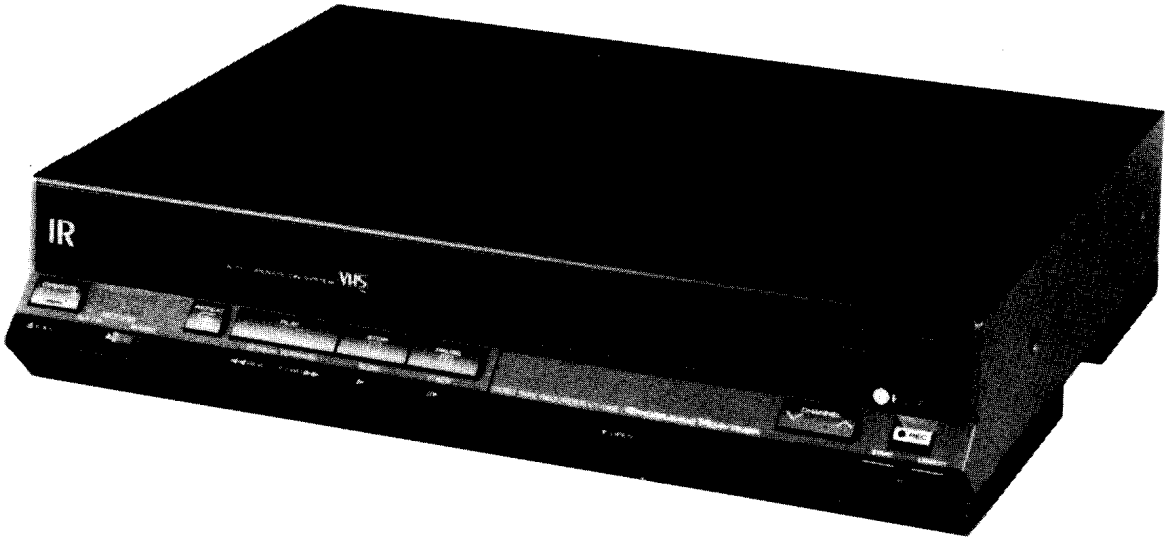
HITACHI
SERVICE MANUAL

TK	No. 2435E

VT-130E(CT)

H101

Technical Data



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

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SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

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March 1986 **TOKAI WORKS**

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ITEM	VT-130E (CT)
Format:	VHS PAL Standard
Recording:	Rotary Two-Head Helical Scan Azimuth Recording
Tape Speed:	23.39 mm/sec.
Tape Width:	12.7 mm
Operation Temperature:	5°C to 40°C
Video:	PAL colour (system B & G) & CCIR monochrome signals 625 lines
Recording Time:	240 min. (with Hitachi E-240 cassette)
Aerial Input:	VHF channels 2 — 12 CATV channels S1 — S20 UHF channels 21 — 69
RF Output:	UHF channels 37 (30 — 39 adjustable) (System G)
Video Input:	0.5 to 1.5V p-p 75 ohm Unbalanced
Video Output:	1V p-p 75 ohm Unbalanced
S/N Ratio (Video):	40 dB
S/N Ratio (Audio):	43 dB
Horizontal Resolution:	Colour 240 lines
Audio Input:	−2 dBm 50 Kohm
Audio Output:	−2 dBm 10 Kohm
Audio Frequency Range:	70 Hz to 12 kHz
Power:	AC 220V 50 Hz
Power Consumption:	35W (including timer)
Timer:	24 hour digital indication
Cabinet Size:	435 mm(W) x 95 mm(H) x 344 mm(D)
Weight:	7.0 kg
Accessory Included:	1 — Aerial cable 2 — Programme sheets 1 — Infrared Remote control unit

* Design and specifications are subject to change without notice.

SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine Hitachi replacement parts. Especially critical parts in the power circuit block should not be replaced with other makers'. Critical parts are marked with ⚠ in the schematic diagram and circuit board diagram.
2. Before returning repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safe to operate without danger of electrical shock.

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LIST OF DIFFERENCES

	ITEM		VT-130E	VT-120E
FEATURES	HQ (HIGH QUALITY)		USED	USED
	TRICK PLAY		○ VISUAL SEARCH ○ PAUSE ○ F. ADV (By Remote Control) ○ REPEAT ○ SLOW	○ VISUAL SEARCH ○ PAUSE ○ F. ADV (By Remote Control) ○ REPEAT
	AUTO OPERATE ON FUNCTION		YES	YES
	NOISE LOCK SEARCH FUNCTION		YES	YES
	REMOTE CONTROL		WIRELESS	WIRELESS
	TIMER RECORDING PROGRAMS		4 PROGRAMMES/2 WEEKS	4 PROGRAMMES/2 WEEKS
	TIMER BACKUP POWER		ABOUT 5 MINUTES	ABOUT 5 MINUTES
	TIMER PROGRAMMED TIME DISPLAY		START AND STOP SIMULTANEOUSLY	START AND STOP SIMULTANEOUSLY
	IRT		CAN SET START TIME	CAN SET START TIME
	TAPE COUNTER INDICATOR		INDEPENDENT	INDEPENDENT
	MEMORY STOP OPERATION MODE		REWIND AND FORWARD	REWIND AND FORWARD
	CHANNEL TUNING FUNCTION		VOLTAGE SYNTHESIZER (AUTO TUNING)	VOLTAGE SYNTHESIZER (AUTO TUNING)
	INPUT SELECT SWITCH		NONE	NONE
	PLAYBACK PICTURE CONTROL		HIGH FREQUENCY CONTROL	HIGH FREQUENCY CONTROL
	ONE BUTTON RECORDING		YES	YES
	SLOW TRACKING		YES	NO
CHASSIS	BASIC CHASSIS TYPE		UY	UY
	CYLINDER MOTOR		THREE-PHASE OUTER ROTOR FG: 300 Hz	THREE-PHASE OUTER ROTOR FG: 300 Hz
	VIDEO HEAD		3 HEADS CH-1/CH-2: 65 μm, CH-3: 33μm CONNECTOR TYPE	2 HEADS CH-1/CH-2: 65 μm CONNECTOR TYPE
	HEATER		NONE (USED HEAT SINK)	NON (USED HEAT SINK)
	DEW SENSOR		NO	NO
MAIN CONTROL ICs	VIDEO SYSTEM	Y-SIGNAL PROCESS CHROMA SIGNAL PROCESS REC/PB AMP AND CORRECTOR PICTURE CONTROL	HT4727AP (IC203) HT4539 (IC301) HT4708 (IC205) HA11852 (IC1) MSM6965RS (IC204)	HT4727 (IC203) HT4539 (IC301) HT4708 (IC205) HA11852 IC1) MSM6965RS (IC204)
	AUDIO SYSTEM	BA5115L (IC402)	BA5115L (IC402)	BA5115L (IC402)
	SERVO SYSTEM	SPEED/PHASE CONTROL CYLINDER MOTOR DRIVE CAPSTAN MOTOR DRIVE TRICK PLAY CONTROL	M54898AP (IC601) HA13403 (IC1651) M54648L-B (IC602) M51483P (IC608)	M54898P (IC601) HA13403 (IC1651) M54648L-B (IC602) ——
	SYSTEM CONTROL	SYSTEM CONTROL μP LOADING MOTOR DRIVE	HD614042SD37 (IC901) M54649L (IC902)	HD614042SD37 (IC901) M54649L (IC902)
	TIMER	TIMER μP	HD614045SE34 (IC751)	HD614045SD53 (IC751)
	CH-TUNING SYSTEM	TUNING μP BAND SWITCHING	M50161-354SP (IC801) LA7934 (IC802)	M50161-354SP (IC801) LA7934 (IC802)
	POWER SUPPLY	REGULATOR	STK5471 (IC851)	STK5471 (IC851)

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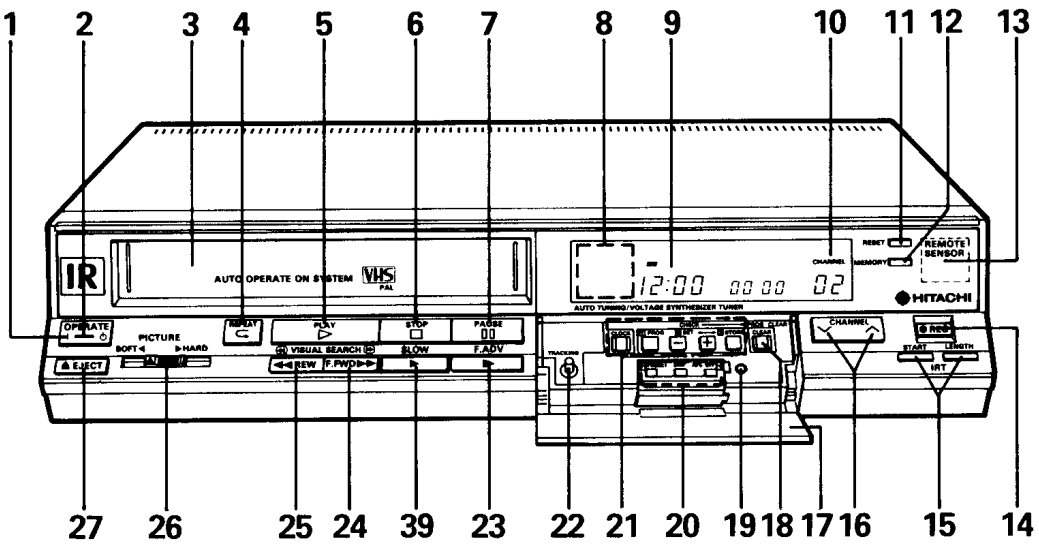
CONTROLS AND FUNCTIONS



1. **OPERATE SWITCH**
   Turn system power on and off.
2. **OPERATE INDICATOR**
3. **CASSETTE COMPARTMENT**
   Insert a cassette in through the door, and loading will be completed automatically.
   Note: Power is turned on automatically when the cassette is loaded.
4. **REPEAT BUTTON**
   Press this button after pressing the PLAY button to repeat the scene you have just viewed during playback. The tape is rewound to the position where PLAY button was pressed, then the tape is played back from that position.
5. **PLAY BUTTON**
6. **STOP BUTTON**
   The STOP button must be pressed between "RECORD" and any other operation.
7. **PAUSE BUTTON**
   Press to pause during recording.
   Press to view a still picture during playback.
   Press again to release.
8. **MODE INDICATORS**
   - " " appears when a cassette is in the compartment.
   - "PLAY" appears during the playback mode.
   - "REC" appears during the record mode.
   - "◀◀" appears during the rewind mode and flashes during rewind visual search mode.
   - "▶▶" appears during the fast forward mode and flashes during forward visual search mode.
   - " ❚❚ " appears during the play/record pause mode.
   - " " appears when turning the power off after programming the timer.
9. **DIGITAL DISPLAY**
   This shows the time with a 24-hour display and shows the tape position.
10. **CHANNEL INDICATOR DISPLAY**
    This shows the channel number corresponding to the channel selected.
11. **COUNTER RESET BUTTON**
    To reset counter to "0000".
12. **MEMORY BUTTON**
    Press this button so "M" is indicated in the display, then fast forward or rewind the tape. The tape stops when the counter reaches approximately "0000".
    Note: Press the button again to switch off the "M" indicator.
13. **INFRARED RAY RECEIVING SECTION**
    Receives infrared rays from remote control unit.
14. **RECORD BUTTON**
    Press RECORD button to record.
15. **INSTANT RECORDING TIMER BUTTONS (IRT)**
    This allows unattended recording.
    Timer will switch the VTR off automatically at a preselected time. This is convenient when you go out during recording.
16. **CHANNEL SELECT BUTTONS**
    Select the channels you wish to view or record by pressing these buttons.
    And you can also select the "AUX" position* by pressing this button to record or watch the programme input at the PERI jack.
    * One channel position either higher or lower outside the range of your preset channels.
17. **SECONDARY CONTROL DOOR**
18. **PROGRAMME CLEAR BUTTON**
    Press the button to clear the programming information.

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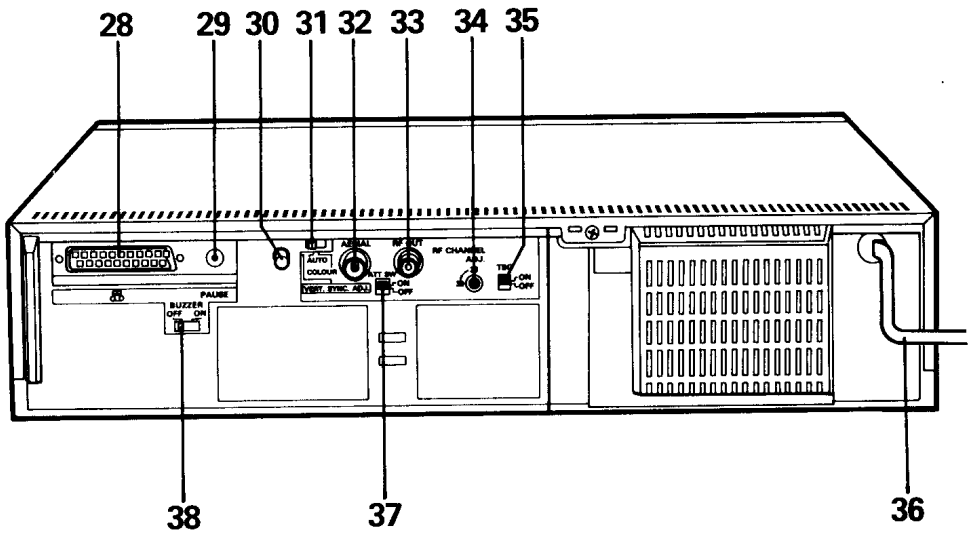

19. TIMER RESET SWITCH
Press this switch if the digital display malfunctions or no display appears to reset the display. Set the correct present time for the clock then programme the timer.

20. CHANNEL PRESET BUTTONS

21. TIME SET BUTTONS

22. TRACKING CONTROL
To minimize noise in playback.

23. FRAME ADVANCE BUTTON
When you hold FRAME ADVANCE button down during still playback mode, tape will be played back frame by frame. Operates only after PAUSE button has been pressed.

24. FAST FORWARD/VISUAL SEARCH BUTTON
Press to activate fast forward.
Press this button during playback and forward playback picture at high speed can be seen.

25. REWIND/VISUAL SEARCH BUTTON
Press to start rewind.
Press this button during playback and reverse playback picture at high speed can be seen.

26. PICTURE CONTROL
Adjust the picture so it is easy to see.

27. EJECT BUTTON
Press to remove cassette. The STOP button must be pressed before "EJECT".

28. PERI JACK
For connection with a TV with a PERI or DIN jack using an exclusive cable. See your dealer for details.

29. CAMERA PAUSE JACK
Connect Camera pause cable.

30. VERTICAL SYNC. ADJUSTMENT CONTROL
If you see vertical shaking on the TV screen in the still playback mode, rotate this control to minimize shaking.

31. AUTO/COLOUR SWITCH
AUTO: Circuits are automatically switched to colour or black/white mode. Set to this position when playing or recording PAL signal.
COLOUR: When recording PAL signal in the area very far from broadcasting station, the recorded picture may lose colour. In this case set to this position in recording and playback.

32. AERIAL INPUT SOCKET
Connect external aerial.

33. RF OUTPUT
Connect to TV aerial input.

34. RF CHANNEL CONTROL
Turn TSG ON/OFF switch to "ON" and rotate this control to set the video channel correctly.

35. TSG ON/OFF SWITCH
Set to ON and check that the video channel of your TV set is correct. After setting, set this switch to OFF.

36. MAINS LEAD

37. ATTENUATOR SWITCH
Generally set to the NORMAL position.
Set to "ATT-ON" when interference occurs in an area with a strong signal.

38. BUZZER SWITCH
When this switch is on, a beep sound will be heard when any VTR operation button is pressed. This is a convenience allowing you to operation.
To stop this function, turn the switch off.

39. SLOW BUTTON
Press SLOW button during playback, and the tape is played back in the forward direction approximately 10 times slower than the normal speed.

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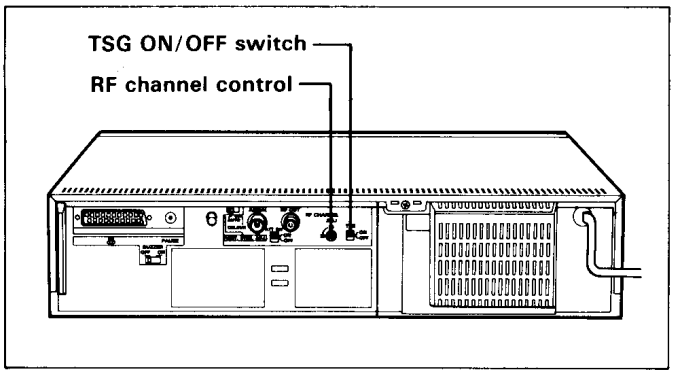
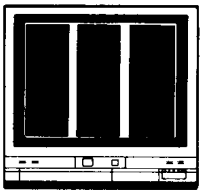
VIDEO CHANNEL SETTING

The RF converter changes the video and audio signals from a previously recorded video tape during playback to the same type of signal used for TV broadcasts. The RF converter output in this unit is pre-set prior to shipment to UHF channel 37.



1. Turn the TV on and select an unused channel (CH37) (in some cases this may be marked A/V).
2. Turn the OPERATE switch on.
3. Set the TSG ON/OFF switch to "ON". Then tune the TV until the test pattern shown below is received.



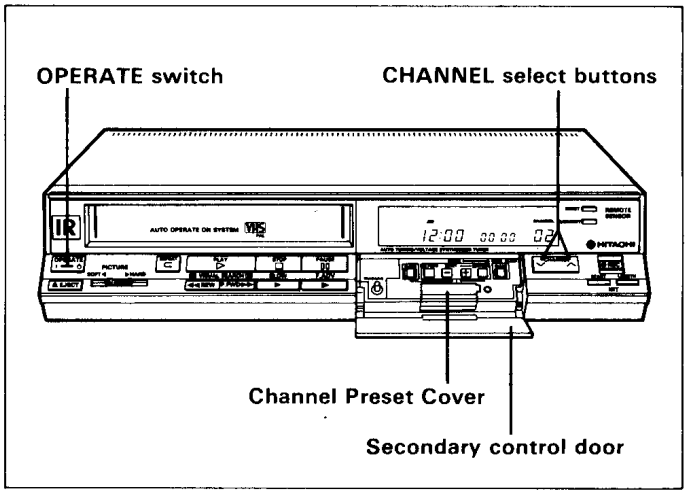
4. If it is not possible to correctly tune to the test pattern or channel 37 is used for broadcasting in your area, adjust the RF converter output with the RF channel control using a small screwdriver and re-adjust your TV until the test pattern is observed.
   For higher channel numbers, turn counterclockwise.
   For a lower channel, turn clockwise.
5. Having completed the adjustment, set the TSG ON/OFF switch to "OFF".

When connecting the VTR to a TV set provided with auto-tuning and the video channel cannot be set, operate as follows:

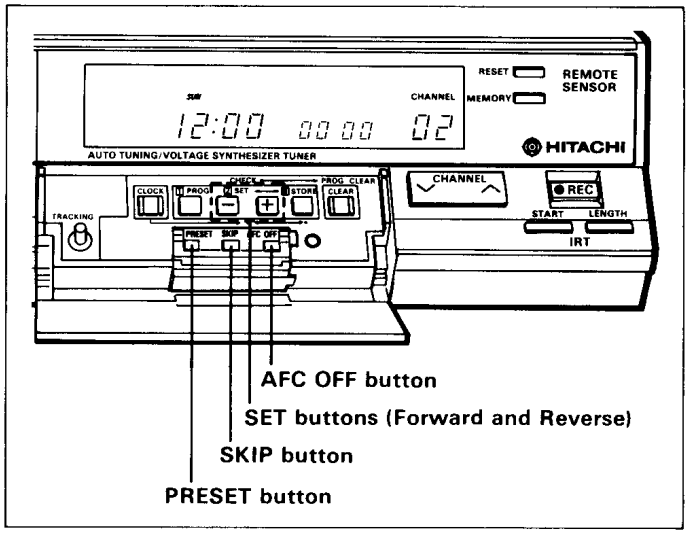
1. Remove the aerial cable from the AERIAL terminal on the VTR.
2. Leave the TSG ON/OFF switch "OFF".
3. Playback a blank tape.
4. Press the PAUSE button to obtain the pause mode.
5. Press the Auto-tuning button.
6. Auto-tuning starts and it stops at video channel 37.
   Note: The auto-tuning indicator of the TV set changes to an exact tuning indicator.
7. Set the channel memory of the TV to ON and store the channel which was set in item 6.
8. Set the TSG ON/OFF switch to "ON" and check that the picture appears on the TV screen.
   Now, the video channel of TV has been set properly.
9. Return the TSG ON/OFF switch to "OFF".
10. Reconnect the aerial cable to the VTR.

PRE-TUNING OF BUILT-IN TV TUNER

This VTR incorporates a complete television tuner with the required tuning controls. Once you have pre-tuned to preferred stations, you can select any of them by merely pressing the CHANNEL select button.



1. Turn the TV on and select the pre-tuned video channel.
2. Turn the OPERATE switch of the VTR on.
3. Open the Secondary control door to access the Pre-tuning controls.
4. Open the Channel Preset Cover.



5. Press the PRESET button once.
   The display indication changes from the clock time display to the band indicator display.
   Note: Pressing the button twice will lock the display. If you have pressed it twice, press it once more.
6. Press the CHANNEL select button on VTR to select the channel to be memorized.
   Notes:
   1. The Channel Number Display can be now consecutively selected from "00" through "73" and then "95" through "99" and "AUX" by pressing the CHANNEL select button either upward or downward. In this case, Channel Number may be any number.
   2. When "AFC" is not indicated in the display, press AFC OFF button to display "AFC".

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For example, the above diagram shows that channel 4 has been selected.

7. Press the SET button (Forward or Reverse) to start tuning.
   At a station that is broadcasting, the picture appears on the TV screen. If the station received is different from the channel to be preset, press SET button (Forward or Reverse) again.
   At the next station, the searching will stop and the new station can be preset. Repeat this until the desired station is reached. By repeating this, the Band indicator on the display will change in sequence L, H, U, L....
   Notes:
   - Press SET button (Forward); channels are searched in the order, VHF (1 — 12) → CATV (S1 — S20) → UHF (21 — 69), and "—" appears in sequence in the direction of the arrow during searching.

   - Press SET button (Reverse); channels are searched in the reverse order to the above, and "—" appears in sequence in the direction of the arrow.

8. Follow the same steps as explained in steps 6 and 7 above for other channels.
   You can preset up to 79 channels in memory.
9. After having completed tuning all channel memories you want, press the PRESET button once again.

These channels preset in memory as shown in the above can be selected by the CHANNEL select buttons on the VTR.
The provided sheet is used to list the programmes to which you pre-tune your VTR. List the programmes and paste the sheet on the side panel, etc. so as not to hinder you when you operate the VTR.

AFC (Automatic Frequency Control)
Since this unit has an AFC circuit, when a channel is preset following the above procedure, the AFC turns on automatically and you can receive the signal in optimum condition.
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.

1. Select the desired channel by pressing CHANNEL select button.
2. Press the PRESET button once.
3. Press the AFC OFF button. "AFC" disappears from the display.
   Note: Pressing the button once again will turn the AFC on.
4. Tap on the SET button (Forward or Reverse) alternately for fine tuning.
5. Press the PRESET button once again.

Channel selection
The channel up and down controls on the VTR permit advancing the tuner directly to the next higher or lower programmed channel.

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

1. Press the PRESET button once.
2. Press the CHANNEL select buttons until an unwanted channel is found.
3. Press the SKIP button once.
   Sound will go off indicating the channel has been erased from memory.
4. Repeat steps 2 and 3 until all unwanted channels have been erased.
5. After eliminating them, press the PRESET button once again.

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

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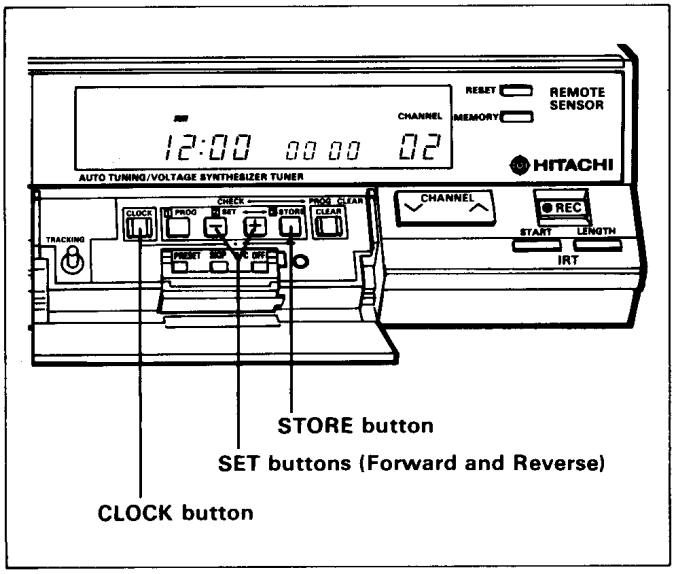
CLOCK TIME SETTING

The built-in digital clock is based on a 24 hour cycle and gives you a constant readout of the time and day.



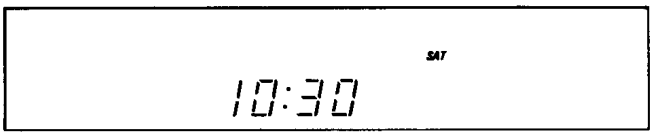
- When the MAINS lead is plugged in for the first time, "–:––" will appear on the display.

1. Press the CLOCK button.
   "SUN" flashes on and off and "0:00" lights.

2. Press the SET button (Forward or Reverse) to select the present day of the week.
   Hold the button down to advance rapidly.
   When the present day of the week appears, press the STORE button. "0" hour starts flashing.

   For example, the above diagram shows that Saturday (SAT) has been set.
3. Press the SET button (Forward or Reverse) 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 "10" hour has been set.
4. Press the SET button (Forward or Reverse) 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.

Now the clock has been set to the correct time of day.

Notes:

- This VTR has a built-in power failure compensation circuit. If power interruption of less than 5 minutes occurs, the clock time and programming will not be lost.
- The digital display is bright when the OPERATE switch is turned ON and automatically becomes dim when the switch is off.

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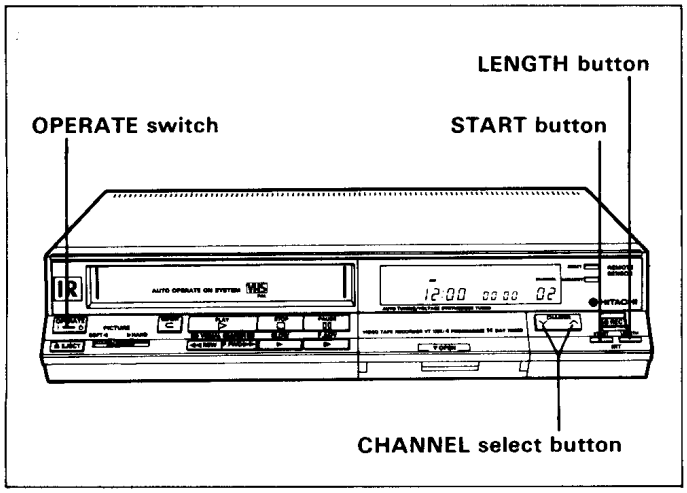
INSTANT RECORDING TIMER (IRT)

Instant Recording Timer allows you to make simplified timer recording without using the programme timer. There are two simplified methods as explained below.



■ FOR IMMEDIATE RECORDING

1. Insert the cassette (one with the erase prevention tab intact) into the cassette loading door.
2. Press CHANNEL select button to select the channel to be recorded.
3. Press LENGTH button to set the timer to "0:00". Then press LENGTH once again to indicate the recording time on the display. The time changes in hours and minutes in the order of 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 every time the button is pressed. Recording starts when 0:30 is displayed. During recording, the remaining time is displayed.
4. At the end of recording the display reads 0:00; the VTR will automatically stop recording.

Note: The IRT feature does not operate during play and after a program timer recording has started. During rewind mode, the IRT recording will automatically start after the tape is rewound fully to the end.

■ FOR SIMPLIFIED TIMER RECORDING

1. First perform Steps 1 and 2 of "FOR IMMEDIATE RECORDING".
2. Press START button to select the start time. Each press will change the clock display (the start time) by increments of 10 minutes from the nearest 10 minutes of the hour.
3. Press LENGTH button for the recording time. The counter display is reset to hours and minutes in the order of 0:00, 0:30, 1:00, 1:30, 2:00, 3:00 and 4:00 every time the button is pressed.
4. Press OPERATE switch off, and the "◴" indication will appear on the Display. The recording will start at the time you have selected and will automatically stop when the recording time display reads "0:00".

Notes:

1. The recording time can be extended any time during IRT by pressing LENGTH button . The recording time display will be reset to 0:30, 1:00, 1:30, 2:00, 3:00 or 4:00 as selected.
2. To stop the VTR during IRT, press LENGTH button until the recording time display reads 0:00, or press OPERATE switch and the STOP button within ten seconds.
3. To change the IRT program, the previous information must be first cleared.
4. If IRT and the program timer recording overlap, the former will override the latter.

To recall the IRT program

Press START or LENGTH button for recalling the start time and the recording time. In about 8 seconds the displays return to the present time of day.

Note: To recall the start time or the recording time, press LENGTH button only once. Pressing more will change the recording time and cause a need for resetting.

To cancel Instant Recording

Press LENGTH button as many as may be required to indicate "0:00" on the display. After approximately 8 seconds the display will return to the present time of day, and IRT has been now cleared.

Note: OPERATE switch may be on or off.

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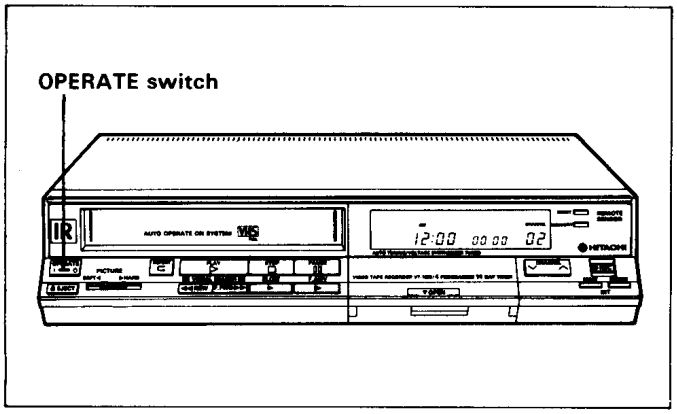
TIMER RECORDING

(The timer can also be programmed with the remote control unit provided. See the supplement manual for more details on programming procedures with the remote control unit.)

The programmable electronic clock/timer permits the unattended recording of 4 preselected programmes within a period of 14 consecutive days, including the same programme(s) repeated on every day and the same programme(s) every week. It turns the unit on and off and selects the channel automatically.

Preparations for timer recording

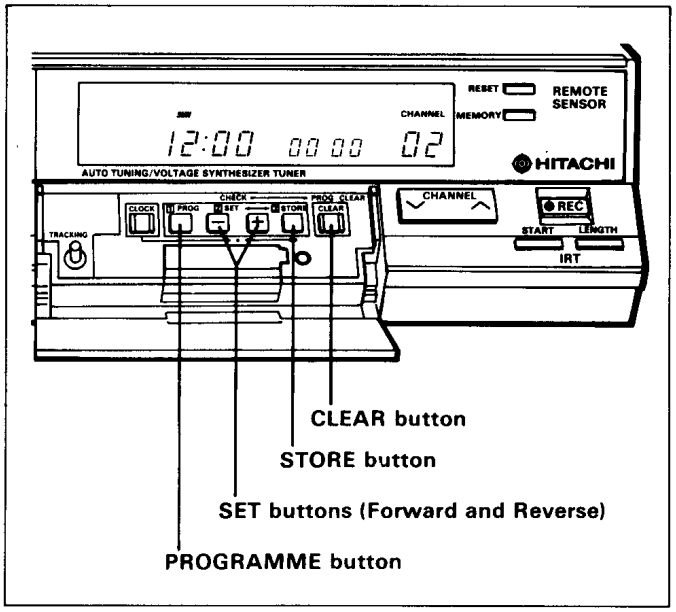


- Your TV does not have to be on to make a recording because the VTR records TV programmes without the aid of your TV. Its only use is for monitoring.

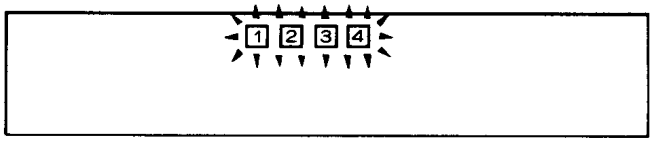
1. Make sure that the clock shows the present time and day correctly.
2. Insert a cassette.
   Be sure to check that the record safety tab is not missing. If the record safety tab is missing, recording will not begin.
3. Programme the timer.

Programming the timer for unattended recording

For unattended recording the timer needs to know what **day** to make the recording, the **time to start**, the **time to stop**, and the **channel to be recorded**.

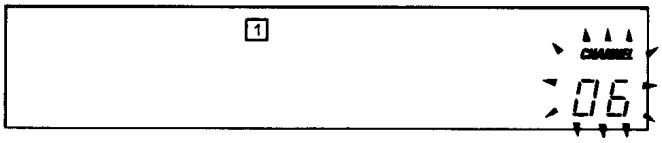


1. Press the PROGRAMME button.
   Programme indicators (1 through 4) flash to indicate which memory positions have not been programmed. If a memory has been programmed, its indicator will not flash.



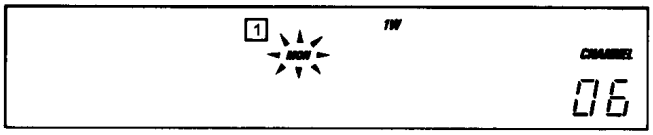
Note: You should determine which memory positions have not been programmed before entering new programming information. New information automatically erases previous programming.

2. Press the SET button (Forward) until the desired programme indicator lights. Programme indicators (1 through 4) light, in sequence, across top of digital display. Press the STORE button when the desired programme number is displayed. Channel number starts flashing.



For example, above diagram shows programme "1" has been set.

3. Choose the channel to be recorded by pressing the SET or CHANNEL select button. Then press the STORE button.
   "1W" appears and the present day flashes.



4. Press the SET button (Forward or Reverse) to select the day of recording. Make sure desired Week indicator (1W or 2W) lights. Continuing forward will advance timer to Week Two.
   Press the STORE button after selecting the day of recording. "0" hour starts flashing.

For example, above diagram shows recording on Thursday within 1 week from today.

Note: If you input erroneous information by mistake when programming the timer, press the CLEAR button and input the correct information again.

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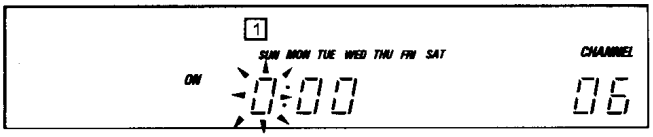
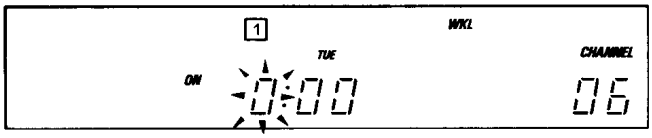
Notes :

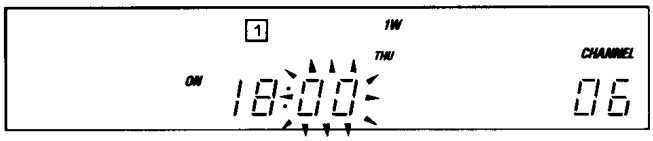
1. To record same time every day of the week:
   Press the SET button (Forward or Reverse) until all day indicators light. Hold down the button to advance rapidly. Then press the STORE button.



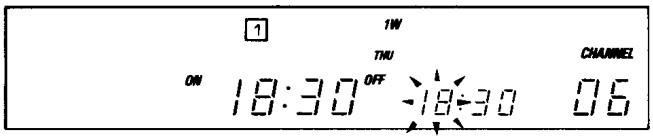
2. To record on a specified day at the same time each week:
   Press the SET button (Forward or Reverse) until the "WKL" indicator lights. Hold down the button to advance rapidly. Then press the STORE button.



5. Select the hour for recording to start by pressing the SET button (Forward or Reverse). Hold down the button to advance rapidly.
   Press the STORE button after selecting the hour for recording to start.
   "00" minutes starts flashing.



   For example, the above diagram shows "18" hours has been set.
6. Select the minutes for recording to start by pressing the SET button (Forward or Reverse). Hold down button to advance rapidly. Press the STORE button after selecting the minute for recording to start.
   "OFF" will appear and "18" hour starts flashing.



   For example, the above diagram shows "30" minutes has been set.
7. Select the hour and minute to stop recording in the same procedures described in steps 5 and 6. Be sure to press the STORE button after selecting the minute.

   Now, one programming has been completed.
   After few seconds the display returns the clock time display together with letters "1" automatically.

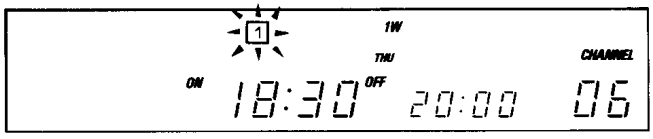
8. Turn off the OPERATE switch. The "◴" indicator will come on.

   Notes:

   1. If the erase prevention tab is removed, the cassette is ejected automatically and "◴" indication will flash. Stick a piece of cellophane tape over the erase prevention hole on the cassette to enable recording.
   2. The "◴" indication will flash, if a cassette is not inserted.

To clear a programme

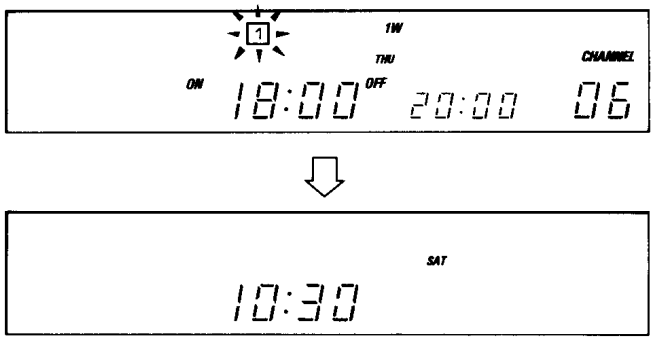
1. Press the SET button (Forward) until desired programme indicator flashes. Then start and stop time appear on the display.



2. Press the CLEAR button.
   The display returns the clock time display to show that the programming has been cleared. Be sure to press the CLEAR button while the display shows the start and stop time. The programming does not clear if the CLEAR button is pressed when the display returns the clock time display.

To check programming

Press the SET button (Forward).
The programme indicator "1" flashes. If the programme No. 1 has been already programmed, both start and stop times are displayed in a few seconds. The display then automatically returns to the present time of day.



Programming errors

If programmes overlap, the VTR will select the programme with the earliest start time. When that programme is over, the VTR will switch to the next programme. If the start times are the same, the VTR will select the programmes in numerical order.

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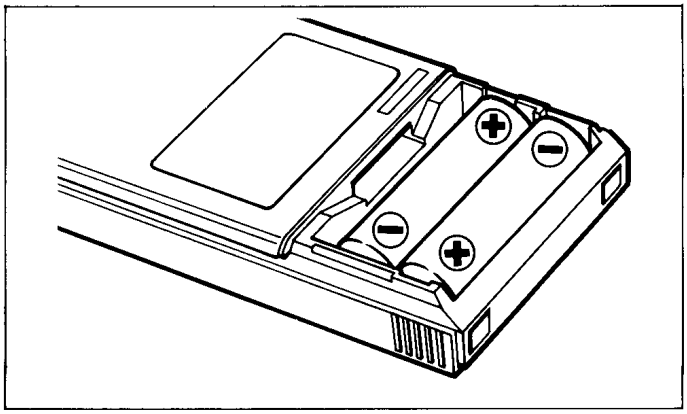
REMOTE OPERATION

You can operate the VTR from a distance using the Infrared Remote Control unit which performs the same functions as the corresponding buttons on the VTR — except for its REMOTE ON/OFF switch, TIMER SET and RECORD buttons.

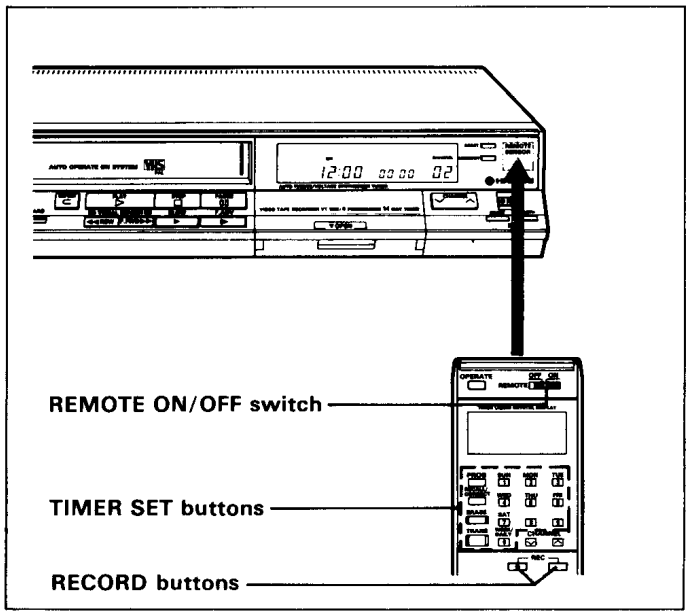
Power source of infrared remote control unit

The infrared remote control unit is powered by two batteries (size IEC standard R6). The life of the batteries is about a year although it depends on the numbers of times the unit is used. Replace the batteries when operation is not possible or when the distance becomes too small.



Operation of remote control

To use the infrared remote control unit aim it at the receiver on the front panel of the VTR and set REMOTE ON/OFF switch to ON.



Notes:

1. Press RECORD buttons simultaneously on the remote control unit to record.
2. The infrared rays will bounce off the walls and eventually reach the receiver on the VTR, but for best results transmit rays directly to the receiver.

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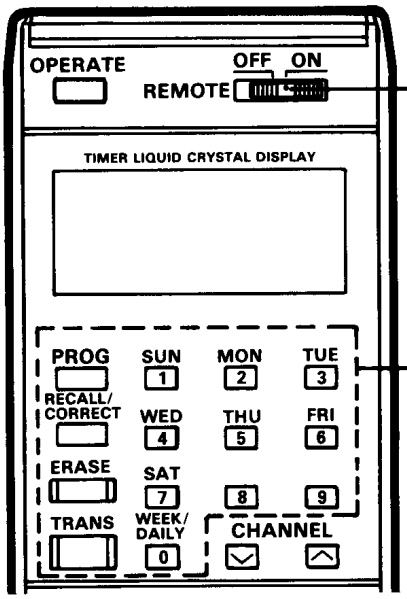
The timer can be programmed from this Remote Control Unit as well as using the operation buttons on the VTR. The channels of the VTR can also be selected directly using this Remote Control Unit.

■ Programming the timer for unattended recording using Remote Control Unit

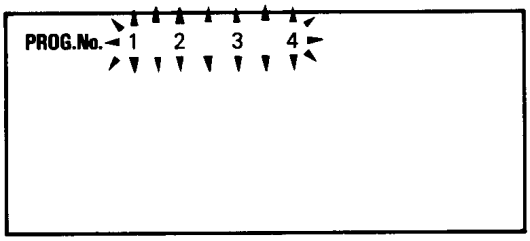


1. Set REMOTE ON/OFF switch to ON.
2. Turn on VTR.
3. Programme the timer by pressing these buttons. (See below.)

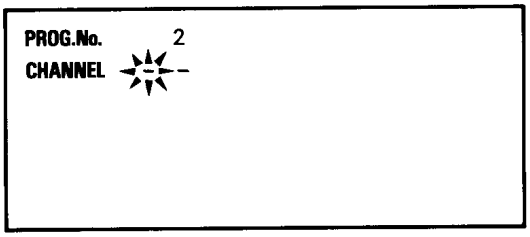
Note: If you input erroneous information by mistake when programming the timer, press RECALL/CORRECT button and input the correct information.

To programme the timer

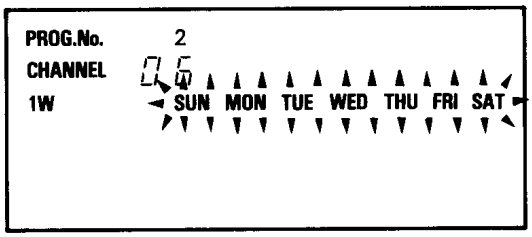
1. Press PROG button once.
   "PROG. No." appears and "1" through "4" flash on the Display.



2. Press one of buttons [1] to [4] to select a Programme No.
   For example, press button [2] to select Programme No. 2.

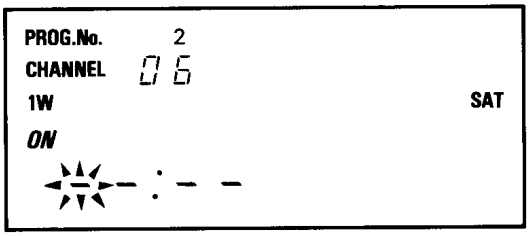


3. Press 10-key buttons [1] to [0] to select the channel to be recorded.
   Note: For single-digit channel numbers, first press [0] and then the channel number [1] through [9].



For example, the above diagram shows that "CHANNEL 06" has been set.

4. Select the day for recording.
   For example, to select this Saturday, press [7] (SAT).



Notes:

1. Display "1W" if the day for recording is within 7 days including today. Display "2W" if the day for recording is between 8th and 14th days.
   Every time button [0] (WEEK/DAILY) is pressed, 1W changes to 2W, WKL (weekly) and SUN through SAT (daily) in sequence.

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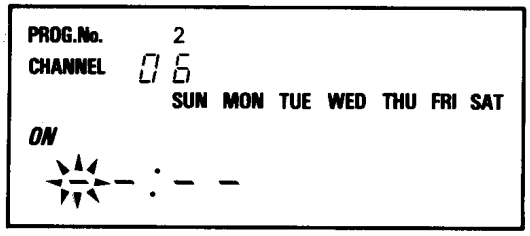
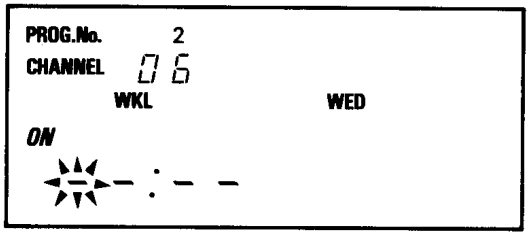
2. To record at same time every day of the week:
Press [0] (WEEK/DAILY) repeatedly so all the day indicators light.

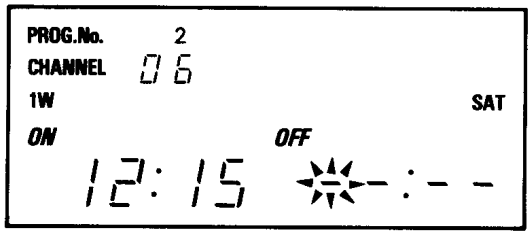


3. To record on a specified day at the same time each week:
Press [0] (WEEK/DAILY) repeatedly so the WKL indicator lights and then press [1] through [7] to select the day.



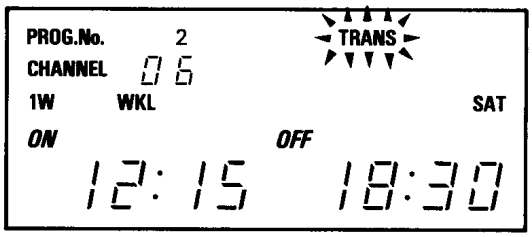
For example, the above diagram shows "WED" on every week has been set.

5. Select the hour and minute for the recording to start by pressing [1] through [0] buttons.
For example, to set "12:15", press buttons [1], [2], [1], [5] in this order.



Note: For a single-digit hour or minute press [0] before entering the hour or minute.

6. Select the hour and minute for recording to stop by pressing [1] through [0] buttons.
For example, to set "18:30", press buttons [1], [8], [3], [0] in this order.

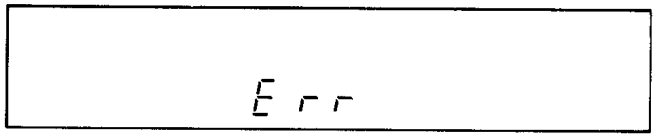


7. Aim the Remote Control Unit at the receiver in the front panel of the VTR and press TRANS button.

Now the programme No. on the display of the VTR will flash for a few seconds and then change to steady lighting.
Programming one event is completed.
Check that a cassette has been loaded in the VTR, then turn off the VTR power.

Notes:

1. The information in the Display of the Remote Control Unit goes off automatically after approx. one minute.
2. Even when the REMOTE ON/OFF switch on the Remote Control Unit is set to OFF after transmitting the programmed information to the VTR, the information is stored in the memory of the VTR.
3. If you select a channel which is not transmitting a signal (a channel which is not displayed if the channel select button on the VTR is pressed) in step 3, "Err" is displayed by the VTR when the TRANS button is pressed.



In this case, correct the channel as follows.

1. Press RECALL/CORRECT button repeatedly until the channel digits flash.
2. Input the correct channel.
3. Press RECALL/CORRECT button repeatedly until "TRANS" flashes.
4. Press TRANS button.

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To check the programming

1. Press RECALL/CORRECT button.
   The programmed information is shown by the Display.
   Note: When 2 or more programmes are stored in memory, only the last programmed information is displayed.

To clear the programming

1. Press RECALL/CORRECT button.
   The last programmed information is displayed.
2. Press ERASE button.
   The programmed information is erased from the Display.
   Note: The programmed information which has already been transmitted to the VTR is not erased. Erase it by using the operation buttons of the VTR.

To change the programming information

When you find a mistake after transmitting the programmed information, correct it as follows and transmit the corrected information again to the VTR.

1. Press RECALL/CORRECT button to diaplay the prorammed information on the display.
2. Press RECALL/CORRECT button repeatedly until the digit to be corrected flashes.
3. Correct the error.
4. Press RECALL/CORRECT button until "TRANS" flashes.
5. Press TRANS button.

   Now the programmed information which was previously transmitted is erased and the correct information is stored in the memory of the VTR.

■ To select a channel directly using the Remote Control Unit

Press 10-key buttons [1] to [0] to select a channel of the VTR directly.
For example, to select channel No. 18, press [1] and then [8].

Notes:

1. For single-digit channel numbers, first press [0] and then channel number [1] through [9].
2. Using the Remote Control Unit, you can also directly select the channel which was erased by pressing the SKIP button of the VTR. For example, when channel No. 5 was previously skipped, the channel is not displayed even if the channel select button on the VTR is pressed, however, it can be displayed when buttons [0] and [5] are pressed.

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DISASSEMBLY

1. NAMES AND LOCATIONS OF CIRCUIT BOARDS

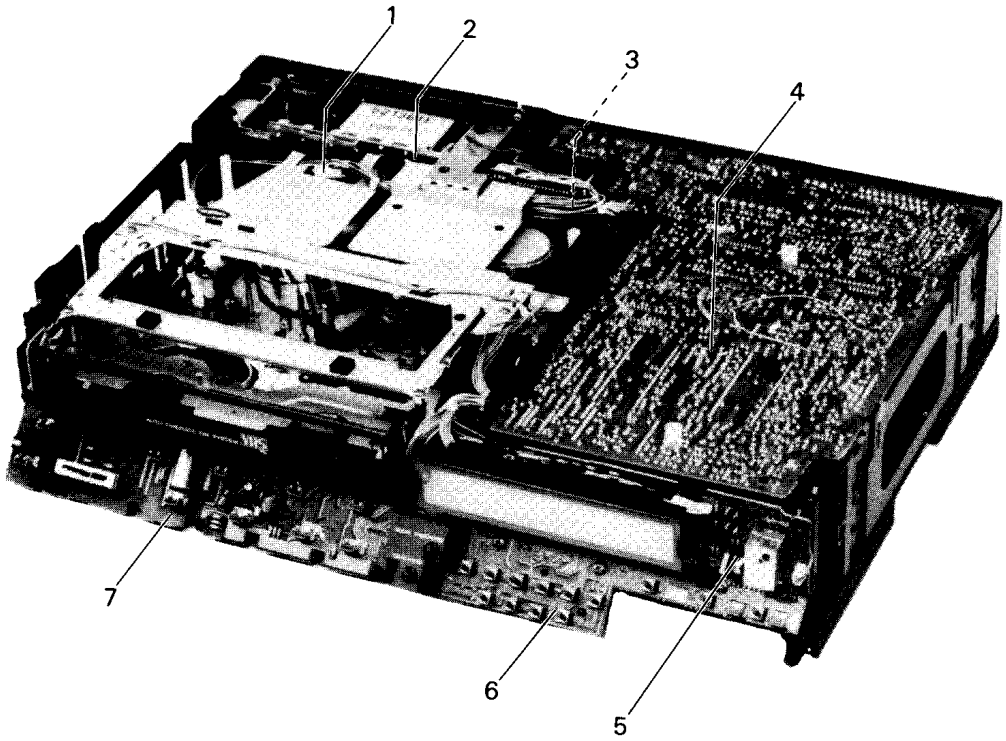

Fig. 1 Top View

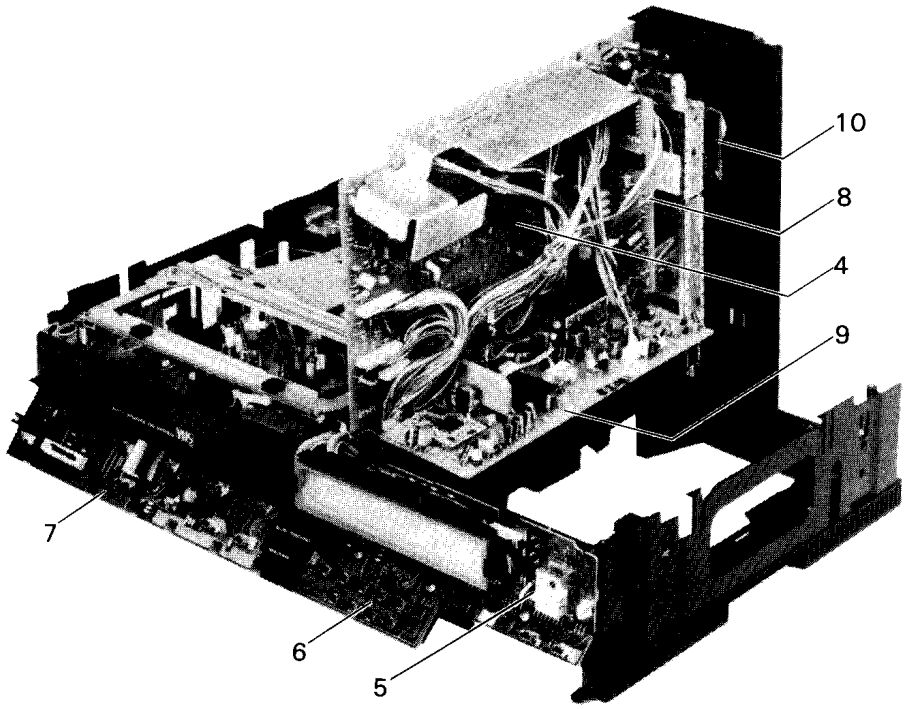

Fig. 2 Top View (with main circuit board open)

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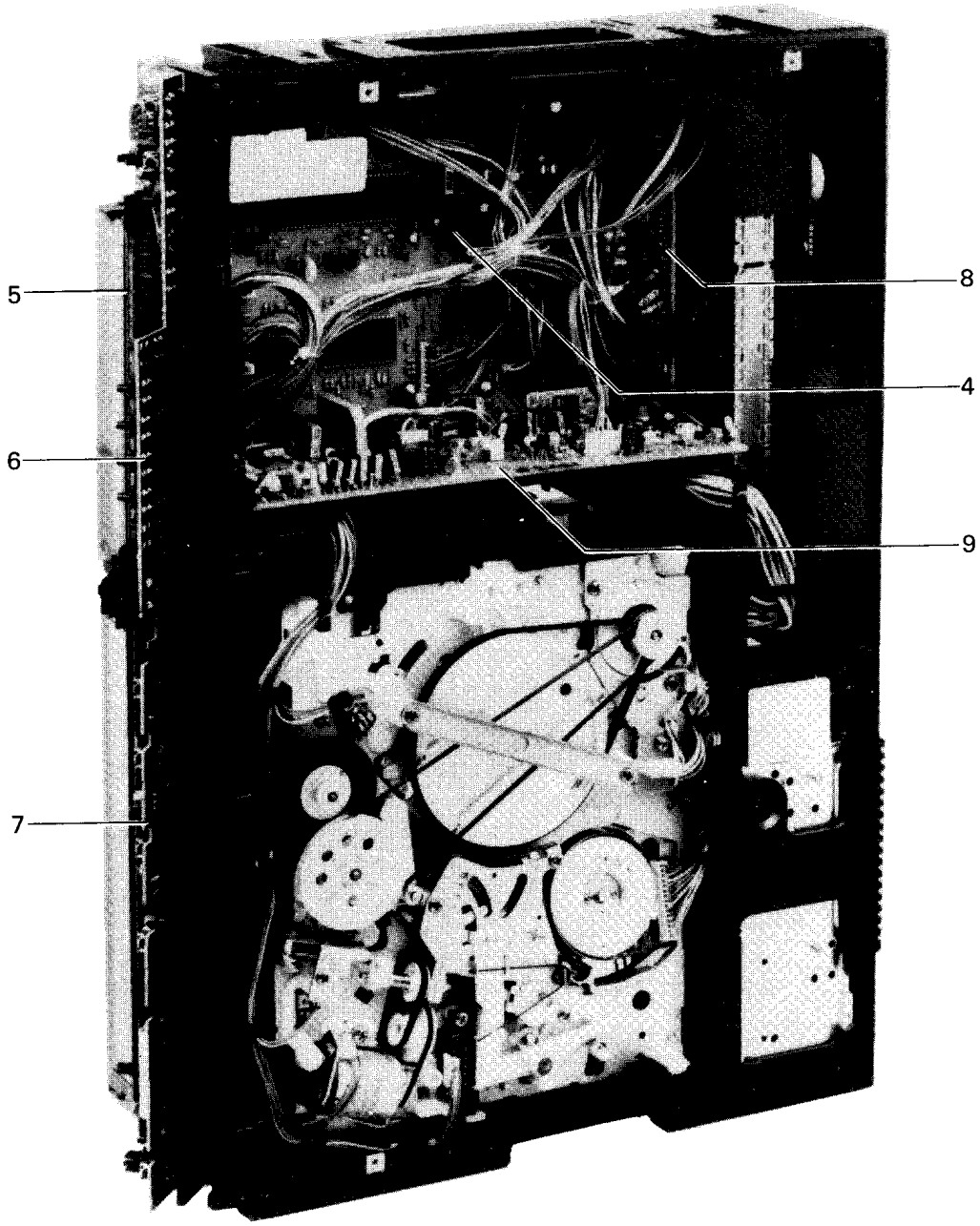

Fig. 3 Bottom View

1. Preamp circuit board
2. Regulator circuit board
3. Cylinder motor driver circuit board
4. Main circuit board
5. Timer circuit board
6. Input key circuit board
7. Operation switch circuit board
8. VS tuning circuit board
9. Y/chroma circuit board
10. Buzzer circuit board

(See page 2-9 for details on removing these circuit boards.)

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2. NAMES AND LOCATIONS OF MAIN MECHANICAL COMPONENTS

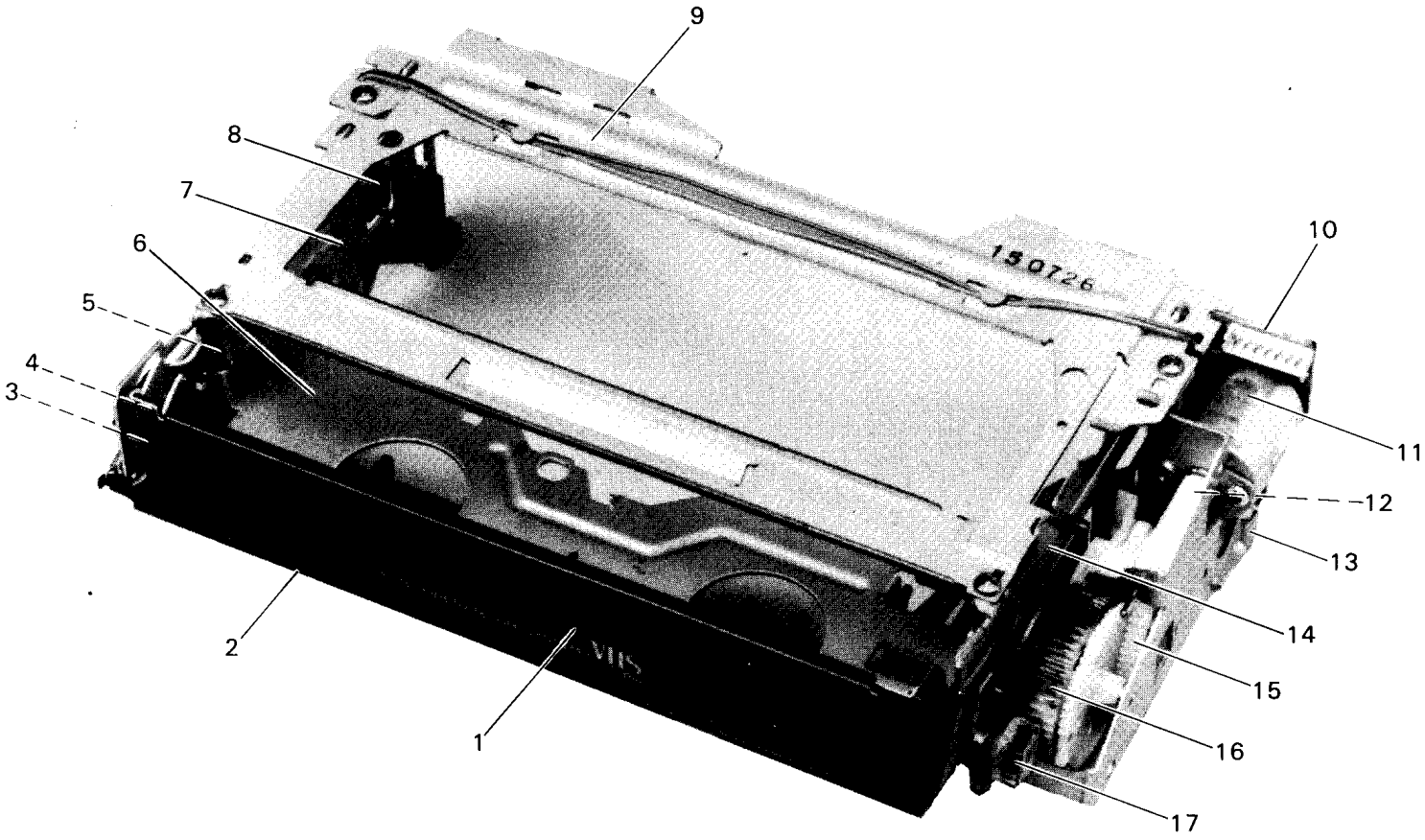

Fig. 4 Cassette Loading Mechanism

1. Cassette door
2. Front holder
3. Synchro gear (L)
4. Door arm
5. Drive gear (L)
6. Cassette holder
7. Side chassis (L)
8. Supply end sensor
9. Chassis holder
10. Cassette loading motor circuit board
11. Cassette loading motor
12. Cassette-in switch
13. Cassette-up switch
14. Side chassis (R)
15. Drive gear (R)
16. Clutch gear
17. Synchro gear (R)

RTV servis Horvat
Kešinci, 31402 Semeljci
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031-856-637
098-788-319
rtv-servis-horvat@os.tel.hr
Croatia

(See page 2-11 for details on removing the above components.)

