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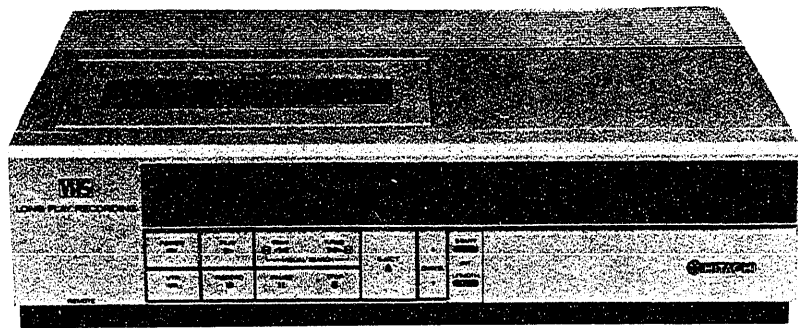
SERVICE MANUAL

TK

No. 2289E

VT-60A

Technical Data



THIS VIDEO DECK IS A VHS TYPE VIDEO RECORDER. FOR PROPER OPERATION, ONLY THE VHS TYPE CASSETTE MUST BE USED.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

September 1985

TOKAI WORKS

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SAFETY PRECAUTION

SAFETY PRECAUTIONS

NOTICE: Comply with all cautions, and safety related notes located on or inside the cabinet and on the chassis.

1. When replacing a chassis in the instrument, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment covers/shields, isolation resistors-capacitors, etc.
2. When service is required, observe the original lead dress. Extraprecautions should be taken to assure correct lead dress in the high voltage circuit.
3. Always use the manufacturer's replacement components. Especially critical components as indicated on the circuit diagram should not be replaced by other manufacturers. Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.
4. Before returning an instrument to a customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently defeated during servicing.

Therefore, the following checks should be performed for the continued protection of the customer and service technician.

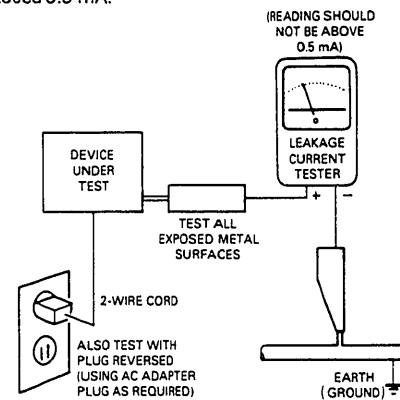
Leakage Current Cold Check

With the AC plug removed from the AC120V, 60 Hz source, place a jumper across the two plug prongs. Turn the AC power switch on. Using an insulation tester (DC500V), connect one lead to the jumpered AC plug and touch the other lead to exposed metal part (antennas, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistor reading of 0.3 M Ω and a maximum resistor reading of 5 M Ω . Any resistor value below or above this range indicates an abnormality which requires corrective action. Exposed meter parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a AC120V, 60 Hz outlet (do not use an isolation transformer for this check). Turn the AC power switch on. Using a "Leakage Current Tester", Measure for current from all exposed metal parts

of the cabinet (antennas, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis, to a known earth (ground) (water pipe, conduit, etc.). Any current measured must not exceed 0.5 mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a Δ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies of, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

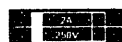
FOR CANADA

CAUTION AGAINST FUSE REPLACEMENT

FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE AND SAME RATING FUSE IN ACCORDANCE WITH THE FUSE SYMBOL LABEL.

The following is the indication of the fuse symbol label which is affixed adjacent to the fuse in the equipment.

* Example



This symbol indicates Fast Operating Typ 2A, 250V Fuse.

COMPARISON WITH CONVENTIONAL MODEL

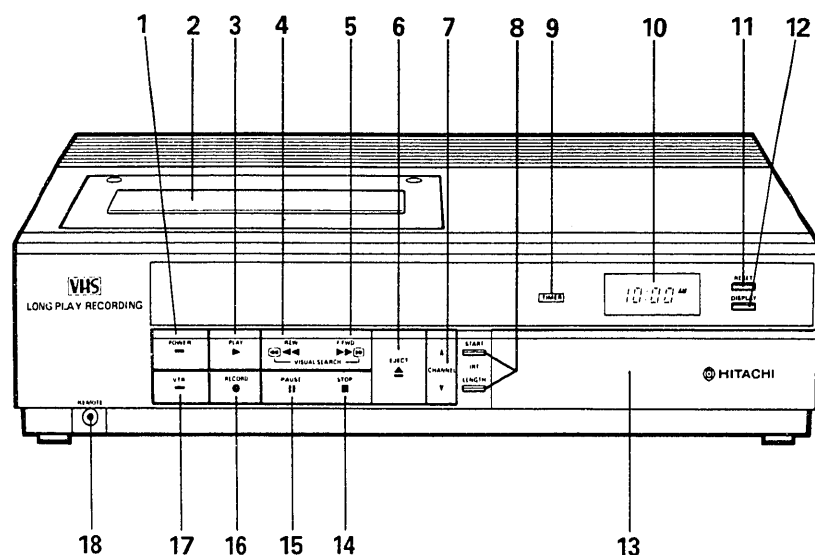
Item		VT-60A	VT-63A
Video heads		2-head	2-head
Recording tape speeds		3 modes (SP/LP/EP)	3 modes (SP/LP/EP)
Play tape speeds	Visual Search	SP	Provided
		EP	Provided
	Still Picture	SP	Provided
		EP	Provided
Tuner		80 - channel (Electronic lock) (Up/Down selection)	80 - channel (Electronic lock) (Up/Down selection)
Timer		4 programs/2 weeks	4 programs/2 weeks
Remote control (number of buttons)		10 mode wired (7 buttons)	13-mode wireless (10 buttons)
Indicators	Operation Switches	Power, Timer, Record, Play, Pause	Provided
		Stop, F. FWD Rewind	Provided (Stop is not provided.)
	Channel Preset	Channels Selected	105
		Programmed	Provided
Audio Dub		Not provided	Not provided
Memory Counter Switch		Not provided	Not provided
Heater		Provided	Provided
Dew Sensor		Not provided	Not provided
Pause 5 Minute		Provided	Provided
IRT (Instant Recording Timer)		Provided	Provided
CATV		Not provided	Not provided
Timer Back Up		Not provided	Not provided
Frame Advance		Not provided	Not provided
Fast		Not provided	Not provided
Picture Control		Not provided	Not provided
Stereo PB/REC		Not provided	Not provided
Dolby NR		Not provided	Not provided
Cassette Loading		Tape Loading	Auto Front Loading
Tape in Indicator Light		Provided	Provided

SPECIFICATIONS

Recording:	Rotary Two-Head Helical Scan Azimuth Recording
Video:	NTSC Color EIA Standard
Cassette:	VHS Type
Heads:	2 video heads: 2 for SP/LP/EP 1 Full track audio/video erase head 1 Combination head for control track, audio erase and audio record/play (3 heads/single housing)
Tape Speed:	33.35 mm/sec (SP), 16.67 mm/sec (LP), 11.12 mm/sec (EP)
Tape Width:	12.7 mm
RF Output:	Channel 3 or Channel 4
RF Input:	VHF 75 ohm, UHF 300 ohm
Tuning Range:	VHF LOW, CH2 - 6 (54 MHz - 88 MHz) VHF HIGH, CH7 - 13 (174 MHz - 216 MHz) UHF CHANNELS, 14 - 83 (470 MHz - 890 MHz)
Video Input:	1 - 2 Vp-p 75 ohm Unbalanced
Video Output:	1 Vp-p 75 ohm Unbalanced
Audio Input:	316 mV rms (-7.8 dB) 100 kohm
Audio Output:	316 mV rms (-7.8 dB) 600 ohm
Video Recording S/N:	Better than 46 dB (SP), Better than 43 dB (LP), Better than 40 dB (EP)
Horizontal Resolution:	240 lines (SP), 230 lines (LP), 230 lines (EP)
Audio Response:	50 Hz - 10 kHz (SP), 50 Hz - 7 kHz (LP), 100 Hz - 6 kHz (EP)
Audio S/N:	Better than 43 dB (SP), Better than 40 dB (LP), Better than 40 dB (EP)
Power Input:	AC 120V 60 Hz
Power Consumption:	36W Nominal
Cabinet Size:	17-1/8"(W) x 4-1/8"(H) x 12-3/16"(D) 43.5(W) x 10.5(H) x 30.9(D) cm
Weight:	15.4 lbs (7 kg)
Accessories:	1 - Coaxial cable with F-type connectors 1 - UHF twin lead 1 - Matching transformer 300 - 75 ohm 1 - Matching transformer 75 - 300 ohm 1 - Remote control unit 1 - Adjustment screwdriver

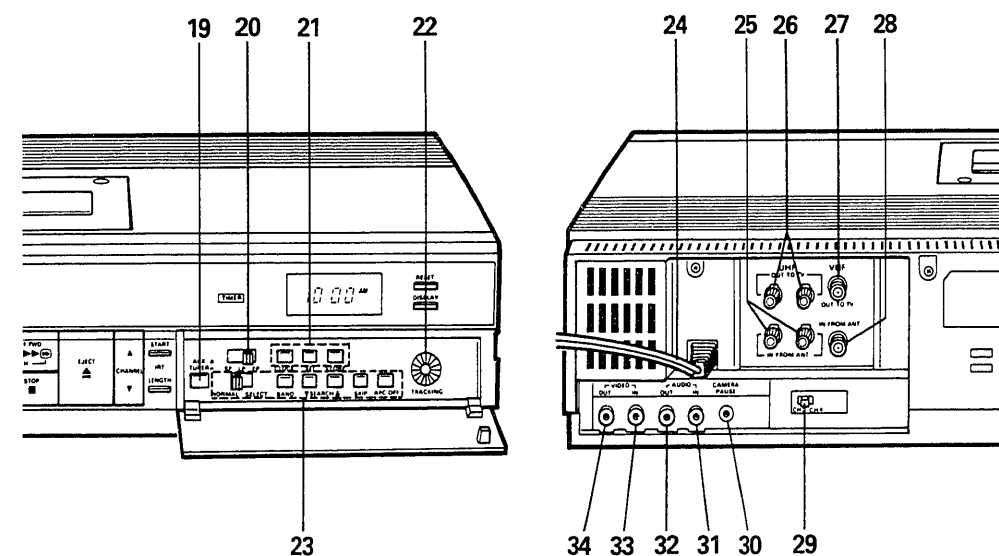
Design and Specifications subject to change without notice.

CONTROLS AND FEATURES



- 1. POWER SWITCH**
Turn system power on and off.
- 2. CASSETTE HOLDER**
- 3. PLAY BUTTON**
Press to start play.
- 4. REWIND/VISUAL SEARCH BUTTON**
Press to start rewind.
Press this button during playback of a recorded tape, and reverse playback picture at high speed can be seen.
- 5. FAST FORWARD/VISUAL SEARCH BUTTON**
Press to activate fast forward.
Press this button during playback of a recorded tape, and forward playback picture at high speed can be seen.
- 6. EJECT BUTTON**
Press to remove cassette.
- 7. CHANNEL SELECT BUTTON**
Select the channels you wish to view or to record by pressing this button.
- 8. INSTANT RECORDING TIMER BUTTON (IRT)**
IRT allows unattended recording without programming the timer. See page 12 for details.
- 9. TIMER INDICATOR**
Will light when turning power off after programming.
- 10. ELECTRONIC DIGITAL DISPLAY**
This display is used as an indicator for the present time of day, channel number, tape counter and instant recording.
- 11. COUNTER RESET BUTTON**
To reset counter to "0000".
- 12. DISPLAY BUTTON**
Repeated presses change the display from clock time to tape counter, to channel number, and back to clock time.
- 13. DOOR FOR SECONDARY CONTROLS**
- 14. STOP BUTTON**
Press to stop tape. The STOP button must be pressed between "RECORD" and any other operation.
- 15. PAUSE BUTTON**
Press to pause during recording or playback.
- 16. RECORD BUTTON**
Press RECORD button and while holding RECORD, press PLAY button to record.
- 17. VTR/TV SELECT SWITCH**
Selects the signal to be viewed.
The VTR indicator comes on when the unit is in VTR mode and the signal received by the VTR is displayed on the TV screen. With the switch in the TV position (indicator light off) the broadcast signal is received directly by your TV set. When the VTR power is turned off, the VTR automatically switches to "TV".
- 18. REMOTE CONTROL JACK**
Connect the Remote control unit provided.

CONTROLS AND FEATURES

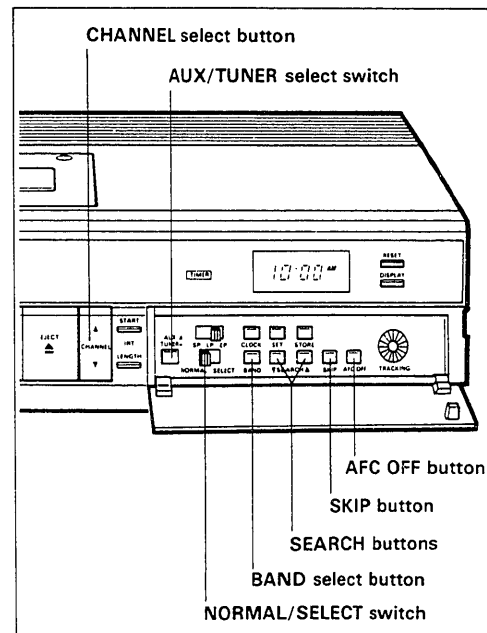


- 19. AUX/TUNER SELECT SWITCH**
In the TUNER position the VTR will record programs using the built-in tuner. In the AUX position the VTR will record from a camera or component system via the VIDEO IN and AUDIO IN jacks located on the back of the VTR.
- 20. TAPE SPEED SELECT SWITCH**
Recording time using Cassette tape T-160:
EP: 8 hours
LP: 5.3 hours
SP: 2.6 hours
Note: Playback speed automatically corresponds with recorded speed.
- 21. CLOCK SET BUTTONS**
- 22. TRACKING CONTROL KNOB**
To minimize noise in playback.
- 23. CHANNEL PROGRAMMING CONTROLS**
Program channels for channel up and down selection with these controls.
- 24. POWER CORD**
Connect to a 120V AC outlet.
- 25. UHF ANTENNA INPUT**
Connect the UHF antenna to these terminals.
- 26. UHF ANTENNA OUTPUT**
Connect these terminals to the UHF antenna terminals on the back of the TV.
- 27. VHF ANTENNA OUTPUT**
Connect this terminal to the VHF antenna terminal on the back of the TV.
- 28. VHF ANTENNA INPUT**
Connect the VHF antenna to this terminal.
- 29. RF CONVERTOR SWITCH**
Set this switch to whichever channel (CH3 or CH4) is unused in your area.
- 30. CAMERA PAUSE JACK**
Connect Camera Pause cable.
- 31. AUDIO IN**
Receives audio signals from a camera or from another VTR.
- 32. AUDIO OUT**
For a connection to a monitor or another VTR.
- 33. VIDEO IN**
Receives video signal from a video camera or another VTR.
- 34. VIDEO OUT**
For connection to monitor TV.

CHANNEL TUNING

Your VTR can be preset for up to 80 memorized channels. It has been preset to receive VHF channels 2 through 13 when shipped. The channel number in the display will originally match the actual TV channel selected. During the procedure which follows, you can reprogram any display channel number, so that it selects any actual TV channel. This means that after programming of the memorized channels, the display can indicate a different number than the actual TV channel tuned by that channel memory position.

You can set any channel memory position to receive any station. To add UHF channels not factory preset, or to preset the VHF channels in some other order, use the procedure which follows.



1. Set the clock to the correct time. (See page 8)
2. Turn on the TV and VTR.
3. Set the TV to Channel 3 (or 4).
4. Set the RF converter switch of VTR to channel 3 (or 4).
5. Open the door for secondary controls.
6. Set the AUX/TUNER select switch to "TUNER" firmly.
7. Set the NORMAL/SELECT switch to "SELECT". The display indication will change to band indication.
8. Set the channel number to be memorized by pressing the CHANNEL select buttons.

Note:

1. Your VTR can use the following numbers as TV channel presets: 00, 01 through 72, 91, 92, 95 through 99.
2. Your VTR has been preset to receive VHF channels 2 through 13.

3. You should determine which channel memory positions have not been preset before entering programming information.

New information automatically erases previous programmed data.

9. Press the BAND select button to select either "L", "H" or "U" according to the channel number as listed below.

Indication on display	Channels to be received
L	VHF low channels 2~6
H	VHF high channels 7~13
U	UHF channels 14~83

For example, if you're going to tune one of UHF channels 14 through 83, display the letter "U" by pressing the BAND select button.

10. Press and hold the SEARCH button (▲) until the picture for the channel number you are programming appears on the TV screen. The active channel with lowest number in the band being programmed will appear, followed in order by the other active channels, as in the "Channel frequency spectrum" on next page.

Note:

1. Holding down the SEARCH button (▲) at the end of band will result in tuning into the next band. The band display will change to the next higher band.
2. If you press the SEARCH button (▼) at first, the band will change to adjacent band immediately. The active channel with the highest frequency in the band will first appear, followed in opposite sequence by the other active channels.
3. Speeds of picture scanning from the lowest channel to the highest in each band are as follows;

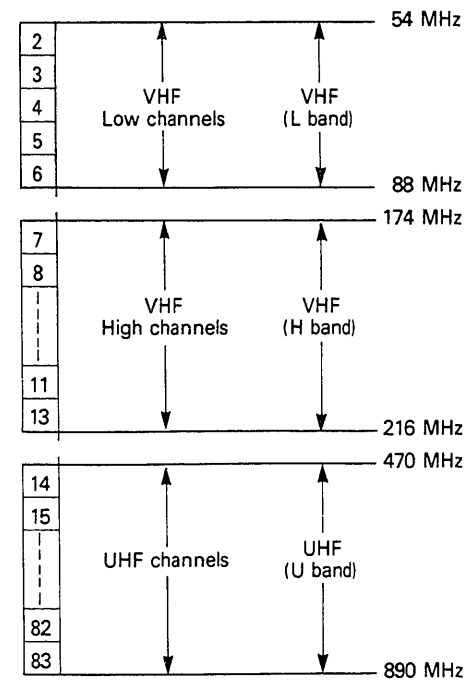
Band	Speeds
L	About 20 seconds
H	About 40 seconds
U	About 80 seconds

11. After releasing the SEARCH button when the channel picture appears for the channel number you are programming, press the up (▲) and down (▼) SEARCH buttons to fine tune the TV channel.
12. Repeat steps 8 through 11 for other channel.
13. Return the NORMAL/SELECT switch to "NORMAL".

- To check programming, press the CHANNEL select buttons to cycle the VTR tuner through all the channels you have programmed. If a channel was missed or requires fine tuning, repeat above steps for the channel involved.

Always return the NORMAL/SELECT switch to "NORMAL" after preprogramming is complete.

Channel frequency spectrum



AFC (Automatic Frequency Control)

A channel is fine tuned using up (▲) and down (▼) SEARCH buttons. When the NORMAL/SELECT switch is returned to "NORMAL", AFC is turned on and the channel "locks in". The AFC electronically optimizes the fine tuning adjustment.

If a TV channel signal is marginal due to graininess or ghosting, the picture may sometimes be improved by manually tuning for best picture and then defeating the AFC action. To turn AFC off, follow the procedure below.

AFC off tuning procedure

- Set the NORMAL/SELECT switch to "SELECT".
 - Select the desired channel and fine tune for best picture with the up (▲) and down (▼) SEARCH buttons.
 - Press the AFC OFF button.
- "AFC" indication above the channel indication display will disappear.
- Return the NORMAL/SELECT switch to "NORMAL".

Note:

- The AFC is only switched off for the channel you have been programming. AFC remains in effect on all other channels. To defeat the AFC for additional channels, repeat the above steps.
- Pressing the AFC OFF button once again will turn the AFC on.

Eliminating unwanted preset channels

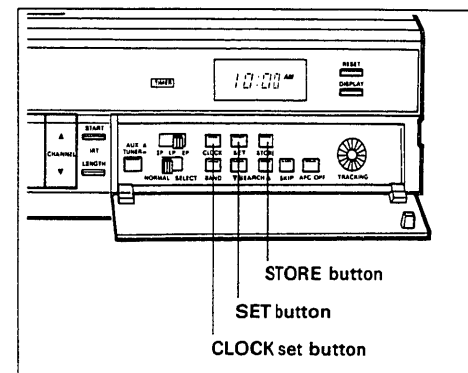
You can rearrange the desired channels by eliminating unwanted preset channels for channel up/down selection.

- Press the CHANNEL select buttons until an unwanted channel is turned.
 - Set the NORMAL/SELECT switch to "SELECT".
 - Press SKIP button.
- Sound will go off indicating the channel has been erased from memory.
- Repeat steps 1 through 3 until all unwanted channels have been eliminated.
 - Return the NORMAL/SELECT switch to "NORMAL".

Channels which have been eliminated cannot be selected by the CHANNEL select buttons.

Note: To restore the erased channel, repeat the above steps 1 through 3.

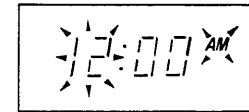
CLOCK TIME SETTING



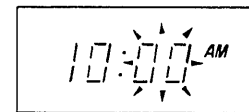
- When VTR is plugged into an AC outlet for first time, the clock display shows "--:--".

The clock is set using the CLOCK, SET and STORE buttons. The CLOCK button selects the clock setting mode. The SET button advances the Hours or Minutes. The STORE button stores the Hours or Minutes. To indicate the "HOUR" mode, the hours digits will flash. To indicate the "MINUTE" mode, the minutes digits will flash. When the STORE button is pressed, the flashing digits will be stored in memory.

- Press and hold the CLOCK set button while performing steps 2 and 3.

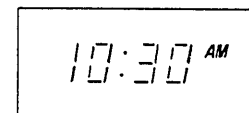


- Press the SET button to set the present hour. Hold the button down to advance rapidly. Press the STORE button when the present hour appears. "00" minutes starts flashing.



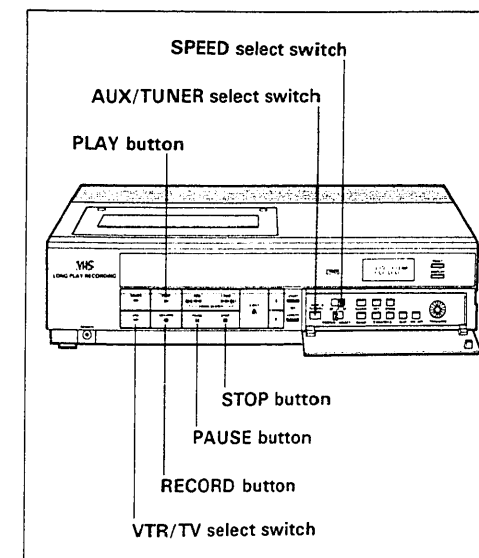
For example, the diagram shows that "AM 10" hour has been set.

- Press the SET button to set the minute. Hold the button down to advance rapidly. Press the STORE button when the present minute appears.



For example, the diagram shows that "30" minutes has been set.

RECORDING TV PROGRAMS



- Turn on VTR power. If you wish to view a program being recorded, turn on TV and select the channel 3 or 4 for your video channel.
 - Insert Cassette. Be sure to check that the record safety tab is not missing.
 - Set SPEED select switch to "SP", "LP" or "EP". It is recommended to set this switch to "SP" when recording a music program.
 - Set the AUX/TUNER select switch to "TUNER".
 - Set the VTR/TV select switch to "VTR" (VTR indicator lights).
 - Select channel to be recorded.
 - Press RECORD button and while holding RECORD, press PLAY button.
 - Press PAUSE button to stop recording temporarily. Press again to release.
- Note: To prevent tape damage, do not leave the unit in the pause mode for more than 5 minutes.
- Press STOP button to stop recording.

To record one program while viewing another
You can record one program while viewing another by merely selecting the channel with your TV channel button after setting the VTR/TV select switch to "TV". The recorded program can be viewed later at your convenience.

To change the channel to be recorded while in record mode

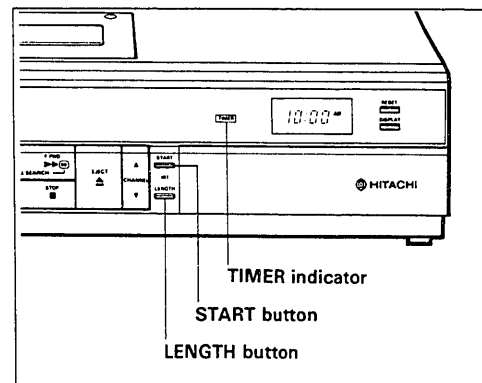
During recording, the channel lock function operates and channel cannot be changed if the channel select button is pressed.

If you wish to change channel, proceed as follows.

- Press the PAUSE button.
- Change channel desired.
- Press the PAUSE button to release record pause mode.

INSTANT RECORDING

Instant recording timer (IRT) allows you to start an unattended recording without programming the timer. It is convenient if you are interrupted while viewing a program and want to record the balance of it. By using the delayed start feature you can delay the recording start up to 24 hours. Although you do not need to program the timer for IRT, the clock must be set.



IRT with immediate start

1. Follow the steps 1 through 6 on "RECORDING TV PROGRAM".
2. Press the LENGTH button to select the recording time. Pressing the button once sets the timer to "0:00". The recording time changes in hour and minute in the order of 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 every time the button is pressed. IRT will begin when 0:30 is displayed. During recording, the remaining IRT time appears on the timer display.
3. At the end of recording the display reads 0:00; the VTR will automatically shut off.

Note:

1. IRT feature does not operate during play.
2. If the LENGTH button is pressed during rewind operation, VTR enters the IRT mode after rewinding tape.

Delayed start IRT

You can delay the start of an IRT by using the START button.

1. Follow the steps 1 through 6 on "RECORDING TV PROGRAM".
2. Press the START button to set the start time. The start time may be set to begin on any hour or half hour, up to 24 hours from present. For example, the present time is 9:15 and you want to record a program that starts at 10:30. Just press the START button three times.
3. Press the LENGTH button repeatedly to select the desired recording time. The recording time changes in hour and minute in the order of 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 every time the button is pressed.

4. Turn off the VCR power.

The TIMER indicator will come on, and IRT will begin at the time you selected.

During recording, the remaining IRT time appears on the timer display.

Note:

1. Delayed IRT will not begin if the VTR is turned on at the start time.
2. The TIMER indicator flashes to warn that recording will not occur because cassette has not been inserted or the safety tab on the cassette has been removed.
3. During IRT, channel number will be displayed for about 5 seconds when the DISPLAY button is pressed.

Recalling the IRT

Press the START or LENGTH button only once to recall the start time or recording time respectively. The display shows start time or recording time for about 4 seconds and returns present time of day or counter reading.

Note: To recall the recording time, press the LENGTH button only once. If you press the button twice or more, the recording time will be changed.

To extend the recording time

The recording time can be extended anytime by pressing the LENGTH button. The timer display will reset to 0:30, 1:00, 1:30, 2:00, 3:00 or 4:00 as selected.

To cancel IRT

You can clear IRT by pressing the LENGTH button until time remaining is 0:00, or by pressing the POWER button and then the STOP button within 10 seconds.

Note:

1. When the recording is not taking place, press the LENGTH button until the display reads 0:00 to cancel IRT.
2. The presetting of IRT is not possible when the previous information is still stored.

DISASSEMBLY

1. REMOVING THE CASE

1. Channel Preset Door
2. Top Cover
3. Bottom Cover
4. Front Cover
5. Rear Panel

1. Channel Preset Door (Fig. 1)

- 1) Open the channel preset door.
- 2) Pull the channel preset door in the direction of the arrow to remove it.

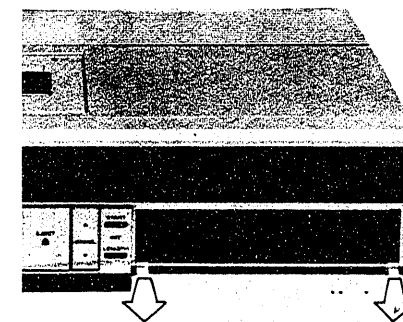


Fig. 1 Channel Preset Door

2. Top Cover (Fig. 2)

- 1) Remove 3 screws located at the rear of the top cover.
- 2) Lift the rear of the top cover first and then lift the whole top cover backwards to remove it.

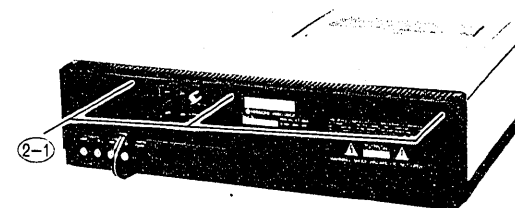


Fig. 2 Top Cover

3. Bottom Cover (Fig. 3)

- 1) Remove 7 screws holding the bottom panel.

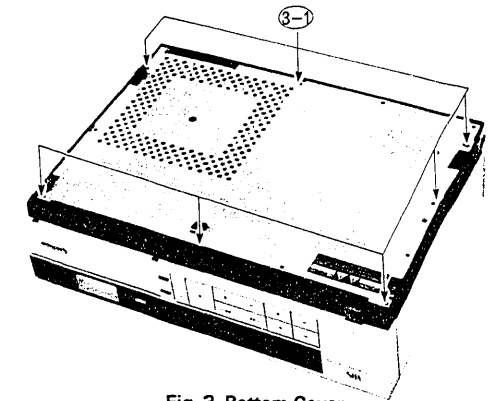


Fig. 3 Bottom Cover

4. Front Cover (Fig. 4)

- 1) Remove the top and the bottom panels. (Refer to item 1-2, 1-3)
- 2) Open the channel preset door and pull the tracking control knob forward to remove.
- 3) Remove the 3 screws and release the 3 tabs from the top of the front panel.
- 4) Lift the front panel diagonally.

- Note:**
- Upon reinstallation, take care the two (2) switch knobs (SP/LP/EP and NORMAL/SELECT switches) on the timer/input key circuit board.
 - Upon reinstallation, align the six (6) holes in the top panel with the six (6) tabs of the stay.

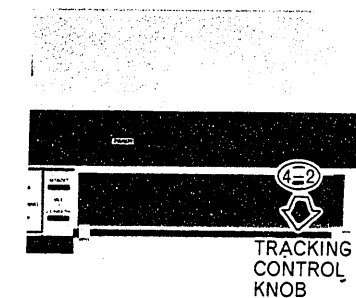


Fig. 4 Tracking Control Knob

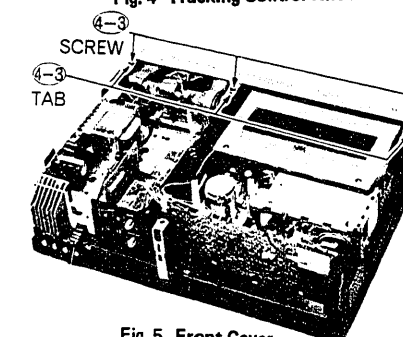


Fig. 5 Front Cover

2. PC BOARD LOCATIONS

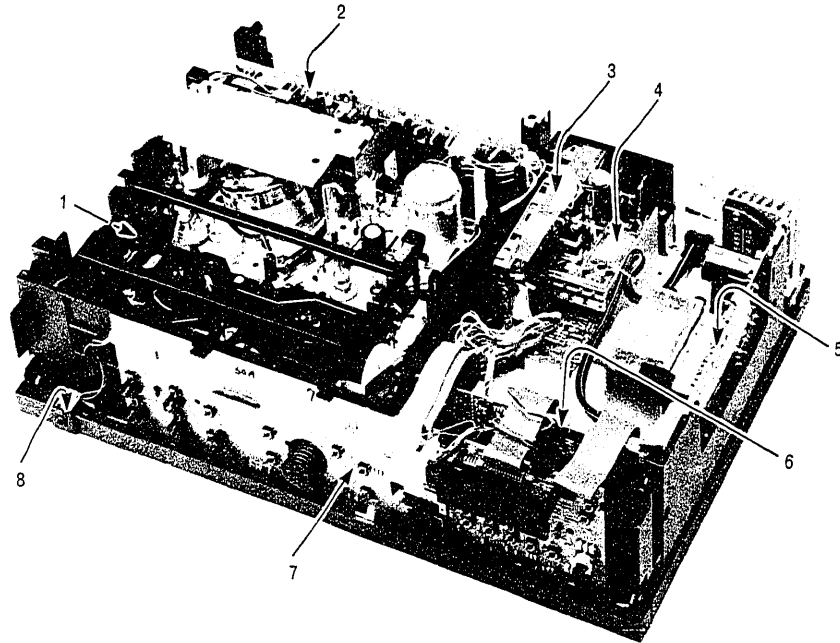


Fig. 6 Top View (I)

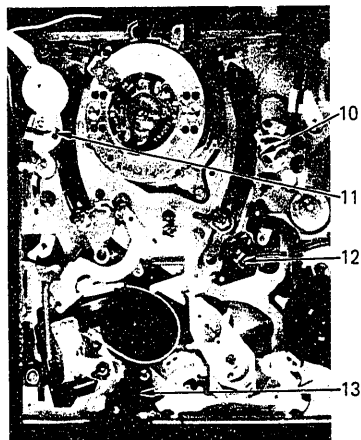


Fig. 7 Top View (II)

1. SUPPLY END SENSOR
2. LUMINANCE/CHROMA P.C.B
3. IF PACK
4. TUNER/PACK
5. REGULATOR P.C.B
6. V.S TUNING P.C.B
7. TIMER P.C.B
8. REMOTE CONTROL JACK
9. TAKE-UP END SENSOR
10. AUDIO/CONTROL HEAD
11. FULL ERASE HEAD
12. END LAMP
13. SAFETY TAB SWITCH

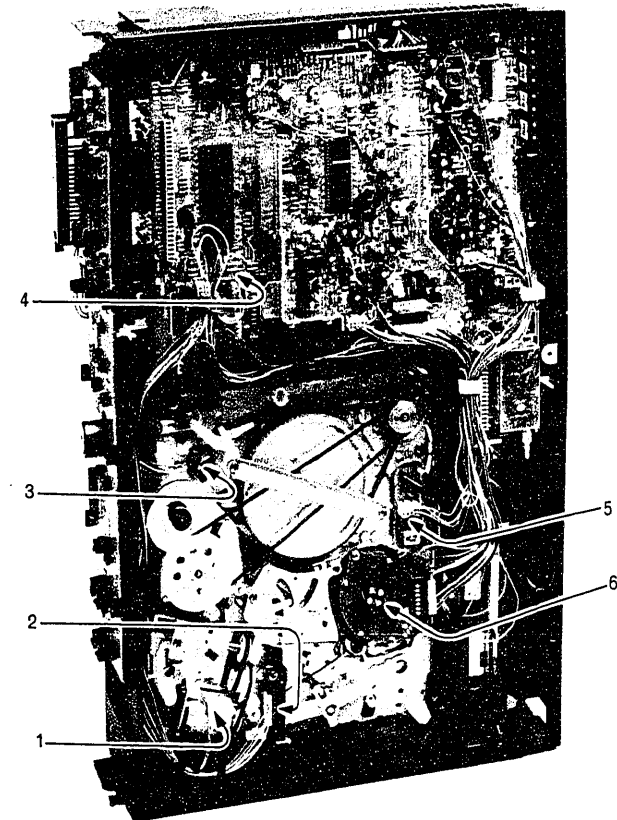


Fig. 8 Bottom View

1. LOADING MOTOR P.C.B
2. MECHANISM STATE SWITCH
3. REEL SENSOR P.C.B
4. MAIN P.C.B
5. CAPSTAN MOTOR P.C.B
6. CYLINDER MOTOR P.C.B

3. REMOVING THE P.C. BOARDS

1. Timer Board
2. Luminance/Chroma Board
3. V.S Tuning Board
4. Tuner/IF Board
5. Regulator Board
6. Main Board

1. Timer P.C Board Release and Timer Display Release (Figs. 9, 10)

- 1) Follow the procedure for removing the panels. (Refer to item 1-2, 1-3)
- 2) Remove the 3 screws holding the stay installed in the frame below the front panel.

Note: 1. The screws are present at the bottom of the stay.
2. Release the 2 stoppers on both sides of the stay.

- 3) Release the 8 stoppers on the circuit board.
- 4) Taking care of the cable assemblies, pull the circuit board forward to release.

