EIKI

EIKIVISION

VHS ™

PROGRAMABLE VIDEO CASSETTE DISPLAY SYSTEM

MODEL EV-10

SERVICE MANUAL

SAFETY WARNING

CAUTION: This unit should only be serviced by persons familiar with television service procedures and precautions. No modifications of any circuit should be made that would expose the user to a potential hazard or risk of injury. No modification of any circuit should be made unless specifically authorized by the manufacturer. Service work should be performed only after becoming thoroughly familiar with all of the safety checks and servicing guidelines shown below and contained elsewhere in this service manual.

- **Handling the Picture Tube:** Although the picture tube is equipped with an integral impolsion protection system, handle the picture tube with **extreme caution**. Do not scratch the tube. Do not subject the tube to undue pressure or shock. Wear safety glasses when handling the picture tube.

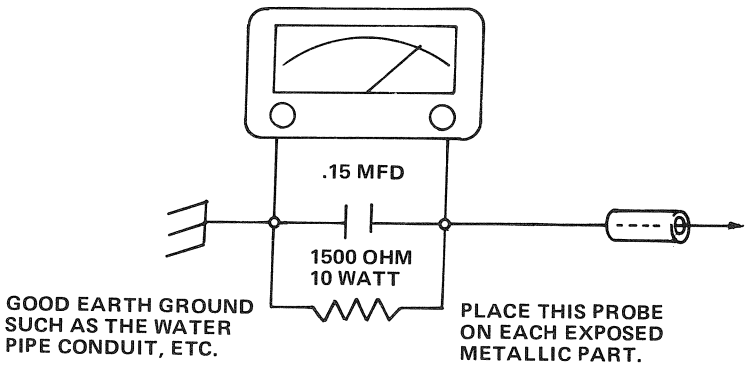
- **X-Radiation:** In order to avoid possible exposure to X-radiation take precautions to keep the high voltage below 22KV. Do not defeat or modify any shields or circuits indicated in the manual by the symbol⚠ . These are critical to high voltage regulation. High voltage can be measured with an accurate H-V meter connected from the picture tube anode connections and the chassis.

- **Fire and Shock Hazard:** All critical components that must be replaced with exact parts are identified on the schematic diagrams by the IEC symbol⚠ . Only use specified replacements for these components. Do not make any unauthorized circuit modifications. Always use an isolation transformer when servicing. Failure to do so exposes you to possible shock hazards and may damage the servicing instruments.

- **AC Leakage Test:** After reassembling the unit make sure the unit is safe to operate without danger of an electrical shock. Always perform an AC leakage test from the line cord to all exposed metallic parts. The resulting measurement must not exceed .45V RMS. (This corresponds to 0.3ma AC.) Any value that exceeds this limit should be treated as a defect which may lead to a potential shock hazard. It must be corrected immediately.

Do not use an isolation transformer during the leakage test. Use an AC voltmeter with an internal resistance of 5000 or more ohms per volt. One at a time, connect a 1500 ohm, 10 watt resistor paralleled by a .15 mfd AC – type capacitor between a known good earth ground (waterpipe, conduit, etc.) and the exposed metallic parts. Measure the AC voltage across the combination 1500 ohm resistor and a .15 mfd capacitor. Reverse the AC plug and repeat the AC voltage measurement for each exposed metallic part.

Example of AC leakage test:



EIKIVISION EV-10 SERVICE MANUAL

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INTRODUCTION

This service manual contains information for normal repairs and adjustment to the EikiVision model EV-10. All pertinent schematics and diagrams are included at the end of appropriate sections. Whenever important modifications are made to the EV-10, this manual will be supplemented by service updates.

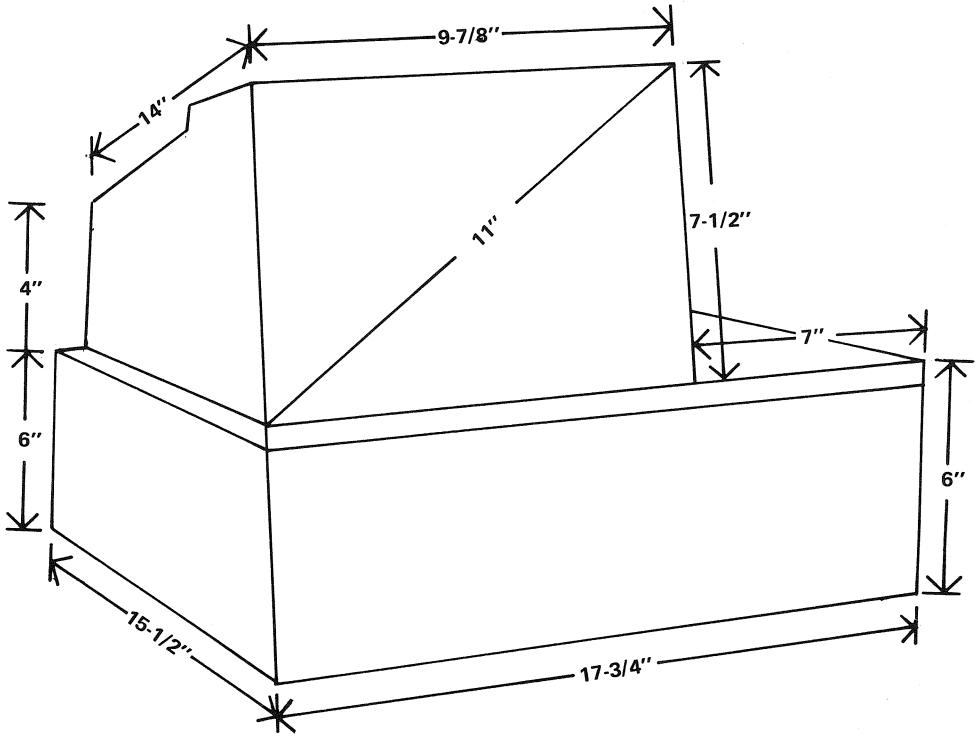
Part numbers used in this manual are for identification only. When ordering parts, please refer to the replacement parts list on page 158.

WARNING: When servicing the monitors critical sweep and high voltage circuits use only exact replacement parts for continued protection from X-ray emissions.

CAUTION: Exercise care to avoid electrical shock.

Section 1: GENERAL DESCRIPTION

1-1: PHYSICAL DIMENSIONS

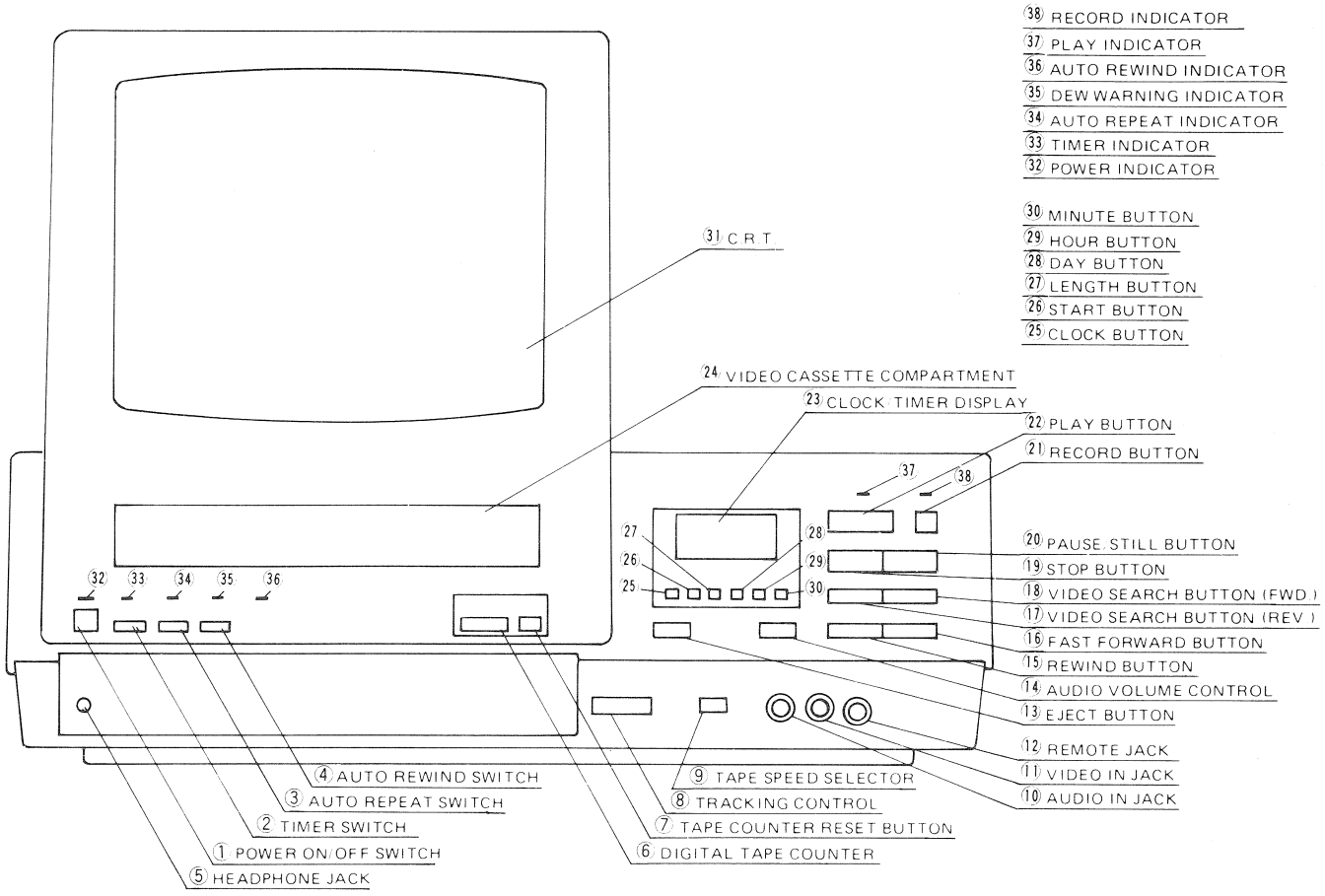


1-2: TECHNICAL SPECIFICATIONS

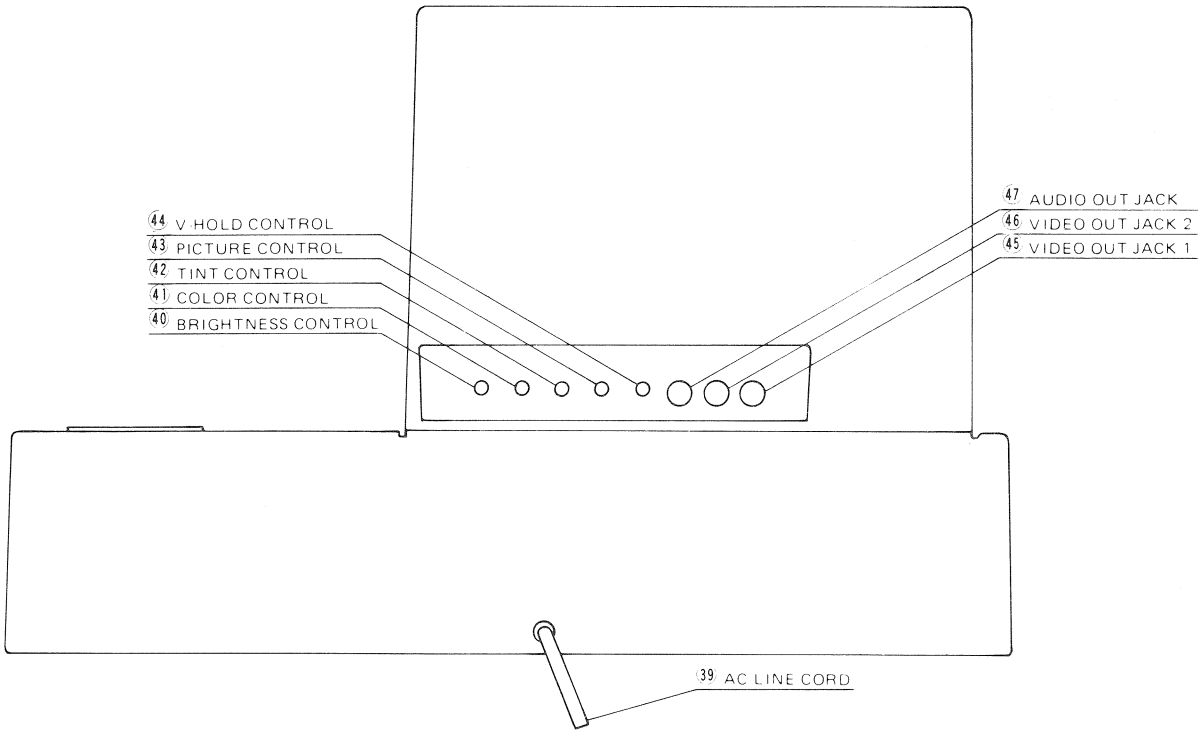
1. Power requirements: 120 volts 60Hz, 70 watts
2. Television System: EIA standard 525 lines 60 fields
   N.T.S.C. color signal
3. Playback/Record System: V.H.S. (½" cassette format)
   2 rotary head, helical scanning system
   Luminance: FM azimuth recording
   Chrominance: Converted subcarrier, direct recording
4. Tape width: 12.7mm (nominal)
5. Tape speed: 33.35 mm/sec. & 11.12 mm/sec.
6. Play/Record Time: 120 min. T-120 tape 33.35 mm/sec.
   360 min. T-120 tape 11.12 mm/sec.
7. Tape Counter: Mechanical 4 digits
8. Video Input: .5 – 0V p-p, 75 ohms
9. Video Output: 1.0V p-p, 75 ohms
10. Horizontal Resolution: 240 lines
11. Video Signal-to-noise ratio. 45dB
12. CRT display: 9" color monitor
13. Audio amplifier: 1.0 watt output power
14. Speaker: 8cm
15. Audio Input: .078V RMS, 50K ohms
16. Audio Output: .38V RMS, 1K ohms
17. Audio Frequency Characteristics: 70Hz to 10KHz
18. Audio Signal-to-noise ratio: 42dB
19. Timer setting: 1 minute to 9 hours, 59 minutes
20. Timer display: AM/PM display
21. Rewind/Fast Forward Time: within 5 minutes T-120 tape
22. Operating posture: Horizontal
23. Operating Temperature: +5° to +40°C
24. Operating Humidity: 35% to 80%
25. Storage Temperature: –20° to 60°C
26. Size: 13½" x 17¾" x 15½" (460mm x 410mm x 350mm)
27. Weight: 37 lbs. (17Kg)

Section 2: OPERATING INSTRUCTIONS

2-1: LOCATION AND IDENTIFICATION OF CONTROLS



FRONT VIEW



REAR VIEW

(FRONT)

1 Power ON/OFF Switch
2 Timer Switch
Selects timer-controlled mode of operation.
3 Auto Repeat Switch
Selects auto-repeat mode of operation.
4 Auto Rewind Switch
5 Headphone Jack
6 Digital Tape Counter
7 Tape Counter Reset Button
8 Tracking Control
Adjusts tracking to eliminate noise bars and black streaks.
9 Tape Speed Selector
Selects desired recording speed.
10 Audio In Jack
Input jack for audio from a tape recorder, phonograph or auxiliary source other than a microphone.
11 Video In Jack
Input jack for video signals from a camera, another video recorder, or auxiliary video equipment.
12 Remote Jack
Connection for EikiVision remote control unit.
13 Eject Button
Ejects the loaded video cassette tape from the unit.
14 Audio Volume Control
15 Rewind Button
Rewinds tape.
16 Fast Forward Button
Advances tape fast forward.
17 18 Video Search Button (Rev. Fwd.)
Video search advances tape 5 X SL speed while in playing mode, forward or reverse.
19 Stop Button
Stops motion.
20 Pause/Still Button
Temporarily halts recording or playback.
21 Record Button
Starts recording.
22 Play Button
Starts playback.
23 Clock/Timer Display
Displays actual time, program's starting time and play time.
24 Video cassette compartment
25 Clock Button
This button is used to set the actual time.
26 Start Button
This button is used to set the playback starting time.
27 Length Button
This button is used to set the length of desired playback time.
28 Day Button
This button is used to set the day of the week.
29 Hour Button
This button is used to set the "Hour".
30 Minute Button
This button is used to set the "Minute".
31 C.R.T.
Monitor screen.
32 Power Indicator
Indicates power switch is on.
33 Timer Indicator
Indicates timer switch is on.
34 Auto Repeat Indicator
Indicates auto repeat switch is on.
35 Auto Rewind Indicator
Indicates auto rewind switch is on.
36 Dew Warning Indicator
Indicates the presence of excessive moisture inside the unit. Activates a protection circuit to prevent the unit from operating until the moisture has evaporated.
37 Play Indicator
Indicates activation of the Play Button.
38 Record Indicator
Indicates activation of the Record Button.

(REAR)

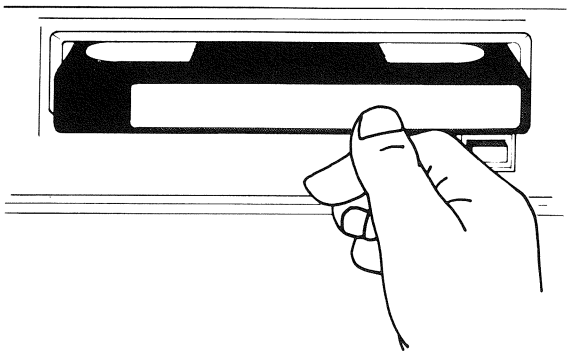
39 AC Line Cord
40 Brightness Control
41 Color Control
42 Tint Control
43 Picture Control
44 V-Hold Control
45 Video Out Jack
Line output of video signal — to connect to other monitor or video recorder.
46 Audio Out Jack
Line output of audio signal — to connect to another video recorder or audio equipment.

2-2: OPERATIONAL FUNCTIONS

LOADING/EJECTING A VIDEO CASSETTE

To Load

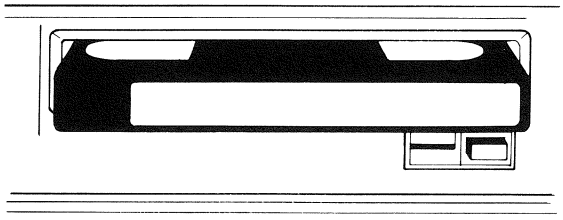
This unit has an automatic loading device. To load the cassette, simply push in the cassette until it is almost all the way in the compartment. A second, gentle push automatically loads the cassette into the VTR.



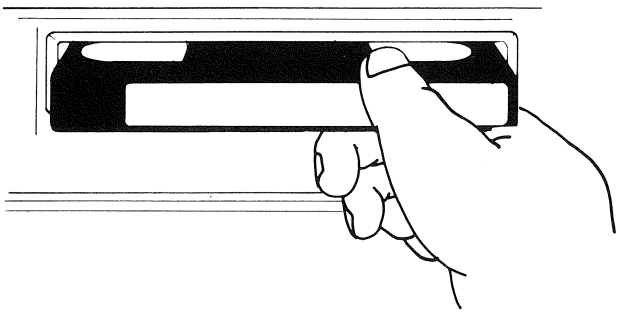
CAUTION: Only one cassette at a time can be loaded. The unit will not accept a video cassette if a cassette is currently inserted. When the unit is not in use, remove any video cassette.

To Eject

❶ Press the EJECT Button to automatically eject the loaded cassette.



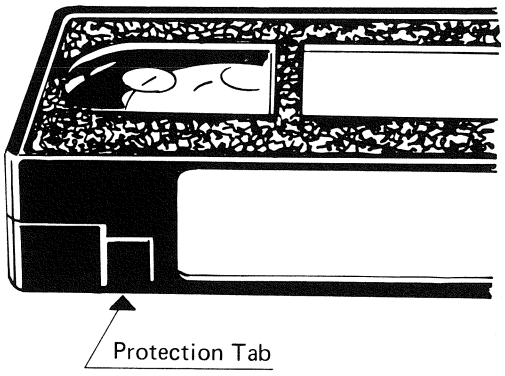
❷ Manually remove the cassette.



❸ Cassette access door closes automatically.

CASSETTE ERASE PROTECTION

All VHS Video Cassettes have a protection tab to insure a recording is not accidently erased. When the protection tab is in place, the cassette can be erased and reused, as necessary. However, when the protection tab is removed, the cassette can not be used to record, only play. With the tab removed, the recording cannot be erased. To record on a cassette when the tab is removed, place a piece of tape over the tab opening and proceed as usual.



CLOCK SETTING

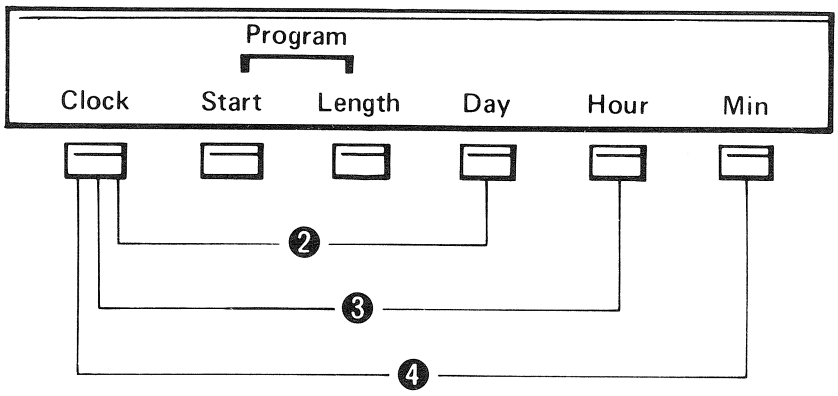
The EV-10 clock displays the time digitally in a 12 hour format with AM and PM indicators. The day of the week is also shown.

Day of week

AM/PM indicator **Digital hour display**

By using the DAY, HOUR, and MIN Buttons, the clock can be set to any day, any time. Each push of a button changes that portion of the display. Continuous pushing causes the display to change continuously. Follow the example below to set the clock.

NOTE: Whenever there is a momentary power interruption or the AC line cord is accidently disconnected, the clock display flashes Sunday AM 12:00. The clock should be reset.

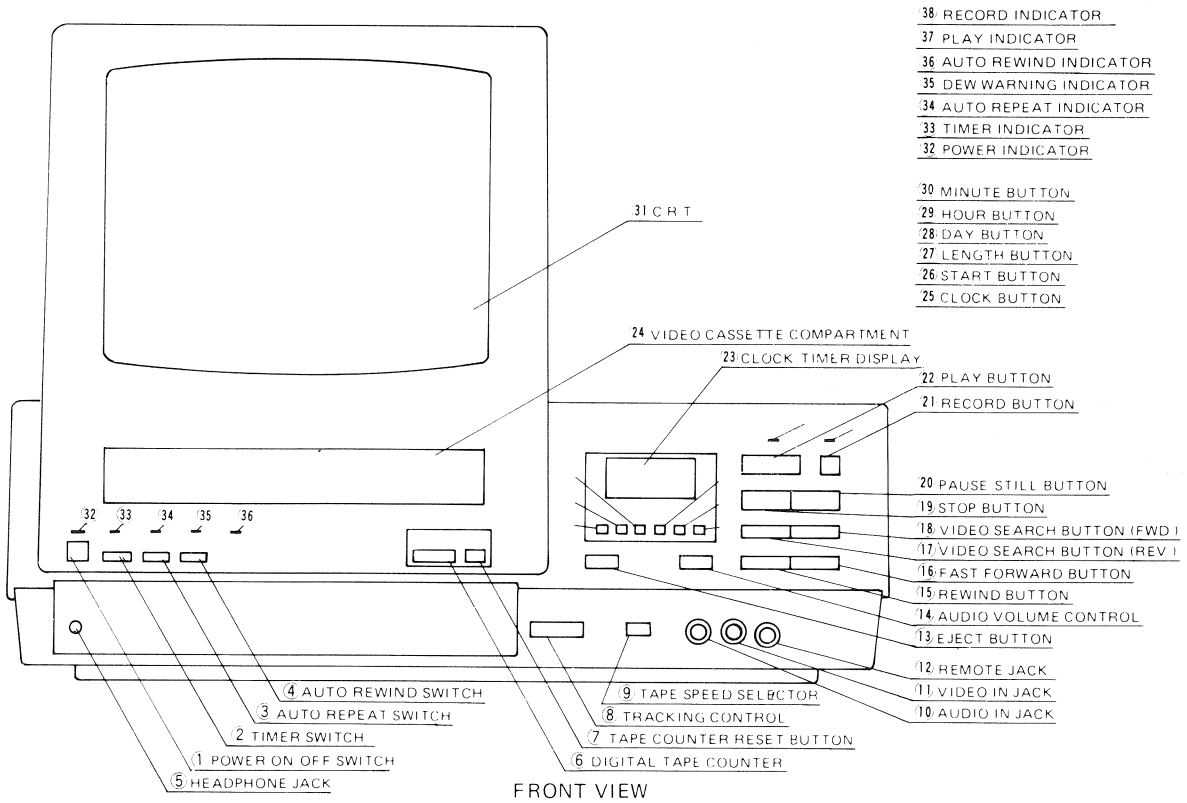


EXAMPLE:

1. Plug the AC line cord into an 120V AC outlet.
2. Press the CLOCK Button and DAY Button at the same time to set the day of the week to Wednesday (WE). Release the DAY Button immediately when (WE) is displayed.
3. Press the CLOCK Button and HOUR Button at the same time to set the "Hour" digits to Ex: PM 6:00. Release the HOUR Button immediately when Ex: PM 6:00 is displayed.
4. Press the CLOCK Button and MIN (Minute) Button at the same time to set the "Minute" digits to 35. Release the MIN Button immediately when Ex: PM 6:35 is displayed.
   (With the CLOCK Button released, the clock begins operation)

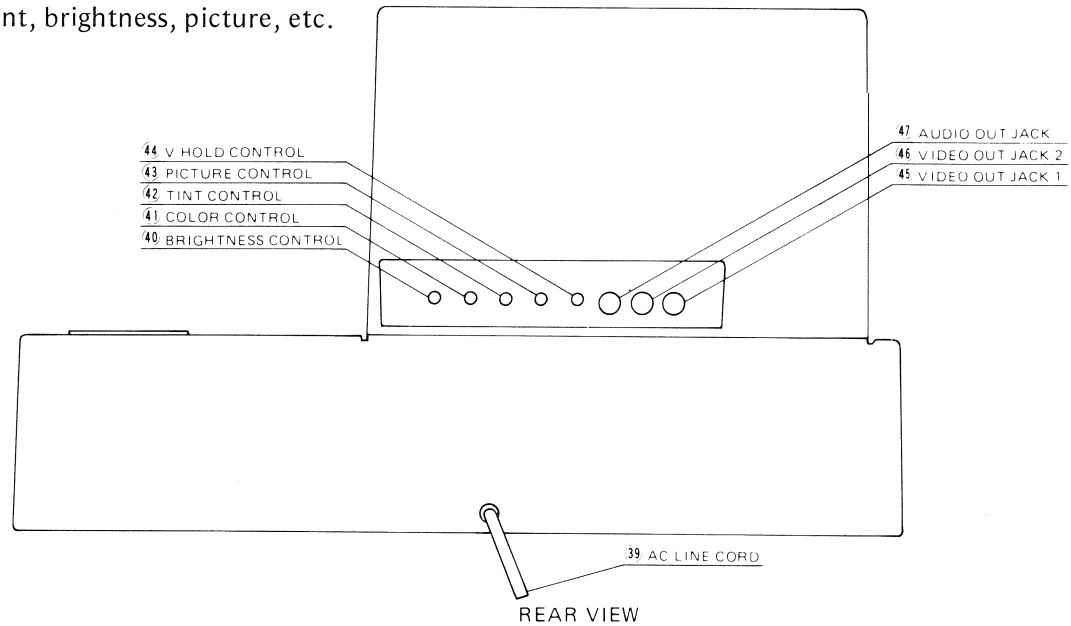
flashing

TO DISPLAY A VIDEO CASSETTE



FRONT VIEW

1. Switch on the POWER Switch 1 . The POWER INDICATOR 32 lights.
2. Make sure the TIMER 2 , AUTO-REPEAT 3 , and AUTO-REWIND 4 Switches are off.
3. Insert a pre-recorded video cassette.
4. Press the PLAY Button 22 . The PLAY INDICATOR 37 lights.
5. Adjust the TRACKING CONTROL 8 , as needed.
6. Press the STOP Button 19 if you want to stop the playback completely. Press the PAUSE/STILL Button 20 to temporarily halt the playback.
7. When the tape comes to its end, the PLAY INDICATOR goes off. The tape automatically rewinds to its beginning.
8. Depending on the quality of the tape, it may be necessary to adjust the monitor controls 40 — 44 for color, tint, brightness, picture, etc.



REAR VIEW

TRACKING CONTROL

NORMAL PICTURE

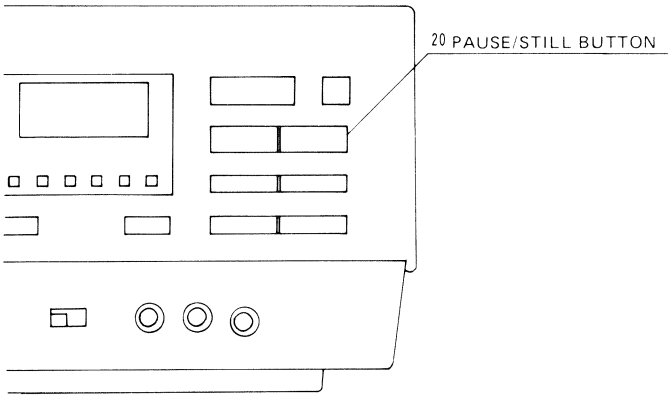
POOR TRACKING

Tracking is used to describe how well the video heads follow a recorded signal during playback. Tracking is said to be "good" when the heads pick up a strong signal and produce a sharp, clear picture. When the heads do not accurately track the signal they pick up recorded noises which, in turn, distort the playback picture.

Except when playing a tape recorded on a different machine, poor tracking is rarely encountered. To correct a noisy picture, rotate the TRACKING CONTROL 8 . Allow several seconds between rotations for the new setting to take effect.

Always return the TRACKING CONTROL to its center position when the playback is concluded.

PAUSE/STILL



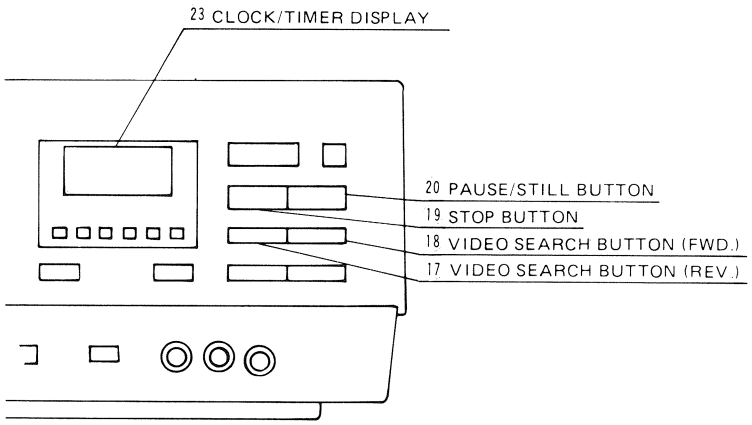
The PAUSE/STILL Button 20 momentarily stops the record or playback modes without disengaging the operating mode.

When recording, the PAUSE Button can also be used to edit, by pressing the PAUSE Button at the start of any interruption, the recording mode is temporarily halted. When the interruption is over, release the button to resume recording.

The PAUSE/STILL mode automatically disengages after 4 to 5 minutes to avoid damaging the tape or drive components.

FORWARD/REVERSE SEARCH

The EikiVision can rapidly scan a cassette, in either a forward or reverse direction, to locate a desired segment. The cassette must contain recorded material. During the search the sound is muted and picture noise bars appear.

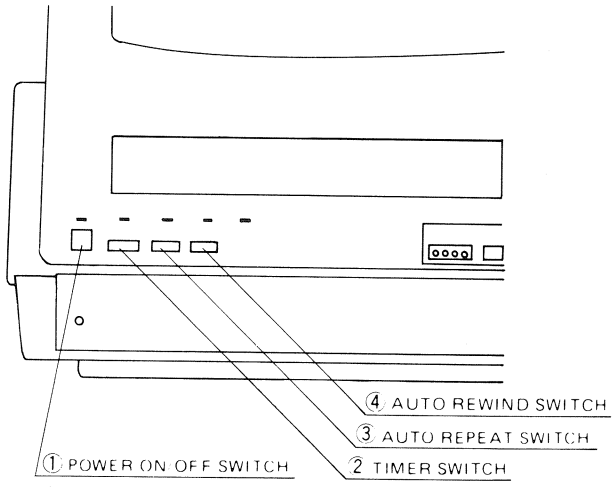


To begin a forward search, press the FWD Video Search Button 18 . To begin a backward (reverse) search, press the REV Video Search Button 17 . The display speed is 5 times the extended play speed.
To end a search or return to normal play, press the activated Search Button a second time.

AUTO-REWIND

EikiVision automatically rewinds a cassette tape at the end of its pre-recorded program. When the program ends or there is a loss of video for 6 to 10 seconds, the tape stops. It automatically rewinds back to the begining of the tape and stops. The tape can then be removed by pressing the EJECT Button 13 or replayed by pressing the PLAY Button 22 .

To rewind a tape before its conclusion:
1. Press the POWER Switch 1 to "on".
2. Press the TIMER Switch 2 to "off".
3. Press the AUTO-REPEAT Switch 3 to "off".
4. Press the AUTO-REWIND Switch 4 to "on".
5. Press the PLAY Button 22 to "on".

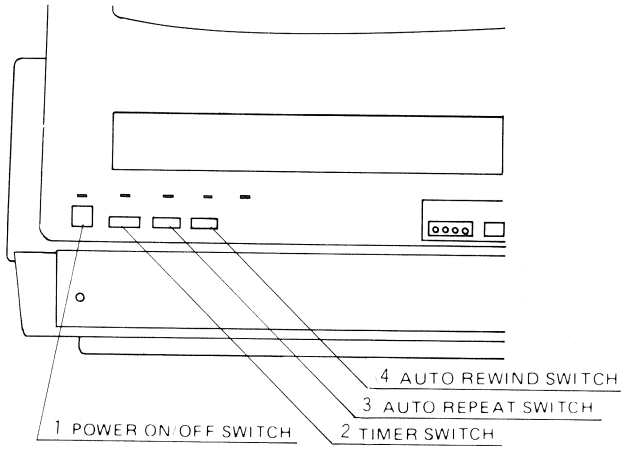


NOTE: If both AUTO-REPEAT and AUTO-REWIND are "on" at the same time, the AUTO-REPEAT function over-rides the AUTO-REWIND function.

AUTO-REPEAT

By following the sequence outlined below, EikiVision automatically repeats the same program (continual playback of the same recorded program). When the program ends or there is a loss of video for 6 to 10 seconds, the program is replayed. The unit continues this operation until the AUTO-REPEAT Switch 3 is pressed to "off" and the STOP 19 Switch is pressed.

1. Press the POWER Switch 1 to "on".
2. Press the TIMER Switch 2 to "off".
3. Press the AUTO-REPEAT Switch 3 to "on".
4. Insert pre-recorded cassette.
5. Press the PLAY Button 22 to "on".



NOTE: If both AUTO-REPEAT and AUTO-REWIND are "on" at the same time, the AUTO-REPEAT function over-rides the AUTO-REWIND function.

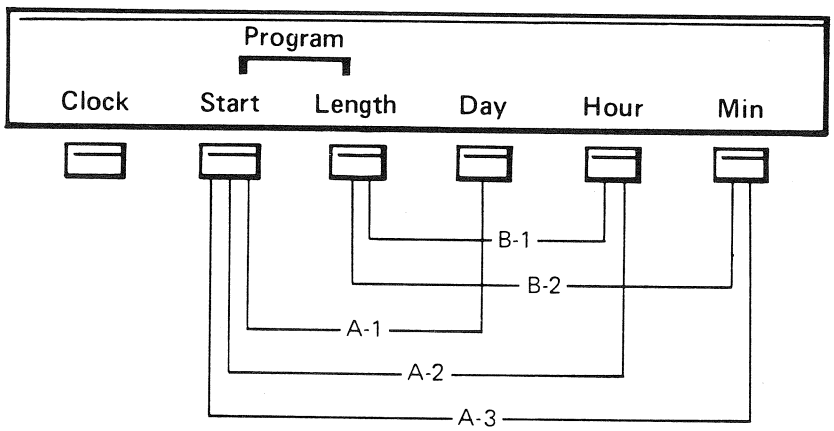
AUTO-PLAY TIMER

EikiVision features a unique AUTO-PLAY TIMER which allows the operator to program the starting time and day of a pre-recorded program. The length of time the program should run may also be selected.

To activate this feature, set the digital clock to the correct time. Then set the day and time for the program to start. Next set the length of the program. Use the example below as a guide

EXAMPLE:

To play an unattended timed program of 50 minutes starting at 9:05 AM on Thursday when the actual time is 6:15 PM on Sunday.



Clock Display

SU

PM 6:15

A-1 Press the START Button and DAY Button at the same time to set the day of the week to Thursday (TH). Release the Day Button immediately when (TH) is displayed.

TH

AM 12:00

A-2 Press the Start Button and Hour Button at the same time to set the "Hour" digits to AM 9:00. Release the Hour Button immediately when AM 9:00 is displayed.

TH

AM 9:00

A-3 Press the Start Button and MIN (Minute) Button at the same time to set the "Minute" digits to 05. Release the MIN Button immediately when AM 9:05 is displayed.

TH

AM 9:05

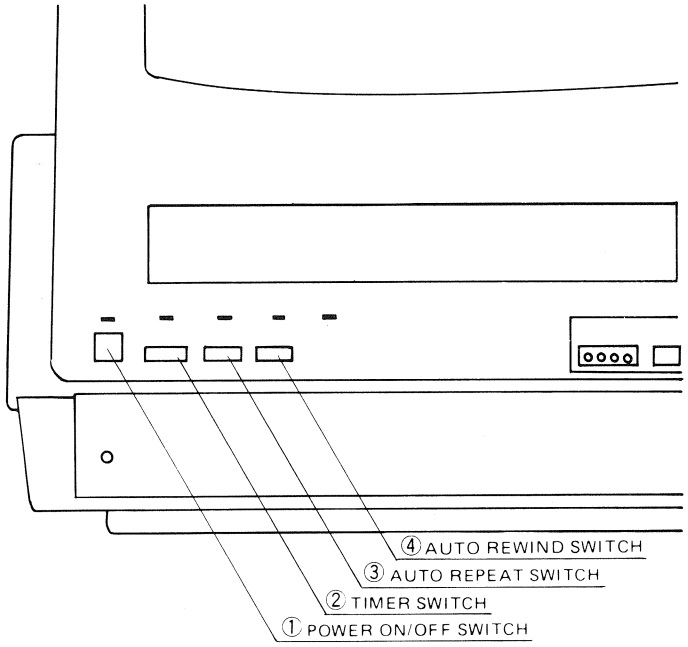
B-1 Press the Length Button and Hour Button at the same time to set the "Hour" digits to 0. Release the Hour Button immediately when 0:00 is displayed.

0:00

B-2 Press the Length Button and MIN (Minute) Button at the same time to set the "Minute" digits to 50. Release the MIN Button immediately when 0:50 is displayed.

0:50

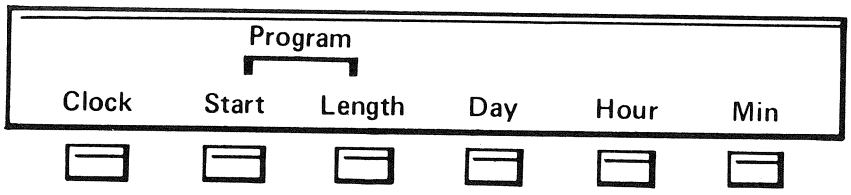
After setting the timer, press the TIMER Switch 2 to "on". Insert the cassette tape and switch "off" the main power 1 . The machine will now play the tape at the designated time.



As an additional feature the AUTO-REPEAT Switch may also be pressed "on" in which case the taped program will repeatedly play until the programed time length is reached.
To replay the program daily (continuous play for 7 days) in the same time zone as given in the example, ensure that SU, MO, TU, WE, TH, FR and SA all light up in step (A-1).
If the program length time is forgotten, the unit will continue to play until end of the tape, unless the AUTO-REPEAT Switch in "on" in which case it will continue to play until the AUTO-REPEAT Switch is switched "off".

CHECKING THE PROGRAMMED CLOCK

To recall the programmed contents and check them, press the START Button so that the program start time is displayed. Press the LENGTH Button so that the playback length time is displayed.

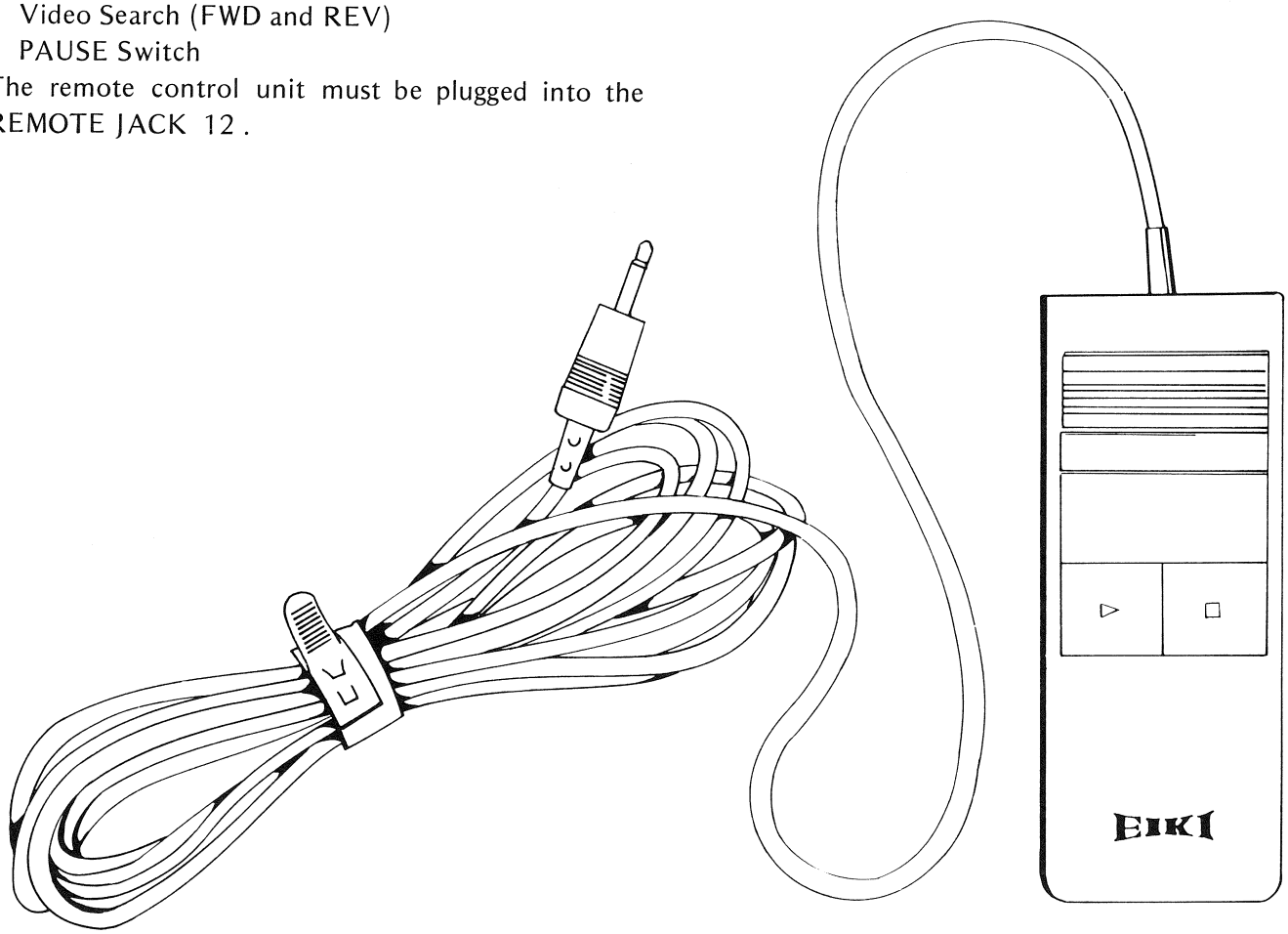


REMOTE CONTROL

An optional hand held remote control unit is available for the EikiVision. It features the following functions:

- PLAY Switch
- STOP Switch
- Video Search (FWD and REV)
- PAUSE Switch

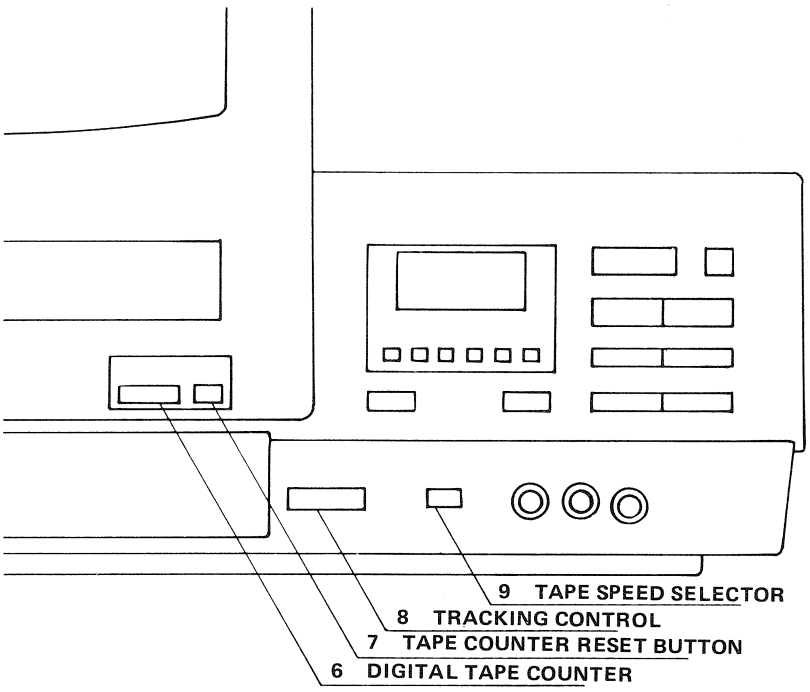
The remote control unit must be plugged into the REMOTE JACK 12 .



TAPE COUNTER

A 4-digit tape counter provides an easy and convenient way to index and locate the beginning of a specific program or segment.

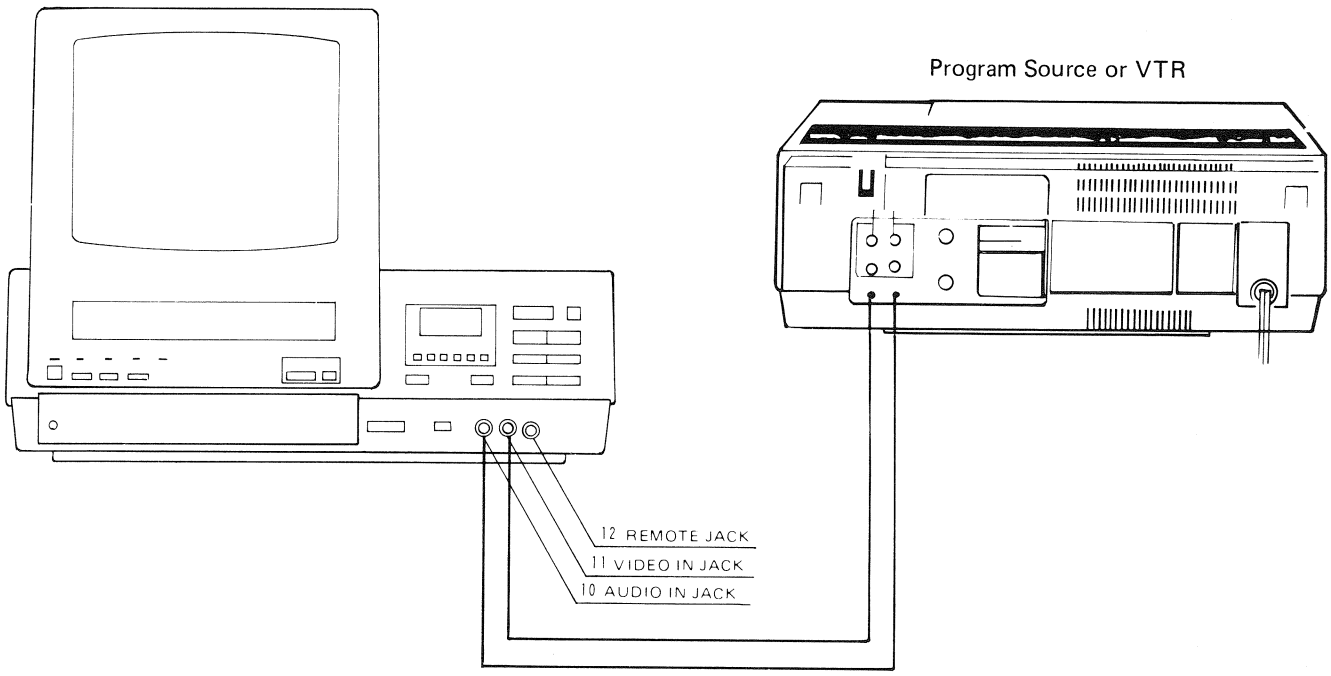
1. Rewind the cassette to its beginning.
2. Reset the counter to "0000".
3. Play the tape.
4. Note the counter reading 7 when the tape is at a point of interest.



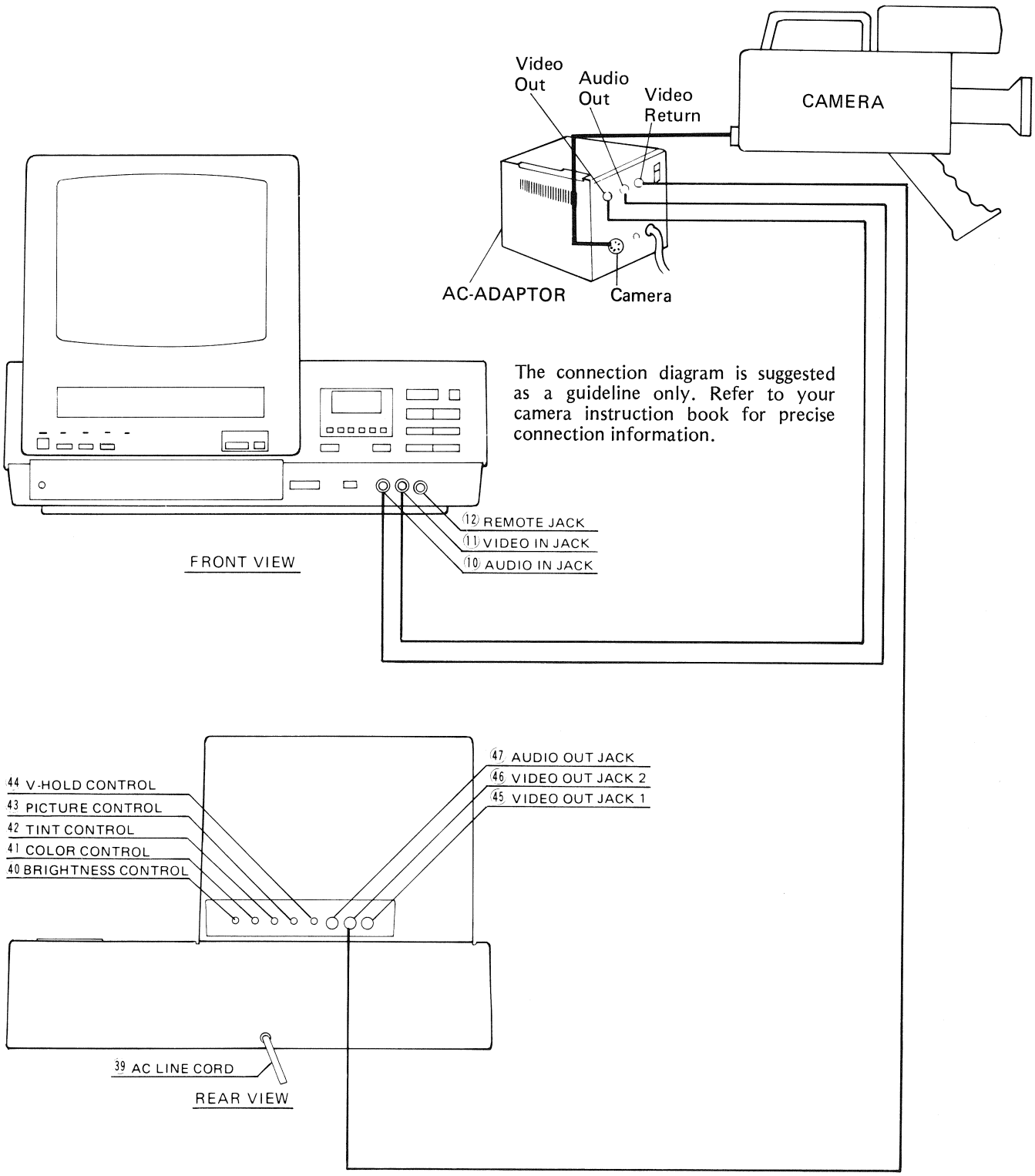
RECORD FUNCTION

The EikiVision is designed to accept audio and video input from equipment such as a VCR, camera, tuner, or monitor.

1. Video and audio outputs from other VCR's may be connected to the EikiVision "RCA" type video and audio jacks. These jacks are located at the lower right front of the unit.
2. Insert pre-recorded tape in other unit.
3. Switch the EikiVision POWER 1 to "on".
4. Make sure the TIMER 2 , AUTO-REPEAT 3 , and AUTO-REWIND 4 are "off".
5. Insert video tape in EikiVision.
6. Select EikiVision tape speed 9 . SP is the standard speed; EP is extended 3 times.
7. Reset TAPE COUNTER 7 to "0000".
8. Press PLAY Button on the other unit. At the same time, press the RECORD Button 21 on the EikiVision.
9. Video and audio is recorded by the EikiVision.
10. When the recording is over, press the STOP Button 19 .



Use the following guidelines when the input source is a camera:



DEW SENSOR

Condensation can occur when:

- The unit is shifted from a cold to a warm place.
- The unit is used in the room immediately after the room heater is started.
- The unit is shifted to place subject to high humidity or high temperature.

Condensation produces liquid. The liquid can damage the cassette and the unit. If condensation occurs within the VTR, to prevent damage, the unit automatically becomes inoperative. The dew indicator light blinks.

CAUTION: Condensation may also effect the dew indicator. It can delay the appearance of the blinking light. Therefore, to ensure the unit is completely dry, wait approximately one hour after the dew indicator has stopped blinking to use the unit. Before using the unit, check the dew indicator again.

Section 3: RECOMMENDED SERVICE PROCEDURES

3-1: TOOLS AND TEST EQUIPMENT

It is recommended that all service be performed by a qualified service technician. Use the proper hand tools, test equipment and special test fixtures described below.

Hand Tools:

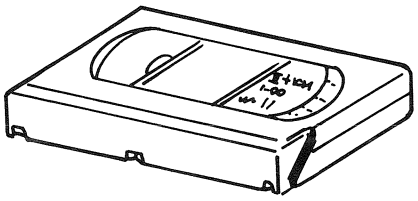
- Iso phillips type screwdrivers (LONG SHAFT)
- Metric nut drivers
- Metric hex wrenches
- Soldering iron
- Degausing coil
- Needle nose pliers

Test Equipment:

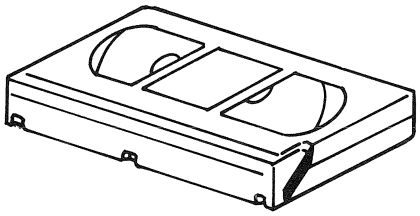
- VTVM or DVM high impedance with a range from .001 – 50 volt
- Dual Trace Oscilloscope, min. bandwidth of 15MHz .005 – 50V range with 1:1 and 1:10 probes
- Frequency counter 0 – 10MHz
- Sine Wave Generator 0 – 10MHz
- N.T.S.C. Color Bar Generator with 100% peak white reference
- Cross-Hatch and B/W Stair Step Generator is also very useful.
- Color TV Receiver/Monitor
- 0 – 20V DC Power Supply
- HV Probe 0 – 30KV range

Special V.H.S. VCR Alignment Tools:

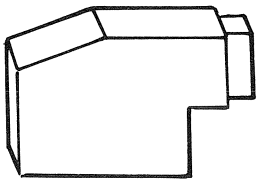
Order #	Part #	Description
3700	JIGBT0007	Back Tension Measuring Cassette
3800	JIGTG1200	Torque Gauge 1200 ATG
3801	JIGTG0090	Torque Gauge 90 ATG
3802	JIGMA0001	Master Plane and Reel Height Jig
3803	JIGGH0110	Retaining Guide Height Adjustment Jig
3804	JIGSG5000	Tension Gauge (5.0Kg)
3805	JIGSG0300	Tension Gauge (300g)
3806	JIGXP0004	X-Position Adjusting Jig
3807	JIGHW0009	Hexagonal Wrench (0.9mm)
3808	JIGHW0012	Hexagonal Wrench (1.2mm)
3809	JIGHW0015	Hexagonal Wrench (1.5mm)
3810	JIGTH0006	Torque Gauge Head
3811	JIGGAST110	D.D. Rotor Ass'y Fitting Jig
3812	JIGDT-0001	Upper Head Drum Jig
3701	VROATSV	Alignment Test Tape (MH-3)



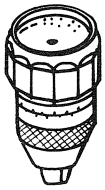
Back tension measuring cassette



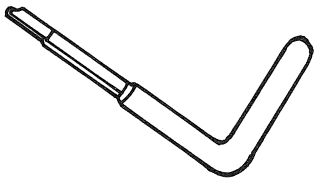
Alignment tape



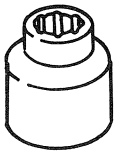
Retaining guide height adjusting jig



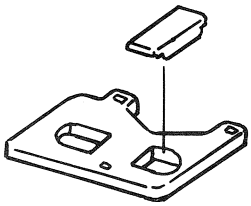
Torque gauge



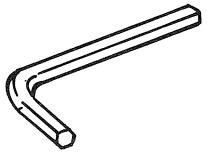
X-position adjusting jig



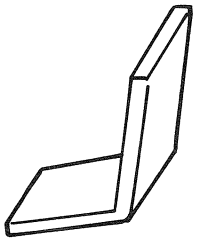
Torque gauge head



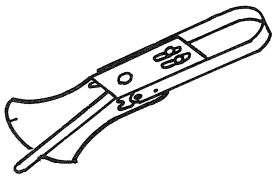
Master plane and reel height adjusting jig



Hexagonal wrench (0.9mm, 1.2mm, 1.5mm)



D.D. rotor ass'y fitting jig



Tension gauge

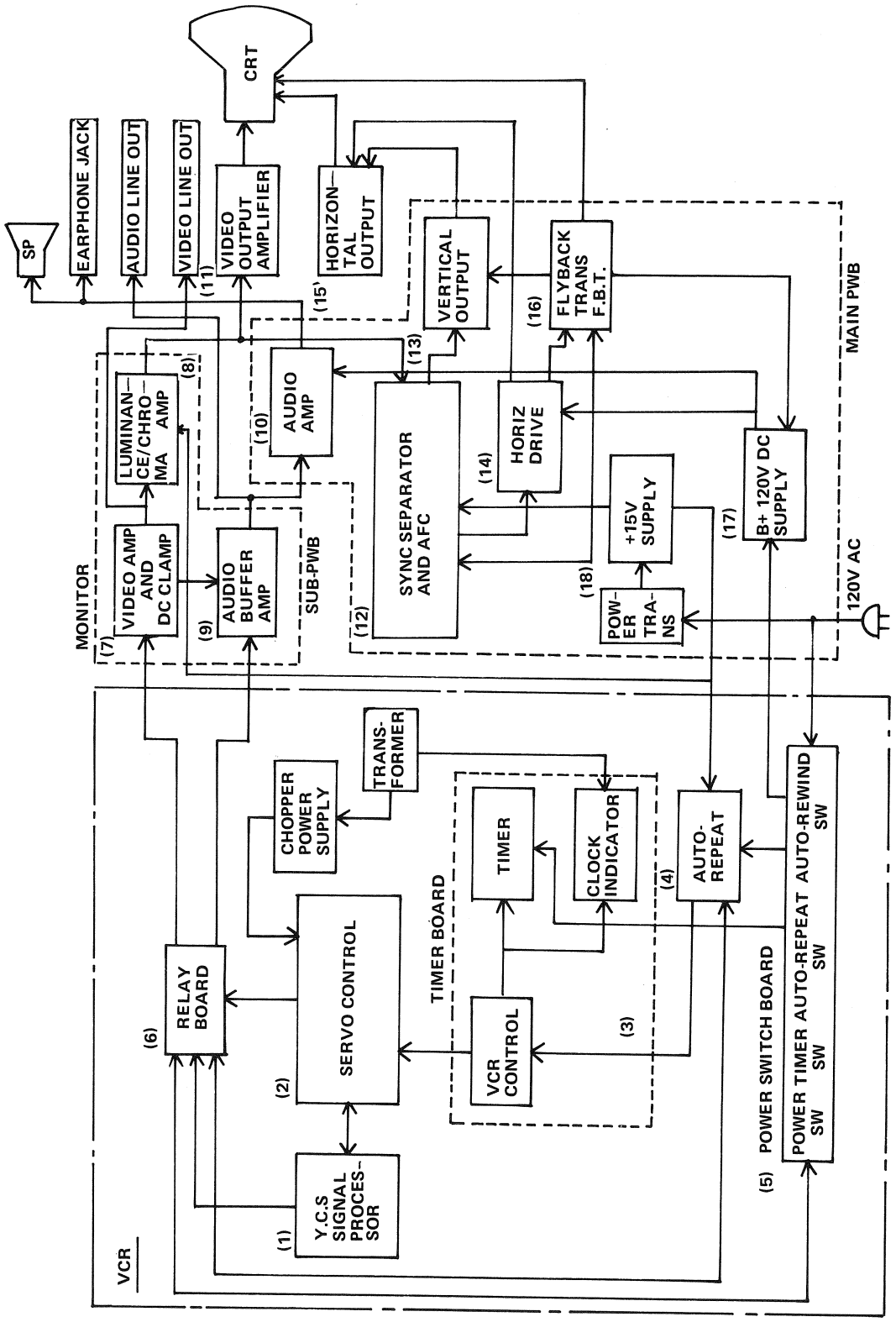
3-2: MECHANICAL PREVENTATIVE MAINTENANCE

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

Maintained every / Parts	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.	3000 hrs.	Remarks
Guide roller ass'y	□	□	□	□	□	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller	□	□	□	□	□	
Supply impedance roller (inner)		□		□	□	Clean with industrial-use methyl alcohol.
Supply impedance roller flange A	□	□	□	□	□	Clean tape contact area with a head cleaning solution such as Freon TF.
Supply impedance roller flange B	□	□	□	□	□	
Take-up impedance roller	□	□	□	□	□	
Retaining guide	□	□	□	□	□	
Guide flange B	□	□	□	□	□	
Slant pole	□	□	□	□	□	
Video head	□	○□	□	○□	○□	Clean all heads with a quality video head cleaner such as Freon TF.
Full-erase head	□	□	□	□	□	
A/C head	□	□	□	□	□	
Loading belt		□		○		Clean all rubber contact areas with isopropyl alcohol.
Capstan belt		□		○		
Counter belt				○		
Pinch roller	□	□	□	□	○□	
Reel idler	□	□	□	□	○□	
Reel motor pulley	□	□	□	□	□	Clean rubber contact area.
Reel motor					○	
Capstan motor					○	
Loading motor					○	
Supply/tape-up reel disk		□△		□△		Clean with industrial use methyl alcohol.
Tension band ass'y					○	
Brake unit					○	

Note: ○: Part replacement
□: Cleaning
△: Oil refilling

3-3: SYSTEM BLOCK DIAGRAM



3-3: SYSTEM BLOCK DIAGRAM

V.C.R.

