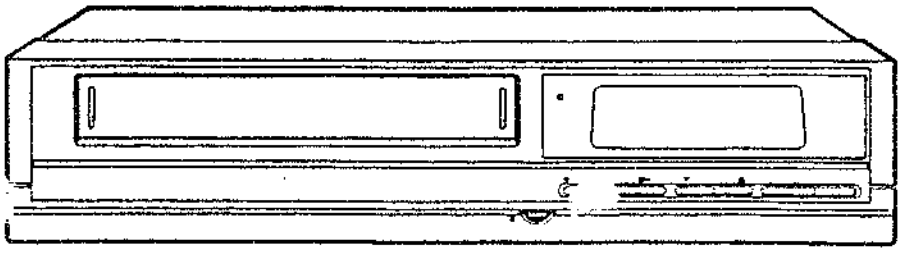
ORION VHS PAL

Video Cassette Recorder

HQ HIGH QUALITY PICTURE

VPS *VIDEO PROGRAM SYSTEM*

VH-689 RC
VH-2996



Bei technischen Änderungen können Ergänzungsblätter angefordert werden.

Specifications are subject to change without notice.

CHASSIS CORD A

Bestell-Nr.:

2971

SPECIFICATONS

Power Source :	220V 50Hz
Power Consumption :	Approx. 27W
Operating Temperature :	5°C to 40°C
Television System :	CCIR : 625 lines, 50 fields PAL and OST color signal
Video Recording System :	2 rotary heads, helical scanning system Luminance : FM azimuth recording Color signal : Converted subcarrier phase shift recording
Audio Track :	1 track
Tape Format :	Tape width 12.7mm high density tape
RF Output Channel:	36 (±4) channel
Heads :	Video : 2 rotary heads Audio/Control : 1 stationary head Erase : 1 full track erase head
Input Level :	Video : VIDEO IN connector 1.0Vp-p, 75 ohm unbalanced Audio : LINE IN jack - 8 dB, 50K ohm unbalanced
Output Level :	Video : VIDEO OUT connector 1.0Vp-p, 75 ohm unbalanced Audio : LINE OUT jack - 6 dB, 1K ohm unbalanced
Weight :	5.2kg
Dimension :	385(W)x81.5(H)x334(D)mm

CONTENTS

HQ FEATURE
This video recorder is equipped with HQ (High Quality) recording capability. A built-in detail enhancer is used to boost the recorded signal for cleaner, sharper images and maximum picture quality in playback.

VPS FUNCTIONH
If the VCR is turned to a TV station transmitting the VPS signal, the VCR automatically takes any delay or extention of the program into account and can record the specified program.

KEY TO ABBRIVATIONS

A	AC	:Alternating Current
	A/C	:Audio/Control
	ACC	:Automatic Color Control
	AE	:Audio Erase
	AFC	:Automatic Frequency Control
	AFT	:Automatic Fine Tuning
	AFT DEF	:Automatic Fine Tuning Defeat
	AGC	:Automatic Gain Control
	AMP	:Amplifier
	ANT	:Antenna
	APC	:Automatic Phase Control
	ASB	:Assemble Mode
	AT	:All Time
B	BGP	:Burst Gate Pulse
	BOT	:Beginning of Tape
	B.P.F	:Band Pass Filter
	B/W	:Black & White
C	CASE	:Cassette
	CAP	:Capstan
	CARR	:Carrier
	CCD	:Charged Coupled Device
	CH	:Channel
	CLK	:Clock
	CLOCK(SY-SE)	:Clock(Syscon to Servo)
	CONV	:Converter
	CPM	:Capstan Motor
	CTL	:Control
	CYL	:Cylinder
	CYL-M	:Cylinder Motor
	CYL SENS	:Cylinder Sensor
D	DATA(SY-SE)	:Data(Syscon to Servo)
	DC	:Direct Current
	DD UNIT	:Direct Drive Motor Unit
	DET	:Detection, Detector
	DEV	:Deviation
E	EE	:Electric to Electric
	EF	:Emitter Follower
	EOT	:Ending of Tape
	EQ	:Equalizer
	EXT	:External
F	FBC	:Feed Back Clamp
	FE	:Full Erase
	FG	:Frequency Generator
	FL SW	:Front Loading Switch
	FM	:Frequency Modulation
	FSC	:Frequency Sub Carrier
	FWD	:Forward
G	GND	:Ground
H	H.P.F	:High Pass Filter
I	IF	:Intermediate Frequency
	INST	:Insert Mode
	INT	:Interrupt
	INV	:Inverter
L	LED	:Light Emitting Diode
	LIMIT AMP	:Limiter Amplifier
	LM	:Loading Motor
	LOAD	:Loading
	L.P.F	:Low Pass Filter
	LUMI	:Luminance
M	MM	:Monostable Multivibrator
	MOD	:Modulator, Modulation
	MS SW	:Mech State Switch
N	NC	:Non Connction
O	OSC	:Oscillator
	OR EQ	:Or Equivalent
P	PB	:Playback
	PB CTL	:Playback Control
	P.CON	:Power Control
	PD	:Phase Detector
	PG	:Phase Generator
	PWM	:Pulse Width Modulation
	PWM IV	:Pulse Width Modulated Tuning Voltage
R	REC	:Recording
	REC ST	:Recording Start
	REEL BRK	:Reel Brake
	REEL S	:Reel Sensor
	REG	:Regulator, Regulated
	REW	:Rewind
	RF	:Radio Frequency
S	S.CLK	:Serial Clock
	S.COM	:Sensor Common
	S.DATE IN	:Serial Date Input
	S.DATE OUT	:Serial Date Output
	SEG	:Segment
	SER	:Search Mode
	SI	:Serial Input
	SIF	:Sound Intermediate Frequency
	SO	:Serial Output
	SP	:Standard Play
	STB	:Serial Strobe
	SW	:Switch
	SYNC SEP	:Sync Separator, Separation
T	TR	:Transistor
	TRACK VR	:Tracking Variable Resistor
	TRIC PB	:Trick Playback
	TP	:Test Point
U	UNREG	:Unregulated
V	VCO	:Voltage Controlled Oscillator
	VIF	:Video Intermediate Frequency
	VP	:Vertical Pulse, Voltage Display
	VR	:Variable Resistor
	V-SYNC	:Vertical-Synchronization
	VT	:Voltage Tuning
Y	Y/C	:Luminance/Chrominance

PREVENTIVE CHECKS AND SERVICE INTERVALS

The following standard table depends on environmental conditions and usage. Unless maintenance is properly carried out, the following service intervals may be quite shortened as harmful effects may be had on other parts. Also, long term storage or disuse may cause transformation and aging of rubber parts.

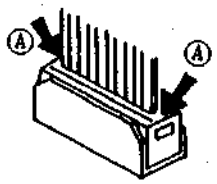
Parts Name \ Time	500 hours	1,000 hours	1,500 hours	2,000 hours	3,000 hours	Notes
Full Erase Head	□	□	□	□	□	Clean those parts in contact with the tape.
Audio Control Head	□	□	□	□	□	
Loading Belt		□		○		Clean the rubber, and parts which the rubber touches.
Reel Belt		□		○		
Front Loading Belt		□		○		
Pinch Roller	□	□	□	□	□○	
Capstan DD Unit					○	
Loading Motor					○	
Tension Band					○	
Capstan Shaft	□	□	□	□	□	
Impedance Roller	□	□	□	□	□	Replace when rolling becomes abnormal.
Tape Running Guide Post	□	□	□	□	□	
Cylinder Unit	□	□○	□	□○	□○	※

○ : Replace
□ : Clean

※ Clean the upper drum (especially the video heads) in the direction or drum rotation using a thick, textured cloth with a high quality methyl alcohol. Avoid wiping vertically as this may cause damage to the video heads.

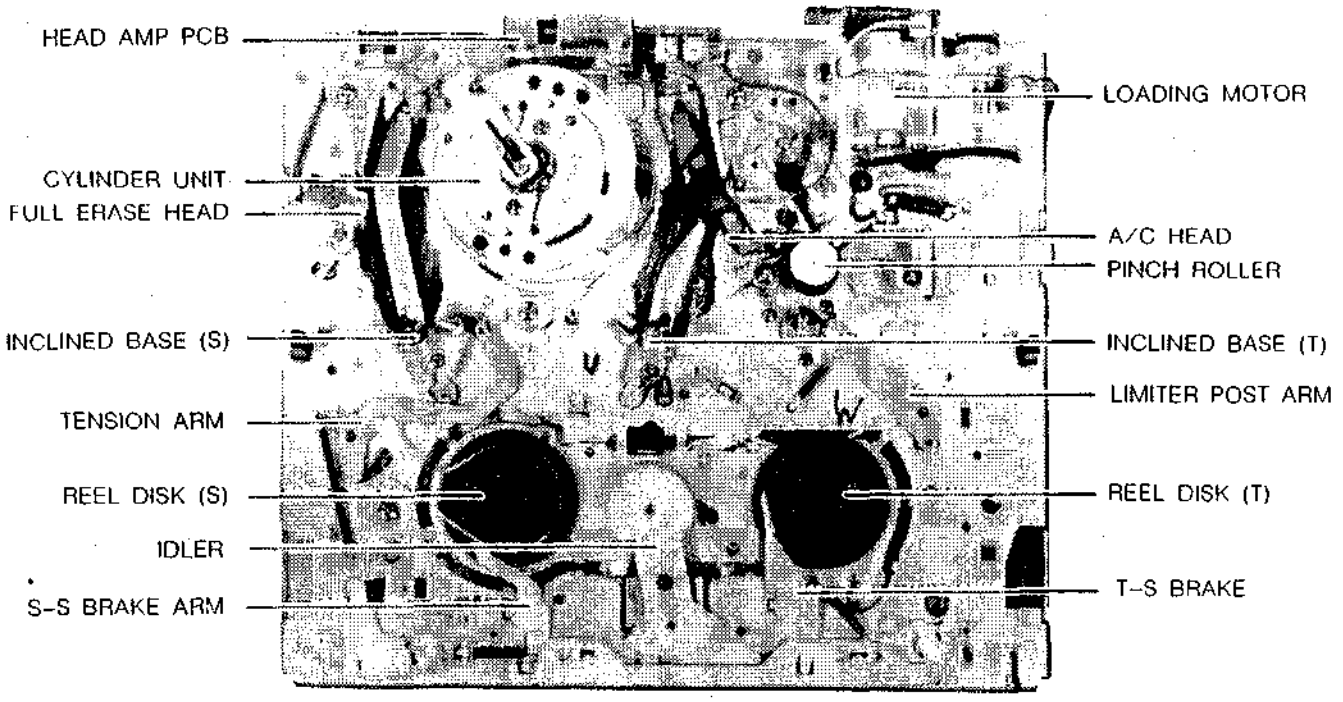
HOW TO REMOVE AND INSTALL RIBBON WIRE IN CASE OF DISCONNECTION.

1. To remove the wire, simultaneously press both parts indicated by arrow Ⓐ .
2. To install the wire, do not press the parts indicated by arrow Ⓐ , but insert the wire into the connector.

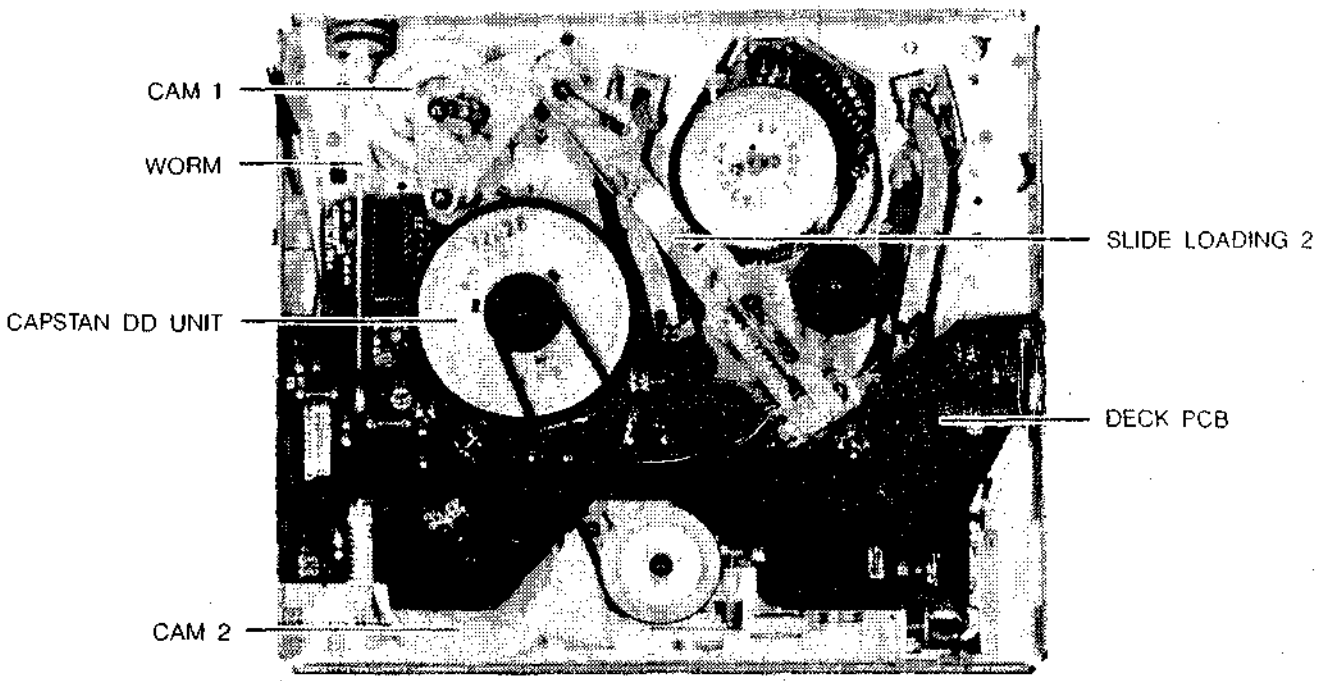


DECK PARTS LOCATION

(TOP VIEW)



(BOTTOM VIEW)



MECHANICAL ADJUSTMENTS

1. BEFORE MECHANICAL ADJUSTMENT

CAUTION

Inferior silicon grease can damage IC's and transistors.
When replacing an IC or transistor, use only specified silicon grease (YG6260).
Remove all the old silicon before applying new silicon.

PRECAUTION

Remove the following items before adjusting.

1. Remove 2 screws and remove the TOP CABINET.
2. Remove 5 screws and remove the BOTTOM CABINET.
3. Remove the FRONT CABINET.
4. Remove the STAGE. **(Refer to Item 1-1)**

Read the following NOTE items before starting work.

* Remove the stage when replacing the deck parts.
* Place an object which weighs between 350g and 500g on the Cassette Tape to keep it steady when you want to make the tape run without the stage. (Do not place an object which weighs over 500g.)
* When you activate the deck without the stage, make Q1011 of the deck bottom PCB short-circuit. (EOT/BOT sensor does not function in this condition.)
  Be sure to return to the beginning from after the end of working.

1-1: HOW TO REMOVE AND INSTALL STAGE

REMOVAL **(Refer to Fig. 1)**

1. Remove the pulley of loading motor box and the loading motor belt hooked on the stage worm.
2. Remove the screws ① in the EJECT mode.
3. Push the stage toward arrow mark, and lift up to remove the stage.

NOTE

When you remove and install the stage, be careful not to touch the guide pin or cylinder head.

INSTALLATION

Install new stage in the reverse steps of REMOVAL.

NOTE

When you install the stage, it should be EJECT mode.

CONFIRMATION

1. The front loading operation works well when turning on the power and when inserting a cassette tape into the stage.
2. Each function works well when pressing the PLAY, EJECT and REC buttons.

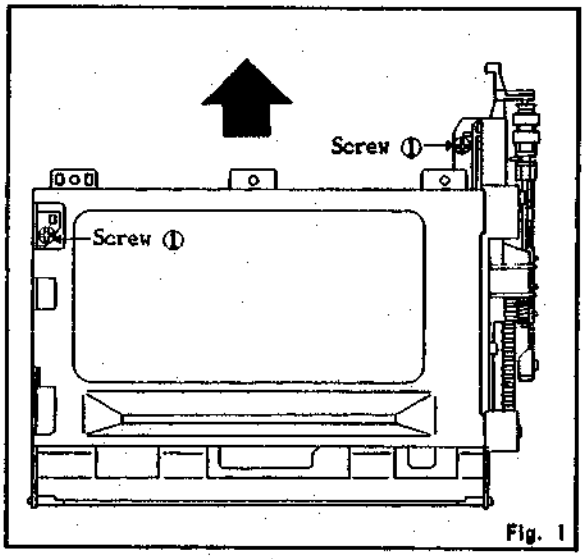


Fig. 1

2. REPLACEMENT OF MAIN PARTS

2-1: REEL DISK

REMOVAL **(Refer to Fig. 2-1)**

(Supply Reel Disk)

1. Remove the actuator sub brake.
2. Remove the SS brake spring, the remove the SS brake arm.
3. Remove the tension band from the main chassis.
4. Remove the polyslider washer ①.
5. Pull the supply reel disk ③ upward and replace it.

(Take-up Reel Disk)

1. Remove the actuator sub brake.
2. Remove the TS brake spring, then remove the TS brake.
3. Remove the polyslider washer ④.
4. Pull the take-up reel disk ⑤ upward and replace it.

NOTE

The height adjustment washers ② and ⑥ are sometimes attached to the back of the reel disk.

INSTALLATION

(Supply/Take-Up Reel Disk)

1. Clean the reel disk shaft and put in height adjusting washers ② and ⑥.
2. Install new reel disk.
3. Adjust the height of the reel disk. **(Refer to Item 3-5)**
4. Pull out the new supply/take-up reel disk. After oiling (Cosmo Oil Hydro HV100) the reel disk shaft, install the new supply/take-up reel disk again.
5. Install the supply/take-up reel disk in the reverse steps of REMOVAL.

MECHANICAL ADJUSTMENTS

NOTE

1. Be careful not to deform the tension band at the time of removal and installation.
2. Be careful not to scratch the reel disk shaft with the polyslider washer or tool at the time of removal and installation.
3. After installation, adjust and confirm the tension pole position. **(Refer to Item 3-6)**

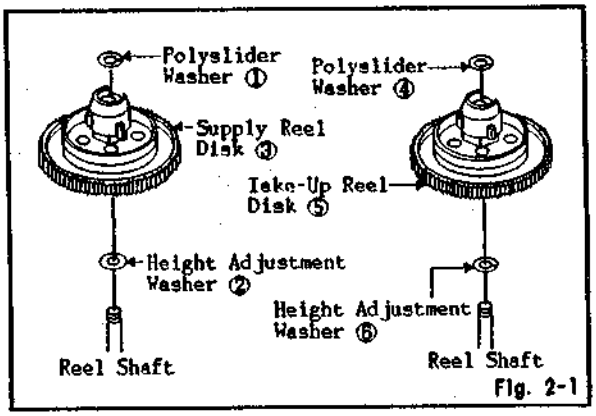


Fig. 2-1

2-2: A/C HEAD

REMOVAL **(Refer to Fig. 2-2)**

Remove the screws ①, ② and ③.

INSTALLATION

Install new A/C head in reverse steps of REMOVAL.

NOTE

Do not touch the heads by any means when replacing the A/C head.

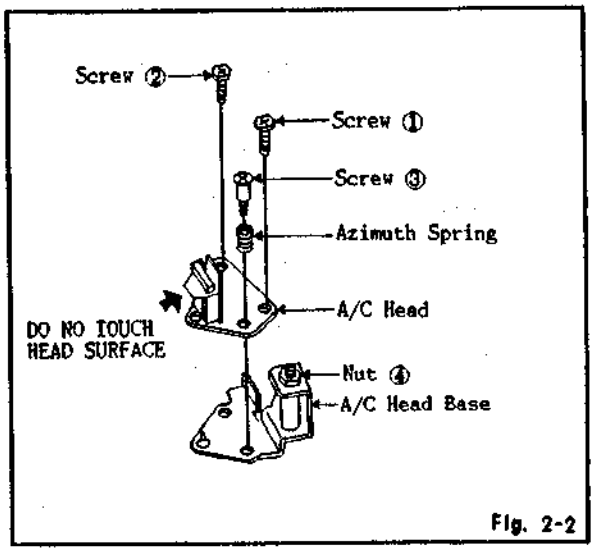


Fig. 2-2

2-3: UPPER DRUM

REMOVAL **(Refer to Fig. 2-3)**

1. Remove the screw ② which holds the earth brush .
2. Desolder the lead wires ① from the upper drum assembly.
3. Be sure to use gloves, avoid the surface of drum head, press the upper drum not to turn it self, remove the screws ④, then remove the upper drum with the upper drum fixing jig (JG031).

INSTALLATION

Install new upper drum in the reverse steps of REMOVAL.

NOTE

1. Do not apply excessive pressure to screwdriver.
2. Before installing, confirm that there are no scratches or dust on the disk, upper drum surface and drum head surface.
3. When setting, take care not to let any dust or dirt go into the clearance between disk and upper drum.
4. Do not touch the surface of the cylinder head.
5. Re-check the adjustment of tape running. **(Refer to Item 4-6)**
6. After replacement confirm the following adjustments.

   a. ELECTRICAL ADJUSTMENTS : ITEM 2-1
   b. ELECTRICAL ADJUSTMENTS : ITEM 2-2
   c. ELECTRICAL ADJUSTMENTS : ITEM 2-5
   d. MECHANICAL ADJUSTMENTS : ITEM 4-3

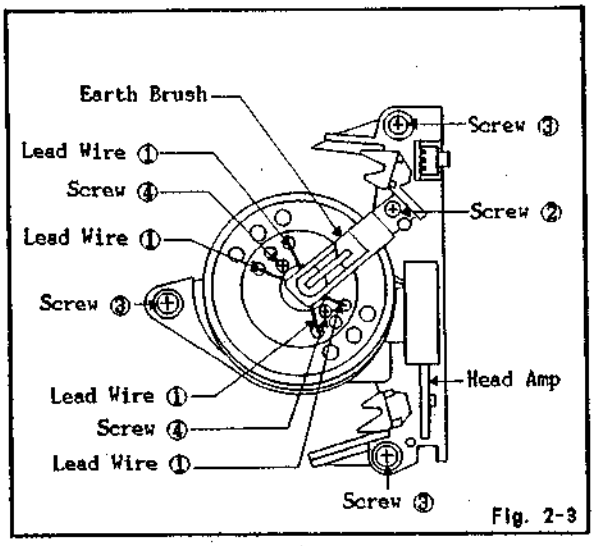


Fig. 2-3

MECHANICAL ADJUSTMENTS

2-4: CYLINDER UNIT

REMOVAL (Refer to Fig. 2-3)

1. Remove the transistor PCB. (Refer to item 2-9)
2. Disconnect the connector (CD4101, 8 pin) from the head amp PCB.
3. Remove the screws ③, then remove the cylinder unit from the main chassis.
4. Disconnect the connector of the cylinder motor.

INSTALLATION

Install new cylinder unit in reverse steps of REMOVAL.

NOTE

1. Do not touch the surface of the cylinder head.
2. After replacement confirm the following adjustments.

a. ELECTRICAL ADJUSTMENTS : ITEM 2-1
b. ELECTRICAL ADJUSTMENTS : ITEM 2-2
c. ELECTRICAL ADJUSTMENTS : ITEM 2-5
d. MECHANICAL ADJUSTMENTS : ITEM 4-3

2-5: TENSION BAND

REMOVAL (Refer to Fig. 2-4)

1. Remove the actuator sub brake.
2. Remove the SS brake spring, the remove the SS brake arm.
3. Remove the screw ①.
4. Remove the tension band from the tension arm.

INSTALLATION

Install new tension band in reverse steps of REMOVAL.

NOTE

1. Install the tension band not to be twisted.
2. Adjust the placement of the tension post. (Refer to item 3-6)
3. Adjust and confirm the back tension during playback. (Refer to item 3-7)

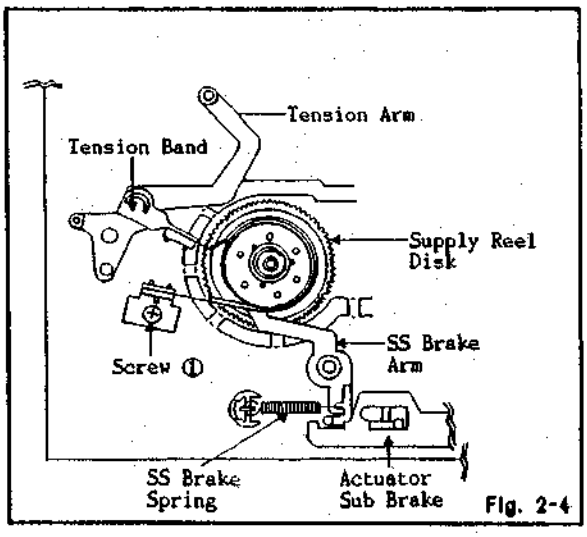


Fig. 2-4

2-6: LOADING MOTOR / LOADING MOTOR BELT

REMOVAL (Refer to Fig. 2-5)

1. Disconnect the connector (CD1104, 2 pin) from the loading motor PCB.
2. Remove the lead wire in the hook of the loading motor box.
3. Remove the loading motor belt ②.
4. Remove the screw ①, then remove the loading motor box.
5. Remove the loading motor belt ③.
6. Remove the screw ④, then remove the loading motor upward.

