

SONY®

HD BLACK AND WHITE MONITOR

HDM-90




HDVS

OPERATION AND MAINTENANCE MANUAL

1st Edition (Revised 2)

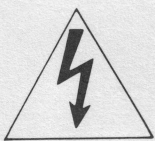
Serial No. 10001 and Higher

SAFETY RELATED COMPONENT WARNING

Components identified by shading and  marked on the schematic diagrams and parts list are critical to safe operation. Replace these components with SONY parts whose part numbers appear as shown in this manual or in supplements published by SONY.

X-RAY RADIATION WARNING

Be sure that parts replacement in the high voltage block and adjustments made to the high voltage circuits are carried out precisely in accordance with the procedures given in this manual.



This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

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SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5 mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 7.5 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20 V AC range are suitable. (See Fig. A)

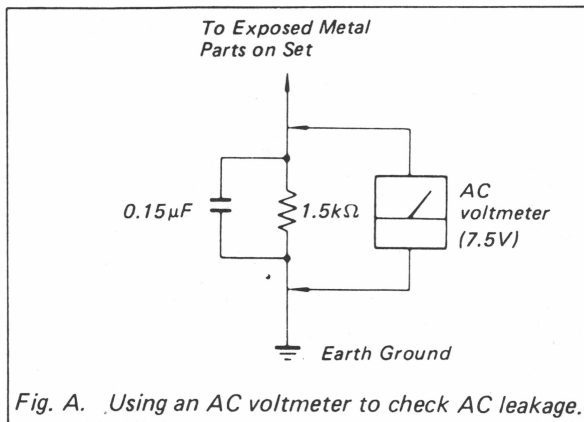


Fig. A. Using an AC voltmeter to check AC leakage.

For the customers in the U.S.A.

Warning—This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Important—To insure that the complete system (including this peripheral) is capable of complying with the FCC requirements, it is recommended that the user make sure that the individual equipment of the complete system has a label with one of the following statements.

"This equipment has been tested with a Class A Computing Device and has been found to comply with Part 15 of FCC Rules."

—or—

"This equipment complies with the requirements in Part 15 of FCC Rules for a Class A Computing Device."

—or equivalent.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a computing device pursuant to Subpart J of Part 15 of FCC Rules.

For the customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiés dans le Règlement sur le brouillage radioélectrique.

WARNING: Changing the voltage selector may require the use of a different line cord or attachment plug, or both.

To reduce the risk of fire or electric shock, refer servicing to qualified service personnel.

SAFETY CHECK OUT

When using the device, always wear safety glasses and use proper lifting techniques. Do not use the device if you are pregnant or have a medical condition that may be affected by the device. The device is not to be used in a confined space or near flammable materials. Always follow the instructions on the label and the manual.

WARNING TEST

WARNING: This device is not to be used in a confined space or near flammable materials. Always follow the instructions on the label and the manual. The device is not to be used in a confined space or near flammable materials. Always follow the instructions on the label and the manual.

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FOR THE CUSTOMER IN THE U.S.A.

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FOR THE CUSTOMER IN CANADA

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POUR LE CLIENT AU CANADA

This device is not to be used in a confined space or near flammable materials. Always follow the instructions on the label and the manual. The device is not to be used in a confined space or near flammable materials. Always follow the instructions on the label and the manual.

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SECTION 1 OPERATION

The HDM-90 is a 9-inch B/W monitor designed for use with Sony High Definition Video System (HDVS).

1-1. Features

High-resolution picture

This monitor employs a high-resolution picture tube.

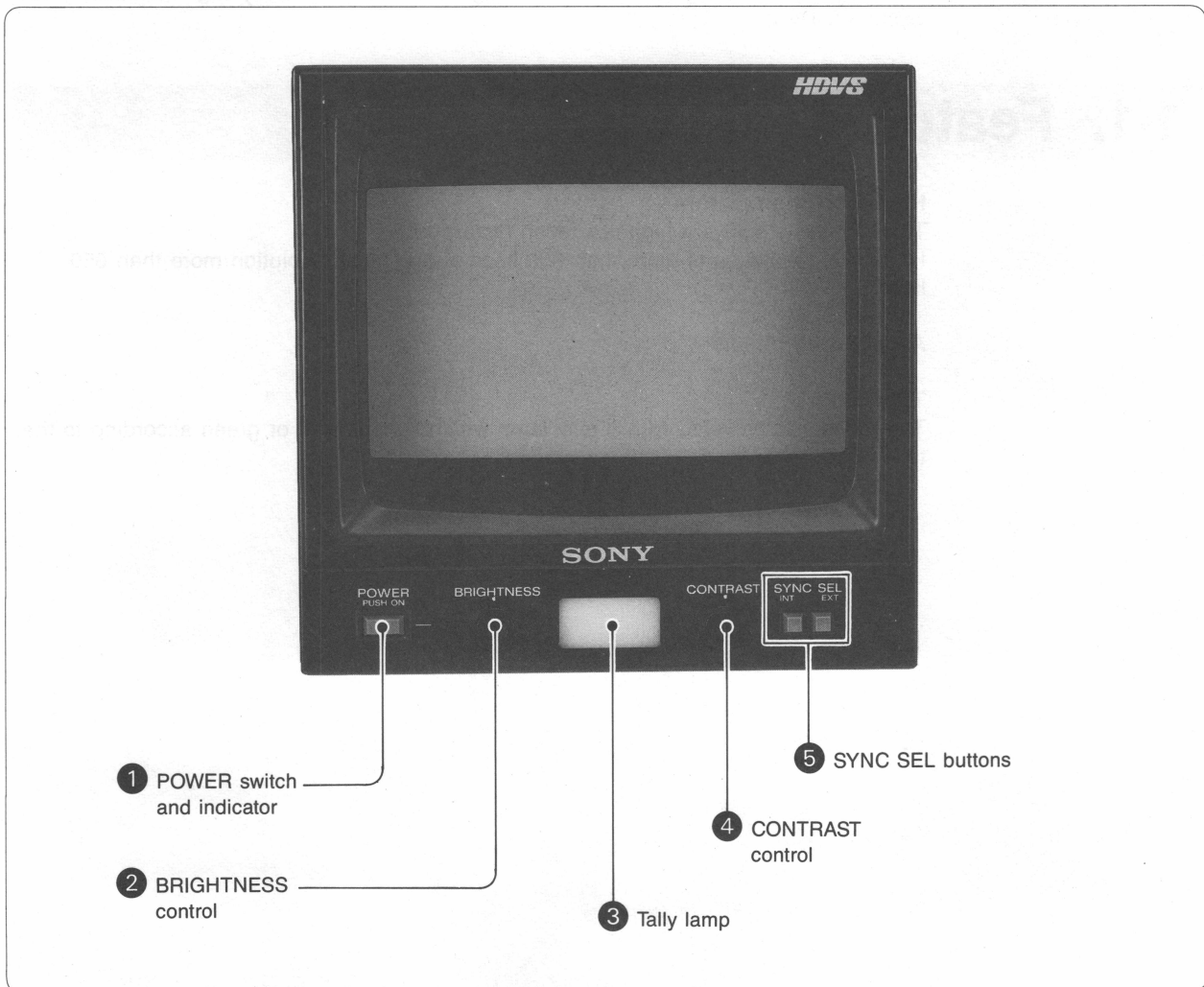
Horizontal resolution is more than 850 lines and vertical resolution more than 650 lines.

Aspect ratio of 16:9

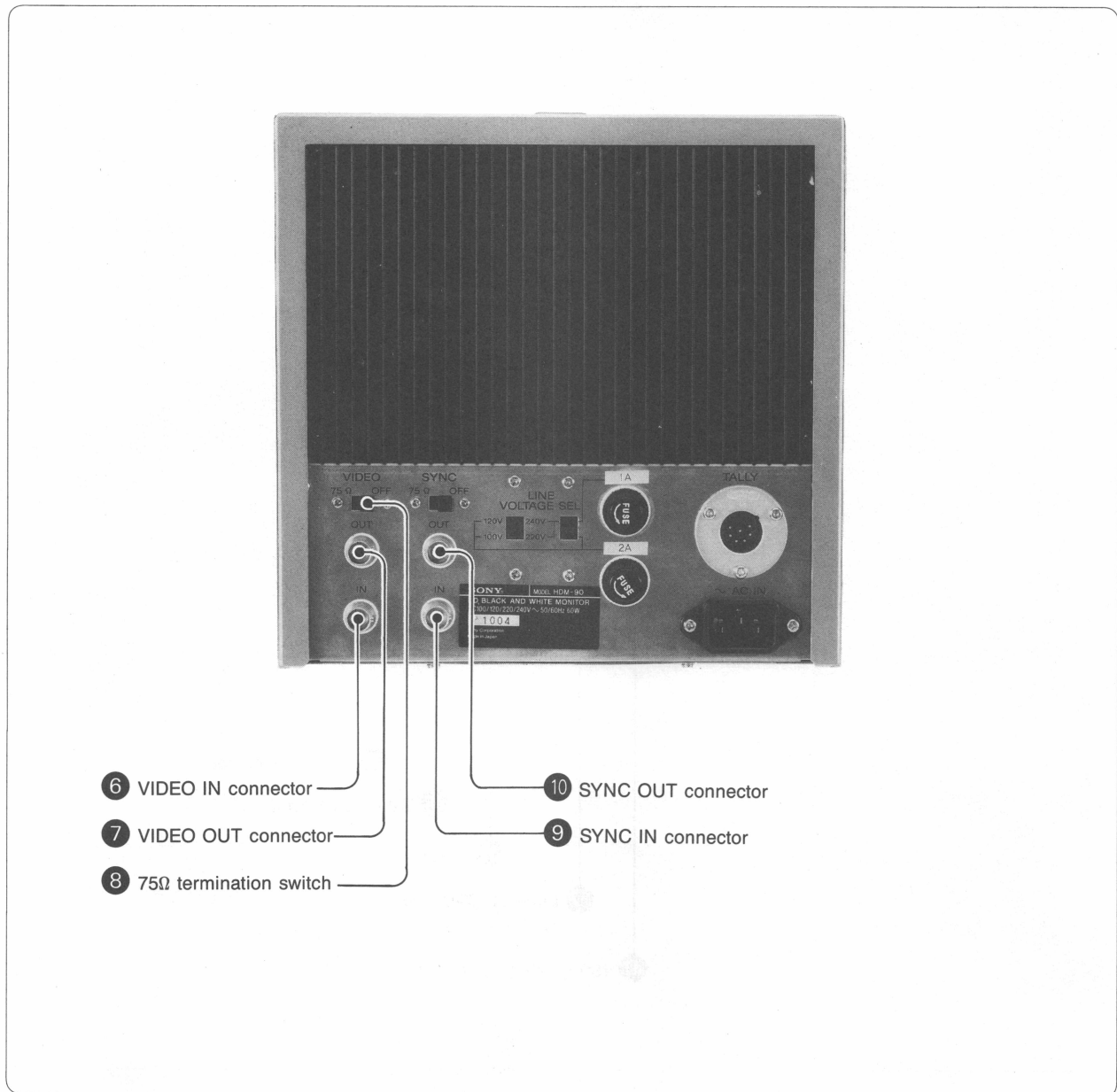
Tally lamp

The monitor is provided with a tally lamp which lights in red or green according to the tally signal received.

1-2. Location and Function of Parts and Controls

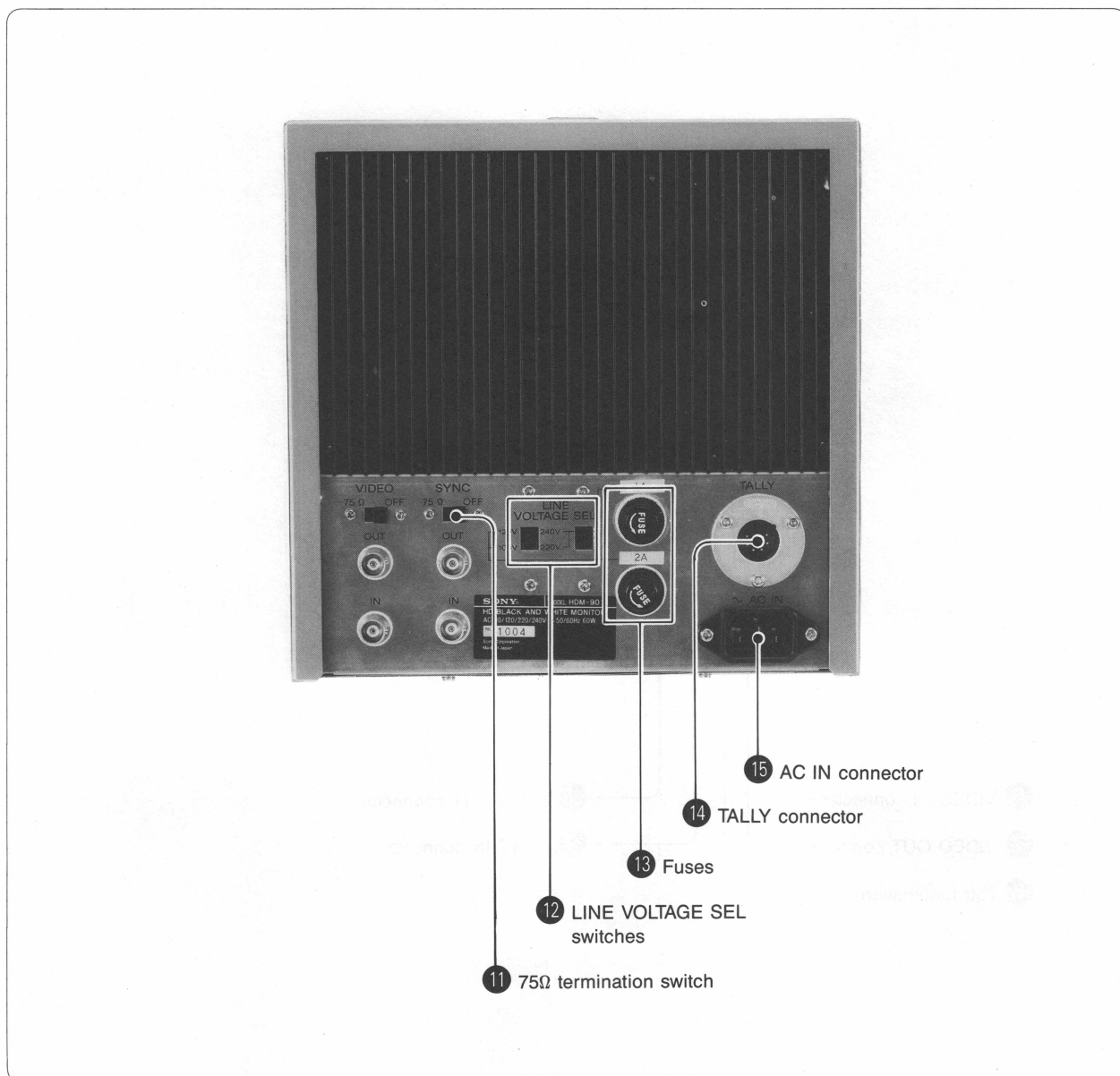


- 1 POWER switch and indicator**
To turn the monitor on, depress the POWER switch. The indicator will light. To turn it off, press the switch again.
- 2 BRIGHTNESS control**
Adjusts the picture brightness.
- 3 Tally lamp**
Lights in red or green according to the tally signal supplied through the TALLY connector located at the rear.
- 4 CONTRAST control**
Adjusts the picture contrast.
- 5 SYNC SEL buttons**
INT: To drive the monitor with the internal sync signal, depress this button.
EXT: To drive the monitor with an external sync signal supplied through the SYNC IN connector located at the rear, depress this button.



- 6 VIDEO IN connector
- 7 VIDEO OUT connector
- 8 75 Ω termination switch
- 9 SYNC IN connector
- 10 SYNC OUT connector

- 6 **VIDEO IN connector (BNC type)**
Connect to the PIC MONI VIDEO OUT connector of the HDCS-300 camera signal processor.
- 7 **VIDEO OUT connector (BNC type)**
Loop-through output of the VIDEO IN connector.
- 8 **75 Ω termination switch**
When only the VIDEO IN connector is used (the VIDEO OUT connector is not used), set this switch to ON.
When both the VIDEO IN and VIDEO OUT connectors are used together for a loop-through connection, set the switch to OFF.
- 9 **SYNC IN connector (BNC type)**
When driving the monitor with an external sync signal, supply the sync signal generated by an external sync generator.
- 10 **SYNC OUT connector (BNC type)**
Loop-through output of the SYNC IN connector.



11 75Ω termination switch

When only the SYNC IN connector is used (the SYNC OUT connector is not used), set this switch to ON.

When both the SYNC IN and SYNC OUT connectors are used together for a loop-through connection, set the switch to OFF.

12 LINE VOLTAGE SEL switches

Set to 100V, 120V, 220V or 240V AC according to your local power line voltage. See "1-3-1. Operating Voltage" on page 1-5.

13 Fuses

1A: Operates when the LINE VOLTAGE SEL switches are set to 220V or 240V.

2A: Operates when the LINE VOLTAGE SEL switches are set to 100V or 120V.

14 TALLY connector (XLR 7-pin)

Connect to the PIC MONI TALLY OUT connector of the HD-CS-300 camera signal processor.

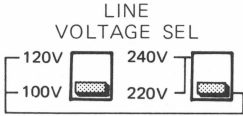
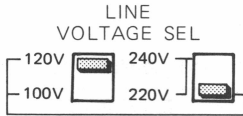
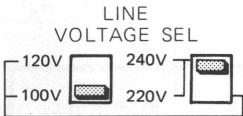
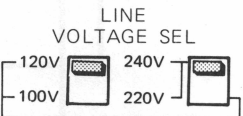
15 AC IN connector

Connect the supplied AC power cord.

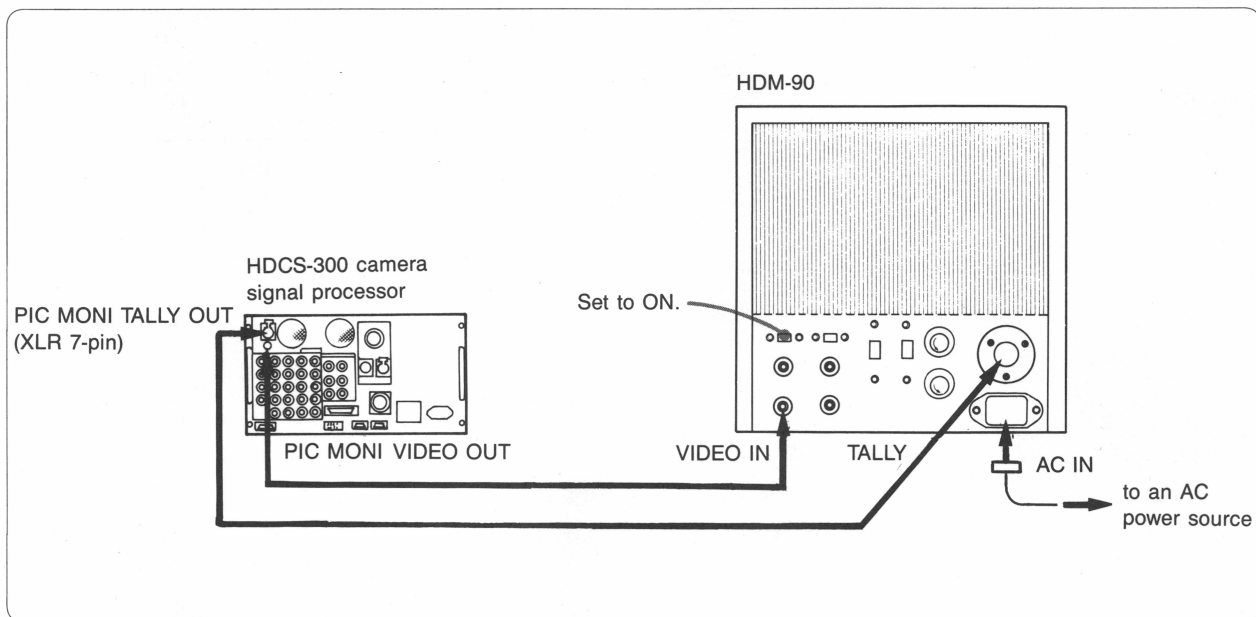
1-3. Connections

1-3-1. Operating Voltage

This unit operates on either 100V, 120V, 220V or 240V AC. Before connecting the unit to the power source, set the LINE VOLTAGE SEL switches located at the rear correctly to your local power line voltage. The operating voltage is determined by the positions of the two switches.