(1) V.C.S. Signal Processing Circuits

This block represents the V.C.R.'s processing of audio and video signals prior to recording and subsequent to re-processing a tape during playback. The video signal is a high frequency, wide band signal. It is separated into its luminance "Y" and its color "C" components. The luminance signal is FM modulated; the color signal is frequency converted.

The audio signal is recorded with a high frequency bias similar to an audio tape recorder.

(2) Servo Control Circuit

This is an electronic control of the transport mechanism. The linear travel of the tape is precisely controlled by the capstan servo circuit. The writing speed of the record/playback heads is controlled by the drum servo. In the Record Mode the magnetic pattern on the tape is indexed by a control track pattern. During playback the index is referenced by the servo to re-trace the exact position where the recorded pattern was placed, thus reproducing the original information.

(3) Timer Board

The playback timer control contains a real-time clock, memory for setting automatic starting and playing time, and the V.C.R.'s operating switch circuit.

(4) Auto-Repeat Circuit

When activated, this circuit senses the absence of the video sync signal and institutes a command to rewind and restart the tape.

(5) Power Switch Board

This board contains the switches for power, timer, auto-repeat, and auto-rewind functions, including the appropriate LED indicators.

(6) Relay Board

This board routes and controls the audio and video from the V.C.R. to the monitor. It supplies the record, play, and re-wind mechanical controls signals to the auto-repeat, timer board, and power switch board.

MONITOR

(7) Video Amplifier and Clamp Circuit

This circuit processes the video output signal from the V.C.R. and clamps it to a D.C. level. Video is buffered to video output #1 and #2.

(8) Luminance and Chroma Circuit

IC-801 separates and processes the luminance and chroma signals. It provides individual picture controls, brightness, and autocolor controls.

(9) Audio Buffer Amplifier

The audio signal from the V.C.R. is buffered to the audio output connector.

(10) Audio Amplifier Circuit

The audio signal from the buffer is isolated by T-201. It is further amplified by the power amplifier and transformer isolated to the speaker and ear phone jack.

(11) Video Amplifier Circuit

This circuit develops the drive voltage for the red, green, and blue cathodes. It provides D.C. level set and R.G.B. screen controls for white balance and black level adjustments.

(12) Sync Separation and A.F.C. Circuit

IC-501 separates the sync signal into its horizontal and vertical components, locking the respective horizontal and vertical oscillators. Horizontal A.F.C. (Automatic Frequency Control) and horizontal and vertical drive signals are derived from this circuit.

(13) Vertical Output Circuit

The vertical drive originated from IC-501 is amplified by TR-501 and TR-502 to drive the vertical deflection yoke.

(14) Horizontal Output and Drive Circuit

The horizontal drive signal developed by IC-501 is amplified by TR-602 and coupled through transformer T-601 to horizontal output transistor TR-603. This drives the horizontal deflection yoke and the high voltage flyback transformer (F.B.T.).

(15) Deflection Yoke

This coil controls the scanning or sweep of the C.R.T.'s electron beam both horizontally and vertically.

(16) Flyback Transformer (F.B.T.)

This transformer boosts the horizontal return pulse ("flyback") from the horizontal circuit. The 15,750Hz horizontal pulse develops a high frequency, high voltage across this transformer which is rectified to supply the CRT anode its high voltage.

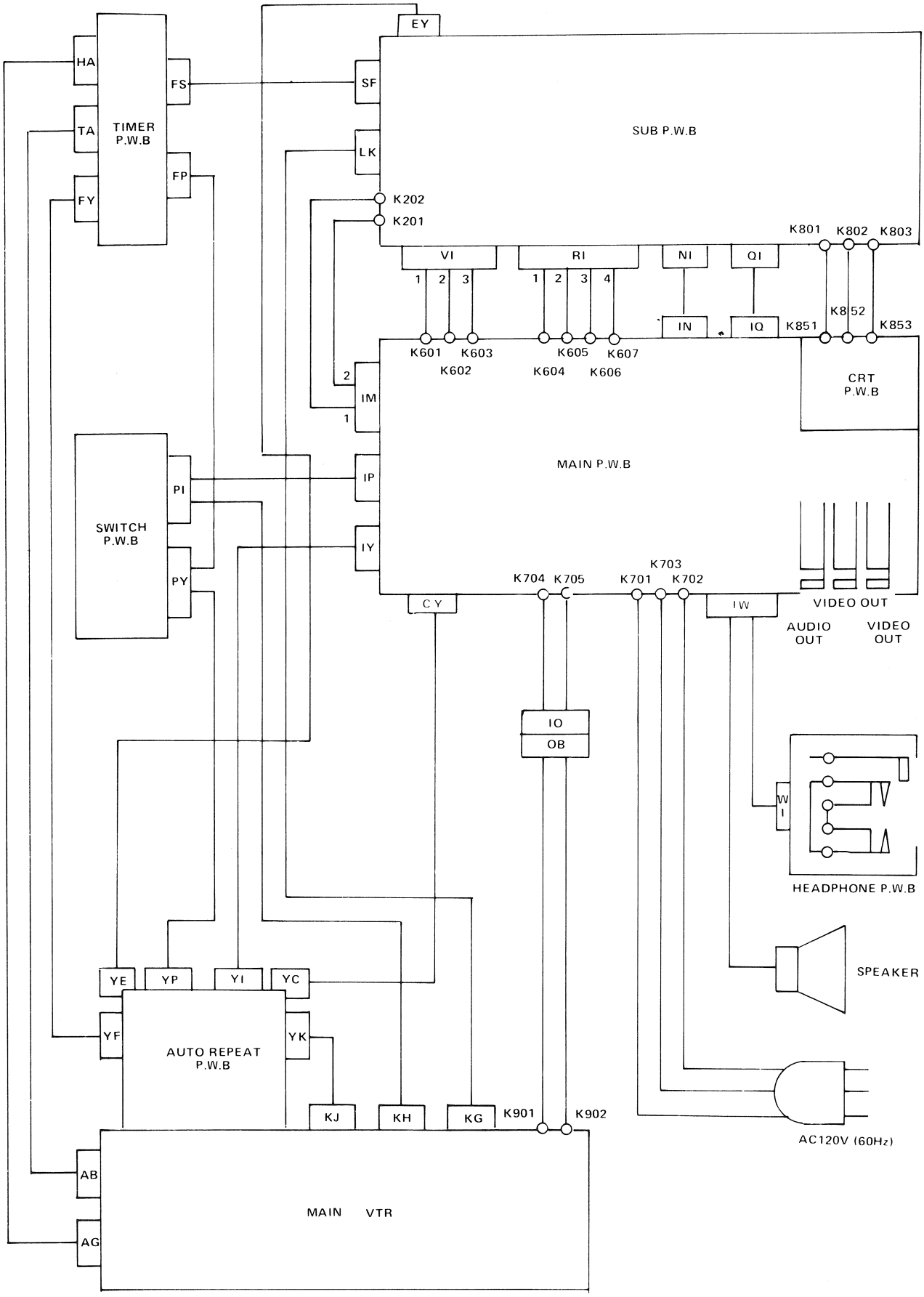
As a by-product of the F.B.T., an additional coil provides a high frequency pulse to the 120V DC B+ switching regulator circuit IC-701 and D-707.

(17) B+ 120V DC Constant Voltage Supply

120 volts 60Hz AC is rectified by diodes D-701 – D-704. Filtering and regulations are accomplished by the high frequency switching of SCR D-707 and the regular circuit IC-701.

(18) 15 Volt Constant Low Voltage Supply

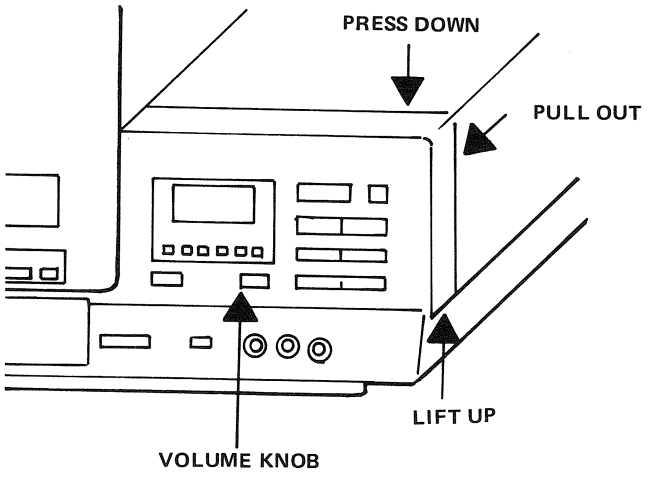
This circuit supplies poer to the sub-P.W.B., sync separator and horizontal drive IC circuit, the V.C.R. auto-repeat circuit, and timer control P.W.B. 20V AC is supplied from transformer T-702, rectified by bridge D-713, filtered by C-714, and regulated by EC-702 to 15V AC.


EY
HA
TA
FY
TIMER P.W.B
FS
FP
SF
LK
SUB P.W.B
K202
K201
K801
K802
K803
VI
RI
NI
QI
1 2 3
1 2 3 4
K852
IN
IQ
K851
K853
K601
K603
K605
K607
K602
K604
K606
CRT P.W.B
2
IM
1
MAIN P.W.B
IP
IY
PI
PY
SWITCH P.W.B
K703
K704
K705
K701
K702
CY
IW
VIDEO OUT
AUDIO OUT
VIDEO OUT
IO
OB
W I
HEADPHONE P.W.B
SPEAKER
YE
YP
YI
YC
YF
YK
AUTO REPEAT P.W.B
KJ
KH
KG
K901
K902
AC120V (60Hz)
AB
AG
MAIN VTR

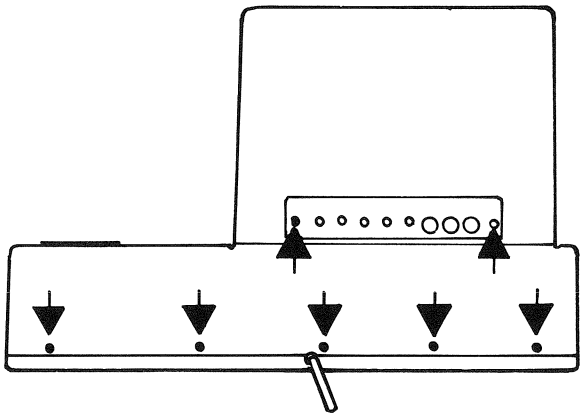
3-4: UNIT DISASSEMBLY

At first glance it appears difficult to open the case without damage. With the proper sequence and a little care the covers may be easily removed.

1. Remove the volume control knob, by gently pulling straight out. Fig. I.

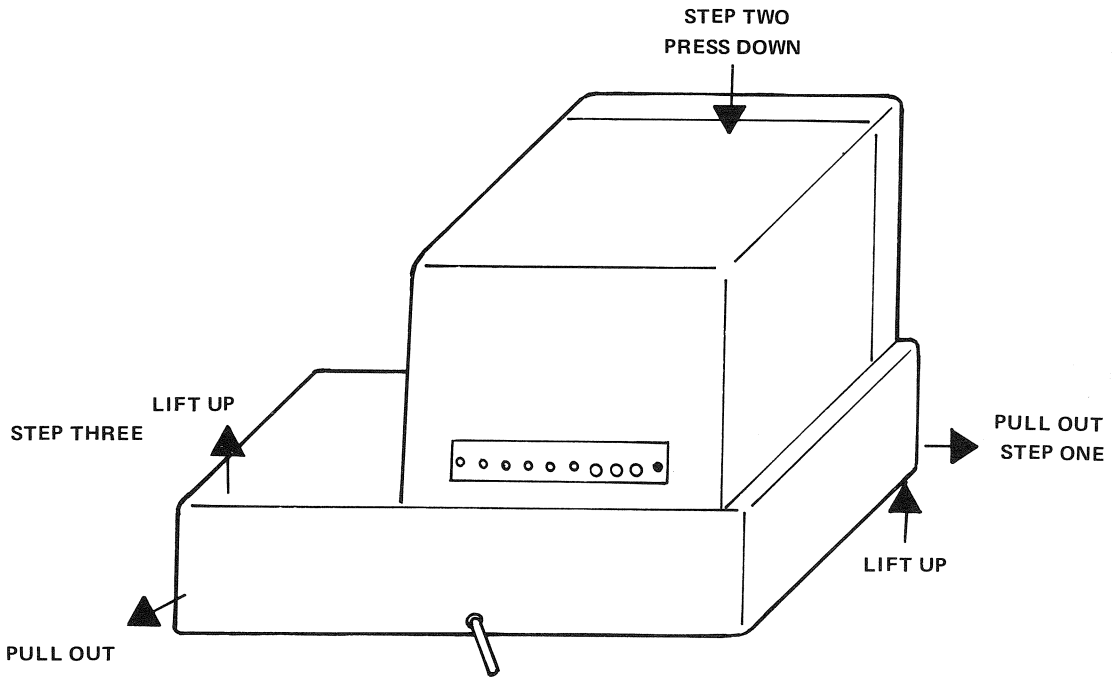


2. Snap off the front control panel by applying a downward pressure on the main case while at the same time pulling out and lifting up as shown above.
3. Remove the 7 brown screws on the rear as shown by the arrows. Fig.II. Extra care should be used when removing the two screws on the monitors control panel. These screws attach to the P.C. Board. When re-assembling do not over-tighten screws.



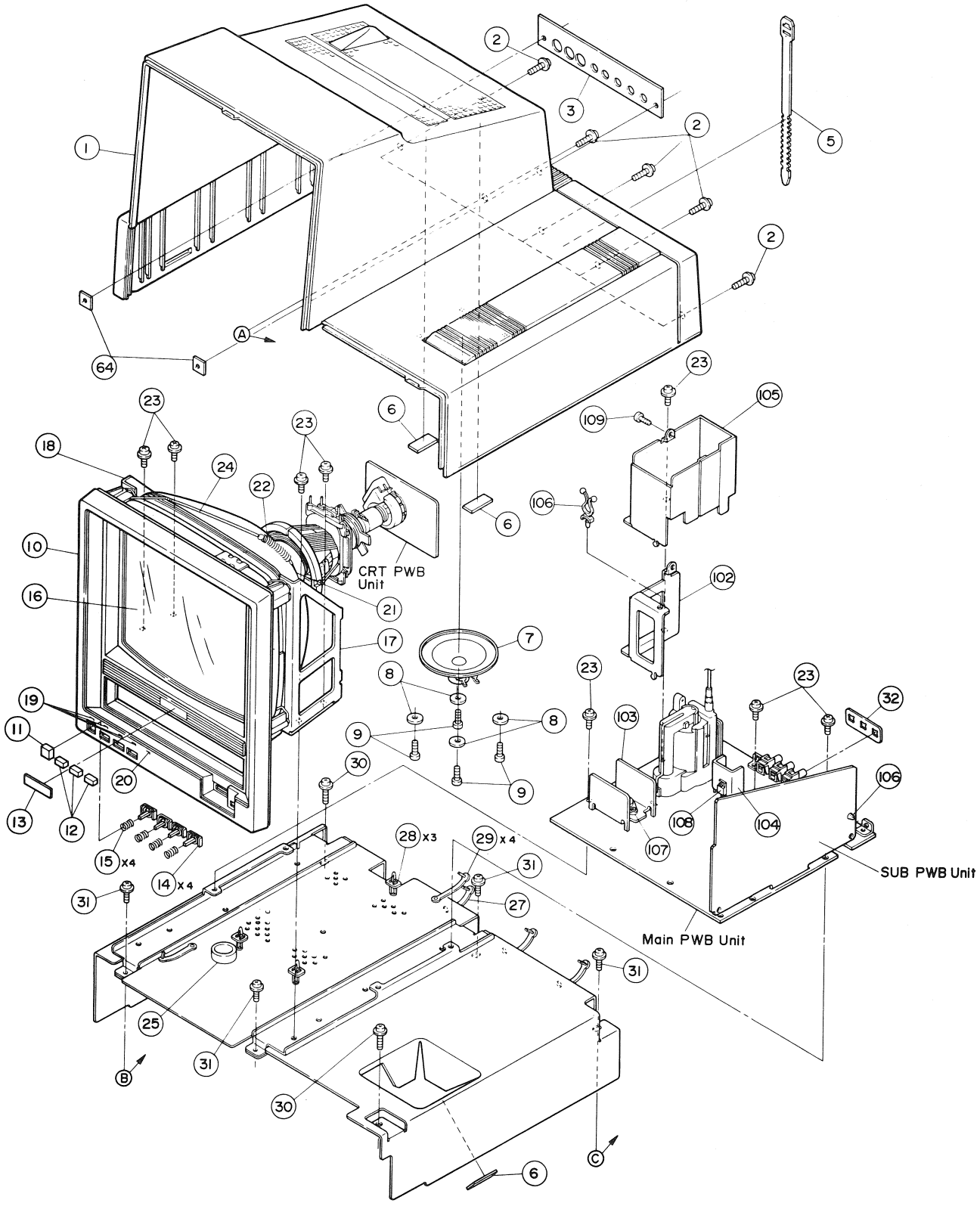
NOTE: The screws in the bottom, should not be removed unless the VCR indicates a major electronic servo problem.

4. Facing the rear of the unit, pull out while lifting up at the lower front right hand corner (Step one).



5. When the right hand corner has popped then press down on the top of the monitor, just behind the seam. (Step two) At the same time pull out and lift the left rear corner until the cover is loose. (Step three) (Be sure the monitor control knobs clear the cover).
6. Pivot back the entire cover towards you. Reach inside and disconnect the in-line speaker wire connector and remove the cover completely.

3-4: UNIT DISASSEMBLY



3-5: BENCH SERVICING THE V.C.R.

Description:

At first it may appear nearly impossible to gain sufficient access to service the V.C.R. mechanism or electronic circuits. A little experience and familiarity with this unit and the following few hints should make servicing the EV-10 a lot less difficult than might be thought.

Disassembly:

Remove the control panel and the top case, following the step by step procedure as described in Section 3-4 "Unit Disassembly".

Once the problem has been isolated to the V.C.R. monitor must be removed for easy access to the tape transport mechanism.

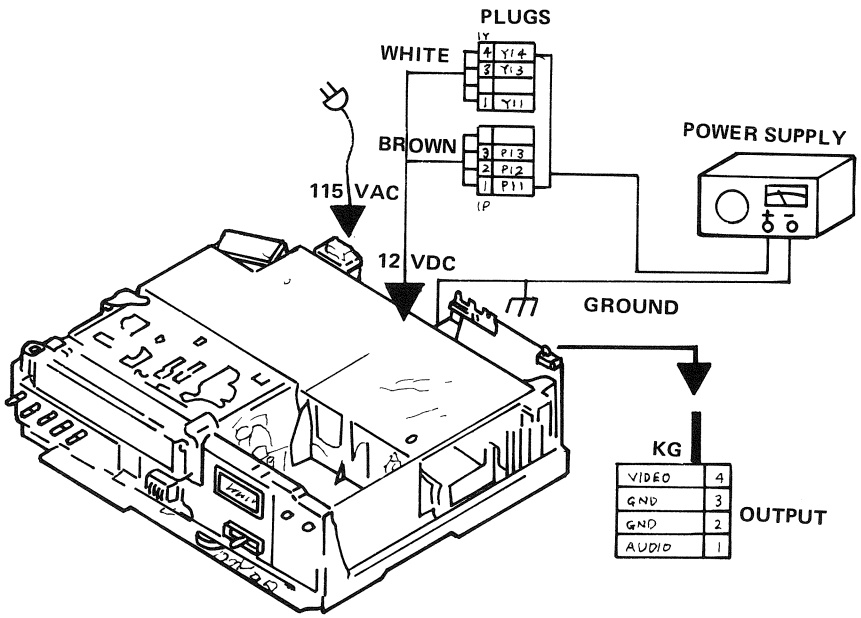
Unplug the AC power and the white AC V.C.R. connector.

Disassemble the monitor following the steps below:

1. Discharge the CRT anode lead to chassis ground and unplug the anode lead.
2. Unplug the yoke connector (DY) from the main PWB.
3. Unplug the black ground lead from the CRT to the CRT PWB.
4. Unplug the two yellow degauss coil leads (M) from the main PWB.
5. Unplug the CRT PWB from the CRT.
6. Remove the 4 screws 23 indicated by the arrows.
7. Lift the CRT and front mask as an assembly from the VCR chassis, and carefully set aside.
8. Unplug connectors IY and IP.
9. Unscrew the 6 screws 30 & 31 .
10. With a little care the metal sheld covering the VCR may be hinged toward the rear. It is necessary to loosen a few cable ties to fold the cover completely back.

SERVICING THE V.C.R.:

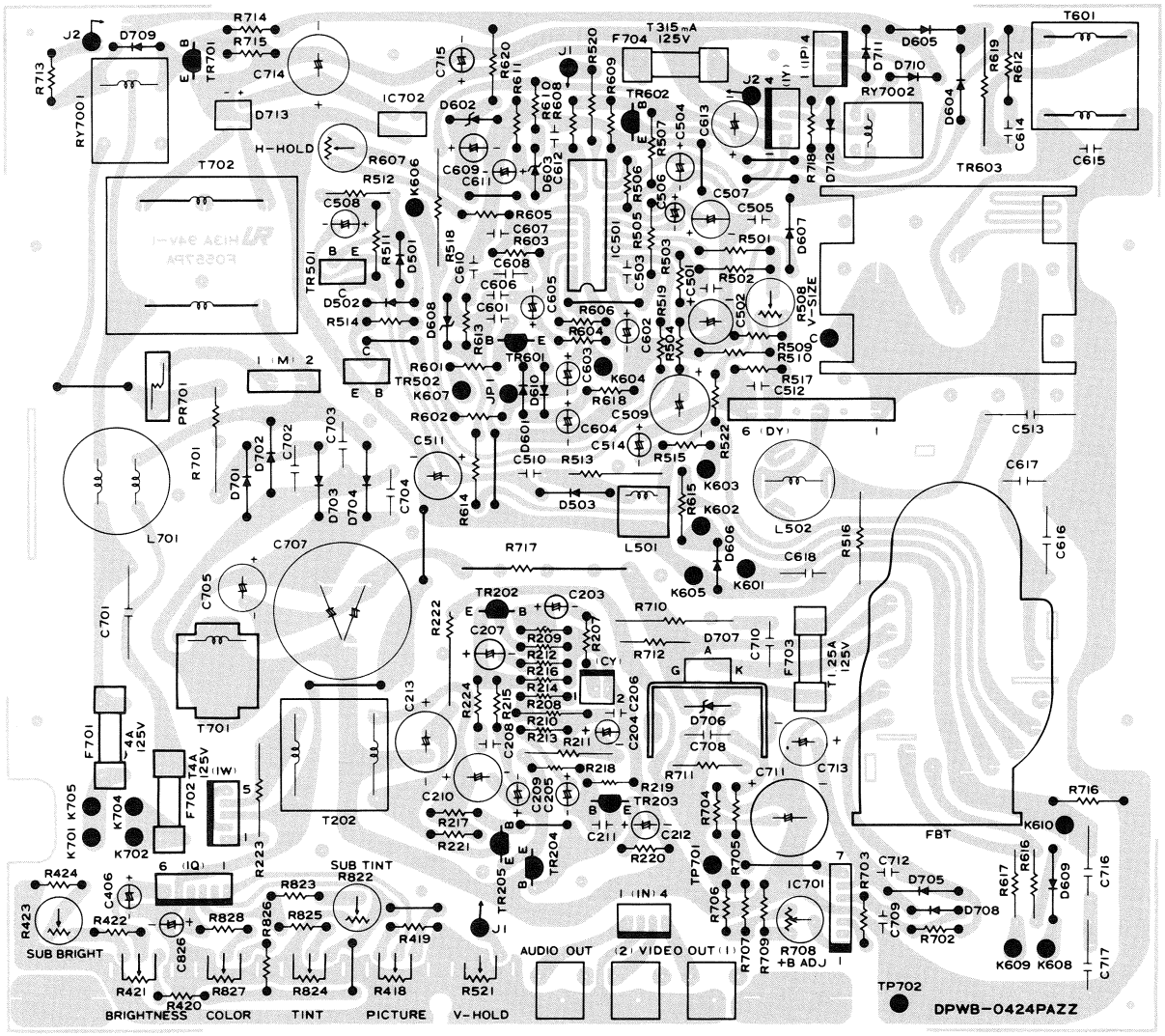
When the monitor has to be disassembled or separated from the V.C.R., the operating controls are disabled. D.C. voltage to the switch P.W.B., timer P.W.B. and the autorepeat P.W.B. originates from the monitors main P.W.B. power supply.



To power up the V.C.R.'s control circuits, connect +12V DC up to pin 4 of the cable which was disconnected from point (IY) on the main monitor P.W.B. and to pin 1 of the cable disconnected from point (IP).
Audio and video outputs may be found at connector (KG) pins 1 & 4 with 3 & 2 as ground.
Connect 115V AC to the white nylon AC receptacal and the tape deck may be serviced as a conventional V.C.R.

3-6: FUSE LOCATIONS

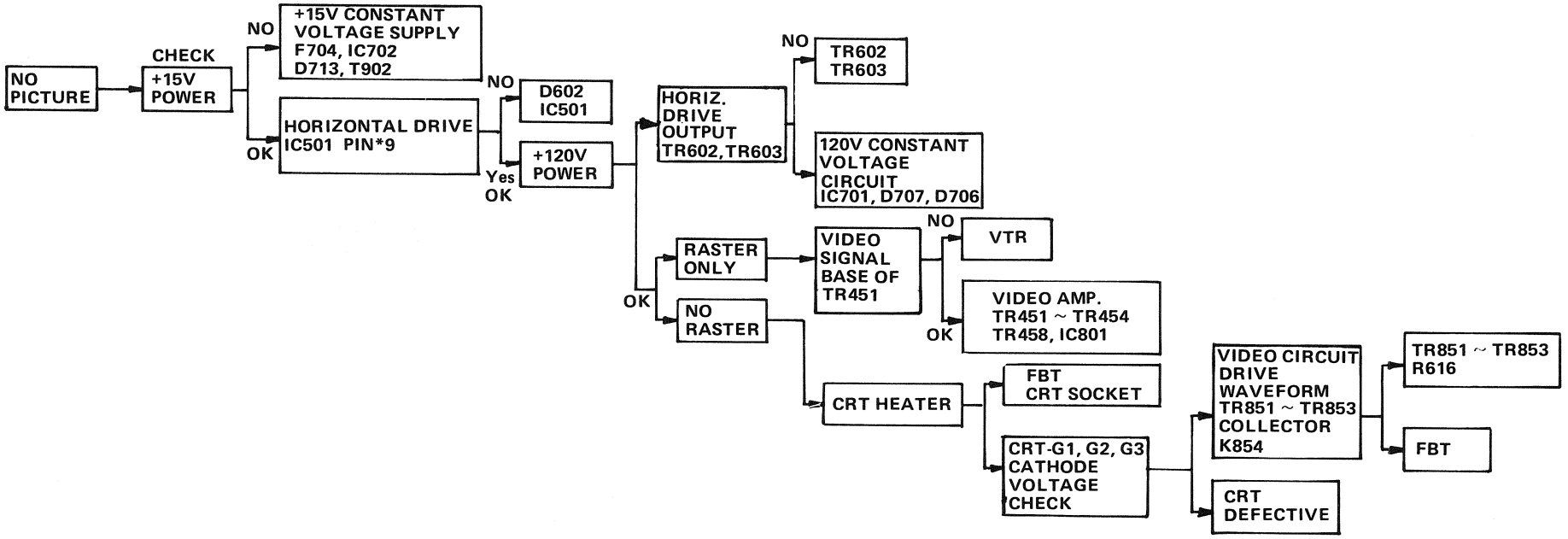
MAIN MONITOR PWB:



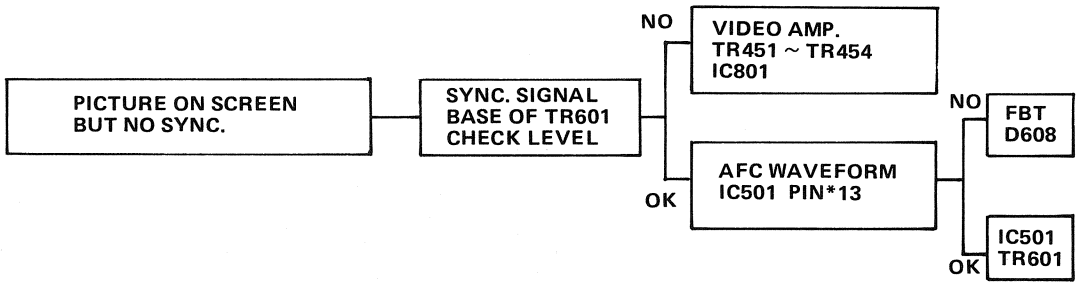
Reference No.	Function	Fuse Rating
F-701, F-702	AC Input	4 amp 125 volt
F-703	B + Supply	1.25 amp 125 volt
F-704	15 DC Supply	315 amp 125 volt
VCR Power Supply:		
F-9001	Chopper Power Supply	2 amp 125 volt
F-1	Chopper Power Supply	1.6 amp 125 volt

A. TROUBLE SHOOTING FLOW-CHART

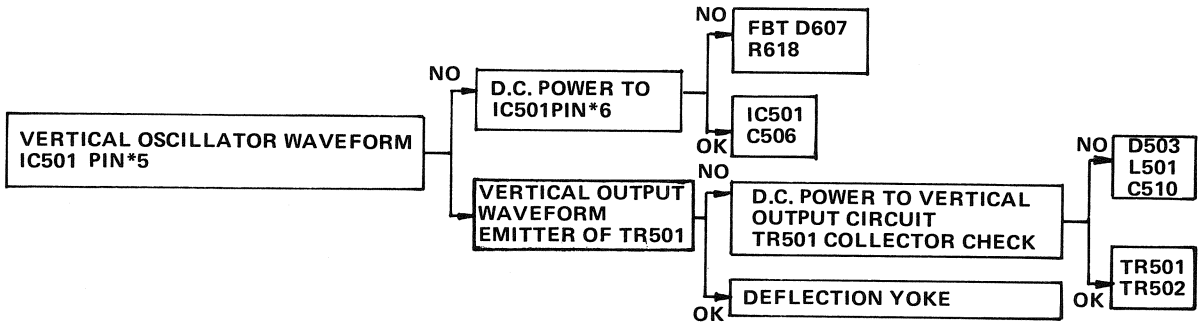
1. NO PICTURE ON SCREEN



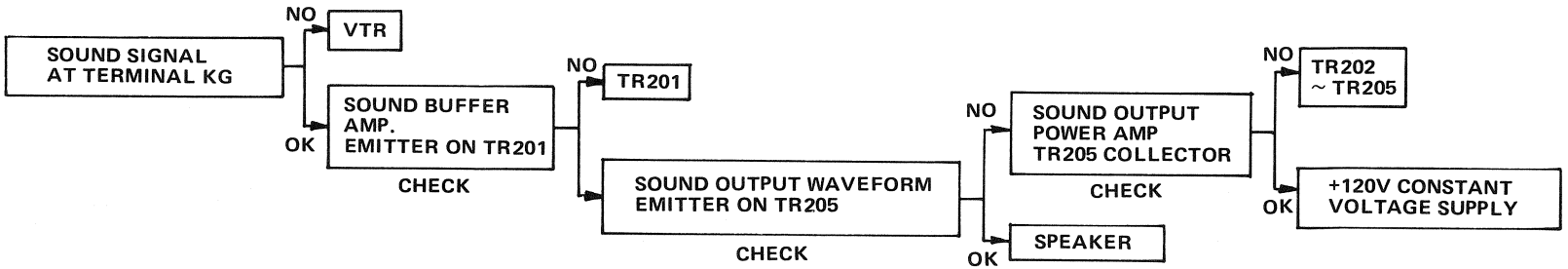
B. NO SYNC.


PICTURE ON SCREEN
BUT NO SYNC.
SYNC. SIGNAL
BASE OF TR601
CHECK LEVEL
NO
VIDEO AMP.
TR451 ~ TR454
IC801
OK
AFC WAVEFORM
IC501 PIN*13
NO
FBT
D608
OK
IC501
TR601

C. ONE HORIZONTAL LINE



D. NO SOUND


SOUND SIGNAL AT TERMINAL KG
NO
VTR
OK
SOUND BUFFER AMP. EMITTER ON TR201
CHECK
NO
TR201
SOUND OUTPUT WAVEFORM EMITTER ON TR205
CHECK
NO
SOUND OUTPUT POWER AMP TR205 COLLECTOR
CHECK
OK
SPEAKER
NO
TR202 ~ TR205
OK
+120V CONSTANT VOLTAGE SUPPLY

Section 4: COLOR MONITOR DISPLAY

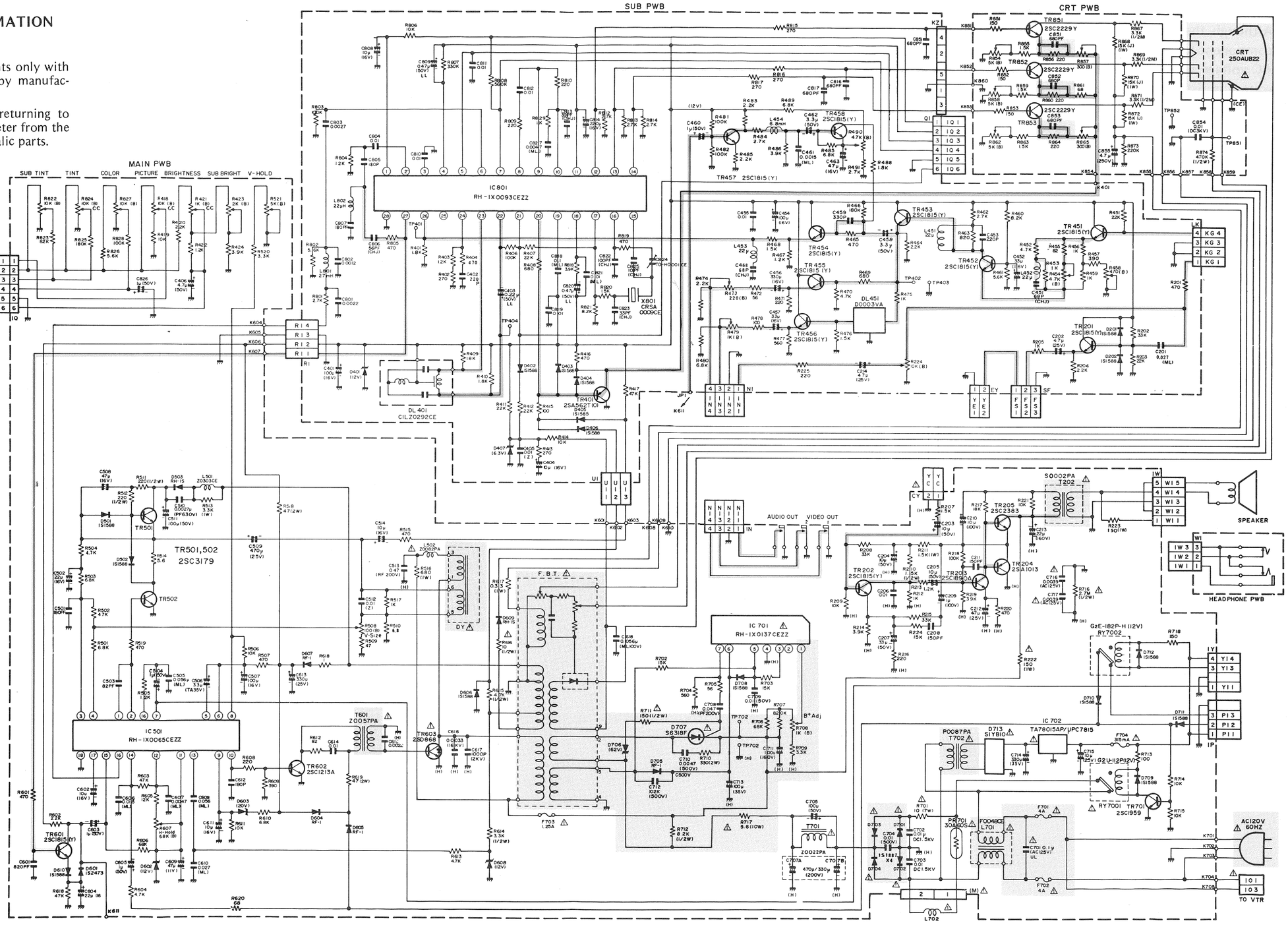
4-1: DESCRIPTION:

Although the EV-10 is designed as an integral unit the color monitor can be considered a major block component for servicing purposes.
AC voltage is supplied directly to the monitors power supply located on the main P.W.B., from here AC voltage is distributed to the V.C.R.
The monitors P.C. power supply provides voltage to all of the V.C.R. control circuits as a result the V.C.R. can not function with out an operational monitor. Audio and video signals are supplied to the monitor from the V.C.R. A video and audio output buffer amplifier is provided from the monitor as external signals allowing the EV-10 to interface with most other video equipment.
Three P.C. boards comprise the monitor, the large main P.W.B. contains the power supply, sweep and deflection circuits, high voltage supply and the audio amplifier.
The smaller sub P.W.B. contains the video circuits and the small crt P.W.B. contains the screen audio drive controls.

WARNING

SERVICE SAFETY INFORMATION

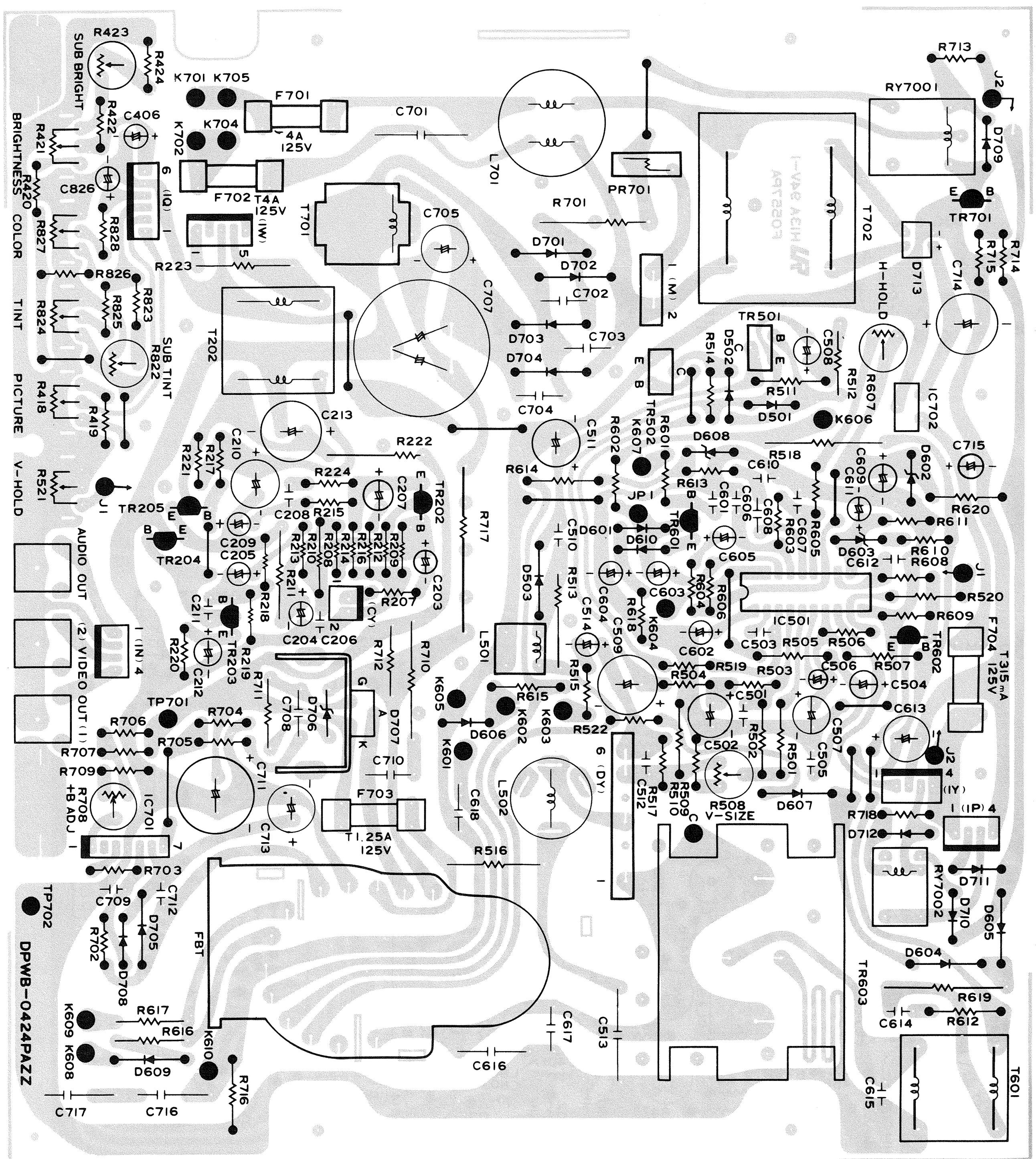
1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.



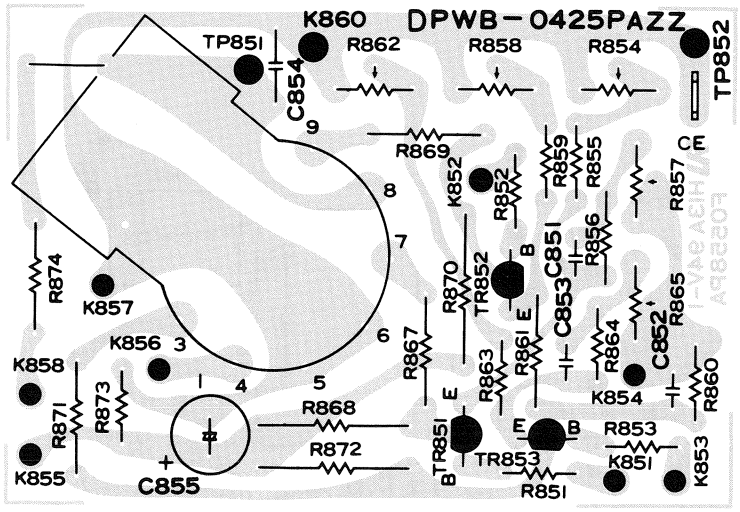
NOTES:

- Video Composit Signal
- Color Signal
- Color Signal (R)
- Color Signal (G)
- Color Signal (B)
- Y Signal
- SYNC
- Audio Signal

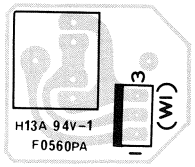
MAIN PWB


SUB BRIGHT
BRIGHTNESS
COLOR
TINT
SUB TINT
PICTURE
V-HOLD
H-HOLD
V-SIZE
+B ADJ
AUDIO OUT
(2) VIDEO OUT (1)
F701
4A
125V
F702
T4A
125V
F703
T1.25A
125V
F704
T315mA
125V
FBT
T202
T601
T701
T702
L701
L501
L502
PR701
RY7001
RY7002
IC501
IC701
IC702
TP701
TP702
DPWB-0424PAZZ

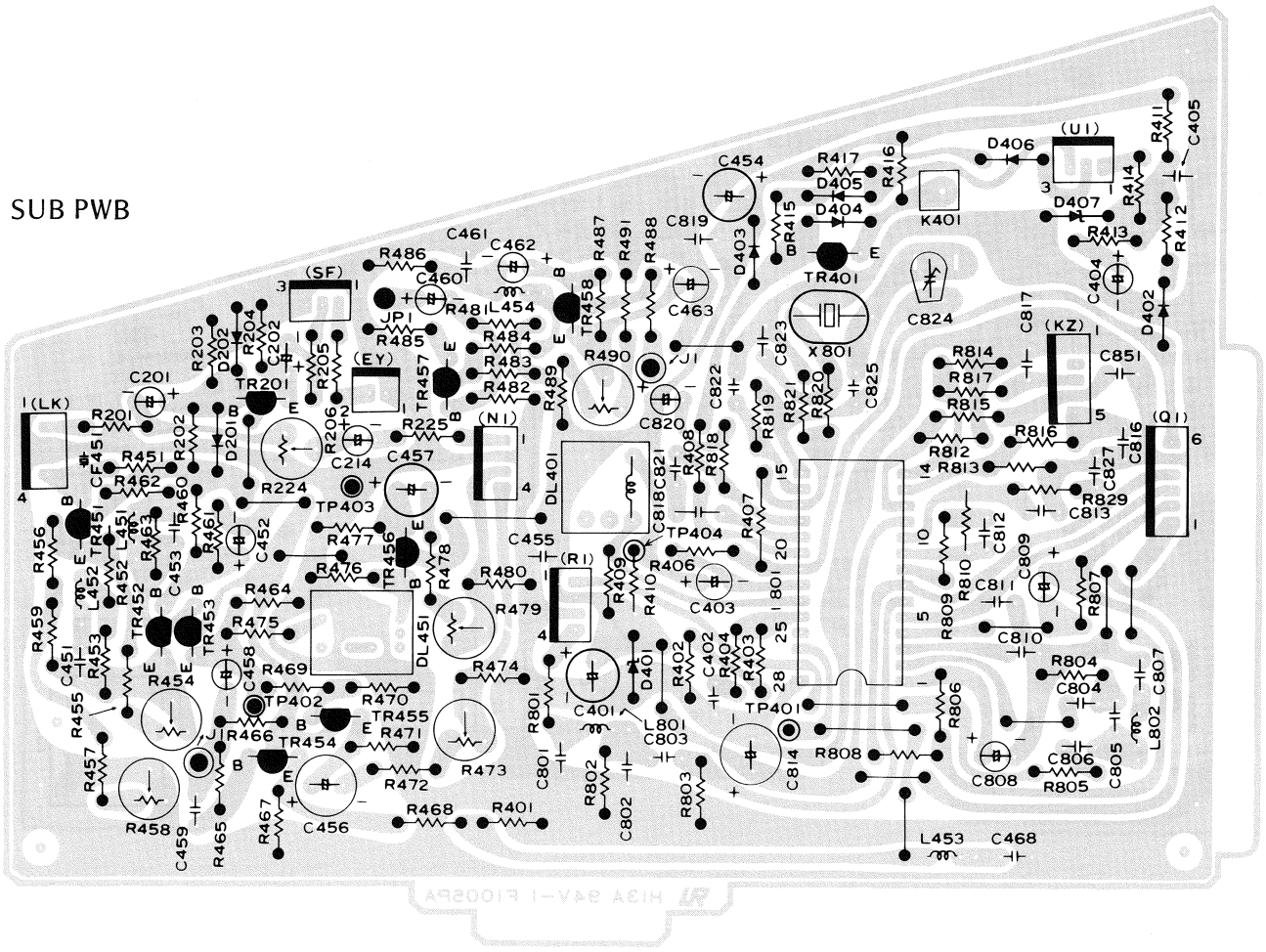
CRT-PWB



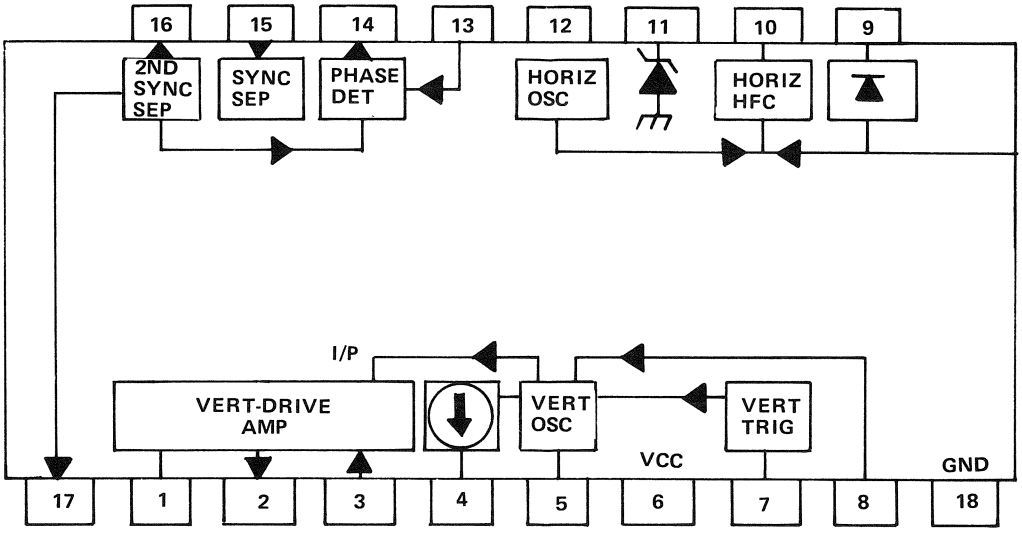
HEADPHONE PWB



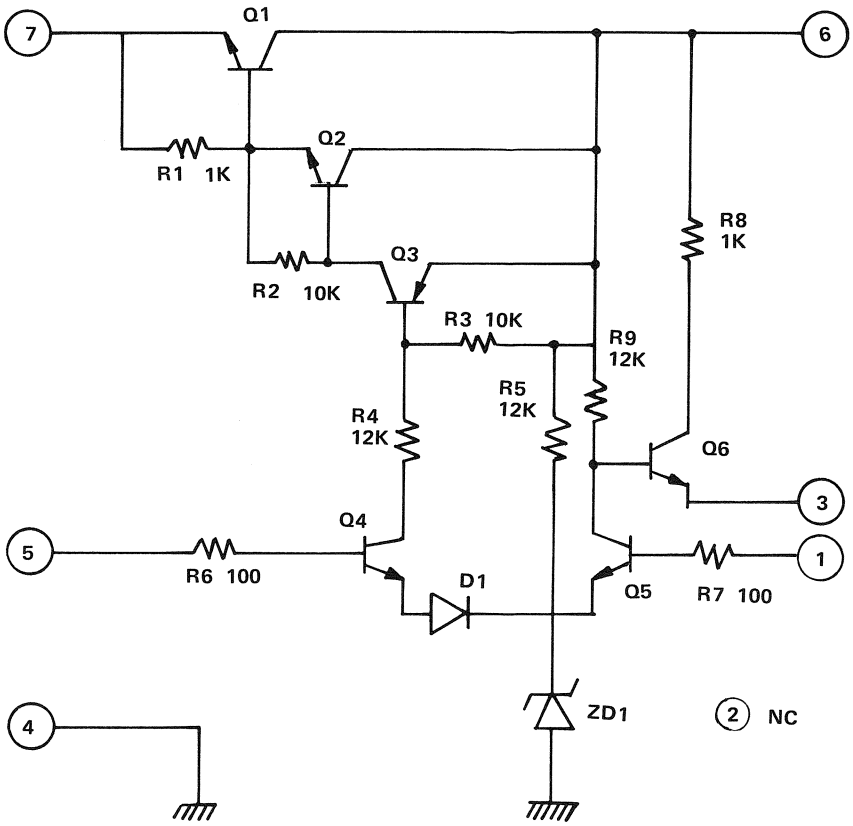
SUB PWB



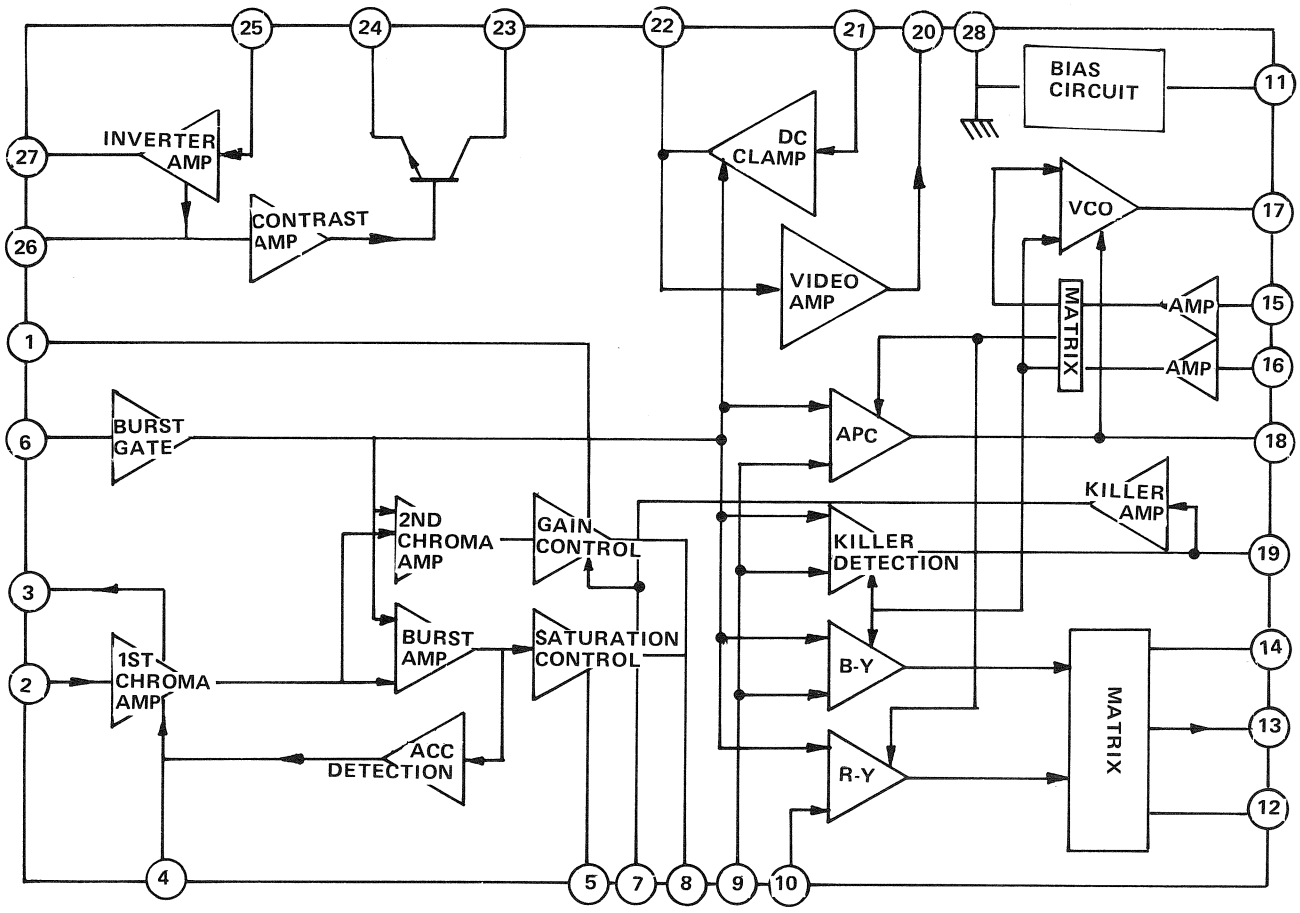
IC501 RH-IX0065CEZZ



IC701 RH-IX0137CEZZ

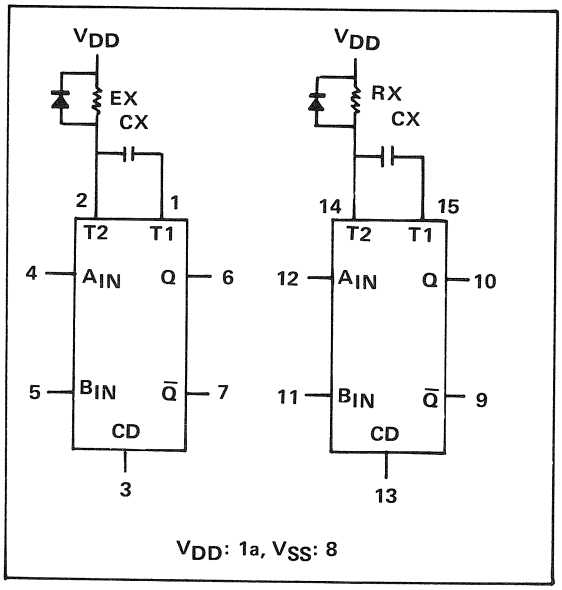


IC801 RHIX0093CEZZ

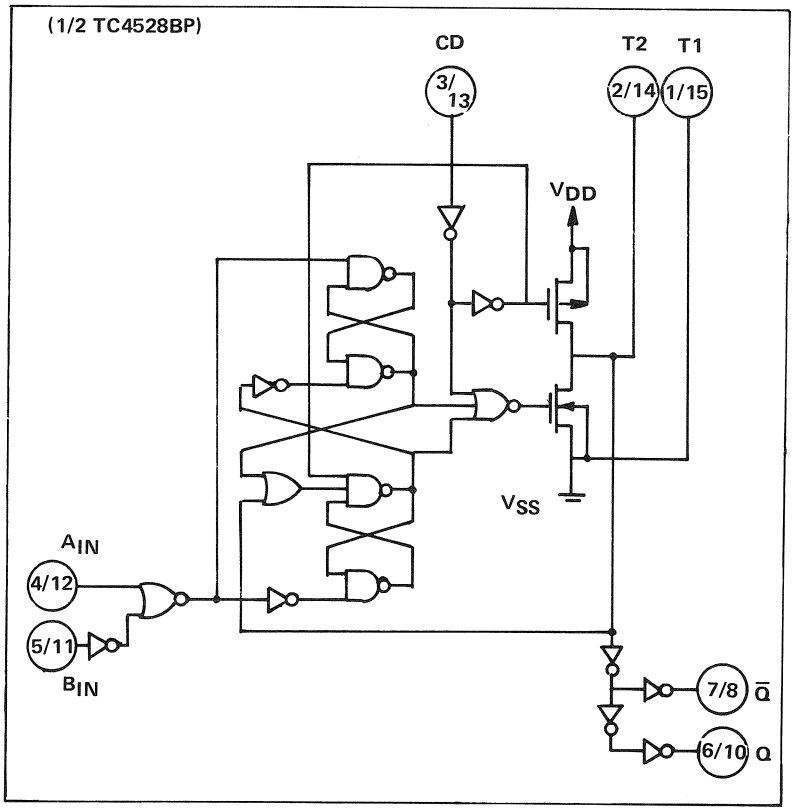


IC2201
IC2202 RH-IX0377PAZZ (TC4528BP)
IC2203

BLOCK DIAGRAM



LOGIC DIAGRAM



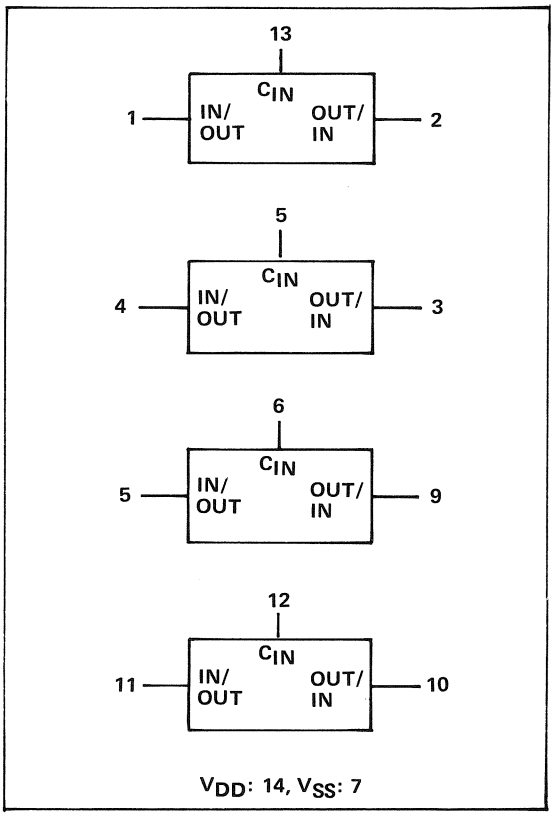
TRUTH TABLE

INPUT			OUTPUT		NOTE
A	B	CD	Q	Q̄	
↓	H	H	⊓	⊔	OUTPUT PULSE
↓	L	H	L	H	INHIBIT
H	↓	H	L	H	INHIBIT
L	↓	H	⊓	⊔	OUTPUT PULSE
*	*	L	L	H	INHIBIT

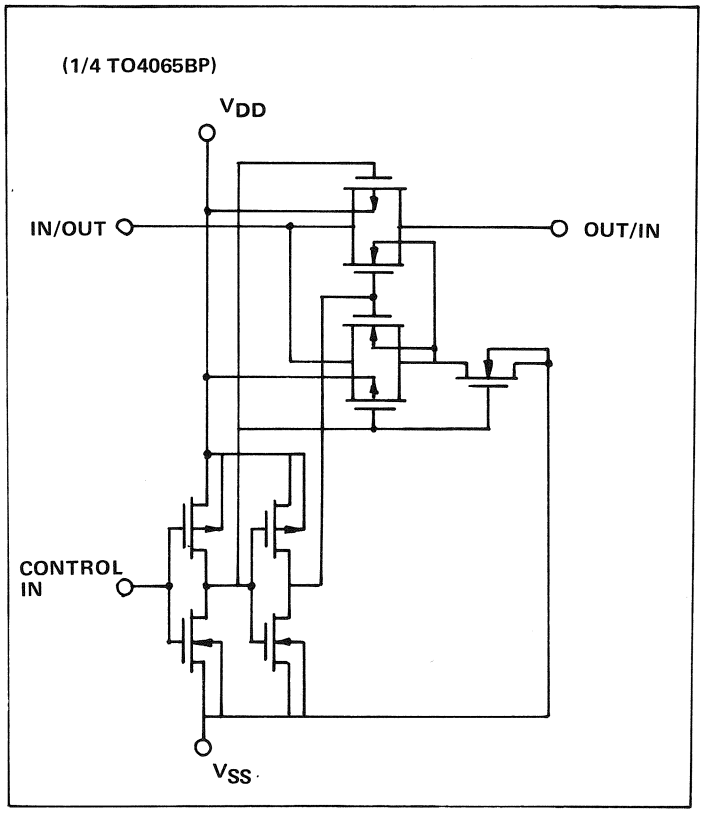
* Don't Care

IC2204
IC2207 RH-IX0376PAZZ (TC4066BP)

BLOCK DIAGRAM



CIRCUIT SCHEMATIC

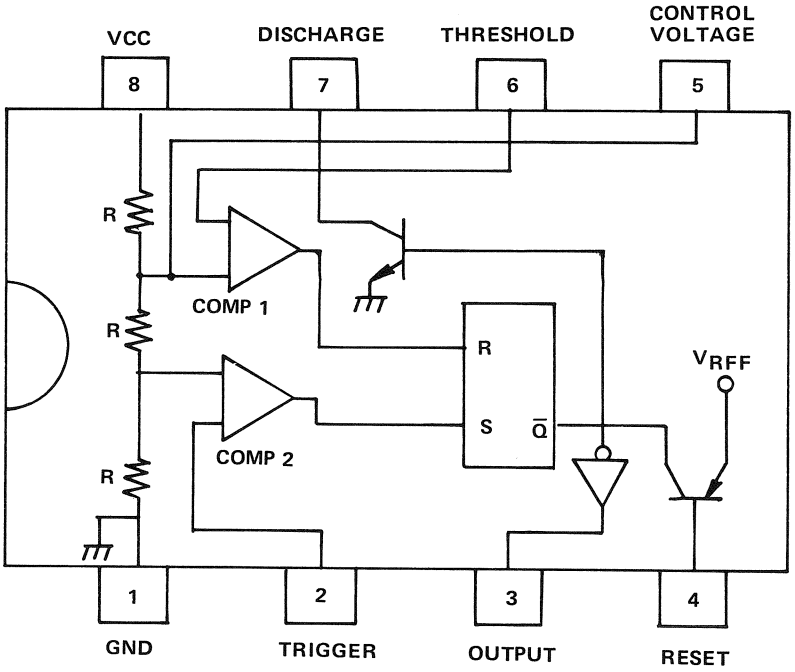


TRUTH TABLE

C_{IN}	Impedance Between IN/OUT – OUT/IN
H	Q5 ~ 5 x 10^2 Ω
L	> 10^9 Ω

IC2205 RH-IX0069PAZZ (TA7555P)

BLOCK DIAGRAM



4-3: COLOR MONITOR ADJUSTMENTS

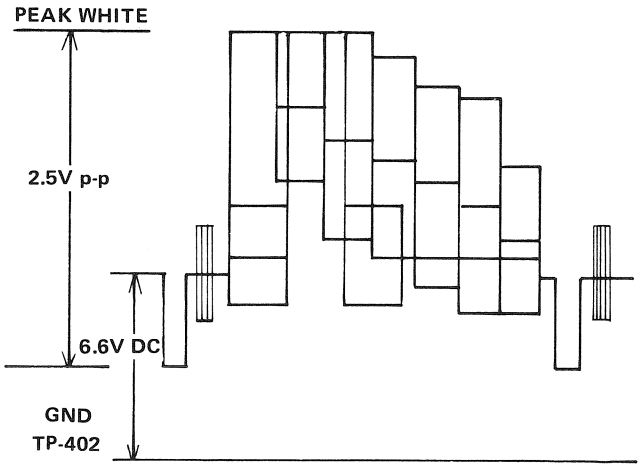
CAUTION: Use an isolation transformer before connecting any instruments to the monitor circuits. All adjustments should be made with a standard test tape or test signal. The tape or test signal (split field color bars) should produce a 1.4 p-p signal at connector KG-4, rear cover. Brightness, tint, color, and picture controls should be set to the center detent position.

