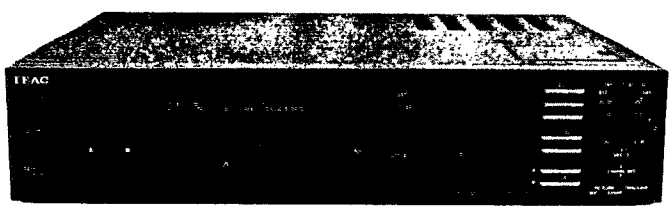
TEAC®



SERVICE MANUAL

PAL

VHS

MV-400

Video Cassette Recorder

General Description

This manual provides service information for our VHS player.
The manual describes the principles and adjustments of mechanical and electrical operation for this model.
Service procedures given herein cover only field maintenance services.
Adjustments which require high-level instruments, jigs and techniques are excluded, since they should be performed at the factory.
Due to design modifications, the servicing procedures and data given in this manual are subject to possible change without prior notice.

Important Safety Precaution

Prior to shipment from the factory, our products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

• Precautions during Servicing

1. Parts identified by the ⚠ symbol are critical for safety.
   Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements.
   Examples: RF converters, RF cables,
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
5. When replacing AC primary side components (transformers, power cords, etc.), wrap ends of wires securely about the terminals before soldering.
6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.
9. Also check areas surrounding repaired locations.
10. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.
11. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.
    Replacement procedure
    1) Remove the old connector by cutting the wires at a point close to the connector.
       Important: Do not re-use a connector (discard it).
    2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
    3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
    4) Use the crimping tool to crimp the metal sleeve at the center position.
       Be sure to crimp fully to the complete closure of the tool.

• Safety Check after Servicing

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, video and audio output terminals, etc.).

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio output terminals, etc.).

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance.

4. **Leakage current test**

Ultra-miniaturized "Chip" Parts

1. In place of conventional resistors and capacitors, this model uses miniature chips to perform these functions. Although these contribute substantially to miniaturization of the product, certain precautions are required in their handling and replacement.
   1) Chip parts are soldered directly to the copper pattern of the circuit board. Due to their small size, tweezers and other tools suitable for handling small objects are required.
   2) For soldering, use a thin, high insulation, soldering "pencil" in the 20 watt range (less than 30 watts is recommended). Perform soldering and unsoldering quickly (within 2 or 3 seconds) to avoid overheating.
   3) Removed chip parts cannot be re-used.
   4) Since ratings and values are not marked on the chip parts, use care to stock them in an orderly manner.

2. Unsoldering
   1) Use a suction type or similar desoldering tool to unsolder both ends of the chip part.
   2) Grasp chip part with tweezers and while carefully heating with the soldering pencil, remove part with a twisting motion.

3. Soldering
   1) Pre-solder the points of the pattern to which the chip part is to be mounted.
   2) Press the chip part against the circuit board and solder both ends.

4. Chip Parts Interchangeability
   In some cases, chip parts can be replaced with conventional parts (holes may be present to allow insertion of part leads).

Mechanical Description

1. TAPE TRANSPORT SYSTEM

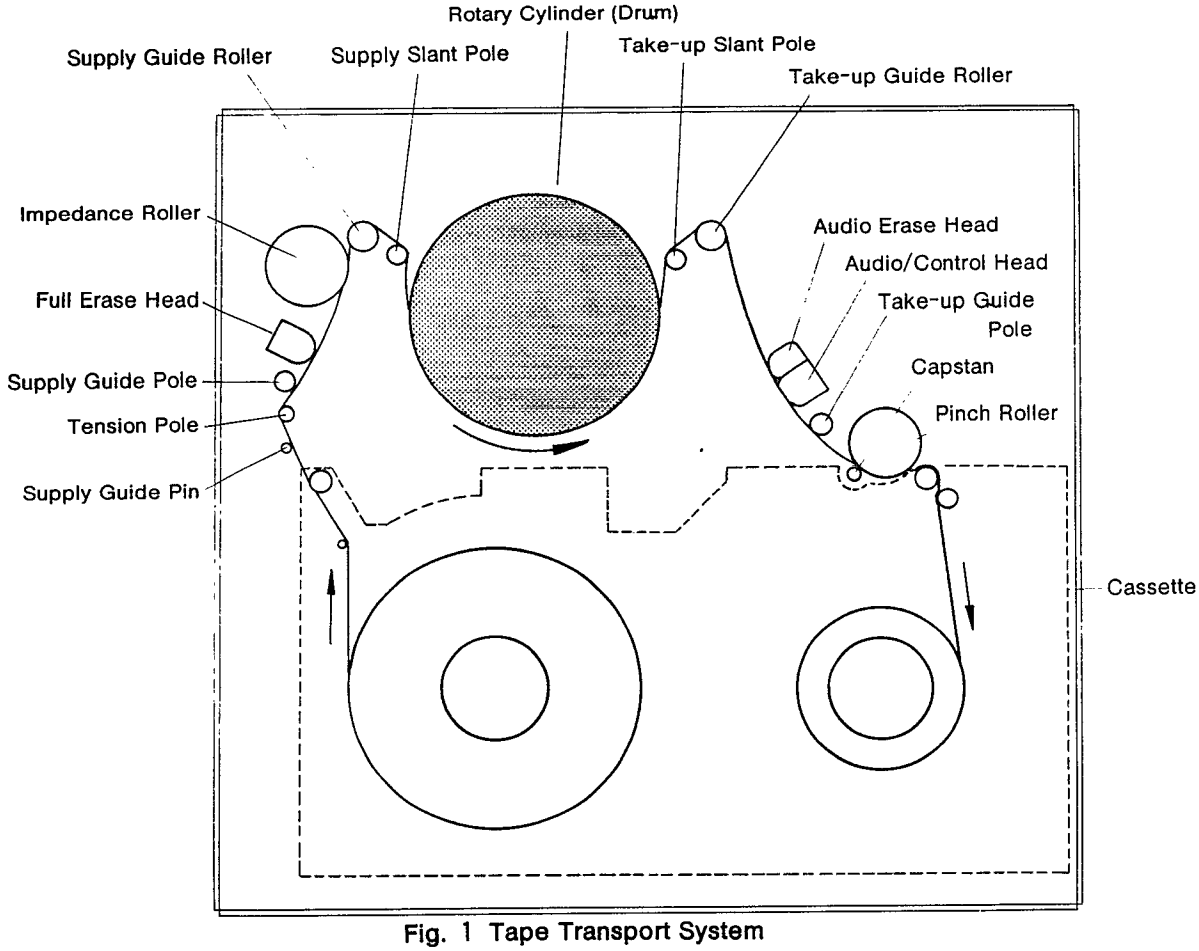


Fig. 1 Tape Transport System

As the designation implies, the most basic function of this system is to transport the tape past the audio and video heads at the specified speed. However, since this model is a helical scan cassette type machine, numerous addition functions are required, which include extracting the tape from the cassette, wrapping it about the cylindrical head drum at a precisely defined angle, and returning the tape to the cassette after it is no longer needed.

To ensure smooth operation, conformance with VHS specifications and "interchangeability" (which allows a tape recorded by one machine to be played by another machine of the same format), the positions, heights and inclination angles of the various fixed and movable tape guides must be adjusted and maintained to close tolerances. The most stringent and difficult of these adjustments have been performed at the factory undr controlled conditions. Therefore, in service, it is usually only necessary to perform minor adjustments to compensate for wear and after replacing certain internal parts.

The following description covers the mechanical states for the various operating modes. An adequate understanding of the mechanical processes is essential before attempting to repair or adjust the transport system.

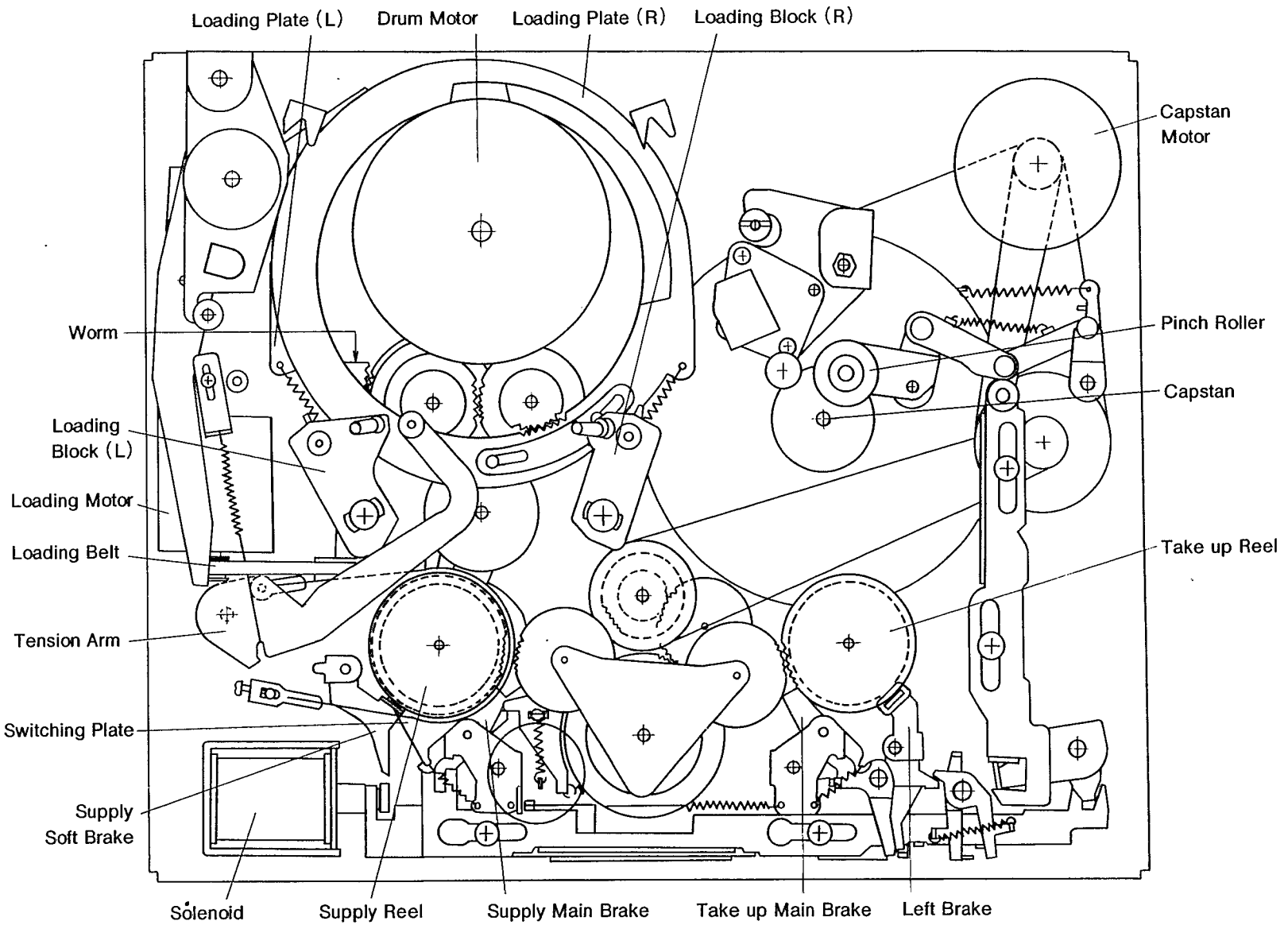


Fig. 2 Main Parts Location

2. FUNCTIONS OF MAIN PARTS

2 — 1 Drum Motor

Rotates the video head.

2 — 2 Capstan Motor

Rotates the capstan, take-up reel and supply reel (Fig. 3).

1. The rotation of the capstan motor drives the capstan flywheel by means of the main belt, which then rotates the capstan.
2. At the same time, the rotation of capstan motor is transmitted to the RF clutch by drive belt and joint belt via the joint pulley. The clutch is rotated via the PLAY gear of FF gear which is geared with the RF clutch. The rotation of the clutch drives the right and left reel drive gears mounted on the gear plate. Since the gear plate is then rotated toward the rotational direction of the reel drive gears, the take-up reel or supply reel is geared with the rotated by the reel drive gears.

2 — 3 Loading Motor

Power is transmitted to the worm and the loading drive gear (A) via the loading belt and:

1. Drives the loading plate (Fig. 4)
   The loading plate (L) is driven via the loading drive gear (A) and next via the loading drive gear (B). The loading plate (R) is also driven via the loading drive gear (B) and then via the joint gears (A) and (B).
2. Controls the brakes (Fig. 5)
   The rotational power is transmitted from the loading drive gear (A) to the control gear, interlocking plate and interlocking gear. Then the switching plate is rotated, the main plate is slided, and each brake is actuated.
3. Controls the pinch roller (Fig. 5)
   The sliding of the pressure plate as mentioned in 3. also allows the pinch roller arm to be actuated via the toggle arm, which results in controlling the pinch roller.
4. Selects the rotational frequency of the reel (Fig. 6)
   The rotation of the switching plate drives the change plate via the change plate driving arm. The revolving speed of the reel is selected by changing the gear which clutches with the RF clutch. (The PLAY gear and FF gear are mounted on the change plate and clutched with the clutch assembly.)

2 — 4 Solenoid/Plunger

Drives the supply main brake and the take-up main brake by the pull plate which is interlocked with the plunger in the FF and REW modes (Fig. 7).

2 — 5 Loading Switch

Detects the position of mode in order to control the above driving components (Fig. 8).

3. EXPLANATIONS OF MODES

3 — 1 Stop Mode (Fig. 9)

When a cassette tape can be put in or taken out, the motor and the plunger are not working. When a cassette tape is put in, the loading blocks (L)L and (R) as well as the tension pole position in the inside of the tape so that the tape may be reeled out of the cassette. Also the capstan position in the inside of the tape. The pinch roller is

separated from the capstan so as not to contact with it when a cassette tape is put in or taken out. The take-up main brake, loading brake and supply main brake are actuated to prevent the take-up and supply reels from rotating freely.

3 — 2 Loading Mode (Fig. 10)

In this mode, the tape is reeled out of the cassette and set at the position of PLAY mode. The pressing of the PLAY button permits the drum motor, capstan motor and loading motor to start rotating. The supply main brake is separated from the supply reel and eject is locked, because of the rotation of the loading motor. The capstan motor slips in the clutch assembly and thus the reel does not rotate because the take-up reel is braked. The loading plates(R) and (L) start working and the tape is reeled out of the cassette by the loading blocks (R) and (L). The loading blocks proceed along the guide slits of the loading base and the pressed to the pole guide.

During this operation, the tension arm is driven, following the movements of the loading block (L) and then the back tension return arm. (The back tension return arm is actuated by the back tension return bar, which is driven by the guide roller of the low disc plate (L).)

The back tension band is pulled by the tension arm and contacts with the supply reel, which results in applying back tension. For this reason, the tension arm stays at the position that the tensile strength of the tape is balanced with the strength of the tension arm spring, separating from the back tension arm. Then the take-up main brake and the left brake separate from the take-up reel, and the reel starts rotating. At the same time, the loading switch which is used to permit the pinch roller to be pressed to the capstan, detects the PLAY mode and the loading motor is stopped.

3 — 3 PLAY, CUE and REVIEW Mode (Fig. 11)

3 — 4 Unloading Mode (Fig. 10)

When the tape comes to its end druing PLAY mode or when the stop button is pressed, the loading motor starts rotating reversely. Then the pinch roller separates from the capstan and the take-up reel is braked. The drum motor is turned off. Simultaneously, the capstan motor reversely rotates and the supply reel starts rotating. The loading blocks (R) and (L) and tdhe tension arm are driven as in the reverse of the loading mode, and the tape is reeled on the supply reel. After the tape is reeled, the supply main brake is applied, the eject lock is released, and each motor is stopped.

3 — 5 FF and REW Modes (Fig. 12)

When the FF (REW) button is pressed, the loading motor starts rotating, the FF gear is clutched with the RF clutch (the PLAY gear is released), the loading brake is detached from the take-up reel, and eject is locked.

When the loading switch detects the FF (REW) mode, the loading motor is stopped. Then the switch for the plunger is turned on and the take-up and supply main brakes are detached from the reel. At the same time,the capstan motor rotates in accordance with the direction for FF or REW. The rotation of the gear plate drives the take-up reel or the supply reel. When the stop button is pressed during the FF (REW) mode, the switches for the capstan motor and the plunger are turned off, resulting in braking. Then the loading motor starts rotating, and stops after the STOP mode is selected. This operation permits eject lock to be released.

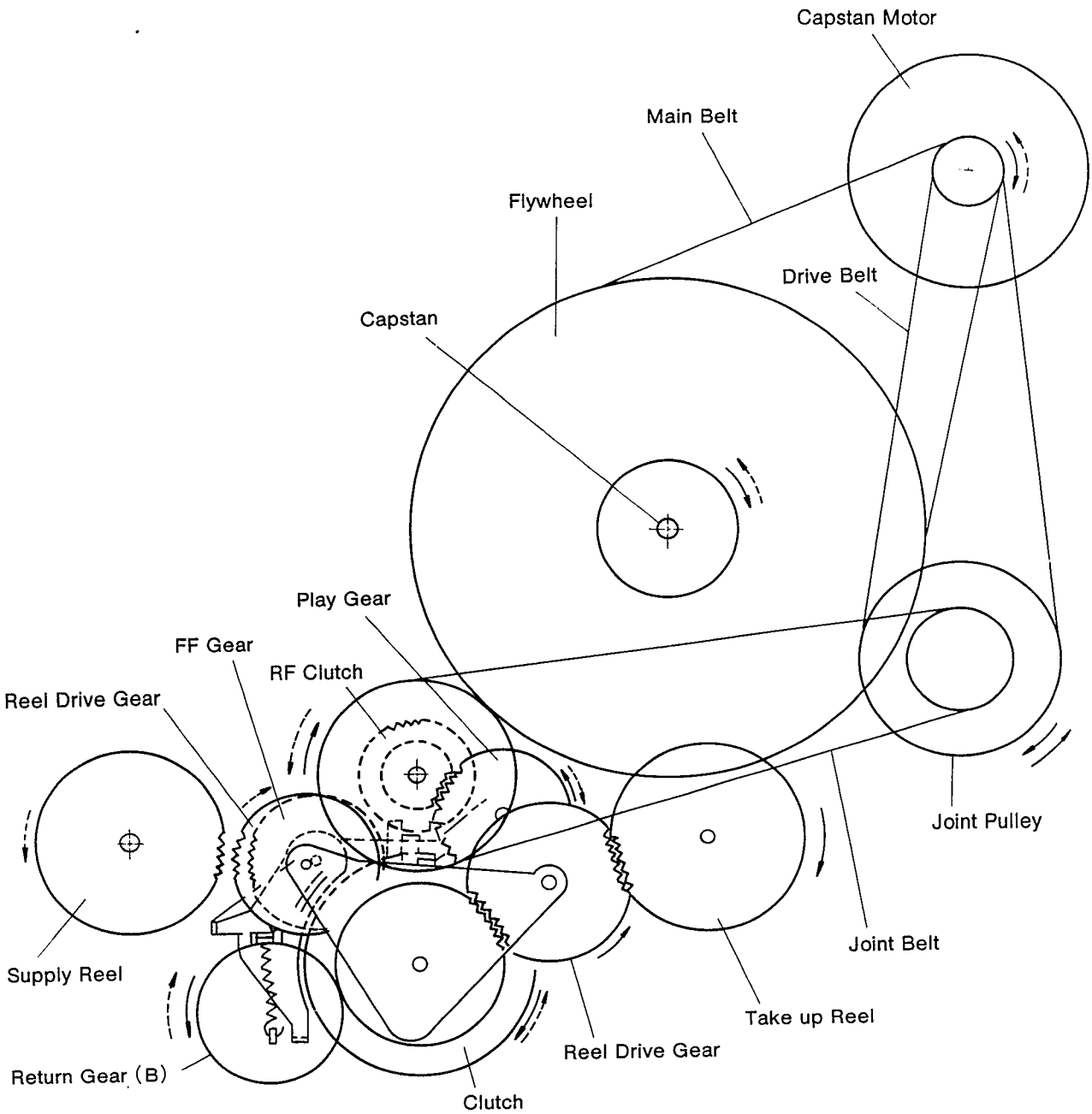


Fig. 3 Capstan Motor Performance

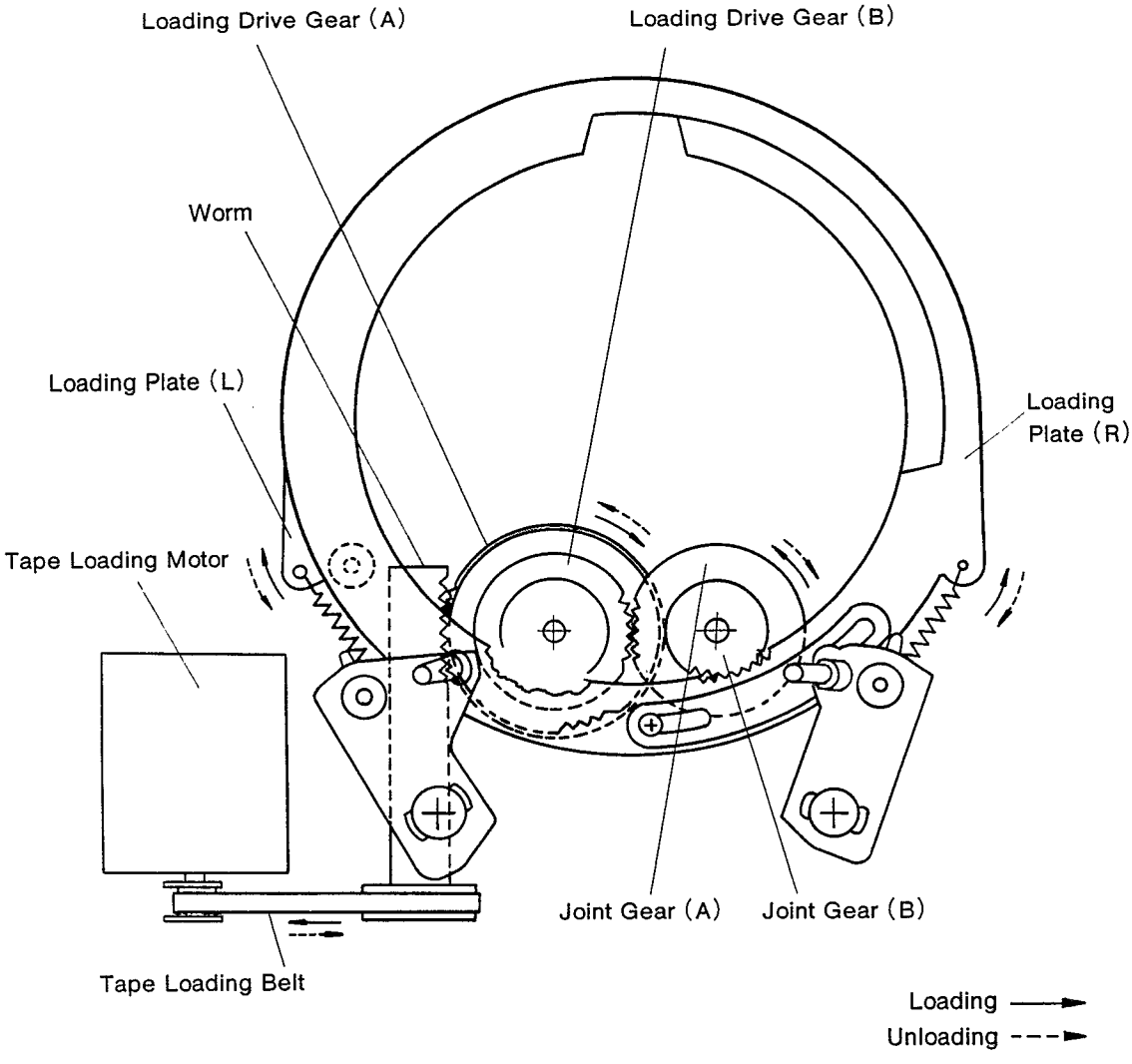


Fig. 4 Loading Plate Mechanism

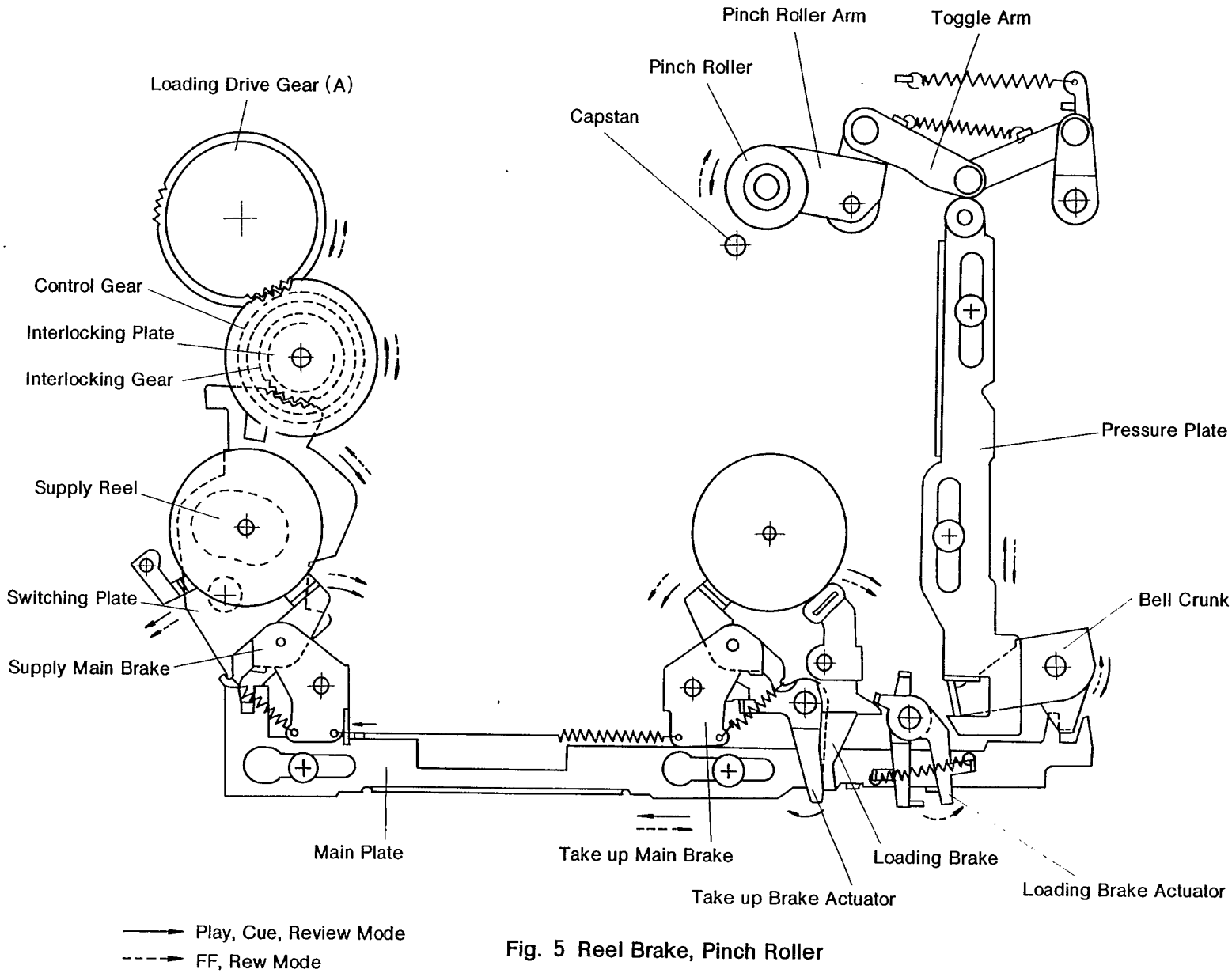


Fig. 5 Reel Brake, Pinch Roller

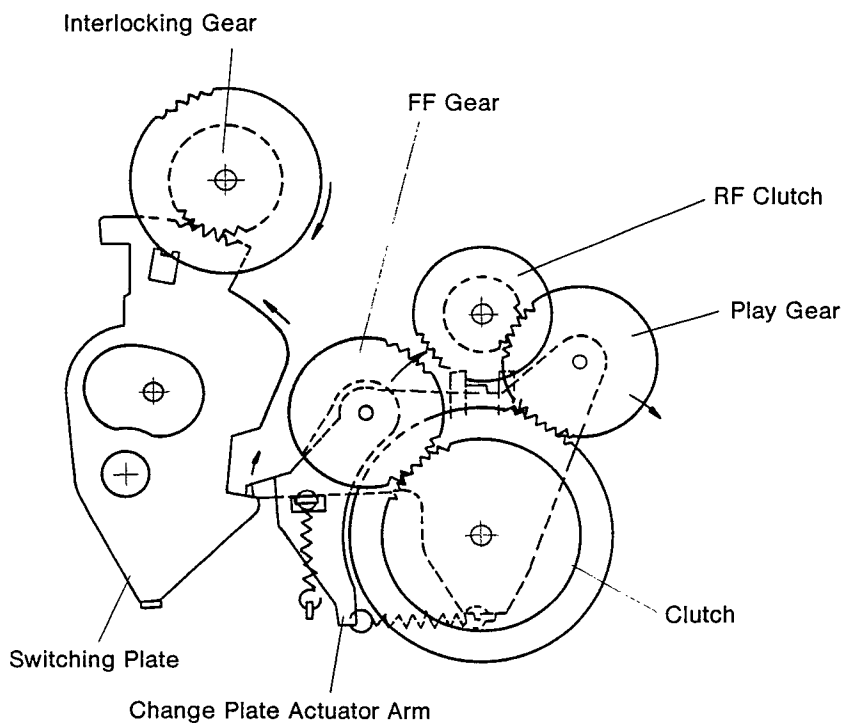


Fig. 6 Reel Revolution Switching Mechanism

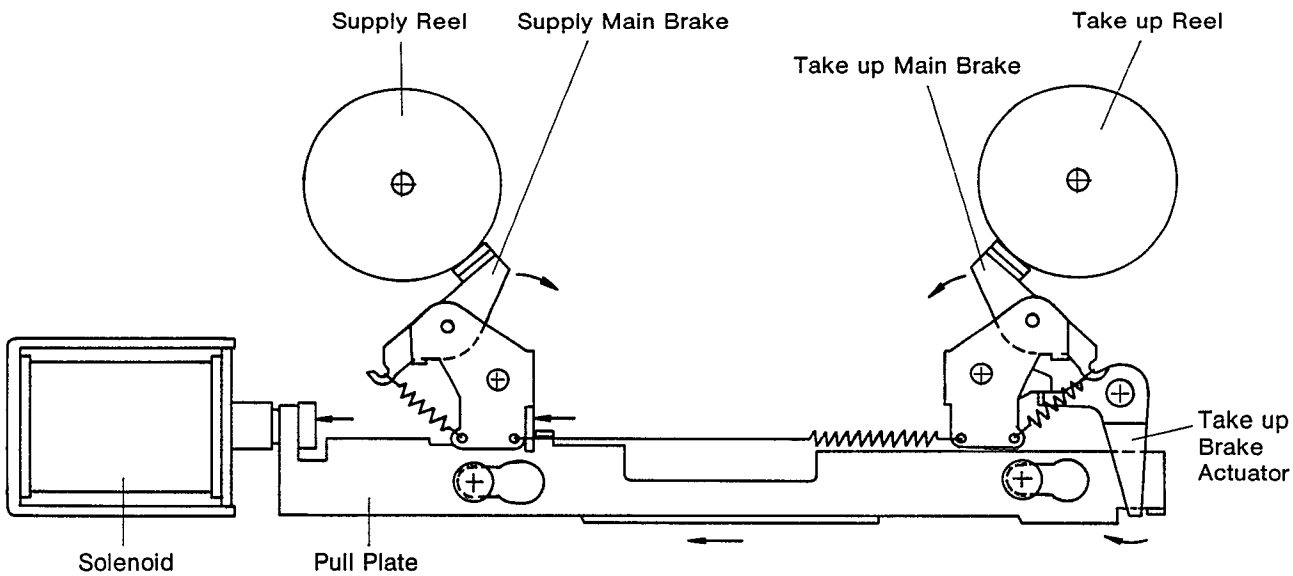


Fig. 7 Solenoid Performance

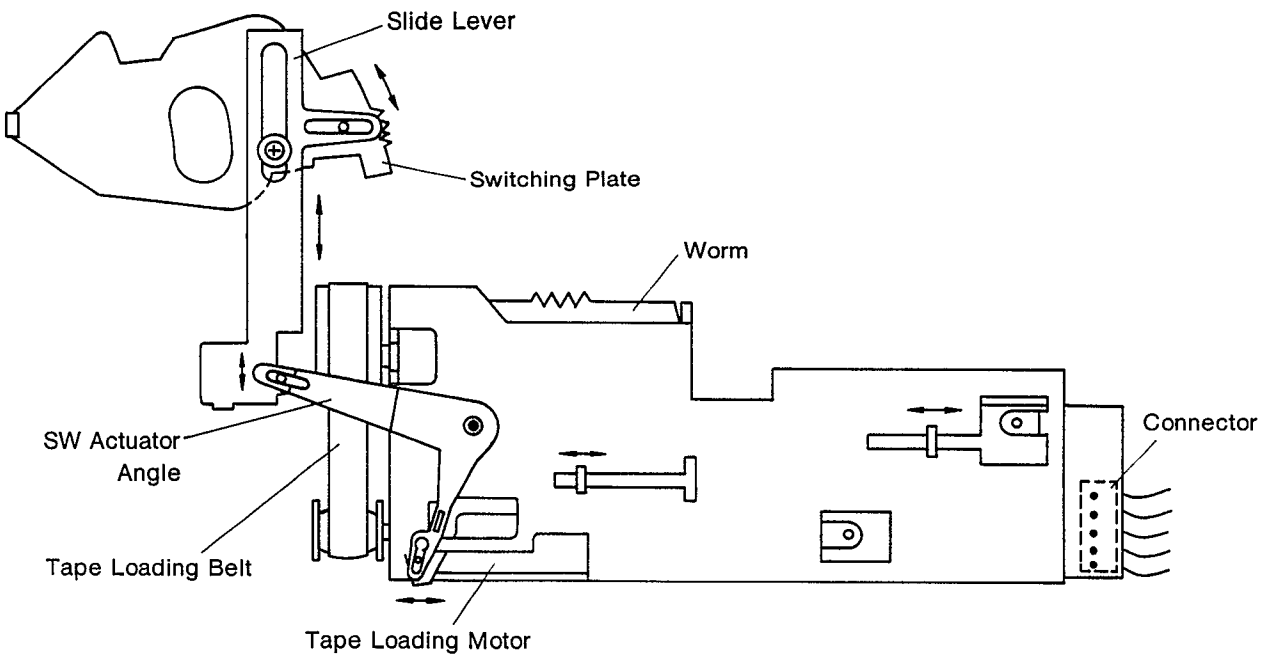


Fig. 8 Loading Switch Performance

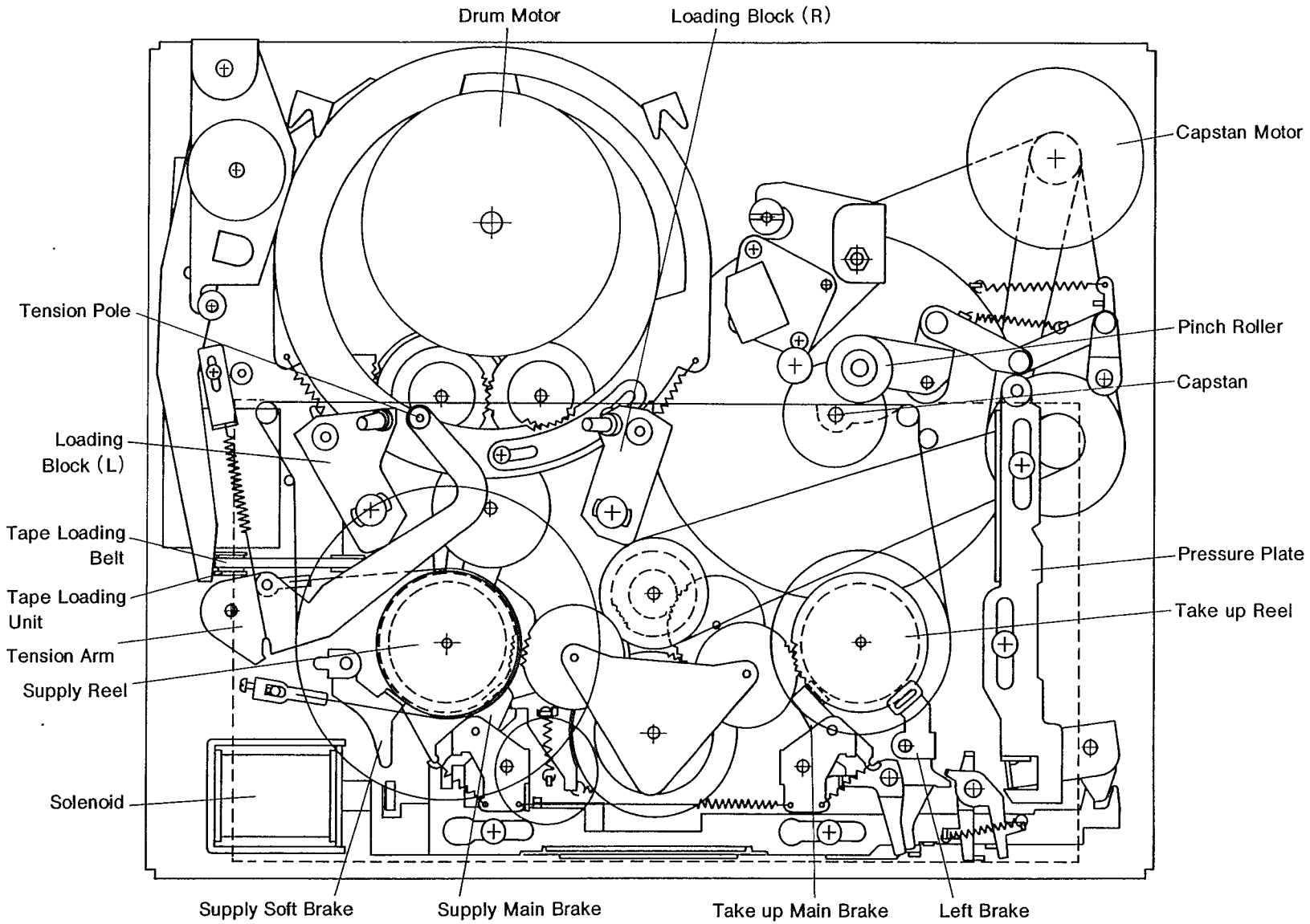


Fig. 9 Stop Mode

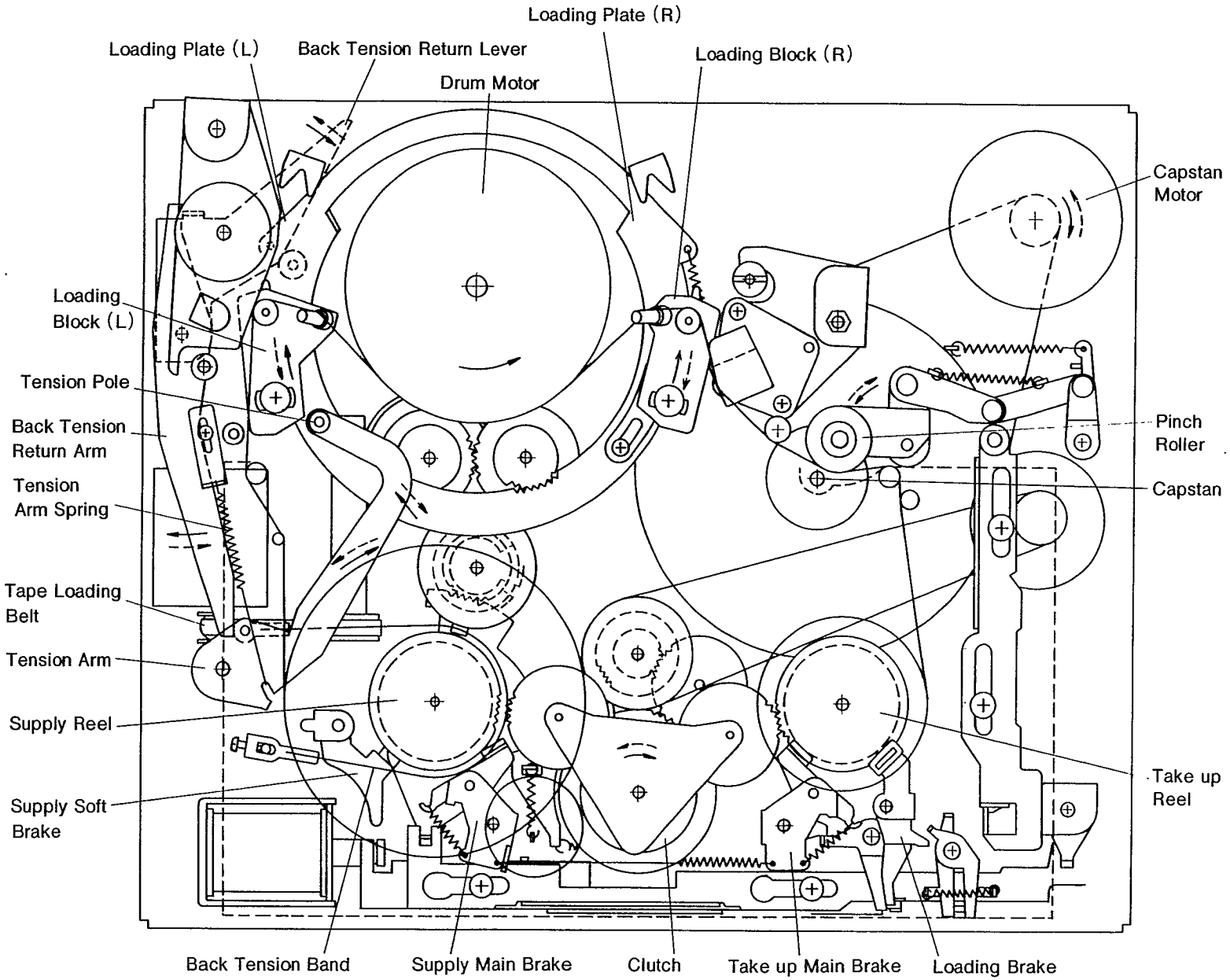


Fig. 10 Loading, Unloading Mode

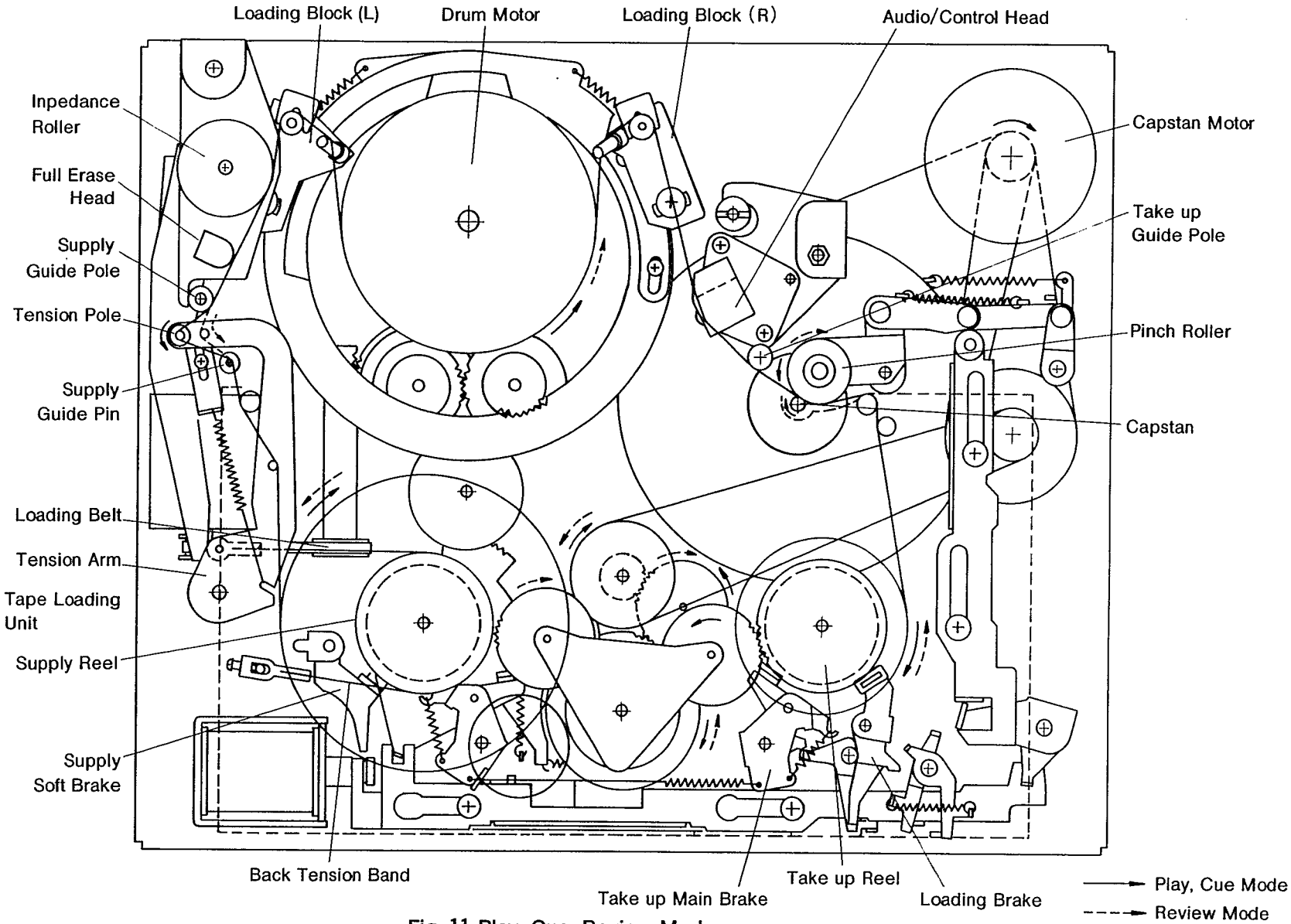


Fig. 11 Play, Cue, Review Mode

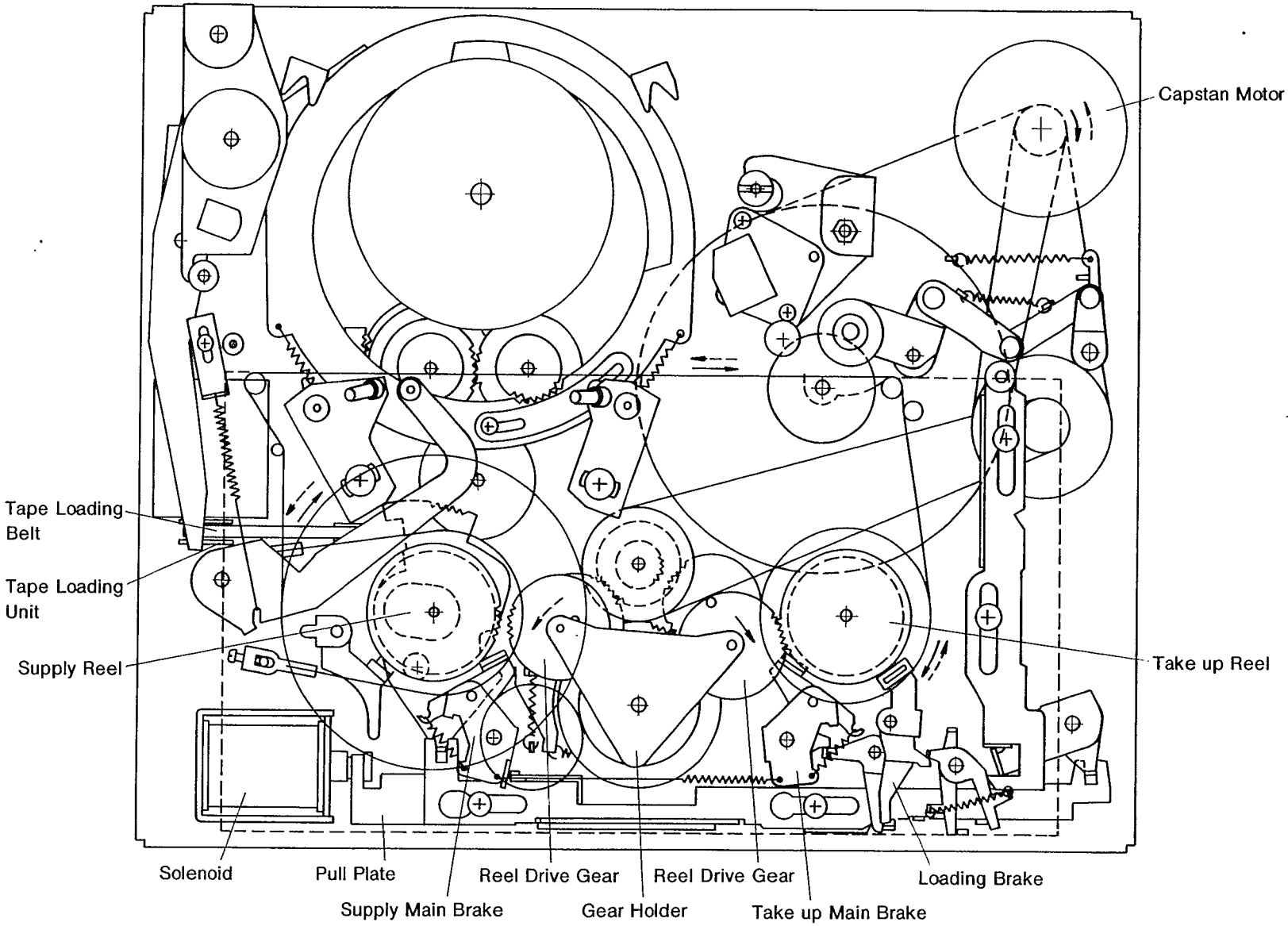


Fig. 12 FF, Rew Mode

Mechanical Adjustment Jig and Tools

Item	Part No.	Adjustment
Dial Gauge	VFK-0190	Reel Height
Master Plane	VFK-0191	Reel Height Tape Guide Height
Height Gauge	VFK-0139B	Tape Guide Height
Torque Meter	VHT-063	Back Tension
Driver Large (Special)	VFK-0189	Control Head
Driver Small (Special)	VFK-0137	Tape Guide Height
Wrench M2 Hexagon		Guide Roller Setting
Wrench M2.6 Hexagon		Capstan Pulley Setting
Wrench M3 Hexagon		A/C Head Azimuth
Mirror	VFK-0169	Tape Transportation Check
Box Driver M3		Guide Pole A/C Head Height

1. Tension arm position (Fig. 13)

1. Push play button and loading without video cassette tape.
2. Turn screw A and match a tip of tension arm.

2. Back tension (Fig. 13)

1. Load cassette torque gauge (VHT-063) and push play button.
2. Loosen screw B and slide backtension plate, until gauge indicates 24±5 g-cm.
3. Gearing position of Interlocking Gear and switching plate and Mounting position of Loading switch. (Fig. 14)

Note: Removal of the front loading ass'y is not necessary at both disassembly and assembly.

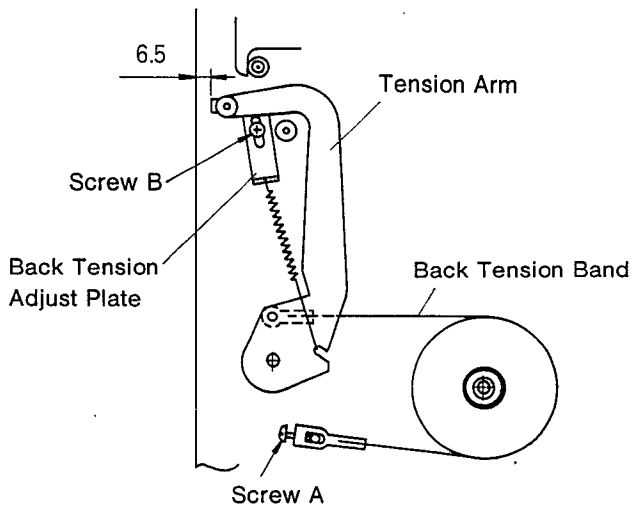


Fig. 13

A. Take-out of Sub Chassis Unit (Fig. 14)

1. Turn the capstan flywheel to clockwise direction more than three times. (Because the levers, etc. are set at neutral.)
2. Remove the joint belt.
3. Remove the polyslider washer.
4. Pull out the wind pulley.
5. Remove the mount screw of sub chassis.
   4 pcs. with the arrow mark (A×1, B×2, C×1)
6. Take out the sub chassis unit.

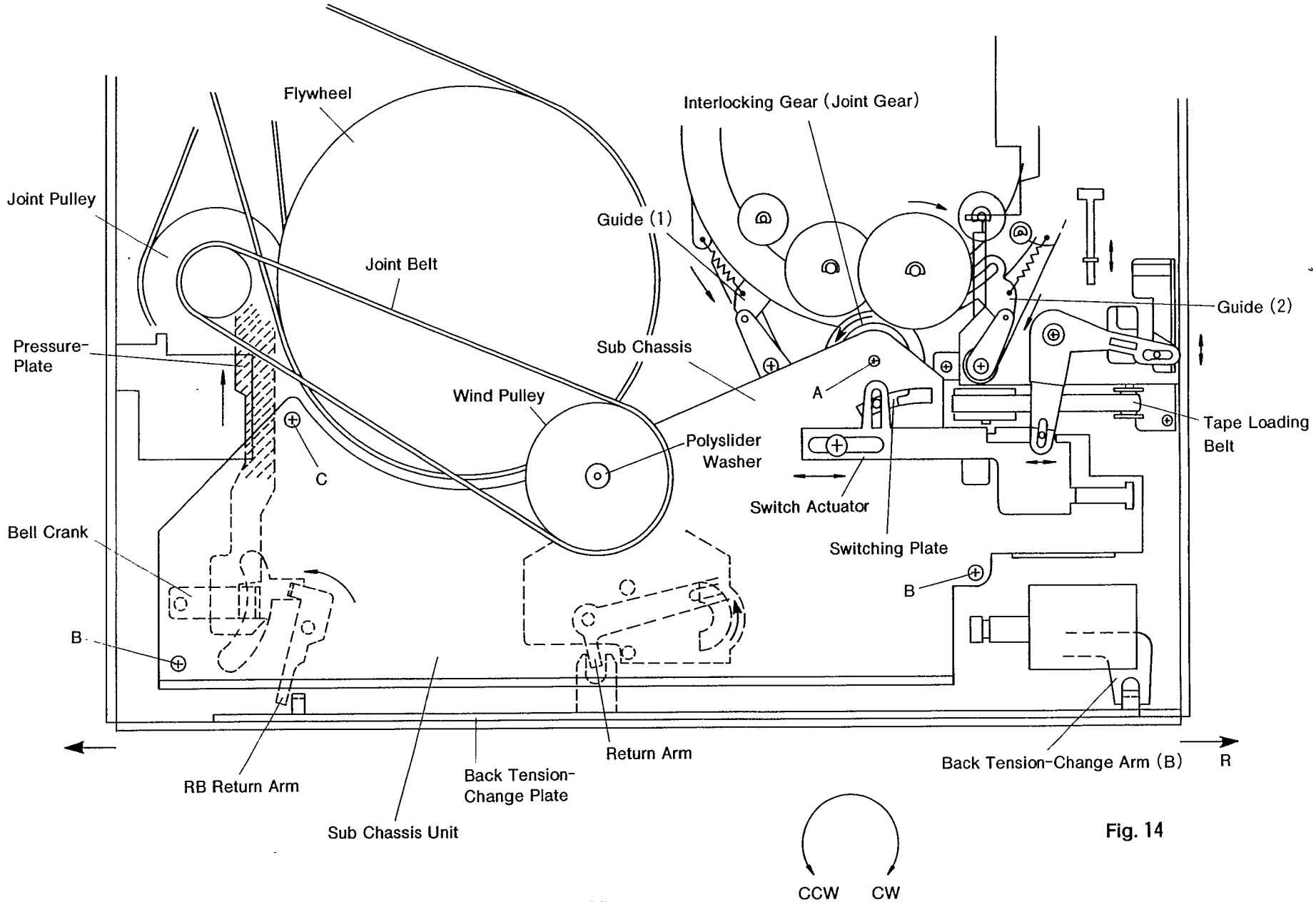


Fig. 14

Bottom View

B. Mounting of Sub Chassis Unit

1. Turn the return arm to the direction of arrow mark.
2. Move the back tension change plate to R side direction extremely.
3. Turn the review back tension arm to the direction of arrow mark extremely.
4. Turn the loading plates (L) and (R), and stop them at the position of hitting the wall of groove and of just stopping.
   This work is done by turning the pulley of the worm gear jointed to the loading motor.
5. Turn the interlocking gear to the direction of arrow mark (counterclockwise) extremely.
6. Mount the sub chassis unit. At this time, make the band brake of back tension fit to the supply reel.
7. Shake the switch actuator to right and left in order to confirm the engagement of interlocking gear.
8. Slide the pressure plate to the direction of arrow mark in order to connect the pressure plate with the bell crank.
9. Mount the sub chassis unit with 4 small screws.
   (AX1, BX2, CX1)
10. Insert the wind pulley.
11. Set the polyslider washer.
12. Mount the joint belt.
13. Confirm that the return arm is set to the claw of the back tension change plate.
    It is OK that following two operations are confirmed by turning the capstan flywheel.
    (1) When the capstan flywheel is turned to counterclockwise direction, the back tension change arm moves to L direction.
    (2) When the capstan flywheel is turned to clockwise direction, the back tension change arm moves to R direction.
14. Confirm the operation of mode switch.

4. REEL DISK HEIGHT

1. Set the master plane jig as shown in Fig. 16.

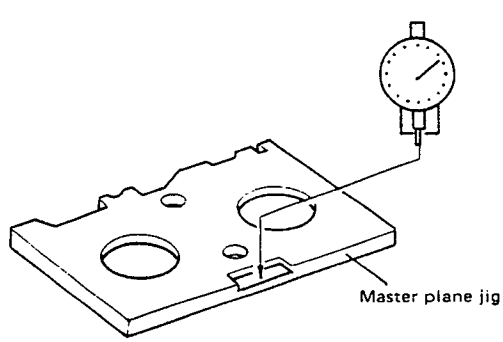


Fig. 16 Master plane jig setting

2. Set dial gauge on the master plane.
3. Check reel assembly height measure at two places 90°apart. (±0.2 mm) (Fig. 17)

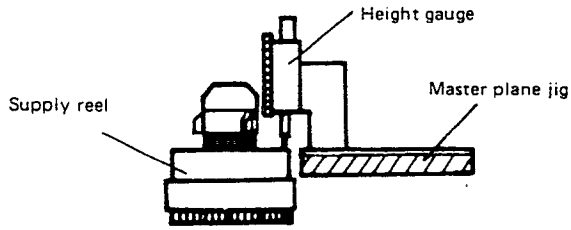


Fig. 17 Reel height adjustment

4. If it is necessary to adjust the height, add or subtract the required number of height adjustment washers as shown in Fig. 18.
5. After reassembling, confirm a small amount of mechanical play between reel disk and slit washer.

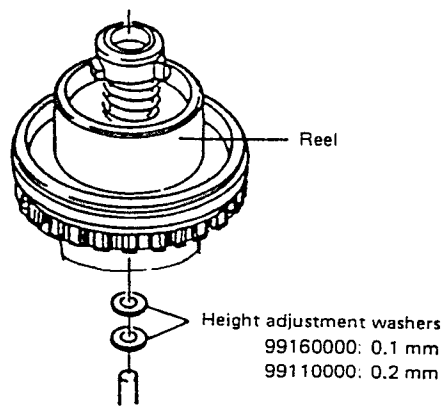


Fig. 18 Washers for height adjustment

5. GUIDE POLE HEIGHT ADJUSTMENT

1. Set the master plane jig as shown in Fig. 19.
2. Set the height gauge on the master plane jig as shown in Fig. 19.

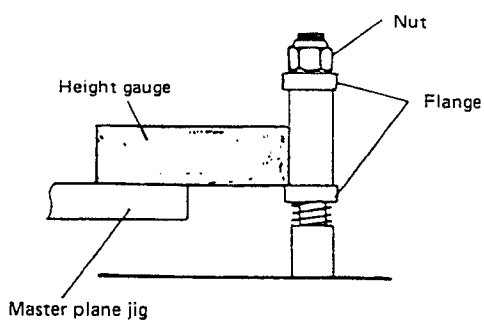


Fig. 19 Guide pole height adjustment

3. For guide pole, check the height of the upper face of the lower flange. If necessary, carefully adjust by turning the nut.
4. If guide pole height has been adjusted following checks and adjustments are required.

6. AUDIO/CONTROL HEAD

A. Tape transport adjustment

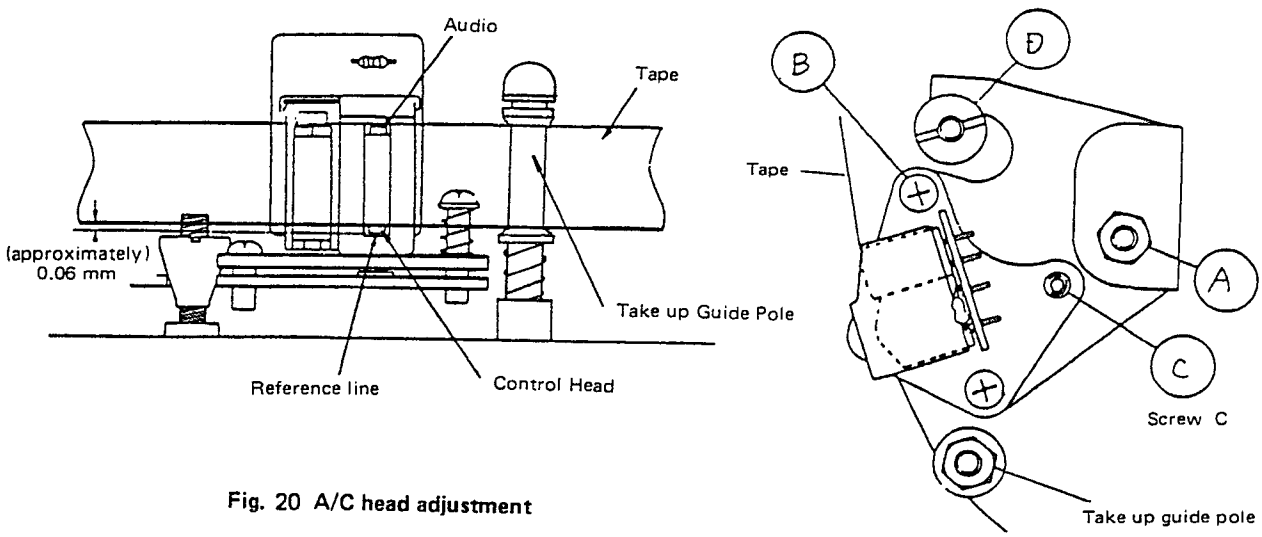


Fig. 20 A/C head adjustment

1. Employ self-recording tape and set for Play mode.
2. Turn screw Ⓒ (Fig. 20) and adjust for smooth transport at the take-up guide pole. Do not adjust the height of the take-up guide pole itself.

B. Audio/Control head height and azimuth

Connect oscilloscope to Audio Out

1. Play alignment tape (8 kHz and stairstep signals) and measure the audio output level.
2. Turn nut Ⓐ, screw Ⓑ and Ⓒ in succession by small and equal increments at a time and adjust for maximum audio output level. With reference to nut Ⓐ, adjust azimuth with screw Ⓑ and screw Ⓒ so that small tape wrinkles are not produced at the guide pole, but at the same time, audio output becomes maximum and level fluctuations minimum. It is suggested to first turn nut Ⓐ by a small amount, then turn screws Ⓑ and Ⓒ by an equal amount and set for maximum output.
3. Carefully and evenly adjust nut Ⓐ, screw Ⓑ and Ⓒ to align the audio/control head height with the tape as shown in Fig. 20.

7. TAPE TRANSPORT SYSTEM CHECKS AND ADJUSTMENT

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following steps are therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

A. Tape transport check

1. Employ self-recording tape and operate the machine between Play and Stop modes several times.
2. During Play mode, observe tape at the input and output portions (A and B in Fig. 21) of the head drum lead. Confirm that the tape slips neither upward nor downward with respect to the lead as shown in Fig. 22.

