SHARP SERVICE MANUAL

TVSMY82395VCR

VHS VIDEO CASSETTE RECORDER

MODEL VC-220N

SHARP CORPORATION

CONTENTS

FEATURES

- Compact and lightweight.
- Uses a compact video cassette tape (VHS-C type).
- Completely noise-free with fine-edit (Clear-Connect System) functions.
- Power saving device.
- Audio Dub-In device.
- Display indicating the amount of remaining tape.
- Three digit mechanical counter.
- Three way power source.
- Compatible with any conventional VHS VTR through the use of the optionally available cassette adaptor.

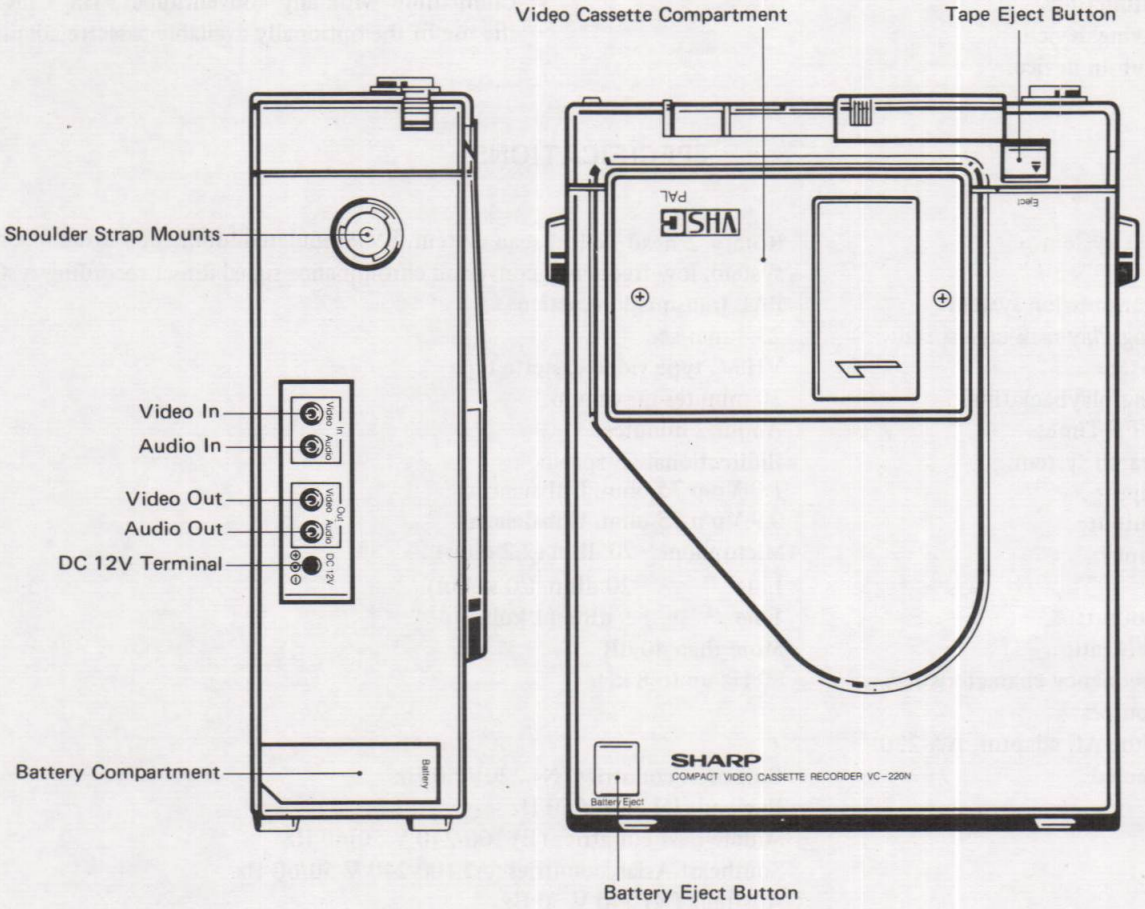
SPECIFICATIONS

• Recording system:	Rotary 2 head helical scan system, FM-Modulated luminance signal recording system, low frequency converted chrominance signal direct recording system.
• Signal transmission system:	PAL transmission system
• Recording/Playback tape speed:	23.4 mm/sec
• Cassette tape:	VHS-C type video cassette tape
• Recording/playback time:	30 minutes maximum
• Rewind/FF Time:	About 2 minutes
• Video search system:	Bidirectional x3 speed
• Video input:	1.0 Vp-p 75 ohm, Unbalanced
• Video output:	0.9 Vp-p 75 ohm, Unbalanced
• Audio input:	Microphone −70 dBm (2.2 ohm) Line −20 dBm (20 kohm)
• Audio output:	Line −5 dBm (1 kohm)
• Audio S/N ratio:	More than 40 dB
• Audio frequency characteristics:	80 Hz up to 8 kHz
• Power sources:	
With the AC adaptor, AA-220 connected:	European countries (N) 220V 50 Hz England (H) 240 V 50 Hz Middle East countries (E) 100-240 V 50/60 Hz Southeast Asian countries (A) 100-240 V 50/60 Hz Australia (X) 240 V 50 Hz New Zealand (NZ) 230 V 50 Hz Hongkong (W) 200 V 50 Hz South Africa (K) 220 V 50 Hz
With the SHARP BT-220N connected:	12 VDC
When using the SHARP CC-615 car battery cord:	12 VDC
When using the SHARP CC-222E car battery cord:	24 VDC
• Power consumption:	6.0 W (During recording) at DC 12 V
• Allowable temperature range:	5°C ~ 40°C
• Allowable humidity:	80% RH and below
• Installation condition:	Operable both in the horizontal and vertical positions
• Dimensions:	17.7(w) x 23.8(d) x 8.0(h) cm
• Net weight (VTR):	2.2 kg
• Accessories:	Shoulder belt x 1, and Instruction manual x 1

Note: Specifications are subject to change without notice.

NAMES OF THE EXTERNAL PARTS

(TOP-RIGHT SIDE)



(FRONT)

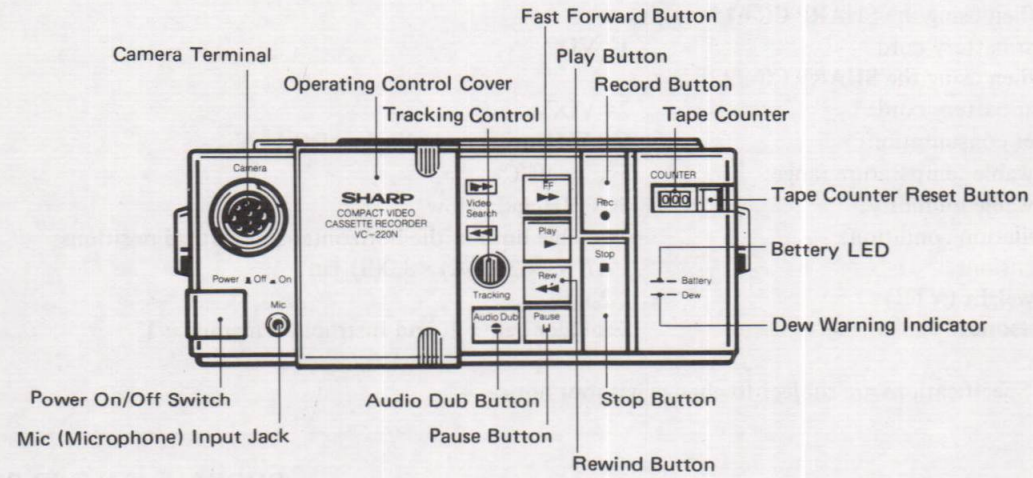


Figure 1

REMOVAL OF THE CABINET.

① Remove 2 screws securing the cassette holder cover.
② Remove 3 screws securing the top cabinet cover.
③ Remove 4 screws securing the front panel.
④ Remove 4 screws securing the bottom panel.
⑤ When the mechanical assembly is to be removed from the bottom plate, remove the 4 screws.

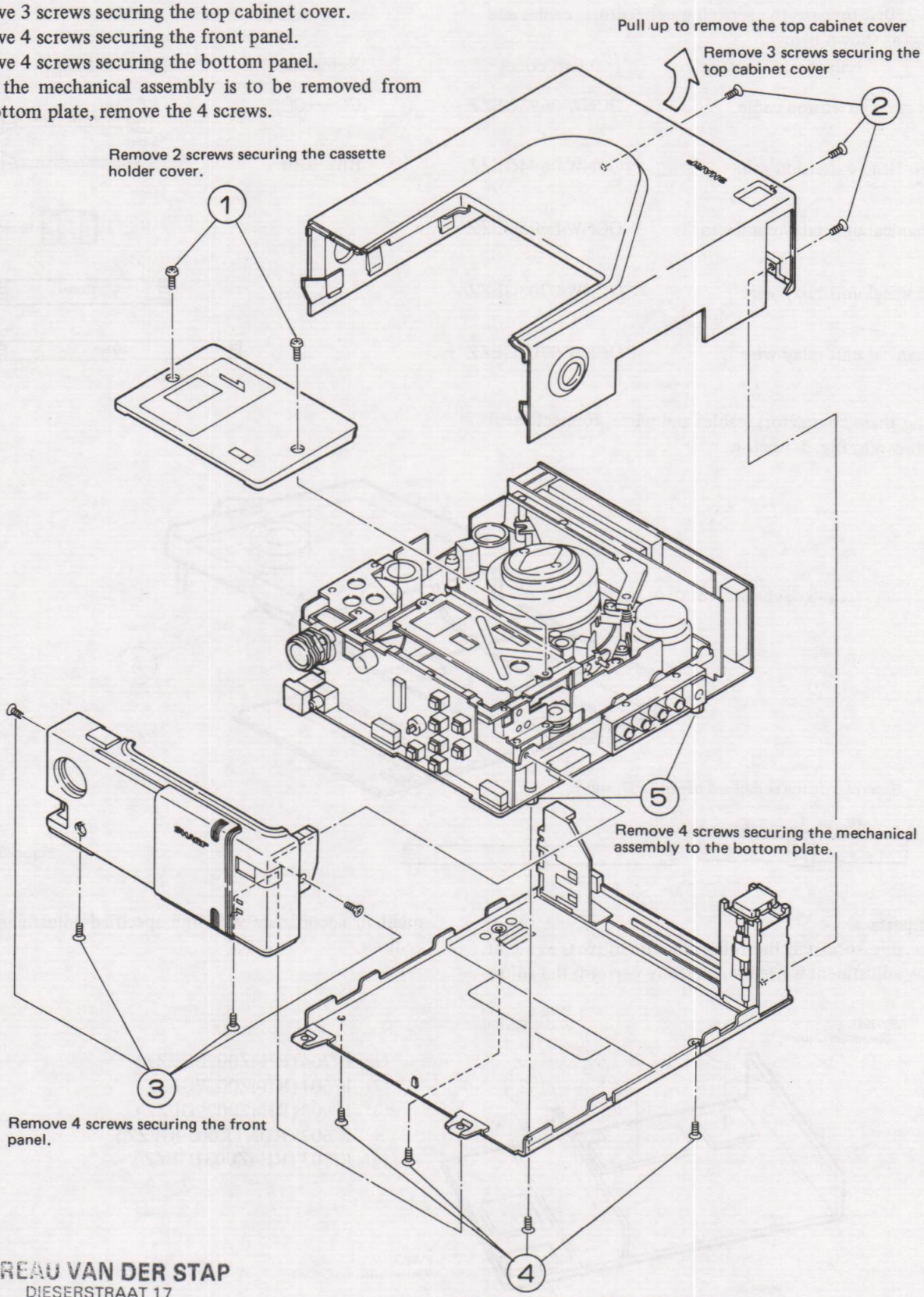


Figure 2

PRECAUTIONS DURING SERVICING

- **Servicing the mechanical chassis and substrate.**

(1) Since it is necessary to maintain the flow of current through the circuits whenever servicing the SHARP VC-220N, prepare the servicing connectors, cables and wires as shown below.

Names	Part codes	Remarks	Shape
A. Head Amp extension cable	QCNW-0693GEZZ	CC←→CC	6-pin 6-pin
B. Audio Head extension cable	QCNW-0694GEZZ	BB←→BB	5-pin 5-pin
C. Mechanical unit relay connector	QCNW-0695GEZZ		16-pin
D. Mechanical unit relay wire	QCNW-0708GEZZ		10 cm 16-pin
E. Mechanical unit relay wire	QCNW-0709GEZZ		20 cm 16-pin

(2) Using these connectors, cables and wires, connect them as shown in Fig. 3-1 below.

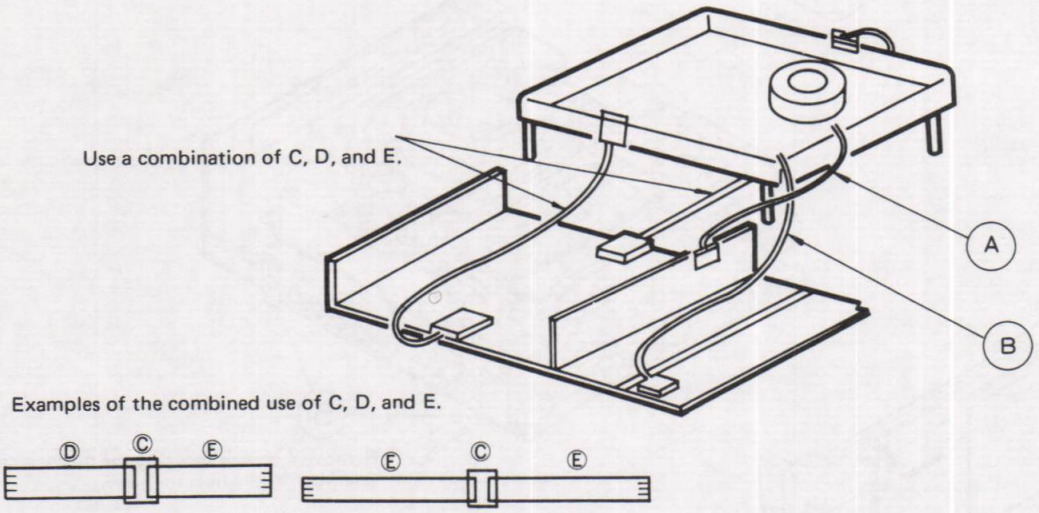
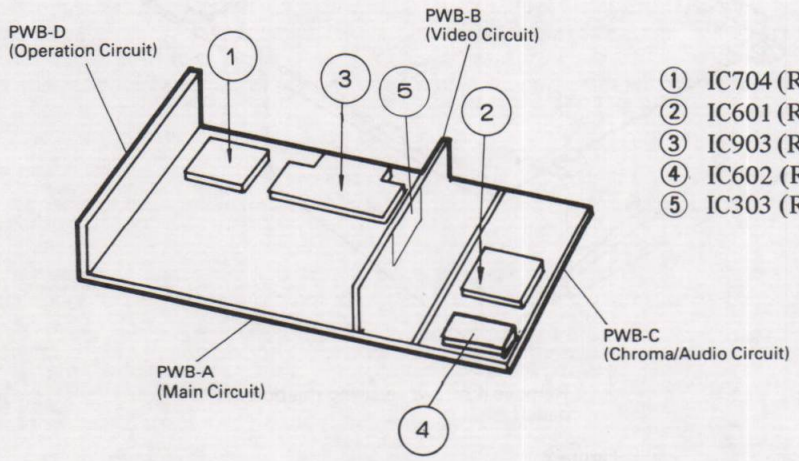


Figure 3

- **Unit parts**

Make sure to install the following circuit parts as a unit. If any adjustment is needed, carefully perform the adjustment in accordance with the specified adjustment procedures.



① IC704 (RH-iZ0028GEZZ)
② IC601 (RH-iZ0027GEZZ)
③ IC903 (RH-iZ0029GEZZ)
④ IC602 (RUNTK0039GEZZ)
⑤ IC303 (RH-iZ0031GEZZ)

Figure 4

MINIATURE CHIP PARTS

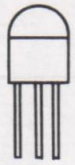
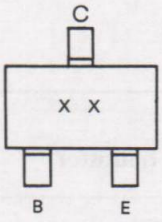
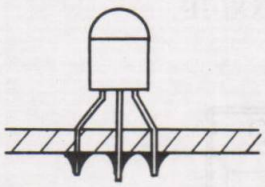
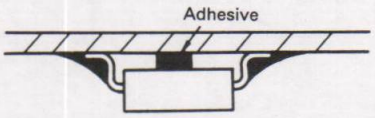
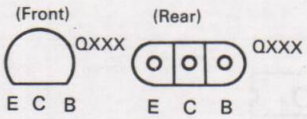
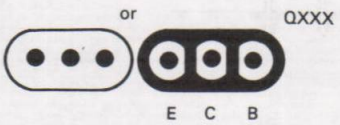
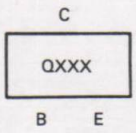
Miniature chip parts have already been introduced to some circuits. The present model, VC-220N incorporates printed circuit boards on which a large number of miniature chip parts have been installed.

It is likely that a greater number of such miniature chip parts will be used in the future. However, handling of these miniature chip parts does not require any special technique. Therefore we believe that you will soon become accustomed to properly handle them during servicing as with conventional chips.

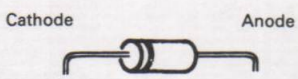
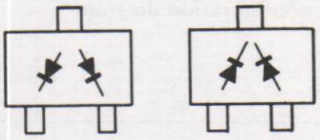
Details of miniature chip parts are given below.

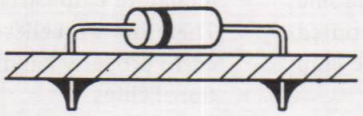
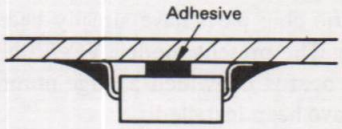
1. Features of miniature chip parts compared to conventional lead connected chips

(1) Chip transistor

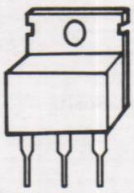
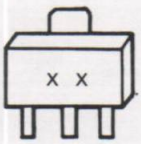
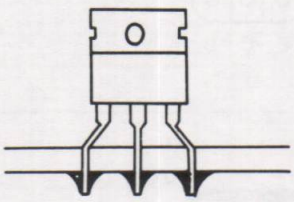
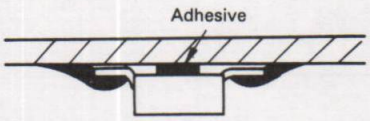
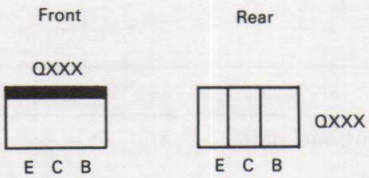
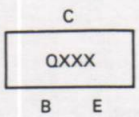
Items	Conventional part	Chip transistor
Part No.	VS2SCXXXX .. 1E	VS2SCXXXX .. 1E
Appearance/shape		
Installation method on P.W. Board		
Actual P.W. Board diagram		QXXX
Part configuration diagram		

(2) Chip diode/Zener diode

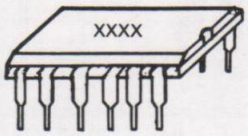
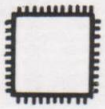
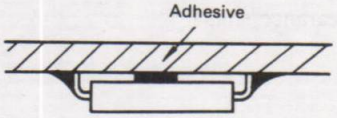
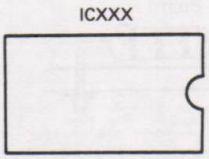
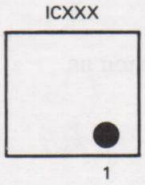
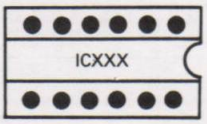
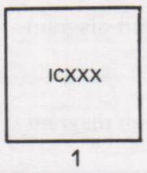
Items	Conventional part	Chip diode/zener diode
Part No.	VHDXXXXXX//1E RH-DXXXXXGEZZ RH-EXXXXXGEZZ	VHDXXXXXX//1E RH-DXXXXXGEZZ RH-EXXXXXGEZZ
Appearance/shape		

Installation method on P.W. Board	 Install on the surface of P.W. Board.	 Install on the soldered surface of P.W. Board.
Actual P.W. Board diagram		DXXX
Part configuration diagram		

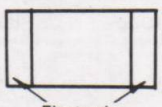
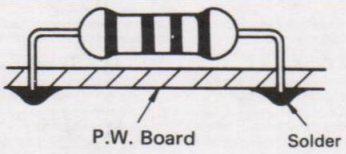
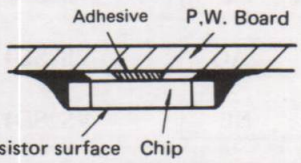
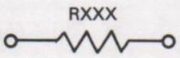
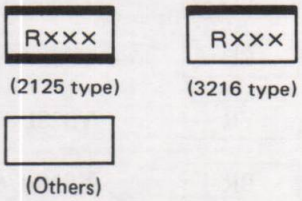
(3) Mini power transistor

Items	Conventional part	Mini power transistor
Part No.	VS2SCXXXX//1E VS2S (A)	VS2SCXXXX//1E VS2S (A)
Appearance/shape		
Installation method on P.W. Board		
Actual P.W. Board diagram		QXXX
Part configuration diagram	Same as miniature lead transistor	

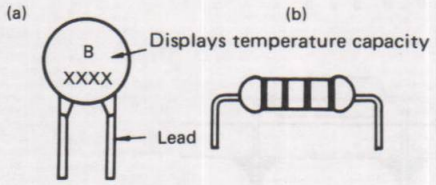
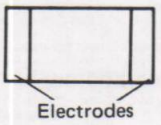
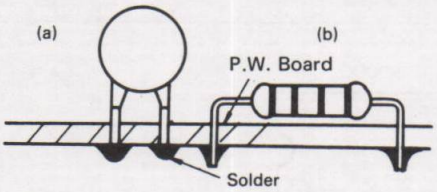
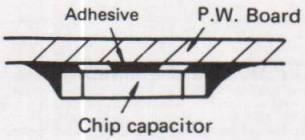
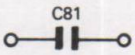
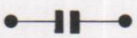
(4) Flat package IC

Items	Conventional part	Flat package IC
Part No.	RH-iXXXXXGEZZ	RH-iXXXXXGEZZ
Appearance/shape		
Installation method on P.W. Board		
Actual P.W. Board diagram		
Part configuration diagram		

(5) Square chip resistor

Items	Conventional part	Square chip resistor
Part No.	VRD-RA2BEXXXJ	VRS-TV1JBXXXJ (2125 type) (VRS-TQ2BDXXXJ) (3216 type)
Appearance/shape		
Installation method on P.W. Board	 Install on the surface of P.W. Board	 Install on the copper foil of P.W. Board
Actual P.W. Board diagram		RXXX
Part configuration diagram		

(6) Square chip capacitor

Items	Conventional part	Square chip capacitor
Part No.	VCKYPB1HBXXXK VCCSAT1HLXXXK VCKYAT1HBXXXK (1E/)	VCKTYTV1HBXXXK (F) (Z) VCCSTV1HLXXXJ VCCCTV1HHXXXJ (Type 3216 displays TQ in the 5th and 6th display positions)
Appearance/shape		
Installation method on P.W. Board	 Install on the surface of P.W. Board.	 Install on the soldered side of P.W. Board.
Actual P.W. Board diagram		CXXX
Part configuration diagram		CXXX (2125 Type) CXXX (3216 Type) (others)

2. Chip part display modes

The display modes for the chip parts have not been standardized, and manufacturers individually name their own display modes. Generally speaking, the following displays have been accepted for use.

(1) Chip transistor and chip diode

- Chip transistor

Display mode	Part code number
L5	VS2SC1623L51E
M5	VS2SA812-M51E
2AQ	VS2SD1304-Q1E
NE	VS2SD1306-E1E
SC	VS2SA1121SC1E
RC	VS2SC2618RC1E
FC	VS2SC2619FC1E
CD	VS2SA1122CE1E
YR	VS2SD874A-R1E
BR	VS2SB766A-R1E

- Chip diode

A3	VHD1S2835//1E
A5	VHD1S2837//1E
M · T	MA151WK
M · N	MA151WA
M · A	MA151A

- Chip Zener diode

47	4.7 V Zener diode
62	6.2 V Zener diode

(2) Square chip resistor/Square chip capacitor

- **Display mode**

Nominal resistance values are represented by the combination of the codes shown in Tables (a) and (b) below. Displayed data can be read visually.

(Example)

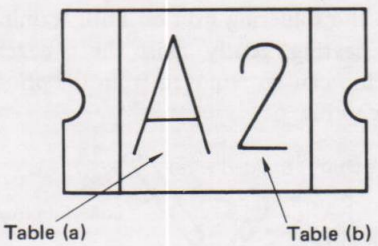


Table (a)

E-24 Series	
Nominal value	Code
1.0	A
1.1	B
1.2	C
1.3	D
1.5	E
1.6	F
1.8	G
2.0	H
2.2	J
2.4	K
2.7	L
3.0	M
3.3	N
3.6	P
3.9	Q
4.3	R
4.7	S
5.1	T
5.6	U
6.2	V
6.8	W
7.5	X
8.2	Y
9.1	Z

Note:
Codes A through Y are also used when using E-12 Series.

Table (b)

Code	Nominal value
0	10^0 ohm
1	10^1 ohm
2	10^2 ohm
3	10^3 ohm
4	10^4 ohm
5	10^5 ohm
6	10^6 ohm

* In reference to the Example above, the displayed data "A2" represents the following:

A : 1.0 (J : 2.2)
2 : 10^2 ohm ($4 : 10^4$ ohm)

A2 = 1.0×10^2 ohm = 100 ohm
(∵ J4 = 2.2×10^4 pF = 0.002 μF)

Table (Reference)

Nominal value	Code	Nominal value	Code
2.5	a	6.0	m
3.5	b	7.0	n
4.0	d	8.0	t
4.5	e	9.0	y
5.0	f		

(∵ f0 = 5.0×10^0 = 5 pF)

3. Method of servicing the chip parts

- **Removal of a square chip**

1. Using the braided wires, absorb the solder on both ends of the square chip. Refer to Fig. 5.
2. Grasp the square chip with a pair of tweezers, and alternately place the soldering iron on both terminals of the chip, while heating, gently twist the tweezers so that the square chip can be removed from the printed wiring board. Refer to Fig. 6.

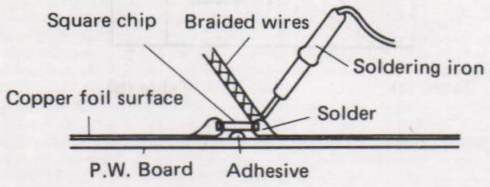


Figure 5

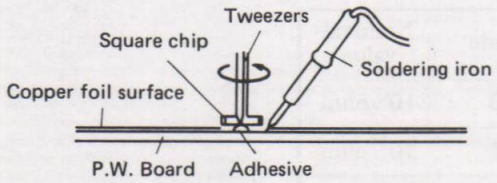


Figure 6

[Precautions]

1. Do not place the soldering iron on the same place for a long period nor press it strongly against the square chip terminals.
2. Do not apply an excessive force to the tweezers when removing the square chip from the printed circuit board.
3. Make sure to use a 30 W soldering iron. (A soldering iron with a temperature controller which can maintain a tip temperature of 280°C is ideal.)
4. After the chip is removed, discard it.

- **Installation of a square chip**

1. First, temporarily solder the square chip onto one side of the copper foil surface. Refer to Fig. 7.
2. Pick up the square chip at the electrodes with a pair of tweezers, then place the chip on the copper foil surface and solder both electrodes. Refer to Fig. 8.

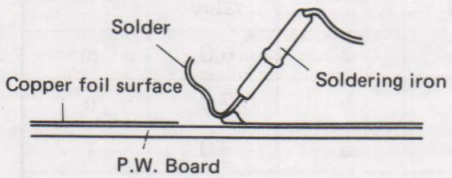


Figure 7

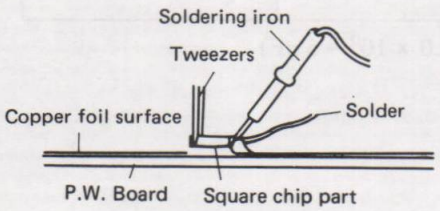


Figure 8

[Precautions]

1. Do not place the soldering iron in direct contact with the electrodes of the square chip. Melt the solder onto the copper foil surface and quickly perform soldering. If the soldering iron is either placed in direct contact with or pressed strongly against the electrodes, the electrodes may be disconnected or the chip itself may crack.
2. Make sure to pick up the chip with a pair of tweezers at the center of the electrodes so that the tweezers will not touch the chip body.
3. Install the chip so that the chip body will be in close contact with the printed circuit board.
4. Make sure to use a 30W soldering iron (A soldering iron with a temperature controller which can maintain a tip temperature of 280°C is ideal.)
5. When soldering, check that the solder does not remain on any portion other than the designated area on the copper foil surface.
6. When using solder flux. Use only rosin based flux, not acid based ones.
7. After the soldering is completed, gradually air cool the the soldered chip.
8. When soldering the chip, do not apply excessive solder as shown in Fig. 9 below, since the chip itself may crack or the electrodes may be disconnected from the chip due to eventual bending of the soldered portion of the printed wiring board or shrinking of the solder.

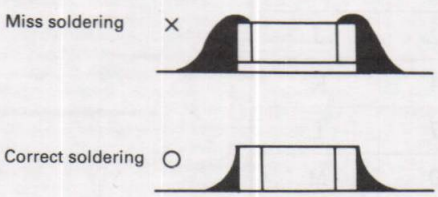


Figure 9

- **Precautions in handling and storing of the chip parts.**

1. Never handle any chip parts with bare fingers in order to prevent the soldered part from possible degradation due to oxidation of the terminal electrodes.
2. Observe the following three prerequisites before storing the chip parts, in order to satisfactorily prevent the terminal electrodes from either oxidation or from degradation of the capacity and resistance value.
   (1) Do not store chip parts in any location where highly corrosive substances such as sulfur and/or chlorinated gas ingredients are present in the atmosphere.
   (2) Make sure to store the chip parts in a location where there is no direct sunlight.
   (3) Do not store the chip parts in any location where high temperature and moisture prevail.

If there are no replacement chip parts on hand, replace with a conventional part having lead wires connected. When installing a conventional part, be extremely careful to perfectly insulate the lead portion using an insulation tube so that the lead portion will not come into contact with any of the adjacent parts.

MECHANICAL DRIVING PARTS/LAYOUT

Top side

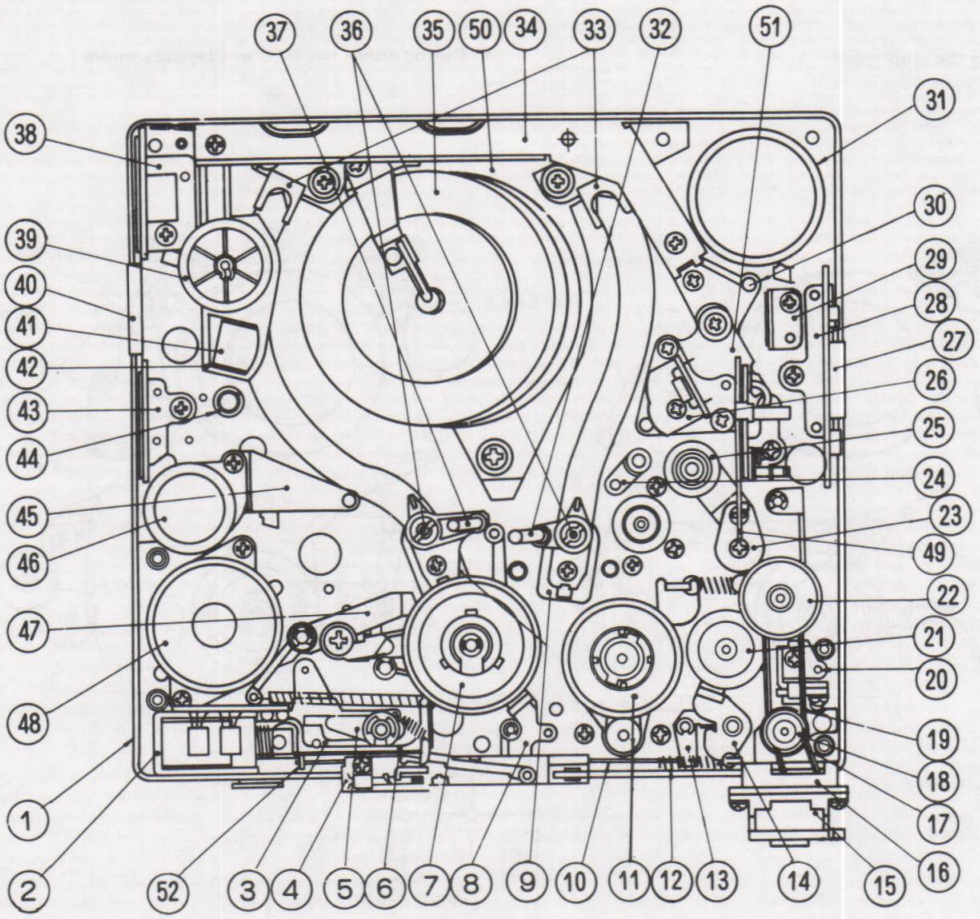


Figure 10

Bottom side

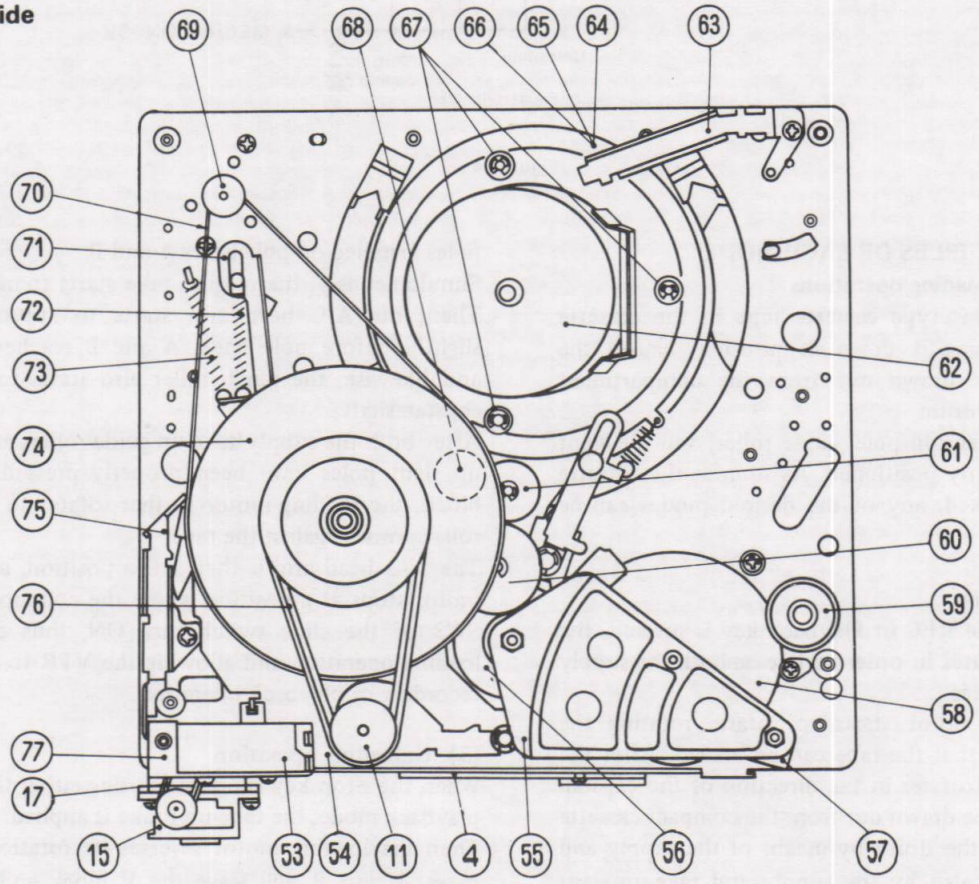


Figure 11

OPERATION OF THE MECHANISM

Tape loading system

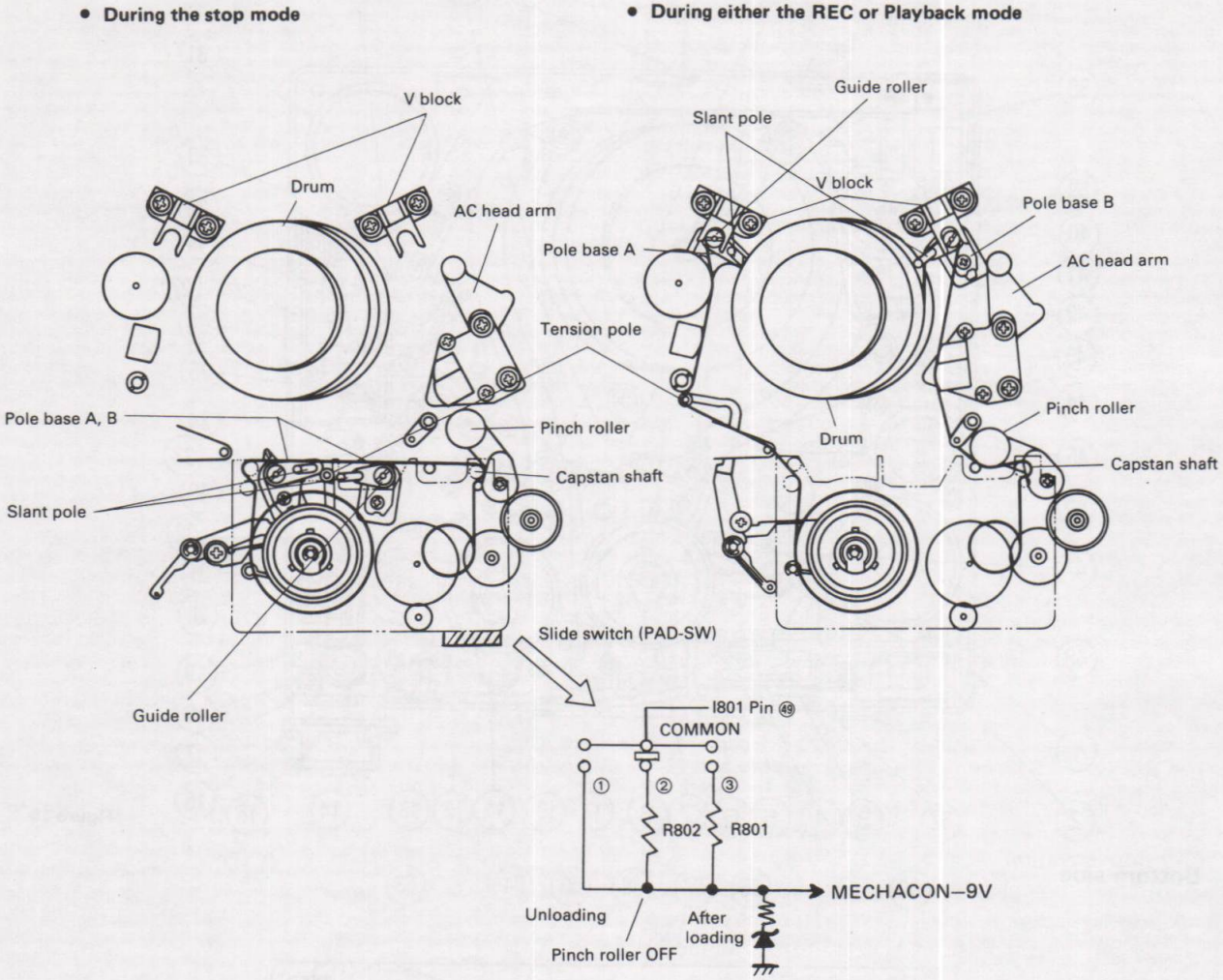


Figure 14

OPERATING PRINCIPLES OF EACH MODE

(1) Cassette insert/loading operations

First, insert a VHS-C type cassette tape in the cassette compartment, pressing it down in position, causes the cassette tape to be drawn out from the compartment and loaded onto the drum.