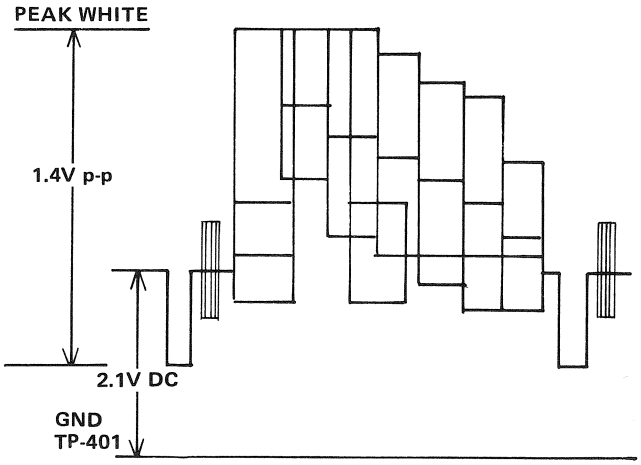
B+ Power Supply Adjustment
1. Connect the plus (+) side of a D.C. voltmeter to TP-701.
2. Connect the negative (—) side to TP-702 ground (H).
3. Adjust R-708 to 120V DC +—1 volt.

C.R.T. Screen Voltage Adjustment
1. Connect the plus (+) side of a D.C. voltmeter to TP-851.
2. Connect the negative (—) side to TP-852 on the CRT-PWB.
3. Turn R-423 (sub-brightness) fully clockwise for zero beam current.
4. Adjust F.B.T. screen control to 430V DC +—5 volts.
5. Re-adjust R-423 to the point just before the picture blooms.

A.P.C. Adjustment
1. Set the color and tint controls to mid-position.
2. Adjust C-824 trimmer capacitor for the center color lock range.

Buffer Amplifier Pedestal and Video Level Adjustments
1. Connect an oscilloscope to TP-402 and ground reference to TP-403.
2. Adjust R-458 for pedestal (DC level) of 6.6V DC +—0.1V (Fig. #).
3. Adjust R-454 for peak white video level of 2.5V p-p +—0.1V p-p.
4. Connect oscilloscope to TP-401 and ground reference to TP-403.
5. Adjust R-490 for pedestal (DC level) of 2.1V DC +—0.5V.
6. Check peak white video level of 1.4V p-p. If not correct, re-adjust R-454 (step 3).





Video Output #1 Level Adjustment
1. Connect a 75 ohm load resistor and an oscilloscope across jack #1.
2. Adjust R-473 for 1.0V p-p +—0.05V p-p.

Video Output #2 Level Adjustment
1. Connect a 1K ohm load resistor and an oscilloscope across jack #2.
2. Adjust R-479 for 1.0V p-p +—0.05V p-p.

NOTE: For the following adjustment connect a cross-hatch/circle test signal to connector KG-4 or test the tape with a standard resolution pattern.

Focus Adjustment
1. Adjust R-521 F.B.T focus control for sharpest pattern in the center.

Horizontal Size
1. Adjust L-502 for 12% over scan according to the alignment tape test pattern.

Vertical Size
1. Adjust R-508 to obtain a uniform circle with about 12% over scan.

NOTE: It may be necessary to re-adjust the horizontal size to achieve a uniform circle pattern.

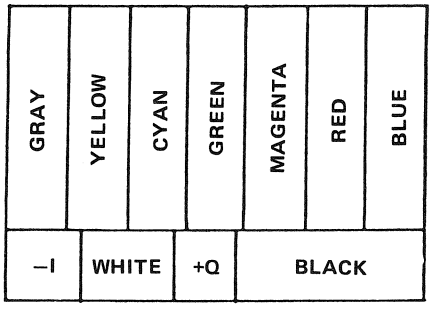
Horizontal Hold
1. Adjust R-607 to horizontally center the circle of the test pattern.

Vertical Hold
1. Adjust R-521 to vertically center the circle of the test pattern.

White Screen Balance
1. Connect a split field color bar pattern to KG-4 or playback the color bar test tape.
2. Adjust color screen controls R-862, R-858, and R-854 on the CRT PWB for an absence of color in the black and white portions of the test patterns.

Black Level Adjustment
1. Connect the color bar pattern from the test tape or generator to KG-4.
2. Adjust R-418 picture control to its maximum counter clockwise position (darkest screen).
3. Connect a 100 UF/25V capacitor from TP-404 to TP-403; negative (—) to TP-403.
4. Adjust R-423 sub-bright until the image is dark (black).
5. Remove capacitor and re-set R-418 picture control to its center position.
6. Check the screen for correct brightness and contrast.

Sub-Tint Adjustment
1. Connect standard color bar pattern from test tape or generator to KG-4.
2. Place R-824 (tint), R-827 (color), R-418 (picture) and R-421 (brightness) in their center positions.
3. Adjust R-822 (sub-tint) to obtain correct colors according to the chart shown below.



4-4: PURITY AND CONVERGENCE ADJUSTMENTS

Description

Purity and static convergence is precisely set from the factory and sealed in place. It should be unnecessary to make any adjustments unless the CRT or yoke assembly has been replaced, or someone has disturbed the convergence magnets.

YOKE OR CRT REPLACEMENT:

- Install the yoke on the CRT neck (do not tighten clamp).
- Position purity and convergence assembly as shown in drawing.
- Manually degauss the CRT.
- Turn on the unit and slide CRT back and forth until a white uniform raster is produced on the screen (lightly tighten the yoke clamp).
- Connect a dot/crosshatch pattern to the VCR video input.
- Note misconvergence in the center of the screen only. At this time do not be concerned about the outside EDGES.
- Adjust the red with blue magnets until they are approximately in the same horizontal plane.
- Adjust the red/blue with green magnet until the green dots are in the same horizontal plane as the red and blue dots.

  NOTE: Precise convergence is not required at this stage.

PURITY ADJUSTMENTS:

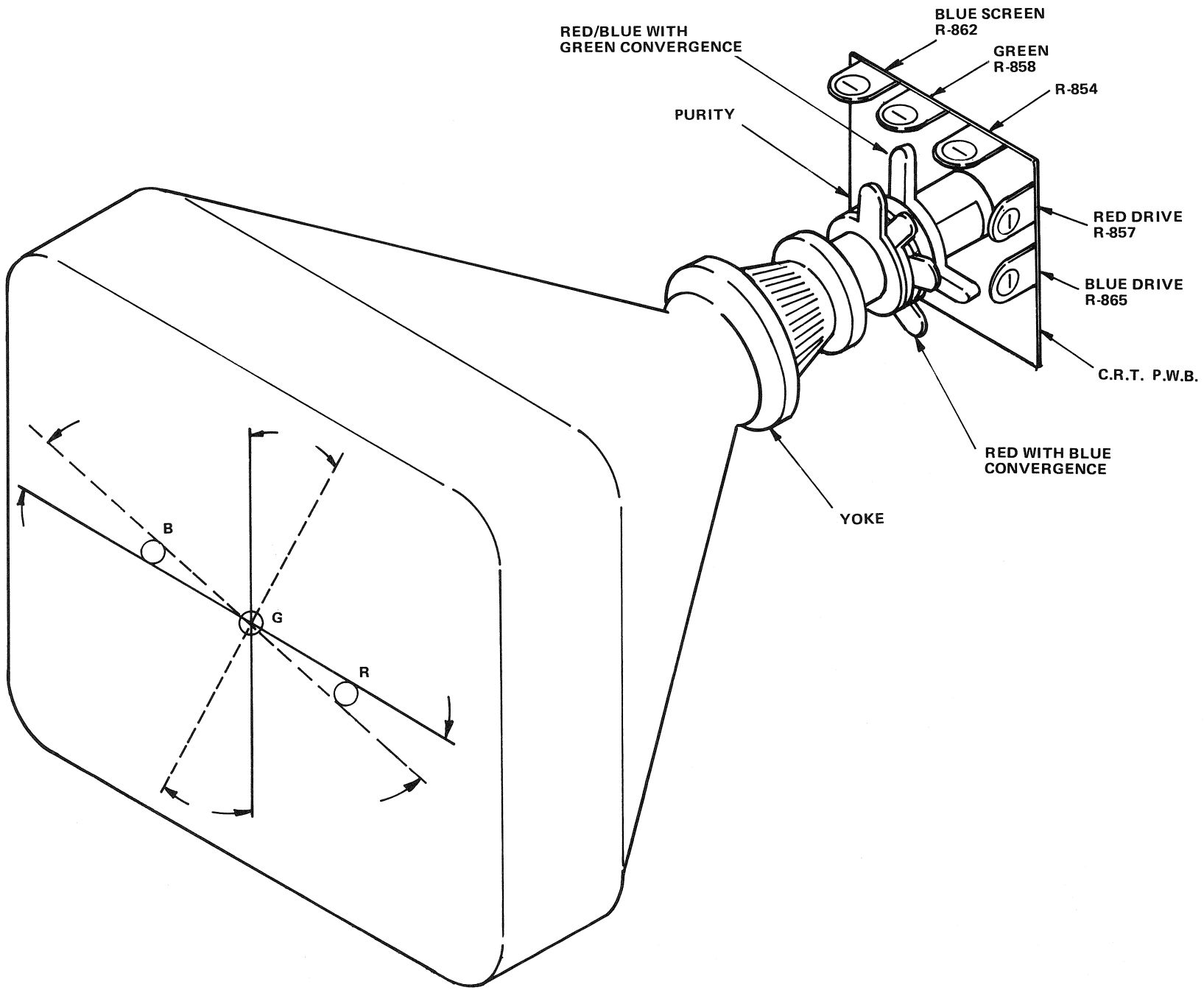
- Connect a white raster signal to the V.C.R. video input.
- Set blue and red screen controls R-862 and R-854 to minimum for a green raster.
- Slide the yoke very carefully back and forth to a position that produces an optimum green raster.
- Adjust purity rings by starting both tabs at the top and seperating them in opposite directions and equal amounts. Seperate only enough to produce a pure green raster.
- If there is impurity at any of the edges or corners, re-adjust the yoke and repeat the purity ring adjustment until a pure green raster is obtained.
- Check the red color fields by turning down the blue and green screens while increasing the red.
- Check the blue color field by turning down the red and green screens while increasing the blue.
- Balance the three screen controls to obtain a white raster. Check that the raster remains white when turning the brightness control through its range.
- If the raster is tilted, slightly rotate the yoke and tighten the clamp securely.

FINAL STATIC CONVERGENCE

- Connect a dot or dot/cross hatch pattern to the V.C.R. input.
- Re-check that the red, green and blue dots converge in the center of the screen.
- Re-adjust the convergence magnets until the center dots converge.
- Some inter action between the magnets is normal, final results should be achieved with minimum adjustment.

OVERALL CONVERGENCE

- Overall convergence is accomplished by moving the deflection yoke vertically, horizontally or diagonally.
- Insert the three wedges until the yoke is firmly in place with the best over all convergence.
- Adhesive should be applied to the wedges to secure the yokes position.


BLUE SCREEN
R-862
GREEN
R-858
R-854
RED/BLUE WITH
GREEN CONVERGENCE
PURITY
RED DRIVE
R-857
BLUE DRIVE
R-865
C.R.T. P.W.B.
RED WITH BLUE
CONVERGENCE
YOKE
B
G
R

4-5: WAVEFORM TEST POINTS:

The following waveforms may be varified under the conditions as listed below.

AC-Power Input 120V:

Timer switch, auto-repeat and auto-rewind switches all on.

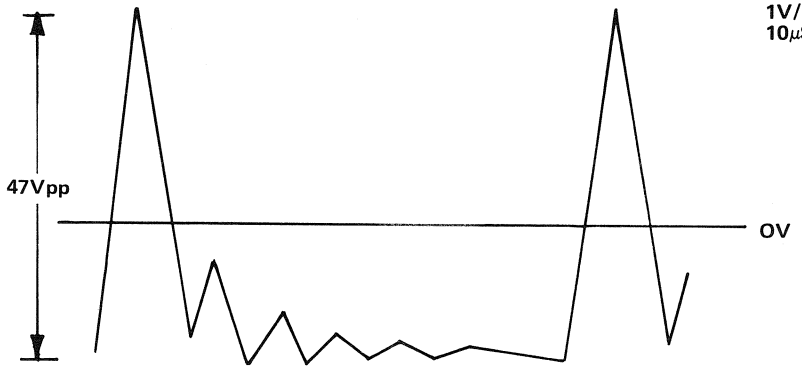
Signal Input:

Standard test tape with NTSC color bars and 1KHz audio test signal.

Optional Signal Input:

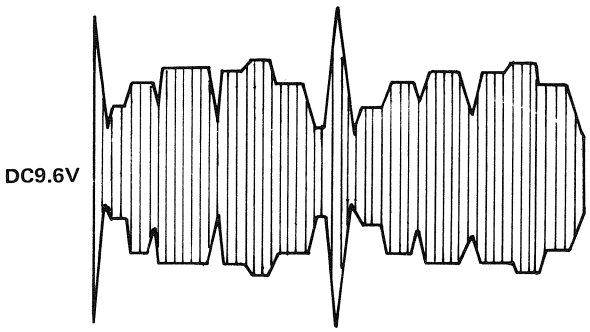
Connect an NTSC split field color test signal 1.4V p-p to pin 4 of connector KG.

1
IC801
6 pin



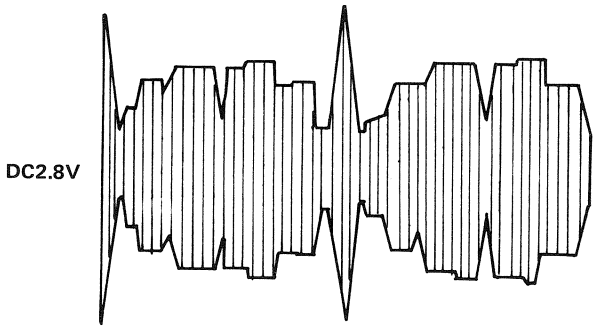
1V/DIV
10μSEC/DIV

2
IC801
8 pin



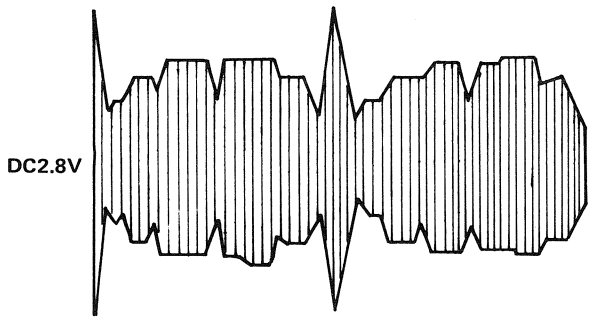
2V/DIV
20μSEC/DIV

3
IC801
9 pin



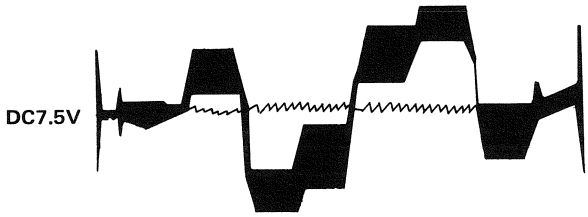
.1V/DIV
20μSEC/DIV

4
IC801
10 pin



1V/DIV
20μSEC/DIV

5
IC801
12 pin

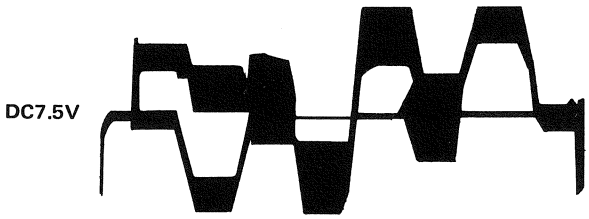


1V/DIV
10μSEC/DIV

6
IC801
13 pin

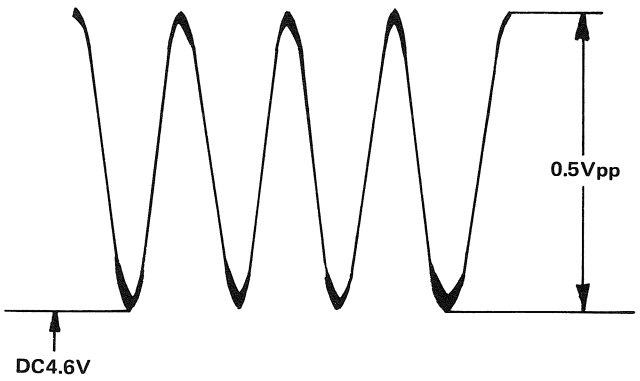
1V/DIV
10μSEC/DIV

7
IC801
14 pin



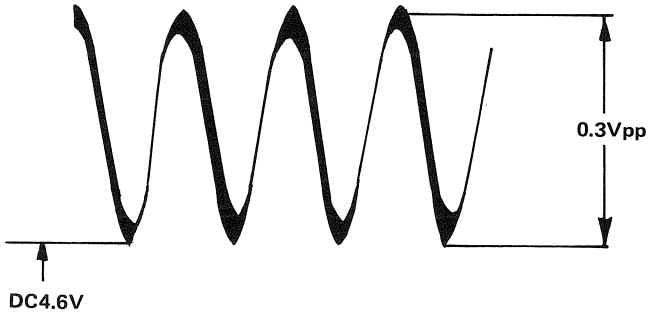
1V/DIV
10μSEC/DIV

8
IC801
15 pin



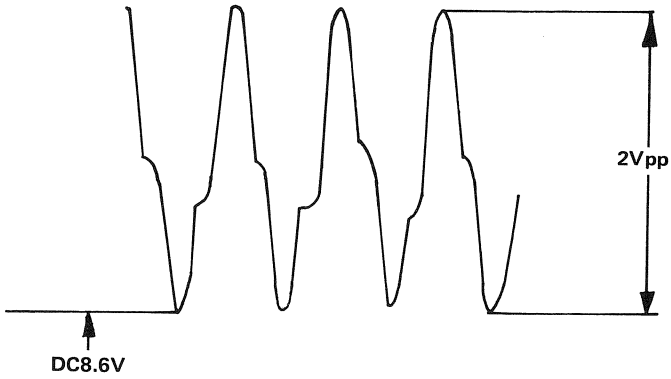
0.1V/DIV
0.2μSEC/DIV

9
IC801
16 pin



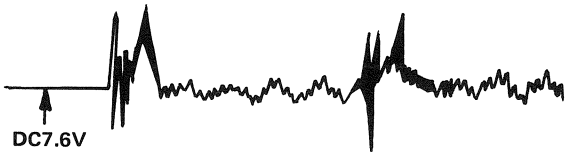
0.1V/DIV
0.2μSEC/DIV

10
IC801
17 pin



0.5V/DIV
0.2μSEC/DIV

11
IC801
18 pin

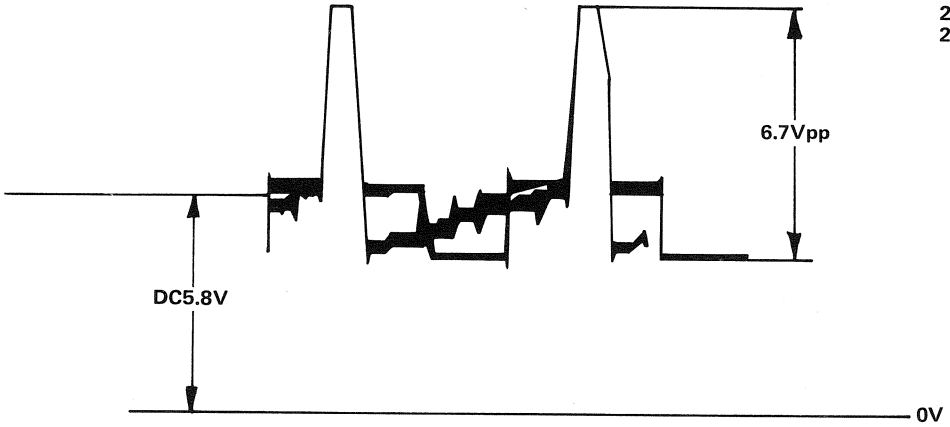


0.1V/DIV
5mSEC/DIV

12
IC801
19 pin

0.2V/DIV
5mSEC/DIV

13
IC801
20 pin

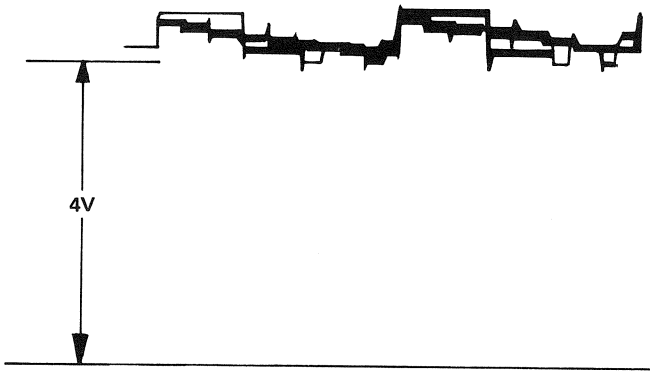


2V/DIV
20μSEC/DIV

14
IC801
21 pin

0.5V/DIV
50μSEC/DIV

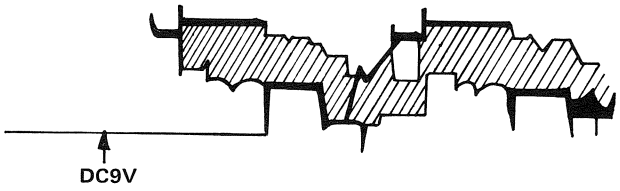
15
IC801
22 pin



1V/DIV
20μSEC/DIV

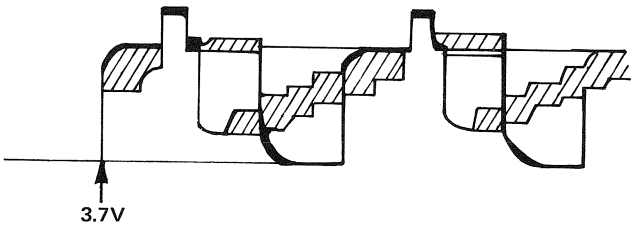
16
IC801
23 pin

0.5V/DIV
20μSEC/DIV



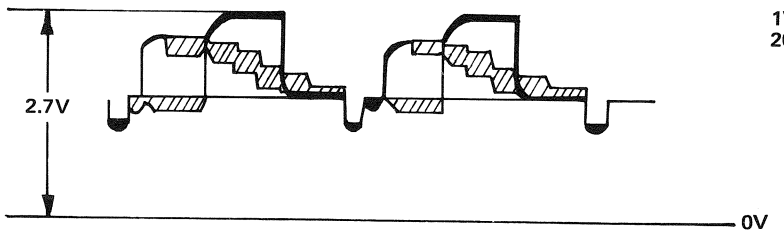
17
IC801
24 pin

0.5V/DIV
20μSEC/DIV



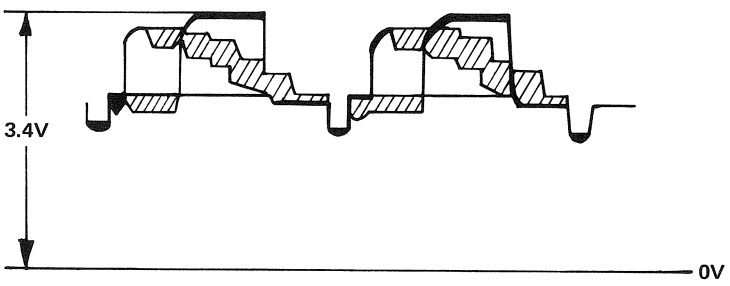
18
IC801
25 pin

1V/DIV
20μSEC/DIV

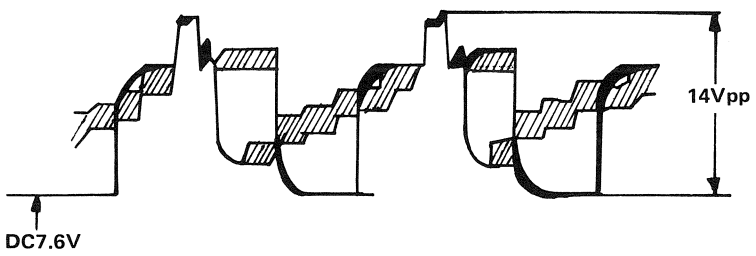


19
IC801
26 pin

1V/DIV
20μSEC/DIV



20
IC801
27 pin

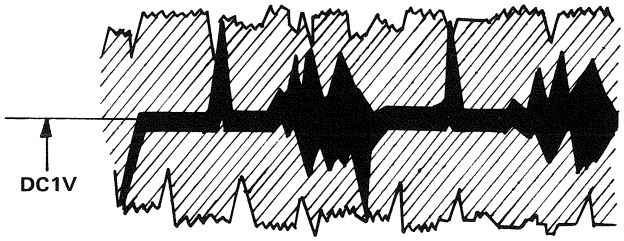


1V/DIV
20μSEC/DIV

21
IC801
1 pin

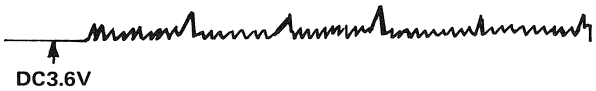
0.05V/DIV
50μSEC/DIV

22
IC801
2 pin



0.05V/DIV
20μSEC/DIV

23
IC801
3 pin

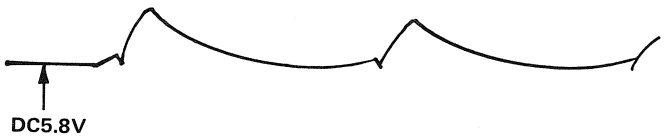


0.05V/DIV
50μSEC/DIV

24
IC801
4 pin

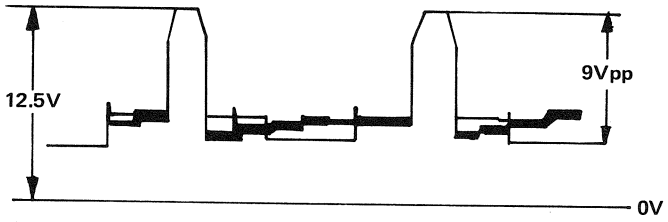
0.05V/DIV
50μSEC/DIV

25
IC801
5 pin



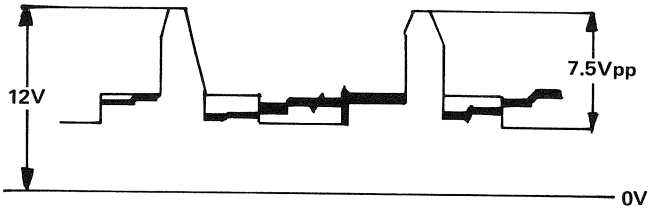
0.05V/DIV
5mSEC/DIV

27
TR401
Base



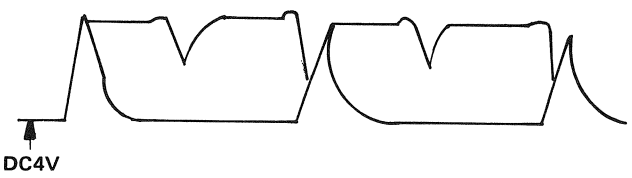
5V/DIV
20μSEC/DIV

28
TR401
Emitter



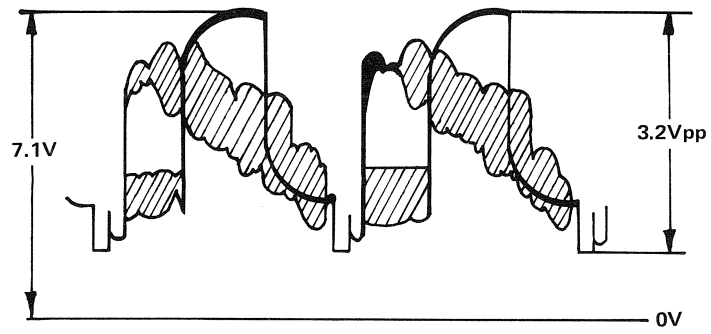
5V/DIV
20μSEC/DIV

29
TR458
Base



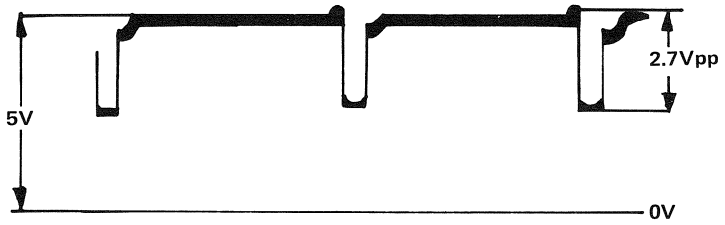
0.5V/DIV
20μSEC/DIV

30
TR458
Collector



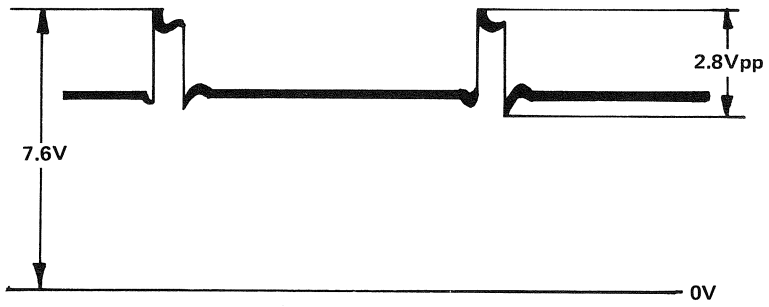
1V/DIV
20μSEC/DIV

31
TR457
Emitter



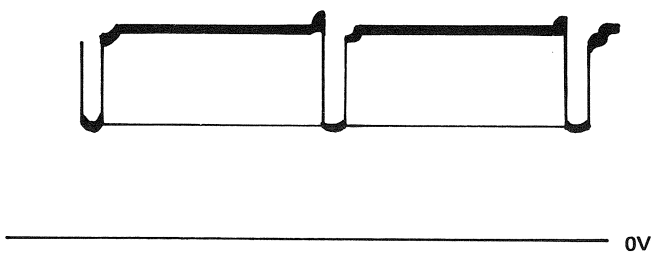
2V/DIV
20μSEC/DIV

32
TR457
Collector



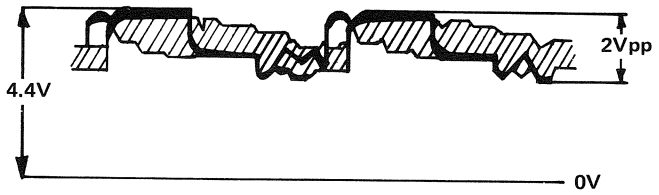
2V/DIV
20μSEC/DIV

33
TR457
Base



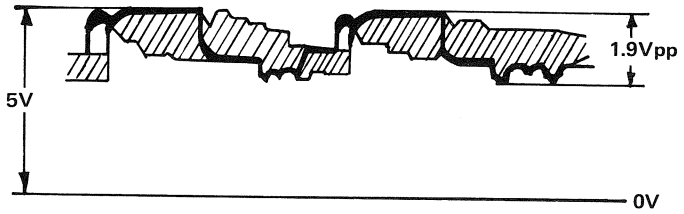
2V/DIV
20μSEC/DIV

34
TR456
Emitter



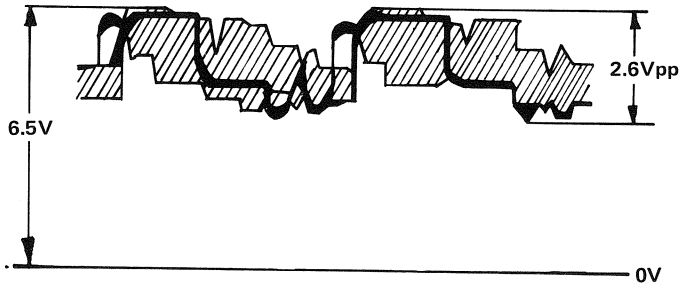
2V/DIV
20μSEC/DIV

36
TR456
Base



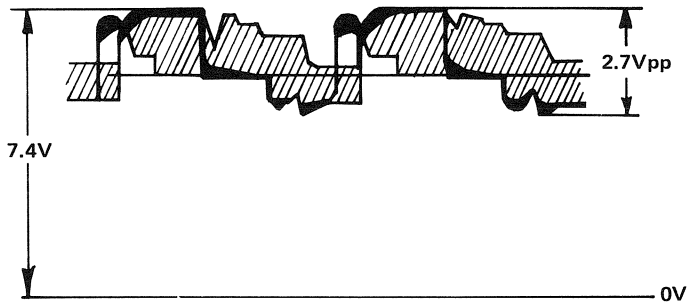
2V/DIV
20μSEC/DIV

37
TR455
Emitter



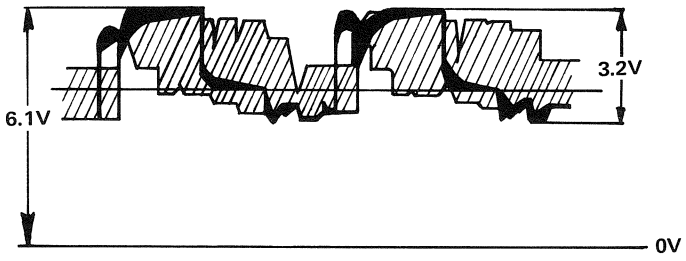
2V/DIV
20μSEC/DIV

39
TR455
Base



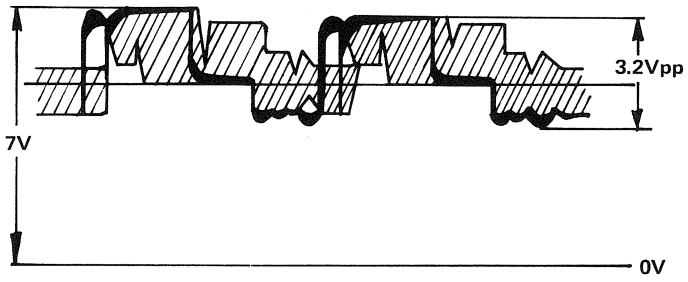
2V/DIV
20μSEC/DIV

40
TR454
Emitter



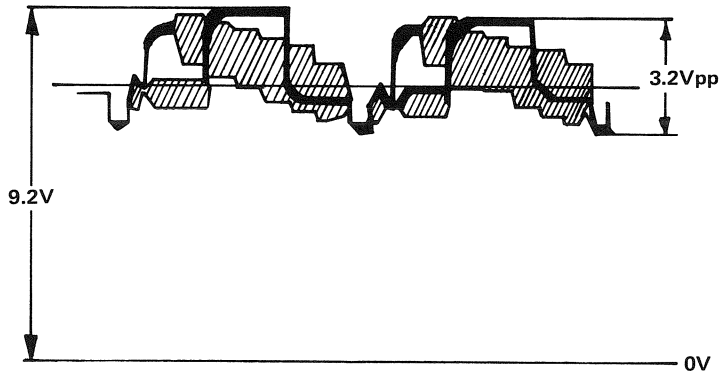
2V/DIV
20μSEC/DIV

41
TR454
Base



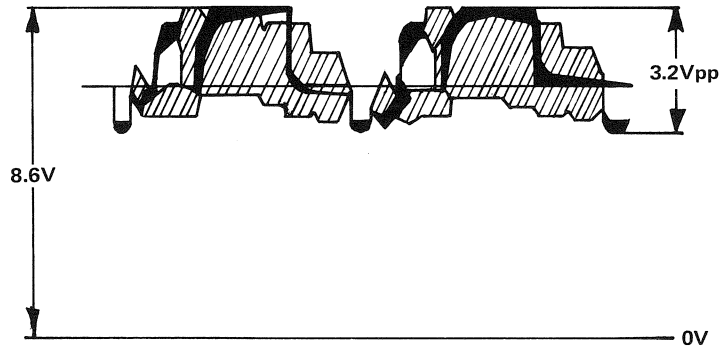
2V/DIV
20μSEC/DIV

42
TR453
Base



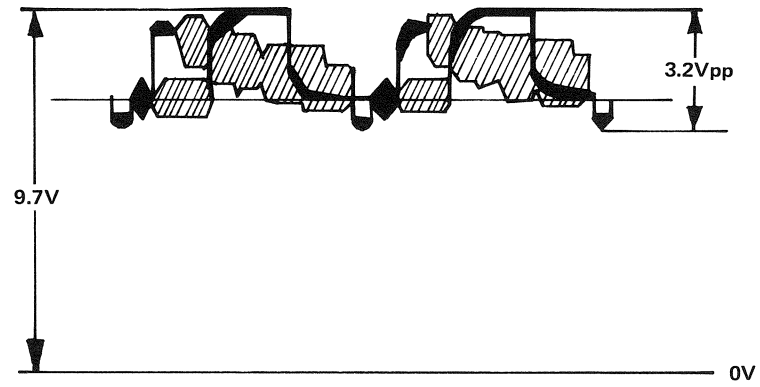
2V/DIV
20μSEC/DIV

43
TR453
Emitter



2V/DIV
20μSEC/DIV

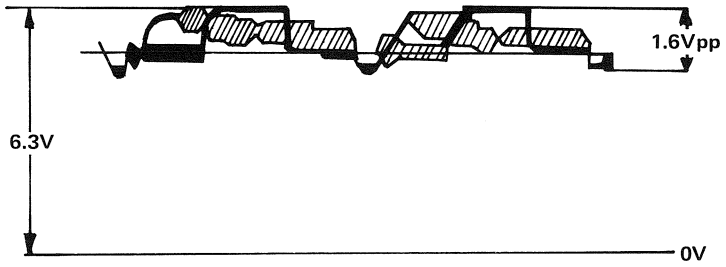
44
TR452
Collector



2V/DIV
20μSEC/DIV

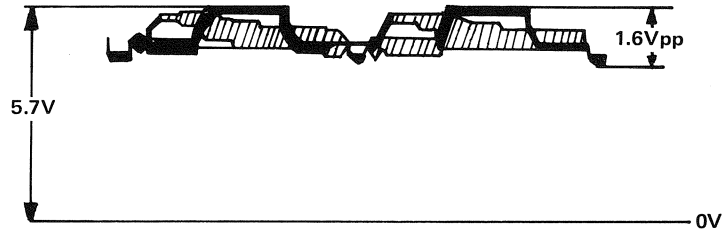
45
TR451
Base

2V/DIV
20μSEC/DIV

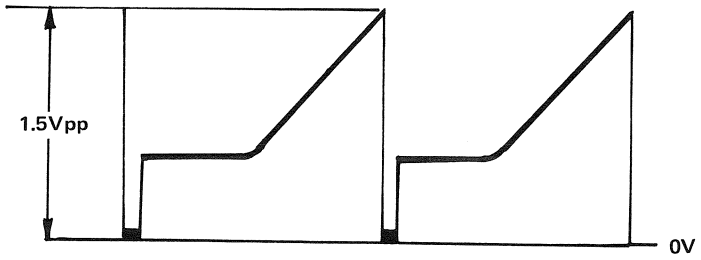


47
TR451
Emitter

0.05V/DIV
5mSEC/DIV

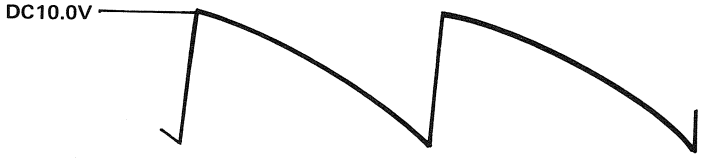


49
IC501
2 pin



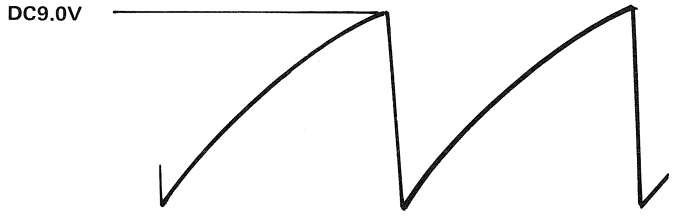
0.5V/DIV
5mSEC/DIV

50
IC501
5 pin



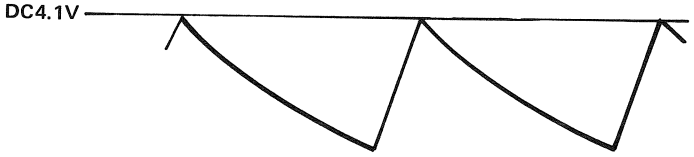
2.0V/DIV
5mSEC/DIV

51
IC501
12 pin



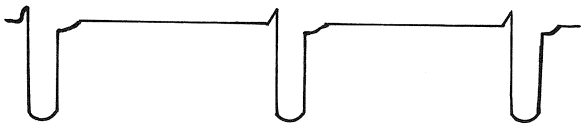
2.0V/DIV
20μSEC/DIV

52
IC501
13 pin



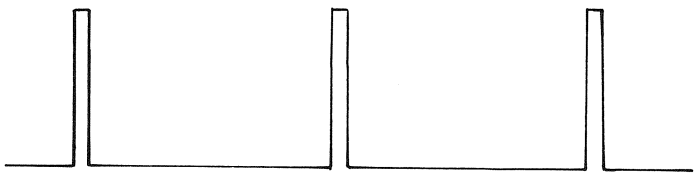
0.5V/DIV
20μSEC/DIV

53
IC501
15 pin



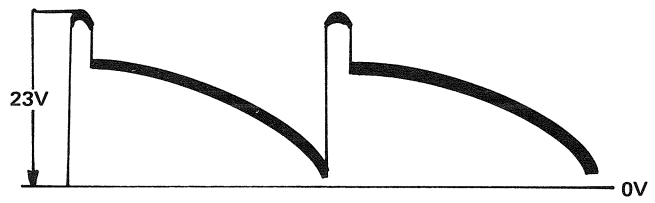
2.0V/DIV
20μSEC/DIV

77
IC501
7 pin



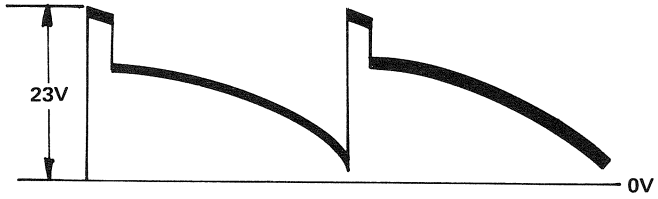
2.0V/DIV
5mSEC/DIV

54
TR501
Base



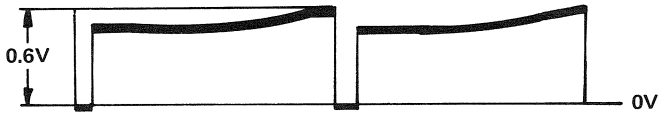
10V/DIV
5mSEC/DIV

55
TR501
Emitter



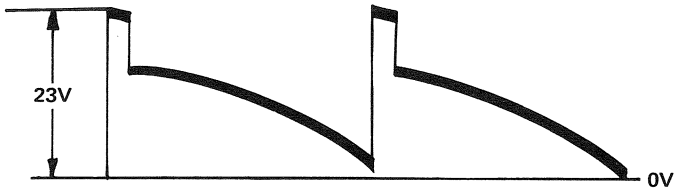
10V/DIV
5mSEC/DIV

56
TR502
Base



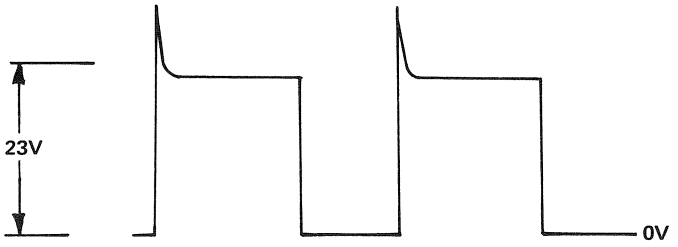
0.5V/DIV
5mSEC/DIV

57
TR502
Collector



10V/DIV
5mSEC/DIV

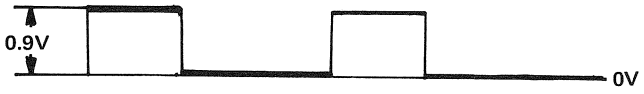
58
TR602
Collector



10V/DIV
20μSEC/DIV

59
TR602
Base

1V/DIV
20μSEC/DIV

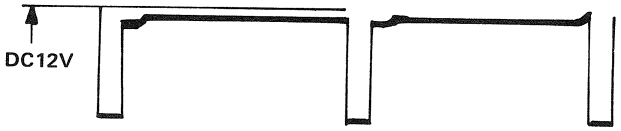


60
TR601
Base

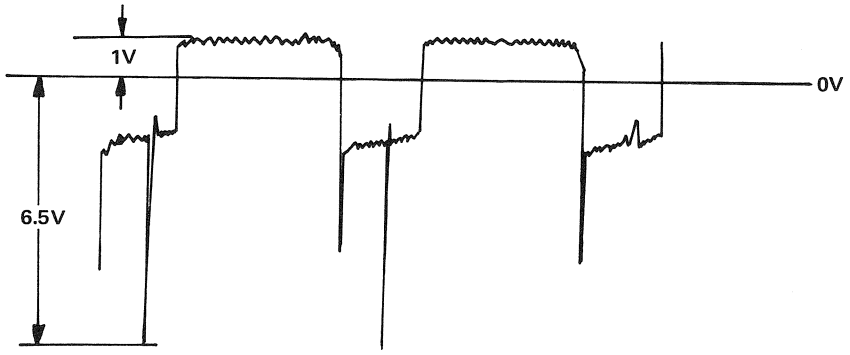
2V/DIV
20μSEC/DIV

61
TR601
Collector

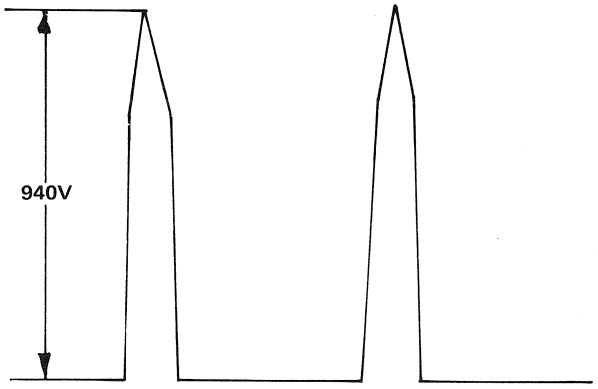
2V/DIV
20μSEC/DIV



62
TR603
Base

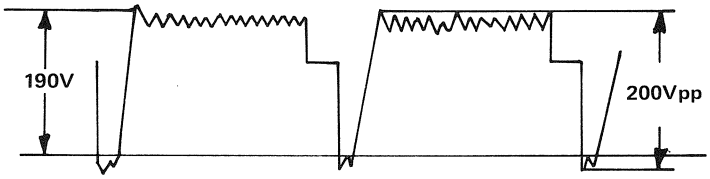


63
TR603
Collector



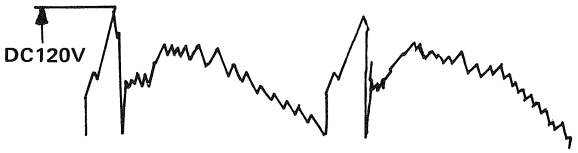
200V/DIV
20μSEC/DIV

64
D707
Anode



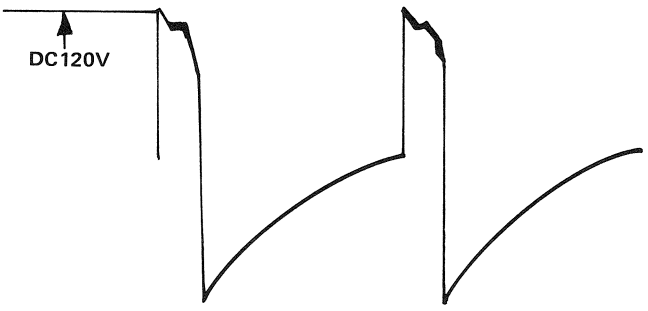
100V/DIV
20μSEC/DIV

65
D707
Casode



0.2V/DIV
20μSEC/DIV

66
D707
Gate

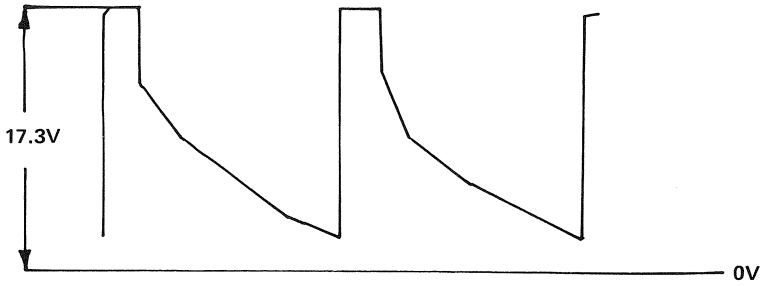


1V/DIV
20μSEC/DIV

67
IC701
5 pin

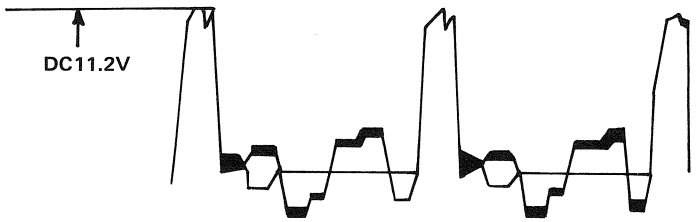
5V/DIV
20μSEC/DIV

68
IC701
7 pin



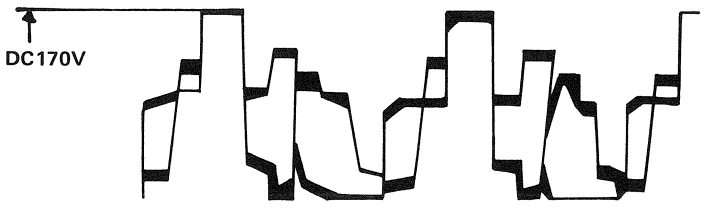
5V/DIV
20μSEC/DIV

69
TR851
Emitter



2V/DIV
20μSEC/DIV

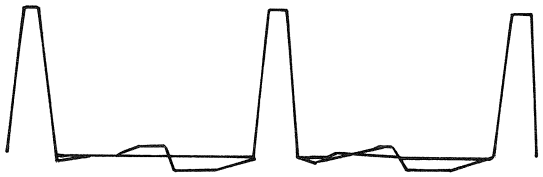
70
TR851
Collector



50V/DIV
20μSEC/DIV

71
TR852
Emitter

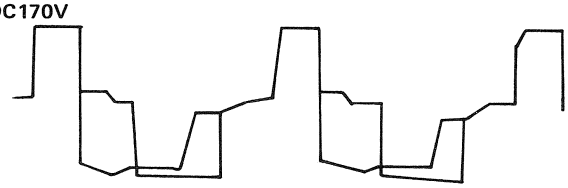
DC11.2V



2V/DIV
20μSEC/DIV

72
TR852
Collector

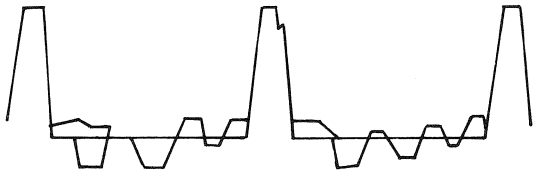
DC170V



50V/DIV
20μSEC/DIV

73
TR853
Emitter

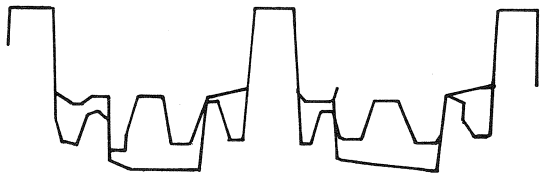
DC11.6V



2V/DIV
20μSEC/DIV

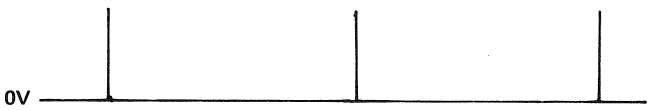
74
TR853
Collector

DC170V



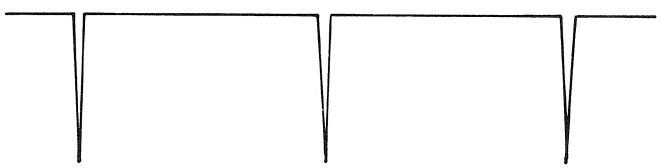
50V/DIV
20μSEC/DIV

75
TR2201
Base



0.5V/DIV
5mSEC/DIV

76
TR2201
Collector



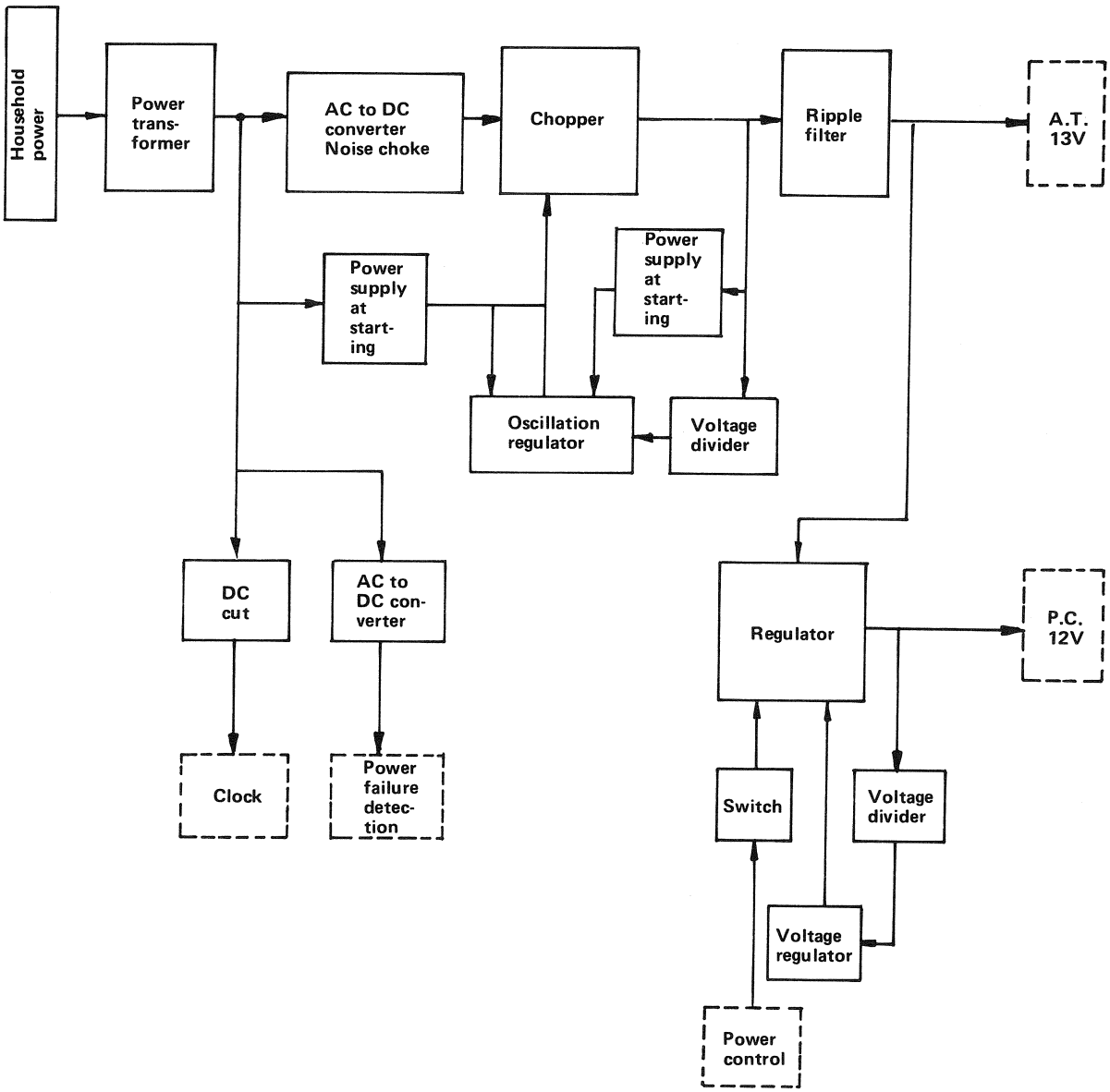
0.5V/DIV
5mSEC/DIV

Section 5: VCR CHOPPER REGULATOR POWER SUPPLY

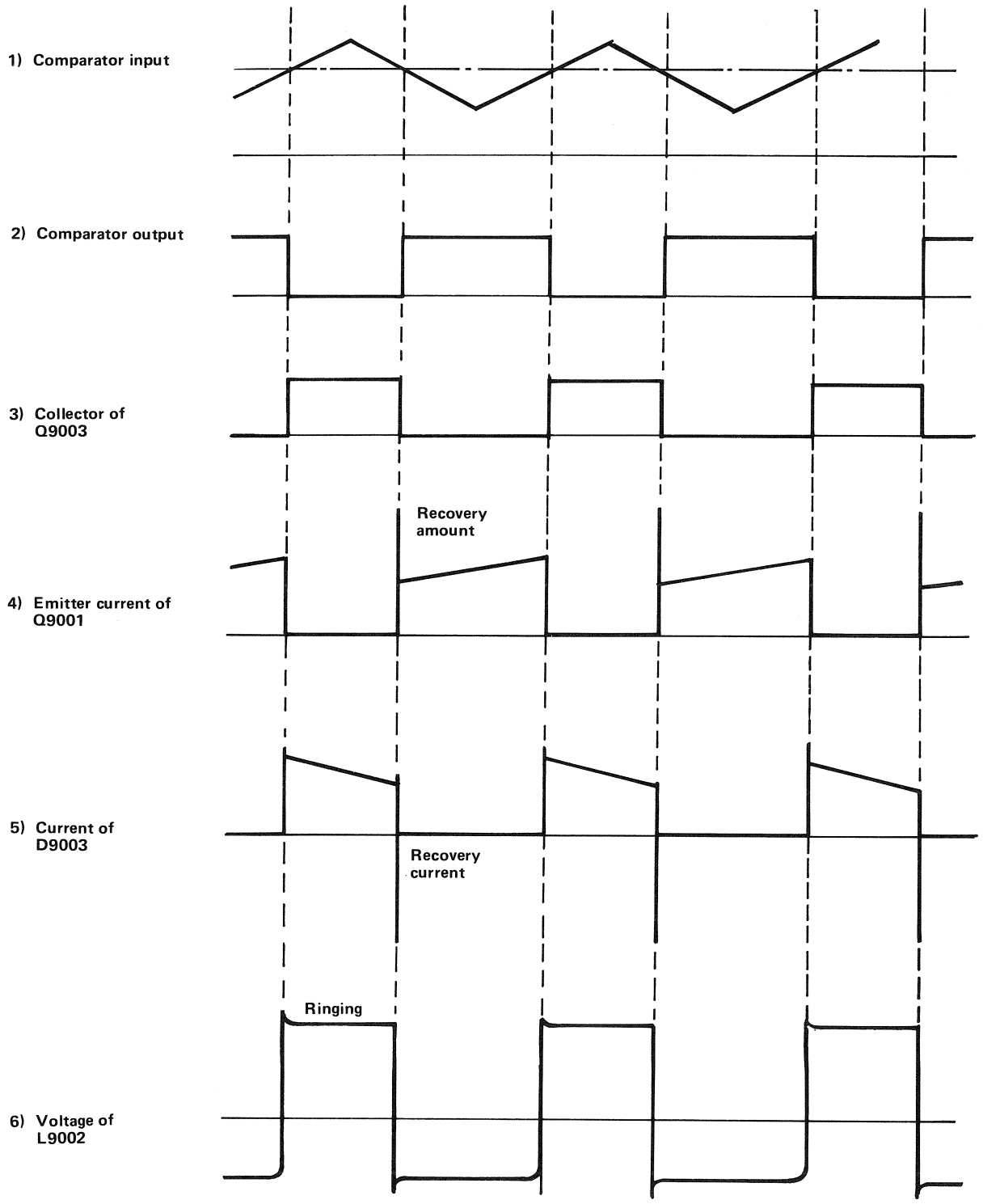
5-1: DESCRIPTION

One comparator in IC-9001 is a 30KHz oscillator. This 30KHz signal is applied to the other comparator where it then is compared to the reference voltage.
The 13V is referenced by Zenner Diode D-9006, which makes the collector potential of Q-9004 swing high or low. The comparators output causes collector of Q-9003 to oscillate high and low, turning off and on the Darlingtons Q-9001 and Q-9002. When Q-9001 is turned off, the excited energy in choke L-9002 is phase converted so D-9003 turns on, allowing current to flow in the choke.
The voltage at L-9002 oscillates at 30KHz. Combined with the current supplied by the effects of Q-9001 and D-9003, this results in a 13V D.C. output voltage of L-9002 which is filtered by C-9007.
Further regulation by Q-9006, Q-9007 and Q-9008 is provided for the +120V DC supply.