INSTALLATION

Install new loading belt in reverse steps of REMOVAL.

NOTE

1. Clean the pulley when replacing loading belt.
2. Replace it while in the EJECT mode.
3. Avoid getting grease on the loading belt.

CHECK AFTER INSTALLATION

1. Check if strange sound is heard in PLAY mode.
2. Check if P2 post and P3 post are fitted to the post stopper.
3. Check if P2 post and P3 post are completely returned in EJECT mode.

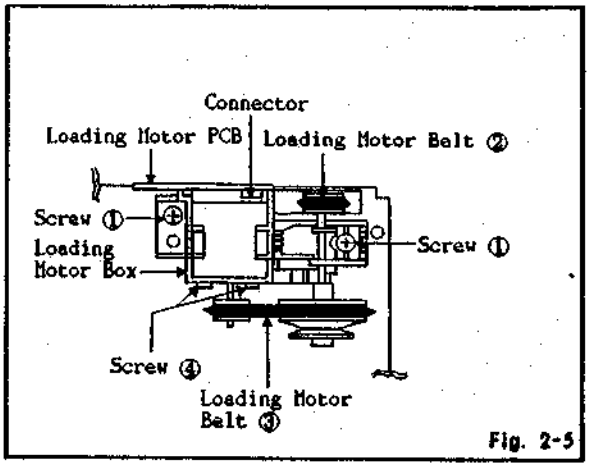


Fig. 2-5

2-7: PINCH ROLLER

REMOVAL (Refer to Fig. 2-6)

1. Remove the pinch roller arm spring.
2. Remove the polyslider washer ①.
3. Remove the pinch roller.

INSTALLATION

Install new pinch roller in reverse steps of REMOVAL.

NOTE

1. Be careful not to bend the pinch roller arm in removal and installation.
2. Do not touch the pinch roller. (Use gloves.)

CHECK AFTER INSTALLATION

Check if the tape is running normally in PLAY mode.

MECHANICAL ADJUSTMENTS

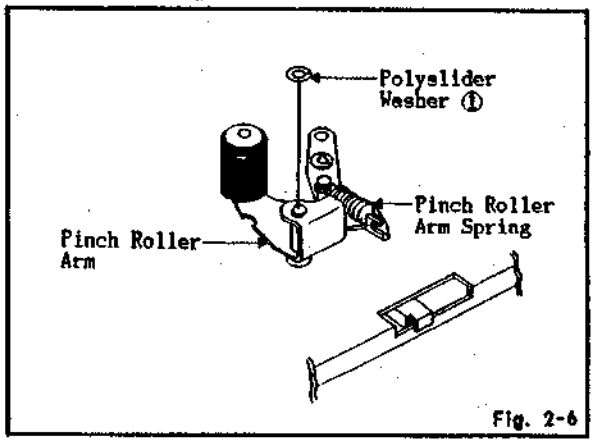


Fig. 2-6

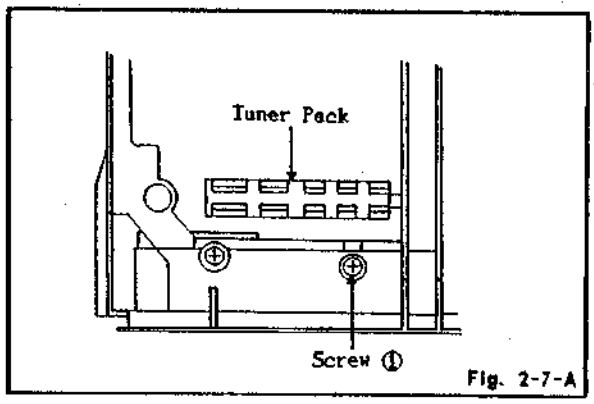


Fig. 2-7-A

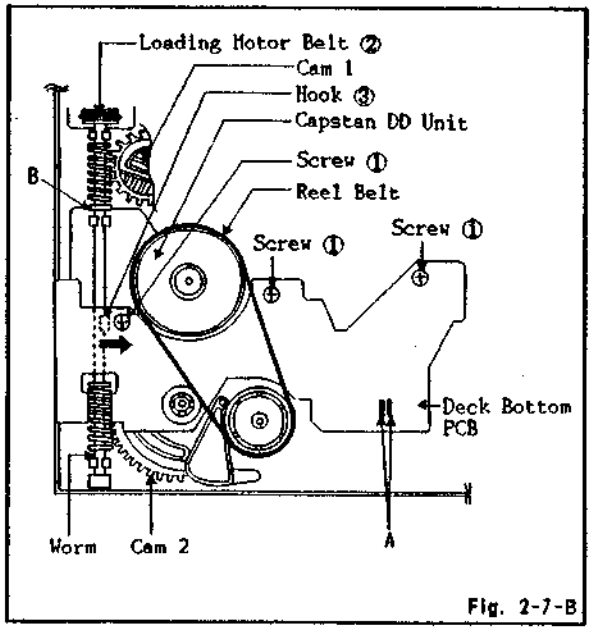


Fig. 2-7-B

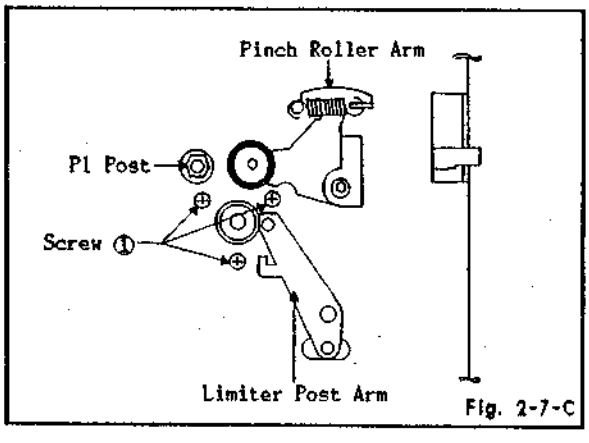


Fig. 2-7-C

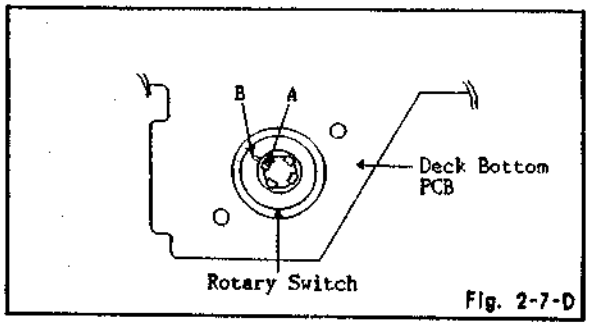


Fig. 2-7-D

2-8: CAPSTAN DD UNIT

REMOVAL

1. Disconnect the connector (CD2003, 17 pin) from the main PCB.
2. Disconnect the connector (CD4101, 8 pin) of the head amp PCB and the connector (CD5001, 5 pin, 2 pin) of the main PCB.
3. Remove the screw ①, unlock the hooks (3 positions) which have been connected to the main PCB. **(Refer to Fig. 2-7-A)**
4. Disconnect the connector (9 pin) of the capstan DD unit.
5. Disconnect the connector (6 pin) of the cylinder unit back side.
6. Remove the reel belt.
7. Remove the solder "A" positions, remove the screws ① and then remove the deck bottom PCB.
8. Remove the loading motor belt ②.
9. Pull the hook ③ in the direction of arrow, then remove the worm. **(Refer to Fig. 2-7-B)**
10. Remove the screws ①, then remove the capstan DD unit. **(Refer to Fig. 2-7-C)**
    (Be sure to support with hand under the capstan DD unit.)

INSTALLATION

Install new capstan DD unit in reverse steps of REMOVAL.

NOTE

1. Do not bend the limiter post.
2. Use the specified screw held to the DD unit.
3. Avoid getting grease on the reel belt.
4. Be sure to install in the EJECT position. **(Refer to Fig. 2-7-E, F)**
5. Install in the position where the capstan DD unit PCB gets up to the "B" position. **(Refer to Fig. 2-7-B)**
6. When installing the worm, be sure to unlock the hook ③ in the direction of arrow, and the cam 1 and cam 2 must be meshed smoothly. **(Refer to Fig. 2-7-B)**
7. When installing the deck bottom PCB, be sure to install the rotary switch in the EJECT position.
   The EJECT position is the point where the "A" tooth is aligned to the "B".
   (Refer to Fig. 2-7-D)

CHECK AFTER INSTALLATION

1. Check if tape running is normal in PLAY mode.
2. Check if FF/REW mode works normally.

MECHANICAL ADJUSTMENTS

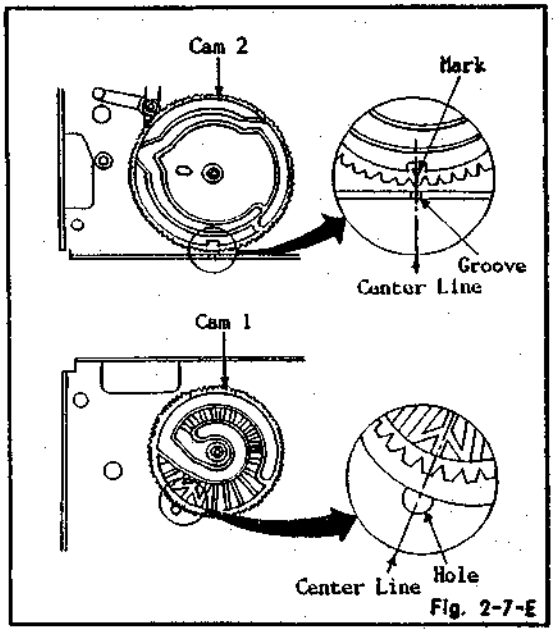


Fig. 2-7-E

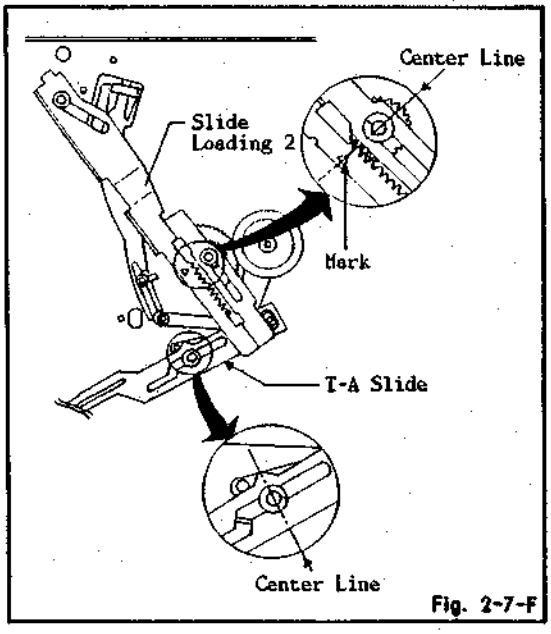


Fig. 2-7-F

2-9: TRANSISTOR PCB

REMOVAL

1. Insert a small flat-blade screwdriver into the transistor spring as shown in Fig. 2-8.
2. Hold both edges of the transistor PCB ("A" part) with your fingers and pull out the transistor PCB while turning the driver.

INSTALLATION

Install new transistor PCB in reverse steps of REMOVAL.

NOTE

1. The unit should be unplugged from the AC outlet.
2. Do not scratch or mar the cylinder.
3. Be careful not to split the transistor PCB.
4. If the transistor spring is broken when holding or removing the transistor PCB, replace with a new one.

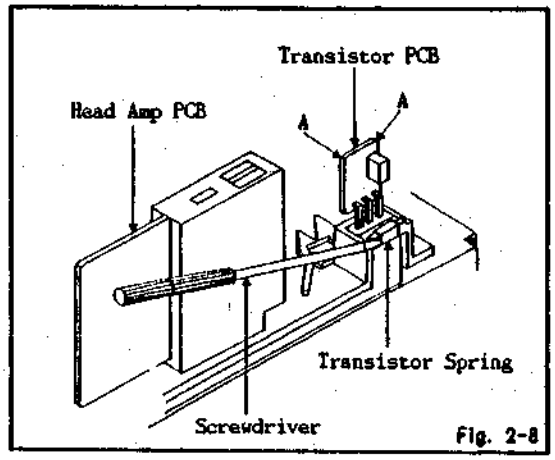


Fig. 2-8

3. CONFIRMATION AND ADJUSTMENT

3-1: CONFIRMATION OF FAST FORWARD TORQUE

CONFIRMATION

1. Set torque gauge (JG0026) on take-up reel disk, and place unit in FAST FORWARD mode. **(Refer to Fig. 3-1)**
2. Confirm that torque is more than 800g/cm.

NOTE

After setting the torque gauge on the reel disk, hold the gauge in place. Push the FAST FORWARD button and the reel disk will begin to turn.

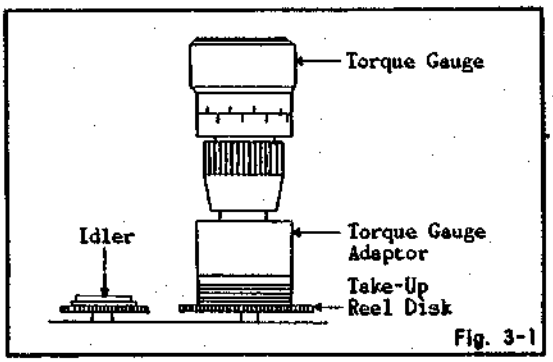


Fig. 3-1

3-2: CONFIRMATION OF REWIND TORQUE

CONFIRMATION

1. Operate within 4 or 5 seconds after the reel disk begins to turn.
2. Set torque gauge (JG0026) on supply reel Disk, and place the unit in REWINDING mode. **(Refer to Fig. 3-2)**
3. Confirm that torque is more than 800g/cm.

NOTE

After setting the torque gauge on the reel disk, hold the gauge in place. Push the FAST FORWARD button and the reel disk will begin to turn.

MECHANICAL ADJUSTMENTS

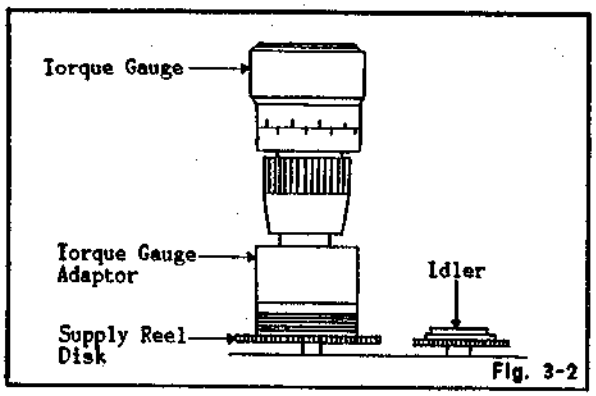


Fig. 3-2

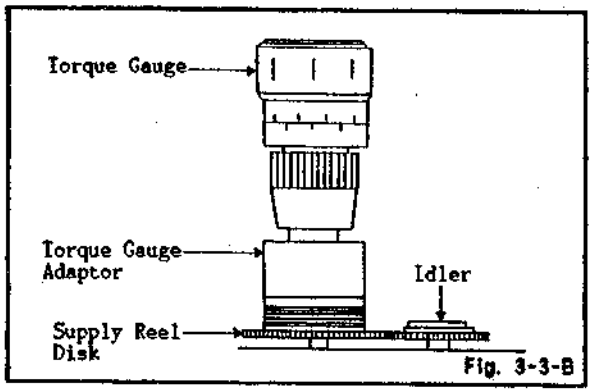


Fig. 3-3-B

3-3: CONFIRMATION OF PLAYBACK TAKE-UP TORQUE

CONFIRMATION

1. Set the torque gauge (JG002F) on the rewind reel disk, then check PB mode.
2. Make sure that the torque covers the range, 60~150g/cm.

3-4: CONFIRMATION OF REEL BRAKE TORQUE

CONFIRMATION

(Take-Up Reel Brake) (Refer to Fig. 3-3-A)

1. Set the STOP mode.
2. Set the torque gauge (JG002G) to the take-up reel and turn it counter-clockwise.
3. Confirm that it is more than 200g/cm at that time.

CONFIRMATION

(Supply Reel Brake) (Refer to Fig. 3-3-B)

1. Set the STOP mode.
2. Set the torque gauge (JG002G) to the supply reel and turn it clockwise.
3. Confirm that it is more than 200g/cm at that time.

NOTE

Separate the idler from the reel and confirm the brake torque.

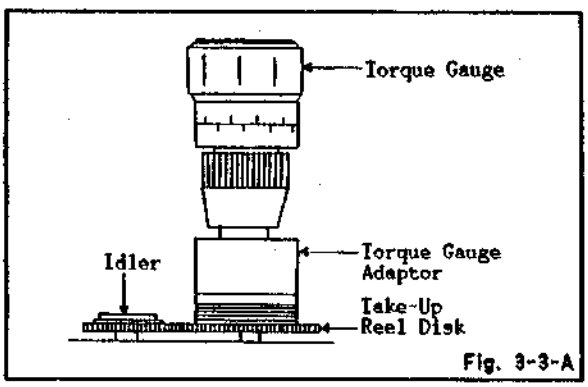


Fig. 3-3-A

NOTE

Refer to the table below listed possible causes of troubles when when you cannot confirm the requested items.

CONFIRMATION ITEM	CHECK POINT (REPLACEMENT)
3-1 3-2 3-3	Capstan belt may be stretched. Clutch may be worn out (if so, change reel disk.) Idler ass'y may be worn out.
3-4	Main brake belt may be worn out.

3-5: CONFIRMATION AND ADJUSTMENT OF REEL DISK HEIGHT

ADJUSTMENT

1. Set the master plane (JG022) at mechanism framework, taking care not to scratch the drum, as shown in Fig. 3-4-A.
2. Confirm that the reel disk is lower than "A" of the reel disk height adjustment jig, (JG024) on the master plane and higher than "B" as shown in Fig. 3-4-B.
3. When it does not satisfy above items, adjust to less than 0.1mm~0.5mm with the height adjustment washer.

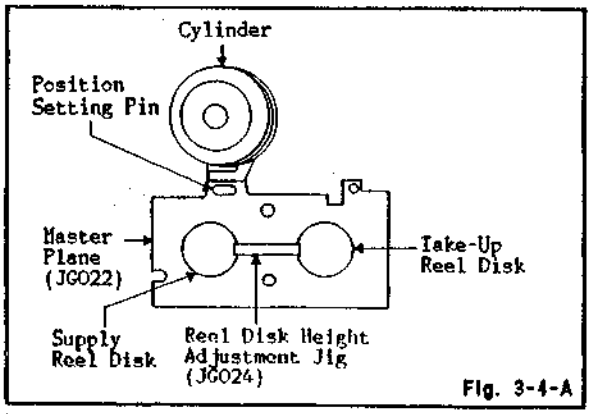


Fig. 3-4-A

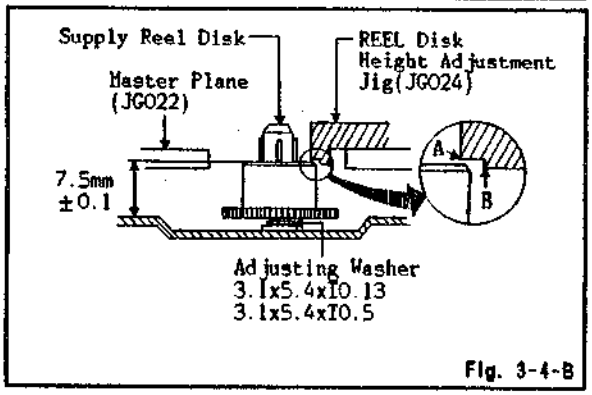


Fig. 3-4-B

MECHANICAL ADJUSTMENTS

3-6: CONFIRMATION AND ADJUSTMENT OF TENSION POLE POSITION

CONFIRMATION

1. Turn on the power and set to the PLAY mode by using the tension post adjustment jig (JG036).
2. As soon as the guide rollers, L, R begin to draw the tape from the cassette, the tension pole shall move to the left, thus loading will start.
3. Move the tension band adjust to the "A" or the "B" direction to set tension post adjusting jig red line to the round of the tension pole. **(Refer to Fig. 3-5)**
4. Confirm that the video tape is not curling at the flange of P1 post or is not running on flanges.

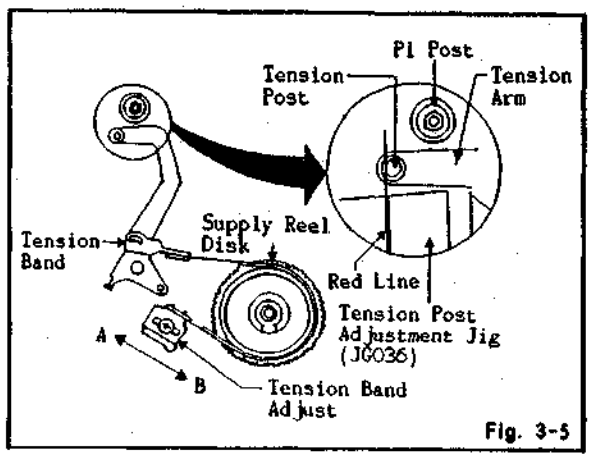


Fig. 3-5

3-7: CONFIRMATION AND ADJUSTMENT OF BACK TENSION ON PLAYBACK

CONFIRMATION

1. Insert the cassette tape **(E-60)**.
2. Set the unit in the PLAY mode.
3. Install the tentelometer as shown in **Fig. 3-6**. Confirm the value is within 25~35g/cm at this time.
4. Confirm there video tape is running tight on P1 post.
5. Confirm there is no sag or damage on edges of the tape both in the beginning and ending of the video tape.
6. Adjust when it does not satisfy the above items.
7. Set the tension arm spring to "B" direction when the tentelometer indicates less than 25g/cm. **(Refer to Fig. 3-6)**
   Set the tension arm spring to "A" direction when the tentelometer indicates more than 30g/cm. **(Refer to Fig. 3-6)**

NOTE

The tentelometer should not touch F/E Head, drum or other components in the tape path.

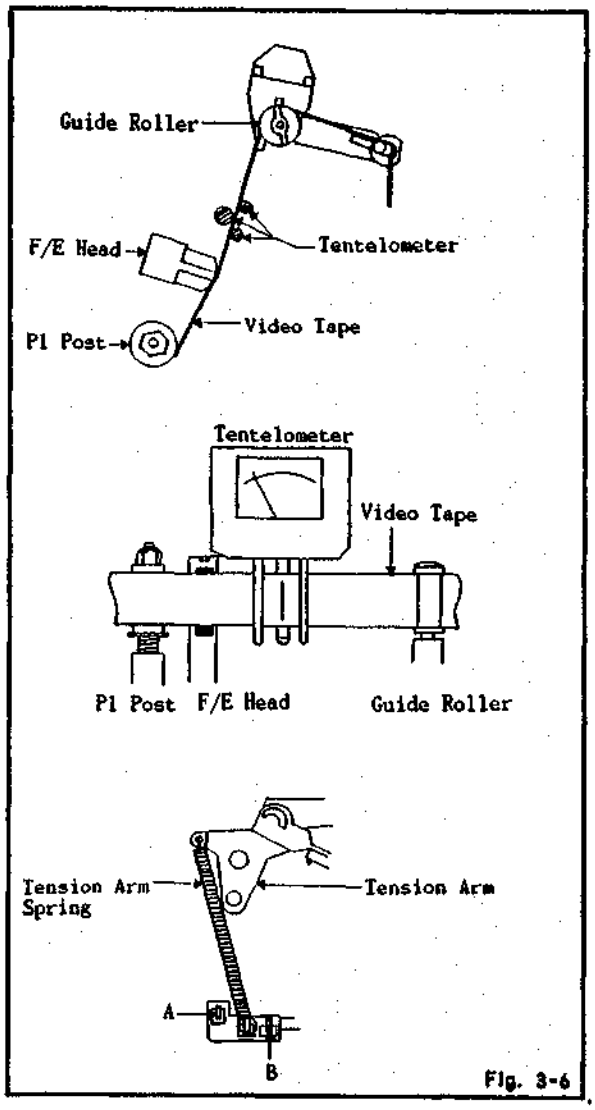


Fig. 3-6

4. TAPE RUNNING CONFIRMATION AND ADJUSTMENT

Since tape running is adjusted precisely at factory, it is not necessary to adjust normaly. It is necessary to confirm and adjust when the parts of the tape running mechanism are replaced because of long time usage or failure.

