SL-F1E

SERVICE MANUAL

AEP Model

711P SYSTEM

March, 1982

Also refer to OPERATION MANUAL and ADJUSTMENT MANUAL.

SPECIFICATIONS

System

Video recording system	Rotary two-head helical scanning
Video signal	CCIR standard, PAL colour
RF output signal	UHF channels 30–39 (variable) 75 ohms, unbalanced
Usable cassettes	Cassettes with the β mark
Tape speed	18.73 mm/sec.
Maximum recording time	2 hours 10 min. (with Sony L-500 cassette) 3 hours 15 min. (with Sony L-750 cassette)
Fast forward/rewind time	Under 3½ min. (with L-500 cassette)
Horizontal resolution	Colour: 260 lines B/W: 300 lines
Video S/N	Colour: Better than 40 dB B/W: Better than 43 dB
Audio frequency response	50 Hz to 10 000 Hz
Audio S/N	Better than 40 dB

Inputs and outputs

CAMERA connector	14-pin, K-type connector Video in: 1 V p-p ±0.5 V p-p 75 ohms unbalanced, sync negative Video out: 1 V p-p ±0.1V p-p 75 ohm unbalanced, sync negative Audio in: −20 dBs (0 dBs = 0.775 V rms) Audio out: −5 dBs (at load impedance 100 kilohms) output impedance: less than 10 kilohms Power supply output: 12 V dc
ACCESSORY CONNECTOR	26-pin connector Video in: 1 V p-p ±0.5 V p-p 75 ohms unbalanced, sync negative Video out: 1 V p-p ±0.1 V p-p 75 ohms unbalanced, sync negative Audio in: −10 dBs input impedance 100 kilohms Audio out: −5 dBs (at load impedance 100 kilohms) output impedance: less than 10 kilohms Power supply input: 12 V dc
Microphone input	Minijack −60 dBs, for low-impedance microphone
Earpiece output	Minijack −26 dBs, for 8-ohm earpiece

General

Power requirements	12 V dc ±10%
Power consumption	8.4 W (dc, record mode without camera)
Operating position	vertical or horizontal
Operating temperature	0°C to 40°C (32°F to 104°F)
Storage temperature	−20°C to +65°C (−4°F to +149°F)
Dimensions	Approx: 215 × 80 × 325 mm (w/h/d) (8½ × 3¼ × 12⅞ inches) not incl. projecting parts and controls
Weight	Approx. 4.3 kg (9 lb 8 oz) net

MICROFILM

Consumer VIDEO

Beta
PORTABLE VIDEO
CASSETTE RECORDER
SONY®

Accessories supplies

Betamax video cassette tape	(1)
75-ohm coaxial cable	(1)
Shoulder strap	(1)
Earpiece	(1)
RF channel adjustment screwdriver	(1)

While the information given is true at the time of printing, small production changes in the course of our company's policy of improvement through research and design might not necessarily be indicated in the specifications. We would ask you to check with your appointed Sony dealer if clarification on any point is required.

Note: Appliance conforms with EEC Directive 76/889 regarding interference suppression.

OPTIONAL ACCESSORIES

Betamax video cassette tape L-250, L-500, L-750
Video head cleaning cassette L-25CL
Rechargeable battery pack NP-1
AC power adaptor AC-F1E
Tuner timer unit TT-F1E
Car battery cord DCC-2500
Colour video camera HVC-2000P, HVC-3000P
Video monitor cable VMC-330
Cable attachment VMC-340
Carrying case LC-330
Carrying handle AH-330
Antenna selector ANS-33

TABLE OF CONTENTS

SECTION 1
GENERAL

PRECAUTIONS

On colour broadcasting systems

This machine is designed to record and play back using the PAL colour standard. Recording and playback of video sources based on other colour systems cannot be guaranteed.

On safety

- Operate the unit only on 12 V dc. For ac operation, use the AC-F1E ac power adaptor (optional) or the TT-F1E tuner timer unit (optional). Do not use any other equipment.

For car battery operation, use the DCC-2500 car battery cord only. Do not use any other car battery cord.

- The nameplate indicating operating voltage, power consumption, etc. is located on the bottom.
- Should any solid object or liquid fall into the cabinet, turn off the unit and have it checked by qualified personnel before operating it any further.

On installation

- Do not install the unit near heat sources such as radiators or air ducts or in a place subject to direct sunlight, excessive dust, or mechanical shock.
- Keep the unit and the cassette away from equipment with strong magnets, as for example, a microwave oven or a large loudspeaker.

On operation

After playing a tape, remove the cassette from its compartment if the unit will not be used for any length of time.

On cleaning

Clean the cabinet, panel and controls with a dry soft cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent, such as alcohol or benzine, which might damage the finish.

On repacking

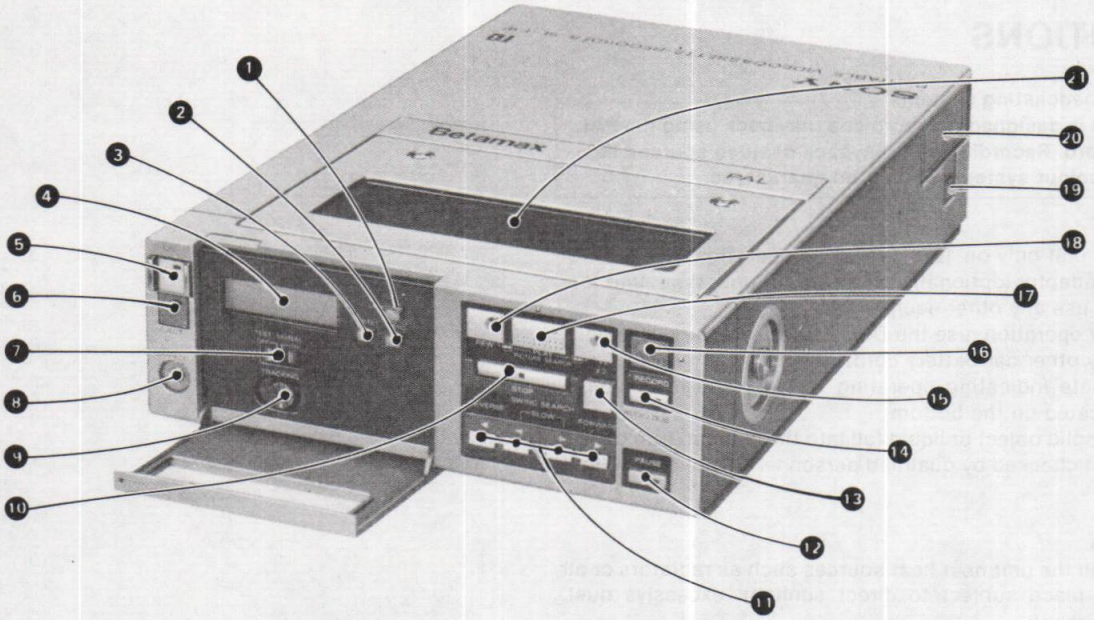
Do not throw away the carton and packing materials. They make an ideal container in which to transport the unit. When shipping the unit to another location, repack it as illustrated on the carton.

If you have any questions about this unit, contact your Sony dealer.

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY. CIRCUIT ADJUSTMENTS THAT ARE CRITICAL TO SAFE OPERATION ARE IDENTIFIED IN THIS MANUAL. FOLLOW THESE PROCEDURES WHENEVER CRITICAL COMPONENTS ARE REPLACED OR IMPROPER OPERATION IS SUSPECTED.

1-1. LOCATION AND FUNCTION OF CONTROLS

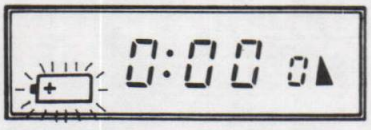


❶ LIGHT button
Press this button to illuminate the time counter for easier reading in the dark.

❷ GO TO ZERO button
Press this button in the stop mode to return the tape to the "0:00 0" point on the time counter.

❸ RESET button
Press to set the time counter to "0:00 0".

❹ Time counter
Indicates in hours, minutes, and 10s of seconds how much the tape has advanced at normal speed.
The " " indication blinks when the battery is about to be exhausted and must be replaced.
The " " indication blinks if there is moisture condensation inside the unit.
When the tape runs in the forward direction, " ▲ " mark blinks and in the reverse direction, " ▼ " mark blinks.



❺ ON button
Press this button to turn on the power. The lamp will light.
To turn the power off, press this button again.
If a tuner timer unit is connected, the recorder is turned on and off by the switch on the tuner timer unit and this button will not function.

❻ Cassette EJECT button
Press to raise the cassette compartment lid to insert or remove a cassette. This button does not function when the recorder is turned off.

❼ TEST SIGNAL switch
Set to ON to tune your TV receiver to the recorder. You can obtain a black and white pattern from the RF OUT jack of this recorder.

❽ EARPIECE jack
Connect the supplied earpiece here to monitor the sound being recorded during audio dubbing or camera recording.

❾ TRACKING control
If streaks or snow appear in a double speed or a reverse playback picture, or during playback of a cassette recorded by another recorder, adjust this control to obtain the best possible picture. Set to the centre position when playing back cassettes recorded on this recorder.

❿ ■ STOP button
Press to stop the tape.

⓫ SWING SEARCH buttons
These buttons are used for a slow-motion or a frame-by-frame picture. For details, see pages 36–38.

⓬ PAUSE button
Press to stop the tape for a moment during recording or playback. A still picture will be seen during playback and variable-speed playback can be realized using the SWING SEARCH buttons.
Press again to release the pause mode.

⓭ x2 (double-speed) button
Press during playback to obtain a double speed picture.
To resume normal playback, press the ▶ PLAY button or press this button again.

⑭ AUDIO DUB button
Use this button to dub audio onto a previously recorded tape.

⑮ ▶▶ FF (fast-forward) button
Press to advance the tape rapidly. This button is also used for the forward picture-search operation.

⑯ ● RECORD button
While pressing this button, press the ▶ PLAY button to start recording. If you press the PAUSE button while pressing this button, the reocrder will enter the recording pause mode.
When a camera is connected, you can set the unit into the recording pause mode by pressing this button and the ▶ PLAY button. To start recording from the recording pause mode, press the PAUSE button or the tape run/stop button on the camera.

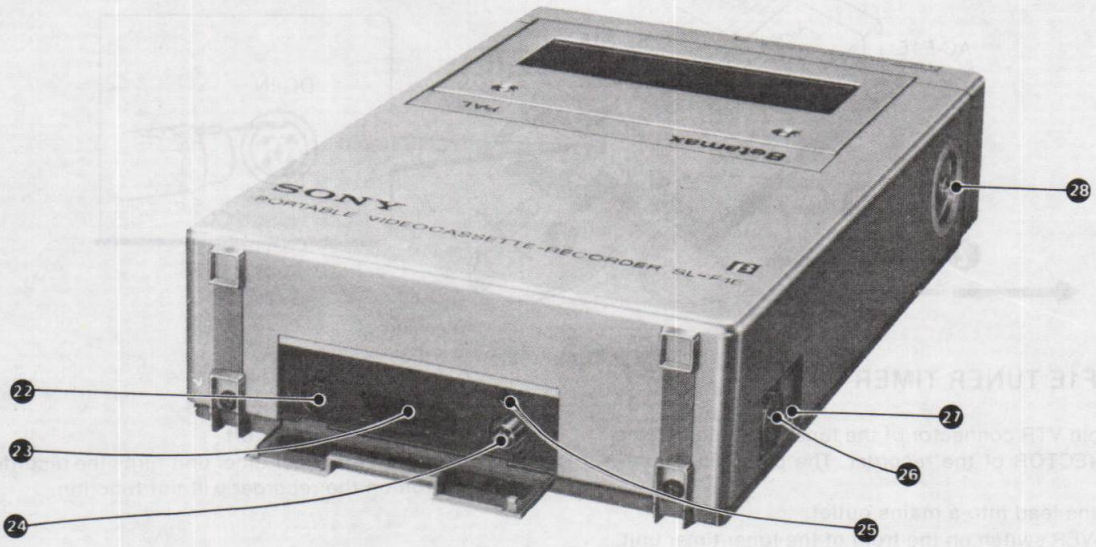
⑰ ▶ PLAY button
Press to play the tape back.

⑱ ◀◀ REW (rewind) button
Press to rewind the tape. This button is also used for the reverse picture-search operation.

⑲ Battery EJECT button
Press to remove the battery pack from its compartment.

⑳ BATTERY compartment
Insert a NP-1 rechargeable battery pack (optional).

㉑ Cassette compartment
Insert the cassette to be recorded on or played back here.



㉒ DC IN jack
Connect an AC-F1E ac power adaptor or the DCC-2500 car battery cord here.

㉓ ACCESSSORY CONNECTOR
Connect a TT-F1E tuner timer unit, a VMC-330 video monitor cable or a VMC-340 cable attachment here.

㉔ RF OUT jack
Connect to the AERIAL IN connector on the TV receiver. The signal of a VTR programme (which is converted into an RF signal) will be supplied to the TV receiver.

㉕ RF CHANNEL screw
If there is interference on the factory preset channel for RF output and the signal of this recorder cannot be displayed clearly on the TV screen, adjust this screw with the adjustment tool (a small screwdriver) supplied.

㉖ CAMERA connector (14-pin, K-type)
Connect a video camera, such as a HVC-3000P or HVC-2000P, here.

㉗ MIC (microphone) jack (minitype)
Connect a microphone here. If your microphone has a phone-type plug, use a plug adaptor.

㉘ Shoudler strap pivot
Attach the supplied shoulder strap here.

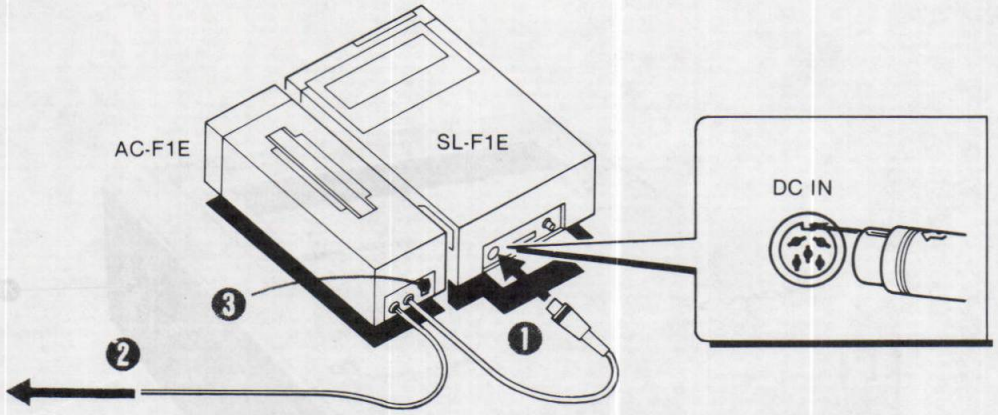
1-2. POWER SOURCES

Operate this video cassette recorder on one of the following power sources:
— NP-1 rechargeable battery pack (optional)
— Mains supply using the ac power adaptor AC-F1E (optional)
— Mains supply using the tuner timer unit TT-F1E (optional)
— 12 V car battery using the DCC-2500 car battery cord (optional)

USING THE AC-F1E AC POWER ADAPTOR

❶ Connect the DC OUT cord of the adaptor to the DC IN jack of the recorder.
● Correctly align the plug and the jack then insert the plug firmly.
❷ Connect the mains lead of the adaptor to a mains outlet.
❸ Set to ON the POWER switch on the rear of the adaptor.

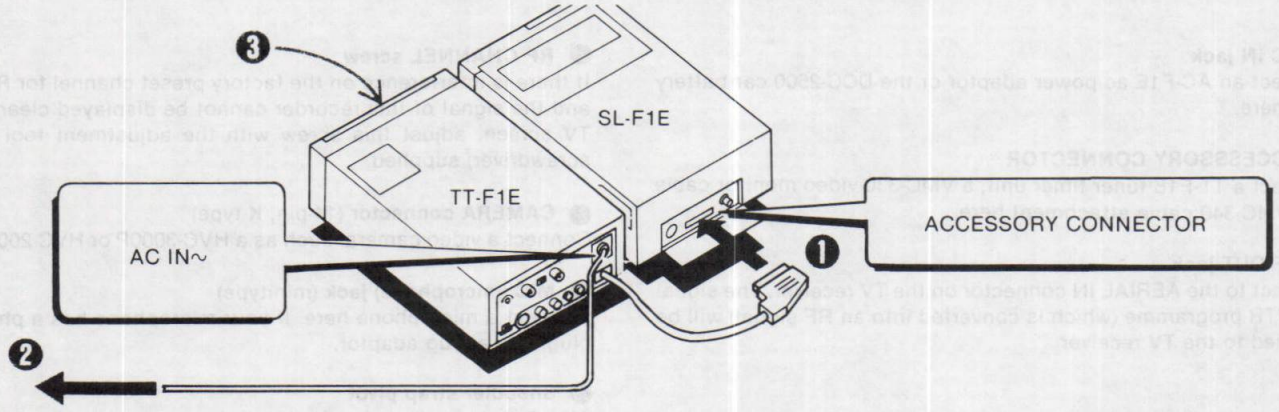
Turning the recorder on and off
— To turn the recorder on, first press the ON/STANDBY button of the ac power adaptor, then the ON button of the recorder.
— To turn it off, simply press the ON/STANDBY button on the ac power adaptor.



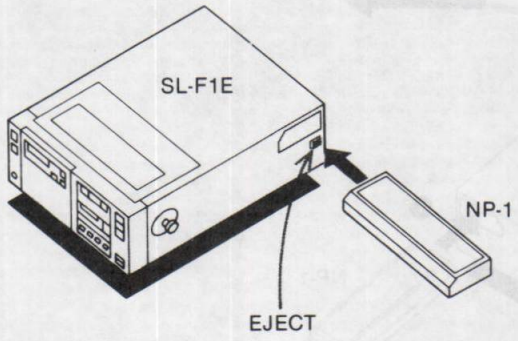
USING THE TT-F1E TUNER TIMER UNIT

❶ Connect the 26-pin VTR connector of the tuner timer unit to the ACCESSORY CONNECTOR of the recorder. The plug will fit only one way.
❷ Connect the mains lead into a mains outlet.
❸ Depress the POWER switch on the front of the tuner timer unit.

Turning the recorder on and off
The ON button on the tuner timer unit turns the recorder on and off. The ON button on the recorder will not function.



USING THE NP-1 RECHARGEABLE BATTERY PACK



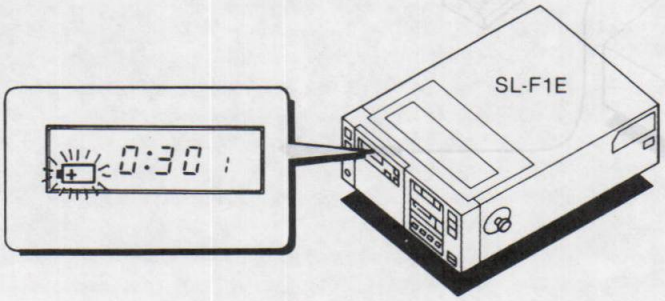
Insert the battery pack into the BATTERY compartment.
The ON button of the recorder turns the recorder on and off.
● To remove the battery pack, press the EJECT button just below the battery compartment.

NOTICE: When you operate the recorder on a battery pack, the recorder will be turned off automatically after about 8 minutes in the stop mode, to save the battery pack.

BEFORE OPERATING THE RECORDER, BE SURE TO RECHARGE THE BATTERY PACK

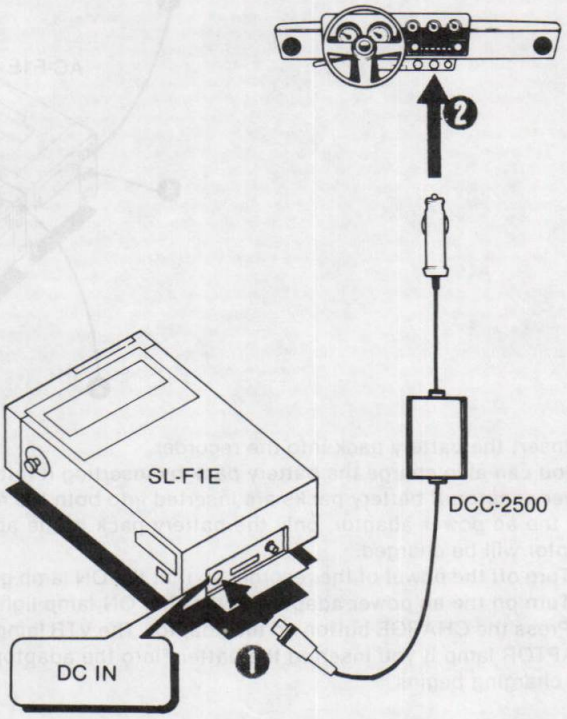
Battery life
At normal temperatures, a fully-charged battery provides 1 hour of continuous operation of both the recorder and the colour video camera.

When to replace the battery pack
The time counter warns you of a discharged battery
If "▭" mark starts blinking on the time counter, replace the battery pack with a fully-charged one. If you do not, the recorder will be automatically turned off in about 30 seconds.



If you connect a tuner timer unit, an ac power adaptor or a car battery cord, the recorder is operated on external power even if the battery pack remains inserted.

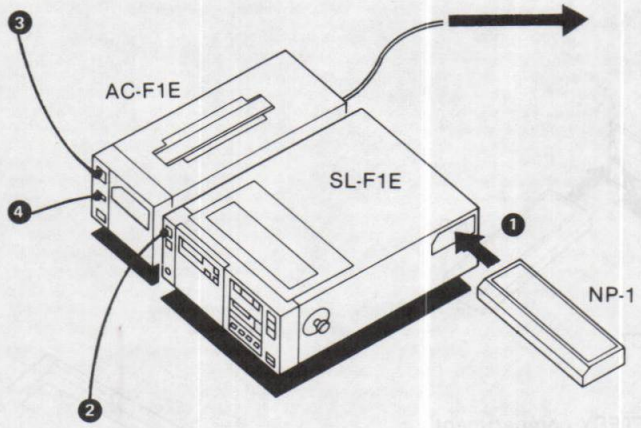
USING THE DCC-2500 CAR BATTERY CORD



❶ Connect the smaller plug of the car battery cord to the DC IN jack of the recorder. Be sure to align the plug and the jack.
❷ Plug the bigger plug into the cigarette lighter socket of your car. Your car's battery should be 12 V.
● For details, refer to the instruction manual of the DCC-2500.

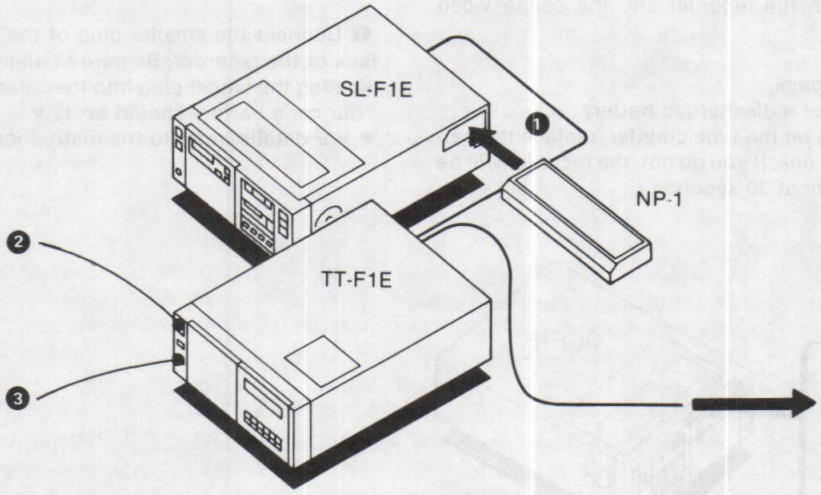
CHARGING THE BATTERY PACK

Using the ac power adaptor



❶ Insert the battery pack into the recorder.
● You can also charge the battery pack by inserting it into the ac power adaptor. If battery packs are inserted into both the recorder and the ac power adaptor, only the battery pack in the ac power adaptor will be charged.
❷ Turn off the power of the recorder so that the ON lamp goes off.
❸ Turn on the ac power adaptor so that the ON lamp lights.
❹ Press the CHARGE button on the adaptor. The VTR lamp (or the ADAPTOR lamp if you inserted the battery into the adaptor) lights and charging begins.

Using the tuner timer unit



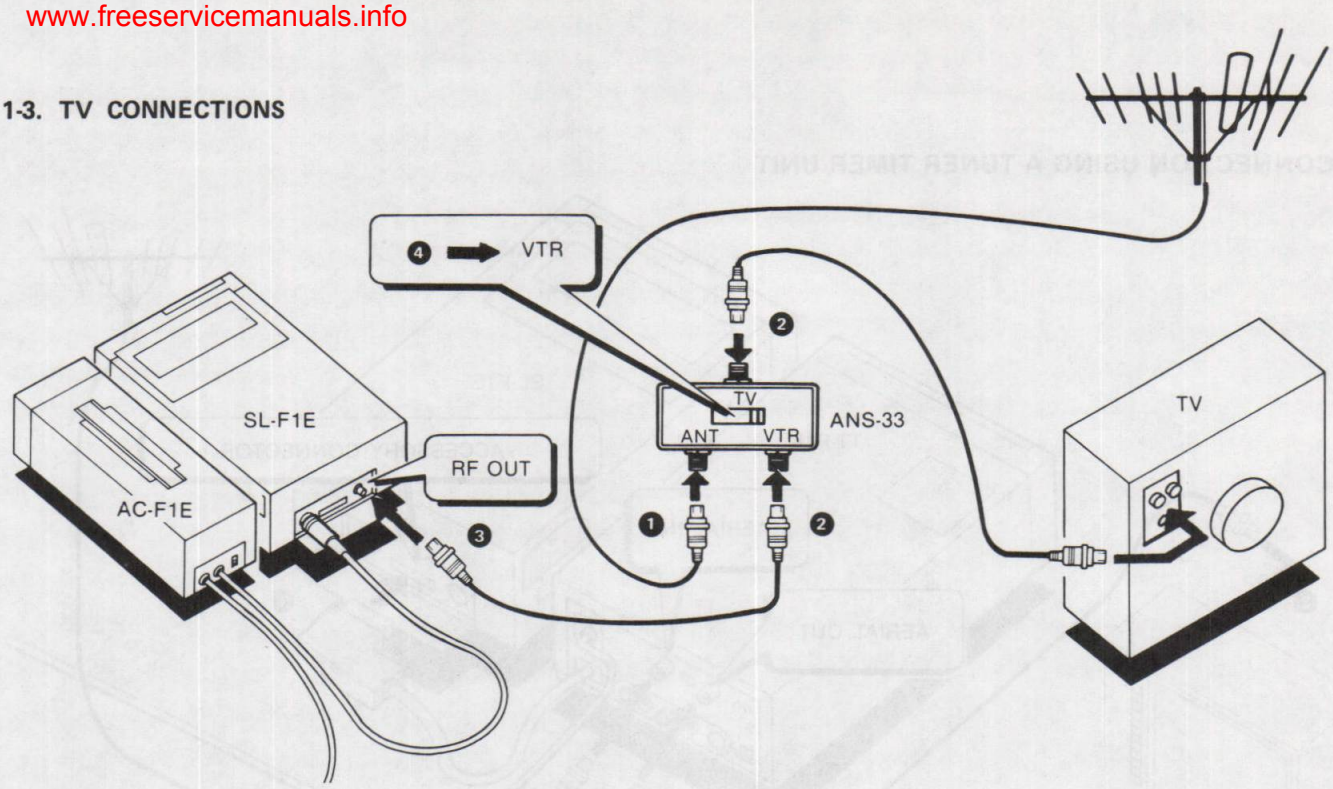
❶ Insert the battery pack into the recorder.
❷ Turn off the power by pressing the ON button of the tuner timer unit so that the green lamp goes off.
❸ Press the CHARGE button on the tuner timer unit.
The CHARGE lamp lights and charging begins.

The charging time is about 1 hour at normal temperatures. When the battery is fully charged, the charging will stop automatically and the lamp will go off.

Notes

● Do not turn on the recorder while a battery pack is charging.
● The battery pack may not be charged if you try to recharge it immediately after it has been used. If this happens, wait for a few minutes before recharging it.

1-3. TV CONNECTIONS



First unplug your TV from the mains outlet and remove the aerial cable from its socket in the back of the TV.

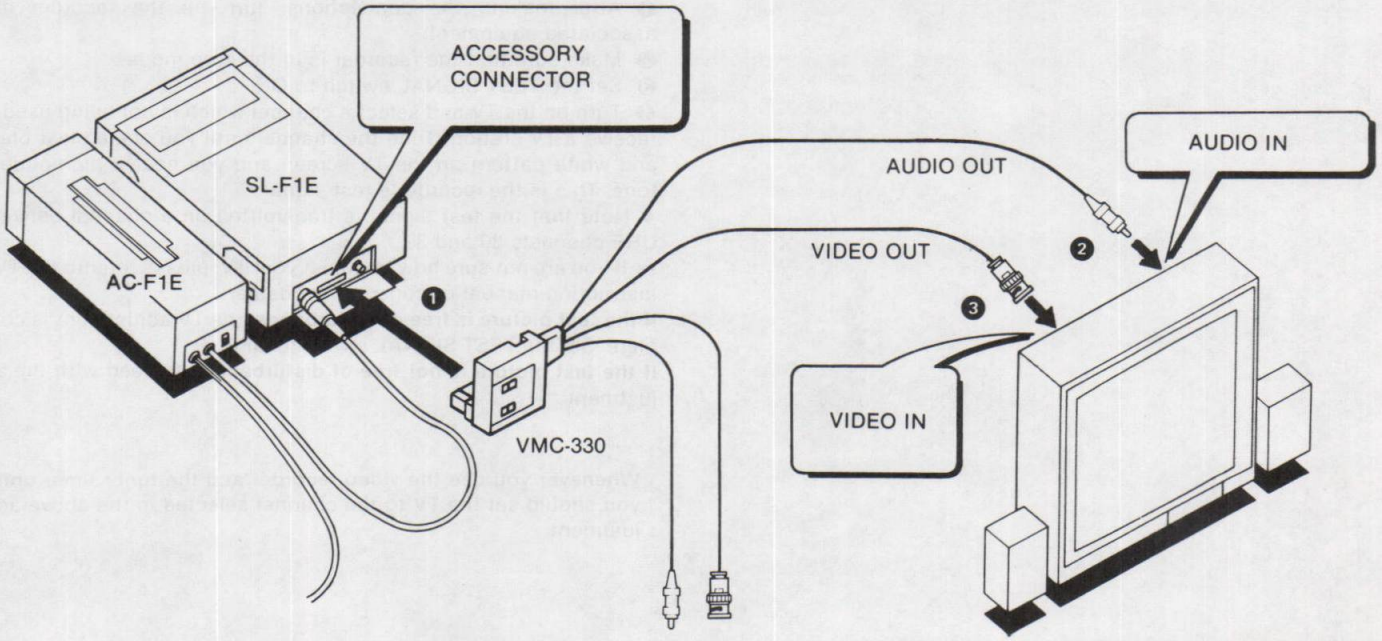
❶ Connect the aerial cable to the ANT connector of the ANS-33 antenna selector (optional).
❷ Connect the TV connector of the ANS-33 to the aerial socket of the TV with a 75-ohm coaxial cable.
❸ Connect the VTR connector of the ANS-33 to the RF OUT connector of the recorder.
❹ Set the switch on the ANS-33 to VTR.
• With this connection, we recommend using an AC-F1E ac power adaptor.

CONNECTING A COLOUR MONITOR TV

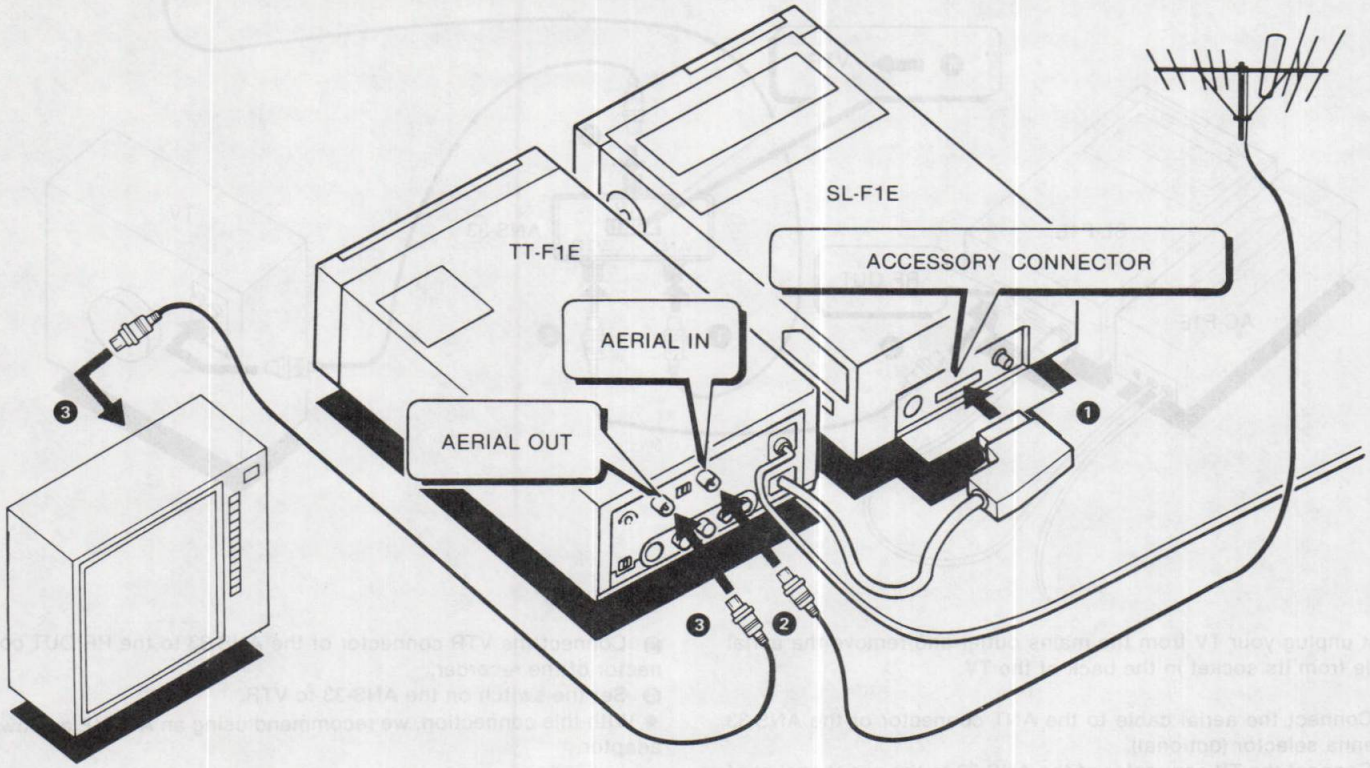
❶ Connect the VMC-330 video monitor cable (optional) to the ACCESSORY CONNECTOR of the recorder.
❷ Connect the AUDIO OUT cord of the VMC-330 to the audio input of the colour monitor TV.
❸ Connect the VIDEO OUT cord to the video input.

• We recommend using the AC-F1E ac power adaptor.
• To connect a system incorporating a tuner timer unit, refer to the instruction manual of the TT-F1E.

With this system, the following TV adjustment is not required.



TV CONNECTION USING A TUNER TIMER UNIT



❶ Connect the VTR connector cable of the tuner timer unit to the ACCESSORY CONNECTOR of the recorder.
❷ Remove the aerial cable from your TV and connect it to the AERIAL IN connector of the tuner timer unit.
❸ Connect the AERIAL OUT connector of the tuner timer unit to the aerial input of the TV using the supplied cable.
The recorder's power is supplied from the tuner timer unit.

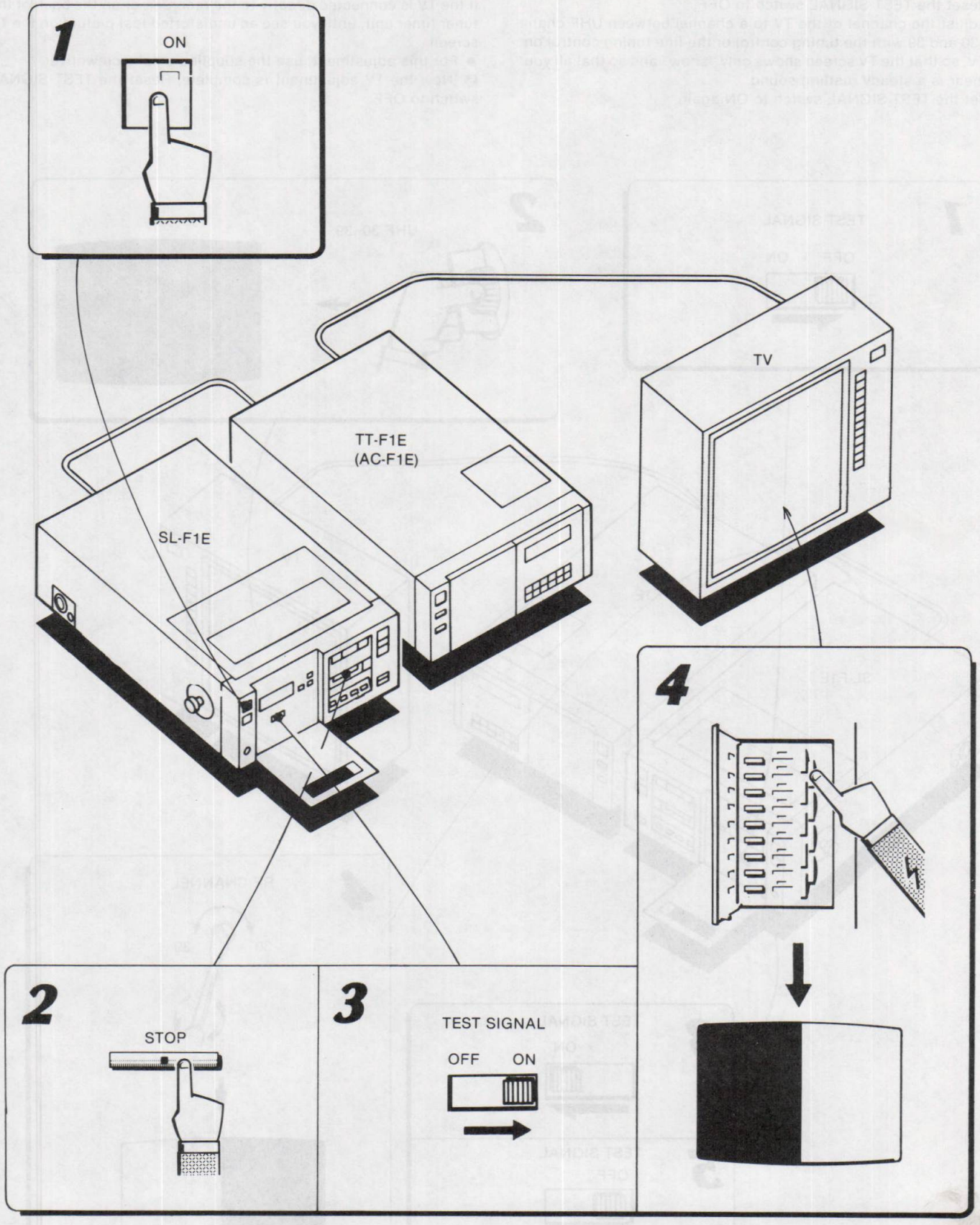
Once one of the above connections have been made, you can view TV programmes in the usual way. To view a video programme, proceed with the TV adjustment

1-4. TV ADJUSTMENT

To view a video programme or the TV programme being recorded on the TV screen, you should adjust the TV receiver so that it is tuned to the signals from the recorder.

❶ After making the connections, turn on the recorder and associated equipment.
❷ Make sure that the recorder is in the stop mode.
❸ Set the TEST SIGNAL switch to ON.
❹ Turn on the TV and select a channel which is not being used to receive a TV station. Tune the channel until you see a clear black and white pattern on the TV screen and you hear a high-pitched tone. This is the recorder's test signal.
● Note that the test signal is transmitted on a channel between UHF channels 30 and 39.
— If you are not sure how to adjust your TV, please refer to the TV's instruction manual or consult your dealer.
If the test picture is free of disturbance, the TV adjustment is complete. Set the TEST SIGNAL switch to OFF.
If the test picture is not free of disturbance, proceed with the adjustment

Whenever you use the video recorder and the tuner timer unit, you should set the TV to the channel selected in the above adjustment.



If the test picture is not free of disturbance

❶ Reset the TEST SIGNAL switch to OFF.

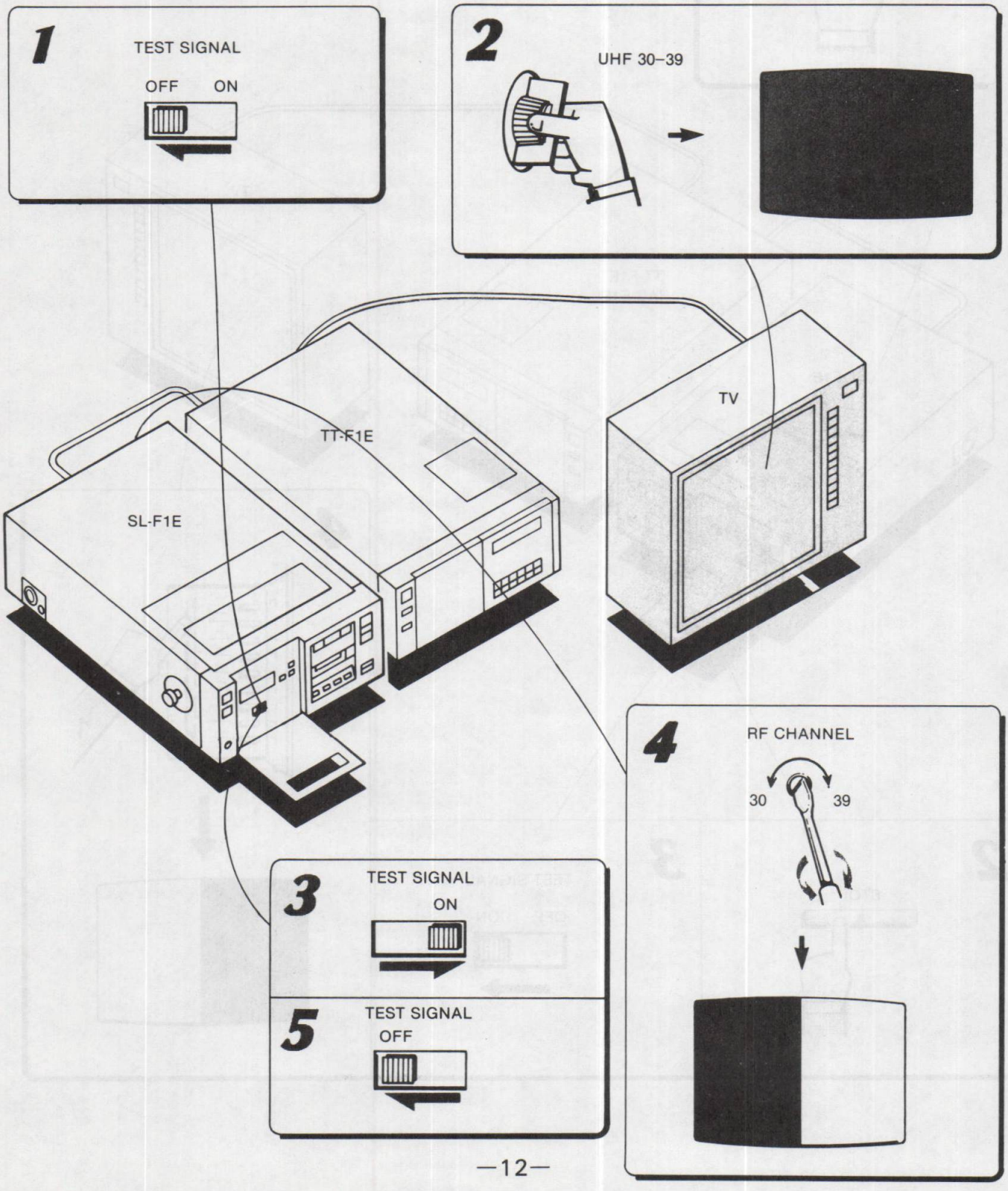
❷ Adjust the channel of the TV to a channel between UHF channels 30 and 39 with the tuning control or the fine tuning control on the TV, so that the TV screen shows only "snow" and so that all you can hear is a steady rustling sound.

❸ Set the TEST SIGNAL switch to ON again.

❹ Slowly turn the RF CHANNEL screw on the back of the recorder if the TV is connected directly to the recorder, or on the back of the tuner timer unit, until you see an undistorted test picture on the TV screen.

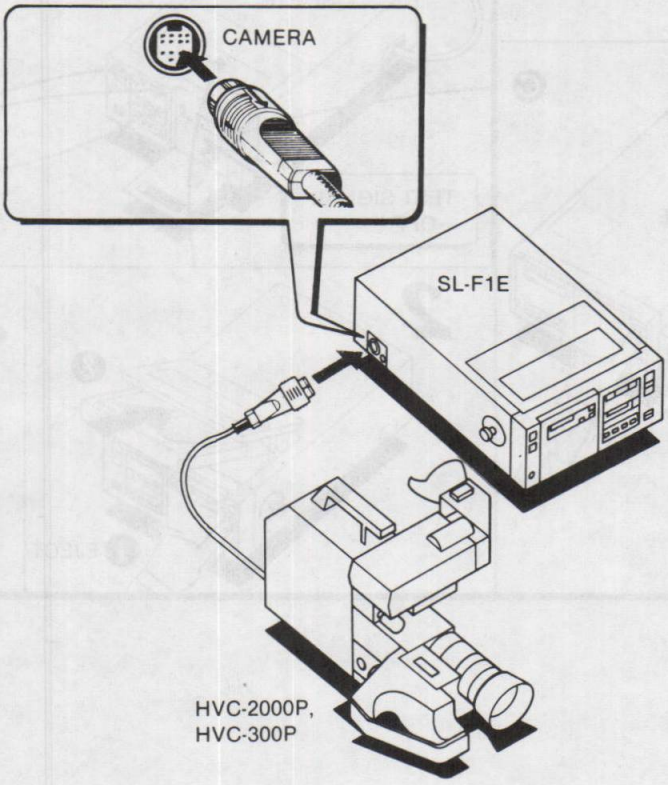
● For this adjustment, use the supplied small screwdriver.

❺ Now the TV adjustment is complete. Reset the TEST SIGNAL switch to OFF.



1-5. CAMERA RECORDING

The camera to be connected must conform to the CCIR TV standard (the PAL colour system).



First connect a power source, such as a battery pack or an ac power adaptor, then plug the K-type (14-pin) connector of a Sony HVC-2000P or HVC-3000P video camera into the CAMERA connector

Align the camera's connector with that of the recorder.

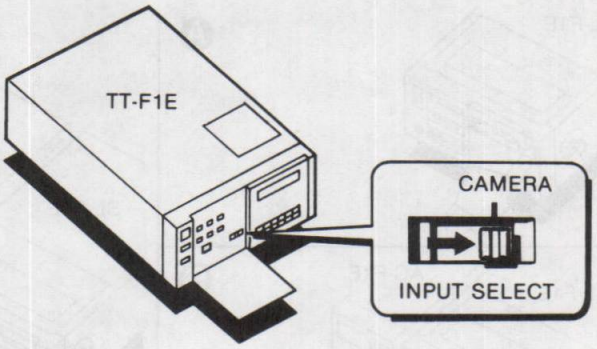
● To disconnect the camera cable, grasp the ring of the connector and pull.

Note

● If you want to use a camera not recommended in this manual, make sure that the power requirement of the camra is DC 12 V and that the power consumption is under 10W. Otherwise, the video cassette recorder will be damaged.

When the TT-F1E tuner timer unit is connected

Be sure to set the INPUT SELECT switch on the tuner timer unit to CAMERA



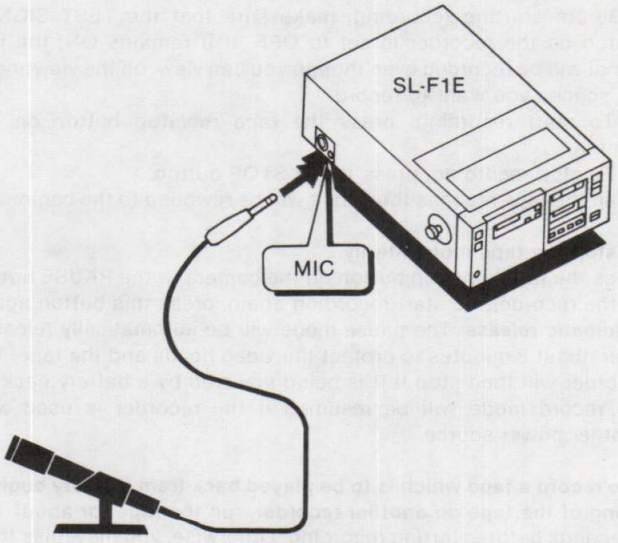
To monitor the scenes being recorded on the TV screen

Connect a TV and set it to the channel preset for the video recorder You cannot monitor, however, if the recorder is being powered by an NP-1 battery pack. In this case, connect a video monitor or a TV receiver equipped with audio and video line inputs with a VMC-330 video monitor cable

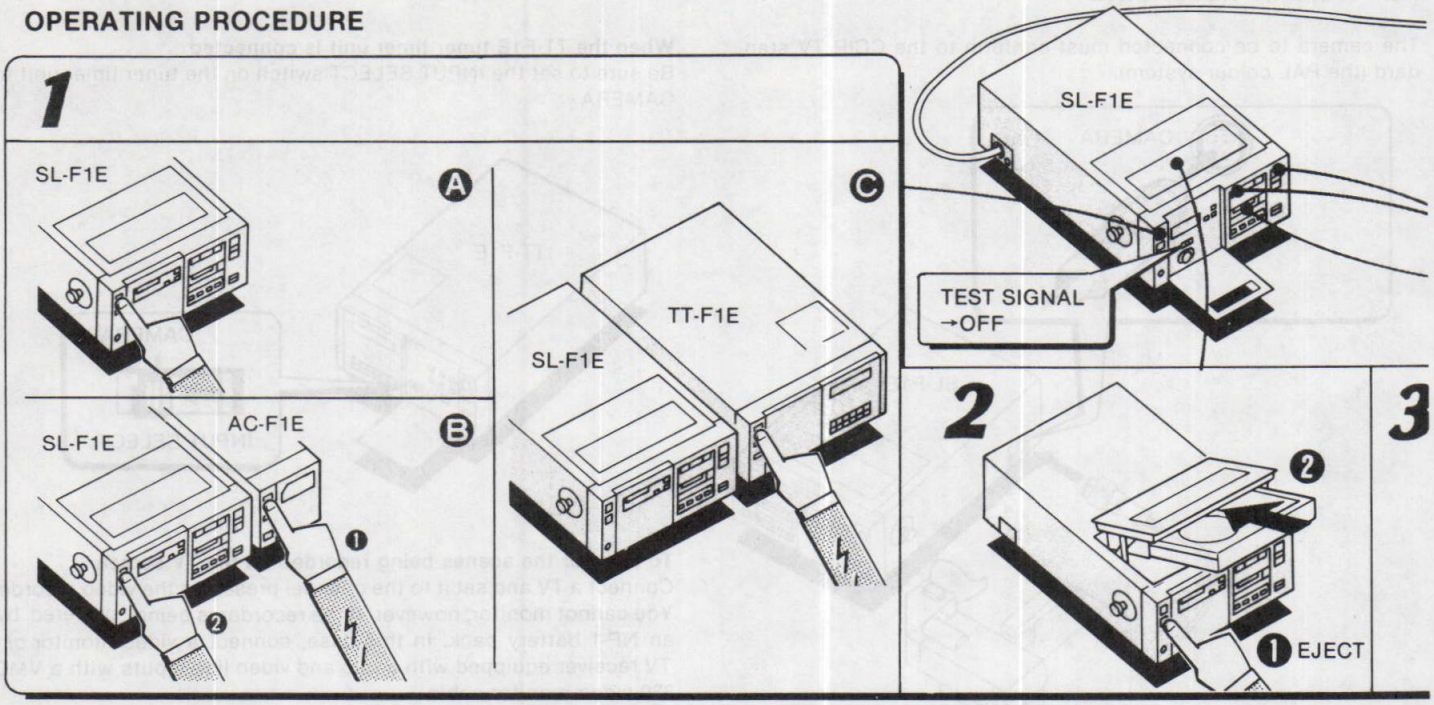
To record the sound from an external microphone

Plug a microphone into the MIC jack on the recorder

The microphone built into the camera will be disconnected. If your microphone has a phone plug, use a plug adaptor such as a Sony PC-1A (optional).



OPERATING PROCEDURE



❶ Turn on the power.
— When using with a battery pack, simply press the ON button on the recorder (case A).
— When using with an ac power adaptor, press the ON buttons on both the adaptor and the recorder (case B).
— When using with a tuner timer unit, press the ON button on the tuner timer unit (case C).

❷ Press the EJECT button and insert a cassette with the round window to the left.

❸ While holding the ● RECORD button depressed, press the ▶ PLAY button. The recorder will be set into the recording pause mode.

❹ Make the necessary adjustments on the camera. For details, refer to the camera's instruction manual.

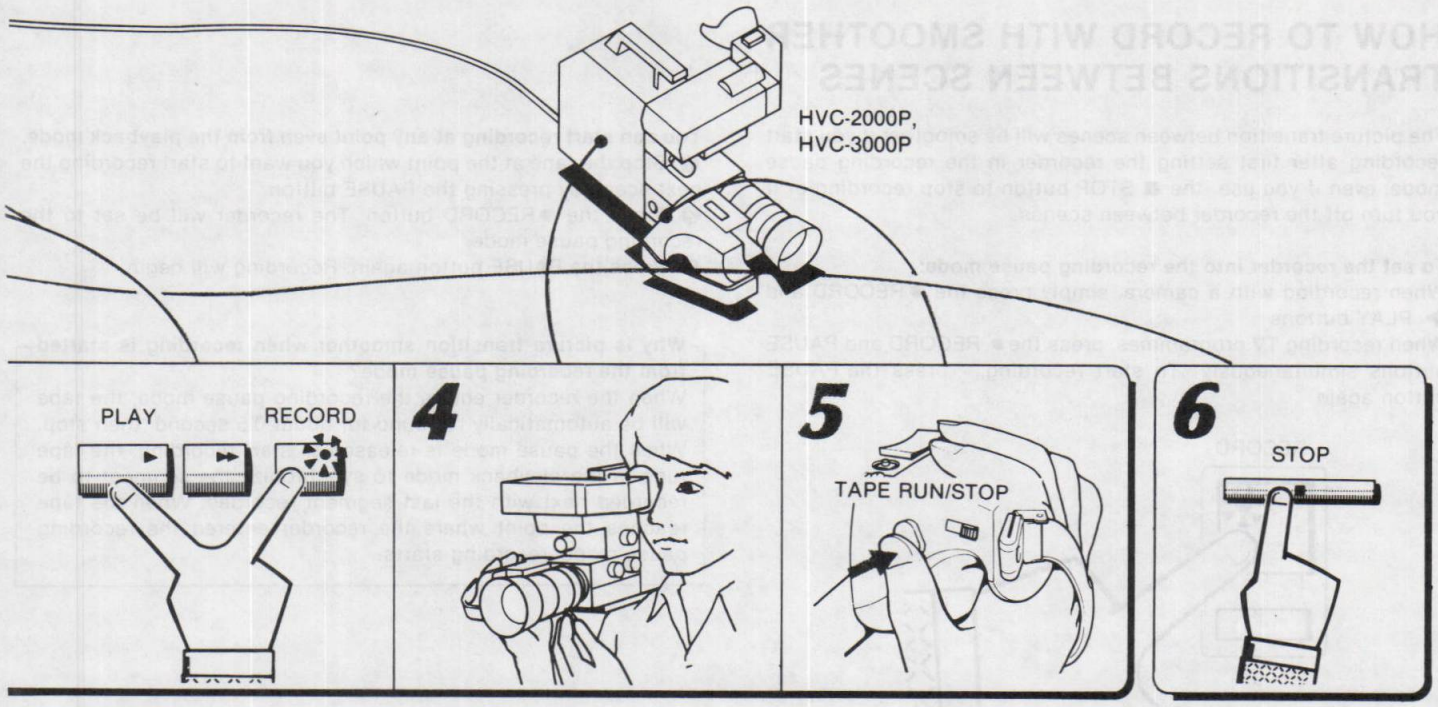
● Before starting recording, make sure that the TEST SIGNAL switch on the recorder is set to OFF. If it remains ON, the test signal will be recorded even though you can view, on the viewfinder, the scenes you want to record.

❺ To start recording, press the tape run/stop button on the camera.

❻ To stop recording, press the ■ STOP button.
When the tape reaches the end, it will be rewound to the beginning.

To stop the tape momentarily
Press the tape run/stop button on the camera or the PAUSE button on the recorder. To start recording again, press this button again.
Automatic release: The pause mode will be automatically released after about 8 minutes to protect the video heads and the tape. The recorder will then stop if it is being powered by a battery pack, or the record mode will be resumed if the recorder is used with another power source.

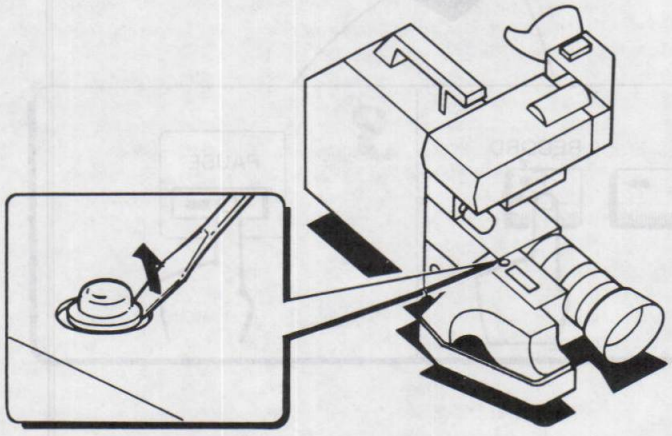
To record a tape which is to be played back from the very beginning of the tape on another recorder, run the tape for about 15 seconds before starting recording. Otherwise, you may miss the starting point during playback on the other machine.



If you use a camera with a recording review function, such as the Sony HVC-3000P and HVC-2000P*, you can check whether the recording has been made correctly immediately after you have set the recorder into the recording pause mode.
Press the recording review button in the recording pause mode. The last few seconds of the recorded scene will be played back on the viewfinder. The recorder will then enter the recording pause mode at the point where the recording review button was pressed.
To restart recording, press the tape run/stop button on the camera.

***For customers who have a HVC-3000P or HVC-200P**
The small projection located near the zoom switch is the recording review button. If this button is covered with a plastic cap, carefully remove the cover over the button with a screwdriver or similar

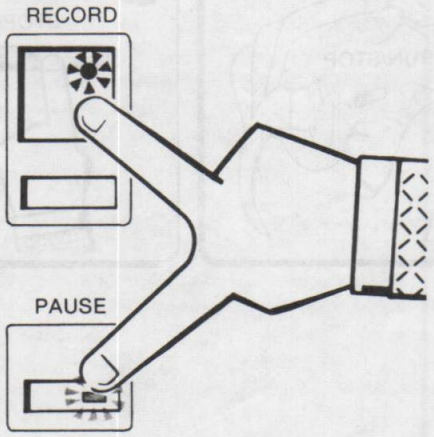
HVC-2000P,
HVC-3000P



HOW TO RECORD WITH SMOOTHER TRANSITIONS BETWEEN SCENES

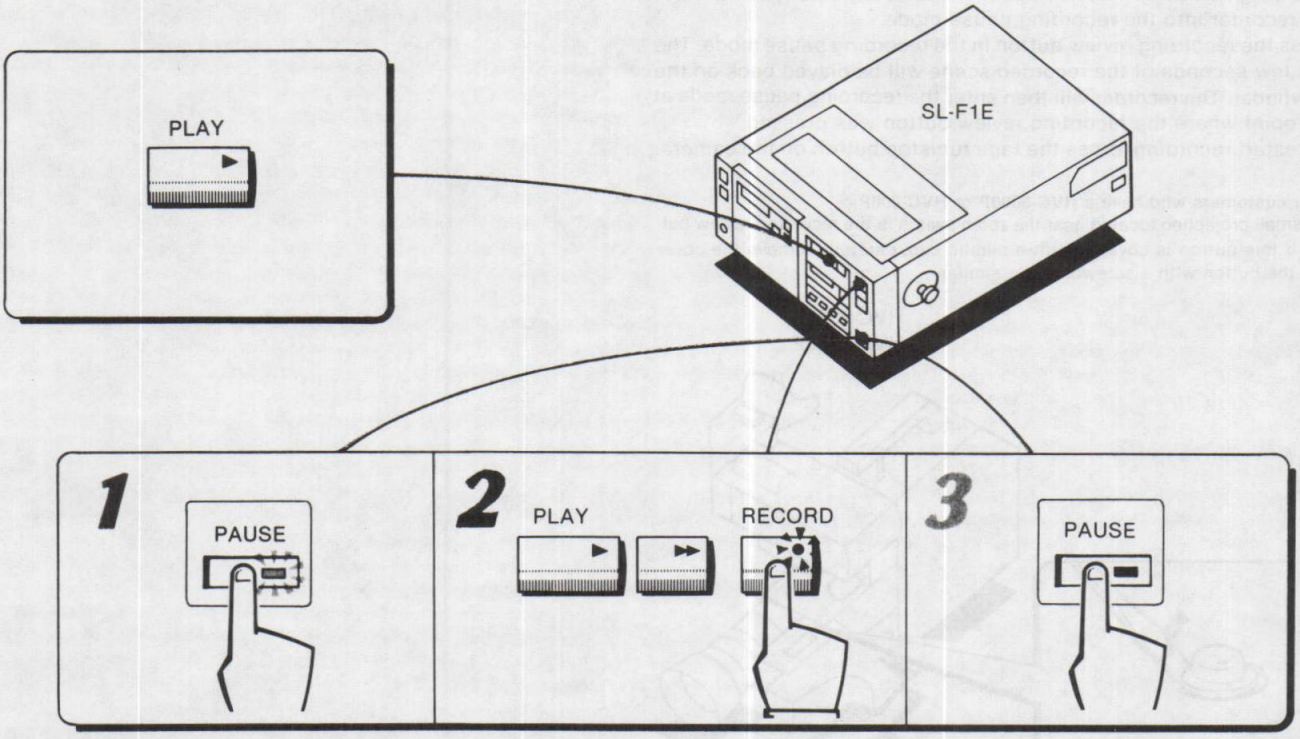
The picture transition between scenes will be smoother if you start recording after first setting the recorder in the recording pause mode, even if you use the ■ STOP button to stop recording or if you turn off the recorder between scenes.

To set the recorder into the recording pause mode:
When recording with a camera, simply press the ●RECORD and ▶ PLAY buttons
When recording TV programmes, press the● RECORD and PAUSE buttons simultaneously To start recording, press the PAUSE button again.



You can start recording at any point even from the playback mode.
❶ Stop the tape at the point which you want to start recording the next scene by pressing the PAUSE button.
❷ Press the ●RECORD button. The recorder will be set to the recording pause mode.
❸ Press the PAUSE button again. Recording will begin.

Why is picture transition smoother when recording is started from the recording pause mode?
When the recorder enters the recording pause mode, the tape will be automatically rewound for about 0.5 second, then stop. When the pause mode is released to start recording, the tape runs in the playback mode to synchronize the segment to be recorded next with the last segment recorded. When the tape reaches the point where the recorder entered the recording pause mode, recording starts.



1-6. TV PROGRAM RECORDING

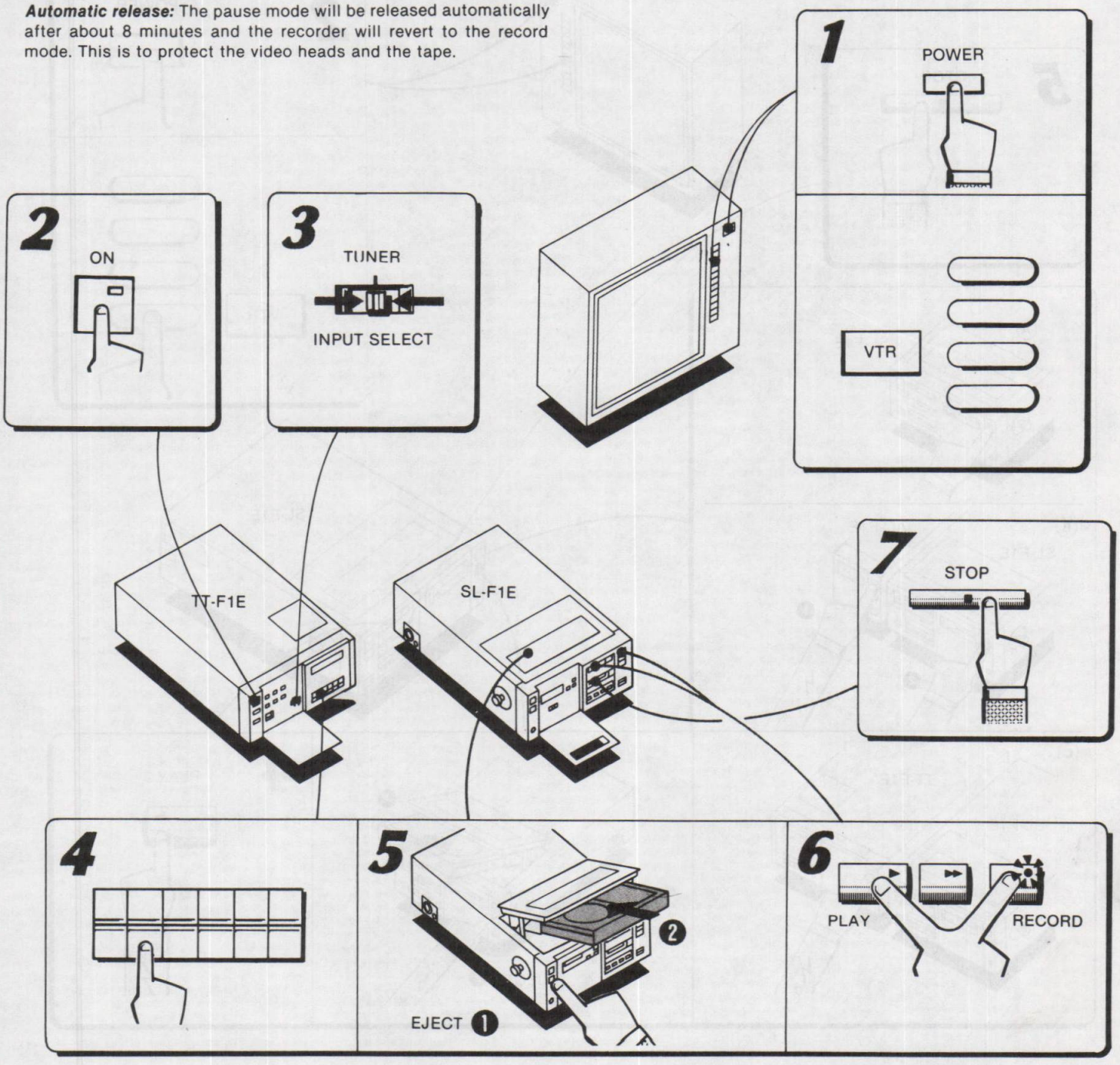
To record TV programmes, a TT-F1E tuner timer unit is necessary.
❶ Turn on the TV and select the channel preset for the video recorder.
❷ Press the ON button on the tuner timer unit.
The recorder will be turned on simultaneously.
❸ Set the INPUT SELECT switch on the tuner timer unit to TUNER.
❹ Select the channel to be recorded with the tuner timer unit.
❺ Insert a cassette into the recorder with the round window to the left.
❻ While holding the ●RECORD button depressed, press the PLAY button. Recording will begin.
❼ To stop recording, press the ■ STOP button on the recorder.

To stop the tape momentarily, press the PAUSE button. During pause mode, the TV programme can be seen on the TV but the picture will not be recorded.
Automatic release: The pause mode will be released automatically after about 8 minutes and the recorder will revert to the record mode. This is to protect the video heads and the tape.

CAUTION
Television programmes, films, video tapes and other materials may copyrighted. Unauthorized recording of such material may be contrary to the provision of the copyright laws.

RECORDING ONE TV PROGRAMME WHILE VIEWING ANOTHER

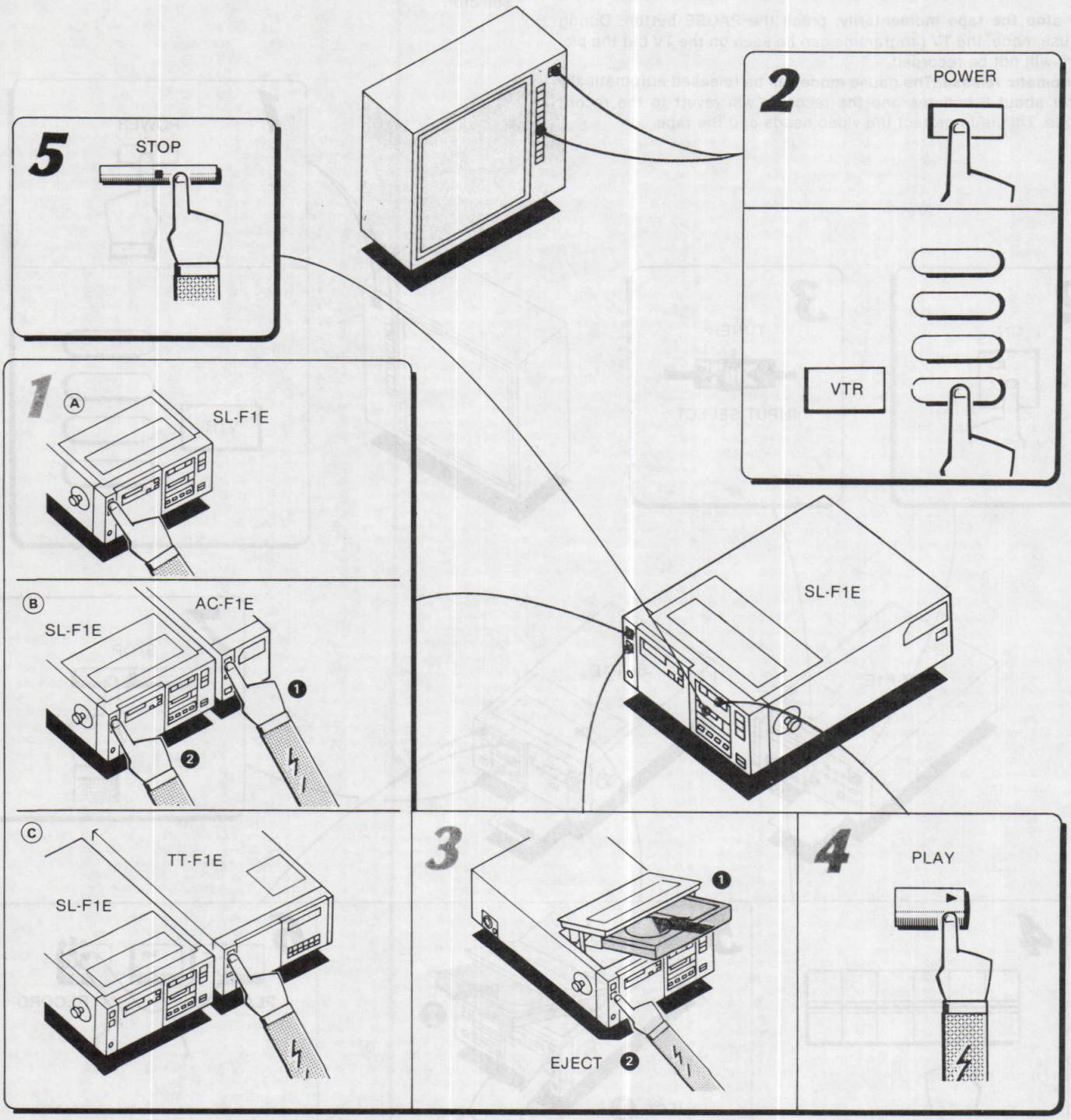
You can enjoy one TV programme while recording another TV programme as follows:
❶ Start recording the desired TV programme in the usual way.
❷ Select the channel you want to view with the TV's programme selector.



1-7. PLAY BACK

❶ Turn on the recorder and the associated equipment.
❷ Set the TV to the channel preset for the video recorder.
❸ Insert a cassette, with the round window to the left.
● Rewind the tape with the ◀◀ REW button, if necessary.
❹ Press the ▶ PLAY button on the recorder. The lamp lights up and playback begins.
❺ To stop playback, press the ■ STOP button.
When the tape reaches the end, it will be automatically rewound to the beginning.

To playback from the beginning of the tape after rewinding
Press the ▶ PLAY button while holding the ◀◀ REW button depressed during rewinding or in the stop mode
After the tape is completely rewound, the tape will automatically replay.

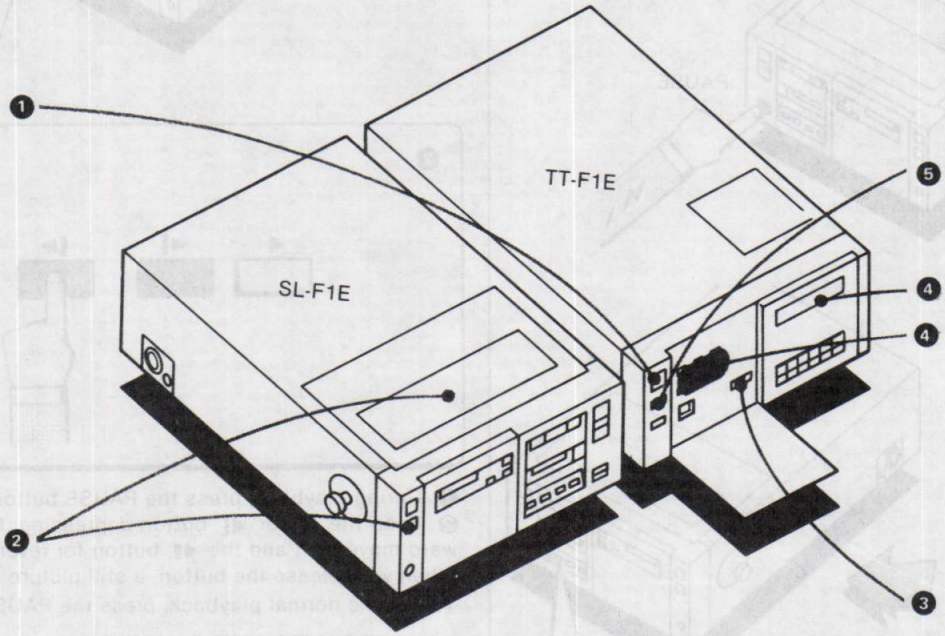


1-8. TIMER ACTIVATED RECORDING

Using the TT-F1E tuner timer unit (optional), you can record a TV programme in your absence. Recording may be begun at any time on any day of the next fourteen days and stopped at a predetermined time.
Up to 8 turn-on and turn-off times can be programmed.

POINTS TO CHECK BEFORE STARTING TIMER RECORDING

- Is the tuner timer unit connected correctly?
- Does the cassette to be used have a safety tab on the bottom?
- Is the tape in the cassette long enough to record the desired programmes?



❶ Turn on the tuner timer unit and the recorder.
❷ Insert a cassette.
❸ Set the INPUT SELECT switch of the tuner timer unit to TUNER.
❹ Set the timer programme: event number, turn-on day and time, turn-off time and channel. For details, see the TT-F1E instruction manual.
❺ Press the TIMER REC button so that the red lamp lights.

At the preset turn-on time on the preset day, recording will start automatically and continue to the preset turn-off time or to the tape end, when the recorder will be turned off.

TO OPERATE THE RECORDER OR THE TUNER TIMER UNIT AFTER THE TIMER HAS BEEN SET

Once the TIMER REC button has been pressed, the ON buttons of the tuner timer unit and the recorder will not function. This is to safeguard the timer recording.
To operate the recorder after the timer has been set, press the TIMER REC button again so that the red lamp goes off.
- The timer settings are kept in the memory even if you disengage the TIMER REC button. To restore the setting, press the TIMER REC button again.

WHEN A POWER INTERRUPTION OCCURS

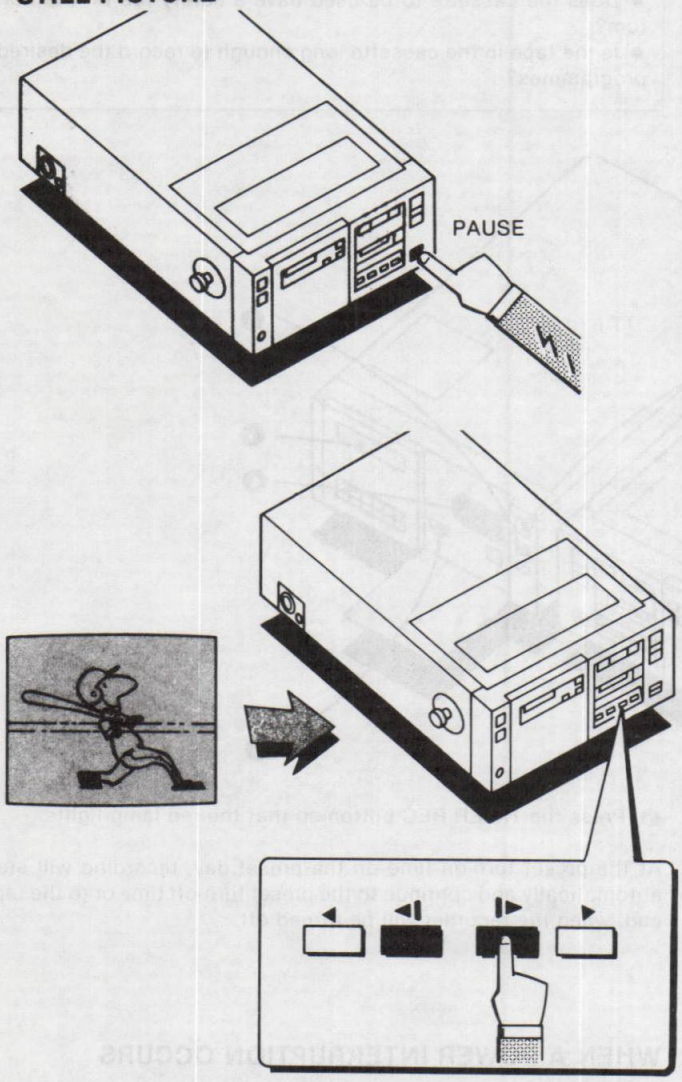
If the clock shows "0:00" of the 1st day and does not advance
all the timer settings have been erased. Reset the clock time and the timer settings.

If the clock still shows the correct time...
the power has been interrupted for less than 10 minutes and the clock has been powered by the self-charging battery built into the tuner timer unit so that the timer programmes were kept in the memory. If the interruption occurs after the recording has begun, recording will be resumed when the power is restored.

1-9. TO OBTAIN VARIABLE SPEED PLAYBACK PICTURES

With this recorder, you can obtain a still, a slow motion, a double speed, a frame-by-frame or a reverse playback picture as well as a normal speed playback picture.

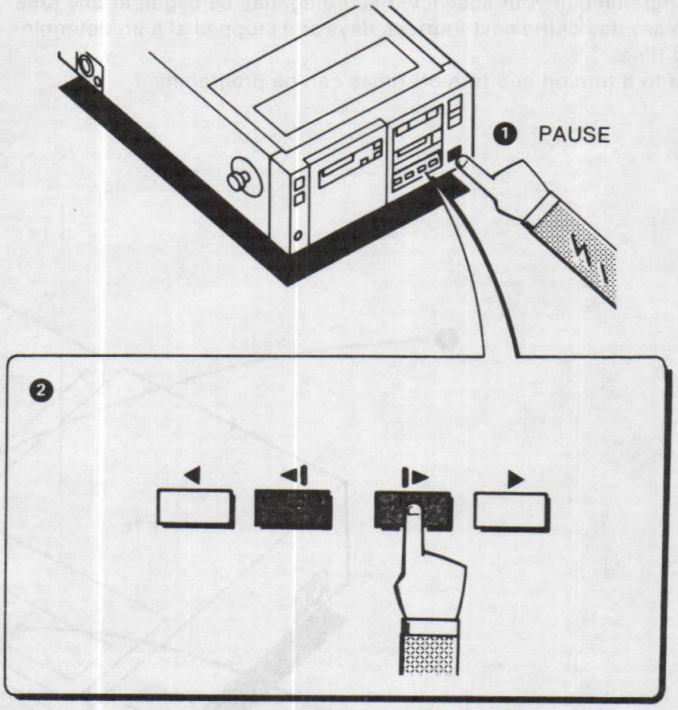
STILL PICTURE



During playback, press the PAUSE button.

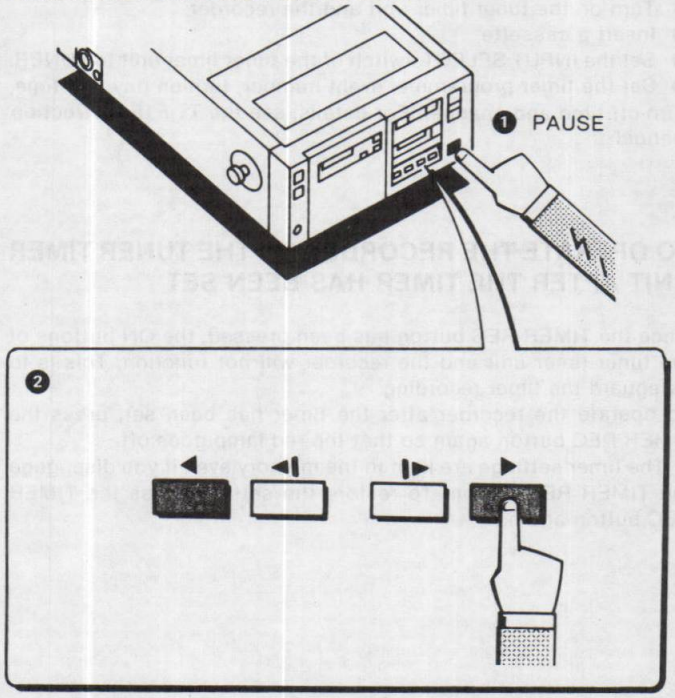
To resume normal playback, press the PAUSE button again.
If a noise band appears, press and release the ▮▶ or ◀▮ button a few times until the noise band disappears

SLOW MOTION



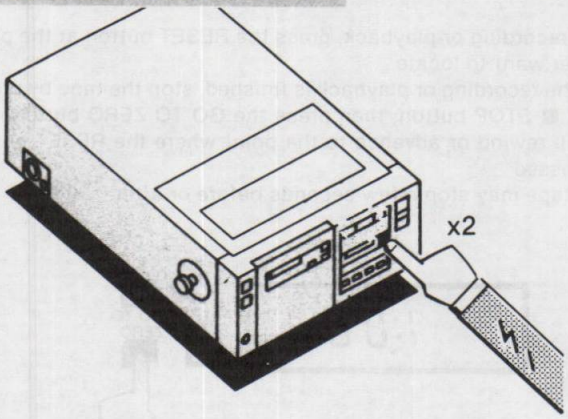
❶ During playback, press the PAUSE button.
❷ Keep the ▮▶ or ◀▮ button depressing: the ▮▶ button for forward movement and the ◀▮ button for reverse movement.
When you release the button, a still picture will be obtained.
To resume normal playback, press the PAUSE button again.

