.
(2) The S0 byte is arranged so that 8 bits compose one system controller mode data.
(3) The system controller mode is the system controller operation modes.
(4) The S1, S2, S3 and S4 bytes are 8 bite data which are used as system controller status data.
(5) The content of system controller status is represented the status of pertinent sensor by each bit.
(6) The timer makes the data valid when the same data is received twice successively (for S0, S1, S2, S3, S4).

2. Format of Data Transmitted from Timer to System Controller

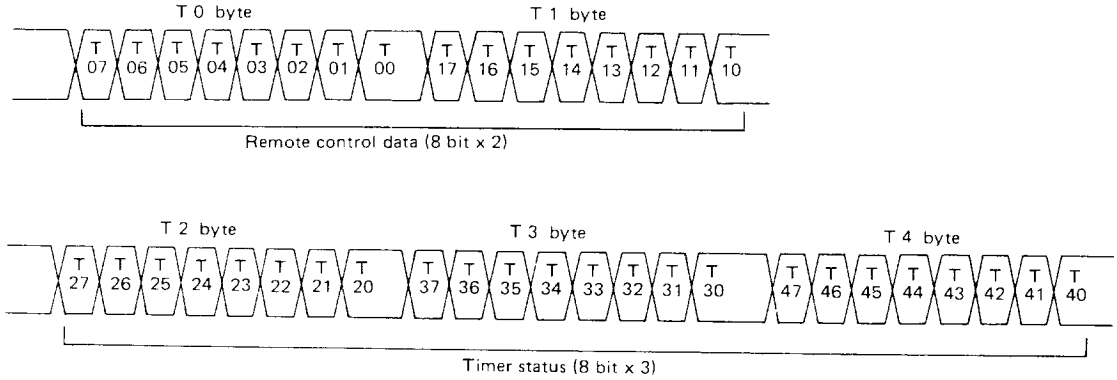
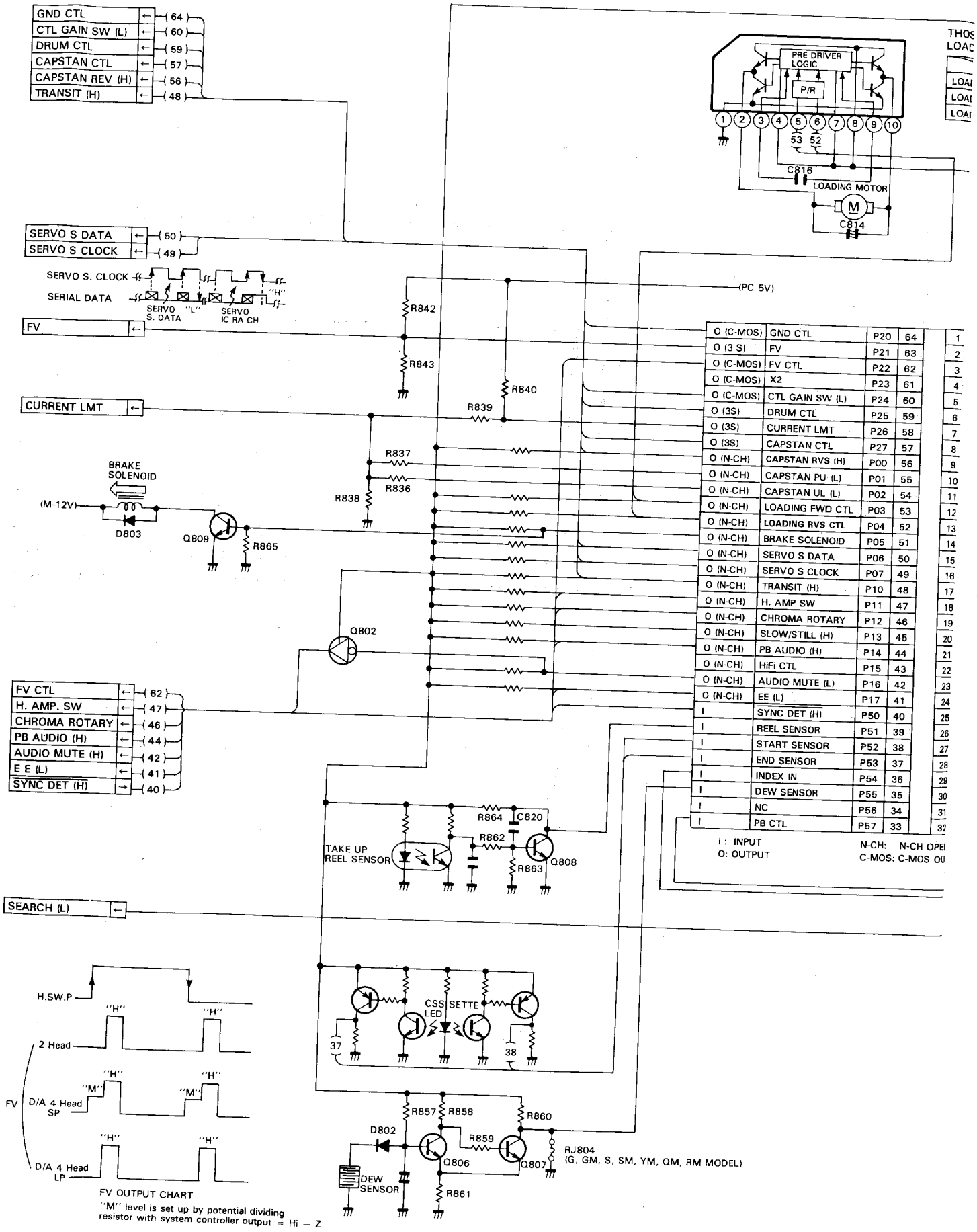


Figure 3-18.

(1) 5-byte data is transmitted by one transmission sequence.
(2) T0 byte and T1 byte are 8 bit data which are used as remote control data.
(3) The remote control data and they are determined by the content of control signals from the optical remote control and timer.
(4) The T0 byte and T1 byte have always the same data content.
(5) The system controller makes the remote control data valid if the T0 byte and T1 byte match with each other.
(6) The T2, T3 and T4 bytes are time master status data. The timer status consists of 8-bit flag it represents the timer status.
(7) The system controller makes the timer status data valid when the same timer status data is received twice successively.

System Controller Block Diagram



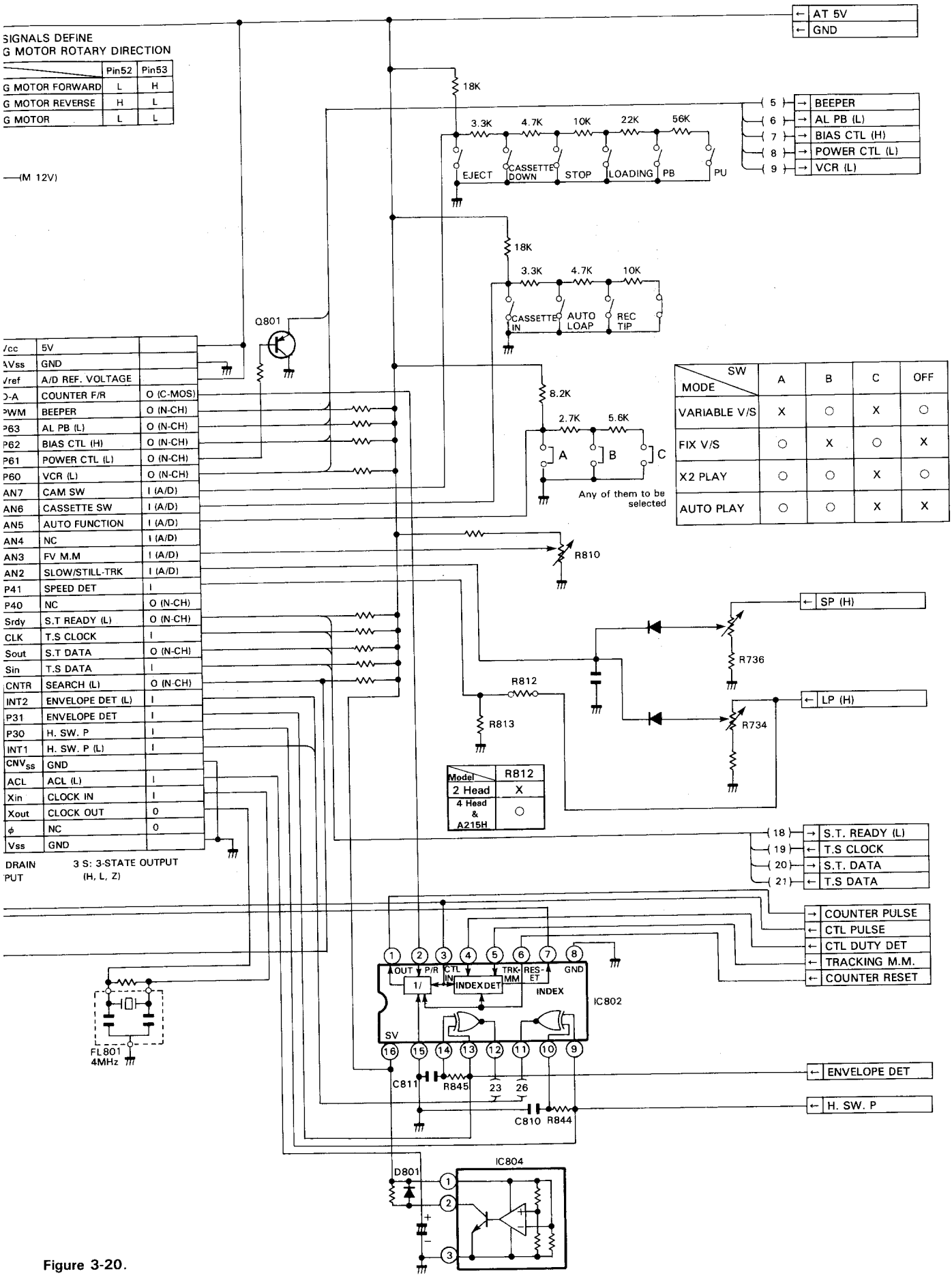

SIGNALS DEFINE
G MOTOR ROTARY DIRECTION
Pin52 Pin53
G MOTOR FORWARD L H
G MOTOR REVERSE H L
G MOTOR L L
(M 12V)
← AT 5V
← GND
18K
3.3K 4.7K 10K 22K 56K
EJECT CASSETTE DOWN STOP LOADING PB PU
5 → BEEPER
6 → AL PB (L)
7 → BIAS CTL (H)
8 → POWER CTL (L)
9 → VCR (L)
18K
3.3K 4.7K 10K
CASSETTE IN AUTO LOAP REC TIP
Q801
8.2K
2.7K 5.6K
A B C
Any of them to be selected
SW / MODE A B C OFF
VARIABLE V/S X ○ X ○
FIX V/S ○ X ○ X
X2 PLAY ○ ○ X ○
AUTO PLAY ○ ○ X X
R810
← SP (H)
R736
R812
R813
← LP (H)
R734
Model R812
2 Head X
4 Head & A215H ○
Vcc 5V
AVss GND
Vref A/D REF. VOLTAGE
D-A COUNTER F/R O (C-MOS)
PWM BEEPER O (N-CH)
P63 AL PB (L) O (N-CH)
P62 BIAS CTL (H) O (N-CH)
P61 POWER CTL (L) O (N-CH)
P60 VCR (L) O (N-CH)
AN7 CAM SW I (A/D)
AN6 CASSETTE SW I (A/D)
AN5 AUTO FUNCTION I (A/D)
AN4 NC I (A/D)
AN3 FV M.M I (A/D)
AN2 SLOW/STILL-TRK I (A/D)
P41 SPEED DET I
P40 NC O (N-CH)
Srdy S.T READY (L) O (N-CH)
CLK T.S CLOCK I
Sout S.T DATA O (N-CH)
Sin T.S DATA I
CNTR SEARCH (L) O (N-CH)
INT2 ENVELOPE DET (L) I
P31 ENVELOPE DET I
P30 H. SW. P I
INT1 H. SW. P (L) I
CNVss GND
ACL ACL (L) I
Xin CLOCK IN I
Xout CLOCK OUT O
φ NC O
Vss GND
DRAIN
PUT
3 S: 3-STATE OUTPUT
(H, L, Z)
18 → S.T. READY (L)
19 ← T.S CLOCK
20 → S.T. DATA
21 ← T.S DATA
→ COUNTER PULSE
← CTL PULSE
← CTL DUTY DET
← TRACKING M.M.
← COUNTER RESET
1 2 3 4 5 6 7 8
OUT P/R CTL IN TRK-MM RES-ET GND
1/
INDEX DET
INDEX
IC802
SV
16 15 14 13 12 11 10 9
FL801
4MHz
C811
R845
23 26
C810 R844
← ENVELOPE DET
← H. SW. P
IC804
D801
1 2 3

Figure 3-20.

4. TIMING CHART

Slow/Still Frame Advance Timing Chart (2-head system)

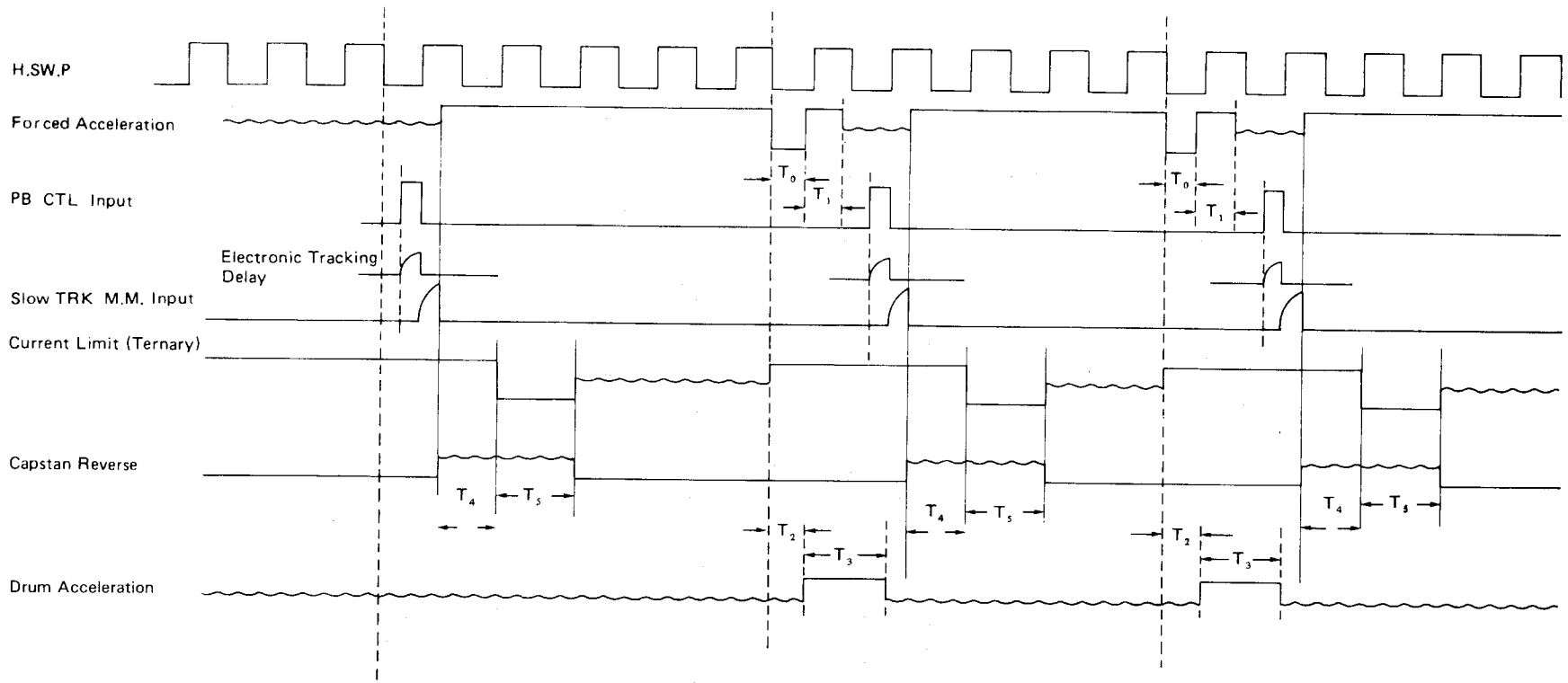


Figure 4-1.

Shift to REC/STOP mode when the Slow/Still mode is cleared (2-head system)

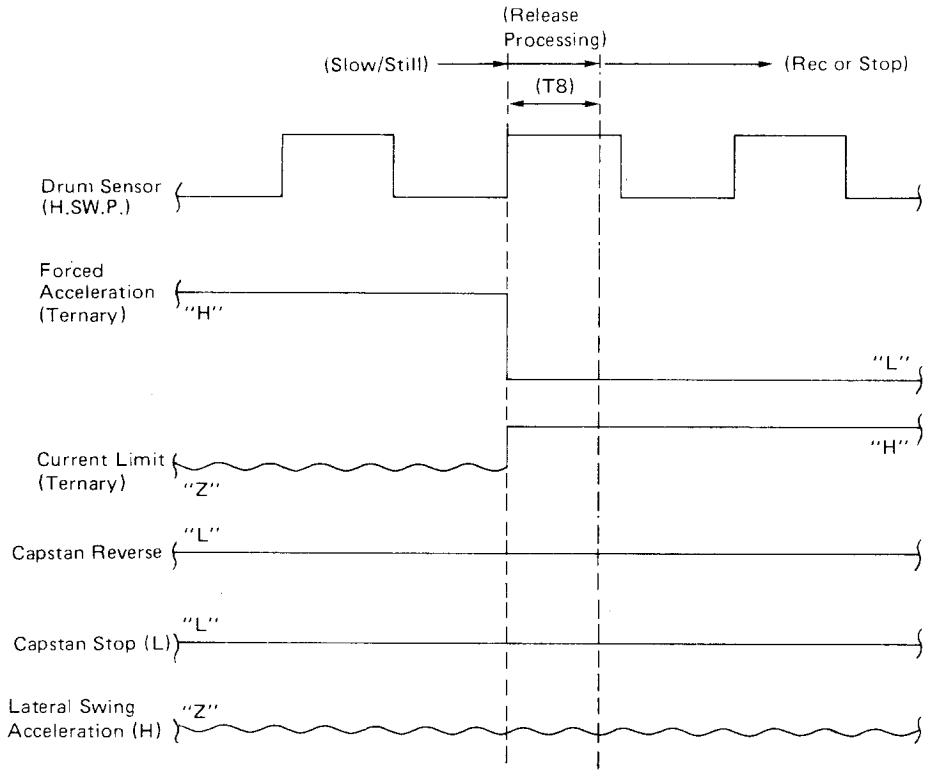


Figure 4-2.

Shift to PB mode when the Slow/Still mode is cleared (2-head system)

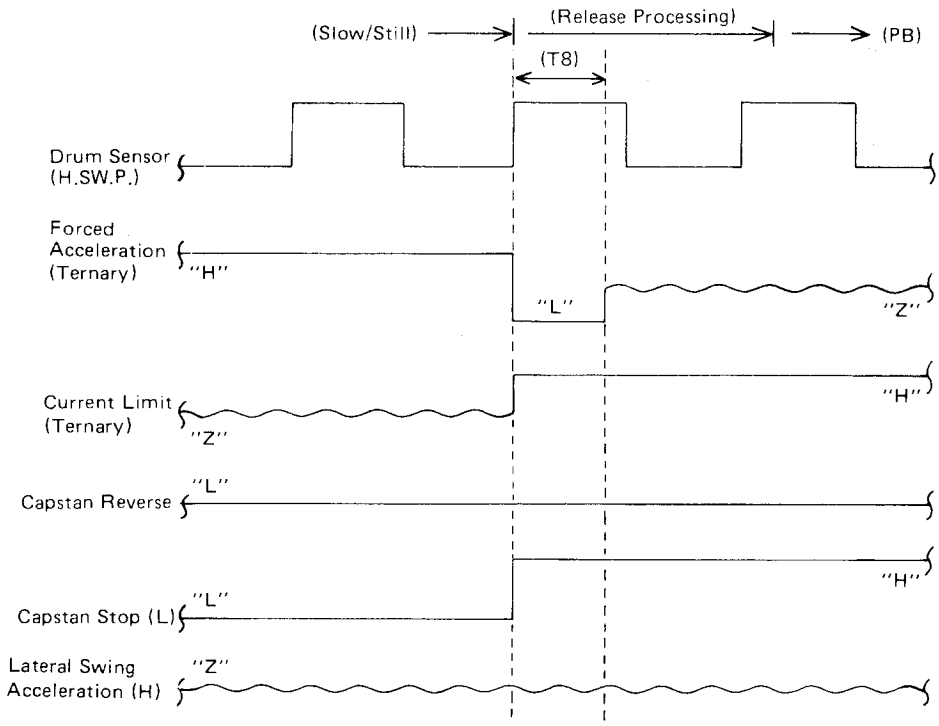


Figure 4-3.

Symbol		Item	Preset Value		
			SP	LP	
Frame Advancing	T0	Start M/M	13.8 ms	—	
	T1	Forced acceleration M/M	16.6 ms	—	
	T2	Lateral swing acceleration start time	18.7 ms	—	
	T3	Lateral swing acceleration M/M	45.8 ms	—	
	T4	Speed reduction M/M	12.0 ms	—	
	T5	Brake M/M	13.6 ms	—	
	T6	———	—	—	
	T7	———	—	—	
Release	T8	Forced acceleration release	23.0 ms	—	
	T9	———	—	—	

Note: Head 2 is special for SP; therefore, Slow/Still M/M, etc. of LP is under study.

Table 4-1.

Slow/Still Frame Advance Timing Chart (4-head system)

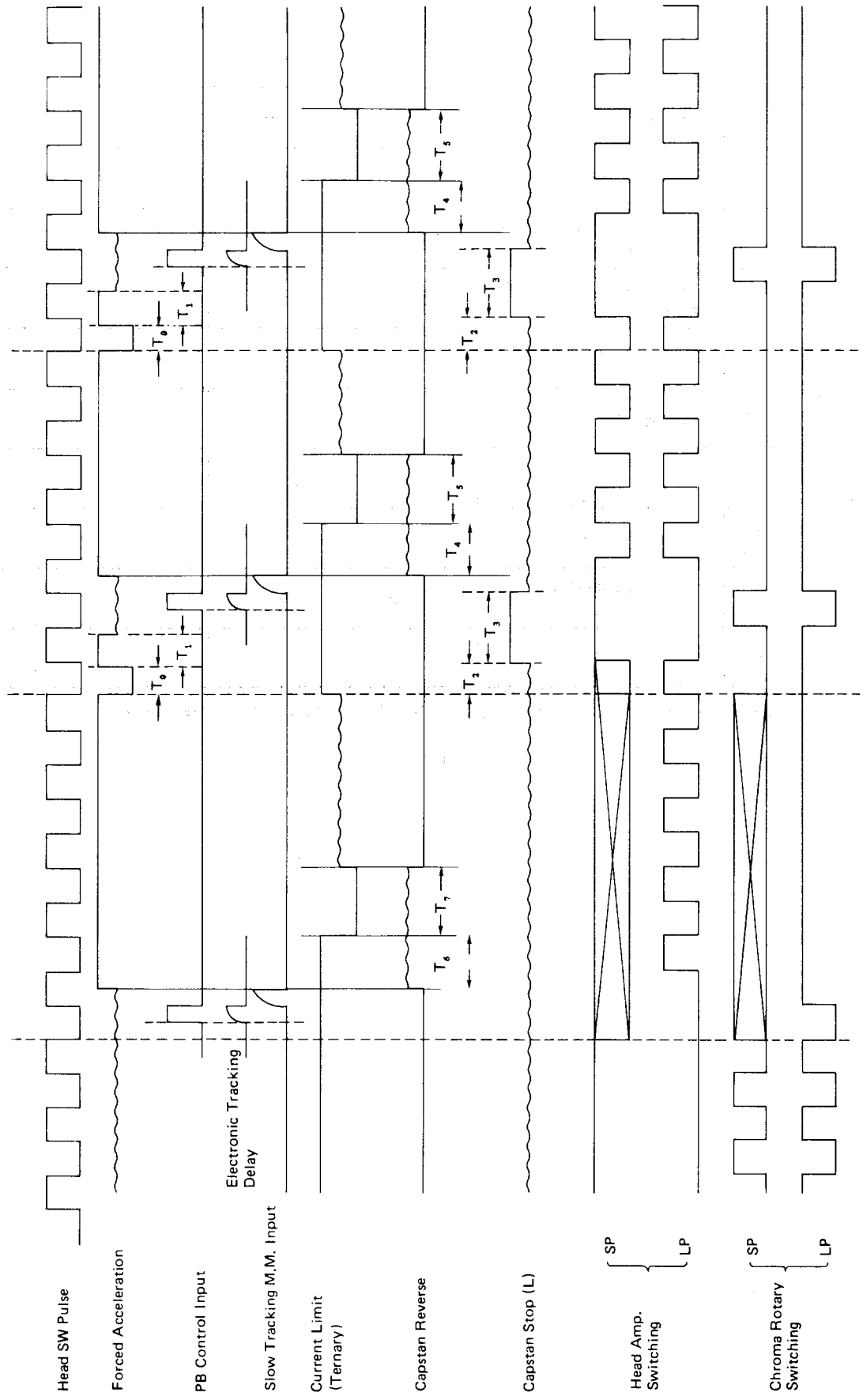


Figure 4-4.

Shift to PB mode when the SP Slow/Still mode is cleared (4-head system)

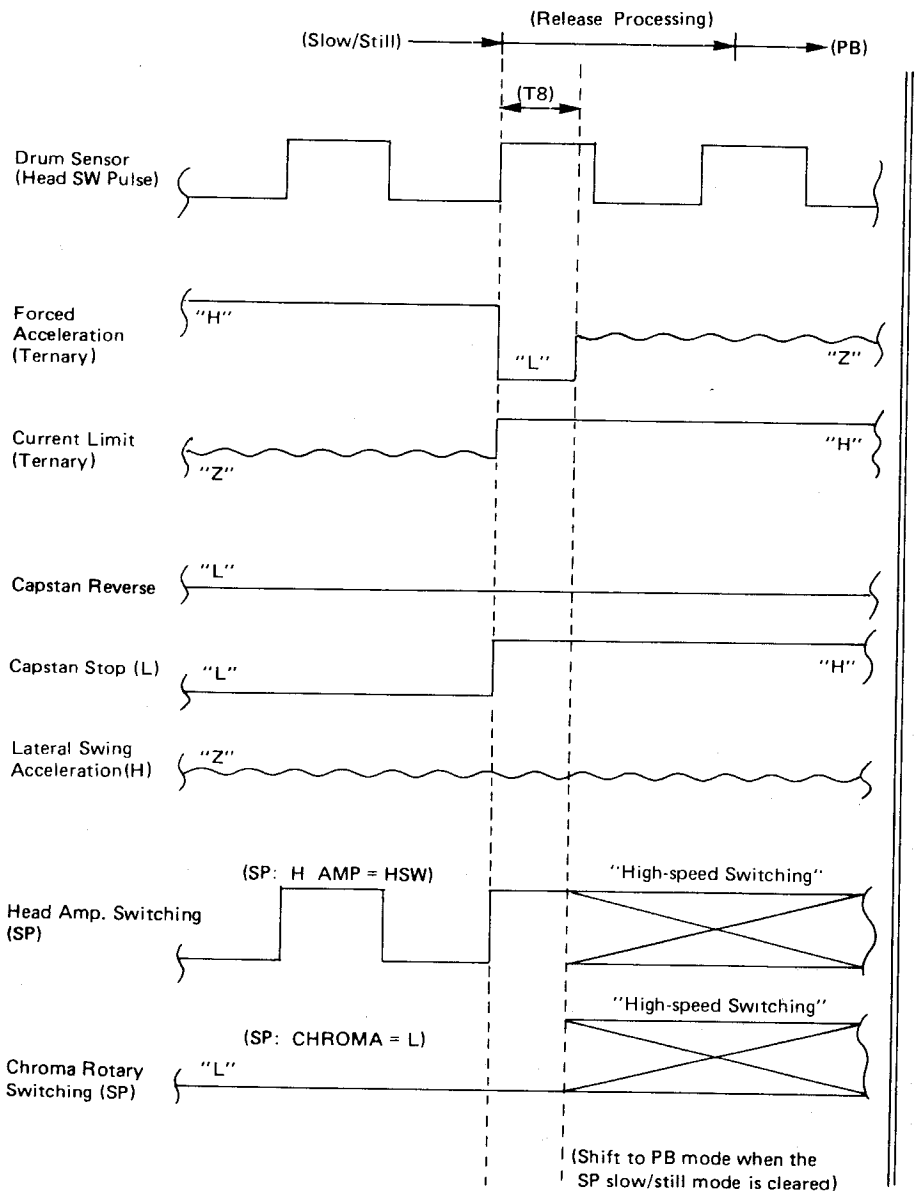


Figure 4-5.