4-1: P1 POST

ADJUSTMENT

1. Set to the EJECT mode. Install the P1/P4 post height adjustment jig **(JG035)** to the main chassis.
2. Adjust the P1 post with P1/P4 post height adjustment jig "A" part. **(Refer to Fig.4-1)**

4-2: P4 POST

ADJUSTMENT

1. Set to the EJECT mode. Install the P1/P4 post height adjustment jig **(JG035)** to the main chassis.
2. Adjust the P4 post with P1/P4 post height adjustment jig "B" part. **(Refer to Fig.4-1)**

MECHANICAL ADJUSTMENTS

NOTE

1. After Adjustment adjust the guide roller. **(Refer to Item 4-3)**
   Confirm that there is no crease on the edge of the tape.
2. After adjustment, do not move the Nut.
3. After adjustment, fix P4 post with screw lock.
4. After adjustment, adjust of tape running. **(Refer to Item 4-6)**

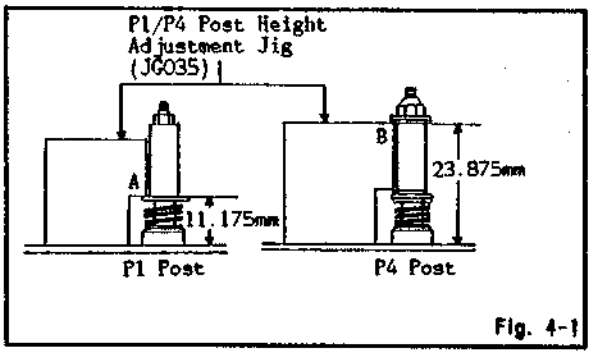


Fig. 4-1

4-3: GUIDE ROLLER

ADJUSTMENT

1. Switch on main power and then connect monitor output cord and video input cord to proper positions.
2. Insert the VHS adjustment tape (**JG001**) into the unit.
3. Connect CH-1 and CH-2 of oscilloscope to envelope output and to the test point of switching pulse, respectively.
4. Carry out this adjustment in PLAY mode.
5. Trigger with SW pulse and observe the envelope. **(Refer to Fig. 4-2-A)**
6. Adjust the guide roller height while observing the envelope, and make the envelope flat. Adjust the envelope so that the flatness will not be affected even when the tracking control knob is turned. (Use the adjustment screwdriver **JG005**).
7. When the tracking control knob is turned (the point that the envelope waveform starts to reduce), adjust the envelope so that its A:B ratio is better than 10:7. **(Refer to Fig. 4-2-B)**
8. Adjust the PB switching position **(ELECTRICAL ADJUSTMENS : ITEM 2-1)** in the PLAY mode.

NOTE

After adjustment, confirm and adjust of A/C head tilt. **(Refer to Item 4-4)**

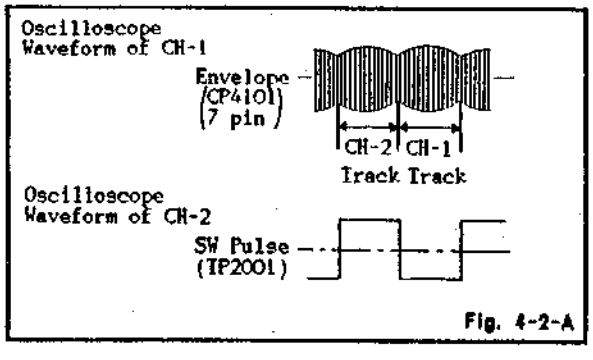


Fig. 4-2-A

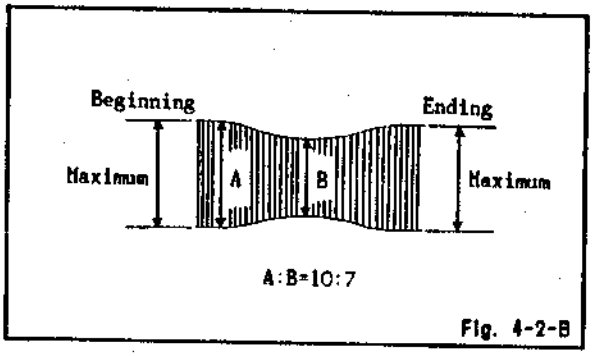


Fig. 4-2-B

4-4: CONFIRMATION AND ADJUSTMENT OF A/C HEAD TILT

ADJUSTMENT

When the tape is running abnormally, perform the following adjustments.

1. Check the tape running condition with the unit in the play mode using the **E-60** tape.
2. Confirm that there is no crease on the tape between the guide post and guide roller(R) and the tape is running smoothly. (It is absolutely impossible to get satisfactory sound if the tape is distorted between the A/C head and guide post.)
3. If the tape still does not run smoothly, turn the screw ① and adjust the tilt of the A/C head. Do not move the guide post. **(Refer to Fig. 2-2)**

4-5: ADJUSTMENT OF A/C HEAD HEIGHT AND AZIMUTH

ADJUSTMENT

1. Playback a VHS adjustment tape (**JG001**) and observe the waveform at the audio output terminal.
2. Turn the screw ② slowly to change the height of the A/C head. Adjust the height so that the audio output becomes maximum. **(Refer to Fig. 2-2)**
3. Adjust the nut ④. **(Refer to Fig. 2-2)** until the height of the A/C head reaches the position against the tape as shown in **Fig. 4-3.**

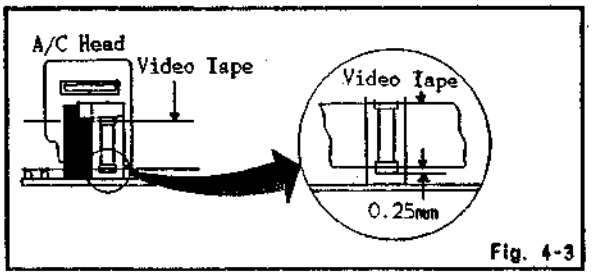


Fig. 4-3

4-6: TAPE RUNNING ADJUSTMENT

1. Adjust the height of reel disk. **(Refer to Item 2-1)**
2. Adjust the P1 post, P4 post. **(Refer to Item 4-1, 2)**
3. Confirm and adjust tension pole position. **(Refer to Item 3-6)**
4. Adjust the guide roller. **(Refer to Item 4-3)**
5. Adjust the A/C head height and azimuth. **(Refer to Item 4-5)**
6. Adjust the A/C head tilt. **(Refer to Item 4-4)**
7. Set the tracking control to the center position. Turn X-nut adjustment screwdriver (**JG021**) to adjust until the envelope appears maximum.

ELECTRICAL ADJUSTMENTS

1. BEFORE ELECTRICAL ADJUSTMENT

These are adjustments when you replace electric parts or PCB ass'y.
When you repair the electric circuit, please read these adjustments.

1-1: Prepare the following measurement tools for the electrical adjustment.

1. Oscilloscope (2 channel type)
2. AC Voltmeter
3. Quartz Timer
4. Sweep-Marker Generator
5. AFT Adjustment Oscillator
6. VIF Unit
7. Voltmeter
8. Frequency Counter
9. DC Voltmeter
10. Spectrum Analyzer

2. ADJUSTMENT PROCEDURE

2-1: PB. SWITCHING POSITION

CONDITIONS

MODE - PLAYBACK
Input Signal - Standard Test Tape

NOTE

Tracking control should be set at click point.

INSTRUCTIONS

1. Connect CH-1 on the oscilloscope to **TP2001** and CH-2 to **TP4201.**
2. Adjust **VR2001** so that the waveform of the oscilloscope measures 6.5±0.5(H) at both leading and trailing edges. **(Refer to Fig. 2-1-A, B)**

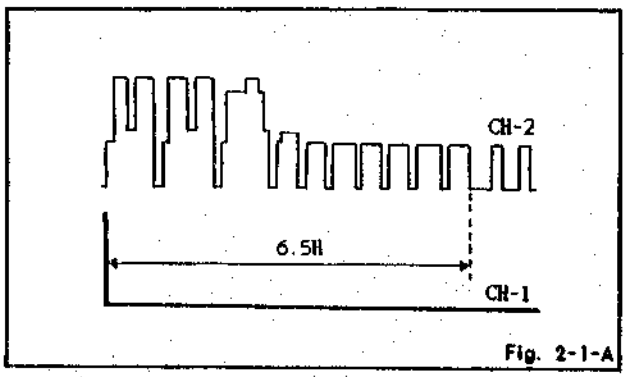


Fig. 2-1-A

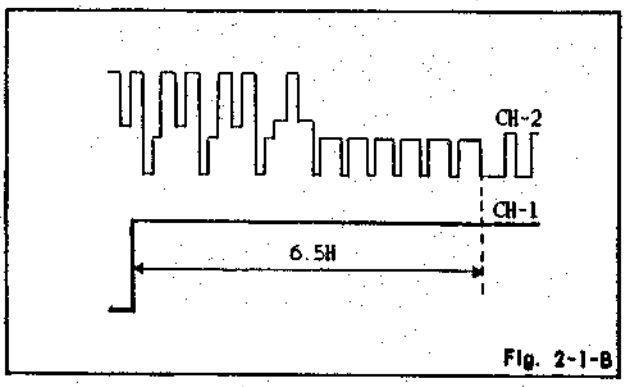


Fig. 2-1-B

2-2: TRACKING FIX

CONDITIONS

MODE - PLAYBACK
Input Signal - Standard Test Tape

NOTE

Tracking control should be set at click point.

INSTRUCTIONS

1. Connect CH-1 on the oscilloscope to **TP2001** and CH-2 to **TP2003.**
2. Adjust **VR2002** so that the "T" portion measures -1.0±0.3msec. **(Refer to Fig. 2-2)**

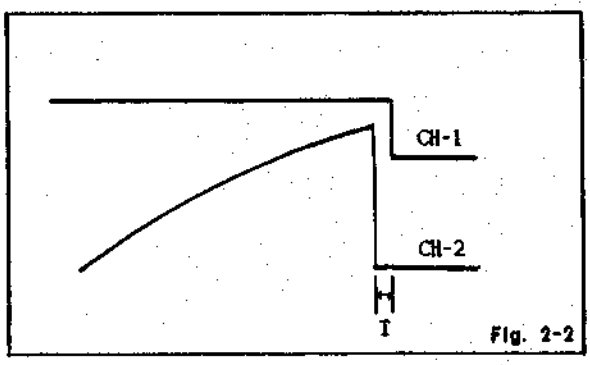


Fig. 2-2

2-3: E-E LEVEL

CONDITIONS

MODE - STOP
Input Signal - PAL Color Bar

NOTE

Video out of the unit should be terminated with 75 ohm load.

INSTRUCTIONS

1. Input the color bar signal to the **VIDEO IN.**
2. Connect the oscilloscope to **TP4005.**
3. Adjust **VR4004** so that the waveform measures 0.53±0.01Vp-p. **(Refer to Fig. 2-3)**

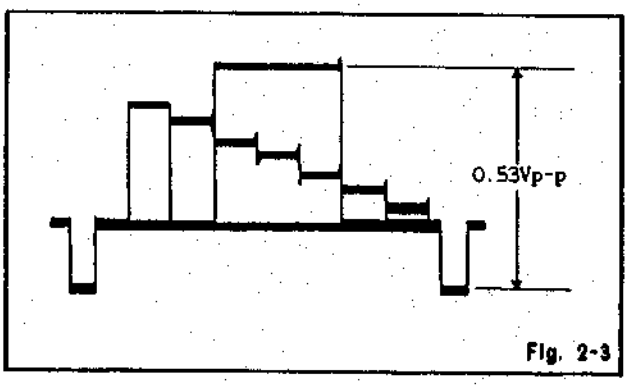


Fig. 2-3

ELECTRICAL ADJUSTMENTS

2-4: CARRIER AND DEVIATION

CONDITIONS

MODE - STOP
Input Signal - PAL Color Bar

INSTRUCTIONS

1. Input the color bar signal to the **VIDEO IN.**
2. Connect **TP4001** to the input terminal on the spectrum analyzer, then adjust 3.8MHz and 4.8MHz as shown in **Fig. 2-4** with **VR4001** and **VR4002.**

VR4001 (CARRIER)
VR4002 (DEVIATION)

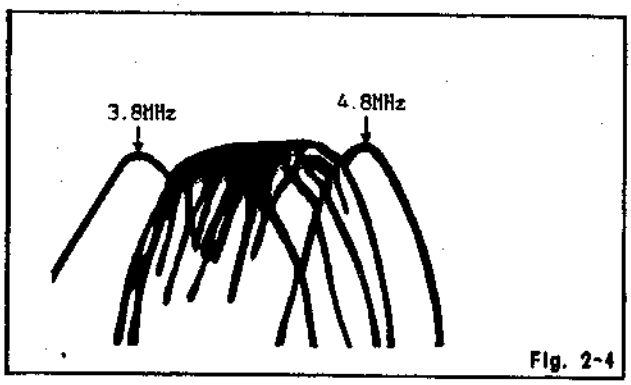


Fig. 2-4

2-5: PLAYBACK LUMINANCE LEVEL

CONDITIONS

MODE - PLAYBACK
Input Signal - Color Bar Test Tape

NOTE

Video out of the unit should be terminated with 75 ohm load.

INSTRUCTIONS

1. Connect the oscilloscope to **TP4201.**
2. Adjust **VR4003** so that the signal becomes 1.0±0.05Vp-p as shown in **Fig. 2-5.**

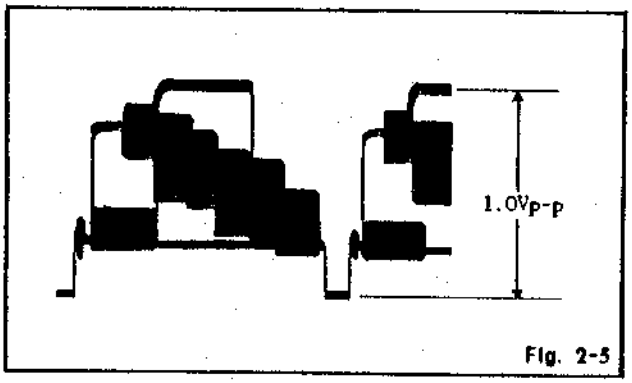


Fig. 2-5

2-6: NOISE CANCEL

CONDITIONS

MODE - PLAYBACK
Input Signal - Color Bar Test Tape

INSTRUCTIONS

1. Connect CH-1 of the oscilloscope to **TP4003** and CH-2 on the oscilloscope to **TP4004.**
2. Reverse the waveform for CH-2 with on inverter and put both the waveforms for CH-1 and CH-2 together by pressing the ADD SW on the oscilloscope.
3. Adjust the **VR4005** so that the waveform of CH-1 is straight as shown in **Fig. 2-6.**

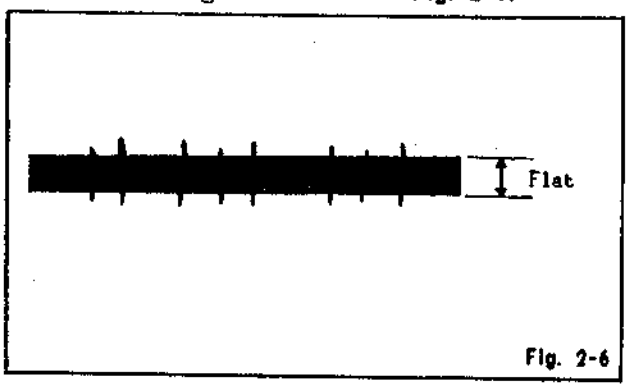


Fig. 2-6

2-7: RECORD CURRENT

CONDITIONS

MODE - RECORD(SP MODE)
Input Signal - PAL Color Bar

INSTRUCTIONS

1. Input the color bar signal to the **VIDEO IN.**
2. Connect CH-1 on the oscilloscope to **TP4101** and CH-2 to **TP4201.**
   Reduce REC.-Luminance signal factors by turning **VR4102** fully counter-clockwise.
3. Adjust **VR4101** so that the cyan level becomes 30±2mVp-p as shown in **Fig. 2-7-A.**
4. Adjust **VR4102** so that the horizontal sync level becomes 120±5mVp-p as shown in **Fig. 2-7-B.**

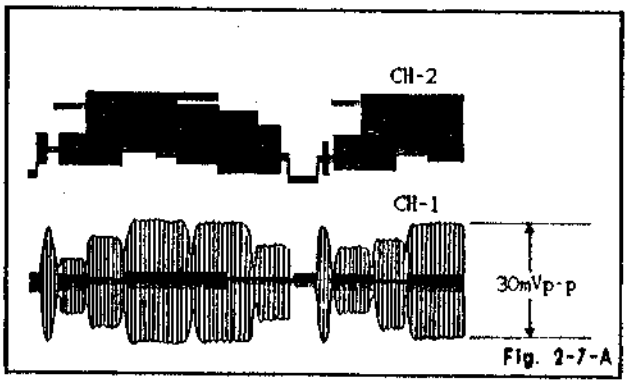


Fig. 2-7-A

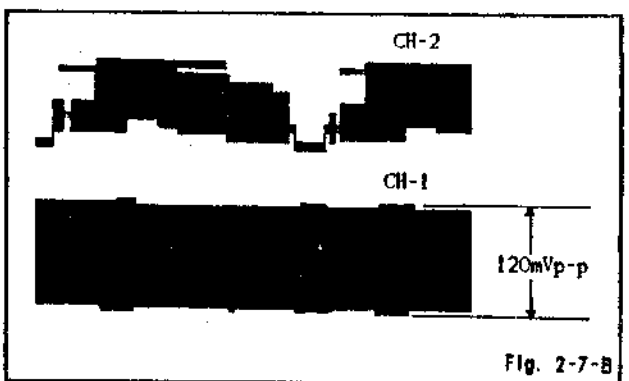


Fig. 2-7-B

ELECTRICAL ADJUSTMENTS

2-8: AUDIO BIAS CURRENT

CONDITIONS

MODE - RECORD
Input Signal - No Signal

INSTRUCTIONS

Connect the AC voltmeter to the arrow point, then adjust the voltage to 3.3±0.1mVrms with **VR5002**.(Refer to Fig. 2-8)

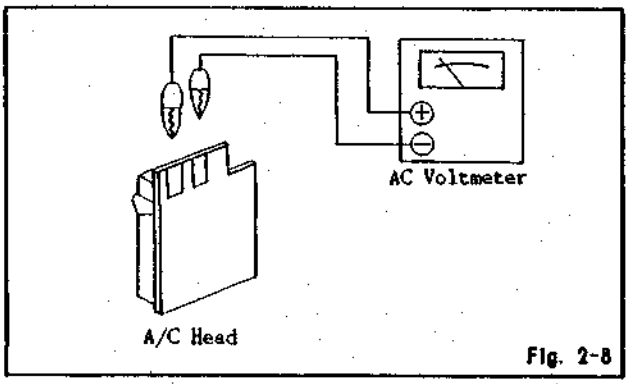


Fig. 2-8

2-9: PLAYBACK AUDIO LEVEL

CONDITIONS

MODE - Self(RECORD and PLAYBACK)(SP MODE)
Input Signal - 1KHz 300mVrms, Audio Signal
Video Signal : PAL Color Bar

INSTRUCTIONS

1. Connect the AC voltmeter to **AUDIO OUT**, which is terminated with 47K ohm resistor.
2. Record and then playback the audio signal as specified.
3. Adjust **VR5001** so that the playback output may become 390±10mVrms.

2-10: CLOCK

CONDITIONS

MODE - STOP
POWER ON
CLOCK SET

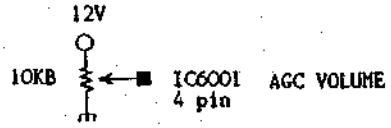
INSTRUCTIONS

1. Connect the frequency counter to **TP601**.
2. Adjust **TC601** so that the value of frequency counter is 1048576±1Hz.

2-11-A VIDEO IF

INSTRUCTIONS

1. Connect the output of sweep-marker generator to **TP6003**.



2. Adjust **L6004** so that output waveform of **TP6004** may become as shown in **Fig. 2-9-A**.

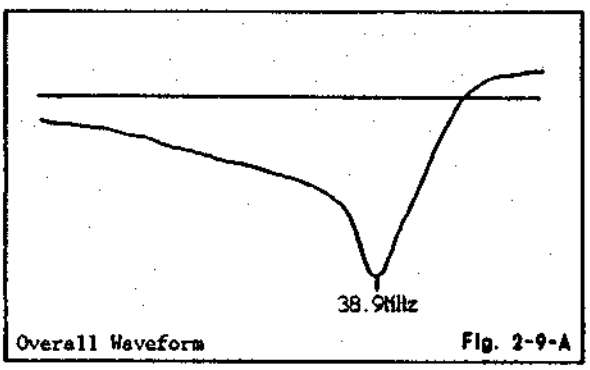
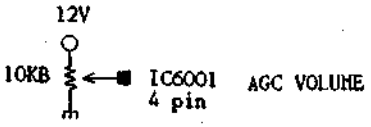


Fig. 2-9-A

2-11-B: CHECKING VIDEO IF OVERALL

1. Connect the output of sweep-marker generator to the tuner pack TP.



2. Terminate with a 100 ohm resistor between **13 pin** and **14 pin** on **IC6001**.
3. Make sure that the output of waveform of **TP6004** is as shown in **Fig. 2-9-B**.

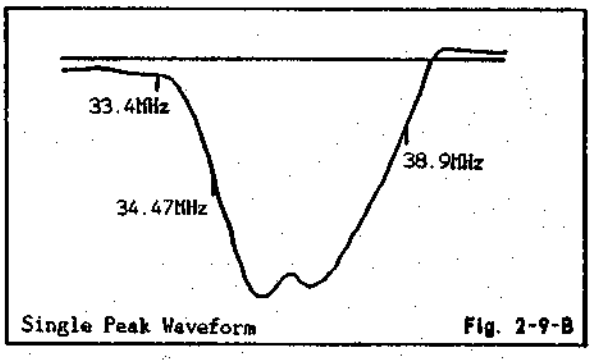


Fig. 2-9-B

ELECTRICAL ADJUSTMENTS

2-11-C: TRAP

CONDITION

MODE - TUNER MODE

INSTRUCTIONS

1. Connect the 1 pin of connector **CP6001** to the output of the sweep-marker generator.
2. Connect the saw filter (CF6001) side of the condenser, to the oscilloscope. (Use the detector as prob.) **(Refer to Fig. 2-9-C)**
3. Adjust **L6014** until the marker of 32.4MHz will be same as shown in **Fig. 2-9-D.**

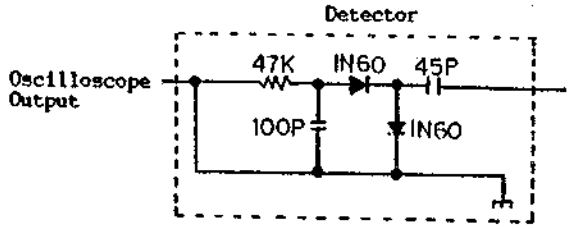


Fig. 2-9-C

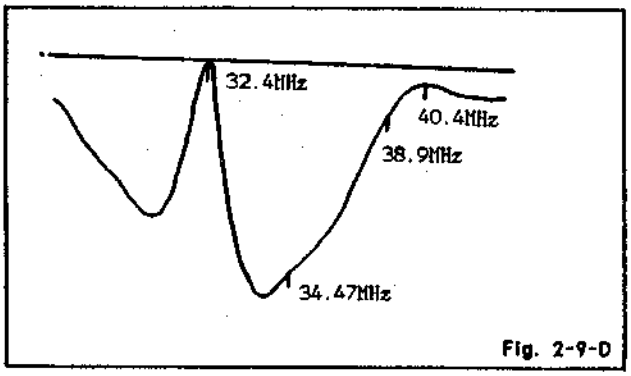


Fig. 2-9-D

2-12: AFT

NOTE

Disconnect the condenser C6014 in the adjustment.

INSTRUCTIONS

1. Connect output of the sweep-marker generator to Tuner Pack IP and adjust **L6005** so that output waveform for **TP6002** is as shown in **Fig. 2-10.**
2. Disconnect the sweep-marker generator and the oscilloscope from tuner pack IP and connect the condenser C6014.
3. Connect the AFT adjustment oscillator (38.9MHz) to the tuner pack IP through 2.2K ohm and connect the DC voltmeter to **TP6002.**
4. Adjust **L6005** so that voltage at AFT switch ON is as much as one at AFT switch OFF.