FRAME-BY-FRAME PLAYBACK



❶ During playback, press the PAUSE button.
❷ Repeatedly press and release the ▶ or ◀ button: ▶ for forward movement and ◀ for reverse movement.
To view fast action scenes, use the ▮▶ or ◀▮ button.
To resume normal playback, press the PAUSE button again.

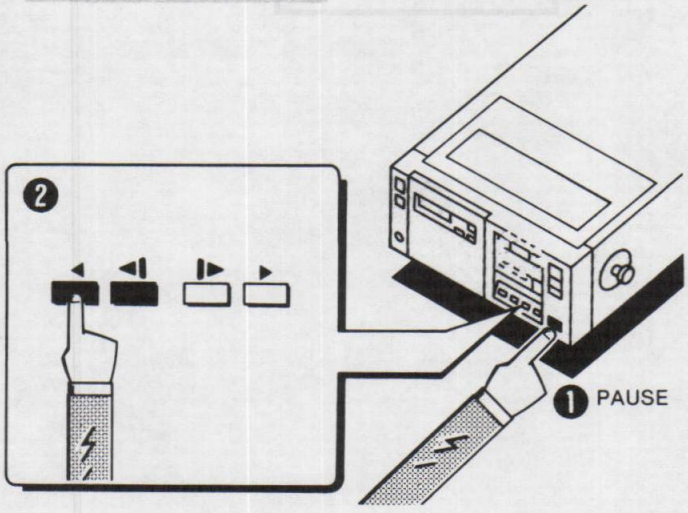
DOUBLE SPEED PICTURE



During playback, press the x2 button.

To resume normal playback, press the x2 button again or the ▶ PLAY button.

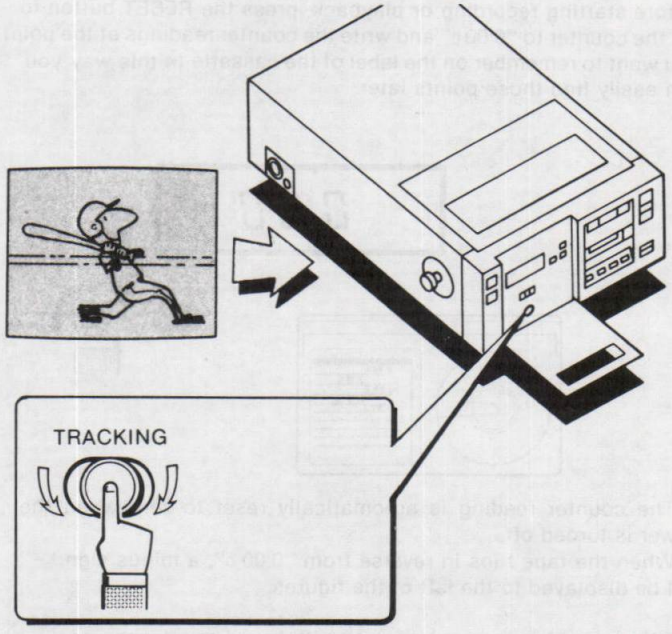
REVERSE PLAYBACK



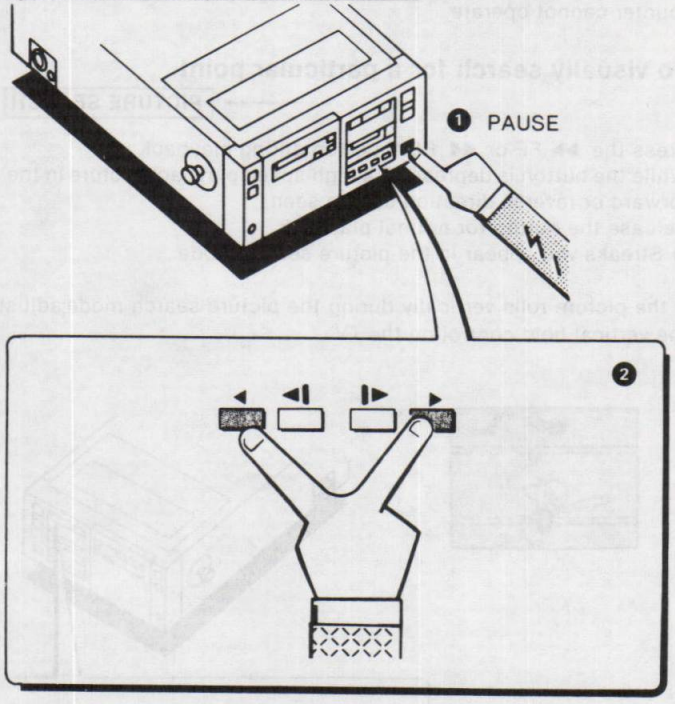
❶ During playback, press the PAUSE button.
❷ Press the ◀ button. When you release the button, the still picture will be resumed.
For a slow motion picture in reverse playback, use the ◀‖ button.
To resume normal playback, press the PAUSE button again.

If a noise band appears during double speed or reverse playback, turn the TRACKING control until the noise band is removed

- Be sure to return the TRACKING control to the centre position after double speed or reverse viewing.



BACK AND FORTH PLAYBACK



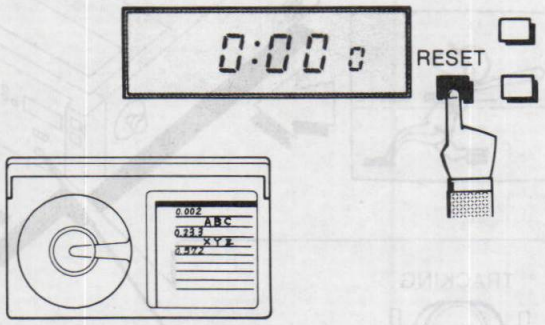
❶ During playback, press the PAUSE button.
❷ Press and release the ▶ and ◀ buttons alternately.
For slow back and forth playback, use the ‖▶ and ◀‖ buttons.
To resume normal playback, press the PAUSE button again.

1-10. TO LOCATE PARTICULAR SCENES QUICKLY

To reference a recorded programme numerically

→ TIME COUNTER

The time counter indicates how much the tape has advanced at normal playback speed in hours, minutes and tens of seconds. Before starting recording or playback, press the RESET button to set the counter to "0:00 0" and write the counter readings at the point you want to remember on the label of the cassette In this way you can easily find those points later.



- The counter reading is automatically reset to zero when the power is turned off.
- When the tape runs in reverse from "0:00 0", a minus sign "–" will be displayed to the left of the figures.

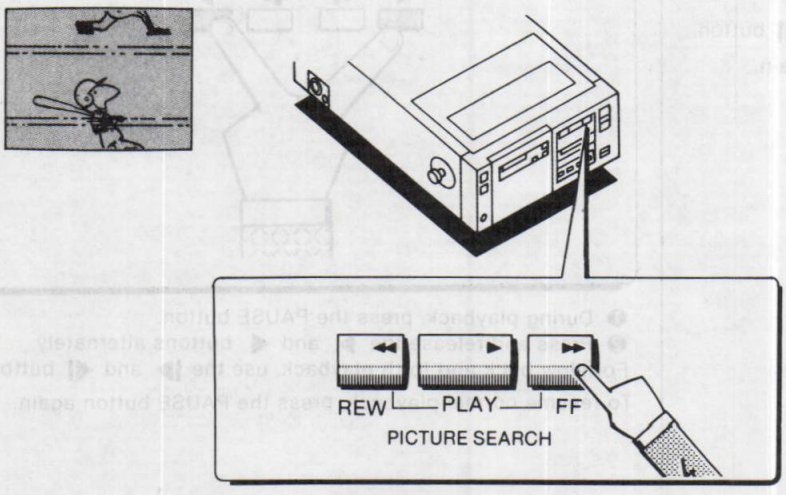
The time counter does not operate with brand-new tapes.
The time counter counts the CTL signals which are generated and recorded at the same time the video signals are recorded. Because brand-new tapes have no CTL signals recorded on them, the time counter cannot operate.

To visually search for a particular point

→ PICTURE SEARCH

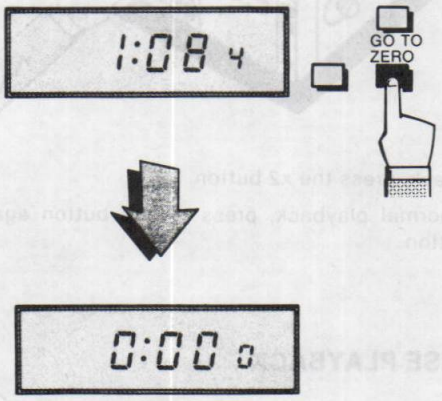
Press the ▶▶ FF or ◀◀ REW button during playback
While the button is depressed, a high-speed playback picture in the forward or reverse direction can be seen.
Release the button for normal playback.
- Streaks will appear in the picture search mode.

If the picture rolls vertically during the picture search mode, adjust the vertical hold control on the TV.



To return to a pre-registered point → GO TO ZERO

During recording or playback, press the RESET button at the point you later want to locate.
When the recording or playback is finished, stop the tape by pressing the ■ STOP button, then press the GO TO ZERO button. The tape will rewind or advance to the point where the RESET button was pressed
- The tape may stop a few seconds before or after 0:00 0.



1-11. IMPORTANT REWINDERS

If the indication blinks and the recorder does not operate
Moisture has condensed on the drum assembly inside the unit*.
Remove the cassette and leave the recorder turned on until the indication goes off.

If the recorder is powered by a battery pack
It may take considerable time for moisture to evaporate as it must be done naturally, with the recorder's power off.

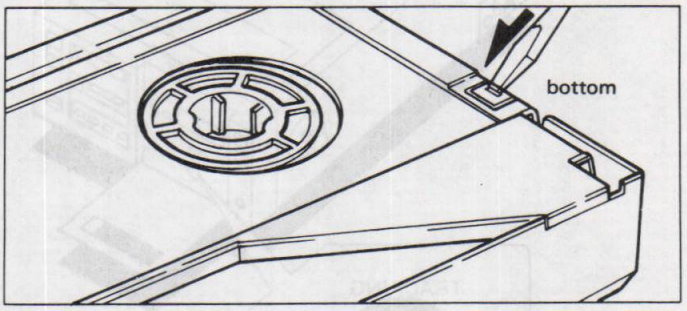
To cause moisture to evaporate more quickly
Connect a TT-F1E tuner timer unit or an AC-F1E ac power adaptor and leave the recorder turned on.
A heater built into the recorder will cause the moisture to evaporate within 1.5 hours.

*If the recorder is brought directly from a cold to a warm location, moisture may condense on the drum assembly inside the unit.
This may create a tendency for the tape to adhere to the head drum and both the tape and the recorder may be damaged.

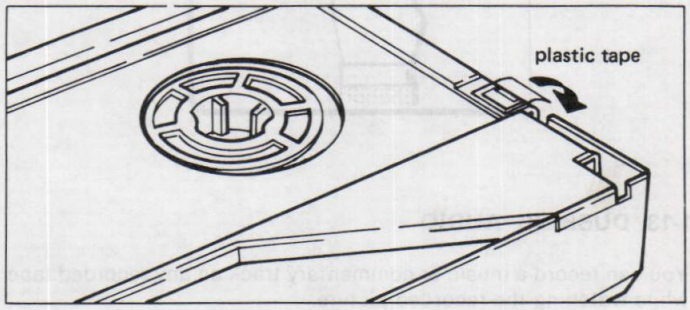
TO KEEP A RECORDED PROGRAMME FROM BEING ACCIDENTALLY ERASED

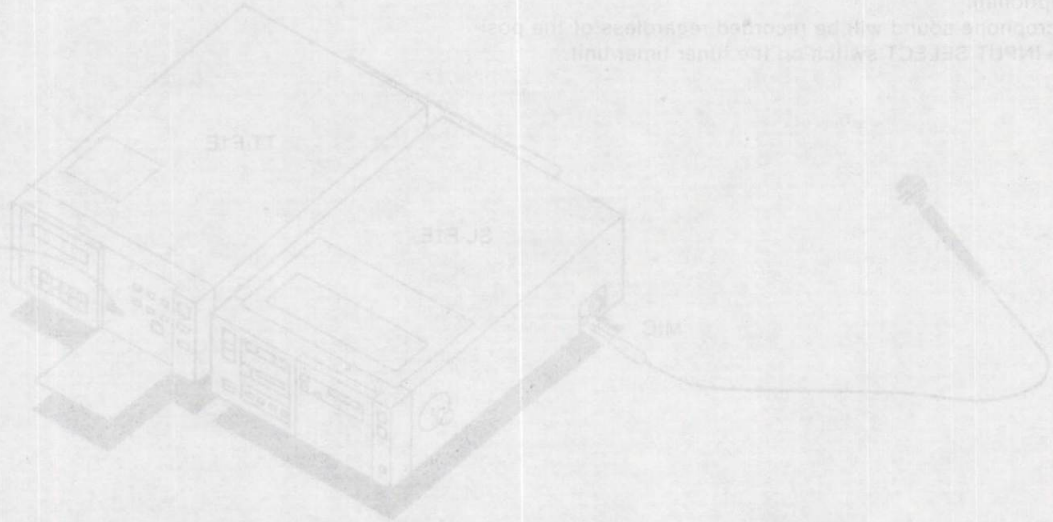
When a new recording is made on a previously recorded cassette, the previous recording will be automatically erased.

To avoid erasing a recording
Break off the safety tab on the bottom of the cassette using a screwdriver or similar object



To re-record on a cassette which has had the safety tab removed, cover the slot with a piece of plastic tape





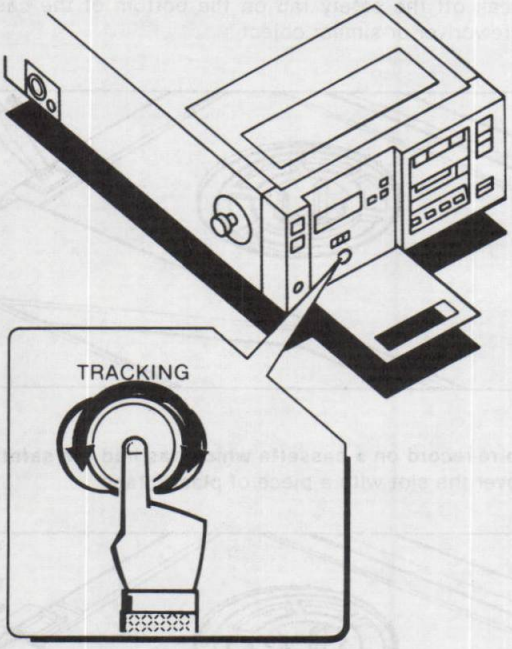
1-12. HOW IS THE PICTURE ON THE SCREEN

Streaks or snow appears

Has the tape been recorded on another video cassette recorder?

If so, open the front compartment and adjust the TRACKING control for the best possible picture

Return the control to the center position after viewing a tape recorded on another machine.



Noisy picture

Video-head cleaning may be needed.

After the machine has been used for an extended period of time, the video heads may have become contaminated and require cleaning. Clean the video heads with the L-25CL video head cleaning cassette (optional). For details about cleaning, refer to the instructions furnished with the cleaning cassette.

1-13. DUBBING AUDIO

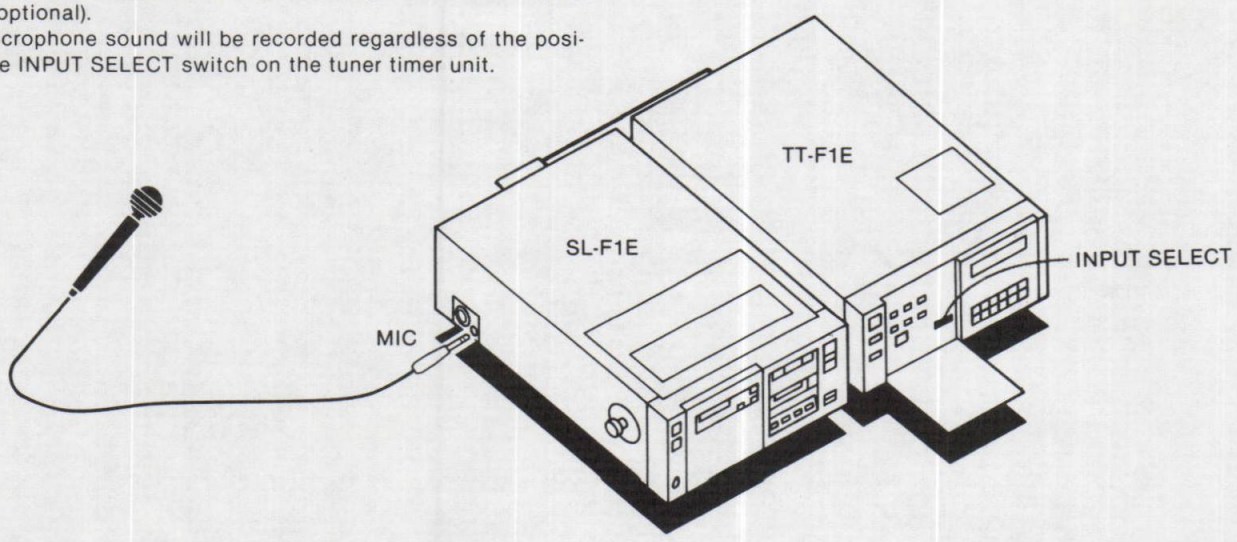
You can record a music or commentary track on any recorded tape while watching the recorded picture.

CONNECTIONS

To record microphone sound

Connect a microphone to the MIC jack of the video cassette recorder. If your microphone has a phone plug, use the PC-1A plug adaptor (optional).

● The microphone sound will be recorded regardless of the position of the INPUT SELECT switch on the tuner timer unit.



To record from a monaural tape recorder or radio

If you want to connect an audio equipment directly to the recorder, use the VMC-330 video monitor cable (optional)

(For the connection using the tuner timer unit.)

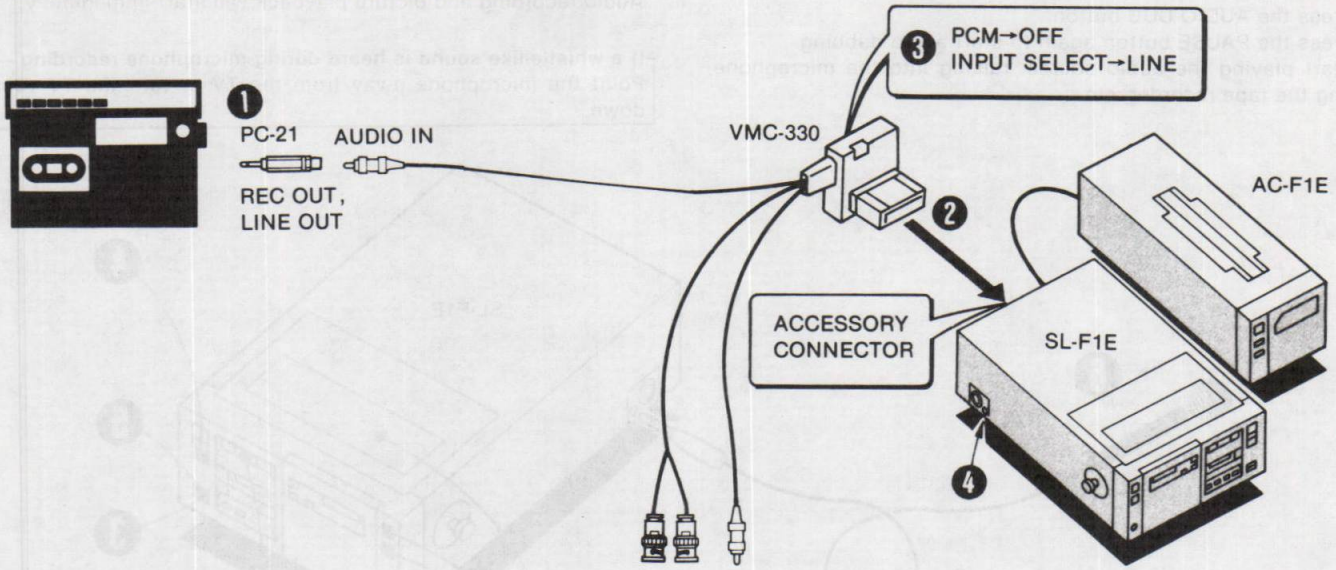
❶ Connect the AUDIO IN cable of the VMC-330 to the output of the audio equipment.

● If the output is a minijack, use a PC-21 plug adaptor.

❷ Connect the 26-pin connector to the ACCESSORY CONNECTOR of the recorder.

❸ Set the PCM switch on the VMC-330 to OFF and the INPUT SELECT switch to LINE.

❹ Make sure that a microphone is not connected to the recorder.



To use a tuner timer unit with the recorder, make connections with the RK-50A connecting cord (optional)

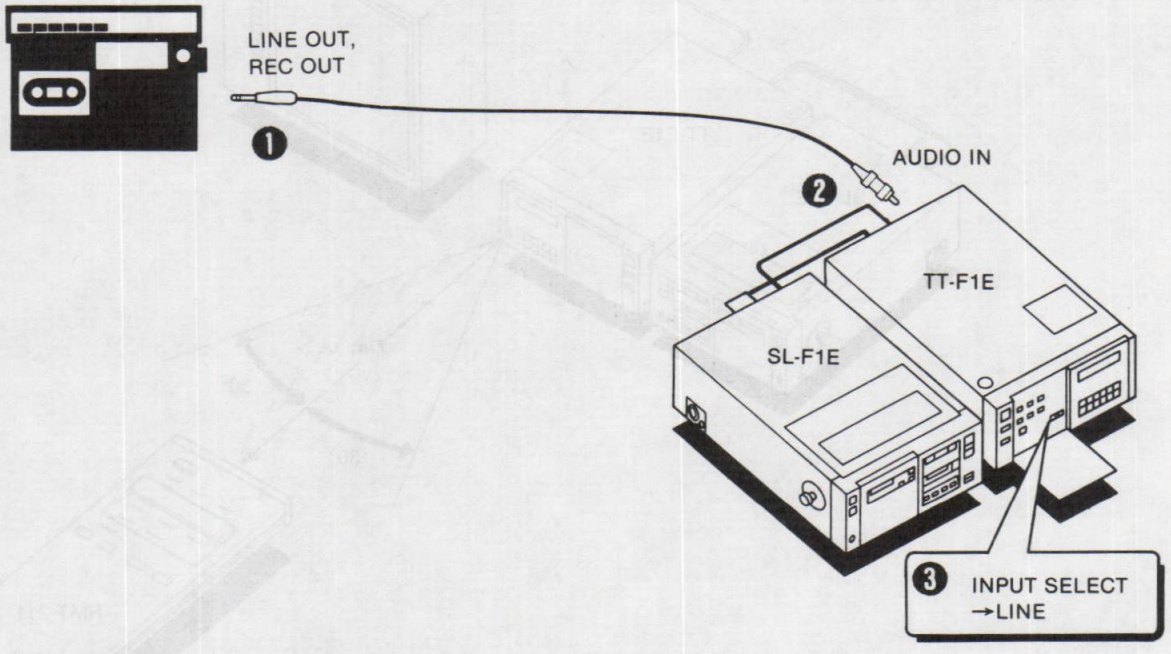
❶ Connect the RK-50A to the output of the audio unit.

● If the RK-50A's plug does not match the receptacle, use a commercially-available plug adaptor.

❷ Connect the RK-50A phono plug to the AUDIO IN jack of the tuner timer unit.

❸ Set the INPUT SELECT switch to LINE.

● The microphone should be disconnected from the recorder.



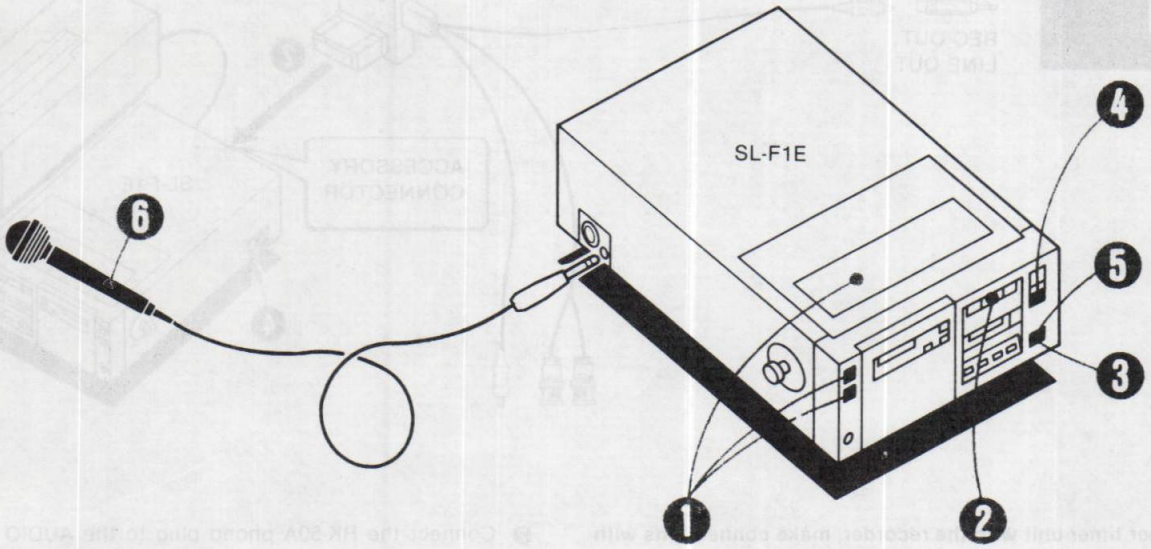
First, decide at which point on the tape you will start audio dubbing and make the necessary preparations for playing the audio source.

❶ Turn on the recorder and insert a cassette.
● Be sure that the safety tab has not been removed.
❷ Press the ▶ PLAY button. Playback will begin.
❸ Press the PAUSE button at the point where audio dubbing is to start.
❹ Press the AUDIO DUB button.
❺ Press the PAUSE button again to start audio dubbing.
❻ Start playing the audio source; talking into the microphone, playing the tape recorder, etc.

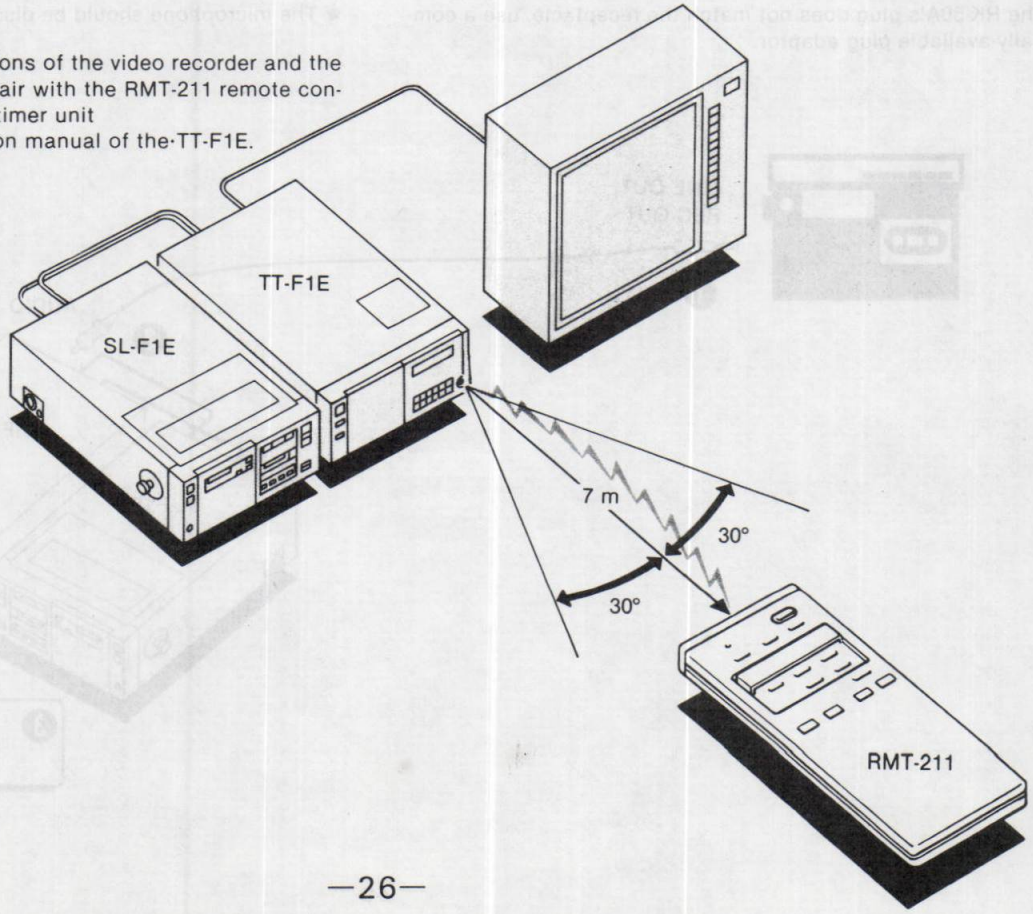
To stop dubbing,
Press the ■ STOP button.
To stop the tape momentarily during dubbing, use the PAUSE button.

To record from the beginning of the tape
While pressing the AUDIO DUB button, press the ▶ PLAY button.
Audio recording and picture playback will start immediately.

If a whistle-like sound is heard during microphone recording
Point the microphone away from the TV or turn the TV volume down.



You can control almost all functions of the video recorder and the tuner timer unit from your armchair with the RMT-211 remote control unit supplied with the tuner timer unit
For details, refer to the instruction manual of the TT-F1E.



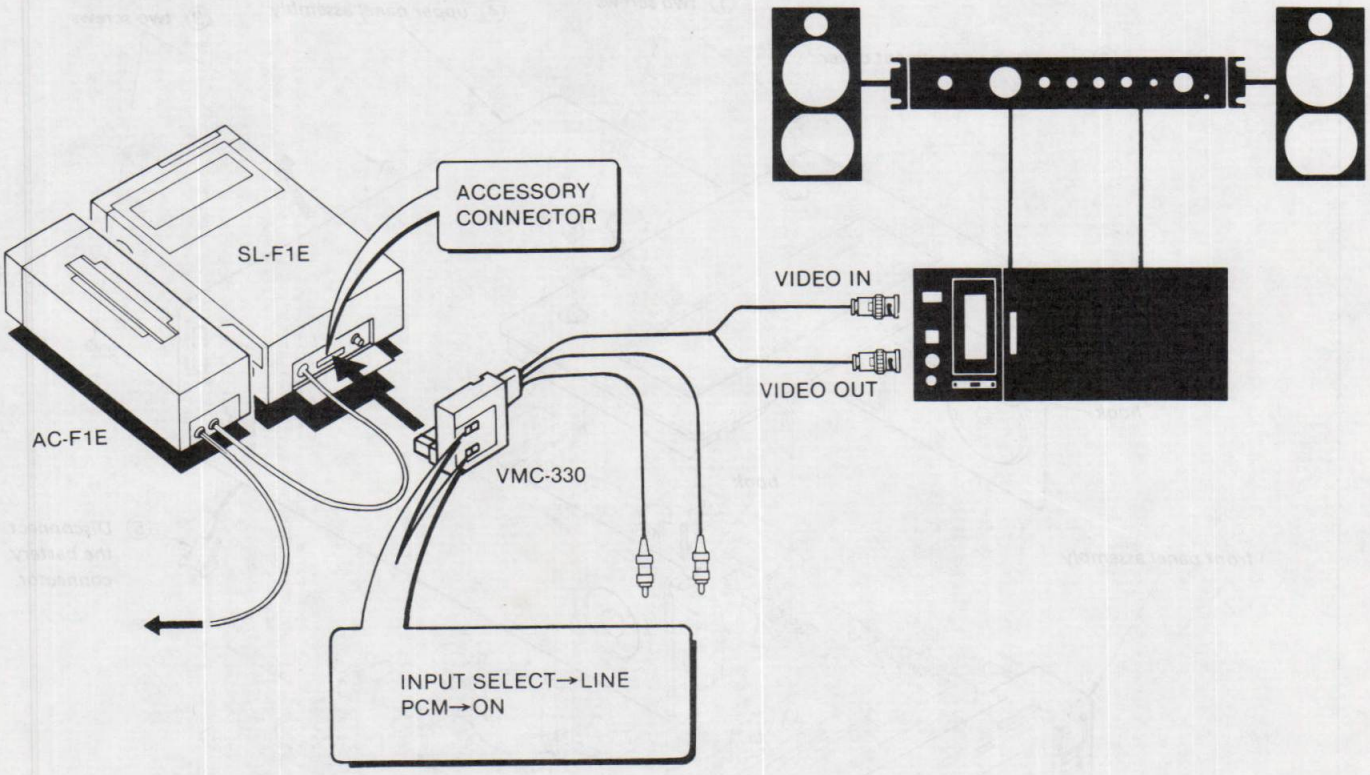
By connecting a PCM digital audio processor, such as a Sony PCM-10, you can enjoy hi-fi sound reproduction with a wide dynamic range, minimal distortion and a flat frequency response.

To connect the PCM audio processor directly to the recorder

When a tuner timer unit is used, connect the processor to the VIDEO IN and OUT jacks using BNC-to-phono plug cords.

In any case, be sure to set the PCM switch to ON position and the INPUT SELECT switch to LINE.

For details on operation of this system, see the instruction manual of the PCM processor.



1-14. DISASSEMBLY

Note:

- Follow the disassembly procedure in the numerical order given.
- All screws are Phillips (cross recess) type.

1. CASSETTE COMPARTMENT COVER, UPPER PANEL, BOTTOM PANEL

Unscrew the screws shown in Fig. 1, and remove the upper and bottom panels.

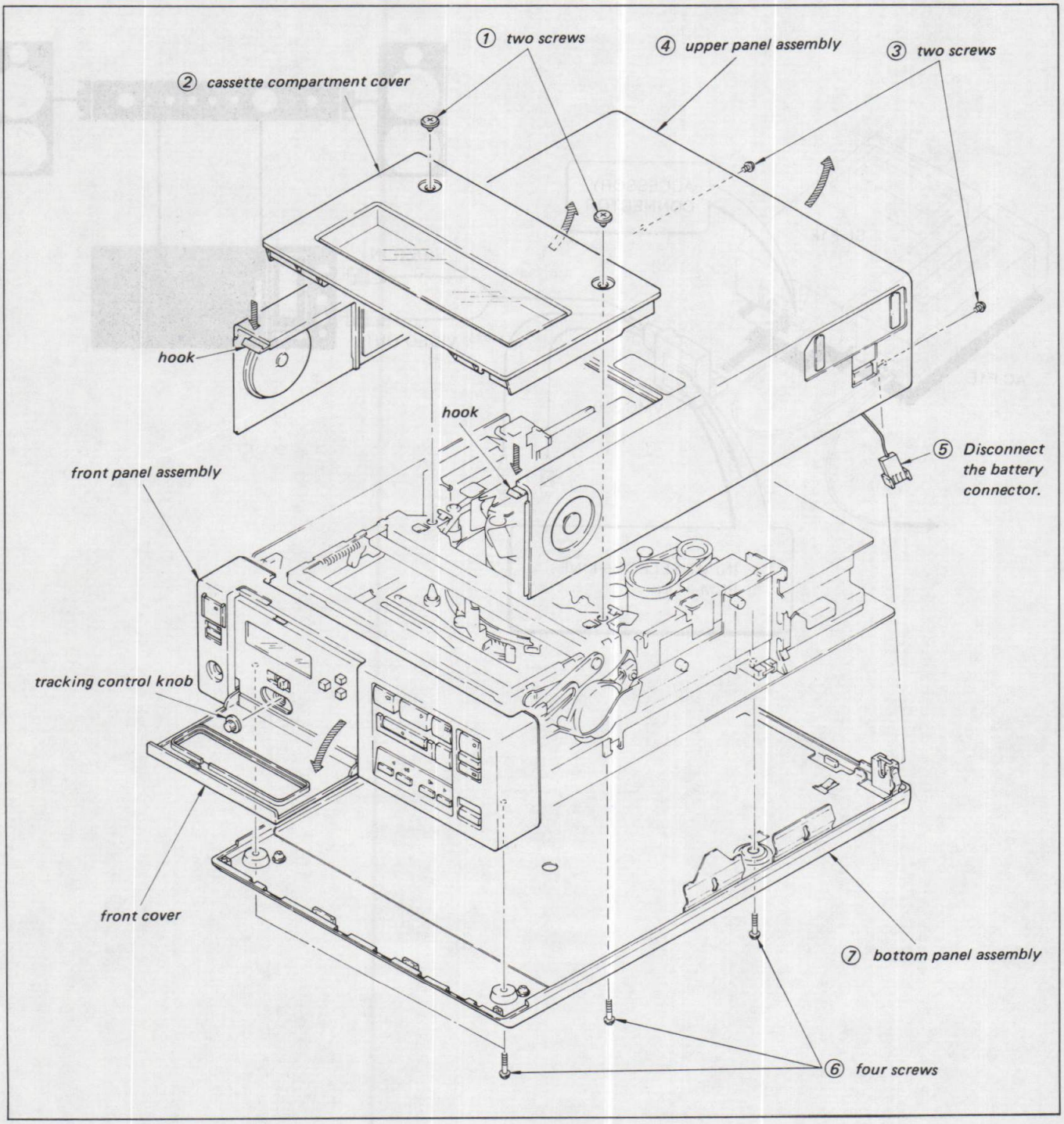


Fig. 1. Panel assembly removal

2. FRONT PANEL

Extract the tracking knob, disengage the right and left hooks (A), and, while holding hooks (B) down with a screwdriver inserted between the circuit board and the front panel, remove the front panel. (Refer to Fig. 2)

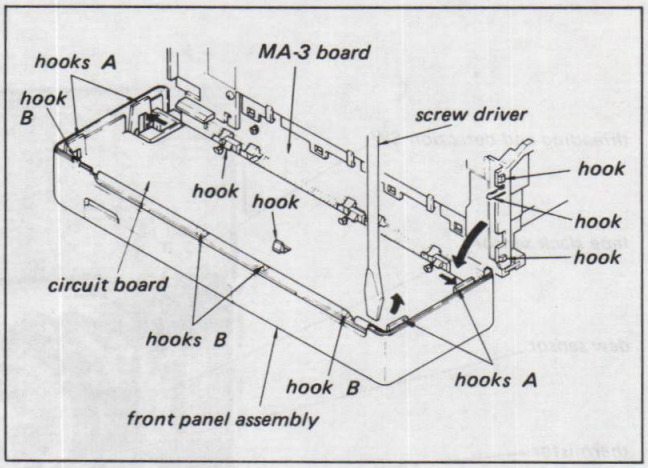


Fig. 2. Front panel removal

3. MECHANISM CASSIS

With this set, the mechanism can be completely disengaged from the circuit board.

1) Unscrew the screws from the rear side of the MA-3 circuit board.
2) Disconnect the connectors. This must be done in order to remove the reel motor, capstan, and the durm.

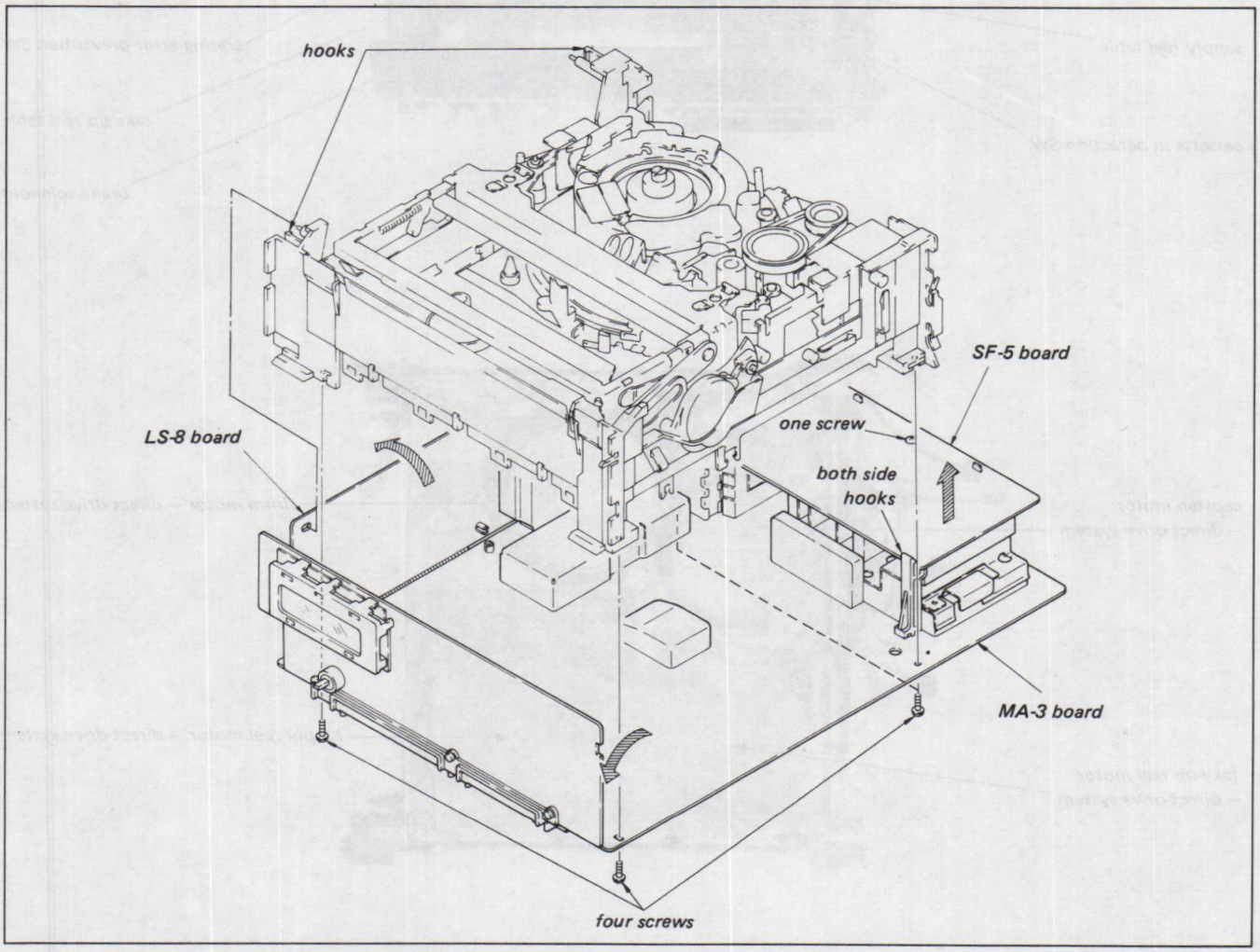
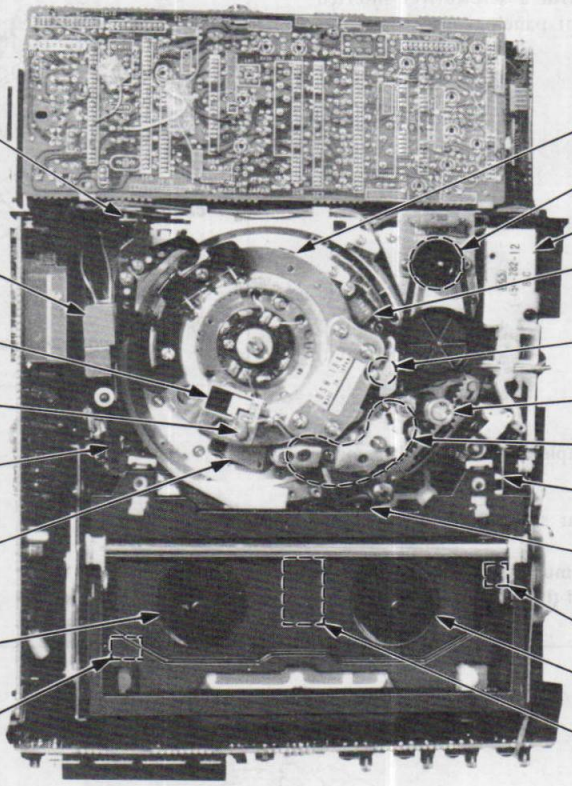
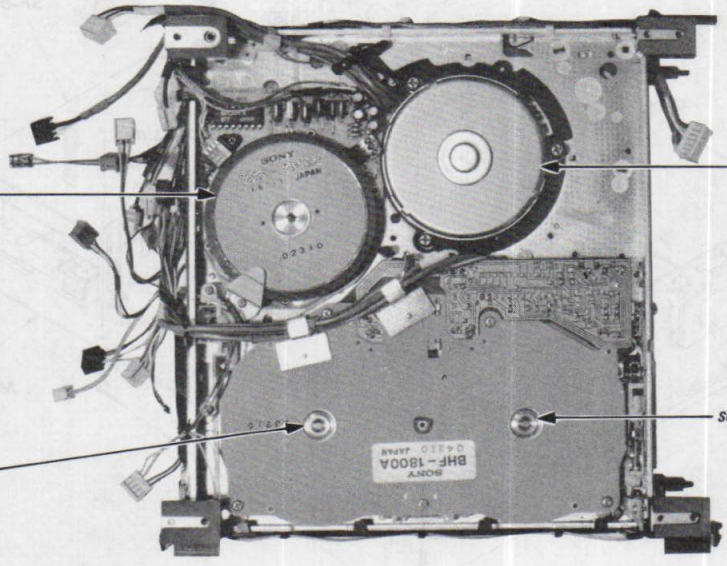


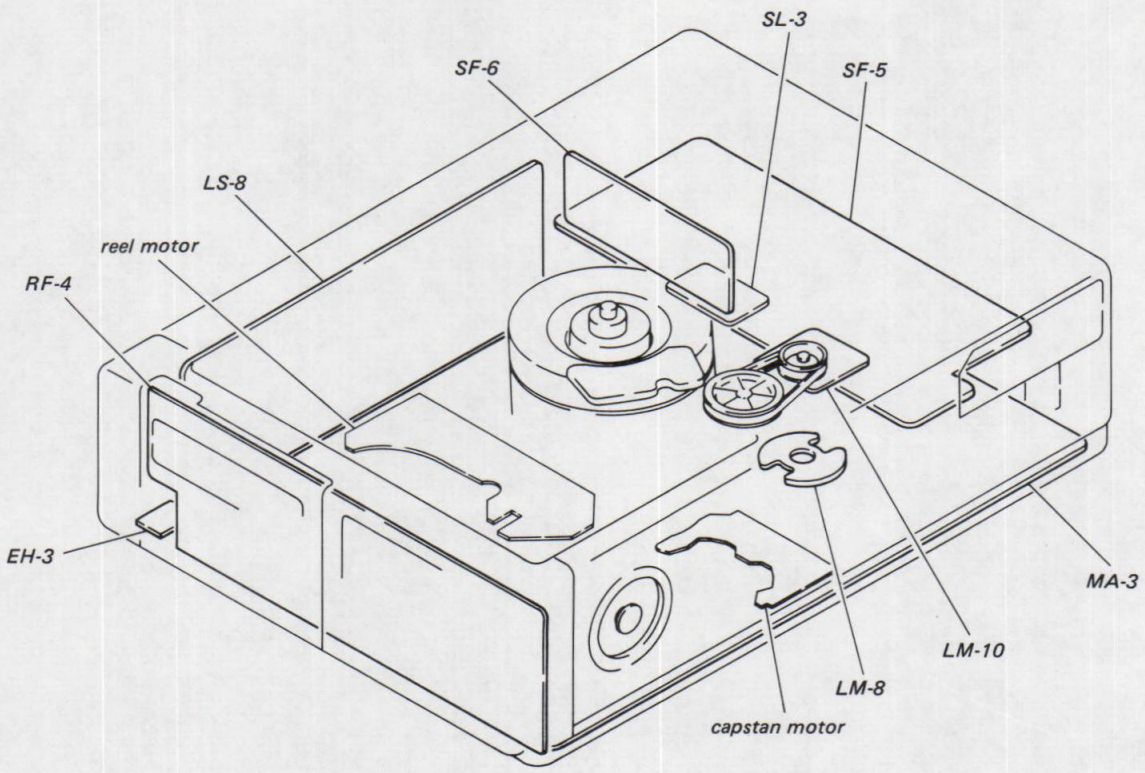
Fig. 3. Mechanism block removal

1-15. INTERNAL VIEWS



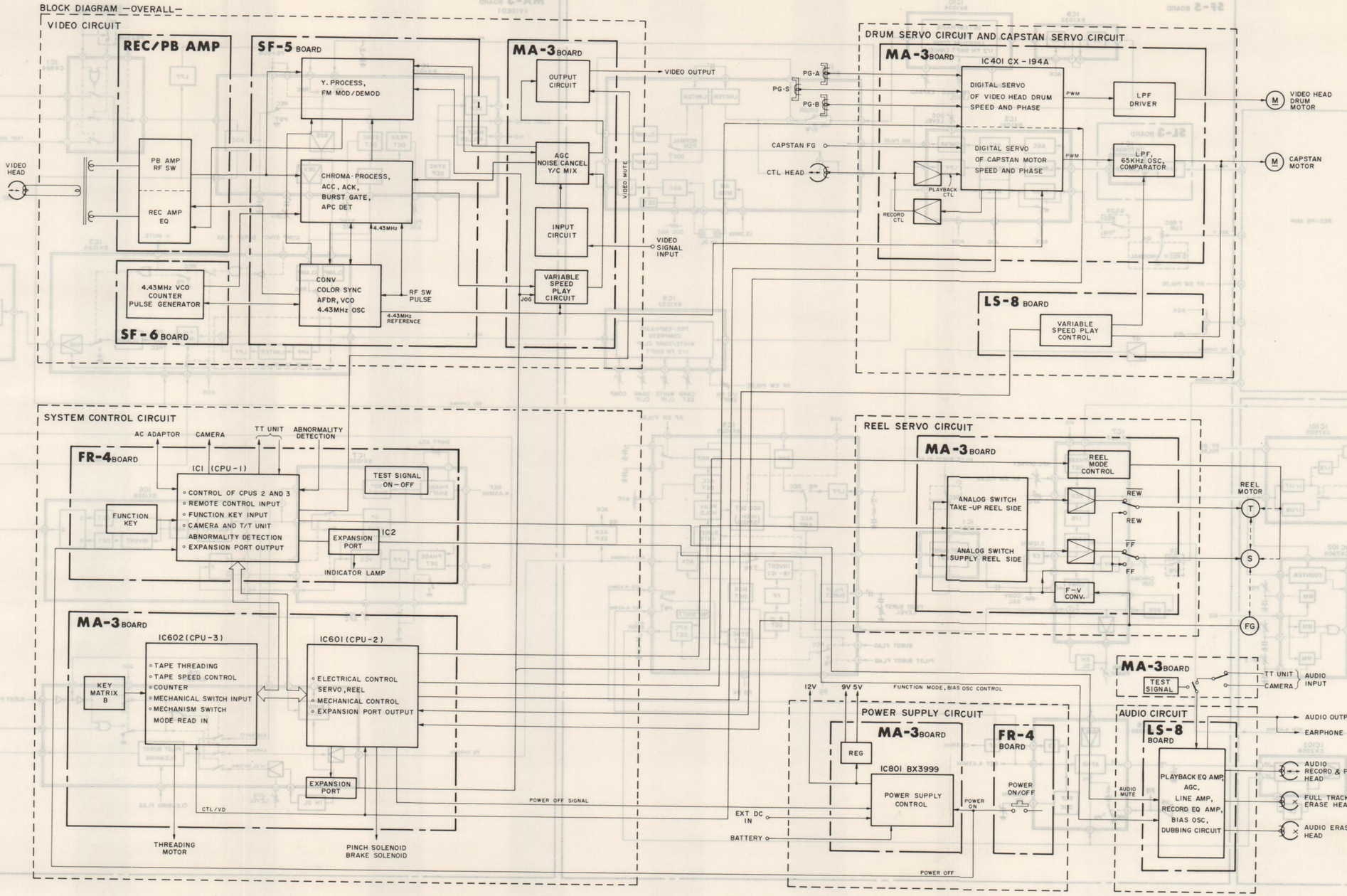


CIRCUIT BOARDS LOCATION

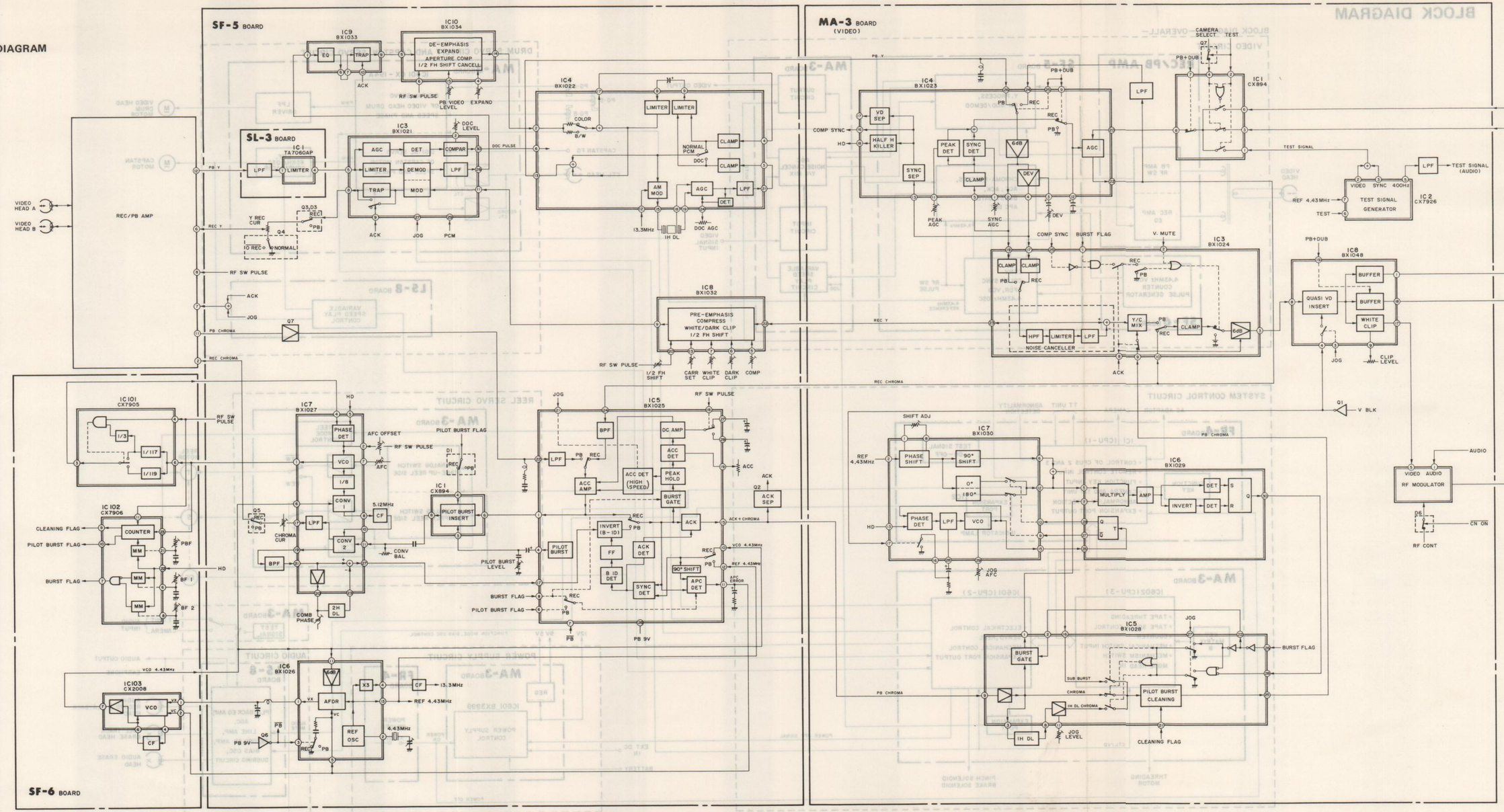


SECTION 2
BLOCK DIAGRAM

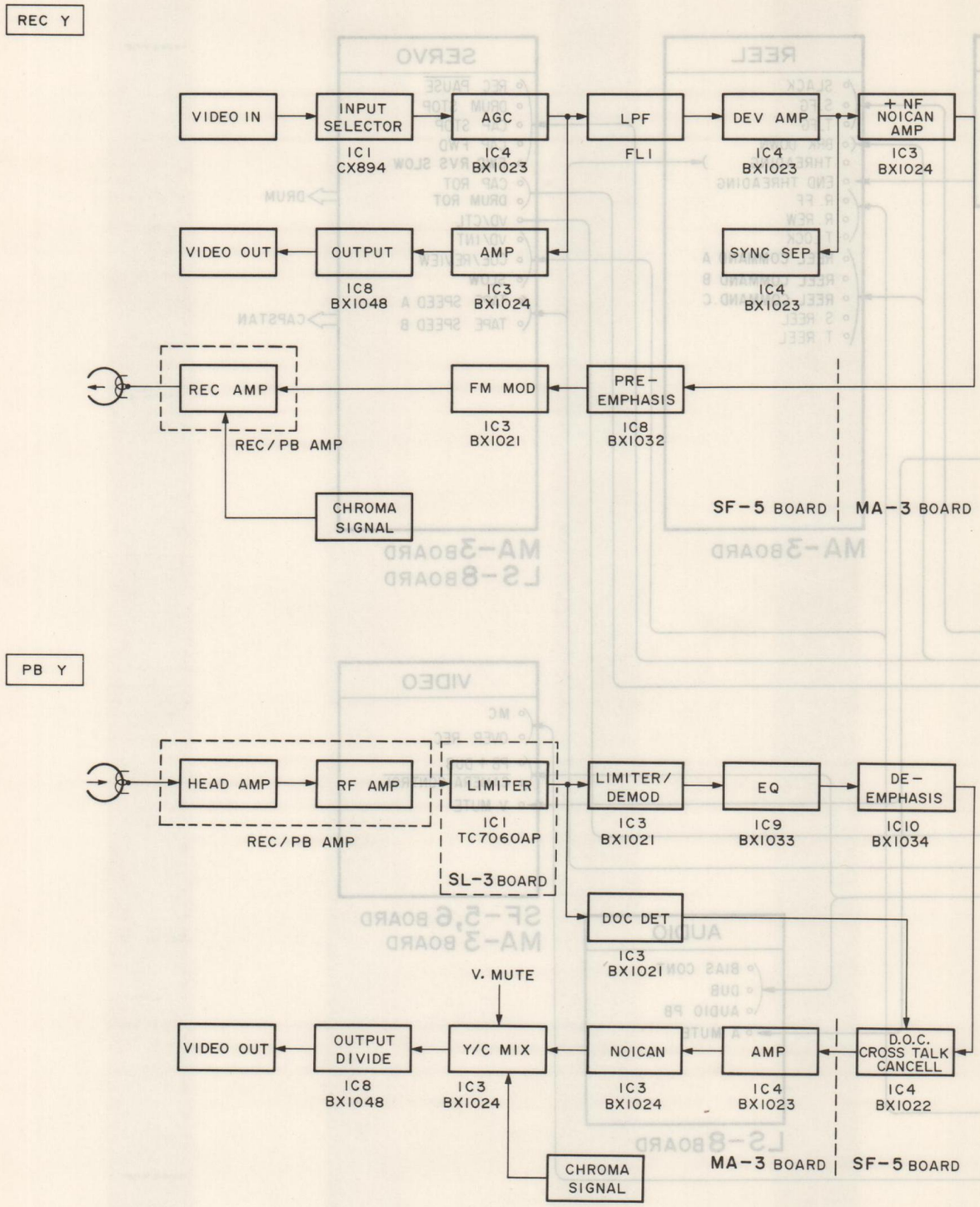
OVERALL BLOCK DIAGRAM



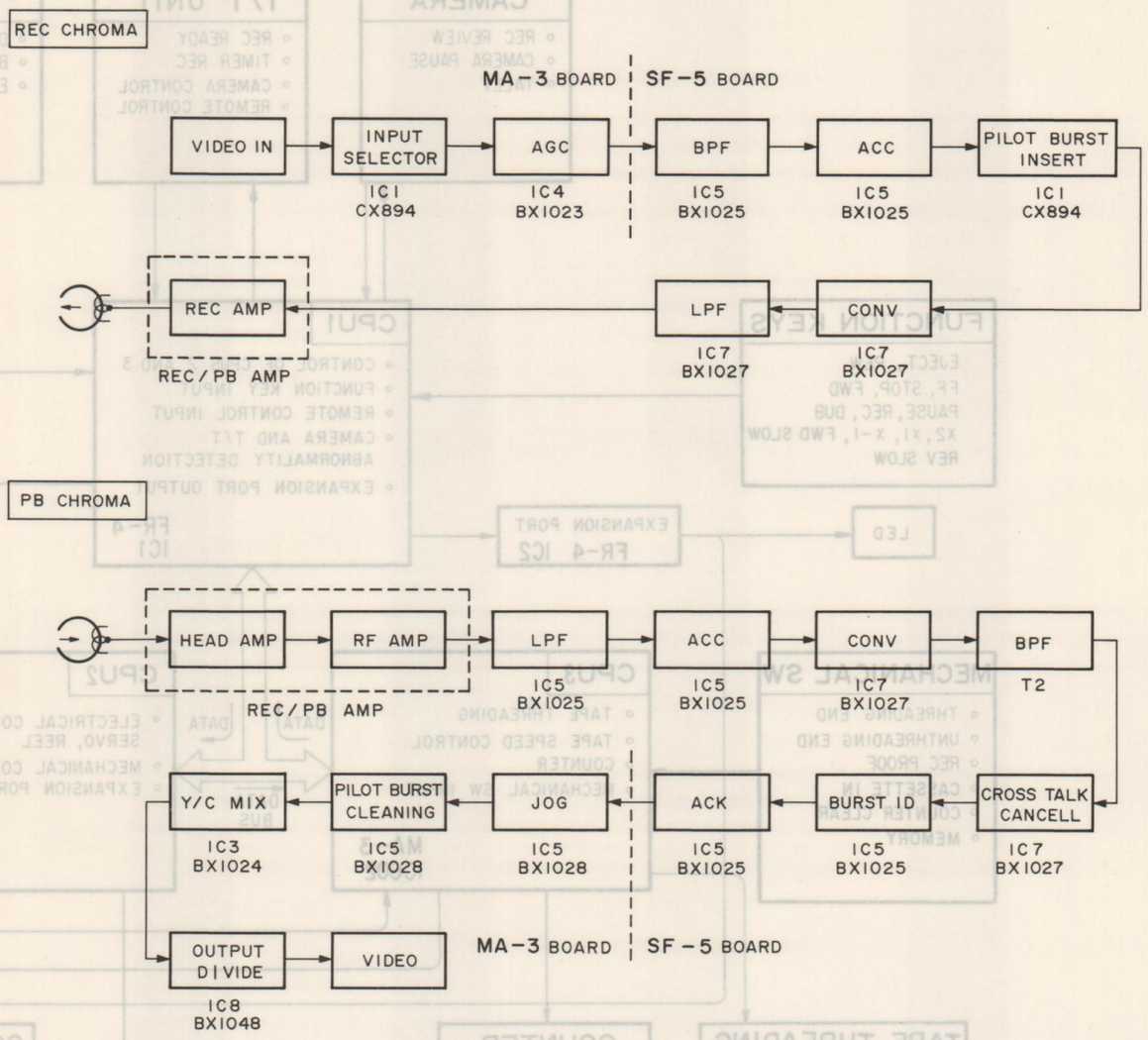
VIDEO SYSTEM BLOCK DIAGRAM



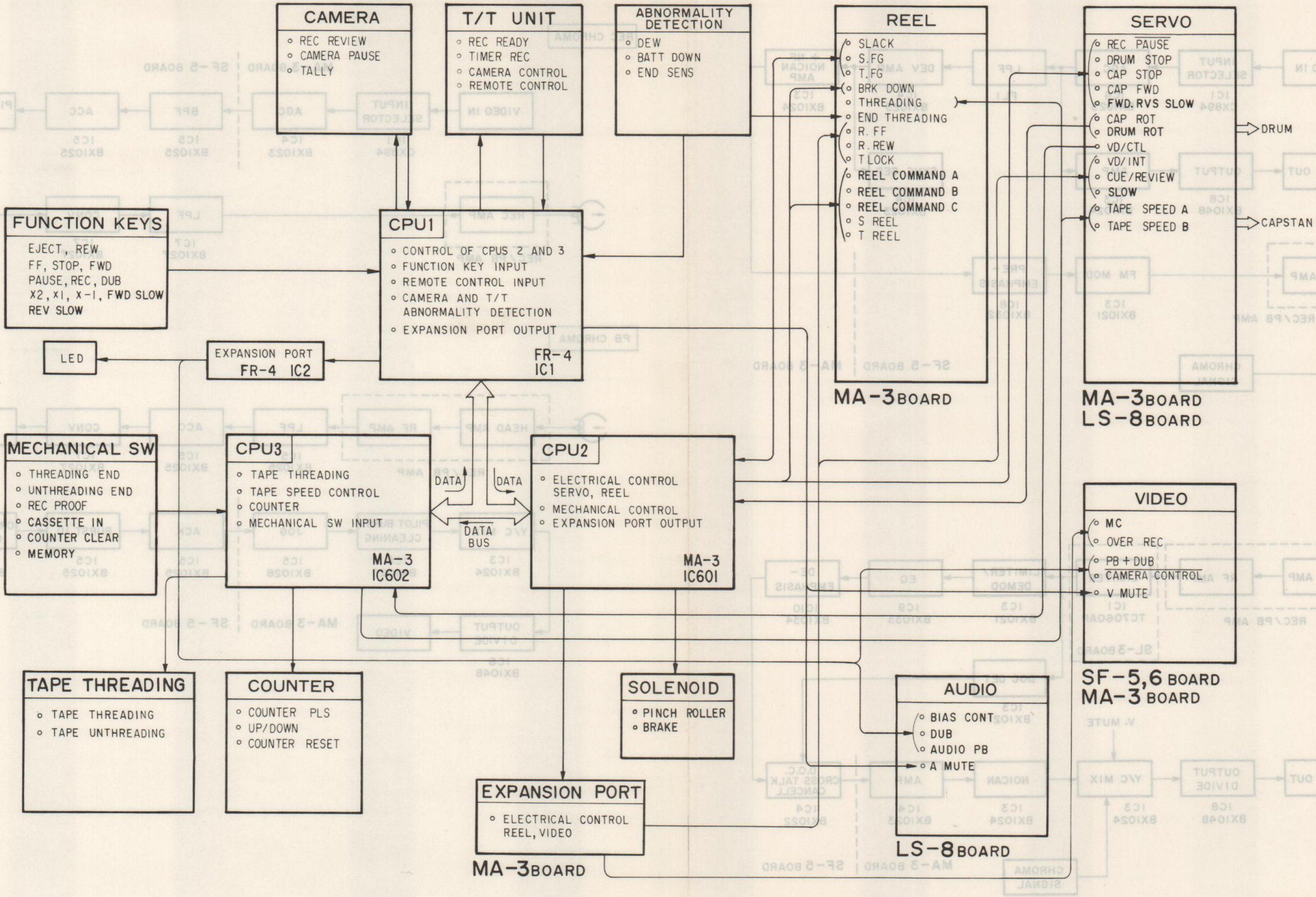
VIDEO Y SIGNAL SYSTEM BLOCK DIAGRAM



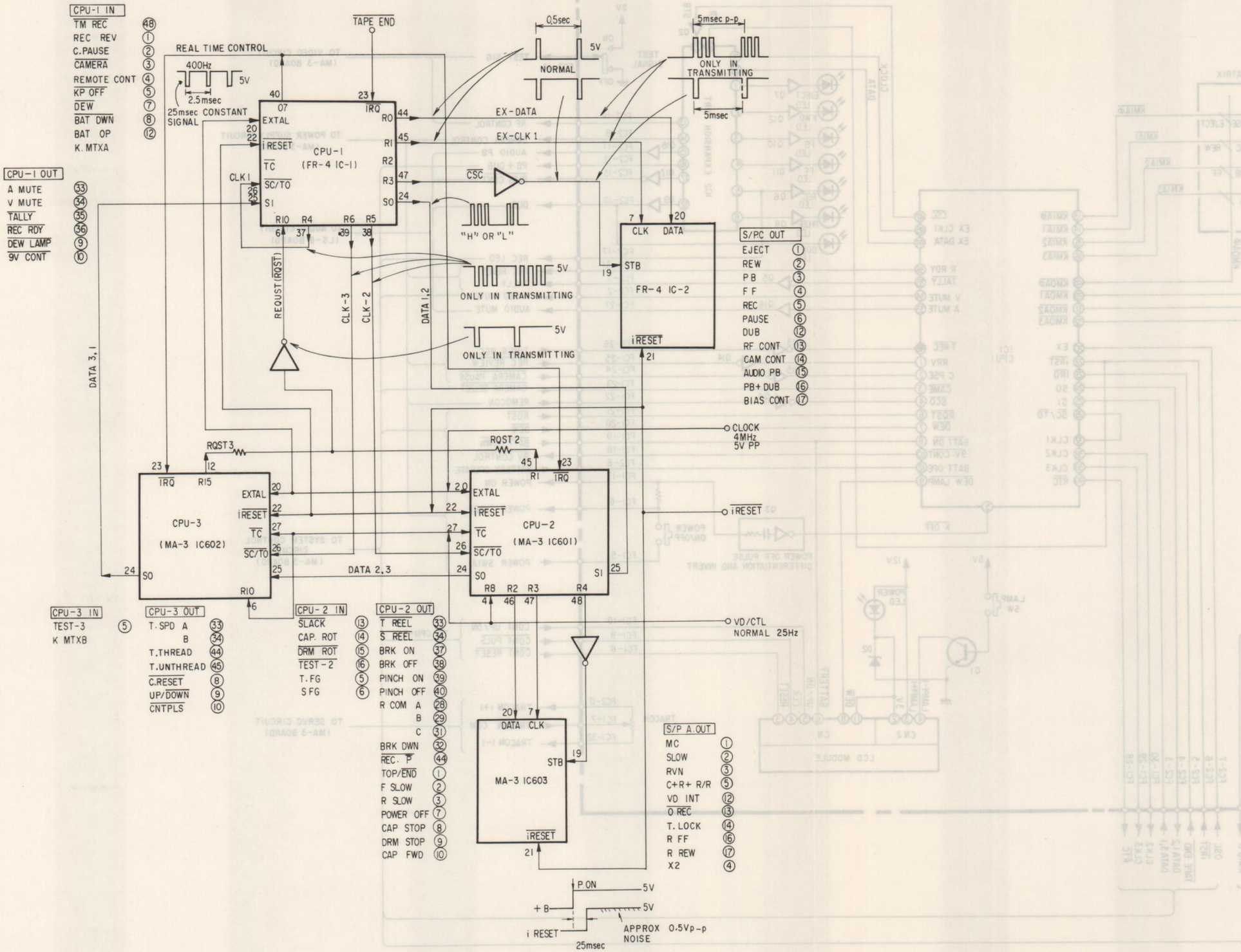
VIDEO CHROMA SYSTEM BLOCK DIAGRAM



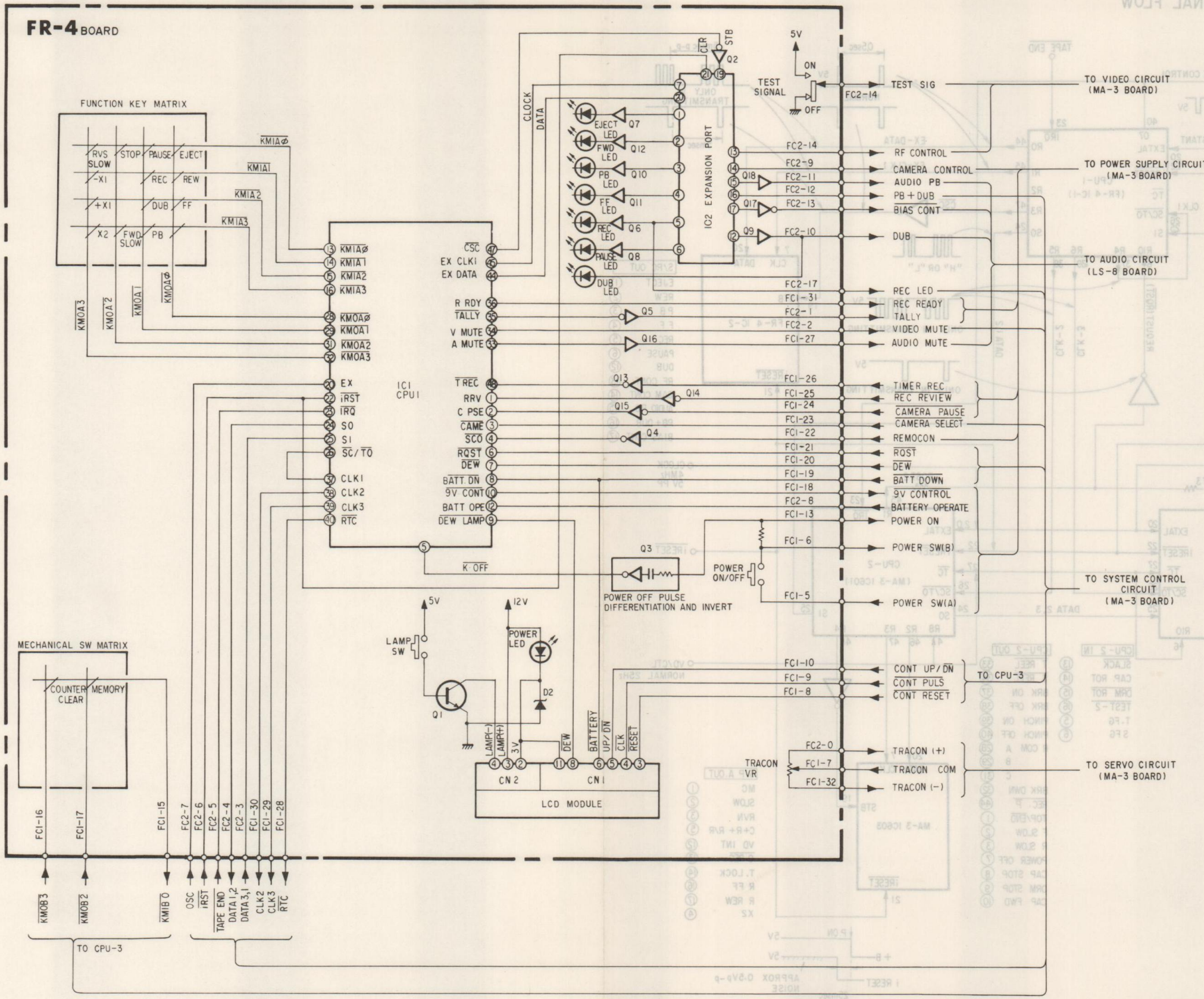
SYSTEM CONTROL BLOCK DIAGRAM



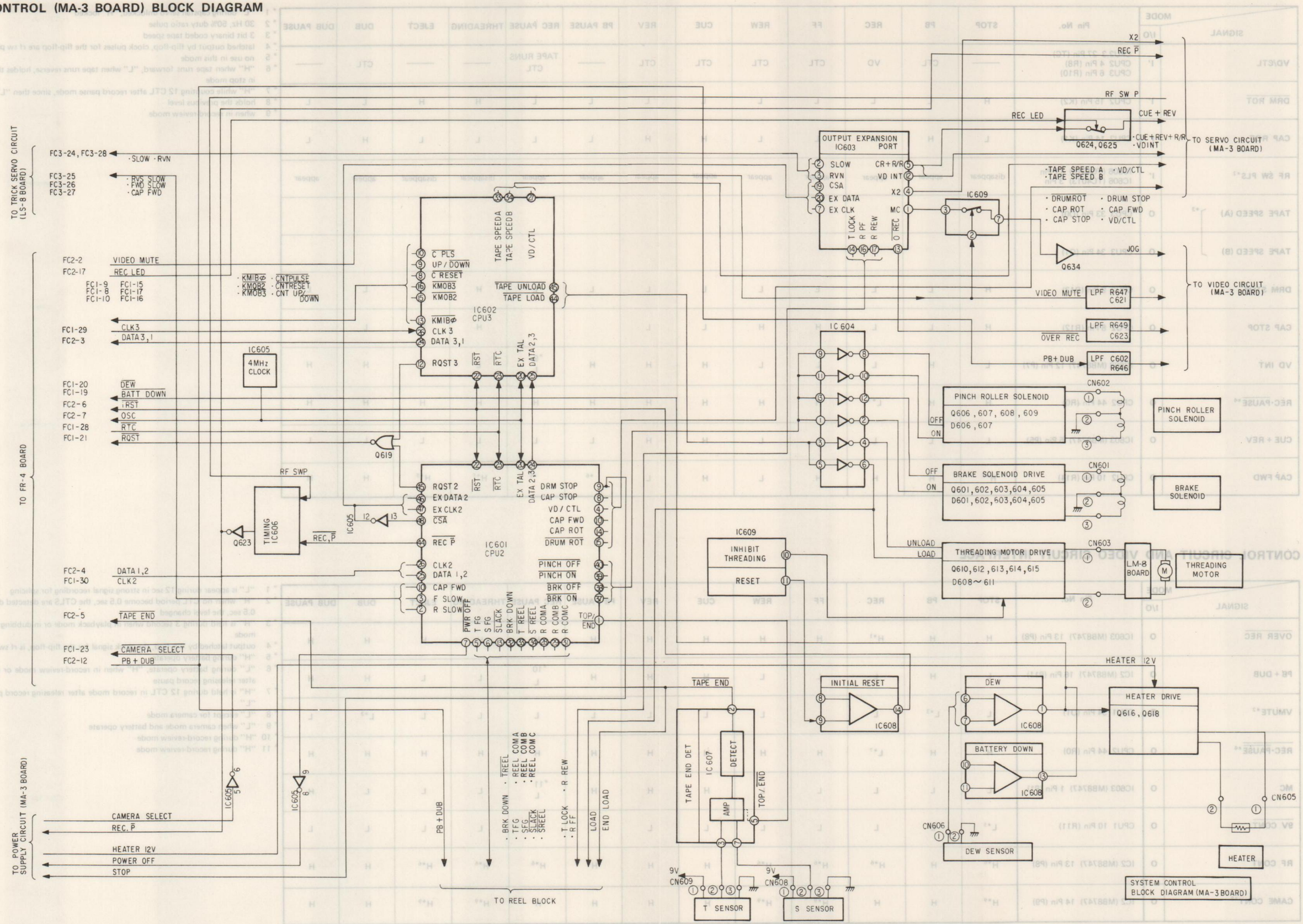
CPU CONTROL SIGNAL FLOW



SYSTEM CONTROL (FR-4 BOARD) BLOCK DIAGRAM



SYSTEM CONTROL (MA-3 BOARD) BLOCK DIAGRAM



SYSTEM CONTROL CIRCUIT AND SERVO CIRCUIT INTERFACE

SIGNAL \ MODE	I/O	Pin No.	STOP	PB	REC	FF	REW	CUE	REV	PB PAUSE	REC PAUSE	THREADING	EJECT	DUB	DUB PAUSE
VD/CTL	I'	CPU2.3 27 Pin (TC) CPU2 4 Pin (R8) CPU3 6 Pin (R10)	——	CTL	VD	CTL	CTL	CTL	CTL	——	TAPE RUNS CTL	——	——	CTL	——
$\overline{\text{DRM ROT}}$	I'	CPU2 15 Pin (K2)	H	L	L	L	L	L	L	L	L	H	H	L	L
CAP ROT	I'	CPU2 14 Pin (K1)	L	H	H	L	L	H	H	L	L	L	L	H	L
RF SW PLS*2	I'	IC606 (TC4013) 11 Pin IC606 (TC4013) 3 Pin	disappear	appear	appear	appear	appear	appear	appear	appear	appear	disappear	disappear	appear	appear
TAPE SPEED (A) *3	O	CPU3 33 Pin (O0)													
TAPE SPEED (B)	O	CPU3 34 Pin (O1)													
DRM STOP	O	CPU2 9 Pin (R13)	H	L	L	L	L	L	L	L	L	H	H	L	L
CAP STOP	O	CPU2 8 Pin (R12)	H	L	L	H	H	L	L			H	H	L	
VD INT	O	IC603 (MB8747) 12 Pin (P7)	L	H	L	L	L	H	H	H	*9 L	L	L	H	H
REC·$\overline{\text{PAUSE}}$*4	O	CPU2 44 Pin (R0)	H	H	L*7	H	H	H	H	H	H	H	H	H	H
CUE + REV	O	IC603 (MB8747) 5 Pin (P5)	L	L	L	L	L	H	H	L	L	L	L	L	L
CAP FWD	O	CPU2 10 Pin (R14)	H*5	H	H	H	L	H	L	*6	*6	H*5	H*5	H	H

*1 "L" during capstan servo unlocked, "H" locked
*2 30 Hz, 50% duty ratio pulse
*3 3 bit binary coded tape speed
*4 latched output by flip-flop, clock pulses for the flip-flop are rf sw pulses.
*5 no use in this mode
*6 "H" when tape runs forward, "L" when tape runs reverse, holdes the previous level in stop mode
*7 "H" while counting 12 CTL after record panse mode, since then "L"
*8 holds the previous level
*9 when in record-review mode

SYSTEM CONTROL CIRCUIT AND VIDEO CIRCUIT INTERFACE

SIGNAL \ MODE	I/O	Pin No.	STOP	PB	REC	FF	REW	CUE	REV	PB PAUSE	REC PAUSE	THREADING	EJECT	DUB	DUB PAUSE
$\overline{\text{OVER REC}}$	O	IC603 (MB8747) 13 Pin (P8)	H	H	H*1	H	H	H	H	H	H	H	H	H	H
PB + DUB	O	IC2 (MB8747) 16 Pin (P11)	L	H	L	L	L	H	H	H	*10 L	L	L	H	H
VMUTE*2	O	CPU1 34 Pin (O1)	L	L*3	L	L	L	L	L	L	L	L	L	L*3	L
REC·$\overline{\text{PAUSE}}$*4	O	CPU2 44 Pin (R0)	H	H	L*7	H	H	H	H	H	H	H	H	H	H
MC	O	IC603 (MB8747) 1 Pin (P1)	L	L	L	L	L	H	H	H	*11 L	L	L	L	H
$\overline{\text{9V CONT}}$	O	CPU1 10 Pin (R11)	L*5	L	L	L	L	L	L	L	L	L	L	L	L
RF CONT	O	IC2 (MB8747) 13 Pin (P8)	H*6	H	H*6	H*6	H*6	H	H	H	H*6	H*6	H*6	H	H
CAME CONT*8	O	IC2 (MB8747) 14 Pin (P9)	H*9	H	H	H*9	H*9	H	H	H	H	H*9	H*9	H	H