Shift to PB mode when the LP Slow/Still mode is cleared (4-head system)

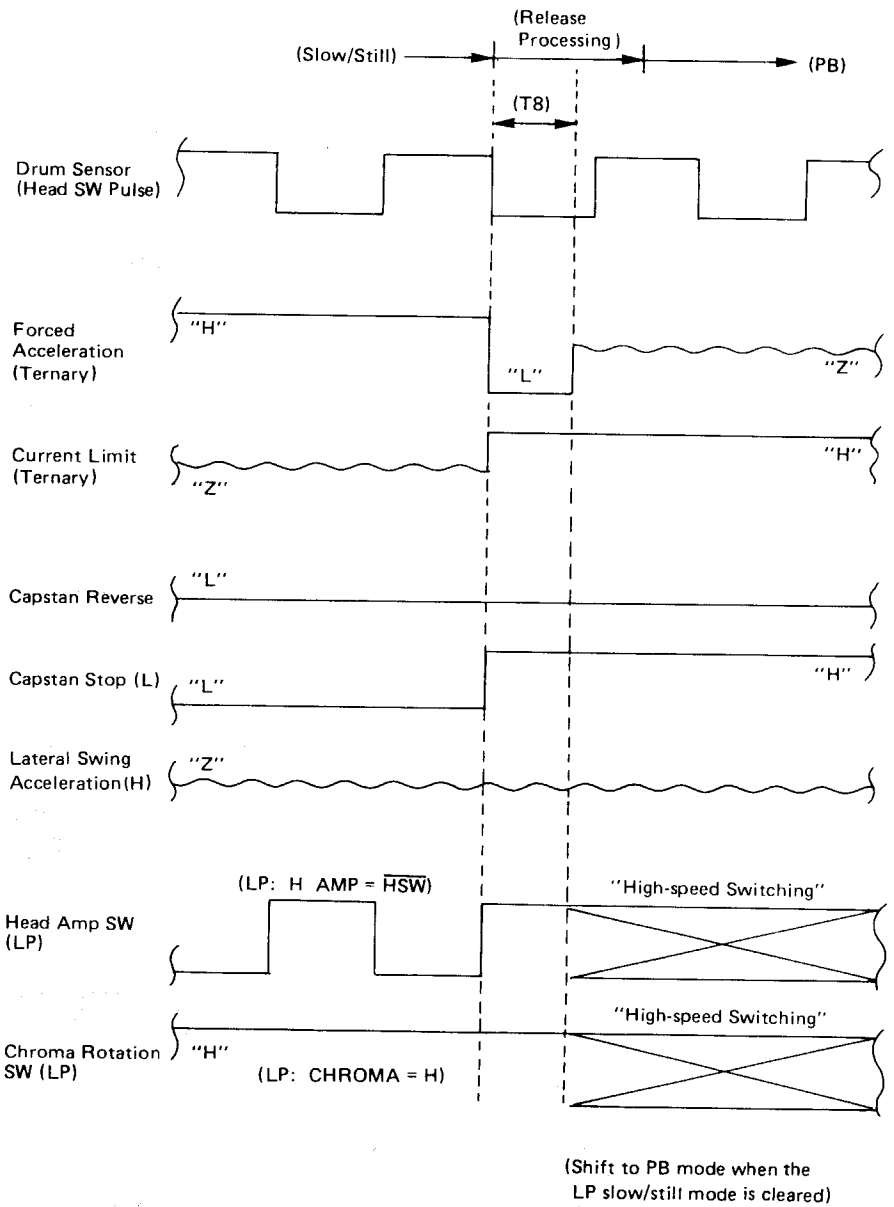


Figure 4-6.

Shift to REC/STOP mode when the SP Slow/Still mode is cleared (4-head system)

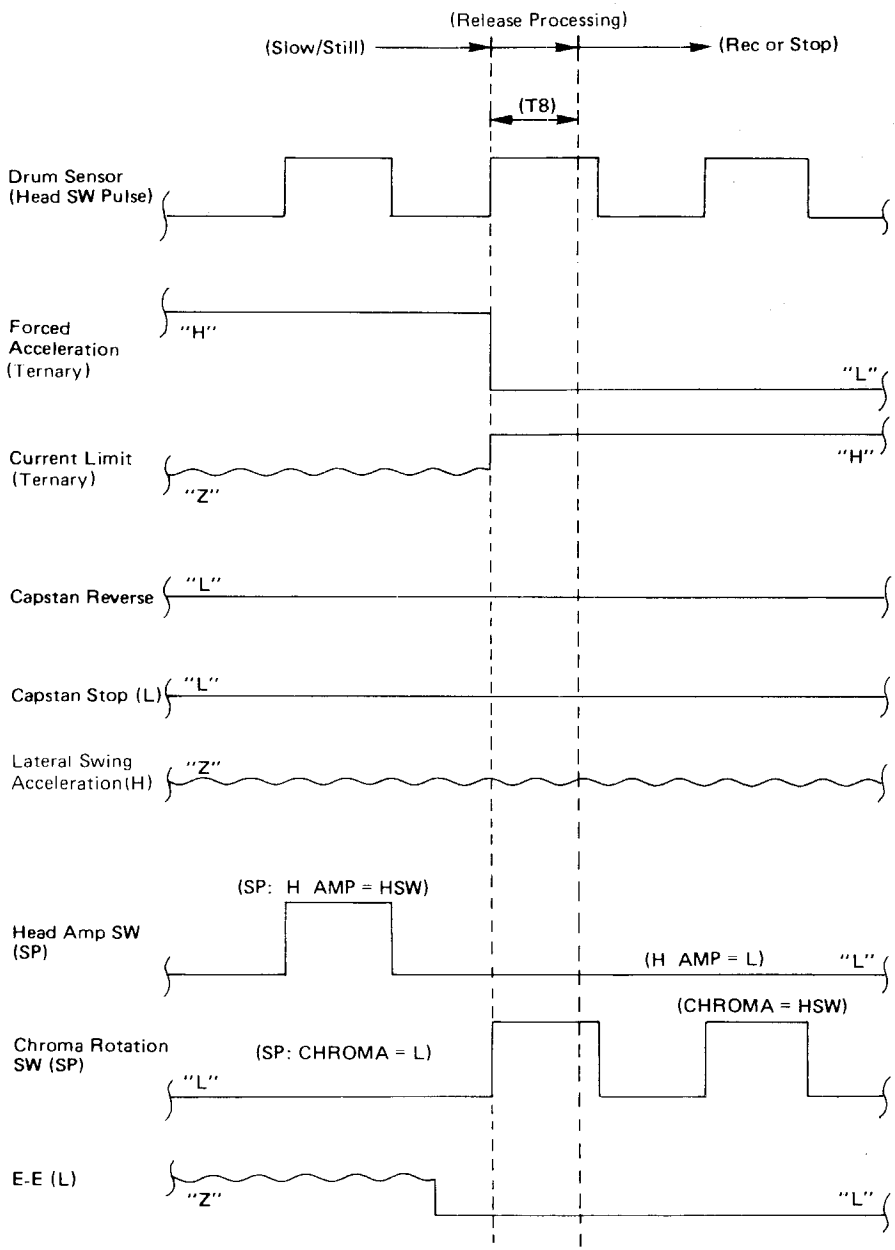


Figure 4-7.

Shift to REC/STOP mode when the SP Slow/Still mode is cleared (4-head system)

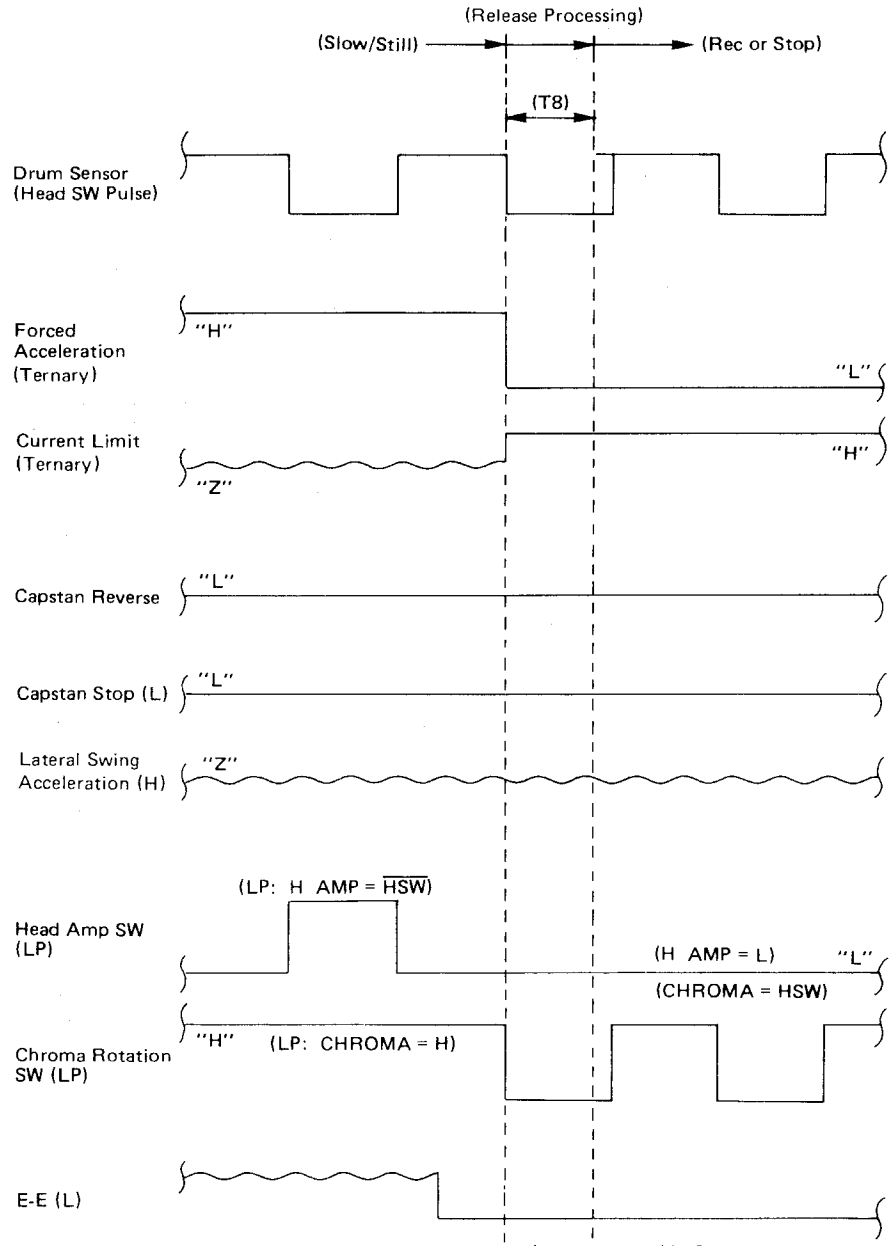


Figure 4-8.

Symbol		Item	Preset Value		
			SP	LP	
Frame Advancing	T0	Start M/M	14.08 ms	9.73 ms	
	T1	Forced acceleration M/M	18.94 ms	11.01 ms	
	T2	Lateral swing acceleration start time	23.04 ms	19.46 ms	
	T3	Lateral swing acceleration M/M	23.81 ms	33.28 ms	
	T4	Speed reduction M/M	11.78 ms	5.12 ms	
	T5	Brake M/M	12.29 ms	3.58 ms	
	T6	Speed reduction M/M (At Still On)	11.78 ms	7.94 ms	
	T7	Brake M/M (At Still On)	12.29 ms	3.58 ms	
Release	T8	Forced acceleration release	23.04 ms	9.22 ms	
	T9	———	——	—	

Note: Head 2 is special for SP; therefore, Slow/Still M/M, etc. of LP is under study.

Table 4-2.

5. TIMER CIRCUIT

5-1. The RH-IX0581GEZZ is a timer microcomputer LSI featuring the channel selection function by a voltage synthesizer tuner. (VC-A103, A116, A125, A118, A508, A615, T620 Series and VC-A215H)

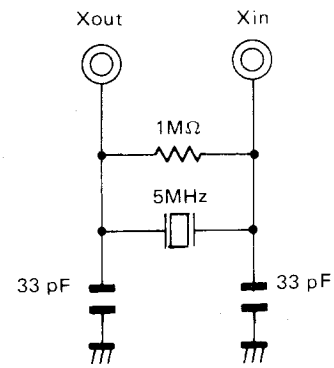
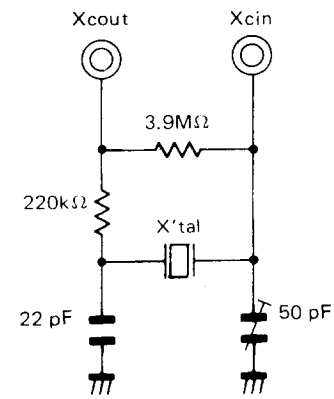
- **Terminal Allocation (RH-iX0581GEZZ)**

Terminal Name	No.	Name		Name	No.	Terminal Name
G11	64	P40		Vcc	1	+5V
G10	63	P41		P65	2	AUDIO OUTPUT CTL
G9	62	P42		P64	3	E^2 PROM CS
G8	61	P43		P63	4	E^2 PROM CLK
G7	60	P44		P62	5	E^2 PROM SO/S1/OSD SO
G6	59	P45		P61	6	PWM OUTPUT
G5	58	P46		P60	7	AFT MUTE
G4	57	P47		P27	8	B0
G3	56	P00		P26	9	B1
G2	55	P01		P25	10	OSD MUTE/BLUE BACK
G1	54	P02		P24	11	OSD CLK
S13	53	P03		P23	12	OSD CS-(L)
S12	52	P04		P22	13	CTL FREQ. DIV. IC RESET
S11	51	P05		P21	14	SECAM OSD PROHIBIT INPUT
S10	50	P06	RH-iX0581GEZZ	P20	15	NORMAL (L)
S9	49	P07		Srdy	16	SYSCON READY-(L)
S4	48	P10		CLK	17	SYSCON/TIMER CLK
S5	47	P11		Sout	18	TIMER SERIAL DATA
S3	46	P12		Sin	19	SYSCON SERIAL DATA
S7	45	P13		P33	20	CTL PULSE (1/25)
S6	44	P14		P32	21	INTERNAL COUNTER CLK INPUT
S2	43	P15		P31	22	VIDEO TUNER (H)
S1	42	P16		P30	23	AUDIO TUNER (H)
S8	41	P17		INT1	24	A/C PULSE
NC	40	P50		INT2	25	R/C PULSE INPUT
PAY (H)	39	P51		CNV_{ss}	26	GND
−30V	38	Vp		RESET	27	RESET -(L)
KEY INPUT 1	37	P54		Xin	28	CLOCK INPUT
KEY INPUT 2	36	P55		Xout	29	CLOCK OUTPUT
KEY INPUT 3	35	P56		XCin	30	CLOCK INPUT FOR TIMER
KEY INPUT 4	34	P57		XCout	31	CLOCK OUTPUT FOR TIMER
X'TAL ADJ.	33	ϕ		V_{ss}	32	GND

Figure 5-1.

5-2. TERMINAL DESCRIPTION (RH-iX0455GEZZ: Voltage synthesizer tuner)

Pin No.	Name	Description	I/O (Type)
1	Vcc	At 5V to be connected.	
2	AUDIO OUTPUT CTL	Control signal to switch the audio output between (L+R), L, R and NORMAL.	O (C-MOS)
3	E^2PROM CS	Used for serial transfer between Timer and E^2PROM. Note that pin No. 5 (E^2PROM SI/SO/OSD SO) is commonly used as the OSD Control serial port.	O (C-MOS)
4	E^2PROM CLK		O (C-MOS)
5	OSD SO/E^2PROM SI/SO		I/O (C-MOS)
6	PWM OUTPUT	Tuning voltage PWM output. 14-bit resolution.	O (C-MOS)
7	AFT MUTE	Output when the volsyn is in preset mode or when tuning is being done.	O (C-MOS)
8	B0	Band switching output for tuning	O (N-CH)
9	B1		O (N-CH)
10	OSD MUTE/ BLUE BACK	OSD control serial terminal.	O (N-CH) O (N-CH)
11	OSD CLK		O (N-CH)
12	OSD CS-(L)		O (N-CH)
13	CTL FREQ. DIV. IC RESET	Control signal to reset the CTL frequency dividing IC.	O (N-CH)
14	SECAM OSD PROHIBIT INPUT	Control signal to prohibit the superimpose function while receiving SECAM signal.	I
15	NORMAL (L)	Terminal commonly used for forced normal (L) output and LR display mute (L) input. (A mute signal is supplied via the N-CH open drain circuit. On Hi-Fi models.)	O (N-CH)
16	SYSCON READY-(L)	Control signal for serial transfer between timer and system controller.	I
17	SYSCON/TIMER CLK		O (N-CH)
18	TIMER SERIAL DATA		O (N-CH)
19	SYSCON SERIAL DATA		I
20	CTL PULSE (1/25)	1-second count source input for the real time counter.	I
21	INTERNAL COUNTER CLK INPUT	Clock count input for the timer. Connected to Pin No. 31. Shortest pattern possible to be taken for connection.	I
22	VIDEO TUNER (H)	Input switching control terminal.	O (N-CH)
23	AUDIO TUNER (H)		O (N-CH)

Pin No.	Name	Description	I/O (Type)
24	A/C PULSE	A/C-shaped signal input for power failure detection. Power failure is identified if there is no change in A/C pulse for 35 msec. External interrupt at the rising edge.	I
25	R/C PULSE INPUT	Rising edge of R/C pulse is detected. External interrupt at the rising edge to measure the interval between two rising edges of R/C pulse.	I
26	CNVss	Connected to GND (0V).	
27	RESET-(L)	All Clear is made when a voltage lower than 0.6V has been put in for 2 μsec or more after the supply voltage reached the microcomputer's operating voltage (5V $\pm$ 10%).	I
28 29	CLOCK INPUT CLOCK OUTPUT	System clock generating circuit built-in. System clock is obtained by adding a ceramic resonance circuit as shown below.  Figure 5-2.	I O
30 31	CLOCK INPUT FOR TIMER CLOCK OUTPUT FOR TIMER	Timer count clock generating circuit built-in. Timer count clock is obtained by adding a crystal resonance circuit as shown below.  Figure 5-3.	I O
32	Vss	Connected to GND (0V).	

Pin No.	Name	Description	I/O (Type)
33	X'tal ADJ.	Crystal adjustment output. Adjustment is made when the microcomputer is reset. Half the crystal output (32.768 kHz) is given out with jumper provided.	O
34 35 36 37	KEY INPUT 4 KEY INPUT 3 KEY INPUT 2 KEY INPUT 1	4 x 13 matrix is formed by Pin Nos. 41 thru 53 (S1 thru S2). Jumper input or key input is made.	I I
38	Vp	−30V to be connected	

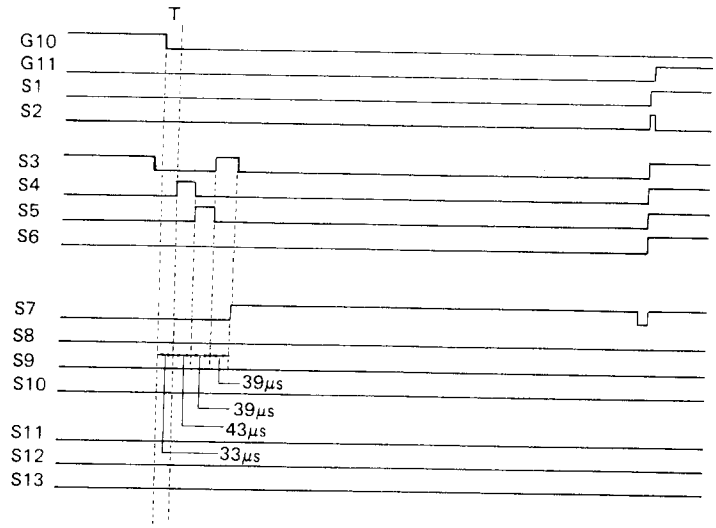


Figure 5-4.

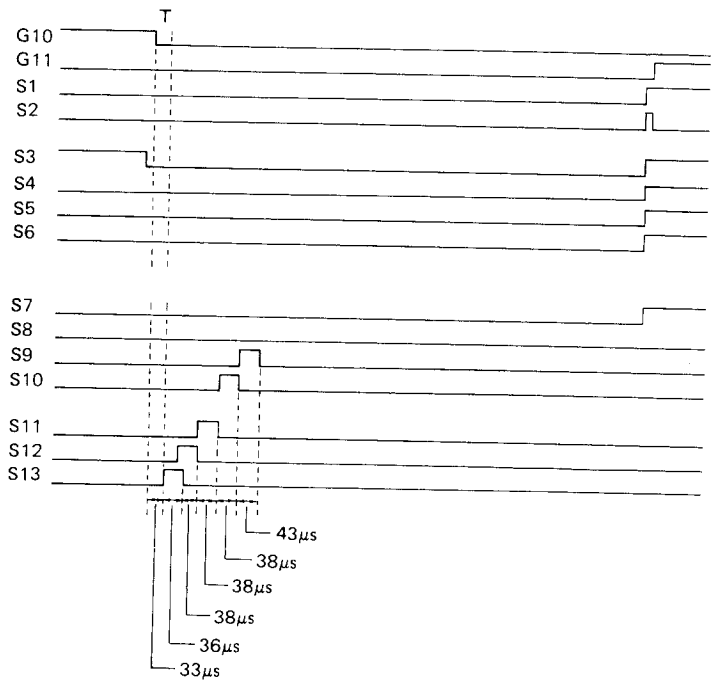
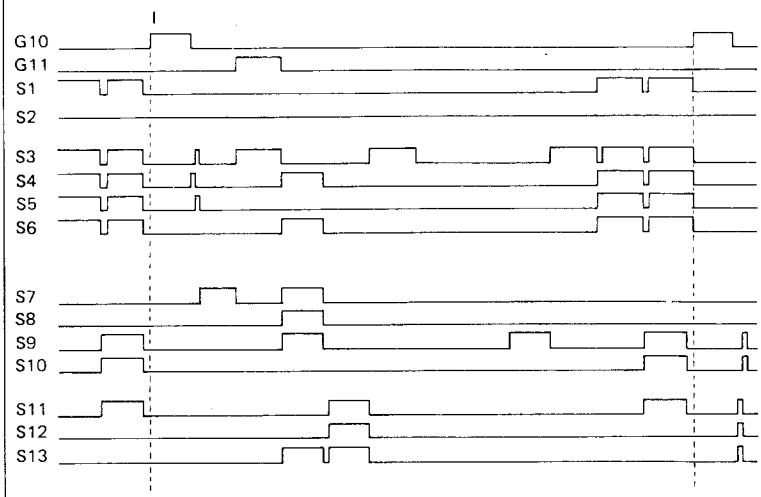
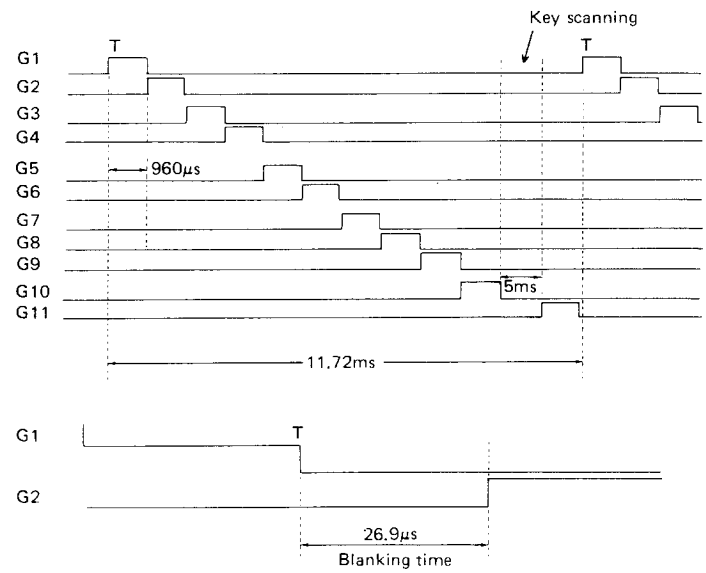


Figure 5-5.

Pin No.	Name	Description	I/O (Type)
39	PAY (H)	Output at "H" while the PAY position is selected.	O (P-CH)
40	NC		
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64	S8 S1 S2 S6 S7 S3 S5 S4 S9 S10 S11 S12 S13 G1 G2 G3 G4 G5 G6 G7 G8 G9 G10 G11	Output terminals for fluorescent display tube drive segment signal and key scan strobe signal. (Segment signal) Segment signal output is timed with digit signal output at Pins 54 thru 64.  Figure 5-6. Output terminals for digit signals to drive the fluorescent display tube.  $\text{Display duty} = \frac{960\mu s}{11.72ms} = \frac{1}{12.21}$ Figure 5-7.	O (P-CH) High withstand voltage O (P-CH) High withstand voltage

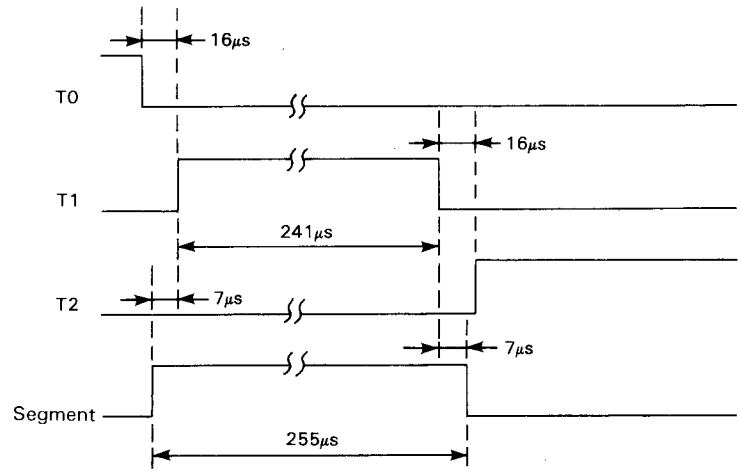
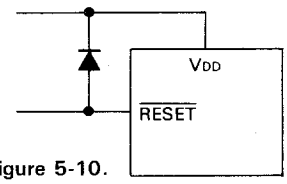
5-3. The RH-IX0580GEZZ and RH-IX0584GEZZ are a timer microcomputer LSI featuring the channel selection function by a frequency synthesizer tuner. (VC-A615G(BK), GM(BK), YM(BK), VC-A215S(BK), VC-A103GV(BK), VC-A106GVM(BK))

- **Terminal Allocation (RH-iX0580GEZZ, RH-iX0584GEZZ)**

Terminal Name	No.	Name	RH-iX0580GEZZ / RH-iX0584GEZZ	Name	No.	Terminal Name
+5V	64	VDD		S3	1	S6
S7	63	S4		S2	2	S2
S3	62	S5		S1	3	S1
S5	61	S6		S0	4	S8
S4	60	S7		INT4	5	AC PULSE
S9	59	S8		$\overline{SCK}$	6	SYSCON/TIMER-CLK
S10	58	S9		SO	7	TIMER SERIAL DATA
−4V	57	VPRE		SI	8	SYSCON SERIAL DATA
−30V	56	VLOAD		INT0	9	R/C PULSE
MODE OSD (H)	55			INT1	10	SYSCON READY (L)
NC	54			INT2	11	CTL PULSE (1/25)
S11	53	S12		P13	12	SECAM OSD PROHIBIT INPUT
S12	52	S13		P20	13	CTL FREQ. DIV. IC RESET
S13	51	S14		P21	14	VCR (L)
G11	50	T10		P22	15	TUNER (H)
G10	49	T9		BUZ	16	PAY (H)/TUNER-PCON
G9	48	T8		P30	17	A-AUX (H)
G8	47	T7		P31	18	MIX (H)
G7	46	T6		P32	19	A-AUX2 (H)
G6	45	T5		P33	20	21 PIN CTL (H)
G5	44	T4		P60	21	AUDIO-OUTPUT-CTL
G4	43	T3		P61	22	NORMAL (L)
G3	42	T2		P62	23	SCL
G2	41	T1		P63	24	SDA
G1	40	T0		P40	25	KEY 1
$\overline{RESET}$	39	$\overline{RESET}$		P41	26	KEY 2
OSD CLK	38	P53		P42	27	KEY 3
OSD DATA	37	P52		P43	28	KEY 4
OSD CS (L)	36	P51		PPO	29	NC
OSD MUTE	35	P50		X1	30	4MHZ
32.768 kHz	34	XT2		X2	31	4MHz
32.768 kHz	33	XT1		VSS	32	GND

Figure 5-8.

