

JVC

SERVICE MANUAL

VIDEO CASSETTE RECORDER

HR-D520EE/HR-D521EE

VHS
PAL

HQ
High Quality

DIGITAL
TRACKING



SPECIFICATIONS

GENERAL

Power requirement : 220 V~, 50/60 Hz
Power consumption : 30 W (HR-D520EE),
37 W (HR-D521EE)
Temperature : 5°C to 40°C (Operating)
-20°C to 60°C (Storage)
Operating position : Horizontal only
Dimensions (WxHxD) : 435 x 85 x 329 mm
Weight : 6.0 kg
Tape format : VHS PAL standard
Tape width : 12.65 mm
Tape speed : 23.39 mm/sec
Maximum recording time : 240 min. with E-240 video cassette

VIDEO

Signal system : PAL colour and CCIR monochrome signals, 625 lines/50 fields
Recording system : Rotary, slant azimuth two-head helical scan system
Input : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced
Output : 1.0 Vp-p, 75 ohms, unbalanced
Signal-to-noise ratio : 43 dB (Rohde & Schwarz noise meter)
Horizontal resolution : 250 lines

AUDIO

Recording system : Longitudinal track
Input : -3.8 dBs (CENELEC standard),
more than 50 k-ohms, unbalanced

Output : -3.8 dBs (CENELEC standard),
less than 1 k-ohm, unbalanced
(100 k-ohms, load)

Frequency range : 70 Hz to 10,000 Hz

TUNER

Tuning system : Voltage synthesized tuner
TV channel storage capacity : 48 positions (+ AUX position "AU")
Channel coverage : VHF 47 - 111 MHz
111 - 300 MHz
UHF 470 - 862 MHz
Aerial output : UHF channels 36 (adjustable 32 - 40)

TIMER

Clock reference : Quartz-Crystal
Programme capacity : 1-year/8-programme timer
Memory back-up time : 60 min.

ACCESSORIES

Provided accessories : Aerial cable,
Infrared remote control unit,
"R6" battery x 2
Video cassette tape
Optional accessories : VPS adapter VU-V110E
(HR-D521EE only) VPV adapter VU-V120E
VPS/VPV adapter VU-V100E
VPT adapter VU-V140E
VPS/VPT adapter VU-V150E

Design and specifications subject to change without notice.

NOTE: For a technical description, please refer to Technical Guide VTG82036 HR-D520 PAL.

- The instructions shown pertain specifically to the Model HR-D520EE. For detailed descriptions, be sure to consult the Instruction booklets of HR-D521EE.
- The following table lists the differing points between models (suffixes HR-D520EE and HR-D521EE).

	HR-D520EE	HR-D521EE
LCD Remote Control unit	No	Yes
VPS/VPV/VPT Connector	No	Yes

TABLE OF CONTENTS

Section	Title	Page	Section	Title	Page
Important Safety Precautions			3.8	AUDIO BLOCK DIAGRAM	3-15
INSTRUCTIONS			3.9	SYSTEM CONTROL BLOCK DIAGRAM	3-17
1. MECHANISM ADJUSTMENTS			3.10	VIDEO UNIT AND VIDEO (MAIN) SCHEMATIC DIAGRAM	3-19
1.1	PRECAUTIONS	1-1	3.11	VIDEO UNIT CIRCUIT BOARD	3-21
1.2	CHECK WITHOUT CASSETTE HOUSING	1-1	3.12	SERVO SCHEMATIC DIAGRAM	3-23
1.3	MANUALLY REMOVING CASSETTE TAPE	1-1	3.13	AUDIO SCHEMATIC DIAGRAM	3-25
1.4	TEST EQUIPMENTS	1-1	3.14	SYSTEM CONTROL SCHEMATIC DIAGRAM	3-27
1.5	DISASSEMBLY	1-2	3.15	DECK TERMINAL, MODE MOTOR, CAPSTAN MDA, C. HOUSING SCHEMATIC DIAGRAMS	3-29
1.5.1	Top cover	1-2	3.16	DECK TERMINAL, MODE MOTOR, C. HOUSING, A/C HEAD CIRCUIT BOARD	3-30
1.5.2	Front panel assembly	1-2	3.17	MAIN CIRCUIT BOARD	3-31
1.5.3	Bottom cover	1-2	3.18	PRE/REC SCHEMATIC DIAGRAM	3-33
1.5.4	Cassette housing	1-2	3.19	PRE/REC CIRCUIT BOARD	3-35
1.5.5	Cassette housing door	1-2	3.20	IF/TUNER CTL SCHEMATIC DIAGRAM	3-37
1.6	MAIN MECHANISM PARTS	1-3	3.21	IF/TUNER CTL CIRCUIT BOARDS	3-39
1.7	INSPECTION AND MAINTENANCE	1-5	3.22	TIMER/DISPLAY/SWITCH SCHEMATIC DIAGRAM	3-41
1.7.1	Standard servicing schedule for main components	1-5	3.23	TIMER/DISPLAY/SWITCH CIRCUIT BOARD	3-43
1.8	MAIN PARTS REMOVAL AND REPLACEMENT	1-6	3.24	POWER TRANSFORMER AND REGULATOR (MAIN) SCHEMATIC DIAGRAMS	3-45
2. ELECTRICAL ADJUSTMENTS			3.25	POWER TRANSFORMER CIRCUIT BOARD	3-47
2.1	PREPARATION	2-1	3.26	REMOTE CONTROL SCHEMATIC DIAGRAM (HR-D520EE)	3-49
2.1.1	Required test equipment	2-1	3.27	REMOTE CONTROL SCHEMATIC DIAGRAM (HR-D521EE)	3-50
2.1.2	Check and adjustment steps	2-2	3.28	RF CONVERTER SCHEMATIC DIAGRAM	3-51
2.2	TIMER CIRCUIT	2-3	4. EXPLODED VIEWS AND PARTS LIST		
2.3	SERVO CIRCUIT	2-3	4.1	PACKING ASSEMBLY <M1>	4-1
2.4	VIDEO CIRCUIT	2-4	4.2	CABINET ASSEMBLY <M2>	4-2
2.5	AUDIO CIRCUIT	2-5	4.3	CHASSIS ASSEMBLY <M3>	4-3
2.6	TUNER/IF CIRCUIT	2-5	4.4	MECHANISM ASSEMBLY(1) <M4>	4-4
3. CHARTS AND DIAGRAMS			5. ELECTRICAL PARTS LIST		
3.1	CIRCUIT BOARD AND LOCATION	3-1	POWER TRANSFORMER BOARD ASSEMBLY <01>		
3.2	GENERAL INFORMATION	3-2	MAIN BOARD ASSEMBLY <03>		
3.2.1	Connections	3-2	VIDEO UNIT BOARD ASSEMBLY <05>		
3.2.2	Disconnecting the flatwire	3-2	IF BOARD ASSEMBLY <07>		
3.2.3	Indications	3-2	TUNER CONTROL BOARD ASSEMBLY <08>		
3.2.4	Schematic diagram values	3-2	AUDIO CONTROL HEAD BOARD <12>		
3.2.5	Signal flow in the schematic	3-2	TIMER/DISPLAY/SW BOARD ASSY <21>		
3.2.6	Semiconductors	3-3	UPPER DRUM BOARD <41>		
3.2.7	Replacement of chip parts	3-3	PRE/REC AMP BOARD ASSEMBLY <43>		
3.3	MAIN TYPES OF ACTIVE AND PACKAGE CIRCUITS	3-5	DECK TERMINAL BOARD ASSEMBLY <51>		
3.4	BOARD INTERCONNECTIONS	3-7	LOADING MDA BOARD ASSEMBLY <55>		
3.5	VIDEO BLOCK DIAGRAM	3-10	CASSETTE HOUSING BOARD <56>		
3.6	PRE/REC BLOCK DIAGRAM	3-11			
3.7	SERVO BLOCK DIAGRAM	3-11			

Important Safety Precautions

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

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the \triangle symbol and shaded (▨) parts are critical for safety.

Replace only with specified part numbers.

Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.

Caution for continued protection against fire hazard.

Replace only with same type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:

- 1) Wires covered with PVC tubing
- 2) Double insulated wires
- 3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:

- | | | |
|--------------------|--------------------------------------|------------|
| 1) Insulation Tape | 3) Spacers | 5) Barrier |
| 2) PVC tubing | 4) Insulation sheets for transistors | |

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

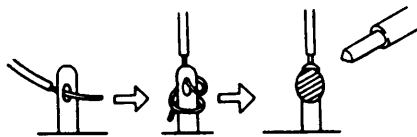


Fig. 1

7. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosen it.

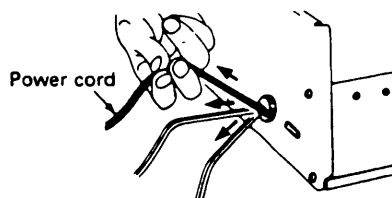


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)

In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1) Connector part number : E03830-001

2) Required tool : Connector crimping tool of the proper type which will not damage insulated parts.

3) Replacement procedure

(1) Remove the old connector by cutting the wires at a point close to the connector.

Important : Do not reuse a connector (discard it).

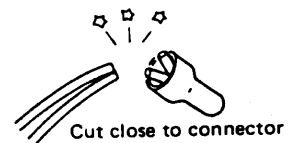


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

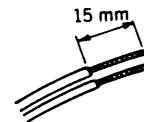


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

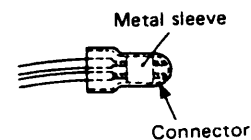


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

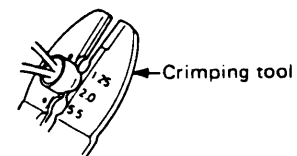


Fig. 6

(5) Check the four points noted in Fig. 7.

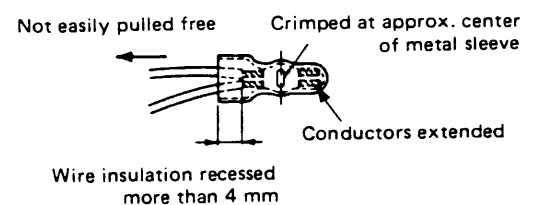


Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions. Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

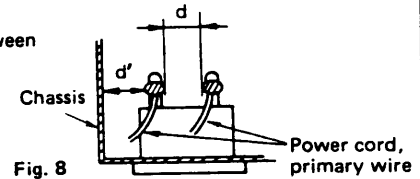
Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

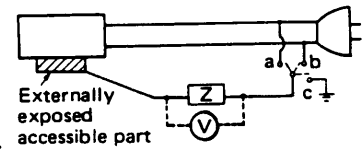


4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method: (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.



5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

Measuring Method:

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

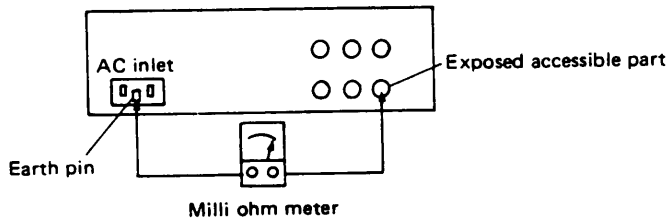


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	$Z \leq 0.1 \text{ ohm}$
Europe & Australia	$Z \leq 0.5 \text{ ohm}$

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	$R \geq 1 \text{ M}\Omega / 500 \text{ V DC}$	AC 1 kV 1 minute	$d, d' \geq 3 \text{ mm}$
100 to 240 V			AC 1.5 kV 1 minute	$d, d' \geq 4 \text{ mm}$
110 to 130 V	USA & Canada	—	AC 900 V 1 minute	$d, d' \geq 3.2 \text{ mm}$
110 to 130 V	Europe & Australia	$R \geq 10 \text{ M}\Omega / 500 \text{ V DC}$	AC 3 kV 1 minute (Class II)	$d \geq 4 \text{ mm}$
200 to 240 V			AC 1.5 kV 1 minute (Class I)	$d' \geq 8 \text{ mm (Power cord)}$ $d' \geq 6 \text{ mm (Primary wire)}$

Table 1 Specifications for each region

AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	$1 \text{ k}\Omega$	$i \leq 1 \text{ mA rms}$	Exposed accessible parts
110 to 130 V	USA & Canada	$0.15 \mu\text{F}$ and $1.5 \text{ k}\Omega$	$i \leq 0.5 \text{ mA rms}$	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	$2 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Antenna earth terminals
		$50 \text{ k}\Omega$	$i \leq 0.7 \text{ mA peak}$ $i \leq 2 \text{ mA dc}$	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

INSTRUCTIONS

SAFETY PRECAUTIONS

The rating plate and the safety caution are on the rear of the unit.

WARNING – DANGEROUS VOLTAGE INSIDE
WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

IMPORTANT (In the United Kingdom)
Mains Supply (240 V~, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with the following code:



If these colours do not correspond with the terminal identifications of your plug, connect as follows:
 Blue wire to terminal coded N (Neutral) or coloured Black.
 Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.

CAUTION

- When you are not using the recorder for a long period of time, it is recommended that you disconnect the power cord from the AC outlet.
- Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial.

Omkopplaren OPERATE på denna apparat är sekundärt kopplad och skiljer inte apparaten från nätet i läge OPERATE OFF.

The OPERATE button does not completely shut off mains power from the unit, but switches operating current on and off.

BEMÆRK: I stilling OFF er apparatet stadig forbundet med lysnettet. Hvis det ønskes fuldstændig afbrudt skaf netledningen trækkes ud.

This unit is produced to comply with Directive 82/499/EEC, CISPR Pub. 13 and Pub. 14 and Standard IEC 65.

CONTENTS

Safety precautions	1	Playing back a video cassette	10
Features	2	Recording TV programmes	11
Precautions	3	Automatic timer recording	12
Controls, indicators and connectors	4	Realtime tape counter/counter memory function/lap	
Connections	6	time indication	13
Video channel setting	6	Next-function memory	13
Operating the built-in tuner	7	Recording from an external source	14
Clock setting	8	In case of difficulty	15
Loading and unloading a cassette	9	Head cleaning	15
Child lock function	9	Specifications	16

FEATURES

High-quality pictures

- HQ (High Quality) System technologies with DE (Detail Enhancer), and WCL (20 % higher white clip level).

Dual-system flexibility

- PAL/MESECAM recording and playback.
- Voltage synthesized wide-band dual tuner with automatic detection of B/G and D/K broadcasts (both PAL and SECAM) and 48-channel preset capacity; can receive VHF and UHF channels.
- G/K dual-system RF converter.

Timer features

- Quartz-locked 1-year/8-event programmable timer.
- One-button instant timer recording.
- Memory backup time of about 60 minutes.

Tape access features

- Half-loading mechanism with realtime tape counter showing tape time in hours, minutes and seconds by counting the recorded 25 Hz control signal pulses.
- Counter memory function for returning to a designated point on the tape.
- Shuttle Search with lock function: with the button locked or held depressed for instant release, offers high-speed playback at 9 times normal speed.

Automatic functions

- Digital tracking system for automatic adjustment of optimum tracking; manual override is also possible.
- Auto-play function: insert a cassette (with safety tab removed), and playback will start automatically.
- Next-function memory: play, timer standby and power-off will be automatically performed after rewind.
- Auto-power-on function.
- Power-off eject.
- Auto-rewind at tape end.
- Automatic backspace editing by Zero Frame Editing system.

Remote control features

- Infrared remote control with timer programming function.
- Child Lock function for making all recorder control buttons ineffective to prevent accidental operation by young children, or other unwanted operation.

Other value features

- Easy, one-button adjustment for "summer time" (daylight saving time) clock setting.
- On-screen record-pause mode display showing elapsed pause time.
- Still picture and frame advance.
- Comprehensive fluorescent display.



- Only cassettes marked "VHS" can be used with this video cassette recorder.
- HQ VHS is compatible with existing VHS equipment.

COPYRIGHT © 1989 VICTOR COMPANY OF JAPAN, LTD.

Printed in Japan

PRECAUTIONS

ENGLISH

Handling and storage

● Avoid using the recorder under the following conditions:

- extremely hot, cold or humid places,
- dusty places,
- near appliances generating strong magnetic fields,
- places subject to vibrations, and
- poorly ventilated places.

● Be careful of moisture condensation.

Avoid using the recorder immediately after moving from a cold place to a warm place. The water vapour in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.

● Handle the recorder carefully

- Do not block the ventilation openings.
- Do not place anything heavy on the recorder.
- Do not place anything which might spill and cause trouble on the top cover of the recorder.
- Use in horizontal (flat) position only.

● In case of transportation,

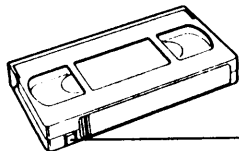
- Avoid violent shocks to the recorder during packing and transportation.
- Before packing, be sure to remove the cassette from the recorder.

Video cassettes

● This recorder employs VHS-type cassettes only.

E-240 for 4 hours, E-180 for 3 hours, E-120 for 2 hours, E-90 for 1 hour and 30 minutes, E-60 for 1 hour and E-30 for 30 minutes of recording.

● Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has already been removed, use adhesive tape to block the hole.



Safety tab

- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or magnet) and dusty places.
- Place the cassettes in cassette cases and position vertically.

Moisture condensation

● If you pour a cold liquid into a glass, water vapour in the air will condense on the surface of the glass. This is called moisture condensation.

● Moisture condensation on the head drum, one of the most crucial parts of the video recorder, will cause damage to the tape.

● Moisture condensation is apt to occur under the following conditions:

- when the recorder is moved from a cold place to a warm place, and
- under extremely humid conditions.

● In conditions where moisture condensation may occur, keep the power cord plugged in an AC outlet and the power switched on; this will help prevent condensation from occurring. When condensation has occurred, it will not evaporate quickly once the power is switched on. Wait a few hours for the recorder to become dry.

Operation

● When a cassette is loaded, the power is switched on automatically.

● The cassette can be unloaded even when the power is off. Pressing the STOP/EJECT button turns the power on and, after ejection of the cassette, shuts it off automatically in this case.

● As long as the TIMER button is engaged with the TIMER indicator lit, the OPERATE and STOP/EJECT buttons have no effect and unloading of a cassette is not possible. If a cassette has not yet been inserted, simply insert a cassette; the power will be switched on to load the cassette properly and, after completion of automatic loading, the Timer Recording Standby mode will be engaged with power off.

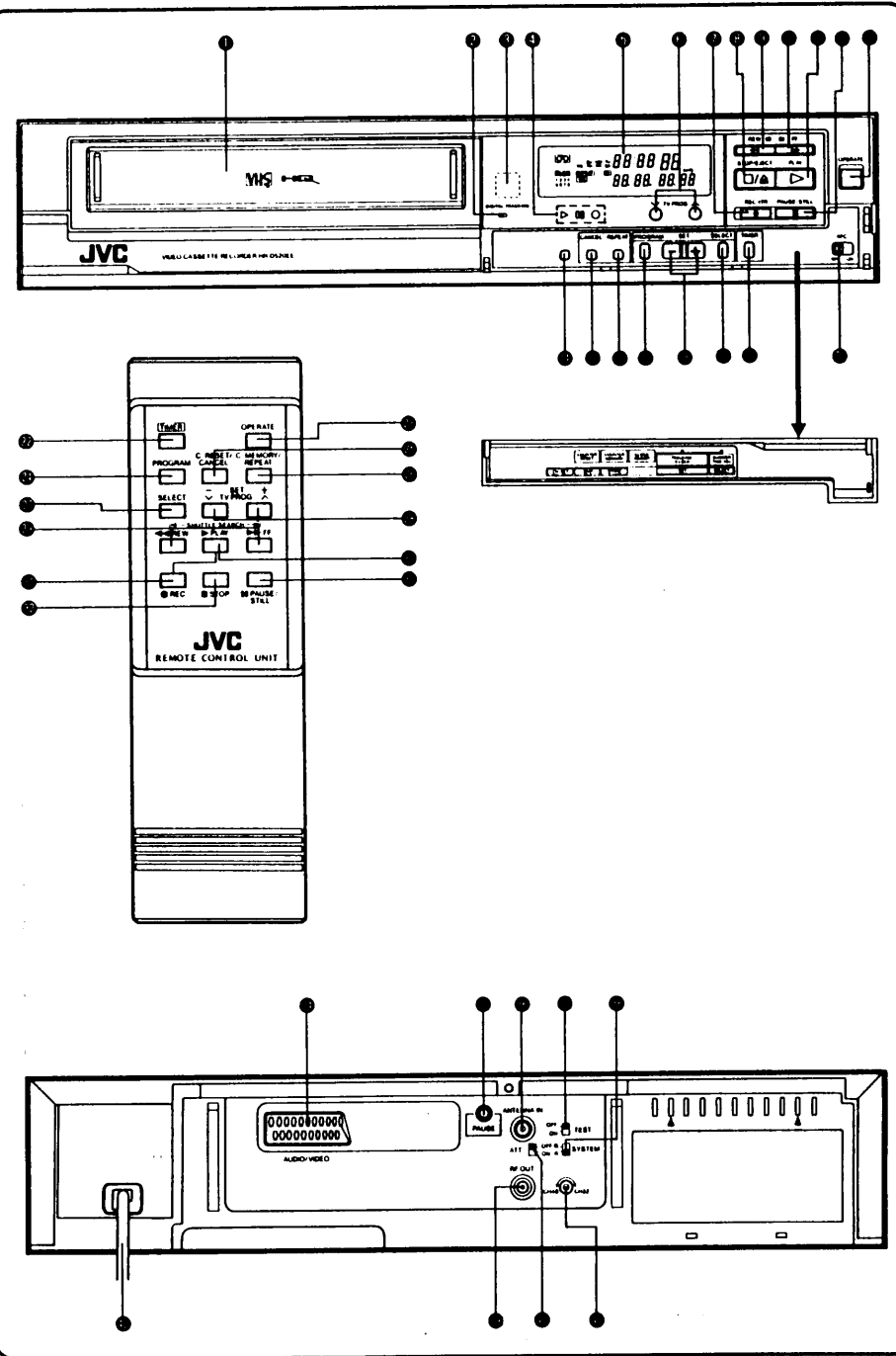
Remote control unit

- Avoid violent shocks, especially take care not to drop the unit.
- Take care not to allow liquid to spill into the unit.
- Do not place heavy objects on the unit.
- Avoid leaving the unit in places subject to direct sunlight or extremely high temperatures.

WARNING

1. In addition to PAL B/G and PAL D/K colour television signals, this recorder can also receive SECAM B/G and SECAM D/K colour television signals. SECAM B/G and SECAM D/K colour television signals can be recorded and played back in colour as far as this same recorder is used for recording and playback.
2. SECAM B/G and SECAM D/K colour television signals recorded on this recorder produce monochrome pictures if played back on another PAL or SECAM recorder.
3. SECAM B/G and SECAM D/K colour television signals recorded on another PAL or SECAM recorder produce monochrome pictures if played back on this recorder.
4. This recorder cannot be used in France. Use in France a recorder which is capable of receiving SECAM L colour television signals.
5. SECAM L prerecorded cassettes or recordings made with a SECAM L video recorder produce monochrome pictures when played back on this recorder.

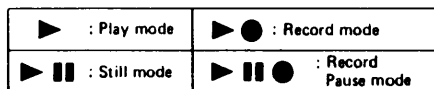
IMPORTANT: It may be unlawful to record or play back copyrighted material without the consent of the copyright owner.



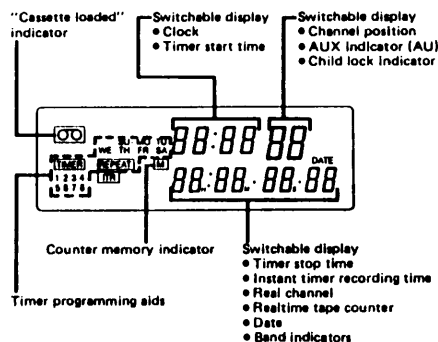
CONTROLS, INDICATORS AND CONNECTORS Refer to diagrams on the front foldout page.

Front Panel

- **Cassette loading slot**
Insert a VHS cassette. The door will close and the "cassette loaded" indicator will appear on the FDP (fluorescent display panel).
- **DIGITAL TRACKING indicator**
Lights in the Digital Tracking mode.
Blinks when adjusting.
- **Infrared beam receiving window**
- **Mode indicators**



● Fluorescent Display Panel (FDP)



- **TV PROG. \vee / \wedge buttons**
Press either button to scan to a desired channel.
- **REC/ITR button**
 - Press once to start recording.
 - Press twice to engage the Instant Timer Recording mode.
- **STOP/EJECT button**
 - Press while in the Stop mode to eject the cassette.
 - Press while in other modes to stop the tape.
- **REW/Shuttle Search button**
 - Press while in the Stop mode to rewind the tape.
 - Press while in the Play mode for Shuttle Search in the reverse direction.
- **FF/Shuttle Search button**
 - Press while in the Stop mode to fast-forward the tape.
 - Press while in the Play mode for Shuttle Search in the forward direction.
- **PLAY button**
 - Press to play back a tape.
 - Also press to cancel the Pause/Still or Shuttle Search mode.
- **PAUSE/STILL button**
 - Press while in the Record mode to stop the tape temporarily to avoid recording of unwanted material.
 - Press while in the Play mode to view a still picture.
 - The still picture can be advanced each time this button is pressed.
 - Holding this button pressed continuously advances the picture to give a slow-motion effect.

- **OPERATE button with LED indicator**
Press to apply operating power to the recorder. Loading a cassette also turns the power on.
- **CH. SET button**
Press to engage the Real Channel mode.
- **CANCEL/COUNTER RESET/SKIP button**
This is a triple-function button:
 - as a CANCEL button – press to cancel the programmed data in the Timer Set mode.
 - as a COUNTER RESET button – press to reset the realtime counter reading to "0H 00M 00S".
 - as a SKIP button – press to skip unnecessary channels in the Real Channel mode.
- **REPEAT/COUNTER MEMORY/STORE button**
This is a triple-function button:
 - as a REPEAT button – press to enter the repeat command in the Timer Set mode.
 - as a COUNTER MEMORY button – press to engage the Counter Memory mode, "M" will appear on the FDP and the tape will stop automatically at the counter reading of "0H 00M 00S" when rewinding or fast-forwarding.
 - as a STORE button – press to store the tuned-in channel in the Real Channel mode.
- **PROGRAM/CLOCK ADJUST button**
Press to change the recorder's mode in the following order: Clock mode, Timer Set mode, Clock Set mode, then return to the Clock mode.
- **SET/TRACKING/V. LOCK buttons (-/+)**
These are dual-function buttons:
 - as SET buttons – press to set the correct data in the Clock Set or Timer Set mode.
 - as TRACKING/V. LOCK buttons – press to minimize noise bars, if observed, during playback (for automatic digital tracking information, refer to page 10) or press to eliminate vertical vibration of the picture, if observed, in the Still mode.
- **SELECT/SUMMER TIME ADJUST button**
This is a dual-function button:
 - as a SELECT button – press to select the item to be set in the Clock Set, Real Channel or Timer Set mode.
 - as a SUMMER TIME ADJUST button – press and quickly release to advance the clock by one hour, hold it pressed for 2 seconds to set the clock back by one hour (see page 8).
- **TIMER button**
Press to engage the Timer Standby mode.
- **AFC switch**
Normally set to ON.

ENGLISH
ENGLISH

Remote Control Unit

- **TIMER button**
Press to engage the timer recording standby mode.
- **OPERATE button**
Press to turn the recorder power on or off.
- **PROGRAM button**
Press to programme the timer.
- **C.RESET/CANCEL button**
 - Press to reset the realtime counter reading to "0H 00M 00S".
 - Press to cancel the preset programme in timer programming.
- **C.MEMORY/REPEAT button**
 - Press to engage the Counter Memory mode, "M" will appear on the FDP and the tape will stop automatically at the counter reading of "0H 00M 00S" when rewinding or fast-forwarding.
 - Press to enter the repeat command in timer programming.
- **SELECT button**
Press to select the item to be set in timer programming.
- **SET (-/+)/CHANNEL (\vee / \wedge) buttons**
Press to set to the correct data in timer programming or to select a desired channel.
- **REW and FF (SHUTTLE SEARCH) buttons**
- **PLAY button**
- **REC button**
Press together with the PLAY button to start recording.
- **STOP button**
- **PAUSE/STILL button**

Operating distance for remote control unit

- The maximum operating distance is about 8 m.

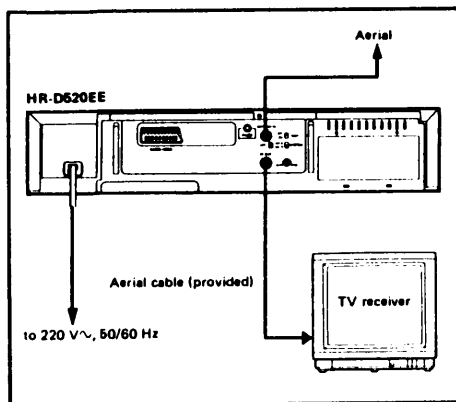
Installing the batteries

- Insert two "R6"-size batteries (provided) into the battery compartment on the rear of the remote control unit, observing correct polarity.

Rear Panel

- **AUDIO/VIDEO socket**
A 21-pin standardised audio/video input/output socket for the connection to a TV or a 2nd video recorder equipped with the same type of socket. The input from this socket can be recorded in the AUX mode engaged by obtaining "AU" in the channel display.
- **Remote PAUSE terminal**
When using a JVC video camera, connect the remote control cable of the camera adapter to this terminal for the purpose of controlling the starting and stopping of the tape with the camera's start/stop switch. When used with a JVC VideoMovie equipped with the Master Edit Control system, this terminal makes quality editing simple.
- **Aerial input connector (ANTENNA IN)**
Connect an aerial to this connector.
- **TEST signal switch**
Set to ON when tuning your TV receiver for the video channel. A test signal in the form of two vertical white bars will be available.
- **SYSTEM select switch**
Set this switch to match the broadcast system of your television receiver (G or K). If the colour TV broadcast system in your area is PAL B/G or SECAM B/G, set it to "G"; if the colour TV broadcast system in your area is PAL D/K or SECAM D/K, set it to "K".
- **RF OUT connector**
Connect to the aerial terminal of a TV receiver through the aerial cable (provided).
- **Attenuator switch (ATT.)**
Set to OFF to receive broadcasts from distant stations. Set to ON to receive broadcasts of high field strength.
- **RF converter frequency adjustment screw (CH40 – CH32)**
(See next page.)
- **Power cord**

CONNECTIONS



- Remove the aerial cable from the TV receiver and reconnect it to the recorder's ANTENNA IN connector ●. The recorder is then ready to record off-air programmes.
- Connect the recorder's RF OUT connector ● to the TV receiver's aerial terminal using the provided aerial cable. The TV receiver is then ready to receive broadcast programmes as well as accommodate video cassette playback.
- Set the SYSTEM select switch ● to the appropriate position according to your TV system. (Refer to the chart below.)

Switch position	Colour TV broadcast system	Major countries
G	PAL B/G	Austria, Denmark, Finland, Holland, Italy, Norway, Spain, Switzerland, Sweden, West Germany
	SECAM B/G	G.D.R. (East Germany)
K	PAL D/K	China, Mongolia
	SECAM D/K	Bulgaria, Czechoslovakia, Hungary, Poland, Rumania, U.S.S.R.

VIDEO CHANNEL SETTING

- Press the OPERATE button ● to turn the power on. Turn on the TV receiver.
- Set the TEST switch ● to ON.
- Adjust your TV receiver in the vicinity of UHF channel 36 until you bring in the two white signal bars on the screen as illustrated. This is your VIDEO CHANNEL.
- Reset the TEST switch to OFF.