The capstan shaft, tension pole, guide roller, and the slant poles become properly positioned. As soon as the cassette compartment is locked, any of the desired modes can be activated.

(2) Loading operation

As soon as either the REC or Playback key is pressed, the break solenoid operates in order to release both the supply and take-up reel brakes.

Then, the loading motor starts to rotate, rotating the master cam gear so that the tape can be loaded. After the pinch roller slightly rotates in the direction of the capstan shaft, the tape can be drawn out from the compact cassette in the direction of the drum by means of the supply and take-up rollers and also by the supply and take-up slant poles installed on pole bases A and B.

Simultaneously, the tension pole starts to move to the left. Then, the A/C head arm starts to approach the drum slightly before pole bases A and B reaches the V block, and likewise, the pinch roller also starts to approach the capstan shaft.

After both the supply/take up guide rollers and supply/take up slant poles have been properly pressed against the V block, the loading motor further rotates so that the pinch roller presses against the tape.

The A/C head arm is then set in position, and the loading motor stops at a position where the common C switch and SW3 of the slide switch turn ON, thus completing the loading operation and allowing the VTR to start either the recording or playback operation.

(3) Unloading operation

When the Stop key is pressed during either the recording or playback mode, the take-up brake is applied.

Then the loading motor reverses its rotation so that pole bases A and B will leave the V block and return to the

Part No.	Part Name	Part Code	Part No.	Part Name	Part Code
1	Main chassis assembly	LCHSM0026GEZZ	40	FPC(flexible print connector) (B)	QCNW-0509GEZZ
2	Brake solenoid	RPLU-0066GEZZ	41	FE (Full Erase) head assembly	RHEDT0008GEZZ
3	Tension arm return lever assembly	MLEVF0153GEZZ	42	FE (Full Erase) head arm assembly	MARMP0018GEZZ
4	Erase protection lever assembly	MLEVP0051GEZZ	43	Mechanical relay P.W. board B angle	LANGQ9022GEFW
5	T. return prevention lever	MLEVP0055GEZZ	44	Stationary guide	PGIDP0001GEFW
6	Tension spring angle	LANGT9055GEFW	45	Tape guide shaft assembly	LANGF9148GEZZ
7	Reel disk assembly	NDAIV1017GEZZ	46	Electrolytic capacitor	RC-EZ0037GEZZ
8	Supply reel brake assembly	MLEVP0052GEZZ	47	Tension arm assembly	MLEVC0010GEZZ
9	Guide roller base assembly	LPOLM0015GEZZ	48	Loading motor	RMOTM1022GEZZ
10	Brake operation rod	MROD-0011GEFW	49	Open angle assembly	LANGF9144GEZZ
11	Planetary gear assembly	NGERH1038GEZZ	50	V base assembly-D	PGIDC0013GEZZ
12	Main brake spring	MSPRT0158GEFJ	51	A/C (Audio/Control and Audio Erase) head plate	LDAIH3009GEFW
13	Brake operation lever	MLEVF0158GEFW	52	Brake operation panel assembly	MLEVF0157GEZZ
14	Take-up brake assembly	MLEVP0053GEZZ	53	PAD switch	QSW-S0042GEZZ
15	Tape counter assembly	KCOUB0016GEZZ	54	Shifter assembly	MSLIF0012GEZZ
16	Tape counter angle	LANGT9056GEFW	55	Loading reinforce board	LANGF9141GEFW
17	Counter belt (B)	NBLTK0029GE00	56	Loading drive gear (a)	NGERH1033GEZZ
18	Counter relay pulley	PMAGF1012GEZZ	57	Segment gear assembly	NGERH3003GEZZ
19	Counter belt (A)	NBLTK0028GE00	58	Master cam	NGERH1035GEZZ
20	Take up sensor P.W. Board angle	LANGQ9019GEFW	59	Loading motor gear	NGERH3004GEZZ
21	Idler gear	NGERH1036GEZZ	60	Loading drive gear (b)	NGERH1034GEZZ
22	Take-up gear assembly	NGERH1039GEZZ	61	Loading gear (A)	NGERH1031GEZZ
23	Pinch adjustment board	MEVLF0162GEFW	62	Direct drive motor assembly	RMOTP1038GEZZ
24	Take up stationary guide assembly	PGIDS0006GEZZ	63	Drum lead angle	LANGF9143GEFW
25	Pinch roller assembly	NROLR0007GEZZ	64	Loading ring (A) assembly	NGERH3001GEZZ
26	A/C (Audio/Control and Audio Erase) head assembly	RHEDU0026GEZZ	65	Loading ring spacer	PSPAT0003GEZZ
27	FPC (flexible print connector) (A)	QCNW-0510GEZZ	66	Loading ring (B) assembly	NGERH3002GEZZ
28	Mechanical relay P.W. board A angle	LANGQ9021GEFW	67	Loading ring roller	NROLP0019GEZZ
29	DEW sensor angle	LANGQ9020GEFW	68	Loading gear (B)	NGERH1032GEZZ
30	A/C (Audio/Control and Audio Erase) Head arm assembly	MLEVC0009GEZZ	69	Capstan motor pulley	NPLYV0081GEFW
31	Capstan motor	RMOTP1032GEZZ	70	Capstan belt	NBLTH0030GE00
32	Slant pole base (B) assembly	LPOLM0017GEZZ	71	AH (Audio Head) operation lever assembly	MLEVF0150GEZZ
33	V block	PGIDC0014GEZZ	72	AH (Audio Head) pressure spring	MSPRT0156GEFJ
34	Chassis reinforce angle	LANGF9142GEFW	73	AH (Audio Head) arm return spring	MSPRT0157GEFJ
35	Drum assembly	DDRMW0003HE01	74	Capstan block	NFLYV0030GEZZ
36	Guide roller assembly	NROLP0021GEZZ	75	PAD lead hold angle	LANGF9154GEFW
37	Slant pole base (A) assembly	LPOLM0016FEZZ	76	Drive belt	NBLTK0027GE00
38	Mechanical relay P.W. board C angle	LANGQ9023GEFW	77	PAD switch angle	LANGQ9018GEFW
39	Impedance roller assembly	NROLM0010GEZZ			

GENERAL DESCRIPTION OF THE MECHANISM

Power-Assisted Drive (P.A.D.)

The VC-220N has a P.A.D. mechanism, as also provided in the VC-9300, by which a variety of mechanical operations can be generated by the loading motor including loading of the tape, pressing of the tape with the pinch roller and moving the tension arm.

The P.A.D. mechanism incorporated in the present VC-220N. however, features some differences from those originally provided in order to minimize the weight and power consumption. Differences are described below.

The VC-220N does not use a reel motor nor electro-magnetic brake. The reel disks are rotated by means of either the clockwise or counterclockwise rotation of the capstan motor and also by the movement and rotation of the planetary gear unit. Instead of the conventional electro-magnetic brake, the VC-220N uses a mechanical brake composed of a latching solenoid.

Ⓐ : The solid line represents the mechanical operations being performed when any of the REC, playback, FF, and FF/Playback modes is activated.

Ⓑ : The two-dot line represents the mechanical operations performed when any of the REW, Unloading, and REW/playback modes is activated.

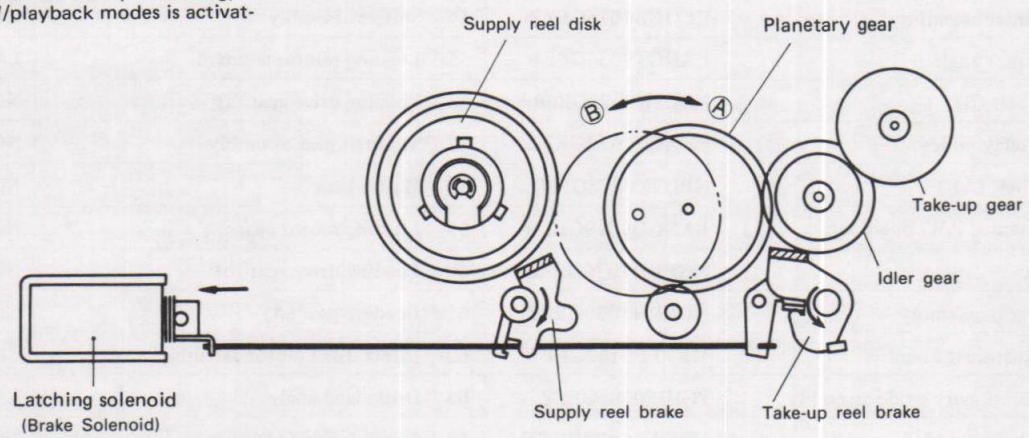


Figure 12

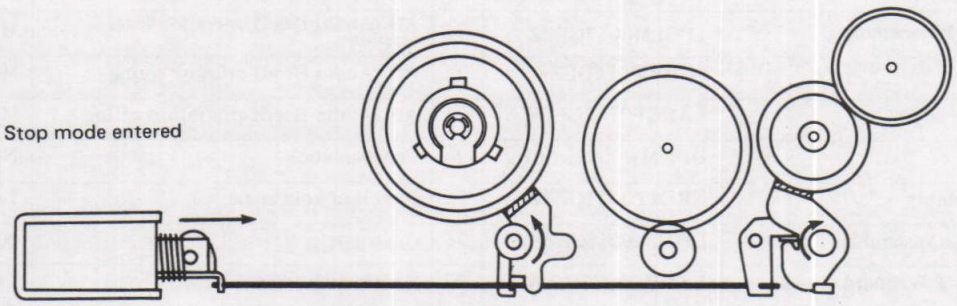


Figure 13

original Stop position. Simultaneously, together with the guide rollers for both the supply and take-up reels, the tape itself will return back to the position where the Stop mode was entered. Likewise, the tension pole, pinch roller and the A/C head arm will also return back to the position where the Stop mode was entered. The loading motor also stops at a position where the common switch C and SW1 of the slide switch turn ON. Finally, the supply reel brake is applied, allowing the VTR to enter the Stop mode. In addition to these operations, the unloading mode will also be activated when either the tape end is detected or the battery voltage has decreased.

(4) Rewind operation

When the REW key is pressed, the solenoid brake starts operation, and both the supply and take-up brakes are released, thus allowing the capstan motor to rotate. Then the planetary gear engages with the supply reel disk, and starts to rotate the suppy reel disk counterclockwise so that the tape can be rewound.

(5) Fast Forward (FF) operation

When the FF key is pressed, the solenoid brake starts operation, and both the supply and take-up brakes are released, thus allowing the capstan motor to rotate. Then the planetary gear engages with the idler gear thus rotating both the idler gear and rewind gears clockwise and counterclockwise, respectively, so that the tape can be wound in the FF direction.

(6) Auto stop operation

When the tape is completely wound onto a reel after any of the REC, Playback, FF, and REW operations is completed, the tape end detector sensor detects this and all modes will be stopped within about 1 second.
When the VTR enters the Stop mode through the Auto stop operation, the stopped mode or a mode which transports the tape in the same direction cannot be entered.

(7) Operation of the pinch roller

After both pole bases A and B complete the loading operation, the loading motor still rotates, turning the master cam in order to press the pinch roller against the capstan shaft and wind the tape onto the take-up reel. Almost simultaneously, the planetary gear engages with the idler, gear causing the take-up gear to rotate so that the tape can be wound onto the take-up reel.

(8) V/S-REW (Video Search Rewind)

If the REW key is pressed during the playback mode, the loading motor will instantly reverse its rotation up to a position where SW3 of the slide switch turns OFF so that the master cam will also reverse its derection of rotation. As a result, the tension band on the side of the tension arm position adjustment angle will be disengaged from the reel table. The capstan motor will then reverse its direction of rotation so that the tape can be sent in the opposite direction through the pinch roller, thus causing the planetary gear to engage with the supply reel disk and the transported tape can be wound back onto the supply reel. During this operation, the solenoid brake is activated to brake the idler gear so that the take-up gear slips and gives the tape a back tension. The supply reel disk mechanically prevents the activation of the main brake.
If the Playback key is again pressed, the Video Search Rewind operation will be disengaged and the VTR enters the Playback mode.

(9) V/S-FF (Video Search FF)

If the FF key is pressed during the Playback mode, the rotating speed of the capstan motor will be tripled. The VTR will then be controlled so that the tape can be sent in the FF direction at a speed three times faster than the normal mode.
If the Playback key is again pressed, the V/S-FF mode will be disengaged and the VTR will enter the Playback mode.

VIDEO SEARCH MECHANISM

Mechanical operation

As was previously mentioned, it is essential that the video search must be performed by driving the tape at a constant speed three times faster than the normal Playback mode. The following describes major operations performed by major mechanical parts during the Forward Video Search and Reverse Video Search modes.

Forward Video Search

An operational diagram of major mechanical parts during the Forward Video Search mode is shown in Fig. 15. The Forward Video Search operation can be performed by first pressing the FF key during the Playback mode so that the capstan motor will rotate at a constant speed three times faster than the normal Playback mode. To achieve this, the tape will be driven by the pinch roller so that the speed can properly be controlled to be about three times the normal playback of the recorded signals.

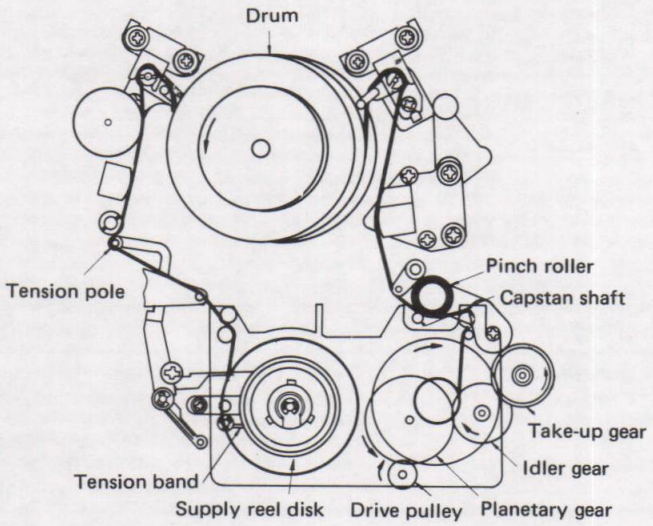


Figure 15 Forward Video Search

Reverse Video Search

An operational diagram of major mechanical parts during the Reverse Video Search mode is shown in Fig. 16. The Reverse Video Search operation can be performed by first pressing the REW key during the Playback mode. Then, the loading motor will slightly rotate counterclockwise so that the master cam will be rotated up to the position where SW3 of the PAD switch turns OFF. Then, the tension band on the side of the tension arm position adjustment angle will be disengaged from the supply reel. The capstan motor then rotates counterclockwise at at speed three times the normal playback so that the tape can be driven by the pinch roller at a speed about three times faster than the playback of the recorded signal under the normal mode.

When the tape is rewound onto the supply reel, the solenoid brake is activated, braking the idler gear so that the take-up gear slips, providing the tape with an optimum back tension.

During this operation, the supply reel disk mechanically prevents itself from being braked.

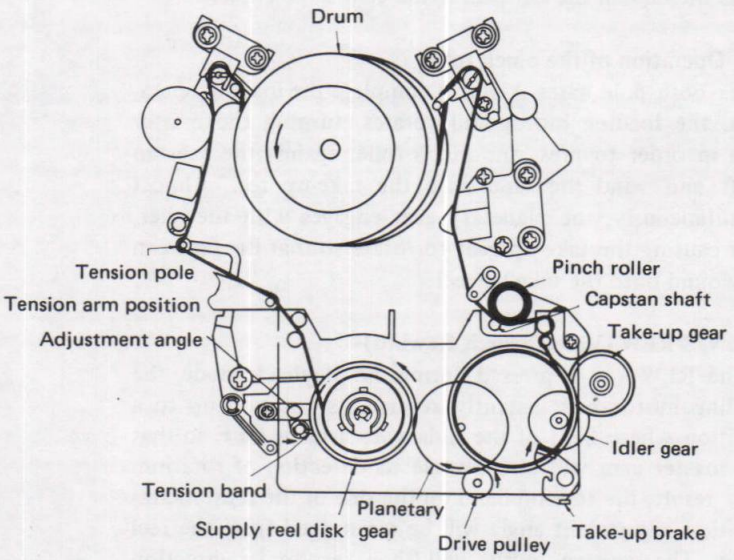


Figure 16 Reverse Video Search operation

ADJUSTING, REPLACING, ASSEMBLING AND CLEANING OF THE MECHANISM

Mechanical adjustment procedures, replacement of the parts, assembly of the parts, and method and procedures of cleaning described in this section are strictly for the convenience in performing general servicing (field services).
Detailed procedures for the adjustment and replacement of parts requiring highly sophisticated equipment, tools and expertise are not described here.
For example, sophisticated servicings such as disassembling/assembling or replacement of the drum, or assembly of the capstan block, should be left to the hands of qualified technical staff who have received special technical training.
Also, in order to satisfactorily maintain the initial characteristics of the VTR, it is absolutely necessary to perform not only periodical maintenances and inspections, but protect the tape from any damage. It is therefore suggested that you should use tools that are specified by us whenever performing adjustments that require tools.

* When either adjusting or checking the mechanism, make sure to use the proper AC adaptor.

(1) TOOLS NEEDED TO ADJUST AND CHECK THE MECHANISM

In order to completely and efficiently adjust and check the VTR mechanism, keep the following tools handy.

1	Torque cassette	7	Hexagonal wrenches (0.9 mm and 1.2 mm)
2	Torque gauge	8	Tape path adjustment tapes including EC-30HG for rough adjustment and alignment tape.
3	Torque gauge head		
4	Tension gauge	9	Tape guide pole height adjustment jig
5	Reel desk height adjustment jig, Master plane	10	Torque measurement jig
6	X-position adjusting jig		

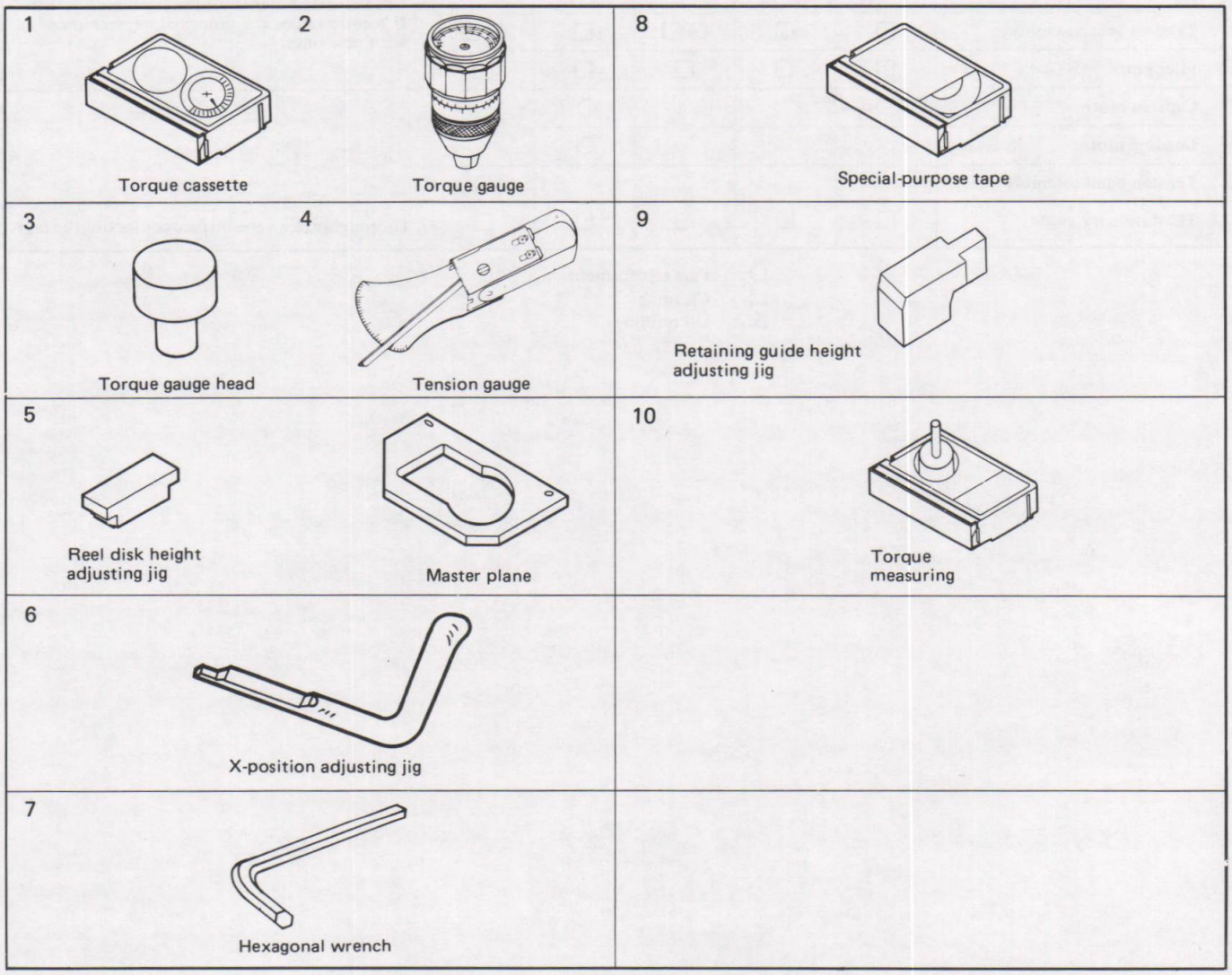


Figure 17

(2) MAINTENANCE/INSPECTION ITEMS AND SUGGESTED SCHEDULE

Item to be serviced \ Period (hours)	500	1,000	1,500	2,000	3,000	Remarks
Guide roller assembly	□	□	□	□	□	Replace if either the guide roller or roller starts to abnormally rotate or swing. Clean the portion contacting the tape.
Roller	□	□	□	□	□	
Stationary guide	□	□	□	□	□	Thoroughly clean the portions that contact the tape. Use the specified cleaning solution.
Guide flange B	□	□	□	□	□	
Slant pole	□	□	□	□	□	
Video heads	□	○□	□	○□	○□	
F/E (Full Erase) head	□	○□	□	○□	○□	
A/C (Audio/control) head	□	□	□	□	□	Do not disassemble the capstan block.
Capstan belt		□		○		
Counter belt A				○		
Counter belt B				○		
Pinch roller	□	□	□	□	○□	
Capstan motor pulley	□	□	□	□	□	
Capstan block	□	□	□	□	□	
Planetary gear assembly	□	□	○□	□	○□	Thoroughly clean the gears. Use industrial mehtanol for cleaning. If torque values are abnormal, replace them with new ones.
Reel disk assembly		□ △		□ △		
Take-up gear assembly	□	□	○□	□	○□	
Idler gear	□	□	□	□	□	
Capstan motor				○		
Loading motor				○		
Tension band assembly					○	
TU stationary guide	□	□	□	□	□	Thoroughly clean the surface contacting the tape.

○ : Part replacement
□ : Cleaning
△ : Oil refilling

* Precautions during servicing

(1) REMOVAL OF THE CAPSTAN BLOCK.

Unscrew 3 screws to remove the capstan block from the assembly, leaving the worm screw as indicated by the arrow in the drawing. The capstan block is built with high procision by a jig. If it is disassembled, the high accuracy will be lost, resulting in improper performance as a unit.

(2) TO OPERATE THE LOADING MOTOR USING THE DC POWER SOURCE.

① Make sure that the DC voltage available for driving the loading motor does not exceed a maximum of 6V. If the master cam rotates too fast, the loading motor may cause an emergency stop by a locking device. Also, if the voltage should exceed a maximum of 6V, the loading motor may be damaged.

② Perform the loading operation only after the solenoid brake has been retracted. If the tape is loaded while the solenoid brake remains in the inactivated position, either the pin of the supply brake lever may be bent or mechanical damage may occur.

(3) REMOVING AND INSTALLING THE CASSETTE COMPARTMENT

(replace the cassette housing as a set)

When either removing or installing the cassette compartment, be sure to observe the following procedures. If either removal or installation is incorrectly performed, the tape cannot be properly positioned, and the counter belt, lead wires, or even the cassette tape may be damaged. Thus be extremely careful when handling and checking the cassette compartment.

[Precautions when removing the cassette compartment.]

When removing the cassette compartment from the VTR assembly, gently perform the operation with care so as not to damage any of the adjacent parts such as lead wires, P.W. Boards, tape path regulating poles, gears, etc.

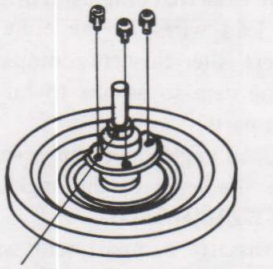


Figure 18

- **Removal procedures**

① Press the Eject key, then draw out the video cassette from the cassette compartment.

② Turn OFF the power, and remove the cassette compartment top cover.

③ Remove 4 screws (XBPS326P06J00) securing the compatment from the left and right sides.

④ Remove the E stop rings.

⑤ Remove the polyslider washer (LX-WZ1004GE00) securing the open angle, then remove the open angle operating lever from the open angle.

⑥ Pull out the 2-pin MD connector from the FPC-B, and remove lead wires from the solenoid transistor insulation board (Fig. 19).

⑦ Remove the cassette compartment assembly so that it turns over and faces the operation circuit board. Then remove the solder on the lead wires connected to the erase protecting switch.

* Step⑦can be skipped except when replacing the cassette compartment. While performing step⑦, be extremely careful not to apply any force to the lead wires connected to the erase protection switch and also not to cause the cassette compartment to hit or come into contact with the operation circuit board.

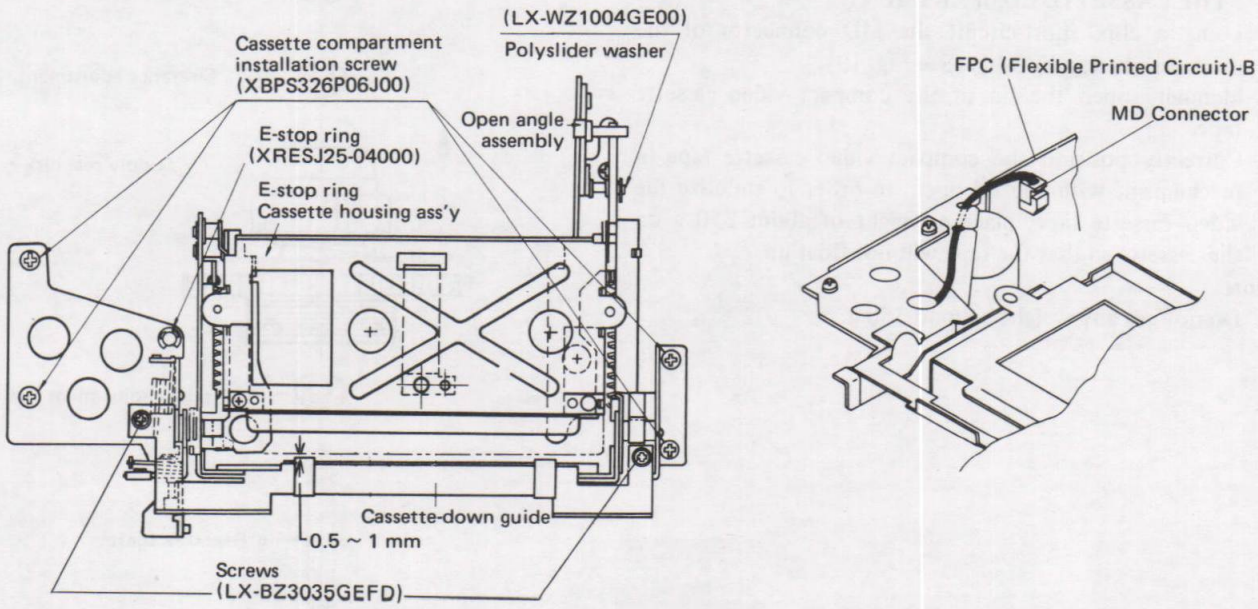


Figure 19

■ **Installing the cassette compartment.**

① Solder the lead wires to the erase protection switch.
② Gently insert the cassette compartment in position with extreme care so as not to hit and damage any of the adjacent parts.
③ Insert the open angle operating lever in the open angle, then secure the lever to the angle with the polyslider washer (LX-WZ1004GE00).
④ Install the cassette compartment with 4 screws (XBPS 326P06J00) and the E stop ring unit.
⑤ Insert a 2-pin connector of the connector lead in the FPC-B so that the connector lead wires can properly be set in position through the solenoid transistor insulation board (Fig. 19). This completes the installation.

■ **Checking the position and operation of the cassette compartment.**

① Checking the position
Insert a video cassette tape in the compartment, and then press down the cassette compartment to lock. Check to see that the gap between the down-guide and the cassette is within 0.5 mm to 1.0 mm. If the gap is out of this range, loosen 2 screws (LX-BZ3035GEFD) securing the down-guide and adjust until the gap is within 0.5 mm to 1.0 mm (See Fig. 19).
② Checking the mechanical operation.

- After the cassette is inserted, the cassette compartment must be fully locked. Also check to see that the cassette compartment fully rises after the Eject key is pressed.
- Check to see that, when the cassette compartment is locked, the cassette tape fixes itself at the basic operating position to enable the mechanism to smoothly perform any of the activated modes.
- Check to see that, when the cassette compartment is locked, there is neither uneven difference nor tilt between the positions of the top cover of the cassette compartment and the upper panel of the VTR cabinet.

(4) TO PERFORM A TAPE TRANSPORT WITHOUT THE CASSETTE COMPARTMENT.

① Using a clip, short-circuit the MD connector of the mechanical relay FPC-(B) (See Fig. 19).
② Manually open the lid of the compact video cassette tape.
③ Correctly position the compact video cassette tape in mechanism, with the lid open. In order to stabilize the video cassette tape, place a weight of about 350 g on the cassette so that the tape will not float up.

Note:
Do not use any weight beyond 350 g.

(5) REPLACING THE SUPPLY REEL TABLE AND CHECKING THE HEIGHT.

[Precautions]

1 Be extremely careful not to hit or damage the reel disk shaft with the E-ring tool when either removing or installing the supply reel disk.
2 Be extremely careful not to deform the tension band when either removing or installing the supply reel disk.
3 Manually activate the solenoid brake before starting either removal or installation of the supply reel disk so that the supply brake will not be deformed.
4 Carefully adjust and check the tension pole position.

- Removing the supply reel disk.

① Remove the E-ring 1 shown in Fig. 20 below.
② Remove the clearance adjustment washer ②.
③ Pull the supply reel disk ③ in the upward direction and replace.
④ Remove the height adjustment washer ⑤, and then clean it.

- Installation/assembly of the supply reel disk.