5-4. TERMINAL DESCRIPTION (RH-iX0580GEZZ, RH-iX0584GEZZ)

Pin No.	Name	Description	I/O
1 2 3 4 51 52 53 58 59 60 61 62 63	S6 S2 S1 S8 S13 S12 S11 S10 S9 S4 S5 S3 S7	Output terminals for segment signals to drive the fluorescent display tube.  Figure 5-9.	O
5	AC PULSE	Used to detect service interruption. It detects service interruption when there is no change in leading or trailing edge for more than 35 ms, and the microcomputer goes into service interruption mode. DUTY is 25% ~ 75%. V_{DD} and this terminal are connected with diode.  Figure 5-10.	I
6	SYSCON/TIMER CLK	Used for serial transferring with the system controller. Connected to the CLK terminal of system controller. N-ch open	O
7	TIMER SERIAL DATA	Used for serial transferring with the system controller. Connected to the timer serial data terminal of system controller. N-ch open	O
8	SYSCON SERIAL DATA	Used for serial transferring with the system controller. Connected to the syscon serial data terminal of system controller. Schmidt trigger input with hysteresis characteristic.	I
9	R/C PULSE	Terminals to input pulses from optical remote control light receiving position. Receive criterion of leading interval (T) of pulses is as follows: T < 0.4 ms ..... Pulse invalid 0.4 ms ≦ T < 1.6 ms ..... Logic "0" 1.6 ms ≦ T < 3.2 ms ..... Logic "1" 3.2 ms ≦ T ..... Pulse end	I
10	SYSCON READY (L)	Used for serial transferring with the system controller. Connected to the READY-L terminal of system controller. Schmidt trigger input with hysteresis characteristic.	I

<table>
<tr><th>Pin No.</th><th>Name</th><th>Description</th><th>I/O</th></tr>
<tr><td>11</td><td>CTL PULSE (1/25)</td><td>Signal to control real time counter.
When leading or trailing edge input of CTL pulse is performed with PCON bit = "1" and cassette-in bit = "1", it makes internal counter UP for 0.5 sec with counter inversion bit = "0" and DOWN for 0.5 sec with counter inversion bit = "1".
Counter inversion bit — Syscon serial data (S34) to show Normal rotation/Inversion of the drum.</td><td>I</td></tr>
<tr><td>12</td><td>SECAM OSD PROHIBIT INPUT</td><td>In case of SECAM input terminal = "H", SECAM bit is "1"; in case of SECAM input terminal = "L", SECAM bit is "0".</td><td>I</td></tr>
<tr><td>13</td><td>CTL FREQ. DIV. IC RESET</td><td>Signal to reset 1/25 dividing IC.
Reset terminal turns "H" for 1 ms when zero reset of counter value or dividing IC is performed.</td><td>O</td></tr>
<tr><td>14</td><td>VCR (L)</td><td>Syscon data VCR mode bit (S_{26}) = "0" → VCR(L) = "H"
Syscon data VCR mode bit (S_{26}) = "1" → VCR(L) = "L"</td><td>O</td></tr>
<tr><td>15</td><td>TUNER (H)</td><td>Inpunt switching control output terminal
<table>
<tr><th>TUNER mode</th><th>SIMUL mode</th><th>AUX1 mode</th><th>AUX2 mode</th></tr>
<tr><td>H</td><td>H</td><td>L</td><td>L</td></tr>
</table>
Table 5-1.</td><td>O</td></tr>
<tr><td>16</td><td>PAY (H)/
TUNER-PCON</td><td>It corresponds to PAY when PAY jumper is present, and becomes tuner-PCON output function when PAY jumper is not present.
PAY(H) — Displaying "+3" when selecting CH3 with AUS jumper present.
Displaying "+4" when selecting CH4 with AUS jumper not present.
Tuner PCON — Signal to control the tuner power supply for receiving VHS code even if in "POWER OFF" state during timer stund-by.
Tuner PCON = "H" when detecting VPS timer value and performing VPS timer picture recording.</td><td>O</td></tr>
<tr><td>17
19</td><td>A-AUX (H)
A-AUX2 (H)</td><td>Input switching control output terminal.
<table>
<tr><th></th><th>TUNER mode</th><th>SIMUL mode</th><th>AUX1 mode</th><th>AUX2 mode</th></tr>
<tr><td>A-AUX (H)</td><td>L</td><td>H</td><td>H</td><td>H</td></tr>
<tr><td>A-AUX2 (H)</td><td>L</td><td>L</td><td>L</td><td>H</td></tr>
</table>
Table 5-2.</td><td>O</td></tr>
<tr><td>18</td><td>MIX (H)</td><td>When EE bit = "1" or EE bit = "0", and SO byte = insert, this terminal is inverted regarding MIX KEY as valid.
When EE bit = "1" and SO byte = insert, this terminal turns "L" regarding MIX KEY as invalid.</td><td>O</td></tr>
<tr><td>20</td><td>21 PIN CTL (H)</td><td>Conditions for terminal = "H"
1) EE bit = "0"
2) During programmed OSD display
3) TSE bit = "1"
In conditions other than the above ones, this terminal turns "L".</td><td>O</td></tr>
</table>

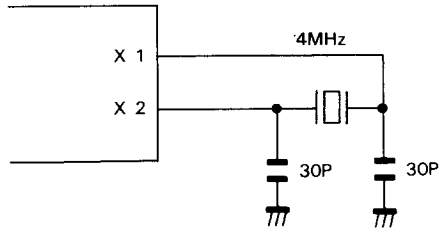
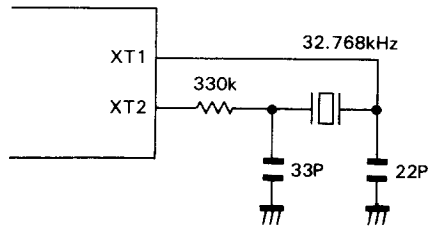
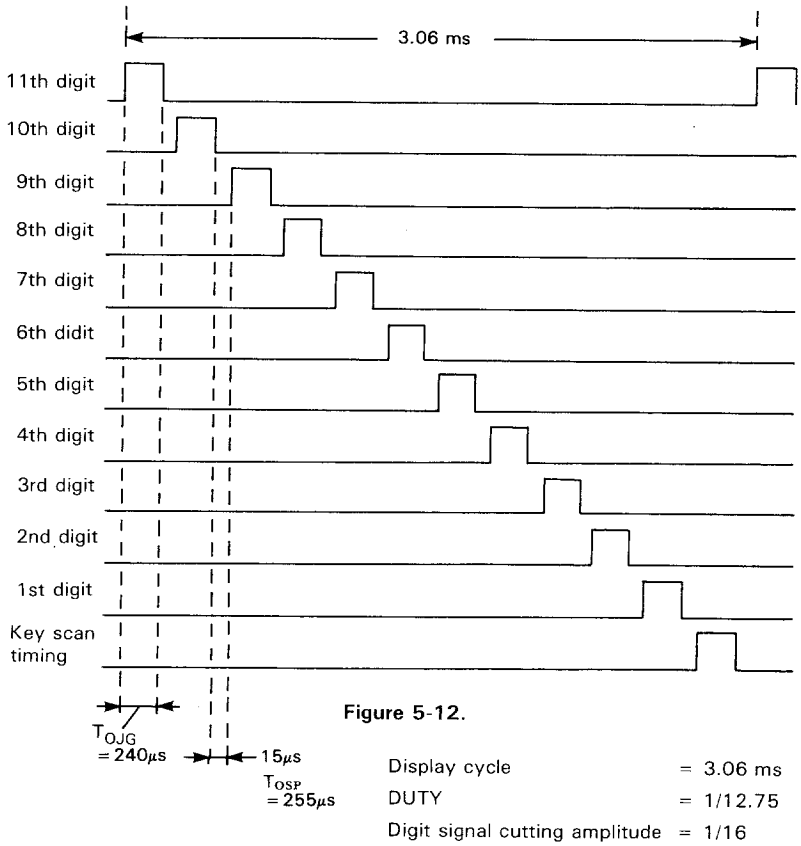
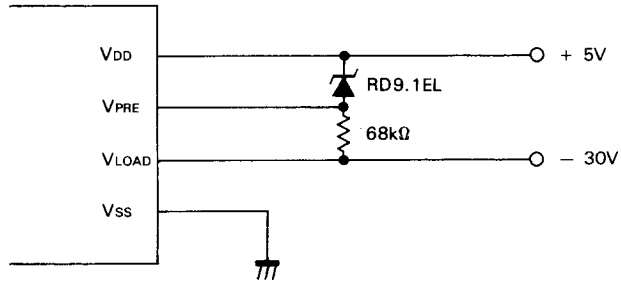
<table>
<tr><th>Pin No.</th><th>Name</th><th>Description</th><th>I/O</th></tr>
<tr><td>21</td><td>AUDIO-OUTPUT-CTL</td><td>Audio output switching control signal
<table>
<tr><th>MODE</th><th>AUDIO-OUTPUT-CTL</th></tr>
<tr><td>Stereo (Main + Sub)</td><td>L</td></tr>
<tr><td>Left (Main)</td><td>High impedance</td></tr>
<tr><td>Right (Sub)</td><td>H</td></tr>
<tr><td>Forced NOR</td><td>L</td></tr>
</table>
Table 5-3.
It is in stereo mode when the microcomputer is reset.</td><td>O</td></tr>
<tr><td>22</td><td>NORMAL (L)</td><td>"L.R.HiFi" display is put out when this terminal is "L".
<table>
<tr><th></th><th></th><th>Normal L terminal</th></tr>
<tr><td>L+R</td><td>H-L, R ON
L-L, R OFF</td><td>Input</td></tr>
<tr><td>L</td><td>H-L ON
L-L OFF</td><td>Input</td></tr>
<tr><td>R</td><td>H-R ON
L-R OFF</td><td>Input</td></tr>
<tr><td>NORMAL</td><td>L output</td><td>Output</td></tr>
</table>
Table 5-4.</td><td>I/O</td></tr>
<tr><td>23</td><td>SCL</td><td>Used for serial communication with the VPS decoder. By converting L to H at the ninth bit (ACK), it transfers "H" or "L" from the receiving side to sending side.
"H" is selected when the I^2C bus is not used.</td><td>I/O</td></tr>
<tr><td>24</td><td>SDA</td><td>Terminal for I^2C bus control.
"H" is selected when the I^2C bus is not used.
With SCL being "H", when the terminal experiences "H" → "L" conversion, data transferring starts; when the terminal experience "L" → "H" conversion, data transferring ends.</td><td>I/O</td></tr>
<tr><td>25
26
27
28</td><td>KEY 1
KEY 2
KEY 3
KEY 4</td><td>Input terminals for jumper and key, which compose 4X matris.</td><td>I</td></tr>
<tr><td>29</td><td>NC</td><td>Open</td><td></td></tr>
<tr><td>30
31</td><td>MAIN SYSTEM
CLOCK</td><td>Main system clock is obtained.


Figure 5-11.</td><td>I
O</td></tr>
</table>

Pin No.	Name	Description	I/O
32	GND	GND (0V)	
33 34	SUB SYSTEM CLOCK	Sub system clock is obtained.  **Figure 5-12.**	I O
35	OSD MUTE	Outputting "H" when controlling OSD IC. Displaying blue mute and emblem for OSD IC. OSD mute terminal turns "H" when displaying programmed content.	O
36	OSD CS (L)	Used for serial transferring with OSD. Connected to $\overline{CS}$ terminal of OSD IC. Being "L" only when accessing OSD IC.	O
37	OSD DATA	Used for serial transferring with OSD. Connected to the SO terminal of OSD IC.	O
38	OSD CLK	Used for serial transferring with OSD. Connected to serial CLK terminal of OSD IC.	O
39	$\overline{RESET}$	The microcomputer is reset when $\overline{RESET}$ = "L".	
40 41 42 43 44 45 46 47 48 49 50	G11 G10 G9 G8 G7 G6 G5 G4 G3 G2 G1	Output terminals for digit signals to drive the fluorescent display tube. P-ch open. Pull-down resistance built-in.  **Figure 5-12.** Display cycle = 3.06 ms DUTY = 1/12.75 Digit signal cutting amplitude = 1/16	O

Pin No.	Name	Description	I/O
54	NC	Open	
55	MODE OSD (H)	This terminal turns "H" during OSD output in OSD mode.	O
56 57	−30V −4V	−30V −4V  **Figure 5-13.**	
64	+5V	V_{DD}(+5V)	

6. AUTOMATIC VOLTAGE SYNTHESIZER CIRCUIT

6-1. Terminal Description of Automatic Voltage Synthesizer IC RH-iX0600GEZZ (VC-A615G(BK), GM(BK), YM(BK), VC-A215S(BK), VC-A103GV(BK), VC-A106GVM(BK))

- **Terminal Allocation (RH-iX0600GEZZ)**

Terminal Name	No.	Name		Name	No.	Terminal Name
AT 5V	48	AD0		POC3	1	NC
AFT-S CURVE IN	47	P1C1		POC2	2	NC
NC	46	P1C2		POC1	3	NC
NC	45	P1C3		POC0	4	NC
T.A DATA	44	P0A0		POD3	5	JUMPER IN
T.A CLOCK	43	P0A1		POD2	6	VHF/UHF SELECT SW
CS	42	P0A2		POD1	7	KEY-1
CLOCK	41	P0A3		POD0	8	KEY-2
DATA I/O	40	P0B0		P1D3	9	NC
B0	39	D0B1		P1D2	10	NC
B1	38	P0B2		P1D1	11	NC
$\overline{\text{SYNC DET}}$	37	P0B3		P1D0	12	NC
$\overline{\text{V SYNC}}$	36	$\overline{\text{VSYNC}}$		V_{DD}	13	AT 5V
$\overline{\text{H SYNC}}$	35	$\overline{\text{HSYNC}}$		CE	14	AT 5V
NC	34	BLANK		INT	15	NC (GND)
NC	33	B		GND	16	GND
NC	32	G		P1A3	17	NC
NC	31	R		P1A2	18	NC
VT PULSE	30	PWM rmp		P1A1	19	NC
AFT MUTE	29	PWM0		P1A0	20	NC
V-MUTE	28	PWM1		XO	21	8-MHz
NC	27	PWM2		XI	22	8-MHz
NC (AT 5V)	26	P1B0		P1B3	23	NC
NC (AT 5V)	25	P1B1		P1B2	24	NC

RH-iX0600GEZZ

Figure 6-1.

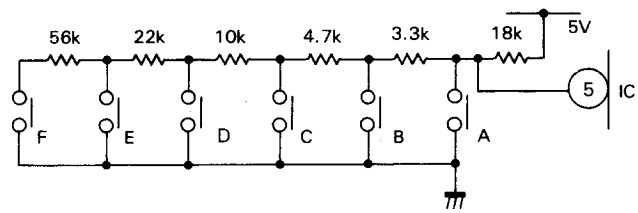
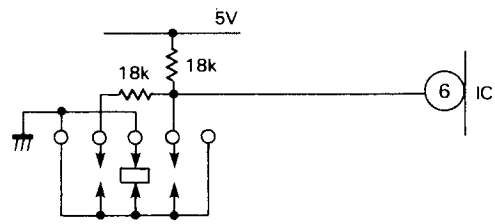
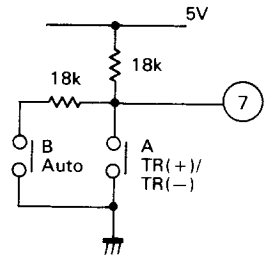
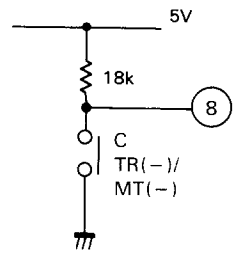
<table>
<tr><th>Pin No.</th><th>Name</th><th>Terminal</th><th>Description</th><th>I/O</th></tr>
<tr><td>1
2
3
4</td><td>NC</td><td>POC3
POC2
POC1
POCO</td><td></td><td></td></tr>
<tr><td>5</td><td>JUMPER INPUT</td><td>POD3</td><td>
<table>
<tr><th>Jump</th><th>Analog data</th><th colspan="3">Digital data</th><th>Content</th></tr>
<tr><td>A</td><td>0 [V]</td><td>0</td><td>0</td><td>0</td><td>AV1 system HYPER not corresponding 60 POSI</td></tr>
<tr><td>B</td><td>0.77</td><td>0</td><td>0</td><td>1</td><td>AV1 system HYPER not corresponding 99 POSI</td></tr>
<tr><td>C</td><td>1.54</td><td>0</td><td>1</td><td>0</td><td>AV1 system HYPER corresponding 60 POSI</td></tr>
<tr><td>D</td><td>2.50</td><td>0</td><td>1</td><td>1</td><td>AV1 system HYPER corresponding 99 POSI</td></tr>
<tr><td>E</td><td>3.45</td><td>1</td><td>0</td><td>0</td><td>AV2 system HYPER not corresponding 99 POSI</td></tr>
<tr><td>F</td><td>4.21</td><td>1</td><td>0</td><td>1</td><td>AV2 system HYPER not corresponding 60 POSI</td></tr>
<tr><td></td><td>5.0</td><td>1</td><td>1</td><td>0</td><td>AV2 system HYPER corresponding 99 POSI</td></tr>
</table>
60/99 bit — 60 POSI = 0, 99 POIS = 1
Hyper bit — Not corresponding = 0, Corresponding = 1
AV2 bit — AV1 system = 0, AV2 system = 1
Table 6-1.


Figure 6-2.
Terminal to perform A/D conversion of pin ⑤ input voltage (analog data) and convert it into digital data.
By identifying this digital data, the selection specified above is performed.
VC-A615G ..... D,
VC-A615GM, YM
VC-A103GV ..... A
VC-A215S
VC-A106GVM
</td><td>I</td></tr>
<tr><td>6</td><td>VHF/UHF SELECT SW</td><td>POD2</td><td>


VHF ← Normal → UHF
H: Normal
M: VHF
L: UHF
Figure 6-3.
Tuning (UHF, VHF) and Normal modes are identified with pin ⑥ input voltage.
</td><td>I</td></tr>
</table>

Pin No.	Name	Terminal	Description	I/O
7 8	KEY-1 KEY-2	P0D1 P0D0	 Figure 6-4. KEY-1  Figure 6-5. KEY-2 With three pieces of SW, this terminal identifies MT (+) and (−) and makes VT up and down in Tuning mode; it identifies TR (+) and (−) and changes tracking in Normal mode.	I
9 10 11 12	NC	P1D3 P1D2 P1D1 P1D0		
13	AT 5V	V_{DD}	Power supply input. 5±0.5V.	
14	AT 5V	CE	Selector signal input terminal. It is made High (5V) in normal operation.	I
15	NC (GND)	INT		
16	GND	GND	GND	
17 18 19 20	NC	P1A3 P1A2 P1A1 P1A0		
21 22	8MHz 8MHz	XO XI	Terminal for system clock. Oscillator of 8 MHz is connected to this terminal.	
23 24	NC	P1B3 P1B2		
25	Bilingual IN (L)	P1B1	In case of "L", bilingual display is lit. Connected to AT 5V because of no display.	I
26	Stereo IN (L)	P1B0	In case of "L", stereo display is lit. Connected to AT 5V because of no display.	I
27	NC	PWM2		
28	V-MUTE	PWM1	Conditions for Video Mute. • When EE bit = "1" and there is no video signal, V-Mute = "H" is made. • When EE bit = "0", V-Mute = "L" is made. • When EE bit is changed from "1" to "0", V-Mute = "L" is continued for 0.5 sec. EE bit ("0":PB, "1":EE) Mute when V-Mute = "H".	O
29	AFT MUTE	PWM0	"H" is putted at PCON rising and Ch position changing.	O

<table>
<tr><th>Pin No.</th><th>Name</th><th>Terminal</th><th>Description</th><th>I/O</th></tr>
<tr><td>30</td><td>VT. PULSE</td><td>PWM rmp</td><td>Waveform having experienced pulse width modulation (PWM) according to 14 bit tuning data is outputted.</td><td>O</td></tr>
<tr><td>31
32
33
34</td><td>NC</td><td>R
G
B
BLANK</td><td></td><td></td></tr>
<tr><td>35</td><td>$\overline{H_{SYNC}}$</td><td>$\overline{H_{YSNC}}$</td><td rowspan="2">Input terminal for data to specify display point of character data.
Connected to GND as not used.</td><td>I</td></tr>
<tr><td>36</td><td>$\overline{V_{SYNC}}$</td><td>$\overline{V_{SYNC}}$</td><td>I</td></tr>
<tr><td>37</td><td>$\overline{\text{SYNC DET}}$</td><td>P0B3</td><td>Terminal to input sync DET IC output and detect video signal. "L" when H sync is present.</td><td>I</td></tr>
<tr><td>38</td><td>B1</td><td>P0B2</td><td rowspan="2">Band switching control output terminal.
<table><tr><th>Band</th><th>VL</th><th>VH</th><th>SYPER</th><th>U</th></tr><tr><td>B0</td><td>L</td><td>H</td><td>L</td><td>H</td></tr><tr><td>B1</td><td>L</td><td>L</td><td>H</td><td>H</td></tr></table>Table 6-2.</td><td>O</td></tr>
<tr><td>39</td><td>B0</td><td>P0B1</td><td>O</td></tr>
<tr><td>40</td><td>DATA I/O</td><td>P0B0</td><td rowspan="3">Terminal for serial transfer between the automatic voltage synthesizer IC and E^2PROM.
(CS turns "H" only when accessing E^2PROM.)</td><td>I/O</td></tr>
<tr><td>41</td><td>CLOCK</td><td>P0A3</td><td>O</td></tr>
<tr><td>42</td><td>CS</td><td>P0A2</td><td>O</td></tr>
<tr><td>43
44</td><td>T.A CLOCK
T.A DATA</td><td>P0A1
P0A0</td><td>Used for serial communication with the timer microcomputer.
Terminal for I^2C bus control.</td><td></td></tr>
<tr><td>45
46</td><td>NC</td><td>P1C3
P1C2</td><td></td><td></td></tr>
<tr><td>47</td><td>AFT-S CURVE IN</td><td>P1C1</td><td>Terminal to input AFT voltage (tuning error voltage) from IF pack.
It detects tuning point with AFT voltage.</td><td>I</td></tr>
<tr><td>48</td><td>AT 5V</td><td>AD0</td><td>A/D converter input terminal.</td><td>I</td></tr>
</table>

6-2. IC1401 Automatic Voltage Synthesizer IC Functions

(1) Manual tuning function
- Selection between UHF, Normal and VHF can be made with pin ⑥ input voltage. Switching is made with 3-position slide switch.
- Manual tuning can be made by continuously pressing MT(+) and (−) key. Fine tuning can be made by pressing momentarily.
- Data can be stored in E^2PROM after tuning.
- AFT mute is outputted when PCON is ON and at channel switching.

(2) Auto search tuning function
- Tuning is made with sync DET IC output and AFT voltage.
- Tuning is automatically made by pressing Auto KEY.

(3) FTZ specification correspondence
- Detecting no sync, and outputting V-mute.

(4) Title OSD function

(5) DATE REC function

(6) Sound multiplex circuit control

Description of (4) ~ (6) is omitted as they are not used in this model.

6-3. Description of tuning unit operation

(1) Auto search tuning operation

a) Start

When "AT" key is pressed with CH Set SW being at VHF or UHF position, auto search tuning is started. Tuning direction is restricted to up direction only.

b) Search route and search time

(When CH Set SW is at VHF)

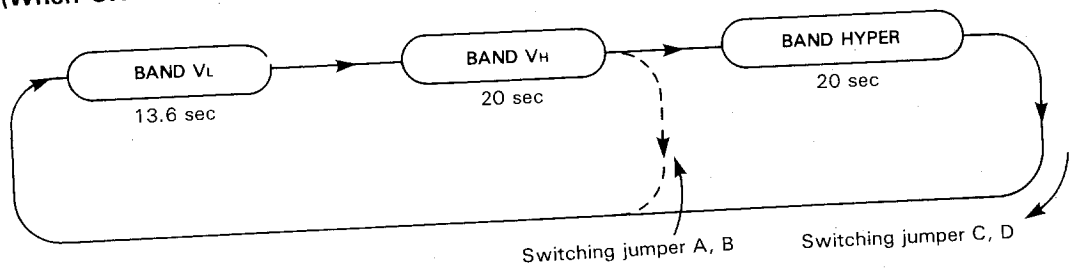
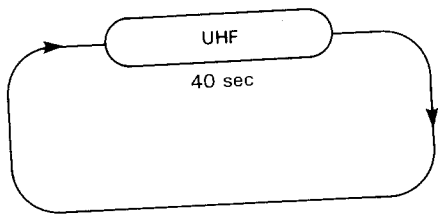


Figure 6-6.

(When CH Set is at UHF)



NOTE: Search time means the time taken when there is no station.

Figure 6-7.

c) Auto search

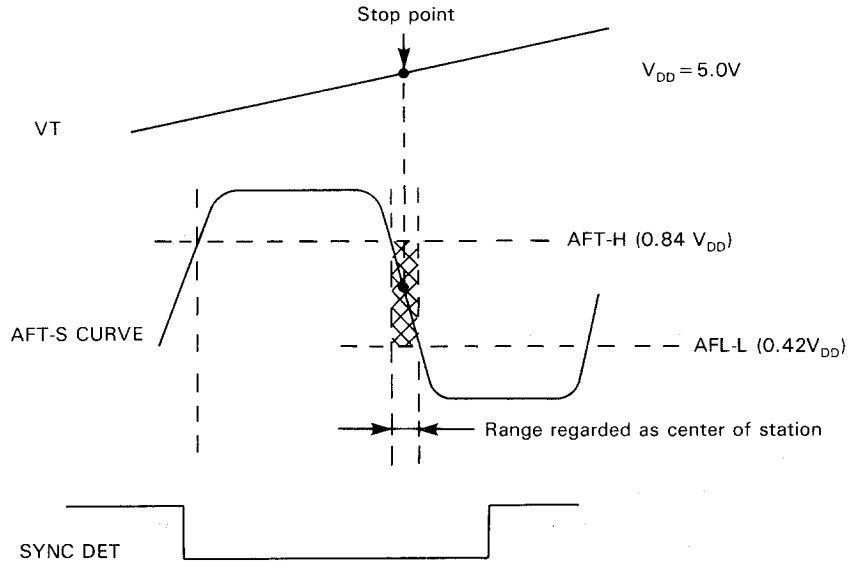


Figure 6-8. AFT-S curve at searching

Fig. 6-8 shows AFT curve and the timing of synchronizing identification signal at searching. AFT-S curve is fed into A/D input terminal pin ㊼ of IC1401. Higher section than (AFT-H), lower section than (AFT-L) and middle section in between are detected, and the range regarded as the center of station is searched.

d) Automatic detection of station

① VT (IC1401 pin ㉚) voltage is raised at fast speed until it is detected that synchronizing detecting = "L" (IC1404 pin ⑩ $\overline{\text{SYNC DET}}$) and AFT-S curve level (IC1401 pin ㊼) is higher than AFT-H (0.84 Vdd).

② VT is raised at slow speed until it is detected that AFT-S curve level (IC1401 pin ㊼) is lower than AFT-L.

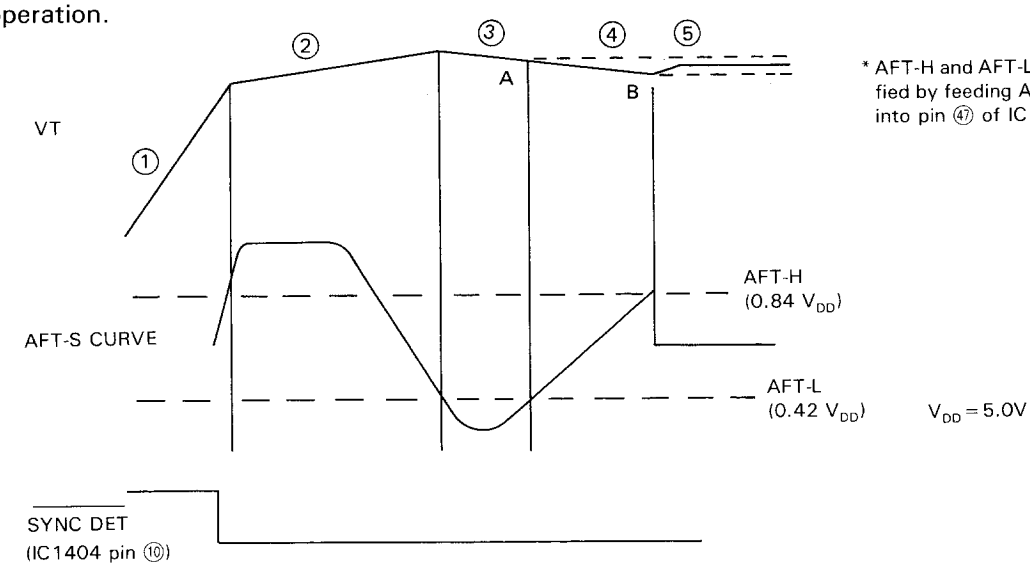
③ With VT being lowered by minimal step, AFT-S curve level is detected becoming higher than AFT-L. VT data at this time is "A".

④ With VT being lowered by minimal step, AFT-S curve level is detected becoming higher than AFTL-H. VT data at this time is "B".
(If no sync is detected during search of 1 ~ 4, it is switched to fast search.)

⑤ The value of VT data (PWM) between "A" and "B" is determined through operation, and outputted. (Middle value is employed to eliminate the error caused by other signals on AFT-S curve.)

$$\text{PWM data of (A)} + \frac{\text{PWM of (B)} - \text{PWM of (A)}}{2} = \text{PWM of station center}$$

⑥ VT data and band data are stored in E^2PROM (IC1402) at stoppage, thus completing tuning operation.



* AFT-H and AFT-L are identified by feeding ATF voltage into pin ㊼ of IC1401.

Figure 6-9.

(2) Manual tuning operation

a) Start

- When MT (+) or MT (−) is pressed in preset mode, shifting to manual search mode is performed.
- Change of constant value (△VT) is made during the first 300 msec, and in case of continuous pressing, continuous sweeping is performed.

b) Direction

Sweeping is made in the direction to raise VT with MT (+) being pressed; in the direction to lower VT with MT (−) being pressed.

c) Stoppage

- Sweeping is stopped when MT (+) or MT (−) is released, and VT data and band data at this time are written into E^2PROM. (Storing is made when KEY is released.)
- If MT (+) and MT (−) key are pressed together with other keys, VT data is not written. If other keys are released and either of MT (+) and MT (−) key remains pressed, and the other MT key is released, VT data is written.

7. Y/C CIRCUIT

7-1. DESCRIPTION OF AN3248K OPERATION (IC201: Luminance Signal Processor)

7-1-1. Main functions

(1) FM modulation/demodulation
(2) Preemphasis/Deemphasis
(3) White Clip/Dark Clip
(4) Base Band Drop Out Compensater (With CCD 1H Delay Line IC202)
(5) 1/2fH Carrier Interleave
(6) Noise Canceller
(7) Nonlinear Emphasis/Deemphasis
(8) Detail Enhancer
(9) Line Correlation Noise Canceller (With CCD 1H Delay Line IC202)
(10) Picture-Tone Control
(11) Y/C Mix
(12) FV Insert
(13) Edit

7-1-2. Description of function

(IC pin NO. whose IC REF NO. is not specified means pin NO. of IC201.)

(1) Base band drop out compensater

Base band (video signal) compensation after FM demodulation is made using CCD* (IC202) as 1H delay line. 2fsc outputted from IC501 pin ⑥ is used as CCD clock.

As transmission throughout all bands of playback luminance signal is possible with CCD, it can make more precise compensation than the system using glass delay line. While the glass delay line causes switching noise when switching FM wave, CCD causes no such noise.

While the glass delay line needs two pieces of FM demodulator, CCD needs only one demodulator.

* CCD: Charge Coupled Device

(2) REC/PB switching

Switching to REC mode is performed with EE(L) signal at pin ⑮ via D202.

(Vcc = 5.0V)

Pin ⑮ DC potential	Operation mode
0V – 1.25V	REC
2.25V – 5.0V	PB

Table 7-1.

(3) SP/LP switching

Controlled by DC potential of pin ㉓. At SP, Q204 is set to ON by SP (H) signal and pin ㉓ is made 0V, thus performing switching to SP mode. In 2-head model (except VC-A215H), pin ㉓ is directly connected to GND.

(Vcc = 5.0V)

Pin ㉓ DC potential	Operation mode
0V – 1.25V	SP
2.25V – 5.0V	LP

Table 7-2.

(4) 1/2 fH carrier interleave

In order to minimize crosstalk from the adjacent track at LP playback, carriers of CH1 and CH2 are recorded being shifted from each other by 1/2 fH (≒ 7.5 kHz) at LP recording. This conversion is performed by H.SW.P. fed into pin ㉓ via R222. At SP, pin ㉓ is made 0V and carrier interleave is not performed.

(5) FV insert

FV Insert at trick playback is controlled by FV signal fed into pin ⑪ as shown in the table below.