5-2: BLOCK DIAGRAM



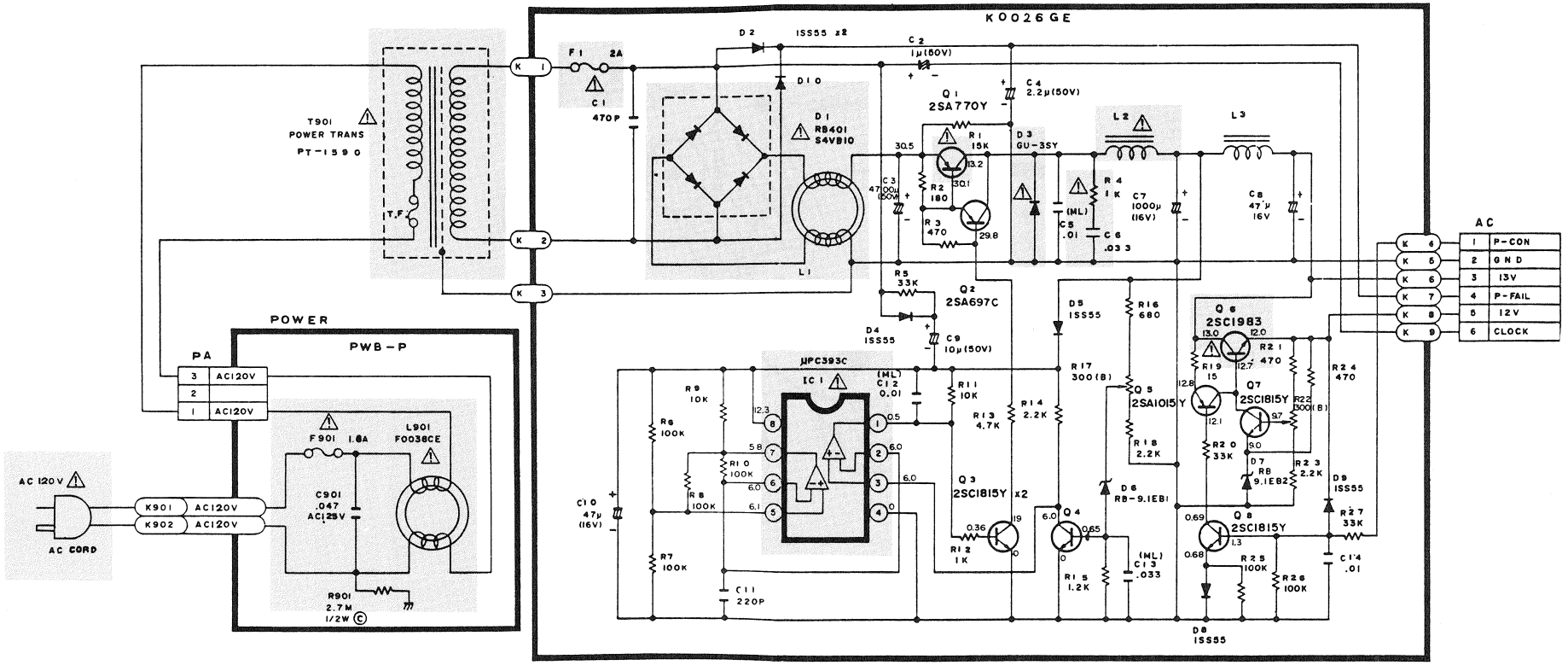
5-3: TIMING CHART



WARNING

SERVICE SAFETY INFORMATION

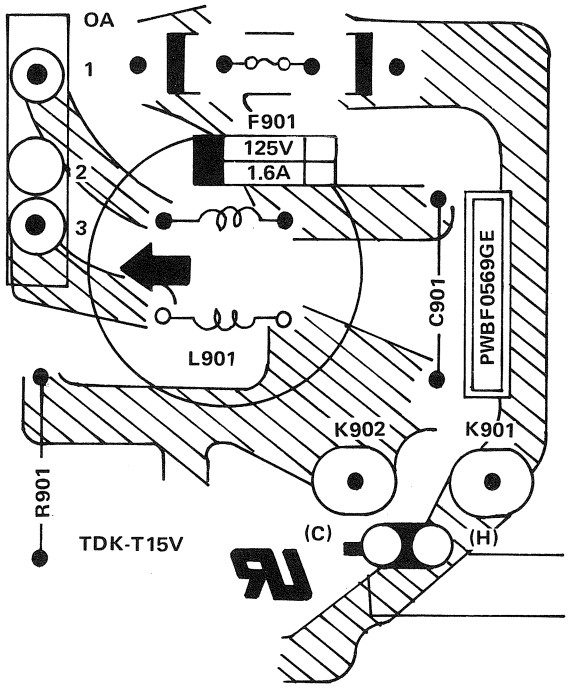
1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.

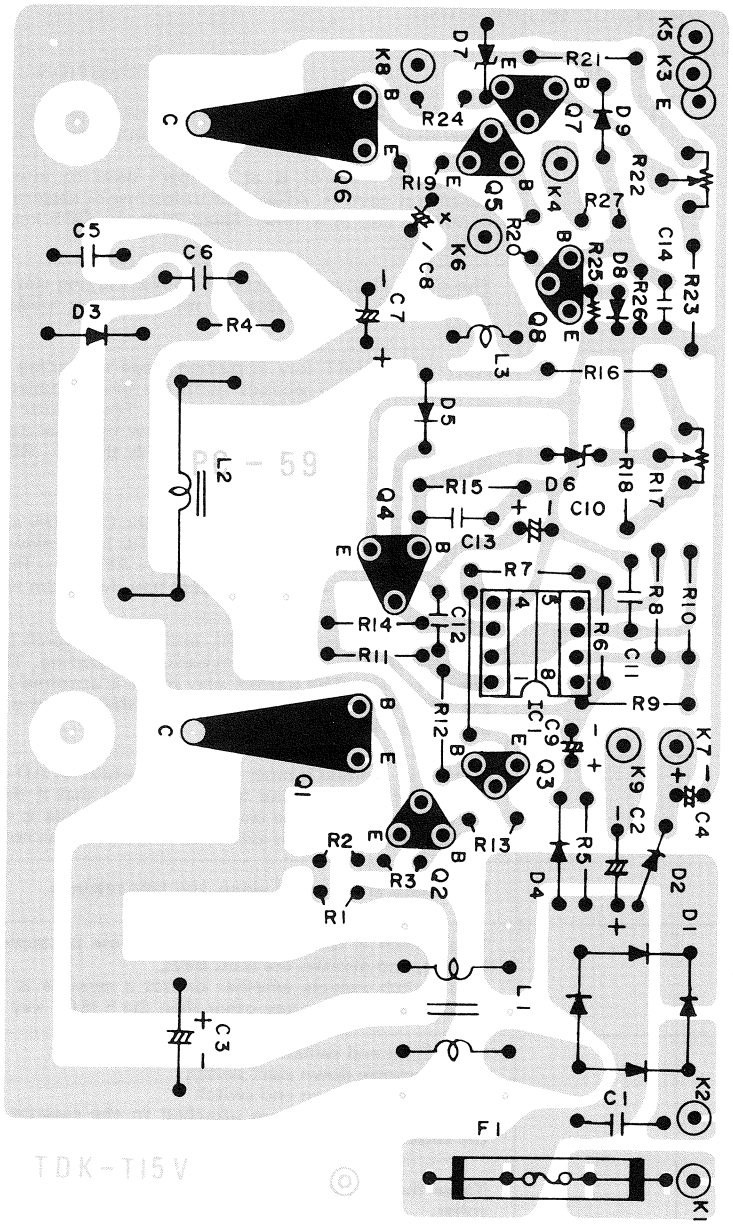


NOTE:
Reference number on the POWER P.W.B. are in the 9000 series.
(Example) Q1 on the board is Q9001.

5-4: PRIMARY POWER P.W.B

CAUTION:
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE FUSE F901 (1.6A – 125V)





NOTE:
Reference number on the POWER P.W.B. are in the 9000 series.
(Example) Q1 on the board is Q9001.

Section 6: V.C.R. SYSTEM CONTROL

6-1: DESCRIPTION

Fig. 5 is block diagram of the system control circuit for the EV-10.

The system control circuit consists of a key operation input section, a sensor operation input section, a mode output section and a motor control section. The signals from each section are electronically processed and applied to the microcomputer. The microcomputer then instructs the machine to perform according to the input signals.

Below is an explanation of how the system control circuit processes the input signals occuring from the operation of any key or the action of any sensor.

INFORMATION BY	PIN NO.	FUNCTION
ON Key	Key Matrix	The power control is at a "high" level to supply power to the peripheral circuits. Then all other keys are accessible. Monitor power is on.
OFF Key		The power control is at a "low" level to interrupt the power supply to the peripheral circuits. After tape unloading or cassette up/down operations, the power control is also at a "low" level. With the OFF key pushed, only the EJECT key is operational.
		The timer play mode becomes active. Playing starts when the timer control is at a "high" level. It is disabled if no cassette is loaded or there is no timer memory input.
EJECT Key		When the EJECT key is pushed, tape unloading starts and finishes. The tape is tightened for 0.75 seconds (with the brake applied to the takeup reel disk and the supply reel disk in reverse rotation). The cassette is then ejected. There is a delay after pushing the EJECT key to allow the cassette motor to start rotating. During this delay time it is possible to push the FF, REW, STOP, PB, or REC keys to interrupt the cassette eject operation.
REW Key STOP Key FF Key PB Key REC Key		The EJECT key has preference over the OFF, ON and TIMER keys. Among these keys, the order of priority is as follows: STOP Key – REW Key – REC Key – FF Key – PB Key The PAUSE key is an independent key, free from this order.
VIDEO SEARCH-REWIND Key VIDEO SEARCH-FAST FORWARD Key		Video Search-Rewind (VSR) and Video Search-Fast Forward (VSFF) keys are accepted during play or playback-after-loading. They operate as a push-on/push-release system. The normal play mode is acquired by pressing the VSFF key during the VSR operation. Or, to return to the normal play mode from the video search mode press PAUSE or PLAY.
PAUSE Key AUTO REW END OF TAPE		Putting in a diode jumper from the output of AD# to the input KE1 enables auto-rewind. The auto-rewind function means that if the power is on, in either the play or record mode, at the end of a tape, the tape is rewound to its starting position. If the timer playback is active, auto-rewind does not function; the tape is ejected.
AUTO-REW Function Button		10 seconds after loss of video, the tape rewinds.
ERASE Protection switch Cassette Switch		This switch is turned on when the erase protection tab at the cassette has been broken, and disables the REC keys. This switch detects whether or not a cassette is loaded in the unit. Without the cassette loaded, any key other than the EJECT key will not operate.
CSA CSB CSD		CSA: Eject end switch CSB: Cassette down start switch CSD: Cassette down end switch These three switches are attached to the cassette control unit and used to locate the cassette position.
		These three switches are used to detect any position of the loading arm and pinch roller.
		UL Switch: This switch functions the same as conventional ones. Video Search SW: Turns on when loading arm is moved to the end (point B) in figure 3-1) during loading. During loading in REC, the reel and capstan motors start when VS SW turns on. The loading motor reverses until VS SW turns off to release the pinch roller only during loading in REC pause or video search (driven by reel motor). During unloading, AL output turns to low when VS SW turns off. * In the record-pause mode: As long as the VS switch is on, the loading motor rotates in the reverse direction. During this time the pinch roller is released but the tape stays loaded. * At the time of tape unloading: When the VS switch turns on, the AL output goes "low". PR switch: After the loading arm reaches point B (shown in Fig. 3-1), the loading motor continues to rotate, forcing the pinch roller against the capstan. After that, the PR switch turns on and the loading motor stops.

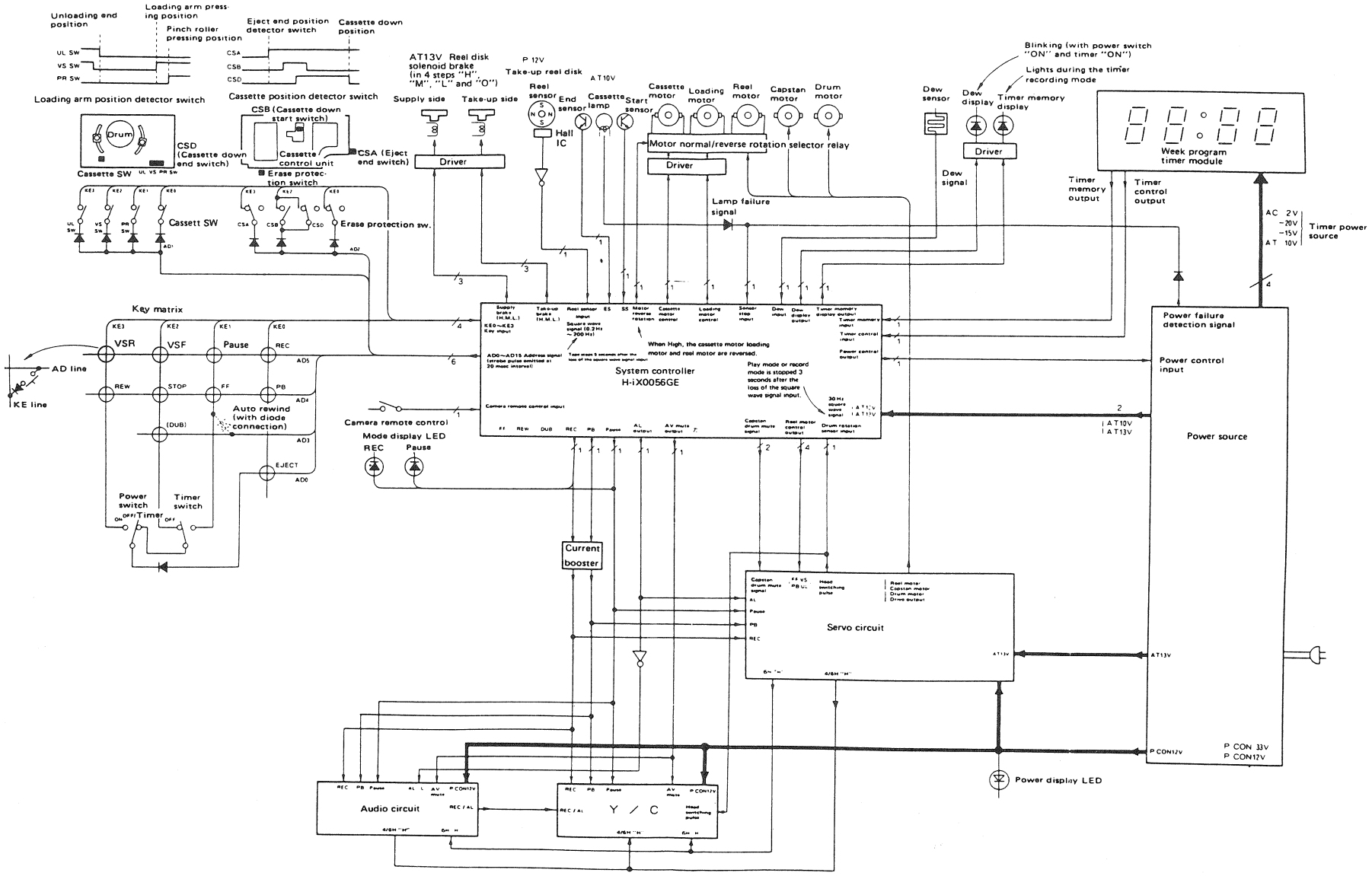
INFORMATION BY	PIN NO.	FUNCTION
END SENSOR START SENSOR	16 17	These sensors function the same as the conventional ones. For external noise, they are kept off for 5m sec.
SENSOR STOP INPUT	18	When a power failure or a tape breakage occurs, this terminal becomes "high" to put the unit in the STOP mode.
DEW SENSOR INPUT	19	With the power switch or timer on, the dew lamp blinks when the dew sensor is active.
TIMER PLAY DISPLAY INPUT	20	When a play is programmed in the memory, the timer memory output from a timer module is at a "high" level and applied to this terminal. The timer lamp lights up when the following conditions are satisfied: (Timer switch on) X (Cassette down) X (Timer memory output at a "high" level). If any of these conditions are not satisfied, the lamp is turned off.
TIMER CONTROL INPUT	21	When the timer control input is a "high" lever, the timer play occurs, when at a "low" level, the time play stops. The tape is then unloaded and the power supply is off.
DRUM ROTATION	37	In the PB mode, the head switching pulse (30Hz square wave) is applied from the servo circuit to this terminal. 3 seconds after the head switching pulse has been discontinued, the PB or REC mode is stopped and the tape is unloaded.
REEL SENSOR INPUT	38	In the FF, PB or REC mode, a square wave signal (0.2Hz – 200Hz) is applied to this terminal from the take-up reel disc rotation sensor. 5 seconds after the square wave signal has been discontinued, the FF, REW, PB or REC mode is stopped and the tape is unloaded.
REMOTE CONTROL INPUT	45	This input functions the same as the front panel keys.

* The loading motor and cassette motor drives and designed to turn off after seven seconds of continuous operation.

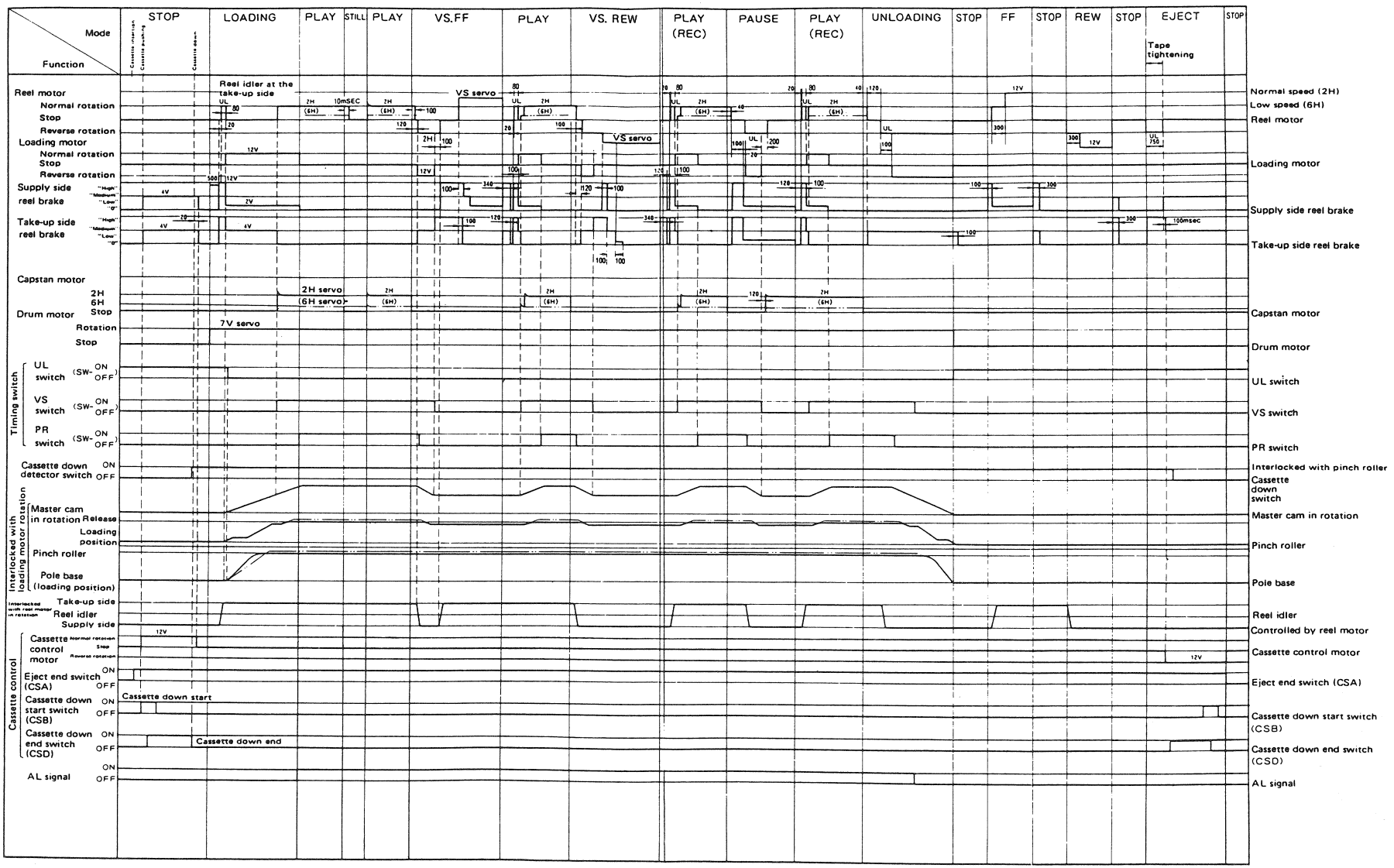
WARNING

SERVICE SAFETY INFORMATION

1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.



6-3: TIMING CHART



6-4: MICROPROCESSOR

The microprocessor used in the EV-10 is a DIP type. It includes 64 input/output pins. Only 46 pins are used: 20 as inputs, 26 as outputs.

Input section:

10 inputs made up of a 4 x 6 key matrix

10 independent inputs

Output section:

15 outputs to control the motors and brakes

8 outputs to control display

3 outputs to control power

The pin locations and functions are shown below:

O	CAS. M CTL	64	D3					D4	1	Supply brake ("High")	O
O	CAP. MUTE	63	D2					D5	2	Supply brake ("Medium")	O
O	LDM CTL	62	D1					D6	3	Supply brake ("Low")	O
O	Motor in reverse rotation	61	D0					D7	4	Take-up brake ("High")	O
O	Reel motor (FF/REW)	60	R63					D8	5	Take-up brake ("Medium")	O
	Reel motor (VS)	59	R62					D9	6	Take-up brake ("Low")	O
		58	(NC)					(NC)	7		
		57	(NC)					(NC)	8		
		56	(NC)					(NC)	9		
O	Reel motor (PB/REC)	55	R61					D10	10	FF LED	O
O	Reel motor (UL)	54	R60					D11	11	REW LED	O
I	KE3	53	R33					D12	12	DUB LED	O
I	KE2	52	R32					D13	13	REC LED	O
I	KE1	51	R31					D14	14	PB LED	O
I	KE0	50	R30	KE3	KE2	KE1	KE0	D15	15	Pause LED	O
O	AD5	49	R23	VSR	VSR	PAUSE	REC	R40	16	End sensor	I
O	AD4	48	R22	REW	STOP	FF	PB	R41	17	Start sensor	I
O	AD3	47	R21					R42	18	Stop sensor stop	I
O	AD2	46	R20	CSA	CSB	CSD	Erase protec-tion sw.	R43	19	Dew sensor	I
I	Remote control input	45	INT 1					R50	20	Timer play display	I
I		44	INT 0					R51	21	Timer control	I
O	AD1	43	R13	UL	VS	PR	Casset-te sw.	R52	22	Timer play	O
O	AD0	42	R12	ON	OFF	Timer	EJECT	R53	23	AL	O
		41	(NC)					VDISP	24		
		40	(NC)					(NC)	25		
		39	(NC)					RESET	26		
I	Reel sensor input	38	R11					VBB	27		
I	Drum rotation sensor	37	R10					VDD	28		
O	DM mute	36	R03					OSC	29		
O	AV mute	35	R02					(NC)	30		
O	Dew display	34	R01					TEST	31		
O	Power control	33	R00					VSS	32		

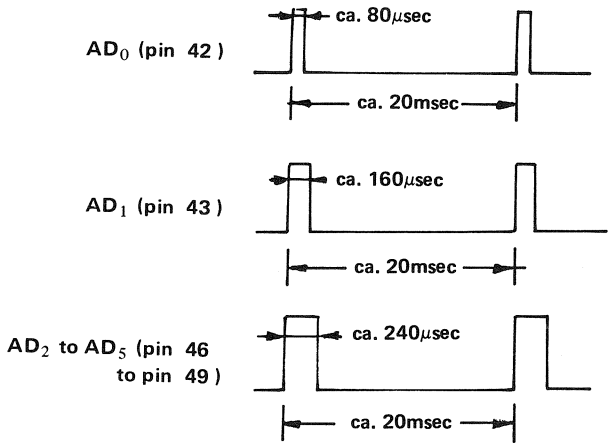
I: means input pin
O: means output pin

6-5: TROUBLE SHOOTING THE SYSTEM CONTROL CIRCUIT

To service the EV-10 system control circuit, follow the procedures shown below:

- Checking the Address Signals (Key Strobe Signals)

When the microprocessor functions normally, the pulse appearing at the address terminals AD_0 to AD_5 appear as in.



- Checking the Microprocessor's Control Functions

Apply 10V from VSS (pin 32) to each output terminal of the microprocessor. Check that the microprocessor can control the motor, brake, etc. according to the function of each output. The microprocessor is a P-MOS type. 10V can be applied directly to its output terminals by using the proper shorting pin.

Pin 1 : Supply brake "High"
Pin 2 : Supply brake "Medium"
Pin 3 : Supply brake "Low"
Pin 4 : Take-up brake "High"
Pin 5 : Take-up brake "Medium"
Pin 6 : Take-up brake "Low"
Pin 10 : FF LED
Pin 11 : REW LED
Pin 12 : DUB LED
Pin 13 : REC LED
Pin 14 : PB LED
Pin 15 : PAUSE LED
Pin 22 : Timer REC
Pin 33 : Power control
Pin 34 : Dew display
Pin 35 : AV mute
Pin 54 : Reel motor (UL)
Pin 55 : Reel motor (PB)
Pin 59 : Reel motor (VS)
Pin 60 : Reel motor (FF)
Pin 61 : Motor reverse rotation
Pin 62 : Loading motor control
Pin 64 : Cassette motor control

6-5: TROUBLESHOOTING

- Checking the Key Matrix
  Applying AT 10V from VSS (pin 32) to each address terminal AD_0 to AD_5 to check for proper key operation.
  With 10V applied, push the key connected with the address terminal, and check that 10V is applied to each of the key matrix terminals KE_0 to KE_3.

- Checking the Independent Input Terminals
  Pin 16 : End sensor
  Pin 17 : Start sensor
  Pin 18 : Stop sensor input
  Pin 19 : Dew sensor

  NOTE:
  Open input terminals result in abnormal operations.

  Pin 45 : Remote control input
  If it is at a "high" level, the unit goes into the PAUSE mode when the PB key or the REC key is pushed with the power switch set at "ON."

  Pin 37 : Drum rotation sensor
  In the PB or REC mode, if the head switching pulse (30Hz square wave) is interrupted for 3 seconds, the unit will goes into the stop mode.

  Pin 38 : Reel sensor
  In the PB, REC, FF or REW mode, if the signal (0.2 ~ 200Hz square wave) is interrupted for 5 seconds the unit goes into the stop mode.

- Checking the Power Source
  VDISP (pin 24): → GND
  RESET (pin 26): → GND
  VBB (pin 27): → GND
  VDD (pin 28): → GND
  TEST (pin 31): → AT10V
  VSS (pin 32): → AT10V

6-6: AUTO-REPEAT CIRCUIT:

Description:

The Sync Discriminator maintains a high output level (H) as long as the sync signal is present. When the absense of a sync signal is detected by the discriminator the output goes low (L).

To prevent a false trigger of the auto-repeat circuit by a few missing sync pulses, a 6.5 second period of missing sync pulses is required before the delay circuits output goes low, closing a switch to activate the rewind function.

With the auto-rewind button depressed the unit will rewind and stop.

When the auto-repeat button is depressed the play switch is activated at the end of rewind.

While the unit is in the auto-rewind or repeat mode all other function controls will operate as normal.

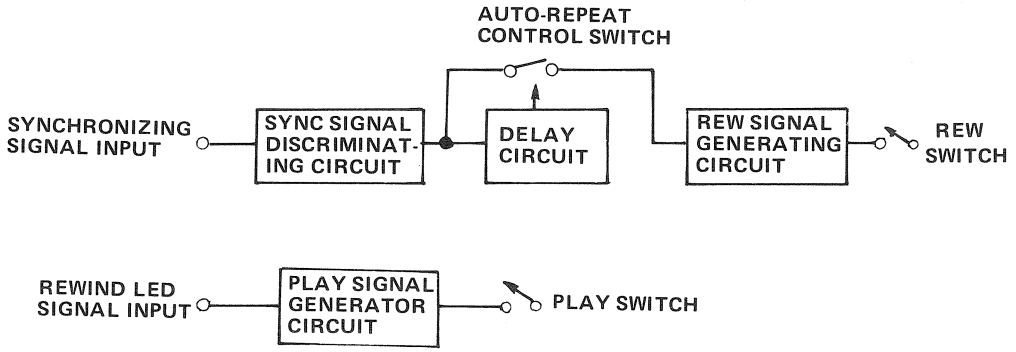
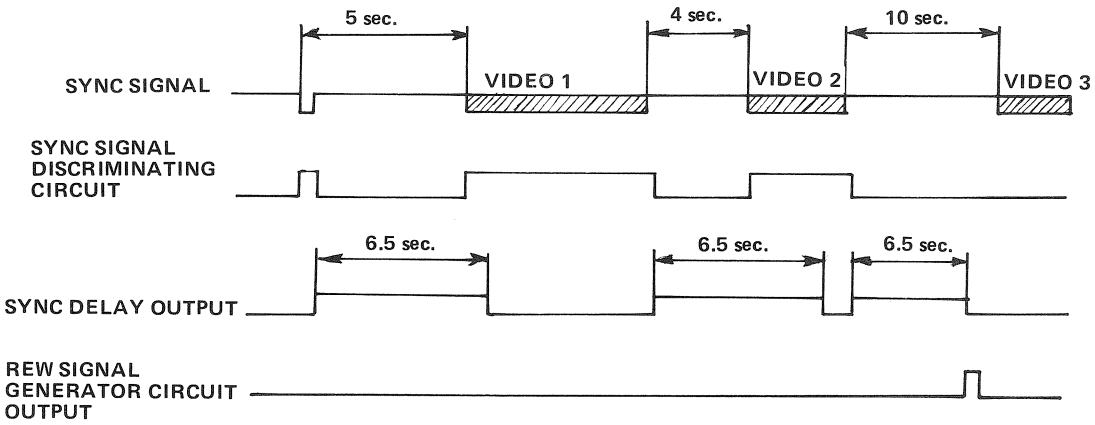


FIG. 1 AUTO-REPEAT CIRCUIT BLOCK DIAGRAM



AUTO-REPEAT CIRCUIT TIME CHART

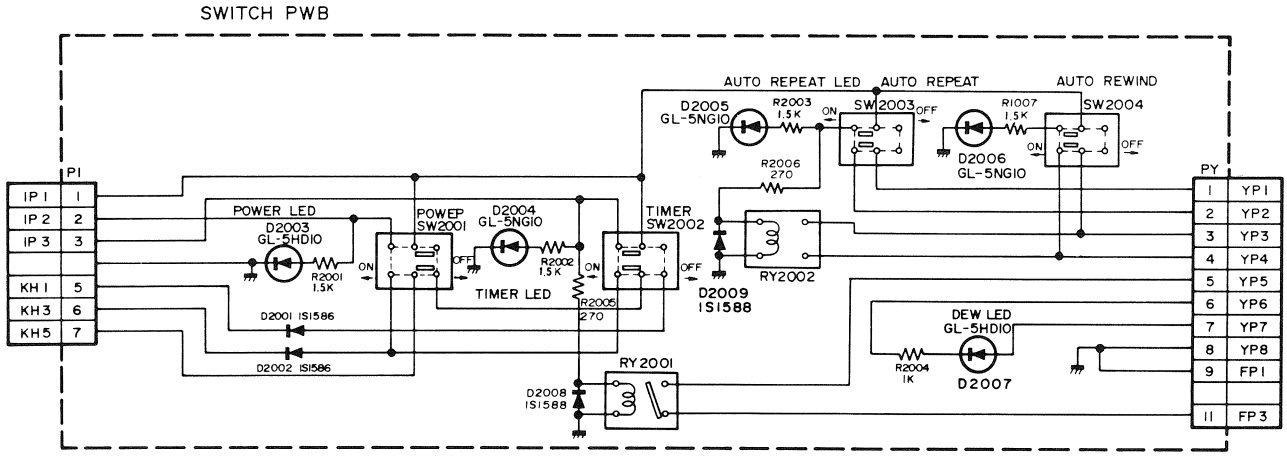
6-6: AUTO-REPEAT CIRCUIT

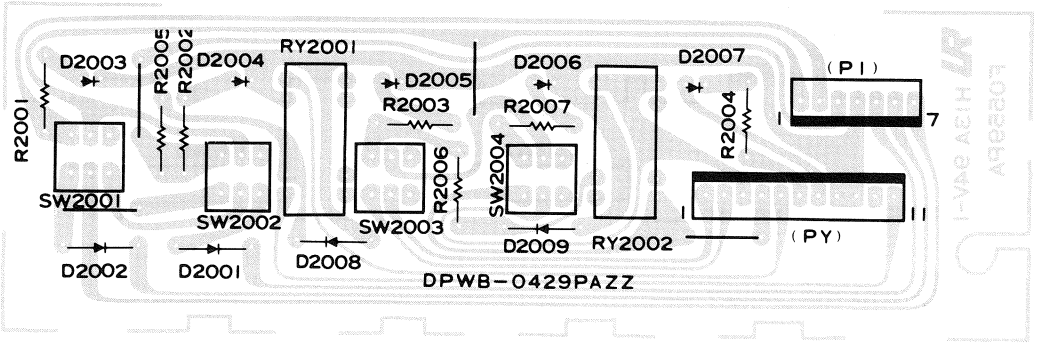
WARNING

SERVICE SAFETY INFORMATION

1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.

Switch Control Board





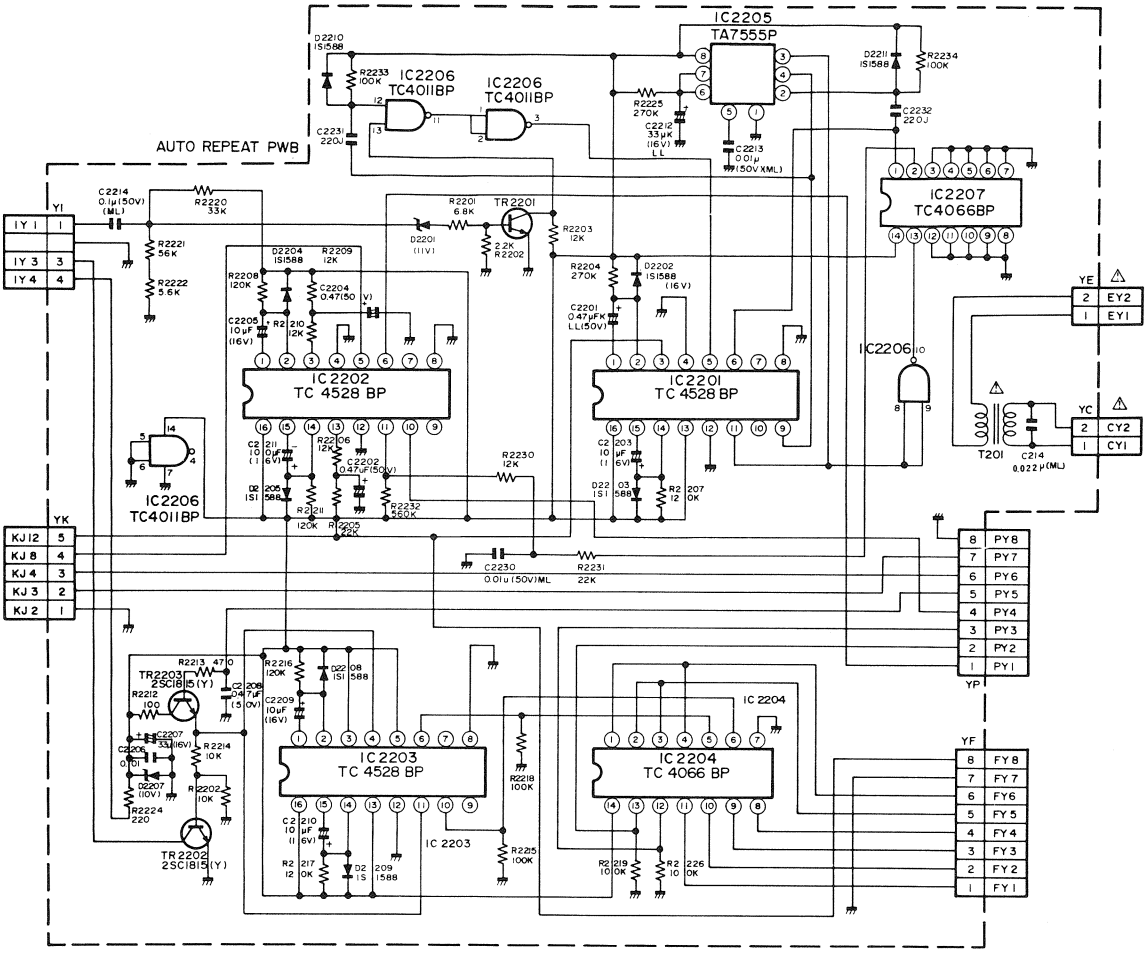
Switch PWB

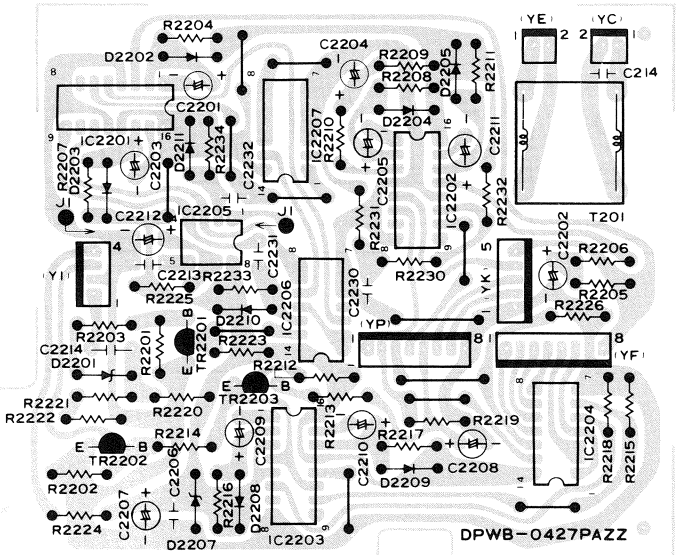
6-6: AUTO-RPEAT CIRCUIT

WARNING

SERVICE SAFETY INFORMATION

1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.



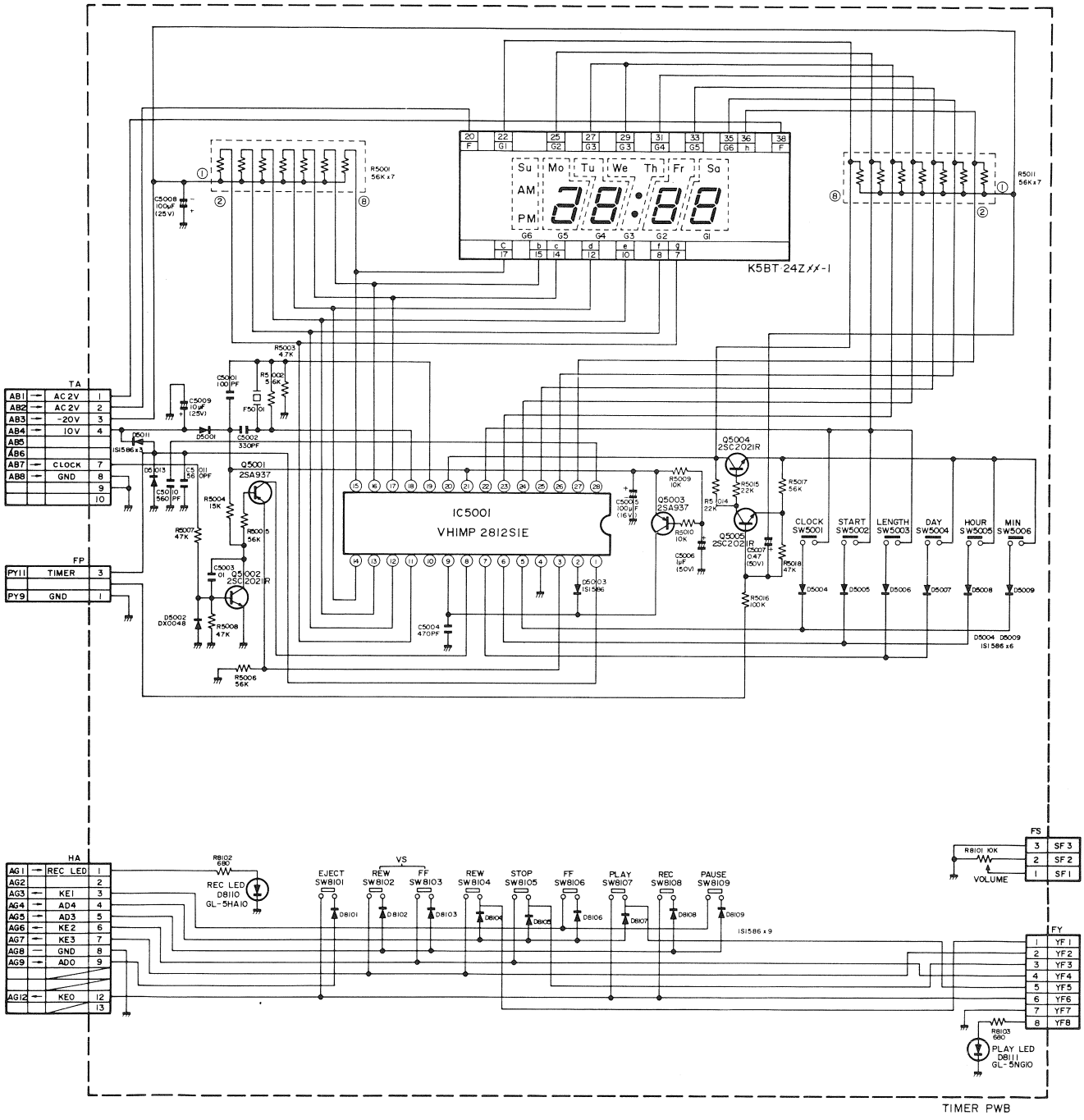


Auto Repeat PWB

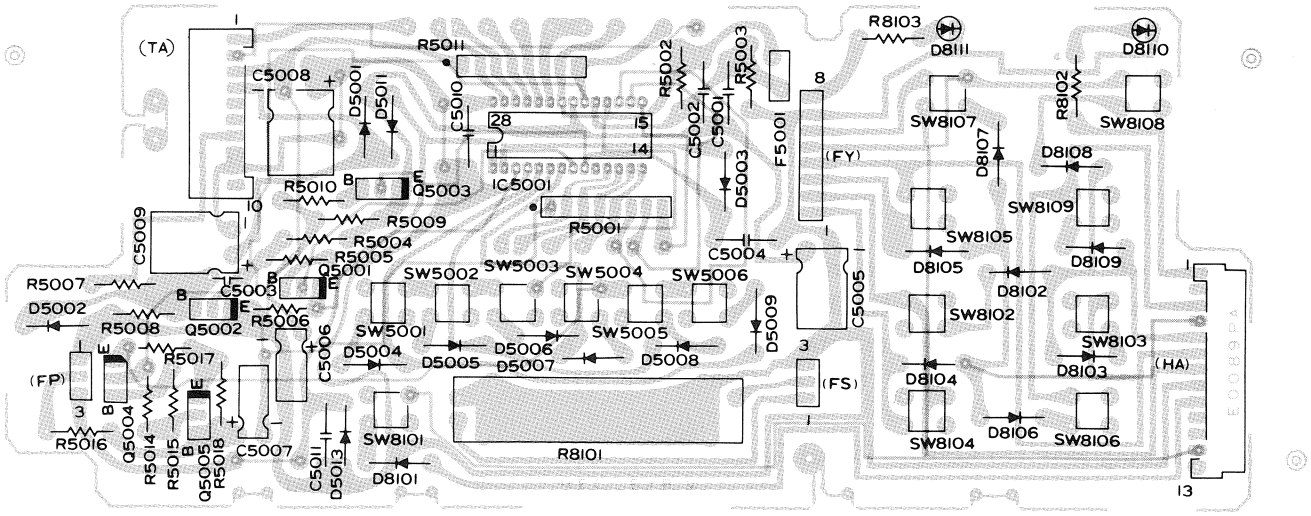
WARNING

SERVICE SAFETY INFORMATION

1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.



6-7: TIMER CIRCUIT



Timer PWB

Section 7: EP/SP AUTOMATIC MODE SELECTOR CIRCUIT

The EV-10 has an EP/SP mode automatic selector circuit. This allows the unit to playback a tape regardless of whether it was recorded in the EP or SP mode.

7-1: EP/SP AUTOMATIC MODE SELECTOR CIRCUIT

When a tape is played back at the same speed it was recorded, the signal-to-signal interval (pulse width) is set to 33.3 milliseconds. When a tape, recorded in SP mode, is played back in the EP mode, the signal goes up to 100 milliseconds (about three times the original). If the tape is recorded in EP mode and played back in the SP mode, the signal comes down to 10 milliseconds (about one third the original).

Recorded Mode	Played Back Mode	Pulse Width (in milliseconds)
SP	SP	33.3
EP	EP	33.3
SP	EP	100.0
EP	SP	10.0

The EP/SP mode automatic selector circuit identifies any pulse changes. By regulating the servo/ mechanism circuits, the unit always plays back the tape in the same speed as the original recording.

Muting DURING the Tape Speed Selection in PLAY Mode
The muting output of pin 18 mutes the audio and video signals when a tape speed is changed. This allows the servo circuit to stabilize for normal operations. The muting timing (how long the audio and video signals are muted) is set by the R/C time constant at pin 17 .

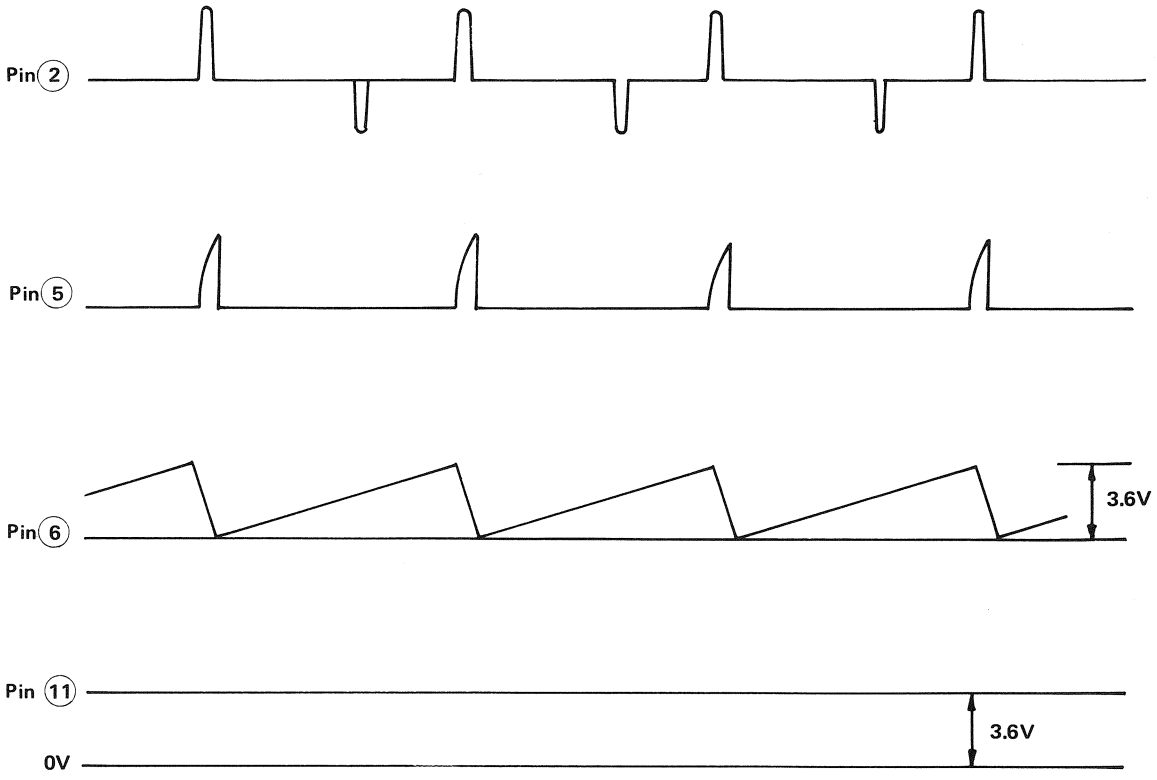
SP Mode Holding With No Control Signal Given
When the unit is in either the FF or REWIND mode, there is no control signal applied to pin 2. In this case the no-signal M.M. circuit sets the tape speed to the same rate used in the SP mode.

Holding in PAUSE and VS Modes
When the unit is in the PAUSE (STILL) mode, or when the mode changes from SP to EP or EP to SP PLAY mode, the IC keeps the internal mechanism in the previous PLAY mode. A "low" level output of pin 10 enables this holding of the previous PLAY mode.

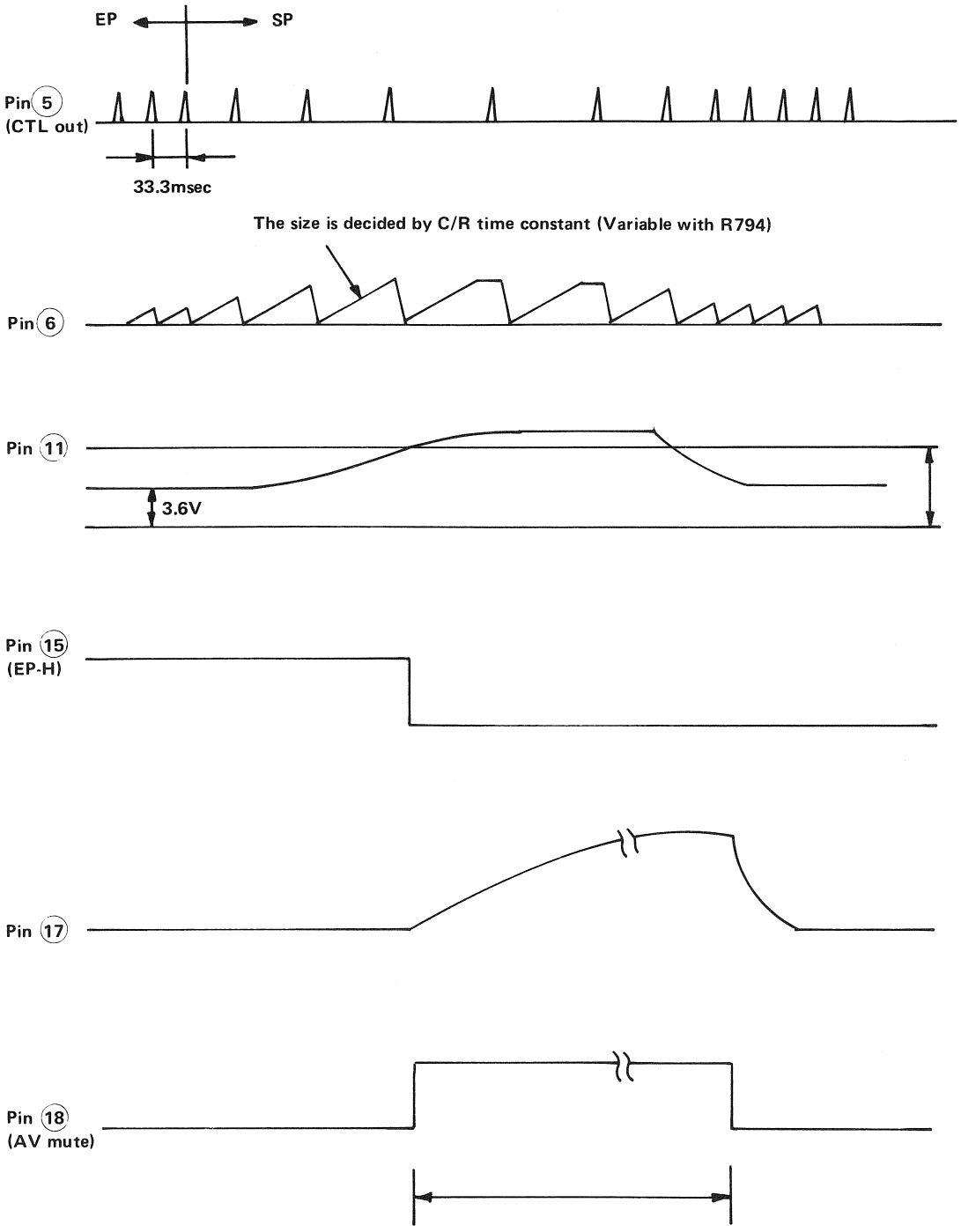
Tape Speed Setting in RECORD Mode

The DC voltage output of pin 12 determines which mode (EP or SP) is initiated in the RECORD mode. When it is set to a "low" level, the EP mode is initiated. When it is set to a "high" level, the SP mode is initiated.

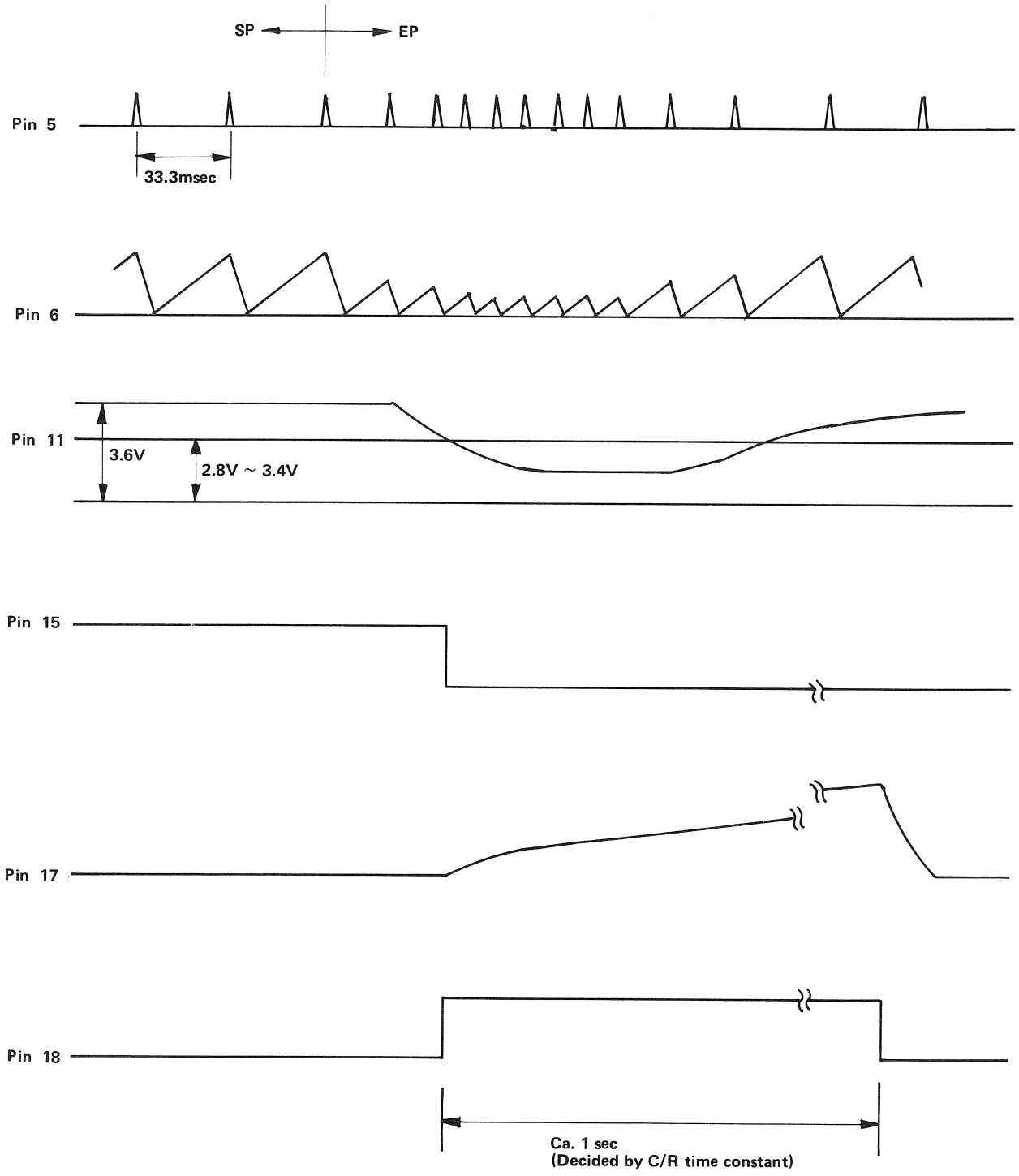
7-2: TIMING CHARTS



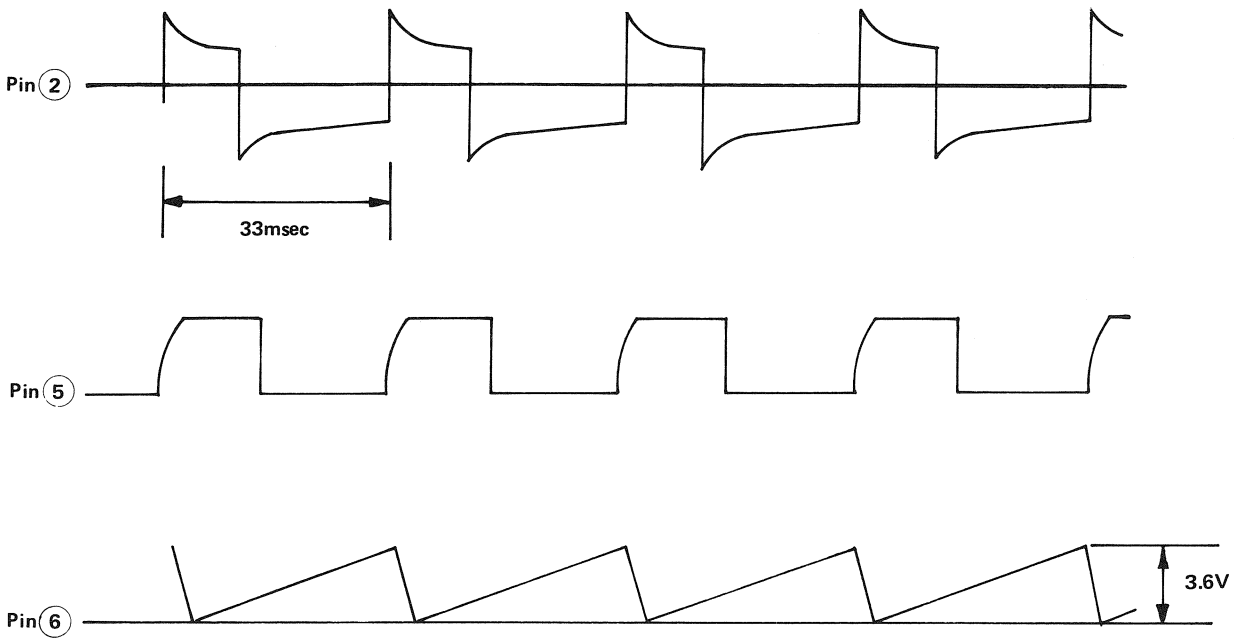
Timing chart upon changing from EP mode to SP mode



Timing chart upon changing from SP mode to EP mode



Timing chart in SP, EP RECORD mode



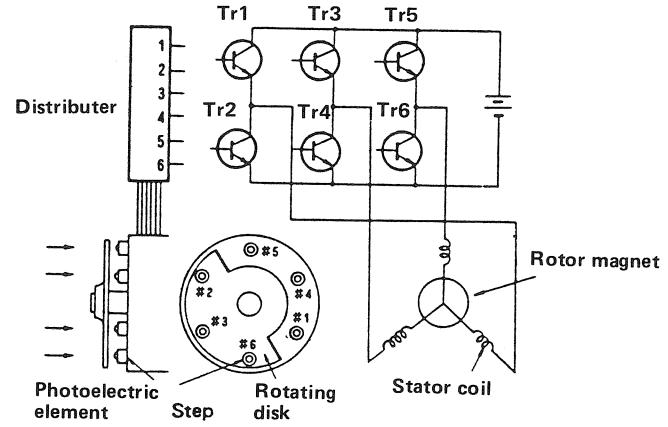
7-3: DIRECT DRIVE DRUM MOTOR

The direct drive drum motor is an electric commutator motor. The brushless motor's main structure is a rotor and a stator. The rotor is a permanent magnet. The stator is a coil.

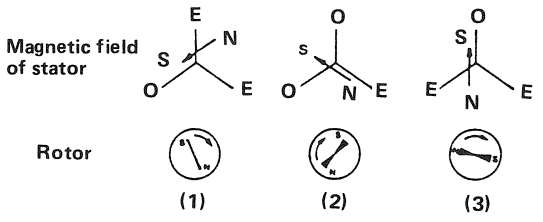
Unlike the conventional motors, it does not use a mechanical brush. This eliminates many drawbacks. With the mechanical brush, the brush and cummutator slide with each other at high speeds resulting in a high wear factor and causing arcing between them. In belt driven motors, long usage reduces the torque and slipping of the belt as a result of the ambient temperature variations.

Figure shown the operational principle of the brushless motor. The motor has six (6) photoelectric elements located at even intervals from each other. Each photoelectric element has a corresponding transistor. A rotating disk is placed between the light source and the photoelectric elements. The position of the rotor determines which of the photoelectric elements receives light. A transistor is turned on when its corresponding photoelectric element receives light.

For example, if transistors Tr1, Tr4, and Tr5 are turned on (as seen in Figure), the stator is magnetized in direction (1). The rotor tends to rotate in the direction of the arrow, according to the magnetization of the stator. When the rotor rotates about 30 degrees, transistor Tr5 turns off and transistor Tr6 turns on. As a result, the magnetic field of the stator rotates about 60 degrees. The rotor now rotates further.