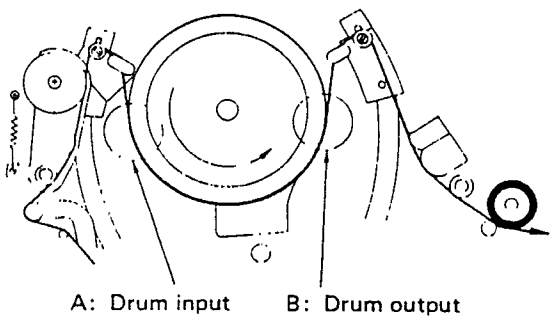


Fig. 21 Tape transport check

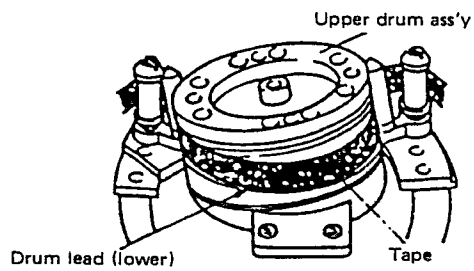


Fig. 22 Drum lead check - 1

NOTES:

1. Slips upward: sound becomes produced by contact between tips of rotating heads and edge of tape.
2. Slips downward: tape curls or wrinkles from contacting lead face (sound may also be produced).
3. During Loading, Play and Unloading, observe the tape at the supply and take up guide rollers and guide poles.
   Confirm absence of curling, wrinkling, etc., as shown in Fig. 23.
4. Observe the tape as it becomes wrapped around drum duirng loading and as it separates from the drum druing unloading.
   Confirm absence of damage to the tape at points C and D as shown in Fig. 24 and absence of contact noise between head tips and tape edge.
5. If defects are noted during the above checks, perform the following adjustments.

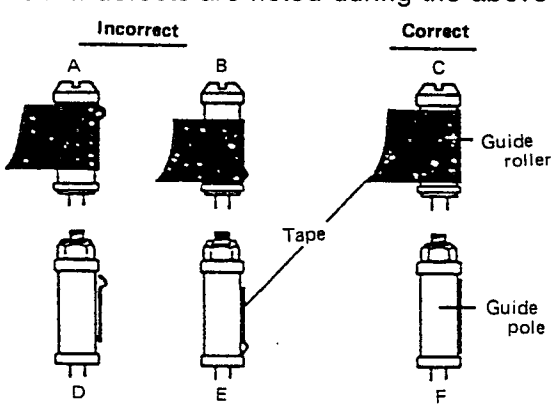


Fig. 23 Guide roller and guide pole

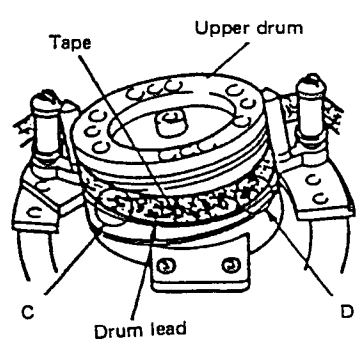


Fig. 24 Drum lead check - 2

B. Guide roller height adjustment

1. Slightly loosen setscrews of the supply and take-up guide rollers as shown in Fig. 25.
2. Use self-recording tape and set for Play mode.
3. With a slotted screwdriver, slightly turn the supply guide roller (do not turn more than 180°at a time) and adjust so that at the drum input, the tape travels smoothly in the drum lead without slipping upwards or downwards.
4. Similarly, adjust the take-up guide roller for the drum output.

NOTES:

1. Loosen the setscrews only enough to allow the guide rollers to be turned. If excessively loose, tape motion may turn the rollers inadvertently.
2. Turn the rollers carefully to avoid damage to the tape.

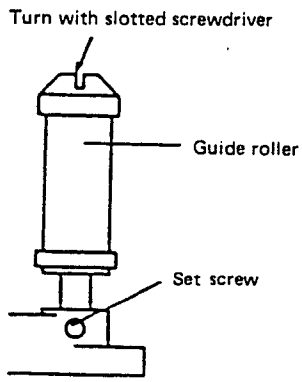


Fig. 25 Guide roller height adjustment

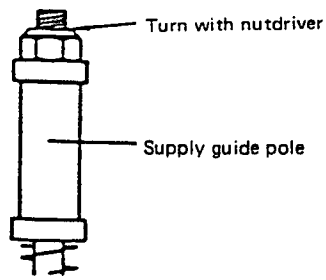


Fig. 26 Supply guide pole height adjustment

C. Supply guide pole height adjustment

1. Use self-recording tape and set for Play mode.
2. Use a metric nutdriver to turn the supply guide pole to align the upper flange of the guide pole with the upper edge of the tape as shown by F of Fig. 23. However, this adjustment must be performed so that at the same time, the upper flange remains within ±0.5 mm of the height adjusting jig portion shown in Fig. 19.
   If there is a large descrepancy, check the height of the supply reel disk, tension pole and other mechanical components.

8. INTERCHANGEABILITY ADJUSTMENT

Before using alignment tape, employ self-recording tape and confirm correct tape transport.

① Preliminary checks

A. Check sequence 1

1. Connect oscilloscope to TP20.
   At this time, trigger the oscilloscope extrenally with the signal (30Hz square wave) from TP21.
2. Play stairstep portion of the alignment tape.
3. Turn the Tracking control and adjust for maximum FM output at TP20.
   Set the Tracking control to center click position and confirm that nearly maximum output is obtained.
4. Refer to Fig. 28. Read the level of portion (a) of the wave form. If the waveform is serrated at point (a), read the value at the most uniform serrations as shown at left in Fig. 29.

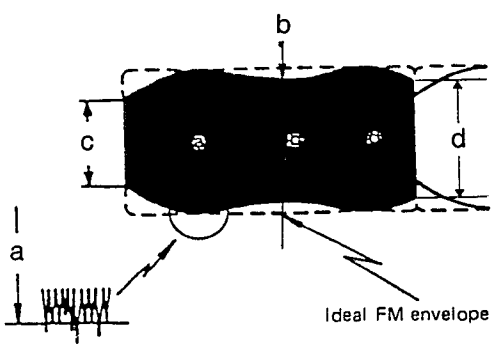


Fig. 28 FM waveform (max. output)

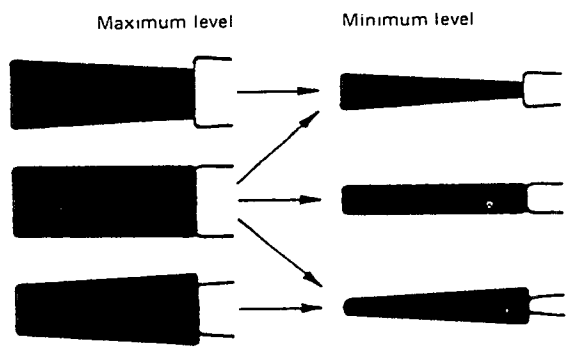


Fig. 29 Normal waveform examples

5. As shown by the broken lines, read the FM waveform value at point (b) and confirm that:

$$\frac{b}{a} \geqq 0.7 \text{ or } 20\log\frac{b}{a} \geqq -3\text{dB}$$

6. Read the values at points (c) and (d) [drum input and output] and confirm that:

$$\frac{c}{a} \geqq 0.5 \text{ and } \frac{d}{a} \geqq 0.5 \ (\geqq -6\text{dB})$$

NOTES:

1. Read minimum levels for (b), (c) and (d).
2. If above checks yield normal results, proceed to section ①-B.
3. If defects are noted, perform adjustments of section ②.

B. Check sequence 2

1. Observe the FM waveform as in the previous section (①-A) and turn the tracking control.
   The waveform variation should be nearly parallel as shown in Fig. 29.

2. If the waveform varies as shown in Fig. 30, adjustment becomes required.

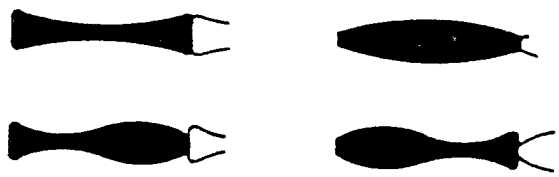


Fig. 30 Incorrect waveform examples

② Preliminary adjustments

1. Loosen the setscrews of the supply guide roller and take-up guide roller.
   If the guide rollers turn freely, slightly tighten the set screws.
2. Connect oscilloscope to TP20.
   Trigger the oscilloscope externally with the signal from TP21.
3. Play the alignment tape (stairstep signal)

A. Drum input

1. Observe oscilloscope display and adjust the Tracking control for maximum FM output.
2. Refer to Fig. 31. Examples of incorrect waveform are shown by A.
   Use a slotted screwdriver to adjust the supply guide roller so that the rising portion (drum input portion) on the waveform becomes flat as shown by B.

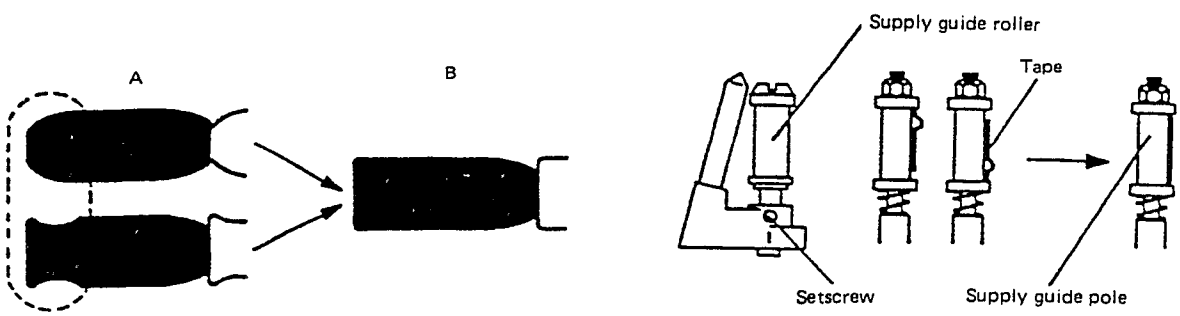


Fig. 31 Drum input adjustment

NOTES:

1. If the guide roller turns freely, tighten the setscrew slightly.
2. Be sure to adjust the guide roller only by small amounts at a time in order to avoid damaging the alignment tape.
   In addition to observing the waveform, confirm absence of tape slippage or curling at the drum lead and guide poles.
3. At the supply guide pole, if the tape separates from the guide or wrinkling occurs, adjust the guide pole height.

B. Drum output

1. In the same manner as for the drum input, turn the take-up guide roller to adjust the falling portion (drum output portion) of the FM waveform.
   Incorrect examples are shown by C in Fig. 32, while D indicates the correct adjustment.
2. If the tape separates from the guide or wrinkling occurs at the take-up guide pole, adjust by turning screw Ⓒ of the audio/control head as shown in Fig. 32.

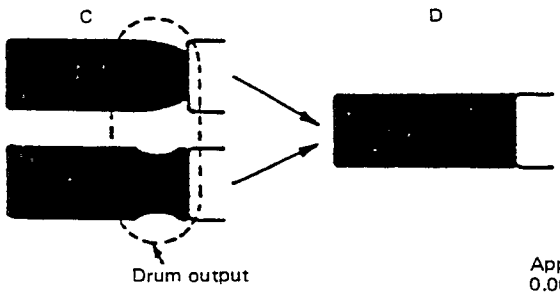


Fig. 32 Drum output adjustment

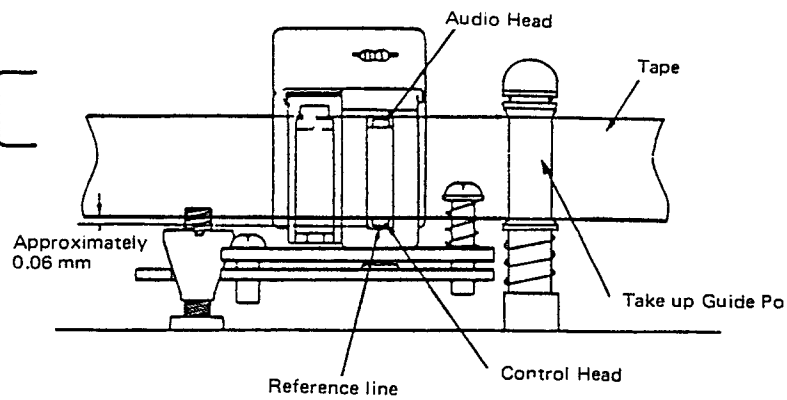


Fig. 33 Audio/Control head height

3. Carefully and evenly adjust screws Ⓑ, Ⓒ and nut Ⓐ to align the audio/control head height with the tape as shown in Fig. 33.

NOTES:

1. Fine adjustment is not required at this time.
   It is sufficient that the tape is engaged with the guide pole and servo operates stably (control signal picked up).
2. If the tape separates from the take-up guide pole or wrinkling occurs, screw Ⓒ (Fig. 32) has been turned excessively with respect to nut Ⓐ and screw Ⓑ causing the audio/control head to incline forward or rearward. Use care to adjust screws Ⓑ, Ⓒ and nut Ⓐ evenly and observe that small wrinkles are not produced at the take-up guide pole.
3. Do not disturb the take-up guide pole.

③ Interchangeability fine adjustment

1. Connect oscilloscope to TP20.
   Observe the FM waveform and adjust the Tracking control for minimum FM output level.
2. If the waveform becomes as shown by A or B of Fig. 34, carefully adjust the supply guide roller height so that the waveform becomes as shown by E, F or G of Fig. 35.
   At this time, if the waveform fluctuates, adjust to the point of minimum fluctuation.
3. If the FM waveform appears as shown by C or D in Fig. 34, carefully adjust the take-up guide roller height to obtain a waveform such as shown by E, F or G of Fig. 35.
   At this time, if the waveform fluctuates, adjust to the point minimum fluctuation.

4. Vary the Tracking control from maximum to minimum FM output.
   Perform fine adjustment of supply and take-up guide rollers so that waveform variation becomes as shown by E, F or G of Fig. 35.

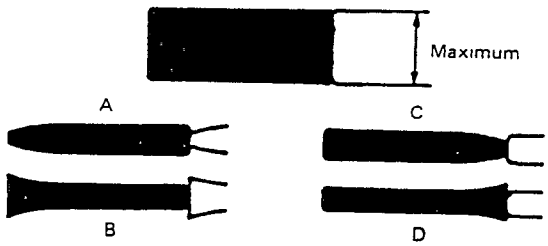


Fig. 34 Minimum FM output (incorrect examples)

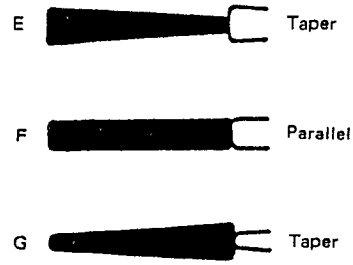


Fig. 35 Minimum FM output (correct examples)

④ Audio/Control head height, azimuth and inclination

See section 6 Audio/control head height and azimuth.

⑤ Setscrew tightening

1. Check for maximum FM output waveform, maximum audio out and absence of tape wrinkling or other transport irregularities, then secure the guide rollers.
   Perform in Stop mode.
2. Since the guide rollers are easily moved, use care when securing.
3. After tightening the setscrews, again perform interchangeability final check.

⑥ Interchangeability final check

Confirm section 8-1 Perliminary checks.

⑦ Servo circuit adjustment

1. Head switching position (see Electrical Adjustment No. 9).
2. Normal tracking preset (see Electrical Adjustment No. 8).

⑧ Control head phase adjustment

1. Connect oscilloscope to TP20.
   Trigger the oscilloscope externally with the signal from TP21.
2. Play stairstep portion of the alignment tape and observe the oscilloscope display.
3. Set the Tracking control to center click position.

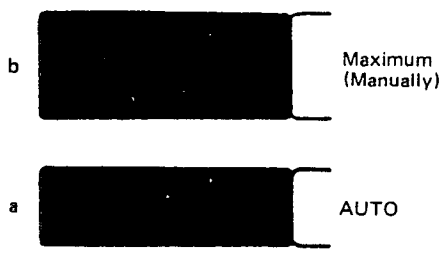


Fig. 36 FM output level

4. Confirm that the level difference between this setting and the maximum level obtained manually is:

$$-20 \log \frac{b}{a} \geqq 1 \text{ dB or } \frac{b}{a} \geqq 0.9$$

5. If necessary, adjust as follows.
6. Set the Tracking control to center click position and play the alignment tape (stairstep).
7. Loosen tracking adjustment nut Ⓓ and slide the A/C head assembly fully to the direction of the take-up guide pole.

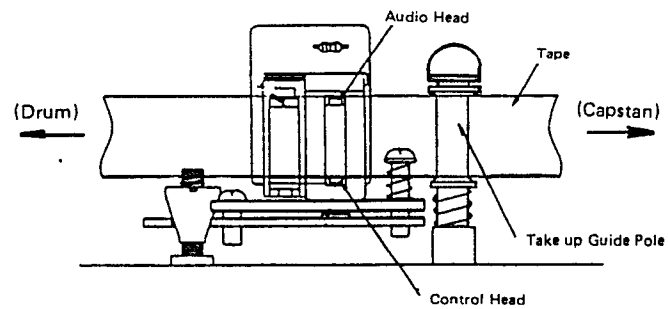


Fig. 37 Control head phase adjustment

8. Tighten adjustment nut slide the A/C head assembly slowly in the direction of the arrow as shown in Fig. 37.
9. Set the A/C head assembly to the position where first maximum FM level is obtained. Put screw Locking glue on the nut Ⓓ.

PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette player.

1 Cleaning

For cleaning, use a lint-free cloth or gauze dampened with alcohol.

A. Tape transport system

1. The following components should be cleaned after every 500 hours of use.
   1) Supply guide pin
   2) Tension pole
   3) Supply guide pole
   4) Full Erase Head
   5) Supply impedance roller
   6) Supply guide roller
   7) Supply slant pole
   8) Video head and Drum system

9) Drum ground
10) Drum motor shaft (upper)
11) Take-up slant pole
12) Take-up guide roller
13) Audio/control head and Audio erase head
14) Take-up guide pole
15) Pinch roller
16) Capstan

2. Since above parts come in direct contact with video tape, they tend to collect dust particles. If allowed to accumulate, dust may lead to damage to the video tape and above parts.
3. After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.

NOTE:

When cleaning the two video heads on the upper drum, do not clean them with a vertical stroke.
Use only a gentle back and forth motion in the direction of the tape path.
Use care since they are easily damaged.
When cleaning Full Erase Head, video heads, A/C head and Audio erase head use a lint-free cloth dampened with alcohol.

B. Reel drive system

1. The following components should be cleaned after every 1,000 hours of use.

—Upper section —

17) Take-up reel
18) Left brake

—Bottom section—

19) Capstan motor pulley
20) Main belt
21) Capstan flywheel
22) Drive belt
23) Joint Pulley
24) Joint Belt
25) Wind Pulley
26) RF clutch
27) Worm pulley
28) Loading belt
29) Loading motor

2. The above revolving parts are of rubber or come in direct contact with rubber parts. Rubber dust can accumulate and interfere with proper operation.
3. Avoid using excessive alcohol when cleaning rubber parts.

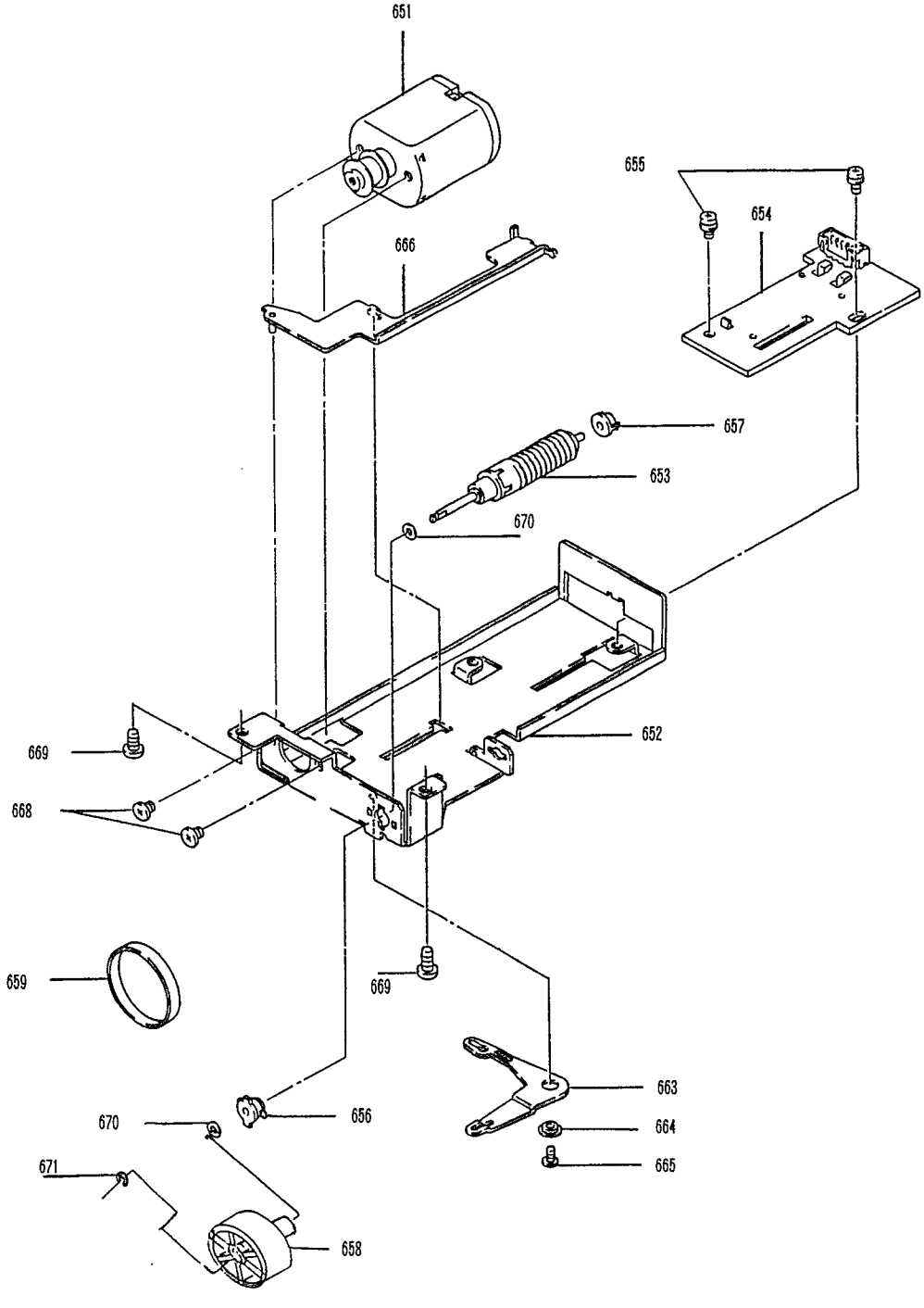
2 Lubrication

The following components should be lubricated with oil after every 2,000 hours of use.

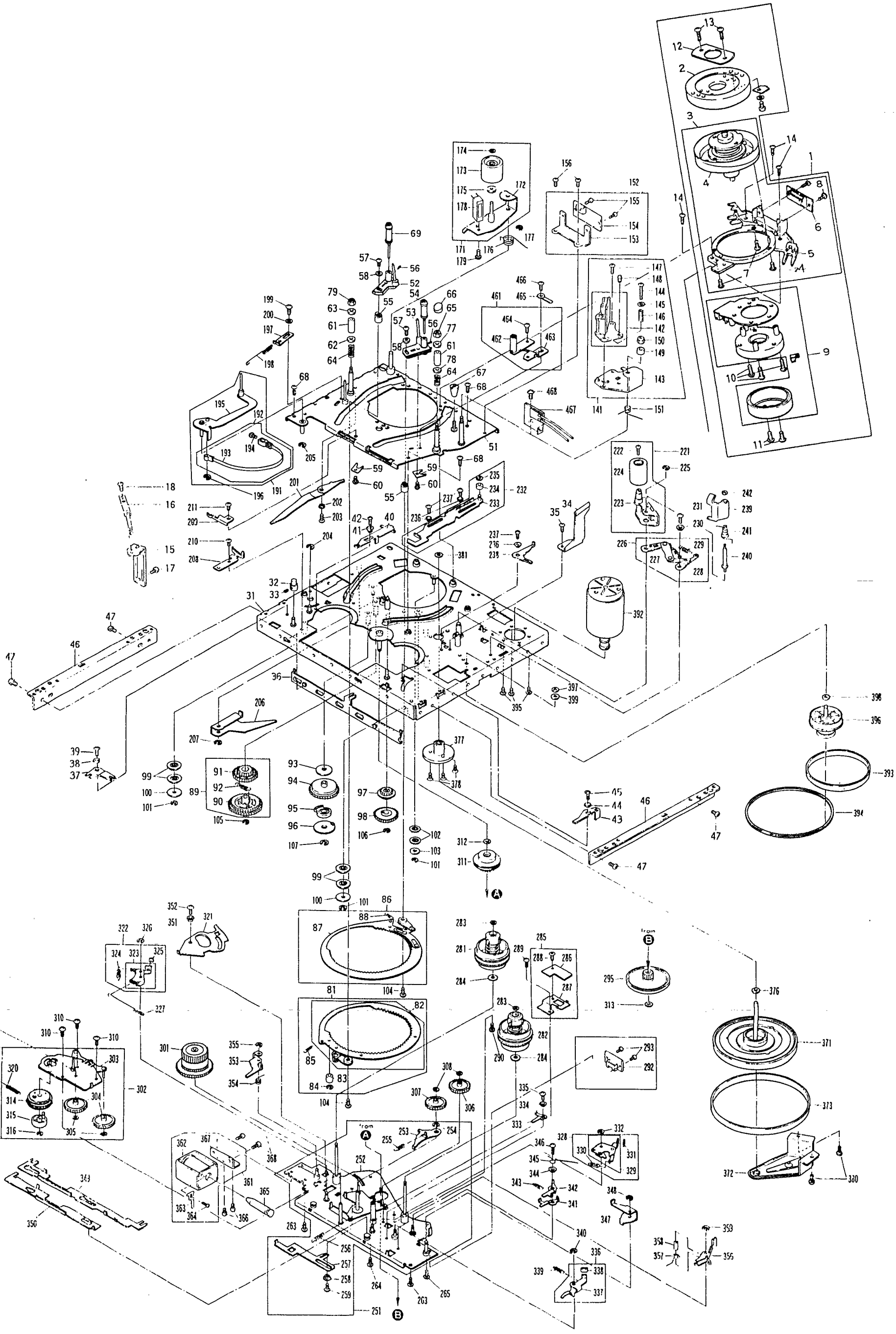
1) Shaft of the take-up reel
2) Shaft of the supply reel

After cleaning above shafts with alcohol. lubricate these shafts with one or two drops of oil.
Do not over lubricate.

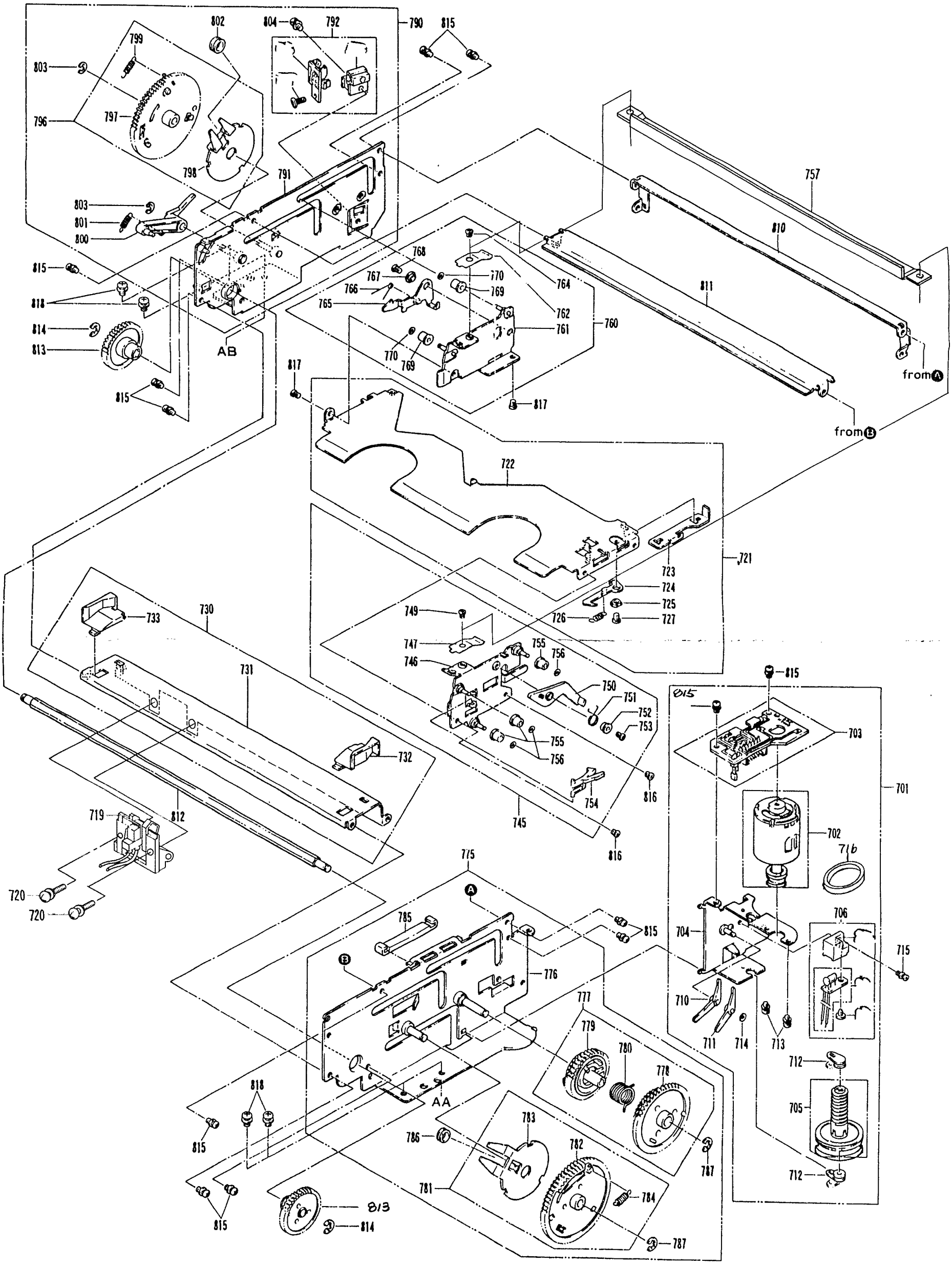
EXPLODED VIEW DECK



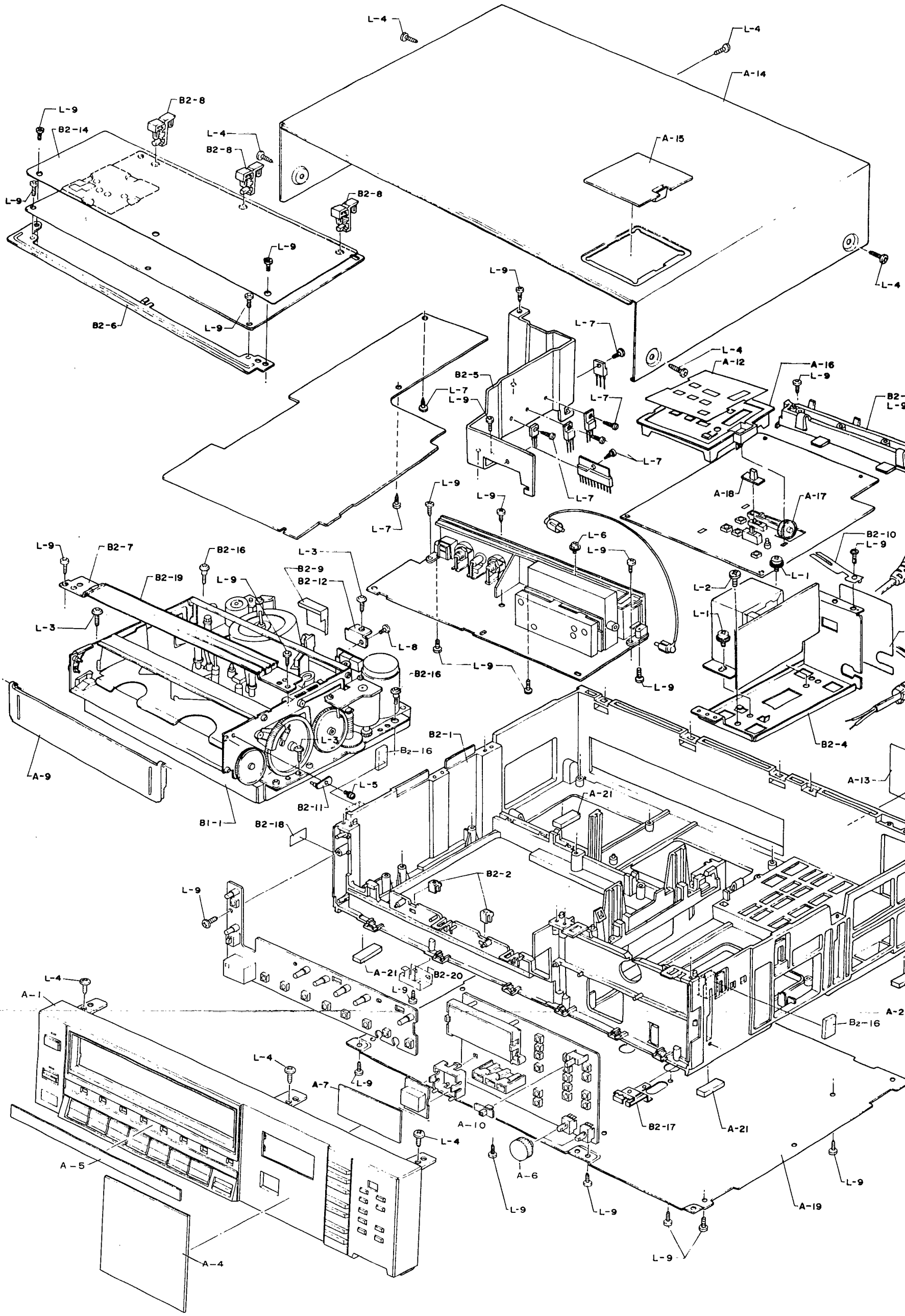
EXPLODED VIEW DECK



EXPLODED VIEW DECK



EXPLODED VIEW CABINET



R6732

ELECTRICAL DESCRIPTIONS

DESCRIPTION OF VIDEO CIRCUITS

1. Luminance Signal (Playback System)

1 — 1 PRE AMP Circuit (Head Amp)

The FM signal being recorded on the video tape is played back by two video heads of CH1 and CH2, and inputs to pins No. 6 and 4 of AN6326 respectively and is amplified by PRE AMP.

VR1 and VR2 are feed back damping and are used for head balance adjustment of CH1 and CH2 preamplifier output. Head switching pulse of 25Hz inputs to AN6326 pin No. 2 from the servo. CH1 and CH2 preamplifier outputs are switched by the signal being amplified by PG AMP while good timing is maintained. Thus continuous FM signal inputs to AGC AMP and CHROMA AMP.

1 — 2 AGC AMP Circuit

AGC AMP keeps the level fluctuation of FM signal being played back by the video head at constant.

1 — 3 FM AMP Circuit

AGC AMP output of AN6326 is supplied to FM AMP of Q9 from pin No. 11 and improves S/N and video frequency characteristics. For this reason high frequency compensation is executed by L and C. The output level being played back by the video head is raised by 6 dB/OCT as the frequency becomes higher. However, in high frequency, the output is lowered due to various kinds of losses and the difference with the noise level is reduced resulting in deteriorated S/N. Therefore, high frequency compensation is executed properly here and there.

High frequency compensation is conducted as much as approx. 3MHz by L7 and C22.

A trap of approx. 626kHz is provided at L6 and C20 to remove the color component.

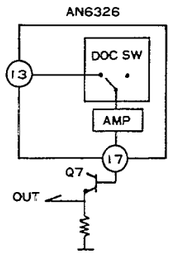
The output of Q9 is supplied to DOC circuit from AN6326 pin No. 13 via C21.

1 — 4 Drop Out compensator Circuit (DOC)

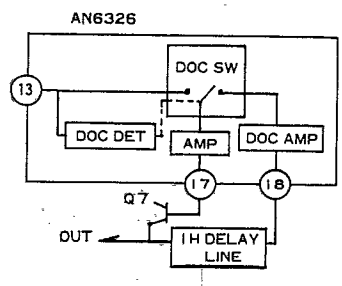
Drop out is such a phenomenon that playback (PB) FM signal is missing due tocontamination or scars on the tape and horizontal ncise appears on the screen.

This circuit is provided to fill the missing portion with 1H before PB FM signal so that the noise may not appear on the screen.

1) Normal operation without drop out



2) In case drop out is caused

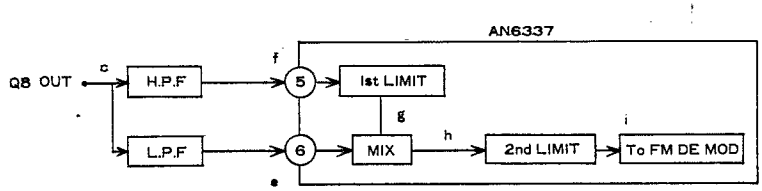


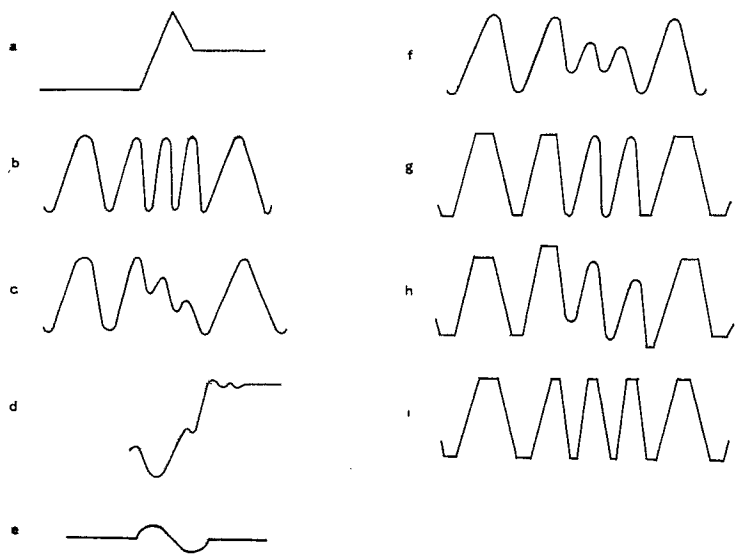
Under normal operation, FM signal is output being passed through in the order of AN6326 pin No. 13→DOC SW→AMP →pin No. 17 →Q7 emitter out.
When drop out is caused, DOC detection circuit is actuated if FM signal does not input to AN6326 pin No. 13 and DOC switch is changed over to DOC AMP output side.
In the meantime, 1H delayed signal passing through 1H delay line from Q7 emitter is further passed through DOC AMP from AN6326 pin No. 18 and outputs passing through in the order of DOC SW→AMP →pin No. 17 →Q7 emitter out thereby filling the FM signal disappeared due to drop out by 1H before FM signal.
L4 and C19 between pin No. 17 and Q7 execute S/N improvement except at high frequency.

1 — 5 Double Limiter FM Circuit

If any portion of video input signal is rapidly changed from black to white, and it passes through the pre-emphasis circuit, a spike will be caused at rising portion of the waveform (waveform a). Its FM MOD OUT is waveform b. If this signal is recorded and played back, missing of zero-cross point will be appeared at spike portion as waveform c. If it passes through the limiter without any treatment, the portion that ought to be while becomes black as waveform d. This is refferred to as the inversion phenomenon.
Following measures are taken to prevent such a difficulty:

1. High frequency component of PB FM signal is taken out by H. P. F. to obtain the waveform which is free from missing of zero-cross point (waveform f). After it pesses through 1st limiter to have same amplitude (waveform g), it inputs to MIX.
2. Low frequency component of PB FM signal is taken out by L. P. F. and inputs to MIX (waveform e).
3. FM signal of high frequency component is free from missing of zero-cross point and FM signal of low frequency component passes through L. P. F. are FM signal mixed but free from distortion outputs (waveform h).
4. FM signal coming from MIX passes through 2nd limiter to have same amplitude (waveform i) and inputs to FM DEMOD.





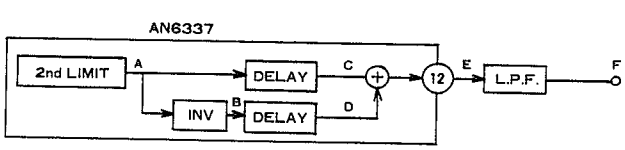
1 — 6 FM DEMOD (Demodulation) Circuit

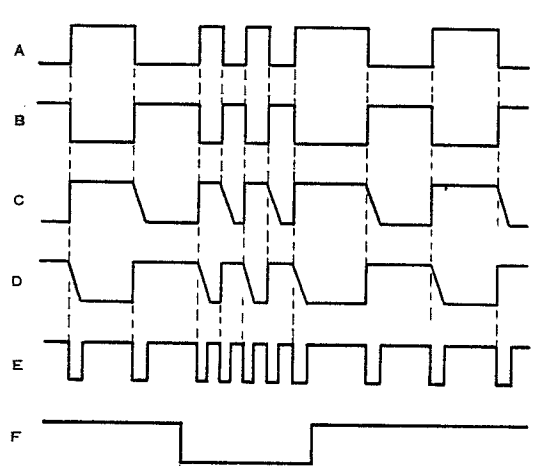
This circuit is intended for FM demodulation (convertion from FM signal to video signal) contrary to FM modulation (conversion from video signal to FM signal).

Waveform A from AN6337 2nd LIMIT supplies to delay circuit of FM DEMOD circuit and is delayed as much as the constant amount at falling portion of the waveform. (waveform C)

Waveform B inverted from waveform A is introduced to delay circuit and is delayed as much as the constant amount at falling portion of the waveform. (waveform D)

Waveform E is obtained by passing these Waveform C and D through NAND circuit (addition). Average voltage being output from AN6337 pin No. 12 is varied by the frequency of Waveform E. When it further passes through L. P. F. of L27 and C60 video signal free from FM carrier component (waveform F) is obtained.





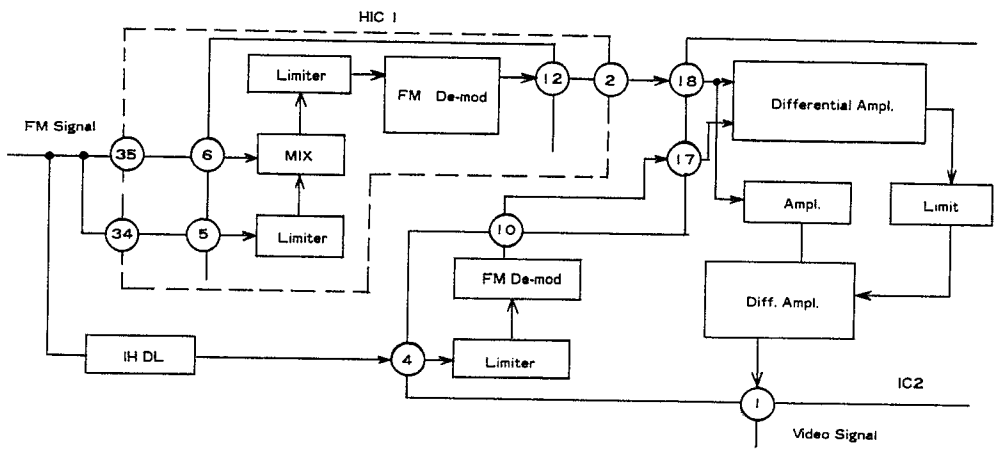
1 — 7 NOISE CANCELER Circuit

The noise cancellation circuit is used to improve the S/N ratio and is activated only in the playback mode.

The RF signal goes, via 1H DL, to pin 4 of IC2. The signal is outputted from pin 10 after being demodulated in IC2 and is supplied via the LPF (L13, C30) and line noise canceller (VR4) to pin 17.

The 1H delayed signal is supplied to the differential amp of IC2. Part of the differential signal is the PB video signal which is passed through LPF and noise appears at pin 15 of IC2. If there is no dropout, the noise enters the limiter where it is clipped.

Switching noise is generated at the switching point and this appears as a spike in the video signal. To reduce this switching noise, it goes to the differential amp directly through C36. The noise is cleared by the video signal in the differential amp and is outputted on pin 1 IC2.

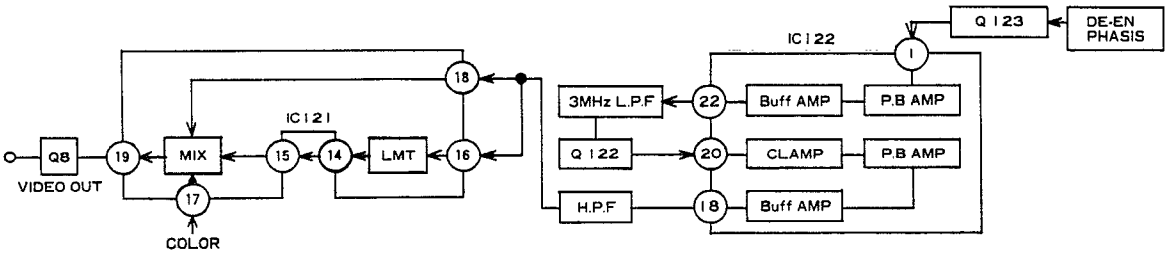


1 — 8 DE-EMPHASIS Circuit

In high frequency region, pre-emphasis is execute to improve S/N in REC system, this circuit is provided to restore VDO signal by passing it through de-emphasis circuit that has reverse characteristics at recording side. This circuit is composed of L16, C45, C41 and R39 connected to Q123 .

1 — 9 Y-C Mix Video Out Circuit

This circuit is used to improve the high frequency S/N ratio. The output of the deemphasis is supplied via the HPF (C55, C54 and R52) to pin 16 of IC121 and the amplitude is limited. This limited signal goes to pin 15 and the video luminance signal from pin 18 is supplied. These two signals are mixed and the high frequency cleared. The noise reduced luminance signal is supplied to pin 18 and the color signal from the color circuit is applied to pin 17. These two signals make the complete video signal.



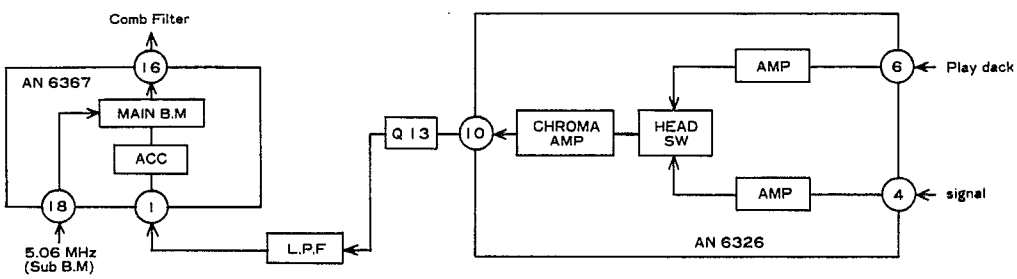
2. Color Signal (Playback System)

2 — 1 1MHz LPF Circuit

The color playback signal being played back by the video head passes through pre-amplifier of AN6326 and outputs from pin No. 10 via CHROMA AMP. After being amplified by Q13, it inputs to L. P. F. of spproximately 626kHz which is composed of L22, L23, C79 and C80 and its output is input to ACC circuit from AN6367 pin No. 1. L. P. F. is a filter which takes out the color playback signal only.

2 — 2 Main CONV Circuit

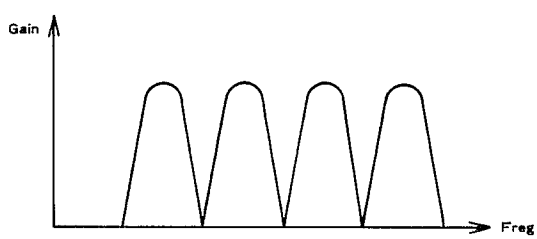
The color signal (626kHz) coming through ACC circuit from AN6367 pin No. 1, inputs to main BM, and is converted its frequency to 4, 43MHz playback color signal by 5. 06MHz signal coming from in SUB BM. The output color signal of 4. 43MHz from No. 16 pin inputs to the comb filter.



2 — 3 Comb Filter

This comb filter is necessary for treatment of the color signal is. For saving video signal band, a color signal is inserted in the clearance of frequency distribution of Y signal. This is refferred to as "FREQUENCY INTER LEAVING".

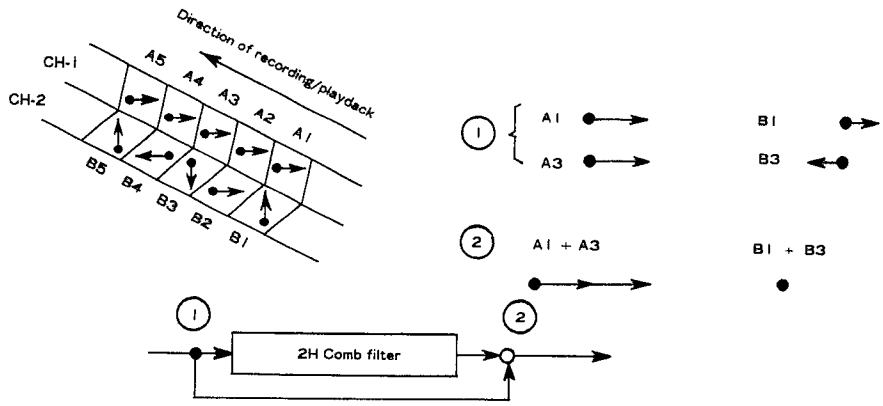
This filter has the characteristics like teeth of a comb as illustrated. The color signal of 4. 43MHz±500kHz is solely taken out by this filter. Another function of this filter is to process the color signal by means of PS method for the sake of removal of cross-talk from adjacent track. For the method it is necessary to delay the color signal 2H, and as for color signal from the comb filter, which is free from cross-talk of the adjacent track and output.



〈PS Color Method〉

Playback color signal is converted in low frequency and is affected by the cross-talk from adjoining track due to the guard bandless recording. Therefore, it should be removed throughly. For this reason, the phase of color signal of CH2 video track is shifted every 90°under recording mode.

And if the signal passed through 2H comb filter and another signal not passed through it are added at playback mode. The cross-talk is then canceled and the color signal is doubled.



2 — 4 4.43MHz B. P. F.

The output that removed color cross-talk component from the adjacent track by the DL2 comb filter is take out color signal component 4.43MHz ± 0.5 MHz through 4.43MHz B. P. F.

It is also eqipped with delay characteristics in order to take timing with Y signal delay time.

The output signal of this B. P. F. is supplied to AN6367 pin No. 22.

2 — 5 Burst De-emphasis Circuit

Recording is executed while the level is raised by 6dB in order to improve burst S/N by burst emphasis. It is restored to original status under playback mode to improve S/N too.

2 — 6 Color Out Circuit

The output of burst de-emphasis is output from AN6367 pin No. 14 via amplifier to C71 →R61 →C53 →AN6337 No. 17→MIX →AMP →No. 19 →video out. The filter of approx. 5.4MHz composed of L19, C68, L20 and L69 is provided between R61 and C53. This filter removes the high frequency noise component thereby improving color S/N.

2 — 7 APC Circuit (Aoutomatic Phase Control)

Playback color signal of (40+1/8) fH ± Δf is input to pin 1 of IC123 and output from pin 16 through ACC and Main B. M.

Color signal from 2H Comb filter is input to APC circuit through 4. 43MHz B. P. F.

X'tal VCO (4. 433618MHz) is also input to APC from pin 5 of IC123.

The output signal from APC is controlled to VCO (321fH± Δf) and output to pin 11 of IC123.

321fH ± Δf signal is input to pin 2 of IC124 and count down to (40 +1/8)fH± Δf and output to pin 16 of IC124.

(40 +1/8)fH± Δf signal input to pin 9 of IC123 and 5. 06MHz± Δf from Sub B. M. is output from pin 7 of IC123.

5. 06MHz ± Δf signal is input to pin 18 of IC123(Main B. M.) through 5. 06MHz B. P. F.

Playback color signal of (40+1/8)fH± Δf and 5. 06MHz ± Δf are no phase difference by Main B. M.

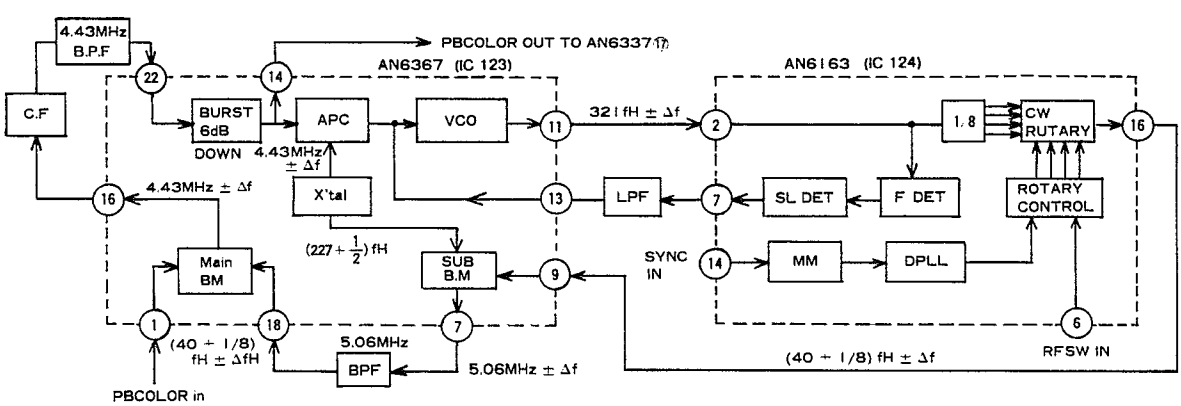
2 — 8 Side Lock Circuit

In APC circuit loop, there is no ploblem if VCO is locked by 321fh. Even if VCO is shifted more than 321fh ± 1fh APC loop is locked and disordered color phase and uneven color occur by erroneous operation.

If VCO oscillation is shifted more than 321fh ± 1fh, frequency error is detected by the frequency detector. VCO's error voltage of AN6163 No. 7 is applied to VCO circuit via L. P. F. and is locked to 321fh ± 1fh.

2 — 9 Color Killer Circuit

Phase comparison is made by the color killer phase comparator between the burst signal from burst de-emphasis output signal and the 90°shifted signal which is subcarrier coming from 4. 43 MHz crystal OSC. If an error voltage is output, Schmitt circuit is turned ON and its output actuates the killer switch to turn OFF AN6367 pin No. 14 output signal.



3. LUMINANCE SIGNAL - Y Signal - (Recording System)

3 — 1 AGC Circuit

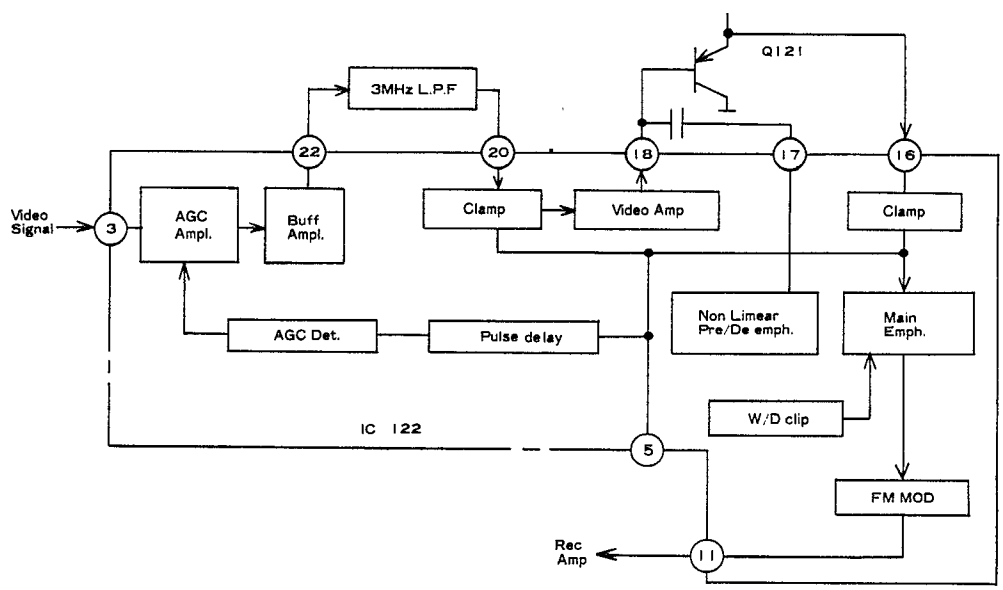
The video signal being input from VIDEO IN is passed through AN6306 pin 3 and AGC amplifier, and outputs to pin 22.

3 — 2 3.0MHz Low-pass Filter

AGC AMP Output (AN6306 pin 22) is utilized to take out only luminance signal from the video signal by 3MHz L. P. F.

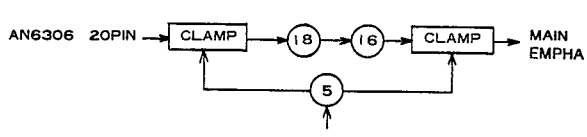
Furthermore, it has delaying characteristics to maintain good timing between the color signal and delaying time.

The output of L. P. F. is supplied from AN6306 pin 20 to the clamp circuit.



3 — 3 Clamp Circuit

This circuit clamps to a certain voltage so that DC level at the tip of synchronous signal (SYNCTIP) may not be varied. SYNC from AN6306 pin 5 is used as the signal to actuate the clamp circuit only during synchronizing.



3 — 4 Main Emphasis

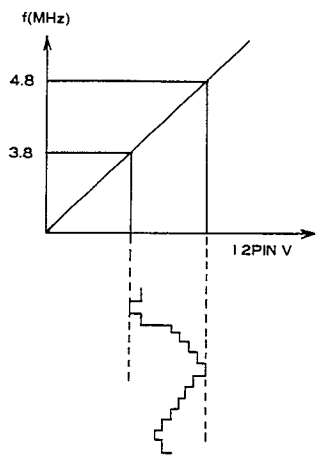
Luminance signal inputs from AN6306 pin 16 clamp to main emphasis circuit. In this main circuit, high pass region is emphasized to improve S/N with a similar manner as non-linear circuit. In this emphasis circuit, emphasis amount is constant regardless of input level, and time constants are determined by C128, C123, R123 and R124.

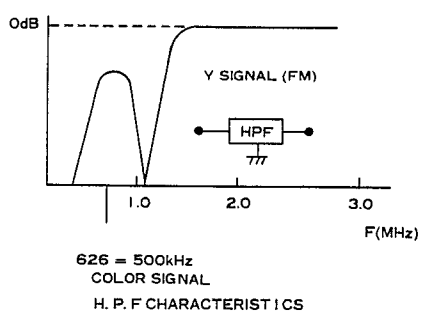
3 — 5 White/Dark Clip Circuit

When the video signal is passed through the emphasis circuit, the high pass region is emphasized. Spikes are caused at rising and falling portion of the wave form to which much high pass components are concentrated and if the signal of rising and falling is modulated in FM without any treatment, overmodulation is caused resulting in the cause of inversion phenomenon. This circuit is provided to clip its spike level at constant.

3 — 6 FM Modulation Circuit (FM MOD)

The emphasized video signal inputs to pin 12 of FM modulation circuit from AN6306 pin 14 via VR123. FM modulation circuit is an oscillator, the frequency is varied according to input level of the video signal. The modulated FM output signal is supplied from pin 11 to REC AMP.





626 = 500kHz
COLOR SIGNAL
H. P. F CHARACTERISTICS

3 — 7 H. P. F. Circuit

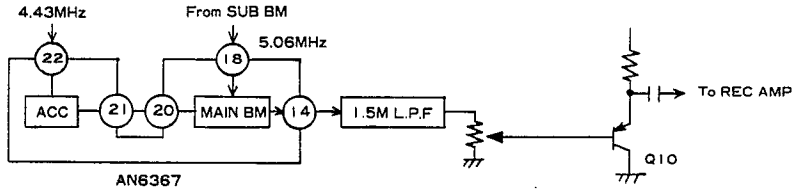
H. P. Filter consists of L1, L2, C7 and C8. This filter is provided due to following reason: The color signal, converted in the low frequency, inputs to REC AMP and mixes with Y signal. It is therefore necessary to secure the band of the color signal component. This H. P. filter cuts Y signal band by as much as color signal band.

3 — 8 REC AMP Circuit

a. It is composed of Q2, Q3 and Q5
b. Q5 is mixed circuit that Y signal (FM) and the color signal converted in low frequency.
c. Q2 and Q3 are push and pull, C combined and connect to the video head.
d. Q1, Q4 and Q6 are R/P selection circuit of the video head.
e. R6 and R14 are test points for video head recording current measurement.
f. C4 and C5 are path condensors which prevent the noise from entering to the video head under PB mode.

3 — 9 EE OUTPUT Circuit

AN6306 pin 4 VR126 makes adjustment of E-E output level.
Under EE mode, the color signal outputs from pin 19 together with Y signal and further outputs at VIDEO OUT without being passed through the color signal treatment circuit.



4. COLOR SIGNAL (Recording System)

4 — 1 4.43MHz B. P. F.

The video signal input from VIDEO INPUT passes through 4.43MHz B. P. F. from output of Q127 collector and 4.43MHz ± 0.5MHz color signal is taken out.
This filter is also equipped with delay characteristics to make the timing with Y signal.

4 — 2 ACC Circuit (Automatic Chroma Level Control)

This circuit suppresses the fluctuation of color signal level and maintains the color signal level constantly.

4 — 3 Burst Emphasis Circuit

The level of color burst signal among color signals is solely raised to 6 dB (twice). This is to improve S/N of the burst signal as the reference of the color signal.

4 — 4 Main BM Circuit (Main Balanced Modulator)

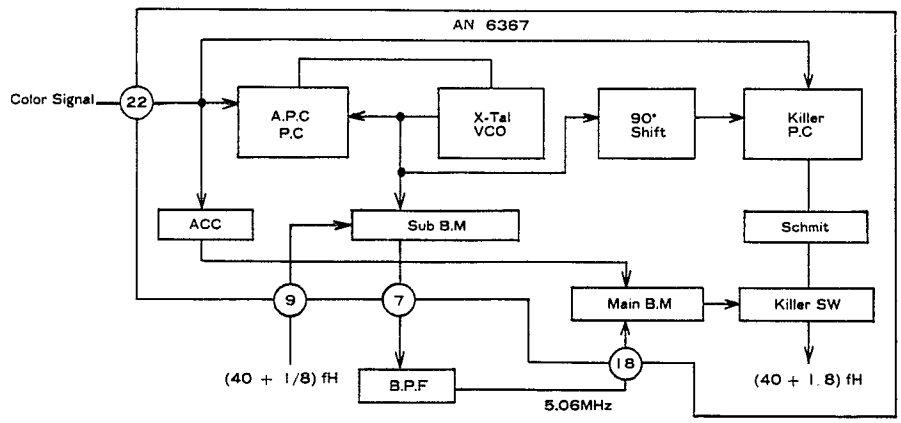
This circuit is that the color signal of 4.43MHz ± 500 kHz is frequency converted with 5.06MHz coming from sub-balanced modulator and taken out low frequency converted color signal of 626kHz ± 500kHz by 1.5M L. P. F.

4 — 5 Color Out Circuit

1.5M L. P. F. is also equipped with delay characteristics in order to make timing with Y signal. VR 6 is provided for adjustment of color recording current.

4 — 6 APC Circuit (Automatic Phase Control)

In APC circuit, the color burst signal inputs to APC phase comparator from ACC out.
In the meantime, the color carrier output signal from 4.43MHz crystal VCO (Voltage Control OSC) input to IC124 pin 2 and make phase comparison with the burst signal coming from the video input. Its error voltage is passed through L. P. F. and converted in DC, 4.43MHz crystal VCO is controlled and its output inputs to sub-balanced modulator.
40 fh (629kHz +90°) inputs to AN6367 pin 9 from MN6163 (pin16), the frequencies of 4.43MHz crystal VCO output and 40 fh are converted and outputs from pin 7. This output is passed through 5.06MHz B. P. F. where 40 fh+ 4.43MHz component is taken out.
Its output is supplied to main BM from AN6367 pin 18 and same processing as stated under 4-4 is executed.



4 — 7 AFC Circuit (Automatic Frequency Control)

SYNC SEP output (plus polarity) coming from AN6337 pin 1 inputs to MN6163 pin 14, passed through mono-multivibrator and the burst G. P. circuit, and its pulse is used at each gate of APC circuit.

In the meantime, SYNC input inputs to AFC phase comparator via mono-multivibrator. Furthermore, 5.06MHz VCO output existing at AN6367 outputs from pin 11 and inputs to MN6163 pin 2 where it is 1/321 frequency divided and inputs to AFC PC.

In AFC PC, phase comparison is made between fh signal from pin 14 and fh signal which is 1/321 frequency divided from 5.06MHz VCO.