PB mode (Vcc = 5.0V)

Pin ⑪ DC potential	Pin ⑨ Video output
4V – 5V	Sync tip level
2V – 3V	Gray level
0V – 1V	Through

Table 7-3.

(6) Line correlation noise canceller
CCD (IC201) is used as 1H delay line. Line correlation noise canceller ON/OFF is controlled by pin ㉗ DC potential. It is set to OFF when this potential is lower than 1.25 V. Only at SP playback, Q206 is set to ON and pin ㉗ is made 0V, thus setting the line correlation noise canceller to OFF.

(7) Picture-Tone control
Controlled by DC potential applied to pin ⑬. At OPEN, it is fixed to the center, with the potential being approx. 2.5 V.

(8) Edit (used only in some models)
To prevent deterioration of picture quality at dubbing, the detail enhancer is set to OFF at recording and the function of the noise canceller is lowered and Picture-Tone control is negated (fixed to the center) at PB.
At recording, it is set to ON when pin ⑫ potential is made lower than 1.25 V. At playback, it is set to ON when pin ④ potential is made lower than 1.25 V.

7-1-3. Signal flow

(1) At recording
The video signal (1Vp-p) fed from connector CD ㉗ passes through the AGC AMP and SUB CLAMP circuits after entering via pin ⑤, being sent to pin ⑦ and the ON SCREEN MUTE circuit. The ON SCREEN MUTE circuit is controlled by DC voltage applied to pin ⑪. It exerts the function of character insertion as an ON SCREEN circuit at REC, but this function is not used in the present model, and the signal is sent through to pin ⑨ with 2.0 Vp-p. This signal level is adjusted by R203 (EE LEV ADJ) externally attached to pin ④. At PB, the ON SCREEN MUTE circuit exerts the function of FV insertion as a MUTE circuit, controlled as described in 7-1-2(5).
The signal goes out of pin ⑦ and passes through 3 MHz L.P.F. of FL201, where only luminance signal is taken out, being fed into pin ⑭. The signal fed into pin ⑭ is mixed with the signal passed through PRE AMP and H.P.F. and experiences detail enhance at the DE (Detail Enhancer) MIX section. The characteristic of detail enhancer is determined inside the IC. The signal having experienced detail enhance goes out of pin ㉑ and enters pin ㉒, experiencing sync tip clamping at the CLAMP circuit, after which it is sent to the NL (NON Linear) MIX section. It is mixed with the signal passed through the H.P.F. → LIM → FM CI section, experiening non linear emphasis, then entering the main emphasis circuit. The characteristic of non linear emphasis is determined inside the IC. At the FM CI section, signal DC voltages of CH1 and CH2 are so controlled that they are shifted from each other by approx. 2.3 mV for 1/2 fH carrier interlieve in LP mode. After entering the main emphasis circuit, the signal experiences preemphasis and undergoes white clip and dark Clip, then going out of pin ㉕ and passing through R204 to enter pin ㉖. White clip level is adjusted by R206 so that overshoot of white peak is 80 ± 4%. Dark clip level is of no adjustment and so controlled that 50 ± 10% level is achieved. The characteristic of preemphasis is determined by the values of R228, C222 and C259 externally attached to pin ㉔, and of R229 and C223 between pin ㉔ and pin ㉕.
The signal fed into pin ㉖ is subject to FM modulation and then sent to pin ㉚ with 1 Vp-p. Carrier frequency (3.8 MHz) is adjusted by R205; deviation adjusted by R204. After going out of pin ㉚, the FM signal passes through REC EQ (H.P.F.) and experiences level adjustment at R208, after which it is mixed with low frequency converted chrominance signal at Q209 and sent to the HEAD AMP via Q210 (emitter follower).

(2) At playback
The PB FM signal (4-head models: CE④, 2-head models: CE⑦) outputted from the HEAD AMP enters pin ㉘ via PB EQ. Then, after passing through D.O.C. envelop detector and double limiter, it enters the demodulator, experiencing demodulation to video signal, then entering pin ⑦ via SUB L.P.F. D.O.C detection level is determined inside the IC. D.O.C period is determined by C225 externally attached to pin ㉙.
The video signal comes from pin ⑦ passes through 3 MHz L.P.F of FL201, FM carrier component being eliminated, and enters pin ⑭, after which it passes through Pre Amp and enters the main deemphasis circuit, undergoing deemphasis, and then goes out of pin ⑰ and enters pin ⑱. The characteristic of deemphasis is determined by the constant of the component externally attached to pins ⑯ and ⑰.
The signal fed via pin ⑱ is sent to the subtracter and usually to pin ⑳ and LNC (Line Correlation Noise Canceller) MIX and NL (Non Linear) Pre Amp. The signal fed into pin ⑳ passes through IC202 CCD IH delay line, clock component being eliminated at L.P.F., and then enters pin ⑲ after experiencing level adjustment at R202. When drop out is detected, the delayed signal supplied via pin ⑲ is sent

to pin ⑳ and LNC MIX NL Pre Amp. Usually, the signal supplied via pin ⑱ and the 1H delayed signal supplied via pin ⑲ enter the subtractor, where difference component is extracted. The extracted component enters the LNC MIX section, where it is mixed with the main signal from pin ⑱, thus line correlation noise cancel being performed (in LP mode only). In case of drop out being detected, the line correlation noise canceller does not function. The signal passed through LNC MIX NL Pre Amp goes out of pin ㉑ and enters pin ㉒, then being clamped. The clamped signal enters the NC (Noise Canceller) MIX section, and at the same time a portion of the signal is fed back to LNC MIX NL Pre Amp via H.P.F → Limiter → FM CI, where it is subject to non linear deemphasis. At the NC MIX section, the signal passed through H.P.F → Limiter → L.P.F. experiences MIX and Noise Cancel. Then it goes into PB C-MIX via the APT (Aperture) CTL section, where it is mixed with playback chrominance signal, and sent to pin ⑨ via AMP → SUB CLAMP → MUTE → AMP.
The output level of pin ⑨ is adjusted to 2.0 Vp-p by R201 externally attached to pin ⑮. At the MUTE section, FV insertion at trick playback is performed.

7-2. DESCRIPTION OF TA8644N OPERATION (IC501: Chrominance Signal Processor)

7-2-1. Description of function

(IC pin NO. whose IC REF NO. is not specified means pin NO. of IC501.)

(1) REC/PB mode switching is controlled by DC potential applied to pin ⑯. PB mode is selected by applying ALPB 5V via D502. Switching to PB mode is performed with the maximum of more than 4.0 V.

(2) PAL/MESECAM switching is controlled by DC potential applied to pin ㉗ as shown in the table below.

(Vcc = 5.0V)

Pin ㉗ DC potential	Operation mode
3.3V – Vcc	NTSC *
1.5V – 2.7V	MESECAM
0V – 0.9V	PAL

* Not used

Table 7-4.

(3) SP/LP switching is controlled by DC potential applied to pin ⑰ as shown in the table below.

(Vcc = 5.0V)

Pin ⑰ DC potential	Operation mode
3.3V – Vcc	EP *
1.5V – 2.7V	LP
0V – 0.9V	SP

* Not used

Table 7-5.

(4) CH switching (CHROMA ROTATION switching) is controlled by CHROMA ROTARY signal DC potential applied to pin ⑤ as shown in the table below.

(Vcc = 5.0V)

Pin ⑤ DC potential	CH	Chroma rotation (at recording)		
		PAL	MESECAM	NTSC *
2.6V –Vcc	CH1	Shift stop	Shift stop	Advanced 90° per 1H
0V – 1.6V	CH2	Delayed 90° per 1H	Shift stop	Delayed 90° per 1H

* Not used

Table 7-6.

(5) Composite synchronizing signal is fed into pin ① with positive approx. 4.7 Vp-p. Threshold values are shown in the table below.

(Vcc = 5.0V)

Input level	Threshold value
H	2.7V
L	1.7V

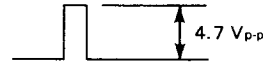


Table 7-7.

7-2-2. Signal flow

(1) At recording

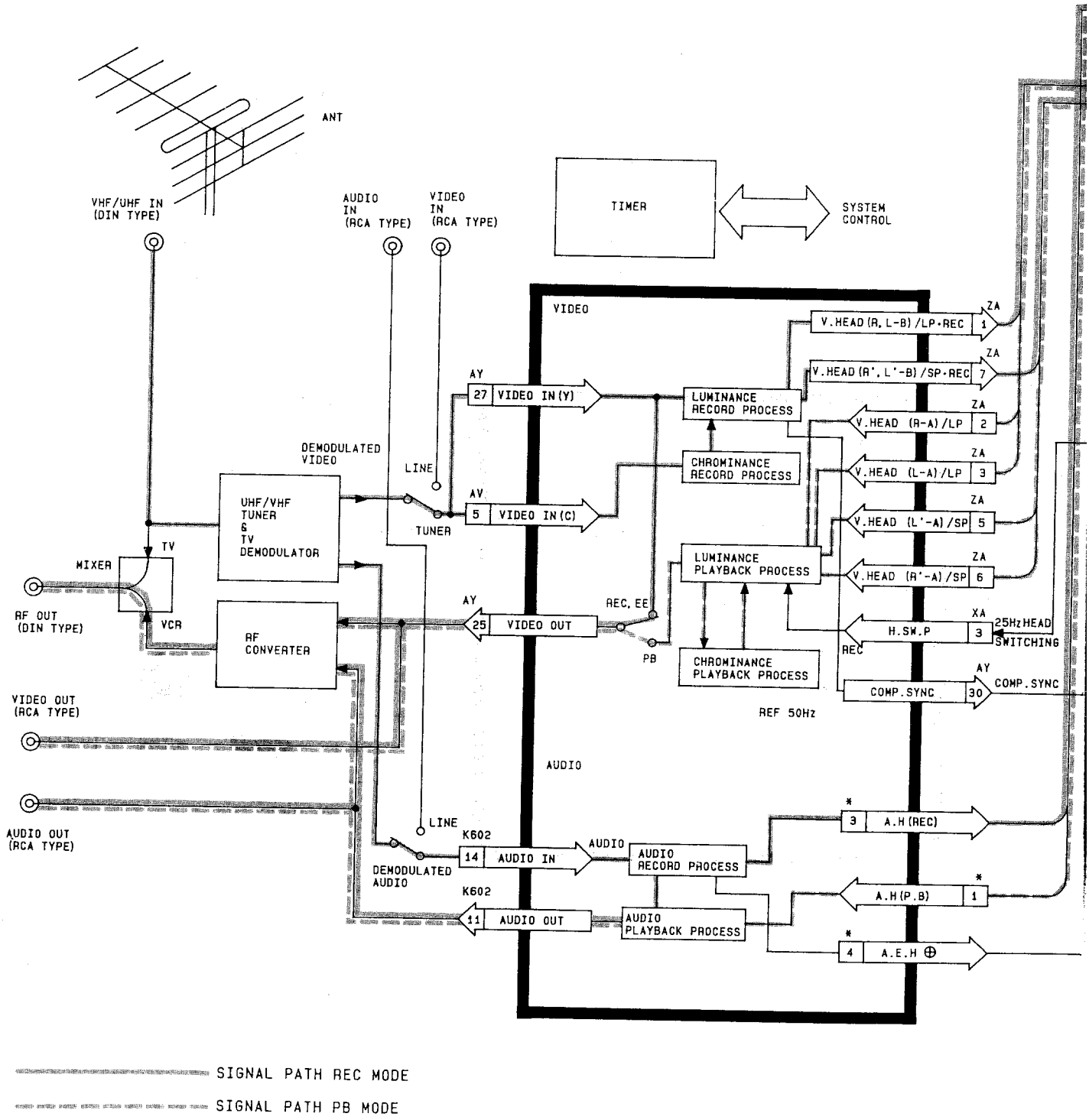
The video signal (1.0 Vp-p) applied to pin ⑱ goes out of pin ⑳ after passing through the switch, after which it passes through 4.43 MHz B.P.F. (FL502), only chrominance signal band being taken out, then entering pin ㉒. The chrominance signal fed into pin ㉒ is amplified at ACC AMP so that burst signal level is constant. Then the signal enters the main converter, where it experiences low frequency conversion to 627 kHz, and enters pin ⑯ via the colour killer. The low frequency converted chrominance signal fed to pin ⑯ passes through 1.4 MHz L.P.F (FL501), undergoing level adjustment at R504, and then enters the emitter of Q209 via Q503 (emitter follower), where it is mixed with recording luminance signal.

(2) At playback

The PB CHROMA signal (4-head models: Connector CE⑥, 2-head models: Connecter CE⑤) outputted from the head amp is amplified at Q507. Then it passes through L.P.F., low frequency converted chrominance signal being taken out, and then enters pin ㉔. The signal fed into pin ㉔ is amplified to a constant level at the ACC amp, sent to the main converter, where it experiences frequency conversion to 4.43 MHz, and then fed into pin ⑳. The signal fed to pin ⑳ passes through 4.43 MHz B.P.F. (FL502), being amplified at Q504, and then enters the emitter follower of Q505. In the case of 2-head models, the output of this emitter follower enters the 2H comb filter via C534. In the case of 4-head models, this output is sent to Q5551 and DL5551 (1H glass delay line) and the output of DL5551 (1H delayed signal) is supplied to the base of Q5553. Only when LP(H) signal from connector CC⑯, H.AMP.SW signal from connector CA① and FV CTL signal from connecter CA③ are all "H", that is, when the output of head amp is switched to SP HEAD side in LP trick mode, Q5555 and Q5554 simultaneously turn on and Q5553 functions, by which the 1H delayed signal outputted from DL5551 is amplified to the same level as at entering DL5551.

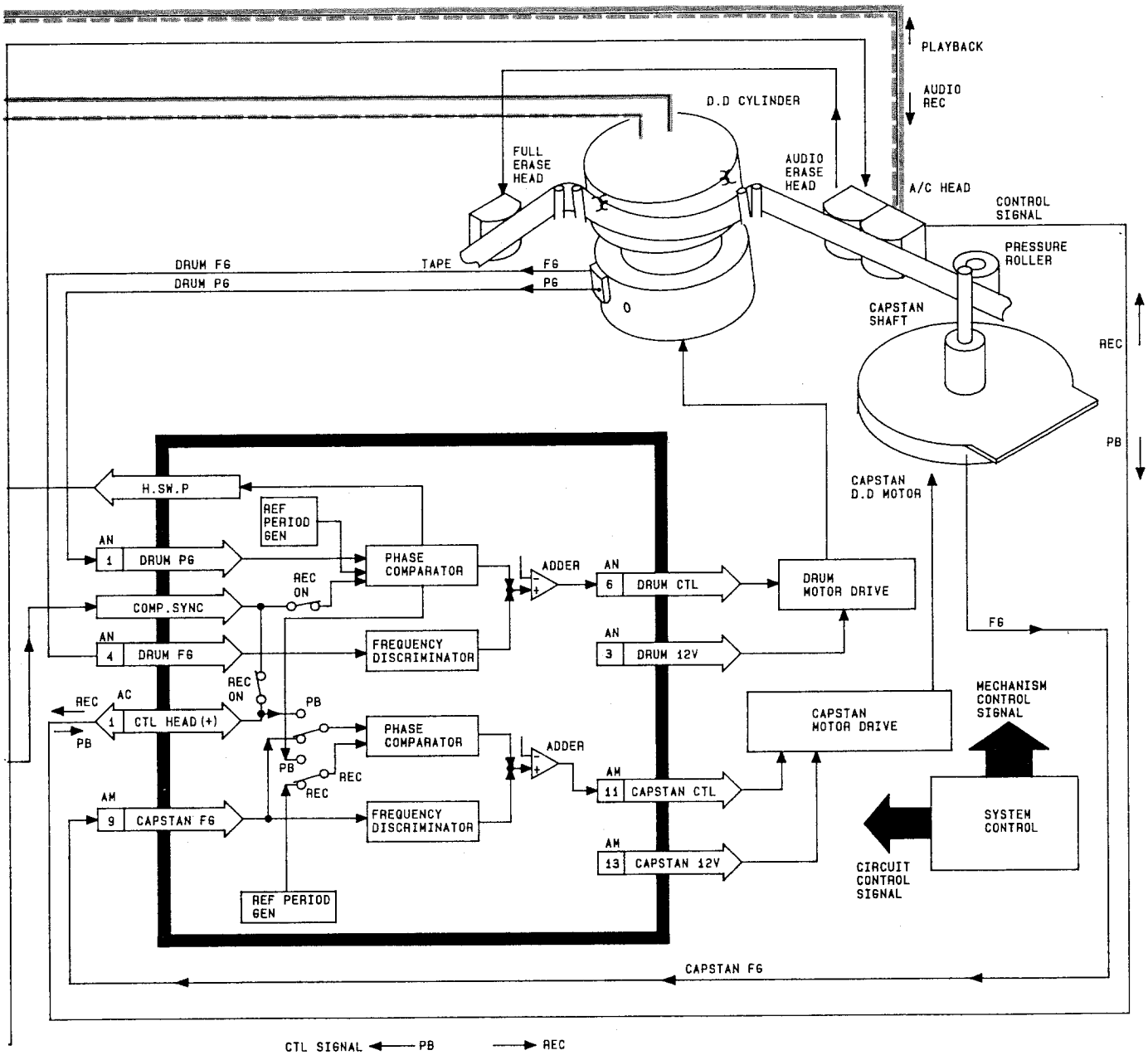
In this case, Q5552 turns on and Q5551 off, and the amplified 1H delayed signal is sent to the 2H comb filter of DL501. In other cases, Q5552 turns off and Q5551 on, and the signal before being 1H delayed enters DL501. This switching is performed to prevent colour disappearance caused by discontinuous phase of burst signal at Still, Slow and Double Speed Playback of LP. In 2-head models, therefore, this circuit is not used and the output of Q505 enters DL501 via C534. In 4-head models, C534 is not used. The signal fed to DL501, with luminance signal interleaved in the chrominance signal band and crosstalk from the adjacent track being eliminated, enters pin ㉘, after which it is sent to pin ㉚ via amp and the colour killer. The playback chrominance signal outputted from pin ㉚ is applied to pin ⑫ of IC201 after passing through the emitter follower of Q506, and mixed with playback luminance signal.

OVERALL BLOCK DIAGRAM (FOR 4-HEAD MODELS)

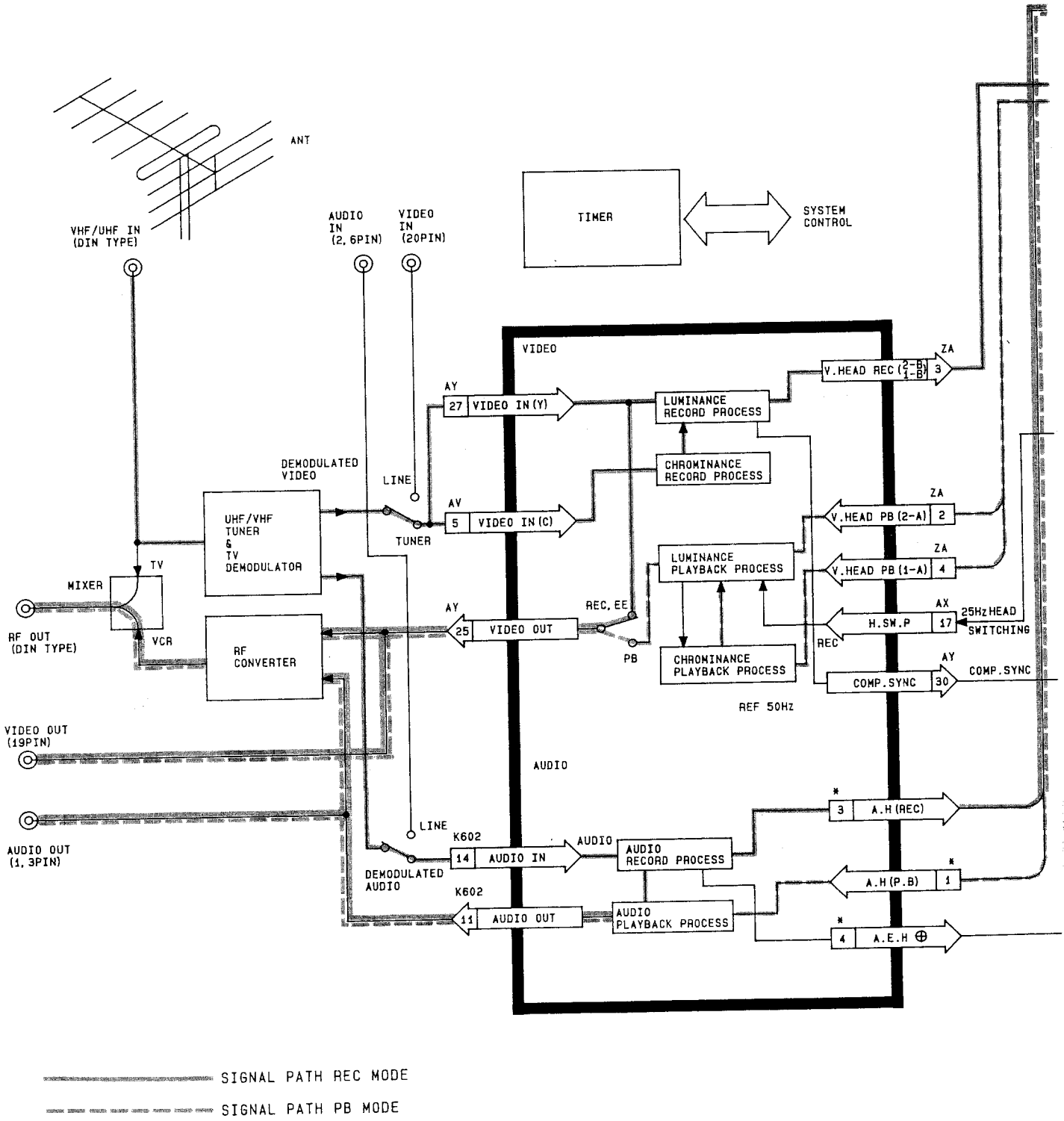


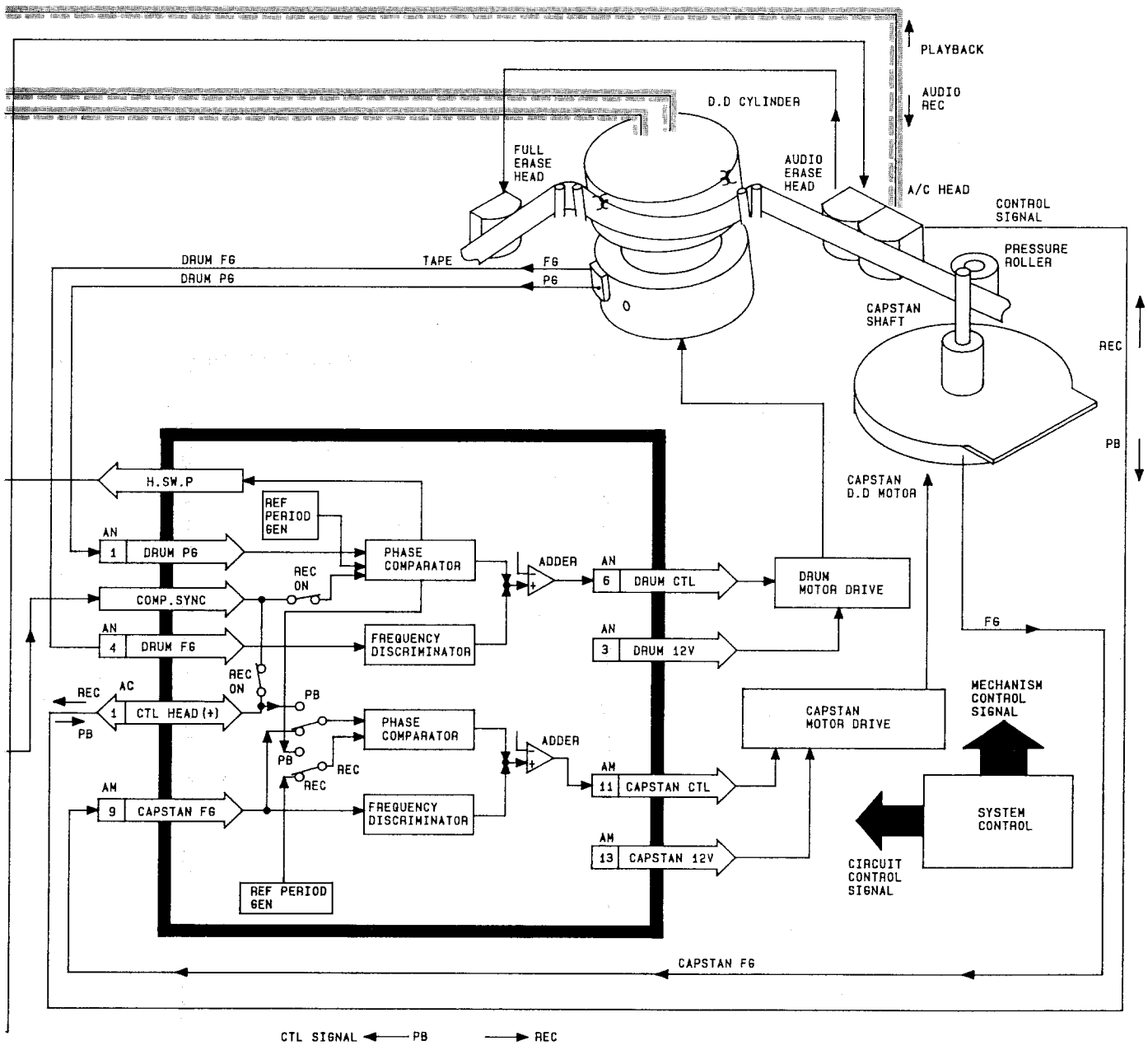
SIGNAL PATH REC MODE

SIGNAL PATH PB MODE

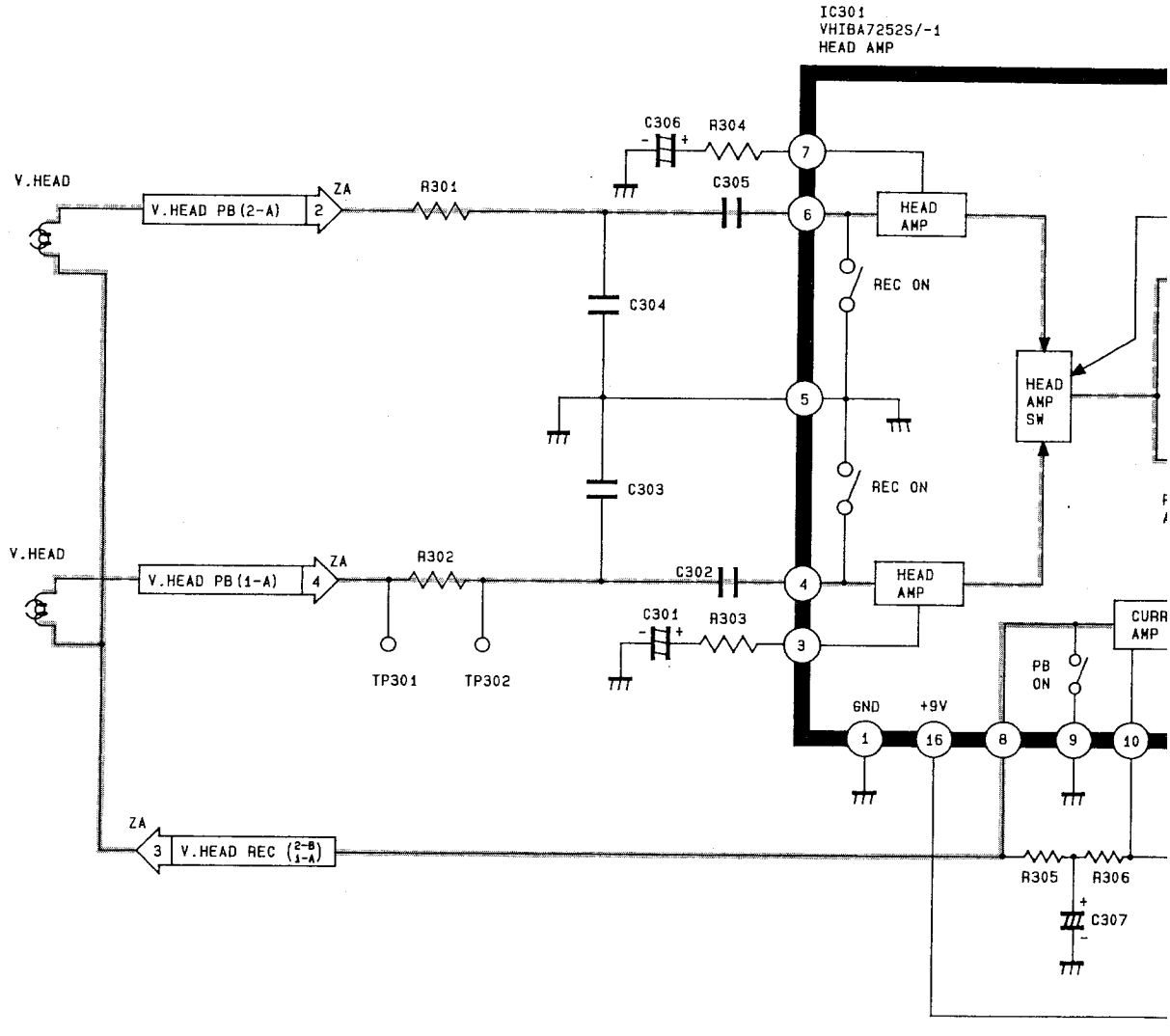

PLAYBACK
AUDIO REC
D.D CYLINDER
FULL ERASE HEAD
AUDIO ERASE HEAD
A/C HEAD
CONTROL SIGNAL
PRESSURE ROLLER
CAPSTAN SHAFT
REC
PB
DRUM FG
DRUM PG
TAPE
FG
PG
CAPSTAN D.D MOTOR
H.SW.P
REF PERIOD GEN
AN
1
DRUM PG
PHASE COMPARATOR
ADDER
6
DRUM CTL
DRUM MOTOR DRIVE
REC ON
COMP.SYNC
FREQUENCY DISCRIMINATOR
4
DRUM FG
3
DRUM 12V
FG
REC
AC
1
CTL HEAD (+)
PB
MECHANISM CONTROL SIGNAL
CAPSTAN MOTOR DRIVE
AM
9
CAPSTAN FG
11
CAPSTAN CTL
13
CAPSTAN 12V
SYSTEM CONTROL
CIRCUIT CONTROL SIGNAL
REF PERIOD GEN
CAPSTAN FG
CTL SIGNAL
PB
REC