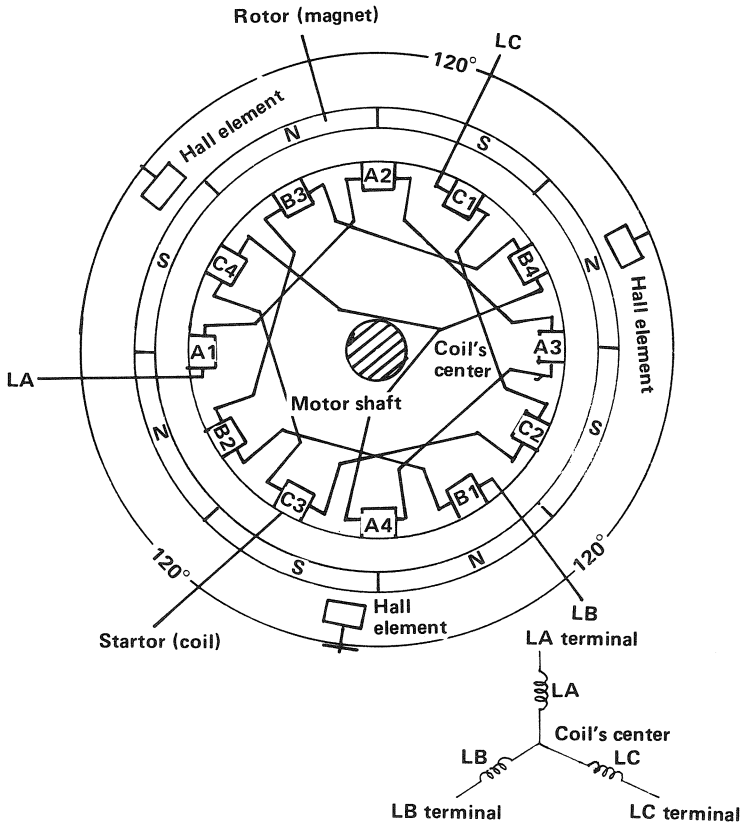
Step / TR	1	2	3	4	5	6
Tr1	1	1	1	0	0	0
Tr2	0	0	0	1	1	1
Tr3	0	0	1	1	1	0
Tr4	1	1	0	0	0	1
Tr5	1	0	0	0	1	1
Tr6	0	1	1	1	0	0



Principle of Brushless Motor

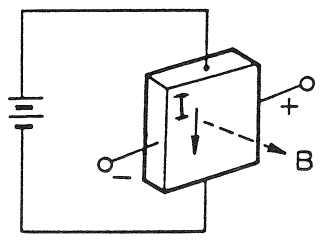
As long as the transistors are activated through their respective photoelectric element, both the stator and rotor continue to rotate. To create high-efficiency and high-speed operations and, to ensure the desired torque and inertia of the motor rotation in the direct drive motor, more phase and torque are needed.

The figure below shows the actual direct drive drum motor. It is a 3-phase, 4-coil, 8-pole magnet brushless motor with an enlarged (diameter) rotor. Three (3) Hall elements are used instead of photoelectric elements for positional detection of the rotor. (A Hall element is a type of semi-conductor.) The output of each Hall element is applied to the IC (IC707) which controls the coil current of the motor.



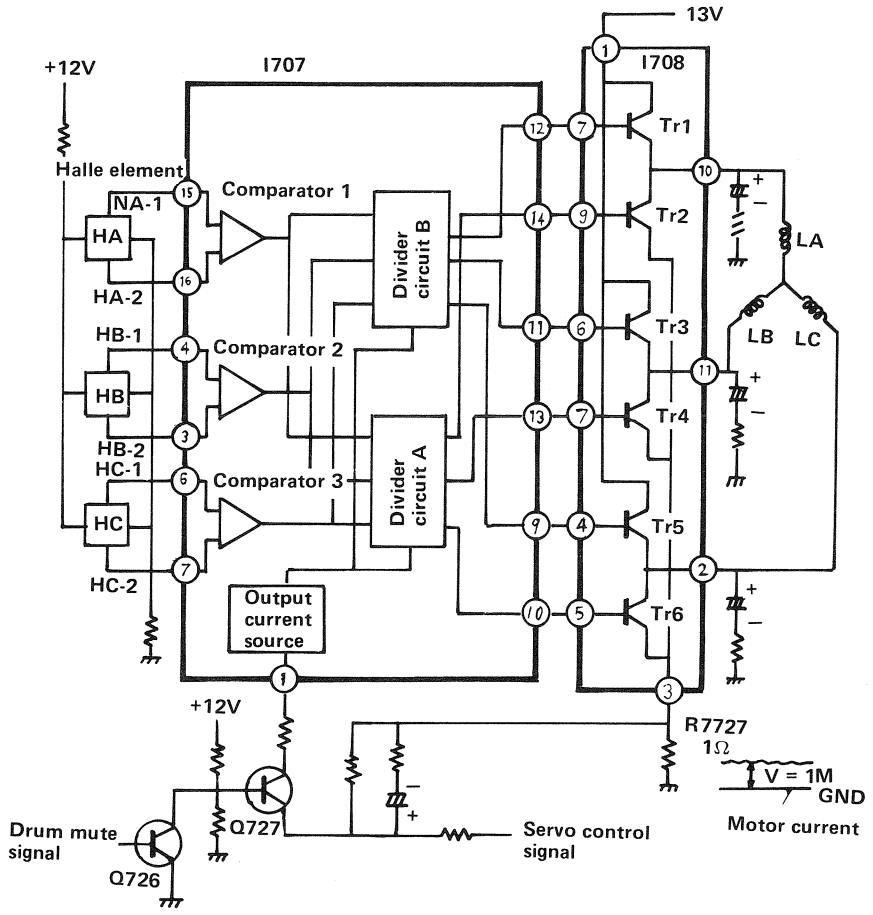
Structure of a Brushless Drum Motor

The figure to the right illustrates that when a current (I) is running through a Hall element, if the element is magnetized in direction B, voltage develops in a right angle to the magnetic field. The size of the voltage is proportional to the magnetic field. This is called the Hall effect. It is used to detect the position of the motor's rotor.



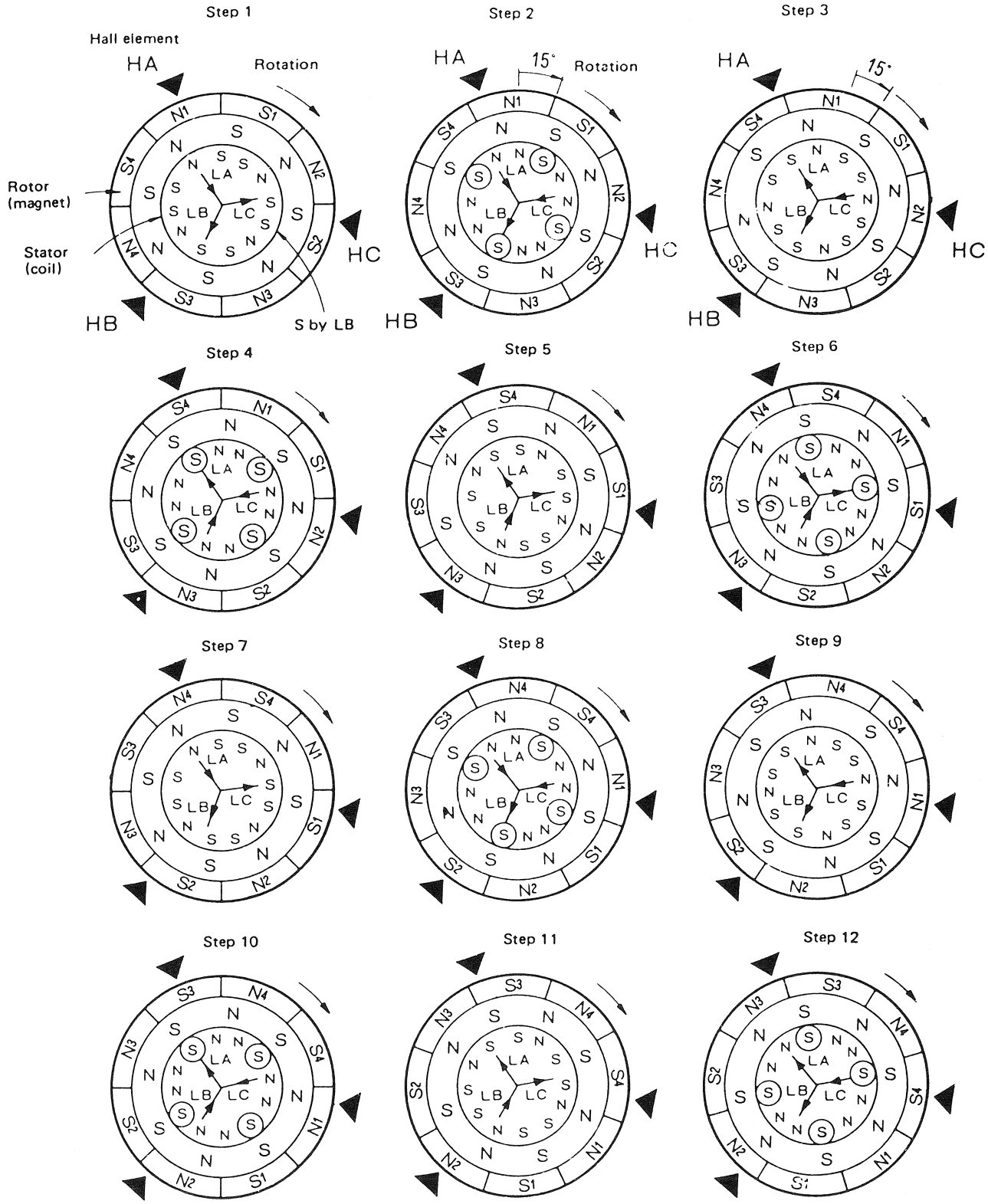
The outputs of the three Hall elements are applied to comparators 1, 2, and 3 and then to the divider circuits A and B. The divider circuits turn transistors Tr1 and Tr6 on and off.

The drum rotation speed and phase is controlled by the current supplied at pin 1 of IC707 and applied to Q719 (ground base amplifier). Q719's emitter voltage is controlled by the servo circuit (speed comparator plus phase comparator). If the drum rotating phase (speed) is lowered, the output from the servo circuit decreases. This increases the base-to-emitter voltage of Q719 and its collector current (at pin 1 of IC707). The output drive current of IC707 increases, causing an increase of the motor coil current. The drum rotating phase is restored to its specified value.

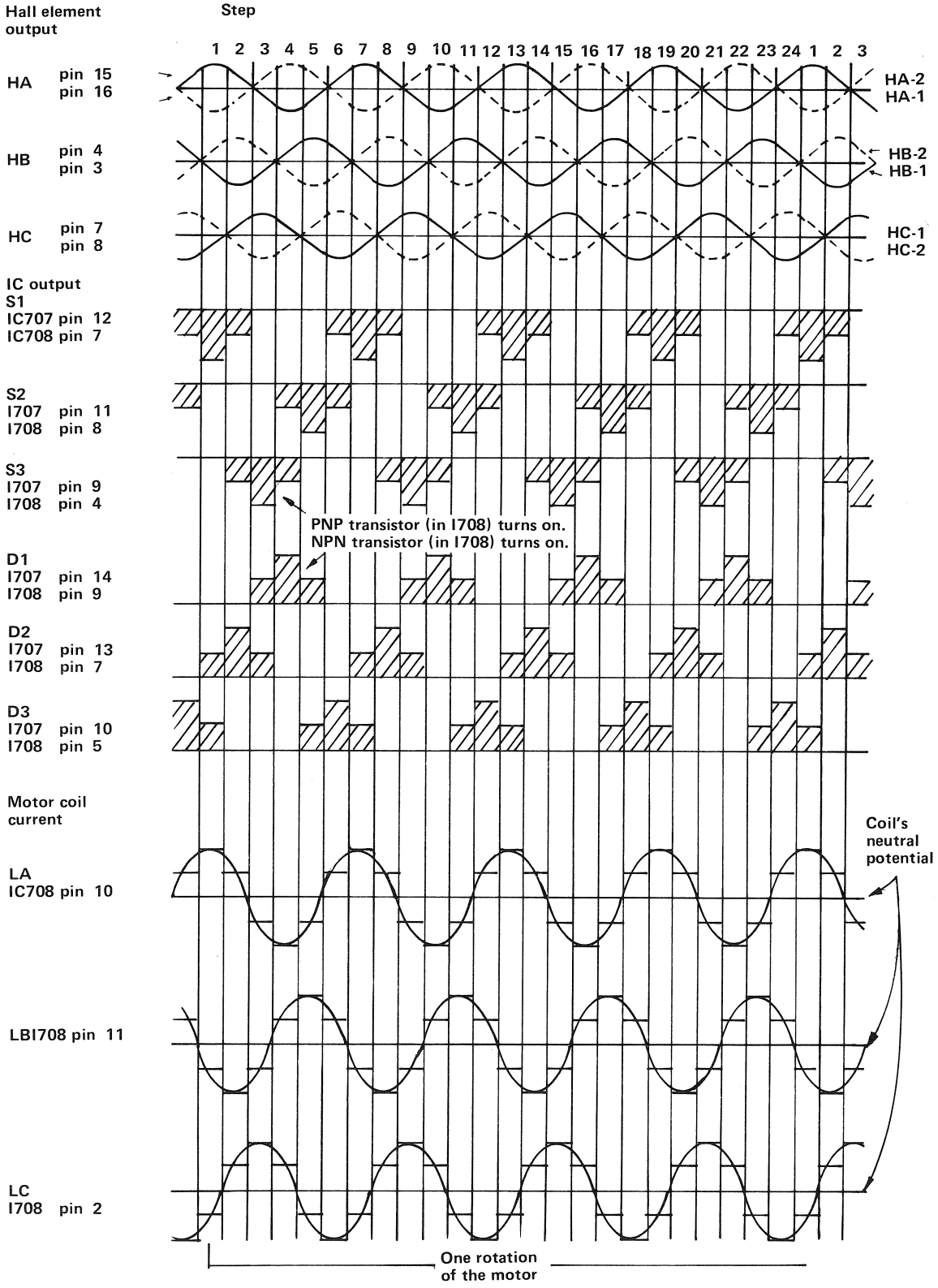


Drive Circuit of Drum Motor

The chart on page 99 describes the drive circuit operation. The diagrams below describe the drive motor's rotation. Steps 1 through 12 reference these figures.



Operation of the Drum Motor Drive Circuit



As seen in Step 1, Hall element HA is in the strong magnetic field N1. Therefore, HA-1 and HA-2 are in opposition – at the positive (maximum) and at the negative (minimum). Hall elements HB and HC are in the weak magnetic fields S3 and S2. HB-1 and HC-1 are at the negative and HB-2 and HC-2 are at the positive. As a result, there is a current at Tr1 of IC708 which is applied through LA, LB, and Tr4 and through LA, LC, and TR6. With the current applied, the coil LA has a large N-pole magnetic field while coils LB and LC have weak S-pole magnetic fields. Because LB and LC are adjacent to each other, there is a large S-pole magnetic field between them. As shown in Step 1, there is an 8-pole magnetic field between the rotor and stator, resulting in a rotation of the rotor by 15 degrees in the direction of the arrow. When the rotor rotates, the motor's rotational direction is changed.

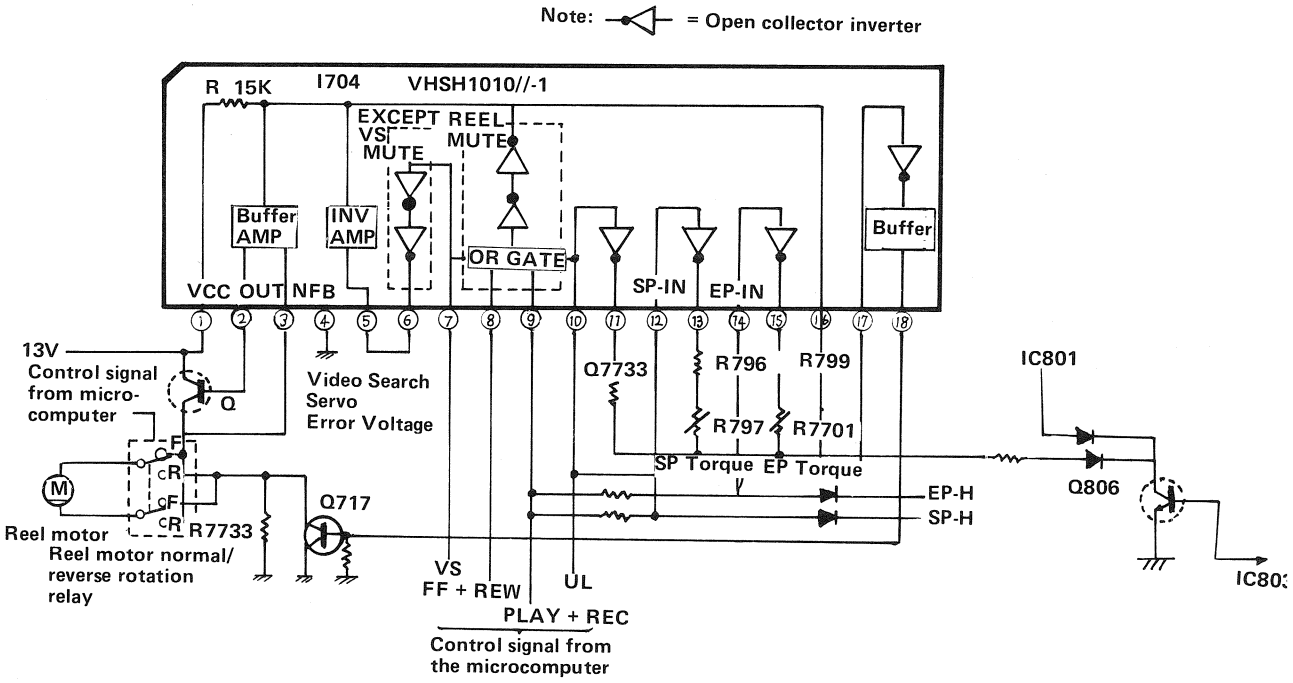
Step 2 shows Hall element HA in the weak magnetic field N1; Hall element HB in the strong magnetic field S3; and Hall element HC in the weak magnetic fields S2 and N2. As a result, HA-1 changes from the maximum positive to the minimum positive voltage; HB-1 changes from the minimum negative to the maximum negative voltage; and HC-1 changes from the minimum negative voltage to the minimum positive voltage. Current runs through Tr1, LA, LB, and Tr4, as well as through Tr5, LC, LB and Tr4. This results in a weak N-pole magnetic field in LA and LC and a srong S-pole magnetic field in LB. The change causes the rotor to rotate 15 degrees in the direction of the arrow.

The same operation occurs with each rotor rotation, step by step. The motor makes one rotation for every 24 steps. One rotation of the motor refers to four (4) cycles of the current waves caused by the motor coil. The drum motor rotates at a speed of 30 rotations per second. Due to its large inductance, the coil's current is a sine wave. This helps reduce the motor torque fluctuations. The coil's current waves have a phase difference of 120 degrees.

7-4: REEL MOTOR DRIVE CIRCUIT

In the EV-10, the capstan motor is used to drive only the capstan shaft. The reel motor is used to load a tape during the RECORD and PLAY modes, to rewind a tape when unloading, and to fast forward (FF) or rewind a tape.

The reel motor drive circuit is controlled by signals from both the microprocessor and the tape speed selector circuit. The F/R signal, VS signal, FF + REW signal, PLAY + REC signal, and UL signal come from the microprocessor. The ER-H, and SP-H, signals come from the tape speed selector circuit.



[Reel Motor Drive Circuit]

When the unit is in the fast forward mode, the FF + REW signal is applied to pin 8 of IC703 to disable the reel muting. Voltage is supplied through A (15K) resistor and applied to the output buffer amplifier where it is amplified to 12V to enter the reel motor. (Thus the reel motor rotates forward at a high speed.) The reel motor normal/reverse rotation selector relay is set to the "F" position.

When the unit is in the REW mode, the reel motor normal/reverse rotation selector replay is set to the "R" position. The FF + REW signal is applied to pin 8 of IC704. Voltage is amplified to 12V so that the reel motor rotates backwards at a high speed.

When the unit is in either the REC or PLAY mode, the PLAY + REC signal is applied to pin 9 of IC703 to disable the reel muting. At the same time, the SP-H signal (2 hour mode) or the EP-H signal (6 hour mode) is added to the PLAY + REC signal to produce an AND signal.

If a SP-H signal is added, the AND signal is applied to pin 12 which grounds pin 13 . The supply voltage is subject to a voltage division by the (15K) resistor in IC703, R7796, and R7797 and is fed to the reel motor by the buffer amplifier.

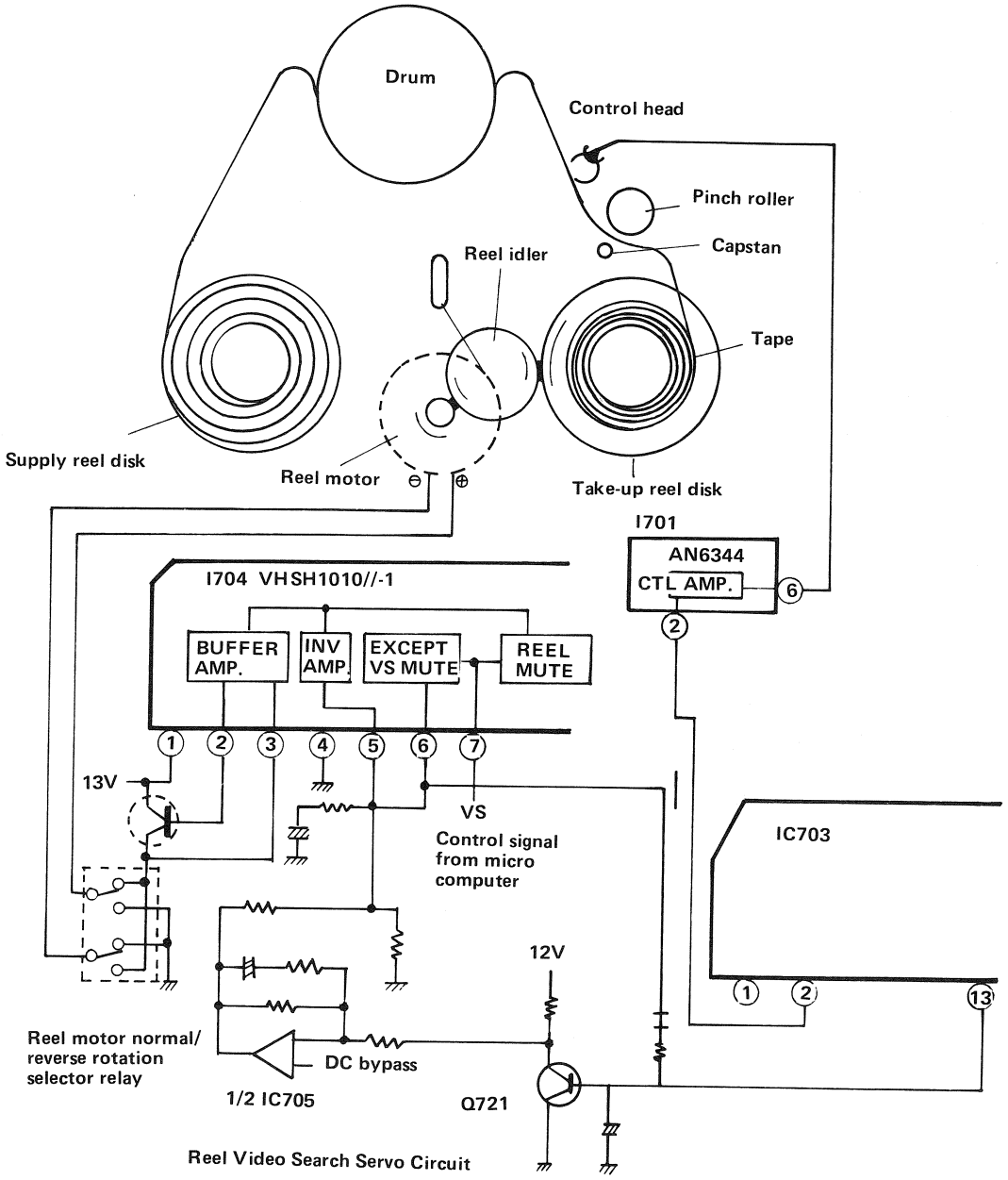
If an EP-H signal is added, th AND signal is applied to pin 14 which grounds pin 15 . The supply voltage is subject to a voltage division by R (15K) in IC704, R , and R and is fed to the reel motor by the buffer amplifier.

When the unit is in the video search mode, a VS signal is applied to pin 7 to release reel and exception VS muting. The error voltage of the video search servo circuit (input to INV-AMP through pin 5) and the voltage regulated by the video search servo error voltage is added to the reel motor. Consequently, in the VS mode, IC704 functions as an INV-AMP and gives 17 times results. The VS mode has both a forward and reverse. This comes from the change-over of reel motor relay caused by a FF + REW signal.

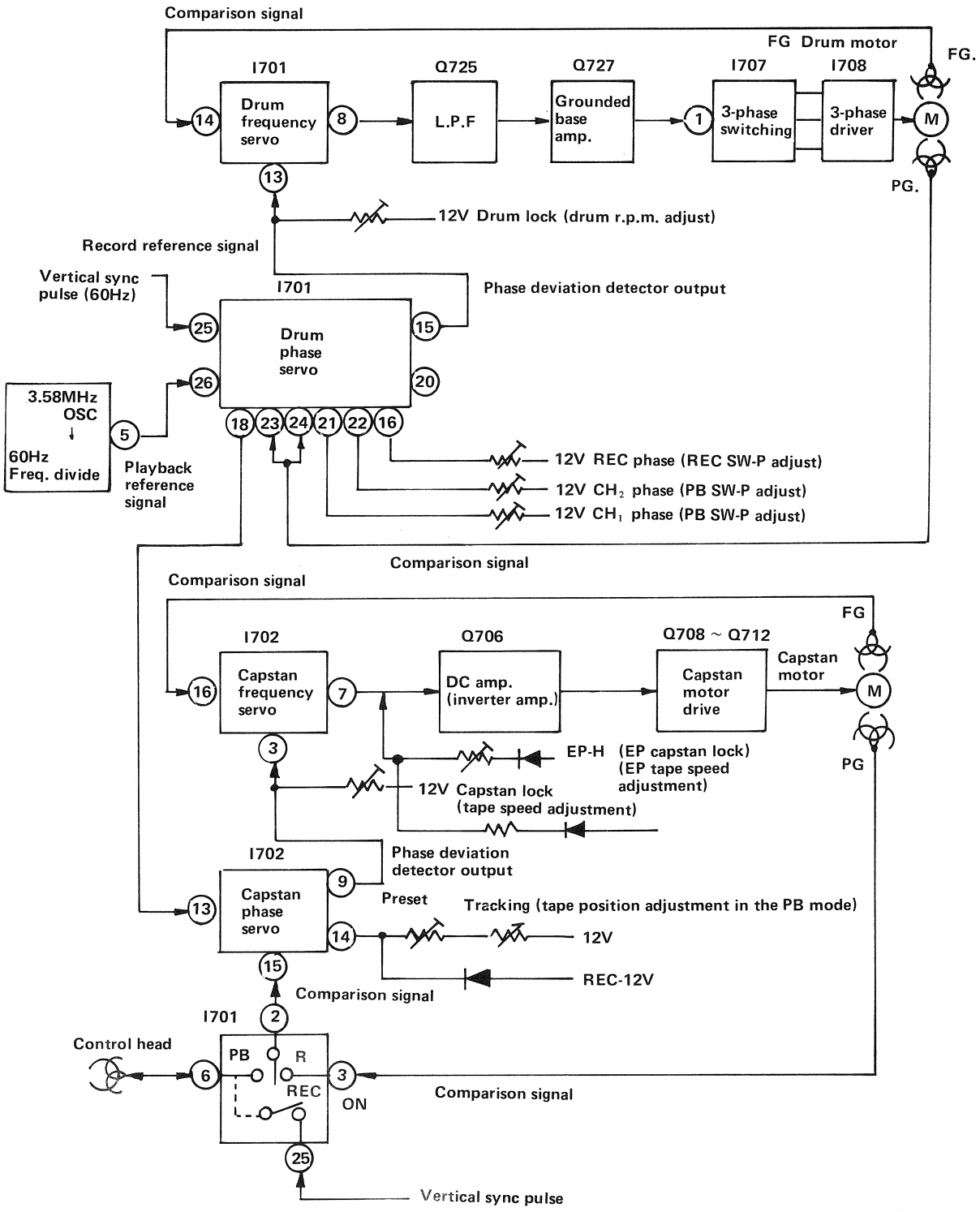
For the EV-10, the tape motion in the VS mode is controlled by the reel motor below is a block diagram of the reel video search servo circuit.

When the unit is in VS mode, the pressure of the pinch roller applied to the tape is released when the tape is loaded onto the reel disk through the rotation of the reel motor. This creates a high speed tape motion with less power supply voltage. However, the tape travel speed can vary slightly with the amount of tape being loaded into the reel disk. To avoid the variance, the EV-10 has a servo circuit that controls the reel motor's rotation by receiving the playback control signal from the control head.

The playback control signal recorded in the control track of the tape is reproduced through the control head and amplified by the playback control amplifier IC701. This is then applied to IC703. When the signal is applied, it produces a voltage (or triangular wave). The peak value of the voltage is held by the IC783 sample hold circuit. The sample hold circuit is amplified by IC705 and IC704 and fed to the reel motor so that the reel motor's rotational speed is regulated according to the frequency of the playback control signal.

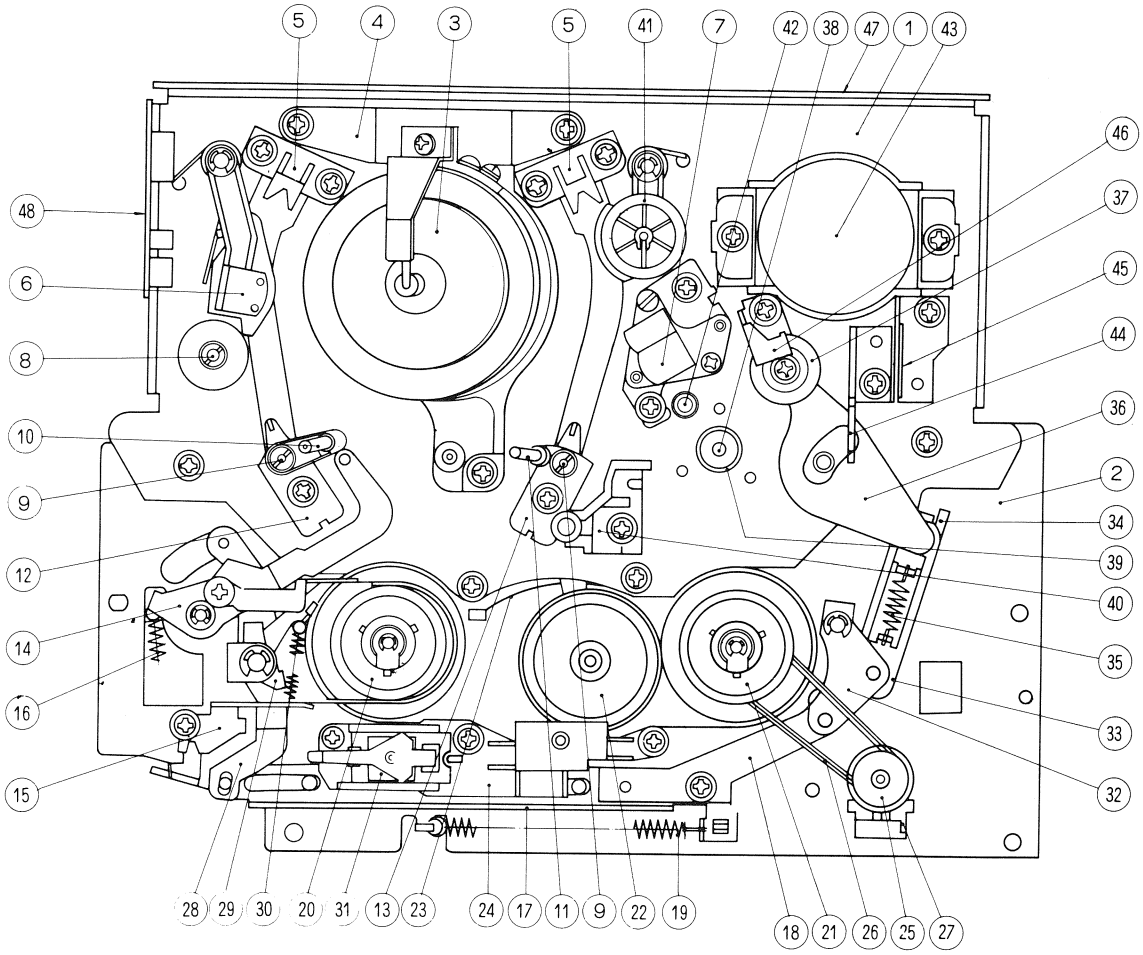


7-5: BLOCK DIAGRAM SERVO CIRCUIT



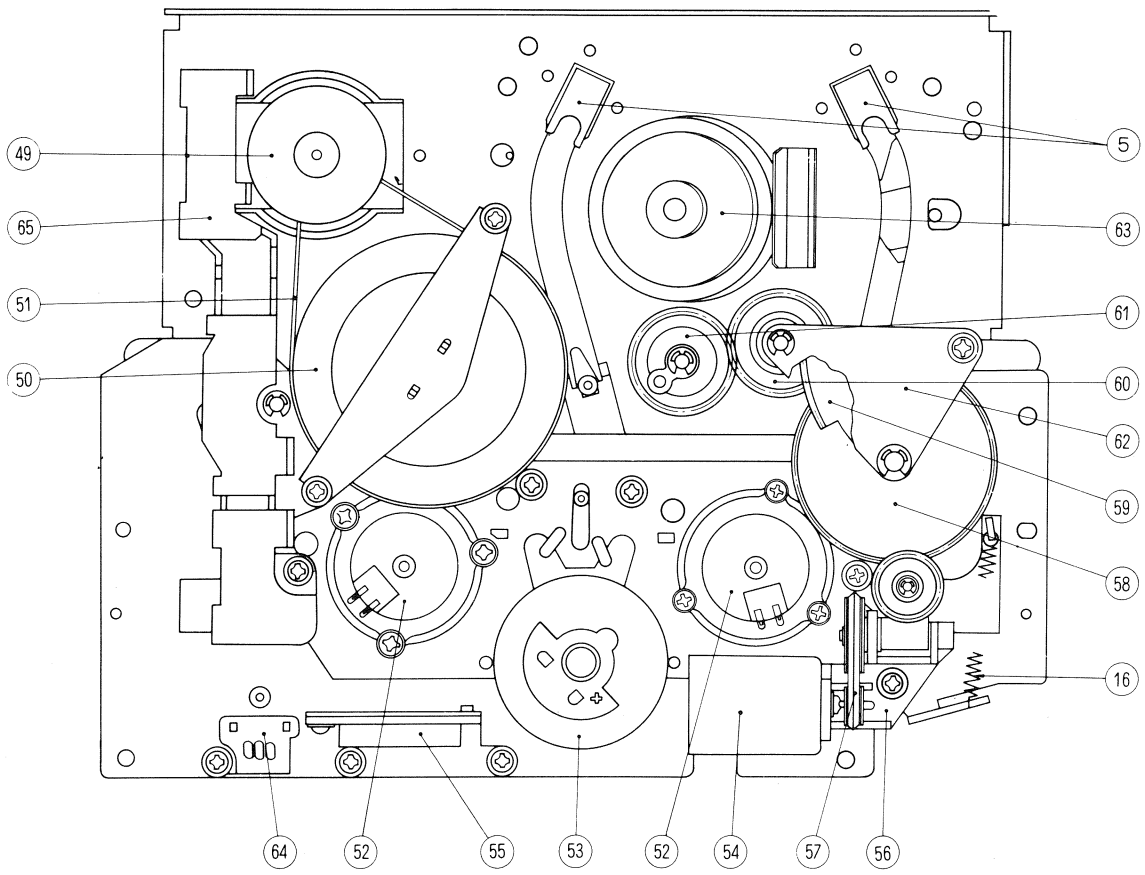
Section 8: MECHANICAL SYSTEM

8-1: LOCATION OF MECHANICAL PARTS



Mechanical Section (Upper)

No.	Part Name	No.	Part Name
1	Chassis A	19	Shifter spring
2	Chassis B	20	Supply reel disk
3	Drum	21	Take-up reel disk
4	V base	22	Reel idler
5	V block (take-up side/supply side)	23	Reel idler spring
6	Full-erase head	24	Cassette down switch holder
7	A/C head	25	Reel pulser
8	Supply impedance roller	26	Counter belt B8010
9	Guide roller (take-up side/supply side)	27	Reel sensor
10	Supply slant pole	28	Shifter arm
11	Take-up slant pole	29	Auxiliary brake
12	Pole base A	30	Auxiliary brake spring
13	Pole base B	31	Cassette down switch
14	Tension arm	32	Pinch roller drive lever
15	Tension band ass'y	33	Pinch roller reciprocating lever (U)
16	Tension arm spring	34	Pinch roller reciprocating lever (L)
17	Shifter A	35	Pinch roller pressure spring
18	Shifter B		



Motor Section (Lower)

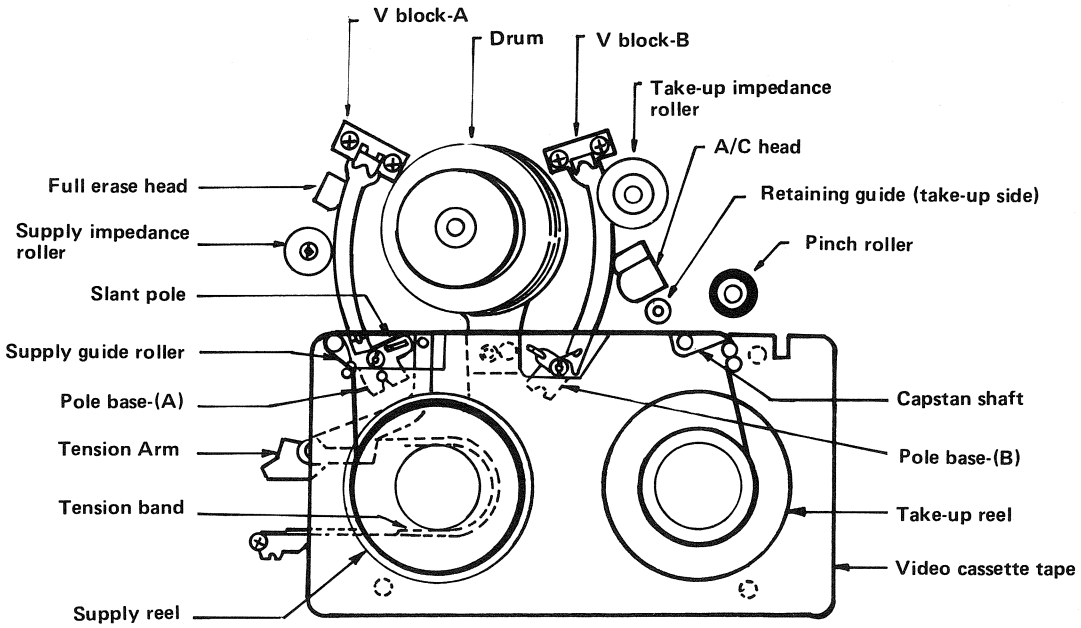
No.	Part Name	No.	Part Name
36	Pinch roller lever	51	Capstan belt
37	Pinch roller	52	Reel brake unit
38	Capstan shaft	53	Reel motor
39	Capstan holder	54	Loading motor
40	Cassette lamp	55	Slide switch
41	Take-up impedance roller	56	Loading block
42	Retaining guide	57	Loading belt
43	Capstan angle	58	Master cam
44	Open angle	59	Segment gear
45	Dew sensor	60	Loading gear A
46	Tape entanglement preventive angle	61	Loading gear B
47	Mechanism relay PWB	62	Loading gear plate
48	DPG relay PWB	63	Drum direct drive motor
49	Capstan pulley	64	Reel sensor PWB
50	Capstan flywheel	65	Leads holder

8-2: MECHANICAL FUNCTIONS

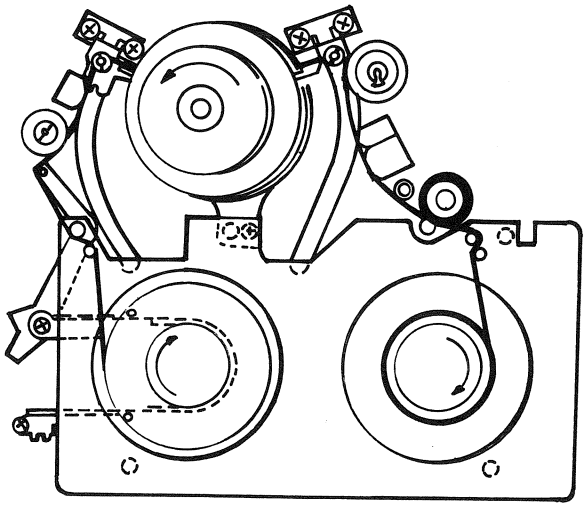
- Loading the cassette:
  When a cassette is placed in the cassette housing it is automatically loaded by the cassette loading motor. At that time, the capstan, tension pole, guide roller (attached to the pole base) and slant pole maintain their original position unless any operation keys are pressed.
- Loading (in PLAY/REC mode):
  When the PLAY or REC key is pressed, the loading motor begins to rotate causing rotation of the master cam, and the loading of the tape starts. The tape is brought out of the cassette and enters the machine, towards the drum by means of the take-up and supply guide rollers and the take-up and supply slant poles (attached to the pole base A and B). At the same time, the tension pole begins to move to the left, while the pinch roller moves toward the capstan. Eventually the guide roller and slant pole will be locked in the V-block. The loading motor continues to rotate and the pinch roller is pressed against the capstan. The slide switches (COMMON and NO. 2) that have been in the "off" position are changed to the "on" position stopping the loading motors rotation. When the loading process is concluded, the tape starts to play (or record).
- Unloading:
  While the unit is in PLAY or REC mode, pressing STOP, CASSETTE EJECT, FAST FORWARD or REWIND key initiates unloading procedures. The loading motor starts to rotate in a reverse direction, the pole base (A and B) comes off the V-block (A and B) and returns to its stop position. At the same time the tape goes back to its stop position together with the take-up or supply guide roller, and the take-up or supply slant pole.
  Finally the slide switches (COMMON and NO. 1) change from "OFF" to "ON" and the unloading process is completed.
  After completing the unloading, the unit establishes mode corresponding to the key which has been pushed during PLAY (or RECORD) mode. Unloading also occurs when the tape end (trailer tape) is detected by the end sensor.
- Rewind mode: (REW)
  When the REWIND key is pressed, the reel motor begins rotating in a counterclockwise direction. The reel idler is forced to contact the supply reel disk to rewind the tape.
- Fast forward mode: (FF)
  When the FAST FORWARD key is pressed, the reel motor begins rotating in a clockwise direction. The reel idler is forced to contact the take-up disk to fast forward the tape.
- Auto stop operation:
  In RECORD, PLAY, FAST FORWARD or REWIND MODE, when the end of the tape is reached, the photo detector senses the end of the tape and stops the machine. If the auto stop operation is not functioning correctly, the tape will break.
- Pinch roller operation:
  After the pole base A (or B) completes its loading action, the loading motor continues to rotate, rotating the master cam, so that the pinch roller is forced to contact the capstan shaft, delivering the tape to the take-up reel disk. With this motion, the reel idler is forced against the take-up reel disk causing it to rotate so that the take-up reel disk pulls the tape into the cassette. Should the contact between the reel idler and take-up reel disk be poor, the tape delivered by the pinch roller and capstan shaft will slacken and not enter the cassette completely, resulting in a broken tape.

- V/S-REW (Video Search Rewind) Mode
  In PLAY mode, when the REWIND-PLAY KEY is pressed, the loading motor rotates in a reverse direction until the slide switches (COMMON (C) and NO. 3) are changed from the "ON" to "OFF" position, causing the master cam to rotate in a reverse direction. With the master cam in rotation, the tension arm moves back, the pinch roller contact is released, the reel motor rotates in reverse direction and the supply reel disk is allowed to rotate. With these actions, tape slackness due to the tension arm and pinch roller is eliminated.
  The reel motor rotates in reverse direction 5 times faster than the normal speed, and the supply reel disk rotates to take up the tape. In order to cancel the video search rewind mode, press the REWIND key again or the PLAY key. The unit then returns to in play mode.
- V/S-FF (Video Search Fast Forward) Mode
  In play mode, when the FAST FORWARD-PLAY key is pressed, the loading motor rotates in a reverse direction until the slide switches (COMMON (C) and NO. 3) are changed from the "ON" to "OFF" position, causing the master cam to rotate in a reverse direction. With the master cam in rotation, the tension arm moves back, the pinch roller contact is released, the reel motor rotates in reverse direction and the supply reel disk is allowed to rotate. With these actions, tape slackness due to the tension arm and pinch roller is eliminated.
  The reel motor rotates in a normal direction and the reel idler is placed in contact with and drives the take-up reel hub.
  At that time, the reel motor rotates in normal direction 5 times faster than the normal speed, and the take-up reel disk takes up the tape.

TAPE LOADING SYSTEM



• STOP Mode



• RECORD/PLAY Mode

8-3: MECHANICAL ADJUSTMENTS

REMOVAL AND REPLACEMENT OF THE CASSETTE CONTROL ASSEMBLY

- Removal

  Remove the two screws from the Y/C P.W.B. and lift it up.

  Remove the front panel.

  1. With the cassette tape in the loaded mode remove the two screws from the cassette down guide, and take the guide out.
  2. Push the cassette eject button, and remove the cassette from the housing.
  3. Pull out the connector at the left of the cassette housing. Be careful not to damage the leads.
  4. Remove the four red screws from the cassette compartment assembly, and pull the assembly upwards.

- Replacement

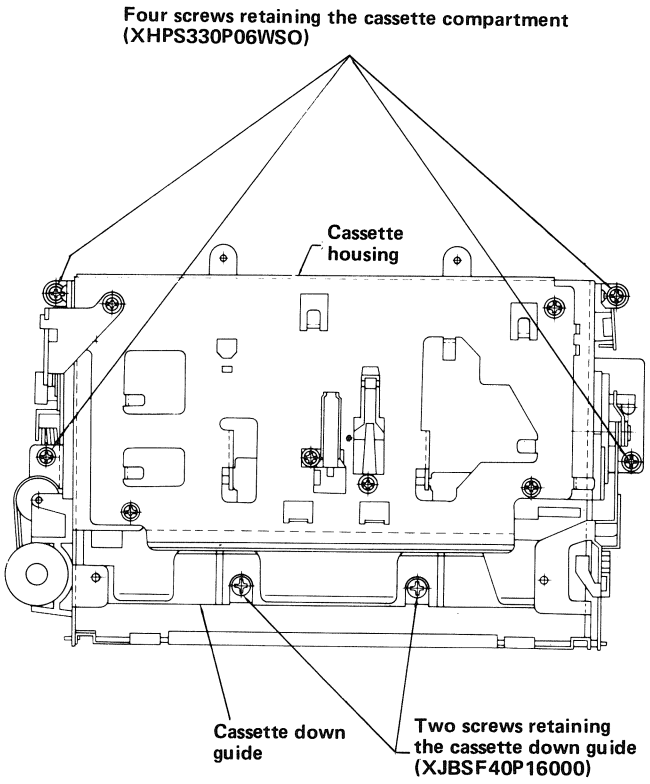
  1. Set the cassette housing in place, and secure it with four red screws (XHPS330P06WSO).
  2. Connect the connector at the left of the cassette housing.
  3. Set the cassette down guide in place, and secure it with two screws (XJBSF40P16000).

- Cautions on Removal and Replacement

  1. When removing the cassette compartment assembly lift it out straight, do not hit the main chassis components – the guide pin, etc.
  2. The cassette down guide must be fastened to both sides of the housing.
  3. Prior to removing or replacement of the cassette compartment assembly, be sure to disconnect or connect the connector.

TO RUN A TAPE WITHOUT THE CASSETTE HOUSING

1. Open the lid of a cassette tape by hand and hold it open with a piece of tape.
2. Set the cassette tape in the tape mechanism. Then, stabilize the cassette tape with a weight (500g or less).



REMOVAL AND HEIGHT ADJUSTMENT OF THE REEL DISKS

Removal:

Supply reel disk:

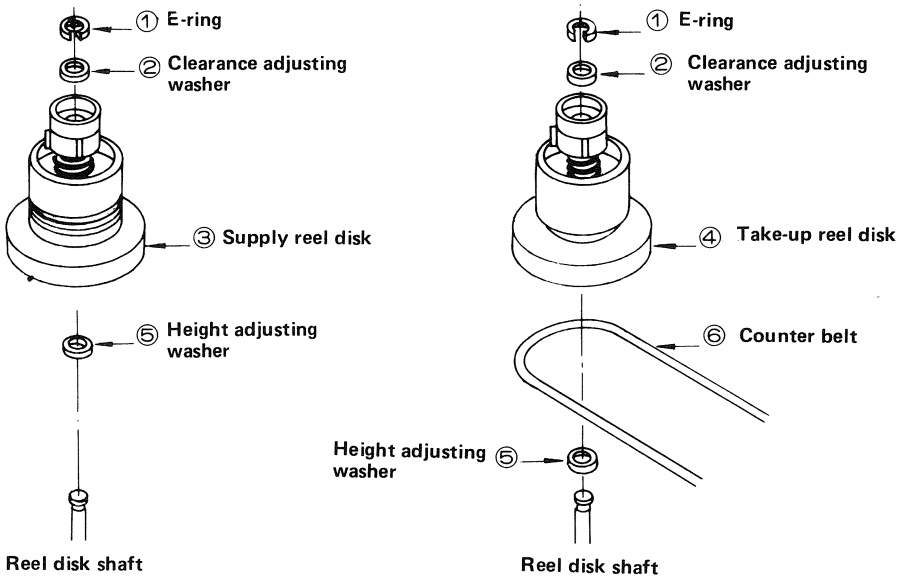
1. Remove the tension band.
2. Remove the E-ring ①.
3. Remove the clearance adjustment washer ②.
4. Pull the supply reel disk ③ upwards, and replace.

Take-up reel disk:

1. Remove the counter belt ⑥.
2. Remove the E-ring ①.
3. Remove the clearance adjusting washer ②.
4. Pull the take-up reel disk ④ upwards, and replace.
   At the time, remove the height adjusting washer ⑤ and clean it.

NOTES:

1. After replacing either of the reel disks, be sure to perform the height adjustment Procedure.
2. Take care, not to damage the tension band.
3. Be careful not to deform the auxiliary brake lever.
4. Check the tension pole position.
5. Check that the reel disk rotates smoothly if moved by hand.



Replacement of the
Supply reel disk:

1. Clean the reel disk shaft, and set the height adjusting washer ⑤.
2. Place the new supply reel disk on the shaft.
3. Adjust the reel disk height by using the master plane and reel height adjusting jig. (JIGMA0001)
4. Take the new supply reel disk off, apply oil to the reel disk shaft and place the disk onto the shaft.
5. Place the clearance adjusting washer ② onto the shaft – the reel disk thrust play must be 0.1 to 0.5mm.
6. Replace the E-ring ①.
7. Replace the tension band.

Take-up reel disk:

1. Clean the reel disk shaft, and set the height adjusting washer ⑤.
2. Place the new take-up reel disk onto the shaft.
3. Adjust the reel disk height by using the master plane and reel disk height adjusting jig. (JIGMA0001)
4. Take the new reel disk off, apply oil to the reel disk and place the disk onto the shaft.
5. Place the clearance adjusting washer ② onto the shaft – the reel disk thrust play must be 0.1 to 0.5mm.
6. Replace the E-ring ①.
7. Replace the counter belt ⑥.

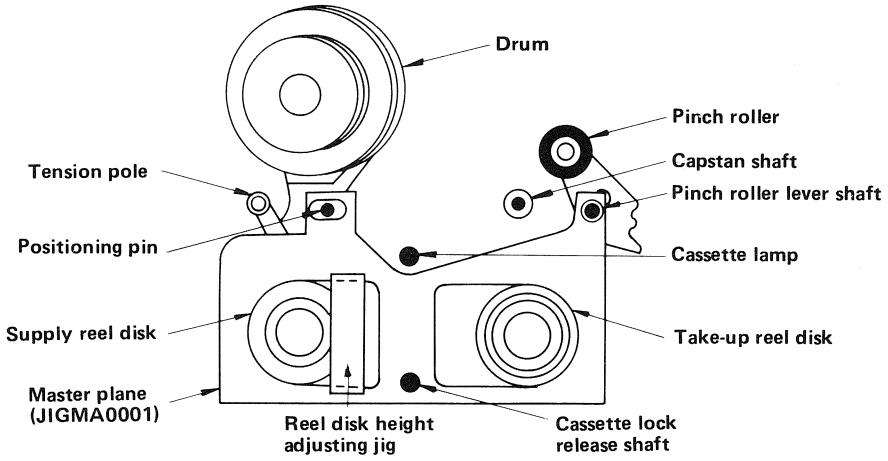
NOTES:

1. Take care not to damage the reel shaft's surface with the E-ring and tools.
2. Check that the tape back tension in the Video Search mode is normal – refer to the description on page 117.
3. Check that the reel disk rotates smoothly if moved by hand.

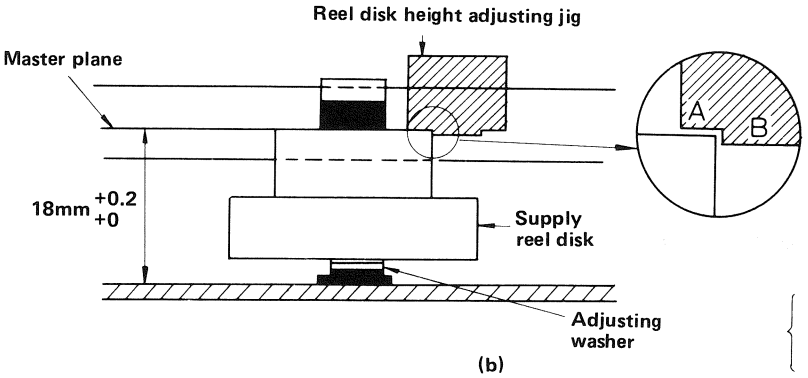
HEIGHT ADJUSTMENT

1. Remove the cassette housing, and place the master plane onto the mechanical unit as shown in Fig. (a). Be careful not to hit the head drum.
2. Insure that the reel disk is lower than the part "A" but higher than the part "B" of Fig. (b), by using the reel disk height adjusting jig. If the height is not correct use the height adjusting washers. These washers are available in three sizes (3.1W5.4-0.5), (3.1W5.4-0.25) and (3.1W5.4-0.13). Looseness in backlash on the shaft should not exceed 0.1 to 0.5mm.

   NOTE: Whenever replacing the reel disk, perform the height adjustment.



(a)



(b)

		Part No.
3.1W5.4	0.5	XWHJ31-05045
	0.25	WXHJ31-02045
	0.13	XWHJ31-01054

ADJUSTMENT OF THE FAST FORWARD TORQUE

NOTES:

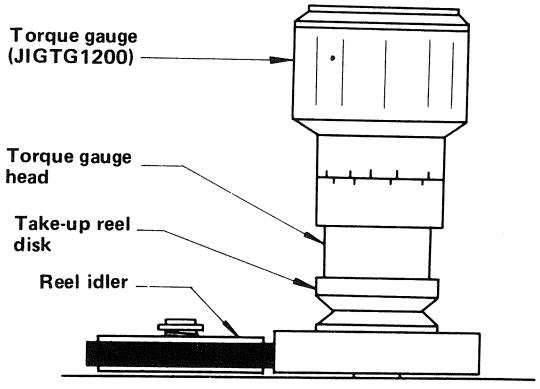
1. The torque gage can easily slip off the reel disk when the spindle starts rotating.
2. Perform the check without using a cassette tape.

Checking

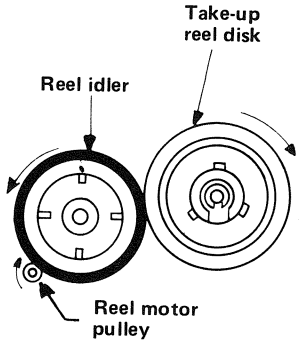
1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Set the torque gage on the take-up reel disk and press the fast forward button.
3. Turn the torque gage very slowly (one rotation every 2 to 3 seconds) until it indicates a little more than 800 gr.cm, then check that there is no slippage between the reel idler, reel motor pulley or take-up reel disk.

Adjustment

If the fast forward torque is less than 800 gr.cm, use cleaning liquid to clean the reel motor pulley, reel idler and take-up reel disk, than recheck the torque.



(a)



(b)

ADJUSTMENT OF THE REWIND TORQUE

NOTES:

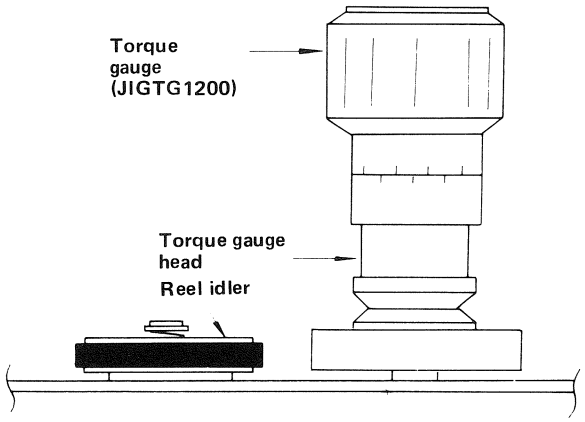
1. The torque gage can easily slip off the reel disk when the spindle starts rotating.
2. Perform this check without using a cassette tape.

Checking

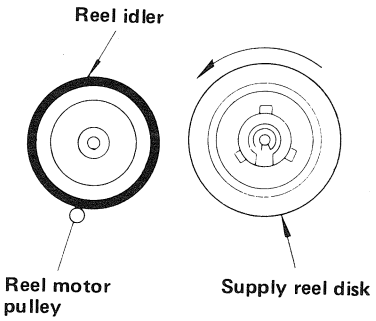
1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Set the torque gage on the supply reel disk and press the rewind button.
3. Turn the torque gage very slowly (one rotation every 2 to 3 seconds) until it indicates a little more than 800 gr.cm. Check that there is no slip between the reel idler, reel motor pulley or supply reel disk.

Adjustment

If the rewind torque is less than 800 gr.cm, use a cleaning liquid to clean the reel motor pulley, reel idler and supply rees disk, then recheck the torque.



(a)



(b)

ADJUSTMENT OF THE PLAYBACK TORQUE

Checking

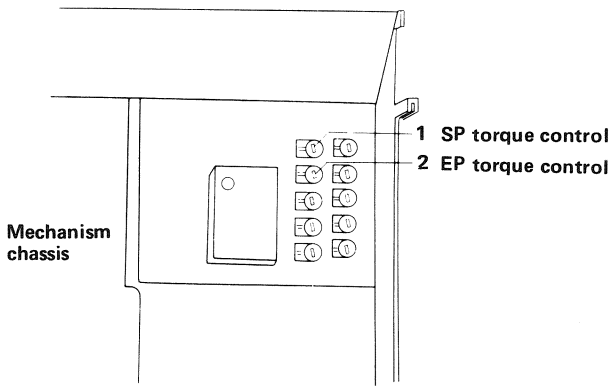
1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Place the torque gauge (JIGTG1200) on the take-up reel disk, and turn it at the speed of one rotation every 6 seconds in the standard (SP) Play Mode and at the speed of one rotation every 20 seconds in the case of the extended (EP) Play Mode. In both cases, check that the torque is the specified value SP-185 ± 15gm, EP-160 ± 30gm.

NOTES:

1. The torque control circuits for the standard play mode and the extended Play Mode are separate. Adjustments for each mode is necessary.
2. The measured torque varies slightly with the rotational deviation of the motor: the average value indicated should be as follows:

Adjustment

1. If the playback torque is outside the range of 160 to 185 gr.cm., correct it by using the SP torque control pot or the EP torque control pot.
2. In the standard Play Mode the SP torque control 1 shown.
3. In the extended Play Mode the EP torque control 2 shown.



CHECKING THE FAST FORWARD BACK TENSION

NOTES:

1. Set the torque gauge securely on the reel disk; otherwise the torque gauge will be loose above the reel disk resulting in an inaccurate measurement.

Checking

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Push the Fast Forward button to place the unit in the Fast Forward mode.
3. Place the torque (JIGTG0090) gauge on the supply reel disk, turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 10 to 35 gr.cm.

CHECKING THE REWIND BACK TENSION

NOTES:

1. Set the torque gauge securely on the reel disk; otherwise the gauge will loosen resulting in an inaccurate measurement.

Checking

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Push the rewind button to place the unit in the rewind mode.
3. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is below 15 gr.cm (specified range).

CHECKING THE VS (VIDEO SEARCH) FAST FORWARD BACK TENSION

NOTES:

1. Preform this check after adjusting the position of the tension arm.
2. Set the torque gauge on the reel disk securely, otherwise the gauge will loosen resulting in an inaccurate measurement.
3. If the VS Fast Forward back tension is outside the specified value (below 15 gr.cm), adjust the auxiliary brake spring. Then recheck the back tension.

Checking

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Push the button to place the unit in playback mode.
3. Push the VS Fast Forward button to place the unit in the VS mode, and check that the auxiliary brake acts on the supply reel disk.
4. Set the torque (JIGTG0090) gauge on the supply reel disk, turn it slowly (by one rotation every 2 to 3 seconds) and check that the torque is 10 – 20 g.cm.

CHECKING OF VS (VIDEO SEARCH) REWIND BACK TENSION

NOTES:

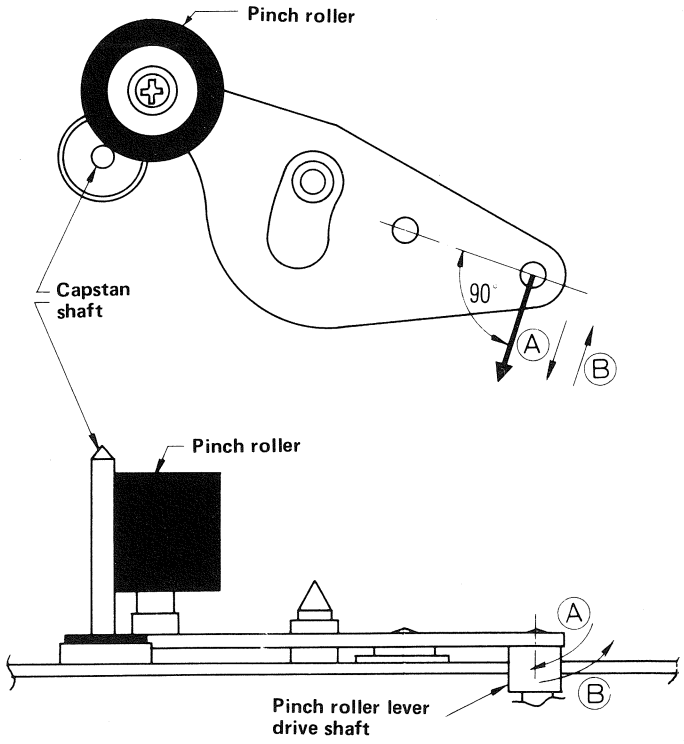
1. Set the torque gauge on the reel disk securely, otherwise the gauge will loosen resulting in an inaccurate measurement.
2. The VS rewind back tension refers to the rewind back tension. If this adjustment has been completed the following adjustment is not required.

Checking

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Push the play button to place the unit in playback mode.
3. Push the VS rewind button to place the unit in the VS rewind mode.
4. Set the torque (JIGTG0090) gauge on the take-up reel disk, turn it slowly (by one rotation every 2 to 3 seconds) and check that the torque is 10 – 20 g.cm.

CHECKING THE PINCH ROLLER PRESSURE

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Push the play button to get the unit in the playback mode.
3. Using a tension (JIGSG5000) gauge, push the pinch roller in the direction of arrow Ⓐ so the pinch roller moves away from the capstan.
4. Gradually release the pressure to allow the pinch roller to touch the capstan. When the pinch roller just touches the capstan, read the indication on the gauge.
5. Check that the reading of the spring scale is at the specified range of 1900 to 2740 gr.cm.