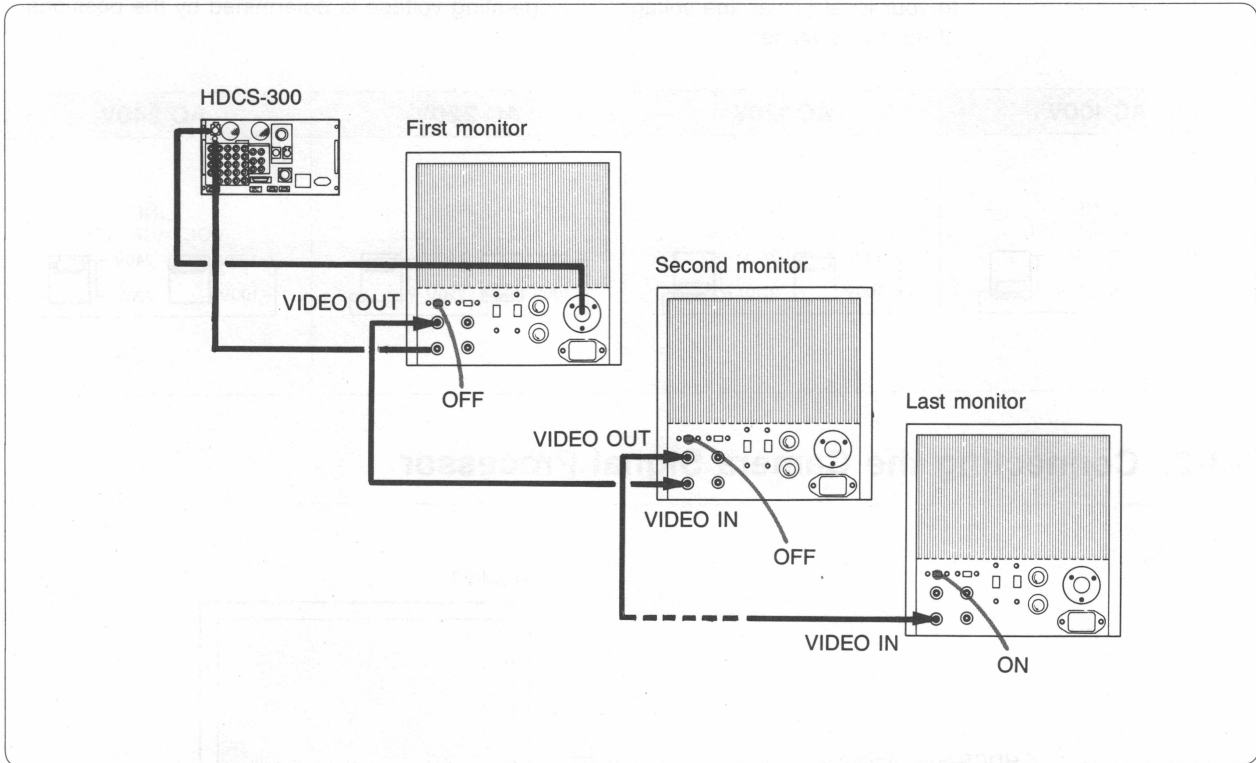
AC 100V	AC 120V	AC 220V	AC 240V
			

1-3-2. Connecting the Camera Signal Processor

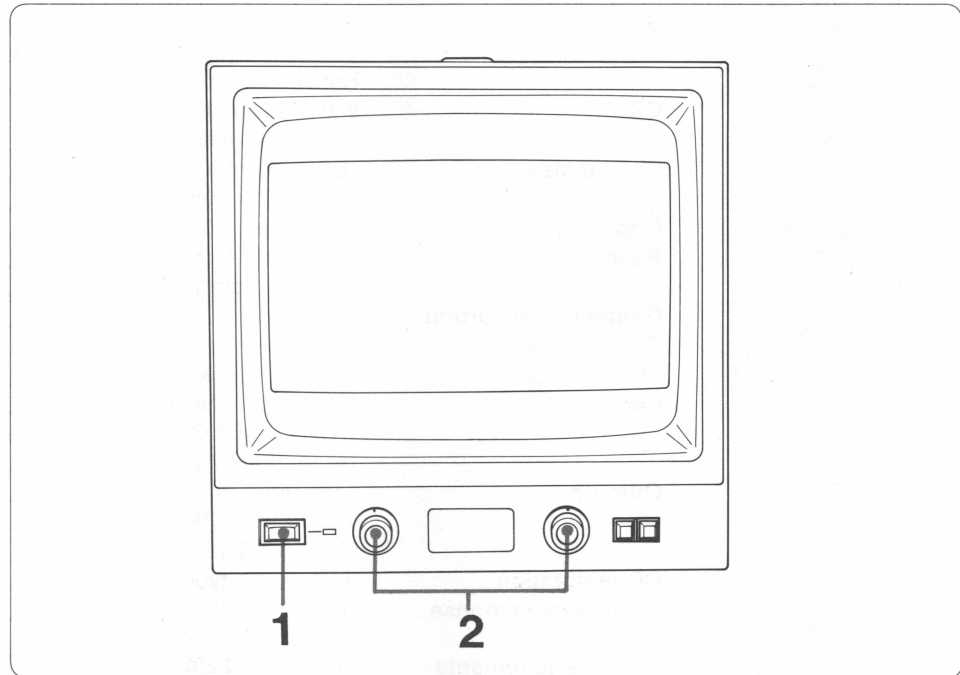


1-3-3. Connecting Several Monitors

The loop-through connection is convenient for monitoring the same signal on several monitors. Up to 5 monitors can be connected.



1-4. Operation



1 Depress the POWER switch.

2 Adjust the picture brightness and contrast with the BRIGHTNESS and CONTRAST controls.

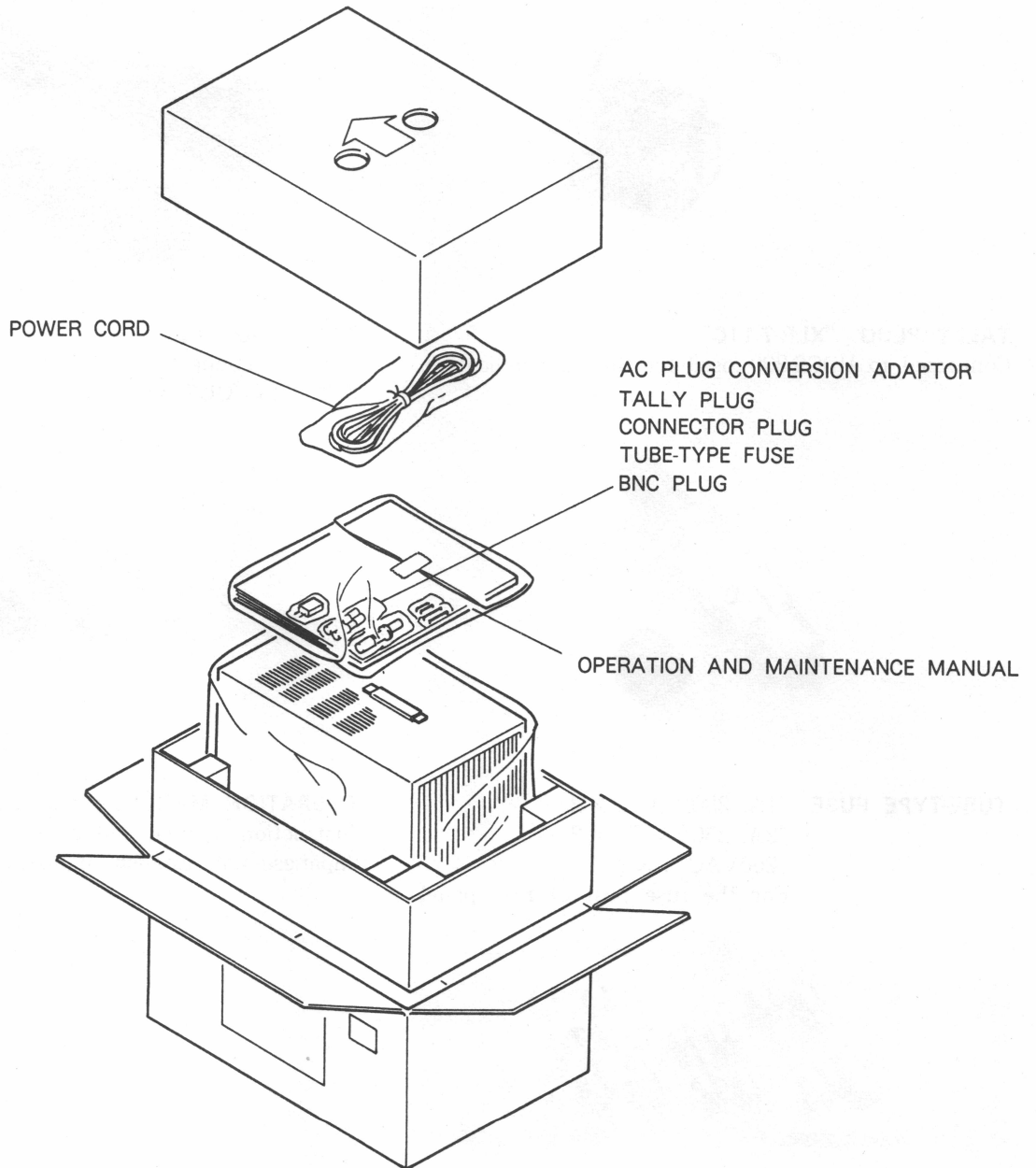
1-5. Specifications

System	Scanning line: 1,125 lines Vertical frequency: 60 Hz Horizontal frequency: 33.75 kHz
CRT	9-inch monochrome 90-degree deflection
Picture size	164 × 92 mm (6 ¹ / ₂ × 3 ⁵ / ₈ inches)
Brightness	More than 150 cd/m ²
Resolution	Horizontal: More than 850 lines Vertical: More than 650 lines
Geometric distortion	Within 2%
EHT regulation	Within 3%
EHT voltage	15.0 kV ± 0.5 kV
Inputs	VIDEO IN (BNC type): 1 Vp-p, 3 level sync, 75 ohms SYNC IN (BNC type): 0.6Vp-p, 3 level, 75 ohms TALLY (XLR 7-pin): contact and power supply
Outputs	Loop-through outputs VIDEO OUT (BNC type) SYNC OUT (BNC type)
DC restoration	Back porch type
Frequency response	30 Hz – 25 MHz ± 1.0 dB. 25 MHz – 30 MHz $\begin{matrix} +1.0 \\ -3.0 \end{matrix}$ dB
Power requirements	100V, 120V, 220V or 240V AC switchable, 50/60 Hz
Power consumption	Approx. 80W
Dimensions	220 × 215 × 350 mm (w/h/d) (8 ³ / ₄ × 8 ¹ / ₂ × 13 ⁷ / ₈ inches)
Weight	Approx. 12 kg (26 lb 7 oz)
Accessories supplied	Tally connector (XLR 7-pin) (1) BNC connector (2) Fuse (1A, 250V, L) (2) Fuse (1A, 250V, S) (2) Fuse (2A, 250V) (2) AC power cord (2) Conversion adaptor (3pin ↔ 2pin) (1) Operation and maintenance manual (1)

Design and specifications are subject to change without notice.

SECTION 2 INSTALLATION

2-1. UNPACKING AND REPACKING

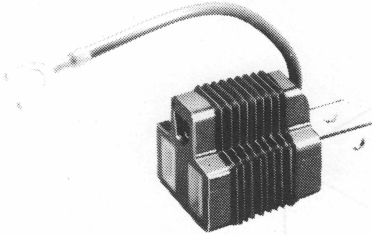


2. INSTALLATION

2-2. SUPPLIED ACCESSORIES

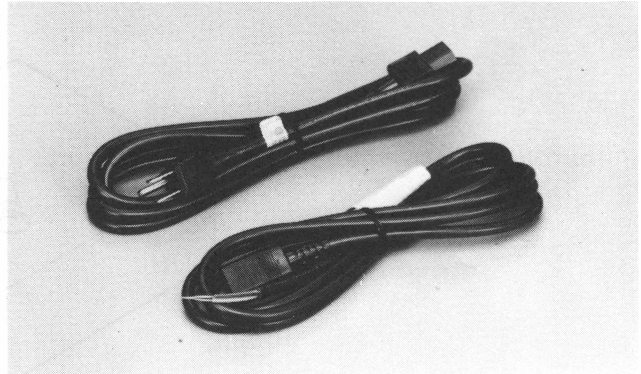
AC PLUG CONVERSION ADAPTOR 3P-2P : × 1

Used to connect the power cord with a 3P plug to the power outlet for 2 pins.



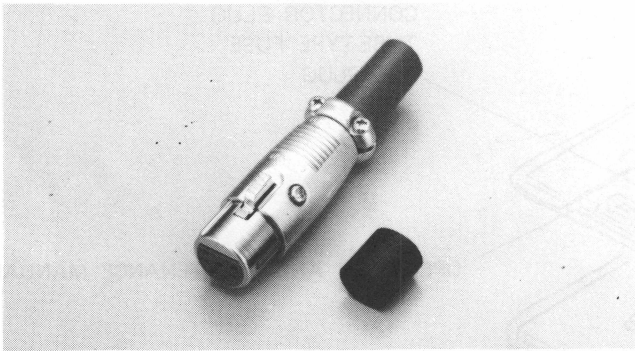
POWER CORD : × 2

The power cord with a 3P plug and the power cord without a plug are supplied. Use one of them according to the power outlet to be used.



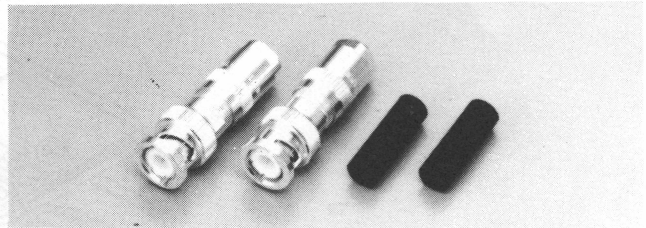
TALLY PLUG "XLR-7-11C" : × 1

Connected to HDCS-300, used for the tally indication.



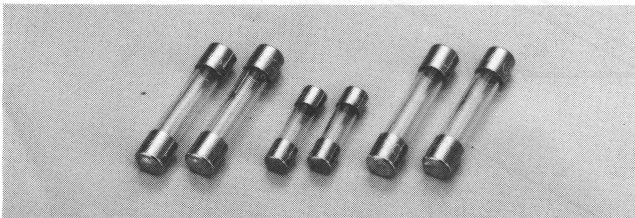
BNC PLUG : × 2

Used to connect to VIDEO IN/OUT terminal and SYNC IN/OUT terminal.



TUBE-TYPE FUSE "1A, 250VAC" : × 2 "2A, 250VAC" : × 2 "250VAC" : × 2

For the fuse post of rear panel

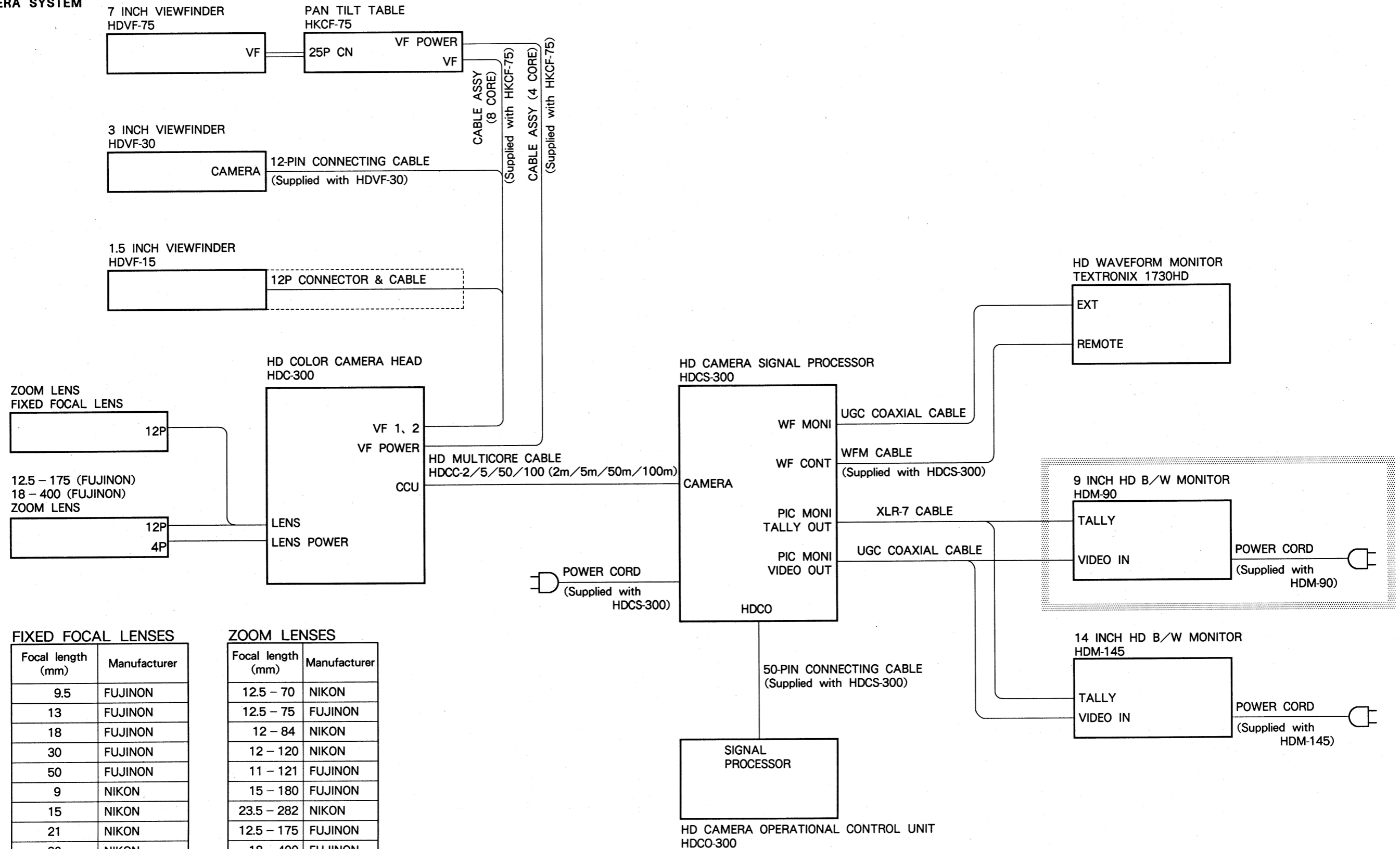


OPERATION MANUAL : × 2

Instruction manual and service manual for HDM-90. Japanese and English manuals.

2-4. CONNECTION EXAMPLE

HDVS CAMERA SYSTEM



CHAPTER 3 THEORY OF OPERATION

3-1. Input Circuit

3-1-1. Video Input Circuit (Q1, Q2 on UPC-492A Board)

The composite video signal supplied through the VIDEO input terminal is converted into a low impedance at Q1 and Q2 and is output from the emitter follower of Q2. The signal then either enters

C2 and passes through the video amplifier system of IC1, or it passes through R12 on the PD-171 board and enters the synchronization system.

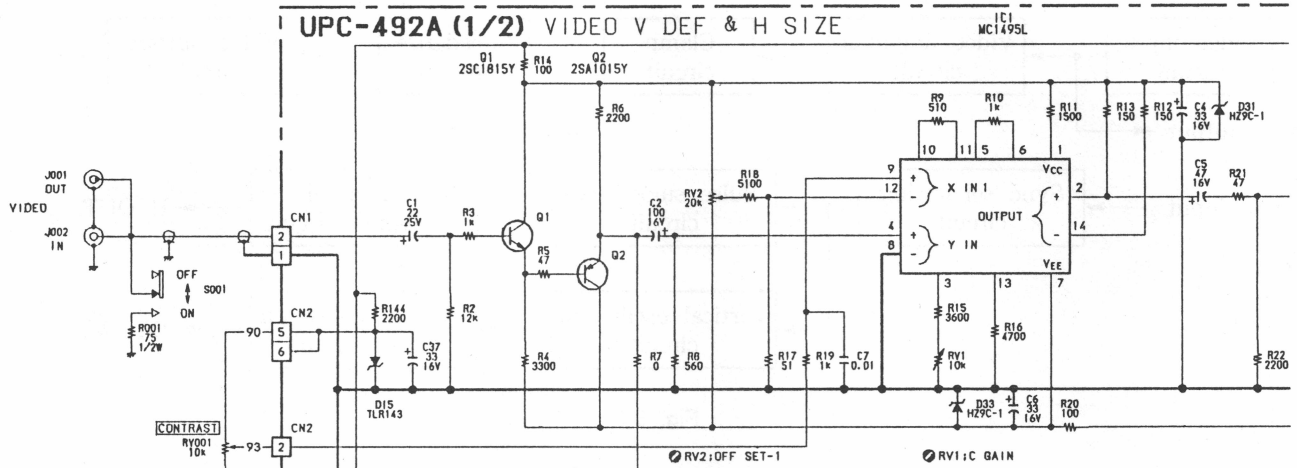


Fig. 3-1

3-1-2. Sync Input Circuit (Q1 on PD-171 Board)

The composite sync signal supplied through the SYNC input terminal is converted into a low impedance at Q1 and is sent to the sync switching circuit consisting of D1 and D2 on the PD-171 board.

3-1-3. Sync Switching Circuit (PD-171 Board)

Internal sync :

When the SYNC SEL switch is set to the INT position by INT or SYNC REMOTE, D1 is forward-biased and internal sync signals appear at R11, and D2 is reverse-biased and no external sync signal can pass through D2.

External sync :

When the SYNC SEL switch is set to the EXT position by EXT or SYNC REMOTE, D2 is forward-biased and external sync signals appear at R11, and D1 is reverse-biased and no internal sync signal can pass through D1.

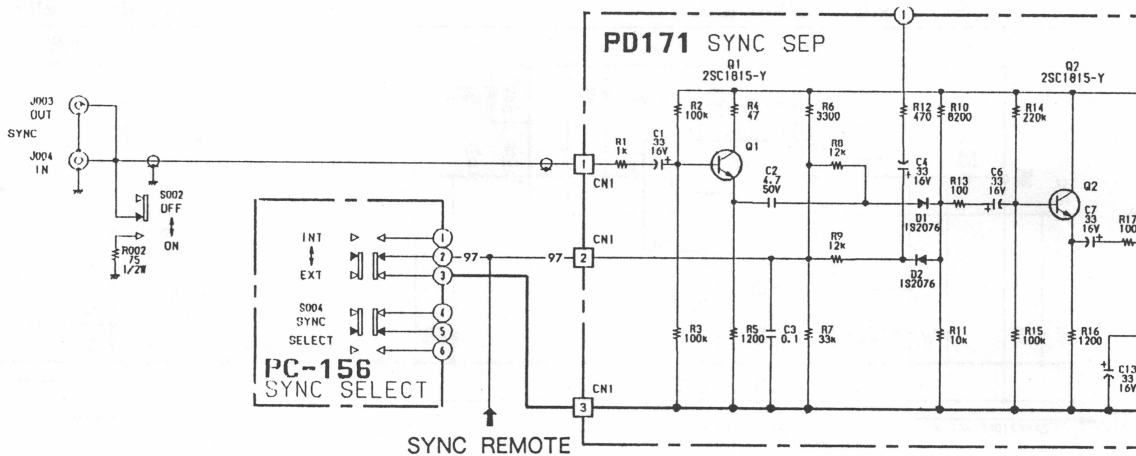


Fig. 3-2

3-2. Video Sync Process Circuit (UPC-492A Board, PD-171 Board)

This circuit board consists of the input circuit, video amplifier circuit, video output circuit (including the clamp circuit), sync circuit, horizontal oscillation

circuit, vertical oscillation circuit, and vertical deflection output circuit. Fig. 7-1 is a block diagram of this circuit board.

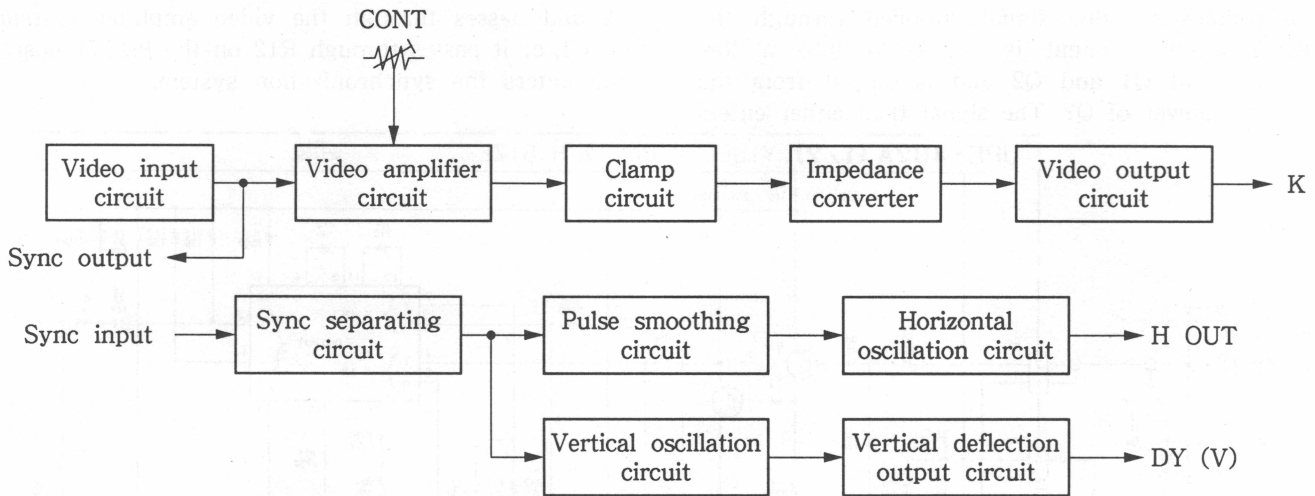


Fig. 3-3

3-2-1. Video Amplifier Circuit

The signal input from C2 enters pin ④ of IC1. It is then output to pin ② after the gain at IC is controlled by the DC voltage, which is adjusted by the external CONTRAST control. By varying the resistance of RV1 of pin ③, the gain at the contrast adjusting circuit is changed. The offset must be adjusted using the voltage of ⑩ so that the output of ② is minimized at CONTRAST MIN of ②.