① First, thoroughly clean the supply reel disk shaft, and then install the height adjustment washer ⑤ onto it.
② Install a replacement supply reel disk.
③ Carefully adjust the height of the reel disk with the master plane and the reel disk height adjustment jig. (Refer to Replacing the supply reel table and Checking the height).
④ Then, pull out the replacement supply reel table, apply an optimum amount of grease to the reel disk shaft, and finally reinstall the replacement supply reel disk.
⑤ Install the clearance adjustment washer ② by carefully providing a 0.1 mm through 0.5 mm thrust gap between the washer and supply reel disk.
⑥ Install the E-ring ①.

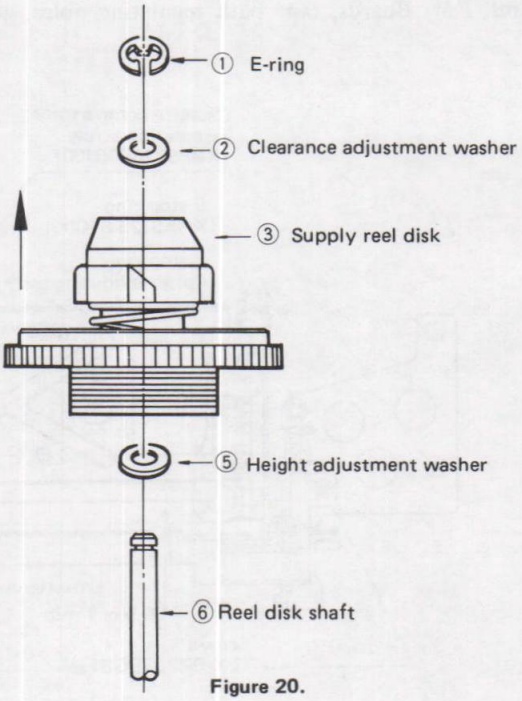


Figure 20.

(6) ADJUSTING AND CHECKING THE REEL DISK HEIGHT.

[Precaution]

After replacing the reel table, be sure to adjust and check the height of the installed reel disk.

- **Adjusting and checking.**

① First, remove the cassette compartment, and then position the master plane on the mechanism with extreme care so as not to hit it against the cylinder, as shown in Fig. 21-a.

② Using the reel disk height adjustment jig, check to see if the upper surface of the reel disk is below portion A and above portion B of the reel disk height adjustment jig positioned, as shown in Fig. 21-b. If not, properly adjust the height of the reel disk with the height adjustment washer so that the thrust gap between the washer and the reel table is less than 0.1 mm through 0.5 mm.

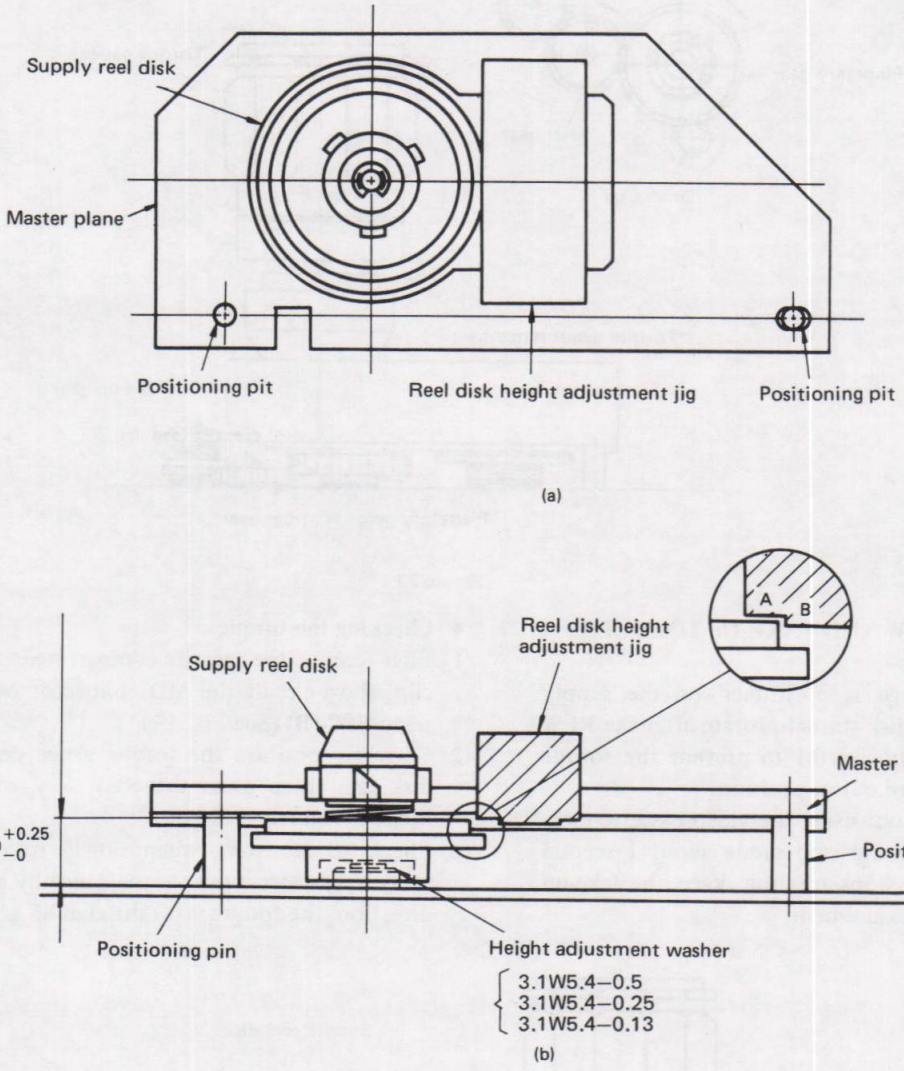


Figure 21

(7) CHECKING THE FF AND TAKE-UP TORQUES

[Precautions]

1. With the torque measurement jig set in position and when the FF key is pressed to start rotation of the take-up gear, be very careful to prevent the torque gauge from being ejected out of position.
2. Since the VTR enters the stop mode about 1 second after the supply reel disk stops rotating, while keep the supply reel disk rotating during measurement.

- **Checking the torque.**

① First remove the cassette compartment, and then short-circuit the MD connector of the mechanical relay FPC-(B) using a clip (Fig. 19).

② Correctly position the take-up torque measurement jig on the take-up gear, and then press the FF key to enter the FF mode.

③ Check to see that, when slowly rotating (1 rotation every 2 to 3 sec.) the torque gauge by hand in the take-up direction, the torque is 63 ± 6 g-cm.

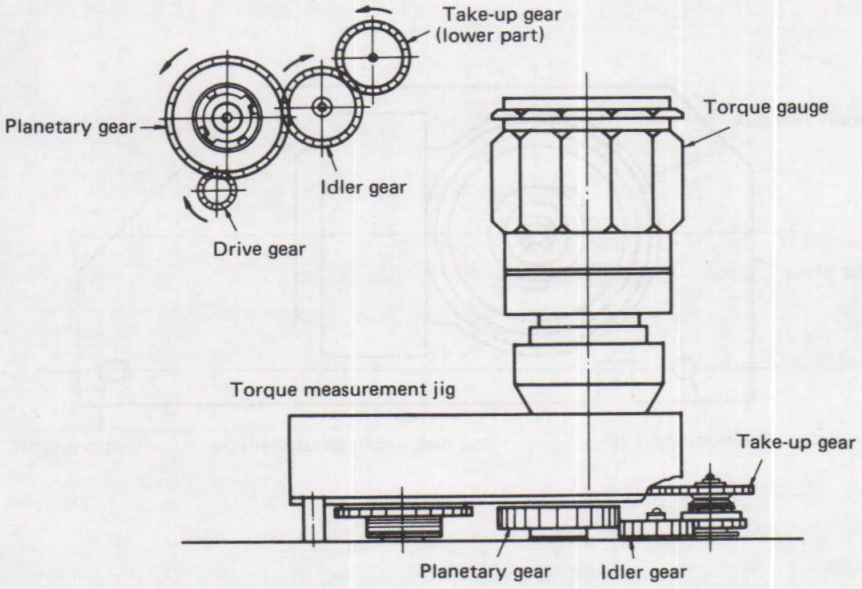


Figure 22

(8) CHECKING THE REW AND TAKE-UP TORQUES

[Precautions]

1. When the torque gauge is positioned on the supply reel disk and the reel disk starts to rotate after the REW key is pressed, be very careful to prevent the torque gauge from being ejected out of position.
2. Adjust and check without using the video cassette tape.
3. Since the VTR enters the stop mode about 1 second after the take-up gear stops rotating, keep the take-up gear rotating during measurement.

- **Checking the torque**

① First remove the cassette compartment, and then using a clip, short-circuit the MD connector of the mechanical relay FPC-(B) (See Fig. 19).

② Correctly position the torque gauge on the supply reel disk, and then press the REW key so that the REW mode is entered.

③ Check to see that, when slowly rotating (1 rotation every 2 to 3 sec.) the torque gauge by hand in the REW direction, the torque is 60 through 85 gcm.

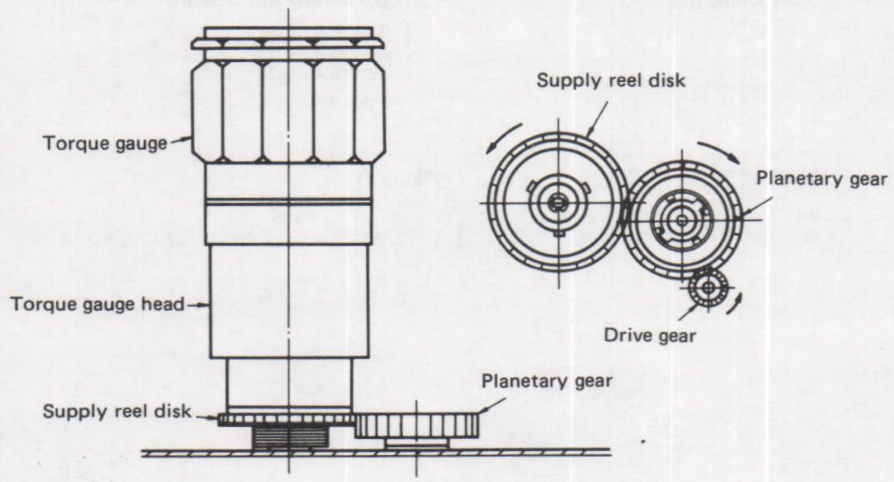


Figure 23

(9) CHECKING THE PLAYBACK TAKE-UP TORQUE

① Using the same procedures as in the FF/Take-up torque (7), check the playback take-up torque.

(10) CHECKING THE FF BACK TENSION

① First remove the cassette compartment, and then using a clip, short-circuit the MD connector of the mechanical relay PWB-B (Fig. 19).
② Manually activate the solenoid brake so that it retracts.
③ Place the torque gauge on the supply reel disk, and then check to see that the torque is below 5 gram cm when rotating the supply reel disk clockwise at a very slow speed (1 rotation every 2 to 3 sec.).

Note: If the torque is found to be more than 5 gram cm, carefully check to see if the tension band is bent and in contact with any part of the supply reel disk.

(11) CHECKING THE REW BACK TENSION

① Correctly position the torque measurement jig on mechanism.
② Manually activate the solenoid brake so that it retracts.
③ Check to see that the torque is below the predetermined value (10 gram cm) by slowly turning the torque gauge.

(12) CHECKING THE V/S-REW (REW/PLAYBACK) BACK TENSION

① In this VTR, back tension during the REW/Playback mode is generated by means of the FF/Take-up torque. Thus properly check the FF/Take-up torque in reference to the procedures described in the preceding section checking the FF and take-up torques.
② Check to see that, when the REW/Playback mode is entered, the solenoid brake is correctly applied to the idler gear so that the REW gear slips.

(13) CHECKING THE PINCH ROLLER'S PRESSURE

① First, remove the cassette compartment, and then using a clip, short-circuit the MD connector of the mechanical relay PWB-B (Fig. 19).
② Press the Playback key to activate the Playback mode, and then turn the power OFF.
③ Place the pinch roller pressure measurement tape (Fig. 25) between the pinch roller and capstan shaft.
④ First, apply the tension gauge to the pinch roller pressure measurement tape, and then pull the pinch roller in a direction opposite from the pressing direction (in the direction of arrow Ⓐ as shown in Fig. 24) so that the pinch roller temporarily leaves the capstan shaft.
⑤ Then, gradually send back the pinch roller (in the direction of arrow Ⓑ as shown in Fig. 24), and measure the tension exactly at the moment when the pinch roller again comes into contact with the capstan shaft.
⑥ Finally, check to see if the measured tension is within the pre-determined range, i.e., 900 through 1,300 grams.

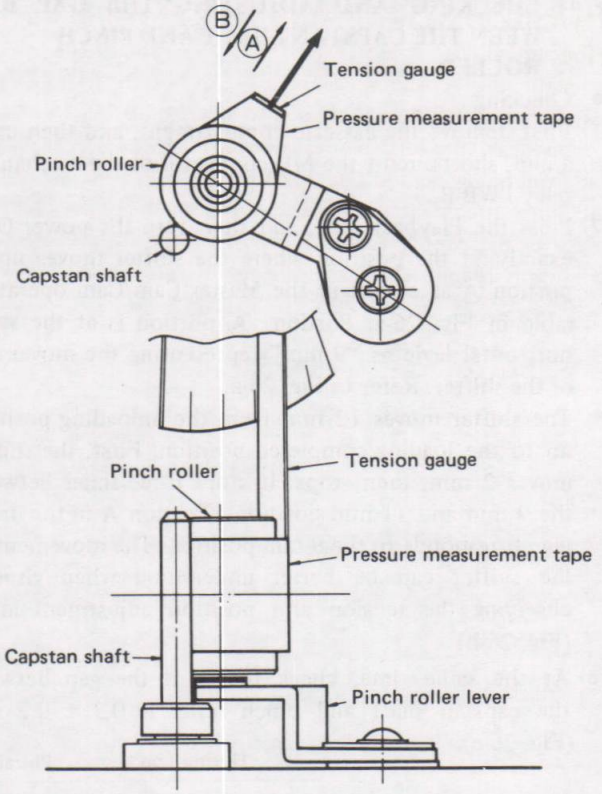
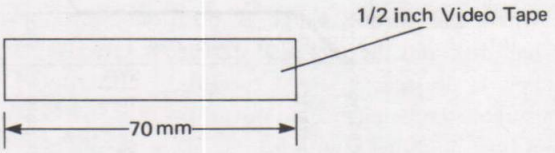


Figure 24

How to make pinch roller pressure measurement tape:

① Cut the video tape.



② Apply adhesive tape to make roop.

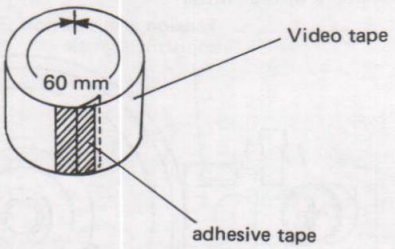


Figure 25

(14) CHECKING AND ADJUSTING THE GAP BETWEEN THE CAPSTAN SHAFT AND PINCH ROLLER

- **Checking**

① First, remove the cassette compartment, and then using a clip, short-circuit the MD connector of the mechanical relay PWB-B.

② Press the Playback key, and then turn the power OFF exactly at the position where the shifter moves up to portion Ⓐ as shown in the Master Cam/Cam operation table in Fig. 26-a. Portion Ⓐ portion is at the same horizontal levle as "9 mm" representing the movement of the shifter. Refer to Fig. 26-a.

* The shifter moves 12 mm from the unloading position up to the loading completed position. First, the shifter moves 2 mm, then stops. It stops three times between the 9 mm and 11 mm positions. Portion A in the drawing corresponds to the 9 mm position. The movement of the shifter can be better understood when visually observing the tension arm position adjustment angle (Fig. 26-b).

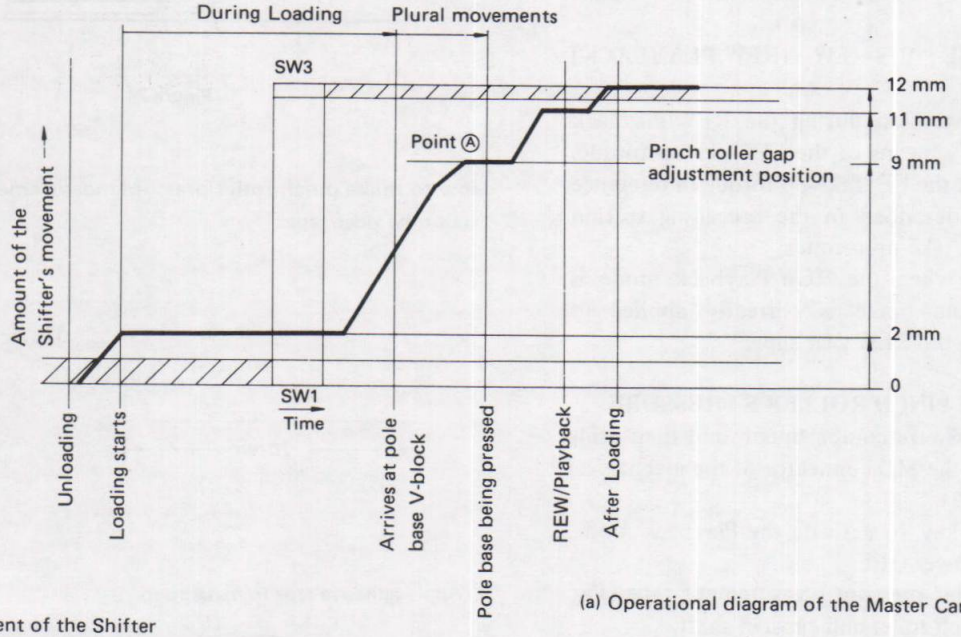
③ At the same time, check to see if the gap between the capstan shaft and pinch roller is 0.3 ± 0.2 mm (Fig. 26-c).

- **Adjustment of the gap**

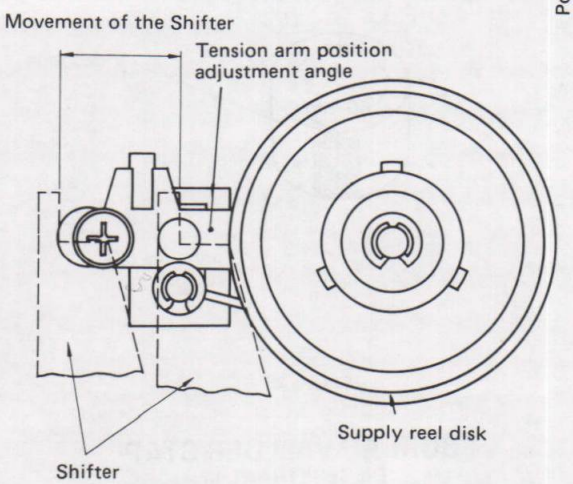
① If there is no gap or conversely if the gap is wider than the specification, slightly loosen two screws (Fig. 26-c), insert a thinness gauge (0.35 mm) between the capstan shaft and pinch roller, and finally tighten the screws before adjusting the gap. During adjustment, roated the pinch adjustment plate clockwise to tighten it so that any looseness can be eliminated.

② After the adjustment is completed, turn the power ON. Then temporarily activate the playback mode in order to tightly press the pinch roller, and finally check the actual gap between the capstan shaft and pinch roller.

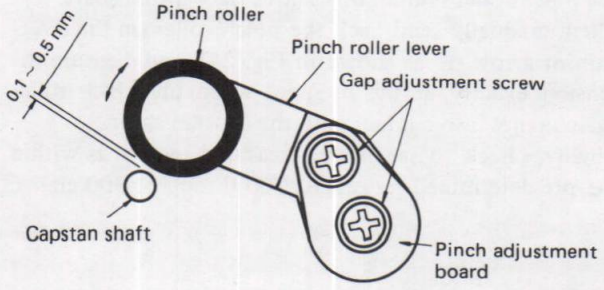
③ After the necessary adjustments are fully completed, apply locking paint to each of the two screws.



(a) Operational diagram of the Master Cam/Cam



(b)



(c)

Figure 26

(15) CHECKING AND ADJUSTING THE TENSION POLE POSITION

- **Checking of the tension pole position**

① Remove the cassette copmartment.
② Set a video cassette tape in position and press the Playback key so that the VTR enters the Playback mode.
③ As soon as pole bases A and B have drawn out the video tape from the cassette, the tension pole also moves to the left so that loading can be activated.
④ While the video tape still remains in the beginning position, visually confirm that the center of the tension pole is in a position 2.5 mm to 3 mm to the left from the center of the stationary supply guide.
⑤ Check to see if the tension band is released from the supply reel disk during the Reverse Video Search mode.
⑥ Check to see that, while the video tape (EC-30HG) is still at the beginning position, the gap between the tension pole stopper and tension arm remains within 0.5 mm through 1.0 mm.
⑦ Check to see that the tension arm is not in contact with the tension feedback prevention lever at the end of the tape (EC-30HG).
⑧ Check to see that the video tape neither curls at the flange of the stationary tape guide nor rides onto the flange.

- **Position adjustment**

[Precautions]

① Afte the adjustments are completed, be sure to apply the screw locks.
② Tighten screws using 2.5 kg. cm of the torque.

Adjustment procedures

① If the position of the tension pole is within 2.5 mm to the left from the center of the stationary supply guide, move the tension band adjustment angle ① in the direction of arrow (B) so that screw ② will be tightened, as shown in Fig. 27 below.
② If the position of the tension pole is more than 3 mm to the right from the center of the stationary supply guide, move the tension band adjustment angle ① in the direction of arrow (A) so that screw ② will be tightened, as shown in Fig. 27.

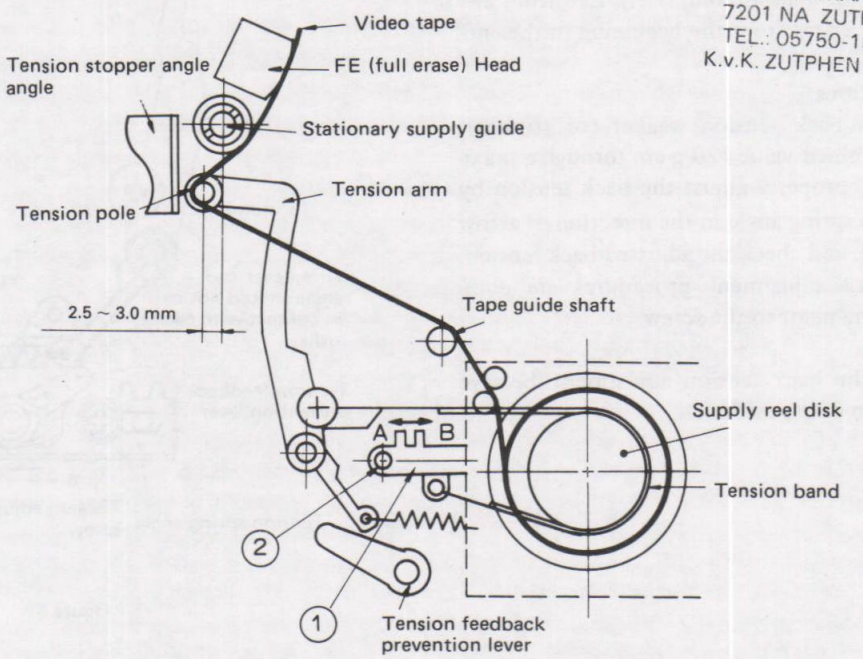


Figure 27

(16) CHECKING THE VERTICALITY OF TENSION POLE

- **Checking verticality**

① Remove the cassette compartment.
② Set the stationary guide height adjustment jig in position as shown in Fig. 28.
③ In this position, check and confirm the verticality of the tension pole.

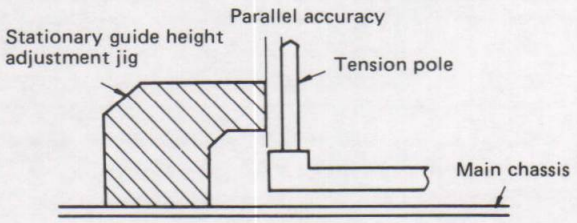


Figure 28

(17) CHECKING AND ADJUSTING THE REC/PLAY-BACK BACK TENSION

[Precautions]

① Use extreme care when checking the REC/Playback back tension with a torque checking cassette tape so that it will never come into contact with the full-erase head, idler roller or the cylinder head with which the tape remains in contact during operation.

② Be sure to use the calibrated torque checking cassette tape whenever checking or adjusting the REC/Playback back tension.

- **Checking**

① Remove the cassette compartment, and then using a clip, short-circuit the MD connector of the mechanical relay FPC-(B) (See Fig. 19).

② Insert a torque checking cassette tape.

③ Press the Playback key to enter the Playback mode.

④ Check that the torque checking cassette tape of supply side torque indicated by the gauge is 20 ~ 27 g. cm. (specified value).

⑤ Check to see that the tension arm does not contact the tension arm stopper nor the tension feedback prevention lever.

⑥ Check to see that the tape is completely free from any slack and damaged edges from the beginning to the end.

- **Adjustment procedures**

① If the tape has a back tension weaker (or stronger) than the pre-determined value (20 g-cm through a maximum of 27 g-cm), properly adjust the back tension by moving the tension spring angle in the direction of arrow A (or B if stronger), and check the adjusted back tension.

② After the necessary adjustment procedures are completed, apply locking paint to the screw.

Note:

After completing the back tension adjustment, be sure to check the tension pole position.

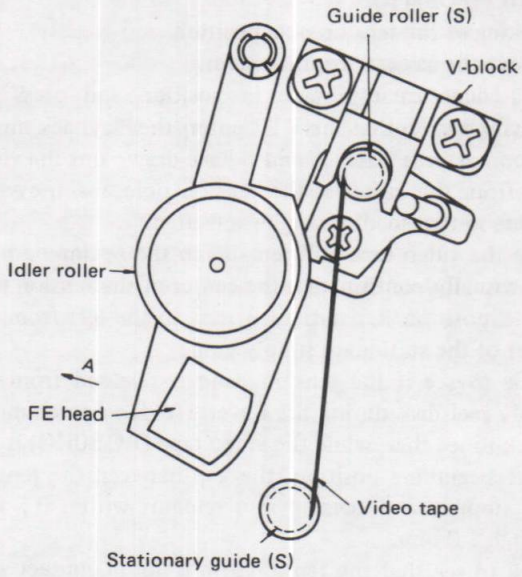


Figure 29

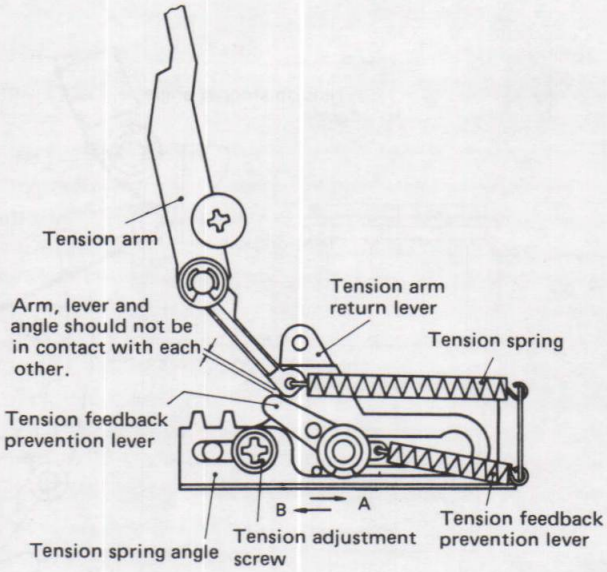


Figure 30

(18) CHECKING THE BRAKE TORQUE

- **Checking the supply reel disk brake torque**

① Remove the cassette compartment.

② Correctly position the torque gauge on the supply reel disk. Then turn it slowly in both directions, clockwise and counterclockwise, and measure the brake torque.

③ Check to see that the measured brake torque is within specifications.

- Brake torque through the clockwise rotation of the supply reel disk 30 through 60 gram. cm
- Brake torque through the counterclockwise rotation of the supply reel disk 60 gram. cm Minimum

- **Checking the take-up reel disk brake torque**

① Remove the cassette compartment.

② To measure the brake torque in the clockwise direction. Correctly position the torque measuring tool on the mechanism, and then slowly rotate the torque gauge clockwise to measure the brake torque. Finally check to see that the measured torque is within specifications, 30 through a maximum of 60 gram. cm.

③ Counterclockwise brake torque.
Correctly place the torque measurement tool on the take-up reel disk, and then slowly turn the torque gauge counterclockwise. Make sure that the take-up gear slips.

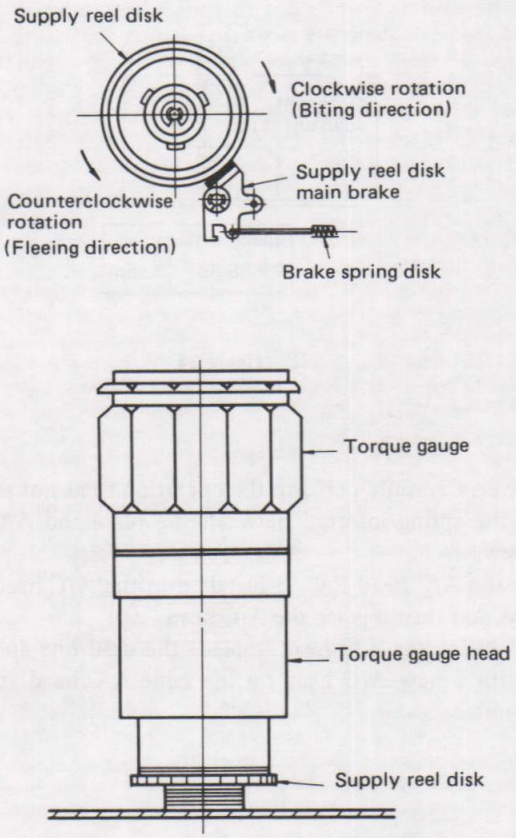


Figure 31

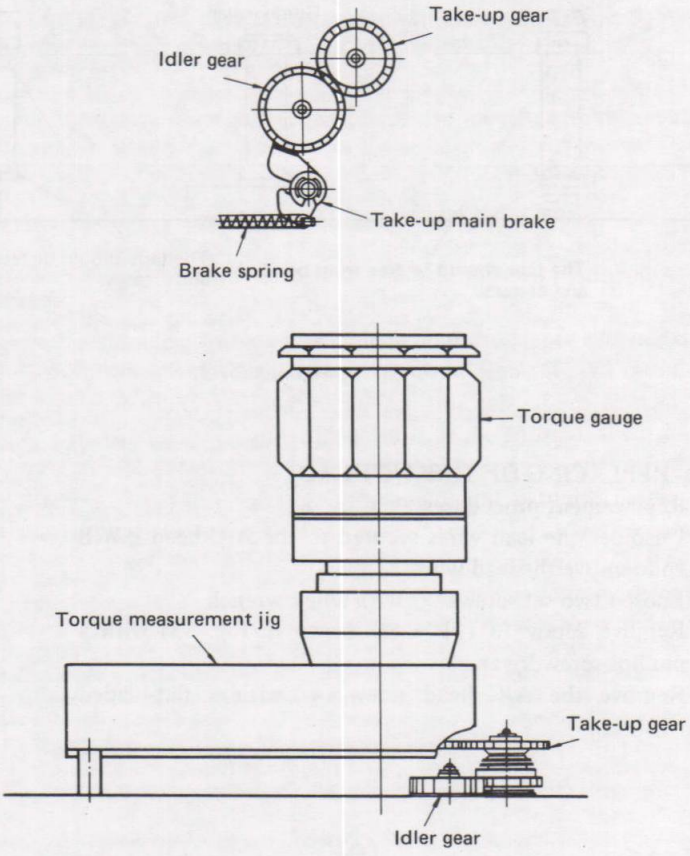


Figure 32

(19) CHECKING AND ADJUSTING THE HEIGHT OF THE STATIONARY SUPPLY GUIDE POST, TAKE-UP GUIDE POST AND THE GUIDE ROLLER.

[Precautions]

1. After adjustments are completed, check the height of the stationary supply guide post, take-up guide post and the guide roller with the video tape running.
2. After the height adjustments are completed, be sure to perform tape run adjustments and guide roller adjustment (both the supply and take-up) before checking the height as shown in Fig. 33.

* After these adjustments are completed, do not turn the adjusted screws.

- **Checking**

Check to see that, when the video tape runs, the tape is completely free from bending or creasing as shown in Fig. 33.

- **Adjustment**

Perform the following adjustments only when the tape is found to be out of correct alignment.

① Correctly place the guide height adjustment jig on the main chassis as shown in Fig. 34.

② Slowly turn the adjustment nut on the upper part of the stationary guide in either direction with a flat-bladed screwdriver so that the adjusted height is within specification ($\ell = 26.35^{+0.1}_{-0}$ mm, as shown in Fig. 34.)

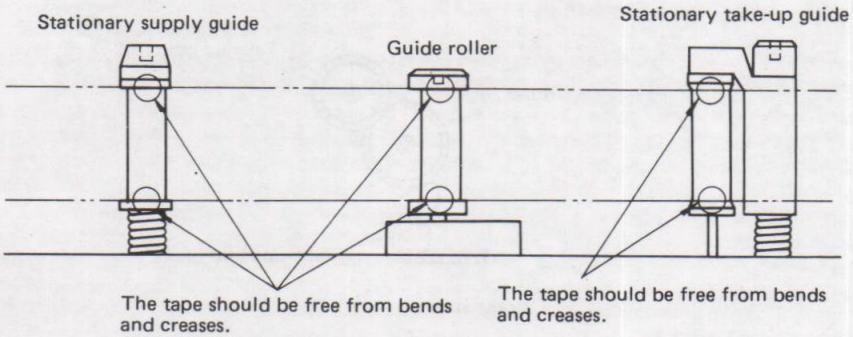


Figure 33

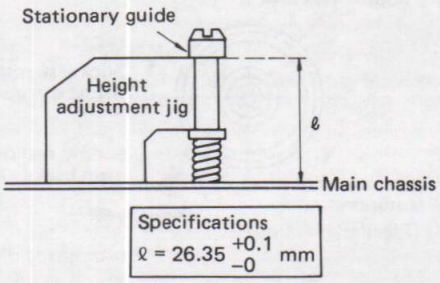


Figure 34

(20) REPLACING OF THE A/C HEAD.

- **Replacement procedures.**

① Unsolder the lead wires secured to the A/C head P.W.B and remove the lead wires.

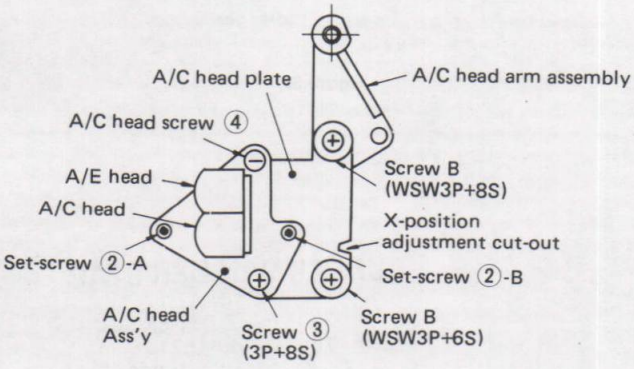
② Loosen two set screws ② with a hex wrench.

③ Remove screw ③ (3P + 8S shown in Fig. 35) with a phillips screwdriver.