(Timer Display)

- 5) Remove the 2 nylon retainers and release the stoppers on both sides of the timer display to remove the display holder. The timer display may now be unsoldered and removed.

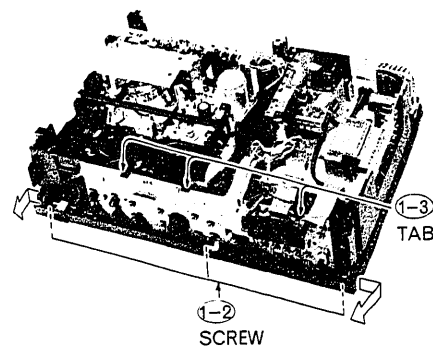


Fig. 9 Timer/P.C. Board Release

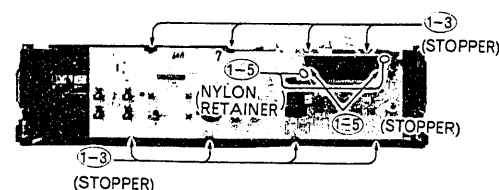


Fig. 10 Timer Display Removal

2. Luminance/Chroma P.C. Board (Fig. 11)

- 1) Remove the top cover (Refer to item 1-2)
- 2) Release a stopper of the shield cover (in the Luminance/Chroma P.C.B) from the chassis.
- 3) Carefully lift the circuit board upward to disconnect the P.C. board connector (PG254) from the main circuit board.
- 4) Disconnect the connector (PG212).

* The connector pins can be inserted securely while holding the connector from the parts side of the main board by hand.

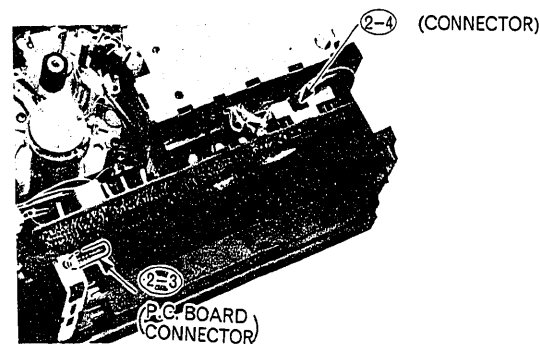


Fig. 11 Luminance/Chroma P.C. Board.

3. V.S Tuning P.C. Board (Fig. 12)

- 1) Remove the top cover. (Refer to item 1-2.)
- 2) Remove the front cover. (Refer to item 1-4.)
- 3) Disconnect 3 flat cables.
- 4) Disconnect 2 connectors
- 5) Disconnect the connector and pull out the connector pins inserted into the main board upward.

Note: Check that the connector pins are securely inserted into the connector of the main board when reassembling the board.

* The connector pins can be inserted securely while holding the connector from the parts side of the main board by hand.

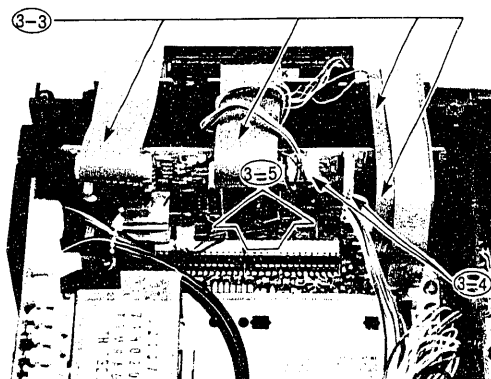


Fig. 12 V.S Tuning P.C. Board

Note: Depress the connector cover as shown in the diagram below to disconnect the flat cable when replacing the board.

Depress the connector cover to insert the flat cable.

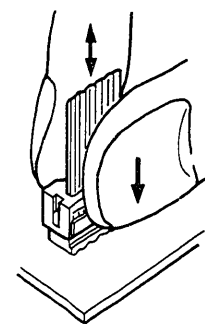


Fig. 13

4. Tuner/IF P.C. Board (Fig. 14)

- 1) Remove the top cover. (Refer to item 1-2.)
- 2) Disconnect 2 connectors and RF cable.
- 3) Remove 3 screws, and then take out the Tuner/IF block.

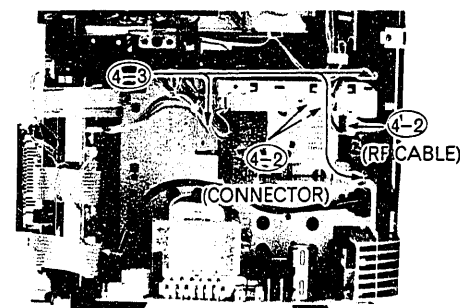


Fig. 14 Tuner/IF P.C. Board.

5. Regulator P.C Board (Fig. 15)

- 1) Remove the top cover. (Refer to item 1-2.)
- 2) Remove the tuner/IF board. (Refer to item 3-4.)
- 3) Remove 3 screws and take out the regulator board together with the power supply assembly.

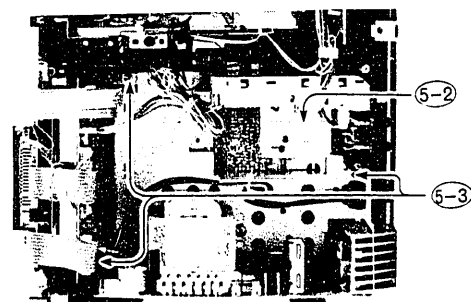


Fig. 15 Regulator P.C. Board

6. Main P.C. Board (Fig. 16)

- 1) Remove the bottom cover. (Refer to item 1-3.)
- 2) Remove the V.S tuning P.C. board. (Refer to item 3-3)
- 3) Remove the luminance/chroma P.C. board. (Refer to item 3-2)
- 4) Remove 3 screws and release 6 stoppers.
- 5) Disconnect connectors and the RF cable.

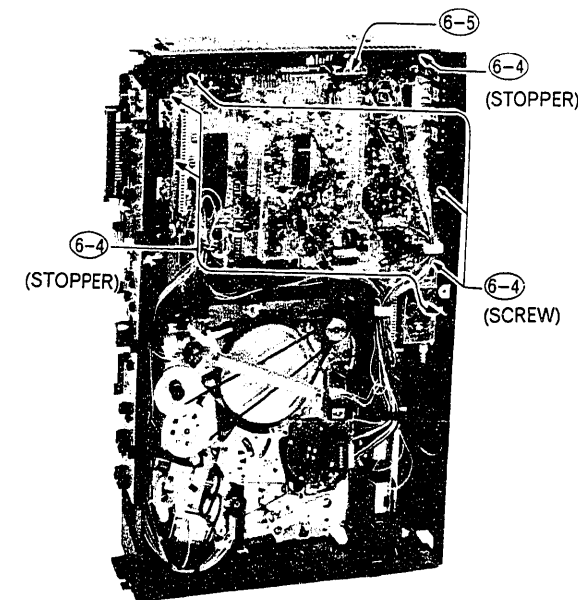


Fig. 16 Main P.C. Board

4. REMOVING CASSETTE HOLDER PARTS

1. Cassetts Lid (Fig. 17)

- 1) Remove 2 cassette lid fixing screws to release the fitting at the front of the cassette lid

2. Shield Cover (Fig. 17)

- 1) Remove the top cover. (Refer to item 1-2)
- 2) Remove the screw.
- 3) Release the 2 tabs holding the shield cover. (Fig. 13-1)
- 4) Lift the shield cover upward to remove.

Note: Upon reinstallation, point the two (2) tabs, protruded from the bottomleft of the shield cover, at the inside of the chassis case.

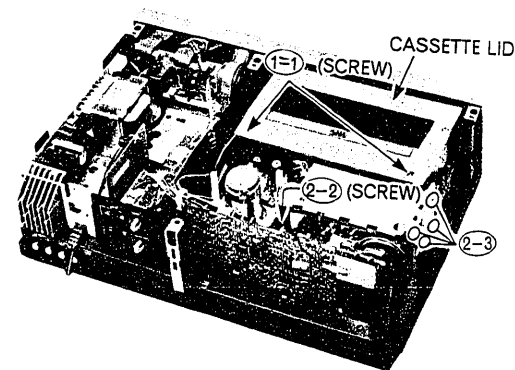


Fig. 17 Cassette Lid/Shield Cover

3. Cassette Holder (Fig. 18)

- 1) Follow the procedure for removing the panels. (Refer to item 1-2, 4-1)
- 2) Open the cassette holder
- 3) Remove the 2 screws holding the cassette holder.
- 4) Lift the rear of the cassette holder upward to release the front mounting.

Note: Reinstall the cassette holder with the holder open.

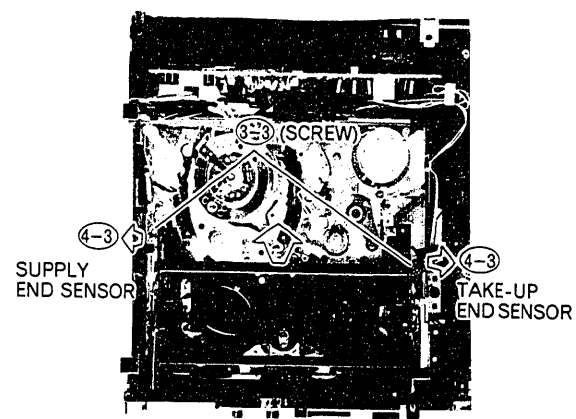


Fig. 18 Cassette Holder/Supply (Take-up) End Sensor

4. Supply (Take-Up) End Sensor (Fig. 18)

- 1) Remove the top panel. (Refer to item 1-2)
- 2) Unsolder the wires to the board to remove.
- 3) Lift the supply end sensor (take-up end sensor) in the groove in the chassis.

Note: The supply end sensor and the take-up end sensor can be removed without the cassette holder disassembled.

5. Cassette Holder Switch (Fig. 19)

- 1) Remove the bottom cover. (Refer to item 1-3)
- 2) Remove the cassette holder switch fixing screw.
- 3) Disconnect the connector.

Note: Install the switch after lifting the cassette holder.

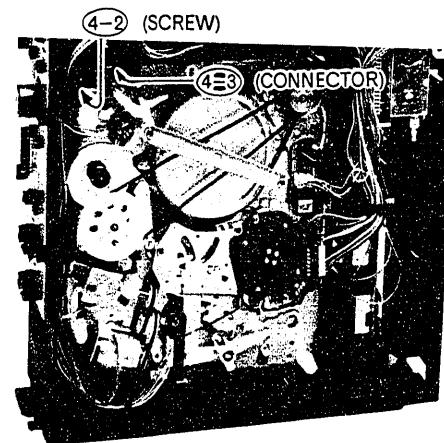


Fig. 19 Cassette Holder Switch

5. MAIN MECHANICAL COMPONENTS LOCATIONS

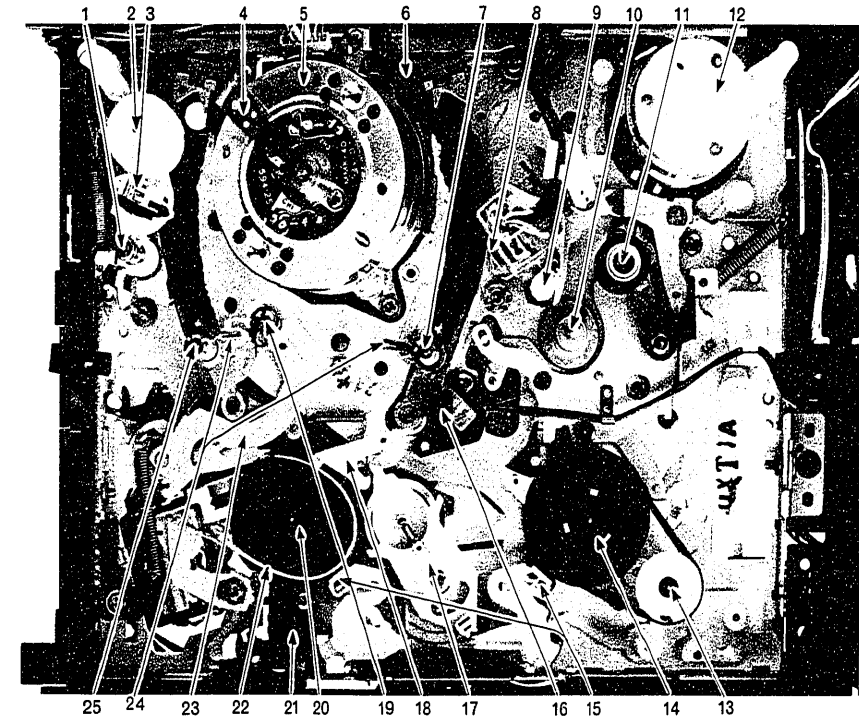


Fig. 20 Top View

- | | |
|--------------------------|-------------------------|
| 1. SUPPLY GUIDE POLE | 14. TAKE-UP REEL DISK |
| 2. IMPEDANCE ROLLER | 15. MAIN BRAKES |
| 3. FULL ERASE HEAD | 16. END LAMP |
| 4. CYLINDER MOTOR BRUSH | 17. REEL DRIVE IDLER |
| 5. UPPER CYLINDER | 18. SUB BRAKE |
| 6. CATCHER/CYLINDER BASE | 19. TENSION POLE |
| 7. TAKE-UP GUIDE ROLLER | 20. SUPPLY REEL DISK |
| 8. AUDIO/CONTROL HEAD | 21. SAFETY TAB SWITCH |
| 9. TAKE-UP GUIDE POLE | 22. TENSION BAND |
| 10. CAPSTAN SHAFT | 23. TENSION ARM |
| 11. PRESSURE ROLLER | 24. ANGLE POSTS |
| 12. CAPSTAN MOTOR | 25. SUPPLY GUIDE ROLLER |
| 13. LOAD PULLEY | |

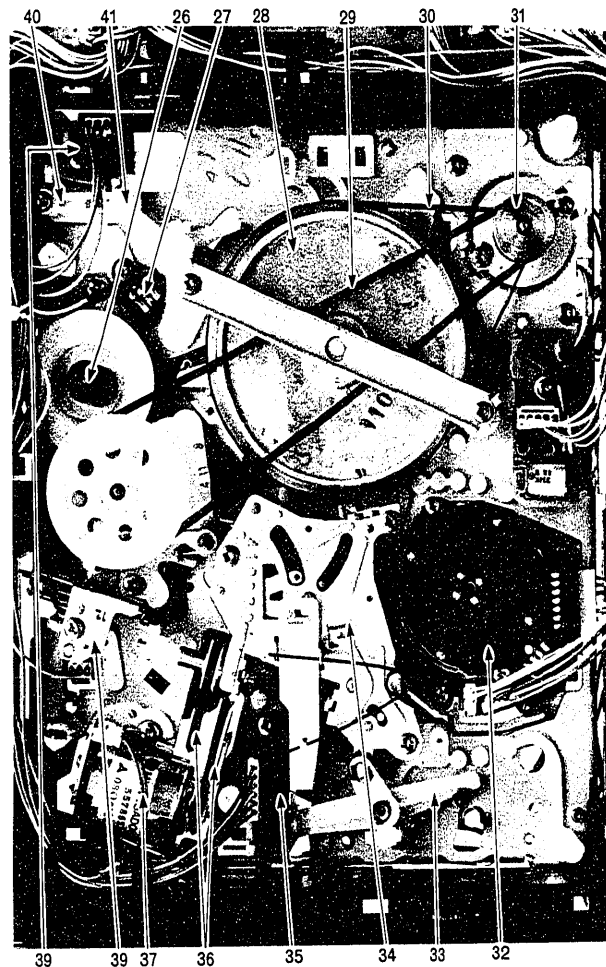


Fig. 21 Bottom View

- 26. CLUTCH PLATE
- 27. REEL SENSOR
- 28. CAPSTAN FLYWHEEL
- 29. REEL BELT
- 30. CAPSTAN BELT
- 31. CAPSTAN MOTOR PULLEY
- 32. LOWER CYLINDER
- 33. TENSION RELEASE ARM
- 34. LOADING GEAR ASSEMBLY
- 35. MECHANISM STATE SWITCH
- 36. LOADING BELTS
- 37. LOADING MOTOR
- 38. BRAKE SLIDER
- 39. CASSETTE HOLDER SWITCH
- 40. EJECT SLIDER
- 41. EJECT HOLD ARM

6. REMOVING THE MAIN COMPONENTS

Reassemble the components by the reverse procedure to removal as far as no cautions (marked *) are given.

Heads

1. FE head (Full erase head)
2. A/C head (Audio/control head)

Motors

3. Video head (Upper Cylinder)
4. Cylinder motor
5. Capstan motor
6. Loading motor

Sensor, Switches

7. Take-up reel sensor
8. Mechanism state switch
9. Safety tab switch

Other Components

10. Pressure roller
11. Impedance roller
12. Main brake
13. Supply sub-brake
14. Load pulley
15. Reel drive idler
16. End lamp
17. Tension band/tension arm
18. Supply reel disk
19. Take-up reel disk
20. Supply guide pole
21. Take-up guide pole
22. Guide roller
23. Clutch Plate
24. Brake slider
25. Loading link
26. Loading gear

1. FE Head (Fig. 22)

- 1) Remove the spring inserted between the FE head and chassis.
 - 2) Remove the guide pole fixing nut, and pull out the guide pole, spring and washer.
 - 3) Pull out the FE head base and then remove the FE head fixing screw at the back of the base.
- * Adjust the guide pole height after installing it.

2. A/C Head (Fig. 22)

- 1) Remove the wire retainer, A/C head base fixing nut and washer, and take them out.
- * Fit the bottom of the spring under the A/C head base to the stopper on the chassis, and the top of the spring to the stopper on the base when installing the A/C head.
- * Adjust the A/C head after installing it.

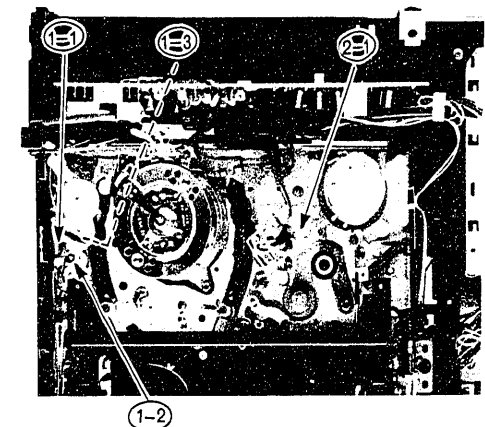


Fig. 22 FE Head, A/C Head

3. Video Head (Upper Cylinder) (Fig. 23)

Note: Use extreme care when removing the upper cylinder. Do not touch the video head tips (located in the upper cylinder) during servicing.

- 1) Remove the screw holding the cylinder motor brush.
 - 2) Unsolder the 4 leads and remove the 2 screws from the top of the upper cylinder and very gently lift the upper cylinder from the D-D cylinder motor shaft.
 - 3) Before replacing or reinstalling the upper cylinder, clean the D-D cylinder motor shaft, base and the inside of the upper cylinder.
 - 4) Reinstall the upper cylinder (video head) so the white marking of the CH-1 head is adjacent to that of the CH-1 leads of the rotary transformer. (Fig. 24)
- * Upon reinstallation, alternately tighten the 2 upper cylinder holding screws and perform the following adjustments.
- Tracking Preset Adjustment
 - A/C Head Adjustment
 - Head Switching Point Adjustment
 - Record Chroma and Luminance Level adjustments

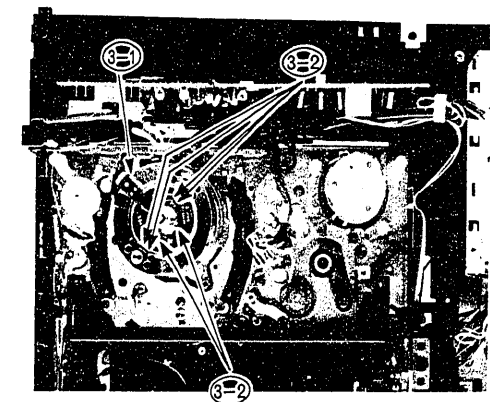


Fig. 23 Video Head (Upper Cylinder)

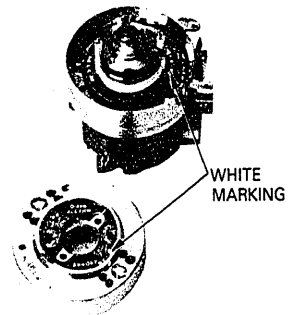


Fig. 24 Caution When Reinstalling the Upper Cylinder

4. Cylinder Motor Assembly (Figs. 25, 26)

- 1) Disconnect the 3 connectors (PG481 – from the cylinder motor P.C. board, PG482 and PG483 – from the cylinder FG P.C. board).
- 2) Remove the 3 screws holding the cylinder motor.
- 3) Disconnect the connector from the video head board.
- 4) Pull the cylinder motor assembly upward to remove.

Note: There is very little clearance between the cylinder motor and the mounting base.

Use extreme care when removing or replacing the motor.

Do not touch the video head tips (located in the upper cylinder) during servicing.

- 5) Wrap the motor in a soft cloth if the same motor is to be reinstalled. Clean the motor tape guide surface and upper cylinder after the motor is installed.

Note: Upon reinstallation, perform the following "interchangeability confirmation".

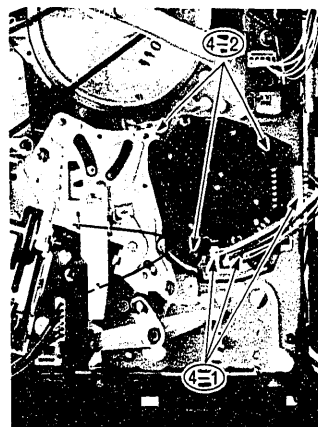


Fig. 25 Cylinder Motor Assembly – Bottom View

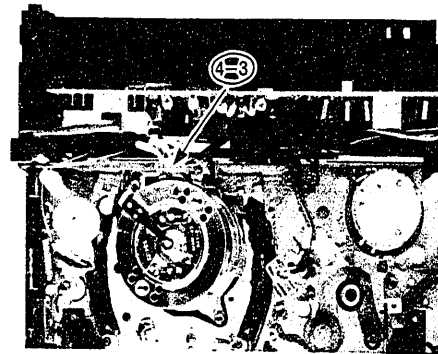


Fig. 26 Cylinder Motor Assembly – Top View

5. Capstan Motor (Fig. 28)

- 1) Remove the reel belt.
 - 2) Remove the flywheel belt.
 - 3) Remove 2 capstan motor holder fixing screws to lift the capstan motor.
- * Confirm the reference oscillation frequency adjustment after installation.

6. Loading Motor (Fig. 28)

- 1) Remove the loading belt.
- 2) Disconnect connector (PG3), remove the bracket fixing screw and then remove the loading motor.

7. Reel Sensor (Fig. 28)

- 1) Remove the screw to take out the reel sensor board.

8. Eject Slider and Eject Hold Arm Removal (Fig. 28)

- 1) Remove the spring.
- 2) Remove the screw which fix the eject slider.

9. Mechanism State Switch (Fig. 28)

- 1) Remove the mechanism state switch fixing screw and lift the screw hole side to release the fitting with the chassis.
- * Fit the switch lever to the groove in the slider to screw the lever when installing the switch.
Adjust the mechanism state switch after installation.

10. Safety Tab Switch (Fig. 28)

- 1) Disconnect connector (PG141) from safety tab switch.
- 2) Remove the safety tab switch fixing screw.

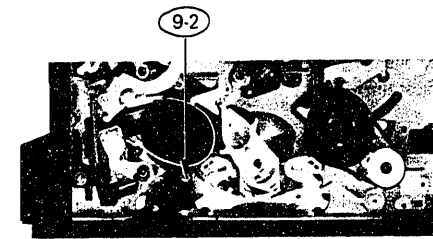


Fig. 27 Safety Tab Switch

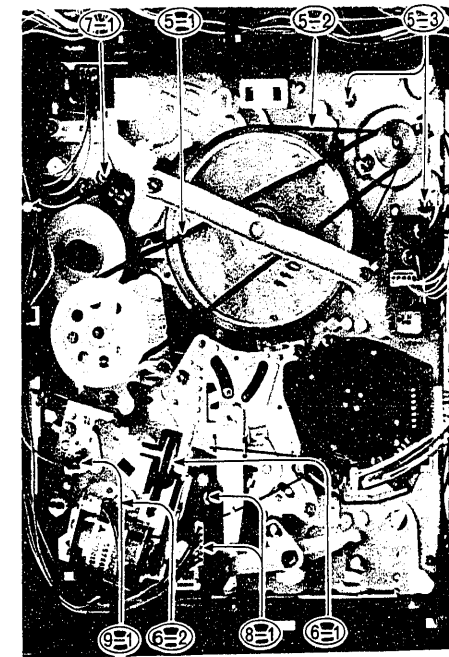


Fig. 28 Capstan Motor, Loading Motor, Reel Sensor, Mechanism State Switch, Safety Tab Switch

11. Pressure Roller (Fig. 29)

- 1) Remove the pressure roller fixing screw.
- * Install the pressure roller so that the internal plastic surface faces upward.

12. Impedance Roller (Fig. 29)

- 1) Remove the spring inserted between the FE head base and chassis.
 - 2) Remove the guide pole fixing nut, and then take out the guide pole, spring and washer.
 - 3) Take out the FE head base, remove the FE head fixing screw at the back of the base and then remove the FE head.
- * The impedance roller is fixed to the FE head base together with the roller shaft and roller.
* Adjust the guide pole height after installing it.

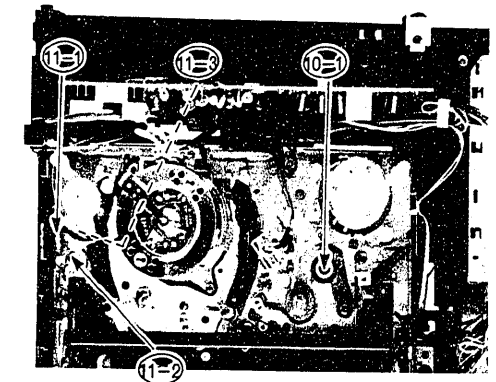


Fig. 29 Pressure Roller, Impedance Roller

13. Main Brake (Supply/Take-up) (Fig. 30)

- 1) Remove the cassette holder. (Refer to item 4-1.)
- 2) Remove each spring inserted between the supply and take-up brakes.
- 3) Release fitting with the chassis.

14. Supply Sub-Brake (Fig. 30)

- 1) Remove the cassette holder. (Refer to item 4-1.)
- 2) Remove the spring inserted between the brake and sub-chassis.
- 3) Release fitting of the brake rotary shaft.

15. Load Pulley (Fig. 30)

- 1) Remove the cassette holder. (Refer to item 4-1.)
- 2) Remove rubber belt inserted between the pulley and reel disk.
- 3) Remove the pulley fixing washer.

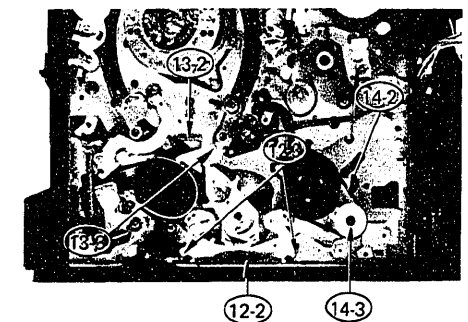


Fig. 30 Main Brake, Sub-Brake, Load Pulley

16. Reel Drive Idler (Fig. 31)

- 1) Remove the cassette holder. (Refer to item 4-1.)
- 2) Pull the spring retainer forward the front of the instrument and pull the idler upward to remove.

17. End Lamp (Fig. 31)

- 1) Remove the cassette holder (Refer to item 4-1)
- 2) Remove the end lamp fixing screw.

18. Tension Band/Tension Arm (Fig. 31)

- 1) Remove the cassette holder (Refer to item 4-1.)
 - 2) Remove the spring inserted between the tension arm and spring holder.
 - 3) Remove the tension band fixing screw.
 - 4) Release fitting of the tension arm, and pull out the tension band/tension arm.
- * Adjust as follows after installing the tension band/tension arm.
 - * Tension pole position and tension adjustment.

19. Supply Reel Disk (Fig. 31)

- 1) Remove the cassette loading mechanism. (Refer to Item 4-1.)
 - 2) Remove the tension band/tension arm. (Refer to Item 6-17.)
 - 3) Remove the supply sub-brake. (Refer to Item 6-13.)
 - 4) Remove the washer at the top of the disk.
- * A washer is inserted between the disk and chassis. Install the disk after checking it.

20. Take-up Reel Disk (Fig. 31)

- 1) Remove the cassette loading mechanism. (Refer to Item 4-1.)
 - 2) Remove the belt between the take-up reel disk and load pulley.
 - 3) Remove the washer at the top of the disk.
- * A washer is inserted between the disk and chassis. Install the disk after checking it.

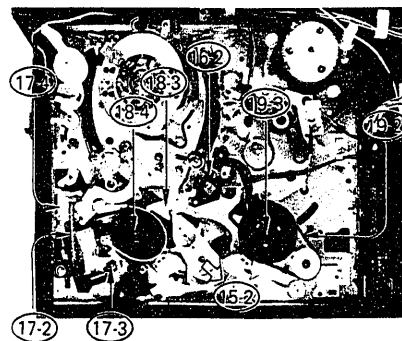


Fig. 31 Reel Drive Idler, Tension Band/Tension Arm, Reel Disk

21. Supply Guide Pole (Fig. 32)

- 1) Remove the guide pole fixing nut.
- * Adjust the height of the guide pole after installing it.

22. Take-up Guide Pole (Fig. 32)

- 1) Remove the cap at the top of the guide pole.
 - 2) Remove the guide pole fixing nut.
- * Adjust the height of the guide pole after installing it.

23. Guide Roller (Fig. 32)

- 1) Loosen the guide roller fixing screw.
 - 2) Turn the guide roller to take it out.
- * Adjust the guide roller after installing it.

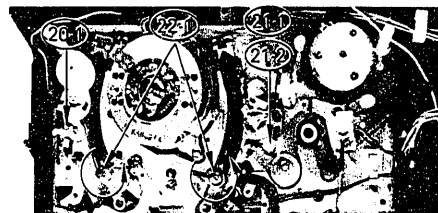


Fig. 32 Supply/Take-up Guide Pole, Guide Roller

24. Clutch Plate (Fig. 33)

- 1) Remove the reel drive idler. (Refer to item 6-15.)
- 2) Remove the reel belt.
- 3) Remove the 2 screws holding the clutch plate.

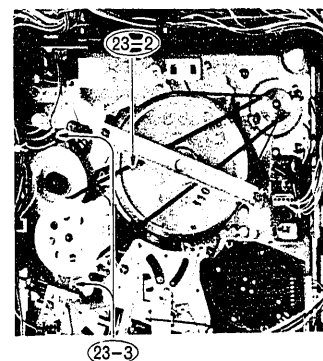


Fig. 33 Clutch Plate

25. Brake Slider (Fig. 34)

- 1) Remove the reel drive idler. (Refer to Item 6-15.)
 - 2) Remove the brake slider fixing screw.
- * Insert the brake drive arm pin into the groove of the slider operation section when installing the slider.



Fig. 34 Brake slider

26. Loading Link (Fig. 35)

- 1) Remove the cassette holder. (Refer to Item 4-1.)
 - 2) Remove the tension band/tension arm and supply sub-brake. (Refer to Items 13 and 17.)
 - 3) Remove 3 sub-chassis fixing screws, and then remove the sub-chassis, guide roller and inclined guide together with the base.
- * Match the tab of the loading gear and the groove of the loading link when installing the loading link.
 - * Insert the pin at the back of the guide base into the hole in the loading link when installing the guide base.

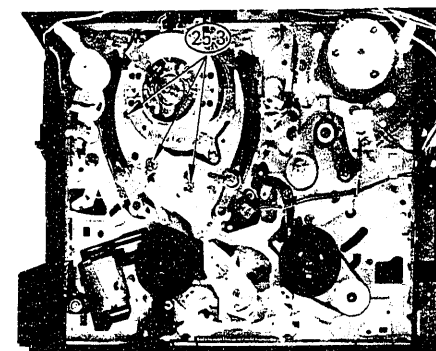


Fig. 35 Loading Link

27. Loading Gear (Fig. 36, 37, 38)

- 1) Remove 2 loading link fixing screws.
- 2) Remove the brake slider. (Refer to Item 6-24.)
- 3) Remove the mechanism state switch and then remove the switch slider. (Refer to Item 6-8)
- 4) Release fitting between the impedance roller operation arm and the chassis, and then remove the impedance roller operation arm.
- 5) Remove the capstan flywheel.
- 6) Remove 3 loading gear fixing screws.

- * Insert the take-up sub-brake drive arm pin into the hole in the take-up sub-brake operation arm, and the pressure roller drive arm pin into the hole in the pressure roller operation arm.

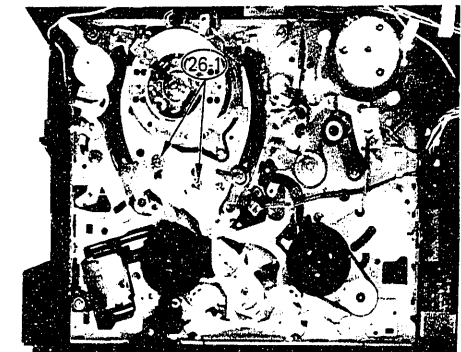


Fig. 36 Loading Gear (Top View)

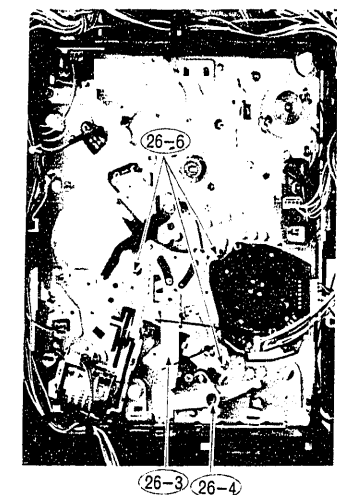


Fig. 37 Loading Gear (Bottom View)

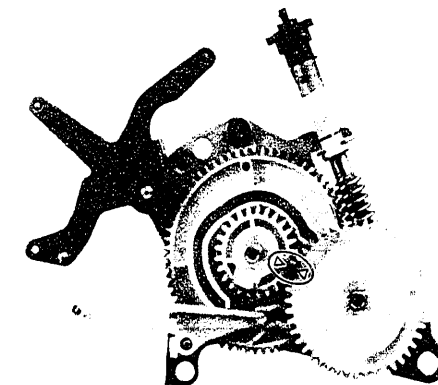


Fig. 38 Loading Gear Marking

ADJUSTMENT

ADJUSTMENT JIG LIST

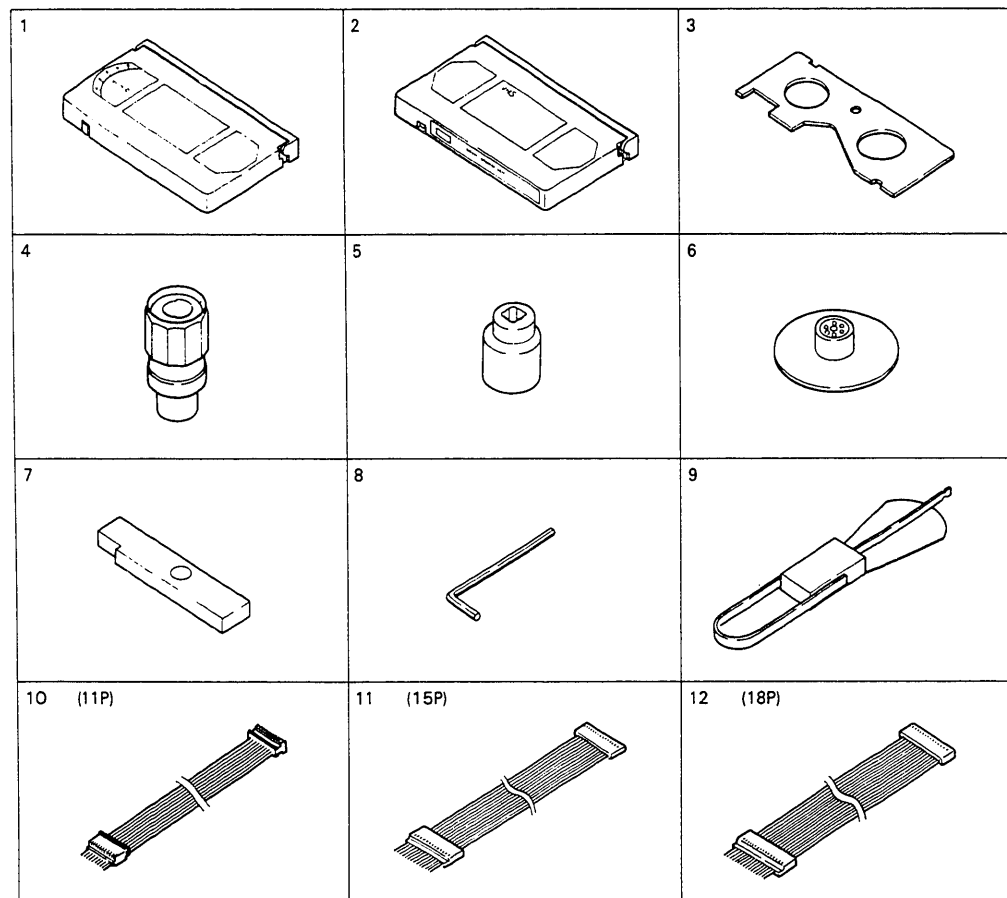


Fig. 1 Adjustment Jigs.