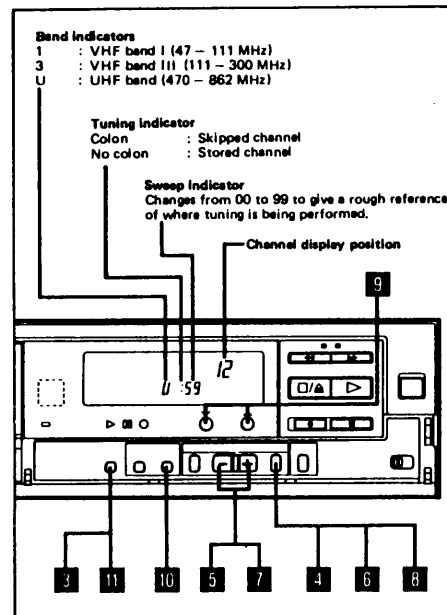


Notes:

- If some interference noise is seen on the screen because of broadcasts on neighbouring channels or if your preset broadcasts should be affected in picture quality, it is necessary to shift the RF converter output frequency from that of channel 36. Consult your JVC dealer for making this adjustment.
- Video channel setting is also possible using a prerecorded VHS video cassette. Play back the tape and tune the TV receiver to obtain clear pictures and sound while monitoring the playback picture on the TV screen.
- If your TV receiver is not provided with an AFC circuit, perform fine tuning of the TV receiver when you are actually viewing video cassettes.
- Set the SYSTEM select switch ● to the appropriate position.

OPERATING THE BUILT-IN TUNER

This recorder incorporates a voltage synthesized tuner with 48-channel preset capacity. Only channels stored can be called up with the TV PROG. buttons in modes other than Channel Set. In the Channel Set mode, all channel numbers including skipped ones are successively displayed so that they can be stored or skipped.



Available channels in each band

Band indicator	Frequency	Channels
1	VHF band I (47 - 111 MHz)	E2 - E4 (Common European channels) S1 - S3, M1 (Belgium) X, Y, Z, S1 (Switzerland) R1 - R5 (Czechoslovakia, Hungary, Poland, U.S.S.R.)
3	VHF band III (111 - 300 MHz)	M2 - M10 (Belgium) S2 - S10 (West Germany, Switzerland) E5 - E12 (Common European channels) U1 - U10 (Belgium) S11 - S20 (West Germany, Switzerland) R6 - R12 (Czechoslovakia, Hungary, Poland, U.S.S.R.)
U	UHF band (470 - 862 MHz)	E21 - E89 (Common European channels) R21 - R69 (Czechoslovakia, Hungary, Poland, U.S.S.R.)

Storing channels

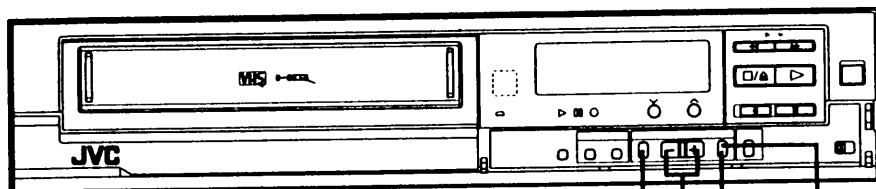
- Turn on the TV receiver and adjust it to your video channel.
- Turn on the recorder.
- Press CH.SET.
- Press SELECT.
 - The band indicator will blink.
- Press SET until the correct band indication appears.
- Press SELECT.
- Press SET until the desired broadcast signal is detected; use either the "-" or "+" button depending on the direction of search.
 - The sweep indicator will count down or up.
- Press SELECT.
 - The channel position display will blink.
- Press the TV PROG. buttons ∨ or ∧ to select the programme number you wish to use for the broadcast signal selected.
- Press STORE. The "colon" will disappear.
 - Repeat steps ■ through ■ for all necessary channels.
- Press CH.SET to disengage the Channel Set mode.
 - Stored channels will be called up during up/down scanning with the TV PROG. buttons.

Skipping channels

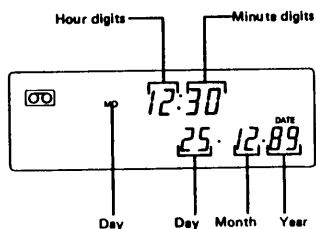
1. Press TV PROG. to select the channel to be skipped.
2. Press CH.SET.
 - The band indicator and the sweep indicator corresponding to the broadcast stored in that channel will appear.
3. Press SKIP ●. The "colon" will appear.
4. Press CH.SET to disengage the Channel Set mode.
 - The skipped channel will not appear on the channel display during up/down scanning with the TV PROG. buttons.

CLOCK SETTING

Plug the recorder into an AC outlet. The display shows a blinking 0:00.



- Press the **CLOCK ADJUST** button ● until the display shows the Clock Set mode with the hour indication blinking.
- Set the hour and minute in that order by using the **SELECT** and **SET** buttons ● ● alternately.
 - The blinking position is ready for entry.
 - Press **SET** until the correct indication appears in each position.
- Set the day, month and year in the same way.
 - In year setting, set only the last two digits of the year.
- Press **CLOCK ADJUST**.
 - Press it at the exact instant of the time signal, and the clock will be set accurately to the present time.
 - The day-of-the-week indication will be displayed automatically.



Notes:

- Clock setting is not possible in the timer recording standby mode. First check to see that the **TIMER** indicator on the FDP is not lit.
- Enter the date within 10 seconds after pressing the **CLOCK ADJUST** button.

SUMMER TIME ADJUST

This convenient feature is for quickly making the annual clock adjustment to the "summer time" (daylight saving time) setting, and back to regular time later.

1. Simply press and quickly release the **SUMMER TIME ADJUST** button ● to set the clock forward by one hour.
2. Later in the year, to switch back to regular time, simply hold the **SUMMER TIME ADJUST** button pressed for 2 seconds to set the clock back by an hour.

Power failure indicator

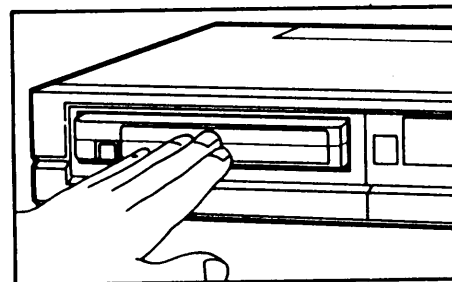
The blinking 0:00 (initial condition of the display) is also a power failure indicator, showing that there has been a power failure exceeding about 60 minutes. Readjusting the time restores the normal condition of the clock display.

LOADING AND UNLOADING A CASSETTE

Loading

Insert a cassette as illustrated. Be sure to insert it firmly into the slot; otherwise, it will be automatically ejected.

- The automatic loading mechanism will operate only when the cassette is inserted correctly.
- With a cassette inserted, the "cassette loaded" indicator will appear on the FDP.



Unloading

Press the **STOP/EJECT** button ● in the Stop mode.

AUTO POWER-ON AND AUTO PLAY SYSTEM

- The cassette can be loaded even when the power has not been turned on. Inserting a cassette into the loading slot turns the power on automatically.
- Inserting a cassette, with its safety tab removed, turns the recorder on and playback of the cassette begins automatically.

POWER-OFF EJECT SYSTEM

- The cassette can be unloaded even after the power has been turned off. Pressing the **STOP/EJECT** button turns the power on automatically and, after ejection of the cassette, shuts it off automatically.

CAUTION

- If unloading of the cassette is not possible, check to see whether the **TIMER** indicator is lit. If so, press the **TIMER** button so the **TIMER** indicator extinguishes.
- Do not attempt to pull out the cassette once automatic loading has started.
- Do not insert fingers or any foreign object beyond the door of the cassette loading slot, as this could lead to injury or damage to the mechanism. Show special caution with children.

CHILD LOCK FUNCTION

The Child Lock function is for preventing accidental operation by young children, or other unwanted operation, such as playing back or recording over an important cassette you may have intentionally left inserted in the recorder. By engaging the Child Lock mode, the operation buttons on the recorder become ineffective, unless the remote control is used.

To engage the Child Lock mode

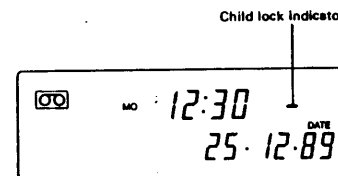
- Press the remote control's **OPERATE** button ● to turn the recorder power off and keep this button pressed for about 2 seconds after the power LED indicator has gone off.
- The Child Lock indicator (-) will appear in the channel display section on the FDP to show that the recorder is now in the Child Lock mode.

To disengage the Child Lock mode

- When the remote control's **OPERATE** button is pressed to turn the recorder power on, this disengages the Child Lock mode. The recorder will turn on and the corresponding display will appear with the channel number appearing where the child lock indicator appeared before.
- Pressing the **TIMER** button during timer recording also disengages the Child Lock mode.

Notes:

- While in the Child Lock mode, the recorder can receive timer programmed data from the remote control.
- Timer recording is possible also, even while in the Child Lock mode. After timer recording has been performed, the Child Lock mode remains in effect.
- Even after automatic cassette ejection at tape end, following timer recording, the Child Lock mode remains in effect.
- It is possible to insert a cassette while in the Child Lock mode. After inserting a cassette, the Child Lock mode remains in effect.



PLAYING BACK A VIDEO CASSETTE

- Turn the TV receiver on and adjust it to your video channel.
- Load a pre-recorded cassette.
 - Power will be switched on automatically.
 - When the cassette loaded has no safety tab, playback will start automatically.
- Press the PLAY button ●.
- Press the STOP/EJECT button ● at the end of the programme.
 - The tape will be rewound automatically when its end is reached and the recorder will enter the Stop mode.

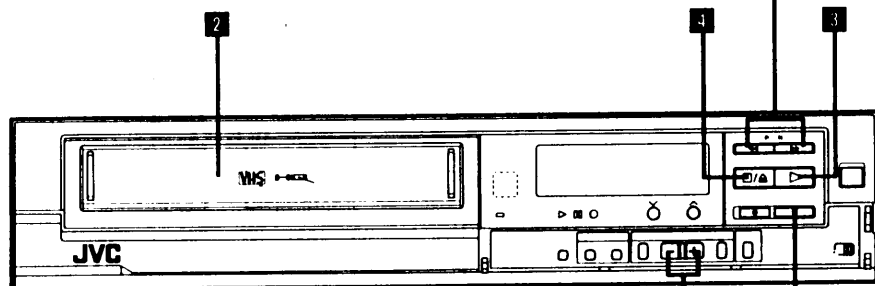
Note:
Only SP (Standard Play) recordings can be played back.

SHUTTLE SEARCH

Shuttle Search allows high-speed playback at 9 times normal speed in either direction.

1. Press either REW or FF Shuttle Search button ● or ● during playback.
2. To cancel the Search mode, press the PLAY button.
 - For briefer scanning, keep the Shuttle Search button pressed for more than 2 seconds; when you release the button, the Search mode will be cancelled.

ENGLISH
ENGLISH



DIGITAL TRACKING SYSTEM

This recorder incorporates a digital tracking system for automatic tracking adjustment. In most cases you do not have to adjust tracking.

- When you start playback after inserting a tape, the digital tracking system automatically adjusts the tape path relative to the heads for optimum tracking.
- This automatic adjustment also takes place when the playback output level reduces below a certain level.
- The DIGITAL TRACKING indicator ● blinks while the system is searching for optimum tracking, and remains lit as long as the automatic tracking mode continues.

If automatic tracking fails, and some noise bars are visible on the screen, use the manual tracking mode.

- Press the TRACKING "+/-" buttons ● simultaneously to cancel the automatic mode, then press either button to move noise bars off the screen.
- To return to the automatic mode, press both buttons simultaneously.

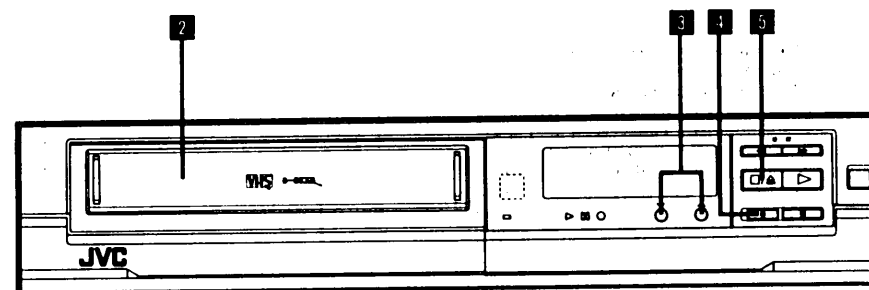
STILL PICTURE

1. Press the PAUSE/STILL button ● during playback.
2. To advance the still picture, press the PAUSE/STILL button a number of times.
3. To cancel the Still mode, press the PLAY button.

Notes:

- When the Still mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- With some televisions, the still picture may be unstable. This is not due to any defect of the unit.

RECORDING TV PROGRAMMES



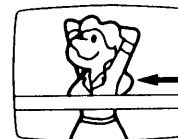
- Turn the TV receiver on and adjust it to your video channel.
- Load a cassette (with safety tab in place).
 - Power will be switched on automatically.
- Press either TV PROG. button ● to select the channel you wish to record.
- Press the REC/ITR button ● to start recording.
 - Be careful to press REC/ITR only once, or Instant Timer Recording will begin.
 - Press the REC and the PLAY buttons simultaneously when using the remote control unit.
 - If there is part of the programme you don't want to record, press the PAUSE/STILL button ●. A white horizontal bar will appear on the screen, which reduces in size in 4 steps as time elapses. When the last quarter starts blinking and disappears, the Stop mode will be entered automatically. The pause duration is possible for about 5 minutes.

INSTANT RECORDING

If you wish for recording to stop automatically after a certain period of time, use this Instant Timer Recording mode.

1. Press the REC/ITR button during recording (or twice if in the Stop mode).
 - Recording will begin and the FDP shows "ITR 0:30", indicating that recording will automatically stop and power will switch off after 30 minutes.
2. Adjust the switch-off time, if necessary.
 - Press REC/ITR to increase the time in 30-minute increments (possible up to 4 hours).
 - Use SELECT and SET to set to a more precise time when required (possible up to 4 hours 59 minutes). After setting the time, press SELECT so that all digits stop blinking.

Pause mode indicator



- To continue recording from the Pause mode, press the PLAY button ● while the white bar is on-screen.
- Press the STOP/EJECT button ● at the end of the programme.
 - When the end of the tape is reached during recording, the tape is automatically rewound and stops.

Notes:

- When recording is restarted from the Pause mode, assemble recording is performed so that the playback picture will not distort at the edit point.
- The selected channel cannot be altered during recording. If you wish to change the channel, first engage the Pause mode and then select a different channel.

RECORDING ONE PROGRAMME WHILE WATCHING ANOTHER

A programme not being viewed can be recorded while you enjoy another programme.

- Select the channel you wish to record with the recorder's channel select buttons.
- Select the channel you wish to view with the TV receiver's channel selector.

AUTOMATIC TIMER RECORDING

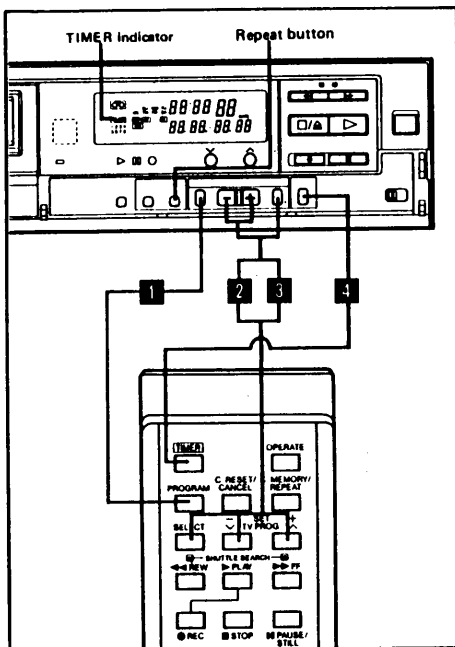


First of all, load a cassette (with safety tab in place); power will be switched on automatically.

Two ways to perform timer programming

A. Local programming: Programme the timer using the recorder's controls while referring to the recorder's FDP.

B. Direct remote programming: Programme the timer using the remote control's buttons while referring to the recorder's FDP.

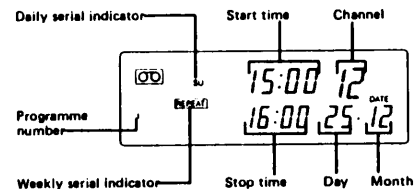


A. Local Programming

- Press the PROGRAM button ●.
- The display will change to the Timer Set mode for programme number "1". To advance to programme number 2 - 8, press the SET button ● a required number of times.
- Set the start time by using the SELECT ● and SET buttons alternately.
 - Select the item to be set with the SELECT button; the selected item will blink.
 - Set the desired data with the SET -/+ buttons.
 - To record a weekly serial, press the REPEAT button ● once.
 - To record a daily serial starting on a certain day, press REPEAT twice.

Set the stop time, date and channel in succession in the same way as for setting the start time.

- To record a daily serial starting on the day of setting, there is no need to enter any date figure; simply advance to the next item.
- For programming the timer to record an external source, while the channel position is blinking, press SET -/+ until the "AU" indicator appears in the channel display section on the FDP.



After making sure that the cassette is loaded, press the TIMER button ●.

- The Timer Recording Standby mode will be engaged with the TIMER indicator and the preset programme number(s) illuminated and the power turned off.
- With no cassette loaded, the TIMER and "cassette loaded" indicators will continue blinking.
- A cassette whose safety tab has been removed will be ejected automatically.
- If a preset programme contains errors, that programme number will not be illuminated. Recheck the programmed data.

B. Direct Remote Programming

Following the procedures above, use the remote control's buttons instead of the recorder's with the remote control directed toward the recorder's REMOTE SENSOR window ●.

Setting the date, start and stop times

- It is not possible to set the date, start and stop times unless the date and clock have previously been set.
- Enter the data while the digits are blinking.
- The stop time can be set within 24 hours from the start time.

Cancelling the preset data

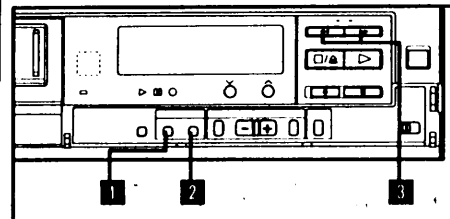
- The preset programmes can be cancelled. First engage the Timer Set mode for the programme number you wish to cancel and then press the CANCEL button ● (or the C. RESET/CANCEL button ●).
- An executed programme is automatically cleared.

Timer recording operation

- When the preset start time is reached, recording starts.
- After timer recording, the power is switched off. If the tape end is reached during timer recording, the cassette is automatically ejected and the power is switched off.

REALTIME TAPE COUNTER/COUNTER MEMORY FUNCTION/LAP TIME INDICATION

Unlike usual tape counters which show tape locations in numbers, this realtime tape counter shows tape time precisely in hours, minutes and seconds in all modes (Record, Play, Rewind, Fast Forward).



Counter Memory function

- Press the COUNTER RESET button ● at a point which you may wish to locate later.
 - The counter will read "0H 00M 00S".
- Press the COUNTER MEMORY button ●. [M] will appear in the FDP.
- Press the REW (or FF) button ● (or ●) when you need to return to the designated point. The tape will rewind (or fast forward) and stop at about the "0H 00M 00S" counter reading automatically.

Lap Time Indication

When you need to know the exact time of a recording, press the COUNTER RESET button before starting recording or playback. The counter will be reset to "0H 00M 00S" and show the exact elapsed time as the tape runs.

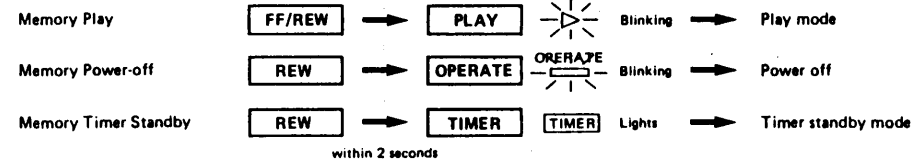
NEXT-FUNCTION MEMORY

Memory Play function

- If you want to watch the tape from its beginning after re-winding, press REW and then the PLAY button within 2 seconds. Playback will start automatically at the beginning of the tape. (Check to see that the counter memory indicator [M] is off.)
- If you want to watch the tape from the counter reading of "0H 00M 00S", press the COUNTER MEMORY button, then the REW (or FF) button and then the PLAY button within 2 seconds.
- While the tape is being rewound, the Play (▶) indicator is blinking. To cancel the Memory Play mode and go to another mode, press the corresponding button (STOP/EJECT, PLAY, FF, REW).

Memory Power-Off/Timer Standby

- If you are going to turn the power off or engage the Timer Standby mode after rewinding the tape, you do not have to wait for completion of rewind to press the corresponding button.
- To turn the power off after rewind, press REW and then the OPERATE button within 2 seconds. (To cancel the Memory Power-off mode, press OPERATE).
- To engage the Timer Standby mode after rewind, press REW and then the TIMER button within 2 seconds. (To cancel the Memory Timer Standby mode, press TIMER).



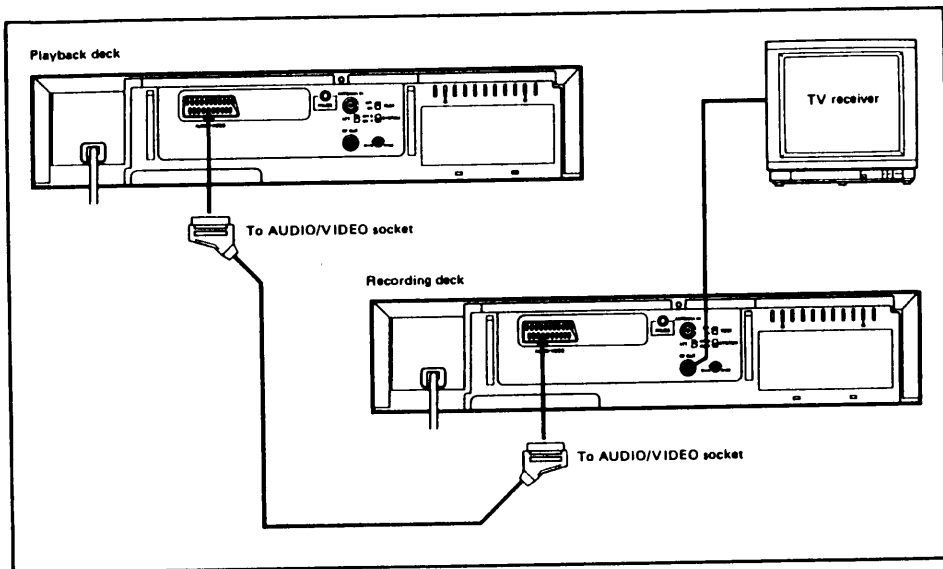
RECORDING FROM AN EXTERNAL SOURCE

By connecting an external video source (such as a 2nd video recorder, VideoMovie camera-recorder, etc.) to the AUDIO/VIDEO socket, editing is possible.

● For connection of these units an appropriate cable is necessary.

Connection

1. Connect the AUDIO/VIDEO socket ● to the appropriate audio/video output of the 2nd video recorder.
2. Connect a TV receiver to the recorder to monitor the picture while recording.



Operation

1. Turn the power on for all connected equipment.
2. Tune the TV receiver to your video channel.
3. Load a cassette with its safety tab in place.
4. Press either TV PROG. button ● to obtain "AU" in the channel display section on the FDP.
5. Press the REC/ITR button ● and the PAUSE/STILL button ● to put the recorder in the Record Pause mode.
6. Play back a tape on the source equipment to determine the segment to be recorded.
7. Press the PLAY button ● to start recording.
8. To stop recording temporarily, press the PAUSE/STILL button.
9. To end recording, press the STOP/EJECT button ●.

Note:

● For the operation of the source equipment, refer to the instruction manual of the relevant machine.

Editing from a VideoMovie

This recorder is equipped with a remote PAUSE terminal. When the recorder is connected to a VideoMovie which incorporates a Master Edit Control system, you can control the recorder with the VideoMovie's controls for making edits free of transition-point gaps and distortion. Refer to the VideoMovie's instruction manual for detailed operating procedures for editing.

Note:

● For direct recording with a video camera, a camera adapter is also necessary.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . .

Symptoms	Check points
No power is applied to the recorder.	● Is the power cord disconnected? Connect it.
Playback picture does not appear while the tape is running.	● Is the TV receiver's channel selector set to the correct video channel? Set to the RF converter channel.
Picture is normal but no sound.	● Is the SYSTEM select switch set to the appropriate position? Set to G or K depending on the system of your television receiver.
Tape does not run in the Record mode.	● Is the PAUSE/STILL button pressed? Press the PLAY button to release.
REC/ITR button cannot be engaged.	● Is the cassette improperly loaded? Load it properly. ● Is the safety tab broken? Reseal the slot.
Tape stops in the Rewind or Fast Forward mode.	● Is the COUNTER MEMORY switch set so that [M] appears on the FDP? Press to make [M] disappear.
Tape will not rewind.	● Is the tape already rewound to the end?
Noisy playback picture.	● Adjust with the TRACKING control buttons. (See page 10.)
Pressing PAUSE/STILL during playback brings a still picture (in a frame-by-frame manner) with noise bars.	● Noise bars can be eliminated by pressing the PAUSE/STILL button a few more times.

This recorder contains microcomputers. External electronic noise or interference could cause malfunctioning. In such cases, switch the power off and unplug the power cord. Then plug it in again and check the functions.

HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the video heads after long periods of use causes such problems. In this case, head cleaning requiring highly technical care is necessary.

For head cleaning, consult your JVC dealer.

SECTION 1 MECHANISM ADJUSTMENTS

1.1 PRECAUTIONS

1. Disconnect mainframe from AC power before soldering.
2. Avoid imparting stress to wires when disengaging connectors.
3. Determine and correct the cause of difficulty before proceeding to adjustments. Do not disturb settings unnecessarily.
4. Use care not to damage tabs, claws, etc. during repairs.
5. Install the cassette housing assembly only when the mechanism is in the Eject or Stop mode position. In the Eject mode, the internal holder of the housing is fully raised. This is fully lowered in the Stop mode.
6. When installing the front panel assembly, be sure to engage the housing door with the door lever of the cassette housing assembly. If this is omitted, the door will not open at Eject and the cassette cannot be removed.

1.2 CHECK WITHOUT CASSETTE HOUSING

Mechanism operations can be observed easily by removing the cassette housing assembly. Note the following.

1. Disable the photo transistor sensor (END SENSOR) on the main-deck by applying an opaque cover.
2. Connect pins 2 and 3 of Main board connector CN601.
3. Select the desired modes with the operation buttons. However, notice that without tape, setting for the reverse direction modes produces the Stop mode after a few seconds due to absence of the reel sensor output.

1.3 MANUALLY REMOVING CASSETTE TAPE

In event of electrical system failure that prevents the tape from being unloaded, the tape can be removed manually by the following procedure. Refer to Figs. 1-6-1, 1-6-2 and 1-6-3.

1. Disconnect power cord from AC outlet.
2. Turn the loading motor by hand so that the control cam rotates clockwise. This retracts the pole base assembly to the unloading position.
3. Continue turning to where the guide arm and half loading gear assemblies shift to beneath the cassette.
4. Turn the clutch assembly at the rear of the deck to absorb slack tape within the cassette.
5. Again turn the loading motor in the same direction to raise the cassette and remove it.

1.4 TEST EQUIPMENTS

The following special tools and fixtures are required for mechanism adjustment.

1. Alignment tapes : MH-2
Stairstep signal is employed for interchangeability checks and adjustments.
2. Torque gauge : PUJ48075-2
Measures tape take-up torque.
3. Back tension cassette gauge : PUJ48076-2
Measures tape tension at the supply side.
4. A/C head positioning tool : PUJ47351-2
Shifts the head base for adjusting the control head position.
5. Roller driver : PTU94002
Turns the guide roller for adjusting FM linearity.

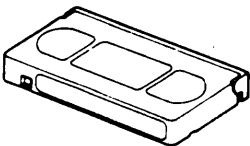
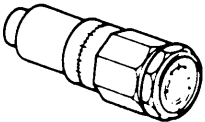
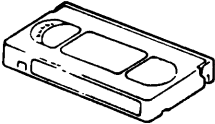

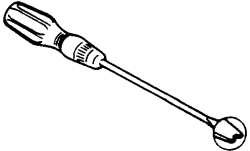
Alignment tapes 1	Torque gauge 2	Back tension cassette gauge 3	A/C head positioning tool 4	Roller driver 5
				

Fig. 1-4-1 Test equipments

1.5 DISASSEMBLY

1.5.1 Top cover

1. Take out five screws (A) from the right, left and rear sides of the set.
2. Tilt up the rear end of the top cover, then remove the top cover.

1.5.2 Front panel assembly

1. Remove the top cover.
2. Carefully bend three hooks (B) of the front panel assembly from the upper side of the chassis in order to disengage the hooks from the chassis.
3. Pull the front panel assembly toward you to disengage three hooks (C) of the front panel assembly from the bottom side of the chassis then remove the front panel assembly.

1.5.3 Bottom cover

1. Verify the top cover has been removed.
2. Take out two screws (D) from the bottom side of the set, then remove the bottom cover.

1.5.4 Cassette housing

Note: Disconnect VCR from AC power.

1. Verify the top cover and front panel have been removed.
2. Take out six screws (E) from the Main board assembly and take out four screws (F) from the chassis.
3. Carefully tilt up and remove the cassette housing assembly.

1.5.5 Cassette housing door

1. Remove the front panel assembly.
2. Bend the centre of the cassette housing door toward you then pull out the right end from the cassette housing.
3. Use care regarding the torsion spring, then pull out the left end of the cassette housing door to remove it.