④ Remove the A/C head screw ④ with a flat-bladed screwdriver. Carefully perform the operation so as not to damage the spring inserted between the plate and A/C head screw.

⑤ Remove the A/C head P.W. B installed in the A/C head assembly, and then replace the A/C head.

⑥ When replacing the A/C head, replace the used one and install with a new A/C head on the same A/C head assembly unit.



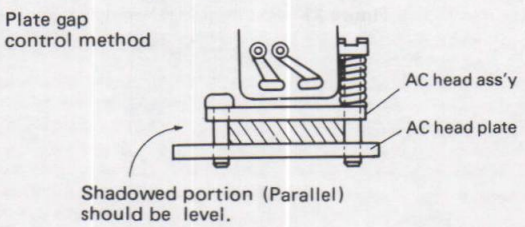


Figure 35

(21) CHECKING AND ADJUSTING THE HEIGHT AND TILT OF THE A/C HEAD.

- **Checking**

① With the playback mode activated, check to see that the tape does not curl at the upper and lower flanges of the stationary take-up guide post.

- **Adjustment procedures**

① Check to see that the tape runs during the playback mode.
② Check to see that the tape smoothly runs perfectly flat between the tension guide roller and capstan shaft.
③ If the tape twists between the A/C head and the stationary take-up guide post, a satisfactory playback picture cannot be obtained. To prevent this, make sure that the tape does not have any creasses and does not ride on the upper or lower flange of the stationary take-up guide post.
④ If the tape does not run properly, adjust with screw ②.
[Warning]
Do not move the stationary take-up guide post.
⑤ Properly adjust the height of the A/C head so that it is in the position against the tape as shown in Fig. 36.

* After the tape run has properly been adjusted and the height of the A/C head temporarily (roughly) adjusted, the height and azimuth of the A/C head must properly be adjusted using an alignment tape.

① Play back a 1 kHz audio signal (or colour bars if the video is played back) recorded on the alignment tape, and then visually observe the waveform out from the audio output terminal through an oscilloscope.
② Gradually turn set-screws ②-A and B and screw ③ until the waveform level is at a maximum and the level variation is at a minimum.
③ Play back a 7 kHz audio signal (or stair waveform if the video is played back) recorded the alignment tape, and then visually observe the waveform out from the audio output terminal.
④ Adjust with azimuth adjustment screw ③ (3P + 8S) so that the audio output level is at a maximum.
⑤ Carefully check to see that the tape run has been properly adjusted.

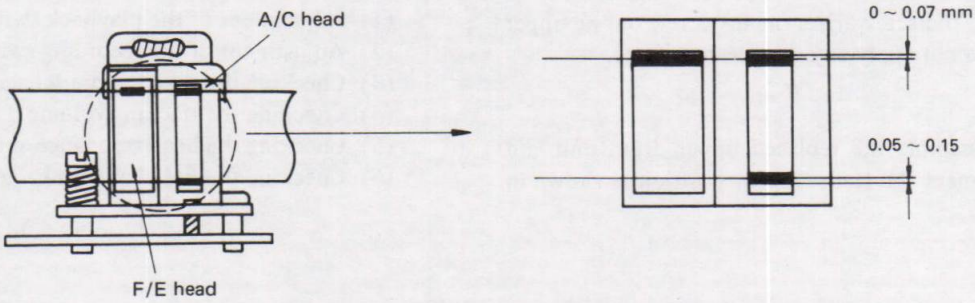


Figure 36

(22) ADJUSTING THE TAPE RUN.

① Using both the master plane and reel disk height adjustment jig, to adjust and check the height of the reel disks.
② Using the stationary guide post height adjustment jig, adjust and check the height of the stationary guide posts.
③ Using the tension pole position adjustment jig, check the position and verticality of the tension poles.
④ Play back the rough adjustment tape, and then roughly adjust the height of the guide roller with the guide roller height adjustment flat-bladed screwdriver so that the lower edge of the tape correctly aligns with the lead portion of the drum.
Check to see that the video tape does not curl at the flange of either the supply or take-up guide roller.
⑤ Play back the gray scale recorded on the alignment tape, and then fine adjust the height of the guide roller so that the flatness of the tape will not be lost by turning the tracking volume. Adjust the switching point at 6.5 ± 0.5 H.
⑥ Fine adjust the height, tilt, and the azimuth of the A/C head.
⑦ Adjust the tracking control to the preset position, and then slightly loosen two B screw (WSW3P + 6S), then place the X-position adjusting jig in the adjustment hole in order to correctly adjust the A/C head position.
⑧ Play back the self-recorded tape in order to check the flatness of the envelope waveform and the audio.
⑨ After these adjustments are completed, apply locking paint to the adjustments screws.

(23) REPLACEMENT OF THE UPPER DRUM

[Precautions]

Since the gap between the outer diameter of the disc and inner diameter of the upper drum is extremely narrow in the micron order, even the slightest damage or dust may adversely affect the accuracy of the drum mechanism and may cause difficulty either in removal or in reinstalling the upper drum. To prevent these problems, be extremely be careful when replacing the upper drum.

- **Replacement**

① Remove 2 stationary screw ⑤ (3P + 3S) with a phillips screwdriver.
② Remove the video head lead wire holding plate ⑥.
③ Unsolder the 2 yellow lead wires ① and remove them.
④ Unsolder one red lead wire ② and remove it.
⑤ Unsolder one brown lead wire ③ and remove it.
⑥ Remove 2 stationary screws ④ (W3P + 7S) accompanied with a flat washer, using a phillips screwdriver.
⑦ With an extreme care, draw out the upper drum unit while preventing it from being tilted incorrectly. Do not damage the outer circle of the disc when replacing the upper drum unit.

[Precautions]

① Never touch the Drum surface with bare fingers.
② When placing the screwdriver on any screw ont he upper drum unit, do not apply any unnecessary force.

- **Reassembly**

① Properly reassemble the replaced upper drum unit and correctly connect the lead wires in position as shown in Fig. 37 below.

[Precautions]

1. Connect yellow and brown lead wires for Channel 1. and connect red and yellow lead wires for Channel 2.
2. Before reassembling the upper Drum unit, confirm that there is no damage on the inner surface and circumference nor dirt on any part of the drum unit.
3. Before reassembling the drum unit, check to see that there is neither damage nor stains on the surfaces and circumference of the disk.
4. When reassembling the drum unit, pay attention in mounting the upper drum so that it will not be secured to the disk at an incorrect angle.
5. Make sure that there are no dust and impurities at all between the disk and upper drum unit.
6. Gently place the screwdriver on screws and carefully tighten them.

② Secure the upper drum unit with 2 screws ④.
③ Solder lead wires ①, ②, and ③ in their correct positions.
* Perform soldering as fast as possible.
④ Secure the video head lead wire holding plate ⑥ with red screw ⑤. Gently tighten the screw.
⑤ After the replacement procedures are completed, make sure to carefully check and confirm the tape run mechanism and performance. Finally, perform the following electrical adjustments and checks.
(1) Adjustment of the playback switching point.
(2) Adjustment of the recording switching point.
(3) Checking the tracking pre-set state.
(4) Checking the tracking volume.
(5) Checking the head resonance and head Q.
(6) Checking the FM-channel's balance.

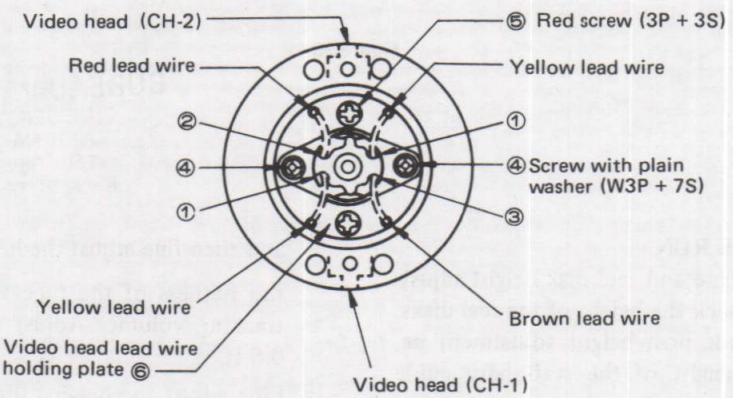


Figure 37

(24) ADJUSTING THE GUIDE ROLLER.

- **Procedure in setting the video tape.**

① Remove the top panel of the VTR cabinet.
② Insert an alignment tape in the cassette compartment.
③ Connect both the AC adaptor cord and video input cord to the designated terminals, respectively.
④ Connect oscilloscope CH1 to the RF envelope output (TP407) and CH2 to CC3 where the switching pulse flows through.
⑤ Press the playback key, then perform the adjustment procedures in the playback mode.

- **Adjustment procedures**

① Keep the guide roller setting screw slightly tightened so that it turns smoothly with the guide roller adjustment flat-bladed screwdriver.
② Trigger the envelope with the switching pulse to observe the envelope waveform on the oscilloscope, as shown in Fig. 38 below.
③ Perform height adjustment of the guide roller while observing the envelope waveform through TP407, then correctly align the tape with the lead portion of the head drum.
If the tape is either in the upper position or in a position lower than the helical lead position of the drum, waveforms are as shown in Fig. 39, 40.

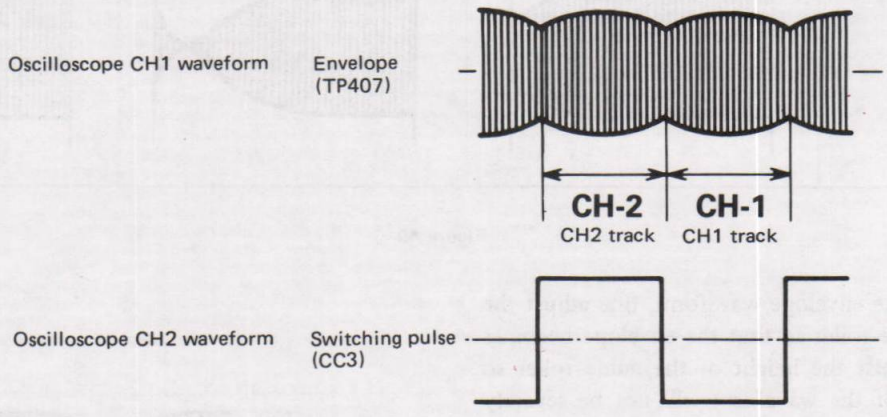


Figure 38

a. Envelope waveforms when the video tape slightly floats above the helical lead portion of the drum are shown below.

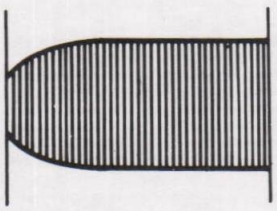
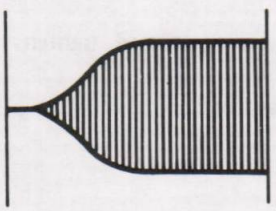
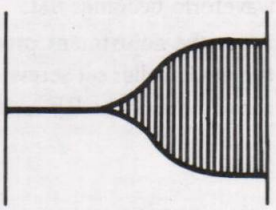
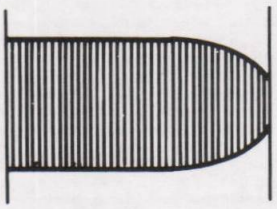
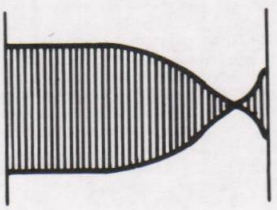
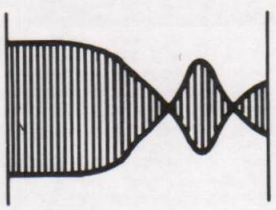
Degree of closeness	When floats up slightly	medially	excessively
Supply reel side (Drum in)			
Take-up reel-side (Drum out)			

Figure 39

b. Envelope waveforms when the video tape is too strongly pressed against the helical lead portion of the drum are shown below.

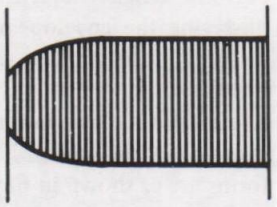
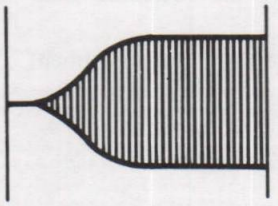
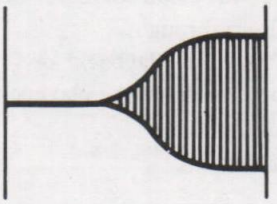
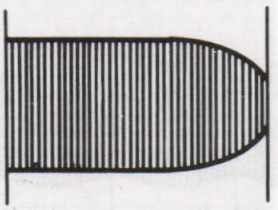
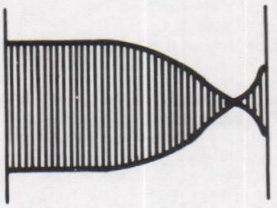
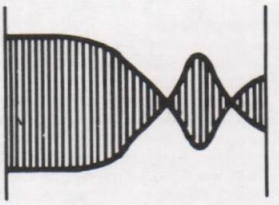
Degree of closeness	When pressed slightly	medially	too strongly
Sypply reel side (Drum in)			
Take-up reel-side (Drum out)			

Figure 40

④ While observing the envelope waveform, fine adjust the height of the guide roller so that the envelope becomes flat. Correctly adjust the height of the guide roller so that the flatness of the waveform will not be severely affected by turning the tracking control.

⑤ Carefully adjust so that the ratio of portions A and B in the RF waveform (Fig. 41) becomes better than A=10 : B=7 when the position of the tracking control is turned to a point where the "A" portion in the RF waveform starts to decrease.

⑥ Adjust the playback switching point in accordance with the playback switching point adjustment procedures described in the Electrical adjustment procedures.

⑦ Using a self-recording/playback tape, record and play back colour bars, then check to see that the envelope waveform becomes flat.

⑧ After the adjustment procedures are completed, tighten the guide roller set screw.

⑨ Finally check the RF envelope waveform.

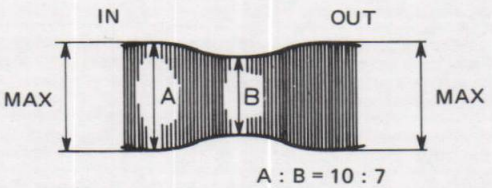


Figure 41

(25) REPLACING OF THE CAPSTAN MOTOR.

- **Disassembly procedures**

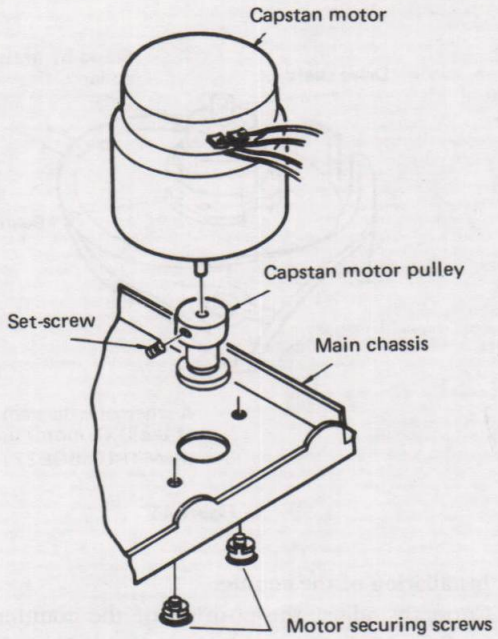
① Remove both the drive and capstan belts.
② Unsolder 4 lead wires connecting the capstan motor to the mechanical relay FPC-(A).
③ Remove 2 screws (XBPSD26P04J00) securing the capstan motor, then pull out the motor upwards (Fig. 42-a).
④ Loosen a set screw (LX-XZ3016GEFJ) securing the capstan motor pulley with a hex wrench, then remove it.

- **Reassembly procedures**

① Correctly set the space between the upper surface of the capstan motor pulley and the lower surface of the capstan motor unit to be 3.5 mm and secure this space with the set screw. (See Fig. 42-b).
② Install the capstan motor on the main chassis and firmly secure it with two screws (XBPSD26DP04J00), as shown in Fig. 42-a below.
③ Solder lead wires on the mechanical relay FPC-(A).
④ Before reassembling the parts, thoroughly clean the capstan motor pulley, capstan fly wheel, capstan drive pulley/belt, then properly install the capstan belt and the fast-wind belt in position.

[Precautions]

1. After the capstan motor is reinstalled, make sure to rotate the capstan motor and check to see that all the operations are correctly performed among the belts, pulleys and the capstan motor.
2. Check and adjust of the Servo circuit.
3. Correctly set the space between the capstan motor and capastan motor pulley at 3.5 mm ± 0.1 mm (Fig. 42-b).
4. Make sure to use the specified screw for correctly installing the capstan motor. If any other screw is used, the capstan motor itself may be damaged.
5. When reinstalling the capstan motor, pay particular attention not to damage the capstan motor pulley.



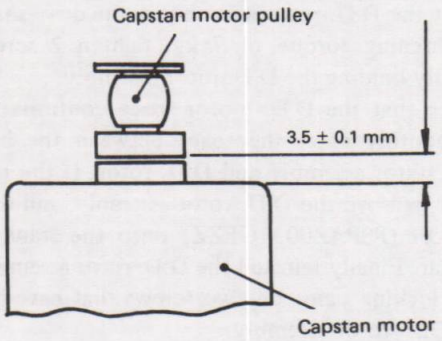


Figure 42

(26) REPLACEMENT OF THE LOADING MOTOR.

① Remove the cassette compartment and solenoid transistor insulator.
② Remove the solenoid.
③ First remove the polyslider washer below the loading gear, then remove the loading gear from the back of the chassis.
④ Unsolder the lead wire connected to the loading motor.
⑤ Remove 2 screws (SW2.6P + 6S), and finally remove the loading motor.

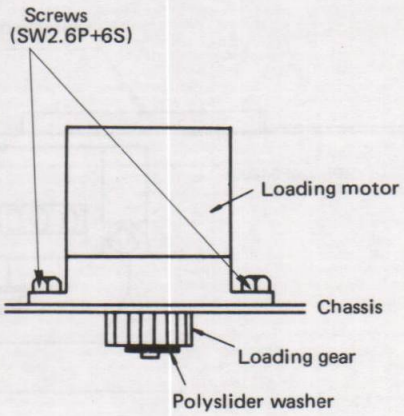


Figure 43

(27) REPLACEMENT OF THE D.D. MOTOR.

- **Tool . . . D.D. motor space confirmation tool.**

[Precautions]

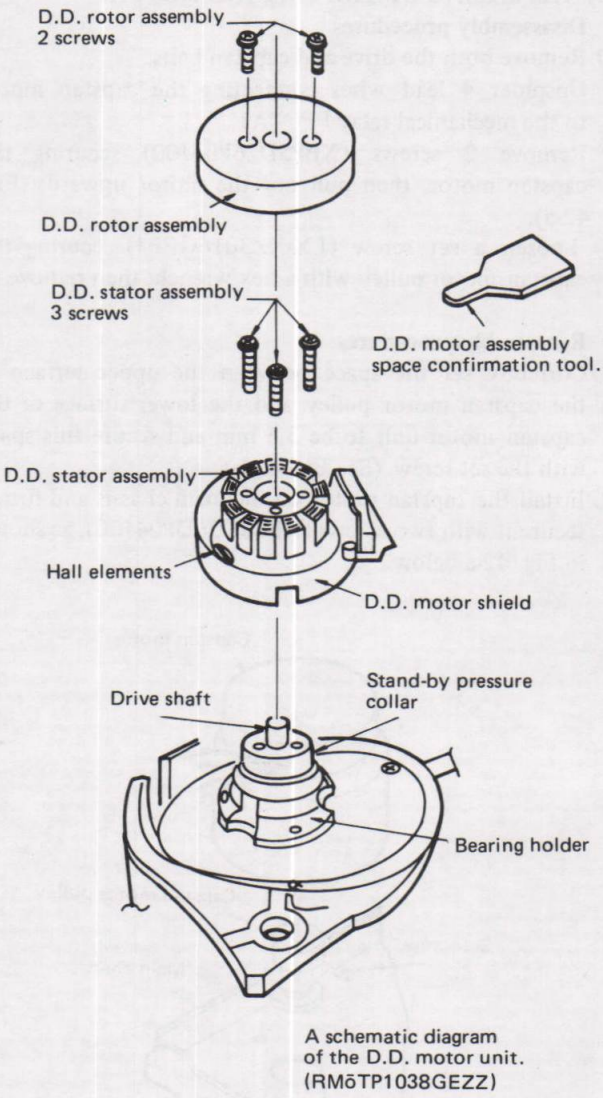
1. Work with an extreme care not to hit or damage both the upper drum and the video heads.
2. Do not forcibly insert the tool nor pull it out by turning.
3. Do not hit the Hall elements with either the tool or with any part of the D.D. motor assembly during operation.
4. Pay particular attention not to deform the D.D. motor shield.

- **Disassembly procedures**

① Remove 2 screws securing the D.D. rotor assembly, and then pull out the D.D. rotor gently.
② Remove 3 screws securing the D.D. stator assembly, and then pull out the D.D. stator assembly.

- **Reassembly procedure**

① Place the D.D. stator assembly on the bearing holder, paying particular attention to the direction of the connector of the D.D. stator assembly.
② Tighten 3 screws by manually holding the D.D. stator assembly. Do not hit the stator coil with the head of the screws.
③ Apply locking paint on the three screws that have just secured the D.D. stator assembly.
④ Gently insert the D.D. rotor assembly in the drive shaft.
⑤ Using a tightening torque of 7 kg, tighten 2 screws while manually holding the D.D. rotor assembly.
⑥ Check to see that the D.D. motor space confirmation tool can smoothly enter the space between the base of the D.D. stator assembly and D.D. rotor. If the tool cannot enter, remove the D.D. rotor assembly, and then insert a spacer (PSPAZ0031GEZZ) onto the stand-by pressure collar. Finally reinstall the D.D. rotor assembly.
⑦ Paint apply locking paint on two screws that have just secured the D.D. rotor assembly.



A schematic diagram of the D.D. motor unit. (RMõTP1038GEZZ)

Figure 44

(28) REPLACEMENT OF THE COUNTER.

- **Removal of the counter.**

① Remove the counter belt B.
② Remove 2 screws (XBPSD20P04J00) securing the counter, and then remove the counter.

- **Installation of the counter.**

① Correctly adjust the position of the counter as shown in Fig. 45 below, and then install it with 2 screws (XBPSD20P04J00).
② Engage the counter with the counter belt B.

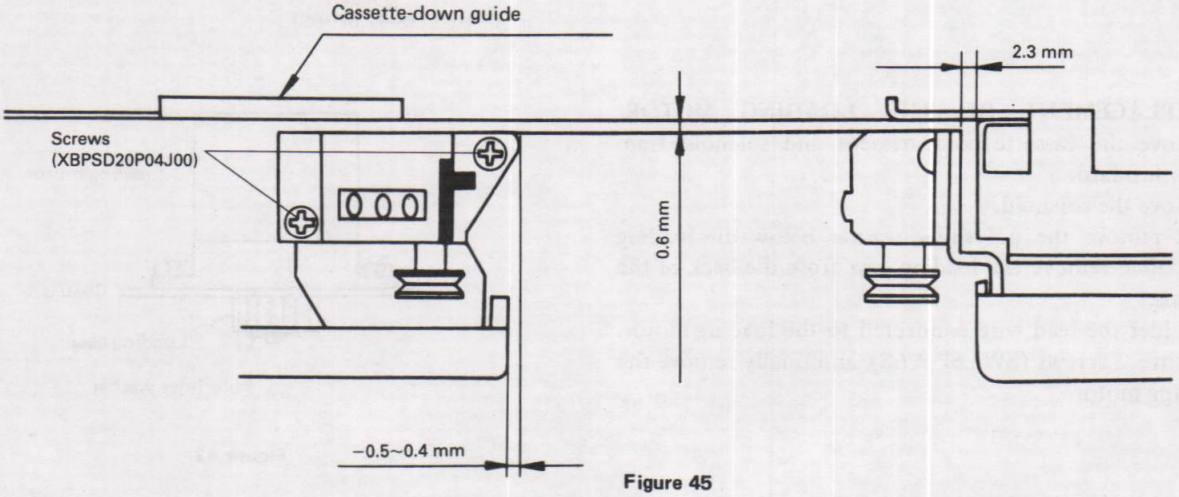
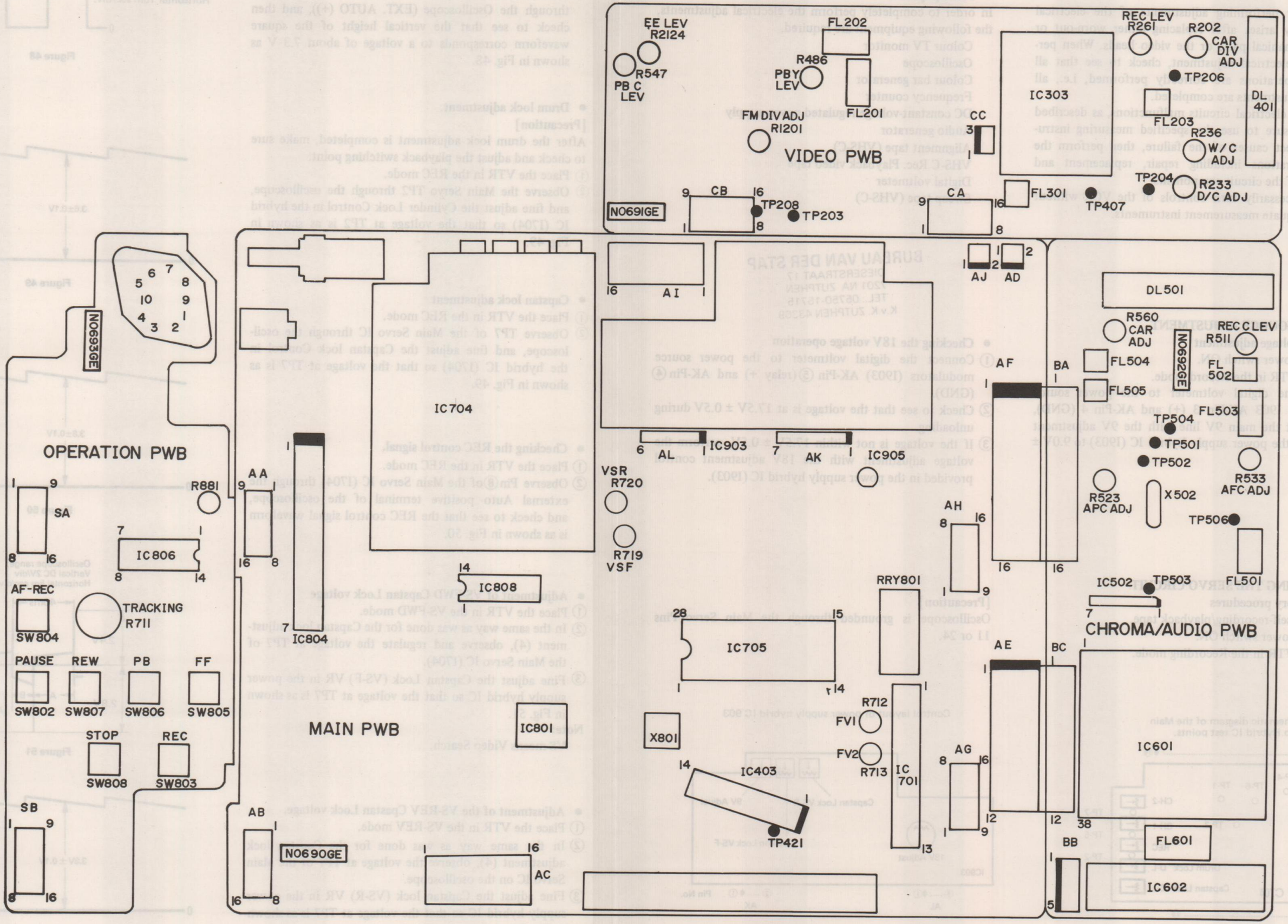


Figure 45

CHASSIS LAYOUT



ELECTRICAL CIRCUITRY ADJUSTMENT PROCEDURES

Introduction

The need for performing adjustments of the electrical circuits mostly arises after replacing either worn-out or damaged mechanical parts or the video heads. When performing the electrical adjustment, check to see that all mechanical operations are correctly performed, i.e., all mechanical adjustments are completed.

If any of the electrical circuits malfunctions, as described below, make sure to use the specified measuring instruments to detect causes of the failure, then perform the servicing operations including repair, replacement and adjustments of the circuit components.

Do not unnecessarily turn controls of the VCR without necessary adequate measurement instruments.

(1) POWER SOURCE ADJUSTMENT

- **Main 9V voltage adjustment**

① Turn the power switch ON.
② Place the VTR in the Record mode.
③ Connect the digital voltmeter to the power source modulators I903 AK-Pin 3 (+) and AK-Pin 4 (GND), then adjust the main 9V line with the 9V adjustment control in the power supply hybrid IC (I903) to 9.0V ± 0.1V.

(2) ADJUSTING THE SERVO CIRCUIT

- **Preparatory procedures**

① Insert the self-recording/playback tape.
② Turn the power switch ON.
③ Place the VTR in the Recording mode.

A schematic diagram of the Main Servo Hybrid IC test points.

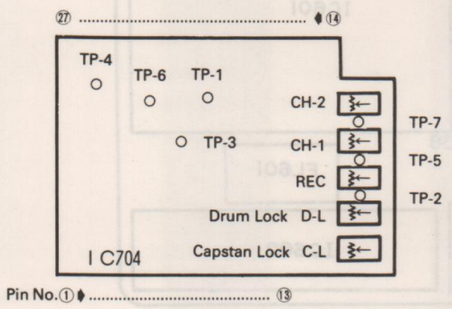


Figure 46

- **Test equipment**

In order to completely perform the electrical adjustments, the following equipment are required.

Colour TV monitor
Oscilloscope
Colour bar generator
Frequency counter
DC constant-voltage regulated power supply
Audio generator
Alignment tape (VHS-C)
VHS-C Rec. Playback video tape
Digital voltmeter
Sweep tape (VHS-C)

- **Checking the 18V voltage operation**

① Connect the digital voltmeter to the power source modulators (I903) AK-Pin ⑤ (relay +) and AK-Pin ④ (GND).
② Check to see that the voltage is at 17.5V ± 0.5V during unloading.
③ If the voltage is not within 17.5V ± 0.5V, perform the voltage adjustment with the 18V adjustment control provided in the power supply hybrid IC (I903).

[Precaution]

Oscilloscope is grounded through the Main Servo Pins 11 or 24.

Control layout of power supply hybrid IC 903

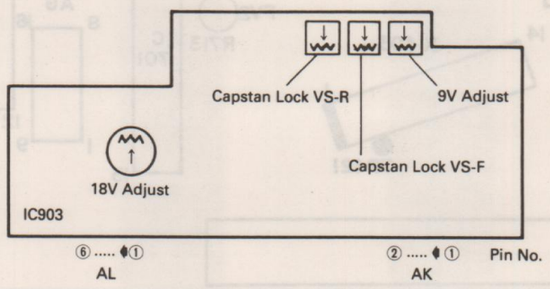


Figure 47

- **Checking the head switching pulse**

① Place the VTR in the REC mode.
② Observe the output from the Main Servo (I704) Pin ㉓ through the Oscilloscope (EXT. AUTO (+)), and then check to see that the vertical height of the square waveform corresponds to a voltage of about 7.3 V as shown in Fig. 48.

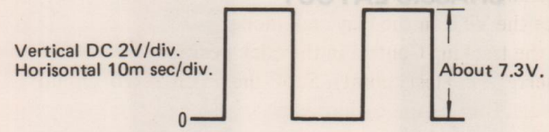


Figure 48

- **Drum lock adjustment.**

[Precaution]

After the drum lock adjustment is completed, make sure to check and adjust the playback switching point.

① Place the VTR in the REC mode.
② Observe the Main Servo TP2 through the oscilloscope, and fine adjust the Cylinder Lock Control in the hybrid IC (I704) so that the voltage at TP2 is as shown in Fig. 49.

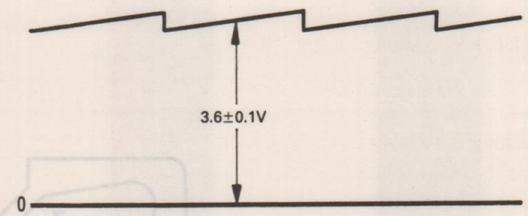


Figure 49

- **Capstan lock adjustment**

① Place the VTR in the REC mode.
② Observe TP7 of the Main Servo IC through the oscilloscope, and fine adjust the Capstan lock Control in the hybrid IC (I704) so that the voltage at TP7 is as shown in Fig. 49.

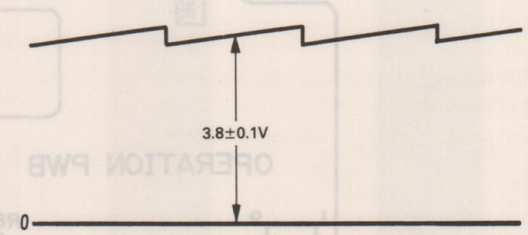


Figure 50

- **Checking the REC control signal.**

① Place the VTR in the REC mode.
② Observe Pin ⑧ of the Main Servo IC (I704) through the external Auto positive terminal of the oscilloscope, and check to see that the REC control signal waveform is as shown in Fig. 50.

- **Adjustment of VS-FWD Capstan Lock voltage**

① Place the VTR in the VS-FWD mode.
② In the same way as was done for the Capstan lock adjustment (4), observe and regulate the voltage at TP7 of the Main Servo IC (I704).
③ Fine adjust the Capstan Lock (VS-F) VR in the power supply hybrid IC so that the voltage at TP7 is as shown in Fig. 51.

Note:

VS means Video Search.

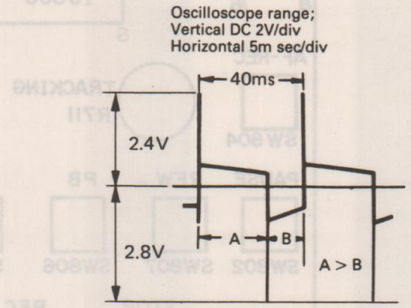


Figure 51

- **Adjustment of the VS-REV Cpastan Lock voltage.**

① Place the VTR in the VS-REV mode.
② In the same way as was done for the Capstan lock adjustment (4), observe the voltage at TP7 of the Main Servo IC on the oscilloscope.
③ Fine adjust the Capstan lock (VS-R) VR in the power supply hybrid IC so that the voltage at TP7 is as shown in Fig. 52.

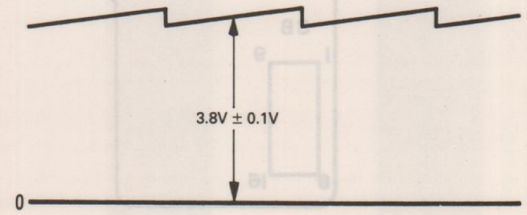


Figure 52

- **Checking the tracking pre-set.**

① Place the VTR in the Playback mode.
② Set the tracking Control in the click position.
③ Observe TP (test point) 5 of the main servo circuit through CH1 of the oscilloscope.
④ Check to see that the pulse width is 26.0 ± 1.0 msec.