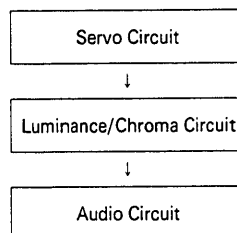
No.	Jig Name	Jig No.	No.	Jig Name	Jig No.
1	Back-tension meter	7099004	7	Reel disk height jig	7099001
2	Alignment tape	7099046	8	1.5 mm hexagonal wrench	—
3	Master plane	7099041	9	Fan-type tension gauge	—
4	Torque gauge	7099039	10	Relay connector (11P)	7099184
5	Torque gauge adaptor	7099035	11	Relay connector (15P)	7099185
6	Dummy reel	7099043	12	Relay connector (18P)	7099186

ELECTRIC CIRCUIT ADJUSTMENT

Test equipment, jigs and tapes required for overall circuit adjustment.

- 1) Color TV set
- 2) Oscilloscope
- 3) VTVM
- 4) Color bar signal generator
- 5) Frequency counter
- 6) DC voltmeter
- 7) Alignment tape
- 8) Blank tape

Order of adjustment
Perform adjustment in the order shown below.



* SERVO/AUDIO (MAIN) P.C. BOARD

Remove the bottom cover, place the VTR with the left down and perform the adjustment by the following procedure.

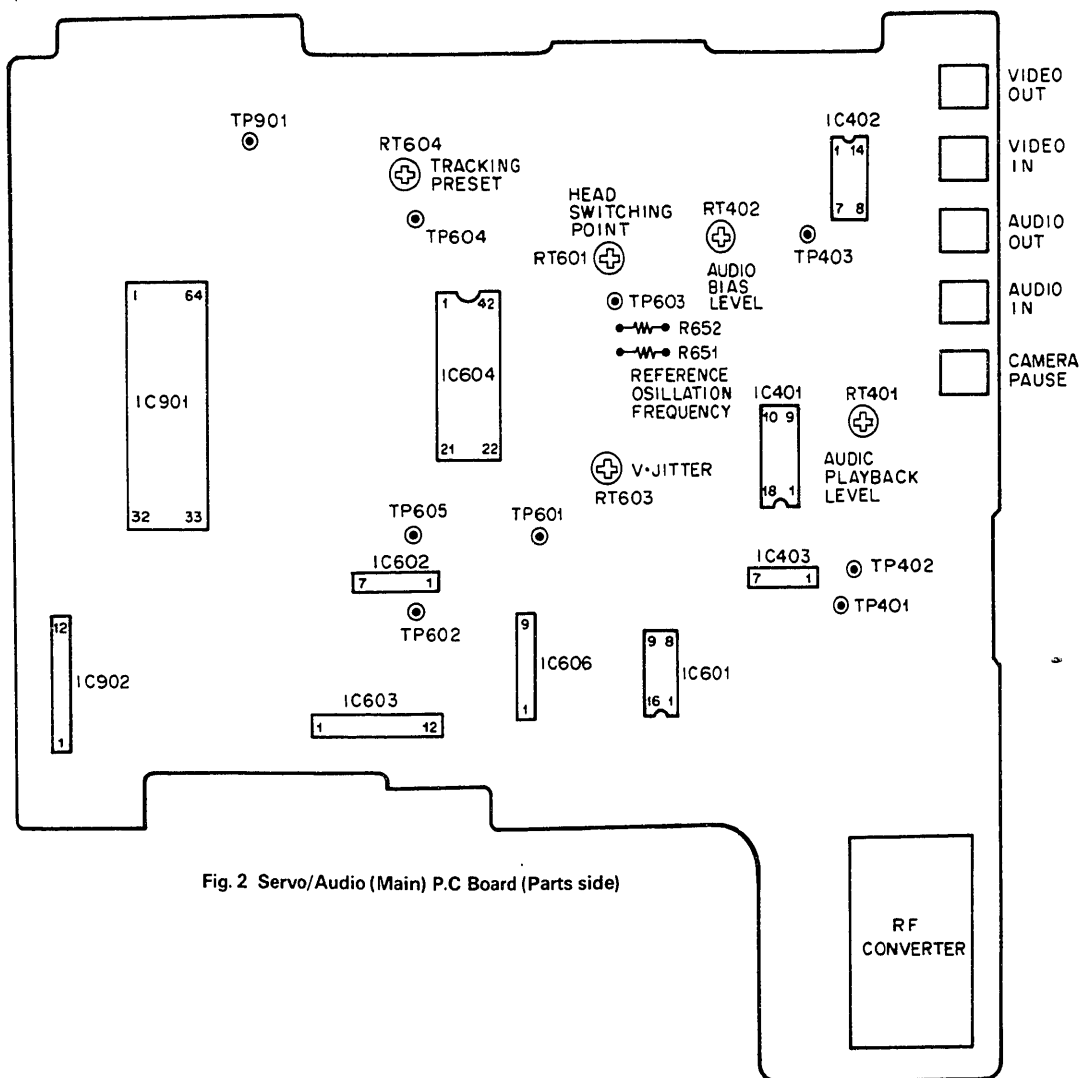


Fig. 2 Servo/Audio (Main) P.C Board (Parts side)

1. SERVO CIRCUIT ADJUSTMENT

1. Reference Oscillation Frequency Adjustment

This adjustment fine tunes the reference oscillation frequency (REF 30 Hz) in the phase control system to correct the rotation transmission loss caused by unevenness of the diameters of the flywheel and pulley, etc. When this adjustment is incomplete, noise appears in the picture or correct tracking is not achieved.

Connecting test equipment

Connect the frequency counter to the audio output jack on the rear panel.

VTR condition

Short-circuit test point terminals TP601 and TP603 to place only the phase control system (IC604) in the record mode.

Set the recording speed select switch to "SP". Then play back the alignment tape. (3 kHz AUDIO)

Adjustment points

R651, R652

Adjustment procedure

Check that the reading of the frequency counter is $3000 \text{ Hz} \pm 15 \text{ Hz}$. When it is more than 3015 Hz, omit R651. On the other hand, when it is less than 2985 Hz, omit R652.

Note: There are some units with R651 or R652 omitted on shipment from the factory.

2. Head Switching Point Adjustment

This adjustment determines the switching point of the video head during playback. When this adjustment is incomplete, the FM signal is degraded and the switching noise appears in the picture or H/V jitter is generated.

Connecting test equipment

- 1) Connect channel-1 of the oscilloscope to test point terminals TP604 (SW30Hz output) and TP602 (GND), and channel-2 to the video output jack on the rear panel.
- 2) Connect the monitor TV to the VHF output jack on the rear panel.

VTR condition

Play back the alignment tape.

Adjustment point

RT601 (CH1)

Adjustment procedure

- 1) Set the sync slope switch of the oscilloscope to "-" to adjust the CH1 phase. Then adjust RT601 so that the trailing edge of the SW30Hz signal is $6.5\text{H} \pm 0.5\text{H}$ before the vertical sync in the video signal.

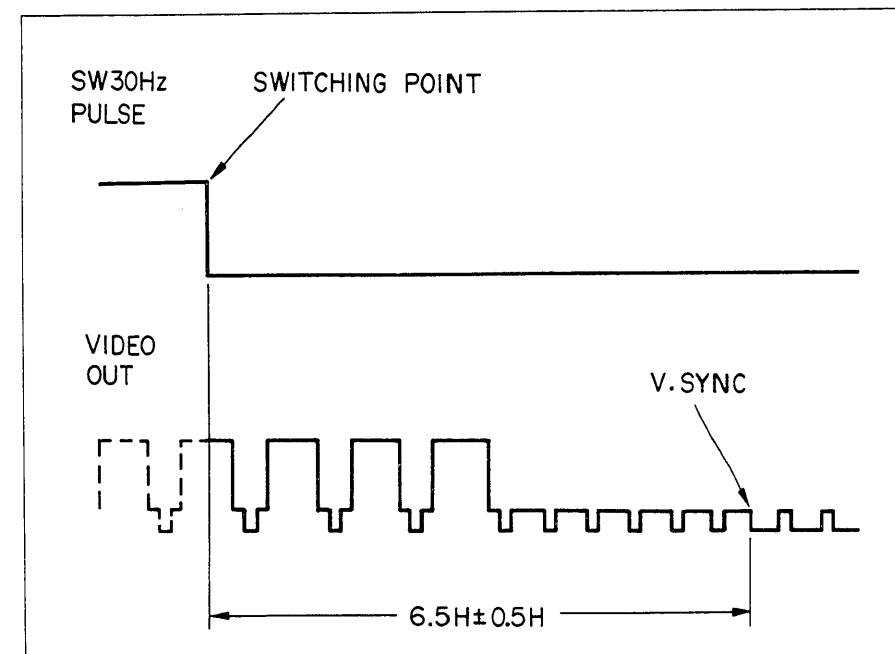


Fig. 3 Head Switching Point

3. Tracking Preset Adjustment

This adjustment optimizes tracking when playing back tape recorded on this VTR. When this adjustment is incomplete, noise is conspicuous in the played back picture with the tracking control set to the center click position or noise may not be removed with the tracking control turned.

Connecting test equipment

- 1) Connect the color bar signal generator to the video input jack on the rear panel or receive a TV program.
- 2) Connect channel-1 of the oscilloscope to the video output jack on the rear panel and channel-2 to TP605.

VTR condition

Set tracking control RV751 to the click position and the recording speed select switch to "SP", and record for a few minutes. Then play back this section.

Adjustment point

RT604

Adjustment procedure

- 1) Trigger channel-2 of the oscilloscope.
- 2) Adjust RT604 so that the vertical sync in the video signal and the positive peak of the control pulse align as shown in Fig. 4.
- 3) Observe the monitor picture, and turn the tracking control (RV751) left and right centered on the click position and check that the S/N is optimum at the click position.

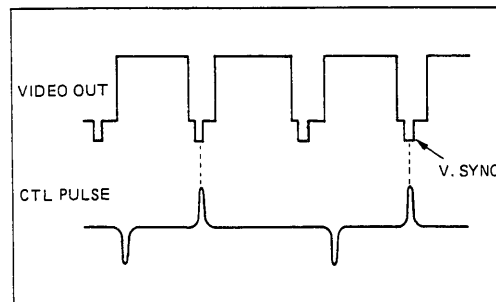


Fig. 4 Tracking Preset

4. V. Jitter Adjustment

This adjustment eliminates vertical jitter and noise in the still picture.

Connecting test equipment

- 1) Connect the color bar signal generator to the video input jack on the rear panel or receive a TV program.
- 2) Connect the monitor TV to the VHF output jack on the rear panel.

VTR condition

Set the recording speed select switch to "EP" and record for a few minutes. Then play back this section.

Adjustment point

RT603

Adjustment procedure

Adjust RT603 while observing the monitor TV so that vertical jitter in the picture stops.

2. AUDIO CIRCUIT ADJUSTMENT

1. Audio Playback Level Adjustment

This adjustment sets the audio playback level to the specified value.

Connecting test equipment

Connect the VTVM to the audio output jack on the rear panel.

VTR condition

Play back the audio 1 kHz section of the alignment tape.

Adjustment point

RT401

Adjustment procedure

Adjust RT401 so that the reading of the VTVM is -8 ± 0.5 dBm.

2. Audio Bias Level Adjustment

This adjustment sets the audio record bias to the optimum level.

When this adjustment is incomplete and bias is too great, the high-frequency response deteriorates, and when bias is too little, sound is likely to be distorted.

Connecting test equipment

Connect the VTVM to TP401 and TP402 (GND).

VTR condition

Set the recording speed select switch to "SP" and place the VTR in the no signal record mode.

Adjustment point

RT402

Adjustment procedure

Adjust RT402 so that the reading of the VTVM is $2.0 \text{ mV} \pm 0.1 \text{ mV}$.

3. LUMINANCE/CHROMA CIRCUIT ADJUSTMENT

Perform adjustment after removing the top cover.

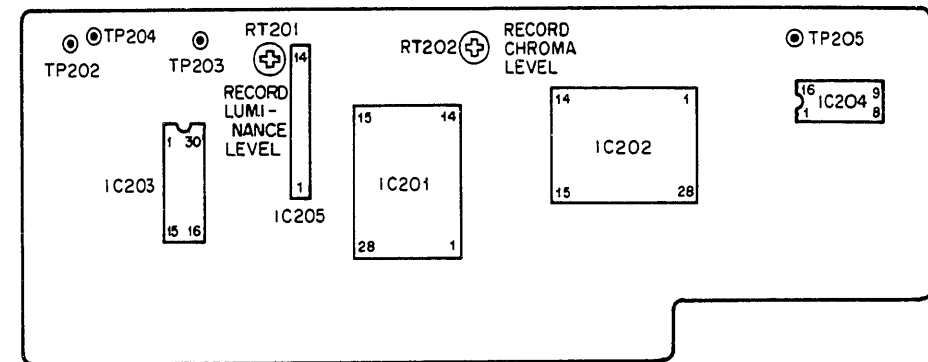


Fig. 5 Luminance/Chroma P.C. Board (Parts Side)

1. Record Chroma Level Adjustment

This adjustment optimizes the chroma level during recording.

When this adjustment is incomplete and the level is too high, diamond beats can be seen in the picture, and when the level is too low, the chroma S/N ratio deteriorates and coloring becomes poor. The optimum record chroma level differs depending on the figure stamped on the section shown on the upper cylinder (video head).

Perform this adjustment when replacing the video heads and the parts in the Luminance/Chroma signal system.

Connecting test equipment

- 1) Receive a TV program or connect the color bar signal generator to the video input jack on the rear panel.
- 2) Connect the oscilloscope to TP202 on the Luminance/Chroma board.

VTR condition

- 1) Load a blank tape and record in the EP mode.

Adjustment point

RT202

Adjustment procedure

- 1) Turn RT201 fully counterclockwise so that the luminance signal level is minimum.
- 2) Adjust RT202 so that the record chroma level shown in Fig. 8 is set to the value specified in Fig. 7.
- 3) Adjust the record luminance level after this adjustment is completed.

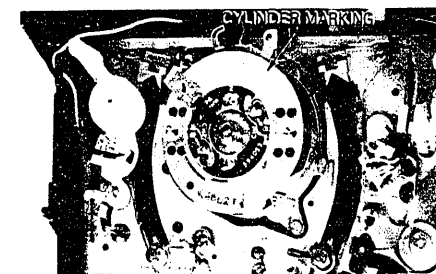


Fig. 6 Cylinder Mark Location

Cylinder mark	Level
No Mark	40 mVp-p
1	45 mVp-p
2 ~ 3	45 mVp-p
4	50 mVp-p

Fig. 7 Record Chroma Level

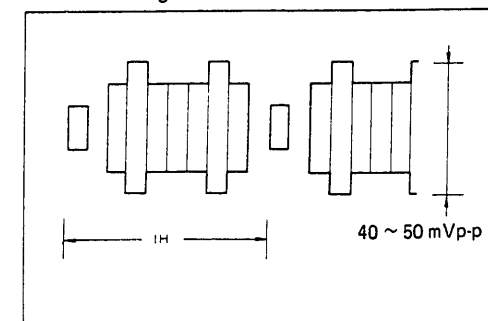


Fig. 8 Record Chroma Level

2. Record Luminance Level Adjustment

This adjustment optimizes the luminance level during recording. When this adjustment is incomplete and the level is too high, the black and white inversion phenomenon may occur or S/N deteriorates causing a rough picture. On the other hand, when the level is too low, the S/N deteriorates.

Connecting test equipment

Connect the same as shown in the previous item "Record Chroma Level Adjustment".

VTR condition

Load a blank tape and record in the EP mode.

Adjustment point

RT201

Adjustment procedure

Adjust RT201 so that the luminance level at sync tip is $130 \text{ mV} \pm 10 \text{ mV}$.

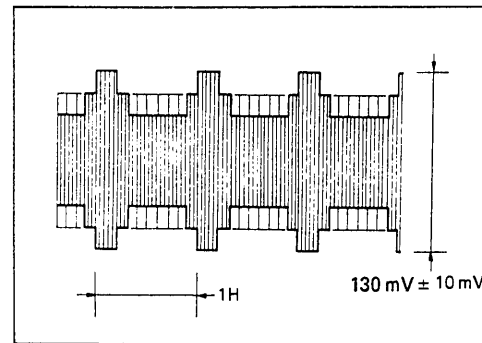


Fig. 9 Record Luminance Level

4. TUNER/IF CIRCUIT ADJUSTMENT

Perform adjustment after removing the top cover.

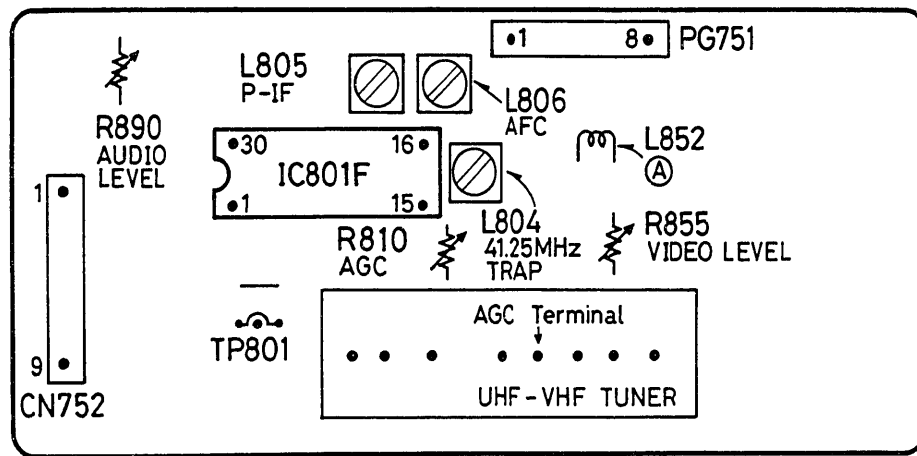


Fig. 10 Tuner/IF PACK P.C. Board (Parts side)

1. Picture-IF/41.25 MHz Trap Adjustments:

L805 (P-IF)

L804 (41.25 MHz)

Connecting test equipment

VTR condition

E-E mode

Adjustment procedure

- 1) Set the Video Level control (R855) and AGC control (R810) to the mechanical center.

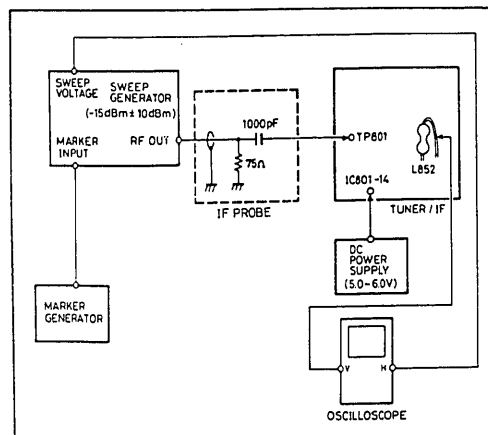


Fig. 11 Picture-IF/41.25 MHz

- 2) Adjust the DC bias supply so that the waveform on the scope is 1Vp-p.
3. Turn on 45.75 MHz marker.
- 4) Adjust the Picture-IF control (L805) for maximum detection of 45.75 MHz marker. (Fig. 13)
- 5) Turn on 41.25 MHz marker.
- 6) Adjust the 41.25 MHz Trap control (L804) for minimum 41.25 MHz marker. (Fig. 13)
- 7) Perform the Video Level/AGC adjustments.

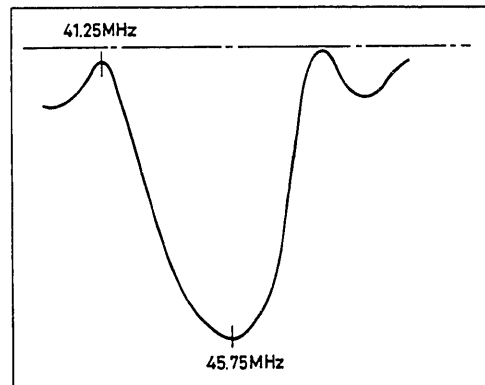


Fig. 12 45.75 MHz / 41.25 MHz markers

2. AFC Adjustment: L806 Connecting test equipment

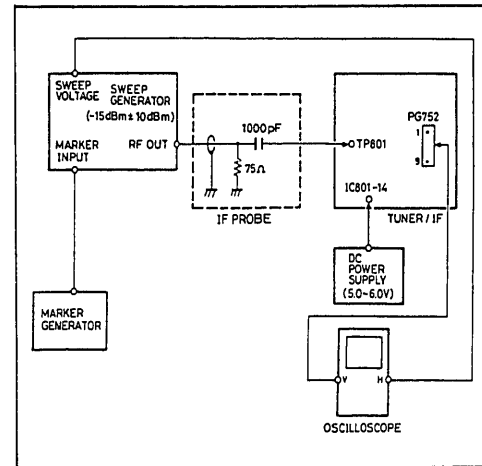


Fig. 13 AFC

VTR condition
E-E mode

Adjustment procedure

- 1) Turn on 45.75 MHz marker.
- 2) Adjust the AFC control (L806) as shown in Fig. 15.

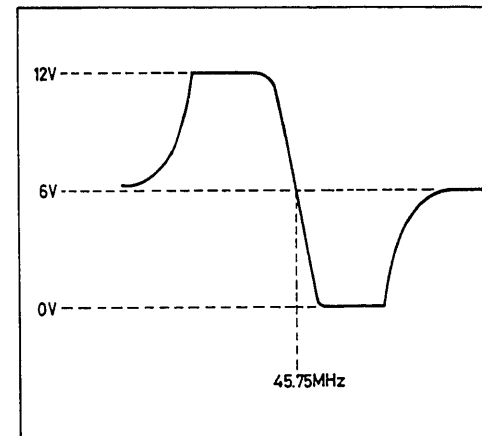


Fig. 14 AFC (45.75 MHz marker)

3. Video Level/AGC Adjustments: R855 (VIDEO LEVEL) R810 (AGC)

Connecting test equipment

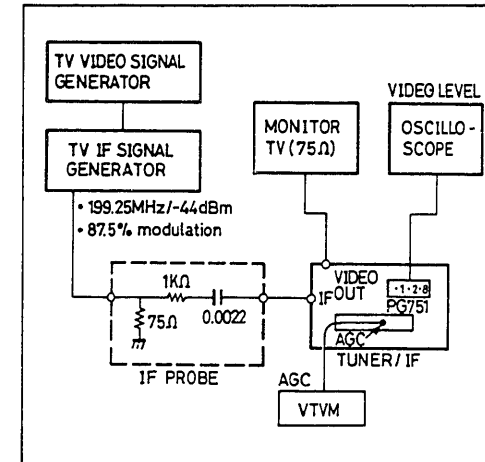


Fig. 15 Video Level/AGC

VTR condition
E-E mode

Adjustment procedure

- 1) Turn AFC on. (No "AFC OFF" indication)
- 2) Connect oscilloscope to the PG751-2.
- 3) Adjust the Video Level control (R855) for the color bar waveform of 1 Vp-p ± 0.05 Vp-p. (Fig. 17).
- 4) Connect a VTVM to the U-V tuner AGC terminal.
- 5) Adjust the AGC control (R810) for 7.2V ± 0.3V DC.

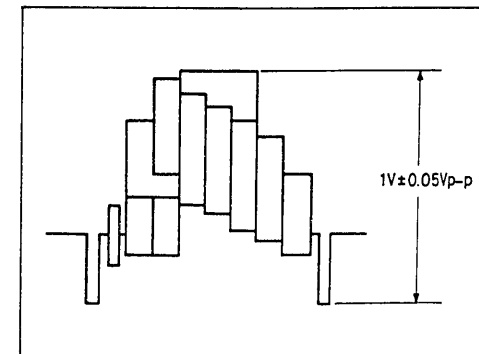


Fig. 16 Video Level

4. Audio Level Adjustment: R890

Connecting test equipment

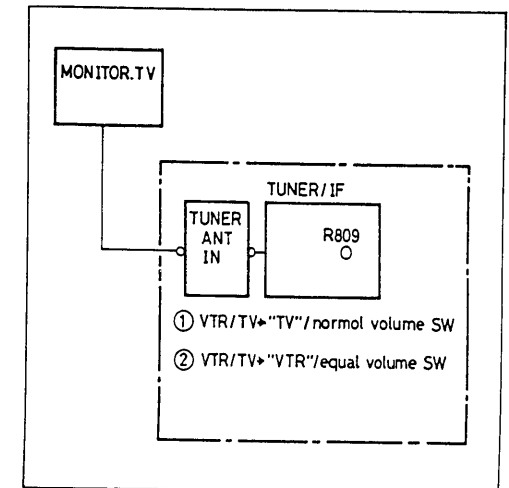


Fig. 17 Audio Level

VTR condition
E-E mode

Adjustment procedure

- 1) Set the VTR/TV switch in the TV position.
- 2) Adjust the volume on the TV for normal volume.
- 3) Place the VTR/TV switch in the VTR position and tune TV program.
- 4) Adjust the Audio Level control (R890) for equal volume.

MECHANISM ADJUSTMENT

1. MECHANISM STATE SWITCH ADJUSTMENT

This mechanism state switch is positioned near the loading gear at the bottom of the chassis and detects the loading condition of the mechanism and controls the loading motor. If this switch is not installed correctly, loading is not done and the mechanism does not operate normally.

- 1) Turn the worm pulley counterclockwise just before its resistance increases.
- 2) Loosen the mechanism state switch fixing screw and slide the switch.
- 3) Tighten the screw at the point where the groove showing the stop mode and the triangular hole of the slide knob match.
(Adjust while viewing from the right above.)

Operation check

Load a blank tape and check that loading and unloading are done correctly in all modes. When faulty operation occurs, readjust the mechanism state switch installation position.

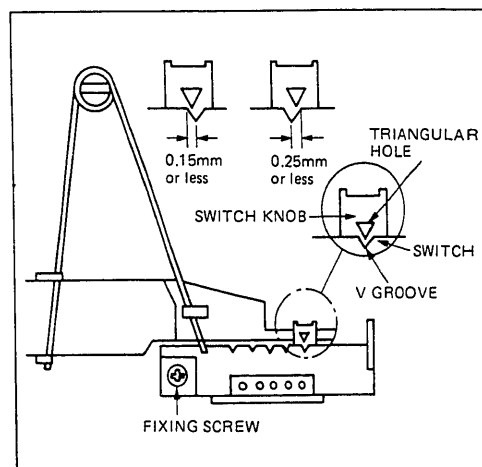


Fig. 1 Mechanism State Switch

2. TAPE TRANSPORT SYSTEM CHECK/ADJUSTMENT

The tape transport system is the path from the supply reel disk to the take-up reel disk via the video head. The transport system parts, especially the parts which directly come into contact with the tape, should be kept clean without scratches, dust and oil, etc. on contact surfaces.

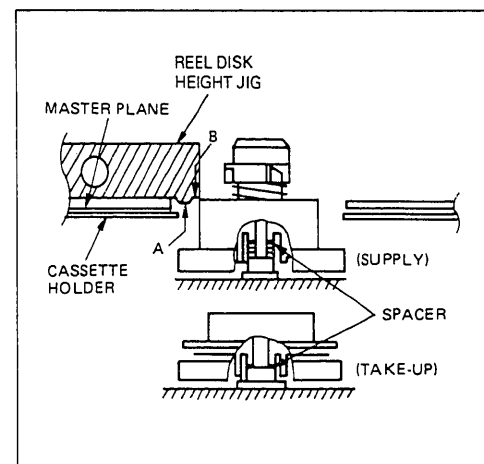
The tape transport system is adjusted when the unit is shipped from the factory, so when the transport system parts are replaced, the tape transport becomes stable by adjusting only the replaced parts.

Do not loosen the fixing screws of the parts shown below. When it is required to replace parts, be sure to install the new ones in the original positions.

- 1) Catcher/cylinder base

1. Reel disk height adjustment

- 1) Remove the top cover and shield cover place the master plane on the cassette holder and lower the holder.
- 2) Place a reel disk height jig on the master plane and apply it to the reel disk.
- 3) Check that the top of the reel disk is positioned between sections A and B of the reel disk height jig.
- 4) When the top of the reel disk does not enter between sections A and B, adjust the number of spacers (2 types: 0.25 mm or 0.5 mm thick) at the bottom of the reel disk.



2. Tension pole position and tension adjustments

Adjust the tension pole position and tension at the same time, and check the tension pole position and tension. Perform the adjustments with the top cover and shield cover removed.

Position adjustment

- 1) Cover the light receiving port of the supply end sensor using paper, etc.
- 2) Press the play button without loading a cassette and set the VTR to the loading mode.
(Refer to "How to set the VTR to the loading mode without loading a cassette".)
- 3) Loosen the tension band bracket fixing screw and insert the tip of a flat screwdriver into the groove between the bracket and the chassis.
- 4) Slide the tension band bracket using the screwdriver, and set the gap between the tension pole and chassis to 1 ~ 2 mm.

- 5) Tighten the bracket fixing screw.

- 6) Set to the loading mode again without a cassette after adjustment and check the tension pole position.

Tension adjustment

- 1) Load a tension cassette and play it back in the SP mode.
- 2) Adjust so that the reading of the tension cassette is 30 ~ 40g-cm.
- 3) When the reading of the tension cassette is higher than the reference value, move the spring hooking position in direction a, and when it is lower, move in direction b, to set the value as specified.
- 4) When the tension is changed greatly (to 6g-cm or more), check the tension pole position again. When it is incorrect, readjust the tension pole position and tension.
- 5) Remove the paper covering the sensor after adjustment.

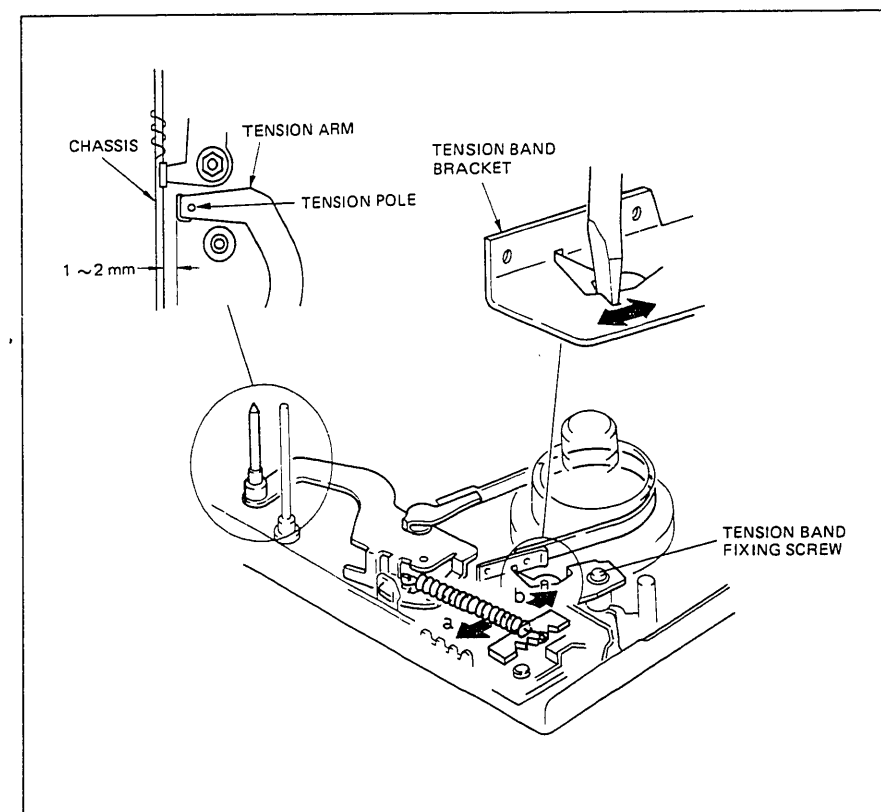


Fig. 3 Tension Pole/Tension Band

3. Guide pole height adjustment (Supply)

- 1) Remove the top cover and shield cover, place the master plane on the cassette holder and lower the holder.
- 2) Place the reel disk height jig on the master plane and apply it to the guide pole.
- 3) Turn the guide pole height adjusting nut to adjust so that the gap between the upper flange of the guide pole and the top of the jig is 0.1 ± 0.1 mm.
- 4) Load a blank tape, run the tape and check that the tape does not ride over the top and bottom flanges.
- 5) When the tape rides over the flange, adjust the guide pole height. When it rides over the upper flange, turn the nut counterclockwise and when it rides over the lower flange, turn the nut clockwise, and move the guide pole up and down so that the tape does not ride over the flanges.

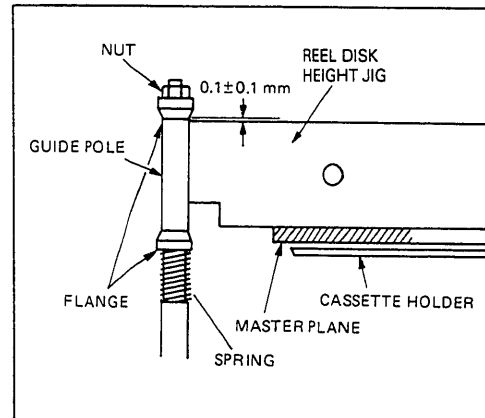


Fig. 4 Guide Pole

4. Guide roller height Adjustment

- 1) Remove the top cover and shield cover, place the master plane on the cassette holder and lower the holder. Place the reel disk height jig on the master plane and apply it to the guide roller.
- 2) Tighten the guide roller fixing screw at the position where the upper flange of the guide roller and the top of reel disk height jig match.
- 3) Run the tape and check that it does not curl or ride over and then perform electrical adjustment.
- 4) Connect the oscilloscope to TP202 (FM output) on the Luminance/Chroma board.
- 5) Play back the color bar test tape and set the tracking control to the click position.
- 6) Check that the FM waveform is flat.
- 7) Then check that the FM drop of the envelope at two positions is equal when the tracking control is turned to the left and right.
- 8) When it cannot be confirmed, loosen the guide roller fixing screw and turn the guide roller slightly to the left and right so that the envelope is flat.
- 9) Tighten the fixing screw.