The signal output from pin ② of IC1 is amplified at Q3 to Q7 and is converted into a low impedance. This output is connected to the clamp circuit at the next stage.

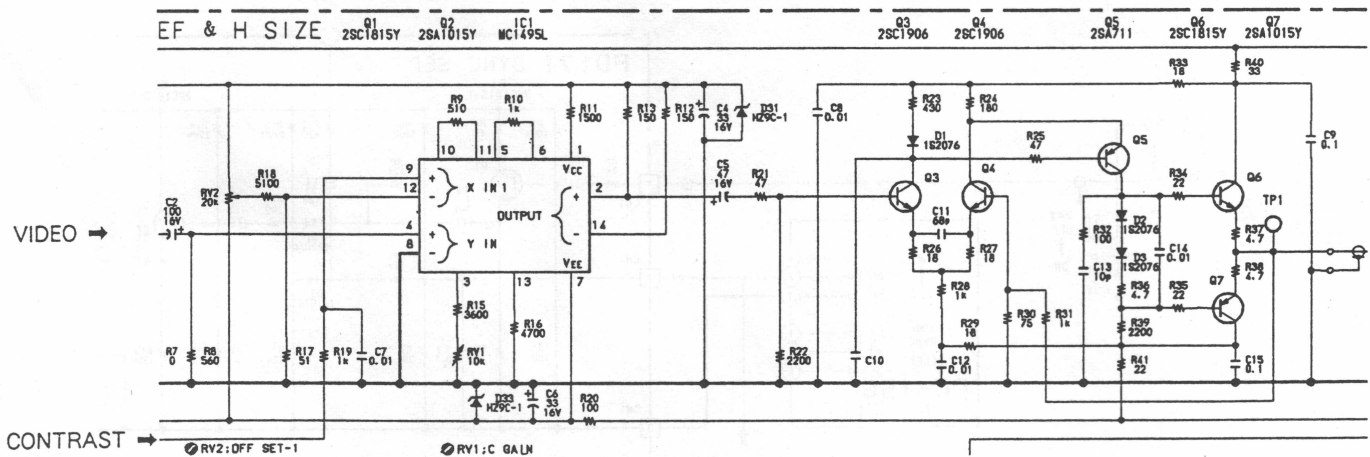


Fig. 3-4

3-2-2. Clamp Circuit

The clamp pulse output from pin ⑤ of IC4 drives Q17. The video signal of TP3 is clamped at the back porch by Q17. Q18 operates as an impedance transformer that provides high-input impedance and low-output impedance.

3-2-3. Video Output Circuit

The video output circuit consists of the cascode-connection amplifiers of Q19 to Q21. It amplifies the video signal to an adequate level to drive the CRT cathode.

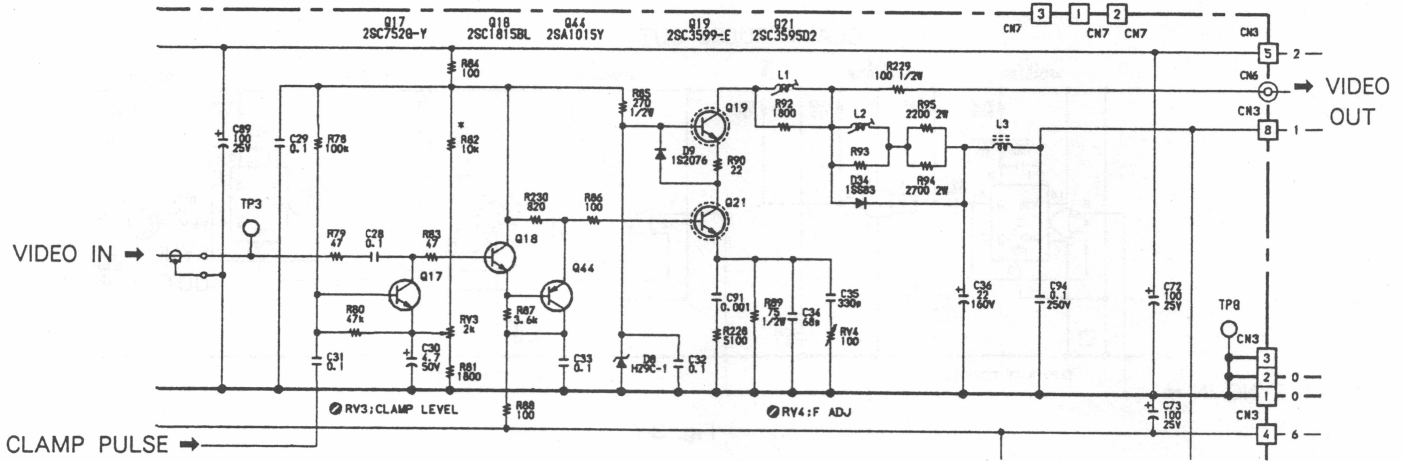


Fig. 3-5

3-2-4. Sync Separating Circuit (PD-171 Board)

The sync signal or sync composite video signal selected by the switching circuit on the PD-171 board is converted into low impedance at Q2 and is input to pin ① of IC1.

The synchronization of the sync composite video signal is separated in the IC, and the separated sync

signal is output from pin ④. The waveform of the sync signal is smoothed at Q3, and is converted into a low impedance at Q4. It is then applied to the UPC-492A board. The sync signal is integrated by R161 and C59, and the vertical sync signal is separated into the collector of Q33.

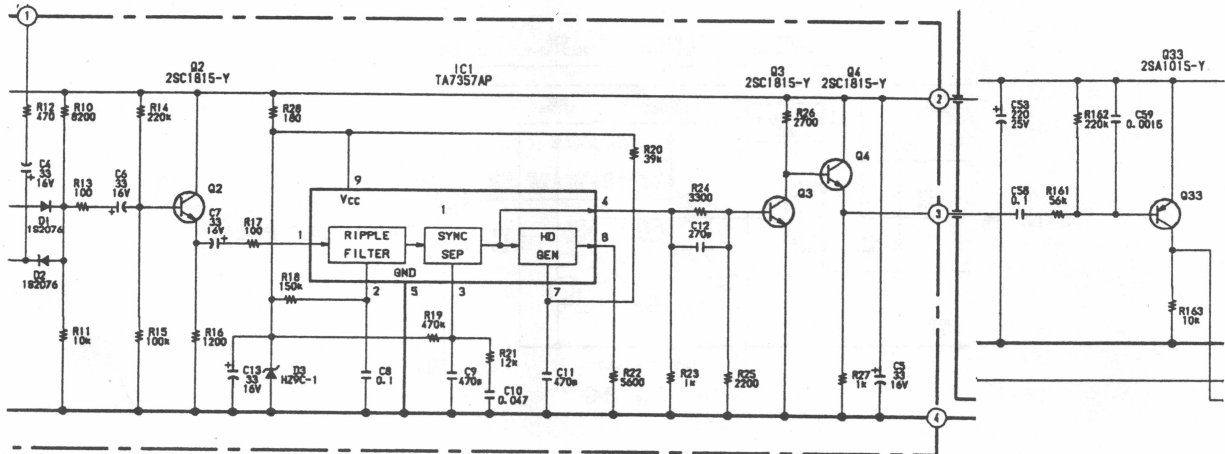


Fig. 3-6

3-2-7. Vertical Oscillation and Sawtooth Wave Generation Circuit

This circuit consists of Q38 to Q42, IC7, and IC8. The vertical sync pulse from the Q33 collector is inverted at Q38 and is input to the reset pin of IC7 to be synchronized with the oscillator. The pulse output from pin ③ of IC7 is inverted at Q39, and a sawtooth wave having good linearity is generated by the constant-current integrating circuit consisting of R198, Q40, 1/2 IC8, and C78. It is then output from the emitter follower of the buffer Q42, and is amplified by 2/2 IC8. Its level is shifted by D22.

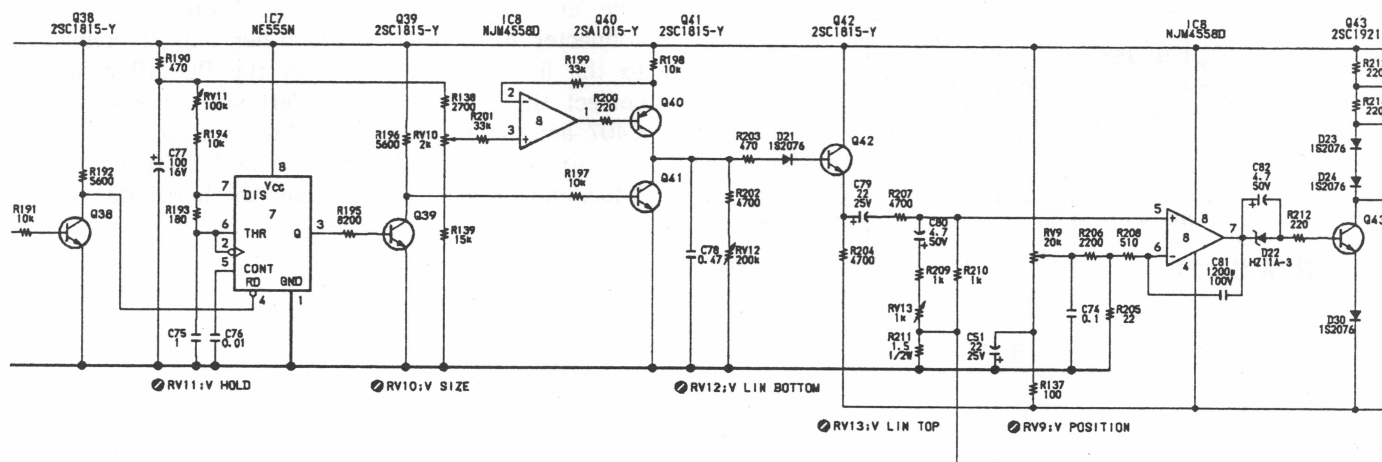


Fig. 3-9

3-2-8. Vertical Deflection Output Circuit

This circuit consists of D22 to D26, D30, Q43, and Q002 to Q004. The sawtooth wave, having passed through D22, is amplified at Q43, and drives Q002 and Q003. To prevent the retrace time from being extended due to gripping of the flyback pulse, Q004 is turned ON by the flyback pulse and a high positive voltage is supplied to the output stage during the retrace time.

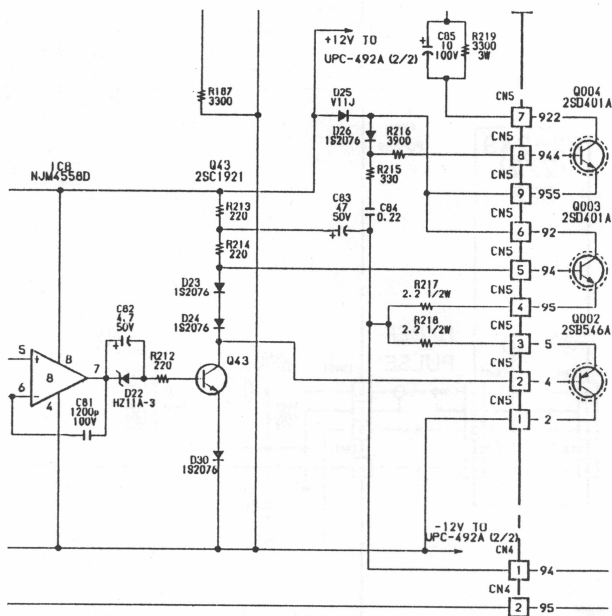


Fig. 3-10

3-2-9. Horizontal Amplification Control Circuit

This circuit consists of IC9, D28, D29, and Q005. It control the amplification by driving Q005 by the output of IC9 and changing the potential at the ground side of the deflection output circuit.

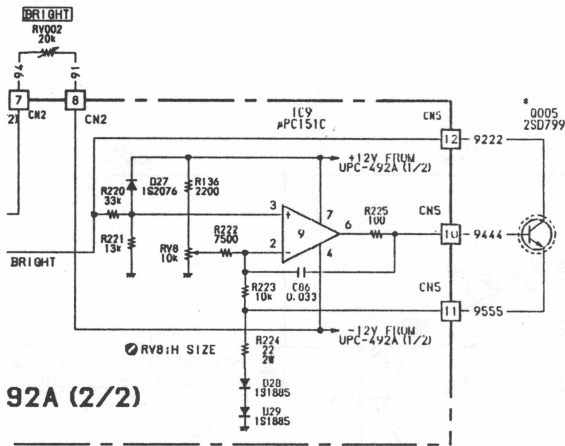


Fig. 3-11

3-3. Horizontal Deflection Output Circuit (UPC-459 Board, PD-249 Board)

The pulse output from Q37 on the UPC-492A board is input to the base of Q401 on the UPC-459 board via the PD-249 board.

Q401 switches the current at the primary side of T401 on and off. The output at the secondary side, which has been converted into an impedance, drives the horizontal deflection output circuit consisting of the transistors Q006 and D401 incorporating damper diodes.

By switching Q006, a horizontal deflection sawtooth wave current flows into the H winding of DY001. One end of the H winding is connected to the connector of Q006, and the other end is connected to the linearity coil L301 on the PD-249 board to correct the linearity of the left side on the screen. C407 and C408 connected to the connector of Q006 constitute a resonance circuit with DY001, D006, and T402, and the circuit determines the horizontal retrace time.

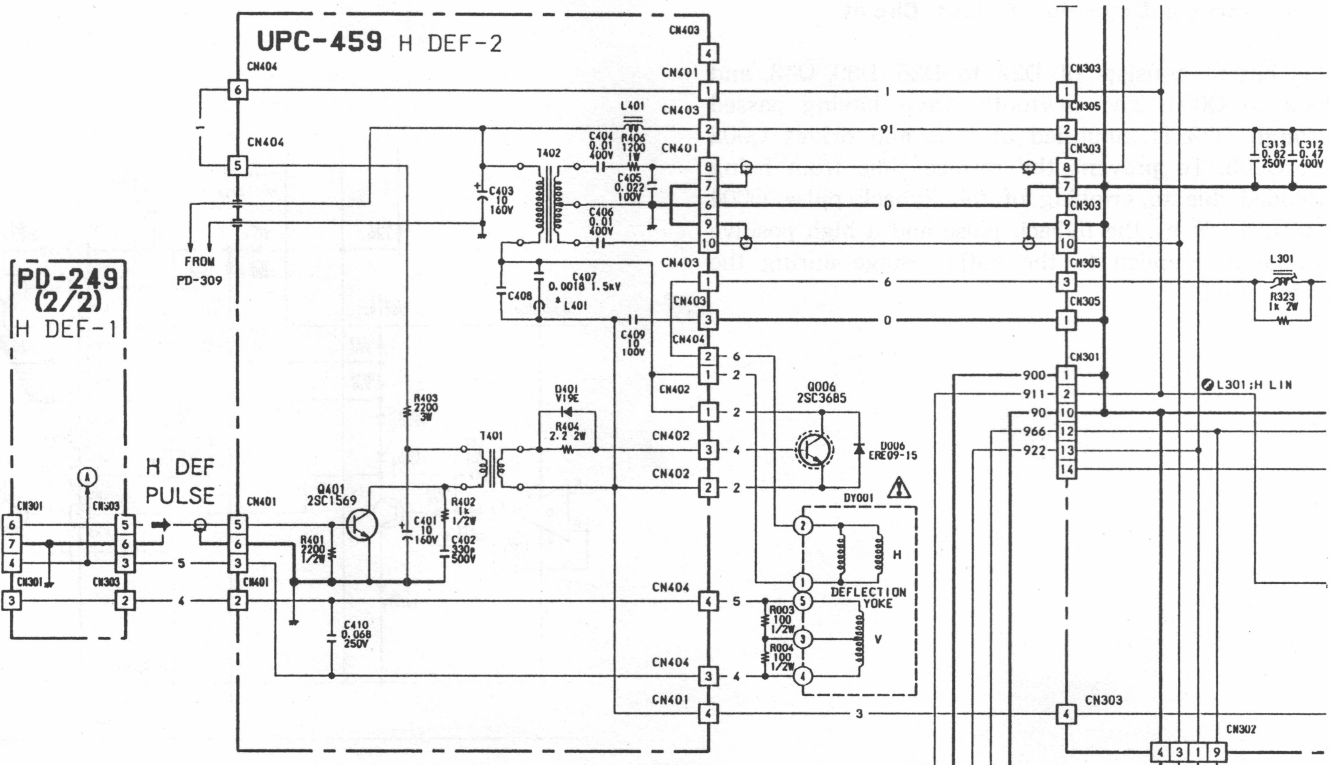


Fig. 3-12

3-4. CRT Peripheral Circuit (UPC-249 Board)

3-4-1. Blanking Circuit

This circuit consists of D301, D302, Q301, and so forth. The vertical retrace pulse input from C303 and the horizontal retrace pulse input from C301 and R301 are combined at the base of Q301, and the amplified pulse is output from the collector. The output enters the first grid (G1) of the CRT, and the beam is cut during the retrace time.

The voltage for controlling BRIGHTNESS is supplied to the cathode side of D302, and D302 adjusts the direct current level to control the brightness.

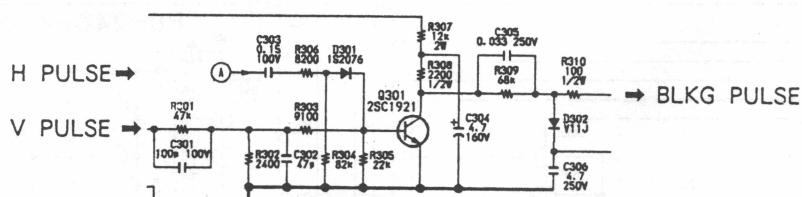


Fig. 3-13

3-4-2. Focus Circuit

This circuit consists of Q302 to Q305. The horizontal parabolic voltage is input to the base of Q302, and is output from the emitter follower. The signal level of the output is adjusted with RV301, and the dynamic focus amplifier circuit amplifies it to the required output level. The amplified voltage is combined with the direct voltage of RV302 through C311, and is applied to the focus (G4) of the CRT.

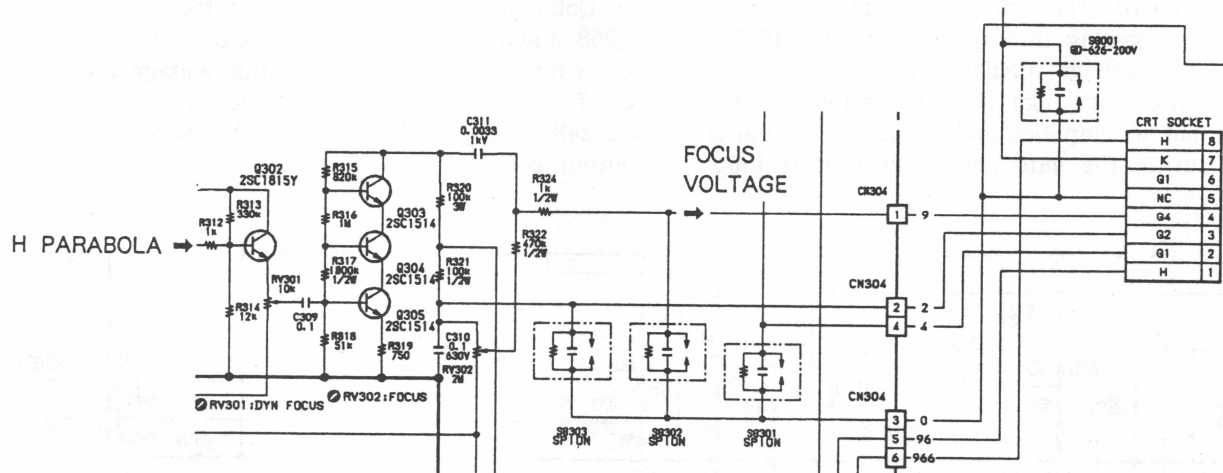


Fig. 3-14

3-5. High-Voltage Circuit – HV UNIT (PD-231 Board, PD-248 Board)

3-5-1. High-Voltage Generation Circuit

The horizontal deflection pulse generated from pin ⑤ of the deflection yoke transformer T402 on the UPC-459 board passes through PD-249 and PD-248 boards and enters the base of Q502 on the PD-231 board. The pulse is inverted and amplified at Q502 to trigger the monostable multivibrator IC501. The output turns the T501 current on and off according to the Q501 switching operation. The pulse is converted into an impedance and is output to the

secondary side to drive the high-voltage output transistor Q007. A flyback pulse is generated in T601 on the PD-248 board according to the Q007 switching operation. By rectifying the flyback pulse, high voltages for anodes, focus voltage, screen voltage, and heater voltage are generated. These voltages are applied to each electrode of the CRT through the PD-249 board.