*1 "L" is appear during 12 sec in strong signal recording for splicing
*2 "H" when no CTL period become 0.5 sec, the CTLS are detected during more than 0.5 sec, the level changed
*3 "H" is held during 3 second when in playback mode or in dubbing mode after stop mode
*4 output latched by flip-flop, the clock signal for the flip-flop, is rf sw pulse
*5 "H" during battery operate
*6 "L" during battery operate, "H" when in record-review mode or record/playback after releasing record pause
*7 "H" is held during 12 CTL in record mode after releasing record pause, since then "L"
*8 "L" except for camera mode
*9 "L" when camera mode and battery operate
*10 "H" during record-review mode
*11 "H" during record-review mode

SYSTEM CONTROL CIRCUIT AND REEL MOTOR CIRCUIT INTERFACE

SIGNAL \ MODE	I/O	Pin No.	STOP	PB	REC	FF	REW	CUE	REV	PB PAUSE	REC PAUSE	THREADING	EJECT	DUB	DUB PAUSE
T FG	I	CPU2 5 Pin (R9)	———	←					*1						→
S FG	I	CPU2 6 Pin (R10)	———	←					*1						→
$\overline{\text{SLACK}}$	I	CPU2 13 Pin (K0)	———	———	———	"H": NORMALITY "L": ABNORMALITY	"H": NORMALITY "L": ABNORMALITY	———	———	———	———	———	———	———	———
BRK DOWN*2	O	CPU2 32 Pin (P3)	L	L	L	L	L	L	L	L	L	L	L	L	L
$\overline{\text{T END}}$*6	O	IC610 ( ) 4 Pin													
T LOCK	O	IC603 (MB8747) 14 Pin (P9)	L	L	L	L	L	L	L	L	L	H	H	L	L
R FF	O	IC603 (MB8747) 16 Pin (P11)	L	L	L	H	L	L	L	L	L	L	L	L	L
R REW	O	IC603 (MB8747) 17 Pin (P12)	L	L	L	L	H	L	L	L	L	L	L	L	L
R COM A	O	CPU2 28 Pin (P0)	*3	L	L	L	H	L	H	L*4	L*5	L	L	L	L*3
R COM B	O	CPU2 29 Pin (P1)	*3	L	L	H	H	L	L	L	L	H	H	L	L*3
R COM C	O	CPU2 31 Pin (P2)	*3	L	L	L	L	H	H	L	L*5	H	H	L	L*3
$\overline{\text{T REEL}}$	O	CPU2 33 Pin (O0)	H	L	L	L	H	L	L	L	L	L	L	L	L
$\overline{\text{S REEL}}$	O	CPU2 34 Pin (O1)	H	L	L	H	L	L	L	L	L	L	L	L	L
$\overline{\text{T THREAD}}$	O	CPU3 44 Pin (R0)	H	H	H	H	H	H	H	H	H	L	H	H	H

* 1 numbers of pulse equal to numbers of reel revolution multiplied 60
* 2 changing signal for electrical brake
* 3 no use in this mode
* 4 "H" when tape runs reverse in SWING SEARCH mode
* 5 "H" when in record-review mode
* 6 "H" at tape end

SYSTEM CONTROL CIRCUIT AND AUDIO CIRCUIT INTERFACE

SIGNAL \ MODE	I/O	Pin No.	STOP	PB	REC	FF	REW	CUE	REV	PB PAUSE	REC PAUSE	THREADING	EJECT	DUB	DUB PAUSE
AUDIO PB*2	O	FC3-36 IC2 (MB8747) 15 Pin (P10)	L	H	L	L	L	H	H	H*1	*8 L	L	L	L	L
DUB	O	FC3-35 IC2 (MB8747) 12 Pin (P7)	L*3	L	L	L	L	L	L	L	L	L	L	H	H
BIAS CONT	O	FC3-34 IC2 (MB8747) 17 Pin (P12)	L	L	H*4	L	L	L	L	L	L	L	L	H*5	L
A MUTE*6	O	FC3-37 CPU1 33 Pin (O0)	H	L*7	H	H	H	H	H	H	H *9	H	H	H	H

* 1 includes double speed play and SWING SEARCH play
* 2 level is changed after 40 msec delay
* 3 "H" is held during 150 msec in stop mode after dubbing, "H" since then "L"
* 4 "L" is held during 12 CTL in record mode after record pause mode, since then "H"
* 5 "L" is held during 50 msec in dubbing mode after stop mode, since then "H"
* 6 "H" when no CTL peried become 0.5 sec, the CTLs are detected during more than 0.5 sec, the level is changed
* 7 "H" is held during 3 sec in playback mode after stop/FF and is held during 0.5 sec, since then "L"
* 8 when in record-review mode
* 9 "H" is held during 0.5 sec in record mode after record-review mode, since then "L"

SYSTEM CONTROL CIRCUIT AND TUNER/TIMER CIRCUIT, POWER SUPPLY CIRCUIT INTERFACE

SIGNAL \ MODE	I/O	Pin No.	STOP	PB	REC	FF	REW	CUE	REV	PB PAUSE	REC PAUSE	THREADING	EJECT	DUB	DUB PAUSE
POWER SW (A)*1	I														
POWER SW (B)*1	O														
REC REVIEW*2	I	CPU1 1 Pin (R5)													
CAMERA PAUSE*3	I	CPU1 2 Pin (R6)													
$\overline{\text{CAMERA}}$*4	I	CPU1 3 Pin (R7)													
$\overline{\text{REMOCON}}$*5	I	CPU1 4 Pin (R8)													
$\overline{\text{TALLY}}$*6	O	CPU1 35 Pin (O2)	H	L*7	L	H	H	H	H	H	*9 H	H	H	L	H
$\overline{\text{REC READY}}$	O	CPU1 36 Pin (O3)													
$\overline{\text{TIMER REC}}$	I	CPU1 48 Pin (R4)													
PB + DUB	O	IC2 (MB8747) 16 Pin (P11)	L	H	L	L	L	H	H	H	L	L	L	H	H
BATT OPERATE*8	I	CPU1 12 Pin (R15)													
POWER ON*1	O														
$\overline{\text{POWER OFF}}$*1	O	CPU2 7 Pin (R11)													

*1 power on/off signal during battery operate or ac adaptor operate
*2 "H" when RECORD REVIEW button is depressed
*3 "H" when PAUSE button of the camera is depressed
*4 "L" when in camera mode
*5 SONY's infrared remote control system serial data from remote control CPU to system control CPU
*6 TALLY will wink 1 Hz 5% duty ratio when become poor charge voltage of the battery
*7 includes double speed mode
*8 "H" during battery operate
*9 "L" when in record-review mode

SYSTEM CONTROL CIRCUIT AND SLOW PLAY CONTROL CIRCUIT INTERFACE

SIGNAL \ MODE	I/O	Pin No.	STOP	PB	REC	FF	REW	CUE	REV	PB PAUSE	REC PAUSE	THREADING	EJECT	DUB	DUB PAUSE
CAP FWD	O	FC3-27 CPU2 10 Pin (R14)	H*1	H	H	H	L	H	L	*2	*2	H*1	H*1	H	H
RVN	O	FC3-28 IC603 (MB8747) 3 Pin (P3)	L	L	L	L	L	L	L	L	*6 L	L	L	L	L
SLOW	O	FC3-24 IC603 (MB8747) 2 Pin (P2)	L	L	L	L	L	L	L	H*3	*7 H	L	L	L	H
FWD SLOW	O	FCS-26 CPU2 2 Pin (R6)	L	L	L	L	L	L	L	L*4	L	L	L	L	L
RVS SLOW	O	FCS-25 CPU2 3 Pin (R7)	L	L	L	L	L	L	L	L*5	L	L	L	L	L

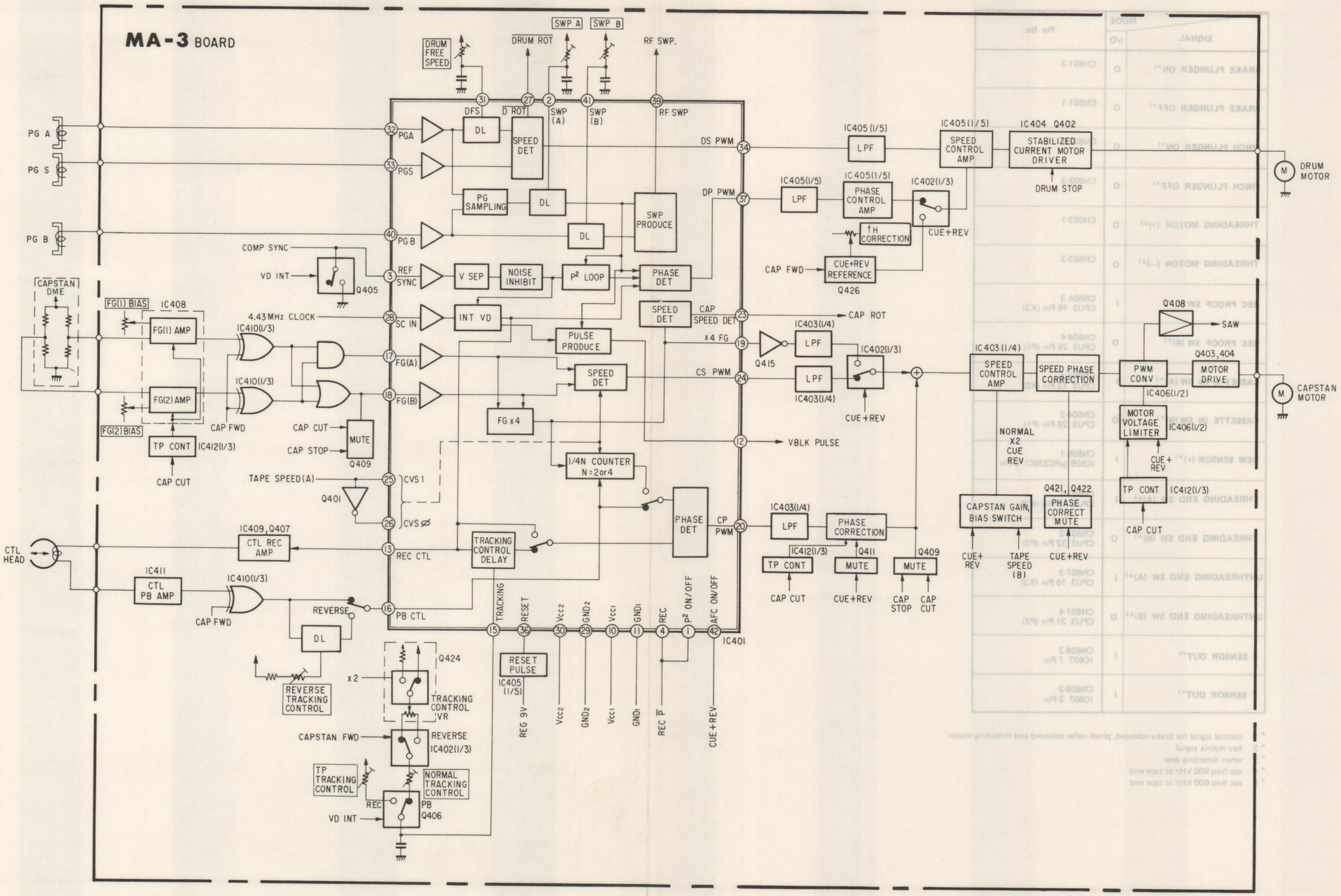
*1 no use in this mode
*2 "H" when tape runs forward, "L" when tape runs reverse, holds previous level in stop mode
*3 "L" when tape runs normal speed forward or normal speed reverse
*4 "H" when in forward slow motion
*5 "H" when in reverse slow motion
*6 "H" when in record-review mode
*7 "L" when in record-review mode

SYSTEM CONTROL CIRCUIT AND MECHANISM BLOCK INTERFACE

SIGNAL \ MODE	I/O	Pin No.
BRAKE PLUNGER ON*1	O	CN601-3
BRAKE PLUNGER OFF*1	O	CN601-1
PINCH PLUNGER ON*1	O	CN602-1
PINCH PLUNGER OFF*1	O	CN602-3
THREADING MOTOR (+)*1	O	CN603-1
THREADING MOTOR (–)*1	O	CN603-2
REC PROOF SW (A)*2	I	CN604-3 CPU3 16 Pin (K3)
REC PROOF SW (B)*2	O	CN604-4 CPU3 29 Pin (P1)
CASSETTE IN SW (A)*2	I	CN604-1 CPU3 13 Pin (K0)
CASSETTE IN SW (B)*2	O	CN604-2 CPU3 29 Pin (P1)
DEW SENSOR (+)*3	I	CN606-1 IC608 (μPC339C) 6 Pin
THREADING END SW (A)*2	I	CN607-1 CPU3 16 Pin (K3)
THREADING END SW (B)*2	O	CN607-2 CPU3 32 Pin (P3)
UNTHREADING END SW (A)*2	I	CN607-3 CPU3 16 Pin (K3)
UNTHREADING END SW (B)*2	O	CN607-4 CPU3 31 Pin (P2)
S SENSOR OUT*4	I	CN608-2 IC607 7 Pin
T SENSOR OUT*5	I	CN609-2 IC607 3 Pin

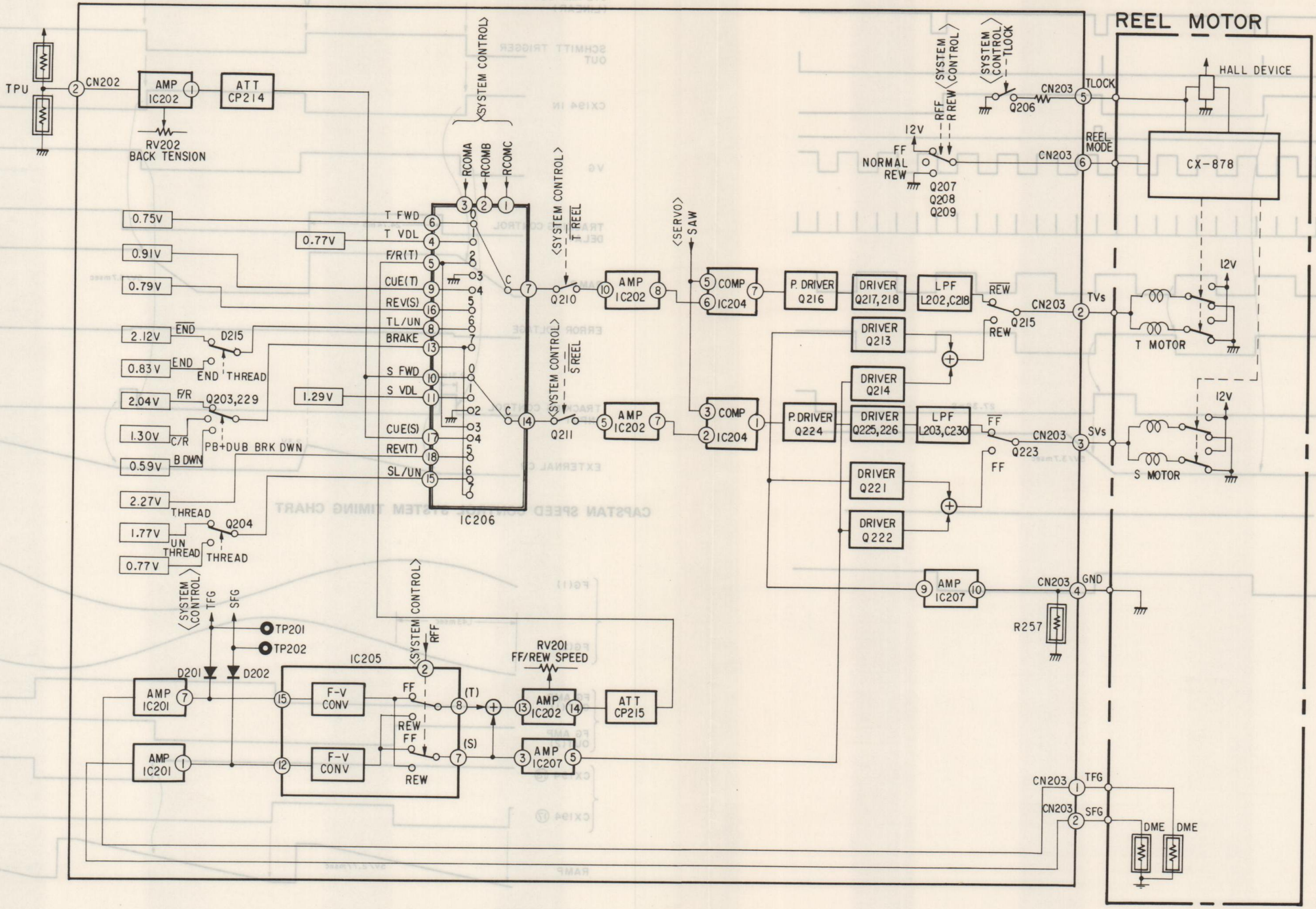
* 1 control signal for brake solenoid, pinch roller solenoid and threading motor
* 2 key matrix signal
* 3 when detecting dew
* 4 osc freq 600 kHz at tape end
* 5 osc freq 600 kHz at tape end

CAPSTAN/DRUM SERVO BLOCK DIAGRAM

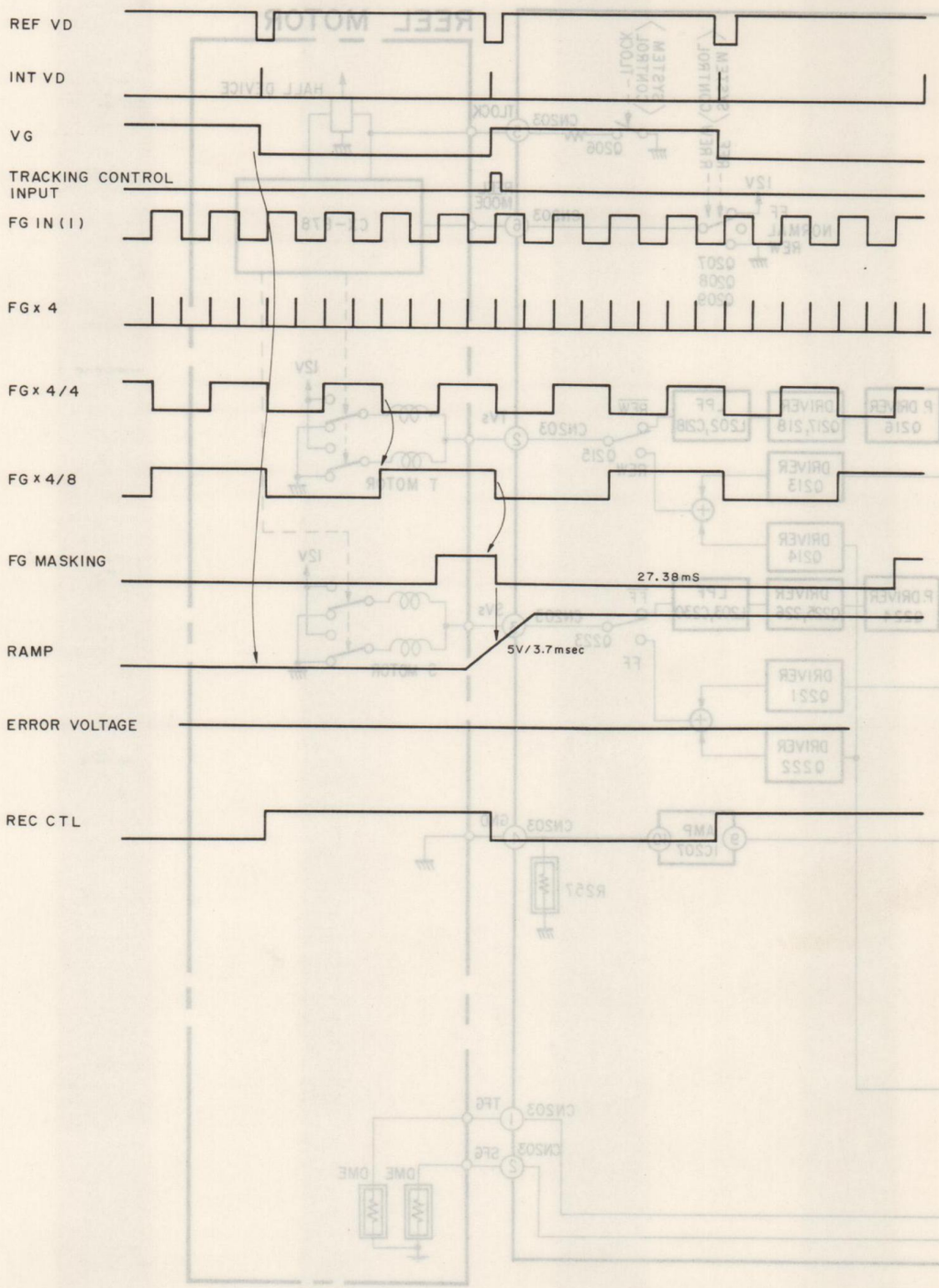


REEL SERVO BLOCK DIAGRAM

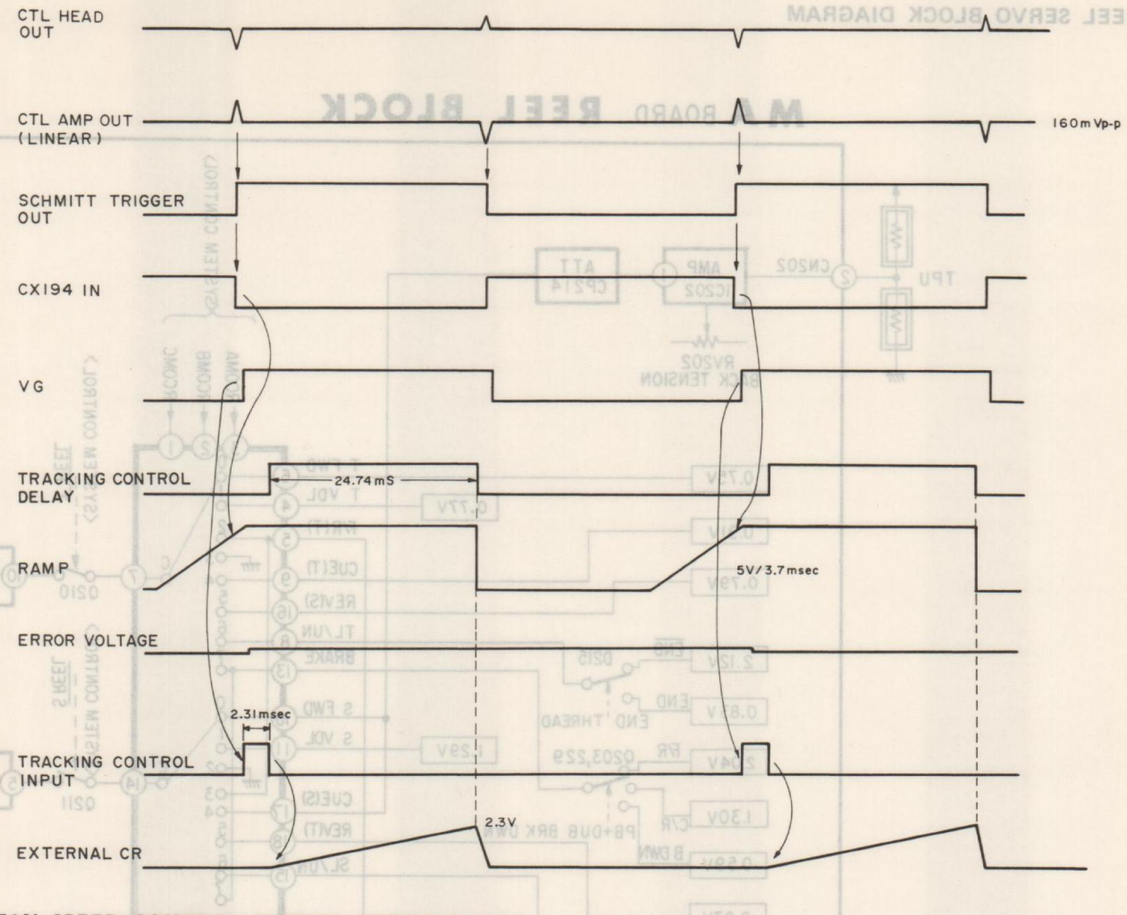
MA BOARD REEL BLOCK



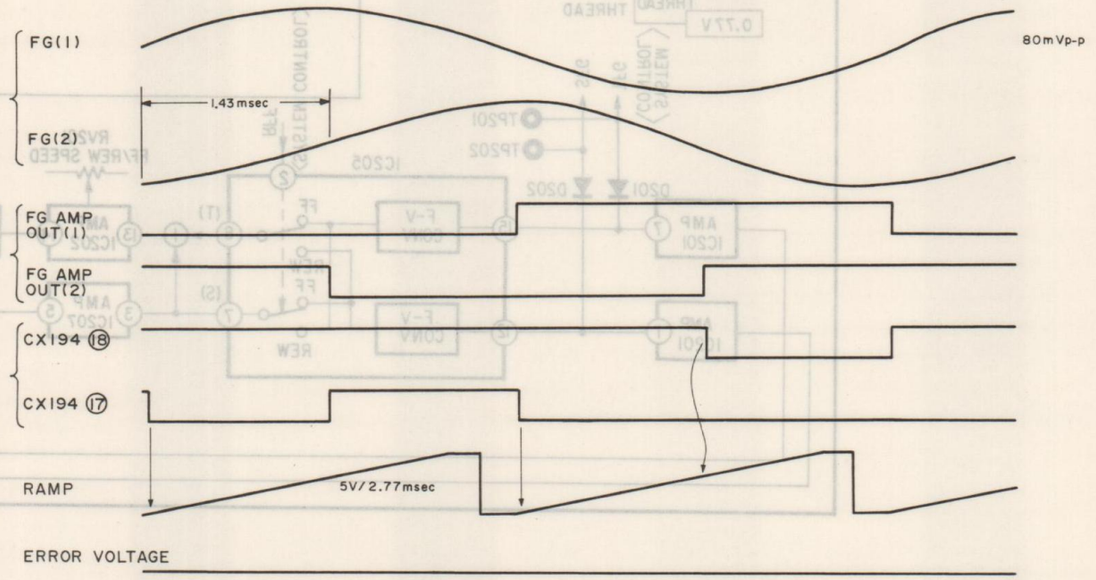
CAPSTAN PHASE CONTROL SYSTEM TIMING CHART (RECORD MODE)



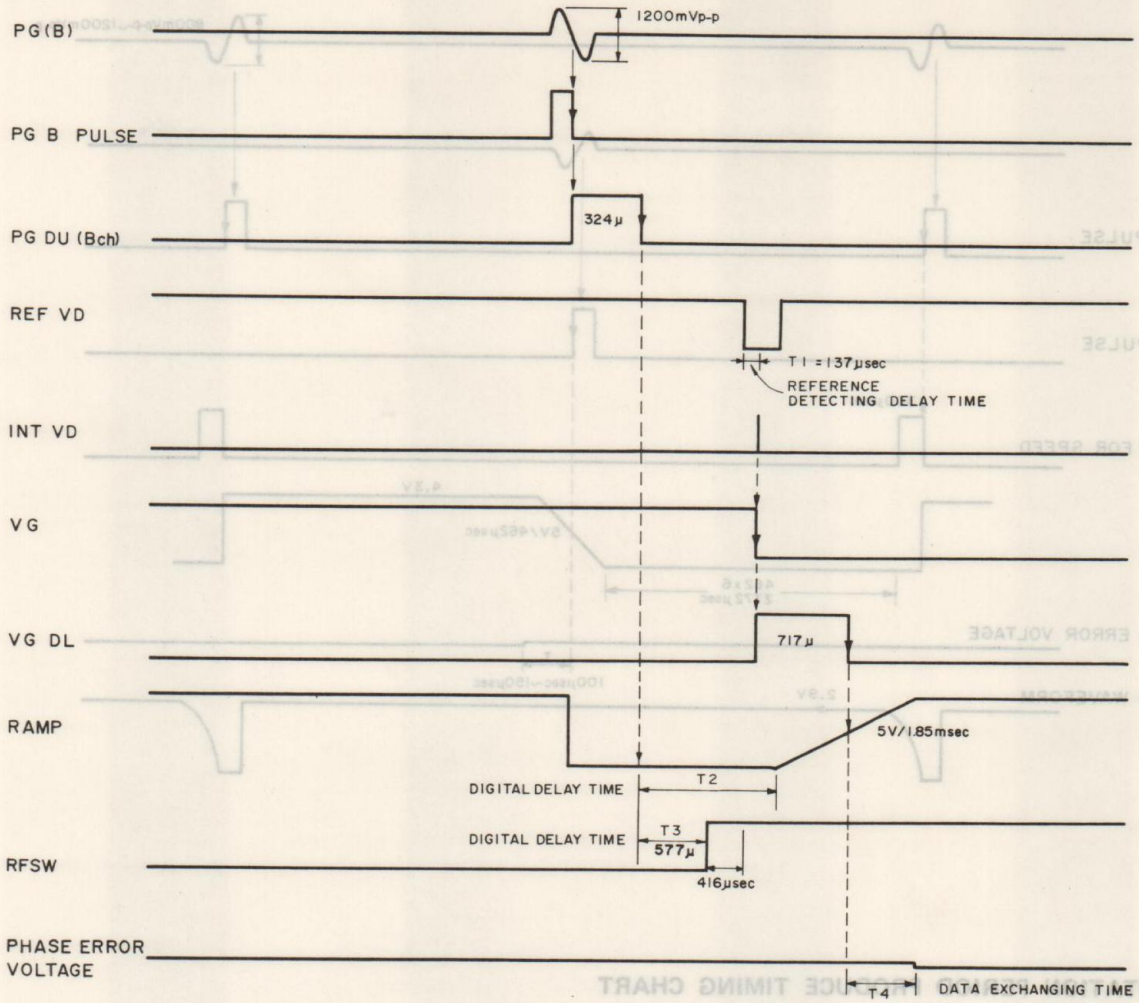
CAPSTAN PHASE CONTROL SYSTEM TIMING CHART (PLAYBACK MODE)



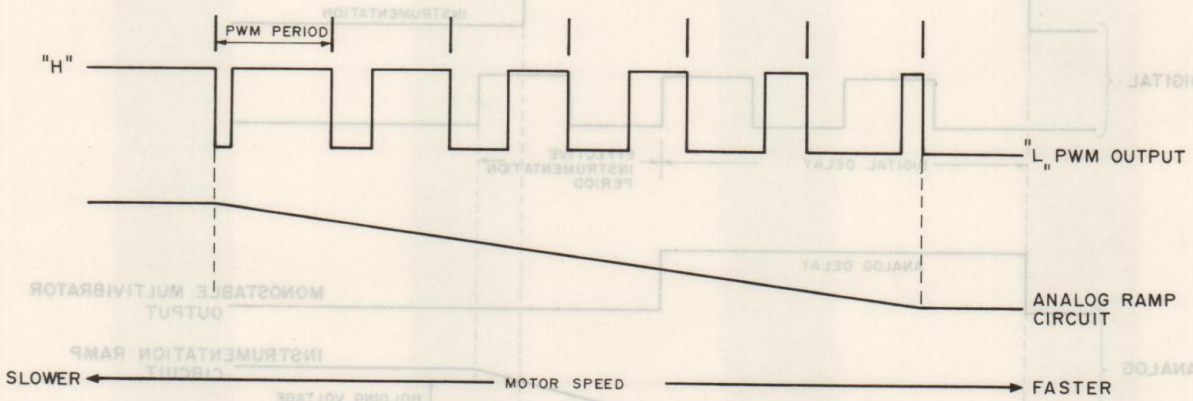
CAPSTAN SPEED CONTROL SYSTEM TIMING CHART



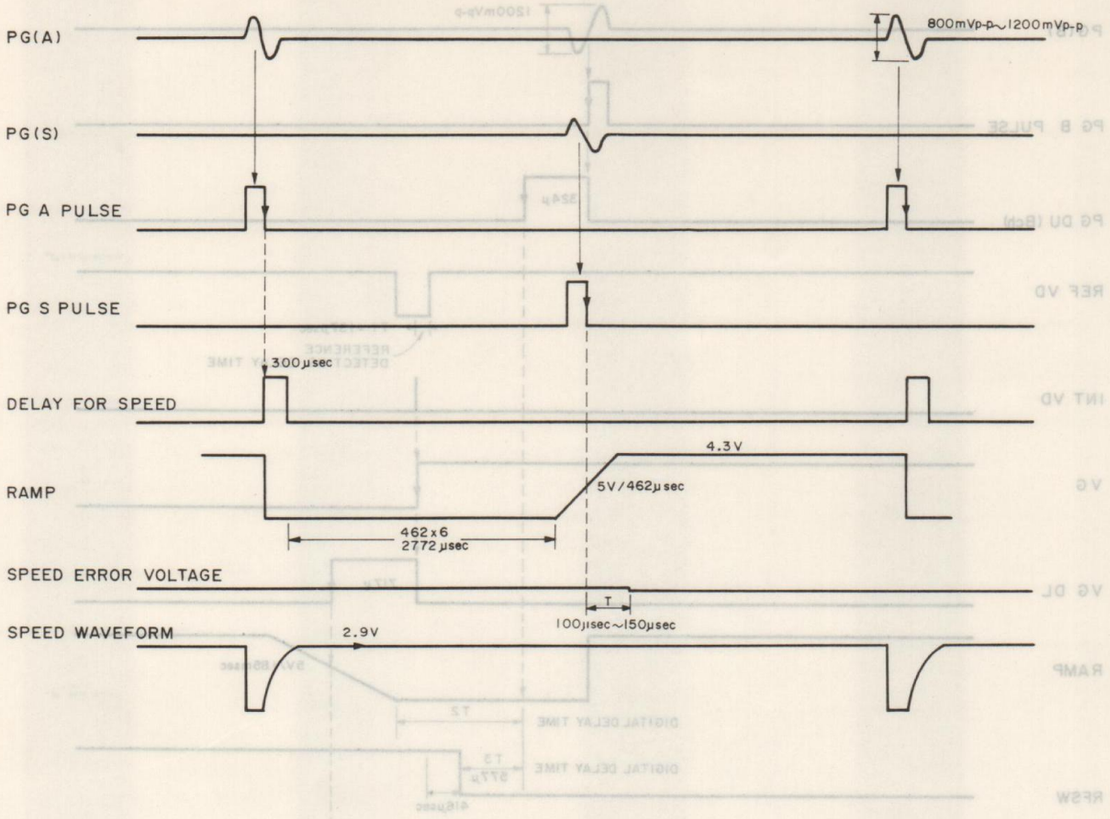
DRUM PHASE SYSTEM TIMING CHART



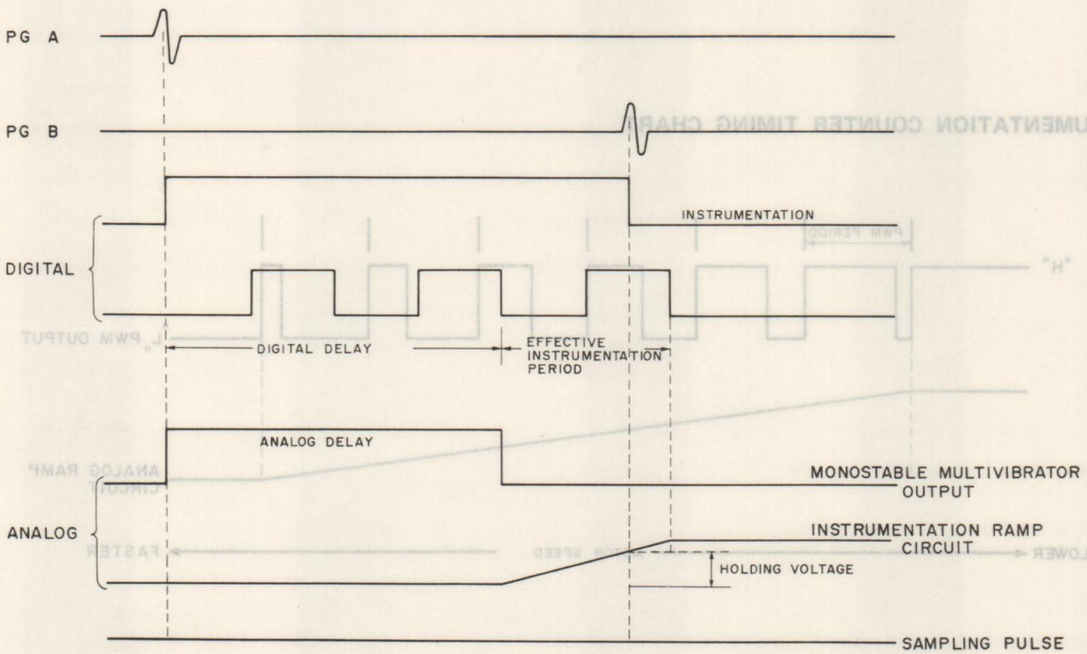
INSTRUMENTATION COUNTER TIMING CHART



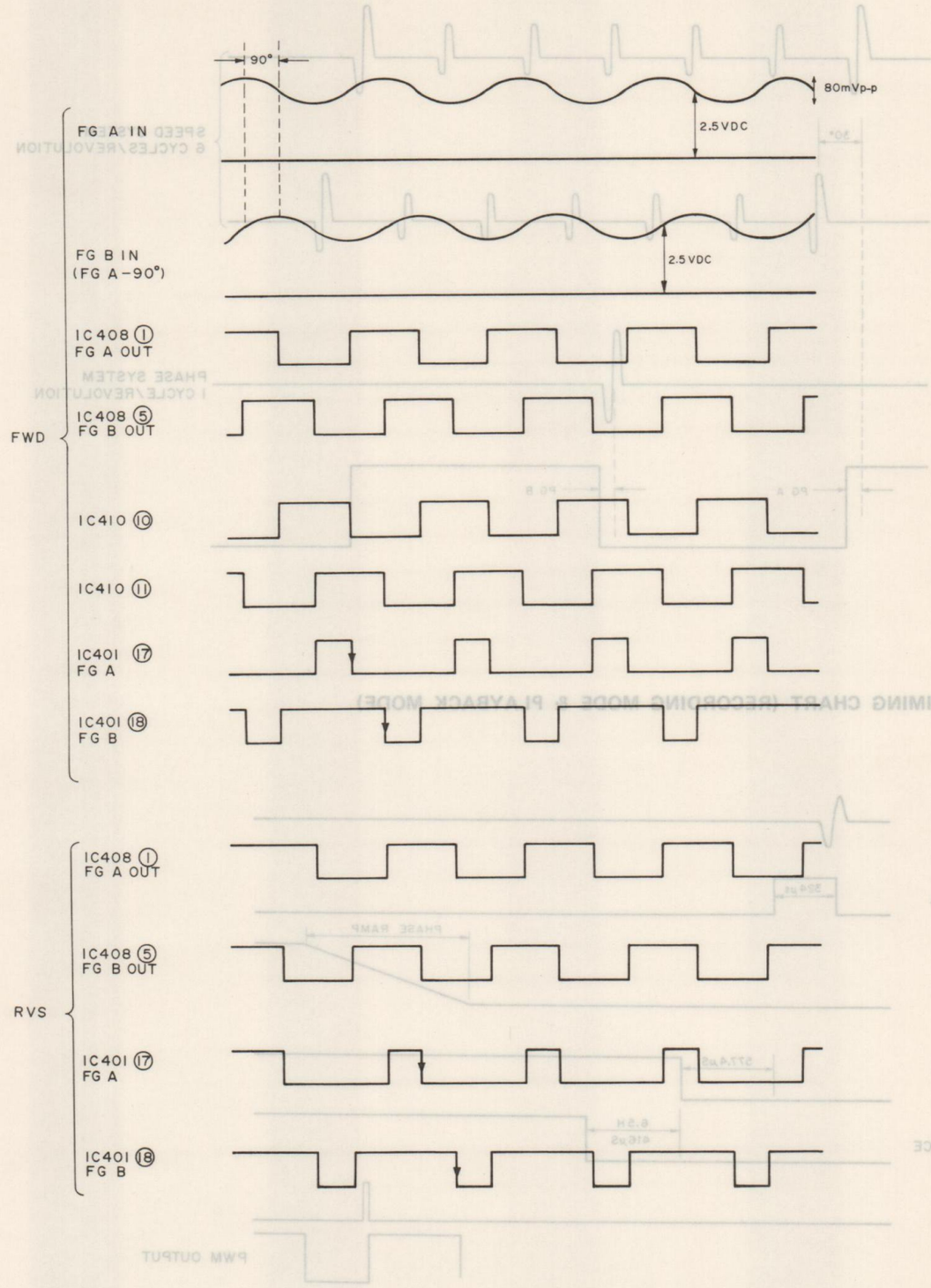
DRUM SPEED SYSTEM TIMING CHART



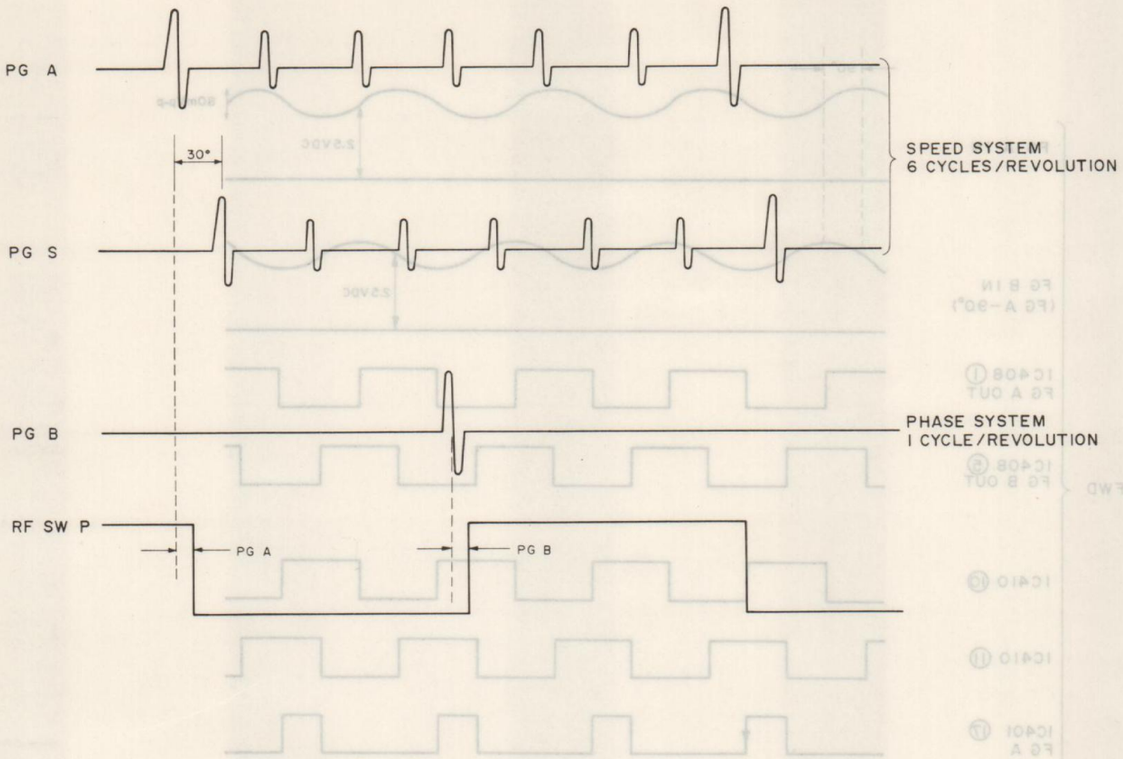
INSTRUMENTATION PERIOD PRODUCE TIMING CHART



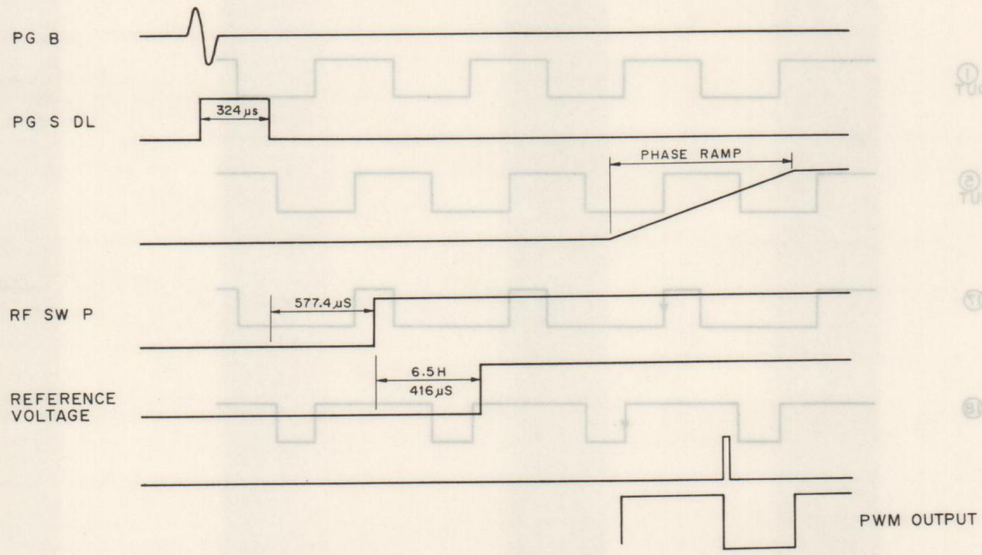
FG CIRCUIT TIMING CHART



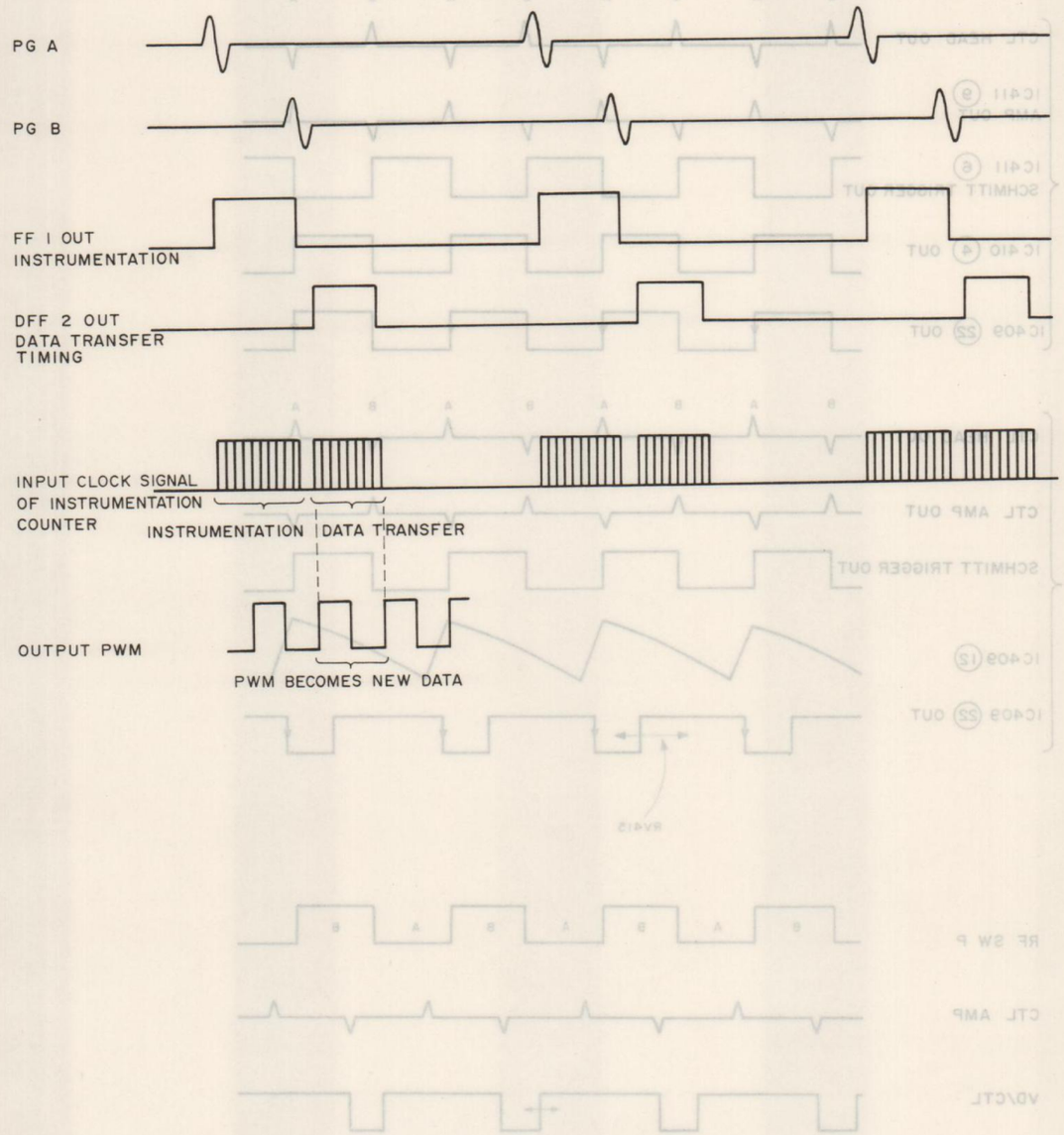
PG-A, PG-B, PG-S TIMING CHART



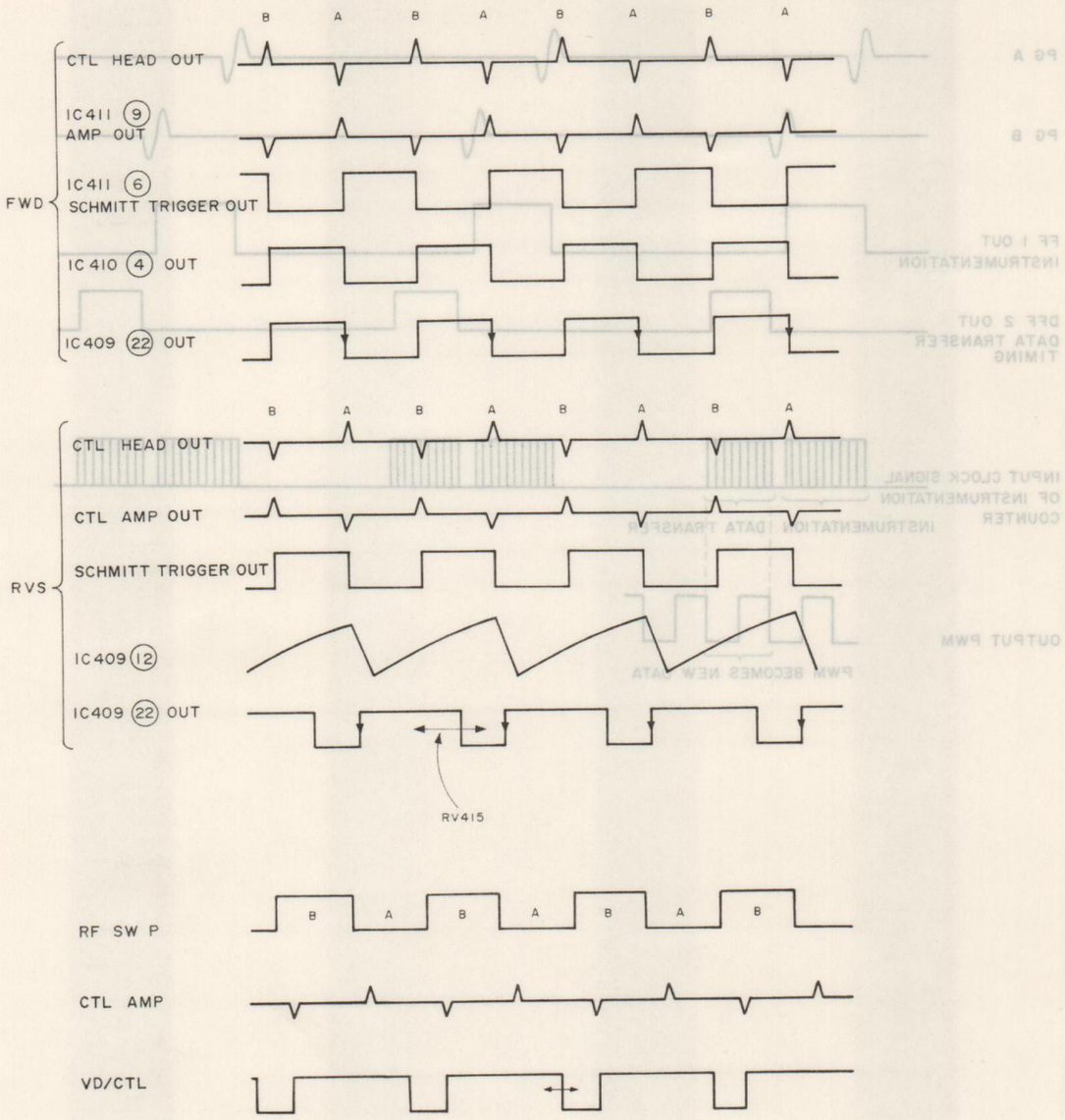
PG-A, PG-S TIMING CHART (RECORDING MODE & PLAYBACK MODE)



SERVO AMP TIMING CHART



CTL CIRCUIT OF IC409 TIMING CHART



VARIABLE SPEED PLAYBACK CIRCUIT TIMING CHART

CHART-1

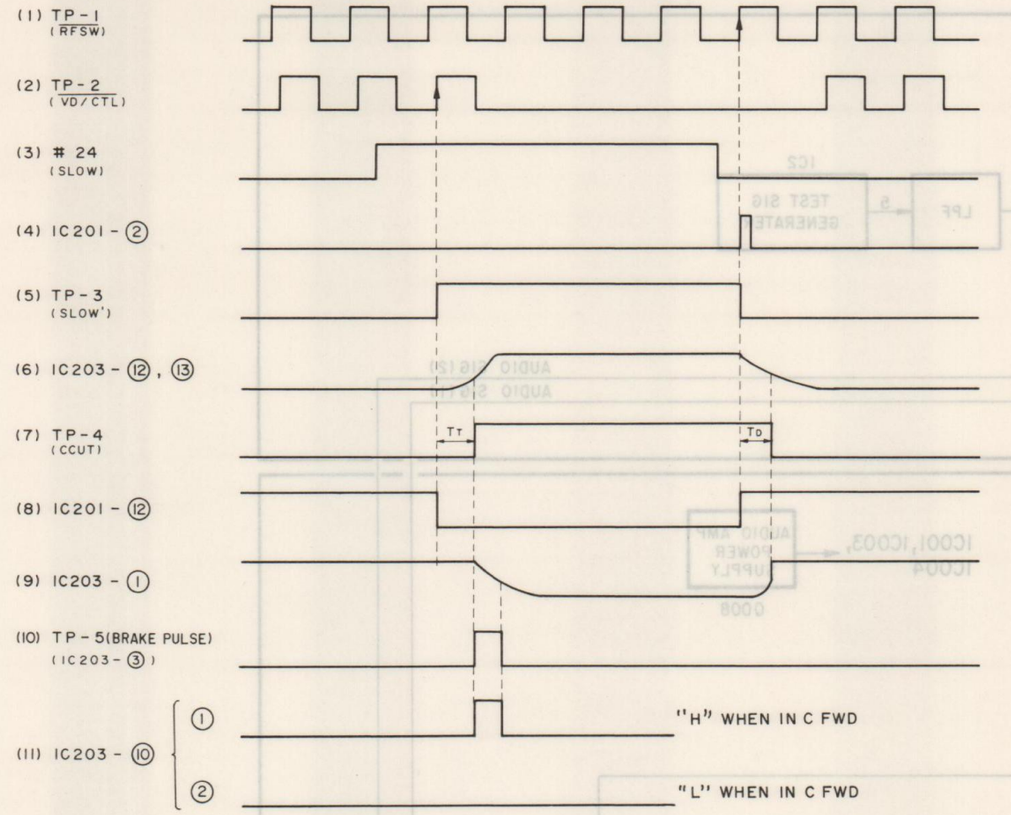
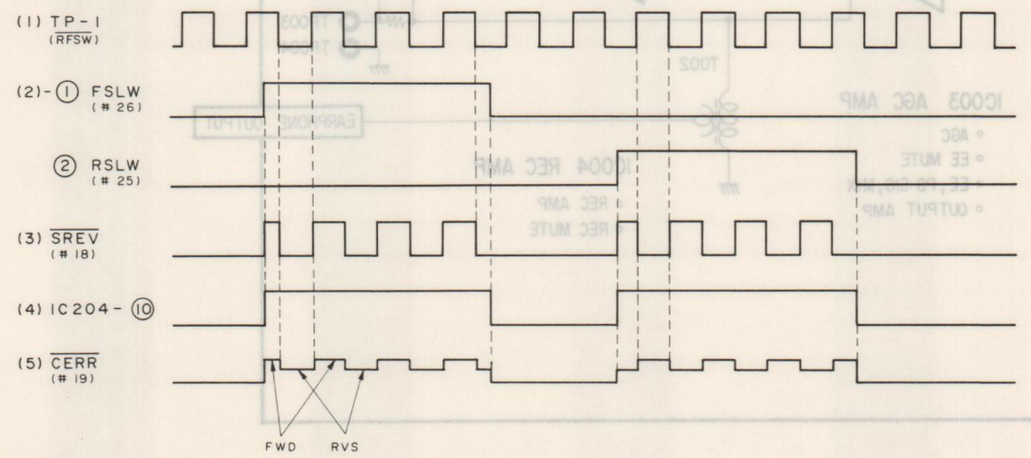
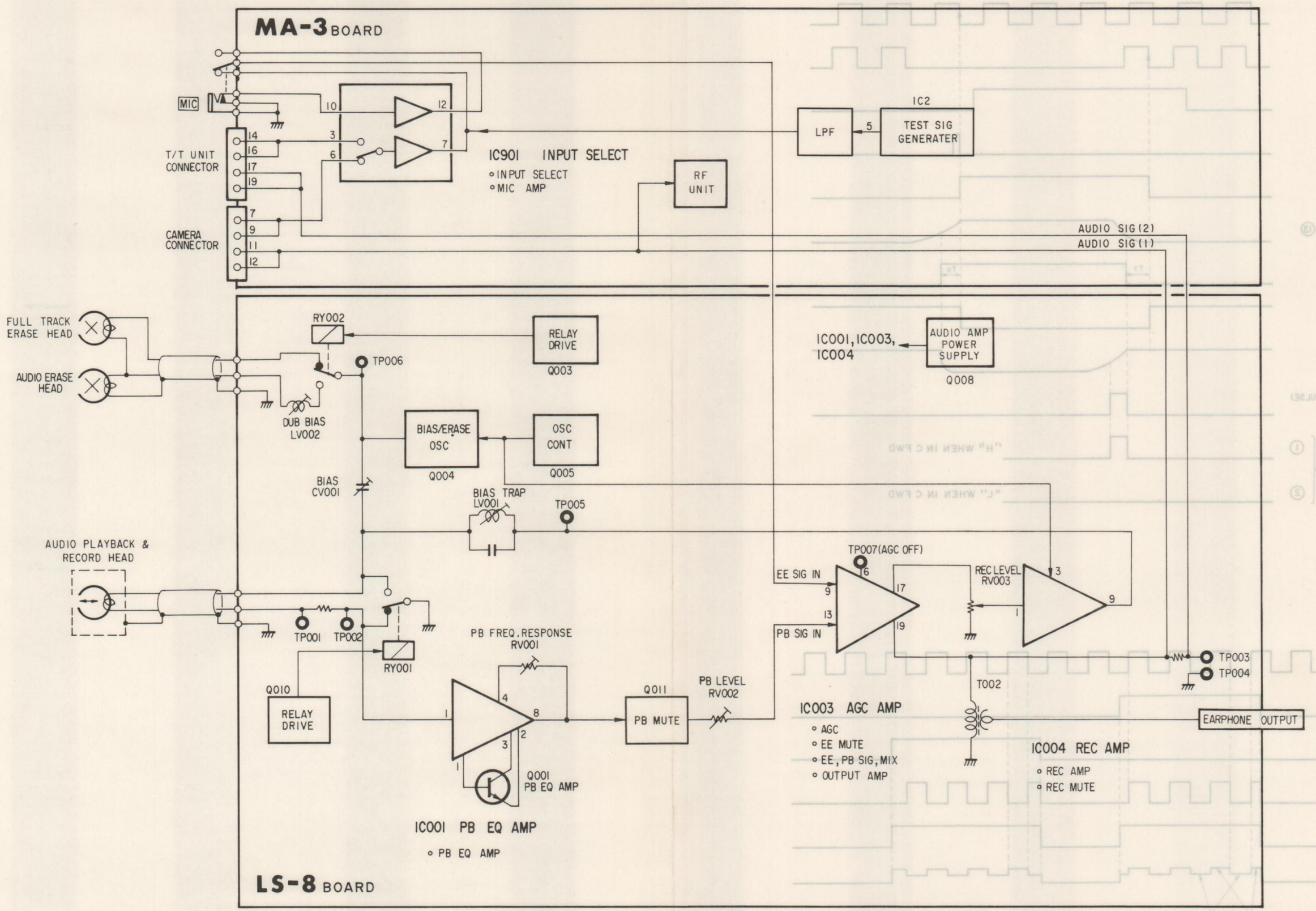


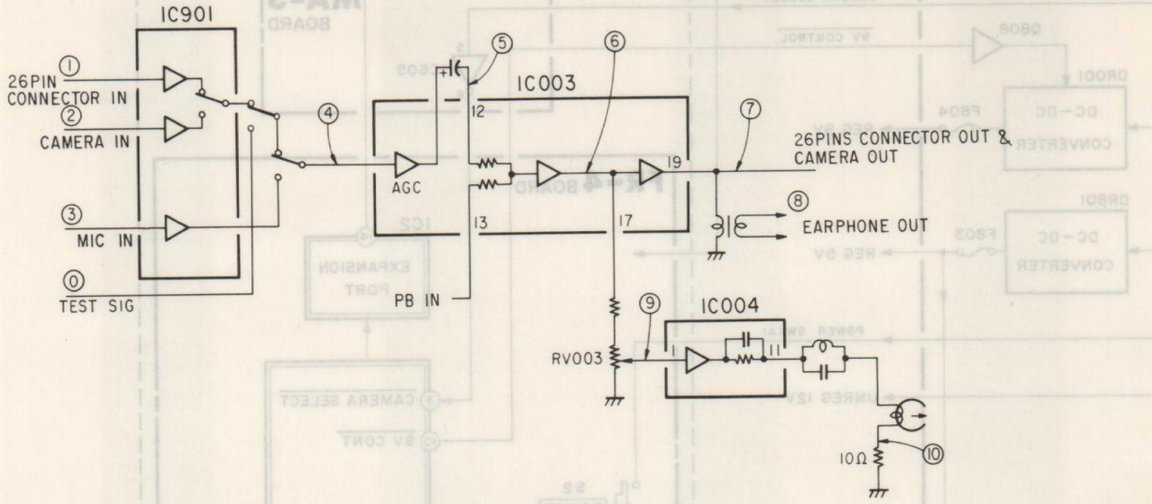
CHART-2

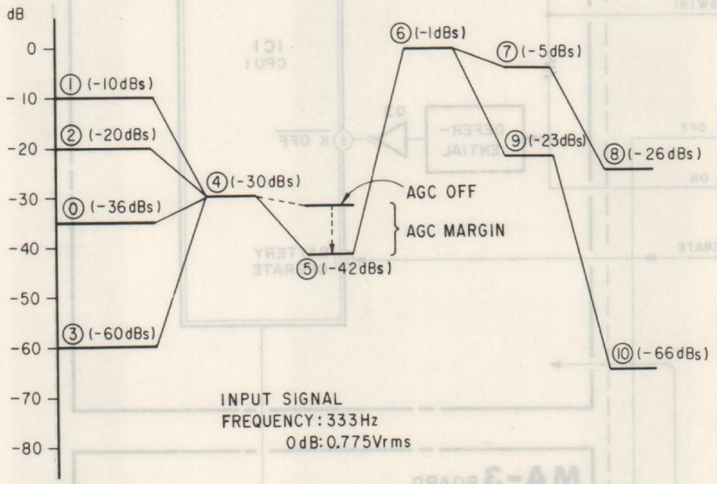


AUDIO CIRCUIT BLOCK DIAGRAM

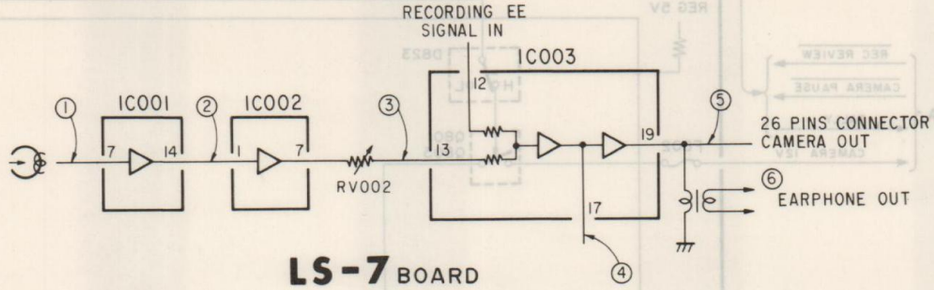


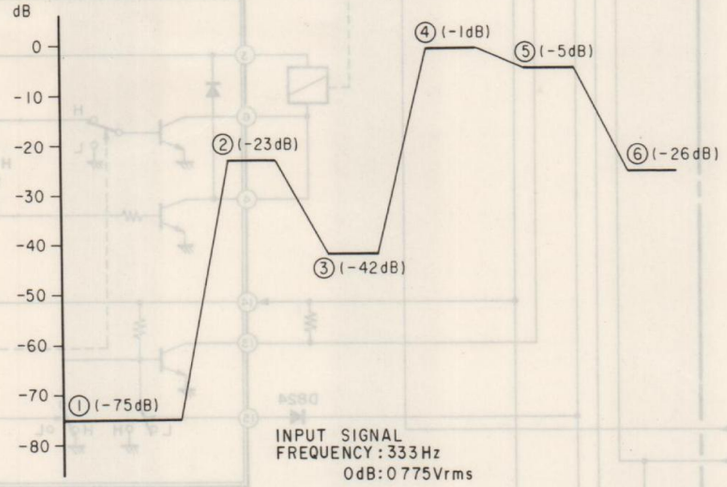
AUDIO LEVEL DIAGRAM
RECORD AMP



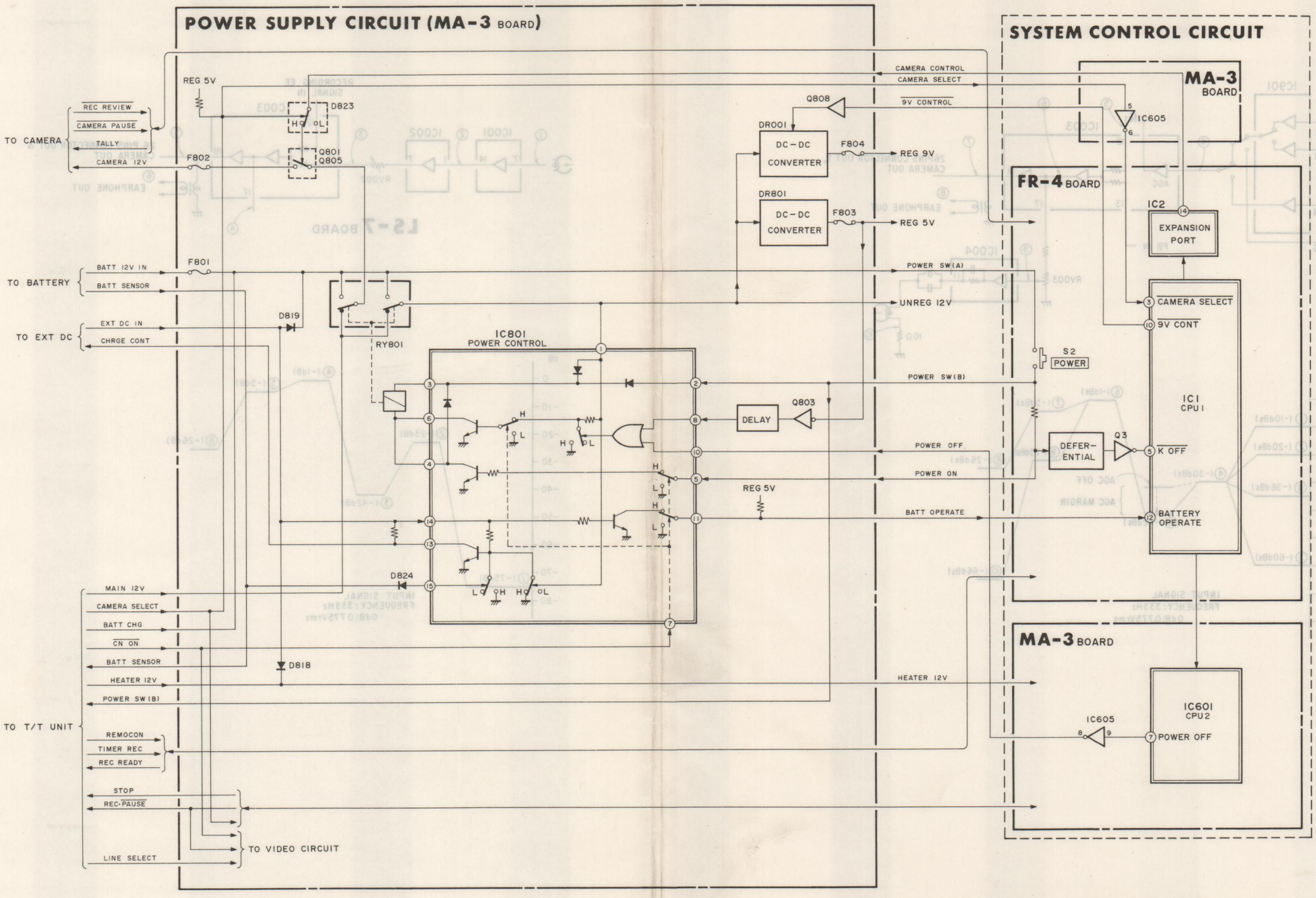


PLAYBACK AMP





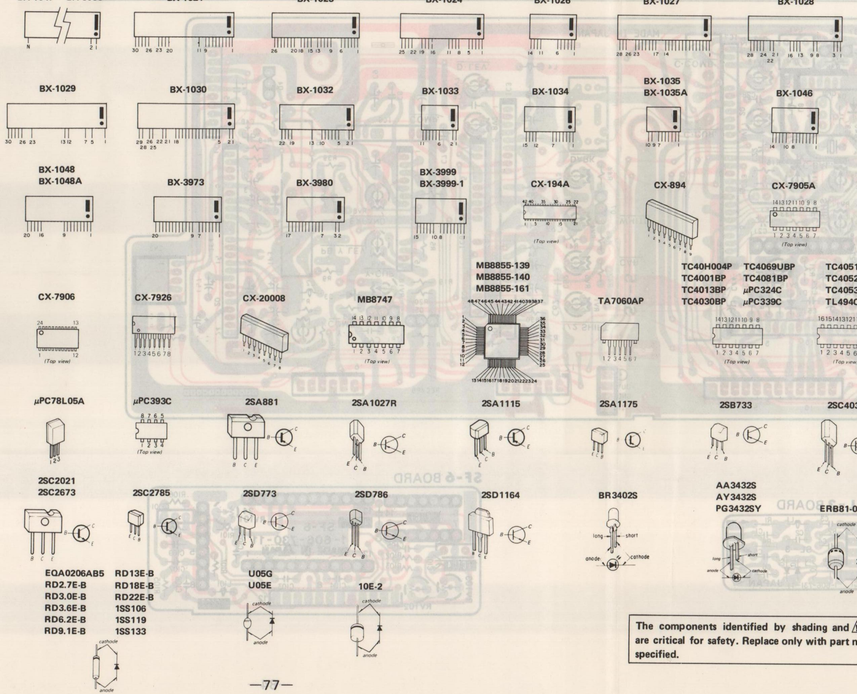
POWER SUPPLY BLOCK DIAGRAM



SECTION 3
PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

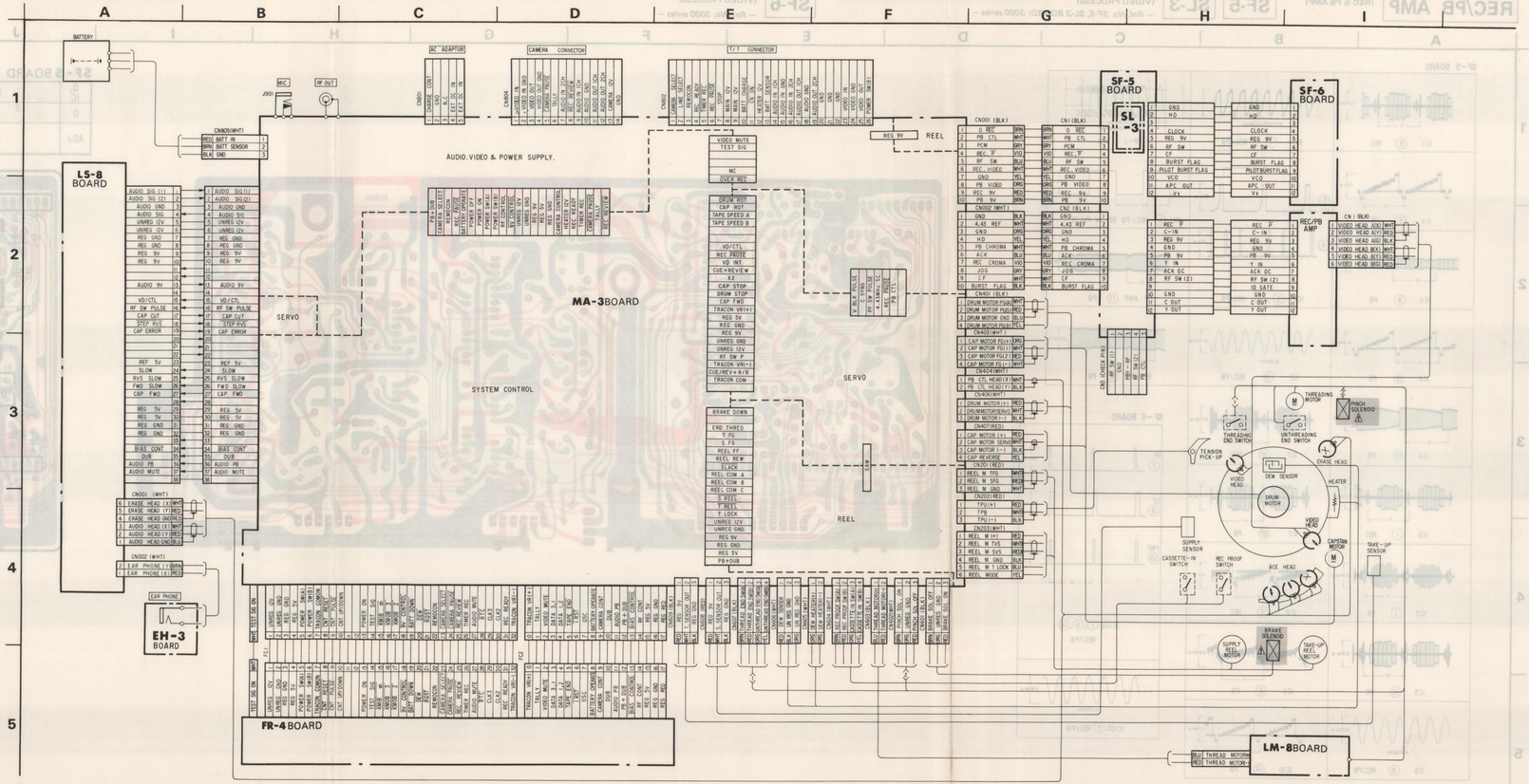
SEMICONDUCTOR

BX-1013 BX-3971
BX-1022 BX-3976
BX-1025 BX-3977
BX-1036 BX-3978
BX-1045 BX-3982-2
BX-1047 BX-3983

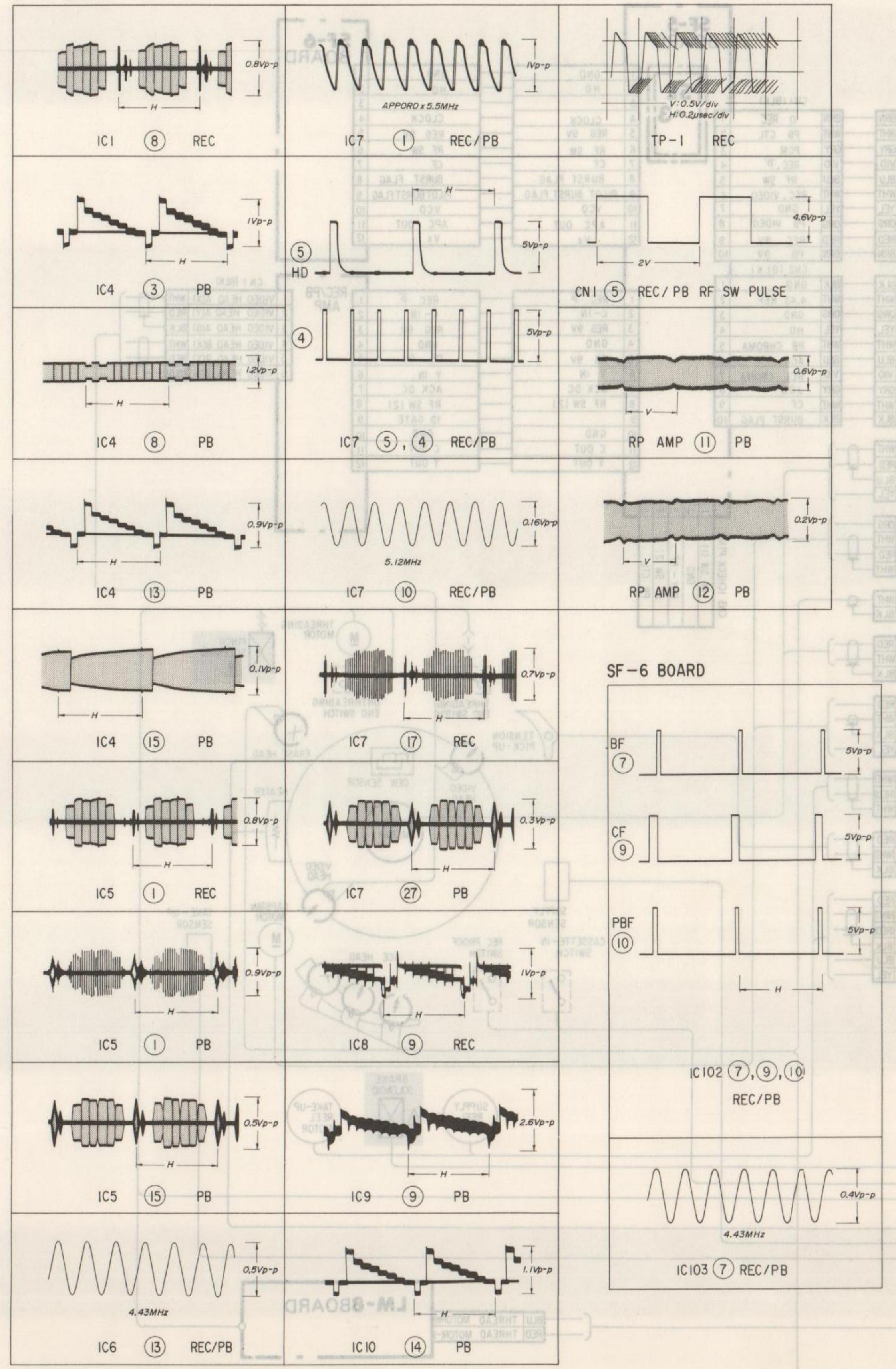


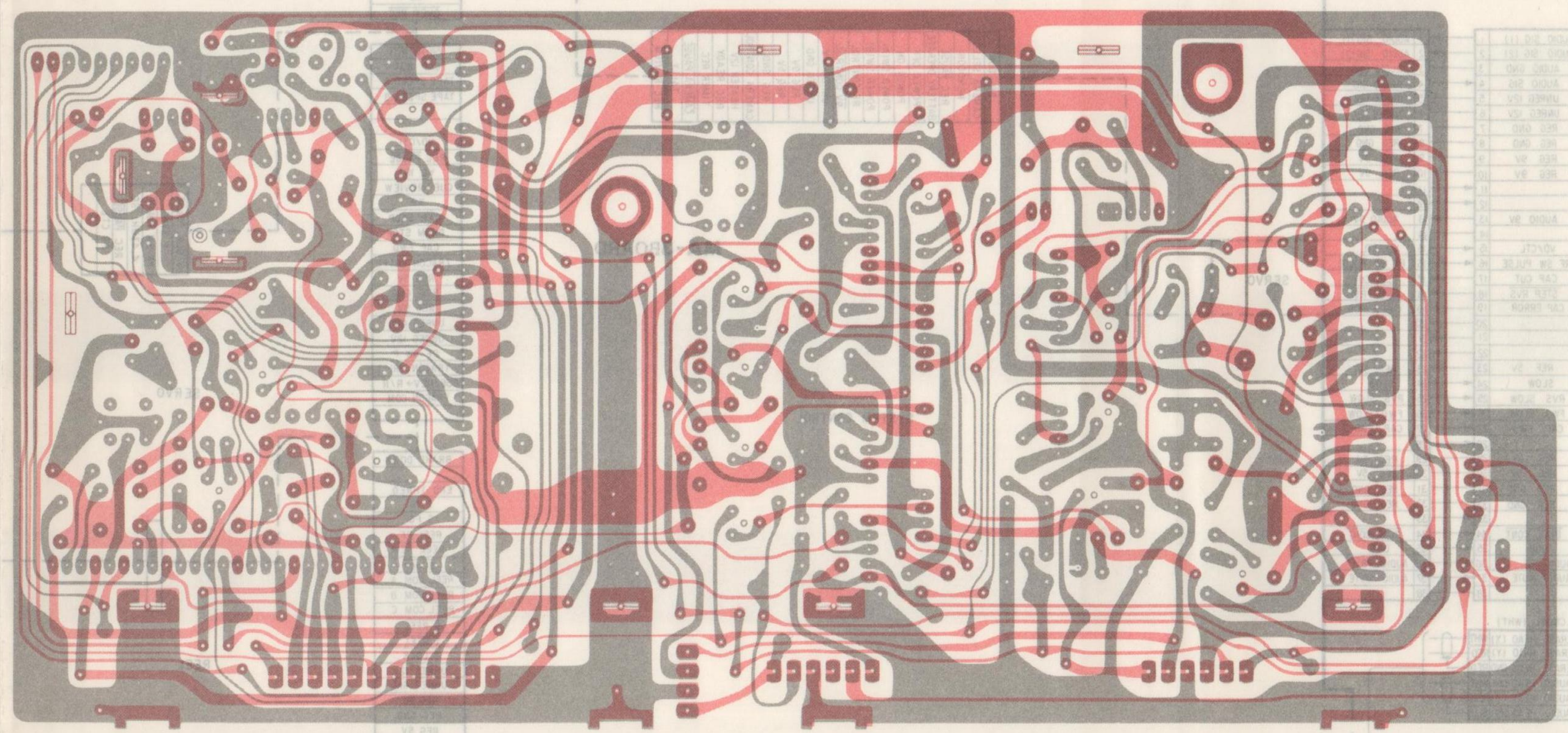
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