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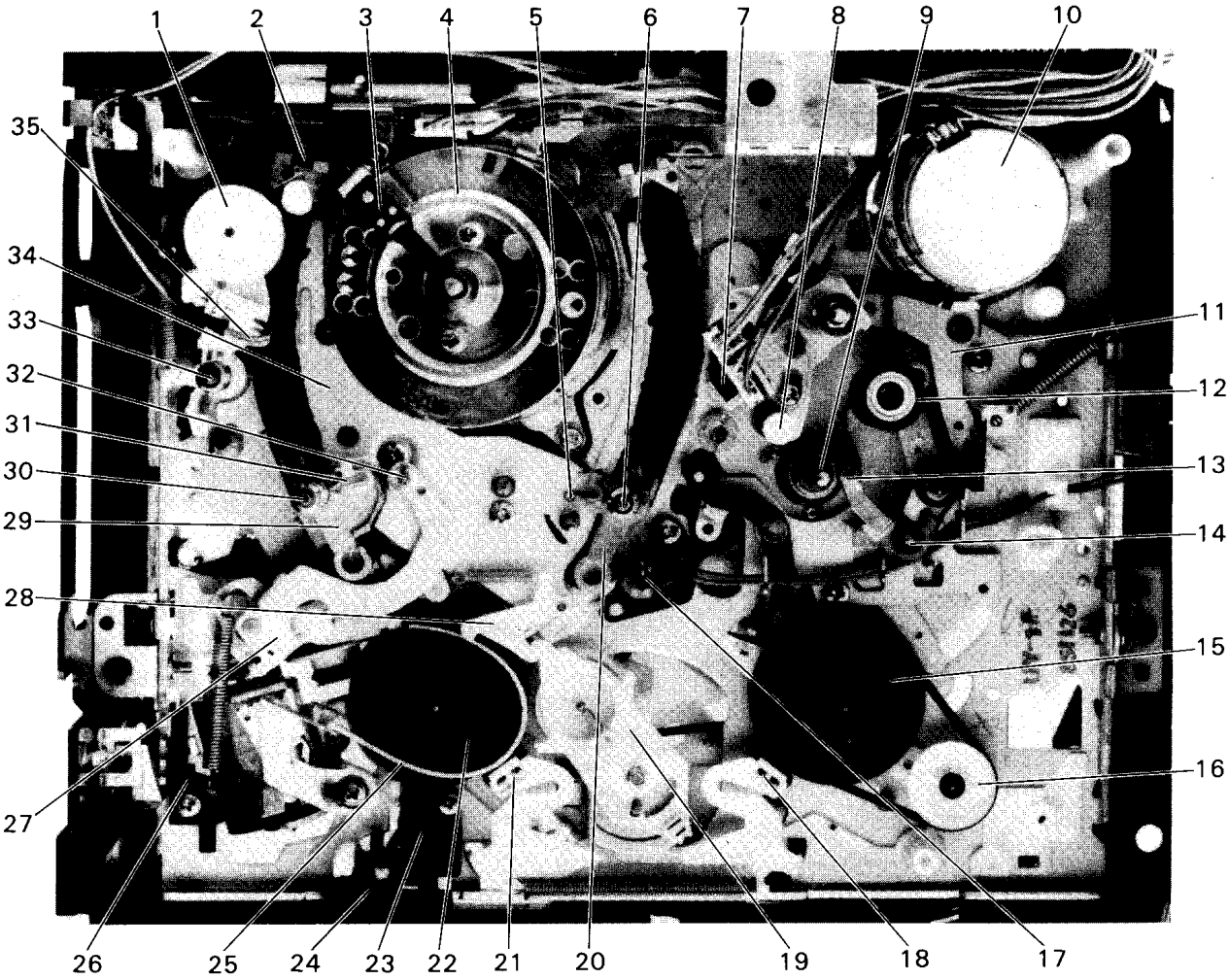

Fig. 5 Top View of Mechanism

1. Impedance roller
2. Catcher/cylinder base
3. Ground brush
4. Upper cylinder (video heads)
5. Inclined guide (take-up)
6. Take-up guide roller
7. A/C (audio/control) head
8. Take-up guide pole
9. Capstan shaft
10. Capstan motor
11. Arm bracket
12. Pressure roller
13. Draw pin
14. Draw arm
15. Take-up reel disk
16. Load pulley
17. End lamp
18. Main brake (take-up)
19. Reel drive gear
20. Take-up guide roller base
21. Main brake (supply)
22. Supply reel disk
23. Safety tab switch
24. Record prevention arm
25. Tension band
26. Spring hanger
27. Tension arm
28. Supply sub brake
29. Supply guide roller base
30. Supply guide roller
31. Inclined guide (supply)
32. Tension pole
33. Supply guide pole
34. Subchassis
35. FE (full-erase) head

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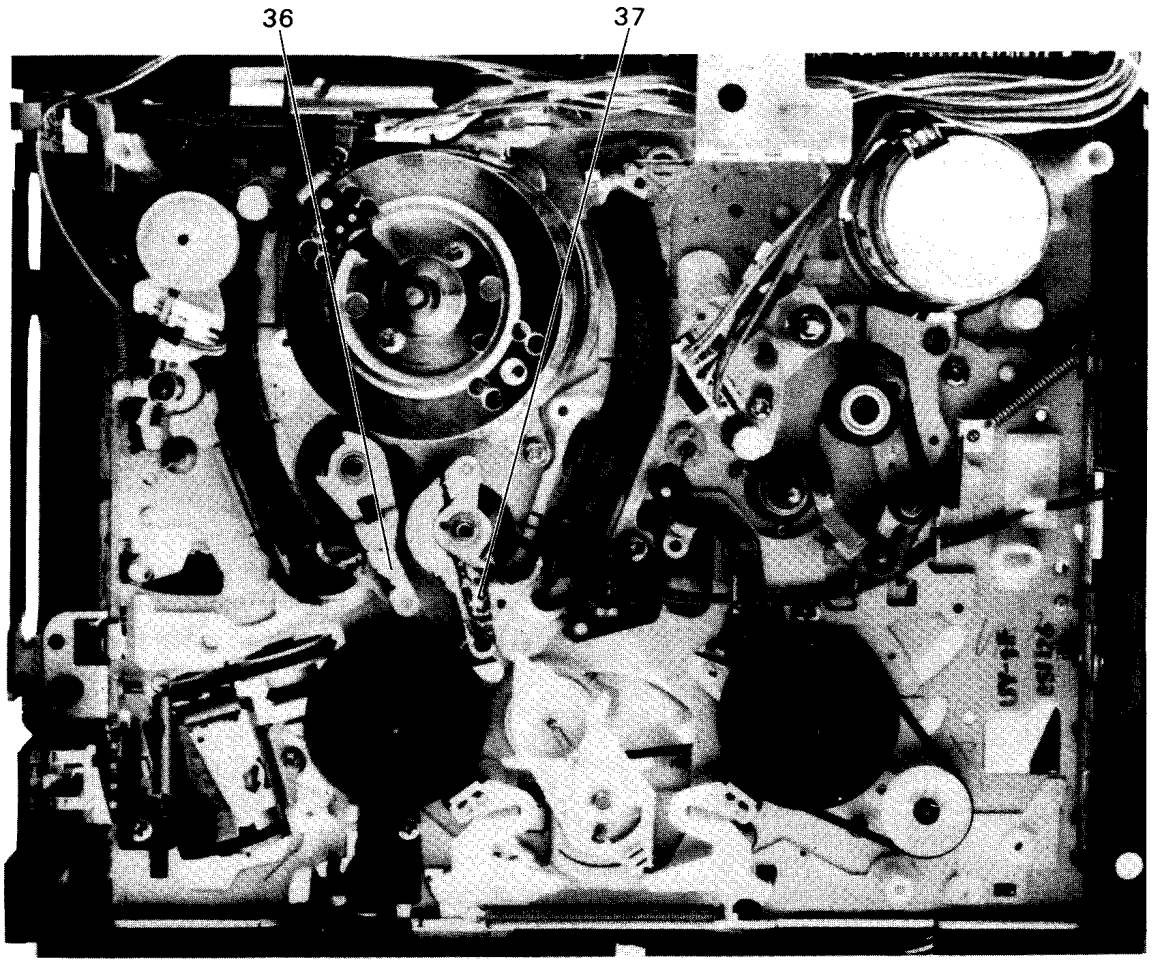

Fig. 6 Top View of Mechanism (with subchassis removed)

36. Supply loading link
37. Take-up loading link

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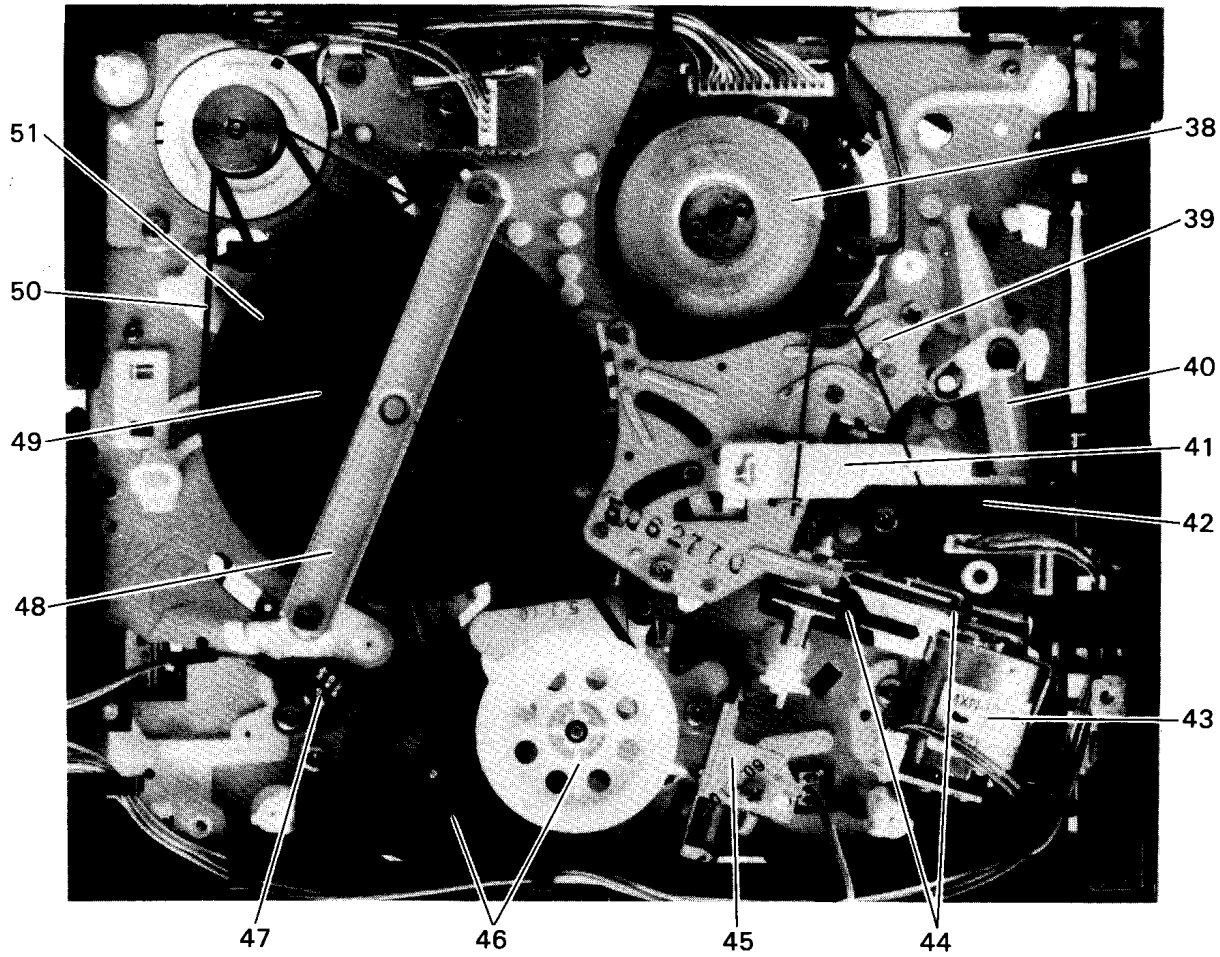

Fig. 7 Bottom View of Mechanism

38. Cylinder motor
39. Loading gear assembly
40. Tension release arm
41. Switch slider
42. Mechanism state switch
43. Loading motor
44. Loading belt
45. Brake slider
46. Clutch plate assembly
47. Reel sensor
48. Flywheel retainer bar
49. Reel belt
50. Capstan belt
51. Capstan flywheel

(See page 2-14 for details on removing the above components.)

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3. CASE REMOVAL

1. **Preset door**
2. **Top cover**
3. **Bottom cover**
4. **Front panel**
5. **Shield cover**
6. **Remote controller**

1. Preset Door

1) Open the preset door. Press down on the attachment holder and pull outward in the direction of the arrow.

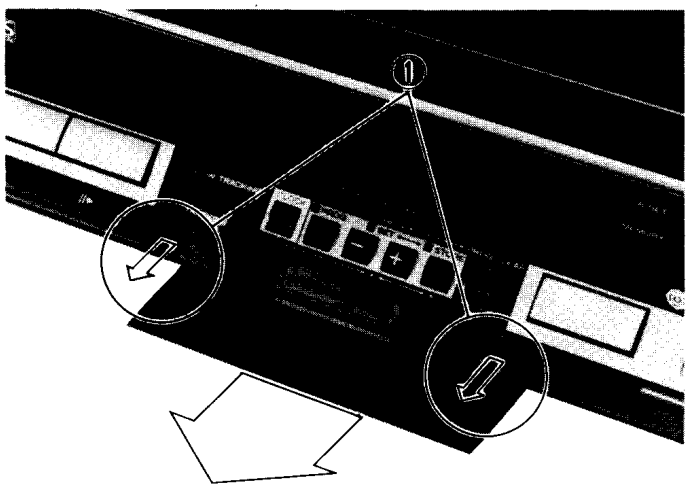

Fig. 1 Preset Door

2. Top Cover

1) Remove the 5 screws.
2) Lift the rear of the top cover upward. Slide the entire cover to the rear.

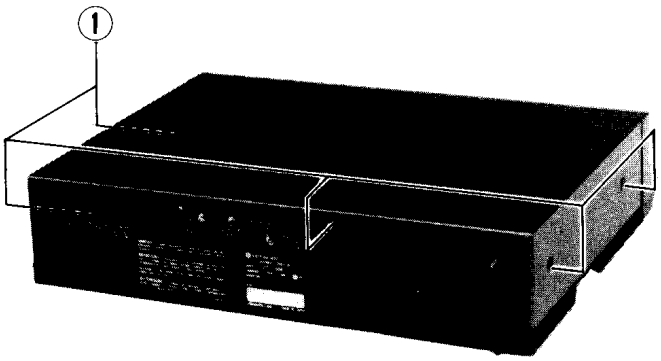

Fig. 2 Top Cover

3. Bottom Cover

1) Remove the 6 screws.

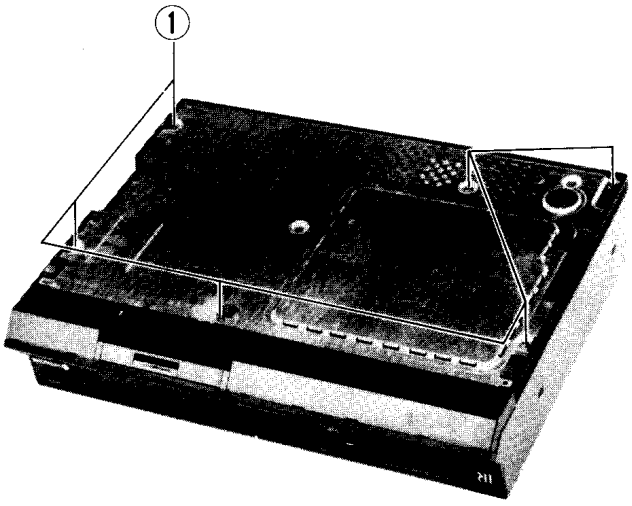

Fig. 3 Bottom Cover

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4. Front Panel

1) Remove top and bottom covers (see items 2 and 3).
2) Remove the screw.
3) Release the 5 stoppers.
4) Tilt the top toward you and pull out the entire front panel.

[Cautions during reassembly]

* Make sure the picture control slide lever on the operation switch circuit board is correctly inserted into the picture control knob on the back of the front panel.
* Removing the tracking control knob first will simplify reassembly.

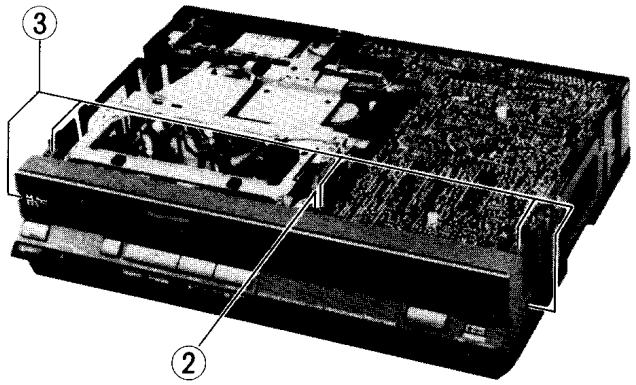

Fig. 4 Front Panel

5. Shield Cover

1) Remove the top cover (see item 2).
2) Remove the screw holding the shield cover.

[Cautions during reassembly]

* Make sure the rear of the shield cover correctly fits over the preamp circuit board's shield case.

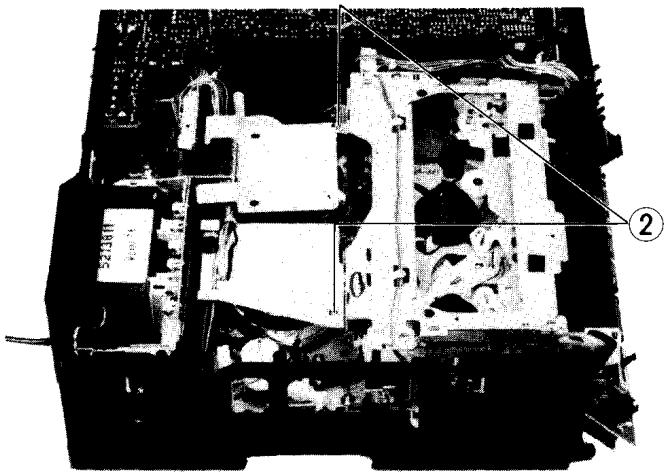

Fig. 5 Shield Cover

6. Remote Controller

1) Remove the screw.
2) Release 8 stoppers.

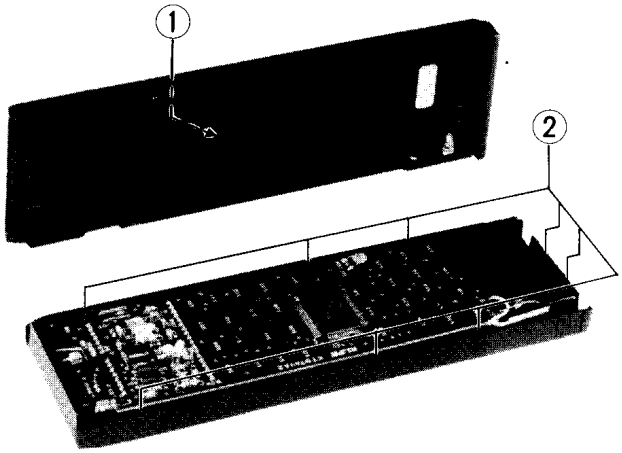

Fig. 6 Remote Controller

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4. CIRCUIT BOARD REMOVAL

1. **Main Circuit Board Block** (Main, Y/chroma, VS tuning)
2. **Operation Switch Circuit Board**
3. **Timer Input Key Circuit Board**
4. **Regulator Circuit Board**
5. **Preamp Circuit Board**

1. Main Circuit Board Block

1) Remove the top and bottom covers (see items 2 and 3 in the section on case removal.)
2) Release the 2 stoppers.
3) Remove the 2 screws.
4) Push the circuit board holder in the direction of the arrow. Then lift up the entire circuit board.
5) The circuit board can now be opened in the direction of the arrow.

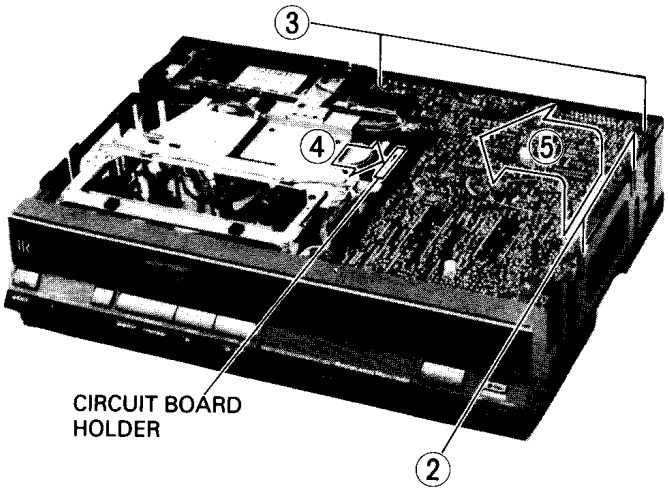

Fig. 1 Main Circuit Board Block

2. Operation Switch Circuit Board (Figs. 2 and 4)

1) Remove the top and bottom covers and the front panel (see items 2, 3 and 4 in the section on case removal.)
2) Disconnect the connector.
3) Release the 5 upper and lower stoppers.

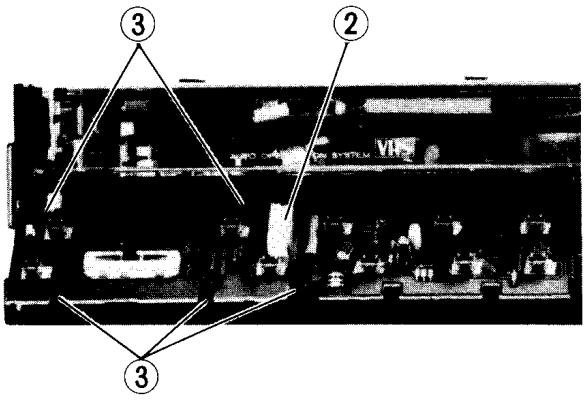

Fig. 2 Operation Switch Circuit Board

3. Timer Input Key Circuit Board (Figs. 3 and 4)

1) Remove the top and bottom covers and the front panel (see items 2, 3 and 4 in the section on case removal.)
2) Disconnect the connector.
3) Release the 7 upper and lower stoppers.
4) Remove the 5 screws.

[Cautions while working]

* Since the backup capacitor retains its charge for approx. 5 minutes after the AC power lead has been unplugged, press the reset switch to discharge the capacitor.

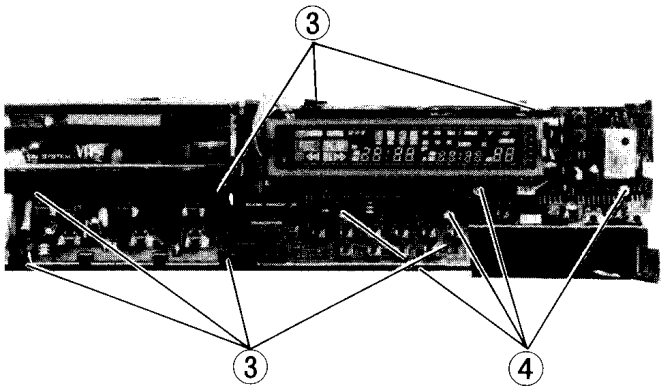

Fig. 3 Timer Input Key Circuit Board

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4. Regulator Circuit Board (Figs. 4 and 5)

1) Remove the top cover (see item 2 in the section on case removal).
2) Remove the 2 screws from the bottom cover.
3) Remove the screw holding the heat sink. Remove the heat sink.
4) Remove the 2 screws on the transformer holder.
5) Lift up in the direction of the arrow.

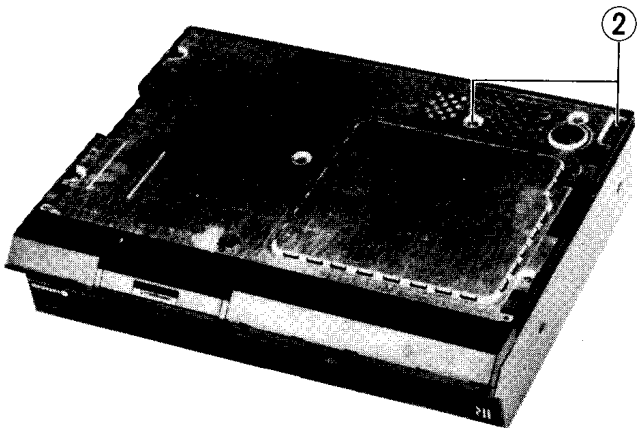

Fig. 4 Bottom Cover

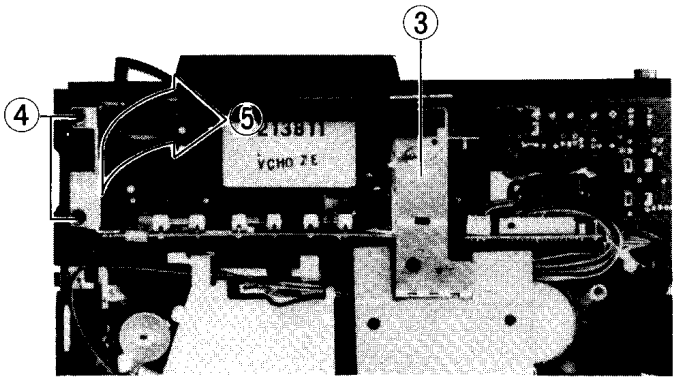

Fig. 5 Regulator Circuit Board

5. Preamp Circuit Board

1) Remove the top cover and the shield cover (see items 2 to 5 in the section on case removal).
2) Pull out and up.

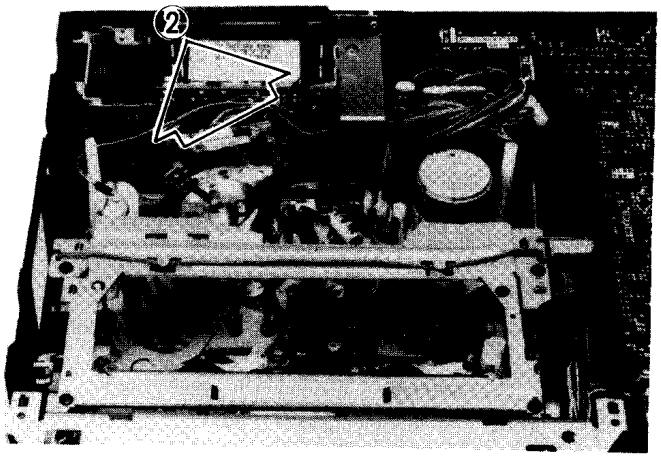

Fig. 6. Preamp Circuit Board

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5. CASSETTE LOADING MECHANISM REMOVAL

1. **Cassette Door**
2. **Supply End Sensor**
3. **Chassis Holder**

* Components listed below will be described as if the top and bottom covers, front panel and shield cover have already been removed. (See items 2, 3, 4, and 5 in the section on case removal.)

4. **Cassette Loading Mechanism**
5. **Gear Cover**
6. **Door Arm**
7. **Drive Gear (L)**
8. **Motor Block**
9. **Cassette Loading Motor**
10. **Drive Gear (R)**
11. **Cassette Holder**

1. Cassette Door

1) Remove the top and bottom covers and the front panel (see items 2, 3 and 4 in the section on case removal).
2) Push and spread apart the front holder in the direction indicated by the arrow. Remove the cassette door.

[Cautions during reassembly]

* Make sure the pin on the door arm fit into the groove in the cassette door.

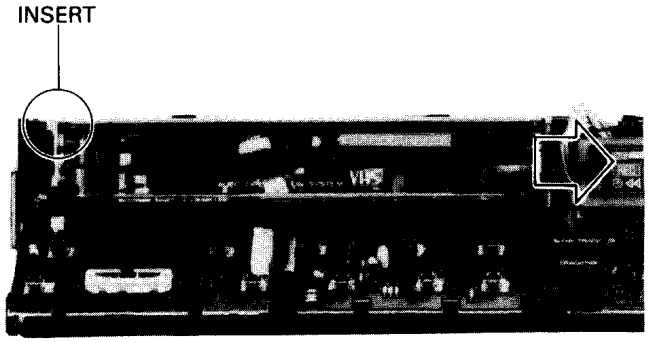

Fig. 1 Cassette Door

2. Supply End Sensor

1) Remove the top cover (see item 2 in the section on case removal).
2) Release the stopper.

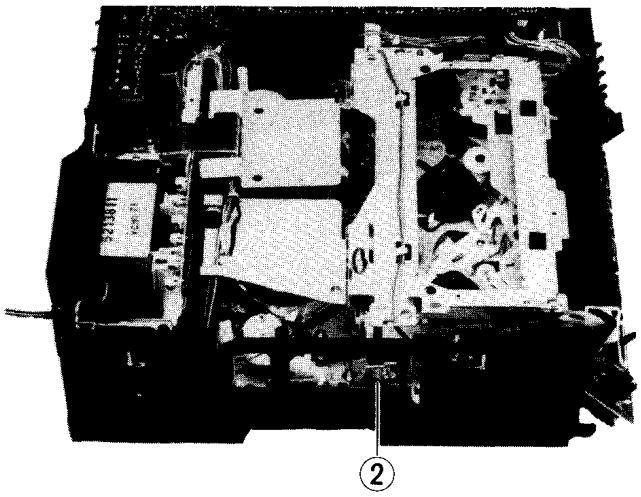

Fig. 2 Supply End Sensor

3. Chassis Holder

1) Remove the top and bottom covers (see items 2 and 3 in the section on case removal).
2) Remove the supply end sensor (see item 2).
3) Release the supply end sensor cord from the chassis holder.
4) Remove the 4 screws.

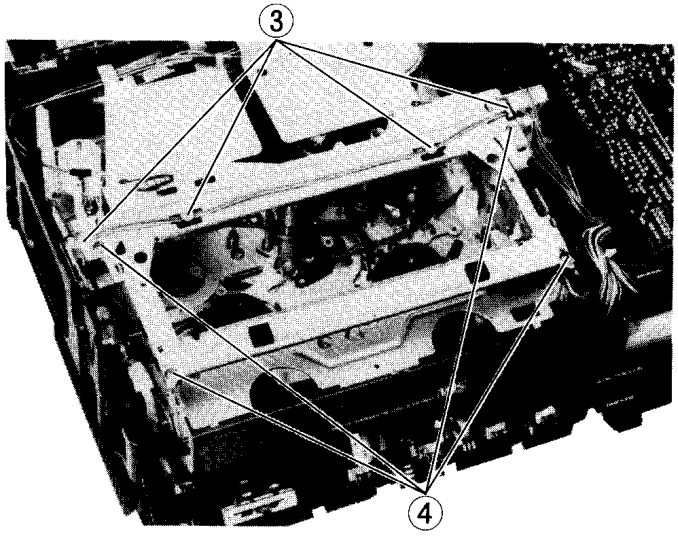

Fig. 3 Chassis Holder

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4. Cassette Loading Mechanism

1) Push the reinforcing plate in the direction of the arrow, and lift upward.
2) Disconnect the connector.
3) Remove the 2 screws.
4) Lift the rear end of the mechanism upwards and release the engagement fitting on the bottom front.

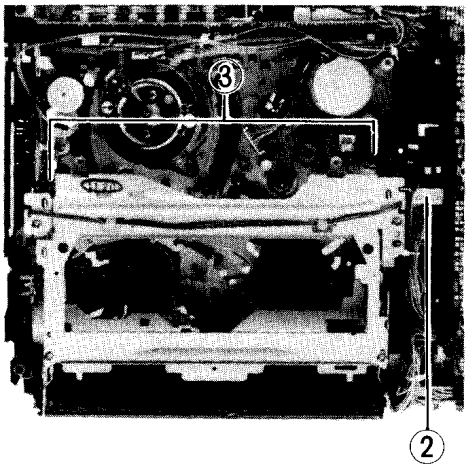

Fig. 4 Cassette Loading Mechanism

5. Gear Cover

1) Remove the cassette loading mechanism (see item 4).
2) Lift section (A) up slightly. Then pull the entire gear cover unit forward.

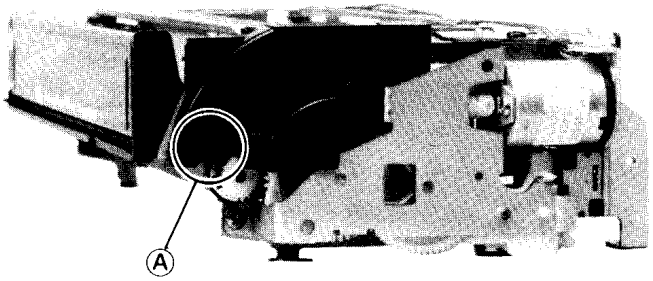

Fig. 5 Gear Cover

6. Door Arm

1) Remove the cassette loaidng mechanism (see item 4.)
2) Remove the spring.
3) Release the 2 stoppers.

[Cautions during reassembly]

* Insert the pin on the front edge of the door arm into the groove in the cassette door.

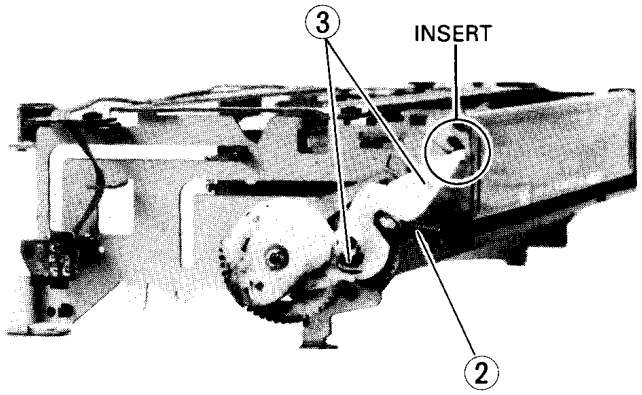

Fig. 6 Door Arm

7. Drive Gear (L)

1) Remove the cassette loading mechanism and the door arm (see items 4 and 6).
2) Release the stopper and pull out the drive gear (L).

[Cautions during reassembly]

* Align the triangular mark on the drive gear (L) with the triangular mark on the synchro gear (L).
* Insert the pin on the cassette holder into the groove in the drive arm.

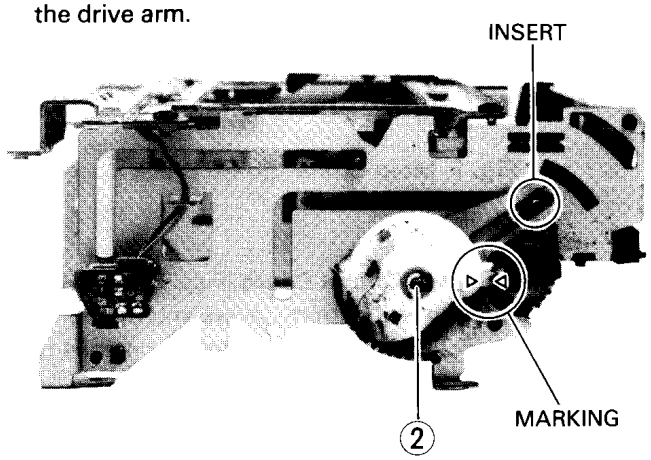

Fig. 7 Drive Gear (L)

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8. Motor Block

1) Remove the cassette loading mechanism, the gear cover, the supply end sensor and the chassis holder (see items 4, 5, 2 and 3).
2) Remove the 2 screws holding the motor block.

[Cautions during reassembly]

* Place the cassette holder in the unloaded position (prior to cassette insertion). Align the triangular markings on the synchro gear and the clutch gear.
* Insert the slide pin on the cassette holder into the groove in the clutch gear's drive arm.

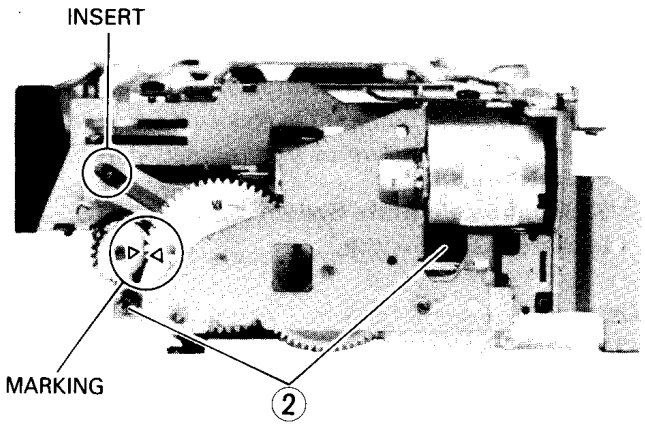

Fig. 8 Cassette Loading Motor Block

9. Cassette Loading Motor

1) Remove the cassette loading mechanism, the gear cover, the supply end sensor, the chassis holder and the motor block (see items 4, 5, 2, 3 and 8).
2) Remove the 2 screws holding the cassette loading motor.

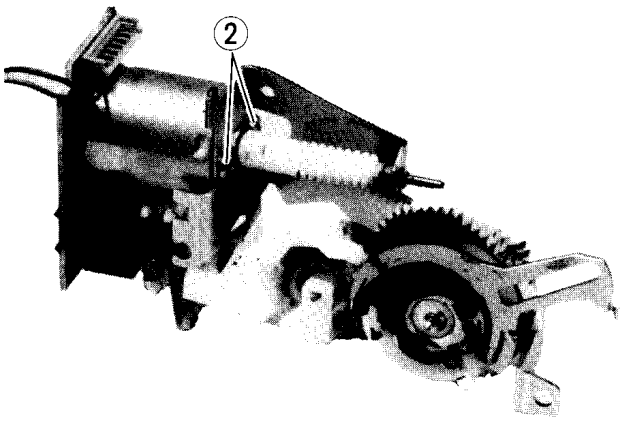

Fig. 9 Cassette Loading Motor

10. Drive Gear (R) (Figs. 10, 11 and 12)

1) Remove the cassette loading mechanism, the gear cover, the supply end sensor, the chassis holder and the motor block (see items 4, 5, 2, 3 and 8).
2) Remove the 2 springs. Pull the switch lever out.
3) Turn the drive arm counterclockwise and pull the clutch gear out.
4) Release the stopper. Pull out another gear.
5) Remove the screw holding the gear holder.

[Cautions during reassembly]

* Position the triangular marking on the drive gear (R) so that it faces the worm gear. (See Fig. 11). The (○) and triangle can also be seen from the outside so that correct position can be checked after reassembling the motor block. (See Fig. 12)
* Align marking (▷) on drive gear (R) with projection (ⵔ) on the clutch gear. (See Fig. 11)
* Attach the spring on the clutch gear to both gears (See Fig. 11)

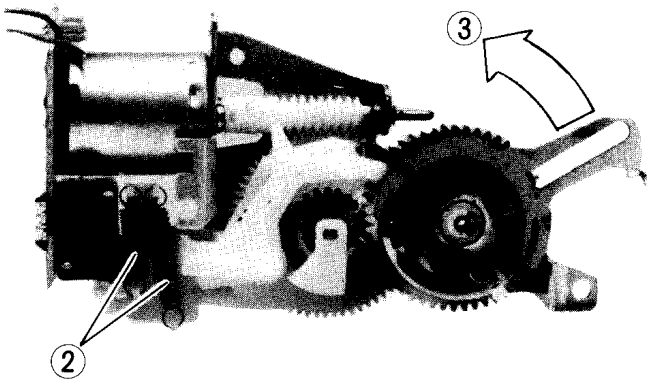

Fig. 10 Drive Gear (I)

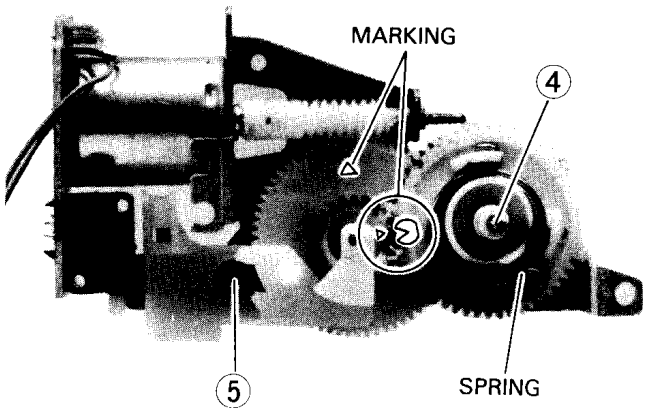

Fig. 11 Drive Gear (II)

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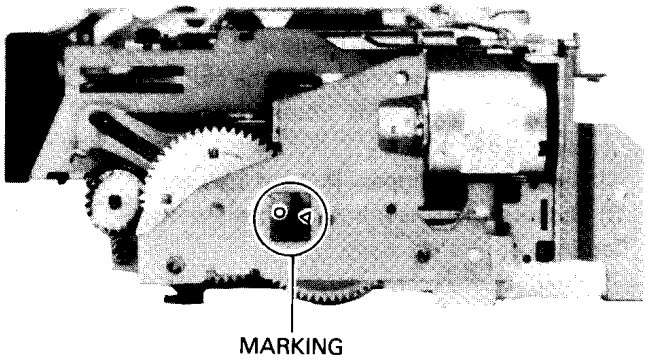

Fig. 12 Marking on Gear

11. Cassette Holder

1) Remove the cassette loading mechanism, the gear cover, the supply end sensor, the chassis holder and the motor block (see items 4, 5, 2, 3 and 8).
2) Remove the screw on top of the front holder. Remove the side chassis (R).

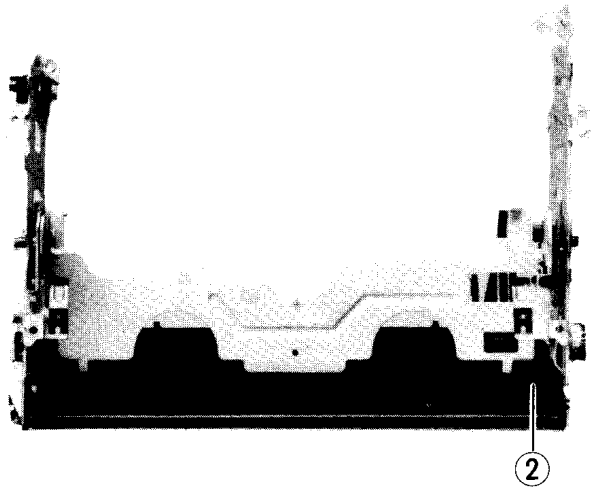

Fig. 13 Cassette Holder

6. MAIN MECHANICAL COMPONENTS REMOVAL

Heads

1. Upper Cylinder (Video Heads)
2. Impedance Roller and FE (Full Erase) Head
3. A/C (Audio Control) Head

Motors

4. Cylinder Assembly
   - Rotor Magnet
   - FG Coil
5. Capstan Motor
6. Loading Motor

Sensors, Switches

7. End Lamp
8. Reel Sensor
9. Mechanism State Switch
10. Safety Tab Switch

Others

11. Main Brake
12. Subbrake
13. Supply Guide Pole
14. Take-up Guide Pole
15. Reel Drive Gear
16. Take-up Reel Disk
17. Load Pulley
18. Tension Arm/Tension Band
19. Guide Roller
20. Supply Reel Disk
21. Pressure Roller
22. Arm Bracket
23. Guide Base and Loading Link
24. Clutch Plate Assembly
25. Capstan Flywheel
26. Brake Slider
27. Loading Gear Assembly

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1. Upper Cylinder (Video Heads) (Figs. 1 and 2)

1) Remove the top cover and shield cover (see items 2 and 5 in the section on case removal)
2) Remove the screw holding the brush. Remove the earth brush.
3) Remove the 2 screws holding the upper cylinder. Pull the upper cylinder out.

[Cautions while working]

* Since the upper cylinder has connectors, do not apply pressure in the direction of rotation. Pull the cylinder vertically upward in the direction of cylinder attachment.
* Do not touch the video head tips with fingers or tools.

[Cautions during reassembly]

* Insert so that the arrow on the rotary transformer matches the blue side of the video head connector.
* Alternately tighten the 2 screws holding the upper cylinder.

[Adjustments after reassembly]

○ Adjustments after replacing the cylinder

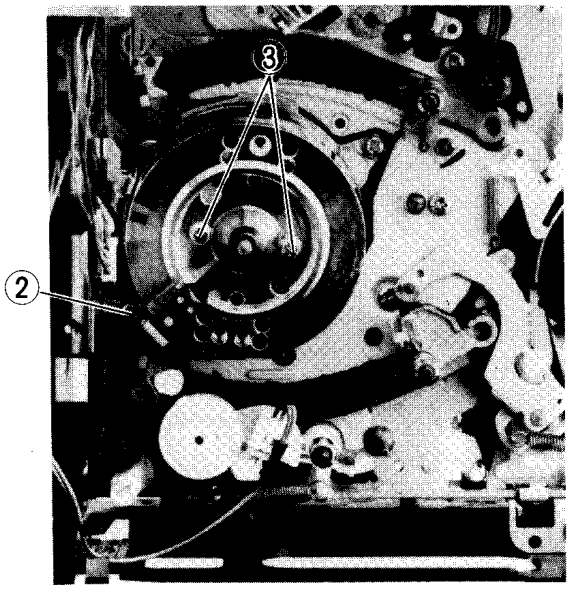

Fig. 1 Video Head

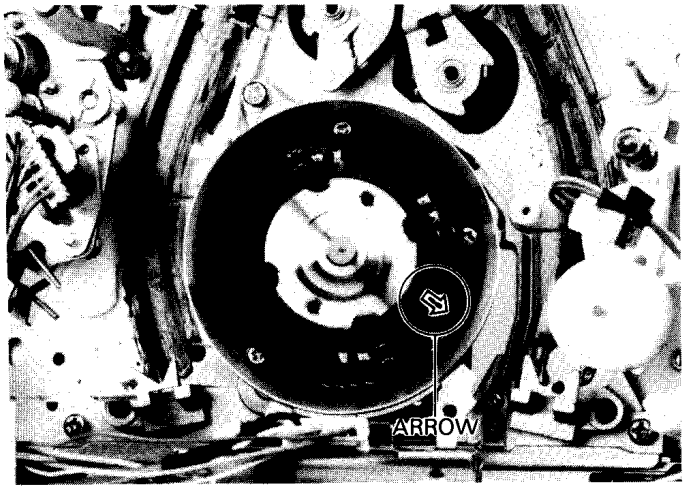

Fig. 2 Rotary Transformer

2. Impedance Roller and FE (Full Erase) Head

1) Remove top cover and shield cover (see items 2 and 5 in the section on case removal).
2) Disconnect the connector.
3) Remove the spring attached between the FE head base and the chassis.
4) Remove the lock nut on the guide pole and then pull the guide pole, spring and washer out.
5) Pull up the FE head together unit the base and out.
6) Then with the FE head removed, remove the screw on the back of the base.

[Adjustments after reassembly]

○ Guide pole height adjustment

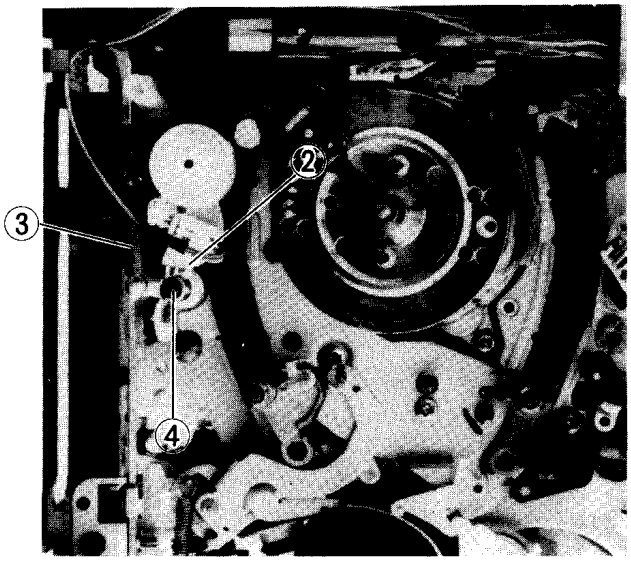

Fig. 3 FE Head

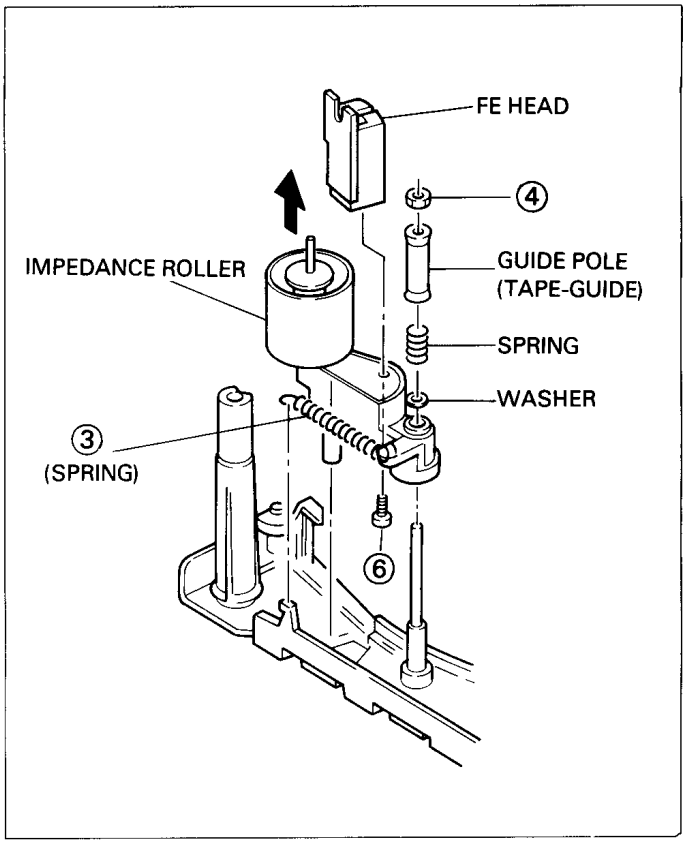

Fig. 4 FE Head

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3. A/C (Audio/Control) Head (Figs. 5 and 6)

1) Remove the top cover (see item 2 in the section on case removal).
2) Pull out the connector.
3) Remove the lock nut and washer from the head base. Pull up the base and out.

* Apply the bottom of the spring under the head base to the stopper on the chassis, the top of the spring to the stopper on the base. (Fig. 6)

[Cautions during reassembly]

* Make sure the tip of the A/C head lock screw protrudes 3 to 4 mm from the top surface of head base 1.

* Make sure that head base 1 and head base 2 are parallel.

[Adjustments after reassembly]

○ A/C head adjustment
○ X value adjustment
○ Audio playback level adjustment
○ Audio bias level adjustment

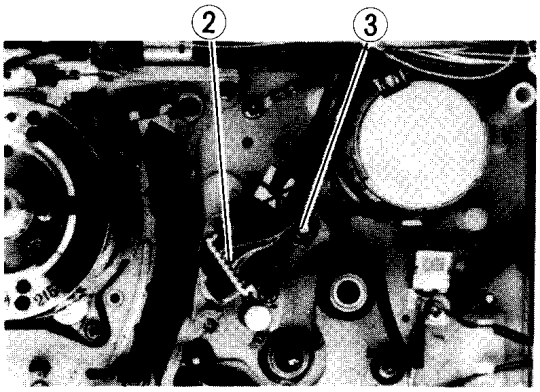

Fig. 5 AC Head

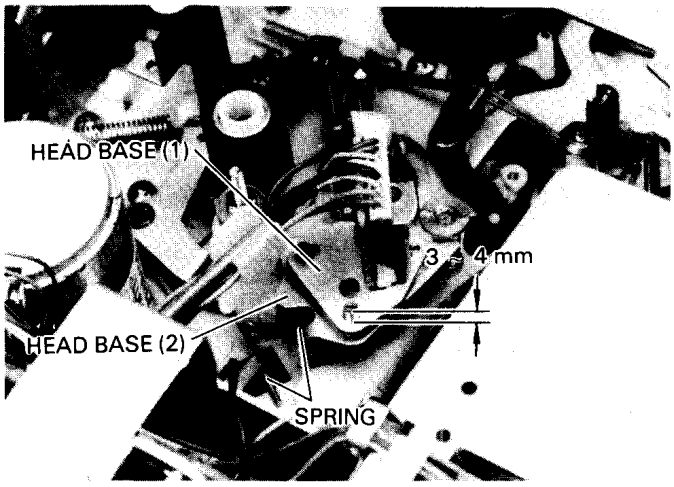

Fig. 6 Spring and Lock Screw

4. Cylinder Assembly

1) Remove the top cover and shield cover (see items 2 and 5 in the section on case removal).
2) Pull out the preamp circuit board.
3) Remove the bottom cover (see item 3 in the section on case removal.)
4) Disconnect the connector from the FG circuit board.
5) Remove the 3 screws holding the cylinder.
6) Remove the cylinder assembly from the top.

[Cautions during reassembly]

* Since the screws position on the back of the assembly, place the unit with the left side down to remove the screws.

* Do not touch the video head tips with fingers or tools.

[Adjustments after reassembly]

○ Adjustments after replacing the cylinder

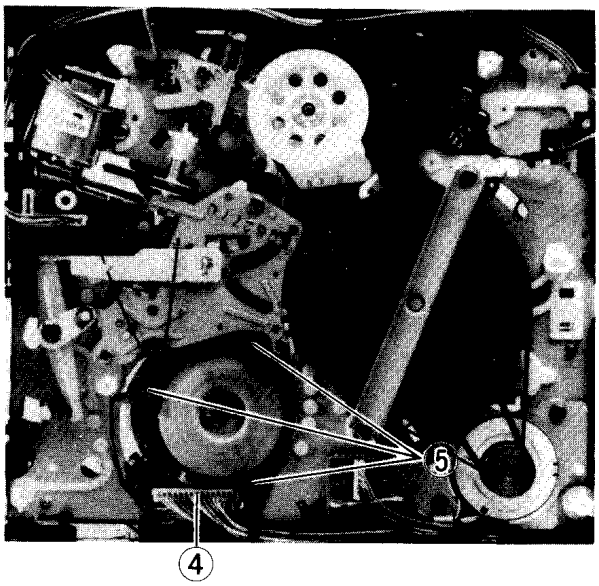

Fig. 7 Cylinder Assembly

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[Removing only the rotor magnet and FG coil]
(Figs. 8 and 9)

a) Remove the bottom cover (see item 3 in the section on case removal).
b) Remove the 2 screws on the rotor. Pull the rotor magnet out.
c) Remove the 3 screws holding the FG coil.

[Cautions during reassembly]

* Fit the slot on the cylinder rotating spindle into the protrusion on the rotor side, then lock the rotor magnet with the screws.

[Adjustments after reassembly]

○ Switching point adjustment

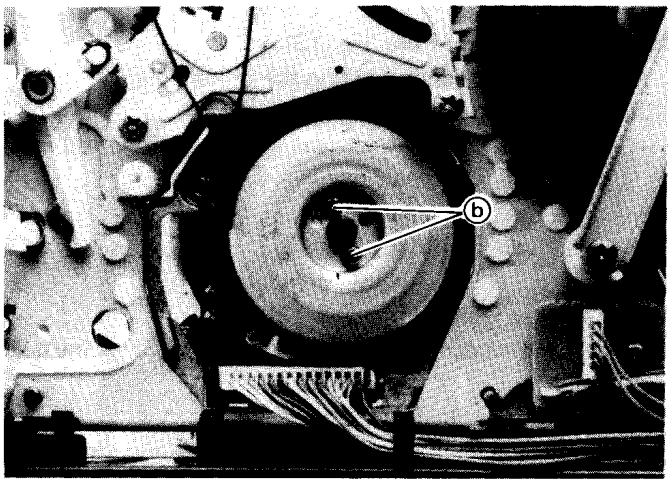

Fig. 8 Rotor Magnet

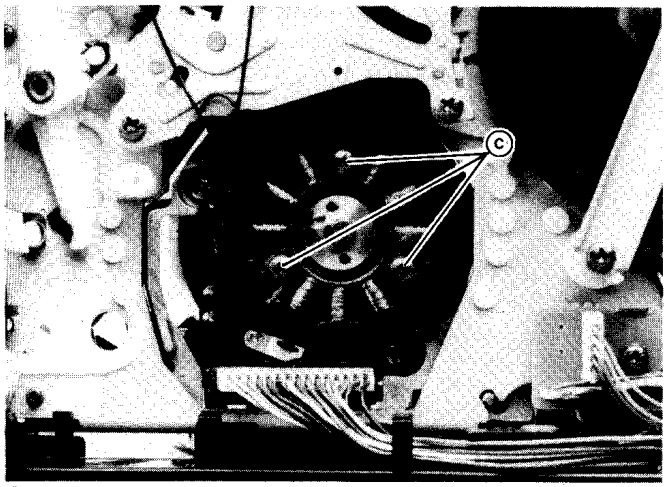

Fig. 9 FG Coil

5. Capstan Motor

1) Remove bottom cover (see item 3 in the section on case removal).
2) Remove the reel belt.
3) Remove the flywheel belt.
4) Disconnect the connector from the capstan motor circuit board.
5) Remove the 2 screws holding the capstan motor holder. Pull out the capstan motor holder.

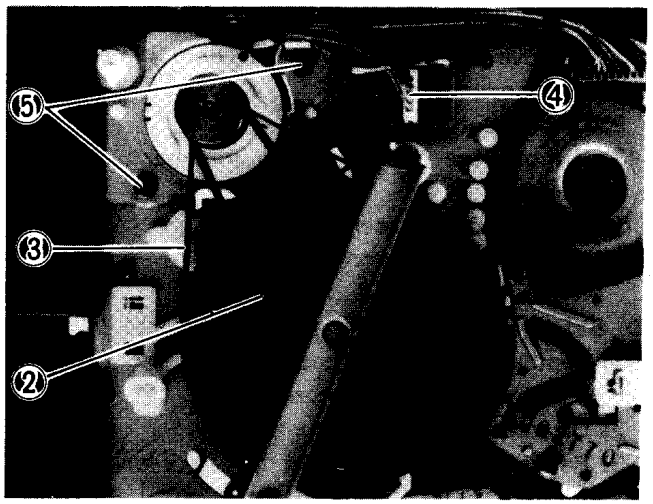

Fig. 10 Capstan Motor

6. Loading Motor

1) Remove the bottom cover (see item 3 in the section on case removal.)
2) Remove the loading belt.
3) Disconnect the connector from the loading motor circuit board.
4) Remove the screw holding the loading motor.

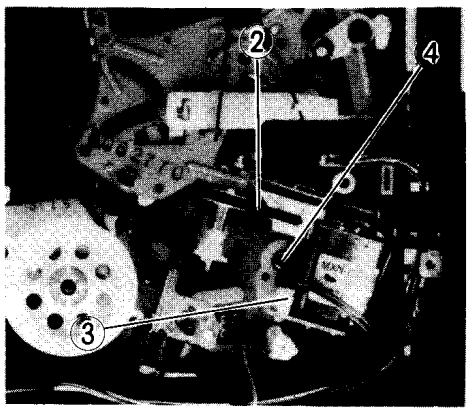

Fig. 11 Loading Motor

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7. End Lamp (Fig. 13)

1) Remove the top cover (see item 2 in the section on case removal).
2) Remove the screw holding the end lamp.

8. Reel Sensor (Fig. 12)

1) Remove the bottom cover (see item 3 in the section on case removal).
2) Remove the screw holding the reel sensor.