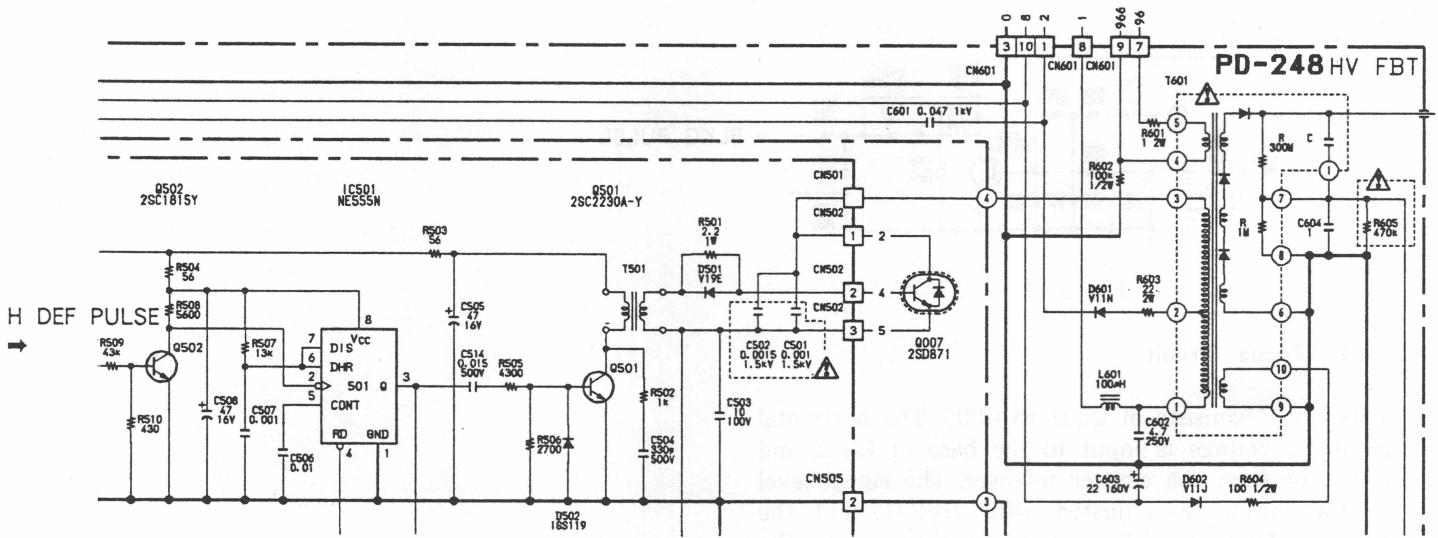


Fig. 3-15

3-5-2. High-Voltage Regulation Circuit

A high voltage is output from pin ⑦ of T601 on the PD-248 board. The voltage is input to pin ② of IC502 after passing through R516 on the PD-231 board. The high-voltage regulation circuit detects the difference between the high voltage and the reference voltage at pin ③, amplifies and outputs it to pin ⑥ of IC502 during the gate period when it is input

to pin ⑤. The voltage is converted into an impedance at Q503 and Q504. By changing the impedance of Q008 and controlling the connector voltage, that is, the emitter potential of the high voltage output of Q007, the flyback pulse voltage of T601 on the PD-248 board is changed, thereby making the HV output constant.

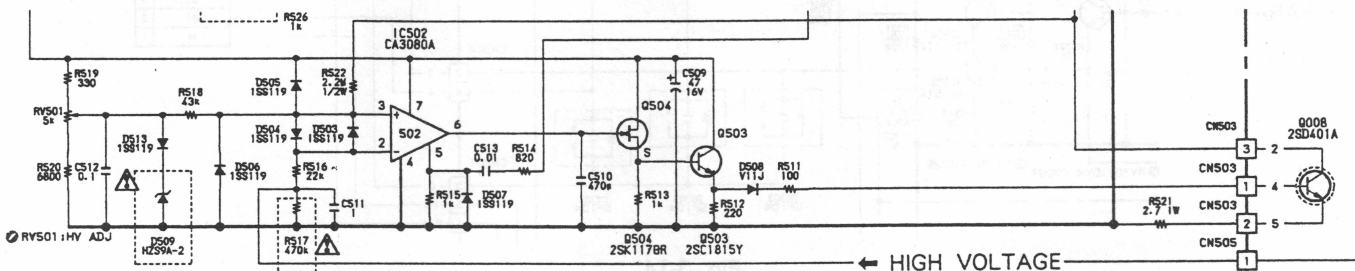


Fig. 3-16

3-6. Power Circuit (PD-247 Board)

3-6-1. +90V Circuit

The output from the T001 power transformer is full-wave rectified (bridge connection) at D001, and its ripple component is suppressed by C801 on the PD-247 board. The rectified direct current enters the collector of the control transistor Q001 after passing through F801. It is then output from the emitter follower and is supplied to various units. IC801 detects and amplifies the amount of variation in the output voltage to drive the base of the Q801 and control the base voltage of the Darlington-connected Q001, thereby making the +90V output constant. D801 regulates the voltage supplied to the differential amplifier Q802.

3-6-2. ±12V Circuit

The output of the T001 power transformer is full-wave rectified at D002, and for each output voltage from the positive and negative electrodes, the ripple component is suppressed at C804 and C805 on the PD-247 board. Its output passes through the 3-pin regulators IC001 and IC002, and is supplied to the +12V and -12V systems.

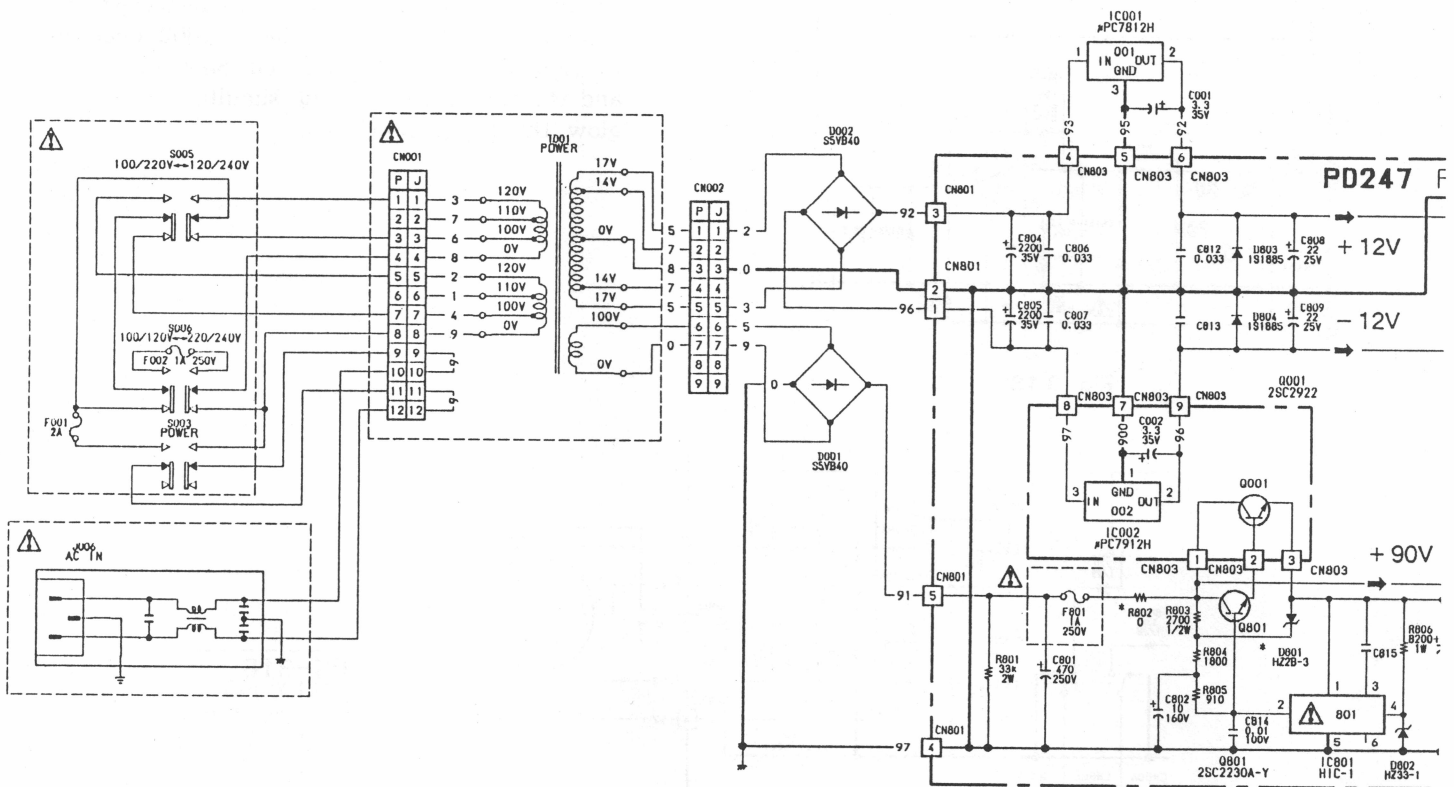


Fig. 3-17

3-7. X-Ray Protection Circuit (PD-231 Board)

If the high-voltage generation circuit fails, this circuit stops the operation of the high-voltage generation circuit, and prevents an abnormally high voltage and X-ray being generated from the CRT. Pin ⑩ of T601 on the PD-248 board detects an abnormal increase in the high voltage. This voltage is applied to pin ③ of IC503 after a bleeder operation is performed by R530, R531, and R532 inside the PD-231 board. A reference voltage (D511) is applied to pin ②. IC503 is a comparator. If the voltage of pin ③ drops below the voltage of pin ②, the voltages of pin ① and pin ④ (reset pin) become negative, and the high voltage oscillation circuit inside IC501 stops. This status is retained until the power switch is turned off.

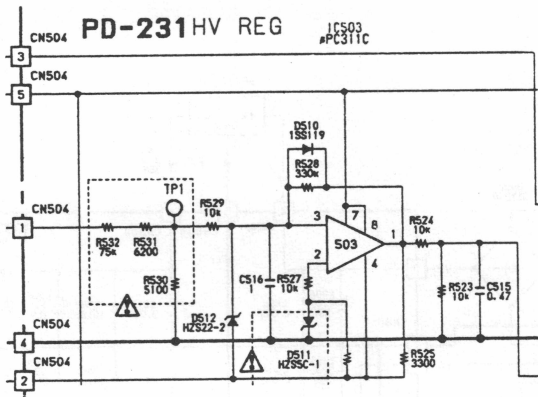


Fig. 3-18

3-8. Accessory Circuits

3-8-1. Tally Circuit

The tally circuit is controlled externally. The input to the tally circuit is provided through J005 in the following two modes a) and b) :

a) Power supply :

Set S801 on the PD-247 board to the POWER position. When the specified DC voltage (normally, 24V) is applied across pin ③ and ④ of J005, RY801 operates and D003 and D004 on the PC-316 board glow red.

Note : Pin ④ of J005 is the cold side.

In the same manner, when the specified DC voltage (normally, 24V) is applied across pins ⑤ and ⑥ of J005, RY802 operates and D003 and D004 on the PC-316 board glow green.

b) Contact supply :

Set S801 on the PD-247 board to CONTACT position. When pin ③ and ④ of J005 are shorted, RY801 is activated to glow D003 and D004 on the PC-316 board. In the same manner, when pin ⑤ and ⑥ of J005 are shorted, RY802 operates to glow D003 and D004 green. Shorting pin ③ and ④, and pin ⑤ and ⑥ simultaneously will glow D003 and D004 red.

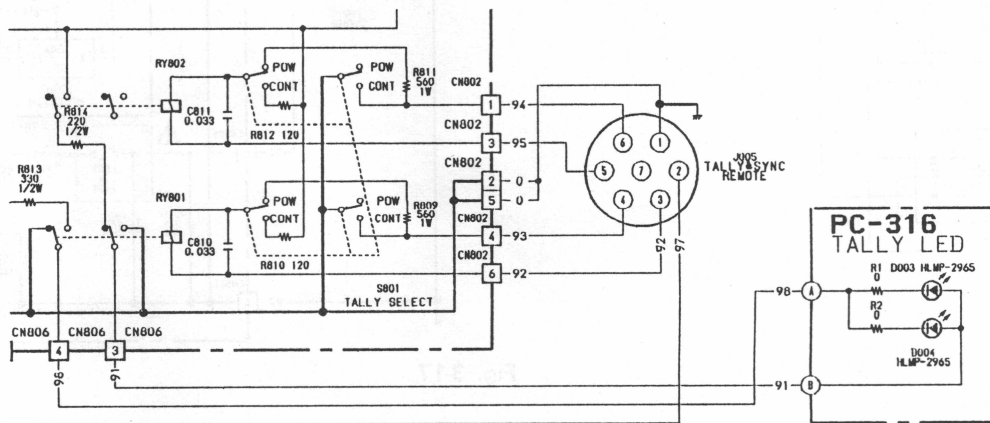
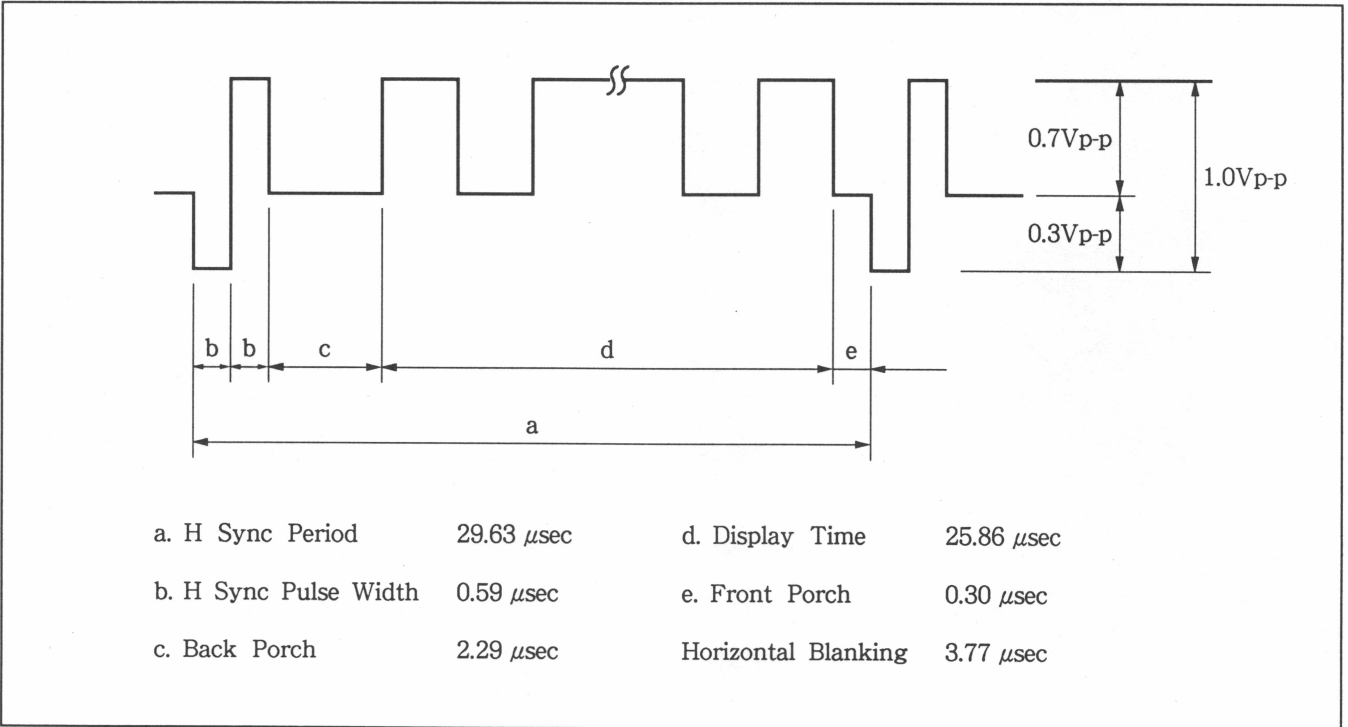


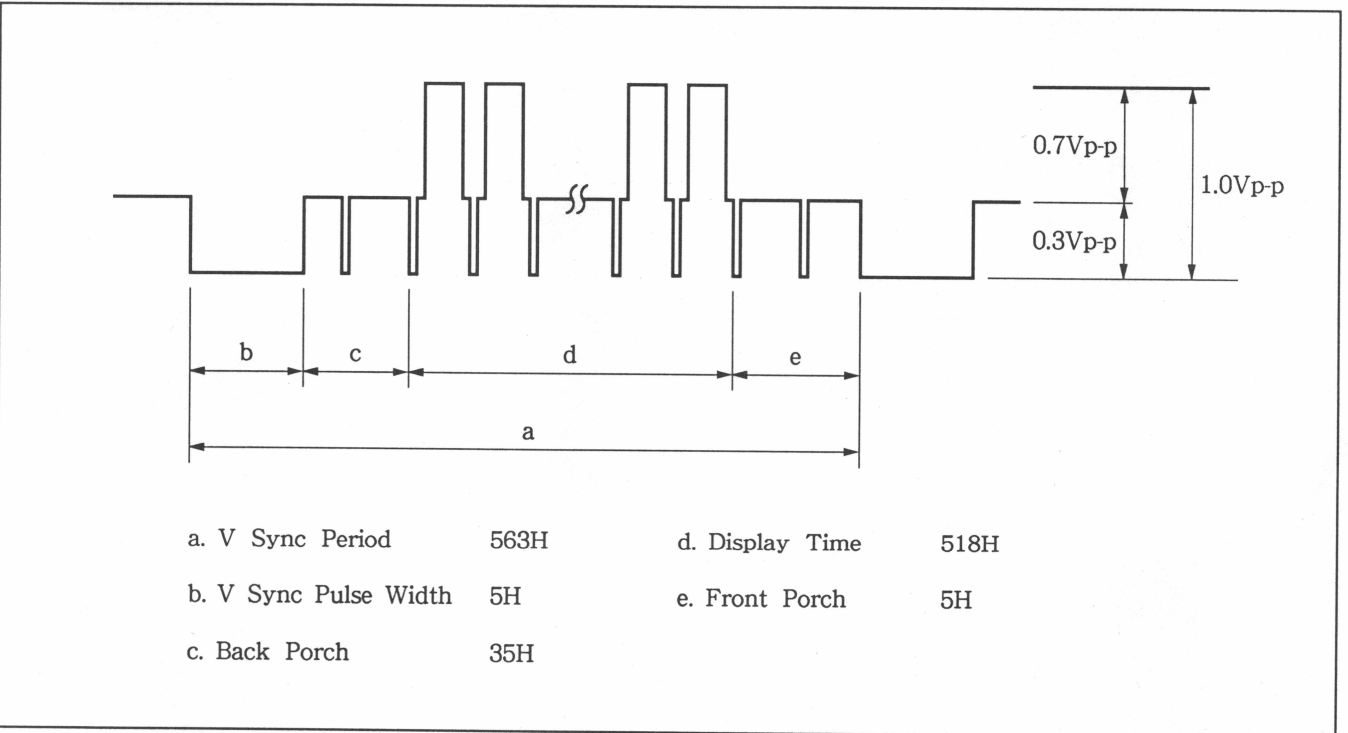
Fig. 3-19

3-9. Synchronizing Signal

(1) Horizontal synchronizing signal (1H)



(2) Vertical synchronizing signal (1V)



Timing Diagram

Timing Diagram



Timing Diagram

Timing Diagram

Timing Diagram

Timing Diagram

Timing Diagram



Timing Diagram

Timing Diagram

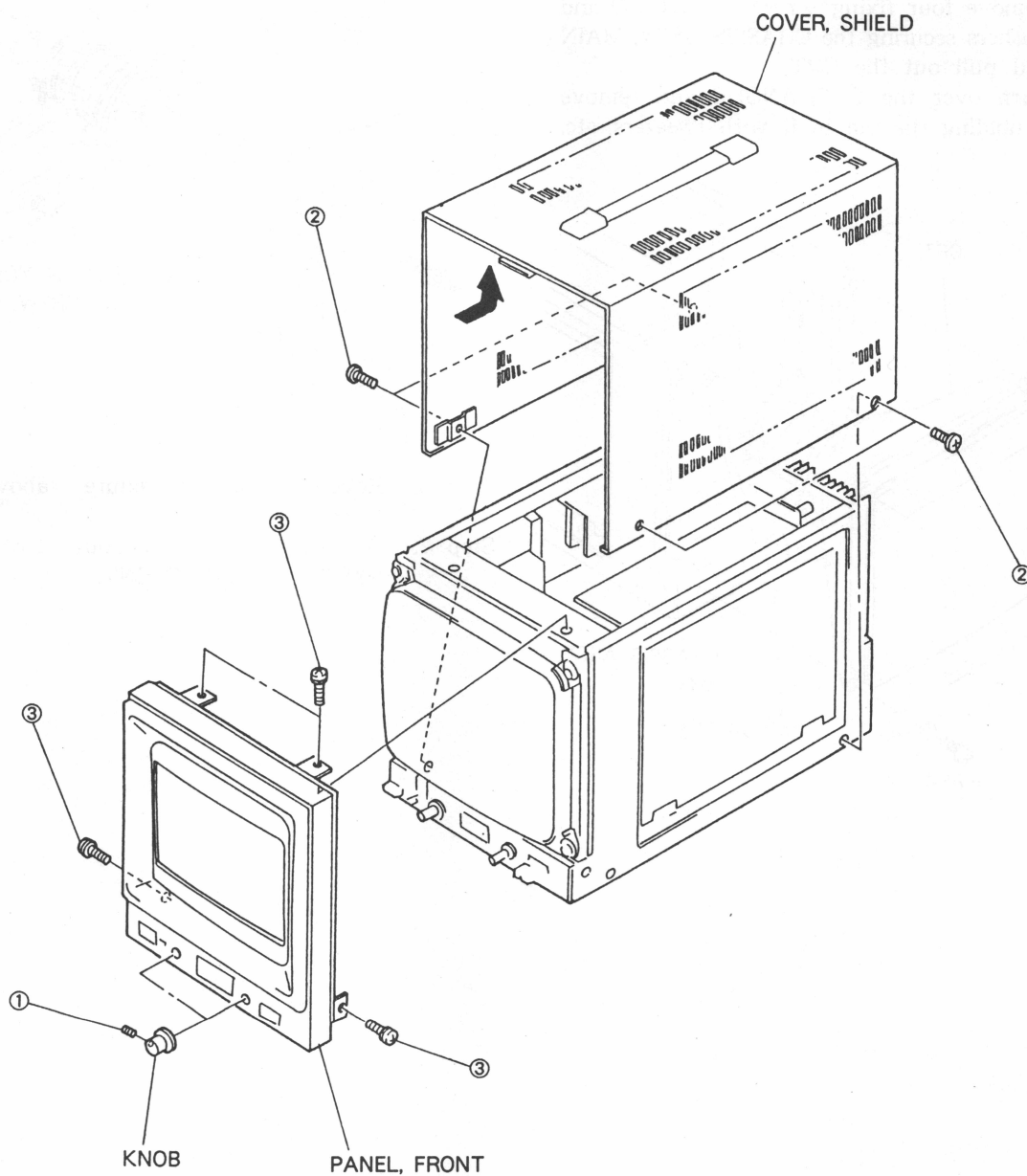
Timing Diagram

Timing Diagram

SECTION 4 MAINTENANCE

4-1. REMOVAL OF CABINET

1. Loosen the two screws ① (SET SCREW HEX. 3×4 FLAT POINT) fixing the KNOB and remove it.
2. Remove the four screws ② (+ B3×6) fixing the COVER, SHIELD and remove it.
3. Remove the four screws ③ (+ PS3×5) fixing the PANEL, FRONT and remove it.