FRAME SCHEMATIC DIAGRAM



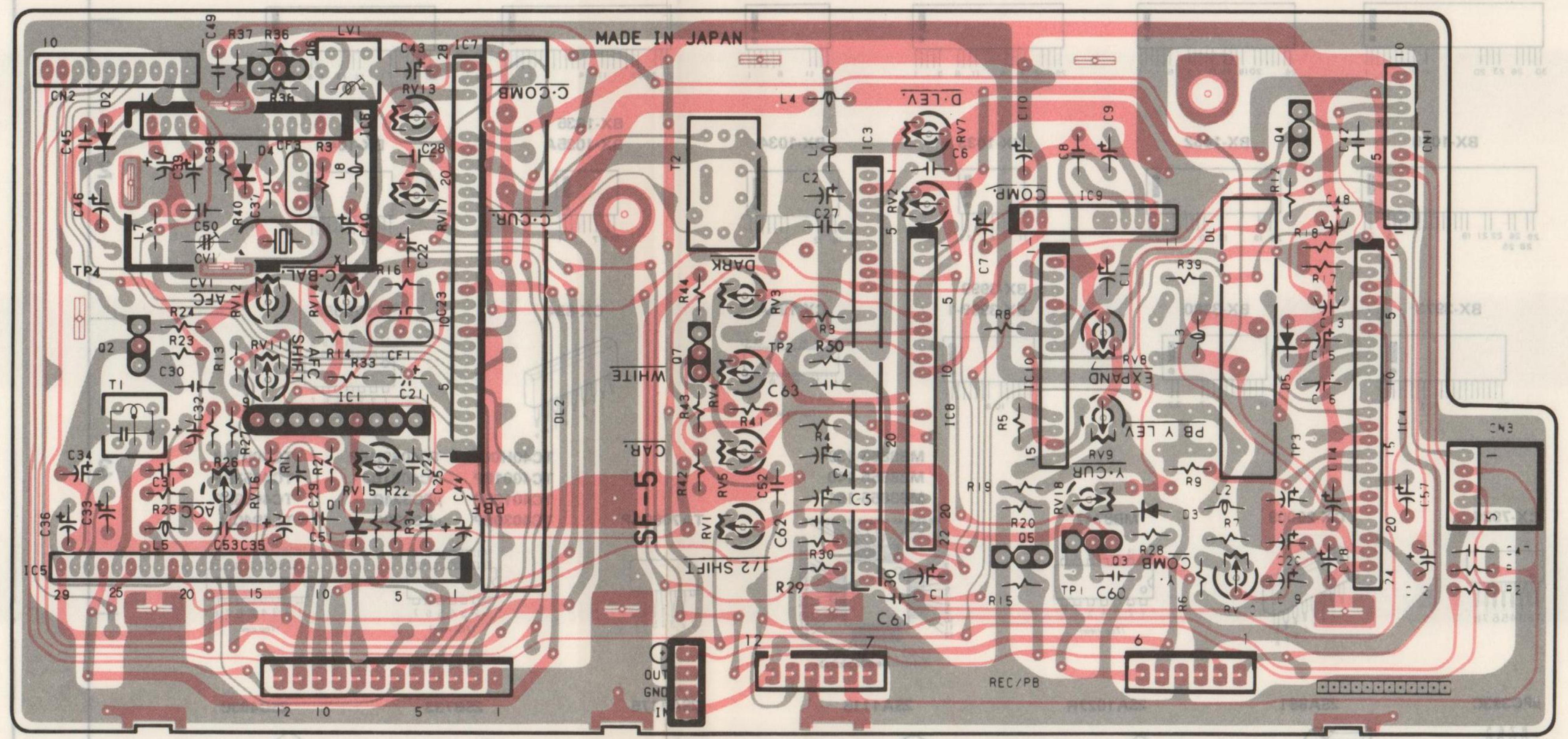
SF-5 BOARD





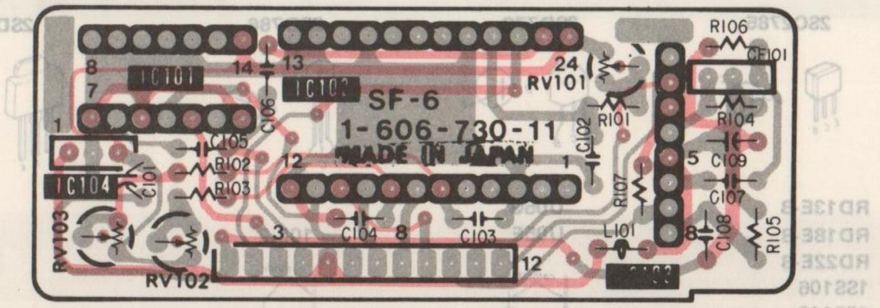
SF-5 BOARD

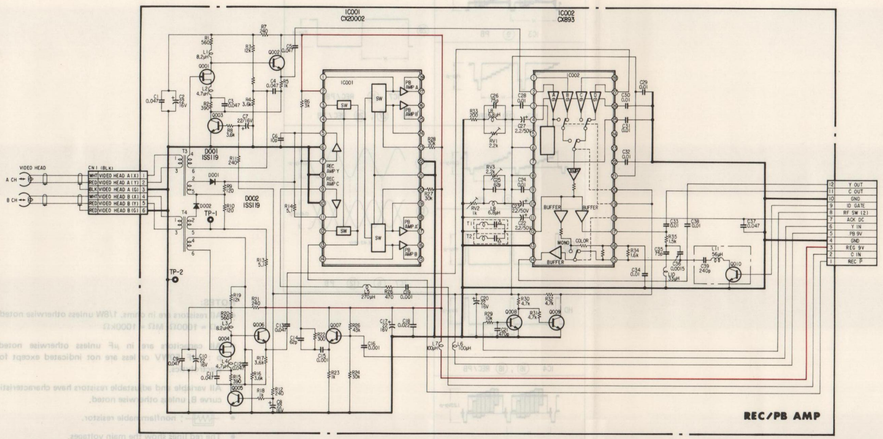
Q, IC	2	IC6 6 IC5	IC7	7	IC3	IC8	5	IC10	IC9 3	4	IC4		Q, IC
D	2	4	1						3	5			D
ADJ	CV1 RV16	RV12 RV11	LV1 RV13 RV14 RV15 RV17	RV3 RV5 RV4 RV1	RV7 RV2		RV8 RV18 RV9		RV10				ADJ



SL-3 BOARD

SF-6 BOARD



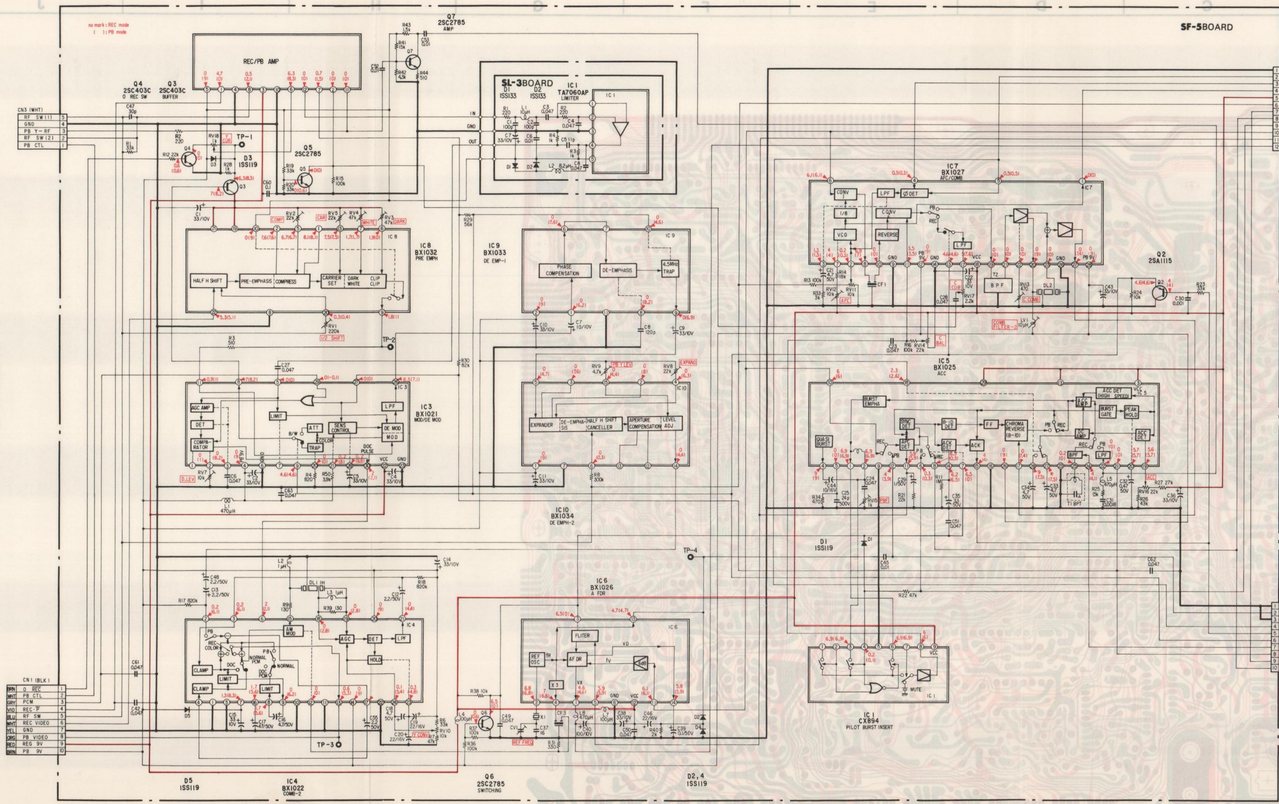


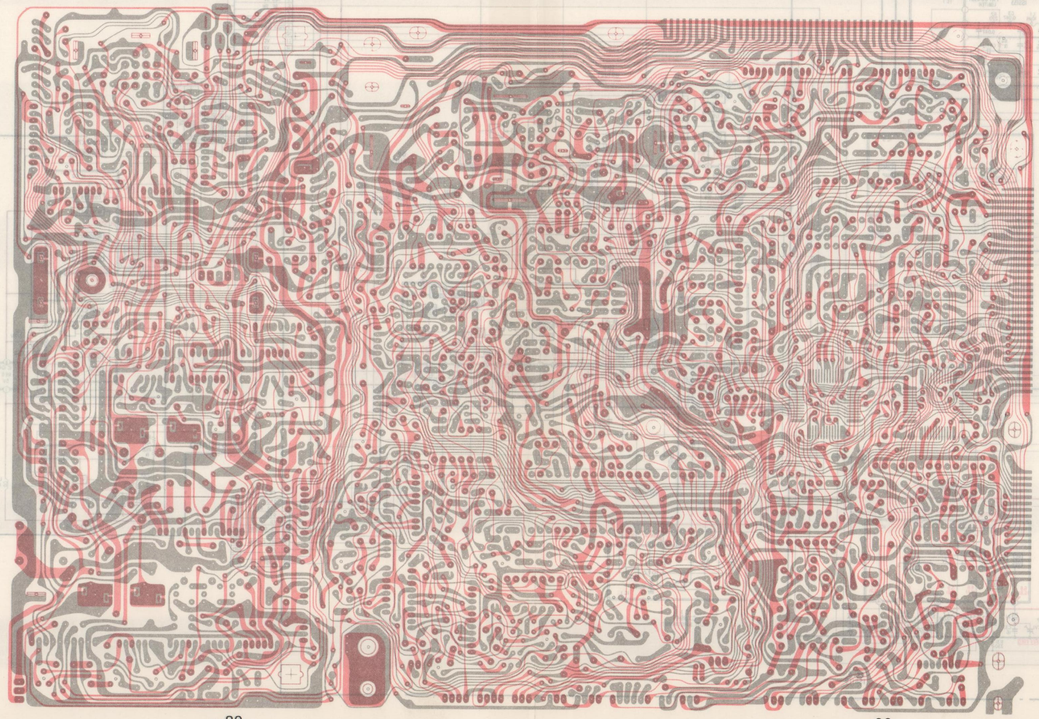
NOTES:

- All resistors are in ohms, 1/8W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⚠ : nonflammable resistor.
- The red lines show the main voltages.
- Marked * is not able to measure the voltage of it's position.
- All voltages are dc measured with a DMT (1MΩ/V).

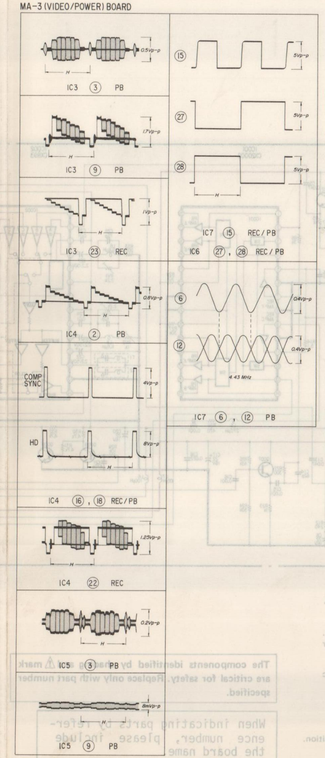
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.





MA-3 (VIDEO/POWER) BOARD

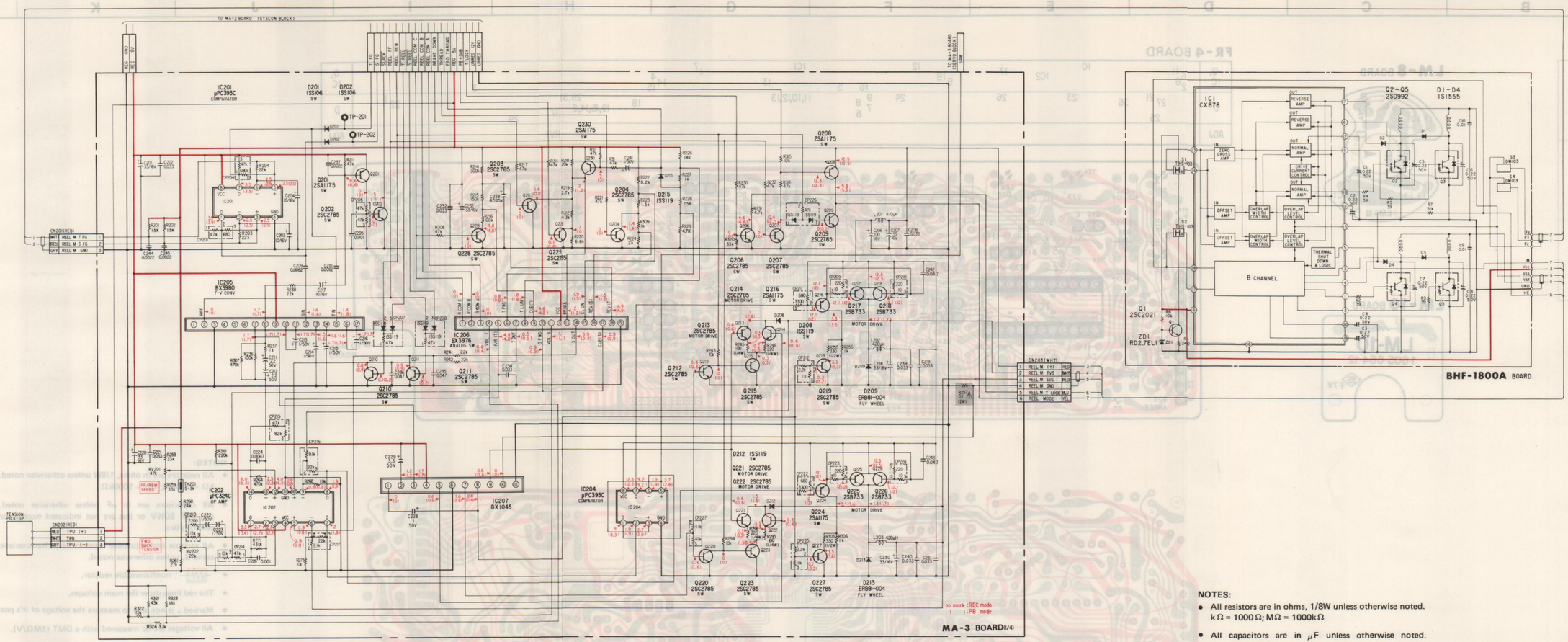


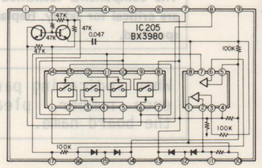
NOTES:

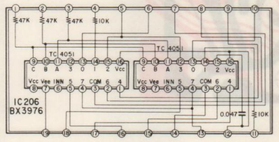
- All resistors are in ohms, 1/8W unless noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⁄WW⁄ : nonflammable resistor.
- The red lines show the main voltages.
- Marked ★ is not able to measure the voltage of it's position.
- All voltages are dc measured with a DMT (1MΩ/V).

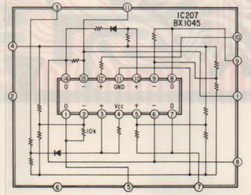
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.









Ref. No. / MODE	IC 206 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Q217 COLLECTOR	Q225 COLLECTOR
FWD	0	0	0	0.6	4.8	0.8	0.8	1.8	4.8	0.5	1.3	1.3	0.9	1.9	1.3	0.9	4.8	1.2	1.3	
RVERSE	0	0	5	0.6	4.8	0.8	0.6	1.8	4.8	0.4	1.3	1.3	1.9	1.3	0.4	4.8	0.7	2.2		
CUE	4.8	0	0	0.6	0.8	0.8	0.9	1.8	0.9	0.8	1.3	1.3	0.8	1.9	1.3	0.8	2.3	1.4	1.2	
REV	4.8	0	5	0.6	0.8	0.8	1.3	1.8	0.9	0.4	1.3	1.3	2.3	1.9	1.3	0.4	2.3	2.4	4.5	
FF	0	5	0	0.6	1.7	0.8	1.7	1.8	4.8	1.6	1.3	2.0	0	1.9	1.3	1.6	4.8	3.1	10.2	
REW	0	5	5	0.6	1.9	0.8	0	1.8	4.8	0.6	1.3	2.0	1.9	1.9	1.3	0.6	4.8	10.2	3.6	

NOTES:

- All resistors are in ohms, 1/8W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⏦: nonflammable resistor.
- The red lines show the main voltages.
- Marked ★ is not able to measure the voltage of it's position.
- All voltages are dc measured with a DMT (1MΩ/V).

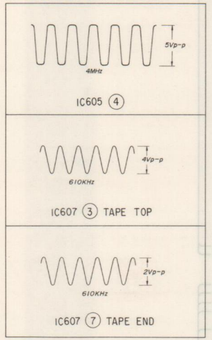
The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

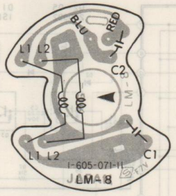
A B C D E F G H I J K

1 2 3 4 5

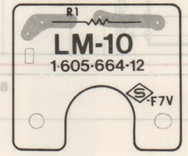
MA-3 (SYSTEM CONTROL) BOARD



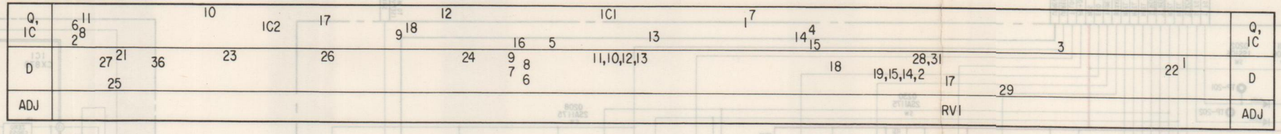
LM-8 BOARD

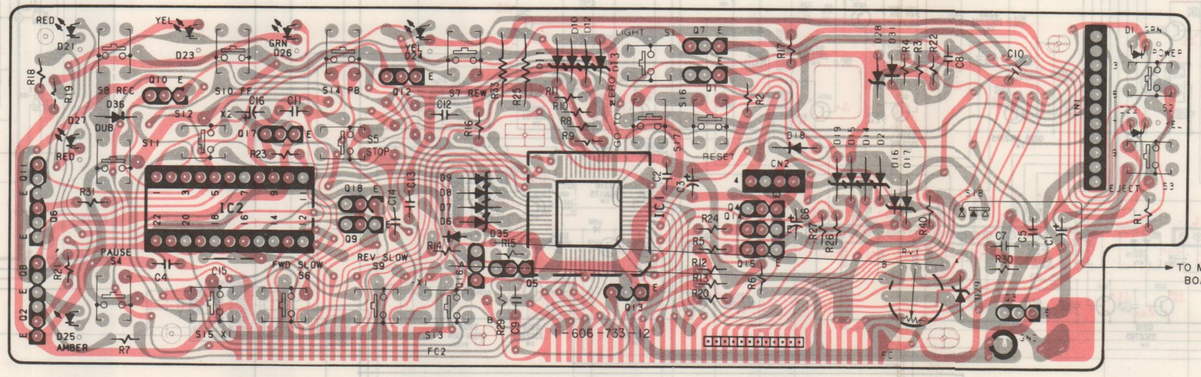


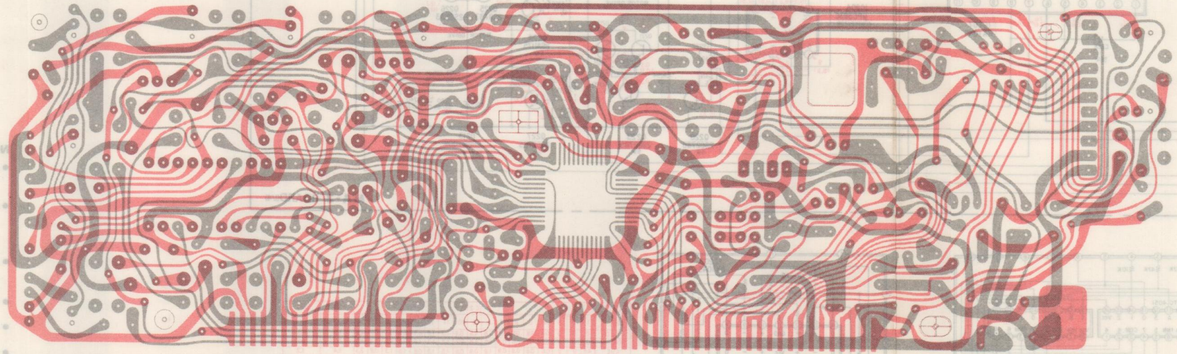
LM-10 BOARD



FR-4 BOARD





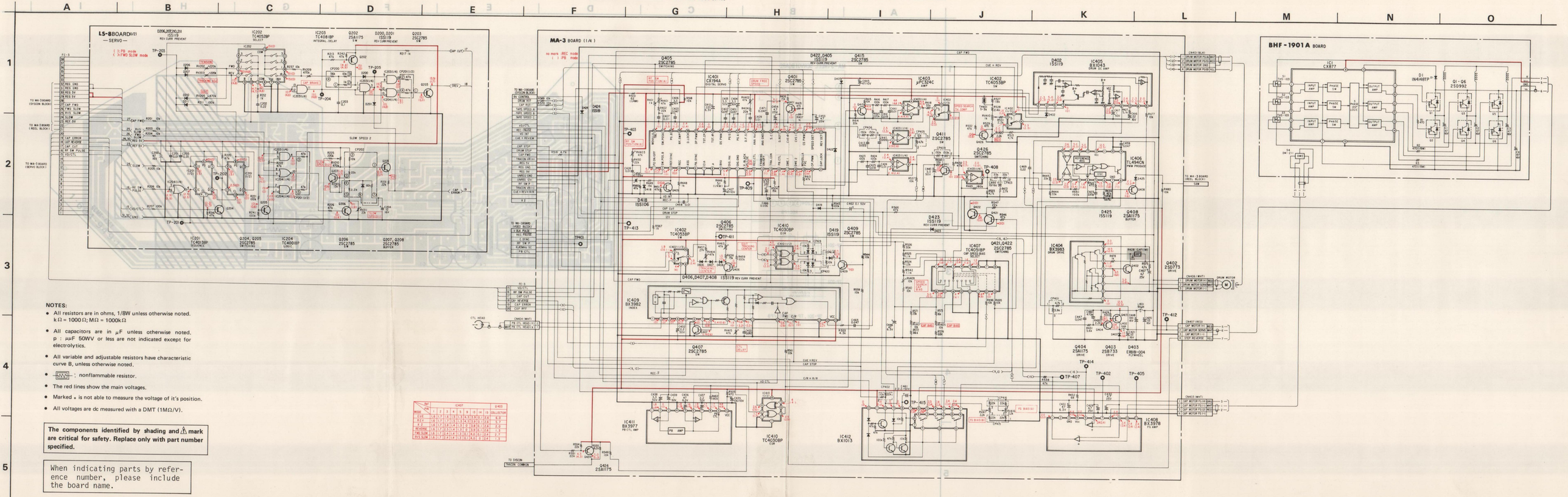


NOTES:

- All resistors are in ohms, 1/8W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- The red lines show the main voltages.
- Marked ⋆ is not able to measure the voltage of it's position.
- All voltages are dc measured with a DMT (1MΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.



NOTES:

- All resistors are in ohms, 1/8W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⏦: nonflammable resistor.
- The red lines show the main voltages.
- Marked ★ is not able to measure the voltage of it's position.
- All voltages are dc measured with a DMT (1MΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

MA-3 (REEL MOTOR DRIVE) — Ref. No. 1000 series —

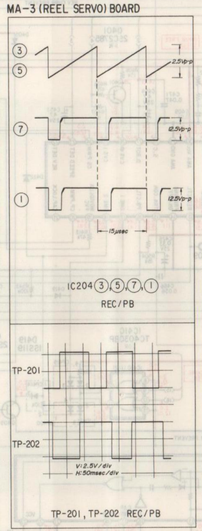
BHF-1800A (REEL MOTOR) — Ref. No. 1000 series —

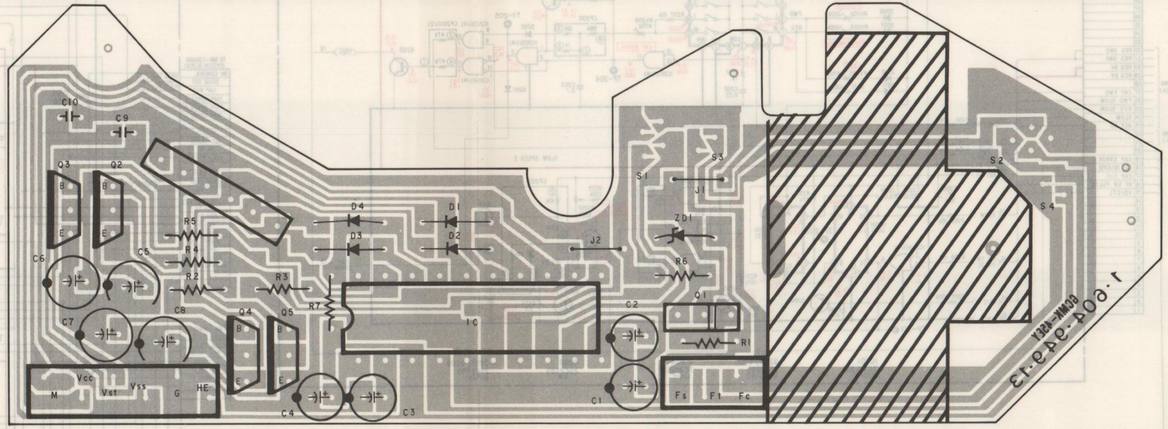
REEL SERVO REEL SERVO

A B C D E F G H I

1 2 3 4 5

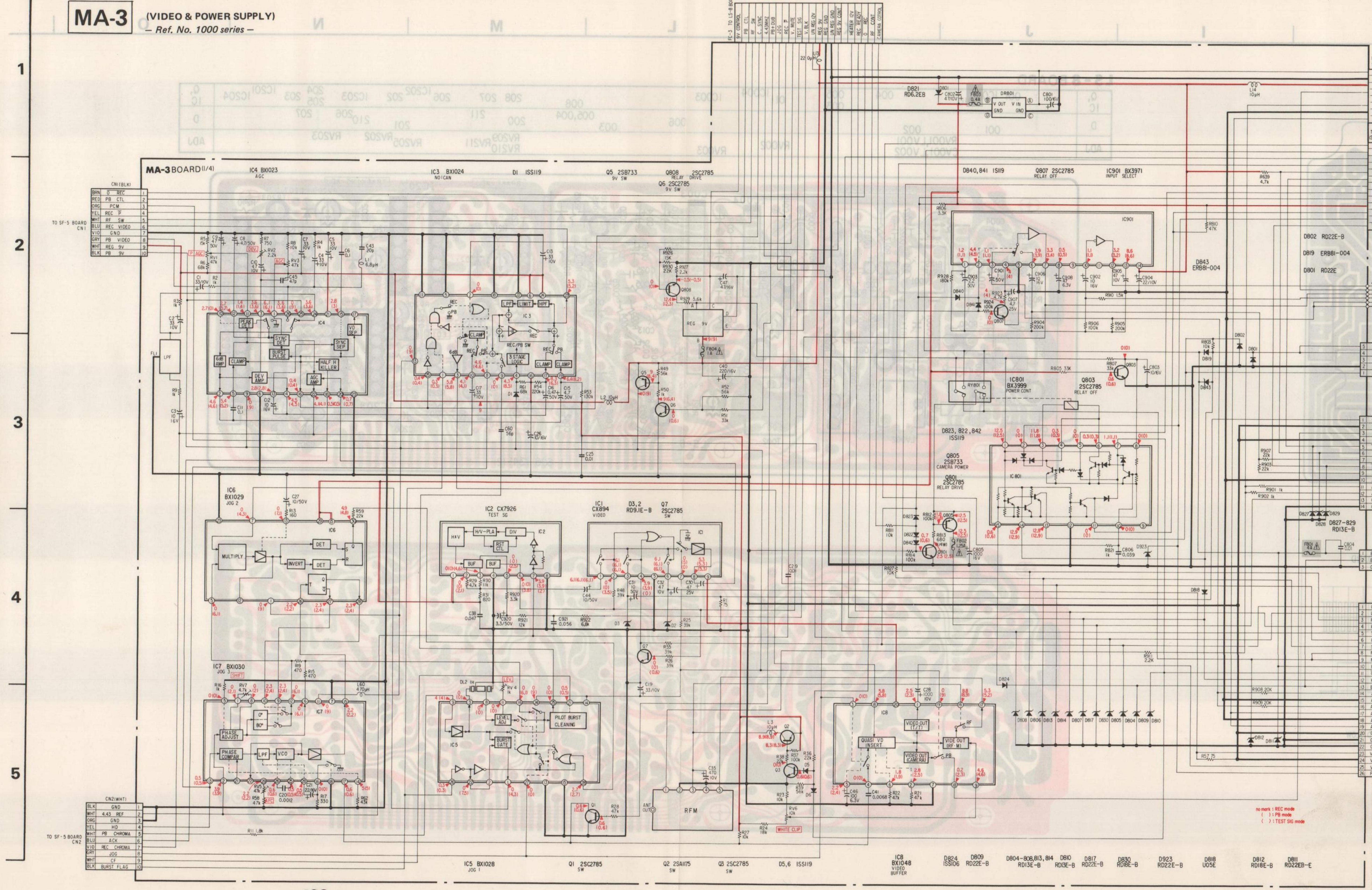
MA-3 (REEL SERVO) BOARD

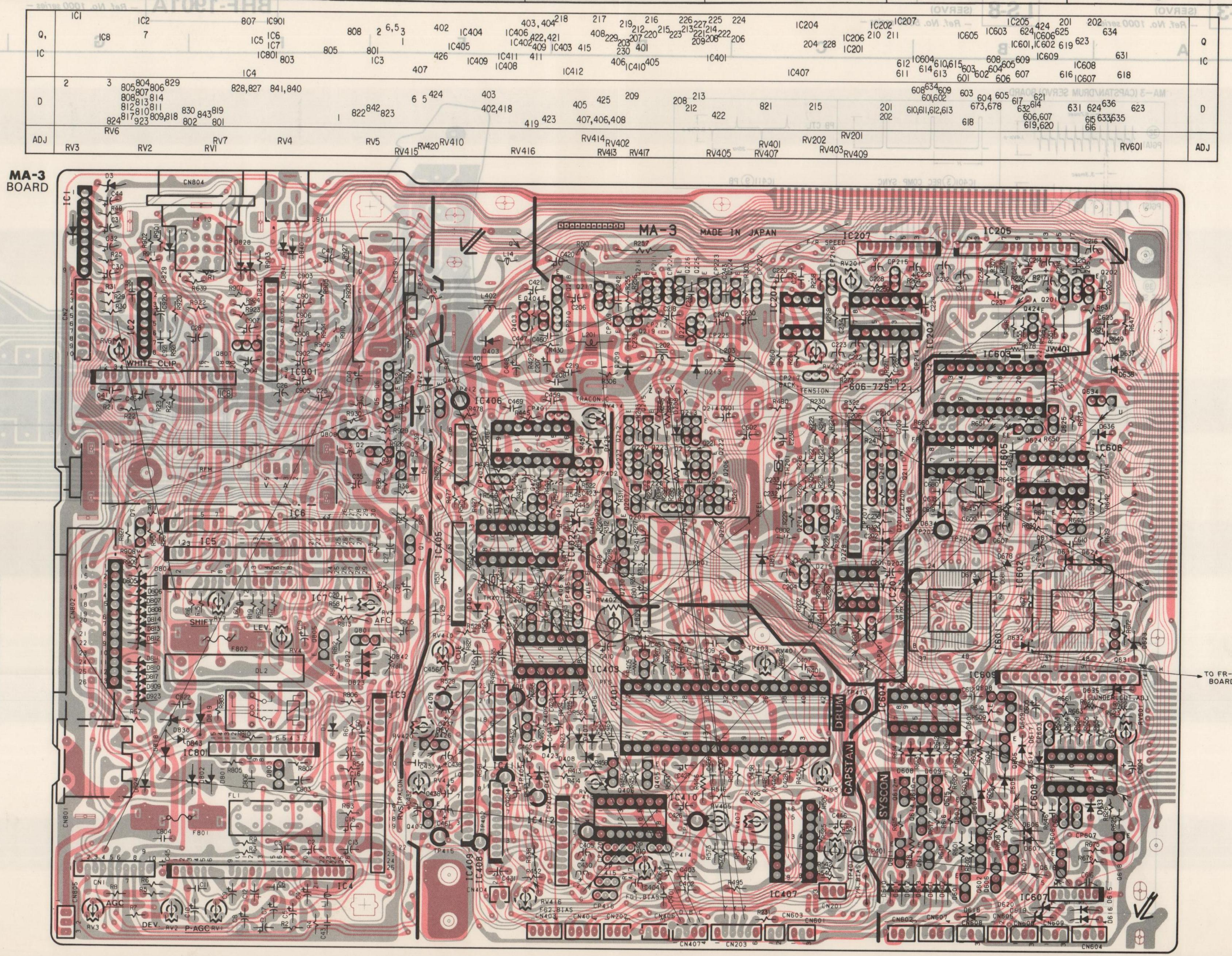




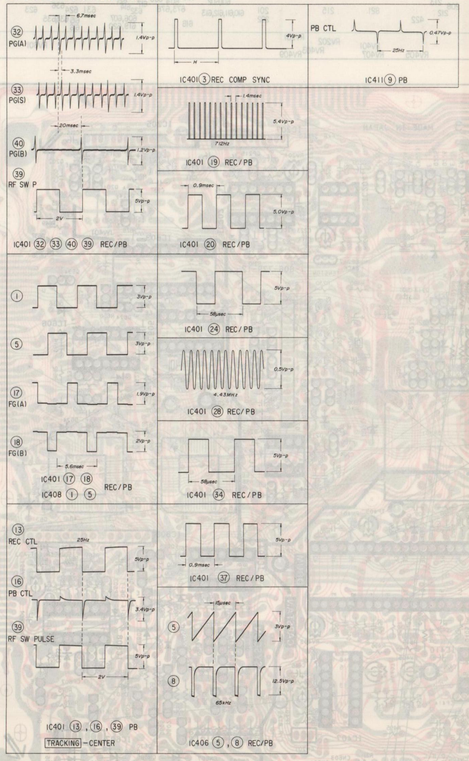
MA-3 (VIDEO & POWER SUPPLY)

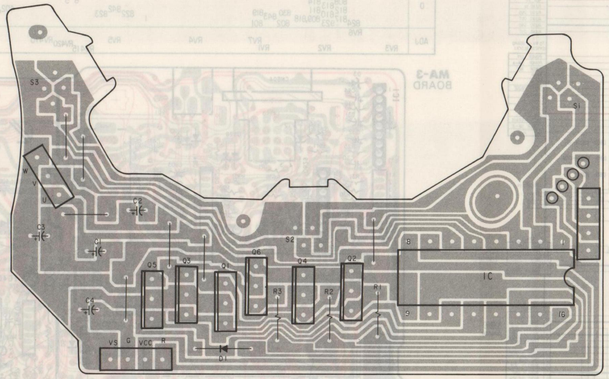
— Ref. No. 1000 series —



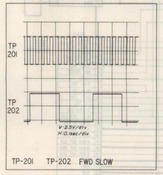


MA-3 (CAPSTAN/DRUM SERVO) BOARD

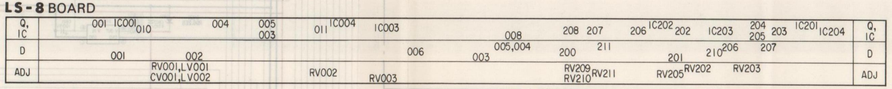


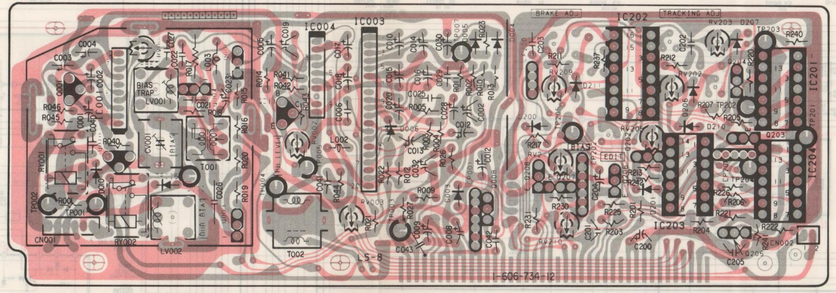


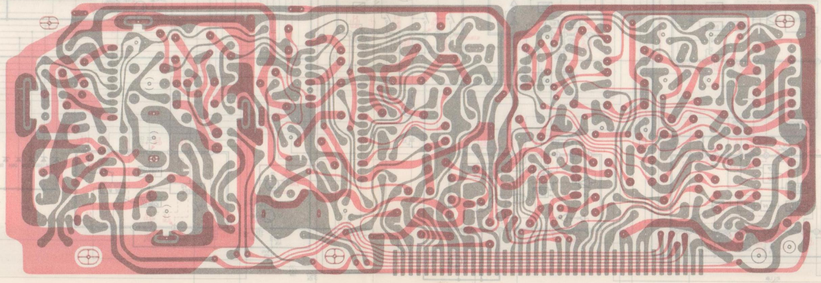
LS-8 (TRICK PLAY) BOARD



LS-8 BOARD





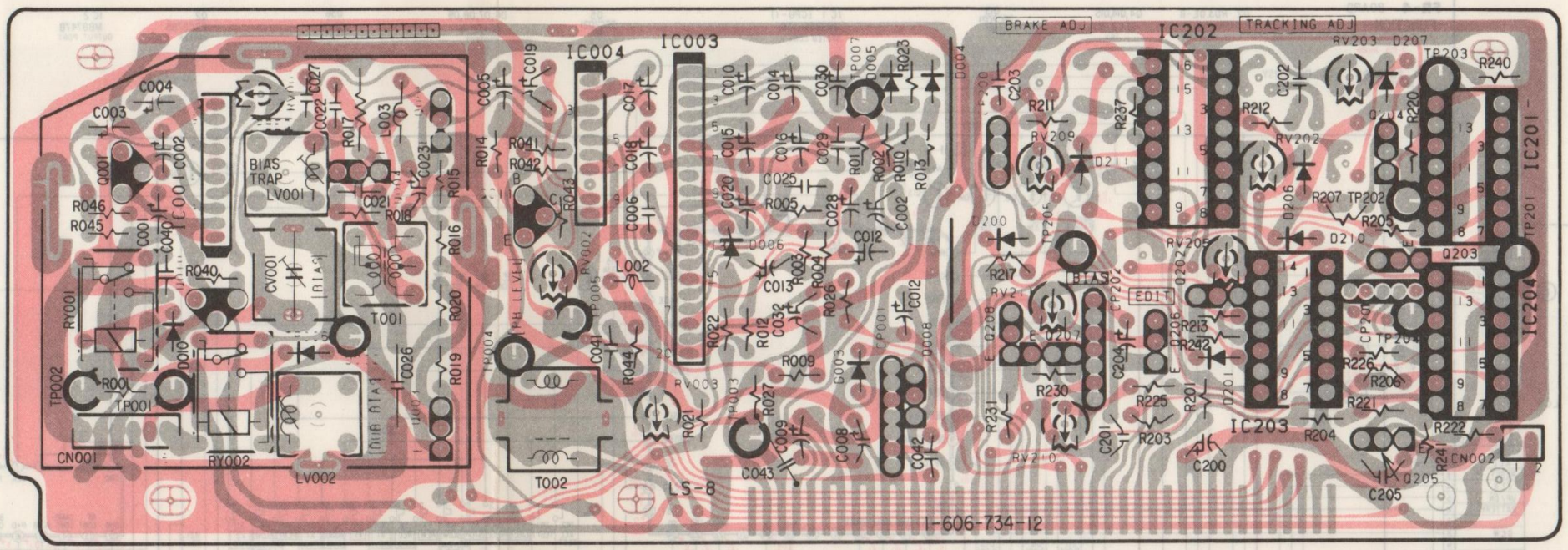


LS-8 (AUDIO PROCESS) — Ref. No. 5000 series —

EH-3 (EARPHONE) — Ref. No. 8000 series —

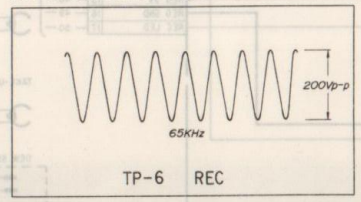
LS-8 BOARD

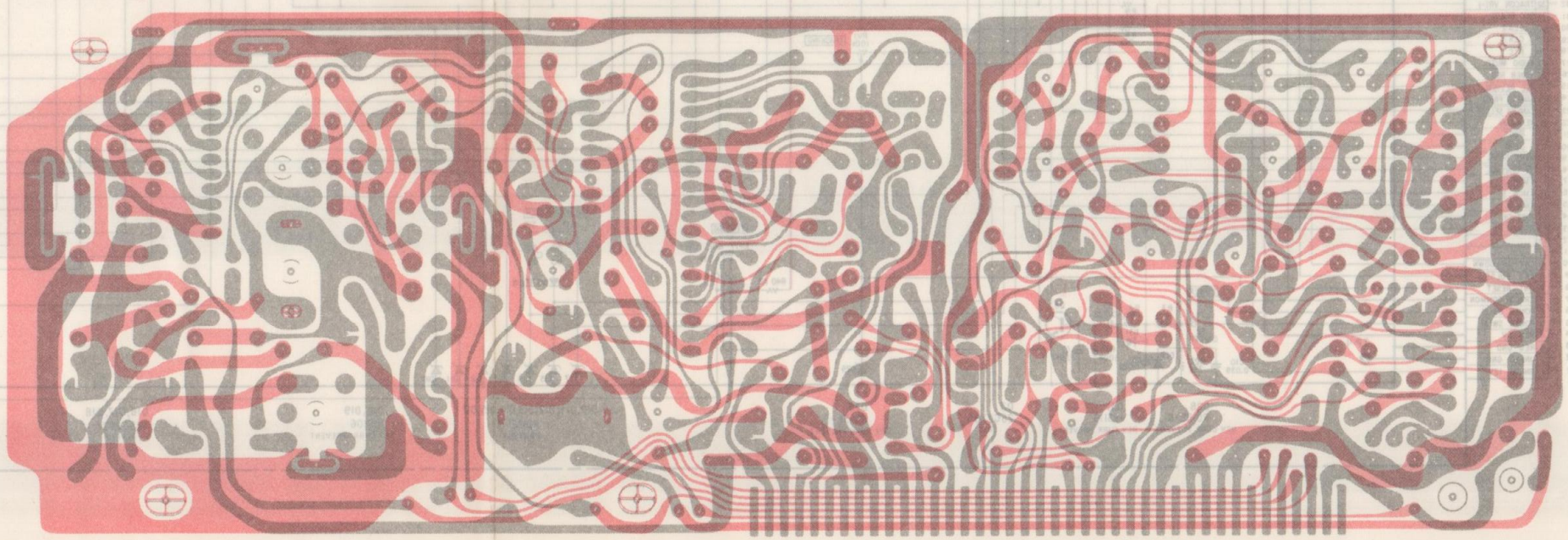
Q, IC	001 IC001 010	004	005 003	011 IC004	IC003	008	208 207	206 IC202	202	IC203	204 205	203	IC201	IC204	Q, IC
D	001	002			006	003	005,004	200	211	201	210 206	207			D
ADJ	RV001,LV001 CV001,LV002			RV002	RV003		RV209 RV210	RV211	RV205	RV202	RV203				ADJ



EH-3 BOARD

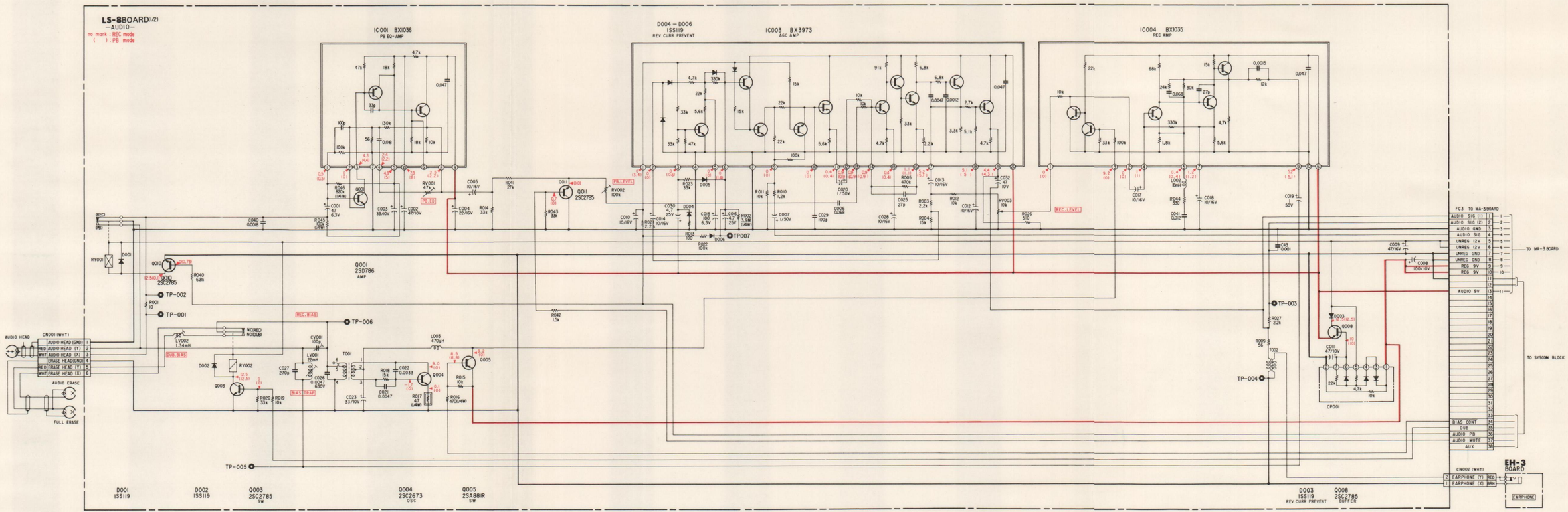
LS-8 (AUDIO) BOARD





LS-8 (AUDIO PROCESS) — Ref. No. 5000 series —

EH-3 (EARPHONE) — Ref. No. 8000 series —



NOTES:

- All resistors are in ohms, 1/8W unless otherwise noted. kΩ = 1000Ω; MΩ = 1000kΩ
- All capacitors are in μF unless otherwise noted. p : μμF 50WV or less are not indicated except for electrolytics.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- The red lines show the main voltages.
- Marked * is not able to measure the voltage of it's position.
- All voltages are dc measured with a DMT (1MΩ/V).

The components identified by shading and ⚠ mark are critical for safety. Replace only with part number specified.

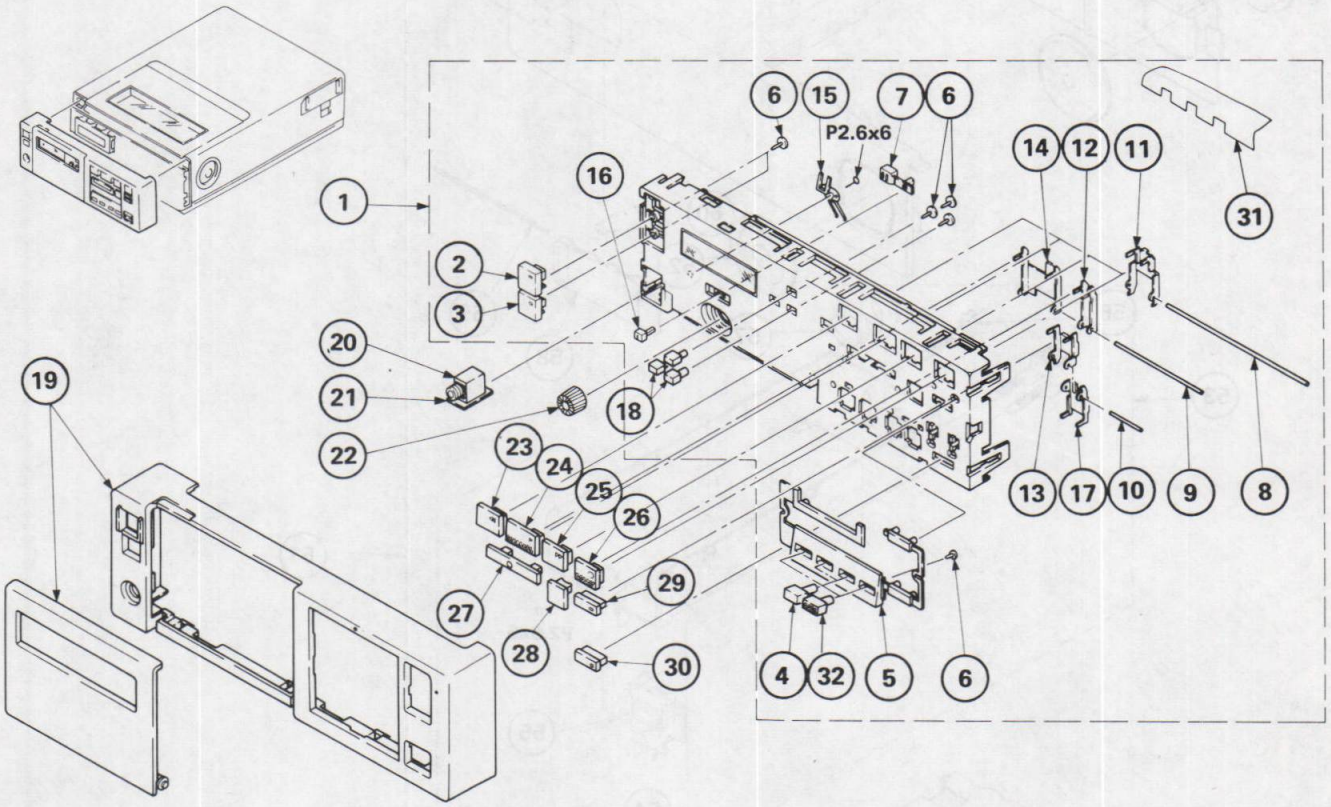
When indicating parts by reference number, please include the board name.

SECTION 4
EXPLODED VIEWS

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- As to the part numbered with E-, refer to the electrical parts list.
- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

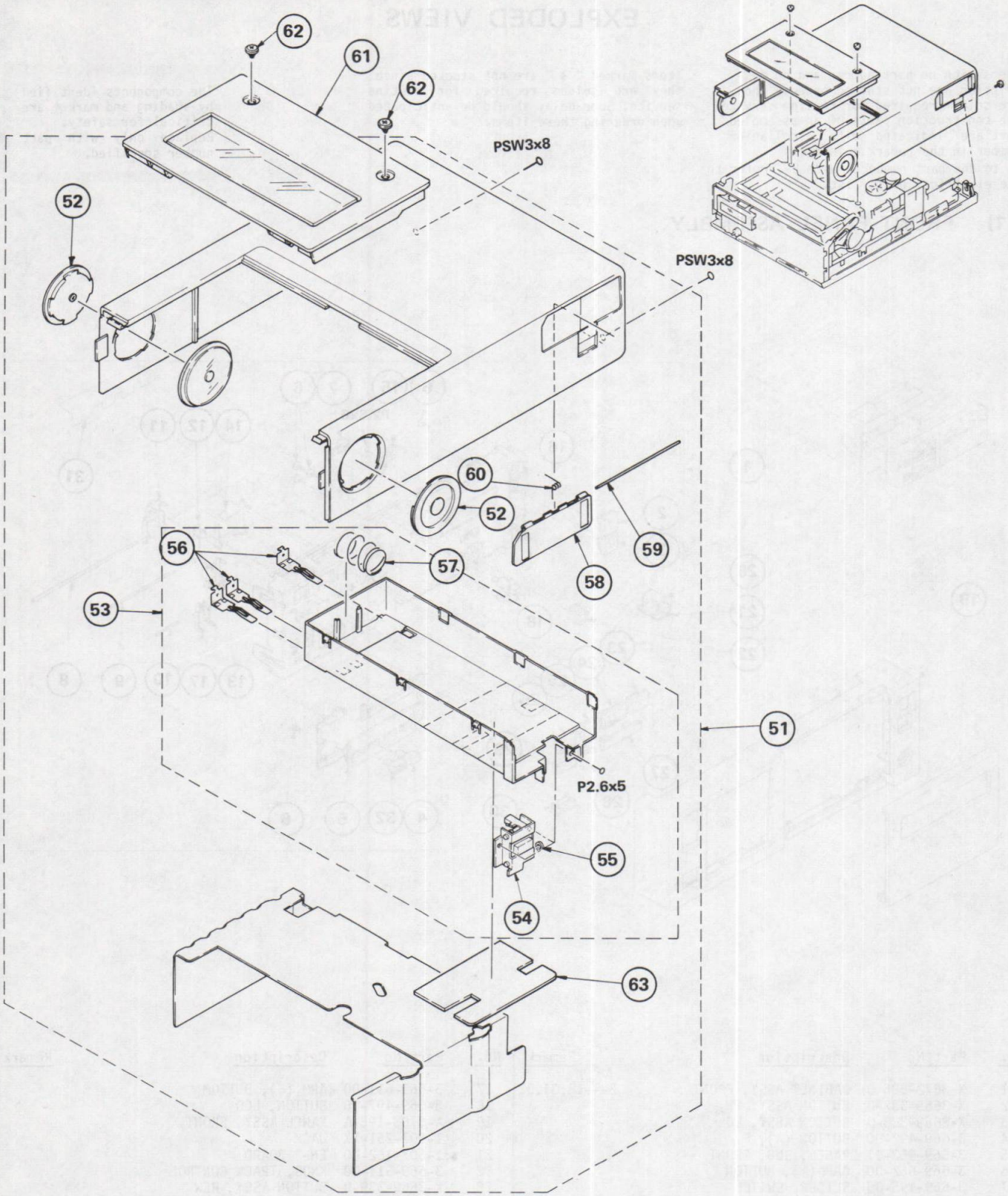
The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

(1) FRONT PANEL ASSEMBLY



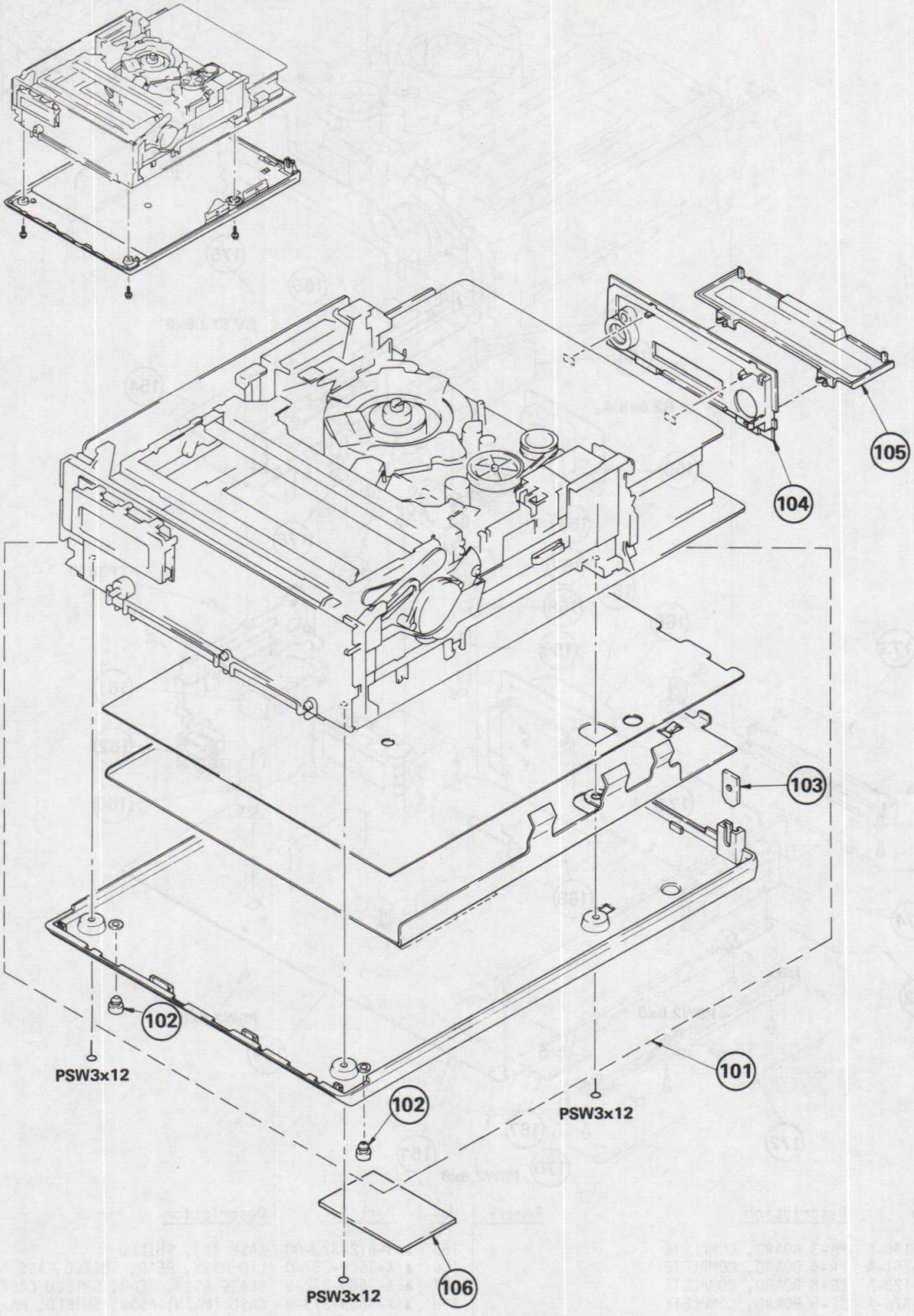
No.	Part No	Description	Remark
1	X-3672-306-0	CABINET ASSY, FRONT	2---18,31,32
2	X-3669-337-0	BUTTON ASSY, PW	
3	X-3669-338-0	BUTTON ASSY, EJ	
4	3-669-492-00	BUTTON (A), F	
5	3-669-553-11	PANEL, SUB, FRONT	
6	3-669-662-00	CAP (A), BUTTON	
7	3-669-495-00	SLIDER, SWITCH	
8	♦:3-669-498-00	SHAFT (A)	
9	♦:3-669-499-00	SHAFT (B)	
10	♦:3-669-500-00	SHAFT (C)	
11	♦:3-669-501-00	ARM (A), BUTTON	
12	♦:3-669-502-00	ARM (B), BUTTON	
13	♦:3-669-503-00	ARM (C), BUTTON	
14	♦:3-669-504-00	ARM (D), BUTTON	
15	3-669-512-00	SPRING, LEAF	
16	3-669-529-00	KNOB, SLIDE SWITCH	
17	3-669-611-00	ARM (E), BUTTOM	
18	3-669-497-00	BUTTON, LCD	
19	A-6703-195-A	PANEL ASSY, FRONT	
20	1-507-251-XX	JACK	
21	♦:1-607-162-00	EH-3 BOARD	
22	3-669-511-00	KNOB, TRACK CONTROL	
23	X-3669-339-0	BUTTON ASSY, REW	
24	X-3669-340-0	BUTTON ASSY, PLAY	
25	X-3669-341-0	BUTTON ASSY, FF	
26	X-3669-342-0	BUTTON ASSY, REC	
27	3-669-563-00	BUTTON, STOP	
28	3-669-554-00	BUTTON (B), F	
29	X-3669-343-0	BUTTON ASSY, PD	
30	X-3669-348-0	BUTTON ASSY, PAUSE	
31	3-669-661-00	COVER, LED	
32	3-672-520-00	BUTTON (C), F	

(2) UPPER PANEL ASSEMBLY



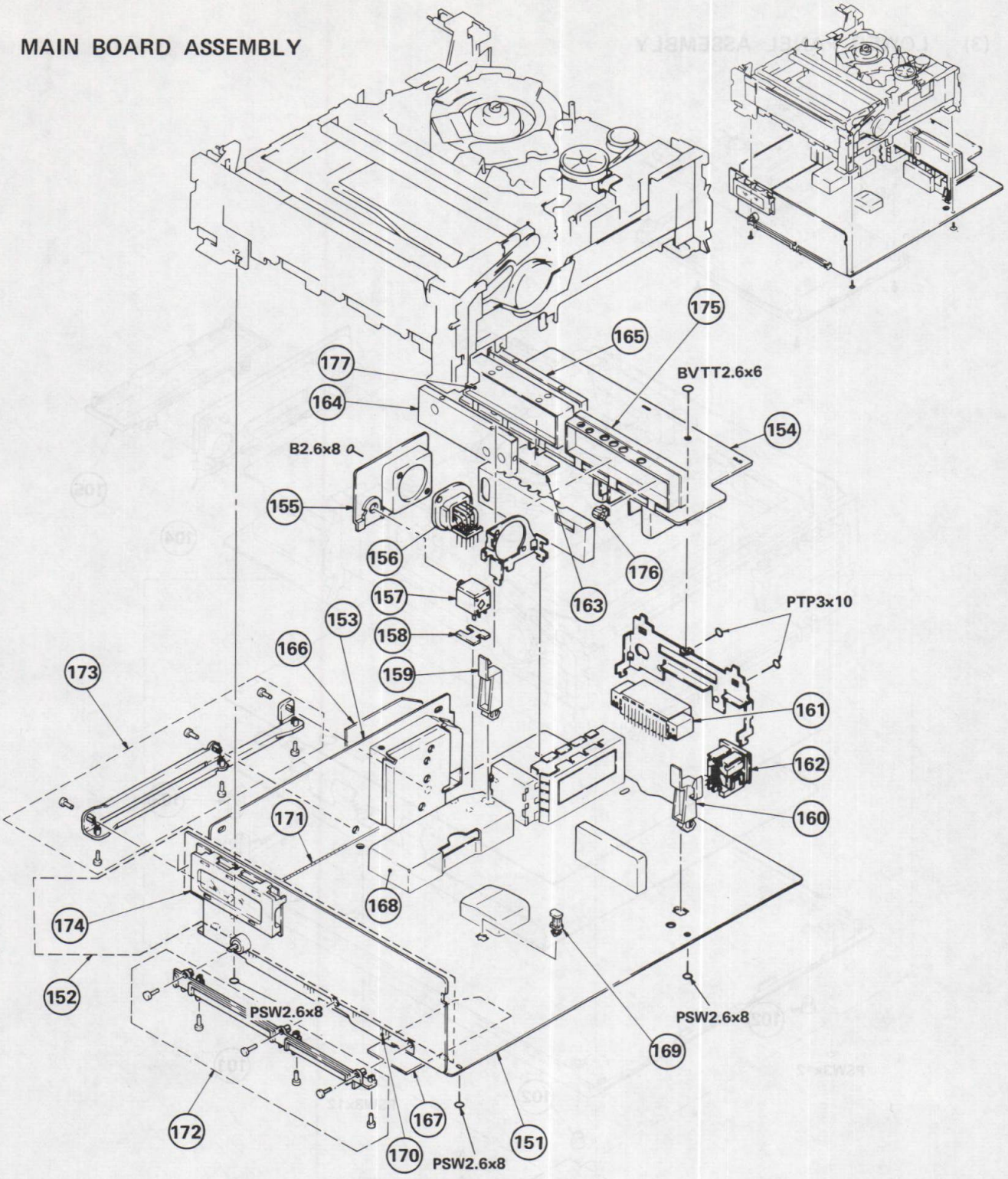
No.	Part No	Description	Remark
51	X-3672-304-0	CABINET (UPPER) ASSY	52---60,63
52	X-3669-349-0	BRACKET ASSY, HANDLE	
53	X-3669-362-0	CASE ASSY, BATTERY	54,55,56,57
54	X-3669-361-0	LOCK BLOCK ASSY, BATTERY	55
55	3-559-408-00	POLY-WASHER, 1.2 DIA	
56	3-672-532-00	TERMINAL (A)	
57	3-669-594-00	SPRING, COMPRESSION	
58	3-669-517-41	LID, BATTERY CASE	
59	♦:3-669-521-00	SHAFT (B)	
60	3-669-592-00	SPRING (A), TORSION	
61	X-3672-303-0	COVER ASSY	
62	3-669-403-00	SCREW, ORNAMENTAL	
63	♦:3-672-329-00	INSULATOR (B)	

(3) LOWER PANEL ASSEMBLY



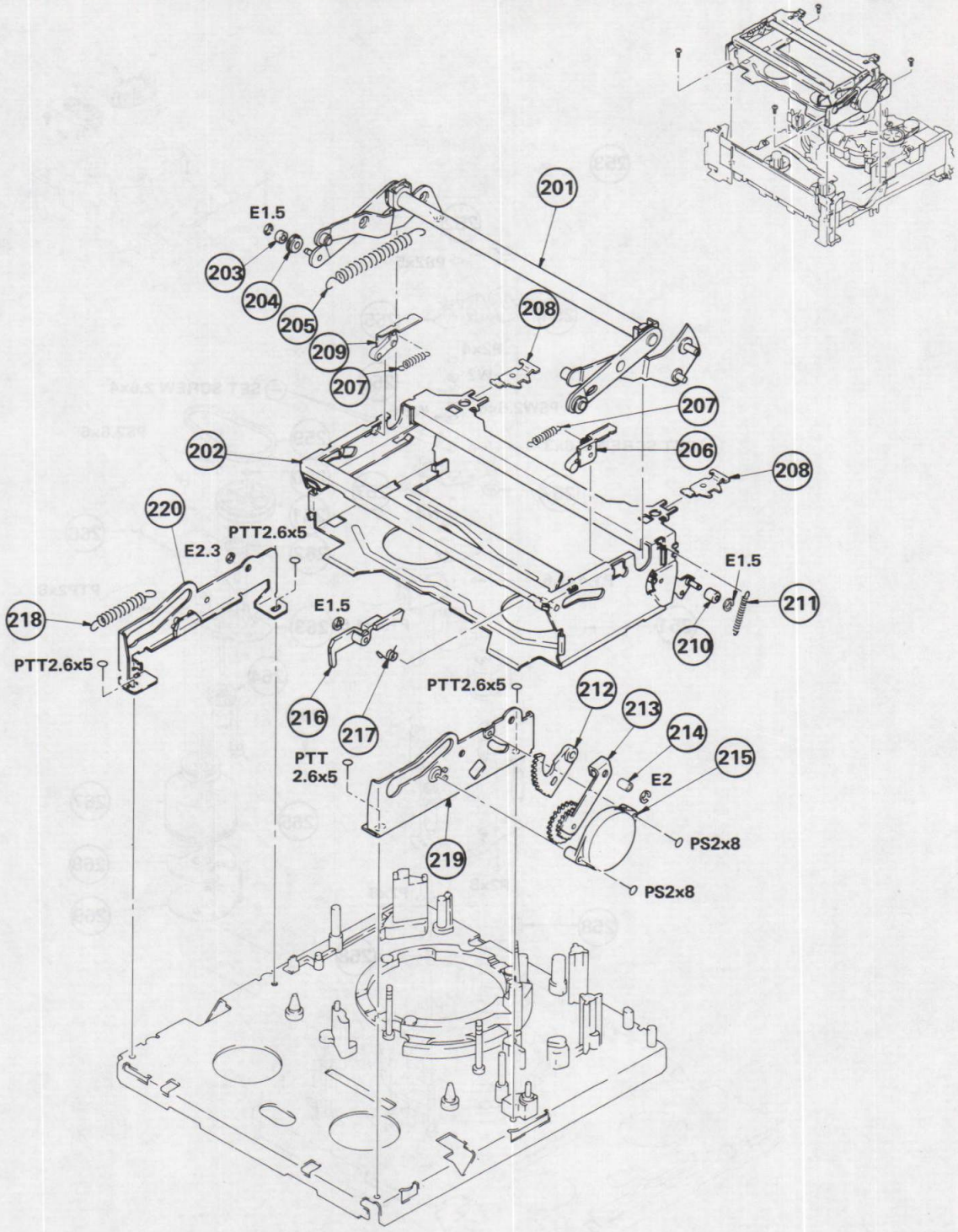
No.	Part No	Description	Remark	No.	Part No	Description	Remark
101	X-3672-305-0	CABINET (LOWER) ASSY	102,103	104	3-672-313-02	PANEL, REAR	
102	3-669-527-00	LEG, RUBBER		105	X-3672-302-0	LID ASSY, PANEL, CONNECTOR	
103	3-669-518-00	NUT, CABINET		106	♦:3-672-302-00	LABEL, MODEL NUMBER (AEP)	

(4) MAIN BOARD ASSEMBLY



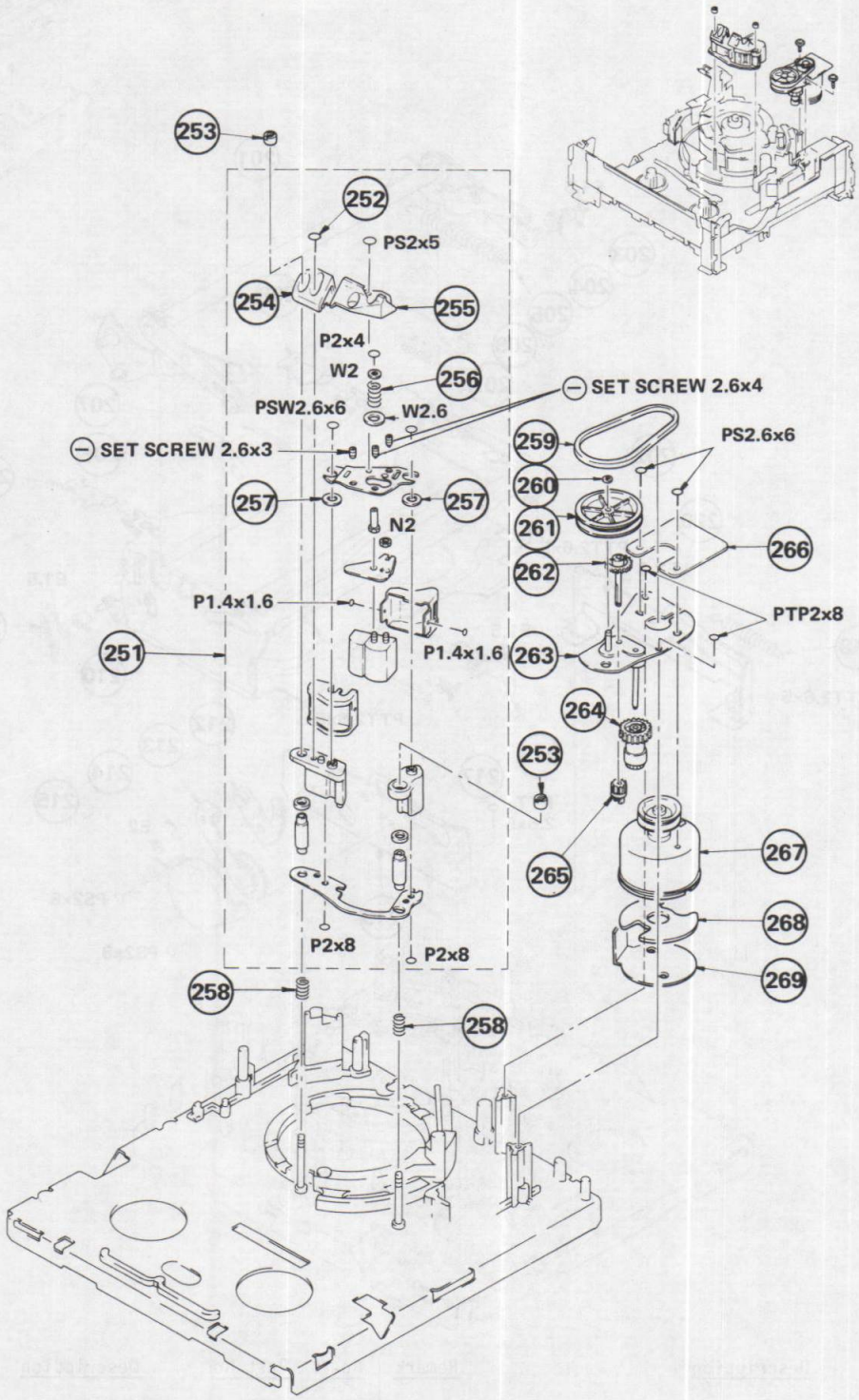
No.	Part No	Description	Remark
151	♦:A-6715-140-A	MA-3 BOARD, COMPLETE	
152	♦:A-6717-251-A	FR-4 BOARD, COMPLETE	
153	♦:A-6713-123-A	LS-8 BOARD, COMPLETE	
154	♦:A-6711-326-A	SF-5 BOARD, COMPLETE	
155	3-669-570-31	PANEL, ORNAMENTAL, CONNECTOR	
156	1-561-690-00	CONNECTOR, CAMERA 14P	
157	1-507-285-00	JACK	
158	♦:3-669-513-00	SPACER, MICROPHONE JACK	
159	♦:3-672-310-00	FOOT (LEFT), SF	
160	♦:3-672-311-00	FOOT (RIGHT), SF	
161	1-561-684-00	CONNECTOR, RECEPTACLE, 26P	
162	♦:1-561-717-00	CONNECTOR, 5P	
163	♦:1-606-731-00	SL-3 BOARD	
164	♦:3-672-321-00	CASE (D), SHIELD	
165	♦:3-672-320-00	CASE (E), SHIELD	
166	♦:X-3669-367-0	LID ASSY, REAR, SHIELD CASE	
167	♦:X-3669-372-0	PLATE ASSY, REAR, SHIELD CASE	
168	♦:X-3669-373-0	CASE (MAIN) ASSY, SHIELD, MA-S	
169	♦:3-669-610-00	SPACER	
170	1-605-077-00	FC-1 BOARD	
171	1-605-078-00	FC-3 BOARD	
172	♦:3-669-565-00	HINGE (FR), CHASSIS	
173	♦:3-369-582-00	HINGE (MA), PC BOARD	
174	1-548-562-00	COUNTER MODULE, TAPE	
175	1-464-186-00	RP BLOCK (RP-1-P-2)	
176	1-427-521-00	TRANSFORMER	
177	♦:1-606-730-00	SF-6 BOARD	

(5) CASSETTE COMPARTMENT ASSEMBLY



No.	Part No	Description	Remark	No.	Part No	Description	Remark
201	X-3669-356-0	ARM SUB ASSY	205	211	3-570-898-00	SPRING, TENSION	
202	X-3669-357-0	HOLDER ASSY, CASSETTE	208,210,211	212	3-669-367-00	GEAR, FAN	
203	3-669-380-00	ROLLER, CLICK		213	X-3669-332-0	GEAR ASSY, MIDWAY	
204	3-669-375-00	ROLLER (R1), ARM		214	3-661-588-00	SPACER	
205	3-669-379-00	SPRING, TENSION		215	X-3669-333-0	DAMPER ASSY	
206	♦:X-3669-335-0	STOPPER (R) ASSY, BEARING	207	216	3-669-368-00	STOPPER, CASSETTE	
207	3-669-386-00	SPRING, TENSION		217	3-669-405-00	SPRING, TORSION	
208	♦:3-669-423-00	STOPPER, COVER		218	3-534-902-00	SPRING, TENSION	
209	♦:X-3669-334-0	STOPPER (L) ASSY, BEARING	207	219	♦:X-3669-358-0	SUPPORT (R) ASSY	
210	3-669-381-00	ROLLER, OPEN, LID		220	♦:X-3669-359-0	SUPPORT (L) ASSY	218

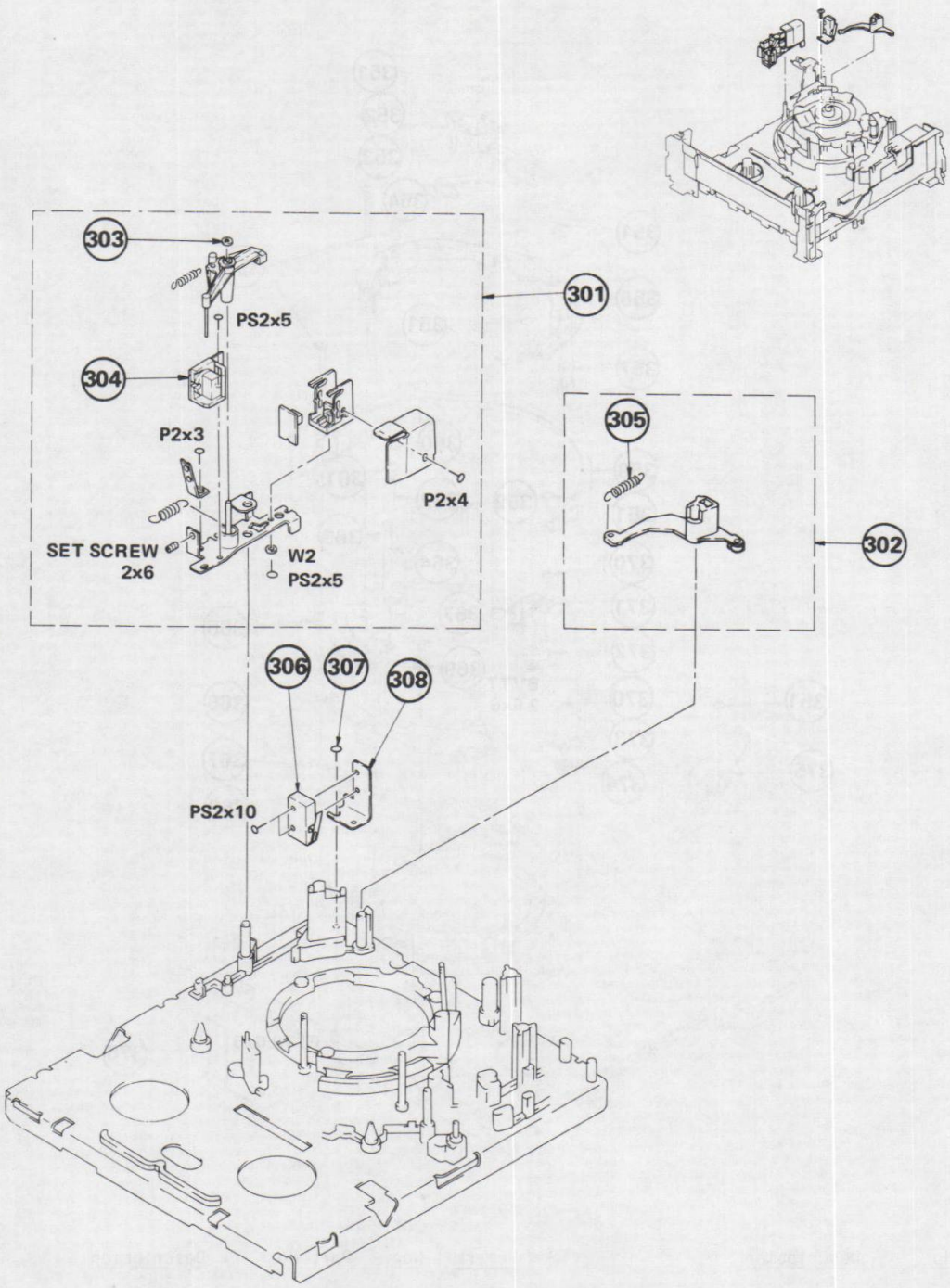
(6) THREADING MOTOR AND ACE HEAD ASSEMBLY



No.	Part No	Description	Remark
251	A-6761-045-A	ACE ASSY (M-3)	254---257
252	3-669-480-00	+ PTPWH 2	
253	3-669-318-00	NUT, ADJUSTMENT, GUIDE	
254	▲:3-669-537-00	SLOPE (LEFT)	
255	▲:3-669-541-00	SLOPE (RIGHT)	
256	▲:3-669-316-00	SPRING, COMPRESSION	
257	3-669-598-00	WASHER, CTL	
258	3-669-317-00	SPRING, COMPRESSION	
259	3-669-327-00	BELT, RUBBER	
260	3-669-465-00	WASHER (1.5), STOPPER	