OVERALL BLOCK DIAGRAM (FOR 2-HEAD MODELS)



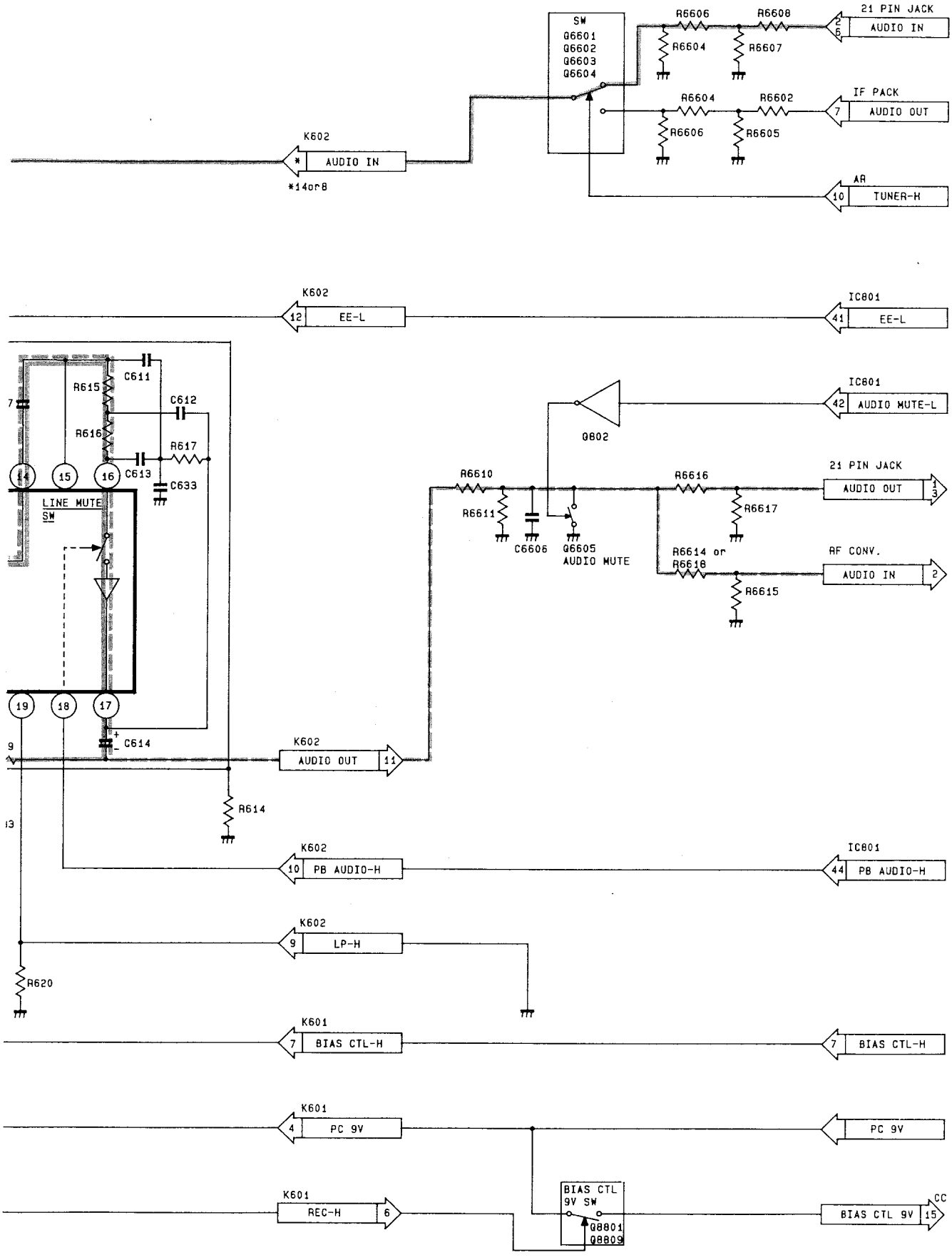

PLAYBACK
AUDIO REC
D.D CYLINDER
FULL ERASE HEAD
AUDIO ERASE HEAD
A/C HEAD
CONTROL SIGNAL
PRESSURE ROLLER
CAPSTAN SHAFT
REC
PB
DRUM FG
DRUM PG
TAPE
FG
PG
CAPSTAN D.D MOTOR
H.SW.P
REF PERIOD GEN
AN
1 DRUM PG
PHASE COMPARATOR
ADDER
AN
6 DRUM CTL
DRUM MOTOR DRIVE
REC ON
COMP.SYNC
AN
4 DRUM FG
FREQUENCY DISCRIMINATOR
AN
3 DRUM 12V
FG
REC
AC
1 CTL HEAD (+)
PB
REC ON
PB
PHASE COMPARATOR
ADDER
CAPSTAN MOTOR DRIVE
MECHANISM CONTROL SIGNAL
REC
PB
REC
AM
9 CAPSTAN FG
FREQUENCY DISCRIMINATOR
AM
11 CAPSTAN CTL
SYSTEM CONTROL
AM
13 CAPSTAN 12V
CIRCUIT CONTROL SIGNAL
REF PERIOD GEN
CAPSTAN FG
CTL SIGNAL
PB
REC

HEAD AMP BLOCK DIAGRAM (FOR 2-HEAD MODELS)

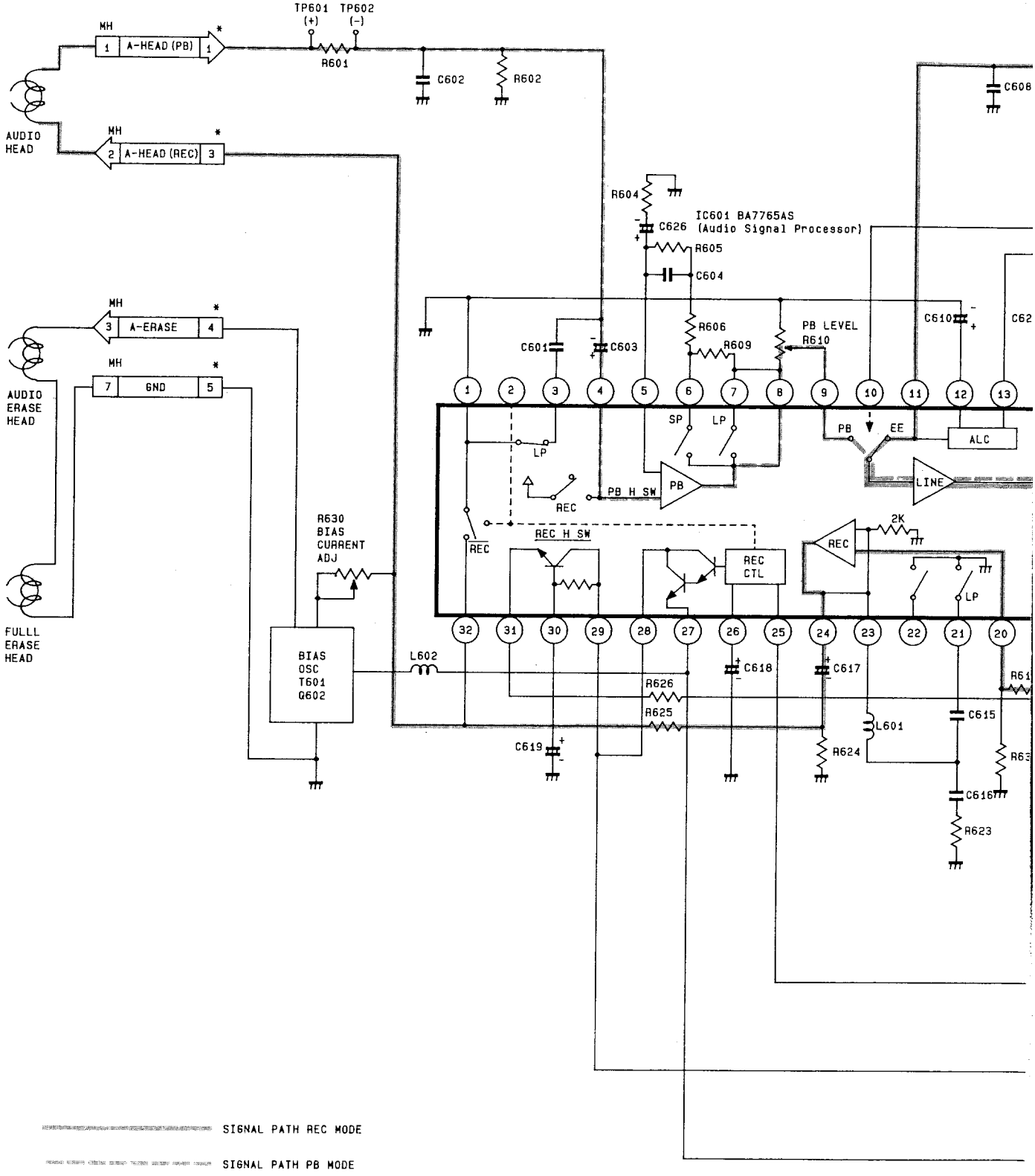


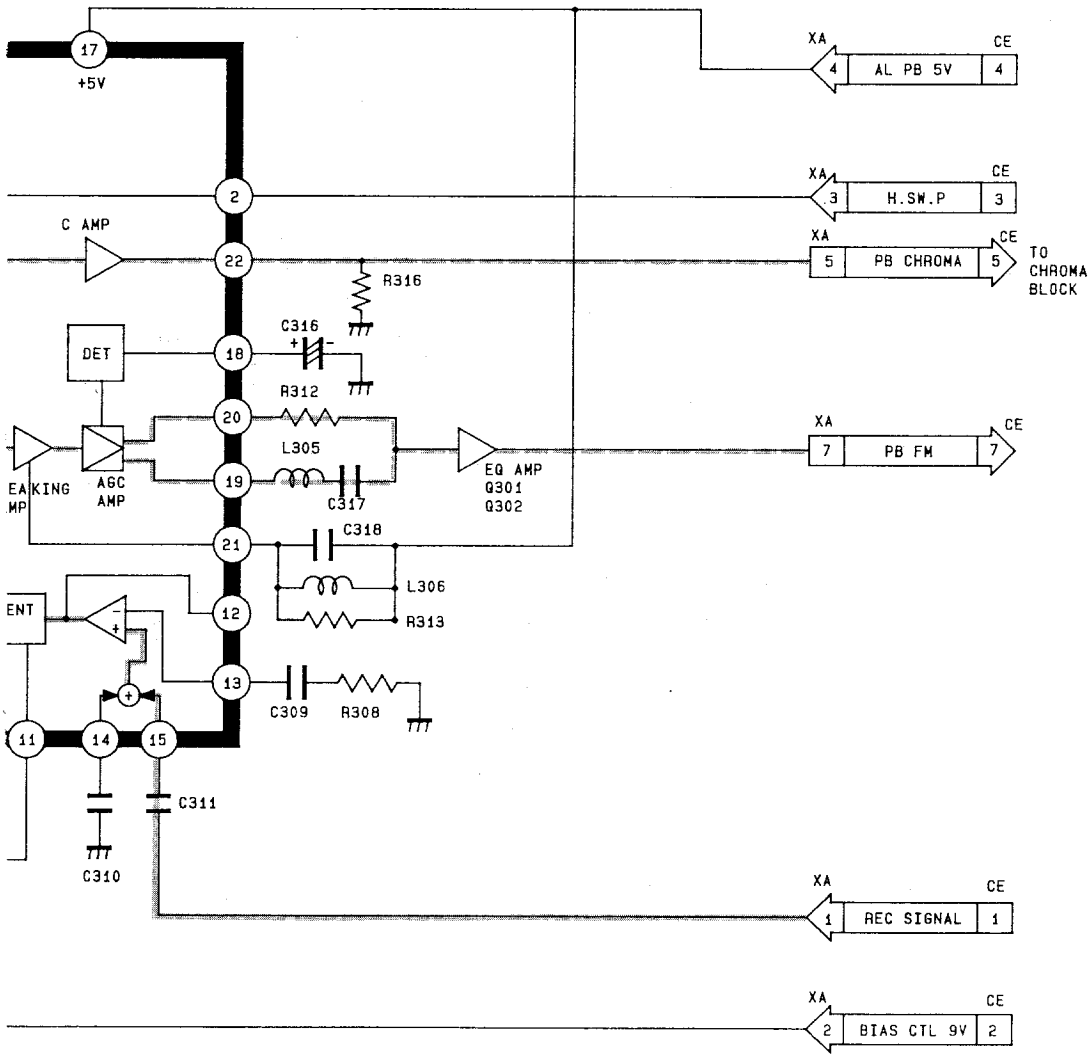
SIGNAL PATH REC MODE

SIGNAL PATH PB MODE

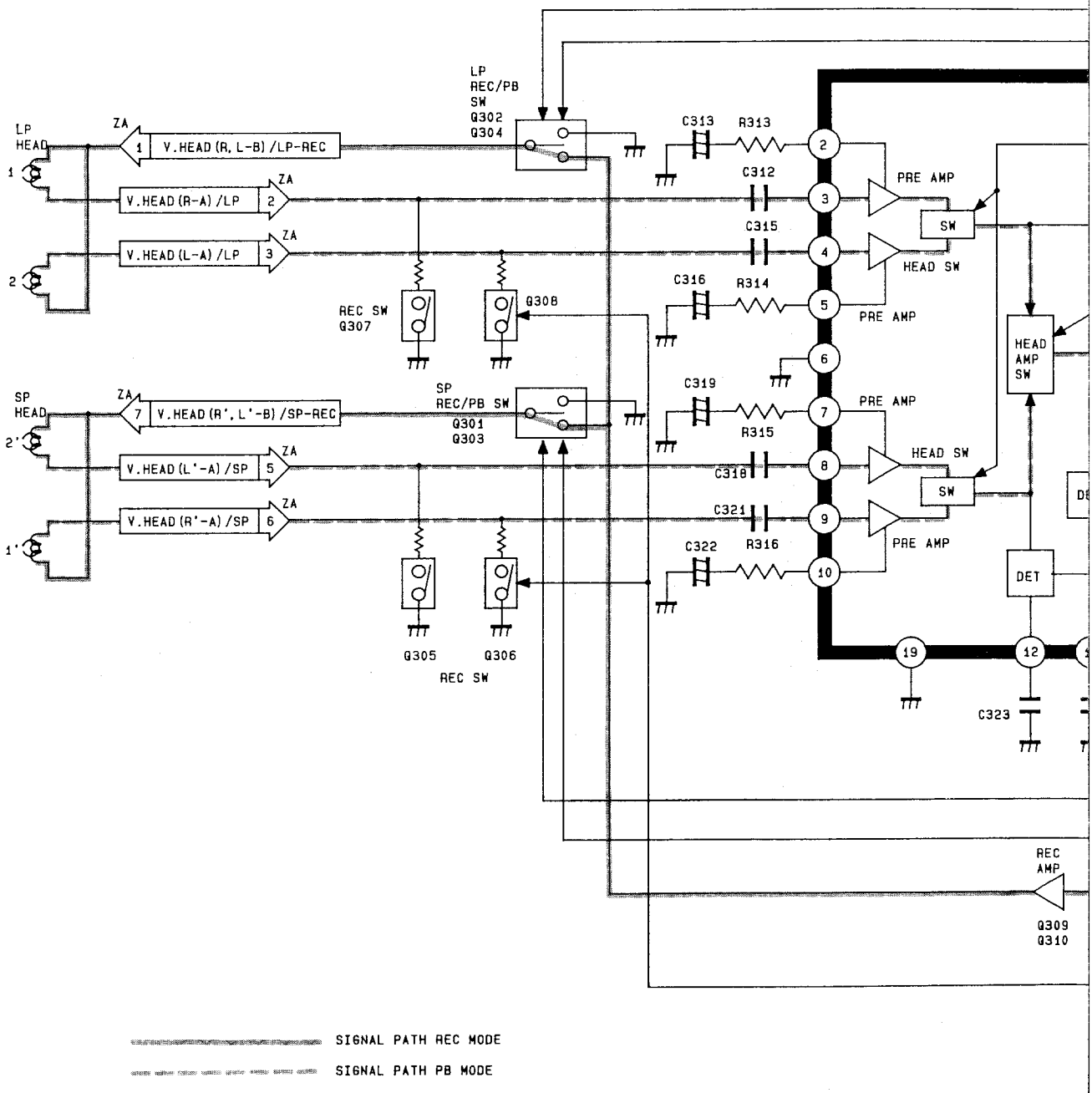

SW
Q6601
Q6602
Q6603
Q6604
R6606
R6608
R6604
R6607
21 PIN JACK
AUDIO IN
R6604
R6602
R6606
R6605
IF PACK
AUDIO OUT
AR
TUNER-H
K602
AUDIO IN
*14or8
K602
12
EE-L
IC801
41
EE-L
C611
R615
C612
R616
R617
C613
C633
14
15
16
LINE MUTE
SW
19
18
17
C614
9
K602
AUDIO OUT
11
R614
Q802
IC801
42
AUDIO MUTE-L
R6610
R6611
C6606
Q6605
AUDIO MUTE
R6616
R6617
21 PIN JACK
AUDIO OUT
R6614 or
R6618
R6615
RF CONV.
AUDIO IN
K602
10
PB AUDIO-H
IC801
44
PB AUDIO-H
K602
9
LP-H
R620
K601
7
BIAS CTL-H
7
BIAS CTL-H
K601
4
PC 9V
PC 9V
K601
REC-H
6
BIAS CTL
9V SW
Q8801
Q8809
BIAS CTL 9V
15

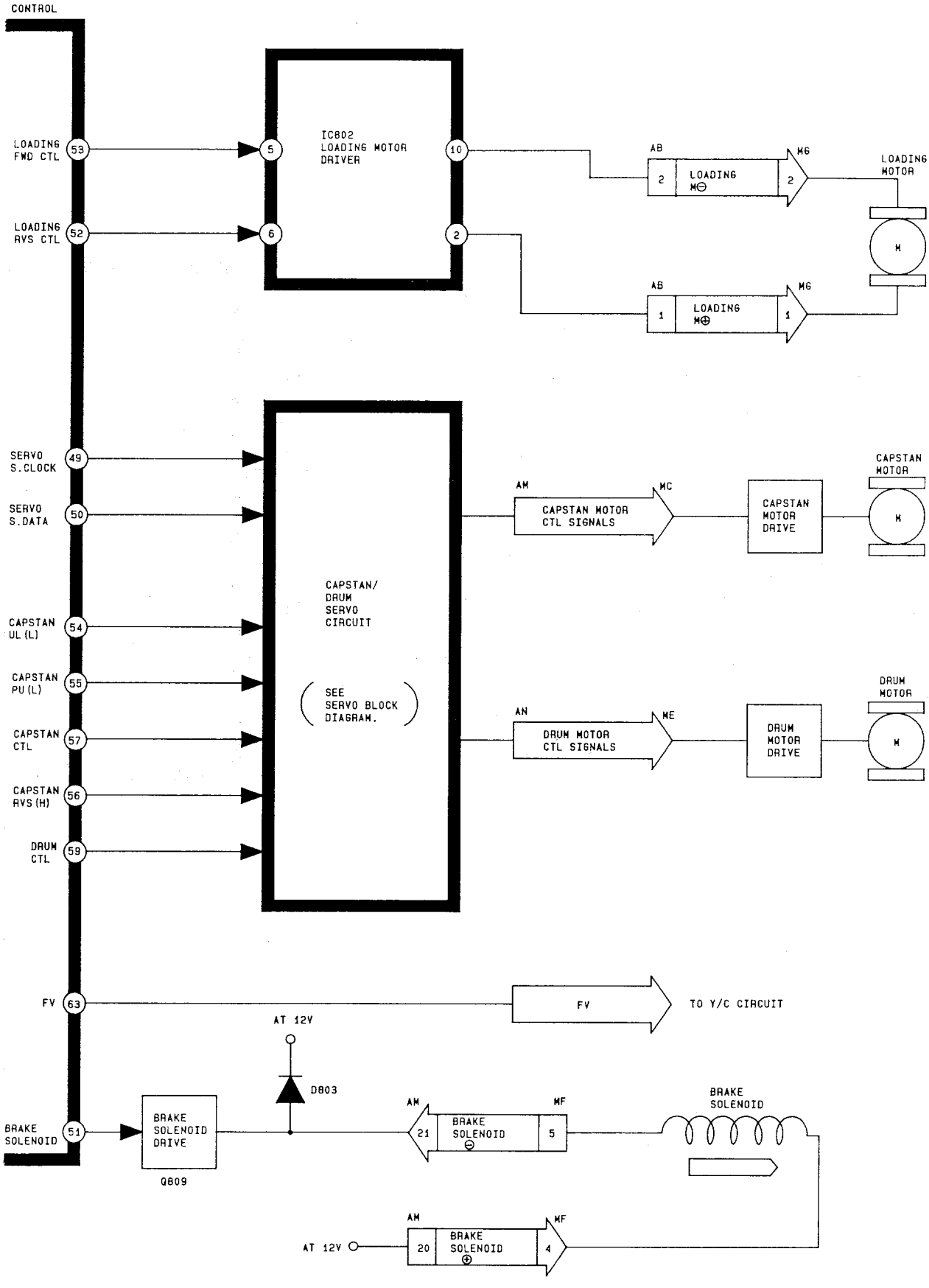
AUDIO BLOCK DIAGRAM



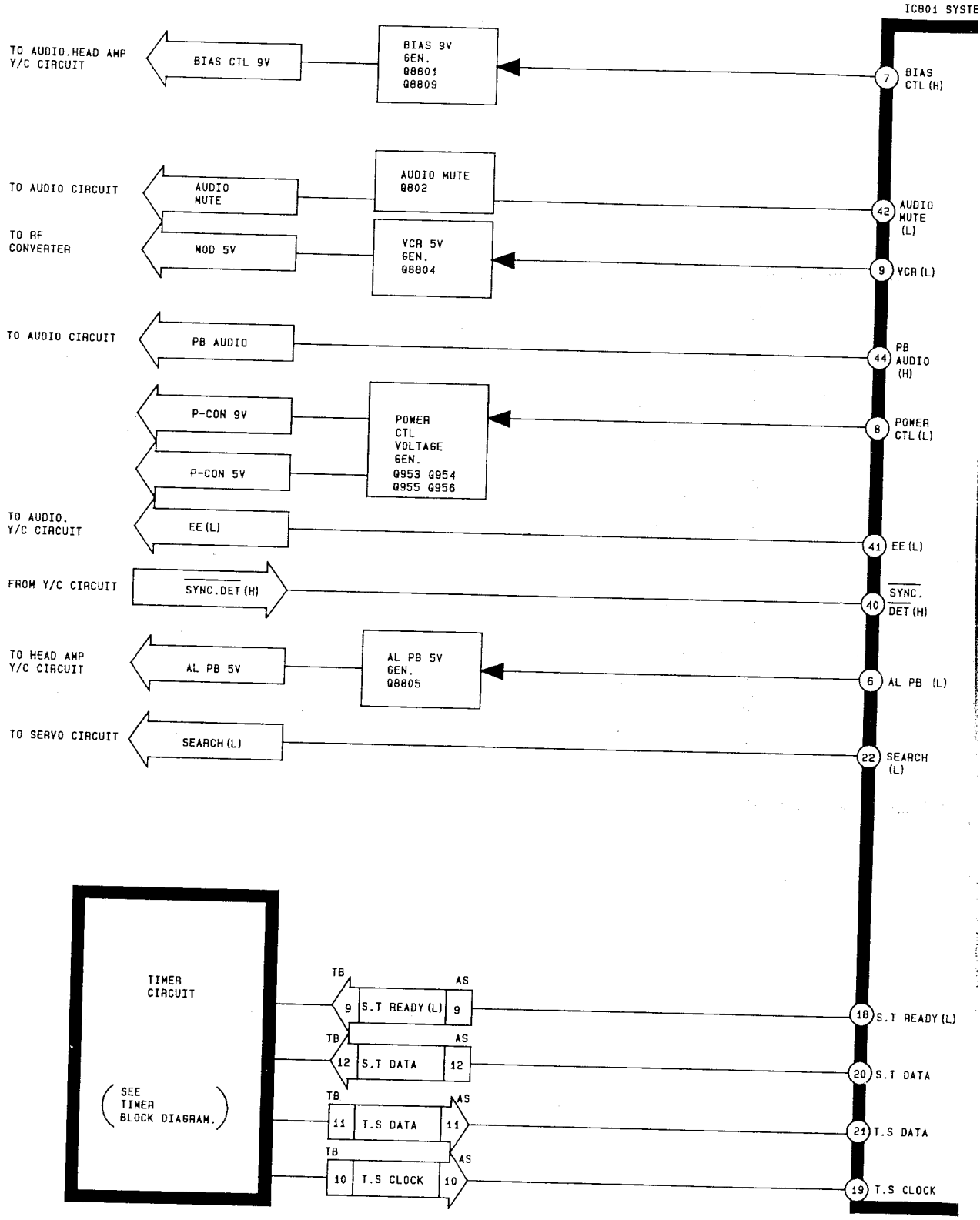

17
+5V
2
C AMP
22
R316
DET
18
C316
R312
20
L305
EA KING
MP
AGC
AMP
19
C317
EQ AMP
Q301
Q302
21
C318
L306
ENT
12
R313
13
C309
R308
11
14
15
C311
C310
XA
CE
4
AL PB 5V
4
3
H.SW.P
3
5
PB CHROMA
5
TO
CHROMA
BLOCK
7
PB FM
7
1
REC SIGNAL
1
2
BIAS CTL 9V
2

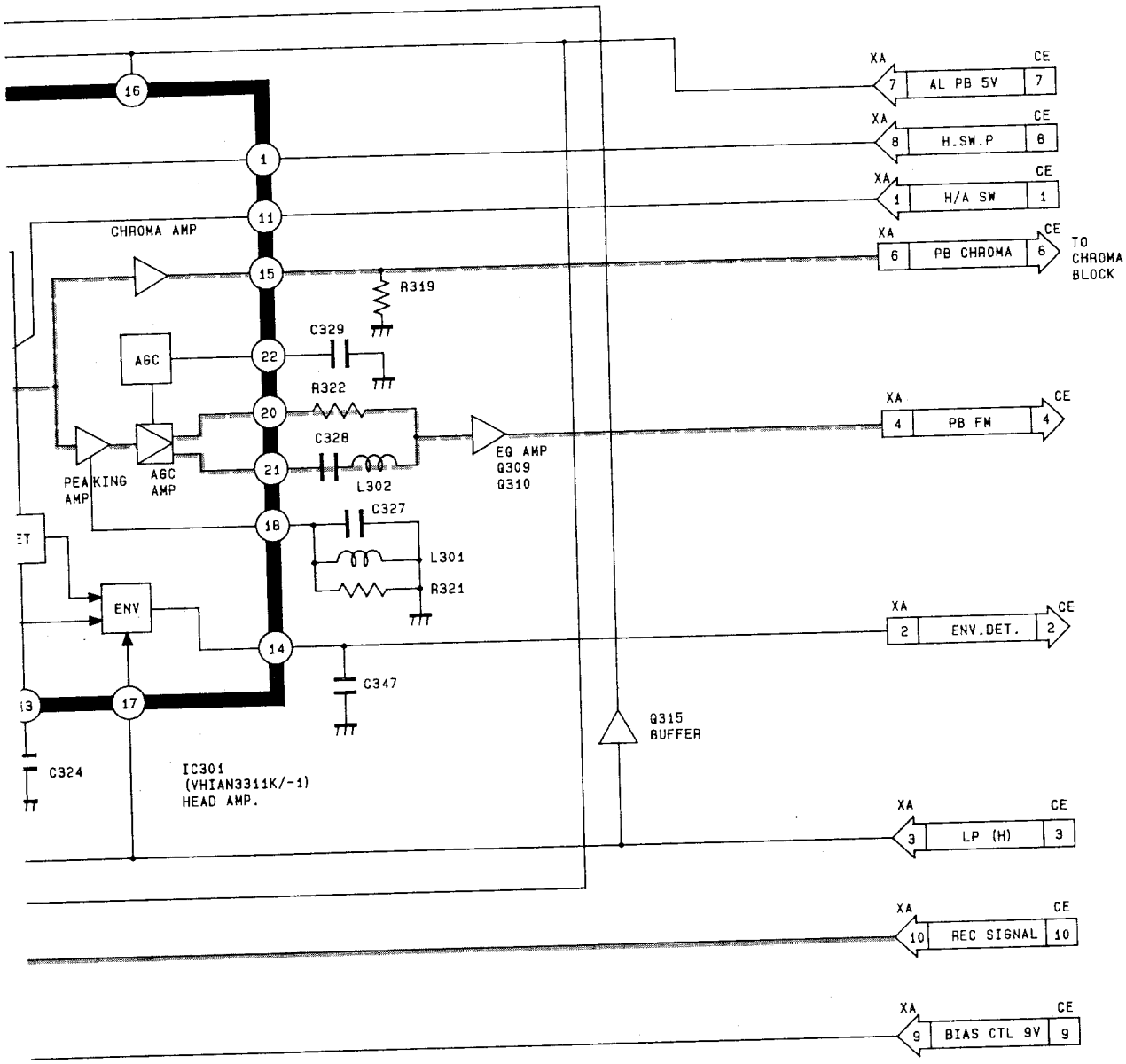
HEAD AMP BLOCK DIAGRAM (FOR 4-HEAD MODELS)