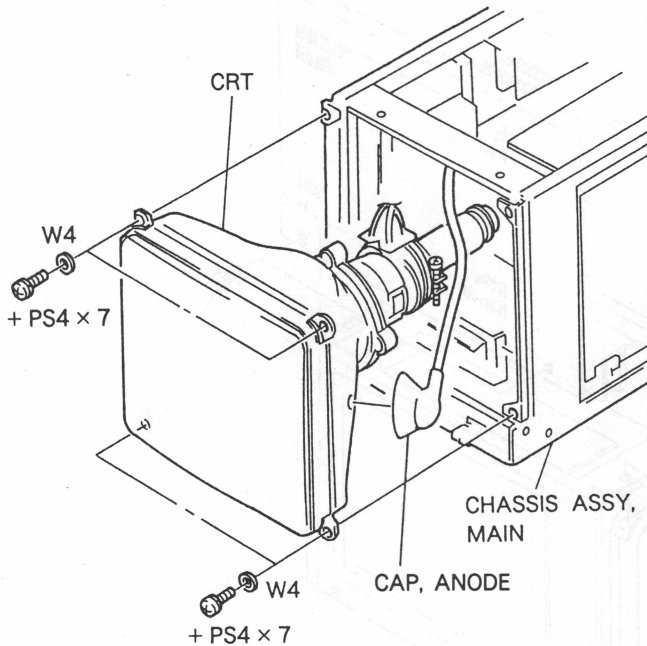


4-2. REPLACEMENT OF MAIN PARTS

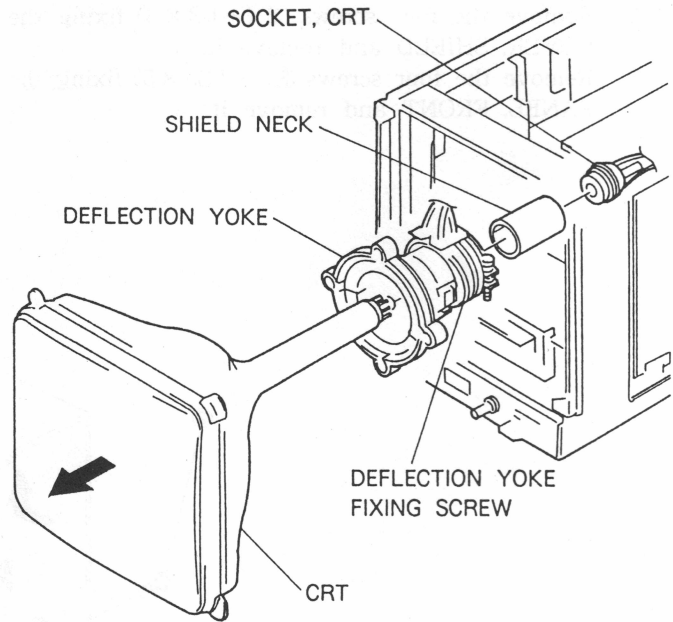
Note : When replacing or repairing the main parts, place the unit in a place with ample space around, such as on a work bench. Take utmost care to prevent possible danger.

4-2-1. Replacement of CRT and Deflection Yoke

- Step 1. Remove the COVER, SHIELD and PANEL, FRONT referring to 4-1. REMOVAL OF CABINET.
- Step 2. Remove four fixing screws (+ PS4 × 7) and washers securing the CHASSIS ASSY, MAIN and pull out the CRT.
- Step 3. Turn over the CAP, ANODE and remove it holding the pin in it with tweezers, etc.



- Step 4. Remove the SOCKET, CRT and the SHIELD NECK from the CRT.
- Step 5. Loosen the DEFLECTION YOKE FIXING SCREW and pull out the CRT in the direction indicated of the arrow.



- Step 6. Reverse the procedure above when reassembling.
- Step 7. Be sure to carry out DEFLECTION SYSTEM ADJUSTMENT.

4-3. PRECAUTIONS ON MAINTENANCE

4-3-1. Precaution on Replacement Parts

(1) Safety Related on Components Warning

Components identified by shading marked with \triangle on the exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony Parts whose part numbers appear in this manual or in Service bulletins and service manual supplement published by Sony.

(2) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the part which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts". This manual's exploded views and electrical spare parts list are indicating the parts number of "the standardization genuine parts at present".

(3) Stocked of Parts

The parts marked with "S" in the SP column of the exploded views and electrical spare parts list are normally required for routine service work. Order for parts marked with "O" will be processed, but allow for additional delivery time.

(4) Units of Capacitors, Inductors, and Resistors

The following units are omitted in the schematic diagrams, exploded views, and electrical parts lists unless otherwise specified ;

Capacitor : μF

Inductor : μH

Resistor : Ω

4-3-2. Precaution on Maintenance

(1) Handle the CRT body and the controls on the neck of the CRT with utmost care and do not apply excessive force to the CRT.

(2) High voltage of 15kV and high voltage pulse of 1kVp-p exist on the high voltage and deflection circuits. Take utmost care when checking the unit while it is operating ; especially high voltage circuit and deflection circuit. 100V and 1KV power lines are installed on the printed board. Do not touch the printed board with bare hand or tools.

(3) Before touching the CRT for checking purpose or replacing it, cut off the power, remove the high voltage anode cap and discharge the accumulated electricity on the anode to the ground using circuit tester lead, etc.

Disconnect the power cord from the AC power source to prevent possible danger caused by accidental turning on the power.

(4) Dust or dirt accumulated on the unit may cause unforeseen trouble. Periodically check and clean wiring subjected to high voltage, and CRT face. Clean especially around anode cap and the high voltage rectifier.

4-3-3. Trouble shooting

(1) First, check cables, connectors and contacts for loosening and disconnection, and signal input and power supply conditions before servicing the viewfinder.

(2) Next, check the position of the controls. If controls are not set at appropriate position, no picture may appear; for example, if CONTRAST control is set at fully CCU position, no picture is produced.

(3) Trouble may concern either a signal or plural circuits. The following table shows symptoms and circuits to be checked.

SYMPTOM \ CIRCUIT TO BE CHECKED	Power regulation circuit	Video circuit	Sync circuit	Blanking circuit	Horizontal oscillating circuit	Horizontal output circuit	Vertical oscillating circuit	Vertical output circuit	High voltage drive circuit	High voltage regulation circuit	Focus power supply circuit	Horizontal/vertical parabola circuit	Screen circuit
Blown fuse (2A), F002	○												
Blown fuse (1A) PD-247 Board, F801	○				○	○		○	○	○			○
No raster	○			○	○	○			○	○			○
No picture	○	○											
Retrace appears				○									
Often out of sync			○		○		○						
Picture in diagonal bars			○		○								
Picture rolling			○				○						
Insufficient width in picture						○							
Insufficient height in picture							○	○					
Picture swinging	○								○	○			
No height in raster							○	○					
No width in raster					○	○							
Insufficient brightness	○	○		○	○				○	○			○
Poor focus									○	○	○	○	
No high-voltage	○				○	○			○	○			

SECTION 5 ALIGNMENT

5-1. NOTES ON ADJUSTMENT

1. All conditions described in these alignments use a standard signal supplied to the HD B/W monitor HDM-90 from the HDTV signal generator (Refer to 5-2-1.).
2. When a test chart is used for HDVS camera system, the monitored waveforms differ slightly from the waveforms shown in these adjustments. However, the reference input signal level to the VIDEO IN connector of the HD B/W monitor HDM-90 and the signal levels at measurement points remain the same.
3. All controls inside the monitor are locked with lock paint; therefore, the lock paint must be removed with thinner or equivalent before adjusting the variable coils. Otherwise, the coil cores may be broken.
4. Use a high-voltage voltmeter when adjusting the voltage from the high-voltage power supply (15 kV). This adjustment is necessary only when \odot RV501 (HV ADJ)/PD-231 board used for this adjustment is replaced.
5. Perform the video frequency response adjustment outlined in 5-3-3 only when \odot L1, or \odot L2, or both, is replaced.
6. Use low capacitance oscilloscope probes having a capacitance of 5 pF or less.
7. Perform the 5-3-11. Sub-brightness adjustment when the CRT is replaced.

5-2. PREPARATION

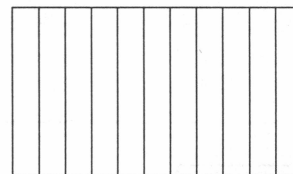
5-2-1. Equipment Required

- Digital voltmeter
- Oscilloscope (Tektronix 2445 or equivalent)
- Sweep signal generator (markers: 5, 10, 20, 30, 40 and 50 MHz)
- High-voltage voltmeter (SINGER ESH-27X or ESH-23X or equivalent)

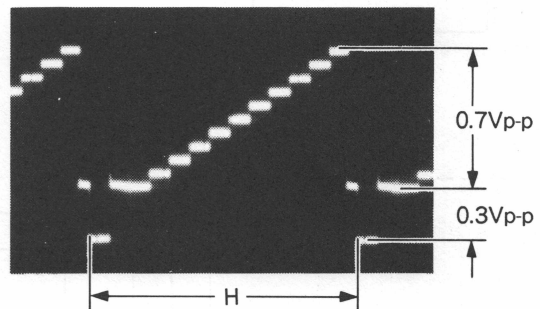
[To use a measuring instrument]

- HD test signal generator (Shibasoku TG91E6 or equivalent)

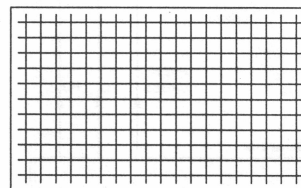
— Step Signal —



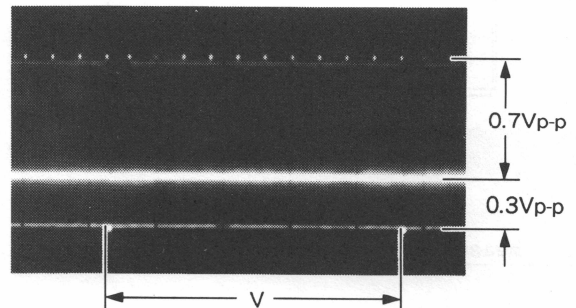
(Monitor Screen)



— Cross Signal —



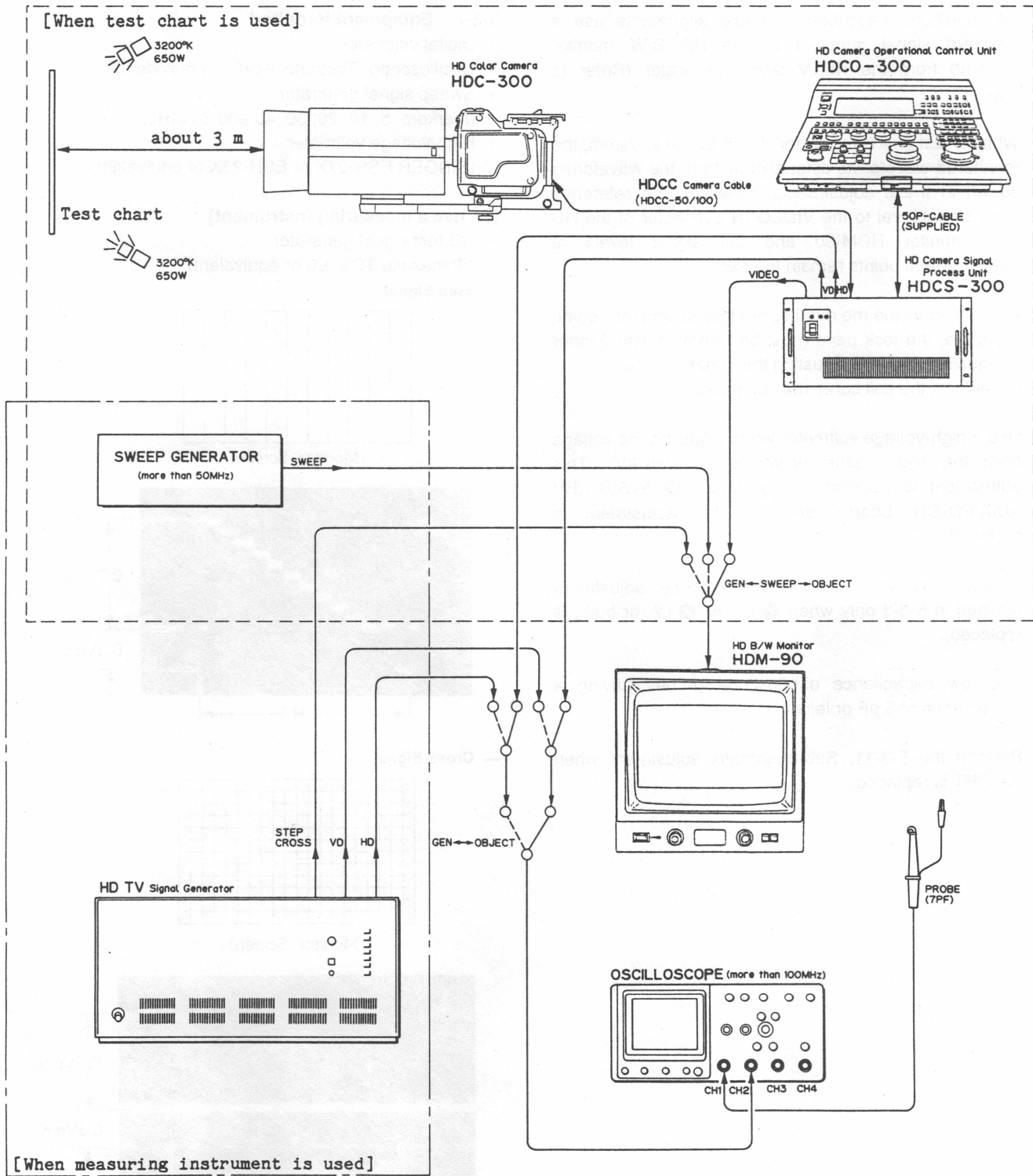
(Monitor Screen)



[To use test chart]

- HDVS camera system (HDC-300, HDCS-300, HDCA-300)
- HD chart (Supplied with HDC-300: Sony part No.3-731-746-01)

5-2-2. Connections



5. ALIGNMENT

5-3. ADJUSTMENT

5-3-1. +15 kV ADJUSTMENT

Note: Perform this adjustment only when RV501 (HV ADJ)/PD-231 board is replaced. This high voltage is within the specification when another part, such as the CRT, HV transformer, and so on in the high-voltage power supply circuit, is replaced with the specified spare part.

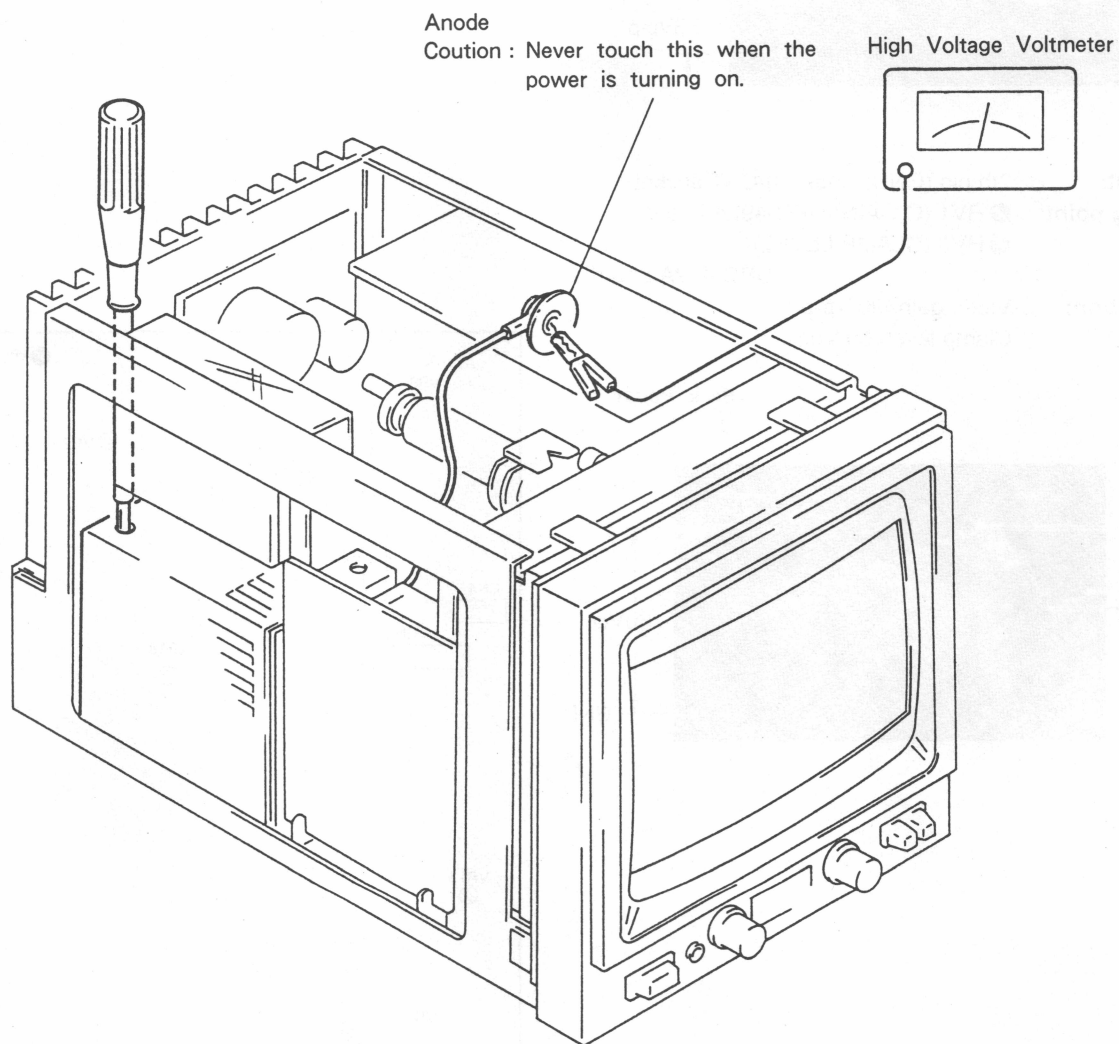
Equipment: High-voltage voltmeter
($2 \times 10^9 \Omega$ or higher)

Preparation

- Turn off the power and disconnect the anode cap from the CRT.
- Connect the high-voltage voltmeter to the disconnected anode cap.

Adjusting point: RV501 (HV ADJ)/PD-231 board

Specification: $+15 \text{ kV} \pm 0.5 \text{ kV}$



5-3-2. VIDEO GAIN AND CLAMP LEVEL ADJUSTMENT

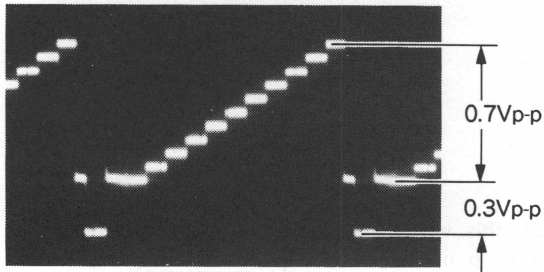
Equipment: Oscilloscope

Trigger: HD

Preparation

- Turn off the power and disconnect the CRT socket from the CRT.
- Connect probe to 7th pin (GND; Chassis) of CRT socket and turn the power on.
- Turn the \odot CONTRAST control fully clockwise.

Input signal: Step signal



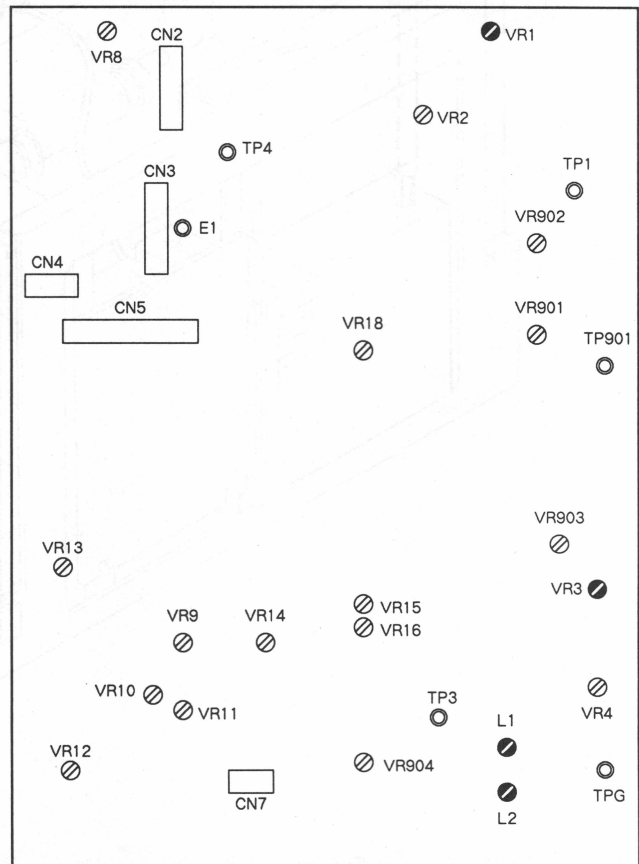
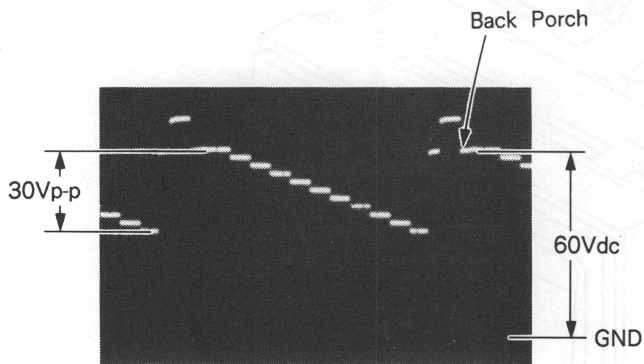
Test point: 7th pin (GND; Chassis)/CRT socket

Adjusting point: \odot RV1 (C GAIN)/UPC-492A board

\odot RV3 (CLAMP LEVEL)

UPC-492A board

Specification: Video gain=30 Vp-p
Clamp level=60 Vdc



UPC-492A BOARD (SOLDERING SIDE)

5. ALIGNMENT

5-3-3. VIDEO FREQUENCY RESPONSE ADJUSTMENT

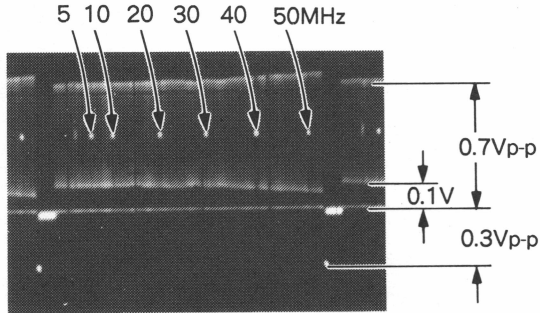
Equipment: Oscilloscope

Trigger: VD

Preparation

- Turn off the power and disconnect the CRT socket from the CRT.
- Connect probe to 7th pin (GND; Chassis) of CRT socket and turn the power on.