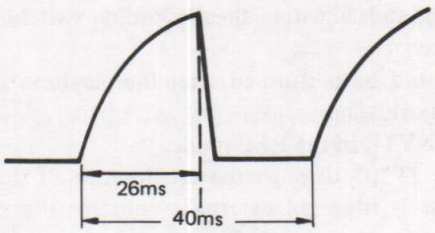


Figure 53

- **Checking the Playback drum lock.**

① Place the VTR in the Playback mode.
② Observe TP2 of the main servo circuit on the oscilloscope and check to see that the voltage at TP2 is 3.6 ± 0.1 V as shown in Fig. 49.

- **Checking the Playback capstan lock.**

① Place the VTR in the Playback mode.
② Observe TP7 of the main servo circuit on the oscilloscope and check to see that the voltage at TP7 is 3.8 ± 0.1 V as shown in Fig. 50.

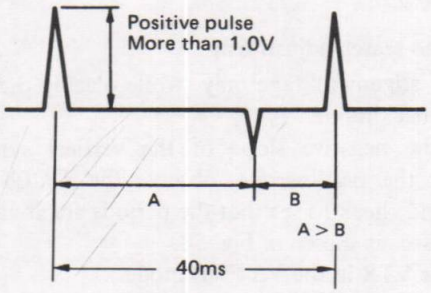


Figure 54

- **Checking the Playback control signal.**

① Place the VTR in the Playback mode.
② Observe the main servo circuit Pin 10 through the oscilloscope and check to see that both the Playback and control signal remain in the value (more than 1.0 V of the positive pulse), as shown in Fig. 54.

- **Checking the Playback switching point.**

[Precautions]

After the Playback switching point has been adjusted, the Recording siwtching point must always be checked.

① Use the alignment tape only, while placing the VTR in the Playback mode.
② Set the tracking Control in the click position.
③ Observe TP203 on the oscilloscope. If the switching pulse is triggered externally, observe the switching pulse at CC connector ③ pin.
④ Using the positive slope of the vertical sync signal through the oscilloscope, properly adjust the CH2 Control (within the hybrid IC) so that the output waveform is as shown in Fig. 55.
⑤ Using the negative slope of the vertical sync signal through the oscilloscope, properly adjust the CH1 Control (within the hybrid IC) so that the output waveform is as shown in Fig. 56.

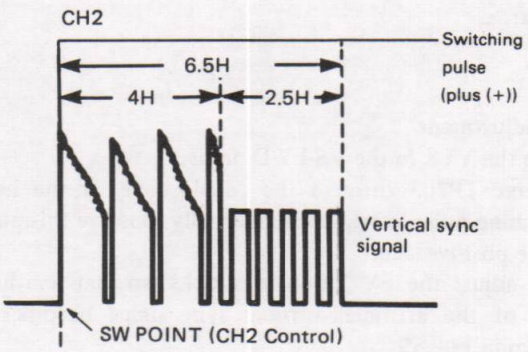


Figure 55

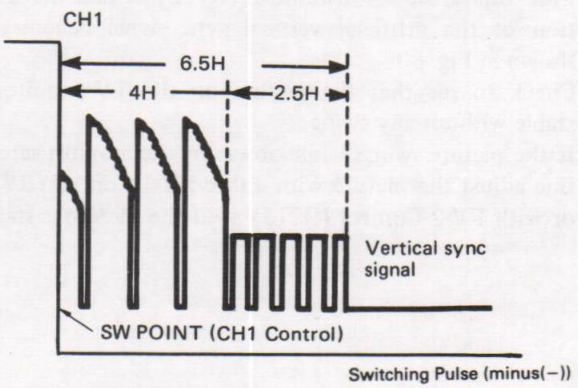


Figure 56

- **Checking and adjusting the Recording switching point.**

[Precautions]

* This should be performed after the playback switching point adjustment.

① Place the VTR in the REC mode.

② Observe TP203 through the oscilloscope. If the switching pulse is triggered externally, observe the switching pulse at CC connector ① Pin.

③ Using the positive slope of the vertical sync signal through the oscilloscope, properly adjust the REC VR (within the hybrid IC (I704)) so that the output waveform is as shown in Fig. 57.

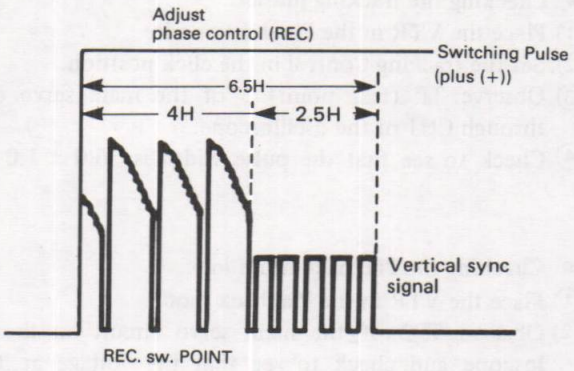


Figure 57

- **The video search adjustment**

① Use the alignment tape only, while placing the VTR in the Playback mode.

② Using the negative slope of the vertical sync signal through the oscilloscope, observe the TP208 (SYNC-OUT) and check to see that the periods are at an interval of 64 msec. as shown in Fig. 58.

③ Place the VTR in the VS-FWD mode.

④ Fine adjust the VS-FWD Control (R719) so that the periods of the pulse out from TP208 are at an interval of 64 msec. as shown in Fig. 58, and then check to see that the noise bar on the TV monitor vertically flows down.

⑤ Place the VTR in the VS-REV mode.

⑥ Fine adjust the VS-REV Control (R720) so that the periods of the pulse out from AG-Pin 7 are at an interval of 64 msec. as shown in Fig. 58., and then check to see that the noise bar on the TV monitor vertically flows upwards.

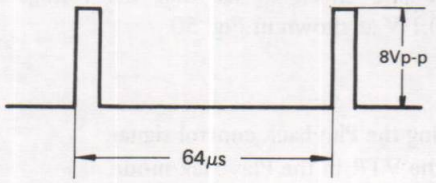


Figure 58

- **FV adjustment**

① Place the VTR in the VS-FWD mode.

② Observe TP203 through the oscilloscope. If the head switching pulse is triggered externally, observe this pulse at the positive side.

③ Fine adjust the FV-2 Control (R713) so that the duration of the artificial vertical sync signal becomes as shown in Fig. 59.

④ Then observe head switching pulse at negative side.

⑤ Fine adjust the FV-1 Control (R712) so that the duration of the artificial vertical sync signal becomes as shown in Fig. 60.

⑥ Check to see that the picture on the TV monitor is stable without any swing.

⑦ If the picture swings while observing the monitor screen, fine adjust the picture with either FV-1 Control (R712) or with FV-2 Control (R713) until the picture is stable.

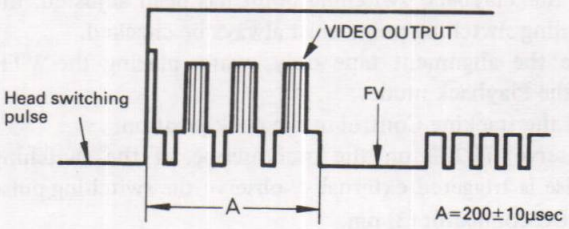


Figure 59

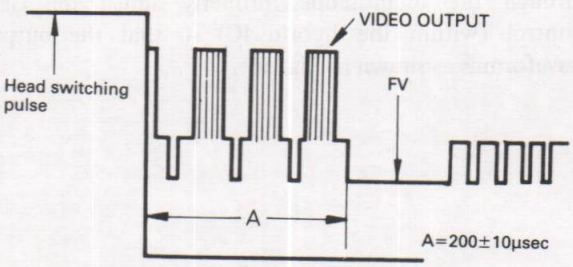


Figure 60

- **Checking the FV sync signal.**

① Place the VTR in the VS-FF (Playback/FF) mode.
② Observe TP203 through the oscilloscope. If the head switching pulse is triggered externally, observe this pulse at the positive side.
③ Check to see that the artificial vertical sync signal is being inserted as shown in Fig. 61.

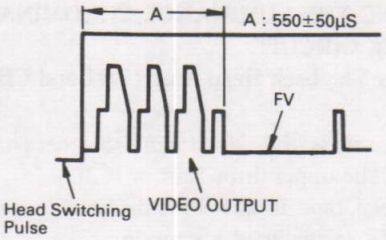


Figure 61.

- **Checking the Fine Edit operation.**

① Place the VTR in the REC mode.
② Observe TP7 (Capstan Lock) on the oscilloscope.
③ Place the VTR in the Pause mode.
④ Check to see that the tape stops after the tape has been sent back for about 2 seconds.
⑤ Check to see that the voltage variable in the Capstan Lock circuit is stabilized at 3.8V ± 0.5 V about 1 second after the Pause has been released.

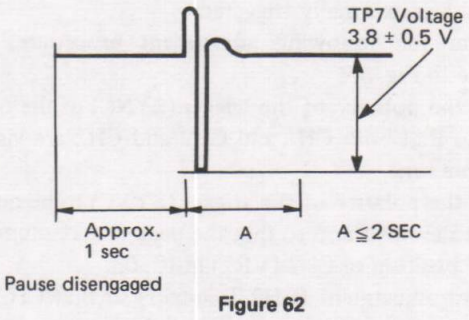


Figure 62

- **Checking the Cylinder motor current.**

① Place the VTR in the REC mode.
② Observe the Main Servo Circuit Pin②on the oscilloscope and check to see that both the voltage and ripple (sine waveform) remain in the values shown in Fig. 63.

Figure 63

- **Checking the Capstan motor voltage.**

① Place the VTR in the REC mode.
② Observe the power supply hybride IC (I903) AK-Pin ⑤ through the oscilloscope and check to see that the voltage at the relay positive terminal and the ripple waveform remain in the value shown in Fig. 64.

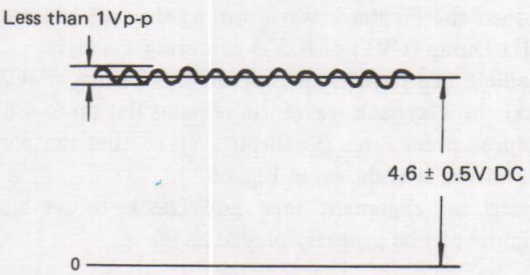


Figure 64

(3) ADJUSTING THE SYSTEM CONTROL CIRCUIT.

- **Adjusting the battery sensor.**

① Stabilize the battery voltage at 10.5 V ± 0.1 V.
② Place the VTR in the Stop mode.
③ Turn the Control (R881) on the Operation Circuit Board fully clockwise.
④ Slowly turn R881 counterclockwise, then stop the rotation as soon as the battery LED lights up.

- **Checking the battery sensor.**

① Check to see that, when the power source is reset from the 10.3 V ± 0.1 V of the battery voltage, the battery LED lights up.
② Check to see that the battery LED does not light up when the battery voltage is lowered from 12.5 V to 10.7 V ± 0.1 V.

(4) ADJUSTING THE LUMINANCE/CHROMINANCE PLAYBACK CIRCUIT.

- **Adjusting the Playback Head Amp (CH1 and CH2).**

[Precautions]

Do not adjust unless the adjustments are necessary after replacing either the upper drum unit or IC303.

① Insert a sweep tape in the VTR cassette compartment.
② Place the VTR in the Playback mode.
③ Connect the positive terminal of the Oscilloscope to TP206 and the negative terminal to the GND, while CC-Pin③is externally triggered.
④ Perform the following adjustment procedures in reference to Fig. 65.
ⓐ Invert the polarity of the trigger (SYNC) of the oscilloscope so that both CH1 and CH2 and CH2 are visible at the same time.
ⓑ Invert the polarity of the trigger (SYNC) to be negative.
ⓒ Adjust the waveform so that the peak is maximum at the DUMP position of CH2 (VR2) in IC303.
ⓓ Perform adjustment (CH2 Trimmer) so that CH2 waveform out from IC303 will be at a maximum centering 4.8 MHz.
ⓔ Reduce the peak frequency at CH2-Dump (VR2) of IC303 so that the Playback waveform remains flat up to 4.8 MHz.
ⓕ Repeat procedures ⓒ and ⓔ so that the Playback waveform is as shown in Fig. 65.
ⓖ Invert the polarity of the oscilloscope trigger to be positive.
ⓗ Adjust the Playback waveform so that the peak point is at maximum CH1-Dump of IC303.
ⓘ Adjust the Playback waveform so that it is maximum at CH1-Dump (CV1) of IC303 centering 4.8 MHz.
ⓙ Reduce the peak frequency at CH1-Dump of IC303 so that the Playback waveform remains flat up to 4.8 MHz.
ⓚ Repeat procedures ⓗ through ⓙ so that the playback waveform is as shown in Fig. 65.
⑤ Insert an alignment tape and check to see that the picture can be properly played back.

[Precautions]

If the sweep tape is not available, play back the alignment tape (colour bars) and properly adjust the CH1, CH2-Dump, CH1 and CH2-Peak so that the best picture can be obtained, free from even the slightest flicker and breakage. Record and Playback by yourself and check to see that there is no irregularity at all in the recorded and played back picture.

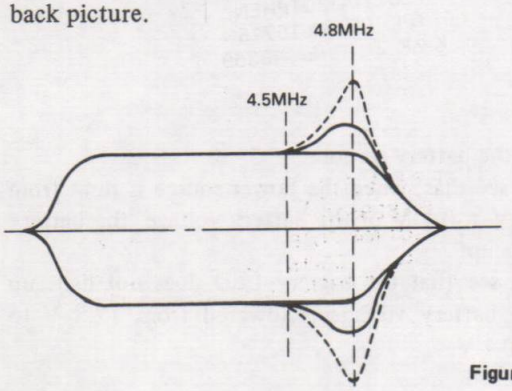


Figure 65-A

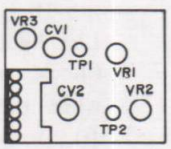


Figure 65-B Head amp. hybrid IC test point layout

- **Level adjustment of Playback video signal.**

[Precaution]

VIDEO OUT should be a 75 ohm terminal.

① Place the VTR in the Playback mode and play back the stair waveform recorded on the alignment tape.
② Observe both ends of a resistor across the 75 ohm terminal on the oscilloscope (at the external trigger TP208, then adjust resistor R486 (PB level) so that the playback video signal level will be as shown in Fig. 66. below.

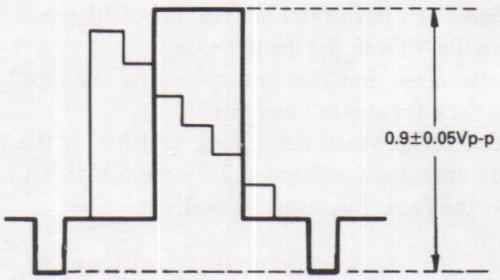


Figure 66

(5) ADJUSTING THE LUMINANCE/CHROMINANCE RECORDING CIRCUIT.

- **Adjusting the FM 3.8 MHz and 4.8 MHz frequencies.**

[Precaution]

Do not adjust the FM-modulated 3.8 MHz/4.8 MHz frequencies except after replacing either IC201 or IC202 or only when either the carrier setting (3.8 MHz) of deviation (4.8 MHz) requires readjustment.

* Place the VTR in the REC mode while short-circuiting the input.

① Release regulator R233 (dark clip) and R236 (white clip) from the state of being clipped.
② Connect the frequency counter to TP206.
③ Turn regulator R202 (carrier) so that the frequency counter reads an FM frequency of 3.8 MHz.
④ Connect a regulated power source and oscilloscope to IC202-Pin⑱, and then observe the DC voltage.
⑤ Properly adjust the voltage of the regulated power source, and then note the DC voltage when the frequency counter reads 4.8 MHz.
⑥ Feed a stair waveform to the input, and then adjust resistor R2101 (AGC) so that the white peak becomes the DC voltage noted in procedure⑤.

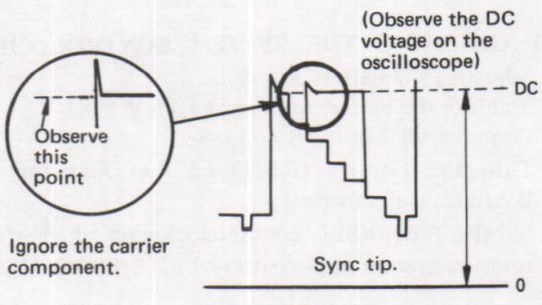


Figure 67

- **Adjusting the E-E (Electric to Electric) level.**

[Precaution]

VIDEO OUT should be a 75 ohm terminal.

① Place the VTR in the REC mode.

② Feed colour bars (stair waveform) to the oscilloscope and observe both ends of a resistor across the 75 ohm terminal on the oscilloscope (at the external trigger TP208), and finally adjust resistor R2124 (EE level) so that the stair waveform becomes as shown in Fig. 68.

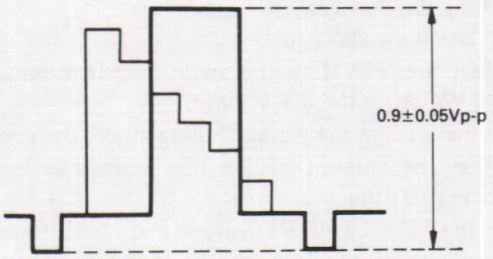


Figure 68

- **Adjusting the White/Dark clips.**

① Place the VTR in the REC mode.

② Input colour bars (stair waveform) of 1 V peak to peak.

③ While observing TP204 on the oscilloscope, fine adjust WHITE CLIP (R236) and DARK CLIP (R233) so that the overshoot and undershoot are as shown in Fig. 69.

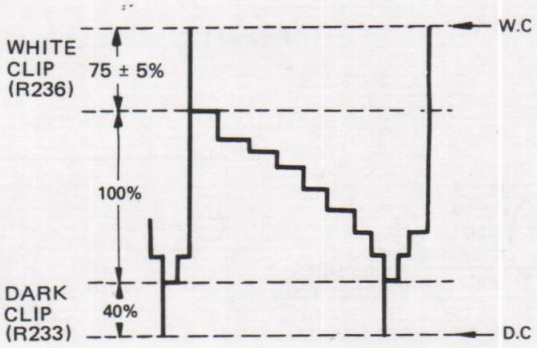


Figure 69

- **Adjusting the FM REC balance and REC current.**

① Place the VTR in the REC mode.

② Feed colour bars (stair waveform) of 1 Vp-p to the video input.

③ Observe the input waveform through a dual-trace oscilloscope (at the external trigger TP413) and perform the following adjustments.

1) Connect CH1 and CH2 of the oscilloscope to TP1 and 2 of IC303 and simultaneously observe both channels.
2) Adjust so that the REC FM current will be at a minimum at resistor R261 (REC FM).
3) Fine adjust the REC FM signal waveform with the REC Balance VR3 of IC303 so that the waveforms in both channels are equally balanced as shown in Fig. 70-(a).
4) Fine adjust the Red component with REC Chroma (R511) so that the level of the red component is 34 mVp-p.

④ Switch the oscilloscope so that only CH1 is made available.

⑤ Adjust resistor R261 (REC FM) so that the level of sync chip portion is 135 mVp-p as shown in Fig. 70-(b).

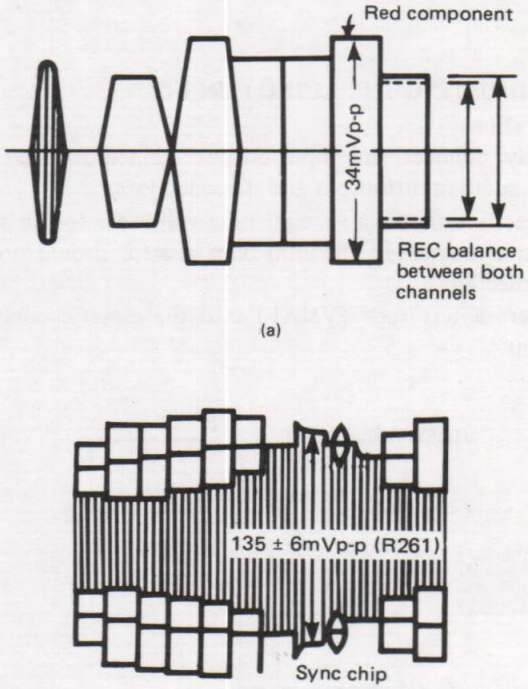


Figure 70

(6) ADJUSTING THE LUMINANCE/CHROMINANCE CIRCUITS.

- **4.43 MHz VCO Adjustment**

① Play back the alignment tape.
② Connect the frequency counter to TP503.
③ Fine adjust resistor R523 (VCO) so that the frequency counter reads at 4.433619 MHz ± 10 Hz.

- **AFC Adjustment (160 fH VCO)**

① Place the VTR in the REC mode and supply colour bars (stair waveform) to the video input.
② Connect the ressistor (680 ohm) to TP501 and TP502.
③ Connect the frequency counter to TP504, while T502 is grounded.
④ Fine adjust resistor R533 (160 fH VCO AFC) so that the frequency counter reads at 625 KHz ± 1KHz.
⑤ Disconnect the resistor.

- **Carrier Balance Adjustment**

① Play back the alignment tape.
② Using the external trigger TP208, observe TP506 on the oscilloscope, and then adjust resistor R560 (Carrier Balance) so that the width of the playback waveform becomes a minimum as shown in Fig. 71.

(7) ADJUSTING THE AUDIO CIRCUIT.

Preparations:

① Fully connect the input/output connectors including the audio input/output and the video input.
* Directly connect a vacuum tube voltmeter to the audio output terminal. The 600 ohm resistor should not be connected.
② Insert a test tape (VMAE) into the cassette compartment.

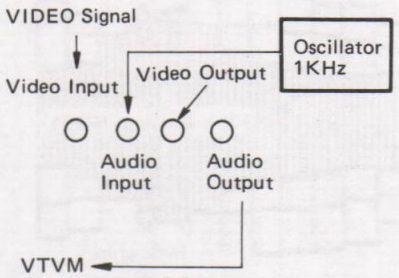


Figure 72

- **Adjusting the Playback Output Level.**

① Play back the alignment tape containing a 1 KHz level control signal.
② Connect a VTVM (1 V range) to the audio output terminal.
③ Adjust the Playback Level VR1 in I601 so that the output level is minus (-) 9.5 ± 1 dBm, which can be measured on the dBm scale of the VTVM.

- **Adjusting the Bias Current.**

① Place the VTR in the REC mode, without an audio input signal.
② Connect the VTVM to both terminals of resistor R811 on the head board so that the guide pole is on the negative side and the VTVM is set to the 10 mV range.
③ Adjust the Bias Adjustment VR2 in I601 so that the bias current is 360 mA with the VTVM reading at 3.6 ± 0.2 mV.

- **Checking the Bias Leakage**

① Eliminate the audio signal.
② Connect the VTVM to the audio output terminal with the VTVM set to the 0.3 V range.
③ Place the VTR in the Audio Dubing mode, then check to see that the amount of the bias leakage is less than minus (-) 20 dBm.
④ Place the VTR in the REC mode and check to see that the amount of the bias leakage is less than -20 dBm using the dBm scale on the VTVM.

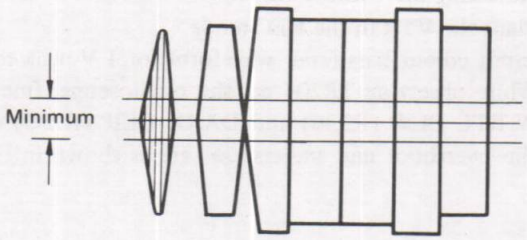


Figure 71

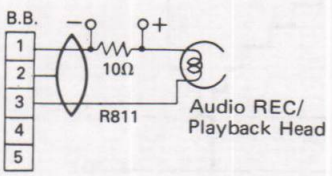


Figure 73-A

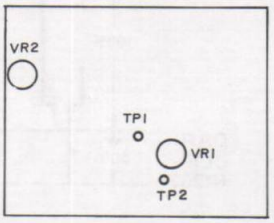


Figure 73-B Audio hybrid IC test point layout

- **Checking the E-E level.**

① Feed a 1 KHz, 0.22 V (-20 dBm) signal to the Audio Input terminal.
② Connect the VTVM to the Audio Output terminal with the meter set to the 1 V range.
③ Place the VTR in the REC mode.
④ Check to see that the audio output is -5 dBm ± 1 dB using the dBm scale on the VTVM.

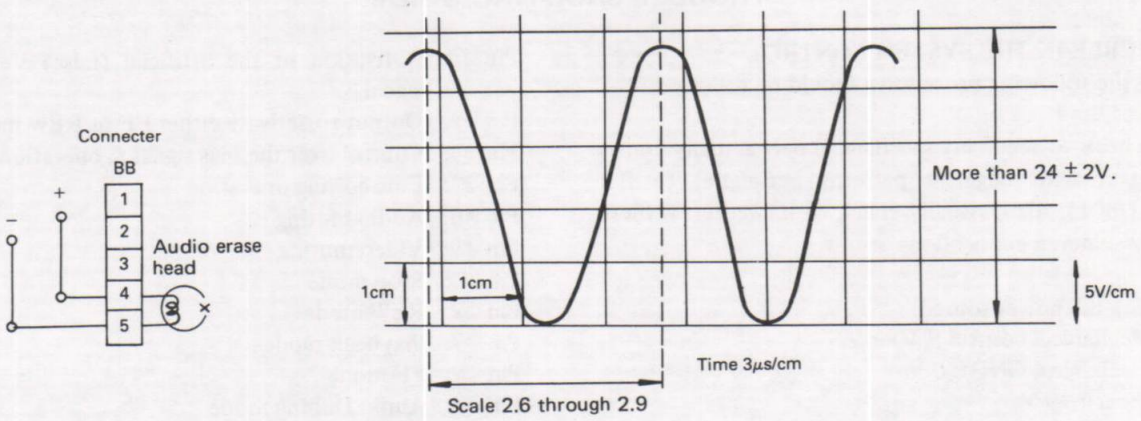


Figure 74

- **Checking the erased voltage Bias oscillation frequency. Refer to Fig. 74.**

① Place the VTR in the REC mode.
② Connect the oscilloscope to the audio erase head. The oscilloscope should have a scale which indicates 10 V/div and 1 ms/div.
③ Check to see that the erased voltage was 24 ± 2 Vp-p.
④ Connect the frequency counter to the audio erase head. The counter should be set to 0.1 S.
⑤ Check to see that the oscillation frequency is 70 ± 3 KHz.
⑥ Place the VTR in the DUB-In mode.
⑦ In the same manner check steps 2-5.

- **Checking the Self-Recorded/Playback Signal Level.**

① Input an arbitrary video signal to the Video Input terminal.
② Connect the oscilloscope to the Audio Input terminal.
③ Feed a 1 KHz (-20 dBm) signal to the Audio Input terminal.
④ Connect the VTVM (1 V range) to the Audio Output terminal.
⑤ Hold the VTR in the REC mode for 10 seconds.
⑥ Play back the portion just recorded and check to see that the playback signal level is minus (-) 5 ± 2 dBm.

- **Checking the video camera terminals.**

① Connect the VTVM to the camera audio terminals 7 and 8 (G).
② Feed a 1 KHz (-20 dBm) signal to the camera audio input terminal.
③ Connect the VTVM (1 V range) to the audio output terminal.
④ Place the VTR in the REC mode.
⑤ Check to see that the camera audio output level is -5 ± 1 dBm.

[Precaution]
Input a video signal to the camera video input terminal (1, 2 (G)).

- **Checking the microhone amplifier**

① Connect the VTVM to the microphone terminal.
② Feed a 1 KHz (-70 dBm) audio signal to the microphone terminal.
③ Connect the VTVM (VV) to the audio output terminal. (VV = 1 V range)
④ Place the VTR in the REC mode.
⑤ Check to see that the microphone output level is -5 ± 1 dBm.

TROUBLE SHOOTING GUIDE

(1) TROUBLE IN THE SYSTEM CONTROL

Basically, the following procedures should be followed.

1. Visually check to see if any mechanical part actually comes into contact with negative patterns peripheral to flat packages (I801). Also, visually check with tweezers if there are poorly soldered connections or not.

2. Checking the power source.

Pin ⑧ (Mechanical control 9 V): +9 V
Pin ⑭ (Mechanical GND): 0 V
Pin ⑮ (Clear): +9 V
Pin ㉕ (Mechanism earth): 0 V
Pin ㊳ (Mechanical control 9 V): +9 V
Pin ㊶ (Voltage Refereme (V_R): +4 V ~ +5 V (Type 4.7 V)

3. Checking the micro-computer clock signal

Pin ⑱ (ϕ2+): 100 kHz Square wave Pin ⑯ 400 kHz Sine wave
Pin 30 (Flash output): 0.5 sec. ON – 0.5 sec. OFF Square wave
Pin ㊻ (F): 2.5 kHz Square wave

After correctly checking the status of the clock pulses out from the microprocessor, in order to ensure correct operations of the clock pulses, it is essential that the microprocessor is correctly operative and all the necessary data signals are correctly being input to the microprocessor.

4. Checking the controllable objects.

Feed a +9 V voltage out to the Pin ⑧ or Pin ㊳, of the System Control Circuit and check the operations performed by the Loading and Capstan motors and solenoid brake. The following operations can be checked by using this method.

Pin ②: Reverse rotation of the Loading motor
Pin ③: Control over the Loading motor
Pin ④: Reverse rotation of the Capstan motor
Pin ⑤: Muting operation of the Capstan motor
Pin ⑥: Muting operation of the Cylinder motor
Pin ⑦: Output during Unloading operation
Pin ⑫: Retraction of the solenoid brake
Pin ⑬: Returning operation of the solenoid brake
Pin ㉝: Activation of the artificial (false) Vertical Sync signal.
Pin ㉟: Output to activate either FF or REW mode.
Pin ㊲: Control over the bias signal & operation.
Pin ㊴: Fine editing operation
Pin ㊶: Audio muting
Pin ㊸: Video muting
Pin ㊷: Stop mode
Pin ㊸: REW mode
Pin ㊹: Playback mode
Pin ㊺: FF mode
Pin ㊻: Audio Dubing mode
Pin ㊼: REC mode
Pin ㊽: Pause mode
Pin ㊿: Power Control

5. Checking the independent input voltages.

Pin ⑲ (Stop input): 0 V
Pin ⑳ (Take-up reel): Normally, 0 V through 9 V. Pins ⑳ and ㉑ send out square waves while the Capstan motor rotates.
Pin ㉑ (Supply reel): Normally, 0 V through 9 V. Pins ⑳ and ㉑ send out square waves while the Capstan motor rotates.
Pin ㉒ (Cylinder sensor input): Normally, 0 V through 9 V. Pin ㉒ outputs a square wave while the cylinder motor rotates.
Pin ㉗ (Playback control input): 0 V, Control Signal (Square wave) input of Playback or record mode
Pin ㉘ (Power saving input): 9 V
Pin ㉙ (Camera Pause): 9 V
Pin ㊺ (Mechanical Ground): 0 V

6. Checking the Analog/Digital input.

Pins ㊼, ㊾, and ㊿ respectively make up the Analog/Digital input terminals, where the voltages are represented by the following equation.

$$Vin = VR + (VCC - VR) \times n/8$$

where

Vin is the voltage at the input terminal,
VR is the reference voltage at Pin ㊶,
VCC is the power source voltage either at Pin ⑧ or

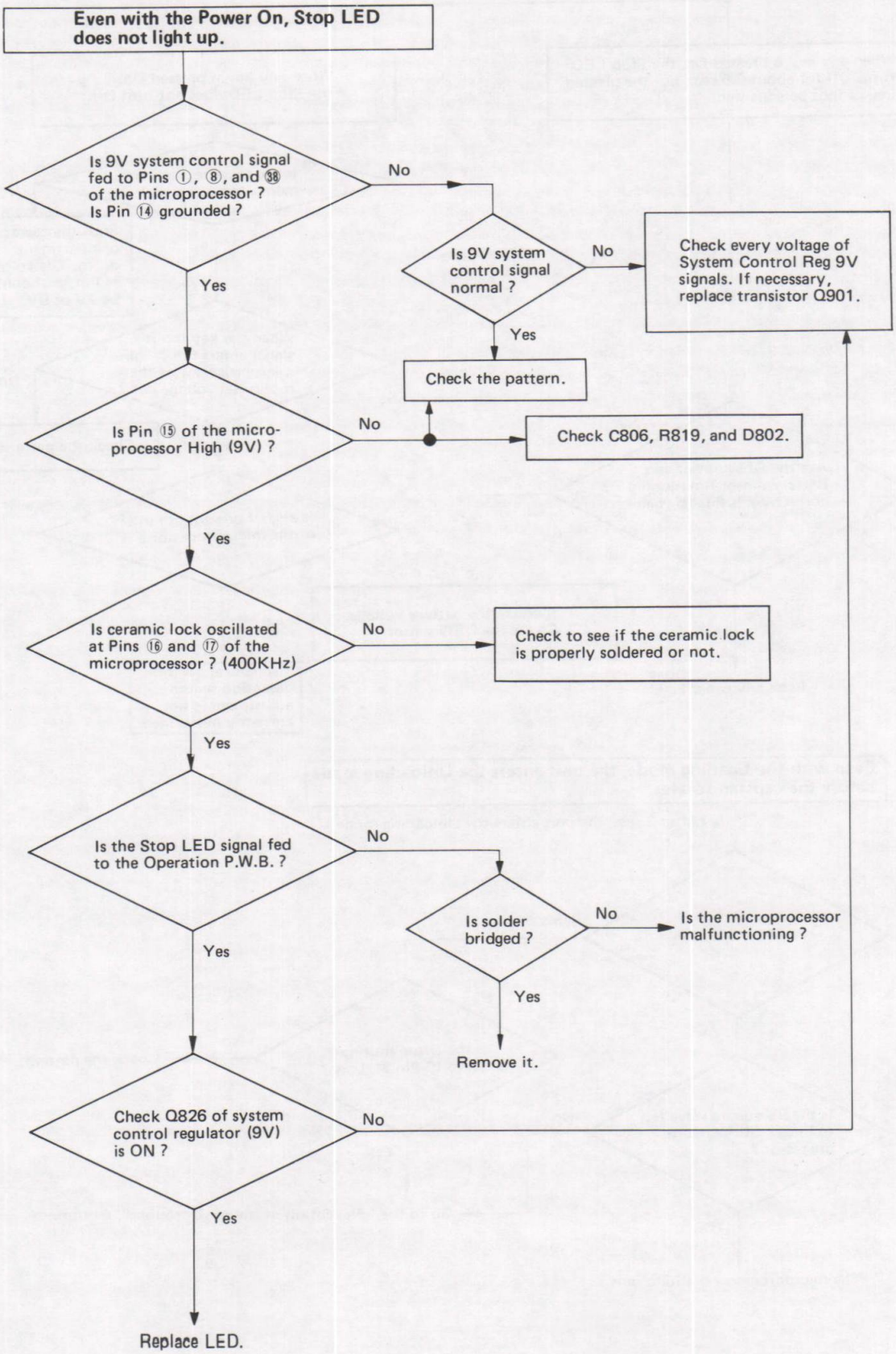
Example of the Analog/Digital input voltages when VR is 4.62V and VCC 8.81V.