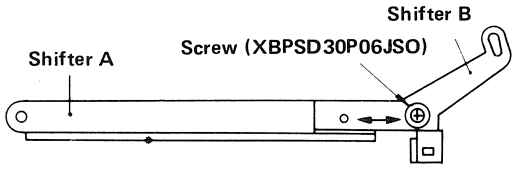
ADJUSTMENT OF THE CLEARANCE BETWEEN THE CAPSTAN SHAFT AND THE PINCH ROLLER IN THE PAUSE MODE

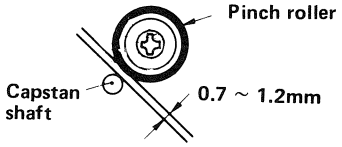
Checking

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Push the record button to place the unit in the record mode.
3. Push the pause button to place the unit in the pause mode.
4. Check that the clearance between the pinch roller and capstan shaft is within 0.7 – 1.2mm.

Adjustment

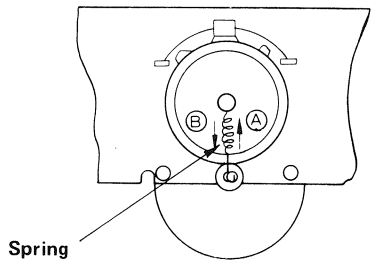
1. If the clearance between the pinch roller and capstan shaft is outside the specified value, loosen the screw (XBPSD30P06JS0) which retains the shifters A and B. Correct the clearance by moving the shifters.
2. After the correction, apply lock-tite to the screw (XBPSD30P06JS0).

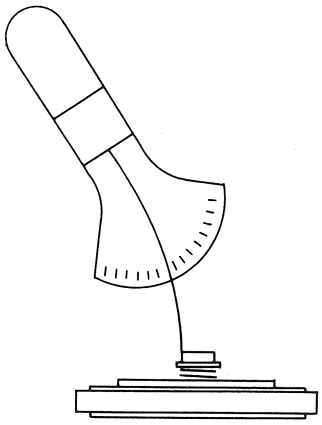




CHECKING THE REEL IDLER PRESSURE

1. Remove the cassette housing.
2. Place the reel idler in its center position as shown.
3. Using a tension gauge, push the reel idler in the direction of arrow Ⓐ, so that the reel idler moves away from the reel motor pulley.
4. Release the force gradually in the direction of arrow Ⓑ, so that the reel idler hits the reel motor pulley again. Check that the reading of the tension (JIGSG0300) gauge is 120 – 170 gr.




Use of tension gauge

ADJUSTMENT OF THE TENSION POLE

Position checking

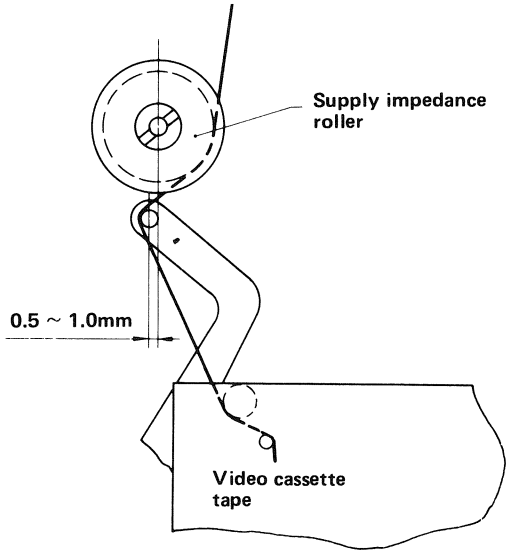
1. Remove the cassette housing.
2. Load a video cassette tape and push the play button to place the unit in the playback mode.
3. The pole bases A and B operate to bring the tape outside the cassette housing and simultaneously the tension pole moves to the left, loading the tape. At that time, check the position of the tension pole.
4. At the end of the tape (T120), check that the tension pole's center is 0.5 to 1.0mm to the left of the supply impedance roller's center.
5. Check that the tape is not curled against the flange of the supply impedance roller.
6. During the video search mode, check that the reel disk is free of the tension band.

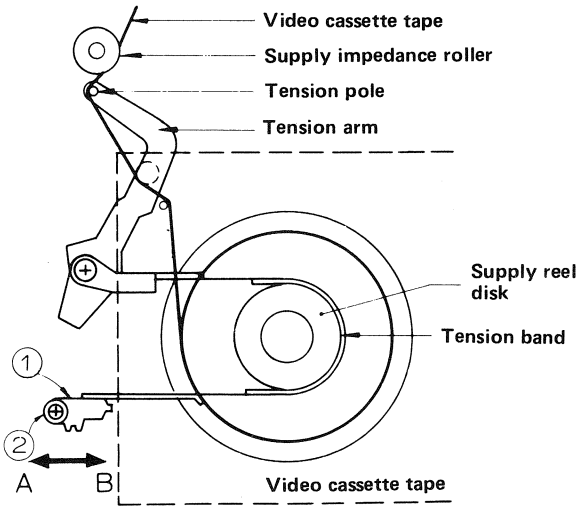
Position adjustment

1. If the tension pole is less than 0.5mm to the left of the supply impedance roller's center, shift the tension band control angle ① in the direction of arrow B, and tighten the screw ②.
2. If the tension pole is more than 1.0mm to the left of the supply impedance roller's center, shift the tension band control angle ① in the direction of arrow A, and tighten the screw ②.

NOTES:

1. After the adjustment, apply lock-tite to the screw.
2. Do not tighten the screw too tight.

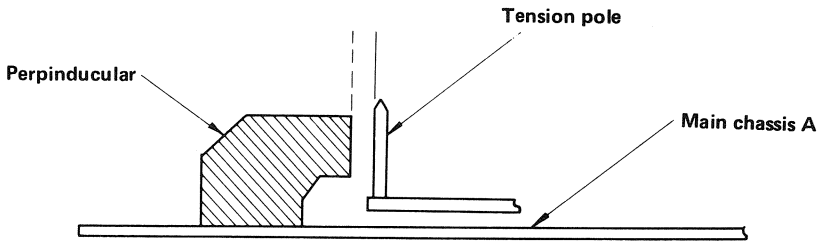




VERTICAL ADJUSTMENT OF TENSION POLE

Vertical check

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Set the retaining guide height-adjusting jig (JIGGH0110) as shown.
3. Check that of the tension pole is perpendicular (90°) to the main chassis.

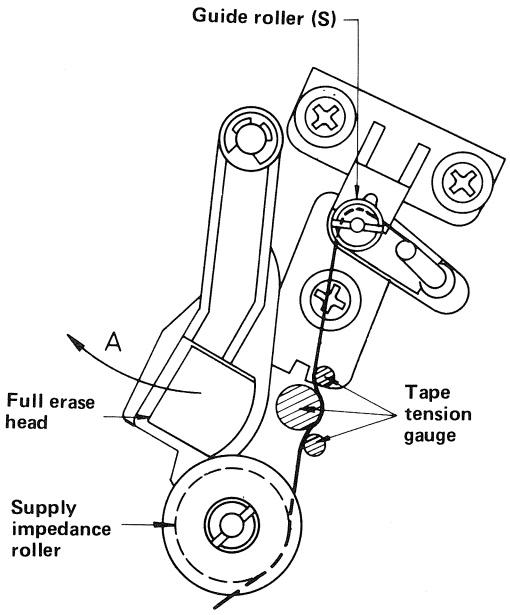


ADJUSTMENT OF THE RECORD/PLAYBACK TENSION

Checking

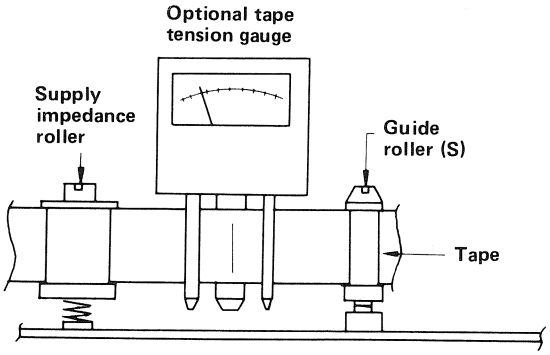
A. When using a back tension measuring cassette tape: (JIGBT0007)

1. Remove the cassette housing, and hold the cassette down switch with tape.
2. Insert the back tension measuring cassette into the unit.
3. Push the record button to place the unit in record mode. Check that the reading of the cassette tape's pointer is 50 to 57 gr.cm.
4. Make sure the video cassette tape is wound over the retaining guide.
5. Make sure that the tape is not slack or damaged at either end.



B. When using a tape tension gauge:

1. Remove the cassette housing.
2. Put a video cassette tape (T-120) into the unit.
3. Push the record button to place the unit in record mode.
4. Pull the full erase head in the direction of arrow A as shown place a tape tension gauge as shown and check that the tape tension indicated by the gauge is 23 to 28 gr.
5. Check that the video cassette tape is wound over the supply impedance roller.
6. Make sure that the tape is not slack nor damaged at either end.

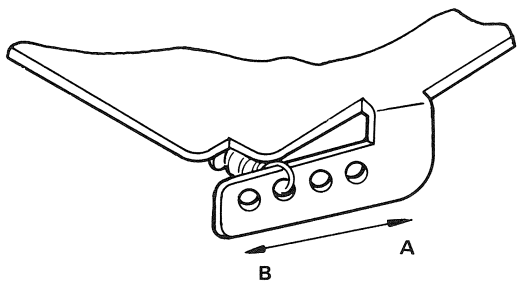


NOTES:

1. Be careful not to allow the tape tension gauge to touch the full erase head or head drum.
2. When using a back tension measuring cassette tape, correct its tension beforehand by using the tape tension gauge.

Adjustment

1. If the reading is below the specified value (23 to 28 gr.), change the hook position of the spring towards A.
2. In case the reading is over the specified value (23 to 28 gr.), change the hook position of the spring towards B.
3. After the adjustment, apply adhesive to the spring hook to secure it.



CHECKING THE REEL BRAKE TORQUE

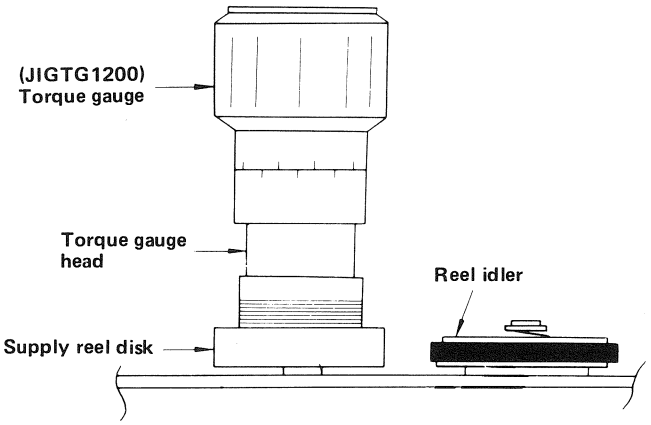
Checking the medium brake torque at the supply reel disk.

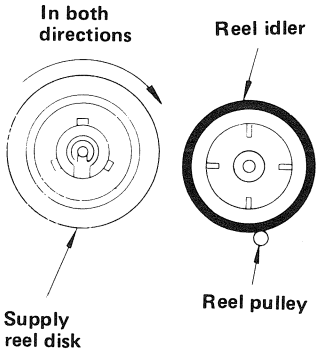
NOTES:

1. The medium brake torque must be checked before checking the strong brake torque.
2. The brake torque must be checked in less than 10 seconds after the power cord is plugged in.
3. The brake torque must be checked while turning the supply reel disk in both directions (clockwise and counterclockwise).
4. The specified medium brake torque is over 100 gr.cm and less than half of the strong brake torque at the take-up reel disk.

Checking

1. Remove the cassette housing.
2. Unplug the power cord, and short the junction of R801 and R803 to ground. After checking, remove the short.
3. Separate the reel idler from the supply reel disk, and place the torque gauge on the supply reel disk.
4. Plug in the power cord.
5. Turn the torque gauge very slowly (one rotation every 2 to 3 seconds), and check that the brake torque is over 100 gr.cm.





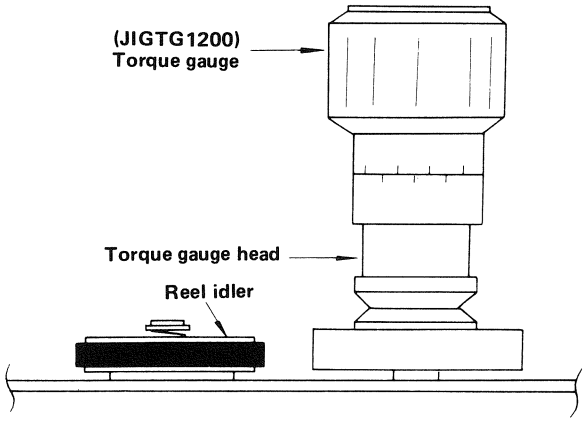
Checking the medium brake torque at the take-up reel disk.

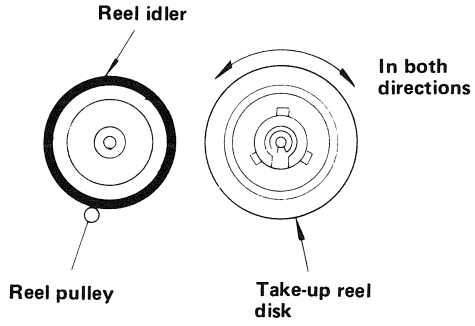
NOTES:

1. The medium brake torque must be checked before checking the strong brake torque.
2. The brake torque must be checked in less than 10 seconds after the power cord is plugged in.
3. The brake torque must be checked while turning the take-up reel in both directions (clockwise and counterclockwise).
4. The specified medium brake torque is over 100 gr.cm and less than half of the strong brake torque at the supply reel disk.

Checking

1. Remove the cassette housing.
2. Unplug the power cord, and short the junction of R802 and R804 to ground. After checking, remove the short.
3. Separate the reel idler from the take-up reel disk, and set the torque gauge on the reel disk.
4. Plug in the power cord.
5. Turn the torque gauge very slowly (one rotation every 2 to 3 seconds), and check that the brake torque is over 100 gr.cm.





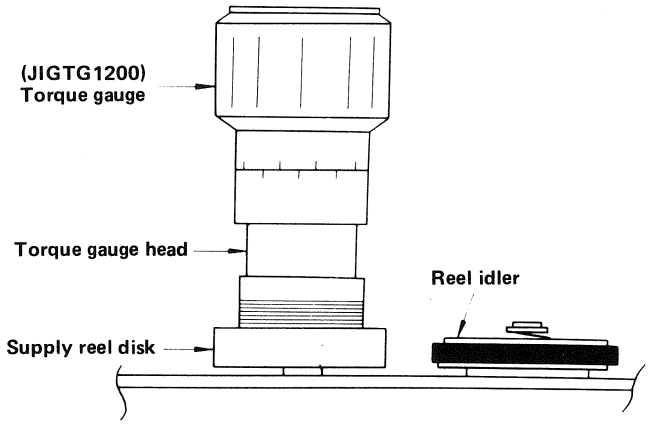
Checking the strong brake torque at the supply reel disk.

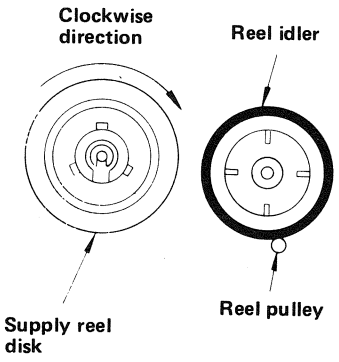
NOTES:

1. The strong brake torque must be checked in less than 10 seconds after the power cord is plugged in.
2. The strong brake torque must be checked after checking the medium brake torque.

Checking

1. Remove the cassette housing.
2. Unplug the power cord, and short pin 5 of connector AA to ground. After checking, remove the short.
3. Separate the reel idler from the supply reel disk, and set the torque gauge on the reel disk.
4. Plug in the power cord.
5. Turn the torque gauge clockwise very slowly (one rotation every 2 to 3 seconds), and check that the brake torque is over 300 gr.cm: it should be greater than twice the medium brake torque at the take-up reel disk.





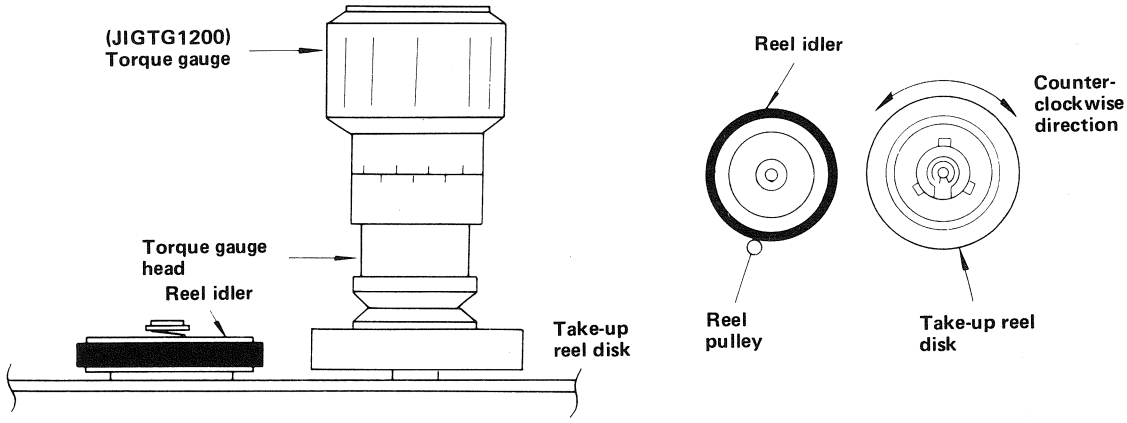
Checking the strong brake torque at the take-up reel disk.

NOTES:

1. The strong brake torque must be checked in less than 10 seconds after the power cord is plugged in.
2. The strong brake torque must be checked after checking the medium brake torque.

Checking

1. Remove the cassette housing.
2. Unplug the power cord, and short pin 6 of connector AA to ground. After checking, remove the short.
3. Separate the reel idler from the take-up reel disk, and set the torque gauge on the reel disk.
4. Plug in the power cord.
5. Turn the torque gauge counterclockwise very slowly (one rotation every 2 to 3 seconds), and check that the brake torque is over 300 gr.cm: it should be greater than twice the medium brake torque at the supply reel disk.



HEIGHT ADJUSTMENT OF THE SUPPLY IMPEDANCE ROLLER'S RETAINING GUIDE

Checking

With the unit in the play mode, check that the tape is neither bent nor winkled.

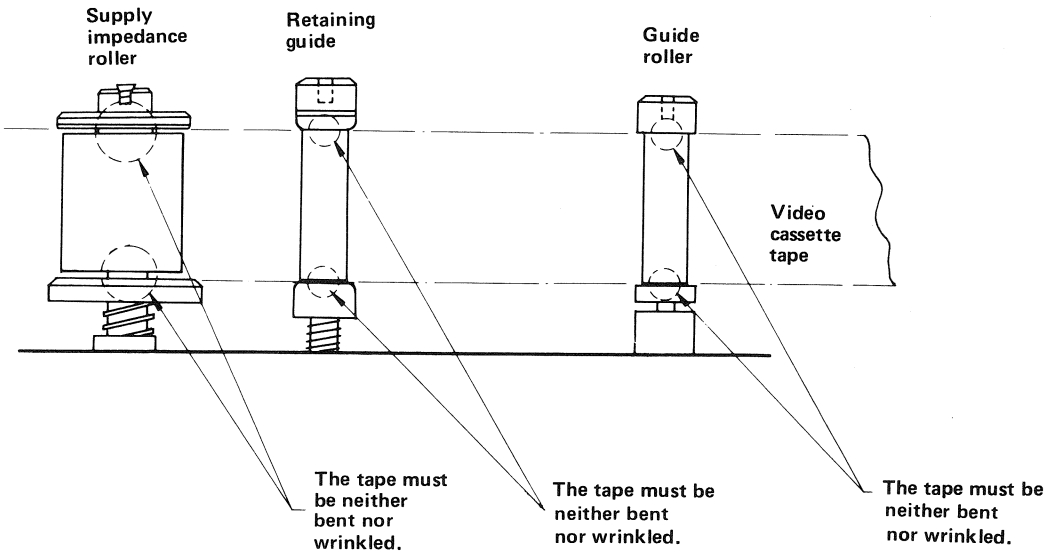
Adjustment

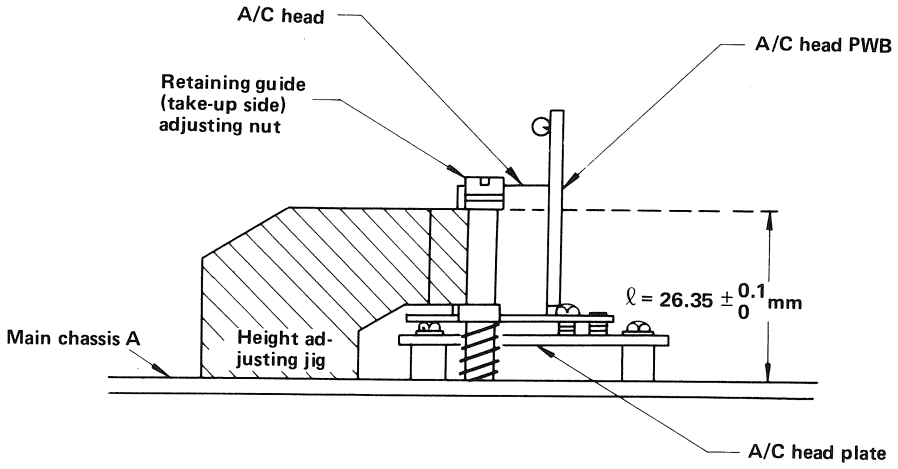
Adjustments in this area are generally not needed. Avoid making any unless absolutely necessary.

1. Place the guide height adjusting jig on the main chassis A as shown.
2. Slowly rotate the retaining guide adjusting nut with a slotted screw-driver so as to obtain the specified value ($1 = 26.35^{+0.1}_{0}$ mm).

NOTES:

1. After the adjustment, set a cassette tape in place, and see that the tape travels normally.
2. After the adjustment, let the tape run and again adjust the guide roller (take-up and supply sides). After the adjustment, refrain from moving the adjusting nut.





8-4: AUDIO & CONTROL TRACK HEAD REPLACEMENT & ALIGNMENT

NOTE:

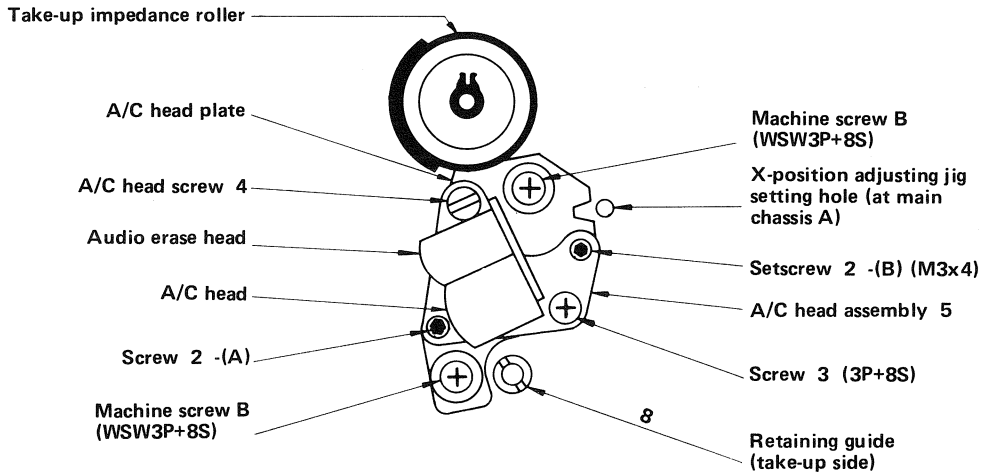
After replacement, check for smooth tape movement. Under all circumstances avoid touching the A/C head.

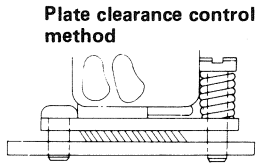
Replacement:

1. Unsolder the leads attached to the A/C head PWB and remove them from the PWB.
2. Loosen the two setscrews 2 by using a hexagon wrench.
3. Remove the screw 3 (3P+8S) with a phillips screwdriver.
4. Remove the A/C head screw 4 with a bladed screwdriver: pay attention to the spring 6 between the A/C head plate and A/C head assembly.
5. Remove the A/C head PWB from the AC head assembly.
6. Then, replace the A/C head assembly 5 with a new one.

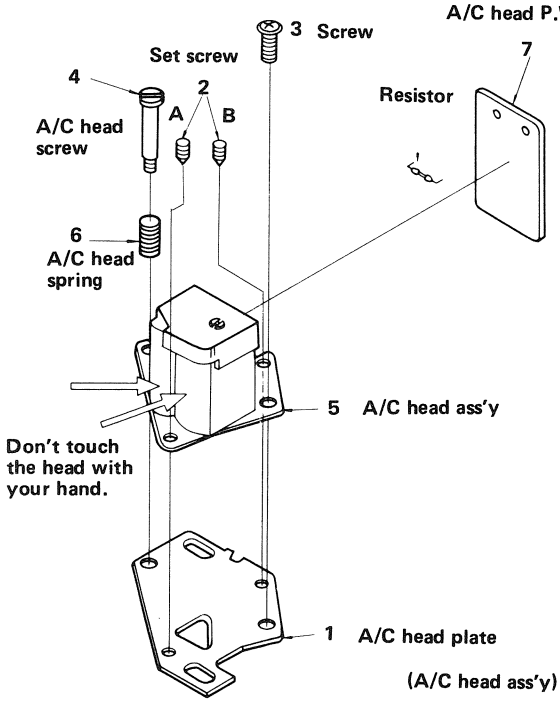
NOTE:

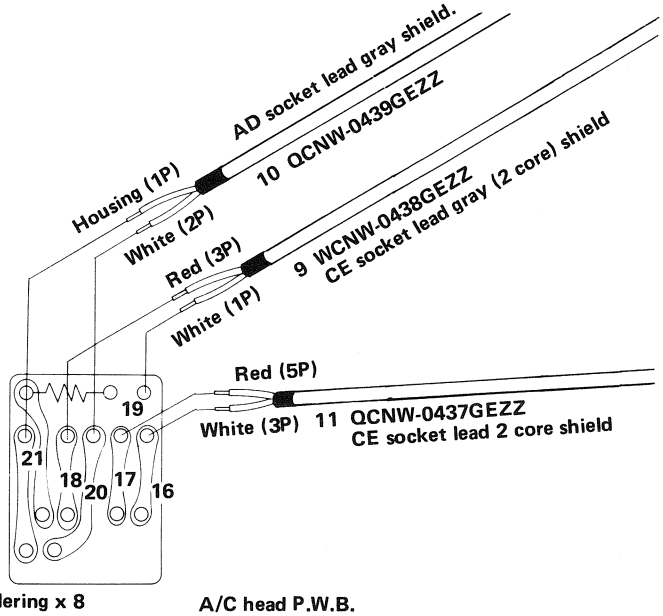
The A/C head includes the A/E head: for that reason. The entire assembly must be replaced.
After replacement, check for smooth tape movement.
Under all circumstances avoid touching the head.





Inserting a clearance gauge (1.6mm) into the marked position, adjust so that the marked portion is level.





HEIGHT AND TILT ADJUSTMENT OF A/C HEAD

Checking

1. Put a 120-minute tape in the unit, and push the play button.
2. Check that the tape is not curled against the flange of the retaining guide (take-up side).
3. See that the A/C head is positioned at the height and tilted, as shown.

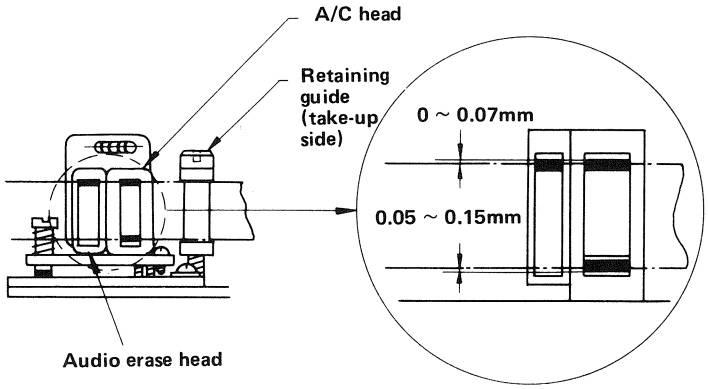
Adjustment

If alignment is required proceed with the following adjustment.

1. Use a 120-minute tape and play it back.
2. Insure that the tape is running normally without any twist between the guide roller and impedance roller (take-up side), between the impedance roller (take-up side) and retaining guide (take-up side), and between the retaining guide (take-up side) and capstan shaft.
3. Even a slight deviation of the tape running between the A/C head and retaining guide effects the reproduced picture: check that the tape is not curled by the flange of the retaining guide nor running over the flange.
4. If the tape is not running normal, adjust the screws 2 A and 2 B while turning them slowly.
   NOTE:
   During this adjustment, keep the retaining guide in its place.
5. The A/C head should be positioned with its height as shown with respect to the tape in motion.

As a result of the above adjustment, the tape should run normally. Now proceed with the fine adjustment using alignment tape.

1. Use the alignment tape to play back its audio 1KHz signal (color bar for video signal), and observe the output of TP-604 (with TP-605 grounded) of the Y/C audio PWB, on an oscilloscope.
2. Slowly rotate screws 2 A, 2 B, and 3 (3P+8S) so as to obtain the maximum audio output level (with the least variation).
3. Play back the audio 7KHz signal (stair-case waveform, for video signal) of the alignment tape, and observe the output of TP-604 (with TP-605 grounded) of the T/C audio PWB, on an oscilloscope.
4. Adjust the azlmuth adjusting screw 3 (3P+8S) so as to attain maximum audio output.
5. Check again that the tape is running normal.



TAPE RUNNING ADJUSTMENT

1. Use the master plane and reel disk height adjusting jig to check and adjust the reel disk height. (JIGMA0001)
2. Use the retaining guide height adjusting jig to check and adjust the height of the supply impedance roller and retaining guide. See Page 127.
3. Check and adjust the position and perpindicular of the tension pole by using the tension pole position adjusting jig. See Page 121.
4. Use a special-purpose (rough-adjustment) tape and play it back: roughly adjust the guide roller's height by using a bladed screwdriver. Allow the lower edge of the tape to run along the drum's lead. Then check that the tape is not curled at the flange of the take-up and/or supply guide roller. See Page 127.
5. Use a alignment tape to finely adjust the height of the guide roller so that the envelope of the reproduced output signal will be as flat as possible. Simultaneously, check flatness by rotation of the tracking knob. In addition, adjust it so as to have the switching point at "6.5H ± 0.5H". See page 146.
6. Adjust the height, tilting and azimuth of the A/C head.
7. Set the tracking knob at the "preset" position, slightly loosen the two machine screws B (WSW3P+8S) shown on page 128 to allow the X-position jig to be inserted into its setting hole, then adjust the A/C head position.
8. With a recording on a standard tape, check for the RF (FM) envelope flatness and audio output signal.
9. After the adjustment, apply screw-lock to the screws and nuts.

8-5: UPPER DRUM REPLACEMENT AND ALIGNMENT

Replacement

1. Remove the two screws ⑤ (3P+4S) with a phillips screwdriver.
2. Remove the video head lead holder plate ⑥.
3. Unsolder the two leads ① (yellow) and remove them.
4. Unsolder one lead ② (red) and remove it.
5. Unsolder one lead ③ (brown) and remove it.
6. Remove the two screws ④ (W3P+9S, with plain washer) with a phillips screwdriver.
7. Remove the upper drum and replace.

   NOTE:

   Avoid touching the drum surface.

Reassembly

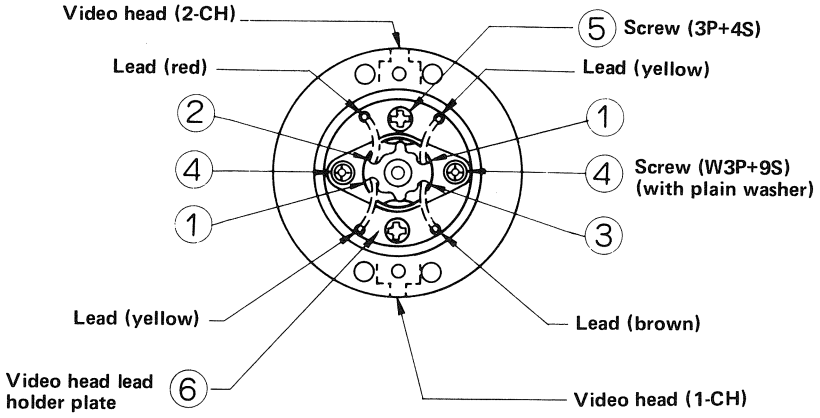
1. Set in place the new upper drum as shown, and position the leads.

   NOTE:

   Handle carefully the yellow/brown leads (CH-1) and yellow/red leads (CH-2)
2. Fasten the upper drum with the two screws ④.
3. Solder the leads ①, ② and ③ to their respective positions.

   NOTE:

   Perform the soldering as quickly as possible. The drum surface must be clean without dust, foreign matter etc.
4. Secure the video head lead holder plate ⑥ with the screws ⑤.
5. After the replacement, be sure to check tape running and the following.
   (1) Adjustment of playback switching point.
   (2) Adjustment of record switching point.
   (3) Checking of tracking preset.
   (4) Checking of tracking volume.
   (5) Checking of playback preamp adjustment.
   (6) Checking of FM channel balance.



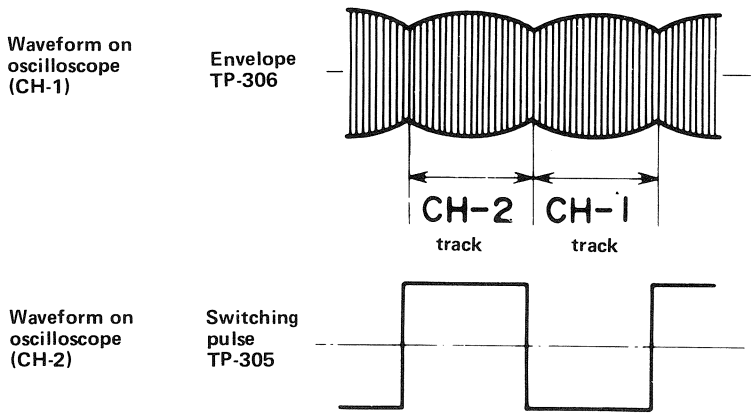
ADJUSTMENT OF GUIDE ROLLER

Cassette tape alignment:

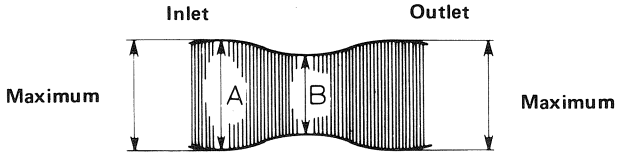
1. Remove the top cabinet.
2. Load an alignment tape in the cassette housing.
3. Connect the power supply cord, monitor output cord and video imput cord to their respective positions.
4. Connect one end "CH-1" of an oscilloscope to RF envelope output (TP-306) and another "CH-2" to the test-point of switching pulse (TP-305).
5. Push the play button to place the unit in play mode.

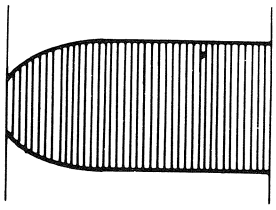
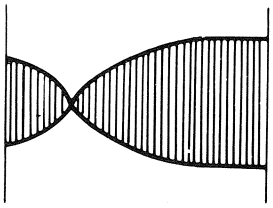
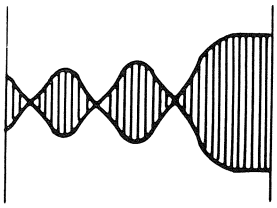
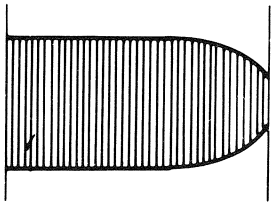
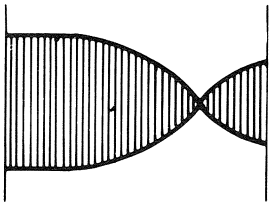
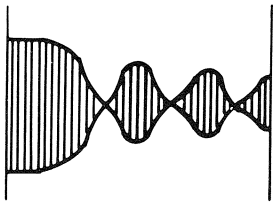
Fine adjustment:

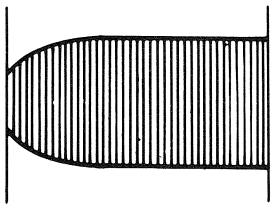
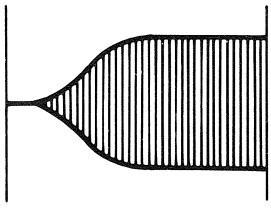
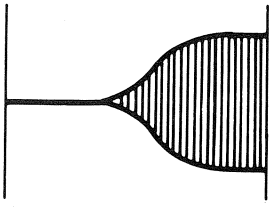
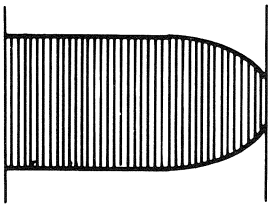
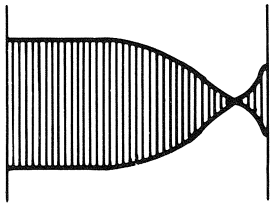
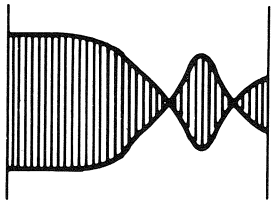
1. By using the bladed screwdriver (specialized for adjusting the guide roller), tighten the setscrew of the guide roller half its full turn, but as firmly as possible.
2. Triggering the output signal with switching pulse observe its envelope.
3. Looking at the envelope, adjust the height of the guide roller making the tape run along the drum lead. If the cassette tape is kept loose above, or close to the helical head position, the waveform envelopes will appear as shown.



4. Fine adjustment of the guide roller's height so the envelope is flat as possible. Check that the flatness is not affected with rotation of the tracking knob.
5. Check, by rotating the tracking knob, that the ratio of A to B is held at 10:7.
6. Perform the play switching adjustment, see instructions in the Electrical Adjustment section.
7. Place the unit in record, and record color bar signal, play it back and check that the envelope is flat.
8. After the adjustment, tighten the setscrew of the guide roller firmly.
9. Again, check the RF envelope.



Degree of Looseness	Slight	Greater	Extreme
Supply side (Drum's entry)			
Take-up side (Drum's outlet)			

Degree of Closeness	Slight	Greater	Extreme
Supply side (Drum's entry)			
Take-up side (Drum's outlet)			

8-6: REEL MOTOR REPLACEMENT

A. Removal

1. Remove the cassette housing.
2. Unsolder the leads at the reel motor terminal.
3. Remove the two screws (XHPSD30P10WSO) from the cassette down switch holder, and shift the cassette down switch holder slightly – being careful not to break the switch leads.
4. Supporting the reel motor by hand (from the rear of the chassis), remove the two screws ⑥ (XBPSD30P05J00) from the reel motor and detach it. The motor won't slip down when the reel idler ④ has been shifted to the right or left.

NOTES:

1. Note the polarity of each lead at the reel motor terminal.
2. Use only the specified screws testing the reel motor, or the motor will be damaged.
3. Even after removing the screws, the cassette down switch holder can not be removed because its leads are soldered. Undue force may break off the leads.

B. Assembly

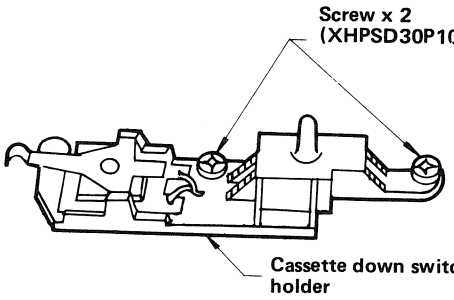
1. Check that the reel idler ④ is not off the reel shaft ①, and that the reel idler spring ⑤ is positioned correctly on the reel idler.
2. Set in place the new reel motor by using the two screws (XBPSD30P05J00), with the motor terminal facing the direction shown. Be careful, do not damage the reel motor pulley ⑦. If screws other than those specified are used the motor will be damaged.
3. Solder the leads to the reel motor terminal.
4. Clean the reel motor pulley, reel idler, supply reel disk and take-up reel disk with alcohol or tape head cleaner.
5. Reset the cassette down switch holder to its original position, and secure it with the two screws (XHPSD30P10WSO).
6. Check and adjust the fast forward torque, rewind torque and play torque, in accordance with the procedures in the sections, "Adjustment of fast forward torque, adjustment of rewind torque." and the "Adjustment of playback torque."

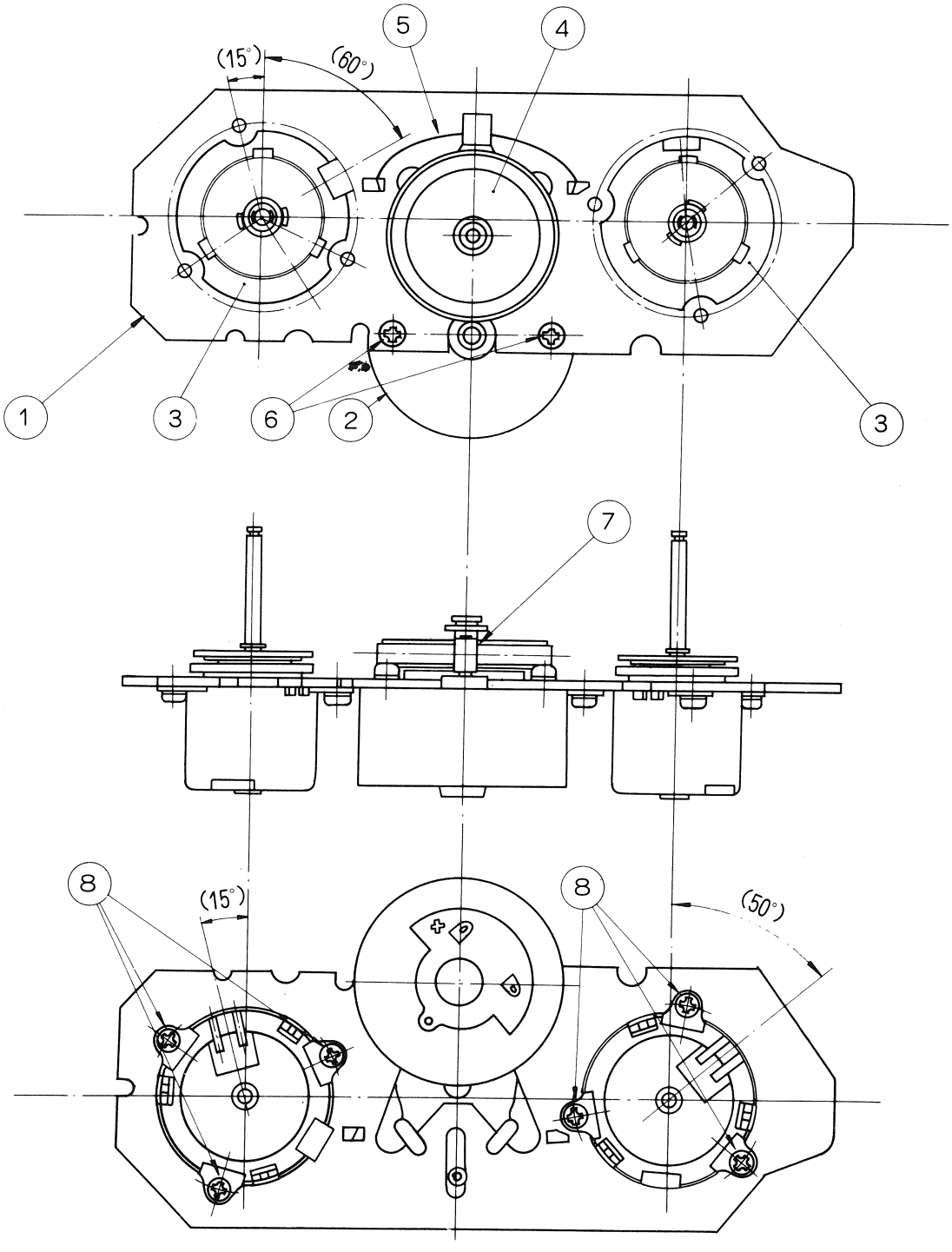
C. Replacement of Reel Idler

NOTES:

Replacement of the reel idler is possible even without unsoldering the leads at the reel motor terminal. The job must be done with care so as not to break the motor leads and not to damage the adjacent parts, such as the reel motor and reel motor pulley.

1. Remove the reel motor according to steps above
2. Move the reel idler to the center of the reel chassis as shown and pull it out towards the reel motor side.


Screw x 2
(XHPSD30P10WSO)
Cassette down switch
holder


5
4
(15°)
(60°)
1
3
6
2
3
7
8
(15°)
8
(50°)

3. Take care not to deform the reel idler spring.
4. When only the reel idler is replaced, it is still necessary to check and adjust the fast forward torque, rewind torque and play torque.

D. Assembly

1. Set the reel idler spring over the reel idler correctly, and put the reel idler into the reel chassis.
2. Shift the reel idler to the right or left.
3. Set in place the reel motor according to the steps in Section B.

E. Replacement of Brake Unit

Removal (for both supply and take-up sides)

1. Remove the reel disk refer to the Height Adjustment section.
2. Unsolder the brake unit's leads at the rear of the chassis.
3. Remove the three screws ⑧ (XBPSD30P04J00) from the brake unit, and detach it.

Assembly (for both supply and take-up sides)

1. Place the new brake unit in the direction shown , and secure it with the three screws (XBPSD30P04J00).
2. Solder the leads to the brake unit.
3. Set in place the reel disk referring to the Section on Height Adjustment.
4. Perform the adjustments shown and check the fast forward back tension.

NOTES:

1. After replacement of the brake unit, be sure to check the reel disk height, video search back tension and fast forward back tension.
2. For removal and assembly of the reel disk, see the cautions in the reel Height Adjustment Section.
3. Never use screws other than specified to the brake unit.

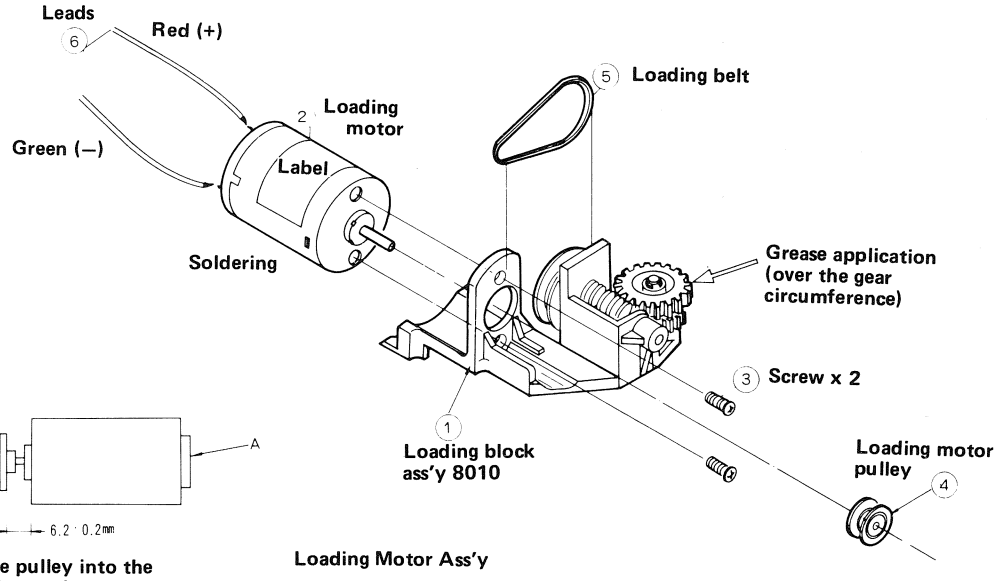
8-7: LOADING MOTOR REPLACEMENT

Replacement

1. Remove the loading belt.
2. Unsolder the leads.
3. Remove the two screws (SBPSD30P05JSO), and detach the loading motor.
4. Replace the loading motor and its pulley at the same time.

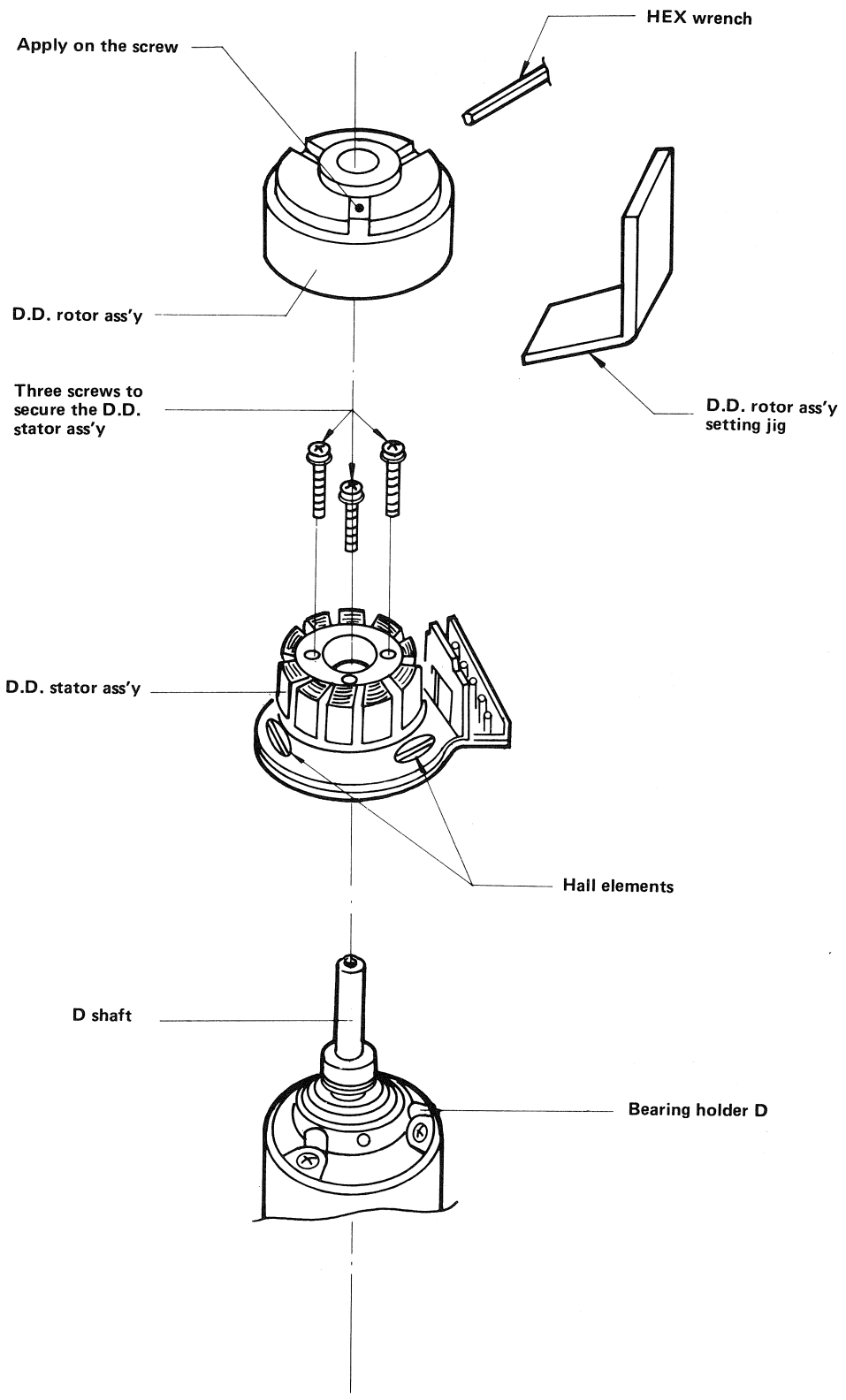
NOTE:

1. When mounting the pulley on the new motor, provide a clearance of 6.2mm ± 0.2mm between the pulley and the motor.
2. After replacement, try to rotate the new loading motor, check the belt and see that there is nothing rubbing the belt or the motor pulley.



Insert the pulley into the unit as shown above.

Loading Motor Ass'y


HEX wrench
Apply on the screw
D.D. rotor ass'y
D.D. rotor ass'y setting jig
Three screws to secure the D.D. stator ass'y
D.D. stator ass'y
Hall elements
D shaft
Bearing holder D

8-8: DIRECT DRIVE HEAD MOTOR REPLACEMENT

Removal

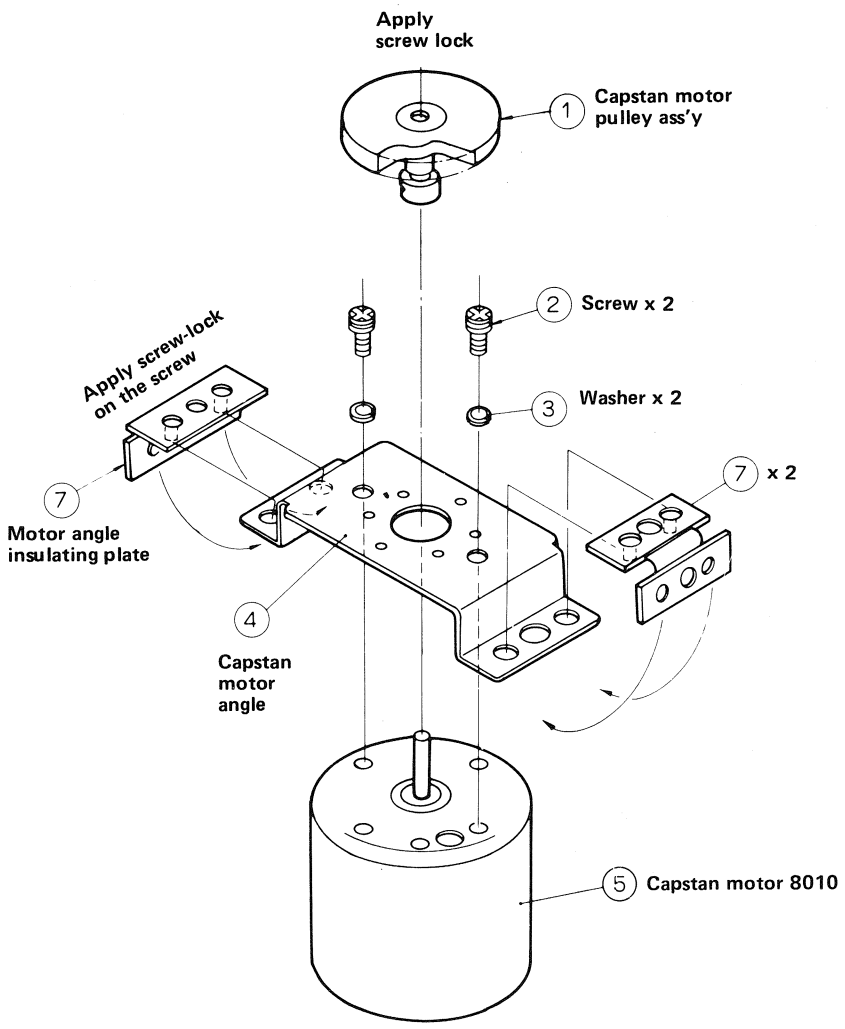
1. Loosen the two screws at the D.D. rotor assembly by using a (1.5mm) hex wrench. (JIGHW0015)
2. Remove the D.D. rotor assembly.
3. Remove the three screws from the D.D. stator assembly, and pull it out.

Assembly

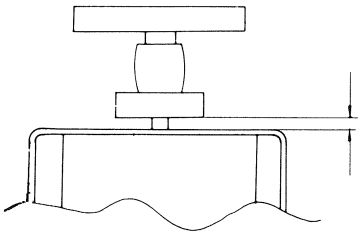
1. Set the D.D. stator assembly on the bearing holder, note the connector's direction of the D.D. stator assembly.
2. Supporting the D.D. stator assembly, secure it with the three screws do not allow the screw top to touch the stator coil.
3. Place the D.D. rotor assembly setting jig (JIGGAT110) on the base of the D.D. stator assembly.
4. Put the D.D. rotor assembly into "D" shaft.
5. Press the D.D. rotor assembly against the setting jig.
6. Supporting the D.D. rotor assembly, secure it with the two hex screws (tightening torque of 8Kg each).
7. Withdraw the D.D. rotor assembly setting jig.
8. Apply Lock-tite to the screws.

NOTE:

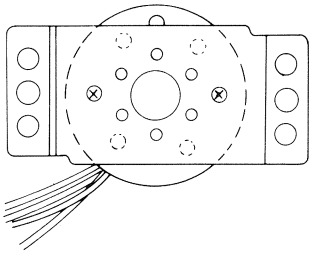
1. Careful not to damage the upper drum and video head.
2. Never handle the jig with undue force.
3. Never allow the jig and D.D. motor rotor assembly to hit the Hall elements and damage them.



Capstan motor pulley



(Top view)



Motor setting position:
Motor's leads shall be
positioned as shown above.

8-9: CAPSTAN MOTOR REPLACEMENT

Removal

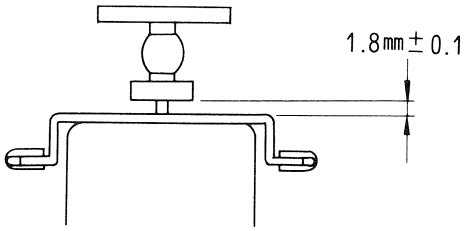
1. Remove the capstan motor belt.
2. Unsolder the four leads coming from the mechanism relay PWB.
3. Remove the two cup-tight screws (XHPSD30P08WSO), and detach the capstan motor from the chassis A.

Assembly

1. Set the capstan motor on the capstan motor bracket, and secure them with the two screws (XBPSD-26P3000) and two spring washers (XWSSD26-05206).
2. Leave a clearance of 1.8mm between the capstan motor pulley and capstan motor, and secure the capstan motor pulley.
3. Check that the motor bracket insulating plate is in place, and locate the capstan motor on chassis A and secure with the two cup-tight screws (XHPSD30P08WSO).
4. Solder the leads to the mechanism relay PWB.
5. Clean the capstan motor belt, capstan motor pulley and capstan motor flywheel. Then install the capstan motor belt.

NOTE:

1. After installing the new capstan motor, see that the belt travels normally.
2. Check and adjust the servo circuit.
3. Provide a clearance of 1.8mm ± 0.1mm between the capstan motor pulley and capstan motor angle.
4. Use only screws specified, or the motor may be damaged.

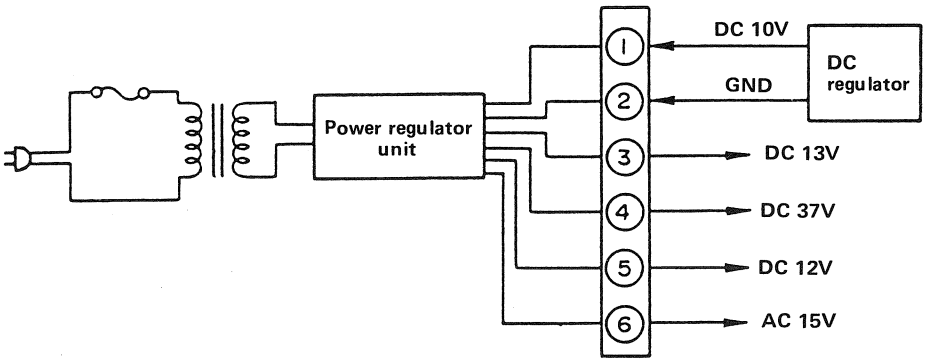


Section 9: ELECTRONIC CHECKS AND ADJUSTMENTS

Electronic adjustments are required after mechanical parts (video head included) have been replaced.
Check that all mechanical functions are normal before attempting to adjust the following electronic circuits.
See section 3-1 for required instrumentation before proceding.

9-1: CHOPPER REGULATOR OPERATIONAL CHECKS

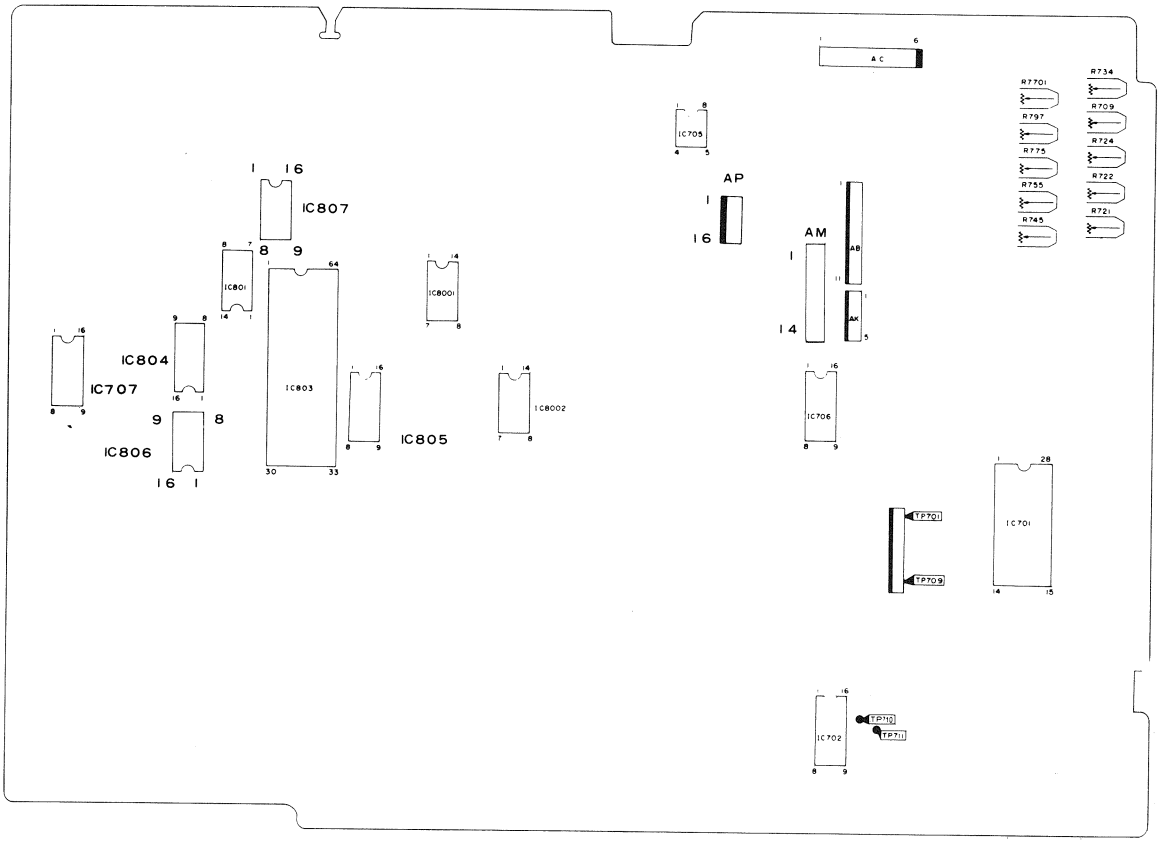
1. Remove AC connector from power regulator unit
2. Connect 10 volts DC regulator to pins (1) and (2)
3. Supply AC 120V to power regulator
4. Measure voltages as shown below



Connector AC

9-2: SERVO CIRCUIT ADJUSTMENTS

TEST POINT LAYOUT

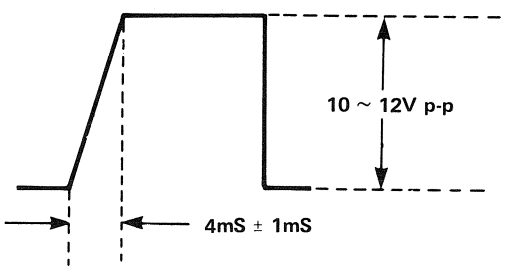


12V CHECK

1. Set VCR in record mode.
2. Connect a VTVM to pin 5 of the AC connector.
3. Voltage should be 12V ± 0.2V DC.

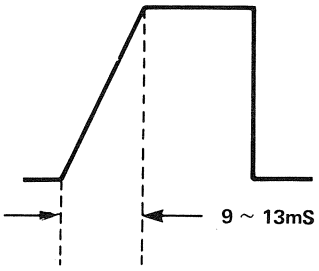
DRUM SERVO TRAPEZOIDAL WAVE-FORM.