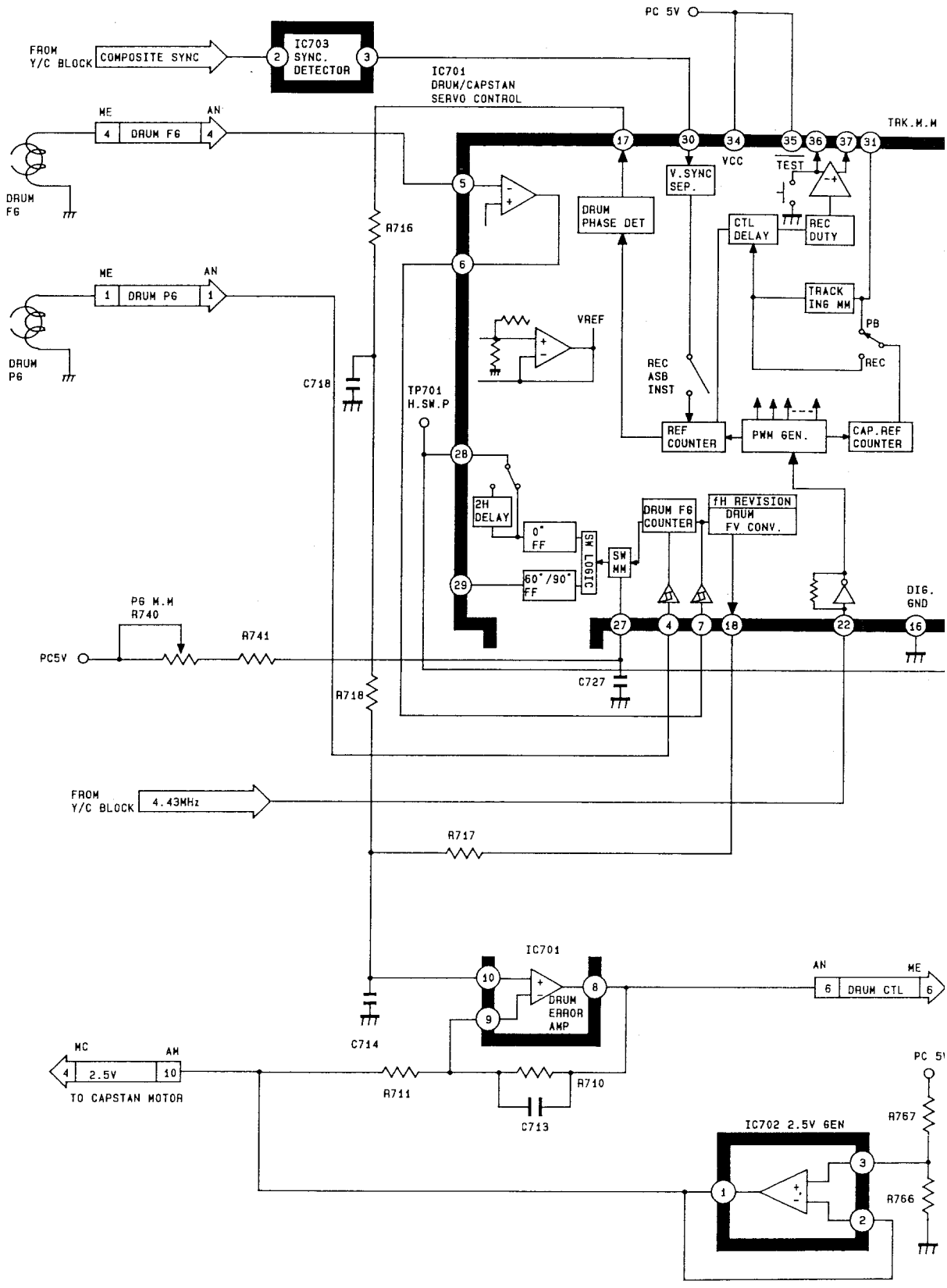

CONTROL
LOADING FWD CTL
53
LOADING RVS CTL
52
5
6
IC802
LOADING MOTOR
DRIVER
10
2
AB
2
LOADING M⊖
2
MG
LOADING MOTOR
M
AB
1
LOADING M⊕
1
MG
SERVO S.CLOCK
49
SERVO S.DATA
50
CAPSTAN UL (L)
54
CAPSTAN PU (L)
55
CAPSTAN CTL
57
CAPSTAN RVS (H)
56
DRUM CTL
59
CAPSTAN/
DRUM
SERVO
CIRCUIT
SEE
SERVO BLOCK
DIAGRAM.
AM
CAPSTAN MOTOR
CTL SIGNALS
MC
CAPSTAN
MOTOR
DRIVE
CAPSTAN
MOTOR
M
AN
DRUM MOTOR
CTL SIGNALS
ME
DRUM
MOTOR
DRIVE
DRUM
MOTOR
M
FV
63
FV
TO Y/C CIRCUIT
AT 12V
D803
BRAKE SOLENOID
51
BRAKE
SOLENOID
DRIVE
Q809
AM
21
BRAKE
SOLENOID
⊖
MF
5
BRAKE
SOLENOID
AT 12V
AM
20
BRAKE
SOLENOID
⊕
MF
4

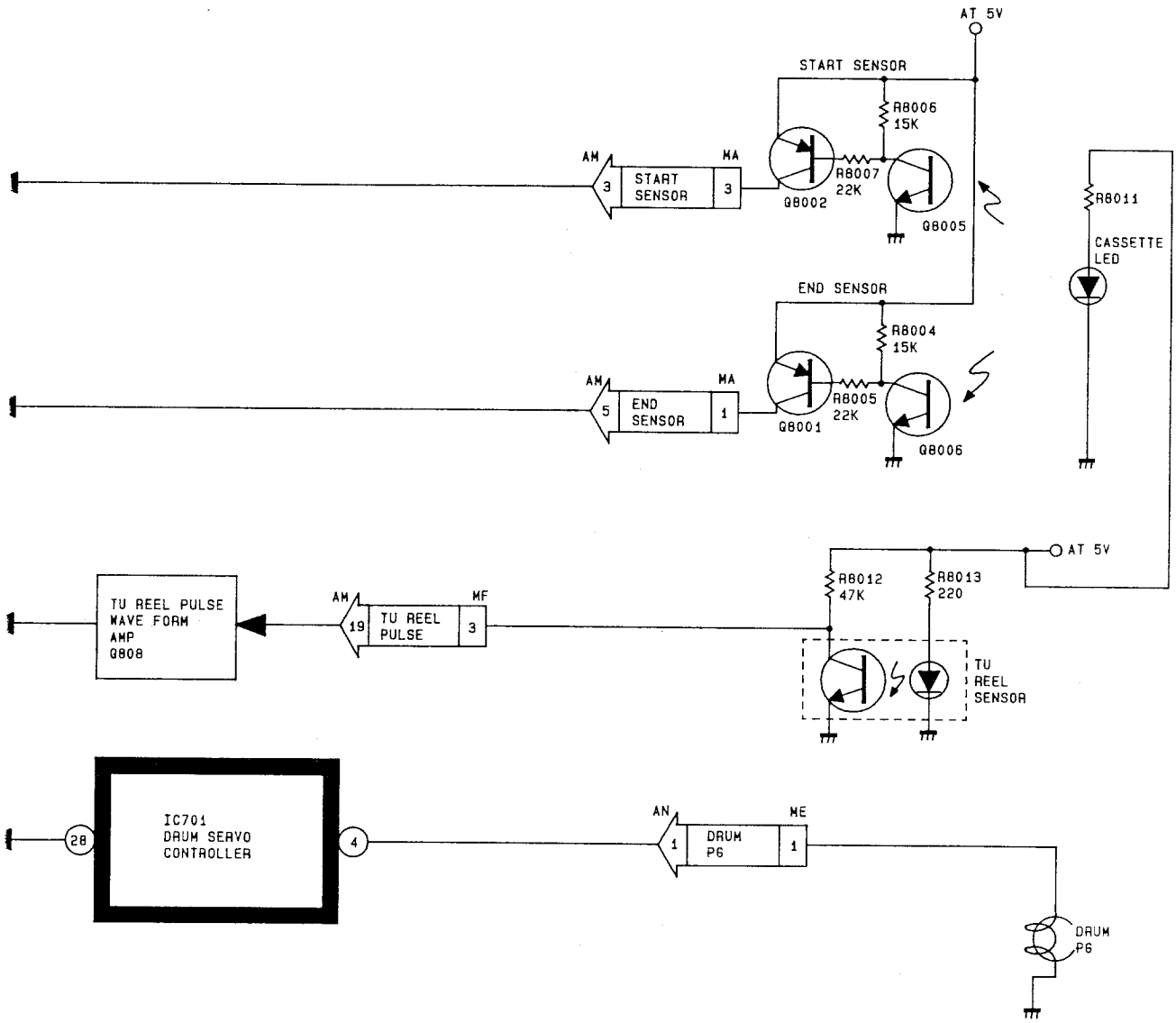
SYSTEM CONTROL BLOCK DIAGRAM



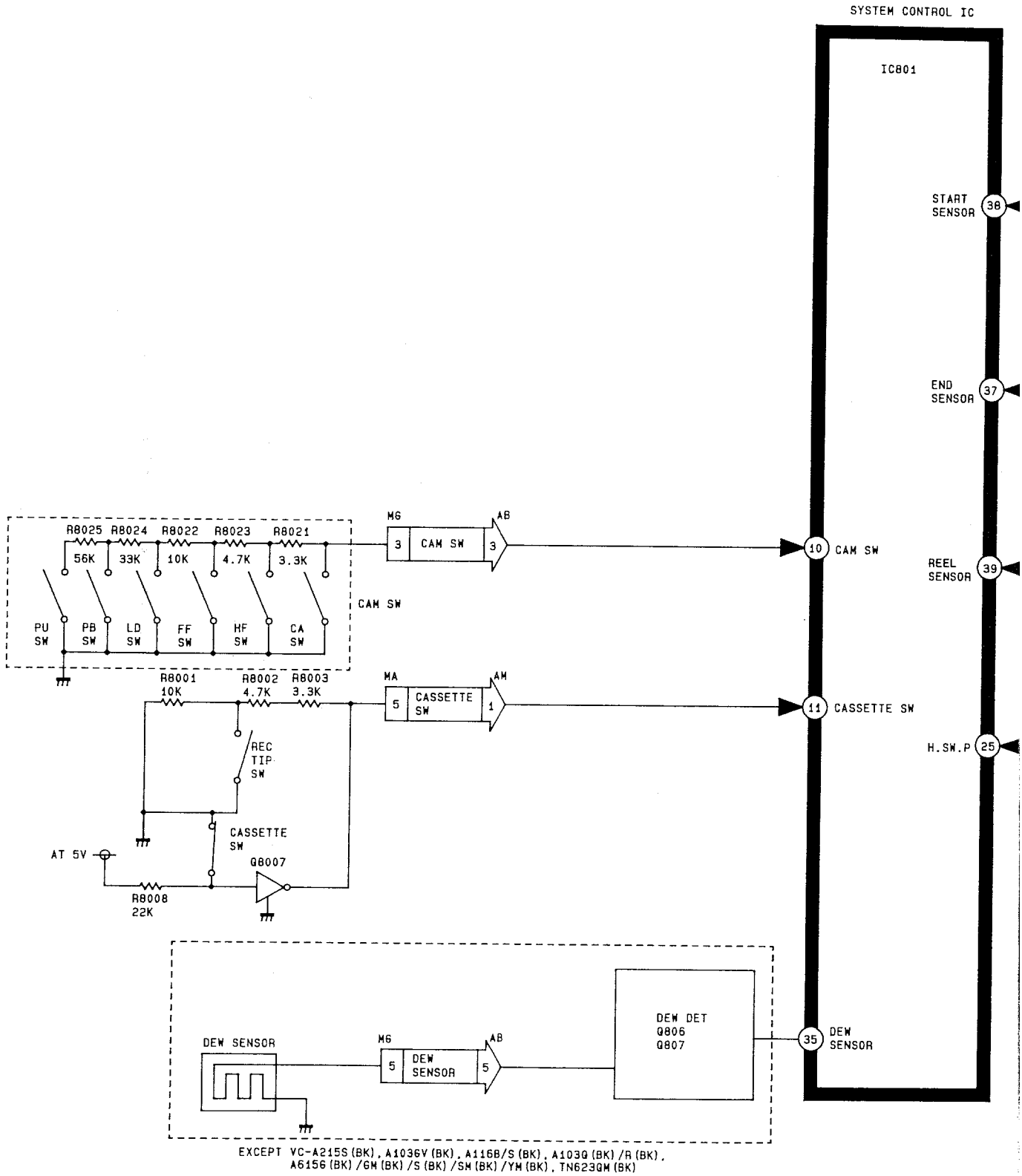

16
1
11
15
22
20
21
18
14
17
CHROMA AMP
AGC
PEAKING AMP
AGC AMP
ENV
R319
C329
R322
C328
L302
C327
L301
R321
C347
C324
IC301
(VHIAN3311K/-1)
HEAD AMP.
EQ AMP
Q309
Q310
Q315
BUFFER
XA
CE
7
AL PB 5V
8
H.SW.P
1
H/A SW
6
PB CHROMA
TO CHROMA BLOCK
4
PB FM
2
ENV.DET.
3
LP (H)
10
REC SIGNAL
9
BIAS CTL 9V

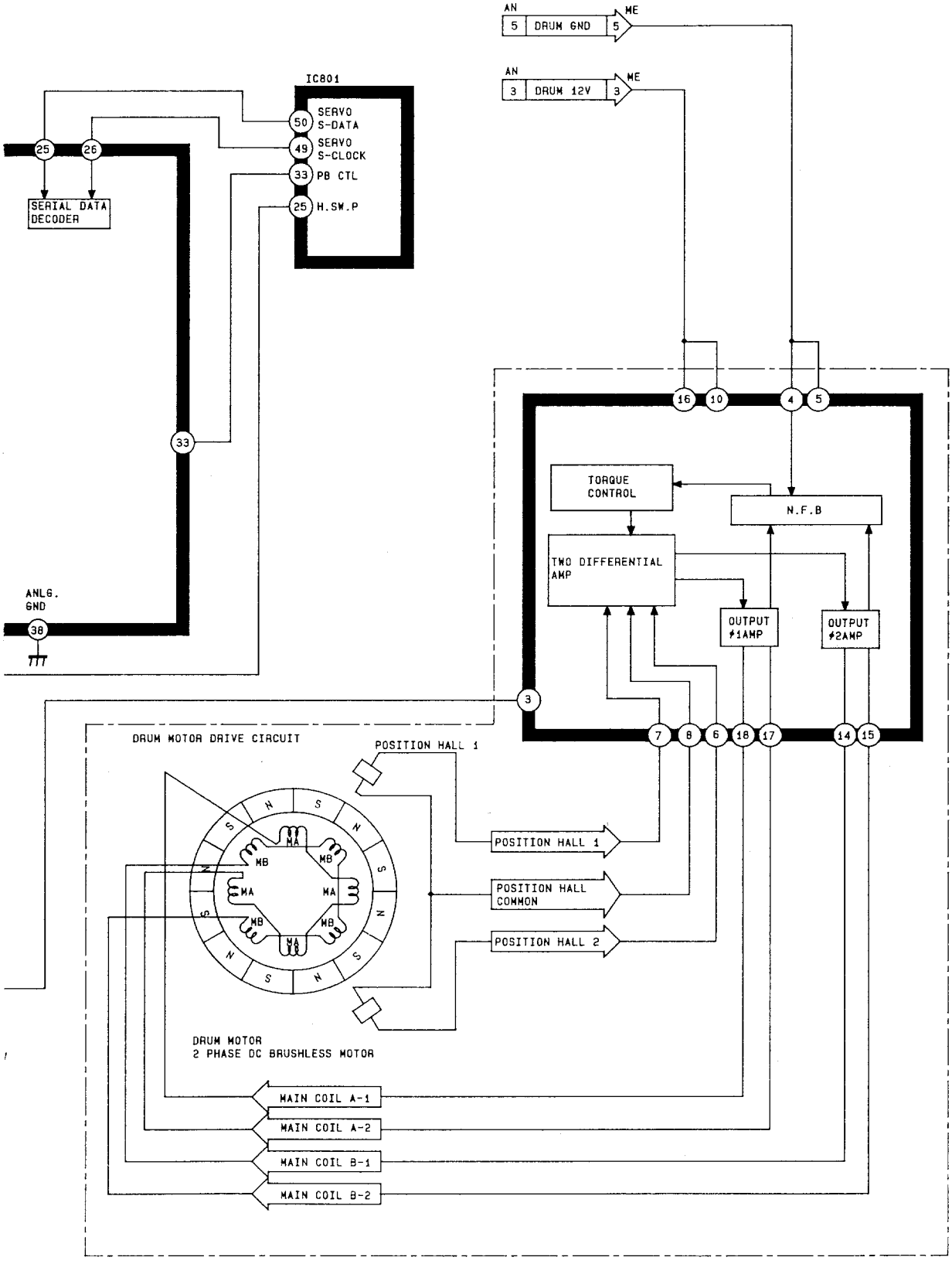
DRUM SERVO BLOCK DIAGRAM



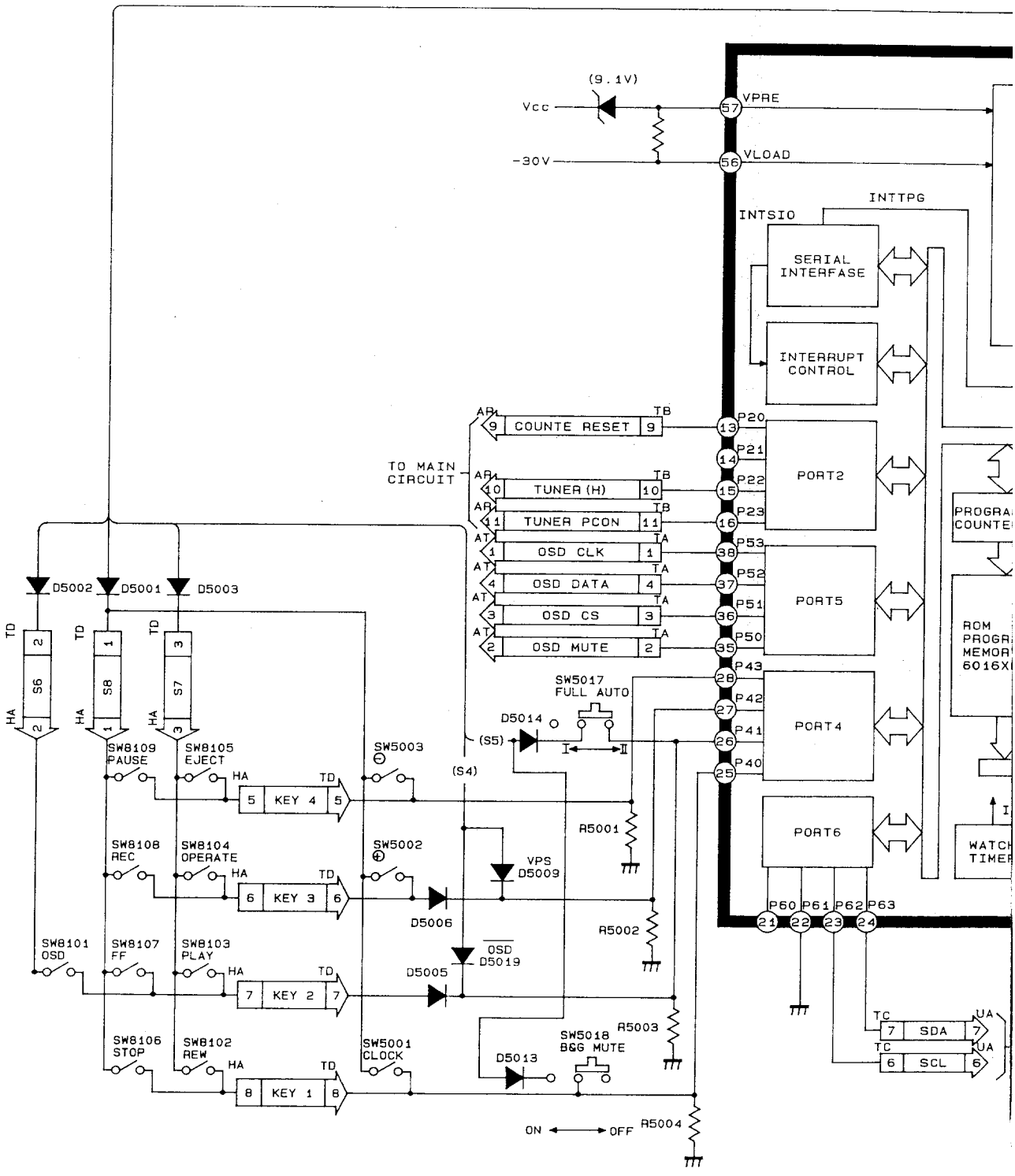

AT 5V
START SENSOR
R8006
15K
AM
3
START
SENSOR
MA
3
R8007
22K
Q8002
Q8005
R8011
CASSETTE
LED
END SENSOR
R8004
15K
AM
5
END
SENSOR
MA
1
R8005
22K
Q8001
Q8006
AT 5V
R8012
47K
R8013
220
TU
REEL
SENSOR
TU REEL PULSE
WAVE FORM
AMP
Q808
AM
19
TU REEL
PULSE
MF
3
IC701
DRUM SERVO
CONTROLLER
28
4
AN
1
DRUM
P6
ME
1
DRUM
P6

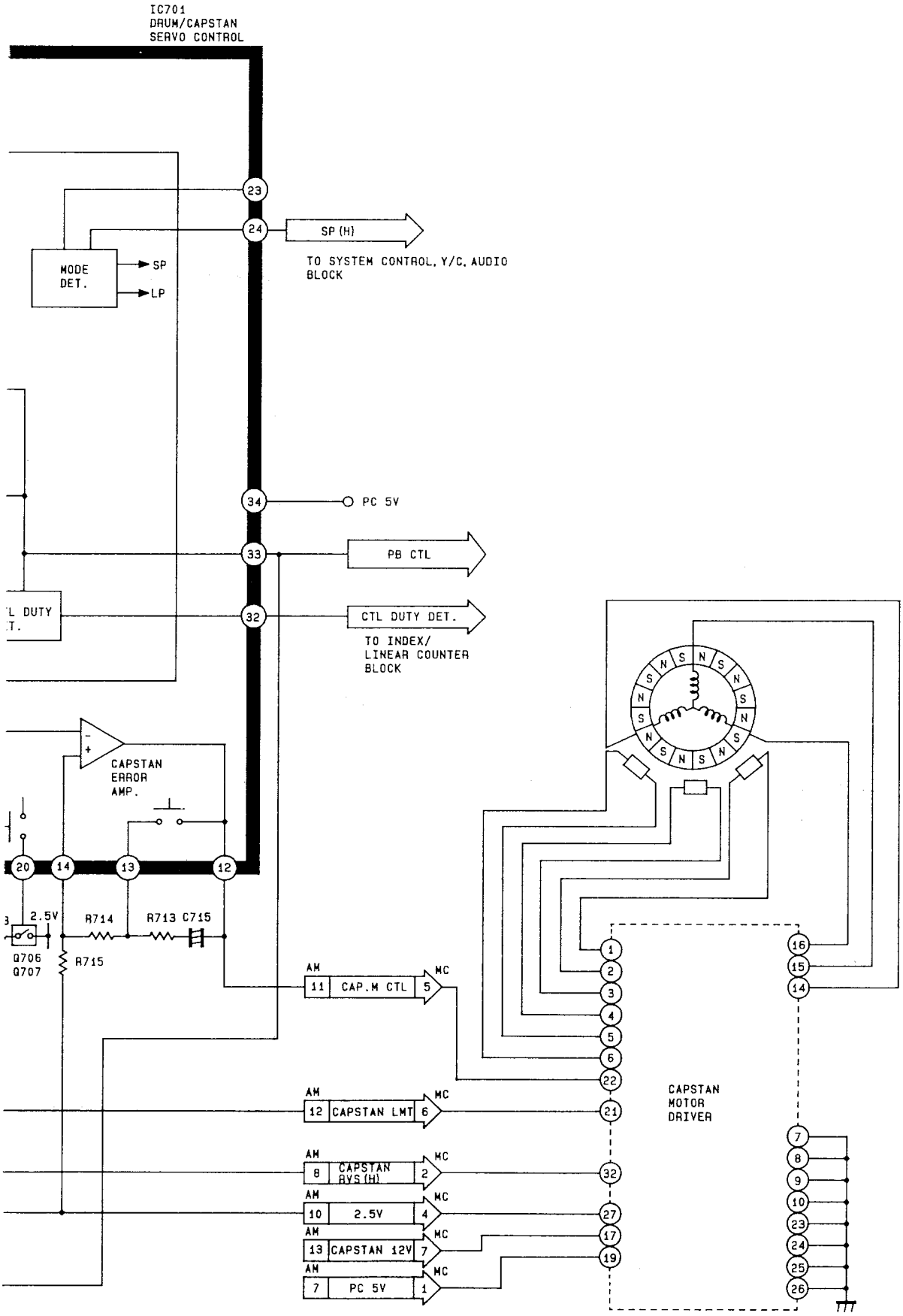
SAFETY DEVICE BLOCK DIAGRAM



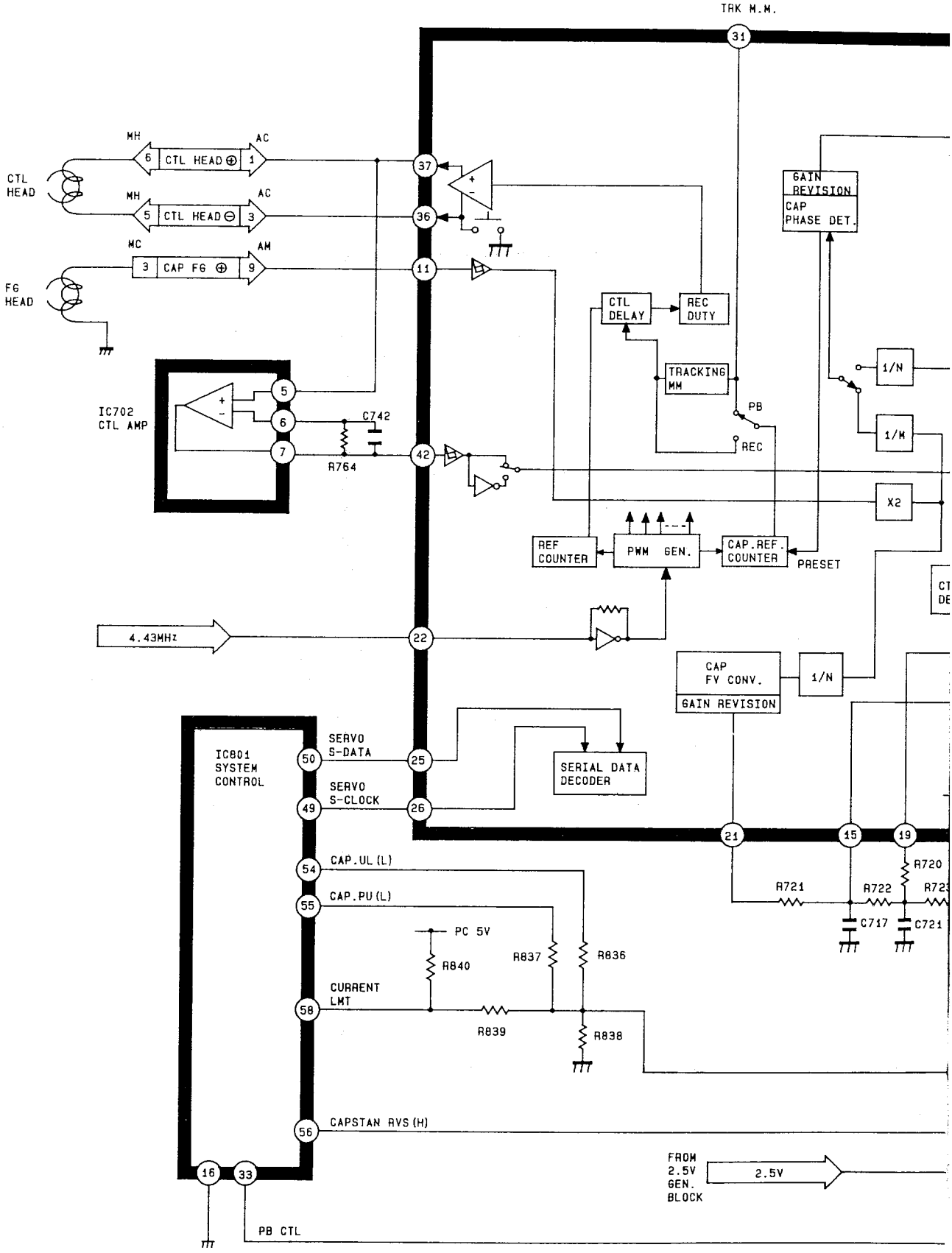

AN
5
DRUM GND
5
ME
AN
3
DRUM 12V
3
ME
IC801
50
SERVO
S-DATA
49
SERVO
S-CLOCK
33
PB CTL
25
H.SW.P
25
26
SERIAL DATA
DECODER
33
ANLG.
GND
38
16
10
4
5
TORQUE
CONTROL
N.F.B
TWO DIFFERENTIAL
AMP
OUTPUT
#1AMP
OUTPUT
#2AMP
3
7
8
6
18
17
14
15
DRUM MOTOR DRIVE CIRCUIT
POSITION HALL 1
POSITION HALL 1
POSITION HALL
COMMON
POSITION HALL 2
MA
MB
DRUM MOTOR
2 PHASE DC BRUSHLESS MOTOR
MAIN COIL A-1
MAIN COIL A-2
MAIN COIL B-1
MAIN COIL B-2