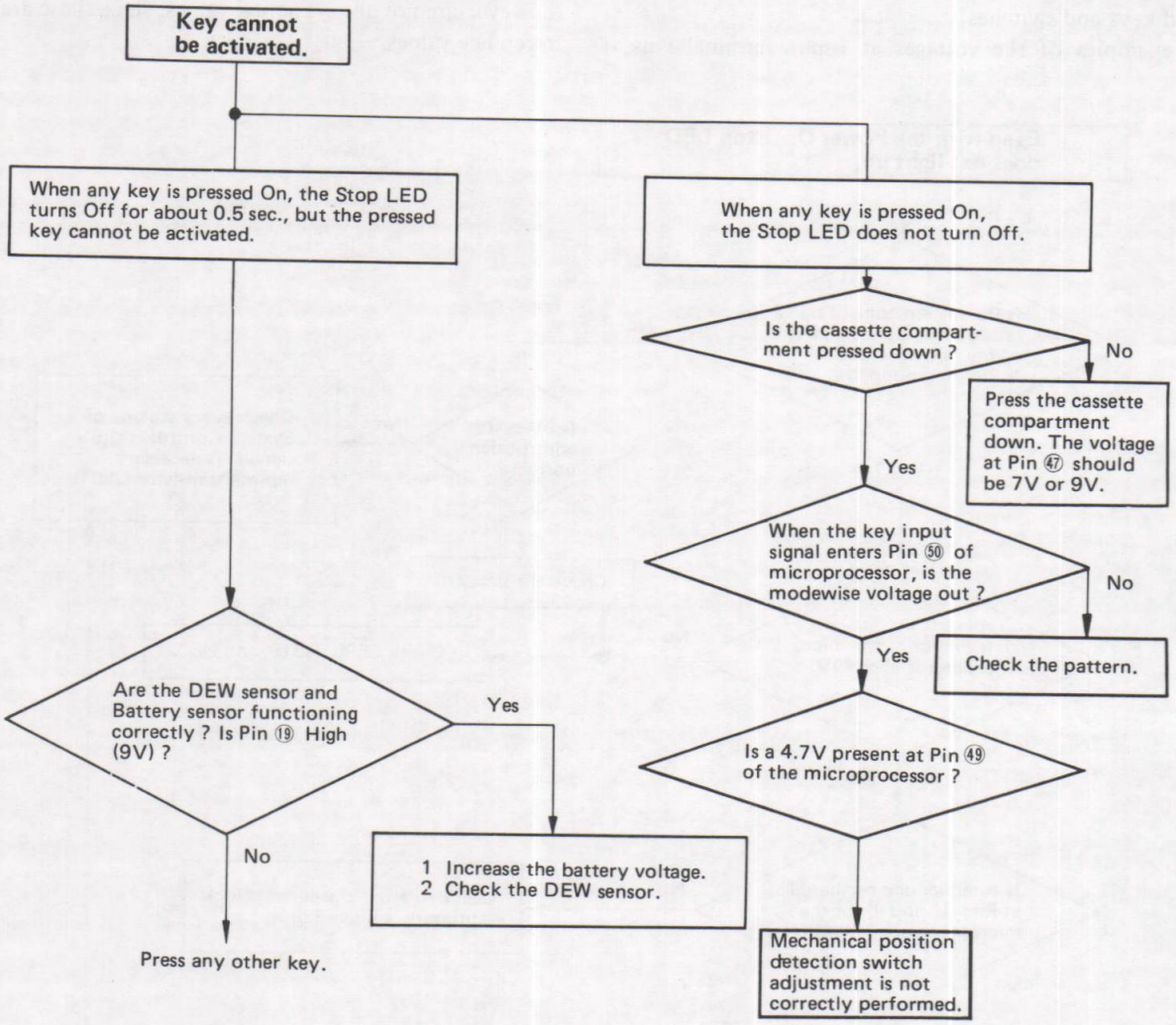
n	SW condition	Voltage at Pin 47	SW condition	Voltage at Pin 49	Key condition	Voltage at Pin 50
0	Cassette SW OFF REC TIP OFF	4.62V	All mechanical SWs OFF	4.62V	All keys are OFF	4.62V
1						
2					Pause Key ON	5.67V
3					REC Key ON	6.19V
4	Cassette SW ON REC TIP OFF	6.72V	All SW ON	6.72V	DUB Key ON	6.72V
5					FF Key ON	7.24V
6			Pinch OFF SW ON	7.76V	Playback Key ON	7.76V
7					REW Key ON	8.27V
8	Cassette SW ON REC TIP ON	8.81V	Unloading SW ON	8.81V	Stop Key ON	8.81V

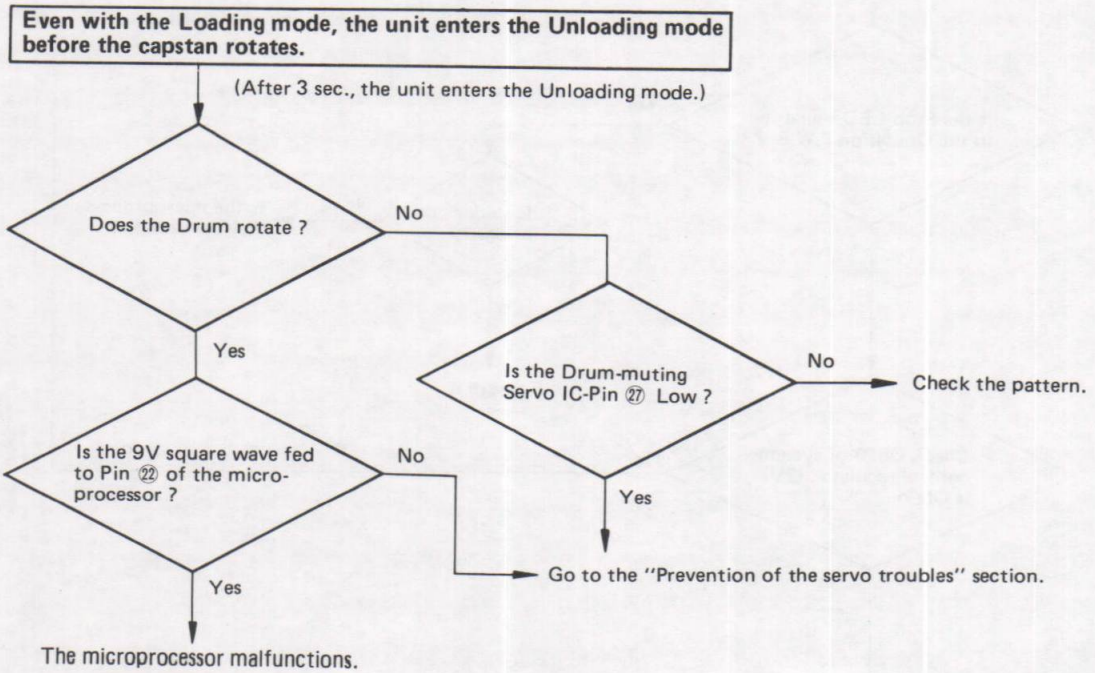
at Pin ㊳.

n is an integer (0 through 8) determined by the activated keys and switches.

Typical examples of the voltages at Input terminal Pins ㊼, ㊾, and ㊿ are shown in the Table below. Note that VR = 4.62 V and VCC = 8.81 V. The voltages shown below however are not always actual values, since these are merely reference values.







About 1 sec. after starting rotation, the capstan motor stops.

If the reel waveform of more than 0.3Vp-p sent to Pin ② of I705 ? Is the 9V square wave sent from Pin ③ ?

No

- FPC malfunctions. (Improper FPC contact) (Connector AC check)
- Check the pattern. (Check the connector.)
- Reel sensor (photo-coupler) malfunctions. (Q809)

If the reel waveform is less than 0.3Vp-p, apply 1.5K resistance to R803 (FPC).

Yes

Is the 9V square wave fed to Pin ㉑ of the microprocessor ?

No

- Check the pattern.
- Check the solder bridge.

Yes

Is the 7V square wave fed to Pin 11 of Take Up sensor I808 ? Is the 9V square wave sent out from Pin ⑩ ?

No

- FPC malfunctions. (Improper FPC contact).
- Check the pattern.
- Hall IC malfunctions. (I810)

Yes

Is the 9V square wave fed to Pin ⑳ of the microprocessor ?

No

Yes

Microprocessor malfunctions.

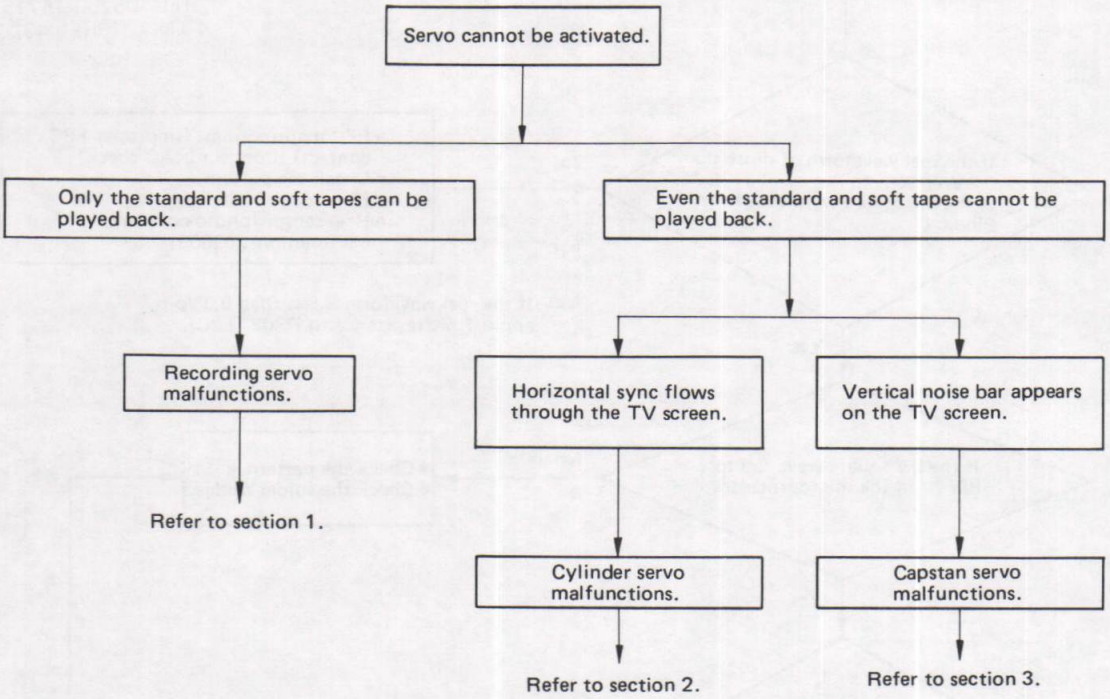
Even though the tape remains more than 3 min. by length, the Rec LED flashes.

- Is R8818 improperly connected ?
- Is an AL-High signal fed to I705-Pin ⑩ ?

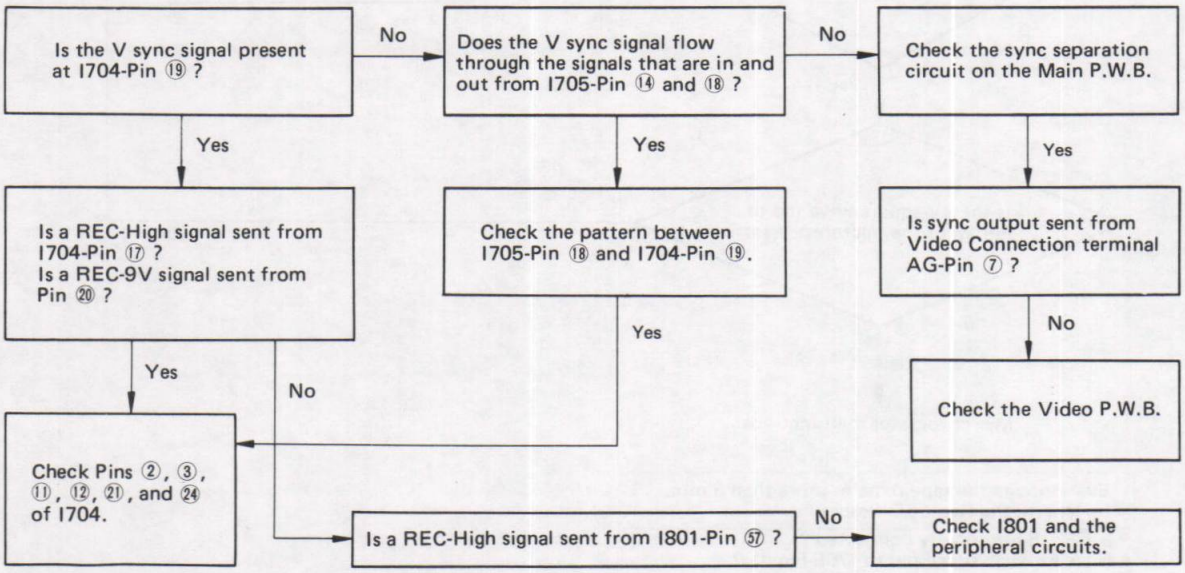
No pulse is sent out from I705-Pin ㉔ during the PB/REC mode.

- Is I705-Pin ㉒ grounded ?
- Is C8804 properly connected ?

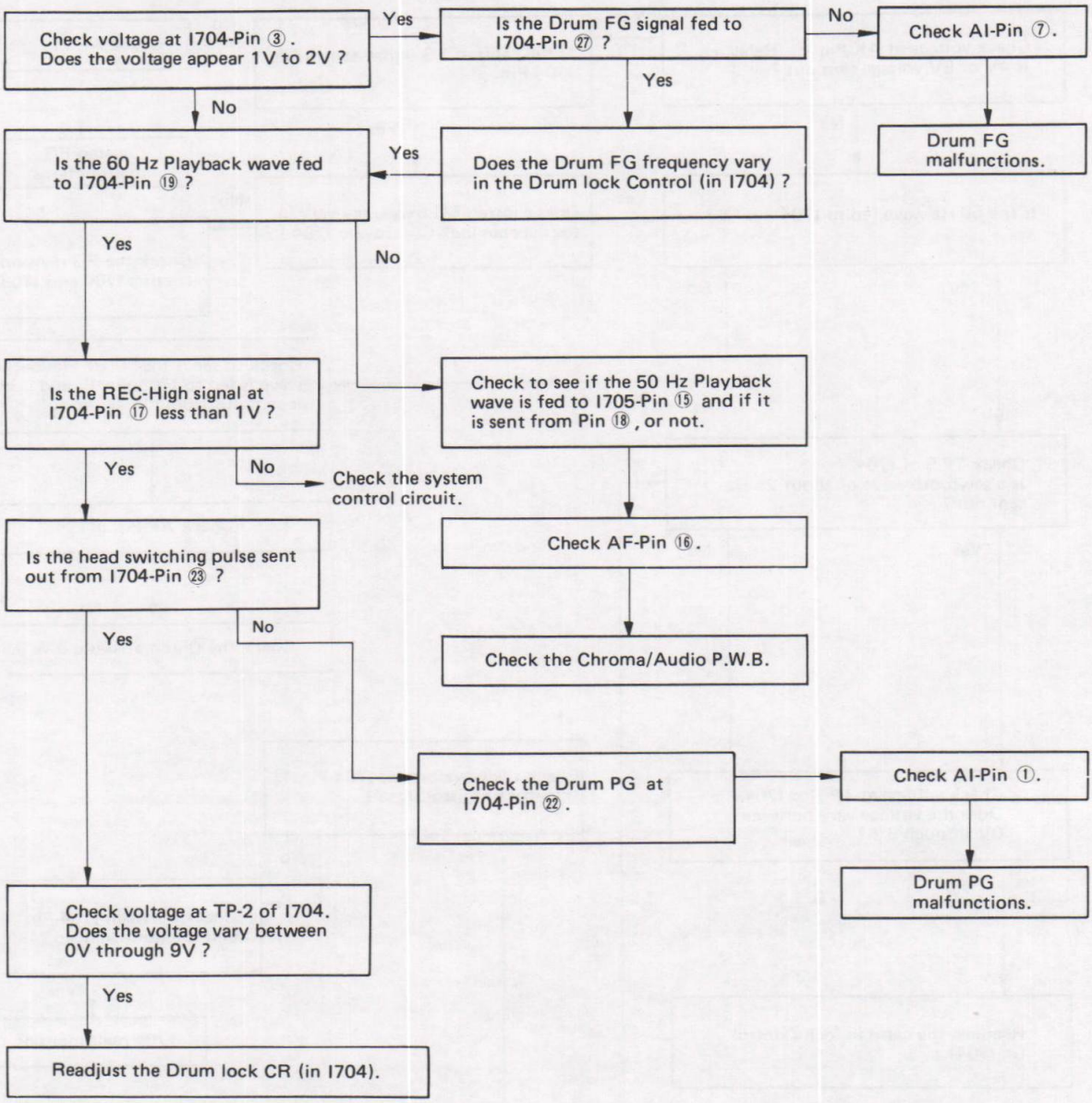
2. TROUBLESHOOTING GUIDE FOR THE SERVO CIRCUIT.



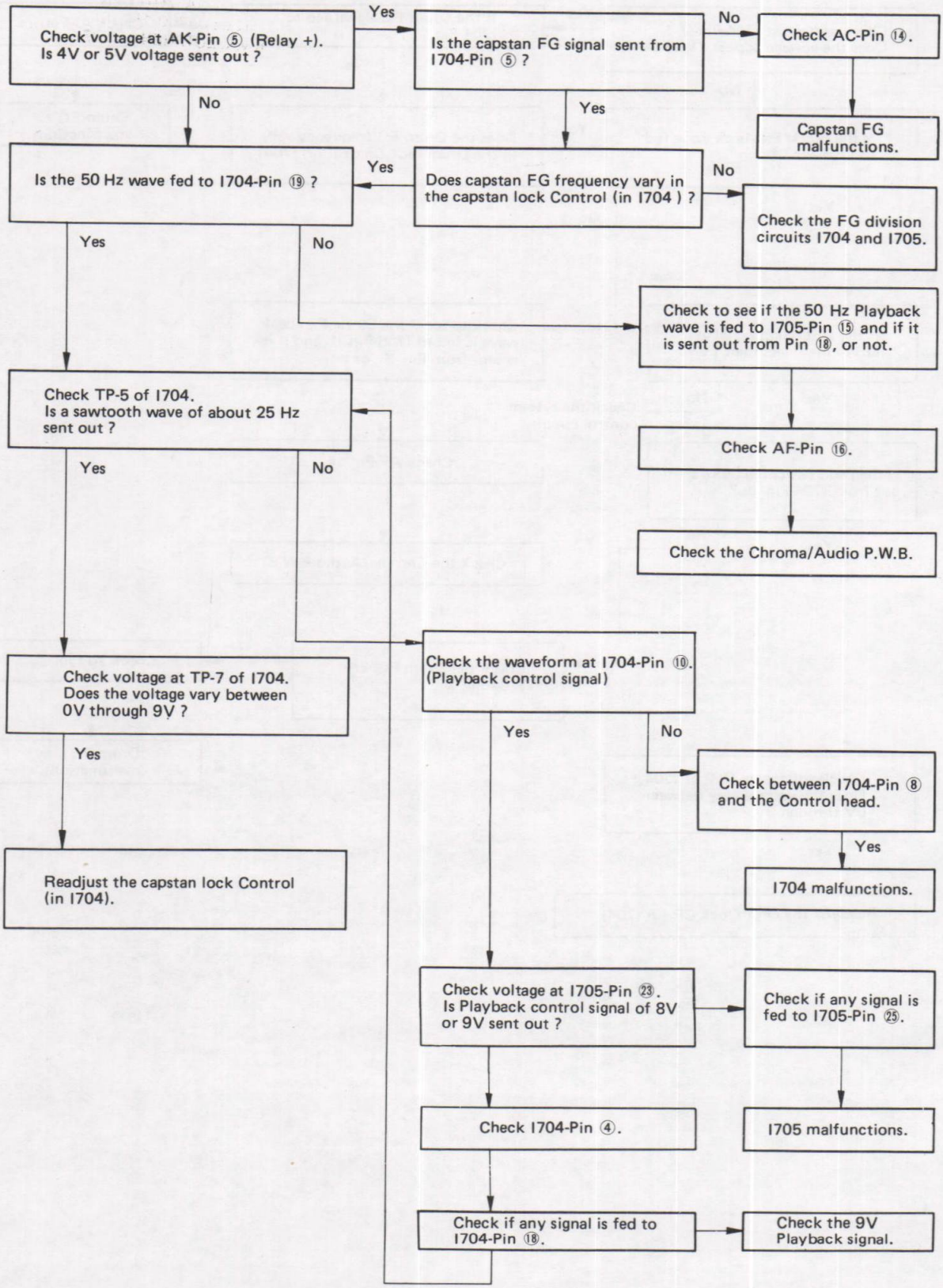
① When the recording servo malfunctions.



② When the Drum servo malfunctions. (Perform adjustment in the Playback mode.)



③ When the capstan servo malfunctions. (Perform adjustment in the Playback mode.)



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.
DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.

The indicated voltages in the above diagram are the ones measured with a VTVM upon receiving color bar (400Hz Sound Signal); the values for Record mode are parenthesized; the values for Play mode are not parenthesized.
This applies to all circuits.

NOTE:
1. *The unit of resistance "ohm" is omitted (K-1000 ohms M-1 Meg ohm).*
2. *All resistors are ¼ watt, unless otherwise noted.*
3. *All capacitors μF, unless otherwise noted P-μμF.*

Voltages and waveforms are measured as follows:
- *DC voltages are measured with VTVM placed between points indicated and chassis ground, line voltage set at 12V DC and all controls for normal positions.*

This circuit diagram is a standard one. Circuits printed may be subject to change for product improvement without prior notice.

SCHEMATIC DIAGRAM OF MAIN CIRCUIT

Note: Part Symbol

; Chip resistor

; Chip capacitor

or

Reference signal

Control signal

Drum comparison signal

Capstan comparison signal in plyback mode

Record audio signal

Circuits in motion during video search mode

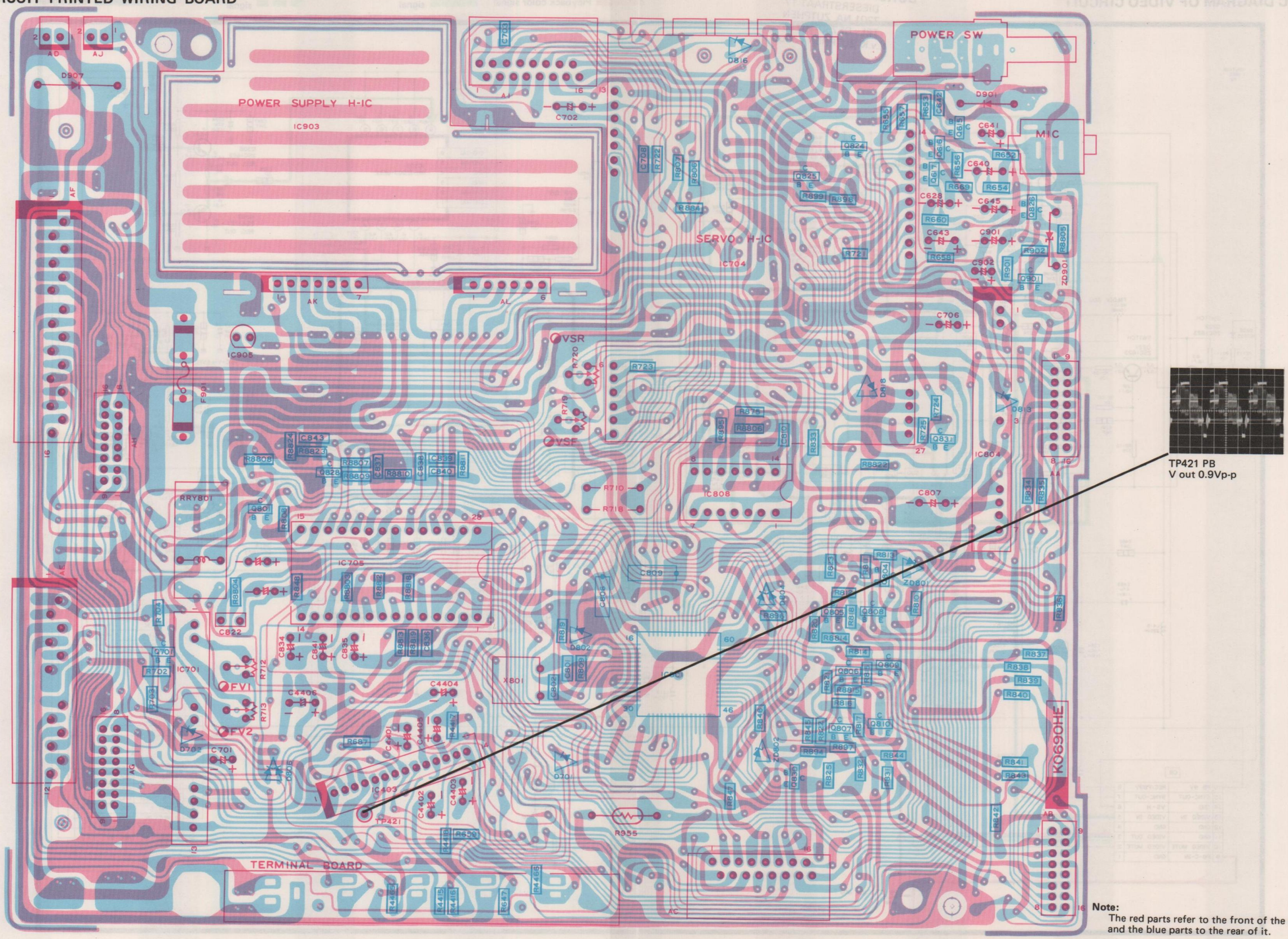
Capstan comparison signal in record mode

This signal contains EE signal of audio.

The signal symbol mark is CAMERA SIGNALS, is this not capstan comparison signal in P.B/REC mode and record audio signal.

TR : TAPE REMAINING

MAIN CIRCUIT PRINTED WIRING BOARD

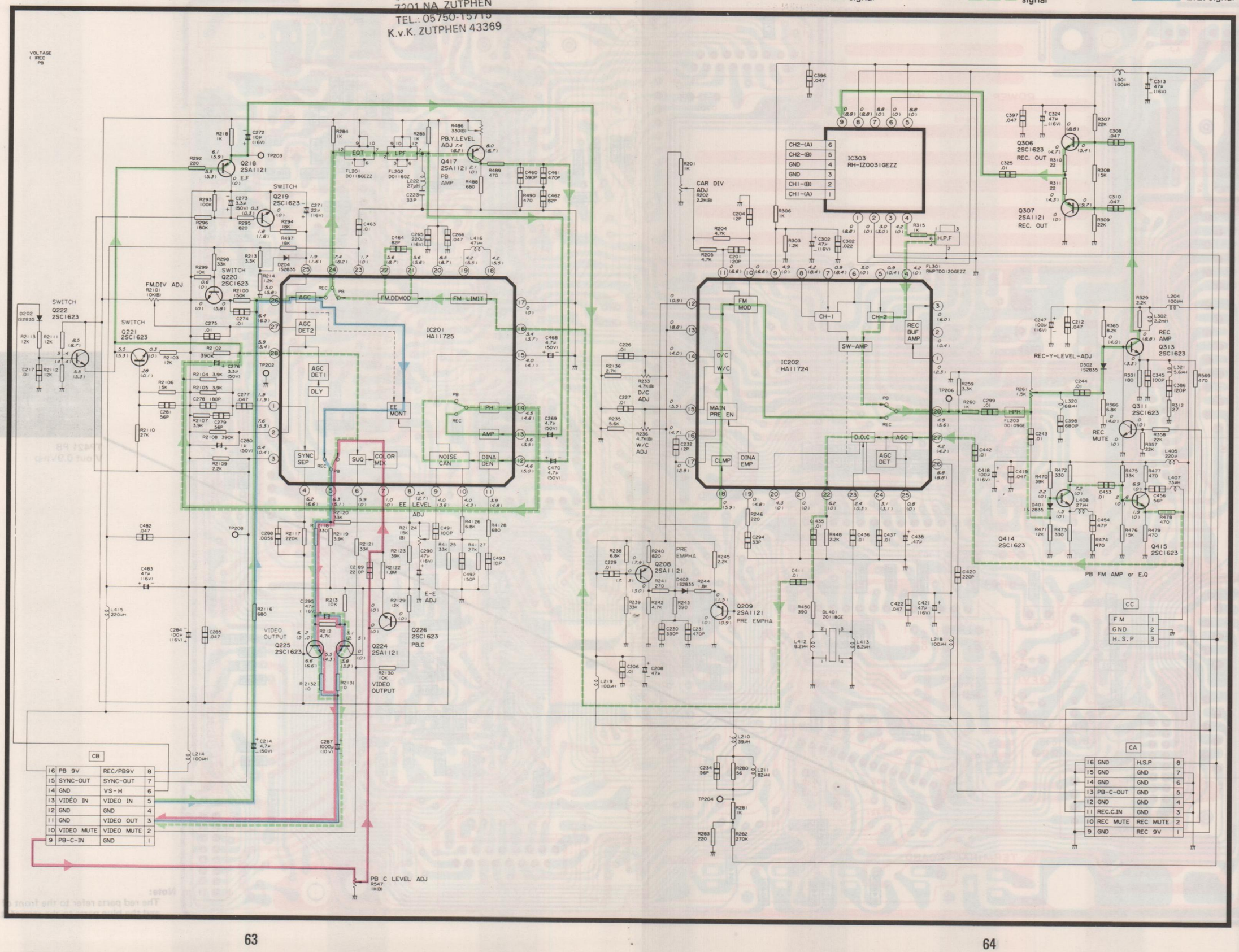


TP421 PB
V out 0.9Vp-p

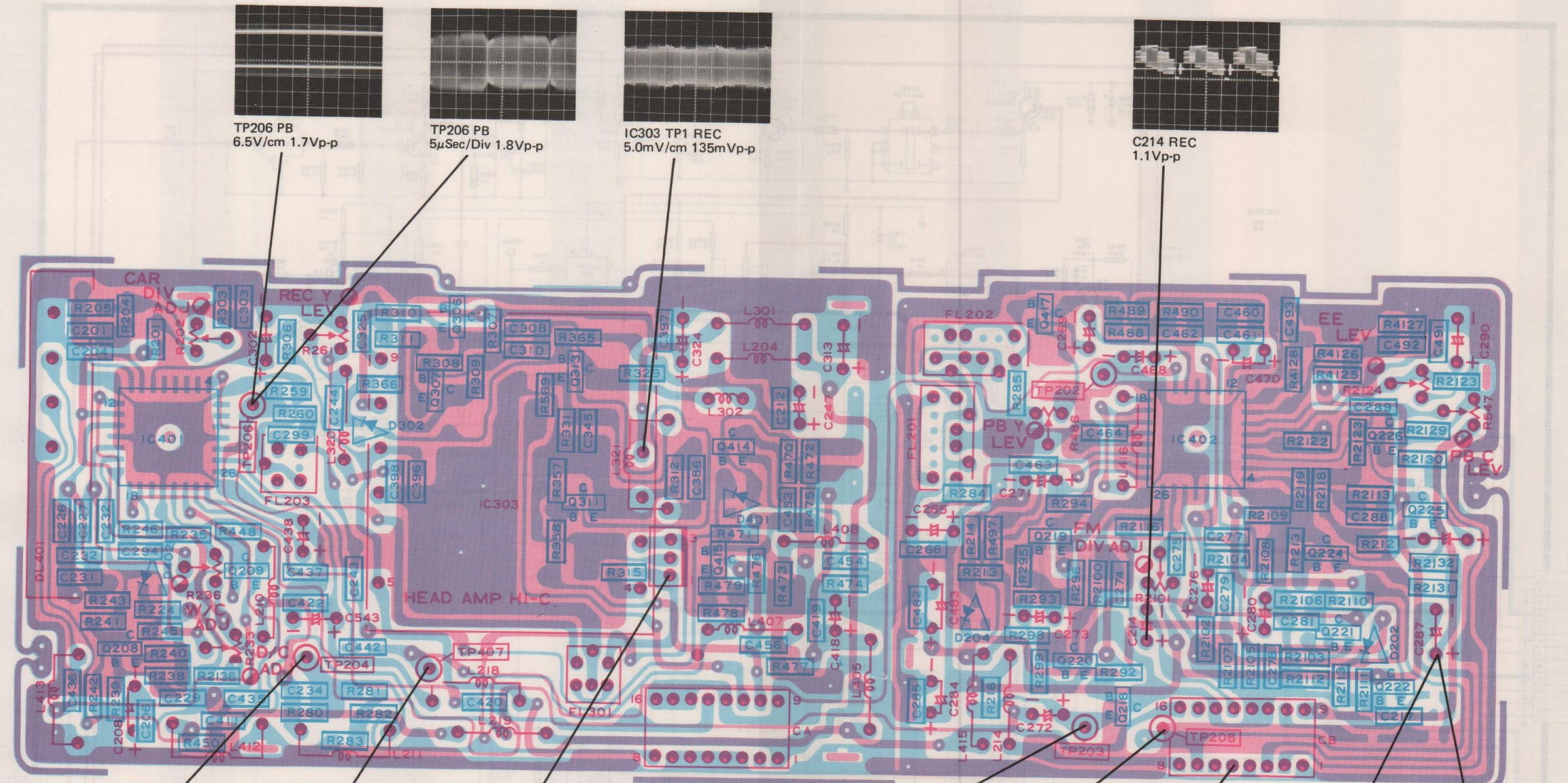
Note:
The red parts refer to the front of the main P.W.B. and the blue parts to the rear of it.