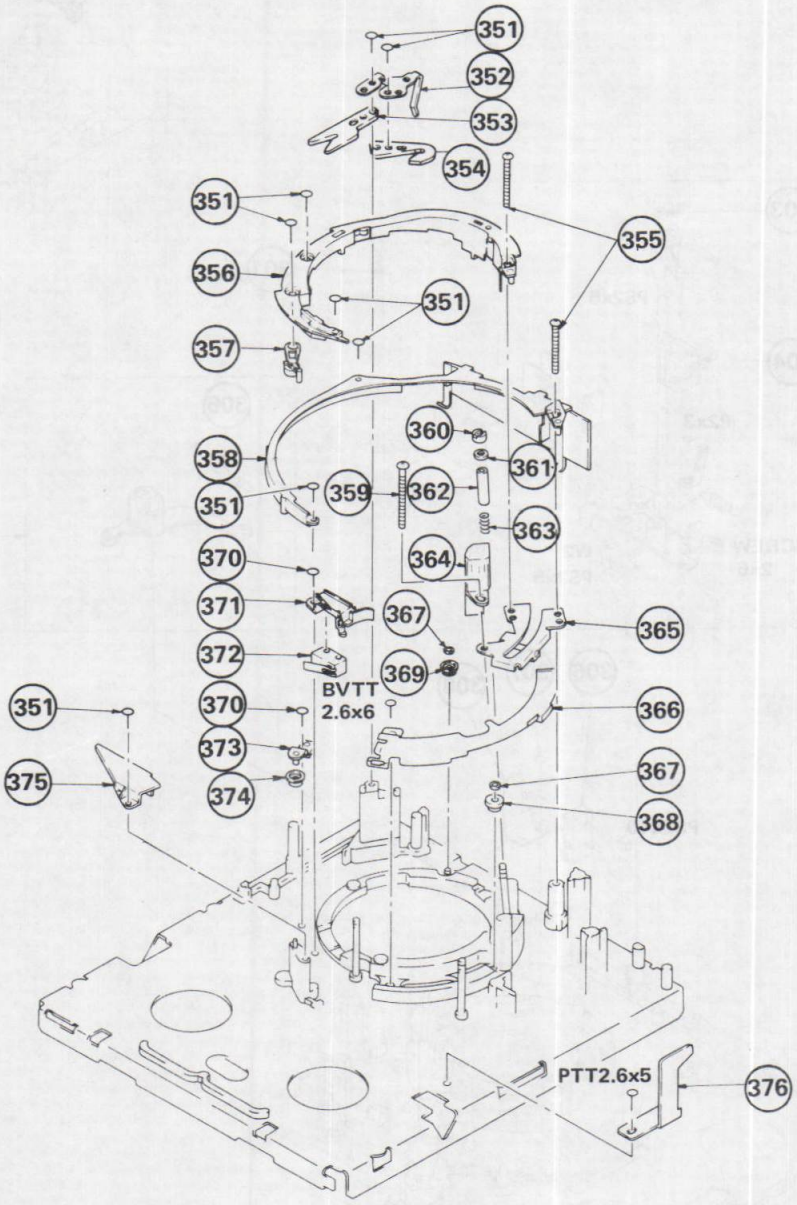
No.	Part No	Description	Remark
261	3-669-328-02	PULLEY, GEAR	
262	3-669-332-00	GEAR (BA)	
263	X-3669-324-3	CHASSIS ASSY, MOTOR, L	
264	X-3669-321-0	GEAR (C) ASSY	
265	3-669-333-00	GEAR (BC)	
266	▲:1-605-664-00	LM-10 BOARD	
267	A-6737-090-A	MOTOR ASSY, L	
268	▲:1-605-071-00	LM-8 BOARD	
269	▲:3-669-613-00	INSULATOR, L MOTOR	

(7) LOCK ARM AND TP ASSEMBLY



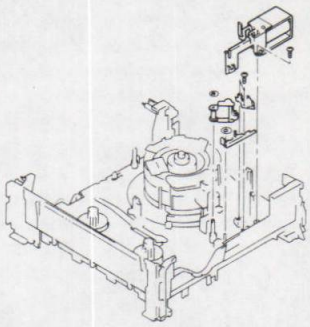
No.	Part No	Description	Remark
301	A-6742-032-A	TP ASSY	303,304
302	X-3669-351-0	ARM ASSY, LOCK	
303	3-669-465-00	WASHER (1.5), STOPPER	
304	1-235-054-00	COIL, SENSOR, S	
305	3-531-860-00	SPRING, TENSION	
306	1-552-664-00	SWITCH, MICRO	
307	3-669-607-00	+PSW (SMALL ROUND) 2.6	
308	♦:3-669-354-00	BRACKET, SWITCH, LE	

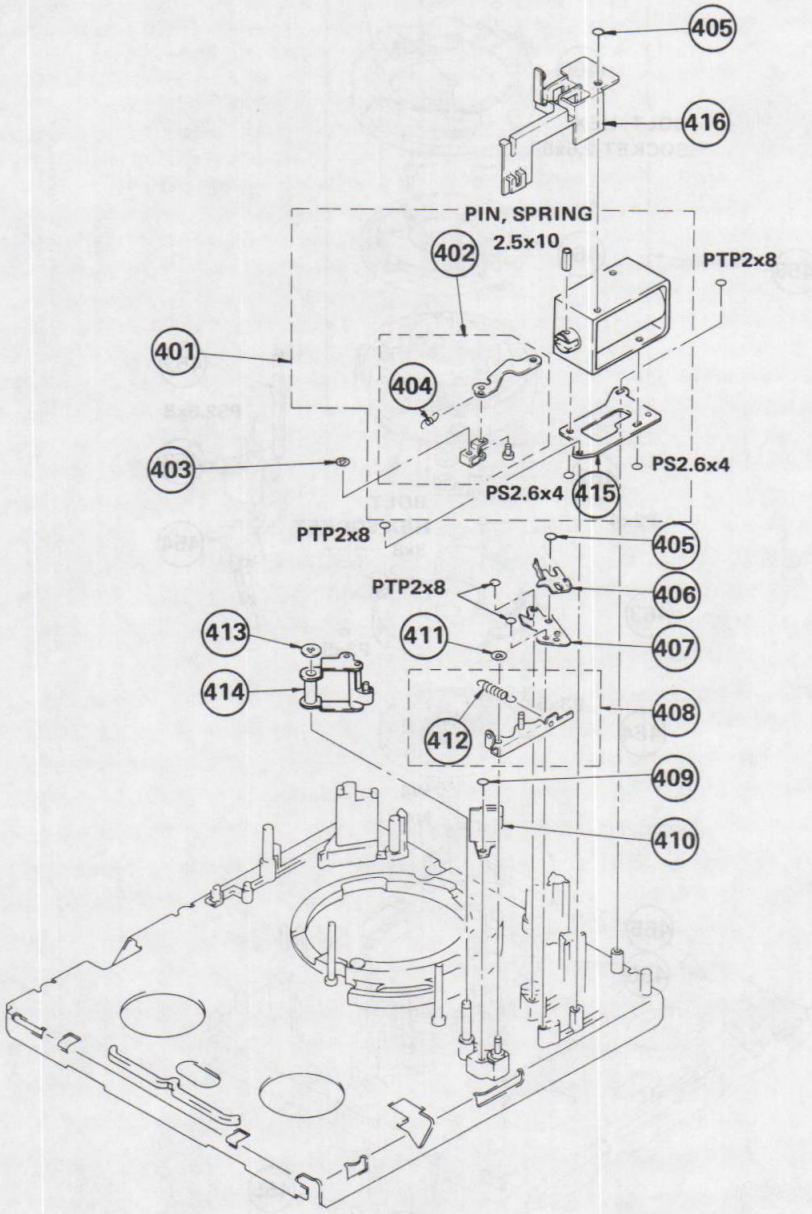
(8) ULE SWITCH AND SHUTTLE GUIDE ASSEMBLY



No.	Part No	Description	Remark
351	3-669-480-11	+ PTPWH 2	
352	♣:3-669-621-00	PLATE, GROUND, TAPE GUIDE	
353	♣:3-669-618-00	PLATE (2), ADJUST	
354	♣:3-672-507-00	PLATE (3-1), ADJUSTMENT	
355	3-669-466-00	SCREW (M 2.6)	
356	♣:3-669-584-00	GUIDE (1), SHUTTLE	
357	X-3669-327-0	ARM ASSY, SWITCH, ULE	
358	♣:3-669-585-00	GUIDE (2), SHUTTLE	
359	3-669-606-00	SCREW (2.6)	
360	3-669-446-00	NUT, GUIDE, NO. 6	
361	3-669-447-00	FLANGE, GUIDE, NO. 6	
362	3-669-445-00	SPACER, GUIDE, NO. 6	
363	3-669-615-00	SPRING, COMPRESSION	
364	8-825-508-10	HEAD, FE	
365	♣:X-3669-313-0	BASE ASSY, SLANT	
366	♣:3-669-477-00	LINER, LINK, PIN	
367	3-669-465-00	WASHER (1.5), STOPPER	
368	3-669-597-00	ROLLER (B), RING	
369	3-669-630-00	ROLLER (C), RING	
370	3-669-607-11	+PSW (SMALL ROUND) (2.6)	
371	♣:3-669-355-00	HOLDER, SWITCH, ULE	
372	1-553-718-00	SWITCH, MICRO	
373	♣:X-3669-329-0	PLATE ASSY, ADJUSTMENT	
374	3-669-360-00	ROLLER, RING	
375	♣:3-669-476-04	PLATE, GUIDE	
376	♣:3-669-484-00	BRACKET, OPEN, LID	

(9) PINCH ROLLER SOLENOID ASSEMBLY

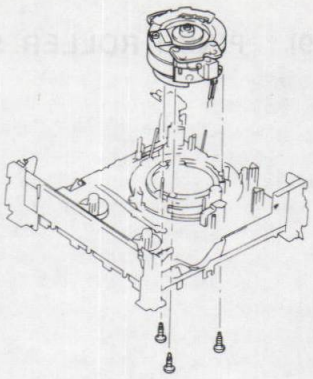


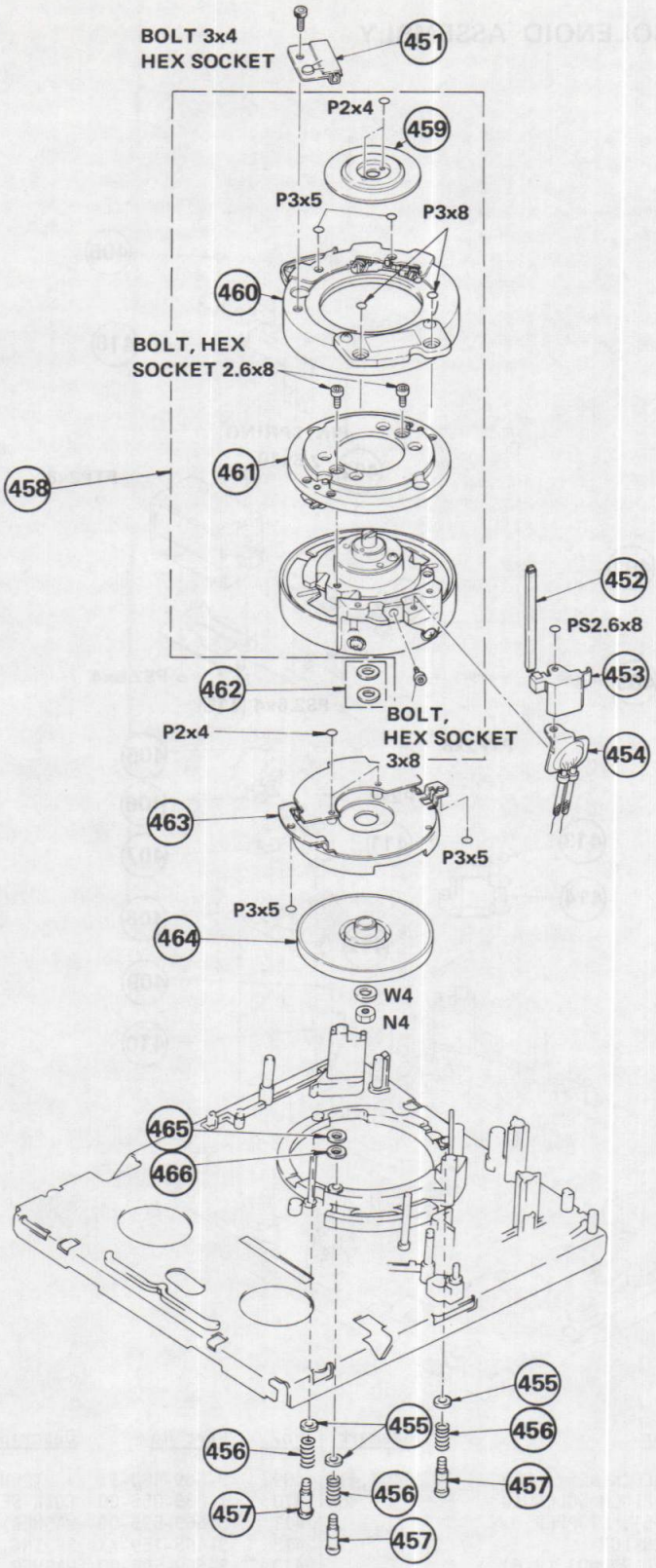


No.	Part No	Description	Remark
401	⚠.A-6749-058-A	SOLENOID BLOCK ASSY, PINCH	402,404,415
402	X-3669-365-0	ARM ASSY, PINCH SOLENOID	404
403	3-669-465-00	WASHER (1.5), STOPPER	
404	3-669-440-00	SPRING, TENSION	
405	3-669-607-11	+PSW (SMALL ROUND) (2.6)	
406	♦:3-669-462-00	PLATE, ADJUSTMENT, LIMITER, PINCH	
407	♦:3-669-349-00	PLATE, LOCK, T	
408	♦:X-3669-379-0	ARM (P) ASSY, PINCH LIMITER	412
409	3-669-480-11	+ PTPWH 2	
410	1-235-055-00	COIL SENSOR, T	
411	3-669-595-00	WASHER (2), STOPPER	
412	3-465-159-XX	SPRING, TENSION	
413	3-669-596-00	WASHER (2.3), STOPPER	
414	♦:X-3669-309-4	ARM ASSY, PRESS, PINCH	
415	♦:3-669-459-00	BRACKET, SOLENOID	
416	♦:3-669-612-00	CLAMP (A), HARNESS	

The components identified by shading and mark ⚠ are critical for safety.
Replace only with part number specified.

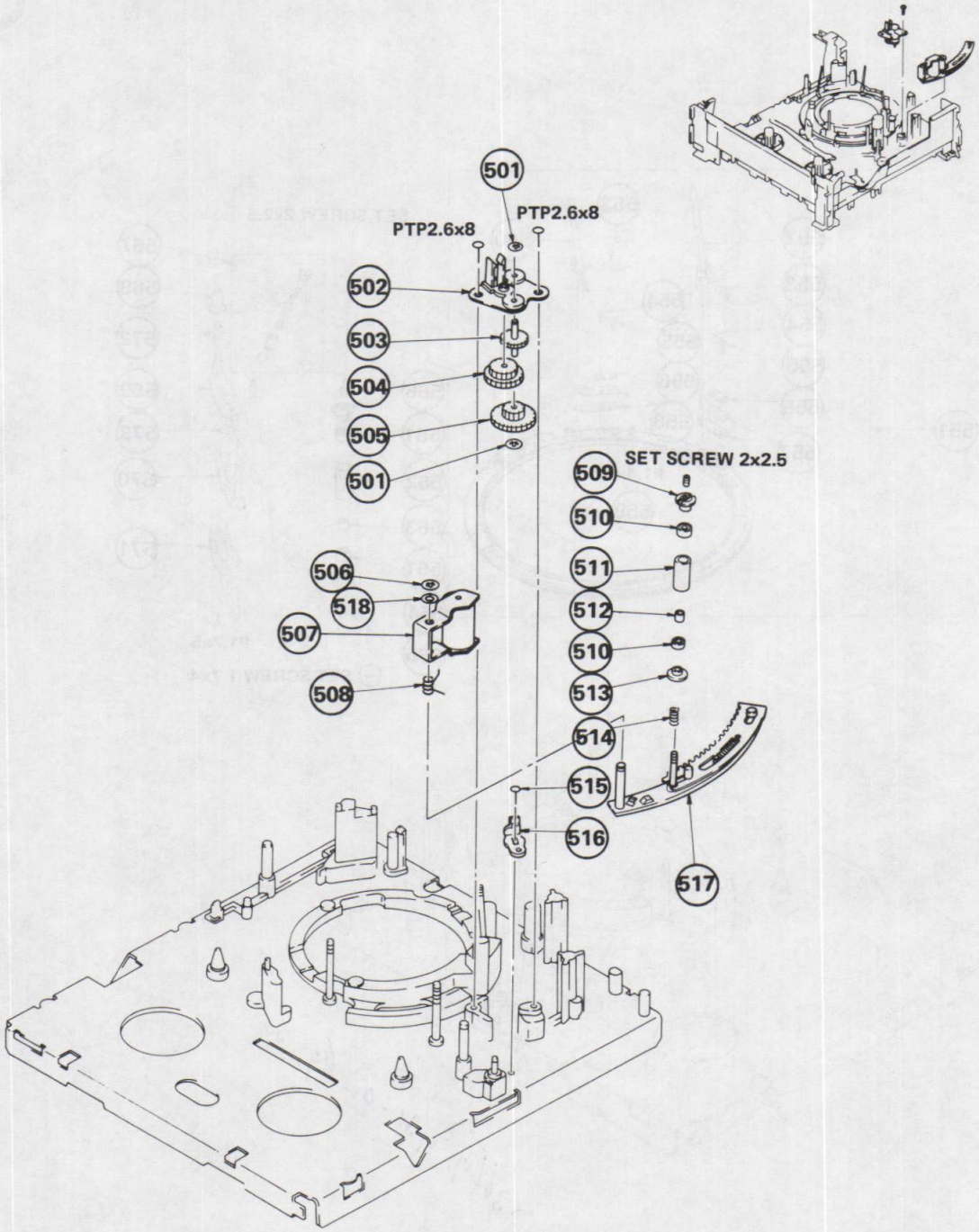
(10) DRUM ASSEMBLY





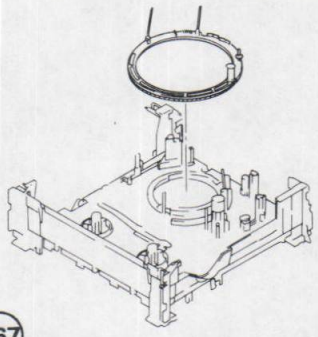
No.	Part No	Description	Remark
451	1-806-354-00	SENSOR, DEW CONDENSATION	
452	♦:X-3669-381-0	STAY ASSY	
453	♦:X-3669-380-0	COVER ASSY, HEATER	
454	1-446-961-00	HEATER, PTC	
455	3-669-600-11	WASHER, FLAT (3.5)	
456	3-429-123-00	SPRING	
457	3-669-302-00	SCREW, FITTING	
458	A-6050-128-A	DSH-22A-C	
459	X-3669-106-1	DAMPER ASSY	
460	A-6760-064-B	DRUM UPPER ASSY	
461	A-6762-073-A	DISK ASSY, DSR-22	
462	♦:X-3669-105-1	SPACER BLOCK ASSY	
463	X-2621-204-0	STATOR ASSY, DRUM	
464	X-2621-202-0	ROTATOR ASSY, DRUM	
465	♦:3-669-646-00	SPACER, DRUM	
466	♦:3-669-646-11	SPACER, DRUM	

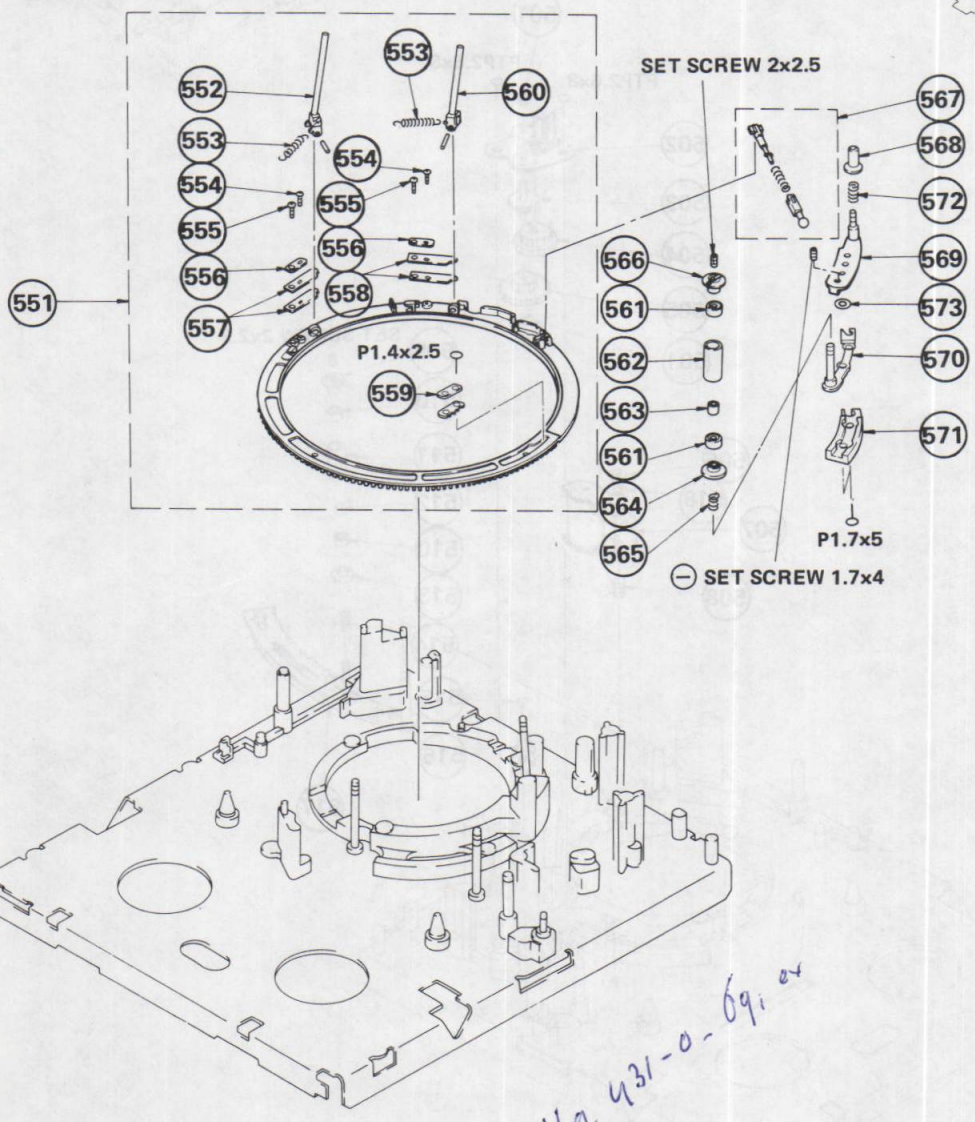
(11) DRIVE GEAR AND T SLIDER ASSEMBLY



No.	Part No	Description	Remark
501	3-669-465-00	WASHER (1.5), STOPPER	
502	X-3669-326-0	CHASSIS ASSY, GEAR, DRIVE	
503	X-3669-305-0	GEAR (F) ASSY	
504	3-669-338-00	GEAR (E)	
505	3-669-337-00	GEAR (D)	
506	3-669-596-00	WASHER (2.3), STOPPER	
507	X-3669-307-6	ARM ASSY, PINCH ROLLER	
508	3-669-444-00	SPRING, TORSION	
509	3-669-431-00	FLANGE (UPPER), GUIDE	
510	3-669-443-00	BEARING, BALL (NO FLANGE)	
511	3-669-438-00	ROLLER, GUIDE	
512	3-657-841-31	SPACER (DIA. 2)	
513	3-669-432-00	FLANGE (LOWER), GUIDE	
514	3-669-452-00	SPRING, COMPRESSION	
515	3-669-607-31	+PSW (SMALL ROUND) (2.6)	
516	♦:3-669-350-00	STOPPER, SLIDER	
517	♦:X-3669-350-0	GEAR ASSY, SLIDER	
518	3-701-439-01	WASHER	

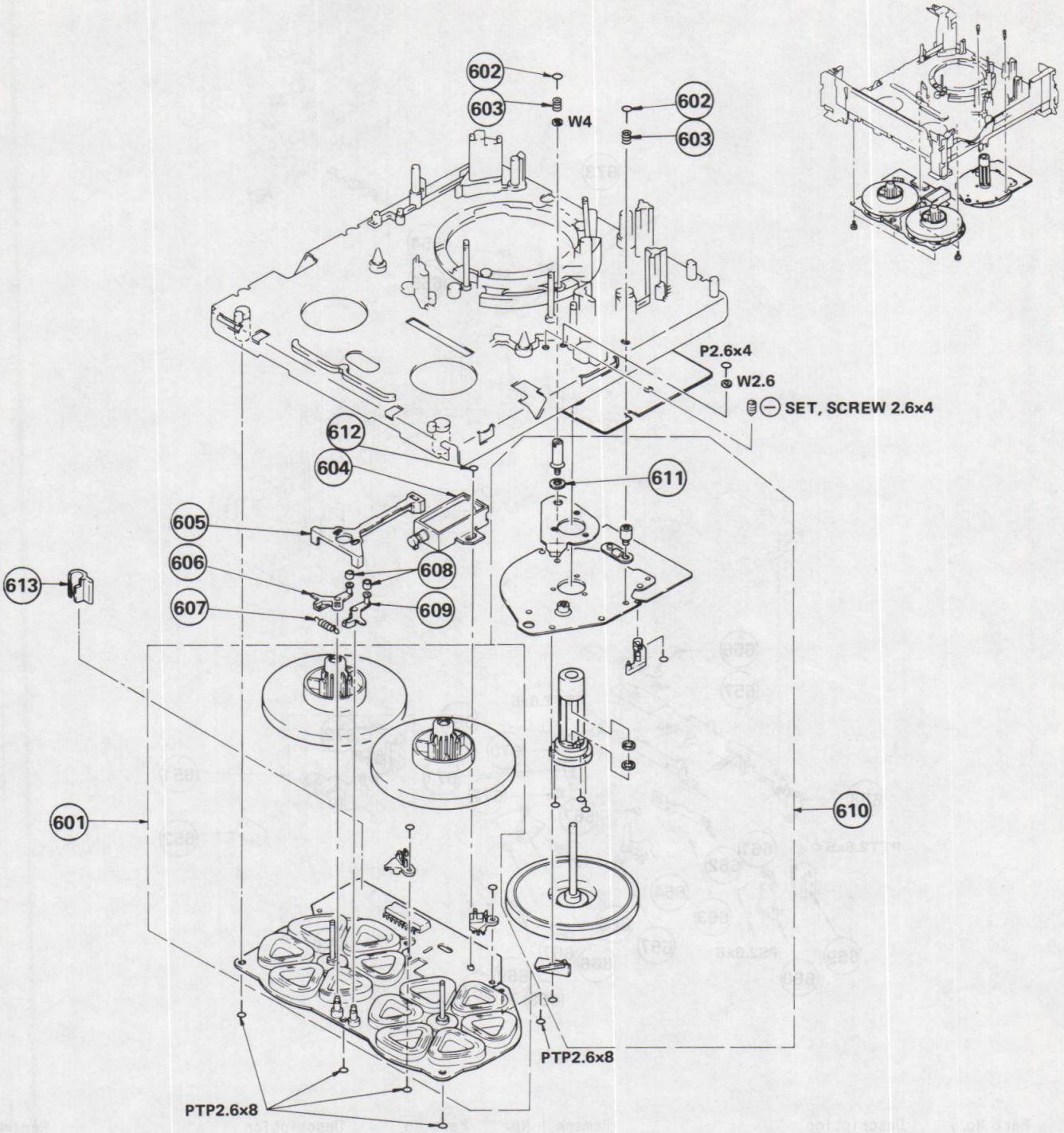
(12) THREADING RING ASSEMBLY





No.	Part No	Description	Remark
551	X-3669-353-0	RING ASSY, THREADING, S	552,560
552	♦:X-3669-303-0	GUIDE ASSY, NO. 2	
553	3-669-473-00	SPRING, TENSION	
554	3-669-478-00	SCREW (1X3), TAPPING	
555	3-669-479-11	SCREW (1.4X3.5), TAPPING	
556	♦:3-669-472-00	RETAINER, SPRING, LEAF	
557	3-669-470-00	SPRING (2), LEAF	
558	3-669-471-00	SPRING (3), LEAF, LIMITER	
559	♦:3-669-616-00	RETAINER	
560	♦:X-3669-304-0	GUIDE ASSY, NO. 3	
561	3-669-443-00	BEARING, BALL (NO FLANGE)	
562	3-669-668-00	ROLLER, GUIDE	
563	3-657-841-31	SPACER (DIA. 2)	
564	3-669-667-00	FLANGE (LOWER), GUIDE	
565	3-669-666-00	SPRING, COMPRESSION	
566	3-669-431-00	FLANGE (UPPER), GUIDE	
567	X-3669-316-0	ROD ASSY, PUSH	
568	♦:3-669-643-00	SLEEVE, GUIDE, NO. 4	
569	♦:X-3669-314-0	PLATE ASSY, SHUTTLE	
570	♦:X-3669-315-0	HEAD ASSY, TILT	
571	♦:3-669-540-00	BLOCK, SHUTTLE	
572	3-672-531-00	SPRING, COMPRESSION	
573	3-701-437-11	WASHER	

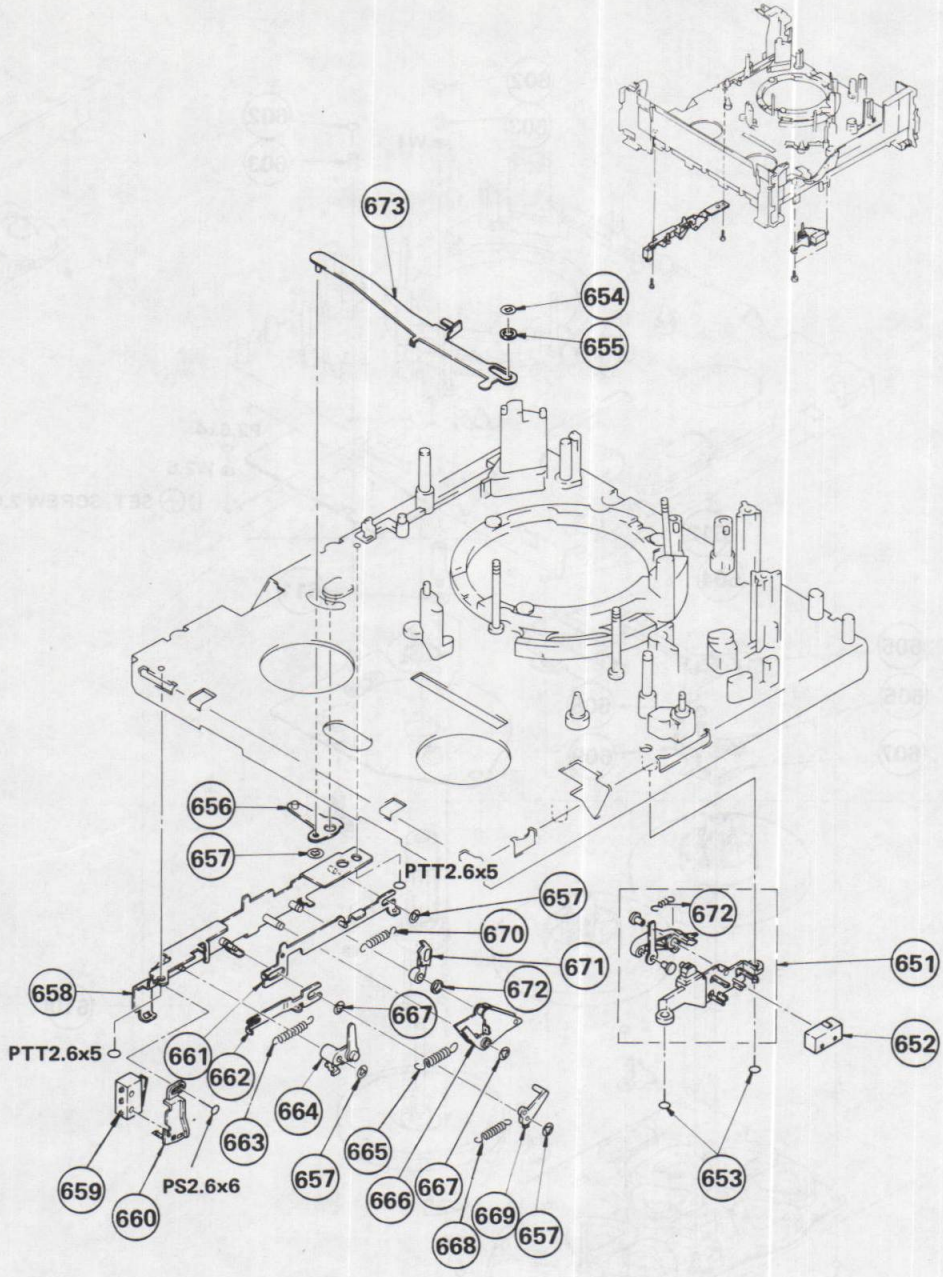
(13) CAPSTAN MOTOR ASSEMBLY



No.	Part No	Description	Remark
601	8-838-021-03	MOTOR, DC	
602	3-669-633-00	SCREW, + PW2	
603	3-669-602-00	SPRING, COMPRESSION	
604	⚠1-454-281-00	SOLENOID, PLUNGER	
605	▲:3-669-530-00	ARM, BRAKE	
606	▲:3-669-304-00	BRAKE, S	
607	3-491-360-00	SPRING, TENSION	
608	3-669-305-00	BUSHING	
609	▲:3-669-303-00	BRAKE, T	
610	8-838-027-01	MOTOR, DC (BHF-1901A)	
611	3-669-697-00	SPACER, CAPSTAN	
612	3-669-663-00	+PSW 2.6	
613	3-672-533-00	STUD	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

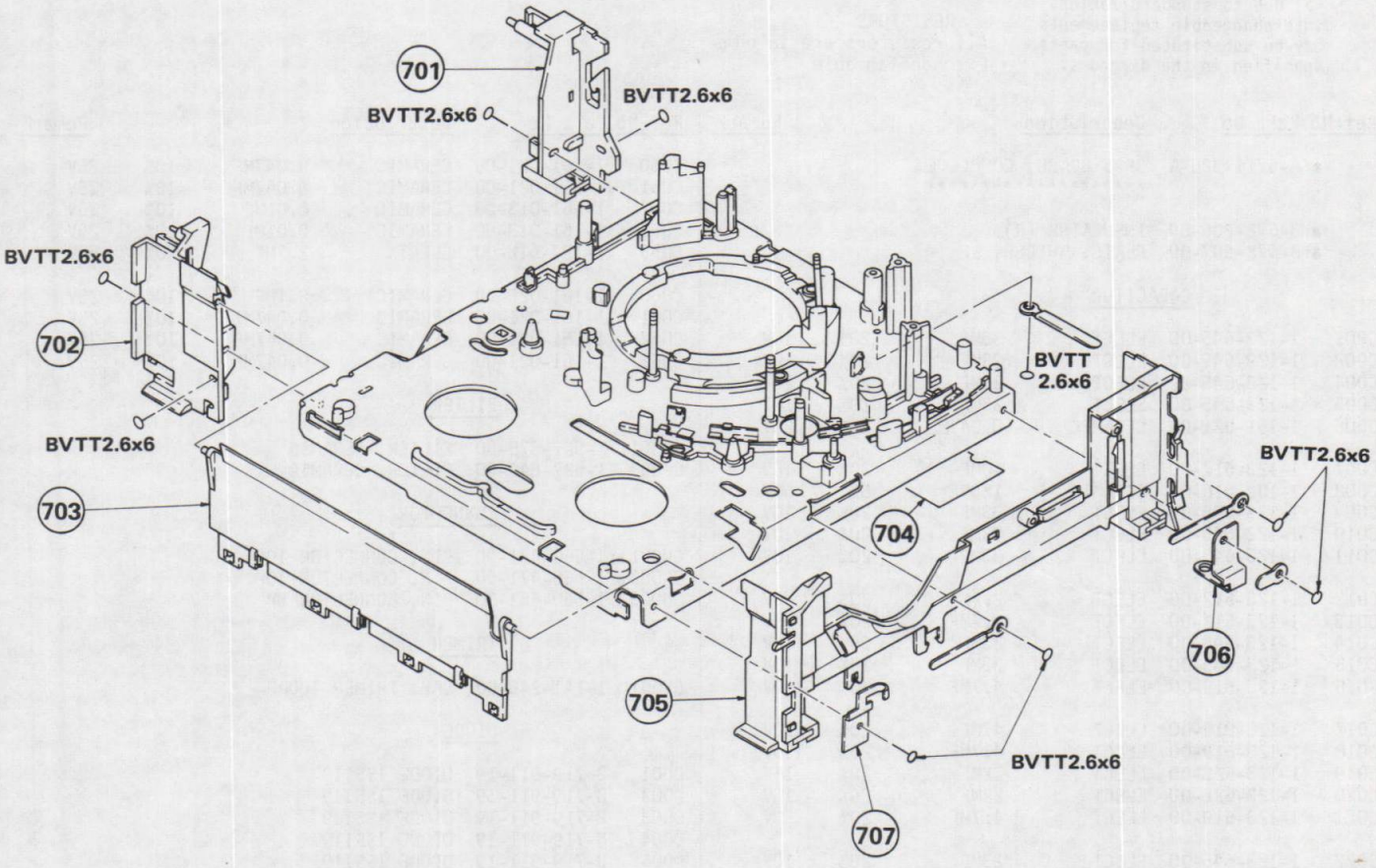
(14) CASSETTE COMPARTMENT LOCK ASSEMBLY



No.	Part No	Description	Remark
651	♣:X-3669-323-0	MR ASSY	
652	1-553-717-00	SWITCH, MICRO	
653	3-669-480-11	+ PTPWH 2	
654	3-669-595-00	WASHER (2), STOPPER	
655	3-701-438-21	WASHER	
656	♣:X-3669-331-0	LEVER ASSY, RELEASE	
657	3-669-465-00	WASHER (1.5), STOPPER	
658	♣:X-3669-378-0	CHASSIS ASSY, LOCK	
659	1-553-718-00	SWITCH, MICRO	
660	♣:3-669-422-00	HOLDER, MICRO SWITCH	
661	♣:X-3669-376-0	PLATE ASSY, SLIDE, RELEASE	
662	♣:3-669-671-00	PLATE, SLIDE, SWITCH	
672			

No.	Part No	Description	Remark
663	3-570-896-00	SPRING, TENSION	
664	♣:X-3669-320-0	LEVER ASSY, CI	
665	3-489-310-XX	SPRING, TENSION	
666	:X-3669-377-0	LEVER ASSY, LOCK	
667	3-669-596-00	WASHER (2.3), STOPPER	
668	3-509-123-00	SPRING, TENSION	
669	♣:3-669-414-00	LEVER, HOLDING, IL	
670	3-480-160-XX	SPRING, TENSION	
671	♣:3-669-670-00	LEVER, LOCK, L	
672	♣:3-669-411-00	SPRING, TENSION	
673	♣:X-3669-366-0	PLATE ASSY, SLIDE, IL	674

(15) CHASSIS ASSEMBLY



No.	Part No	Description	Remark
701	♦:X-3669-345-0	FRAME (B) BLOCK ASSY, CHASSIS	
702	♦:X-3669-344-0	FRAME (A) BLOCK ASSY, CHASSIS	
703	♦:3-669-532-00	PLATE, BLIND	
704	♦:3-669-599-00	INSULATOR	
705	♦:X-3669-346-0	FRAME (C) BLOCK ASSY, CHASSIS	
706	3-669-519-00	PLATE, CONTACT	
707	♦:3-672-502-00	PLATE (R), CONNECTION, BRACKET	

SECTION 5
ELECTRICAL PART LIST

NOTE:

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

- =>: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.
- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.

CAPACITORS
- MF : μF, PF : μμF

RESISTORS
- All resistors are in ohms
- F : nonflammable

COILS
- MMH : mH, UH : μH

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description			Remark
	♦:A-6711-326-A	SF-5 BOARD, COMPLETE **********			
	♦:3-672-306-00	INSULATOR (R)			
	♦:3-672-307-00	PLATE, SHIELD, SF			
		CAPACITOR			
C001	1-123-645-00	ELECT	33MF	20%	10V
C002	1-123-645-00	ELECT	33MF	20%	10V
C004	1-123-645-00	ELECT	33MF	20%	10V
C005	1-123-645-00	ELECT	33MF	20%	10V
C006	1-161-021-00	CERAMIC	0.047MF	10%	25V
C007	1-123-617-00	ELECT	10MF	20%	16V
C008	1-102-816-00	CERAMIC	120PF	5%	50V
C009	1-123-645-00	ELECT	33MF	20%	10V
C010	1-123-645-00	ELECT	33MF	20%	10V
C011	1-123-645-00	ELECT	33MF	20%	10V
C012	1-123-612-00	ELECT	2.2MF	20%	50V
C013	1-123-612-00	ELECT	2.2MF	20%	50V
C014	1-123-645-00	ELECT	33MF	20%	10V
C015	1-123-645-00	ELECT	33MF	20%	10V
C016	1-123-619-00	ELECT	4.7MF	20%	50V
C017	1-123-816-00	ELECT	47MF	20%	50V
C018	1-123-619-00	ELECT	4.7MF	20%	50V
C019	1-123-622-00	ELECT	22MF	20%	16V
C020	1-123-622-00	ELECT	22MF	20%	16V
C021	1-123-619-00	ELECT	4.7MF	20%	50V
C022	1-123-645-00	ELECT	33MF	20%	10V
C023	1-161-021-00	CERAMIC	0.047MF	10%	25V
C024	1-161-021-00	CERAMIC	0.047MF	10%	25V
C025	1-107-211-00	MICA	24PF	5%	500V
C027	1-161-021-00	CERAMIC	0.047MF	10%	25V
C028	1-161-021-00	CERAMIC	0.047MF	10%	25V
C029	1-123-611-00	ELECT	1MF	20%	50V
C030	1-161-039-00	CERAMIC	0.001MF	10%	25V
C031	1-108-561-00	MYLAR	0.0018MF	5%	50V
C032	1-123-610-00	ELECT	0.47MF	20%	50V
C033	1-123-619-00	ELECT	4.7MF	20%	50V
C034	1-123-619-00	ELECT	4.7MF	20%	50V
C035	1-123-613-00	ELECT	3.3MF	20%	50V
C036	1-123-645-00	ELECT	33MF	20%	10V
C037	1-102-512-00	CERAMIC	16PF	5%	50V
C038	1-123-645-00	ELECT	33MF	20%	10V
C039	1-123-607-00	ELECT	0.1MF	20%	50V
C040	1-123-307-00	ELECT	100MF	20%	10V
C042	1-161-021-00	CERAMIC	0.047MF	10%	25V
C043	1-123-645-00	ELECT	33MF	20%	10V
C044	1-123-617-00	ELECT	10MF	20%	16V
C045	1-161-013-00	CERAMIC	0.01MF	10%	25V
C046	1-123-622-00	ELECT	22MF	20%	16V
C047	1-102-962-00	CERAMIC	30PF	5%	50V
C048	1-123-612-00	ELECT	2.2MF	20%	50V
C049	1-161-021-00	CERAMIC	0.047MF	10%	25V
C050	1-161-021-00	CERAMIC	0.047MF	10%	25V
C051	1-161-021-00	CERAMIC	0.047MF	10%	25V
C052	1-161-013-00	CERAMIC	0.01MF	10%	25V
C053	1-161-013-00	CERAMIC	0.01MF	10%	25V
C055	1-123-612-00	ELECT	2.2MF	20%	50V
C060	1-161-025-00	CERAMIC	0.1MF	10%	25V
C061	1-161-021-00	CERAMIC	0.047MF	10%	25V
C062	1-161-021-00	CERAMIC	0.047MF	10%	25V
C063	1-161-021-00	CERAMIC	0.047MF	10%	25V
		FILTER			
CF001	1-527-875-00	FILTER, CERAMIC			
CF003	1-527-849-00	FILTER, CERAMIC			
		CONNECTOR			
CN001	♦:1-560-471-00	PIN, CONNECTOR 10P			
CN002	♦:1-560-471-00	PIN, CONNECTOR 10P			
CN003	♦:1-560-461-00	PIN, CONNECTOR 5P			
		TRIMER			
CV001	1-141-246-00	CAP, TRIMER 100PF			
		DIODE			
D001	8-719-911-19	DIODE 1SS119			
D002	8-719-911-19	DIODE 1SS119			
D003	8-719-911-19	DIODE 1SS119			
D004	8-719-911-19	DIODE 1SS119			
D005	8-719-911-19	DIODE 1SS119			
		DELAY LINE			
DL001	1-415-273-00	DELAY LINE (1H)			
DL002	1-415-223-21	DELAY LINE			
		IC			
IC001	8-759-208-94	IC CX894			
IC003	8-741-102-10	IC BX1021			
IC004	8-741-102-20	IC BX1022			
IC005	8-741-102-50	IC BX1025			
IC006	8-741-102-60	IC BX1026			
IC007	8-741-102-70	IC BX1027			
IC008	8-741-103-20	IC BX1032			
IC009	8-741-103-30	IC BX1033			
IC010	8-741-103-40	IC BX1034			
		COIL			
L001	1-408-429-00	MICRO INDUCTOR 470UH			
L002	1-408-397-00	MICRO INDUCTOR 1UH			
L003	1-408-397-00	MICRO INDUCTOR 1UH			
L004	1-408-421-00	MICRO INDUCTOR 100UH			
L005	1-408-429-00	MICRO INDUCTOR 470UH			
L007	1-408-421-00	MICRO INDUCTOR 100UH			
L008	1-408-429-00	MICRO INDUCTOR 470UH			
L050	1-408-415-00	MICRO INDUCTOR 33UH			

Ref.No	Part No	Description			Remark
		VARIABLE COIL			
LV001	1-408-512-00	COIL (VARIABLE) 10UH			
		TRANSISTOR			
Q002	=>8-729-612-77	TRANSISTOR 2SA1027R			
Q003	=>8-724-375-01	TRANSISTOR 2SC403C			
Q004	=>8-724-375-01	TRANSISTOR 2SC403C			
Q005	8-729-178-54	TRANSISTOR 2SC2785			
Q006	8-729-178-54	TRANSISTOR 2SC2785			
Q007	8-729-178-54	TRANSISTOR 2SC2785			
		RESISTOR			
R001	1-246-801-00	CARBON	33K	1/8W	
R002	1-246-775-00	CARBON	220	1/8W	
R003	1-246-840-00	CARBON	510	1/8W	
R004	1-246-782-00	CARBON	820	1/8W	
R006	1-246-801-00	CARBON	33K	1/8W	
R007	1-246-803-00	CARBON	47K	1/8W	
R008	1-247-055-00	CARBON	300K	1/8W	
R009	1-246-833-00	CARBON	130	1/8W	
R011	1-247-053-00	CARBON	1M	1/8W	
R012	1-246-799-00	CARBON	22K	1/8W	
R013	1-246-807-00	CARBON	100K	1/8W	
R014	1-246-798-00	CARBON	18K	1/8W	
R015	1-246-807-00	CARBON	100K	1/8W	
R016	1-246-807-00	CARBON	100K	1/8W	
R017	1-247-052-00	CARBON	820K	1/8W	
R018	1-247-052-00	CARBON	820K	1/8W	
R019	1-246-801-00	CARBON	33K	1/8W	
R020	1-246-801-00	CARBON	33K	1/8W	
R021	1-246-799-00	CARBON	22K	1/8W	
R022	1-246-803-00	CARBON	47K	1/8W	
R023	1-246-801-00	CARBON	33K	1/8W	
R024	1-246-795-00	CARBON	10K	1/8W	
R025	1-246-785-00	CARBON	1.5K	1/8W	
R026	1-246-863-00	CARBON	43K	1/8W	
R027	1-246-800-00	CARBON	27K	1/8W	
R028	1-246-783-00	CARBON	1K	1/8W	
R029	1-246-804-00	CARBON	56K	1/8W	
R030	1-246-806-00	CARBON	82K	1/8W	
R031	1-246-777-00	CARBON	330	1/8W	
R033	1-246-849-00	CARBON	3K	1/8W	
R034	1-246-779-00	CARBON	470	1/8W	
R036	1-246-807-00	CARBON	100K	1/8W	
R037	1-246-807-00	CARBON	100K	1/8W	
R038	1-246-795-00	CARBON	10K	1/8W	
R039	1-246-833-00	CARBON	130	1/8W	
R040	1-246-847-00	CARBON	2K	1/8W	
R041	1-246-797-00	CARBON	15K	1/8W	
R042	1-246-851-00	CARBON	4.3K	1/8W	
R043	1-246-785-00	CARBON	1.5K	1/8W	
R044	1-246-840-00	CARBON	510	1/8W	

Ref.No	Part No	Description			Remark
R050	1-246-790-00	CARBON	3.9K	1/8W	
R051	1-246-834-00	CARBON	160	1/8W	
		VARIABLE RESISTOR			
RV001	1-226-776-00	RES, ADJ, METAL GLAZE 220K			
RV002	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV003	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV004	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV005	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV007	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV008	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV009	1-226-772-00	RES, ADJ, METAL GLAZE 4.7K			
RV010	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV011	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV012	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV013	1-226-770-00	RES, ADJ, METAL GLAZE 470			
RV014	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV015	1-226-771-00	RES, ADJ, METAL GLAZE 1K			
RV016	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV017	1-226-702-00	RES, ADJ, METAL GLAZE 2.2K			
RV018	1-226-771-00	RES, ADJ, METAL GLAZE 1K			
		TRANSFORMER			
T001	1-426-093-00	COIL, REC C BPT			
T002	1-235-098-00	FILTER, BAND PASS: BPF			
		CRYSTAL			
X001	1-527-345-00	CRYSTAL, OSC			
**********					
♦:	1-606-730-00	SF-6 BOARD			
		**********			
♦:	3-672-322-00	CASE (MAIN) (D), SHIELD			
		CAPACITOR			
C101	1-123-645-00	ELECT	33MF	20% 10V	
C102	1-102-973-00	CERAMIC	100PF	5% 50V	
C103	1-101-361-00	CERAMIC	150PF	5% 50V	
C104	1-101-361-00	CERAMIC	150PF	5% 50V	
C105	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C106	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C107	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C108	1-161-021-00	CERAMIC	0.047MF	10% 25V	
C109	1-123-645-00	ELECT	33MF	20% 10V	
		FILTER			
CF101	1-527-874-00	FILTER, CERAMIC			
		CONNECTOR			
CN101	♦: 1-560-741-00	PIN, CONNECTOR 12P			

When indicating parts by reference number, please include the board name.

SF-6 LS-8

Ref.No	Part No	Description			Remark
		IC			
IC101	8-759-919-05	IC CX7905A			
IC102	8-759-919-06	IC CX7906			
IC103	8-752-000-80	IC CX20008			
IC104	8-759-108-05	IC UPC78L05A			
		COIL			
L101	1-408-421-00	MICRO INDUCTOR 100UH			
		RESISTOR			
R101	1-246-795-00	CARBON	10K	1/8W	
R102	1-246-797-00	CARBON	15K	1/8W	
R103	1-246-803-00	CARBON	47K	1/8W	
R104	1-246-783-00	CARBON	1K	1/8W	
R105	1-246-860-00	CARBON	24K	1/8W	
R106	1-246-783-00	CARBON	1K	1/8W	
R107	1-246-791-00	CARBON	4.7K	1/8W	
		VARIABLE RESISTOR			
RV101	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV102	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV103	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
**********					
♦:A-6713-123-A		LS-8 BOARD, COMPLETE **********			
♦:3-669-625-00		LID, SHIELD CASE, LS-A			
♦:3-669-628-00		CASE (MAIN), SHIELD, LS-A			
		CAPACITOR			
C001	1-123-647-00	ELECT	47MF	20%	6.3V
C002	1-123-822-00	ELECT	47MF	20%	10V
C003	1-123-617-00	ELECT	10MF	20%	16V
C004	1-123-622-00	ELECT	22MF	20%	16V
C005	1-123-356-00	ELECT	10MF	20%	16V
C006	1-130-493-51	MYLAR	0.068MF	5%	50V
C007	1-123-380-00	ELECT	1MF	20%	50V
C008	1-123-307-00	ELECT	100MF	20%	10V
C009	1-123-332-00	ELECT	47MF	20%	16V
C010	1-123-356-00	ELECT	10MF	20%	16V
C011	1-123-306-00	ELECT	47MF	20%	10V
C012	1-123-356-00	ELECT	10MF	20%	16V
C013	1-123-356-00	ELECT	10MF	20%	16V
C014	1-123-356-00	ELECT	10MF	20%	16V
C015	1-123-295-00	ELECT	100MF	20%	6.3V
C016	1-123-328-00	ELECT	4.7MF	20%	25V
C017	1-123-356-00	ELECT	10MF	20%	16V
C018	1-123-356-00	ELECT	10MF	20%	16V
C019	1-123-380-00	ELECT	1MF	20%	50V
C020	1-123-380-00	ELECT	1MF	20%	50V
C021	1-108-571-00	MYLAR	0.0047MF	5%	50V
C022	1-108-567-00	MYLAR	0.0033MF	5%	50V
C023	1-123-305-00	ELECT	33MF	20%	10V
C025	1-102-961-00	CERAMIC	27PF	5%	50V
C026	1-129-710-00	FILM	0.0047MF	10%	630V
C027	1-102-980-00	CERAMIC	270PF	5%	50V
C028	1-123-356-00	ELECT	10MF	20%	16V
C029	1-102-973-00	CERAMIC	100PF	5%	50V
C030	1-123-328-00	ELECT	4.7MF	20%	25V
C032	1-123-306-00	ELECT	47MF	20%	10V
C040	1-130-474-00	MYLAR	0.0018MF	5%	50V
C041	1-130-484-00	MYLAR	0.012MF	5%	50V
C042	1-161-051-00	CERAMIC	0.01MF	10%	50V
C043	1-161-039-00	CERAMIC	0.001MF	10%	25V
C200	1-123-319-00	ELECT	47MF	20%	16V
C201	1-161-051-00	CERAMIC	0.01MF	10%	50V
C202	1-130-499-00	MYLAR	0.22MF	5%	50V
C203	1-130-495-00	MYLAR	0.1MF	5%	50V
C204	1-123-617-00	ELECT	10MF	20%	16V
C205	1-161-051-00	CERAMIC	0.01MF	10%	50V
		CONNECTOR			
CN001♦	1-560-469-00	PIN, CONNECTOR 6P			
CN002♦	1-560-456-00	PIN, CONNECTOR 2P			
		TRIMER			
CV001	1-141-215-00	CAP, TRIMER			
		DIODE			
D001	=>8-719-901-33	DIODE 1SS133			
D002	=>8-719-901-33	DIODE 1SS133			
D003	=>8-719-901-33	DIODE 1SS133			
D004	=>8-719-901-33	DIODE 1SS133			
D005	=>8-719-901-33	DIODE 1SS133			
D006	=>8-719-901-33	DIODE 1SS133			
D007	8-719-113-07	DIODE RD13E-B			
D200	=>8-719-901-33	DIODE 1SS133			
D201	=>8-719-901-33	DIODE 1SS133			
D206	=>8-719-901-33	DIODE 1SS133			
D207	=>8-719-901-33	DIODE 1SS133			
D210	=>8-719-901-33	DIODE 1SS133			
D211	=>8-719-901-33	DIODE 1SS133			
		IC			
IC001	8-741-103-60	IC BX1036			
IC003	8-743-973-00	IC BX3973			
IC004	=>8-749-910-35	IC BX1035A			
IC201	8-759-240-13	IC TC4013BP			

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description			Remark
IC202	8-759-240-52	IC TC4052BP			
IC203	8-759-240-81	IC TC40813P			
IC204	8-759-240-01	IC TC4001BP			
		COIL			
L002	1-408-220-00	MICRO INDUCTOR 18MMH			
L003	1-407-488-00	MICRO INDUCTOR 470UH			
		VARIABLE COIL			
LV001	1-408-523-00	COIL, VARIABLE 22MMH			
LV002	1-408-524-00	INDUCTOR, ADJ 34MMH			
		TRANSISTOR			
Q001	8-729-908-62	TRANSISTOR 2SD786			
Q003	8-729-178-54	TRANSISTOR 2SC2785			
Q004	8-729-967-32	TRANSISTOR 2SC2673			
Q005	8-729-988-12	TRANSISTOR 2SA881			
Q008	8-729-178-54	TRANSISTOR 2SC2785			
Q010	8-729-178-54	TRANSISTOR 2SC2785			
Q011	8-729-178-54	TRANSISTOR 2SC2785			
Q202	8-729-117-54	TRANSISTOR 2SA1175			
Q203	8-729-178-54	TRANSISTOR 2SC2785			
Q204	8-729-178-54	TRANSISTOR 2SC2785			
Q205	8-729-178-54	TRANSISTOR 2SC2785			
Q206	8-729-178-54	TRANSISTOR 2SC2785			
Q207	8-729-178-54	TRANSISTOR 2SC2785			
Q208	8-729-178-54	TRANSISTOR 2SC2785			
		RESISTOR			
R001	1-246-759-00	CARBON	10	1/8W	
R002	1-202-469-00	COMPOSITION	3.9M 5%	1/4W	
R003	1-246-787-00	CARBON	2.2K	1/8W	
R004	1-246-797-00	CARBON	15K	1/8W	
R005	1-247-049-00	CARBON	470K	1/8W	
R009	1-246-768-00	CARBON	56	1/8W	
R010	1-246-784-00	CARBON	1.2K	1/8W	
R011	1-246-795-00	CARBON	10K	1/8W	
R012	1-246-795-00	CARBON	10K	1/8W	
R013	1-246-771-00	CARBON	100	1/8W	
R014	1-246-801-00	CARBON	33K	1/8W	
R015	1-246-795-00	CARBON	10K	1/8W	
R016	1-246-465-00	CARBON	470 5%	1/4W	
R017	1-212-849-00	FUSIBLE	4.7 5%	1/4W	F
R018	1-246-797-00	CARBON	15K	1/8W	
R019	1-246-795-00	CARBON	10K	1/8W	
R020	1-246-801-00	CARBON	33K	1/8W	
R021	1-246-787-00	CARBON	2.2K	1/8W	
R022	1-246-807-00	CARBON	100K	1/8W	
R023	1-246-801-00	CARBON	33K	1/8W	
R026	1-246-840-00	CARBON	510	1/8W	
R027	1-246-787-00	CARBON	2.2K	1/8W	
R040	1-246-793-00	CARBON	6.8K	1/8W	
R041	1-246-800-00	CARBON	27K	1/8W	

Ref.No	Part No	Description			Remark
R042	1-246-785-00	CARBON	1.5K	1/8W	
R043	1-246-801-00	CARBON	33K	1/8W	
R044	1-246-777-00	CARBON	330	1/8W	
R046	1-246-543-00	CARBON	820K 5%	1/4W	
R201	1-246-795-00	CARBON	10K	1/8W	
R203	1-246-795-00	CARBON	10K	1/8W	
R204	1-246-795-00	CARBON	10K	1/8W	
R205	1-246-795-00	CARBON	10K	1/8W	
R206	1-246-795-00	CARBON	10K	1/8W	
R207	1-246-807-00	CARBON	100K	1/8W	
R211	1-246-807-00	CARBON	100K	1/8W	
R212	1-246-783-00	CARBON	1K	1/8W	
R213	1-246-803-00	CARBON	47K	1/8W	
R217	1-246-783-00	CARBON	1K	1/8W	
R220	1-246-803-00	CARBON	47K	1/8W	
R221	1-246-807-00	CARBON	100K	1/8W	
R222	1-246-803-00	CARBON	47K	1/8W	
R225	1-246-811-00	CARBON	220K	1/8W	
R226	1-246-803-00	CARBON	47K	1/8W	
R230	1-246-857-00	CARBON	13K	1/8W	
R231	1-246-799-00	CARBON	22K	1/8W	
R237	1-246-795-00	CARBON	10K	1/8W	
R240	1-246-803-00	CARBON	47K	1/8W	
R241	1-246-807-00	CARBON	100K	1/8W	
R242	1-246-803-00	CARBON	47K	1/8W	
		VARIABLE RESISTOR			
RV001	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV002	1-226-775-00	RES, ADJ, METAL GLAZE 100K			
RV003	1-226-710-00	RES, ADJ, SOLID 10K			
RV202	1-226-776-00	RES, ADJ, METAL GLAZE 220K			
RV203	1-226-776-00	RES, ADJ, METAL GLAZE 220K			
RV205	1-226-704-00	RES, ADJ, METAL GLAZE 470K			
RV209	1-226-704-00	RES, ADJ, METAL GLAZE 470K			
RV210	1-226-704-00	RES, ADJ, METAL GLAZE 470K			
RV211	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
		RELAY			
RY001	1-515-418-00	RELAY			
RY002	1-515-416-00	RELAY			
		TRANSFORMER			
T001	1-433-236-00	TRANSFORMER, OSCILLATOR			
T002	1-427-506-00	TRANSFORMER, OUTPUT			

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♦:A-6715-140-A	MA-3 BOARD, COMPLETE	
	**********	
1-426-105-00	TRANSFORMER, MODULATION	
1-464-181-00	MODULATOR, RF (RFM-110-E)	
♦:1-533-087-00	HOLDER, FUSE	
♦:3-669-513-00	SPACER, MICROPHONE JACK	
♦:3-669-610-00	SPACER	

When indicating parts by reference number, please include the board name.

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CAPACITOR

Ref.No	Part No	Description			Remark
C001	1-123-645-00	ELECT	33MF	20%	10V
C002	1-123-645-00	ELECT	33MF	20%	10V
C003	1-123-645-00	ELECT	33MF	20%	10V
C004	1-123-645-00	ELECT	33MF	20%	10V
C005	1-123-645-00	ELECT	33MF	20%	10V
C006	1-108-603-00	MYLAR	0.1MF	5%	50V
C007	1-123-645-00	ELECT	33MF	20%	10V
C008	1-123-619-00	ELECT	4.7MF	20%	50V
C010	1-123-822-00	ELECT	47MF	20%	10V
C011	1-108-603-00	MYLAR	0.1MF	5%	50V
C013	1-123-645-00	ELECT	33MF	20%	10V
C015	1-123-619-00	ELECT	4.7MF	20%	50V
C016	1-123-610-00	ELECT	0.47MF	20%	50V
C017	1-123-645-00	ELECT	33MF	20%	10V
C019	1-123-645-00	ELECT	33MF	20%	10V
C020	1-108-557-00	MYLAR	0.0012MF	5%	50V
C021	1-123-622-00	ELECT	22MF	20%	16V
C025	1-161-013-00	CERAMIC	0.01MF	10%	25V
C026	1-123-617-00	ELECT	10MF	20%	16V
C028	1-123-311-00	ELECT	1000MF	20%	10V
C029	1-161-013-00	CERAMIC	0.01MF	10%	25V
C031		ELECT	10MF		50V
C035	1-123-310-00	ELECT	470MF	20%	10V
C038	1-161-021-00	CERAMIC	0.047MF	10%	25V
C040	1-123-321-00	ELECT	220MF	20%	16V
C041	1-161-011-00	CERAMIC	0.0068MF	10%	25V
C043	1-102-958-00	CERAMIC	20PF	5%	50V
C044		ELECT	10MF		50V
C045	1-101-880-00	CERAMIC	47PF	5%	50V
C046	1-123-661-00	ELECT	100MF	20%	6.3V
C060	1-101-884-00	CERAMIC	56PF	5%	50V
C061	1-161-021-00	CERAMIC	0.047MF	10%	25V
C062	1-161-021-00	CERAMIC	0.047MF	10%	25V
C201	1-123-318-00	ELECT	33MF	20%	16V
C202	1-161-057-00	CERAMIC	0.033MF	10%	50V
C203	1-123-617-00	ELECT	10MF	20%	16V
C204	1-123-617-00	ELECT	10MF	20%	16V
C205	1-161-039-00	CERAMIC	0.001MF	10%	25V
C206	1-123-333-00	ELECT	100MF	20%	16V
C207	1-123-318-00	ELECT	33MF	20%	16V
C208	1-161-057-00	CERAMIC	0.033MF	10%	50V
C209	1-130-482-00	MYLAR	0.0082MF	5%	50V
C210	1-130-482-00	MYLAR	0.0082MF	5%	50V
C211	1-123-612-00	ELECT	2.2MF	20%	50V
C212	1-123-612-00	ELECT	2.2MF	20%	50V
C213	1-123-611-00	ELECT	1MF	20%	50V
C214	1-123-611-00	ELECT	1MF	20%	50V
C215	1-123-611-00	ELECT	1MF	20%	50V
C216	1-123-611-00	ELECT	1MF	20%	50V
C217	1-123-617-00	ELECT	10MF	20%	16V
C218	1-123-318-00	ELECT	33MF	20%	16V
C219	1-161-057-00	CERAMIC	0.033MF	10%	50V
C220	1-123-318-00	ELECT	33MF	20%	16V
C221	1-161-057-00	CERAMIC	0.033MF	10%	50V
C222	1-123-611-00	ELECT	1MF	20%	50V
C223	1-123-611-00	ELECT	1MF	20%	50V
C224	1-161-009-00	CERAMIC	0.0047MF	10%	25V
C226	1-161-039-00	CERAMIC	0.001MF	10%	25V
C228	1-123-611-00	ELECT	1MF	20%	50V
C229	1-123-613-00	ELECT	3.3MF	20%	50V
C230	1-123-318-00	ELECT	33MF	20%	16V
C231	1-161-057-00	CERAMIC	0.033MF	10%	50V
C232	1-161-057-00	CERAMIC	0.033MF	10%	50V
C233	1-123-820-00	ELECT	33MF	20%	16V
C234	1-161-057-00	CERAMIC	0.033MF	10%	50V
C235	1-161-021-00	CERAMIC	0.047MF	10%	25V
C236	1-161-021-00	CERAMIC	0.047MF	10%	25V
C237	1-161-005-00	CERAMIC	0.0022MF	10%	25V
C238	1-123-616-00	ELECT	4.7MF	20%	25V
C239	1-161-057-00	CERAMIC	0.033MF	10%	50V
C240	1-161-057-00	CERAMIC	0.033MF	10%	50V
C241	1-123-611-00	ELECT	1MF	20%	50V
C242	1-161-021-00	CERAMIC	0.047MF	10%	25V
C243	1-161-021-00	CERAMIC	0.047MF	10%	25V
C244	1-161-005-00	CERAMIC	0.0022MF	10%	25V
C245	1-161-005-00	CERAMIC	0.0022MF	10%	25V
C401	1-161-021-00	CERAMIC	0.047MF	10%	25V
C402	1-161-021-00	CERAMIC	0.047MF	10%	25V
C403	1-161-021-00	CERAMIC	0.047MF	10%	25V
C404	1-123-613-00	ELECT	3.3MF	20%	50V
C405	1-123-613-00	ELECT	3.3MF	20%	50V
C406	1-123-613-00	ELECT	3.3MF	20%	50V
C407	1-130-483-51	MYLAR	0.01MF	5%	50V
C409	1-130-483-51	MYLAR	0.01MF	5%	50V
C410	1-123-296-00	ELECT	220MF	20%	6.3V
C412	1-161-016-00	CERAMIC	0.018MF	10%	25V
C413	1-161-945-00	CERAMIC	0.022MF	10%	50V
C416	1-123-622-00	ELECT	22MF	20%	16V
C417	1-123-611-00	ELECT	1MF	20%	50V
C420	1-123-318-00	ELECT	33MF	20%	16V
C421	1-123-820-00	ELECT	33MF	20%	16V
C423	1-161-947-00	CERAMIC	220PF	5%	50V
C424	1-161-013-00	CERAMIC	0.01MF	10%	25V
C425	1-161-016-00	CERAMIC	0.018MF	10%	25V
C426	1-127-468-00	ELECT	0.22MF	5%	16V
C427	1-123-822-00	ELECT	47MF	20%	10V
C428	1-130-483-51	MYLAR	0.01MF	5%	50V
C429	1-123-616-00	ELECT	4.7MF	20%	25V
C430	1-123-616-00	ELECT	4.7MF	20%	25V
C431	1-123-296-00	ELECT	220MF	20%	6.3V
C432	1-123-612-00	ELECT	2.2MF	20%	50V
C433	1-130-494-51	MYLAR	0.082MF	5%	50V
C435	1-123-307-00	ELECT	100MF	20%	10V
C436	1-123-647-00	ELECT	47MF	20%	6.3V

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description			Remark
C437	1-123-612-00	ELECT	2.2MF	20%	50V
C438	1-123-613-00	ELECT	3.3MF	20%	50V
C439	1-123-611-00	ELECT	1MF	20%	50V
C441	1-161-013-00	CERAMIC	0.01MF	10%	25V
C442	1-161-040-00	CERAMIC	0.0012MF	10%	50V
C443	1-123-613-00	ELECT	3.3MF	20%	50V
C444	1-123-617-00	ELECT	10MF	20%	16V
C445	1-123-822-00	ELECT	47MF	20%	10V
C446	1-123-647-00	ELECT	47MF	20%	6.3V
C447	1-161-021-00	CERAMIC	0.047MF	10%	25V
C448	1-123-333-00	ELECT	100MF	20%	16V
C453	1-123-616-00	ELECT	4.7MF	20%	25V
C454	1-123-616-00	ELECT	4.7MF	20%	25V
C456	1-123-616-00	ELECT	4.7MF	20%	25V
C458	1-161-616-00	CERAMIC	0.01MF	10%	25V
C459	1-161-021-00	CERAMIC	0.047MF	10%	25V
C460	1-102-114-00	CERAMIC	470PF	10%	50V
C461	1-123-612-00	ELECT	2.2MF	20%	50V
C462	1-123-607-00	ELECT	0.1MF	20%	50V
C465	1-161-021-00	CERAMIC	0.047MF	10%	25V
C466	1-130-492-51	MYLAR	0.056MF	5%	50V
C467	1-123-616-00	ELECT	4.7MF	20%	25V
C469	1-130-499-51	MYLAR	0.22MF	5%	50V
C471	1-161-021-00	CERAMIC	0.047MF	10%	25V
C601	1-123-323-00	ELECT	470MF	20%	16V
C602	1-123-323-00	ELECT	470MF	20%	16V
C603	1-123-622-00	ELECT	22MF	20%	16V
C604	1-123-617-00	ELECT	10MF	20%	16V
C605	1-123-616-00	ELECT	4.7MF	20%	25V
C607	1-123-616-00	ELECT	4.7MF	20%	25V
C609	1-161-021-00	CERAMIC	0.047MF	10%	25V
C610	1-161-021-00	CERAMIC	0.047MF	10%	25V
C611	1-161-021-00	CERAMIC	0.047MF	10%	25V
C612	1-161-021-00	CERAMIC	0.047MF	10%	25V
C613	1-161-021-00	CERAMIC	0.047MF	10%	25V
C614	1-161-021-00	CERAMIC	0.047MF	10%	25V
C615	1-161-021-00	CERAMIC	0.047MF	10%	25V
C616	1-161-021-00	CERAMIC	0.047MF	10%	25V
C617	1-123-645-00	ELECT	33MF	20%	10V
C618	1-102-529-00	CERAMIC	100PF	5%	50V
C619	1-102-529-00	CERAMIC	100PF	5%	50V
C620	1-161-013-00	CERAMIC	0.01MF	10%	25V
C621	1-161-013-00	CERAMIC	0.01MF	10%	25V
C623	1-161-013-00	CERAMIC	0.01MF	10%	25V
C680	1-101-882-00	CERAMIC	51PF	5%	50V
C681	1-161-013-00	CERAMIC	0.01MF	10%	25V
C801	1-123-320-00	ELECT	100MF	20%	16V
C802	1-123-822-00	ELECT	47MF	20%	10V
C803	1-123-617-00	ELECT	10MF	20%	16V
C804	1-161-013-00	CERAMIC	0.01MF	10%	25V
C805	1-123-324-00	ELECT	1000MF	20%	16V
C806	1-161-020-00	CERAMIC	0.039MF	10%	25V
C901	1-123-611-00	ELECT	1MF	20%	50V

Ref.No	Part No	Description			Remark
C902	1-123-617-00	ELECT	10MF	20%	16V
C903	1-123-612-00	ELECT	2.2MF	20%	50V
C904	1-123-644-00	ELECT	22MF	20%	10V
C905	1-123-822-00	ELECT	47MF	20%	10V
C906	1-123-617-00	ELECT	10MF	20%	16V
C907	1-123-616-00	ELECT	4.7MF	20%	25V
C908	1-123-647-00	ELECT	47MF	20%	6.3V
C920	1-123-613-00	ELECT	3.3MF	20%	50V
C921	1-161-022-00	CERAMIC	0.056MF	10%	25V
C924	1-161-025-00	CERAMIC	0.1MF	10%	25V

CONNECTOR

CN001	1-560-471-00	PIN, CONNECTOR 10P	
CN002	1-560-471-00	PIN, CONNECTOR 10P	
CN201	1-560-459-00	PIN, CONNECTOR 3P	
CN202	1-560-466-00	PIN, CONNECTOR 3P	
CN203	1-560-469-00	PIN, CONNECTOR 6P	
CN401	1-560-467-00	PIN, CONNECTOR 4P	
CN403	1-560-467-00	PIN, CONNECTOR 4P	
CN404	1-560-455-00	PIN, CONNECTOR 2P	
CN406	1-560-466-00	PIN, CONNECTOR 3P	
CN407	1-560-467-00	PIN, CONNECTOR 4P	
CN601	1-560-466-00	PIN, CONNECTOR 3P	
CN602	1-560-466-00	PIN, CONNECTOR 3P	
CN603	1-560-456-00	PIN, CONNECTOR 2P	
CN604	1-560-467-00	PIN, CONNECTOR 4P	
CN605	1-560-456-00	PIN, CONNECTOR 2P	
CN606	1-560-466-00	PIN, CONNECTOR 3P	
CN607	1-560-467-00	PIN, CONNECTOR 4P	
CN608	1-560-466-00	PIN, CONNECTOR 3P	
CN609	1-560-466-00	PIN, CONNECTOR 3P	
CN801	1-561-717-00	CONNECTOR 5P	
CN802	1-561-684-00	CONNECTOR, RECEPTACLE 26P	
CN804	1-561-690-00	CONNECTOR, CAMERA 14P	
CN805	1-508-742-00	PIN, CONNECTOR 3P	

When indicating parts by reference number, please include the board name.