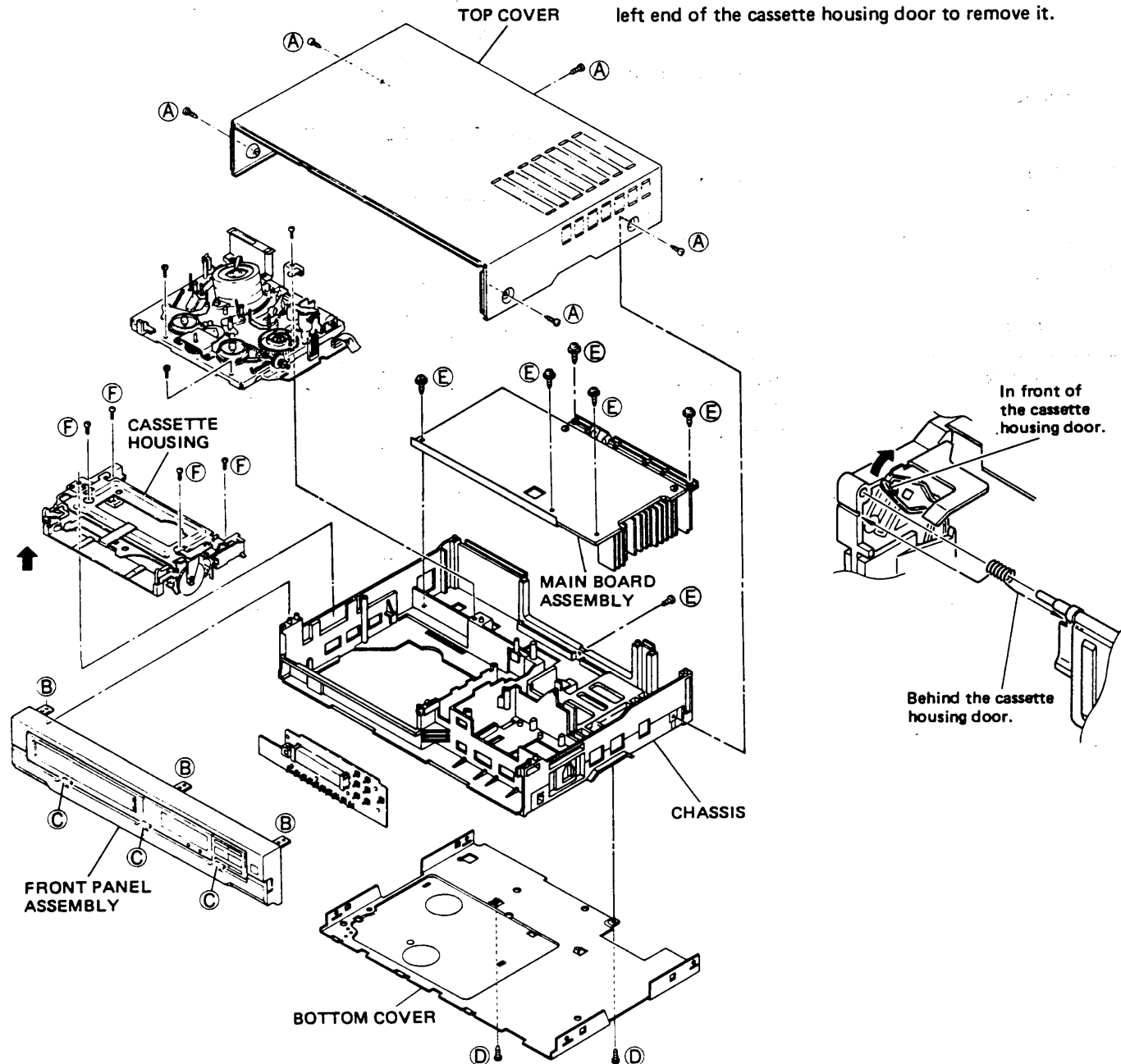


Fig. 1-5-1 Removal of external covers

1.6 MAIN MECHANISM PARTS

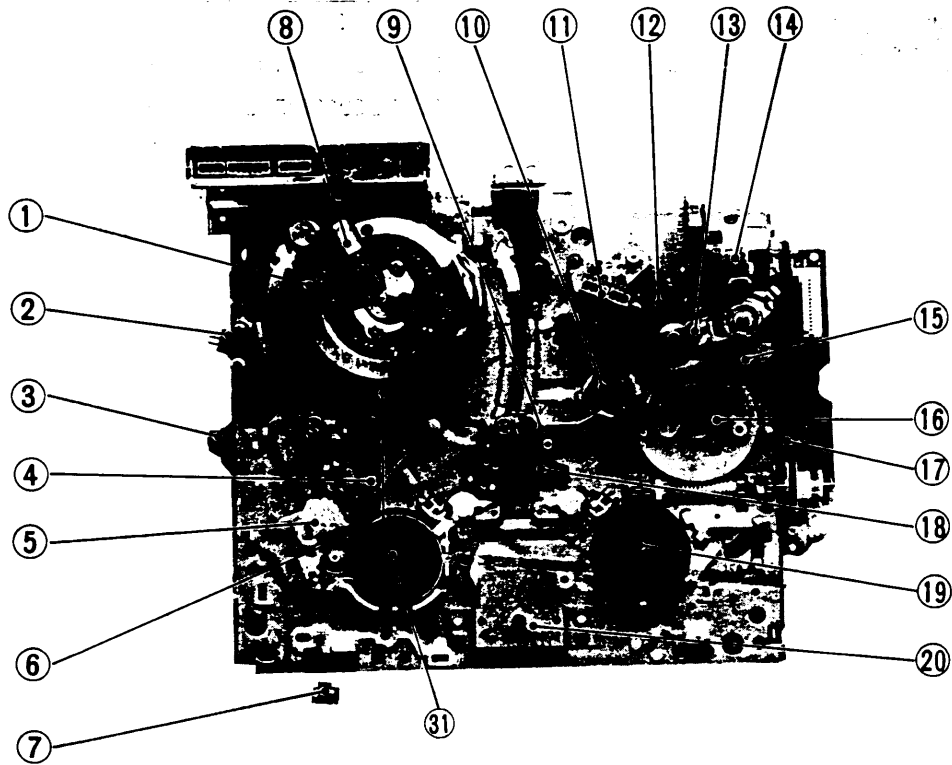


Fig. 1-6-1 Top view of main-deck

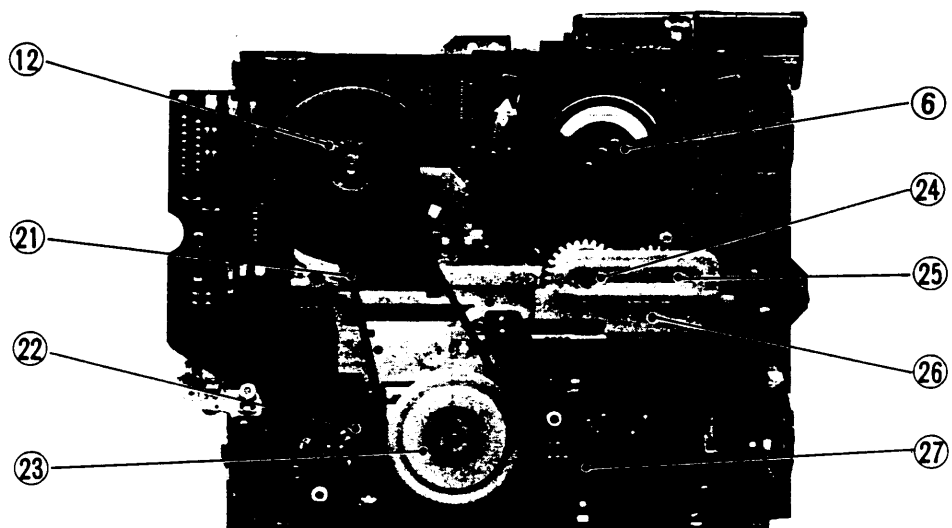


Fig. 1-6-2 Bottom view of main-deck

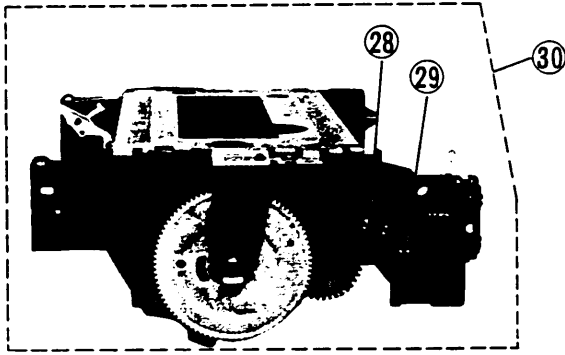


Fig. 1-6-3 Side view of cassette housing

A. Cleaning

Periodic cleaning of the tape transport system is desirable, but ordinarily not feasible in practice. Therefore, perform cleaning when a set is brought in for repairs or maintenance. Heavy Contamination of the video heads, tape guides and brushes can detract from playback picture quality and in extreme cases, even damage the tape. For cleaning, use a fine-mesh cotton cloth (about the texture of a white dress-shirt) moistened in alcohol.

- To clean the video heads, press the moistened cloth gently against the upper drum with fingertip and turn the drum by hand.
Do not use a vertical stroke, as this may damage the heads.

B. Lubrication

Oil and grease do not require periodic replenishing. Apply only when replacing lubricated parts (also clean and replace lubrication of mating parts if soiled).

1. Table 1-6-1 indicates the oil and grease used in this set. Use these or recommended locally available equivalents.

Category	Part Name	Part number
Oil	Video Oil	COSMO-HV56
Grease	Video Grease	KANTO-G-31KAV

Table 1-6-1

2. Grease is not required for a replacement cassette housing assembly, as this has been applied at the factory.

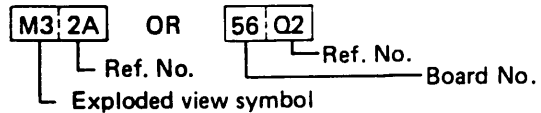
Note: Stir grease that has been stored for an extended period.

C. Main mechanical parts

See Figs. 1-6-1, 1-6-2 and 1-6-3.

No.	Exploded view Ref.	Parts Name	See Item
1	PDM2008C-5/M32A	Upper drum assy	1.8.1
2	PU60616/M44	Full erase head	
3	PU60625/51Q1	End sensor	
4	PQ43497E/M41	Tension arm assy	1.8.4
5	PQ43501A-7/M42	Tension band assy	1.8.4
6	PDM2108D/M32C	Lwr drum motor assy	1.8.2
7	PU60624-1-2/M461	REC safety switch (S2)	
8	PDM4181A-3/M32D	Brush assy	
9	PQ43570A/M449	Half loading gear assy	1.8.5
10	PQ43567A-7/M447	Guide arm assy	1.8.5
11	PU60617/M48	A/C head	1.8.3
12	PU60892/M422	Capstan motor	
13	PQ43558A/M442	Pinch roller arm assy	
14	PQ43676B-5/M434	Modo motor assy	
15	PQ32416-1-1/M446	Pinch roller cam	1.8.5
16	PQ32413/M438	Control cam	1.8.5
17	PQM30003-23/M437	Loading belt	
18	PU60621-1-1/M460	LED holder (D1)	
19	PU60858/M430	Reel disk (take-up)	
20	PU60618-1-2/M424	Idler gear unit	
21	PQM30003-24/M429	Reel belt	
22	PU60623/51PHS1	TU reel sensor (PS1)	
23	PU60953-1-1/M426	Clutch unit	1.8.6
24	PQ43542B/M433	TU loading arm assy	1.8.7
25	PQ43537A/M432	SUP loading arm assy	1.8.7
26	PQ43555B/M439	Plate assy	1.8.7
27	PU60622-1-1/M462	Slide switch (S3)	
28	PU60629/56PHS3	Cassette sensor (PS3)	
29	PN268VI-NC/56Q2	Photo transistor	
30	PUS29183C-3/M36	Cassette housing assy	
31	PU60859/M470	Reel disk (supply)	

- Symbol interpretation example



1.6 MAIN MECHANISM PARTS

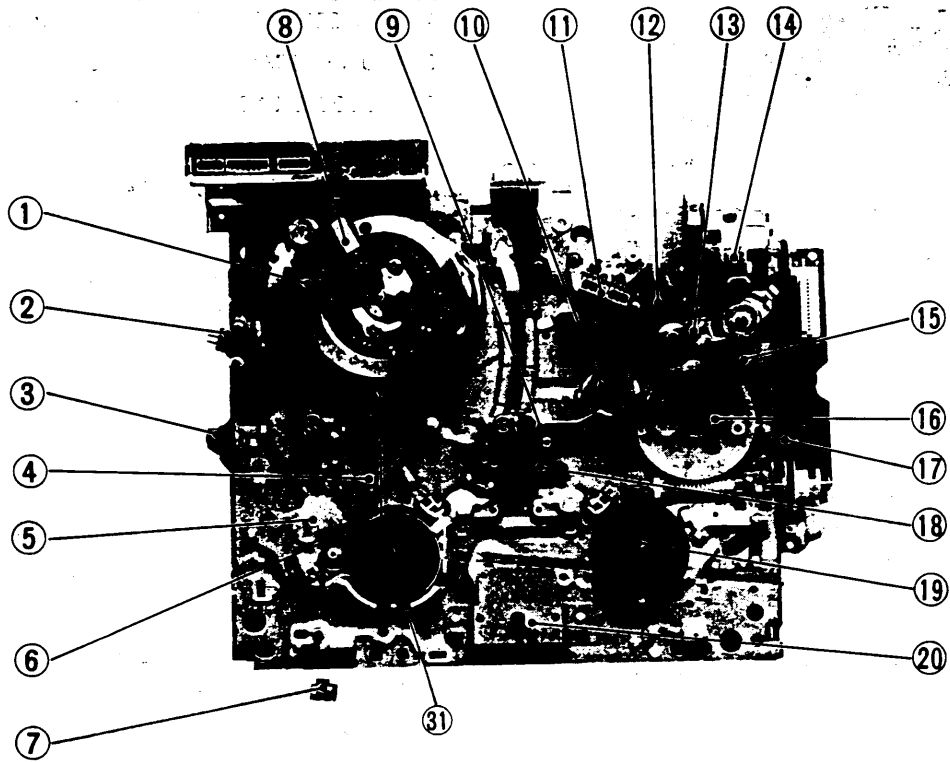


Fig. 1-6-1 Top view of main-deck

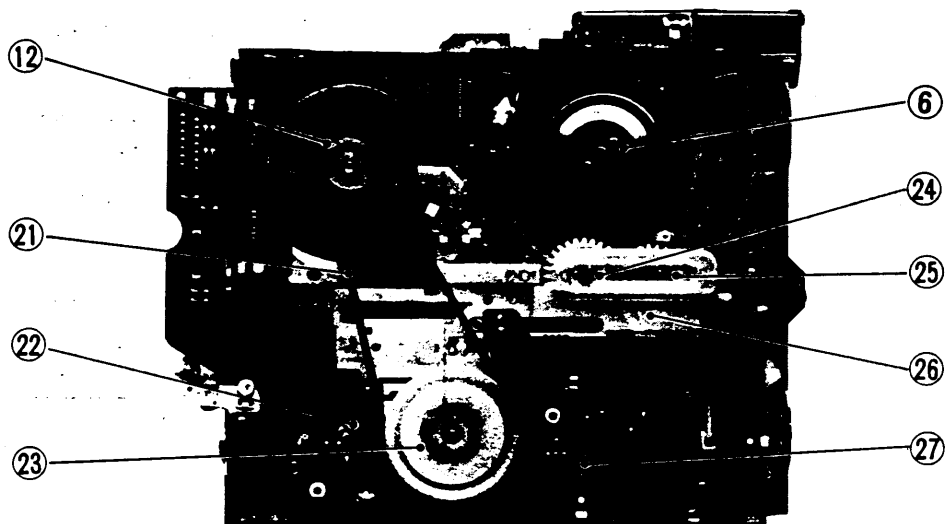


Fig. 1-6-2 Bottom view of main-deck

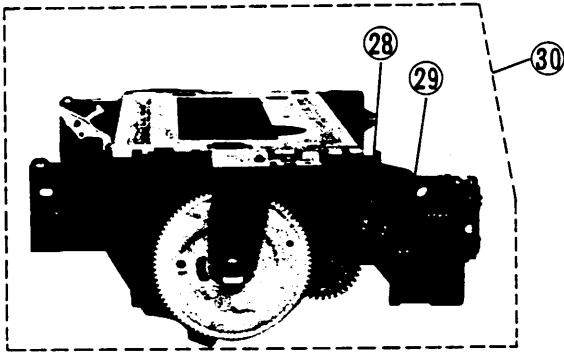


Fig. 1-6-3 Side view of cassette housing

A. Cleaning

Periodic cleaning of the tape transport system is desirable, but ordinarily not feasible in practice. Therefore, perform cleaning when a set is brought in for repairs or maintenance. Heavy Contamination of the video heads, tape guides and brushes can detract from playback picture quality and in extreme cases, even damage the tape. For cleaning, use a fine-mesh cotton cloth (about the texture of a white dress-shirt) moistened in alcohol.

- To clean the video heads, press the moistened cloth gently against the upper drum with fingertip and turn the drum by hand.
Do not use a vertical stroke, as this may damage the heads.

B. Lubrication

Oil and grease do not require periodic replenishing. Apply only when replacing lubricated parts (also clean and replace lubrication of mating parts if soiled).

1. Table 1-6-1 indicates the oil and grease used in this set. Use these or recommended locally available equivalents.

Category	Part Name	Part number
Oil	Video Oil	COSMO-HV56
Grease	Video Grease	KANTO-G-31KAV

Table 1-6-1

2. Grease is not required for a replacement cassette housing assembly, as this has been applied at the factory.

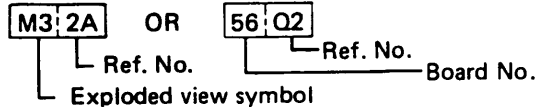
Note: Stir grease that has been stored for an extended period.

C. Main mechanical parts

See Figs. 1-6-1, 1-6-2 and 1-6-3.

No.	Exploded view Ref.	Parts Name	See Item
1	PDM2008B-5/M32A	Upper drum assy	1.8.1
2	PU60616/M44	Full erase head	
3	PU60625/51Q1	End sensor	
4	PQ43497E/M41	Tension arm assy	1.8.4
5	PQ43501A-7/M42	Tension band assy	1.8.4
6	PDM2108D/M32C	Lwr drum motor assy	1.8.2
7	PU60624-1-4/M461	REC safety switch (S2)	
8	PDM4181A-3/M32D	Brush assy	
9	PQ43570A/M449	Half loading gear assy	1.8.5
10	PQ43567A-7/M447	Guide arm assy	1.8.5
11	PU60617/M48	A/C head	1.8.3
12	PU60892/M422	Capstan motor	
13	PQ43558A/M442	Pinch roller arm assy	
14	PQ43676B-5/M434	Modo motor assy	
15	PQ32416-1-1/M446	Pinch roller cam	1.8.5
16	PQ32413/M438	Control cam	1.8.5
17	PQM30003-23/M437	Loading belt	
18	PU60621-1-1/M460	LED holder (D1)	
19	PU60858/M430	Reel disk (take-up)	
20	PU60618-1-3/M424	Idler gear unit	
21	PQM30003-24/M429	Reel belt	
22	PU60623/51PHS1	TU reel sensor (PS1)	
23	PU60953-1-2/M426	Clutch unit	1.8.6
24	PQ43542B/M433	TU loading arm assy	1.8.7
25	PQ43537A/M432	SUP loading arm assy	1.8.7
26	PQ43555B/M439	Plate assy	1.8.7
27	PU60622-1-1/M462	Slide switch (S3)	
28	PU60629/56PHS3	Cassette sensor (PS3)	
29	PN268VI-NC/56Q2	Photo transistor	
30	PUS29183C-3/M36	Cassette housing assy	
31	PU60859/M470	Reel disk (supply)	

- Symbol interpretation example



1.7 INSPECTION AND MAINTENANCE

This product employs rotary and moving parts which wear out in the course of usage. Periodic inspection, cleaning, lubrication and maintenance are therefore important for ensuring maximum performance. Worn parts must also be replaced at regular intervals.

1.7.1 Suggested servicing schedule for main components

The following table indicates the suggested period for such service measures as cleaning, lubrication and replacement. In practice, the indicated periods will vary widely according to environmental and usage conditions. However, the indicated components should be inspected when a set is brought for service and the maintenance work performed if necessary.

Also note that rubber parts may deform in time, even if the set is not used.

System	No.	Parts Name	Symbol No.	Periodic servicing schedule (operation hours)									
				250	500	750	1000	1250	1500	1750	2000	Overhaul	
Tape Transport	1	Upper drum	M32A	★	★	☆	○	○	○	○	○	○	●
	11	A/C head	M48	★	★	★	○	○	○	○	○	○	●
	13	Pinch roller	M442	★	★	★	○	○	○	○	○	○	●
	2	Full erase head	M44	★	★	★	○	○	○	○	○	○	●
	4	Tension arm	M41										●
	6	Lower drum	M32C				○	○	○	○	○	○	●
	12	Capstan (shaft)	M422	★	★	★	★	★	★	★	★	★	●
	9	Half loading gear	M449										●
	10	Guide arm	M447										●
	Drive	12	Capstan motor	M422				○	○	○	○	○	○
17		Loading Belt	M437				○	○	○	○	○	○	●
21		Reel Belt	M429				○	○	○	○	○	○	●
19		Take-up reel disk	M430				○	○	○	○	○	○	●
31		Supply reel disk	M470				○	○	○	○	○	○	●
23		Clutch assy	M426								○	○	●
14		Loading motor	M434				○	○	○	○	○	○	●
		Worm clutch assy	M436									△	●
	Plate assy	M439									△	●	
Others	5	Tension band	M42				○					○	●
	8	Brush	M32D				○					○	●

★ : Cleaning

☆ : Cleaning (or Replacement if necessary)

△ : Lubrication

No: Refer to Main mechanical parts

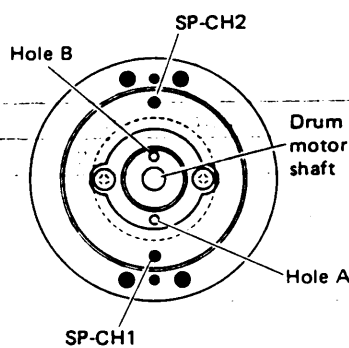
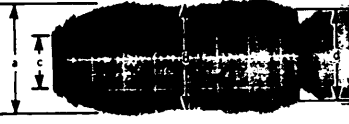
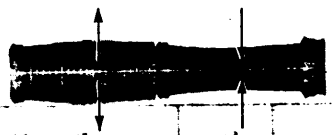
▲ : Lubrication (or Replacement if necessary)

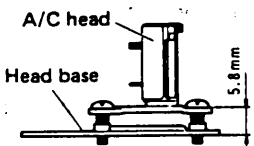
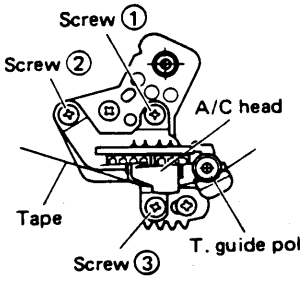
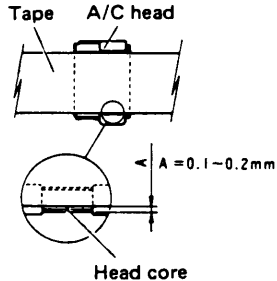
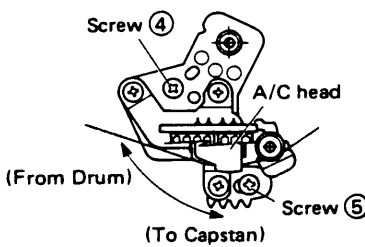
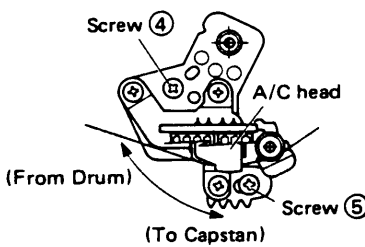
● : Replacement

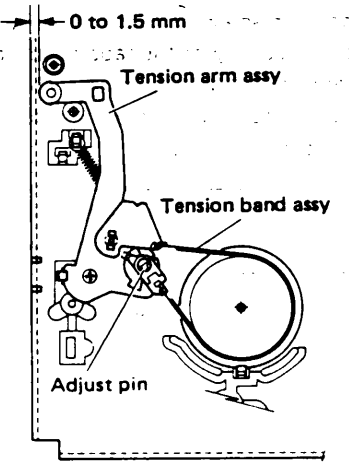
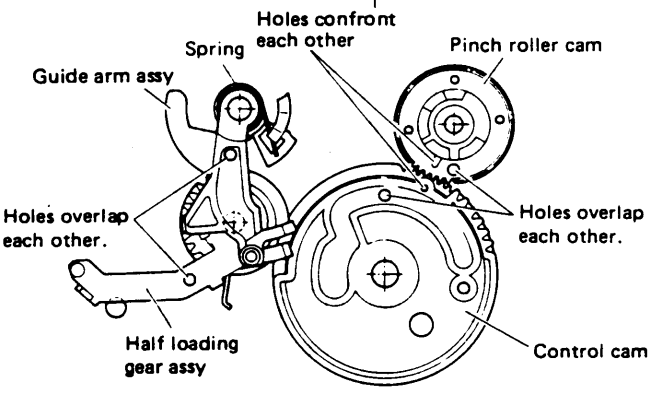
○ : Inspection or Replacement if necessary

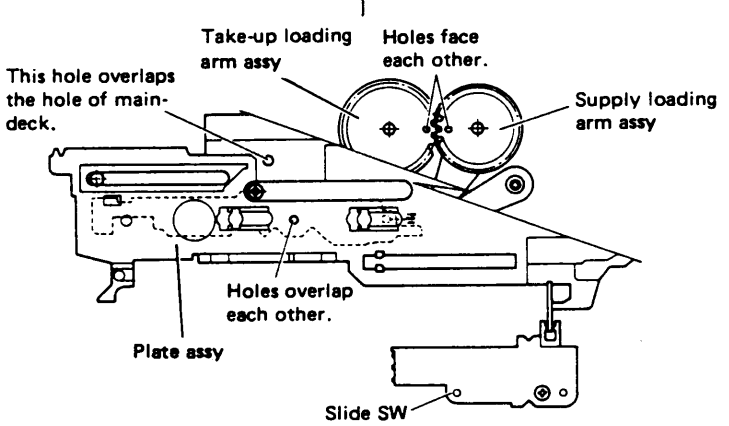
Table 1-7-1 Approximate maintenance schedule

1.8 MAIN PARTS REMOVAL AND REPLACEMENT

No.	Item	Checkpoints	Adjustment and Checks
1	<p>Upper drum assembly</p> <ul style="list-style-type: none"> • Effects: FM signal absent, intermittent or weak on one channel; large difference in channel output levels • Cause: Worn or damaged video heads, poor response, etc.  <p>Fig. 1-8-1</p>  <p>Fig. 1-8-3</p>	<p>Mounting direction See Fig. 1-8-1. (Effect: no picture)</p>	<p>After replacing, observe that upper drum hole A is opposite the motor axis from lower drum hole B.</p>
	<p>Axis wobble See Fig. 1-8-2. (Effect: jitter, poor FM linearity) PB FM: Main board TP206 FF: Main board TP411</p>	<p>Record and play back in SP mode. Confirm absence of large difference between channels. (Fig. 1-8-2).</p>  <p>Fig. 1-8-2</p>	
	<p>FM linearity check See Fig. 1-8-3. (Effect: vertical sync absent, picture noise) PB FM: Main board TP206 FF: Main board TP411</p> $\frac{b}{a} \geq 0.7, \frac{c}{a} \geq 0.65, \frac{d}{a} \geq 0.65$	<p>Set for Auto Tracking off by pressing the + and - buttons simultaneously.</p> <ol style="list-style-type: none"> 1) Play stairstep signal of the MH-2 Alignment Tape. Confirm absence of obvious FM waveform loss and that operating the Tracking yields the optimum point. 2) Adjust for loss at the left edge (drum entry) of the FM waveform by turning the guide roller of the supply pole base. Similarly, adjust for loss at the right edge (drum exit) by turning the guide roller of the take-up pole base. <p>Note: If FM loss occurs on both channels and cannot be corrected by adjusting the guide rollers, the lower drum needs replacement.</p>	
<p>Check switching point (Effect: switching noise at picture bottom)</p>	<p>See Electrical Adjustment (Servo circuit).</p>		
2	<p>Lower drum assembly</p> <ul style="list-style-type: none"> • Effects: Poor FM linearity, noisy rotation, jitter • Cause: Faulty rotary transformers, bearing wear. 	<p>Check FM linearity and switching point.</p>	<p>See above upper drum assembly items.</p>
		<p>Check control head phase (X value) Effect: tracking error PB FM: Main board TP206 FF: Main board TP411</p>	<ol style="list-style-type: none"> 1) Play stairstep signals of MH-2 and Alignment Tapes. Set for Auto Tracking off and Engage the Tracking Preset mode by pressing the + and - buttons simultaneously. Confirm that the same maximum FM waveform level is obtained as when the tracking is adjusted manually. 2) Refer to the A/C head adjustments. (1.8-3).

No.	Item	Checkpoints	Adjustment and Checks
3	A/C head	Temporarily set height as indicated in Fig. 1-8-4.	Set the height as indicated in Fig. 1-8-4 to facilitate tape transport checks and adjustments.
	 <p>Fig. 1-8-4</p>	Tilt (forward inclination) See Fig. 1-8-5. (Effect: audio level varies greatly.)	<ol style="list-style-type: none"> 1) Run tape, turn screw ① counterclockwise to where slight curling of the tape occurs at the lower flange of the take-up guide roller. 2) Then slowly turn the screw clockwise to where the curling ceases.
	 <p>Fig. 1-8-5</p>	Azimuth See Fig. 1-8-5 (Effect: audio low level or noisy) Audio output: Main board AUDIO OUT	<ol style="list-style-type: none"> 1) Play stairstep signal (with audio 6 kHz) of the MH-2 Alignment Tape. Observe audio output signal with oscilloscope. 2) Turn screw ② and adjust for maximum audio output level.
	 <p>Fig. 1-8-6</p>	Height See Figs. 1-8-5 and 1-8-6. (Effect: low audio and control signal levels)	<ol style="list-style-type: none"> 1) Run tape and observe the control head area. 2) Turn screws ①, ② and ③ by small and equal amounts until 0.1 to 0.2 mm of the head core bottom can be seen. <p>Note: If difficult to observe, play stairstep signal of MH-2 Alignment Tape and adjust for maximum audio output and control pulse level.</p>
	 <p>Fig. 1-8-7</p>	FM linearity	Refer to upper drum assembly items. If adjustment is major, again check the azimuth.
	 <p>Fig. 1-8-7</p>	Control head phase See Fig. 1-8-7. PB FM: Main board TP206 FF : Main board TP411	<ol style="list-style-type: none"> 1) Play stairstep signal of MH-2 Alignment Tape and observe the FM waveform. Set for Tracking Preset and Auto Tracking off by pressing the + and - buttons simultaneously. 2) Loosen screws ④ and ⑤. Set the A/C head positioning tool on screw ④, with the stud inserted into the nearby oblong hole. 3) Turn the tool first to position the A/C head fully toward the capstan. Then gradually return it toward the drum and stop at the position of maximum FM waveform output level. 4) Tighten screw ⑤. Remove the tool and tighten screw ④.

No.	Item	Checkpoints	Adjustment and Checks
4	<p>Tension arm assembly Tension band assembly</p>  <p>Fig. 1-8-8</p>	<p>Tension pole position See Fig. 1-8-8. (Effect: poor FM waveform response)</p> <p>Back tension (Effect: skew)</p>	<ol style="list-style-type: none"> 1) Remove the cassette housing assembly and set the mechanism for the playback mode (see 1.2). 2) Turn the eccentric adjust pin to align the tip of the tension arm with the edge of the main deck. <ol style="list-style-type: none"> 1) When the tension pole position is correctly adjusted, the back tension will assume the correct value. 2) Use the Back Tension Cassette Gauge and set for the playback mode. Confirm reading of 22 to 35. 3) Changing the tension pole position in order to vary the back tension will cause adverse effects elsewhere.
5	<p>Pinch roller cam Control cam Half loading gear assembly Guide arm assembly</p>  <p>Fig. 1-8-9</p>	<p>Important: Do not remove or disturb parts other than those mentioned. See Fig. 1-8-9.</p> <p>Cassette housing assembly</p>	<p>Set mechanism to Eject mode position.</p> <ol style="list-style-type: none"> 1) When installing the pinch roller cam, overlap the largest hole of the gear portion with the hole of the deck. 2) Set the control cam on the deck with the hole of the groove overlapped with the hole of the deck. Observe that the small hole of the control cam and the ridge of the pinch roller cam are aligned. (If the control cam does not fit readily, shift the rear plate assembly within the range of play.) 3) Install the half loading gear assembly with the hole overlapped with the hole of the deck. Secure with E-ring. 4) Install the guide assembly over the spring and with the hole overlapping that of the deck. Engage the spring correctly. <p>Install the cassette housing assembly with the mechanism in the Eject mode. Also observe that the inner holder of the housing is raised and locked.</p>

No.	Item	Checkpoints	Adjustment and Checks
6	Clutch assembly • Effect: inadequate take-up torque	Take-up torque	1) Remove cassette housing and set for play-back mode (see 1.2). 2) Set torque gauge on the take-up reel disk. Gradually relax your grip on the gauge and read the needle indication at the point the gauge begins to rotate with the disk. Confirm indication of 60 to 100.
7	Take-up loading arm assembly Supply loading arm assembly Plate assembly		Notes: <ul style="list-style-type: none"> • Set mechanism to the Eject or Stop mode before removing these parts. • The flange of the plastic rivet securing the loading arm assembly and the pole base assembly can be damaged by attempting to remove it directly. Press the loading arm assembly firmly to prevent motion. Then use a narrow-shafted tool to press the rivet from the shaft end to remove it.
	Mounting position alignment • Remove the tension arm assembly to facilitate operation. See Fig. 1-8-10.		1) Set the supply and take-up loading arm assemblies so that the holes of the gear portions are aligned, then secure to the pole base assemblies with rivets. 2) Shift the plate assembly and install with the holes of the upper and lower components overlapped.
	Slide switch See Fig. 1-8-10.	 <p>The diagram illustrates the mechanical alignment of the tape deck's loading arm assemblies. It shows the take-up and supply loading arm assemblies positioned relative to the main deck and a separate plate assembly. Key alignment points are highlighted: the take-up hole overlapping the main deck hole, the gear holes of the two arm assemblies facing each other, and the holes of the upper and lower components overlapping. A slide switch is also shown at the bottom right.</p>	Be sure to engage the slide switch slider with the edge of the plate assembly.