9. Mechanism State Switch (Fig. 12)

1) Remove the bottom cover (see item 3 in the section on case removal).
2) Disconnect the connectors
3) Remove the screw holding the mechanism state switch.

[Adjustments after reassembly]

○ Mechanism state switch adjustment

10. Safety Tab Switch (Figs. 12 and 13)

1) Remove the top and bottom covers (see items 2 and 3 in the section on case removal).
2) Disconnect the connector from the bottom side.
3) Remove the screw holding the safety tab switch.

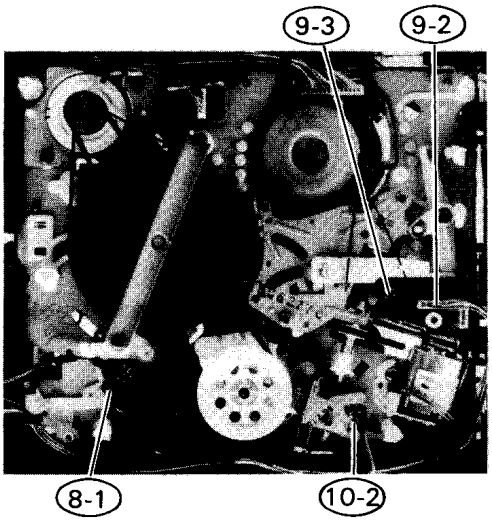

Fig. 12 Bottom View of Mechanism

* Components in items 11 to 17 are described as if the top cover has already been removed. See item 2 in the section on case removal.

11. Main Brakes (Fig. 13)

1) Remove the spring between the supply and take-up brakes.
2) Release each section engaged with the chassis.

12. Supply Subbrake (Fig. 13)

1) Remove the spring between the subchassis and the brake.
2) Release the section engaging the brake spindle.

13. Supply Guide Pole (Fig. 13)

1) Remove the screw holding the guide pole.

[Cautions during reassembly]

* Make sure the washer and spring are inserted in the guide pole attachment shaft.

[Adjustments after reassembly]

○ Guide pole height adjustment

14. Take-up Guide Pole (Fig. 13)

1) Remove the cap. Remove the screw holding the guide pole.

[Cautions during reassembly]

* Make sure the spring is inserted in the guide pole attachment shaft.

[Adjustments after reassembly]

○ Guide pole height adjustment

15. Reel Drive Gear (Fig. 13)

1) Push the spring holder in the direction of arrow to pull the spring holder up and out.

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16. Take-up Reel Disk (Fig. 13)

1) Remove the rubber belt across the load pulley and reel disk.
2) Remove the washer from the top of the disk.

[Cautions during reassembly]

* Make sure the washer is inserted in the reel disk attachment shaft.

[Adjustments after reassembly]

○ Reel disk height adjustment

17. Load Pulley (Fig. 13)

1) Remove the rubber belt across the pulley and the reel disk.
2) Remove the washer from the top of the pulley.

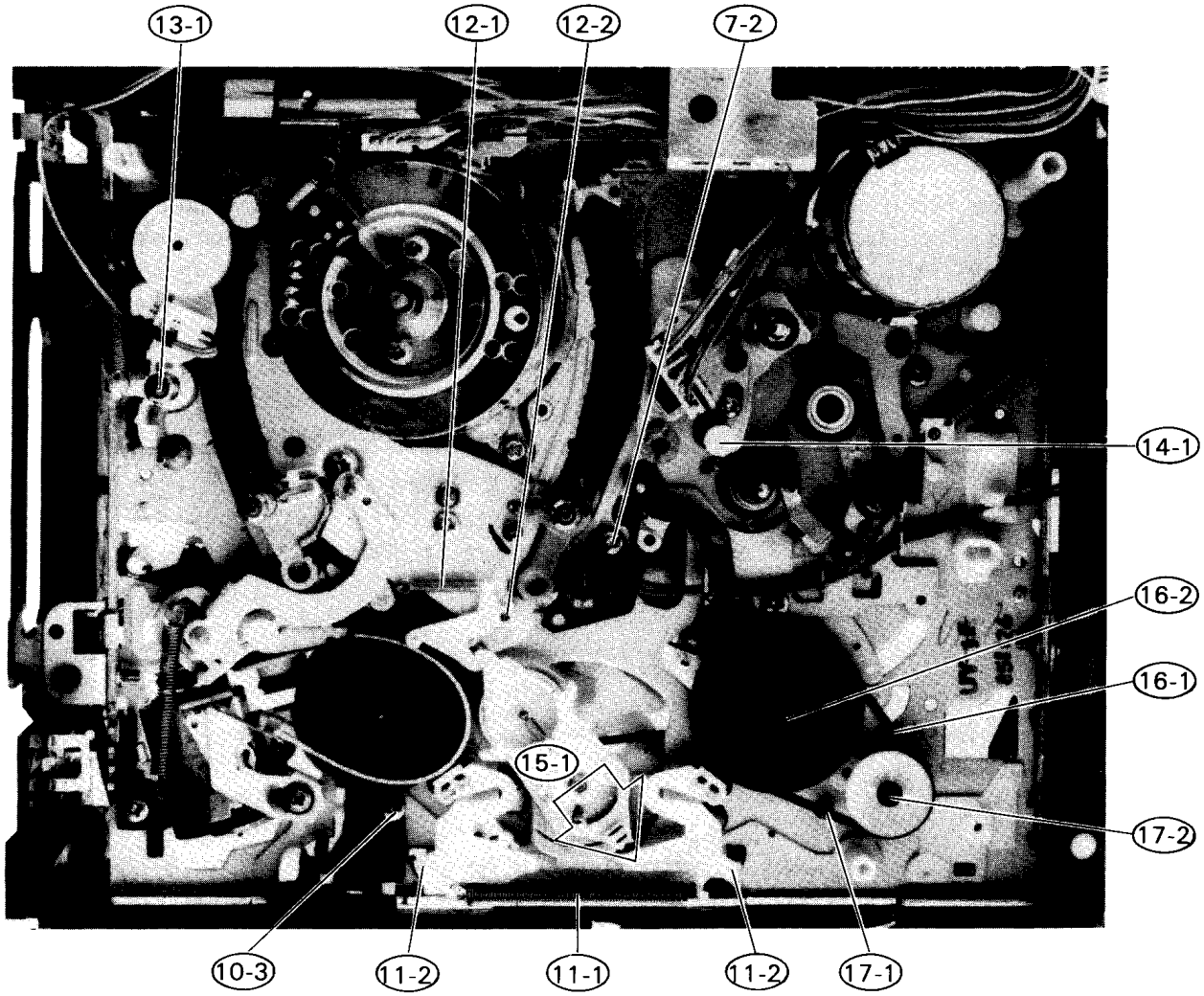

Fig. 13 Top View of Mechanism

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* Components in items 18 to 23 are described as if the top and bottom covers, the front panel, the shield cover, and cassette loading mechanism have already been removed. See item 4 in the section on cassette loading mechanism removal and items 2, 3, 4 and 5 in the section on case removal.

18. Tension Arm/Tension Band (Fig. 14)

1) Remove spring (18-1) across the tension arm and spring holder.
2) Remove the screw holding the tension band.
3) Release the engagement section with the tension arm. Pull out the tension arm and tension band.

[Adjustments after ressembly]

○ Tension/tension pole position Adjustments

19. Guide Roller (Fig. 14)

* Remove the supply and take-up sides in the same way.

1) Loosen the hex lock nut on the guide roller.
2) Turn the guide roller counterclockwise to remove.

[Adjustments after reassembly]

○ Guide roller height adjustment

20. Supply Reel Disk (Fig. 14)

1) Remove the supply subbrake and tension arm/tension band (see items 12 and 18).
2) Remove the washer from the top of the disk.

[Cautions during reassembly]

* Make sure the washer and collar are inserted in the reel disk attachment shaft.

[Adjustments after reassembly]

○ Tension/tension pole position Adjustments
○ Reel disk height adjustment

21. Pressure Roller (Fig. 14)

1) Remove washer.

22. Arm Bracket Assembly (Fig. 14)

1) Remove the take-up reel disk and pressure roller (see items 16 and 21).
2) Release the 2 leads from the chassis.
3) Remove the 2 screws. Pull out the arm bracket assembly.

[Cautions during reassembly]

* Insert operation arm spindle into slot in take-up brake operation arm.
* Insert drive arm spindle into slot in link piece.

23. Guide Base/Loading Link (Fig. 14)

1) Remove supply subbrake and tension band/tension arm. (See items 12 and 18)
2) Remove the 3 screws holding the subchassis. Remove the subchassis and guide base.

[Cautions during reassembly]

* When reinstaling the loading link, make sure that the projection on the loading gear is aligned with the groove in the loading link.
* When reinstalling the guide base, make sure that the pin on the back of the guide base is inserted into the slot in the loading link.

[Adjustments after reassembly]

○ Tension/tension pole position Adjustments

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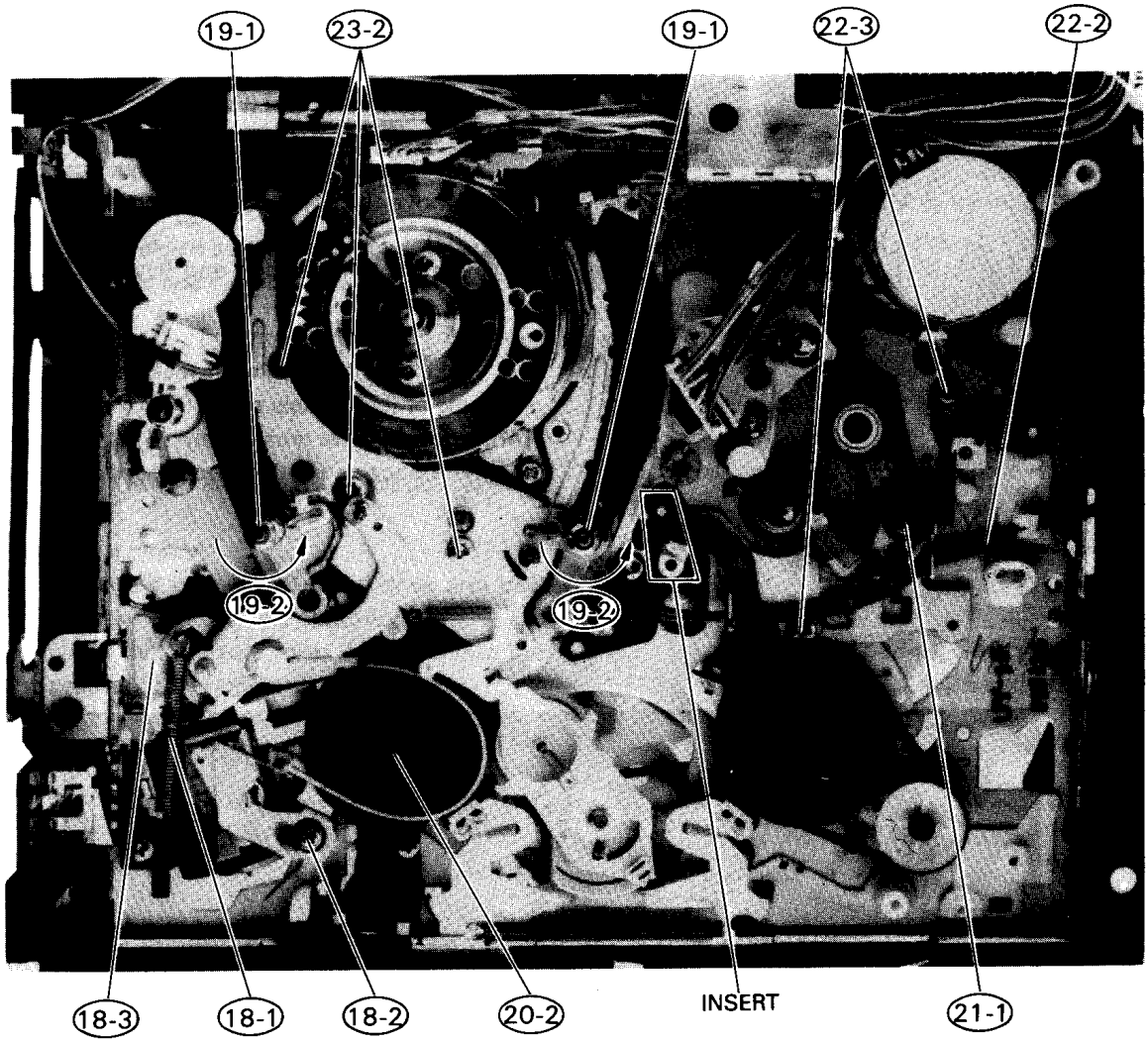

Fig. 14 Top View of Mechanism

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* Components in items 24 to 26 are described as if the top and bottom covers have already been removed. (See items 2 and 3 in the section on case removal)

24. Clutch Plate Assembly (Fig. 15)

1) Remove the reel drive gear (see item 15).
2) Remove reel belt.
3) Remove the 2 screws holding the clutch plate assembly.

25. Brake Slider (Fig. 15)

1) Remove the reel drive gear and clutch plate assembly (See items 15 and 24).
2) Remove the screw holding the brake slider.

[Cautions during reassembly]

* Make sure the pin on the brake drive arm is inserted into the groove on the slider operating section.

26. Capstan Flywheel (Fig. 15)

1) Remove the 2 screws holding the flywheel retainer bar. Remove the flywheel retainer bar.
2) Remove the nylon washer from the top of the capstan shaft.
3) Remove the reel belt and flywheel belt. Remove the flywheel.

[Cautions during reassembly]

* Make sure the washer is inserted between the bottom side of the chassis and the flywheel.

[Adjustments after reassembly]

○ Reference oscillation frequency adjustment

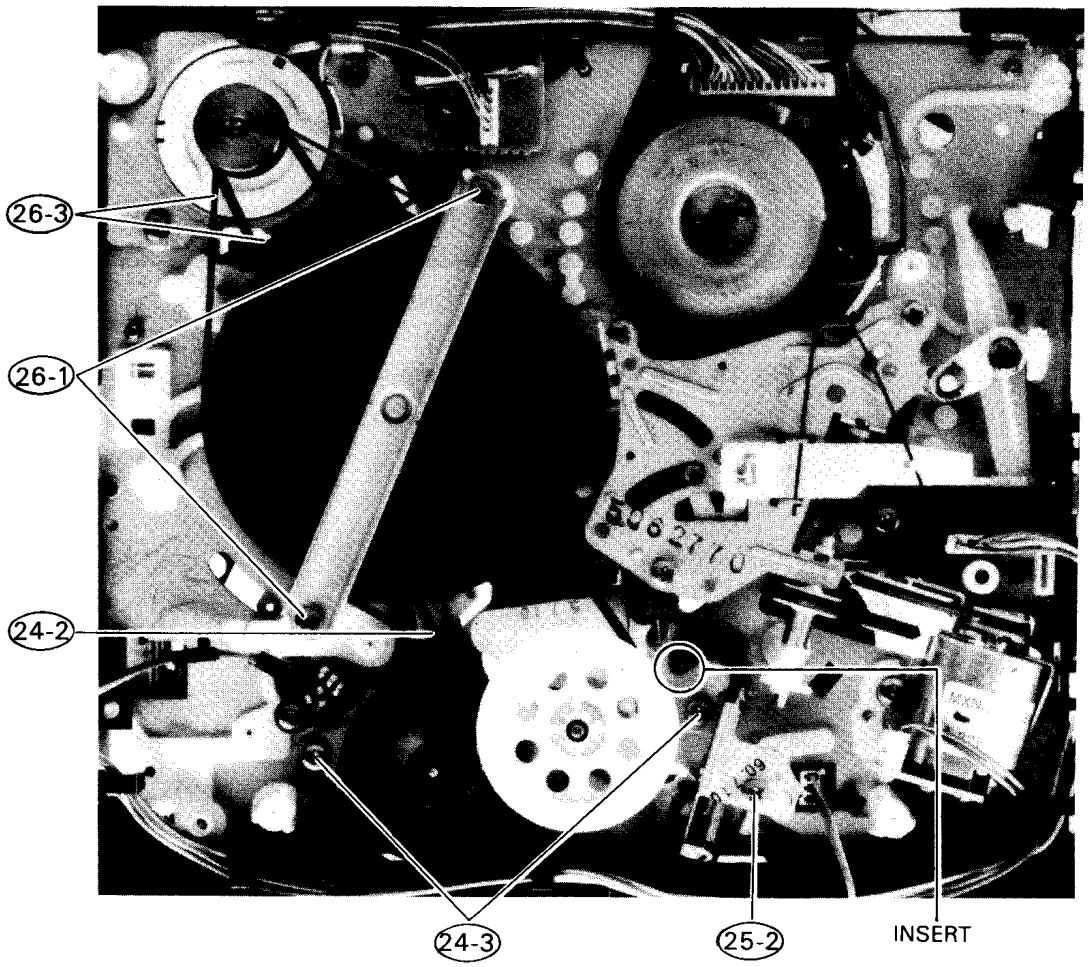

Fig. 15 Bottom View of Mechanism

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27. Loading Gear Assembly (Figs. 16 and 17)

1) Remove the top and bottom covers (see items 2 and 3 in the section on case removal).

Top Side

2) Remove the 2 screws from the top of the subchassis.
3) Remove the reel drive gear. (See item 15)

Bottom Side

4) Remove the mechanism state switch, clutch plate assembly, brake slider and capstan flywheel. (See items 9, 24, 25 and 26.)
5) Remove the spring and switch slider from the loading gear assembly.
6) Remove tension release arm.
7) Remove loading belt.
8) Remove the 3 screws holding the loading gear assembly.

[Cautions during reassembly]

* Insert the pin on the take-up subbrake drive arm into the slot on the take-up subbrake operation arm.
* Insert the pin on the pressure roller drive arm into the slot on the pressure roller operation arm.

[Adjustments after reassembly]

○ Mechanism state switch adjustment

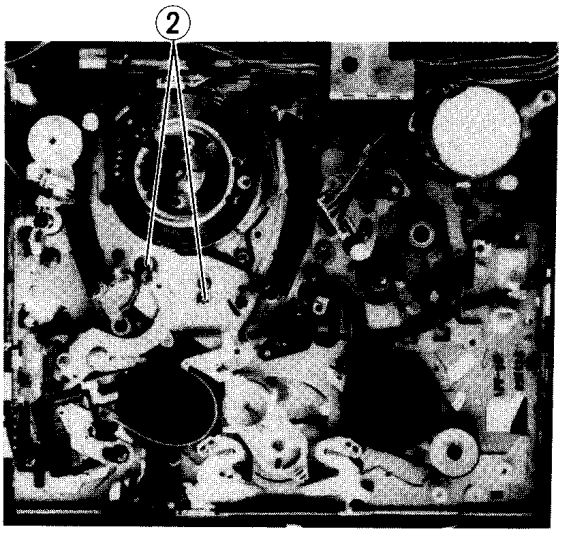

Fig. 16 Top View of Mechanism

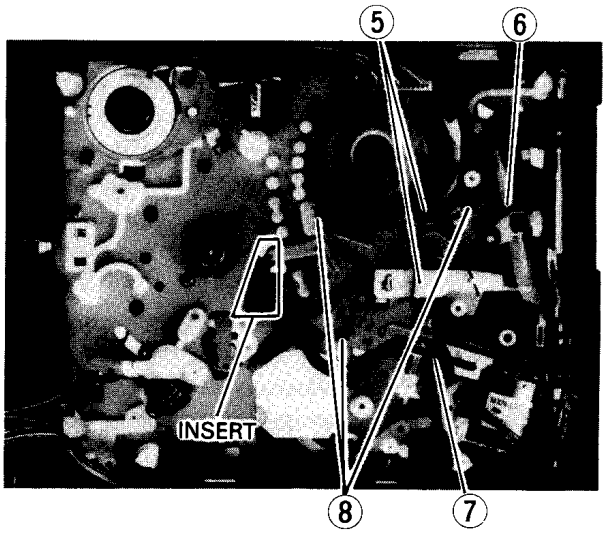

Fig. 17 Loading Gear Assembly
(with items in 9, 24, 25 and 26 removed)

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ELECTRIC CIRCUIT ADJUSTMENT

Test equipment and tapes necessary for adjustment.

1) Oscilloscope
2) Colour bar generator
3) VTVM
4) Frequency counter
5) Monitor TV
6) Alignment tape
7) Blank tape

Cautions on adjustments

1) If there are no special instructions, the following conditions apply:
   - ○ Oscilloscope probe: 10 : 1
   - ○ Oscilloscope synchronization: Auto-Sync
   - ○ Tracking control: center click.
2) When making more than one adjustment, make those adjustments in the order listed.

Resetting microprocessors

All microprocessors installed in the unit will be reset once the AC power lead is removed from the wall socket. However, the timer microprocessor's back-up circuit keeps it from resetting until about five minutes after power off.

The timer microprocessor can be reset by switch S759 on the timer circuit board. (Switch S759 can be operated by inserting a screwdriver into the round slot adjacent to the PRESET switch even when the front panel is attached.)

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Adjust the main circuit board (servo and audio circuits) with the main circuit board open as shown in Fig. 1.

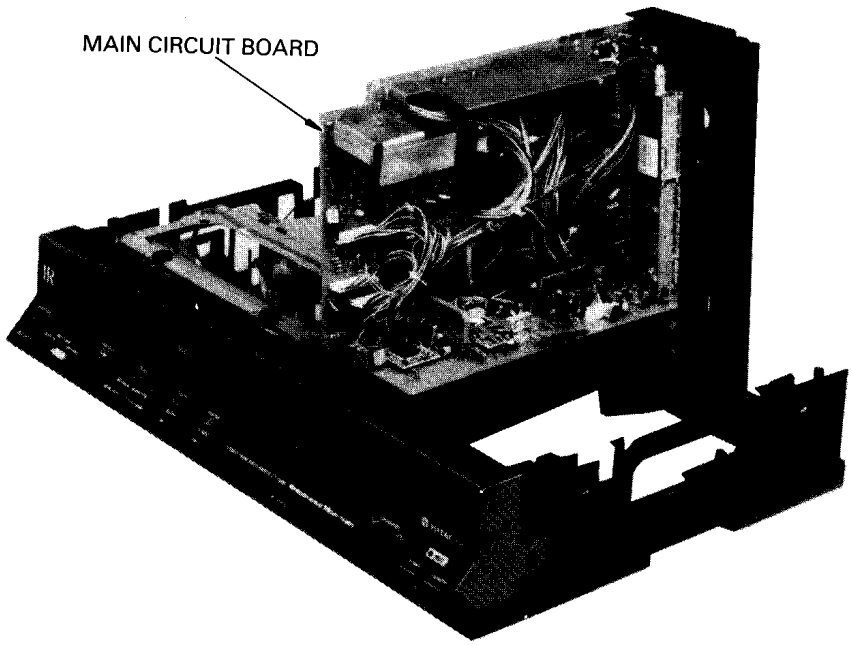

Fig. 1 Ready to Adjust Main Circuit Board

Adjust the Y/chroma circuit board with the left side down and the circuit board open as shown in Fig. 2.

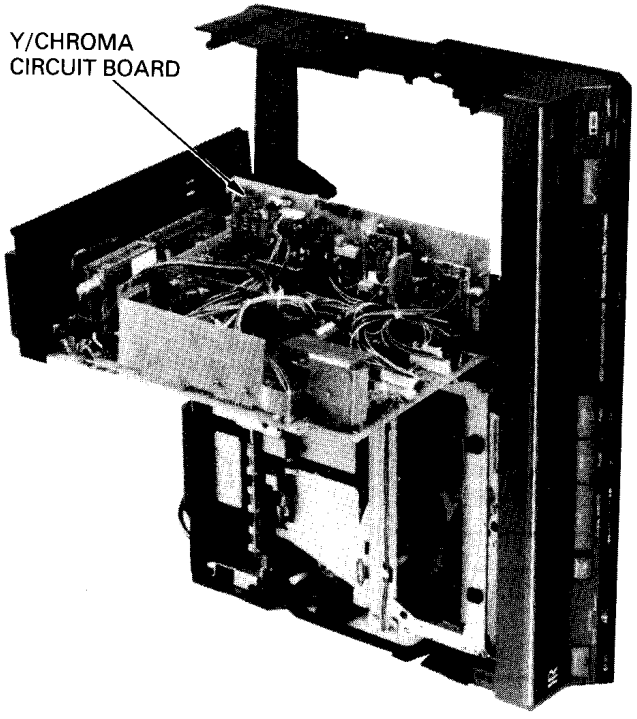

Fig. 2 Ready to Adjust Y/Chroma Circuit Board

* See item 1 in chapter 2 on circuit board removal, for details on main circuit board removal.

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COMPONENTS LOCATIONS ON CIRCUIT BOARDS

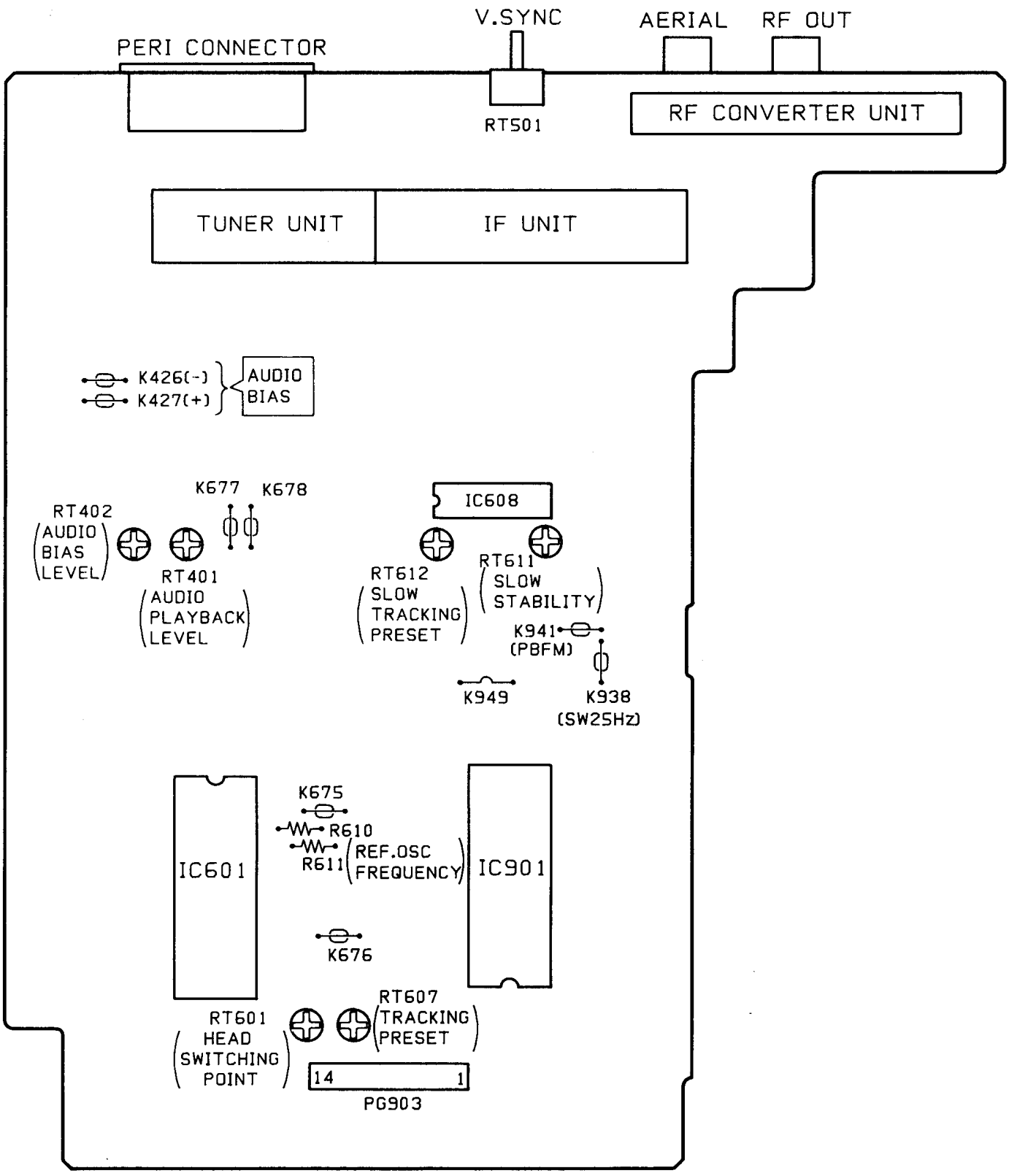

Fig. 3 Components on Main Circuit Board (Component Side)

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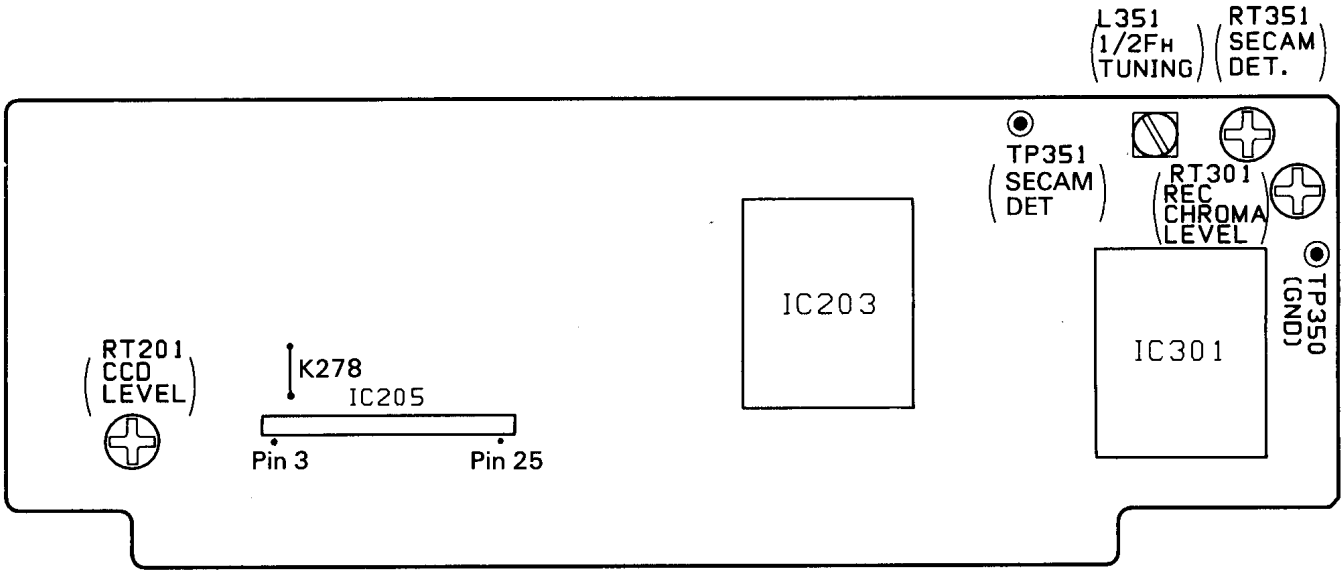

Fig. 4 Components on Y/Chroma Circuit Board (Component Side)

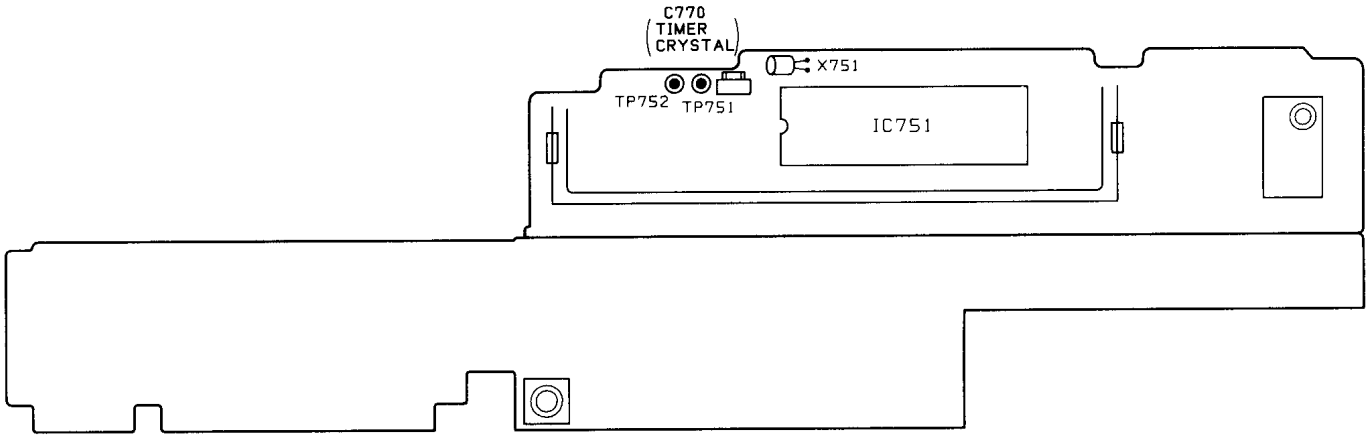

Fig. 5 Components on Timer Circuit Board (Component Side)

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1. SERVO CIRCUIT ADJUSTMENTS

1. Reference Oscillation Frequency Adjustment

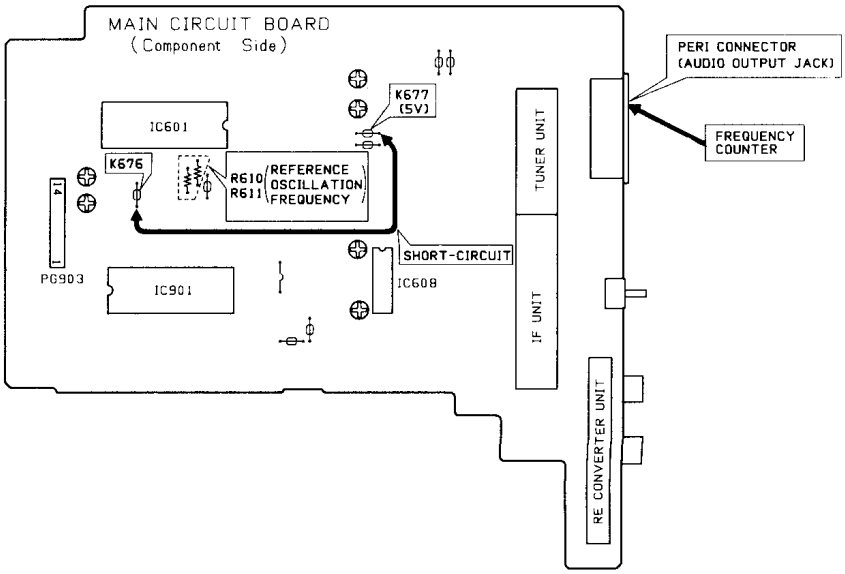
Purpose of adjustment and fault occurring if incomplete

Purpose: Fine tune the reference oscillation frequency (REF25 Hz) in the phase control loop to correct variations in diameters of flywheel, pulley, etc.

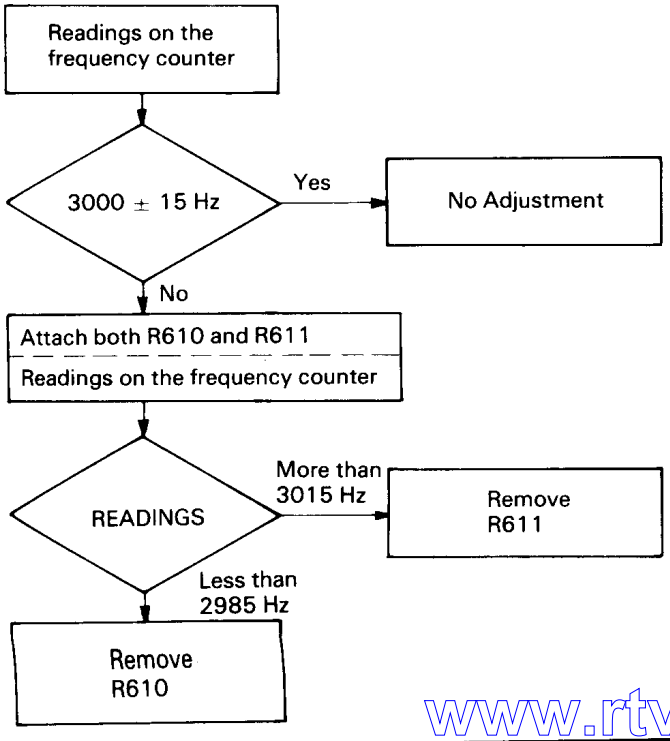
Fault: ○ Noise appears in picture.
○ Tracking cannot be optimized.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment point
● Frequency counter ● Alignment tape	● Audio output jack	Alignment tape: Play back 3 kHz portion	● R610 (4.7K) ● R611 (3.9K)

Connection Diagram



Adjustment Procedure



Note: There are some units in which R610 or R611 is removed when shipped from the factory.

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Kešinci, 31402 Semeljci
031-856-139
031-856-637
098-788-319
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2. Head Switching Point Adjustment

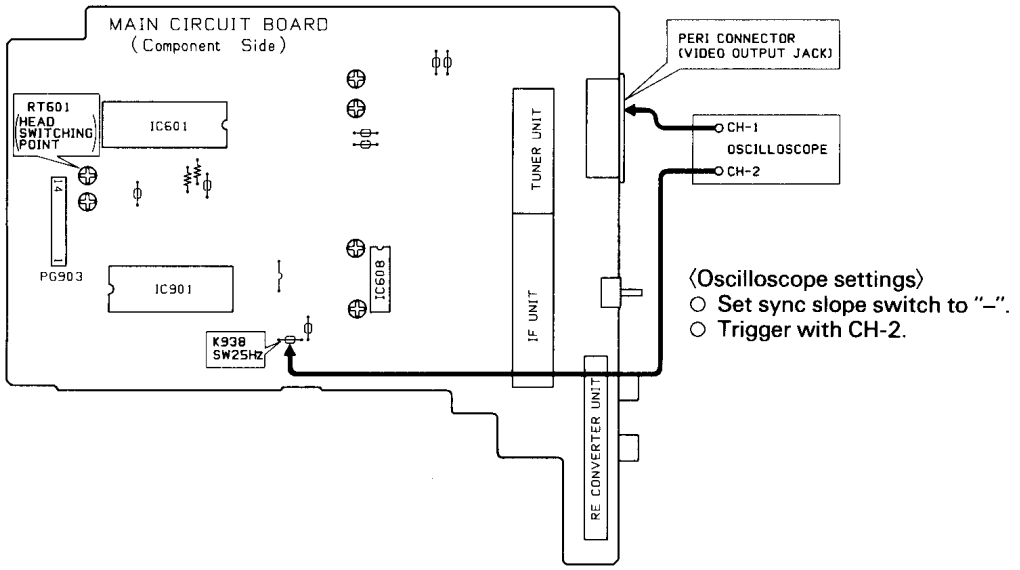
Purpose of adjustment and fault occurring if incomplete

Purpose: Set the video head switching point to almost centre where the CH-1 and CH-2 envelopes overlap each other during playback.

Fault: ○ The vertical sync signal is degraded and vertical jitter occurs.
○ Switching noise occurs in lower part of picture.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Oscilloscope ● Alignment tape	● CH-1: video output jack ● CH-2: K938 (SW25Hz)	● Play back alignment tape	● RT601 (HEAD SWITCHING POINT)

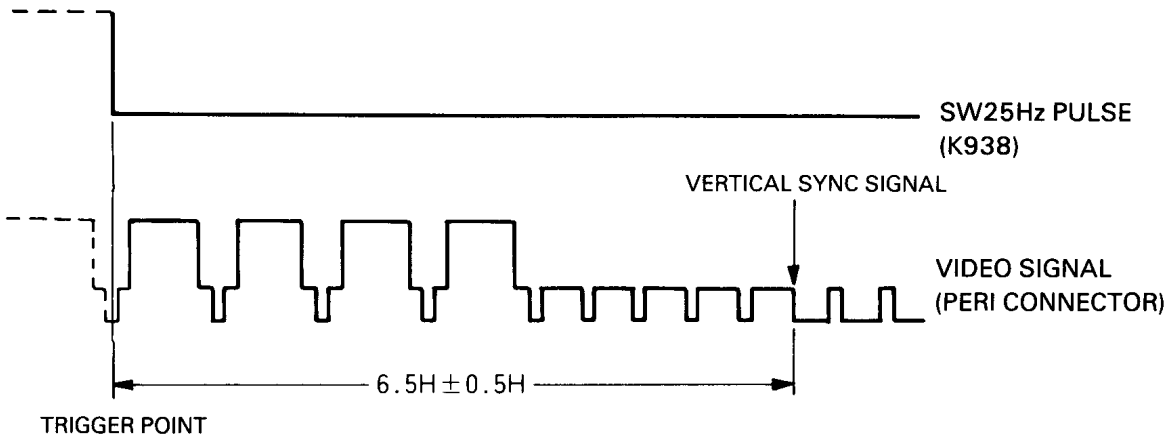
Connection Diagram



Adjustment Procedure

Vertical sync signal:
6.5H ±0.5H from trailing edge (trigger point) of SW25 Hz pulse.

Waveform



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3. Tracking Preset Adjustment

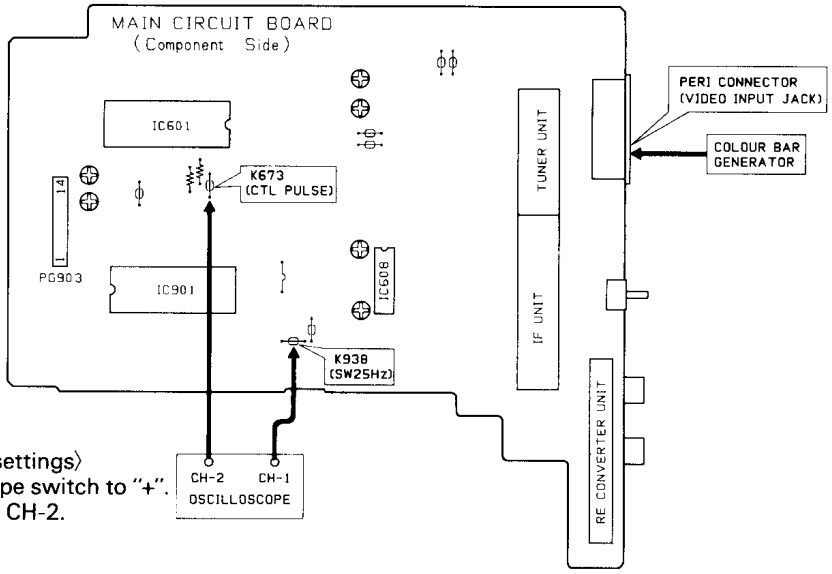
Purpose of adjustment and fault occurring if incomplete

Purpose: Optimize tracking when playing back a tape recorded by this unit.

Fault: ○ Noise occurs even with tracking control centred.
○ Noise cannot be removed by turning the tracking control.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Oscilloscope ● Colour bar generator (or receive TV programme) ● Blank tape	● CH-1: K938 (SW25Hz) ● CH-2: K673 (CTL PULSE)	● Record colour bar signal and play it back with this unit.	● RT607 [TRACKING PRESET]

Connection Diagram

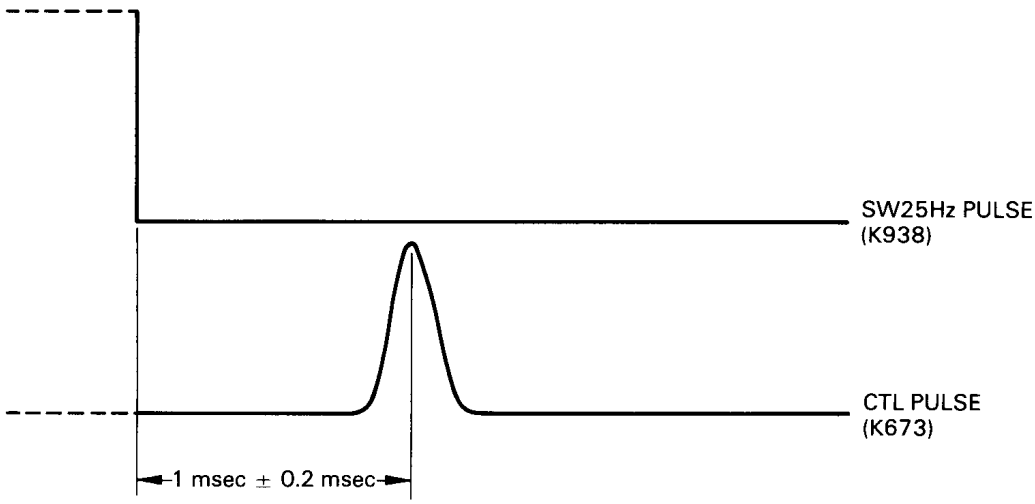


〈Oscilloscope settings〉
○ Set sync slope switch to "+".
○ Trigger with CH-2.

Adjustment Procedure

1) Tracking control: centred
2) It is 1 msec ± 0.2 msec from the fall of SW 25 Hz to the peak of CTL pulse.

Waveform



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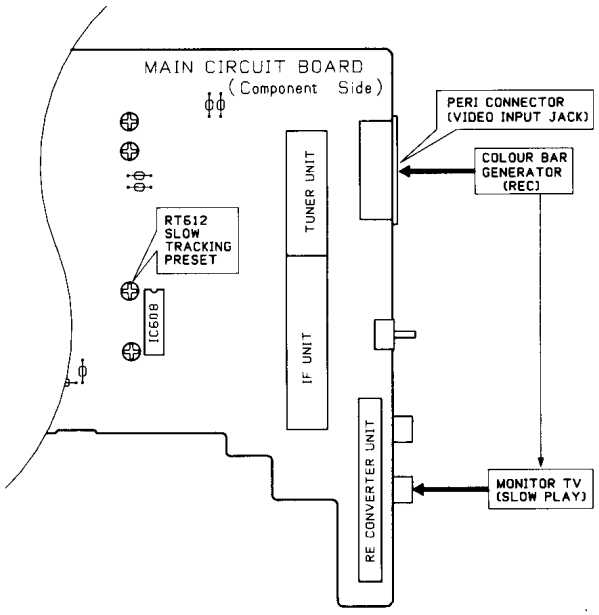
4. Slow Tracking Preset Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Optimize tracking during slow play.
Fault: A noise bar appears in the picture during slow play.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Monitor TV ● Colour bar generator (or receive TV programme) ● Blank tape	● Check with monitor TV	● Record colour bar signal, play it back with this unit in slow mode.	● RT612 (SLOW TRACKING PRESET)

Connection Diagram



Adjustment Procedure

1) Slow tracking control: centered
2) More than 12 frames are advanced intermittently until the noise bar flows from the bottom to top and disappears.

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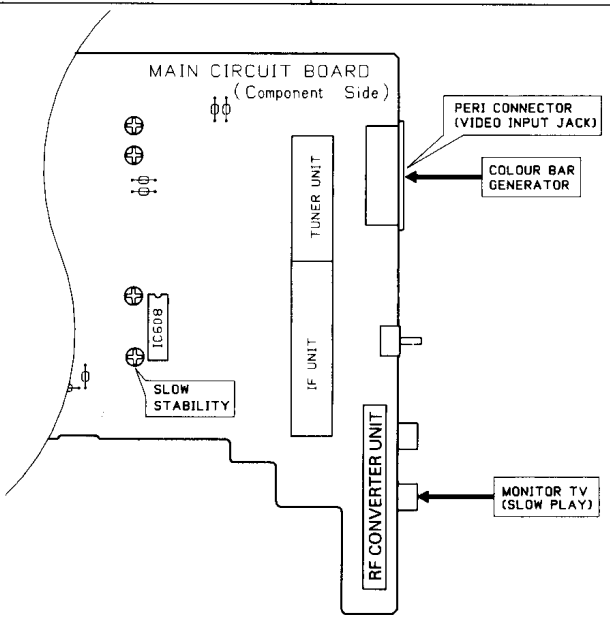
5. Slow Stability Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Suppress the horizontal jitter in the picture during slow play.
Fault: Horizontal jitter occurs in the picture during slow play.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Monitor TV ● Colour bar generator (or receive TV programme) ● Blank tape	● Check with monitor TV	● Record colour bar signal, play it back with this unit in slow mode.	● RT607 [SLOW STABILITY]

Connection Diagram



Adjustment Procedure
1) Slow tracking control: centered
2) Minimize horizontal jitter in the picture.

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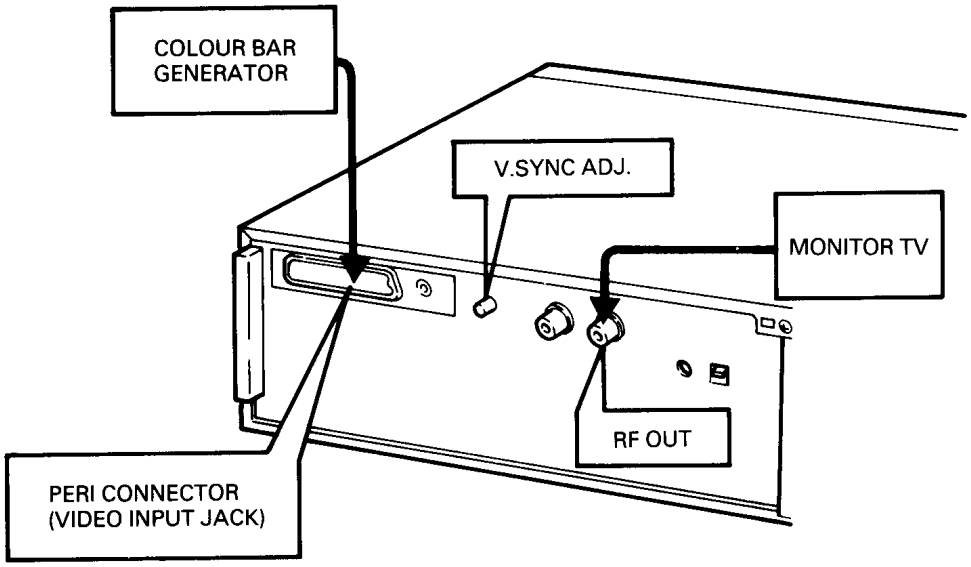
6. V Jitter Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Change timing for adding vertical drive pulse and suppress vertical jitter in picture during trick play.
Fault: Vertical jitter during trick play.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Monitor TV ● Colour bar generator (or receive TV programme) ● Blank tape	● Check with monitor TV	● Record colour bar signal, play it back with this unit in F.ADV mode.	● RT501 (V JITTER)

Connection Diagram (Can be adjusted without removing any covers)



Adjustment Procedure
Suppress vertical jitter in picture.

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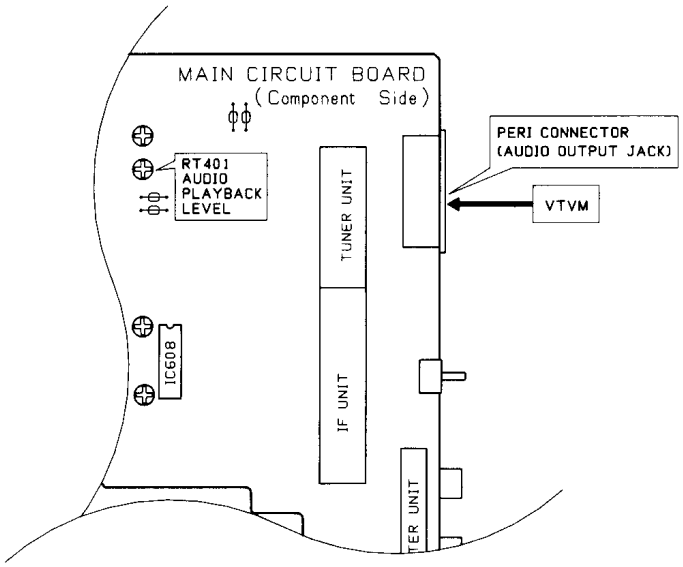
2. AUDIO CIRCUIT ADJUSTMENTS

1. Audio Playback Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Set the audio playback level to the specified value.
Fault:

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● VTVM ● Alignment tape	● Audio output jack	● Play back alignment tape	● RT401 (AUDIO PLAYBACK LEVEL)

Connection Diagram



Adjustment Procedure
The VTVM reads –8 dBm ± 1 dBm

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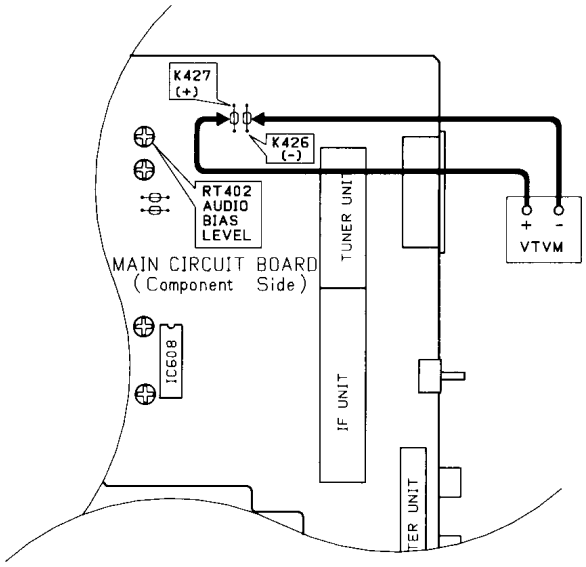
2. Audio Bias Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Set audio bias during recording to optimum level.
Fault: ○ Bias too deep: High-frequency response deteriorates.
○ Bias too shallow: Sound tends to be distorted.

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● VTVM ● Blank tape	● K426 (–) ● K427 (+)	● Non-signal recording	● RT402 (AUDIO BIAS LEVEL)

Connection Diagram



Adjustment Procedure
The VTVM reads 2.3 mV ±0.1 mVrms.

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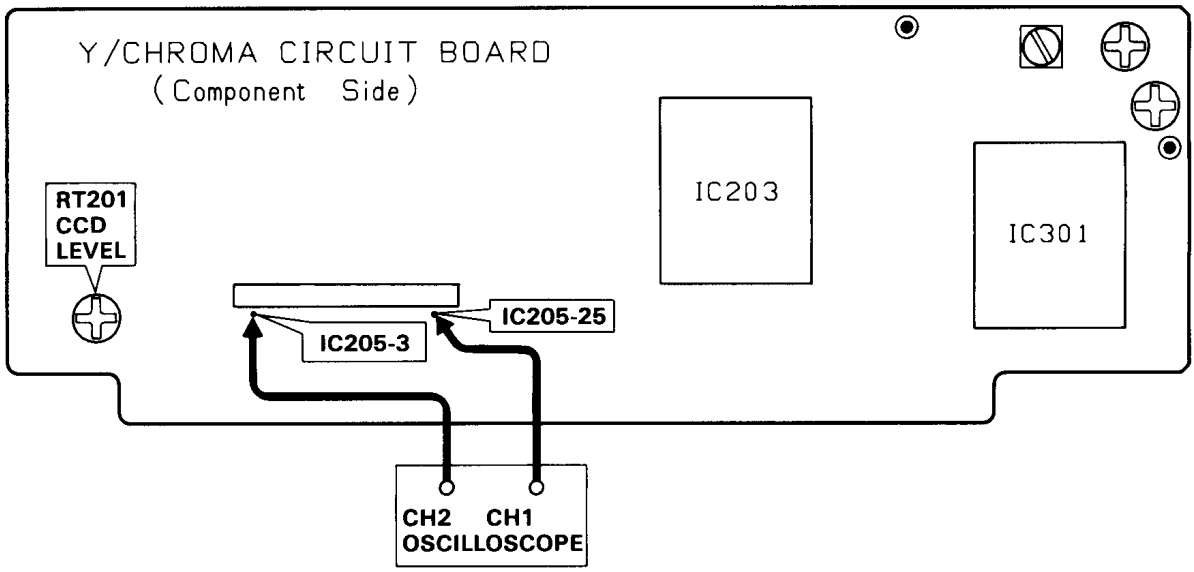
3. Y/CHROMA CIRCUIT ADJUSTMENT

1. CCD Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose:
Fault:

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Oscilloscope ● Alignment tape	● CH-1: IC205-25 ● CH-2: IC205-3	● Play back alignment tape	● RT201 (CCD LEVEL)

Connection Diagram



Adjustment Procedure
Align the CH-1 and CH-2 levels.
CH-2 = CH-1 $^{+0}_{-10}$ mVp-p.

Note: CH-2 level is less than CH-1 level.

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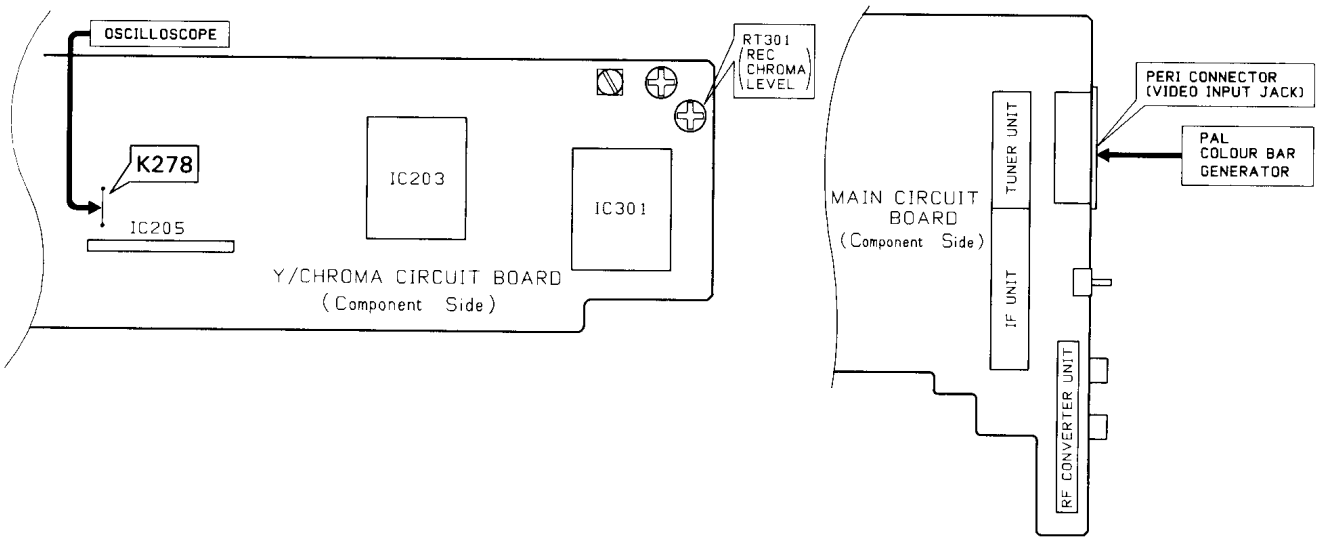
2. Rec Chroma Level Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Set the chroma record level to an optimum value.
Fault: The diamond beats occur in the played back picture or coloring becomes poor.