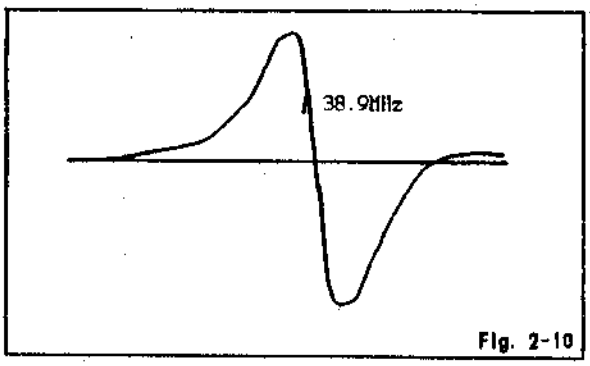


Fig. 2-10

2-13: RF AGC

CONDITIONS

MODE - STOP

INSTRUCTIONS

1. Receive the monochrome pattern signal. (Receive the E-11ch)
2. Connect the DC voltmeter to **TP6008.**
3. Set input field strength to 80dB μ.
4. Adjust **VR6001** so that the voltage is equal to 4.5±0.1V.

2-14: COLOR LEVEL

CONDITION

MODE - STOP

INSTRUCTIONS

1. Obtain a color bar signal. (Receive the E-48ch)
2. Connect the oscilloscope to **TP4201.**
3. Adjust **VR6002** so that the magenta level is 55±5% when Y-level is 100%. **(Refer to Fig. 2-11)**

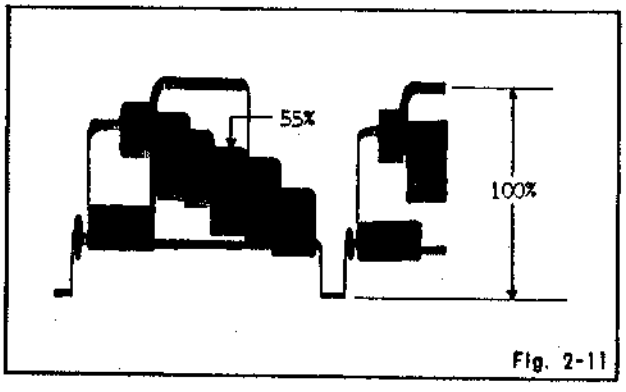


Fig. 2-11

ELECTRICAL ADJUSTMENTS

2-15-A: SECAM IDENTIFICATION (1)

CONDITIONS

MODE - RECORD
Input signal - SECAM RF signal

INSTRUCTIONS

1. Connect CH-1 on the oscilloscope to **TP4201** and CH-2 to **TP3702**.
2. Adjust **L3702** so that peak of waveform "A" and leading edge of video signal of waveform "B" may become same as shown in **Fig. 2-12**.

2-15-B: SECAM IDENTIFICATION (2)

CONDITIONS

MODE - RECORD
Input signal - SECAM RF signal

INSTRUCTIONS

1. Connect the oscilloscope to **TP3701**.
2. Receive SECAM RF signal at 33dB.
3. At this time, adjust **TP3701** to High Level with **VR3701**
4. Next, check that the **TP3701** will indicate Low Level with adjusting the output level to 31dB.
5. Receiving the PAL signal, check that the **TP3701** will indicate Low Level regardless of output strength.

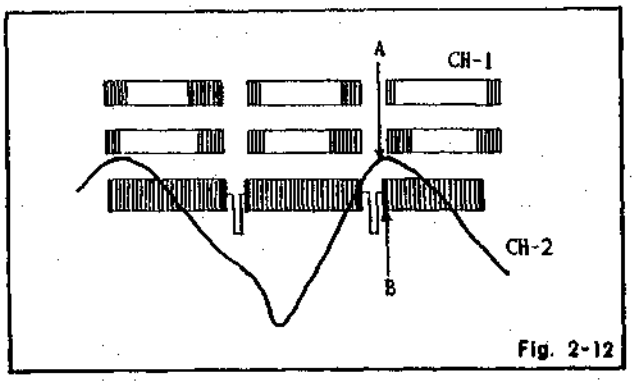
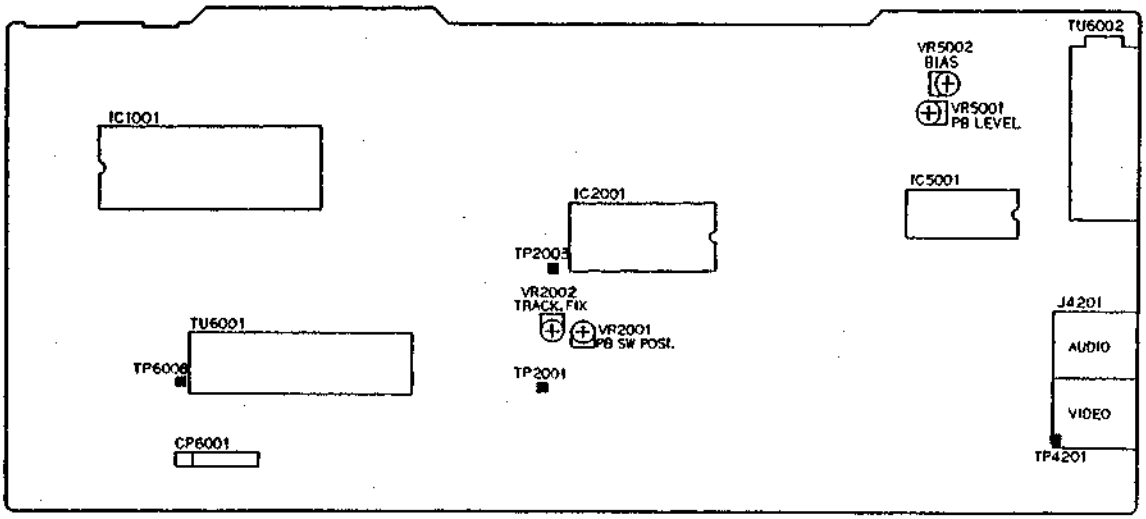
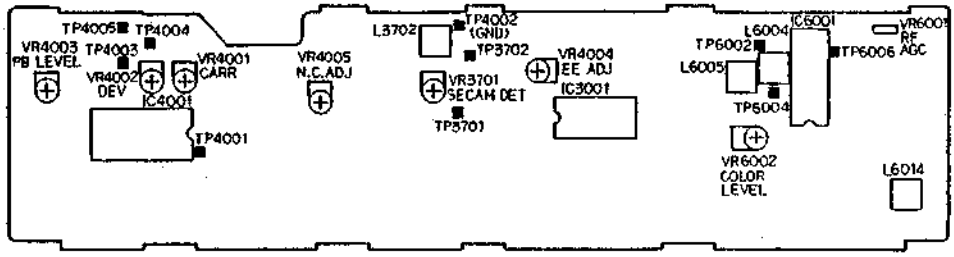


Fig. 2-12

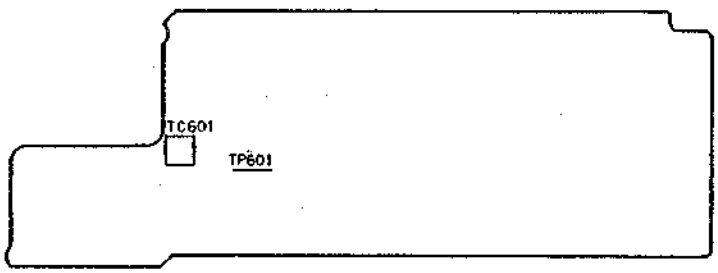
MAJOR COMPONENTS LOCATION GUIDE



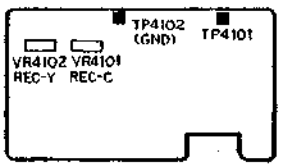
MAIN P.C.BOARD



Y. C P.C.BOARD



OPERATION P.C. BOARD



HEAD AMP P.C.BOARD

HOW TO RESET MICROCOMPUTER

When either or both of the following conditions occur, follow the procedure below:

CONDITIONS

* The digitron display does not light up.
* The unit does not stop, even when the "STOP" button is pressed.

PROCEDURE

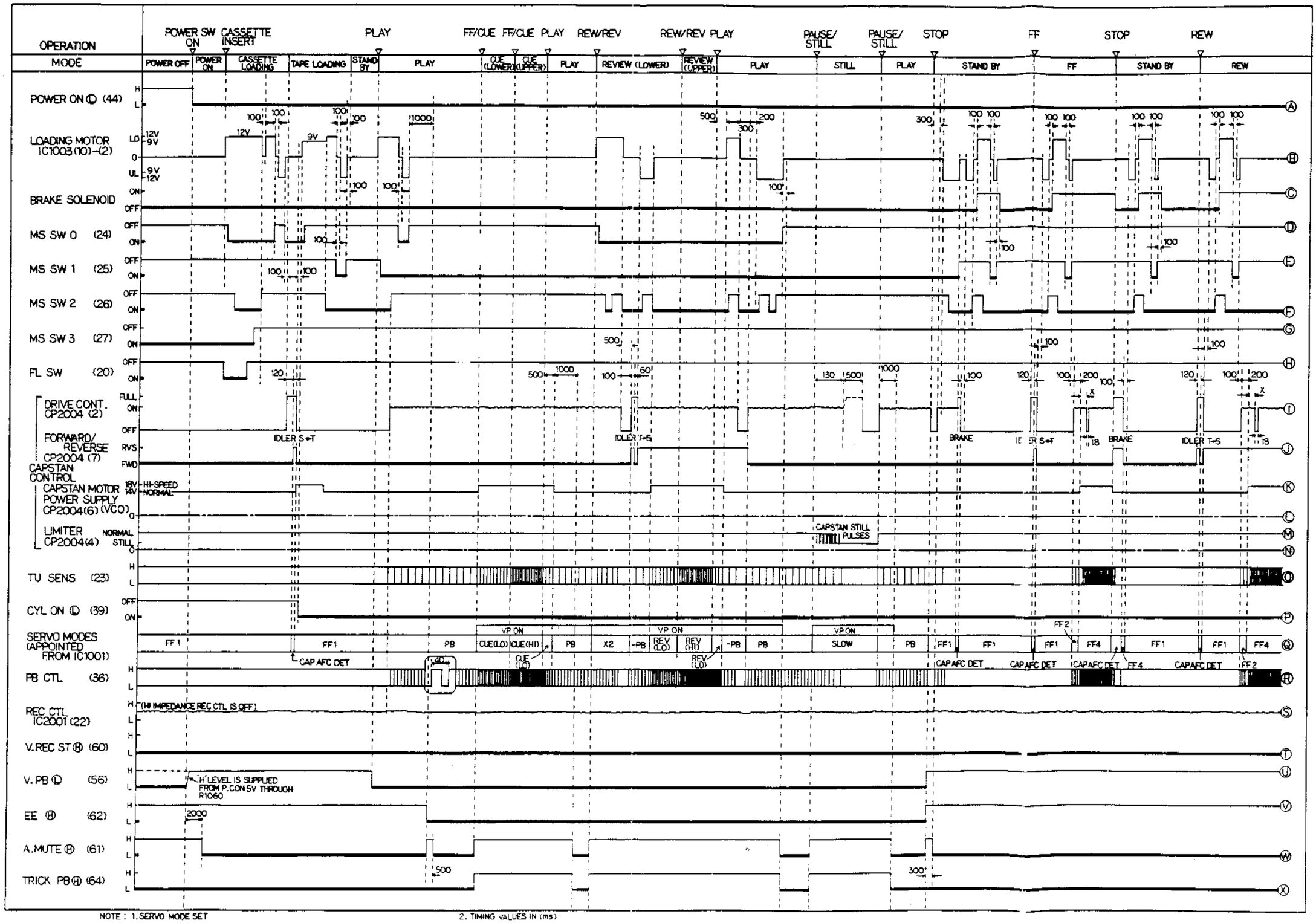
1. The reset switch is accessed through as unmarked hole, which is pointed by arrow is the illustration.

2. The unit is reset when a long, narrow probe (eg, the end of a paper clip) is inserted into the hole.

* After resetting the microcomputer, set the clock to the present time according to the owner's manual.

* A back-up circuit protects the unit from entering reset mode, even if the AC cord is unplugged from its AC outlet.