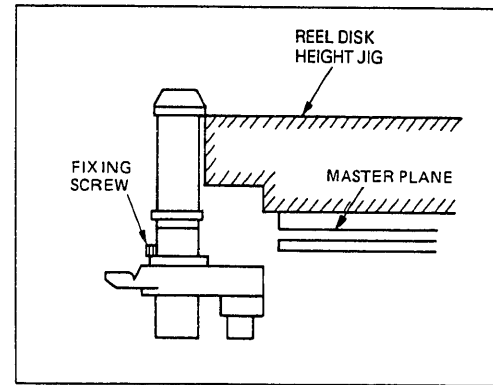


Fig. 5 Guide Roller

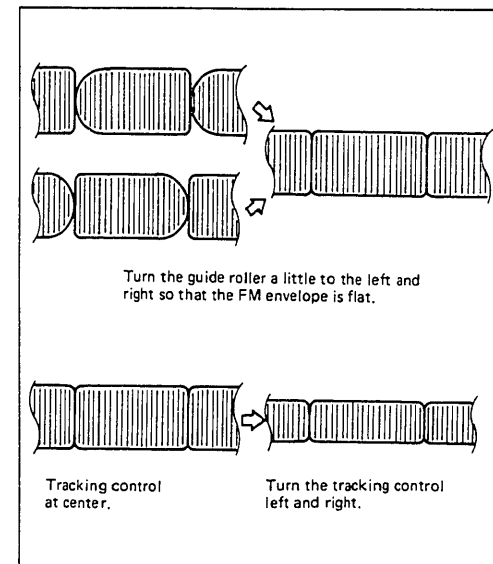
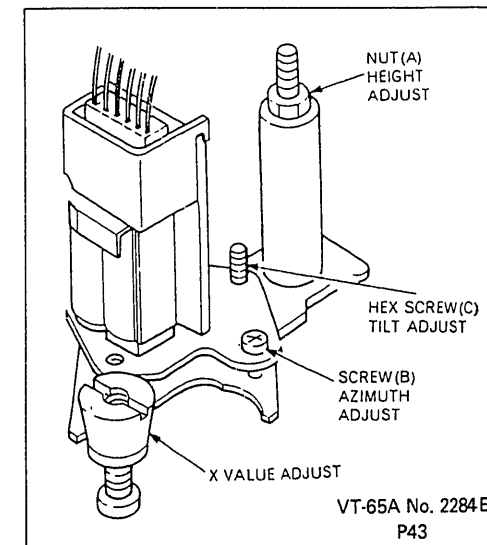


Fig. 6 FM Output

5. A/C head adjustment

Adjust the height, tilt and azimuth for the A/C head, then adjust the X value. Repeatedly adjust the former 3 items and determine the A/C head fixing position and then adjust the X value. The details of the adjustment below show the adjustment procedure when the A/C head is replaced.

Be sure to adjust precisely after performing coarse adjustment.



Coarse adjustment

- 1) Tighten the A/C head fixing screw through the bottom of head base (2) via the spring so that the tip of the screw protrudes approx. 3 ~ 4 mm above head base (1). (Refer to Fig. 8)
- 2) Adjust the tilt adjusting hexagonal screw and azimuth adjusting screw so that head base (1) and head base (2) are parallel.
- 3) Place the master plane on the cassette holder and lower the holder.
- 4) Place the reel disk height jig on the master plane and bring it near the A/C head, then adjust the height adjusting nut so that the gap between the reel disk height jig and the shield case of the A/C head is approx. 0.5 mm. (Refer to Fig. 9)
- 5) Remove the adjusting jigs, load a blank tape and set the VTR to the play mode. Check that conspicuous curling or riding over of the tape does not occur around the A/C head. When conspicuous curling or riding over, etc. occurs, readjust the tilt adjusting hexagonal screw, azimuth adjusting screw and height adjusting screw. The height of the A/C head should be approx. 0.1 ~ 0.15 mm above the bottom of the control head core. (Refer to Fig. 10)

Precise adjustment

- 6) Connect the oscilloscope to the audio output jack.
- 7) Play back the alignment tape (7 kHz audio).
- 8) Alternately adjust the tilt adjusting screw and azimuth adjusting screw slightly so that the audio output is maximum and flat (without fluctuations).

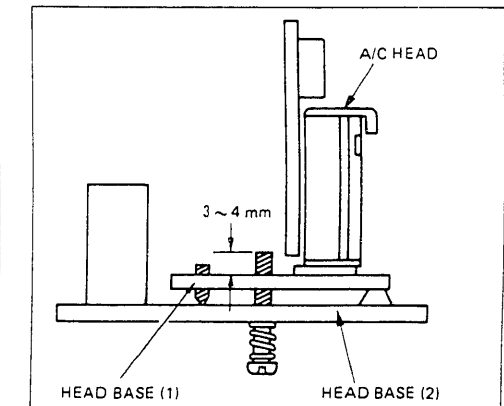


Fig. 8 Azimuth/Tilt Adjustments

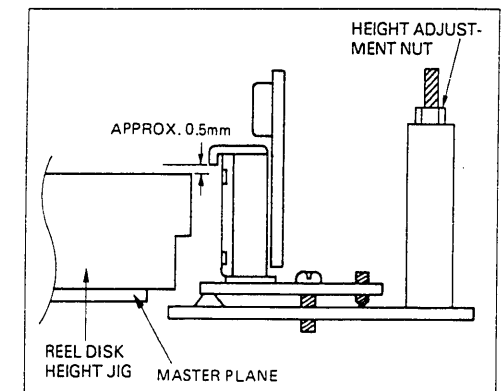


Fig. 9 Height Adjustment

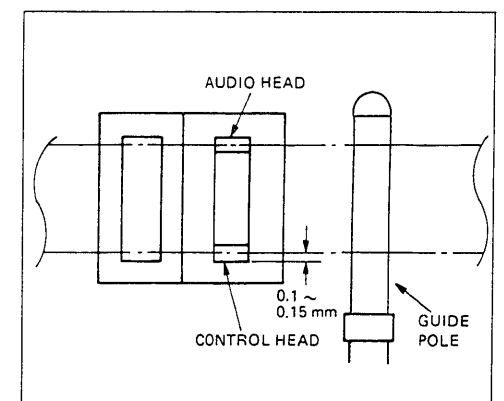


Fig. 10 Height Adjustment

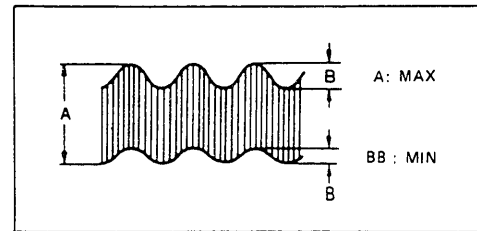


Fig. 11 Audio Output

X value adjustment

- * Be sure to perform "Tracking Preset Adjustment" before adjusting the X value.
- 9) Connect the oscilloscope to TP202 (FM output) on the Luminance/Chroma board.
- 10) Play back the alignment tape and check that the FM output is maximum when the tracking control on the front panel is at the click position. Then, turn the tracking control and check that the FM output starts dropping at the same angle to the right and left from the click position. When this is confirmed, the X value adjustment is correct.
- 11) When the adjustment is incorrect, adjust the X value adjusting screw so that the FM output is maximum when the tracking control is at the click position and it starts dropping at the same angle to the left/right from the click position. (When the tracking control is turned counterclockwise and FM output starts dropping earlier than when turned clockwise, turn the X value adjusting screw clockwise.)
- 12) Check item 10) again.
- 13) Lock the tilt adjusting hexagonal screw, X value adjusting screw, azimuth adjusting screw and height adjusting nut with paint after adjustment is complete.
- 14) Perform the playback level adjustment and bias level adjustment described in the audio circuit adjustment.
- 15) Adjust the guide roller height after this adjustment is complete.

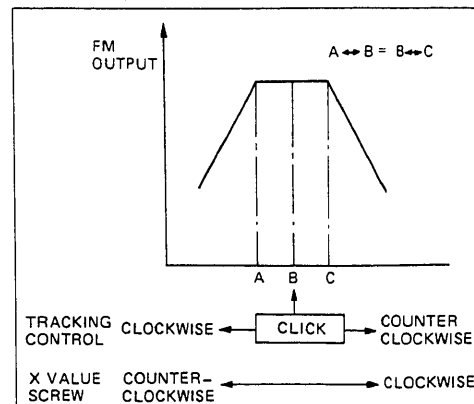


Fig. 12 Tracking Characteristics

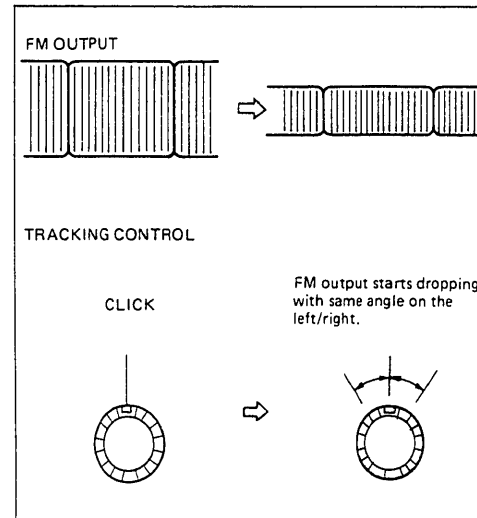


Fig. 13 X Value

6. Adjustments after replacing the cylinder (video head)

When the cylinder is replaced, the relative height with the guide roller and the X value, etc. drift, so it is required to adjust the tape transport system and servo system.

Note: The drift of the relative height and X value are so little when the cylinder is replaced normally, so they can be corrected by electrical adjustments.

- 1) Check that curling and creasing are not present around the guide roller. When they are present, adjust the guide roller height.
- 2) Perform the tracking preset adjustment (servo circuit).
- 3) Adjust the X value (See "A/C head adjustment").
- 4) Check the flatness and level change of the FM output. The method to check is described later.
- 5) Adjust the servo circuit and Luminance/Chroma circuit.
 - Head switching point adjustment (Servo circuit)
 - Record Luminance/Chroma level adjustments (Luminance/Chroma circuit)

Checking the flatness and fluctuations of the FM output

- 1) Set the tracking control to the click position.
- 2) Fine adjust the voltage level range of the oscilloscope to set the FM output to 4 graduations.
- 3) Turn the tracking control to set the max. amplitude of the FM output to 3 graduations.
- 4) Check that the minimum amplitude is more than 2 graduations at this time.
- 5) Check that the level fluctuation is less than 13% at max. and min.

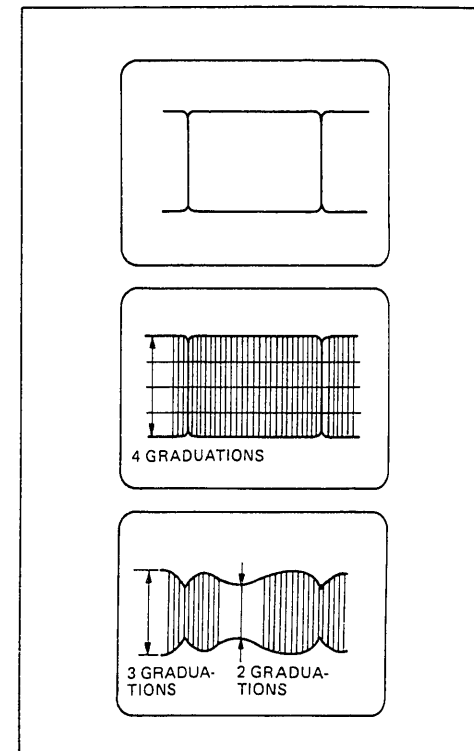


Fig. 14 FM Envelope Flatness

3. TENSION AND TORQUE CHECKS

Checking the tension, torque and the compression strength at the movable section of the tape take-up section is required to smooth the tape transport and to satisfy the fundamental functions of the VTR. When the tape transport is not smooth or the tape speed is abnormal, perform this checking to find out the faulty section, replace the faulty parts and check again.

Note 1: The value measured while sliding the torque gauge at the speed of 0.8 rps using the torque gauge and torque gauge adapter. The main brake torque, however, shows the value measured while turning the take-up reel counterclockwise and the supply reel clockwise by hand at the speed of 0.8 rps.

Note 2: The value measured while drawing the take-up reel disk counterclockwise and the supply reel disk clockwise at the speed of 50 mm/sec using the dummy reel and fan type tension gauge.

Item	VTR operation mode	Measured reel	Measurement value	Remarks
Main brake torque	Stop	Supply & take-up reels	170g·cm or more	Note 1
Unloading torque	Unloading	Supply reel	90 ~ 190g·cm	Note 1
Fast forwards torque	Fast forward	Take-up reel	400g·cm or more	Note 1
Rewind torque	Rewind	Supply reel	400g·cm or more	Note 1
Take-up torque	Play	Take-up reel	90 ~ 180g·cm	Note 1
Back tension torque	Fast forward	Supply reel	4 ~ 15g·cm	Note 2
	Rewind	Take-up reel		

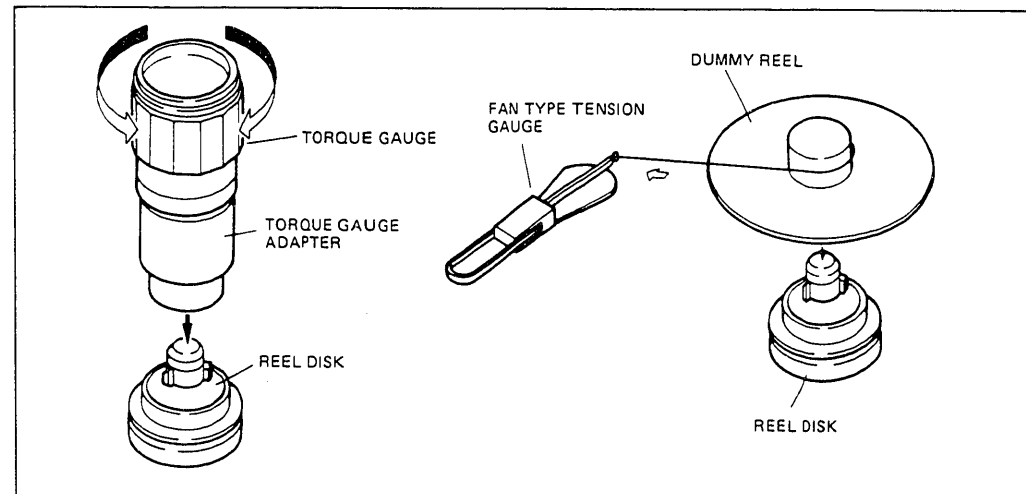


Fig. 15 Tension/Torque Measurement

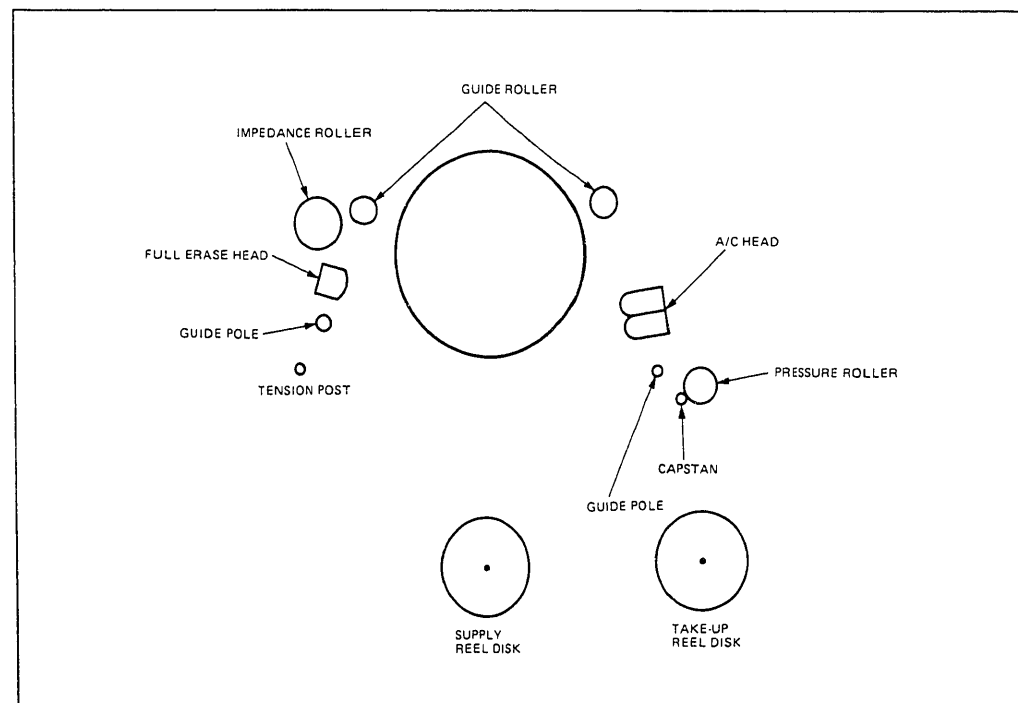


Fig. 16 Tape Transport System

4. How to place the VTR in the loading mode without loading a cassette

- 1) Remove the top cover.
- 2) Apply paper, etc. over the light receiving ports (A) of the end sensors on both sides of the cassette holder.
- 3) Lower the cassette holder while pressing tabs (B) on both sides of the cassette holder. All operation modes can be input to the VTR in this condition. The rewind operation, however, can be done only for a few seconds because the take-up reel disk is in the stop mode and reel pulse detection is not possible. Be careful in that when the covering paper, etc. is too thin, the end sensor detects infrared rays or external light, and it may not be possible to input each operation mode.

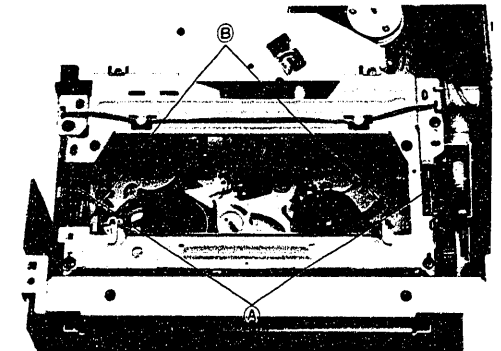
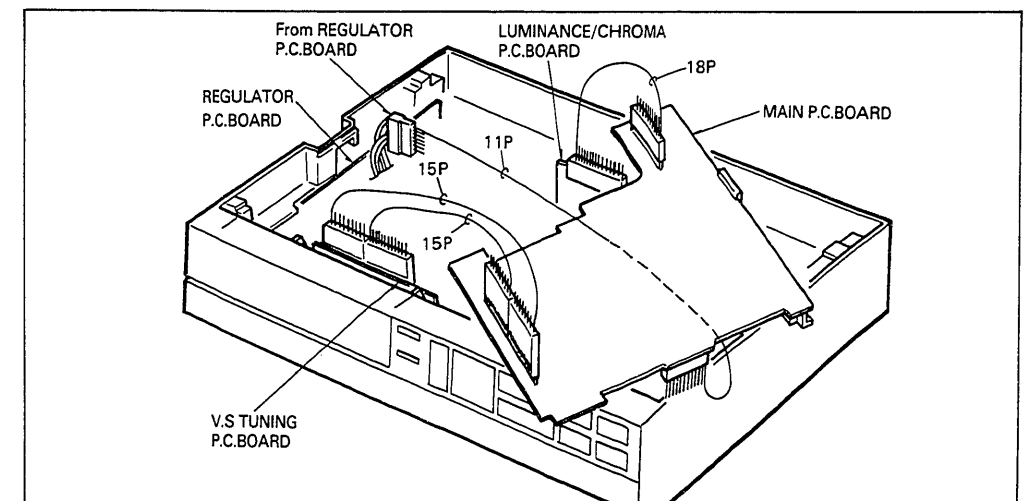


Fig. 17 Cassette Loading Mechanism

Extension connector connection method when servicing main P.C.board

When servicing the main P.C.board, connect four extension connectors as shown in the figure below, being sure not to confuse the connector installation directions.



SCHEMATIC/CIRCUIT BOARD DIAGRAMS

Note

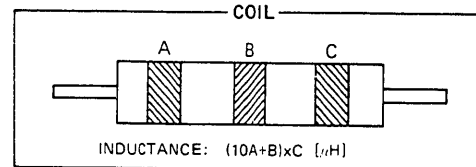
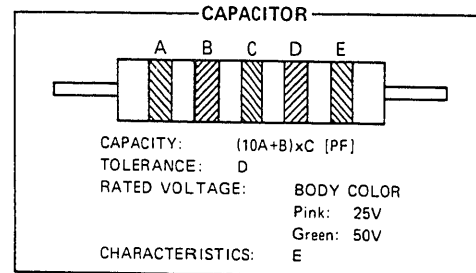
- 1 Voltage measured at base of chassis with minimum volume control and no signal () are shown in recording condition
- 2 Nomenclature of Resistors and Capacitors

Circuit No	
Value	No indicated Ω (Ohm) M 1000k Ω
Tolerance	No indicated \pm 5% K \pm 10% M \pm 20%
Wattage	No indicated $\frac{1}{2}$ W
Sort	No indicated Carbon film RC Composition RW Wire wound RS Oxide metal film RN Fixed metal film

Circuit No	
Value	No indicated μ F P PF
Tolerance	No indicated \pm 10% J \pm 5% M \pm 20% Z \pm 80% 20% D \pm 0.5pF C \pm 0.25pF
Sort	Ceramic Electrolytic Mylar Polyester Styrol
Voltage	No indicated 50WV

- 3 Be sure to make your orders of resistors and capacitors with value, voltage, tolerance and sort
- 4 When replacing capacitors marked with a use specified ones stated on parts list since required temperature characteristics

HOW TO READ CAPACITY AND INDUCTANCE OF RESISTOR SHAPE CAPACITORS AND COILS



COLOR	A, B	C	D	E
Black	0	10 ⁰	\pm 20%	For temperature compensation
Brown	1	10 ¹		
Red	2	10 ²		
Orange	3	10 ³		
Yellow	4	10 ⁴		
Green	5	10 ⁵		
Blue	6			
Violet	7			
Grey	8		\pm 30%	High dielectric constant type
White	9			For temperature compensation
Gold		10 ¹	\pm 5%	
Silver		10 ²	\pm 10%	High dielectric constant type

SEMICONDUCTOR CONFIGURATION

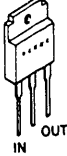
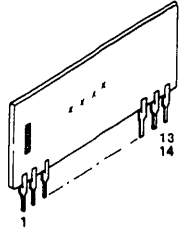
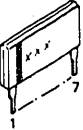
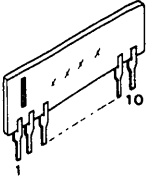
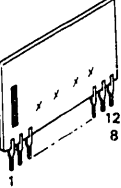
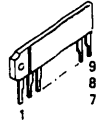
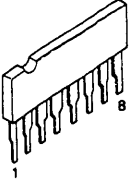
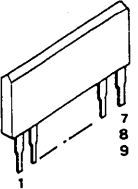
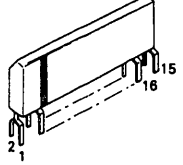
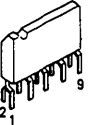
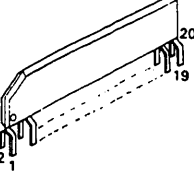
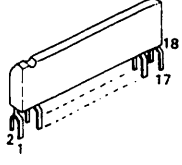
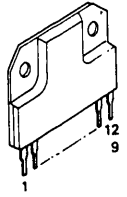
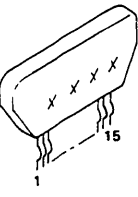


When replacing a semiconductor, take care of its pin numbers and markings (recess, paint) so as not to insert it in reverse.

1	2	3	4
2SC2021 DTC124 DTA124	2SC458 2SC1845 2SA952 2SA1198 2SC1213 2SA934 2SA844 2SC2320 2SA673 2SD655 2SC1741 2SC1740S 2SC1162 2SD467	2SD468	2SD947 2SB772 2SD882
5	6	7	8
2SK68 2SK186	2SB642	2SD1510 2SD1276	2SD1266A

Cautions on use of MOS IC

1. The MOS IC is inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during their storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
2. High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
3. The human body, clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because of friction, so a workers should be grounded.
4. Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

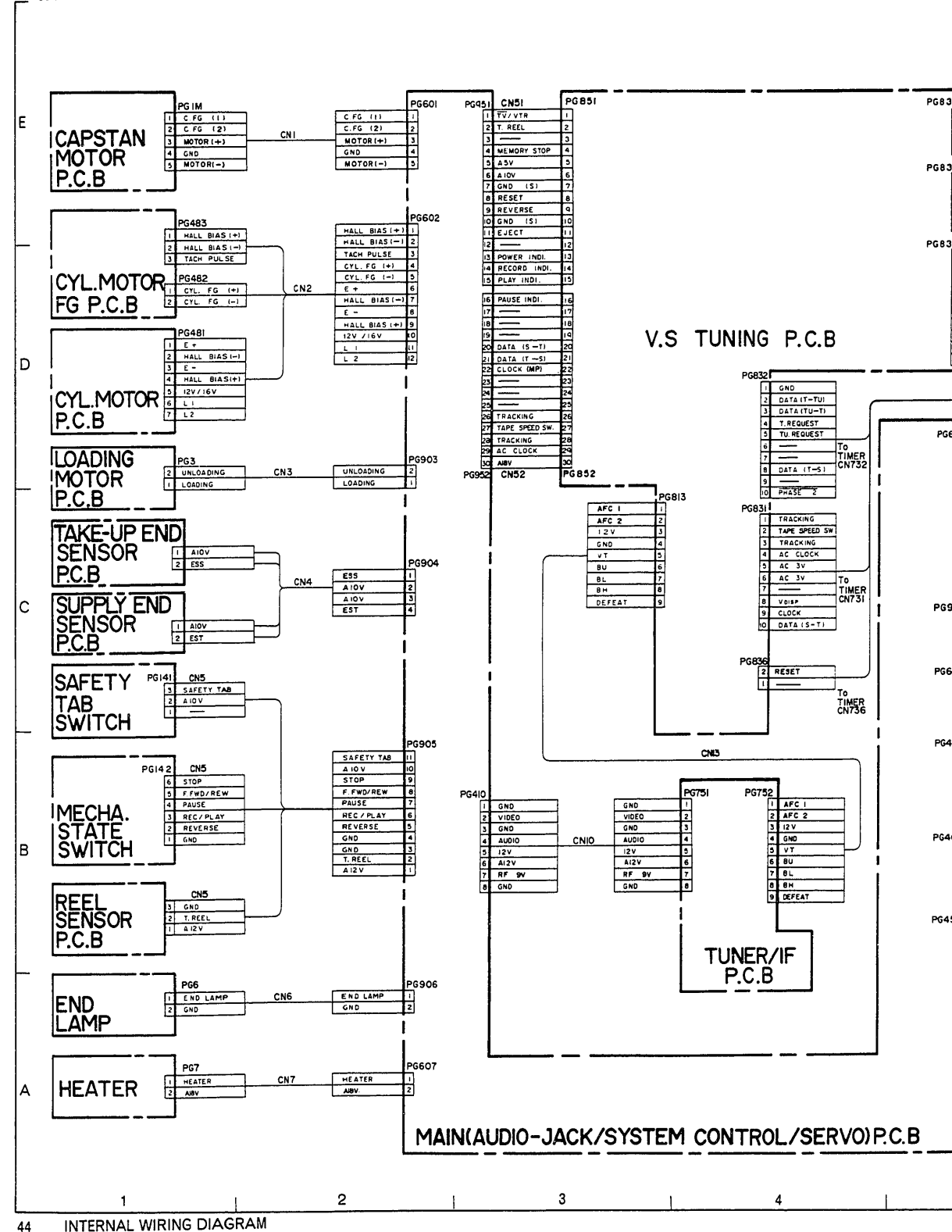
IC (SINGLE INLINE PACKAGE)

			
<p>μPC78M05</p>	<p>HT4438 HT4443(14P) HT4437 4HEAD, IC</p>	<p>μPC1513HA</p>	<p>TA4390 TA4398A TA4396 HT4404</p>
			
<p>HT4415A(12P) TA4373(12P) HT4401(12P) HT4430(8P)</p>	<p>μPC1373HA (8P) LA7910(9P) LA7016(8P) NJM4558S(9P) μPC566H3(7P) BA301B(7P)</p>	<p>BA340 BA328</p>	<p>M5218L(8P) TA7324P(9P) TA7361P(7P) M54549L-A(12P)</p>
			
<p>NJM2207 D4066SIP</p>	<p>TK15021Z</p>	<p>TK15011Z</p>	<p>BA5102</p>
			
<p>M54648AL(12P) M54548L(12P) M54543L(9P)</p>	<p>STK-5451</p>	<p>DN6838A</p>	<p>M5278L-05 M5278L-56</p>

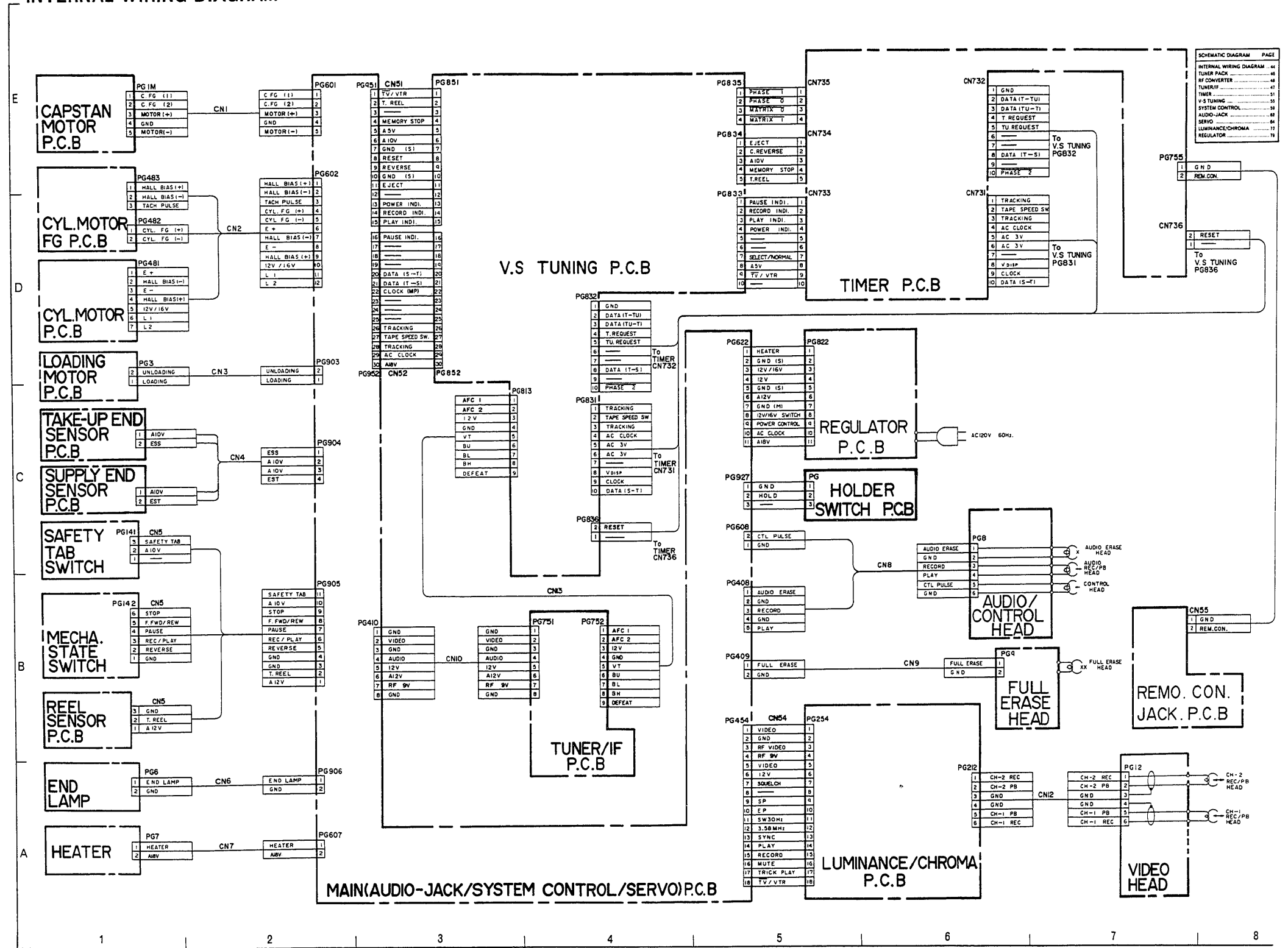
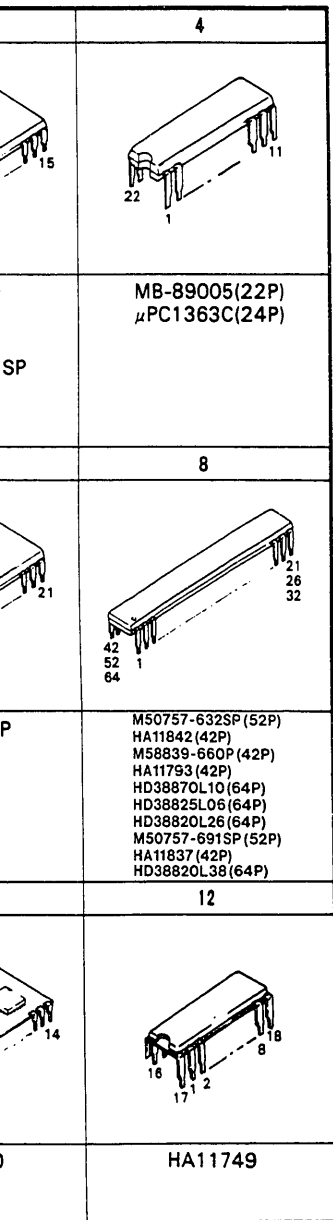
IC (DUAL INLINE PACKAGE)

1	2	3	4
MSM5258RS MSL9378RS	µPD1913(16P) HA11788(16P) HA13430A(16P) EWA127(16P) HA11787(16P) LA3410(16P) BA5102A(18P) HA12046(18P) TK15050(16P)	M50161-157 HA11797 HA12072 M50161-251SP	MB-89005(22P) µPC1363C(24P)
5	6	7	8
M58657P M4011BP NJM2074D µPD4011	CX20126 HA1174A HD38702A35 µPD554C	MB8841HP	M50757-632SP(52P) HA11842(42P) M58839-660P(42P) HA11793(42P) HD38870L10(64P) HD38825L06(64P) HD38820L26(64P) M50757-691SP(52P) HA11837(42P) HD38820L38(64P)
9	10	11	12
µPD7519G	HT4501 HT4233 HT4504 HT4234 HT4505 HT4235 HT4506A HT4236	HT6210	HA11749
13			
HA13402			

INTERNAL WIRING DIAGRAM



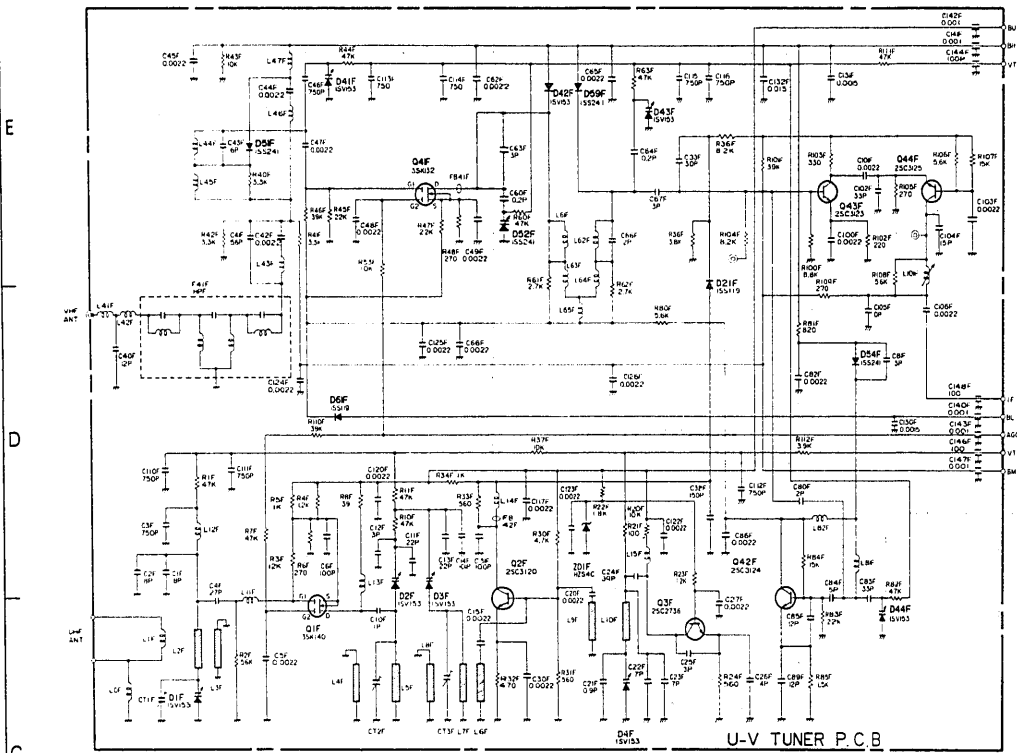
INTERNAL WIRING DIAGRAM



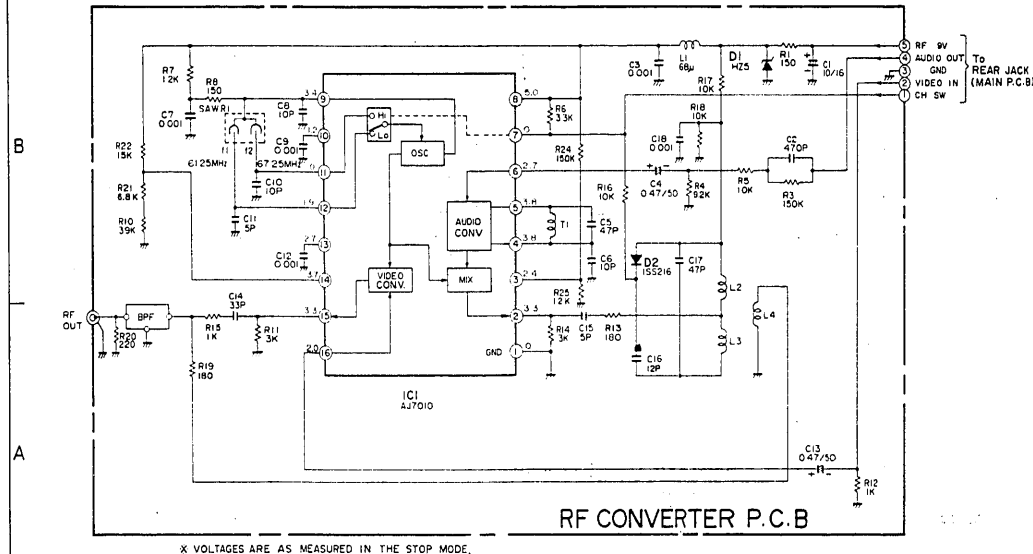
SCHEMATIC DIAGRAM PAGE

INTERNAL WIRING DIAGRAM	44
TUNER PACK	45
RF CONVERTER	46
TUNER IF	47
TIMER	51
V-S TUNING	53
SYSTEM CONTROL	59
AUDIO-JACK	60
SERVO	64
LUMINANCE/CHROMA REGULATOR	72