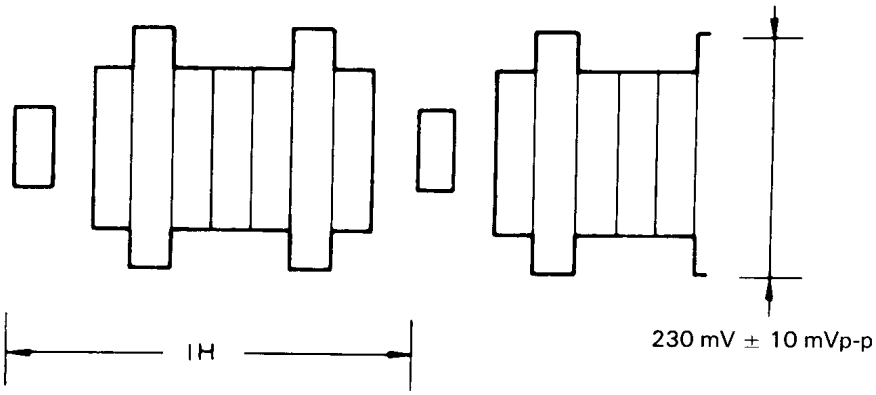
Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● Colour bar generator ● Oscilloscope	● K278	● E-E mode	● RT301 (REC CHROMA LEVEL)

Connection Diagram



Adjustment Procedure
The oscilloscope reads 230 mV ± 10 mVp-p

Waveform



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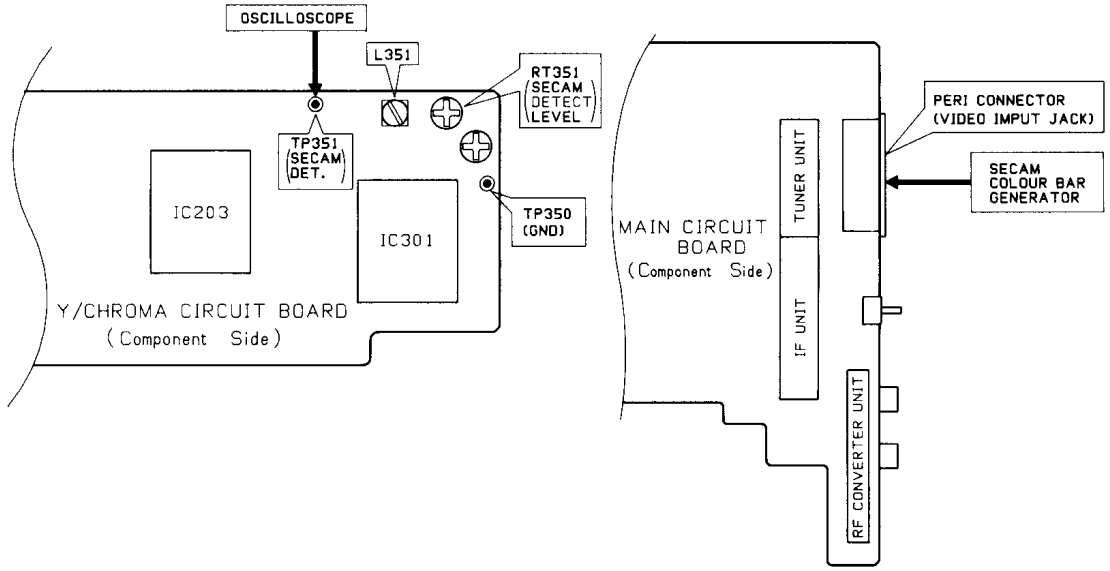
3. Secam Detect Level Adjustment

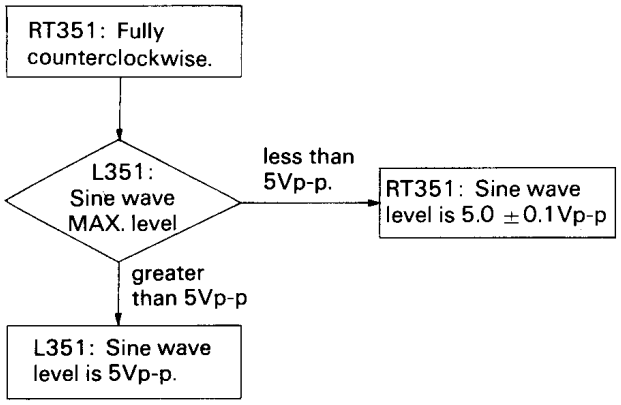
Purpose of adjustment and fault occurring if incomplete
Purpose:
Fault:

Test Equipment/Jigs	Test Equipment Connection Points	VTR State	Adjustment Point
● SECAM colour bar generator ● Oscilloscope	● TP351 ● TP350 (GND)	● REC mode	● RT351 (SECAM DETECT LEVEL)

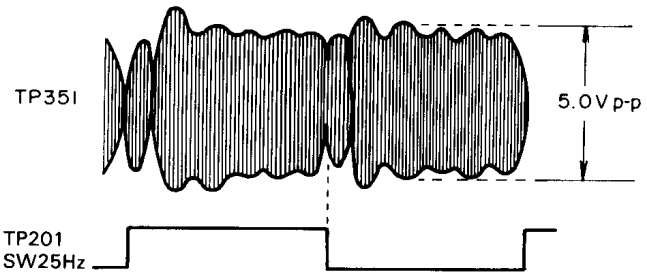
Connection Diagram



Adjustment Procedure



Wave form



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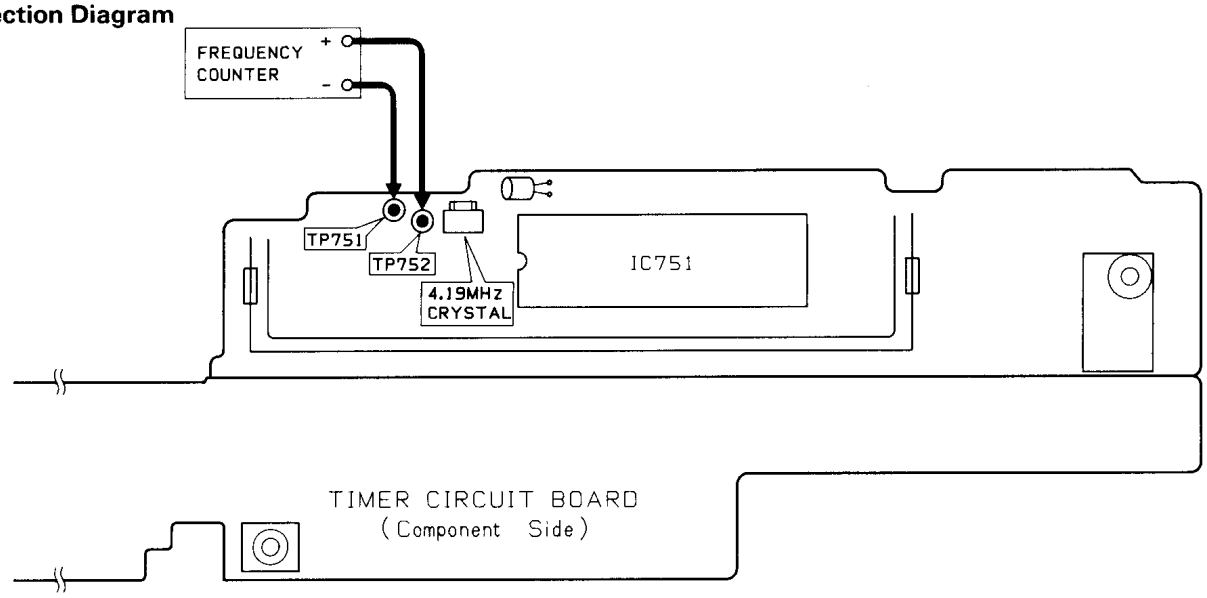
4. TIMER CIRCUIT ADJUSTMENTS

1. 4.19 MHz Crystal Adjustment

Purpose of adjustment and fault occurring if incomplete
Purpose: Suppress the time gain or lag of the timer less than 0.2 seconds per day.
Fault:

Test Equipment/Jig	Test Equipment Connection Points	VTR State	Adjustment Point
● Frequency counter	● TP751 (–) ● TP752 (+)	● Stop mode	● C770 (4.19 MHz CRYSTAL)

Connection Diagram



Adjustment Procedure
1) Set the counter gate time to 10 seconds.
2) The counter reads 4.1941902 MHz.

Note: Set the probe to 10 : 1 for use.

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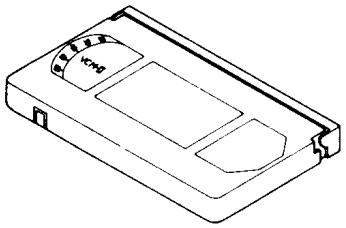
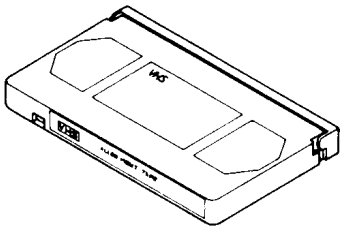
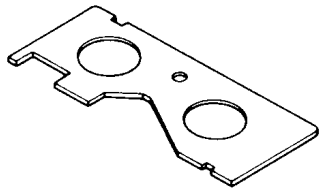
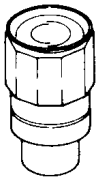
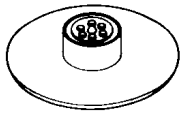
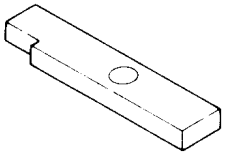
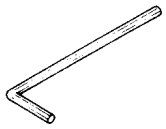
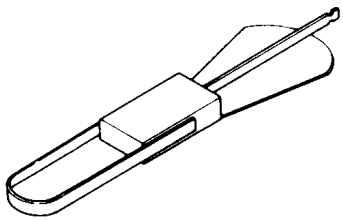
MECHANISM ADJUSTMENT

SERVICING JIGS AND TOOLS

1. Back tension meter Parts No. 7099004 	2. Alignment tape Parts No. 7099052 	3. Height reference plate (master plane) Parts No. 7099041 
4. Torque gauge Parts No. 7099039 	5. Torque gauge adaptor Parts No. 7099035 	6. Dummy reel Parts No. 7099043 
7. Reel disk height jig Parts No. 7099038 	8. 1.5 mm hexagonal wrench 	9. Fan-shaped tension gauge 

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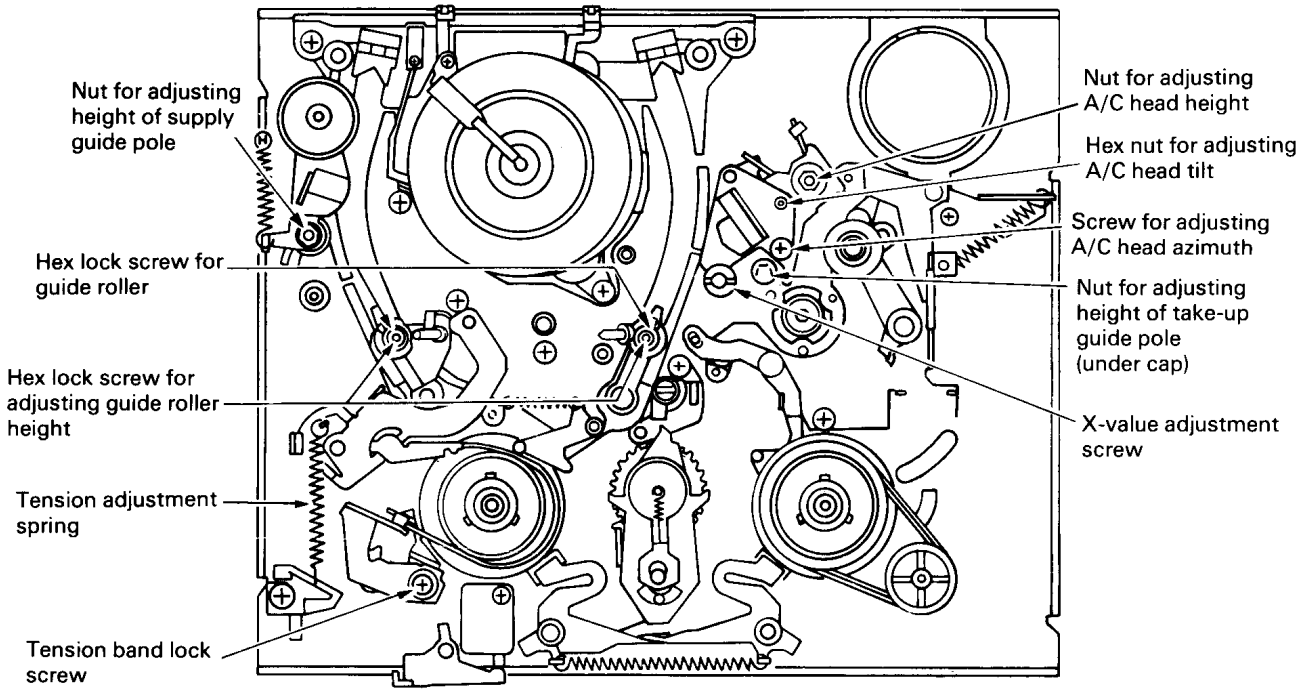
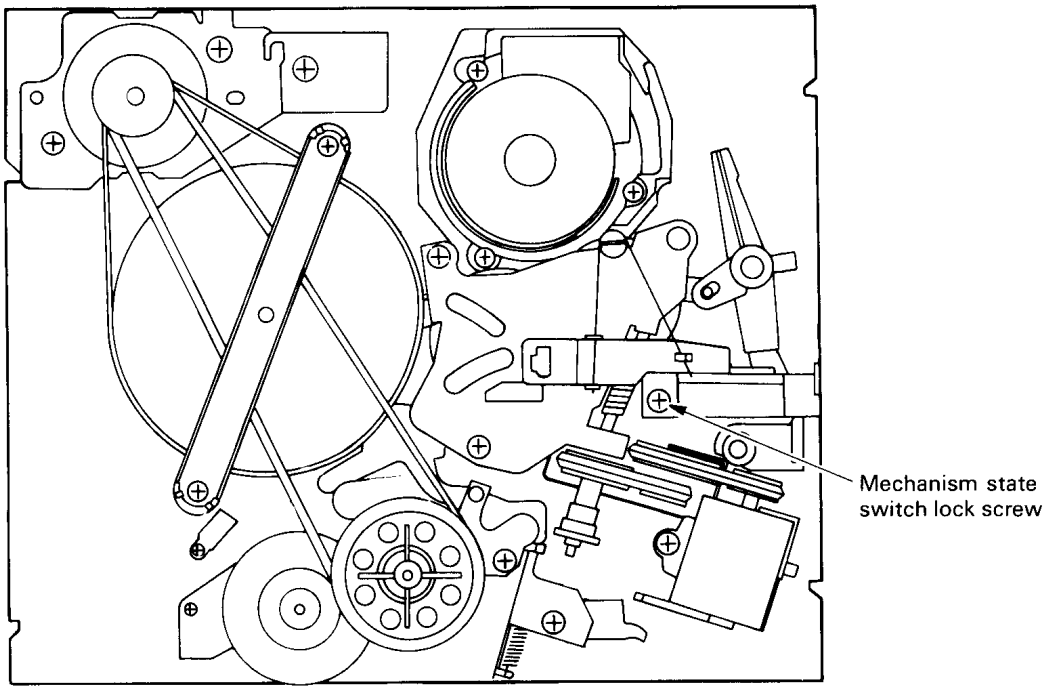
LIST OF ADJUSTMENT LOCATIONS





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MECHANICAL COMPONENT ADJUSTMENT

1. Mechanism State Switch Adjustment

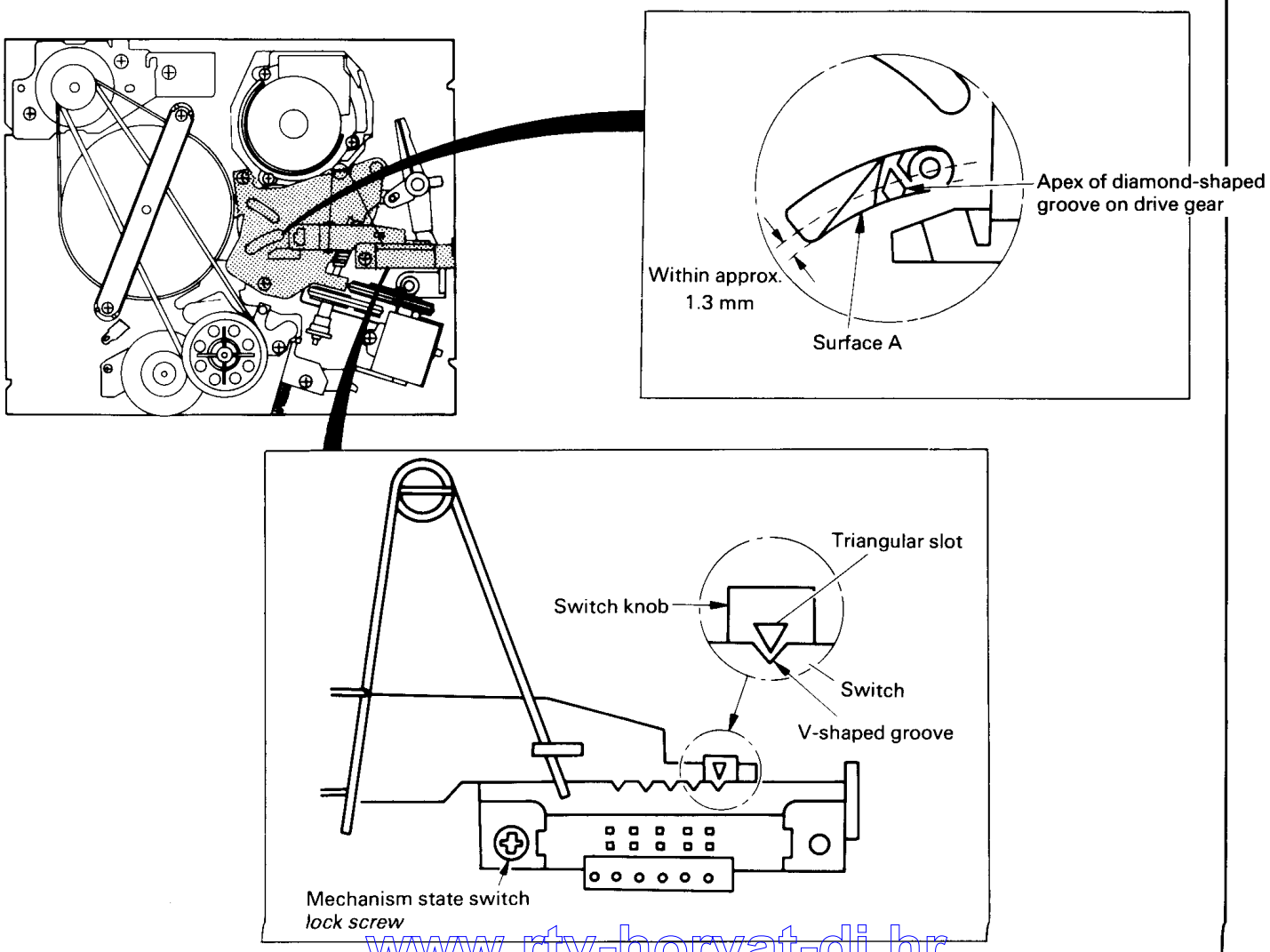
Purpose: Accurately detect mechanism states and prevent malfunction.

Test Equipment/Jigs	VTR State	Adjustment Point
● Blank tape	● Stop mode	● Mechanism state switch lock screw

Adjustment Procedure

1) Turn the worm pulley by hand. Position the apex of the diamond-shaped groove on the drive gear so that it is within 1.3 mm from the A surface of the gear plate.
2) Loosen the lock screw on the mechanism state switch. Slide the switch so that the apex of the triangular slot on the switch knob is aligned with the V-shaped groove on the extreme outside of the switch.
3) Loosen the lock screw. Insert the blank tape in the cassette holder. Check to make sure that all unloading and loading operations are correct.

Adjustment Diagram



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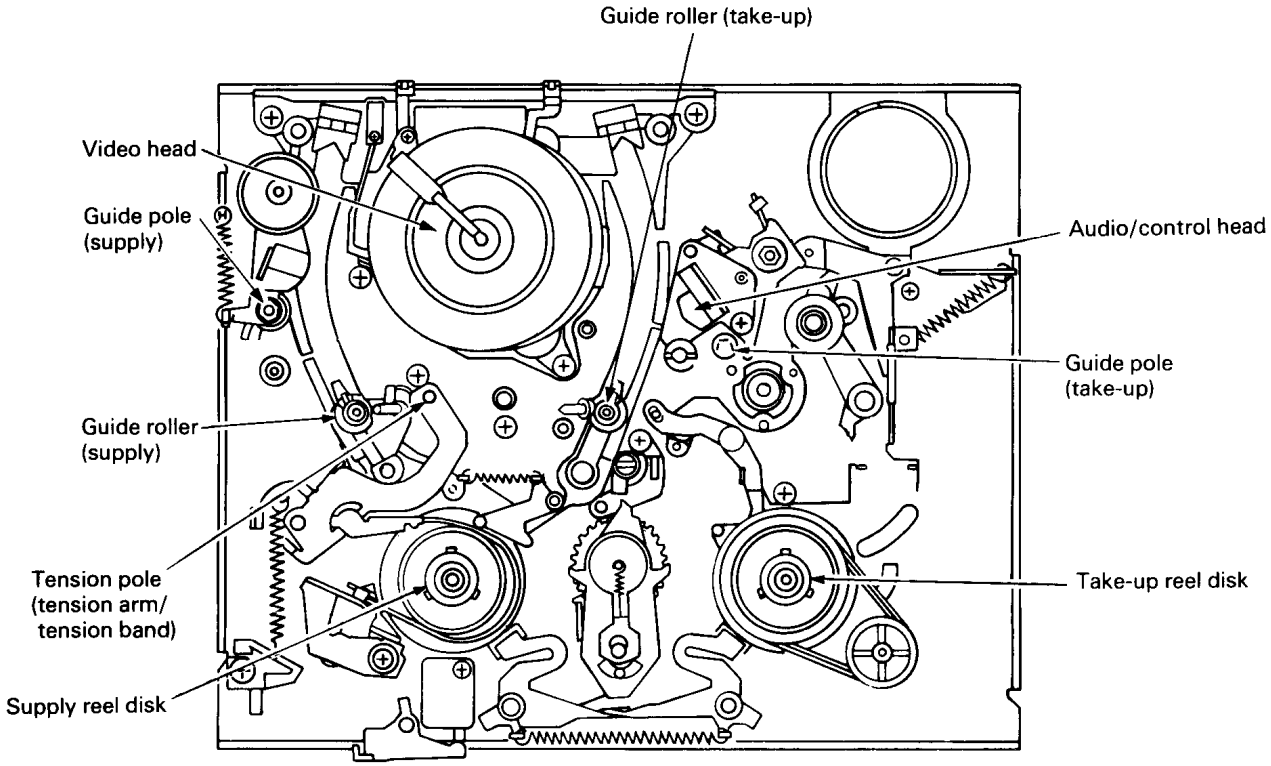
TAPE TRANSPORT SYSTEM ADJUSTMENT

The transport system is the system in which tape moves from the supply reel disk, over the video head and then to the take-up reel disk. The components in the tape transport system must be perfectly clean, particularly those that come in contact with the tape.
These components must have no scratches, no dust, no oil on them. The tape transport system is adjusted at the factory prior to shipping. When components need to be replaced, accurately adjusting the new components ensures that the tape transport system will operate stably.



Components Adjusted in Tape Transport System

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1. Reel Disk Height Adjustment

Purpose: Determine correct tape height by setting cassette tape reel to the specified height.

Test Equipment/Jigs	VTR State	Adjustment Point
● Master plane ● Reel disk height jig	1) Remove chassis holder 2) Mount master plane and place reel disk height jig on it.	● Spacers in supply and take-up reel disks.

Adjustment Procedure

1) Make sure the reel disk is correctly positioned between points A and B on the reel disk height jig.
2) If the reel disk will not fit between points A and B, replace the spacer in the reel disk or adjust the number of spacers (0.25 mm and 0.5 mm thicknesses).

Caution:
If the tension arm/tension band have been removed, adjust the tension pole's position and tension after reassembling.

Adjustment Diagram

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Kešinci, 31402 Semeljci
031-856-139
031-856-637
098-788-319
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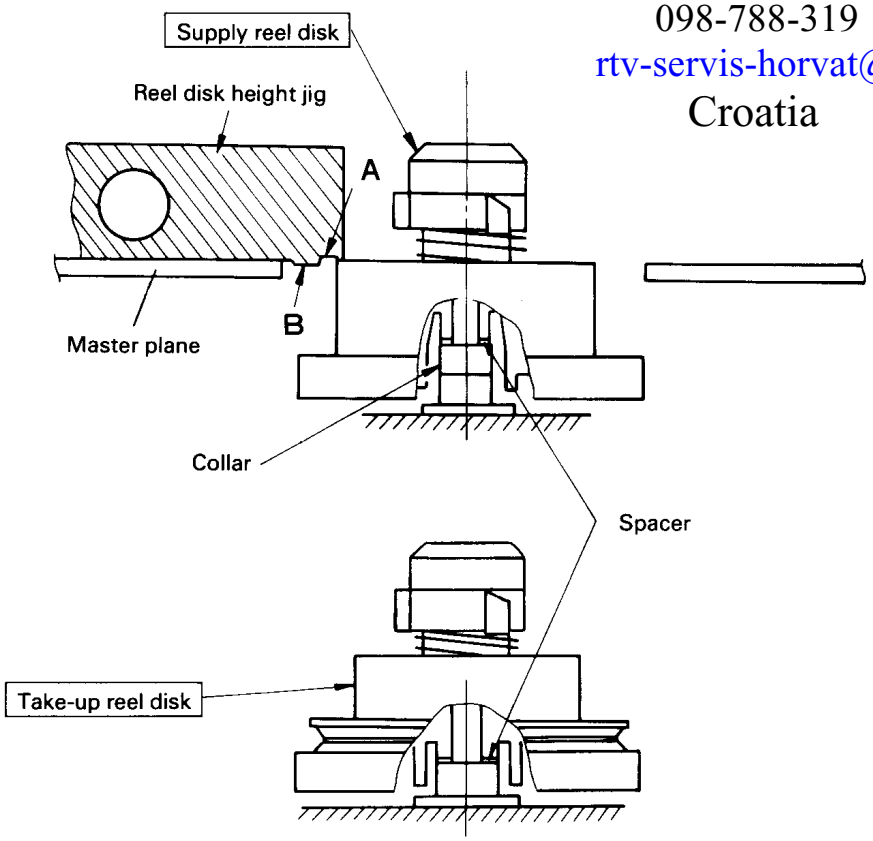
Croatia



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2. Tension/Tension Pole Position Adjustments

Purpose: Stabilize contact between video head and tape being supplied so that the tape tension is uniform throughout.

Test Equipment/Jigs	VTR State	Adjustment Point
● Flat-bladed screwdriver ● Tension cassette	1) Remove top cover 2) Place VTR in loading state without cassette insertion (see 4-17). **Tension adjustment** 3) Play tension cassette	**Position adjustment:** Tension band lock screw **Tension:** Tension spring hook position

Adjustment Procedure

Position Adjustment

1) Loosen lock screw on tension band. Insert flat bladed screwdriver in slot in bracket and chassis.
2) Use the screwdriver to slide the bracket for a 1 ~ 2 mm interval between the tension pole and chassis.
3) Tighten the lock screw on the tension band.
4) After adjusting, reload without inserting the tape and recheck the position of the tension pole.

Tension Adjustment

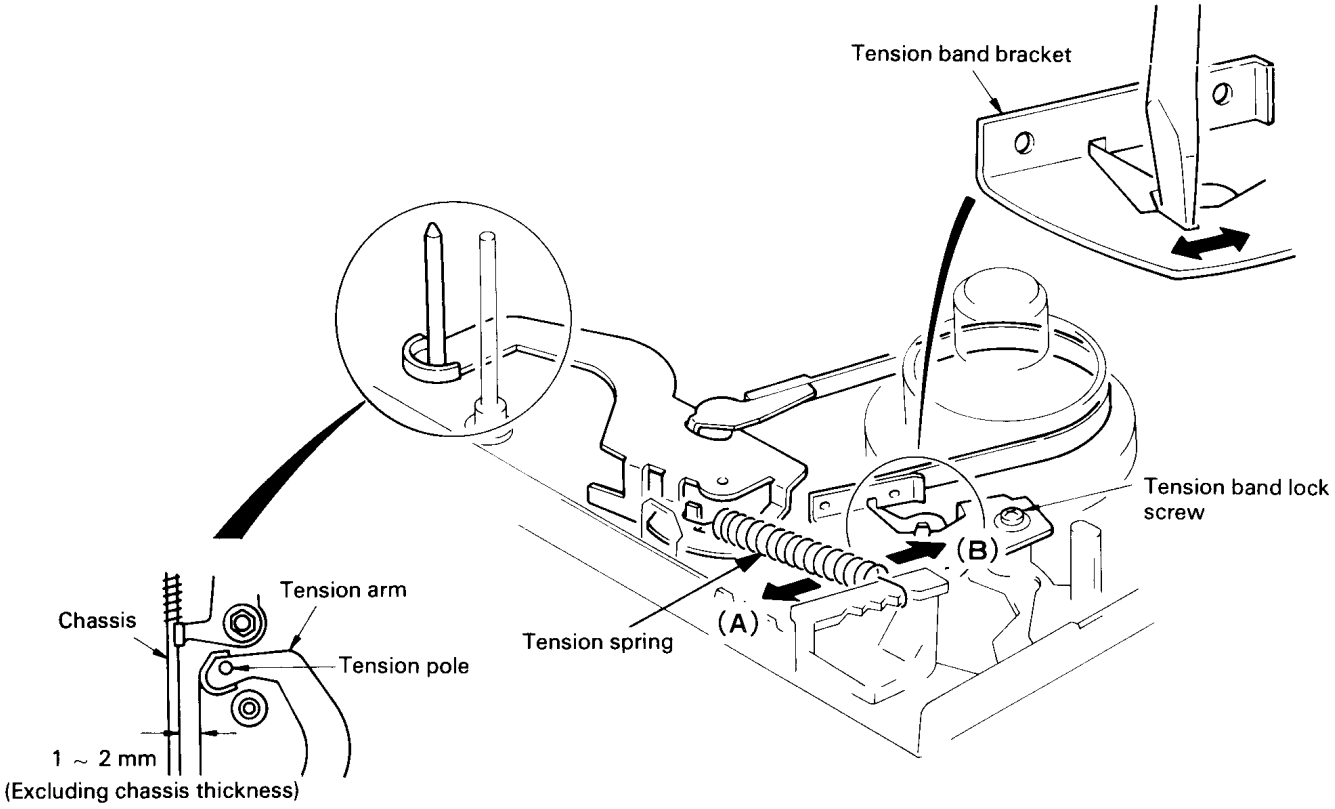
Reading of tension cassette:
30 ~ 40 g-cm. (reference value)

If tension is higher than the reference value, move the spring in direction A.

If tension is lower than the reference value, move the spring in direction B.

Caution: If a 6 g-cm or larger change is made in tension position, recheck tension pole position. If the position is off, readjust the tension pole's position and tension.

Adjustment Diagram



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3. Guide Pole Height Adjustment

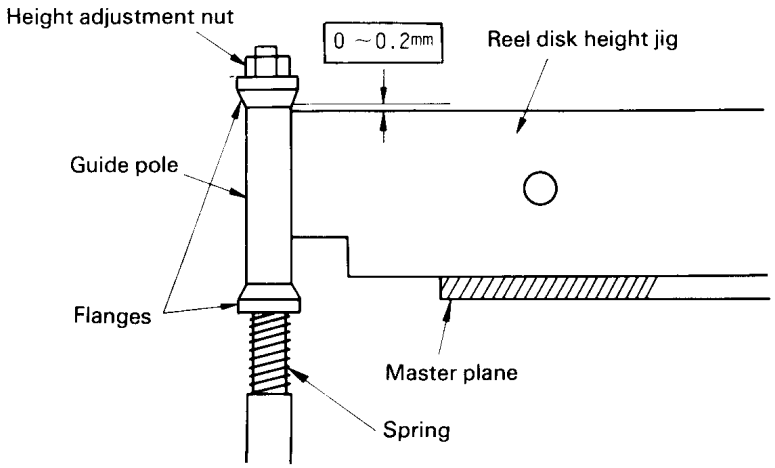
Purpose: Control tape height.

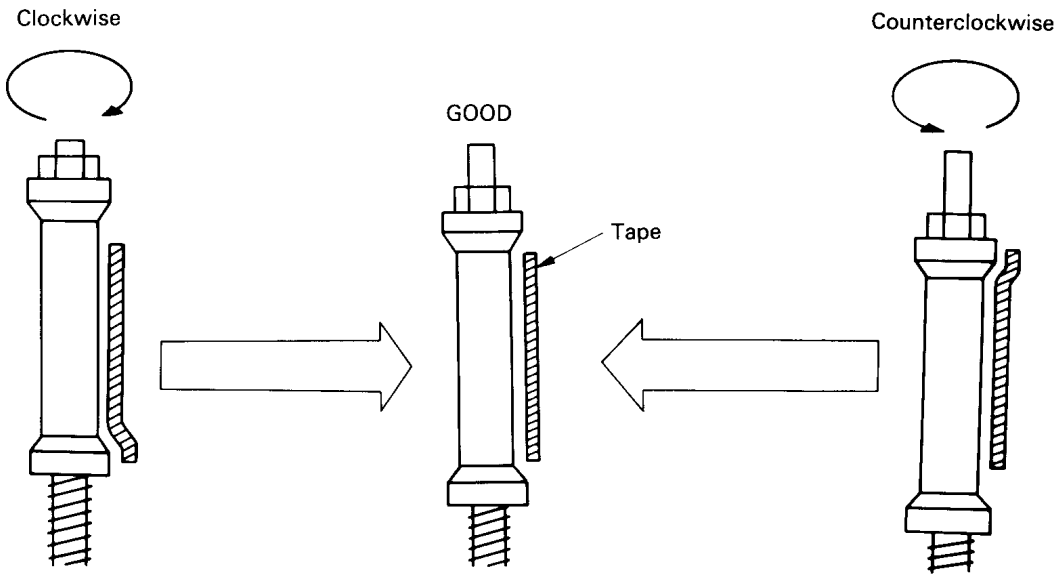
Test Equipment/Jigs	VTR State	Adjustment Point
● Master plane ● Reel disk height jig ● Blank tape	1) Remove chassis holder 2) Mount master plane and place the reel disk height jig on it.	● Nut for adjusting height of supply and take-up guide poles (take-up pole is under cap).

Adjustment Procedure

1) Adjust gap between guide pole's upper flange and reel disk height jig to 0 ~ 0.2 mm.
2) Load and run the blank tape. Check to make sure the tape does not ride over the pole's upper or lower flange.
3) If the tape does ride over, adjust guide pole height.
   If tape rides over upper flange, turn adjustment nut counterclockwise.
   If tape rides over lower flange, turn adjustment nut clockwise.

Adjustment Diagram





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4. Guide Roller Height Adjustments

Purpose: Control tape height so the tape's bottom edge runs along the cylinder's tape guideline.

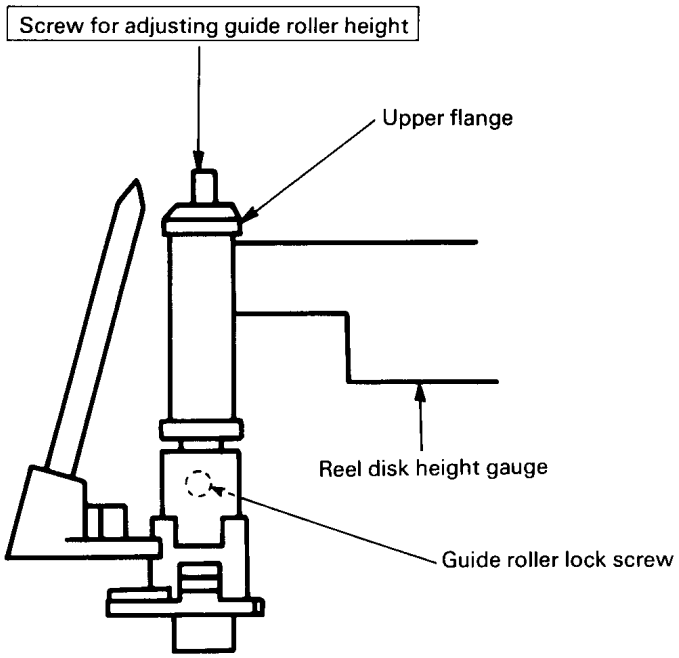
Coarse Adjustment

Test Equipment/Jigs	VTR State	Adjustment Point
● Master plane ● Reel disk height jig ● 1.5 mm hexagonal wrench	1) Remove chassis holder 2) Mount master plane and place reel disk height jig on it.	● Screws for adjusting height of supply and take-up guide roller

Adjustment Procedure

1) Loosen guide roller lock screw so that the guide roller does not turn during loading, unloading and playback.
2) Set the upper edge of the reel disk height jig to the same level as the guide roller's upper flange.
3) Now make precision adjustments.

Adjustment Diagram



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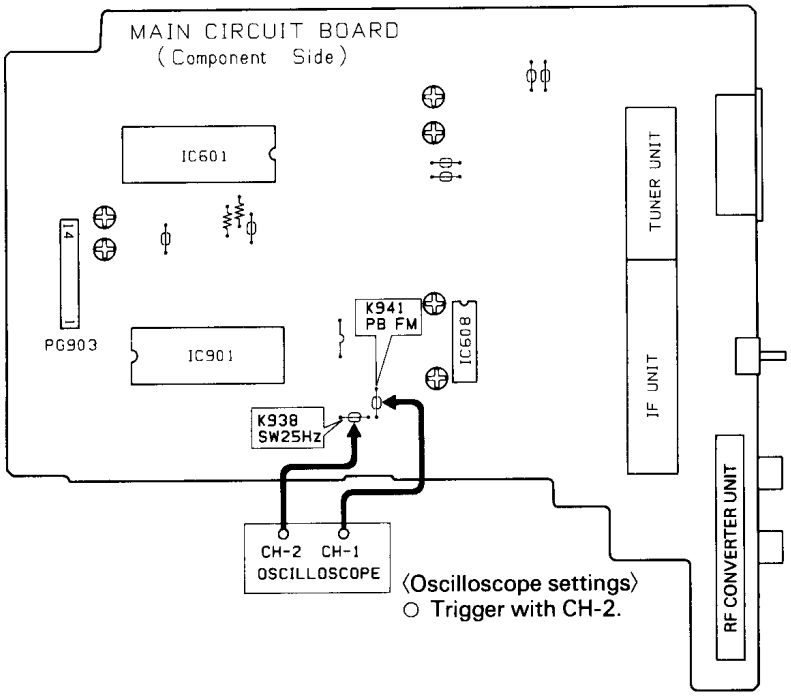
Precision Adjustment

Test Equipment/Jigs	Test Equipment Connection Point	VTR State	Adjustment Point
● Oscilloscope ● Alignment tape ● Hexagonal wrench	● CH-1: K941 ● CH-2: K938	● Playback alignment tape	● Screw for adjusting guide roller height

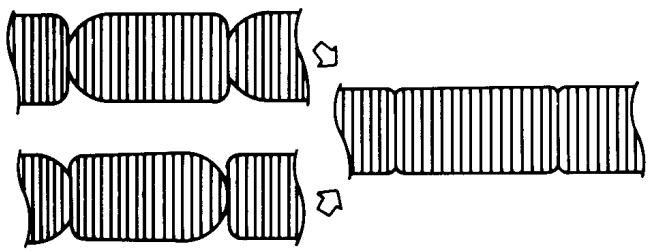
Connection Diagram



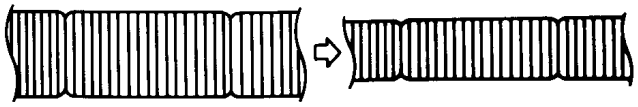
Adjustment Procedure

1) Tracking control: centered (when making this adjustment after replacing the cylinder, set the tracking control so the FM output is maximum.
2) Turn height adjustment screw to flatten the FM waveform.
3) Turn the tracking control clockwise.
4) Make sure that FM drops at the head and tail.
5) Tighten lock screw.

Waveform



Turn guide roller height adjustment screw a little at a time to flatten waveform.



Tracking control centred

Turn tracking control clockwise

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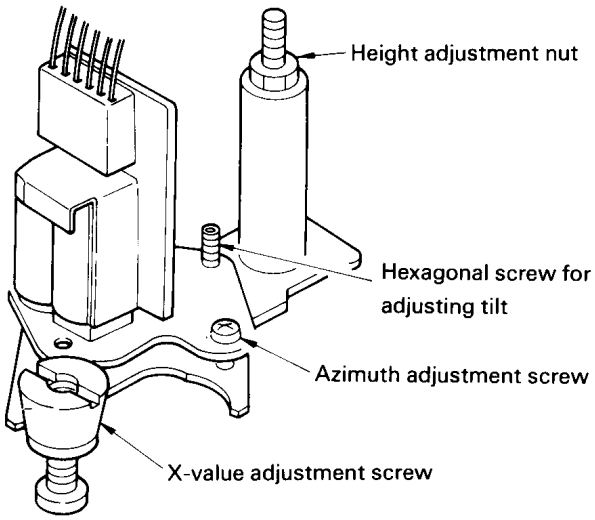
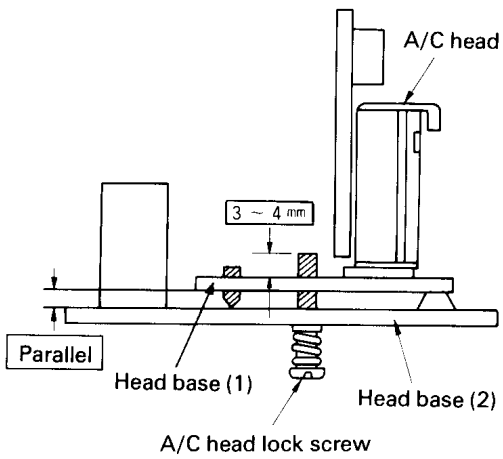
5. Audio and Control Head

Purpose: Ensure uniform contact between tape and head to record and play a prescribed track.



Coarse Adjustment

Test Equipment/Jigs	VTR State	Adjustment Point
● Master plane ● Reel disk height jig ● Blank tape ● Hexagonal wrench	1) Remove chassis holder 2) Mount master plane and place reel disk height jig on it.	● Azimuith adjustment screw ● Height adjustment nut ● Tilt adjustment screw

Adjustment Procedure	Adjustment Diagram
1) Tighten the A/C head lock screw through the spring from the bottom of head base (2) until the screw tip protrudes 3 ~ 4 mm from the top surface of head base (1). 2) Turn the tilt adjustment hexagonal screw and the azimuth adjustment screw so that head base (1) and head base (2) are parallel.	

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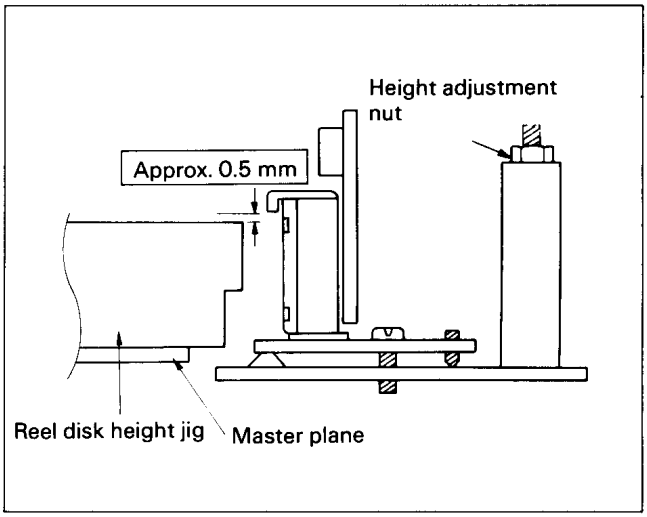
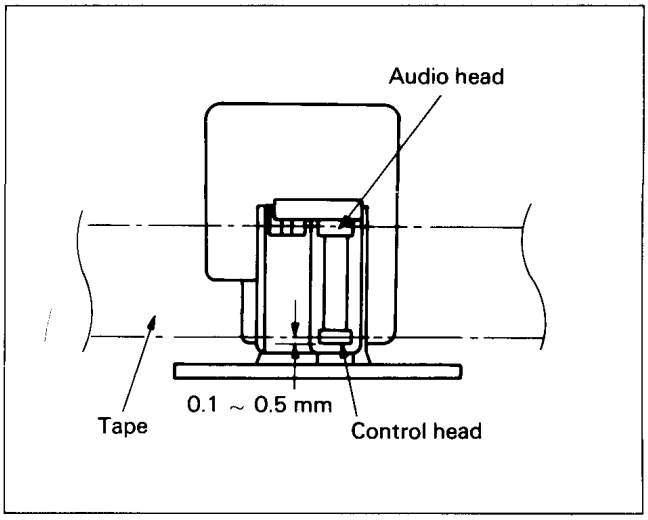
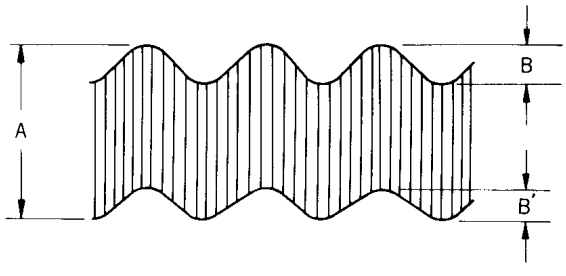
Adjustment Procedure	Adjustment Diagram
3) Turn the height adjustment nut until the gap between reel disk height jig and A/C head is approx. 0.5 mm.	
4) Remove the adjustment jigs and insert a blank tape. Place in playback mode. Make sure the tape does not curl or ride over around the A/C head. If the tape curls or rides over, readjust the tilt adjustment hex screw, the azimuth adjustment screw and the height adjustment nut. The ideal A/C head height is with the tap's bottom edge 0.1 ~ 0.15 mm from the bottom edge of the control head's core. 5) Now move on to precision adjustments.	

Precision Adjustment

Test Equipment/Jigs	Test Equipment Connection Point	VTR State	Adjustment Point
● Hexagonal wrench ● Oscilloscope ● Alignment tape	● Audio output jack	● Playback alignment tape (7 kHz portion)	● Azimuth adjustment screw ● Height adjustment nut ● Tilt adjustment screw

Adjustment Procedure	Waveform Diagram
1) Alternate turning, a little at a time, of the azimuth adjustment screw, the height adjustment nut and the tilt adjustment hex screw to both maximize and flatten audio output (minimize fluctuation).	 A: maximum BB': minimum

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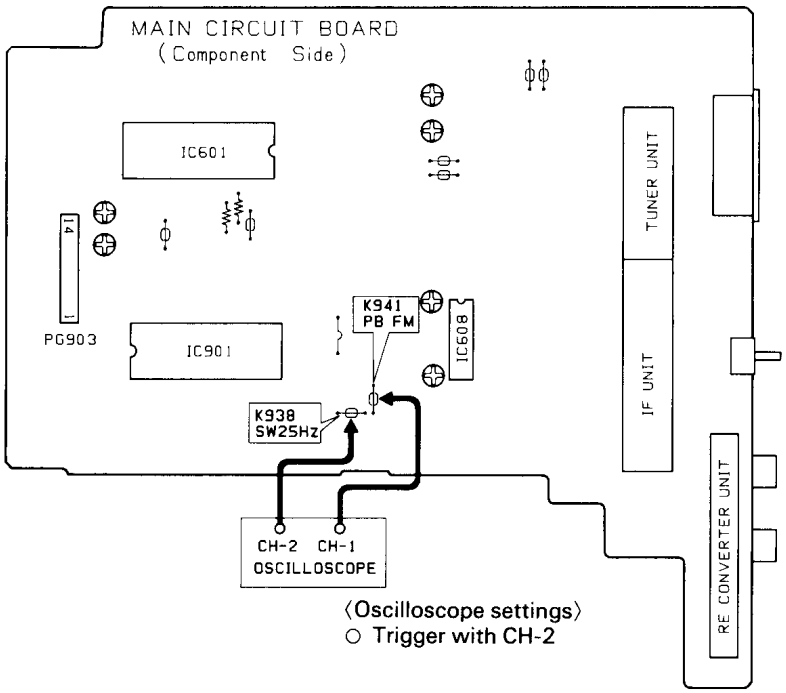
6. X Value Adjustment

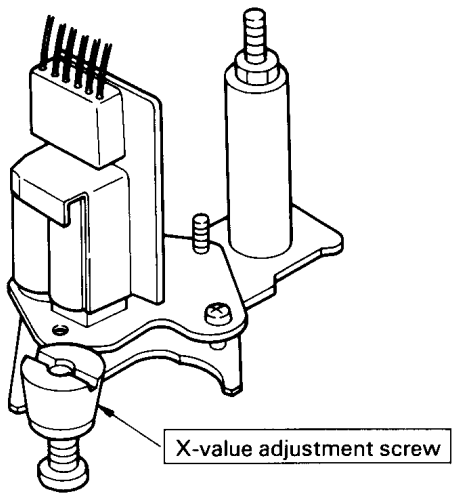
Purpose: Ensure compatibility with other VTRs.

Caution: Be sure to adjust the tracking preset before making this adjustment.

Test Equipment/Jigs	Test Equipment Connection Point	VTR State	Adjustment Point
● Oscilloscope ● Alignment tape ● X-value adjustment screwdriver	● CH-1 : K938 ● CH-2 : K941	● Play back alignment tape	● X-value adjustment screw

Connections Diagram





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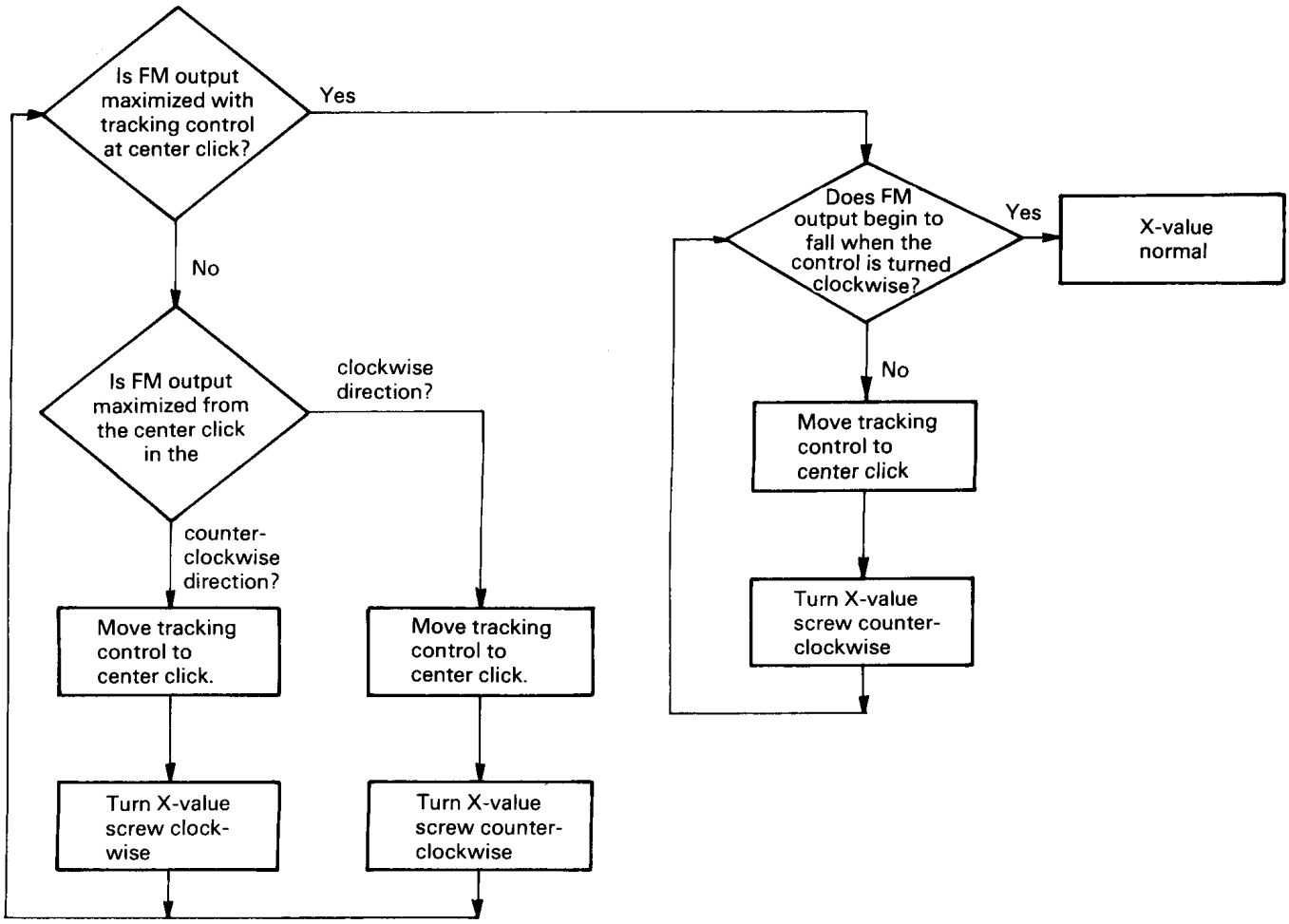
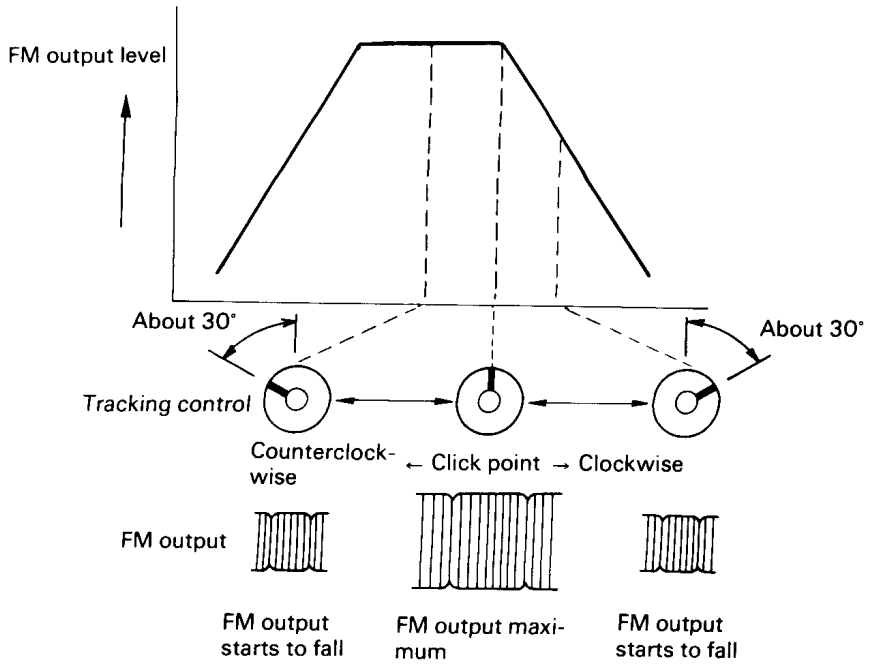
Adjustment Procedure

Since the 65 μm head will trace over 49 μm width track, center tracking control and make adjustments to maximize FM output, or turn the control clockwise about 30° and adjust so that FM output begins to fall. (Is FM output maximized with tracking control at center click?)





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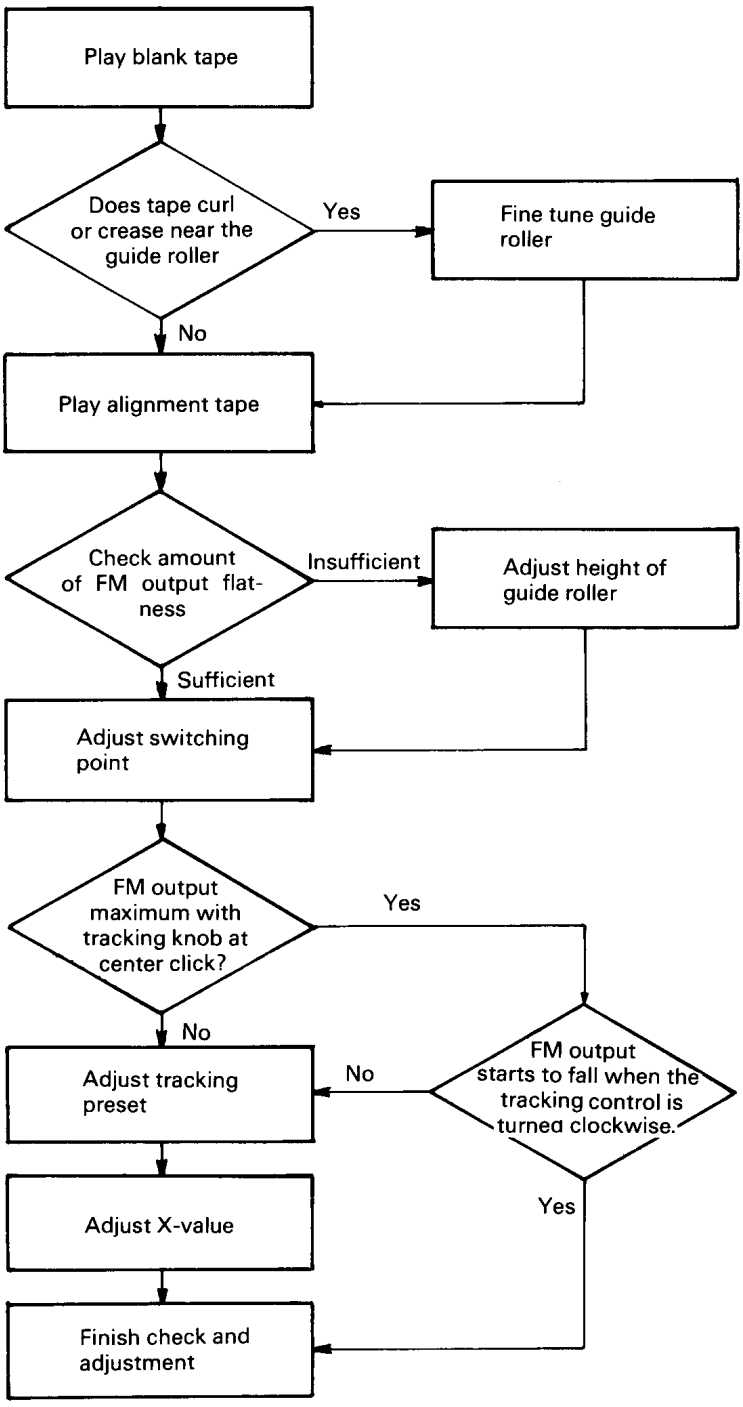
7. Adjustments after replacing Cylinder (Video Head)

Purpose: A new replacement cylinder will differ with the guide roller in X-value and relative height. But, correct replacement procedures will reduce this disparity to a minimum.

Test Equipment/Jigs	Test Equipment Connection Points	Adjustment Points
● Oscilloscope ● Alignment tape ● Blank tape ● Hexagonal wrench ● X-value adjustment screwdriver	● Check amount of flattening ● CH-1 : K938 ● CH-2 : K941	● Guide roller (see precision adjustment on page 4-9) ● Switching point (see section 3) ● Tracking preset (see section 3) ● X-value (see page 4-12)

Check and Adjustment Procedures



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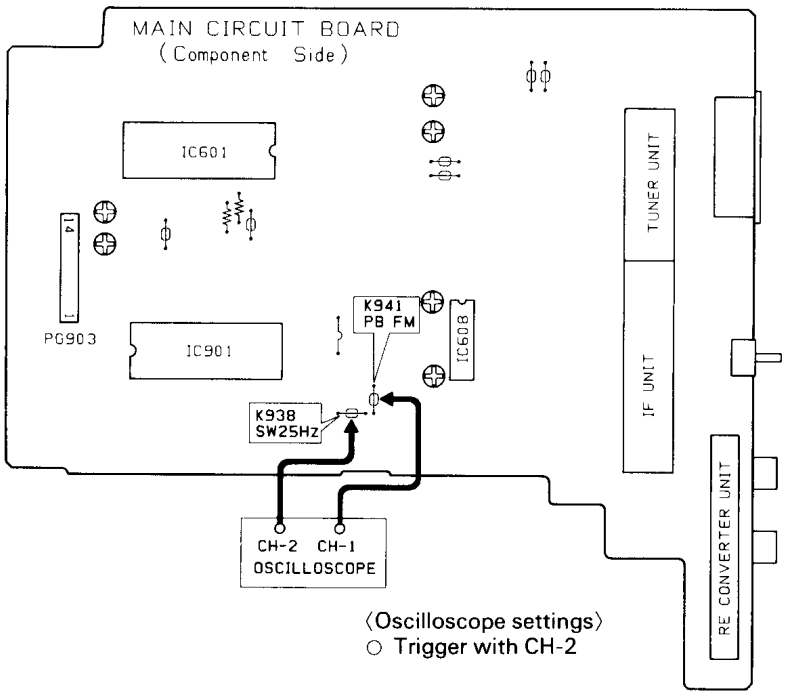
Connection Diagram

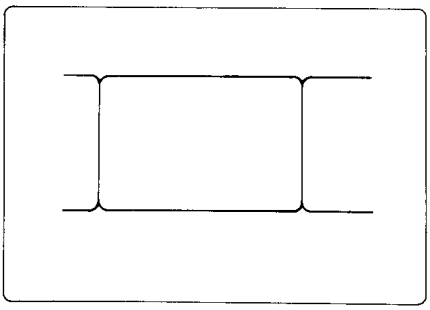


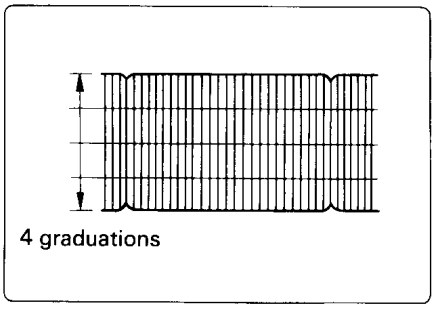
〈Oscilloscope settings〉
○ Trigger with CH-2

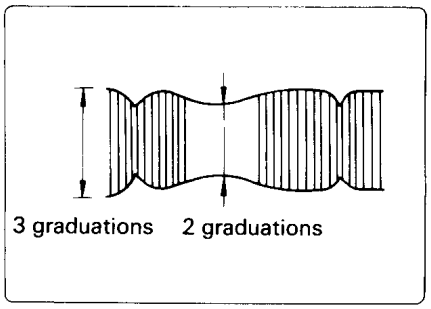
Procedures for checking amount of fluctuations and flatness in FM output

1) Use tracking control to maximize FM output.
2) Fine tune the oscilloscope's voltage level range to adjust FM output to 4 graduations.
3) Turn the tracking control to set the FM output's maximum amplitude at 3 graduations.
4) Make sure the minimum amplitude at this time is at 2 graduations or higher.
5) Make sure the difference between maximum and minimum level fluctuation is 13% or less.

Waveform Diagram







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8. Checking Tension and Torque

Purpose: Checking tension torque and pressure on the components that wind and move the tape is necessary to ensure smooth tape run and fulfill the VTR's basic functions. Make this check when tape run is rough or tape speed is incorrect.

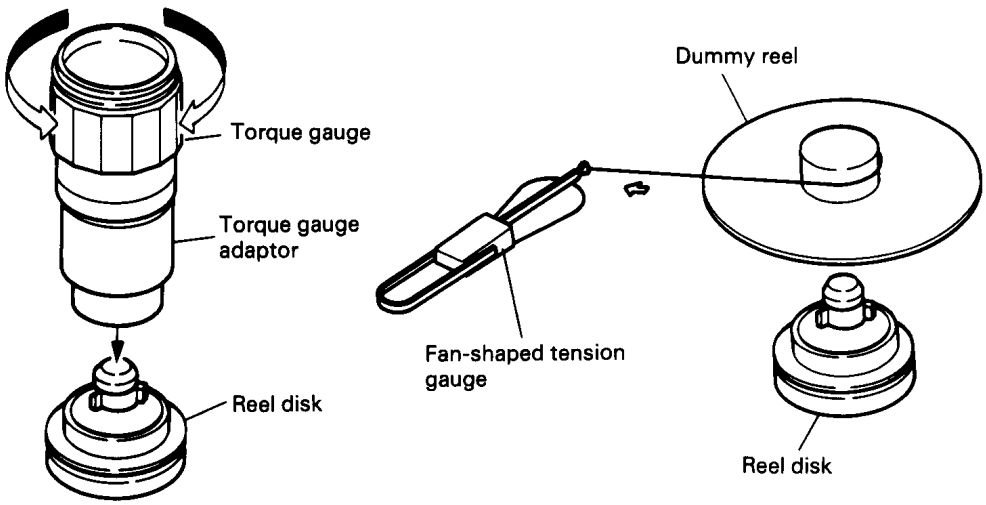
Test equipment/jigs	VTR state
● Torque gauge ● Torque gauge adaptor ● Fan-shaped tension gauge ● Dummy reel	● Operate VTR without loading tape cassette (see page 4-17)

Item	VTR Operation mode	Measurement reel	Measurement values	Remarks
Main brake torque	Stop	Supply and take-up reels	170 g·cm or more	Note 1
Slack removal torque	Unloading	Supply reel	90 ~ 190 g·cm	Note 1
Fast forward torque	Fast forward	Take-up reel	400 g·cm or more	Note 1
Rewind torque	Rewind	Supply reel	400 g·cm or more	Note 1
Reel winding torque	Play	Take-up reel	90 ~ 180 g·cm	Note 1
Back-tension torque	Fast forward	Supply reel	4 ~ 15 g·cm	Note 2
	Rewind	Take-up reel		

Note: 1. Value when using torque gauge and torque gauge adaptor for measurement with torque gauge sliding at 0.8 rps. However, main brake torque indicates measurement values during manual rotation of take-up reel, counterclockwise, and supply reel, clockwise, at 0.8 rps.