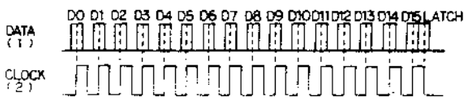
TIMING CHART



NOTE : 1. SERVO MODE SET

2. TIMING VALUES IN (ms)

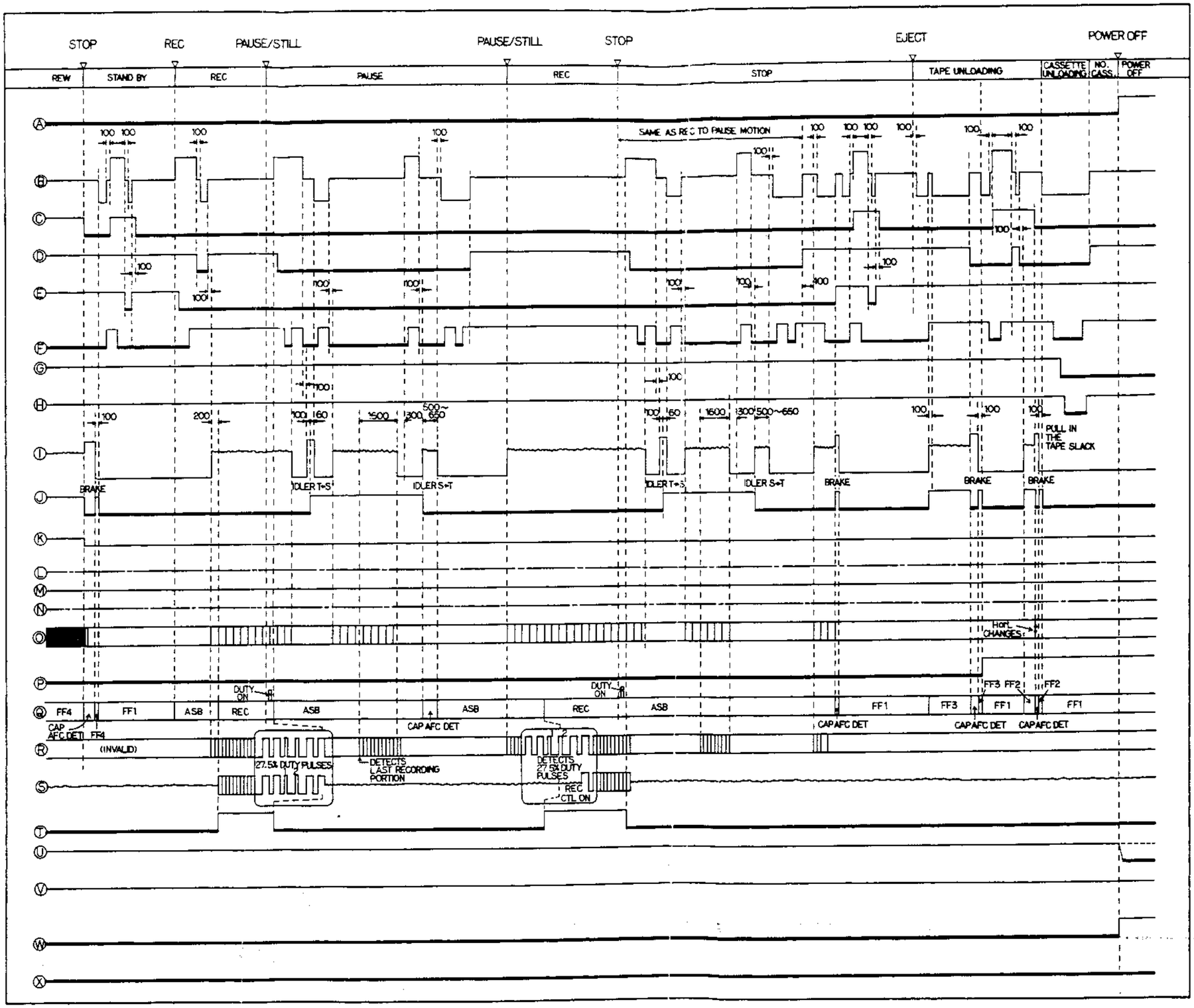
3. TIMING WAVE FORM



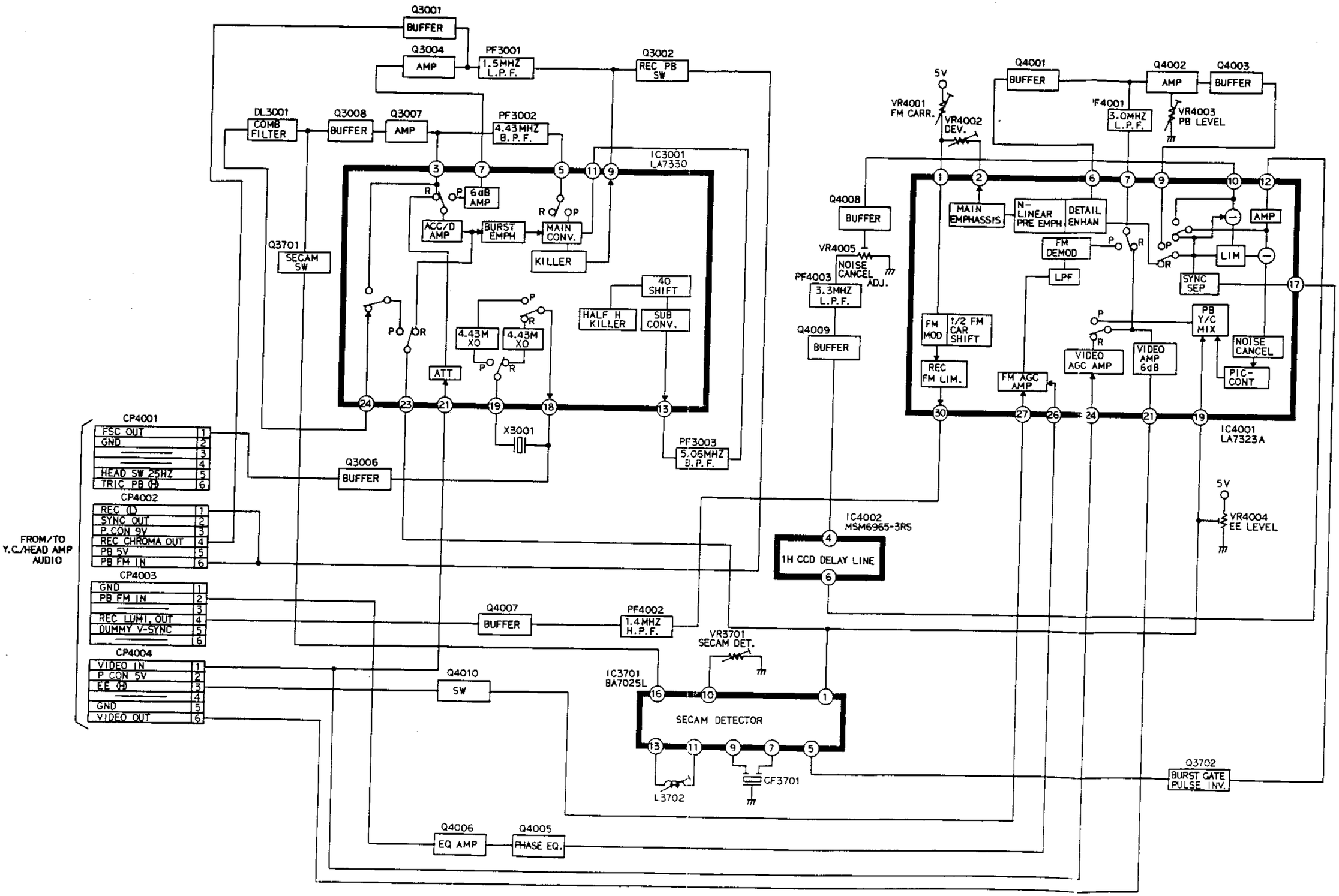
HIGH — STAY HIGH or LOW

LOW — ALTERNATELY HIGH and LOW

TIMING CHART



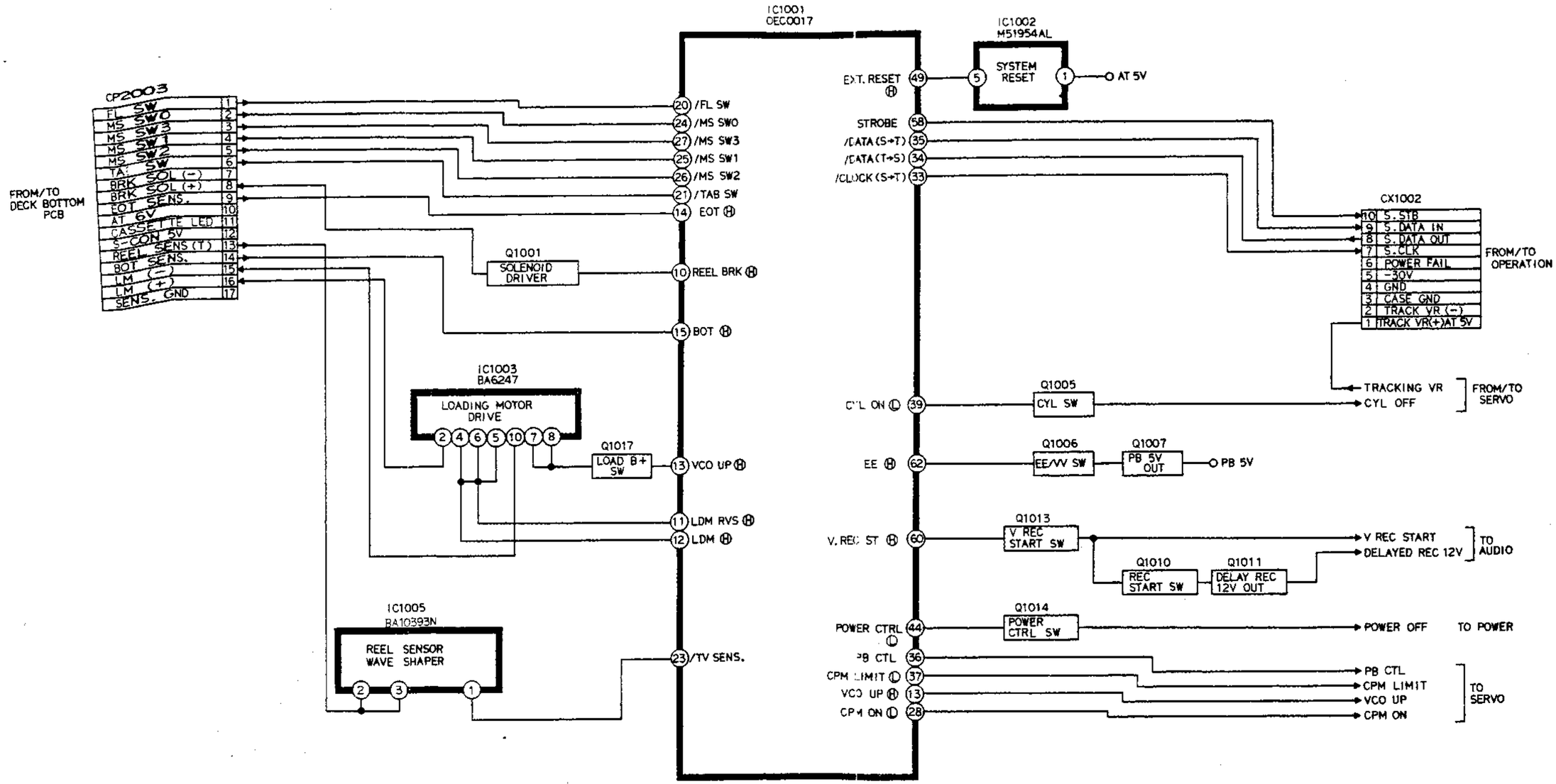
Y.C. BLOCK DIAGRAM



Y.C. BLOCK DIAGRAM

2-3378

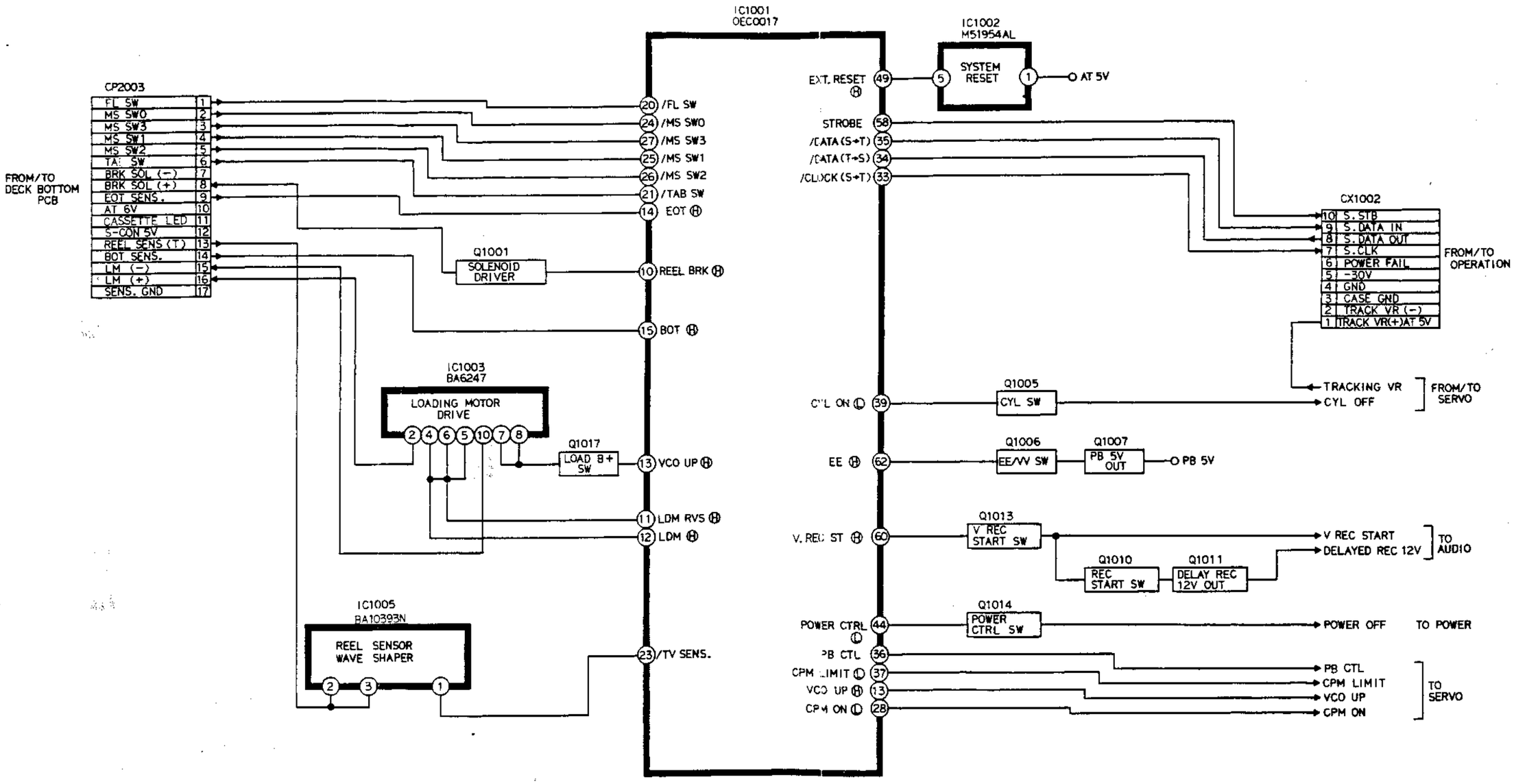
SYSTEM CONTROL BLOCK DIAGRAM



SYSTEM CONTROL BLOCK DIAGRAM

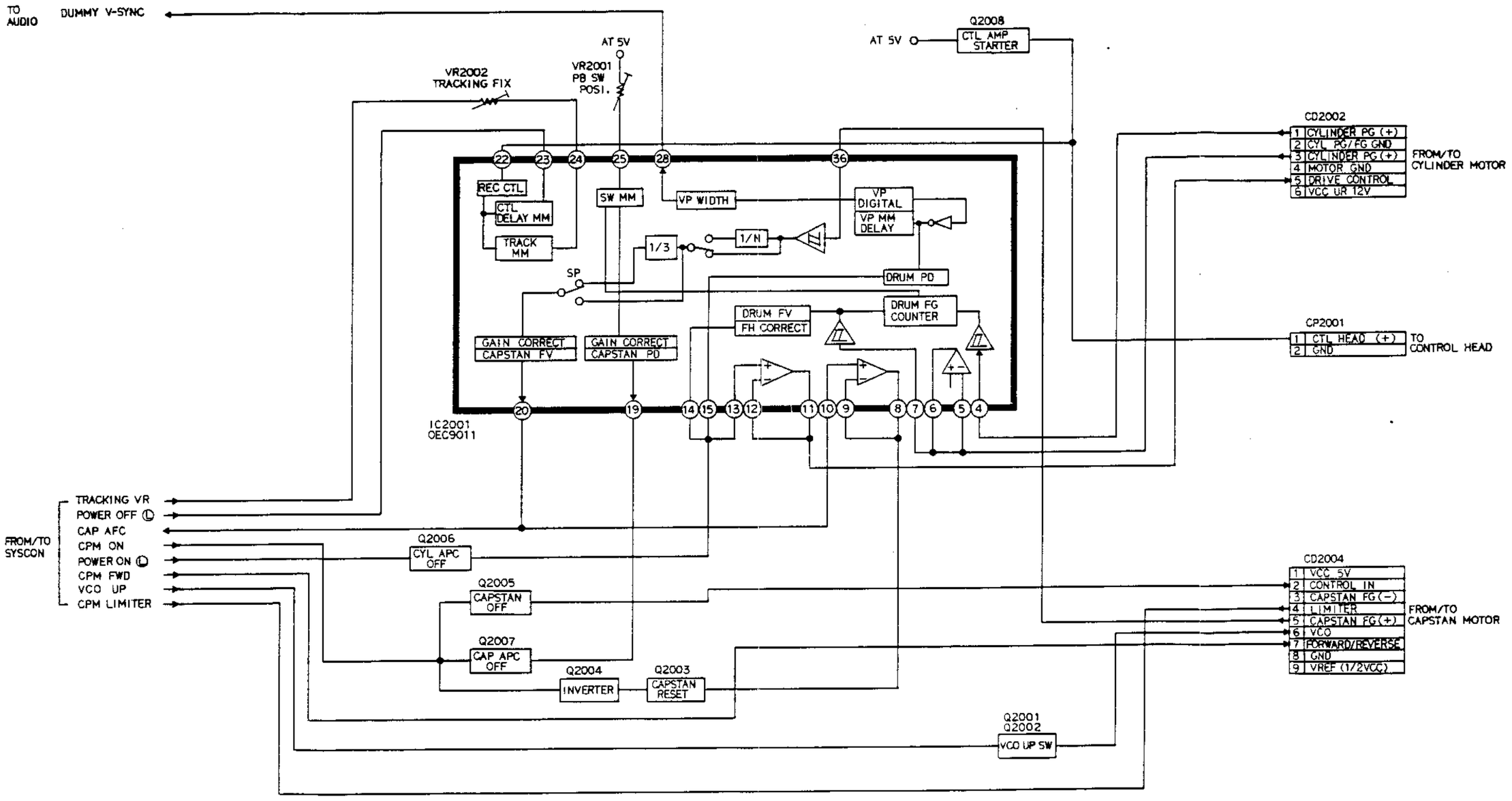
2-3376

SYSTEM CONTROL BLOCK DIAGRAM



SYSTEM CONTROL BLOCK DIAGRAM

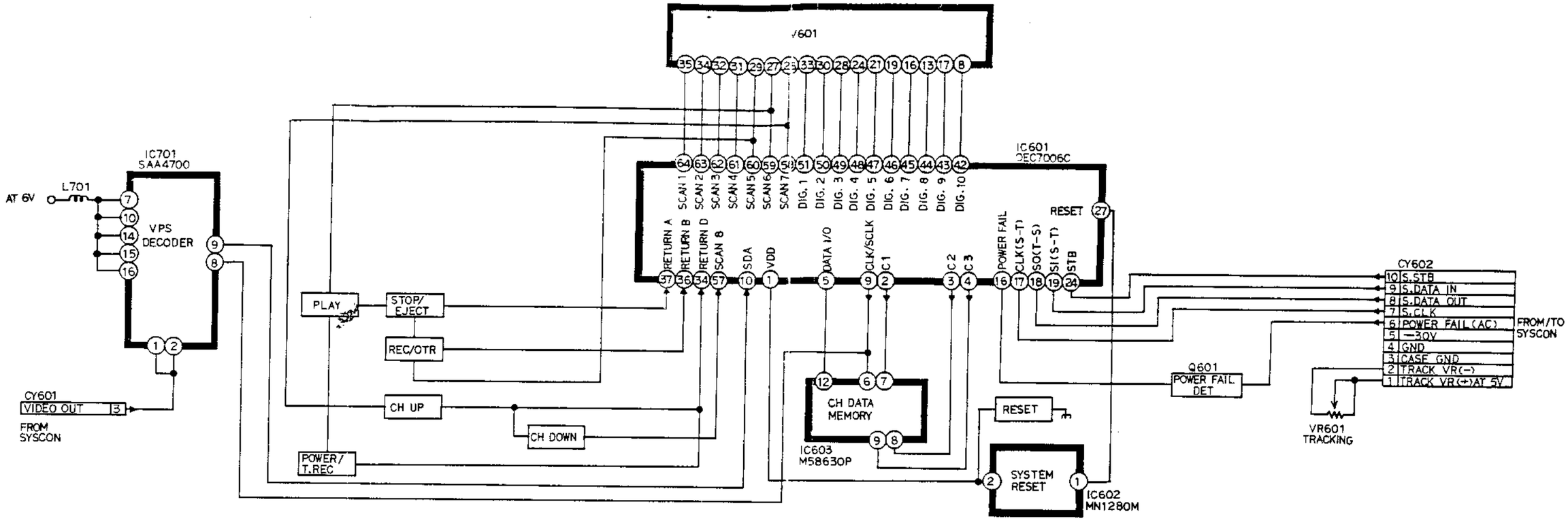
SERVO BLOCK DIAGRAM



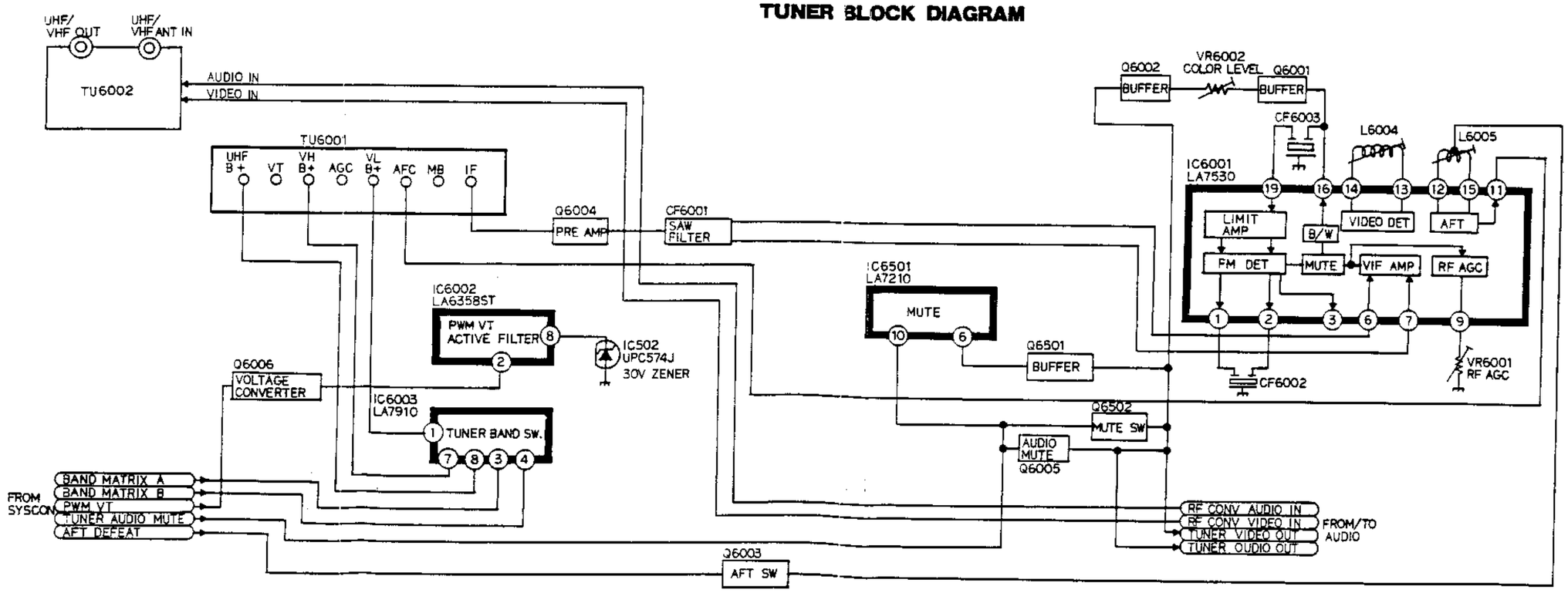
SERVO BLOCK DIAGRAM

2-3377

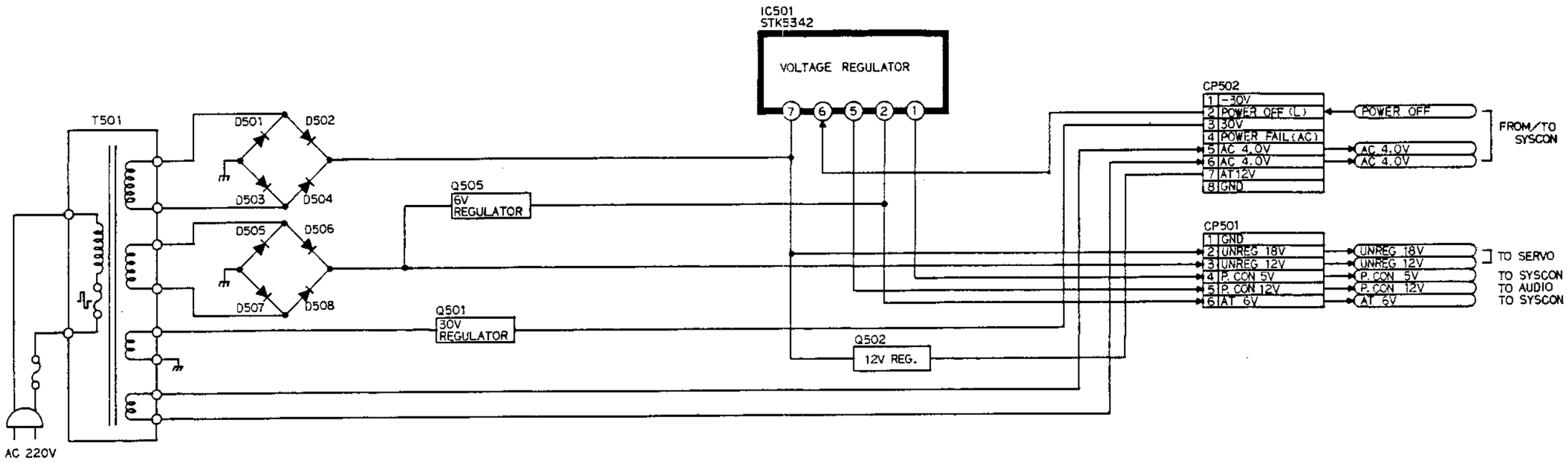
OPERATION BLOCK DIAGRAM



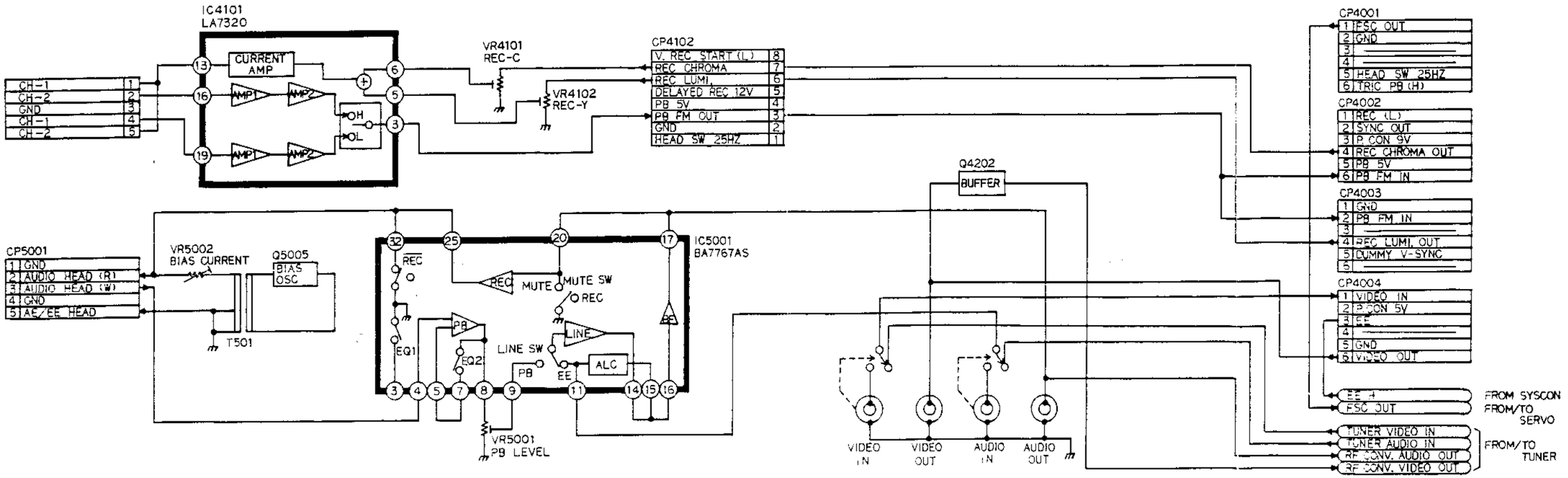
TUNER BLOCK DIAGRAM



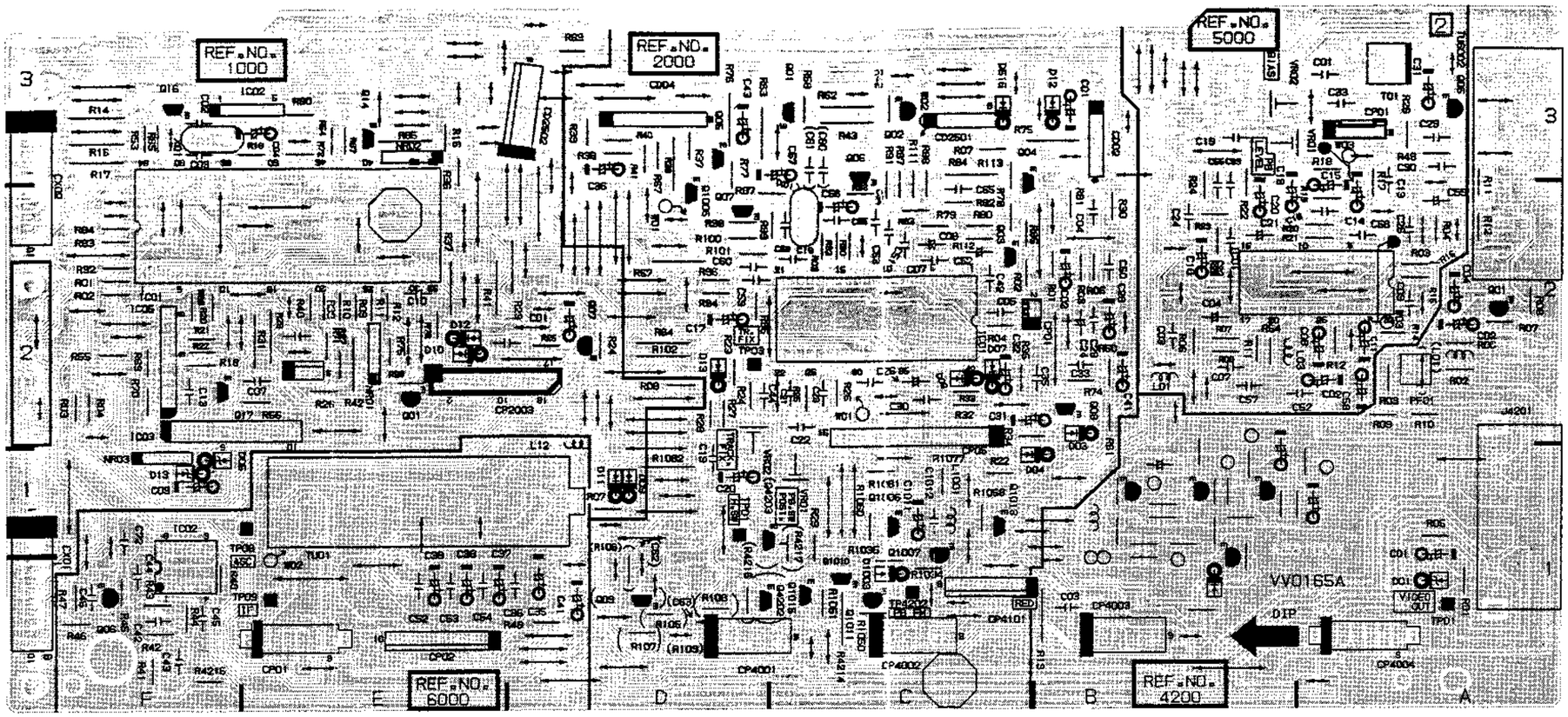
POWER SUPPLY BLOCK DIAGRAM



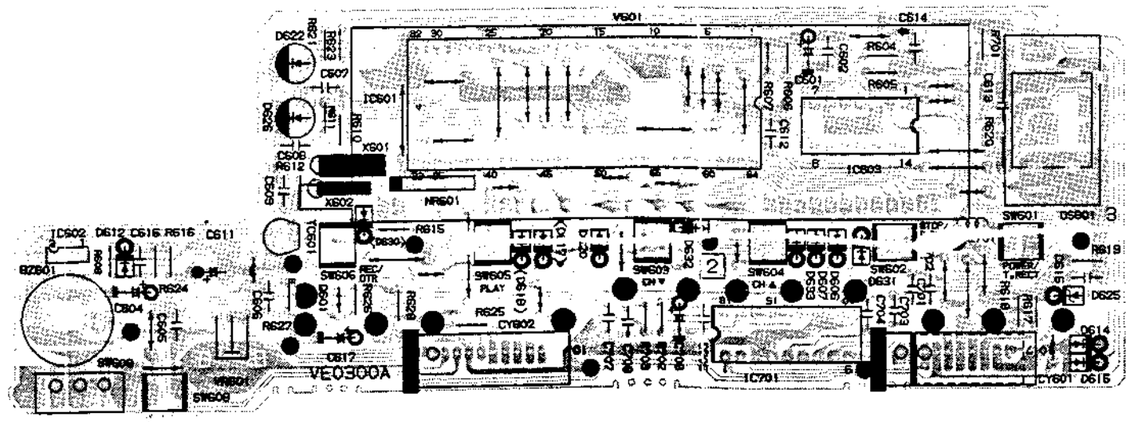
Y.C./HEAD AMP/AUDIO BLOCK DIAGRAM



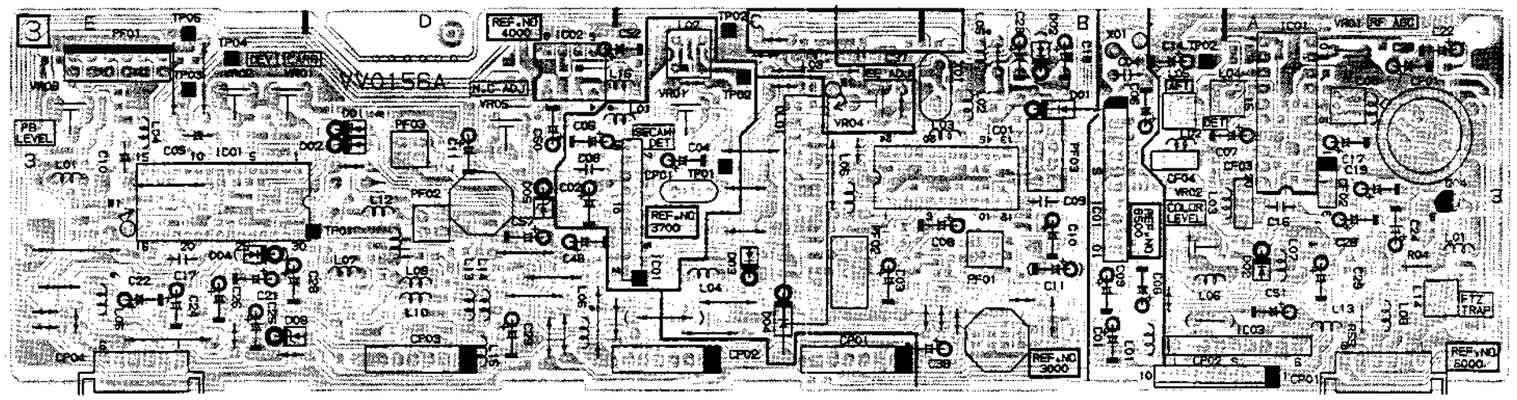
MAIN P.C.BOARD



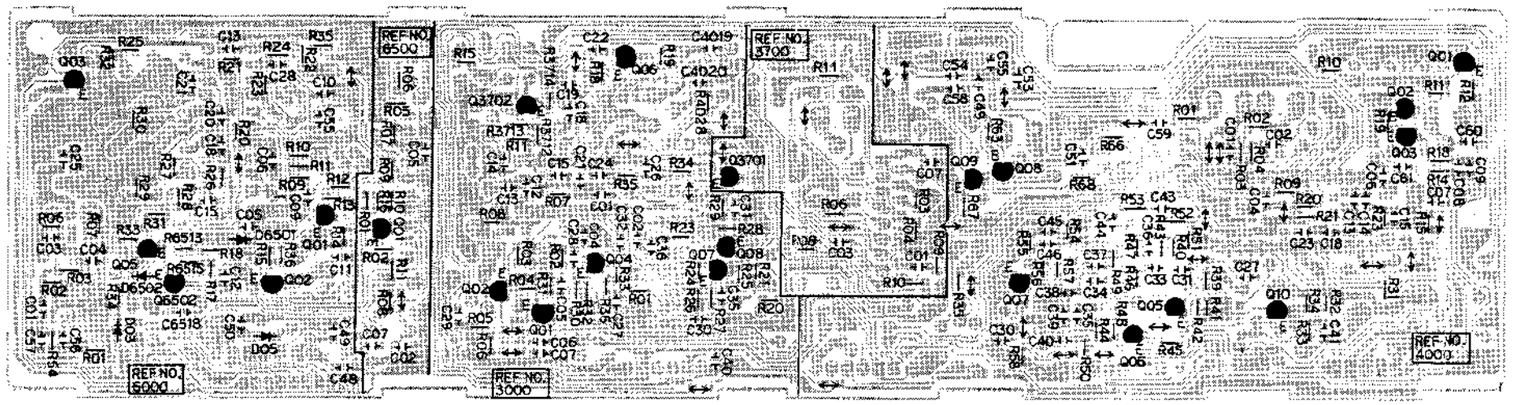
OPERATION P.C.BOARD



Y.C. P.C.BOARD

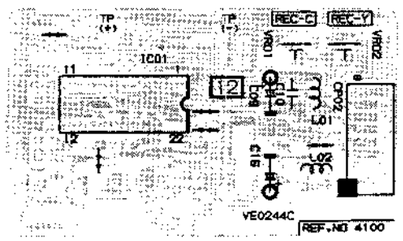


COMPONENT SIDE

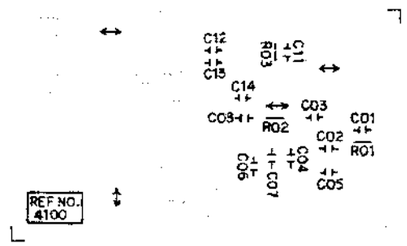


SOLDER SIDE

HEAD AMP P.C.BOARD

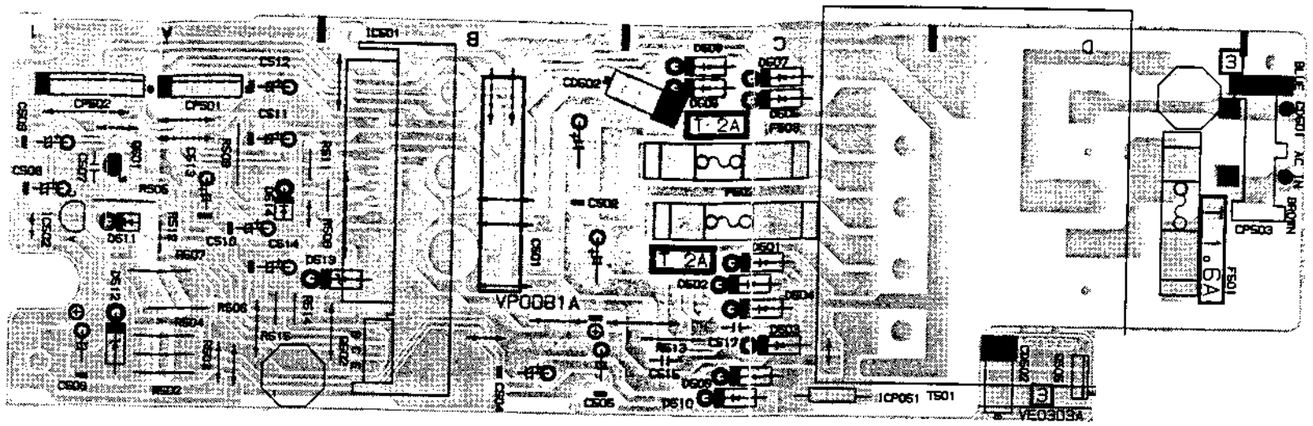