And following actions are taken:

In case fh is delayed with regard to fh signal from pin 14:

Pin 9 output becomes low.

In case fh is advanced with regard to fh signal from pin 1:

Pin 9 output becomes high.

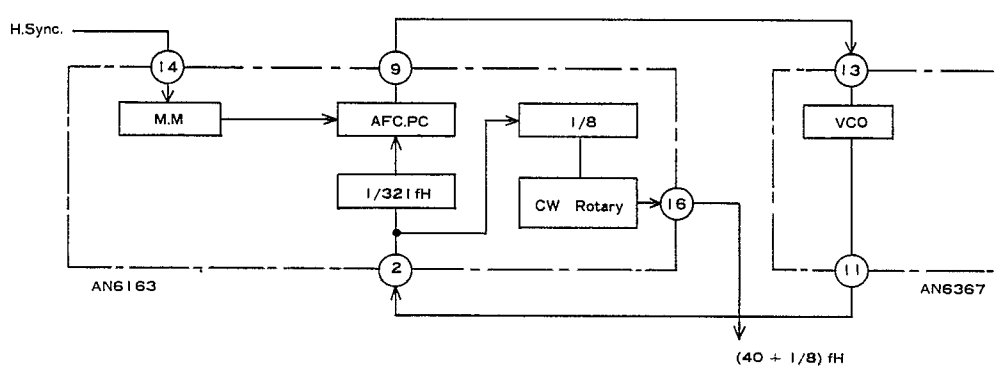
In case fh is synchronized with fh signal from pin 14:

Pin 9 output becomes high impedance.

Pin 9 output is passed through L. P. F. , replaced with the change in DC level and 5.06MHz VCO is controlled from AN6367 pin 13.

The said 5.06 VCO output is frequency divided into 1/2 and 1/4 from MN6163 pin 2 and inputs to 4 ϕ gate (data selector).

Furthermore, fh being passed through M-M from pin 14 is also passed through DPLL (Buffer OSC), 1/4 frequency divided and inputs to the data selector. From MN6163 pin 6, PG signal inputs to the data selector. As mentioned above, 90°shifted 40 fh (626 kHz) outputs every 1H from MN6163 pin 16 and inputs to sub-balanced modulator from AN6367 pin 9.



DESCRIPTION OF DRUM SERVO CIRCUIT

1. Drum Servo Circuit

1 — 1 Drum Speed System Circuit (REC)

Drum FG signal (600Hz) inputs from pin 3 of CN-7 and inputs to pin 3 of servo main IC306 after being amplified.

Drum FG signal to pin 3 of IC306 is compared with ROM data which is written in IC306. The speed error is converted into pulse width and outputs pin 28 of IC 301.

The speed error of pulse width modulation being converted into DC by the low pass filter, amplified by IC306, output from pin 5 of CN-7 as the drum motor control signal and is used as the control signal of motor driving IC being mounted to the drum motor.

Drum control voltage is controled by Q312 switching which is reversed DM on signal of 49 pin of IC501 by Q301.

1 — 2 Drum Phase System Circuit (REC)

Two magnets N and S which are mounted on the drum motor are detected as PG signal by hall IC, being input from pin 1 of CN-7 and after being amplified by IC305, input to pin 17 of IC302 (AN6346N). The waveform of PG signal being input to IC302 is shaped by Schmitt circuit, creates H. S. W. (Head Switching Pulse) by PG M. M (A), (B) and R-S FF and outputs from pin 14 and inputs to pin 25 of IC301.

In the meantime, V-sync. signal being synchronized and separated from the video input signal by the video circuit inputs from pin 2 of CL-6 and it inputs to pin 5 of IC301. HSW pulse being created from PG signal is compared in the phase comparison circuit while the said V-sync. signal is referenced, its error is converted into the change in pulse width and outputs from pin 27.

The phase error of pulse width modulation being converted into DC by the low pass filter and is mixed with the speed error by R321.

1 — 3 Drum Speed System Circuit (PB)

Drum speed servo under playback mode is almost same as that of recording. However, relative speed between the tape and the head is compensated by slightly changing the drum speed since, at speed search playback, the relative speed may be deviated from that of recording resulting in color slippage.

1 — 4 Drum Phase System Circuit (PB)

Under playback mode, the internal reference signal which is obtained by dividing the clock of crystal OSC in the video circuit, and drum PG are compared with the phase as the reference signal of the phase servo, and phase servo is then applied.

2. Capstan Servo Circuit

2 — 1 Capstan Speed System Circuit (REC)

Capstan FG signal due to capstan motor rotation inputs from pin 1 of CL-E and is input to pin 11 of IC304. It is 1/2 frequency divided in the IC304, being output from pin 13 and inputs to pin 17 of servo main IC301.

1/2 FG signal being input to pin 17 of IC301 is compared with the speed ROM data by the capstan speed comparison circuit thereby detecting the speed error. This error is converted into the change in pulse width and is output from pin 2.

The capstan speed error of pulse width modulation is converted into DC by the low-pass filter and is input to pin 3 of IC307.
IC307 amplifies the speed error input coming from pin 3 while the gain is changed over by recording mode and outputs it from pin 2.
It is amplified by IC307 and input to pin 4 of capstan driver IC303, passed through No.3 and 4 pins of CL-E from the output of pins 2 and 10 and drives the capstan motor. Capstan motor control signal (input to pin 5 and pin 6 of IC303) is controled by FWD, REV signal from pin 39 and pin 38 of system control IC501.

IC 303 / Mode	INPUT		OUTPUT	
	Pin 5	Pin 6	Pin 2	Pin 10
C-FWD	L	H	L	H
C-REV	H	L	H	L
Brake	H	H	L	L
Free	L	L	L	L

2 — 2 Capstan Phase System Circuit (REC)

In the phase system under recording mode, capstan FG signal to pin 17 of servo main IC301 is frequency divided internally to generate capstan PG signal to be used as the comparison signal of phase comparison at recording mode.
The phases of this PG signal and the internal reference signal are compared to detect the phase error, this error is converted into the change in pulse width and is output from pin 3.
The pulse width modulation phase error is mixed with speed system error after being converted into DC by the low pass filter.

2 — 3 CTL Recording Circuit

V-sync. signal being input to pin 5 of IC301 which is described in drum phase system circuit at image transcription is 1/2 frequency divided and is output from pin 4 as CTL signal at recording mode. This 1/2 V-sync. inputs to pin 10 of IC302.
It is output from pin 6 after being amplified by CTL REC AMP of IC302, being passed through pin 2 of CN-8, and 1/2 V-sync. signal is recorded by CTL head.

2 — 4 Capstan Speed System (PB)

Capstan speed system servo under playback mode is same as that of under recording mode.

2 — 5 Capstan Phase System (PB)

As for capstan phase servo under playback mode, the internal reference signal from pin 4 of IC301 inputs to pin 10 of IC302, being passed through tracking mono-multi, input to pin 6 of IC301 and is used as the reference signal for phase comparison.
In the meantime, CTL signal inputs from pin 2 of CN-8 to pin 6 of IC302, being amplified by playback CTL AMP, passed through FWD/REV selection circuit, further passed through pin 3, pin 2 and waveform shaping amplifier, and outputs from pin 1.
Playback CTL signal after waveform shaping inputs to pin 16 of servo main IC301, being passed through CTL frequency dividing circuit and digital mono-multi circuit, foregoing internal reference signal is compared with the internal reference signal being phase adjusted by the tracking mono-multi, eventual phase error is detected and this error is modulated with pulse width and outputs from pin 3. After that, same operations as observed under recording mode are executed.
The phase error of pulse width modulation is converted into DC by L. P. F. and mixed with the speed error.
It is amplified by IC307 and input to pin 4 of capstan driver IC303.

		Drum Servo		Capstan Servo	
		Reference signal	Comparison signal	Reference signal	Comparision signal
REC	Speed	CLOCK ROM DATA	D.FG	CLOCK ROM DATA	C.FG
	Phase	V. Sync.	D.PG	CLOCK	C.PG
PB	Speed	CLOCK ROM DATA	D.FG	CLOCK ROM DATA	C.FG
	Phase	CLOCK	D.PG	CLOCK	CTL

3. Rec. Pause

When Pause key depressed during recording.
Short rewind is operated 2.5 sec. by C-REV signal " H " from pin 39 of system control IC501. Tape speed during short rewind is same as Rec. mode. Q315 turned on by Rec. Puase " H " signal from pin 46 of IC501 and error data of main servo IC501 is locked by Q315 so output signal (pin 8 of IC307) is same level as Rec. mode.
After short rewind is complete. Pause mode is stand-by Pause mode is obtained till Pause " H " is leleased PB mode is obtained 2.0 sec. under capstan servo circuit. This time is called "Standing by mode". At standing by mode play back CTL is phase completed by Vss/2 (VSY-2) of standard signal at phase complete operation of capstan servo circuit is as followers.
Phase is completed by play back CTL signal and standard signal (Vss/Vss-2). So play back CTL and Rec. CTL becomes same phase. Also phase making is operated by capstan PG that is made by play back CTL.
These operation is controled by D. Rec. " H " signal (pin 37 of IC501) and input to pin 7 of IC301.

4. Operation at Special Playback

Setting of speed at special playback selects pin 19 ~22 (capstan speed select signal) and pin 18 (CUE/REV change) of main IC301, according to the mode signal (FS, RS, PAUSE) from system control.

And the inside of IC301 presets each data which corresponds capstan speed select signal to comparative circuits. The data corresponds to each mode is shown the folloing table.

Input	VSC 0 22	VSC 1 21	VSC 2 20	VSC 3 19	CUE/REVIEW 18
PB	H	L	L	L	L
STILL(PAUSE)	L	L	L	L	L
CUE(FWD SEARCH)	H	L	H	L	L
REVIEW(REW SEARCH)	H	L	H	L	H

4 — 1 Play Pause (STILL)

The pause signal of system control inverts by Q303 at still. It input to 22 pin of servo main IC301.

The servo signal in the inside of IC301 selects the Rom data which corresponds to the input of the speed data, at the same time, in the drum system the correction of the relative drum speed is made and in the capstan system the phase comparison output is fixed to 50% duty.

4 — 2 Still Noise Cancel

At noise cancel, the drive voltage of capstan motor is the voltage of normal PB mode, and the speed sending the noise makes the pin 38, pin 39, FWD, REV signal of system control to " H " and pulse-drives in fixed cycle " H "←→" L ".

According to this, it sends the tape intermittently and cancels the noise bar from a picture.

4 — 3 FWD Search (CUE)/REWIND Search (REVIEW)

4 — 3 — 1 FWD Search

At FWD SEARCH, as the speed is five times, OR of pin 48 FS and pin 49 RS of system control IC501 is taken, 20 pin (VSC 2) of main IC301 is changed to " H ".

According to this, in the inside of IC, Rom data of five times is selected. In the drum speed system, as the relative speed between tape and head at normal PB changes, it is corrected to become the fixed speed automatically in the inside.

Other comparison operations are equal to those at normal PB.

The error voltage of the capstan system puts on Q309 by OR of FS, RS signal of IC501 and ups the gain of IC307-B.

4 — 3 — 2 A Point of Difference Between FWD Search and REVERSE Search

At REVERSE SEARCH the correct amount of the drum speed system is changed by input of PIN49 RS " H " signal to pin 18 (C-REV) of servo main IC301 and the relative speed between tape and head is fixed. And in the capstan system the traveling of tape is reverse direction, so the polarity of the signal picked up by CTL head is the opposite polarity. Therefore the polarity of CTL pulse turns over by input of the pin 39 C-REV " H " signal to pin 4 of IC302, and output the pulse equal to the polarity at FWD SEARCH from pin 1 of IC302.

5. Error Voltage Reset at Stop and Mode Change

At stop, the signal which DM-ON signal is turned over by Q301 is used.
At move from the special playback to normal PB, pin 43 SP-PB signal of system control IC501 is used. And Q308 is putted on.
The answer of the servo at the move of mode is quickened by the reset of the voltage of C333 loop characteristic corrective filter to the reference voltage of the servo system.

6. FF/REW

At FF, REW, the error voltage of the servo main IC is not used. The driving voltage of capstan motor puts on Q310 by pin 40 C-FAST signal of system control IC501 and ups the gain of IC307 AMP to near the line voltage of IC307.
Therefore the driving voltage of the motor is determined by the line voltage of IC303. (The driving voltage becomes line voltage muinus about 2.1V)

7. Others

Q305 fixes the voltage of filter C333 of capstan phase system to the reference voltage 2.5V not to make a bigchange and speeds up to return to the normal operation in case of the change from stop to REC mode or CTL signal comes off during the short play in continuence recording and PB, D301, R305.
1CH and 2CH during artificial V which makes V-Sync. of the video signal from HSW pulse, a picture cause vertical shake.
In order to check this, the rise of HSW pulse is delayed to correct the position of artificial V in 1CH side.

System Control

1. GENERAL

The unit is control led by a 4-bit microprocessor, and motor driving circuit has sufficient functions as predetermined.

2. FUNCTIONS

This circuit has following functions:

2 — 1 Operation Key Input

(1)	EJECT	:	Tape ejecting
(2)	STOP	:	Stopping
(3)	FF/FS	:	Fast forward; FS (Foward Search) during play mode.
(4)	REW/RS	:	Rewinding; RS (Reverse Search) during play mode.
(5)	PLAY	:	Playback
(6)	REC	:	Recording
(7)	PAUSE	:	PLAY PAUSE mode at PLAY. REC PAUSE mode at REC.
(8)	NOISE CANCEL	:	Effective at PLAY PAUSE mode. Removal of noise band.

2 — 2 Other Inputs

1. Infrared wireless Remocon Input
   Remote operation is possible by the designated infrared wireless remote controller.
   9 Keys (10 modes)
   1 STOP
   2 FF/FS
   3 REW/RS
   4 PLAY
   5 REC : Press two record keys together to record.
   6 PAUSE
   7 NOISE CANCEL
   8 POWER ON/OFF
2. Camera remote control input
   REC PAUSE is possible by the Camera at REC mode.
   (The adapter is required)

2 — 3 Control Functions

(1)	Video circuit control	:	Muting, Still
(2)	Audio circuit control	:	Muting
(3)	Servo circuit control	:	Drum motor, Capstan motor
(4)	Mechanical deck control	:	Loading motor, Brake solenoid (Drive circuit incorporated)
(5)	Display LED control	:	Still
(6)	Control of power supply circuit	:	POWER ON
(7)	Control by input from timer circuit and control of timer circuit. Display of TIMER and QUICK REC, COUNTER, CASSETTE IN and DEW.		

2 — 4 Protection Functions

(1) Tape start : Tape is automatically stopped at tape start position.
(2) Tape end : Tape is automatically rewound at tape end position.
(3) Abnormal reel rotation
: Tape is automatically stopped when a take-up reel is stopped.
(4) Abnormal drum rotation
: Tape is automatically stopped when drum rotation is stopped.
(5) Loading motor abnormal
: When any abnormality is caused at loading/unloading, the motor is stopped immediately.
(6) Front loading abnormal
: When any abnormality is caused at front loading, the tape is ejected.
(7) REC SAFETY : This prevents erroneous erasing of the recorded tape.
(8) PAUSE time : When PAUSE is depressed, the motor is stopped automatically after 5 min. has elapsed. (excluding STOP PAUSE)
(9) DEW : When much droplet condensation is caused at high humidity condition, the motor is stopped automatically.

3. OUTLINE OF MECHANICAL COMPONENTS

3 — 1 Loading Motor

This motor executes loading and unloading. It also drives the loading switch which is interconnected to the mechanical components.

3 — 2 Loading Switch

This switch is turned ON/OFF in connection with the loading motor thereby detecting the position of loading.

3 — 3 Capstan Motor

This motor rotates the capstan and also rotates the reel.

3 — 4 Drum Motor

This motor rotates the drum. It is rotated under PLAY, FS, RS, REC and PAUSE mode.

3 — 5 Brake Solenoid

This solenoid is actuated under FF and REW modes only where the brake is released. The solenoid may not be controlled under PLAY and REC mode since mechanical brake is applied.

3 — 6 Reel Sensor

A pulse is generated when the take-up reel is turned.

3 — 7 END/START Sensor

This sensor is composed of a phototransistor and is used for tape end and tape start detection.

3 — 8 Front Loading Motor

This motor drives the front loading mechanism (tape in/out).

3 — 9 Front Loading Switch

Four switches are combined and are used for the tape in/out execution and their detection. Switch C is commonly used as the cassette-in switch.

4. VTR OPERATIONAL MODES

4 — 1 EJECT

This mode is obtained when EJECT button is depressed where the cassette is ejected automatically. When this button is depressed directly under other mode, the machine is once put into STOP mode and, after unloading operation is completed, EJECT mode is obtained. This operation is not valid under TIMER REC mode.
Transfer from this mode to other mode is not possible.

4 — 2 STOP

This mode is obtained when STOP button is depressed where the operation carried out so far is stopped and unloading operation is executed. This operation is not valid under TIMER REC mode.

4 — 3 FF

This mode is obtained when FF button is depressed where the tape is fed fast. FF mode is obtained from STOP mode after front loading is completed. FF mode is also obtained from REC and PAUSE, etc. where the tape is loaded after unloading operation, stop and front loading operation are completed. This operation is not valid under TIMER REC mode.
Furthermore, FS (FORWARD SEARCH) mode is obtained whenever FF button is depressed under PLAY mode.

4 — 4 REW

This mode is obtained when REW button is depressed where the tape is rewound. Same operations as observed under FF mode are executed. RS (REVERSE SEARCH) mode is obtained whenever REW button is depressed under PLAY mode.

4 — 5 PLAY

This mode is obtained when PLAY button is depressed where playback operation is executed after the tape is being loaded.
This operation is valid under STOP, FF, REW, and PLAY PAUSE modes.

4 — 6 REC

This mode is obtained when REC buttons are depressed where recording operation is executed after the tape is loaded. This operation is valid under STOP, FF, REW, REC PAUSE, and PLAY PAUSE modes.

4 — 7 PLAY PAUSE

This mode is obtained when PAUSE button is depressed under PLAY mode where tape running is stopped and the standstill picture is played back and the voice is muted. If this mode is continued for 5 min., the machine is put into STOP mode. It is released upon depreseing PAUSE button again and PLAY mode is obtained. PLAY mode is also obtainable by PLAY button manipulation.

4 — 8 REC PAUSE

This mode is obtained when PAUSE button is depressed under REC mode where tape running and recording operations are stopped. After the tape is rewond for 2.5 sec., the machine is put into stand-by status. Upon depressing PAUSE button again, the tape is runs and recording is started after 2 sec. Recording is also obtainable by depressing REC button manipulation.

4 — 9 NOISE CANCEL

This mode is obtained when NOISE CANCEL button is depressed under PLAY PAUSE mode where the tape runs at very slow speed and the noise bar in the standstill picture moved and the voice is still muted. This operation is valid as long as the button is depressed. The machine is put into PLAY PAUSE mode if the button is released. PLAY PAUSE mode is obtained if the button is depressed continuously for more than 5 sec., and NOISE CANCEL mode is obtained if the button is once released and is depressed again.

4 —10 STOP PAUSE

This mode is obtained when PAUSE button is depressed under STOP mode. If REC button is depressed under this mode, the tape is loaded and REC PAUSE mode is obtained. If PAUSE button is depressed again, REC mode is obtained. When EJECT, STOP, FF, REW and PLAY Buttons are depressed, STOP PAUSE mode is released and the machine is transferred to the mode concerned. Same operation is executed when TIMER MODE signal is input.

4 —11 CAMERA PAUSE

This mode is obtained by PAUSE signal coming from the video camera. Same operations as observed under REC PAUSE mode are executed. However, PAUSE mode is obtained by " L " and it is released by " H "

NOTE: Camera adapter is required.

4 —12 FS (FORWARD SEARCH)

This mode is obtained when FF button is depressed under PLAY or RS mode where the tape is fed to fast forward and the picture is played back and the voice is muted. It is released by depressing FF or PLAY button and the machine is put into PLAY mode.

4 —13 RS (REVERSE SEARCH)

This mode is obtained when REW button is depressed under PLAY or FS mode where the tape is fed to fast reverse direction and the picture is played back and the voice is muted. It is released by depressing REW or PLAY button and the machine is put into PLAY mode.

4 —14 TIMER REC and QUICK REC

These modes are obtained by the control signal coming from the timer circuit where the tape is loaded and recording is started. REC mode is obtained by input " H " coming from the timer circuit and it is released by " L ". Other key operation is not valid under REC mode.

5. MICROCOMPUTER CIRCUIT

5 — 1 — 1 Outline of microcomputer

1) One-chip 4-bit

2) Clock oscillation circuitis incorporated 3.58MHz.
(Oscillating element is provided externally.)

3) C. MOS + 5V single power supply
Terminal 64:VDD (+5V)
Terminal 1:GND

5 — 1 — 2 Outline of microcomputer input and output signals

1) Input Signals

Name of Signal	Terminal No.	Description
KEY SCAN	2~5	KEY SCAN Matrix output
KEY SCAN	30~32	KEY SCAN Matrix input
T. REC	6	"H" when timer rec or quick rec is on.
M. STOP	8	"L" when the motors is stopped
REC. SAF	9	Recording is prohibited by "L".
REMCON	12	Infrared remocon input.
RESET	16	Reset terminal
V-REF	17	Referance Voltage input
LD-A, B, C	18~20	Detection of loading position (See Fig. 6. 1)
P. ON-IN	21	"H" when power switch is ON and "L" when the timer switch is ON.
REEL . P	22	Reel pulse input
SW. PULSE	23	Switch pulse input
START	24	"H" when tape start is detected
END	25	"H" when tape end is detected
FL-A, B, C	26~28	Detection of front loading position
CAM PAUSE	29	"L" when camera pause is ON.

2) Output Signals

Name of Signal	Terminal No.	Description
REC	61	"H" under REC (PAUSE) mode
PLAY	60	"H" under PLAY (PAUSE, SEARCH) mode.
PAUSE	57	"H" under PAUSE (PLAY, REC, STOP and CAMERA) ande.
REW	56	"H" under REW and RS modes
FF	55	"H" under FF and FS mades
STOP	54	"H" under STOP mode
FL·REV	53	"L" when front loading motor is turned reversely.
FF·FWD	52	"H" when front loading motor is turned forward
LM·REV	51	"L" when loading motor is turned reversely.
LM·FWD	50	"H" when loading motor is turned forward.
DM·ON	49	"H" under PLAY and REC modes
FS	48	"H" under FS mode
RS	47	"H" under RS mode
REC· PAUSE	46	"H" under REC PAUSE mode
D-PB	45	"H" under PLAY mode (after AL 2 sec.)
P-ON	44	"H" when P. ON-IN is "H"
SP-PB	43	"H" under PLAY PAUSERS and FS modes
PLNG	41	"H" when break solenoid is actuated.
C-FAST	40	"H" when capstan motor is turned at high speed.
C-REV	39	"H" when capstan motor is turned reversely.
C-FWD	38	"H" when capstan motor is turned forward.
D-REC	37	"H" under REC mode
A-MUT	35	"H" under AUDIO MUTE made
CAS-IN	34	"H" at cassitte in.
REC-INH	33	"H" when recording prohibited,

5 — 1 — 3 Supplementary description for input signals Mode switch input signal.

(1) POW. SW

Input signal showing POWER switch ON/OFF. " H " at ON and " L " at OFF. When the timer switch in ON (timer stand-by), it is " L " regardless of POWER switch.

(2) M. STOP

Stop signal coming from the timer (tape counter).
STOP mode is obtained at " L ". This is valid under FF and REW mode only.

5 — 1 — 4 Supplementary description for output signals

(1) Deck control signal

1) LM-FWD

Loading motor forward rotation signal. " H " at tape loading.

2) LM-REV

Loading motor reverse rotation signal. " H " at tape unloading. LM-FWD and LM-REV are related each other, and control operations are executed as started in Table 6.3.1. Further, control operation is necessary under SEARCH and SHORT REW mode due to shifting of the mechanism part.

3) FL-FWD

Front loading motor forward turning signal.
" H " at cassette down operation.

4) FL-REV

Front loading motor reverse turning signal.
" H " at cassette up operation.
FL-FWD and FL-REV signals are related each other, and control operations are executed as stated in Table 6.3.2.

5) C-FWD

Capstan motor forward turning signal.
" H " under LOADING, PLAY, REC, FF, and NOISE CANCEL mode.

6) C-REV

Capstan motor reverse turning signal.
" H " under REW, SHORT REW, and UNLOADING. Pulse output under NOISE CANCEL.
C-FWD and C-REV signals are related each other, and control operations are executed as stated in Table 6.3.3.

7) PLNG

Brake solenoid control signal. It becomes " H " under FF and REW modes to release the reel brake. It is turned to " L " within 2 mS after STOP signal is input (especially for stopping by the START and END sensor under FF and REW modes) and the brake is applied at once.

8) C-FAST

This signal is used when the capstan motor is turned at high speed and high torque. " H " under FF, REW, and UNLOADING modes.

(2) Display signals

1) STOP

" H " under STOP mode.

2) PLAY

PLAY lamp lighting signal. " H " under PLAY, PLAY PAUSE, NOISE CANCEL, FS and RS modes.

3) REC

REC lamp lighting signal. " H " under REC and REC PAUSE modes.

4) PAUSE

PAUSE lamp lighting signal. " H " under PLAY PAUSE, NOISE CANCEL, REC PAUSE, CAMERA PAUSE, and STOP PAUSE modes.

5) FF

FF lamp lighting signal. " H " under FF and FS modes.

6) REW

REW lamp lighting signal. " H " under REW and RS modes.

7) CAS-IN (CASSETTE IN)

CASSETTE IN indicating lamp lighting signal. " H " when the cassette is down and " L " when only the cassette holder is down (without tape).

(3) Circuit control signals

1) D-PB (DELAYED PLAY BACK)

PLAY signal for the video and the audio.

" H " 2.0 sec. after loading is completed under PLAY mode. " L " immediately after PLAY is released.

2) D-REC (DELAYED RECORD)

REC signal for the video.

" H " 1.0 sec. after loading is completed under REC mode. " L " immediately after REC is released.

" L " under REC PAUSE mode. " H " 2.0 sec. after being released.

3) REC-P (REC PAUSE)

Servo control signal under REC PAUSE mode.

" H " under REC PAUSE mode.

4) SP-PB (SPECIAL PLAY BACK)

" H " under PLAY PAUSE, FS, RS, and N. CANCEL modes.

" L " 1.0 sec. after being released. Simulated V-SYNC added signal.

5) DM-ON (DRUM MOTOR ON)

Head drum rotating signal.

" H " under PLAY, REC, PLAY PAUSE, REC PAUSE, NOISE CANCEL, FS, and RS modes.

6) FS

Servo control signal under FORWARD SEARCH mode.

" H " under FORWARD SEARCH mode.

7) RS

Servo control signal under REVERSE SEARCH mode.

" H " under REVERSE SEARCH mode.

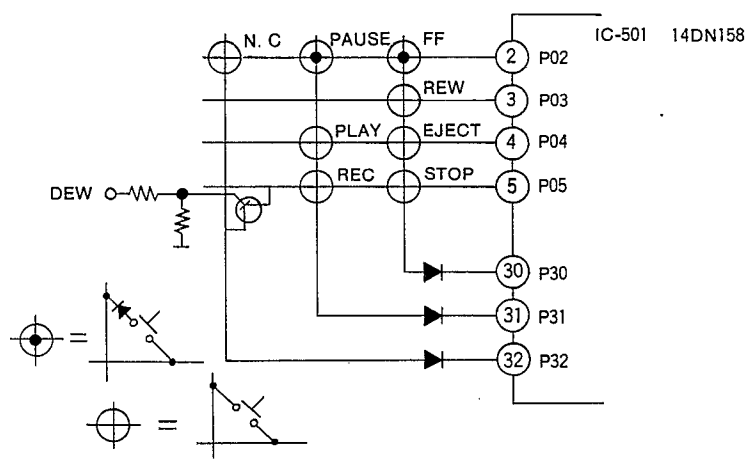
8) A-MUTE
Audio muting signal. " H " with SP-PB signals, and temporarily " H " when being operated PLAY →REC or REC→PLAY.

9) REC INH
Rec operation inhibition signal.
REC operation is inhibited by the end sensor, dew sensor " H " under REC SAFETY and FL-C regardless of operational mode. Also " H " under PLAY mode.

10) P-ON
Power supply control signal.
" H " when P. SW is ON or T. REC (Q. REC) mode is ON.
" L " when T. REC (Q. REC) mode is turned form ON to OFF.

5 — 2 Operation Key Circuit

5 — 2 — 1 Signal control of operation button.



5 — 3 Infrared wireless remocon operation

5 — 3 — 1

The infrared remocon signal is received by remocon unit which is located in Control P. C .B., and the signal from remocon unit is going into remocon terminal (IC501 PIN 12), and system control IC (IC501) is converted into each operations mode.

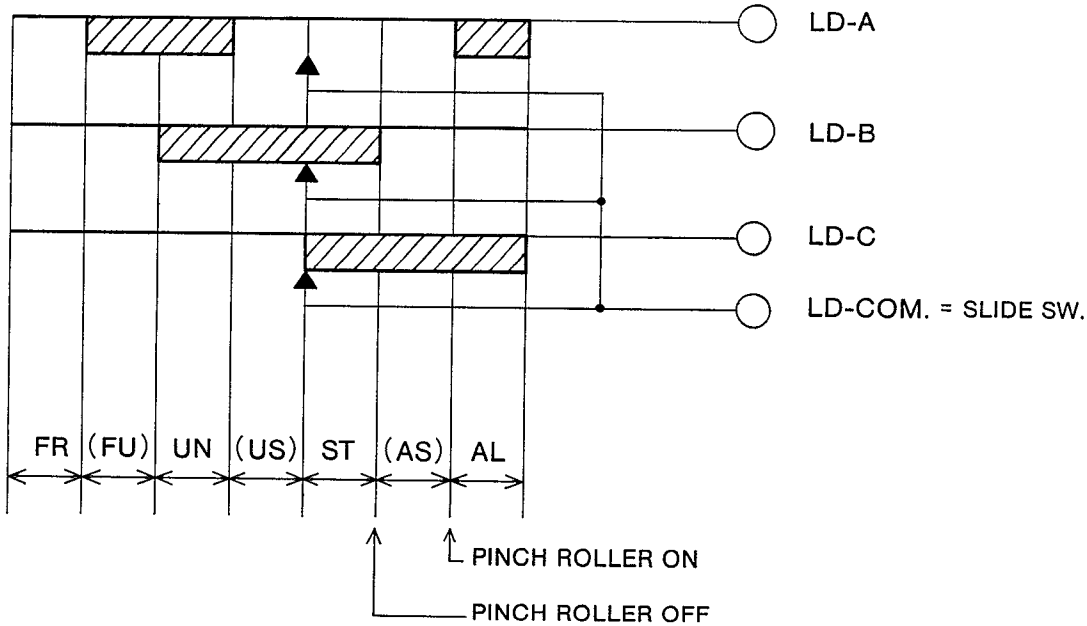
5 — 3 — 2

Infrared wrireless remocon is not operated under operating TIMER REC or QUICK REC.

6. CIRCUIT OPERATIONS

6 — 1 Operation of Loading Switch

6 — 1 — 1 Position of loading switch



LD SW			Symbol	Position
A	B	C		
I	I	I	FR (FR LOADING)	FF. REW
O	I	I	(FU)	
O	O	I	UN (UN-LOADING)	STOP EJECT
I	O	I	(US)	
I	O	O	ST (SHORT STOP)	Loading motor is stopped temporarily at unloading.
I	I	O	(AS)	
O	I	O	AL (AFTER-LOADING)	PLAY RECPAUSE SHORT REW

O:MAKE I :BREAK

Break means intermediate position.

TABLE 6.1.1

6 — 1 — 2 Operation of loading switch

The loading switch is of 3-circuits type which interconnects with the loading mechanism, and operational status of the loading mechanism is shown by the combination of their contacts. The loading mechanism excutes controls such as shifting of the pinch roller, brake and gear as well as the tape loading. The relation between the loading switch and the loading mechanism is as follows:

a)FR (FR LOADING) position

Loading position under FF or REW mode while the brake is released.

b)UN (UN LOADING) position

Loading position under EJECT or STOP mode while the brake is applied and the pinch roller is disengaged.

c)AF (AFTER LOADING) position

Loading position under PLAY, REC and PAUSE modes. Also same position under REC PAUSE, FS, RS and N. CANCEL modes. The tape is loaded and the pinch roller is pressure fit, and the brake is rleased.

d)ST (SHORT STOP) position

Loading position where the loading motor is stopped instantaneously while the tape is unloaded. This operation is necessary to remove possible deflection of the tape at unloading. The pinch roller is disengaged on this occasion.

e)FU, US and AS positions

Intermediate position between FR, UN, ST, and AF. accidentaly Power supply is disconnected at these positions during loading operation and when the power is restored subsequently, they are utilized to know the position of loading mechanism.

6 — 2 Front Loading Switch

6 — 2 — 1

The front loading switch is composed of 4 independent switches which detect cassette in, up and down operations in the front loading mechanism as shown below.

FL-A	L at ON	CASSETTE IN detection
FL-B	L at ON	CASSETTE UP detection
FL-C	L at ON	CASSETTE DOWN detection

6 — 2 — 2 Operation of front loading switch

Controls of tape in and out are executed according to the status of FL-A, B, and C switches.

FL-A : Two switches are connected in series and when both of them are turned to ON, front loading (cassette) is executed.

FL-B : When this switch is turned to ON during front unloading (cassette up), operation is stopped.

FL-C : When this switch is turned to ON during front loading (cassette in), operation is stopped.

6 — 3 Motor Controls

6 — 3 — 1 Loading motor control

LM FWD	LM REV	Motor	Remark
L	L	Stop (Idle turning)	Stopped Brake is not applied
L	H	Reverse turning	Unloading direction
H	L	Forward turning	Loading direction
H	H	Brake	Immediate stop

TABLE 6.3.1

6 — 3 — 2 Front loading motor control

FL FWD	FL REV	Motor	Remark
L	L	Stop (Idle turning)	Stopped Brake is not applied
L	H	Reverse turning	Cassette up direction
H	L	Forward turning	Cassette down direction
H	H	Brake	Immediate stop

TABLE 6.3.2

6 — 3 — 3 Capstan motor control

C—FWD	C—REV	Motor	Remark
L	L	Stop (Idle turning)	Stopped Brake is not applied
L	H	Reverse turning	Capstan and reel rever turning direction
H	L	Forward turning	Capstan and reel normal turning direction
H	H	Brake	Immediate stop

TABLE 6.3.3

6 — 4 Description of Operations

(Following description is intended for operations through the microprocessor.)

6 — 4 — 1 PLAY Operation (timing Chart 6.4.1)

When PLAY button is depressed, STOP becomes " L " (IC501, pin 54) and PLAY becomes " H " (IC501, pin 60) and they are so displayed, and the servo circuit is changed over to PLAY mode. C-FWD becomes " H " (IC501, pin 38) and DM ON becomes " H " (IC501, pin 49), and the capstan motor is turned forward.

LM. FWD becomes " H " (IC501, pin 50) after 0.4 sec., and the loading motor is turned forward thereby starting tape loading.

When the loading switch is positioned at AL, both LM. FWD and LM. REV (IC501, pins 51 and 50) become " H ", and the loading motor is stopped. After that, both LM. FWD and LM. REV become " L ". 2 sec. after AL, D-PB becomes " H " (IC501, pin 45), and the video circuit is changed over from E-E mode to PLAY mode. At this instance, A MUTE is kept at " H " (IC501, pin 35) for 1 sec. and an audio mute is applied.

6 — 4 — 2 PLAY PAUSE→NOISE CANCEL Operation (Timing Chart 6.4.1)

When PAUSE button is depressed under PLAY mode, C-FWD (IC501, pin 38), D-PB (IC501, pin 45), DM-ON (IC501, pin 49) and PLAY (IC501, pin 60) are unchanged while PAUSE and eventually stopping the capstan motor.

The SP. PB (IC501, pin 43) becomes " H ", the video circuit is controlled and a simultated V-SYNC is added while A. MUTE (IC501, pin 35) becomes " H " and an audio muting is executed under PAUSE mode. When NOISE CANCEL button is depressed under PAUSE mode, C-REV signal (IC501, pin 39) is changed from " H " to " L " with pulse-like manner (see Timing Chart), and the capstan motor is turned at low speed.

The capstan motor is turned at low speed as long as NOISE CANCEL button is being depressed. By this operation, a noise bar is moved from the screen. If the button is released, the capstan motor is stopped.

If NOISE CANCEL button is depressed continuously for 5sec., PLAY PAUSE mode is obtained. If it is once released and depressed again, NOISE CANCEL mode is obtained.

When either PAUSE button or PLAY button is depressed under PAUSE mode, it is transferred to PLAY mode. Furthermore, PAUSE mode is discontinued after 5 min. continuance and is transferred to STOP mode.

6 — 4 — 3 PLAY→STOP Operation (Timing Chart 6.4.2)

After STOP button is depressed, both C-FWD and C-REV (IC501, pin 38 and 39) are turned to " H " for 0.2 sec. thereby stopping the capstan motor. After that, LM. REV (IC501, pin 51) is turned to " H " while C-REV is remained at " H " and the loading motor and the capstan motor are turned reversely.

When the loading switch comes to ST position, LM. FWD (IC501, pin 50) becomes " H " thereby stopping the loading motor and turning the capstan motor reversely.

Thus gear shift is carried out. After 0.5 sec., LM. REV (IC501, pin 51) becomes " L " thereby turning the loading motor forward and when it is located at AL position, the pinch roller makes tight contact with it. Since the capstan motor is turned reversely, the tape is taken up to reverse direction. After 1.5 sec., C-FWD (IC501, pin 38) becomes " H " and the capstan motor is stopped for 0.2 sec. When the loading switch is located at ST position, the loading motor is solely stopped for 0.5 sec. This is provided for the sake of prevention of slackened tape. After that, the loading motor is again turned reversely, and both loading motor and capstan motor are stopped at UN position. Furthermore, an audio mute is applied for 1.0 sec. when STOP button is depressed (PLAY→STOP transfer). This unloading operation takes place with entirely identical timing for transfer operations from operational mode having loading status.
However, an audio mute is not applied from REC mode.

6 — 4 — 4 REC Operation (Timing Chart 6.4.3)

This mode is obtained when REC button is depressed. Both loading and unloading operations are identical with those as observed under PLAY mode. If the button is depressed, however, REC (IC501, pin 61) becomes " H ". D-REC (IC501, pin 37) becomes " H " 1.0 sec. after AL, and the video servo circuit is controlled.

6 — 4 — 5 REC PAUSE Operation (Timing Chart 6.4.3)

When PAUSE button is depressed under REC mode, REC PAUSE mode is obtained. At this instance, D-REC (IC501, pin 37) becomes " L " thereby stopping recording. Subsequently, the loading motor and the capstan motor are controlled and the tape is rewound for 2.5 sec. Operations in this case are same as those at unloading operation. After that, the loading motor is again turned reversely and the capstan motor is turned forward.
Gear shift is executed when the loading switch is located at ST position.
After that, LM. FWD (IC501, pin 50) becomes, " H ", the loading motor is turned forward and is stopped when the loading switch is located at AL position (pinch roller makes tight contact with it) and REC PAUSE mode is obtained.
CAP. FAST (IC501, pin 40) is turned to " H " whenever the gear is shifted.
PAUSE mode is released by depressing PAUSE or REC button, C-FWD (IC501, pin 38) becomes " H " and the capstan is turned. After 2.0 sec., D-REC becomes " H " and REC mode is obtained.
If REC PAUSE mode is continued for 5 min., it is transferred to STOP mode.

6 — 4 — 6 FF, REW and STOP Operations (Timing Chart 6.4.4)

When FF button is depressed, FF (IC501, pin 55) and PLUNG (IC501, pin 41), become " H ", PLUNG is actuated and the brake is released. C-FAST (IC501, pin 40) then becomes " H ". LM. REV (IC501, pin 51) becomes " H ", the loading motor is turned reversely and FR loading is executed. When the loading switch is located at FR position, the loading motor is stopped, C-FWD (IC501, pin 50) becomes " H " and the capstan motor is turned forward at full torque. When STOP button is depressed, C-REV (IC501, pin 39) becomes " H " for 0.2 sec. thereby stopping the capstan motor immediately. After that, LM. FWD (IC501, pin 50) becomes " H ", the loading motor is turned forward.

When the loading switch is located at UN position, both LM. FWD and LM. REV are turned to " H ", the loading motor is stopped, both LM. FWD and LM. REV are turned to " L " and STOP mode is obtained.
In case of REW mode is transferred to STOP mode, conduct same operations as observed for FF mode.
However, the capstan motor is turned reversely and the timing chart is different.

6 — 4 — 7 PLAY→FS→PLAY and Each Mode (Timing Chart 6.4.5)

When FF button is depressed under PLAY mode, FS mode is obtained. FS (IC501, pin 48) and SP. PB (IC501, pin 43) become " H " thereby controlling the servo circuit and the video circuit. Furthermore, FF (IC501, pin 55) become " H " and both PLAY and FF are displayed. A. MUTE (IC501, pin 35) becomes " H " and the sound is muted during FS mode.
When either FF or PLAY button is depressed, FS mode is transferred to PLAY mode. At this instance C-REV (IC501, pin 39), becomes " H " for 0.2 sec. thereby applying the brake to the capstan motor. The motor is then turned forward. SP-PB and A. MUTE become " L " 1 sec. later and PLAY mode is obtained. If any other buttons are depressed during FS mode FS, FF, and SP-PB become " L ", and it is transferred to each modes.

6 — 4 — 8 PLAY→RS→PLAY and Each Mode (Timing Chart 6.4.5)

When REW button is depressed during PLAY mode, RS mode is obtained. At this moment, gear shift is executed which is not executed in FS mode. Other operations are same as those observed under FS mode. Therefore, the following description deals with different operations from FS mode:
Upon depressing REW button, LM. REV (IC501, pin 51) becomes " H ", C-REV (IC501, pin 39) becomes " H " the loading motor is turned reversely and the capstan motor is stopped immediately. When the loading switch is located at ST position, LM. FWD (IC501, pin 52) becomes " H " thereby stopping the loading motor, and C-FWD (IC501, pin 38) becomes " L " thereby turning the capstan motor reversely. Gear shift is thus executed. After 0.5 sec., LM. REV becomes " L " and the loading motor is turned forward. When the loading switch is located at AL position, LM. REV is turned to " H " for 0.1 sec. and subsequently, both LM. FWD and LM. REV are turned to " L " thereby stopping the motor and running the tape to reverse direction. When either REWor PLAY button is depressed during RS mode, it is transferred to PLAY mode. At this instance, C-FWD becomes " H ", LM. REV becomes " H " and the capstan motor is stopped immediately. In the meantime, the loading motor is turned reversely and is stopped when the loading switch comes to ST position, C-REV becomes " L " and the capstan motor is turned forward. Thus gear shift is carried out.
After 0.5 sec., LM. REV becomes " L " (LM. FWD is remained at " H "), the loading motor is turned forward and is stopped when the loading switch comes to AL position, and RS mode is obtained. If any other buttons are depressed during RS mode, RS mode is transferred to each modes. Other operations are same as those observed under FS mode.

6 — 4 — 9 FS→RS→FS Operations (Timing Chart 6.4.6)

When REW button is depressed during FS mode, RS mode is obtained. FS (IC501, pin 48) and FF (IC501, pin 55) become " L " and RS (IC501, pin 47) and REW (IC501, pin 56) become " H ", and servo control and change over of mode display are made. LM. REV (IC501, pin 51) and C-REV (IC501, pin 38) become " H ", the loading motor is turned reversely and the capstan motor is stopped immediately. When the loading switch is located at ST position, LM. FWD (IC501, pin 52) becomes "H" and C-FWD becomes "L", the loading motor is stopped and the capstan motor is turned reversely. Thus gear shift is carried out.

After 0.5 sec., LM. REV becomes " L " (LM. FWD is remained at " H "), the loading motor is turned forward, the loading motor is stopped when loading switch comes to AL position and RS mode is obtained. In the meantime, A. MUTE and SP. PB are unchanged.

When FF button is depressed during RS mode, FS mode is obtained. Operations are similar to those observed at FS →RS. However, the capstan motor is turned forward under FS mode. Each signal is different. See Timing Chart.

6 — 4 —10 PLAY→(DRUM SENSOR ON)→STOP (Timing Chart 6.4.7 on page 43)

When drum turning is stopped and SW PULSE becomes " H " or " L " under PLAY mode(also REC, PLAY PAUSE and REC PAUSE modes), the drum sensor is actuated 2 sec. later and unloading is initiated. Operations in this case are same as those observed at PLAY →STOP. However, rewinding operation for 1.5 sec. is not executed, but unloading is initiated immediately. Subsequently, each operational button is made effective.

6 — 4 —11 FF→(END SENSOR)→REW (Timing Chart 6.4.8)

When END sensor becomes " H " during FF mode, within 2 msec., PLUNG (IC501, pin 41) becomes " L " C-REV (IC501, pin 39) becomes " H ", FF (IC501, pin 55) becomes " L ", REW (IC501, pin 56) becomes " H " and C-FAST (IC501, pin 40) becomes " L " thereby applying the brake to stop the motor immediately. Further 0.2 sec. later, C-REV becomes " L " and 0.5 sec. later, it again becomes " H ", C-FAST becomes " H ", PLUNG becomes " H ", the brake is released, the capstan motor is turned reversely with full torque and it is transferred to AUTO REW mode. The loading motor is not actuated at this instance. Furthermore, if END sensor becomes " H " during PLAY, REC, NOISE CANCEL, and FS mode, it is transferred to REW mode after unloading has been completed.

6 — 4 —12 REW →(START SENSOR)→STOP (Timing Chart 6.4.8)

When START sensor becomes "H" during REW mode, within 2 msec. PLUNG (IC501, pin 41) becomes " L ", C-FWD (IC501, pin 38) becomes " H ", C-FAST (IC501, pin 40) becomes " L ", REW (IC501, pin 56) becomes " L ", the brake is applied and the capstan motor is stopped immediately and at the same time, it is transferred to STOP mode.

6 — 4 —13 Cassette In Operation (Timing Chart 6.4.9 on page 44)

When the cassette is inserted from door portion, FL-A switch is turned to ON (FL-A: " L " IC501, pin 26). If FL-A switch is positioned at ON for more than 0.2 sec., FL. FWD (IC501, pin 52) becomes " H ", and front loading (cassette down operation) is executed. If FL-C switch is turned to ON subsequently, FL. REV (IC501, pin 53) becomes " H " and the front loading motor is stopped. After 0.1 sec., both FL. FWD and FL. REV become " L ".

If FL-A is turned to OFF within 0.2 sec., cassette in operation is not accepted.

6 — 4 —14 Eject Operation (Timing Chart 6.4.9)

When EJECT button is depressed during STOP mode, C-FAST (IC501, pin 40) becomes " H ", PLUNG (IC501, pin 41) becomes " H " and LM. REV (IC501, pin 51) becomes " H ", the brake is released, front loading is executed and the loading motor is stopped at loading switch FR position. At this instance, C-REV (IC501, pin 39) is turned to " H " for 0.1 sec., the capstan motor is turned reversely with full torque to remove possible slack of the tape. Subsequently, both C-FWD and C-REV are turned to " H " for 0.2 sec. thereby stopping the motor immediately. PLUNG becomes " L " thereby applying the brake.

C-FAST also becomes " L ". Subsequently, LM. FWD (IC501, pin 50) is turned to " H " to execute front unloading switch is located at UN position, the loading motor is stopped.

Further 0.5 sec. later, FL. REV (IC501, pin 53) becomes " H " to execute front unloading (cassette up). When FL-B switch is turned to ON, both FL. FWD and FL. REV are turned to " H " thereby stopping the front loading motor. (Both FL. FWD and FL. REV are turned to " L " at 0.1 sec. later.)

When START sensor becomes " H " during SHORT REW mode of 0.1 sec. under EJECT mode, REW is interrupted and EJECT operation is executed after rewinding the tape.

SHORT REW is not executed also for the case where EJECT button is depressed under STOP PAUSE mode. When EJECT button is depressed under PLAY, REC, PLAY PAUSE and REC PAUSE modes, unloading is once executed and after it is transferred to STOP mode, foregoing operations are executed.

When the tape is inserted and EJECT button is depressed before cassette down (FL-C ON), EJECT operation is executed immediately.

6 — 4 —15 Loading Motor and Front Loading Motor Driving Circuits

Operational mode of IC BA6209 (IC502 and IC503) for motor driving is shown in Table 6.4.15. Normal or reverse turning of the motor is controlled by input signals of FIN and RIN. Following description deals with protection operations taken when an abnormality is occurred.

F IN (5)	R IN (6)	VOUT 1 (2)	VOUT 2 (10)
I	I	L	L
O	I	L	H
I	O	H	L
O	O	L	L

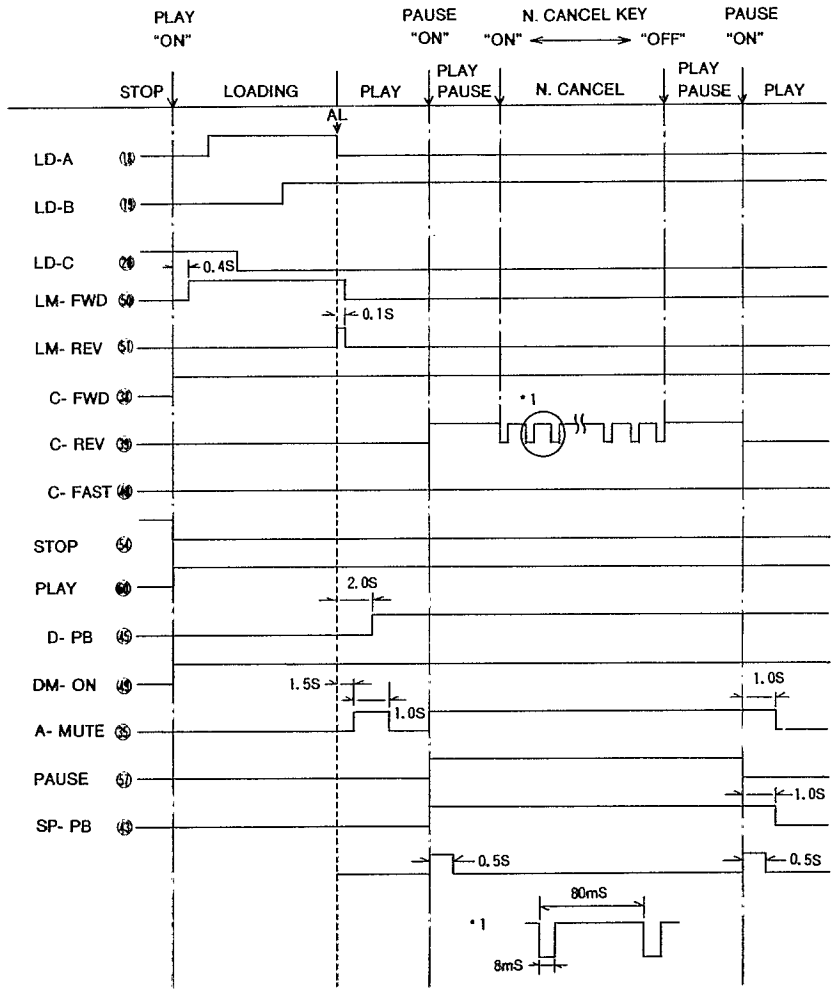
Table 6. 4. 15

When the loading motor is not turned for any reason, excessive current flows into R561, the potential at pin 8 of IC503 is lowered, it is integrated by C519 and R559 and approximately 2.5 sec. later, Q509 is turned to ON. After Q509 is turned to ON, IC506 is turned to ON too, the voltage at pin 4 of IC503 becomes " L ", the output of VOUT 1 or V PUT 2 becomes " L " regardless of IC503 F IN or R IN and turning of the motor is stopped.

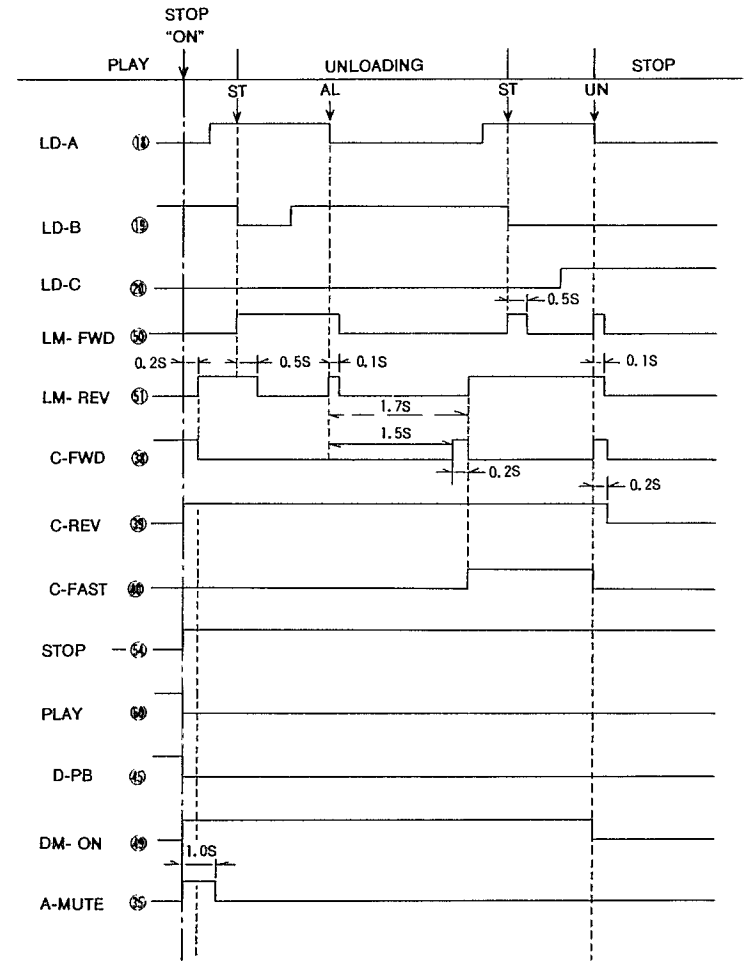
When the motor is stopped, electric current is not flowed and is restored, and foregoing operations are repeated. After 7 sec., however, IC501 turns the output signal (LM. FWD or LM. REV) to " L " thereby prohibiting all operations. Circuits are thus protected. Identical operations are observed for the front loading circuit.

6 — 4 SYSTEM CONTROL TIMING CHART

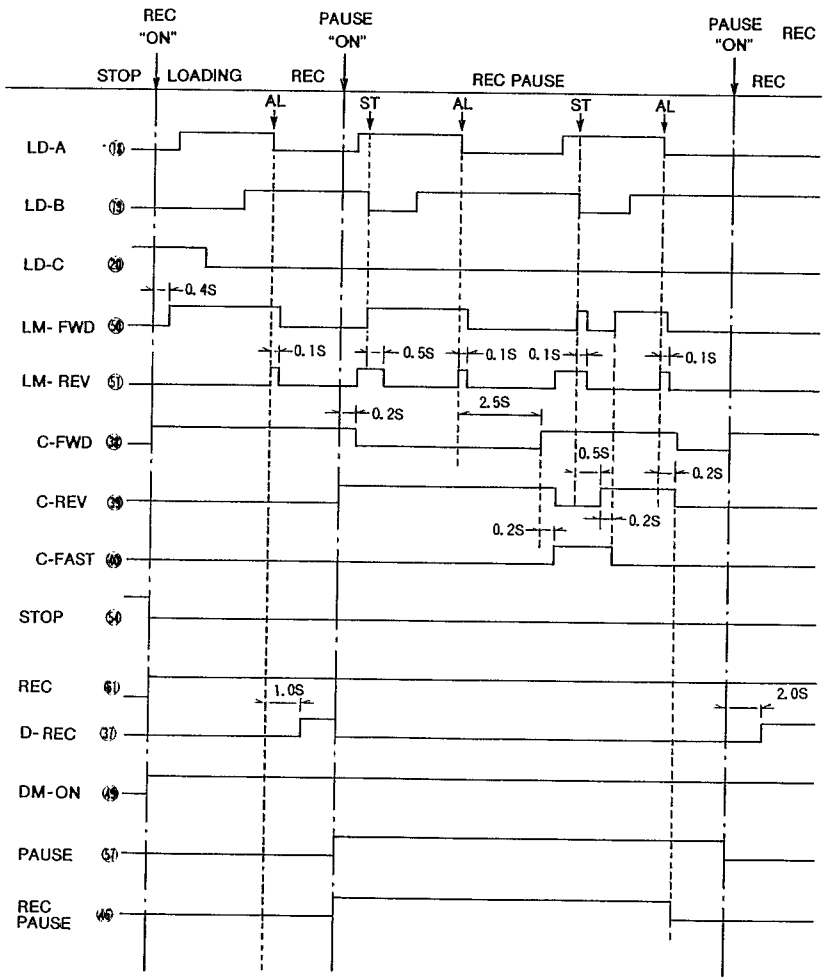
6 — 4 — 1 STOP→PLAY→PAUSE →N. CANCEL→PLAY



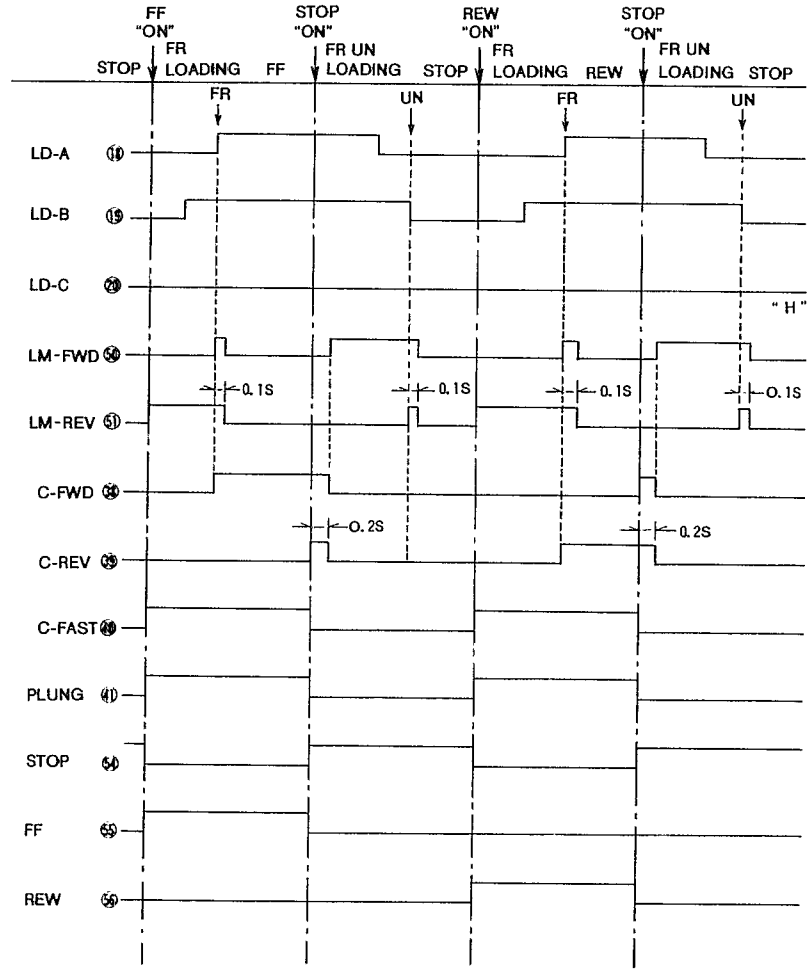
6 — 4 — 2 PLAY→STOP



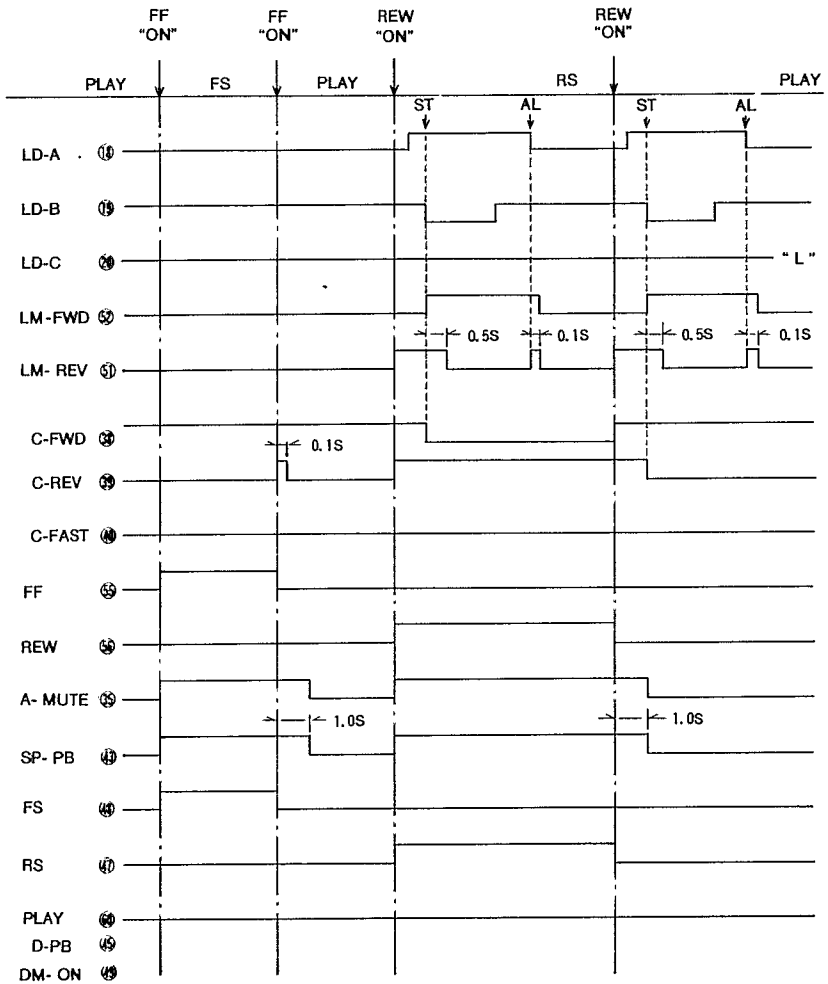
6 — 4 — 3　STOP→REC →REC PAUSE →REC



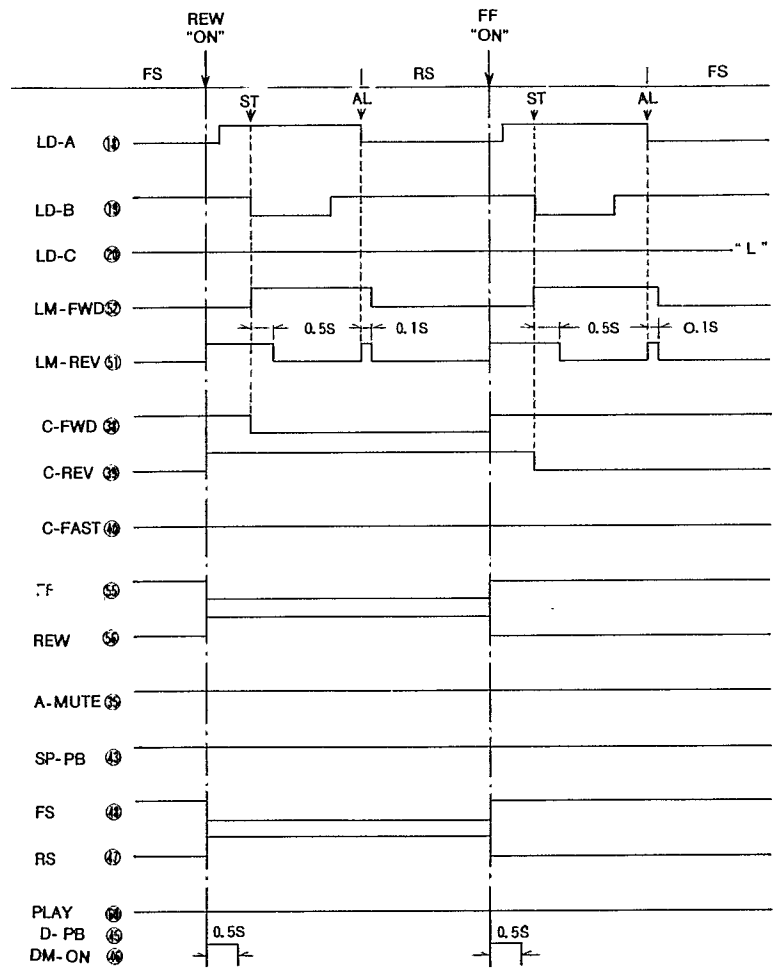
6 — 4 — 4　STOP→FF→STOP→REW →STOP



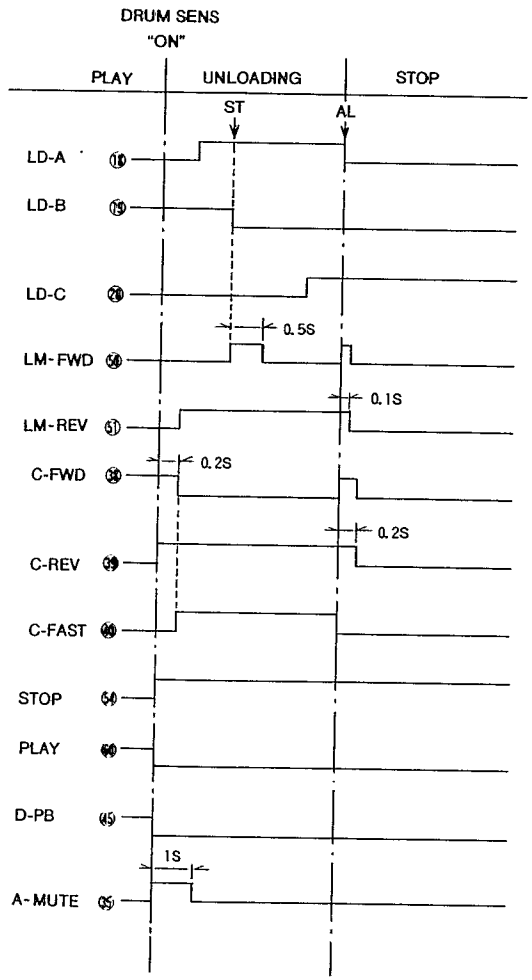
6 — 4 — 5　PLAY→FS→PLAY→RS→PLAY



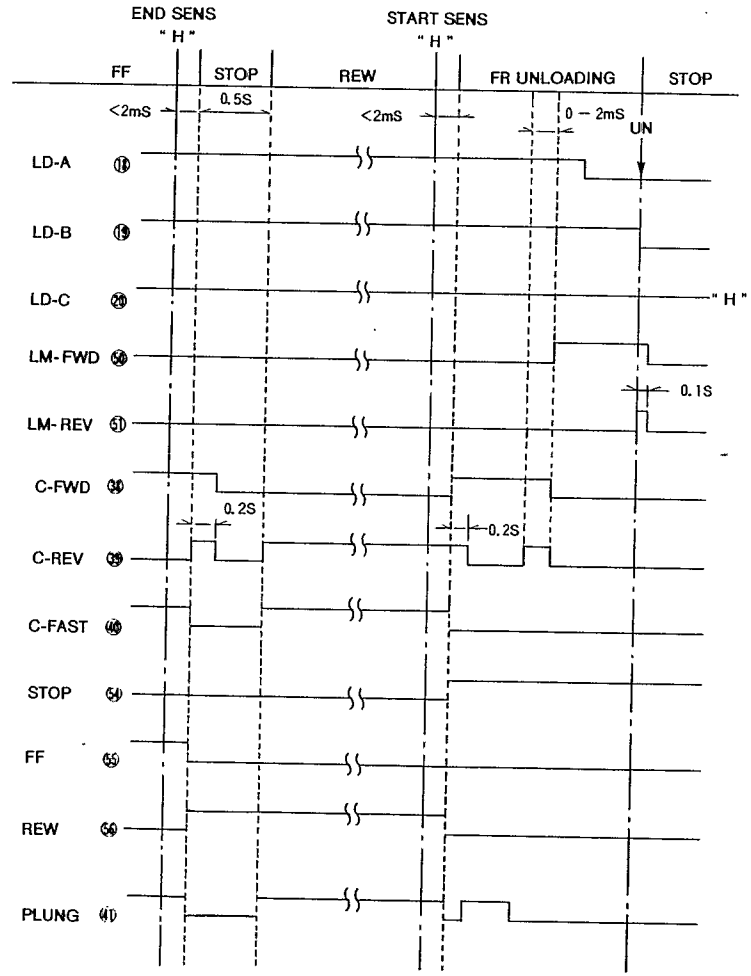
6 — 4 — 6　FS→RS→FS



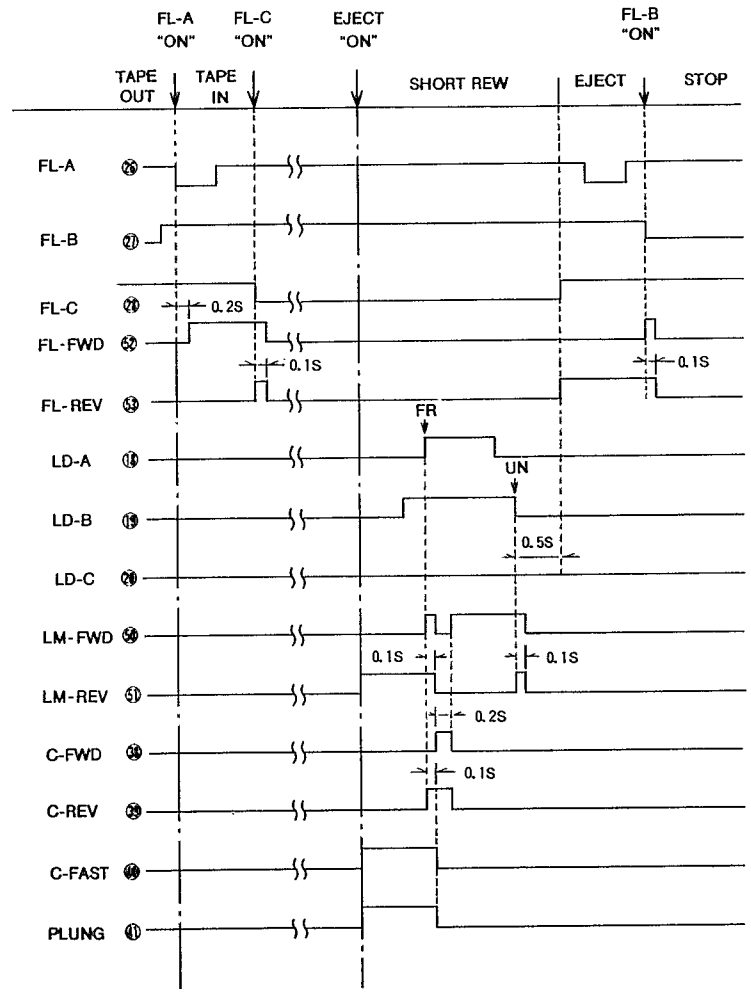
6 — 4 — 7 DRUM SENS



6 — 4 — 8 FF→END. SENS→REW →ST. SENS →STOP



6 — 4 — 9　TAPE IN. EJECT

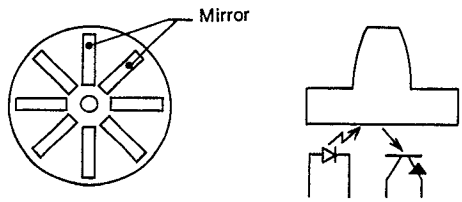


6 — 5 Sensor Circuits and Protection Circuits

6 — 5 — 1 Reel Sensor Circuit

Reel sensor portion is made up with LED, photo transistor and mirror which combined with take up reel. Luminance of LED is refrected by mirror and received with photo transistor and output " H " signal from photo transistor.