SECTION 2 ELECTRICAL ADJUSTMENTS

2.1 PREPARATION

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

2.1.1 Required test equipment

1. Color television or monitor
2. Oscilloscope: wide-band, dual-trace, triggered delayed sweep
3. Frequency counter
4. Audio oscillator
5. Audio voltmeter
6. Digital voltmeter
7. Signal generator: RF/IF sweep/marker
8. Signal generator: PAL color bar, staircase, video sweeper
9. Signal generator: Audio multiplex TV signal generator
10. Recording tape
11. Alignment tape: MH-2

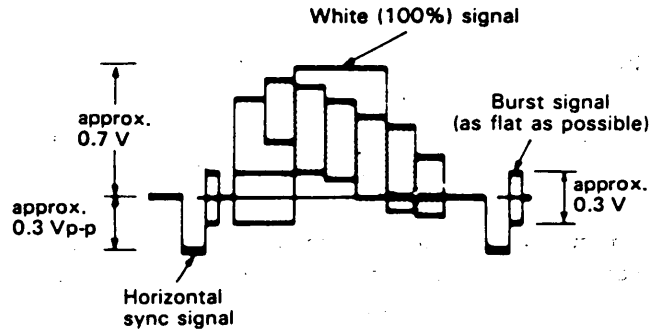


Fig. 2-1-1 Color bar signal of pattern generator

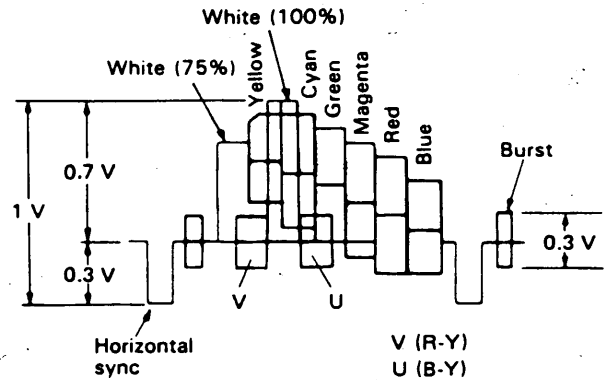


Fig. 2-1-2 Color bar signal waveform

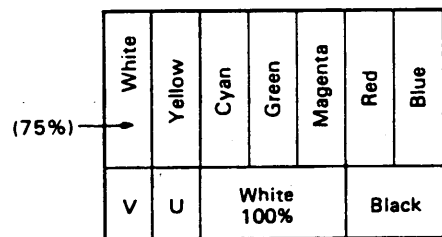


Fig. 2-1-3 Color bar pattern

2.1.2 Check and adjustment steps

The check and adjustment steps are provided in the following in the form of charts. For clarity, the nomenclature used in the charts is outlined below.

No.	Checks and adjustments are numbered in the recommended sequence in which they are to be performed.
Item	Name assigned to the particular check and adjustment step.
Check Point	Location to which measuring instrument (oscilloscope unless otherwise noted) is to be connected.
Adjustment Parts	Variable component (resistor, capacitor, etc.) to be adjusted in this step. Dash (-) indicates check only.
Signal & Mode	<ul style="list-style-type: none"> • Input signal required to perform adjustment. Dash (-) indicates that special signal is not required. • Equipment operating mode at time of check or adjustment.
Color bars	Color bars signal as video input.
Stairstep	Stairstep signal as video input.
1 kHz	1 kHz sinewave as audio input signal.
MH-2 color bars	Color bars segment of MH-2 alignment tape.
MH-2 stairstep	Stairstep segment of MH-2 alignment tape.
MH-2 1 kHz	1 kHz audio signal segment of MH-2 alignment tape.
MH-2 RF sweep	RF sweep segment of MH-2 alignment tape.
E-E	Power on and machine in Stop mode.
REC	Recording mode
PB	Playback mode
SEARCH	Search (FWDS and REVS) playback mode
SLOW	Slow motion playback mode
STILL	Pause during playback mode
SP mode	SP recording speed
Description	This column provides an explanation of the step, notes and adjustment values.

2.2 TIMER CIRCUIT

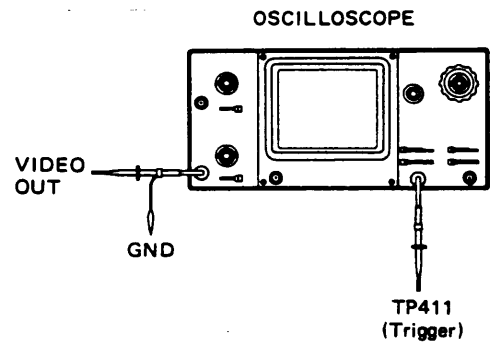
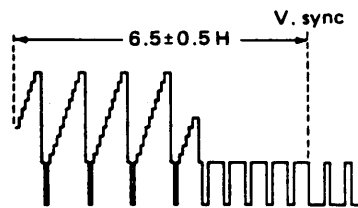
Note: Unless otherwise noted, all test points and adjustments are located on the T/D/S board.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Timer clock	IC1 pin 16	C6	• E-E	<ol style="list-style-type: none"> 1) Connect a frequency counter between IC1 pin 16 and GND. 2) Short between TP1 (TEST) and GND, then short the leads of electrolytic capacitor C3 once in order to reset IC1. 3) Adjust C6 for 2048.000 ± 0.002 Hz. (488.2808 to $488.2818 \mu\text{s}$).

2.3 SERVO CIRCUIT

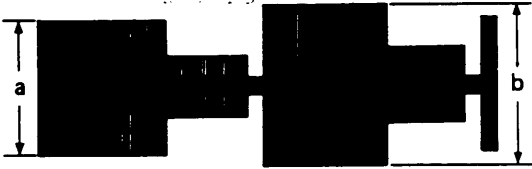
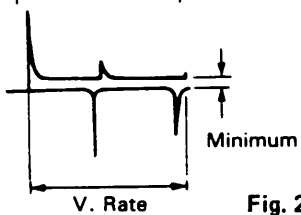
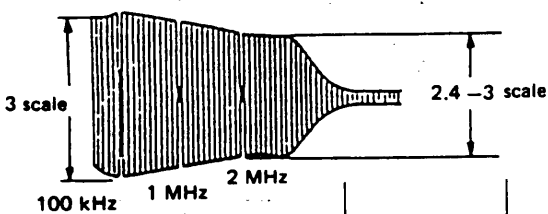
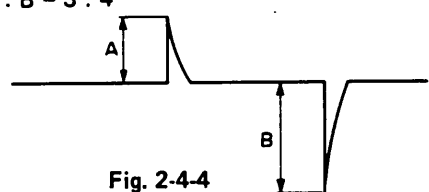
Note: Unless otherwise noted, all test points and adjustments are located on the MAIN board.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	SP PB switching point	VIDEO OUT	R420	<ul style="list-style-type: none"> • PB • MH-2 (stairstep) • Trigger slope (-) • SP mode • AUTO <p>TRACKING OFF</p>	<ol style="list-style-type: none"> 1. Connect an oscilloscope to VIDEO OUT. 2. Play back the stairstep segment of MH-2 alignment tape. 3. Trigger the oscilloscope externally (- slope) with the signal from TP411. 4. Adjust R420 to position the trigger point $6.5 \pm 0.5\text{H}$ from V. sync.



2.4 VIDEO CIRCUIT

Note: Unless otherwise specified, all test points and adjustments are located on the MAIN board.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	SP REC Color Level and Balance	IC201-19 (VIDEO UNIT board)	R220	<ul style="list-style-type: none"> • PB mode • MH-2 color bar • REC then PB • Color bar • SP mode • AUTO TRACKING OFF 	<ol style="list-style-type: none"> 1. Connect an oscilloscope to IC201-19. Play back a color bar segment of the MH-2 and observe color signal level. 2. Adjust by pressing the + and - tracking buttons of the FRONT panel for maximum level of the color waveform and make a note of the higher color level. 3. Record and play back a color bar signal. If necessary, before recording, adjust R220 so that the higher level channel becomes 80 to 90% of the noted level during play back. At this time, confirm that the channel difference is within 3 dB.
 <p style="text-align: center;">Fig. 2-4-1</p>					
2	Noise cancel balance	TP21 (VIDEO UNIT board)	R16 (VIDEO UNIT board)	<ul style="list-style-type: none"> • Color bar • E-E • AUX 	<ol style="list-style-type: none"> 1. Supply a color bar signal and connect an oscilloscope to TP21. 2. As indicated in the figure, adjust R16 for minimum DC step difference.
 <p style="text-align: center;">Fig. 2-4-2</p>					
3	SP PB Frequency & CH Balance	VIDEO OUT	R226	<ul style="list-style-type: none"> • REC then PB • Video sweep • SP mode • AUTO TRACKING OFF 	<ol style="list-style-type: none"> 1. Terminate VIDEO OUT at 75 Ω. Connect a video sweep generator to VIDEO IN. 2. Record and play back a video sweep signal in the SP mode. Use the control of the oscilloscope to position the 100 kHz region at graduation 3 (0 dB) of the oscilloscope scale. 3. Adjust R226 to position the 2 MHz of CH1 portion at 2.4 - 3.0 (-1 ± 1 dB) of the oscilloscope graduations as shown in Fig. 2-4-3. 4. Confirm that the channel difference is within 2 dB.
 <p style="text-align: center;">Fig. 2-4-3</p>					
				<ul style="list-style-type: none"> • REC then PB • TV broadcast • SP mode 	<p>Alternate method</p> <ol style="list-style-type: none"> 1. Record and play back a color broadcast that shows a good depiction of human facial contours in the SP mode. Adjust R226 to obtain distinct facial features on the monitor. <p>Note: R226 nearly at the center position.</p>
4	SECAM DET.	IC251-18 (VIDEO UNIT board)	LC251 (VIDEO UNIT board)	<ul style="list-style-type: none"> • E-E • SECAM color bar 	<ol style="list-style-type: none"> 1. Connect an oscilloscope to pin 18 of IC251. 2. Adjust LC251 so that A and B are related as follows: A : B = 3 : 4
 <p style="text-align: center;">Fig. 2-4-4</p>					

2.5 AUDIO CIRCUIT

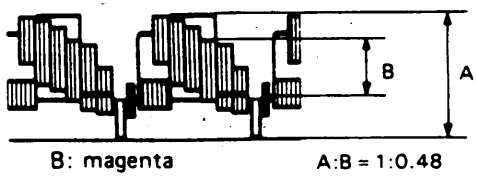
Note: Unless otherwise specified, all test points and adjustments are located on the MAIN board.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Audio Bias Level	TP31 (+) TP32 (-)	R11	<ul style="list-style-type: none"> • SOURCE Select: AUX • SP mode • REC mode • No signal 	<ol style="list-style-type: none"> 1. Connect a millivoltmeter between TP31 and TP32. 2. Set for REC mode without incoming signal. 3. Adjust R11 for 1.9 mVrms.

2.6 TUNER/IF CIRCUIT

Note: Unless otherwise specified, all test points and adjustments are located on the TUNER/IF board.

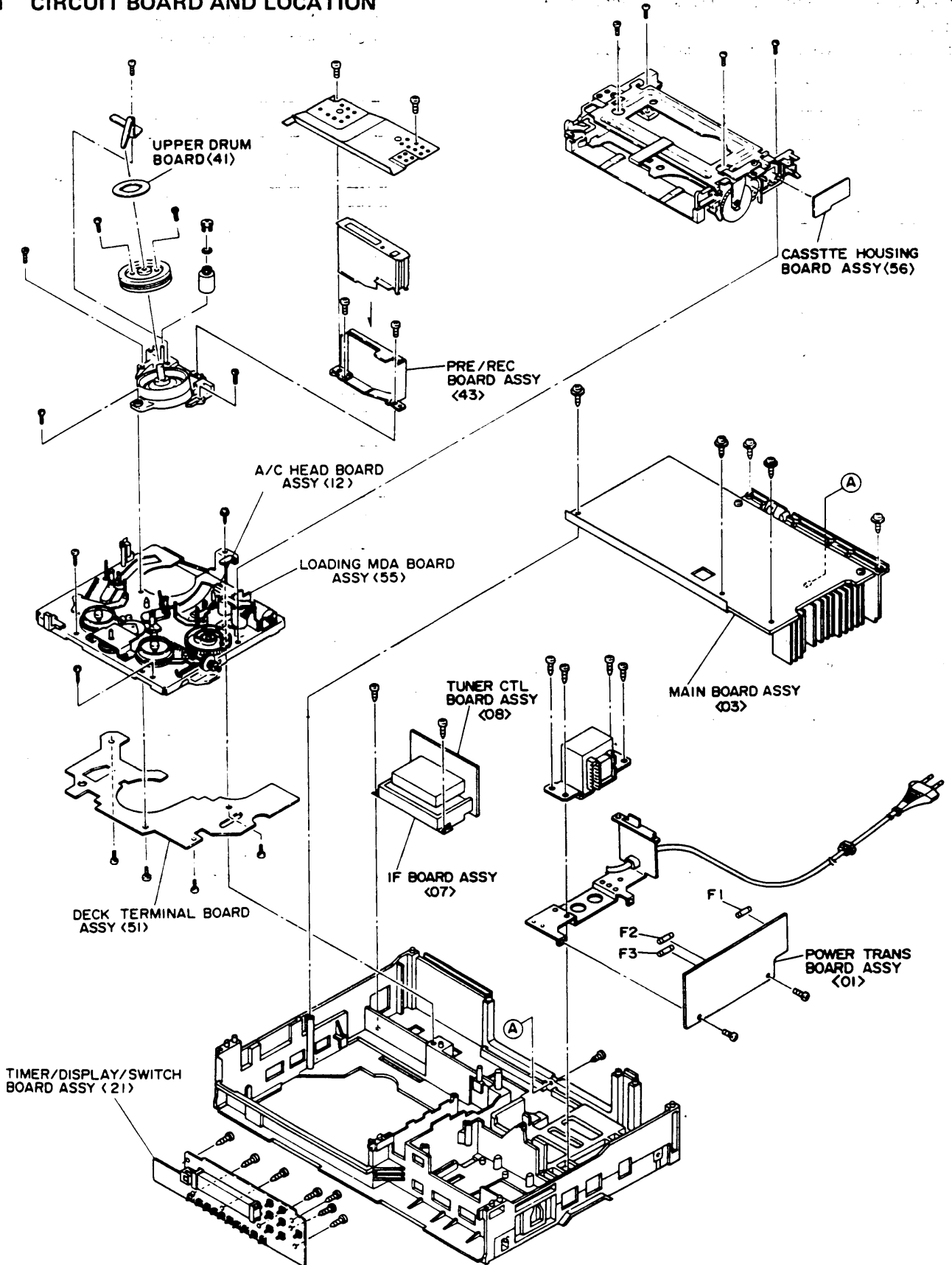
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
<p>Equipment required:</p> <ol style="list-style-type: none"> 1. Oscilloscope 2. IF sweep signal generator with suitable markers (PIF, etc.) 3. Sweeper probe (sweep signal supply cable) as shown below. 					
		<p style="text-align: center;">Fig. 2-6-1</p>			
1	VCO	IC1-28	T2 (VCO)	<ul style="list-style-type: none"> • Sweep generator out: 70 dBμ (38.9 MHz) • Tuner mode without antenna IN 	<ol style="list-style-type: none"> 1. Use a sweeper probe as shown in Fig. 2-6-1 and connect the sweep generator output to pin 1 of SAW 1. Adjust the sweep gain so that the waveform does not distort as observed with the oscilloscope. Connect the oscilloscope to pin 28 of IC1 (VIDEO DET OUT) and adjust T2 to align the waveform with the frequency marker as shown in Fig. 2-6-2. <p>Alternate method:</p> <ol style="list-style-type: none"> 1. Receive a color broadcast on a VHF-HI channel. 2. Adjust T2 to obtain a fine picture on the monitor.
		<p style="text-align: center;">Fig. 2-6-2</p>			
				<ul style="list-style-type: none"> • TV broadcast • Tuner mode 	

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
<ul style="list-style-type: none"> ● Before the following adjustments: 1. Connect a cable to ANT IN and terminate TV OUT at 75 Ω. 2. Set a TV channel signal generator as follows. <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> Video : 65 dBμ/75 Ω, color bar 87.5% modulation Audio : 55 dBμ/75 Ω, 1 kHz ± 50 kHz deviation </div>					
2	RF AGC	IF terminal of Front end	R21	<ul style="list-style-type: none"> ● TV signal ● Tuner mode 	1. Connect the oscilloscope to IF terminal of UHF Tuner (Front end). Adjust R21 for maximum level, then again adjust R21 for -5 dB again.
		MONITOR	R21	<ul style="list-style-type: none"> ● TV broadcast ● Tuner mode 	Alternate method: Note: Adjust R21 (RF AGC) to correct for excess noise in the picture or when streaky cross interference occurs due to strong electrical fields. <ol style="list-style-type: none"> 1. Adjust R21 to minimize noise or streaks on the TV screen. 2. Check for absence of abnormality on all channels.
3	AFC	IC1-16	T3 (AFC)	<ul style="list-style-type: none"> ● TV broadcast ● Tuner mode 	<ol style="list-style-type: none"> 1. Receive a color broadcast or signal generator on a VHF-HI channel. 2. Connect oscilloscope to pin 16 of IC1. 3. Set the oscilloscope to DC mode and adjust T3 to set the lower edge of the ripple waveform to 4.5 V.
4	Color Level	CN1-4 (VIDEO OUT)	R40	<ul style="list-style-type: none"> ● TV signal ● Tuner mode ● Color bar 	1. Receive a color bar signal. Set the Y level for 100% reference signal and then adjust R40 for a magenta level of 48% at pin 4 of CN1.
 <p>B: magenta A:B = 1:0.48</p>					
Fig. 2-6-3					

No.	Item	Check point	Adjustment Parts	Signal & Mode	Description				
5	SOUND DET	CN1-7 (TUNER CTL board)	T4 (Sound det)	<ul style="list-style-type: none"> • TV signal • Tuner mode 	<ol style="list-style-type: none"> 1. Use an adjustment circuit as shown in Fig. 2-6-4, connect a distortion meter as shown in Fig. 2-6-4. 2. Adjust T4 for minimum distortion. 				
<p>Fig. 2-6-4 Adjustment circuit</p>									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td data-bbox="391 696 555 891" style="width: 15%;">CN1-7 (TUNER CTL board)</td> <td data-bbox="555 696 715 891" style="width: 15%;">T4 (Sound det)</td> <td data-bbox="715 696 943 891" style="width: 15%;"> <ul style="list-style-type: none"> • TV broadcast • Tuner mode </td> <td data-bbox="943 696 1520 891" style="width: 55%;"> <p>Alternate method:</p> <ol style="list-style-type: none"> 1. Receive a color broadcast on a VHF-HI channel. Connect an oscilloscope to CN1-7 of the TUNER CTL board. 2. Adjust T4 for maximum level at audio sound. </td> </tr> </tbody> </table>						CN1-7 (TUNER CTL board)	T4 (Sound det)	<ul style="list-style-type: none"> • TV broadcast • Tuner mode 	<p>Alternate method:</p> <ol style="list-style-type: none"> 1. Receive a color broadcast on a VHF-HI channel. Connect an oscilloscope to CN1-7 of the TUNER CTL board. 2. Adjust T4 for maximum level at audio sound.
CN1-7 (TUNER CTL board)	T4 (Sound det)	<ul style="list-style-type: none"> • TV broadcast • Tuner mode 	<p>Alternate method:</p> <ol style="list-style-type: none"> 1. Receive a color broadcast on a VHF-HI channel. Connect an oscilloscope to CN1-7 of the TUNER CTL board. 2. Adjust T4 for maximum level at audio sound. 						

SECTION 3 CHARTS AND DIAGRAMS

3.1 CIRCUIT BOARD AND LOCATION



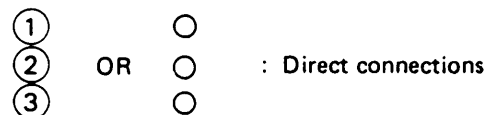
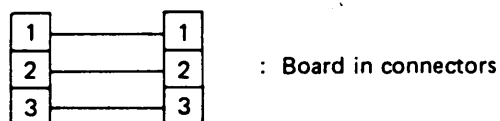
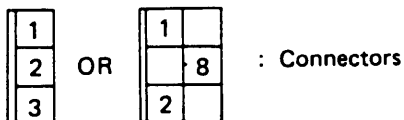
3.2 GENERAL INFORMATION

3.2.1 Connections

Note:

Unless otherwise specified, only signal input flow is indicated.

Connection arrows indicate only signal outputs.



: Connected pattern in the board.

Abbreviations

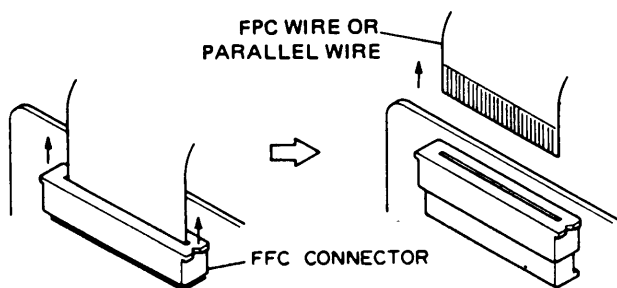
V : Video M : Mechacon

S : Servo A : Audio

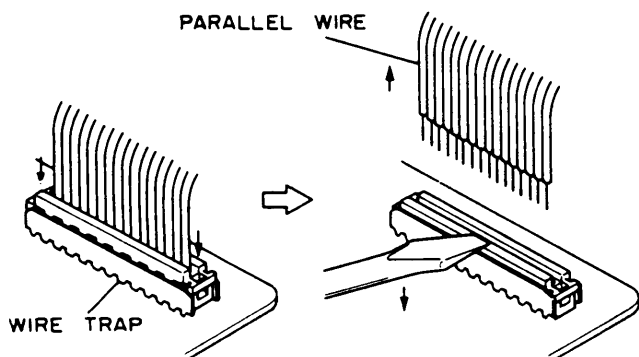
VS : Signal flow from video to servo.

3.2.2 Disconnecting the flatwire

1. Pull the connector structure upward to release the clamp when removing or inserting the flat wire cable.



2. Depress the connector structure downward to release the clamp when removing or inserting the flat wire cable, as indicated below.



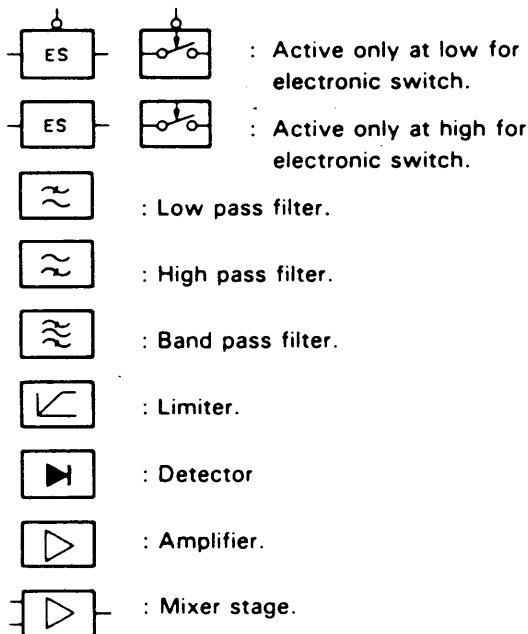
3.2.3 Indications

AUX : Active only at high.

$\overline{\text{AUX}}$: Active only at low.

$\overline{\text{AUX}}$: Active only at middle.

$\overline{\text{AUX}}$: Active only at open.

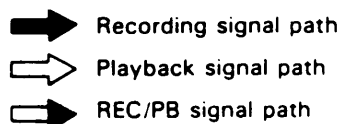


3.2.4 Schematic diagram values

Unless otherwise specified.

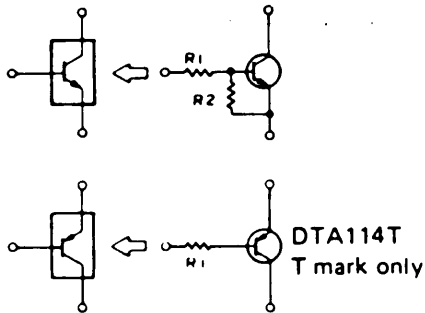
1. All resistance values are in ohms, 1/6 W, 1/8 W, (refer to parts list).
2. All capacitance values are in μF , (P; PF).
3. All inductance values are in μH , (m; mH).
4. All diodes are 1SS133 or MA165, (refer to parts list).
5. Voltages are DC-measured (reference to ground) with a digital voltmeter during recording (SP mode) and playback (SP mode) with alignment tape. Where voltages differ between recording and playback, the voltage during playback is shown in parentheses.
6. Waveforms (VIDEO System) are measured (reference to ground) with a color bar during recording (SP mode) and playback (SP mode) with alignment tape.
7. Waveforms (AUDIO System) are measured (reference to ground) with 1 kHz (-8 dBs) during recording and playback with alignment tape (1 kHz).
8. Shaded (■) parts are critical for safety. Replace only with specified parts numbers.

3.2.5 Signal flow in the schematic

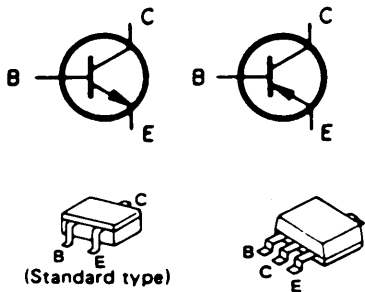


3.2.6 Semiconductors

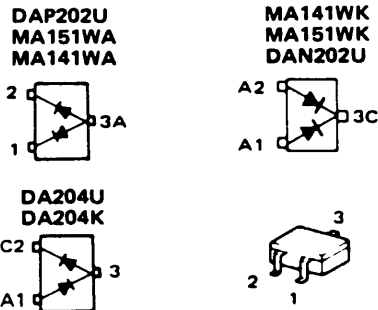
1. Digital transistor



2. Chip transistor



3. Chip diode



Note:
The digital transistor includes built in resistors. It features small size and high reliability. Both PNP and NPN types are available.

Uses:
Inverter, Interface, driver circuits.

3.2.7 Replacement of chip parts

For replacing chip parts, proceed it as follows.
Use a well insulated fine-tipped soldering iron (approx. 17 W, 130°C ~ 260°C in temp.).
In addition, it is recommended to use a soldering iron (55 W approx.) with solder absorber for convenience.

- Caution:**
- Do not apply heat for more than 3 seconds.
 - Do not rub electrodes.
 - Do not reuse chips removed once. Discard them.
 - Supplementary cementing is not required.

1. Soldered condition of chip parts

- Resistors, capacitors, etc.

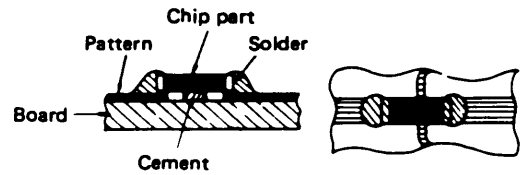


Fig. 3-2-1 Soldering condition-1

- Transistors, diodes, etc.

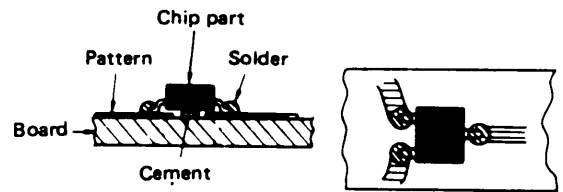


Fig. 3-2-2 Soldering condition-2

2. How to remove chip parts

- Resistors, capacitors, etc.

- 1) Set a chip parts replacing tool onto the chip parts to hold it down.
- 2) Unsolder at a side of the chip parts.

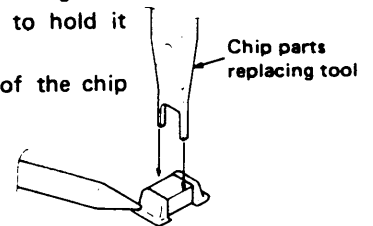


Fig. 3-2-3 R/C removal-1

- 3) Remove the chip parts by twisting and sliding it.

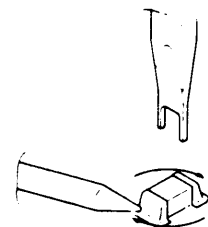


Fig. 3-2-4 R/C removal-2

3. How to remove transistors, diode.

- 1) Unsolder at the one-lead side of the chip parts.

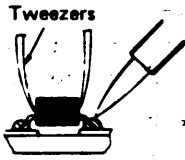


Fig. 3-2-5 Tr/Diode removal-1

- 2) Lift the unsoldered side upwards.



Fig. 3-2-6 Tr/Diode removal-2

- 3) Heat the other two leads simultaneously and remove the chip parts upwards.

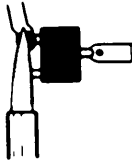


Fig. 3-2-7 Tr/Diode removal-3

4. Preheating and soldering

When setting new chip parts, especially capacitors, but except transistors, preheat them with hot air (150°C approx.) by use of a blower type of hair dryer for about 2 minutes just before soldering. For soldering, use a soldering iron of 30 watt approximately.

5. How to set and solder chip parts

- 1) Presolder the contact points of the circuit pattern to which the chip parts will be soldered.

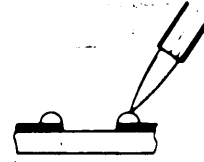


Fig. 3-2-8 Soldering-1

- 2) Holding down the chip parts with the chip parts replacing tool, solder it with a soldering iron.