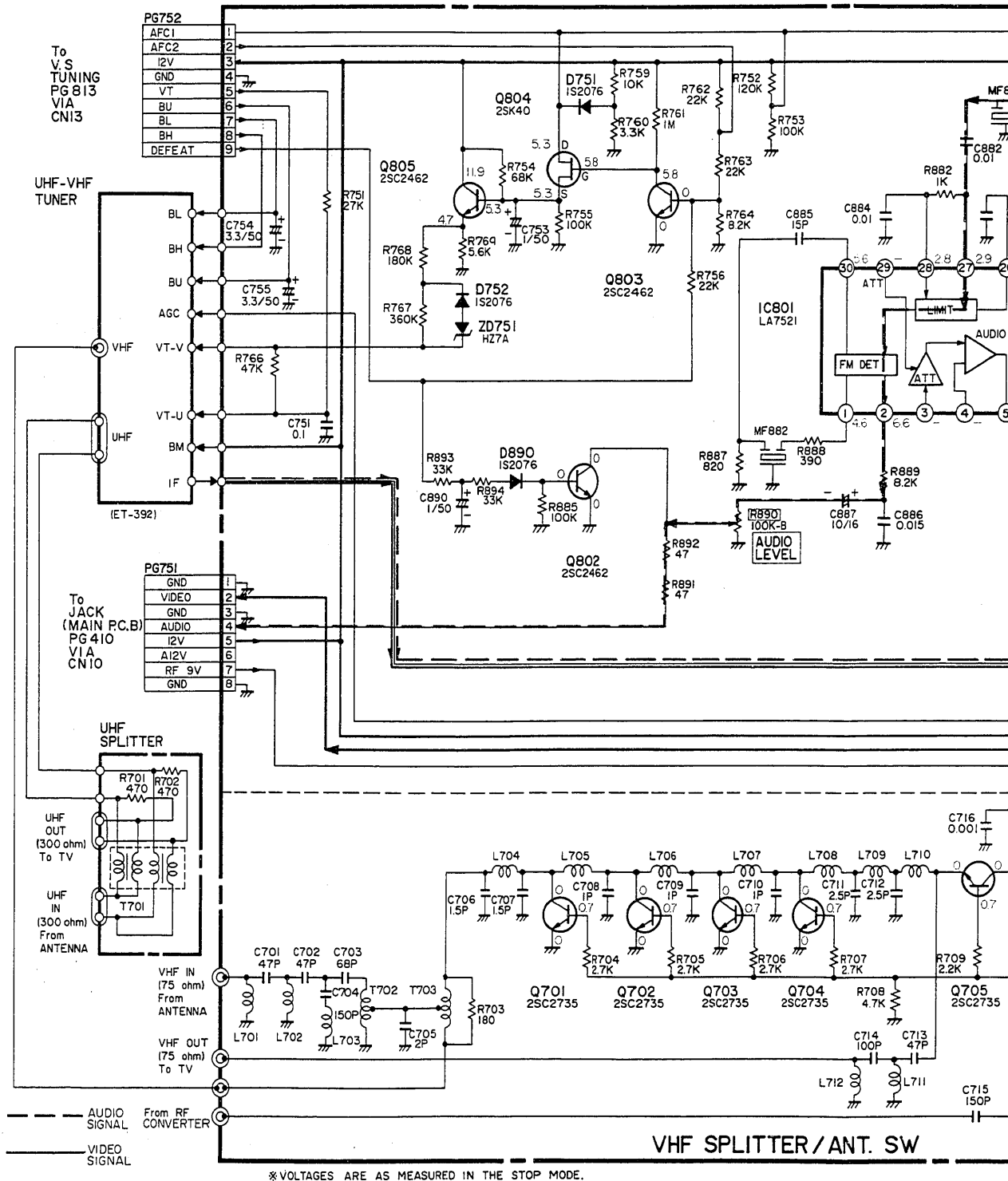
TUNER PACK



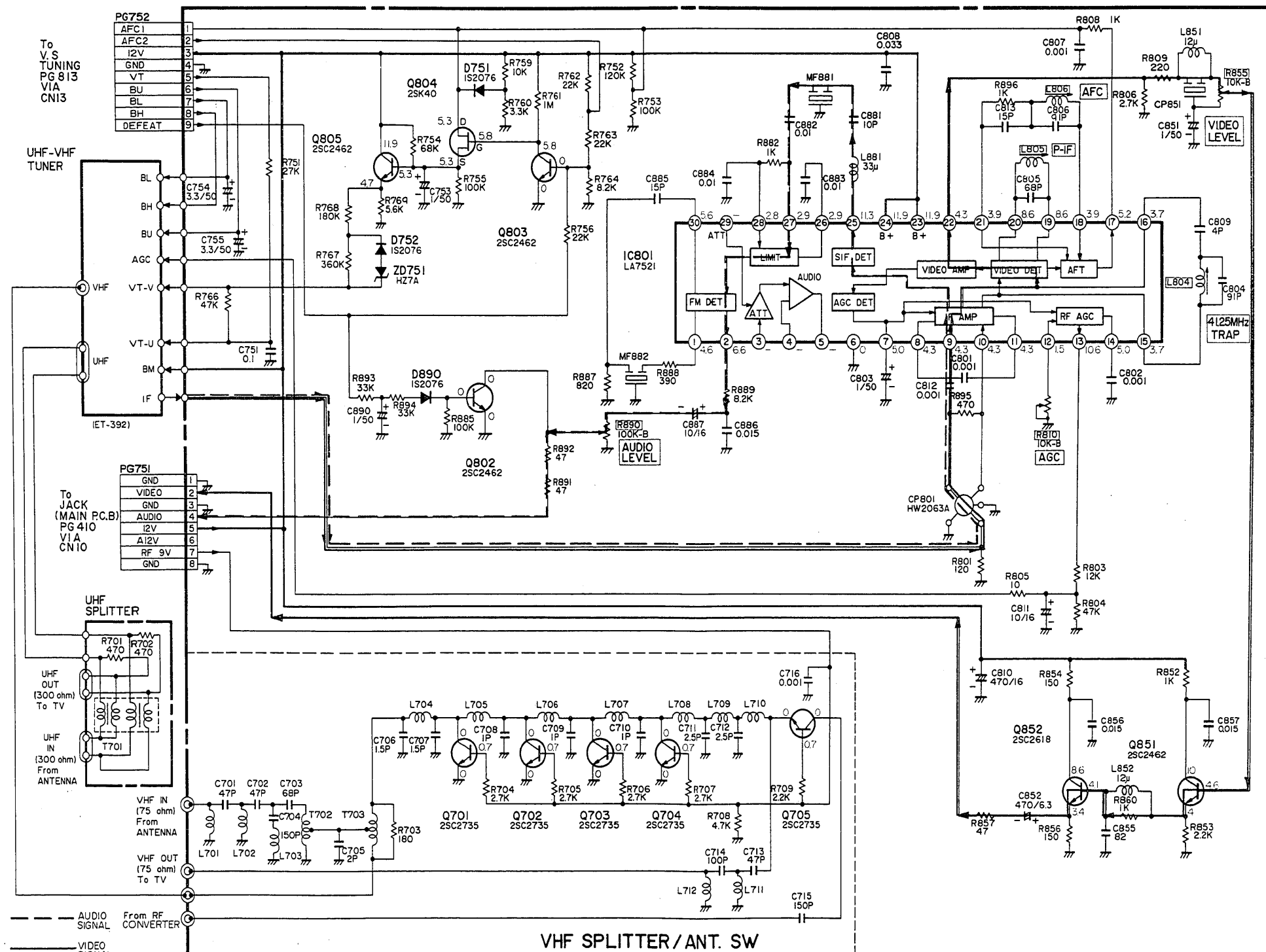
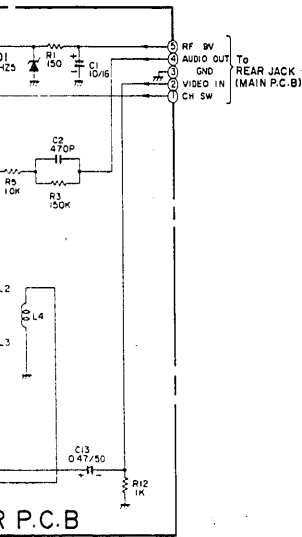
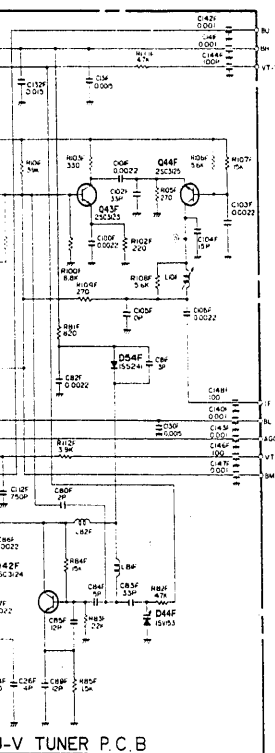
RF CONVERTER



TUNER/IF

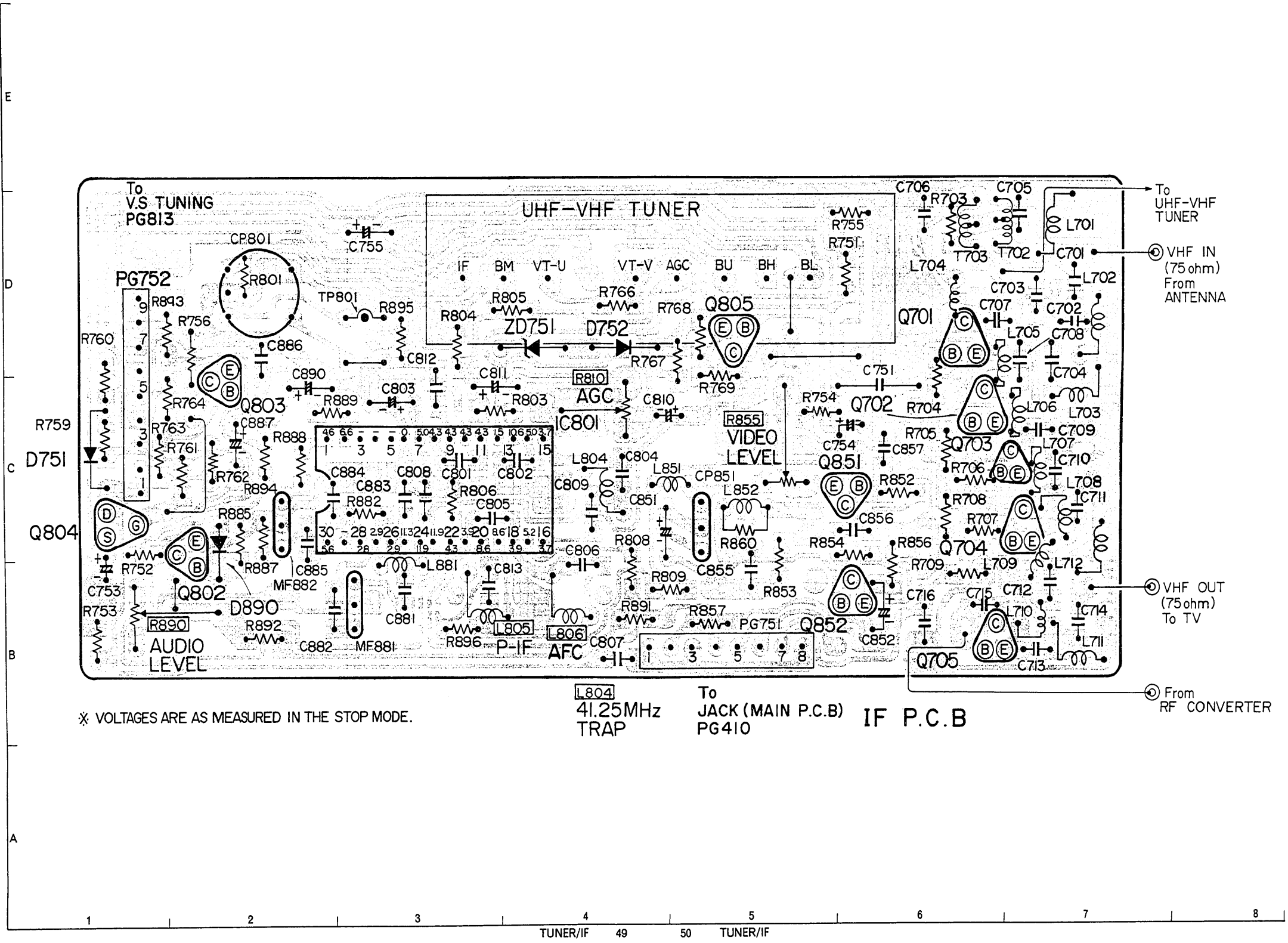


TUNER/IF



*VOLTAGES ARE AS MEASURED IN THE STOP MODE.

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SERVO	64
LUMINANCE/CHROMA	72
REGULATOR	79



⊗ VOLTAGES ARE AS MEASURED IN THE STOP MODE.

L804
41.25MHz
TRAP

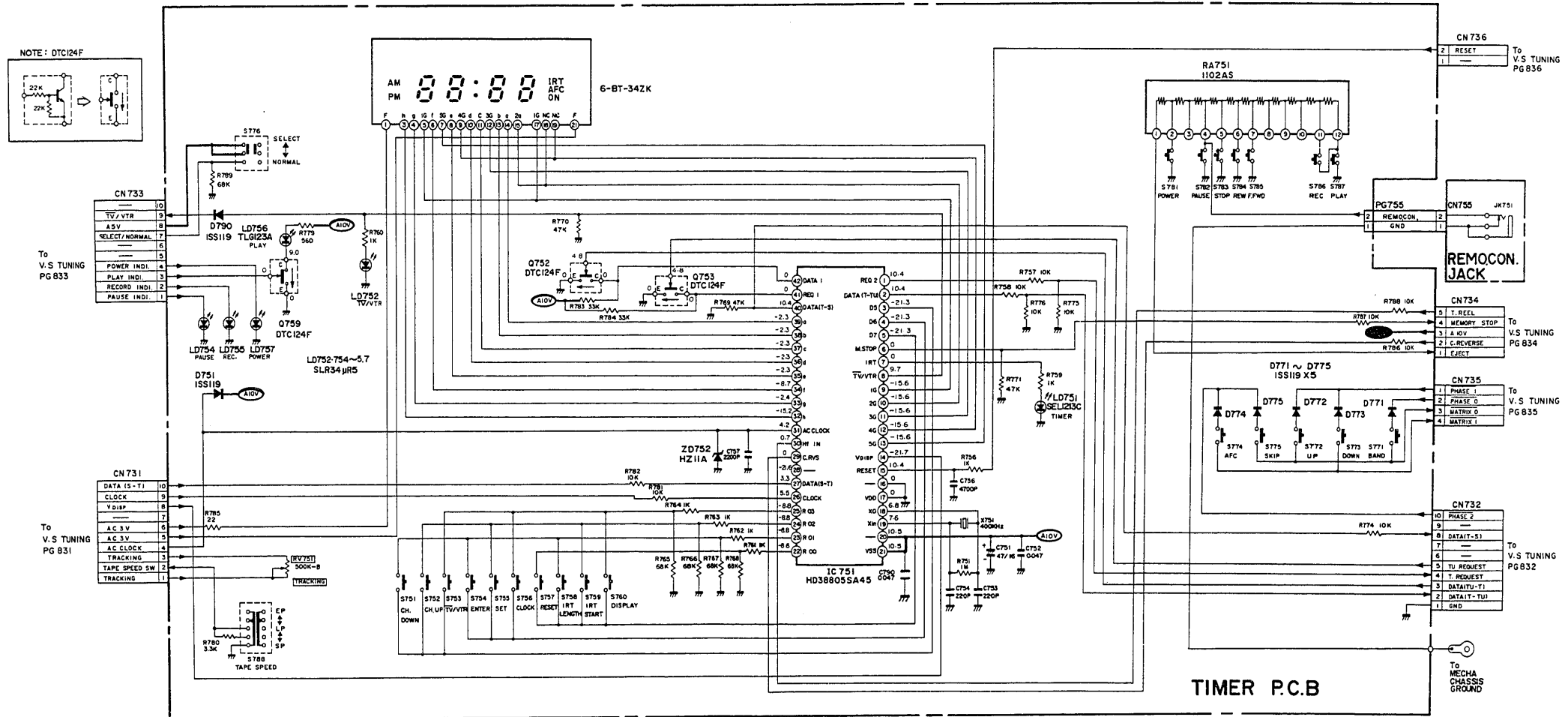
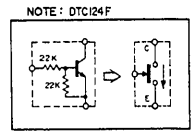
To
JACK (MAIN P.C.B)
PG410

IF P.C.B

⊗ From
RF CONVERTER

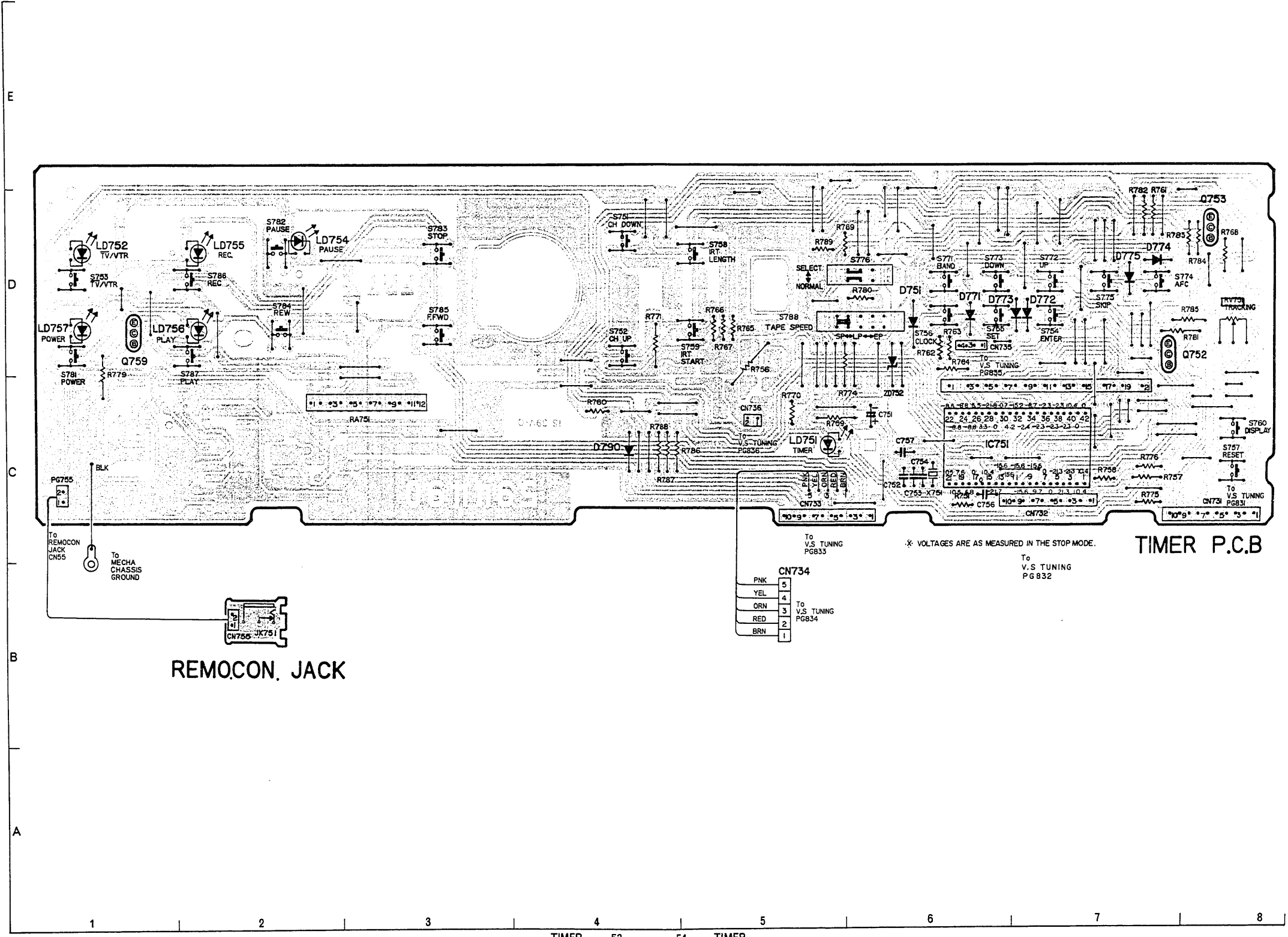
TIMER

E
D
C
B
A



* VOLTAGES ARE AS MEASURED IN THE STOP MODE.

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SERVO	64
LUMINANCE/CHROMA	72
REGULATOR	79



TIMER P.C.B

* VOLTAGES ARE AS MEASURED IN THE STOP MODE.

To V.S TUNING PG833

To V.S TUNING PG832

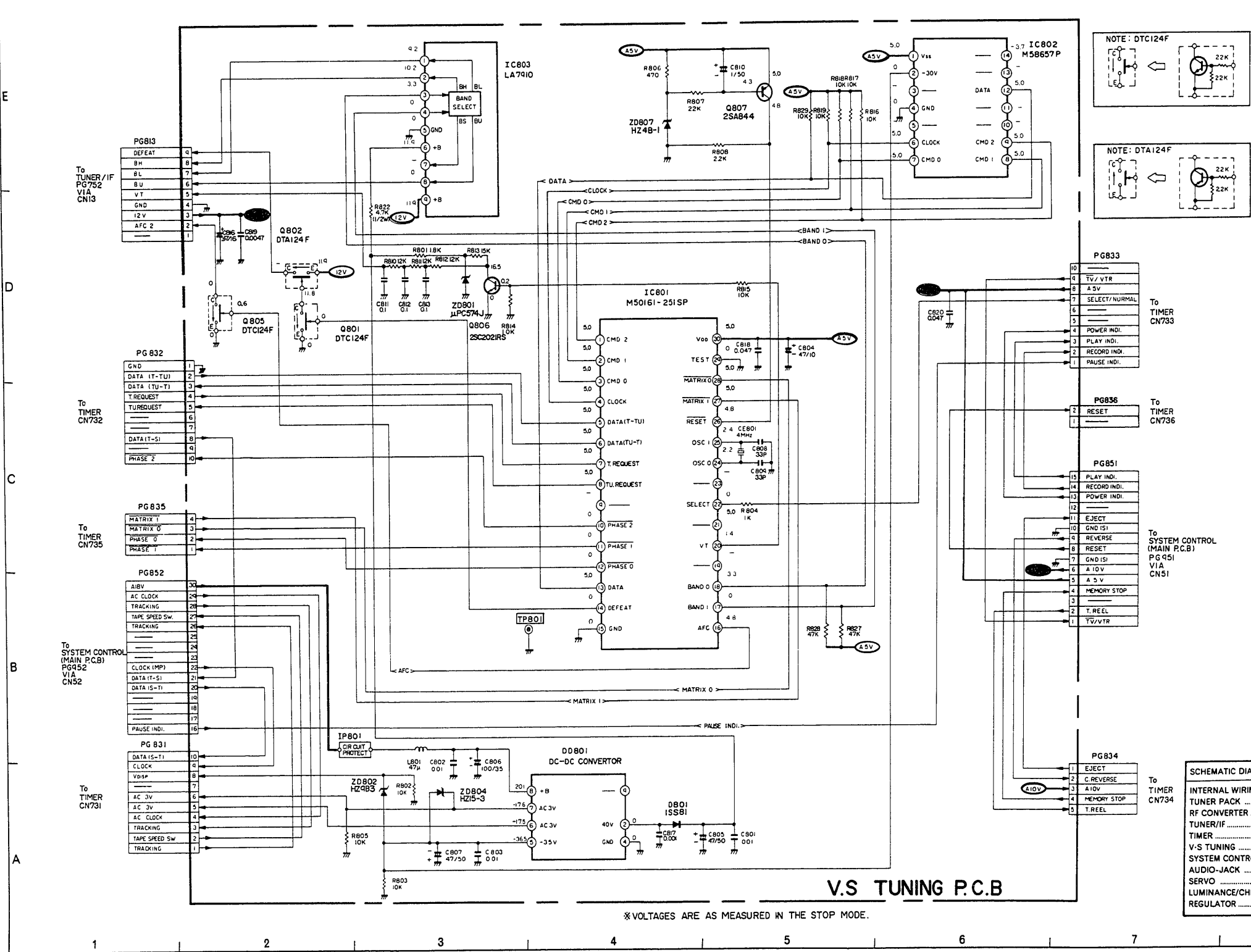
To V.S TUNING PG834

PNK	5
YEL	4
ORN	3
RED	2
BRN	1

REMOCON. JACK

E
D
C
B
A

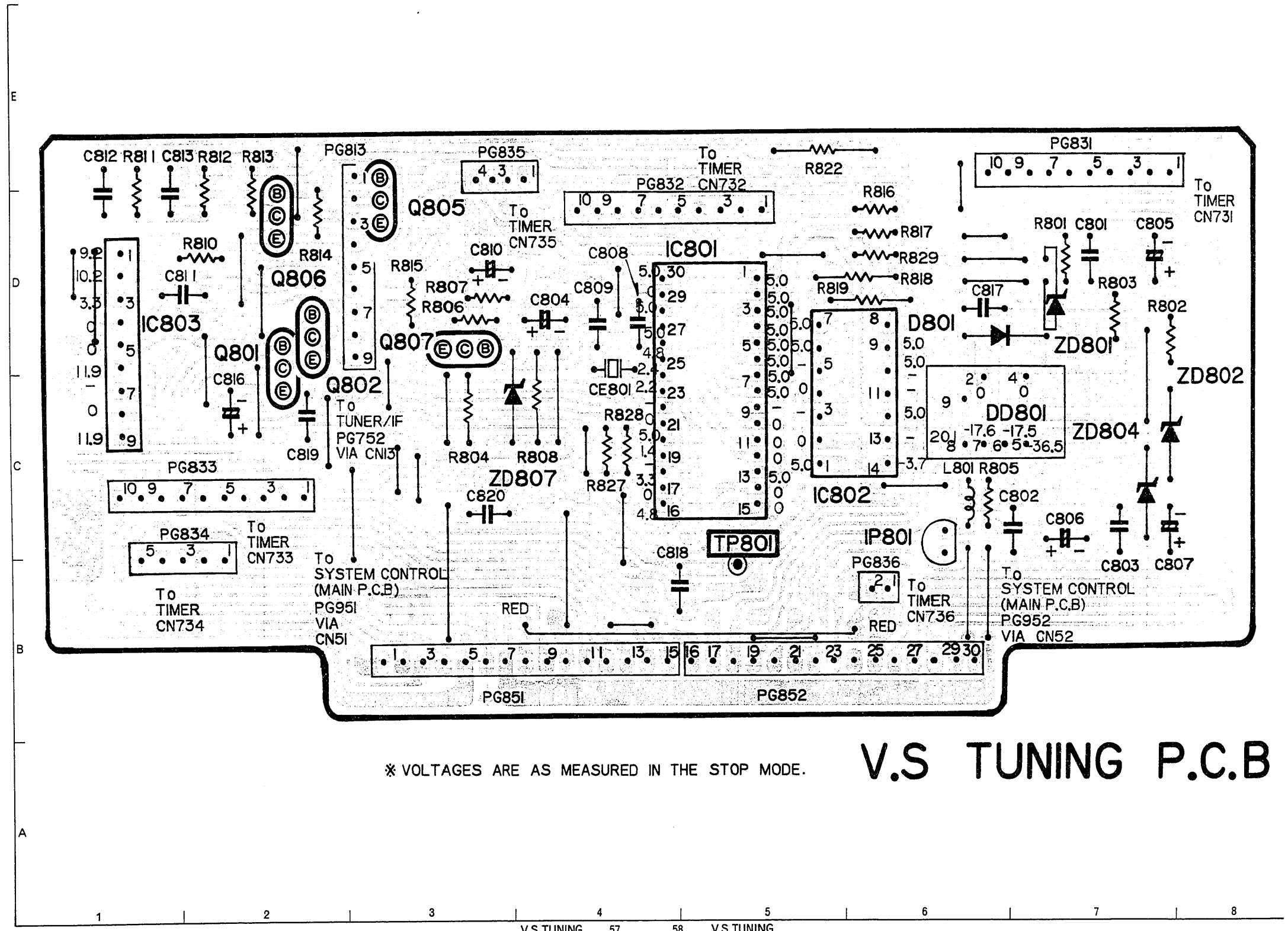
V.S TUNING



V.S TUNING P.C.B

*VOLTAGES ARE AS MEASURED IN THE STOP MODE.

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RF CONVERTER ...	46
TUNER/IF ...	47
TIMER ...	51
V-S TUNING ...	55
SYSTEM CONTROL ...	59
AUDIO-JACK ...	62
SERVO ...	64
LUMINANCE/CHROMA ...	72
REGULATOR ...	79

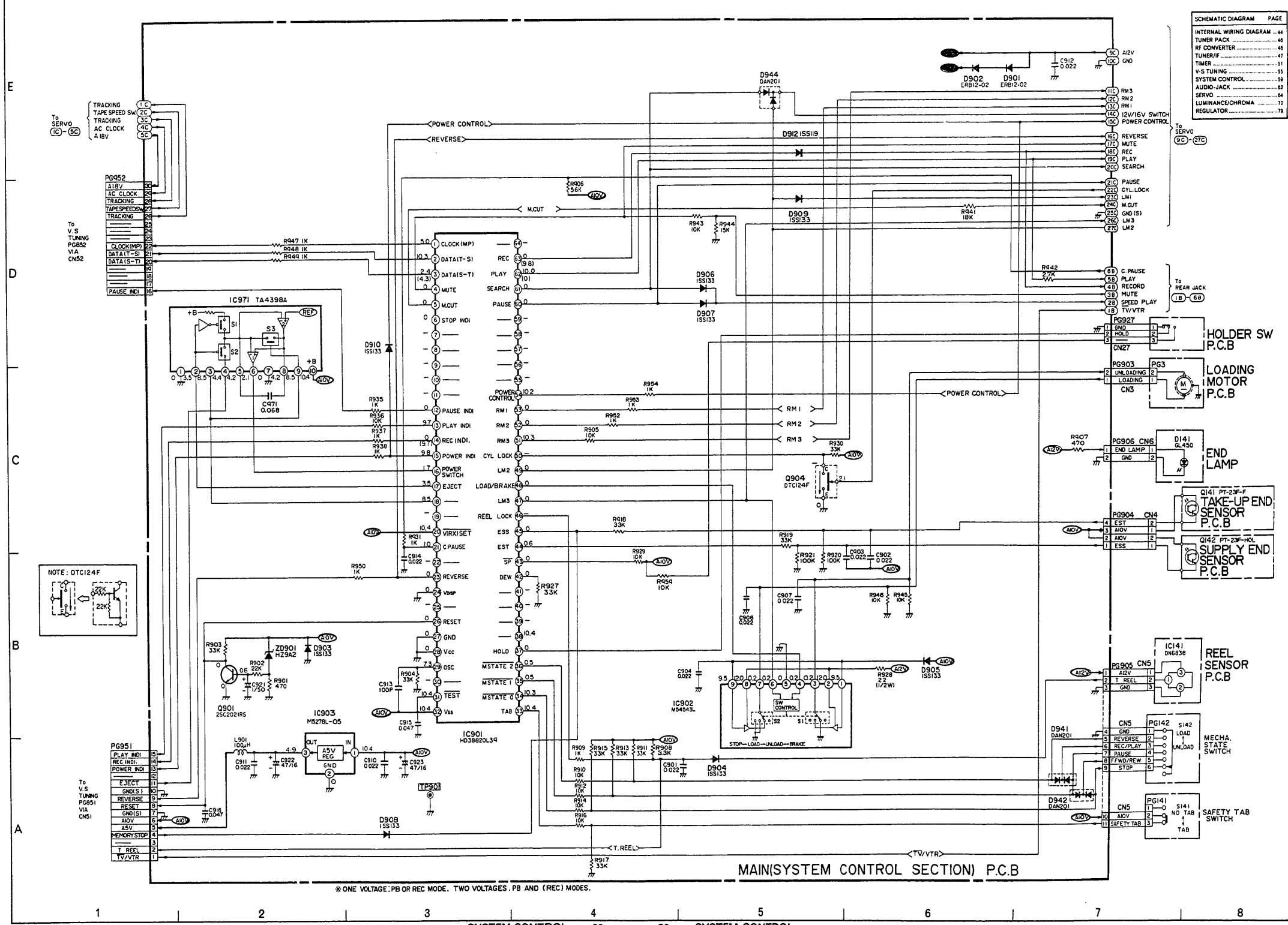


* VOLTAGES ARE AS MEASURED IN THE STOP MODE.