Shown on bellow take up reel



When LED luminance is not reflected by mirror, " L " signal is output from photo transistor. So when take up reel is turned the output signal becomes waveform as "~~~".

The output signal from photo transistor is converted into the change in pulse width by Q510 and input to pin 22 of IC501. If take up reel is stopped more than 5 sec. any reason, system control is transfer to stop mode. After that, operation buttons are not accepted except EJECT button. It will not accepted any mode other than FUNCTION button is depressed twice.

6 — 5 — 2 Start Sensor Circuit

Transparent tape portion is detected optically using a LED and phototransistor provided for the tape start position detection. When it comes to the tape start position (position of reader tape), a light enters into the phototransistor and the transistor turns to ON.

ST. S input (IC501, pin 24) becomes " H " and it is transfered to STOP mode. After that, the reader tape is requond. See 6.4 for the details of operational timing. Operations are executed duting SHORT REW of each REW, REC PAUSE and RS.

6 — 5 — 3 END Sensor Circuit

Same operations as observed by start sensor are executed. However, REW operation is initiated after detection is done. Operations are executed during PLAY, REC, N. CANCEL, FF, and FS modes. It is transferred to STOP mode. It is transferred to STOP mode.

6 — 5 — 4 Drum Sensor Circuit

When the tape is run while the drum motor is not turned, the tape is disengaged from the guide post and may be damaged. This circuit is used for detection of drum motor turning and if an abnormality is found, it is transferred to STOP mode.
The head switching pulse is input into the microprocessor (IC501, pin 23). When drum turning is stopped, it is fixed at either " H " or " L ". If " H " or " L " is continued for more than 2 sec., it is judged that the turning is stopped, it is unloaded and is transfered to STOP mode. After that, operational buttons are made effective. Operations are executed during PLAY, REC, FS, RS PAUSE and N. CANCEL modes.

6 — 5 — 5 Dew Sensor Circuit

When dew condensation is caused at the drum, the tape may be stuck and damaged. It is therefore designed in such that, if any condensation is detected, the device is put into STOP mode.
Under high humidity ambient condition, the resistance of dew sensor is rapidly increased. The microcomputer is put into STOP mode. No operational buttons other the EJECT are accepted. The drum is turned as long as condensation exists.

6 — 5 — 6 REC Safety

When REC safety switch is OFF, microcomputer REC SAF. input becomes " H " (IC501, pin 9) thereby prohibiting REC mode and timer mode operations.

6 — 5 — 7 Cassette In

When FL-C is " L ", it is discriminated that no cassette exists and operations other than EJECT are prohibited.

6 — 5 — 8 Loading Circuit Protection

If loading motor is driven more than 7 sec. and the loading switch is not positioned at designated mode in the loading circuits operation, both LM. FWD (IC501, pin 50) and LM. REV (IC501, pin 51) are turned to " L ". At this time operation buttons are not accepted except EJECT button. Once turn the power OFF and turn it to ON again to reset the device.

6 — 5 — 9 Front Loading Circuit Protection

When FL-C (cassette down) is not turned to ON 4 sec. after FL-A switch is turned to ON, cassette down operation is interrupted and EJECT operation is executed.
As cassette up operation, both FL. FWD (IC501, pin 52) and FL. REV (IC501, pin 53) are turned to " L " thereby interrupting the operation. After that, the POWER ON signal becomes " L ". Once turn the power OFF and turn it to ON again to reset the device.

6 — 5 —10 Protection of Tape under PAUSE Mode

The tape may be damaged if PAUSE mode is continued for a long time. It is therefore designed in such that, if this mode is maintained for more than 5 min., the device is automatically put into STOP mode.

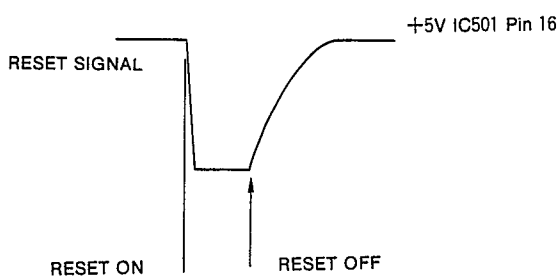
6 — 5 —11 Power Switch OFF

When the power switch is turned to OFF under each mode, it is transferred to STOP mode and the power is turned to OFF. If above operation is attempted under CASSETTE IN or EJECT mode, the power is turned to OFF after each operation is completed.

6 — 6 Other Circuits

6 — 6 — 1 Microcomputer Reset Circuit

When power switch is turned to ON, P-ON-IN signal is supplied from the timer circuit (CN-23). Therefore, charging of C501 is done through R502. As long as charging is done, Q501 is kept ON, C505 is discharged and RESET terminal is turned to " L ". After that, Q501 is turned to OFF, RESET terminal becomes " H " again and the device is reset.



DESCRIPTION OF TUNER CIRCUITS

1. SIGNAL

Broadcast signal input from the terminal of signal INPUT of the RF converter. (This signal amprifired about 4dB up at RF converter.) Then inputs to the terminal of TUNER INPUT.
Selected signals at the TUNER section, will be detected by the VIF unit. So that video signal and audio signal are coming out separatery.

2. TUNING METHOD

A capacitance of VARI-CAP will be varied to tune and it is controled by VT voltage which comes from tuning unit.

3. BAND SELECTOR METHOD

Band selection will be made by voltage of tuning unit (Bs, Bu, Bv).

	VHF Low	VHF High	UHF
BS	30V	0V	0/30V
BV	12V	12V	——
BU	——	——	12V

4. AFT (Automatic Frequency Tuning)

AFT actuates when the voltage becomes equal between AFC terminal and AFC SW terminal of VIF UNIT by Q714.
AFT DEFECT will be activated as follows:
AFT DEFECT signal becomes " L " → Q712 OFF status → Q713 ON status → Q714 OFF status.

So the voltage between AFC terminal and AFC SW terminal of VIF UNIT becomes not equal. That is why AFT circuit is not activate.

DESCRIPTION OF TIMER/TUNING BLOCK CIRCUITS

1. GENERAL

Timer and tuning unit constructed by 4 bit 1 chip microcomputer. (USE 2'PCS.) Also deviated to timer control function and tuning control function (voltage synthesizer system).

2. TIMER CONTROL FUNCTION

MN15847FVD (14DN156) 4 bit 1 chip microcomputer controls following items.

(1) CLOCK CONTROL

- 24hr display mode
- Second display mode
- Time setting, UP/DOWN by minute a unit (on amend mode)
- Power ON/RESET start display will be displyed
  Sunday O hr 00 min 00 sec
- When occured power failure during AC power cord is connected, display is blinking to tell that power failure is occured.

(2) TIMER RESERVATION CONTROL

- Program reservation is available (4 program in 2 wks).
- Daily program reservation is available.

(3) ONE TOUCH RECORDING CONTROL

- Setting by Q-REC key is available up to 4 hours in 30 minutes a unit.
- By using a "MINUTE" key, setting is available from 1 minute to 59 minute. (Combination use with Q-REC, maximum setting is available up to 4 hours 59 minutes.)

(4) COUNTER CONTROL

- Display counter number. (up, down) (counting reel pulse from system control)
- Zero reset available at any counter position.
- Counter displayed "0000" zero output (memory stop signal) will be activated.
- Display blinking tape running mark " * ".

3. TUNING CONTROL FUNCTION

MN1512FVC (14DN157) 4 bit 1 chip microcomputer controls following items.

(1) CHANNEL CONTROL

- Maximum 32 channels can be tuned by UP/DOWN key.
- Skip channels can be designated (unused channel).
- AFT action ON/OFF setting is available.
- Any channels (broadcasting) can be set by preset channel (00~99).

(2) GENERATING TUNING VOLTAGE (VOLTAGE SYNTHESIZER SYSTEM)

- Tuning voltage can be controled by 1 piece of tuning volume.
- Fine tuning is available by fine adjustment key (FINE⊕, FINE⊖).
- Tuning voltage can be memoried by unvolatility memory element.

4. SYSTEM COMPOSITION AND ACTION

Timer, tuning system composition are shown in Fig. 1.

4 — 1 ACTION OF TIMER IC

Voltage (+5V, −28V, +12V, +32V) supplys to each circuit, then IC803 and IC804 are detecting starting signal will input from the reset signal terminal of IC801 and IC802. Power supply voltage (+5V) to IC801 and IC803 are using for power fluctuating back up.

The input signal matrix which is connecting IC801, are reading in by IC801 and will act corresponds to input signal.

IC801 has 2 type clock signal, 4.19MHz and 32kHz. 4.19MHz uses a normal operation and 32 kHz uses when happens power failure, for back up.

Pin 2 of IC801 detects what power failure happens or not. If the level is " L " it happens power failure. If the level is " H " it is normal situation.

IC801 has 3 communication lines (SBT pin 19, SB$\overline{O}$ pin 21, SBI pin 20) between IC802.

Signal from remote control key pad (infrared rays) reaching the sensor and converting the serial signal. Thus input to IC801 through IC802 and 3 communication lines.

IC801 and system control PCB are connected with 9 INPUT/OUTPUT lines. So that the condition of each signal are as follows.

INPUT SIGNAL TO IC801 FROM SYSTEM CONTROL PCB

- **REC** (PIN 22) : This signal becomes " H " during the recording mode at this time channel selection can not be made.
- **REC INH** (PIN 23) : This signal becomes " H " when occur recording prohibited condition. During the timer recording, quick recording mode, if this signal becomes " H ", T-REC output signal will be off and cancels rest of T-REC time.
- **D-PB** (PIN 24) : This signal becomes " H " duirng the playback mode at this time, display of channel number will be off also TV/VCR mode signal changes to VCR.
- **REEL** (PIN 3) : This is a cassette reel signal from cassette deck pulse input is made, during the tape is running this signal also use for counter action and display of tape running.
- **STOP-H** (PIN 5) : This signal becomes " H " during the stop mode counter action can not be made.
- **C-REV** (PIN 4) : This signal shows tape running direction.
  In the forward mode " L "
  In the reverse mode " H "
  This signal also controled counter action.
  Counter number UP → " L "
  Counter number DOWN → " H "

OUTPUT SIGNAL TO COUNTER PCB FROM IC801

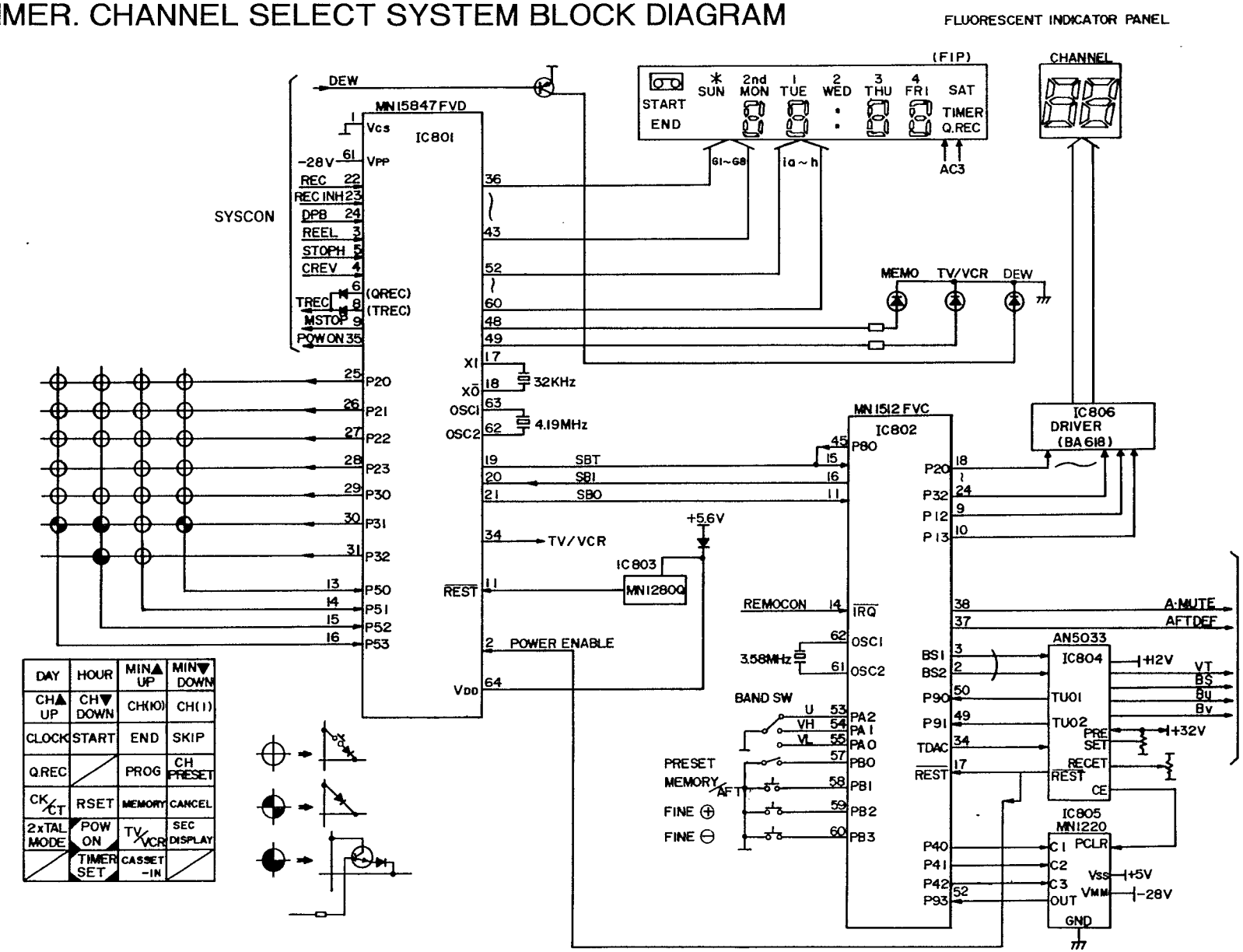
- **T REC (PIN 6) (PIN 8)** : This output signal becomes " H " during the quick record, program reservation modes. These signal outputs individualy and gathering at or circuit as T REC.
- **M STOP (PIN 9)** : If the counter memory key is in set, counter number becomes "0000", " H " signal outputs about 1 second.
- **POW ON (PIN 35)** : This signal controled power ON/OFF system in the timer SW OFF position, H/L signals output alternately by pushing the power key. In the quick record mode, program reservation mode, this signal becomes " H " after each action is complete finished this signal becomes " L ".

Display (FIP) displays clock, counter, timer reservation cassette in, and Q-REC.
These displays are controlled by IC801 (pin 36~43, pin 52~60)

4 — 2 ACTION OF TUNING IC

Tuning control controlled by IC802, 804, 805 and 806.
Program of the IC802 (1 chip microcomputer) controlls sensitive action.
IC802 activates by 3.58MHz clock signal input.
One of the channel turned by IC801 input signal matrix (channel UP/DOWN key), this information notice to IC802 through SBO, SBI and SBT 3 transmission lines and displays channel number by channel display output of IC806.
By preset switch signal (input pin 57 of IC802) is " L " or " H " judges "TUNING DATA SET" mode or "TUNING DATA READ OUT" mode then access tuning memory IC805.
IC805 is made by unvolatility memory element thus the writing memory data will not erased even if power is turned off.
AFT DEF signal (AFT function ON/OFF control) and a mute signal (audio muting control) are activated when power ON-OFF, channel select and preset switch ON-OFF.
Output signal (television band selection data) to TURN/VIF unit, will converted to B_V, B_S, B_U (pin 13 ~15, IC804) signal by band selection switch (V_L, V_H, U).

TIMER. CHANNEL SELECT SYSTEM BLOCK DIAGRAM



TUNING VOLTAGE GENERATOR CIRCUIT

Block diagram of the voltage synthesizer tuning action is shown in Fig. 2. Tuning setting action is available when the preset switch is "ON" status (pin 57 of IC802 is " L " input).
Voltage (0.5V ~ 29V) will be set at 5 pin of IC804 by adjusting the VR802.
Voltage comparison will be made between V_{REF} and V_T by voltage comparator of IC804.
If the voltage comparison result become following status.

$$V_{REF} > V_T, \quad V_{REF} < V_T, \quad V_{REF} = V_T$$

Pin 6, 7 of IC804 will output following levels.

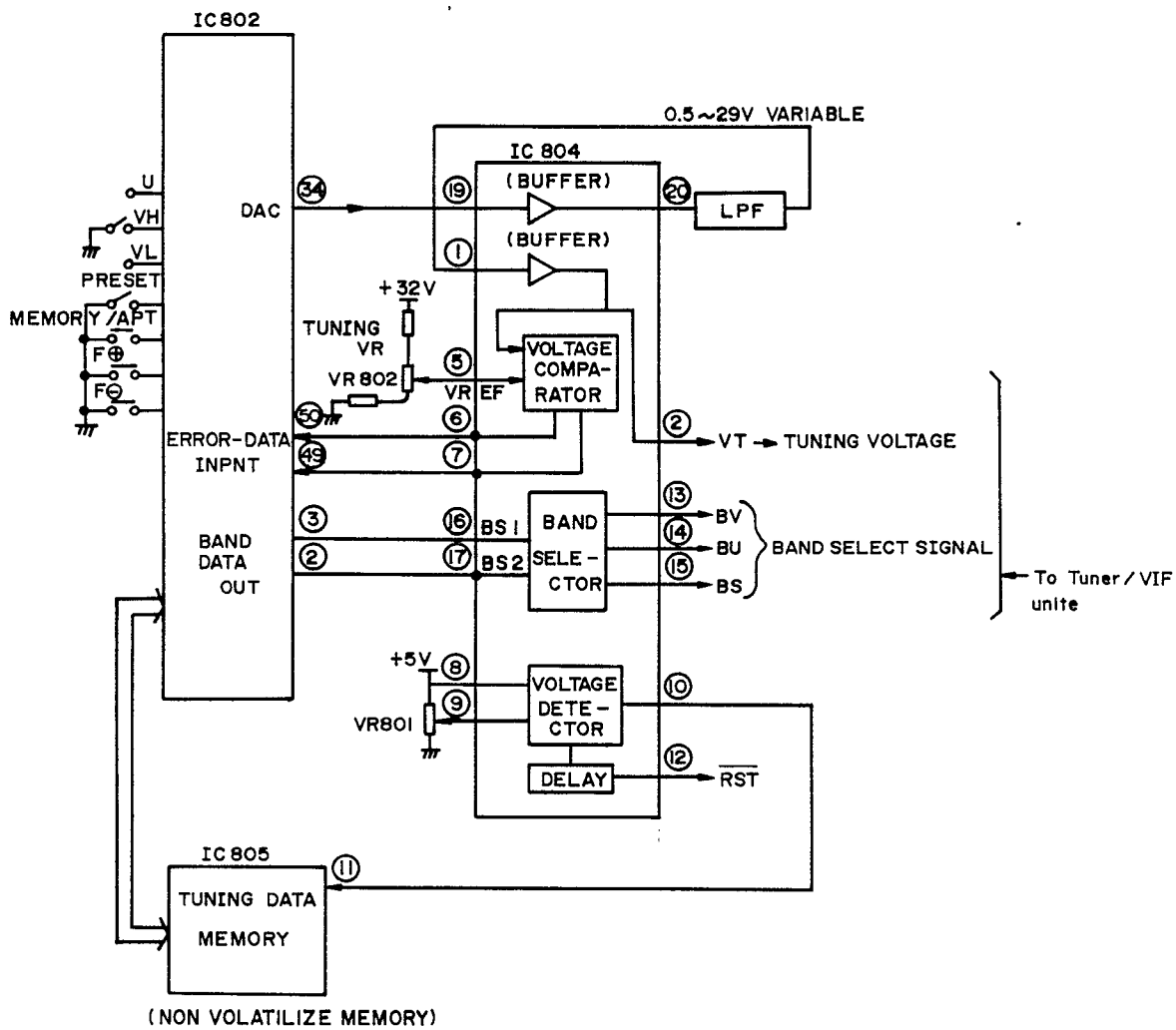
$$L \cdot H, \quad H \cdot L, \quad L \cdot L$$

When input the comparison result data to pin 49, 59 (error date input terminal), IC802 will output DAC data. DAC data output is variable and proportional to the comparison result data.
Above sequence procedure controls by computer control in a moment, so that V_T output voltage is always same as V_{REF} (UR802 output voltage)
If there is key input from "MEMORY/AFT" when tuning operation is finished. DAC data will store in memory (IC805).
Repeat above procedure, tuning data which is corresponded to the channel number, is in memory.
When the preset switch is "OFF" status (pin 57 of IC802 " H " input), output of tuning voltage is same as memoried tuning voltage data.
One of the channel number (1~32) is selected by channel selection key, channel data which is corresponded to selected channel, will read out from the memory.
At the same time band select data will output from pin 2, 3 of IC802. This signal converted at IC804 and output to TUNER/VIF unit.
Band selection switch and conversion are as follows

TUNER BAND	BS1 (16)	BS2 (17)	BV (13)	BU (14)	BS (15)
U	L	H	0	12V	L
VH	H	H	12V	0V	L
VL	H	L	12V	0V	30V

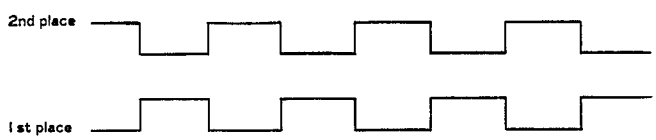
Fine tuning is available by fine adjustment key (fine UP/DOWN key). Fine tuning means that can be re-adjusted voltage which is once tuned.
When the fine UP/DOWN key is operated, DAC data will be fine adjusted in fixed period by internal control program of IC802. This fine tuned DAC data is stored in IC805 as a new memory when the fine UP/DOWN key level converted from " L " TO " H ".

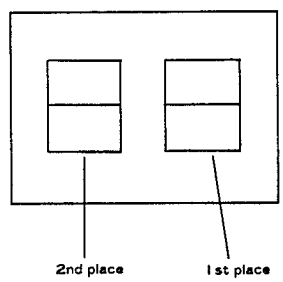
VOLTAGE SYNTHESIZER TUNING
ACTION BLOCK DIAGRAM



CHANNEL DISPLAY LED CIRCUIT

A number of 2 figures LED display, is taking a dynamic display system which making power ON and OFF of the 1st place and the 2nd place alternately.
Data of LED's segment (a~g) output from pin 18 ~24 of IC802. And controlled through IC806 driver.
The 2nd place and the 1st place are controlled by output from pin 9, 10 of IC802 through Q856, 857.
If IC802 is in reset status, LED display will be displayed " 88 ".
Unusual situation is happened at power supply voltage (−28V), MEMORY OF IC805 will not access correctly so that LED display becomes unusual (" 55 ", " 66 " etc.).





DESCRIPTION OF AUDIO CIRCUIT

The audio circuit of VCR employs an IC (BA7001) integrated on a single chip.

〔Explanations of circuit〕

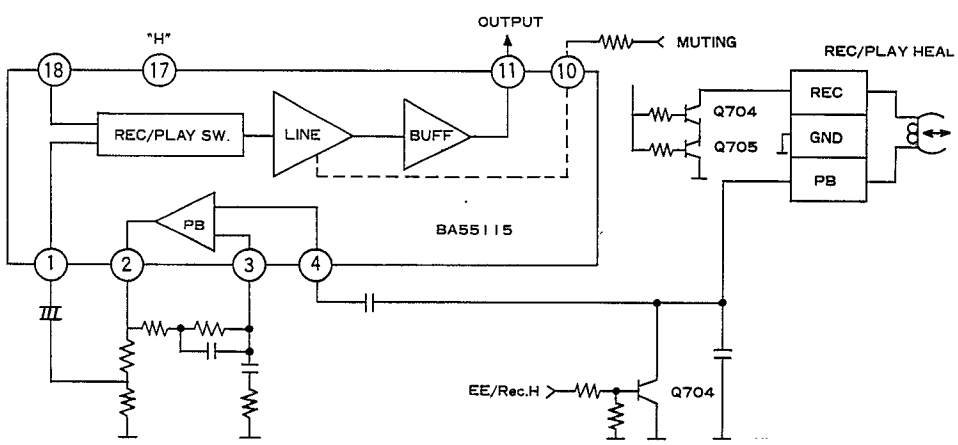
The play and recording systems employ the IC BA7001, which has a switching function with their amplifiers for play or recording.

1. Play mode

When playing, pin 9 of IC704 becomes " L " and pin 17 " H " with the control voltage from the system control, and then the IC is put into the play condition. In the head switching, since Q702 is turned on, Q705 and Q704 is put into the play condition with the REC side of the play/recording head grounded. The play signal is input to pin 4 by the head and amplified by the play EQ amplifier. After equalized, the signal outputs to pin 2.

The signal is divided by means of resistors and input to pin 1. It passes through the play/recording switch and reaches the line amplifier. In the play/recording switch pin 17 is switched to the play side as it is " H " and the ALC circuit is stopped. Thus the signal input to the line amplifier is smplified. It is passed through the buffer amplifier and then output.

Muting of play mode is operate tape loarding and special play (STILL, F. F. SEARCH, REV SEARCH) when pin 10 of IC704 becomes " H " by signal from system control muting is operated.



2. EE/recording mode

In the EE mode, pin 17 becomes " L " and the input signal which passed through the input attenuation circuit is applied to pin 18. Since the play/recording switch is changed to the recording side, the signal is input to the line amplifier. At this time, because the ALC circuit is actuated (when pin 17 is " L ", the play/recording switch is set to the recording side and the ALC circuit starts working), the variable resistor circuit in the input part can be operated in accordance with the output level of the line amplifier. The output of the line amplifier is passed through the buffer amplifier and then output.

In the recording mode, the REC amplifier which is directly connected to the inside starts working. This amplifier is actuated by making pin 9 " H ", and controlled by the DLY'd REC signal from the system control.

The REC amplifier amplifies the signal with the output from the line amplifier, and corrects treble during recording by means of the recording equalizer connected to the NFB terminal.

The base of Q702 becomes " H " with the control signal. Q702 is reversely biased and turned off. Q705 and Q704 become open. The same control signal allows the base of Q707 to become " H ". The play/recording head is shorted and the PB side becomes GND. Thus the recording condition is set.

Electrical Adjustment

PREPARATION

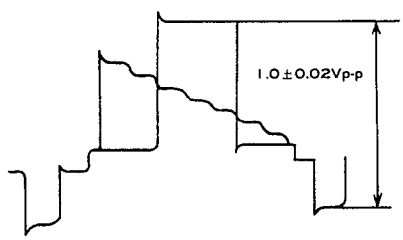
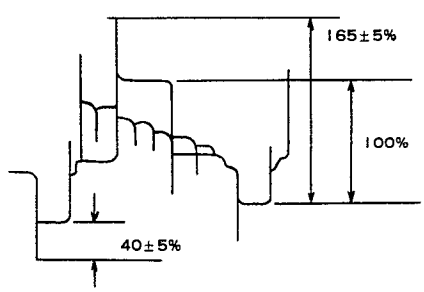
Electrical adjustments are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

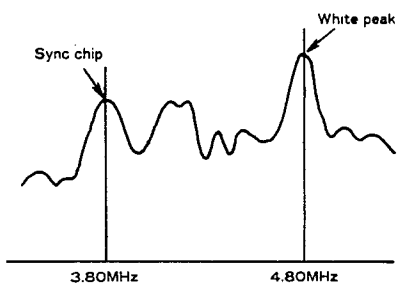
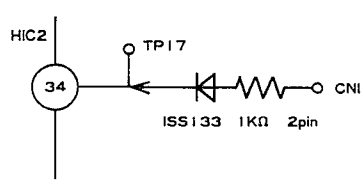
Required test equipment

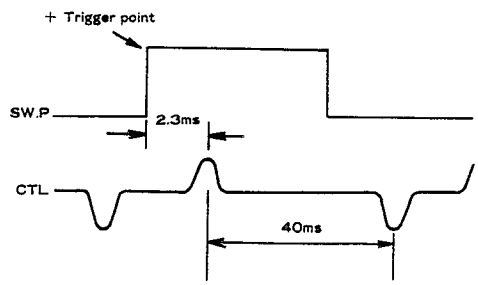
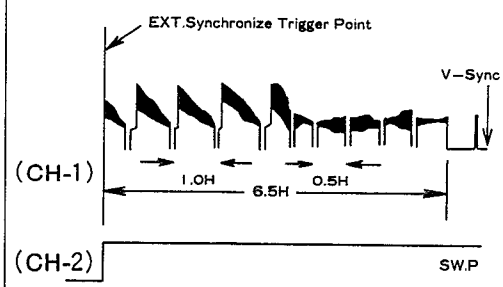
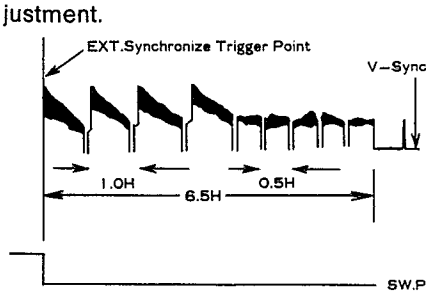
1. Oscilloscope: Dual-trace, BW 20 MHz with10:1 prove
2. Frequency Counter
3. Color Monitor
4. Pattern Generator (PAL)
5. Spectrum Analyzer
6. 75 ohm ± 1 ohm Dummy Load
7. Degital Volt Meter
8. DC 4.5V, 4.7V Power Supply

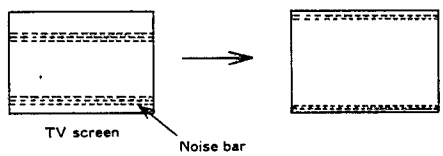
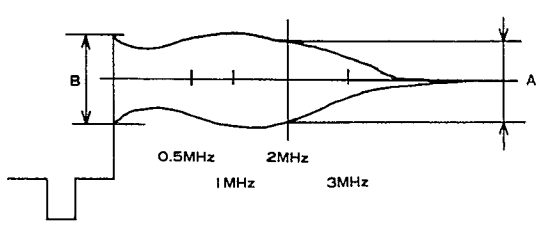
Alignment Tape

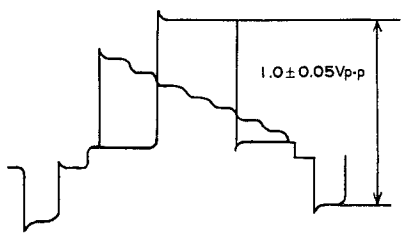
Ref. No.	Video Signal	Audio Signal	Applications
F6A	Color Bar	1 kHz (0 dB)	Y-Level Adjust C-Level Adjust Audio Level
F6J	Stairstep	1 kHz 200 Hz 6 kHz	Audio Freq. Responce
F6M	Mono Scope	3 kHz (-20 dB)	Wow and Flutter Resolution
F6C	50% Video Sweep	none	Video Frequency Resp.
F6N	Stairstep	6 kHz	Tracking Adjust

No.	Item	Test Point	Adjustment Point	Method	Connection Figure
1.	X'tal OSC Adjustment (E-E Mode)	TP12 TP23	VC3	1. Connect frequency counter to TP12 and TP23. 2. Adjust VC3 very slowly until counter indicates. 4.433618 MHz±10 Hz.	Fig. 1
2.	E-E Output Adjustment (E-E Mode)	Video out terminal	VR126 ON HIC-1	1. Input color bar signal with 100% white to VIDEO INPUT. 2. Connect oscilloscope to Video out terminal with 75 ohm dummy load. 3. Adjust by VR126 so that output of VIDEO OUT becomes 1.0V±0.02Vp-p. 	Fig. 8
3.	White/Dark Clip Adjustment (E-E Mode)	TP9 TP23	VR121 VR124 ON HIC-1	1. Input color bar signal with 100% white to VIDEO INPUT. 2. Connect oscilloscope to TP9 and TP23. 3. From SYNC TIP to WHITE PEAK is defined as 100%, then adjust by VR124 so that A=165±5%, by VR121 so that B=40 ±5%. 	Fig. 2

No.	Item	Test Point	Adjustment Point	Method	Connection Figure
4.	Carrier Set/ Deviation Adjustment (E-E Mode)	TP8 TP7 (GND)	VR122 VR123 ON HIC-1	1. Input color bar signal with 100% white to VIDEO INPUT. 2. Connect Spectrum Analyzer to TP8. 3. Adjust VR122 to SYNC. chip 3.8 MHz±20 kHz and adjust VR123 to White peak 4.8 MHz ±20 kHz.  	Fig. 3
5.	VXO Adjustment (E-E Mode)	TP14 TP15 TP17 TP23	VR125 ON HIC-2	1. Connect TP15 to Ground. 2. Following circuit connect to between TP17 and pin 2 of CN1.  3. Connect frequency counter to TP14 and make adjust by VR125 so that the indication becomes 4.2 MHz ±20 kHz.	Fig. 1
6.	+5V Adjustment (P. B Mode) Test Tape F6A	Pin 4 of CN TEST	VR651	1. Connect digital voltage meter to pin 4 of CN TEST and pin 3 (GND). 2. Adjust by VR651 so that the voltage becomes 5.06±0.1V.	Fig. 4
7.	CTL Preset Adjustment (P. B Mode) Test Tape F6N	4pin of CN TEST	VR851 VR303	1. Connect EXT TRIG. of oscilloscope to pin 2 of CN TEST and pin 3 of CN TEST (GND). Connect CH1 to pin 1 of CN TEST and CH2 to pin 2 of CN TEST. Set CHOP mode. 2. Play back the tape by setting VR851 (TR. VOL.) at preset position (VOL. center).	Fig. 4

No.	Item	Test Point	Adjustment Point	Method	Connection Figure
				3. Adjust VR303 to make a position of CTL pulse where delated 2.3mS from switching pulse starting position as shown in Fig.  	
8.	Switching Point+ Adjustment (P. B Mode) Test Tape F6N	TP18	VR301	1. Connect EXT TRIG. of oscilloscope to pin 2 of CN TEST and pin 3 (GND). Connect CH1 to TP18 and CH2 to pin 2 of CN TEST, and CHOP mode (+ trigger). 2. Play back the tape and adjust by VR301 so that the V-Sync. front edge of CH1 waveform comes the position where 6.5H is delayed from the rising of CH2 waveform.  	Fig. 4
9.	Switching Point− Adjustment (P. B Mode) Test Tape F6N	TP18	VR302	1. Set the trigger of oscilloscope to - trigger. Adjust by VR302 with the same manner observed in item 8. Switching Point + Adjustment.  	Fig. 4

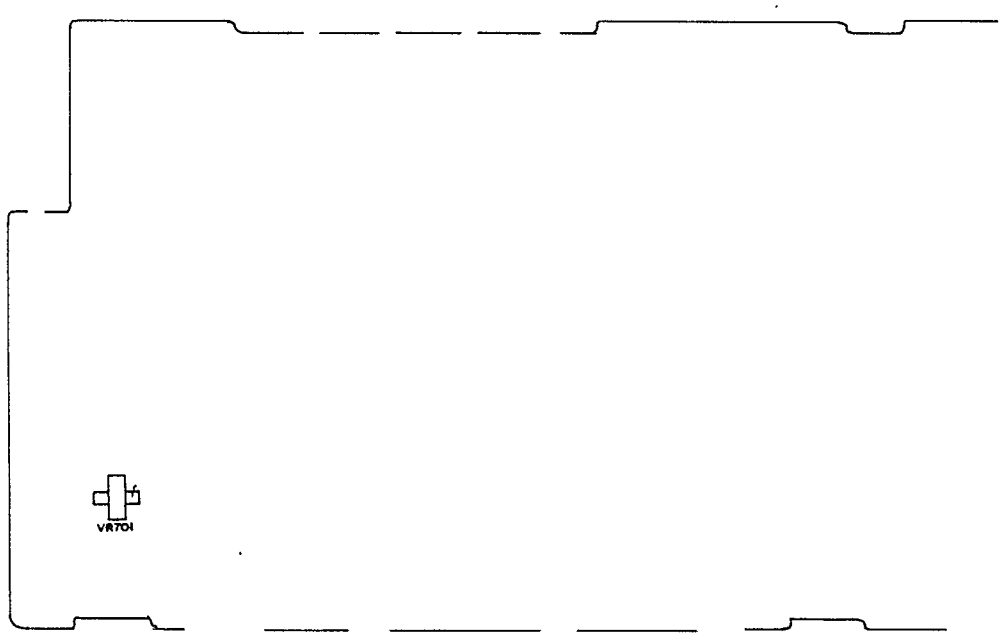
No.	Item	Test Point	Adjustment Point	Method	Connection Figure
10.	Still Check (P. B Mode) Test Tape F6M			1. Connect VIDEO OUT to TV Color Monitor. 2. Play back the tape and push still button and make noise bar on TV screen. Push noise cancel button make as shown Fig.  3. Adjust VR302 to make minimum drift in vertical direction. (Check with center portion of horizontal line.)	Fig. 5
11.	Rec. Current Adjustment (Rec. Mode) Blank tape	TP1 TP2	VR3 VR6	1. Connect + side of oscilloscope to TP1, - side to TP2. 2. Turn VR3 to counter clockwise fully. 3. Input color bar signal to VIDEO INPUT. 4. Adjust VR6 to chroma level 27 ±3 mVp-p. 5. Input 100% white to VIDEO INPUT. 6. Adjust VR3 to V-Sync. level 140 ± 10 mVp-p.	Fig. 6
12.	Video frequency resp. (P. B Mode) Test Tape F6C	TP18 TP23 TP21	VR1 VR2	1. Connect EXT TRIG. of oscilloscope to TP21. 2. Connect oscilloscope to TP18 and TP23 (GND). 3. Play back the tape. 4. Adjust VR1 to make 70% for B/A at (-) TRIG. mode. 5. Adjust VR2 to make 70% for B/A at (+) TRIG. mode.  	Fig. 7

No.	Item	Test Point	Adjustment Point	Method	Connection Figure
13.	P. B Output Level Adjustment (P. B Mode) Test Tape F6A	Video out terminal	VR5	1. Connect EXT TRIG. of oscilloscope to TP21. 2. Connect oscilloscope to Video out terminal with 75 ohm dummy load. 3. Play back the tape and adjust VR5 make output level 1.0 ±0.05Vp-p. 	Fig. 8
14.	Noise Cancel Adjustment (P. B Mode) Test Tape F6A	TP22 TP23 (GND)	VR4	1. Connect oscilloscope to TP22 and TP23 (GND). 2. Play back the tape and adjust VR4 make output level 100 mVp-p.	Fig. 7
15.	※SECAM 1/2 fH Tune Adjustment (REC Mode) Blank tape	TP11 TP23 (GND)	L19	1. Input SECAM color bar to VIDEO INPUT. 2. Connect oscilloscope to TP11 and TP23 (GND). 3. Rec. the tape and adjust L19 to make maximum output level.	
16.	Audio Rec. bias current Adjustment (REC. Mode) Blank tape	TP701 TP702	VR701	1. Connect AC mVolt meter to TP701 and TP702. 2. Insert short-pin to AUDIO INPUT then set in Rec. mode. 3. Adjust VR701 until AC mVolt meter indicates 2.8 mV.	

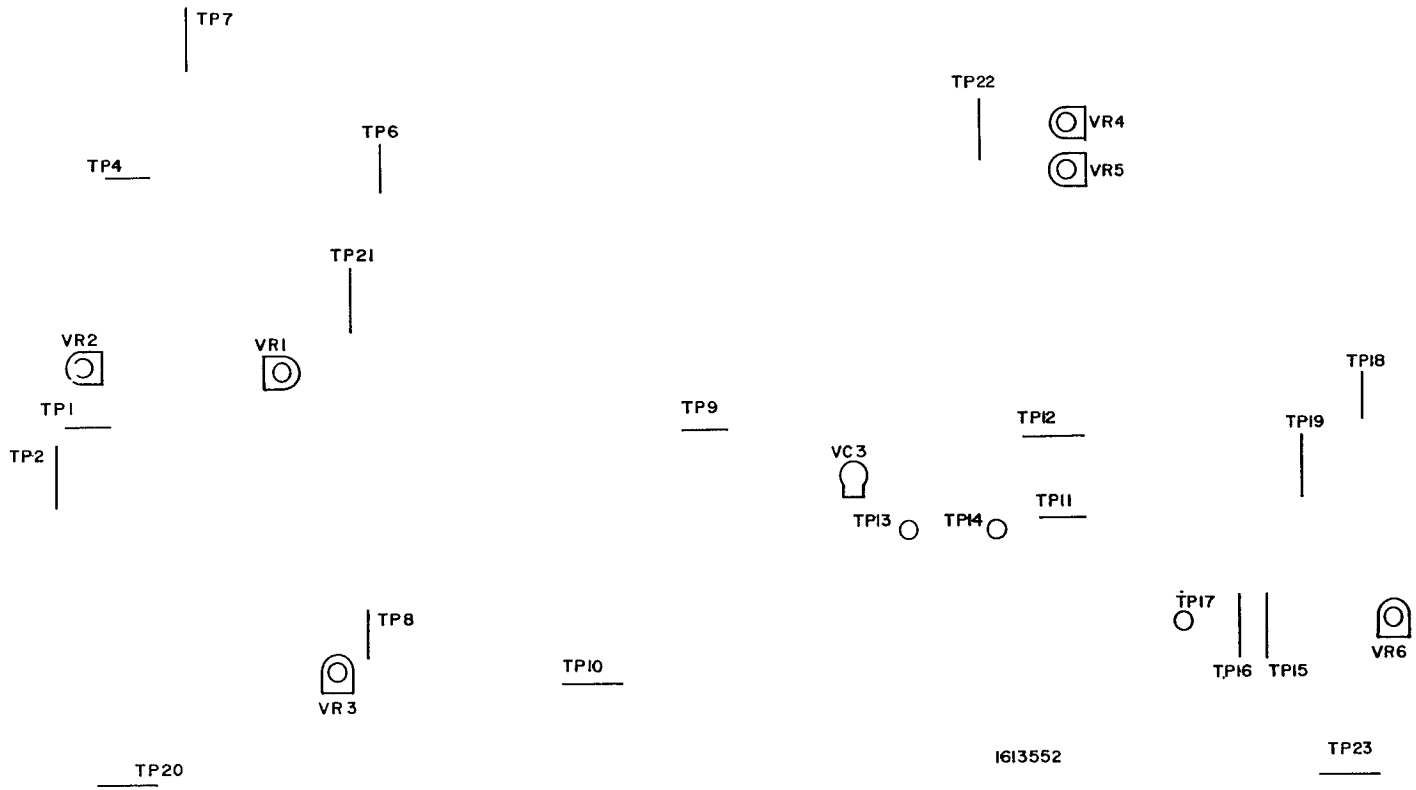
No.	Item	Test Point	Adjustment Point	Method	Connection Figure
17.	TP803 Voltage Adjustment	TP803 TP801 (GND)	VR802	1. Disconnect AC plug. 2. Input DC 4.5V to pin 6 of CN24. 3. Connect Digital Voltmeter to TP803 and TP801 (GND). 4. Adjust by VR802 so that the voltage becomes Low level (less than 0.5V). 5. Input DC 4.7V to pin 6 of CN24. 6. Adjust by VR802 so that the voltage becomes High level (more than 3V).	
18.	Clock Adjustment	TP802 TP801 (GND)	C812	1. Connect the frequency counter to TP802 and TP801 (GND). 2. Adjust by C812 so that the indication of frequency counter becomes 349.525 kHz±3 Hz.	

Test Points and Alignment Points

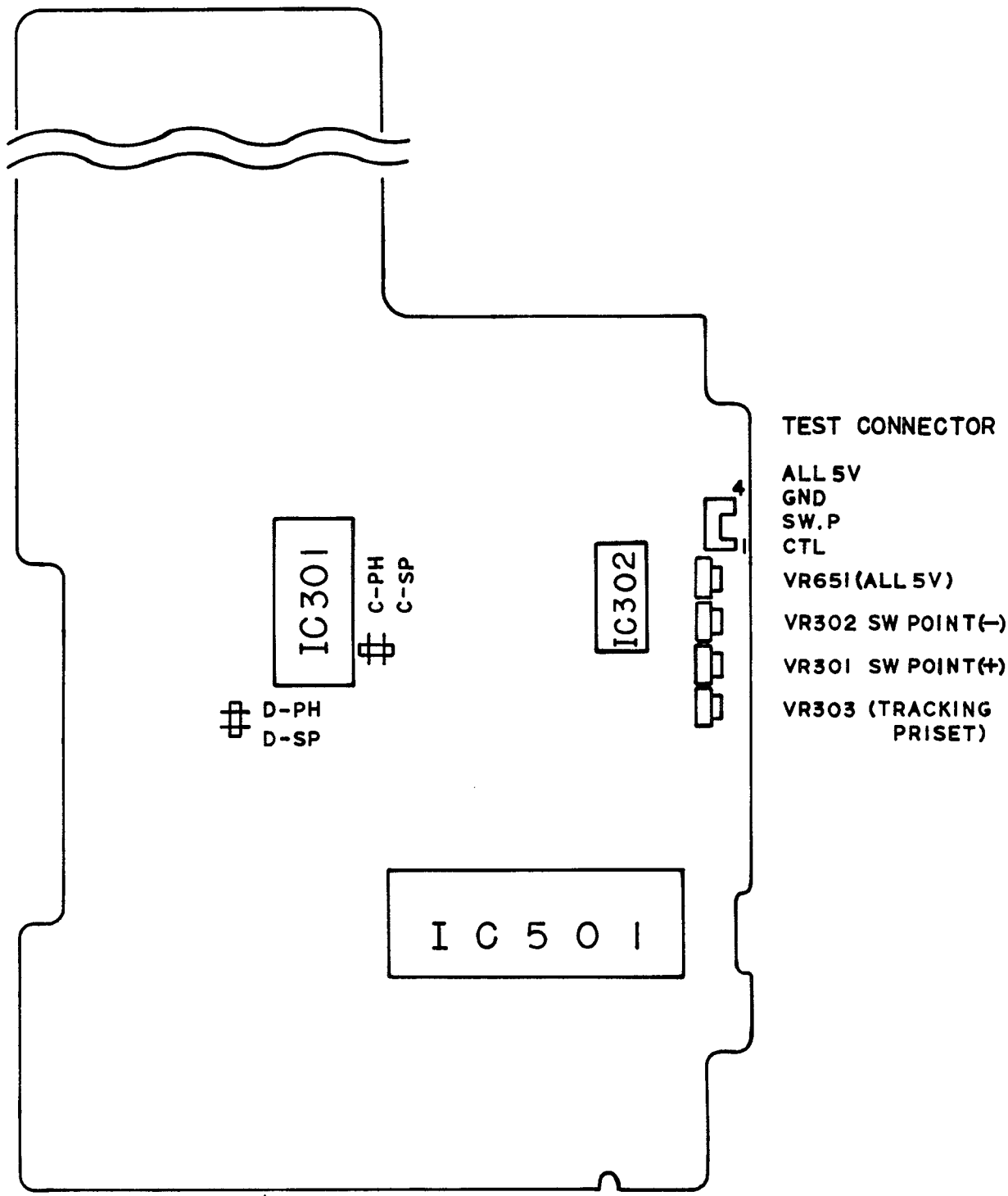
AUDIO, TUNER PCB (TOP)



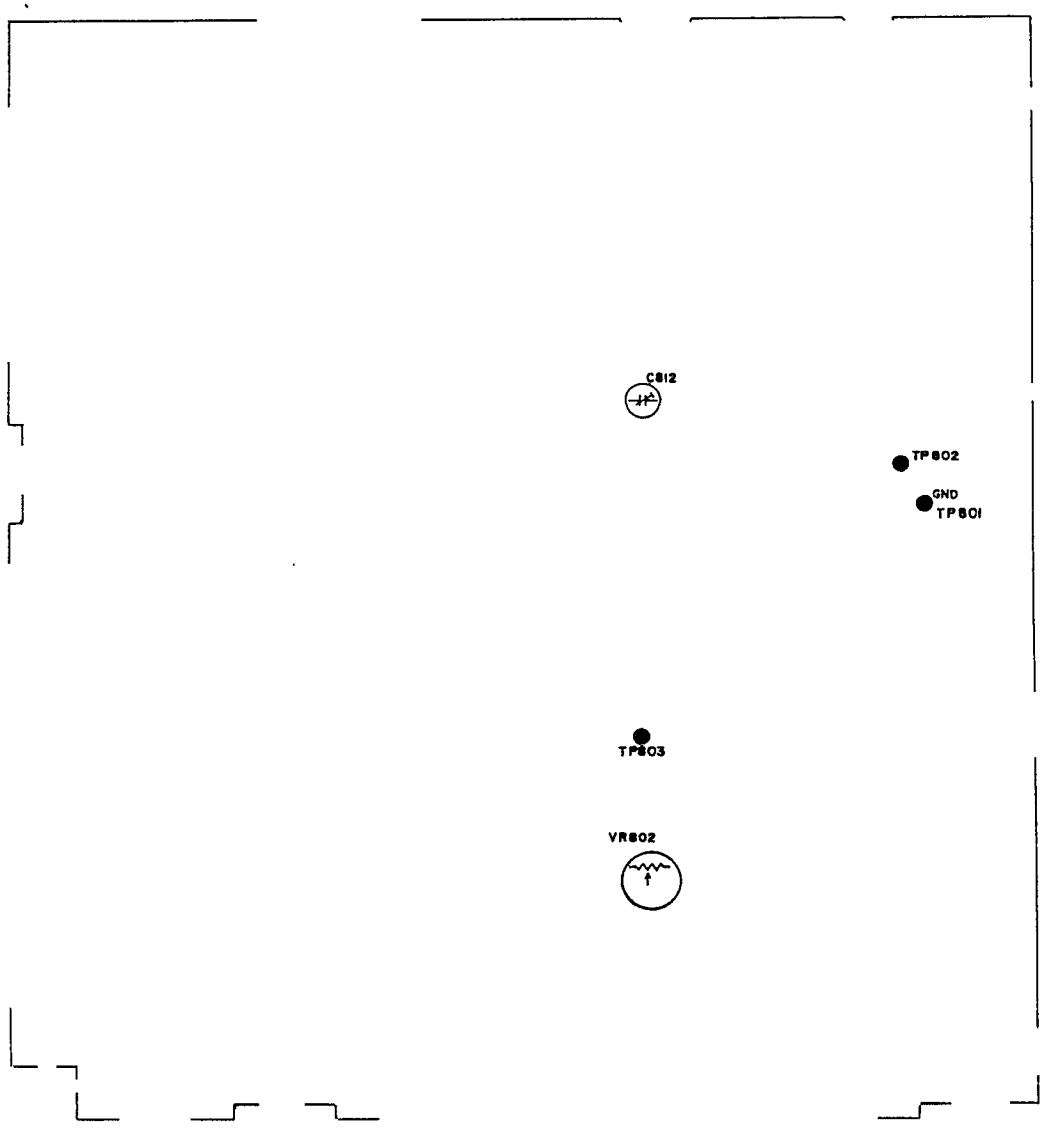
VIDEO PCB (BOTTOM)



SYSCON, SERVO, POWER PCB (TOP)



CHANNEL SELECT PCB (TOP)



EQUIPMENT CONNECTION (Video & Servo)

Fig.1

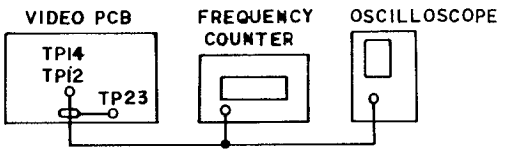


Fig.2

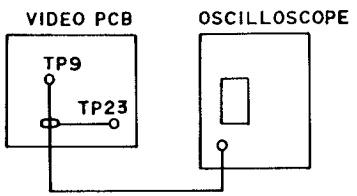


Fig.3

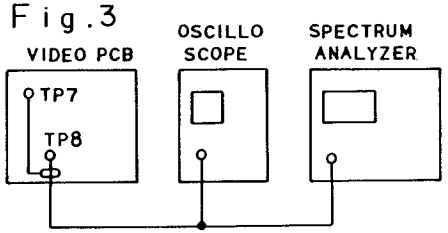


Fig.4

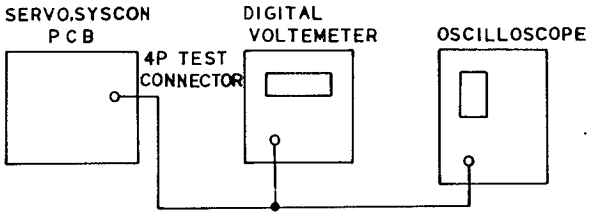


Fig.5

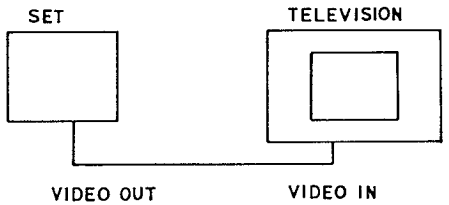


Fig.6

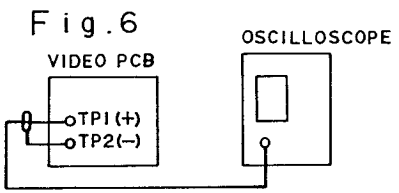


Fig.7

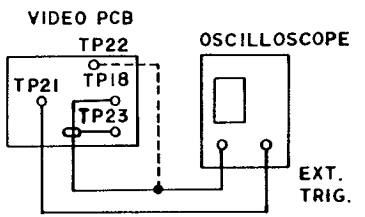


Fig.8

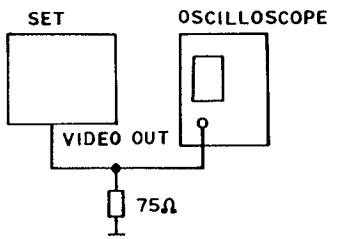
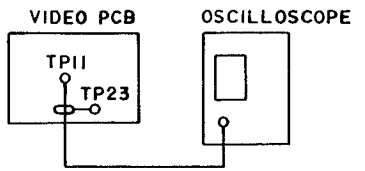
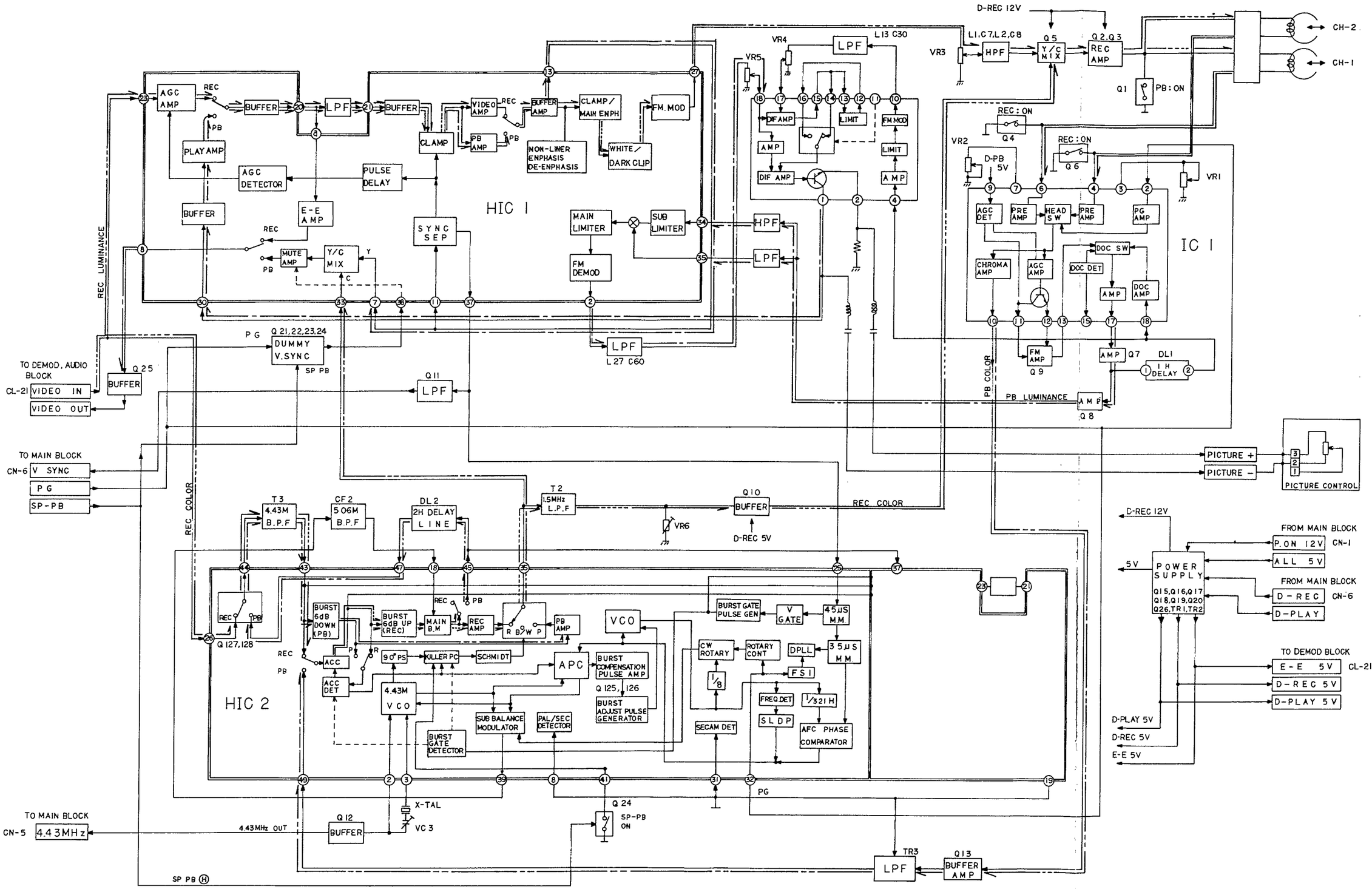