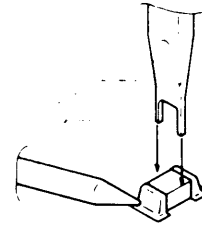


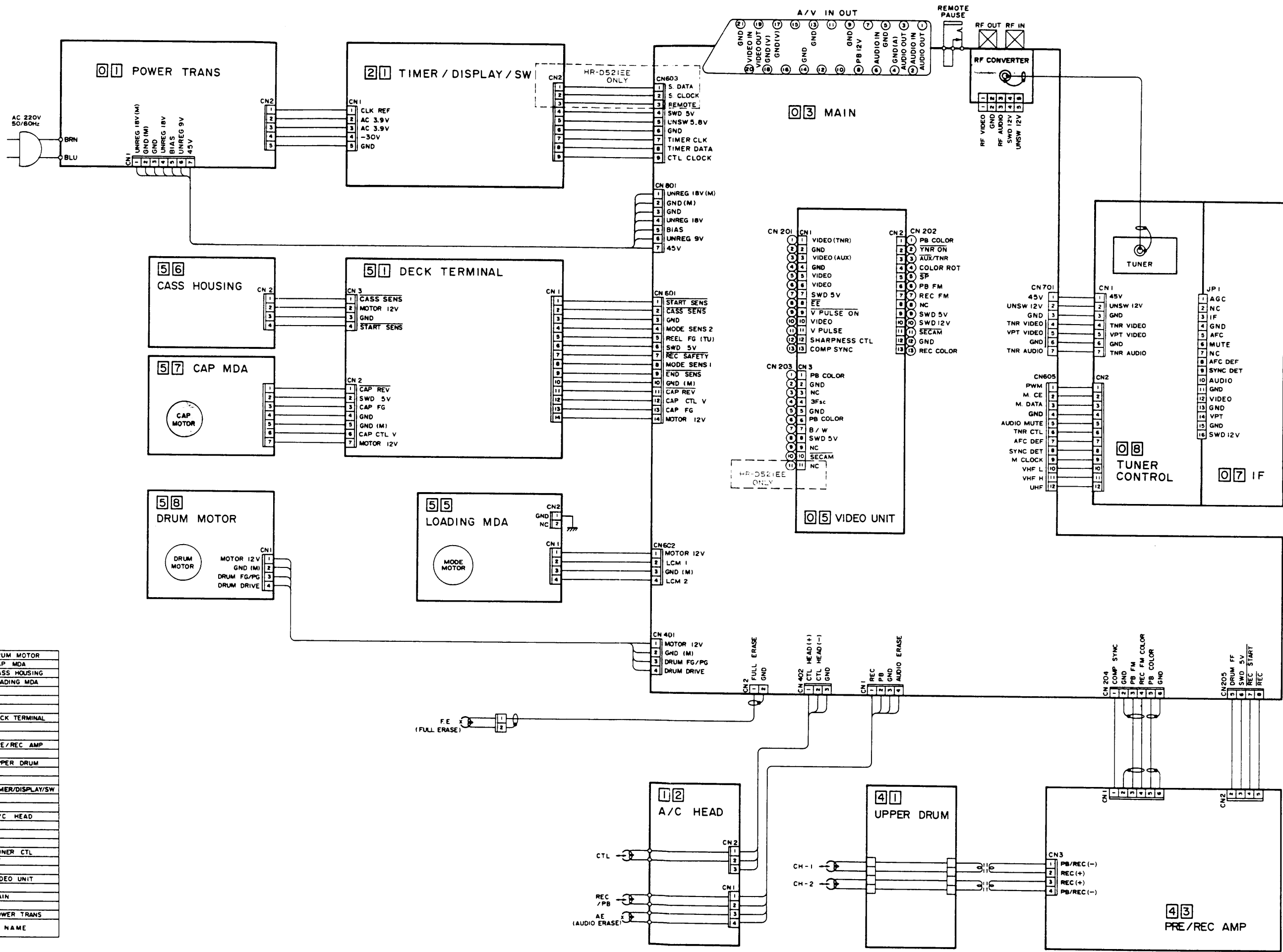
Fig. 3-2-9 Soldering-2

3.3 MAIN TYPES OF ACTIVE AND PACKAGE CIRCUITS

	Integrated Circuit		Transistor		Diode
	A	B	C	D	E
1					
2					
3					
4					
5					
6					

NAME		L	NAME		L	NAME		L
IC			TRANSISTOR			Diode		
A	AN3880K	1A	DTA	DTA114ES DTA124ES DTA144EU	1C 1C 3C	E	E-452-2 E-103	3E 4E
B	BA6418N BA7106LS BA7765AS	1B 4B 5A	DTC	DTC114WK DTC114WS DTC124EK DTC124ES DTC144EK DTC144ES DTC144WS	1C 1C 3C 1C 3C 1C 1C	H	HZ7B2 HZ30-2 HZS7.5EB2 HZT33-D2 HZT33-02	4E 4E 4E 4D 4E
C	CAT35C104P-001 CAT35C104P-002 CAT35C104P-009 CAT93C46P	2A 2A 2A 2A				M	MA165 MTZ10D	3E 4E
G	GP1U521	2B	2SA	2SA720 2SA933S 2SA1037K 2SA1267 2SA1267(G)-TJK 2SA1309R,S	1D 1C 3C 1C 1C 1C	O	OA90	3E
H	HD49733NT	2A				R	RD5.1ES-T1B2 RD5.6ES-T1B3 RD9.1EB3 RD9.1ES-T1B2 RD10ES-T1B2 RBV-601	4E 4E 4E 4E 4E 2E
I	IC-PST523H-2	4A						
L	LM2940CT-5.0	3B	2SB	2SB810H, J	1C			
M	M37417M4-120SP M37417M4-124SP M37418M6-210SP M51365SP MC7812ACT MSM6967RS	1A 1A 1A 1A 3B 2A	2SC	2SC1317 2SC1740 2SC1740S 2SC2412K 2SC3199 2SC3199(G)-TJK 2SC3354	2C 1C 1C 3C 1C 1C 2D	S	SLR-34DC3F SLR-34MC3F SLR-34VC3F	1E 1E 1E
P	PB20166G PB20166G-01 PB20227A	3A 3A 3A	2SD	2SD1450S 2SD1796 2SD1863	1C 3D 4C	1	1SS292 1SS131Y 1SS133 11E2 11ES2	3E 3E 3E 3E 3E
S	STK5490 SDA5642	1B 5A						
U	UPC324C UPD75216ACW-252 UPD75216ACW-286	1A 1A 1A						

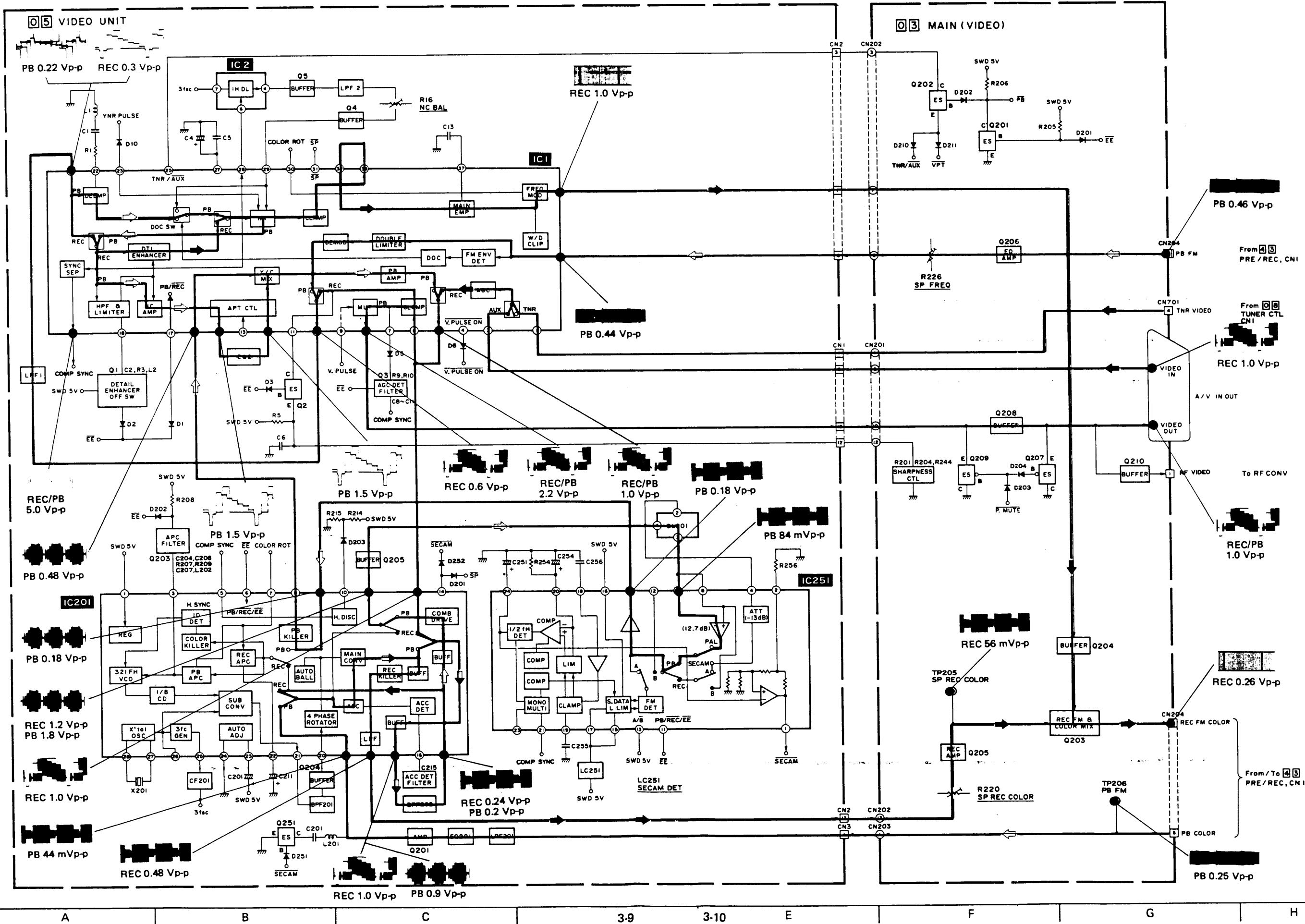
3.4 BOARD INTERCONNECTIONS



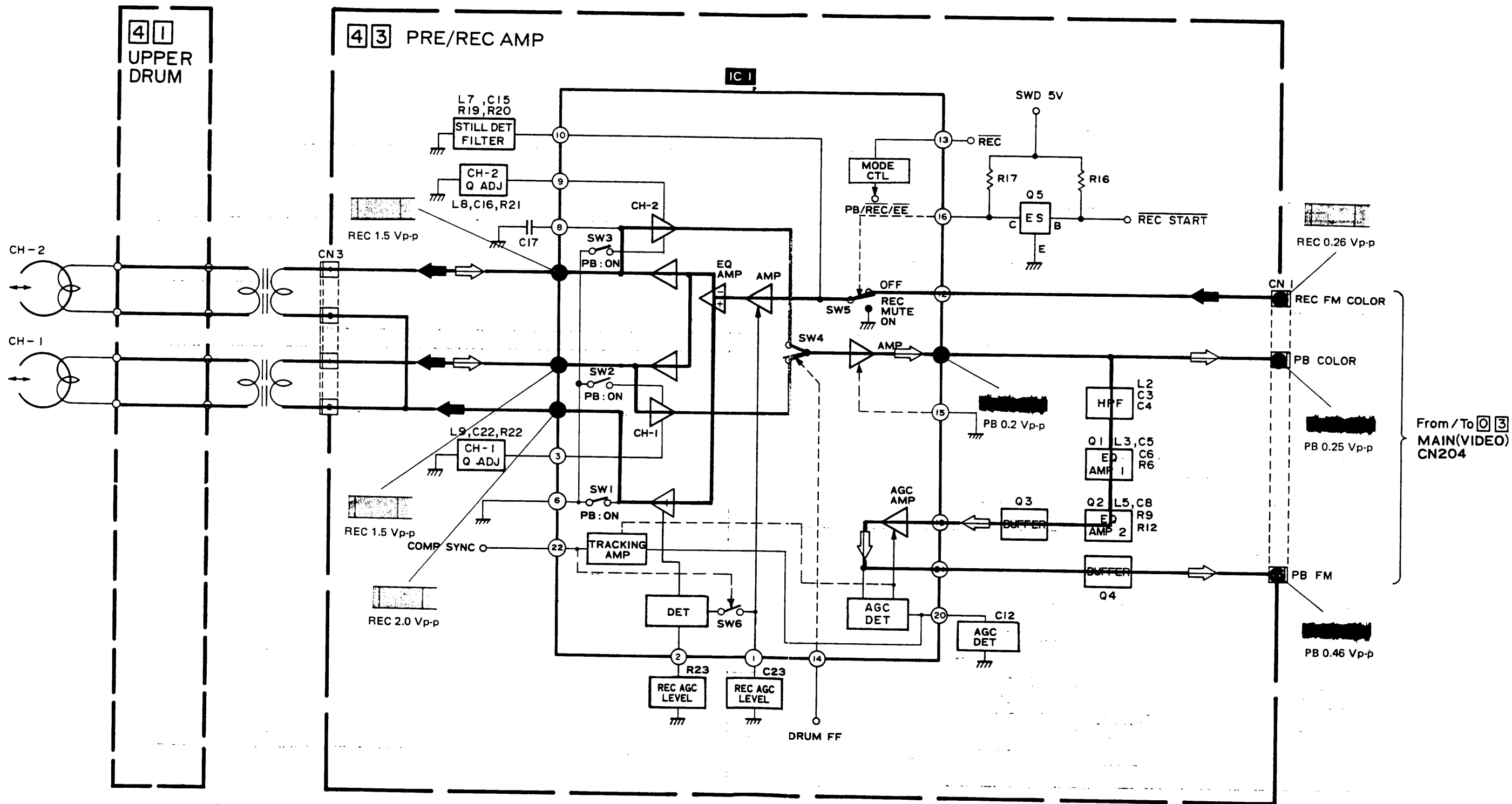
NO	NAME
58	DRUM MOTOR
57	CAP MDA
56	CASS HOUSING
55	LOADING MDA
54	
53	
52	
51	DECK TERMINAL
43	PRE/REC AMP
42	
41	UPPER DRUM
21	TIMER/DISPLAY/SW
19	
12	A/C HEAD
11	
10	
09	
08	TUNER CTL
07	IF
06	
05	VIDEO UNIT
04	
03	MAIN
02	
01	POWER TRANS
NO	NAME

A B C 3-7 3-8 E F G H

3.5 VIDEO BLOCK DIAGRAM



3.6 PRE/REC BLOCK DIAGRAM

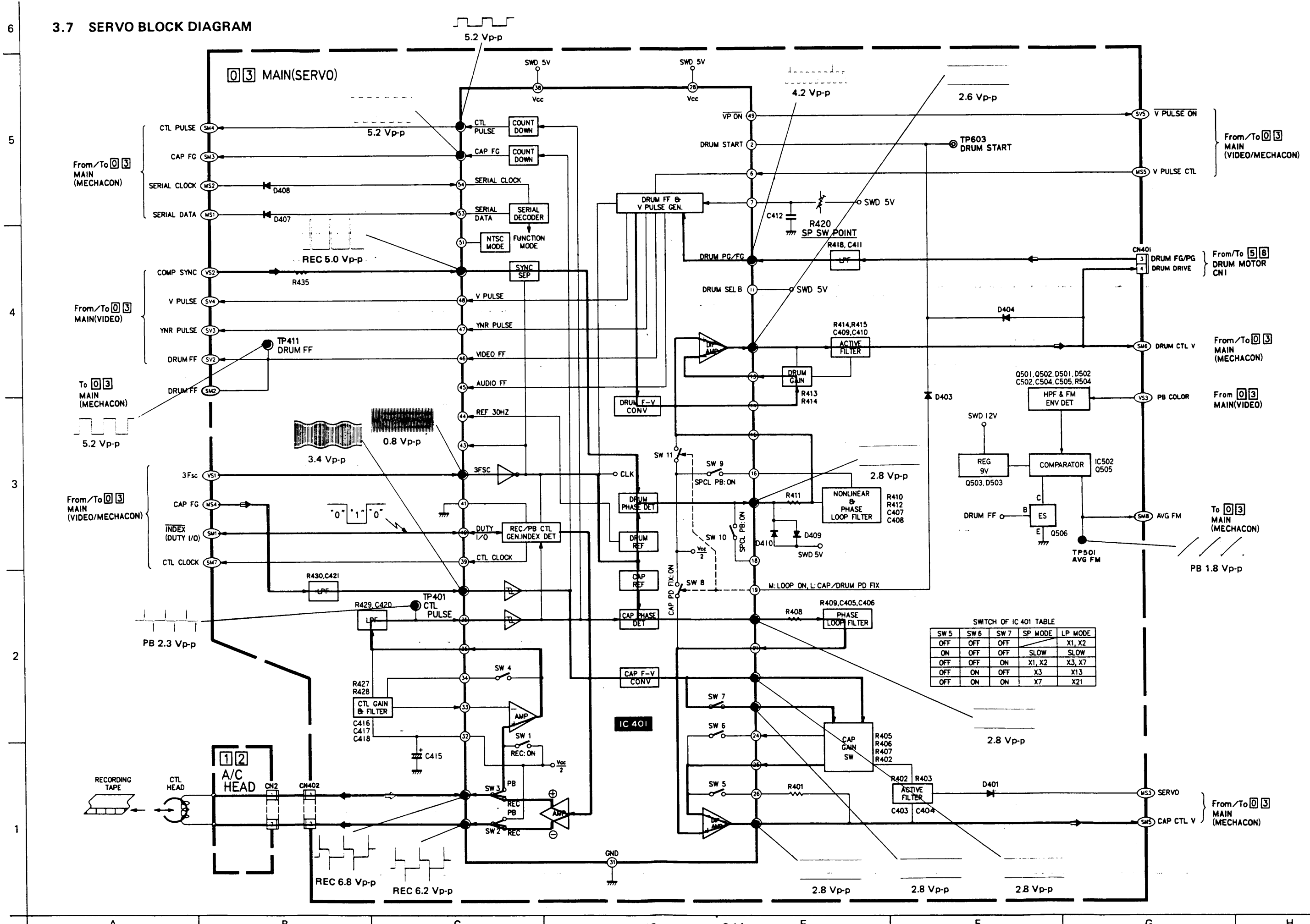


From / To 03 MAIN(VIDEO) CN204

6
5
4
3
2
1

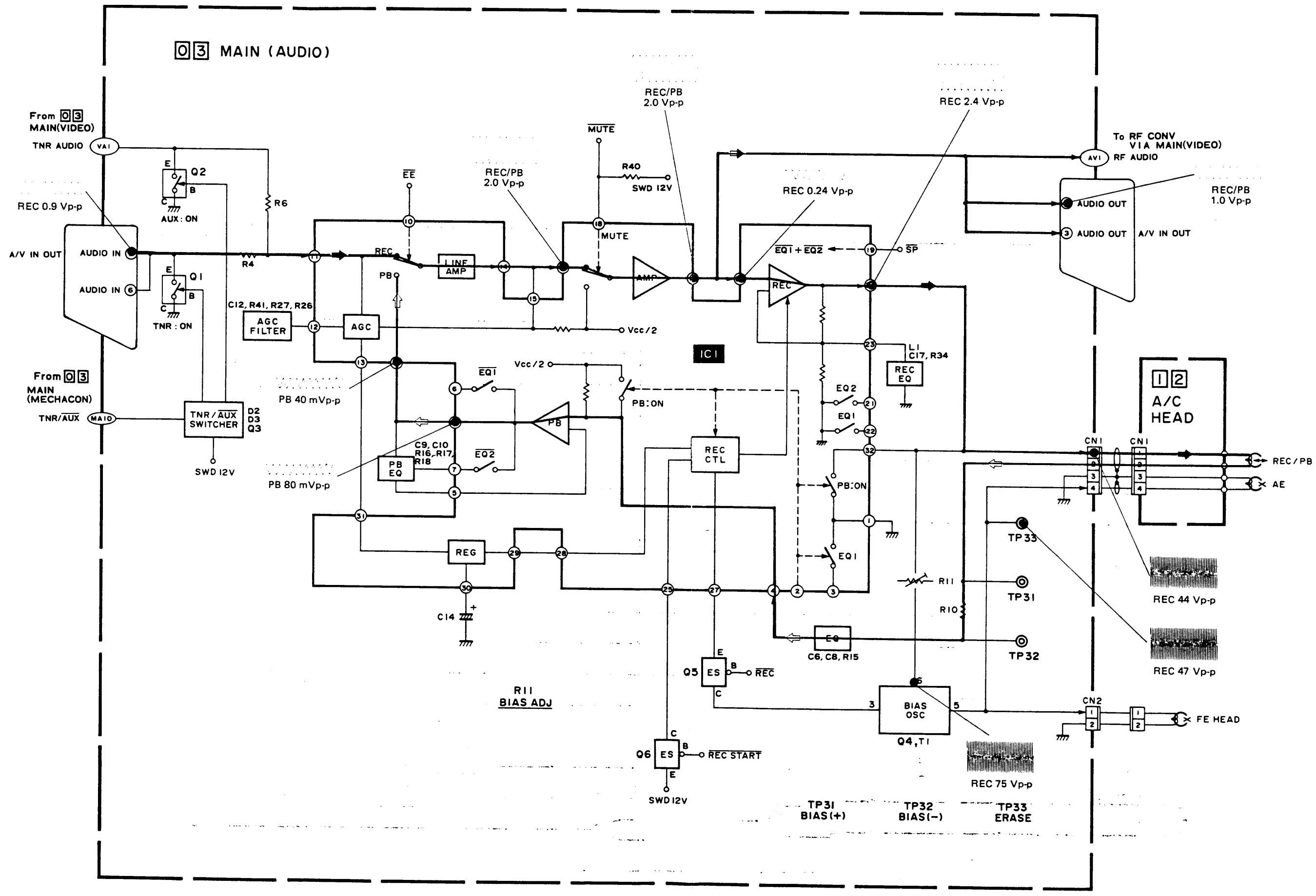
A B C 3-11 3-12 E F G H

3.7 SERVO BLOCK DIAGRAM



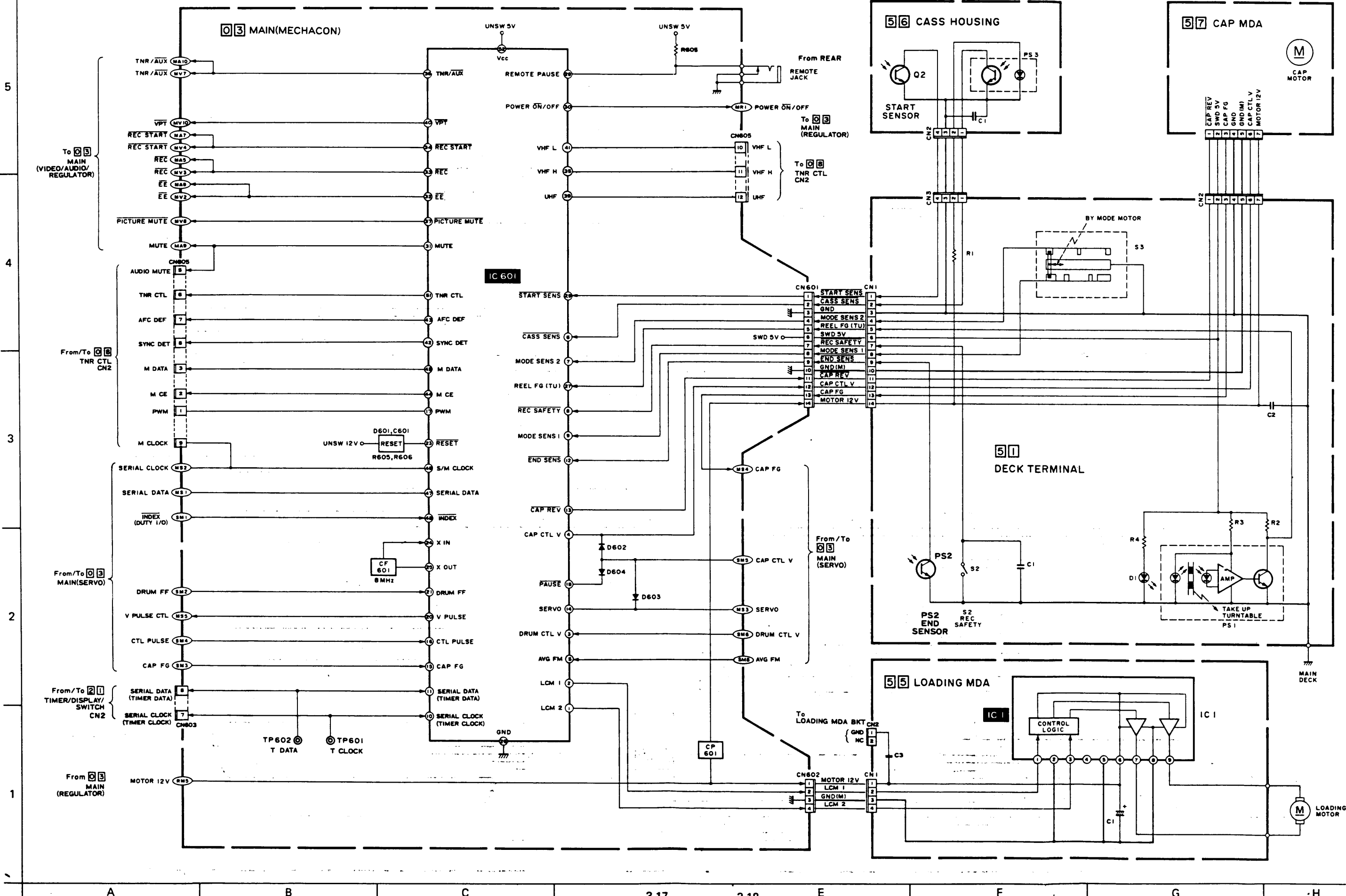
3.8 AUDIO BLOCK DIAGRAM

6
5
4
3
2
1



A B C 3-15 3-16 E F G H

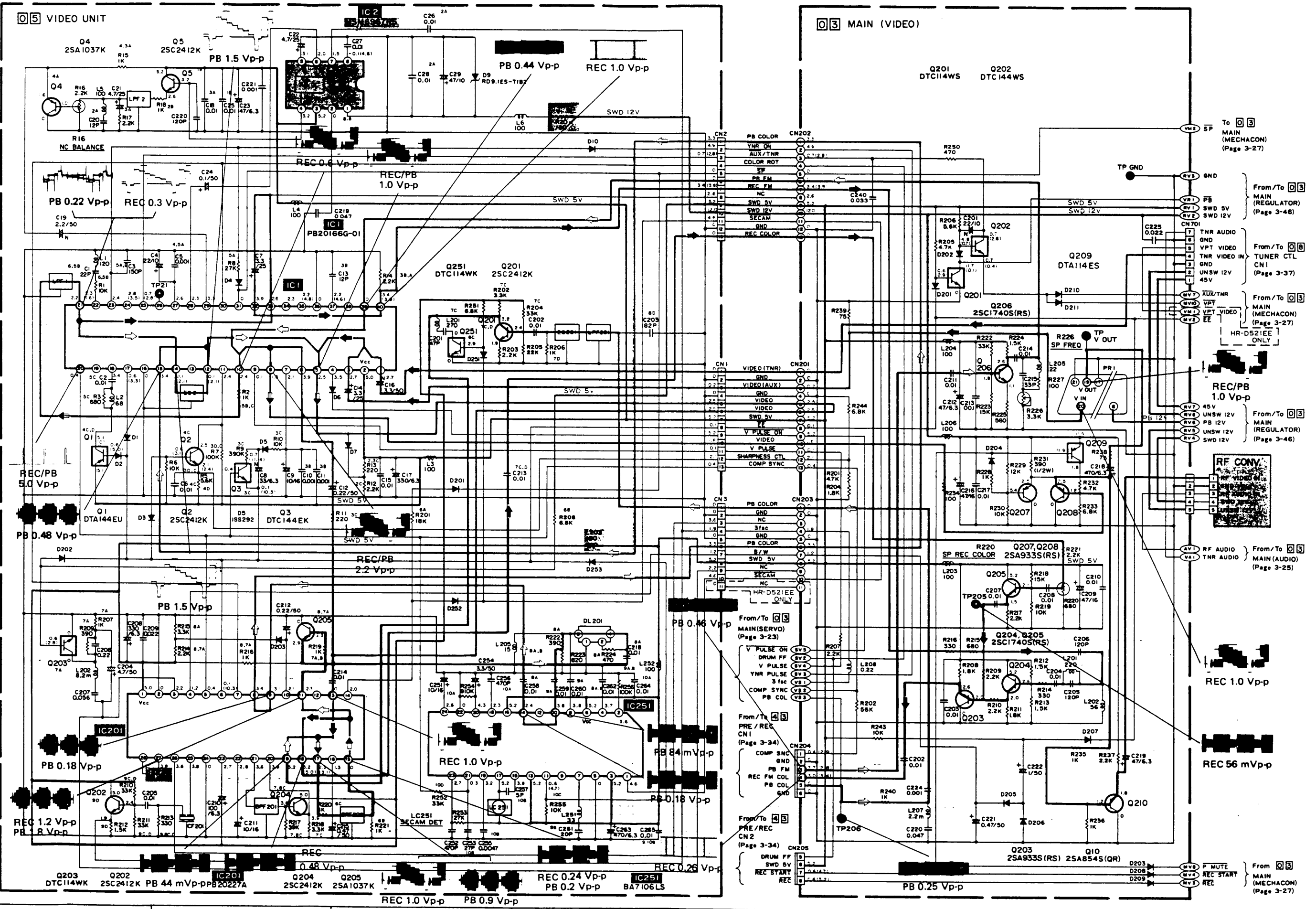
3.9 SYSTEM CTL BLOCK DIAGRAM



3.10 VIDEO UNIT & VIDEO (MAIN) SCHEMATIC DIAGRAMS

• Address of chip parts

1D Address



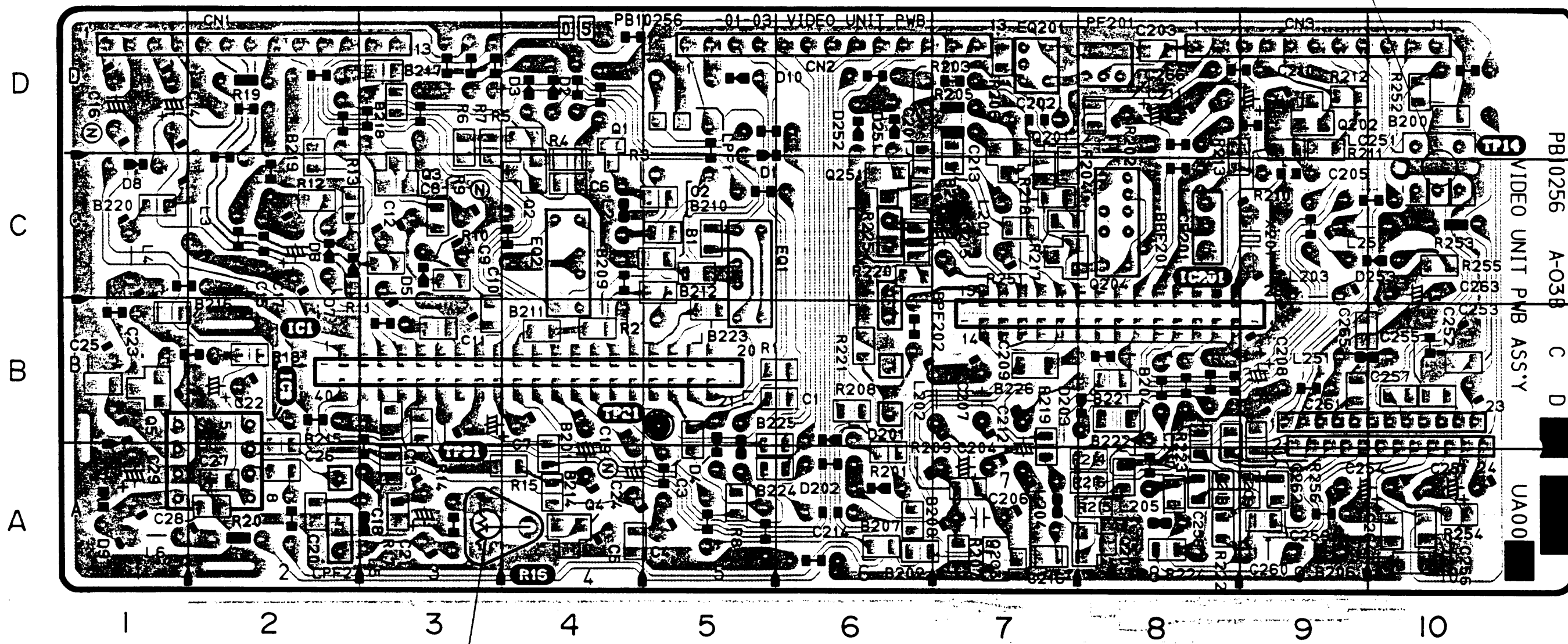
3.11 VIDEO UNIT CIRCUIT BOARD

Note: Double edging indicates not used in this model.