Note: 2. Indicates the value when the dummy reel and fan-shaped tension gauge are used to measure the take-up reel disk pulling counterclockwise and the supply reel disk pulling clockwise at 50 mm/s.

Adjustment Diagram



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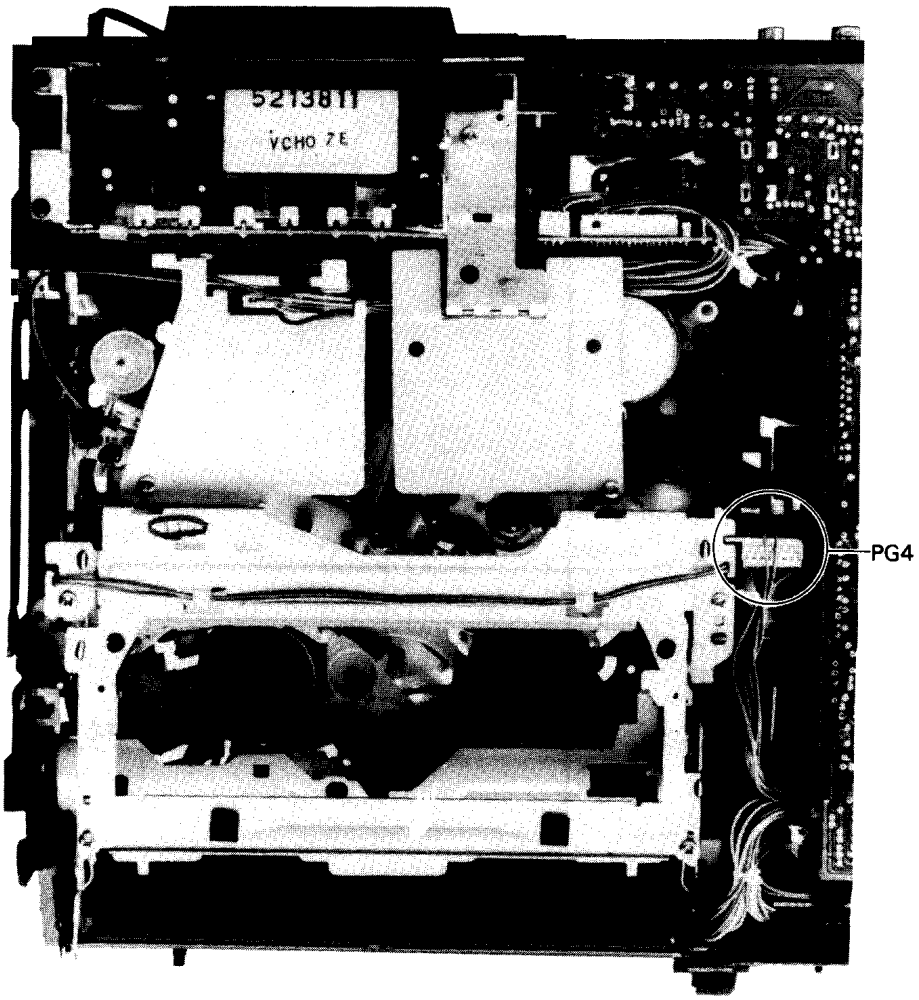
Note: Method with VTR in loading state and no tape cassette inserted.

1) Remove top cover.
2) Remove AC plug from wall socket.
3) Disconnect the connector from the plug (PG-4) on the cassette loading motor circuit board.
4) Short-circuit pins 2 and 5 of the connector.
5) Insert AC plug into wall socket.
6) Turn VTR power on.
   In this state, the VTR will accept all modes. However, rewind can be performed for only a few seconds because the take-up disk is in stop state and reel pulses cannot be detected.

[Caution]
After the above operations, always use the following steps to return to the original modes.

1) Remove short-circuit from connector and insert in plug.
2) Remove the AC plug from the wall socket once to reset the system control microprocessor.



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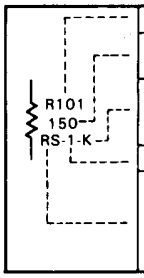
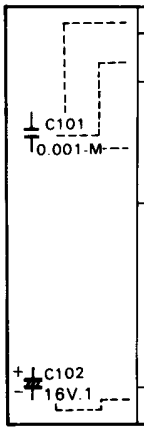
SCHEMATIC/CIRCUIT BOARD DIAGRAMS

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 : 1000kΩ
Tolerance	No indicated ± 5% K : ± 10% M : ± 20%
Wattage	No indicated ¼ W
Sort	No indicated Carbon film RC : Composition RW : Wire wound RS : Oxide metal film RN : Fixed metal film

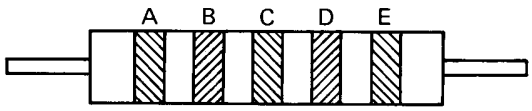


Circuit No.		
Value	No indicated μF P : PF	
Tolerance	No indicated ± 10% J : ± 5% M : ± 20% Z : +80%, −20% D : ± 0.5pF C : ± 0.25pF	
Sort		Ceramic
		Electrolitic
		Mylar
		Polyester
		Styrol
Voltage	No indicated 50WV	

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

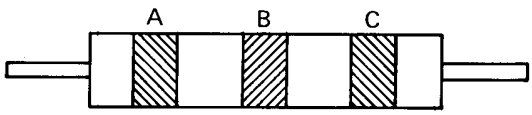
HOW TO READ CAPACITY AND INDUCTANCE OF RESISTOR SHAPE CAPACITORS AND COILS

CAPACITOR



CAPACITY: (10A+B)xC [PF]
TOLERANCE: D
RATED VOLTAGE: BODY COLOR
Pink: 25V
Green: 50V
CHARACTERISTICS: E

COIL



INDUCTANCE: (10A+B)xC [μH]

COLOR	A, B	C	D	E
Black	0	10^0	±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		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	± 5%	
Silver		10^{-2}	±10%	High dielectric constant type

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 worker should be grounded.
4. Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

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Hinweis
1. Die a
Minim
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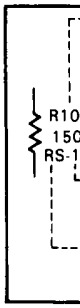
2. Bezeic



3. Bei de
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4. Werde
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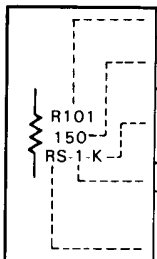
ten Ko
Tempe

Ableser
Widerst

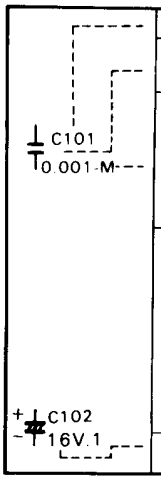
SCHALTPLAN/LEITERPLATTEN-DIAGRAMM

Hinweise:

1. Die aufgeführten Spannungswerte wurden bei auf Minimum gestelltem Lautstärkeregler und ohne Signal gemessen. Die in Klammern ( ) gestellten Werte gelten für den Aufnahmemodus.
2. Bezeichnung der Widerstände und Kondensatoren



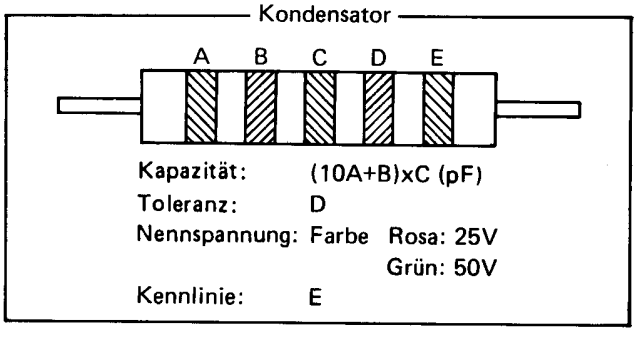
Schaltkreis-Nr.	
Wert	Keine Angabe: Ohm M: 1000 kOhm
Toleranz	Keine Angabe: ± 5% K: ±10% M: ±20%
Wattzahl	Keine Angabe: 1/4W
Bauart	Keine Angabe: Kohlefilm RC: Verbundbauweise RW: Drahtspule RS: Metalloxidfilm RN: Fester Metallfilm

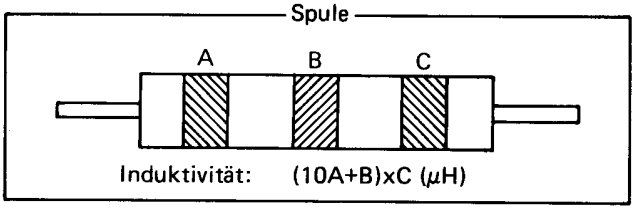


Schaltkreis-Nr.		
Wert	Keine Angabe: µF P : PF	
Toleranz	Keine Angabe: ±10% J : ± 5% M : ±20% Z : +80%, −20% D : ±0.5pF C : ±0.25pF	
Bauart		Keramik
		Electrolyt
		Mylar
		Polyester
		Styrol
Spannung	Keine Angabe: 50V	

3. Bei der Bestellung von Widerständen und Kondensatoren unbedingt Wert, Spannung und Bauart angeben.
4. Werden die mit "*" markierten Kondensatoren ausgetauscht, dann müssen due in der Stückliste spezifizierten Kondensatoren verwendet werden, da diese spezielle Temperatureigenschaften aufweisen.

Ablesen der Kapazität und Induktivität der in Form von Widerständen ausgeführten Kondensatoren und Spulen





Vorsichtsmaßnahmen bei der Verwendung von MOS-ICs

1. Die MOC-ICs werden für den Versand in schwarzem Schaumstoff verpackt. Dieser Schaumstoff ist elektrisch leitend und schließt die Leiter kurz, um Beschädigungen zu vermeiden. Die ICs während der Lagerung niemals aus der Schaumstoffverpackung entfernen. Die ICs nur unmittelbar vor der Verwendung auspacken und niemals auf Plastikteilen ablegen (statische Elektrizität!) bzw. in Styrol-Schaumstoff einsetzen.
2. Aufgrund von Leckagen am Lötkolben kann es während des Lötens zu Hochspannungen kommen; daher immer die Spitze des Lötkolbens erden und nur einen Niederspannungs-Lötkolben verwenden.
3. Statische Elektrizität von einigen tausend Volt kann sich aufgrund von Reibung im menschlichen Körper bzw. in aus Kunstfasern hergestellten Kleidern und Handschuhen aufbauen. Daher sollten auch die mit der Handhabung von ICs betrauten Personen geerdet werden.
4. Unbedingt die für die Reparaturen verwendeten Meßinstrumente wie Oszilloskop, Röhrenvoltmeter usw. erden.

Farbe	A, B	C	D	E
Schwarz	0	10^0	±20%	Für Temperature-Kompensation
Braun	1	10^1		
Rot	2	10^2		
Orange	3	10^3		
Gelb	4	10^4		
Grün	5	10^5		
Blau	6			
Violett	7			
Grau	8		±30%	Bauart mit hoher Dielektrizitätskonstanter
Weiß	9			Für Temperatur-Kompensation
Gold		10^{-1}	± 5%	
Silber		10^{-2}	±10%	Bauart mit hoher Dielektrizitätskonstanter

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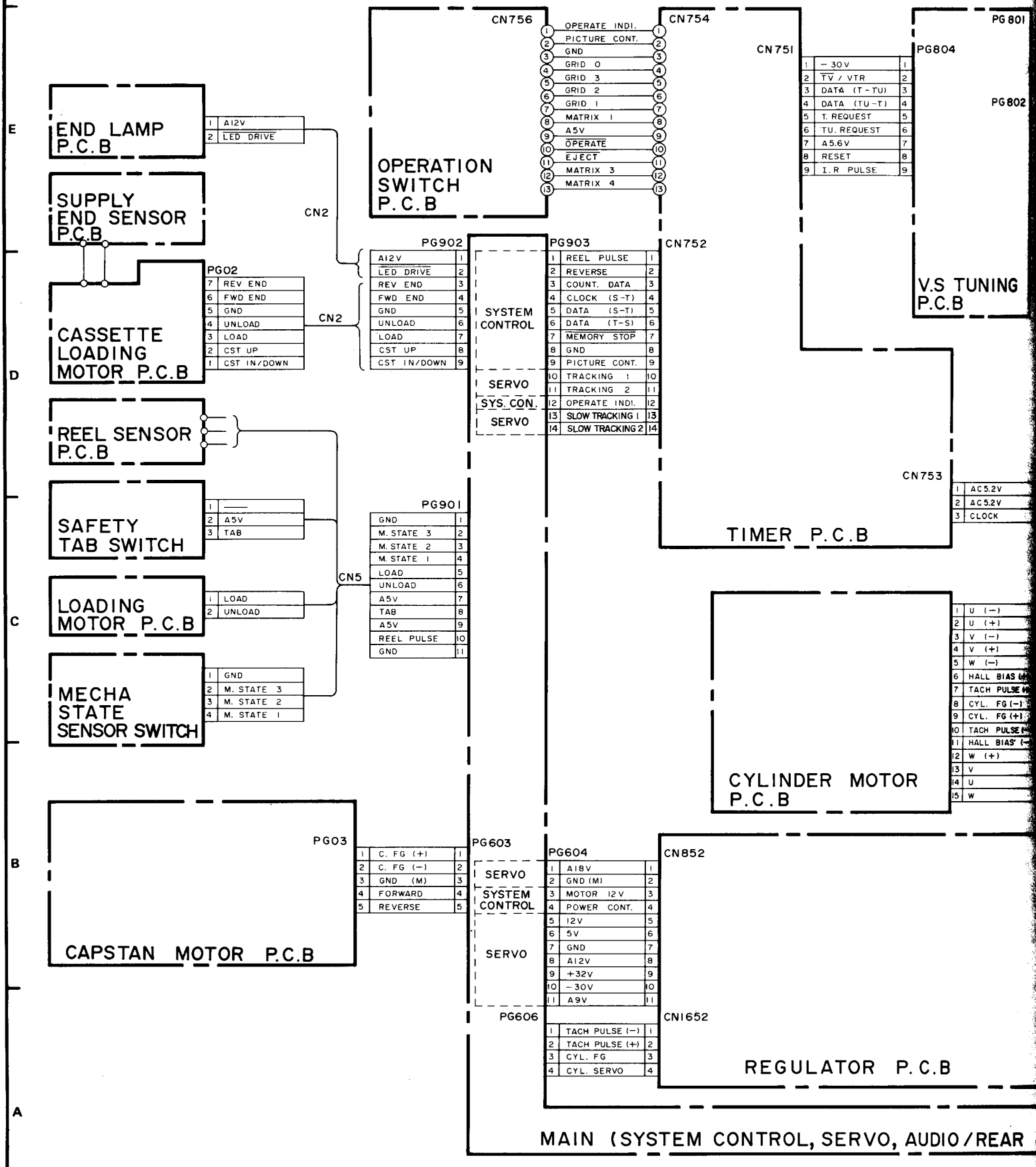
INTERNAL WIRING DIAGRAM (KABELANSCHLUSSDIAGRAMM)



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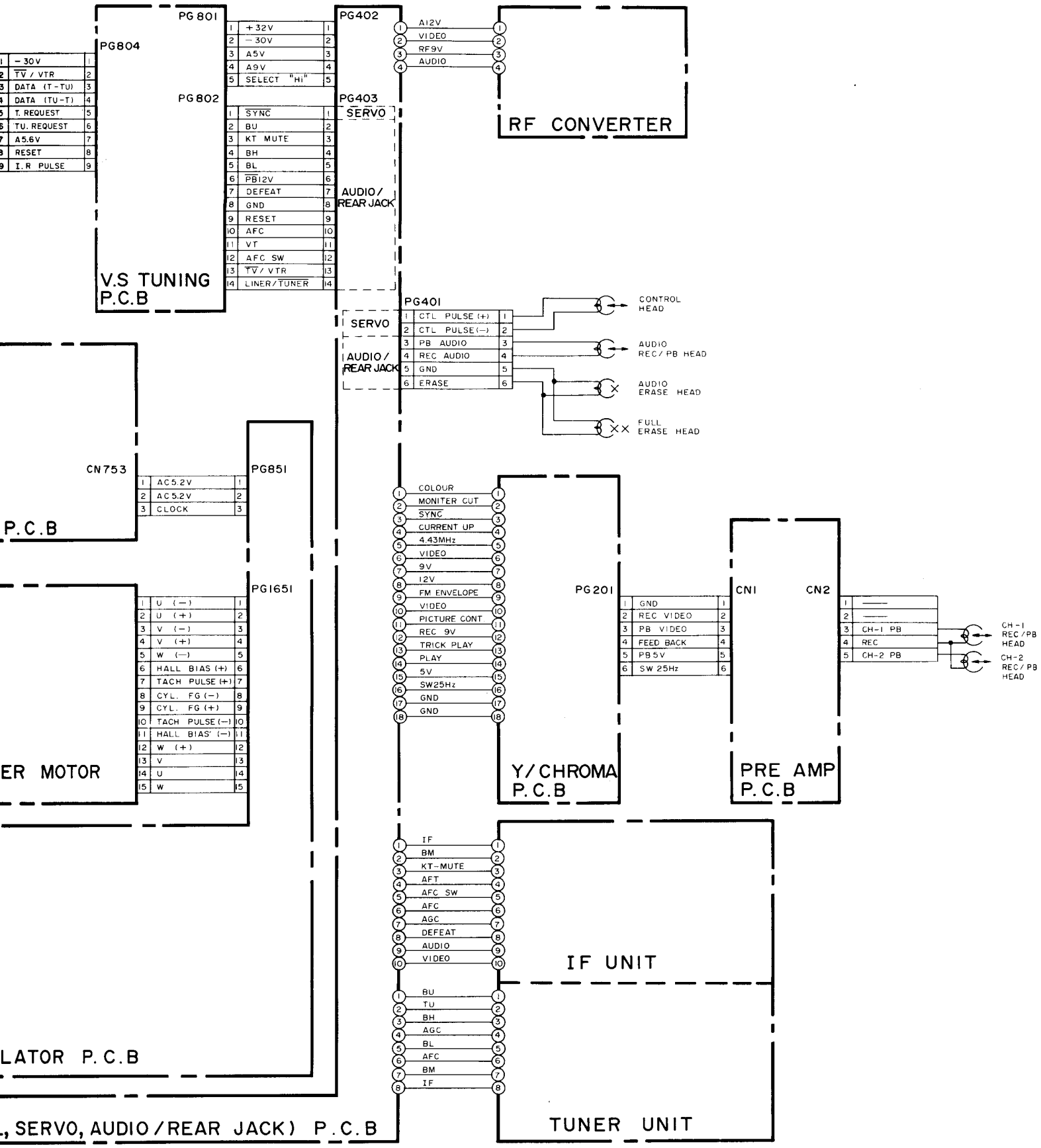
RAMM)



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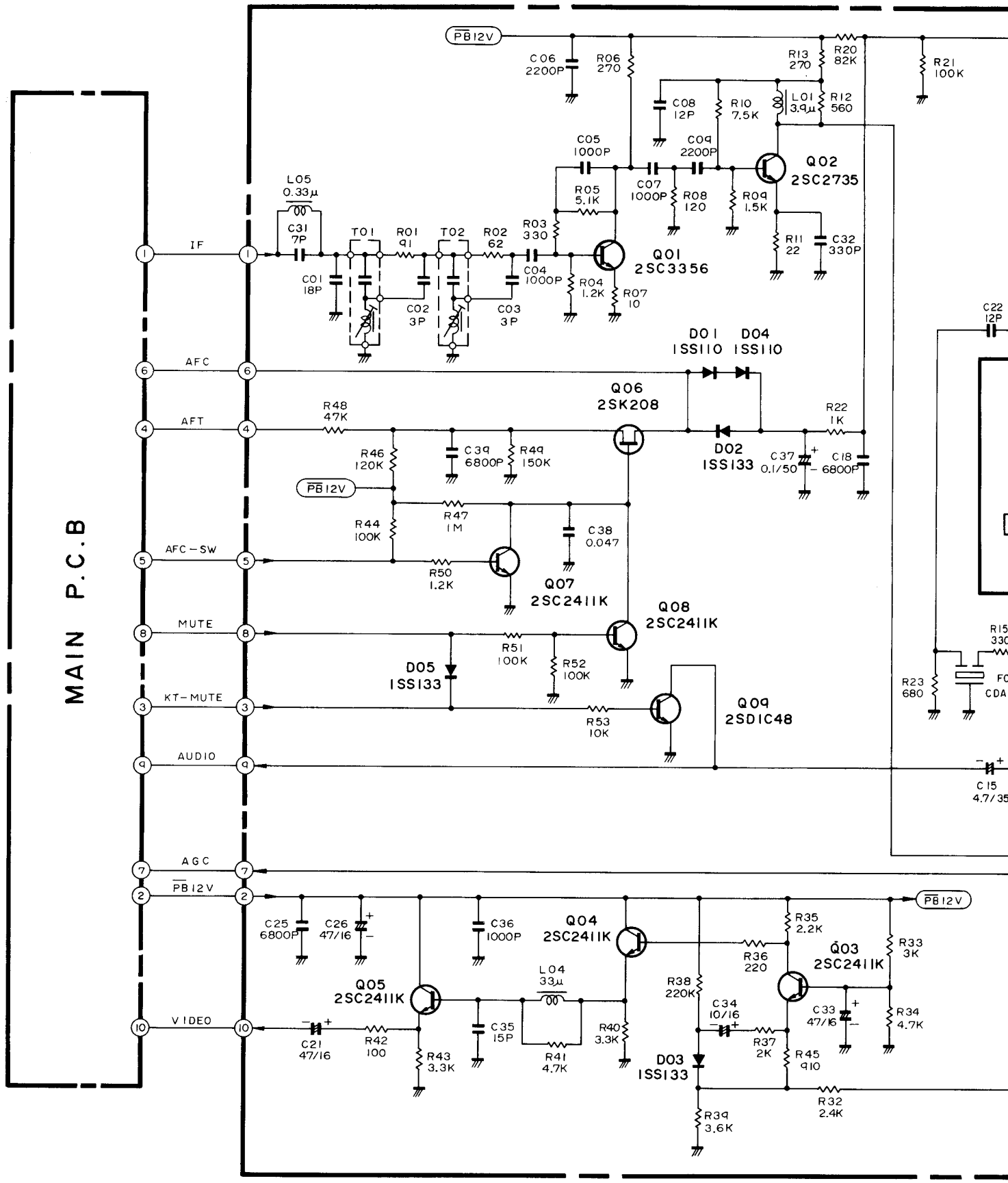
IF UNIT (ZF-EINHEIT)



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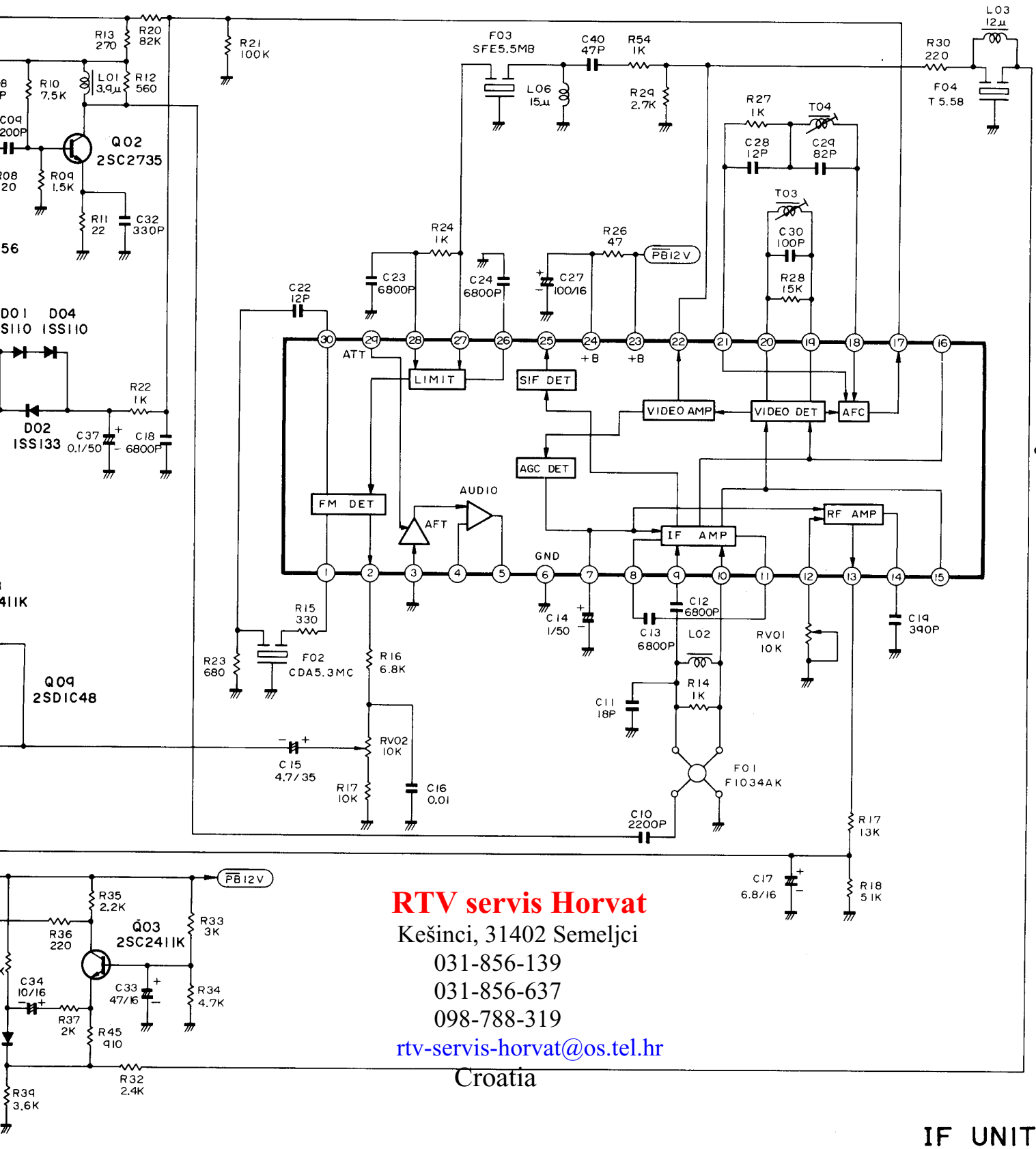

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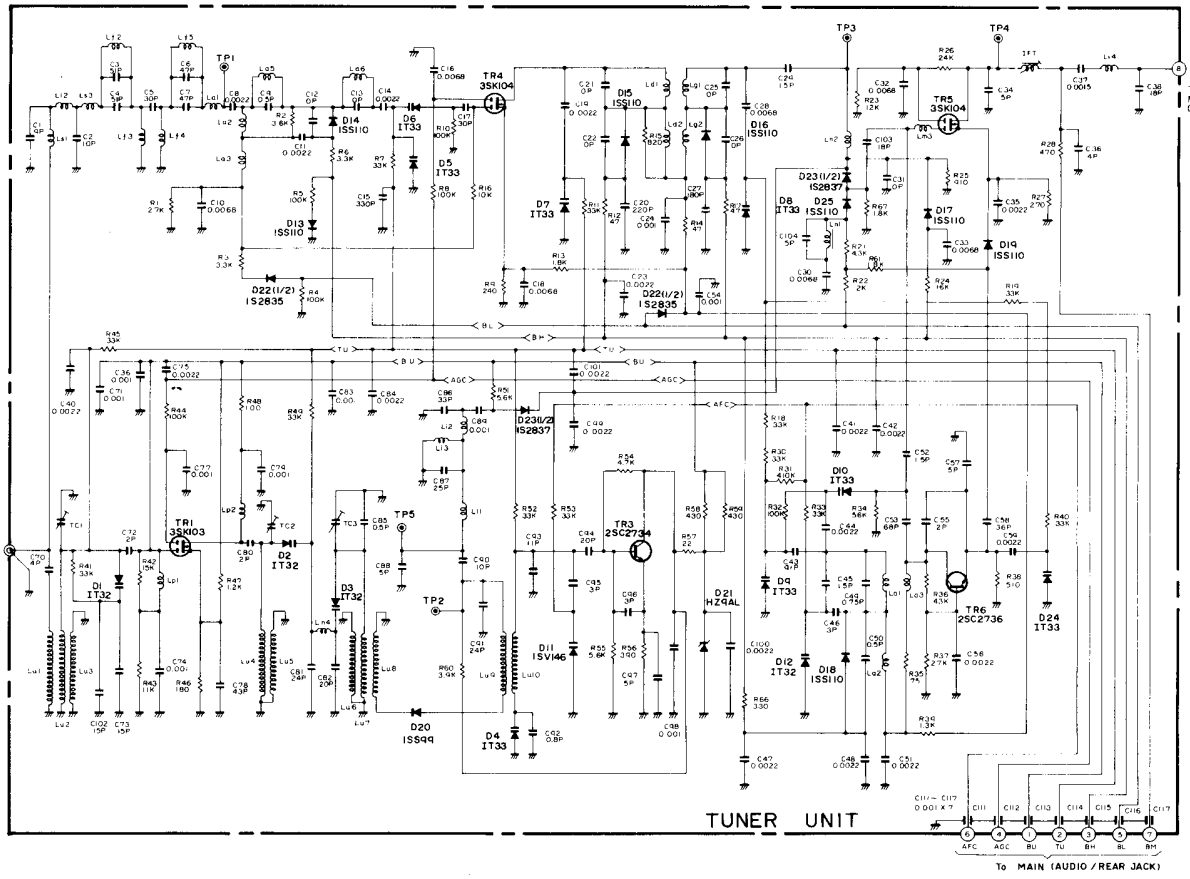
TUNER UNIT/(TUNER-EINHEIT)



SCHEMATIC DIAGRAM	PAGE
INTERNAL WIRING DIAGRAM	5-2
IF UNIT	5-4
TUNER UNIT	5-6
V·S TUNING	5-7
TIMER/OPERATION SWITCH	5-13
SYSTEM CONTROL	5-19
REMOTE CONTROL	5-23
AUDIO/REAR JACK	5-25
RF CONVERTER	5-28
PREAMP	5-29
SERVO	5-38
Y/CHROMA	5-41
REGULATOR	5-50

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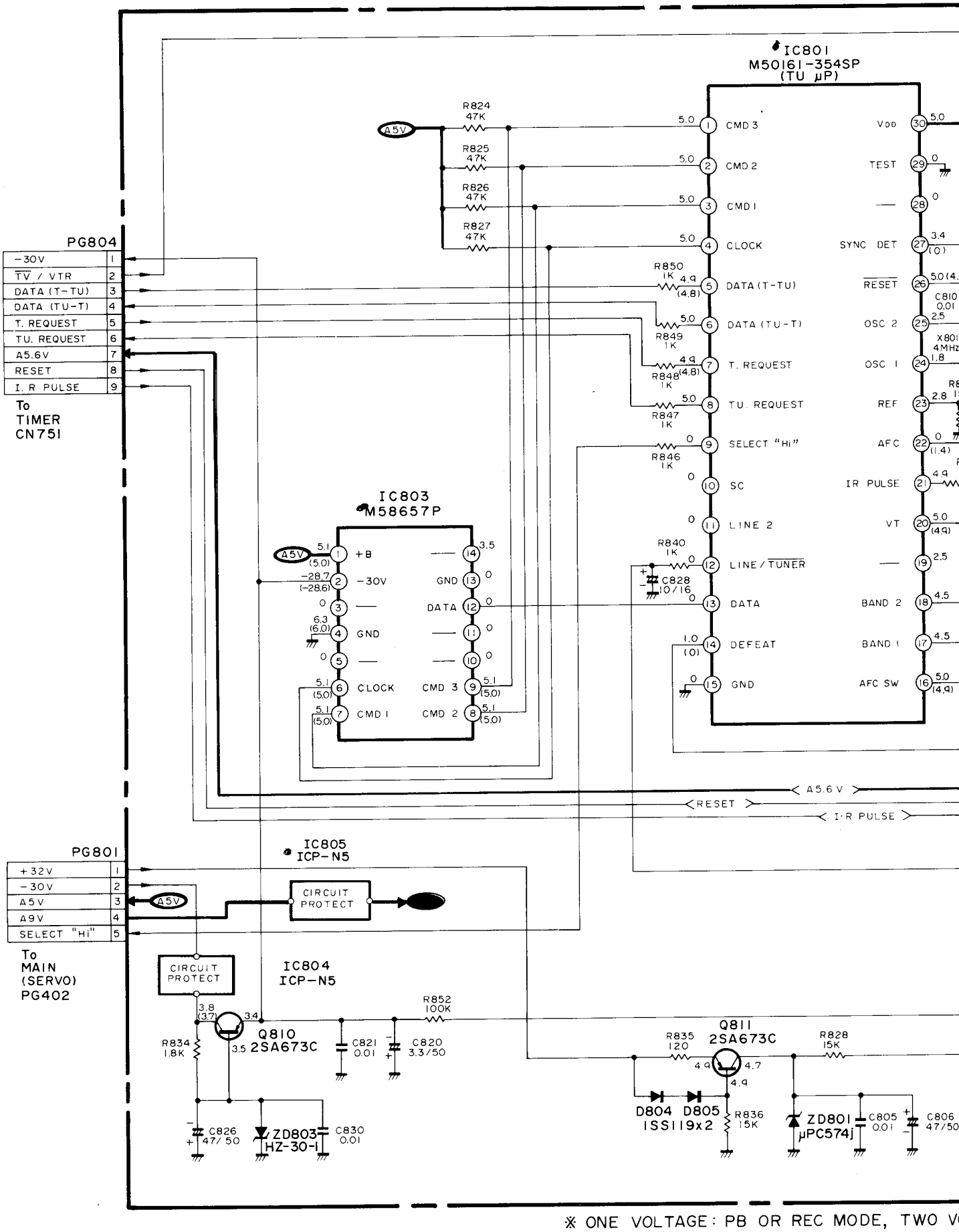
ANNUNGSSYNTHESIZER-TUNER)



※ ONE VOLTAGE : PB OR REC MODE, TWO V

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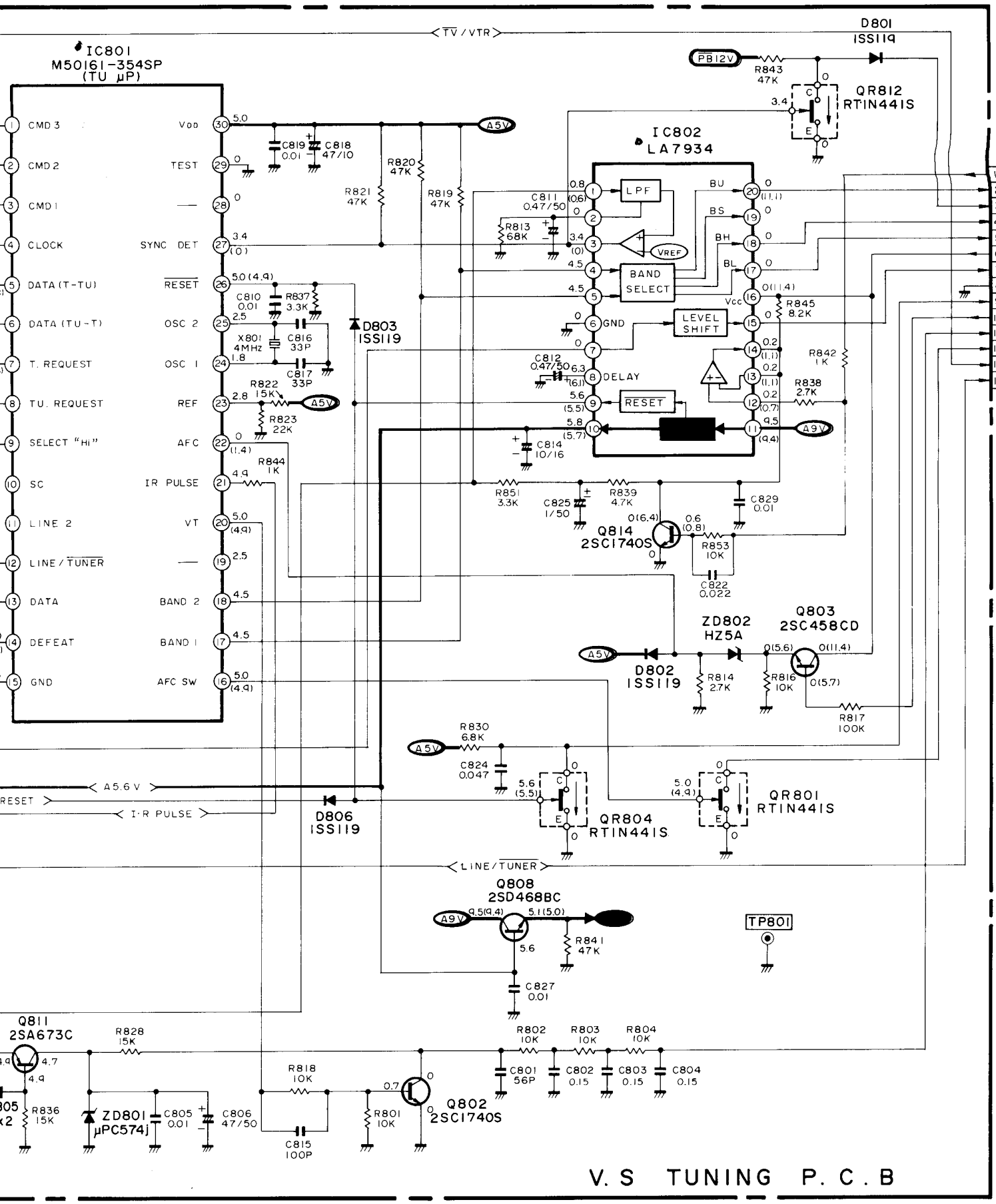

V. S TUNING P. C. B

E: PB OR REC MODE, TWO VOLTAGES: PB AND (REC) MODES.

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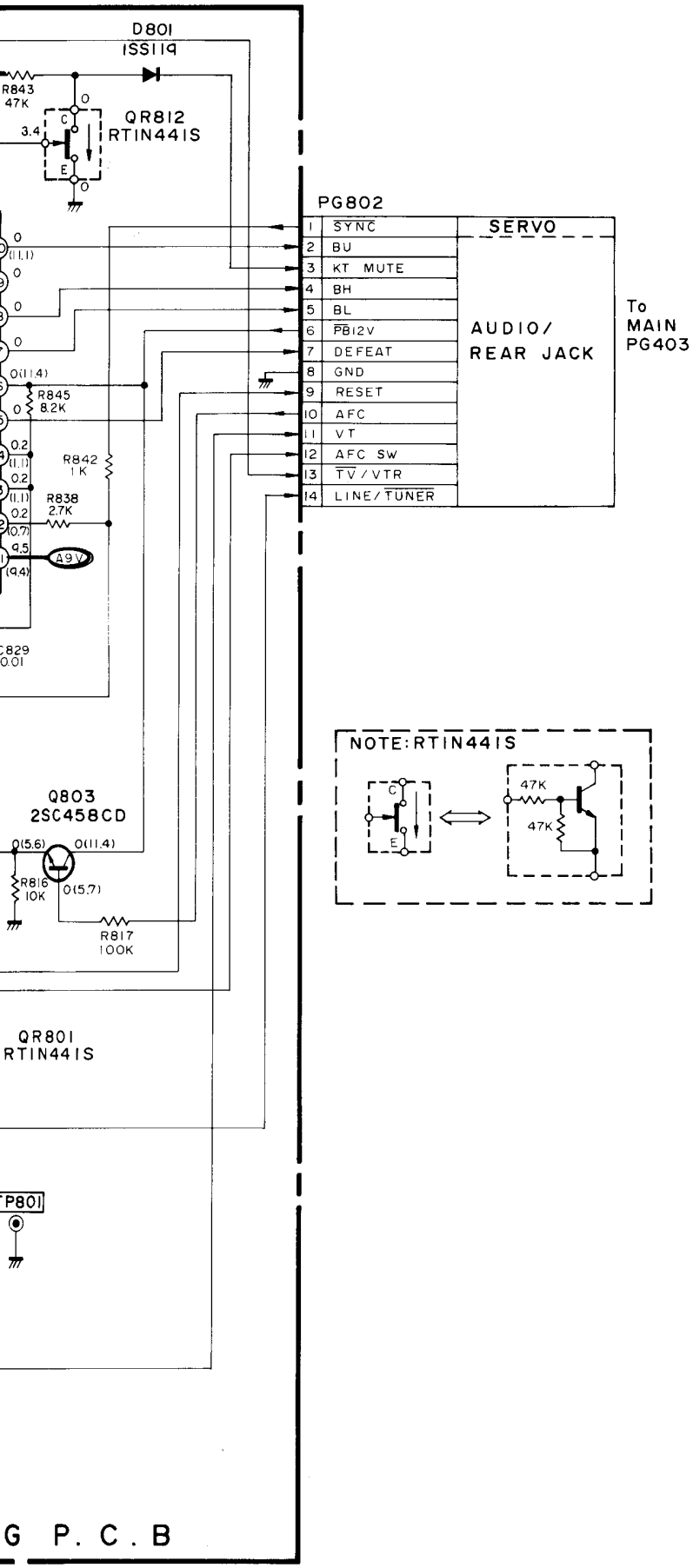

SCHEMATIC DIAGRAM	PAGE
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REGULATOR	5-50

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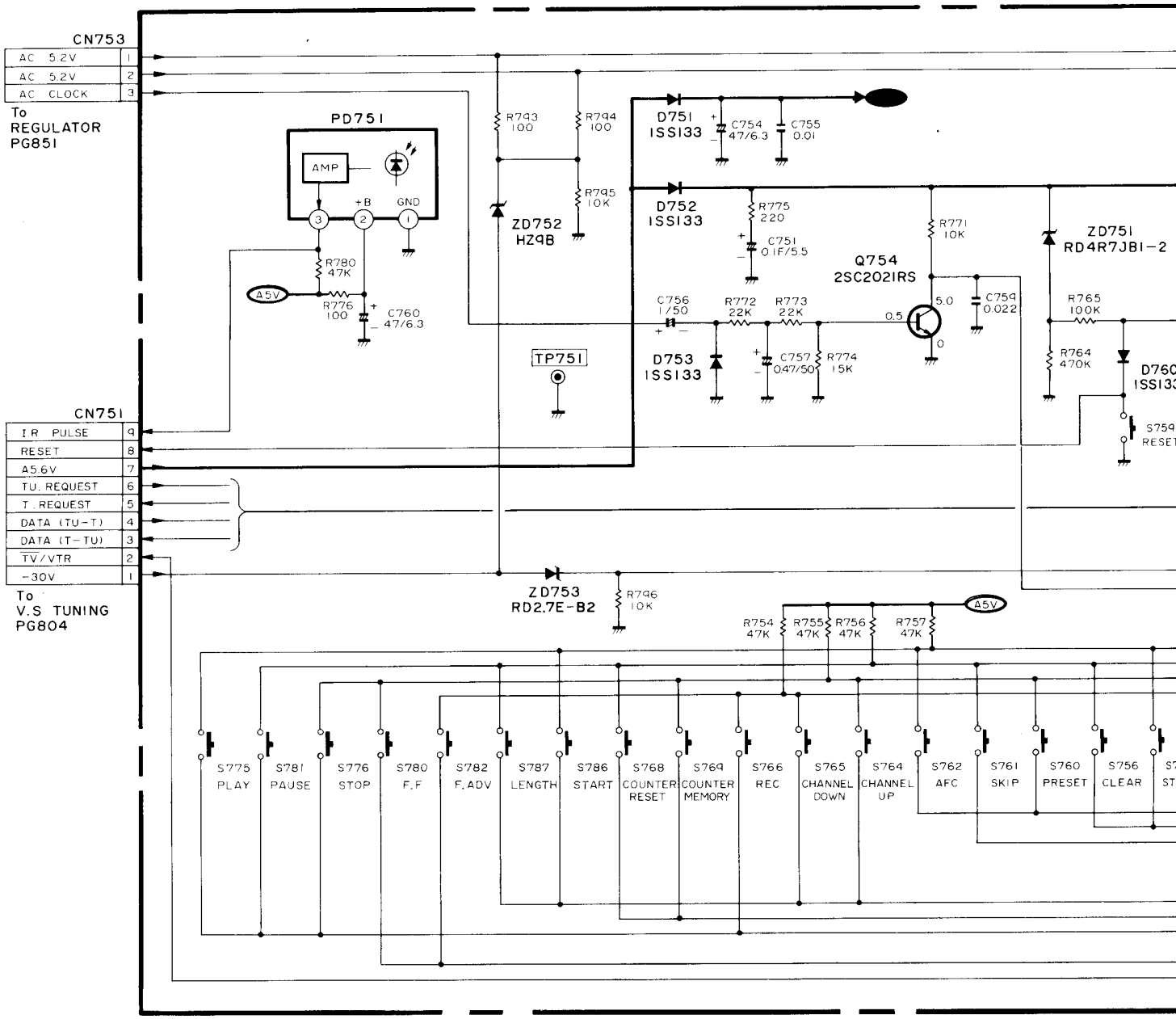
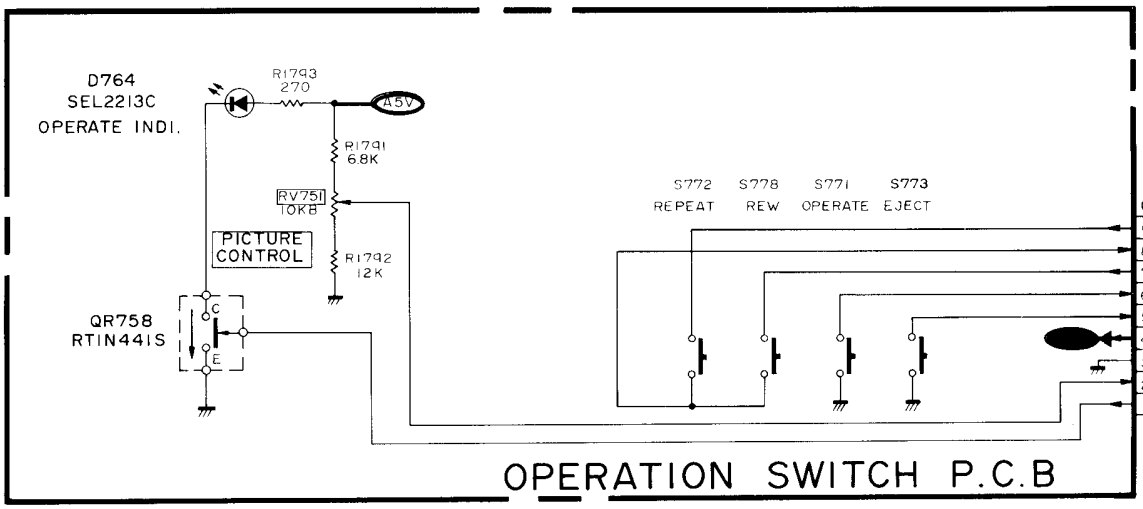
TIMER/OPERATION SWITCH (TIMER/FUNKTIONSSCHALTER)





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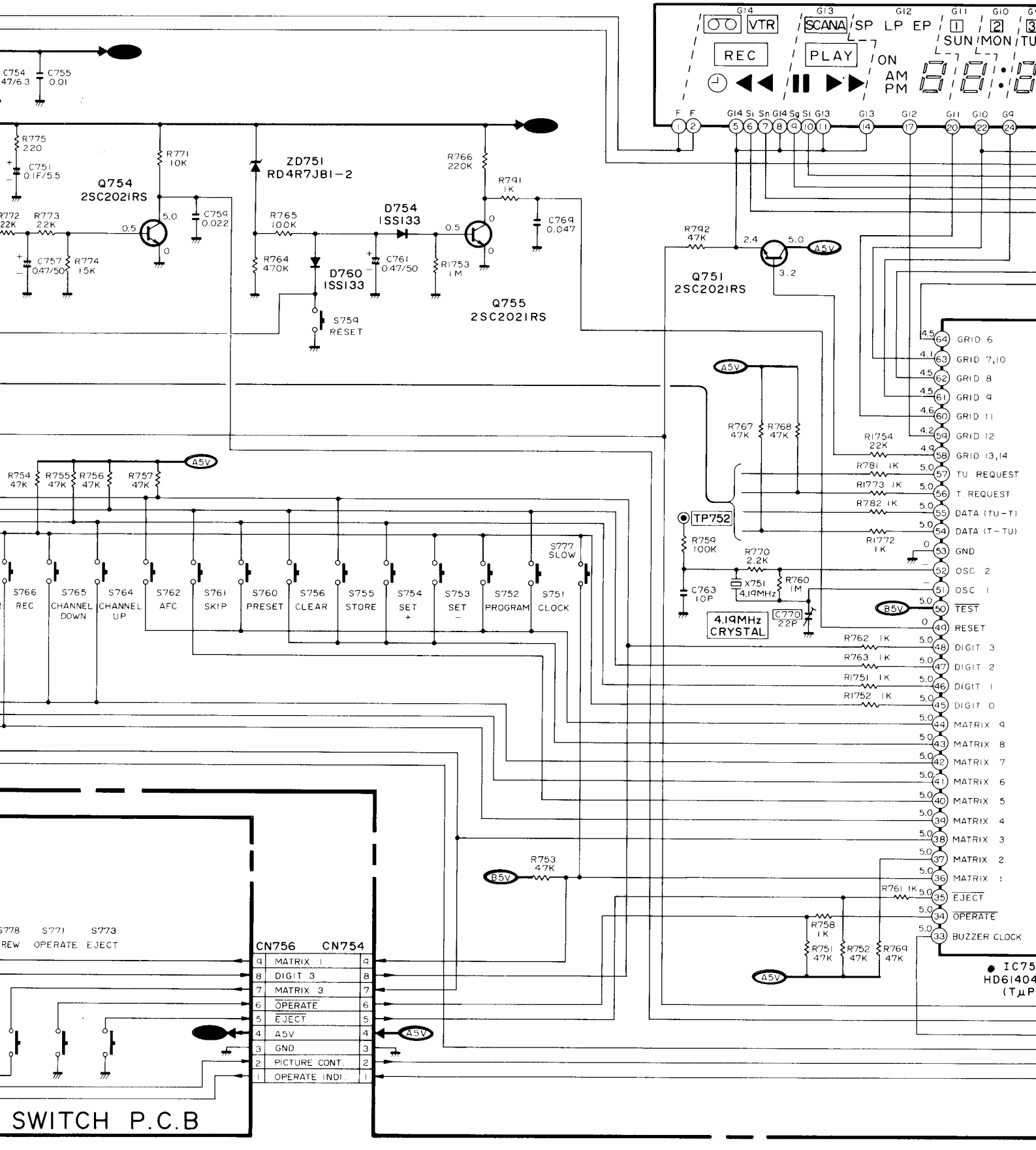
ONSSCHALTER)



※ VOLTAGE : STOP MODE.

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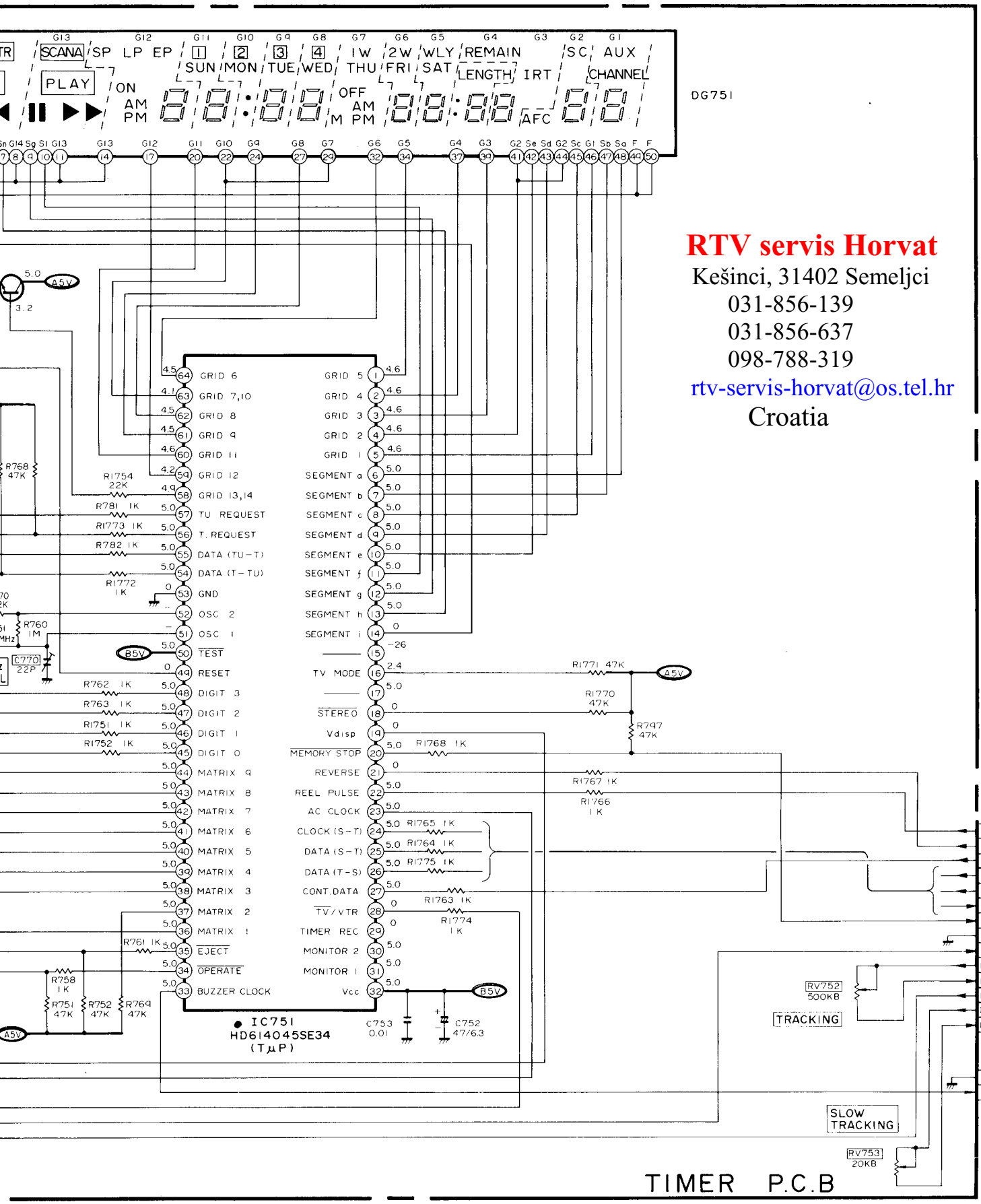

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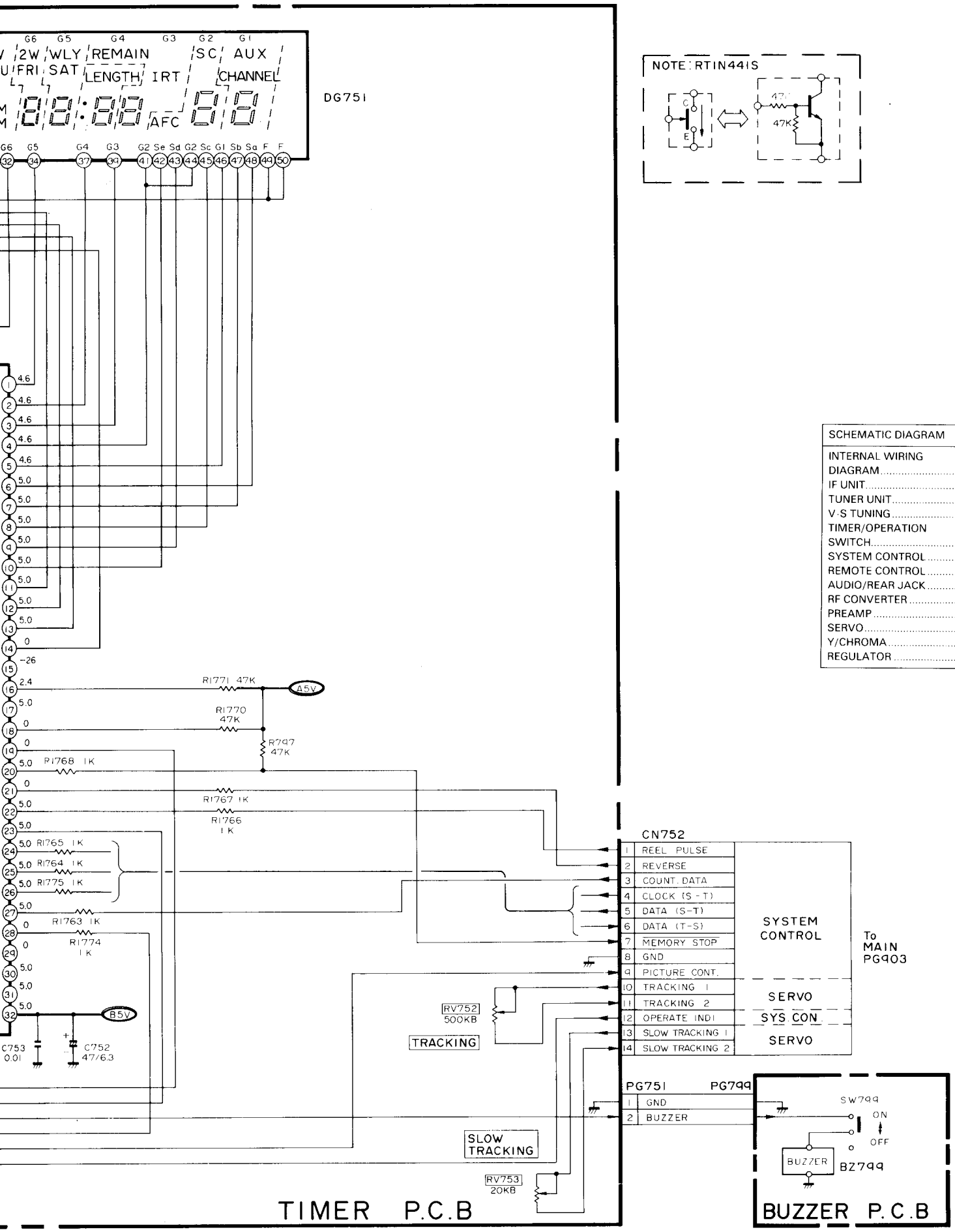

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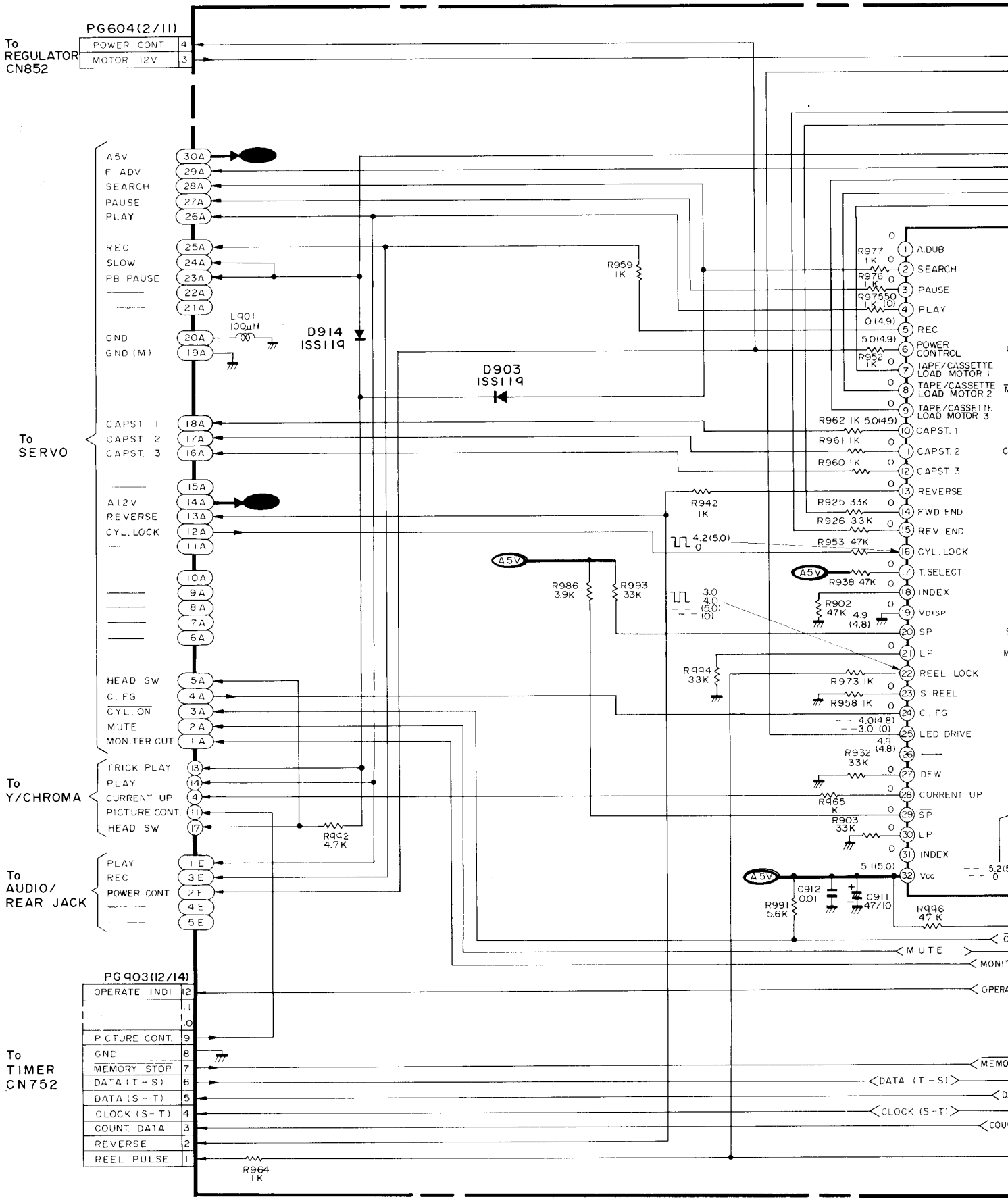
SYSTEM CONTROL (SYSTEMREGELUNG)



※ ONE VOLTAGE: PB OR REC MODE, TWO VOLTAGES: PB AND (REC)

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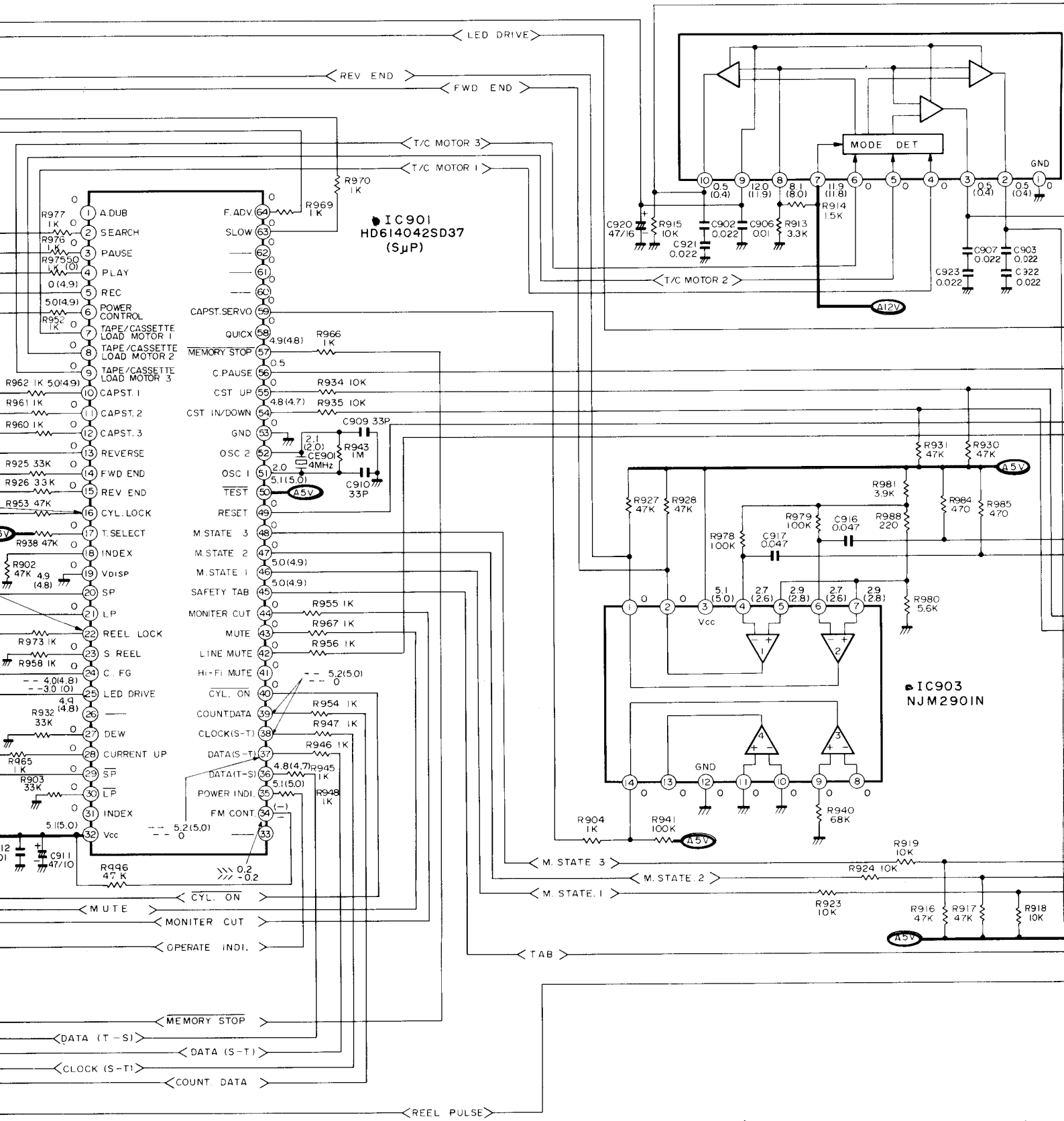

MAIN (SYSTEM CONTROL) P

LTAGES: PB AND (REC) MODES.