V.S TUNING P.C.B

E
D
C
B
A

SYSTEM CONTROL

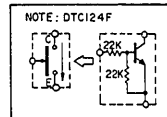


SCHEMATIC DIAGRAM	PAGE
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SERVO	64
LUMINANCE/CHROMA	72
REGULATOR	79

E
D
C
B
A

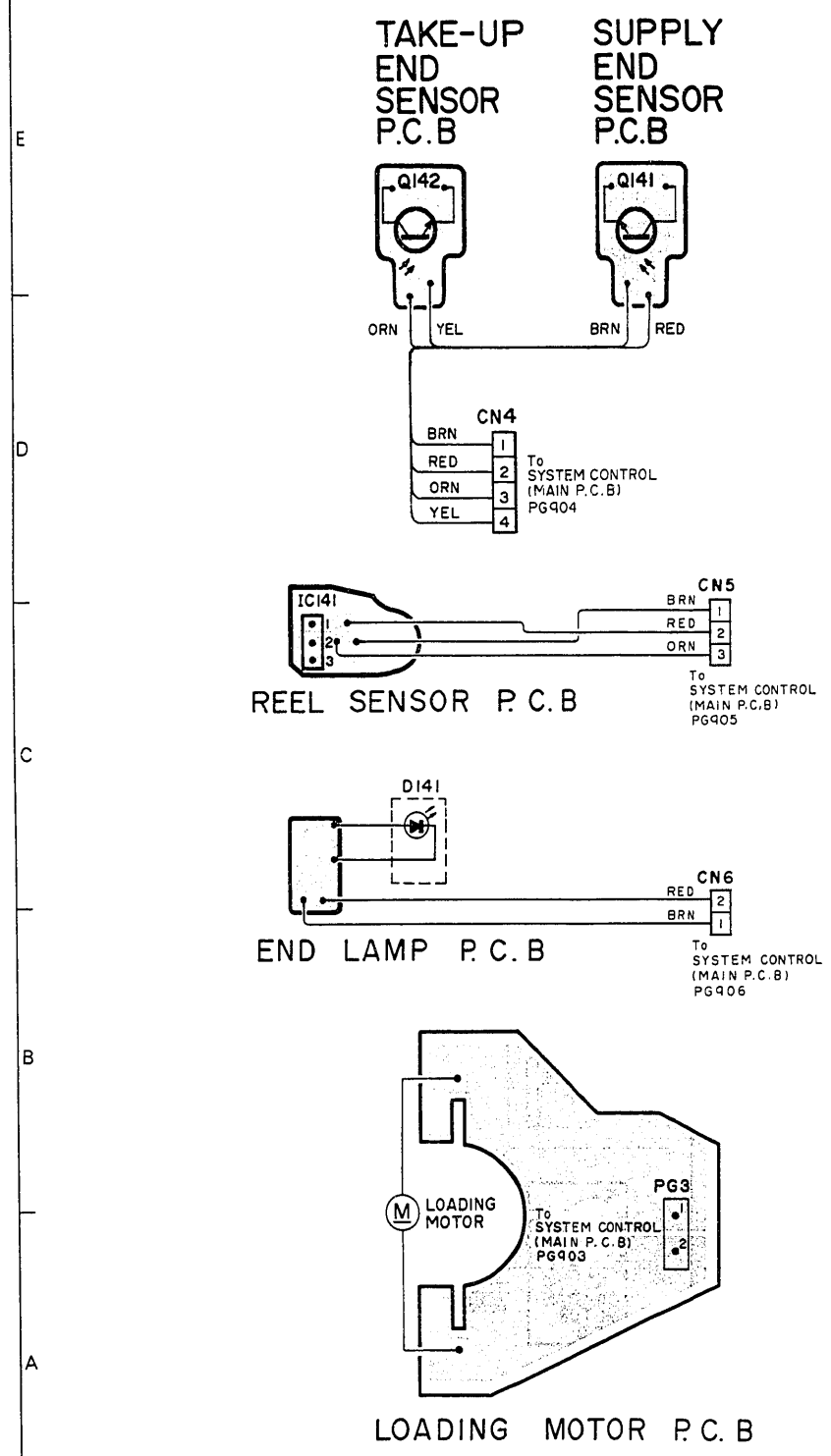
To SERVO (IC-9C)

To V.S TUNING PG852 VIA CNS2

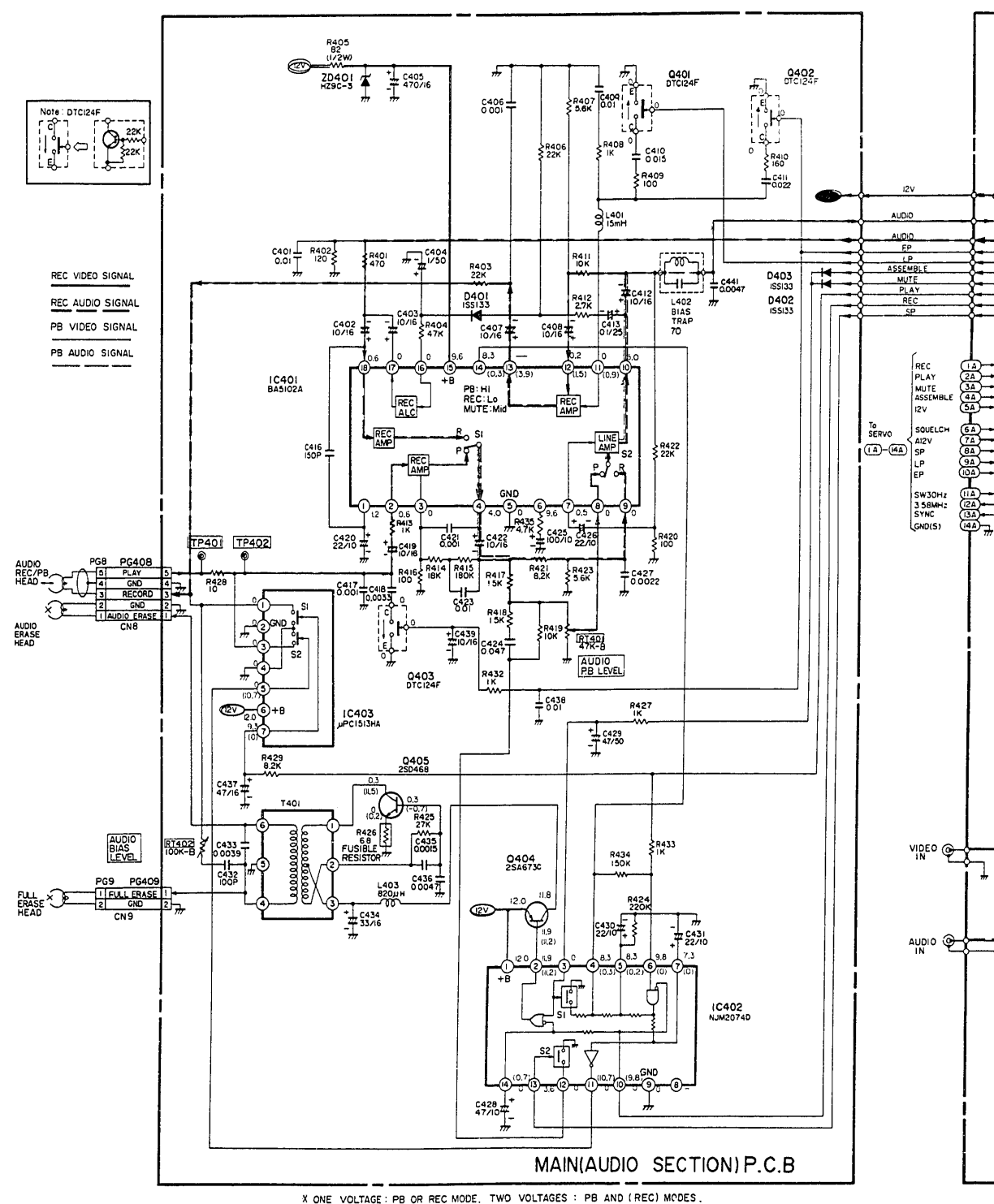


To V.S TUNING PG851 VIA CNS1

SYSTEM CONTROL SMALL BOARD

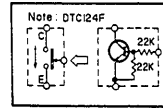


AUDIO-JACK

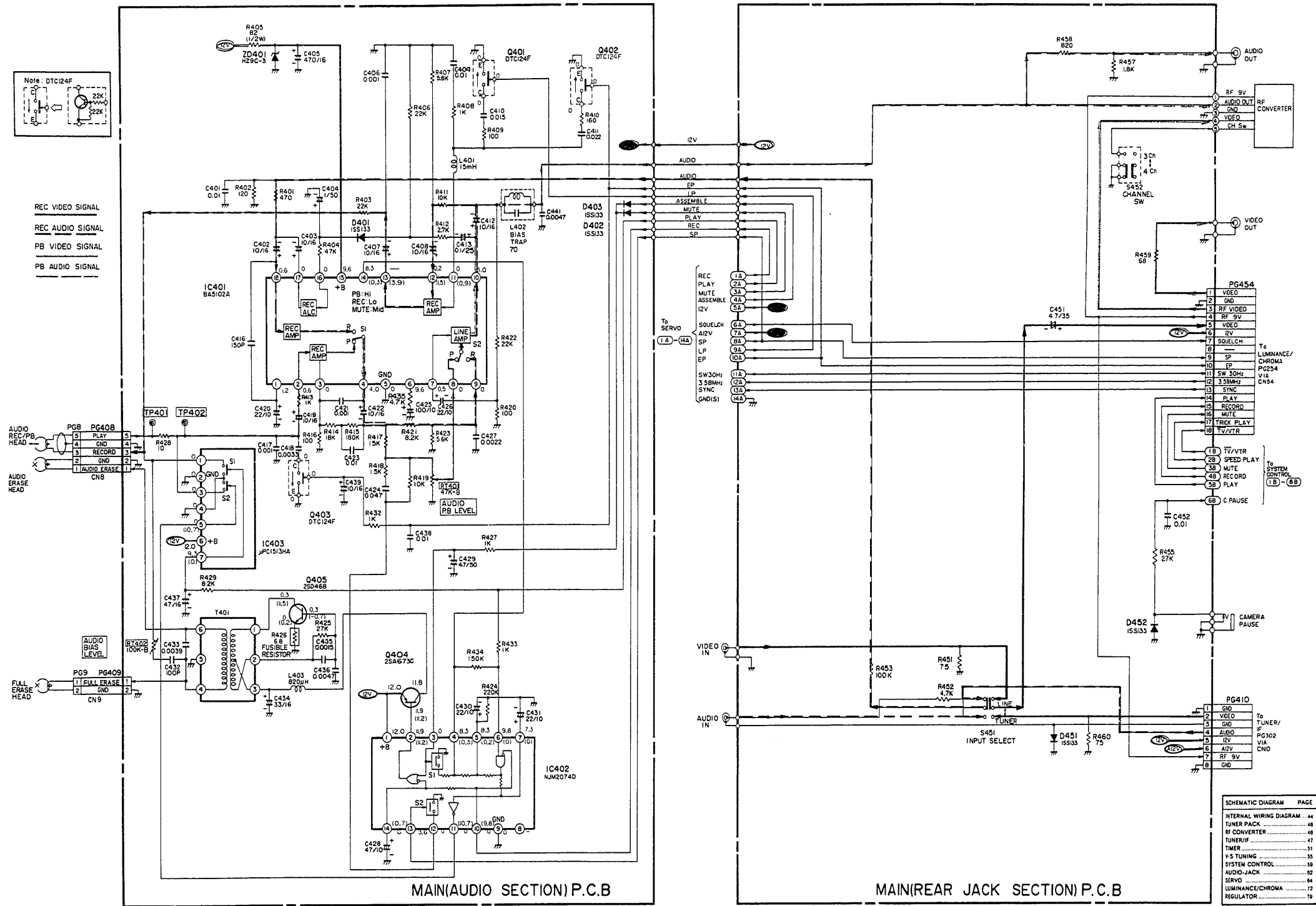


X ONE VOLTAGE: PB OR REC MODE. TWO VOLTAGES: PB AND (REC) MODES.

AUDIO-JACK



REC VIDEO SIGNAL
 REC AUDIO SIGNAL
 PB VIDEO SIGNAL
 PB AUDIO SIGNAL



MAIN(AUDIO SECTION) P.C.B

MAIN(REAR JACK SECTION) P.C.B

* ONE VOLTAGE : PB OR REC MODE. TWO VOLTAGES : PB AND (REC) MODES.

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TUNER/IF	47
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SYSTEM CONTROL	59
AUDIO-JACK	62
SERVO	64
LUMINANCE/CHROMA	72
REGULATOR	79

CN5
1
2
3

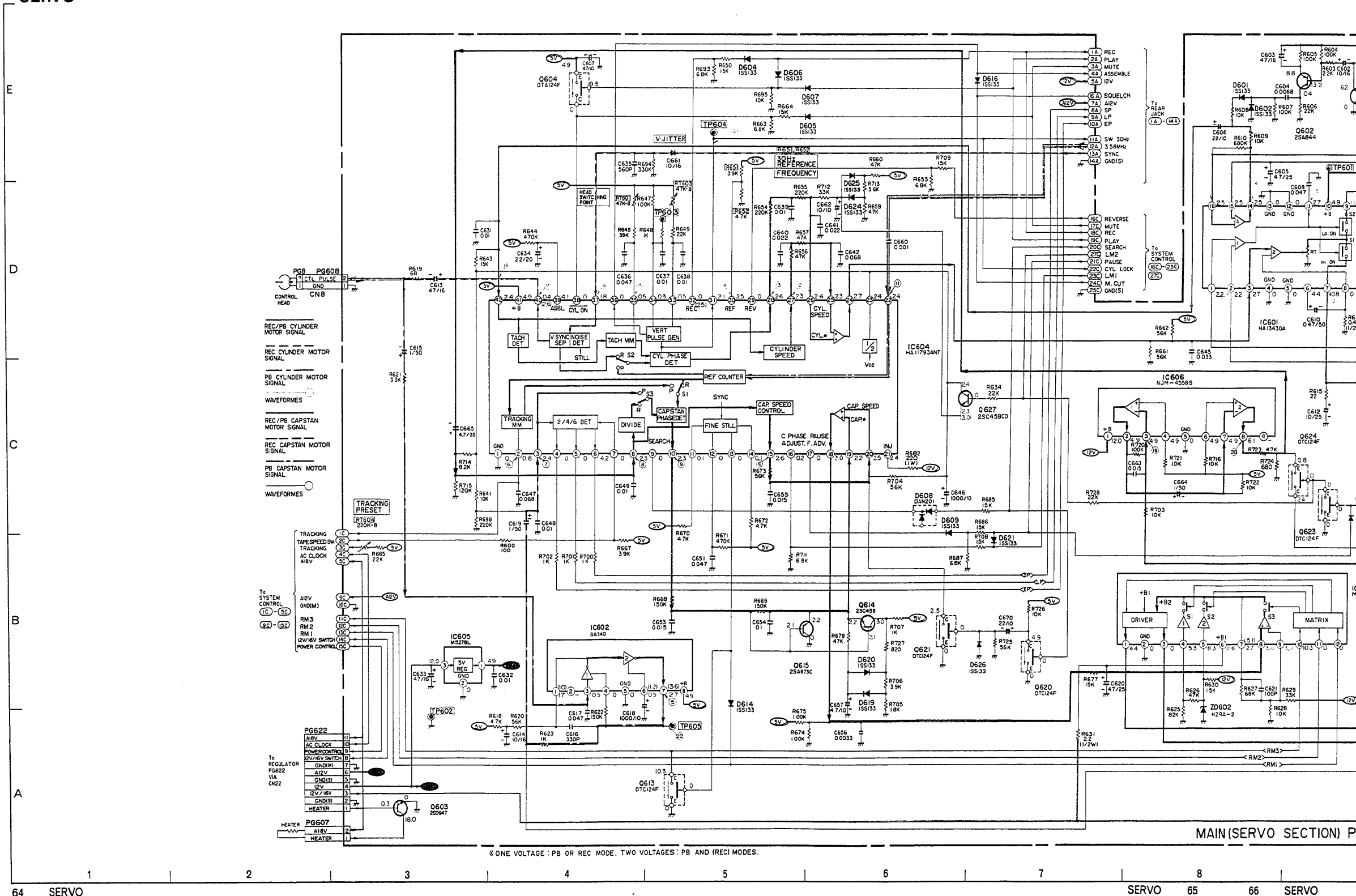
SYSTEM CONTROL
MAIN P.C.B)
PG905

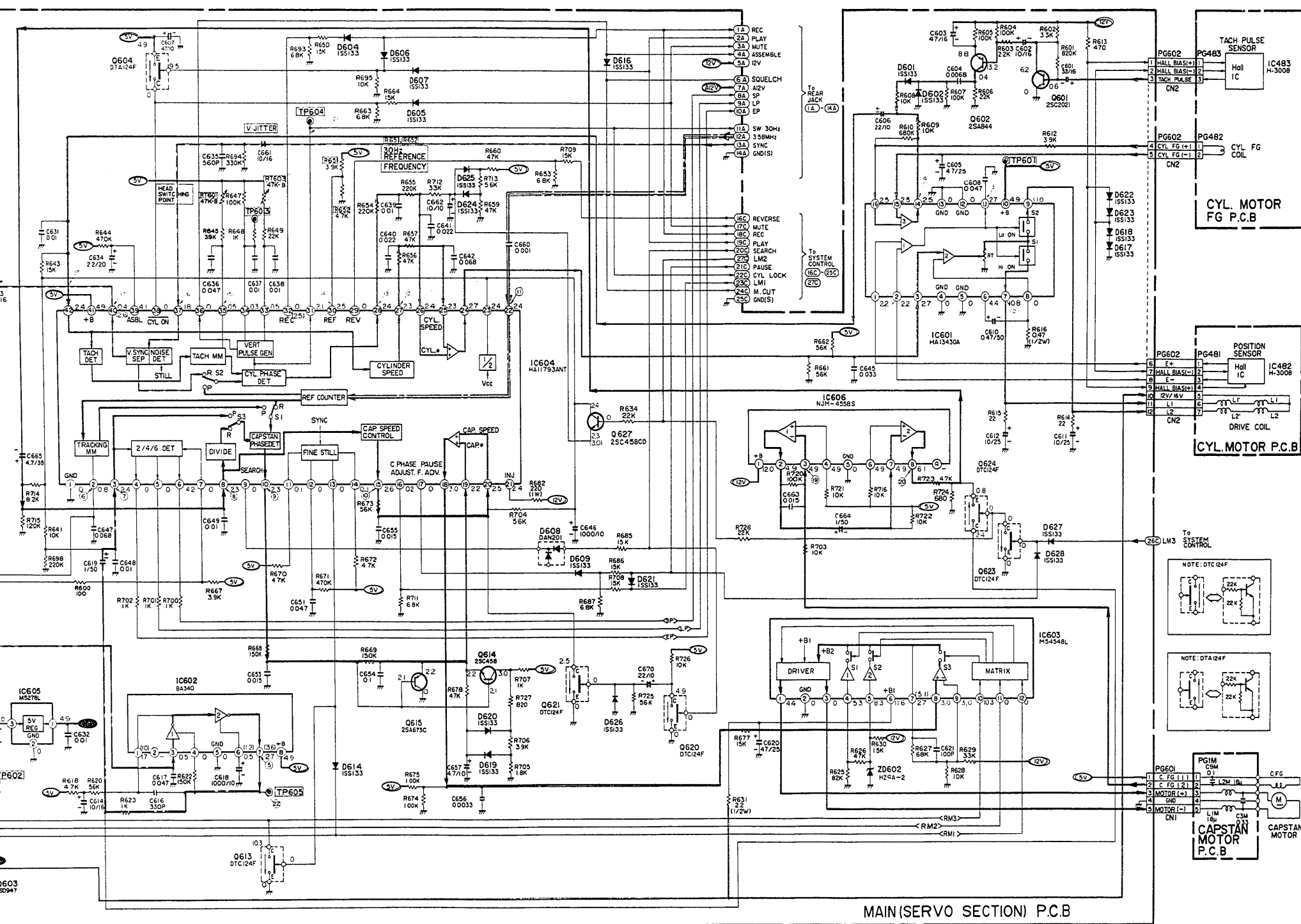
CN6
2
1

SYSTEM CONTROL
MAIN P.C.B)
PG906

C.B

SERVO





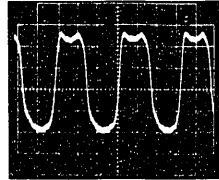
SCHEMATIC DIAGRAM	PAGE
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TUNER/IF	47
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V-S TUNING	55
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SERVO	64
LUMINANCE/CHROMA	72
REGULATOR	79

* ONE VOLTAGE : PB OR REC MODE. TWO VOLTAGES : PB AND (REC) MODES.

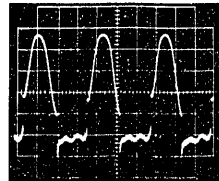
SERVO CIRCUIT WAVEFORMS

[IC601]

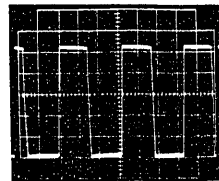
① PIN ② REC/PLAY
50 mV/5 ms. div.



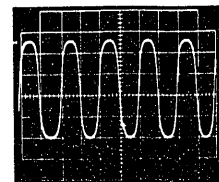
② PIN ① REC/PLAY
2V/5 ms. div.



③ PIN ⑩ REC/PLAY
0.2 V/5 ms. div.

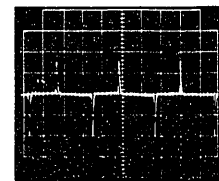


④ PIN ⑭ REC/PLAY
0.5V/2 ms. div.



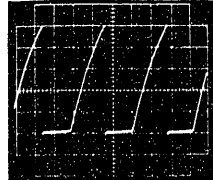
[IC602]

⑤ PIN ① PLAY
1V/10 ms. div.

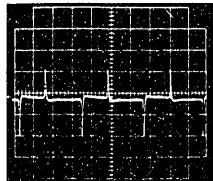


[IC604]

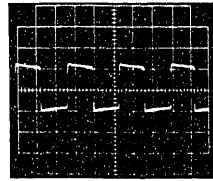
⑥ PIN ② PLAY
0.5V/5 ms. div.



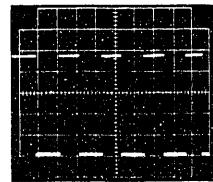
⑦ PIN ③ PLAY
1V/10 ms. div.



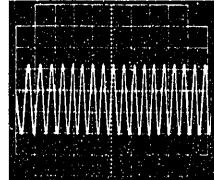
⑧ PIN ④ REC/PLAY
0.5V/0.5 ms. div.



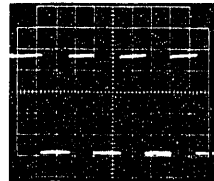
⑨ PIN ⑩ REC/PLAY
1V/0.5 ms. div.



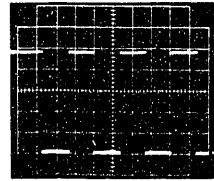
⑩ PIN ⑭ REC/PLAY
0.1V/0.5 μs. div.



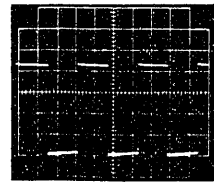
⑫ PIN ⑯ REC/PLAY
1V/0.2 ms. div.



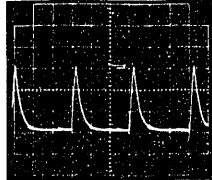
⑬ PIN ⑰ REC/PLAY
1V/0.2 ms. div.



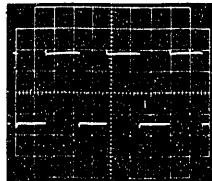
⑭ PIN ⑳ REC/PLAY
1V/10 ms. div.



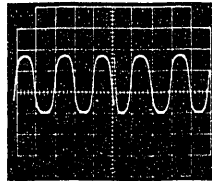
⑮ PIN ⑳ REC/PLAY
1V/20 μs. div.



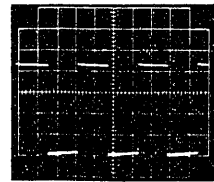
⑰ PIN ⑭ REC
1V/10 ms. div.



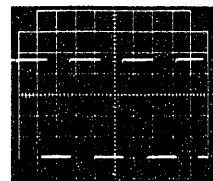
⑱ PIN ④ REC/PLAY
0.5V/2 ms. div.



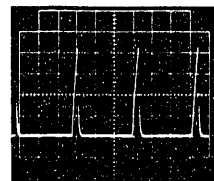
⑰ PIN ⑳ REC/PLAY
0.5V/5 ms. div.



⑩ PIN ⑮ REC/PLAY
1V/50 μs. div.

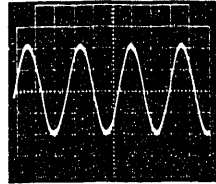


⑮ PIN ⑮ REC/PLAY
0.5V/5 ms. div.

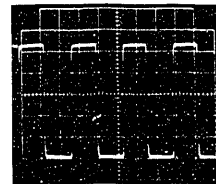


[IC606]

⑮ PIN ③ REC/PLAY
0.1V/0.5 ms. div.

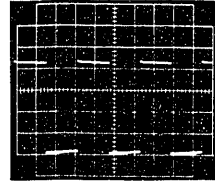


⑯ PIN ③ REC/PLAY
0.2V/0.5 ms. div.

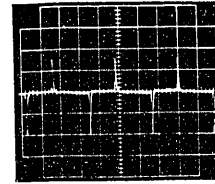


[TEST POINT]

⑰ TP604 REC/PLAY
1V/10 ms. div.

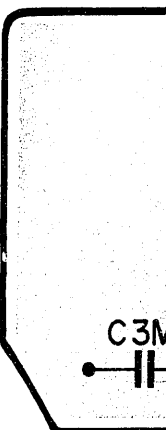
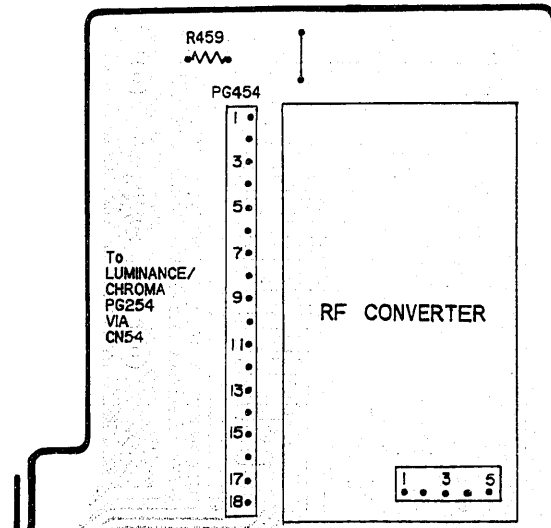
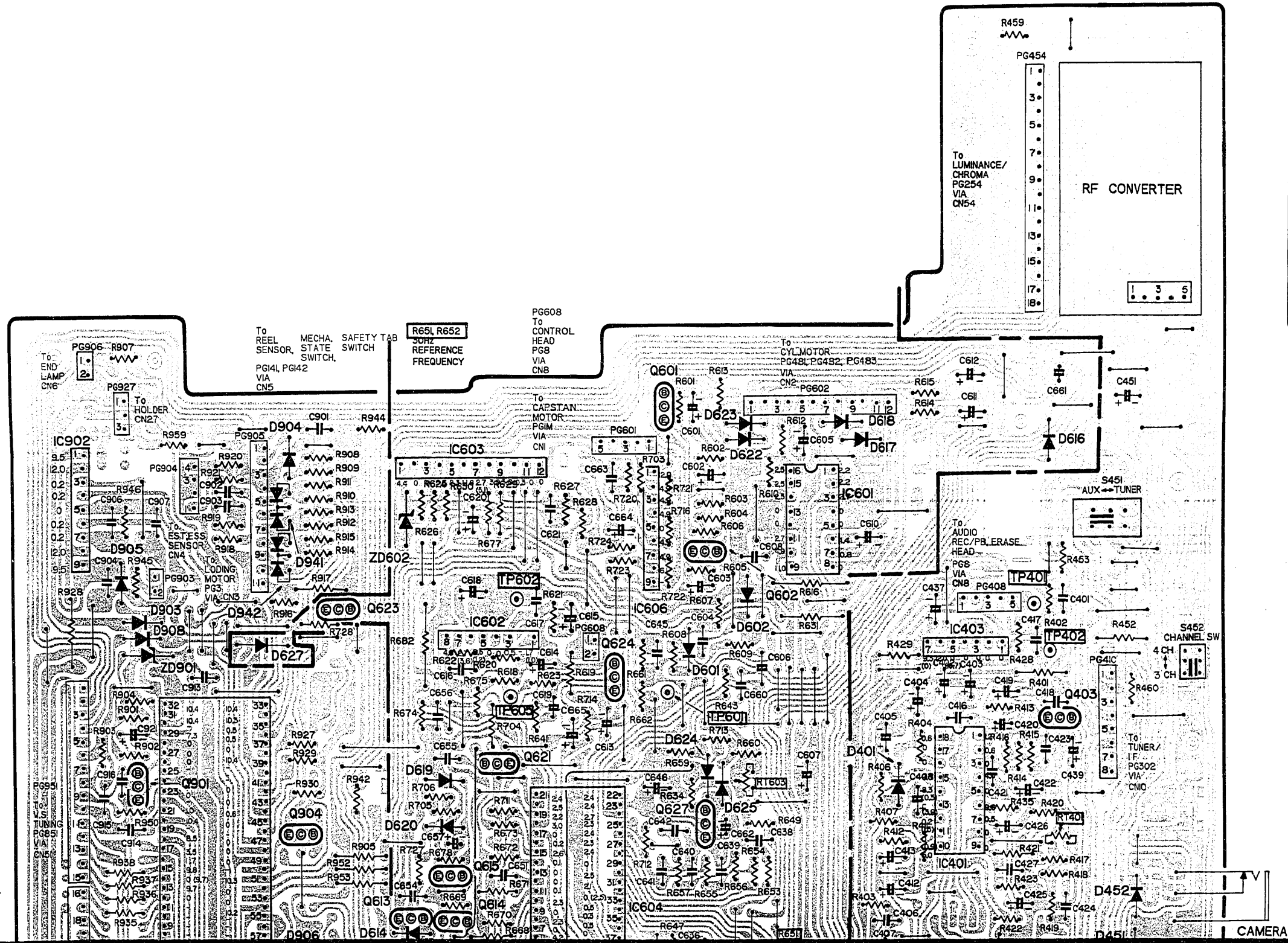


⑱ TP605 PLAY
1V/10 ms. div.



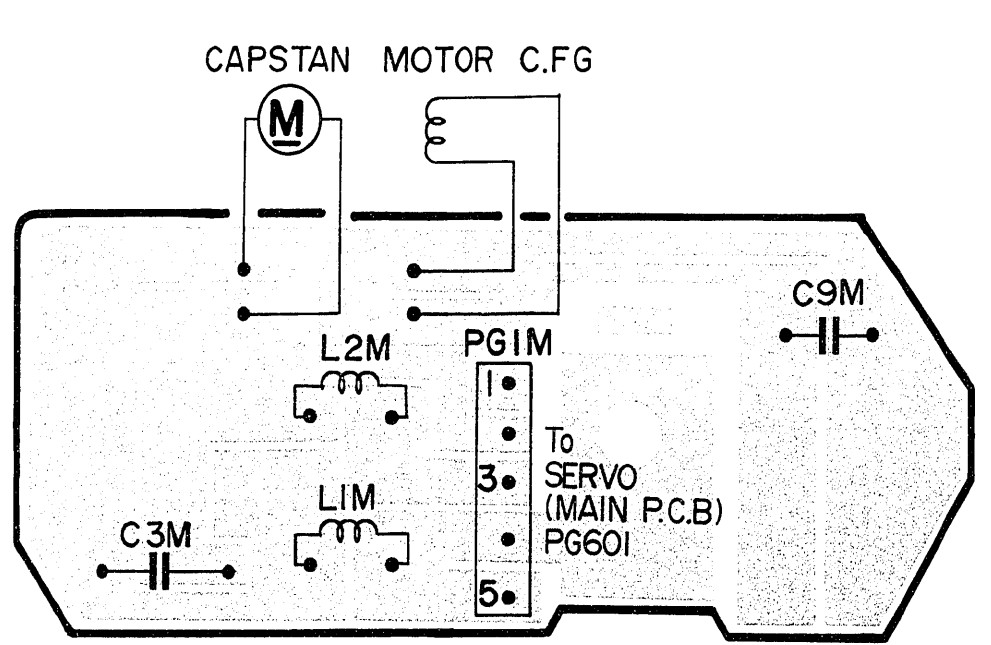
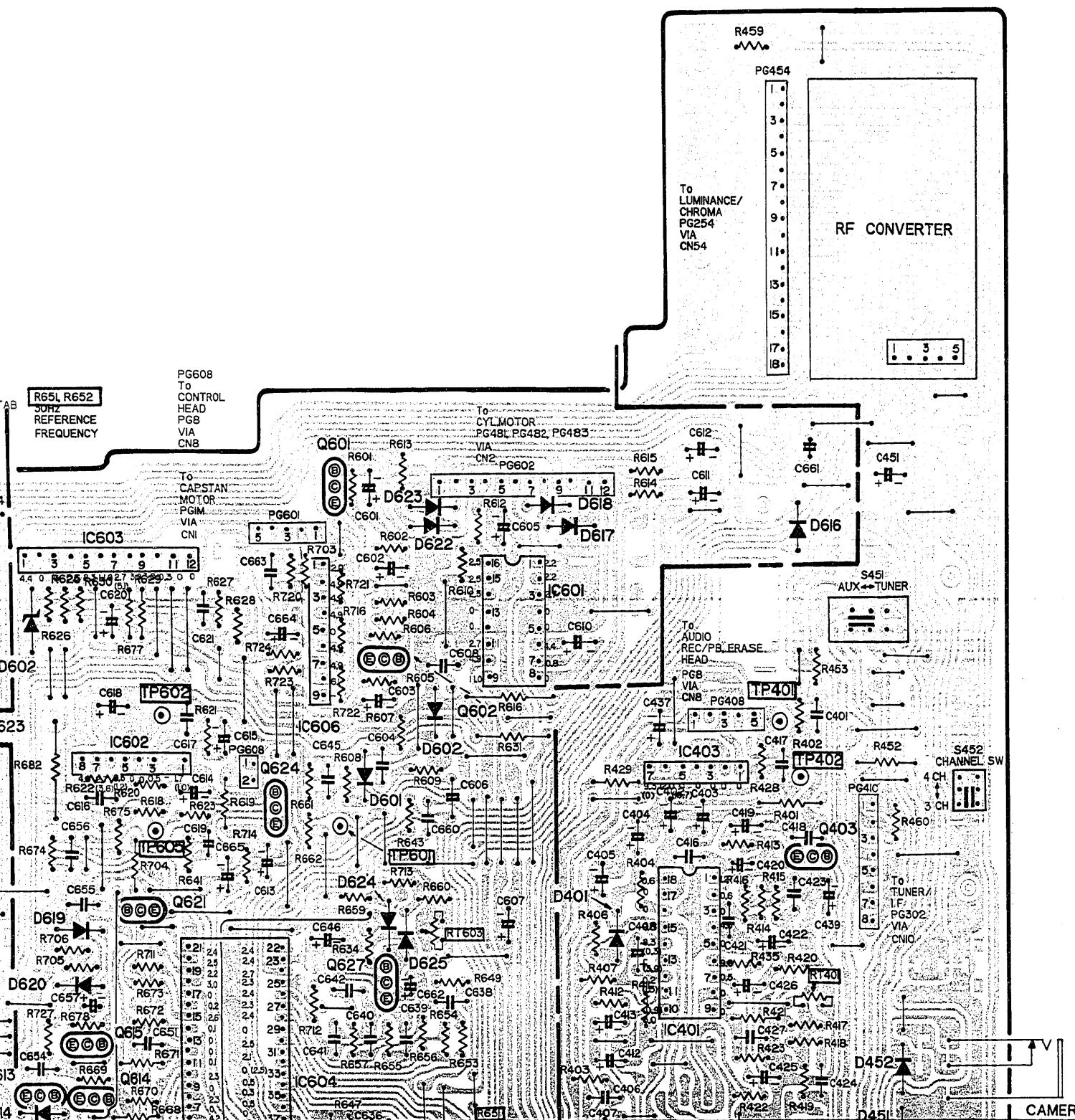
MAIN