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DIODE

Ref.No	Part No	Description	Remark
D001	8-719-911-19	DIODE 1SS119	
D002	8-719-191-07	DIODE RD9.1E-B	
D003	8-719-191-07	DIODE RD9.1E-B	
D005	8-719-911-19	DIODE 1SS119	
D006	8-719-911-19	DIODE 1SS119	
D201	8-719-911-06	DIODE 1SS106	
D202	8-719-911-06	DIODE 1SS106	
D208	=>8-719-901-33	DIODE 1SS133	
D209	8-719-982-04	DIODE ERB81-004	
D212	=>8-719-901-33	DIODE 1SS133	
D213	8-719-982-04	DIODE ERB81-004	
D215	=>8-719-901-33	DIODE 1SS133	
D402	=>8-719-901-33	DIODE 1SS133	
D403	8-719-982-04	DIODE ERB81-004	
D405	=>8-719-901-33	DIODE 1SS133	
D406	=>8-719-901-33	DIODE 1SS133	
D407	=>8-719-901-33	DIODE 1SS133	
D408	=>8-719-901-33	DIODE 1SS133	
D418	8-719-911-06	DIODE 1SS106	
D419	=>8-719-901-33	DIODE 1SS133	
D422	=>8-719-901-33	DIODE 1SS133	
D423	=>8-719-901-33	DIODE 1SS133	
D424	=>8-719-901-33	DIODE 1SS133	
D425	=>8-719-901-33	DIODE 1SS133	
D601	8-719-200-02	DIODE 10E2	
D602	8-719-200-02	DIODE 10E2	
D603	8-719-911-19	DIODE 1SS119	
D604	8-719-200-02	DIODE 10E2	
D605	8-719-127-07	DIODE RD2.7E-B	
D606	8-719-200-02	DIODE 10E2	
D607	8-719-200-02	DIODE 10E2	
D608	8-719-911-19	DIODE 1SS119	
D609	8-719-911-19	DIODE 1SS119	
D610	8-719-200-02	DIODE 10E2	
D611	8-719-200-02	DIODE 10E2	
D612	8-719-200-02	DIODE 10E2	
D613	8-719-200-02	DIODE 10E2	
D614	8-719-911-19	DIODE 1SS119	
D615	8-719-911-06	DIODE 1SS106	
D616	8-719-911-06	DIODE 1SS106	
D617	8-719-911-06	DIODE 1SS106	
D618	8-719-911-06	DIODE 1SS106	
D619	8-719-113-07	DIODE RD13E-B	
D620	8-719-113-07	DIODE RD13E-B	
D621	8-719-911-19	DIODE 1SS119	
D623	8-719-113-07	DIODE RD13E-B	
D624	8-719-911-19	DIODE 1SS119	
D631	8-719-911-19	DIODE 1SS119	
D632	8-719-911-19	DIODE 1SS119	
D633	8-719-911-19	DIODE 1SS119	
D634	8-719-911-19	DIODE 1SS119	
D635	8-719-100-19	DIODE RD3.6EB2	
D636	8-719-911-19	DIODE 1SS119	
D673	8-719-911-06	DIODE 1SS106	
D678	8-719-911-06	DIODE 1SS106	
D801	8-719-122-07	DIODE RD22E-B	
D802	8-719-122-07	DIODE RD22E-B	
D804	8-719-113-07	DIODE RD13E-B	
D805	8-719-113-07	DIODE RD13E-B	
D806	8-719-113-07	DIODE RD13E-B	
D807	8-719-113-07	DIODE RD13E-B	
D808	8-719-113-07	DIODE RD13E-B	
D809	8-719-122-07	DIODE RD22E-B	
D810	8-719-113-07	DIODE RD13E-B	
D811	8-719-122-07	DIODE RD22E-B	
D812	8-719-122-07	DIODE RD22E-B	
D813	8-719-113-07	DIODE RD13E-B	
D814	8-719-113-07	DIODE RD13E-B	
D817	8-719-122-07	DIODE RD22E-B	
D818	=>8-719-911-55	DIODE U05G	
D819	8-719-982-04	DIODE ERB81-004	
D821	8-719-162-07	DIODE RD6.2E-B	
D822	8-719-911-19	DIODE 1SS119	
D823	8-719-911-19	DIODE 1SS119	
D824	8-719-911-06	DIODE 1SS106	
D827	8-719-113-07	DIODE RD13E-B	
D828	8-719-113-07	DIODE RD13E-B	
D829	8-719-113-07	DIODE RD13E-B	
D830	8-719-118-07	DIODE RD18E-B	
D840	8-719-911-19	DIODE 1SS119	
D841	8-719-911-19	DIODE 1SS119	
D842	8-719-911-19	DIODE 1SS119	
D843	8-719-982-04	DIODE ERB81-004	
D923	8-719-122-07	DIODE RD22E-B	

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description	Remark
		DELAY LINE	
DL002	1-415-198-00	DELAY LINE (1H)	
		CONVERTER	
DR001	1-447-210-00	CONVERTER, DC-DC	
DR801	1-464-156-00	CONVERTER, DC-DC (CD-02)	
		FUSE	
F801 ⚠	1-532-350-00	FUSE, TIME-LAG 4A	
F802 ⚠	1-532-285-00	FUSE, TIME-LAG 1.25A	
F803 ⚠	1-532-605-00	FUSE, ELECTRIC CURRENT 0.4A	
F804 ⚠	1-532-637-00	FUSE, ELECTRIC CURRENT 1A	
		FILTER	
FL001	1-235-097-00	FILTER, LOW PASS	
		IC	
IC001	8-759-208-94	IC CX894	
IC002	8-759-979-26	IC CX7926	
IC003	8-741-102-40	IC BX1024	
IC004	8-741-102-30	IC BX1023	
IC005	8-741-102-80	IC BX1028	
IC006	8-741-102-90	IC BX1029	
IC007	8-741-103-00	IC BX1030	
IC008=>	8-749-910-48	IC BX1048A	
IC201	8-759-103-93	IC UPC393C	
IC202	8-759-132-40	IC UPC324C	
IC204	8-759-103-93	IC UPC393C	
IC205	8-743-980-00	IC BX3980	
IC206	8-743-976-00	IC BX3976	
IC207	8-741-104-50	IC BX1045	
IC401	8-751-940-03	IC CX194A	
IC402	8-759-240-53	IC TC4053BP	
IC403	8-759-132-40	IC UPC324C	
IC404	8-743-983-00	IC BX3983	
IC405	8-741-104-30	IC BX1043	
IC406	8-759-904-94	IC TL494CN	
IC407	8-759-240-51	IC TC4051BP	
IC408	8-743-978-00	IC BX3978	
IC409	8-743-982-20	IC BX3982-2	
IC410	8-759-240-30	IC TC4030BP	
IC411	8-743-977-00	IC BX3977	
IC412	8-741-013-00	IC BX1013	
IC601	8-759-981-40	IC MB8855-140	
IC602	8-759-900-46	IC MB8855-161	
IC603	8-759-987-47	IC MB8747	
IC604	8-759-240-69	IC TC4069UBP	
IC605	8-759-220-04	IC TC40H004P	
IC606	8-759-240-13	IC TC4013BP	
IC607	8-741-104-70	IC BX1047	
IC608	8-759-133-90	IC UPC339C	
IC609	8-741-104-60	IC BX1046	

Ref.No	Part No	Description	Remark
IC801=>	8-743-999-10	IC BX3999-1	
IC901	8-743-971-00	IC BX3971	
		JACK	
J901	1-507-285-00	JACK	
		COIL	
L001	1-408-407-00	MICRO INDUCTOR 6.8UH	
L002	1-408-409-00	MICRO INDUCTOR 10UH	
L003	1-408-409-00	MICRO INDUCTOR 10UH	
L013	1-408-458-11	MICRO INDUCTOR 220UH	
L014	1-408-442-11	MICRO INDUCTOR 10UH	
L060	1-408-429-00	MICRO INDUCTOR 470UH	
L201	1-408-519-00	COIL, CHOKE 420UH	
L202	1-408-519-00	COIL, CHOKE 420UH	
L203	1-408-519-00	COIL, CHOKE 420UH	
L401	1-459-232-00	COIL, CORE 90UH	
L402	1-408-518-00	COIL, CHOKE 1MMH	
		TRANSISTOR	
Q001	8-729-178-54	TRANSISTOR 2SC2785	
Q002	8-729-117-54	TRANSISTOR 2SA1175	
Q003	8-729-178-54	TRANSISTOR 2SC2785	
Q005	8-729-113-32	TRANSISTOR 2SB733	
Q006	8-729-178-54	TRANSISTOR 2SC2785	
Q007	8-729-178-54	TRANSISTOR 2SC2785	
Q201	8-729-117-54	TRANSISTOR 2SA1175	
Q202	8-729-178-54	TRANSISTOR 2SC2785	
Q203	8-729-178-54	TRANSISTOR 2SC2785	
Q204	8-729-178-54	TRANSISTOR 2SC2785	
Q206	8-729-178-54	TRANSISTOR 2SC2785	
Q207	8-729-178-54	TRANSISTOR 2SC2785	
Q208	8-729-117-54	TRANSISTOR 2SA1175	
Q209	8-729-178-54	TRANSISTOR 2SC2785	
Q210	8-729-178-54	TRANSISTOR 2SC2785	
Q211	8-729-178-54	TRANSISTOR 2SC2785	
Q212	8-729-178-54	TRANSISTOR 2SC2785	
Q213	8-729-178-54	TRANSISTOR 2SC2785	
Q214	8-729-178-54	TRANSISTOR 2SC2785	
Q215	8-729-178-54	TRANSISTOR 2SC2785	
Q216	8-729-117-54	TRANSISTOR 2SA1175	
Q217	8-729-113-33	TRANSISTOR 2SB733-U2	
Q218	8-729-113-33	TRANSISTOR 2SB733-U2	
Q219	8-729-178-54	TRANSISTOR 2SC2785	
Q220	8-729-178-54	TRANSISTOR 2SC2785	
Q221	8-729-178-54	TRANSISTOR 2SC2785	
Q222	8-729-178-54	TRANSISTOR 2SC2785	
Q223	8-729-178-54	TRANSISTOR 2SC2785	
Q224	8-729-117-54	TRANSISTOR 2SA1175	
Q225	8-729-113-33	TRANSISTOR 2SB733-U2	
Q226	8-729-113-33	TRANSISTOR 2SB733-U2	
Q227	8-729-178-54	TRANSISTOR 2SC2785	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

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Ref.No	Part No	Description	Remark
Q228	8-729-178-54	TRANSISTOR 2SC2785	
Q229	8-729-178-54	TRANSISTOR 2SC2785	
Q230	8-729-117-54	TRANSISTOR 2SA1175	
Q401	8-729-178-54	TRANSISTOR 2SC2785	
Q402	8-729-177-32	TRANSISTOR 2SD773	
Q403	8-729-113-33	TRANSISTOR 2SB733-U2	
Q404	8-729-117-54	TRANSISTOR 2SA1175	
Q405	8-729-178-54	TRANSISTOR 2SC2785	
Q406	8-729-178-54	TRANSISTOR 2SC2785	
Q407	8-729-178-54	TRANSISTOR 2SC2785	
Q408	8-729-117-54	TRANSISTOR 2SA1175	
Q409	8-729-178-54	TRANSISTOR 2SC2785	
Q411	8-729-178-54	TRANSISTOR 2SC2785	
Q415	8-729-178-54	TRANSISTOR 2SC2785	
Q421	8-729-178-54	TRANSISTOR 2SC2785	
Q422	8-729-178-54	TRANSISTOR 2SC2785	
Q424	8-729-117-54	TRANSISTOR 2SA1175	
Q426	8-729-178-54	TRANSISTOR 2SC2785	
Q601	8-729-113-32	TRANSISTOR 2SB733	
Q602	8-729-113-32	TRANSISTOR 2SB733	
Q603	8-729-178-54	TRANSISTOR 2SC2785	
Q604	8-729-178-54	TRANSISTOR 2SC2785	
Q605	8-729-117-54	TRANSISTOR 2SA1175	
Q606	8-729-113-32	TRANSISTOR 2SB733	
Q607	8-729-113-32	TRANSISTOR 2SB733	
Q608	8-729-178-54	TRANSISTOR 2SC2785	
Q609	8-729-178-54	TRANSISTOR 2SC2785	
Q610	8-729-178-54	TRANSISTOR 2SC2785	
Q611	8-729-113-32	TRANSISTOR 2SB733	
Q612	8-729-177-32	TRANSISTOR 2SD773	
Q613	8-729-113-32	TRANSISTOR 2SB733	
Q614	8-729-177-32	TRANSISTOR 2SD773	
Q615	8-729-178-54	TRANSISTOR 2SC2785	
Q616	8-729-116-42	TRANSISTOR 2SD1164	
Q618	8-729-117-54	TRANSISTOR 2SA1175	
Q619	8-729-178-54	TRANSISTOR 2SC2785	
Q623	8-729-178-54	TRANSISTOR 2SC2785	
Q624	8-729-178-54	TRANSISTOR 2SC2785	
Q625	8-729-178-54	TRANSISTOR 2SC2785	
Q631	8-729-178-54	TRANSISTOR 2SC2785	
Q634	8-729-178-54	TRANSISTOR 2SC2785	
Q801	8-729-178-54	TRANSISTOR 2SC2785	
Q803	8-729-178-54	TRANSISTOR 2SC2785	
Q805	=>8-729-113-32	TRANSISTOR 2SB733	
Q807	8-729-178-54	TRANSISTOR 2SC2785	
Q808	8-729-178-54	TRANSISTOR 2SC2785	

RESISTOR

Ref.No	Part No				Remark
R001	1-246-830-00	CARBON	75	1/8W	
R002	1-246-783-00	CARBON	1K	1/8W	
R003	1-246-783-00	CARBON	1K	1/8W	
R004	1-246-783-00	CARBON	1K	1/8W	
R005	1-246-797-00	CARBON	15K	1/8W	
R006	1-246-805-00	CARBON	68K	1/8W	
R007	1-246-842-00	CARBON	750	1/8W	
R008	1-246-795-00	CARBON	10K	1/8W	
R009	1-246-783-00	CARBON	1K	1/8W	
R011	1-246-786-00	CARBON	1.8K	1/8W	
R013	1-246-834-00	CARBON	160	1/8W	
R015	1-246-779-00	CARBON	470	1/8W	
R016	1-246-783-00	CARBON	1K	1/8W	
R017	1-246-777-00	CARBON	330	1/8W	
R019	1-246-779-00	CARBON	470	1/8W	
R021	1-246-803-00	CARBON	47K	1/8W	
R022	1-246-803-00	CARBON	47K	1/8W	
R023	1-246-795-00	CARBON	10K	1/8W	
R024	1-246-798-00	CARBON	18K	1/8W	
R025	1-246-802-00	CARBON	39K	1/8W	
R026	1-246-802-00	CARBON	39K	1/8W	
R027	1-246-795-00	CARBON	10K	1/8W	
R028	1-246-803-00	CARBON	47K	1/8W	
R029	1-246-791-00	CARBON	4.7K	1/8W	
R030	1-246-856-00	CARBON	11K	1/8W	
R031	1-246-782-00	CARBON	820	1/8W	
R036	1-246-799-00	CARBON	22K	1/8W	
R037	1-246-807-00	CARBON	100K	1/8W	
R038	1-246-799-00	CARBON	22K	1/8W	
R039	1-246-804-00	CARBON	56K	1/8W	
R048	1-246-802-00	CARBON	39K	1/8W	
R049	1-246-804-00	CARBON	56K	1/8W	
R050	1-246-783-00	CARBON	1K	1/8W	
R051	1-246-801-00	CARBON	33K	1/8W	
R052	1-246-804-00	CARBON	56K	1/8W	
R053	1-246-869-00	CARBON	130K	1/8W	
R054	1-246-811-00	CARBON	220K	1/8W	
R055	1-246-802-00	CARBON	39K	1/8W	
R057	1-246-830-00	CARBON	75	1/8W	
R058	1-246-803-00	CARBON	47K	1/8W	
R059	1-246-799-00	CARBON	22K	1/8W	
R061	1-246-805-00	CARBON	68K	1/8W	
R062	1-246-863-00	CARBON	43K	1/8W	
R201	1-246-785-00	CARBON	1.5K	1/8W	
R202	1-246-785-00	CARBON	1.5K	1/8W	
R203	1-246-799-00	CARBON	22K	1/8W	
R204	1-246-799-00	CARBON	22K	1/8W	
R211	1-246-803-00	CARBON	47K	1/8W	
R214	1-247-055-00	CARBON	300K	1/8W	
R215	1-246-809-00	CARBON	150K	1/8W	
R216	1-246-807-00	CARBON	100K	1/8W	
R217	1-246-803-00	CARBON	47K	1/8W	
R218	1-246-859-00	CARBON	20K	1/8W	
R219	1-246-788-00	CARBON	2.7K	1/8W	
R220	1-246-793-00	CARBON	6.8K	1/8W	
R221	1-246-803-00	CARBON	47K	1/8W	
R222	1-246-794-00	CARBON	8.2K	1/8W	
R223	1-246-785-00	CARBON	1.5K	1/8W	

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description			Remark
R224	1-246-847-00	CARBON	2K	1/8W	
R226	1-246-798-00	CARBON	18K	1/8W	
R227	1-246-783-00	CARBON	1K	1/8W	
R228	1-246-854-00	CARBON	7.5K	1/8W	
R229	1-246-791-00	CARBON	4.7K	1/8W	
R230	1-246-803-00	CARBON	47K	1/8W	
R231	1-246-791-00	CARBON	4.7K	1/8W	
R232	1-246-803-00	CARBON	47K	1/8W	
R236	1-246-807-00	CARBON	100K	1/8W	
R237	1-246-783-00	CARBON	1K	1/8W	
R238	1-246-799-00	CARBON	22K	1/8W	
R241	1-246-799-00	CARBON	22K	1/8W	
R242	1-246-799-00	CARBON	22K	1/8W	
R243	1-246-795-00	CARBON	10K	1/8W	
R245	1-246-449-00	CARBON	100 5%	1/4W	
R246	1-246-457-00	CARBON	220 5%	1/4W	
R255	1-244-861-00	CARBON	330 5%	1/2W	
R256	1-246-783-00	CARBON	1K	1/8W	
R257 ⚠	1-217-612-00	WIREWOUND	0.1	2W	
R258	1-246-801-00	CARBON	33K	1/8W	
R259	1-246-801-00	CARBON	33K	1/8W	
R260	1-246-860-00	CARBON	24K	1/8W	
R261	1-246-800-00	CARBON	27K	1/8W	
R264	1-247-049-00	CARBON	470K	1/8W	
R268	1-246-795-00	CARBON	10K	1/8W	
R271	1-247-057-00	CARBON	430K	1/8W	
R273	1-246-795-00	CARBON	10K	1/8W	
R294	1-246-795-00	CARBON	10K	1/8W	
R295	1-246-449-00	CARBON	100 5%	1/4W	
R296	1-246-457-00	CARBON	220 5%	1/4W	
R303	1-244-861-00	CARBON	330 5%	1/2W	
R306	1-246-783-00	CARBON	1K	1/8W	
R307	1-247-049-00	CARBON	470K	1/8W	
R308	1-246-803-00	CARBON	47K	1/8W	
R309	1-246-783-00	CARBON	1K	1/8W	
R310	1-246-811-00	CARBON	220K	1/8W	
R311	1-246-803-00	CARBON	47K	1/8W	
R312	1-246-851-00	CARBON	4.3K	1/8W	
R313	1-246-803-00	CARBON	47K	1/8W	
R314	1-246-803-00	CARBON	47K	1/8W	
R315	1-246-795-00	CARBON	10K	1/8W	
R316	1-246-803-00	CARBON	47K	1/8W	
R320	1-246-801-00	CARBON	33K	1/8W	
R321	1-246-863-00	CARBON	43K	1/8W	
R322	1-246-797-00	CARBON	15K	1/8W	
R323	1-246-798-00	CARBON	18K	1/8W	
R324	1-246-789-00	CARBON	3.3K	1/8W	
R401	1-246-783-00	CARBON	1K	1/8W	
R402	1-246-799-00	CARBON	22K	1/8W	
R404	1-246-859-00	CARBON	20K	1/8W	
R405	1-246-803-00	CARBON	47K	1/8W	
R406	1-246-797-00	CARBON	15K	1/8W	
R407	1-246-783-00	CARBON	1K	1/8W	

Ref.No	Part No	Description			Remark
R413	1-246-803-00	CARBON	47K	1/8W	
R414	1-246-801-00	CARBON	33K	1/8W	
R415	1-246-795-00	CARBON	10K	1/8W	
R416	1-246-807-00	CARBON	100K	1/8W	
R417	1-246-807-00	CARBON	100K	1/8W	
R418	1-246-801-00	CARBON	33K	1/8W	
R423	1-246-807-00	CARBON	100K	1/8W	
R424	1-246-807-00	CARBON	100K	1/8W	
R427	1-246-852-00	CARBON	5.1K	1/8W	
R428 ⚠	1-212-356-00	METAL	0.47 5%	1W	F
R429	1-246-837-00	CARBON	300	1/8W	
R430	1-246-787-00	CARBON	2.2K	1/8W	
R431	1-246-792-00	CARBON	5.6K	1/8W	
R432	1-246-803-00	CARBON	47K	1/8W	
R439	1-214-178-00	METAL	82K 1%	1/4W	
R440	1-246-807-00	CARBON	100K	1/8W	
R444	1-246-801-00	CARBON	33K	1/8W	
R445	1-246-801-00	CARBON	33K	1/8W	
R446	1-246-418-00	CARBON	5.1 5%	1/4W	
R448	1-246-783-00	CARBON	1K	1/8W	
R449	1-246-797-00	CARBON	15K	1/8W	
R450	1-246-799-00	CARBON	22K	1/8W	
R451	1-246-803-00	CARBON	47K	1/8W	
R452	1-246-769-00	CARBON	68	1/8W	
R457	1-246-800-00	CARBON	27K	1/8W	
R458	1-246-866-00	CARBON	75K	1/8W	
R459	1-246-807-00	CARBON	100K	1/8W	
R462	1-246-810-00	CARBON	180K	1/8W	
R463	1-246-801-00	CARBON	33K	1/8W	
R465	1-246-810-00	CARBON	180K	1/8W	
R472	1-246-788-00	CARBON	2.7K	1/8W	
R477	1-246-795-00	CARBON	10K	1/8W	
R478	1-246-783-00	CARBON	1K	1/8W	
R480	1-246-795-00	CARBON	10K	1/8W	
R495	1-246-795-00	CARBON	10K	1/8W	
R496	1-246-795-00	CARBON	10K	1/8W	
R504	1-246-797-00	CARBON	15K	1/8W	
R505	1-246-779-00	CARBON	470	1/8W	
R510	1-246-444-00	CARBON	62 5%	1/4W	
R513	1-246-791-00	CARBON	4.7K	1/8W	
R515	1-246-811-00	CARBON	220K	1/8W	
R516	1-246-791-00	CARBON	4.7K	1/8W	
R518	1-246-795-00	CARBON	10K	1/8W	
R522	1-214-549-00	METAL	470 1%	1/8W	
R523	1-246-791-00	CARBON	4.7K	1/8W	
R524	1-246-784-00	CARBON	1.2K	1/8W	
R525	1-246-844-00	CARBON	1.1K	1/8W	
R526	1-246-861-00	CARBON	30K	1/8W	
R527	1-246-786-00	CARBON	1.8K	1/8W	
R528	1-246-848-00	CARBON	2.4K	1/8W	
R529	1-246-779-00	CARBON	470	1/8W	
R531	1-246-787-00	CARBON	2.2K	1/8W	
R532	1-246-803-00	CARBON	47K	1/8W	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

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Ref.No	Part No	Description			Remark
R537	1-246-795-00	CARBON	10K	1/8W	
R540	1-246-795-00	CARBON	10K	1/8W	
R542	1-246-844-00	CARBON	1.1K	1/8W	
R543	1-246-807-00	CARBON	100K	1/8W	
R544	1-246-795-00	CARBON	10K	1/8W	
R546	1-246-803-00	CARBON	47K	1/8W	
R547	1-246-799-00	CARBON	22K	1/8W	
R548	1-246-795-00	CARBON	10K	1/8W	
R551	1-246-799-00	CARBON	22K	1/8W	
R553	1-246-851-00	CARBON	4.3K	1/8W	
R554	1-246-799-00	CARBON	22K	1/8W	
R555	1-246-853-00	CARBON	6.2K	1/8W	
R559	1-246-795-00	CARBON	10K	1/8W	
R560	1-246-803-00	CARBON	47K	1/8W	
R561	1-246-799-00	CARBON	22K	1/8W	
R566	1-246-803-00	CARBON	47K	1/8W	
R567	1-246-783-00	CARBON	1K	1/8W	
R569	1-246-795-00	CARBON	10K	1/8W	
R570	1-246-795-00	CARBON	10K	1/8W	
R571	1-246-801-00	CARBON	33K	1/8W	
R572	1-246-862-00	CARBON	36K	1/8W	
R573	1-246-858-00	CARBON	16K	1/8W	
R574	1-246-805-00	CARBON	68K	1/8W	
R575	1-246-791-00	CARBON	4.7K	1/8W	
R580	1-246-792-00	CARBON	5.6K	1/8W	
R581	1-246-792-00	CARBON	5.6K	1/8W	
R601	1-246-457-00	CARBON	220 5%	1/4W	
R602	1-246-457-00	CARBON	220 5%	1/4W	
R603	1-246-795-00	CARBON	10K	1/8W	
R604	1-246-783-00	CARBON	1K	1/8W	
R605 ⚠	1-246-413-00	CARBON	3.3 5%	1/4W	F
R606	1-246-803-00	CARBON	47K	1/8W	
R607	1-246-457-00	CARBON	220 5%	1/4W	
R608	1-246-457-00	CARBON	220 5%	1/4W	
R609	1-246-795-00	CARBON	10K	1/8W	
R610	1-246-795-00	CARBON	10K	1/8W	
R611	1-246-795-00	CARBON	10K	1/8W	
R612	1-246-795-00	CARBON	10K	1/8W	
R613	1-246-789-00	CARBON	3.3K	1/8W	
R614	1-246-789-00	CARBON	3.3K	1/8W	
R615	1-246-799-00	CARBON	22K	1/8W	
R616	1-246-789-00	CARBON	3.3K	1/8W	
R617	1-246-843-00	CARBON	910	1/8W	
R618 ⚠	1-247-587-00	CARBON	0.47 5%	1/4W	
R619	1-246-789-00	CARBON	3.3K	1/8W	
R620	1-246-843-00	CARBON	910	1/8W	
R622	1-246-801-00	CARBON	33K	1/8W	
R623	1-246-800-00	CARBON	27K	1/8W	
R625	1-246-799-00	CARBON	22K	1/8W	
R626	1-246-799-00	CARBON	22K	1/8W	
R627	1-246-801-00	CARBON	33K	1/8W	
R628	1-246-865-00	CARBON	62K	1/8W	
R629	1-246-801-00	CARBON	33K	1/8W	

Ref.No	Part No	Description			Remark
R630	1-246-801-00	CARBON	33K	1/8W	
R631	1-246-801-00	CARBON	33K	1/8W	
R639	1-246-791-00	CARBON	4.7K	1/8W	
R640	1-246-781-00	CARBON	680	1/8W	
R641	1-246-807-00	CARBON	100K	1/8W	
R642	1-246-795-00	CARBON	10K	1/8W	
R643	1-246-795-00	CARBON	10K	1/8W	
R644	1-247-053-00	CARBON	1M	1/8W	
R645	1-246-801-00	CARBON	33K	1/8W	
R646	1-246-787-00	CARBON	2.2K	1/8W	
R647	1-246-787-00	CARBON	2.2K	1/8W	
R649	1-246-787-00	CARBON	2.2K	1/8W	
R650	1-246-795-00	CARBON	10K	1/8W	
R651	1-246-795-00	CARBON	10K	1/8W	
R653	1-246-795-00	CARBON	10K	1/8W	
R654	1-246-795-00	CARBON	10K	1/8W	
R655	1-247-047-00	CARBON	330K	1/8W	
R660	1-246-795-00	CARBON	10K	1/8W	
R661	1-246-801-00	CARBON	33K	1/8W	
R663	1-246-799-00	CARBON	22K	1/8W	
R671	1-246-795-00	CARBON	10K	1/8W	
R672	1-246-803-00	CARBON	47K	1/8W	
R673	1-246-804-00	CARBON	56K	1/8W	
R674	1-246-795-00	CARBON	10K	1/8W	
R675	1-246-790-00	CARBON	3.9K	1/8W	
R676	1-246-859-00	CARBON	20K	1/8W	
R678	1-246-795-00	CARBON	10K	1/8W	
R803	1-246-795-00	CARBON	10K	1/8W	
R805	1-246-801-00	CARBON	33K	1/8W	
R806	1-246-789-00	CARBON	3.3K	1/8W	
R807	1-246-801-00	CARBON	33K	1/8W	
R810	1-246-803-00	CARBON	47K	1/8W	
R811	1-246-795-00	CARBON	10K	1/8W	
R812	1-246-807-00	CARBON	100K	1/8W	
R813	1-246-469-00	CARBON	680 5%	1/4W	
R814	1-246-807-00	CARBON	100K	1/8W	
R821	1-246-783-00	CARBON	1K	1/8W	
R827	1-246-795-00	CARBON	10K	1/8W	
R901	1-246-783-00	CARBON	1K	1/8W	
R902	1-246-783-00	CARBON	1K	1/8W	
R903	1-246-799-00	CARBON	22K	1/8W	
R904	1-246-871-00	CARBON	200K	1/8W	
R905	1-246-871-00	CARBON	200K	1/8W	
R906	1-246-807-00	CARBON	100K	1/8W	
R907	1-246-799-00	CARBON	22K	1/8W	
R908	1-246-859-00	CARBON	20K	1/8W	
R909	1-246-859-00	CARBON	20K	1/8W	
R910	1-246-785-00	CARBON	1.5K	1/8W	
R911	1-246-787-00	CARBON	2.2K	1/8W	
R920	1-246-789-00	CARBON	3.3K	1/8W	
R921	1-246-796-00	CARBON	12K	1/8W	
R922	1-246-793-00	CARBON	6.8K	1/8W	
R923	1-246-791-00	CARBON	4.7K	1/8W	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description			Remark
R924	1-246-807-00	CARBON	100K	1/8W	
R926	1-246-797-00	CARBON	15K	1/8W	
R927	1-246-787-00	CARBON	2.2K	1/8W	
R928	1-246-810-00	CARBON	180K	1/8W	
R929	1-246-792-00	CARBON	5.6K	1/8W	
R930	1-246-799-00	CARBON	22K	1/8W	
		VARIABLE RESISTOR			
RV001	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV002	1-226-702-00	RES, ADJ, METAL GLAZE 2.2K			
RV003	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV004	1-226-771-00	RES, ADJ, METAL GLAZE 1K			
RV005	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV006	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV007	1-226-772-00	RES, ADJ, METAL GLAZE 4.7K			
RV201	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV202	1-226-773-00	RES, ADJ, METAL GLAZE 22K			
RV401	1-226-753-00	RES, ADJ, SOLID 47K			
RV402	1-224-254-XX	RES, ADJ, METAL GLAZE 47K			
RV403	1-226-753-00	RES, ADJ, SOLID 47K			
RV405	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV407	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV409	1-226-703-00	RES, ADJ, METAL GLAZE 10K			
RV410	1-226-771-00	RES, ADJ, METAL GLAZE 1K			
RV413	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV414	1-226-753-00	RES, ADJ, SOLID 47K			
RV415	1-226-774-00	RES, ADJ, METAL GLAZE 47K			
RV416	1-226-702-00	RES, ADJ, METAL GLAZE 2.2K			
RV417	1-226-702-00	RES, ADJ, METAL GLAZE 2.2K			
RV420	1-226-702-00	RES, ADJ, METAL GLAZE 2.2K			
RV601	1-226-711-00	RES, ADJ, SOLID 22K			
		RELAY			
RY801	1-515-323-00	RELAY			
		THERMISTOR			
TH201	1-800-200-00	THERMISTOR S-3K			
TH401	1-800-200-00	THERMISTOR S-3K			
		CRYSTAL			
X601	1-527-822-00	OSCILLATOR, CERAMIC 4.00MS			
**********					
♣:	A-6717-251-A	FR-4 BOARD, COMPLETE			
		**********			
	1-548-562-00	COUNTER MODULE, TAPE			
♣:	2-283-410-00	HOLDER (A), LED			
♣:	3-670-095-00	HOLDER, LED			
		CAPACITOR			
C001	1-123-611-00	ELECT	1MF	20% 50V	
C002	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C003	1-123-618-00	ELECT	22MF	20% 6.3V	
C004	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C005	1-161-017-00	CERAMIC	0.022MF	10% 25V	
C006	1-123-617-00	ELECT	10MF	20% 16V	
C007	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C008	1-101-006-00	CERAMIC	0.047MF	50V	
C009	1-161-021-00	CERAMIC	0.047MF	10% 25V	
C010	1-161-020-00	CERAMIC	0.039MF	10% 25V	
C011	1-161-039-00	CERAMIC	0.001MF	10% 25V	
C012	1-161-039-00	CERAMIC	0.001MF	10% 25V	
C013	1-161-039-00	CERAMIC	0.001MF	10% 25V	
C014	1-161-039-00	CERAMIC	0.001MF	10% 25V	
C015	1-161-013-00	CERAMIC	0.01MF	10% 25V	
C016	1-123-616-11	ELECT	4.7MF	20% 25V	
C017	1-161-025-00	CERAMIC	0.1MF	10% 25V	
		CONNECTOR			
CN001	♣: 1-560-569-00	PIN, CONNECTOR 11P			
CN002	♣: 1-560-570-00	PIN, CONNECTOR 4P			
		DIODE			
D001	=>8-719-914-33	DIODE PG3432SY			
D002	8-719-130-07	DIODE RD3.0E-B			
D006	8-719-113-07	DIODE RD13E-B			
D007	8-719-113-07	DIODE RD13E-B			
D008	8-719-113-07	DIODE RD13E-B			
D009	8-719-113-07	DIODE RD13E-B			
D010	8-719-113-07	DIODE RD13E-B			
D011	8-719-113-07	DIODE RD13E-B			
D012	8-719-113-07	DIODE RD13E-B			
D013	8-719-113-07	DIODE RD13E-B			
D014	8-719-113-07	DIODE RD13E-B			
D015	8-719-113-07	DIODE RD13E-B			
D017	8-719-113-07	DIODE RD13E-B			
D018	8-719-911-06	DIODE 1SS106			
D019	8-719-911-06	DIODE 1SS106			
D021	=>8-719-914-02	DIODE BR3402S			
D022	=>8-719-903-42	DIODE AY3432S			
D023	=>8-719-903-42	DIODE AY3432S			
D024	=>8-719-903-42	DIODE AY3432S			
D025	=>8-719-934-34	DIODE AA3432S			
D026	=>8-719-914-33	DIODE PG3432SY			
D027	=>8-719-914-02	DIODE BR3402S			
D028	8-719-118-07	DIODE RD18E-B			
D029	8-719-113-07	DIODE RD13E-B			
D031	=>8-719-901-33	DIODE 1SS133			
D036	8-719-911-06	DIODE 1SS106			
		IC			
IC001	8-759-986-39	IC MB8855-139			
IC002	8-759-987-47	IC MB8747			

When indicating parts by reference number, please include the board name.

FR-4 EH-3 LM-8 LM-10

Ref.No	Part No	Description			Remark
		TRANSISTOR			
Q001	8-729-178-54	TRANSISTOR 2SC2785			
Q002	8-729-178-54	TRANSISTOR 2SC2785			
Q003	8-729-178-54	TRANSISTOR 2SC2785			
Q004	8-729-178-54	TRANSISTOR 2SC2785			
Q005	8-729-902-11	TRANSISTOR 2SC2021			
Q006	8-729-902-11	TRANSISTOR 2SC2021			
Q007	8-729-178-54	TRANSISTOR 2SC2785			
Q008	8-729-178-54	TRANSISTOR 2SC2785			
Q009	8-729-902-11	TRANSISTOR 2SC2021			
Q010	8-729-902-11	TRANSISTOR 2SC2021			
Q011	8-729-902-11	TRANSISTOR 2SC2021			
Q012	8-729-902-11	TRANSISTOR 2SC2021			
Q013	8-729-902-11	TRANSISTOR 2SC2021			
Q014	8-729-178-54	TRANSISTOR 2SC2785			
Q015	8-729-178-54	TRANSISTOR 2SC2785			
Q016	8-729-902-11	TRANSISTOR 2SC2021			
Q017	8-729-902-11	TRANSISTOR 2SC2021			
Q018	8-729-902-11	TRANSISTOR 2SC2021			
		RESISTOR			
R001	1-246-783-00	CARBON	1K	1/8W	
R002	1-246-789-00	CARBON	3.3K	1/8W	
R003	1-246-799-00	CARBON	22K	1/8W	
R004	1-246-803-00	CARBON	47K	1/8W	
R005	1-246-801-00	CARBON	33K	1/8W	
R006	1-246-795-00	CARBON	10K	1/8W	
R007	1-246-801-00	CARBON	33K	1/8W	
R008	1-246-799-00	CARBON	22K	1/8W	
R009	1-246-799-00	CARBON	22K	1/8W	
R010	1-246-799-00	CARBON	22K	1/8W	
R011	1-246-799-00	CARBON	22K	1/8W	
R012	1-246-854-00	CARBON	7.5K	1/8W	
R013	1-246-854-00	CARBON	7.5K	1/8W	
R014	1-246-801-00	CARBON	33K	1/8W	
R015	1-246-801-00	CARBON	33K	1/8W	
R016	1-246-801-00	CARBON	33K	1/8W	
R017	1-246-777-00	CARBON	330	1/8W	
R018	1-246-781-00	CARBON	680	1/8W	
R019	1-246-777-00	CARBON	330	1/8W	
R020	1-246-795-00	CARBON	10K	1/8W	
R021	1-246-801-00	CARBON	33K	1/8W	
R022	1-246-801-00	CARBON	33K	1/8W	
R023	1-246-801-00	CARBON	33K	1/8W	
R024	1-246-801-00	CARBON	33K	1/8W	
R025	1-244-857-00	CARBON	220 5%	1/2W	
R026	1-246-801-00	CARBON	33K	1/8W	
R027	1-246-801-00	CARBON	33K	1/8W	
R029	1-246-807-00	CARBON	100K	1/8W	
R030	1-246-800-00	CARBON	27K	1/8W	
R031	1-246-795-00	CARBON	10K	1/8W	
R033	1-244-857-00	CARBON	220 5%	1/2W	

Ref.No	Part No	Description				Remark
R040	1-246-795-00	CARBON	10K		1/8W	
		VARIABLE RESISTOR				
RV001	1-228-603-00	RES, VAR, CARBON 100K				
		SWITCH				
S001	1-553-766-00	SWITCH, KEY BOARD				
S002	1-553-766-00	SWITCH, KEY BOARD				
S003	1-553-766-00	SWITCH, KEY BOARD				
S004	1-553-766-00	SWITCH, KEY BOARD				
S005	1-553-766-00	SWITCH, KEY BOARD				
S006	1-553-766-00	SWITCH, KEY BOARD				
S007	1-553-766-00	SWITCH, KEY BOARD				
S008	1-553-766-00	SWITCH, KEY BOARD				
S009	1-553-766-00	SWITCH, KEY BOARD				
S010	1-553-766-00	SWITCH, KEY BOARD				
S011	1-553-766-00	SWITCH, KEY BOARD				
S012	1-553-766-00	SWITCH, KEY BOARD				
S013	1-553-766-00	SWITCH, KEY BOARD				
S014	1-553-766-00	SWITCH, KEY BOARD				
S015	1-553-766-00	SWITCH, KEY BOARD				
S016	1-553-766-00	SWITCH, KEY BOARD				
S017	1-553-766-00	SWITCH, KEY BOARD				
S018	1-553-716-00	SWITCH, SLIDE				
**********						
♣:1-607-162-00		EH-3 BOARD				
		**********				
		JACK				
J910	1-507-251-XX	JACK				
**********						
♣:1-605-071-00		LM-8 BOARD				
		**********				
		CAPACITOR				
C001	1-161-057-00	CERAMIC	0.033MF	10%	50V	
C002	1-161-057-00	CERAMIC	0.033MF	10%	50V	
		COIL				
L001	1-408-120-00	MICRO INDUCTOR 18UH				
L002	1-408-120-00	MICRO INDUCTOR 18UH				
**********						
	1-605-664-00	LM-10 BOARD				
		**********				
		RESISTOR				
R001	1-206-479-00	METAL	47	5%	2W	F

When indicating parts by reference number, please include the board name.

Ref.No	Part No	Description			Remark
★:	1-606-731-00	SL-3 BOARD			
		**********			
		CAPACITOR			
C001	1-102-960-00	CERAMIC	24PF	5%	50V
C002	1-102-960-00	CERAMIC	24PF	5%	50V
C003	1-161-021-00	CERAMIC	0.047MF	10%	25V
C004	1-161-021-00	CERAMIC	0.047MF	10%	25V
C005	1-102-948-00	CERAMIC	11PF	5%	50V
C006	1-161-013-00	CERAMIC	0.01MF	10%	25V
C007	1-123-645-00	ELECT	33MF	20%	10V
C008	1-161-021-00	CERAMIC	0.047MF	10%	25V
		DIODE			
D001	=>8-719-911-19	DIODE 1SS119			
D002	=>8-719-911-19	DIODE 1SS119			
		IC			
IC001	8-759-200-60	IC TA7060AP			
		COIL			
L001	1-408-415-00	MICRO INDUCTOR 33UH			
L002	1-408-408-00	MICRO INDUCTOR 8.2UH			
		RESISTOR			
R001	1-246-782-00	CARBON	820	1/8W	
R002	1-246-782-00	CARBON	820	1/8W	
R003	1-246-783-00	CARBON	1K	1/8W	
R004	1-246-783-00	CARBON	1K	1/8W	

****

MISCELLANEOUS
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	A-6737-090-A	MOTOR ASSY, L
⚠	A-6749-058-A	SOLENOID BLOCK ASSY, PINCH
	A-6761-045-A	ACE ASSY (M-3)
	1-235-054-00	COIL, SENSOR, S
	1-235-055-00	COIL, SENSOR, T
	1-446-961-00	HEATER, PTC
⚠	1-454-281-00	SOLENOID, PLUNGER
	1-464-186-00	RP BLOCK (RP-1-P-2)
	1-553-717-00	SWITCH, MICRO
	1-553-718-00	SWITCH, MICRO
	1-605-077-00	FC-1 BOARD
	1-605-078-00	FC-3 BOARD
	1-806-354-00	SENSOR, DEW CONDENSATION
	8-825-508-10	HEAD, FE
	8-838-021-02	MOTOR, DC (BHF-1800A)
	8-838-027-00	MOTOR, DC (BHF-1901A)

Part.No	Description	Remark
	ACCESSORIES AND PACKING MATERIALS	
	**********	
1-504-059-11	MAGNETIC EARPHONE(ME-20H)	
1-551-513-00	CABLE, COAXAL ASSY	
3-656-301-00	SCREWDRIVER, CONTROL	
3-669-635-00	BAG, PROTECTION	
3-671-419-03	LID, CASE, ACCESSORY	
3-671-424-00	CASE, ACCESSORY	
3-672-323-00	INDIVIDUAL CARTON	
3-672-325-00	CUSHION (LEFT UPPER)	
3-672-326-00	CUSHION (RIGHT UPPER)	
3-672-327-00	CUSHION (LEFT LOWER)	
3-672-328-00	CUSHION (RIGHT LOWER)	
3-701-628-00	BAG, POLYETHYLENE	
3-701-630-00	BAG, POLYETHYLENE	
3-783-868-11	MANUAL, INSTRUCTION	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

Sony Corporation
TV & Camera Group

9-972-167-01

82C0956-1
Printed in Japan

SL-F1E

SONY

SERVICE MANUAL

AEP Model

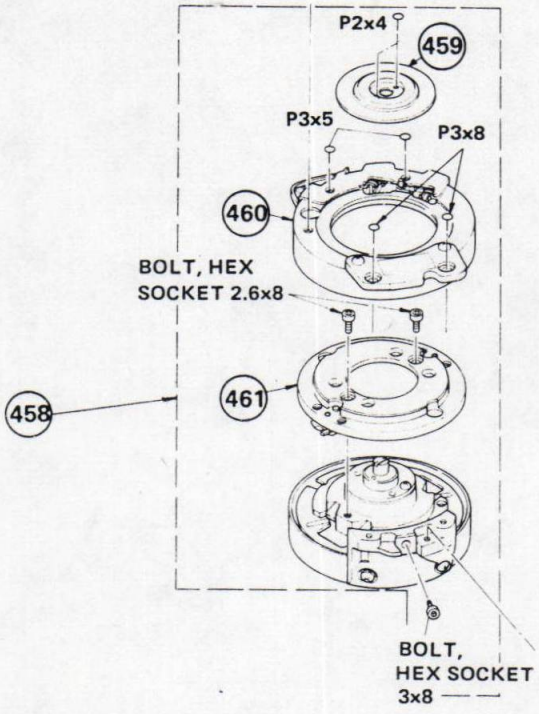
June, 1982

CORRECTION-1

File this correction with the service manual.

SECTION 4 EXPLODED VIEWS

(10) DRUM ASSEMBLY



PAGE	CORRECT			INCORRECT		
138	458	A-6050-126-A	DSH-22A-R	458	A-6050-128-A	DSH-22A-C
	461	A-6762-072-A	DISK ASSY, DSR-22R	461	A-6762-073-A	DISK ASSY, DSR-22

MICROFILM

9-972-167-91

Consumer VIDEO

Sony Corporation
Audio & Video Group

English
82F0965-1
Printed in Japan

SL-F1E

ADJUSTMENT MANUAL

AEP Model
UK Model
E Model

July, 1982

711P CHASSIS

SPECIFICATIONS

System

Video recording system	Rotary two-head helical scanning
Video signal	CCIR standard, PAL colour
RF output signal	UHF channels 30–39 (variable) 75 ohms, unbalanced
Usable cassettes	Cassettes with the β mark
Tape speed	18.73 mm/sec.
Maximum recording time	2 hours 10 min. (with Sony L-500 cassette) 3 hours 15 min. (with Sony L-750 cassette)
Fast forward/rewind time	Under 3½ min. (with L-500 cassette)
Horizontal resolution	Colour: 260 lines B/W: 300 lines
Video S/N	Colour: Better than 40 dB B/W: Better than 43 dB
Audio frequency response	50 Hz to 10 000 Hz
Audio S/N	Better than 40 dB

Inputs and outputs

CAMERA connector	14-pin, K-type connector
	Video in: 1 V p-p ±0.5 V p-p 75 ohms unbalanced, sync negative
	Video out: 1 V p-p ±0.1V p-p 75 ohm unbalanced, sync negative
	Audio in: −20 dBs (0 dBs = 0.775 V rms)
	Audio out: −5 dBs (at load impedance 100 kilohms) output impedance: less than 10 kilohms
	Power supply output: 12 V dc
ACCESSORY CONNECTOR	26-pin connector
	Video in: 1 V p-p ±0.5 V p-p 75 ohms unbalanced, sync negative
	Video out: 1 V p-p ±0.1 V p-p 75 ohms unbalanced, sync negative
	Audio in: −10 dBs input impedance 100 kilohms
	Audio out: −5 dBs (at load impedance 100 kilohms) output impedance: less than 10 kilohms
	Power supply input: 12 V dc
Microphone input	Minijack −60 dBs, for low-impedance microphone
Earpiece output	Minijack −26 dBs, for 8-ohm earpiece

General

Power requirements	12 V dc ±10%
Power consumption	8.4 W (dc, record mode without camera)
Operating position	vertical or horizontal
Operating temperature	0°C to 40°C (32°F to 104°F)
Storage temperature	−20°C to +65°C (−4°F to +149°F)
Dimensions	Approx: 215 × 80 × 325 mm (w/h/d) (8½ × 3¼ × 12⅞ inches) not incl. projecting parts and controls
Weight	Approx. 4.3 kg (9 lb 8 oz) net

MICROFILM

Consumer VIDEO

Beta
β PORTABLE VIDEO CASSETTE RECORDER
SONY®

TABLE OF CONTENTS

SECTION 1
CHECKING, ALIGNMENT AND REPLACEMENT OF MECHANICAL SECTION

1-1. REMOVAL OF THE CASE

1-1-1. Removal of Panel Assembly (Fig. 1-1)

1) Raise the cassette compartment.

2) Unscrew the two screws (1) on the cassette compartment cover and remove the cover by pulling it upward in the direction of arrow (A).

3) Unscrew the four screws (3) on the lower panel assembly and remove it.

4) Unscrew the two screws (2) on the upper panel assembly and disconnect the battery connector.

5) Remove the upper panel assembly by lifting it in the direction of arrow (B).

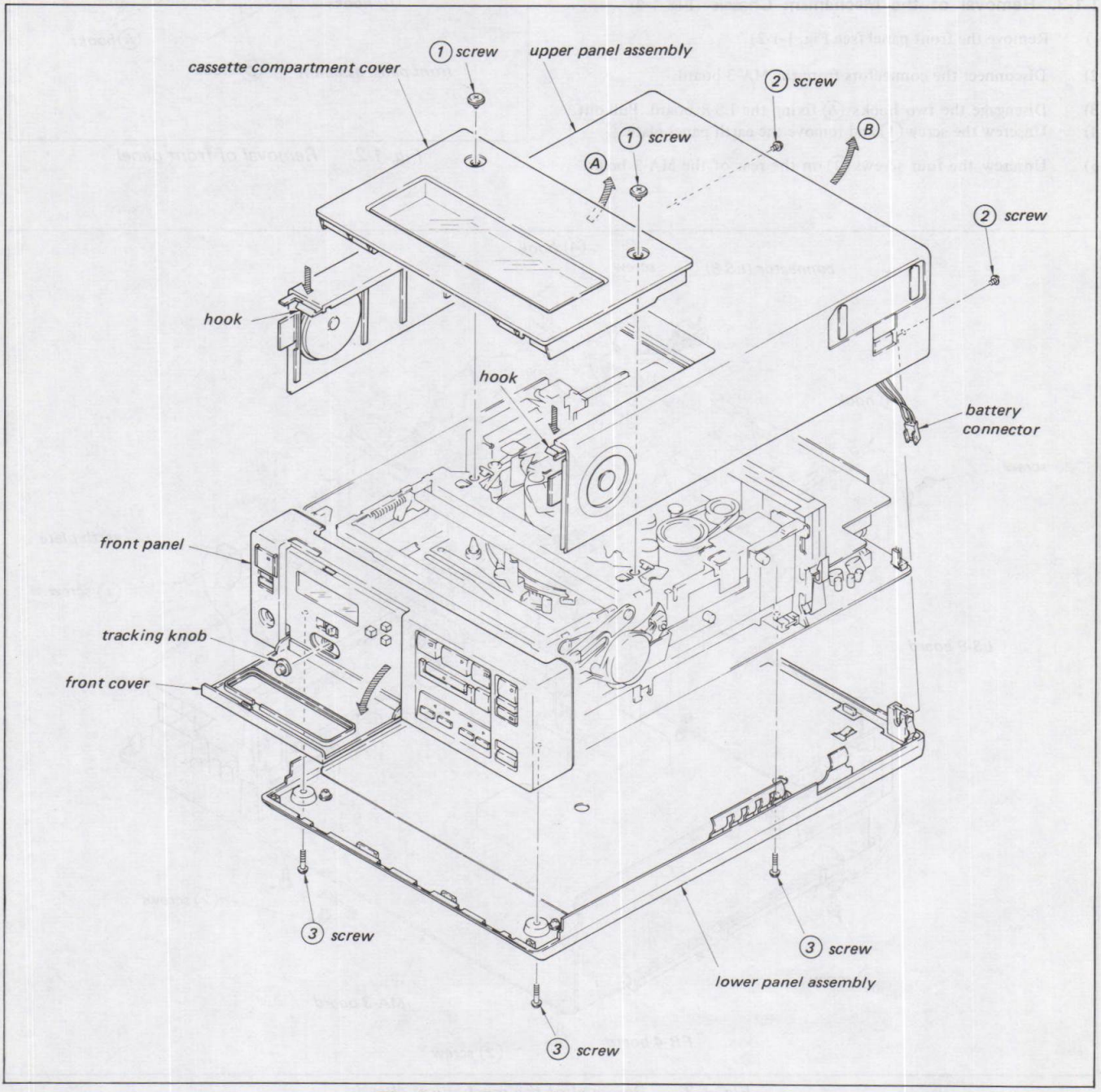


Fig. 1-1. Removal of panel assembly

1-1-2. Removal of Front Panel (Fig. 1-2)

1) Open the front cover and pull out the tracking knob. (Fig. 1-1)

2) Disengage the four hooks Ⓐ by pushing them outward. Disengage the four hooks Ⓑ, pull the panel down in the dierection indicated by the arrow ⓐ, then forward together with the circuit board.

3) Disconnect the wire harness connector from the LS-8 board.

4) Insert a blade-tip screwdriver between the front panel and FR-4 board and disengage the four hooks Ⓓ while pushing hook Ⓒ down by hand.

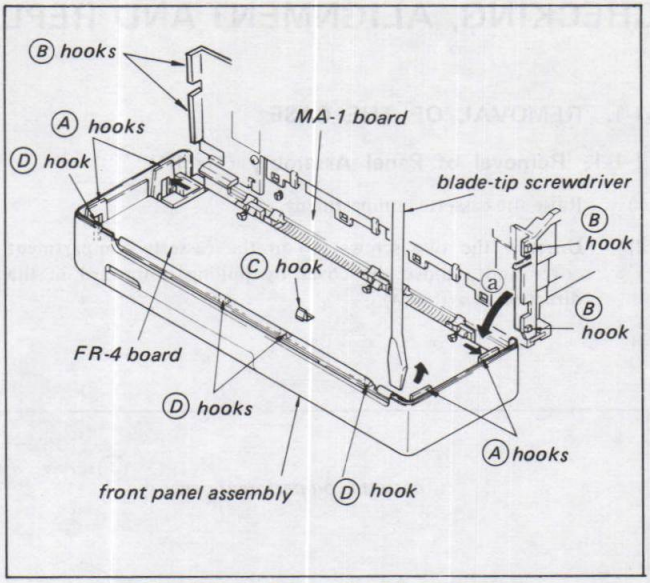


Fig. 1-2. Removal of front panel

1-1-3. Removal of the Mechanism Chassis (Fig. 1-3)

1) Remove the front panel (see Fig. 1-1-2)

2) Disconnect the connectors from the MA-3 board.

3) Disengage the two hooks Ⓐ fixing the LS-8 board. Pull out

4) Unscrew the screw ① and remove the earth panel plate.

5) Unscrew the four screws ② on the rear of the MA-3 board.

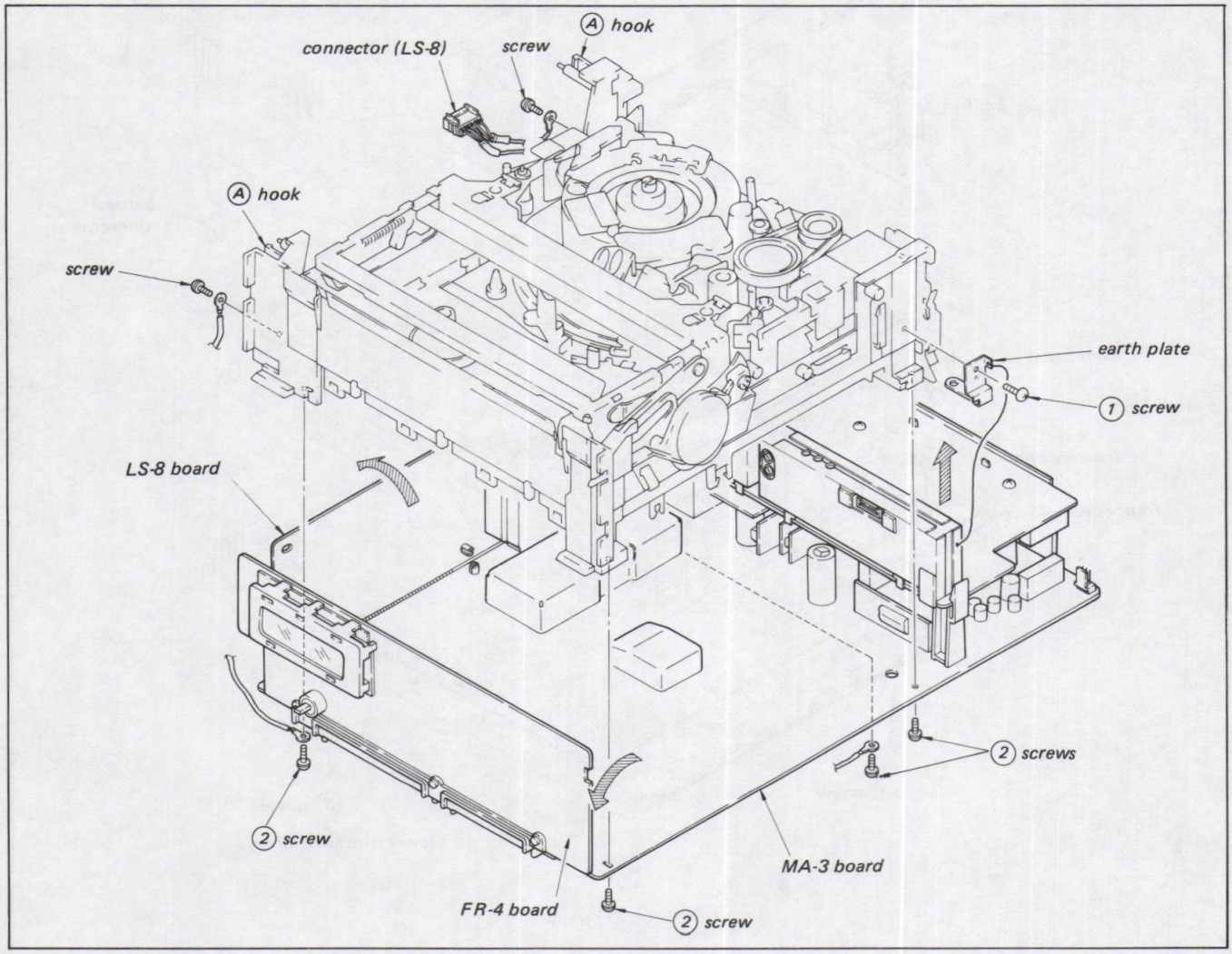


Fig. 1-3. Removal of the mechanism chassis

1-2. PRECAUTIONS WHEN SERVICING

1. Attention should be paid to the positioning of the set when working with the case removed and circuit boards dismounted.
2. When making an operation check or electrical adjustment, use AC adapter AC-F1E or battery NP-1.
3. Do not use alignment tapes other than KR5-2H.

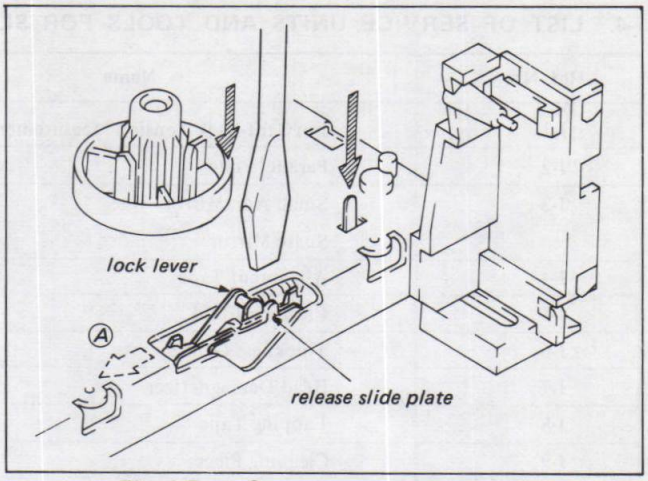


Fig. 1-5. Cassette compartment lock

1-3. MECHANICAL OPERATION WITHOUT CASSETTE INSTALLED

1-3-1. Completing Threading Without Cassette (This state is called "STOP mode" in this guide.)

1) Depress the cassette detection lever shown in Fig. 1-4 while lowering the cassette compartment.

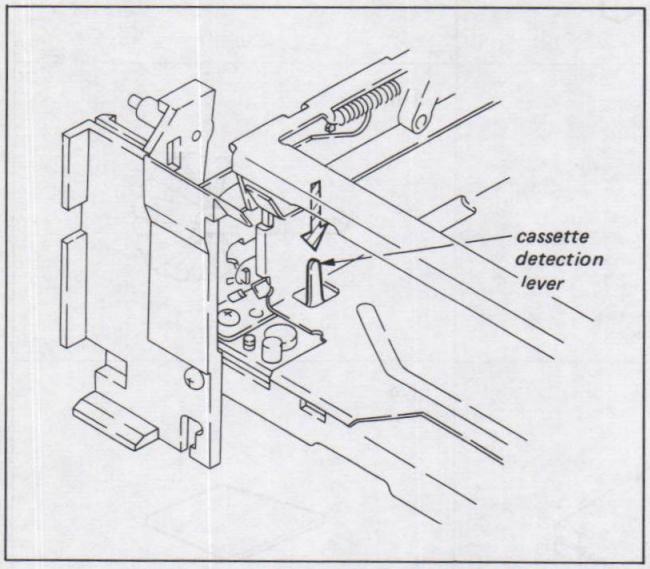


Fig. 1-4. Cassette detection lever

2) With the cassette compartment raised, push the lock lever in Fig. 1-5 using a blade-tip screwdriver, or other tool to lock the cassette compartment, then press the cassette detection lever.

Caution: The cassette compartment lock does not release automatically. Pull the release slide panel in the direction of arrow Ⓐ and push the lock lever assembly in the same direction to return it to its previous state.

1-3-2. Setting Playback Without Cassette Installed

Press the playback button after setting the STOP mode in step 1-3-1.

1-3-3. Setting Record Mode without a Cassette

1) Thread as explained in 1-3-1 and press the record proof switch as shown in Fig. 1-6.

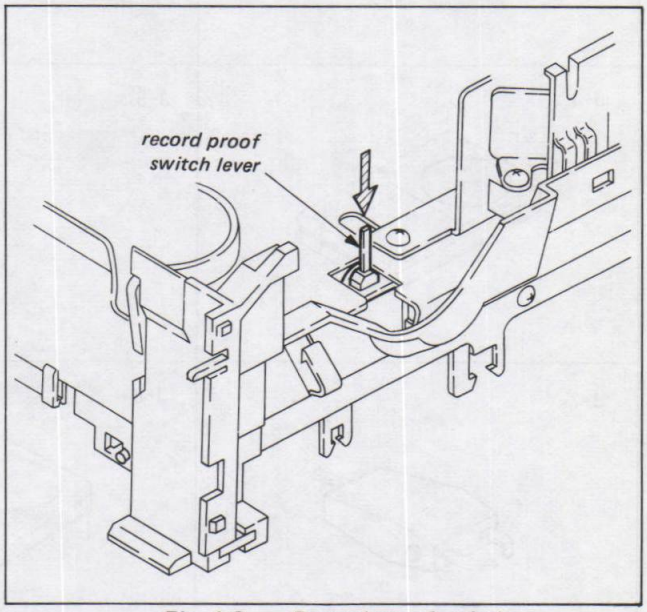


Fig. 1-6. Record proof switch

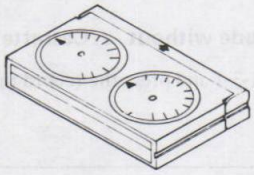
2) Press the PB button while pressing the record or dubbing button, while continuously holding down the record proof switch.

Note: The pause lamp and record lamp light when the record button is pressed, and it is necessary to release pause. Caution: fast-forward and rewind are not possible without a cassette installed.

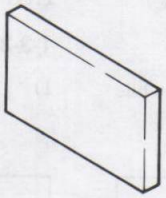
1-4. LIST OF SERVICE UNITS AND TOOLS FOR SL-F1E

Ref. No.	Name	Cord No.	Fixture No.
J-1	Forward-Back Tension Measurement Tape	J-6080-003-C	SL-0003C
J-2	Parallel Plate	J-6086-750-A	SL-0657
J-3	Small Adj. Mirror	J-6080-029-A	SL-5052
	Spare Mirror	J-6080-030-1	
J-4	Alignment Tape	8-969-995-52	KR5-2H
J-5	Cleaning Fluid	Y-2031-001-0	
J-6	Thickness Gauge	9-911-053-00	
J-7	Head Demagnetizer	Readily available	
J-8	Lapping Tape	8-888-004-00	
J-9	Cleaning Piece	Z-034-697-00	
J-10	Dihedral Adj. Screw	J-6080-013-1	SL-0013

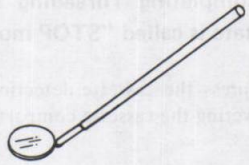
J-1



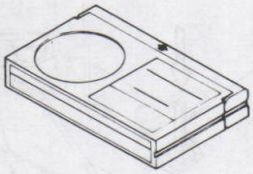
J-2



J-3

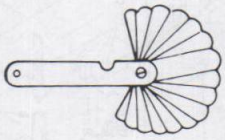


J-4

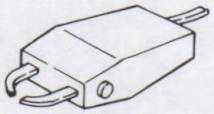


J-5

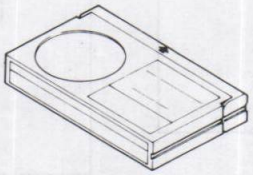
J-6



J-7

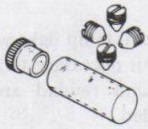


J-8



J-9

J-10



SECTION 2
PERIODIC CHECK AND MAINTENANCE

The following maintenance and periodic checks are recommended to ensure optimum machine function and performance and to prolong machine and tape life.

2-1. MAINTENANCE AFTER REPAIR

Carry out maintenance work for the following items after repairing the machine regardless of the period of use.

2-1-1. Rotary Head Disc Assembly

1) Place a piece of chamois (tool Ref. No. J9) soaked in cleaning fluid (tool Ref. No. J5) lightly against the rotary drum assembly and clean the rotary head disc assembly by slowly rotating it by hand. (Important-Do not clean by rotating with the motor on.)

2) Do not clean the head tip by moving the chamois in a vertical direction. This may damage the head tip.

2-1-2. Cleaning of the Tape Transportation System

Clean the tape contact surfaces, such as the tape guide, drum assembly surfaces, capstan, and pinch roller using cleaning piece etc. soaked in cleaning fluid.

2-1-3. Cleaning of the Drive System

Clean the driving elements (threading motor belt, reel base surfaces, etc.) using a cloth soaked in cleaning fluid.

2-2. PERIODIC CHECK ITEMS

Carry out maintenance checks for the following items depending on the duration of use.

	Maintenance & Check	Replacement Part No.	Operating Hours (H) 500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape Transportation System	Cleaning of tape transportation system		○	○	○	○	○	○	○	○	○	○	This cleaning must be done whenever a repair is made.
	Cleaning and degaussing of ACE assembly		○	○	○	○	○	○	○	○	○	○	
	Cleaning and degaussing of video disk assembly		○	○	○	○	○	○	○	○	○	○	The life of the head varies, depending on operational conditions and method.
Driving System	Replacement of threading DC motor belt		○	○	○	○	○	○	○	★	○	○	• This cleaning must be done whenever a repair is made. • Replacement must be done depending on operating hours on the table, or every two years.
	Cleaning of iron core and opening of solenoid		–	–	–	○	–	–	–	○	–	–	Wipe iron core and opening of solenoid with dry cloth.
Performance Confirmation	Abnormal sound		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Adjust or replace the section which causes abnormal sound.
	Measurement of FWD back tension		–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to section Specified value: 45 ~ 48 g·cm (When measured with torque cassette tape)
	Confirmation of brake system		–	☆	–	☆	–	☆	–	☆	–	☆	Confirmation must be made according to section
	Confirmation of record & playback functions		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	Perform the confirmation whenever repair is made.

○ Cleaning ★ Replacement ☆ Confirmation

SECTION 3
CHECK, ADJUSTMENT AND REPLACEMENT PROCEDURES

3-1. REPLACEMENT OF VIDEO HEAD DISC ASSEMBLY (Fig. 3-1)

3-1-1. Removal of the Rotary Head Disc Assembly

1) Unscrew the screw (1) which fixes the PTC heater cover and remove the PTC heater cover and the stay.

2) Unscrew hexagonal socket bolt (2) using an Allen wrench.

3) Unscrew the two fixed screws (3) and remove the damper.

4) Unscrew the two screws (4) and remove the upper drum.

Note: Remove the upper drum while rotating it without moving the adjust plate. Be very careful not to move the adjust plate, otherwise the tape path will be affected.

5) Unsolder the rotary head disc circuit board (four red-and-white lead wires).

6) Unscrew the two hexagonal socket bolt and remove the rotary head disc assembly.

Note: Be very careful not to touch the head tip, or touch it against anything.

3-1-2. Replacement

1) Position the rotary head disc paying attention to the direction of the red and white lead wires.

2) Tighten the hexagonal socket bolt and solder the lead wires.

Note: Solder securely, being careful not to break the lead wires.

3) Be careful not to move the adjust plate, as when removing the upper drum. Lightly tighten the screws (4), clamp hexagonal socket bolt , then securely tighten the screws (4).

Caution: Be careful not to touch the upper drum or the head tip.

4) Attach the damper and fix the screws (3).

5) Attach the PTC heater cover and fix the screw (1).

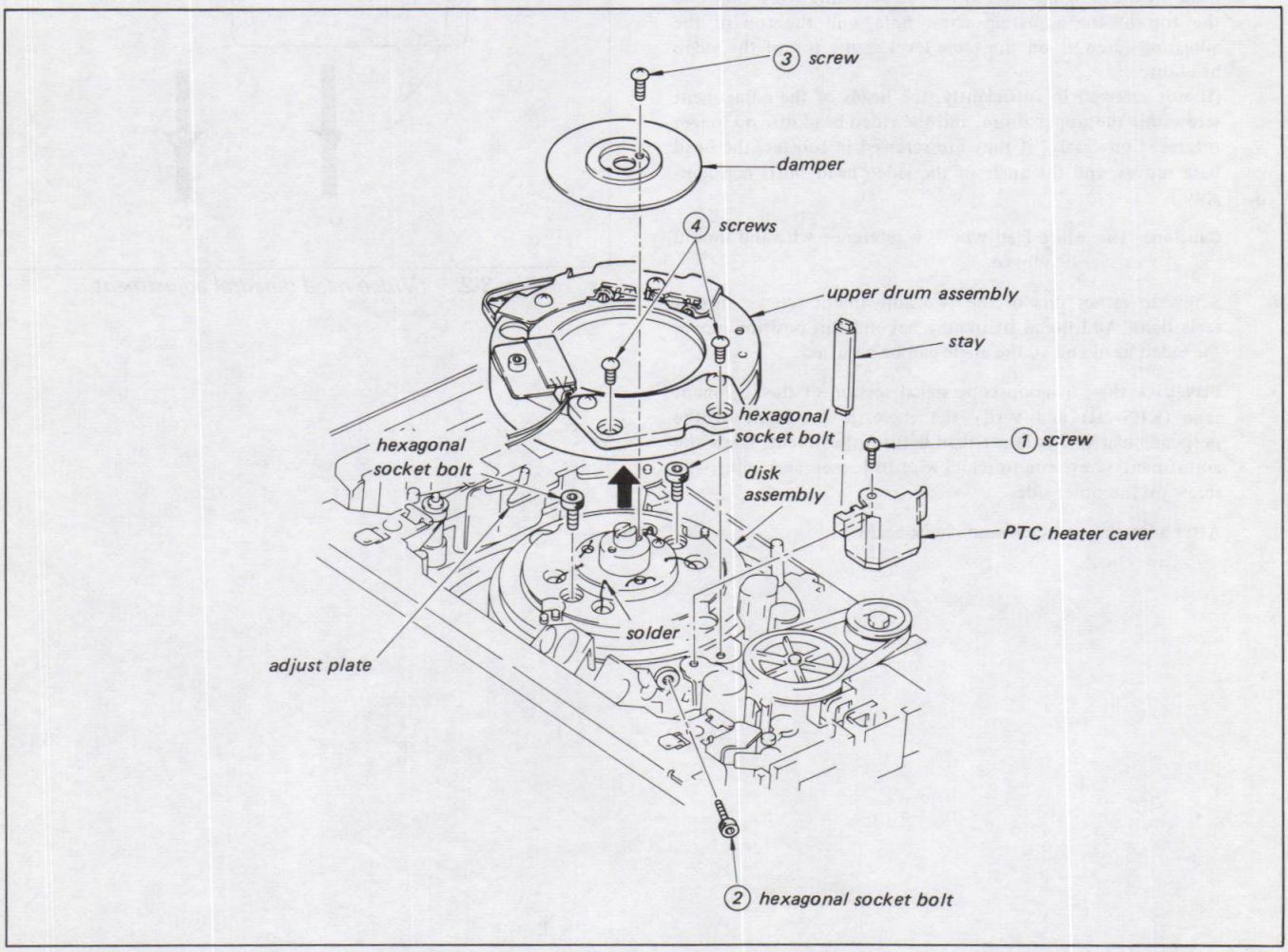


Fig. 3-1. Removal of video head disc assembly

3-2. VIDEO HEAD DIHEDRAL ADJUSTMENT

Generally this adjustment is not necessary except after video head disc replacement. (Video head discs for repair and replacement are precision adjusted using a microscope, and there is virtually never a need for readjustment.)
When determining the appropriate video head angle, play back an alignment tape. Make sure the tracking control knob is set at the center click position. When the check is made at a position other than the center click (tracking is off), the pictures will be played back as if the angle is wrong even if it is correct.
Be sure the ACE assembly position adjustment is completed (refer to "Tape Path Adjustment") before making this adjustment.

[Checking Method]

Play back the βII monoscope signal section of the alignment tape (KR5-2H) after setting the tracking control knob at the center click position. Verify that only one monoscope perpendicular line is played back immediately underneath the switching pulse, and not two lines.
If only one perpendicular line can be seen, the angle is correct, and no adjustment is needed.
If there are two, adjust as follows.

[Adjustment Procedure]

1. As shown in Fig. 3-2, screw in the two angle adjustment screws (Jig Ref. No. J-10) so that the lead wires from the video head are on the same level as the red adjusting screw hole and the top of the adjusting screw hole, and the top of the adjusting screw is on the same level as the top of the video head disc.
   (If not screwed in sufficiently, the heads of the adjustment screws hit the upper drum, and the video head disc no longer rotates. Conversely, if they are screwed in too far, the head base moves, and the angle of the video head shifts considerably.)

   Caution: The white lead wire is a reference wire and should never be moved.

2. Screw in either one of the two adjustment screws until it feels tight. Additional tightening beyond this position moves the video head and so the angle can be adjusted.

3. Play back the βII monoscope signal section of the alignment tape (KR5-2H) and verify the angle. If the angle of the perpendicular line is larger than before adjustment, screw the adjustment screw counterclockwise to loosen and adjust the screw on the other side.

4. After adjusting, unscrew and check again.

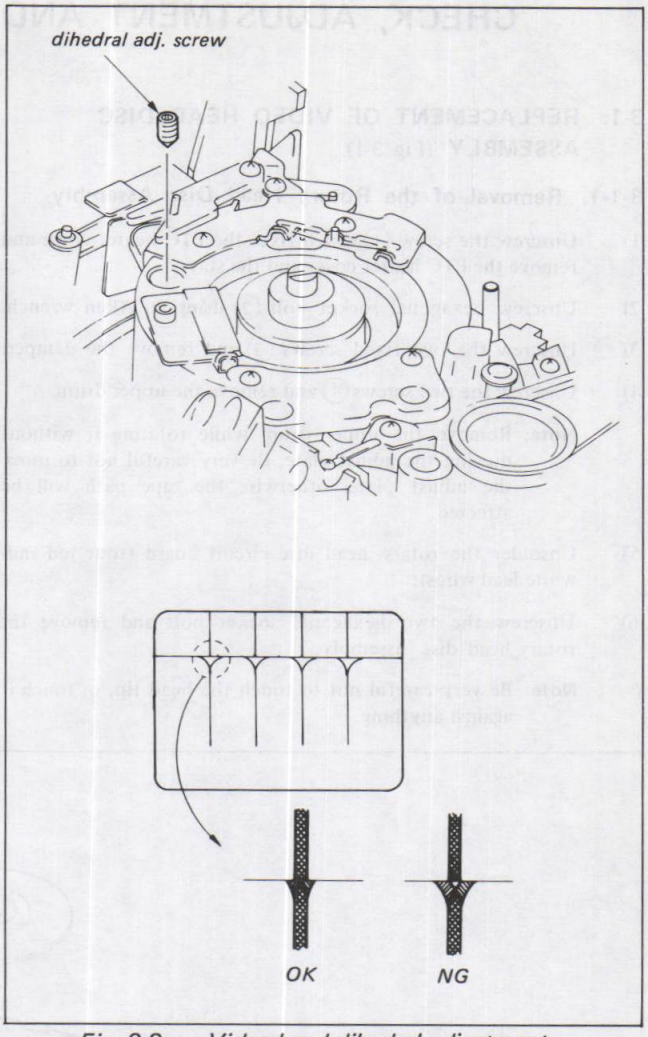


Fig. 3-2. Video head dihedral adjustment

3-3. REPLACEMENT OF DRUM ASSEMBLY

1. Remove the mechanism chassis from the circuit board. (Refer to 1-1-3)
2. Measure and record the two gaps between the upper drum tape holding section and adjust plate (Ⓐ in Fig. 3-3). (Do not forget to do this, as the adjust plate mounting position affects the tape path.)
3. Unscrew the screws ① shown in Fig. 3-3 and remove the tape guide ground plate and adjust plates (1) and (2).
4. Unfasten dew sensor bolt ① shown in Fig. 3-4 and remove the dew sensor.
5. Unscrew screw ② and remove the PTC heater cover, PTC heater and stay from the drum body.
6. Remove the connector, ground terminal, and three drum mounting screws from the rear of the chassis and remove the drum assembly body.
7. Re-assemble the parts in reverse order.
8. Adjust according to "Tape Path Adjustment" after replacing the drum.

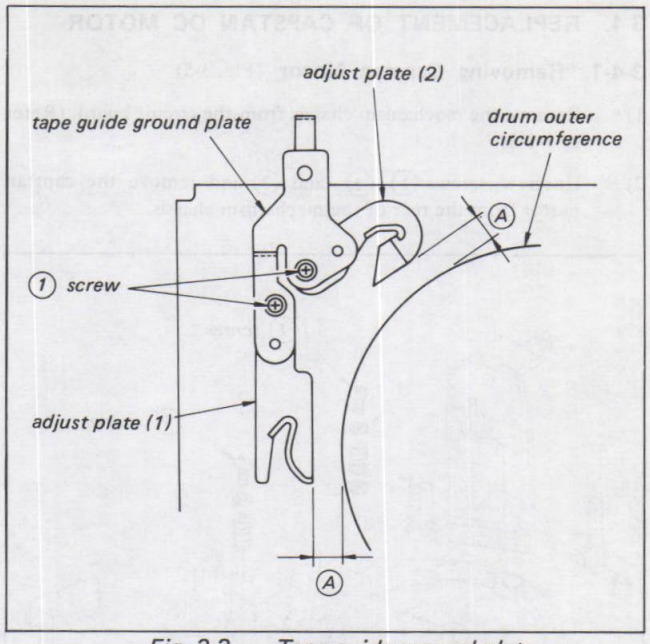


Fig. 3-3. Tape guide ground plate

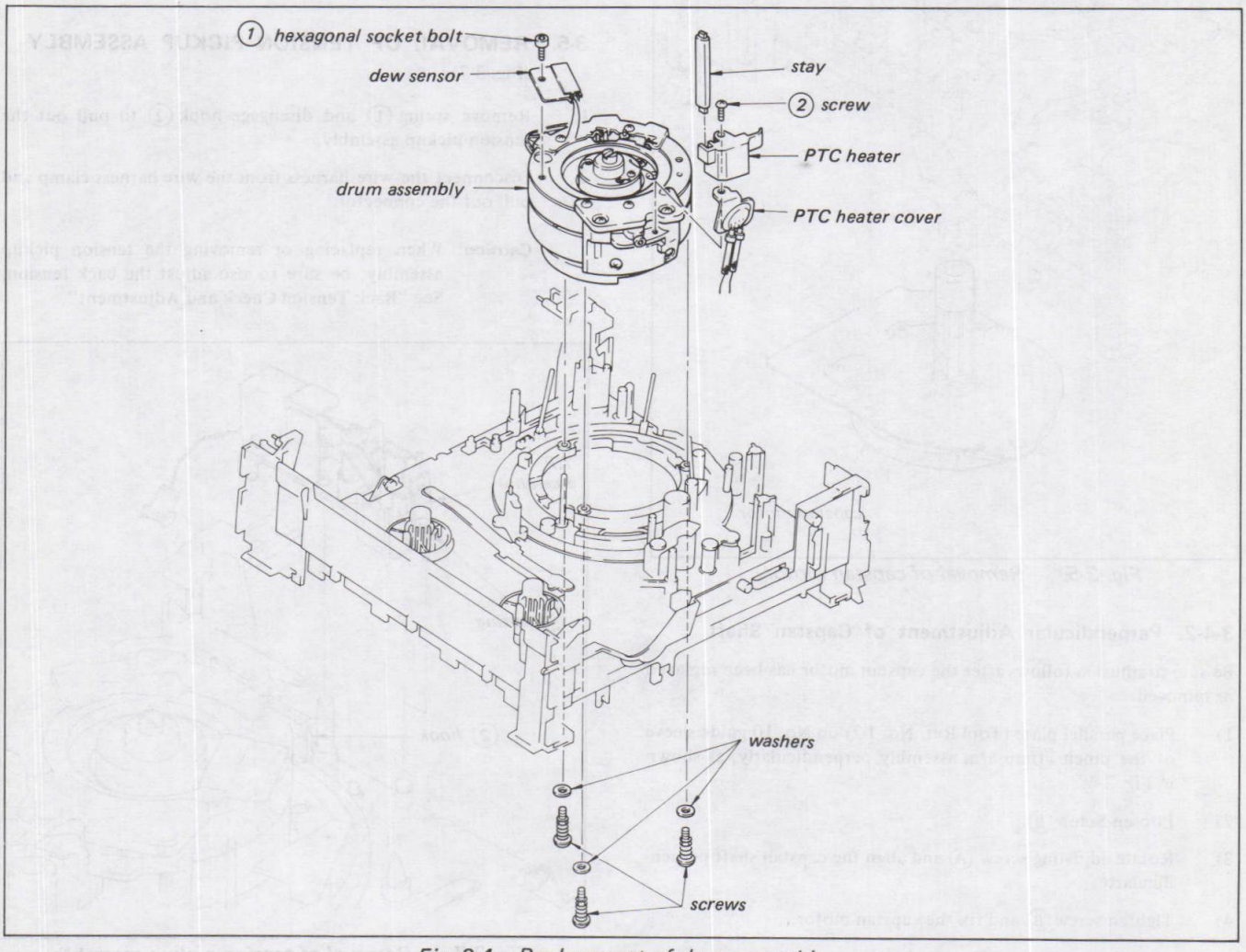


Fig. 3-4. Replacement of drum assembly

3-4. REPLACEMENT OF CAPSTAN DC MOTOR

3-4-1. Removing Capstan Motor (Fig. 3-5)

1) Remove the mechanism chassis from the circuit board. (Refer to 1-1-3)

2) Unscrew screws ①, ②, and ③ and remove the capstan motor from the rear of the mechanism chassis.

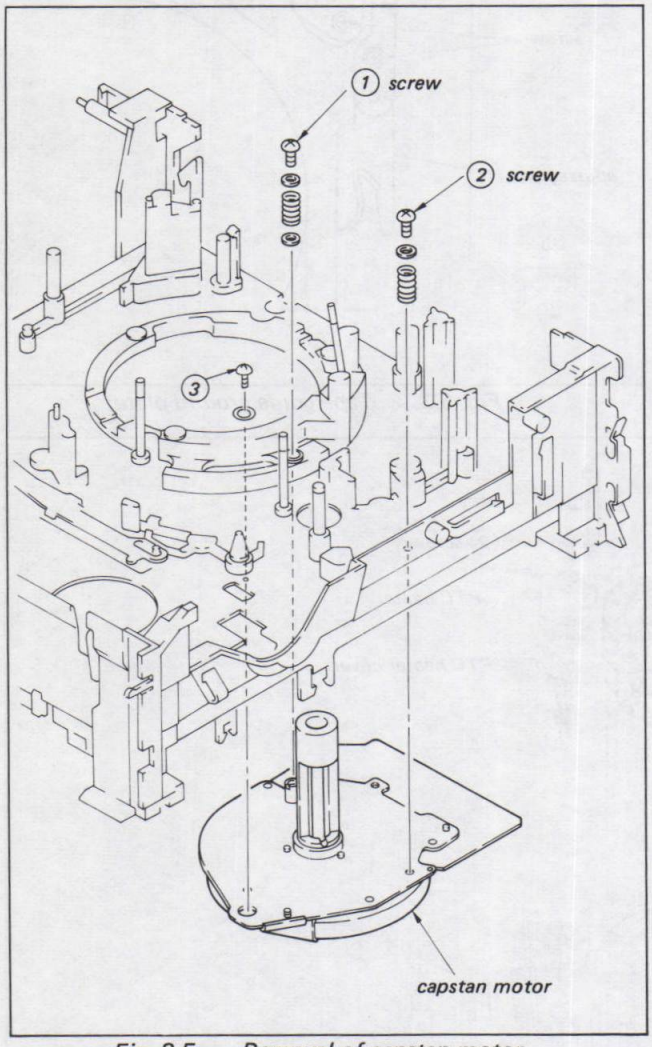


Fig. 3-5. Removal of capstan motor

3-4-2. Perpendicular Adjustment of Capstan Shaft

Be sure to adjust as follows after the capstan motor has been replaced or removed:

1) Place parallel plate (Tool Ref. No. J-2) on No. 10 guide sleeve of the pinch crimp arm assembly perpendicularly, as shown in Fig. 3-6.

2) Loosen Screw Ⓑ.

3) Rotate adjusting screw Ⓐ and align the capstan shaft perpendicularly.

4) Tighten screw Ⓑ and fix the capstan motor.

5) Adjust according to "Tape Path Adjustment".

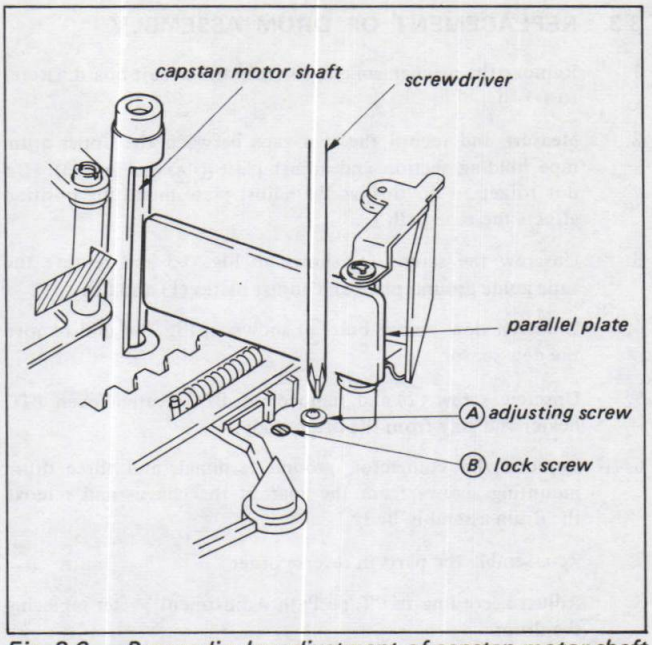


Fig. 3-6. Perpendicular adjustment of capstan motor shaft

3-5. REMOVAL OF TENSION PICKUP ASSEMBLY (Fig. 3-7)

1. Remove spring ① and disengage hook ② to pull out the tension pickup assembly.

2. Disconnect the wire harness from the wire harness clamp and pull out the connector.

Caution: When replacing or removing the tension pickup assembly, be sure to also adjust the back tension. See "Back Tension Check and Adjustment".

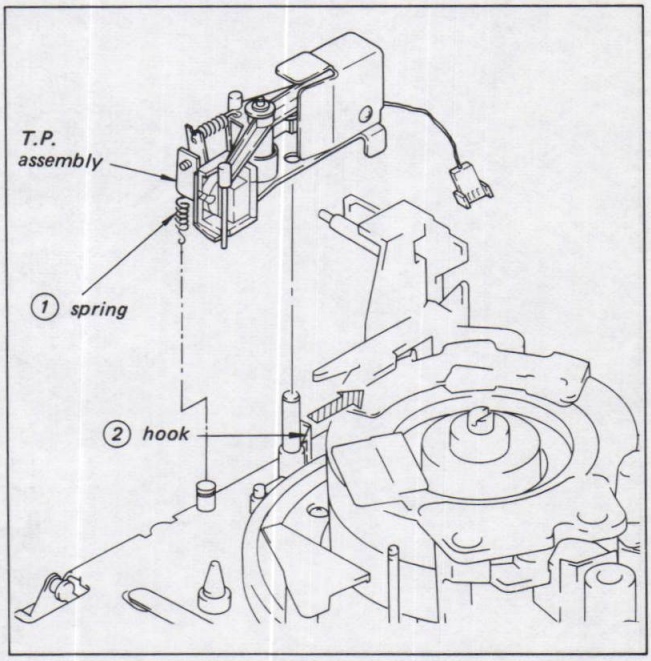


Fig. 3-7. Removal of tension pickup assembly

3-6. REMOVAL OF CASSETTE COMPARTMENT

(Fig. 3-8)

1. Unthread and lift up the cassette compartment.
2. Unscrew four screws (1) and remove the cassette compartment by lifting it up.

   Caution: When removing the cassette compartment be careful not to hook it on the tension pickup.