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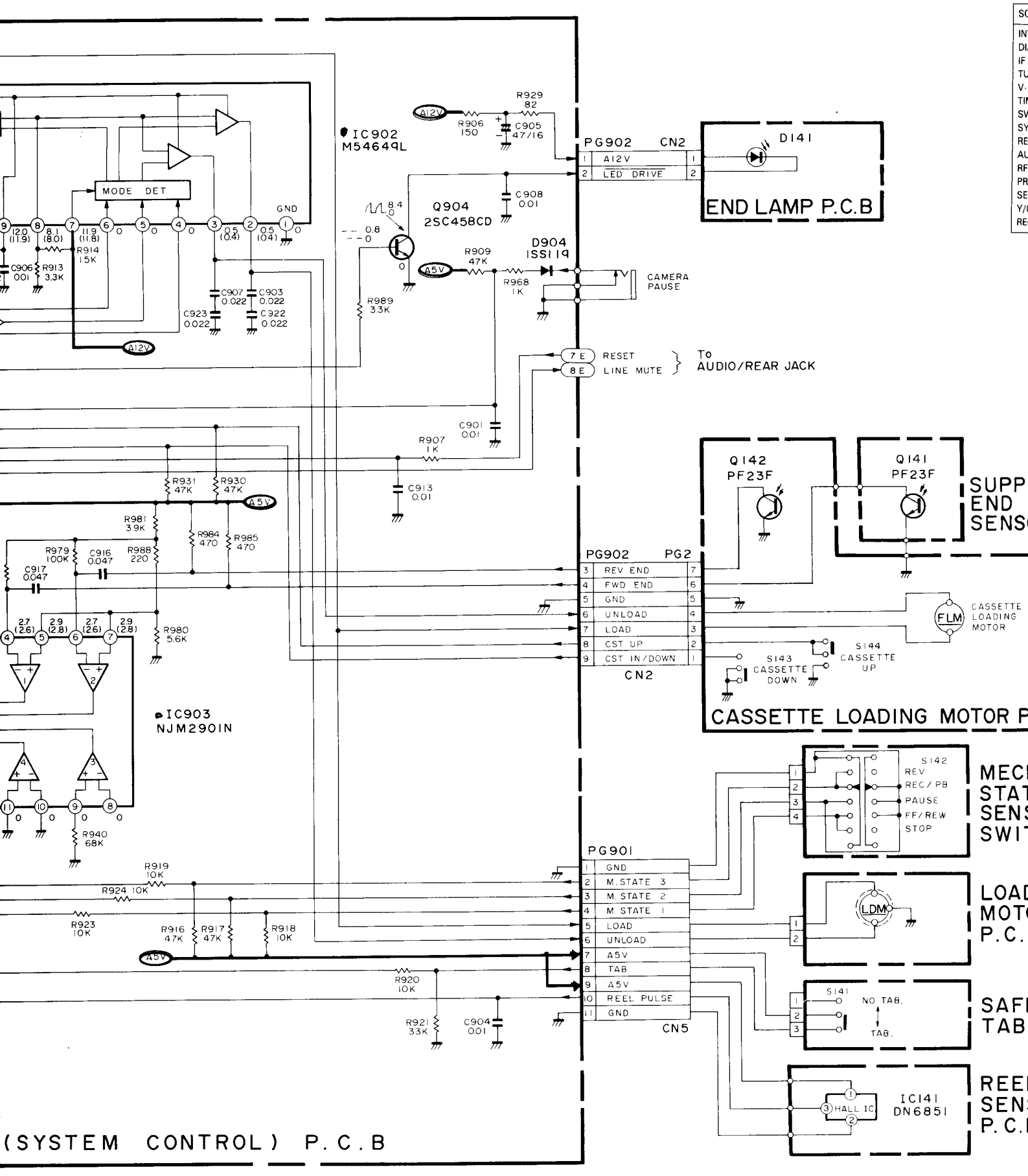

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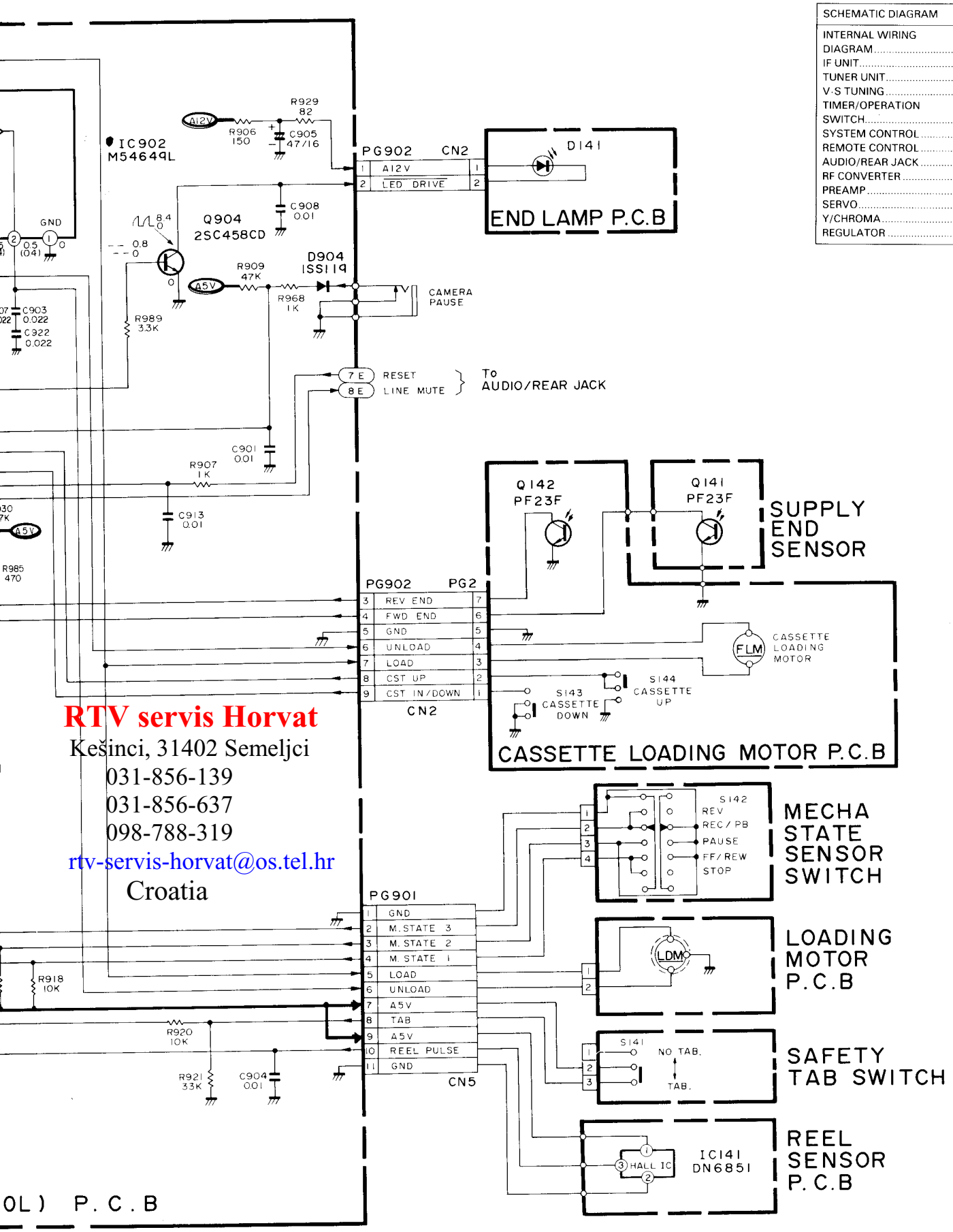

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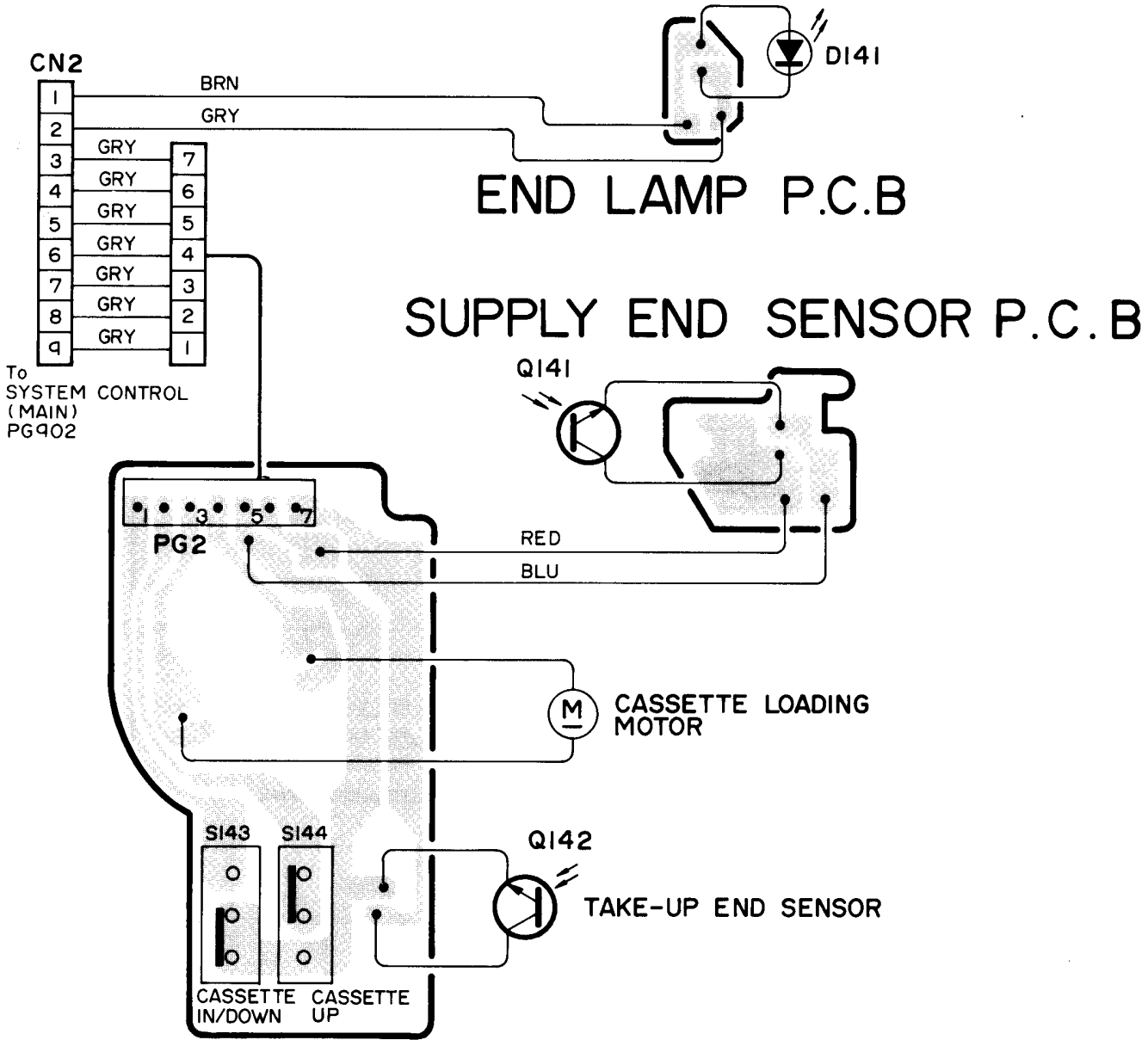
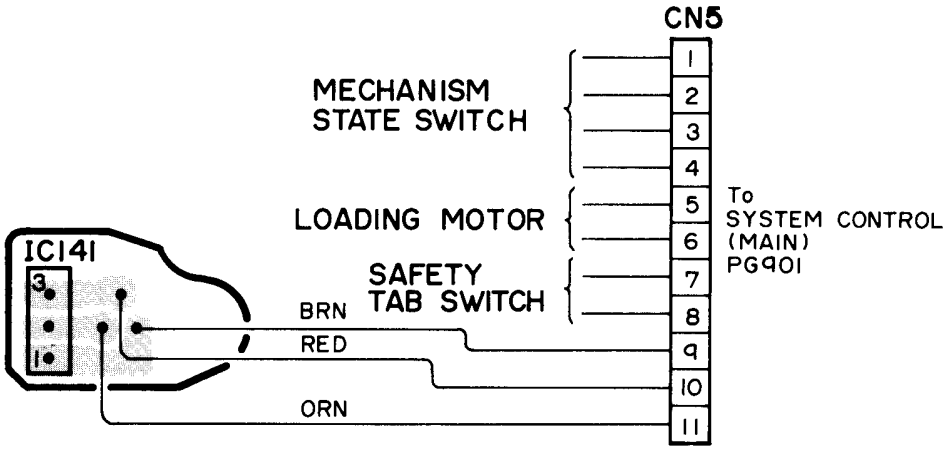
PERIPHERAL BOARD (PERIPHERIE-LEITERPLATTE)





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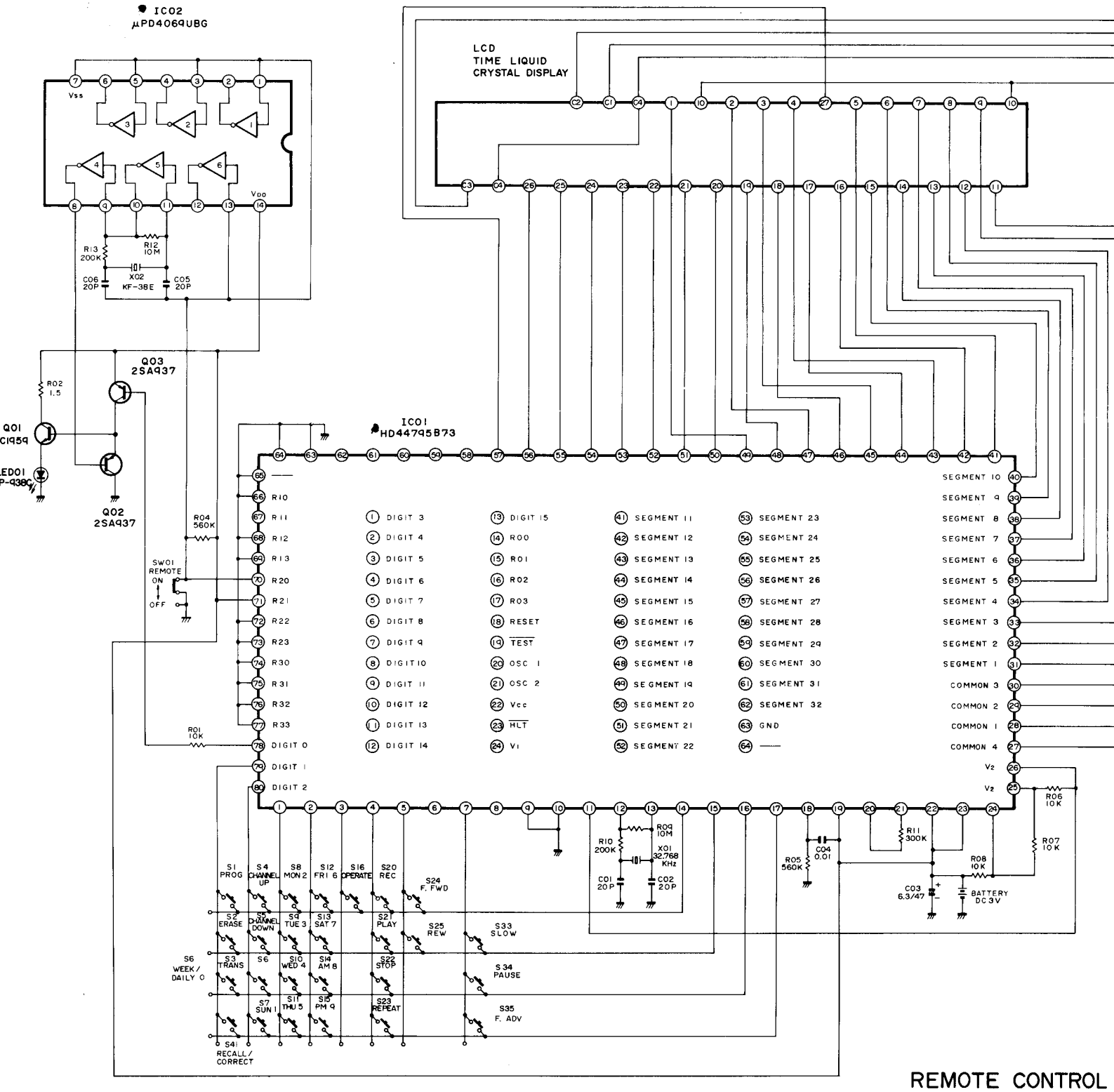
REMOTE CONTROL/OPERATION SWITCH
(FERNBEDIENUNG/FUNKTIONSSCHALTER)



REMOTE CONTROL

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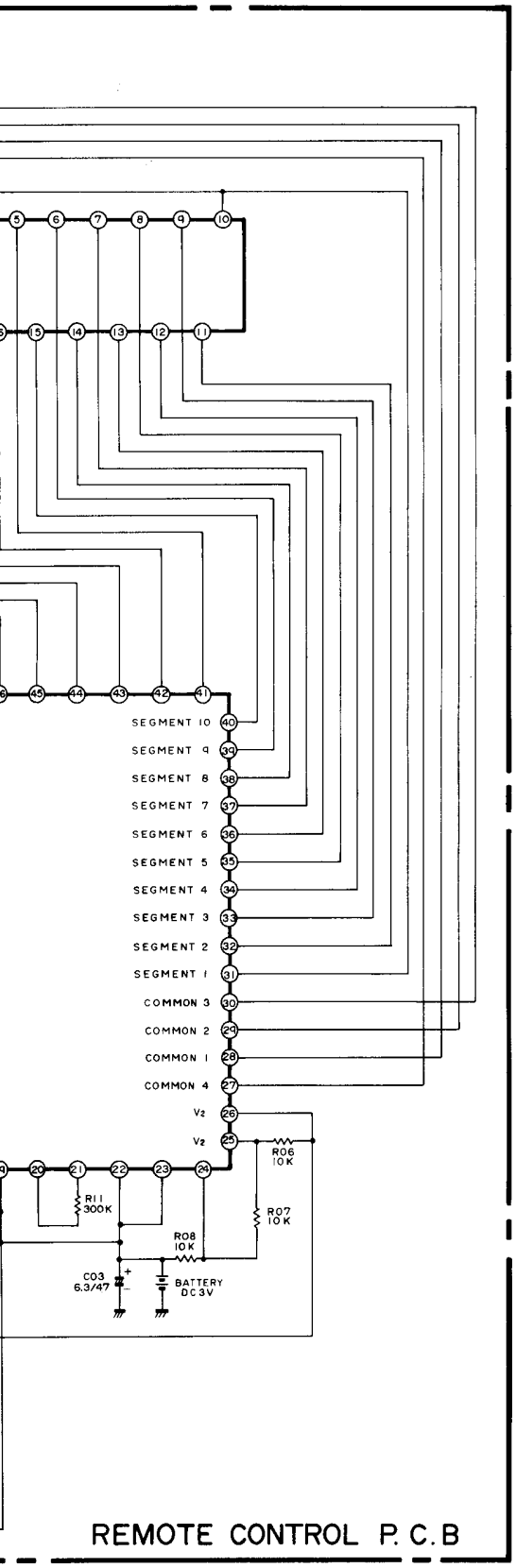
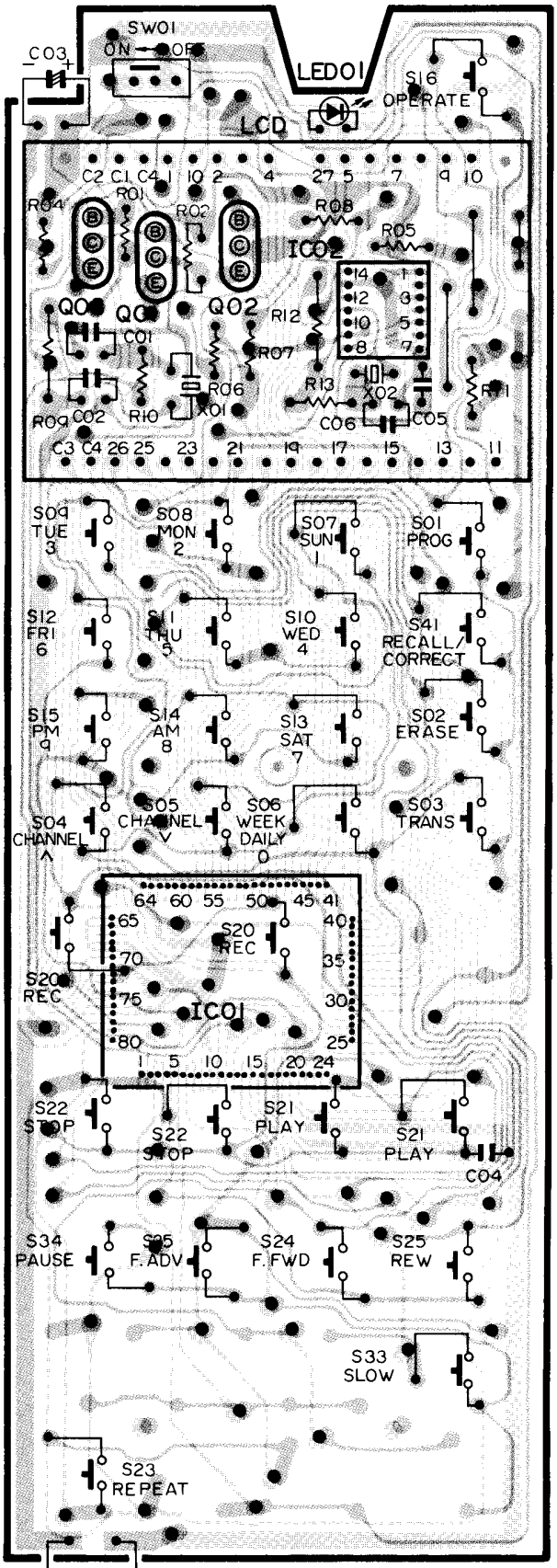


REMOTE CONTROL P. C. B



REMOTE COTROL P.C.B

Solderd side

Parts side

● Through hole

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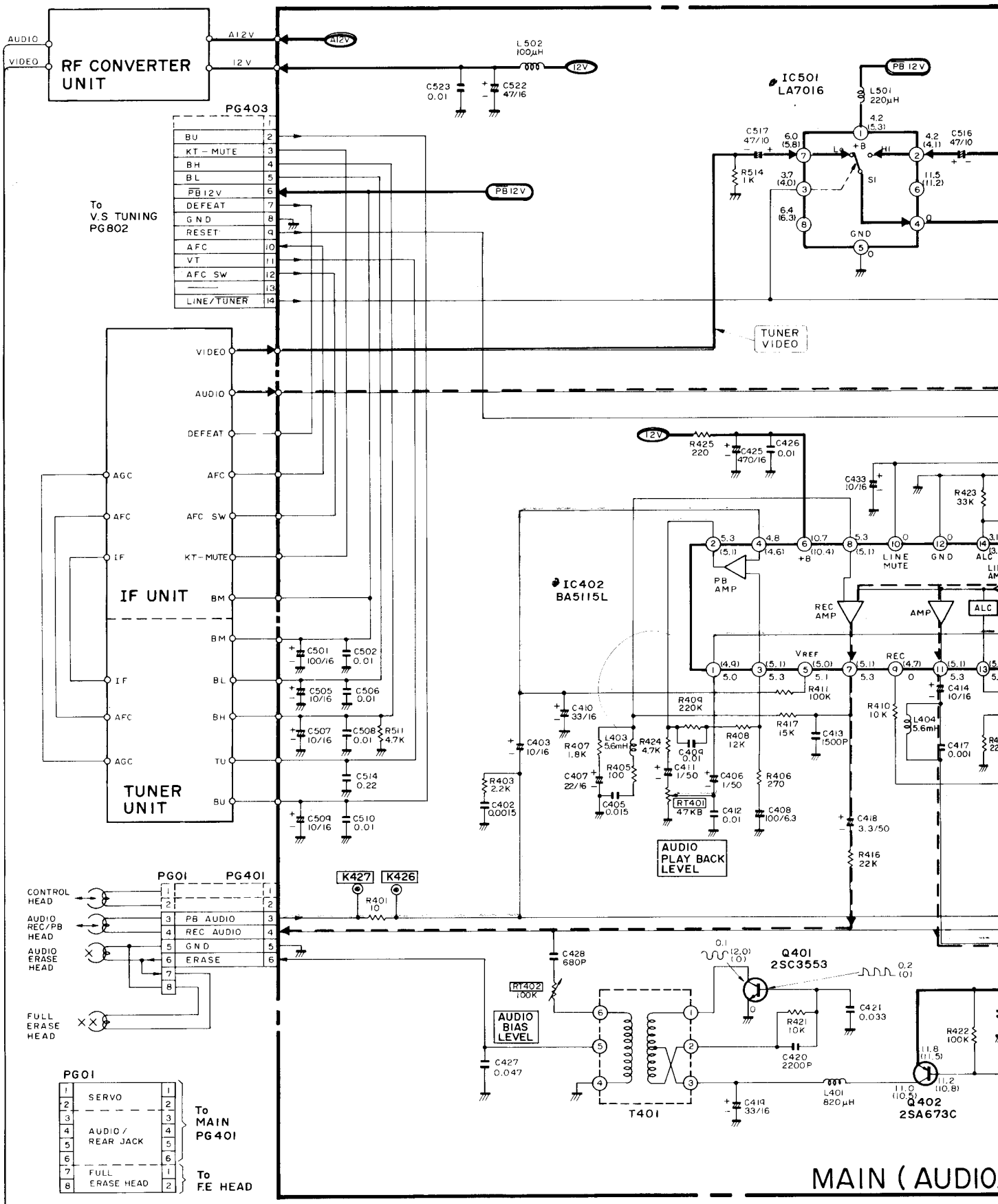
AUDIO/JACK (AUDIO-BUCHSE)



※ ONE VOLTAGE : PB OR REC MODE, TWO VOLTAGES : PB A

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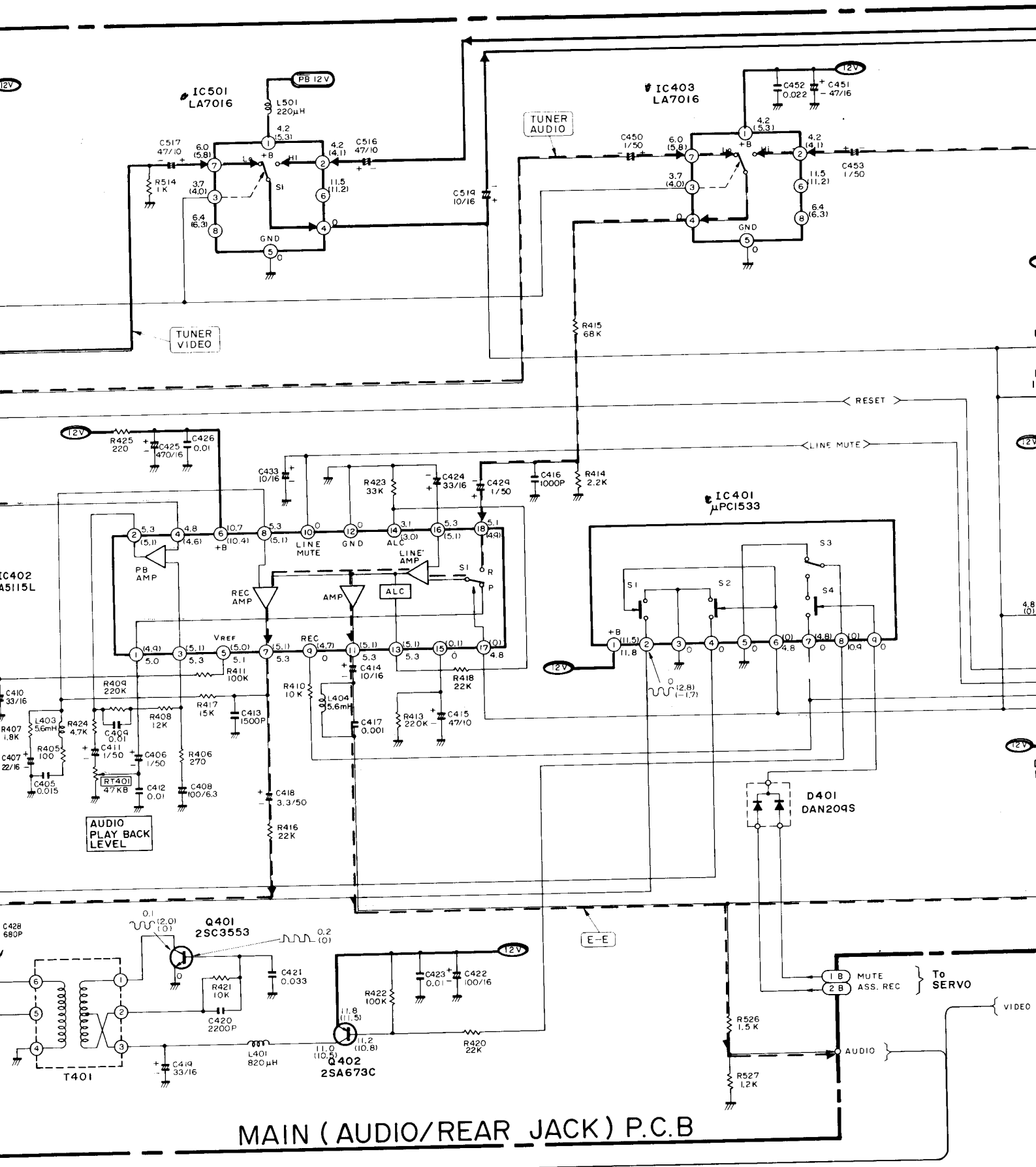

MAIN (AUDIO/REAR JACK) P.C.B

LTAGE : PB OR REC MODE, TWO VOLTAGES : PB AND (REC) MODES.

3 4 5 6 7

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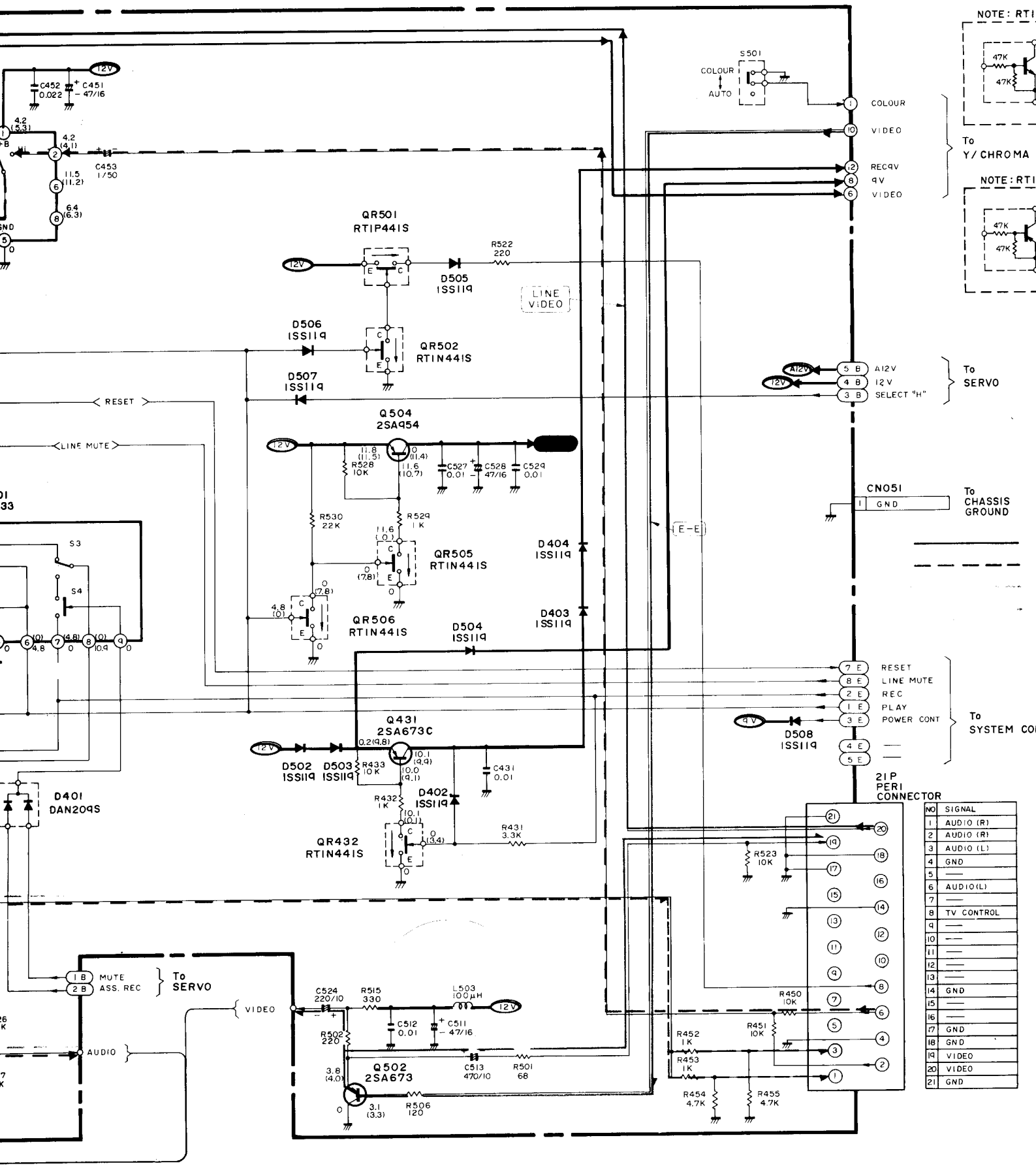

7 8 9 10

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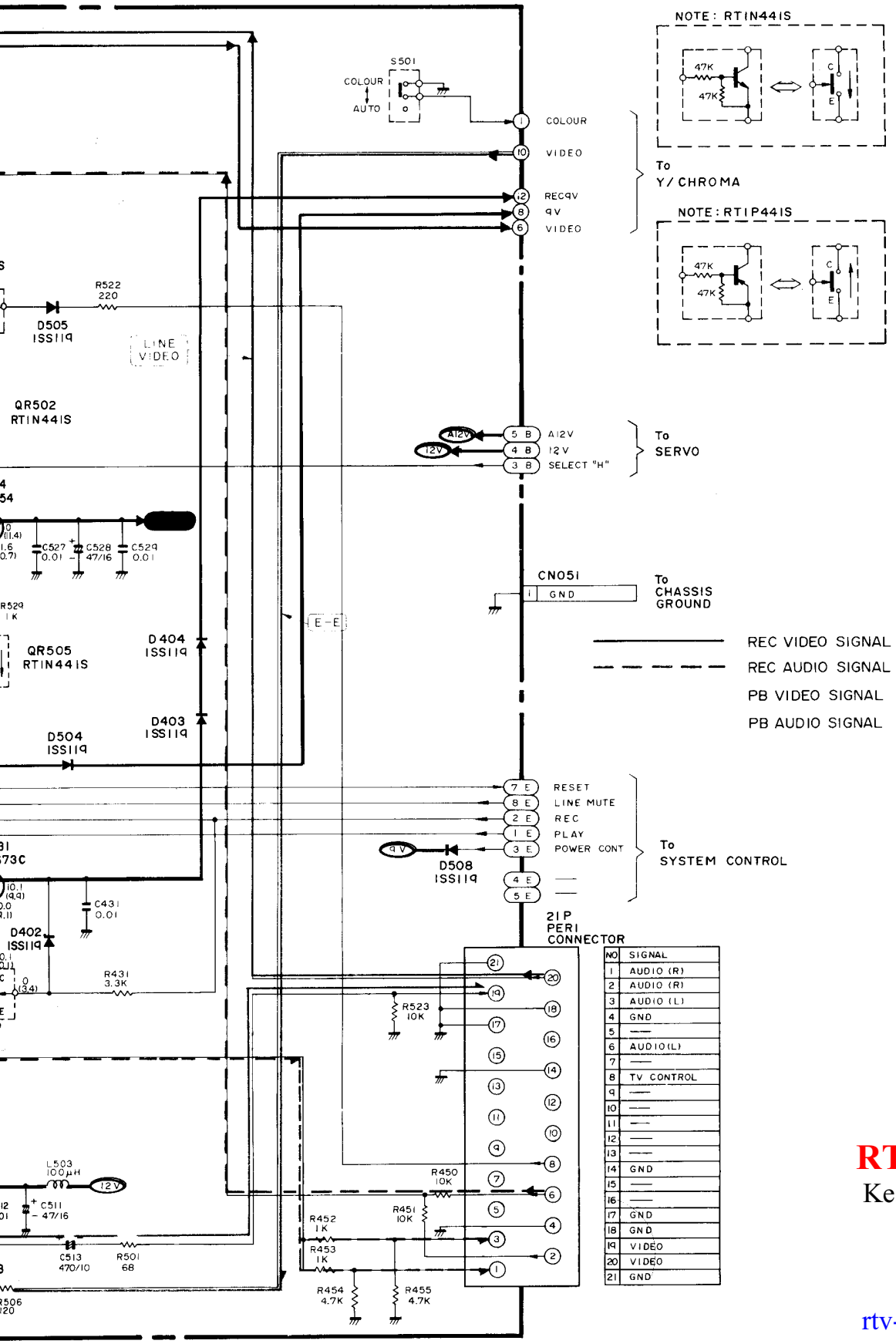

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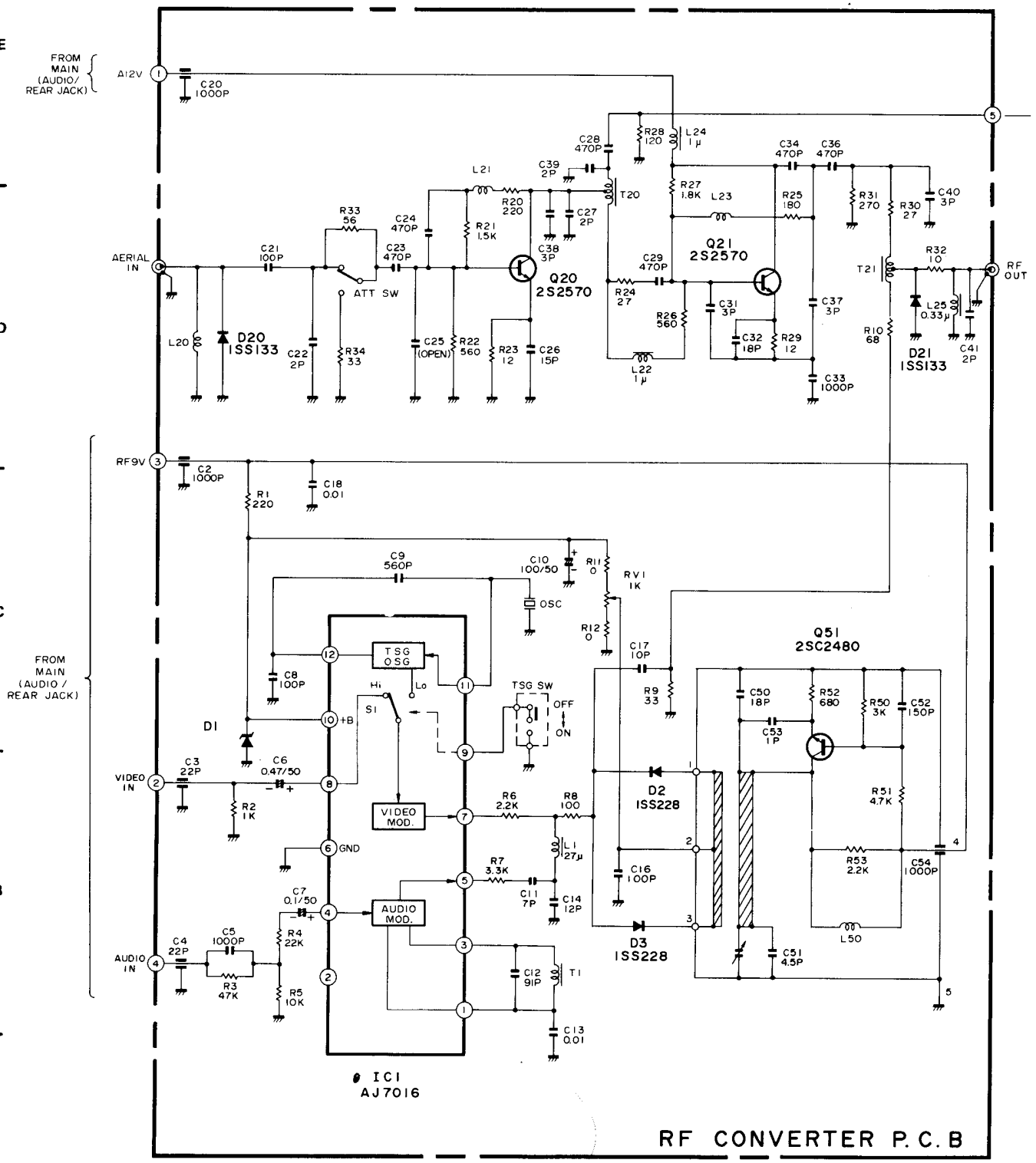
RF CONVERTER (HF-KONVERTER)



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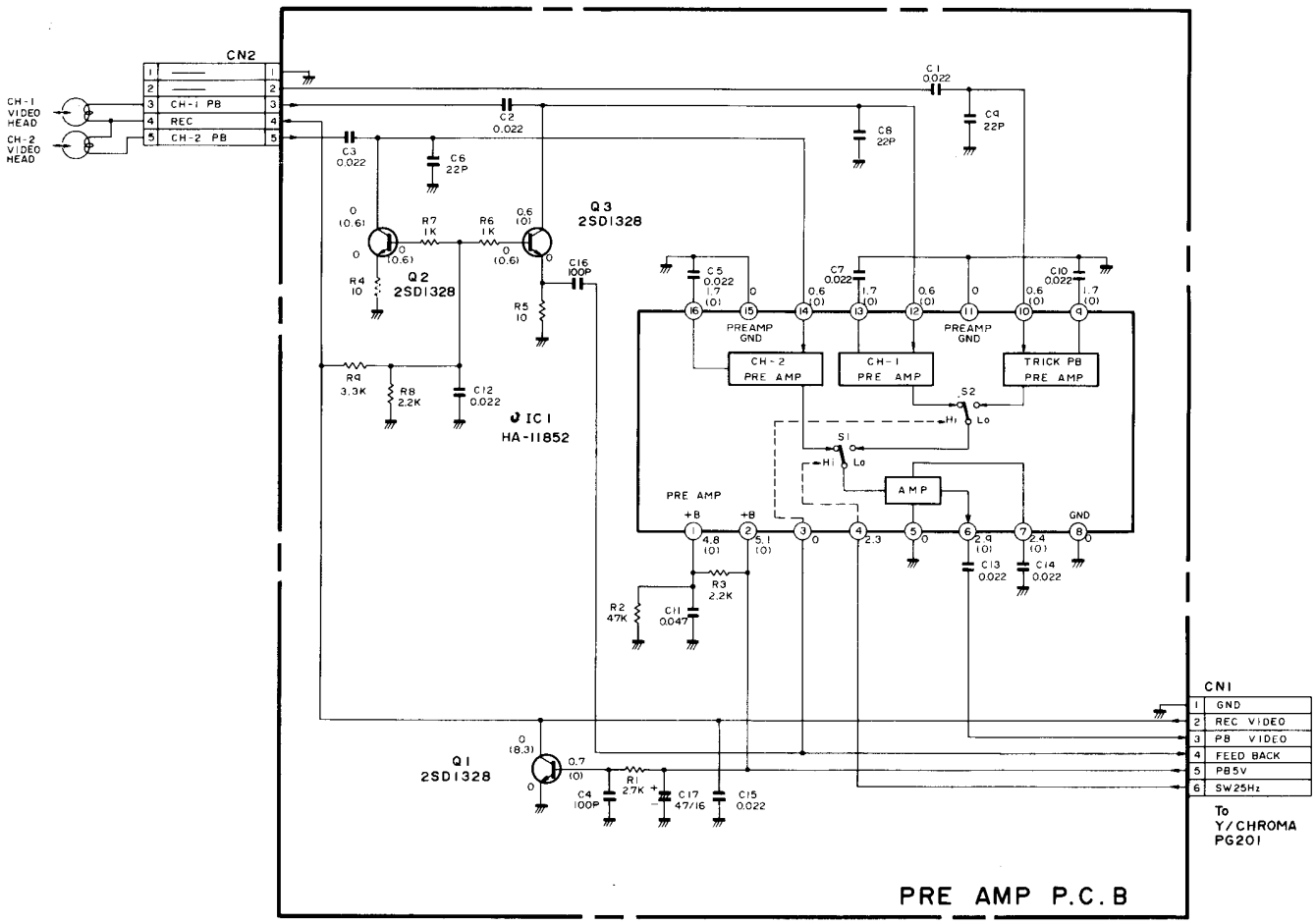
PREAMP (CORVERSTÄRKER)



※ONE VOLTAGE : PB OR REC MODE,
TWO VOLTAGES : PB AND (REC) MODE.

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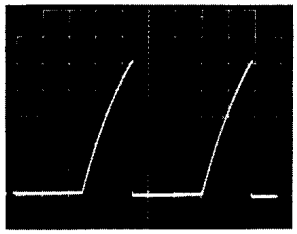
SERVO CIRCUIT WAVEFORMS (WELLENFORM)

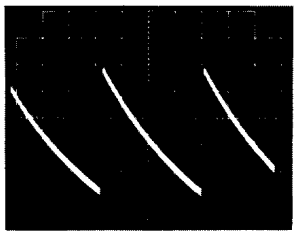
[IC601]

(REC: Colour bar Video in/PB: Alignment tape)

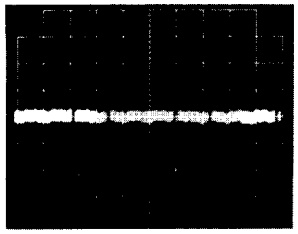
① PIN2 REC/PB
0.5V/10ms. div.



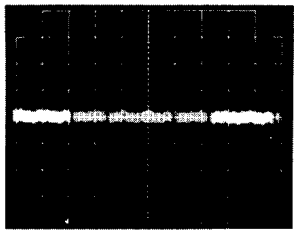
② PIN3 REC/PB
0.1V/10ms. div.



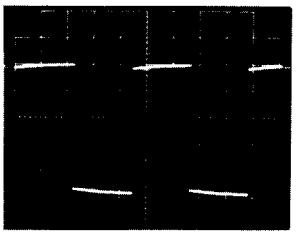
③ PIN4 REC/PB
50mV/10ms. div.



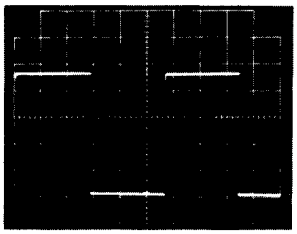
④ PIN5 REC/PB
50mV/10ms. div.



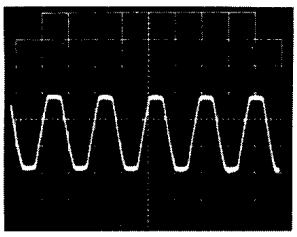
⑤ PIN11 REC/PB
1V/0.2ms. div.



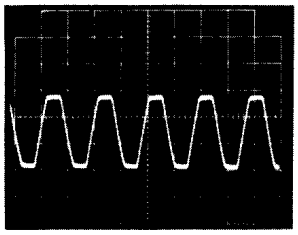
⑥ PIN22 REC/PB
1V/20μs. div.



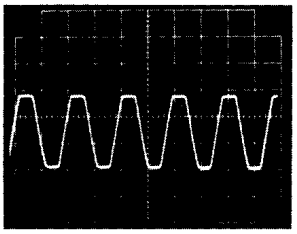
⑦ PIN28 REC/PB
0.5V/1ms. div.



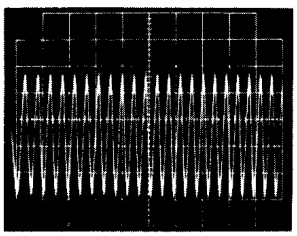
⑧ PIN29 REC/PB
0.5V/1ms. div.



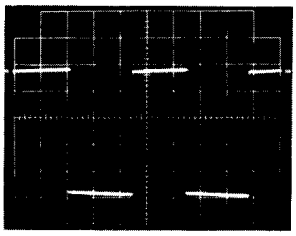
⑨ PIN30 REC/PB
1V/1ms. div.



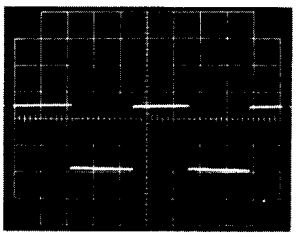
⑩ PIN32 REC/PB
50mV/0.5μs. div.



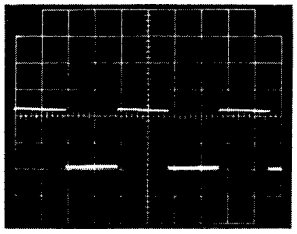
⑪ PIN42 REC/PB
1V/0.1ms. div.



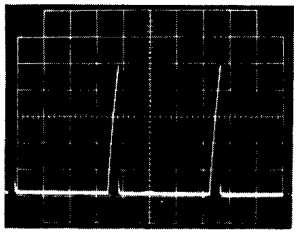
⑫ PIN43 REC/PB
2V/0.1ms. div.



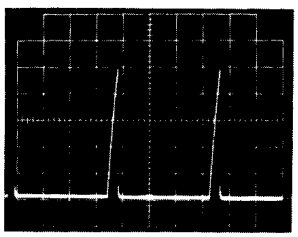
⑬ PIN44 REC/PB
2V/10ms. div.



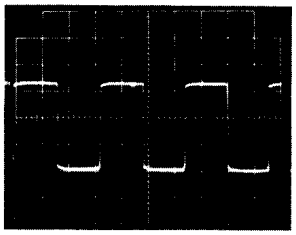
⑭ PIN45 REC/PB
0.5V/5ms. div.



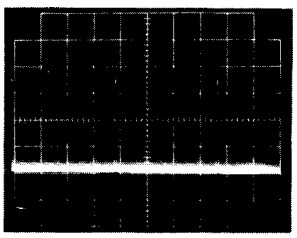
⑮ PIN46 REC/PB
0.5V/5ms. div.



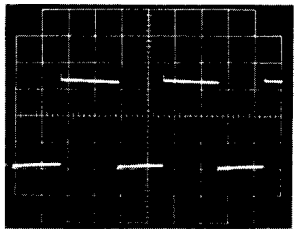
⑯ PIN50 REC/PB
1V/1ms. div.



⑰ PIN53 REC/PB
1V/5ms. div.



⑱ PIN59 REC
1V/10ms. div.



⑲ PIN60 REC
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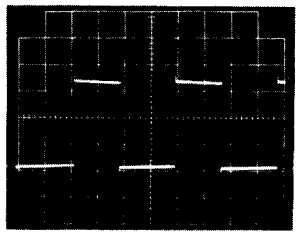
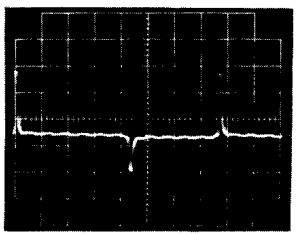


⑳ PIN62 PB
1V/5ms. div.



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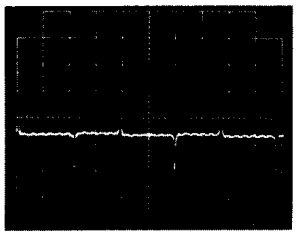
[IC601]

㉑ PIN63 PB
1V/10ms. div.



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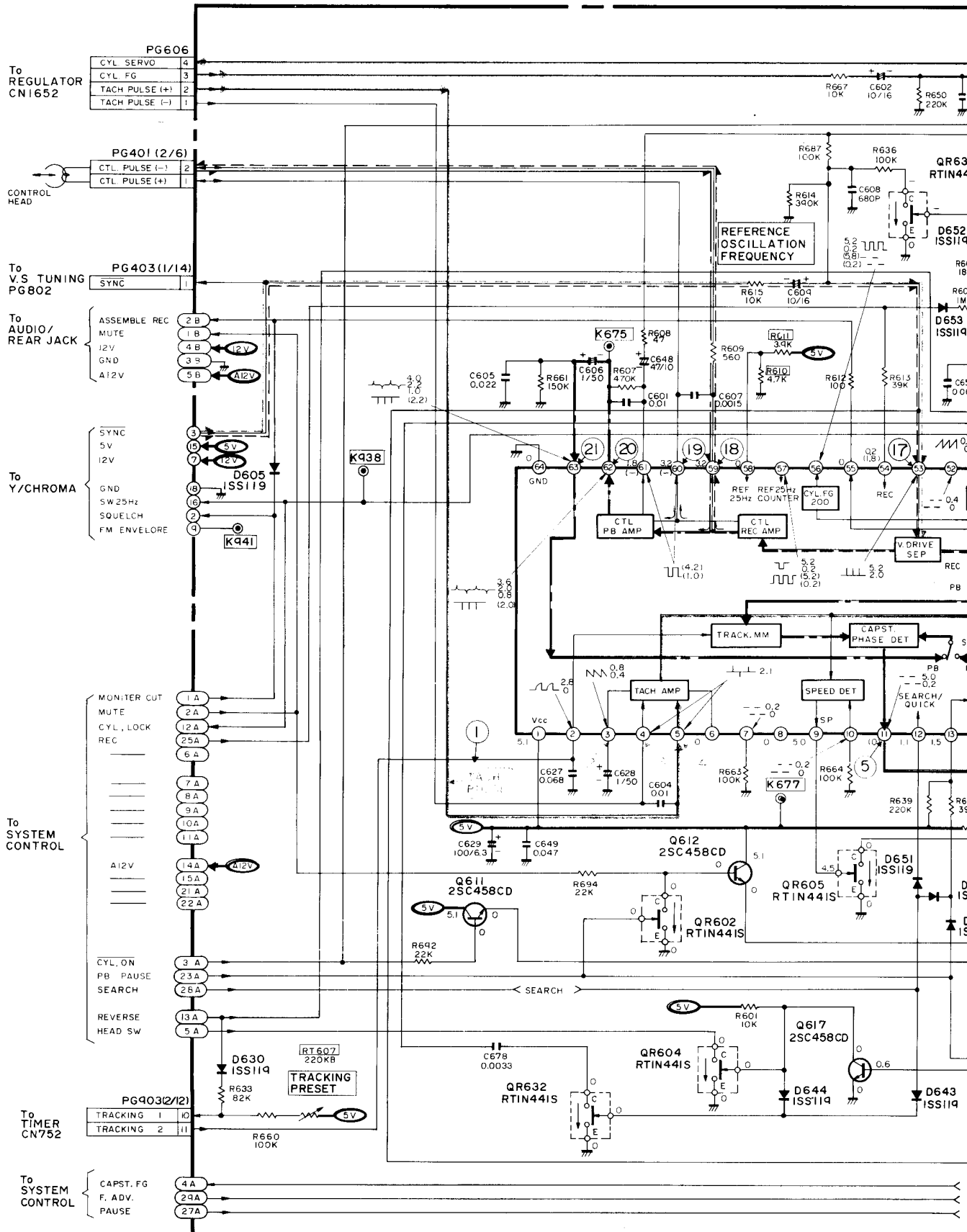
SERVO



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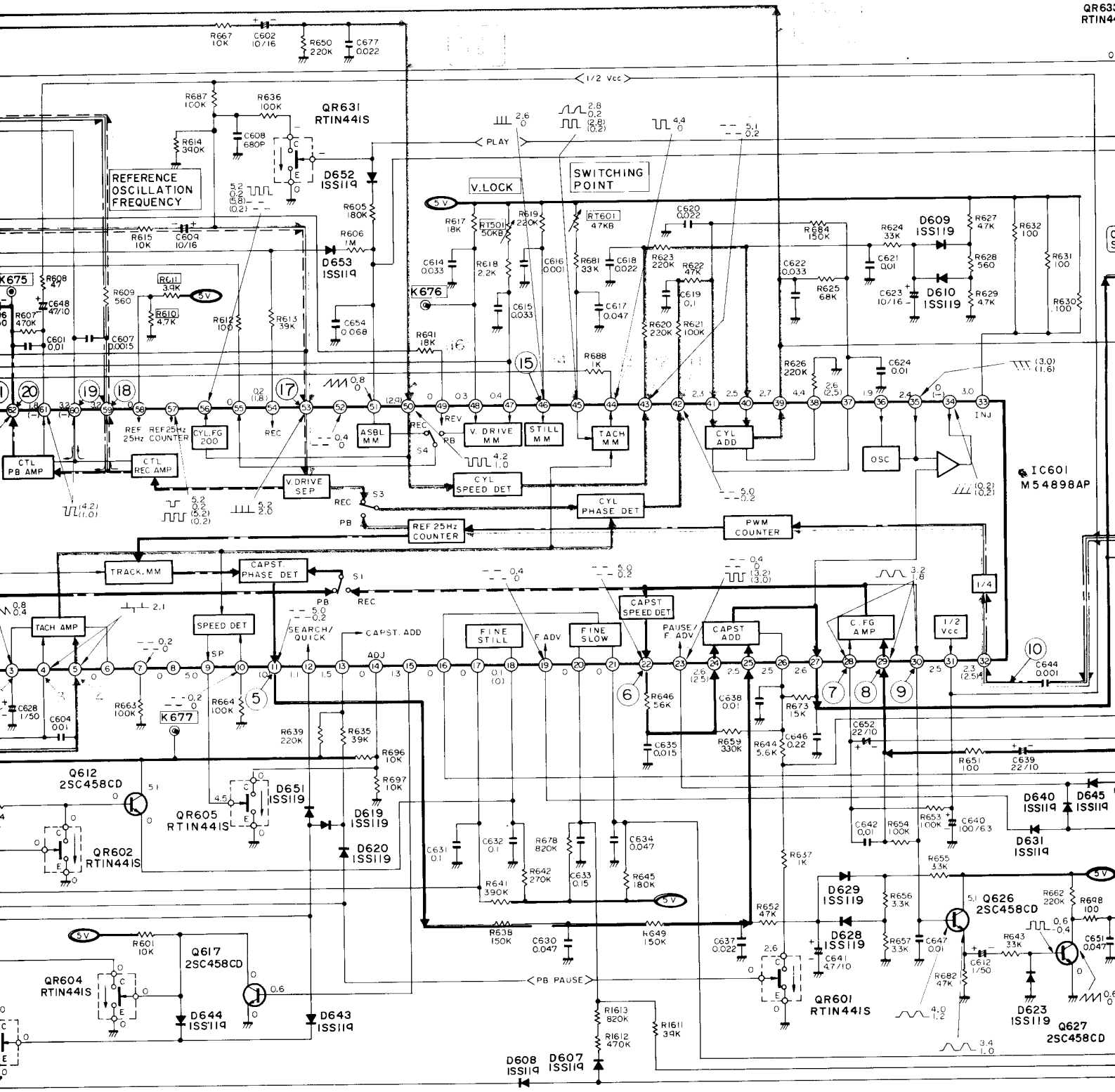

C MODE, TWO VOLTAGES : PB AND (REC) MODE.