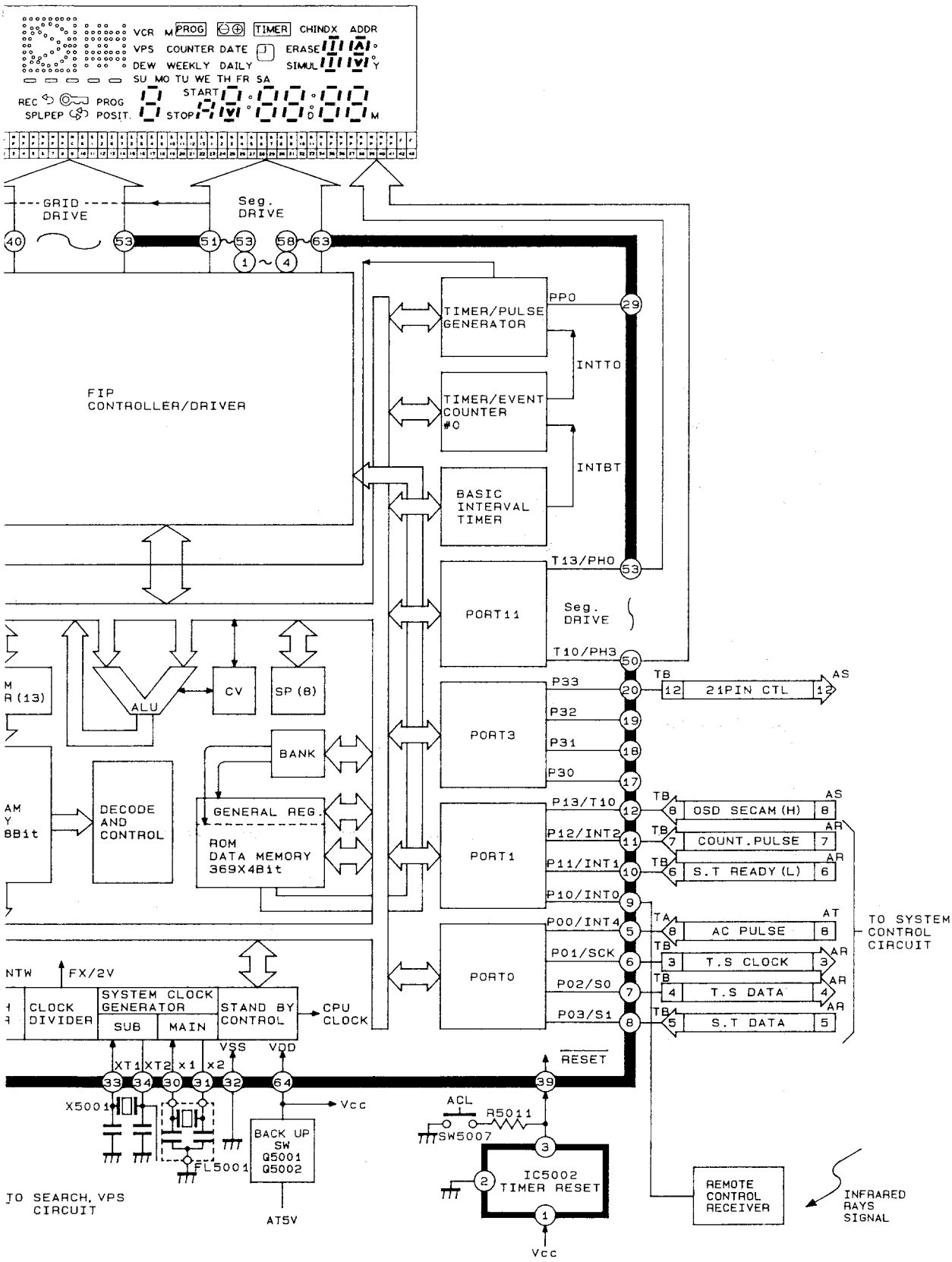
TIMER BLOCK DIAGRAM
(VC-A103GV(BK), A215S(BK), A615G(BK)/GM(BK))



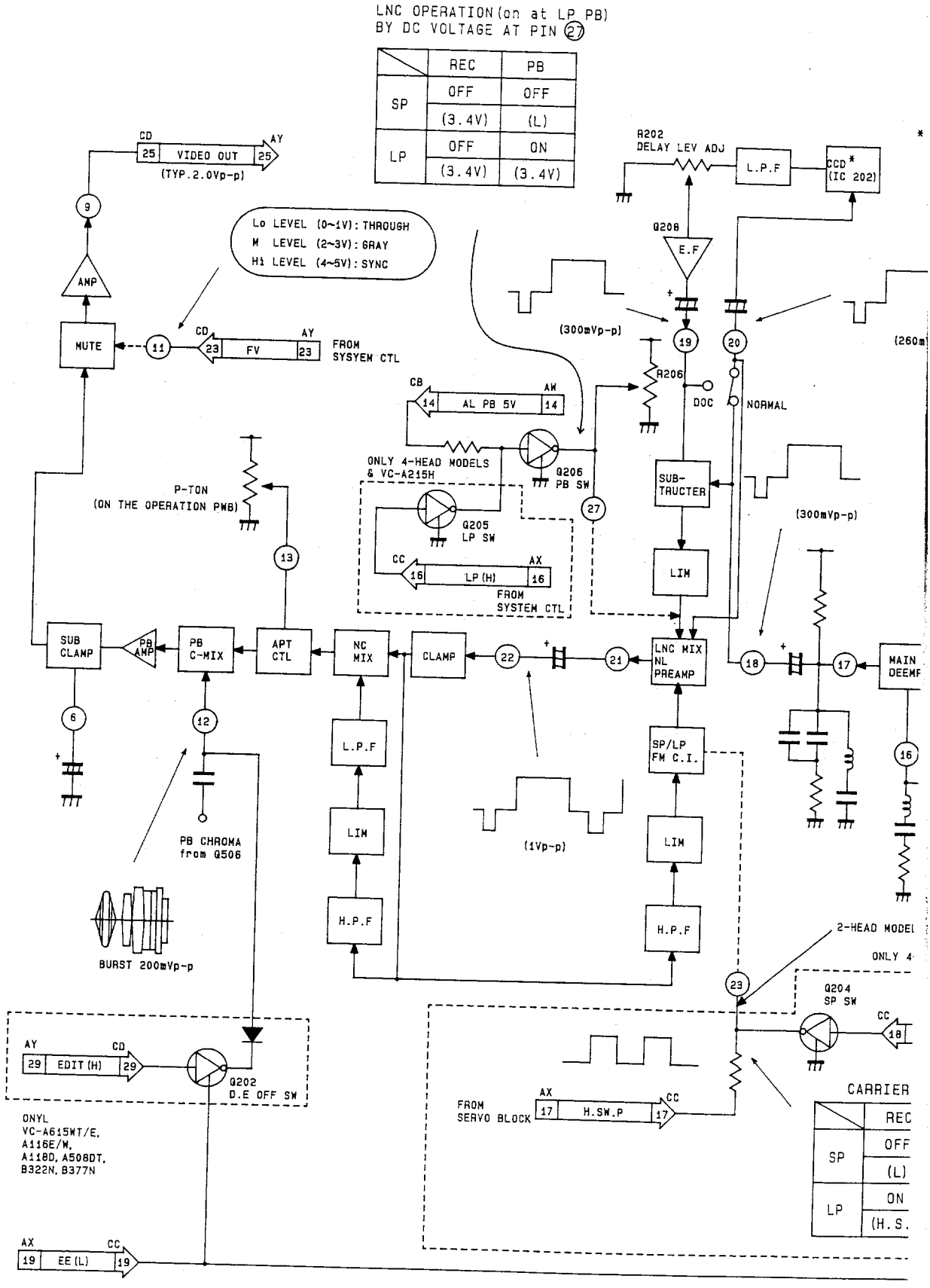

IC701
DRUM/CAPSTAN
SERVO CONTROL
23
24
SP (H)
TO SYSTEM CONTROL, Y/C, AUDIO
BLOCK
MODE
DET.
SP
LP
34
PC 5V
33
PB CTL
32
CTL DUTY DET.
TO INDEX/
LINEAR COUNTER
BLOCK
CAPSTAN
ERROR
AMP.
20
14
13
12
2.5V
R714
R713 C715
Q706
Q707
R715
AM
11
CAP.M CTL
5
MC
AM
12
CAPSTAN LMT
6
MC
AM
8
CAPSTAN
FG (H)
2
MC
AM
10
2.5V
4
MC
AM
13
CAPSTAN 12V
7
MC
AM
7
PC 5V
1
MC
CAPSTAN
MOTOR
DRIVER
1
2
3
4
5
6
22
21
32
27
17
19
16
15
14
7
8
9
10
23
24
25
26

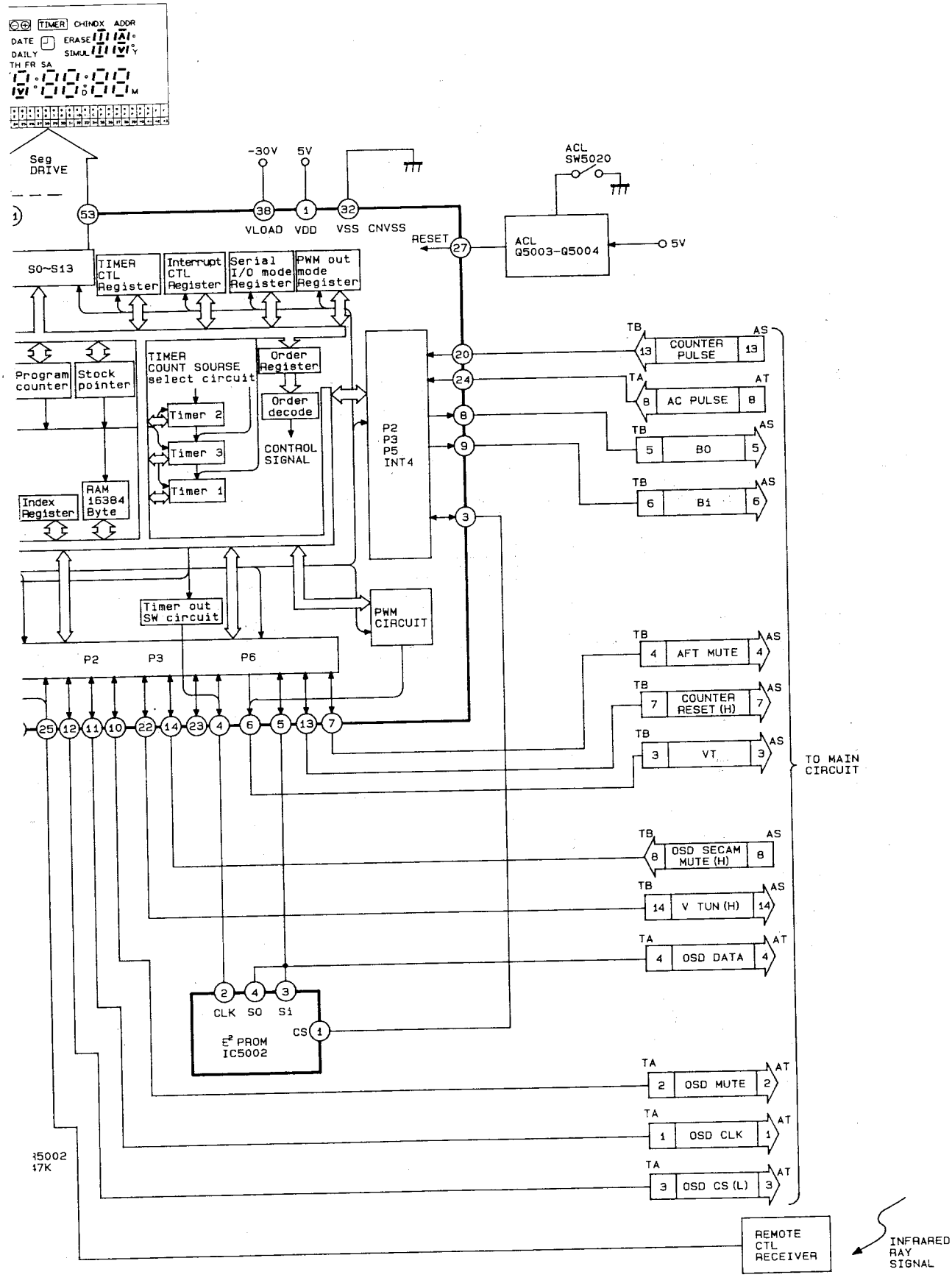
CAPSTAN SERVO BLOCK DIAGRAM



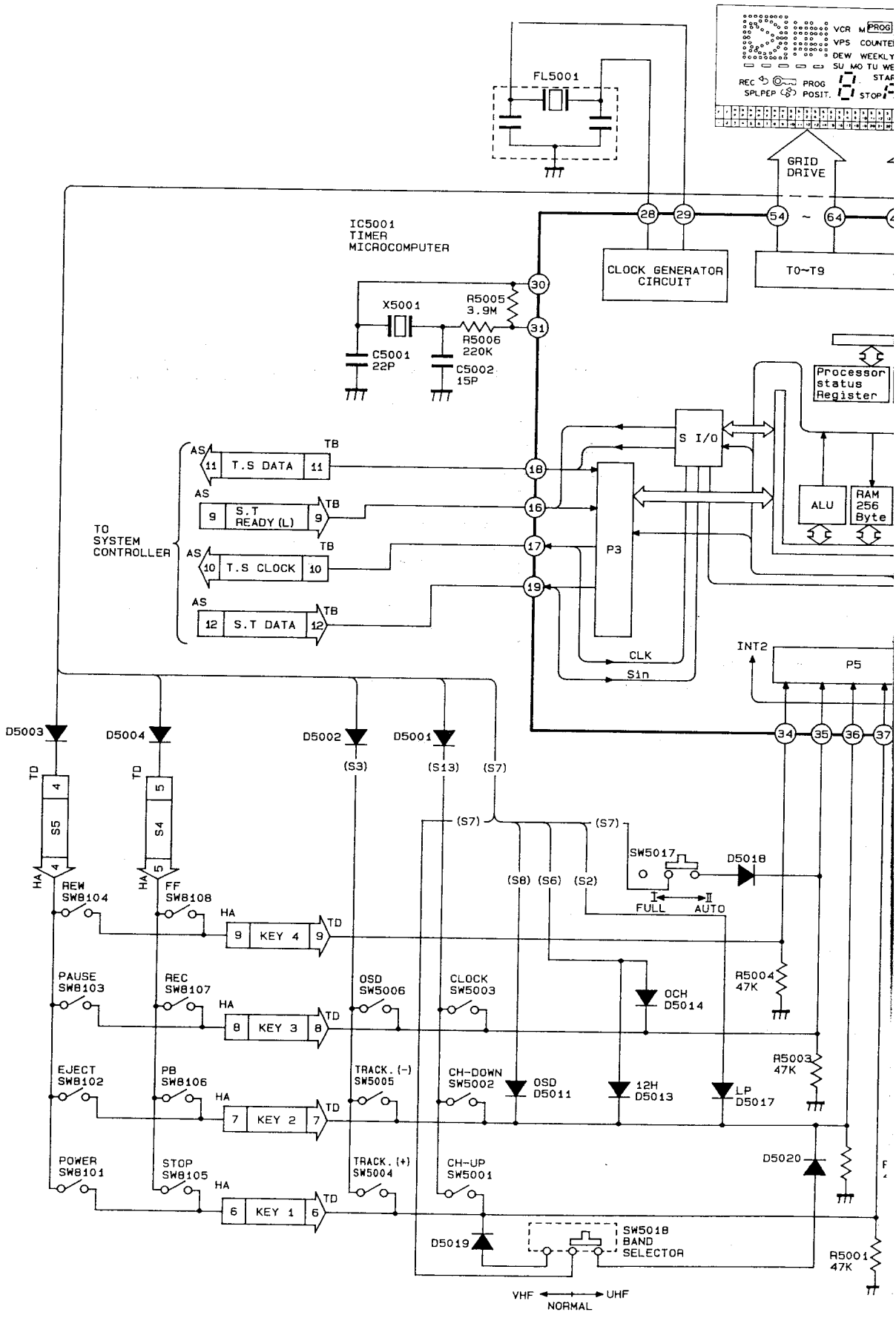

VCR M PROG TIMER CHINDX ADDR
VPS COUNTER DATE ERASE
DEW WEEKLY DAILY SIMUL
SU MO TU WE TH FR SA
REC PROG
SPLPEP POSIT.
START
STOP
GRID DRIVE
Seg. DRIVE
FIP CONTROLLER/DRIVER
TIMER/PULSE GENERATOR
TIMER/EVENT COUNTER #0
BASIC INTERVAL TIMER
PORT11
PORT3
PORT1
PORT0
PP0
INTTO
INTBT
T13/PHO
T10/PH3
P33
P32
P31
P30
P13/T10
P12/INT2
P11/INT1
P10/INT0
P00/INT4
P01/SCK
P02/SO
P03/S1
ALU
CV
SP (8)
BANK
GENERAL REG.
ROM DATA MEMORY 369X4Bit
DECODE AND CONTROL
CLOCK DIVIDER
SYSTEM CLOCK GENERATOR
SUB
MAIN
STAND BY CONTROL
CPU CLOCK
FX/2V
XT1 XT2 x1 x2
VSS VDD
RESET
Vcc
X5001
FL5001
BACK UP SW Q5001 Q5002
AT5V
ACL
R5011
SW5007
IC5002 TIMER RESET
21PIN CTL
OSD SECAM (H)
COUNT.PULSE
S.T READY (L)
AC PULSE
T.S CLOCK
T.S DATA
S.T DATA
TO SYSTEM CONTROL CIRCUIT
REMOTE CONTROL RECEIVER
INFRARED RAYS SIGNAL
TO SEARCH, VPS CIRCUIT

AN3248K/NK PB LUMINANCE SIGNAL LINE BLOCK DIAGRAM

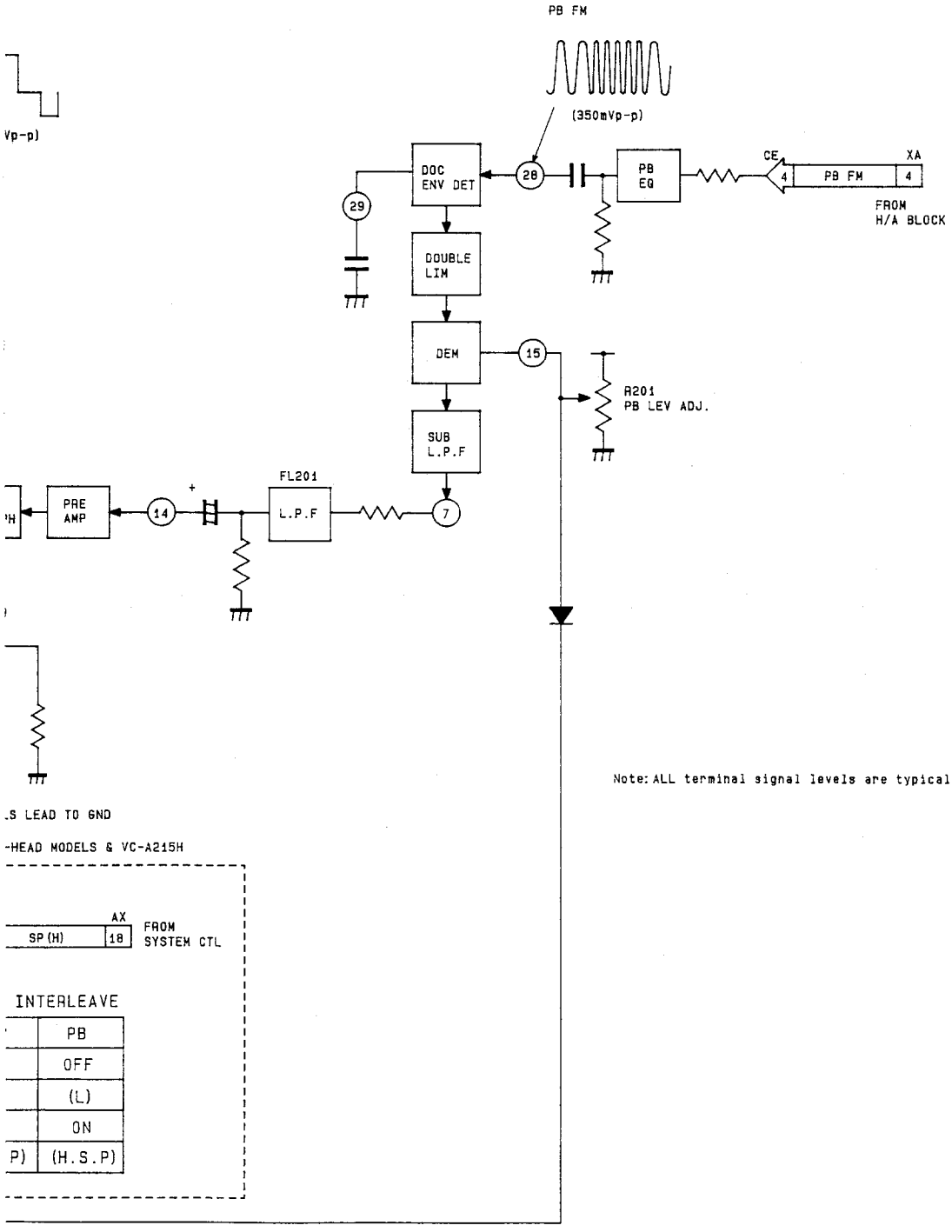



TIMER
CH/NO
ADDR
DATE
ERASE
DAILY
SIMUL
TH FR SA
Seg DRIVE
-30V
5V
ACL SW5020
53
38
1
32
VLOAD
VDD
VSS
CNVSS
RESET
27
ACL Q5003-Q5004
5V
S0~S13
TIMER CTL Register
Interrupt CTL Register
Serial I/O mode Register
PWM out mode Register
Program counter
Stock pointer
TIMER COUNT SOURSE select circuit
Order Register
Order decode
CONTROL SIGNAL
Timer 2
Timer 3
Timer 1
Index Register
RAM 16384 Byte
P2
P3
P5
INT4
20
24
8
9
3
TB
AS
13
COUNTER PULSE
13
TA
AT
8
AC PULSE
8
5
B0
5
6
Bi
6
Timer out SW circuit
PWM CIRCUIT
P2
P3
P6
25
12
11
10
22
14
23
4
6
5
13
7
4
AFT MUTE
4
7
COUNTER RESET (H)
7
3
VT
3
TO MAIN CIRCUIT
8
OSD SECAM MUTE (H)
8
14
V TUN (H)
14
4
OSD DATA
4
2
CLK
4
SO
3
Si
CS
1
E² PROM IC5002
2
OSD MUTE
2
1
OSD CLK
1
3
OSD CS (L)
3
REMOTE CTL RECEIVER
INFRARED RAY SIGNAL

TIMER BLOCK DIAGRAM (FOR 4-HEAD MODELS)

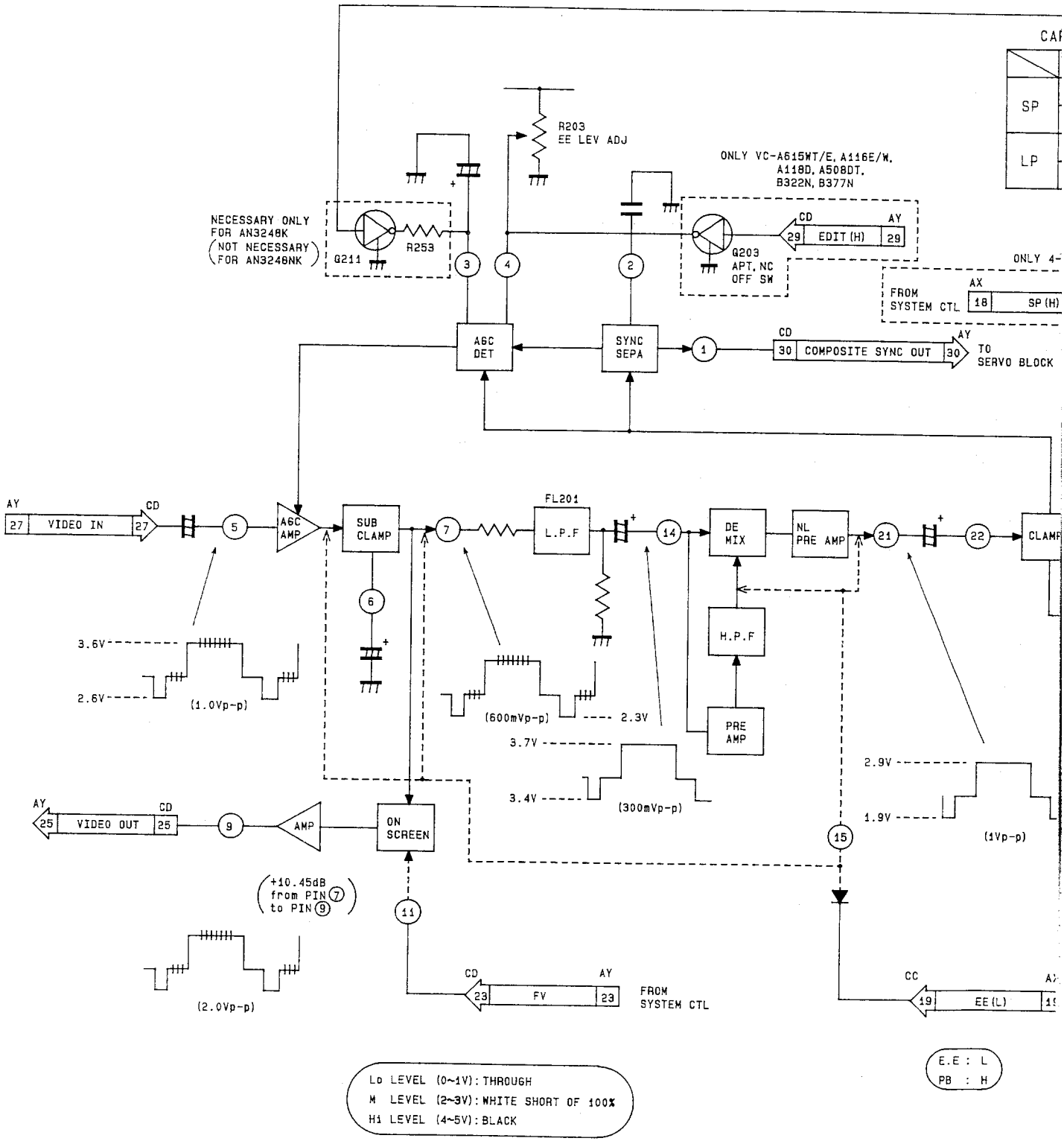


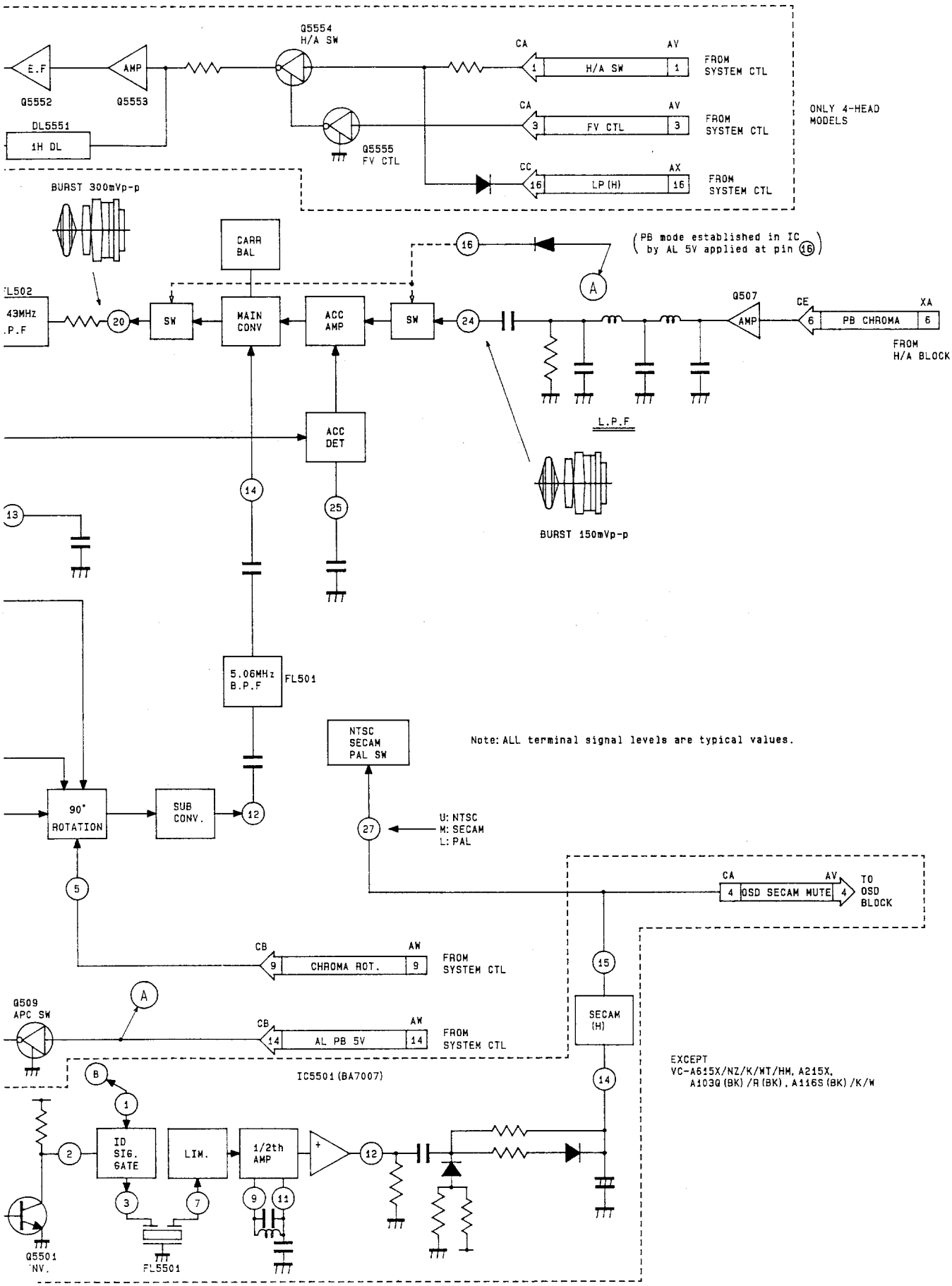
CCD : Charge Coupled Device



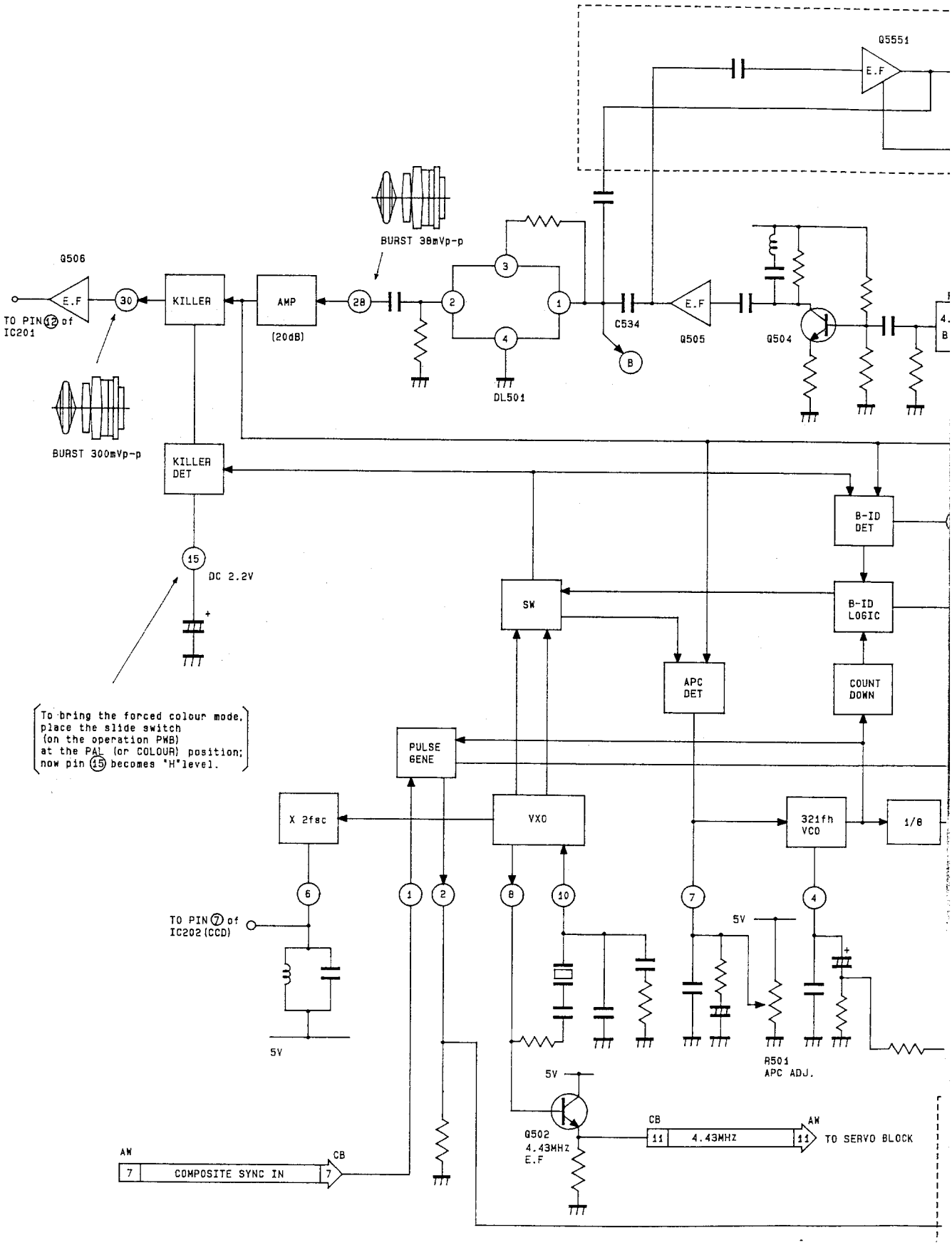
Note: ALL terminal signal levels are typical values.