Fig.9



VIDEO BLOCK DIAGRAM



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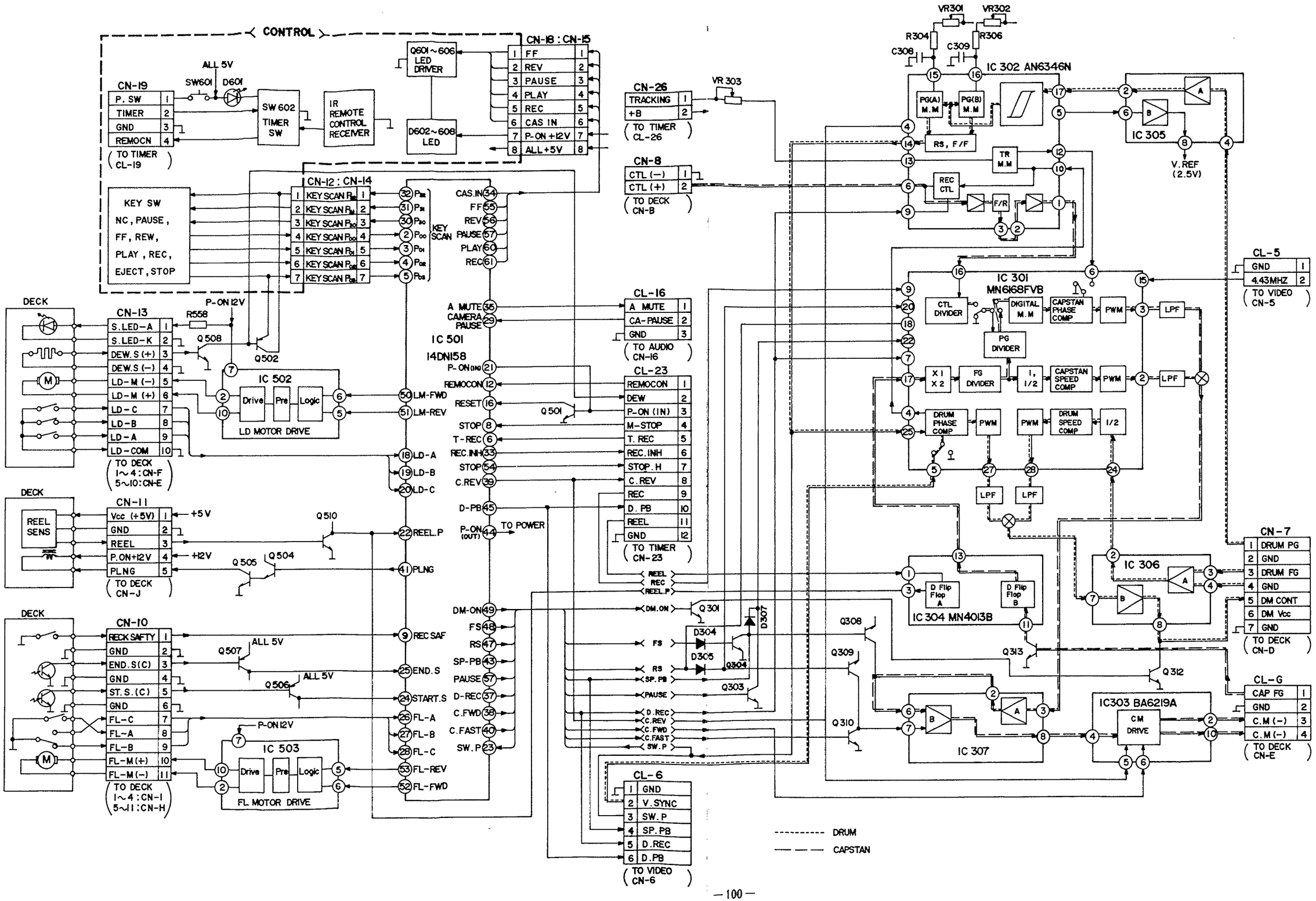
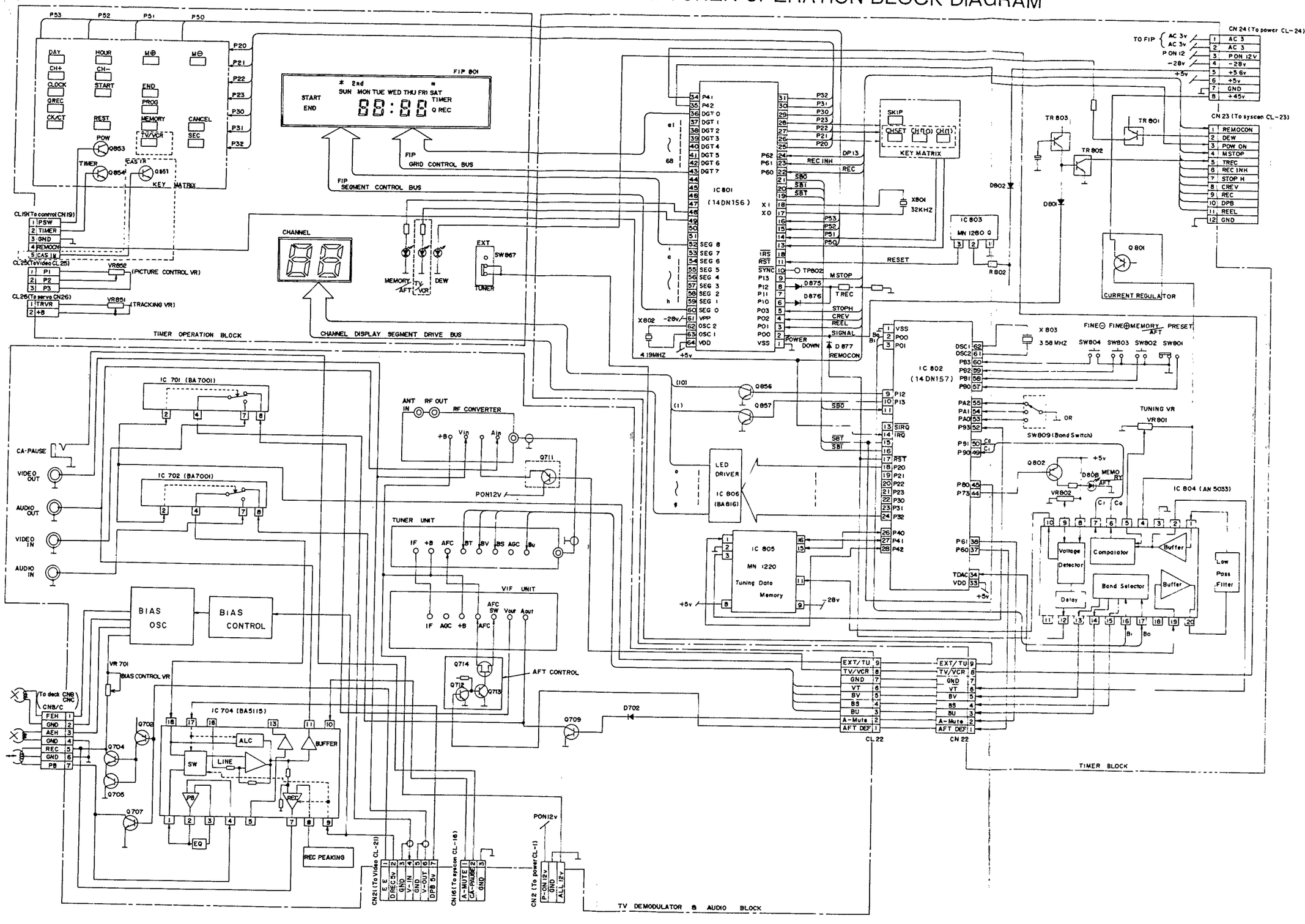
SERVO / SYSTEM CONTROL / CONTROL BLOCK DIAGRAM



TV DEMODULATOR / AUDIO / TIMER & TUNER OPERATION BLOCK DIAGRAM



VIDEO PCB (TOP VIEW)

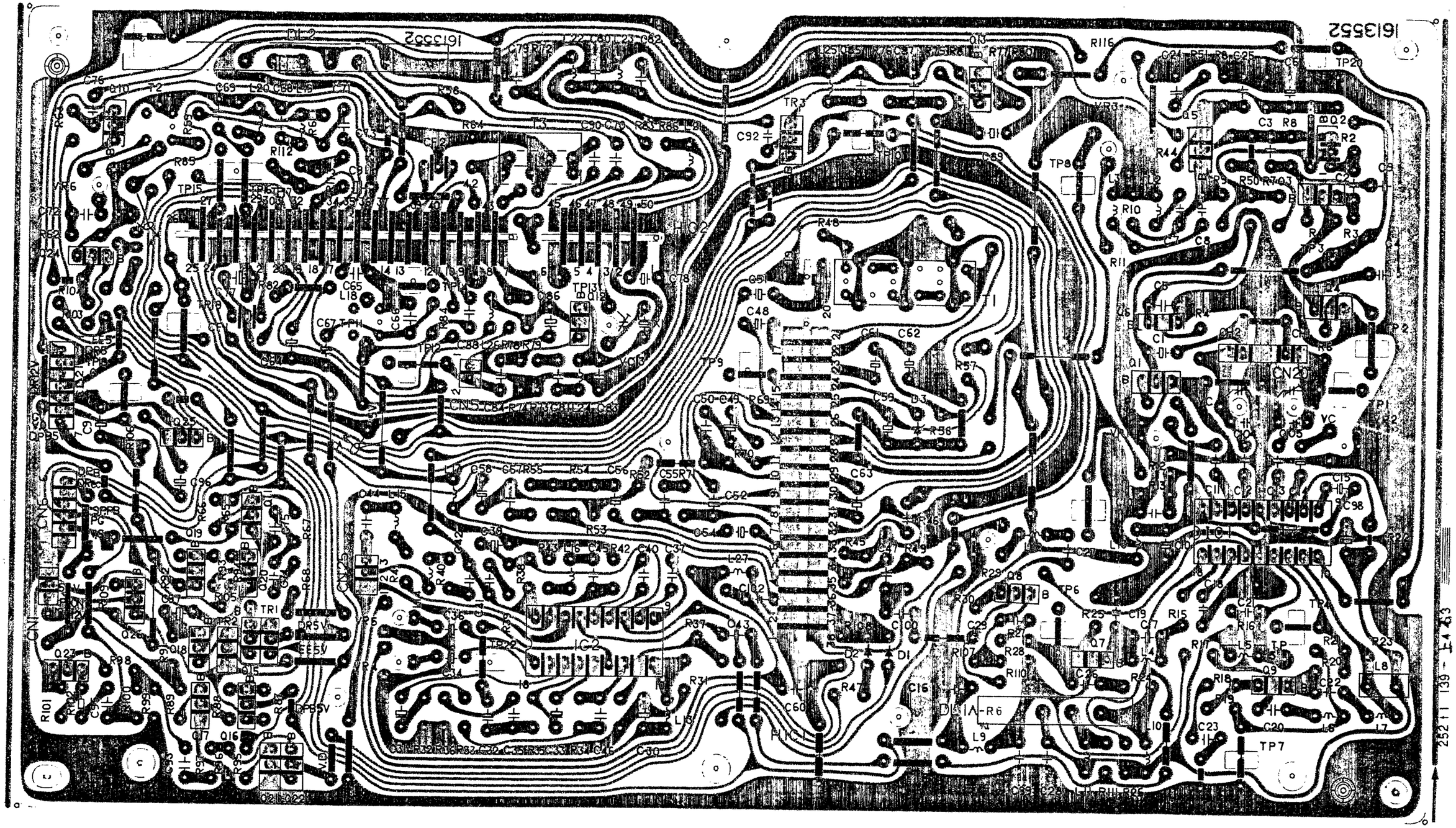
HIBRID IC PCB
(LUMINANCE)

HIC 1

HIBRID IC PCB
(CHROMINANCE)

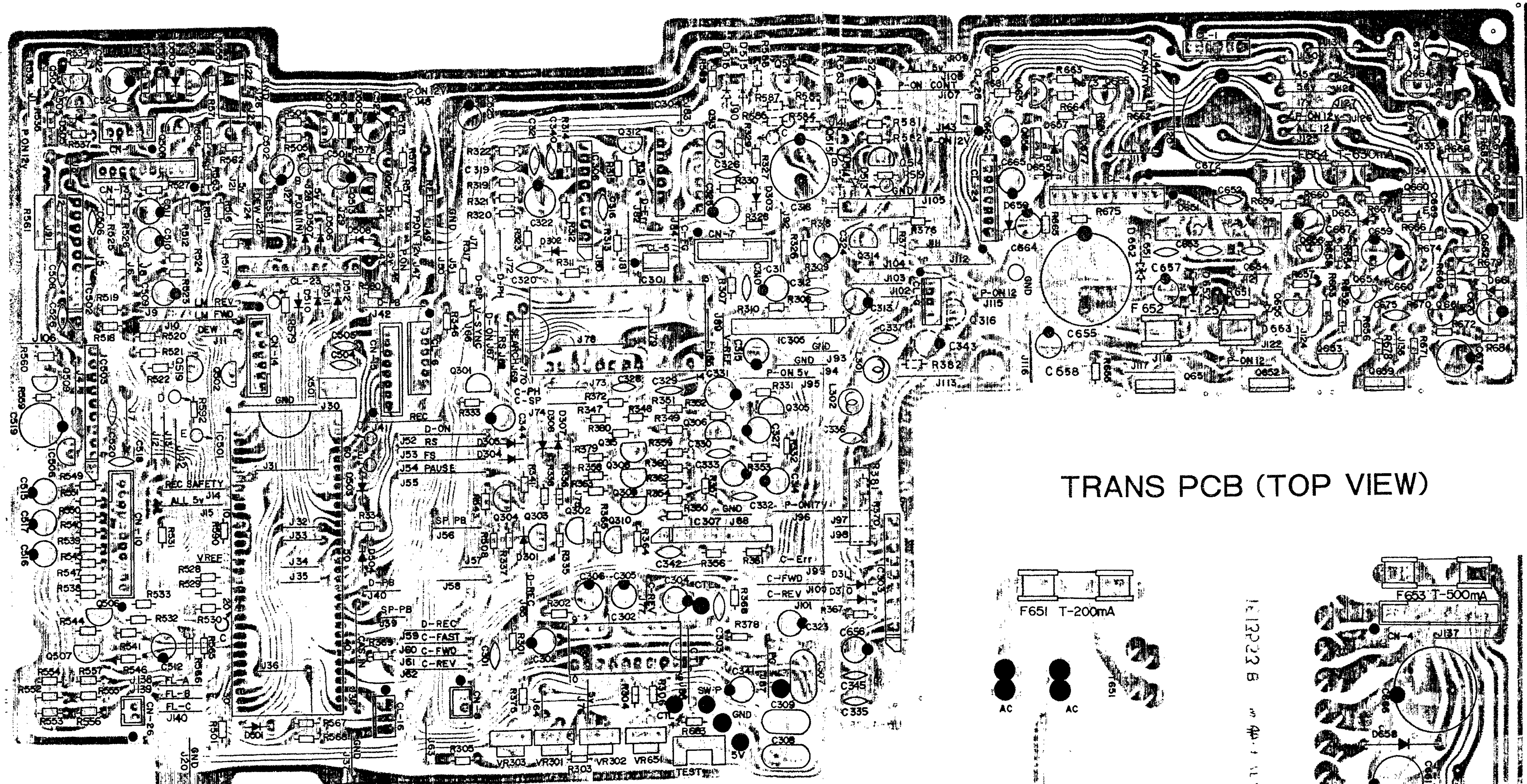
HIC 2

R6701 02 32



VIDEO PCB (BOTTOM VIEW)

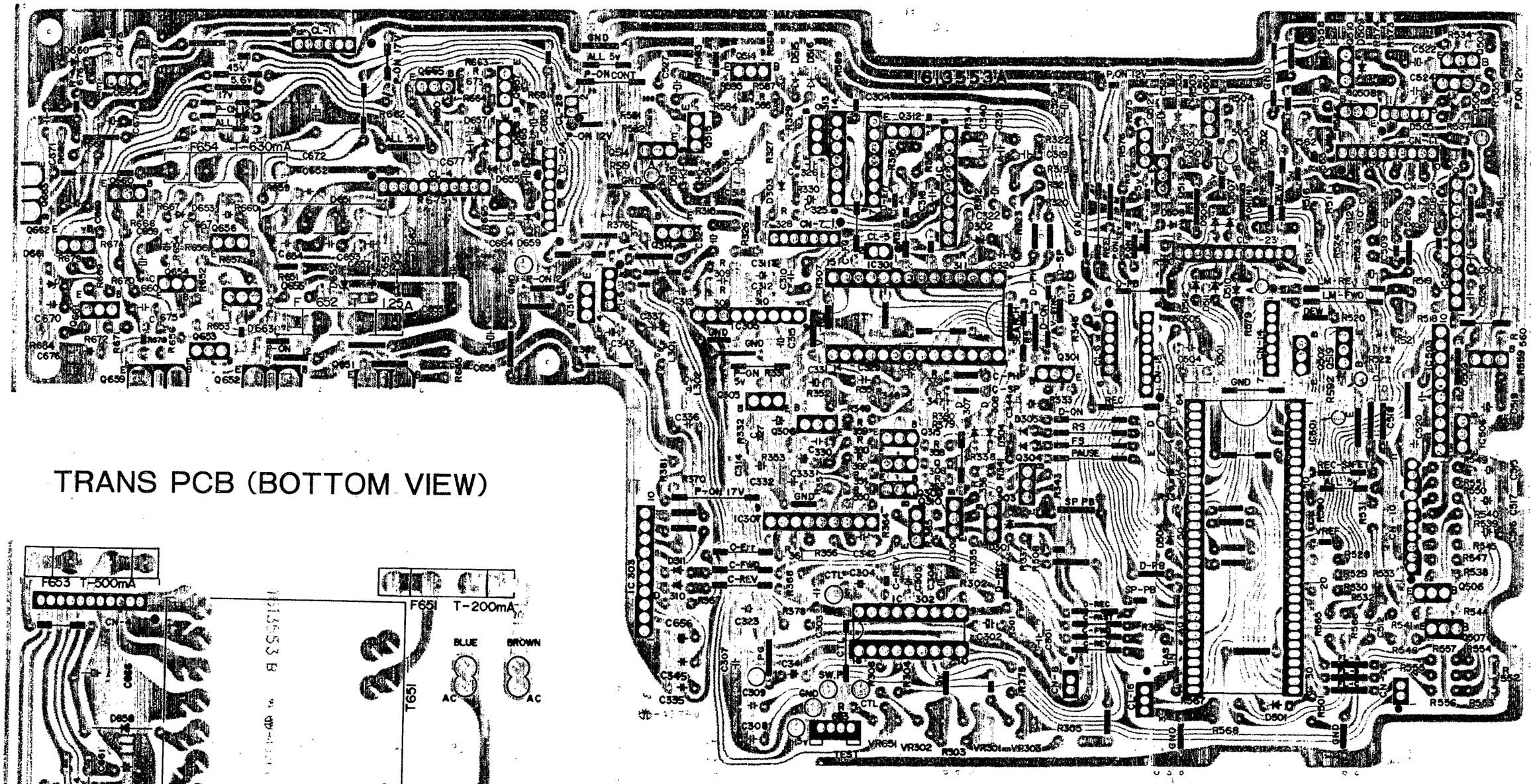
SYSCON. SERVO. POWER PCB (TOP VIEW)



TRANS PCB (TOP VIEW)

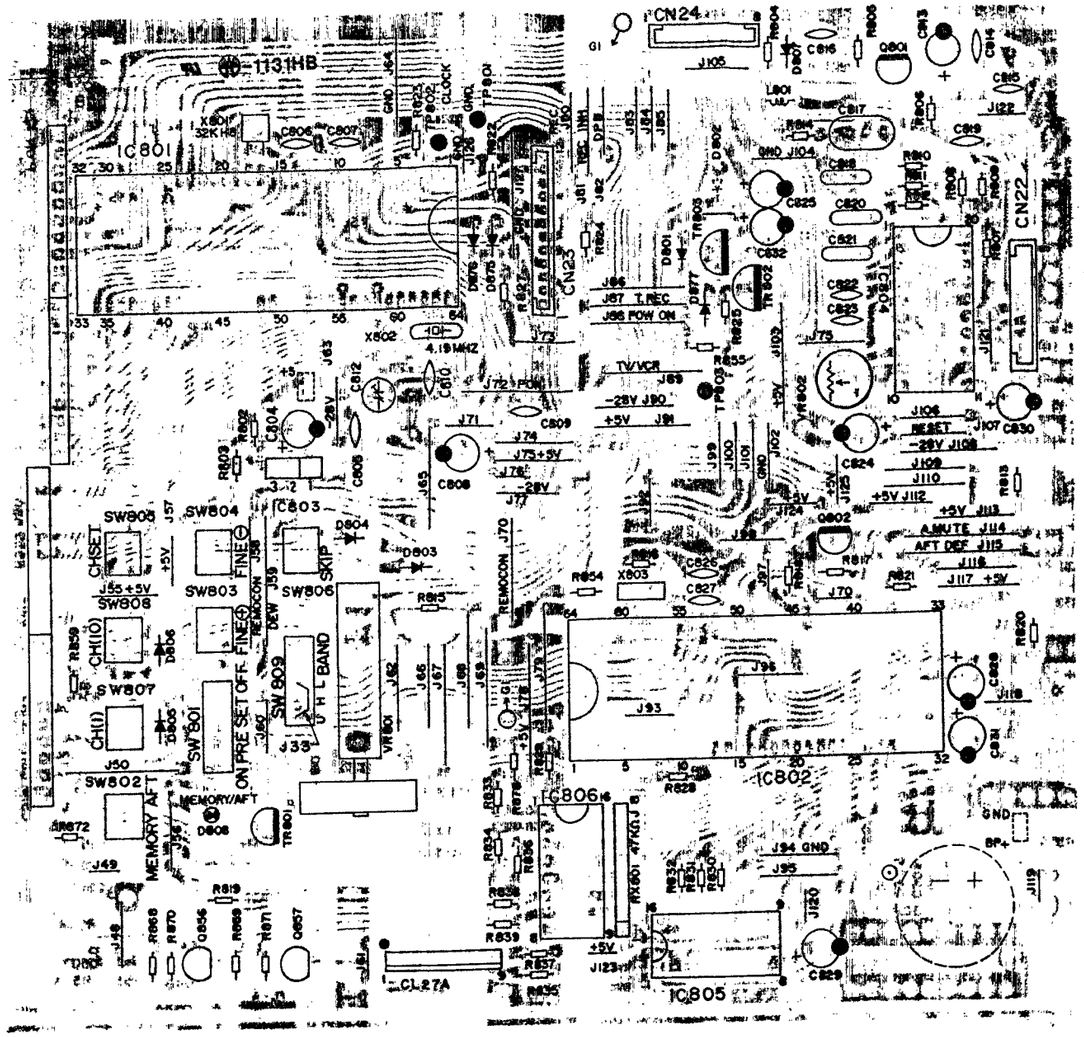
R6701 30'32

SYSCON. SERVO. POWER PCB (BOTTOM VIEW)

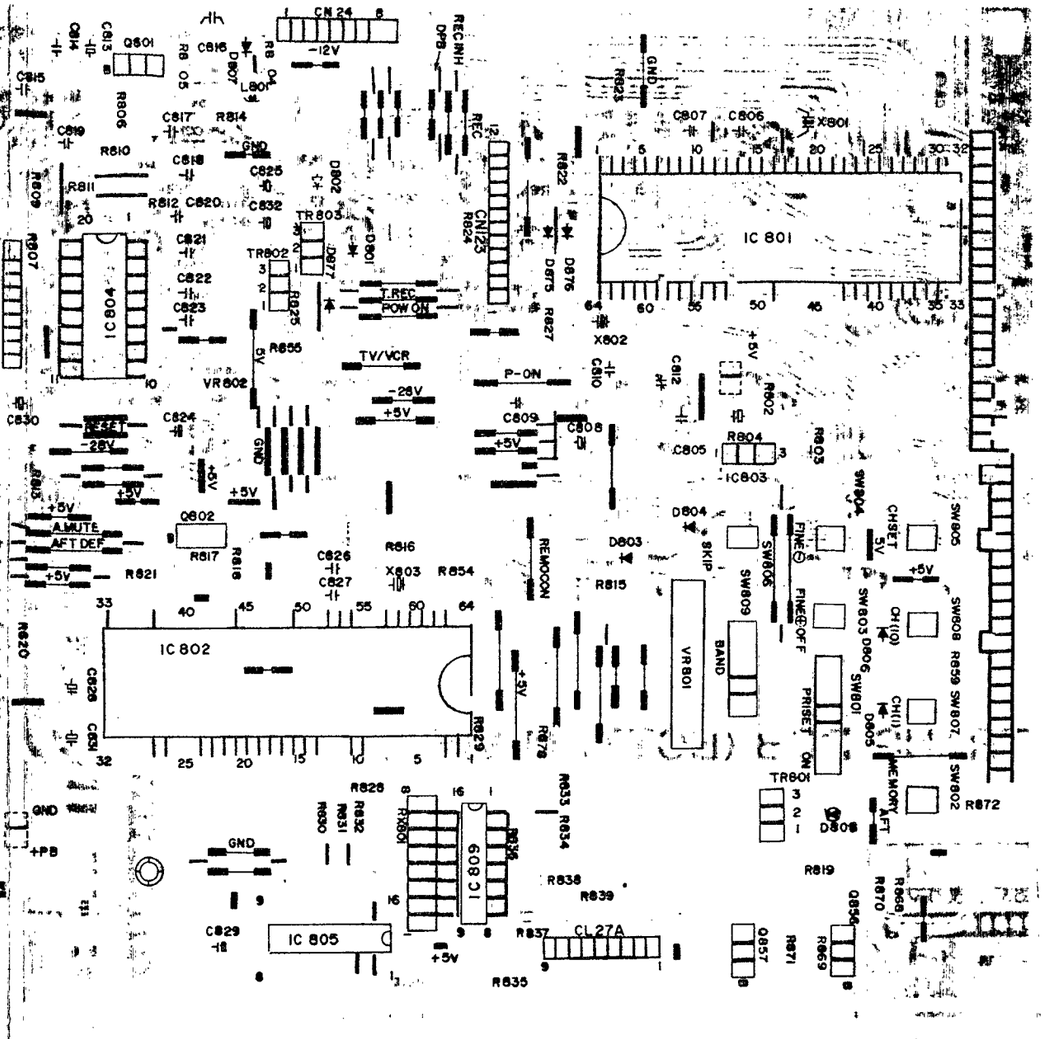


TRANS PCB (BOTTOM VIEW)

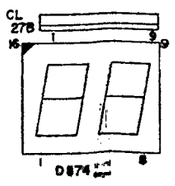
CHANNEL SELECT PCB (TOP VIEW)



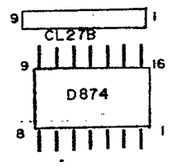
CHANNEL SELECT PCB (BOTTOM VIEW)



CHANNEL DISPLAY PCB (TOP VIEW)

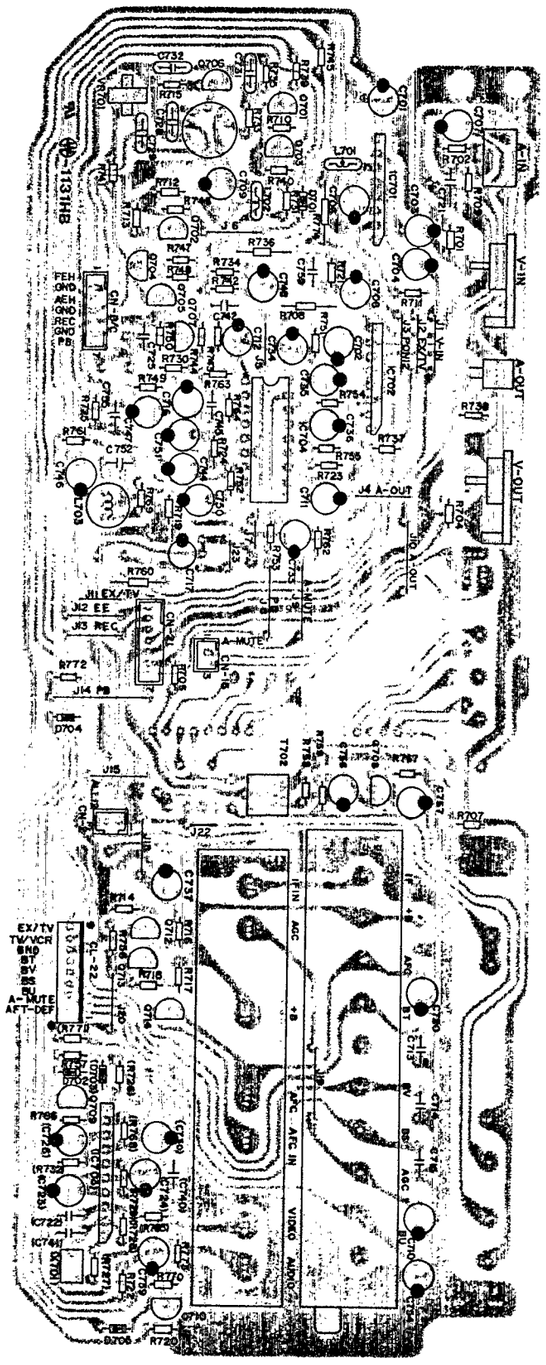


CHANNEL DISPLAY PCB (BOTTOM VIEW)

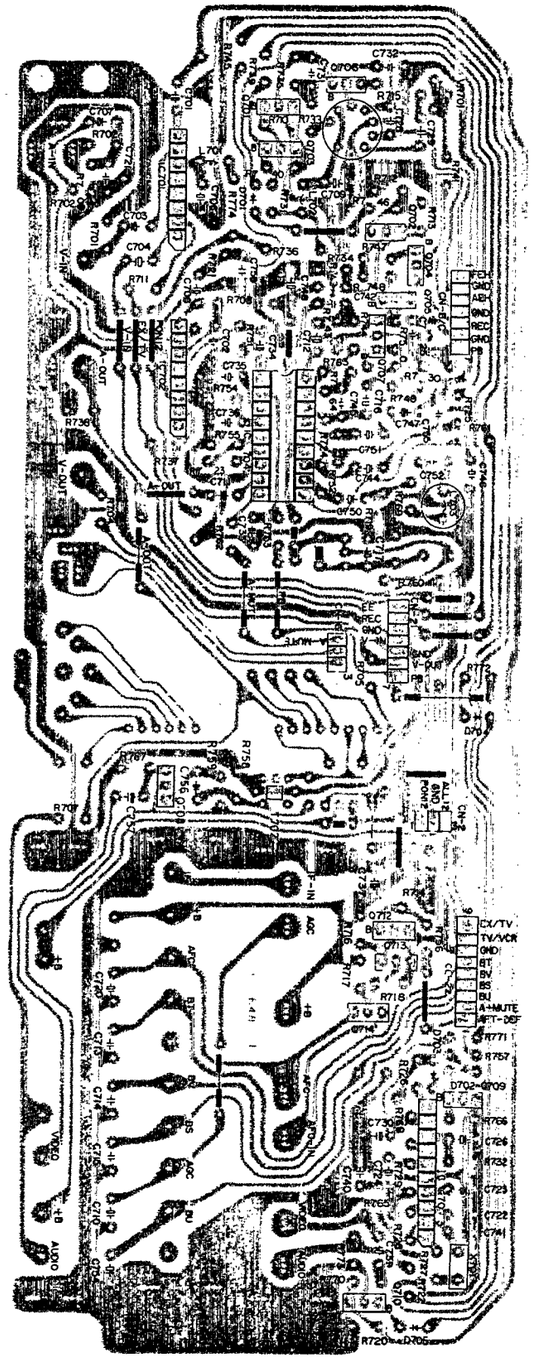


AUDIO TUNER PCB

(TOP VIEW)

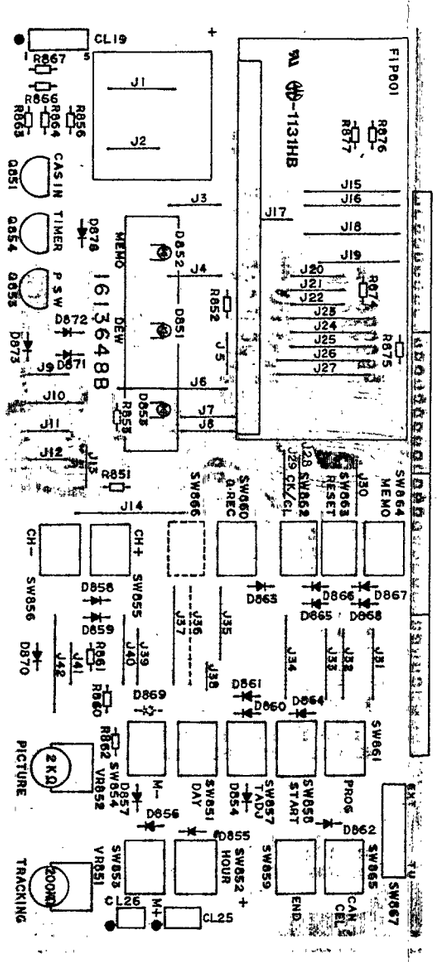


(BOTTOM VIEW)

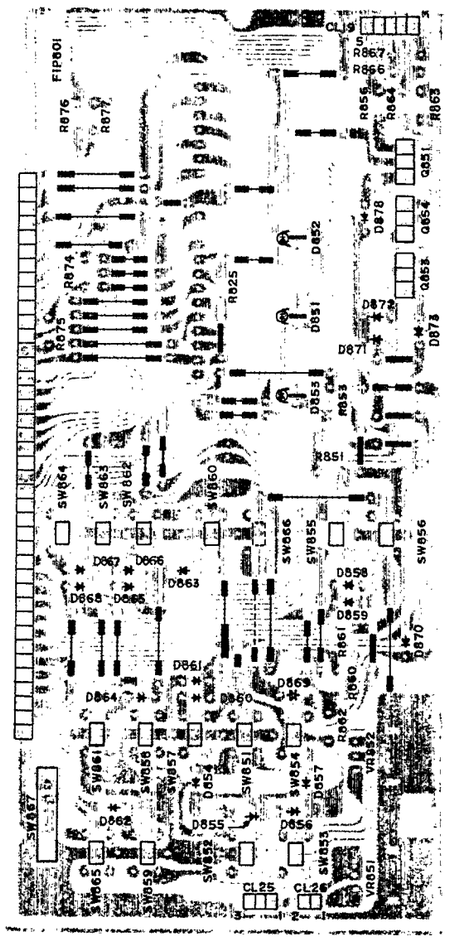


TIMER PCB

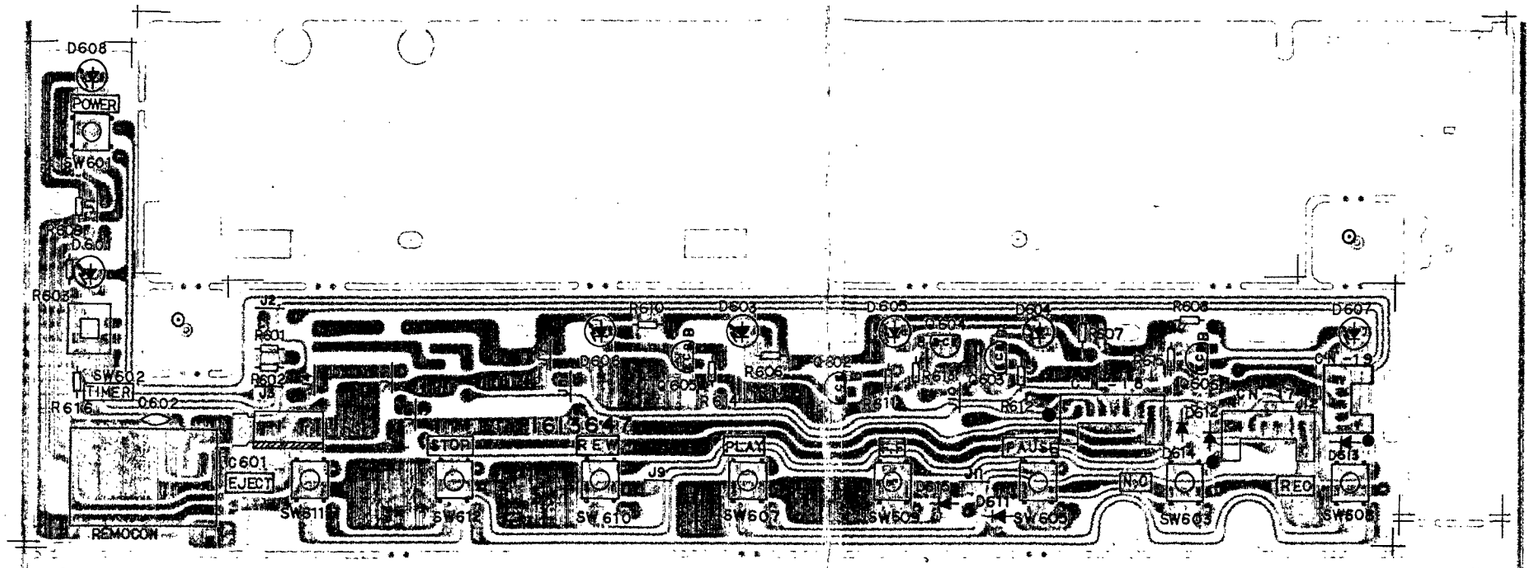
(TOP VIEW)



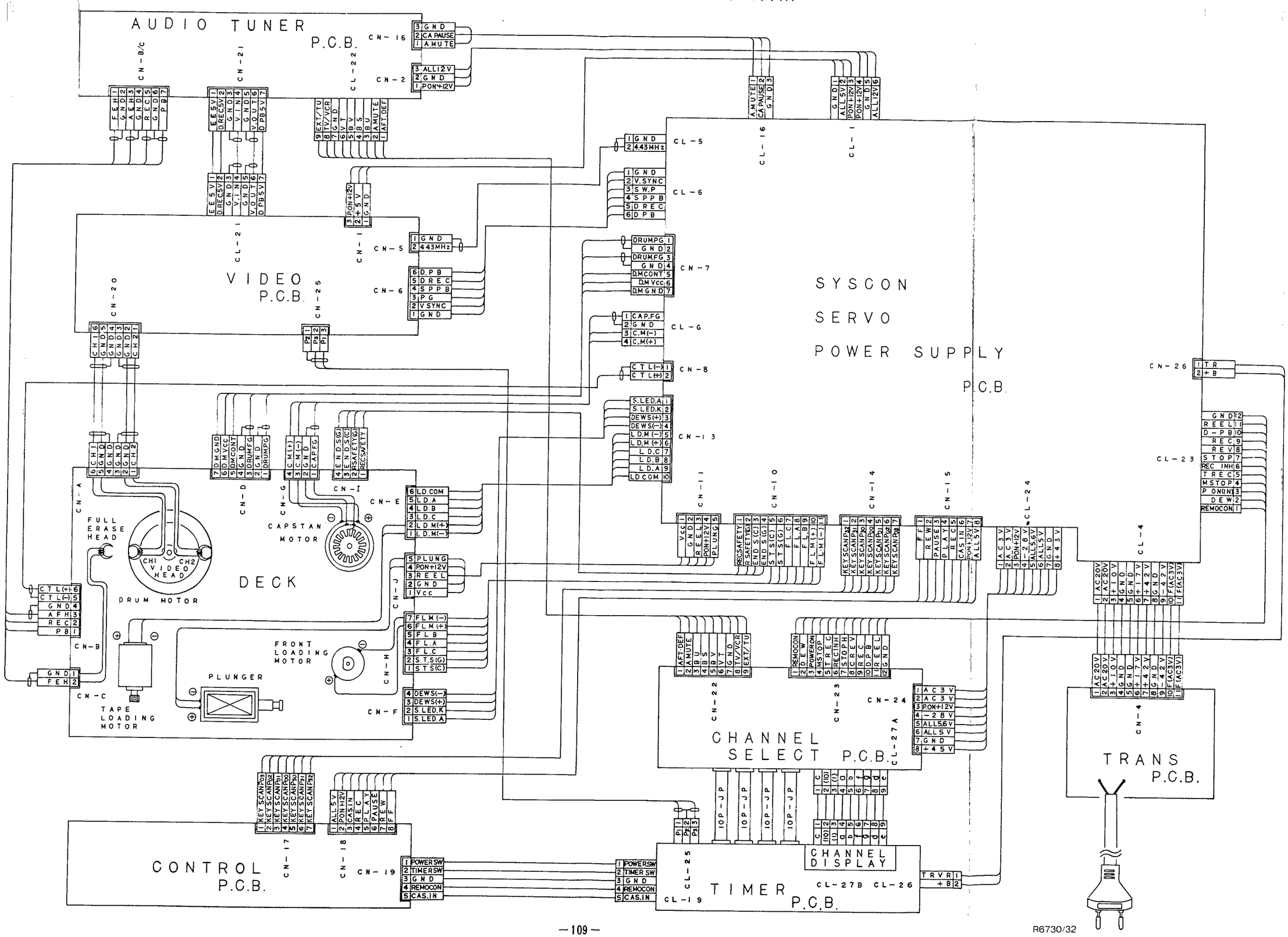
(BOTTOM VIEW)



CONTROL PCB

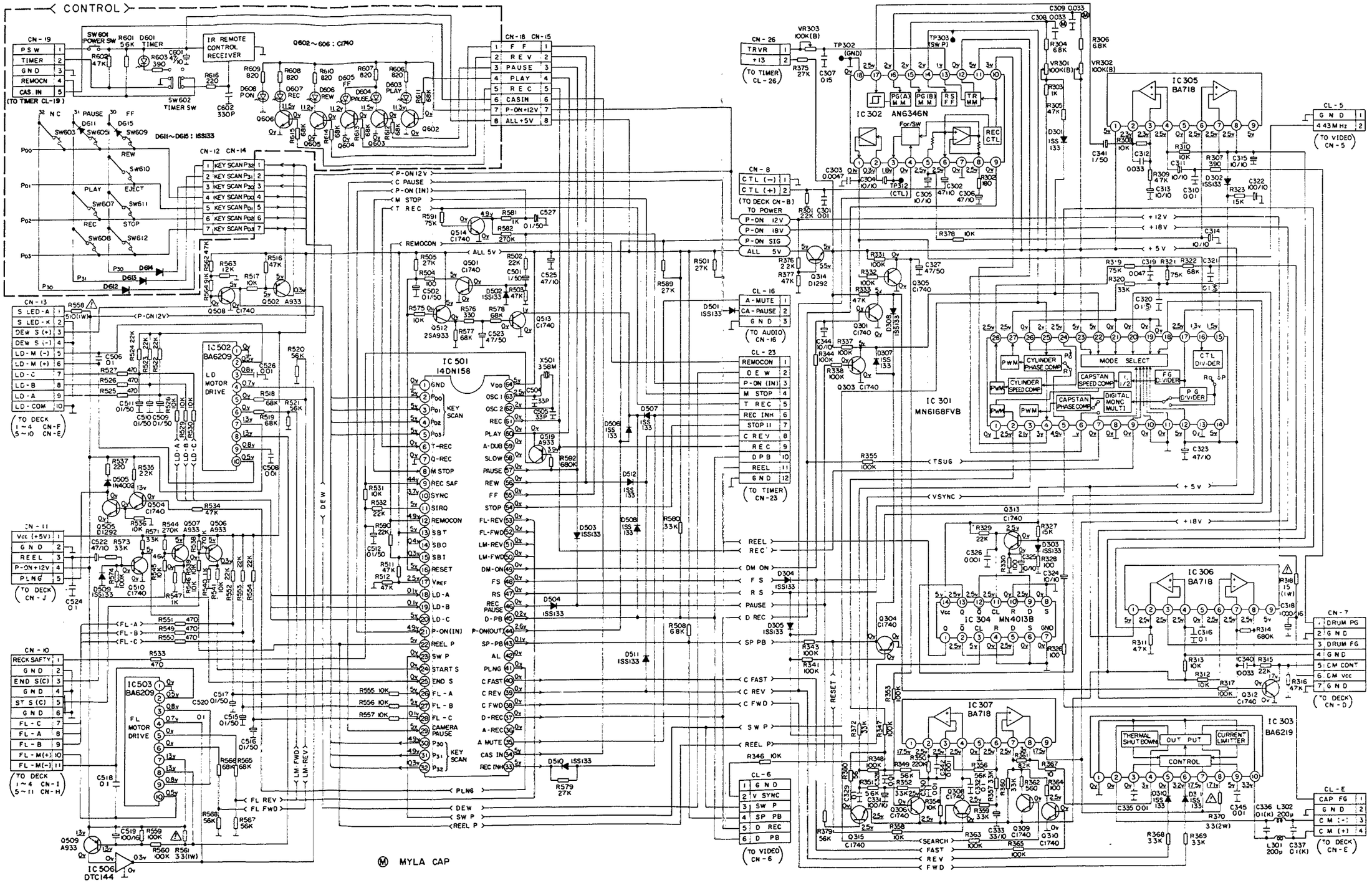

D608
POWER
SW601
D609
R603
SW602
TIMER
D602
R616
C601
EJECT
REMOCON
SW611
SW612
SW610
SW607
SW606
SW605
SW604
SW603
SW608
STOP
REW
PLAY
F.F
PAUSE
N.O
REC
D610
D611
D612
D613
D614
D615
D603
D604
D605
D606
D607
R601
R602
R604
R605
R606
R607
R608
R609
R610
R611
R612
R613
R614
R615
IC L3647
J1
J2
J3
J9

WIRING DIAGRAM

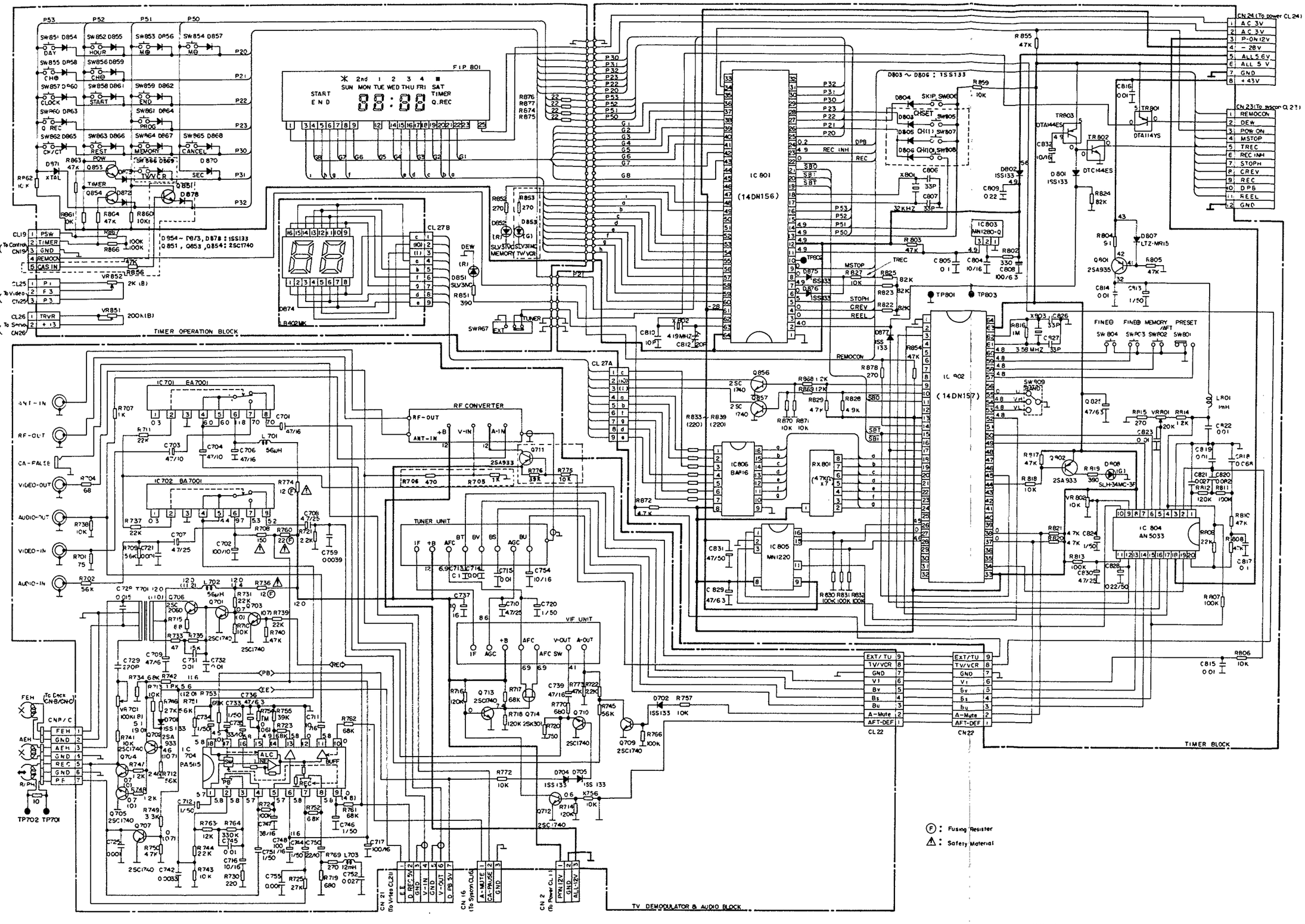


R6730/32

SERVO / SYSTEM CONTROL / CONTROL SCHEMATIC DIAGRAM

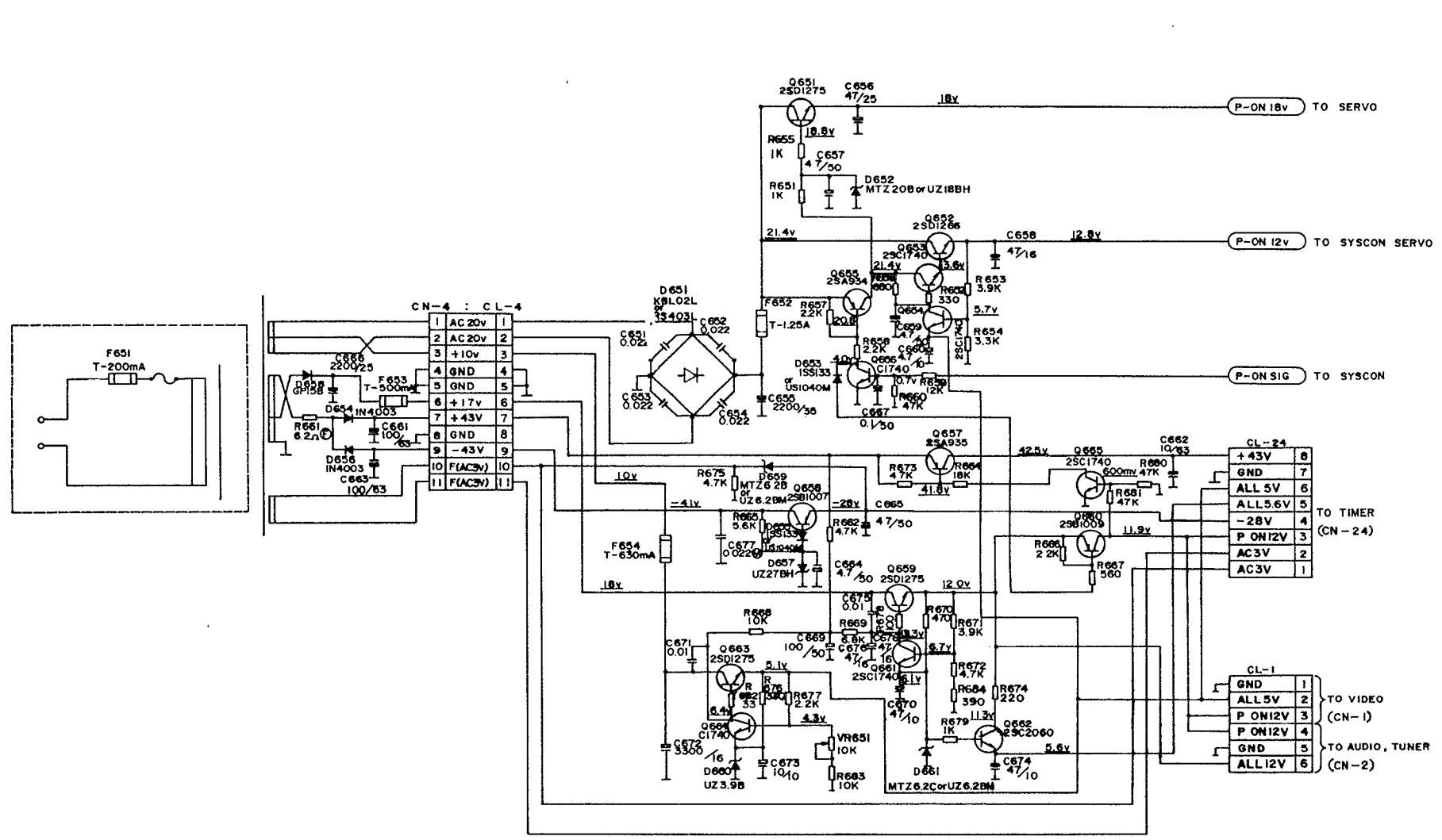


TV DEMODULATOR / AUDIO / TIMER & TUNER OPERATION SCHEMATIC DIAGRAM

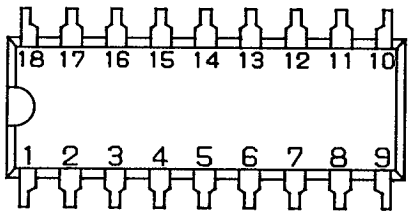


R6732

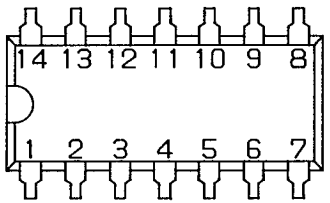
SCHEMATIC DIAGRAM (POWER SUPPLY)



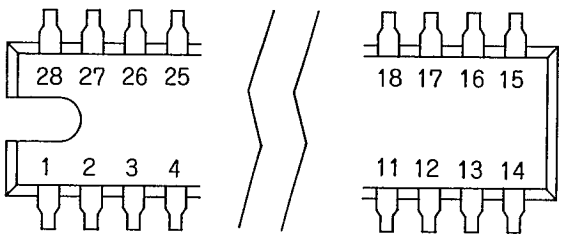
LEAD IDENTIFICATION 1



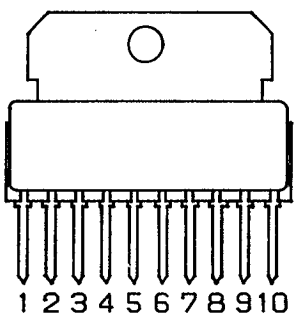
AN6326 : IC1
AN6328 : IC2
AN6346N : IC302
BA5115 : IC704



MN4013B : IC304

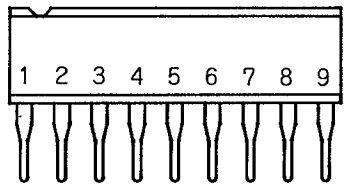


MN6168FVB : IC301

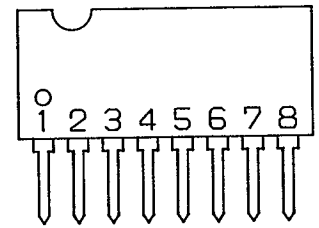


BA6219 : IC303
BA6209 : IC502, IC503

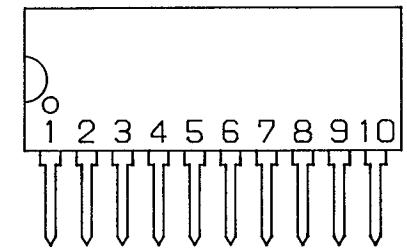
LEAD IDENTIFICATION 2



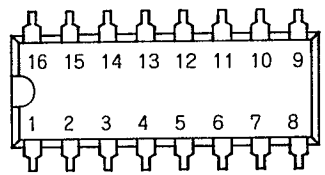
BA718 : IC 305~IC307



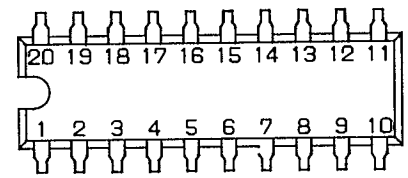
BA7001 : IC701, IC702



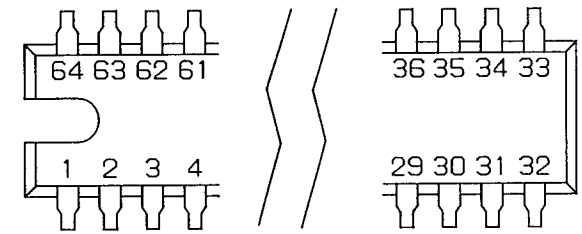
LA7210 : IC703



MN1220 : IC805
BA618 : IC806

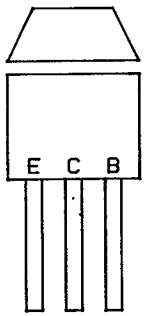


AN5033 : IC804



MN15342FVS : IC501
MN15487FVD : IC801
MN1512FVC : IC802

LEAD IDENTIFICATION 3



2SC1740 : Q1, Q4, Q7, Q11～Q13, Q15
Q17, Q20～Q22, Q24, Q301
Q303～Q306, Q308～Q310
Q312, Q313, Q315, Q501, Q504
Q508, Q510, Q513, Q514, Q601～Q606
Q653, Q654, Q656, Q661, Q664, Q665
Q701, Q703～Q705, Q707, Q709, Q710
Q712, Q713, Q853, Q854, Q856, Q857

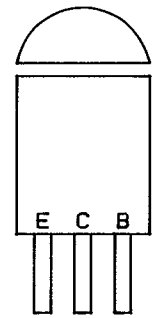
2SA933 : Q3, Q10, Q16, Q18, Q23, Q25, Q502
Q506, Q507, Q509, Q512, Q519, Q702, Q802

2SC2058 : Q2, Q8, Q9

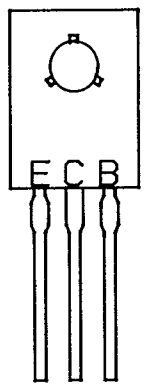
2SC1809 : Q5

DTA114YS : TR1～TR3

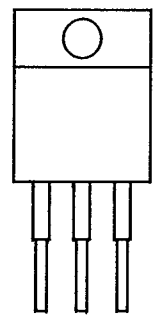
DTC144S : IC506



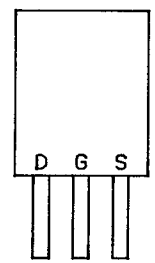
2SA934 : Q19, Q655
2SC2060 : Q26, Q662, Q706
2SA935 : Q657, Q801
2SC1292 : Q314, Q505



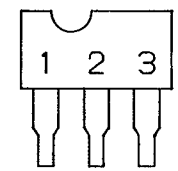
2SB1007 : Q658
2SB1009 : Q660



2SD1275 : Q651, Q659, Q663
2SD1266 : Q652



2SK301 : Q714

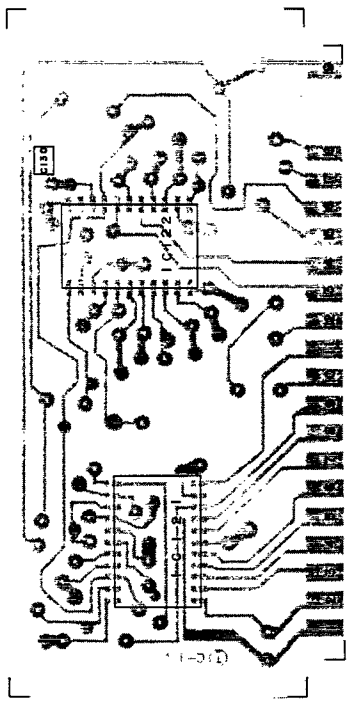


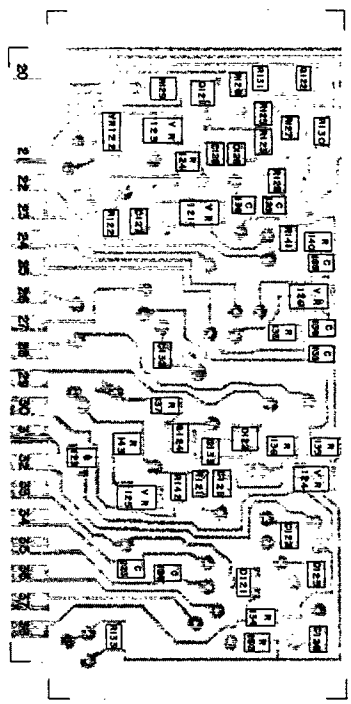
MN1280Q : IC803
DTA114YS : TR801
DTC114ES : TR802
DTA144ES : TR803

HIBRID IC PCB

(LUMINANCE)

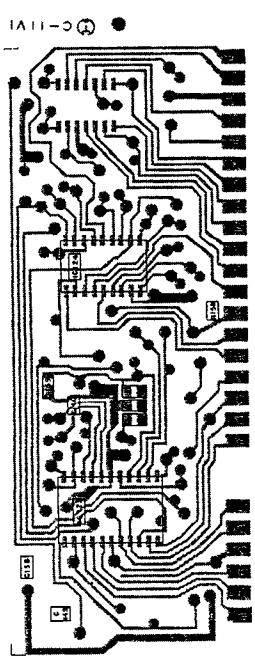
HIC 1

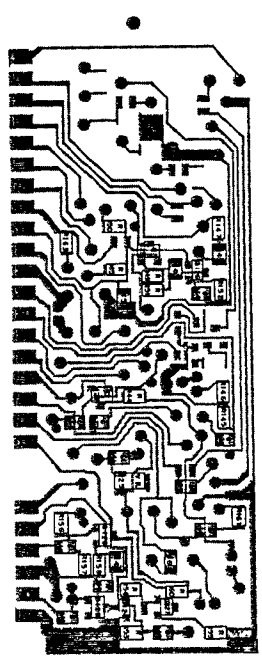




(CHROMINANCE)

HIC 2





R6701/02/32

TROUBLE SHOOTING MANUAL

1. POWER SUPPLY SECTION

① NO POWER LED

② NO P-ON 18V

③ NO P-ON 12V (To System Control/Servo)