H
G
F
E
D

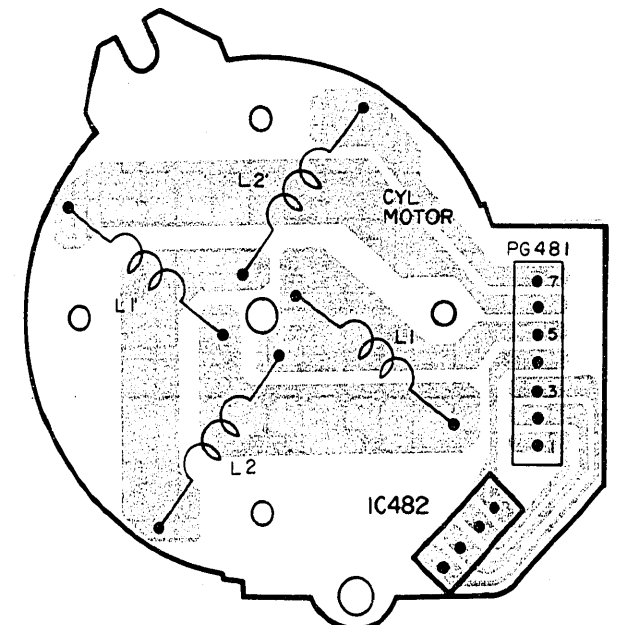


CY

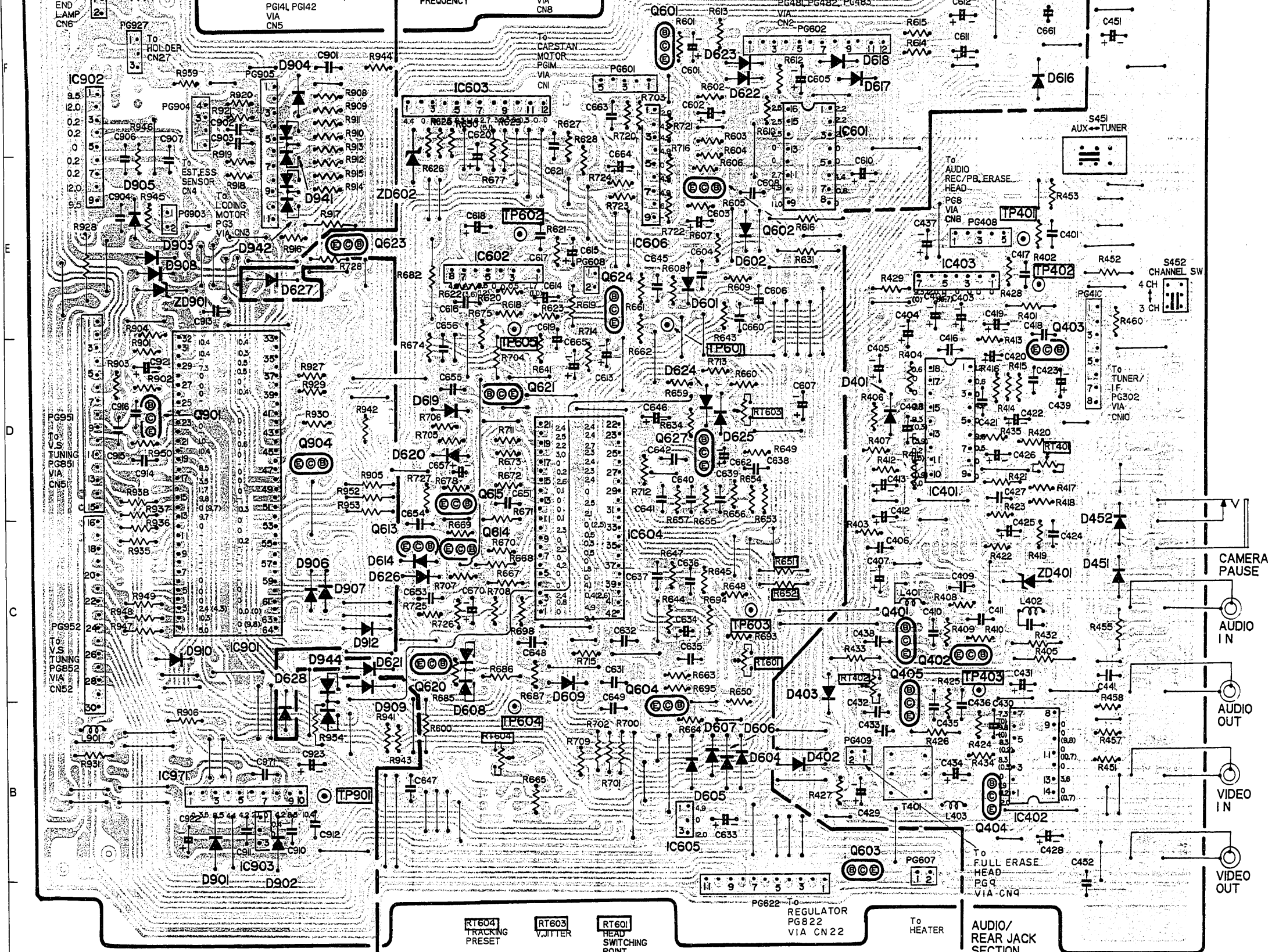
CAMERA



CAPSTAN MOTOR P.C.B



CYLINDER MOTOR P.C.B



SYSTEM CONTROL SECTION

SERVO SECTION

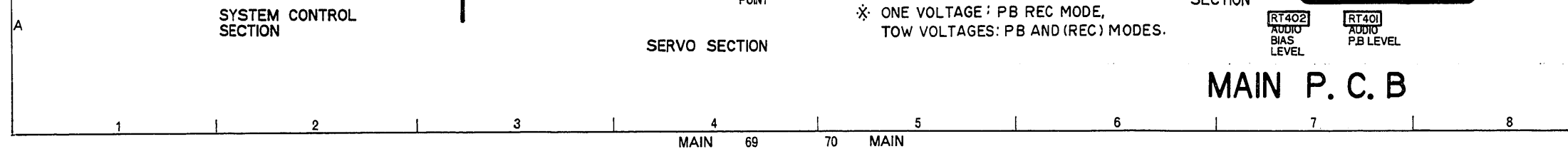
REGULATOR
PG8 22
VIA CN22

To HEATER

AUDIO/REAR JACK SECTION

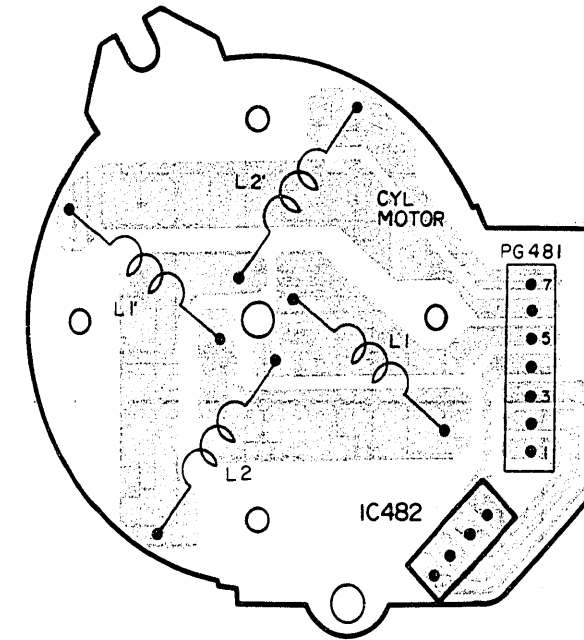
RT402 AUDIO BIAS LEVEL
RT401 AUDIO PB LEVEL

MAIN P. C. B



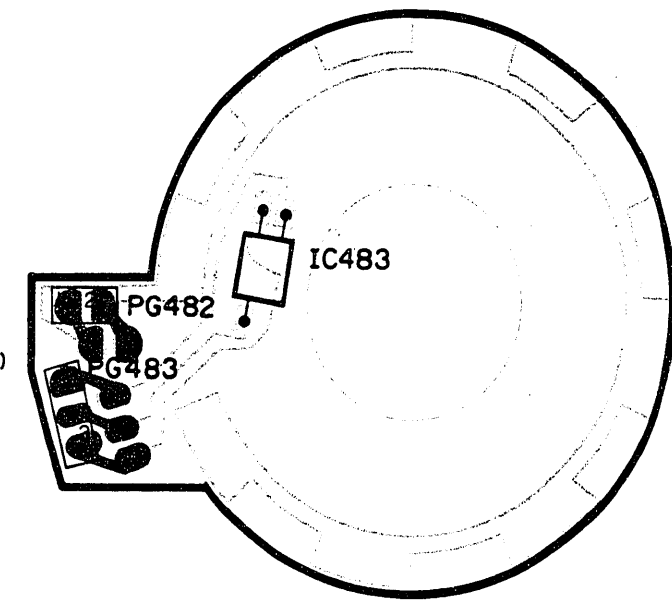
* ONE VOLTAGE : PB REC MODE,
TOW VOLTAGES: PB AND (REC) MODES.

CAPSTAN MOTOR P.C.B



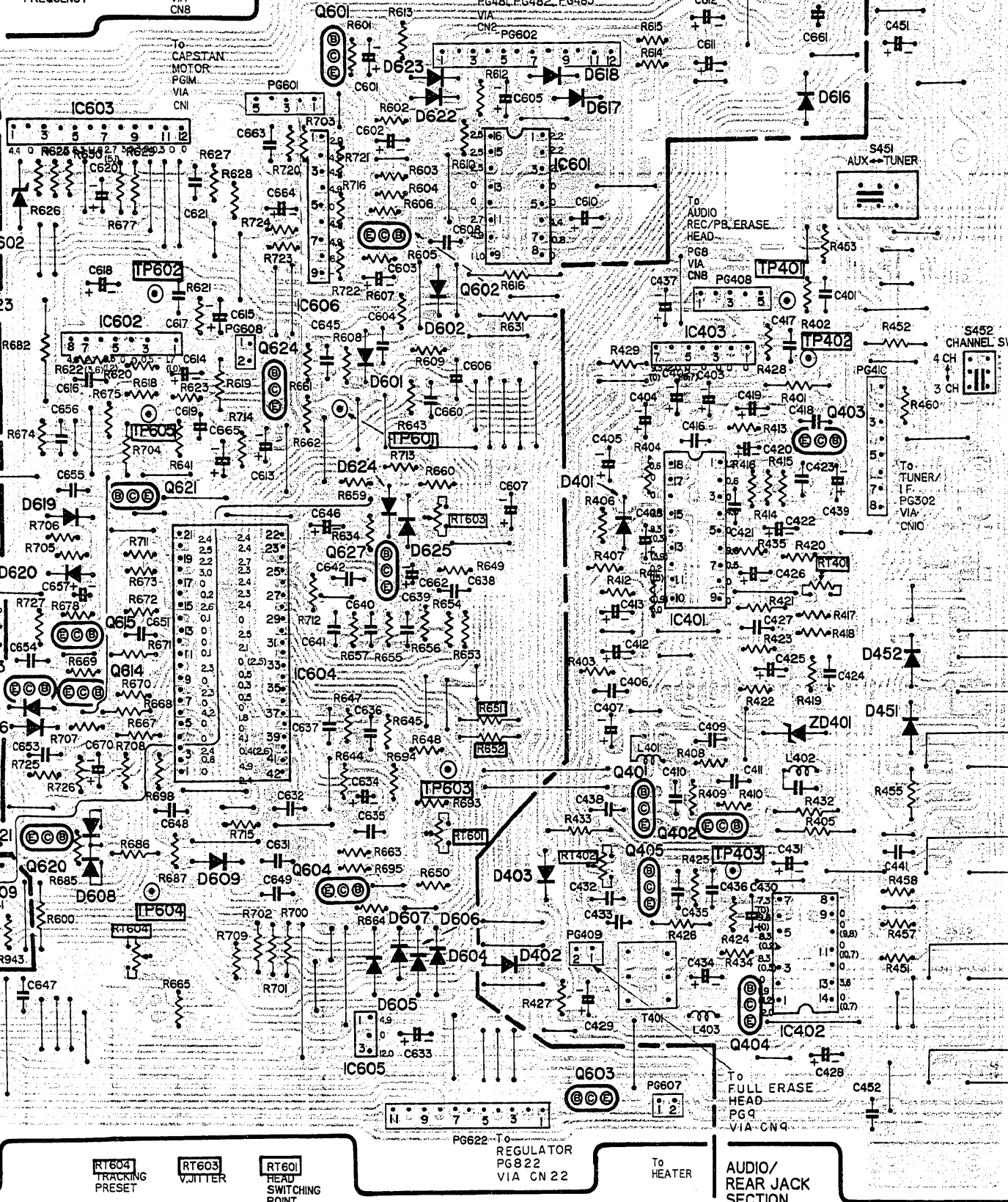
To
SERVO(MAIN P.C.B)
PG602

CYLINDER MOTOR P.C.B



To
SERVO
(MAIN P.C.B)
PG602

CYLINDER MOTOR FG P.C.B



* ONE VOLTAGE : PB REC MODE,
TOW VOLTAGES: PB AND (REC) MODES.

RT402 AUDIO BIAS LEVEL
RT401 AUDIO P.B LEVEL

MAIN P.C.B

LUMINANCE/CHROMA

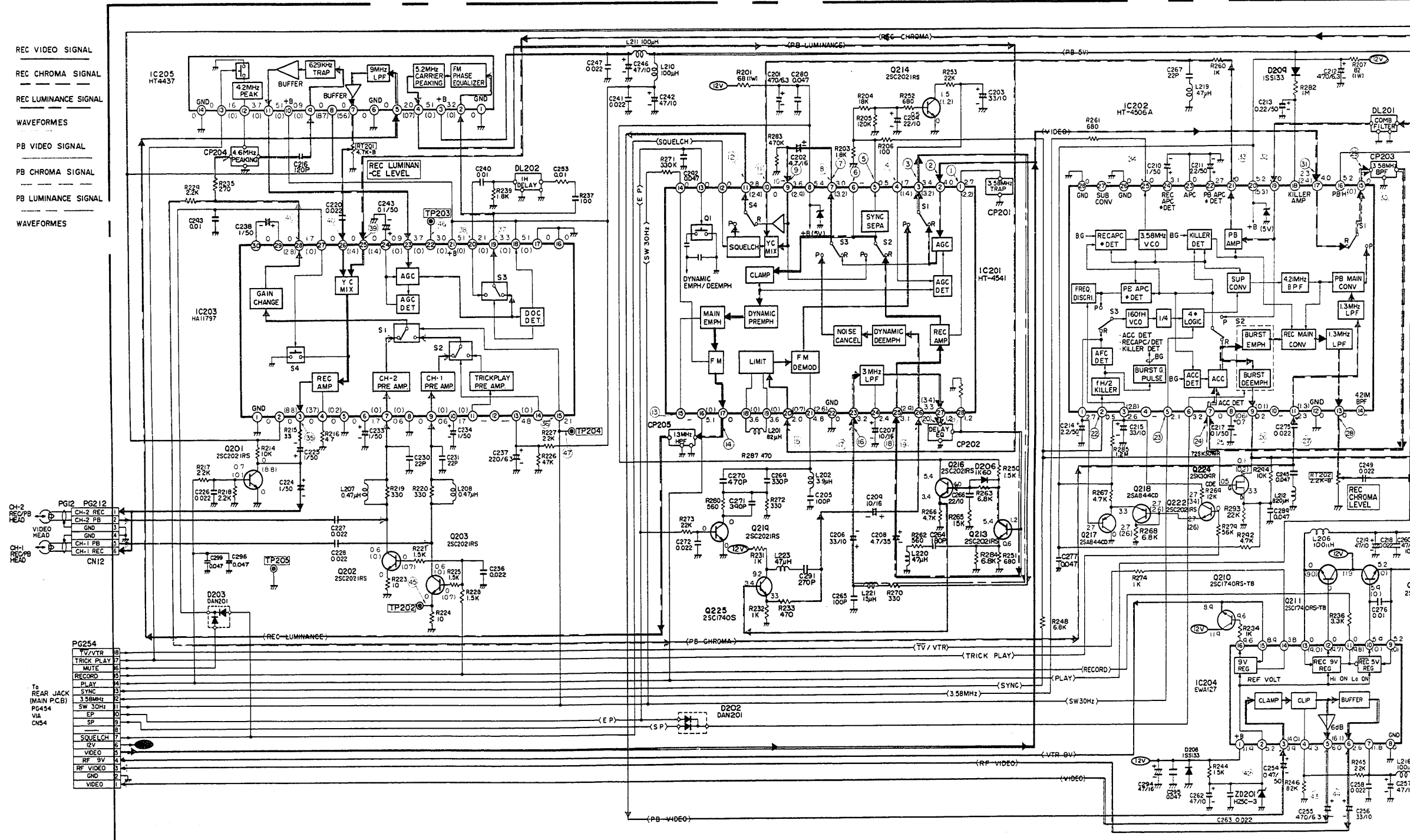
- REC VIDEO SIGNAL
- REC CHROMA SIGNAL
- REC LUMINANCE SIGNAL
- WAVEFORMES
- PB VIDEO SIGNAL
- PB CHROMA SIGNAL
- PB LUMINANCE SIGNAL
- WAVEFORMES

D

C

B

A



72

LUMINANCE/CHROMA

2

3

4

5

6

LUMINANCE/CHROMA

73

74

LUMINANCE/CHROMA

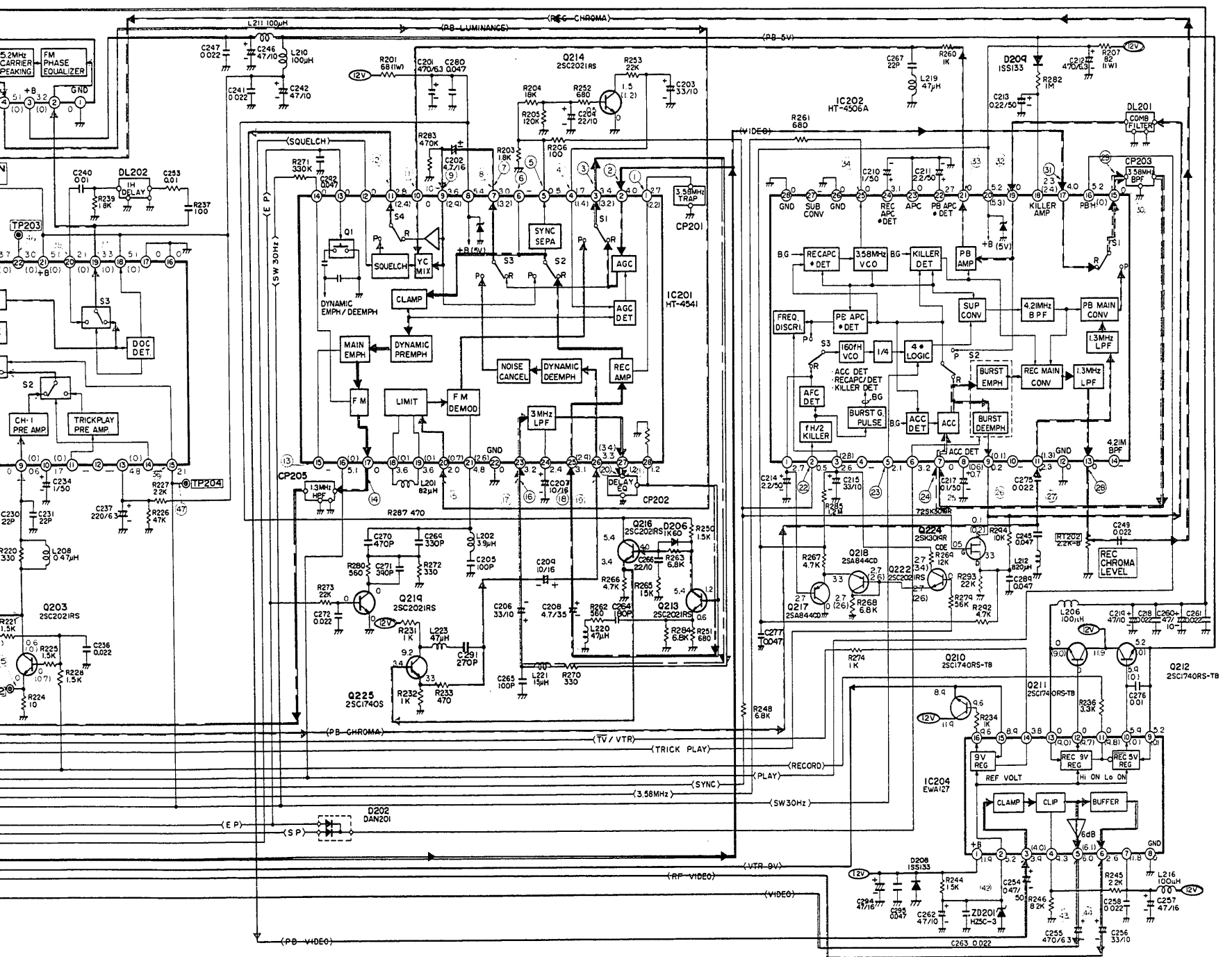
* ONE VOLTAGE: PB OR REC MODE. TWO VOLTAGES: PB AND (REC) MODES.

LUMINANCE / CHROMA P.C.B

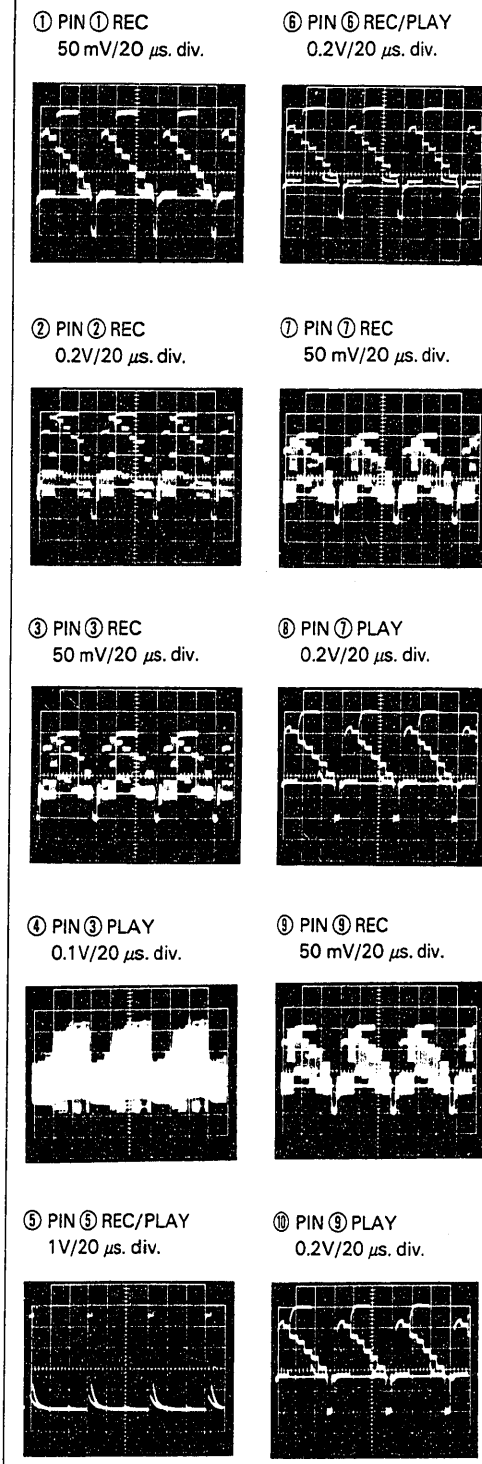
LUMINANCE/CHROMA CIRCUIT WAVEFORMS

[IC201]

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REGULATOR	76



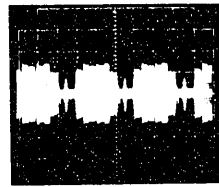
LUMINANCE / CHROMA P.C.B



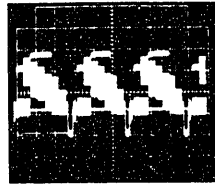
* ONE VOLTAGE: PB OR REC MODE. TWO VOLTAGES: PB AND (REC) MODES.

[IC201]

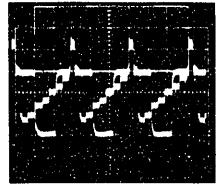
① PIN ⑩ PLAY
50 mV/20 μ s. div.



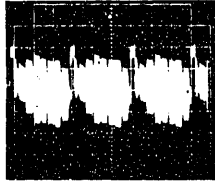
⑩ PIN ⑫ REC
50 mV/20 μ s. div.



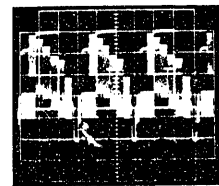
⑫ PIN ⑦ PLAY
50 mV/20 μ s. div.



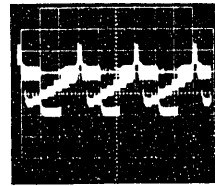
⑫ PIN ④ PLAY
50 mV/20 μ s. div.



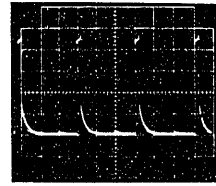
⑫ PIN ⑩ REC/PLAY
0.2V/20 μ s. div.



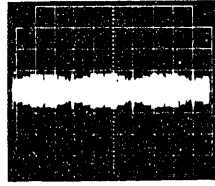
⑩ PIN ⑫ PLAY
50 mV/20 μ s. div.



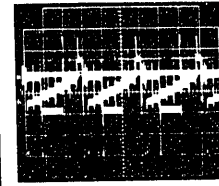
⑫ PIN ⑦ REC/PLAY
1V/20 μ s. div.



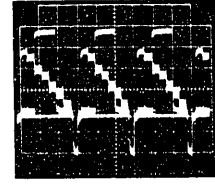
⑫ PIN ⑩ PLAY
50 mV/20 μ s. div.



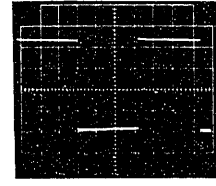
⑬ PIN ⑩ REC
0.2V/20 μ s. div.



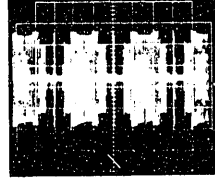
⑩ PIN ⑫ REC
50 mV/20 μ s. div.



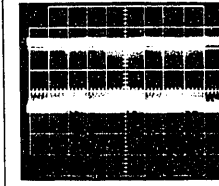
⑬ PIN ⑤ REC/PLAY
1V/5 ms. div.



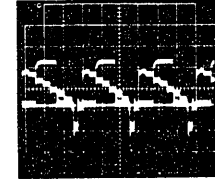
⑬ PIN ⑬ REC
0.1V/20 μ s. div.



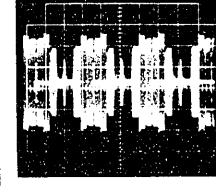
⑭ PIN ⑦ REC
0.2V/20 μ s. div.



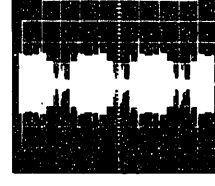
⑩ PIN ⑫ PLAY
0.1V/20 μ s. div.



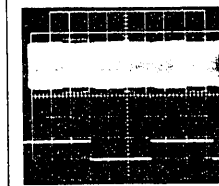
⑭ PIN ⑦ REC
50 mV/20 μ s. div.



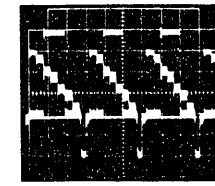
⑭ PIN ⑬ REC
50 mV/20 μ s. div.



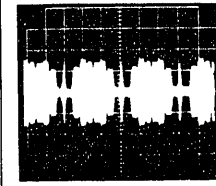
⑮ PIN ⑫ PLAY
0.2V/5 ms. div.



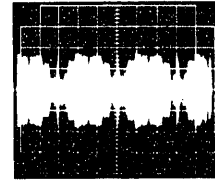
⑫ PIN ⑦ REC
50 mV/20 μ s. div.



⑮ PIN ⑦ PLAY
0.1V/20 μ s. div.



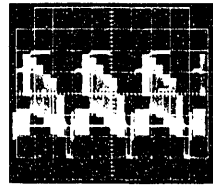
⑮ PIN ⑬ PLAY
0.1V/20 μ s. div.



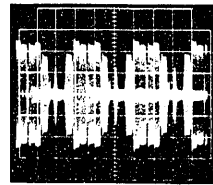
[IC202]

[IC202]

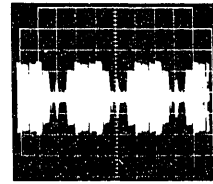
⑬ PIN ⑦ REC
0.2V/20 μ s. div.



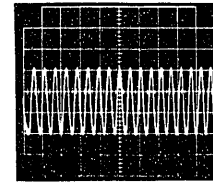
⑭ PIN ⑩ PLAY
50 mV/20 μ s. div.



⑮ PIN ⑫ PLAY
1V/5 ms. div.

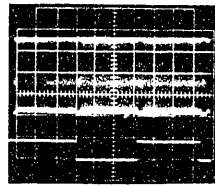


⑯ PIN ⑮ REC/PLAY
0.2V/0.5 μ s. div.

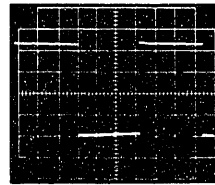


[IC203]

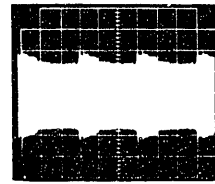
⑰ PIN ③ REC
1V/5 ms. div.



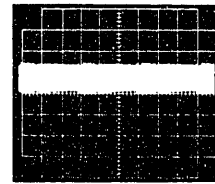
⑱ PIN ⑤ REC/PLAY
1V/5 ms. div.



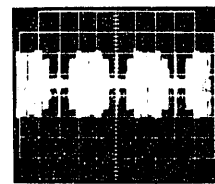
⑲ PIN ⑩ PLAY
0.1V/20 μ s. div.



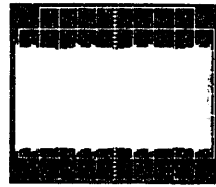
⑳ PIN ⑫ PLAY
50 mV/20 μ s. div.



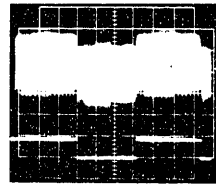
㉑ PIN ⑮ REC
20 mV/20 μ s. div.



㉒ PIN ⑮ REC
0.1V/20 μ s. div.

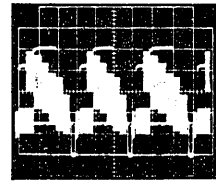


㉓ PIN ⑰ PLAY
50 mV/5 ms. div.

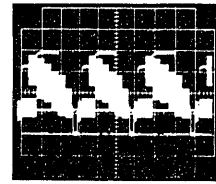


[IC204]

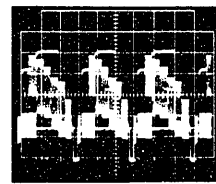
㉔ PIN ③ REC/PLAY
0.2V/20 μ s. div.



㉕ PIN ⑤ REC/PLAY
0.5V/20 μ s. div.

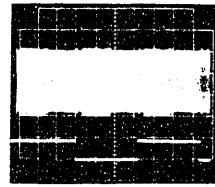


㉖ PIN ⑤ REC/PLAY
0.2V/20 μ s. div.

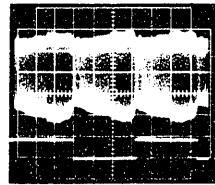


[TEST POINT]

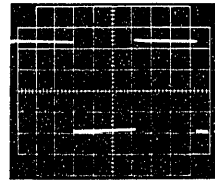
㉗ TP202 REC
50 mV/5 ms. div.

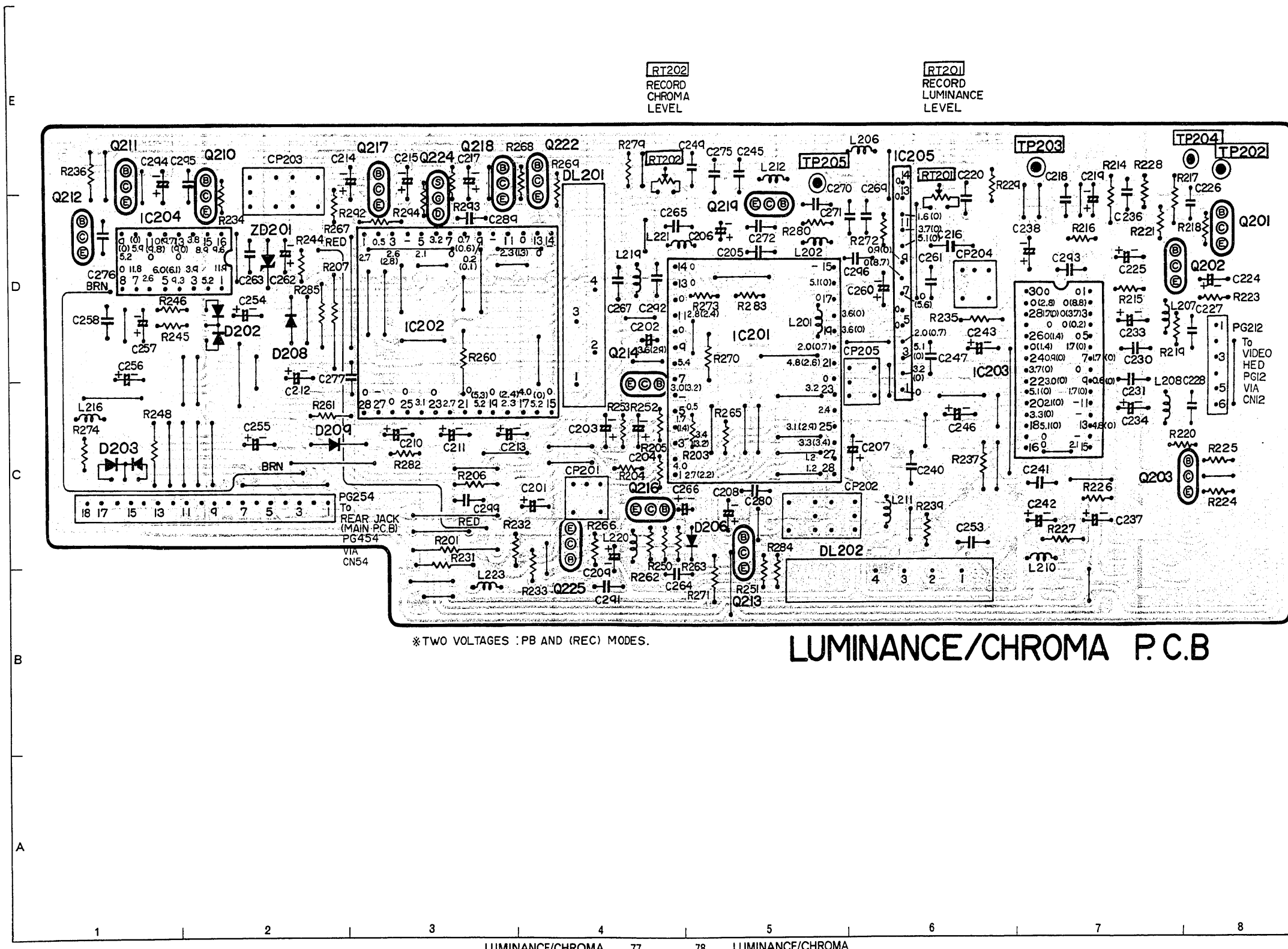


㉘ TP203 PLAY
50 mV/5 ms. div.



㉙ TP204 REC/PLAY
1V/5 ms. div.





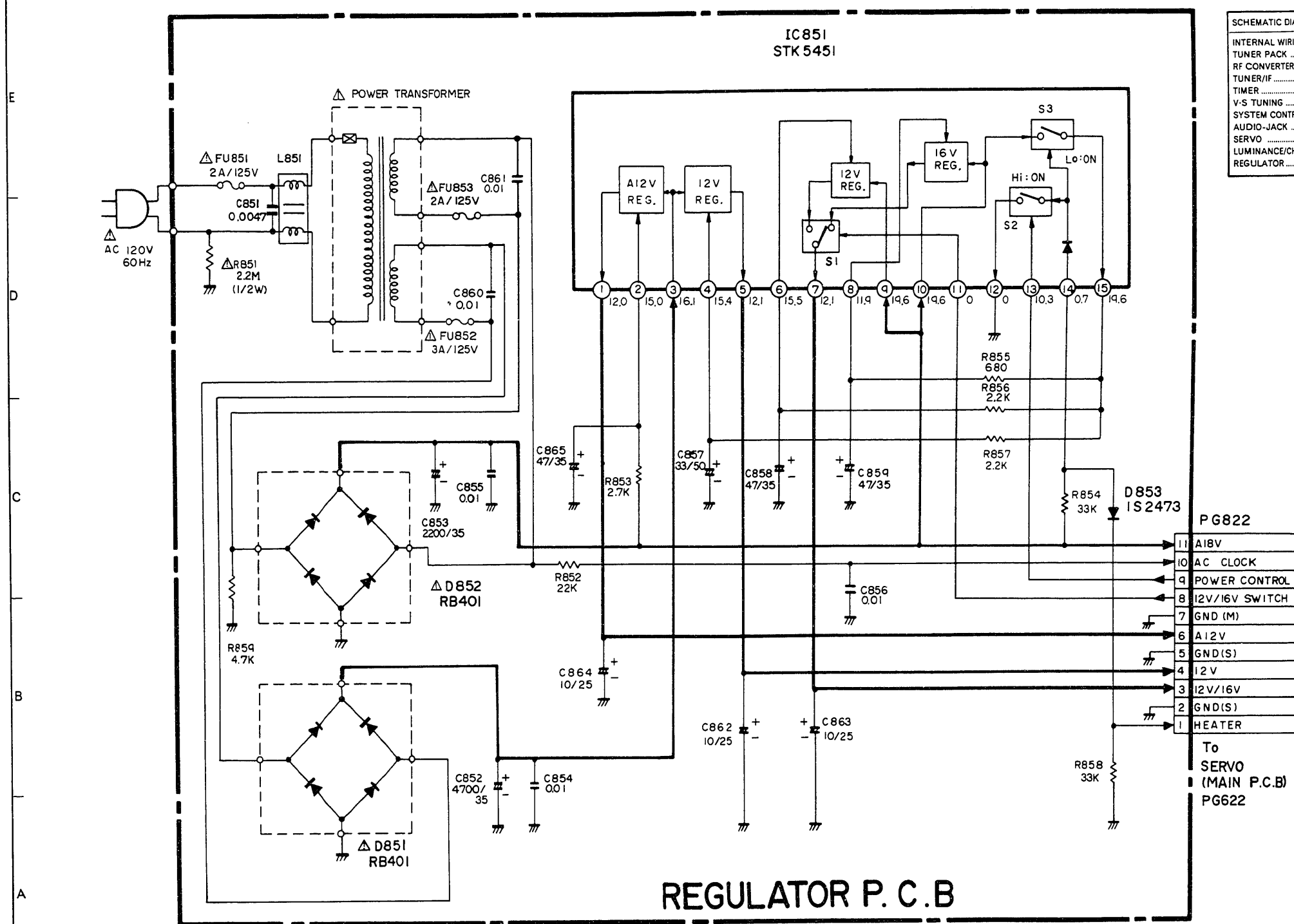
RT202
RECORD
CHROMA
LEVEL

RT201
RECORD
LUMINANCE
LEVEL

*TWO VOLTAGES : PB AND (REC) MODES.