1. Set VCR in record.
2. Set scope to internal trigger.
3. Observe wave-form as shown at pin 13 (IC-702).



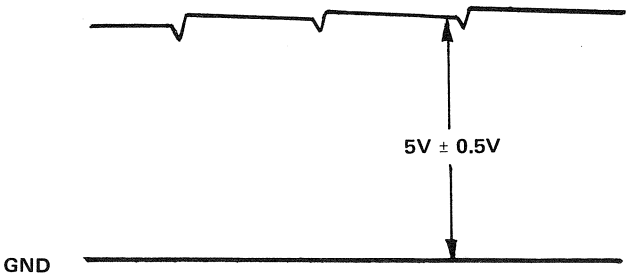
CAPSTAN SERVO TRAPEZOIDAL WAVE-FORM:

1. Set VCR in record.
2. Set scope to internal trigger.
3. Observe wave-form as shown at pin 12 (IC-702).



DRUM LOCK ADJUSTMENT:

1. Set VCR in record.
2. External trigger scope from pin 13 (IC-702).
3. Observe wave-form at pin 15 (IC-701).
4. Adjust R-709 (drum lock) so that it's wave-form is as shown.
5. Check DC level of 5V ± 0.5V.

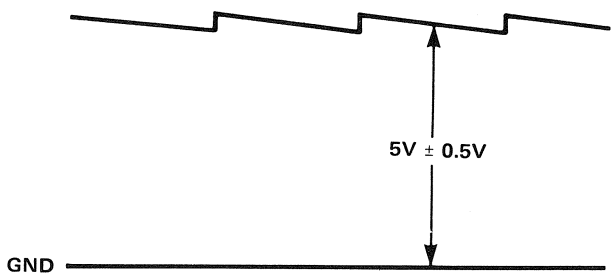


NOTE:

After completing this adjustment, check and adjust the play switching point.

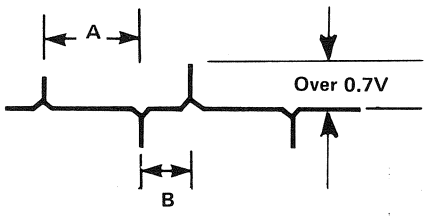
CAPSTAN LOCK ADJUSTMENT:

1. Set VCR in SP record.
2. External trigger scope from pin 13 (IC-702).
3. Observe wave-form at pin 9 (IC-702).
4. Adjust R-734 (SP capstan lock) so that it's wave-form is as shown.
5. Set VCR in EP record.
6. Observe wave-form at pin 9 (IC-702).
7. Adjust R-755 (6H capstan lock) so that it's wave-form is as shown.



PLAYBACK CONTROL SIGNAL:

1. Set VCR in play with an alignment tape.
2. Set scope to internal trigger.
3. Observe wave-form at pin 2 (IC-701) as shown.



TAKE-UP TORQUE ADJUSTMENT:

1. Load a torque measurement cassette.
2. Set VCR in SP record.
3. Adjust R-797 so that the take-up reel disk is 175 ± 15 gr.cm.
4. Set VCR in EP record.
5. Adjust R-7701 so that the take-up reel disk is 175 ± 15 gr.cm.

NOTE:
Re-check capstan lock adjustment.

PLAYBACK SWITCHING POINT ADJUSTMENT:

1. Set VCR in play with an alignment type.
2. Set tracking control at its "click detent" position.
3. External trigger scope from TP-704 (–) sync slope.
4. Observe the wave-form at TP-404.
5. Adjust R-721 so that the wave-form is as shown in Fig. B

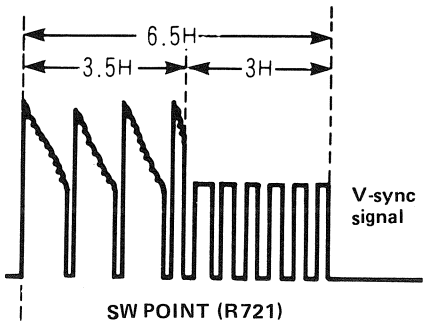


Figure A

NOTE:

After this adjustment, check and adjust the record video heads switching point.

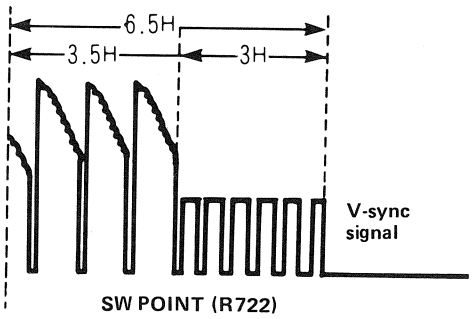
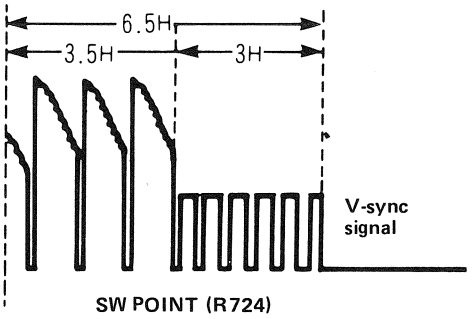


Figure B

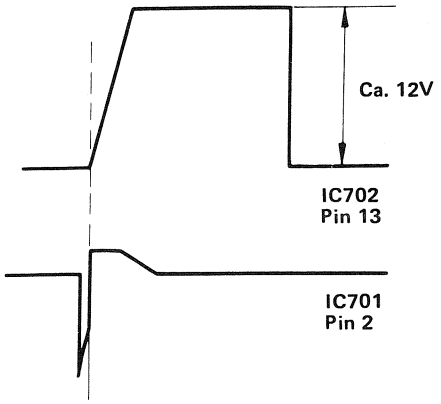
RECORD VIDEO HEADS SWITCHING POINT ADJUSTMENT:

1. Playback switching adjustment.
2. Set VCR in SP record.
3. External trigger scope from TP-704.
4. Observe wave-form at TP-404 (+) sync slope.
5. Adjust R-724 so that the wave-form is as shown.



TRACKING PRESET:

1. Set VCR in play with an alignment type.
2. Set tracking control at its "click detent" position.
3. Set scope to internal trigger.
4. Connect scope CH-1 to pin 13 (IC-702).
5. Connect scope CH-2 to pin Z (IC-701).
6. Adjust R-745 so that both wave-form have a phase relationship as shown.

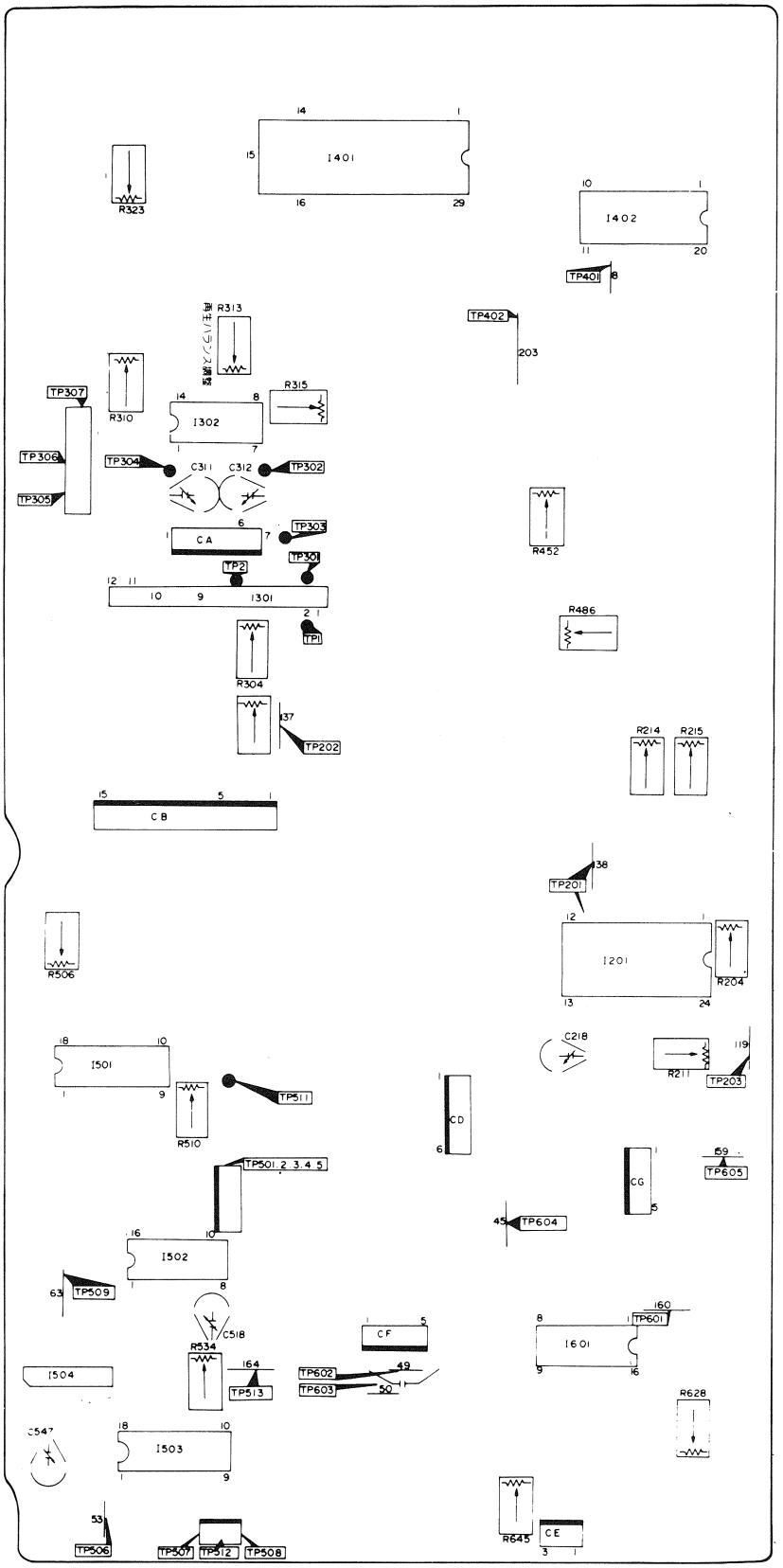


VIDEO SEARCH SPEED ADJUSTMENT:

1. Record a T-30 or T-60 tape in the SP mode and playback.
2. Set VCR in fast forward video search.
3. Adjust R-775 for minimum noise bars, noise bars should be stationary or slightly moving towards the top of the screen.

9-3: Y/C PLAYBACK CIRCUIT:

TEST POINT LAYOUT



PLAYBACK AMPLIFIER ADJUSTMENTS

NOTE:

These should only be required if the upper head drum or IC-301 has been replaced.

1. Set VCR in play with a sweep alignment tape.
2. External trigger scope from TP-305.
3. Observe wave-form at TP-406 (pin 7 or IC-401).
4. Refering to figure A perform the following adjustments.
   a. Adjust the sweep of the oscilloscope to display the wave-forms of both head (A) and head (B).
   b. Adjust R-315 (head (A) dump control) and R-310 (head (B) dump control) so that the wave-form is at peak value.
   c. Adjust C-312 (head (A)) trimmer and C-311 (head (B)) trimmer so that the wave-form is peaked at 4.5MHz.
   d. Adjust R-315 and R-310 so that the wave-form peak is changed from 4.5MHz to 4.08MHz, and the 3.58MHz signal is the same level as the 4.5MHz signal.
   e. Repeat the above steps until the wave-form observed is similair to the above Fig. A
   f. Playback the color bar portion of the alignment tape as a check for a normal picture.
5. If a sweep alignment tape is unavailable the above adjustments may be made using a color bar alignment tape and adjusting C-312, C-311, R-315 and R-310 to produce a sharp stable picture.

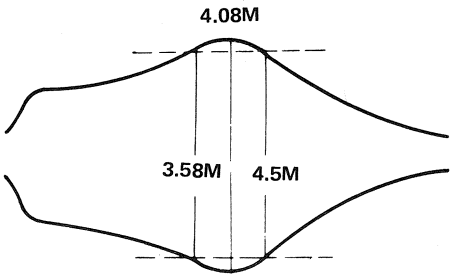
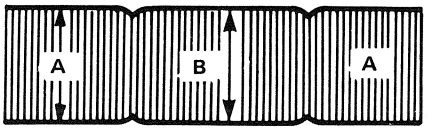


Fig. A

PLAYBACK BALANCE ADJUSTMENT:

1. Set VCR in play with a color bar alignment tape.
2. External trigger scope from TP-305.
3. Observe wave-form at TP-406 (pin 7 of IC-401).
4. Adjust R-313 (playback balance) so that head (A) and head (B) wave-forms are the same level.
5. Playback A color bar test tape recorded in EP mode.
6. Observe the wave-form as above. The difference between head (A) and head (B) should not be less than 25%, and the smaller signal must be at least 75% of the larger signal.



A = B

(Fig. #1)

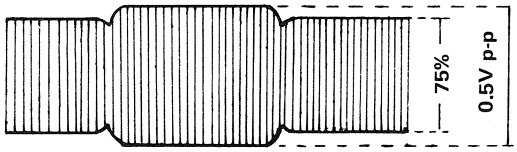


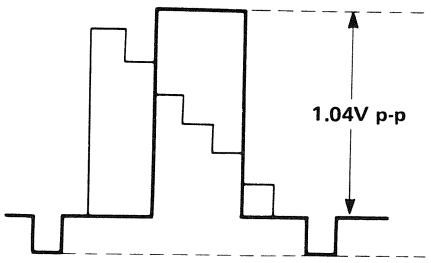
Fig. #2

LIMITER INPUT LEVEL ADJUSTMENT:

1. Adjustment of tracking preset should have been done first.
2. Playback a color bar test tape recorded in the EP mode.
3. External trigger scope from TP-305.
4. Observe wave-form at TP-406.
5. Adjust R-323 (limiter level) so that the wave-form is 0.5V p-p as shown in Fig. #2.

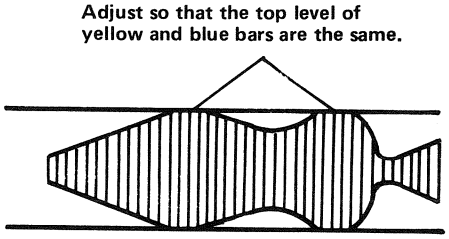
PLAYBACK VIDEO LEVEL ADJUSTMENT:

1. If the monitor has been separated from the VCR, connector KG should be terminated with a 75 ohm resistor between pins 4 & 3.
2. Playback a staircase alignment tape.
3. External trigger scope at TP-506.
4. Observe wave-form at TP-403.
5. Adjust R-486 (playback level) for 1.04 volts P-P as shown.

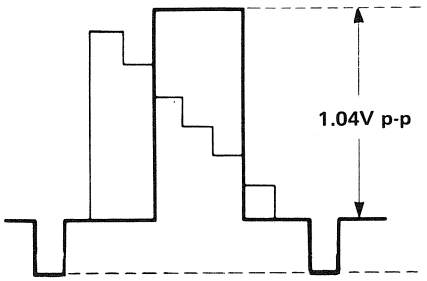


LINE RE-INSERTION CIRCUIT

1. Set VCR in play with a color bar alignment tape.
2. External trigger scope at TP-506.
3. Observe wave-form at TP-401.
4. Adjust R-452 (L/R mix control) until the noise is evenly distributed and yellow and blue horizontal bars are the same level.



9-4: Y/C RECORD CIRCUIT ADJUSTMENT:



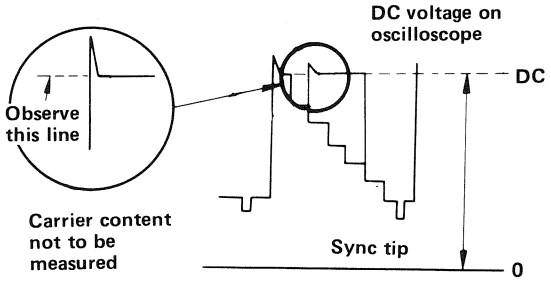
E-E Level Adjustment:

1. Terminate the VCR video output at connector KG, pins 4 & 3 with a 75 ohm resistor.
2. Set VCR in record with a color bar signal input.
3. External trigger scope at TP-506.
4. Observe wave-form as shown at TP-403.
5. Adjust R-203 (E-E level) so that the wave-form is 1.04V p-p as shown.

FM 3.4MHz/4.4MHz Adjustment:

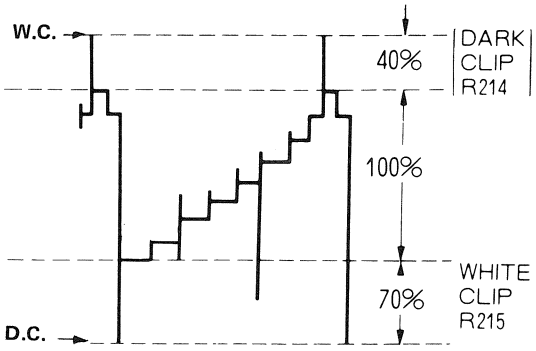
This adjustment should only be required when IC-201 is replaced.

1. Short circuit the video input and set VCR in the EP-record mode.
2. Rotate R-214 (dark clip control) and R-215 (white clip control) fully counter clockwise.
3. Connect a frequency counter to TP-202.
4. Adjust C-218 (carrier control) so that the frequency counter reads 3.4MHz.
5. Connect a regulated DC voltage source to pin 16 of IC-201 and observe the DC level on the scope.
6. Adjust the DC voltage source until the frequency counter indicates 4.3MHz.
7. Remove Input Short, and connect a staircase signal to the VCR Input.
8. Adjust R-211 (Deviation) until the peak white step has the same DC voltage level as measured in step 6 above.



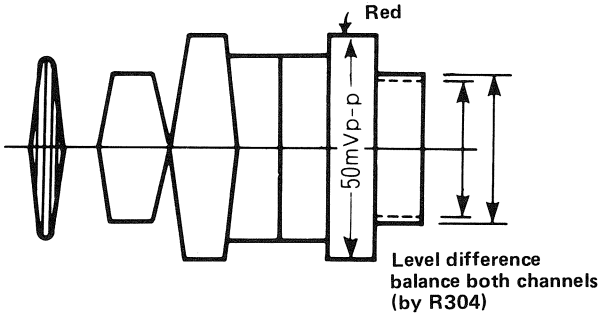
DARK/WHITE CLIP ADJUSTMENT:

1. Set VCR in record.
2. Connect a color bar signal to the VCR Input.
3. Connect scope to TP-201.
4. Observe wave-form and adjust R-215 (white clip) and R-214 (dark clip) to achive the wave-form as shown.

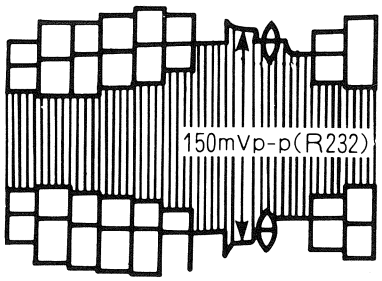


FM RECORD BALANCE AND RECORD CURRENT ADJUSTMENTS:

1. Set VCR in EP record with a color bar signal input.
2. With a dual trace scope, external trigger from TP-506 observe wave-forms and adjust as follows.
   a. Connect CH-1 to TP-302 and ground at TP-301.
   b. Connect CH-2 to TP-304 and ground at TP-303.
   c. Set R-232 (record FM level) to the minimum.
   d. Adjust R-304 (record balance) to balance the two channels as shown Fig. A.
   e. Adjust R-506 (record chroma level) until the red signal is 50mV p-p as shown in Fig. A.
   f. Switch scope to CH-1 only.
   g. Adjust R-232 (record FM level) until the sync tip level is 150mV p-p as in Fig. B.



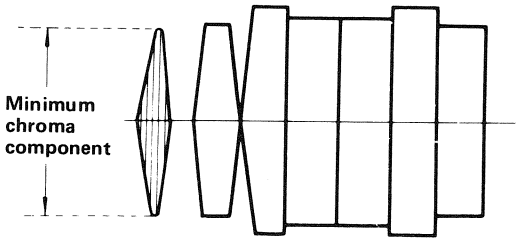
(A)



Sync tip

9-5: Y/C COLOR CIRCUIT ADJUSTMENTS:

- Phase Adder Filter:
  1. Play back a color bar alignment tape.
  2. External trigger scope from TP-506.
  3. Observe waveform at TP-511.
  4. Adjust R-510 (mixture control) for minimum chroma component as shown.



- 3.58MHz VCO Adjustment:
  1. Ground TP-501 to TP-502 with a .015 UF capacitor.
  2. Connect TP-503 to TP-501 with a 39K ohm resistor.
  3. Connect TP-504 to TP-501 with a 18K ohm resistor in series with a 10 UF/16 volt capacitor.
  4. Set VCR in record with a color bar signal input.
  5. Connect a frequency counter to TP-505.
  6. Adjust C-518 (APC trimmer) until the frequency counter reads 3.579545MHz (±10Hz).
  7. Remove the above jumper components.

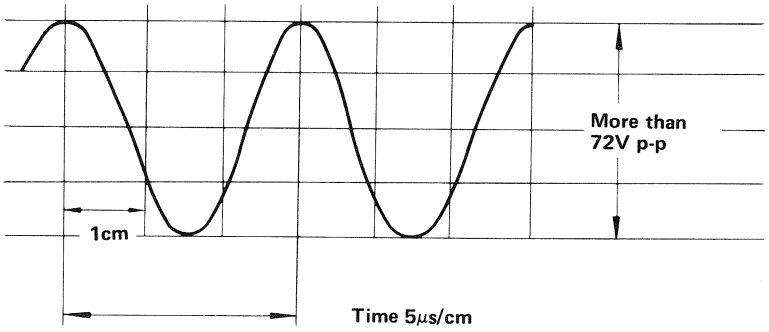
- 3.58MHz Local Oscillator Adjustment:
  1. Set VCR in record with a color bar signal input.
  2. Connect a frequency counter to TP-509.
  3. Adjust C-547 (3.58MHz trimmer) until the frequency counter reads 3.579545MHz (±10MHz).

- AFC Adjustment:
  1. Set VCR in record with a color bar signal input.
  2. Ground TP-512 through a 10 UF/16V capacitor.
  3. Connect a frequency counter to TP-507.
  4. Adjust R-534 (AFC) until the frequency counter reads 15.734KHz.
  5. Remove the 10 UF/16V capacitor.

9-6: AUDIO CIRCUIT ADJUSTMENTS:

- Playback Output Level:
  1. Play back an alignment tape with 1KHz signal for level calibration.
  2. Connect an audio VTVM to TP-604.
  3. Adjust R-628 (playback level) until the output level reads −5dBm.

- Erase Voltage and Oscillator Frequency:
  1. Set VCR in record.
  2. Connect Scope to TP-602.
  3. Erase voltage should be more than 72V p-p.
  4. Oscillator frequency should be 70 ± 5KHz.

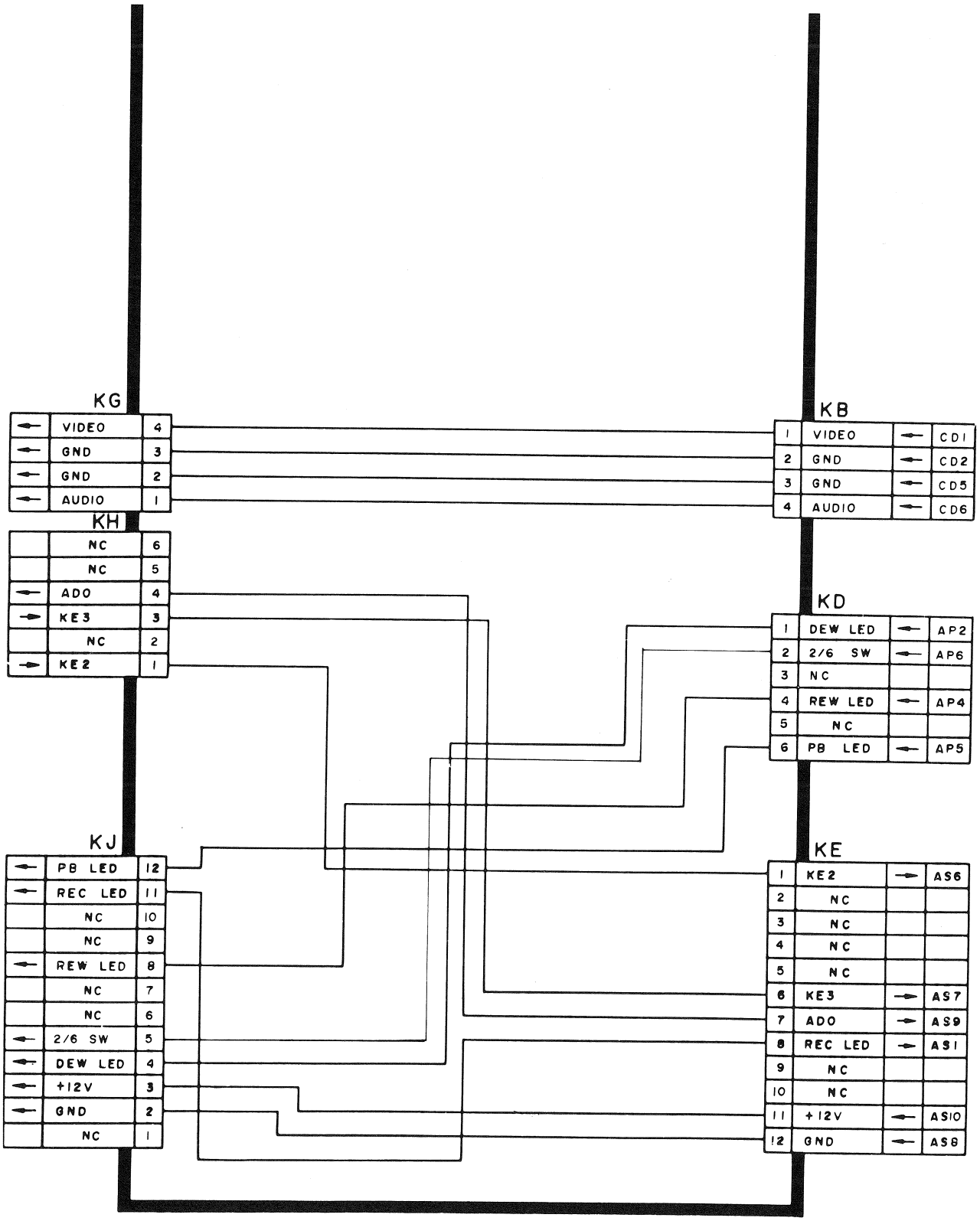


About three graduations:
60KHz to 75KHz

- Bias Current Adjustment:
  1. Connect VTVM across R-8008 on the audio head PWB.
  2. Set VCR in record.
  3. Adjust R-645 (bias current) for a reading of 1.1mV ± 0.05mV.

- Bias Leakage Adjustment:
  1. With no input signal set VCR in record.
  2. Connect a VTVM to TP-604.
  3. Bias leakage should be less than −20dB.

- Record Level:
  1. Connect a 1KHz, 0.22V p-p (−20dBm) signal to the audio input.
  2. Record a video test signal and the 1KHz audio.
  3. Connect a VTVM to TP-604.
  4. Play back the recorded signal, the audio output at TP-604 should be −5dBm (±3dBm).
  5. If not, repeat the audio adjustment procedures.

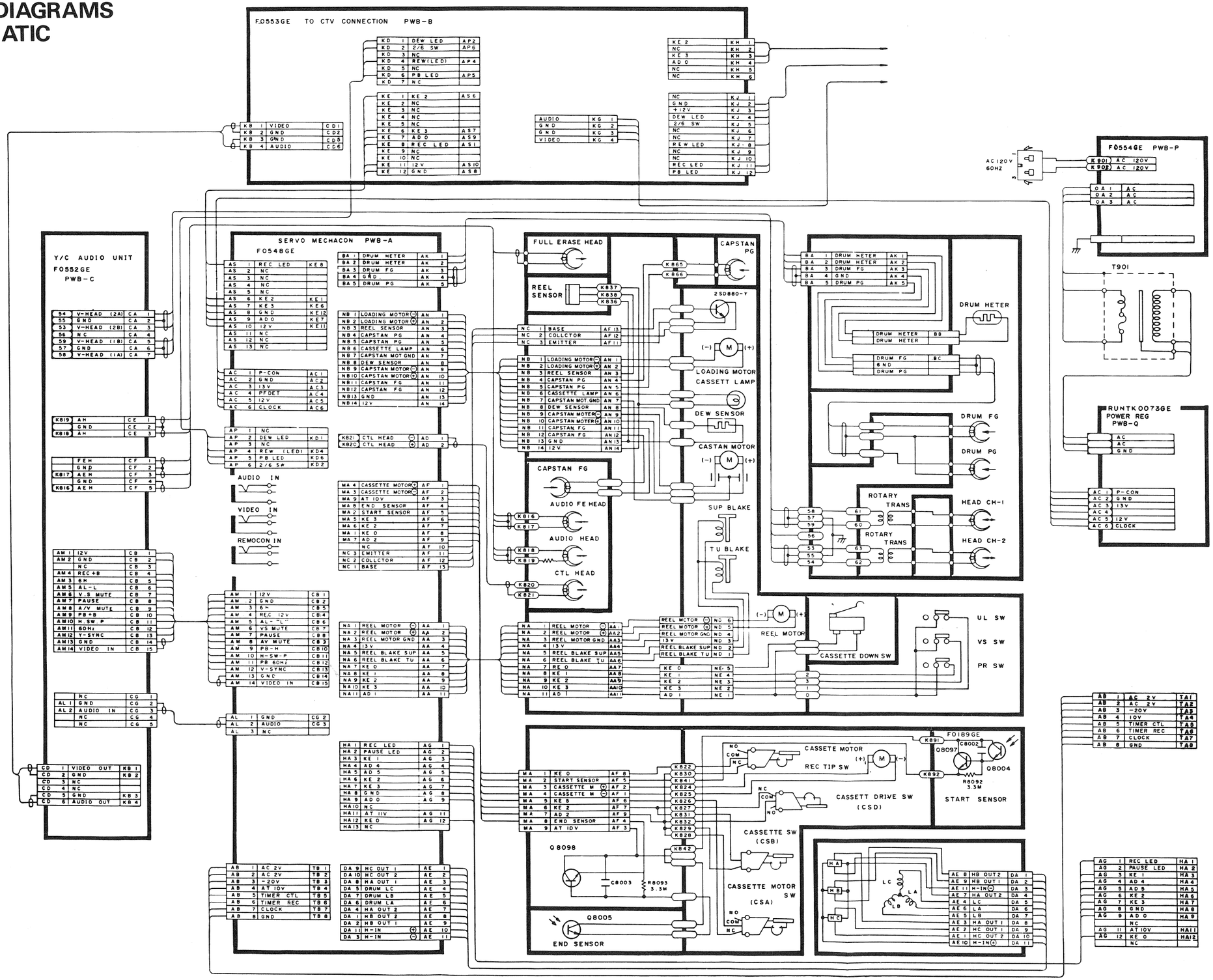

KG
VIDEO 4
GND 3
GND 2
AUDIO 1
KH
NC 6
NC 5
ADO 4
KE3 3
NC 2
KE2 1
KJ
PB LED 12
REC LED 11
NC 10
NC 9
REW LED 8
NC 7
NC 6
2/6 SW 5
DEW LED 4
+12V 3
GND 2
NC 1
KB
1 VIDEO CD1
2 GND CD2
3 GND CD5
4 AUDIO CD6
KD
1 DEW LED AP2
2 2/6 SW AP6
3 NC
4 REW LED AP4
5 NC
6 PB LED AP5
KE
1 KE2 AS6
2 NC
3 NC
4 NC
5 NC
6 KE3 AS7
7 ADO AS9
8 REC LED AS1
9 NC
10 NC
11 +12V AS10
12 GND AS8

Section 10: SCHEMATIC DIAGRAMS
EV-10, OVER ALL SCHEMATIC

WARNING

SERVICE SAFETY INFORMATION

1. Unplug unit before servicing.
2. ⚠1 Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.

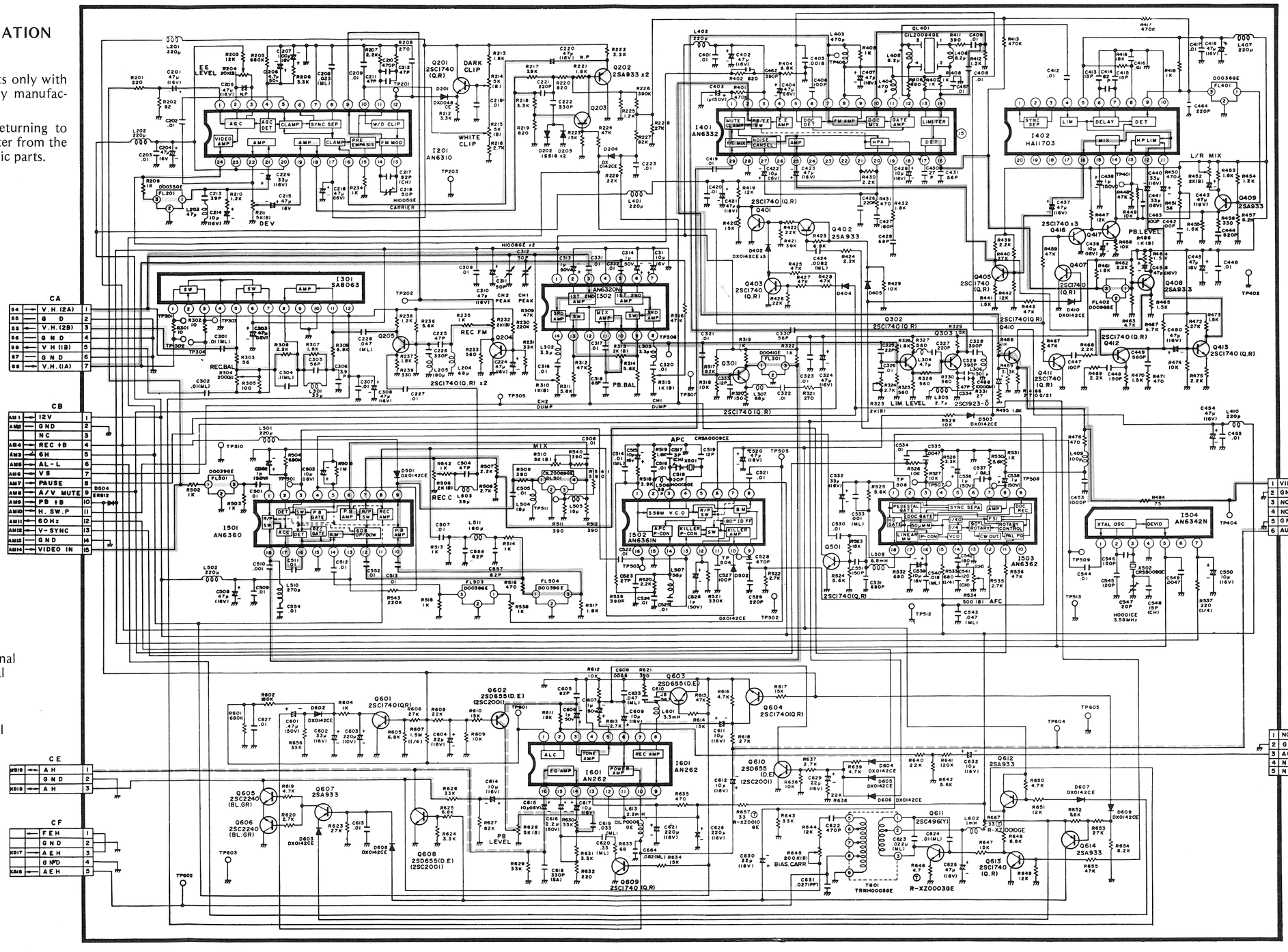


Y/C VIDEO PROCESSOR AND AUDIO HEAD

WARNING

SERVICE SAFETY INFORMATION

1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.



NOTES:

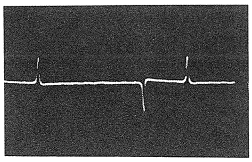
E.E Signal
Sound E.E Signal
Luminance REC Signal
Luminance PB Signal
Color PB Signal
Sound PB Signal
Color REC Signal
Sound Record Signal

SERVO CONTROL DIAGRAM

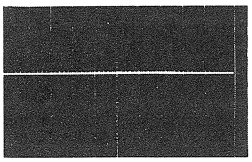
WARNING

SERVICE SAFETY INFORMATION

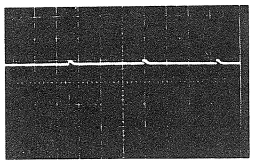
1. Unplug unit before servicing.
2. ⚠ Replace critical components only with exact type as recommended by manufactor.
3. Perform leakage test before returning to owner. Check with a OHM meter from the plug blades to all external metalic parts.



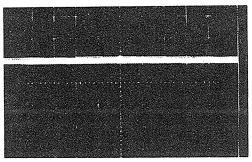
TP702 4.8Vp-p
5msec P.B



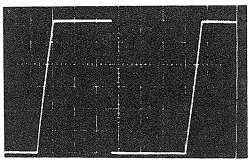
TP703 3.9Vp-p
5msec REC、PB



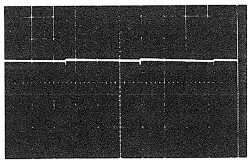
TP705 8Vp-p
10msec REC



TP706 5Vp-p
5msec REC、PB



TP707 12Vp-p
5msec REC、PB

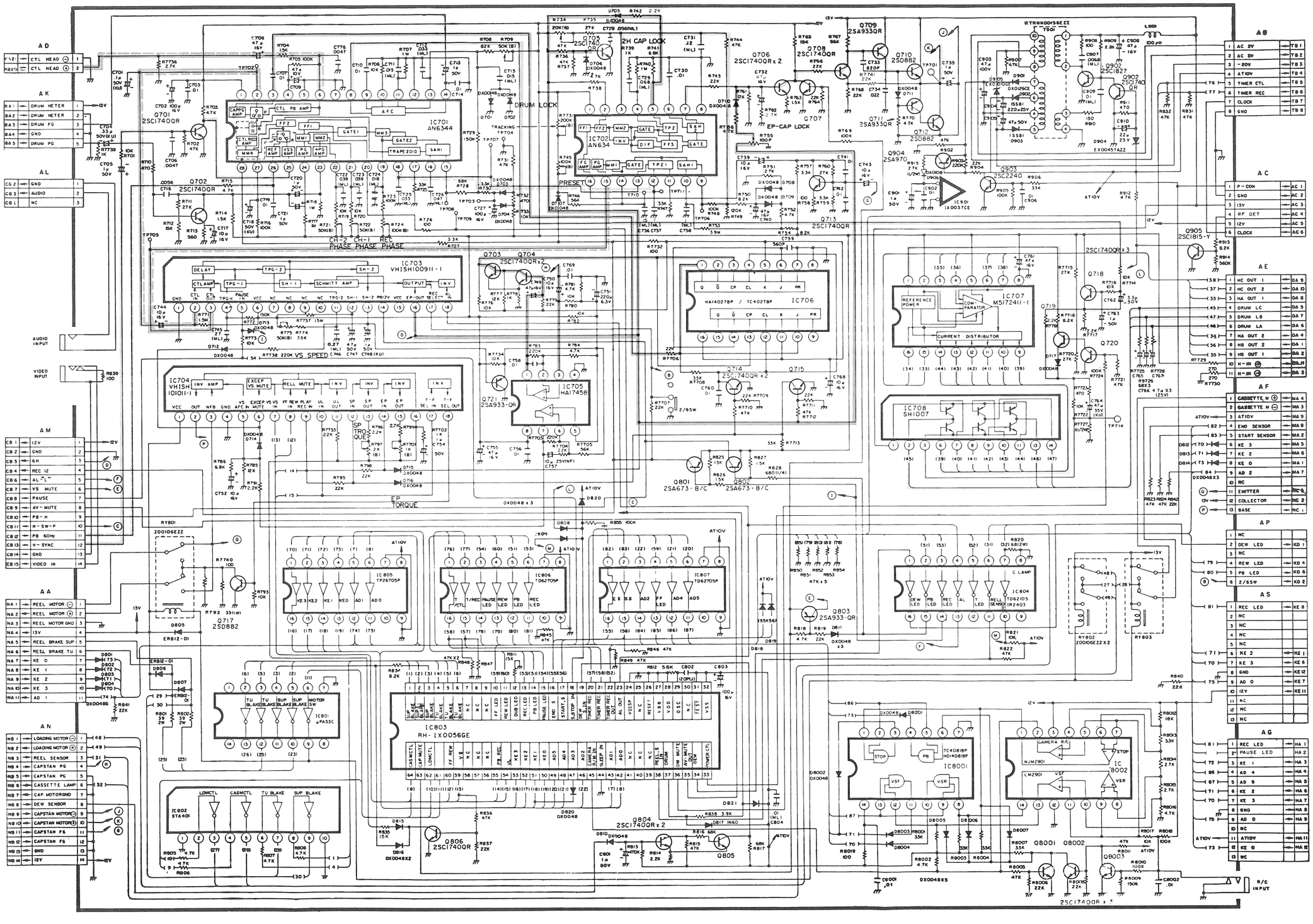


TP708 5Vp-p
10msec REC、PB

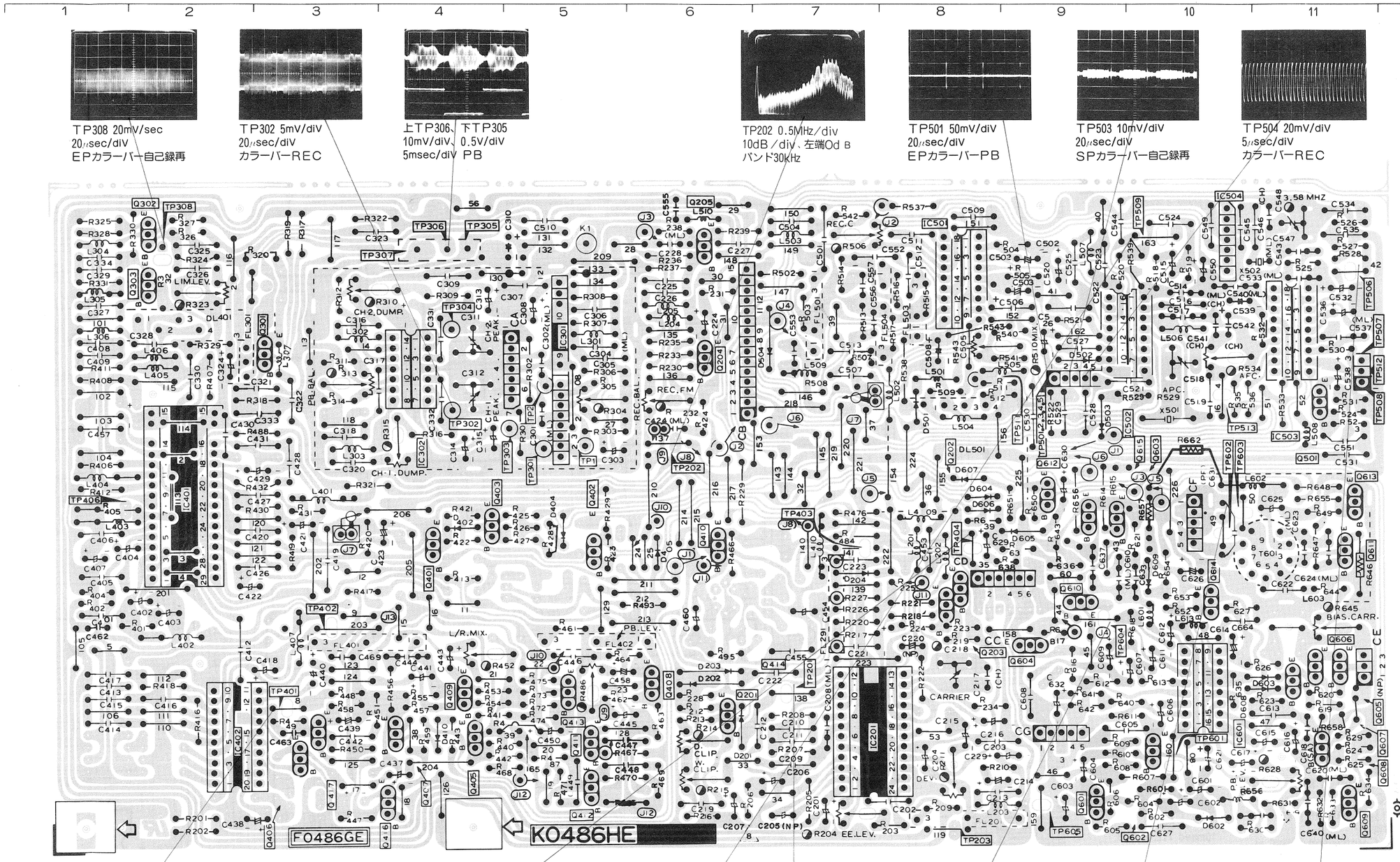
NOTES:

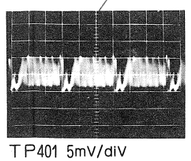
- Control Signal
- Working Circuit at REC 11.12 MM/SEC.
- Capstan Comparison Signal at recording
- Capstan Comparison Signal at playback
- Drum Comparison Signal
- Reference Signal at recording
- Reference Signal at playback

M

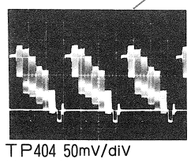

IC701 AN6344
IC702 AN634
IC703 VHIS1100911-1
IC704 VHISH 101011-1
IC705 HA17458
IC706 HA14027BP / 1C4027BP
IC707 M51724II-1
IC708 SH1007
IC801 PA55C
IC802 STA401
IC803 RH-IX0056GE
IC804 TD62105 IR2403
IC805 TP26705P
IC806 TD62705P
IC807 TD62705P
IC901 1Z0037CE
Q701 2SC1740QR
Q702 2SC1740QR
Q703 Q704 2SC1740QR x2
Q705 2SC1740
Q706 2SC1740QR x 2
Q707 EP-CAP LOCK
Q708 2SC1740QR
Q709 2SA933QR
Q710 2SD882
Q711 2SA933QR
Q712 2SD882
Q713 2SC1740QR
Q714 2SC1740QR x2
Q715
Q716 2SC1740QR x3
Q717 2SD882
Q718
Q719
Q720
Q721 2SA933-QR
Q801 2SA673-B/C
Q802 2SA673-B/C
Q803 2SA933-QR
Q804 2SC1740QR x 2
Q805
Q806 2SC1740QR
Q901 2SC1827
Q902 2SC1740QR
Q903 2SC2240
Q904 2SA970
Q905 2SC1815-Y
AD
AK
AL
AM
AN
AA
AS
AC
AE
AF
AP
AS
AG
CTL HEAD
DRUM HETER
DRUM FG
DRUM PG
GND
AUDIO
NC
REEL MOTOR
REEL BRAKE SUP
REEL BRAKE TU
LOADING MOTOR
REEL SENSOR
CAPSTAN FG
CASSETTE LAMP
CAP MOTORGND
DEW SENSOR
CAPSTAN MOTOR
AC 2V
- 20V
ATIOV
TIMER CTL
TIMER REC
CLOCK
P-CON
RF DET
12V
HC OUT 1
HC OUT 2
HA OUT 1
DRUM LC
DRUM LB
DRUM LA
HA OUT 2
HB OUT 2
HB OUT 1
H-M
CASSETTE M
TATIOV
END SENSOR
START SENSOR
KE 3
KE 2
KE 0
AB 2
RC
EMITTER
COLLECTOR
BASE
DEW LED
REW LED
PB LED
REC LED
AL
T LED
REEL SENSOR
C LAMP
PAUSE LED
KE 1
AD 0
AD 4
AD 5
AD 6
AD 7
AD 3
CAMERA R/C
STOP
VSF
VSR
R/C INPUT
DELAY
TPG-2
SH-2
CTLAMP
TPG-1
SH-1
SCHMITT AMP
OUTPUT
INV
CH-2 PHASE
CH-1 PHASE
REC PHASE
EP TORQUE
SP TRQUE
DRUM LOCK
PRESET
EP-CAP LOCK
2H CAP LOCK
VS SPEED
AUDIO INPUT
VIDEO INPUT
CTL PB AMP
AFC
CAPPG AMP
TRACKING
REFERENCE POWER
COMPARATOR
CURRENT DISTRIBUTOR
TRANSFORMER
TP709 10.8Vp-p
10msec、REC、PB
TP710 6Vp-p
5msec PB
TP711 12Vp-p
5msec REC、PB

VIDEO SIGNAL PROCESSOR AND AUDIO CIRCUIT

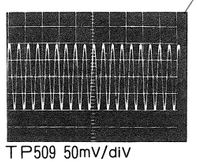




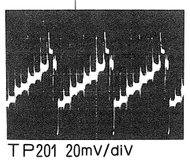
TP401 5mV/diV
20μsec/diV
EPカラーバー自己録再



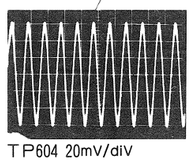
TP404 50mV/diV
20μsec/diV
EEカラーバーREC



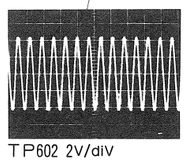
TP509 50mV/diV
0.5μsec/diV
EPカラーバー自己録再



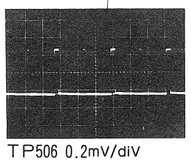
TP201 20mV/diV
20μsec/diV
カラーバーREC



TP604 20mV/diV
1μsec/diV
1kHz、−20dBm(79mV)

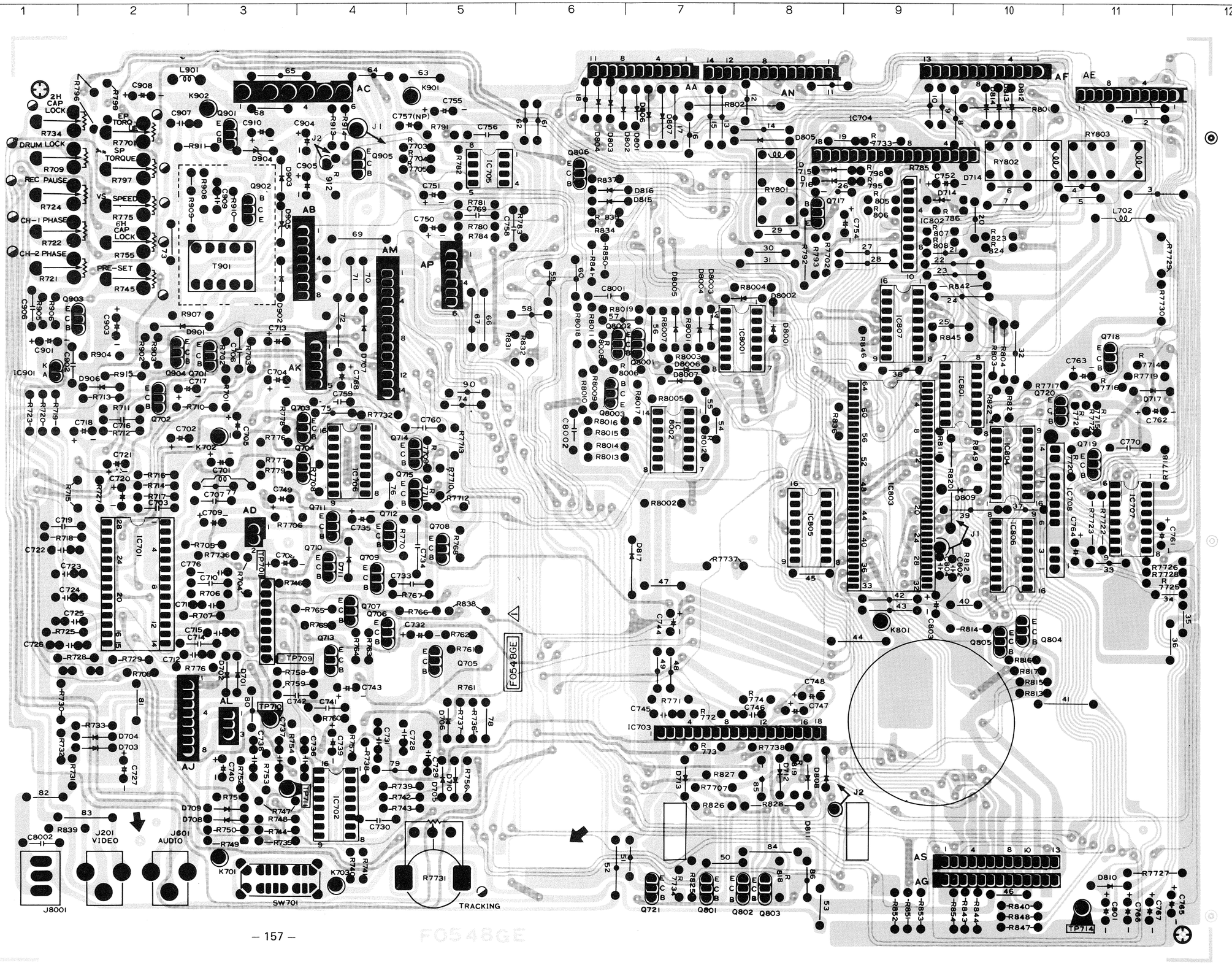


TP602 2V/diV
20μsec/diV REC



TP506 0.2mV/diV
20μsec/diV REC

SERVO CONTROL DIAGRAM



REPLACEMENT PARTS LIST

Many electrical and mechanical parts in the video cassette recorder have special safety-related characteristics. These characteristics are often not evident from a visual inspection of the part.
Replacement parts which have special safety characteristics are identified in the Replacement Parts List and Schematic Diagrams by shaded areas. Electrical components which have special safety characteristics are identified by a ⚠ throughout this manual.
The use of a substitute replacement part which does not have the same safety characteristic as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following information:

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

Parts may be ordered from any authorized Eikivision Dealer. Parts ordered directly from Eiki International are subject to minimum order charges and shipped C.O.D. unless a previous credit account has been established.
For information as to your nearest Eikivision Dealer or to order parts contact:

EIKI INTERNATIONAL, INC.
27882 CAMINO CAPISTRANO
LAGUNA NIGUEL, CA 92677
(714) 831-2511

PART NUMBER IDENTIFICATION

RESISTOR IDENTIFICATION GUIDE

Example- VRC-MT2EG123J

a b c d e

EXAMPLE ACCORDING TO CHARTS

1/4W, 12 KΩ ± 5%

a TYPE		
CARBON	VRC-MT	
	VRD-ST VRN-RT	
	VRD-SU	
WIRE WOUND	VRS-	
	VRW-	

b WATTAGE	
2B	0.125 (1/2) W
2E	0.25 (1/4) W
2H	0.5 (1/2) W
3A	1.0 W
3D	2.0 W
3H	5.0 W

d RESISTANCE	
R X X	0.10 ~ 0.99 Ω
X R X	1.0 ~ 9.9 Ω
X X R	10 ~ 99 Ω
X X 1	100 ~ 990 KΩ
X X 2	1.0 ~ 9.9 KΩ
X X 3	10 ~ 99 KΩ
X X 4	100 ~ 990 KΩ
X X 5	1.0 ~ 9.9 MΩ
X X 6	10 ~ 99 MΩ
X X 7	100 ~ 990 MΩ

X = ANY NUMBER (VALUE)
EX: 123 = 12 KΩ

e TOLERANCE	
F	± 1%
G	± 2%
J	± 5%
K	+10%
M	+20%

c FOR MFG PURPOSES ONLY

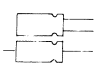
CAPACITOR IDENTIFICATION GUIDE

Example- VCEAAU1HW475R

a b c d e

EXAMPLE ACCORDING TO CHARTS

50V, 4.7μF +150% −10%

a TYPE		
CERAMIC	VCCCSP VCKYPU	
TANTALUM	VCSATU VCSATT	
PLASTIC FILM	VCQYKU	
ELECTRO-LYTIC	VCEAAU VCEAAT	

d CAPACITANCE	
R X X	0.1 ~ 0.99 PF
X R X	1.0 ~ 0.9 PF
X X R	10 ~ 99 PF
X X 1	100 ~ 990 PF
X X 2	1000 ~ 9900 PF
X X 3	0.01 ~ 0.099 μF
X X 4	0.1 ~ 0.99 μF
X X 5	1.0 ~ 9.9 μF
X X 6	10 ~ 99 μF
X X 7	100 ~ 990 μF
X X 8	1000 ~ 9900 μF

X = ANY NUMBER (VALUE)
EX: 475 = 4.7μF

b VOLTAGE			
1A	10V	2A	100V
1C	16	2C	160
1E	25	2D	200
1H	50	2E	250
1J	63	2F	315

e TOLERANCE	
J	± 5%
K	±10%
M	±20%
Q	+100%, −10%
R	+150%, −10%

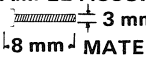
c FOR MFG PURPOSES ONLY

SCREW IDENTIFICATION GUIDE

Example- X B P S D 3 0 P 0 8 0 0 0

a b c d e f g h

EXAMPLE ACCORDING TO CHARTS



3 mm

8 mm MATERIAL = STEEL

PLATE = CHROMATE

a TYPE OF BODY		
MACHINE SCREW	B	
METAL SCREW	C	

b TYPE OF HEAD		
FILLISTER HEAD	B	
BINDER HEAD	H	
OVAL HEAD	N	
PAN HEAD	P	
HEXAGON HEAD	R	
FLAT HEAD (COUNTER SUNK)	P	
ROUND HEAD (MUSHROOM HEAD)	T	

c MATERIAL	
STEEL	S
BRASS	B
STAINLESS	U
PLASTIC	R

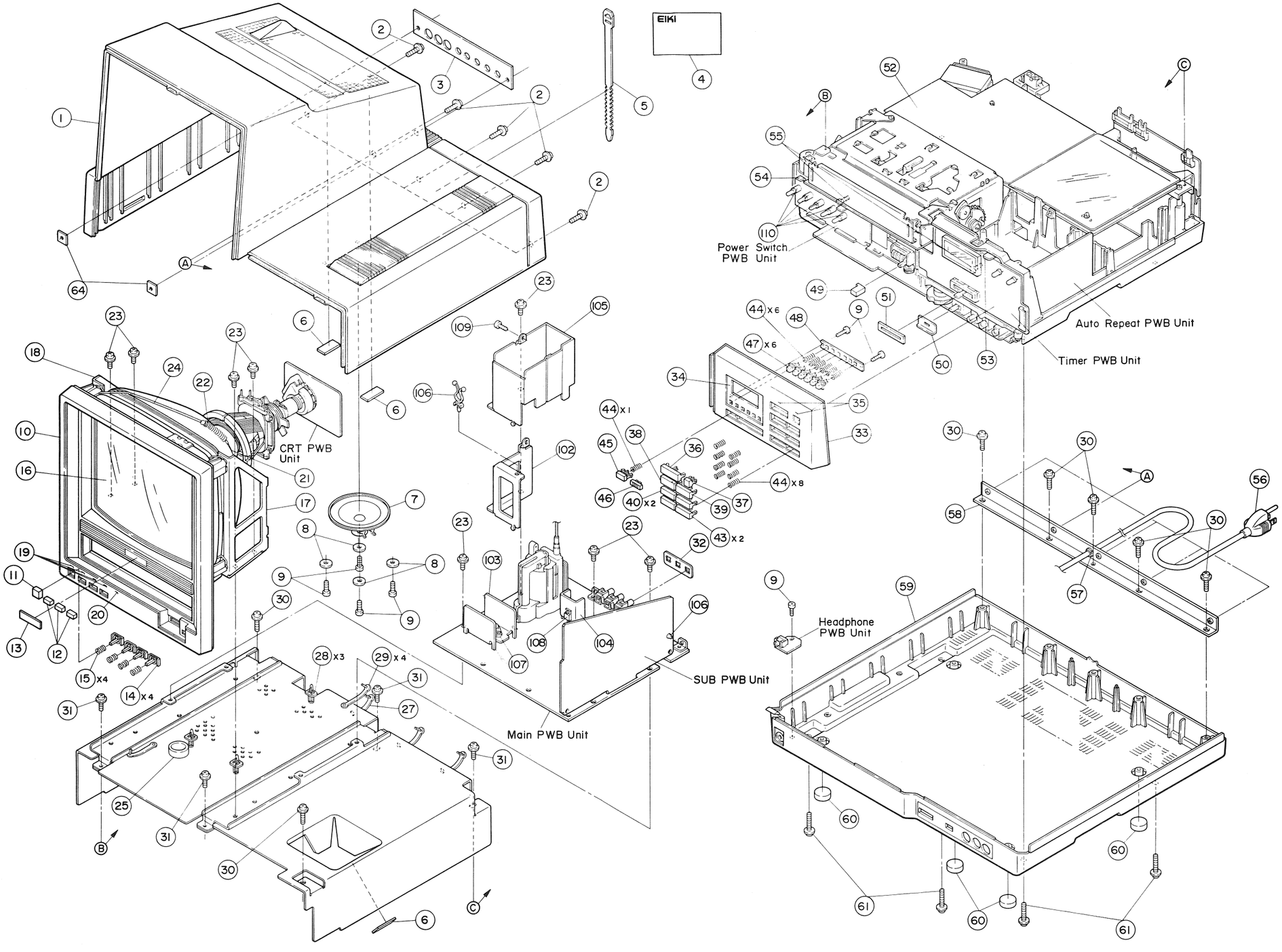
d PLATING TYPE	
CHROMIUM	C
CHROMATE	D
BLACK	F
NICKEL	N
NO PLATING	Z

e DIAMETER	
20	2 mm (Approx. 0.079 inch)
26	2.6 mm (0.102 inch)
30	3 mm (0.118 inch)

f DRIVER TYPE		
PHILIPS	P	
SLOT	M	
COMBINATION (PHILIPS/SLOT)	W	
HEXAGON	L	

g LENGTH	
08	8 mm (0.315 inch)
10	10 mm (0.394 inch)
12	12 mm (0.472 inch)

h WASHER	
000	NO WASHER
K00	WITH SPLIT LOCK WASHER
KS0	WITH LOCK AND FLAT WASHER


EIKI
CRT PWB Unit
Main PWB Unit
SUB PWB Unit
Power Switch PWB Unit
Auto Repeat PWB Unit
Timer PWB Unit
Headphone PWB Unit

PARTS LIST MAIN ASSEMBLIES

REF. NO.	PART NUMBER	DESCRIPTION
	DPWB-0424PAZZ	Main P.W.B. Ass'y
	DPWB-0425PAZZ	CRT P.W.B. Ass'y
	DPWB-0426PAZZ	Sub P.W.B. Ass'y
	DPWB-0427PAZZ	Auto Repeat P.W.B. Ass'y
	DPWB-0428PAZZ	Timer P.W.B. Ass'y
	DPWB-0429PAZZ	Power Switch P.W.B. Ass'y
	DPWB-0430PAZZ	Headphone P.W.B. Ass'y
	DUNTK0548HE01	System Control P.W.B. System
	DUNTK0552HE01	Y/C P.W.B. Ass'y
	DUNTK0553HE01	Relay P.W.B. Ass'y
	DUNTK0569HE02	Power P.W.B. Ass'y
	RUNTK0073GEZZ	Power P.W.B. Ass'y
	DMECV0006GE01	Mechanical Ass'y
	CHLDX3010GE01	Cassette Holder Ass'y

CABINET PARTS

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
1	GCABA4883PASA	Cabinet
2	LX-BZ0105PAFF	Screw (special)
3	HPNLH0111PASA	Panel
4	TLABG0001PAZZ	Label
5	LBNDC0006PAZZ	Band
6	PCUSG0013PAZZ	Cushion
7	VSP0080P-746A	Speaker
8	XWHSD34-10130	Washer
9	XYBSD26P06000	Screw
10	GCABC4883PASA	Cabinet
11	JBTN-0163PASA	Button, Power
12	JBTN-0232PASA	Button, Time Reset
13	HBDGE0012PASA	Badge "Eiki"
14	LHLDZ0020PAZZ	Holder
15	MSPRC0043PAZZ	Spring
16 ⚠	VB250AUB22T-J	Picture Tube
17	LANGK0425PAZZ	Fixing Metal
18	LANGK0424PAZZ	Fixing Metal
19	PFILW0056PASA	Filter
20	PFILW0061PASA	Filter
21 ⚠	RCILG0006PAZZ	Degaussing Coil L-702
22	MSPRT0011PAZZ	Spring
23	LX-BZ0105PAFD	Screw (special)
24	DSOCN0263PAZZ	Socket Ass'y
25	LBSHC0021PAZZ	Bushing
26	TLABZ0221PAZZ	Label
27	LBNDC0009PAZZ	Band
28	LHLDF0016PAZZ	Holder
29	LBNDC0007PAZZ	Band
30	LX-BZ0122PAFD	Screw (special)
31	LX-BZ0099PAFD	Screw (special)
32	GCOVA0038PAZZ	Cover
33	HPNLH0112PASA	Panel
34	HPNLH0113PASA	Panel
35	PFILW0057PASA	Filter
36	JBTN-0155PASA	Button, Play
37	JBTN-0230PASA	Button, Record
38	JBTN-0159PASA	Button, Stop
39	JBTN-0156PASA	Button, Pause
40	JBTN-0157PASA	Button, Reverse, Forward
41	TLABZ0220PAZZ	Ground Label
42	TLABS0014PAZZ	UL Label
43	JBTN-0160PASA	FF/REW Button

CABINET PARTS CON'T

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
44	MSPRC0042PAZZ	Spring
45	JBTN-0158PASA	Eject Button
46	JKNBP6002PASA	Volume Knob
47	JBTN-0233PASA	Clock Button
48	LANGK0426PAZZ	Fixing Metal
49	JBTN-0231PASA	Counter Button-
50	GCOVA0037PAZZ	Cover
51	GCOVA0032PAZZ	Cover
52	PSLDM0239PAZZ	Shield
53	LHLDZ0021PAZZ	Holder
54	LHLDZ0022PAZZ	Holder
55	XCSSD40P12000	Screw
56 ⚠	QACCD0001PAZZ	AC Power Cord
57	LBSHC0009PAZZ	Bushing
58	LANGK0429PAZZ	Fixing Metal
59	GCABB4883PASA	Cabinet
60	GLEGP0008PAZZ	Foot
61	LX-BZ0123PAFD	Screw (special)
62	PZETN0010PAZZ	Insulator
QI-IQ	DSOCN0264PAZZ	Socket Ass'y
NI-IN	DSOCN0266PAZZ	Socket Ass'y
LK-KG	DSOCN0267PAZZ	Socket Ass'y
	DSOCN0270PAZZ	Socket Ass'y
YE-EY	DSOCN0271PAZZ	Socket Ass'y
YC-CY ⚠	DSOCN0268PAZZ	Socket Ass'y
IP-PI	DSOCN0274PAZZ	Socket Ass'y
IY-YI	DSOCN0275PAZZ	Socket Ass'y
YK-KJ	DSOCN0276PAZZ	Socket Ass'y

MONITOR MAIN P.W.B.