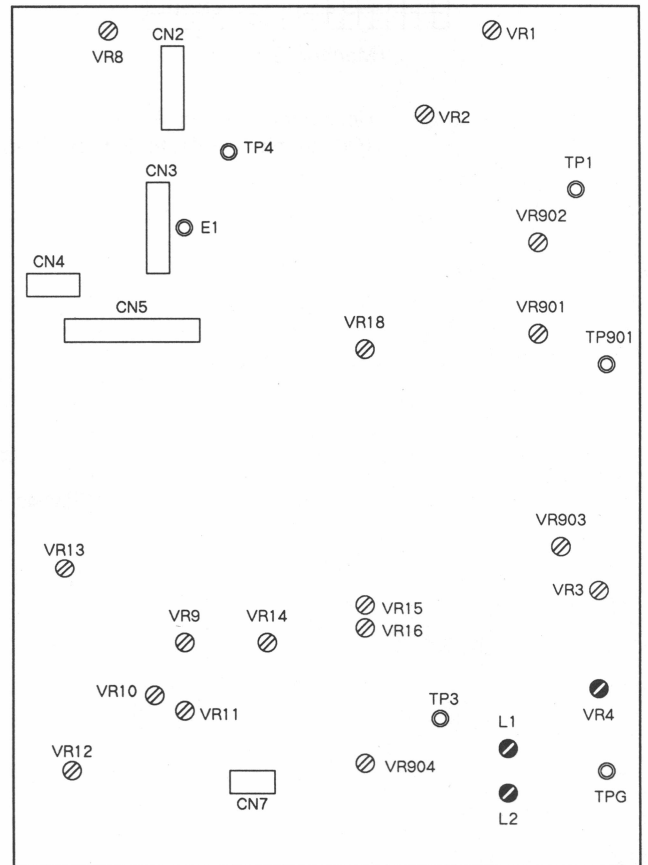
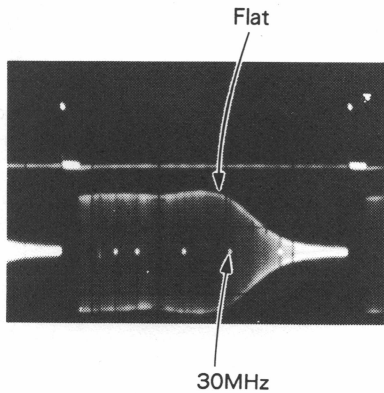
Input signal: Sweep signal



Test point: 7th pin (GND; Chassis)/CRT socket

Adjustment procedure

1. Adjust \odot RV4/UPC-492A board so that 10 MHz to 20 MHz is flat.
2. Adjust \odot L1/UPC-492A board so that vicinity of 30 MHz is flat.
3. Adjust \odot L2/UPC-492A board so that vicinity of 20 MHz is flat.
4. Repeat procedures 1 through 3 so that the frequency response up to 30 MHz is flat.

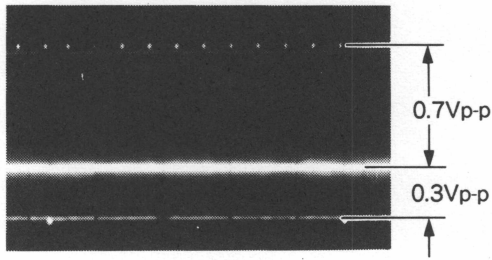


UPC-492A BOARD (SOLDERING SIDE)

5-3-4. HORIZONTAL OSCILLATION FREQUENCY AND HOLD ADJUSTMENTS

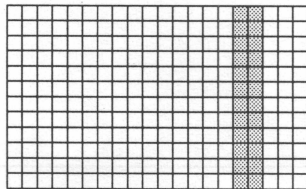
Note: Warm up the machine for about 30 minutes before making this adjustment.

Input signal: Cross signal



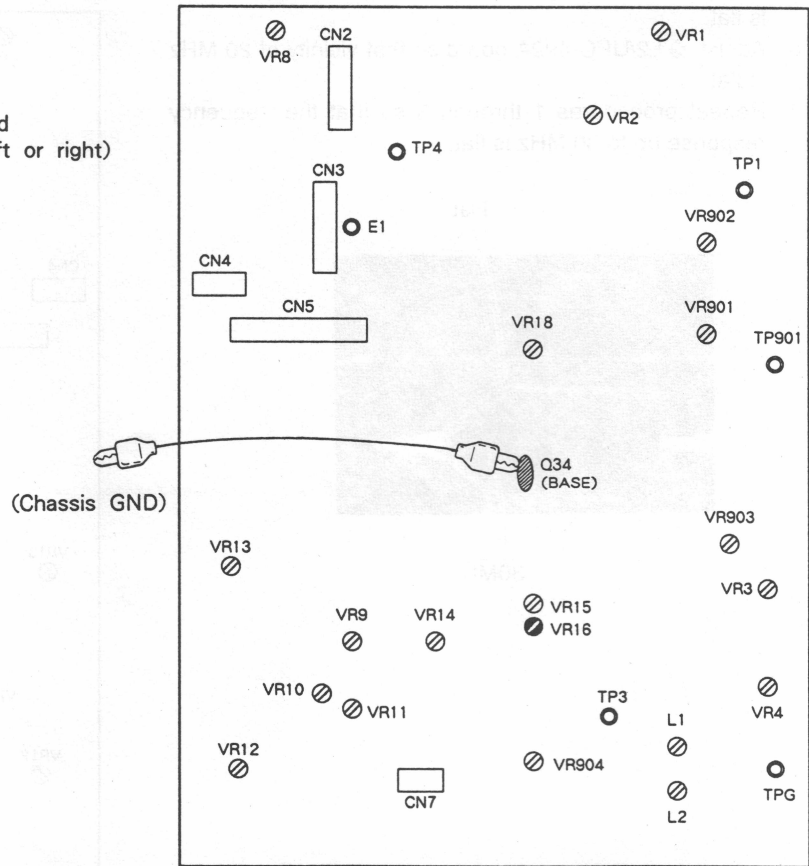
Adjustment procedures

1. Connect Q34-Base/UPC-492A board to GND (Chassis) with a jumper cable.
2. Observing the picture on the monitor, adjust \odot RV16 (H HOLD)/UPC-492A board so that picture is synchronized horizontally.



(Monitor Screen)

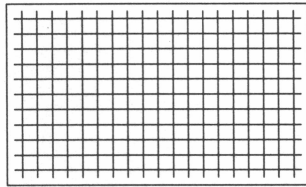
Horizontal Blanking Period
(OK to tilt a little to left or right)



UPC-492A BOARD (SOLDERING SIDE)

5-3-5. DEFLECTION YOKE TILT ADJUSTMENT

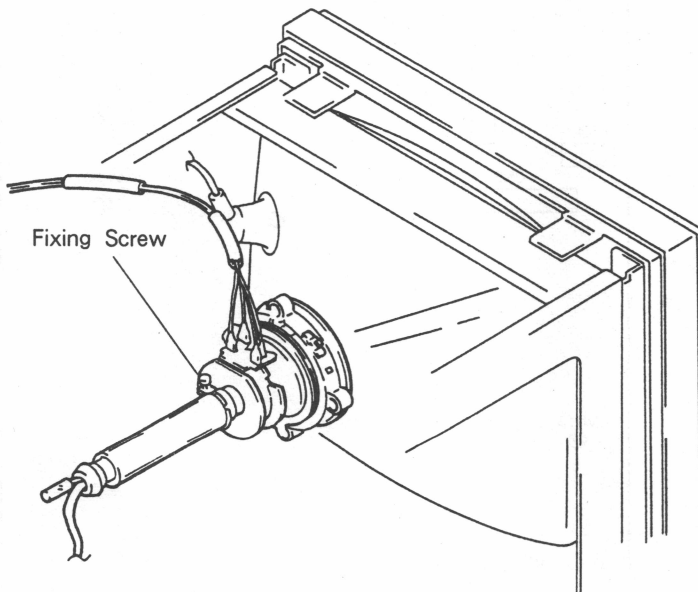
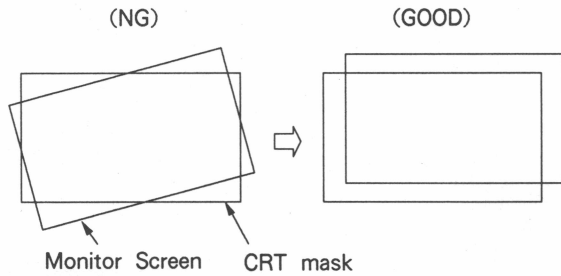
Input signal: Cross signal



(Monitor Screen)

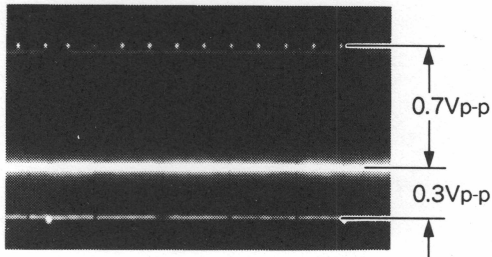
Adjustment procedures

1. Loosen the deflection yoke coil fixing screw.
2. Position the deflection yoke coil so that the monitor picture is not tilted.
3. Press the deflection yoke coil against the CRT funnel, then retighten the fixing screw with taking care of peripheral circuits.



5-3-6. CLAMP PULSE PHASE ADJUSTMENT

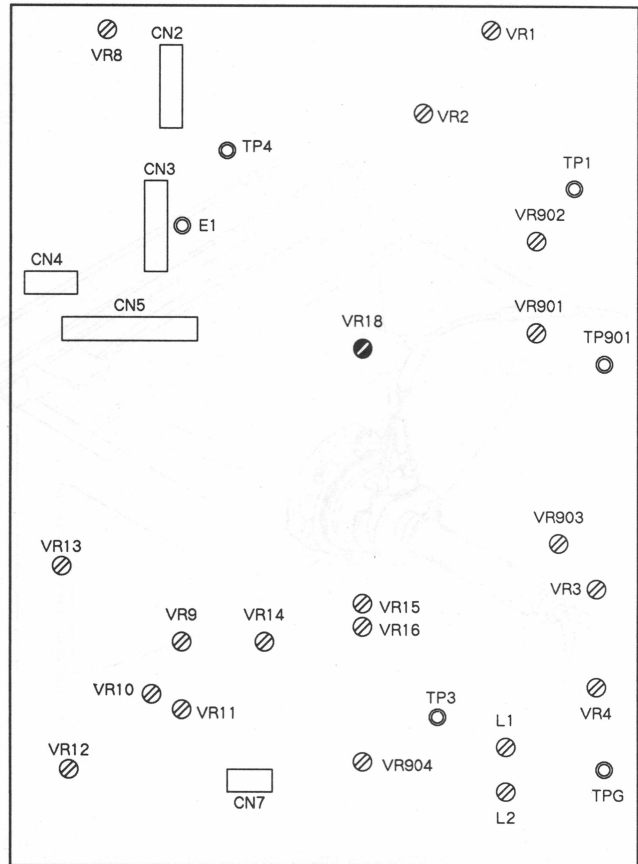
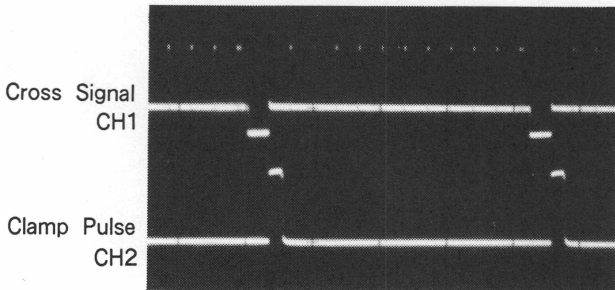
Equipment: Oscilloscope
Trigger: HD
Input signal: Cross signal



Test point: CH1=CN1-2 (GND; CN1-1) /UPC-492A board
 CH2=Q17-Base (GND; Chassis) /UPC-492A board

Adjusting point: ●RV18/UPC-492A board

Specification: Set the clamp pulse at the back porch in video signal.

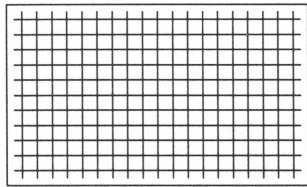


UPC-492A BOARD (SOLDERING SIDE)

5. ALIGNMENT

5-3-7. HORIZONTAL PHASE, SIZE AND LINEARITY ADJUSTMENT

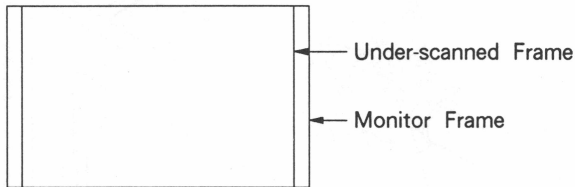
Input signal: Cross signal



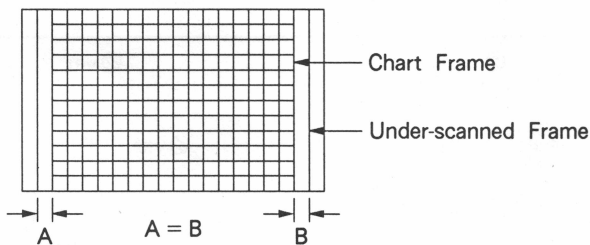
(Monitor Screen)

Adjustment procedures

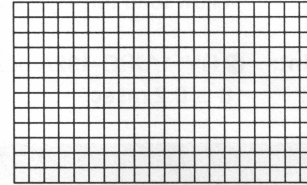
1. Adjust the raster size with \odot RV8 (H SIZE)/UPC-492A board to under-scan it horizontally, then fix it where the horizontal blanking part is slightly observed on the monitor screen.



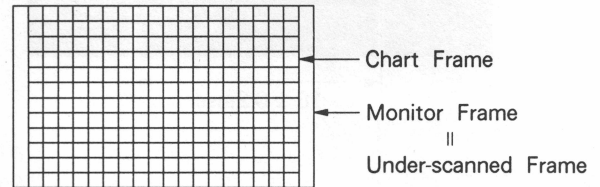
2. Adjust the chart position with \odot RV15 (H PHASE)/UPC-492A board so that the margins between the chart edges (cross signal) and under-scanned frame edges on the left and right are the same.



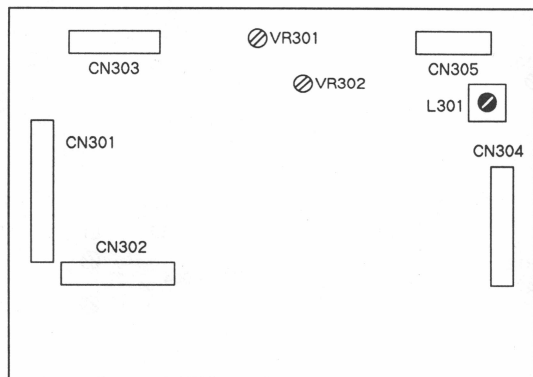
3. Adjust the raster linearity with \odot L301 (H LIN)/PD-249 board so that the intervals between vertical stripes are the same.



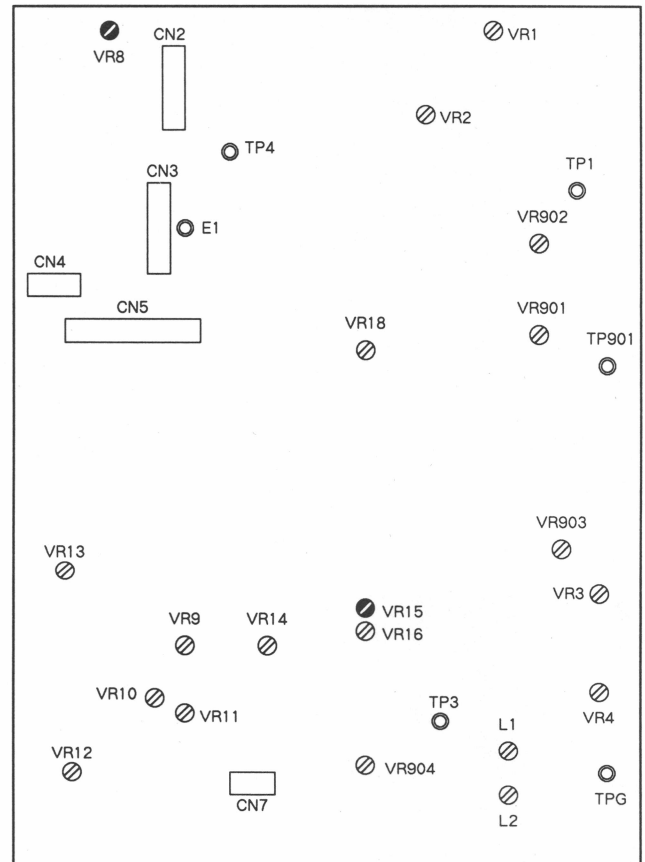
4. Perform procedures 2 and 3 several times.
5. Adjust the raster size with \odot RV8/UPC-492A board so that the under-scanned frame edges are in the same position as the monitor mask edges.



6. Fine adjust the horizontal linearity with \odot L301 (H LIN) /PD-249 board.



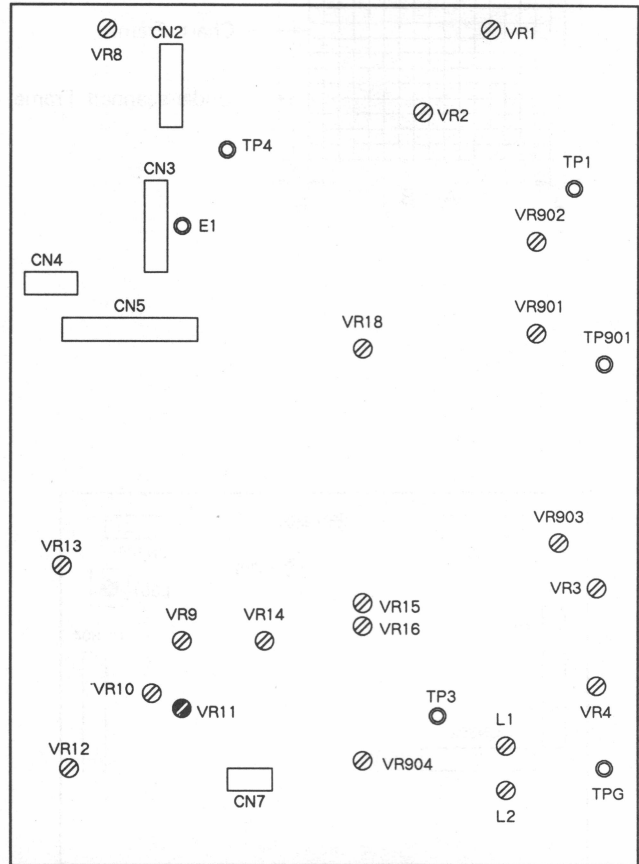
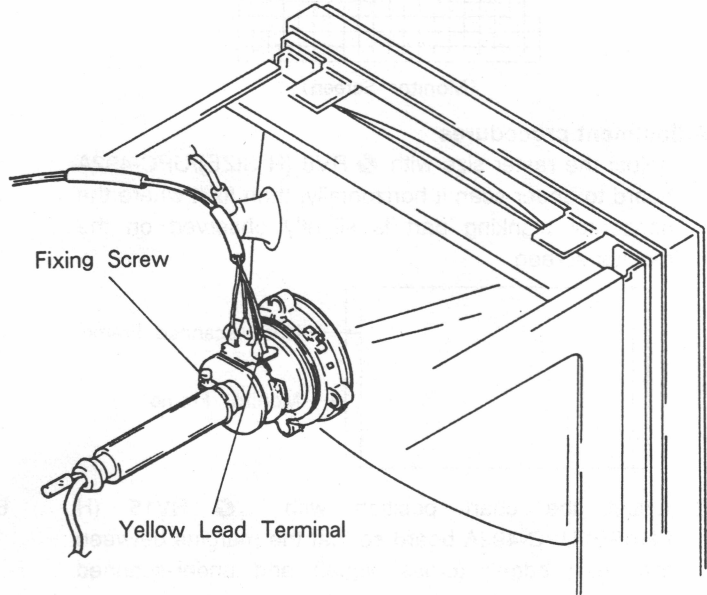
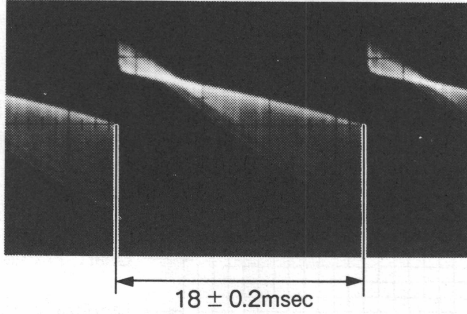
PD-249 BOARD (SOLDERING SIDE)



UPC-492A BOARD (SOLDERING SIDE)

5-3-8. VERTICAL HOLD ADJUSTMENT

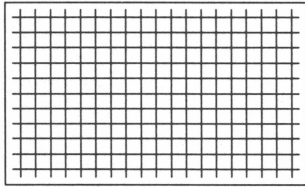
- Equipment:** Oscilloscope
Trigger: VD
Input signal: No signal (raster only)
Test point: Yellow lead terminal (GND; Chassis) / Deflection yoke
Adjusting point: ● RV11/UPC-492A board
Specification: 18 ± 0.2 msec



UPC-492A BOARD (SOLDERING SIDE)

5-3-9. VERTICAL SIZE, CENTERING AND LINEARITY ADJUSTMENT

Input signal: Cross signal



(Monitor Screen)

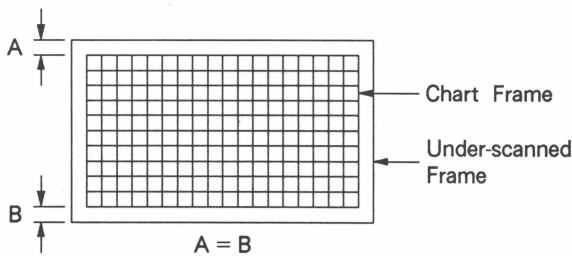
Adjustment procedures

1. Adjust the raster size with \odot RV10 (V SIZE)/UPC-492A board to under-scan it vertically, then fix it where the vertical blanking part is slightly observed at the bottom of the monitor.

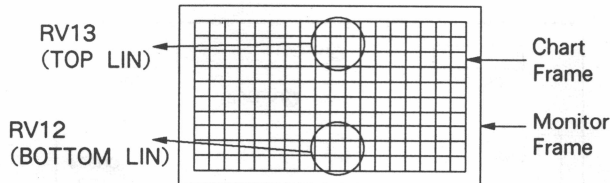


Monitor Frame Under-scanned Frame

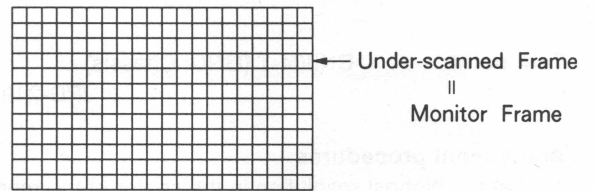
2. Adjust the chart position with \odot RV9 (V CENT)/UPC-492A board so that the margins between the chart edges (cross signal) and the under-scanned frame edges at the top and bottom are the same.