Examples ; Resistor, Capacitor, Transistor, DIODE



LC251
SECAM DET

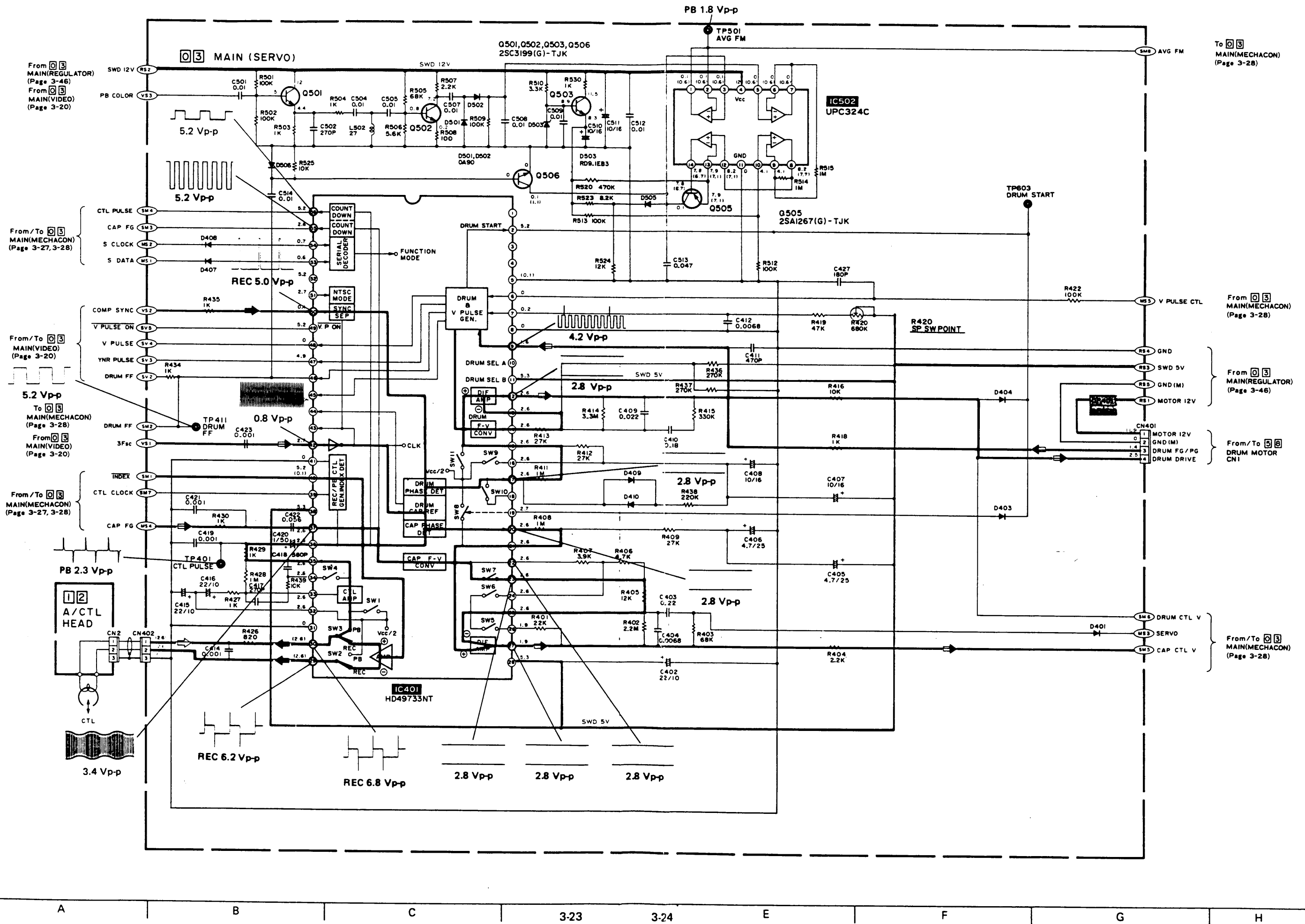


R16
NC BAL

6
5
4
3
2
1

A B C 3-21 3-22 E F G H

3.12 SERVO SCHEMATIC DIAGRAM



To [3] MAIN(MECHAON) (Page 3-28)

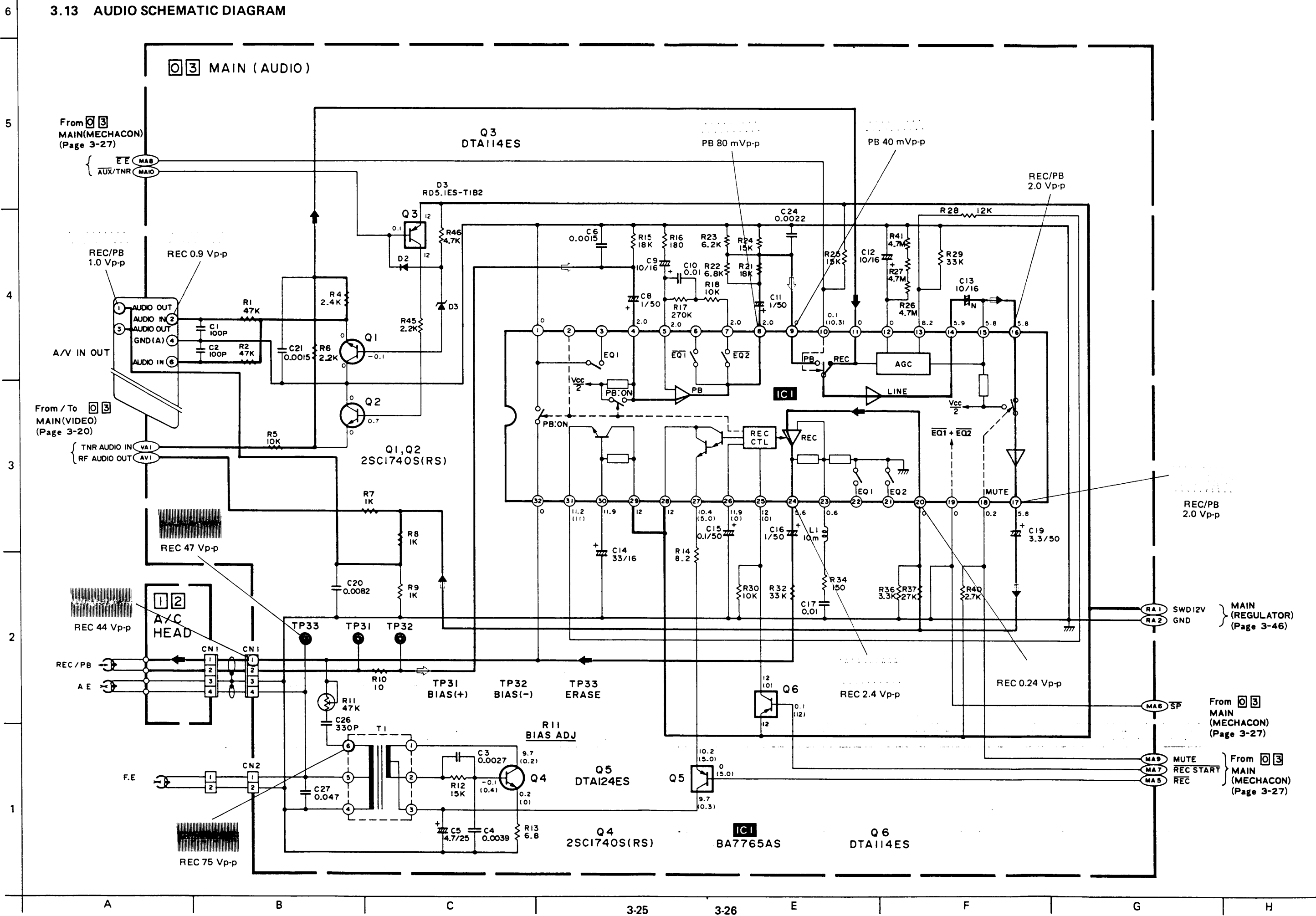
From [3] MAIN(MECHAON) (Page 3-28)

From [3] MAIN(REGULATOR) (Page 3-46)

From/To [5] [6] DRUM MOTOR CN1

From/To [3] [5] MAIN(MECHAON) (Page 3-28)

3.13 AUDIO SCHEMATIC DIAGRAM



3.14 SYSTEM CTL SCHEMATIC DIAGRAM

6

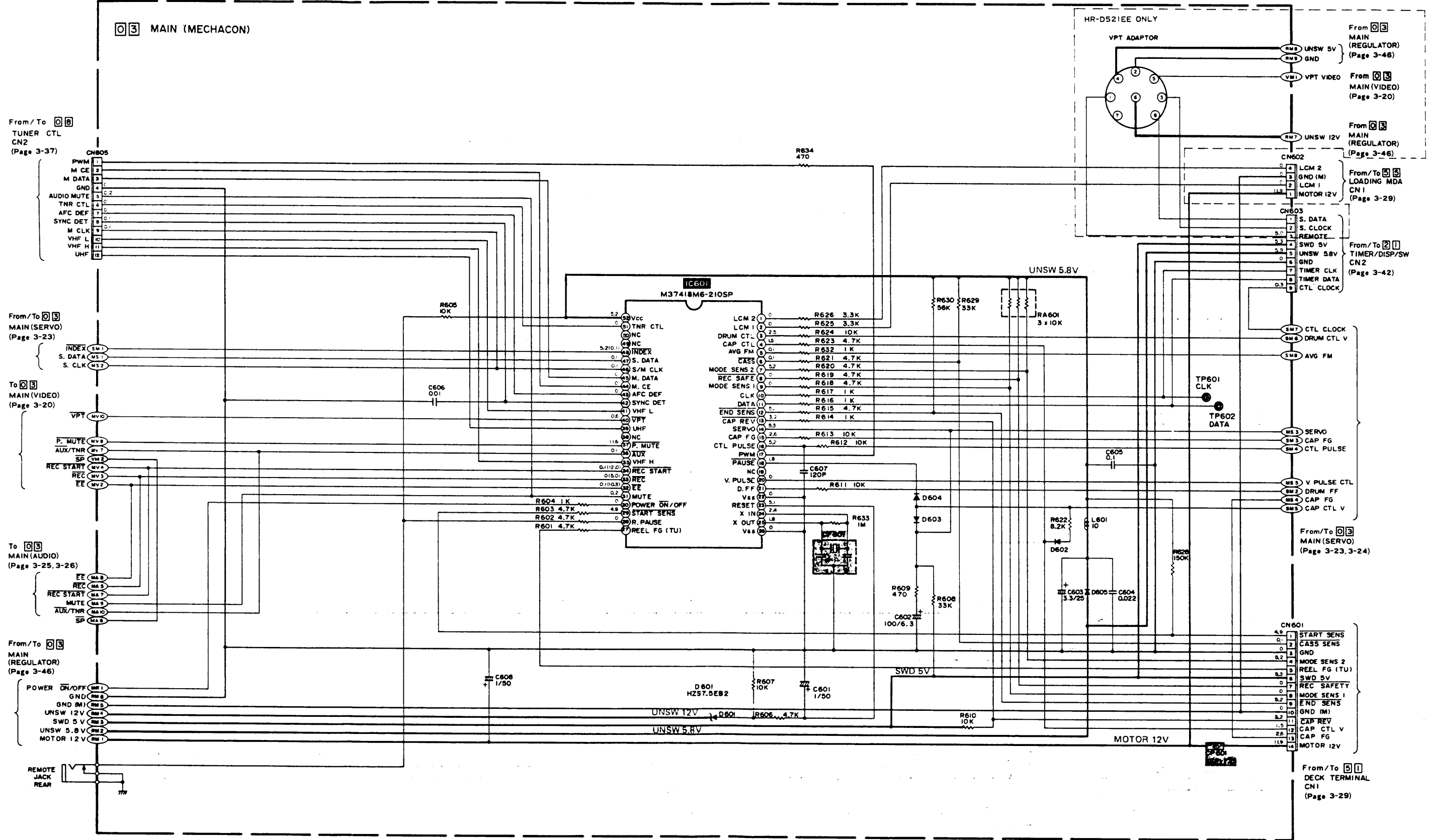
5

4

3

2

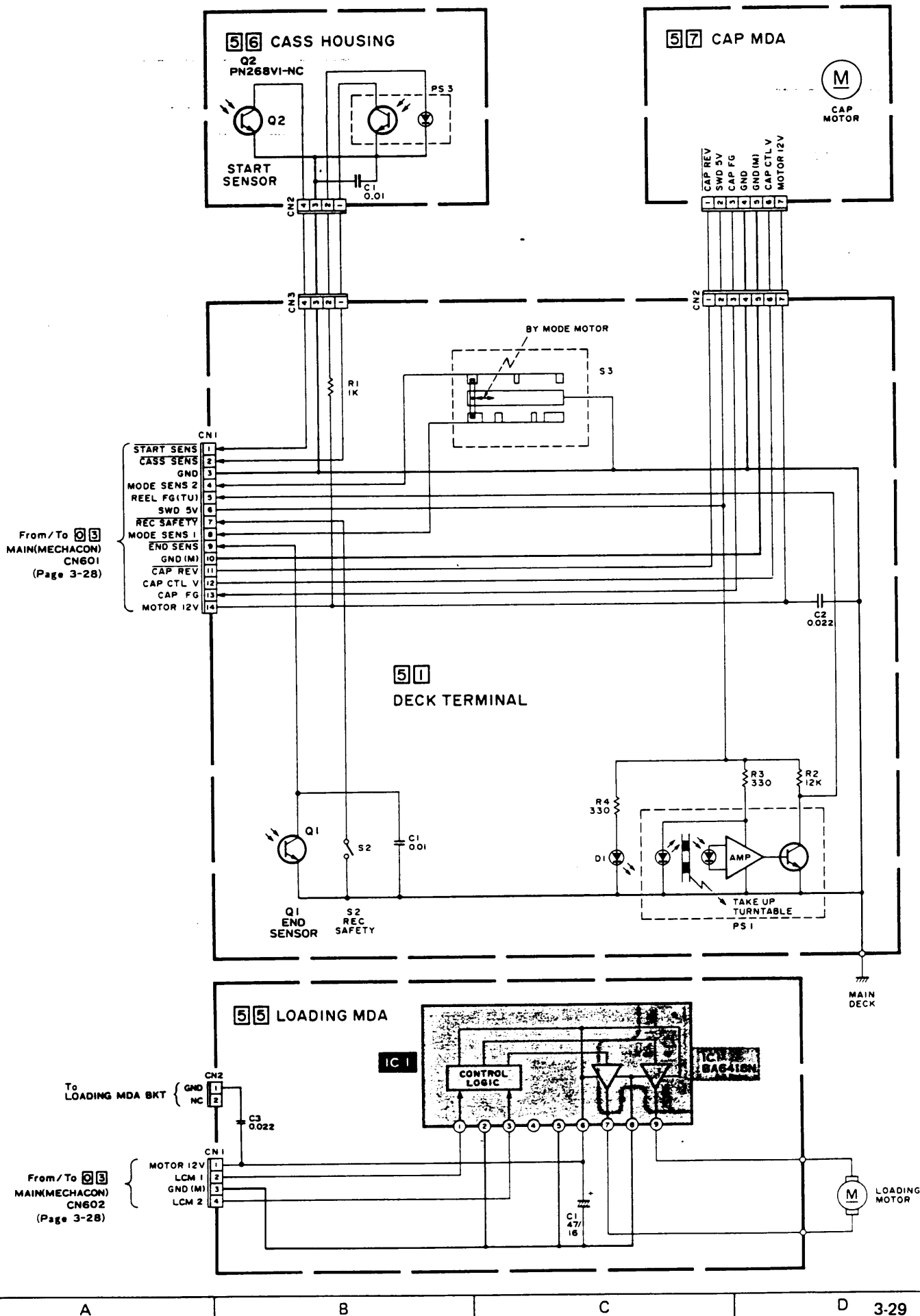
1



A B C 3-27 3-28 E F G H

From 03 MAIN (REGULATOR) (Page 3-46)
 From 03 MAIN (VIDEO) (Page 3-20)
 From 03 MAIN (REGULATOR) (Page 3-46)
 From 05 LOADING MDA CNI (Page 3-29)
 From 02 TIMER/DISP/SW CN2 (Page 3-42)
 From 03 MAIN (SERVO) (Page 3-23, 3-24)
 From 03 MAIN (REGULATOR) (Page 3-46)
 From 03 DECK TERMINAL CNI (Page 3-29)