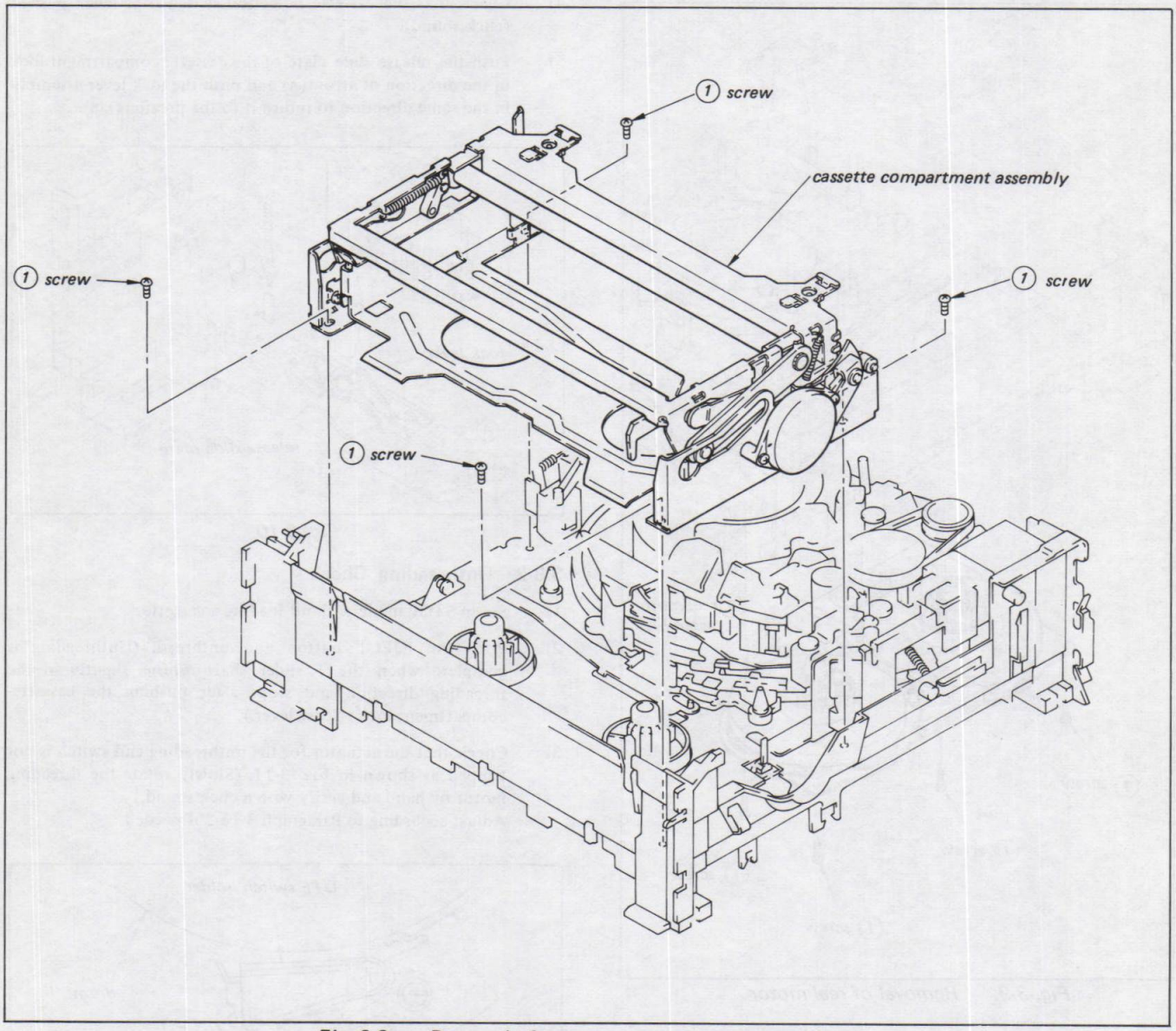


Fig. 3-8. Removal of cassette compartment assembly

3-7. REMOVAL OF REEL MOTOR (Fig. 3-9)

1. Remove the mechanism chassis from the circuit board. (Refer to Paragraph 1-1-3)
2. Unscrew the five mounting screws (1) on the rear of the chassis and remove the reel motor body.

   Note: The rotor section can be removed by pulling it straight up.

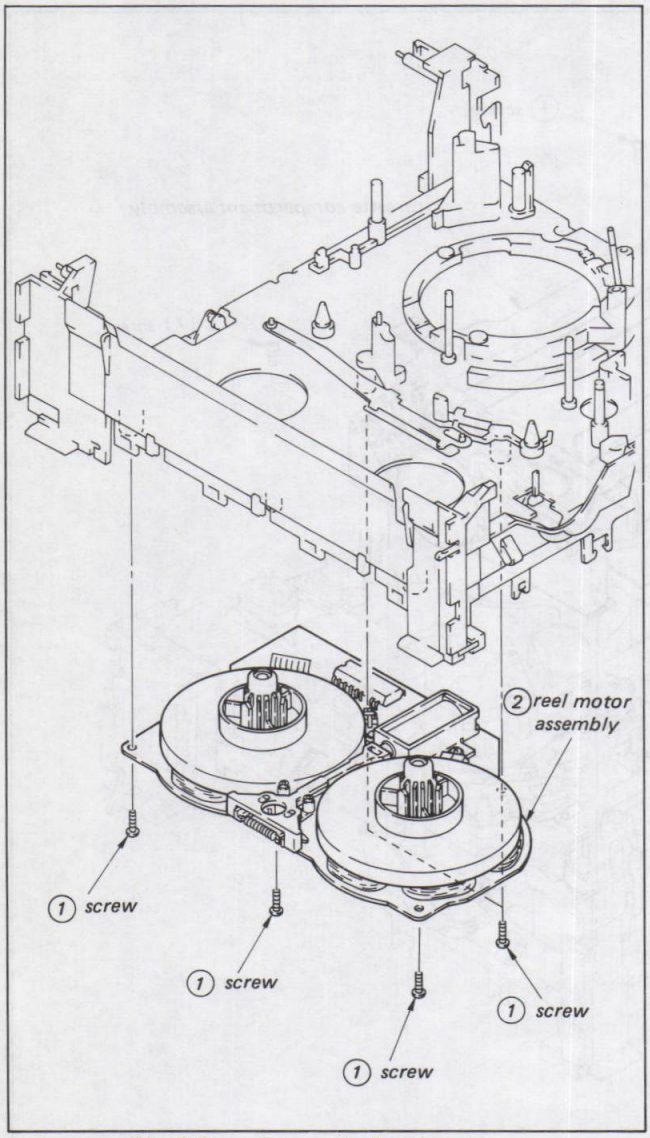


Fig. 3-9. Removal of reel motor

3-8. THREADING/UNTHREADING ADJUSTMENT

3-8-1. Checking Cassette Detection Switch Operation

1) Unthread manually without loading a cassette.
2) Check that the cassette detection switch in Fig. 3-10 does not trip (no click is generated) when pushed.
3) Press the cassette compartment lock in the diagram with blade-tip screwdriver to lock it.
4) Check that the cassette detection switch trips when pushed (click sound).
5) Push the release slide plate of the cassette compartment lock in the direction of arrow (A) and push the lock lever assembly in the same direction to return it to the previous state.

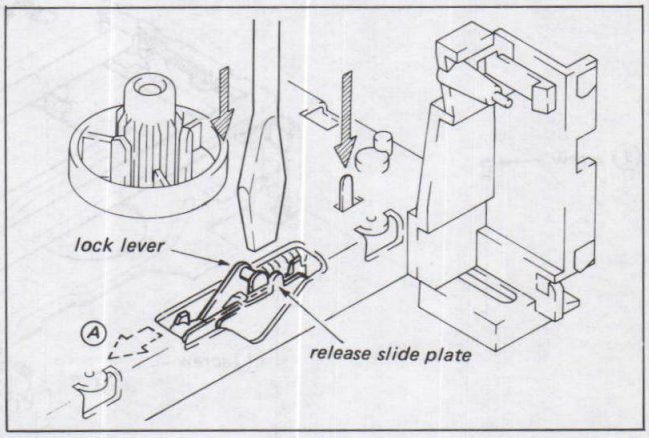


Fig. 3-10.

3-8-2. Unthreading Check

1) Set in STOP mode without loading a cassette.
2) Press the EJECT button and unthread. (Unthreading is complete when the T slider shaft returns slightly in the threading direction and stops after pushing the cassette-compartment lock release lever.)
3) Check that the actuator for the unthreading end switch is not tripped as shown in Fig. 3-11. (Slowly rotate the threading motor by hand and verify with a click sound.)
   Adjust according to Paragraph 3-13-2 if needed.

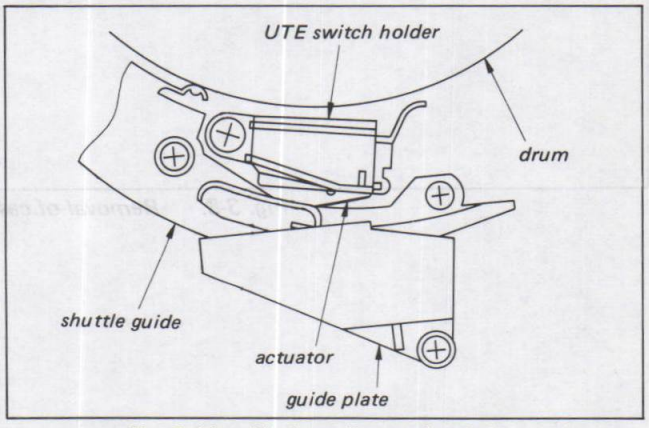


Fig. 3-11. Unthreading end switch

3-9. S-THREADING RING REPLACEMENT AND ADJUSTMENT

3-9-1. Removal of S-Threading Ring

Remove ACE head Assembly, FE Head, and Unthreading Motor (Fig. 3-12)

1) Unscrew the screw (1).

2) Remove the No. 6 guide nut (2), flange (3), spacer (4), and compression coil spring (5).

3) Remove the two guide adjusting nuts (6) and remove the ACE head assembly and FE head.

Caution: ACE assembly and FE head are connected by a lead. Be careful when removing them. The compression coil spring underneath the ACE assembly does not have to be removed. However, be careful not to lose it.

4) Unscrew the two screws (7) and pull up the threading motor assembly to remove.

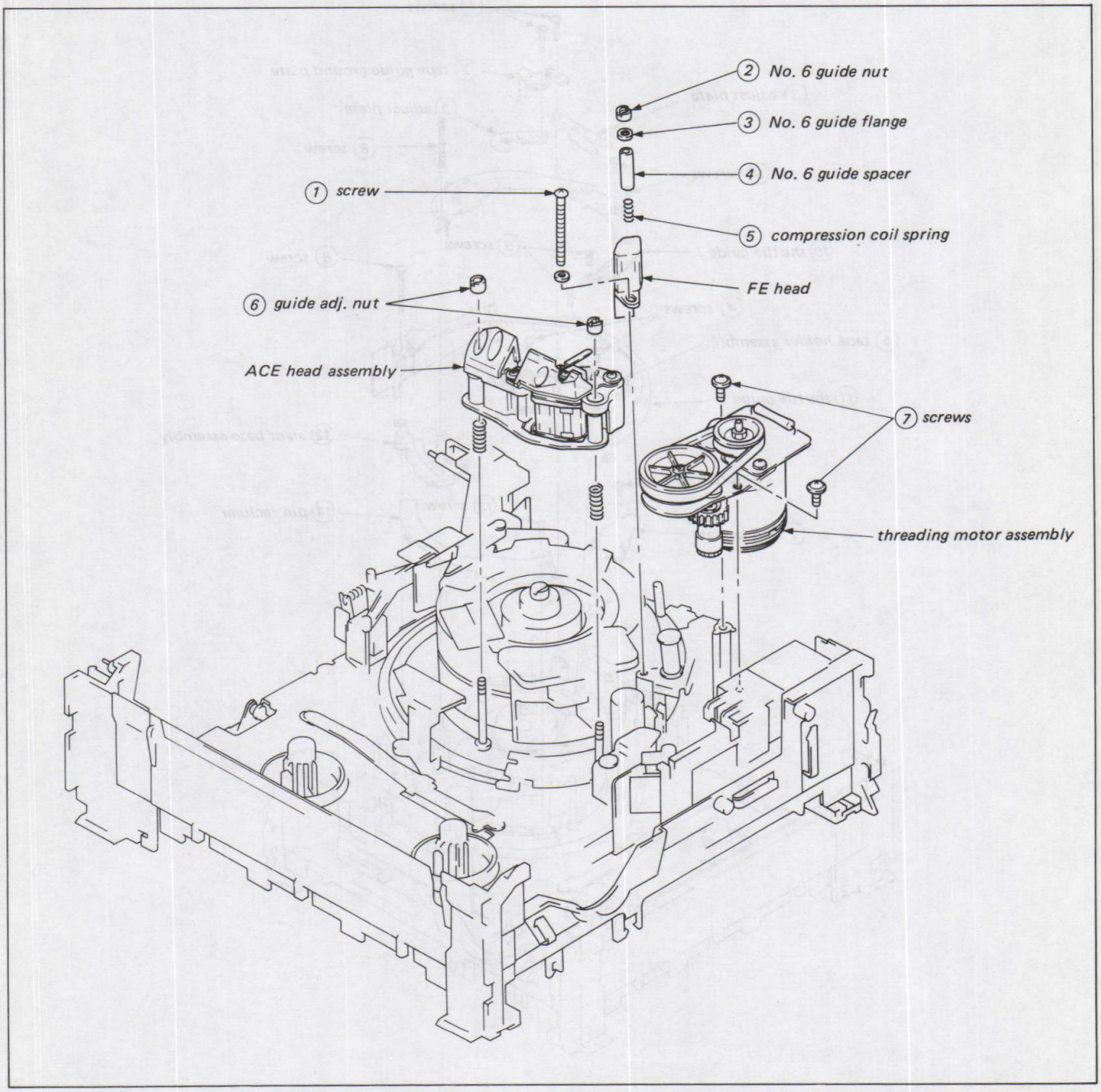


Fig. 3-12. Removal of ACE head assembly, FE head and threading motor

Removal of Other Parts (Fig. 3-13)

1) Measure the gap between the upper drum and adjust the plate as for replacement of the drum assembly. (Fig. 3-3)

2) Unscrew the screws (1) and remove the tape guide ground plate (2) and adjust plate (3).

3) Unscrew the two screws (4) and remove the holder assembly (5).

4) Unscrew screw (6) and remove the guide plate (7).

5) Unscrew the two screws (8) and five screws (9) to remove the shuttle guide I (10) and II (11), as well as the slant base assembly (12).

6) Unscrew screw (13) and remove the pin recliner (14).

Caution: When the guide plate is removed, do not thread or unthread with the shuttle guide mounted.

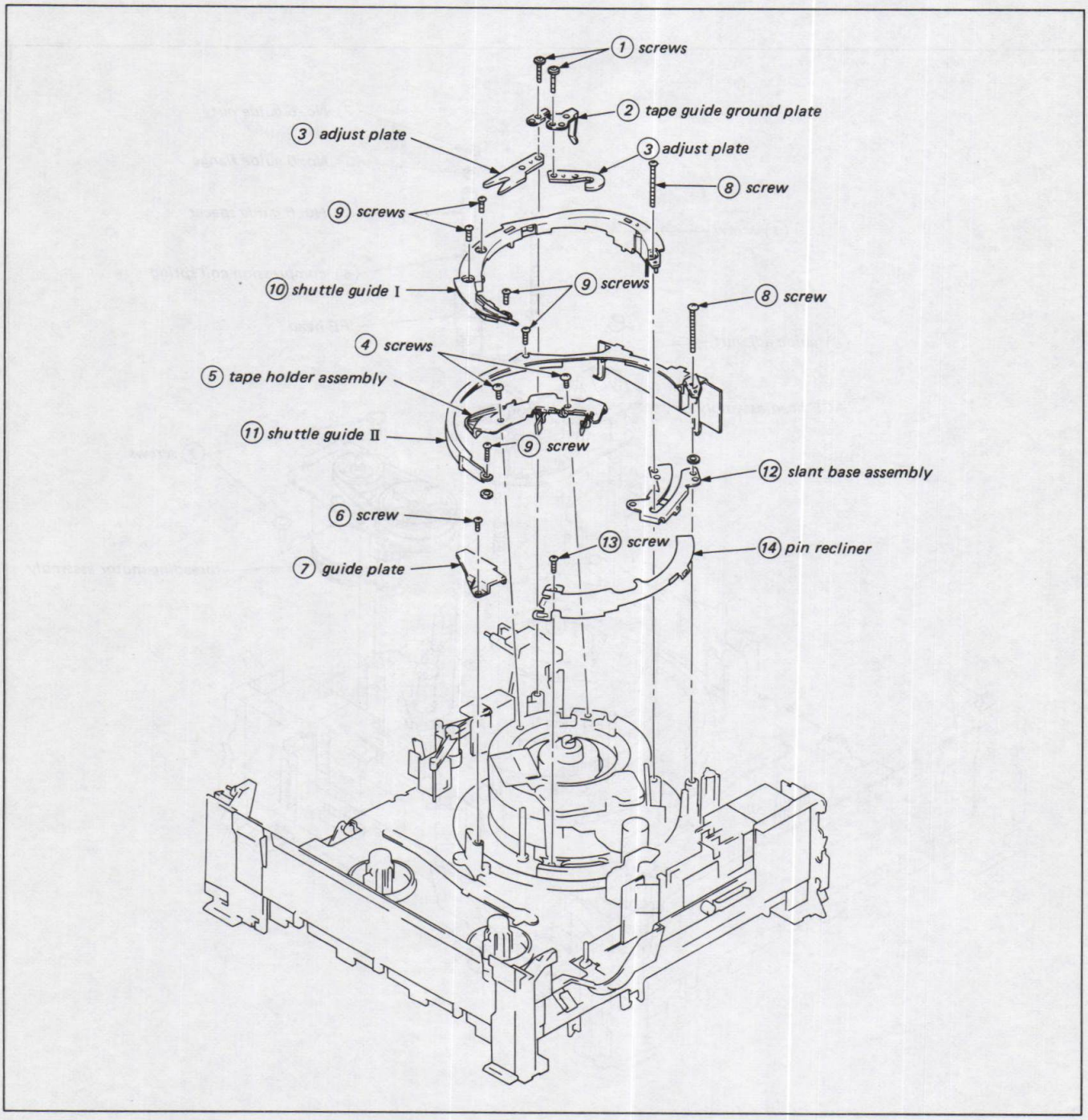


Fig. 3-13.

3-9-2. Removal of S-Threading Ring Assembly

(Fig. 3-14)

1) Make sure that the drum assembly has been removed according to Paragraph 3-3.

2) Remove the spring of the lock arm assembly. (Refer to Paragraph 3-13-1, Fig. 3-21)

3) Remove stop washer (1) and ring roller (2).

4) Remove the UTE switch subassembly. (Refer to Paragraph 3-13-2, Fig. 3-25)

5) Unscrew screw (3) and remove the ring roller adjust plate (4) and ring roller (5).

6) Remove the S-threading ring assembly (6).

Caution: Do not use the same washer twice.

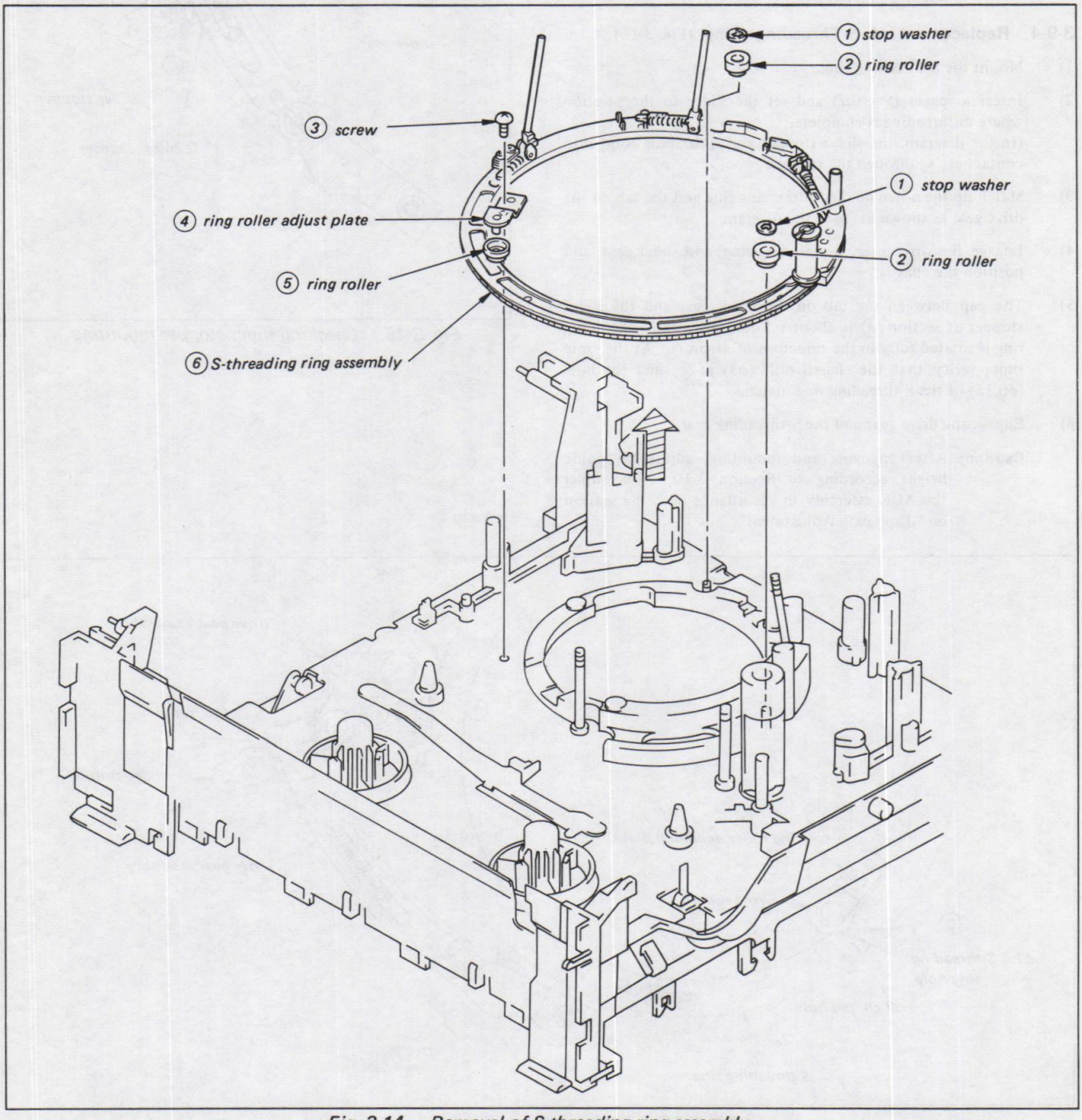


Fig. 3-14. Removal of S-threading ring assembly

3-9-3. Checking Slider Stopper Mounting (Fig. 3-15)

1) Check that the drive gear is engaged.

2) Loosen screw (1), insert a spacer (t = 0.2) between the slider gear and slider stopper, then tighten screw (1) while pushing in the directions of arrows (A) and (B).

Caution: Make sure to push it in the direction (A) to eliminate any backlash. The slider stopper rotates in the direction of arrow (A) when screw (1) is tightened. Therefore, tighten the screw while holding it with blade-tip screwdriver.

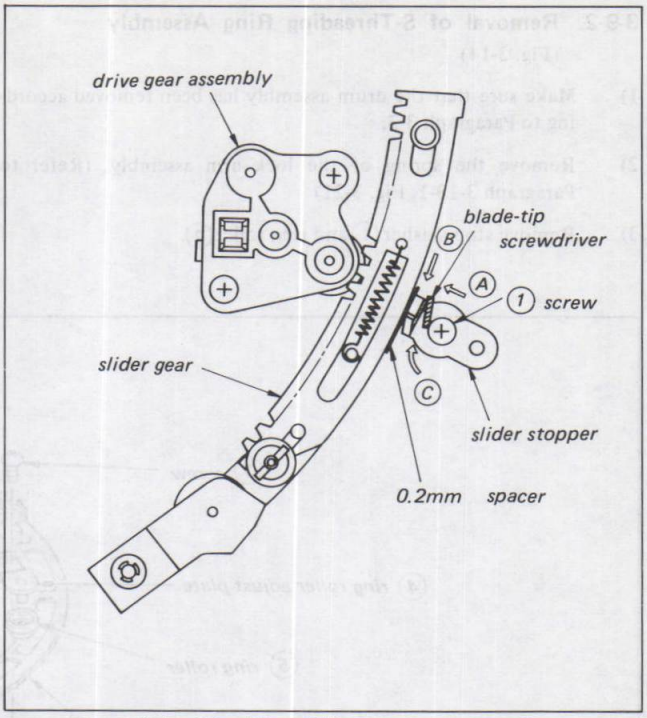


Fig. 3-15. Checking slider stopper mounting

3-9-4. Replacement of S-Threading Ring (Fig. 3-16)

1) Mount the S-threading ring.

2) Insert a spacer (t = 0.2) and set the slider to the position where unthreading is complete.
(In the diagram, the slider stopper and slider gear come into contact at (A) through the spacer.)

3) Match up the notch on the S-threading ring and the tab on the drive gear as shown at (B) in the diagram.

4) Engage the drive gear, S-threading ring, and slider gear, and position the chassis.

5) The gap between the tab on the slider gear and the slider stopper at section (A) is about 0.5 mm when the S-threading ring is rotated fully in the direction of arrow (a). At the same time, verify that the chassis hole (ϕ3) at (C) and the hole (ϕ0.15) of the S-threading ring match.

6) Engage the drive gear and the S-threading gear.

Caution: After changing and mounting, adjust the guide height according to Section 3-10. Also adjust the ACE assembly in accordance with the section on "Tape Path Adjustment".

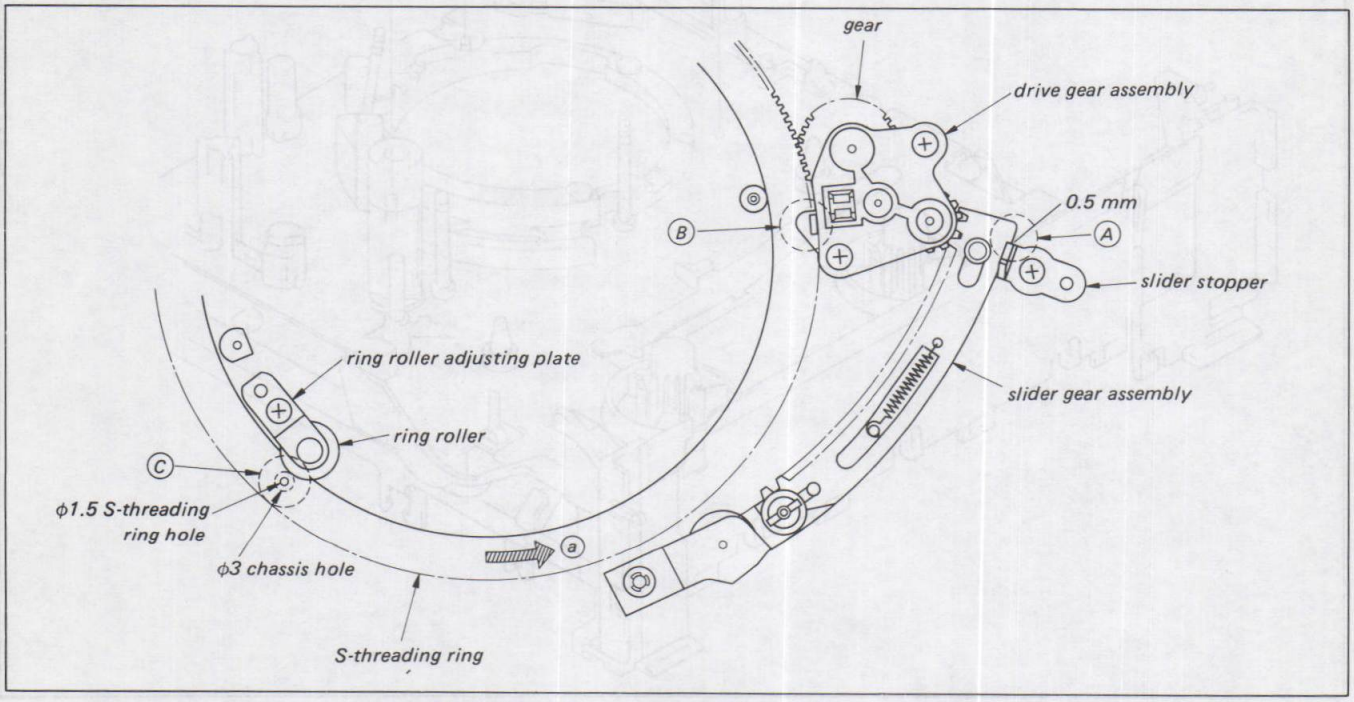
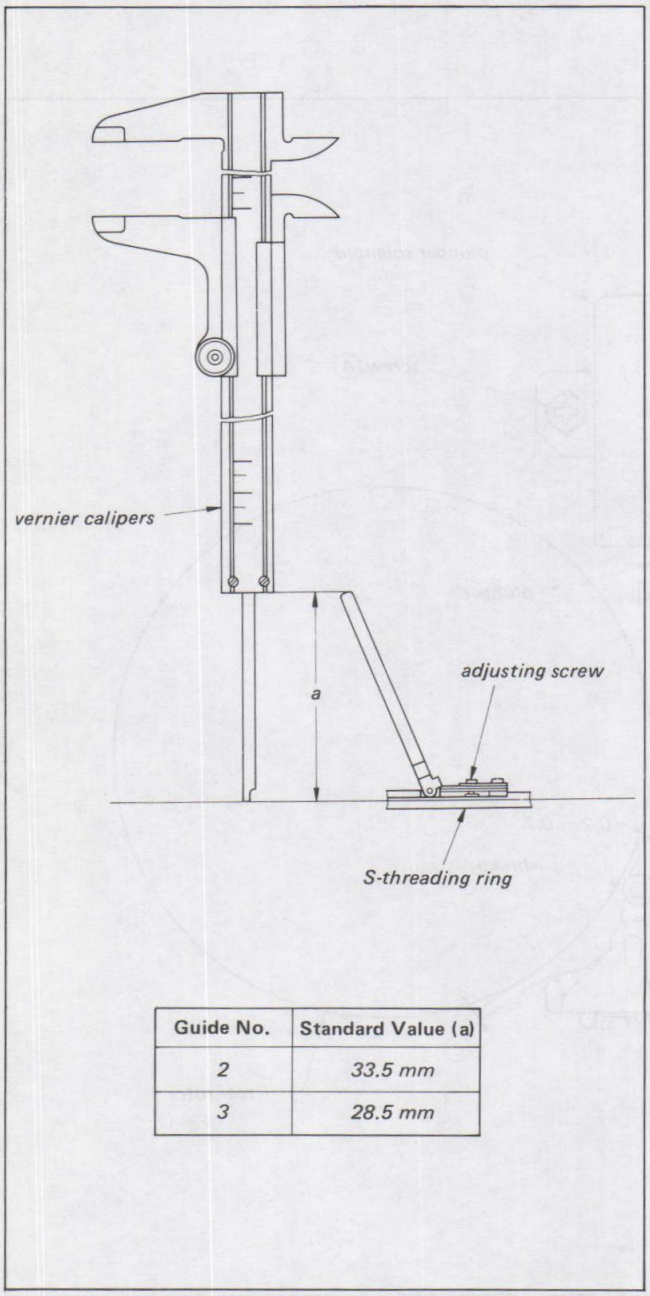


Fig. 3-16. Replacement of S-threading ring

3-10. ADJUSTMENT OF NO. 2 AND 3 GUIDE HEIGHTS (Fig. 3-17)

1. Rotate the threading motor by hand until the No. 2 guide comes up completely.
2. Adjust the height between the upper face of the S-threading ring and guide tip as shown in the diagram, so as to attain the values indicated in the table when the guide is pushed down by hand and comes up again. Adjust with the height adjusting screw.
3. Adjust the No. 3 guide in the same manner.



Guide No.	Standard Value (a)
2	33.5 mm
3	28.5 mm

Fig. 3-17. Height adjustment, Nos. 2 and 3 guides

3-11. CHECKING AND ADJUSTMENT OF PINCH CLOSING LIMITER CLEARANCE (CHECKING PROCEDURE)

1. Set in the STOP mode without loading a cassette.
2. Check that the clearance 't' of the pinch closing limiter (Fig. 3-18) is 0.2 to 0.7 mm. If it is not, adjust as follows:

[Adjustment Procedure]

1) Loosen screw (A) in Fig. 3-18 with the pinch solenoid held in.
2) Move the pinch limiter adjust plate (shaded in the diagram) fully in the direction of arrow (a). The clearance 't' in this state is 0.
3) Push the pinch limiter adjust plate in the direction of arrow (b) as shown at section (B) using a blade-tip screwdriver, until the clearance 't' is 0.2 to 0.7 mm.
4) Tighten screw (A) and lock it.

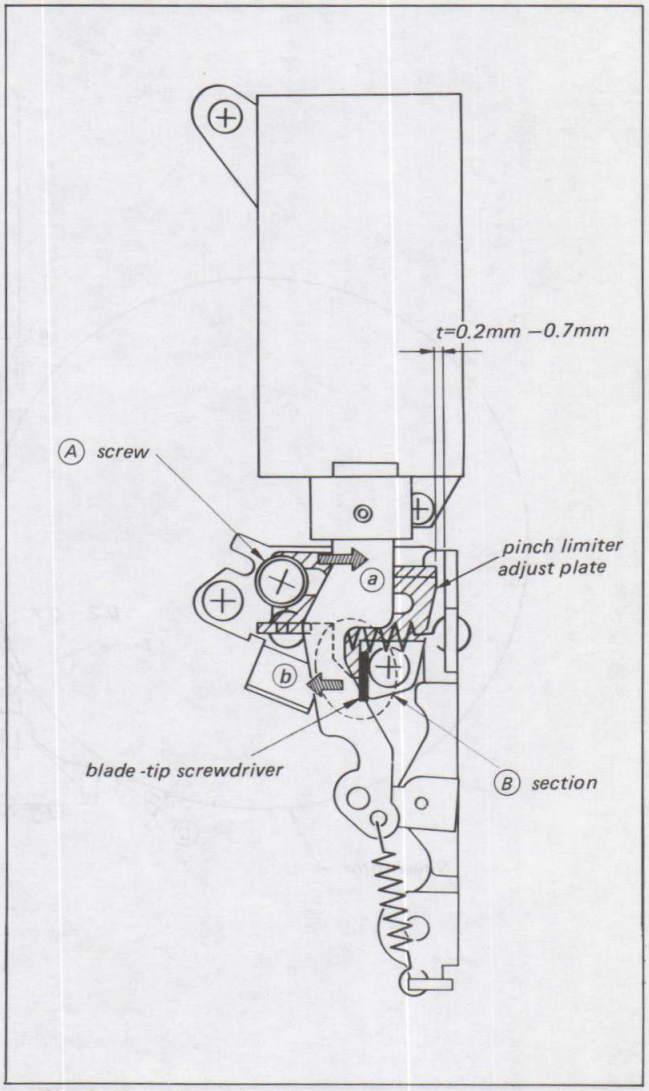


Fig. 3-18 Adjusting clearance of pinch crimp limiter

3-12. BRAKE OPERATION CHECK AND BRAKE PLUNGER ADJUSTMENT

The tape slackens particularly when the tape diameter on the take-up side in both FF and REW is small.

[Checking Procedure]

1) Start winding a cassette. (Rewind the tape and start forward feed)

2) Repeat FF→STOP several times and check that the tape does not slacken. If the tape slackens, adjust as follows.

3) Wind the tape to the end in forward feed.

4) Repeat REW→STOP several times and verify that the tape does not slacken. Adjust as follows if the tape slackens.

[Adjustment Procedure]

1) Remove the mechanism chassis from the circuit board.

2) Loosen screw (A) on the plunger solenoid (Fig. 3-19).

3) Push the plunger in the direction of arrow (B) by hand until fully retracted.

4) Adjust the plunger solenoid so as to obtain clearances of 0.2 to 0.7 mm between the two brakes and S and T reel rotors. Tighten screw (A).

Note: After tightening screw (A), check for proper clearance at (C) and (D).

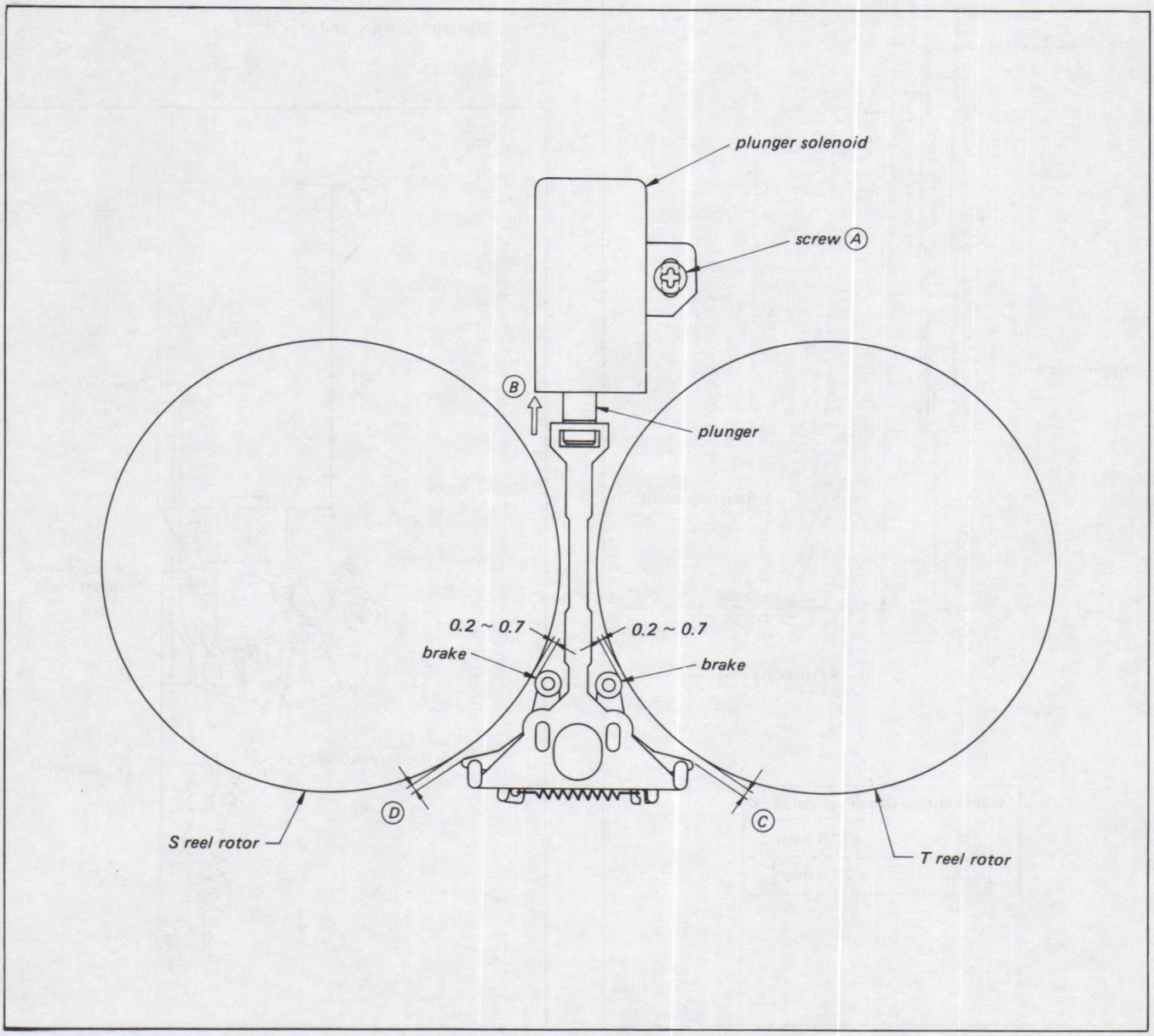


Fig. 3-19. Brake plunger adjustment

3-13. CHECKING AND ADJUSTMENT OF MICROSWITCH POSITION

3-13-1. Checking and Adjustment of Threading End Switch (TE Switch) Position

[Checking Procedure] (Fig. 3-20)

Rotate the S-threading ring by hand and check that the TE switch turns on and off with a clicking noise while the lock roller is moving within the lower 2/3 of the straight portion ℓ of the recess (Ⓐ in Fig. 3-20) on the ring

If not, adjust as follows.

[Adjustment Procedure]

1) Bring the lock roller into the lower 2/3 of the 'ℓ' range in the recess on the S-threading ring, move the TE switch in the direction of the arrow using a blade-tip screwdriver, until the switch trips (click noise), then tighten screw Ⓑ.

2) Check the results of the adjustment following the check procedure given above.

[Removal]

1) Unhook the tension coil spring from the lock arm assembly.

2) Unscrew screw ① and remove the TE switch subassembly.

3) Push the hook on the main chassis assembly in the direction of the arrow to unhook, and remove the lock arm assembly.

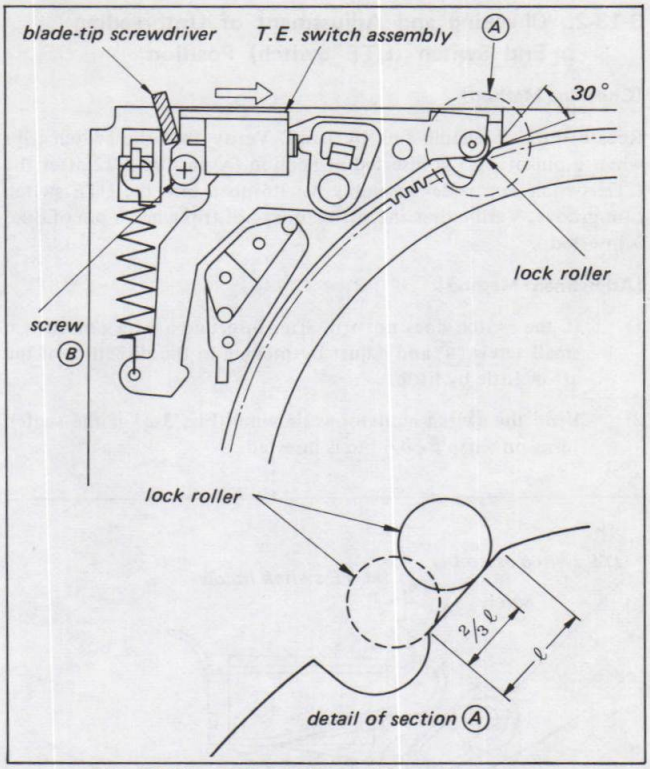


Fig. 3-20. TE switch position adjustment

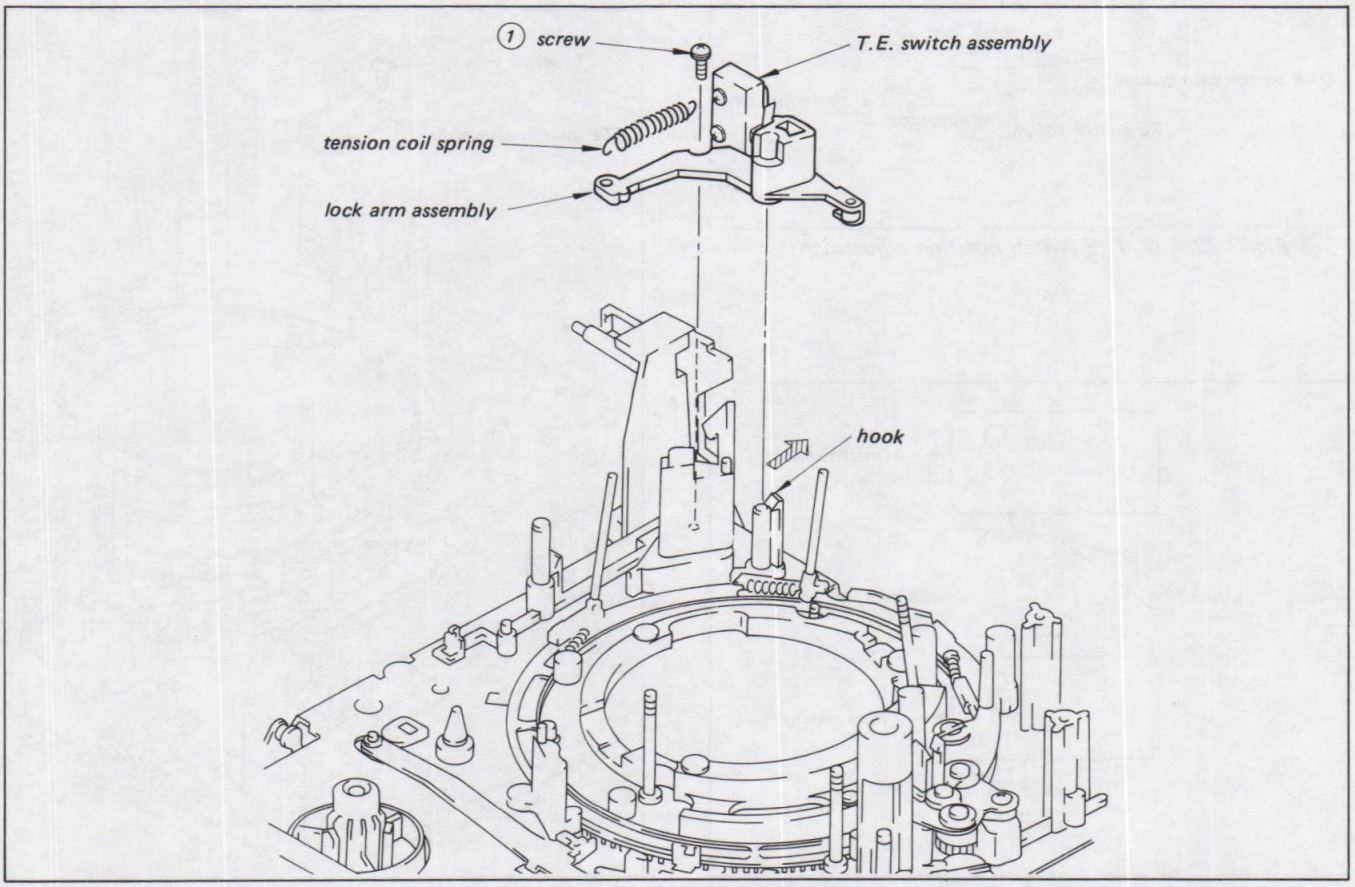


Fig. 3-21. Removal of TE switch

3-13-2. Checking and Adjustment of Unthreading End Switch (UTE Switch) Position

[Checking Method]

Rotate the S-threading ring by hand. Verify that the switch trips when a pin of ϕ1.5 is inserted at Section (A) in Fig. 3-22 after the UTE switch arm roller assembly has dropped into the UTE switch cam groove. Verify that the switch does not trip when a pin of ϕ0.6 is inserted.

[Adjustment Method]

1) If the switch does not trip after inserting a ϕ1.5 pin, loosen small screw (B) and adjust by moving in the direction of the arrow little by little.

2) Bend the switch actuator as shown in Fig. 3-23 if the switch turns on when a ϕ0.6 pin is inserted.

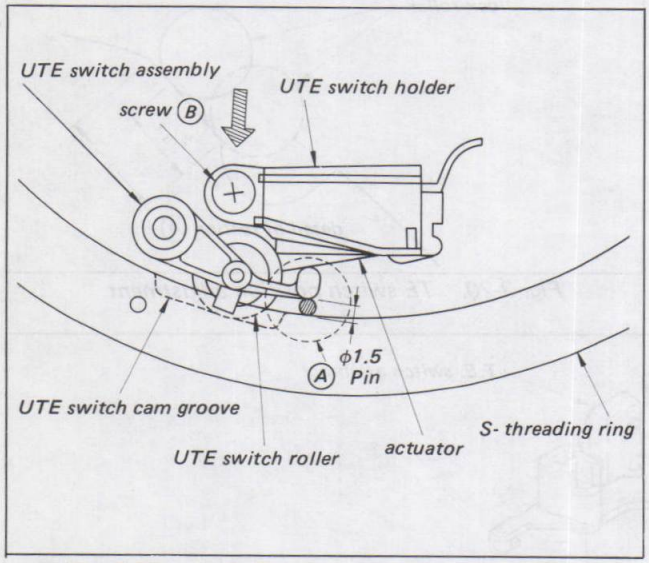


Fig. 3-22. U. T. E switch position adjustment

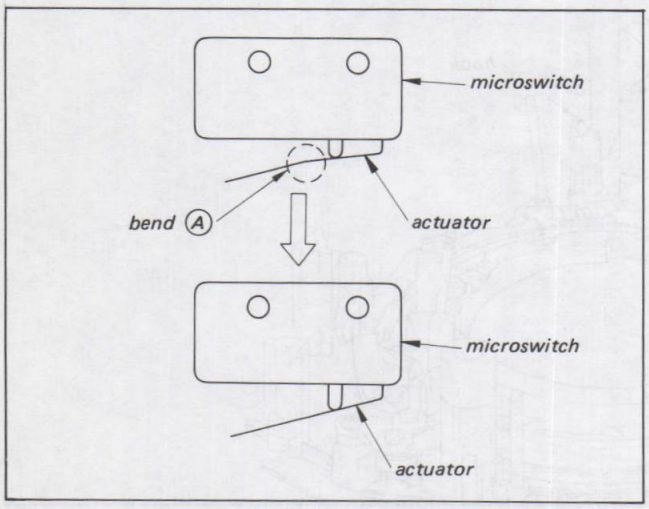


Fig. 3-23.

Caution: Insert the ϕ1.5 and 0.6 pins in the positions shown in Fig. 3-22. (If the pins are inserted too close to the UTE roller side as shown in Fig. 3-24, the clearance inside will be less than 1.5 mm, even though it is 1.5 mm at the entrance, because of the switch construction.

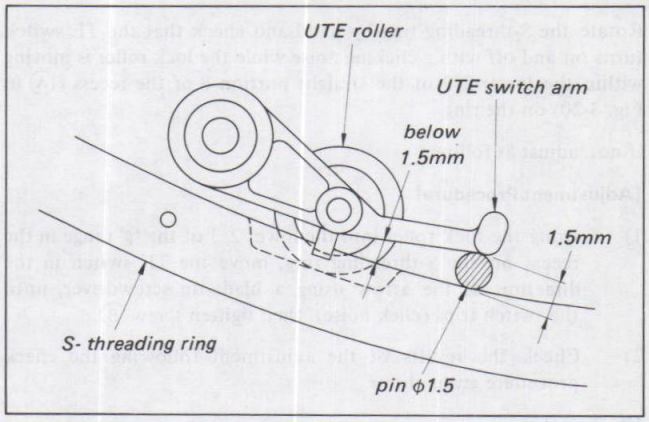


Fig. 3-24.

[Removal]

1) Unscrew screw (1) as shown in Fig. 3-25.

2) Release the switch hook from the chassis and remove the switch body while pushing the actuator to the "ON" position.

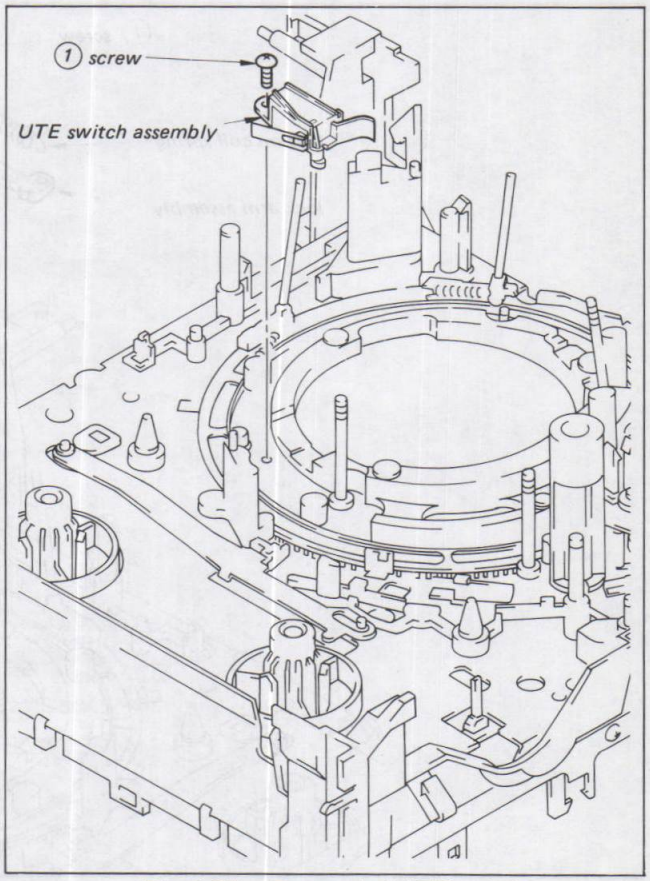


Fig. 3-25. Removal of UTE switch

3-14. FORWARD/BACK TENSION MEASUREMENT

The forward/back tension measurement for SL-F1E performed using a torque cassette (SL-0003C).

3-14-1. Measurement Procedure

1) Remove the top panel so that the tape path is visible.

2) Insert the torque cassette and put the set into replay mode.

3) Read the indicated value of the S-reel side meter after the pointer has made one revolution.

Specified Value 45 ~ 48 g·cm

Notes: i) The set must be level when the measurement is performed.

ii) After measuring, the tape may go slack if the stop button is pushed. In this case, put the set into forward mode to take up the slack before removing the tape.

3-14-2. Adjustment Procedure

If the specified value is not obtained, adjust by turning RV-202 on the MA-3 board.

SECTION 4
TAPE PATH ADJUSTMENT

4-1. TRACKING ADJUSTMENT

This adjustment has significant effect on picture quality in each mode and tape interchangeability, so please perform it very carefully.

4-1-1. Preparation

1) Remove the cassette cover of alignment tape KR5-2H as shown in Fig. 4-1.

2) Clean the tape contact surfaces (tape guides, drum, capstan spindle, pinch roller, ACE·FE head surfaces) with chamois dampened with methanol.

3) Oscilloscope connection: CN3-3 pin (SF-5 board)

4) Replay the tracking portion of the KR5-2H alignment tape:

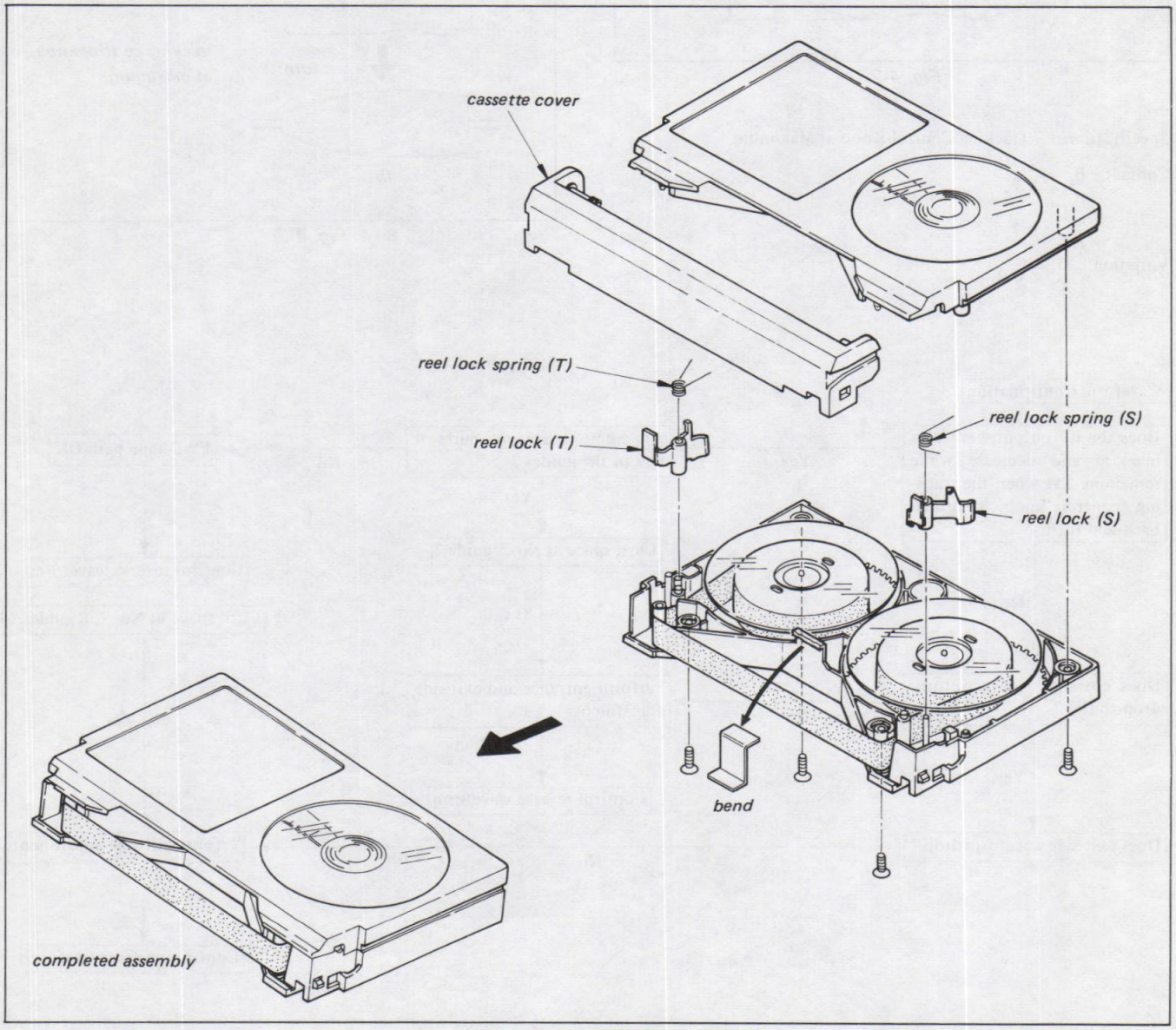


Fig. 4-1.

5) Confirm that the RF output waveform is flat, with maximum amplitude. (The waveform should increase and decrease, remaining flat, when the tracking control knob is turned back and forth.) Also, when the waveform is maximum, confirm that the RF output waveform variation and contact satisfy the specifications shown in Fig. 4-2. If they do not meet the specifications, follow the instructions in 6).

6) If the tracking control knob is turned and the entrance waveform does not flatten as shown in Fig. 4-3(a), perform the entrance side adjustment in 4-1-2. If the exit waveform does not flatten as shown in Fig. 4-3(b), perform the exit side adjustment in 4-1-3.

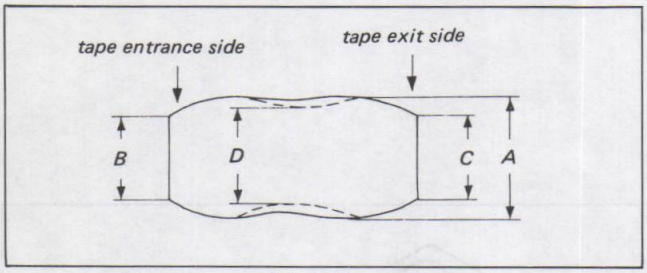


Fig. 4-2.

Specifications: Tracking Control Knob at Maximum

Contact: $\frac{B}{A} \geqq 0.7$

$\frac{C}{A} \geqq 0.7$

Variation: $\frac{D}{A} \geqq 0.9$

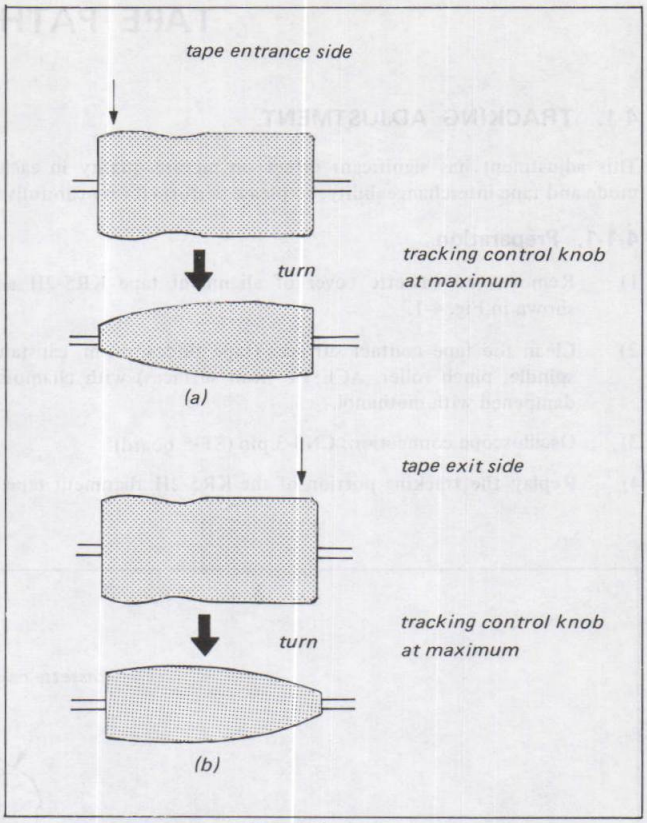
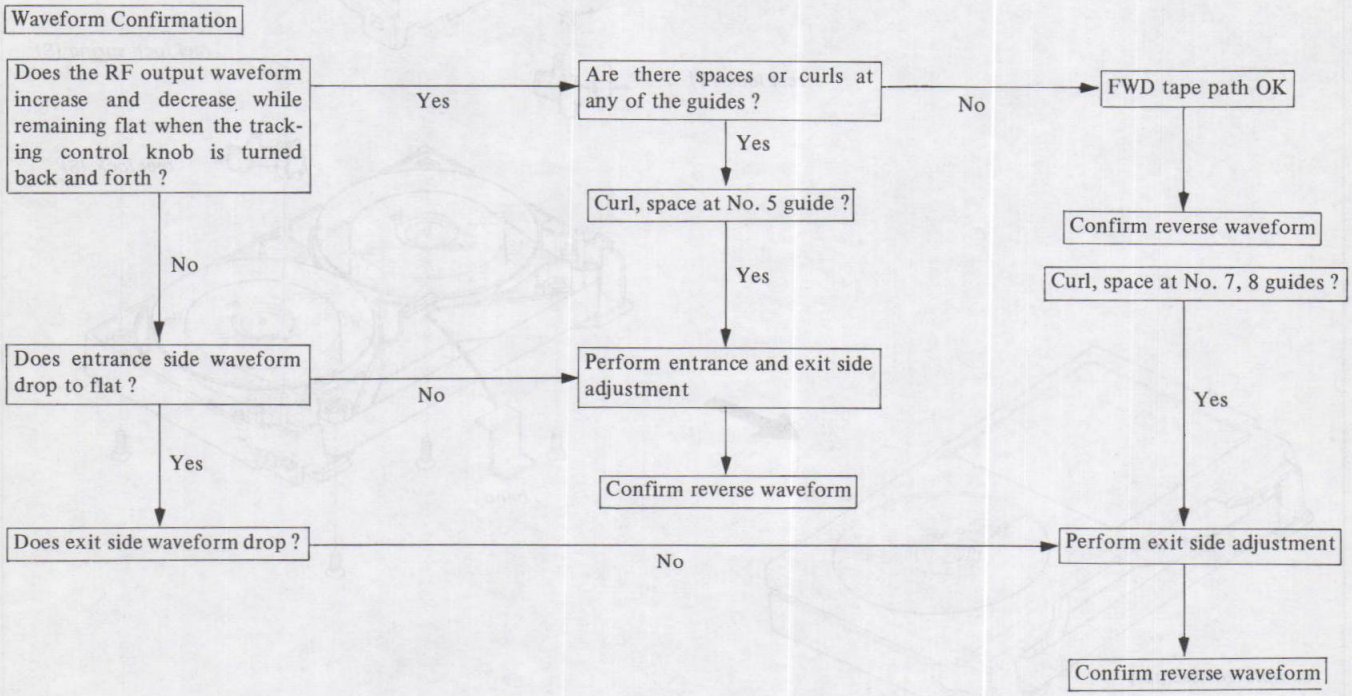


Fig. 4-3.



4-1-2. Entrance Side Adjustment

Always perform the exit side adjustment as well as the entrance side adjustment. Fig. 4-4 illustrates the guides and adjustment locations.

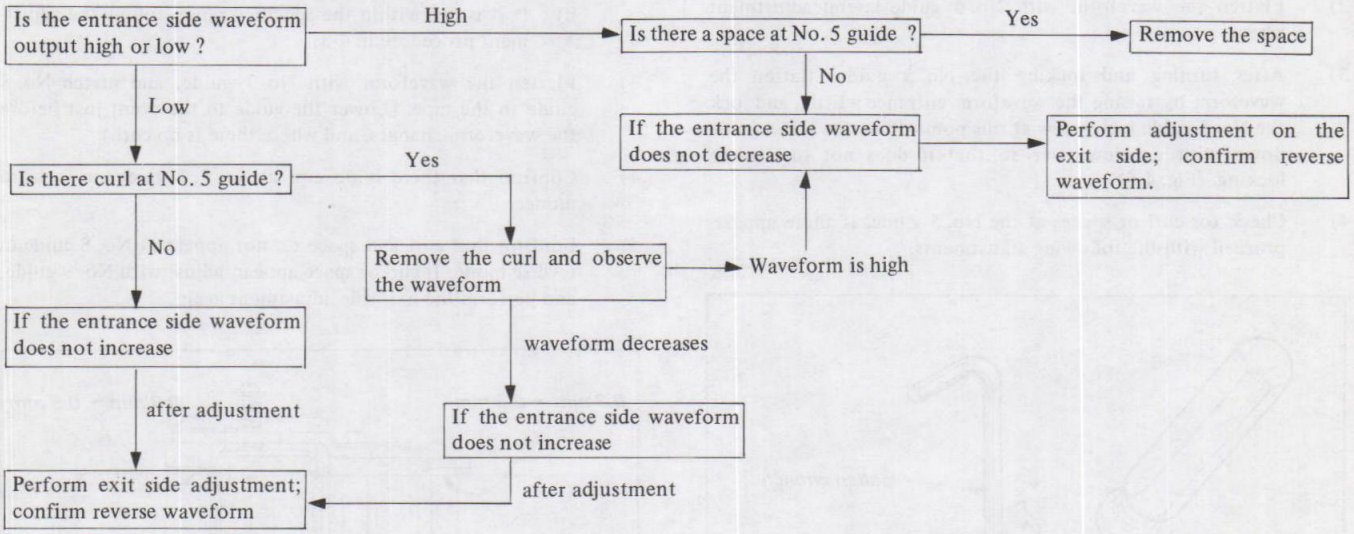
Turn the tracking control knob clockwise to lower the RF output waveform to about 60% of the maximum.

Note: Be sure to turn clockwise to lower the waveform. By doing this, the entrance side waveform will increase when the No. 5 guide is loosened, and when the No. 5 guide is lowered, the waveform will decrease.

1) First, screw the No. 4 guide down completely, then loosen the No. 6 guide to create a space and free the tape running.

2) Loosen the No. 5 guide lock screw (1), turn No. 5 guide so that there are no curls or spaces, and check the waveform. If the waveform does not flatten, perform adjustments as follows.

ENTRANCE SIDE FLOW CHART



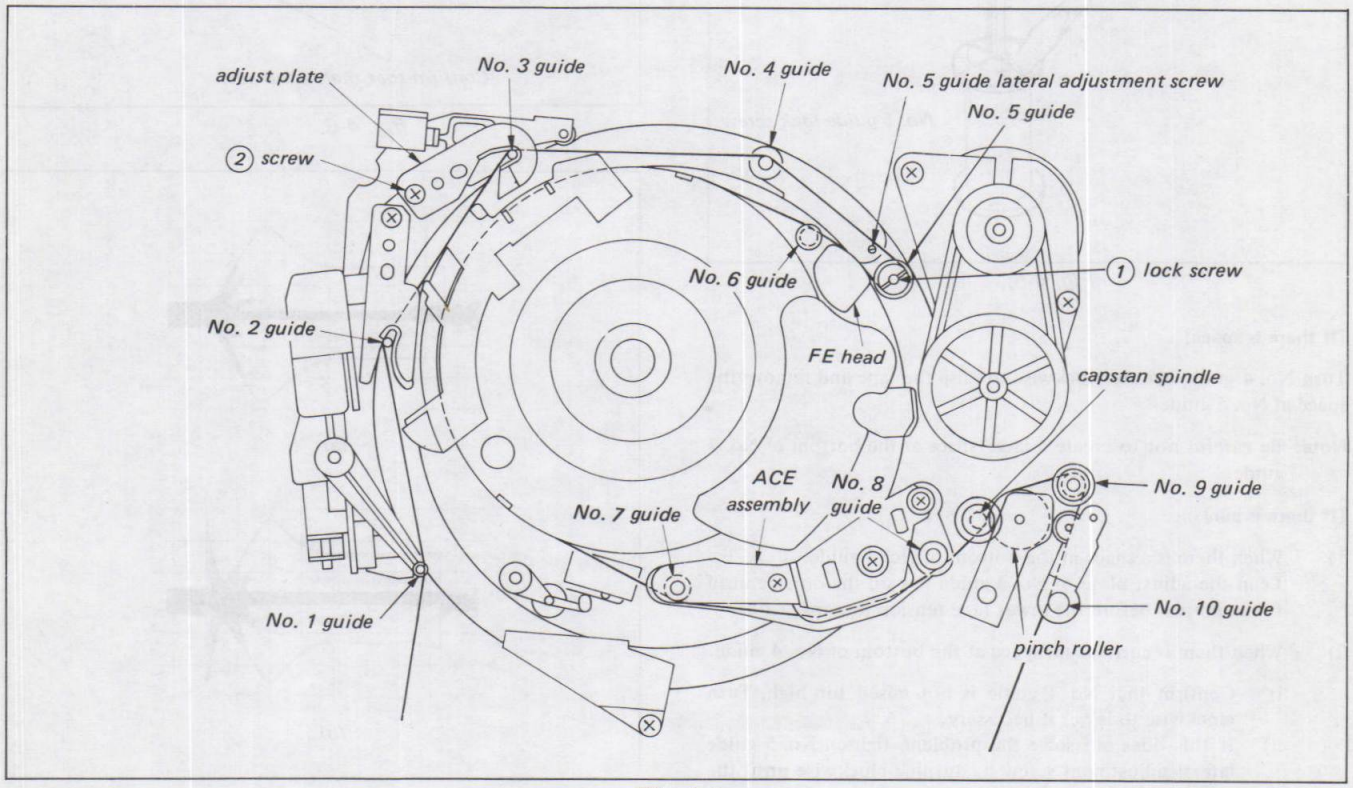


Fig. 4-4.

[If the waveform entrance output does not increase]

1) Loosen the adjust plate screw ② on No. 3 guide, and move it towards the drum. When the waveform increases, tighten screw ②.

2) Flatten the waveform with No. 5 guide.

[If the waveform entrance output does not decrease]

1) Move the No. 3 guide adjust plate away from the drum, and tighten screw ② at the point just before the lower tension of the tape loosens.

2) Flatten the waveform with No. 5 guide lateral adjustment screw.

3) After turning and locking the No. 5 guide, flatten the waveform by raising the waveform entrance a little, and lock the No. 5 guide lock screw at this point. Press the No. 5 guide down with a screwdriver so that it does not turn when locking. (Fig. 4-5)

4) Check for curl or spaces at the No. 5 guide. If these appear, proceed with the following adjustments.

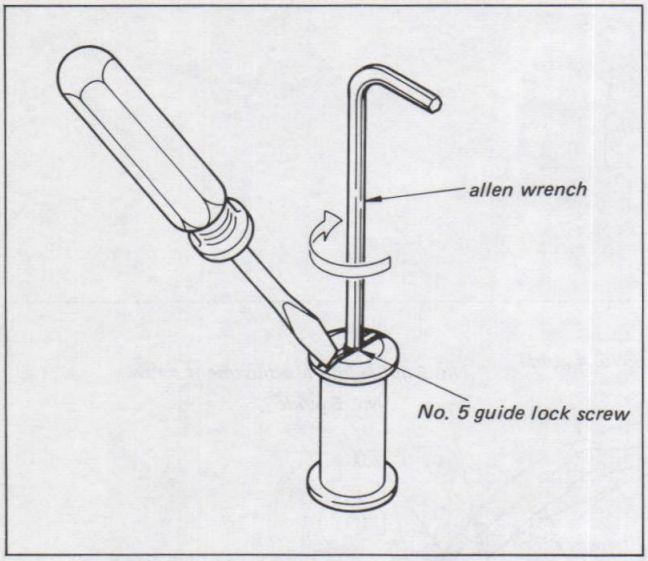


Fig. 4-5.

[If there is space]

Turn No. 4 guide counterclockwise to raise the tape and remove the space at No. 5 guide.

Note: Be careful not to create a large space at the bottom of No. 4 guide.

[If there is cur]

1) When there is a space at the bottom of No. 4 guide:
Lean the adjust plate of No. 3 guide toward the outside until the point just before the lower tape tension loosens.

2) When there is curl but no space at the bottom of No. 4 guide:

   i) Confirm that No. 4 guide is not raised too high. Turn clockwise to lower if necessary.
   ii) If this does not solve the problem, tighten No. 5 guide lateral adjustment screw by turning clockwise until the curl disappears.

4-1-3. Exit Side Adjustment

1) Turn the tracking control knob clockwise to lower the RF output waveform to about 60% of the maximum.

2) Raise No. 7, 8 guides to free the tape running, and check the waveform. (This waveform is called "exit free waveform".)

Note: Be careful not to raise the guides too much. They should be raised about 0.3 ~ 0.5 mm, and also, the tape should not touch the ACE head bottom flange. (Fig. 4-6)

   i) If the exit free waveform is within the range illustrated in Fig. 4-7(a), (b), process with exit side adjustment.
   ii) If it is not within the specified range, follow the adjustment procedure in 4-3.

3) Flatten the waveform with No. 7 guide, and match No. 8 guide to the tape. (Lower the guide to the point just before the waveform changes, and where there is no curl.)

4) Confirm that there is no curl at No. 7, 8 guides in forward mode.

5) Confirm that curl and space do not appear at No. 8 guide in reverse mode. If curl or space appear, adjust with No. 9 guide, and perform the exit side adjustment again.

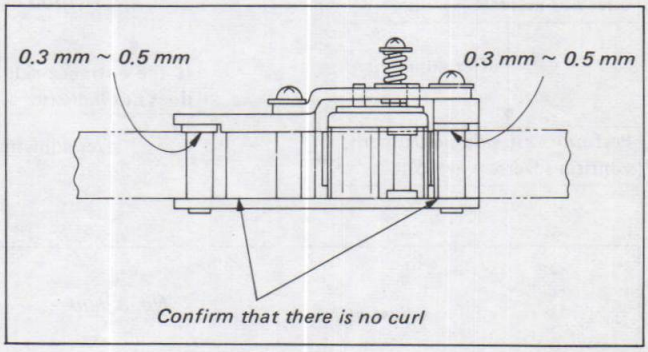


Fig. 4-6.

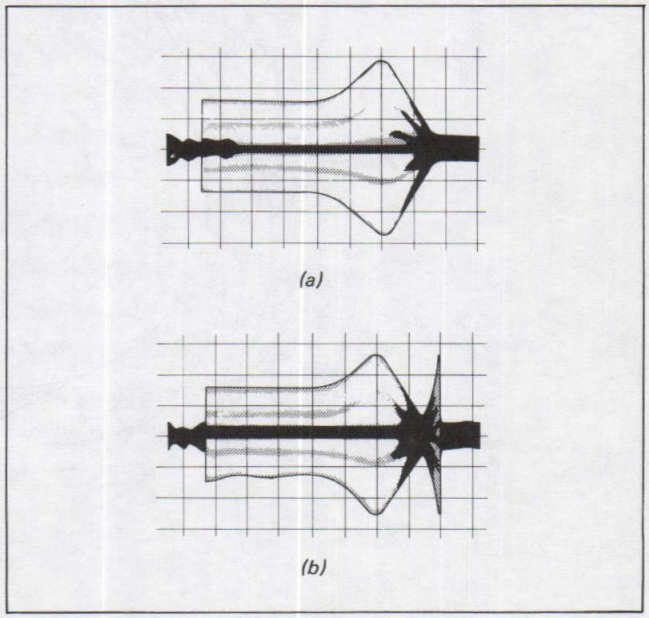


Fig. 4-7.

4-1-4. Reverse Waveform Confirmation

1) Confirm that the entrance and exit side waveforms do not bounce when the tracking control knob is turned (less than 30°) in the reverse mode. (Fig. 4-8)

2) If there is bounce in the entrance side waveform, readjust the entrance side in the forward mode, and if there is bounce in the exit side waveform, readjust the exit side.

3) Confirm the waveform in the reverse mode again.

Note: When readjusting, be sure to return the tracking control knob to the center position.

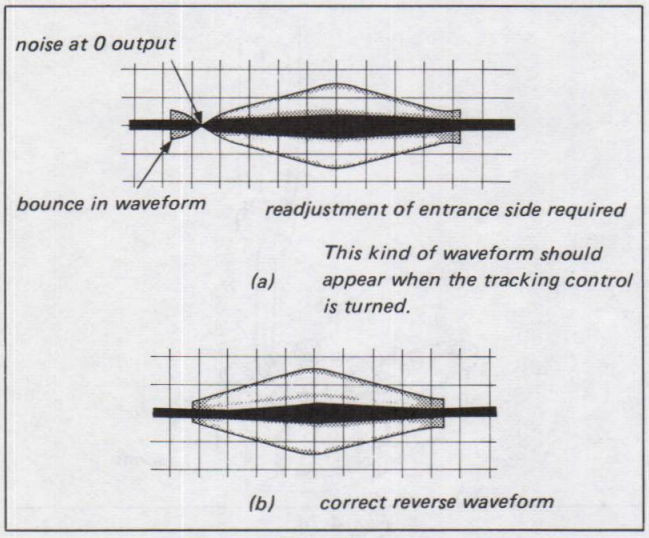


Fig. 4-8.

4-2. ADJUSTMENT FOR REMOVAL OR REPLACEMENT OF THE ACE ASSEMBLY

Perform the following adjustments when removing or replacing the ACE assembly.

4-2-1. Tracking Adjustment

1) Turn the tracking control knob clockwise to lower the RF output waveform to about 60% of the maximum.

2) Replay the tracking portion of the alignment tape (KR5-2H), raise No. 7, 8 guides about 0.3 ~ 0.5 mm, and check the exit free waveform of the RF output waveform.

Note: Be sure that the tape does not touch the bottom flange of the ACE assembly.

i) If the waveform is within the range illustrated in Fig. 4-7(a), (b), proceed with the adjustment.
ii) If the exit free waveform appears as shown in Fig. 4-10, turn the ACE lateral adjustment screw clockwise (less than 30°) until the waveform is within the range illustrated in Fig. 4-7(a), (b). (See Fig. 4-9)
iii) If the exit free waveform appears as shown in Fig. 4-11, turn the ACE lateral adjustment screw counterclockwise (less than 30°), until the waveform is within the specified range.

4) Turn the No. 7 guide to flatten the waveform, and match the No. 8 guide to the tape.
(Lower the guide until the point just before the waveform changes.)

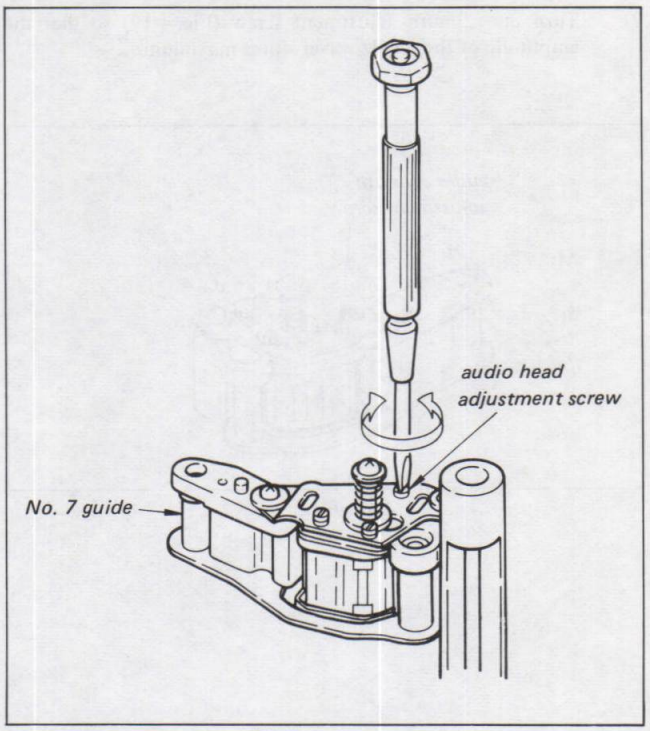


Fig. 4-9.

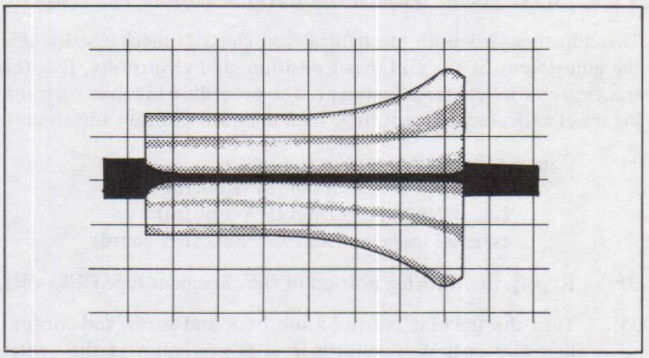


Fig. 4-10.

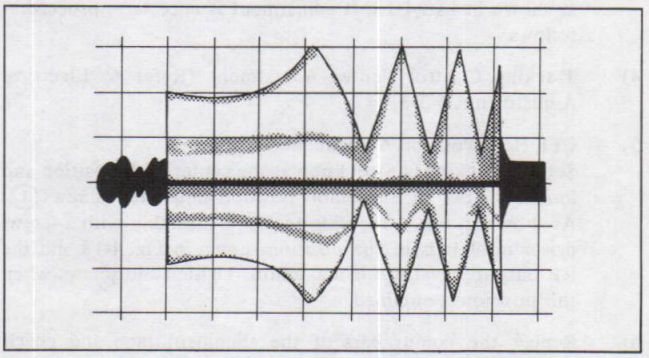


Fig. 4-11.

4-2-2. Audio Azimuth Peak Adjustment

1) Connect the oscilloscope as follows:
CN804 . . . 11 pin (MA-3 board)
Replay the 5 kHz portion of the alignment tape (KR5-2H).

2) Turn the azimuth adjustment screw (Fig. 4-12) so that the amplitude of the 5 kHz waveform is maximum.

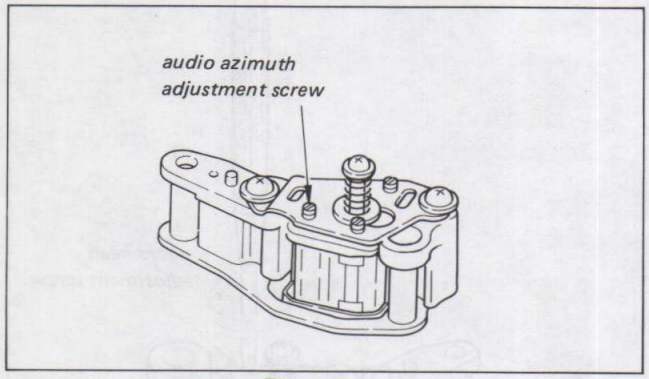


Fig. 4-12.

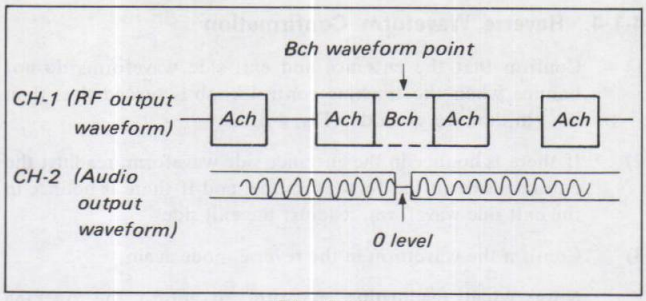


Fig. 4-13.