LUMINANCE/CHROMA P.C.B

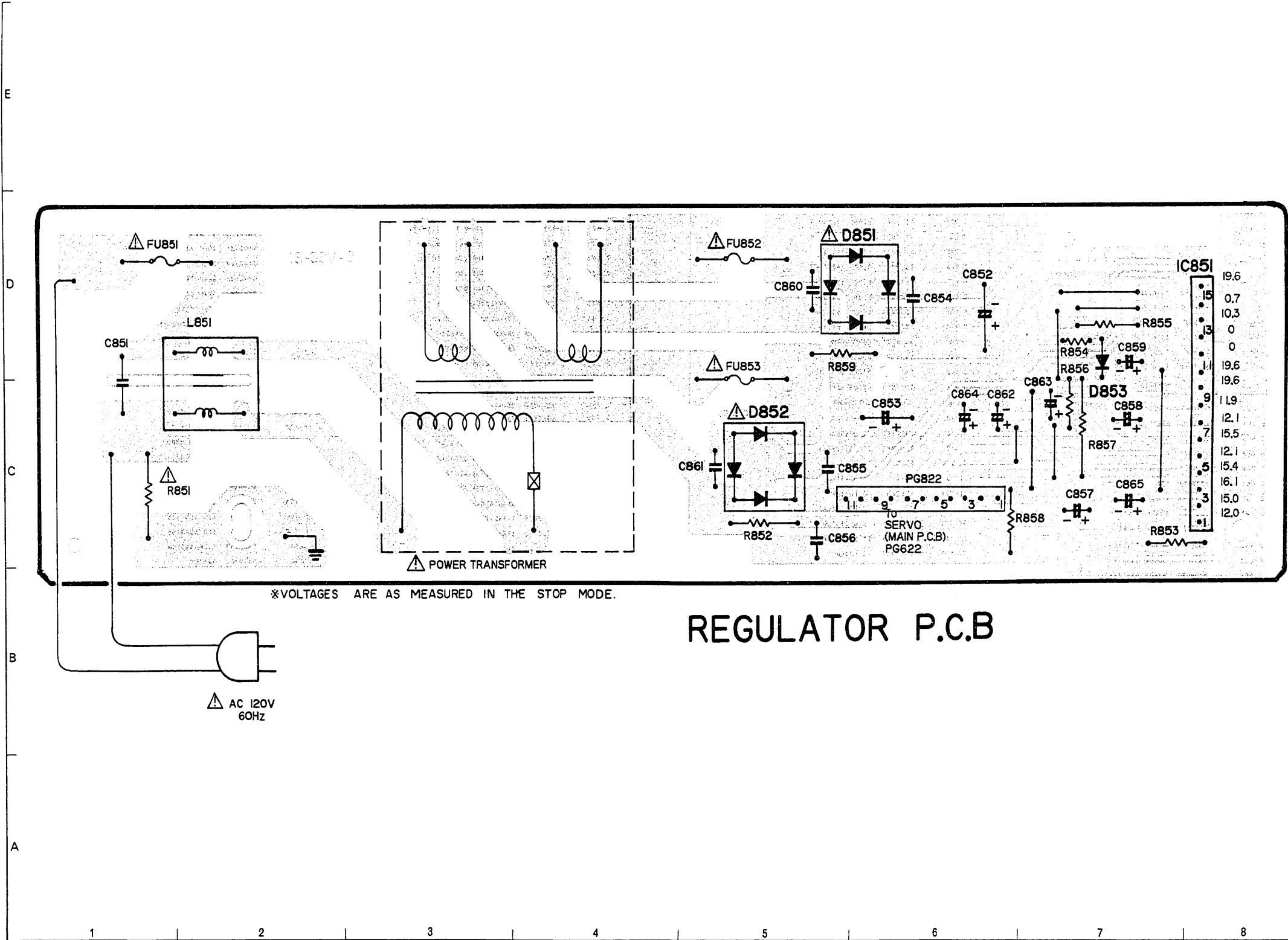
REGULATOR



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REGULATOR P.C.B

*VOLTAGES ARE AS MEASURED IN THE STOP MODE.



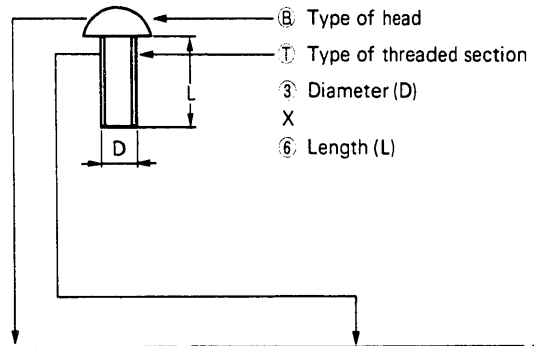
*VOLTAGES ARE AS MEASURED IN THE STOP MODE.

REGULATOR P.C.B

EXPLODED VIEWS

SCREW CLASSIFICATION

Example: BT3 - 6



Abbreviation	Name	Shape	Abbreviation	Name	Shape	Abbreviation	Name	Shape
No symbol	Brazier head		No symbol	Machine (clamps without tapping)		W	Washer	
P	Pan head		t	Tapping (clamps with tapping) Type 1		LW	Spring washer	
B	Binding head		T	Tapping (clamps with tapping) Type 2		LW	Locking washer	
O	Oval countersunk head		f	Forming tight (for metal)		E	E-ring	
F	Flat countersunk head		Note: Since the forming tight screw tightens while self-tapping, machine screws can be replaced by tapping screws.		Note: Internal dia is indicated for nuts and washers.			

Washers and Nuts

LUBRICATION

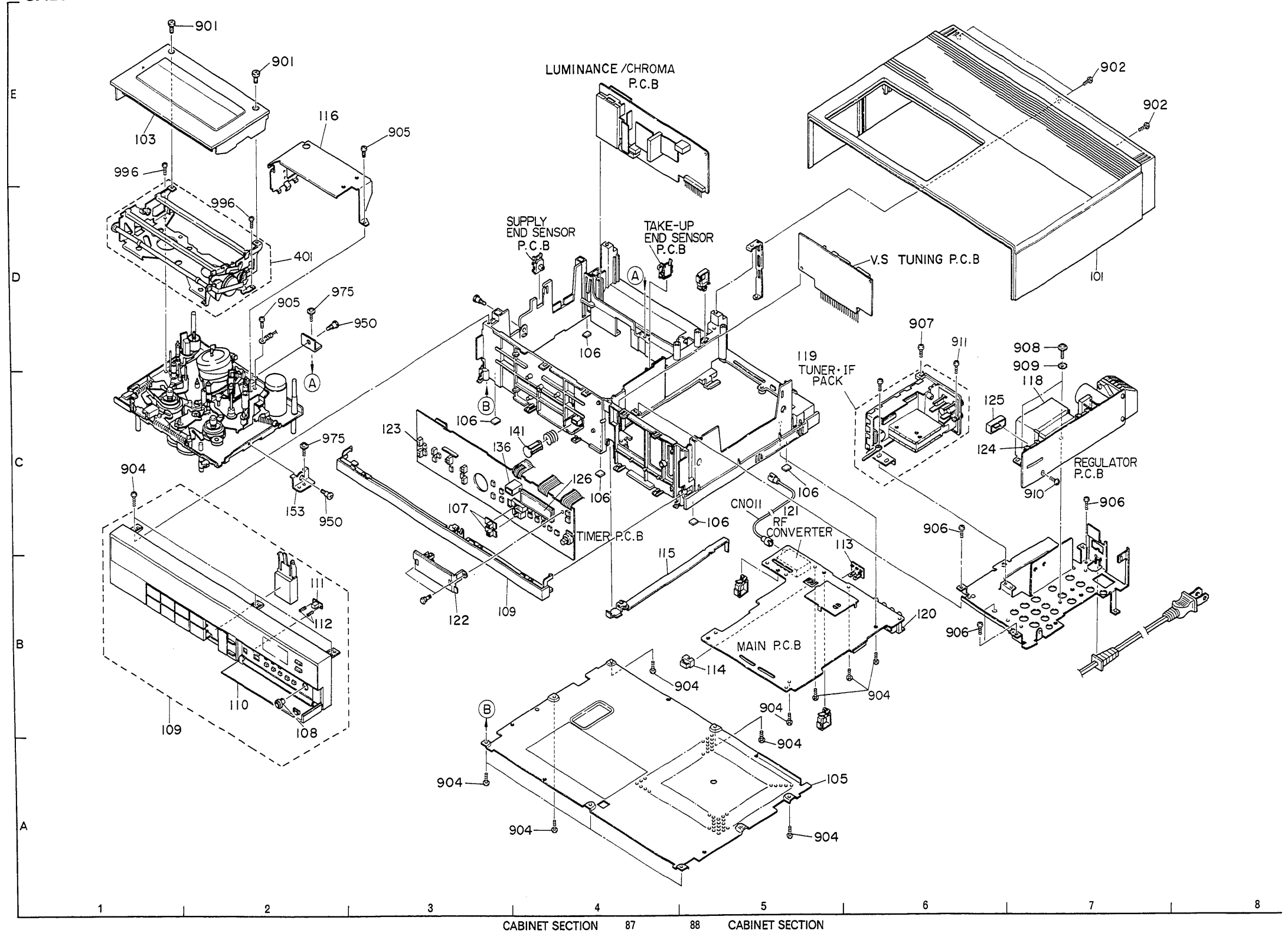
Lubrication points are shown in the exploded view diagrams by marks (S), (H)

Lubricants shown in the diagram are as follows.

(S) Sonic slider oil (≅ 1600)

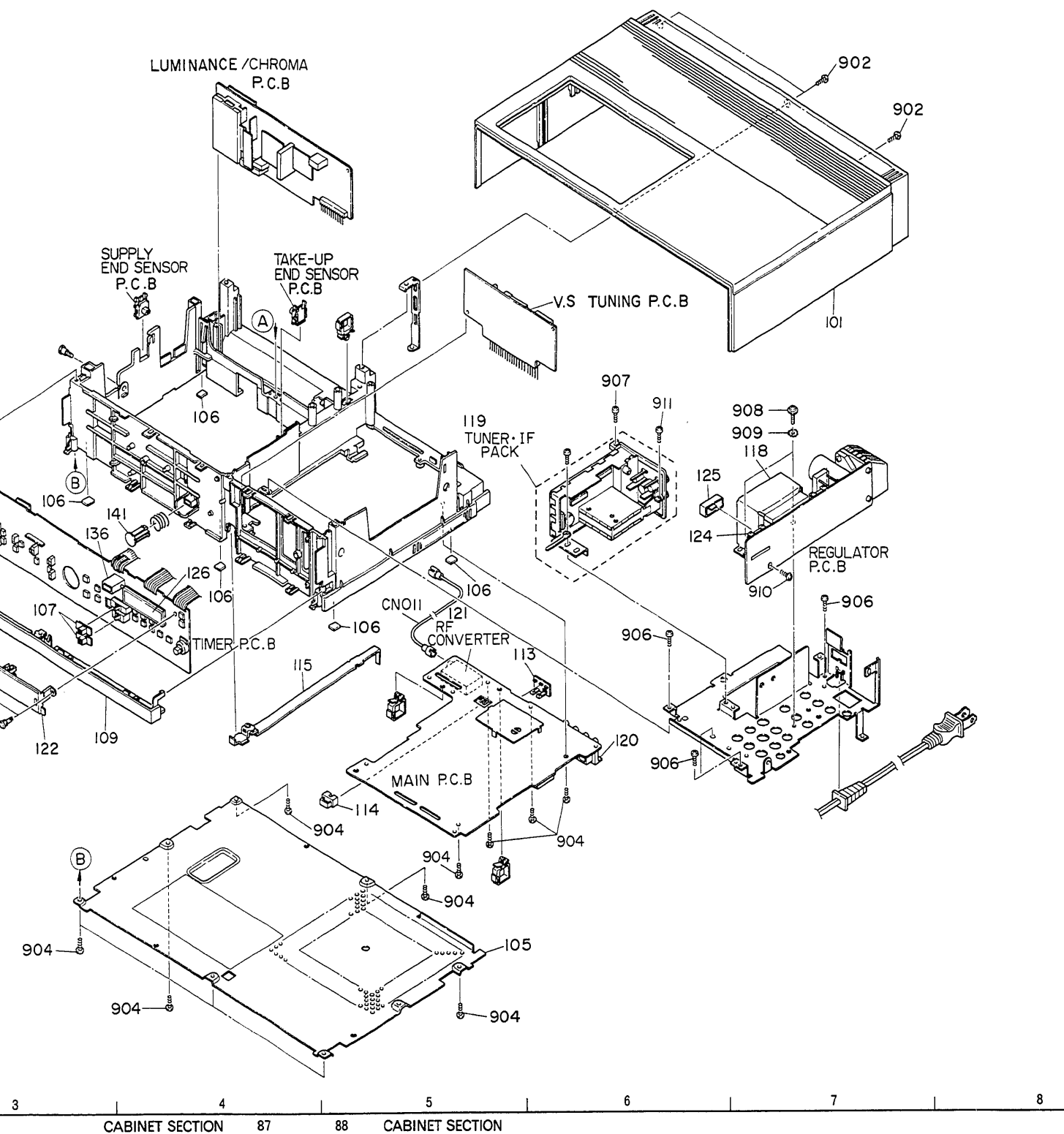
(H) Hitazol (MO-138)

CABINET SECTION



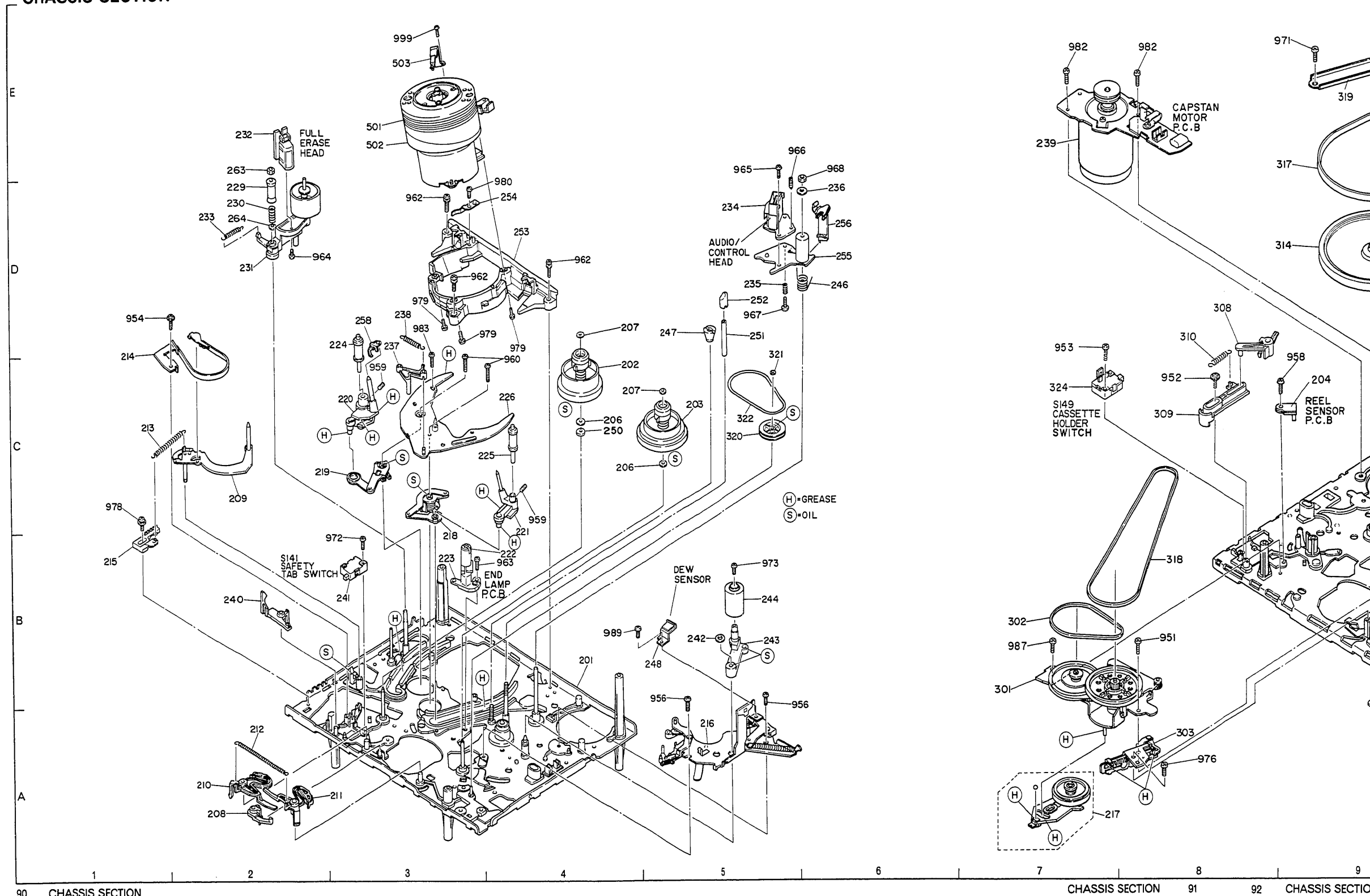
SYMBOL-N
101
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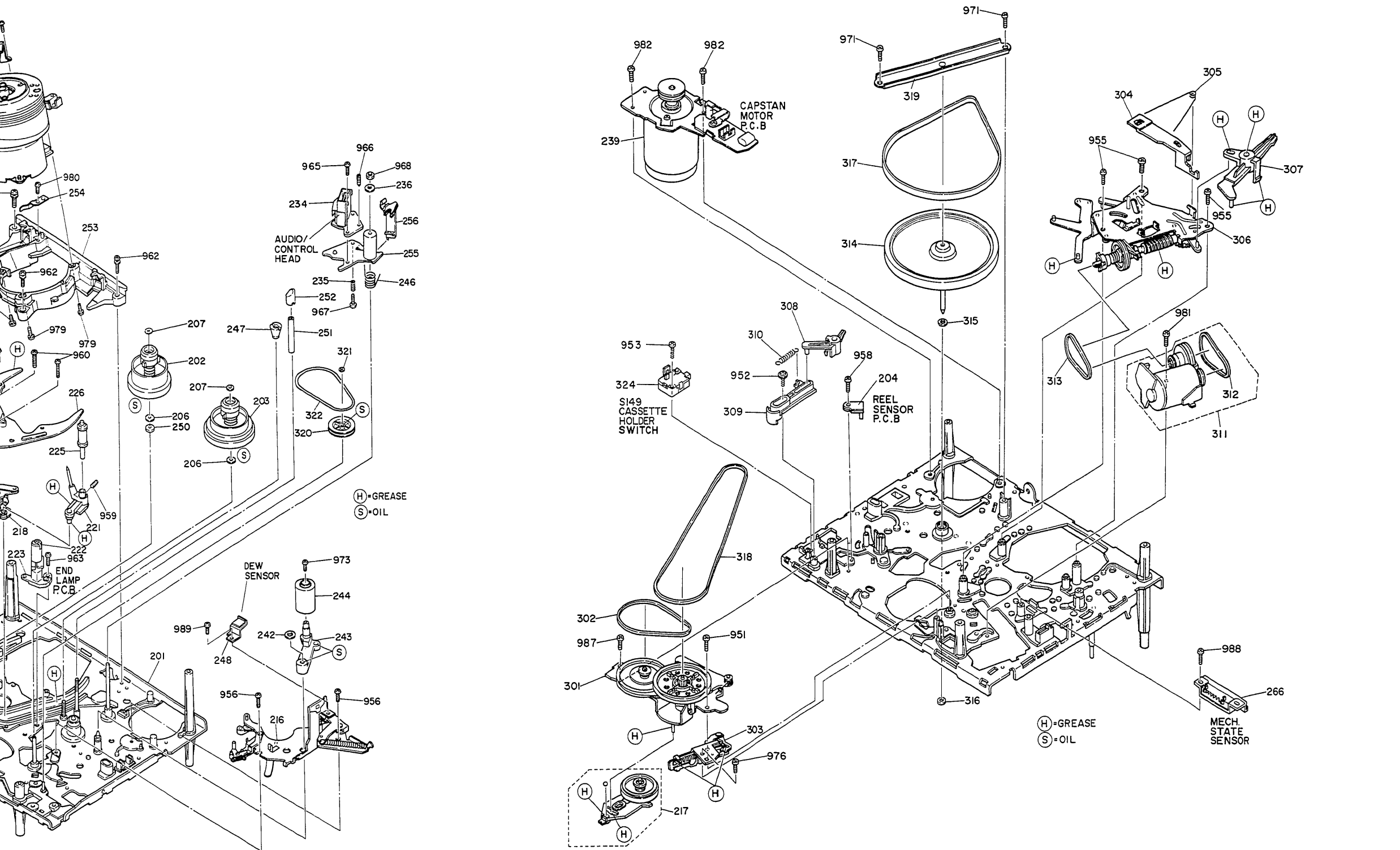
MECHANICAL PARTS(CABINET SECTION)



SYMBOL-NO	P-NO	DESCRIPTION
FOR FINAL ASSEMBLY		
101	6024523	TOP COVER
102	6237064	BOTTOM PANEL
103	6188734	CASSETTE LID
104	7470971	JACK HOLDER
105	7389727	BOTTOM COVER
106	1141244	LEG-FELT
107	6075241	KNOB
108	6075821	KNOB
109	6237353	FRONT PANEL ASSEMBLY
110	6189121	TIMER DOOR
111	6075801	KNOB
112	6303714	SPRING
113	6882271	COVER
115	7391775	LEVER
118	5213711	POWER TRANSFORMER
119	5580241	VTR FRONTEND
120	5672241	JACK PLATE
121	5587431	RF CONVERTOR
122	6885861	HOLDER
123	6889161	LED HOLDER
124	5722214	FUSE HOLDER
125	6753912	FUSE COVER
126	5311223	TIMER DISPLAY(PG751)
141	6866892	EJECT SHAFT
901	7547749	SCREW
902	7781131	SCREW BIND TIGHTING 3MMDX12MM
903	8691308	BT SCREW-2.6MMDX8MM
904	8699412	BIND TAPPING SCREW 3MMDX14MM
905	8671406	DT SCREW-3MMDX6MM
906	8691408	SCREW BIND TIGHTING 3MMDX8MM
907	8691410	BT BIND SCREW-3MMDX8MM
908	8660606	SCREW PW4X8
909	8815116	LOCK WASHER 4MMD
910	8691408	SCREW BIND TIGHTING 3MMDX8MM
911	8691408	SCREW BIND TIGHTING 3MMDX8MM
FOR ACCESSORIES		
	5638003	WIRED REMOTE CONTROL BOX
	6865082	DRIVER
	5896764	CABLE
	5893173	CABLE
	5687871	300-75OHM VHF ANTENNA ADAPTER
	5687572	MATCHING DOX

CHASSIS SECTION





4 5 6 7 8 9 10 11 12

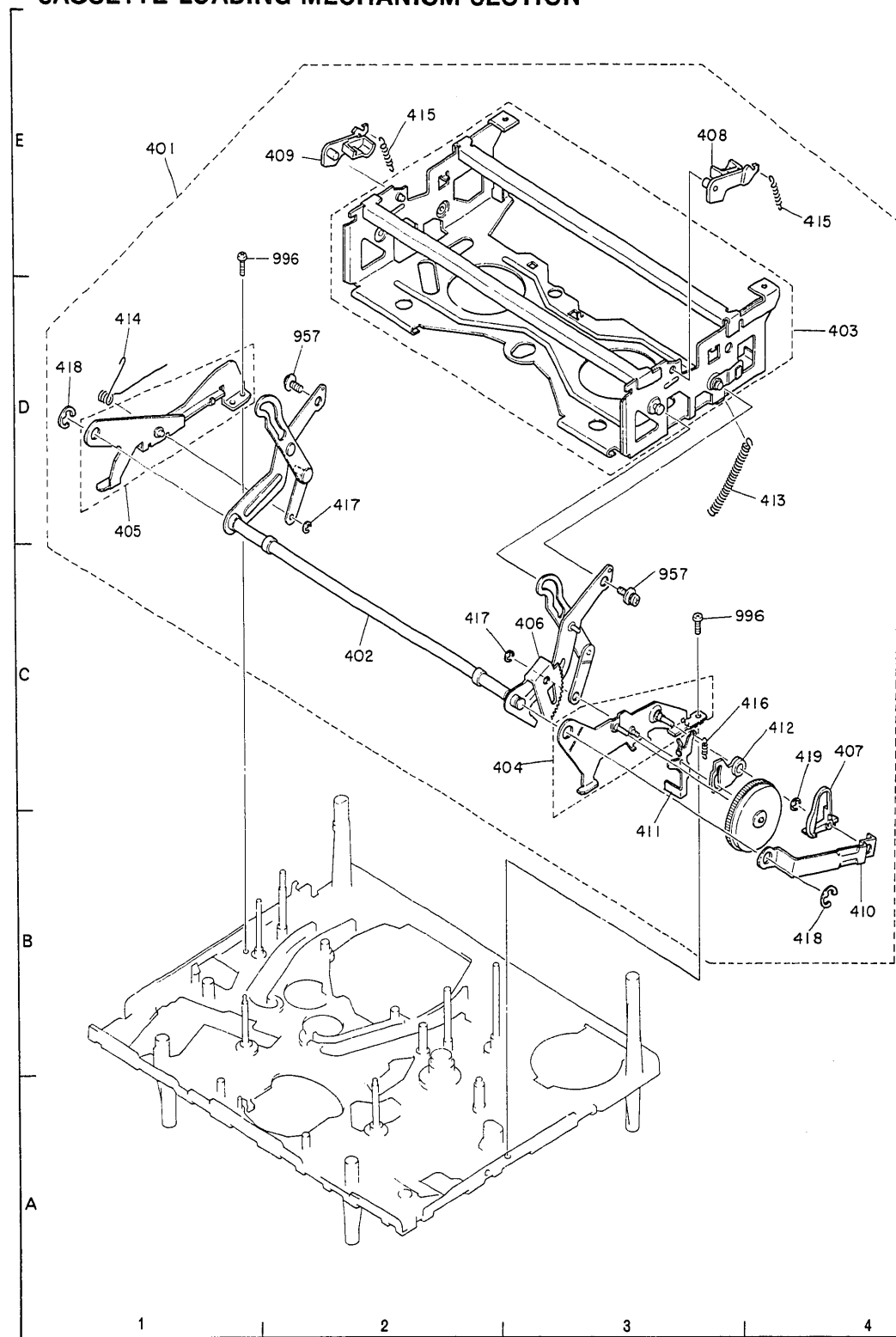
CHASSIS SECTION 91 CHASSIS SECTION

MECHANICAL PARTS (CHASSIS/CASSETTE LOADING MECHANISM/CYLINDER SECTION)

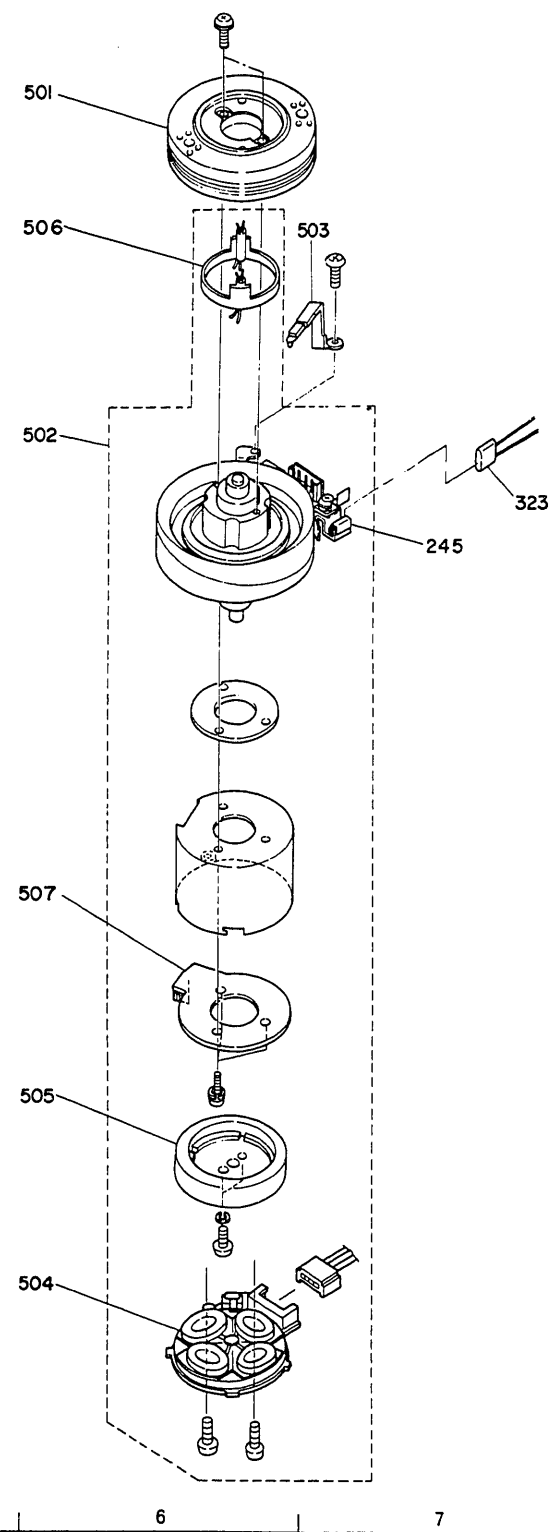
SYMBOL-NO	P-NO	DESCRIPTION	SYMBOL-NO	P-NO	DESCRIPTION
FOR FINAL ASSEMBLY			314	6979051	FLYWHEEL
202	6414654	SUPPLY REEL ASSEMBLY	315	7788142	POLYSLIDER WASHER (THRUST)
203	6414674	TAKE-UP REEL ASSEMBLY	316	7788861	WASHER
204	6871851	IC HOLDER	317	6356101	BELT
206	7787412	WASHER	318	6356081	BELT
207	7778859	POLYSLIDER WASHER	319	7386833	FLYWHEEL HOLDER
208	6865662	BRAKE ARM	320	6869291	PULLEY
209	7386841	TENSION ARM	321	7778859	POLYSLIDER WASHER
210	6865804	BRAKE L	322	6355561	BELT
211	6865812	BRAKE R	323	0249696	HEATER
212	6302471	SPRING	401	7384065	CASSETTE HOLDER ASSEMBLY
213	6302083	SPRING	402	7376073	HOLDER LINK ASSEMBLY
214	7376271	TENSION BAND	403	7376032	CASSETTE HOLDER ASSEMBLY
215	6865591	HOLDER	404	7375903	BRACKET R
216	7375717	ARM BRACKET ASSEMBLY	405	7375912	BRACKET L
217	6886971	FR ARM ASSEMBLY	406	6866063	DUMPER
218	7376303	LOADING LINK R ASSEMBLY	407	6866081	CLUTCH ARM
219	7376313	LOADING LINK L ASSEMBLY	408	6866152	PRESSURE ARM(RIGHT)
220	6978301	GUIDE ROLLER BASE (I)	409	6866142	PRESSURE ARM(LEFT)
221	6978291	GUIDE ROLLER BASE (D)	410	7375932	PLATE
224	6869481	GUIDE ROLLER	411	7375924	ARM
225	6868061	GUIDE ROLLER ASSEMBLY(OUT)	412	6866072	LOCK ARM
226	7376176	GUIDE BASE HOLDER	413	6542591	SPRING
229	7570671	TAPE GUIDE (I)	414	6547881	SPRING L
230	6304903	SPRING	415	6542581	SPRING
231	6879902	IMPEDANCE ARM ASSEMBLY	416	6542571	LOCK SPRING
232	5447841	F E HEAD	417	7778395	E RING
233	6302391	SPRING	418	7230903	E RING - 4MMD
234	5447865	AUDIO CONTROL HEAD	501	5459151	UPPER CYLINDER
235	6304906	SPRING	502	5459131	LOWER CYLINDER
236	7786245	WASHER	503	5792131	BRUSH
237	6878932	SUB BRAKE	504	5792543	STATOR
238	6300084	SPRING	505	5773064	ROTOR
239	5578153	CAPSTAN MOTOR	506	5792802	WIRE HOLDER
240	6865675	RECORDING PREVENTION ARM	507	5391151	CYL.FG.PC BOARD
241	5633971	SWITCH (S141)	950	7541395	SPECIAL SCREW
242	7788143	POLYSLIDER WASHER	951	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
243	6977813	PRESSURE ROLLER ASSEMBLY	952	8741408	SCREW (B3X8)
245	7380942	HOLDER (HEATER)	953	7541392	SCREW
246	6547811	SPRING	954	7781133	BT SCREW-3MMD
247	6979041	X-ADJUST SCREW	955	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
248	5625091	SLIDE SWITCH	956	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
250	6873291	COLOR	957	0741305	SCREW(2.6X5B)
251	7571871	TAPE GUIDE (D)	958	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
252	6873721	CAP	959	7773083	SCREW
255	6877521	COLLAR	960	8741408	SCREW (B3X8)
256	6538171	SPRING	962	8650412	SCREW 3X12 WITH SPRING WASHER
301	6879515	CLATCH PLATE ASSEMBLY	963	8821114	3D NUT
302	6355561	BELT	964	8741103	SCREW(2X3B)
303	7386971	BRAKE SLIDER	965	7781872	SCREW-3MMDX8MM
304	6865733	MODE SLIDER	966	7773086	SCREW
305	6547821	SPRING	967	8741414	BINDING SCREW - 3MMD X 14MM
306	6879484	LOADING GEAR ASSEMBLY	968	8821114	3D NUT
307	6865791	TENSION ARM	969	8741408	SCREW (B3X8)
311	7386931	MOTOR(DC)3.7W 66G LOADING	970	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
312	6356111	BELT	971	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
313	6356091	BELT	972	8691312	BT BIND SCREW-2.6MMDX12MM
			973	8812114	WASHER-3MMD SMALL

SYMBOL-NO	P-NO	DESCRIPTION
FOR FINAL ASSEMBLY		
974	8691312	BT BIND SCREW-2.6MMDX12MM
975	7781131	B TIGHTING SCREW-3MMDX12MM
975	8652405	SCREW 3X5 WITH WASHER
976	7782781	SCREW 3X8BT
977	8691408	BIND TAPPING SCREW-3MMDX8MM (BLACK)
978	8652412	SCREW 3X12 WITH SPRING WASHER
979	8650408	SCREW
980	8741406	BIND SCREW - 3MMD X 6MM
988	8691410	BT BIND SCREW-3MMDX10MM
989	8711103	PAN HEAD SCREW-2MMDX3MM

CASSETTE LOADING MECHANISM SECTION



CYLINDER MOTOR SECTION





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