MOTOR — PB CAPSTAN MOTOR — WAVEFORM — REC/PB CYLINDER MOTOR — REC CYLINDER MOTOR — PB CYLINDER

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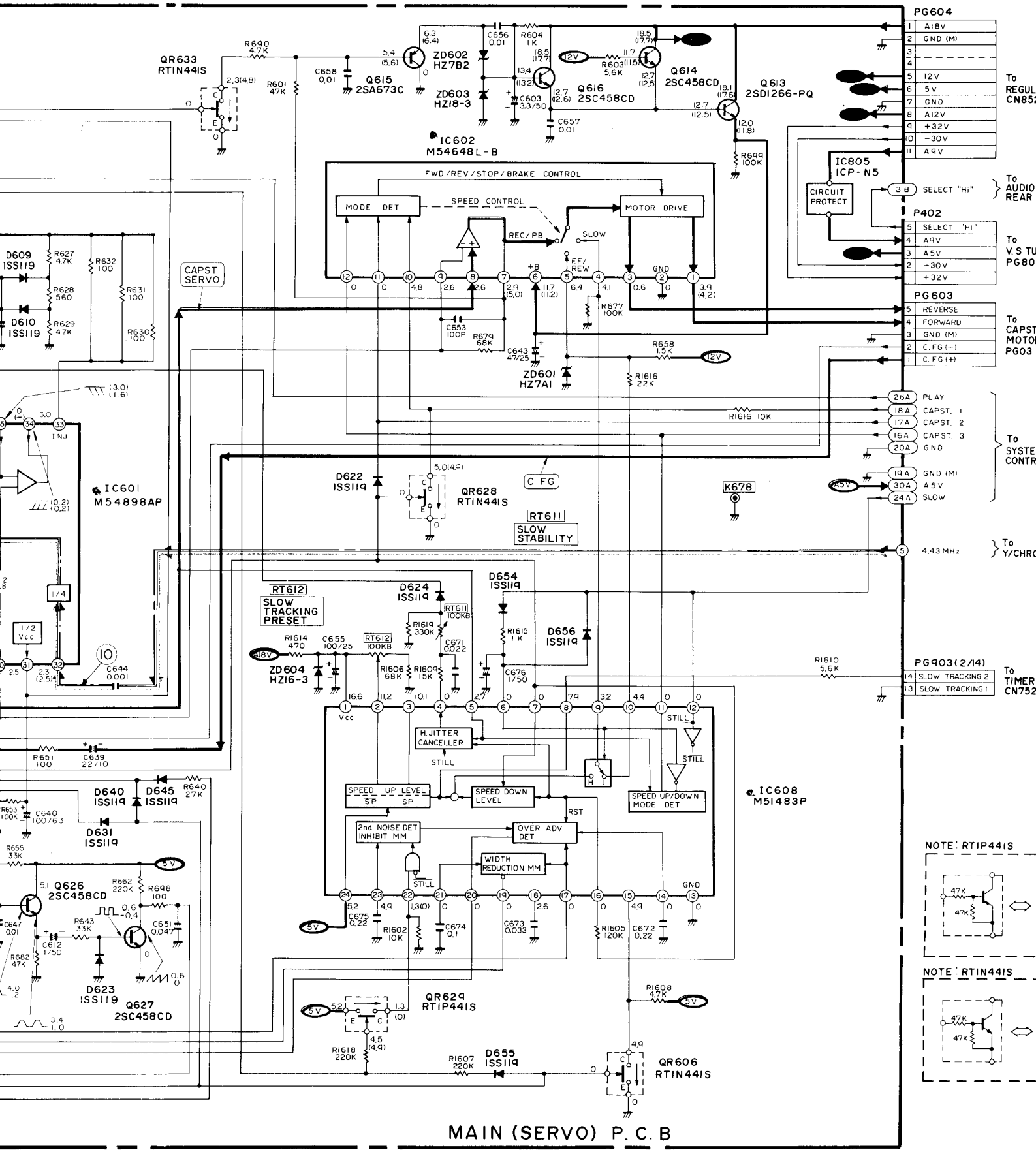

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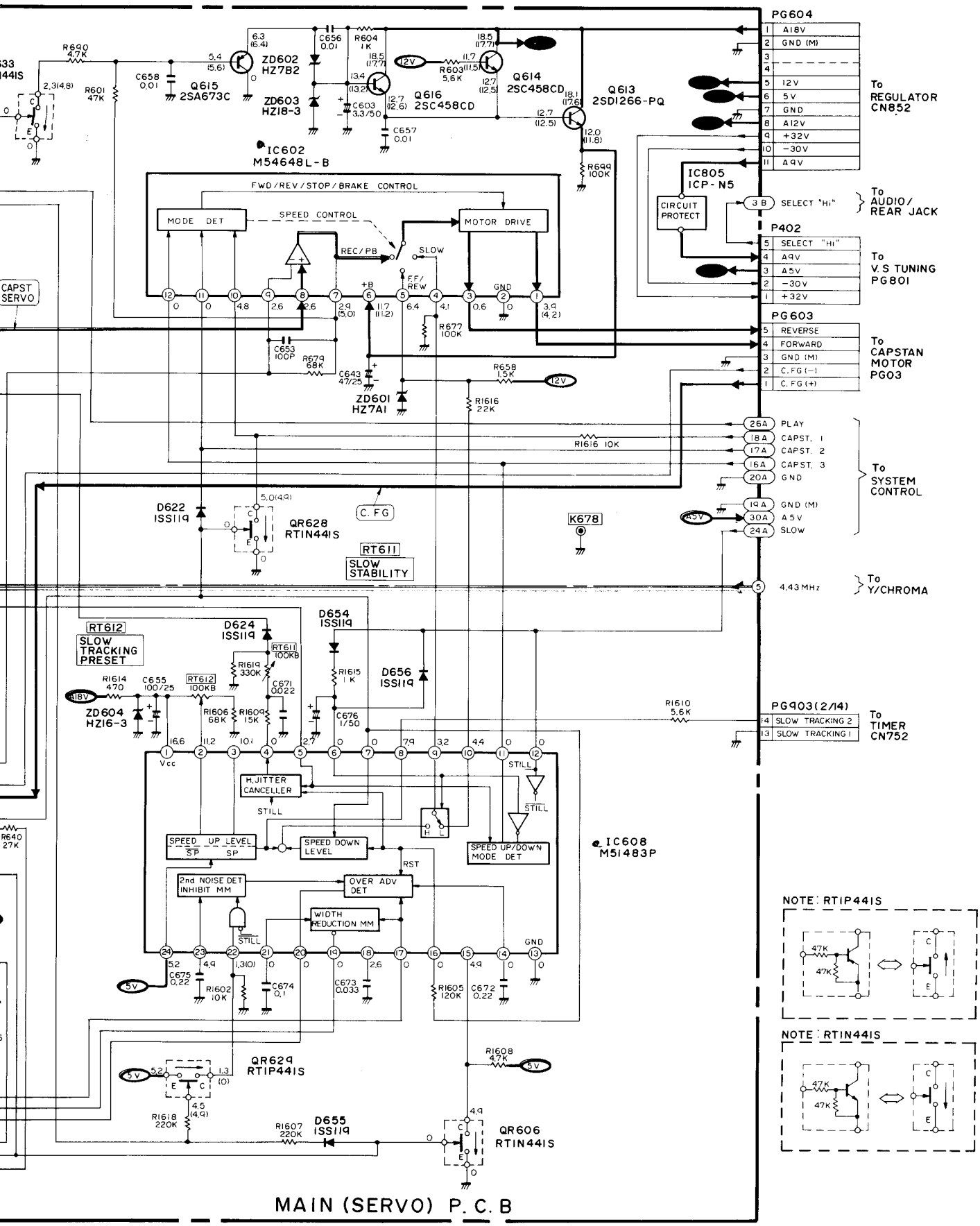

MOTOR WAVEFORM

8 9 10 11

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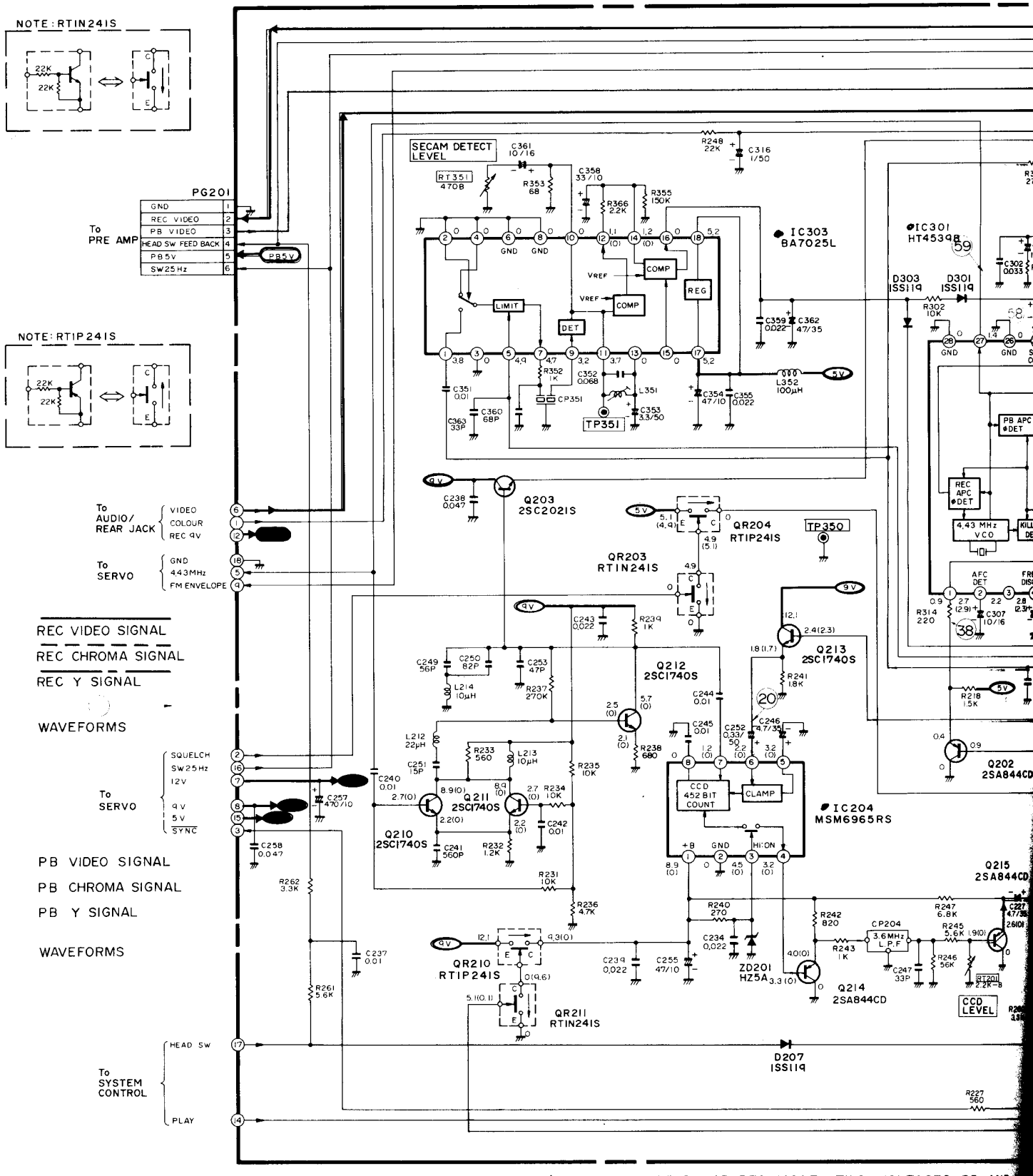
Y/CHROMA (LUMINANZ/CHROMANINANZ)



※ ONE VOLTAGE : PB OR REC MODE, TWO VOLTAGES : PB AND

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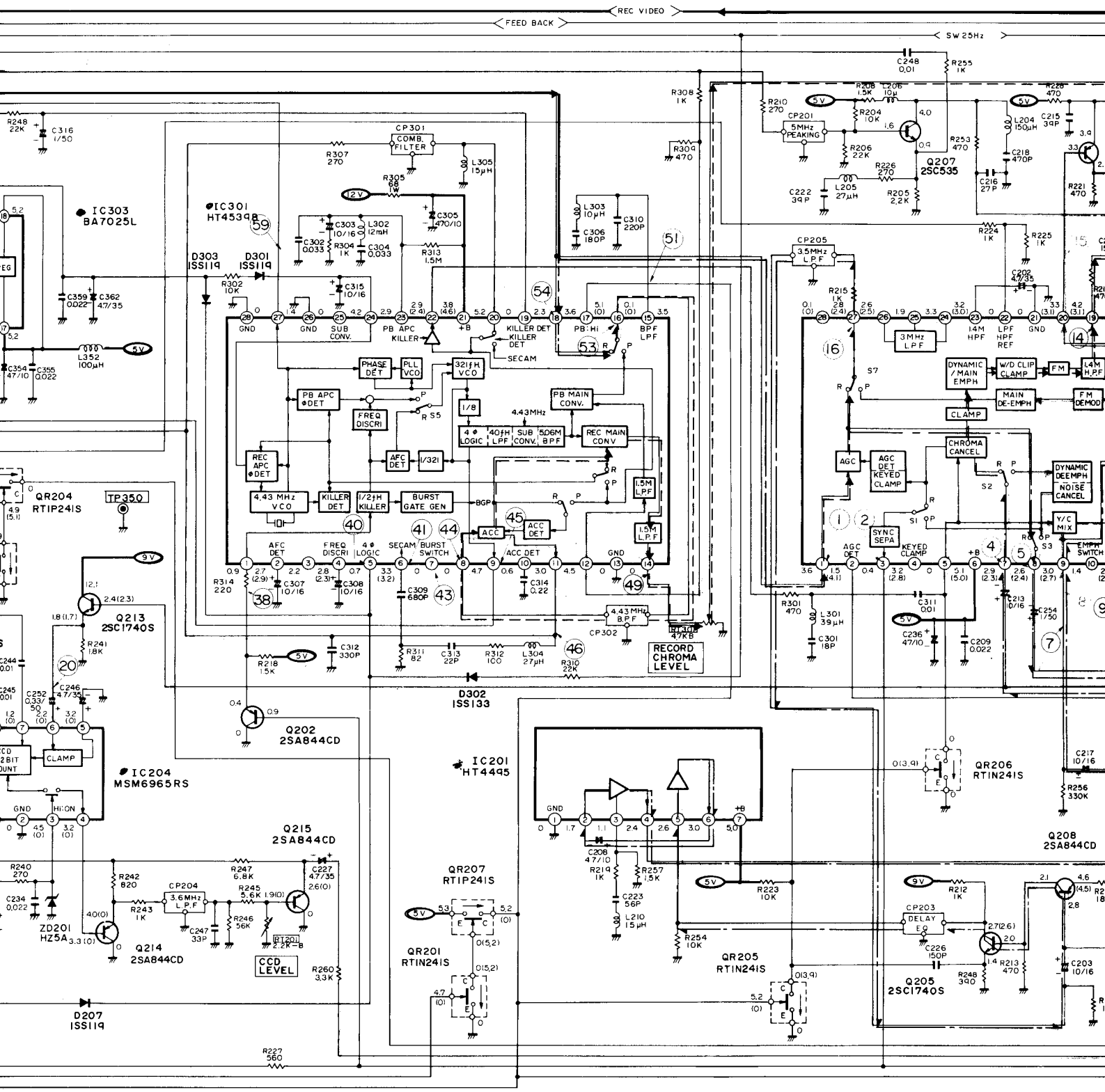

B OR REC MODE, TWO VOLTAGES : PB AND (REC) MODES.

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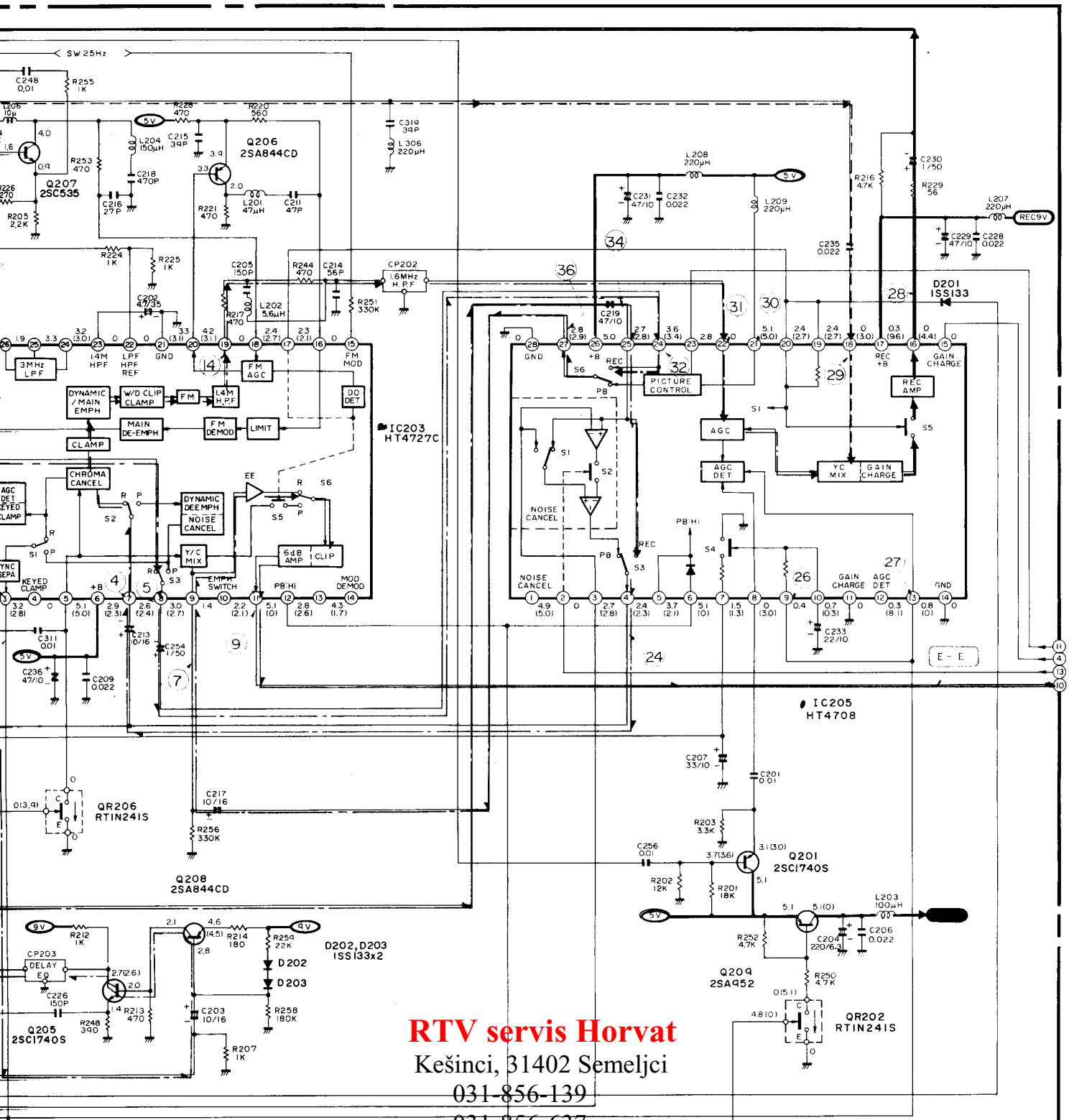

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Y / CHROMA P.C.B

7 8 9 10 11

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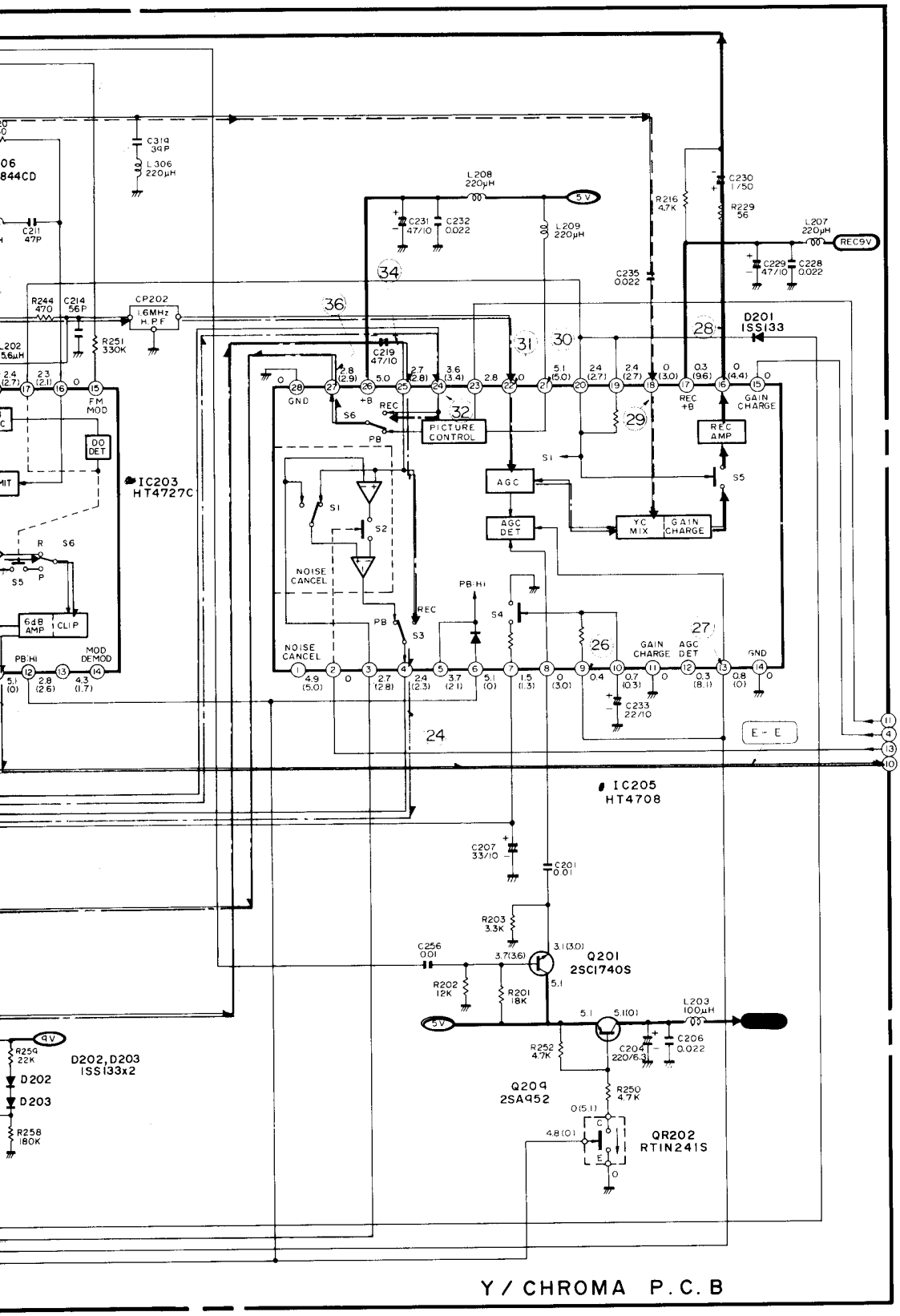

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TIMER/OPERATION SWITCH	5-13
SYSTEM CONTROL	5-19
REMOTE CONTROL	5-23
AUDIO/REAR JACK	5-25
RF CONVERTER	5-28
PREAMP	5-29
SERVO	5-38
Y/CHROMA	5-41
REGULATOR	5-50

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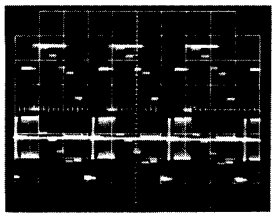
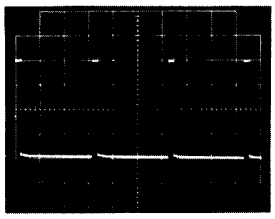
Y/CHROMA CIRCUIT WAVEFORMS (WELLENFORM)

[IC203] **(REC: Colour bar Video in/PB: Alignment tape)**

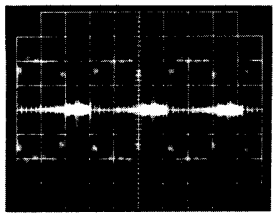
① PIN1 REC
0.1V/20μs. div.



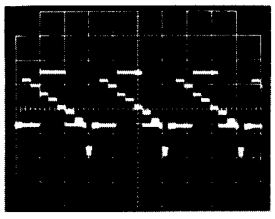
② PIN3 REC/PB
1V/20μs. div.



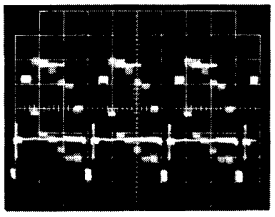
③ PIN5 PB
50mV/20μs. div.



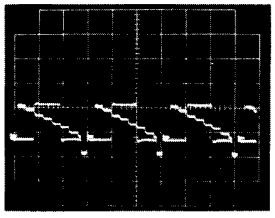
④ PIN7 REC/PB
0.1V/20μs. div.



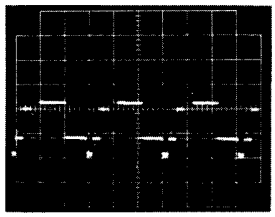
⑤ PIN8 REC
50mV/20μs. div.



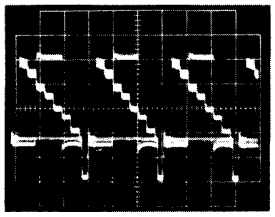
⑥ PIN8 PB
0.5V/20μs. div.



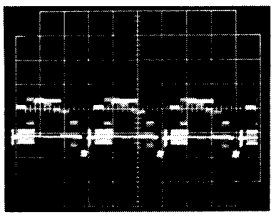
⑦ PIN9 REC
0.1V/20μs. div.



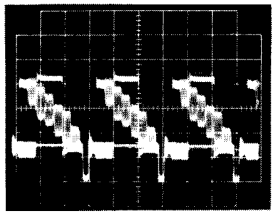
⑧ PIN9 PB
0.2V/20μs. div.



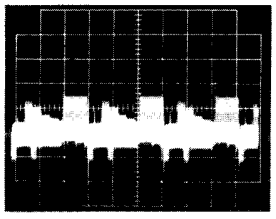
⑨ PIN11 REC
0.1V/20μs. div.



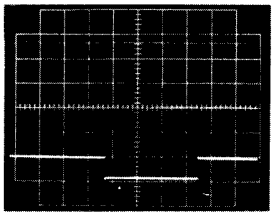
⑩ PIN11 PB
0.5V/20μs. div.



⑪ PIN14 PB
0.2V/20μs. div.

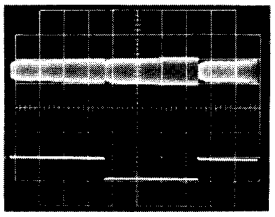


⑫ PIN16 PB
0.5V/5ms. div.



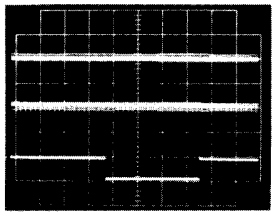
(SW25Hz: 5Vdiv.)

⑬ PIN18 PB
0.5V/5ms. div.



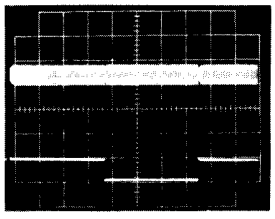
(SW25Hz: 5Vdiv.)

⑭ PIN19 REC
0.5V/5ms. div.



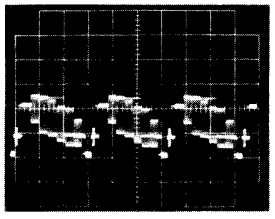
(SW25Hz: 5Vdiv.)

⑮ PIN20 PB
0.5V/5ms. div.

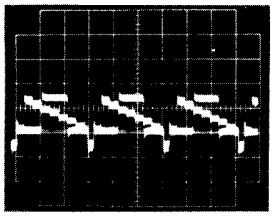


(SW25Hz: 5Vdiv.)

⑯ PIN27 REC
0.1V/20μs. div.



⑰ PIN27 PB
0.1V/20μs. div.



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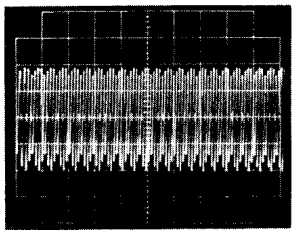
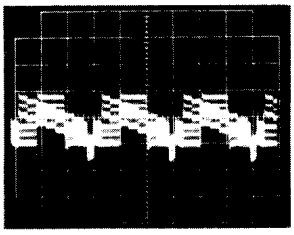
[IC204]

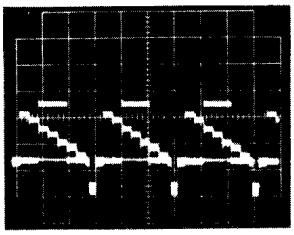
⑱ PIN3 PB
0.2V/0.5μs. div.



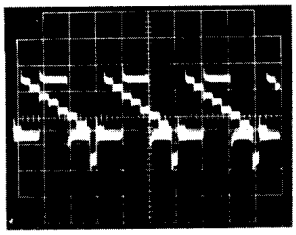
⑲ PIN4 PB
0.5V/20μs. div.



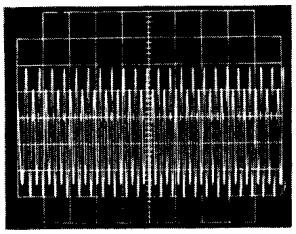
⑳ PIN6 REC
0.1V/20μs. div.



㉑ PIN6 PB
0.1V/20μs. div.

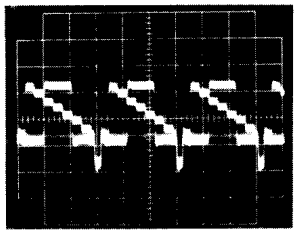


㉒ PIN7 PB
0.1V/0.5μs. div.

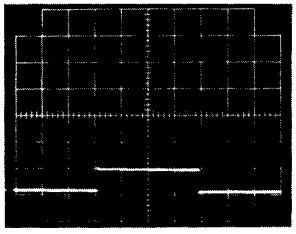


[IC205]

㉓ PIN3 PB
0.1V/20μs. div.

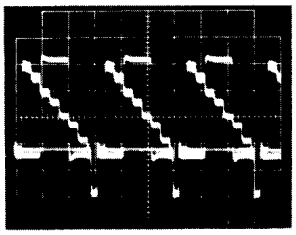


㉘ PIN16 REC
0.5V/5ms. div.

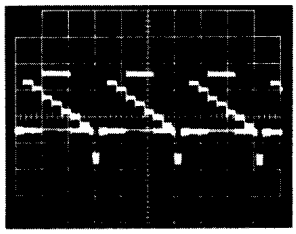


(SW25Hz: 5Vdiv.)

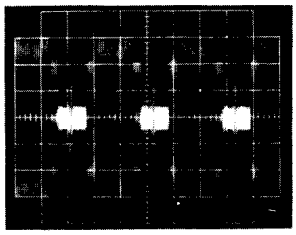
㉝ PIN24 PB
0.2V/20μs. div.



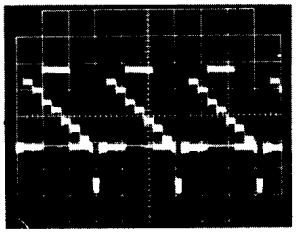
㉔ PIN 4 REC
10mV/20μs. div.



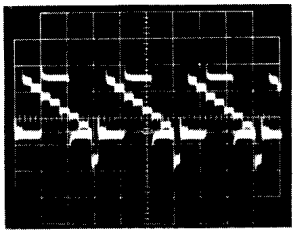
㉙ PIN18 REC
20mV/20μs. div.



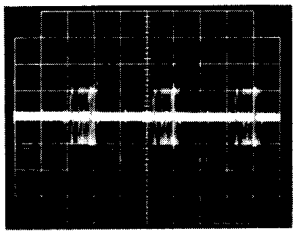
㉞ PIN25 REC
0.1V/20μs. div.



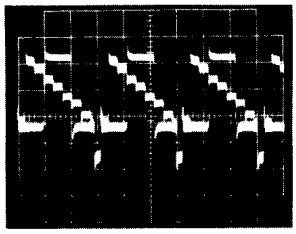
㉕ PIN4 PB
10mV/20μs. div.



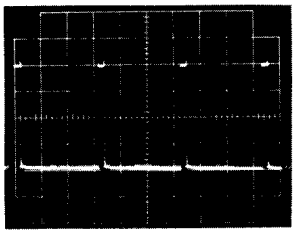
㉚ PIN21 REC
50mV/20μs. div.



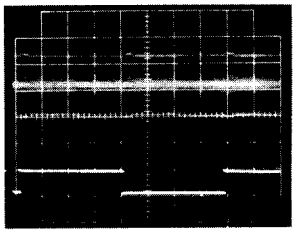
㉟ PIN25 PB
0.1V/20μs. div.



㉖ PIN9 REC/PB
1V/20μs. div.

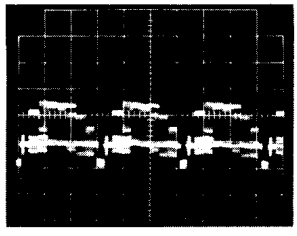


㉛ PIN22 REC
0.2V/5ms. div.

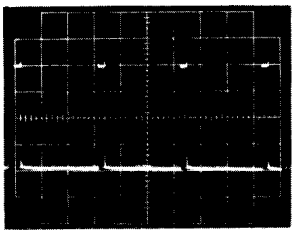


(SW25Hz: 5Vdiv.)

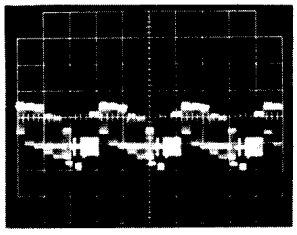
㊱ PIN27 REC
0.1V/20μs. div.



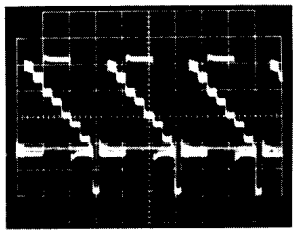
㉗ PIN13 REC/PB
1V/20μs. div.



㉜ PIN24 REC
0.1V/20μs. div.



㊲ PIN27 PB
0.2V/20μs. div.



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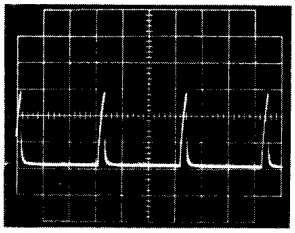
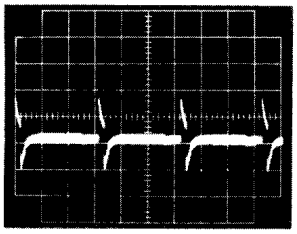
[IC301]

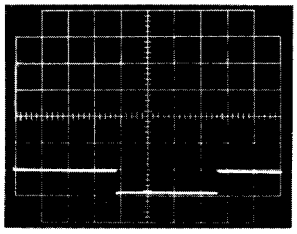
㊳ PIN1 REC
1V/20μs. div.



㊸ PIN7 REC/PB
0.1V/20μs. div.

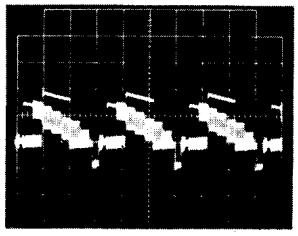


㊽ PIN12 PB
50mV/0.5ms. div.

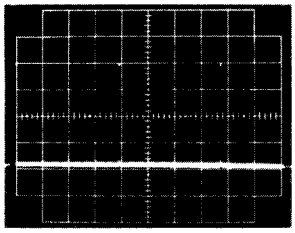


(SW25Hz: 5Vdiv.)

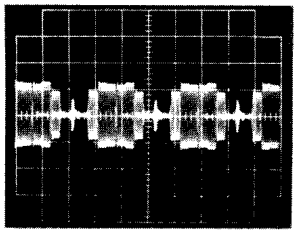
㊸ PIN16 REC
0.2V/20μs. div.



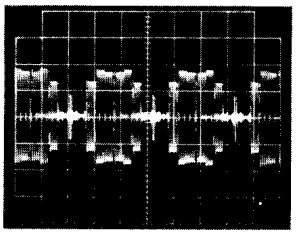
㊴ PIN1 PB
1V/0.5ms. div.



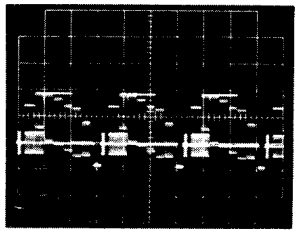
㊹ PIN8 REC/PB
50mV/20μs. div.



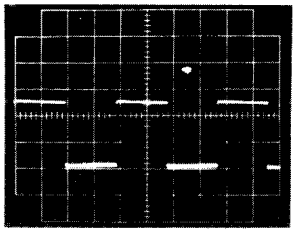
㊾ PIN14 REC
0.1V/20μs. div.



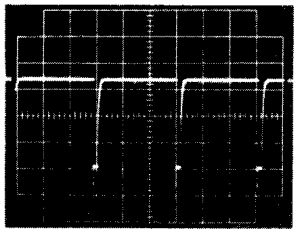
㊹ PIN18 REC
0.2V/20μs. div.



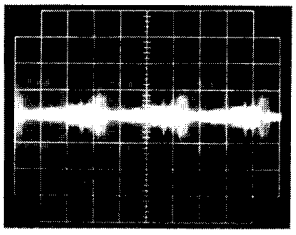
㊵ PIN5 REC/PB
0.5V/10ms. div.



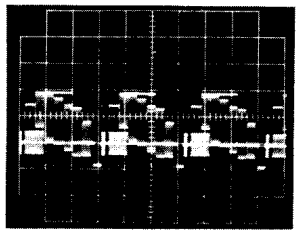
㊺ PIN9 REC/PB
1V/20μs. div.



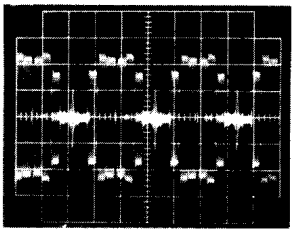
㊿ PIN14 PB
50mV/20μs. div.



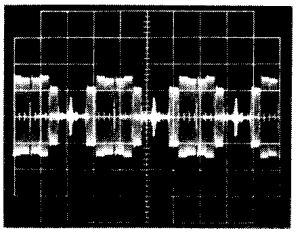
㊺ PIN18 PB
0.2V/20μs. div.



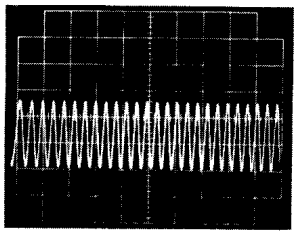
㊶ PIN6 REC
0.1V/20μs. div.



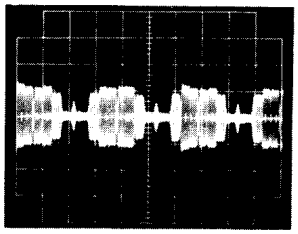
㊻ PIN11 REC
0.2V/20μs. div.



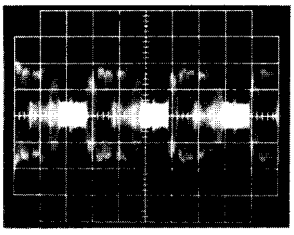
㊶ PIN15 REC
0.1V/0.5μs. div.



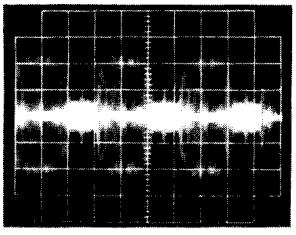
㊻ PIN20 PB
50mV/20μs. div.



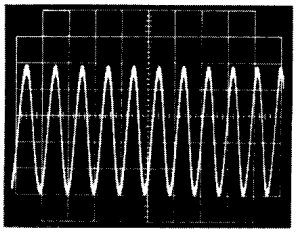
㊷ PIN6 PB
20mV/20μs. div.



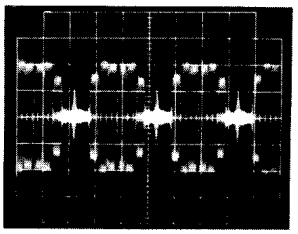
㊼ PIN11 PB
0.2V/20μs. div.



㊷ PIN15 PB
50mV/0.2μs. div.



㊼ PIN22 PB
0.1V/20μs. div.



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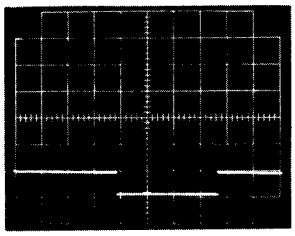
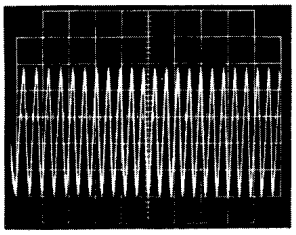
[IC301]

⑱ PIN25 PB
0.1V/5ms. div.



(SW25Hz: 5Vdiv.)

⑲ PIN27 REC/PB
50mV/0.5μs. div.



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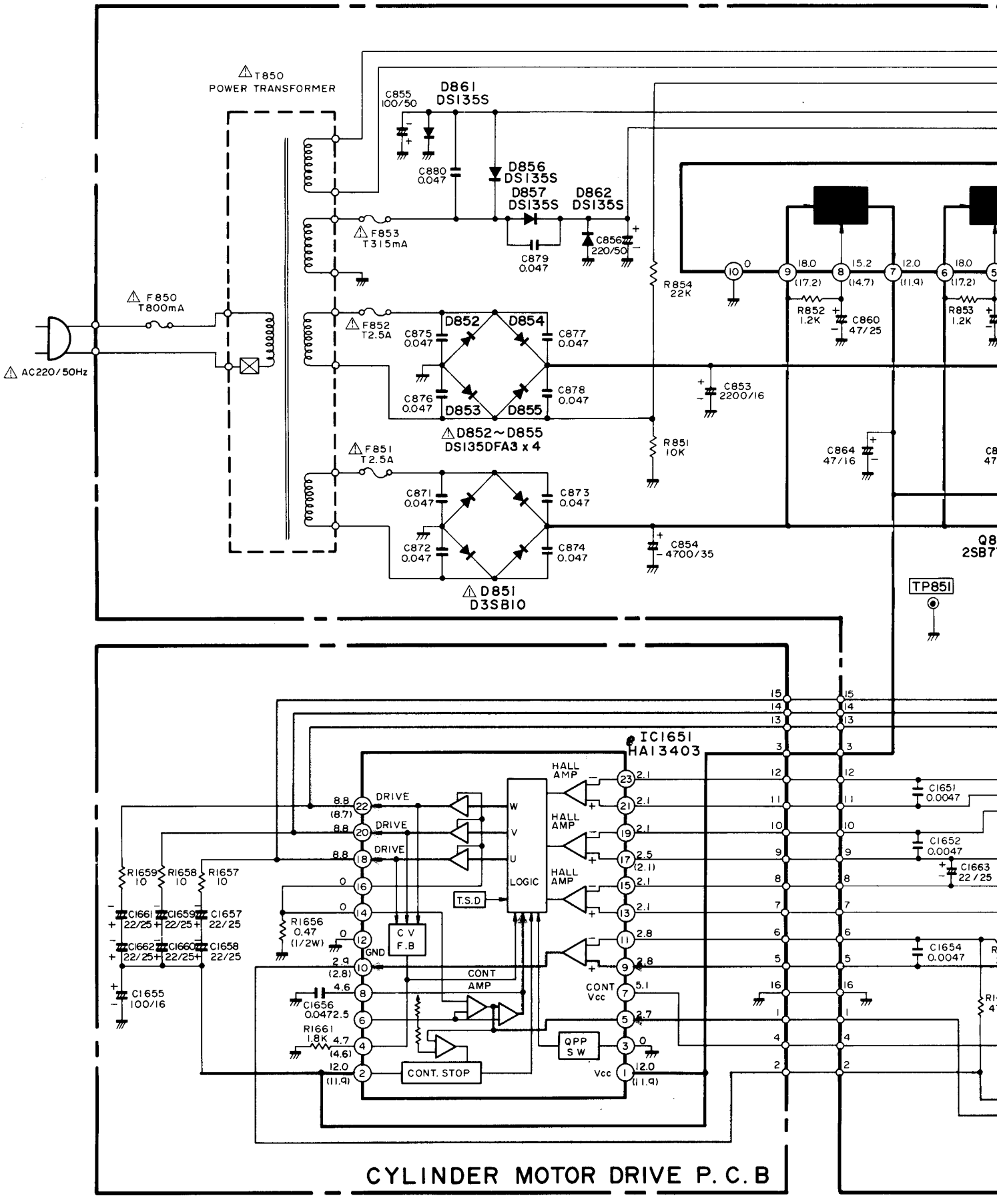
REGULATOR (REGLER)



CYLINDER MOTOR DRIVE P.C.B

※ ONE VOLTAGE : PB OR REC MODE. TWO VOLTAGES : PB AND (REC) M

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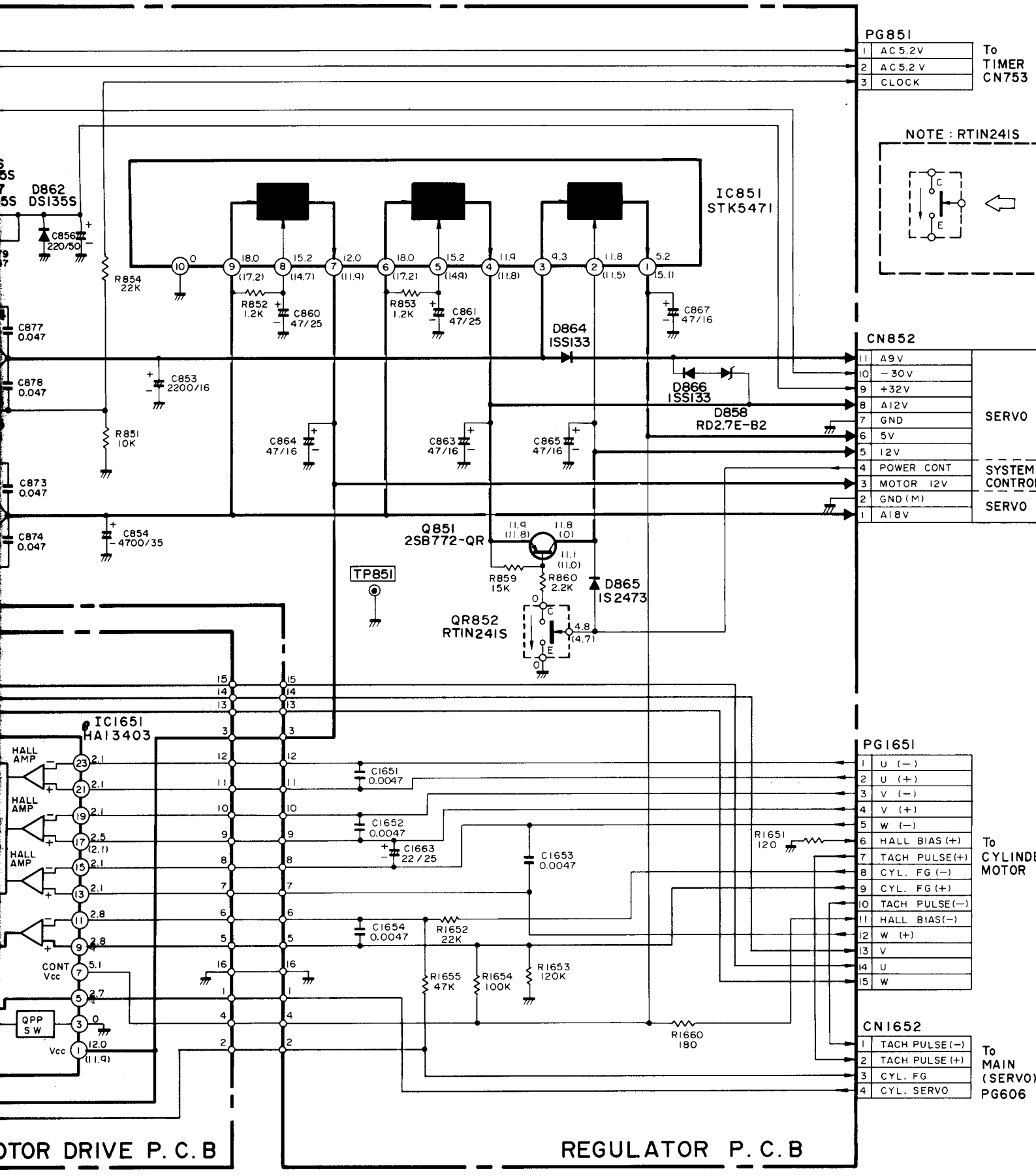

PB OR REC MODE. TWO VOLTAGES : PB AND (REC) MODE.

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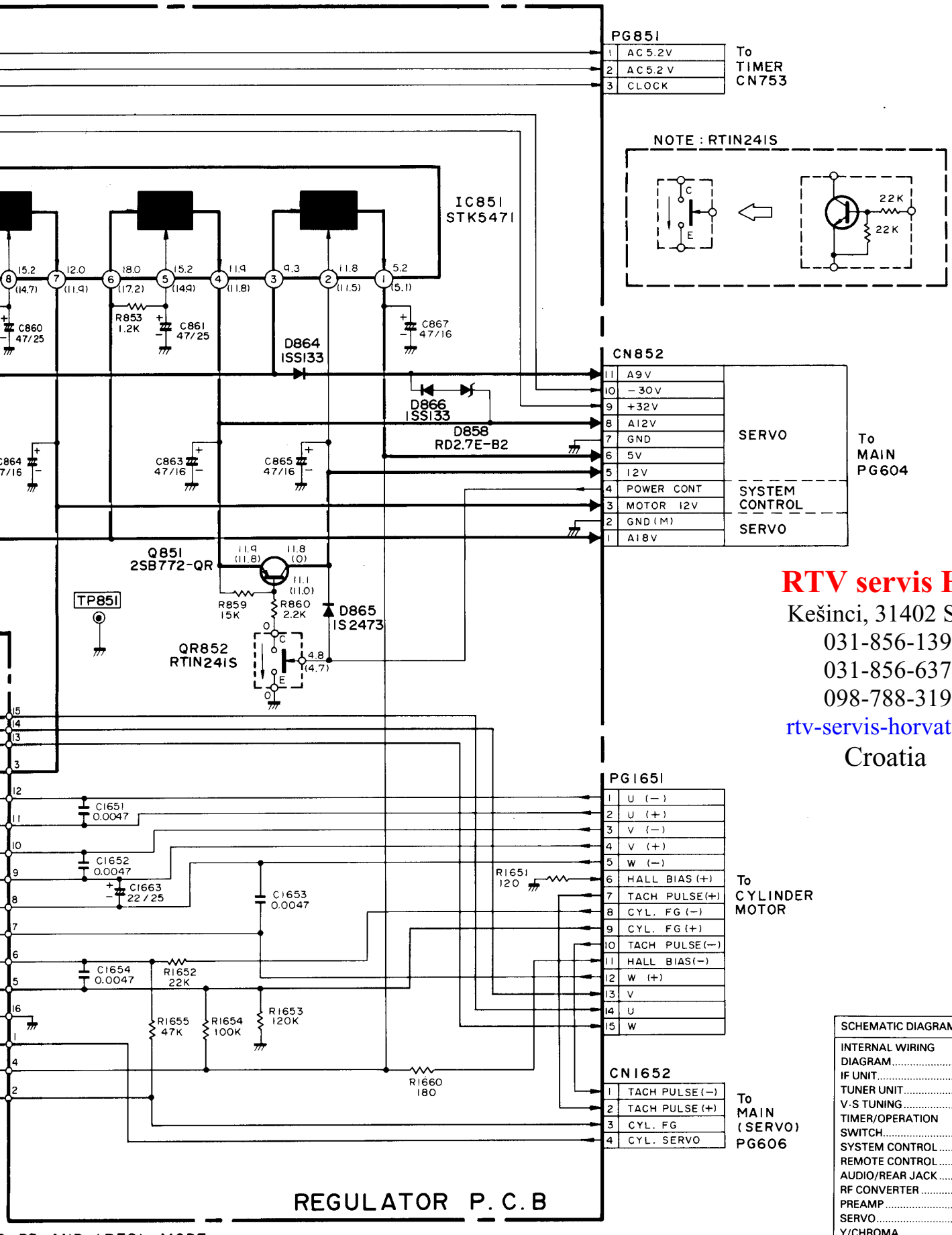

S : PB AND (REC) MODE.