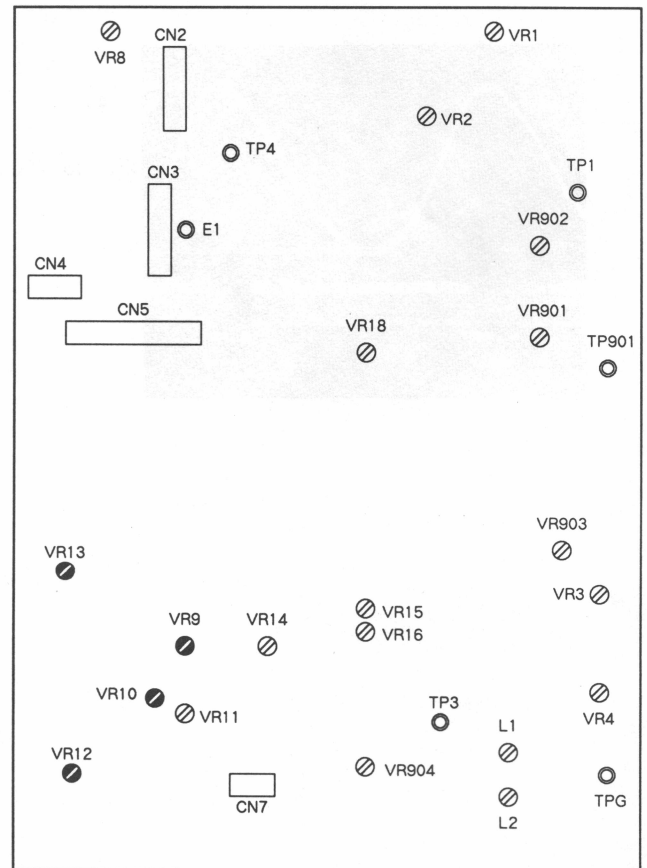
3. Adjust the raster linearity with \odot RV12 (BOTTOM LIN)/PC-492A board and \odot RV13 (TOP LIN)/PC-492A board so that the sizes of each grid line in the vertical direction are the same.



4. Adjust the raster size with \odot RV10 (V SIZE)/UPC-492A board so that the under-scanned frame edge is in the same position as the monitor mask edge.



5. Finally adjust the raster linearity in the vertical direction with \odot RV12 (BOTTOM LIN)/PC-492A board and \odot RV13 (TOP LIN)/UPC-492A board.



UPC-492A BOARD (SOLDERING SIDE)

5-3-11. SUB-BRIGHT ADJUSTMENT

Note: When not replacing CRT, this adjustment is not required.

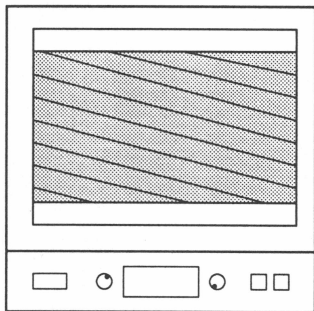
Preparation

- Set the ☉ BRIGHTNESS control/front panel at 2 o'clock position.
- Turn the ☉ CONTRAST control/front panel ○ fully counterclockwise.

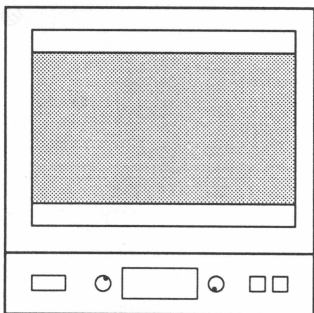
Input signal: No signal (raster only)

Adjustment procedures

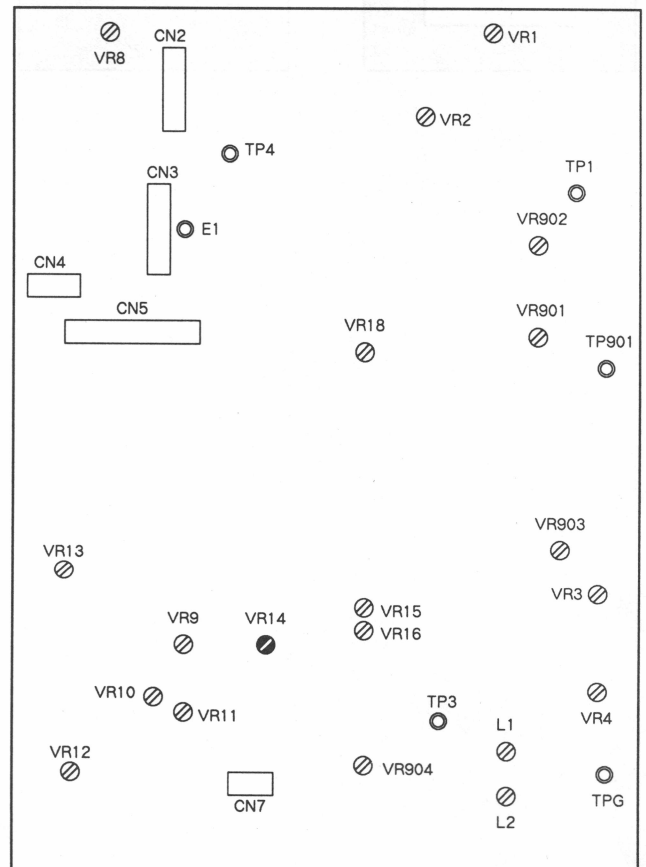
- Set ● RV14 (SUB BRIGHT)/UPC-492A to the position where the raster is to appear.



(There is a raster.)



(Just before the raster appears.)



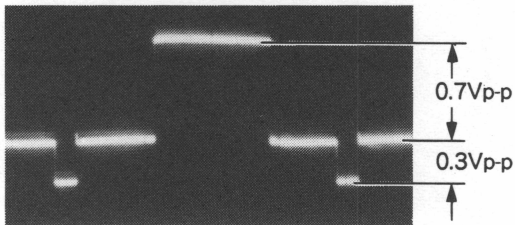
UPC-492A BOARD (SOLDERING SIDE)

5-3-12. OFFSET ADJUSTMENT

Preparation

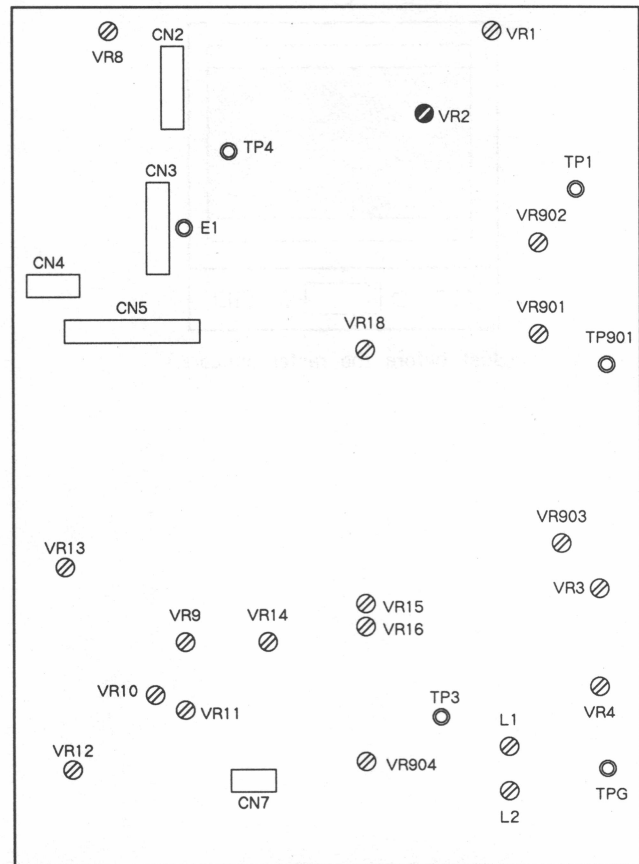
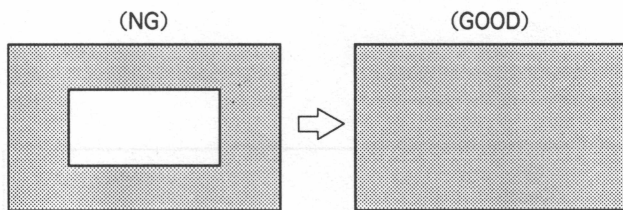
- Turn the \odot CONTRAST control/front panel \bigcirc fully counterclockwise.
- Turn the \odot BRIGHTNESS control/front panel \bigcirc fully clockwise.

Input signal: Square wave



Adjustment procedures

- Adjust \odot RV2/UPC-492A board so that the only raster appear.



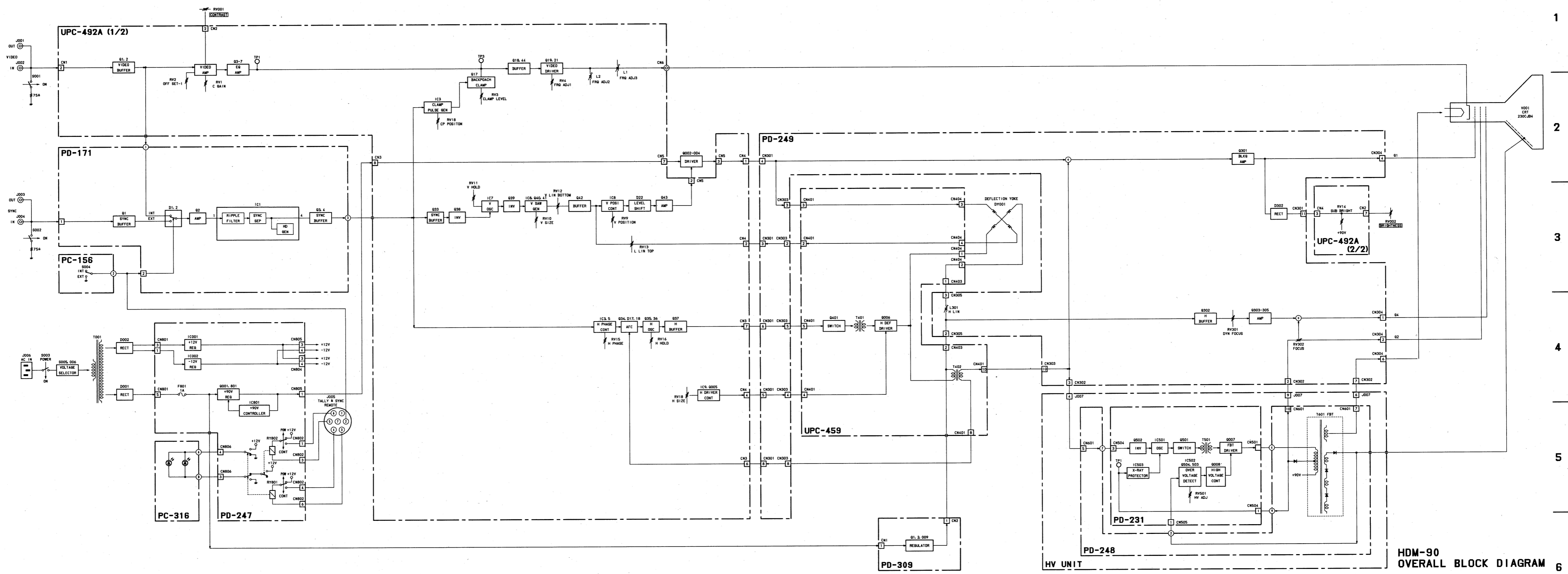
UPC-492A BOARD (SOLDERING SIDE)

SECTION A
BLOCK DIAGRAM

BLOCK DIAGRAM BLOCK DIAGRAM

BLOCK DIAGRAM

OVERALL BLOCK DIAGRAM



HDM-90
OVERALL BLOCK DIAGRAM 6

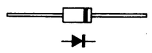
SECTION B

SEMICONDUCTOR

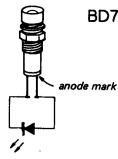
The circuit diagram of IC is obtained from the IC data book published by the manufacturer.

TYPE	PAGE	TYPE	PAGE
1S1585	B-2	MC1495L	B-3
1S1885	B-2	NE555N	B-3
1S2076	B-2		
1SS119	B-2	NJM4558D	B-4
1SS83	B-2	NJM555D	B-3
		NJM7812B	B-4
2SA1015	B-2		
2SA1091	B-2	RC78L05A	B-4
2SA711	B-2		
2SB546A	B-2	RD10ES-B3	B-2
		RD3.9ES-B1	B-2
2SC1505	B-2	RD33ES-B4	B-2
2SC1514	B-2		
2SC1569	B-2	RU1C	B-2
2SC1815	B-2		
2SC1815BL	B-2	S5VB40	B-2
2SC1906	B-2		
2SC1921	B-2	TA7357AP	B-4
2SC2230A	B-2	TA78L005AP	B-4
2SC2458	B-2		
2SC2785	B-2	TC40107BP	B-4
2SC2922	B-2	TC4528BPHB	B-5
2SC3468	B-2		
2SC3595	B-2	TLR143	B-2
2SC3599	B-2		
2SC3685	B-2	V11J	B-2
2SC752TM	B-2	V11N	B-2
		V19E	B-2
2SD1018	B-2	V19G	B-2
2SD401A	B-2		
2SD799	B-2	uPC151C	B-5
2SD871	B-2	uPC311C	B-5
		uPC4558C	B-4
2SK117-GR	B-2	uPC574J	B-5
2SK117	B-2	uPC7812H	B-4
		uPC7912H	B-5
BD703G	B-2		
		uPD4528BC	B-5
BR5628S	B-2		
CA3080A	B-3		
ERE09-15	B-2		
GH3F	B-2		
HLMP2965	B-2		
HZ33-1	B-2		
HZ11A3	B-2		
HZ2B-3	B-2		
HZ9C-1	B-2		
HZS9A2L	B-2		
HZS5C-1	B-2		
HZS22-2L	B-2		

DIODE, TRANSISTOR



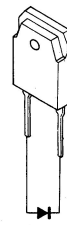
1S1585
1S1885
1S2076
1S5119
1S583
RU1C



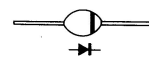
BD703G ; GREEN



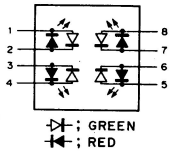
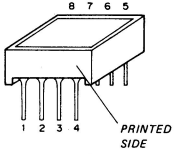
BR5628S ; RED



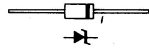
ERE09-15



GH3F
V11 ?
V19 ?

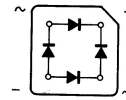


HLMP2965



HZ ? A ? L
HZ ? B ? L
HZ ? C ? L
HZ ? ? - ?
HZS ? ? A - ?
HZS ? ? C - ?
HZS ? ? L
RD ? ? ESB ?

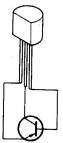
BOTTOM VIEW



S5VB ? ?



TLR143 ; RED

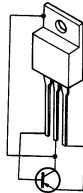


2SA1015
2SA1091

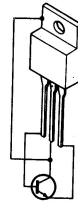
BOTTOM VIEW



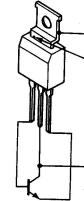
2SA711



2SB546A



2SC1505
2SC1569
2SD401A



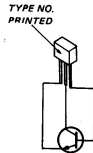
2SC1514



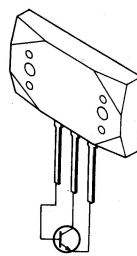
2SC1815
2SC1906
2SC1921
2SC2230A
2SC752TM



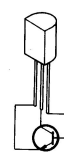
2SC2458



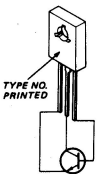
2SC2785



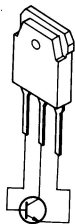
2SC2922



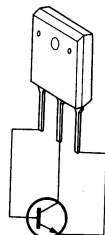
2SC3468



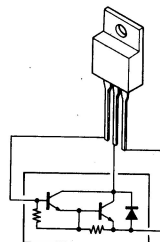
2SC3595
2SC3599



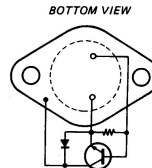
2SC3685



2SD1018

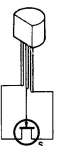


2SD799



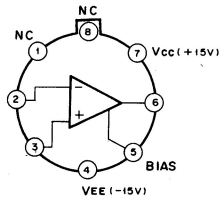
BOTTOM VIEW

2SD871

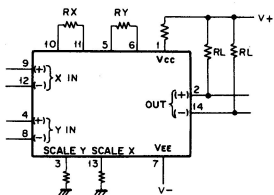
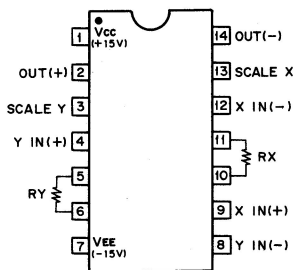


2SK117
2SK117-GR

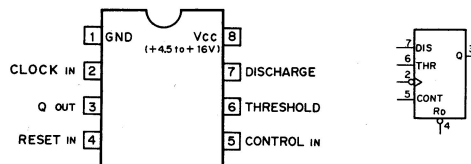
CA3080A (RCA)
OPERATIONAL TRANSCONDUCTANCE AMPLIFIER
- TOP VIEW -



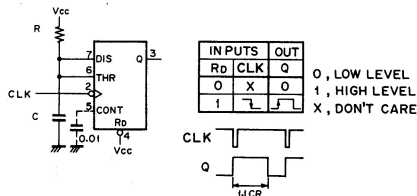
MC1495L (MOTOROLA)
FOUR-QUADRANT MULTIPLIER
- TOP VIEW -



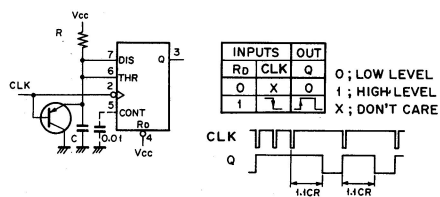
NE555N (SIGNETICS)
NJM555D (JRC)
PRECISION TIMER
- TOP VIEW -



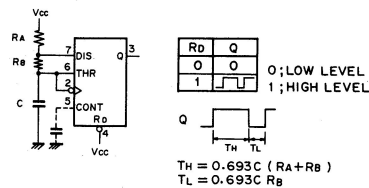
MONOSTABLE MULTIVIBRATOR



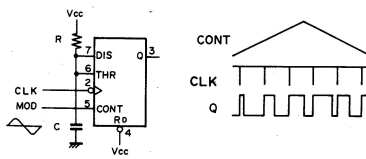
RETRIGGERABLE MONO. MULTIVIBRATOR
(MISSING PULSE DETECTOR)



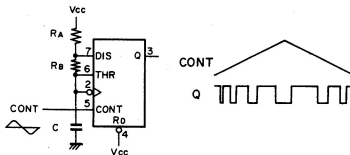
ASTABLE MULTIVIBRATOR



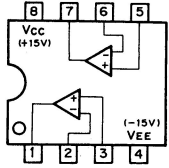
PULSE WIDTH MODULATOR



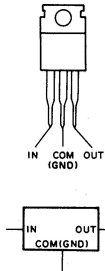
VCO
(PULSE POSITION MODULATOR)



NJM4558D (JRC)
 uPC4558C (NEC)
 OPERATIONAL AMPLIFIER
 - TOP VIEW -



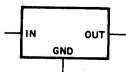
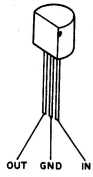
NJM7812B (JRC)
 uPC7812H (NEC)
 POSITIVE VOLTAGE REGULATOR (1A)
 - SIDE VIEW -



OUTPUT VOLTAGE	AN78??	FS78??	HA178??P	L78??	NJM78??B	NJM78??A/K
+5V	AN7805	FS7805	HA17805P	L7805	-----	NJM7805A/K
+6V	AN7806	-----	HA17806P	-----	-----	NJM7806A/K
+7V	AN7807	-----	HA17807P	L7807	-----	-----
+8V	AN7808	-----	HA17808P	-----	-----	NJM7808A/K
+8.5V	-----	-----	-----	-----	-----	-----
+9V	AN7809	-----	-----	-----	-----	NJM7809A/K
+10V	AN7810	-----	-----	-----	-----	-----
+12V	AN7812	FS7812	HA17812P	-----	NJM7812B	NJM7812A/K
+15V	AN7815	FS7815	HA17815P	-----	-----	NJM7815A/K
+18V	AN7818	-----	HA17818P	-----	-----	NJM7818A/K
+20V	AN7820	-----	-----	-----	-----	NJM7820A/K
+24V	AN7824	FS7824	HA17824P	-----	-----	NJM7824A/K

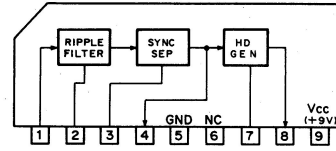
OUTPUT VOLTAGE	uA78??UC	uPC143??H	uPC78??H	TA78??P/AP
+5V	uA7805UC	uPC14305H	uPC7805H	TA78005P/AP
+6V	uA7806UC	-----	-----	TA78006P/AP
+7V	-----	-----	-----	-----
+8V	uA7808UC	uPC14308H	uPC7808H	TA78008P/AP
+8.5V	uA7885UC	-----	-----	-----
+9V	-----	-----	-----	TA78009P/AP
+10V	-----	-----	-----	TA78010P/AP
+12V	uA7812UC	uPC14312H	uPC7812H	TA78012P/AP
+15V	uA7815UC	uPC14315H	uPC7815H	TA78015P/AP
+18V	uA7818UC	uPC14318H	uPC7818H	TA78018P/AP
+20V	-----	-----	-----	TA78020P/AP
+24V	uA7824UC	uPC14324H	uPC7824H	TA78024P/AP

RC78L05A (RAYTHEON)
 POSITIVE VOLTAGE REGULATOR (100mA)

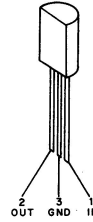


OUTPUT VOLTAGE	NJM78L??A	RC78L??A	uA78L??ACL	uA78L??AWV	uPC78L??J	AN78L??
+2.6V	NJM78L02A	RC78L02A	uA78L02ACL	uA78L26AWV	-----	-----
+4V	-----	-----	-----	-----	-----	AN78L04
+5V	NJM78L05A	RC78L05A	uA78L05ACL	uA78L05AWV	uPC78L05J	AN78L05
+6V	NJM78L06A	RC78L06A	-----	-----	-----	AN78L06
+6.2V	-----	-----	uA78L06ACL	uA78L62AWV	-----	-----
+7V	-----	-----	-----	-----	-----	AN78L07
+8V	NJM78L08A	RC78L08A	uA78L08ACL	-----	uPC78L08J	AN78L08
+8.2V	-----	-----	-----	uA78L82AWV	-----	-----
+9V	NJM78L09A	RC78L09A	uA78L09ACL	uA78L09AWV	-----	AN78L09
+10V	-----	-----	uA78L10ACL	-----	-----	AN78L10
+12V	NJM78L12A	RC78L12A	uA78L12ACL	uA78L12AWV	uPC78L12J	AN78L12
+15V	NJM78L15A	RC78L15A	uA78L15ACL	uA78L15AWV	uPC78L15J	AN78L15
+18V	NJM78L18A	RC78L18A	-----	uA78L18AWV	-----	AN78L18
+20V	NJM78L20A	RC78L20A	-----	-----	-----	AN78L20
+24V	NJM78L24A	RC78L24A	-----	uA78L24AWV	-----	AN78L24