SCHEMATIC DIAGRAM OF VIDEO CIRCUIT

Playback color signal
Record luminance signal
Playback luminance signal
E.E. signal



VIDEO CIRCUIT PRINTED WIRING BOARD



TP206 PB
6.5V/cm 1.7Vp-p

TP206 PB
5μSec/Div 1.8Vp-p

IC303 TP1 REC
5.0mV/cm 135mVp-p

C214 REC
1.1Vp-p

TP204 REC
0.2V/cm 0.9Vp-p

TP407 PB
5μSec/Div.
0.9Vp-p

CC1 REC
10μSec/cm 6Vp-p

TP203 REC
20μSec/cm, 0.2V/cm
0.7Vp-p

TP208 REC
2V/cm 8Vp-p

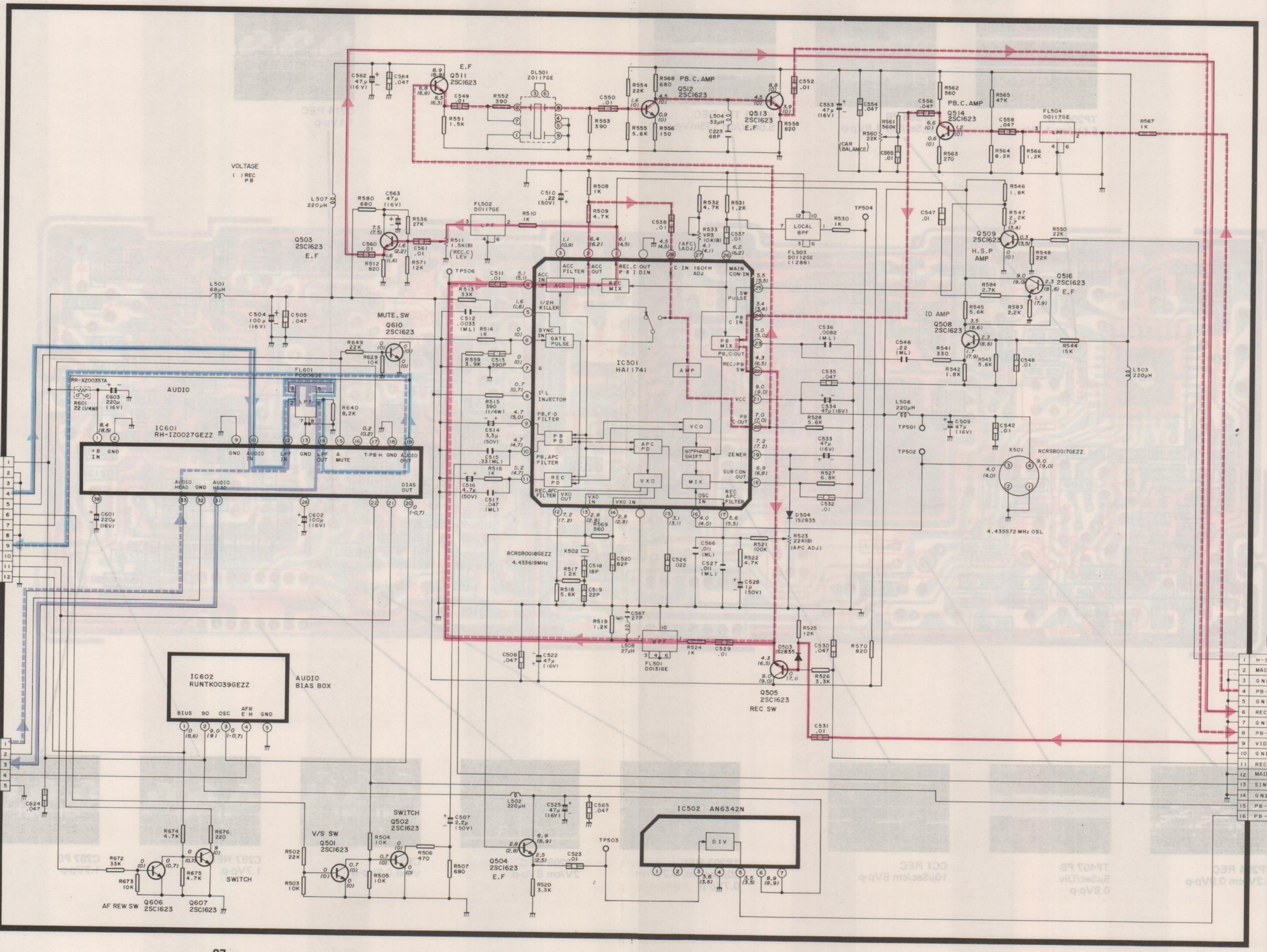
CB3 PB
Vout 0.9Vp-p

C287 REC
1.7Vp-p

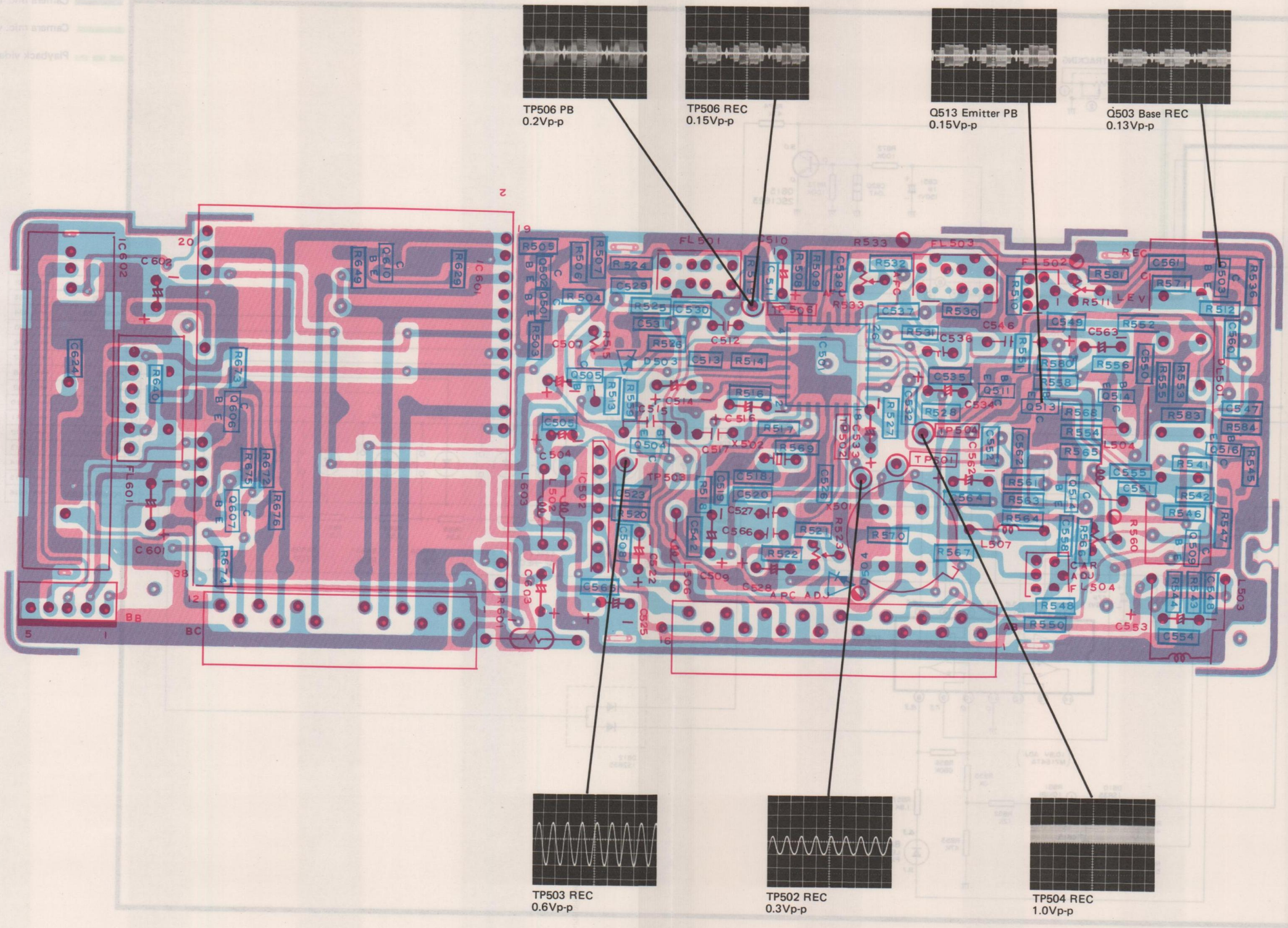
C287 PB
1.7Vp-p

SCHEMATIC DIAGRAM OF CHROMA AND AUDIO CIRCUIT

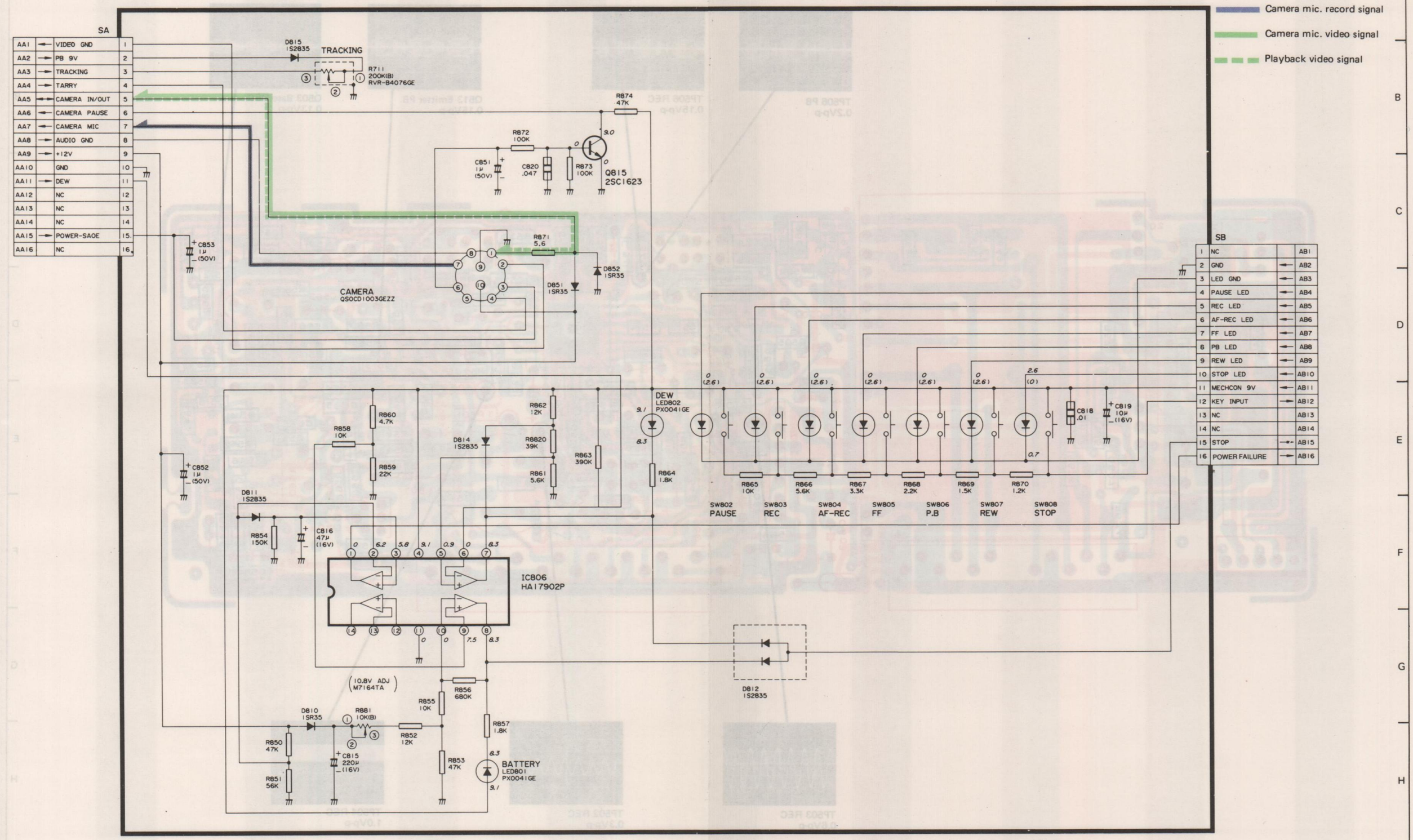
Record color signal
Playback color signal
Audio EE signal
Record audio signal
Playback audio signal



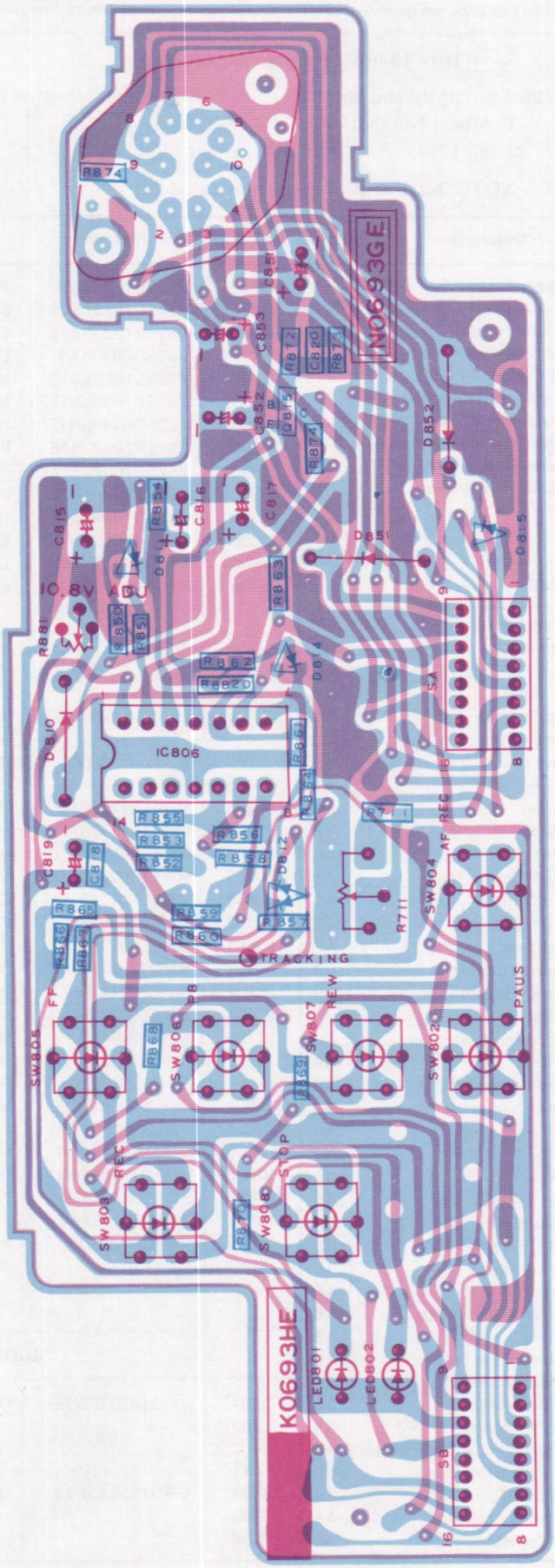
CHROMA AND AUDIO CIRCUIT PRINTED WIRING BOARD



SCHEMATIC DIAGRAM OF OPERATION CIRCUIT



OPERATION CIRCUIT PRINTED WIRING BOARD



REPLACEMENT PARTS LIST

It is recommended to use genuine factory SHARP replacement parts to assure fine performance.

"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

NOTE: Marked ⚠ : Safety Related Parts.

Ref. No.	Part No.	Description	Code
PRINTED WIRING BOARD ASS'Y			
	DUNTK0690HE00	Main Circuit Unit (Not replacement item.)	–
	DUNTK0691HE00	Video(Y) circuit PWB Unit (Not replacement item.)	–
	DUNTK0692HE00	Chroma Audio Circuit PWB Unit (Not replacement item.)	–
	DUNTK0693HE00	Operation Circuit PWB Unit (Not replacement item.)	–
TRANSISTORS			
Q208	VS2SA1121SC1E	Preemphasis	AC
Q209	VS2SA1121SC1E	Preemphasis	AC
Q218	VS2SA1121SC1E	Emitter Follower (EF)	AC
Q224	VS2SA1121SC1E	Video Output	AC
Q307	VS2SA1121SC1E	Record Output	AC
Q417	VS2SA1121SC1E	Playback Amp.	AC
Q219	VS2SC1623L51E	Switching	AB
Q220	VS2SC1623L51E	Switching	AB
Q221	VS2SC1623L51E	Switching	AB
Q222	VS2SC1623L51E	Switching	AB
Q225	VS2SC1623L51E	Video Output	AB
Q226	VS2SC1623L51E	Playback Colour Mute	AB
Q306	VS2SC1623L51E	Record Output	AB
Q311	VS2SC1623L51E	Record Mute	AB
Q313	VS2SC1623L51E	Record Amp.	AB
Q414	VS2SC1623L51E	Plyback Switching	AB
Q415	VS2SC1623L51E	Playback FM Amp. or Equalizer	AB
Q501	VS2SC1623L51E	Video Search Switching	AB
Q502	VS2SC1623L51E	Switching	AB
Q503	VS2SC1623L51E	Emitter Follower (EF)	AB
Q504	VS2SC1623L51E	Emitter Follower (EF)	AB
Q505	VS2SC1623L51E	Record Switching	AB
Q508	VS2SC1623L51E	ID Amp.	AB
Q509	VS2SC1623L51E	HSP Amp.	AB
Q511	VS2SC1623L51E	Emitter Follower (EF)	AB
Q512	VS2SC1623L51E	Playback Colour Amp.	AB
Q513	VS2SC1623L51E	Emitter Follower (EF)	AB
Q514	VS2SC1623L51E	Playback Amp.	AB
Q516	VS2SC1623L51E	Emitter Follower	AB
Q606	VS2SC1623L51E	AF Rewind Switching	AB
Q607	VS2SC1623L51E	Switching	AB
Q610	VS2SC1623L51E	Mute Switching	AB
Q615	VS2SC1623L51E	Mic Signal Amp.	AB
Q616	VS2SC1623L51E	Mic Signal Amp.	AB
Q617	VS2SC1623L51E	Emitter Follower	AB
Q701	VS2SC1623L51E	Head Switching Pulse Invertor	AB
Q804	VS2SC1623L51E	Power Save Switching	AB
Q805	VS2SC1623L51E	Playback 9V	AB
Q806	VS2SC1623L51E	Record 9V	AB
Q807	VS2SC1623L51E	Playback/Record 9V	AB
Q824	VS2SC1623L51E	Solenoid Mute	AB
Q825	VS2SC1623L51E	Solenoid Mute	AB
Q826	VS2SC1623L51E	LED Grand	AB
Q815	VS2SD882-PQ-1	Loading Motor Drive	AD
Q828	VS2SC1623L51E	Vertical Sync.	AB
Q831	VS2SC1623L51E	Invertor	AB
Q901	VS2SD874A-R1E	Regulator	AD
Q808	VS2SB766A-R1E	Playback 9V	AD
Q813	VS2SB766A-R1E	Record 9V	AD
Q810	VS2SB766A-R1E	Playback/Record 9V	AD
Q801	VS2SD1304-Q1E	Relay Inverter	AC
Q805	VS2SD1153WB1E	Loading Motor Switching	AE
Q806	VS2SD1153WB1E	Loading Motor Switching	AE
Q809	RH-PX0042GEZZ	LED	AH
INTEGRATED CIRCUITS			
IC201	VHiHA11725MP1	Video Amp.	AX
IC202	VHiHA11724MP1	Head Amp.	AX
IC303	RH-iZ0031GEZZ	Head Amp.	BE
IC403	RH-iZ0020GEZZ	Video Return	BA
IC501	VHiHA11741MP1	Chroma Control	BD
IC502	VHiAN6342N/-1	Playback Signal	AN
IC601	RH-iZ0027GEZZ	Audio Circuit	BL
IC602	RUNTK0039GEZZ	Bias Box	AR
IC701	RH-iZ0014GEZZ	False Vertical Sync. (FV)	AY
IC704	RH-iZ0028GEZZ	Servo IC	BR
IC705	VHiBA854///-1	Noise Less Record/Divider/ Reel Amplifier/Tape Remaining Disp.	AW
IC801	RH-iX0066GEZZ	Micro Computer (LSI)	AX
IC804	VHiSi6900L/-1	Loading Motor (L/M) Change	AR
IC806	VHiHA17902P-1	Operation Amp.	AL
IC808	VHiHD14069P-1	Invertor	AE
IC903	RH-iZ0029GEZZ	Power IC	BQ
IC905	VHiiCP-N15/-1	Protector	AD
IC906	VHiiCP-N38/1	Protector	AE
DIODES			
D204, 302, 402, 411	VHD1S2835//1E	Diode	AC
D401, 503, 504	VHD1S2835//1E	Diode	AC

Ref. No.	Part No.	Description	Code
D602	VHD1SS119//-1	Diode	AL
D701, 702, 802, 813, 818, 816	VHD1S2835//1E	Diode	AC
D804, 806	VHD1S2837//1E	Diode	AC
D810, 851, 852, 901	VHD1SR35-10-2	Diode	AB
D811, 812 814 815	VHD1S2835//1E	Diode	AC
D907	RH-DX0024GEZZ	Diode	AF
ZD801	RH-EX0035GEZZ	Zener Diode	AC
ZD802	RH-EX0034GEZZ	Zener Diode	AC
ZD901	RH-EX0038GEZZ	Zener Diode	AB
LED801, 802	RH-PX0041GEZZ	LED	AC
	CAPACITORS		
C201	VCCCTV1HH121J	120pF, 50V, ±5%, Ceramic	AA
C202	VCKYTV1HF223Z	.022μF, 50V, +80%, −20%, Ceramic	AB
C204, 232	VCCCTV1HH120J	12pF, 50V, ±5%, Ceramic	AA
C205, 286, 290, 295 302, 483, 421, 324, 313	VCEAEA1CW476M	47μF, 16V, ±20%, Electrolytic	AC
C206, 217, 226, 411	VCKYTV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C230	VCCCTV1HH331J	330pF, 50V, ±5%, Ceramic	AA
C231 461	VCCSTV1HL471J	470pF, 50V, ±5%, Ceramic	AA
C234, 279, 281, 456	VCCCTV1HH560J	56pF, 50V, ±5%, Ceramic	AA
C247, 265, 284, 418	VCEAEN1CW107M	100μF, 16V, ±20%, Electrolytic	AC
C266, 277, 308, 310	VCKYTV1HF473Z	.047μF, 50V, +80%, −20%, Ceramic	AB
C214, 269, 468, 470	VCEAEN1HW475M	4.7μF, 50V, ±20%, Electrolytic	AB
C271	VCEAEN1CW226M	22μF, 16V, ±20%, Electrolytic	AB
C273, 514	VCEAEA1HW335M	3.3μF, 50V, ±20%, Electrolytic	AB
C276, 438	VCEAEN1HW474M	.47μF, 50V, ±20%, Electrolytic	AB
C278	VCCCTV1HH181J	180pF, 50V, ±5%, Ceramic	AA
C280	VCEAEA1HW105M	1μF, 50V, ±20%, Electrolytic	AB
C288	VCKYTV1HB562K	.0056μF, 50V, ±10%, Ceramic	AA
C289, 345	VCCCTV1HH221J	220pF, 50V, ±5%, Ceramic	AA
C294, 733	VCCCTV1HH330J	33pF, 50V, ±5%, Ceramic	AA
C299, 493, 299, 452, 462	VCCCTV1HH820J	82pF, 50V, ±5%, Ceramic	AA
C272, 450	VCEAEA1CW106M	10μF, 16V, ±20%, Electrolytic	AB
C309	VCEAEA1HW225M	2.2μF, 50V, ±20%, Electrolytic	AB
C386, 459, 492	VCCCTV1HH151J	150pF, 50V, ±5%, Electrolytic	AA
C398, 734	VCKYTV1HB222K	.0022μF, 50V, ±10%, Ceramic	AA
C453	VCKYTQ1HB103K	.01μF, 50V, ±10%, Ceramic	AB
C454	VCCCTV1HH470J	47pF, 50V, ±5%, Ceramic	AA
C460	VCCSTV1HL391J	390pF, 50V, ±5%, Ceramic	AA
C491	VCCCTV1HH101J	100pF, 50V, ±5%, Ceramic	AA
C504, 602, 706, 628, 4401	VCEAEN1CW107M	100μF, 16V, ±20%, Electrolytic	AC
C505, 508, 530, 564, 565, 624	VCKYTV1HF473Z	.047μF, 50V, +80%, −20%, Ceramic	AB
C516	VCEAEA1HW475M	4.7μF, 50V, ±20%, Electrolytic	AB
C534, 553, 561, 562, 563, 509, 522, 525, 533	VCEAEA1CW476M	47μF, 16V, ±20%, Electrolytic	AC
C510	VCEAEA1HW224M	.22μF, 50V, ±20%, Electrolytic	AB
C511, 523, 529, 531	VCKYTV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C507	VCEAEN1HW225M	2.2μF, 500V, ±20%, Electrolytic	AB
C513	VCCCTV1HH391J	390pF, 50V, ±5%, Ceramic	AA
C515	VCFYSH1JA334J	.33μF, 63V, ±5%, Mylar	AD
C517	VCFYSA1JA473J	.047μF, 63V, ±5%, Mylar	AC
C518	VCCCTV1HH180J	18pF, 50V, ±5%, Ceramic	AA
C519	VCCCTV1HH220J	22pF, 50V, ±5%, Ceramic	AA
C520	VCCCTV1HH820J	82pF, 50V, ±5%, Ceramic	AA

Ref. No.	Part No.	Description	Code
C526	VCKYTV1HF223Z	.022μF, 50V, +80%, –20%, Ceramic	AB
C527	VCKYJV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C528, 851, 852, 853	VCEAEA1HW105M	1μF, 50V, ±20%, Electrolytic	AB
C536	RC-QZG822TAYJ	.0082μF, 50V, ±5%, Mylar	AB
C546	VCKYTV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C551	VCKYTV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C601, 603, 287	VCEADA1CW227M	20μF, 16V, ±20% Electrolytic	AC
C640	VCEAEA1CW336M	33μF, 16V, ±20%, Electrolytic	AC
C641, 645, 671, 701, 902, 4402, 4403, 4405	VCEAEN1CW106M	10μF, 16V, ±20%, Electrolytic	AB
C704, 841, 901	VCEAEN1HW105M	1μF, 50V, ±20%, Electrolytic	AB
C4404	RC-EZ0056GEZZ	330μF, 16V, ±20%, Electrolytic	AC
C708	VCKYTV1HF393Z	.039μF, 50V, +80%, –20%, Ceramic	AB
C801, 802	VCCCTV1HH221J	220pF, 50V, ±5%, Ceramic	AA
C806	VCSAPB1CJ335M	3.3μF, 16V, ±20%, Ceramic	AE
C807	RC-EX0047GEZZ	330μF, 16V, Electrolytic	AC
C809	VCSAPA1CJ106M	10μF, 16V, ±20%	AG
C810	VCKYTV1EF104Z	.1μF, 25V, +80%, –20%, Ceramic	AB
C815	VCEADA1CW227M	220μF, 16V, ±20%, Electrolytic	AC
C816, 702, 4406	VCEAEA1CW476M	47μF, 16V, ±20%, Electrolytic	AC
C817, 819, 842	VCEAEN1CW106M	10μF, 16V, ±20%, Electrolytic	AB
C818	VCKYTV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C820	VCKYTV1HF473Z	.047μF, 50V, +80%, –20%, Ceramic	AB
C822	RC-QZG103TAYJ	.01μF, 50V, ±5%, Mylar (ML)	AB
C834	VCEAEN1HW225M	2.2μF, 50V, ±20%, Electrolytic	AB
C835	VCEAEN1HW335M	3.3μF, 50V, ±20%, Electrolytic	AB
C836	VCKYTV1HB682K	.0068μF, 50V, ±10%, Ceramic	AA
C837, 838, 840, 843	VCKYTV1HB103K	.01μF, 50V, ±10%, Ceramic	AA
C839	VCKYTV1HB472K	.0047μF, 50V, ±10%, Ceramic	AA

Ref. No.	Part No.	Description	Code
		RESISTORS	
R201, 218, 260, 281, 285, 284, 306, 315	VRS-TV1JD102J	1k ohm, 0.063W, ±5%, Oxide Film	AA
R204, 205, 212, 242, 2115	VRS-TV1JD472J	4.7k ohm, 0.063W, ±5%, Oxide Film	AA
R213, 259, 734	VRS-TV1JD332J	3.3k ohm, 0.063W, ±5%, Oxide Film	AA
R214, 303	VRS-TV1JD122J	1.2k ohm, 0.063W, ±5%, Oxide Film	AA
R235, 2114	VRS-TV1JD562J	5.6k ohm, 0.063W, ±5%, Oxide Film	AA
R238, 366, 4126	VRS-TV1JD682J	6.8k ohm, 0.063W, ±5%, Oxide Film	AA
R239, 298, 820, 2120, 2121, 4125	VRS-TV1JD333J	33k ohm, 0.063W, ±5%, Oxide Film	AA
R240, 295, 734	VRS-TV1JD821J	820 ohm, 0.063W, ±5%, Oxide Film	AA
R214, 303	VRS-TV1JD122J	1.2k ohm, 0.063W, ±5%, Oxide Film	AA
R235, 2114	VRS-TV1JD562J	5.6k ohm, 0.063W, ±5%, Oxide Film	AA
R238, 366, 4126	VRS-TV1JD682J	6.8k ohm, 0.063W, ±5%, Oxide Film	AA
R239, 298, 820 2120, 2121, 4125	VRS-TV1JD333J	33k ohm, 0.063W, ±5%, Oxide Film	AA
R240, 295, 734	VRS-TV1JD821J	820 ohm, 0.063W, ±5%, Oxide Film	AA
R241	VRS-TV1JD271J	270 ohm, 0.063W, ±5%, Oxide Film	AA
R2118, 472, 473	VRS-TV1JD331J	330 ohm, 0.063W, ±5%, Oxide Film	AA
R244	VRS-TV1JD182J	1.8k ohm, 0.063W, ±5%, Oxide Film	AA
R245, 329, 448, 2109	VRS-TV1JD222J	2.2k ohm, 0.063W, ±5%, Oxide Film	AA
R246, 283, 292	VRS-TV1JD221J	220 ohm, 0.063W, ±5%, Oxide Film	AA
R282	VRS-TV1JD274J	270k ohm, 0.063W, ±5%, Oxide Film	AA
R293, 521	VRS-TV1JD104J	100k ohm, 0.063W, ±5%, Oxide Film	AA

Ref. No.	Part No.	Description	Code
R294, 497	VRS-TV1JD183J	18k ohm, 0.063W, ±5%, Oxide Film	AA
R296	VRS-TV1JD184J	180k ohm, 0.063W, ±5%, Oxide Film	AA
R299, 2130	VRS-TV1JD103J	10k ohm, 0.063W, ±5%, Oxide Film	AA
R307, 309, 357, 358	VRS-TV1JD223J	22k ohm, 0.063W, ±5%, Oxide Film	AA
R308, 476, 2106	VRS-TV1JD153J	15k ohm, 0.063W, ±5%, Oxide Film	AA
R310, 311	VRS-TV1JD220J	22 ohm, 0.063W, ±5%, Oxide Film	AA
R331	VRS-TV1JD181J	180 ohm, 0.063W, ±5%, Oxide Film	AA
R365	VRS-TQ2BD822J	8.2k ohm, 1/8W, ±5%, Oxide Film	AA
R450, 243, 515	VRS-TV1JD391J	390 ohm, 0.063W, ±5%, Oxide Film	AA
R470	VRS-TQ2BD393J	39k ohm, 1/8W, ±5%, Oxide Film	AA
R471, 2103, 2112, 2113, 2129	VRS-TV1JD123J	12k ohm, 0.063W, ±5%, Oxide Film	AA
R474, 477, 478, 489, 490, 507	VRS-TV1JD471J	470 ohm, 0.063W, ±5%, Oxide Film	AA
R475	VRS-TQ2BD333J	33k ohm, 1/8W, ±5%, Oxide Film	AA
R487, 569, 562	VRS-TV1JD561J	560 ohm, 0.063W, ±5%, Oxide Film	AA
R488	VRS-TV1JD681J	680 ohm, 0.063W, ±5%, Oxide Film	AA
R502, 548, 550, 554, 649	VRS-TV1JD223J	22k ohm, 0.063W, ±5%, Oxide Film	AA
R503, 504, 505, 673, 629, 660	VRS-TV1JD103J	10k ohm, 0.063W, ±5%, Oxide Film	AA
R506, 676	VRS-TV1JD221J	220 ohm, 0.063W, ±5%, Oxide Film	AA
R568, 580, 2116, 4128	VRS-TV1JD681J	680 ohm, 0.063W, ±5%, Oxide Film	AA
R508, 510, 514, 524, 516, 530, 567,	VRS-TV1JD102J	1k ohm, 0.063W, ±5%, Oxide Film	AA
R509, 522, 532, 581, 674, 675	VRS-TV1JD472J	4.7k ohm, 0.063W, ±5%, Oxide Film	AA
R512, 558, 570	VRS-TV1JD821J	820 ohm, 0.063W, ±5%, Oxide Film	AA
R520, 526, 639	VRS-TV1JD332J	3.3k ohm, 0.063W, ±5%, Oxide Film	AA
R569	VRS-TV1JD471J	470 ohm, 0.063W, ±5%, Oxide Film	AA
R518, 528, 543, 545 555	VRS-TV1JD562J	5.6k ohm, 0.063W, ±5%, Oxide Film	AA
R517, 519, 531, 566	VRS-TV1JD122J	1.2k ohm, 0.063W, ±5%, Oxide Film	AA
R513, 672	VRS-TV1JD333J	33k ohm, 0.063W, ±5%, Oxide Film	AA
R525, 571	VRS-TV1JD123J	12k ohm, 0.063W, ±5%, Oxide Film	AA
R527	VRS-TV1JD682J	6.8k ohm, 0.063W, ±5%, Oxide Film	AA
R536	VRS-TV1JD273J	27k ohm, 0.063W, ±5%, Oxide Film	AA
R541, 563	VRS-TV1JD331J	330 ohm, 0.063W, ±5%, Oxide Film	AA
R542, 546	VRS-TV1JD182J	1.8k ohm, 0.063W, ±5%, Oxide Film	AA
R544	VRS-TV1JD153J	15k ohm, 0.063W, ±5%, Oxide Film	AA
R547, 651, 583	VRS-TV1JD222J	2.2k ohm, 0.063W, ±5%, Oxide Film	AA
R561, 656	VRS-TV1JD152J	1.5k ohm, 0.063W, ±5%, Oxide Film	AA
R552, 553	VRS-TV1JD391J	390 ohm, 0.063W, ±5%, Oxide Film	AA
R556	VRS-TV1JD151J	150 ohm, 0.063W, ±5%, Oxide Film	AA
R559, 2119	VRS-TV1JD392J	3.9k ohm, 0.063W, ±5%, Oxide Film	AA
R561	VRS-TV1JD564J	560k ohm, 0.063W, ±5%, Oxide Film	AA
R564, 640	VRS-TV1JD822J	8.2k ohm, 0.063W, ±5%, Oxide Film	AA
R565	VRS-TV1JD473J	47k ohm, 0.063W, ±5%, Oxide Film	AA
R601	RR-XZ0035TAZZ	220ohm,1/4W,FR Oxide Film	AB
R584, 647, 653, 2136	VRS-TV1JD272J	2.7k ohm, 0.063W, ±5%, Oxide Film	AA
R658, 901, 902	VRS-TV1JD681J	680 ohm, 0.063W, ± 5%, Oxide Film	AA
R652	VRS-TV1JD223J	22k ohm, 0.063W, ±5%, Oxide Film	AA
R654	VRS-TV1JD123J	12k ohm, 0.063W, ±5%, Oxide Film	AA
R655	VRS-TV1JD154J	150k ohm, 0.063W, ±5%, Oxide Film	AA