COMPONENT SIDE

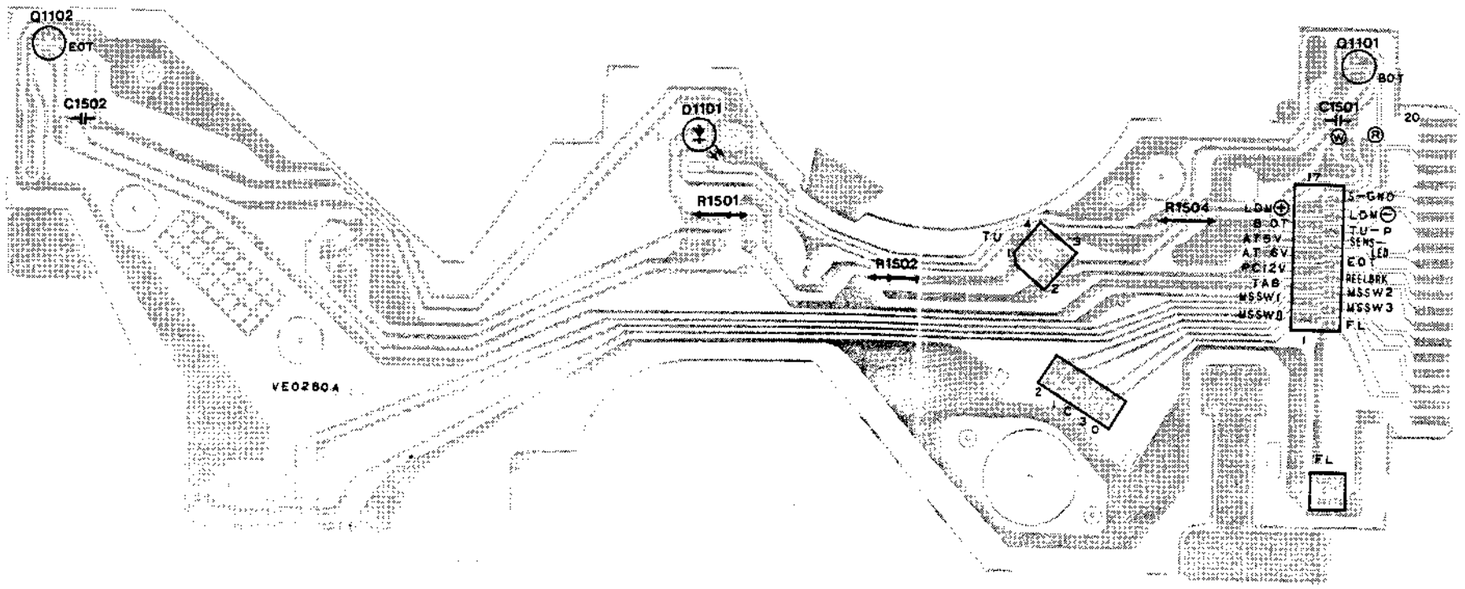


SOLDER SIDE

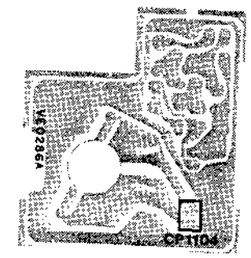
POWER SUPPLY/TRANSISTOR P.C.BOARD



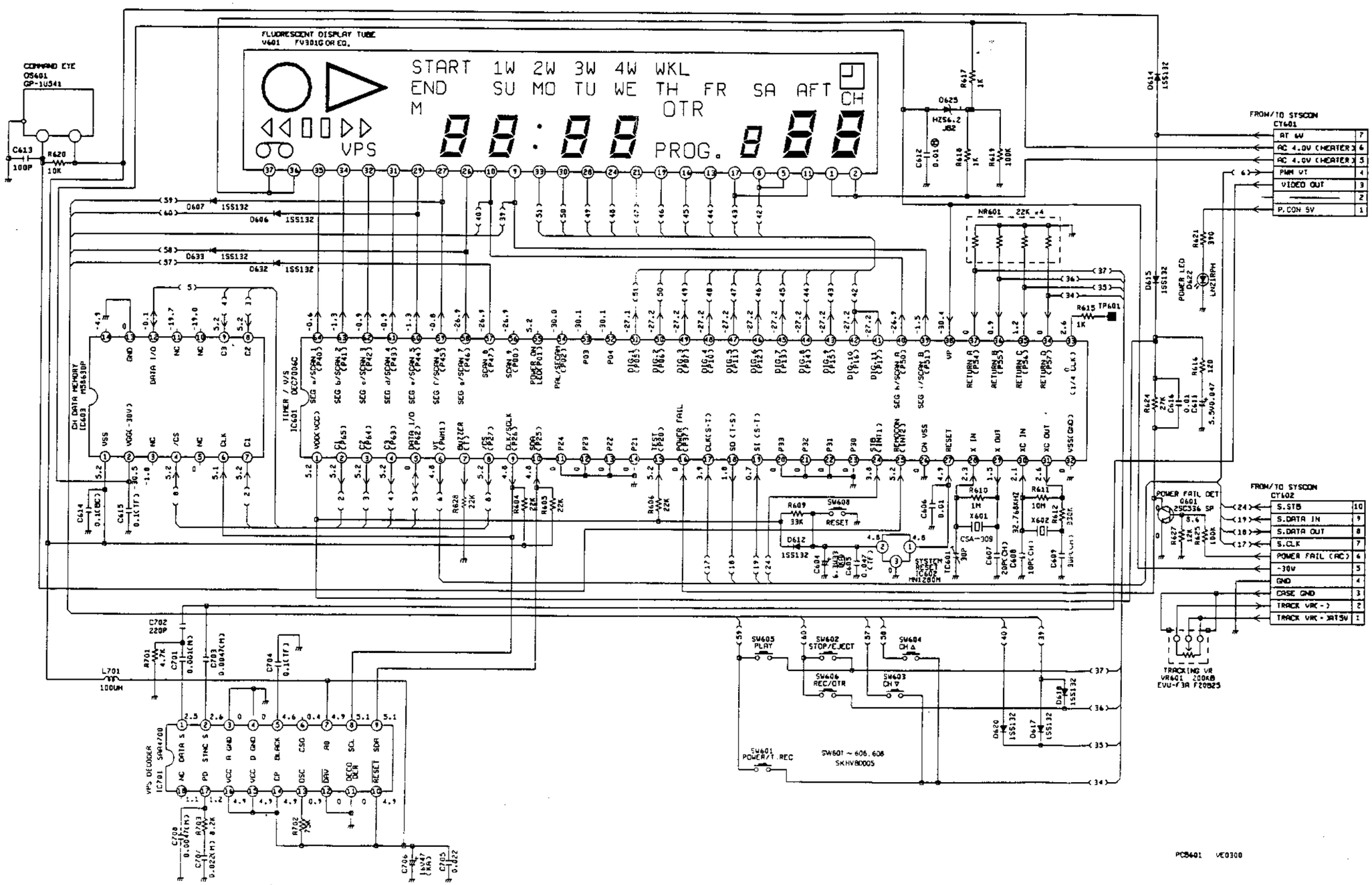
DECK BOTTOM P.C.BOARD



LOADING MOTOR P.C.BOARD



OPERATION SCHEMATIC DIAGRAM



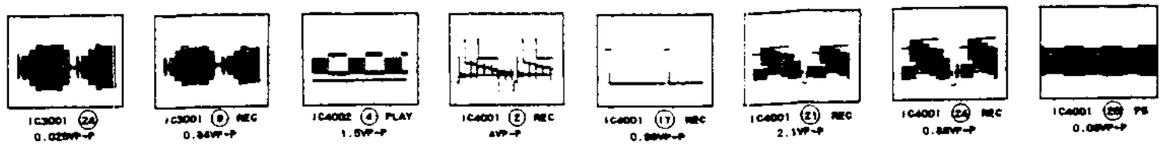
CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED ON PARTS LIST ONLY.

ATTENTION: LES PIECES REPEREES PAR UN ⚠ ETANT DANGEREUSES AU POINT DE VUE SECURITE N'UTILISER QUE CELLES DECRITES DANS LA NOMENCLATURE DES PIECES.

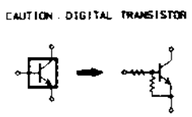
NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

OPERATION SCHEMATIC DIAGRAM

Y.C. SCHEMATIC DIAGRAM



CAUTION : DIGITAL TRANSISTOR



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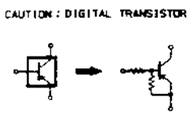
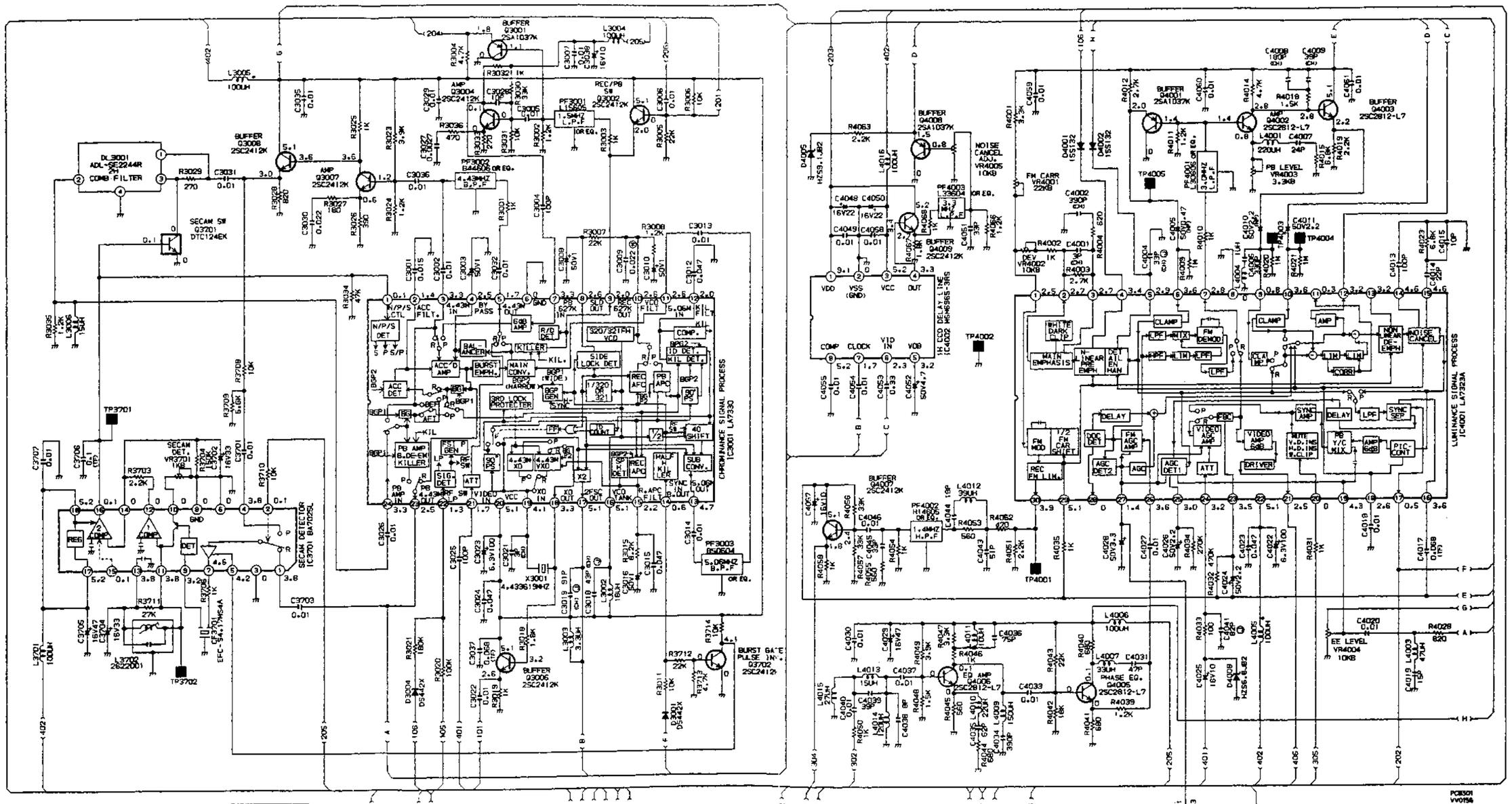
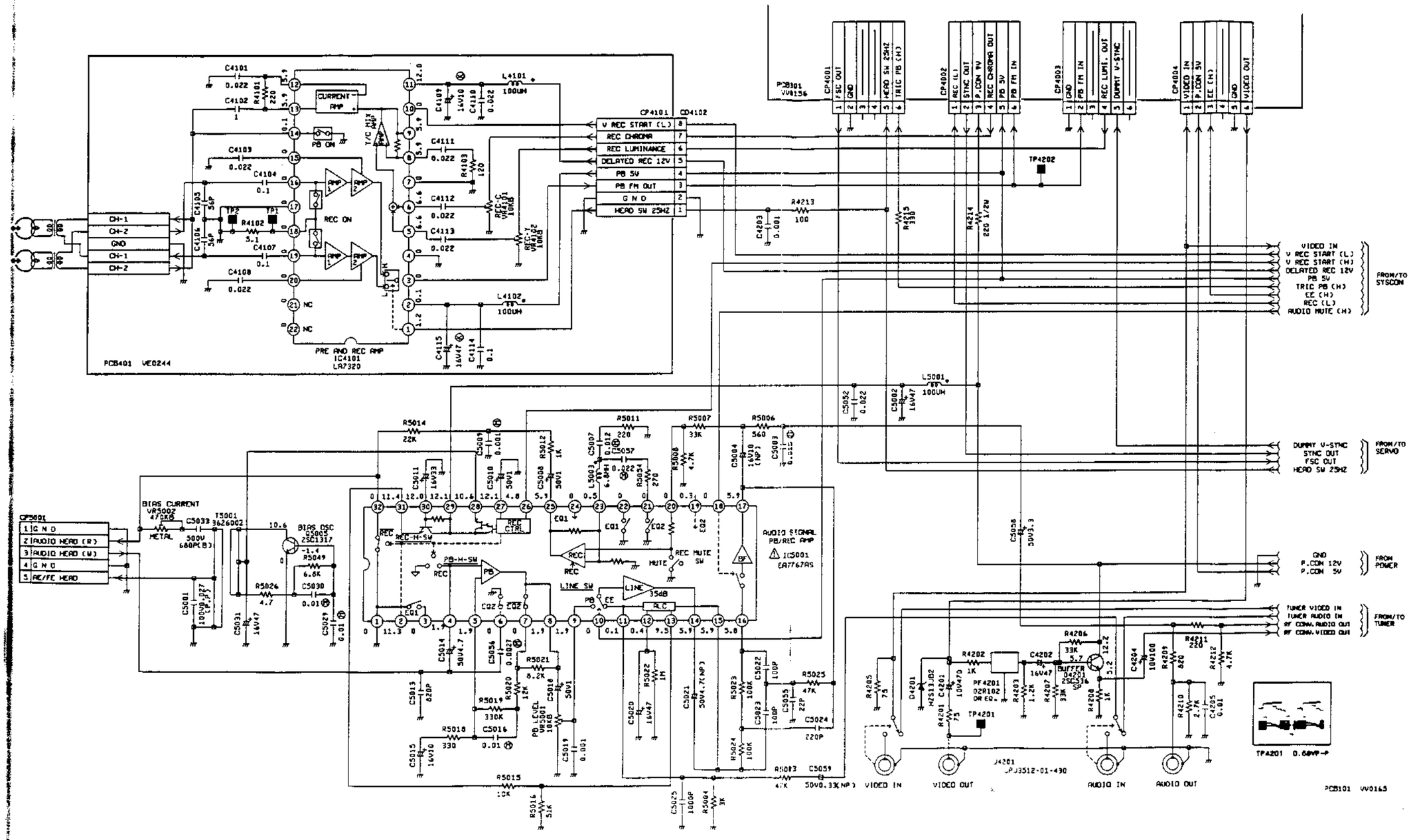




NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

Y.C./HEAD AMP/AUDIO SCHEMATIC DIAGRAM



CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY. USE ONES DESCRIBED ON PARTS LIST ONLY.

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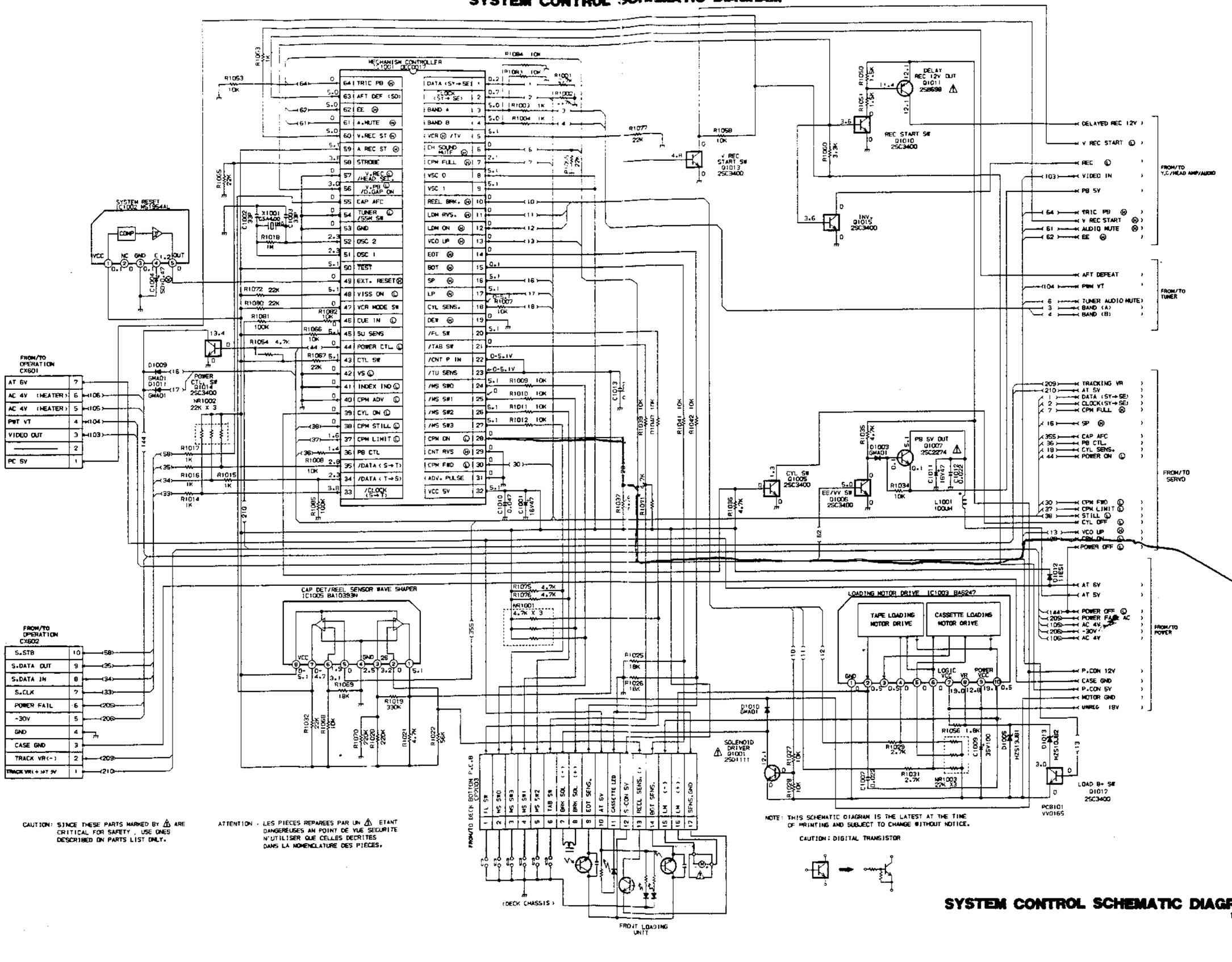
SYSTEM CONTROL SCHEMATIC DIAGRAM



CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY , USE ONES DESCRIBED ON PARTS LIST ONLY.