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(INTEGRATED CIRCUITS)
PR701⚠	RMPTP0001PAZZ	30A60S
IC501	RH-IX0065CEZZ	IC HA-11235
IC701⚠	RH-IX0137CEZZ	IC T2508
IC702⚠	RH-IX0268PAZZ	IC TA78015AP
		(TRANSISTORS)
TR202	VS2SC1815-Y-1	2SC1815(Y)
TR203	VS2SC1890A/1E	2SC1890A(E)
TR204	VS2SA1013//-1	2SA1013
TR205	VS2SC2383-Y-1	2SC2383
TR501	VS2SC3179//-1	2SC3179
TR502	VS2SC3179//-1	2SC3179
TR601	VS2SC1815-Y-1	2SC1815(Y)
TR602	VS2SC1213AC1A	2SC1213A
TR603⚠	VS2SD868-//1E	2SD868
TR701	VS2SC1959-Y-A	2SC1959(Y)
		(DIODES)
D501	RH-DX7502YAZZ	Diode 1S1588
D502	RH-DX7502YAZZ	Diode 1S1588
D503	RH-DX0086TAZZ	Diode RH-1S
D504	RH-DX0101CEZZ	Diode RF-1
D505	RH-DX0101CEZZ	Diode RF-1
D601	VHD1S2473//-1	Diode 1S2473
D602	VHERD12EB3/-1	Zener Diode (12V)
D603	RH-DX0072CEZZ	Diode (20V)
D607	RH-DX0101CEZZ	Diode RF-1
D608	VHERD12EB3/-1	Zener Diode (12V)
D609	RH-DX0086TAZZ	Diode RH-1S
D610	RH-DX7502YAZZ	Diode 1S1588
D701⚠	RH-DX8201YAZZ	Diode 1S1887
D704	RH-DX8201YAZZ	Diode 1S1887
D705	RH-DX0101CEZZ	Diode RF-1
D706⚠	RH-EX0086CEZZ	Zener Diode (62V)
D707⚠	VHSS6318FLC6A	SCR 6318F
D713⚠	VHDS1YB10//-1	Diode S1YB10
		(RESISTORS)
R211	VRS-PU3AB152J	1.5K ohm 1W
R222	VRS-PU3AB151J	150 ohm 1W
R223	VRS-PU3AB151J	150 ohm 1W
R418	RVR-B0029PAZZ	VR 10K ohm (B)
R421	RVR-B0036PAZZ	VR 1K ohm (B)

MONITOR MAIN P.W.B. CON'T

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
R423	RVR-M2015YAZZ	VR 2.2K ohm (B)
R508	RVR-M0039PAZZ	VR 100 ohm (B)
R513	VRS-PU3AB322J	3.3K ohm 1W
R516	VRS-PU3AB681J	680 ohm 1W
R518	VRS-PU3DB470J	47 ohm 2W
R521	RVR-B0028PAZZ	VR 5K ohm (B)
R607	RVR-M0018PAZZ	VR 6.8K ohm (B)
R616⚠	RR-XZ0004PAZZ	Fuse Resistor 10 ohm 1/2W
R617	VRS-FC3ABR33J	0.33 ohm 1W
R619	VRS-PU3DB470J	47 ohm 2W
R701⚠	RR-WZ0002PAZZ	10 ohm 7W
R708	RVR-M0010PAZZ	VR 1K ohm (B)
R710	VRS-PU3DB331J	330 ohm 2W
R716⚠	VRC-UT2HG275K	2.7M ohm 1/2W
R717⚠	RR-WZ0001PAZZ	5.6 ohm 10W
R822	RVR-M0015PAZZ	VR 10K ohm (B)
R824	RVR-B0029PAZZ	VR 10K ohm (B)
R827	RVR-B0035PAZZ	VR 10K ohm (B)
		(CAPACITORS)
C209	VCEAAU2AW105M	1 mfd 100V
C210	VCEAAU2AW106M	10 mfd 100V
C211	VCCCPU1H3151J	150 pfd 50V
C213	VCEAAU2CW226M	22 mfd 160V
C502	VCEACA1CC226M	22 mfd 16V
C506	VCSACU1VE335K	3.3 mfd 35V
C507	VCEAAU1CW107M	100 mfd 16V
C509	RC-EZ0023PAZZ	470 mfd 25V
C510	VCQPPB2JB272J	2700 pfd 630V
C511	VCEAAU1HW107M	100 mfd 50V
C513	VCFPPD2DB474J	0.47 mfd 200V
C613	VCEAAU1EW337M	330 mfd 25V
C616	VCQYBU3CB332J	3300 pfd 1.6V
C617	RC-KZ0002PAZZ	1000 pfd 2KV
C618	VCQYSU2AM563K	0.056 mfd 100V
C701⚠	RC-FZ004DPAZZ	0.1 mfd AC120V
C702	RC-KZ9141PAZZ	0.01 mfd 1.5KV
C703	RC-KZ9141PAZZ	0.01 mfd 1.5KV
C704	VCKYPU2HB103K	0.01 mfd 500V
C705	VCEAAU1HW107M	100 mfd 50V
C707	RC-EZ0022PAZZ	470/330 mfd 200V
C708	VCQPSB2DA473K	0.047 mfd 200V
C710	VCKYPU2HB472K	4700 pfd 500V

MONITOR MAIN P.W.B. CON'T

Indicates a Safety Related Part

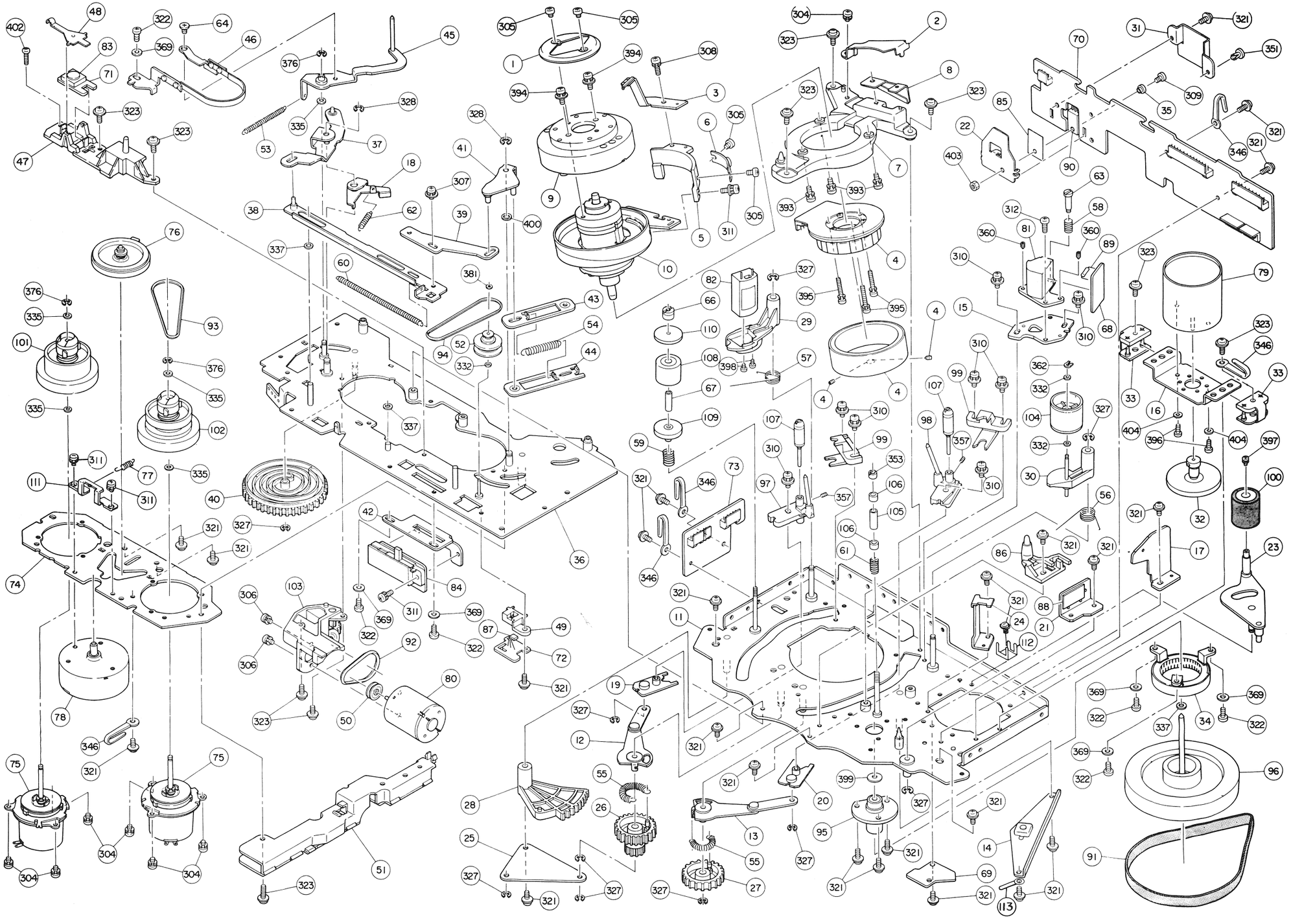
REF. NO.	PART NUMBER	DESCRIPTION
C711	VCEAAU2CW107M	100 mfd 16V
C712	VCKYPU2HB102K	1000 pfd 500V
C713	VCEAAU1VW107M	100 mfd 35V
C714	VCEAAU1VW337M	330 mfd 35V
C716⚠	RC-FZ003DPAZZ	3900 pfd AC125V
C717⚠	RC-FZ003DPAZZ	3900 pfd AC125V
		(FUSES)
F701⚠	QFS-B0007PAZZ	Fuse 4A 125V
F702⚠	QFS-B0007PAZZ	Fuse 4A 125V
F703⚠	QFS-B0006PAZZ	Fuse 1.25A 120V
F704⚠	QFS-B0001PAZZ	Fuse 315A 125V
	QFSHA0001PAZZ	Fuse Holder
		(TRANSFORMERS & COILS)
T202⚠	RTRNS0002PAZZ	Audio Output Transformer
T601⚠	RTRNZ0057PAZZ	Horiz. Driver Transformer
T701⚠	RTRNC0033CEZZ	Choke
T702⚠	RTRNP0087PAZZ	Power Transformer
FBT ⚠	RTRNF0004PAZZ	H.V. Flyback Transformer
L501	RCILZ0303CEZZ	Coil
L502⚠	RCILZ0082PAZZ	Coil
L701⚠	RCILF0048CEZZ	Coil
L702	RCILG0006PAZZ	Degausing Coil
		(MISCELLANEOUS)
K601–K603	DSOCN0259PAZZ	Socket Ass'y (3 Pin)
K604–K607	DSOCN0258PAZZ	Socket Ass'y (4 Pin)
K704–K705⚠	DSOCN0261PAZZ	Socket Ass'y (3 Pin)
	QSOCJ0019PAZZ	Socket
	QSOCJ0021PAZZ	Socket
IN	QPLGZ0108PAZZ	Plug (4 Pin)
IP	QPLGZ0144PAZZ	Plug (4 Pin)
IY	QPLGZ0147PAZZ	Plug (4 Pin)
IW	QPLGZ0148PAZZ	Plug (5 Pin)
IQ	QPLGN0610GEZZ	Plug (6 Pin)
DY 3⚠	QPLGZ0143PAZZ	Plug (6 Pin)
CY ⚠	QPLGZ0152PAZZ	Plug (2 Pin)
RY7001⚠	RRLYU0034PAZZ	Relay G2U-112 (12V)
RY7002	RRLYU0035PAZZ	Relay G2E-182P-H
101	LANGK0428PAZZ	Fixing Metal FBT
102	PRDAR1156CEFW	Heat Sink RT603
103	PRDAR5018CEFW	Heat Sink D-707

MONITOR MAIN P.W.B. CON'T

⚠ Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
104	PSLDM0238PAZZ	Shield Cover
105	LHLDW0014PAZZ	Wire Holder
106	XCBSN30P16000	Screw
107	XCTSD30P08000	Screw
108	XYBSD30P06000	Screw
109⚠	QPLGN0207CEZZ	Plug (2 Pin)
		(CRT PWB)
0851	VS2SC2229Y/IE	TR 2SC2229Y Transistor
0852	VS2SC2229Y/IE	TR 2SC2229Y Transistor
0853	VS2SC2229Y/IE	TR 2SC2229Y Transistor
R854	RVR-B4225CEZZ	VR 5K ohm (B) Variable Resistor
R857	RVR-B4223CEZZ	VR 300 ohm (B) Variable Resistor
R858	RVR-B4225CEZZ	VR 5K ohm (B) Variable Resistor
R862	RVR-B4225CEZZ	VR 5K ohm (B) Variable Resistor
R865	RVR-B4223CEZZ	VR 300 ohm (B) Variable Resistor
R868	VRS-PU3AB153J	1.5K ohm 1W Resistor
R870	VRS-PU3AB153J	1.5K ohm 1W Resistor
R872	VRS-PU3AB153J	1.5K ohm 1W Resistor
C504	RC-KZ9148PAZZ	0.01 mfd 3KV Capacitor
C505	RC-KZ9148PAZZ	0.01 mfd 3KV Capacitor
CRT	QSOCV0015PAZZ	Socket
		(SUB PWB)
IC801	RH-1X0093CEZZ	IC TA7608CP Transistor
Q201	VS2SC1815-Y-1	2SC1815(Y) Transistor
Q401	VS2SA562TMO-1	2SA562TMO Transistor
Q451	VS2SC1815-Y-1	2SC1815(Y) Transistor
Q458	VS2SC1815-Y-1	2SC1815(Y) Transistor
D201	RH-DX7502YAZZ	Diode 1S1588
D202	RH-DX7502YAZZ	Diode 1S1588
D401	VHERD12EB3/-1	Zener Diode (6.3V)
D405	VHD1S1585//-1	Diode 1S1585
D407	VHEHZ-6C2//-1	Zener Diode (12V)
R224	RVR-M0015PAZZ	VR 10K ohm (B) Variable Resistor
R454	RVR-M0013PAZZ	VR 4.7K ohm (B) Variable Resistor
R458	RVR-M0068PAZZ	VR 470 ohm (B) Variable Resistor
R479	RVR-M0010PAZZ	VR 1K ohm (B) Variable Resistor
R473	RVR-M0065PAZZ	VR 220 ohm (B) Variable Resistor
R490	RVR-M0013PAZZ	VR 4.7K ohm (B) Variable Resistor
R224	RVR-M0015PAZZ	VR 10K ohm (B) Variable Resistor
C401	VCEAAU1CW107M	100 mfd 16V Capacitor
C403	VCEALA1HW224M	0.22 mfd 50V Capacitor
C451	VCCCPR1H3680J	68 pfd 50V Capacitor

MAIN CHASSIS PARTS



MONITOR MAIN P.W.B. CON'T

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
C454	VCEAAU1CW107M	100 mfd 16V Capacitor
C456	VCEAAU1CW337M	330 mfd 16V Capacitor
C468	VCCCPR1H3680J	68 pfd 50V Capacitor
C805	VCCCPR1H3181J	180 pfd 50V Capacitor
C806	VCCCPR1H3560J	56 pfd 50V Capacitor
C807	VCCCPR1H3181J	180 pfd 50V Capacitor
C809	VCEALA1HW474M	0.47 mfd 50V Capacitor
C813	VCCCPR1H3390J	39 pfd (dch) 50V Capacitor
C814	VCEAAU1CW227M	220 mfd 16V Capacitor
C820	VCEALA1HW474M	0.47 mfd 50V Capacitor
C822	VCCCPR1H3101J	100 pfd 50V Capacitor
C824	RTO-H0001CEZZ	Trimmer Capacitor
C825	VCCCPR1H3100D	10 pfd 50V Capacitor
DL401	RC1LZ0292CEZZ	Coil
DL451	RMPTD0003VAZZ	Delay Line
L451	VP-MK220K0000	Peaking Coil 22 mh
L453	VP-MK220K0000	Peaking Coil 22 mh
L454	VP-MK682K0000	Peaking Coil 6.8 mh
L801	VP-MK272K0000	Peaking Coil 2.7 mh
L802	VP-MK220K0000	Peaking Coil 22 mh

MONITOR

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
K401	QPLGN0103CEZZ	Plug (1 Pin)
EY	QPLGZ0106PAZZ	Plug (2 Pin)
UI	QPLGZ0139PAZZ	Plug (3 Pin)
LK	QPLGZ0140PAZZ	Plug (4 Pin)
QI	QPLGN0610GEZZ	Plug (6 Pin)
SF	QPLGZ0020PAZZ	Plug (3 Pin)
RI	QPLGZ0057PAZZ	Plug (4 Pin)
NI	QPOGZ0108PAZZ	Plug (4 Pin)
KZ	QPLGZ0153PAZZ	Plug (5 Pin)
X801	RCRSA0009CEZZ	3.58MHz Crystal
		(AUTO REPEAT P.W.B)
IC2201	RH-IX0377PAZZ	IC TC4528BBP
IC2203	RH-IX0377PAZZ	IC TC4528BBP
IC2204	RH-IX0376PAZZ	IC TC4066BP
IC2205	RH-IX0069PAZZ	IC TA7555P
IC2206	RH-IX2012YAZZ	IC TC4011BP
IC2207	RH-IX0376PAZZ	IC TC4066BP
TR2001	VS2SC1815-Y-1	2SC1815(Y) Transistor
TR2003	VS2SC1815-Y-1	2SC1815(Y) Transistor
D2201	VHERD11EB3/-1	Zener Diode (11V)
D2202	RH-DX7502YAZZ	Diode 1S1588
D2203	RH-DX7502YAZZ	Diode 1S1588
D2207	VHERD10EB3/-1	Zener Diode (10V)
C2201	VCEALA1HW474K	0.47 mfd 50V Capacitor
C2212	VCEALA1CW336K	33 mf 16V Capacitor
C2231	VCCCPR1H3221J	220 pfd 50V Capacitor
C2232	VCCCPR1H3221J	220 pfd 50V Capacitor
T201⚠	RTRNS0001PAZZ	Audio Transformer
Y1	QPLGZ0147PAZZ	Plug (4 Pin)
YK	QPLGZ0141PAZZ	Plug (5 Pin)
YF	QPLGZ0151PAZZ	Plug (6 Pin)
YP	QPLGN0810GEZZ	Plug (8 Pin)
YE	QPLGZ0106PAZZ	Plug (2 Pin)
YC ⚠	QPLGZ0152PAZZ	Plug (2 Pin)

TIMER AND FUNCTION CONTROL P.W.B.

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
IC5001	VHIMP281SLIE	IC MP2812SL
Q5001	VS2SA937Q//-1	2SA937Q Transistor
Q5002	VS2SC2021-R-1	2SC2021R Transistor
Q5003	VS2SA937Q//-1	2SA937Q Transistor
Q5004	VS2SC2021-R-1	2SC2021R Transistor
Q5005	VS2SC2021-R-1	2SC2021R Transistor
D5001	VHD1S1586//-1	Diode 1S1586
D5009	VHD1S1586//-1	Diode 1S1586
D8110	VHPGL5HD10/-1	Diode GL-5HD10
D8111	VHPGL5NG10/-1	Diode GL-5NG10
R5001	RR-KZ2029YAZZ	Resistor Ass'y 50K ohm X 8
R5011	RR-KZ2029YAZZ	Resistor Ass'y 50K ohm X 8
R8101	RVR-P0001PAZZ	VR 10K ohm Variable Resistor
C5001	VCCSAT1HL101J	100 pfd 50V Capacitor
C5002	VCKYAT1HB331K	330 pfd 50V Capacitor
C5004	VCKYAT1HB471K	470 pfd 50V Capacitor
C5005	VCEAAU1CW107M	100 mfd 16V Capacitor
C5008	VCEAAU1EW107M	100 mfd 25V Capacitor
C5009	VCEAAU1EW107M	100 mfd 25V Capacitor
C5010	VCKYAT1HB561K	560 pfd 50V Capacitor
C5011	VCKYAT1HB561K	560 pfd 50V Capacitor
F5001	RF1LA0001GEZZ	Filter 400KHz
FP	DSOCN0277PAZZ	Socket Ass'y (3 Pin)
FS	DSOCN0278PAZZ	Socket Ass'y (3 Pin)
FY	DSOCN0279PAZZ	Socket Ass'y (8 Pin)
TA	QPLGZ0149PAZZ	Plug (10 Pin)
HA	QPLGZ0168PAZZ	Plug (13 Pin)
SW5001—5006	QSW-P0035PAZZ	Switch
K5BT	VVK5BT24Z//-1	Flouresent Indicator
LED	PSPAK2030YAZZ	Spacer

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(MAIN CHASSIS PARTS)
1	PCOVP3006GEFW	Video Head Leads Cover
2	PSLDM3248GEFW	Drum Lead Shield Case
3	QBRSK0012GEZZ	Ground Brush Ass'y
4	RMOTP1027CEZZ	D.D. Motor Ass'y
5	LHLDZ3016GEFW	Heater Holder
6	RHETP0001GEZZ	PTC Heater
7	PGIDC0011GEZZ	V Base Ass'y
8	PCOVP3007GEFW	Video Head Amp Lead Plate
9	DDRMU0002HE01	Upper Drum Ass'y
10	DDRML0002HE00	Bottom Drum Ass'y
12	MARMM0033GEZZ	Loading Arm Ass'y (A)
13	MARMM0034GEZZ	Loading Arm Ass'y (B)
14	LANGF9116GEZZ	Fly Angle Ass'y
15	LDAIH1007GEFW	Audio/Control Head Plate
16	LANGT9046GEFW	Capstan Motor Table
17	LANGF9117GEZZ	Cassette Cover Open Ass'y
18	MLEVF0137GEZZ	Auxiliary Brake Ass'y
19	PGIDH0018GEZZ	Slider Ass'y (A)
20	PGIDH0019GEZZ	Slider Ass'y (B)
21	LANGT9047GEFW	Dew Sensor Plate
22	LANGQ9005GEFW	Transistor Heat Sink
23	MLEVF0129GEZZ	Pinch Roller Lever Ass'y
24	LANGA0017GEFW	Angle Bracket
25	LANGF9122GEFW	Loading Gear Plate
26	NGERH1021GEZZ	Loading Gear Ass'y (A)
27	NGERH1022GEZZ	Loading Gear Ass'y (B)
28	NGERH1023GEZZ	Segment Gear Ass'y
29	MARMP0015GEZZ	Erase Head Arm
30	MARMP0016GEZZ	Take-Up Impedance Roller Arm
31	PCOVQ9004GEZZ	Transistor Cover
32	NPLYV0067GEZZ	Capstan Motor Pulley Ass'y
33	PZETN0002GEZZ	Motor Insulating Plate
34	RSTR-0019GEZZ	NTSC PG Stator Ass'y (L)
35	PZETN0003GEZZ	Transistor Insulating Bush
37	MARMM0035GEZZ	Shifter Arm Ass'y
38	MSLIF0006GEZZ	Shifter Ass'y (A8010)
39	MSLIF0007GEFW	Shifter (8010)
40	MGERH1024GEZZ	Master Cam
41	MLEVF0030GEZZ	Pinch Drive Lever Ass'y (8010)
42	LANGQ9006GEFW	Slider Switch Angle (8010)
43	MLEVF0131GEFW	Upper Pinch Lever
44	MLEVF0132GEFW	Lower Pinch Lever

Indicates a Safety Related Part

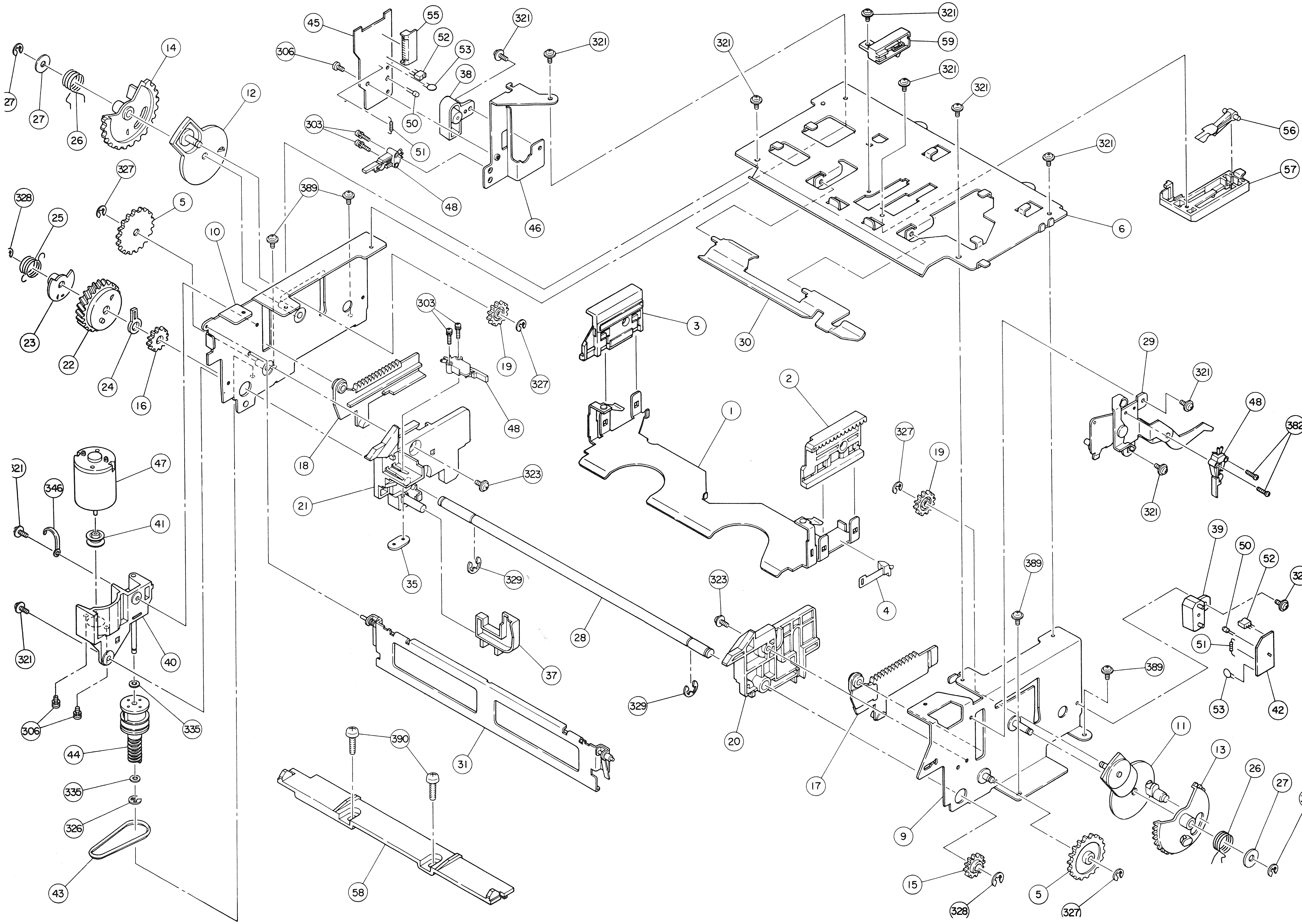
REF. NO.	PART NUMBER	DESCRIPTION
45	MLEVF0133GEZZ	Tension Arm Ass'y (8010)
46	LBNDK3010GEZZ	Tension Band Ass'y (8010)
47	LHLDZ1066GEOO	Cassette Down Switch Holder
48	MLEVF0135GEFW	Cassette Down Lever
49	LHLDZ1067GEOO	Reel Sensor Holder (8010)
50	NPLYV0036GEZZ	Loading Motor Pulley
51	LHLDW1025GEZZ	Lead Holder (8010)
52	PMAGP1002GEZZ	Reel
53	MSPRT0138GEFJ	Tension Arm Spring
54	MSPRT0139GEFJ	Pinch Pressure Spring
55	MSPRT0140GEFJ	Reciprocating Spring
56	MSPRD0029GEFJ	T/U Roller Arm Spring
57	MSPRD0030GEFJ	Erase Head Arm Spring
58	MSPRC0006GEFJ	Audio/Control Head Spring
59	MSPRC0015GEFJ	Adjust Spring (A)
60	MSPRT0141GEFJ	Shifter Spring
61	MSPRC0016GEFJ	Adjust Spring (B)
62	MSPRT0143GEFJ	Auxiliary Brake Spring
63	LX-BZ3018GEZZ	A/C Head Screw
64	LX-BZ3026GEFD	Tension Spacer
66	LX-NZ3008GEFW	Adjust Nut
67	NSFTL0215GEFW	Supply Impedance Roller Inner
75	RPLU-0062GEZZ	Reel Brake Ass'y
76	NIDL-0005GEZZ	Reel Idler Ass'y
77	MSPRT0169GEFJ	Reel Idler Spring
78	RMOTV1004GEZZ	Reel Motor Ass'y
79	RMOTP1026GEZZ	Capstan Motor Ass'y (8010)
80	RMOTM1017GEZZ	Loading Motor Ass'y
81	RHEDU0014GEZZ	A/C Head Ass'y (710)
82	RHEDT0003GEZZ	Full Erase Head Ass'y
83	QSW-K0008GEZZ	Cassette Down Switch
84	QSW-S0032GEZZ	Slider Switch (8010)
85	PZETM0006CEZZ	Transistor Insulating Plate
86	RLMPM0008GEZZ	Cassette Lamp
87	VHIDN6838//-1	Reel Sensor
88	RDTCH0005GEZZ	Dew Sensor
89	VRD-RA2EE100J	Resistor
90	VS2SD880-Y/-1	Transistor
91	NBLTH0022GE00	Capstan Belt (8010)
92	NBLTK0020GE00	Loading Belt (8010)
93	NBLTK0010GE00	Counter Belt (A)
94	NBLTK0021GE00	Counter Belt (B)
95	NBRGC0015GEZZ	Capstan Holder Ass'y (8010)

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
96	NFLYV0021GEZZ	Capstan Flywheel Ass'y (8010)
97	LPOLM0013GEZZ	Pole Base Ass'y (A)
98	LPOLM0014GEZZ	Pole Base Ass'y (B)
99	PGIDC0010GEFW	V. Block
100	NROLR0005GEZZ	Pinch Roller Ass'y
101	NDAIV1013GEZZ	Supply Reel Disk Ass'y (8010)
102	NDAIV1014GEZZ	Take-Up Reel Disk Ass'y (8010)
103	NPLYV0096GEZZ	Loading Block Ass'y (8010)
104	NROLM0010GEZZ	Impedance Roller Ass'y
105	PGIDP0001GEFW	Fix Guide
106	PGIDP0003GEFW	Guide Flange (B)
107	NROLP0007GEZZ	Guide Roller Ass'y
108	NROLM0011GEZZ	Supply Impedance Roller Ass'y
109	PGIDS0004GEZZ	Supply Impedance Roller Flange (A)
110	PGIDS0005GEZZ	Supply Impedance Roller Flange (B)
111	LANGK0066GEFW	Reel Idler Spring Bracket
112	QEARP0015GEFW	Ground Terminal Plate
113	QHWS-0004CEFN	Terminal Lug

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(RESISTORS)
R792	VRS-PU3DB330J	33 ohm 2W
R801	VRS-PU3DB390J	39 ohm 2W
R802	VRS-PU3DB390J	39 ohm 2W
R820	VRS-PU3DB680J	68 ohm 2W
R9001	VRD-RU2EE153J	15K ohm 1/4W
R9002	VRD-RU2EE181J	180 ohm 1/4W
R9003	VRD-RA2EE471J	470 ohm 1/4W
R9004	95KUEZ0025ZZ/	1K ohm 1/4W
R9005	VRD-RU2EE333J	33K ohm 1/4W
R9006	VRD-RA2EE104J	100K ohm 1/4W
R9007	VRD-RA2EE104J	100K ohm 1/4W
R9008	95KUEEB104AJ/	100K ohm
R9009	VRD-RU2EE103J	10K ohm 1/4W
R9010	95KUEEB104AJ/	100K ohm
R9011	VRD-RU2EE103J	10K ohm 1/4W
R9012	VRD-RA2EE102J	1K ohm 1/4W
R9013	VRD-RU2EE472J	4.7 ohm 1/4W
R9014	VRD-RU2EE222J	2.2K ohm 1/4W
R9015	VRD-RU2EE122J	1.2 ohm 1/4W
R9016	VRD-RU2EE681J	680 ohm 1/4W
R9018	VRD-RU2EE222J	2.2K ohm 1/4W
R9020	VRD-RU2EE333J	33K ohm 1/4W
R9021	VRD-RU2EE471J	470 ohm 1/4W
R9023	VRD-RU2EE222J	2.2K ohm 1/4W
R9024	VRD-RU2EE471J	470 ohm 1/4W
R9027	VRD-RU2EE333J	33K ohm 1/4W



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Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(CAPACITORS)
C204	VCEAAA1CW107M	100μF 16V
C418	RC-EZ0025GEZZ	
C466	VCEAAA1AW107M	100μF 10V
C603	VCEAAA1AW227M	220μF 10V
C621	VCEAAA1CW227M	220μF 16V
C626	VCEAAA1CW227M	220μF 16V
C631	VCOPSC2GA273K	0.027μF 400V
C702	VCEAAA1CW107M	100μF 16V
C727	VCEAAA1CW107M	100μF 16V
C751	VCEAAAQJW227M	220μF 6.3V
C803	VCEAAA1CW107M	100μF 16V
C902	VCKYPB2HE103P	0.01μF 500V
C903	VCEAAA2AW476M	47μF 100V
C904	VCEAAA1EW227M	220μF 25V
C9001	95KUGCZ103AC/	0.01μF AC250V
C9002	VCEAAU1HWA05M	1μF 50V
C9003	95KUGZ0085ZZ/	4700μF 50V
C9004	VCEAAU1HW225M	2.2μF 50V
C9005	95KUGFF103AF/	0.01μF
C9006	95KUGFF333AF/	0.033μF
C9007	95KUGAC102AK/	1000μF 10V
C9008	VCEAAU1CW226M	22μF 16V
C9009	95KUGAF100AK/	10μF 50V
C9010	VCEAAU1CW476M	47μF 16V
C9011	95KUGZ0086ZZ/	220pF
C9012	95KUGFF103AF/	0.01μF
C9013	95KUGFF333AF/	0.033μF
C9014	95KUGFF103AF/	0.01μF
C9015	VCEAAU1CW107M	100μF 16V
C9016	95KUGZ0137ZZ/	0.047μF 25V
C9017	95KCZ103AA///	0.01μF 500V
C9018	95KCZ103AA///	0.01μF 500V
C9019	95KUGZ0147ZZ/	0.047μF 25V
		(TRIMMER CAPACITORS)
C218	RTO-H1005GEZZ	50pF, Carrier
C311	RTO-H1006GEZZ	50pF Peak Freq.
C518	RTO-H0001CEZZ	20pF A.P.C.
C547	RTO-H0001CEZZ	20pF A.P.C.

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(MISCELLANEOUS)
X501	RCRSA0009CEZZ	3.58MHz Crystal, Color APC
X502	RCRSB0009GEZZ	Crystal, Playback Reference
RY801	RRLYZ0010GEZZ	Relay
RY802	RRLYZ0010GEZZ	Relay
RY903	RRLYZ0010GEZZ	Relay

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(DIODES)
D202	VHD1SS16-2/1E	
D203	VHD1SS16-2/1E	
D204	RH-DX0142CEZZ	
D401	RH-DX0142CEZZ	
D404	RH-DX0142CEZZ	
D419	RH-DX0142CEZZ	
D504	VHDERB1201/-1	
D701	RH-DX0048CEZZ	
D702	RH-DX0048CEZZ	
D703	RH-DX0048CEZZ	
D704	RH-DX0048CEZZ	
D705	RH-DX0048CEZZ	
D706	RH-DX0048CEZZ	
D707	RH-DX0048CEZZ	
D708	RH-DX0048CEZZ	
D709	RH-DX0048CEZZ	
D710	RH-DX0048CEZZ	
D711	RH-DX0048CEZZ	
D712	RH-DX0048CEZZ	
D713	RH-DX0048CEZZ	
D714	RH-DX0048CEZZ	
D715	RH-DX0048CEZZ	
D716	RH-DX0048CEZZ	
D717	RH-DX0048CEZZ	
D801	RH-DX0048CEZZ	
D805	VHDERB1201/-1	
D806	VHDERB1201/-1	
D807	VHDERB1201/-1	
D817	VHD1N60///-1	
D901	RH-DX0126CEZZ	
D902	VHD1SS81///-1	
D903	VHD1SS81///-1	
D904	RH-EX0045TAZZ	
D905	RH-EX0010GEZZ	
D906	RH-DX0108CEZZ	
D9001	RH-DX0008GEZZ	Diode S4VB10
D9002	95K1SS55/////	Diode 1SS55
D9003	95KUBZ0010ZZ/	Diode GU-3SY
D9004	95K1SS55/////	Diode 1SS55
D9006	95KUBD0031BZ/	Diode RD-9.1JB1
D9007	95KUBD0120CZ/	Diode RD-9.1EB2

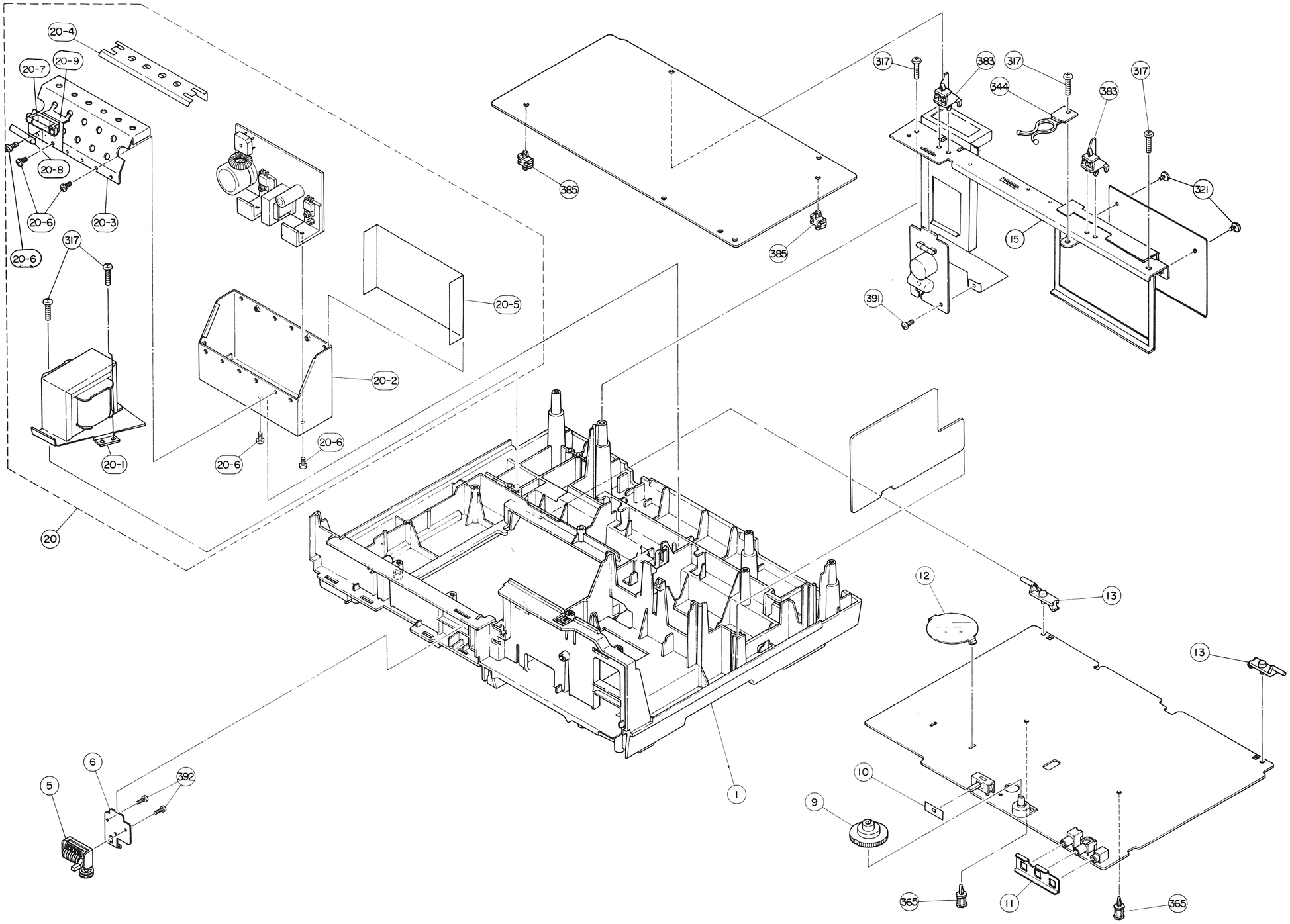
Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
	(POWER SWITCH)	(P.W.B.)
D2001	VHD1S1586//-1	Diode 1S1586
D2002	VHD1S1586//-1	Diode 1S1586
D2003	VHPGL5HD10/-1	Diode GL-5HD10
D2004	VHPGL5NG10/-1	Diode GL-5NG10
D2005	VHPGL5NG10/-1	Diode GL-5NG10
D2006	VHPGL5NG10/-1	Diode GL-5NG10
D2007	VHPGL5HD10/-1	Diode GL-5HD10
D2008	RH-DX7502YAZZ	Diode 1S1588
D2009	RH-DX7502YAZZ	Diode 1S1588
PI	QPLGN0016PAZZ	Plug (7 Pin)
PY	QPLGN1110GEZZ	Plug (11 Pin)
SW2001	QSW-P0041PAZZ	Switch
SW2002	QSW-P0041PAZZ	Switch
SW2003	QSW-P0041PAZZ	Switch
SW2004	QSW-P0041PAZZ	Switch
LED	PSPAK0017PAZZ	Spacer
RY2001	RRLYU0036PAZZ	Relay LAD1 (12V)
RY2002	RRLYU0036PAZZ	Relay LAD1 (12V)
	(HEADPHONE)	(P.W.B.)
	QJAKJ0001VAZZ	Jack
	DSOCN0269PAZZ	Socket Ass'y

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
	(TRANSISTORS)	(V.C.R. ELECTRONIC COMPONENTS)
Q202	VS2SA933-Q/-1	
Q203	VS2SA933-Q/-1	
Q301	VS2SC1740-Q1E	
Q303	VS2SC1923-Q1E	
Q402	VS2SA933-Q/-1	
Q403	VS2SC1740-Q1E	
Q501	VS2SC1740-Q1E	
Q602	VS2SD655-D/-1	
Q603	VS2SD655-D/-1	
Q605	VS2SC2240BL1E	
Q606	VS2SC2240BL1E	
Q608	VS2SD655-D/-1	
Q610	VS2SD655-D/-1	
Q611	VS2SC496-Y/-1	
Q710	VS2SD882-Q/1E	
Q712	VS2SD882-Q/1E	
Q717	VS2SD882-Q/1E	
Q801	VS2SA673-C/1E	
Q802	VS2SA673-C/1E	
Q902	VS2SC1827//2E	
Q903	VS2SC2240BL1E	
Q904	VS2SA970-BL1E	
Q8001	VS2SD880-Y/-1	
Q8097	VS2SD636-Q/1E	
Q8098	VS2SD636-Q/1E	
Q9001	95KUAA0020SZ/	TR2SA770Y
Q9002	95KUAA0021BZ/	TR2SA697C
Q9003	VS2SC1815YW-1	TR2SC1815Y
Q9004	VS2SC1815YW-1	TR2SC1815Y
Q9005	VS2SA1015Y/1E	TR2SA1015Y
Q9006	95KUAC0026TZ/	TR2SC1983
	RH-PX0001GEZZ	Photo Transistor (End of tape sensor)

MECHANICAL V.C.R PARTS



Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
	(IC'S)	(V.C.R. ELECTRONIC COMPONENTS)
I201	VHIAN6310//-1	
I301	VHISAB063//-1	
I302	VHIAN6320N/-1	
I401	VHIAN6332//-1	
I402	VHIHA11703/-1	
I501	VHIAN6360//-1	
I502	VHIAN6361N/-1	
I503	VHIAN6362//-1	
I504	VHIAN6342N/-1	
I601	VHIAN262///-1	
I701	VHIAN6344//-1	
I702	VHIAN6341N/-1	
I703	VHISH1009//-1	
I704	VHISH1010//-1	
I705	VHIHA17458P-1	
I706	VHIHD14027P-1	
I707	VHIM51724//1E	
I708	VHISH1007//-1	
I801	VHIUPA53C//-1	
I802	VHISTA401//-1	
I803	RH-IX0056GEZZ	
I804	VHITD62105/-1	
I805	VHITD62705PIE	
I806	VHITD62705PIE	
I807	VHITD62705PIE	
I901	RH-IX0037CEZZ	
I8001	VHITC4081BP-1	
I8002	VHINJM2901N-1	
IC9001	95KUCZ0007ZZ/	
	VHIDN6838//-1	

Includes a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
L9005	95KUKZ0007ZZ/	Coil
FL201	RMPTD0035GEZZ	Filter, Low Pass
FL301	RMPTD0041GEZZ	Filter, 629KHz Low Pass
FL401	RMPTD0036GEZZ	Filter, Low Pass
FL402	RMPTD0096GEZZ	Filter, Low Pass
FL501	RMPTD0039GEZZ	Filter, 3.58MHz P.B. Chroma
FL503	RMPTD0038GEZZ	Filter, 4.2MHz, Band Pass
FL504	RMPTD0037GEZZ	Filter, 3.58MHz, Band Pass
		(SWITCHES)
	QSW-F0004GEZZ	Cassette Switch
	QSW-M0019GEZZ	Skelton Switch
	QSW-S0020GEZZ	Record Speed Selector
	QSW-F0013GEZZ	Leaf Switch
		(VARIABLE RESISTORS)
R211	RVR-B4060GEZZ	5K ohm, Deviation
R214	RVR-B4060GEZZ	5K ohm, Deviation
R215	RVR-B4060GEZZ	5K ohm, Deviation
R232	RVR-B4059GEZZ	2K ohm, Record FM Level
R304	RVR-B4056GEZZ	200 ohm, Record Balance
R310	RVR-B4058GEZZ	1K ohm, Channel Dump
R313	RVR-N4059GEZZ	2K ohm, Record FM Level
R315	RVR-B4058GEZZ	1K ohm, Channel Dump
R323	RVR-B4059GEZZ	2K ohm, Record FM Level
R486	RVR-B4460CEZZ	1K ohm, Playback Level
R534	RVR-B4057GEZZ	500 ohm, AFC
R645	RVR-B4466CEZZ	200K ohm, Bias Current
R709	RVR-B4150GEZZ	50K ohm
R721	RVR-B4064GEZZ	50K ohm, CH-1, 2 & Record Phase
R722	RVR-B4064GEZZ	50K ohm, CH-1, 2 & Record Phase
R724	RVR-B4065GEZZ	100K ohm, Record Phase
R734	RVR-B4062GEZZ	20K ohm, SP Capstan Lock
R745	RVR-B4065GEZZ	100K ohm, Record Phase
R755	RVR-B4771CEZZ	100K ohm
R775	RVR-B4064GEZZ	50K ohm, CH-1, 2 & Record Phase
R7731	RVR-B4024GEZZ	Tracking Control
R9017	95KUFZ0021ZZ/	VR 300 ohm (B)
R9022	95KUFZ0021ZZ/	VR 300 ohm (B)

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(FUSES & FUSE HOLDERS)
	QFSHD1002CEZZ	Fuse Holder
R646	RR-XZ0003GEZZ	Fuse Resistor
	RLMPM0008GEZZ	Cassette Lamp
R657	RR-XZ0010GEZZ	Fuse Resistor
R667	RR-XZ0010GEZZ	Fuse Resistor
R901	QFS-B1621GEZZ	Fuse
F-1	95KPJC0106ZZ/	Fuse 2A 125V
	95KUEZ0054ZZ/	Fuse Resistor
		(TRANSFORMERS)
	RTRNP0073GEZZ	Power Transformer
T601	RTRNH0005GEZZ	OSC Transformer
T901	RTRNH0015GEZZ	OSC Transformer
		(COILS & INDUCTORS & FILTERS)
DL401	RCILZ0094GEZZ	Delay Line
DL501	RCILZ0069GEZZ	Delay Line
L201	VP-DF221K0000	220 mh, Decoupling
L202	VP-DF221K0000	220 mh, Decoupling
L203	VP-DF470K0000	47 mh, Matching
L204	VP-DF680K0000	68 mh, High Pass
L205	VP-DF181K0000	180 mh, Trap
L301	VP-DF330K0000	33 mh, Trap
L302	VP-DF3R3K0000	3.3 mh, Trap
L303	VP-DF3R3K0000	3.3 mh, Trap
L304	VP-DF120K0000	Coil
L305	VP-LK2R7K0000	2.7 mh, Peaking
L306	VP-DF151K0000	150 mh, Trap
L307	VP-LK680K0000	Coil
L401	VP-DF221K0000	220 mh, Decoupling
L402	VP-CF221K0000	220 mh, Decoupling
L403	VP-CF471K0000	470 mh, Choke
L404	VP-CF471K0000	470 mh, Choke
L405	VP-DF8R2K0000	8.2 mh, Matching
L406	VP-DF8R2K0000	8.2 mh, Matching
L407	VP-CF221K0000	220 mh, Decoupling
L409	VP-DF101K0000	1000 mh, Low Pass Filter
L503	VP-DF390K0000	39 mh, Low Pass Filter
L504	VP-DF220K0000	Peaking Coil
L505	VP-DF220K0000	Peaking Coil
L506	VP-DF680K0000	68 mh, High Pass
L507	VP-DF560K0000	56 mh, Filter

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
L508	RCILP0014GEZZ	Coil
L511	VP-CF181K0000	180 mh, Filter
L602	RCILP0002GEZZ	
L613	RCILP0008GEZZ	2.2 mh, Trap
L901	RCILP0010GEZZ	Coil
L901	RCILP0019GEZZ	Coil
L9001	95K831030001/	Choke
L9002	95K831030002/	Choke
L9003	95K831030003/	Choke
L9004	95KUKZ0007ZZ/	Coil

MECHANICAL V.C.R. PARTS

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
		(CONNECTORS)
	QJAKA0010CEZZ	Remote Jack
	QJAKE0005GEZZ	Audio Jack
	QJAKE0013GEZZ	Video Jack
	QPLGN0212GEZZ	2 Pin Plug
OA	QPLGN0304CEZZ	Plug OA, TP (3 Pin)
TP	QPLGN0304CEZZ	Plug OA, TP (3 Pin)
CE	QPLGN0310GEZZ	Plug CE, TP (3 Pin)
TP	QPLGN0310GEZZ	Plug CE, TP (3 Pin)
	QPLGN0312GEZZ	Plug (3 Pin)
CG	QPLGN0510GEZZ	Plug CF, AK, TP, CG (5 Pin)
TP	QPLGN0510GEZZ	Plug CF, AK, TP, CG (5 Pin)
CF	QPLGN0510GEZZ	Plug CF, AK, TP, CG (5 Pin)
AK	QPLGN0510GEZZ	Plug CF, AK, TP, CG (5 Pin)
	QPLGN0512GEZZ	Plug (5 Pin)
AC	QPLGN0603CEZZ	Plug AC (6 Pin)
AP	QPLGN0610GEZZ	Plug AP, CD (6 Pin)
CD	QPLGN0610GEZZ	Plug AP, CD (6 Pin)
CA	QPLGN0710GEZZ	Plug CA, KD (7 Pin)
KD	QPLGN0710GEZZ	Plug CA, KD (7 Pin)
AB	QPLGN0810GEZZ	Plug AB (8 Pin)
TP	QPLGN0907CEZZ	Plug TP
	QPLGN0912GEZZ	Plug (9 Pin)
	QPLGN1112GEZZ	Plug (11 Pin)
KJ	QPLGN1206GEZZ	Plug KJ
KE	QPLGN1210GEZZ	Plug KE (3 Pin)
AM	QPLGN1410GEZZ	Plug AM (14 Pin)
CB	QPLGN1510GEZZ	Plug CB (15 Pin)
	QPLGN1412GEZZ	Plug (14 Pin)
AD	QPLGN0210GEZZ	Plug AD (2 Pin)
KG	QPLGN0406GEZZ	Plug KG (4 Pin)
KB	QPLGN0410GEZZ	Plug KB (4 Pin)
KH	QPLGN0606GEZZ	Plug KH (6 Pin)
AS	QPLGN1331GEZZ	Plug AS (13 Pin)
		(MECHANICAL V.C.R. PARTS)
1	GCABB1008GEKA	Bottom Cabinet
5	KCOUB0021GEZZ	Tape Counter
6	LANGF9112GEZZ	Counter Bracket
9	JKNBK1011GESA	Tracking Knob
10	PSPAH0010GEZZ	Spacer
11	PSPAV0009GEZZ	Spacer
12	PZETV0055GEZZ	Insulating Plate

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
13	NSFTP0005GEZZ	Servo P.W.B. Hinge
15	LANGQ9029GEZZ	Rear Angle Bracket
20-2	95KLHZ0103ZD/	Case
20-3	95KLHZ0102ZD/	Case
20-6	95KPZZ0110ZZ/	Fuse Holder
20-7	95KHZZ0164ZZ/	Fuse Cover
20-8	95KLZZ0093ZP/	Fuse Holder Bracket
20-43	95KGPZ99021Z/	Sheet
20-54	95KGPZ99020Z/	Case
20-65	95KPAZ3010ZB/	Screw

(SCREWS, NUTS & WASHERS)

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
303	XBPSD20P10J00	Pan Head
304	XBPSD30P04J00	Pan Head
305	XBPSD30P04000	Pan Head
306	XBPSD30P05J00	Pan Head
307	XBPSD30P06JS0	Pan Head
308	XBPSD30P06J00	Pan Head
309	XBPSD30P06000	Pan Head
310	XBPSD30P08JS0	Pan Head
311	XBPSD30P08J00	Pan Head
312	XBPSD30P08000	Pan Head
317	XEBSD40P16000	Fillister Head
321	XHPSD30P06WS0	Pan Head
322	XHPSD30P06000	Pan Head
323	XHPSD30P08WS0	Pan Head
325	XLHAZ20-6000	Binder Head
326	XRESJ20-04000	E-Ring
327	XRESJ30-06000	E-Ring
328	XRESJ40-06000	E-Ring
329	XRESJ50-06000	E-Ring
332	XWHJZ21-05045	Binder Head
333	XWHJZ31-01054	Binder Head
334	XWHJZ31-02054	Binder Head
335	XWHJZ31-05054	Binder Head
337	XWHJZ42-05070	Binder Head
346	LHLDW9003CEZZ	Wire Clamp
351	LX-LZ1002GE09	
353	LX-NZ3005GEFW	Oval Head
357	LX-XZ3001GEFP	
360	LX-XZ3013GEFP	
362	LX-RZ3001GEFP	Hexagon Head
363	XJBSD30P10000	Fillister Head
366	XHPS030P08WSO	Flat Head
369	XWHSD31-05080	Binder Head
372	XWHSD31-05060	Binder Head
375	XWHJZ21-05045	Binder Head
376	XRESJ25-04000	E-Ring
380	LX-HZ3008GEFD	Binder Head
381	XWHJZ17-05040	Binder Head
382	XBPSD20P08J00	Pan Head
383	MHNG-0005GEZZ	Oval Head
392	XJBSD26P06000	Fillister Head

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
53	VCKZPA1HF103Z	Capacitor
54	PSPAZ0017GEZZ	Set Door Collar
55	QPLGN0912GEZZ	Plug (9 Pin)
56	MLEVP0047GEZZ	Insertion Error Lever
57	LHLDZ1070GEZZ	Insertion Error Lever
58	PGIDM0017GEOO	Cassette Down Guide
59	QSW-F0004GEZZ	Cassette Switch

(SCREWS, NUTS & WASHERS)

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
303	XBPSD20P10J00	Pan Head
304	XBPSD30P04J00	Pan Head
305	XBPSD30P04000	Pan Head
306	XBPSD30P05J00	Pan Head
307	XBPSD30P06JS0	Pan Head
308	XBPSD30P06J00	Pan Head
309	XBPSD30P06000	Pan Head
310	XBPSD30P08JS0	Pan Head
311	XBPSD30P08J00	Pan Head
312	XBPSD30P08000	Pan Head
317	XEBSD40P16000	Fillister Head
321	XHPSD30P06WS0	Pan Head
322	XHPSD30P06000	Pan Head
323	XHPSD30P08WS0	Pan Head
325	XLHAZ20-6000	Binder Head
326	XRESJ20-04000	E-Ring
327	XRESJ30-06000	E-Ring
328	XRESJ40-06000	E-Ring
329	XRESJ50-06000	E-Ring
332	XWHJZ21-05045	Binder Head
333	XWHJZ31-01054	Binder Head
334	XWHJZ31-02054	Binder Head
335	XWHJZ31-05054	Binder Head
337	XWHJZ42-05070	Binder Head
346	LHLDW9003CEZZ	Wire Clamp
351	LX-LZ1002GE09	
353	LX-NZ3005GEFW	Oval Head
357	LX-XZ3001GEFP	
360	LX-XZ3013GEFP	
362	LX-RZ3001GEFP	Hexagon Head
363	XJBSD30P10000	Fillister Head
366	XHPS030P08WSO	Flat Head
369	XWHSD31-05080	Binder Head
372	XWHSD31-05060	Binder Head
375	XWHJZ21-05045	Binder Head
376	XRESJ25-04000	E-Ring
380	LX-HZ3008GEFD	Binder Head
381	XWHJZ17-05040	Binder Head
382	XBPSD20P08J00	Pan Head
383	MHNG-0005GEZZ	Oval Head
392	XJBSD26P06000	Fillister Head

(SCREWS, NUTS & WASHERS)

Indicates a Safety Related Part

REF. NO.	PART NUMBER	DESCRIPTION
393	XBPSD30P10J00	Pan Head
395	XBPSD20P17J00	Pan Head
396	XBPSD26P03000	Pan Head
397	XBPSD26P04J00	Pan Head
398	XBPSD20P03000	Pan Head
399	XWHJZ34-05100	Binder Head
400	XWHJZ52-05080	Binder Head
401	LX-XZ3016GEFP	Set Screw
402	XJBSD30P10000	Fillister Head
403	XNESD30-02000	E-Ring
404	XWSSD26-06000	Washer

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