3.15 DECK TERMINAL, MODE MOTOR, CAPSTAN MDA, C. HOUSING SCHEMATIC DIAGRAMS



A

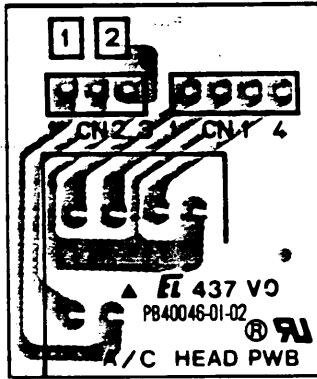
B

C

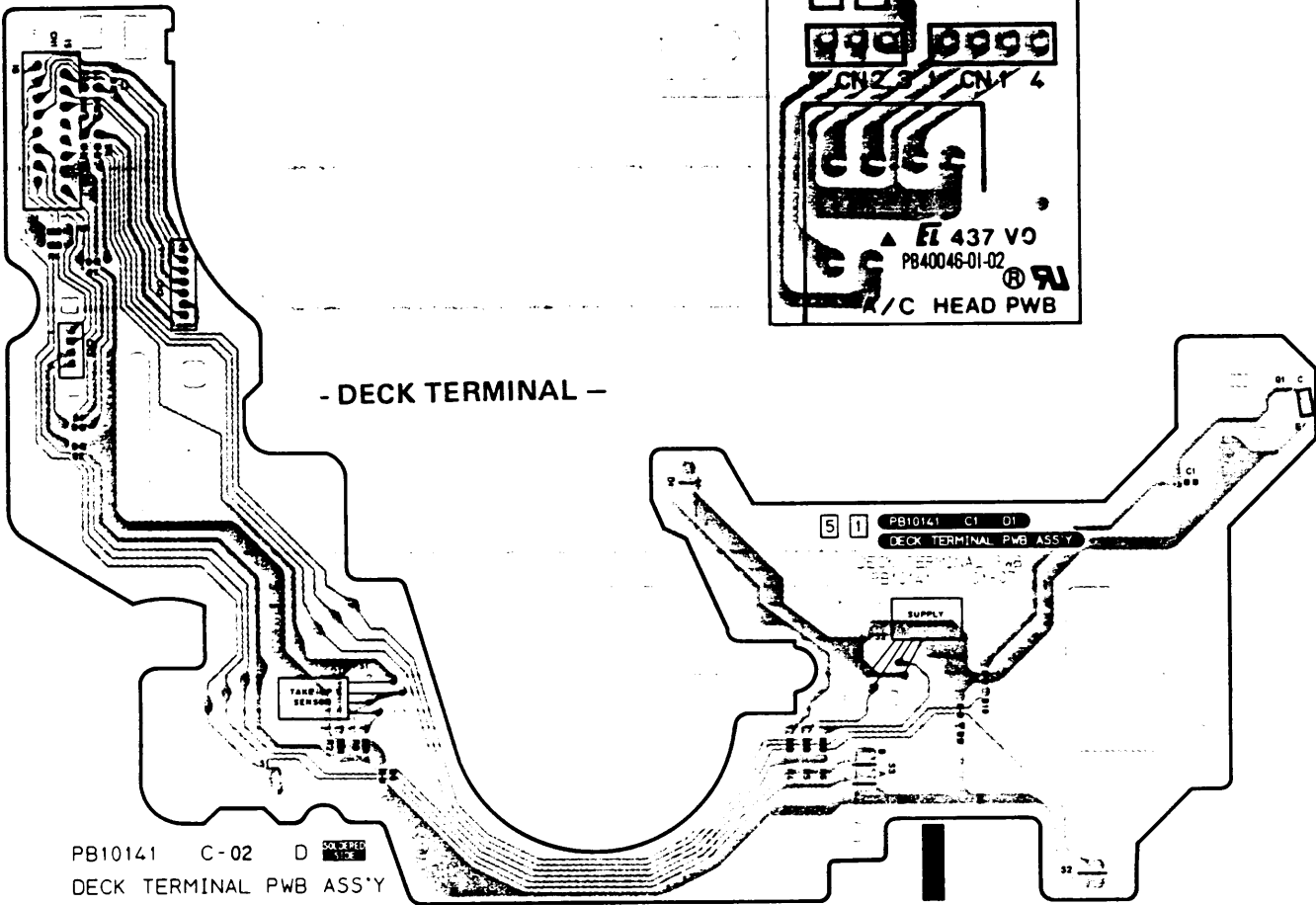
D

3.16 DECK TERMINAL, MODE MOTOR, C-HOUSING, A/C HEAD
CIRCUIT BOARDS

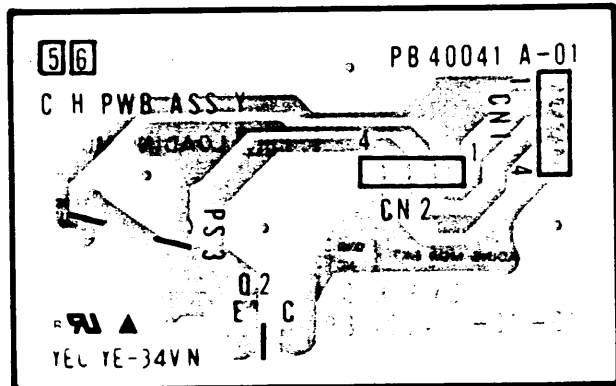
— A/C HEAD —



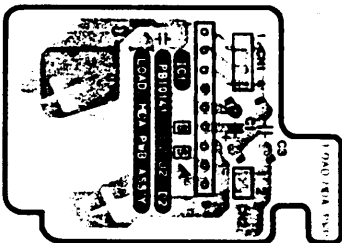
— DECK TERMINAL —



— CASSETTE HOUSING —



— MDA —



6

3.17 MAIN (VIDEO/SERVO/AUDIO/MECHACON/REGULATOR) CIRCUIT BOARD

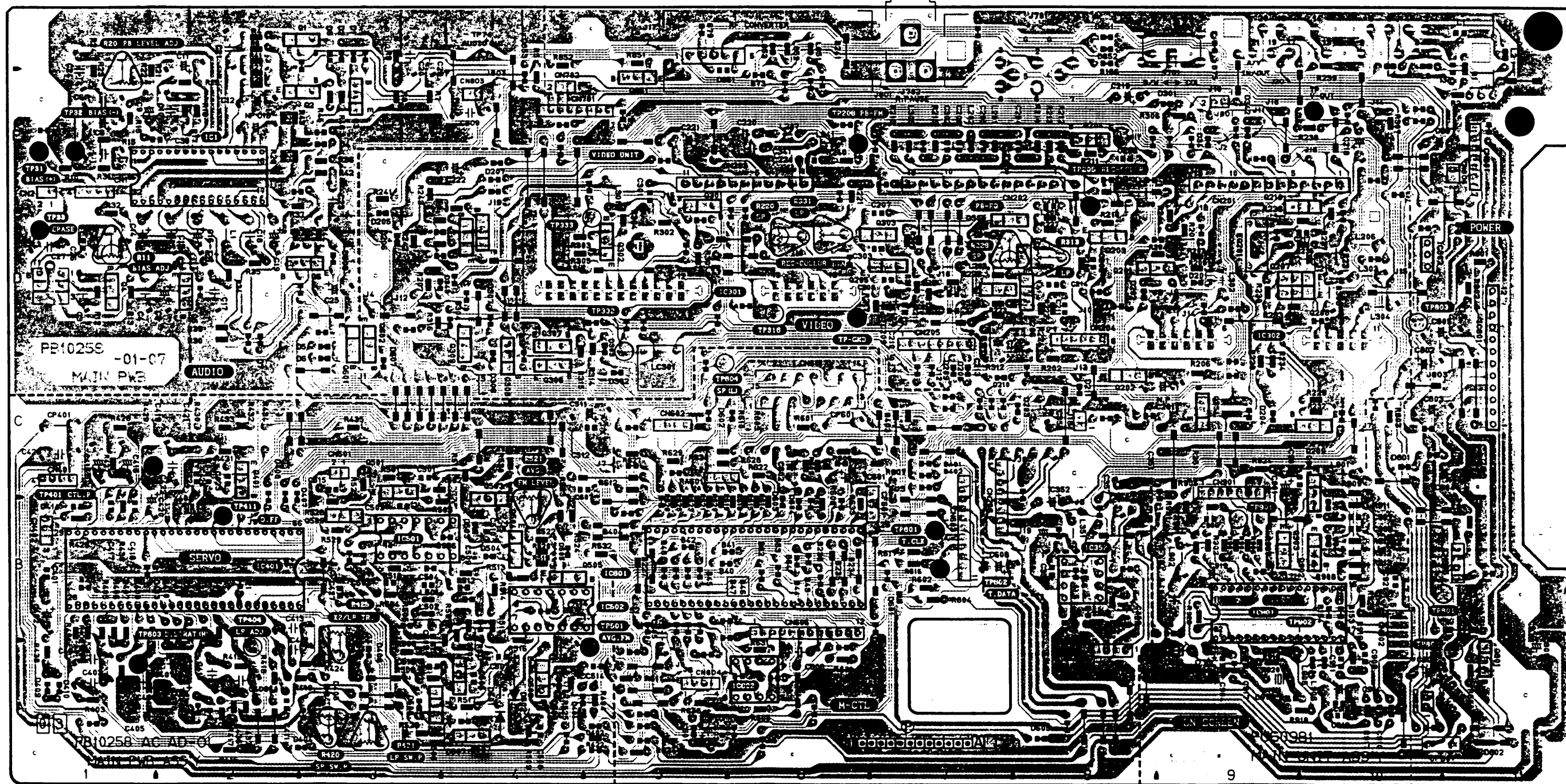
5

4

3

2

1



A

B

C

3-31

3-32

E

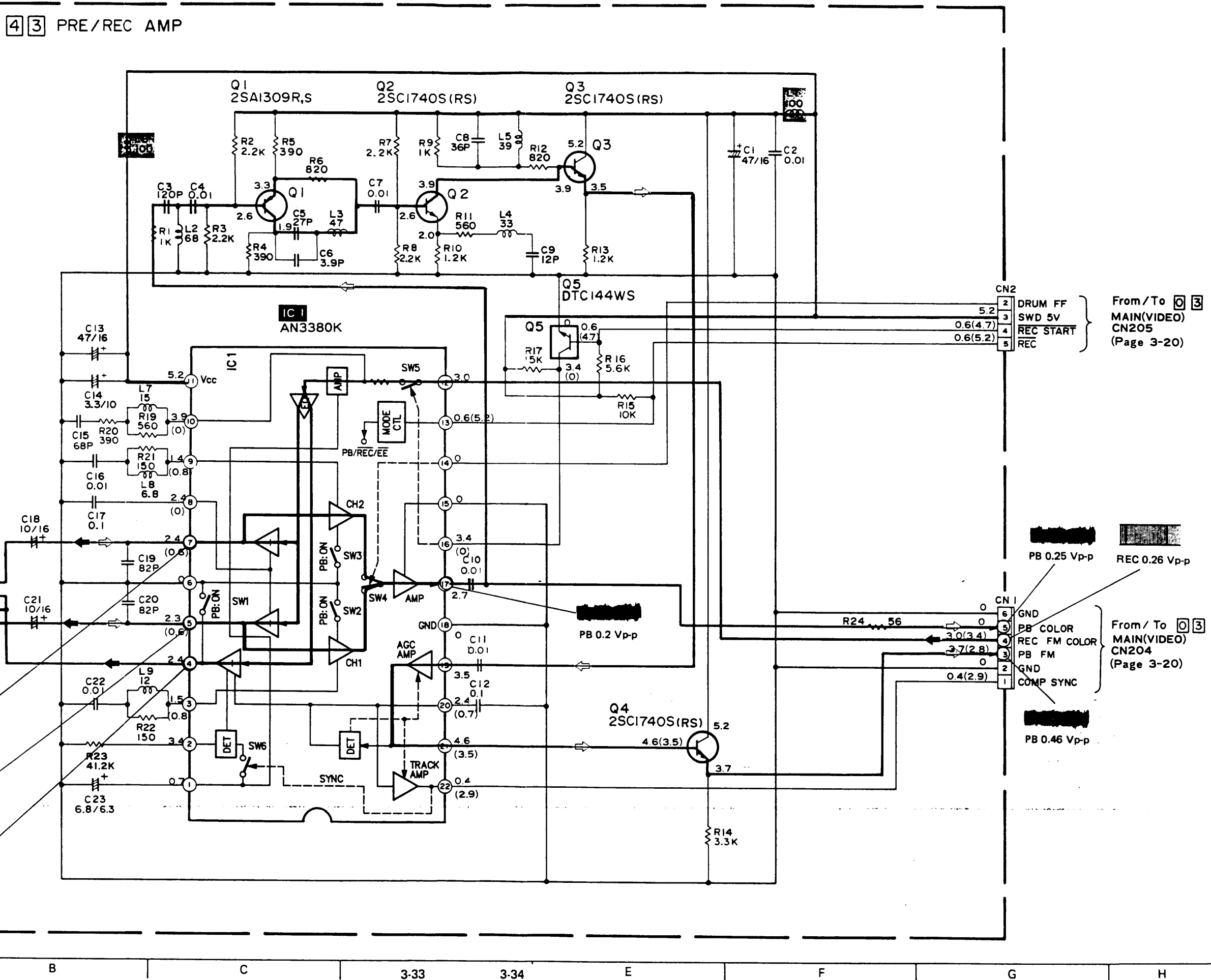
F

G

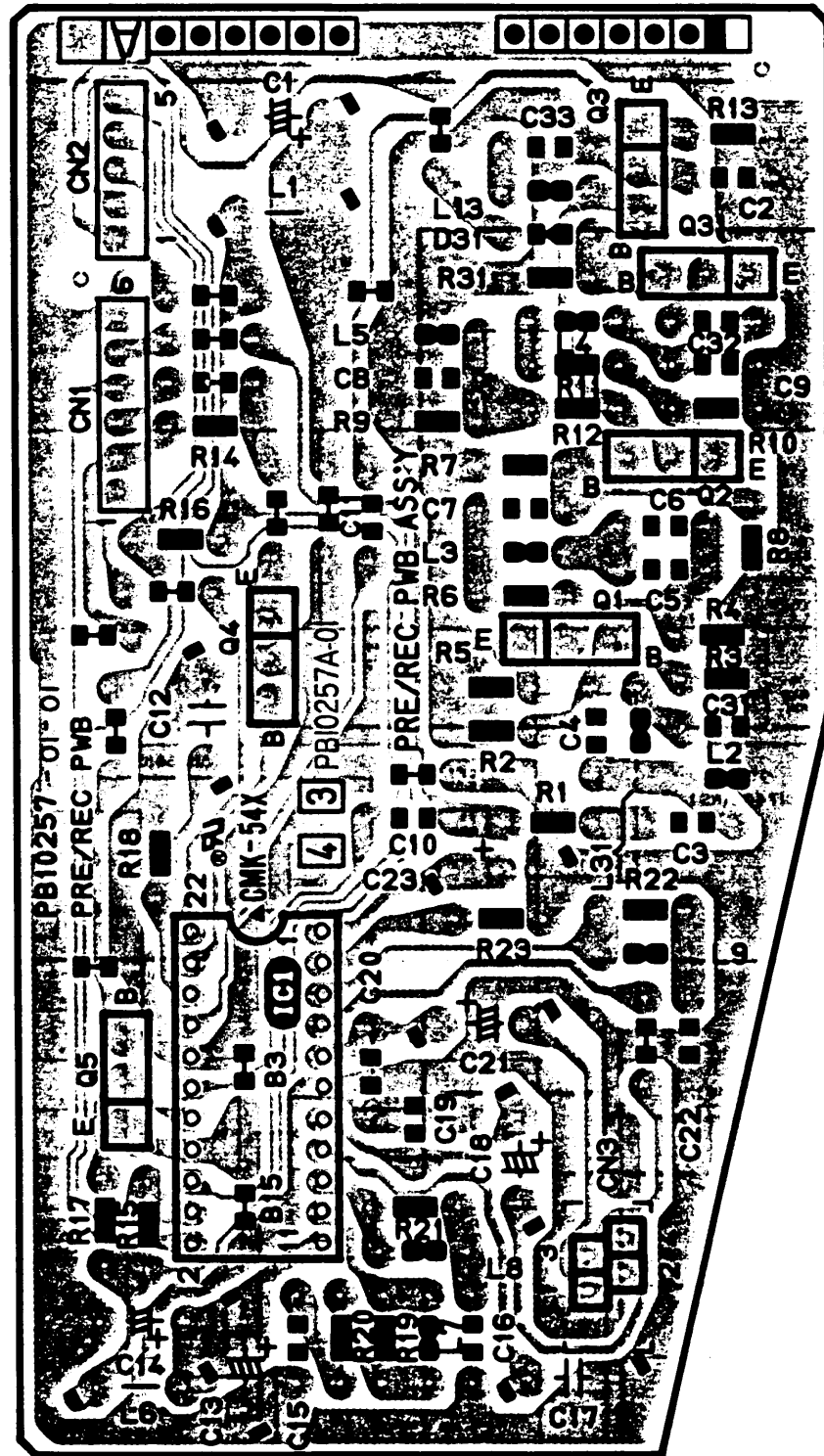
H

3.18 PRE/REC SCHEMATIC DIAGRAM

6
5
4
3
2
1



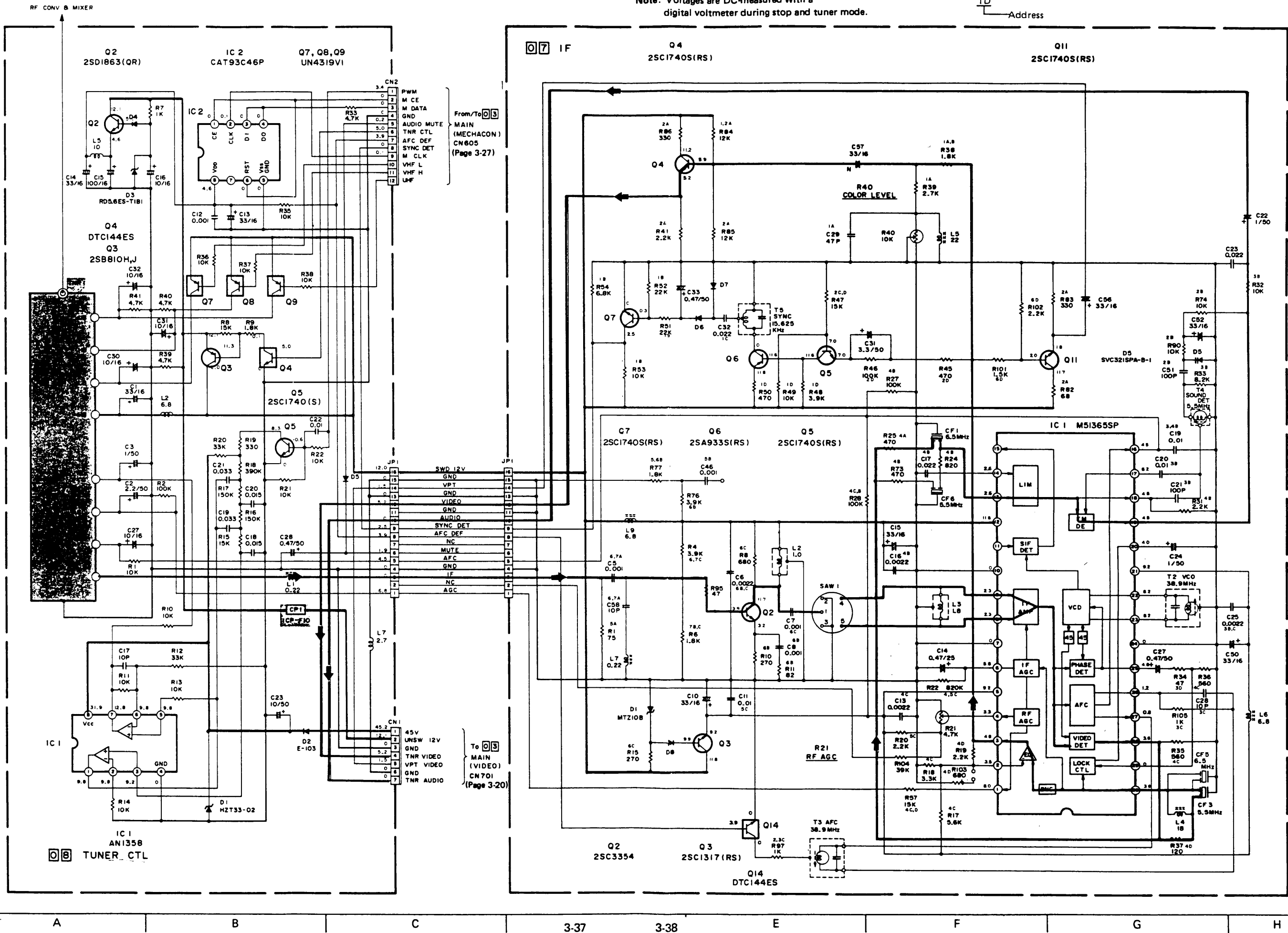
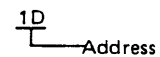
3.19 PRE/REC CIRCUIT BOARD



3.20 IF & TNR CTL SCHEMATIC DIAGRAM

Note: Voltages are DC-measured with a digital voltmeter during stop and tuner mode.

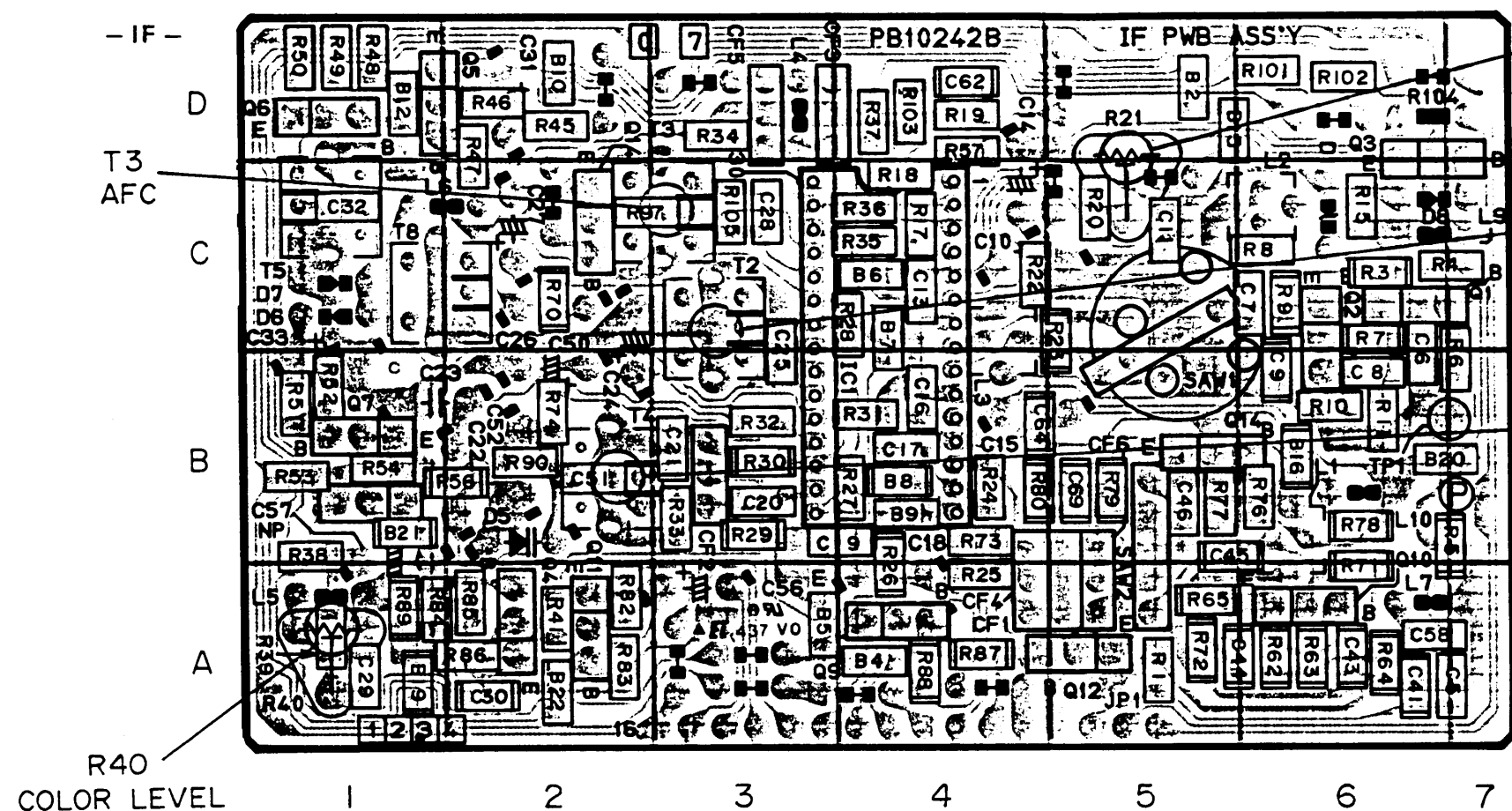
● Address of chip parts



6
5
4
3
2
1

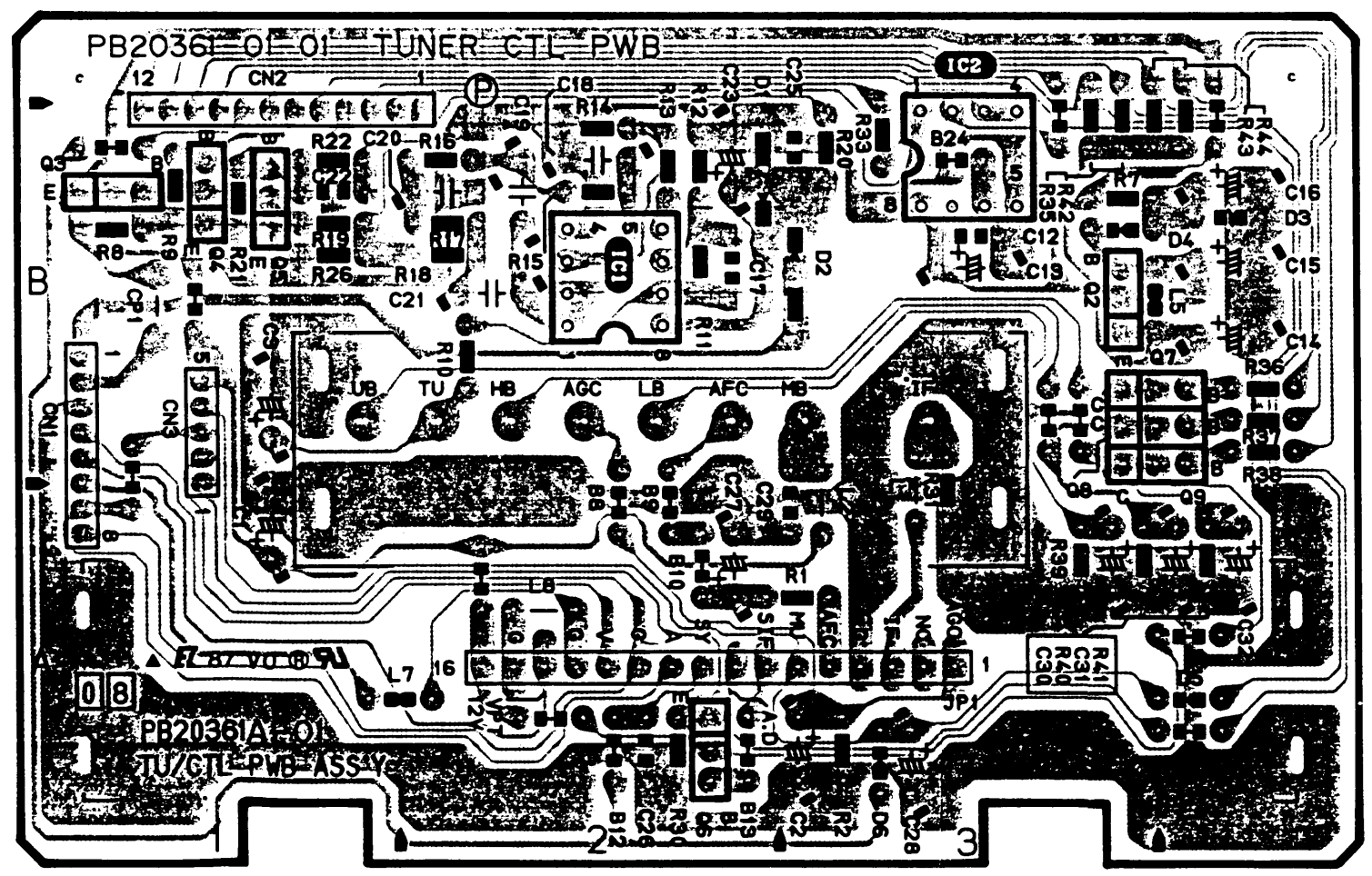
A B C 3-37 3-38 E F G H

3.21 IF & TNR CTL CIRCUIT BOARDS



Note: Double edging indicates not used in this model.
 Examples: Resistor, Capacitor, Transistor, DIODE

- TUNER CTL -



3-39

3-40

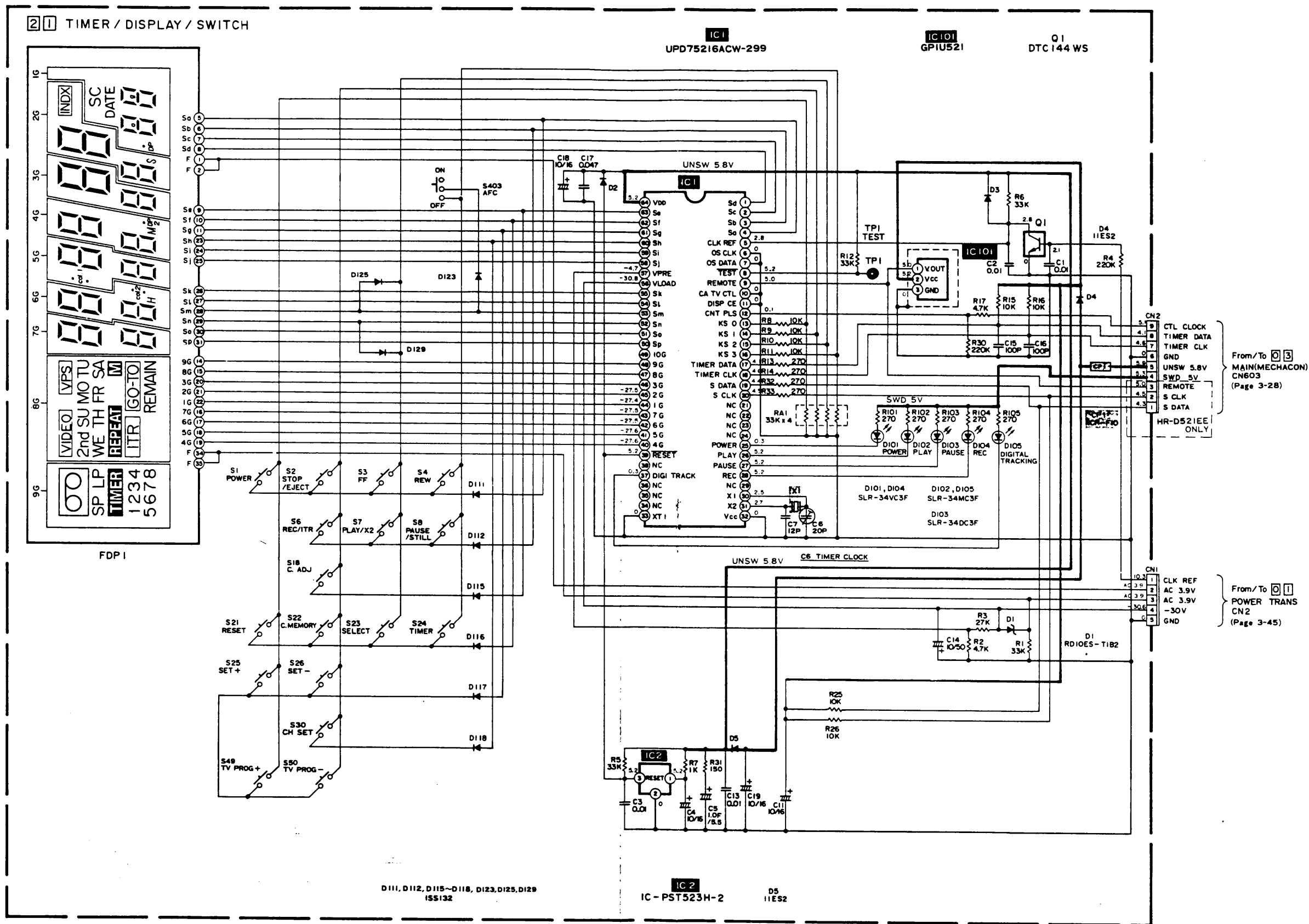
E

F

G

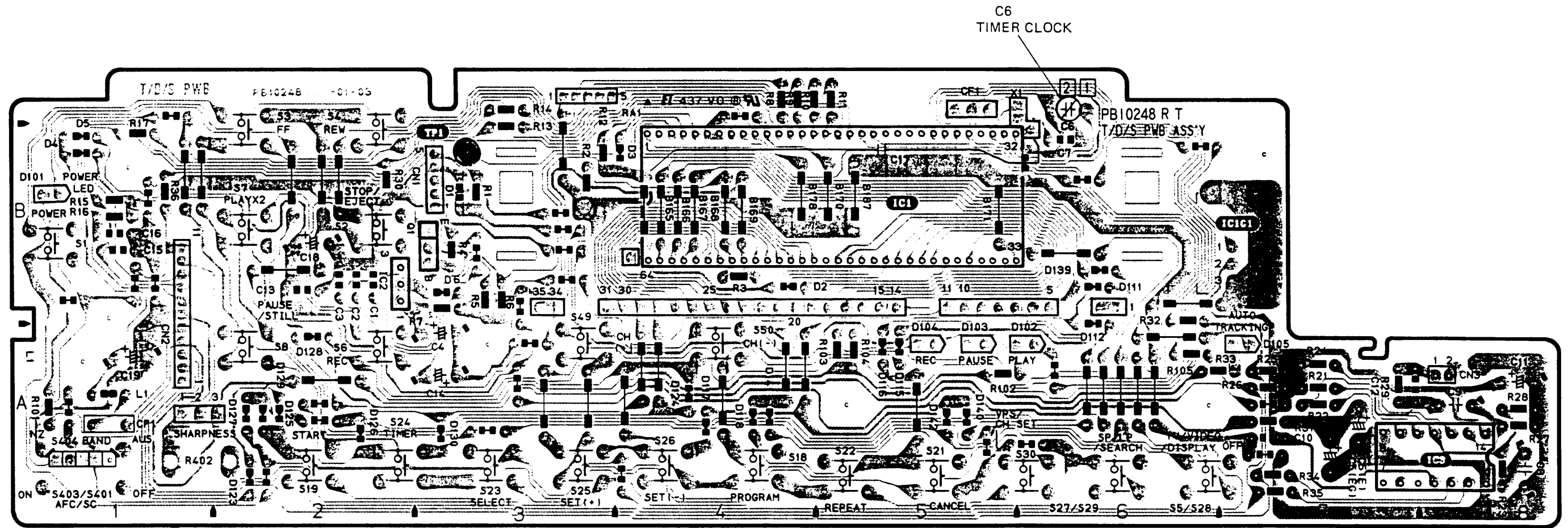
H

3.22 TIMER/DISP/SW SCHEMATIC DIAGRAM



Note: Voltages are DC-measured with a digital voltmeter during stop and tuner mode.

3.23 TIMER/DISP/SW CIRCUIT BOARD



C6
TIMER CLOCK

A

B

C

3-43

3-44

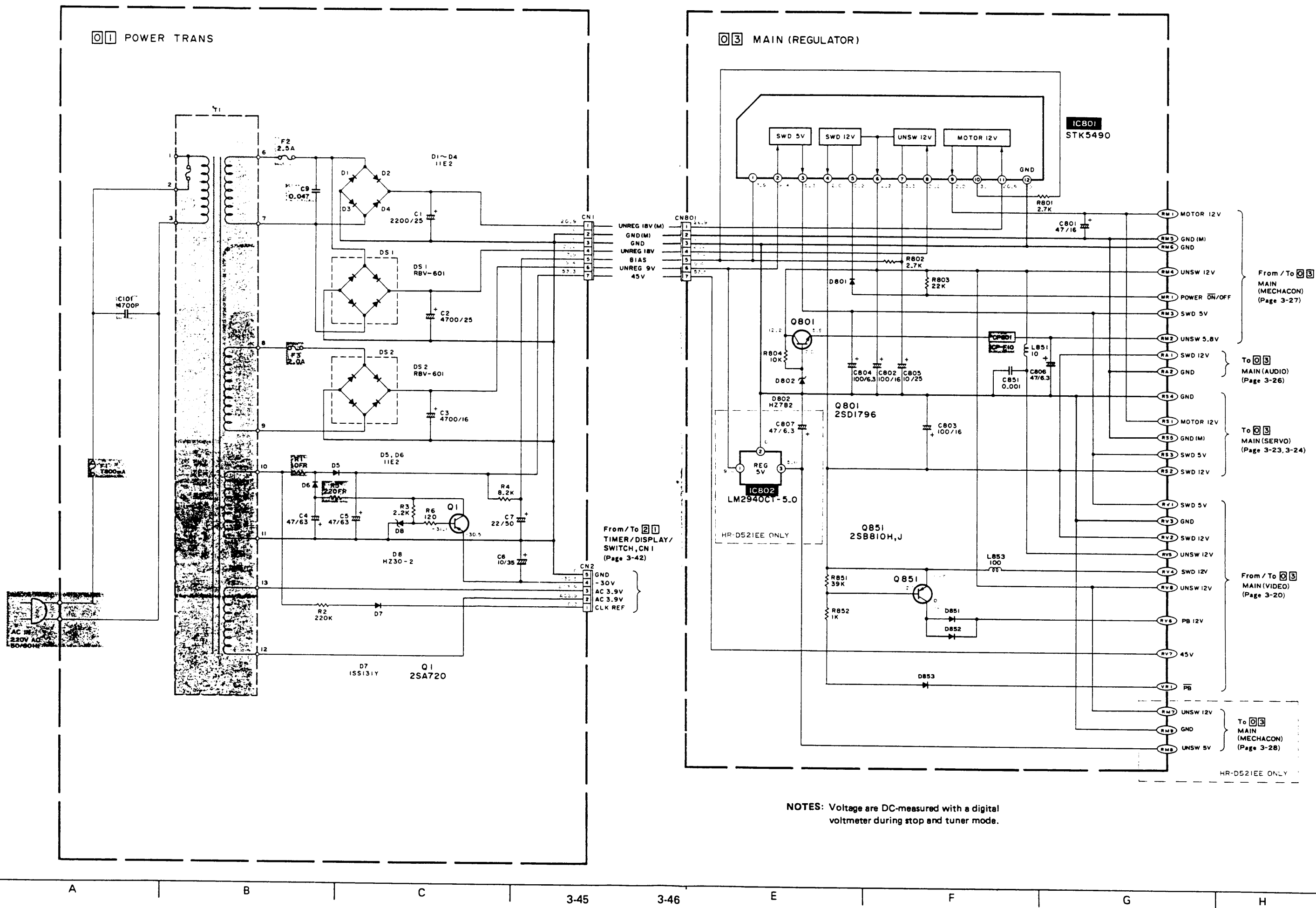
E

F

G

H

3.24 POWER TRANS & REGULATOR (MAIN) SCHEMATIC DIAGRAMS

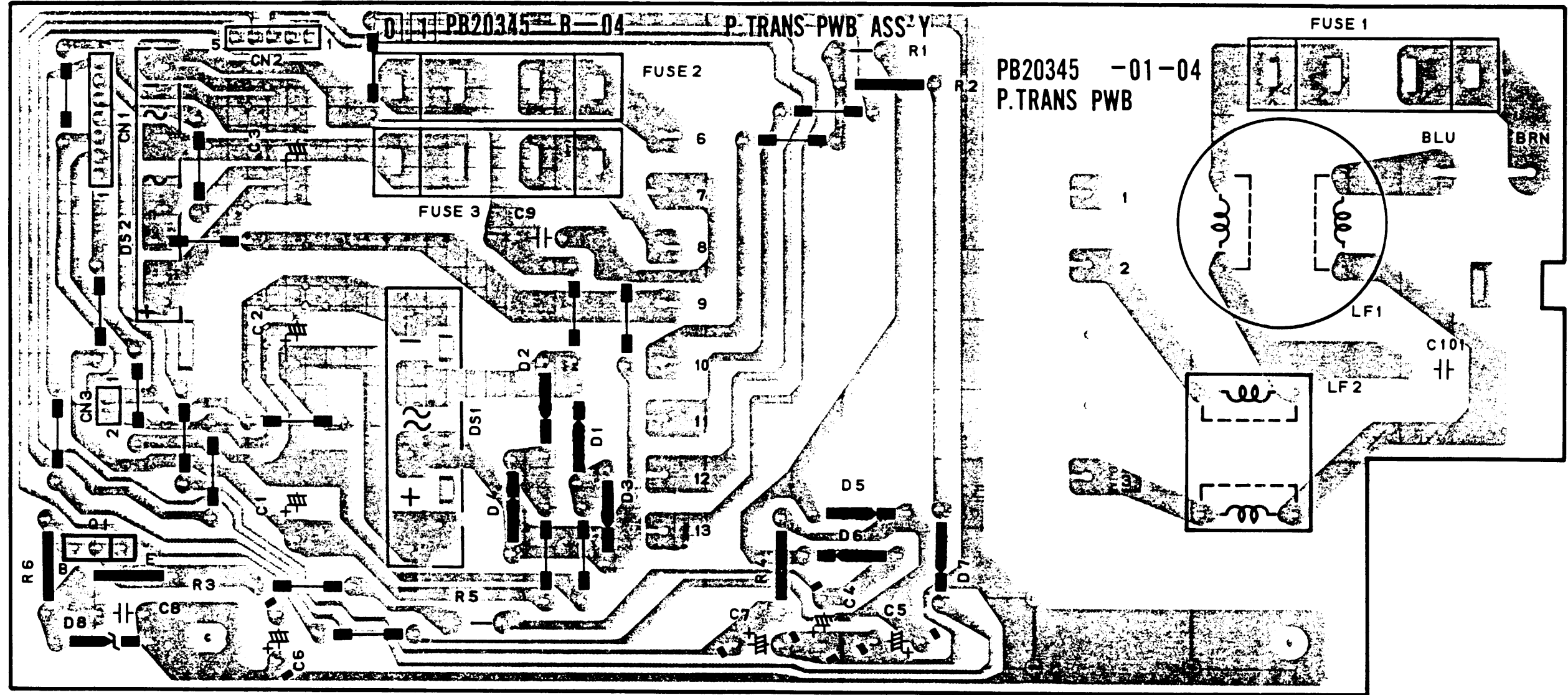


NOTES: Voltage are DC-measured with a digital voltmeter during stop and tuner mode.

6
5
4
3
2
1

A B C 3-45 3-46 E F G H

3.25 POWER TRANS CIRCUIT BOARD



A

B

C

3-47

3-48

E

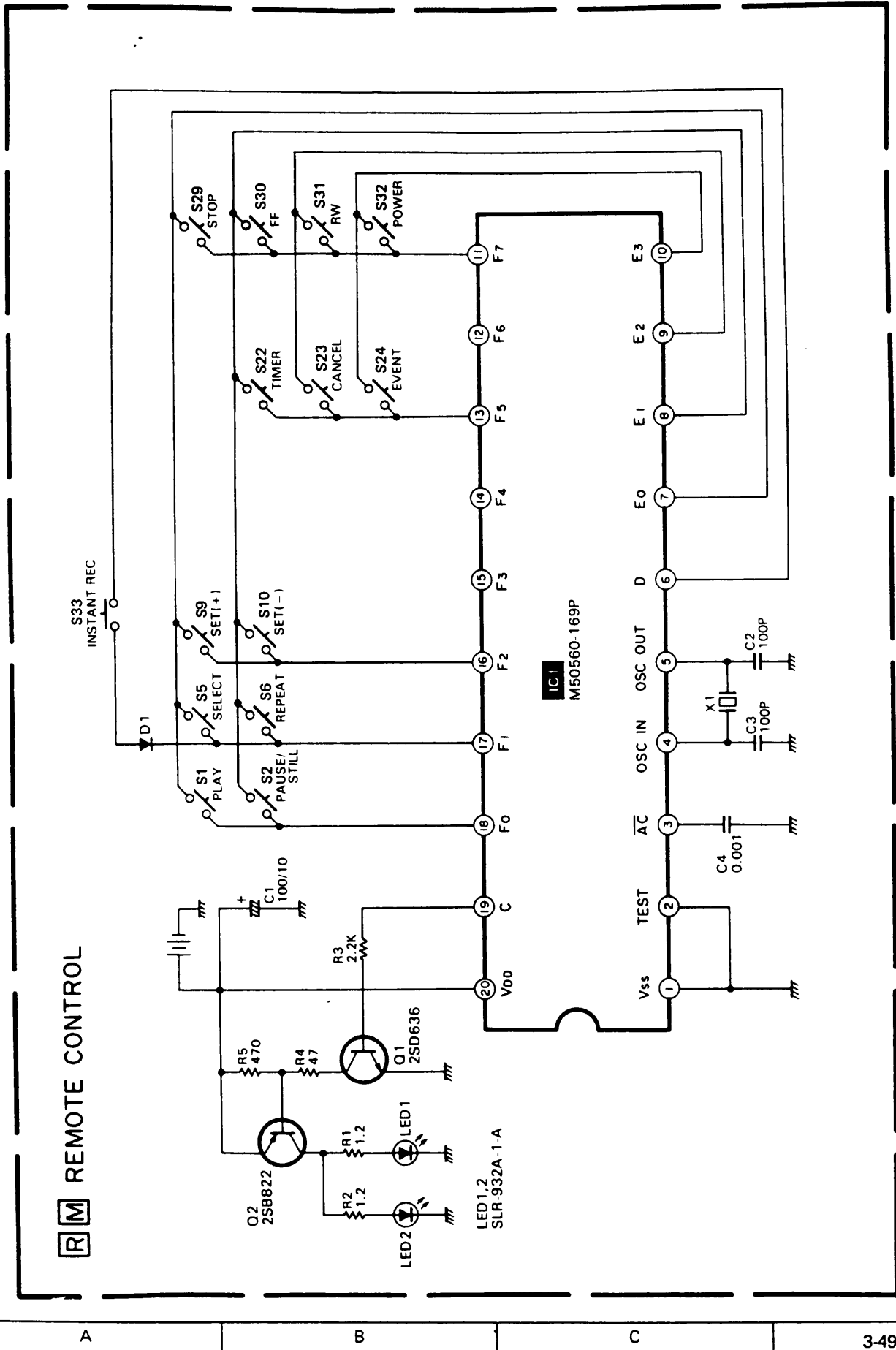
F

G

H

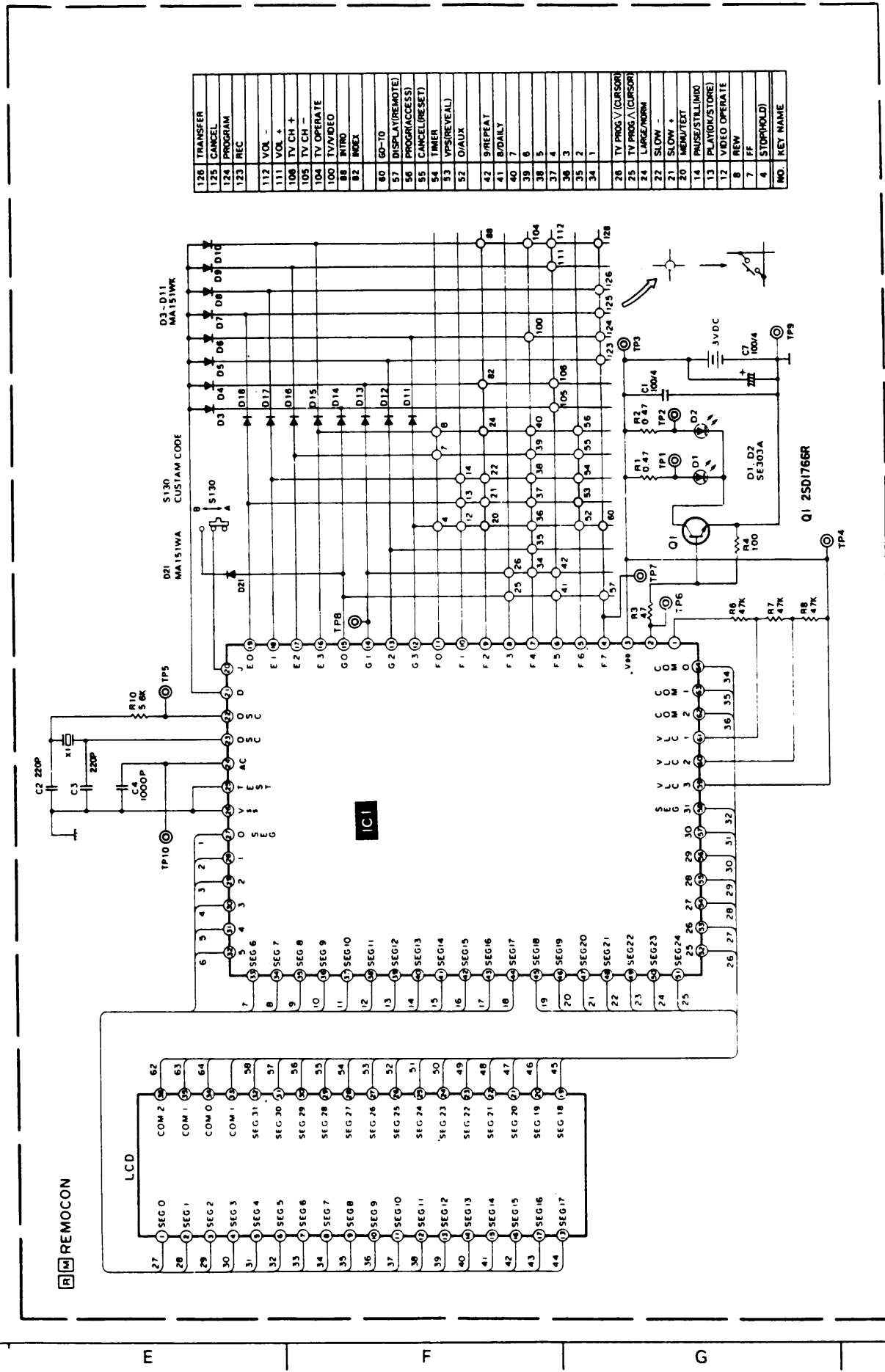
3.26 REMOTE CONTROL SCHEMATIC DIAGRAM (HR-D520EE)

- NOTES: 1. All parts shown in this schematic are critical for safety.
 2. This schematic is only for reference.
 Avoid replacing individual parts.
 Replace the entire unit only.