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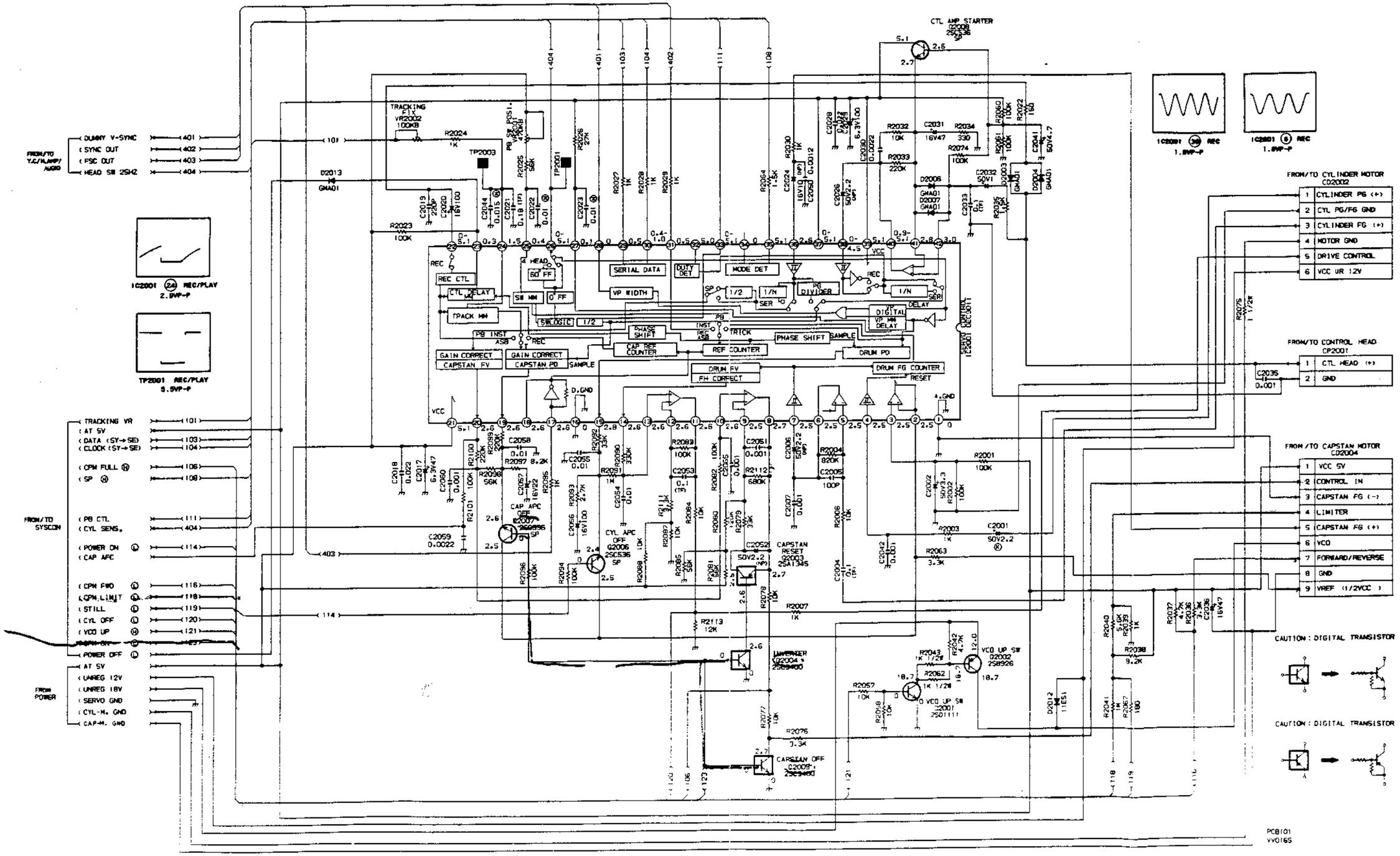
CAUTION: DIGITAL TRANSISTOR

SYSTEM CONTROL SCHEMATIC DIAGRAM

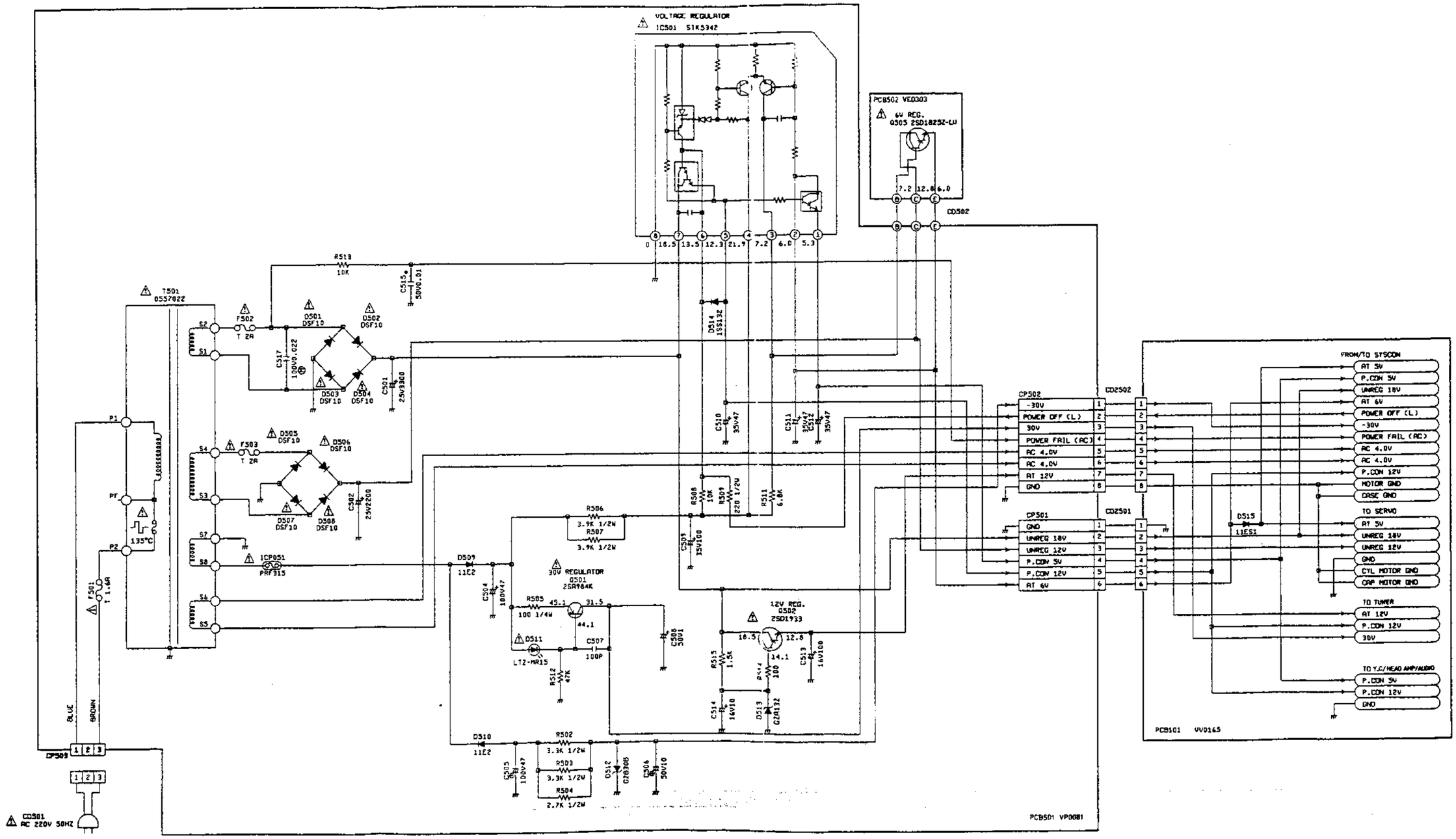
1-8327

SERVO SCHEMATIC DIAGRAM



Capst...

POWER SUPPLY SCHEMATIC DIAGRAM



CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED ON PARTS LIST ONLY.

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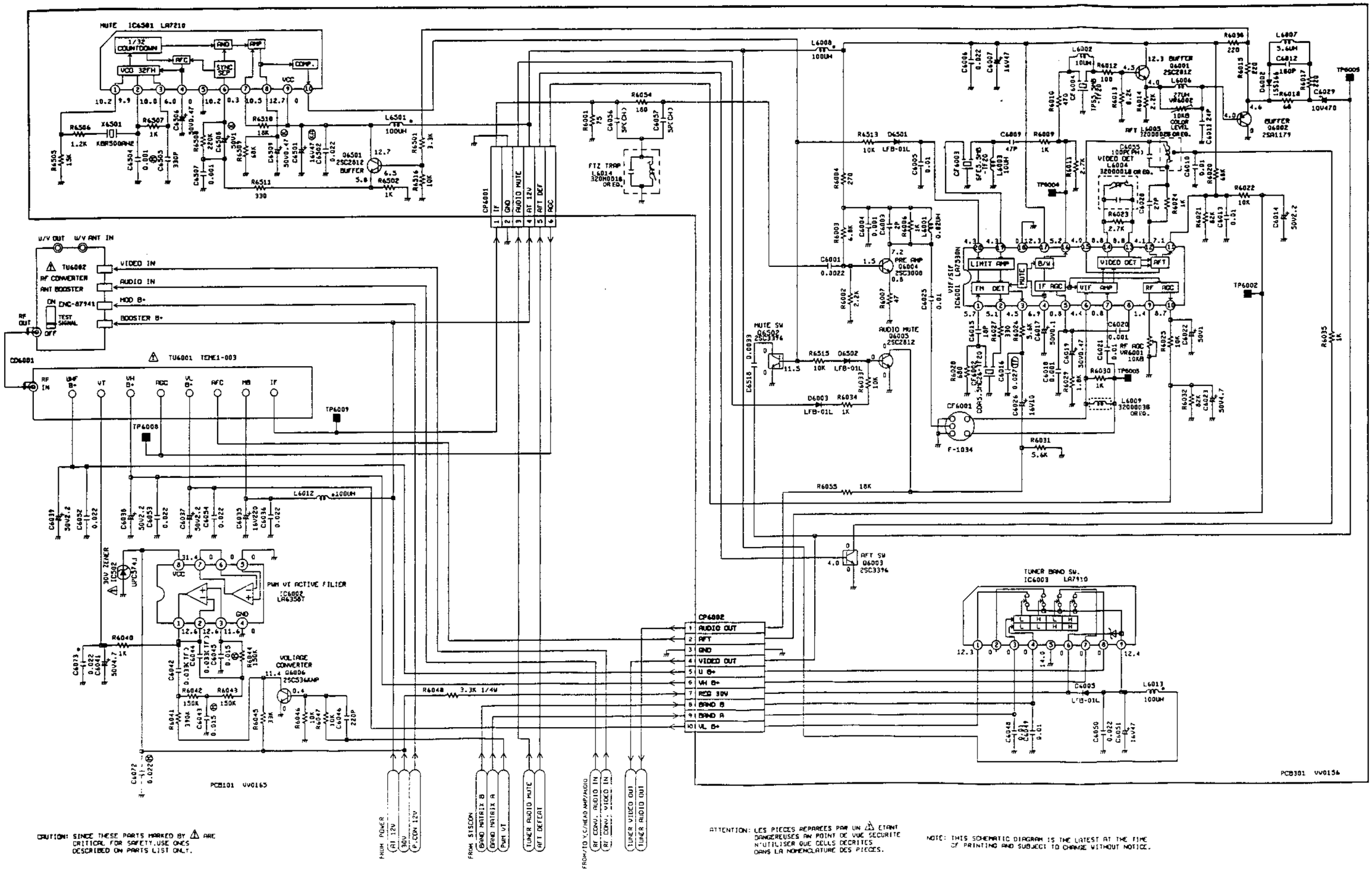
POWER SUPPLY SCHEMATIC DIAGRAM
1-8329

TUNER SCHEMATIC DIAGRAM



CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED ON PARTS LIST ONLY.

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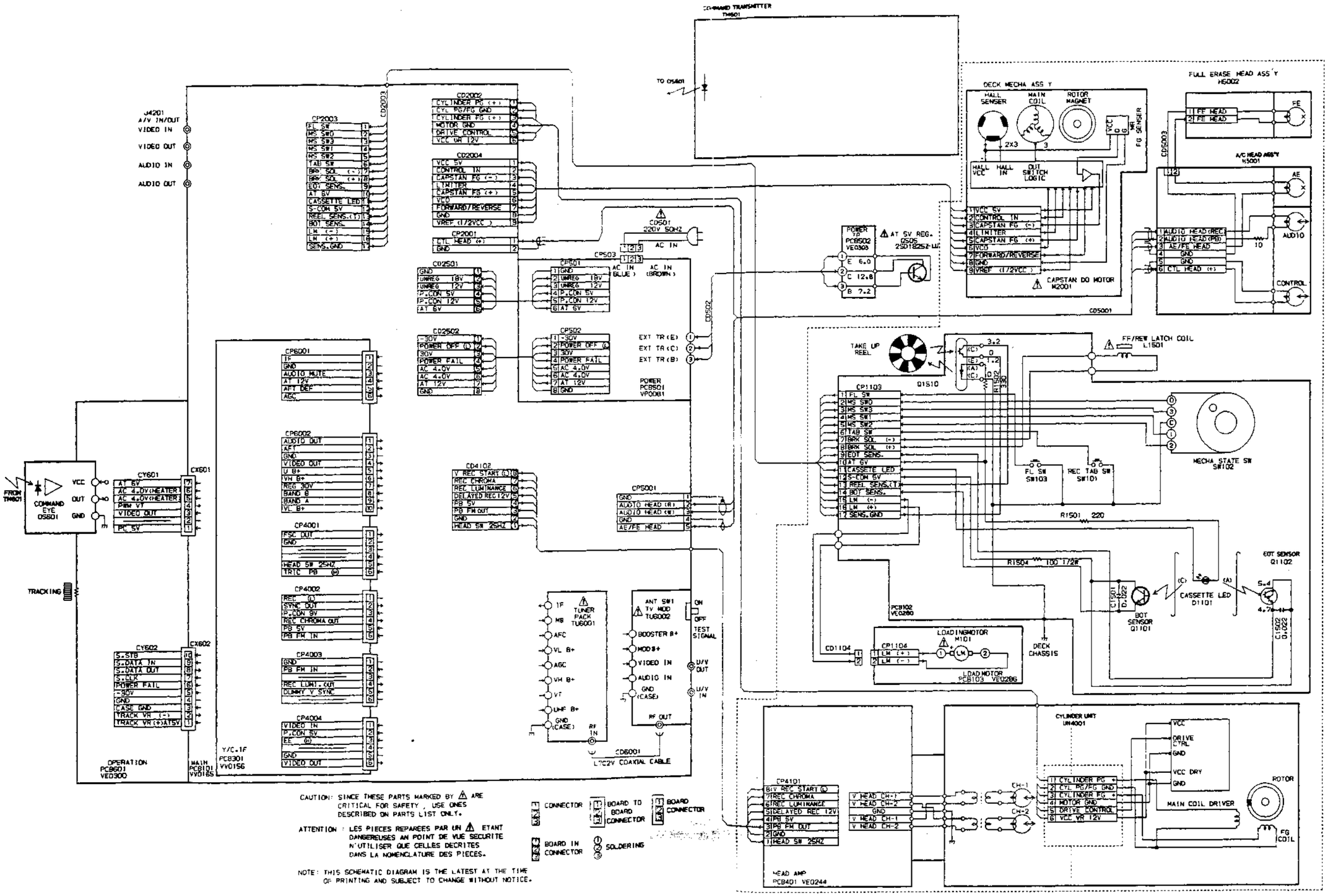
NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

INTERCONNECTION DIAGRAM



CAUTION: SINCE THESE PARTS MARKED BY ⚠ ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED ON PARTS LIST ONLY.

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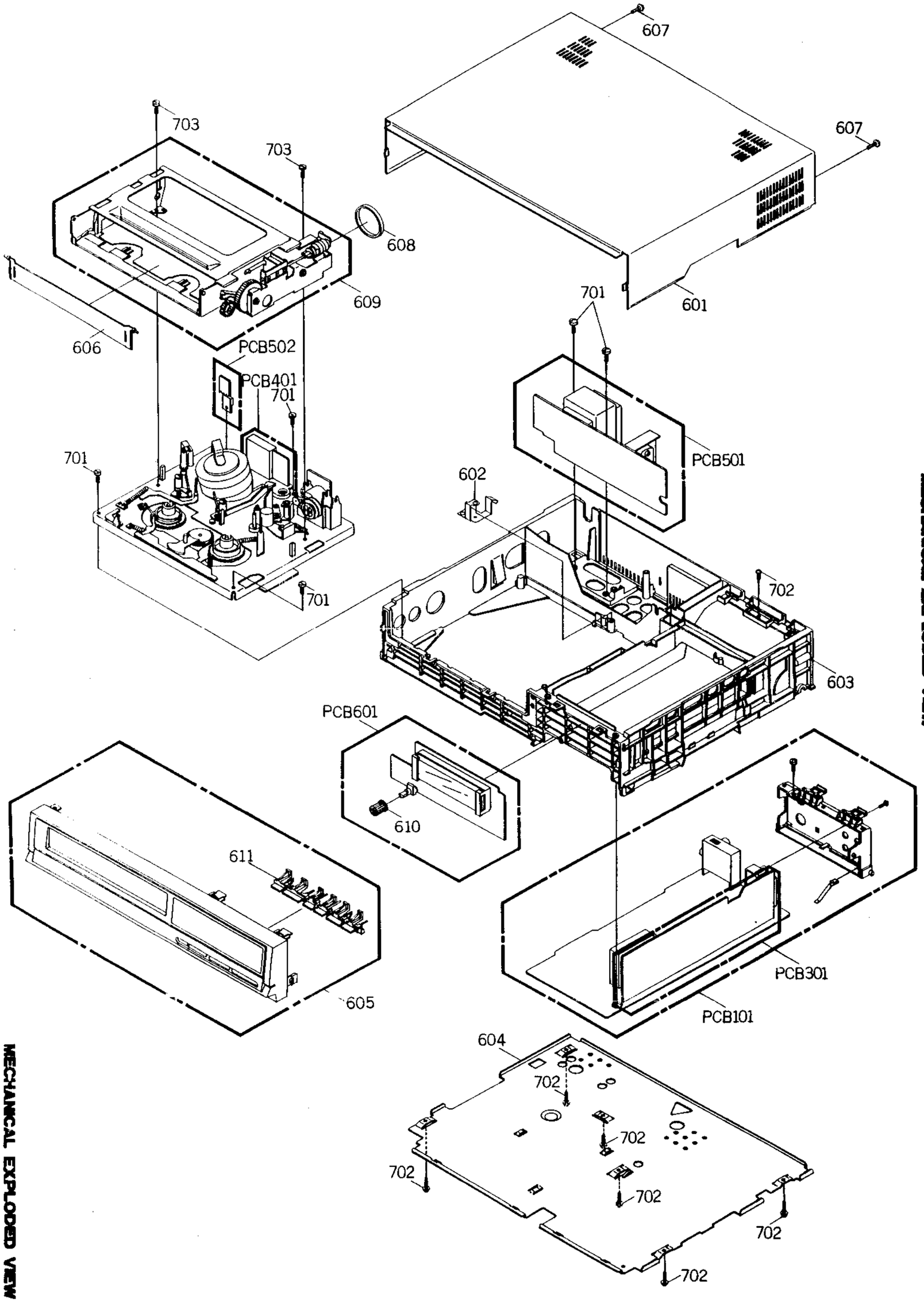
NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

CONNECTOR — BOARD TO BOARD CONNECTOR — BOARD CONNECTOR

BOARD IN CONNECTOR — SOLDERING


607
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PCB502
PCB401
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PCB501
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702
PCB601
610
611
605
PCB301
PCB101
604
702
702
702
702
702
702

MECHANICAL REPLACEMENT PARTS LIST

REF.NO	PART NO	DESCRIPTION
601	702USS0013	CABINET,TOP
602	753TUA0009	SPRING,DECK EARTH
603	702UPA0017	CABINET,INSIDE
		SHEET RATING
604	702USA0009	PLATE,BOTTOM
605	A44803A720	CABINET,FRONT ASS'Y
606	7230003045	FLAP
607	789JSE0014	TAPPING(BO) TRUSS 4*12 BK
608	789JRA0001	BELT,FRONT LOADING
609	A44801A650	FRONT LOADING UNIT ASS'Y(FL-6)
610	732WPA0002	TRACKING,KNOB
611	735UPA0040	BUTTON,DECK
701	8117140A24	TAPPING(BO) PAN 4*12 CH
702	8110630804	TAP TITE(P) BRAZIER 3*8 CH
703	8107230804	TAP TITE(S) BIND 3*8 CH
---	J4093002A	GUARANTEE CARD
---	J42377208	CAUTION SHEET
---	J42440398	VPS CAUTION SHEET
---	J4371726A	WARNING SHEET
---	J4480301A	INSTRUCTION BOOK
---	J4480307A	QUICK SET-UP SHEET
---	791UHA0005	GIFT,SHEET
---	792UHA0020	PACKAGE
---	793UCD0207	GIFT BOX

DECK REPLACEMENT PARTS LIST

REF.NO	PART NO	DESCRIPTION	
301	850P800023	SPRING,TR.	
302	850A600093	TENSION BAND ASS'Y	
303	850A400082	TENSION ARM ASS'Y	
304	850P800141	SPRING,TENSION ARM	
305	850A200023	REEL,DISK S ASS'Y	
306	850A600092	MAIN BRAKE S ASS'Y	
307	850P800142	SPRING,MAIN BRAKE	
308	850P600289	ARM,S-S BRAKE	
309	850P800164	SPRING SS BRAKE	
310	850A400079	BASE,S INCLINED ASS'Y	
311	850P800163	SPRING,M-B 3	
312	850A200024	REEL,DISK T ASS'Y	
313	850A600094	MAIN BRAKE T ASS'Y	
314	850A400080	BASE,T INCLINED ASS'Y	
315	850P500032	ROLLER,IMPEDANCE	
316	850P600274	FLANGE,P1	
317	850P800075	SPRING,P1	
318	850P600281	LEVER,REC,SW.	
319	850P500045	BASE,AC HEAD 2	
320	850P800150	SPRING,AC HEAD BASE	
321	850A600102	LOADING MOTOR BOX ASS'Y	
322	850P600276	BELT,LOADING MOTOR	
323	850A500009	P-R,LEVER ASS'Y	
324	850P600122	NUT,ADJUST X	
325	850A000026	MAIN,CHASSIS ASS'Y	
326	850A400073	PINCH ROLLER ARM ASS'Y	
327	850P800149	SPRING,P-R ARM	
328	850A400084	LIMITER,POST ARM ASS'Y	
329	850P800148	SPRING,L-P ARM	
330	850P600268	CAM 1	
331	850A600100	WORM ASS'Y	
332	850A400076	G-ROLLER ASS'Y	
333	850A300034	LOADING,LEVER 2 ASS'Y	
334	850P600291	LEVER,SUB BRAKE	
335	850A900086	LEVER FL ASS'Y	
336	850A300033	LOADING,ARM T ASS'Y	
337	850A300032	LOADING,ARM S ASS'Y	
338	850A600107	T-S BRAKE ASS'Y	
339	850P800165	SPRING TS BRAKE	
340	850A200021	CLUTCH ASS'Y	
341	850A200020	IDLER ASS'Y	
342	850P600253	MAIN BRAKE LEVER 1	
343	850P600290	ACTUATOR,SUB BRAKE	
344	850A600096	CLUTCH ACTUATOR ASS'Y	
345	850P600282	LEVER TENSION	
346	850P600295	POST,P4	
347	850P600252	SLIDE,MAIN BRAKE	
348	850P800143	SPRING,M-B SLIDE	
349	850A600112	M-B 2 LEVER ASS'Y	
350	850A600111	T-A SLIDE ASS'Y	
351	850P600255	LEVER,LIMITER POST	
352	850P600258	LEVER,CLUTCH ACTUATOR	
353	850P300113	SLIDE,LOADING 2	
354	850P600266	CAM 2	
355	850A600110	M-B 3 LEVER ASS'Y	
356	850P300100	GEAR,LOADING S	
357	850P300101	GEAR,LOADING T	
358	850P800147	SPRING,LOAD.GEAR	
359	850P800167	SPRING,AZIMUTH	
360	868X0HH604	CONEHEAD SCREW	M3*6 CH
361	868512HA11	JOINT SCREW BIND	M3*11 CH
362	850P500010	ADJUST NUT	
363	850P800161	SPRING,FL LEVER	
364	850P600313	PULLEY,LOADING MOTOR	
365	850P600277	BELT,REEL	
366	850P800146	SPRING,P4	
367	850P600273	SLEEVE,P1	
368	850PAA0080	SHIELD,CASE	
369	850P000219	BRACKET,WORM 2	
370	789JRA0001	BELT,FRONT LOADING	
371	850PAA0112	SHIELD LID 6	
372	868501H804	TAP TITE(S) PAN W6	3*8 CH
401	850P900355	GEAR,LINK L	
402	850P800151	SPRING,LINK GEAR L	
403	850P900358	GEAR,SYNCHRO	
404	850P900360	LEVER,FLAP	
405	850P900259	SPRING,FLAP OPENER	
406	850A900080	TOP BRACKET ASS'Y	
407	850P900352	LOCKER	
408	850P800154	SPRING,LOCKER	
409	850P900349	CASS.SIDE L	
410	850P900354	SPRING,PACK	
411	850P900350	CASS.SIDE R	
412	850P900365	REMOVING	