④ NO +43V

⑤ NO ALL 5V

⑥ NO ALL 5.6V

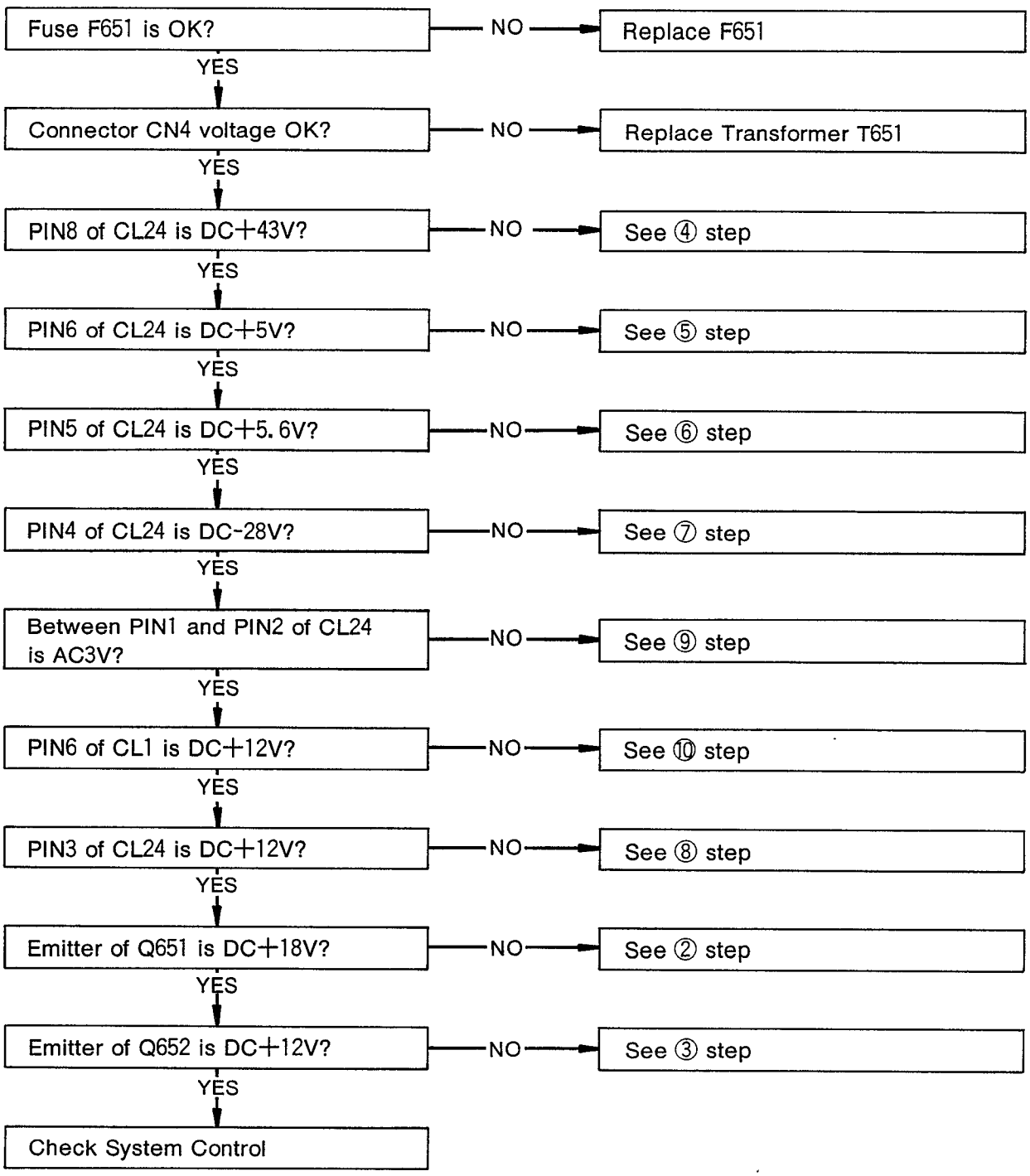
⑦ NO −28V

⑧ NO P-ON 12V

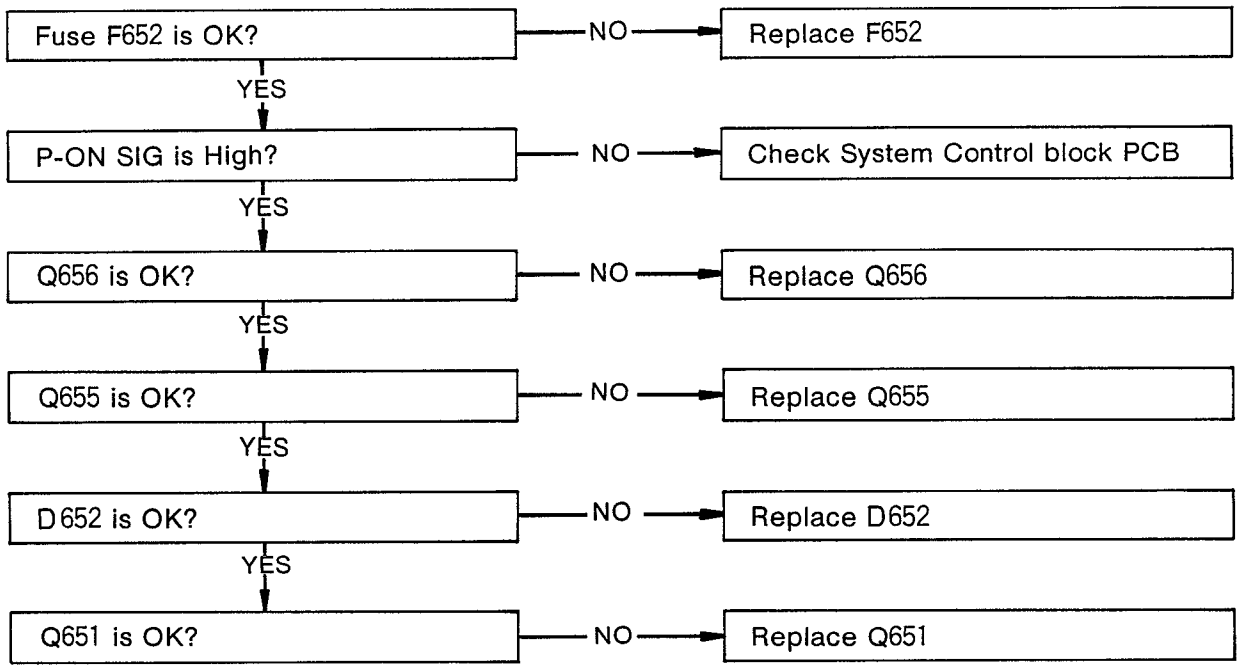
⑨ NO AC 3V

⑩ NO ALL 12V

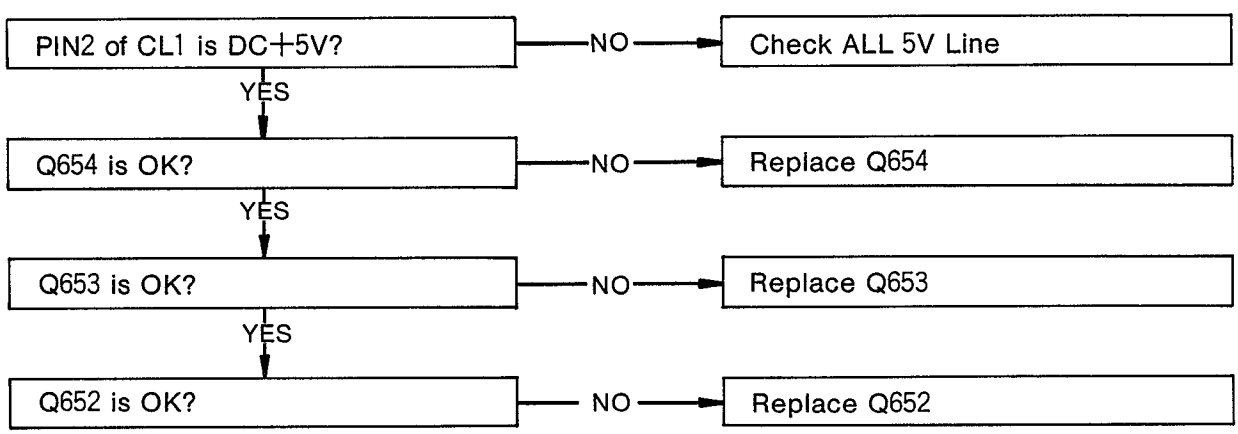
① NO POWER LED



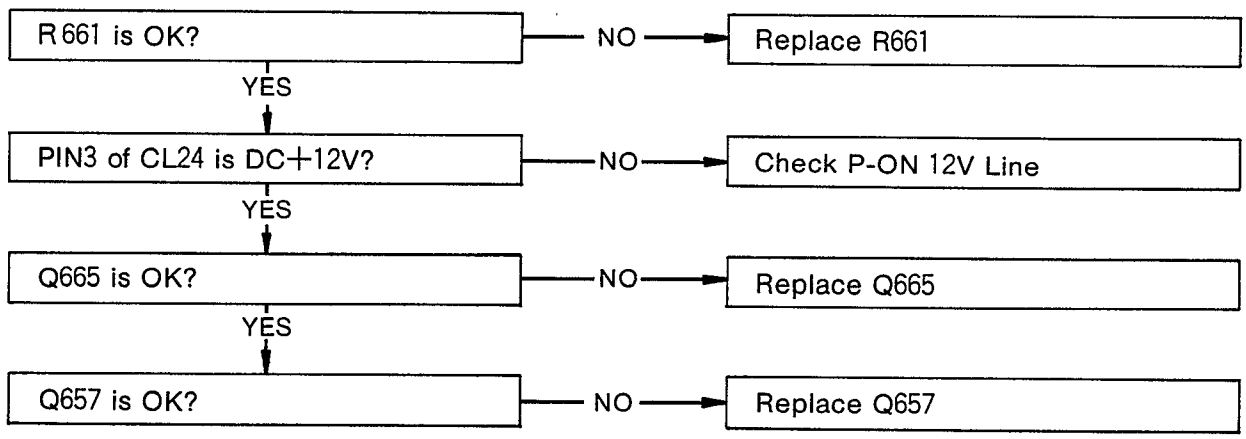
② NO P-ON 18V



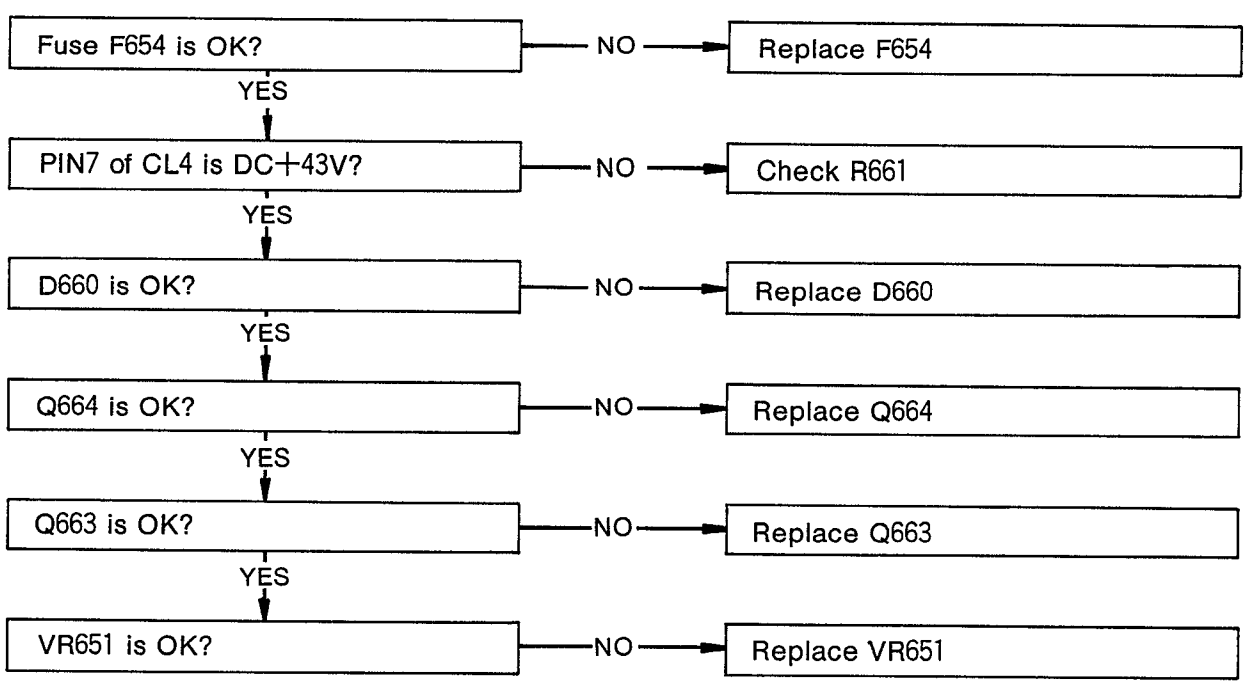
③ NO P-ON 12V (To System Control/Servo)



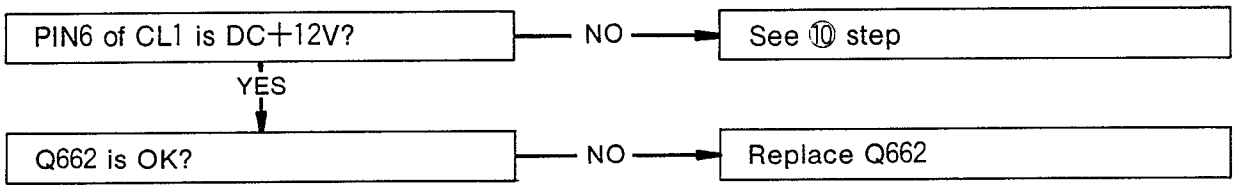
④ NO +43V (PIN8 of CL24)



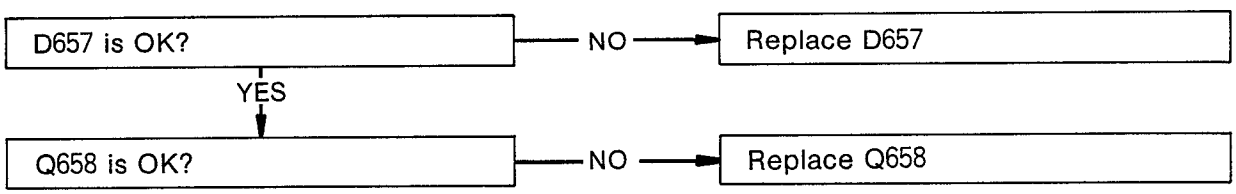
⑤ NO ALL 5V



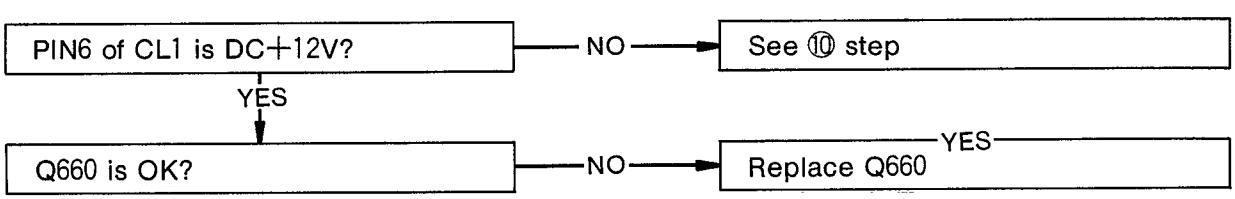
⑥ NO ALL 5.6V



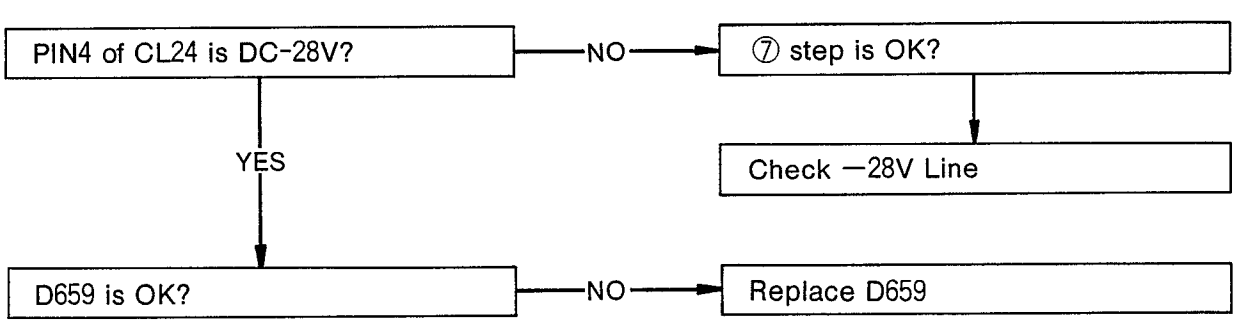
⑦ NO−28V



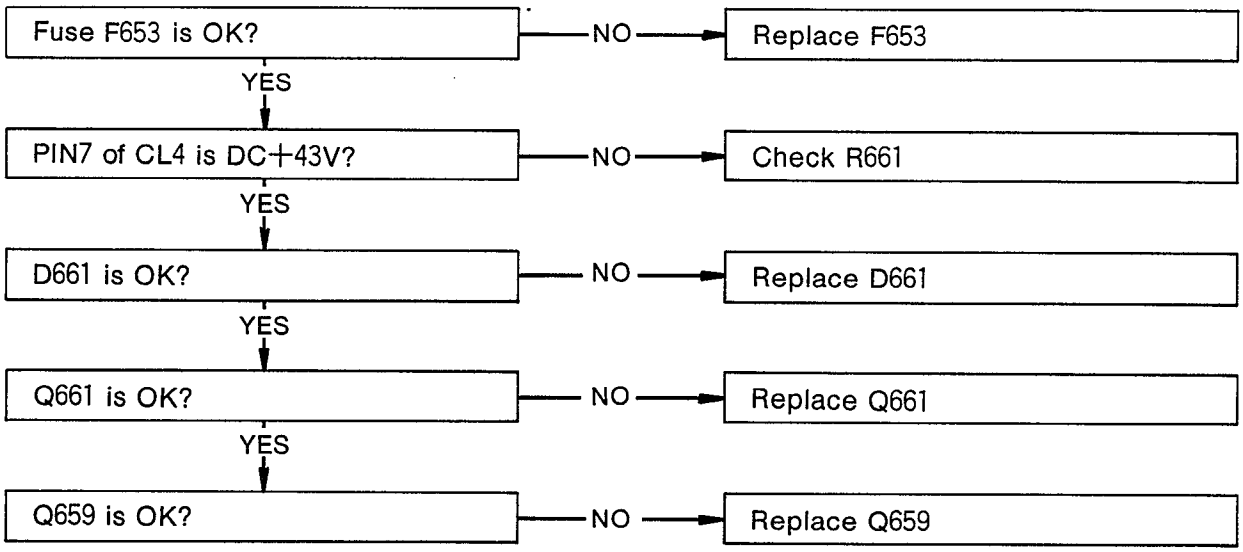
⑧ NO P-ON 12V



⑨ NO AC3V (Between PIN1 and PIN2 of CL24)



⑩ NO ALL 12V

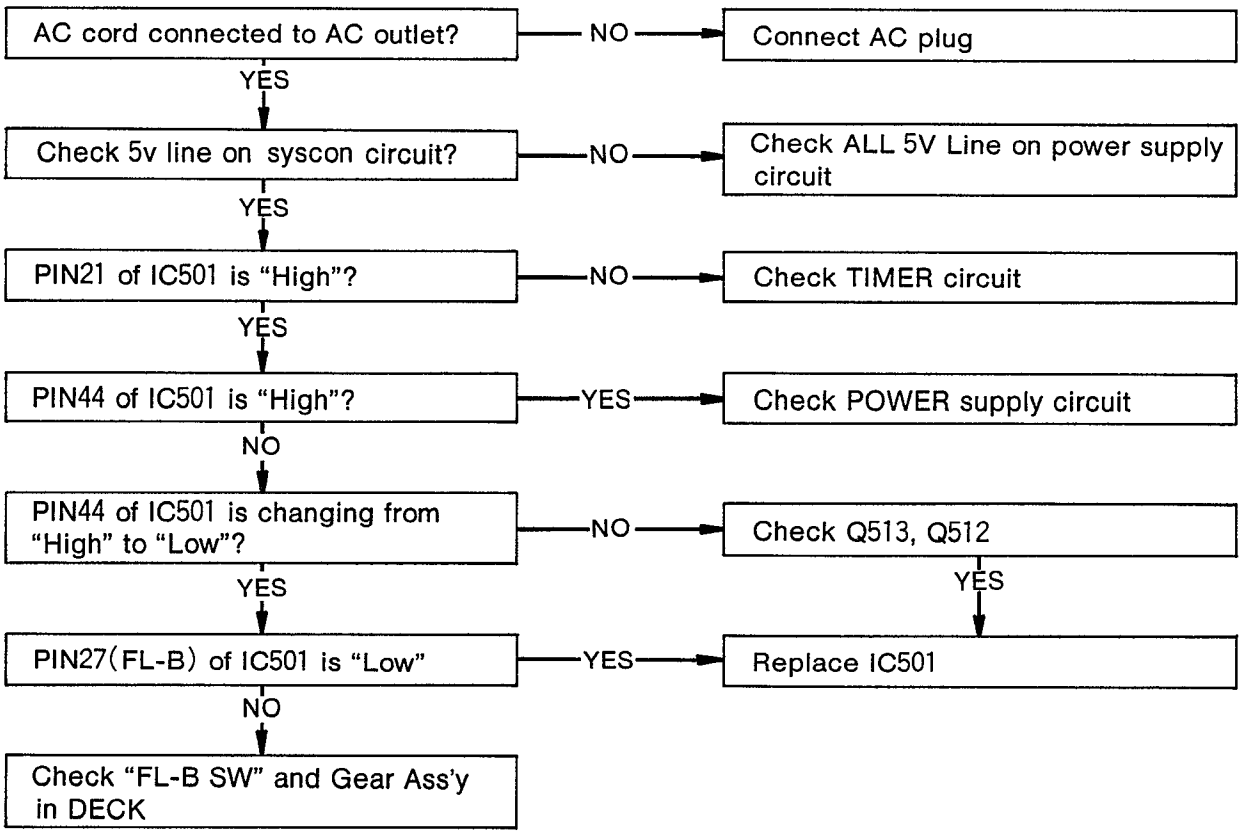

Fuse F653 is OK?
NO
Replace F653
YES
PIN7 of CL4 is DC+43V?
NO
Check R661
YES
D661 is OK?
NO
Replace D661
YES
Q661 is OK?
NO
Replace Q661
YES
Q659 is OK?
NO
Replace Q659

2. SYSTEM CONTROL SECTION

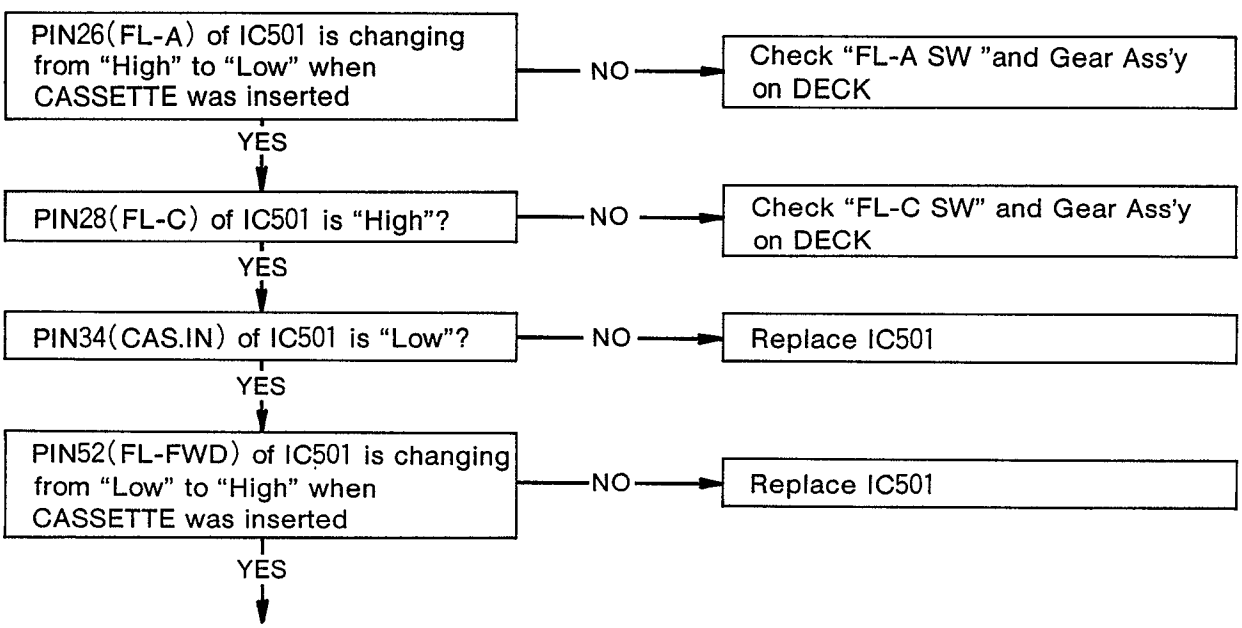
① NO POWER LED
↓ OK
② CASSETTE INSERT IS NOT POSSIBLE
↓ OK
③ EJECT IS NOT POSSIBLE
↓ OK
④ FF IS NOT POSSIBLE
↓ OK
⑤ REW IS NOT POSSIBLE
↓ OK
⑥ PLAY IS NOT POSSIBLE
↓ OK
⑦ PLAY PAUSE IS NOT POSSIBLE
↓ OK
⑧ NOISE CANCEL IS NOT POSSIBLE
↓ OK
⑨ FF SEARCH IS NOT POSSIBLE
↓ OK
⑩ REW SEARCH IS NOT POSSIBLE
↓ OK
⑪ REC IS NOT POSSIBLE
↓ OK
⑫ AUTO REWIND DOSE NOT OPERATE
↓ OK
⑬ AUTO STOP DOSE NOT OPERATE AT TAPE START
↓ OK
⑭ REMOTE CONTROL IS NOT POSSIBLE

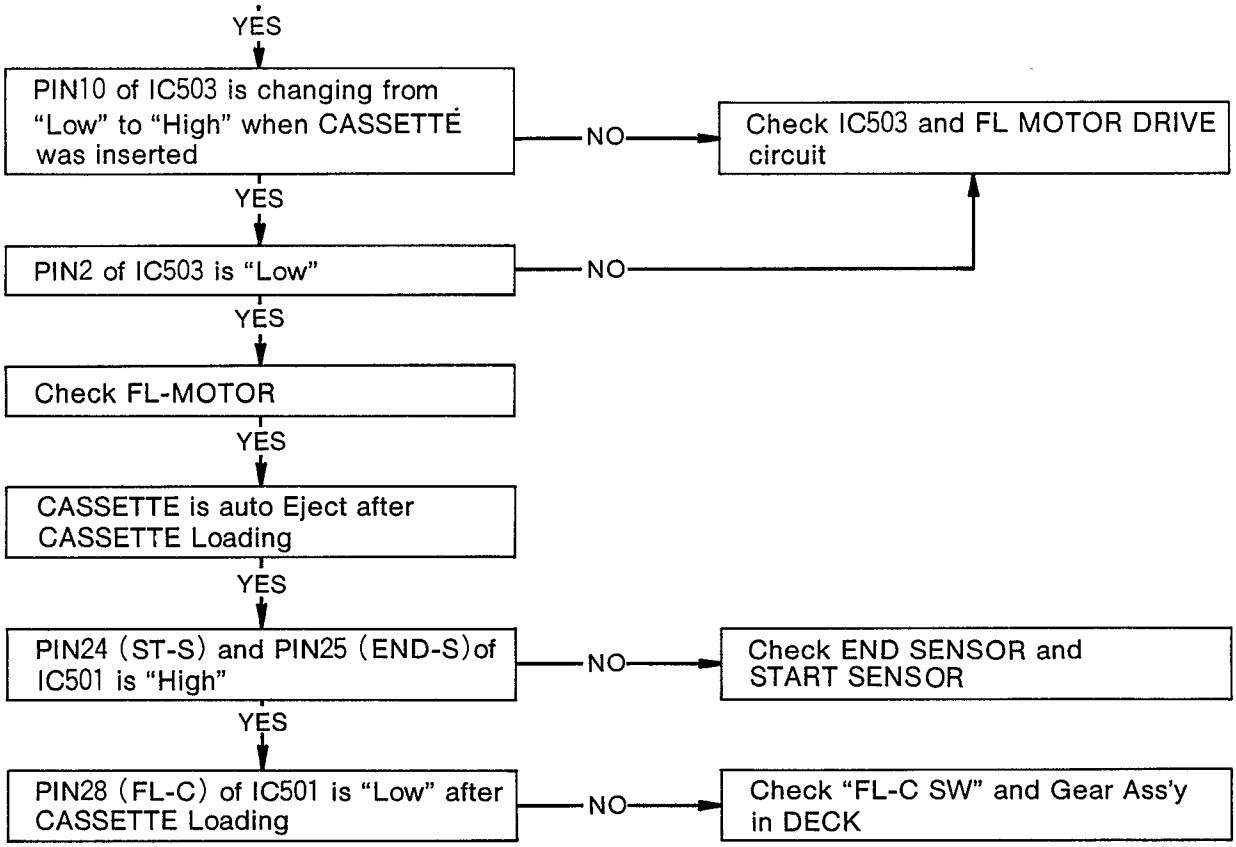
When SYSTEM CONTROL IC has run away SYSTEM CONTROL IC will not accept any mode.
At this time, must POWER SW OFF/ON to reset the SYSTEM CONTROL IC.