Ref. No.	Part No.	Description	Code
R657	VRS-TV1JD151J	150 ohm, 0.063W, ±5%, Oxide Film	AA
R659	VRS-TV1JD224J	220k ohm 0.063W, ±5%, Oxide Film	AA
R669	VRS-TV1JD471J	470 ohm, 0.063W, ±5%, Oxide Film	AA
R687, 903, 563	VRS-TV1JD271J	270 ohm, 0.063W, ±5%, Oxide Film	AA
R811, 813, 835, 8807, 8809, 8810	VRS-TV1JD472J	4.7k ohm, 0.063W, ±5%, Oxide Film	AA
R702, 703, 724, 808, 820, 821, 822, 845, 894, 4417	VRS-TV1JD333J	33k ohm, 0.063W, ±5%, Oxide Film	AA
R704, 810, 833	VRS-TV1JD562J	5.6k ohm, 0.063W, ±5%, Oxide Film	AA
R710, 718	VRD-RA2HD2R2J	2.2k ohm, 1/2W, ±5%, Carbon	AA
R721, 815, 817, 818	VRS-TV1JD682J	6.8k ohm, 0.063W, ±5%,	AA
R722, 725, 895	VRS-TV1JD473J	47k ohm, 0.063W, ±5%, Oxide Film	AA
R723, 847	VRS-TV1JD153J	15k ohm, 0.063W, ±5%, Oxide Film	AA
R809, 848	VRS-TV1JD105J	1M ohm, 0.063W, ±5%, Oxide Film	AA
R812, 814, 816, 2136	VRS-TV1JD272J	2.7k ohm, 0.063W, ±5%, Oxide Film	AA
R804, 848	VRS-TV1JD105J	1M ohm, 0.063W, ±5%, Oxide Film	AA
R312	VRS-TV1JD270J	27 ohm, 0.063W, ±5%, Oxide Film	AA
R825, 831, 832, 846, 4416, 8823	VRS-TV1JD822J	8.2k ohm, 0.063W, ±5%, Oxide Film	AA
R834	VRS-TV1JD152J	1.5k ohm, 0.063W, ±5%, Oxide Film	AA
R836, 8812, 8818, 8824	VRS-TV1JD223J	22k ohm, 0.063W, ±5%, Oxide Film	AA
R837, 838	VRS-TV1JD122J	1.2k ohm, 0.063W, ±5%, Oxide Film	AA
R850, 853, 874	VRS-TV1JD473J	47k ohm, 0.063W, ±5%, Oxide Film	AA
R851, 819	VRS-TV1JD563J	56k ohm, 0.063W, ±5%, Oxide Film	AA
R852, 862	VRS-TV1JD123J	12k ohm, 0.063W, ±5%, Oxide Film	AA
R854	VRS-TV1JD154J	150k ohm, 0.063W, ±5%, Oxide Film	AA
R823, 855, 858, 865	VRS-TV1JD103J	10k ohm, 0.063W, ±5%, Oxide Film	AA
R856	VRS-TV1JD684J	680k ohm, 0.063W, ±5%, Oxide Film	AA
R857, 864, 4415	VRS-TV1JD182J	1.8k ohm, 0.063W, ±5%, Oxide Film	
R859	VRS-TV1JD223J	22k ohm, 0.063W, ±5%, Oxide Film	AA
R860	VRS-TV1JD472J	4.7k ohm, 0.063W, ±5%,	AA
R860	VRS-TV1JD472J	4.7k ohm, 0.063W, ±5%, Oxide Film	AA
R806, 807, 861, 866, 875, 884	VRS-TV1JD562J	5.6k ohm, 0.063W, ±5%, Oxide Film	AA
R863	VRS-TV1JD394J	390k ohm, 0.063W, ±5%, Oxide Film	AA
R867	VRS-TV1JD332J	3.3k ohm, 0.063W, ±5%, Oxide Film	AA
R868	VRS-TV1JD222J	2.2k ohm, 0.063W, ±5%, Oxide Film	AA
R869	VRS-TV1JD152J	1.5k ohm, 0.063W, ±5%, Oxide Film	AA
R870	VRS-TV1JD122J	1.2k ohm, 0.063W, ±5%, Oxide Film	AA
R872, 873	VRS-TV1JD104J	100k ohm, 0.063W, ±5%, Oxide Film	AA
R896, 897 8805, 8814, 8815	VRS-TV1JD103J	10k ohm, 0.063W, ±5%, Oxide Film	AA
R898, 899	VRS-TV1JD563J	56k ohm, 0.063W, ±5%, Oxide Film	AA
R955	RR-XZ0017GEZZ	1 ohm, 1/2W, FR Oxide Film	AC
R2100	VRS-TV1JD154J	150k ohm, 0.063W, ±5%, Oxiede Film	AA
R2102, 2108	VRS-TV1JD394J	390k ohm, 0.063W, ±5%, Oxide Film	AA
R2104, 2015, 2107, 2119	VRS-TV1JD392J	3.9k ohm, 0.063W, ±5%, Oxide Film	AA
R2110, 4127	VRS-TV1JD273J	27k ohm, 0.063W ±5%, Oxide Film	AA
R2111	VRS-TQ2BD123J	12k ohm, 1/8W, ±5%, Oxide Film	AA
R2116	VRS-TV1JD101J	100 ohm, 0.063W, ±5%, Oxide Film	AA
R2117	VRS-TV1JD224J	220k ohm, 0.063W, ±5%, Oxide Film	AA
R2122	VRS-TV1JD185J	1.8M ohm, 0.063W, ±5%, Oxide Film	AA
R2123	VRS-TV1JD393J	39k ohm, 0.063W, ±5%, Oxide Film	AA
R2132, 2131	VRS-TV1JD100J	10 ohm, 0.063W, ±5%, Oxide Film	AA
R4418	VRS-TV1JD393J	39k ohm, 0.063W, ±5%, Oxide Film	AA

Ref. No.	Part No.	Description	Code
R4465, 280	VRS-TV1JD560J	56 ohm, 0.063W, ±5%, Oxide Film	AA
R4466	VRS-TV1JD820J	82 ohm, 0.063W, ±5%, Oxide Film	AA
R8803, 8806	VRS-TV1JD474J	470k ohm, 0.063W, ±5%, Oxide Film	AA
R8804	VRS-TV1JD564J	560k ohm, 0.063W, ±5%, Oxide Film	AA
R8808	VRS-TV1JD102J	1k ohm, 0.063W, ±5%, Oxide Film	AA
R8811	VRS-TV1JD392J	3.9k ohm, 0.063W, ±5%, Oxide Film	AA
R8813	VRS-TV1JD683J	68k ohm, 0.063W, ±5%, Oxide Film	AA
R8819	VRS-TV1JD334J	330k ohm, 0.063W, ±5%, Oxide Film	AA
R8820	VRS-TV1JD393J	39k ohm, 0.063W, ±5%, Oxide Film	AA
R8822	VRS-TV1JD124J	120k ohm, 0.063W, ±5%, Oxide Film	AA
R871	VRS-TQ2BD5R6J	5.6 ohm, 1/8W, ±5%, Oxide Film	AA

CONTROLS

R202	RVR-M7160TAZZ	2.2k ohm, Pot, Carrier Diviced	AE
R233, 236	RVR-M7162TAZZ	4.7k ohm, Pot, Dark—Clip White—Clip	AE
R261	RVR-M7159TAZZ	1.5k ohm, Pot, Recording-Y-Level	AE
R486	RVR-M7155TAZZ	330 ohm, Pot, Playback-Y-Level	AE
R511	RVR-M7159TAZZ	1.5k ohm, Pot, Recording-C-Level	AE
R523, 560	RVR-M7166TAZZ	22k ohm, Pot, APC. Carrier Balance	AE
R533	RVR-M7164TAZZ	10k ohm, Pot, AFC	AE
R547	RVR-M7158TAZZ	1k ohm, Pot., Playback-C-Level	AE
R711	RVR-B4076GEZZ	100k ohm, Pot, Tracking	AF
R712, 713	RVR-M7170TAZZ	100k ohm, Pot, FV-1, Pot, FV-2	AE
R719	RVR-M7166TAZZ	22k oym, Pot, Video Search Forward	AE
R720	RVR-M7167TAZZ	33k ohm, Pot, Video Search Reverse	AE
R881	RVR-M7164TAZZ	10k ohm, Pot, 10.8V, Adjust	AE
R2101	RVR-M7164TAZZ	10k ohm, Pot. FM-Diviced Adjust	AE
R2124	RVR-M7165TAZZ	15k ohm, Pot, EE level Adjust	AD

COILS AND TRANSFORMERS

L204, 214, 218, 219, 301	VP-DF101K0000	100μH	AB
L210	VP-DF390K0000	39μH	AB
L211	VP-DF820K0000	82μH	AB
L302	RCiLP0008GEZZ	2.2mH	AD
L321	VP-DF5R6K0000	5.6μH	AB
L405, 415	VP-DF221K0000	220μH	AB
L406	VP-DF120K0000	12μH	AB
L408, 222, 508	VP-DF270K0000	27μH	AB
L412, 413	VP-DF8R2K0000	8.2μH	AB
L416	VP-DF470K0000	47μH	AB
L501	VP-DF680K0000	68μH	AB
L502, 503, 506, 507	VP-DF221K0000	220μH	AB
L504	VP-DF330K0000	33μH	AB
FL201	RMPTD0118GEZZ	Filter (EQT)	AH
FL202	RMPTD0116GEZZ	Low Pass Filter (LPF)	AH
FL203	RMPTD0109GEZZ	Filter (HPH)	AF
FL301	RMPTD0120GEZZ	Filter (HPF)	AF
FL501	RMPTD0131GEZZ	3.58 MHz Band Pass Filter (BPF)	AK
FL502, 504	RMPTD0117GEZZ	Low Pass Filter (LPF)	AF
FL503	RMPTD0112GEZZ	Band Pass Filter (BPF)	AH
FL601	RCiLF0006GEZZ	Low Pass Filter	AK
DL401	RCiLZ0118GEZZ	Delay Line	AS
DL501	RCiLZ0117GEZZ	Delay Line	AX

MISCELLANEOUS

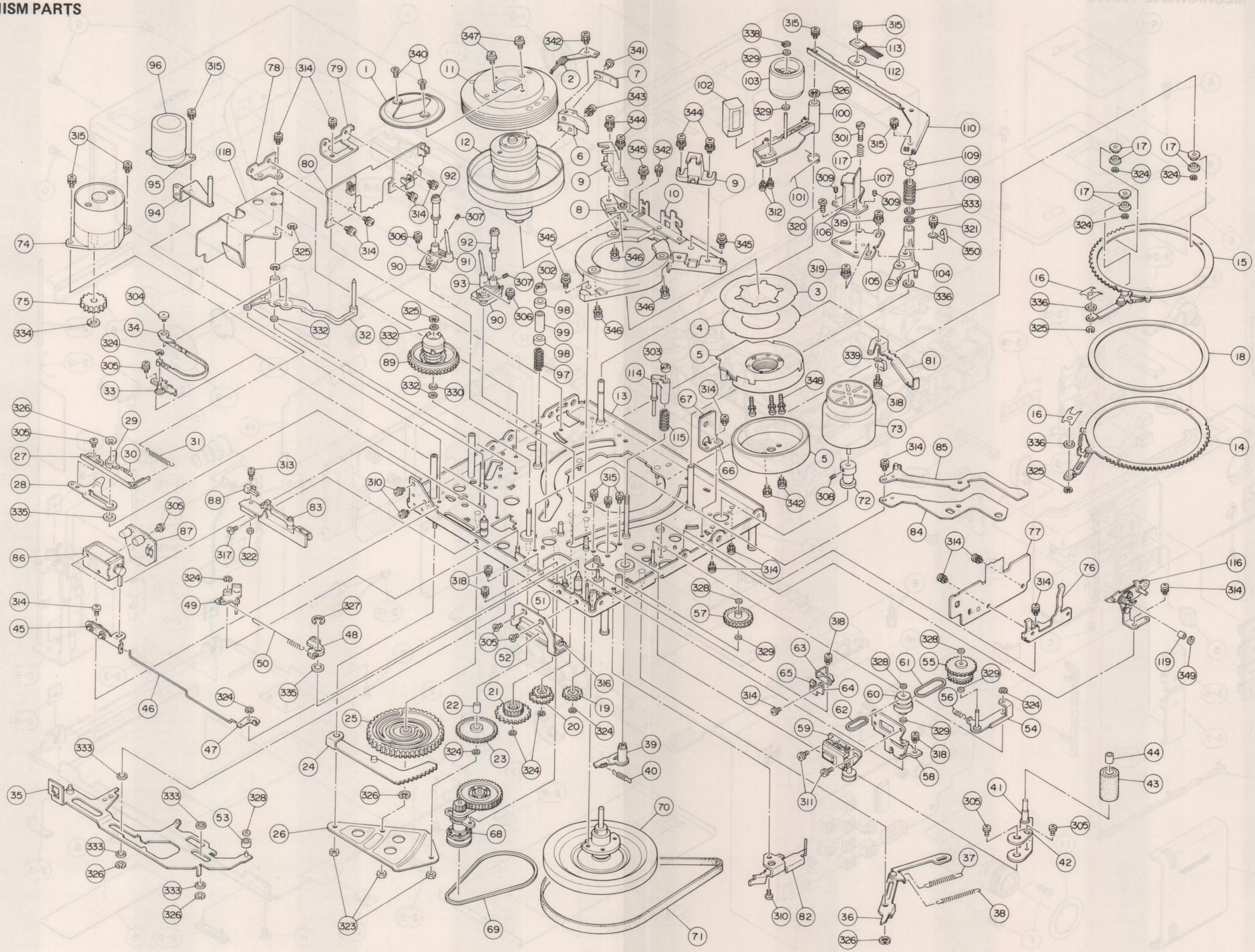
RRY801	RRLYZ0011GEZZ	Relay	AP
X501	RCRSB0017GEZZ	Crystal	AU
X502	RCRSB0018GEZZ	Crystal	AN
X801	RFiLA0002GEZZ	Crystal	AE
SW802 — 808	QSW-K0002GEZZ	Switch	AC
F901	QFS-C3222CEZZ	Fuse T3.15A	AE
	QFSHD1002CEZZ	Fuse Holder	AA
	QJAKA0001TAZZ	Mic. Jack	AD
	QPLGN0213GEZZ	Plug, AD, AJ	AB
	QSōCN1628GEZZ	Plug, AI	AG
	QTANJ9036GEZZ	Board Terminal	AP
	QPLGN1630GEZZ	Plug 16 Pin	AF
	QSōCN1626GEZZ	Plug 16 Pin	AH
	QPLGN0513GEZZ	Plug 5 Pin	AB
	QPLGN0328TAZZ	Plug 3 Pin	AD
	QSōCD1003GEZZ	Camera Terminal	AN
	QSW-P0049GEZZ	Switch, Power	AK

Ref. No.	Part No.	Description	Code	Ref. No.	Part No.	Description	Code
117	MSPRC0006GEFJ	Audio Control Head Spring	AA		PSPAV0027GEZZ	Counter Spacer	AB
118	PZETV0090GEZZ	Insulating Board (PVC Sheet)	AC		CHLDX3013GE00	Cassette Housing Ass'y	BB
119	PGUMM0024GEZZ	Angle Up Brake	AB				

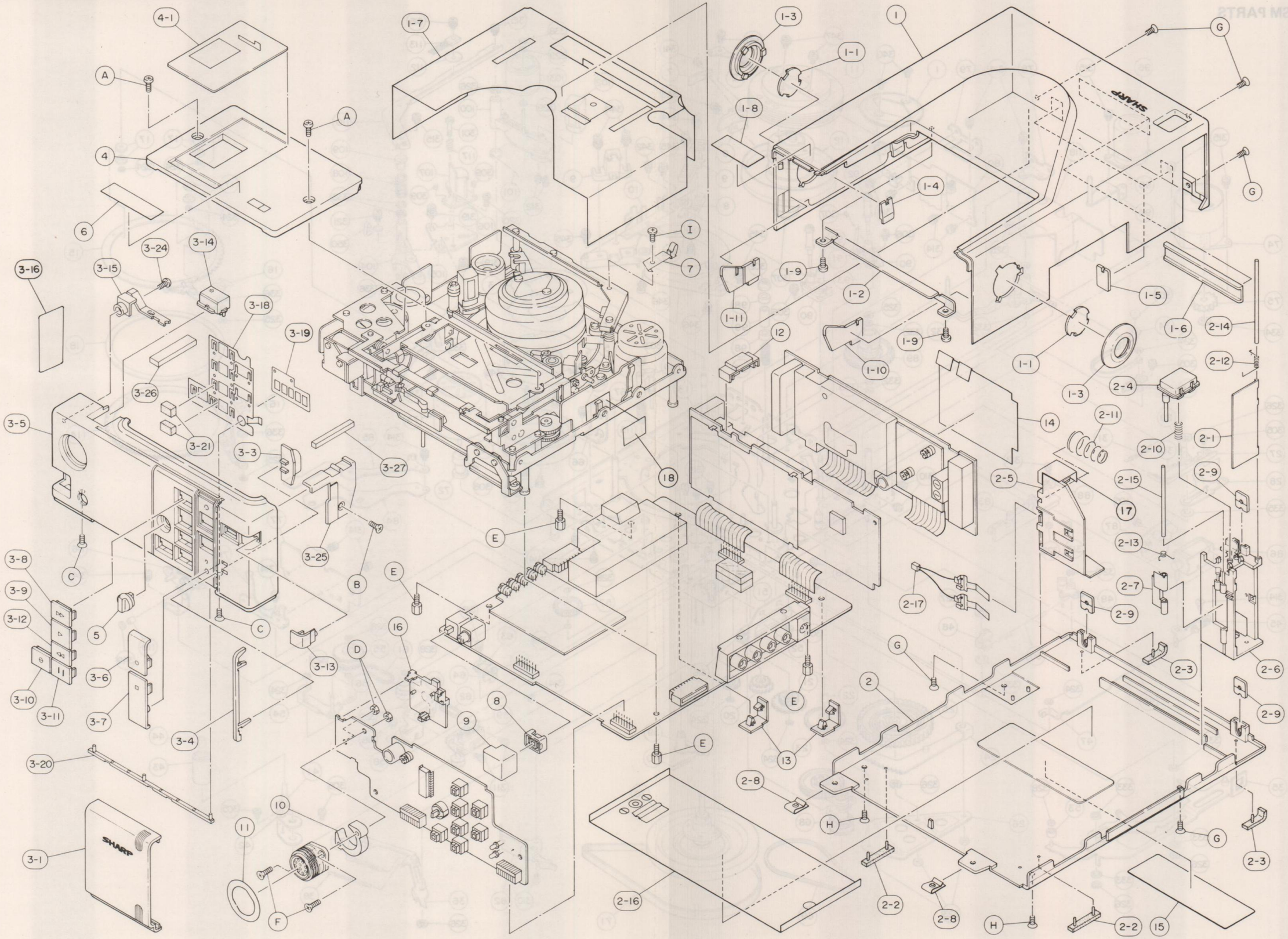
MECHANISM PARTS

Ref. No.	Part No.	Description	Code
1	PCõVP3006GEFW	Video Head Leads Cover	AC
2	QBRSK0010GEZZ	Earth Brush Ass'y (G)	AE
3	PSLDM3341GEZZ	D.D Shield	AE
4	PZETV0086GEZZ	D.D Shield Insulation Panel	AB
5	RMõTP1038GEZZ	D.D Motor Ass'y	BF
6	LHLDZ3018GEFW	Heater Holder (E)	AG
7	RHETP0003GEZZ	PTC. Heater (B)	AG
8	PGiDC0013GEZZ	V. Base Ass'y (D)	AF
9	PGiDC0014GEZZ	V. Block	AG
10	LANGK0070GEFW	Leads Angle	AB
11	DDRMU0003HE01	Upper Drum Ass'y	BR
12	DDRML0003HE01	Lower Drum Ass'y	BR
13	LCHSM0026GEZZ	Main Chassis Ass'y	BB
14	NGERH3001GEZZ	Loading Ring Ass'y (A)	AH
15	NGERH3002GEZZ	Loading Ring Ass'y (B)	AK
16	MSLiF0011GEFW	Slider	AC
17	NRõLP0019GEZZ	Loading Ring Roller	AA
18	PSPAT0003GEZZ	Loading Ring Spacer	AE
19	NGERH1032GEZZ	Loaing Gear (B)	AA
20	NGERH1031GEZZ	Loading Gear (A)	AB
21	NGERH1034GEZZ	Loading Drive Gear (b)	AB
22	NSFTL0302GEFW	Loading Drive Gear Spacer	AC
23	NGERH1033GEZZ	Loading Drive Gear Ass'y (a)	AB
24	NGERH3003GEZZ	Segment Gear Ass'y	AF
25	NGERH1035GEZZ	Master Cam	AD
26	LANGF9141GEFW	Loading Reinforcement Plate	AC
27	LANGT9055GEFW	Tension Spring Angle	AB
28	MLEVF0153GEZZ	Tension Arm Return Lever	AD
29	MLEVP0055GEZZ	Tension Reution Preventive	AA
30	MSPRT0162GEFJ	Tension Retrogressive Preventive Lever Spring	AB
31	MSPRT0155GEFJ	Tension Spring	AB
32	MLEVC0010GEZZ	Tension Arm Ass'y	AN
33	LANGT9054GEZZ	Tension Pole Adjust Angle Ass'y	AE
34	LBNDK3012GEZZ	Tension Band Ass'y	AG
35	MSLiF0012GEZZ	Shifter Ass'y	AK
36	MLEVF0150GEZZ	Audio Head Operation Lever Ass'y	AE
37	MSPRT0156GEFJ	Audio Head Pressing Spring	AB
38	MSPRT0157GEFJ	Audio Head Arm Return Spring	AB
39	MLEVF0154GEZZ	Pinch Arm Ass'y	AE
40	MSPRT0161GEFJ	Pinch Roller Pressure Spring	AB
41	MLEVF0155GEZZ	Pinch Roller Lever Ass'y	AF
42	MLEVF0162GEFW	Pinch Roller Adjust Plate	AB
43	NRõLR0007GEZZ	Pinch Roller Ass'y	AQ
44	PCAPS1006GEZZ	Pinch Roller Holder	AA
45	MLEVF0157GEZZ	Brake Control Board Ass'y	AF
46	MRõD-0011GEFW	Brake Operation Rod	AB
47	MLEVF0158GEFD	Brake Operation Lever	AB
48	MLEVP0053GEZZ	Take-up Reel Brake Ass'y	AD
49	MLEVP0052GEZZ	Supply Reel Brake Ass'y	AD
50	MSPRT0158GEFJ	Main Brake Spring	AB
51	LANGQ9018GEFW	PAD (Power Assisted Drive Slide Switch Hold) Angle	AC
52	QSW-S0042GEZZ	PAD Slide Switch	AN
53	NRõLP0020GEZZ	Audio Head Drive Roller	AA
54	MLEVF0159GEZZ	Take-up Gear Lever Ass'y	AE
55	NGERH1039GEZZ	Take-up Gear Ass'y	AG
56	MSPRT0159GEFJ	Take-up Gear Lever Spring	AB
57	NGERH1036GEZZ	Idler Gear	AB
58	LANGT9056GEFW	Tape Counter Ass'y Angle	AD
59	KCõUB0016GEZZ	Tape Counter Ass'y	AL
60	PMAGF1012GEZZ	Counter Relay Pulley	AD
61	NBLTK0028GE00	Counter Belt (A)	AC
62	NBLTK0029GE00	Counter Belt (B)	AC
63	LANGQ9019GEFW	Take-up Sensor P.W.B. Hold Plate	AC
64	QPWBF0684GEZZ	Take-up Sensor P.W.B	—
65	VHiDN6838//-1	Take-up Real Sensor	AG
66	LANGQ9020GEFW	Dew Sensor Hold Angle	AC
67	RDTCH0007GEZZ	Dew Sensor	AH
68	NGERH1038GEZZ	Epicyclic Gear	AP
69	NBLTK0027GE00	Drive Belt	AC
70	NFLYV0030GEZZ	Capstan Block	AY
71	NBLTH0030GE00	Capstan Belt	AE
72	NPLYV0081GEFW	Capstan Motor Pulley	AG
73	RMõTP1032GEZZ	Capstan Motor	BC
74	RMõTM1022GEZZ	Loading Motor	AZ
75	NGERH3004GEZZ	Loading Motor Gear	AG
76	LANGQ9021GEFW	Mechanism Relay P.W.B. Hold Angle	AD
77	QCNW-0510GEZZ	Flexible Printed Connector (A)	AU
78	LANGQ9022GEFW	Mechanism Relay P.W.B. (B) Hold Angle	AC
79	LANGQ9023GEFW	Mechanism Relay P.W.B. (C) Hold Angle	AC
80	QCNW-0509GEZZ	Flexible Printed Connector (B)	AW
81	LANGF9143GEFW	Drum Leads Hold Angle	AC
82	LANGF9154GEFW	PAD. Leads Hold Angle	AD
83	MLEVP0051GEZZ	Erase Protection Lever	AE
84	PZETV0084GEZZ	Reel Sensor P.W.B. Insulating Plate	AB
85	QPWBF0683GEZZ	Reel Sensor P.W.B.	—
86	RPLU-0066GEZZ	Brake Solenoid	AR
87	QPWBF0682GEZZ	Solenoid P.W.B.	—
88	QSW-F0007GEZZ	Cassette Erase Protection Switch	AC
89	NDAiV1017GEZZ	Reel Disk Ass'y	AK
90	LPõLM0015GEZZ	Guide Roller Base Ass'y	AM
91	LPõLM0016GEZZ	Slant Pole Base Ass'y (A)	AK
92	NRõLP0021GEZZ	Guide Roller Ass'y	AM
93	LPõLM0017GEZZ	Slant Pole Base Ass'y (B)	AK
94	LANGF9148GEZZ	Tape Guide Shaft Ass'y	AF
95	QPWBF0681GEZZ	Capacitor P.W.B.	—
96	RC-EZ0037GEZZ	Electrolytic Capacitor (C812)	AH
97	MSPRC0027GEFJ	Adjust Spring (A)	AA
98	PGiDP0003GEFW	Fixed Guide Flange (B)	AC
99	PGiDP0001GEFW	Fixed Guide	AE
100	MARMP0018GEZZ	Full Erase (FE) Head Arm Ass'y	AD
101	MSPRD0040GEFJ	Full Erase (FE) Head Arm Spring	AB
102	RHEDT0008GEZZ	Full Erase (FE) Head Ass'y	AV
103	MRõLM0010GEZZ	Impedance Roller Ass'y	AK
104	MLEVC0009GEZZ	Audio Control Hand Arm Ass'y	AK
105	LDAiH3009GEFW	Audio Control Head Plate	AC
106	RHEDU0026GEZZ	Audio Contorl/Audio Erase Head Ass'y	BA
107	QPWBS0677GEZZ	Audio Control P.W.B.	—
108	MSPRC0024GEFJ	Audio Head Arm Spring	AB
109	PCAPS1007GEZZ	Audio Control Head Arm Spring Flange	AA
110	LANGF9142GEFW	Chassis Reinforcement Angle	AE
111	——		—
112	PZETM0002GEZZ	Insulating Sheet (Mylar Film)	AA
113	VS2SD882-PQ-1	Transistor, Loading Motor Drive (Q816)	AD
114	PGiDS0006GEZZ	Take-up Fixed Guide Ass'y	AQ
115	MSPRC0023GEFJ	Adjust Spring (B)	AB
116	LANGF9144GEZZ	Cassette Cover Open Angle Ass'y	AL

MECHANISM PARTS



CABINET AND MECHANICAL PARTS



CABINET AND MECHANICAL PARTS

Ref. No.	Part No.	Description	Code
1	CCABA1039GE01	Upper Cabinet Ass'y	BD
1-1	GCōVA1107GESA	Shoulder Catch Cover	AK
1-2	LANGF2006GEFJ	Shoulder Strap Mount Angle	AC
1-3	LHLDE1003GESA	Shoulder Strap Mount	AD
1-4	LHLDZ1110GEZZ	Reb (A)	AD
1-5	LHLDZ1111GEZZ	Reb (B)	AC
1-6	LHLDZ1113GEZZ	Guide Reb	AC
1-7	PSLDM3345GEZZ	Shield Panel (A)	AK
1-8	TCAUH3071GEZZ	Temperature Caution Label	AA
1-9	XJBSD30P06000	Screw	AA
1-10	LHLDZ1146GEZZ	Panel Holder (A)	AC
1-11	LHLDZ1147GEZZ	Panel Holder (B)	AC
2	CCABB1013GE02	Bottom Cabinet Ass'y	AZ
2-1	GDōRB3002GESA	Battery Door	AC
2-2	GLEGG0001GESA	Felt Bottom	AC
2-3	GLEGG0002GESA	Felt Bottom	AC
2-4	JBTN-1110GESB	Battery Button	AC
2-5	LHLDB1001GEZZ	Battery Terminal Holder	AC
2-6	LHLDB1002GESA	Battery Terminal Holder	AC
2-7	LHLDB1003GEZZ	Latch	AC
2-8	LX-NZ3006GEZZ	Nut	AA
2-9	LX-NZ3011GEZZ	Insert Nut	AB
2-10	MSPRC0019GEFJ	Battery Eject Spring	AA
2-11	MSPRC0021GEFJ	Battery Spring	AA
2-12	MSPRD0037GEFJ	Battery Door Spring	AA
2-13	MSPRD0038GEFJ	Latch Spring	AB
2-14	NSFTL0246GEFJ	Door Shaft	AB
2-15	NSFTL0247GEFD	Latch Shaft	AC
2-16	PSLDM3339GEZZ	Shield Panel	AC
2-17	QCNW-0652GEZZ	Connector	AC
2-18	LHLDB1004GEZZ	Battery Holder	AD
2-19	GEARP0001GEZZ	Earth Panel	AC
2-20	GCABB1013GESB	Bottom Cabinet	AQ
3	CPNLC1071GE02	Cabinet Front Panel Ass'y	BA
3-1	GCōVA1084GESA	Mode Selector Button Cover	AG
3-3	HDECQ0016GESA	LED Cover	AK
3-4	HDECQ0019GESA	Decoration Panel	AK
3-5	HPNLC1071GESA	Front Panel	AW
3-6	JBTN-1112GESA	Record Button	AD
3-7	JBTN-1113GESA	Stop Button	AC
3-8	JBTN-1114GESA	Fast Forward Button	AC
3-9	JBTN-1116GESA	Playback Button	AC
3-10	JBTN-1117GESA	Audio Dub. Button	AC
3-11	JBTN-1118GESA	Pause Button	AC
3-12	JBTN-1115GESA	Rewind Button	AD
3-13	JBTN-1109GESB	Tape Counter Reset Button	AD
3-14	JBTN-1111GESB	Eject Button	AD
3-15	LHLDZ1115GEZZ	Button Holder	AC
3-16	LHLDZ1155GEZZ	Reb	AC
3-17	—		
3-18	MSPRP0054GEFW	Button Spring	AD
3-19	MSPRP0070GEFW	Spring Holder	AB
3-20	PGiDM0025GEZZ	Guide Panel	AE
3-21	PMLT-0020GEZZ	Moltplene	AA
3-24	XJBSD30P08000	Screw (Button Holder)	AA
3-25	HLDZ1144GEZZ	Cabinet Holder (A)	AD
3-26	LHLDZ1145GEZZ	Cabinet Holder (B)	AB
3-27	NSFTZ0003GEZZ	Shaft	AB
4	CFTAC1010GE01	Cassette Cover Ass'y	AN
4-1	HDECP0031GESA	Cassette Window Panel	AG
5	JKNBK1015GESA	Knob, Tracking	AC
6	TCAUH3080GEZZ	Caution Label	AA
7	MSPRP0061GEFW	Spring	AB
8	MJNTP0003GEZZ	Joint	AA
9	JBTN-1101GESB	Power Button	AD
10	LHLDZ1114GEZZ	Camera Terminal Holder	AC
11	HDECP0033GEZZ	Camera Terminal Decoration Panel	AA
12	LHLDF1010GEZZ	P.W.B. Holder	AB
13	MHNG-1008GEZZ	Hinge	AB
14	PZETV0108GEZZ	Insulation Sheet	AD
15	TLABM0196GEZZ	Model Label	AA
16	PSPAJ0007GEZZ	Camera Terminal Holder	AG
17	LHLDB1004GEZZ	Holder	AD
18	PSPAV0027GEZZ	Spacer	AA
A	LX-BZ3036GEFH	Screw	AA
B	XBSSD26P05000	Screw	AA
C	XJSSH30P06000	Screw	AA
D	XNESC26-20000	Nut	AA
E	LX-BZ3032GEFN	Screw	AC
F	XBSSC26P10000	Screw	AA
G	XHSSH26P05000	Screw	AA
H	XJSSH30P06000	Screw	AA
I	XBSSD26-08000	Screw	AA
J	XWHJZ34-05100	Washer	AA

Ref. No.	Part No.	Description	Code
	SCREW, NUTS, WASHERS, AND WIRE CLAMP		
301	LX-BZ3018GEZZ	Audio Control Head Screw	AA
302	LX-NZ3005GEFW	Nut E (Fixed Guide Adjust)	AA
303	LX-NZ3010GEFW	Nut P (Take-up Fixed Guide Adjust)	AB
304	LX-BZ3034GEFD	Screw (Tension Band Fix)	AA
305	LX-BZ3035GEFD	Screw W2.6B+3S	AA
306	LX-BZ3037GEFD	Screw W2.6B+5.5S	AA
307	LX-XZ3001GEFP	Set screw M2+3W	AC
308	LX-XZ3016GEFP	Set screw M2+4W	AA
309	LX-XZ3018GEFP	Set screw M2.6+5T	AC
310	XBBSD26P03000	Screw 2.6B+3S	AA
311	XBPSD20P04J00	Screw SW2P+4S	AA
312	XBPSD20P04000	Screw 2P+4S	AA
313	XBPSD20P06J00	Screw SW2P+6S	AA
314	XBPSD26P04J00	Screw SW2.6+4S	AA
315	XBPSD26P06J00	Screw SW2.6P+6S	AA
316	XBPSD26P08J00	Screw SW2.6P+8S	AA
317	XBBSD26P04000	Screw 2.6B+4S	AA
318	XBPSD26P05J00	Screw SW2.6P+5S	AA
319	XBPSD30P06JS0	Screw WSW3P+6S	AA
320	XBPSD30P08000	Screw 3P+8S	AA
321	XBPSD30P04J00	Screw SW3P+4S	AA
322	XNESD20-16000	Nut 2N	AA
323	XNESD26-2000	Nut 2.6N	AA
324	XRESJ20-04000	E-Ring E-2	AA
325	XRESJ25-04000	E-Ring E-2.5	AA
326	XRESJ30-06000	E-Ring E-3	AA
327	XRESJ40-06000	E-Ring E-4	AA
328	XWHJZ17-05040	Slider Washer 1.7W4–0.5	AA
329	XWHJZ21-05045	Slider Washer 2.1W4.5–0.5	AA
330	XWHJZ31-01054	Slider Washer 3.1W5.4–0.13	AA
331	XWHJZ31-02054	Slider Washer 3.1W5.4–0.25	AA
332	XWHJZ31-05054	Slider Washer 3.1W5.4–0.5	AA
333	XWHJZ42-05070	Slider Washer 4.2W7–0.5	AA
334	LX-WZ1001GE00	Slider Washer 3.3W8–0.5	AA
335	XWHJZ52-05080	Slider Washer 5.2W8–0.5	AA
336	XWHJZ42-01070	Slider Washer 4.2W7–0.13	AA
337	XWHJZ42-02070	Slider Washer 4.2W7–0.25	AA
338	LX-RZ3001GEFP	Grip Ring ϕ2	AA
339	LHLDW1019GEZZ	Wire Holder	AA
340	XBPS330P03000	Pan Head Screw 3P+3S	AA
341	XBPSD30P04000	Pan Head Screw 3P+4S	AA
342	XBPSD30P05J00	Pan Head Screw SW3P+5S	AA
343	XBPSD30P06J00	Pan Head Screw SW3P+6S	AA
344	XBPSD30P10JS0	Pan Head Screw WSW3P+10S	AA
345	XBPSD30P08WS0	Pan Head Screw W3P+8S	AA
346	XBPSD30P08J00	Pan Head Screw W3P+8S	AA
347	LX-BZ3031GEFN	Pan Head Screw W3P+7S	AA
348	XBPS320P15J00	Pan Head Screw SW2P+15S	AA
349	LX-WZ1004GE00	Slider Washer 2.1–7–0.5	AA
350	LHLDW9001GEZZ	Wire Holder	AA

SHARP

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