REF.NO	PART NO	DESCRIPTION	
413	850P800155	SPRING,REMOVING	
414	850P900351	CASS.HOLDER	
415	850P900267	SHAFT,SYNCHRO	
416	850P900392	TAPE GUIDE PIECE	
417	850P900348	BRACKET,SIDE R1	
418	850P900361	LEVER,FL SW.	
419	850P800158	SPRING,FL SW.LEVER	
420	850A900081	SIDE BRACKET R2 ASS'Y	
421	850P900356	GEAR,LINK R	
422	850P800153	SPRING,CLUTCH GEAR	
423	850P800152	SPRING,LINK GEAR R	
424	850P900357	GEAR,CLUTCH	
425	850P900362	LEVER,LOCK	
426	850P800159	SPRING,LOCK LEVER	
427	850P900367	WHEEL	
428	850P900364	LEVER,CLUTCH	
429	850P900363	LEVER,SLIDE	
430	850P800160	SPRING,SLIDE LEVER	
431	850P900366	JOINT,PULLEY	
432	850A900082	WORM ASS'Y	
433	850P900353	OPENER	
434	850P800156	SPRING,OPENER	
435	850P900396	COVER,SENSOR	
436	A44801A640	SIDE BRACKET R ASS'Y	
437	A44801A690	CASSETTE HOLDER ASS'Y	
501	868N710604	TAP TITE(S) PAN	2.6*6 CH
502	868021H404	SCREW (PAN)	M3*4 CH
503	868072G604	TAP TITE(S) BIND	2.6*6 CH
504	868072HA44	TAP TITE(S) BIND	3*14 CH
505	868072HA64	TAP TITE(S) BIND	3*16 CH
506	868072H604	TAP TITE(S) BIND	3*6 CH
507	868072H804	TAP TITE(S) BIND	3*8 CH
508	868102H804	TAP TITE(P) BIND	3*8 CH
509	868NETW251	E-RING	2.5
510	868WP3154J	PW	3.1*5.4*T0.25
	868WP3154Q	PW	3.1*5.4*T0.5
	868WP3154E	PW	3.1*5.4*T0.13
511	868WQ2555N	PW (CUT)	2.5*5.5*T0.4
512	868WQ3160Q	PW (CUT)	3.1*6.0*T0.5
513	868WA3270Q	WASHER	3.1*7.0*T0.5
514	868WA4370Q	WASHER	4.3*7.0*T0.5
515	868NO07204	NYLON NUT	M2
516	8685DZD302	SET SCREW 6CUP POINT	M2*3 BK
517	868X4HH601	SCREW +UPSET	M3*6 NI
518	83CST35050	CS RING	3.5
519	868WP3154E	PW	3.1*5.4*T0.13
520	868073H804	TAP TITE(S) FLAT	3*8 CH
550	868WP3154Q	PW	3.1*5.4*T0.5
551	86817CGA04	TAPPING(80) BIND WH6.5	2.6*10 CH
C1501	CH4FF03H4Z	CC	22000 PF 25V
C1502	CH4FF03H4Z	CC	22000 PF 25V
CD1104	068122008A	CORD EIS CONNECTOR	8122008A
CD5001	068126017A	CORD EIS CONNECTOR	8126017A
CD5003	068122007A	CORD EIS CONNECTOR	8122007A
CP1103	069R7H0069	CONNECTOR PCB SIDE	52044-1710
CP1104	0694220139	CONNECTOR PCB SIDE	173979-2
D1101	0010100300	INFRARED LED	LN59L
H5001	1523D91010	HEAD AUDIO CONTROL	HVMZA1054A
H5002	1543D02004	HEAD FULL ERASE	HVFMF0006A
L1501	028L000005	ELECTRO MAGNET	JTM1002-01
M101	1596958008	MOTOR,LOADING	MXN-13FB12F
M2001	1510398011	CAPSTAN,DD UNIT	F2QKB85
PCB102	A44801A550	PCB ASS'Y	VE0280
PCB103	A44801A550	PCB ASS'Y	VE0286
Q1101	0000G00300	PHOTO TRANSISTOR	PT493F
Q1102	0000G00300	PHOTO TRANSISTOR	PT493F
Q1510	0002300140	PHOTO COUPLER	SPI-315-04
R1501	R001T6221J	RC	220 OHM 1/6W
R1502	R001T6331J	RC	330 OHM 1/6W
R1504	R002T2101J	RC	100 OHM 1/2W
SW101	0500211001	PUSH SWITCH	SPPB61023A
SW102	0520244002	SWITCH,ROTARY	SRZZ00
SW103	0501211001	PUSH SWITCH	SPPB51096A
UN4001	A44804A500	UNIT,CYLINDER	A44804A500
UN4002	A42350620	UPPER DRUM ASS'Y	A42350620

ELECTRICAL REPLACEMENT PARTS LIST

REF.NO	PART NO	DESCRIPTION	
COILS & TRANSFORMERS (CONT)			
L6002	021JA6100K	COIL	10 UH
L6003	021JA6100K	COIL	10 UH
L6004	0332000018	COIL,VIDEO IFT	32000018
L6005	0332000028	COIL,VIDEO IFT	32000028
L6006	021JA6270K	COIL	27 UH
L6007	021JA65R6K	COIL	5.6 UH
L6008	021B73101K	COIL	100 UH
L6009	0332000038	COIL,VIDEO IFT	32000038
L6012	021B73101K	COIL	100 UH
L6013	021B73101K	COIL	100 UH
L6014	03320M0018	COIL,VIDEO IFT	320M0018
L6501	021B73101K	COIL	100 UH
⚠ T501	0405570220	TRANSFORMER,POWER AC	0557022
T6001	0336260028	COIL,BIAS OSC	3626002
JACK			
J4201	0632000024	JACK,PLATE	JPJ3512-01-430
SWITCHES			
SW601	0504201T22	SWITCH TACT	SKHVBD005
SW602	0504201T22	SWITCH TACT	SKHVBD005
SW603	0504201T22	SWITCH TACT	SKHVBD005
SW604	0504201T22	SWITCH TACT	SKHVBD005
SW605	0504201T22	SWITCH TACT	SKHVBD005
SW606	0504201T22	SWITCH TACT	SKHVBD005
SW608	0504201T22	SWITCH TACT	SKHVBD005
VARIABLE RESISTORS			
VR601	V014025B05	VR,ROTARY	EVU-F3A F20 B25
VR2001	V126305BT1	VR,SEMIFIXED	RH0634CS5R01
VR2002	V126315BT1	VR,SEMIFIXED	RH0634C15R01
VR3701	V126313BT1	VR,SEMIFIXED	RH0634C13R01
VR4001	V1263H4BT1	VR,SEMIFIXED	RH0634CJ4R01
VR4002	V126314BT1	VR,SEMIFIXED	RH0634C14R01
VR4003	V1263L3BT1	VR,SEMIFIXED	RH0634CN3R01
VR4004	V126314BT1	VR,SEMIFIXED	RH0634C14R01
VR4005	V126314BT1	VR,SEMIFIXED	RH0634C14R01
VR4101	V126214BT1	VR,SEMIFIXED	RH0632C14R01
VR4102	V126214BT1	VR,SEMIFIXED	RH0632C14R01
VR5001	V126314BT1	VR,SEMIFIXED	RH0634C14R01
VR5002	V1263Q5B03	VR,SEMIFIXED	RH0624CS5J09
VR6001	V126214BT1	VR,SEMIFIXED	RH0632C14R01
VR6002	V126314BT1	VR,SEMIFIXED	RH0634C14R01
P.C. BOARDS ASS'Y			
PCB101	A44803A01AB	PCB ASS'Y	VV0165
PCB301	A44803A30AB	PCB ASS'Y	VV0156
PCB401	A43T09A33AB	PCB ASS'Y	VE0244
PCB501	A44803A02AB	PCB ASS'Y	VP0081
PCB502	A44803A02AB	PCB ASS'Y	VE0303
PCB601	A44803A27AB	PCB ASS'Y	VE0300
MISCELLANEOUS			
BT601	1412004002	BATTERY,MANGAN	R03(UM-4(SP))
⚠ CD501	120M450031	CORD AC	E2N 7FEET
CD502	122U031203	CORD JUMPER	2U031203
CP501	069R260149	CONNECTOR PCB SIDE	52008-0610
CP502	069R280149	CONNECTOR PCB SIDE	52008-0810
CP503	0694430100	CORD UX CONNECTOR	2-173270-3
CX601	06942T0070	CONNECTOR PCB SIDE	173992-7
CX602	06942A0070	CONNECTOR PCB SIDE	1-173992-0
CY601	0694270060	CONNECTOR PCB SIDE	173991-7
CY602	06942A0060	CONNECTOR PCB SIDE	1-173991-0
CD2002	0681260194	CORD EIS CONNECTOR	8126019A
CD2003	122B0H1001	CORD JUMPER	2B0H1001
CD2004	068129017A	CORD EIS CONNECTOR	8129017A
CD2501	1226061702	CORD JUMPER	26061702
CD2502	1226062502	CORD JUMPER	26062502
CD4102	068128010A	CORD EIS CONNECTOR	8128010A
CD6001	0662H27003	CORD COAXIAL	62H27003
CD6002	0680L05004	CABLE,PAL	PDS05-DP05-3C1.5
CF3701	10114R1703	FILTER,CERAMIC	EFCS4R17MS4A
CF6001	1027038R91	FILTER,SAW	F1034
CF6002	1012T5R501	FILTER,CERAMIC	CDA5.5MC26-TF20
CF6003	1012T5R502	FILTER,CERAMIC	SFE5.5MB-TF20
CF6004	1012T5R503	FILTER,CERAMIC TRAP	TPS5.5MB-TF20
CP2001	069H220329	CONNECTOR PCB SIDE	IL-S-2P-S2T2-EF
CP2003	069R1H0059	CONNECTOR PCB SIDE	52045-1710
CP4001	0697160189	CONNECTOR PCB SIDE	TXX-H06P-G1
CP4002	0697160189	CONNECTOR PCB SIDE	TXX-H06P-G1
CP4003	0697160189	CONNECTOR PCB SIDE	TXX-H06P-G1
CP4004	069Q160179	CONNECTOR PCB SIDE	CPB1806-0101

REF.NO	PART NO	DESCRIPTION	
MISCELLANEOUS (CONT)			
CP4101	0694280139	CONNECTOR PCB SIDE	173979-6
CP5001	069H250329	CONNECTOR PCB SIDE	IL-S-5P-S2T2-EF
CP6001	069Q160179	CONNECTOR PCB SIDE	CPB1806-0101
CP6002	069R2A0319	CONNECTOR PCB SIDE	5550-10A
DL3001	104A24R436	DELAY LINE GLASS	ADL-SE2244R
⚠ F501	080ET1R601	FUSE	BET 1.6 A(T)250V
⚠ F502	080ET02001	FUSE	BET 2 A(T)250V
⚠ F503	080ET02001	FUSE	BET 2 A(T)250V
FH501	067M0T0004	HOLDER,FUSE	H0451
FH502	067M0T0005	HOLDER,FUSE	H0452
⚠ ICP051	084EF0R301	IC PROTECTOR	PRF-315-F003
NR601	110E4223T4	R,NETWORK	RN5E5A223J01
NR1001	110E3472T2	R,NETWORK	RN5E4A472J01
NR1002	110E3223T2	R,NETWORK	RN5E4A223J01
NR1003	110E3223T2	R,NETWORK	RN5E4A223J01
OS601	0779010002	REMOTE RECEIVER	GP-1U541
PF3001	1147L15605	FILTER,LOW PASS	47L15605
PF3002	1147B44606	FILTER,BAND PASS	47B44606
PF3003	1147B50604	FILTER,BAND PASS	47B50604
PF4001	1147L30606	FILTER,LOW PASS	47L30606
PF4002	1147H14605	FILTER,HIGH PASS	47H14605
PF4003	1147L33604	FILTER,LOW PASS	47L33604
PF4201	103802R102	DELAY	3802R102
TC601	0100614T08	C,CERAMIC TRIMMER	VCT51F716A
TM601	076G008001	TRANSMITTER	EUR-53950
⚠ TU6001	0145M01016	TUNER,UHF-VHF	TEME1-003(KAI)
⚠ TU6002	0151N01008	RF-CONVERTER	ENC-87941
V601	096770R304	TUBE FLUORESCENT DISPLAY	FV301G
X501	100EA4R108	CRYSTAL	CSA-309
X602	100D32R801	CRYSTAL DT-26S	32.768KHZ
X1001	1002T4R001	CERAMIC,OSCILLATOR	CSA4.00MG-TF01
X3001	1006A4R302	CRYSTAL HC-49/U	4.43361875MHZ
X6501	1003R50001	CERAMIC,OSCILLATOR	KBR-500AH2

RESISTOR
RC.....CARBON RESISTOR

CAPACITORS
CC.....CERAMIC CAPACITOR
CE.....ALUMI ELECTROLYTIC CAPACITOR
CP.....POLYESTER CAPACITOR
CPP.....POLYPROPYLENE CAPACITOR
CPL.....PLASTIC CAPACITOR
CMP.....METAL POLYESTER CAPACITOR
CMPL.....METAL PLASTIC CAPACITOR
CMPP.....METAL POLYPROPYLENE CAPACITOR
CST.....STYROL CAPACITOR

INTERCHANGEABLE PARTS LIST

NOTE:THE FOLLOWING PART(S) MAY BE SUBSTITUTED FOR PARTS INDICATED IN THE BASIC PART(S) LIST (WITH THE SAME REF.NO.). THESE PARTS SHARE THE SAME ELECTRICAL CHARACTERISTICS AND OTHER ELEMENTS FOR COMMON USAGE.
EITHER PART NUMBER MAY BE USED IN THIS UNIT.

REF.NO	DESCRIPTION (PART NO)	DESCRIPTION (PART NO)
L6004	32000018 (03320000018)	3200001 (033200001K)
L6005	32000028 (03320000028)	3200002 (033200002K)
L6009	32000038 (03320000038)	3200003 (033200003K)
L6014	320M0018 (03320M0018)	320M001 (03320M001K)
PF3001	47L15605 (1147L15605)	41L15605 (1141L15605)
PF3002	47B44606 (1147B44606)	41B44606 (1141B44606)
PF3003	47B50604 (1147B50604)	41B50604 (1141B50604)
PF4001	47L30606 (1147L30606)	41L30606 (1141L30606)
PF4002	47H14605 (1147H14605)	41H14605 (1141H14605)
PF4003	47L33604 (1147L33604)	41L33604 (1141L33604)
PF4201	3802R102 (103802R102)	3L02R102 (103L02R102)
V601	FV301G (096770R304)	FIP11BKM (096J70R304) FIP11BKM7 (096270R304)

THIS ELECTRICAL PARTS LIST IS STANDARD PART LIST. BUT
INTERCHANGEABLE PARTS MAY BE USED IN THE UNIT.
SEE THE INTERCHANGEABLE PARTS LIST AFTER THE STANDARD PARTS LIST.

ELECTRICAL REPLACEMENT PARTS LIST

REF.NO	PART NO	DESCRIPTION
RESISTOR		
R611	R00104106J	RC 10M OHM 1/4W
CAPACITORS		
C501	E011F3332M	CE 3300 UF 25V
C502	E011F3222M	CE 2200 UF 25V
C606	CH40F0314Z	CC 10000 PF 25V
C611	E59A0P473Z	CE 0.047 UF 5.5V
C2028	CH00F03H4Z	CC 0.022 UF 25V
C4205	CH40F0314Z	CC 10000 PF 25V
SEMICONDUCTORS		
⚠ D501	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D502	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D503	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D504	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D505	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D506	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D507	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
⚠ D508	D23TDSF10T	DIODE,RECTIFIER DSF10TB-BT-A
D509	D28T011E20	DIODE,SILICON 11E2TA1
D510	D28T011E20	DIODE,SILICON 11E2TA1
⚠ D511	D8TT2MR150	GLASS SEALED LED LTZ-MR15-T77
D512	D93013001B	DIODE,ZENER GZB30B
D513	D93T01300Z	DIODE,ZENER GZA13 Z BT
D514	D17T001320	DIODE,SILICON 1SS132T-77
D515	D28T011ES1	DIODE,SILICON 11ES1TA1
D606	D17T001320	DIODE,SILICON 1SS132T-77
D607	D17T001320	DIODE,SILICON 1SS132T-77
D612	D17T001320	DIODE,SILICON 1SS132T-77
D614	D17T001320	DIODE,SILICON 1SS132T-77
D615	D17T001320	DIODE,SILICON 1SS132T-77
D617	D17T001320	DIODE,SILICON 1SS132T-77
D618	D17T001320	DIODE,SILICON 1SS132T-77
D620	D17T001320	DIODE,SILICON 1SS132T-77
D622	002112P010	LED LN21RPH-(TA)
D625	D94UA6R2J2	DIODE,ZENER HZS6R2JB2-T
D632	D17T001320	DIODE,SILICON 1SS132T-77
D633	D17T001320	DIODE,SILICON 1SS132T-77
D1003	D13TGMA010	DIODE,SILICON GMA-01-BT
D1005	D94TA130J1	DIODE,ZENER HZS13JB1-TE
D1009	D13TGMA010	DIODE,SILICON GMA-01-BT
D1010	D13TGMA010	DIODE,SILICON GMA-01-BT
D1011	D13TGMA010	DIODE,SILICON GMA-01-BT
D1012	D28T011ES1	DIODE,SILICON 11ES1TA1
D1013	D94TA100J2	DIODE,ZENER HZS10JB2-TE
D2003	D13TGMA010	DIODE,SILICON GMA-01-BT
D2004	D13TGMA010	DIODE,SILICON GMA-01-BT
D2007	D13TGMA010	DIODE,SILICON GMA-01-BT
D2008	D13TGMA010	DIODE,SILICON GMA-01-BT
D2012	D28T011ES1	DIODE,SILICON 11ES1TA1
D2013	D13TGMA010	DIODE,SILICON GMA-01-BT
D3001	D13TDS442X	DIODE,SILICON DS442X-BT
D3004	D13TDS442X	DIODE,SILICON DS442X-BT
D4001	D17T001320	DIODE,SILICON 1SS132T-77
D4002	D17T001320	DIODE,SILICON 1SS132T-77
D4005	D94TA9R1J2	DIODE,ZENER HZS9R1JB2-TE
D4008	D94TA6R8J2	DIODE,ZENER HZS6R8JB2-TE
D4201	D94TA130J2	DIODE,ZENER HZS13JB2-TE
D6002	D14UD01660	DIODE,SILICON 1SS166-03TE
D6003	DD3RLFB01L	DIODE,SILICON LFB-01L
D6005	DD3RLFB01L	DIODE,SILICON LFB-01L
D6501	DD3RLFB01L	DIODE,SILICON LFB-01L
D6502	DD3RLFB01L	DIODE,SILICON LFB-01L
⚠ IC501	123S953420	IC STK5342
⚠ IC502	102190574J	IC UPC574J-T
IC601	156DT7005C	IC OEC7005C
IC602	101901280M	IC MN1280
IC603	156D066300	IC M58630P
IC701	19KD647000	IC SAA4700
IC1001	154D50017A	IC OEC0017
IC1002	106S51954A	IC M51954AL
IC1003	107S062470	IC BA6247
IC1005	107S003930	IC BA10393N
IC2001	197D49011A	IC OEC9011
IC3001	103D373300	IC LA7330
IC3701	107TC7025L	IC BA7025L
IC4001	103D37323A	IC LA7323A
IC4002	106D369653	IC MSM6965-3RS
IC4101	103D373200	IC LA7320
⚠ IC5001	107D767AS0	IC BA776TAS
IC6001	103DA7530N	IC LA7530N

REF.NO	PART NO	DESCRIPTION
SEMICONDUCTORS (CONT)		
IC6002	103D06358T	IC LA6358T
IC6003	103S079100	IC LA7910
IC6501	103S072100	IC LA7210
⚠ Q501	TA3T0984K0	TRANSISTOR,SILICON 2SA984K-T
⚠ Q502	TD70019330	TRANSISTOR,SILICON 2SD1933
⚠ Q505	TD3H018250	TRANSISTOR,SILICON 2SD1825Z-LU
Q601	TCTT0536S0	TRANSISTOR,SILICON 2SC5365P-T
⚠ Q1001	TD3T011110	TRANSISTOR,SILICON 2SD1111-T
Q1005	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q1006	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
⚠ Q1007	TC3T022740	TRANSISTOR,SILICON 2SC2274
Q1010	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
⚠ Q1011	TB3T006980	TRANSISTOR,SILICON 2SB698-AA
Q1013	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q1014	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q1015	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q1017	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q2001	TD3T011110	TRANSISTOR,SILICON 2SD1111-T
Q2002	TB3TD09260	TRANSISTOR,SILICON 2SB926-T
Q2003	TP3TD06001	COMPOUND,TRANSISTOR 2SA1345
Q2004	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q2005	TNTTC03001	COMPOUND,TRANSISTOR 2SC3400-T
Q2006	TCTT0536S0	TRANSISTOR,SILICON 2SC536SP-T
Q2007	TCTT0536S0	TRANSISTOR,SILICON 2SC536SP-T
Q2008	TCTT0536S0	TRANSISTOR,SILICON 2SC536SP-T
Q3001	T67A1037K0	TRANSISTOR,SILICON 2SA1037KT97
Q3002	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q3004	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q3006	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q3007	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q3008	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q3701	TN7TC05001	COMPOUND,TRANSISTOR DTC124EKT97
Q3702	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q4001	T67A1037K0	TRANSISTOR,SILICON 2SA1037KT97
Q4002	T83A028127	TRANSISTOR,SILICON 2SC2812-L7-TA
Q4003	T83A028127	TRANSISTOR,SILICON 2SC2812-L7-TA
Q4005	T83A028127	TRANSISTOR,SILICON 2SC2812-L7-TA
Q4006	T83A028127	TRANSISTOR,SILICON 2SC2812-L7-TA
Q4007	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q4008	T67A1037K0	TRANSISTOR,SILICON 2SA1037KT97
Q4009	T87A02412K	TRANSISTOR,SILICON 2SC2412K
Q4010	TN7TC05001	COMPOUND,TRANSISTOR DTC124EKT97
Q4201	TCTT0536S0	TRANSISTOR,SILICON 2SC536SP-T
Q5005	TC1T013170	TRANSISTOR,SILICON 2SC1317-T
Q6001	T83A028126	TRANSISTOR,SILICON 2SC2812-L6-TA
Q6002	T63A011790	TRANSISTOR,SILICON 2SA1179-TA
Q6003	TN3TC05001	COMPOUND,TRANSISTOR 2SC3396(CY)-TA
Q6004	TC3T030000	TRANSISTOR,SILICON 2SC3000-AA
Q6005	T83A028126	TRANSISTOR,SILICON 2SC2812-L6-TA
Q6006	TC3T0536K0	TRANSISTOR,SILICON 2SC536KNP-AA
Q6501	T83A028126	TRANSISTOR,SILICON 2SC2812-L6-TA
Q6502	TN3TC05001	COMPOUND,TRANSISTOR 2SC3396(CY)-TA
COILS & TRANSFORMERS		
L701	021JA6101K	COIL 100 UH
L1001	021B73101K	COIL 100 UH
L3002	021JA6180K	COIL 18 UH
L3003	021JA63R3K	COIL 3.3 UH
L3004	021JA6101K	COIL 100 UH
L3005	021B73101K	COIL 100 UH
L3006	021JA6150K	COIL 15 UH
L3701	021B73101K	COIL 100 UH
L3702	0326220011	COIL,TRAP 2622001
L4001	021JA6221K	COIL 220 UH
L4003	021JA6470K	COIL 47 UH
L4004	021JA61R0M	COIL 1.0 UH
L4005	021B73101K	COIL 100 UH
L4006	021B73101K	COIL 100 UH
L4007	021JA6330K	COIL 33 UH
L4009	021JA6151K	COIL 150 UH
L4010	021JA5220K	COIL 22 UH
L4011	021JA6100K	COIL 10 UH
L4012	021JA6390K	COIL 39 UH
L4013	021JA6150K	COIL 15 UH
L4014	021JA6121K	COIL 120 UH
L4015	021JA6270K	COIL 27 UH
L4016	021JA6101K	COIL 100 UH
L4101	021B73101K	COIL 100 UH
L4102	021B73101K	COIL 100 UH
L5001	021B73101K	COIL 100 UH
L5003	021J74682J	COIL 6.8 MH
L6001	021JA6R82M	COIL 0.82 UH