① NO POWER LED

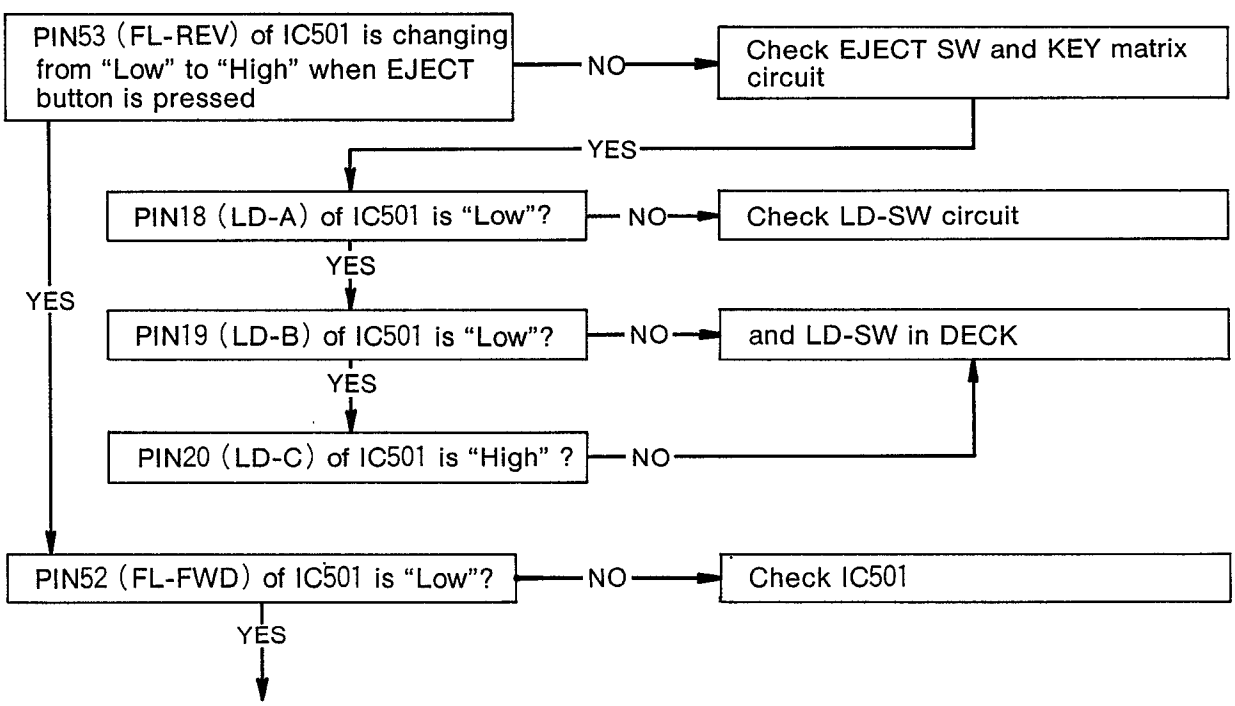


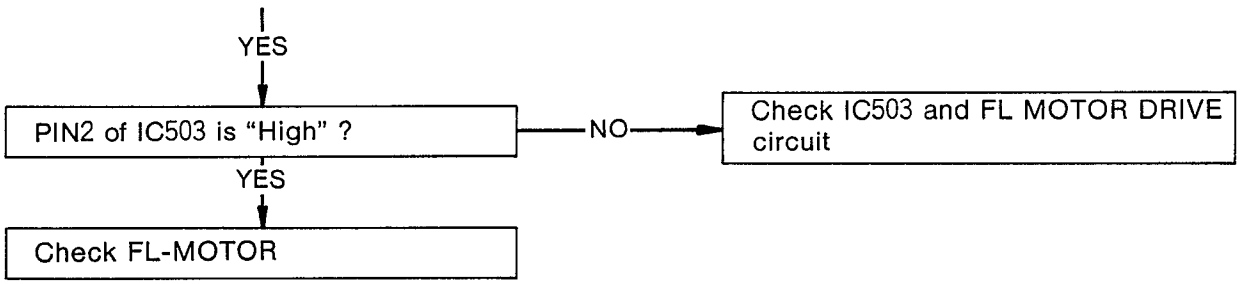
② CASSETTE INSERT IS NOT POSSIBLE



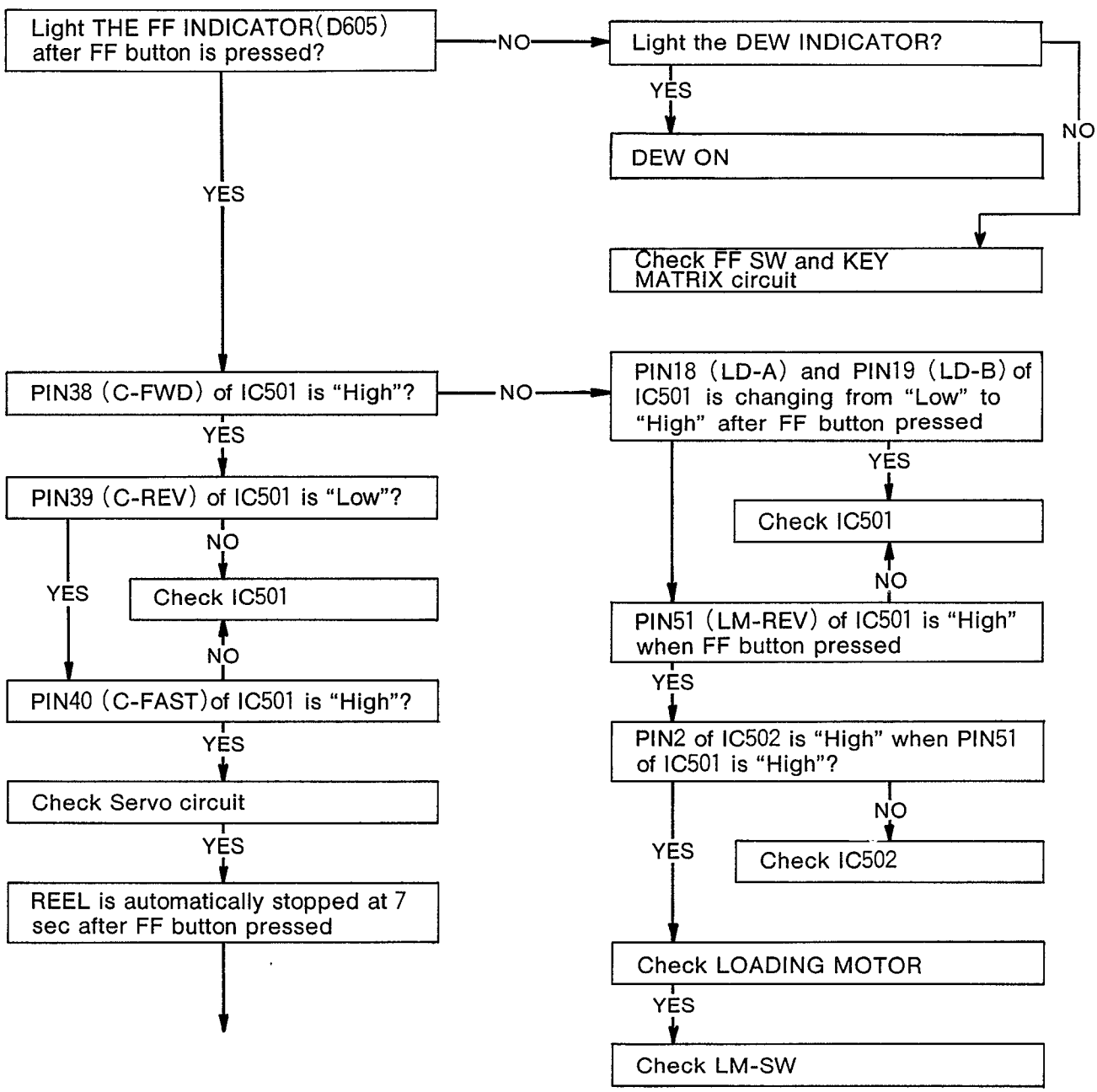


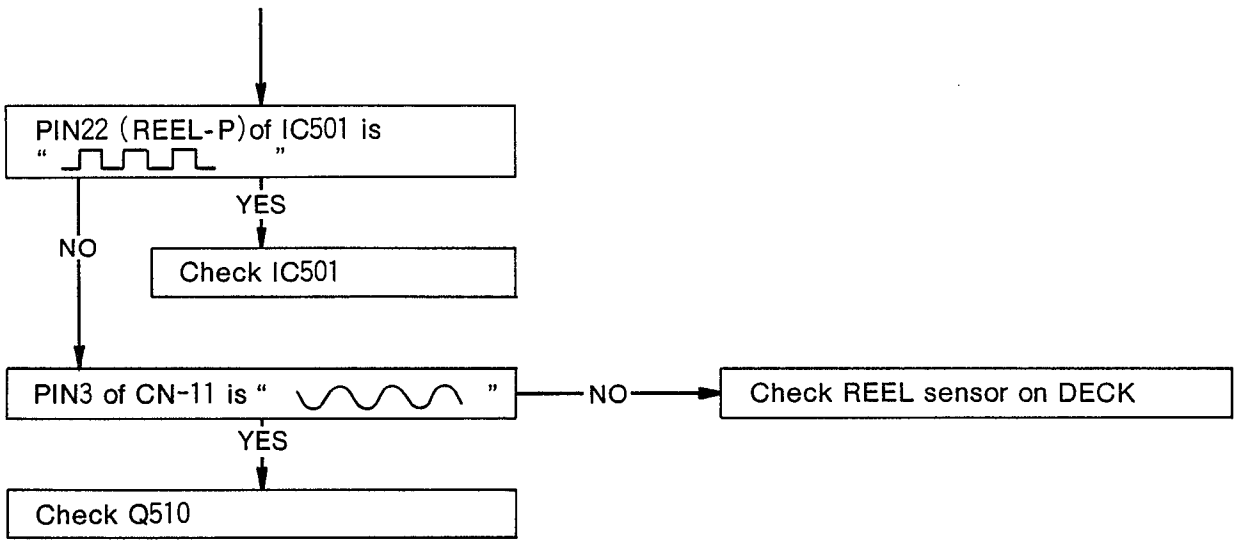
③ EJECT IS NOT POSSIBLE



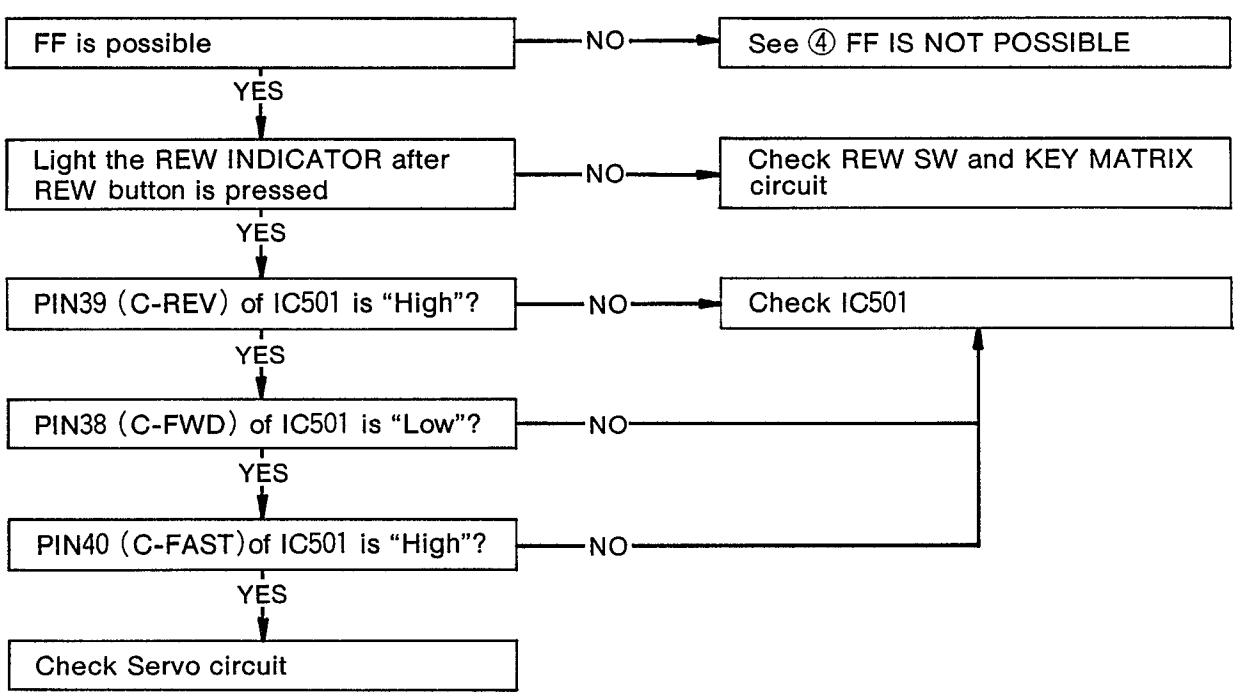


④ **FF IS NOT POSSIBLE (Replay POWER SW ON/OFF press)**

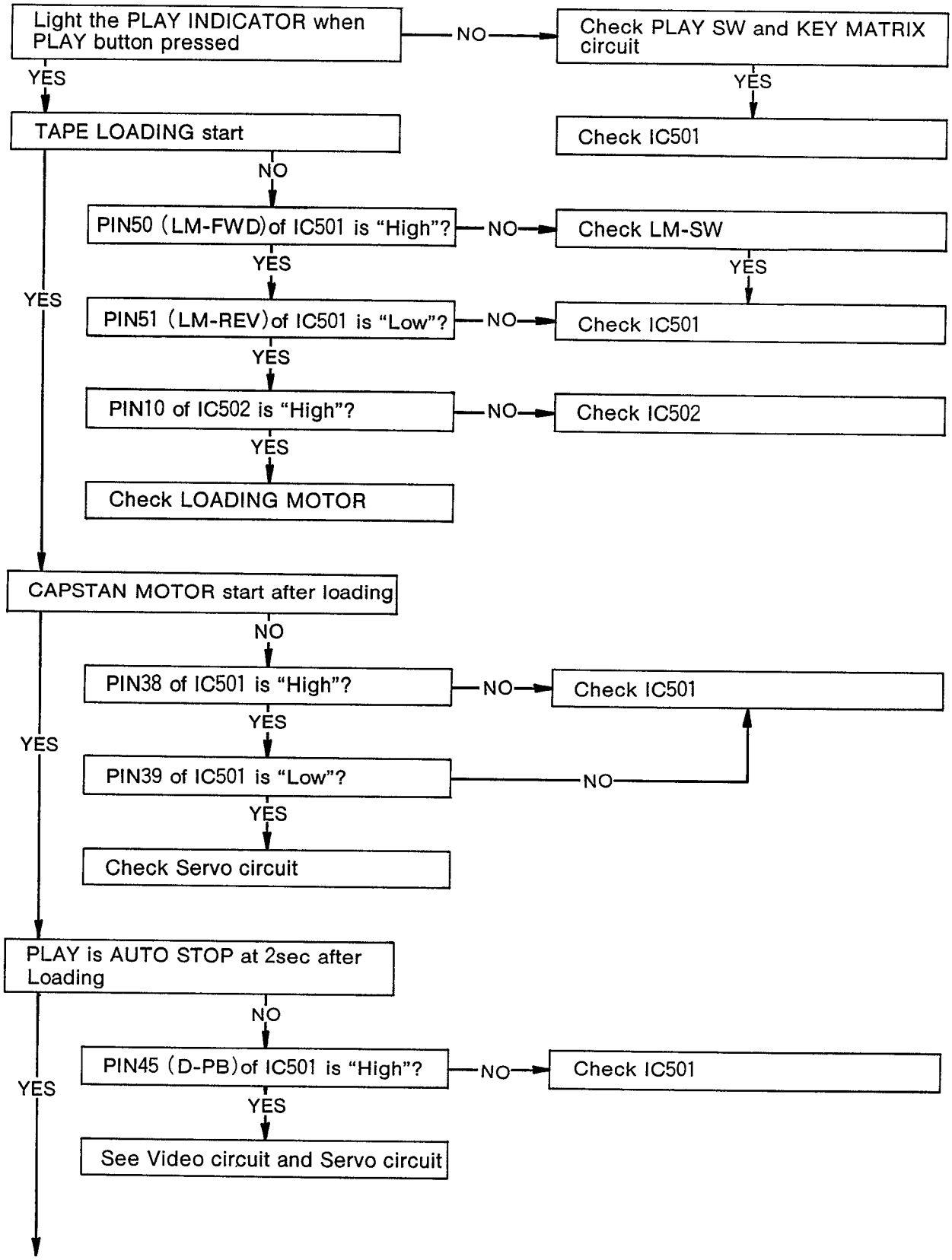


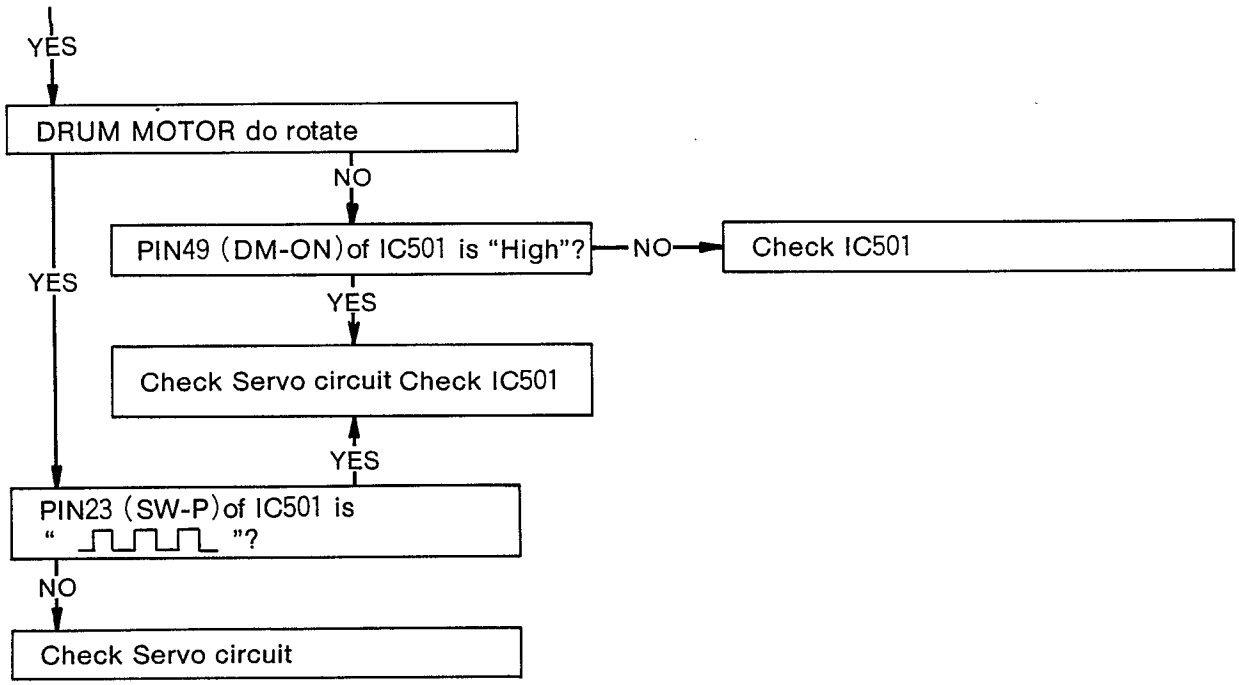


⑤ REW IS NOT POSSIBLE

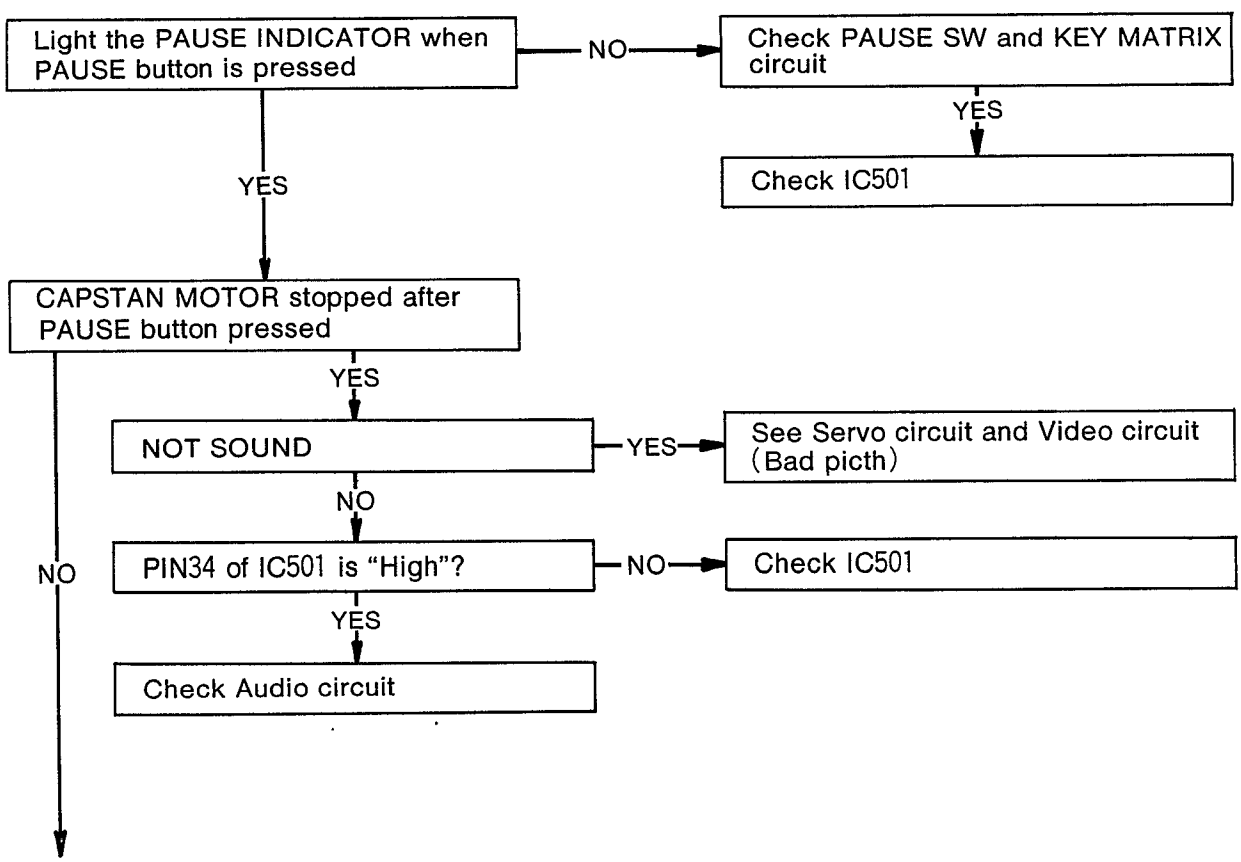


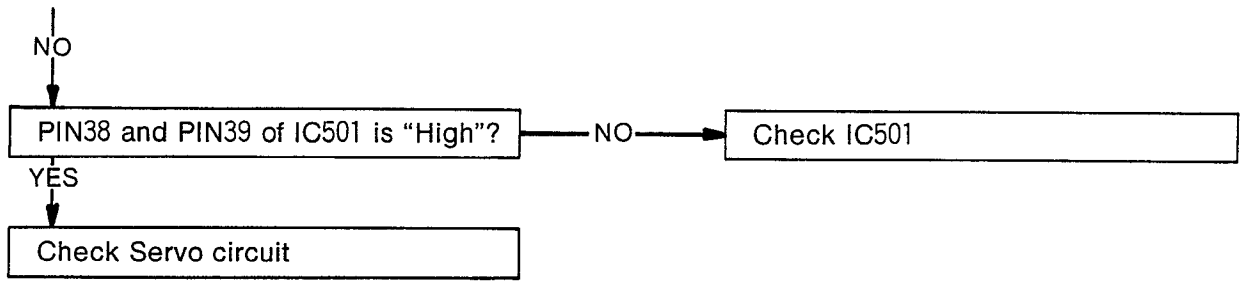
⑥ PLAY IS NOT POSSIBLE



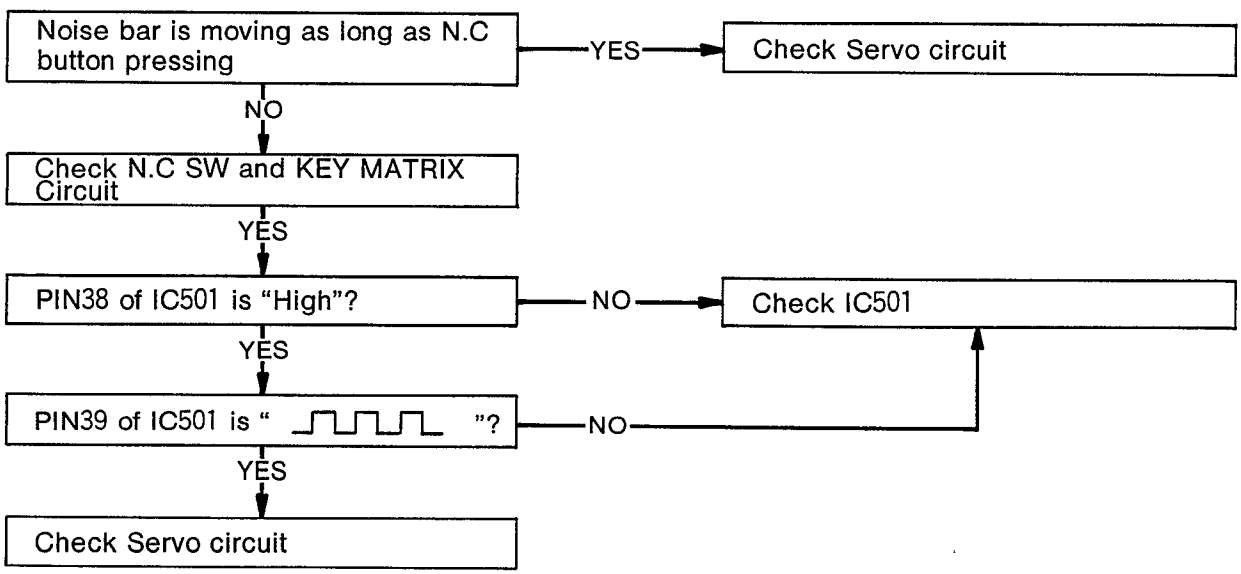


⑦ PLAY PAUSE IS NOT POSSIBLE

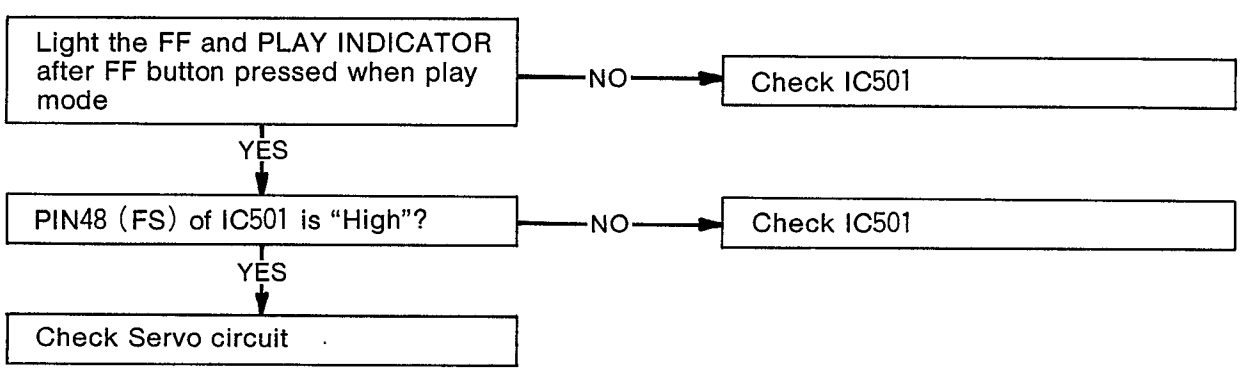




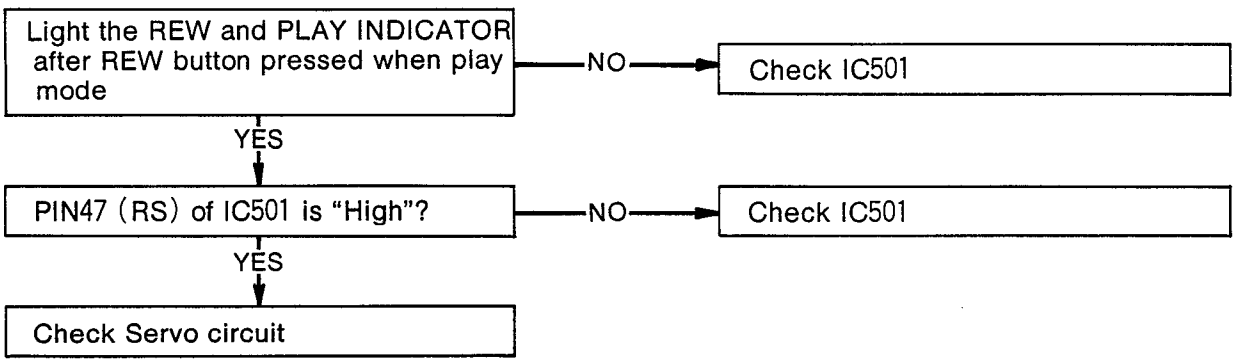
⑧ NOISE CANCEL IS NOT POSSIBLE



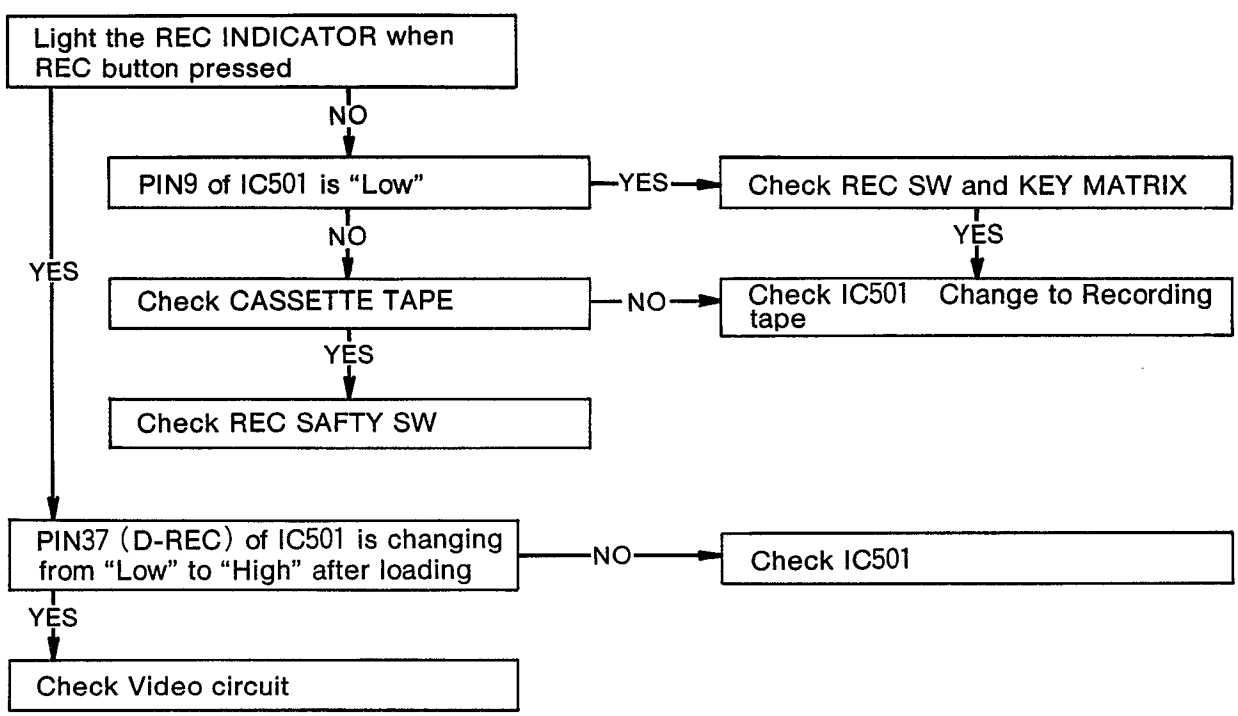
⑨ FF SEARCH IS NOT POSSIBLE



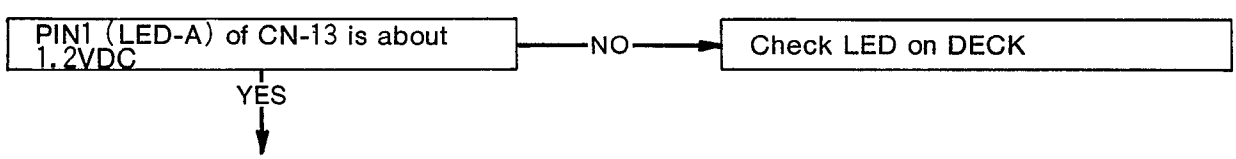
⑩ REW SEARCH IS NOT POSSIBLE

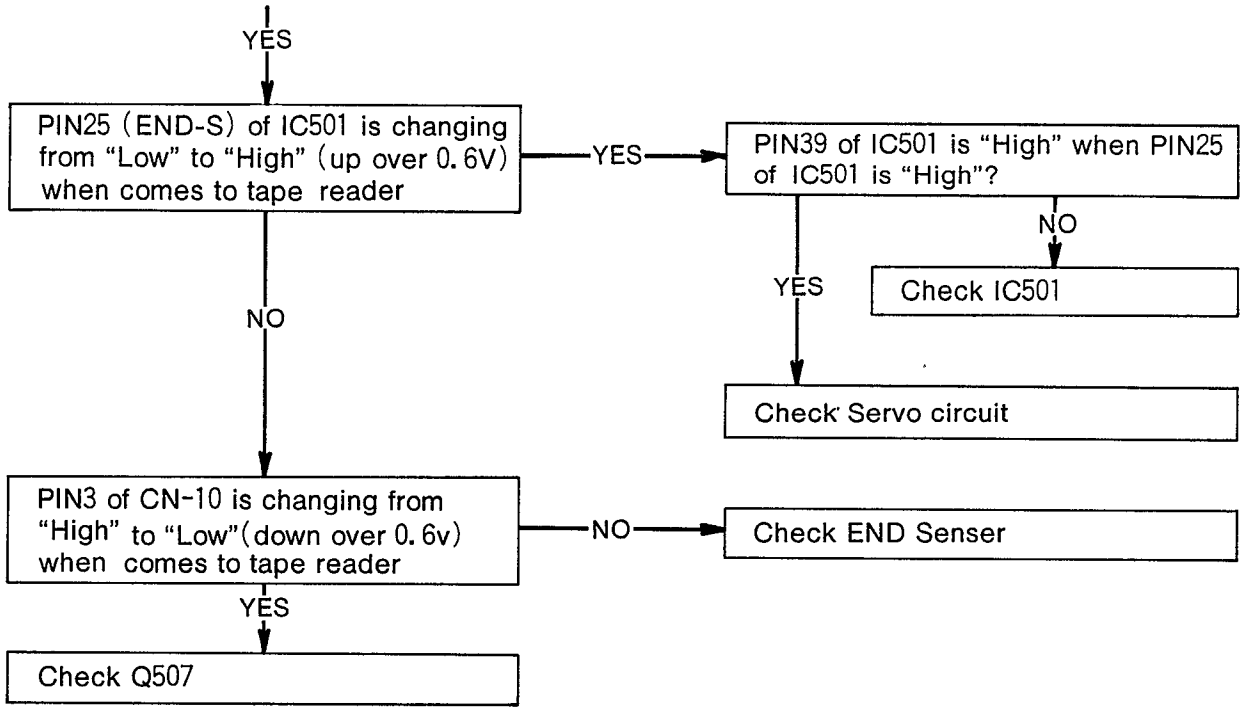


⑪ REC IS NOT POSSIBLE

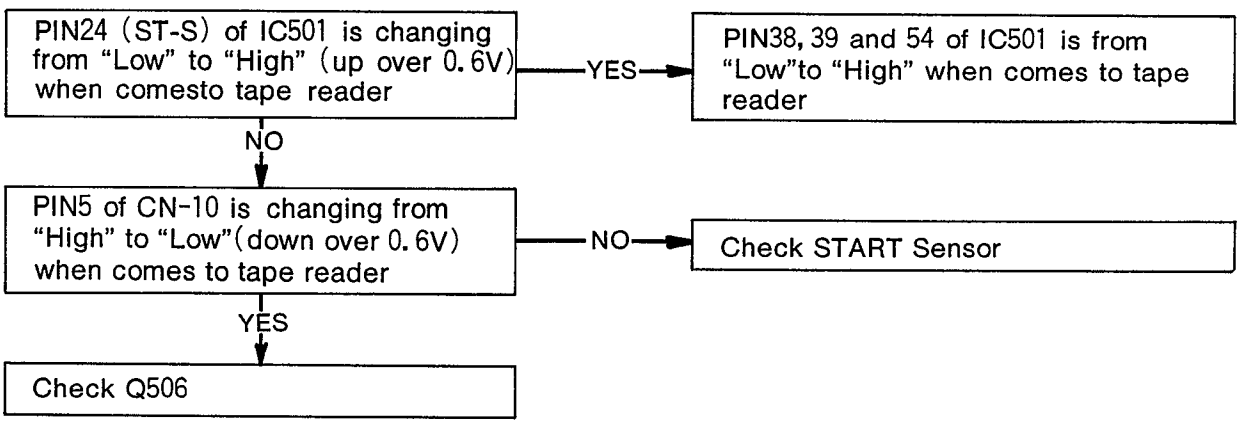


⑫ AUTO REWIND DOSE NOT OPERATE

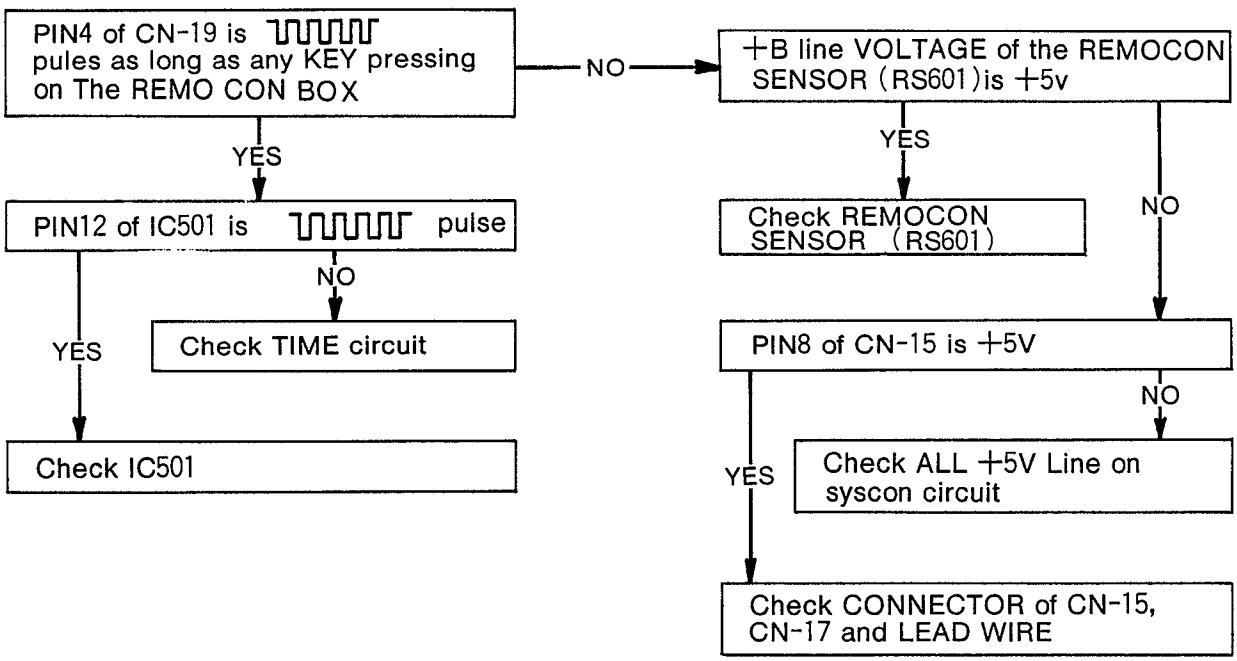




⑬ AUTO STOP DOSE NOT OPERATE AT TAPE START



⑭ REMOTE CONTROL IS NOT POSSIBLE



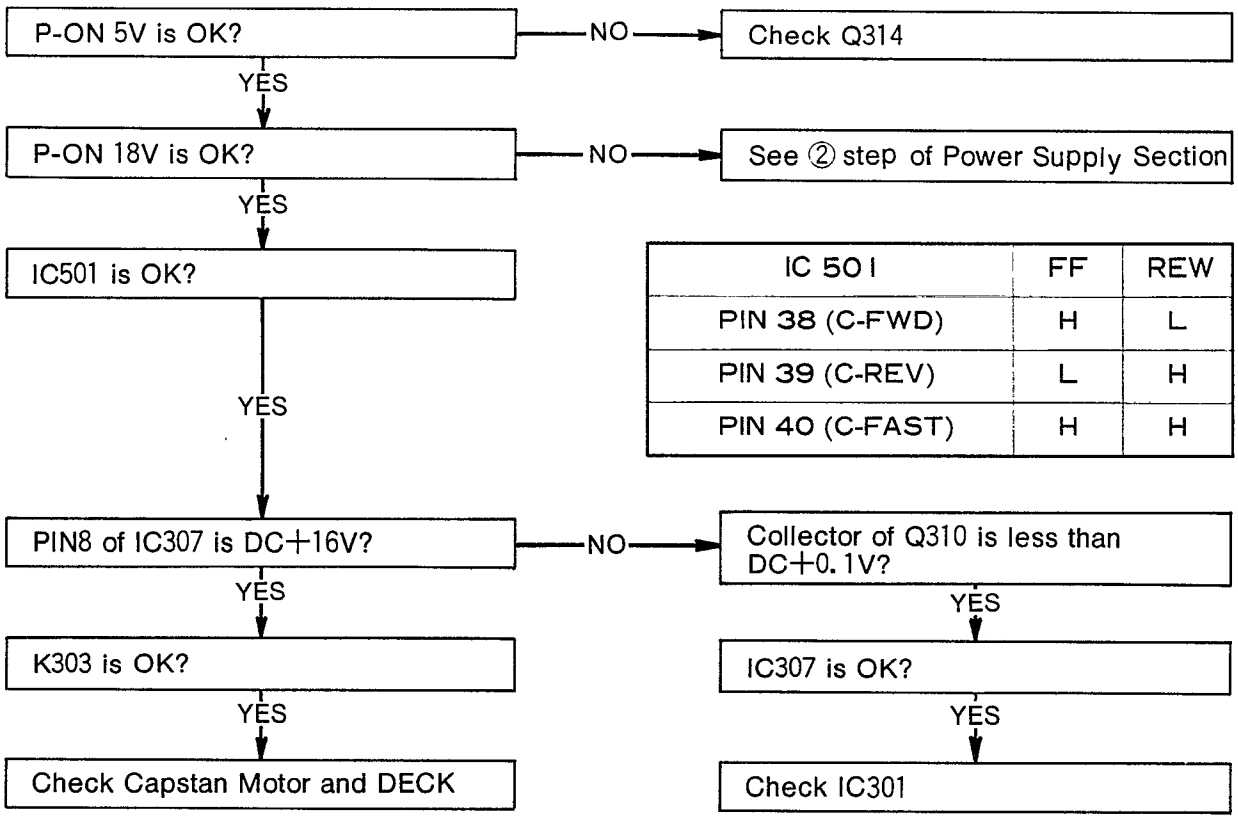
3. SERVO SECTION

① CAN NOT FF/REW

② P. B MODE DEFECT

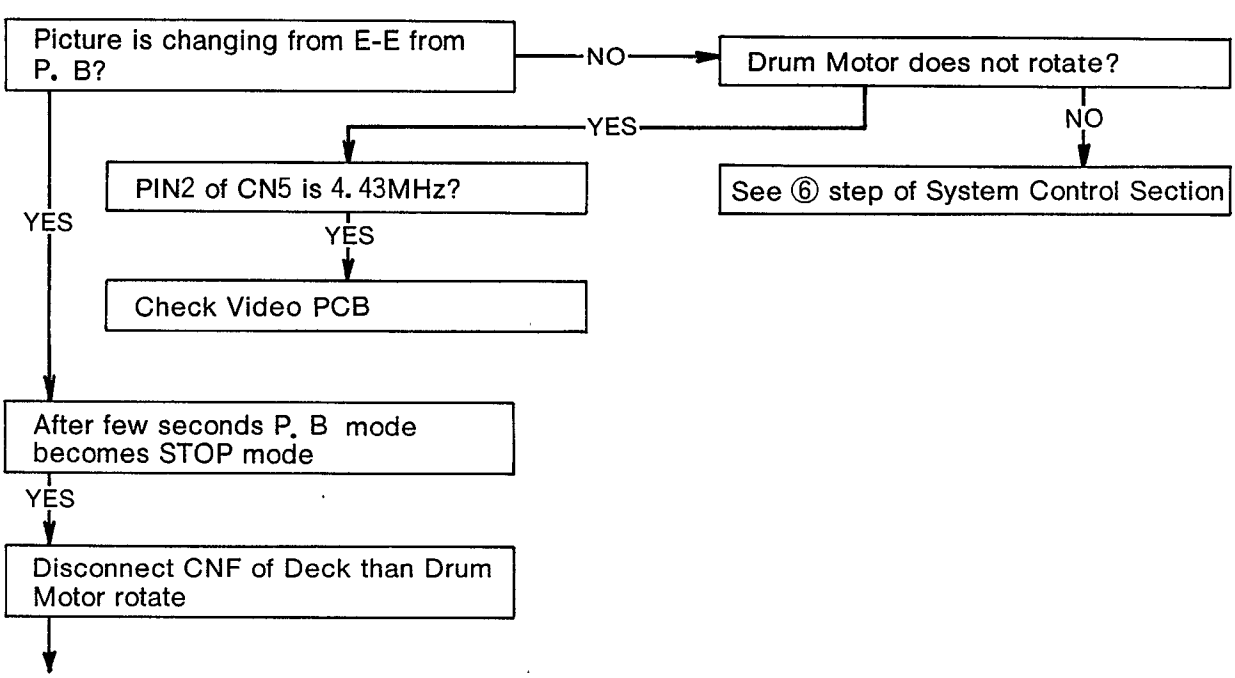
③ PICTURE DEFECT

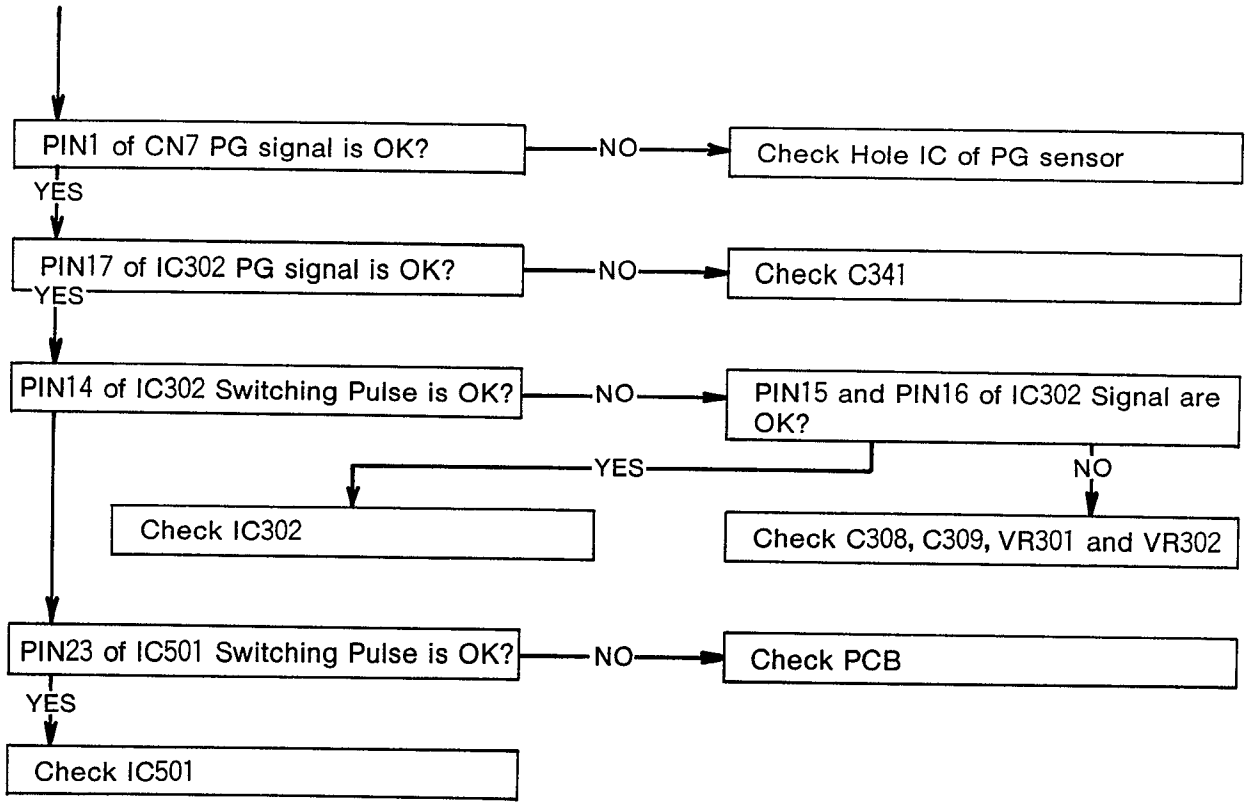
① CAN NOT FF/REW



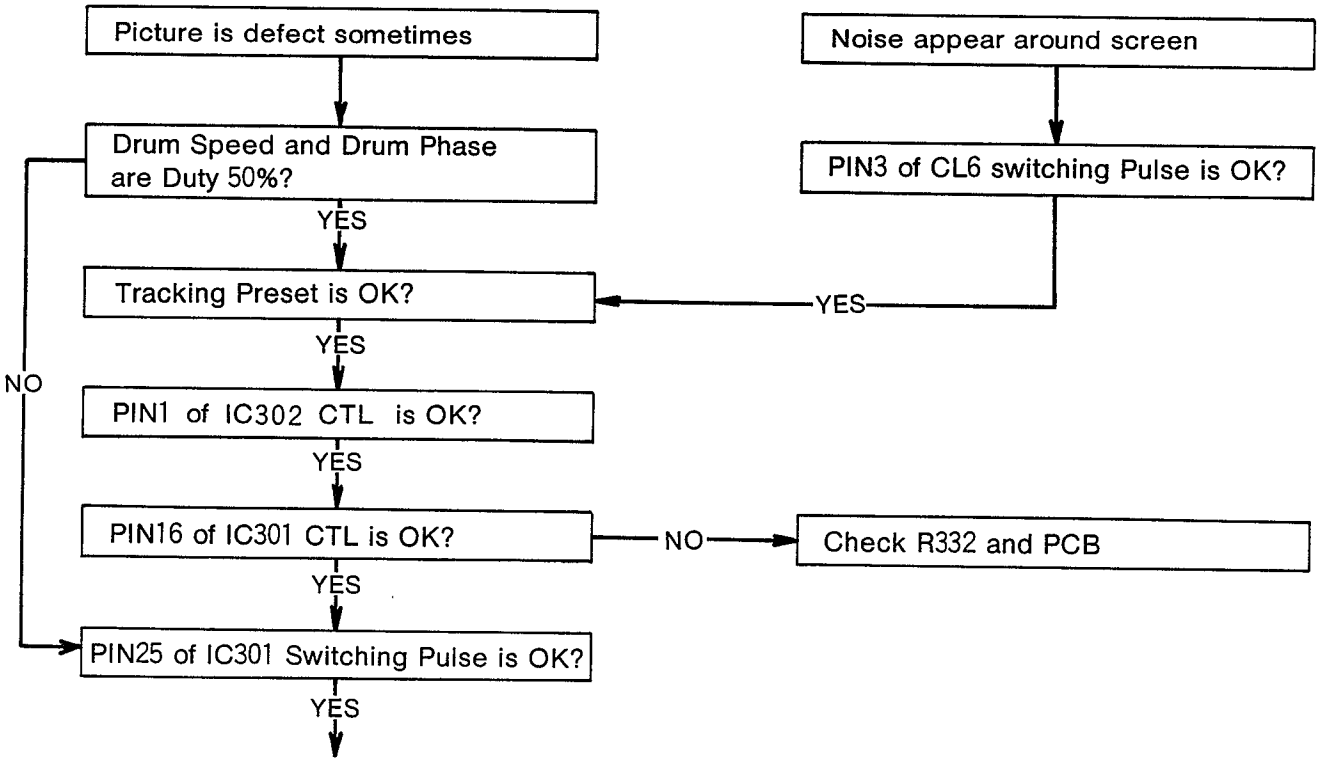
IC 501	FF	REW
PIN 38 (C-FWD)	H	L
PIN 39 (C-REV)	L	H
PIN 40 (C-FAST)	H	H

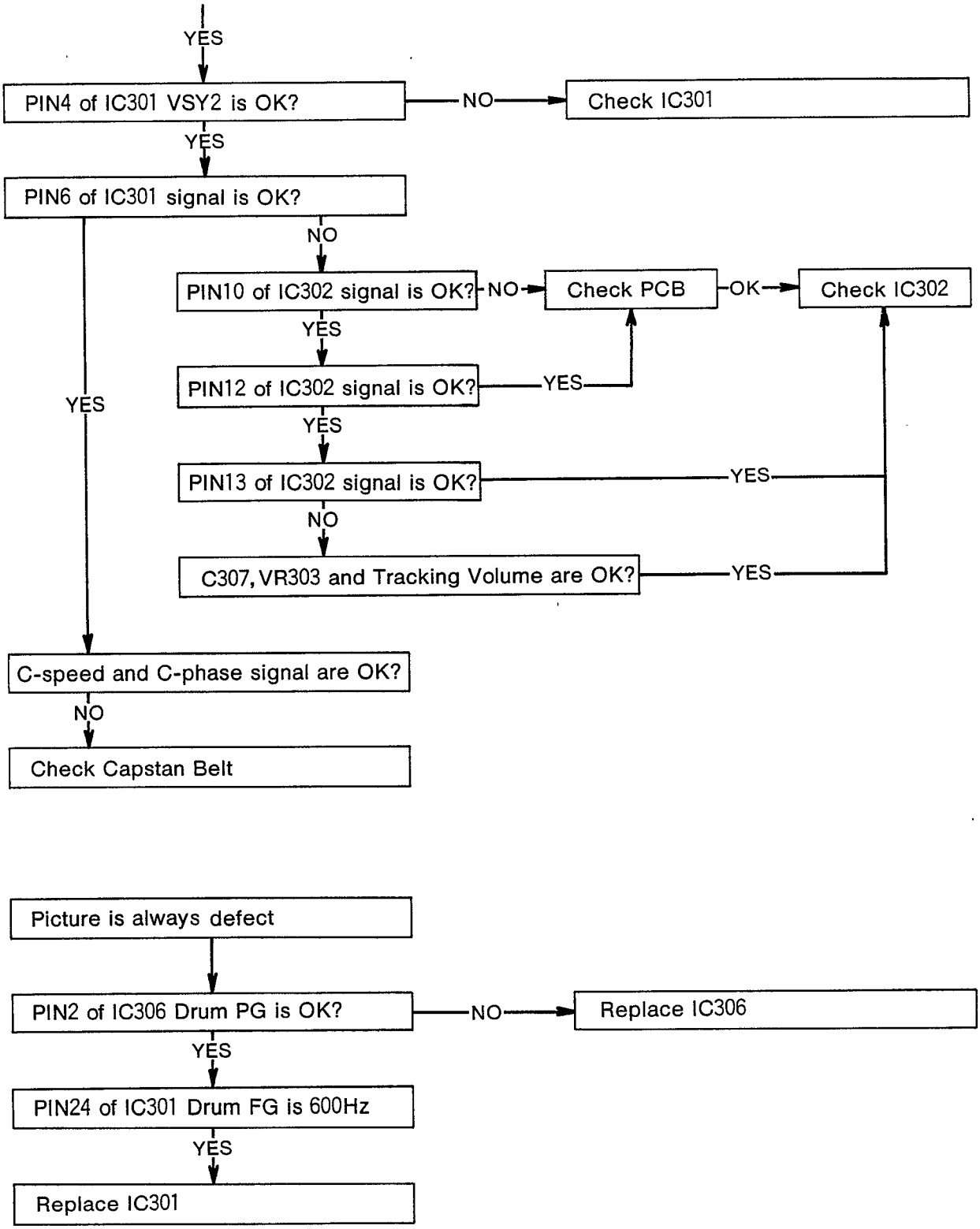
② P. B MODE DEFECT





③ PICTURE DEFECT




YES
PIN4 of IC301 VSY2 is OK?
NO
Check IC301
YES
PIN6 of IC301 signal is OK?
NO
PIN10 of IC302 signal is OK?
NO
Check PCB
OK
Check IC302
YES
PIN12 of IC302 signal is OK?
YES
YES
YES
PIN13 of IC302 signal is OK?
YES
NO
C307, VR303 and Tracking Volume are OK?
YES
C-speed and C-phase signal are OK?
NO
Check Capstan Belt
Picture is always defect
PIN2 of IC306 Drum PG is OK?
NO
Replace IC306
YES
PIN24 of IC301 Drum FG is 600Hz
YES
Replace IC301

4. VIDEO SECTION

① NO PICTURE AT P.B MODE

② NO PICTURE AT E-E MODE

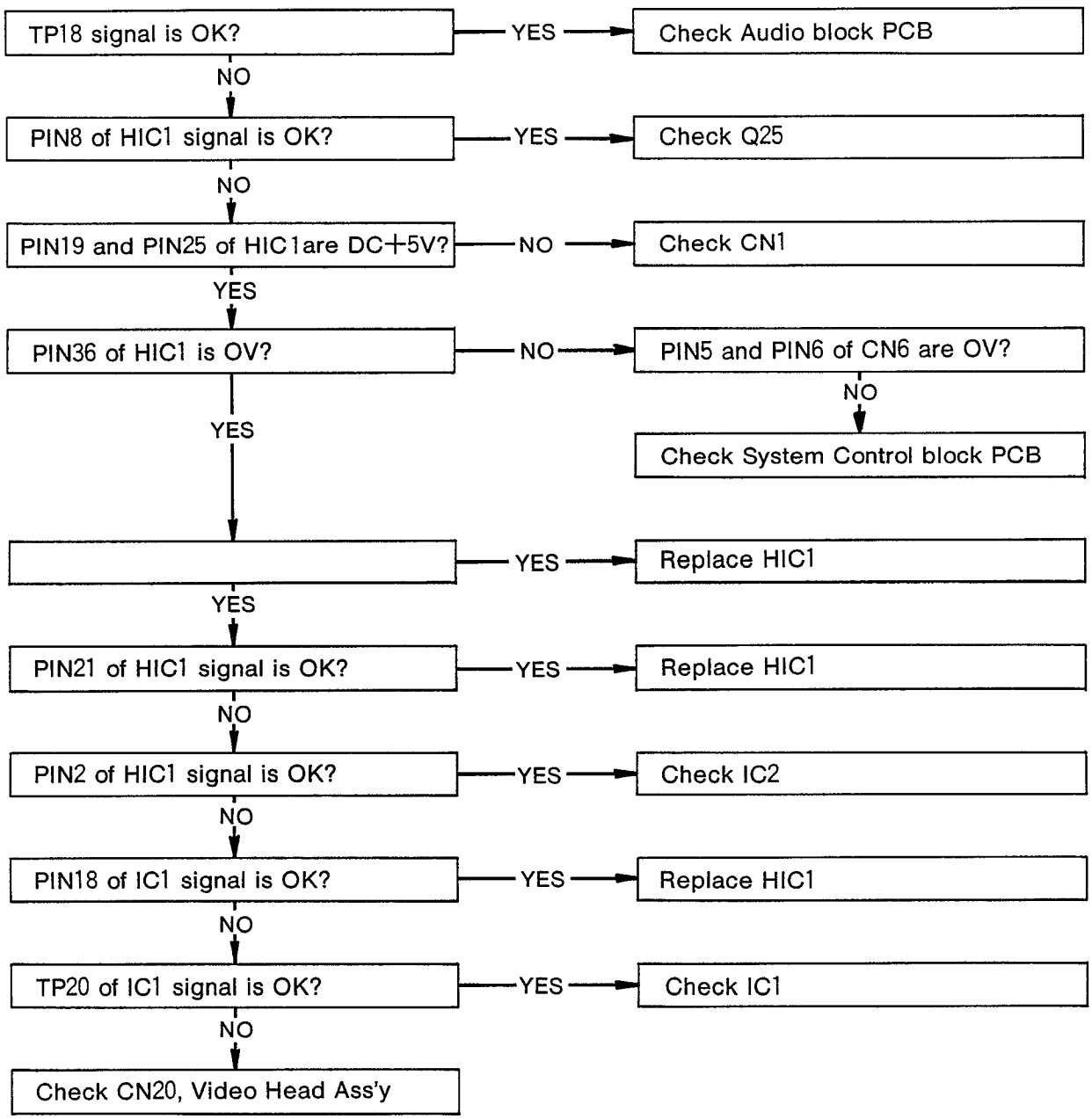
③ CAN NOT RECORDING

④ NO COLOR AT P.B MODE

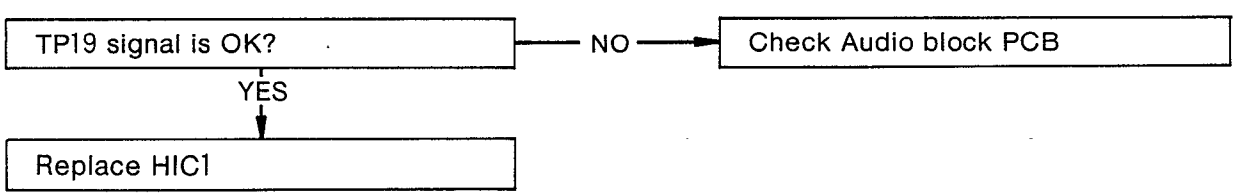
⑤ CAN NOT COLOR RECORDING

⑥ SNOW NOISE

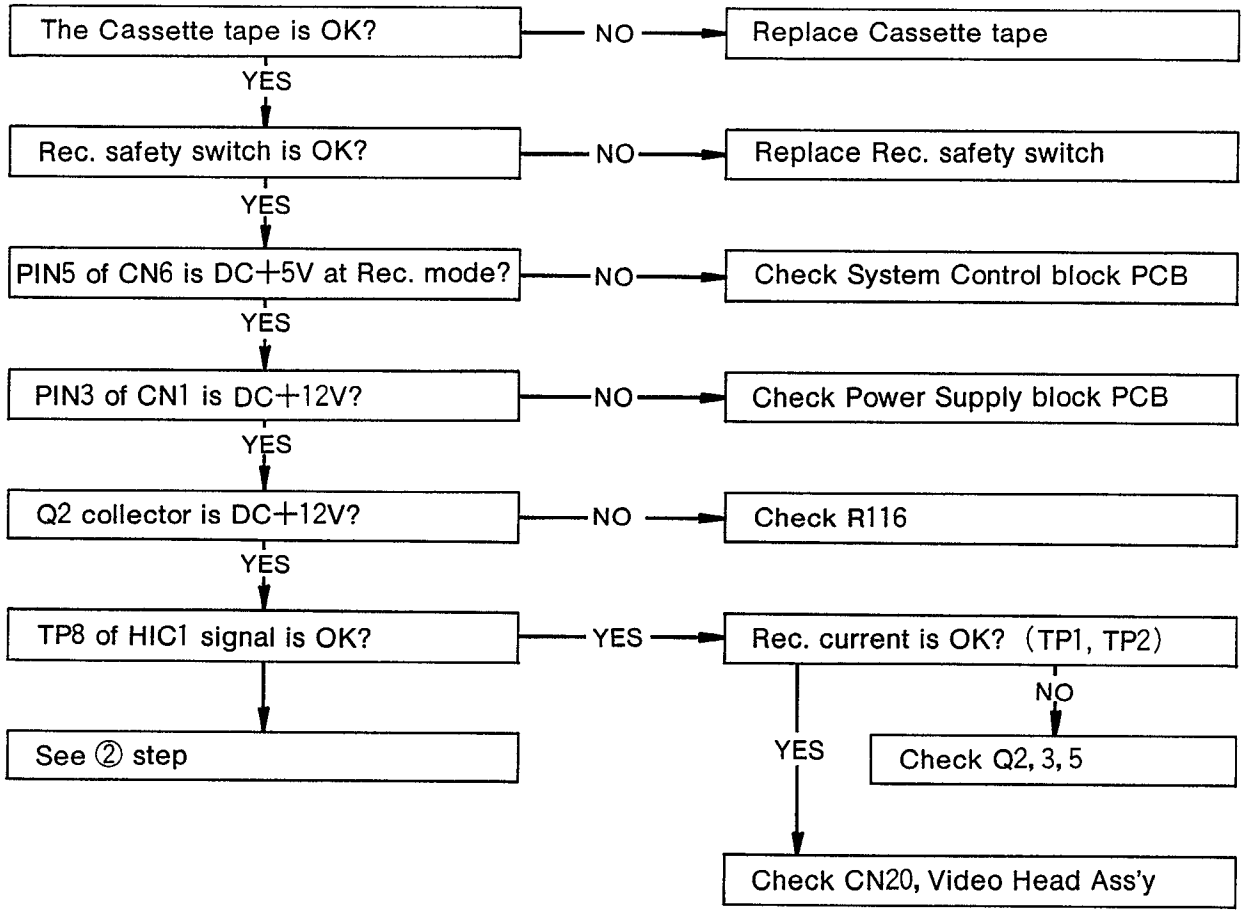
① NO PICTURE AT P. B MODE



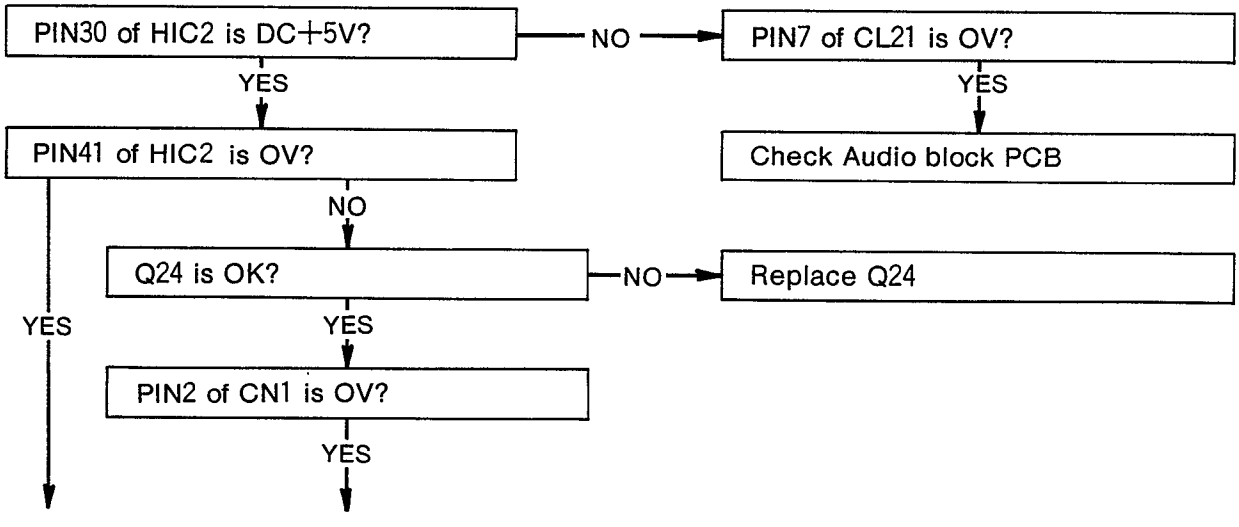
② NO PICTURE AT E-E MODE

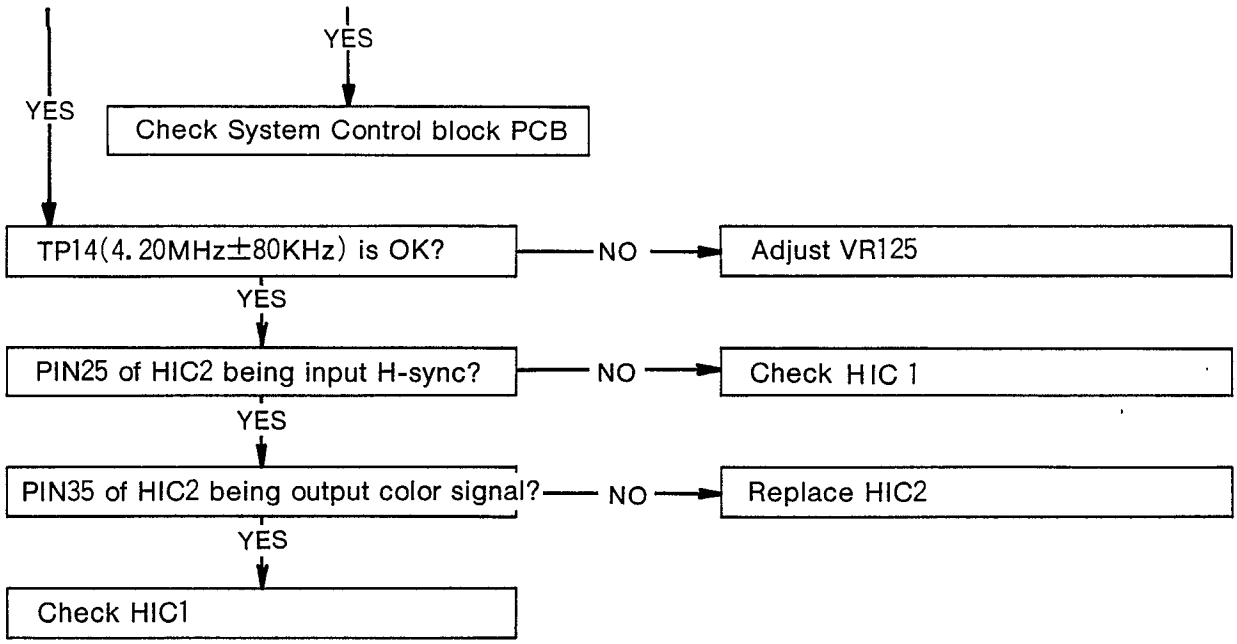


③ CAN NOT RECORDING

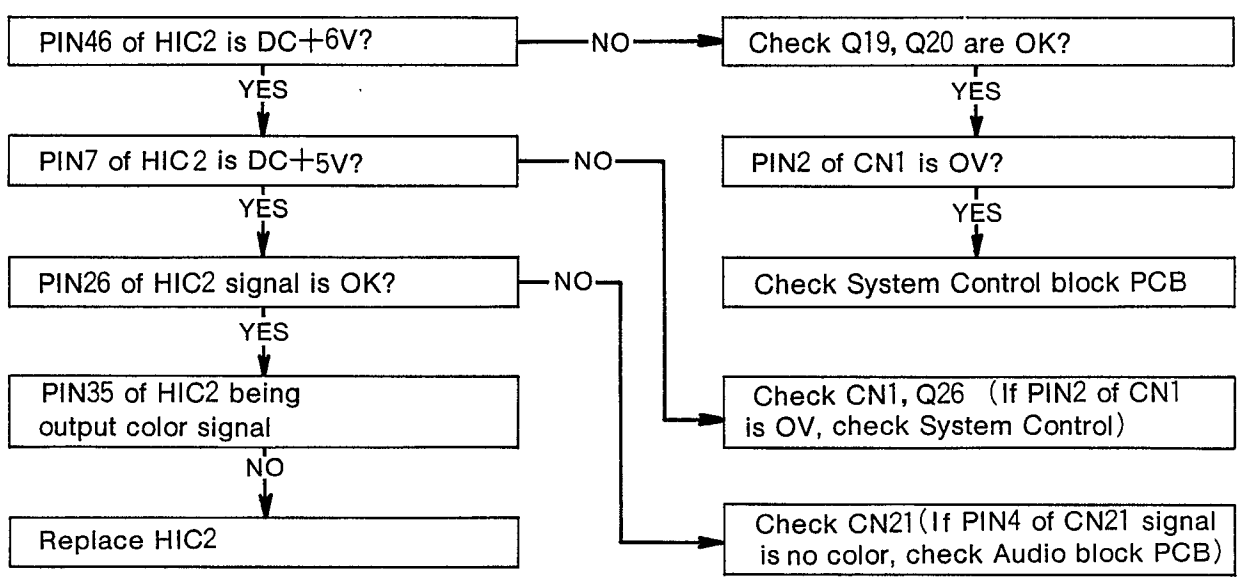


④ NO COLOR AT P. B MODE





⑤ CAN NOT COLOR RECORDING



⑥ SNOW NOISE

Clean Video Head and check wire Ass'y from Head.

5. TUNER/TIMER AUDIO SECTION

① NO POWER ON

② CAN NOT QUICK RECORDING

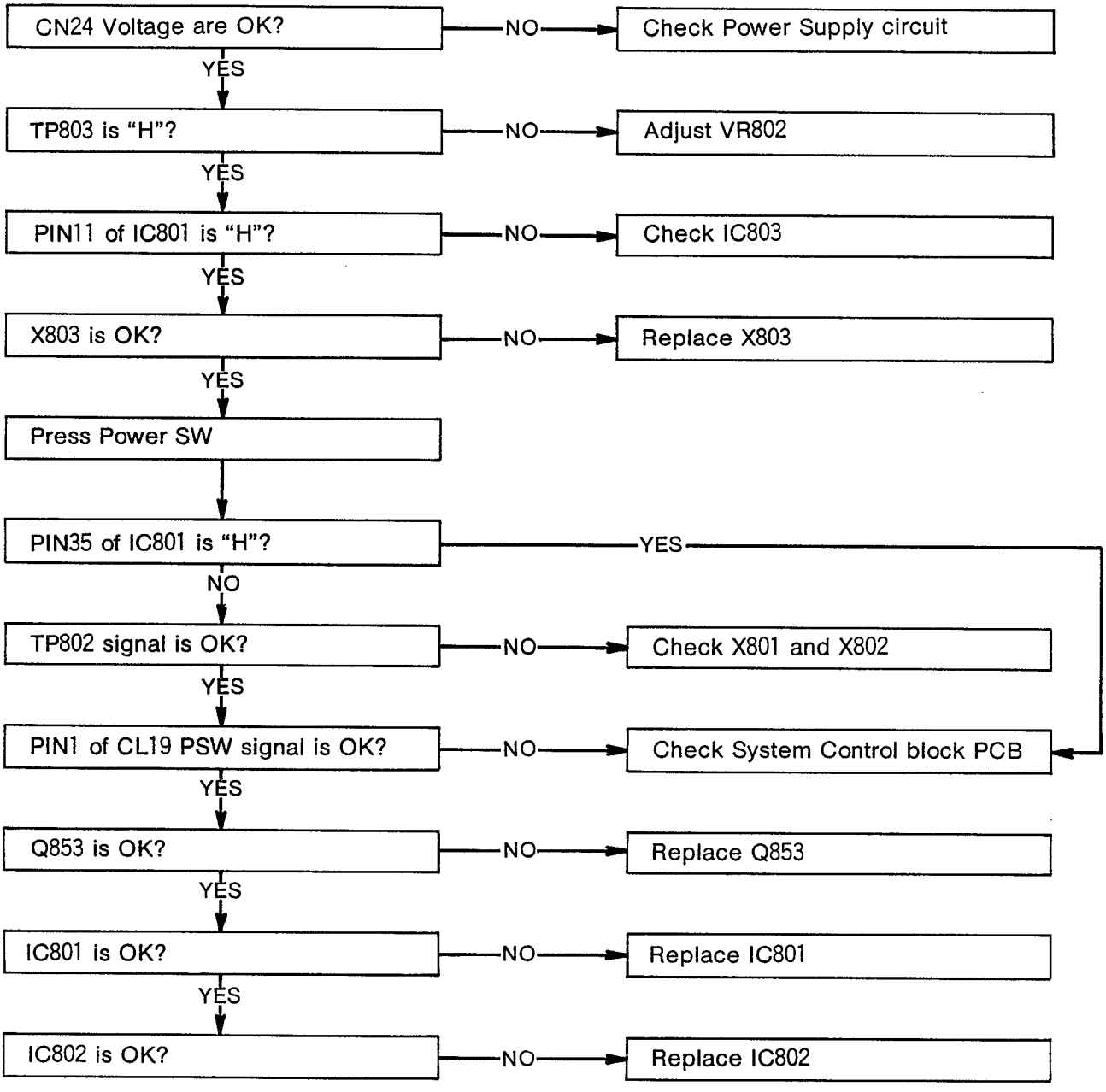
③ CAN NOT TUNING OPERATION

④ CAN NOT TIMER RECORDING

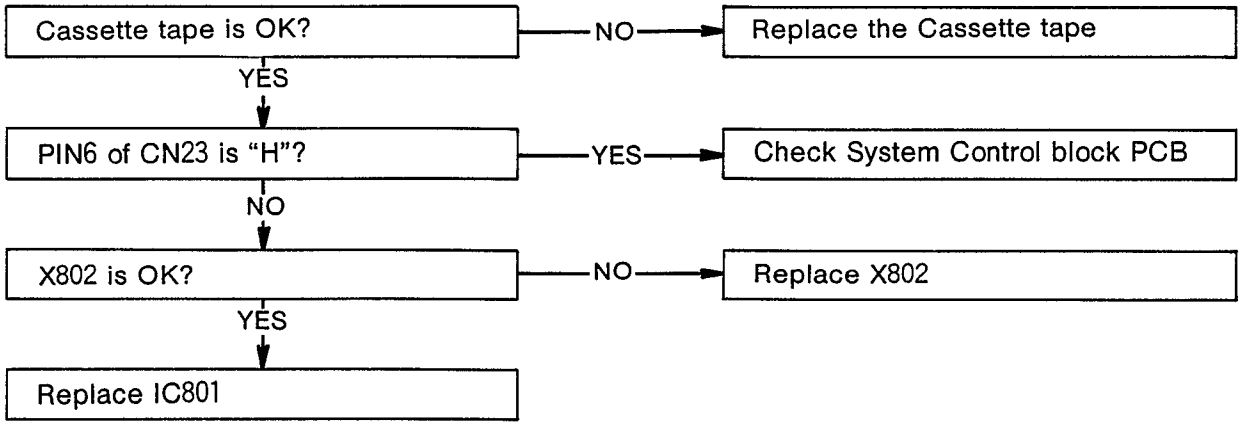
⑤ SOUND DEFECT AT P. B MODE

⑥ SOUND DEFECT AT REC MODE

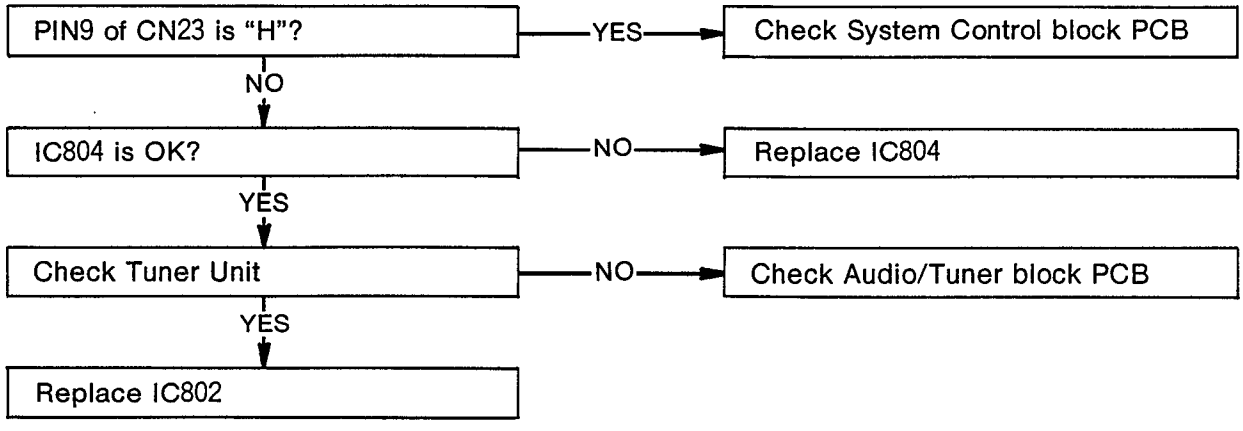
① NO POWER ON


CN24 Voltage are OK?
NO
Check Power Supply circuit
YES
TP803 is "H"?
NO
Adjust VR802
YES
PIN11 of IC801 is "H"?
NO
Check IC803
YES
X803 is OK?
NO
Replace X803
YES
Press Power SW
PIN35 of IC801 is "H"?
YES
NO
TP802 signal is OK?
NO
Check X801 and X802
YES
PIN1 of CL19 PSW signal is OK?
NO
Check System Control block PCB
YES
Q853 is OK?
NO
Replace Q853
YES
IC801 is OK?
NO
Replace IC801
YES
IC802 is OK?
NO
Replace IC802

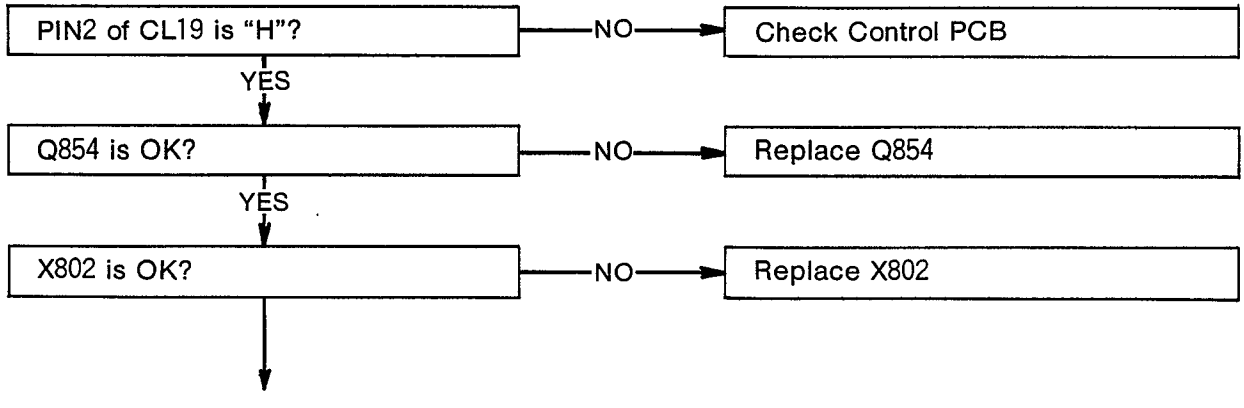
② CAN NOT QUICK RECORDING

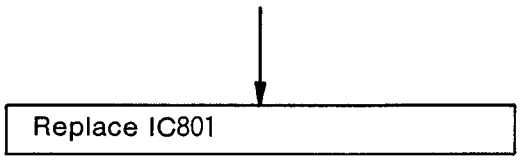


③ CAN NOT TUNING OPERATION

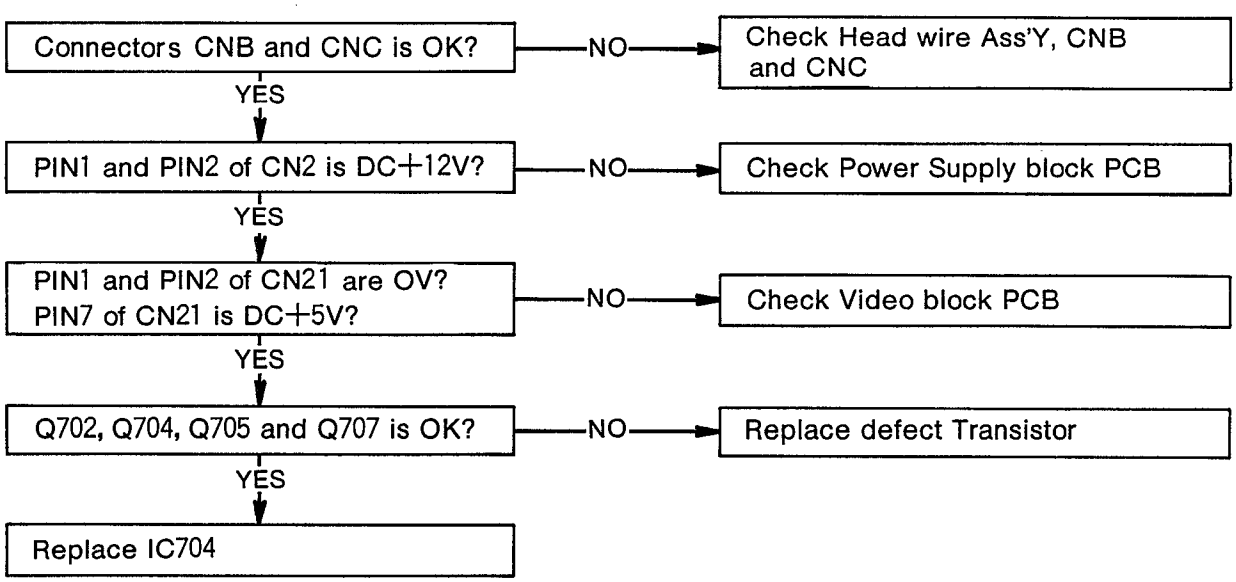


④ CAN NOT TIMER RECORDING

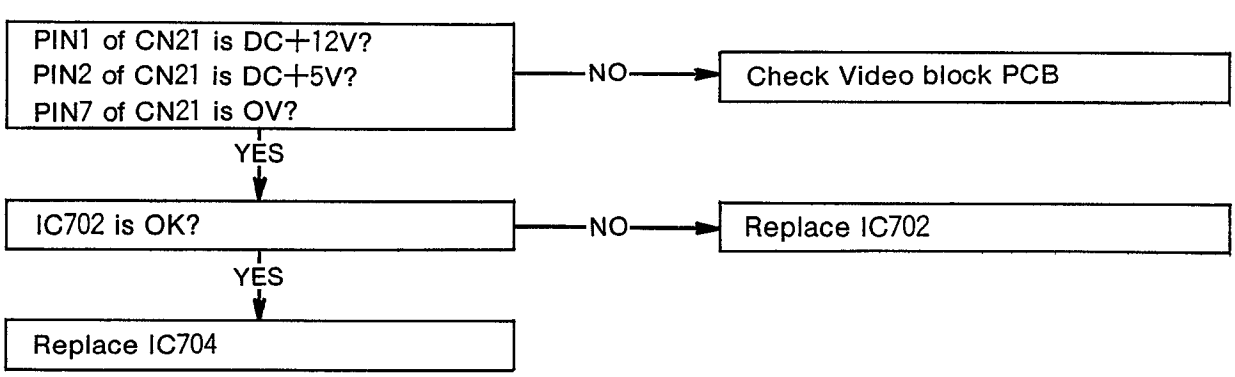




⑤ SOUND DEFECT AT P · B MODE



⑥ SOUND DEFECT AT REC MODE



PARTS LIST

ELECTRICAL PARTS LIST

Ref. No.	Description	Parts No.
	PCB Ass'y, Video	**1613552X**
	Capacitors	
C1	Electrolytic 1uF/50V (M)	126F105
C2 – 5	Ceramic, 0.01uF/50V (Z)	12F3103
C6	Electrolytic 47uF/16V (M)	126C476
C7	Ceramic, 180pF 50V(J.SL)	1270181
C8	Ceramic, 82pF 50V(J.SL)	1270820
C9	Ceramic, 22pF 50V(J.SL)	1270220
C10	Electrolytic 47uF/6.3V(M)	126A476
C11	Electrolytic 1uF/50V (M)	126F105
C12 – 13	Ceramic, 0.01uF/50V (Z)	12F3103
C14 – 15	Electrolytic 1uF/50V (M)	126F105
C16	Semi-Conductive 0.047uF/25V(K,SR)	12Y2473
C17	Ceramic, 18pF/50V (NPO)(J)	12CH180
C18	Ceramic, 100pF/50V (J.SL)	1270101
C19	Ceramic, 15pF/50V(NPO)(J)	12CH150
C20	Ceramic, 430pF/50V (J.SL)	1270431
C21	Ceramic, 270pF/50V (J.SL)	1270271
C22	Ceramic, 150pF/50V (NPO)(J)	12CH151
C23	Ceramic, 0.01uF/50V (Z)	12F3103
C24	Semi-Conductive 0.1uF/25V(Z,SR)	1220520
C25	Ceramic, 470pF/50V (J.SL)	1270471
C26	Ceramic, 0.01uF/50V (Z)	12F3103
C27	Ceramic, 330pF/50V (J.SL)	1270331
C28	Semi-Conductive 0.1uF/25V(Z,SR)	1220520
C29	Ceramic, 0.001uF/50V(K)(Y.B)	12B3102
C30	Ceramic, 68pF/50V(J.SL)	1270680
C31 – 33	Electrolytic 1uF/50V (M)	126F105
C34	Electrolytic 10uF/16V (M)	126C106
C35	Ceramic, 0.0012uF/50V(K)(Y.B)	12B3122
C36	Electrolytic 10uF/16V (M)	126C106
C37	Ceramic, 47pF/50V(J.SL)	1270470
C39	Electrolytic 47uF/6.3V (M)	126A476
C40	Ceramic, 0.01uF/50V(Z)	12F3103
C41 – 42	Ceramic, 330pF/50V(J.SL)	1270331
C43	Ceramic, 0.01uF/50V(Z)	12F3103
C44	Ceramic, 100pF/50V(J.SL)	1270101
C45	Ceramic, 82pF/50V(J.SL)	1270820
C46	Ceramic, 0.0012uF/50V(Y.B)(K)	12B3122
C47	Ceramic, 27pF/50V(J.SL)	1270270
C48	Electrolytic 1uF/50V (M)	126F105
C49	Electrolytic 2.2uF/50V(M)	126F225
C50	Ceramic, 0.0012uF/50V(K)(Y.B)	12B3122
C51	Electrolytic 4.7uF/25V (M)	126D475
C52	Electrolytic 1uF/50V(M)	126F105
C53	Ceramic, 220pF/50V(J.SL)	1270221
C54	Electrolytic 1uF/50V(M)	126F105

Ref. No.	Description	Parts No.
C55	Ceramic, 150pF/50V(J.SL)	1270151
C56	Electrolytic 1uF/50V(M)	126F105
C57	Ceramic, 180pF/50V(J.SL)	1270181
C58	Electrolytic 47uF/6.3V (M)	126A476
C59	Electrolytic 100uF/6.3V(M)	126A107
C60	Ceramic, 68pF/50V(J.SL)	1270680
C61	Electrolytic 2.2uF/50V(M)	126F225
C62	Electrolytic 47uF/6.3V(M)	126A476
C63	Electrolytic 4.7uF/25V(M)	126D475
C68	Ceramic, 470pF/50V(J.SL)	1270471
C69	Ceramic, 18pF/50V(J.NPO)	12CH180
C70 – 72	Ceramic, 0.01uF/50V(Z)	12F3103
C73	Ceramic, 47pF 50V(J.SL)	1270470
C74	Semi-Conductive 0.1uF/25V(Z,SR)	1220520
C75	Ceramic, 0.0047uF/50V(K)(Y.B)	12B3472
C76	Ceramic, 0.01uF/50V(Z)	12F3103
C78	Electrolytic 47uF/6.3V (M)	126A476
C79	Ceramic, 150pF/50V(J.SL)	1270151
C80	Ceramic, 100pF/50V(J.SL)	1270101
C81	Ceramic, 0.001uF/50V(K)(Y.B)	12B3102
C82	Ceramic, 0.01uF/50V(Z)	12F3103
C83	Ceramic, 8pF/50V(NPO)(J)	12CH809
C84	Ceramic, 0.01uF/50V(Z)	12F3103
C85	Mylar, 0.15uF/50V(K)	1250154
C86	Electrolytic 47uF/6.3V (M)	126A476
C87	Ceramic, 0.01uF/50V(K)(Y.B)	12B3103
C88	Ceramic, 680pF/50V(J.SL)	1270681
C89	Electrolytic 47uF/6.3V (M)	126A476
C90	Ceramic, 0.01uF/50V(Z)	12F3103
C91	Electrolytic 1uF/50V(M)	126F105
C92	Ceramic, 330pF/50V(J.SL)	1270331
C93	Mylar, 0.018uF/50V(K)	1250183
C94	Electrolytic 47uF/16V (M)	126C476
C95	Semi-Conductive 0.1uF/25V(Z,SR)	1220520
C96	Electrolytic, 1000uF/6.3V(M)	626A108
C98	Electrolytic 47uF/6.3V(M)	126A476
C99	Semi-Conductive 0.047uF/25V(K,SR)	12Y2473
C100	Ceramic, 0.01uF/50V(Z)	12F3103
C101	Ceramic, 0.001uF/50V(Y.B)(K)	12B3102
C102	Semi-Conductive 0.1uF/25V(Z)	1220520
C103	Electrolytic, 4.7uF/25V(M)	126D475
C104 – 105	Ceramic, 8pF/50V(J)NPO	12CH809
	Coils	
L1	150uH	2162151
L2	82uH	2162820
L3	100uH	2162101

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Ref. No.	Description	Parts No.
L4	22uH	2162220
L5	470uH	117M490 or 117D490
L6	150uH	2162151
L7	18uH	2162180
L8	1mH	117M482 or 117D465
L9	100uH	2162101
L10	15uH	2162150
L11	15uH	2162150
L12	2.7uH	2162279
L13	100uH	2162101
L14	6.8uH	2162689
L15	82uH	2162820
L16	68uH	2162680
L17	47uH	2162470
L19	150uH	2162151
L20	27uH	2162270
L21	15uH	2162150
L22	330uH	117D473
L23	680uH	117D491 or 117M491
L24	47uH	2162470
L25	680uH	117D491 or 117M491
L26	47uH	2162470
L27	100uH	2162101
	Diodes	
D1-2	1SS133	1SS1333
D3	UZ-3.3B Zener	UZ3.3B
	Filters	
DL1	1H Delay Line	1810773
DL2	2H Comb	1810772
CF2	Ceramic, SFS 5.06MB	1810497
T1	Low-pass, 3MHz	1810771
T2	Low-pass, 1.5MHz	113M621
T3	Band-pass, 4.43MHz	1810770
	ICs	
IC1	AN6326N	14LN112
IC2	AN6328	14LN111
HIC1	Hybrid Luminance	1810769
HIC2	Hybrid Color	1810803

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Ref. No.	Description	Parts No.
	Resistors	
R1	Carbon 1.2k ohm 1/5W,J	1324122
R2 – 3	Carbon 56 ohm 1/5W,J	1324560
R4 – 5	Carbon 6.8k ohm 1/5W,J	1324682
R6	Carbon 10 ohm 1/5W,J	1324100
R7	Carbon 820 ohm 1/5W,J	1324821
R8	Carbon 220 ohm 1/5W,J	1324221
R9	Carbon 6.8k ohm 1/5W,J	1324682
R10	Carbon 1.5k ohm 1/5W,J	1324152
R11	Carbon 470 ohm 1/5W,J	1324471
R12	Carbon 2.2k ohm 1/5W,J	1324222
R13	Carbon 10k ohm 1/5W,J	1324103
R14	Carbon 10 ohm 1/5W,J	1324100
R15	Carbon 820 ohm 1/5W,J	1324821
R16	Carbon 1.0k ohm 1/5W,J	1324102
R17	Carbon 560 ohm 1/5W,J	1324561
R18	Carbon 390 ohm 1/5W,J	1324391
R19	Carbon 1.0k ohm 1/5W,J	1324102
R20	Carbon 680 ohm 1/5W,J	1324681
R21 – 23	Carbon 1.5k ohm 1/5W,J	1324152
R24	Carbon 270 ohm 1/5W,J	1324271
R25	Carbon 1.5k ohm 1/5W,J	1324152
R26	Carbon 820 ohm 1/5W,J	1324821
R27	Carbon 680 ohm 1/5W,J	1324681
R28	Carbon 560 ohm 1/5W,J	1324561
R29	Carbon 27 ohm 1/5W,J	1324270
R30	Carbon 1.0k ohm 1/5W,J	1324102
R31	Carbon 1.8k ohm 1/5W,J	1324182
R32	Carbon 100 ohm 1/5W,J	1324101
R33	Carbon 68 ohm 1/5W,J	1324680
R34 – 35	Carbon 1.2k ohm 1/5W,J	1324122
R36	Carbon 100 ohm 1/5W,J	1324101
R37	Carbon 10k ohm 1/5W,J	1324103
R38	Carbon 1.5k ohm 1/5W,J	1324152
R39	Carbon 680 ohm 1/5W,J	1324681
R40	Carbon 120 ohm 1/5W,J	1324121
R41	Carbon 820 ohm 1/5W,J	1324821
R42	Carbon 1.0k ohm 1/5W,J	1324102
R43	Carbon 820 ohm 1/5W,J	1324821
R44 – 45	Carbon 470 ohm 1/5W,J	1324471
R46	Carbon 2.2k ohm 1/5W,J	1324222
R47	Carbon 6.8k ohm 1/5W,J	1324682
R48	Carbon 1.0k ohm 1/5W,J	1324102
R49	Carbon 1.5k ohm 1/5W,J	1324152
R50	Carbon 10k ohm 1/5W,J	1324103
R51	Carbon 270 ohm 1/5W,J	1324271
R52	Carbon 2.2k ohm 1/5W,J	1324222
R53	Carbon 3.9k ohm 1/5W,J	1324392
R54	Carbon 1.8k ohm 1/5W,J	1324182
R55	Carbon 1.5k ohm 1/5W,J	1324152
R56	Carbon 270 ohm 1/5W,J	1324271

Ref. No.	Description	Parts No.
R57	Carbon 680 ohm 1/5W,J	1324681
R58	Carbon 270 ohm 1/5W,J	1324271
R59	Carbon 1.0k ohm 1/5W,J	1324102
R61	Carbon 1.2k ohm 1/5W,J	1324122
R62	Carbon 330k ohm 1/5W,J	1324334
R63	Carbon 2.2k ohm 1/5W,J	1324222
R64	Carbon 2.7k ohm 1/5W,J	1324272
R65	Carbon 2.2k ohm 1/5W,J	1324222
R66	Carbon 3.9M ohm 1/4W,J	1345395
R67	Carbon 1.8k ohm 1/5W,J	1324182
R68	Carbon 10k ohm 1/5W,J	1324103
R69	Carbon 330 ohm 1/5W,J	1324331
R71	Carbon 10 ohm 1/5W,J	1324100
R72	Carbon 1.5k ohm 1/5W,J	1324152
R73	Carbon 1.8k ohm 1/5W,J	1324182
R74	Carbon 2.7k ohm 1/5W,J	1324272
R75	Carbon 100 ohm 1/5W,J	1324101
R76	Carbon 820 ohm 1/5W,J	1324821
R77	Carbon 1.5k ohm 1/5W,J	1324152
R78	Carbon 8.2k ohm 1/5W,J	1324822
R79	Carbon 10k ohm 1/5W,J	1324103
R80 – 81	Carbon 1.0k ohm 1/5W,J	1324102
R83	Carbon 12k ohm 1/5W,J	1324123
R84	Carbon 47 ohm 1/5W,J	1324470
R85	Carbon 22k ohm 1/5W,J	1324223
R86	Carbon 1.2k ohm 1/5W,J	1324122
R87 – 88	Carbon 3.3k ohm 1/5W,J	1324332
R89	Carbon 68k ohm 1/5W,J	1324683
R91	Carbon 47k ohm 1/5W,J	1324473
R92	Carbon 6.8k ohm 1/5W,J	1324682
R93	Carbon 1.8k ohm 1/5W,J	1324182
R94 – 95	Carbon 82k ohm 1/5W,J	1324823
R96	Carbon 22k ohm 1/5W,J	1324223
R97	Carbon 5.6k ohm 1/5W,J	1324562
R98	Carbon 2.2k ohm 1/5W,J	1324222
R99	Carbon 10k ohm 1/5W,J	1324103
R100	Carbon 18k ohm 1/5W,J	1324183
R101	Carbon 22k ohm 1/5W,J	1324223
R102	Carbon 12k ohm 1/5W,J	1324123
R103	Carbon 82k ohm 1/5W,J	1324823
R104	Carbon 10k ohm 1/5W,J	1324103
R105	Carbon 82k ohm 1/5W,J	1324823
R106	Carbon 330 ohm 1/4W,J	1345331
R107	Carbon 560 ohm 1/5W,J	1324561
R108	Carbon 47k ohm 1/5W,J	1324473
R109	Carbon 2.2k ohm 1/5W,J	1324222
R110	Carbon 560 ohm 1/5W,J	1324561
R111	Carbon 220 ohm 1/5W,J	1324221
R112	Carbon 680 ohm 1/5W,J	1324681
R113	Carbon 27k ohm 1/5W,J	1324273
R116	Fuseble Resistor,22ohm 1/4W.J	5361220

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Ref. No.	Description	Parts No.
	Semi-Fixed Resistors	
VR1 – 3	1k ohm (B)	138J777
VR4 – 5	2k ohm (B)	138J778
VR6	1k ohm (B)	138J777
	Transistors	
Q1	2SC1740(R.S)	C1740(R,S)
Q2	2SC2058(Q)	C2058Q
Q3	2SA933(R,S)	A933(R,S)
Q4	2SC1740(R.S)	C1740(R,S)
Q5	2SC1809(N)	C1809N
Q6 – 7	2SC1740(R.S)	C1740(R,S)
Q8 – 9	2SC2058(Q)	C2058Q
Q10	2SA933(R,S)	A933(R,S)
Q11 – 13	2SC1740(R.S)	C1740(R,S)
Q15	2SC1740(R.S)	C1740(R,S)
Q16	2SA933(R,S)	A933(R,S)
Q17	2SC1740(R.S)	C1740(R,S)
Q18	2SA933(R,S)	A933(R,S)
Q19	2SA934(Q)	A934Q
Q20 – 22	2SC1740(R.S)	C1740(R,S)
Q23	2SA933(R,S)	A933(R,S)
Q24	2SC1740(R.S)	C1740(R,S)
Q25	2SA933(R,S)	A933(R,S)
Q26	2SC2060(Q)	C2060Q
TR1 – 3	Degital Transistor,DTA114YS	DTA114Y
	Miscellaneous	
	Shield Plate, Top	6S50233
	Shield Frame	6S50261
	Shield Plate, Bottom	6S50260
	Wrapping Pin	1730692
X1	XTAL, 4.433614MHz	V811006
VC3	Cap. Trimmer, 20P	1280156
CN1	Connector Base, 3P (Top)	1740765
CN5	Connector Base, 2P (Top)	1740764
CN6	Connector Base, 6P (Top)	1740768
CN20	Connector Base, 6P (Top)	1740458
CN25	Connector Base, 3P (Top)	1740765