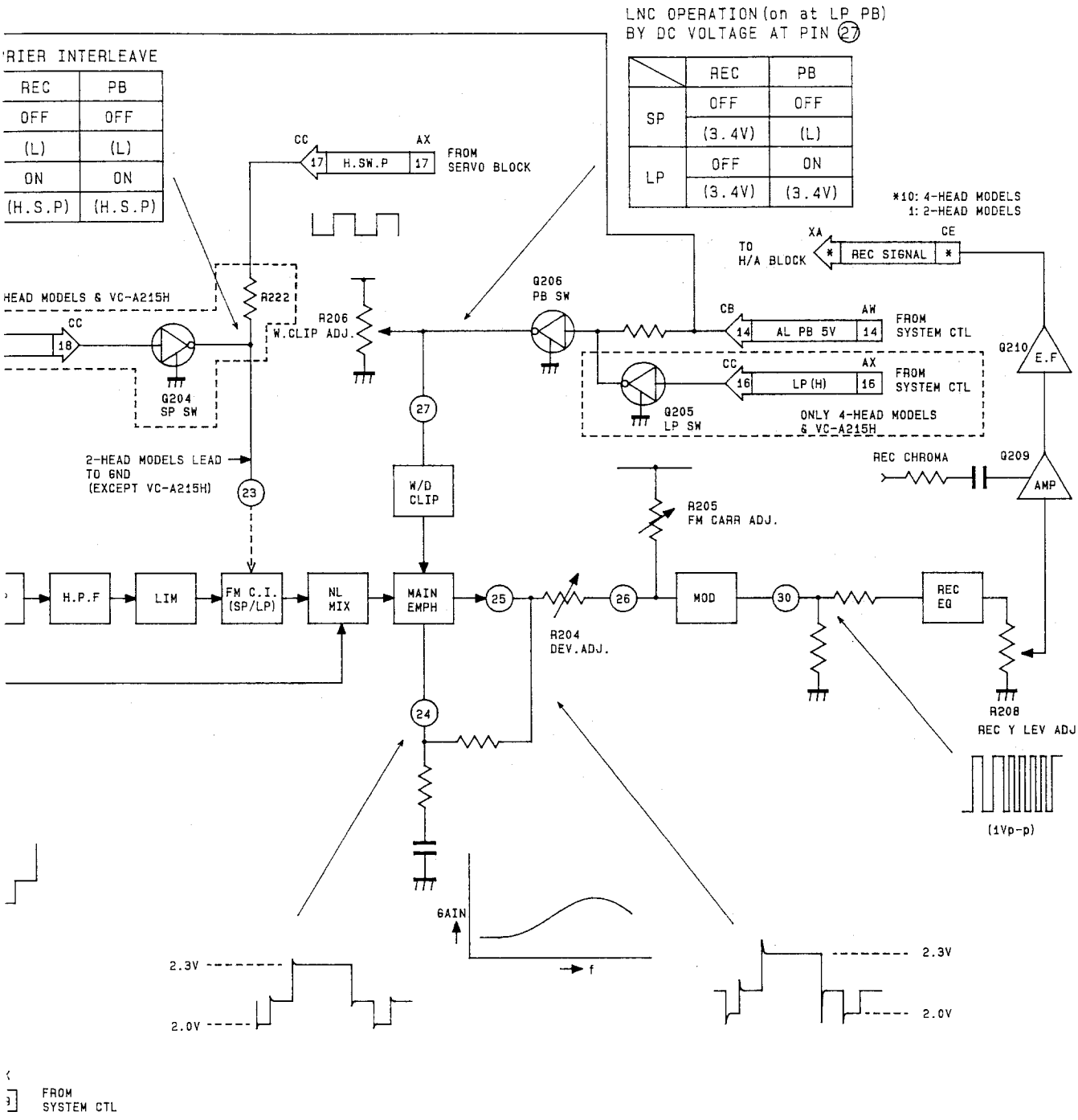
AN3248K/NK REC LUMINANCE SIGNAL LINE BLOCK DIAGRAM




Q5554
H/A SW
E.F
AMP
Q5552
Q5553
DL5551
1H DL
Q5555
FV CTL
CA
AV
1
H/A SW
1
FROM
SYSTEM CTL
3
FV CTL
3
CC
AX
16
LP(H)
16
ONLY 4-HEAD
MODELS
BURST 300mVp-p
CARR
BAL
(PB mode established in IC
by AL 5V applied at pin 16)
A
L502
43MHz
.P.F
20
SW
MAIN
CONV
ACC
AMP
SW
24
Q507
AMP
CE
6
PB CHROMA
XA
6
FROM
H/A BLOCK
L.P.F
ACC
DET
BURST 150mVp-p
14
25
13
5.06MHz
B.P.F
FL501
NTSC
SECAM
PAL SW
Note: ALL terminal signal levels are typical values.
90°
ROTATION
SUB
CONV.
12
27
U: NTSC
M: SECAM
L: PAL
CA
AV
4
OSD SECAM MUTE
4
TO
OSD
BLOCK
5
CB
AW
9
CHROMA ROT.
9
FROM
SYSTEM CTL
15
Q509
APC SW
A
CB
AW
14
AL PB 5V
14
FROM
SYSTEM CTL
SECAM
(H)
IC5501 (BA7007)
EXCEPT
VC-A615X/NZ/K/WT/HM, A215X,
A103Q(BK)/R(BK), A116S(BK)/K/W
8
1
2
ID
SIG.
GATE
LIM.
1/2th
AMP
12
14
3
7
9
11
Q5501
FL5501

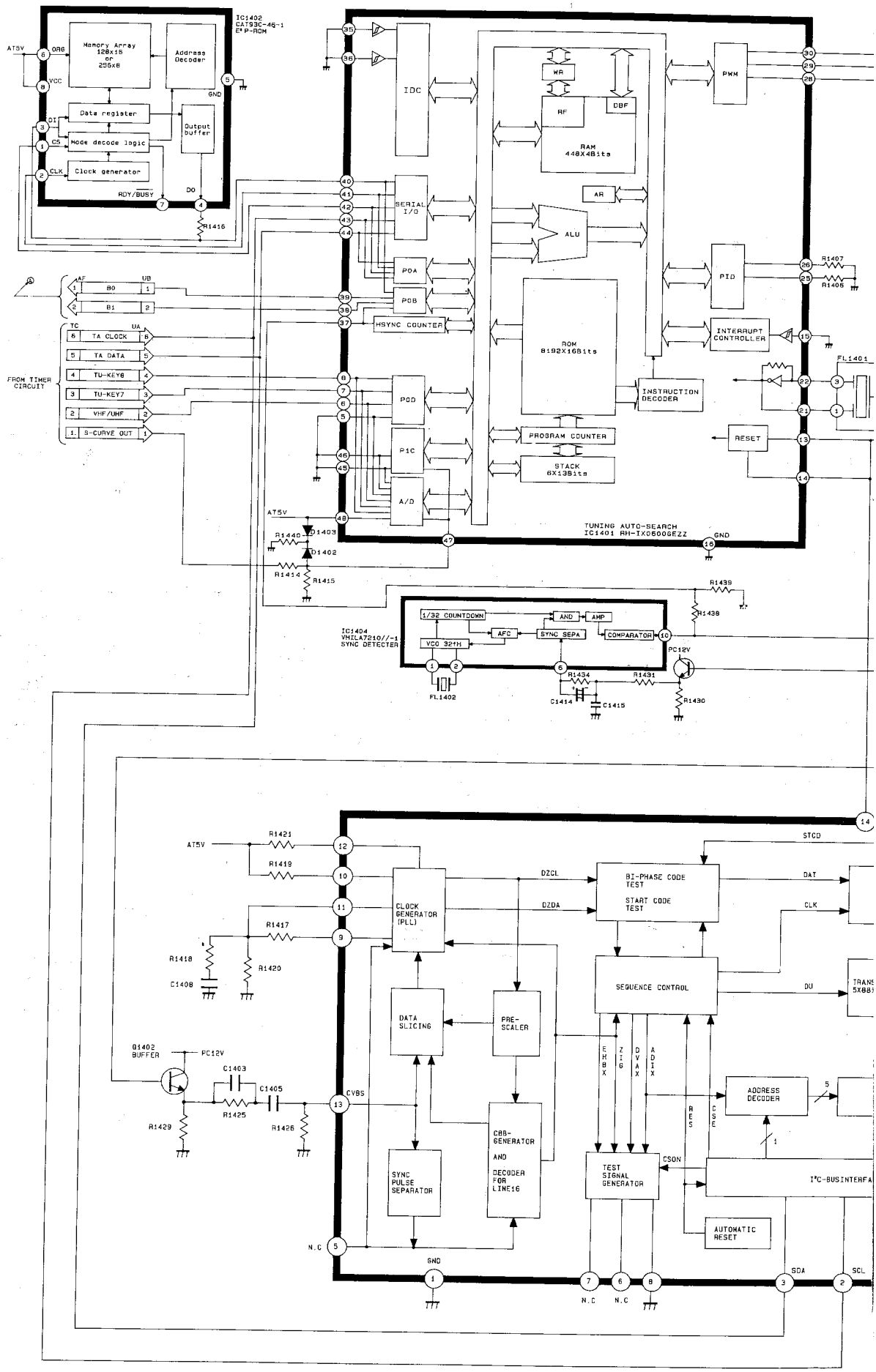
TA8644N PB (PAL SYSTEM) CHROMA SIGNAL LINE BLOCK DIAGRAM



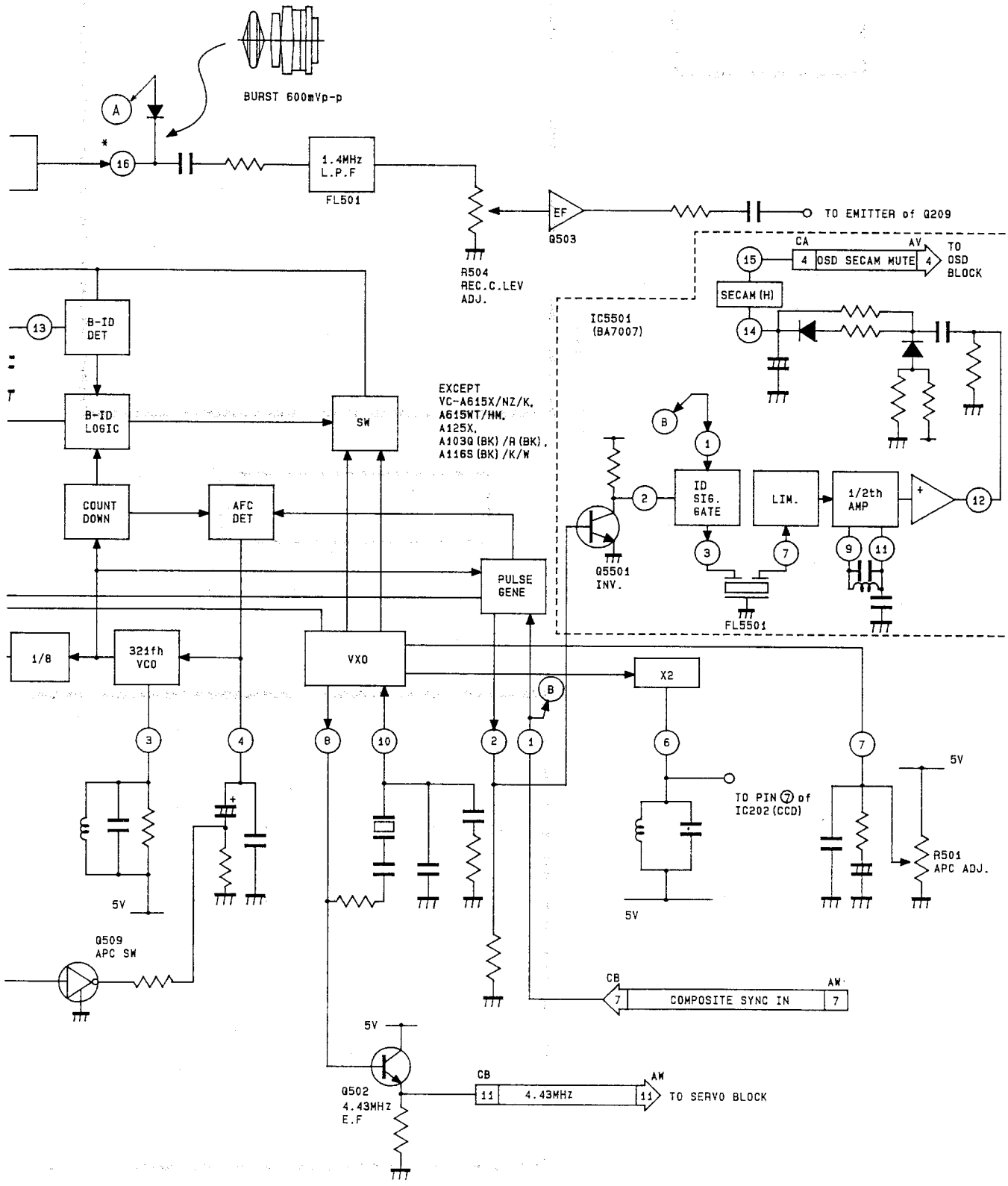


Note: ALL terminal signal levels are typical values.

AUTO VOLTAGE SYNTHESIZER BLOCK DIAGRAM

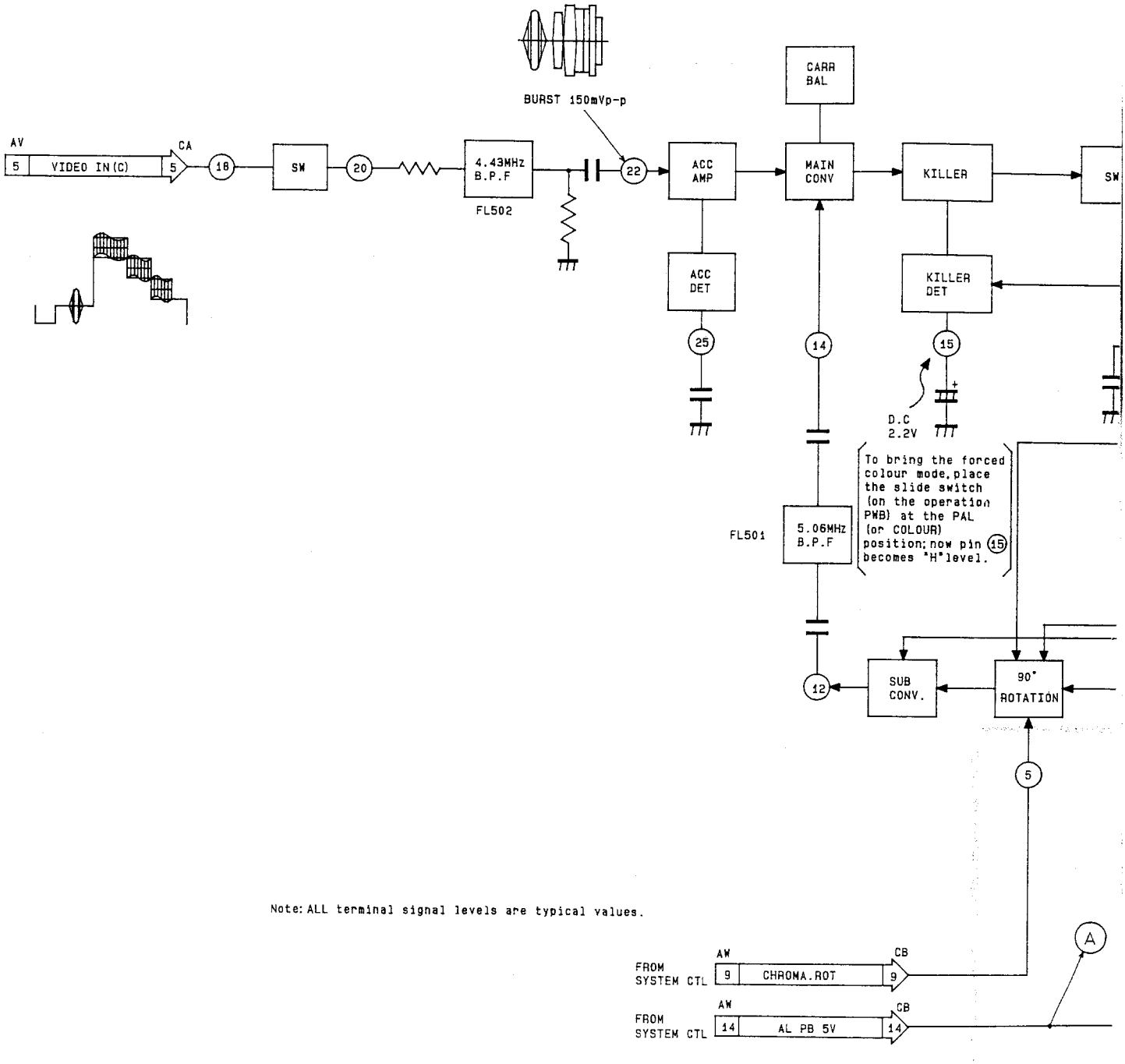


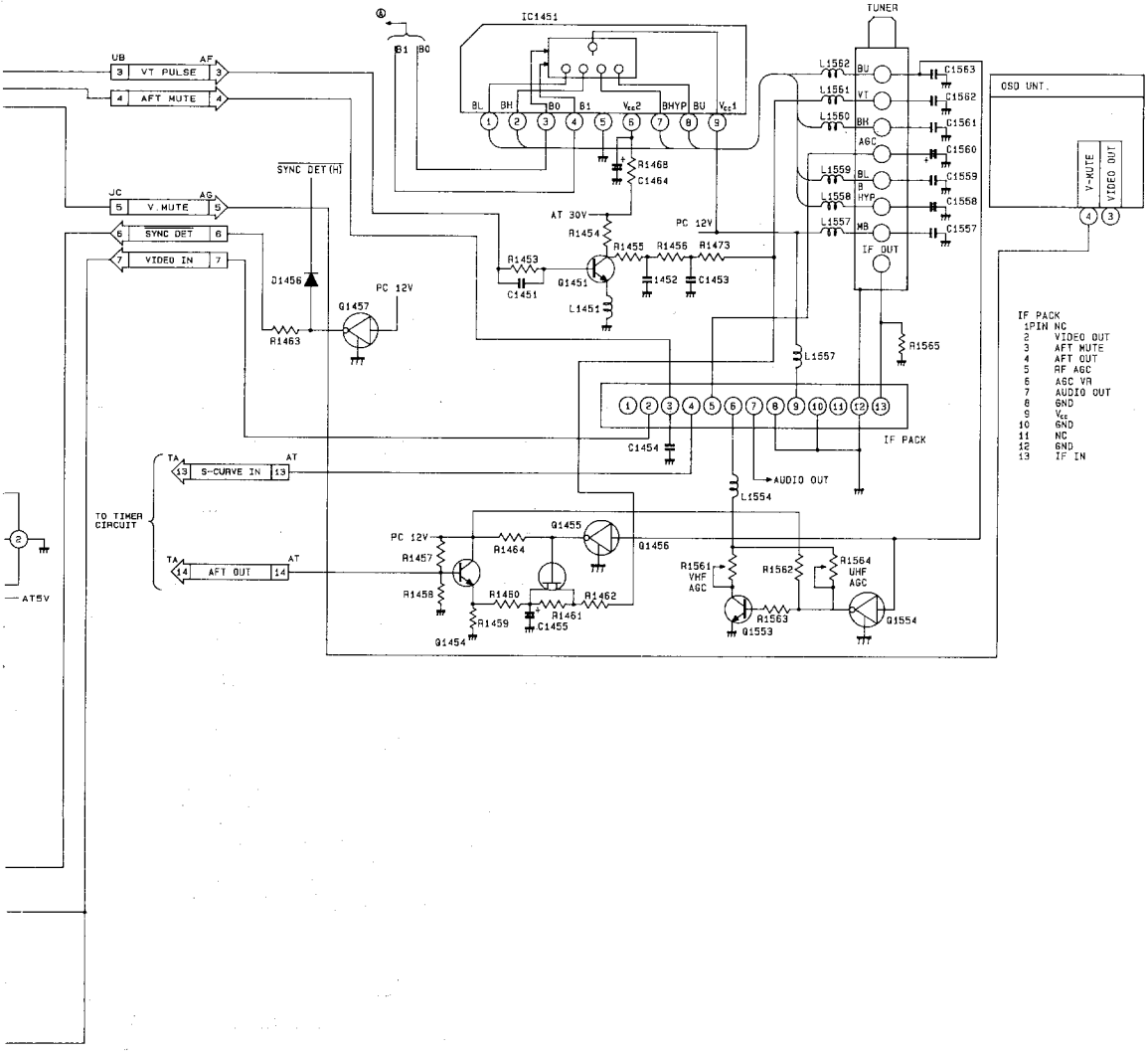
s an EE(REC)/PB selector terminal too.)

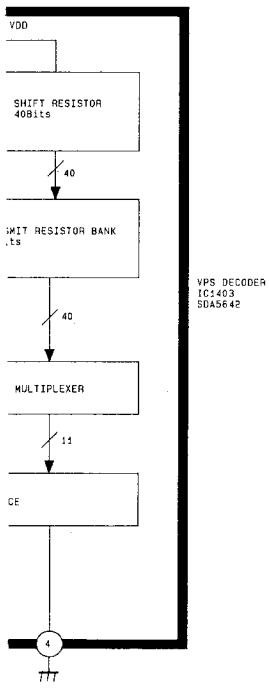


TA8644N REC (PAL SYSTEM) CHROMA SIGNAL LINE BLOCK DIAGRAM

(* Pin (16) is used a




IC1451
TUNER
OSD UNT.
V-MUTE
VIDEO OUT
UB
AF
3 VT PULSE 3
4 AFT MUTE 4
UC
AG
5 V MUTE 5
6 SYNC DET 6
7 VIDEO IN 7
SYNC DET(H)
D1456
R1463
Q1457
PC 12V
AT 30V
R1454
R1455
R1456
R1473
R1453
C1451
Q1451
C1452
C1453
L1451
R1468
C1464
L1562
L1561
L1560
L1559
L1558
L1557
C1563
C1562
C1561
C1560
C1559
C1558
C1557
IF OUT
L1557
R1565
IF PACK
C1454
AUDIO OUT
L1554
IF PACK
1PIN NC
2 VIDEO OUT
3 AFT MUTE
4 AFT OUT
5 RF AGC
6 AGC VR
7 AUDIO OUT
8 GND
9 Vcc
10 GND
11 NC
12 GND
13 IF IN
TA
13 S-CURVE IN 13
AT
TO TIMER CIRCUIT
TA
14 AFT OUT 14
AT
AT5V
Q1455
Q1456
R1464
R1457
R1458
R1460
R1462
R1459
R1461
C1455
Q1454
R1561
VHF AGC
R1562
R1564
UHF AGC
R1563
Q1553
Q1554


VDD
SHIFT RESISTOR
40Bits
40
MULTIPLEXER
11
VPS DECODER
IC1403
SDA5642

VIDEO TECHNICAL BULLETIN

MODELS	**VCA215HM**	**VCA60HM**	**VCA615HM**	**VCD805HM**
	VCS1000H	**VCT310HM**	**VCT510HM**	

SYMPTOM Capstan motor will not rotate.

CAUSE Open circuit track due to C6 leaking. C6 is located on the capstan motor unit PWB.

ACTION Clean the PWB, repair the printed track and replace C6 with a 10uF, 25V capacitor with the part number given below.

REF NO	**DESCRIPTION**	**PART NUMBER**	**PRICE CODE**
C6	10uF, 25V	94SSEE5131713P	AD

MODELS	**VCA215HM**	**VCA111HM**	**VCA113HM**	**VCA615HM**
	VCH81HM	**VCT310HM**	**VCT510HM**	

SYMPTOMS

1. Intermittant tape loading or unloading.
2. Intermittant no eject.
3. Half load lever moving irreguarly.

CAUSE Intermittant cam switch contacts.

ACTION Replace the cam switch using the part number given below.

REF NO	DESCRIPTION	PART NUMBER	PRICE CODE
18	Cam Switch	QSW-R0026GEZZ	AE

MODELS	**VCA105HM**	**VCA111HM**	**VCA113HM**	**VCA140HM**
	VCA215HM	**VCA5011HM**	**VCH81HM**	**VCT310HM**
	VCT510HM			

SYMPTOM Slow rewind.

CAUSE This can be caused by either of the following.

1. Brake torque of take up reel is too high due to contamination of the slow brake lever.
2. After a period of use the felt pad on the video search brake lever hardens.

ACTION

1. Replace the slow brake lever and clean the take up reel.
2. Replace the video search brake lever.

REF NO	DESCRIPTION	PART NUMBER	PRICE CODE
30	Slow Brake Lever	MLEVP0136GEZZ	AA
38	Video Brake Lever	MLEVP0181GEZZ	AD

MODELS **VCA215HM** **VCA111HM** **VCA113HM** **VCT310HM**

VCT510HM

SYMPTOM The back tension lever is stuck on the wrong side of the take up guide.

CAUSE Excesive wear of the tension adjusting lever, where it comes in contact with the brake shift lever.

ACTION Replace the tention adjusting lever. The shape of this part has been changed so that there is an increase in the contact area between the brake shift lever and the tension adjusting lever.

REF NO	DESCRIPTION	PART NUMBER	PRICE CODE
51	Tension Adjusting Lever	MLEVP0134GEZZ	AC

PACKAGING WEIGHTS DATA SHEET

Model: VCA215HM

MATERIAL TYPE	WEIGHT (grammes)
Cardboard	850
Paper	0
Total Card	850
EPS	80
PE	0
PP	0
Other Plastic	15
Total Plastic	95
Aluminium	0
Steel	0
Total Metal	0
Total Wood	0
Total Glass	0
Other	0

VIDEO TECHNICAL BULLETIN

MODELS **VCT310HM** **VCT510HM** **VCA30HM** **VCA40HM** **VCA50HM** **VCA615HM**

VCA81HM **VCA215HM** **VCA55HM** **VCA63HM** **VCH84HM** **VCH86HM**

SYMPTOM Unit laces up in play or record mode then unlaces after a few seconds.

CAUSE Loss of the drum FG pulse resulting in no head-switching signal.

ACTION Replace the drum motor assembly using the part number given in the respective Service Manual.

VIDEO TECHNICAL BULLETIN

MODELS				
	VCT310HM	VCT510HM	VCT72HM	VCH81HM
	VCH84HM	VCH86HM	VCH89HM	VCA30HM
	VCA40HM	VCA215HM	VCA45HM	VCA60HM
	VCA615HM	VCBS97HM		

SYMPTOM Poor rewind - normal too slow at the start of rewinding.

CAUSE Slow brake becomes contaminated with dirt.

ACTION Replace the slow brake using the part number given below.

REF NO	DESCRIPTION	PART NUMBER	PRICE CODE
30	Slow brake	MLEVP0136GEZZ	AA