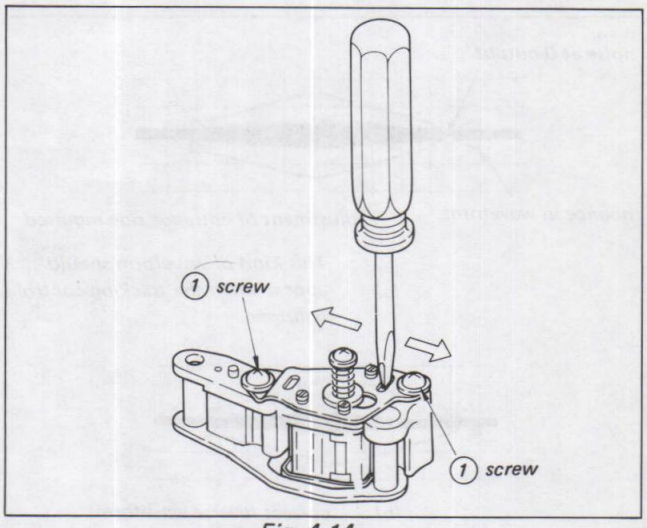


Fig. 4-14.

4-2-3. CTL Head (ACE Assembly) Position Adjustment

This adjustment is both mechanical and electric: mechanically, it is the adjustment of the CTL head position, and electrically, it is the tracking control center adjustment. The procedure involves performing the electrical adjustment first, then the head position adjustment.

1) Connect the oscilloscope as follows:
1ch: CN3 . . . 3 pin (SF-5 board)
2ch: CN804 . . . 11 pin (MA-3 board)
external trigger: CN3 . . . 5 pin (SF-5 baord)

2) Replay the tracking portion of the alignment tape (KR5-2H).

3) Turn the tracking control knob back and forth, and confirm that the output waveform level is maximum at the center click position, and that the 0 level of the audio signal is at the point where the RF output waveform Bch waveform appears, as shown in Fig. 4-13. If adjustment is necessary, proceed as follows.

4) Tracking Control Center Adjustment (Refer to Electrical Adjustments, 5-3-3, 4)

5) CTL Head Position Adjustment
Set the tracking control knob at the center click position and loosen the two ACE assembly position adjustment screws ①. As shown in Fig. 4-14, slide the ACE assembly with a screwdriver until it is in the position shown in Fig. 4-13 and the RF output waveform is maximum. Tighten the screws when this position is obtained.

6) Replay the colour bars of the alignment tape and check the picture quality.

4-2-4. Audio Head (ACE Assembly) Height Adjustment

Perform this adjustment only after completing the exit side tracking adjustment.

1) Oscilloscope connection: 1ch: CN804 . . . 11 pin (MA-3 board)
Replay the 5 kHz portion of the alignment tape (KR5-2H).

2) Turn the audio head height adjustment screw ① and the lateral adjustment screw ② (Fig. 4-15) until the aduio output waveform amplitude is maximum.

Note: Both of these adjustment screws should be turned in the same direction at the same angle, less then 30°.

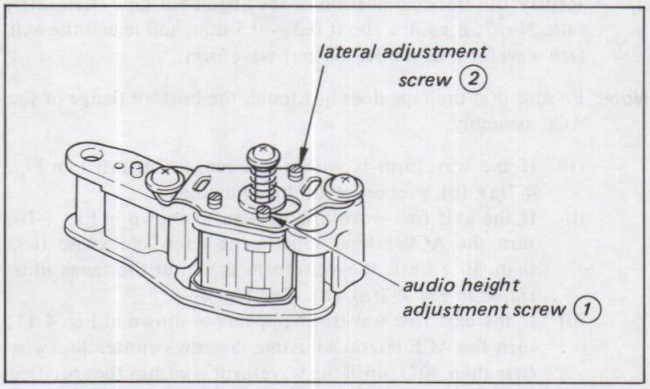


Fig. 4-15.

4-3. ADJUSTMENT FOR REMOVAL OR REPLACEMENT OF THE CAPSTAN MOTOR

1) Perform the vertical adjustment of the capstan spindle according to 3-4, Replacement and Adjustment of Capstan Motor.

2) Replay the tracking portion of the alignment tape (KR5-2H). Connect the oscilloscope as follows:
   1ch: CN3 . . . 3 pin (SF-5 board)

3) Turn the tracking control knob clockwise to lower the RF output waveform to about 60% of the maximum.

4) Raise No. 7, 8 guides a little, and check the exit free waveform.

   i) If the exit free waveform is within the range indicated in Fig. 4-16(a), (b), proceed from step 5).
   ii) If the peak of the exit free waveform is smaller than that illustrated in Fig. 4-16(a) (e.g.: Fig. 4-17), loosen the capstan lock screw, then turn the adjustment screw counterclockwise (less then 60°) until the waveform is within the specifed range.
   iii) If the peak shape of the exit free waveform differs from that shown in Fig. 4-16(b) (e.g.: Fig. 4-18), loosen the lock screw, then turn the capstan adjustment screw clockwise (less than 60°) until the waveform is within the specified range.

   Note: After turning the capstan adjustment screw, wait until the waveform stabilizes (about 10–15 seconds) before continuing with the adjustment.

5) Lock the capstan lock screw. (Turn clockwise until it stops, then turn a little more.)

6) Flatten the waveform with No. 7 guide, and match No. 8 guide to the tape.

7) Confirm and adjust according to 4-1-3, exit side adjustment procedure, items 4), 5).

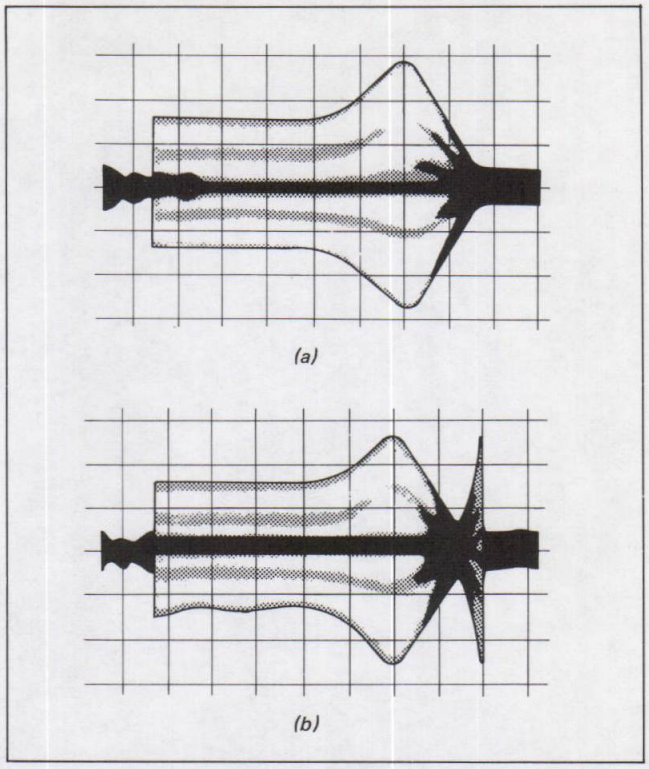


Fig. 4-16.

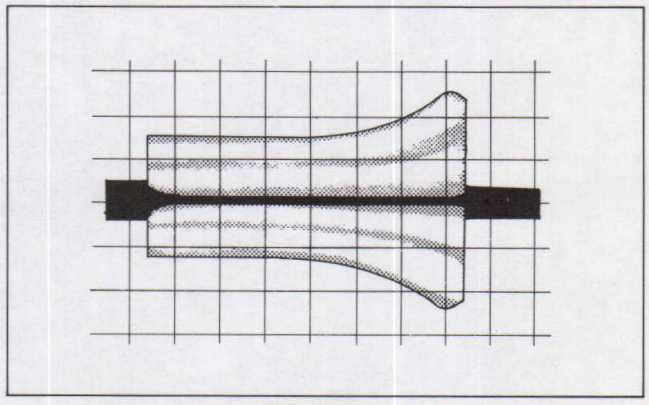


Fig. 4-17.

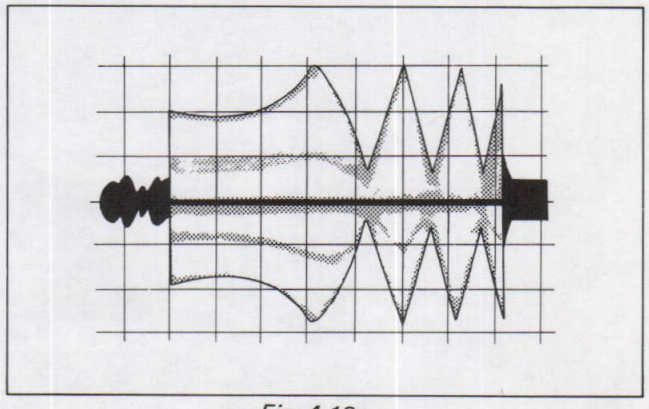


Fig. 4-18.

SECTION 5
ELECTRICAL ALIGNMENT

All the electrical alignment can be performed by using the equipment mentioned below, the alignment tape, and the PAL colour bar signal (100%).

[Equipment Required]

(1) Colour monitor TV

(2) Oscilloscope, Dual-trace, Bandwidth . . more than 10 MHz with delay mode

(3) Frequency Counter

(4) PAL Colour-Bar Generator

(5) Digital voltmeter

(6) VOM (20 kΩ/V)

(7) Audio Signal Generator

(8) Attenuator

(9) Alignment Tape, type: KR5-2H, Code No. 8-969-995-52

(10) Alignment Tool (Adjusting screwdriver for semi-fixed resistors and coils)
Code No. 7-700-733-01

[Setup for Alignment]

In this alignment, video signals obtained from the pattern generator or the timer tuner unit will be used as alignment signals. Therefore, the video output signals should be within the specifications. Verify video signals by connecting an oscilloscope to pin 1 of CN804 NOTE i on the MA-3 board, or to pin (23) of CN802 NOTE ii. Check that the video signals are flat when the amplitude of the horizontal sync signal is about 0.3V, the amplitude of the video portion is about 0.7V, and the amplitude of the burst signal is about 0.3V.
The video signal(colour-bar signal)used in this alignment is shown in Fig. 5-1.

Notes: i) When the external power supply is connected to DC IN jack.
ii) When the tuner timer unit is connected to the ACCESSORY CONNECTOR.

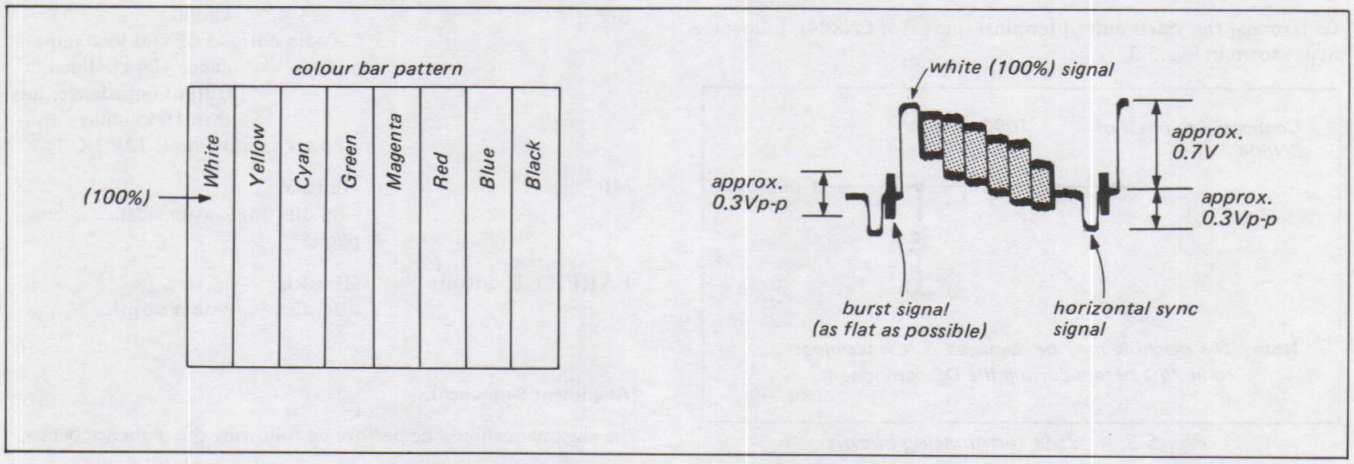


Fig. 5-1. Colour-bar signal of pattern generator

[Alignment Tape]

KR5-2H

	Video signal	Audio signal	Playing time	Use for
1.	Colour bars	3 kHz – 5 dB	5 min	General performance, tape speed checks, switching position adjustment.
2.	Monoscope	333 Hz – 25 dB	5 min	Video head dihedral, audio level adjustment.
3.	RF sweep	5 kHz – 25 dB	5 min	Video, audio frequency characteristics, audio azimuth adjustment marker: 1, 2, 3.58, 4.5, 5.2 MHz
4.	Tracking 1 MHz (CH-B) *1 (Channel B is inserted in every 3 frames.)	1 kHz – 5 dB *2 (Signal is dropped out in the positions where channel B is inserted.)	5 min	Tracking, Audio height adjustments CTL Position check (Check if *1 and *2 are the same position.)

[Colour-Bar Signal]

The 100% colour bar signal recorded on the Alignment tape is shown in Fig. 5-2.

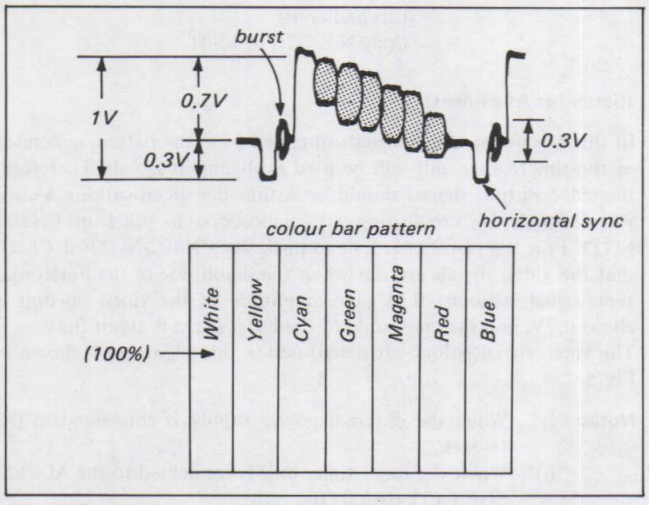
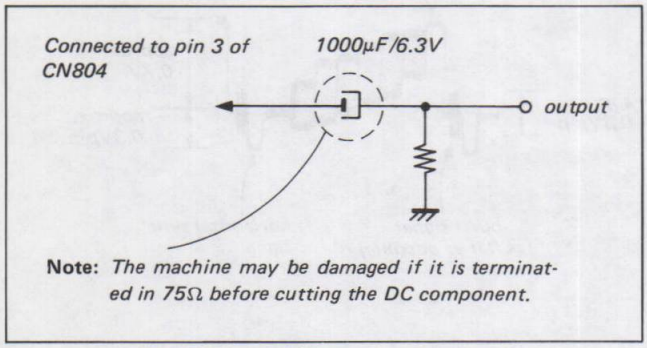


Fig. 5-2. Colour bar signal recorded on the alignment tape

[75Ω Terminating Method]

To terminal the video output terminal (pin ③ of CN804), follow the steps shown in Fig. 5-3.



Note: *The machine may be damaged if it is terminated in 75Ω before cutting the DC component.*

Fig. 5-3. 75Ω terminating circuit

[VR Alignment Tool Screwdriver]

Use the tool screwdriver supplied for alignment of semi-fixed VRs and inductances on each printed circuit board. An ordinary screwdriver is too large and is difficult to use when adjusting VRs from the print pattern side of a board. The special alignment tool screwdriver is shown in Fig. 5-4.

The metal blade of the screwdriver is used for variable resistors and trimmer capacitors.

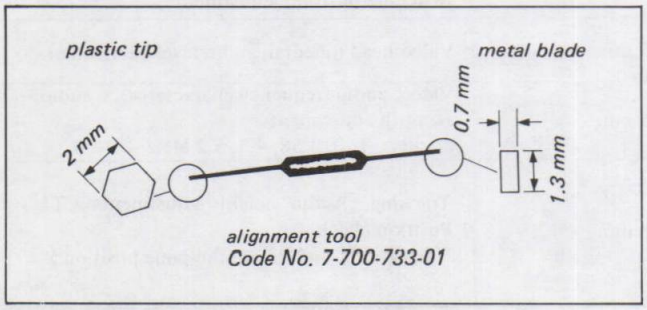


Fig. 5-4. Alignment tool screwdriver

[Required Levels and Impedances of Input and Output]

Inputs and outputs

CAMERA connector — 14-pin, Sony K-type connector
- Video in: 1 Vp-p $^{+1.0}_{-0.5}$ Vp-p, 75 ohms unbalanced, sync negative
- Video out: 1 Vp-p ± 0.1 Vp-p, 75 ohms unbalanced, sync negative
- Audio in: −20 dBs (0 dBs = 0.775 V rms)
- Audio out: −5 dBs (at load impedance 100 kilohms) Output impedacne: less than 10 kilohms
- Power supply output: 12V DC

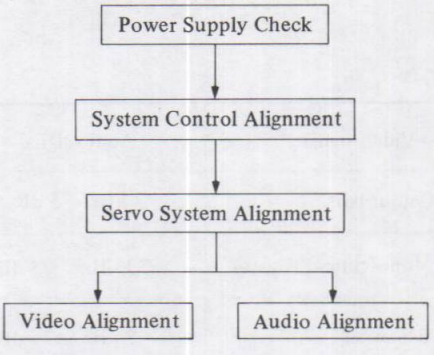
ACCESSORY connector — 26-pin connector
- Video in: 1 Vp-p $^{+1.0}_{-0.5}$ Vp-p, 75 ohms unbalanced, sync negative
- Video out: 1 Vp-p ± 0.1 Vp-p, 75 ohms unbalanced, sync negative
- Audio in: −10 dBs, Input impedance 100 kilohms
- Audio out: −5 dBs (at load impedance 100 kilohms) Output impedance: less than 10 kilohms
- Power supply input: 12V DC

MIC input — Minijack, −60 dBs, for low-impedance microphone

EARPIECE output — Minijack, −26 dBs, for 8-ohm earpiece

[Alignment Sequence]

The alignment should be performed following the sequence below.



5-1. POWER SUPPLY CHECK (MA-3 Board)

Measure in E-E mode (power supply switch ON).

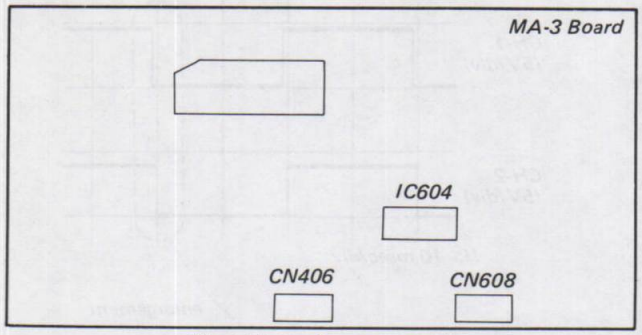


Fig. 5-1-1. Component layout

1. +12V Check
   UNREG 12V LINE shall be above 11.5V.
2. REG 9V Check
   Pin ① of CN608 shall be 9.0V ± 0.2V.
3. REG 5V Check
   Pin ⑭ of IC604 shall be 5V ± 0.3V.

5-2. SYSTEM CONTROL ALIGNMENT AND CHECK (MA-3 Board)

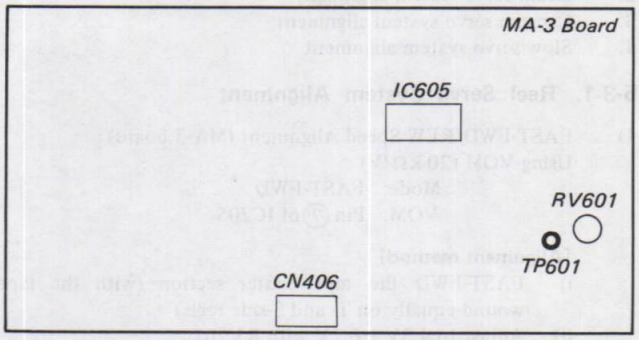


Fig. 5-2-1. Component layout

1. Battery Down (Prevention of Excess Discharge) Alignment
   Mode: E-E
   Digital voltmeter: UNREG 12V LINE
   (1) Decrease the external power supply voltage and set at 10.8V.
   (2) Connect VOM to TP601 (Pin ⑬ of IC608)
   (3) Turn RV601 fully clockwise (↻) as seen from the pattern side.
   (4) Turn RV601 counterclockwise (↺) and set so that VOM changes from "H . . . . . about 5V" to "L . . . . . about 0V."

   Note: VTR power supply is automatically cut off when the "L" state continues for more than about 30 seconds.

   (5) Return the external power supply voltage to 12V and again slowly decrease. Check that TP601 changes from "H" → "L" when the voltage reaches 10.8V (pin ① of CN406).
2. Clock Frequency Check
   Mode: E-E
   Signal: None
   Frequency counter: Pin ④ of IC605
   Check: Within 3.9 MHz ± 0.1 MHz

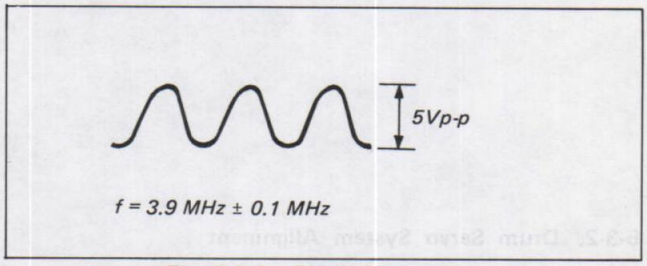


Fig. 5-2-2. Clock frequency

5-3. SERVO SYSTEM ALIGNMENT

Alignment Sequence

1. Reel servo system alignment
2. Drum servo system alignment
3. Capstan servo system alignment
4. Slow servo system alignment

5-3-1. Reel Servo System Alignment

1) FAST-FWD/REW Speed Alignment (MA-3 board)
Using VOM (20 kΩ/V)
Mode: FAST-FWD
VOM: Pin ⑦ of IC205

[Alignment method]

i) FAST-FWD the tape center section (with the tape wound equally on T- and S-side reels)
ii) Adjust to 4.3V ± 0.2V with RV201.
iii) Set up the REW mode at the tape center section.
iv) Check that VOM shows 4.3V ± 0.5V.

Using frequency counter:
Mode: FAST-FWD
Frequency counter: D202 anode

[Alignment method]

i) FAST-FWD the tape center section (with the tape wound equally on T- and S-side reels)
ii) Adjust to 380 Hz ± 30 Hz with RV201.
iii) Connect the frequency counter to the anode of D201.
iv) Set up the REW mode at the tape center section.
v) Check that the frequency is 380 Hz ± 50 Hz.

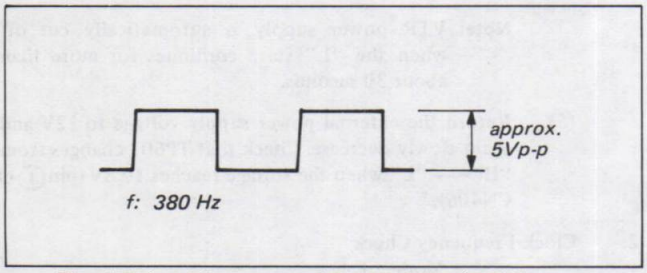


Fig. 5-3-1. Alignment of FAST-FWD/REW speed

2) FWD Back Tension Alignment (MA-3 Board)
See "Mechanical Adjustment"

5-3-2. Drum Servo System Alignment

1) Drum Free Speed Adjustment (MA-3 Board)
Mode: Playback
Signal: Alignment tape colour bar, or monoscope
Oscilloscope: CH-1 TP409 (pin ⑬ of IC401)
CH-2 TP401 (pin ㊴ of IC401)

[Alignment method]
Adjust to 553μsec ± 10μsec with RV402 (See Fig. 5-3-2)

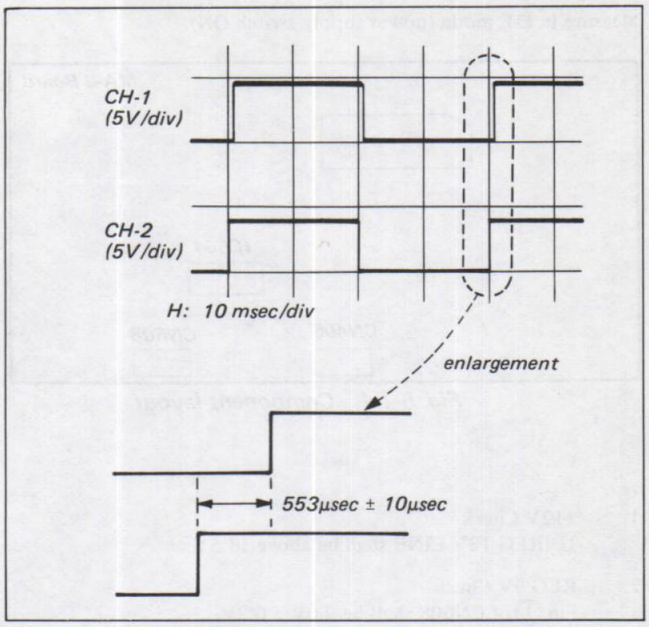


Fig. 5-3-2. Drum free speed adjustment

2) RF Switching Position Adjustment (MA-3 Board)
Mode: Playback
Signal: Alignment tape colour bar or monoscope
Oscilloscope CH-1 TP401 (pin ㊴ of IC401)
CH-2 Pin ㊵ of IC401

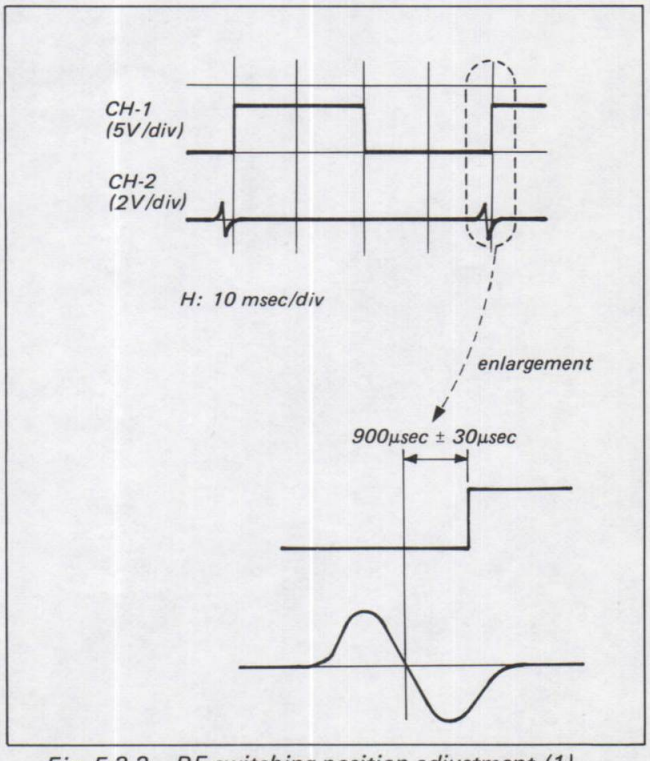


Fig. 5-3-3. RF switching position adjustment (1)

[Adjustment method]

i) Adjust to 900μsec ± 30μsec with RV401. (See Fig. 5-3-3)
ii) Change connection of CH-2 only to pin (32) of IC401.
iii) Adjust to 900μsec ± 30μsec with RV403. (See Fig. 5-3-4)

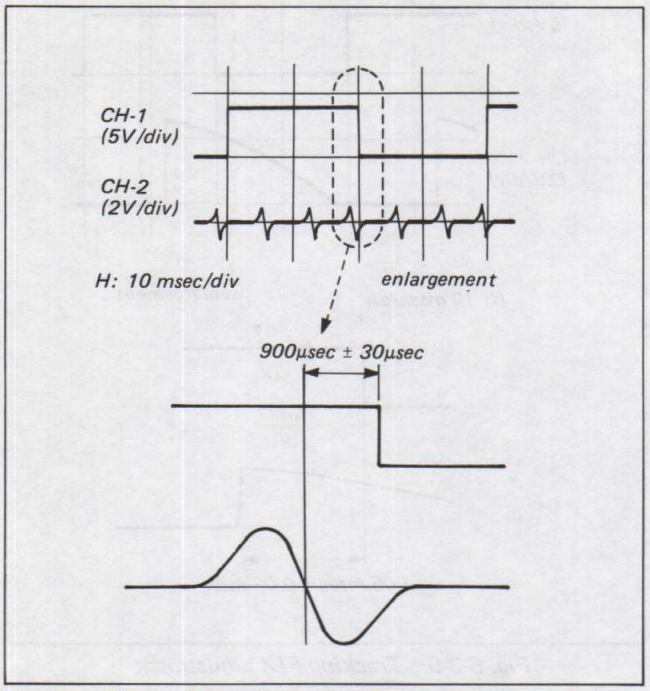


Fig. 5-3-4. RF switching position adjustment (2)

iv) Set up the pause mode and feed one frame by pressing the FORWARD ► button. Observe the amount of V-jitters. Again press the FORWARD ► button to feed one frame and compare the amount of V-jitter with the previous amount. Perform fine adjustment if they are not identical with RV403.

3) PICTURE SEARCH, Drum Free Speed Adjustment (MA-3 Board)

- Adjust both FWD/REVERSE mode.
- REVERSE is indicated by ( ).

Mode: PICTURE SEARCH (FWD/REVERSE)
Signal: Alignment tape colour bar or mono-scope
Frequency counter: Pin (4) of CN2

[Adjustment method]

Adjust to 15.625 kHz ± 0.05 kHz with RV410 (RV420) (See Fig. 5-3-5).

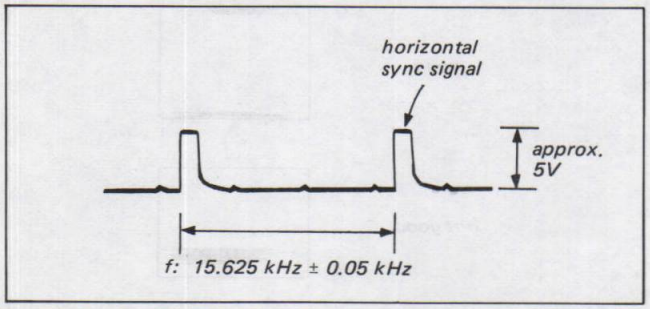


Fig. 5-3-5. PICTURE SEARCH, drum free speed adjustment

5-3-3. Capstan Servo System Alignment

1) Capstan DC Bias Adjustment (MA-3 Board)

Mode: Playback
Signal: Alignment tape colour bar or mono-scope
Oscilloscope: Pin (20) of IC401

[Adjustment method]

Adjust to the relevant duty (ratio for A and B) in the play mode with the RV as shown in Table 1.

Playback Mode	Adjustment RV	Duty
PB	RV407	50%
DOUBLE SPEED	RV405	50%

Table 1.

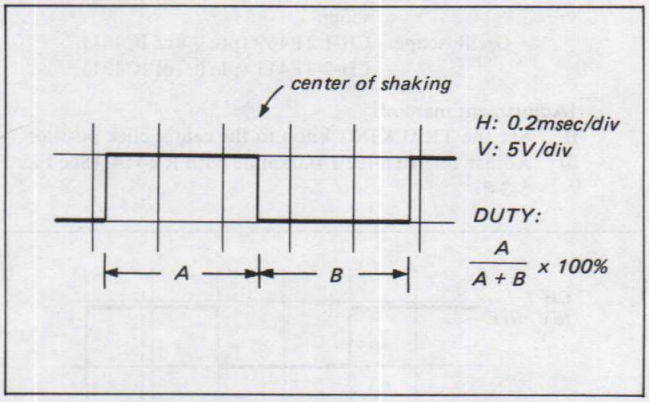


Fig. 5-3-6. Capstan DC bias adjustment

2) PICTURE SEARCH, Capstan DC Bias Adjustment (MA-3 Board)

Mode: PICTURE SEARCH (FWD)
Signal: Alignment tape colour bar or mono-scope
Frequency counter: TP407 (Pin (1) of IC408)

[Adjustment method]

i) Adjust to 1613 Hz ± 5 Hz with RV409. (See Fig. 5-3-7)

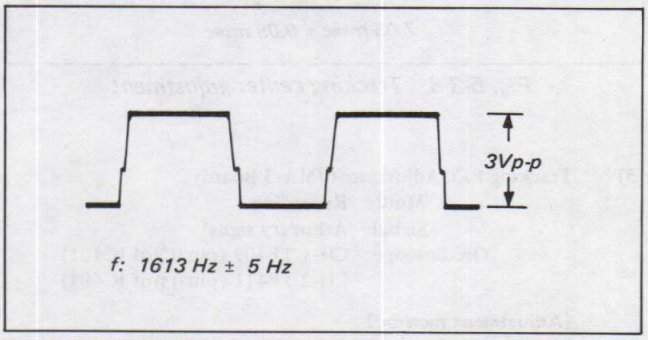


Fig. 5-3-7. PICTURE SEARCH, capstan DC bias adjustment

3) FG Amp DC Bias Adjustment (MA-3 Board)

Mode: Playback + x2 (Double speed)
Signal: Alignment tape colour bar or monoscope

[Adjustment method]

i) Denote the voltage at TP405 (pin ⑪ of IC408) by V1.
ii) With TP403 and TP415 shorted, V2 denotes the voltage at TP405.
iii) Adjust RV417 to attain a voltage level of V1 = V2.
iv) V3 denotes the voltage at TP402 (pin ⑦ of IC408).
v) With TP403 and TP415 disconnected, V4 denotes the voltage at TP402.
vi) Adjust RV416 to attain a voltage level of V3 = V4.

4) Tracking Center Adjustment (MA-3 Board)

Mode: Playback
Signal: Alignment tape colour bar, or monoscope
Oscilloscope: CH-1 TP409 (pin ⑬ of IC401)
CH-2 TP411 (pin ⑮ of IC401)

[Adjustment method]

i) Set the TRACKING knob to the center click position.
ii) Adjust to 7.05msec ± 0.05msec with RV414. (See Fig. 5-3-8)

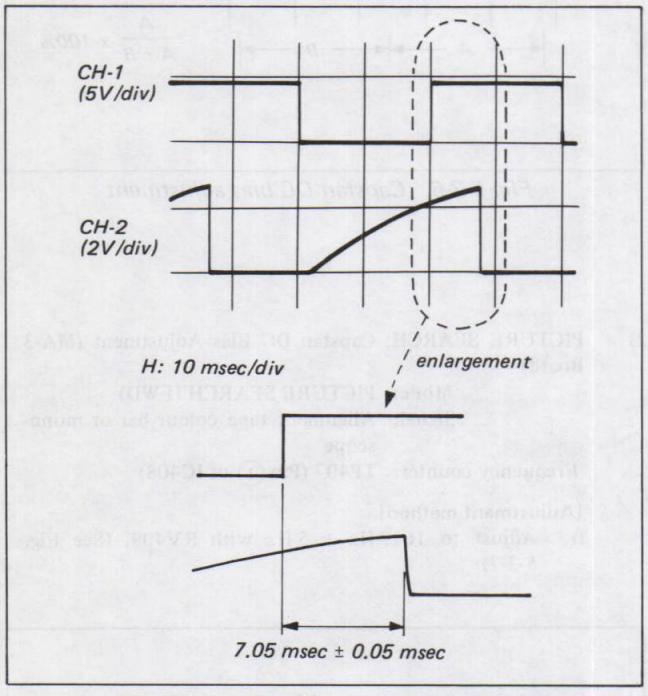


Fig. 5-3-8. Tracking center adjustment

5) Tracking FIX Adjustment (MA-3 Board)

Mode: Recording
Signal: Arbitrary signal
Oscilloscope: CH-1 TP409 (pin ⑬ of IC401)
CH-2 TP411 (pin ⑮ of IC401)

[Adjustment method]

i) Set the TRACKING knob to the center click position.
ii) Adjust to 7.05msec ± 0.05msec with RV413. (See Fig. 5-3-9)

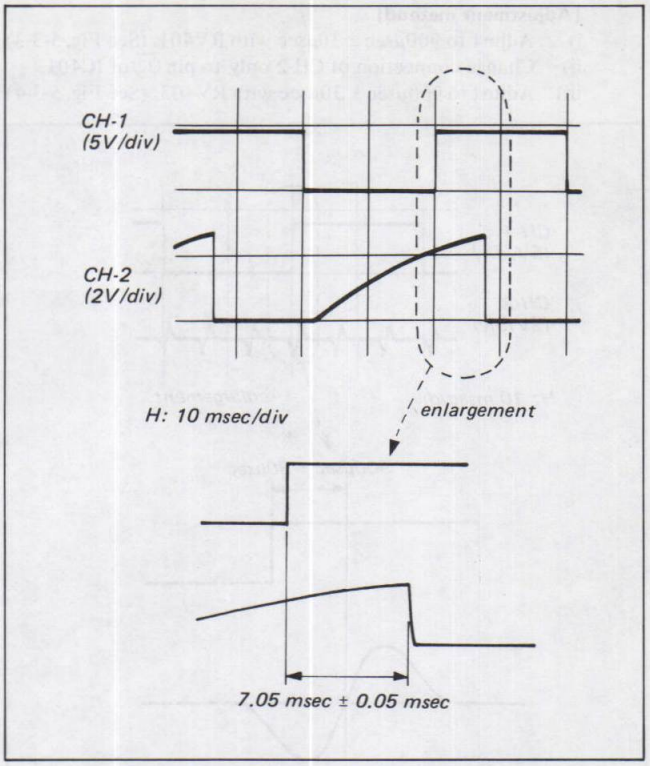


Fig. 5-3-9. Tracking FIX adjustment

6) CTL Delay Adjustment (MA-3 Board)

- Adjust using a self-recorded tape.

Mode: Playback + Pause
Signal: Colour bar signals recorded in βII mode.

[Adjustment method]

i) Set the TRACKING knob to the center click position.
ii) Adjust RV415 so that noise bars on the TV monitor screen disappear from the screen top or bottom (or are kept to a minimum) while pressing the REVERSE ◄ button (See Fig. 5-3-10)

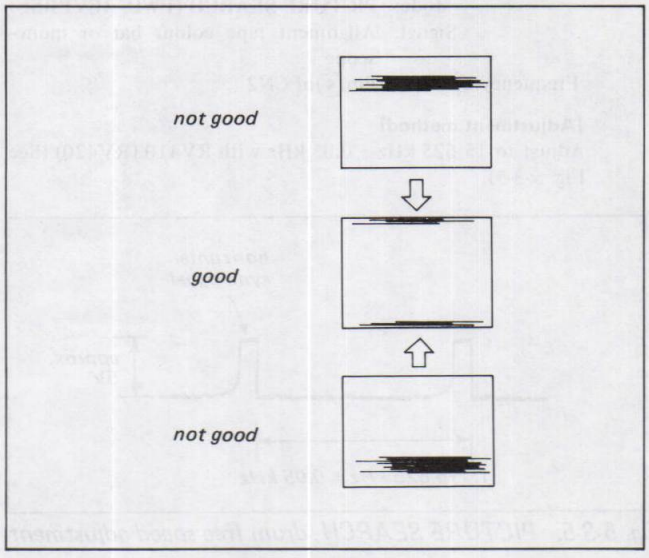


Fig. 5-3-10. CTL delay adjustment

SONY

ADJUSTMENT MANUAL

AEP Model
UK Model
E Model

April, 1983

CORRECTION-1

Correct the Adjustment Manual as shown below.

☛: corrected portion

Page 39 : 5-3-4. Slow Servo System Alignment

Correct	Incorrect
3) Edit Adjustment (MA-3 and LS-8 Boards) Mode: Record Signal: Arbitrary signal ☛ Oscilloscope: Pin ④ of IC401 on MA-3 board ☛ External trigger: pin ㉑ of IC401 on MA-3 board Trigger slope: – Input: DC range Sweep mode: NORMAL **[Adjustment method]** i) Set up the PAUSE mode. (more than 3 sec) ii) Push the PAUSE button again to clear the PAUSE mode (adjust the trigger level of the oscilloscope to triggerit), and adjust RV205 on the LS-8 board until the time T between the end of pause to the waveform rise point becomes a maximum.	3) Edit Adjustment (MA-3 and LS-8 Boards) Mode: Record Signal: Arbitrary signal Oscilloscope: Pin ④ of IC301 on MA-3 board External trigger: pin ㉑ of IC301 on MA-3 board Trigger slope: – Input: DC range Sweep mode: NORMAL **[Adjustment method]** i) Set up the PAUSE mode. (more than 3 sec) ii) Push the PAUSE button again to clear the PAUSE mode (adjust the trigger level of the oscilloscope to triggerit), and adjust RV205 on the LS-8 board until the time T between the end of pause to the waveform rise point becomes a maximum.

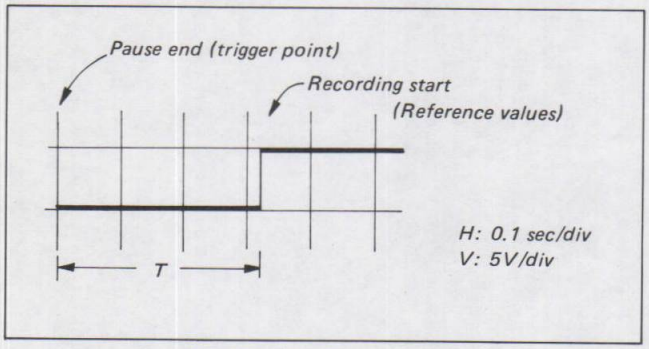
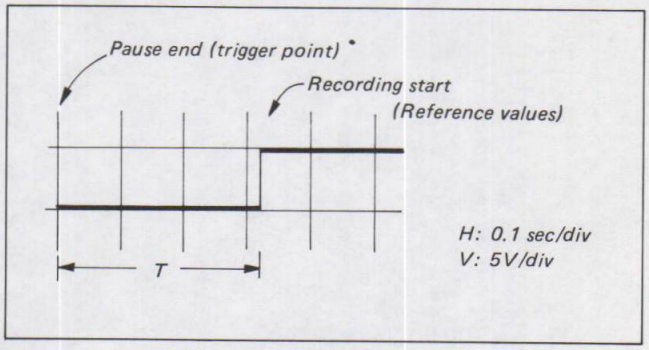

	

Fig. 5-3-13. Edit adjustment	*Fig. 5-3-13. Edit adjustment*

MICROFILM

9-972-167-93

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Consumer Products Group
Technical Support Dept.

Englgh
83D0989-1
Printed in Japan

Consumer VIDEO

5-3-4. Slow Servo System Alignment

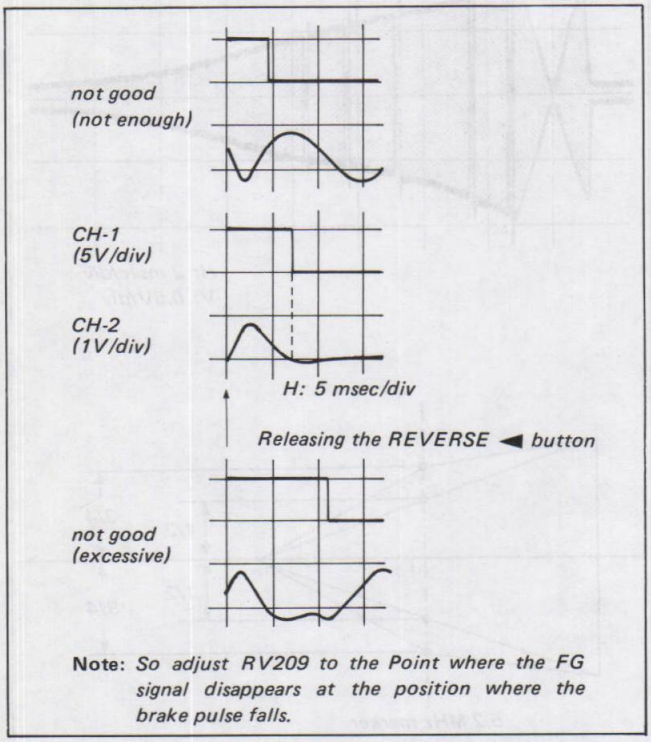
1) Capstan Brake Alignment (LS-8 and MA-3 Boards)

Mode: Playback + Pause
Signal: Recorded tape
Oscilloscope: CH-1 TP205 (LS-8 Board)
CH-2 TP402 or TP405 (MA-3 Board)
Sweep mode: NORMAL
Trigger slope: +

[Adjustment method]

i) Press the REVERSE ◄ button for more than one second, then release. (Adjust the trigger level of the oscilloscope so that a waveform appears.)

ii) Repeat the process of pressing the REVERSE ◄ button for one second --- releasing --- pressing, and adjust to optimum state as shown in Fig. 5-3-11 with RV209. (See Fig. 5-3-11)



Note: *So adjust RV209 to the Point where the FG signal disappears at the position where the brake pulse falls.*

Fig. 5-3-11. Capstan brake alignment

2) Tracking Adjustment (LS-8 Board)

- Adjust using the self-recorded tape.
- Adjust both the FWD and RVS modes.

Mode: Playback + Pause
Signal: Colour bar mentioned above

[Adjustment method]

i) Set the TRACKING knob to the center click position.

ii) Press the FORWARD ► button for about one second, then release it. (The pause mode will be set) Adjust with RV202 so that noise bars on the TV monitor screen are reduced to a minimum on the bottom of the screen. (See Fig. 5-3-12).

iii) Press the REVERSE ◄ button for about on second, then release it. (The pause mode will be set) Adjust with RV203 so that noise bars on the TV monitor screen are reduced to a minimum on the bottom of the screen. (See Fig. 5-3-12).

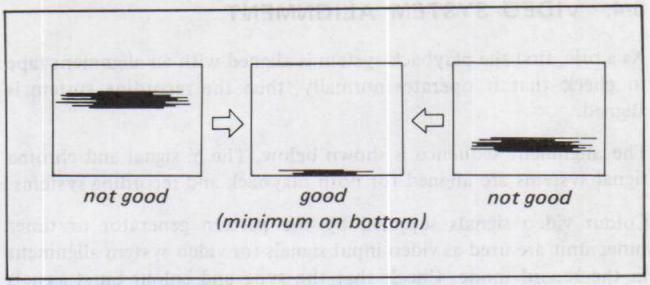


Fig. 5-3-12. Tracking adjustment

3) Edit Adjustment (MA-3 and LS-8 Boards)

Mode: Record
Signal: Arbitrary signal
Oscilloscope: Pin ④ of IC301 on MA-3 board
External trigger: pin ㉑ of IC301 on MA-3 board
Trigger slope: –
Input: DC range
Sweep mode: NORMAL

[Adjustment method]

i) Set up the PAUSE mode. (more than 3 sec)

ii) Push the PAUSE button again to clear the PAUSE mode (adjust the trigger level of the oscilloscope to triggerit), and adjust RV205 on the LS-8 board until the time T between the end of pause to the waveform rise point becomes a maximum.

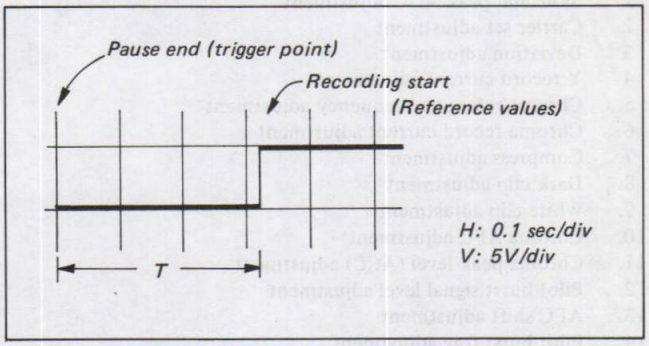


Fig. 5-3-13. Edit adjustment

iii) Repeat; PAUSE ⟶ release of PAUSE two or three times, and check that the result meets Paragraph (ii).

iv) Make self-recording the playback and check that edits are free of noise.

4) Slow Speed Adjustment (LS-8 Board)

Mode: Playback + Pause
Signal: Alignment tape colour bar, or monoscope
VOM (20kΩ/V): MA-3 board pin 2 of CN407

[Adjustment method]

i) Turn RV210 fully clockwise (↻) as seen from the pattern side.

ii) Adjust to 3.0V ± 0.2V with RV211 while pressing the SLOW▮► button.

iii) Adjust RV210 so that noise bars on the monitor screen progress about four times per second from top to bottom while pressing the SLOW ▮► button.

Note: The VOM voltage decreases after making the adjustment in Paragraph (3). However, there is no need for readjustment.

5-4. VIDEO SYSTEM ALIGNMENT

As a rule, first the playback system is aligned with an alignment tape to check that it operates normally, then the recording system is aligned.

The alignment sequence is shown below. The Y signal and chroma signal systems are aligned for both playback and recording systems.

Colour video signals supplied by the pattern generator or timer tuner unit are used as video input signals for video system alignment in the record mode. Check that the sync and colour burst signals conform to the specifications designated in "Set-up for Alignment" in Fig. 5-1.

[Playback System Alignment]

1. Playback frequency characteristic adjustment
2. Playback video level adjustment
3. Y-Comb and DOC level adjustment
4. Shift adjustment
5. Expand adjustment
6. Chroma comb filter adjustment
7. Converter balance adjustment
8. White peak clip adjustment

[Slow Motion Playback System Alignment]

1. JOG AFC adjustment
2. JOG level adjustment

[Record System Alignment]

1. Sync and peak AGC adjustment
2. Carrier set adjustment
3. Deviation adjustment
4. Y record current adjustment
5. Chroma reference frequency adjustment
6. Chroma record current adjustment
7. Compress adjustment
8. Dark clip adjustment
9. White clip adjustment
10. Chroma AFC adjustment
11. Chroma peak level (ACC) adjustment
12. Pilot burst signal level adjustment
13. AFC shift adjustment
14. Pilot burst frag adjustment
15. Burst frag adjustment

5-4-1. Playback System Alignment

1) Playback Frequency Characteristic Adjustment (SF-5 Board)

Mode: Playback
Signal: Alignment tape RF sweep
Oscilloscope: Pin (3) of CN3
External trigger: Pin (5) of CN3

[Adjustment method]

A-CH RV1
B-CH RV3
CH balance RV2

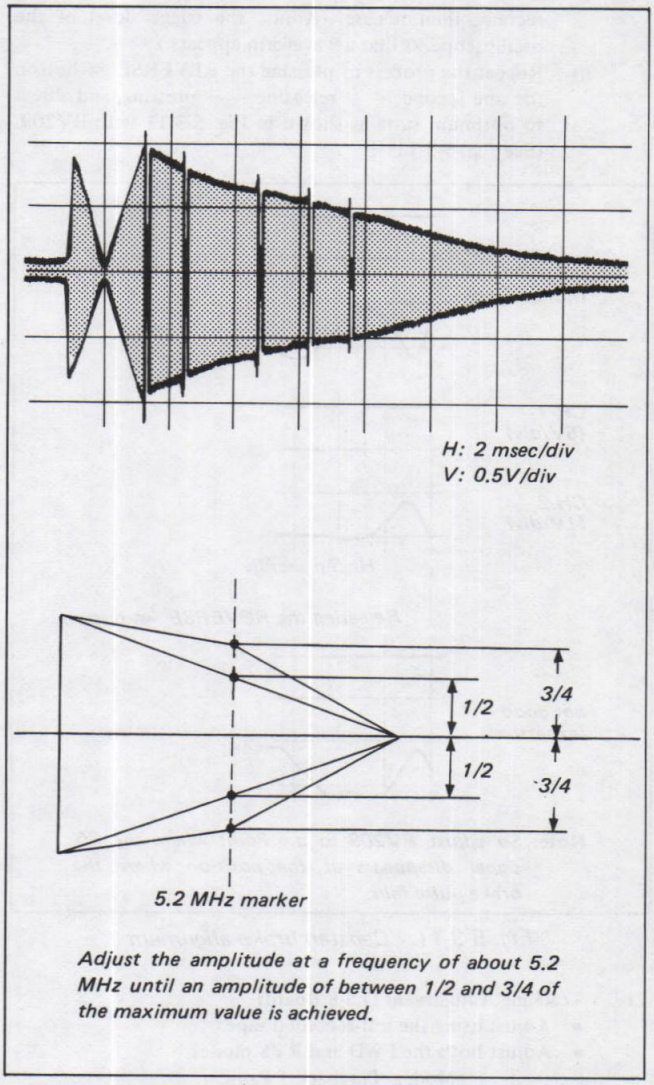


Fig. 5-4-1. Playback amplifier frequency characteristic adjustment

Note:
- If the characteristic shown in Fig. 5-4-1 can not be obtained by the adjustment of RV1 or RV3, the amplitude at around 4 MHz can be increased when L8 (6.8μH . . . A-CH) or L9 (6.8μH . . . B-CH) in REC/PB AMP BLOCK is replaced by 10μH (1-407-157-11 or 1-407-190-11).
- The reason for the difference (imbalance) of waveform between A-CH and B-CH is the difference in the impedance of the head systems resulting from the difference in the winding diameters of the rotary transformers.

2) Playback Video Level Adjustment (SF-5 Board, MA-3 Board)
Mode: Playback
Signal: Alignment tape colour bar
Oscilloscope: Pin (25) of CN802 on MA-3 board

[Adjustment method]
i) Adjust to 1.0V ± 0.05 Vp-p with RV9 on SF-5 board.

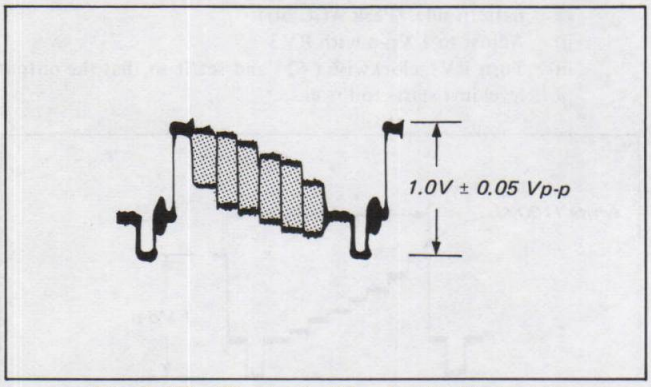


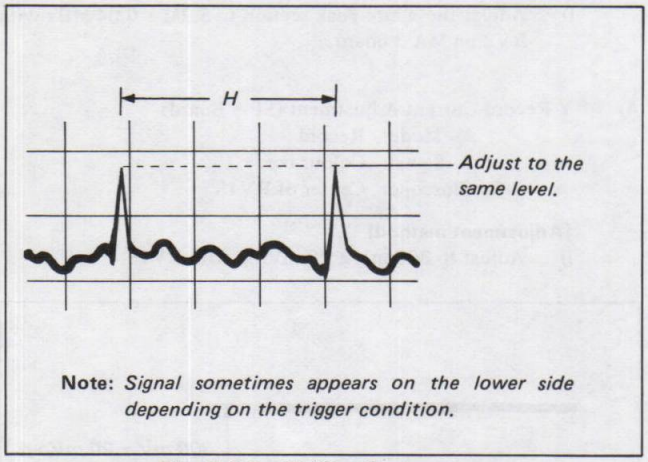
Fig. 5-4-2. Playback video level adjustment

3) Y-Comb and DOC Level Adjustment (SF-5 Board)
Mode: Playback
Signal: Tape with dropouts
Adjust while observing the monitor TV screen.

[Adjustment method]
i) Turn RV10 (Y-COMB) to eliminate dropouts, and then turn RV7 so that white dot noise just appears at the compensating section.

4) Shift Adjustment (MA-3 Board)
Mode: Playback
Signal: Alignment tape colour bar
Oscilloscope: Pin (12) of IC6

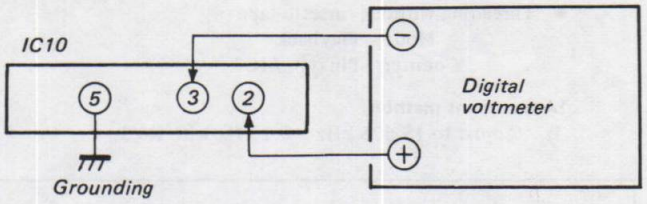
[Adjustment method]
i) Align the signal level (per 1H) with RV7.



Note: *Signal sometimes appears on the lower side depending on the trigger condition.*

Fig. 5-4-3. Shift adjustment

5) Expand Adjustment (SF-5 Board)
Mode: Playback
Signal: Colour bar
Digital voltmeter:



[Adjustment method]
i) Adjust to 0.345V ± 0.01 Vdc with RV8.

6) Chroma Comb Filter Adjustment (SF-5 Board)
Mode: Playback
Signal: Alignment tape colour bar
Adjust while observing the monitor TV screen.

[Adjustment method]
i) Turn RV13 and LV1 alternately to obtain a smooth picture.

7) Converter Balance Adjustment (SF-5 Board)
Mode: Playback
Signal: Alignment tape colour bar
Adjust while observing the monitor TV screen.

[Adjustment method]
i) Minimize beats with RV14.

8) White Peak Clip Adjustment (MA-3 Board)
Use an AC adapter for adjustment because, in the case of the TT unit, power is not supplied to the RF-modulator.
Mode: Stop
Test signal switch: ON
Oscilloscope: Pin (17) of IC8

[Adjustment method]
i) Turn RV6 and set it to just before the waveform clips.

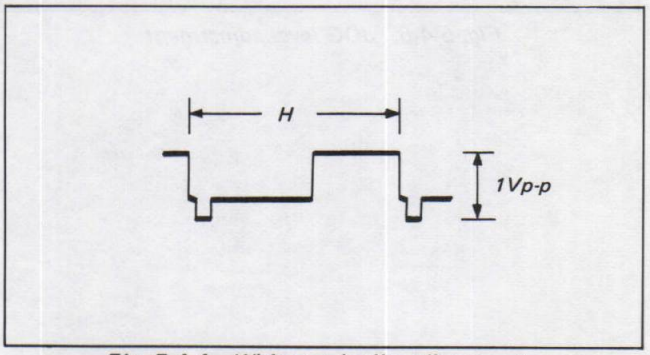


Fig. 5-4-4. White peak clip adjustment

5-4-2. Slow Motion Playback System Alignment

1) JOG AFC Adjustment (MA-3 Board)
- Threading without cassette tape

Mode: Playback
Counter: Pin (15) of IC7

[Adjustment method]

i) Adjust to 15.625 kHz ± 0.1 kHz with RV5.

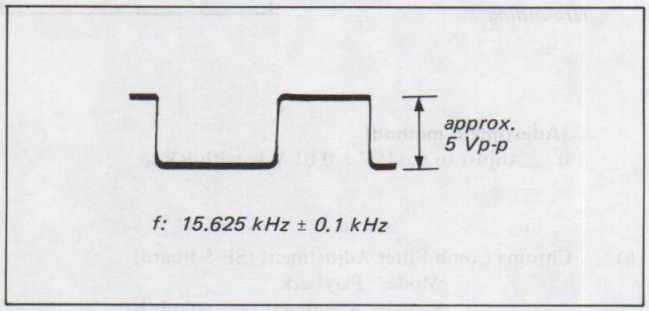


Fig. 5-4-5. JOG AFC adjustment

2) JOG Level Adjustment (MA-3 Board)

Mode: Playback
Signal: Self-recorded tape
Oscilloscope: Pin (25) of IC5

[Adjustment method]

i) Make a note of the output at normal PB time. (Approx. 600 mVp-p)
ii) Press the PAUSE button to set STILL mode.
iii) Equalizer the level at STILL time to the level at normal PB time with RV4.

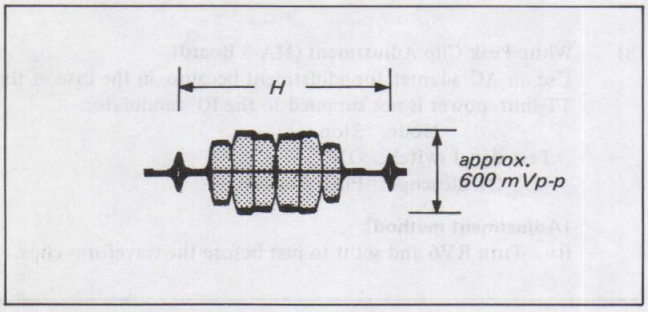


Fig. 5-4-6. JOG level adjustment

5-4-3. Record System Alignment

1) Sync and Peak AGC Adjustment (MA-3 Board)

Mode: Record
Oscilloscope: Pin 25 of CN802 (Accessory Connector)
Signal: B/W

[Adjustment method]

i) Turn RV1 fully counterclockwise (↺) as seen from the pattern side. (Peak AGC off)
ii) Adjust to 1 Vp-p with RV3.
iii) Turn RV1 clockwise (↻) and set it so that the output level just starts to lower.

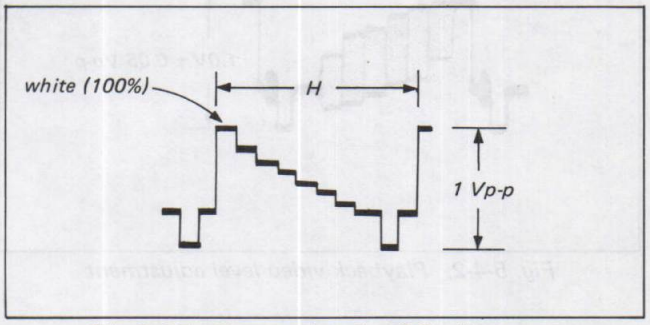


Fig. 5-4-7. Sync and peak AGC adjustment

2) Carrier Set Adjustment (SF-5 Board)

Mode: Record
Signal: Colour bar
Spectrum analyzer: TP1

[Adjustment method]

i) Adjust the sync tip section to 3.8M ± 0.04 MHz with RV5.

3) Deviation Adjustment (MA-3 Board, SF-5 Board)

Mode: Record
Signal: Colour bar
Spectrum analyzer: TP1 of SF-5 board

[Adjustment method]

i) Adjust the white peak section to 5.2M ± 0.04 MHz with RV2 on MA-3 board.

4) Y Record Current Adjustment (SF-5 Board)

Mode: Record
Signal: Colour bar
Oscilloscope: Center of RV18

[Adjustment method]

i) Adjust to 300 mV ± 20 mVp-p with RV18.

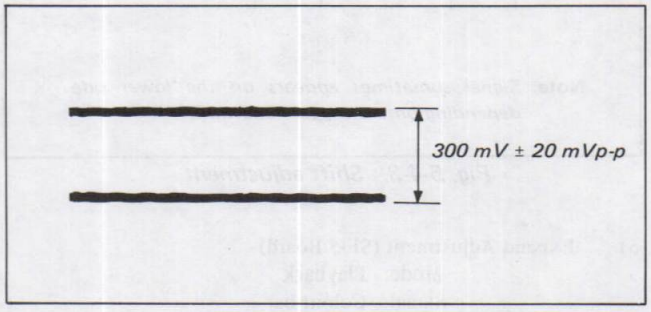


Fig. 5-4-8. Y record current adjustment

5) Chroma Reference Frequency Adjustment (SF-5 Board)
Mode: Record
Signal: None
Counter: (Pin (13) of IC6) TP4

[Adjustment method]
i) Adjust to 4.433619 MHz ± 5 Hz with CV001.

6) Chroma Current Adjustment (SF-5 Board)
Mode: Record
Signal: Colour bar
Oscilloscope: Q5 collector

[Adjustment method]
i) Adjust to 260 mV ± 20 mVp-p with RV17.

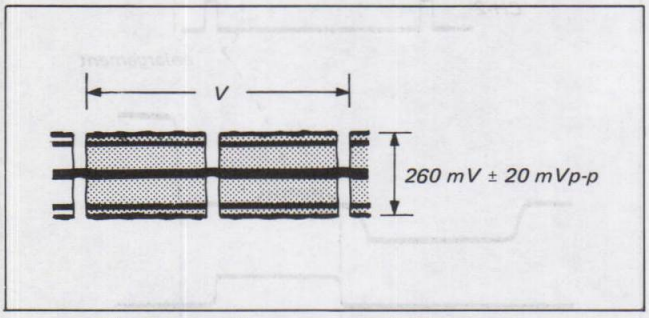
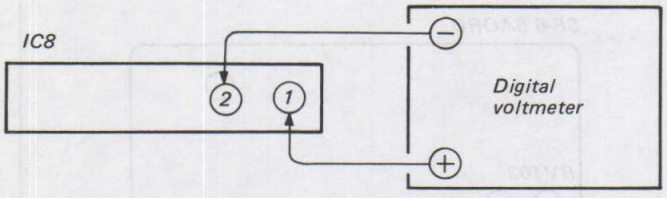


Fig. 5-4-9. Chroma current adjustment

7) Compress Adjustment (SF-5 Board)
Mode: Record
Signal: Colour bar
Digital voltmeter:



[Adjustment method]
i) Adjust to 0.3V ± 0.01 Vdc with RV2.

8) Dark Clip Adjustment (SF-5 Board)
Mode: Record
Signal: Colour bar
Digital voltmeter: Center of RV3

[Adjustment method]
i) Adjust to 2.1V ± 0.05 Vdc with RV3.

9) White Clip Adjustment (SF-5 Board)
Mode: Record
Signal: Colour bar
Digital voltmeter: Center of RV4

[Adjustment method]
i) Adjust to 2.25V ± 0.05 Vdc with RV4.

10) Chroma AFC Adjustment (SF-5 Board)
Mode: Record
Signal: None/Colour bar signal
Counter: Pin (1) of IC7

[Adjustment method]
i) Under the condition of no signal input, adjust to 4.8 MHz ± 0.1 MHz with RV12.
ii) Next, input a colour bar signal, and make sure that adjustment to 5.5 MHz ± 0.2 MHz has been made.

11) Chroma Peak Level (ACC) Adjustment (SF-5 Board)
Mode: Record
Signal: Colour bar
Oscilloscope: Pin (1) of IC5

[Adjustment method]
i) Adjust to 700 mV ± 5 mVp-p with RV16.

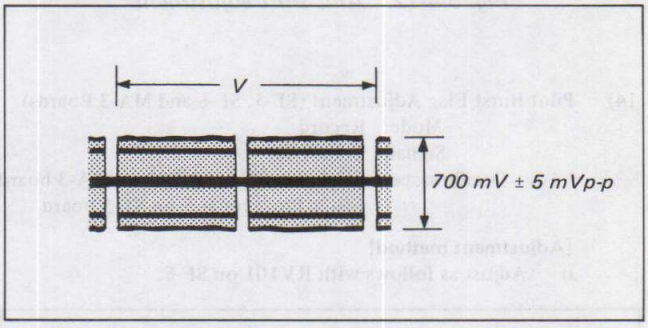


Fig. 5-4-10. Chroma peak level (ACC) adjustment

12) Pilot Burst Signal Level Adjustment (SF-5 Board)
Mode: Record
Signal: Colour bar
Oscilloscope: Pin (11) of IC7

[Adjustment method]
i) Align the pilot burst signal with the chroma signal level using RV15.

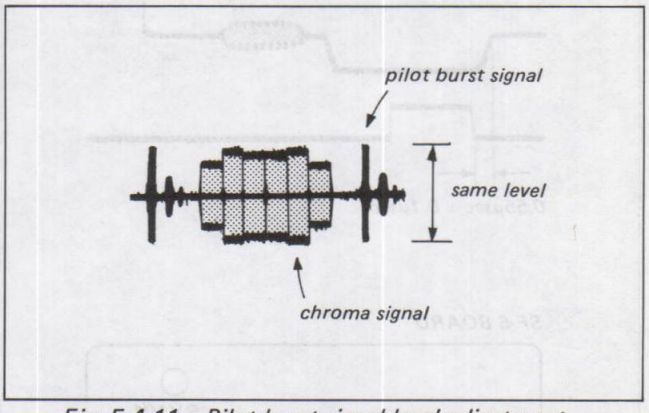


Fig. 5-4-11. Pilot burst signal level adjustment

13) AFC Shift Adjustment (SF-5 Board)

Mode: Record
Signal: Colour bar
Oscilloscope: Pin (3) of IC7

[Adjustment method]

i) Adjust the DC-OFFSET to zero with RV11.

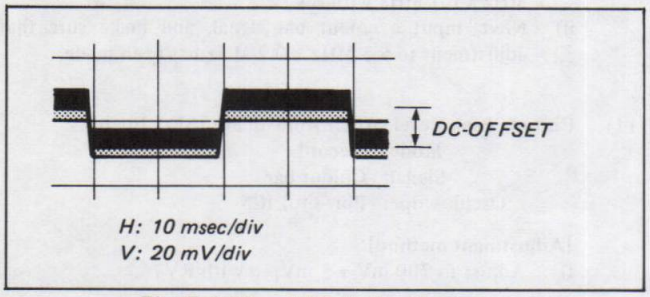


Fig. 5-4-12. AFC shift adjustment

14) Pilot Burst Flag Adjustment (SF-5, SF-6 and MA-3 Boards)

Mode: Record
Signal: Colour bar
Oscilloscope: CH-1: Pin (25) of CN802 on MA-3 board
CH-2: Pin (6) of IC5 on SF-5 board

[Adjustment method]

i) Adjust as follows with RV101 on SF-6.

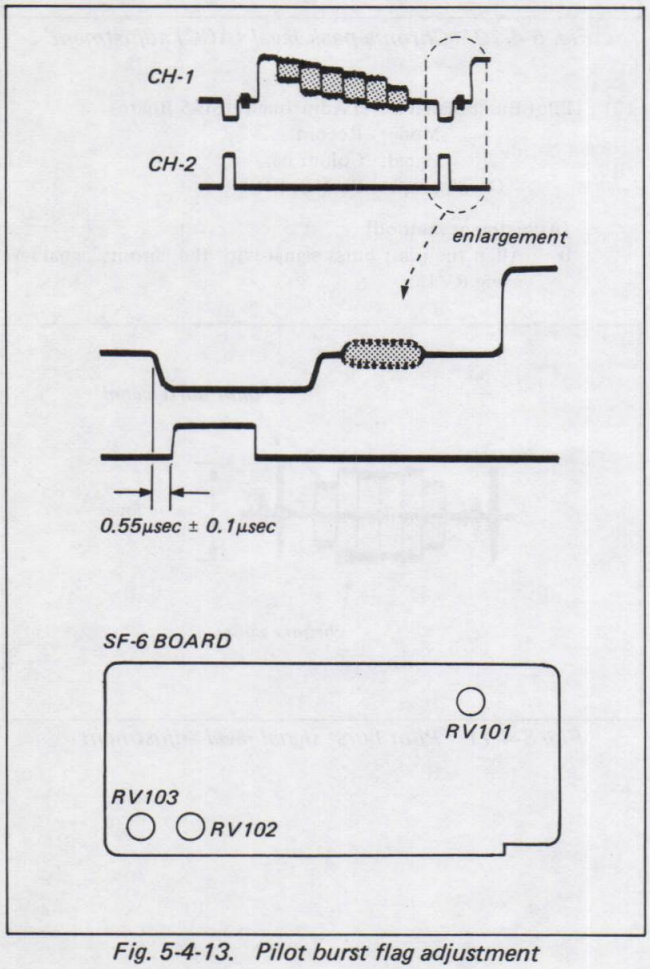


Fig. 5-4-13. Pilot burst flag adjustment

15) Burst Flag Adjustment (SF-5, SF-6 and MA-3 Boards)

Mode: Record
Signal: Colour bar
Oscilloscope: CH-1: Pin (25) of CN802 on MA-3 board
CH-2: Pin (8) of IC5 on SF-5 board

[Adjustment method]

i) Adjust as follows with RV102 and RV103 on SF-6 board.

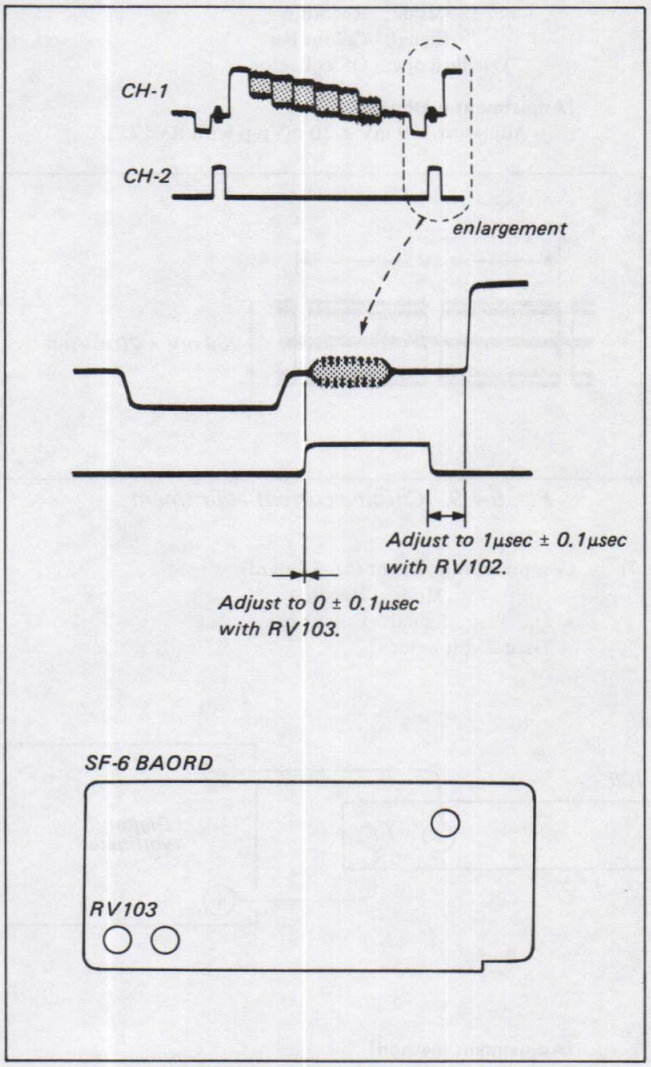


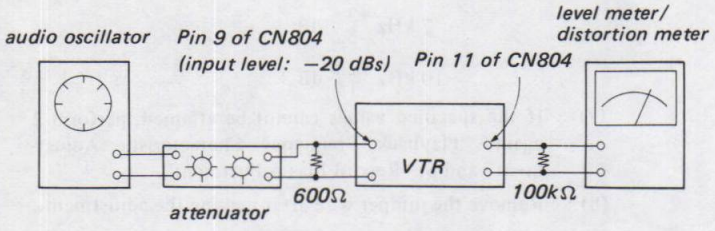
Fig. 5-4-14. Burst flag adjustment

5-5. AUDIO SYSTEM ADJUSTMENT (LS-8 Board)

Use a Dynamicron tape for adjustments.

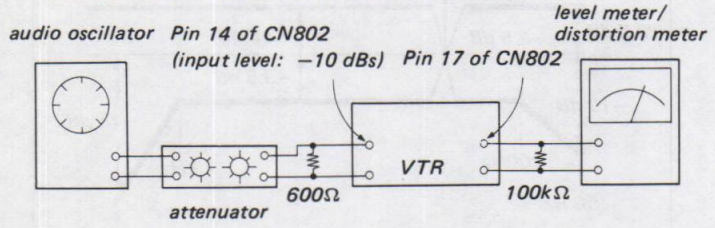
[Connection of Related Equipment]

- When using AC-F1E (AC power adaptor)



- When using TT-F1E (tuner/timer unit)

Note: Set the INPUT SELECT switch on LINE.



[Adjustment Sequence]

1. ACE head adjustment . . . See "Mechanical Adjustment"
2. Playback frequency characteristic adjustment
3. Playback output level adjustment
4. Bias oscillator check
5. Bias trap adjustment
6. Record bias adjustment
7. Record current adjustment
8. Audio dubbing bias adjustment and check
9. Overall frequency characteristic check

*10. AGC output check
*11. Overall S/N check
*12. Overall distortion check

Note: The adjustment items marked * are for AC-F1E and TT-F1E for which the input level is different.

1. ACE Head Adjustment

Refer to "Mechanical Adjustment"

2. Playback Frequency Characteristic Adjustment

(1) Play back 333 Hz and 5 kHz from the alignment tape and adjust so that the level difference between 333 Hz and 5 kHz is within 0 dB ± 1 dB with RV001.

3. Playback Output Level Adjustment

(1) Play back 333 Hz from the alignment tape and adjust so that the output level is −25 dB ± 1 dB with RV002.

4. Bias Oscillator Check

(1) Set the input signal level to zero and set up the REC-ORD mode.
(2) Connect a frequency counter to TP006. The reading should be 65 kHz ± 6.5 kHz. (See Fig. 5-5-1)

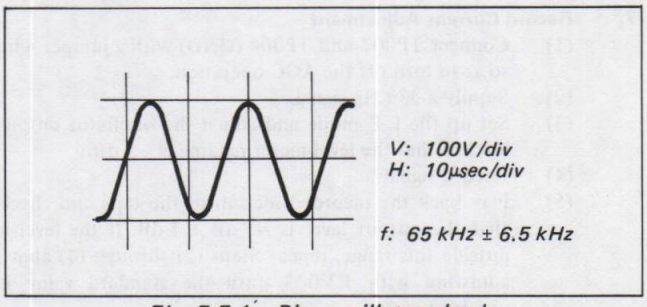


Fig. 5-5-1. Bias oscillator check

5. Bias Trap Adjustment

(1) Set the input signal level to zero and set up the REC-ORD mode.
(2) Connect an oscilloscope to TP005.
(3) Adjust LV001 for minimum bias leak.
Value: minimum level below 1.0 Vp-p. (See Fig. 5-5-2)

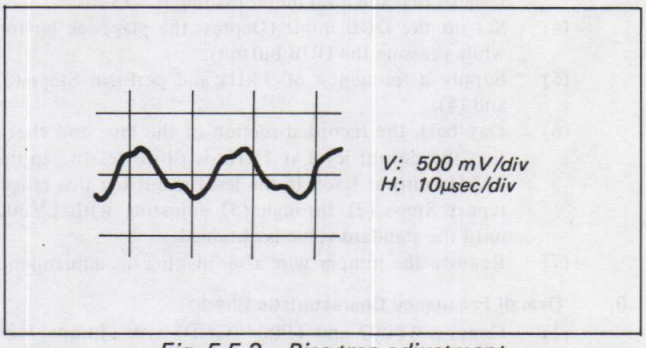


Fig. 5-5-2. Bias trap adjustment

6. Record Bias Adjustment

Check that "Playback frequency characteristic adjustment" has been made.

(1) Connect TP007 and TP004 (GND) with a jumper wire so as to turn off the AGC operation.
(2) Supply a 333 Hz signal.
(3) Set up the E-E mode and adjust the oscillator output level so that the level meter reading is −25 dB.
(4) Record signals.
(5) Supply a frequency of 7 kHz and perform Steps (3) and (4) above.
(6) Play back the recorded section of the tape and check that the output level at 7 kHz is ±1 dB relative to the output level at 333 Hz. If the level is outside this range, repeat Steps (2) through (5) adjusting with CV001 until the standard is met.
(7) Remove the jumper wire after making the adjustment.

7. Record Current Adjustment

(1) Connect TP007 and TP004 (GND) with a jumper wire so as to turn off the AGC operation.
(2) Supply a 333 Hz signal.
(3) Set up the E-E mode and adjust the oscillator output level so that the level meter reading is −5 dB.
(4) Record signals.
(5) Play back the recorded section of the tape and check that the output level is −5 dB ± 1 dB. If the level is outside this range, repeat Steps (2) through (4) above adjusting with RV003 until the standard value is obtained.
(6) Verify that the record current adjustment has been completed.
(7) Remove the jumper wire after making the adjustment.

8. Audio Dubbing Bias Adjustment and Check

(1) Connect TP007 and TP004 (GND) with a jumper wire so as to turn off the AGC operation.
(2) Supply a 333 Hz signal.
(3) Set up the E-E mode and adjust the oscillator output level so that the level meter reading is −25 dB.
(4) Set up the DUB mode (Depress the playback button while pressing the DUB button).
(5) Supply a frequency of 7 kHz and perform Steps (3) and (4).
(6) Play back the recorded section of the tape and check that the output level at 7 kHz is ±1 dB relative to the 333 Hz output level. If the level is outside this range, repeat Steps (2) through (5) adjusting with LV002 until the standard value is obtained.
(7) Remove the jumper wire after making the adjustment.

9. Overall Frequency Characteristic Check

(1) Connect TP007 and TP004 (GND) with a jumper wire so as to turn off the AGC operation.
(2) Connect a 333 Hz signal.
(3) Set up the E-E mode and adjust the oscillator output level so that the level meter reading is −25 dB.
(4) Record signals.
(5) Change the frequency to 50 Hz, 100 Hz, 5 kHz and 7 kHz and repeat Steps (3) and (4).
(6) Play back the recorded section of the tape and verify that the level is within the specification. (See Fig. 5-5-3).

Standard values: With reference to the 333 Hz playback output level.

50 Hz $^{+2.5}_{-12}$ dB

100 Hz $^{+2.5}_{-3.5}$ dB

5 kHz $^{+2.5}_{-3.5}$ dB

7 kHz $^{+2.5}_{-3.5}$ dB

10 kHz $^{+2.5}_{-15}$ dB

(7) If the specified values cannot be attained, perform 2 again. "Playback Frequency Characteristic Adjustment" and 6. "Record Bias Adjustment".
(8) Remove the jumper wire after making the adjustment.

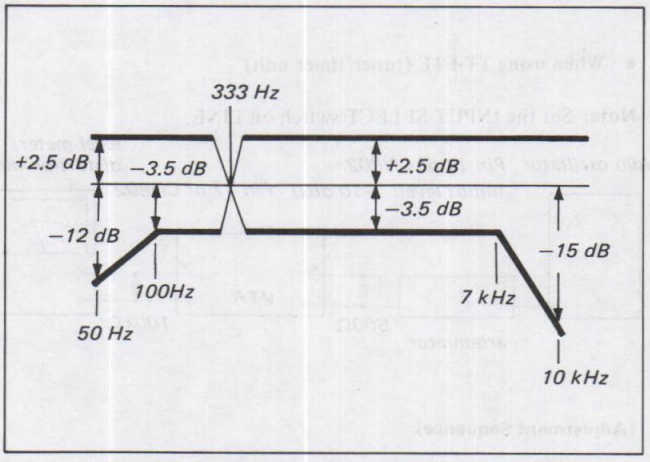


Fig. 5-5-3. Overall frequency characteristic

10. AGC Output Check

(1) Connect a 333 Hz signal at −20 dBs for AC-F1E and at −10 dBs for TT-F1E.
(2) Record signals.
(3) Play back the recorded section of the tape and check that the output level is −5 dB ± 2 dB.

11. Overall S/N Check

(1) Set the input signal level to zero and record signals.
(2) Supply a 333 Hz signal at −20 dBs for AC-F1E and at −10 dBs for TT-F1E.
(3) Record signals.
(4) Play back the recorded section of the tape and check that the output level difference is greater than 40 dB.

12. Overall Distortion Check

(1) Supply a 400 Hz signal at −20 dBs for AC-F1E and at −10 dBs for TT-F1E.
(2) Record signals.
(3) Play back the recorded section of the tape and verify that the distortion is below 4%.

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