Ref. No.	Description	Parts No.
	PCB Ass'y Syscon, Servo, Power	**1613553AX**
	Capacitors	
C301	Semi-Conductive 0.01uF/25V (K,SR)	12Y2103
C302	Electrolytic 47uF/10V (M)	126B476
C303	Ceramic 0.0047uF/50V(K) (YB)	12B3472
C304 – 305	Electrolytic 10uF/10V (M)	126B106
C306	Electrolytic 47uF/10V (M)	126B476
C307	Maylar 0.15uF/50V (J)	1254154
C308 – 309	Maylar 0.033uF/50V (J)	1254333
C310	Semi-Conductive 0.01uF/25V(K,SR)	12Y2103
C311	Electrolytic 10uF/10V (M)	126B106
C312	Semi-Conductive 0.033uF/25V(K,SR)	12Y2333
C313 – 315	Electrolytic 10uF/10V (M)	126B106
C316	Semi-Conductive 0.1uF/25V (M)	12X2104
C318	Electrolytic 1000uF/16V (M)	626C108
C319	Semi-Conductive 0.047uF/25V(K,SR)	12Y2473
C320 – 321	Semi-Conductive 0.1uF/25V (M)	12X2104
C322	Electrolytic 100uF/10V (M)	126B107
C323	Electrolytic 47uF/10V (M)	126B476
C324 – 325	Electrolytic 10uF/10V (M)	126B106
C326	Ceramic 0.001uF/50V (YB)(K)	12B3102
C327	Electrolytic 4.7uF/50V (M)	126F475
C328	Semi-Conductive 0.01uF/25V(K,SR)	12Y2103
C329	Semi-Conductive 0.1uF/25V (M)	12X2104
C330	Semi-Conductive 0.01uF/25V(K,SR)	12Y2103
C331	Electrolytic 100uF/10V (M)	126B107
C332	Semi-Conductive 0.1uF/25V (M)	12X2104
C333	Electrolytic 33uF/10V (M)	126B336
C335	Semi-Conductive 0.01uF/25V (K,SR)	12Y2103
C336 – 337	Semi-Conductive 0.1uF/25V (M)	12X2104
C340	Semi-Conductive 0.033uF/25V(K,SR)	12Y2333
C341	Electrolytic 1uF/50V (M)	126F105
C342	Ceramic 0.001uF/50V (YB)(K)	12B3102
C344	Electrolytic 10uF/10V (M)	126B106
C345	Semi-Conductive 0.01uF/25V (K,SR)	12Y2103
C501	Electrolytic 1uF/50V (M)	126F105
C502	Electrolytic 0.1uF/50V (M)	126F104
C504 – 505	Ceramic 33pF/50V (J)	1270330
C506	Semi-Conductive 0.1uF/25V (M)	12X2104
C508	Semi-Conductive 0.01uF/25V(K,SR)	12Y2103
C509 – 512	Electrolytic 0.1uF/50V (M)	126F104
C515 – 517	Electrolytic 0.1uF/50V (M)	126F104
C518	Semi-Conductive 0.1uF/25V (M)	12X2104
C519	Electrolytic 100uF/16V (M)	126C107
C520	Semi-Conductive 0.1uF/25V (M)	12X2104
C522	Electrolytic 47uF/10V (M)	126B476
C523	Electrolytic 4.7uF/50V (M)	126F475
C524	Semi-Conductive 0.1uF/25V (M)	12X2104

Ref. No.	Description	Parts No.
C525	Electrolytic 47uF/10V (M)	126B476
C526	Semi-Conductive 0.01uF/25V (K,SR)	12Y2103
C527	Electrolytic 0.1uF/50V (M)	126F104
C651 – 654	Ceramic 0.022uF/50V (Z)	12F3223
C655	Electrolytic 2200uF/35V (M)	626E228
C656	Electrolytic 47uF/25V (M)	126D476
C657	Electrolytic 4.7uF/50V (M)	126F475
C658	Electrolytic 47uF/16V (M)	126C476
C659	Electrolytic 4.7uF/50V (M)	126F475
C660	Electrolytic 47uF/10V (M)	126B476
C662	Electrolytic 10uF/63V (M)	626G106
C664 – 665	Electrolytic 4.7uF/50V (M)	126F475
C667	Electrolytic 0.1uF/50V (M)	126F104
C669	Electrolytic 100uF/50V (M)	626F107
C670	Electrolytic 47uF/10V (M)	126B476
C671	Ceramic 0.01uF/50V (Z)	12F3103
C672	Electrolytic 3300uF/16V (M)	626C338
C673	Electrolytic 10uF/10V (M)	126B106
C674	Electrolytic 47uF/10V (M)	126B476
C675	Ceramic 0.01uF/50V (Z)	12F3103
C676	Electrolytic 47uF/16V (M)	126C476
C677	Mylar 0.022uF/100V (J)	1255223
	Coils	
L301 – 302	Choke 200 uH	117B441
	Diodes	
D301 – 305	1SS133 or US1040M	1SS133 or US1040M
D307 – 308	1SS133 or US1040M	1SS133 or US1040M
D310 – 311	1SS133 or US1040M	1SS133 or US1040M
D501 – 504	1SS133 or US1040M	1SS133 or US1040M
D505	IN4002	IN4002
D506 – 512	1SS133 or US1040M	1SS133 or US1040M
D651	Rectifier	KBL02L or RS403L
D652	Zener UZ18BH or MTZ20B	UZ18BH or MTZ20B
D653	1SS133 or US1040M	1SS133 or US1040M
D655	1SS133 or US1040M	1SS133 or US1040M

Ref. No.	Description	Parts No.
D657	Zener UZ27BH	UZ27BH
D659	Zener UZ6.2BM or MTZ6.2B	UZ6.2BM or MTZ6.2B
D660	Zener UZ3.9B	UZ3.9B
D661	Zener UZ6.2BH or MTZ6.2C	UZ6.2BH or MTZ6.2C
	ICs	
IC301	MN6168FVB	14DN168
IC302	AN6346N	14LN113
IC303	BA6219	14LD104
IC304	MN4013B, TC	MN4013B
IC305	BA718	14L0088
IC306	BA718	14L0088
IC307	BA718	14L0088
IC501	MN15342FVS	14DN158
IC502	BA6209	14L0106
IC503	BA6209	14L0106
IC506	D-TR, DTC144S	DTC144ES
	Resistors	
R301	Carbon 2.2k ohm 1/5W,J	1324222
R302	Carbon 180 ohm 1/5W,J	1324181
R303	Carbon 1k ohm 1/5W,J	1324102
R304	Carbon 6.8k ohm 1/5W,J	1324682
R305	Carbon 47k ohm 1/5W,J	1324473
R306	Carbon 6.8k ohm 1/5W,J	1324682
R307	Carbon 390 ohm 1/5W,J	1324391
R308	Carbon 10k ohm 1/5W,J	1324103
R309	Carbon 4.7k ohm 1/5W,J	1324472
R310	Carbon 10k ohm 1/5W,J	1324103
R311	Carbon 47k ohm 1/5W,J	1324473
R312 – 313	Carbon 10k ohm 1/5W,J	1324103
R314	Carbon 680k ohm 1/5W,J	1324684
R315	Carbon 22k ohm 1/5W,J	1324223
R316	Carbon 47k ohm 1/5W,J	1324473
R317	Carbon 100k ohm 1/5W,J	1324104
R318	Metal 1.5 ohm 1W,J	1330317
R319	Carbon 75k ohm 1/5W,J	1324753
R320	Carbon 33k ohm 1/5W,J	1324333
R321	Carbon 75k ohm 1/5W,J	1324753
R322	Carbon 68k ohm 1/5W,J	1324683
R323	Carbon 1.5k ohm 1/5W,J	1324152
R326	Carbon 100 ohm 1/5W,J	1324101
R327	Carbon 15k ohm 1/5W,J	1324153
R328	Carbon 100 ohm 1/5W,J	1324101
R329	Carbon 22k ohm 1/5W,J	1324223

Ref. No.	Description	Parts No.
R330	Carbon 100 ohm 1/5W,J	1324101
R331 – 332	Carbon 100k ohm 1/5W,J	1324104
R333	Carbon 4.7k ohm 1/5W,J	1324472
R334 – 335	Carbon 100k ohm 1/5W,J	1324104
R337 – 338	Carbon 100k ohm 1/5W,J	1324104
R341	Carbon 100k ohm 1/5W,J	1324104
R343	Carbon 100k ohm 1/5W,J	1324104
R346	Carbon 10k ohm 1/5W,J	1324103
R347 – 348	Carbon 100k ohm 1/5W,J	1324104
R349	Carbon 56k ohm 1/5W,J	1324563
R350	Carbon 220k ohm 1/5W,J	1324224
R351	Carbon 5.6k ohm 1/5W,J	1324562
R352	Carbon 3.3k ohm 1/5W,J	1324332
R353	Carbon 100k ohm 1/5W,J	1324104
R354	Carbon 10k ohm 1/5W,J	1324103
R356	Carbon 56k ohm 1/5W,J	1324563
R357	Carbon 3.3k ohm 1/5W,J	1324332
R358	Carbon 10k ohm 1/5W,J	1324103
R359 – 360	Carbon 3.3k ohm 1/5W,J	1324332
R361	Carbon 82k ohm 1/5W,J	1324823
R362	Carbon 560 ohm 1/5W,J	1324561
R363	Carbon 100k ohm 1/5W,J	1324104
R364	Carbon 100 ohm 1/5W,J	1324101
R365	Carbon 100k ohm 1/5W,J	1324104
R367	Carbon 10 ohm 1/5W,J	1324100
R368 – 369	Carbon 3.3k ohm 1/5W,J	1324332
R370	Metal 3.3 ohm 2W,J	1330318
R372	Carbon 33k ohm 1/5W,J	1324333
R375	Carbon 27k ohm 1/5W,J	1324273
R376	Carbon 2.2k ohm 1/5W,J	1324222
R377	Carbon 47k ohm 1/5W,J	1324473
R378	Carbon 10k ohm 1/5W,J	1324103
R379	Carbon 56k ohm 1/5W,J	1324563
R380	Carbon 56 ohm 1/5W,J	1324560
R502	Carbon 22k ohm 1/5W,J	1324223
R501	Carbon 27k ohm 1/5W,J	1324273
R503	Carbon 47k ohm 1/5W,J	1324473
R504	Carbon 100 ohm 1/5W,J	1324101
R505	Carbon 27k ohm 1/5W,J	1324273
R508	Carbon 6.8k ohm 1/5W,J	1324682
R511 – 512	Carbon 47k ohm 1/5W,J	1324473
R516	Carbon 47k ohm 1/5W,J	1324473
R517	Carbon 10k ohm 1/5W,J	1324103
R518 – 519	Carbon 68k ohm 1/5W,J	1324683
R520 – 521	Carbon 56k ohm 1/5W,J	1324563
R522 – 524	Carbon 22k ohm 1/5W,J	1324223
R525 – 527	Carbon 470 ohm 1/5W,J	1324471
R528 – 531	Carbon 10k ohm 1/5W,J	1324103
R532	Carbon 22k ohm 1/5W,J	1324223
R533	Carbon 470 ohm 1/5W,J	1324471
R534	Carbon 47k ohm 1/5W,J	1324473

Ref. No.	Description	Parts No.
R535	Carbon 2.2k ohm 1/5W,J	1324222
R536	Carbon 10k ohm 1/5W,J	1324103
R537	Carbon 220 ohm 1/5W,J	1324221
R538	Carbon 270k ohm 1/5W,J	1324274
R539	Carbon 10k ohm 1/5W,J	1324103
R540	Carbon 1k ohm 1/5W,J	1324102
R541	Carbon 10k ohm 1/5W,J	1324103
R544	Carbon 270k ohm 1/5W,J	1324274
R545 – 546	Carbon 10k ohm 1/5W,J	1324103
R547	Carbon 1k ohm 1/5W,J	1324102
R549 – 551	Carbon 470 ohm 1/5W,J	1324471
R552 – 554	Carbon 22k ohm 1/5W,J	1324223
R555 – 557	Carbon 10k ohm 1/5W,J	1324103
R558	Metal Res. 510 ohm 1W,J	1330608
R559 – 560	Carbon 100k ohm 1/5W,J	1324104
R561	Metal 3.3 ohm 1W,J	1330320
R562	Carbon 4.7k ohm 1/5W,J	1324472
R563	Carbon 1.2k ohm 1/5W,J	1324122
R564	Carbon 91k ohm 1/5W,J	1324913
R565 – 566	Carbon 68k ohm 1/5W,J	1324683
R567 – 568	Carbon 56k ohm 1/5W,J	1324563
R571	Carbon 3.3k ohm 1/5W,J	1324332
R573	Carbon 3.3k ohm 1/5W,J	1324332
R574	Carbon 100k ohm 1/5W,J	1324104
R575	Carbon 10k ohm 1/5W,J	1324103
R576	Carbon 330 ohm 1/5W,J	1324331
R577 – 578	Carbon 68k ohm 1/5W,J	1324683
R579	Carbon 27k ohm 1/5W,J	1324273
R580	Carbon 3.3k ohm 1/5W,J	1324332
R581	Carbon 1k ohm 1/5W,J	1324102
R582	Carbon 270k ohm 1/5W,J	1324274
R589	Carbon 27k ohm 1/5W,J	1324273
R590	Carbon 22k ohm 1/5W,J	1324223
R591	Carbon 75k ohm 1/5W,J	1324753
R592	Carbon 680k ohm 1/5W,J	1324684
R651	Carbon 1k ohm 1/5W,J	1324102
R652	Carbon 330 ohm 1/5W,J	1324331
R653	Carbon 3.9k ohm 1/5W,J	1324392
R654	Carbon 3.3k ohm 1/5W,J	1324332
R655	Carbon 1k ohm 1/5W,J	1324102
R656	Carbon 680 ohm 1/5W,J	1324681
R657 – 658	Carbon 2.2k ohm 1/5W,J	1324222
R659	Carbon 12k ohm 1/5W,J	1324123
R660	Carbon 47k ohm 1/5W,J	1324473
R662	Carbon 4.7k ohm 1/5W,J	1324472
R664	Carbon 18k ohm 1/5W,J	1324183
R665	Carbon 5.6k ohm 1/5W,J	1324562
R666	Carbon 2.2k ohm 1/5W,J	1324222
R667	Carbon 560 ohm 1/5W,J	1324561
R668	Carbon 10k ohm 1/5W,J	1324103

Ref. No.	Description	Parts No.
R669	Carbon 6.8k ohm 1/5W,J	1324682
R670	Carbon 470 ohm 1/5W,J	1324471
R671	Carbon 3.9k ohm 1/5W,J	1324392
R672	Carbon 4.7k ohm 1/5W,J	1324472
R673	Carbon 47k ohm 1/5W,J	1324473
R674	Carbon 220 ohm 1/5W,J	1324221
R675	Carbon 4.7k ohm 1/5W,J	1324472
R676	Carbon 470 ohm 1/5W,J	1324471
R677	Carbon 2.2k ohm 1/5W,J	1324222
R678	Carbon 100 ohm 1/5W,J	1324101
R679	Carbon 1k ohm 1/5W,J	1324102
R680 – 681	Carbon 47k ohm 1/5W,J	1324473
R682	Carbon 33 ohm 1/5W,J	1324330
R683	Carbon 10k ohm 1/5W,J	1324103
R684	Carbon 390 ohm 1/5W,J	1324391
	Semi-fixed Resistors	
VR301 – 303	Metal 100k ohm (B)	1380876
VR651	Metal 10k ohm (B)	1380872
	Transistors	
Q301	2SC1740 (R.S)	C1740(R.S)
Q303 – 306	2SC1740 (R.S)	C1740(R.S)
Q308 – 310	2SC1740 (R.S)	C1740(R.S)
Q312 – 313	2SC1740 (R.S)	C1740(R.S)
Q314	2SD1292 (Q,R)	D1292(Q,R)
Q315	2SC1740 (R.S)	C1740(R.S)
Q501	2SC1740 (R,S)	C1740(R.S)
Q502	2SA933 (Q,R)	A933(Q,R)
Q504	2SC1740 (R,S)	C1740(R.S)
Q505	2SD1292 (Q,R)	D1292(Q,R)
Q506 – 507	2SA933 (Q,R)	A933(Q,R)
Q508	2SC1740 (R,S)	C1740(R.S)
Q509	2SA933 (Q,R)	A933(Q,R)
Q510	2SC1740 (R,S)	C1740(R.S)
Q512	2SA933 (Q,R)	A933(Q,R)
Q513 – 514	2SC1740 (R,S)	C1740(R.S)
Q519	2SA933 (Q,R)	A933(Q,R)
Q651	2SD1275 (Q,R)	D1275(Q,R)
Q652	2SD1266 (Q,R)	D1266(Q,R)
Q653	2SC1740 (R,S)	C1740(R,S)
Q654	2SC1740 (R,S)	C1740(R.S)
Q655	2SA934 (Q,R)	A934(Q,R)
Q656	2SC1740 (R,S)	C1740(R.S)
Q657	2SA935 (Q,R)	A935(Q,R)
Q658	2SB1007 (Q,R)	B1007(Q,R)
Q659	2SD1275 (Q,R)	D1275(Q,R)
Q660	2SB1009 (Q,R)	B1009(Q,R)
Q661	2SC1740 (R,S)	C1740(R,S)

Ref. No.	Description	Parts No.
Q662	2SC2060 (Q,R)	C2060(Q,R)
Q663	2SD1275 (Q,R)	D1275(Q,R)
Q664	2SC1740 (R,S)	C1740(R,S)
Q665	2SC1740 (R,S)	C1740(R,S)
	Miscellaneous	
F652	Fuse, T1.25A	1790482
F654	Fuse, T630mA	1790479
X501	Ceramic Resonators,	1810727 or
	KBR-3.58M, CSA-3.58MG	1810726 or
		1810728
CN-7	Connector Base 7P (Top)	1740769
CN-8	Connector Base 2P (Top)	1740764
CN-10	Connector Base 11P (Top)	1740773
CN-11	Connector Base 5P (Top)	1740767
CN-13	Connector Base 10P (Top)	1740772
CN-14	Connector Base 7P (Top)	1740769
CN-15	Connector Base 8P (Top)	1740770
CN-16	Connector Base 3P (Top)	1740765
CN-26	Connector Base 2P (Top)	1740764
TEST	Connector Base 4P (Side)	1740778
	Fuse Holder	1790424
	PCB Ass'y, Power Supply	**1613553BX**
T651	Power Trans	115E390
	AC Cord	1750697
	Stopper, AC Cord	1790173
F651	Fuse, T200mA	1790474
F653	Fuse, T500mA	1790478
	Coxial Cable with RCA Plug	1750772
R661	Fuse Res. 6.2 ohm 1/4WG	1361629
	Capacitors	
C661	Electrolytic 100uF/63V (M)	626G107
C663	Electrolytic 100uF/63V (M)	626G107
C666	Electrolytic 2200uF/25V (M)	626D228
	Diodes	
D654	IN4003	IN4003
D656	IN4003	IN4003
D658	GP15BL	GP15BL
	Connector	
CN-4	Connector Base 11P (Top)	1740773
	Fuse Holder	1790424

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Ref. No.	Description	Parts No.
	PCB Ass'y, Control	**1613647X**
	Capacitors	
C601	Electrolytic, 47uF/10V (M)	126B476
C602	Ceramic, 330pF/50V (J.SL)	1270331
	Diodes	
D601	LED (RED), SLH34VC	1401255
D603	LED (GREEN), SLR55MC	1401149
D604	LED (RED), SLR55VC	1401219
D605 – 606	LED (GREEN), SLR55MC	1401149
D607	LED (RED), SLR55VC	1401219
D608	LED (RED), SLH34VC	1401255
D611 –612	1SS133	1SS133
D613 – 615	1SS133	1SS133
	Resistors	
R601	Carbon 5.6 kohm 1/5W ,J	1324562
R602	Carbon 4.7 kohm 1/5W ,J	1324472
R603	Carbon 390 ohm 1/5W ,J	1324391
R605	Carbon 68 kohm 1/5W ,J	1324683
R606 – 610	Carbon 820 ohm 1/5W ,J	1324821
R611 – 615	Carbon 68 kohm 1/5W ,J	1324683
R616	Carbon 220 ohm 1/5W ,J	1325221
	Switches	
SW601	Tact SW KHH10902 or KHW0269-01-010	1622743 or 1622922
SW602	Push SW, ESB-64529-5	5622011
SW603	Tact SW KHH10902 or KHW0269-01-010	1622743 or 1622922
SW605	Tact SW KHH10902 or KHW0269-01-010	1622743 or 1622922
SW607 – 612	Tact SW KHH10902 or KHW0269-01-010	1622743 or 1622922
	Transistor	
Q602 – 606	2SC1740(Q,R)	1740QR
	Miscellaneous	
CN-17	Connector Base, 7P(side)	1740777
CN-18	Connector Base, 8P(side)	1740781
CN-19	Connector Base, 4P(side)	1740778
	Remote Sensor Unit	1810751 or 1810958
	LED Bush	6N50091

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Ref. No.	Description	Parts No.
	PCB Ass'y, Channel Select	**1613648AX**
	Capacitors	
C804	Electrolytic 10uF/16V(M)	126C106
C805	Ceramic 0.01uF/50V(Z)	12F3103
C806 – 807	Ceramic 33pF/50V(J)(NPO.CH)	12CH330
C808	Electrolytic 100uF/6.3V(M)	126A107
C809	Semi-Conductive 0.22uF/25V(Z)	1220524
C810	Ceramic 10pF/50V(J)(NPO.CH)	12CH100
C812	Trimmer 20pF	1280140 or 1280122
C813	Electrolytic 1uF/50V(M)	126F105
C814 – 815	Ceramic 0.01uF/50V(K)(Y.B)	12B3103
C816	Ceramic 0.01uF/50V(Z)	12F3103
C817	Mylar 0.1uF/50V(K)	1250104
C818	Mylar 0.068uF/50V(K)	1250683
C819	Ceramic 0.01uF/50V(K)(Y.B)	12B3103
C820	Mylar 0.082uF/50V(J)	1254823
C821	Mylar 0.027uF/50V(J)	1254273
C822 – 823	Ceramic 0.01uF/50V(K)(Y.B)	12B3103
C824	Electrolytic 1uF/50V(M)	126F105
C825	Electrolytic 47uF/6.3V(M)	126A476
C826 – 827	Ceramic 33pF/50V(J)(NPO.CH)	12CH330
C828	Electrolytic 0.22uF/50V(M)	126F224
C829	Electrolytic 47uF/6.3V(M)	126A476
C830	Electrolytic 4.7uF/25V(M)	126D475
C831	Electrolytic 47uF/50V(M)	126F476
C832	Electrolytic 10uF'16V(M)	126C106
	Coil	
L801	Inductor 1mH	117M482
	Diodes	
D801 – 806	US1040M or 1SS133	US1040M or 1SS133
D807	Zener Diode, 1.5V	LTZ-MRI5
D808	LED (Green) SLH-34MC-3F	1401253
D875 – 877	US1040M or 1SS133	US1040M or ISS133
	ICs	
IC801	Custom, MN15847FVD	14DN156
IC802	Custom, MN1512FVC	14DN157
IC803	Custom, MN1280Q	14DN185

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Ref. No.	Description	Parts No.
IC804	Custom, AN5033	14LN142
IC805	Custom, MN1220	14DN159
IC806	Custom, BA618	14LF143
	Resistors	
RX801	Resistance Array 4.7k ohm x 7	1370028 or I37N029
VR801	Small Type Variable Resistor (EWE-U2A016-B24) 20k ohm(B)	539N619
VR802	Variable Resistor 10k ohm (B)	138J781
R802	Carbon 330 ohm 1/5W, J	1324331
R803	Carbon 47k ohm 1/5W, J	1324473
R804	Carbon 91 ohm 1/5W, J	1324910
R805	Carbon 47k ohm 1/5W, J	1324473
R806	Carbon 10k ohm 1/5W, J	1324103
R807	Carbon 100k ohm 1/5W, J	1324104
R808	Carbon 47k ohm 1/5W, J	1324473
R809	Carbon 22k ohm 1/5W, J	1324223
R810	Carbon 47k ohm 1/5W, J	1324473
R811	Carbon 100k ohm 1/5W, J	1324104
R812	Carbon 120k ohm 1/5W, J	1324124
R813	Carbon 100k ohm 1/5W, J	1324104
R814	Carbon 1.2k ohm 1/5W, J	1324122
R815	Carbon 270 ohm 1/5W, J	1324271
R816	Carbon 1M ohm 1/5W, J	1324105
R817	Carbon 47k ohm 1/5W, J	1324473
R818	Carbon 10k ohm 1/5W, J	1324103
R819	Carbon 390 ohm 1/5W, J	1324391
R820 – 821	Carbon 4.7k ohm 1/5W, J	1324472
R822 – 825	Carbon 82k ohm 1/5W, J	1324823
R827	Carbon 10k ohm 1/5W, J	1324103
R828 – 829	Carbon 4.7k ohm 1/5W, J	1324472
R830 – 832	Carbon 100k ohm 1/5W, J	1324104
R833 – 839	Carbon 220 ohm 1/5W, J	1324221
R854 – 855	Carbon 47k ohm 1/5W, J	1324473
R859	Carbon 10k ohm 1/5W, J	1324103
R868 – 869	Carbon 1.2k ohm 1/5W, J	1324122
R870 – 871	Carbon 10k ohm 1/5W, J	1324103
R872	Carbon 4.7k ohm 1/5W, J	1324472
R878	Carbon 270 ohm 1/5W, J	1324271
	Transistors	
Q801	Transistor 2SA935(Q)(R)	A935QR
Q802	Transistor 2SA933(Q)(R)	A933QR
Q856 – 857	Transistor 2SC1740(Q)(R)	C1740QR

Ref. No.	Description	Parts No.
	Digital Transistors	
TR801 TR802 TR803	DTA114YS DTC114ES DTA144ES	DTA114YS DTC114ES DTA144ES
	Switches	
SW801 SW802 – 808 SW809	Slide (HSW0939-01-200) Push (Non-Lock) Slide (HSW0789-01-800)	1621631 1622922 or 1622970 or 1622743 1621602
	Miscellaneous	
X801 X802 X803 CN22 CN23 CN24 TP801 – 803	X' TAL, 32.768KHz X' TAL, 4.194304MHz Ceramic Resonator, 3.58MHz LED Bush Plate, Channel Select PCB Connector 9P (TOP) Connector 12P (TOP) Connector 8P (TOP) Test Pin Parallel Wire Insulation, Channel Select PCB	1811100 1811191 1810728 or 1810727 or 1810726 6N50091 6S50263 1740771 1740774 1740770 1730445 1750777 6P50106
	PCB Ass'y, Timer	**1613648BX**
	Diode	
D851 D852 D853 D854 – 873 D878	LED (RED) SLV-31VC(DEW) LED (RED) SLV-31VC(MEMO) LED(GREEN) SLV-31MC(TV/VCR) Silicon Diode Silicon Diode	1401250 1401250 1401248 US1040M or ISS133 US1040M or ISS133

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Ref. No.	Description	Parts No.
	Resistors	
R851	Carbon 390 ohm 1/5W, J	1324648
R852 – 853	Carbon 270 ohm 1/5W, J	1324649
R856	Carbon 47k ohm 1/5W, J	1324473
R860 – 862	Carbon 10k ohm 1/5W, J	1324103
R863 – 864	Carbon 47k ohm 1/5W, J	1324473
R866 – 867	Carbon 100k ohm 1/5W, J	1324104
R874 – 877	Carbon 22 ohm 1/5W, J	1324220
VR851	Variable Resistor 200K ohm(B)	539N626
VR852	Variable Resistor 2K ohm(B)	539N625
	Transistors	
Q851	Transistor 2SC1740(Q)(R)	C1740QR
Q853 – 854	Transistor 2SC1740(Q)(R)	C1740QR
	Switches	
SW851-866	Push Switch (Non-Lock)	1622922 or 1622970 or 1622743
SW867	Slide Switch(HSW0939-01-210)	1621630
	Miscellaneous	
FIP801	Display Tube	1810762 or 1810565
	Display Tube Holder	6N50078
	LED Base	6N50118
	PCB Ass'y, Channel Display	**1613648CX**
D874	2-Digit 7-Segment LED LB402MK	1401245

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Ref. No.	Description	Parts No.
	PCB Ass'y, Audio/Tuner	**1613648DX**
	Capacitors	
C701	Electrolytic 47uF/16V(M)	126C476
C702	Electrolytic 100uF/10V(M)	126B107
C703 – 704	Electrolytic 47uF/10V(M)	126B476
C706	Electrolytic 47uF/16V(M)	126C476
C707 – 708	Electrolytic 4.7uF/25V(M)	126D475
C709	Electrolytic 47uF/16V(M)	126C476
C710	Electrolytic 4.7uF/25V(M)	126D475
C711	Electrolytic 10uF/16V(M)	126C106
C712	Electrolytic 1uF/50V(M) (L.L)	124S105
C713	Semi-Conductive 0.01uF/25V(M)	12X2104
C714 – 715	Ceramic 0.01uF/50V(Z)	12F3103
C716	Electrolytic 10uF/16V(M) (L.L)	124H106
C717	Electrolytic 100uF/16V(M)	126C107
C720	Electrolytic 1uF/50V(M)	126F105
C721	Ceramic 0.001uF/50V(K)YB	12B3102
C725	Ceramic 0.001uF/50V(K)YB	12B3102
C728	Maylar 0.015uF/100V(J)	1255153
C729	Polypropylen 220pF/100V(J)	2231221
C731 – 732	Maylar 0.01uF/50V(K)	1250103
C733 - 734	Electrolytic 1uF/50V(M)	126F105
C735	Electrolytic 33uF/10V(M)	126B336
C736	Electrolytic 47uF/6.3V(M)	126A476
C737	Electrolytic 10uF/16V(M)	126C106
C739	Electrolytic 47uF/16V(M)	126C476
C742	Ceramic 0.0033uF/50V(K)YB	12B3322
C744	Electrolytic 1uF/50V(M)	126F105
C745	Semi-Conductive 0.01uF/25V(K)	12Y2103
C746	Electrolytic 1uF/50V(M)	126F105
C747	Electrolytic 33uF/16V(M)	126C336
C748	Electrolytic 100uF/16V(M)	126C107
C750	Electrolytic 22uF/10V(M)	126B226
C751	Electrolytic 1uF/50V(M) (L.L)	124S105
C752	Semi-Conductive 0.027uF/25V(K)	12Y2273
C754	Electrolytic 10uF/16V(M)	126C106
C755	Ceramic 0.001uF/50V(K)YB	12B3102
C759	Ceramic 0.0039uF/50V(K)	12B3392

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Ref. No.	Description	Parts No.
	Coils	
T701	Bias OSC	117D496
L701 – 702	Inductor 56uH	2162560
L703	12mH	117D472
	Diodes	
D701 – 702	ISS133	1SS133
D704 – 705	1SS133	1SS133
	ICs	
IC701 – 702	BA7001	14LF136
IC704	BA5115	14LF095
	Resistors	
R701	Carbon 75 ohm 1/5W,J	1324750
R702	Carbon 56k ohm 1/5W,J	1324563
R704	Carbon 68 ohm 1/5W,J	1324680
R705	Carbon 1k ohm 1/5W,J	1324102
R706	Carbon 470 ohm 1/5W,J	1324471
R707	Carbon 1k ohm 1/5W,J	1324102
R708	Carbon 150 ohm 1/4W,J	1346151
R709	Carbon 5.6k ohm 1/5W,J	1324562
R710	Carbon 10k ohm 1/5W,J	1324103
R711	Carbon 22k ohm 1/5W,J	1324223
R712	Carbon 56k ohm 1/5W,J	1324563
R713	Carbon 10k ohm 1/5W,J	1324103
R714	Carbon 120k ohm 1/5W,J	1324124
R715	Carbon 6.8 ohm 1/5W,J	1324689
R716	Carbon 120k ohm 1/5W,J	1324124
R717	Carbon 68k ohm 1/5W,J	1324683
R718	Carbon 120k ohm 1/5W,J	1324124
R719	Carbon 680 ohm 1/5W,J	1324681
R720	Carbon 750 ohm 1/5W,J	1324751
R721 – 722	Carbon 2.2k ohm 1/5W,J	1324222
R723	Carbon 6.8k ohm 1/5W,J	1324682
R724	Carbon 100k ohm 1/5W,J	1324104
R725	Carbon 27k ohm 1/5W,J	1324273

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Ref. No.	Description	Parts No.
R730	Carbon 220 ohm 1/5W,J	1324221
R731	Carbon 22k ohm 1/5W,J	1324223
R733	Carbon 47 ohm 1/5W,J	1324470
R734	Carbon 6.8k ohm 1/5W,J	1324682
R735	Carbon 15k ohm 1/5W,J	1324153
R736	Fusble 12 ohm 1/4W,G	5361120
R737	Carbon 22k ohm 1/5W,J	1324223
R738	Carbon 10k ohm 1/5W,J	1324103
R739	Carbon 22k ohm 1/5W,J	1324223
R740	Carbon 47k ohm 1/5W,J	1324473
R741	Carbon 10k ohm 1/5W,J	1324103
R742	Carbon 1.8k ohm 1/5W,J	1324182
R743	Carbon 10k ohm 1/5W,J	1324103
R744	Carbon 22k ohm 1/5W,J	1324223
R745	Carbon 56k ohm 1/5W,J	1324563
R746	Carbon 2.7k ohm 1/5W,J	1324272
R747 – 748	Carbon 1.2k ohm 1/5W,J	1324122
R749	Carbon 3.3k ohm 1/5W,J	1324332
R750	Carbon 4.7k ohm 1/5W,J	1324472
R751	Carbon 5.6k ohm 1/5W,J	1324562
R752	Carbon 6.8k ohm 1/5W,J	1324682
R753	Carbon 68k ohm 1/5W,J	1324683
R754	Carbon 1M ohm 1/5W,J	1324105
R755	Carbon 39k ohm 1/5W,J	1324393
R756	Carbon 10k ohm 1/5W,J	1324103
R757	Carbon 10k ohm 1/5W,J	1324103
R760	Fusible 22 ohm 1/4W,G	5361220
R761 – 762	Carbon 68k ohm 1/5W,J	1324683
R763	Carbon 12k ohm 1/5W,J	1324123
R764	Carbon 330k ohm 1/5W,J	1324334
R766	Carbon 100k ohm 1/5W,J	1324104
R769	Carbon 270 ohm 1/5W,J	1324271
R770	Carbon 680 ohm 1/5W,J	1324681
R772	Carbon 10k ohm 1/5W,J	1324103
R773	Carbon 47k ohm 1/5W,J	1324473
R774	Fusible 12 ohm 1/4W,G	5361120
R775	Carbon 10k ohm 1/5W,J	1324103
R776	Carbon 39k ohm 1/5W,J	1324393
VR701	Semi-Fixed Res. 100k ohm(B)	138J921
	Transistors	
Q701	2SC1740(R)(S)	C1740RS
Q702	2SA933(Q)(R)	A933QR
Q703 – 705	2SC1740(R)(S)	C1740RS

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Ref. No.	Description	Parts No.
Q706	2SC2060(Q)(R)	C2060QR
Q707	2SC1740(R)(S)	C1740RS
Q709 – 710	2SC1740(R)(S)	C1740RS
Q711	2SA933(Q)(R)	A933QR
Q712 – 713	2SC1740(R)(S)	C1740RS
Q714	FET 2SK301 (Q)(R)	2SK301QR
	Miscellaneous	
	JACK BOARD ASS'Y	1730775
	TUNER VIF UNIT	1810827
	RF CONVERTOR	1810819
	IL-S CONNECTOR 3P BASE POST	1740765
	IL-S CONNECTOR 7P BASE POST	1740769

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MECHANICAL PARTS LIST

(CABINET)

Ref. No.	Description	Parts No.
A-1	Front Ass'y (Black)	6A50110X
	(Non-Reparable)	
	Front	6C50098
	Button, Power	6D50562
	Button, Timer Rec.	6D50563
	Button, Mode	6D50460
	Button, Record	6D50466
	Button, Program	6D50461
	Window, Remote Control	6D50465
	Lens, Power Ind.	6D50176
	Lens, T-Rec, Ind.	6D50065
	Button, Timer (Memo, Reset, Clock, Counter, TV/VCR, UP, DOWN)	6D50467
	Spring, Timer Button	6N50117
A-4	Panel, Display	6E50444
A-5	Panel, Mode	6E50445
A-6	Knob, Tracking (Tracking, Picture)	6D50468
A-7	Lens, Display	6E50040
A-9	Door, Cassette	6D50367
A-10	Knob, Input Select	6D50469
A-12	Plate, Tuner	6E50285
A-13	Label, Type	6E50446
A-14	Cabinet, Top	6G50040
A-15	Door, Tuner	6D50340
A-16	Cover, Tuner	6D50341
A-17	Knob, Tuning	6D50342
A-18	Knob, Band	6D50203
A-19	Panel, Bottom	5G50039
A-20	Panel, Power Supply	6E50284
A-21	Foot	6E50044
B1-1	Deck Assy	TN-8000P206SRF
B2-2	Cabinet, Main	6C50060
B2-2	Spacer, Deck	6N50101
B2-3	Holder, Pre-Set PCB	6N50099
B2-4	Holder, Transformer	6S50256
B2-5	Heatsink	6S50257
B2-6	Holder, Video PCB	6S50258
B2-7	Holder, Deck Angle	6S50259
B2-8	Hing, Video PCB	6N50098
B2-9	Shield, Head	6S50221
B2-10	Plate, Ground	6S50212
B2-11	Holder, Cassette Door	6L50062
B2-12	Holder, Deck	6S50208
B2-13	Holder, Channel Display	6N50103

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Ref. No.	Description	Parts No.
B2-14	Cover, Video PCB	6P50092
B2-16	Screw, Special	6U50123
B2-17	Ground Plate, Bottom Panel	6S50284
B2-18	Spacer, Cabinet	6P50109
B2-19	Insulation, Deck Angle	6P50104
B2-20	Ground Plate (for B2-1)	6S50288
L-1	Screw, Sems with Flat Washer M4x8 (for Transformer --- 2pcs)	FPM3408
L-2	Screw, P-Tight, Bind Head 4x12 (for Transformer---1pc)	GBMP412
L-3	Screw, P-Tight, Pan Head Franged 3x12 (for Deck---3pcs) (for Front---3pcs)	GCMP312
L-5	Screw, Sems, M3x5 (for Holder, Cassette Door---1pc)	CPM3305
L-6	Screw, Sems, with Washer M3x5 (for RF Convertor---1pc)	FPM3305
L-7	Screw, Tapping, Bind Head 3x8 (for Transistors---4pcs) (for IC---1pc) (for Heatsink---2pcs)	DBM1308
L-8	Screw, S-Tight, Bind Head M3x8 (for Holder, Deck---1pc)	GBMS308
L-9	Screw, P-Tight, Bind Head 3x10 (for Holder, Deck Angle---2pcs) (for Control PCB---1pc) (for Heatsink---2pcs) (for Holder, Transformer---1pc) (for Jack Board---3pcs) (for Tuner/Audio PCB---3pcs) (for Holder, Video PCB---3pcs) (for Video PCB---2pcs) (for Holder, Pre-Set PCB---2pcs) (for B2-20---1pc)	GBMP310
	* Hardware Kits	
L-4	Screw, P-Tight, Bind Head 4x12 (for Cabinet, Top---5pcs)	GBIP412
L-9	Screw, P-Tight, Bind Head 3x10 (for Panel, Bottom---6pcs)	GBMP310

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MECHANICAL PARTS LIST

(**Deck**)

Ref. No.	Description	Parts No.
1	Cylinder Ass'y (consists of 2,3,9-13)	8000-01-301
	2 Drum, upper with video head	8000-01-13
	3 Mount Ass'y, Cylinder	8000-01-302
	(consists of 4-8, 24)	
	4 Drum, Lower Ass'y	8000-01-303
	5 Mount, Cylinder	8000-01-22
	6 PCB Ass'y, video out	8000-01-304
	7 Screw, Sems, M3 x 10	9109-00-00
	8 Screw, Sems, M2.6 x 6	9098-00-00
	24 Screw, Sems M3 x 12	9110-00-00
	9 Motor, E20EL05	6003-09-03
	10 Screw, Camera M2 x 12	9824-00-00
	11 Screw, Sems, M2.6 x 6	9098-00-00
	12 PCB for Upper Drum	8000-01-14
	13 Screw, Sems M3 x 8	9108-00-00
14	Screw, Sems M3 x 8	9108-00-00
15	Bracket, Drum Ground	8000-01-23
16	Ground, Drum	8000-01-24
17	Screw, C-Tight M3 x 5	9202-00-00
18	Screw, W Sems M3 x 5	9964-00-00
19 – 23	Not used	
31	Rivet, chassis	8000-02-505
32	Adjuster, Cassette	8000-02-15
33	Screw, Set with Hexagon Hole 2.6 x 4	9951-00-00
34	Angle, Open	8000-02-26
35	Screw, C-Tight M2.6 x 5	9192-00-00
36	Rivet, Back Tension Change Plate	8000-02-502
37	Arm (B), Back Tension Change	8000-13-32
38	Collar	8000-08-12
39	Screw, Camera S-Tie M2.6 x 3.5	9840-00-00
40	Actuator (B), Back Tension	8000-13-31
41	Collar	8000-08-12
42	Screw, C-Tite M2.6 x 5	9192-00-00
43	Return Arm, Right Brake	8000-02-21
44	Collar	8000-08-12
45	Screw, C-Tight M2.6 x 5	9192-00-00
46	Bracket, Mecha	8000-22-09
47	Screw, C-Tite M3 x 5	9202-00-00
51	Rivet, Loading Base	8000-03-501
52	Block (L), Loading	8000-03-31
53	Block (R), Loading	8000-03-09
54	Post, Roller	8000-03-11
55	Boss, Loading	8000-03-12
56	Screw, Set with Hexagon Hole 2 x 3	9952-00-00
57	Screw, Camera M2.6 x 4.5	9559-00-00
58	Washer, Flat ϕ2.6 x ϕ7 x t0.8	9324-00-00
59	Holder, Loading	8000-03-13
60	Screw, Sems M2 x 6	9079-00-00
61	Guide, Tape	8000-03-14
62	Flange, Tape Guide	8000-03-18
63	Flange (B), Tape Guide	8000-03-20
64	Spring, Tape Guide	8000-03-15

Ref. No.	Description	Parts No.
65	Nut, M3	9453-00-00
66	Cap, Guide	8000-03-19
67	Nut, Tracking Adjuster	8000-03-16
68	Screw, Sems M3 x 6	9107-00-00
69	Rollerpost, SIS	8000-03-33
70 – 76	Not used	
77	Flange (C), Tape Guide	8000-03-28
78	Flange (D), Tape Guide	8000-03-29
79	Nut M3	9953-00-00
80	Not used	
81	Plate (L) Ass'y, Loading	8000-04-301
	(consists of 82-85)	
	82 Rivet, Loading Plate (L)	8000-04-501
	83 Roller, Back Tension Return	8000-04-25
	84 E-Ring ϕ1.5	9500-00-00
	85 Spring, Loading Plate	8000-04-23
86	Plate (R) Ass'y Loading	8000-04-302
	(consists of 87-88)	
	87 Rivet, Loading Plate (R)	8000-04-502
	88 Spring, Loading Plate	8000-04-23
89	Drive Gear (L) Ass'y	8000-04-303
90	Gear (A), L Drive	8000-04-13
91	Gear (B), Ass'y, L Drive	8000-04-304
92	Gear Spring, L Drive	8000-04-16
93	Washer, Flat ϕ4 x ϕ16 x t0.6	9956-00-00
94	Gear, Control	8000-04-20
95	Plate, Gang	8000-04-21
96	Gear, Gang	8000-04-22
97	Gear, Joint B	8000-04-19
98	Gear, Joint A	8000-04-18
99	Gear, Guide	8000-04-09
100	Washer, Flat ϕ2.5 x ϕ14 x t1	9955-00-00
101	E-Ring ϕ2.0	9502-00-00
102	Roller, Guide	8000-04-10
103	Washer, Flat ϕ2.5 x ϕ10 x t1	9954-00-00
104	Screw, Small M2.6 x 4	9038-00-00
105	E-Ring ϕ3.2	9506-00-00
106	E-Ring ϕ2.3	9503-00-00
107	E-Ring ϕ2.5	9504-00-00
108 – 140	Not used	
141	Head Base Ass'y (consists of 142-150)	8000-06-310
	142 Head, Audio Control	8000-06-313
	143 Rivet Head Base	8000-06-501
	144 Screw, Small M2.6 x 12	9045-00-00
	145 Washer, Flat ϕ2.6 x ϕ4.6 x t0.4	9311-00-00
	146 Spring, Azimuth	8000-06-04
	147 Screw, Small M2.6 x 7	9041-00-00
	148 Screw, Set with Hexagon Socket 3 x 5	9950-00-00
	149 Collar, Adjust	8000-06-05
	150 Nut, Nylon M3	9953-00-00
151	Spring, Head	8000-06-03
152	Bracket Ass'y, MD P.C.B.	8000-06-312
	(consists of 153-155)	
	153 Bracket, MD P.C.B.	8000-06-18

Ref. No.	Description	Parts No.
	154 PCB ass'y MD	8000-06-308
	155 Screw, Sems M2 x 5	9078-00-00
156	Screw, Sems M2.6 x 5	9097-00-00
157 – 170	Not used	
171	Plate Ass'y, Impedance Roller	8000-07-303
	(consists of 172-175, 178)	
	172 Rivet, Impedance	8000-07-501
	173 Roller, Impedance	8000-07-05
	174 Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00
	175 Washer, Polyslider ϕ2.1 x ϕ5 x t0.3	9747-00-00
	178 Head, Full Erase	8000-15-03
176	FE Plate Spring	8000-07-04
177	E-Ring ϕ3.0	9505-00-00
179	Screw, camera M2x3	9550-00-00
180 – 190	Not used	
191	Tension Arm Ass'y (consists of 192-196)	8000-08-302
	192 Brake Ass'y (consists of 193 -194)	8000-08-303
	193 Flat Ass'y, Back Tension	8000-08-301
	194 Screw, C-Tight M2 x 6	9182-00-00
	195 Arm Ass'y, Tension Arm	8000-08-501
	196 E-Ring ϕ1.5	9500-00-00
197	Plate, Back Tension Adjusting	8000-08-13
198	Spring, Tension Arm	8000-08-14
199	Screw, Sems M2.6 x 5	9097-00-00
200	Washer, Flat ϕ2.6 x ϕ7 x t0.8	9324-00-00
201	Arm, Back Tension Return	8000-08-10
202	Collar	8000-08-12
203	Screw M2.6 x 4	9038-00-00
204	E-Ring, ϕ2.0	9502-00-00
205	E-Ring, ϕ2.0	9502-00-00
206	Lever, Back Tension Return	8000-08-11
207	E-Ring, ϕ2.5	9504-00-00
208	Guide, Tension	8000-08-17
209	Support (B), Back Tension	8000-08-16
210	Screw, C-Tight M2.6 x 5	9192-00-00
211	Screw, C-Tight M3 x 5	9202-00-00
212 – 220	Not used	
221	Pinch Roller Ass'y	8000-09-306
	(consists of 222-224)	
	222 Screw M2.6 x 4	9038-00-00
	223 Rivet, Pinch Roller Arm	8000-09-504
	224 Pinch Roller	8000-09-16
225	E-Ring, ϕ2.3	9503-00-00
226	Toggle Arm Ass'y (consists of 227-229)	8000-09-305
	227 Rivet, Toggle Arm	8000-09-505
	228 Spring (B), Pinch Roller	8000-09-05
	229 Spring (A), Pinch Roller	8000-09-04
230	Collar	8000-08-12
231	Screw, C-Tight M2.6 x 5	9192-00-00
232	Plate Ass'y, Pressure	8000-09-303
	(consists of 233-237)	
	233 Rivet, Pressure Plate	8000-09-503
	234 Roller, Pressure	8000-09-08
	235 E-Ring, ϕ2.0	9502-00-00

Ref. No.	Description	Parts No.
	236 Collar	8000-08-12
	237 Screw, C-Tight M2.6 x 5	9192-00-00
238	Actuator, Pressure Arm	8000-09-20
239	Support, Tape	8000-09-17
240	Shaft, Tape Support	8000-09-18
241	Spring, Tape Support	8000-09-19
242	Nut, Self	8000-09-21
251	Sub Chassis Ass'y (consists of 252-259)	8000-10-306
	252 Rivet, Sub Chassis	8000-10-507
	253 Arm, Change Plate Aciton	8000-10-17
	254 E-Ring, ϕ3	9505-00-00
	255 Spring, Change Plate	8000-10-15
	256 Spring, Change Plate Action Arm	8000-10-19
	257 Rivet, Actuator Switch	8000-10-506
	258 Collar	8000-08-12
	259 Screw, Sems M2.6 x 5	9097-00-00
260 – 262	Not used	
263	Screw, Sems M2.6 x 5	9097-00-00
264	Screw, Sems M2 x 6	9079-00-00
265	Screw, Camera, Flat Head M2.6 x 5	9564-00-00
266 – 280	Not used	
281	Reel Ass'y, Supply	8000-11-301
282	Reel Ass'y, Take-up	8000-11-305
283	Washer, Polyslider ϕ2.1 x ϕ5 x t0.5	9876-00-00
284	Washer, ϕ3.1 x ϕ6 x t0.5	9912-00-00
285	Bracket Ass'y, Reel Sensor (consists of 286-288)	8000-11-308
	286 PCB Ass'y, Reel Sensor	8000-11-306
	287 Bracket (B), Reel Sensor	8000-11-17
	288 Screw, Camera M2.6 x 2.5	9555-00-00
289	Screw, Sems M2.6 x 5	9097-00-00
290	Screw, M2.6 x 7	9041-00-00
291	Bracket ass'y, Reel Sensor Connector	8000-11-309
292	PCB Ass'y, Reel Sensor Connector	8000-11-307
293	Screw, Sems M2.6 x 5	9097-00-00
295	Pulley, Wind	8000-12-308
296 – 300	Not used	
301	Ass'y, Clutch	8000-12-304
302	Gear Holder Ass'y (consists of 303-305, 314-320)	8000-12-305
	303 Rivet, Gear Holder	8000-12-503
	304 Gear, R Drive	8000-12-19
	305 Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00
	314 Gear (B) Ass'y, Return	8000-12-306
	315 Drum Ass'y, Return	8000-12-307
	316 E-Ring, ϕ1.5	9500-00-00
	317 Arm, Return	8000-12-18
	318 Arm Collar, Return	8000-12-26
	319 Screw, Camera M2 x 3	9562-00-00
	320 Spring, Return	8000-12-25
306	Gear Shaft A	8000-12-07
307	Gear, FF	8000-12-08
308	Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00
310	Screw, Sems M2 x 5	9078-00-00
311	Clutch Ass'y, RF	8000-12-309

Ref. No.	Description	Parts No.
312	Washer, ϕ3.6 x ϕ6 x t0.1	9798-00-00
313	Washer, Polyslider ϕ2.6 x ϕ6 x t0.5	9884-00-00
321	Plate, Switching	8000-13-50
322	Brake Ass'y, Supply Reel	8000-13-301
	(consists of 323-325)	
	323 Main Brake Ass'y, Supply Reel	8000-13-501
	324 Spring, Brake Arm	8000-13-09
	325 Shue B, Brake	8000-13-26
326	E-Ring, ϕ2.3	9503-00-00
327	Spring, Brake Main	8000-13-10
328	Brake Ass'y, Take-up Reel	8000-13-302
	(consists of 329-331)	
	329 Main Brake Ass'y, Take-up Reel	8000-13-502
	330 Spring, Brake Arm	8000-13-09
	331 Shue B, Brake	8000-13-26
332	E-Ring, ϕ2.3	9503-00-00
333	Arm, Take-up Brake Actuator	8000-13-34
334	Collar	8000-08-12
335	Screw, Sems M2.6 x 5	9097-00-00
336	Arm Ass'y, Left Brake	8000-13-304
	(consists of 337-338)	
	337 Arm, Left Brake	8000-13-38
	338 Shue, Brake	8000-13-11
339	Spring LB Arm	8000-13-18
340	E-Ring, ϕ2.3	9503-00-00
341	Arm, Right Brake Actuator	8000-13-21
342	Arm, Left Brake Actuator	8000-13-20
343	Spring, Nutral	8000-13-37
344	Collar, Left Brake Actuator Arm	8000-13-29
345	Spring, Left Brake Actuator Arm	8000-13-28
346	Screw, Small M2.6 x 9	9140-00-00
347	Crank, Bell	8000-13-23
348	E-Ring, ϕ2.5	9504-00-00
349	Plate Main	8000-13-02
350	Plate, Pull	8000-13-03
351	Collar	8000-08-12
352	Screw, Sems M2.6 x 5	9097-00-00
353	Brake Ass'y, S Soft	8000-13-305
354	Spring, S Soft Brake	8000-13-16
355	E-Ring, ϕ2.3	9503-00-00
356	Arm Ass'y, Back Tension	8000-13-306
357	Spring, Right Brake	8000-13-17
358	Sleeve, Right Brake Arm	8000-13-24
359	E-Ring, ϕ2.3	9503-00-00
360	Not used	
361	Planger Ass'y, Supply	8000-14-303
	(consists of 362-364)	
	362 Planger Ass'y, Main	8000-14-302
	363 Board, Release Spring	8000-14-06
	364 Screw, Sems M2 x 4	9077-00-00
365	Planger	8000-14-04
366	Screw, Sems M2.6 x 5	9097-00-00
367	Holder, Planger	8000-10-23
368	Screw, Sems M2.6 x 5	9097-00-00

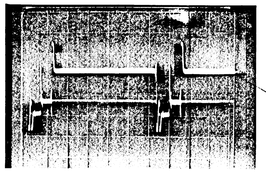
Ref. No.	Description	Parts No.
371	Capstan Ass'y, Flywheel	8000-15-28
372	P.C.B. FG Plate	8000-15-304
373	Belt, Main	8000-15-26
374 – 375	Not used	
376	Washer, Nylon ϕ3.6 x ϕ10 x t0.5	9957-00-00
377	Capstan Metal	8000-15-24
378	Screw, Flat M2.6 x 6	9684-00-00
379	Not used	
380	Screw, C-Tight M3 x 5	9202-00-00
381	Washer, ϕ3.43 x ϕ5 x t0.5	9860-00-00
392	Motor Ass'y, Capstan	8000-16-305
393	Belt, Drive	8000-16-07
394	Belt, Joint	8000-16-08
395	Screw, Pan Small M3 x 3	9060-00-00
396	Pulley, Joint	8000-16-304
397	Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00
398	Washer, Lumilar ϕ2.1 x ϕ5 x t0.5	9920-00-00
399 – 460	Not used	
461	Lamp Bracket Ass'y	8000-18-307
	(consists of 462-464)	
	462 PCB Ass'y, Lamp	8000-18-308
	463 Bracket, Lamp	8000-18-01
	464 Screw, Small 2.6 x 4	9136-00-00
465	Clamp, Cord (A)	8000-18-10
466	Screw, Sems M2.6 x 5	9097-00-00
467	Sensor, Dew	6808-00-01
468	Screw, Sems M 3 x 4	9105-00-00
650	Tape Loading Motor Ass'y	8000-21-302
	(consists of 651-659,663-666,668-671)	
	651 Motor with Pulley	8000-21-303
	652 Motor Bracket (B), Tape Loading	8000-21-27
	653 TL Worm Gear	8000-21-304
	654 Mode Switch Ass'y	8000-21-305
	655 Screw, Sems M2.6 x 5	9097-00-00
	656 Holder (A), TL Worm Gear	8000-21-32
	657 Holder (B), TL Worm Gear	8000-21-33
	658 Pulley, TL	8000-21-40
	659 Belt, TL	8000-21-39
	660 – 662 Not used	
	663 Actuator, Angle Switch	8000-21-28
	664 Collar, Actuator Angle	8000-21-12
	665 Screw, Sems M2 x 4	9077-00-00
	666 Actuator, M Switch	8000-21-501
	667 Not used	
	668 Screw, Sems M3 x 3	9105-00-00
	669 Screw C-Tight M2.6 x 5	9192-00-00
	670 Washer ϕ2.2 x ϕ3.8 x t0.2	9939-00-00
	671 E-Ring ϕ1.2	9499-00-00
700	Front Loading Ass'y (consists of 701-818)	8000-22-323
701	BracketAss'y, Loading Motor	8000-22-302
	(consists of 702-706,710-716)	8000-22-303
	703 PCB Aaa'y Loading Motor	8000-22-304
	704 Rivet, Motor Bracket	8000-22-501
	705 Gear, Worm	8000-22-305

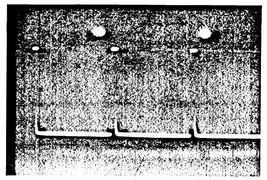
Ref. No.	Description	Parts No.
	706 PCB Ass'y, Sensor (R)	8000-22-320
	707 – 709 Not used	
	710 Lever (A) Switch	8000-22-28
	711 Lever (B) Switch	8000-22-29
	712 Holder, Worm Gear	8000-22-27
	713 Screw, Sems M2.6 x 4	9096-00-00
	714 Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00
	715 Screw, Sems M2 x 5	9078-00-00
	716 Belt, Front Loading	8000-22-64
717 – 718	Not used	
719	Record Switch Ass'y	8000-22-324
720	Screw Sems M2x4	9077-00-00
721	Cassette Holder Ass'y	8000-22-308
	(consists of 722-727)	
	722 Holder, Cassette	8000-22-03
	723 Plate, Slide	8000-22-13
	724 Lock Plate (R)	8000-22-12
	725 Collar	8000-08-12
	726 Spring, Lock Plate	8000-22-43
	727 Screw, Camera M2.6 x 3	9556-00-00
728 – 729	Not used	
730	Front Bracket Ass'y	8000-22-309
	(consists of 731-733)	
	731 Bracket, Front	8000-22-06
	732 Guide (R), Tape	8000-19-25
	733 Guide (L), Tape	8000-19-26
734 – 744	Not used	
745	Side Plate (R) Ass'y	8000-22-310
	(consists of 746-756)	
	746 Plate (R), Side	8000-22-502
	747 Pressure, Cassette	8000-19-11
	748 Not used	
	749 Screw, Camera M2.3 x 2	9833-00-00
	750 Lever, Open	8000-22-25
	751 Spring, Open Lever	8000-22-44
	752 Collar, Open Lever	8000-22-42
	753 Screw, Camera M2 x 4	9551-00-00
	754 Lever, Rock Cancel	8000-22-16
	755 Roller, Guide	8000-22-23
	756 Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00
757	Stay, top	8000-22-65
758 – 759	Not used	
760	Side Plate (L) Ass'y	8000-22-311
	(consists of 761-770)	
	761 Plate (L), Side	8000-22-503
	762 Pressure, Cassette	8000-19-11
	763 Not used	
	764 Screw, Camera M2.3 x 2	9833-00-00
	765 Lock Plate (L)	8000-19-62
	766 Spring, Lock Plate (L)	8000-19-65
	767 Collar, Lock Plate	8000-19-63
	768 Screw, Camera M2.0 x 2.5	9828-00-00
	769 Roller, Guide	8000-22-23
	770 Washer, Polyslider ϕ1.6 x ϕ3.8 x t0.3	9743-00-00

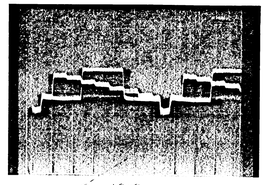
Ref. No.	Description	Parts No.
771 – 774	Not used	
775	Housing Bracket (R) Ass'y	8000-22-312
	(consists of 776-787)	
	776 Bracket (R), Housing	8000-22-504
	777 Wormwheel Ass'y (consists of 778-780)	8000-22-313
	778 Wormwheel	8000-22-20
	779 Gear, Friction	8000-22-21
	780 Spring, Friction	8000-22-48
	781 Lift Gear (R) Ass'y	8000-22-314
	782 Gear (R), Lift	8000-22-15
	783 Arm, Lift	8000-22-11
	784 Spring, Lift Gear	8000-22-45
	785 Guide, Open Lever	8000-22-26
	786 Sleeve, Guide	8000-22-24
	787 E-Ring, ϕ2.5	9504-00-00
788 – 789	Not used	
790	Housing Bracket (L) Ass'y	8000-22-315
	(consists of 791-804)	
	791 Bracket (L), Housing	8000-22-505
	792 PCB Ass'y (L) Sensor	8000-22-321
	793 – 795 Not used	
	796 Lift Gear (L) Ass'y (consits of 797-799)	8000-22-318
	797 Gear (L), Lift	8000-22-14
	798 Arm, Lift	8000-22-11
	799 Spring, Lift Gear	8000-22-45
	800 Lever Lift	8000-22-22
	801 Spring, Lift Lever	8000-22-47
	802 Sleeve, Guide	8000-22-24
	803 E-Ring ϕ2.5	9504-00-00
	804 Screw, Sems M2.6 x 6	9098-00-00
805 – 809	Not used	
810	Bracket, Rear	8000-22-08
811	Plate, Upper	8000-22-07
812	Shaft, Synchronize	8000-22-46
813	Gear (A), Synchronize	8000-22-34
814	E-Ring ϕ2.5	9504-00-00
815	Screw, Sems M2.6 x 4	9096-00-00
816	Screw, Camera M2.6 x 3	9556-00-00
817	Screw, Camera M2.3 x 2.5	9991-00-00
818	Screw, C-Tight M3 x 5	9202-00-00

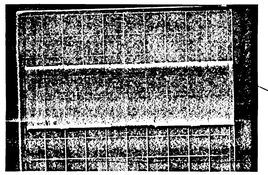
—MEMO—

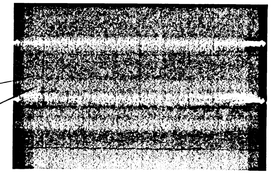
HEAD AMP, LUMINANCE. CHROMINANCE SCHEMATIC DIAGRAM

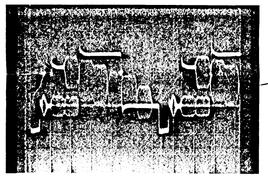

10μS
0.2V

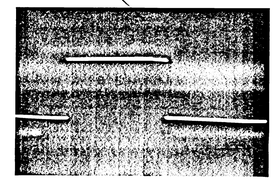

20μS
1V

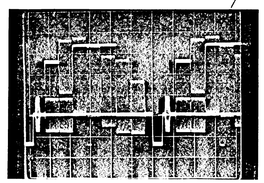

10μS
50mV

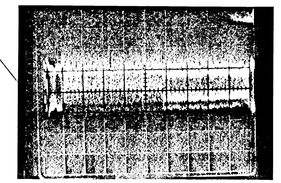

10μS
0.2V

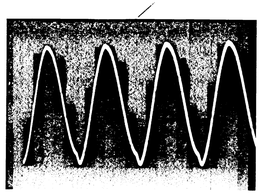

2mS
50mV


10μS
0.5V


5mS
2V


10μS
0.2V


2mS
50mV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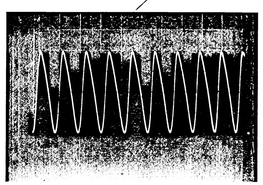
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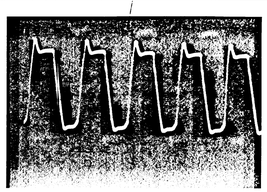
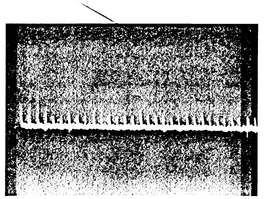
0.1V


5μS
0.2V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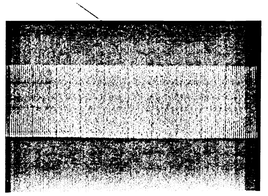
20μS
0.2V

Luminance + Color (PLAY)
Luminance (PLAY)
Color (PLAY)

Luminance + Color (REC)
Luminance (REC)
Color (REC)

R6701-02/32