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Croatia

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REGULATOR	5-50

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REPLACEMENT PARTS LIST (ERSATZTEILLISTE)

ELECTRICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C 201	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 206	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 209	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 211	0208356	CERAMIC DISC 47PF 50V
C 217	0256834	ELECTROLYTIC 10UF 16V
C 218	0208364	CERAMIC DISC 470PF+-10% 50V
C 221	0208353	CERAMIC DISC 27PF 50V
C 222	0208355	CERAMIC DISC 39PF+-5% 50V
C 223	0208360	CERAMIC DISC 100PF+-5% 50V
C 228	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 232	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 234	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 235	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 240	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 242	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 243	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 244	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 245	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 247	0208354	CERAMIC DISC 33PF+-5% 50V
C 248	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 249	0208357	CERAMIC DISC 56PF+-5% 50V
C 250	0208364	CERAMIC DISC 470PF+-10% 50V
C 251	0256650	ELECTROLYTIC 3300UF 6.3V
C 252	0256611	ELECTROLYTIC 0.33UF 50V
C 253	0208356	CERAMIC DISC 47PF 50V
C 256	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 257	0256194	ELECTROLYTIC 470MF,10V
C 301	0208351	CERAMIC DISC 18PF 50V
C 305	0256194	ELECTROLYTIC 470MF,10V
C 309	0208365	CERAMIC DISC 680PF+-10% 50V
C 310	0208362	CERAMIC DISC 220PF+-10% 50V
C 311	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 313	0208352	CERAMIC DISC 22PF 50V
C 317	0208355	CERAMIC DISC 39PF+-5% 50V
C 351	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 355	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 359	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 360	0208358	CERAMIC DISC 68PF+-5% 50V
C 410	0256622	ELECTROLYTIC 33MF,16V
C 412	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 413	0208368	CERAMIC DISC 1500PF+-20% 50V
C 416	0208367	CERAMIC DISC 1000PF+-10% 50V
C 423	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 425	0256603	ELECTROLYTIC 220UF 16V
C 426	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 428	0208365	CERAMIC DISC 680PF+-10% 50V
C 431	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 433	0256614	ELECTROLYTIC 10UF,16V
C 452	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 502	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 506	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 508	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 510	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 512	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 513	0256789	CAPACITOR 470UF 10V ELECTROLYTIC
C 523	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 524	0256782	CAPACITOR 220UF 10V ELECTROLYTIC
C 527	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 529	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 604	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 607	0208368	CERAMIC DISC 1500PF+-20% 50V
C 608	0208365	CERAMIC DISC 680PF+-10% 50V
C 616	0208367	CERAMIC DISC 1000PF+-10% 50V
C 618	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 620	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 621	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 624	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 637	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 638	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 641	0256475	TANTALUM 4.7UF+-30% 10V
C 642	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 644	0208367	CERAMIC DISC 1000PF+-10% 50V
C 653	0208360	CERAMIC DISC 100PF+-5% 50V
C 656	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 657	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 658	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 677	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 751	0256488	CAPACITOR 22UF 5V
C 752	0256626	ELECTROLYTIC 47MF,6.3V
C 753	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 754	0256626	ELECTROLYTIC 47MF,6.3V
C 755	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 756	0256606	ELECTROLYTIC 1MF,50V
C 757	0256612	ELECTROLYTIC 0.47UF 50V
C 760	0256626	ELECTROLYTIC 47MF,6.3V
C 761	0256612	ELECTROLYTIC 0.47UF 50V
C 763	0208348	CERAMIC DISC 10PF+-5% 50V
C 770	5058562	TRIMMER 22PF
C 801	0208357	CERAMIC DISC 56PF+-5% 50V
C 805	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 810	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 815	0208360	CERAMIC DISC 100PF+-5% 50V
C 816	0208354	CERAMIC DISC 33PF+-5% 50V
C 817	0208354	CERAMIC DISC 33PF+-5% 50V
C 819	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 821	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 825	0256180	CAPACITOR 1UF 50V ELECTROLYTIC
C 827	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 830	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 854	0256657	ELECTROLYTIC 4700UF 35V
C 856	0256635	ELECTROLYTIC 220UF 50V
C 860	0256607	ELECTROLYTIC 47UF 25V
C 861	0256607	ELECTROLYTIC 47UF 25V
C 863	0256627	ELECTROLYTIC 47MF,16V

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SYMBOL-NO	P-NO	DESCRIPTION
C 864	0256627	ELECTROLYTIC 47MF,16V
C 865	0256627	ELECTROLYTIC 47MF,16V
C 867	0256627	ELECTROLYTIC 47MF,16V
C 901	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 902	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 903	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 904	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 906	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 907	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 908	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 909	0208354	CERAMIC DISC 33PF+-5% 50V
C 910	0208354	CERAMIC DISC 33PF+-5% 50V
C 912	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 913	0208374	CERAMIC DISC 0.01UF+-20% 50V
C 921	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 922	0208375	CERAMIC DISC 0.022UF+-10% 50V
C 923	0208375	CERAMIC DISC 0.022UF+-10% 50V
C1657	0256618	ELECTROLYTIC 22UF 25V
C1658	0256618	ELECTROLYTIC 22UF 25V
C1659	0256618	ELECTROLYTIC 22UF 25V
C1660	0256618	ELECTROLYTIC 22UF 25V
C1661	0256618	ELECTROLYTIC 22UF 25V
C1662	0256618	ELECTROLYTIC 22UF 25V
C1663	0256618	ELECTROLYTIC 22UF 25V
C1665	0256196	CAPACITOR 100UF 16V ELECTROLYTIC
		RESISTORS
R 305	0171015	METAL FILM 680HM+-5% 1W
RT 201	5007445	RESISTOR SEMI VARIABLE 2.2K OHM
RT 301	5007434	RESISTOR SEMI VARIABLE 4.7K OHM
RT 351	5007431	RESISTOR SEMI VARIABLE 470 OHM
RT 401	5007899	SEMI VARIABLE 47KOHM
RT 402	5007901	SEMI VARIABLE 100KOHM
RT 501	5009142	RESISTOR VARIABLE 50KOHM
RT 601	5007899	SEMI VARIABLE 47KOHM
RT 607	5007902	SEMI VARIABLE 220KOHM
RT 611	5007901	SEMI VARIABLE 100KOHM
RT 612	5007901	SEMI VARIABLE 100KOHM
RV 751	5027225	RESISTOR VARIABLE 10KOHM
RV 752	5009131	VARIABLE 500KOHM
RV 753	5009132	VARIABLE 20KOHM
R1656	0149705	RESISTOR METAL OXIDE 470 OHM
		SEMI-CONDUCTORS
D 201	5331592	DIODE 1SS133
D 202	5331592	DIODE 1SS133
D 204	5339071	DIODE 1SS119-T
D 207	5339071	DIODE 1SS119-T
D 208	5339071	DIODE 1SS119-T
D 301	5339071	DIODE 1SS119-T
D 302	5339071	DIODE 1SS119-T
D 303	5339071	DIODE 1SS119-T

SYMBOL-NO	P-NO	DESCRIPTION
D 401	5339091	DIODE DAN209S
D 402	5339071	DIODE 1SS119-T
D 403	5339071	DIODE 1SS119-T
D 404	5339071	DIODE 1SS119-T
D 502	5339071	DIODE 1SS119-T
D 503	5339071	DIODE 1SS119-T
D 504	5339071	DIODE 1SS119-T
D 505	5339071	DIODE 1SS119-T
D 506	5339071	DIODE 1SS119-T
D 507	5339071	DIODE 1SS119-T
D 508	5339071	DIODE 1SS119-T
D 605	5339071	DIODE 1SS119-T
D 607	5339071	DIODE 1SS119-T
D 608	5339071	DIODE 1SS119-T
D 609	5339071	DIODE 1SS119-T
D 610	5339071	DIODE 1SS119-T
D 619	5339071	DIODE 1SS119-T
D 620	5339071	DIODE 1SS119-T
D 622	5339071	DIODE 1SS119-T
D 623	5339071	DIODE 1SS119-T
D 624	5339071	DIODE 1SS119-T
D 628	5339071	DIODE 1SS119-T
D 629	5339071	DIODE 1SS119-T
D 630	5339071	DIODE 1SS119-T
D 640	5339071	DIODE 1SS119-T
D 643	5339071	DIODE 1SS119-T
D 644	5339071	DIODE 1SS119-T
D 645	5339071	DIODE 1SS119-T
D 651	5339071	DIODE 1SS119-T
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D 653	5339071	DIODE 1SS119-T
D 654	5339071	DIODE 1SS119-T
D 655	5339071	DIODE 1SS119-T
D 656	5339071	DIODE 1SS119-T
D 751	5339021	DIODE 1SS133
D 752	5339021	DIODE 1SS133
D 753	5339021	DIODE 1SS133
D 754	5339021	DIODE 1SS133
D 760	5339021	DIODE 1SS133
D 764	5381211	LED SLR-34UR5
D 801	5332681	DIODE 1SS 119-P
D 802	5339071	DIODE 1SS119-T
D 803	5339071	DIODE 1SS119-T
D 804	5339071	DIODE 1SS119-T
D 805	5339071	DIODE 1SS119-T
D 806	5339071	DIODE 1SS119-T
⚠ D 851	5332741	DIODE D3SB10
⚠ D 852	5331671	DIODE DS135D-FA3
⚠ D 853	5331671	DIODE DS135D-FA3
⚠ D 854	5331671	DIODE DS135D-FA3
⚠ D 855	5331671	DIODE DS135D-FA3
D 856	5331671	DIODE DS135D-FA3
D 857	5331671	DIODE DS135D-FA3

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SYMBOL-NO	P-NO	DESCRIPTION
D 858	5331588	DIODE RD2.7E-B2
D 861	5331671	DIODE DS135D-FA3
D 862	5331671	DIODE DS135D-FA3
D 864	5339021	DIODE 1SS133
D 865	5330571	DIODE 1S2473VE SI 100MHZ 250MW 10NS
D 866	5331592	DIODE 1SS133
D 903	5339071	DIODE 1SS119-T
D 904	5339071	DIODE 1SS119-T
D 914	5339071	DIODE 1SS119-T
IC 201	5370821	IC HT4495
IC 203	5370844	IC HT4727C
IC 204	5362262	IC MSM6965RS
IC 205	5370501	IC HT4708
IC 301	5370273	IC HT4539B
IC 303	5366641	IC BA7025L
IC 401	5366331	IC UPC1533HA
IC 402	5364931	IC BA5115L
IC 403	5369431	IC LA7016
IC 501	5369431	IC LA7016
IC 601	5367302	IC M54898AP
IC 602	5369913	IC M54648L-B
IC 608	5366992	IC M51483P
IC 751	5361997	IC HD 614045-SE34
IC 801	5361834	IC M50161-354SP
IC 802	5366132	IC LA7934
IC 803	5361071	IC M58657P
IC 804	5721802	IC PROTECTER
IC 805	5721802	IC PROTECTER
IC 851	5353651	IC STK5471
IC 901	5361812	IC HD614042SD37
IC 902	5367111	IC M54649L
IC 903	5365673	IC NJM2901N
IC1651	5355582	IC HA13403
Q 201	5327062	TRANSISTOR 2SC1740S-R
Q 202	5321255	TRANSISTOR 2SA844CD SILICON 200MHZ 0.3W
Q 203	5327062	TRANSISTOR 2SC1740S-R
Q 205	5327062	TRANSISTOR 2SC1740S-R
Q 206	5321255	TRANSISTOR 2SA844CD SILICON 200MHZ 0.3W
Q 207	0573511	TRANSISTOR 2SC535C SILICON 700MHZ 100MW
Q 208	5321255	TRANSISTOR 2SA844CD SILICON 200MHZ 0.3W
Q 209	5322732	TRANSISTOR 2SA952ML2 SILICON 160MHZ 0.6W
Q 210	5327062	TRANSISTOR 2SC1740S-R
Q 211	5327062	TRANSISTOR 2SC1740S-R
Q 212	5327062	TRANSISTOR 2SC1740S-R
Q 213	5327062	TRANSISTOR 2SC1740S-R
Q 214	5321255	TRANSISTOR 2SA844CD SILICON 200MHZ 0.3W
Q 215	5321255	TRANSISTOR 2SA844CD SILICON 200MHZ 0.3W
Q 401	5327101	TRANSISTER 2SC3553BC
Q 402	5327031	TRANSISTOR 2SA673C-TB
Q 431	5327031	TRANSISTOR 2SA673C-TB
Q 502	5327031	TRANSISTOR 2SA673C-TB
Q 504	5322732	TRANSISTOR 2SA952ML2 SILICON 160MHZ 0.6W
Q 611	5327001	TRANSISTOR 2SC458CD-TB
Q 612	5327001	TRANSISTOR 2SC458CD-TB
Q 613	5323461	TRANSISTOR 2SD1266PQ
Q 614	5327001	TRANSISTOR 2SC458CD-TB
Q 615	5327031	TRANSISTOR 2SA673C-TB
Q 616	5327001	TRANSISTOR 2SC458CD-TB
Q 617	5327001	TRANSISTOR 2SC458CD-TB
Q 626	5327001	TRANSISTOR 2SC458CD-TB
Q 627	5327001	TRANSISTOR 2SC458CD-TB
Q 751	5321663	TRANSISTOR 2SC2021RS SILICON 180MHZ 0.3W
Q 754	5321663	TRANSISTOR 2SC2021RS SILICON 180MHZ 0.3W
Q 755	5321663	TRANSISTOR 2SC2021RS SILICON 180MHZ 0.3W
Q 802	5323903	TRANSISTOR 2SC1740S-RS
Q 803	5327001	TRANSISTOR 2SC458CD-TB
Q 808	5321214	TRANSISTOR 2SD468BC SILICON 190MHZ 0.9W
Q 810	5327031	TRANSISTOR 2SA673C-TB
Q 811	5327031	TRANSISTOR 2SA673C-TB
Q 814	5327062	TRANSISTOR 2SC1740S-R
Q 851	5323334	TRANSISTOR 2SB772-QR
Q 904	5327001	TRANSISTOR 2SC458CD-TB
QR 201	5327081	TRANSISTOR RT1N241S
QR 202	5327081	TRANSISTOR RT1N241S
QR 203	5327081	TRANSISTOR RT1N241S
QR 204	5327083	TRANSISTER RT1P241S
QR 205	5327081	TRANSISTOR RT1N241S
QR 206	5327081	TRANSISTOR RT1N241S
QR 207	5327081	TRANSISTOR RT1N241S
QR 210	5327083	TRANSISTER RT1P241S
QR 211	5327081	TRANSISTOR RT1N241S
QR 432	5327081	TRANSISTOR RT1N241S
QR 501	5327084	TRANSISTER RT1P441S
QR 502	5327082	TRANSISTOR RT1N441S
QR 505	5327082	TRANSISTOR RT1N441S
QR 506	5327082	TRANSISTOR RT1N441S
QR 601	5324092	TRANSISTOR RT1N441S
QR 602	5324092	TRANSISTOR RT1N441S
QR 604	5324092	TRANSISTOR RT1N441S
QR 605	5324092	TRANSISTOR RT1N441S
QR 606	5324092	TRANSISTOR RT1N441S
QR 628	5324092	TRANSISTOR RT1N441S
QR 629	5324094	TRANSISTOR RT1P441S
QR 631	5324092	TRANSISTOR RT1N441S
QR 632	5324092	TRANSISTOR RT1N441S
QR 633	5324092	TRANSISTOR RT1N441S
QR 758	5324092	TRANSISTOR RT1N441S
QR 801	5327082	TRANSISTOR RT1N441S
QR 804	5327082	TRANSISTOR RT1N441S
QR 812	5327082	TRANSISTOR RT1N441S
QR 852	5324091	TRANSISTOR RT1N241S
ZD 201	5331014	DIODE HZ5A SI ZENER
ZD 601	5339105	DIODE HZ7A1
ZD 602	5339101	DIODE HZ7B2
ZD 603	5331271	DIODE HZ18-3
ZD 751	5332633	ZENNER DIODE RD4R7JSB1-2

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SYMBOL-NO	P-NO	DESCRIPTION
ZD 752	5330322	DIODE HZ9B SI ZENER 1MHZ 0.4W
ZD 753	5331588	DIODE RD2.7E-B2
ZD 801	5366151	IC UPC574J
ZD 802	5339102	DIODE HZ5A
ZD 803	5331274	DIODE ZENNER
		TRANSFORHERS
T 401	5262531	BIAS COIL
		COILS
L 201	5153039	CHOKE COIL 47UH
L 202	5152321	CHOKE COIL 5.6MICRO H
L 203	5152337	CHOKE COIL 100UH+-10%
L 204	5152339	CHOKE COIL 150UH+-10%
L 205	5153036	CHOKE COIL 27UH
L 206	5153001	CHOKE COIL 10UH
L 207	5159082	CHOKE COIL 220UH+-10%
L 208	5159082	CHOKE COIL 220UH+-10%
L 209	5159158	CHOKE COIL 220UH
L 210	5159143	CHOKE COIL 15UH
L 211	5159082	CHOKE COIL 220UH+-10%
L 212	5159145	CHOKE COIL 22UH
L 213	5159141	CHOKE COIL 10UH
L 214	5159141	CHOKE COIL 10UH
L 301	5153038	CHOKE COIL 39UH
L 302	5150577	CHOCK COIL 12MH
L 303	5153031	CHOKE COIL 10UH
L 304	5159146	CHOKE COIL 27UH
L 305	5153033	CHOKE COIL 15UH
L 306	5152342	CHOKE COIL 220UH+-10%
L 351	5120849	TRAP COIL
L 352	5152337	CHOKE COIL 100UH+-10%
L 401	5152349	CHOKE COIL 820MH
L 403	5159111	CHOKE COIL 5600UH
L 404	5159111	CHOKE COIL 5600UH
L 501	5159158	CHOKE COIL 220UH
L 502	5159154	CHOKE COIL 100UH
L 503	5159154	CHOKE COIL 100UH
L 901	5159077	CHOKE COIL 100UH+-10%
		CRYSTALS
X 751	5781611	CRYSTAL
X 801	5781121	XTAL
		MISCELLANEOUS
BZ 799	5409271	BUZZER
CE 901	5781121	XTAL
CP 201	5123839	TRAP COIL
CP 202	5169002	HIGH PASS FILTER
CP 203	5169012	DELAY LINE
CP 204	5169003	LOW PASS FILTER
CP 205	5169022	LOW PASS FILTER

SYMBOL-NO	P-NO	DESCRIPTION
CP 301	5785814	DELAY LINE
CP 302	5163081	BAND PASS FILTER
CP 351	5160431	BAND PASS FILTER
DG 751	5311772	TIMER DISPLAY
⚠ F 850	5720175	FUSE 0.8A
⚠ F 851	5721064	FUSE 2.5A
⚠ F 852	5721064	FUSE 2.5A
⚠ F 853	5720171	FUSE 315MA
HZ 604	5330563	DIODE HZ16-3 SI ZENER 1MHZ 0.4W
S 143	5633362	PUSH SWITCH
S 144	5633362	PUSH SWITCH
S 501	5622462	SLIDE SWITCH
S 751	5635061	SWITCH
S 752	5635061	SWITCH
S 753	5635061	SWITCH
S 754	5635061	SWITCH
S 755	5635061	SWITCH
S 756	5635061	SWITCH
S 759	5635061	SWITCH
S 760	5635061	SWITCH
S 761	5635061	SWITCH
S 762	5635061	SWITCH
S 764	5635061	SWITCH
S 765	5635061	SWITCH
S 766	5635061	SWITCH
S 768	5635061	SWITCH
S 769	5635061	SWITCH
S 771	5635111	SMK CONNECTOR (V-10)
S 772	5635111	SMK CONNECTOR (V-10)
S 773	5635111	SMK CONNECTOR (V-10)
S 774	5635111	SMK CONNECTOR (V-10)
S 775	5635111	SMK CONNECTOR (V-10)
S 776	5635111	SMK CONNECTOR (V-10)
S 777	5635111	SMK CONNECTOR (V-10)
S 778	5635111	SMK CONNECTOR (V-10)
S 780	5635111	SMK CONNECTOR (V-10)
S 781	5635111	SMK CONNECTOR (V-10)
S 782	5635111	SMK CONNECTOR (V-10)
S 786	5635111	SMK CONNECTOR (V-10)
S 787	5635111	SMK CONNECTOR (V-10)
S 799	5622801	SWITCH

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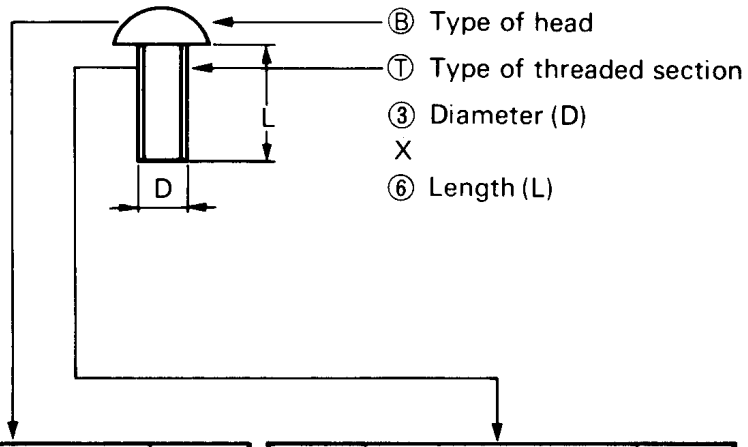
EXPLODED VIEWS

SCREW CLASSIFICATION

Example: BT3 × 6



Abbre-viation	Name	Shape
No symbol	Brazier head	
P	Pan head	
B	Binding head	
O	Oval countersunk head	
F	Flat countersunk head	

Abbre-viation	Name	Shape
No symbol	Machine (clamps without tapping)	
t	Tapping (clamps with tapping) Type 1	
T	Tapping (clamps with tapping) Type 2	
f	Forming tight (for metal)	
Note	Since the forming tight screw tightens while self-tapping. machine screws can be replaced by tapping screws.	

Washers and Nuts

Abbre-viation	Name	Shape
W	Washer	
SW	Spring washer	
LW	Locking washer	
E	E-ring	
N	Nut	
Note	Internal dia is indicated for nuts and washers.	

LUBRICATION

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

Lubricants shown in the diagram are as follows.

Ⓢ Sonic slider oil (≠ 1600)

Ⓗ Hitazol (MO-138)

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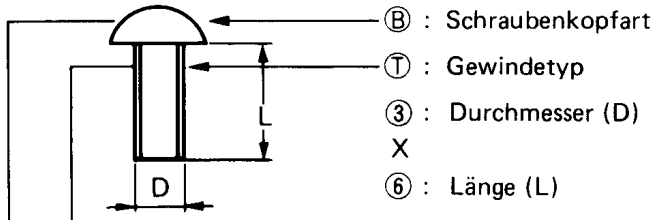
EXPLOSIONSZEICHNUNGEN

Schrauben-Klassifikation

Beispiel: BT3 x 6



Abkürzung	Bezeichnung	Form
Kein symbol	Rundkopfschraube	
P	Zylinderkopfschraube	
B	Halbrundschraube	
O	Linsenkopf-Senkschraube	
F	Senkschraube	

Abkürzung	Bezeichnung	Form
Kein symbol	Maschinenschraube	
t	Schneidschraube Typ 1 (selbstschneidend)	
T	Schneidschraube Typ 2 (selbstschneidend)	
f	Blechschraube (für Metall)	

Hinweis: Blechschrauben sind selbstschneidend; die selbstschneidenden maschinenschrauben können durch Schneidschrauben ersetzt werden.

Unterlegescheiben und Muttern

Abkürzung	Bezeichnung	Form
W SW LW	Unterlegescheibe Federscheibe Sicherungsscheibe	
E	E-Ring	
N	Mutter	

Hinweis: Für Muttern und Scheiben werden der Innendurchmesser angegeben.

Schmierung

Die Schmierpunkte sind in den Explosionszeichnungen durch Symbole (Ⓢ, Ⓗ) gekennzeichnet.
Die im Diagramm gezeigten Schmierpunkte sind mit folgenden Schmiermittel zu schmieren:

Ⓢ Sonic-Gleitöl (Nr. 1600)
Ⓗ Hitazol (MO-138)

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MECHANICAL PARTS LIST

[CABINET SECTION]

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	6189398	CASSETTE DOOR
102	6077031	ROTARY KNOB
103	6892335	HOLDER
104	7741444	FELT (LEG)
105	6001561	BOTTOM COVER
106	6001894	TOP COVER ASSEMBLY
107	6238493	FRONT PANEL
108	6083613	BUTTON
109	6083572	BUTTON
110	6083582	BUTTON
111	6083603	BUTTON
112	6083892	BUTTON
113	6083883	BUTTON
115	6890461	PCB HOLDER
116	6864241	CAP
120	6026751	REAR PANEL
123	6795152	RIVET
124	6893941	HINGE
125	6890501	STUD
126	6794591	BUSHING
127	5746157	POWER CORD WITH PLUG
128	5213811	POWER TRANSFORMER
130	6892512	PIECE
131	5672981	JACK PLATE
132	5586591	TUNER IF BLOCK
133	5587621	RF CONVERTOR
134	6890631	LED HOLDER
135	6891531	DISPLAY HOLDER
136	6869311	COVER
150	5490295	IR MODULE
901	8699410	BT BIND HEAD SCREW 3MMD X 14MM BLACK
902	7784428	SCREW (M3)
903	8741406	BIND SCREW - 3MMD X 6MM
904	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
905	8699410	BT BIND HEAD SCREW 3MMD X 14MM BLACK
906	8699412	BIND TAPPING SCREW-3MMX12MM (BLACK)
907	8691608	SCREW 4X8BT
908	8691414	SCREW
909	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM

[CHASSIS/CASSETTE LOADING MECHANISM/ CYLINDER MOTOR SECTION]

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
202	6415391	REEL TABLE-SUPPLY
203	6415412	REEL TABLE-TAKE UP
206	7787412	WASHER
207	7778859	POLYSLIDER WASHER
208	6865662	ARM-BRAKE
209	7386841	TENSION ARM
210	6865804	BRAKE L
211	6865812	BRAKE R
212	6302471	SPRING
213	6543864	SPRING
214	7376271	TENSION BAND
215	6879421	BT.SPRING HOLDER
216	7368351	ARM BRAKET
217	6886792	ARM
218	7376303	LOADING LINK (RIGHT) ASSEMBLY
219	7376313	LOADING LINK (LEFT) ASSEMBLY
220	6978301	GUIDE ROLLER BASE (I)
221	6974661	BASE
224	6869481	GUIDE ROLLER
226	7386892	GUIDE BASE HOLDER
228	6868061	GUIDE ROLLER ASSEMBLY (OUT)
229	7570671	TAPE GUIDE (I)
230	6304903	SPRING
231	6879902	IMPEDANCE ARM ASSEMBLY
232	5446151	FULL ERASE HEAD
233	6302391	SPRING
234	5446161	AUDIO CONTROL HEAD
235	6304906	SPRING
236	7786245	WASHER
237	6878932	SUB BRAKE
238	6300084	SPRING
239	5578762	CAPSTAN MOTOR
240	6865675	RECORDING PREVENTION ARM
241	5633971	SWITCH (S142)
242	7788143	POLYSLIDER WASHER
243	6979842	PRESSURE ROLLER ASSEMBLY
246	6547811	SPRING
247	6979042	SCREW
248	5625141	SWITCH
250	6873291	COLLAR
251	4504401	TAPE GUIDE
255	6877521	COLLAR
256	6539101	SPRING
257	6979872	ARM ASSEMBLY
258	6550751	SPRING
259	7786626	WASHER
260	5372041	PRE AMP PCB ASSEMBLY
301	6886824	CLUCH PLATE ASSEMBLY
302	6355561	BELT
303	7386971	SLIDER-BRAKE
304	6865733	MODE SLIDER

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SYMBOL-NO	P-NO	DESCRIPTION
305	6547821	SPRING
306	6889552	GEAR
307	6865791	TENTION ARM
311	7386941	MOTOR BRACKET ASSEMBLY
312	6356111	BELT
313	6356451	BELT
314	6979051	FLYWHEEL
315	7788142	POLYSLIDER WASHER (THRUST)
316	7788861	WASHER
317	6356101	BELT
318	6356081	BELT
319	7386833	PLATE
320	6869291	PULLEY
321	7778859	POLYSLIDER WASHER
322	6355561	BELT
401	7397054	FRONT LOADING MECHA ASSEMBLY
402	7386745	SIDE BRACKET (L) ASSEMBLY
403	7386701	BRACKET(R)
404	7386815	CASSETTE HOLDER
412	7394493	BRACKET-MOTOR
414	5946911	MOTOR CBA
417	6879104	LOADING GEAR ASSEMBLY (R)
423	6879093	LOADING GEAR ASSEMBLY (L)
424	7367361	PLATE
425	6887322	FRONT HOLDER
426	4500402	SHAFT
427	6879153	DOOR ARM
428	6301027	SPRING
430	6879182	GUIDE PIECE
501	5457472	UPPER CYLINDER
502	5457482	LOWER CYLINDER
503	5792631	BRUSH
950	7541395	SPECIAL SCREW
951	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
952	8741408	SCREW (B3X8)
954	7781133	BT SCREW 3MMD
955	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
956	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
958	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
959	7773083	SCREW
960	8741408	SCREW (B3X8)
961	8812114	WASHER - 3MMD SMALL
962	8650412	SCREW 3X12 WITH SPRING WASHER
963	8821114	3D NUT
964	8741103	SCREW(2X3B)
965	7781872	SCREW-3MMDX8MM
966	7773086	SCREW
967	8741414	BINDING SCREW - 3MMD X 14MM
968	8821114	3D NUT
969	8741408	SCREW (B3X8)
970	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
971	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
972	8691312	BT BIND SCREW-2.6MMDX12MM
975	8699410	BT BIND HEAD SCREW 3MMD X 14MM BLACK
976	7782781	SCREW 3X8BT
977	8691408	BIND HEAD TAPPING SCREW 3MMD X 8MM
978	8741408	SCREW (B3X8)
979	8650408	SCREW
980	8741406	BIND SCREW - 3MMD X 6MM
983	8741403	BIND SCREW-3MMDX3MM
985	8671406	DT SCREW-3MMDX6MM
986	8678405	DT SCREW-3MMDX5MM (BLACK)
988	8691410	SCREW
989	8711103	PAN HEAD SCREW 2X3
990	8741406	BIND SCREW - 3MMD X 6MM

FOR ACCESSARIES

	5898876	CONNECTER CORD
	5638905	REMOTE HAND SET

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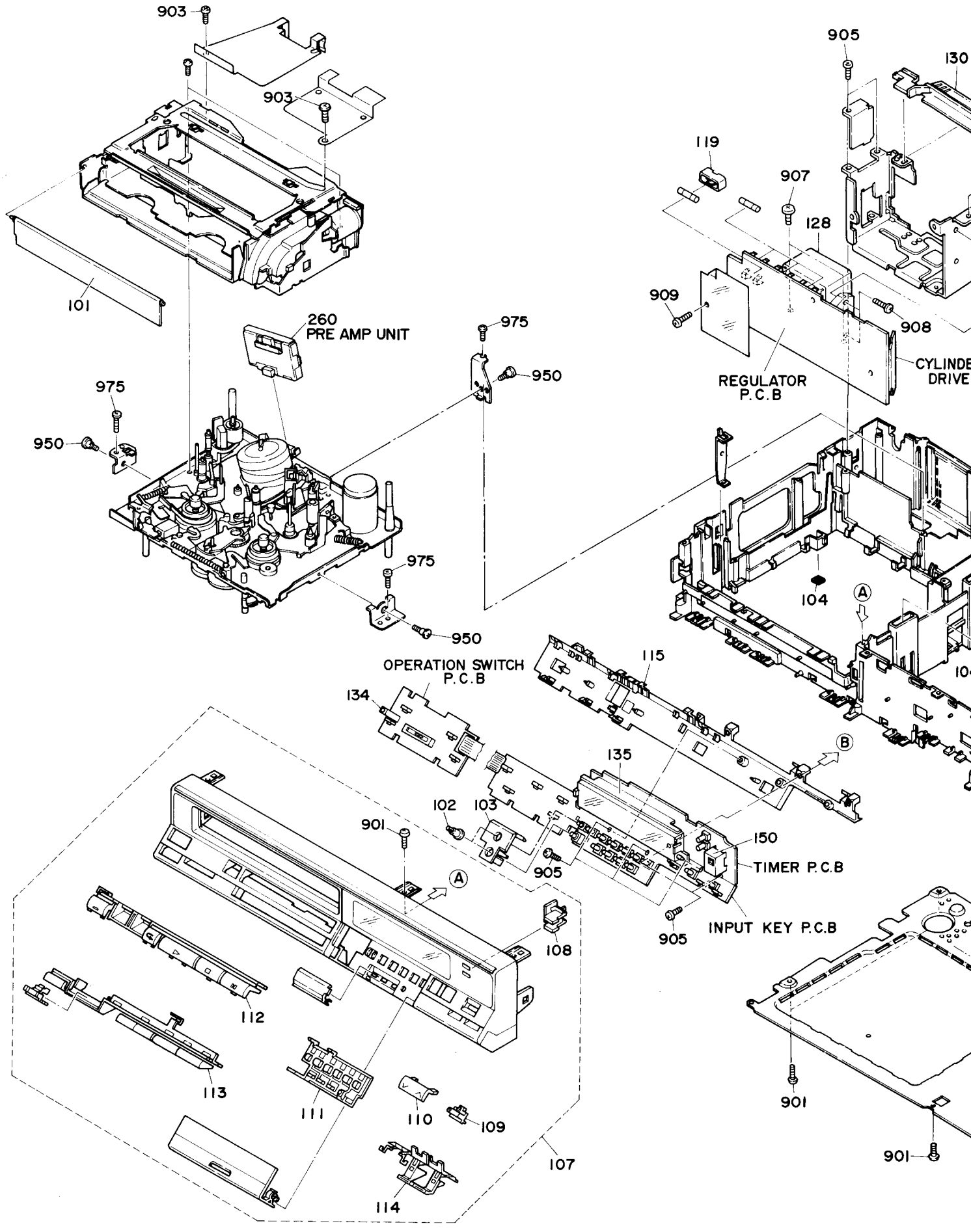
CABINET SECTION (GEHÄUSEEINHEIT)



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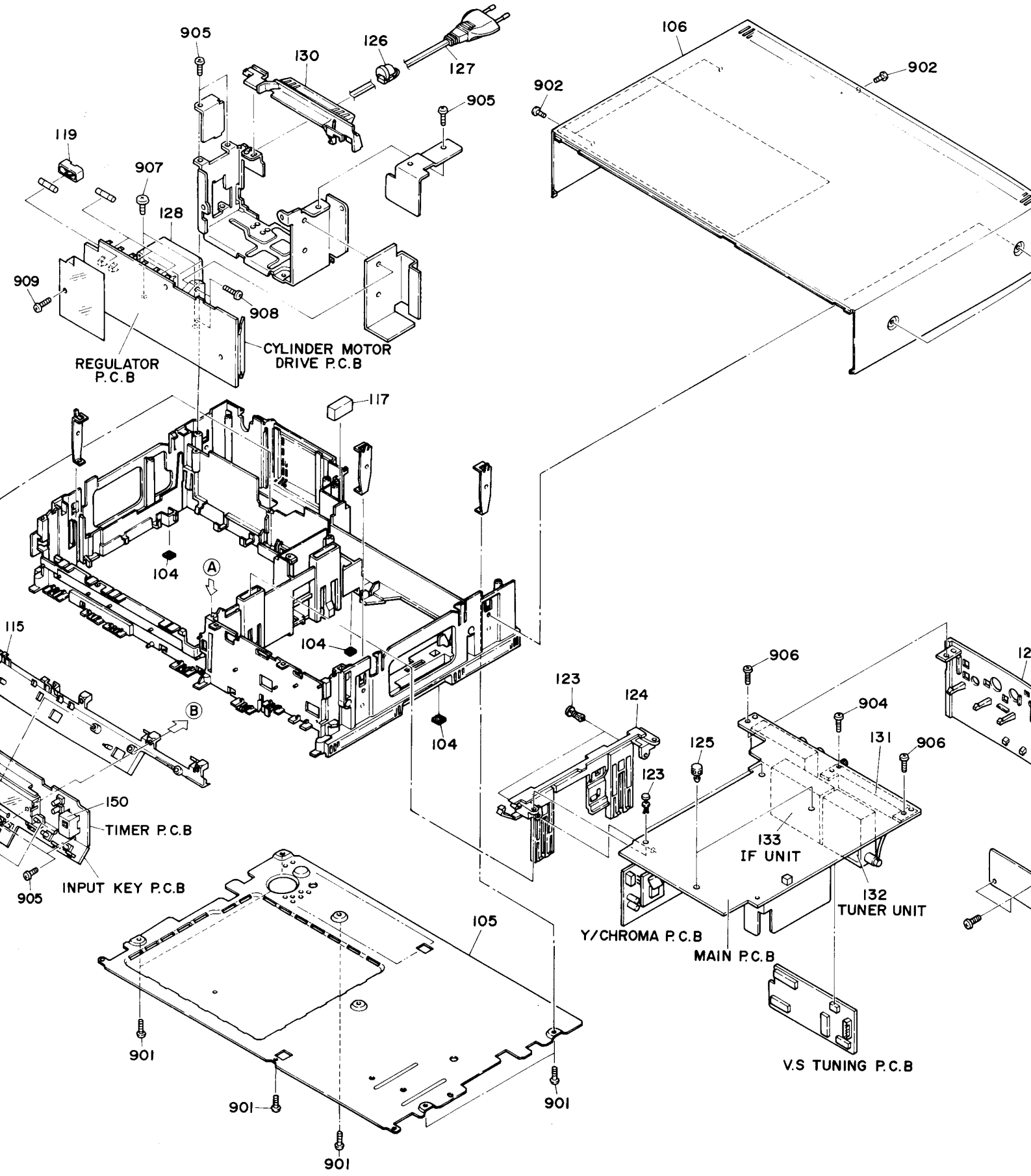

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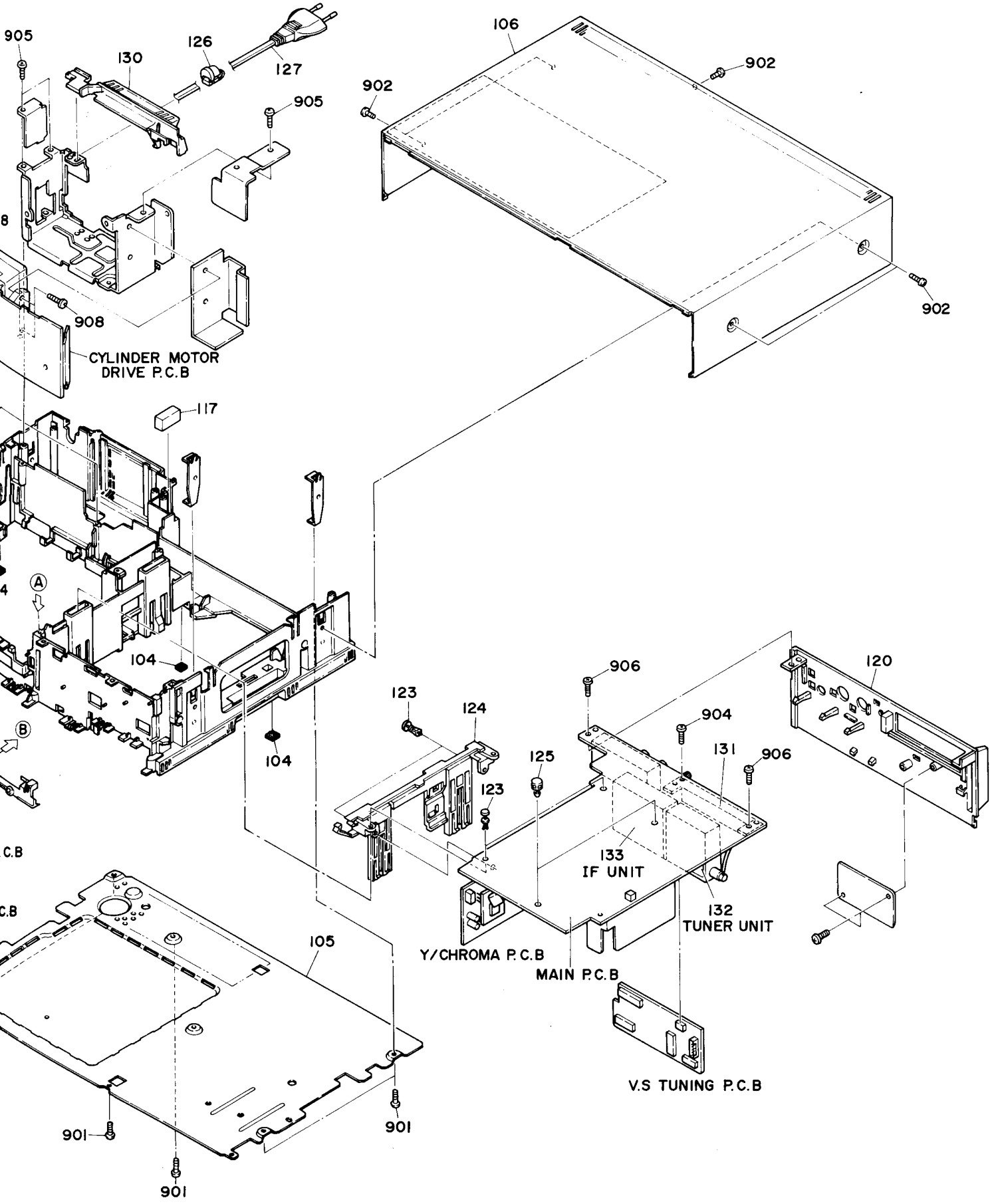

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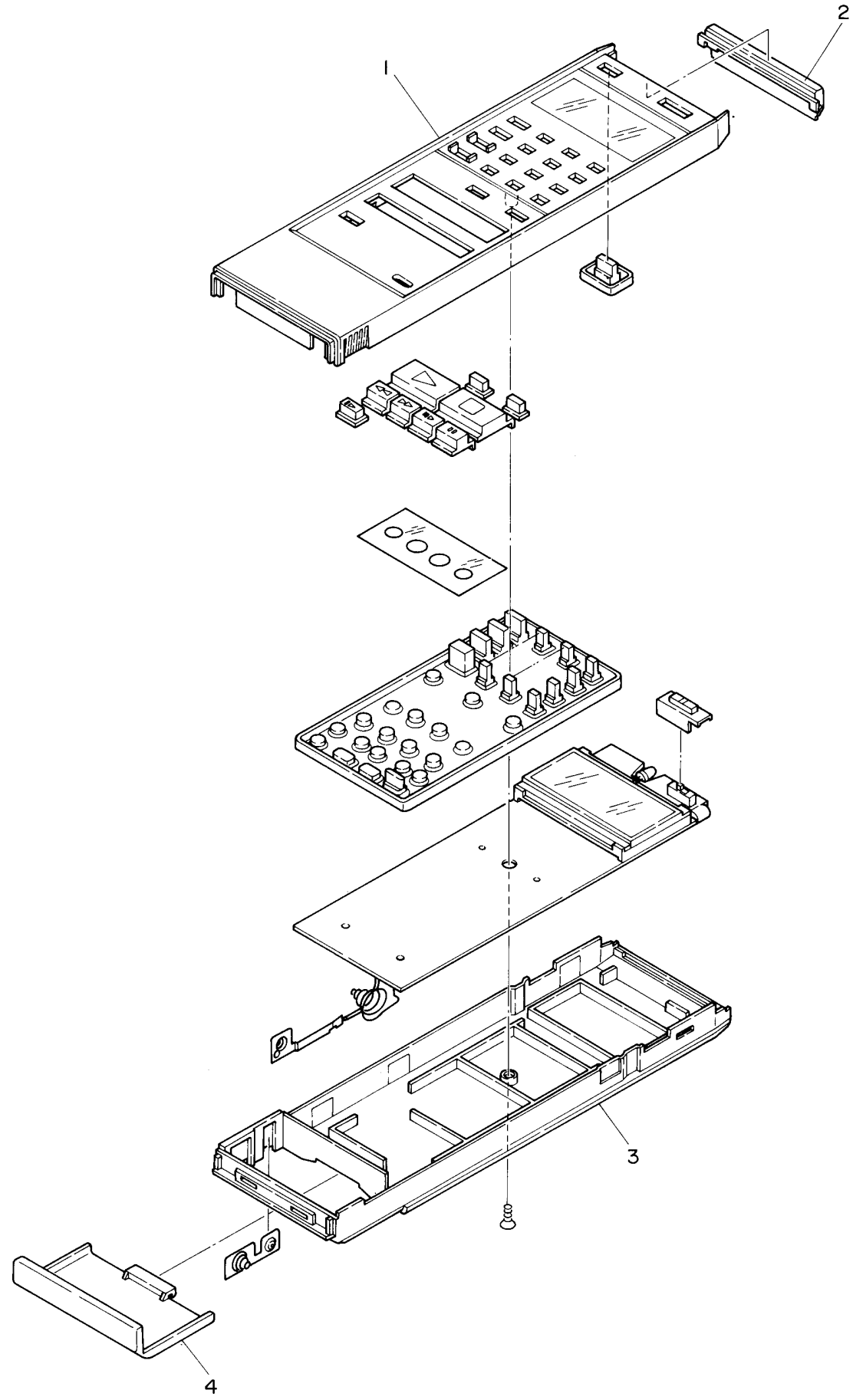
REMOTE CONTROL UNIT (FERNBEDIENUNG)



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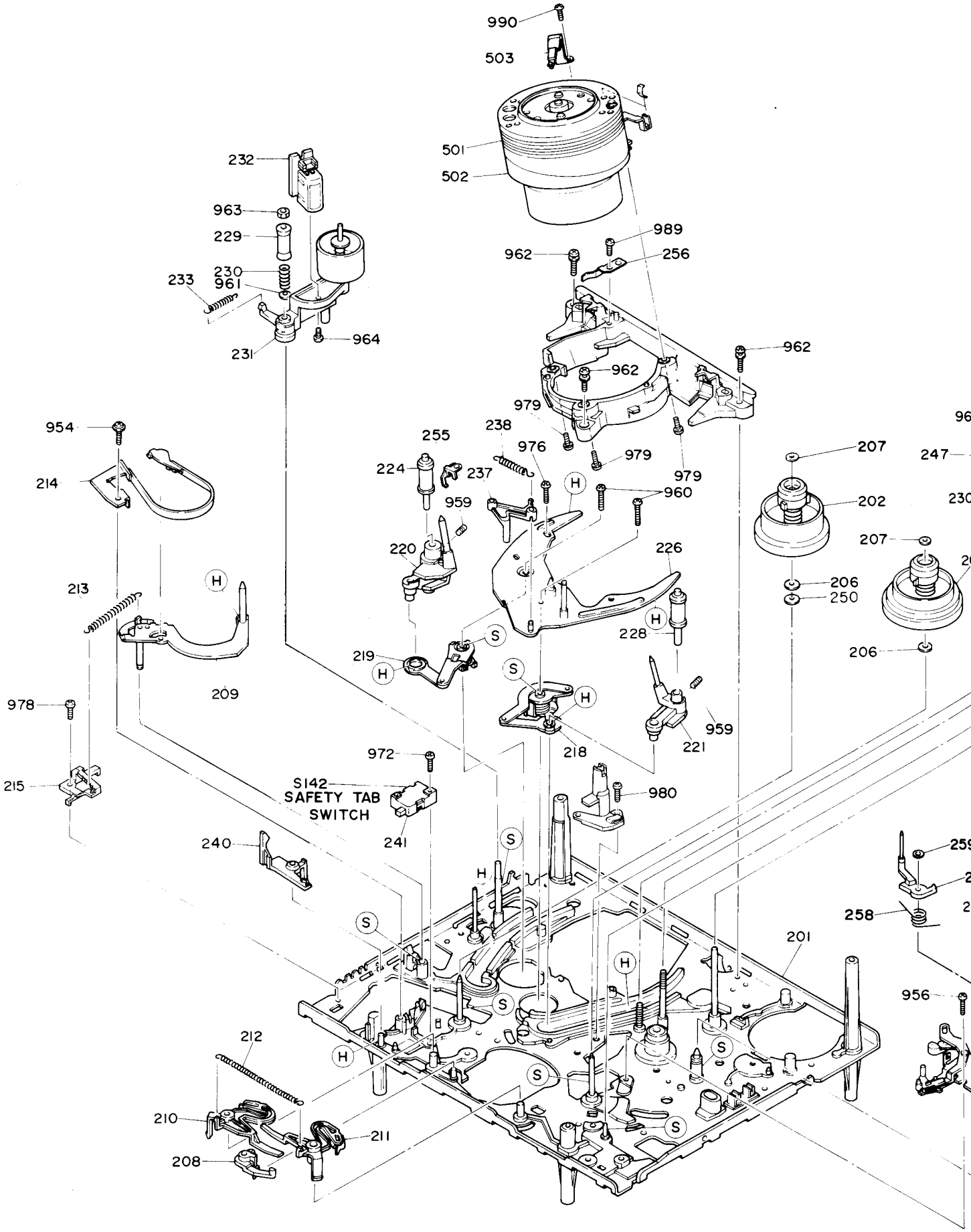
CHASSIS (I) SECTION (CHASSIS [I])



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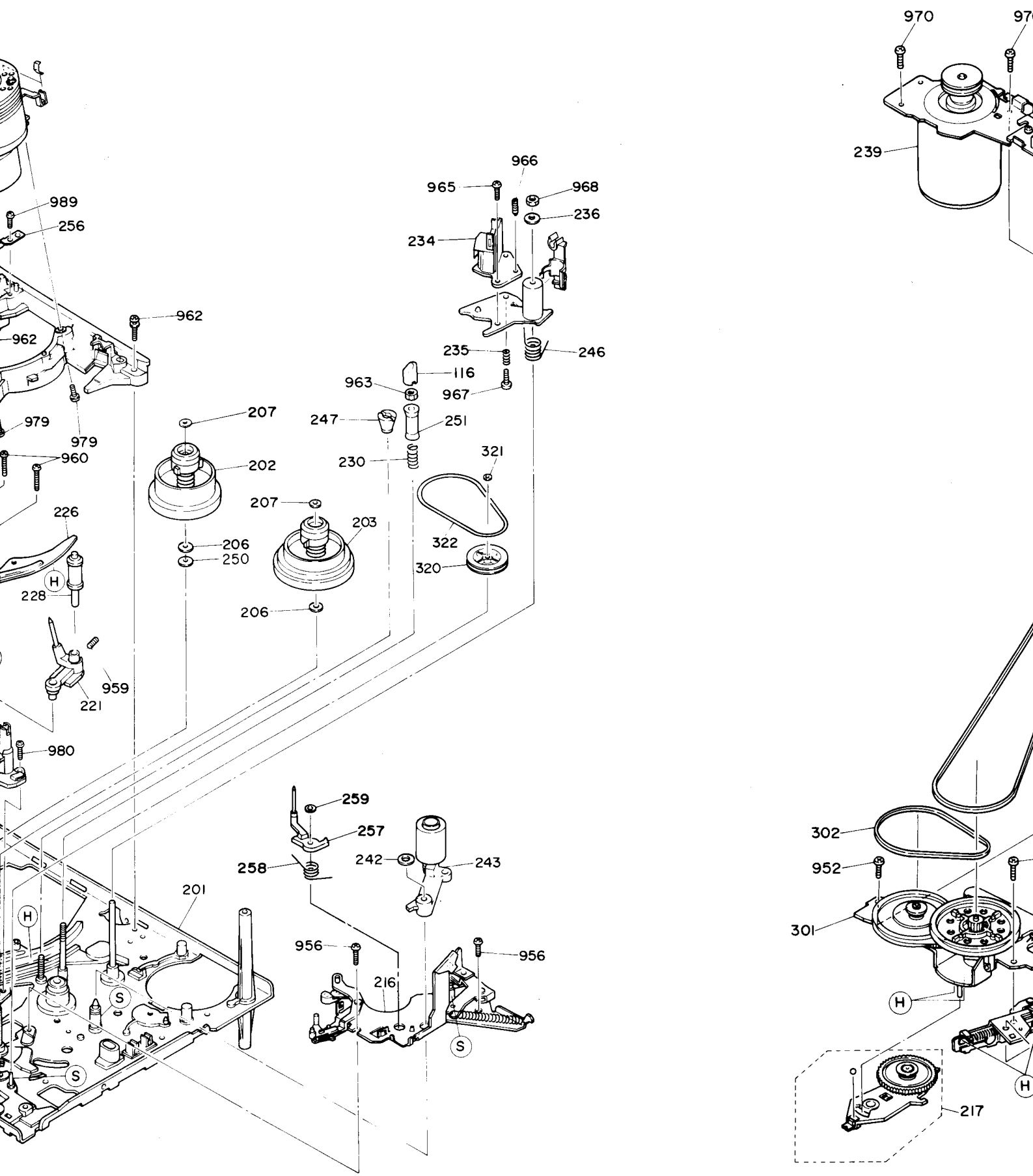

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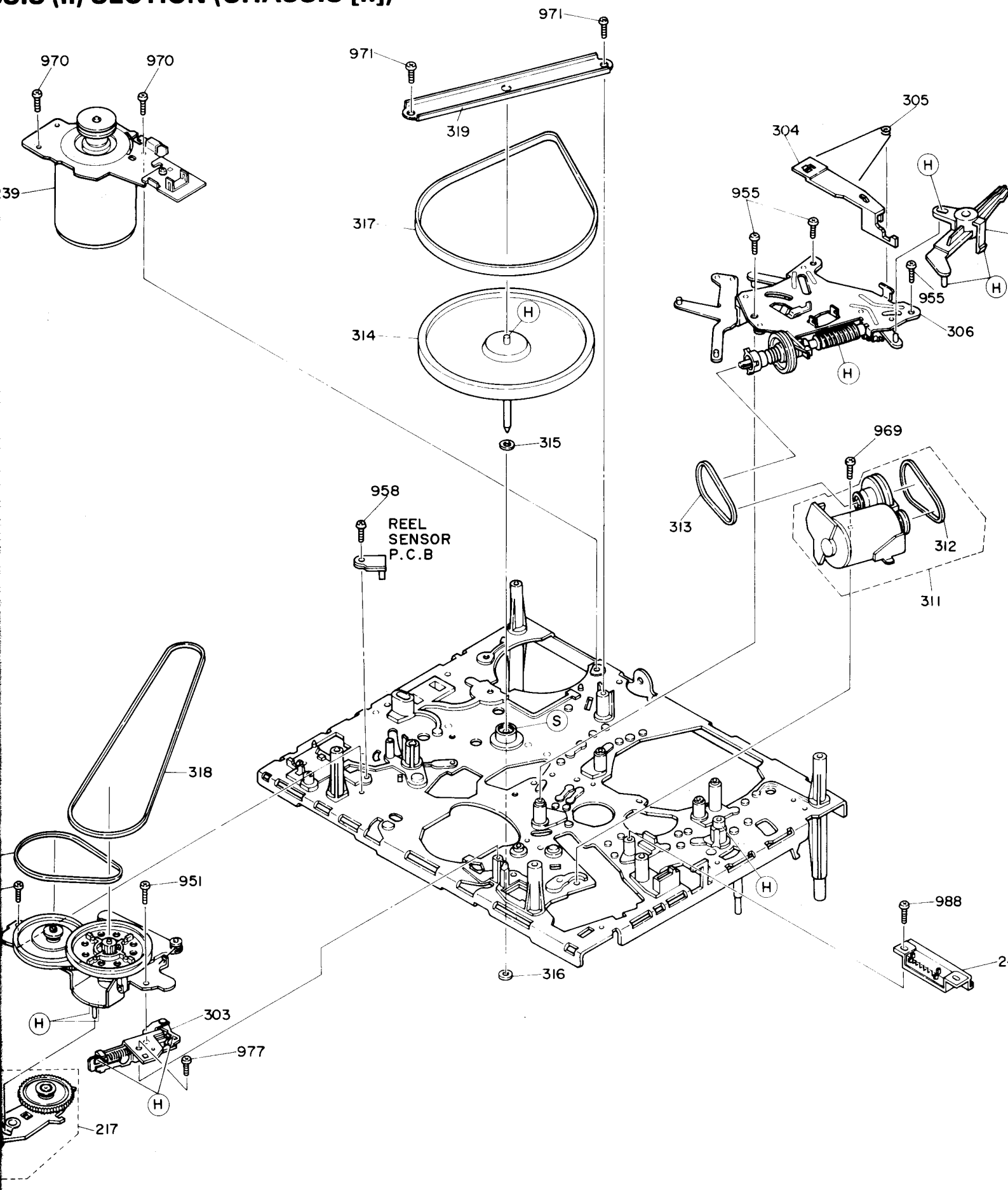
SIS (II) SECTION (CHASSIS [II])



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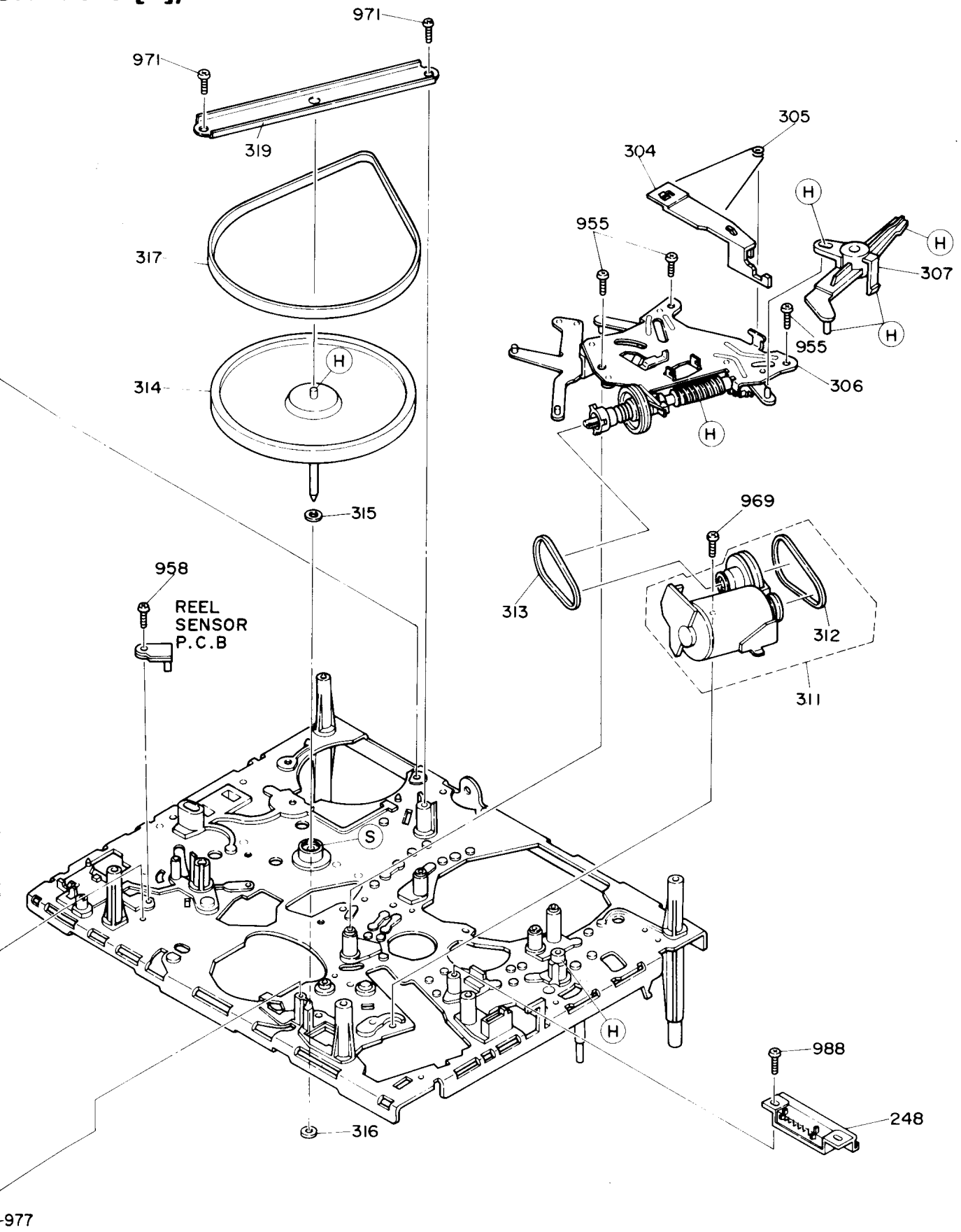
CHASSIS [II])



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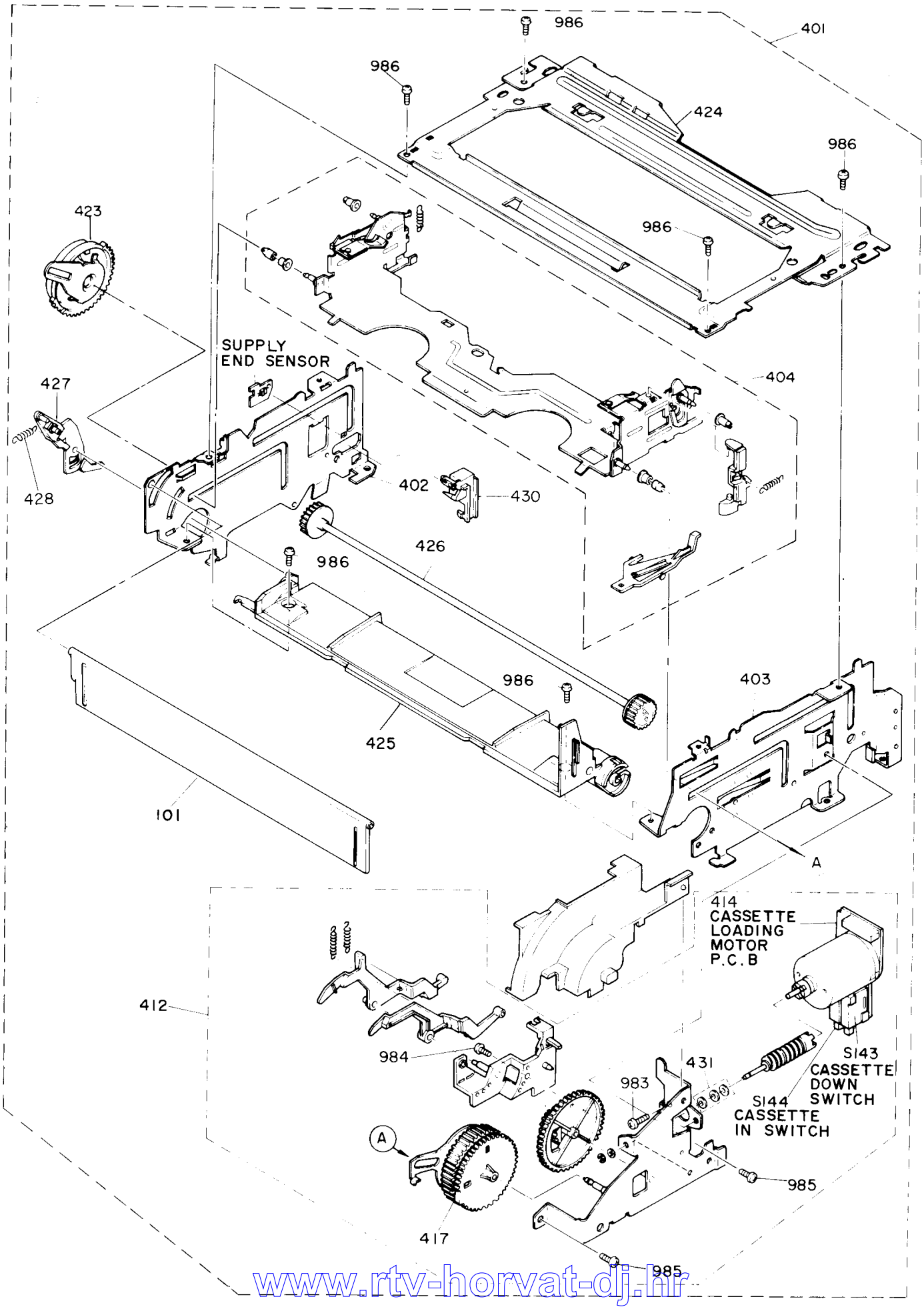
CASSETTE LOADING MECHANISM SECTION (CASSETTEN-LADEMECHANISMUS)



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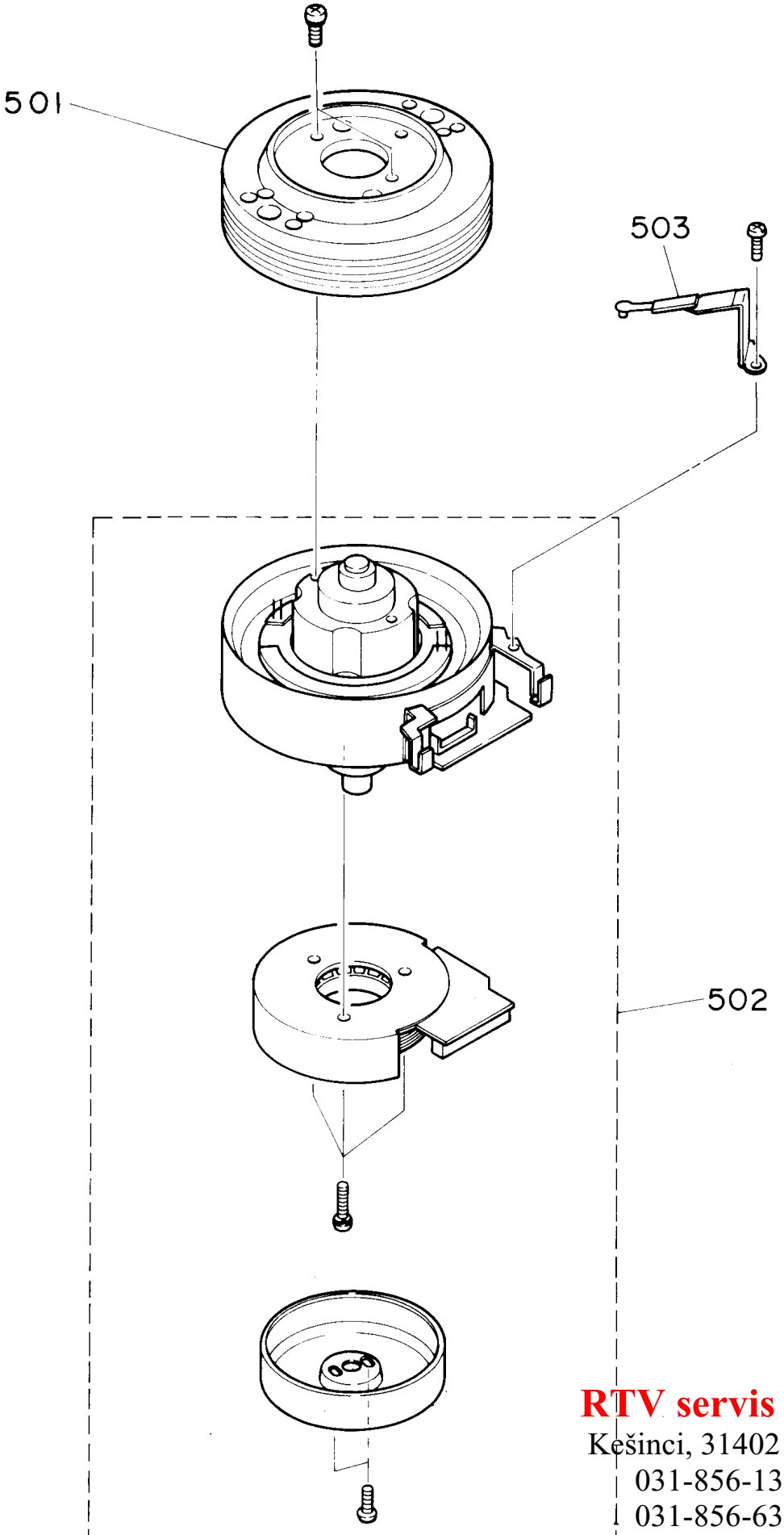
CYLINDER MOTOR SECTION (KOPFTROMMELMOTOR)



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