3.27 REMOTE CONTROL SCHEMATIC DIAGRAM (HR-D521EE)

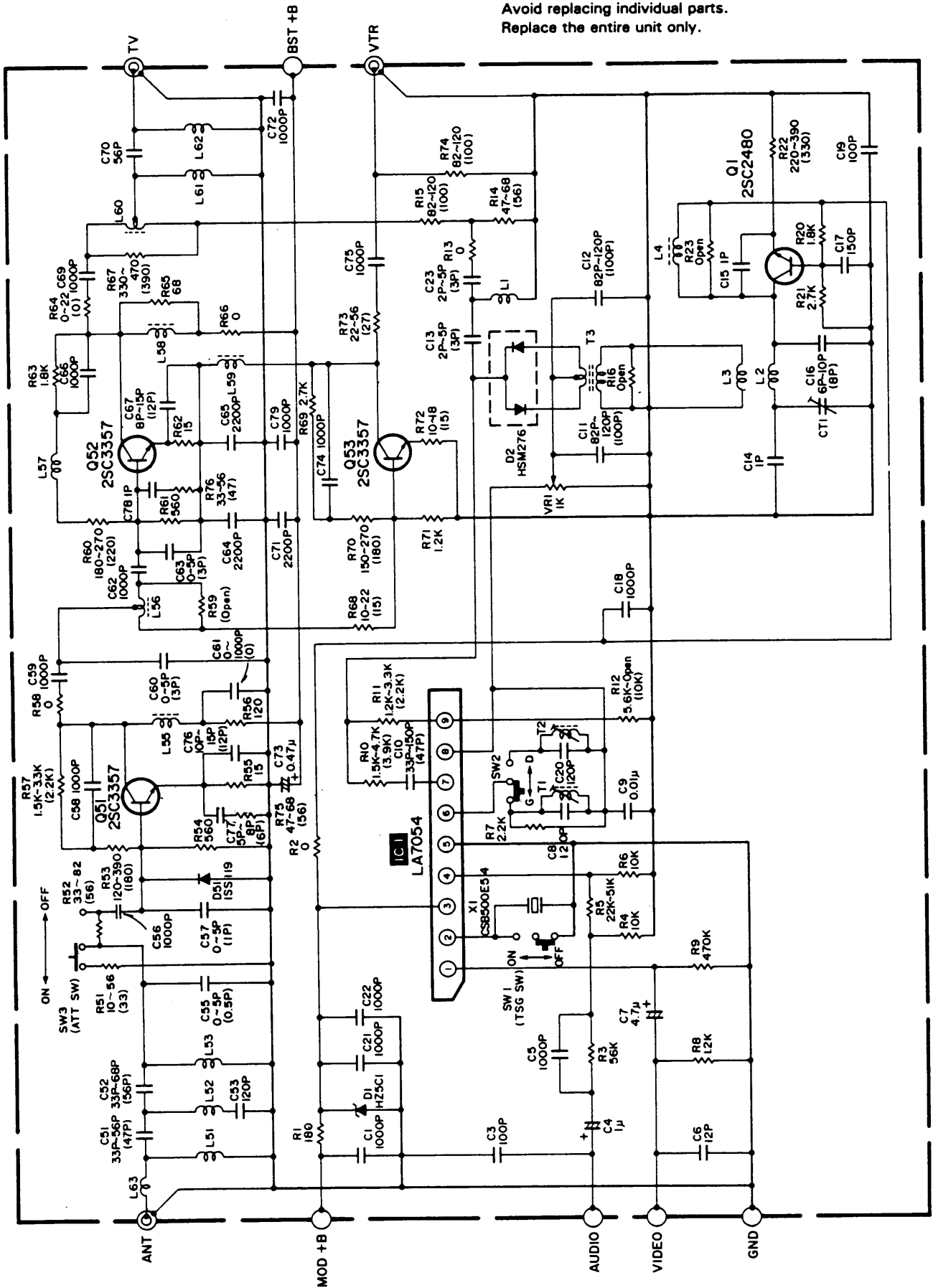
- NOTES: 1. All parts shown in this schematic are critical for safety.
 2. This schematic is only for reference.
 Avoid replacing individual parts.
 Replace the entire unit only.



3.28 RF CONVERTER AND RF SWITCH SCHEMATIC DIAGRAM

NOTES:

1. All parts shown in this schematic are critical for safety.
2. This schematic is only for reference.
Avoid replacing individual parts.
Replace the entire unit only.



SECTION 4 EXPLODED VIEWS AND PARTS LIST

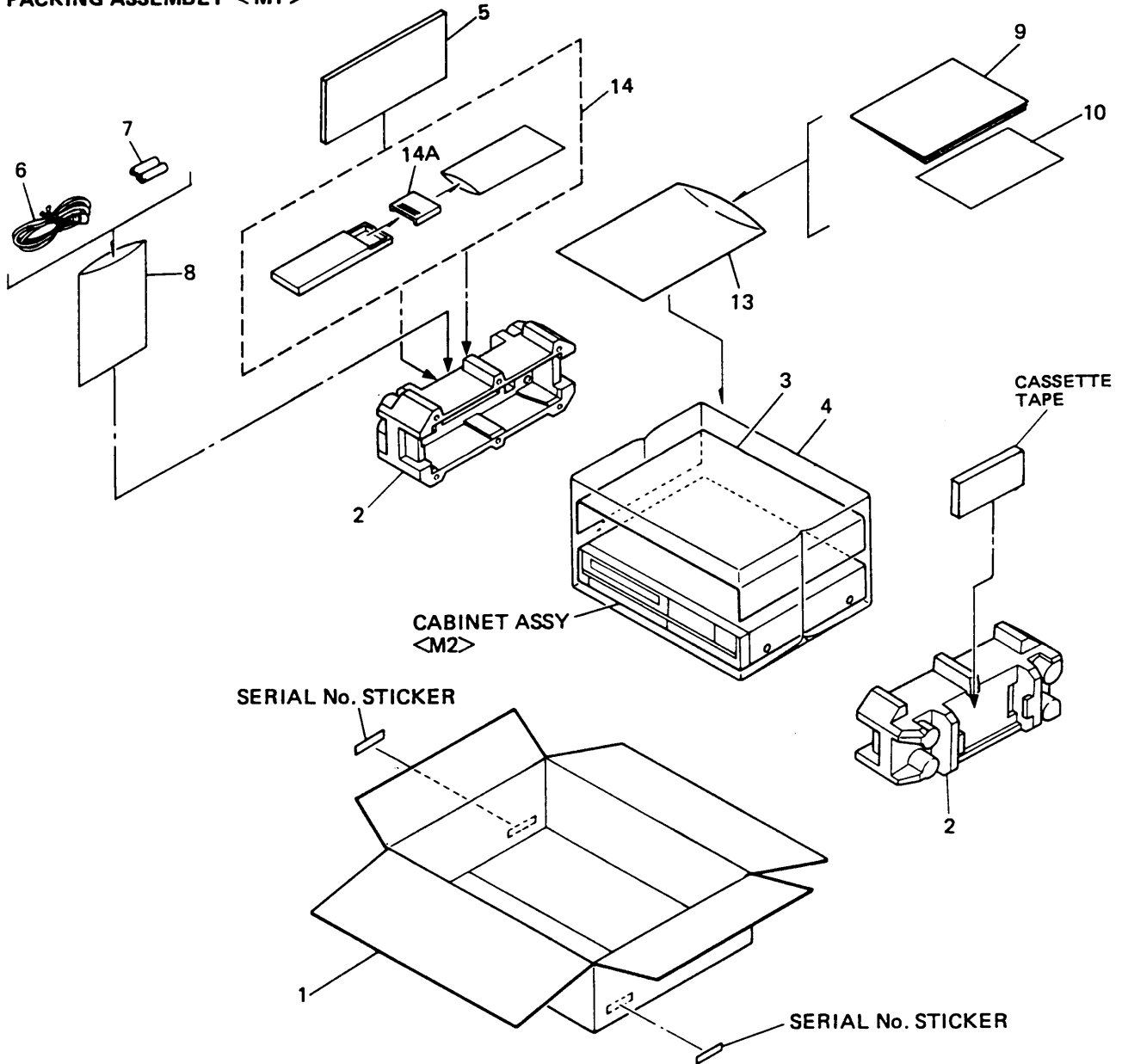
SAFETY PRECAUTION

Parts identified by the Δ symbol are critical for safety. Replace only with specified part numbers.

NOTE:

[M] indicates mechanical symbol number.

4.1 PACKING ASSEMBLY <M1>



Δ REF No. PART No. PART NAME, DESCRIPTION

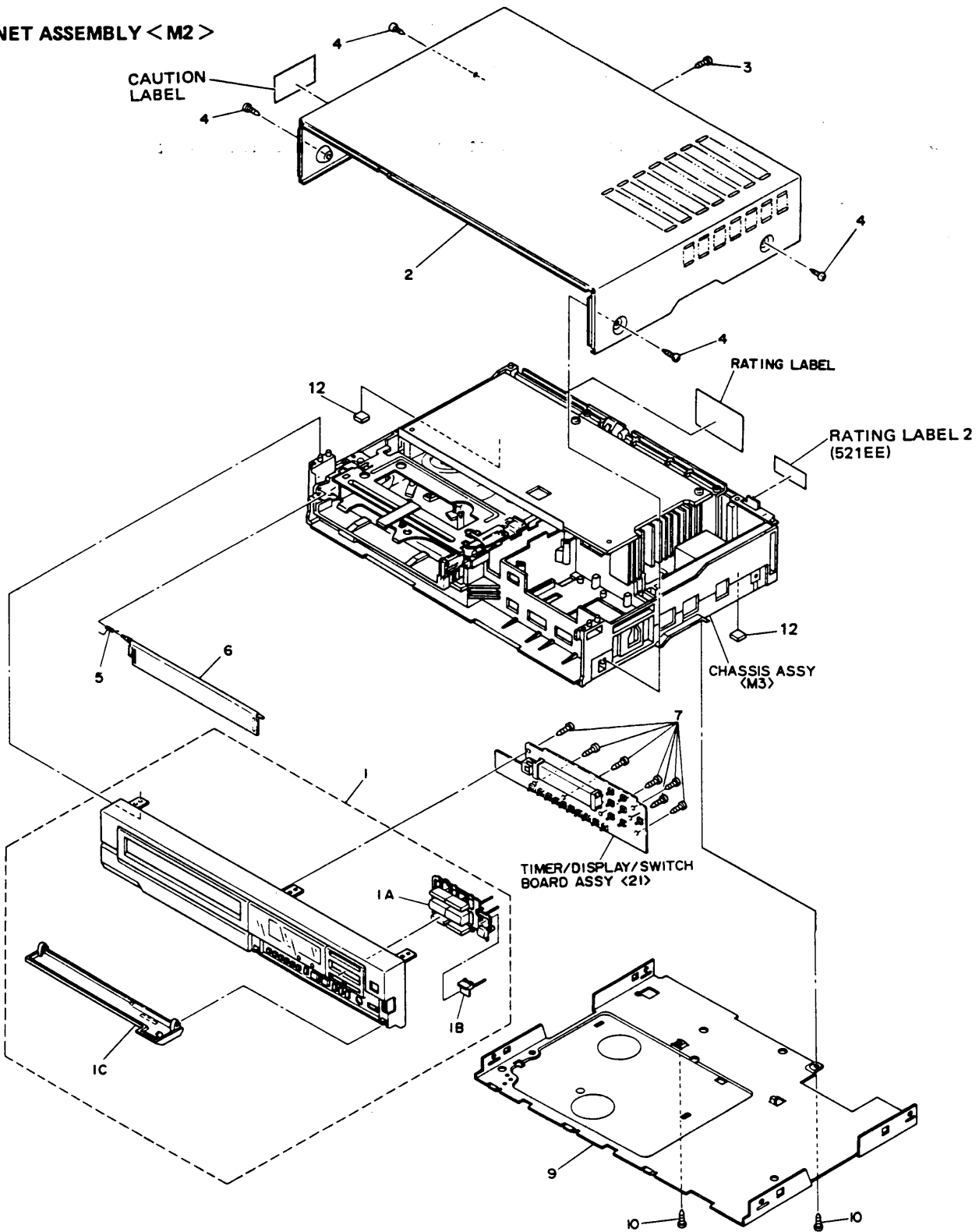
1. PACKING ASSEMBLY <M1>

1	PQ32790-114	PACKING CASE, 520EE
1	PQ32790-134	PACKING CASE, 521EE
2	PQ33104A	CUSHION ASSY
3	PQ41026-20	PROTECT SHEET
4	PQM30021-59-11	POLY BAG
5	PQ42987-6	SHEET
6	PU59168-3	RF CABLE
	or PU59167-3	RF CABLE

Δ REF No. PART No. PART NAME, DESCRIPTION

7	UM-3DJ2P	BATTERY, X2
8	QPGA020-02005	POLY BAG
Δ 9	PU30425-1094	INSTRUCTIONS, 520EE
Δ 9	PU30425-1106	INSTRUCTIONS, 521EE
10	TCN-3379	TAPE CATALOG
13	QPGA025-03505	POLY BAG
Δ 14	PQ10543CV	REMOTE CONTROLLER, 521EE
Δ 14	PQ10344CG	REMOTE CONTROLLER, 520EE
14A	PQ31449	BATTERY CAP, 521EE
14A	PQ31323	BATTERY CAP, 520EE

4.2 CABINET ASSEMBLY < M2 >



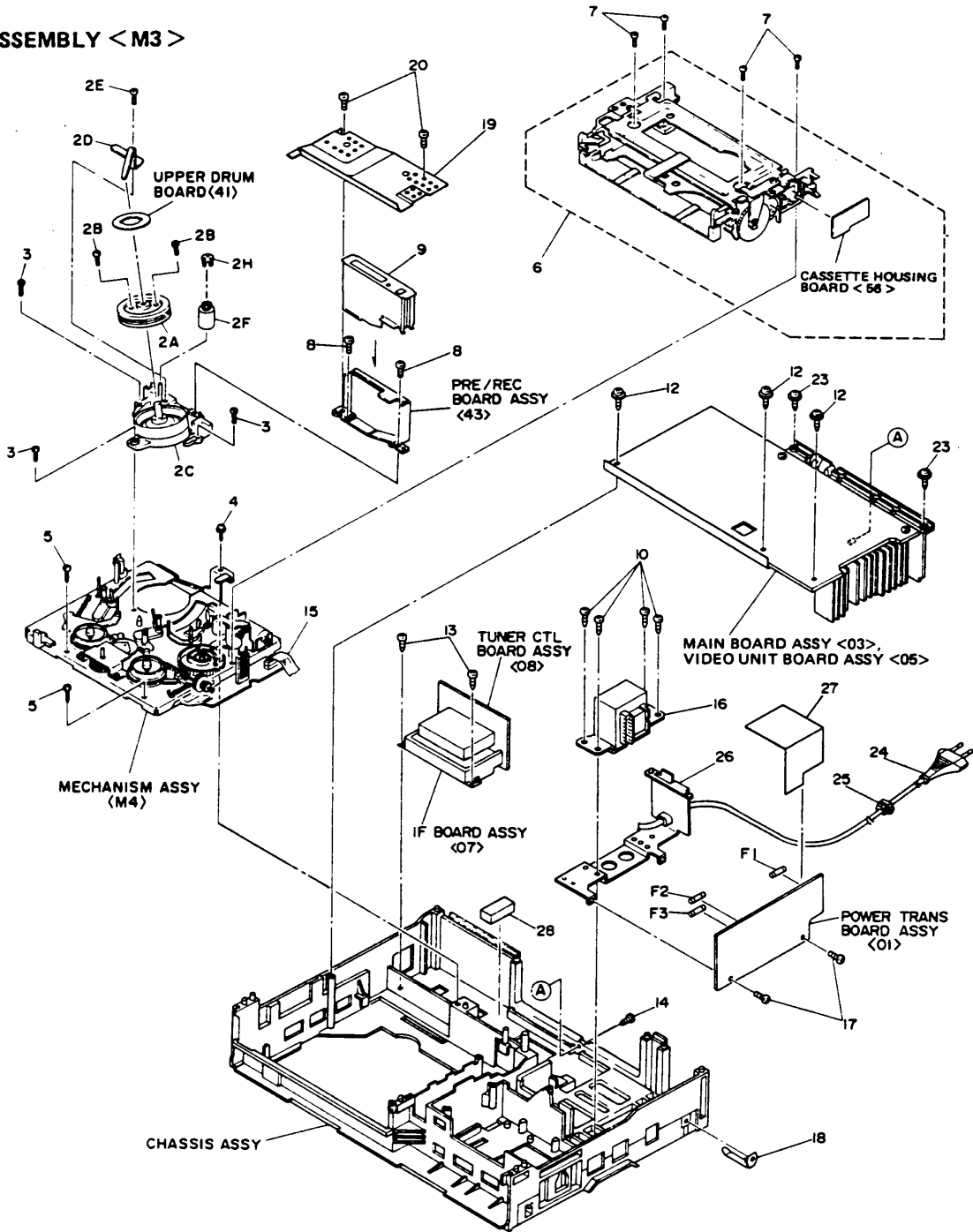
#△ REF No. PART No. PART NAME, DESCRIPTION
 :**

2. CABINET ASSEMBLY < M2 >

1	PQ10751AJ	FRONT PANEL ASSY, 521EE
1	PQ10751AF	FRONT PANEL ASSY, 520EE
1A	PQ20726-3	BUTTON (OPE)
1B	PQ43751	INDICATOR
1C	PQ32664Z	DOOR ASSY

#△ REF No.	PART No.	PART NAME, DESCRIPTION
△ 2	PQ10602-6	TOP COVER
3	SDSF3010M	SCREW
4	PQ43827	SPECIAL SCREW, X4
5	PQ43772	TORSION SPRING
6	PQ32650-4	CASSETTE HOUSING DOOR
7	SDSF2608Z	SCREW, X7
△ 9	PQ10712-1-3	BOTTOM COVER
10	SDSF3008Z	SCREW, X2 FOR BOTTOM COVER
12	PQ43013	FOOT, X2

4.3 CHASSIS ASSEMBLY <M3>



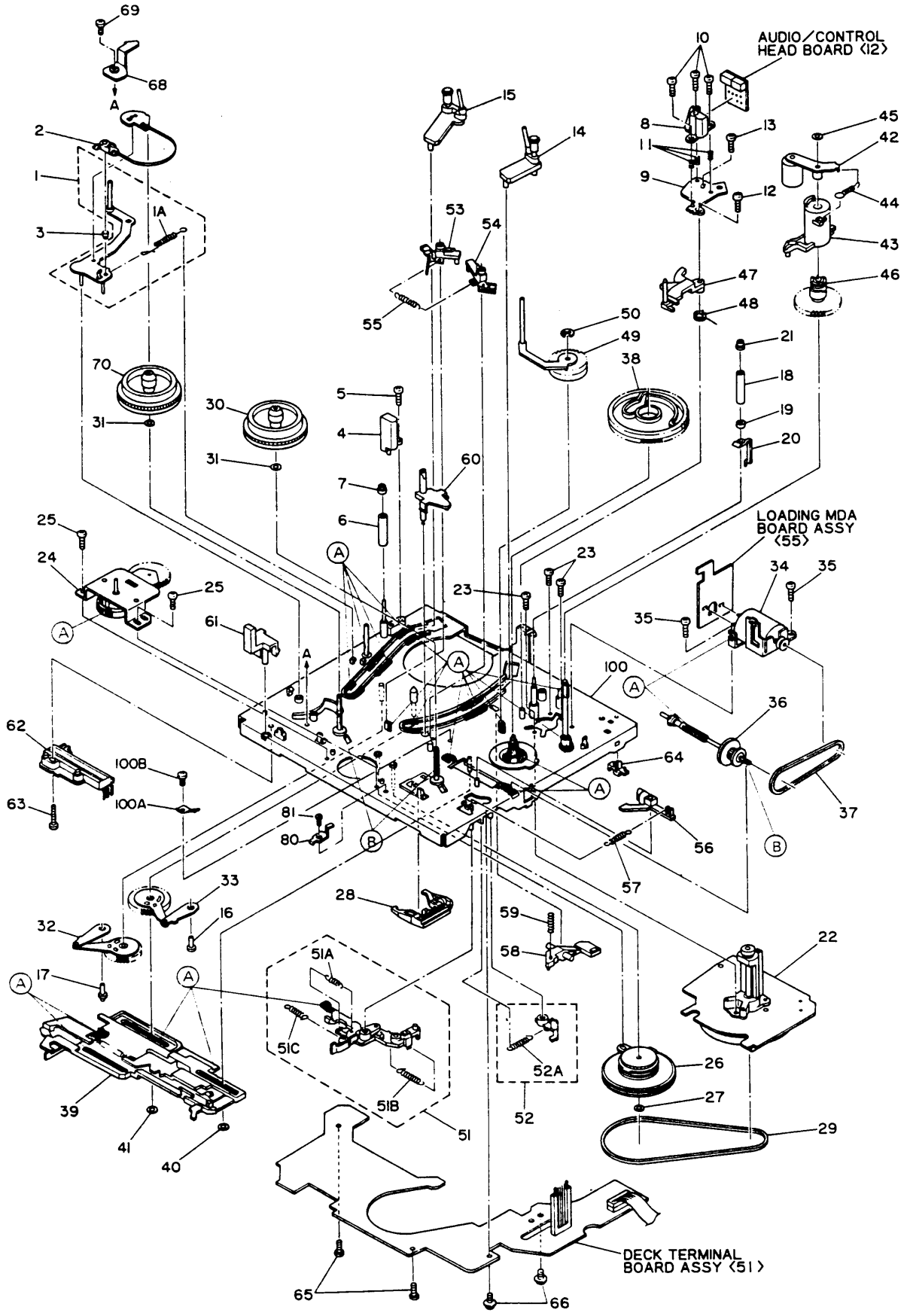
#△ REF No. PART No. PART NAME, DESCRIPTION
 :**

3. CHASSIS ASSEMBLY (M3)

2A	PDM2008B-5	UPPER DRUM ASSEMBLY
2B	PDM4165A	DRUM SCREW ASSEMBLY, X2
2C	PDM2108D	LOWER DRUM MOTOR ASSEMBLY
2D	PDM4181A-3	BRUSH ASSEMBLY
2E	SDST2606Z	SCREW, FOR BRUSH ASSEMBLY
2F	PDM4187A	I.D. ROLLER ASSY
2H	PQ41163	CAP
3	SPST2610Z	SCREW, X3, FOR DRUM
4	PQ43831	SPECIAL SCREW, FOR MAIN DECK
5	PQ43831	SPCL SCREW, X2, FOR MAIN DECK
6	PUS29183C-3	CASSETTE HOUSING ASSY
7	SDST2608Z	SCREW, X4, FOR C. HOUSING
8	SDST2606Z	SCREW, X2, FOR PRE/REC
9	PQ32217-1-1	SHIELD CASE (2), FOR PRE/REC

#△ REF No.	PART No.	PART NAME, DESCRIPTION
10	PQ43831	SPCL SCREW, X4, FOR P. TRANS
12	GPSF2610Z	SCREW, X3, FOR MAIN BOARD
13	SDSF3008Z	SCREW, X2, FOR TUNER UNIT
14	SDSF3010M	SCREW, FOR TERMINAL BOARD
15	PW30601-14450	PARALLEL WIRE
△ 16	PU60982	POWER TRANSFORMER, 520EE
△ 16	PU61038	POWER TRANSFORMER, 521EE
17	SDST3006Z	SCREW, X2 FOR TRANS BKT
18	PQ43278	EARTH PLATE
19	PQ32387-1-4	DRUM SHIELD
20	SDST2608Z	SCREW, X2, FOR DRUM SHIELD
23	GPSF2610Z	SCREW, X2, FOR TERMINAL BOARD
△ 24	QMP3980-200	POWER CORD
△ 25	QHS3771-108	STRAIN RELIEF
△ 26	PQ32166-2-6	TRANS BRACKET
△ 27	PQ43782-1-1	COVER (AC)
28	PQM30029-127	SPACER, FOR CHASSIS

4.4 MECHANISM ASSEMBLY <M4>



Category	Part number	MARK
Grease	KANTO-G-31KAV	(A)
Oil	COSMO-HV56	(B)

NOTE: The section marked in red (A) and (B) indicate lubrication and greasing areas.

#△ REF No. PART No. PART NAME, DESCRIPTION
 :**

4. MECHANISM ASSEMBLY (M4)

1	PQ43497E	TENSION ARM ASSY
1A	PQ43500	TENSION SPRING
2	PQ43501A-7	TENSION BAND ASSY
3	PQ43503-1-4	ADJUST PIN
4	PU60616	FULL ERASE HEAD
5	SDSF2614Z	TAPPING SCREW
6	PQ43505-1-1	ROLLER
7	PQ43506	GUIDE POLE CAP
8	PU60617	AUDIO/CONTROL HEAD
9	PQ43509	HEAD BASE
10	PQ43687A	SCREW, X3
11	PQM30002-192	COMPRESSION SPRING, X3
12	SPSP2606Z	SCREW
13	SPSF2608M	TAPPING SCREW
14	PU61103-2	POLE BASE ASSY (TAKE-UP)
15	PU61151-2	POLE BASE ASSY (SUPPLY)
16	PQ43524	STOPPER
17	PQ43525	STOPPER 2
18	PQ43526	TAPE GUIDE
19	PQ43670-1-1	GUIDE FLANGE
20	PQ43675	TAPE GUARD
21	PQ43506	GUIDE POLE CAP
△ 22	PU60892	CAPSTAN MOTOR
23	SPSG2608Z	TAPPING SCREW, X3
24	PU60618-1-3	IDLER GEAR UNIT
25	SPST2606Z	SCREW, X2
26	PU60953-1-2	CLUTCH UNIT
27	PQM30017-8	SLIT WASHER
28	PQ43532A-1	CHANGE LEVER ASSY
29	PQM30003-24	BELT
30	PU60858	REEL DISK (TAKE-UP)
31	PQM30018-54	SPACER, X2
32	PQ43537A	LOADING ARM ASSY (SUPPLY)
33	PQ43542B	LOADING ARM ASSY (TAKE-UP)
34	PQ43676B-5	MODE MOTOR ASSY
or	PQ43676C	MODE MOTOR ASSY
35	SPST2606Z	TAPPING SCREW, X2
36	PQ43548A-2	WORM CLUTCH ASSY
37	PQM30003-23	BELT (LOADING)
38	PQ32413	CONTROL CAM
39	PQ43555B	PLATE ASSY
40	PQM30017-12	SLIT WASHER
41	PQM30017-8	SLIT WASHER
42	PQ43558A	PINCH ROLLER ARM ASSY
or	PQ43558B	PINCH ROLLER ARM ASSY
43	PQ32415	PINCH ROLLER PRESS LEVER
44	PQM30001-233	TENSION SPRING
45	PQM30017-12	SLIT WASHER

#△ REF No. PART No. PART NAME, DESCRIPTION

46	PQ32416-1-1	PINCH ROLLER CAM
47	PQ43567A-7	GUIDE ARM ASSY
48	PQ43569-1-3	TORSION SPRING
49	PQ43570A	HALF LOADING GEAR ASSY
50	PQM30017-12	SLIT WASHER
51	PQ43575A-5	CANCEL LEVER ASSY
51A	PQM30001-273	TENSION SPRING
51B	PQM30001-237	TENSION SPRING
51C	PQM30001-274	TENSION SPRING
52	PQ43578A-2	HOOK ASSY
52A	PQM30001-238	TENSION SPRING
53	PQ43581B	MAIN BRAKE ASSY (SUPPLY)
54	PQ43582A-1	MAIN BRAKE ASSY (TAKE-UP)
55	PQM30001-251	TENSION SPRING
56	PQ43583A	SUB BRAKE ASSY (TAKE-UP)
57	PQM30001-235	TENSION SPRING
58	PQ43584A-4	CAPSTAN BRAKE ASSY
59	PQM30002-201	COMPRESSION SPRING
60	PU60621-1-1	LED HOLDER (INCL LED : D1)
61	PU60624-1-4	REC SAFETY SWITCH (S2)
62	PU60622-1-1	SLIDE SWITCH (S3)
63	SDSF2614Z	TAPPING SCREW
64	PQ32516	PWB HOLDER
65	SDST2616Z	TAPPING SCREW, X2
66	GPSF2608Z	TAPPING SCREW, X2
68	PQ43999	TENSION BAND BRACKET-2
69	SPSP3004Z	SCREW
70	PU60859	REEL DISK (SUPPLY)
80	PQ43941	R. BRACKET
81	SPST2606Z	SCREW
or	SDST2606Z	SCREW
100	PQ20650D-17	MAIN DECK ASSY
100A	PQ43849	EARTH PLATE
100B	SPST2604Z	SCREW