TA7357AP (TOSHIBA)
 SYNC SEPARATOR/HD PULSE GENERATOR
 - SIDE VIEW -

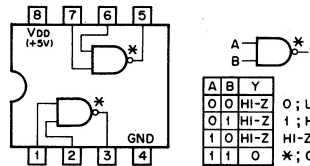


TA78L ??? AP (TOSHIBA)
 POSITIVE VOLTAGE REGULATOR (150mA)



OUTPUT VOLTAGE	PPF
+5V	005
+6V	006
+7V	007
+7.5V	075
+8V	008
+9V	009
+10V	010
+12V	012
+13.2V	132
+15V	015
+18V	018
+20V	020
+24V	024

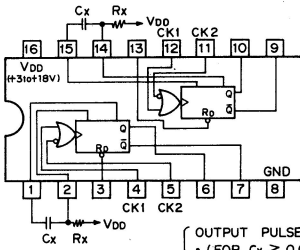
TC40107BP (TOSHIBA)
 C-MOS NAND BUFFER/DRIVER WITH OPEN-DRAIN
 - TOP VIEW -



A	B	Y
0	0	HI-Z
0	1	HI-Z
1	0	HI-Z
1	1	0

0; LOW LEVEL
 1; HIGH LEVEL
 HI-Z; HIGH IMPEDANCE
 *; OPEN-DRAIN

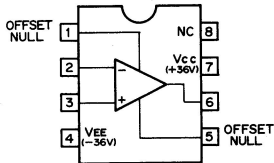
TC4528BPHB (TOSHIBA)
 uPD4528BC (NEC)
 C-MOS RETRIGGERABLE/RESETTABLE MMV
 - TOP VIEW -



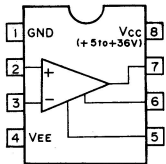
INPUTS		OUTPUTS	
CK1	CK2	Q	\bar{Q}
F	1	1	0
F	0	1	0
1	1	0	0
0	1	0	0
X	X	0	0
X	X	0	1

OUTPUT PULSE WIDTH Q OR \bar{Q}
 • (FOR $C_x \geq 0.01\mu F$ USE FORMULA)
 $PW = 0.2 \cdot R_x \cdot C_x \cdot f_n (V_{DD} - GND)$
 • (FOR $C_x < 0.01\mu F$ USE DATA BOOK)

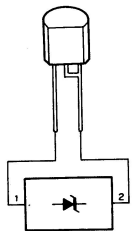
uPC151C (NEC)
 OPERATIONAL AMPLIFIER
 - TOP VIEW -



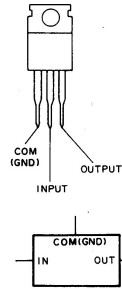
uPC311C (NEC)
 VOLTAGE COMPARATOR
 - TOP VIEW -



uPC574J (NEC)
 BIPOLAR ZENER DIODE (10mA)
 - FRONT VIEW -



uPC7912H (NEC)
 NEGATIVE VOLTAGE REGULATOR (1A)
 - SIDE VIEW -



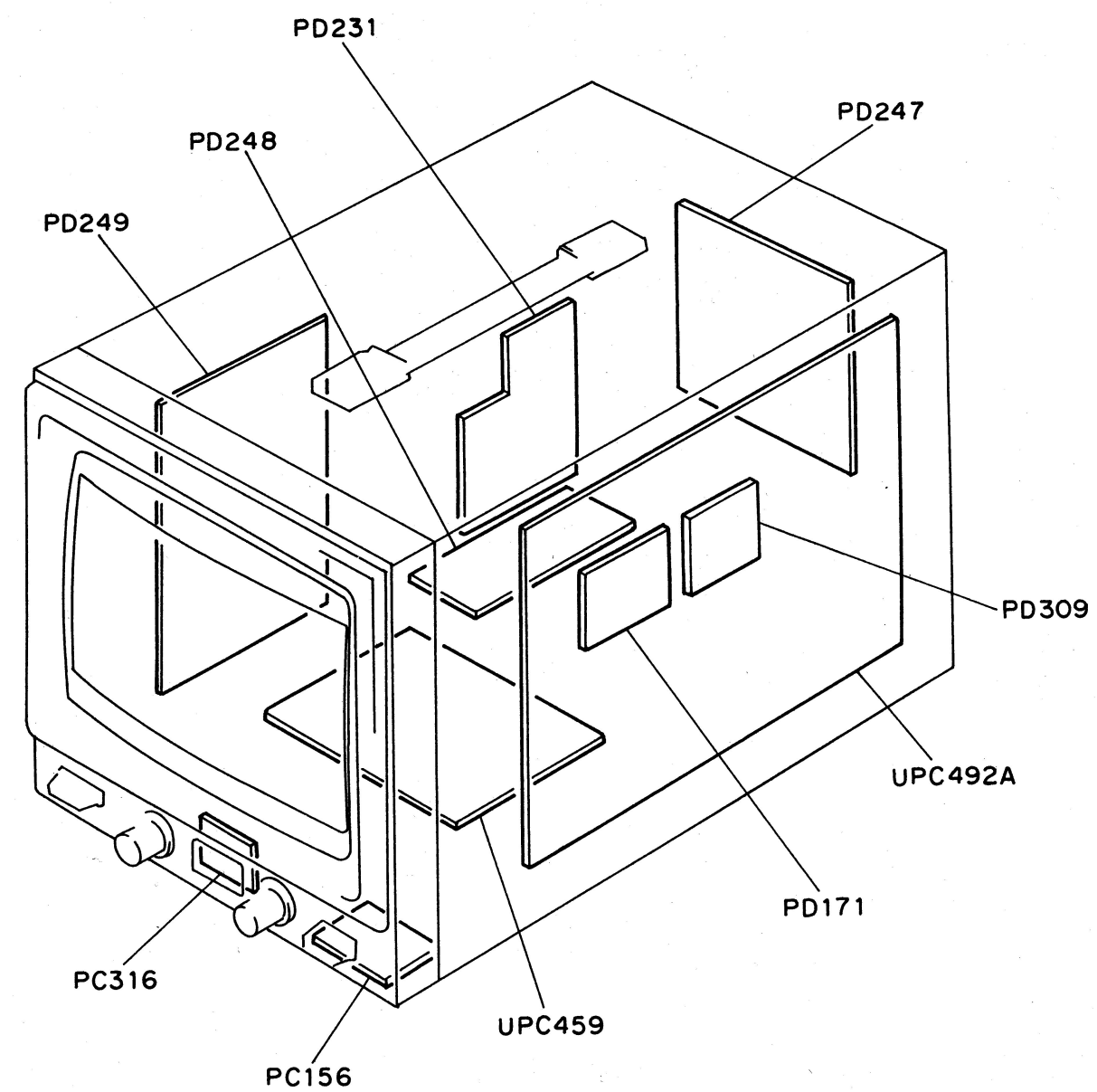
OUTPUT VOLTAGE	AN79???	FS79???	uA79???	uA79???	uPC79???	MC79???
-2V						MC7902CT
-5V	AN7905	FS7905	uA7905UC	uPC7905H		MC7905CT
-5.2V						MC7905.2CT
-6V	AN7906		uA7906UC			MC7906CT
-7V	AN7907					
-8V	AN7908		uA7908UC	uPC7908H		MC7908CT
-9V	AN7909					
-10V	AN7910					
-12V	AN7912		uA7912UC	uPC7912H		MC7912CT
-15V	AN7915		uA7915UC	uPC7915H		MC7915CT
-18V	AN7918		uA7918UC	uPC7918H		MC7918CT
-20V	AN7920					
-24V	AN7924		uA7924UC	uPC7924H		MC7924CT

OUTPUT VOLTAGE	NJM79???
-2V	
-5V	NJM7905A
-5.2V	
-6V	NJM7906A
-7V	
-8V	NJM7908A
-9V	NJM7909A
-10V	
-12V	NJM7912A
-15V	NJM7915A
-18V	NJM7918A
-20V	
-24V	NJM7924A

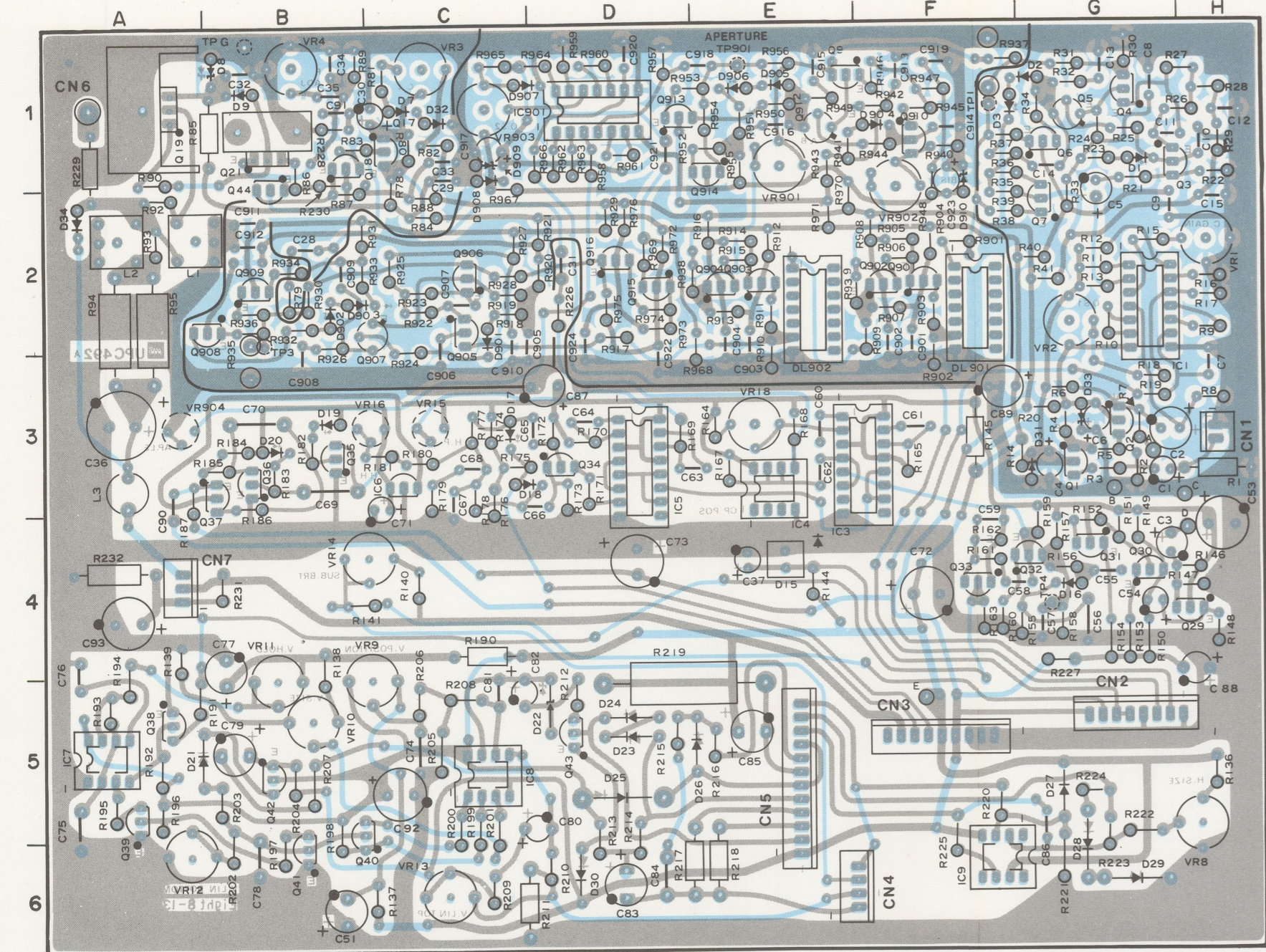
SECTION C

SCHEMATIC DIAGRAMS AND BOARD ILLUSTRATIONS

BOARD LAYOUT



UPC-492A BOARD Serial No. 10001 -

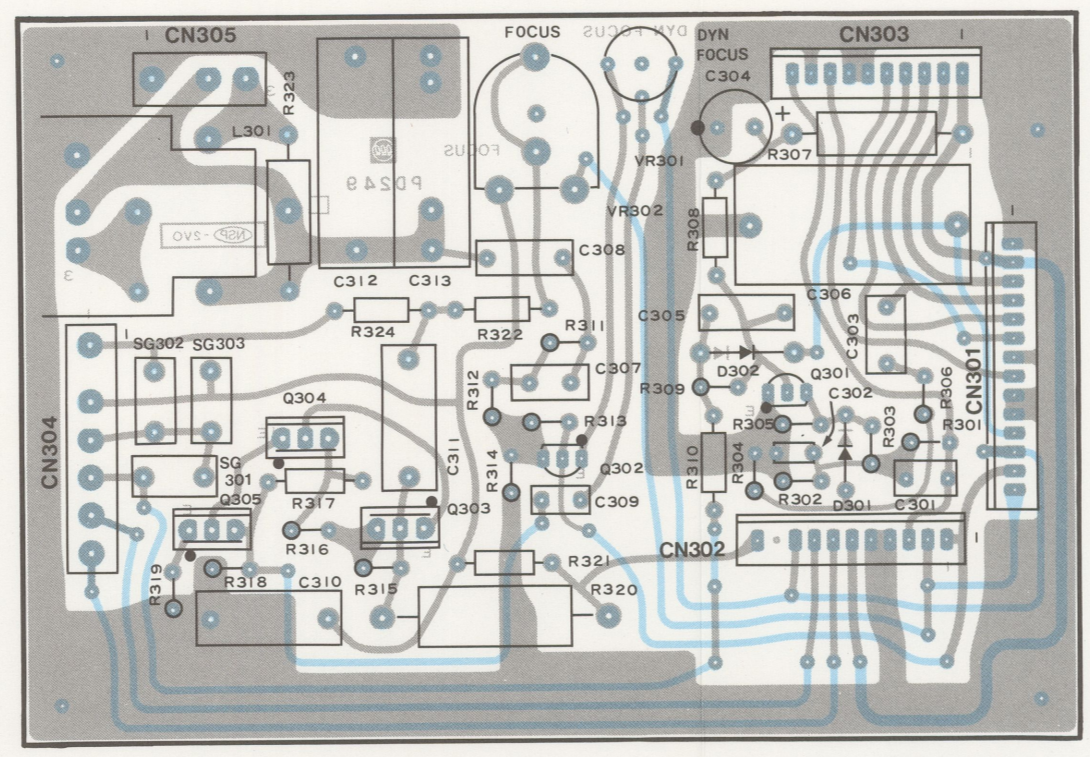


1-631-103-11 COMPONENT SIDE

CN1	H-3	D21	A-5	D906	E-1	Q2	G-3	Q37	B-3	Q914	E-1	VR13	C-6
CN2	G-5	D22	D-5	D907	C-1	Q3	G-1	Q38	A-5	Q915	D-2	VR14	B-4
CN3	F-5	D23	D-5	D908	C-1	Q4	G-1	Q39	A-5	Q916	D-2	VR15	C-3
CN4	E-6	D24	D-5	D909	C-1	Q5	G-1	Q40	B-5	TP1	F-1	VR16	B-3
CN5	E-6	D25	D-5	D910	F-1	Q6	G-1	Q41	B-6	TP3	B-2	VR901	E-1
CN6	A-1	D26	D-5	DL901	F-2	Q7	G-2	Q42	B-5	TP4	G-4	VR902	F-2
CN7	A-4	D27	G-5	DL902	E-2	Q8	E-1	Q43	D-5	TP901	E-1	VR903	C-1
		D28	G-6			Q17	C-1	Q44	B-1			VR904	A-3
		D29	G-6			Q18	B-1	Q901	F-2				
D1	G-1	D30	D-6	IC1	G-2	Q19	F-3	Q902	F-2	TPG	B-1		
D2	G-1	D31	G-3	IC3	F-3	Q19	A-1	Q903	B-2				
D3	F-1	D32	C-1	IC4	E-3	Q21	B-1	Q904	E-2	VR1	H-2		
D7	C-1	D33	G-3	IC5	D-3	Q29	H-4	Q905	C-2	VR2	G-2		
D8	B-1	D34	A-2	IC6	C-3	Q30	G-4	Q906	C-2	VR3	C-1		
D9	B-1	D34	A-2	IC7	A-5	Q31	G-4	Q907	C-2	VR4	B-1		
D15	E-4	D34	F-1	IC8	C-5	Q32	G-4	Q908	B-2	VR8	H-5		
D16	G-4	D901	C-2	IC9	F-6	Q33	F-4	Q909	B-2	VR9	B-4		
D17	C-3	D902	B-2	IC901	D-1	Q34	D-3	Q910	F-1	VR10	B-5		
D18	C-3	D903	B-2			Q35	B-3	Q912	E-1	VR11	B-4		
D19	B-3	D904	F-1			Q36	B-3	Q913	D-1	VR12	A-6		
D20	B-3	D905	E-1	Q1	G-3								

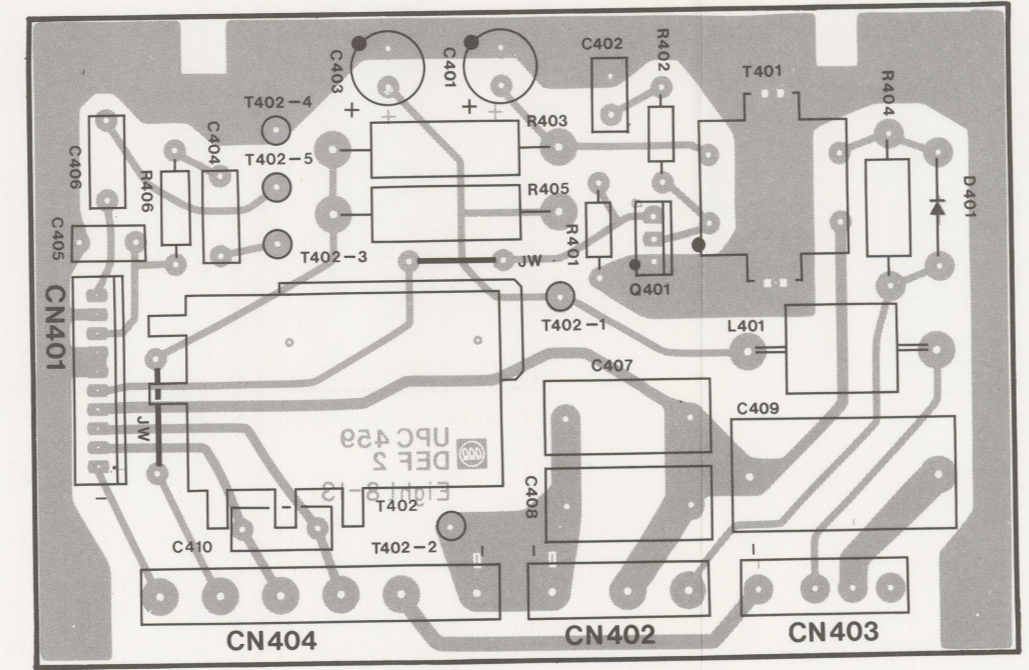
Note
Identification name of potentiometers
are changed from VR to RV on the
schematic diagram and parts list.

PD-249 BOARD Serial No. 10001 -



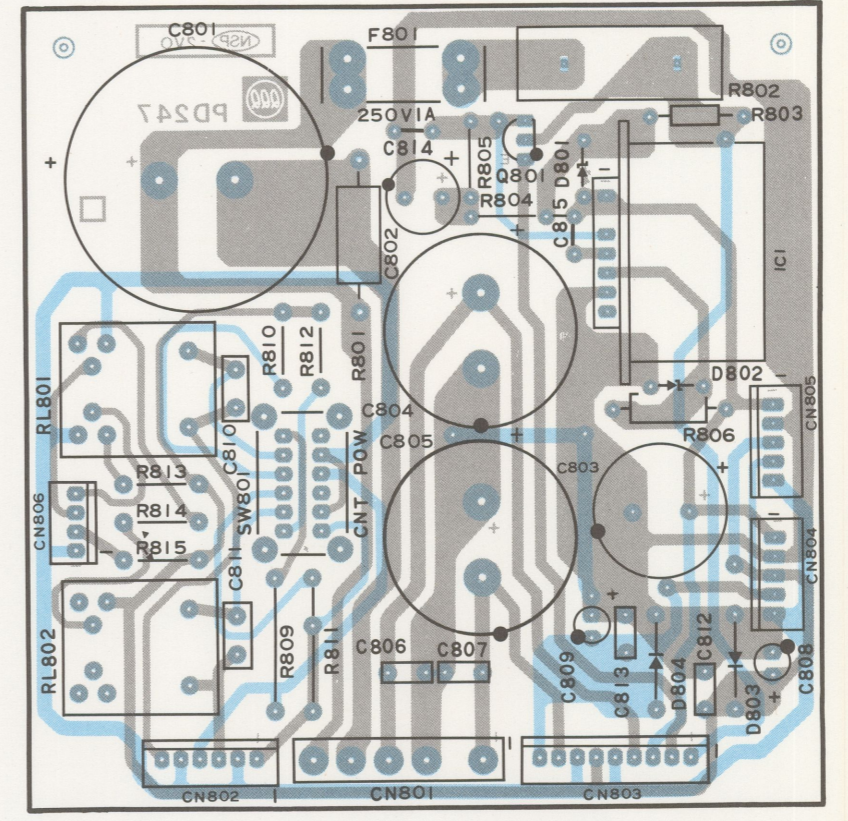
1-628-888-11 COMPONENT SIDE

UPC-459 BOARD Serial No. 10001 -



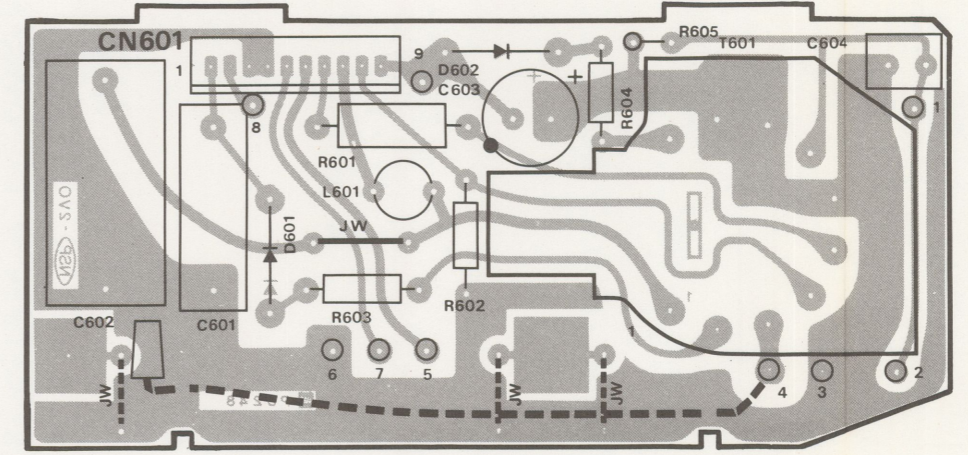
1-628-890-11 COMPONENT SIDE

PD-247 BOARD Serial No. 10001 -



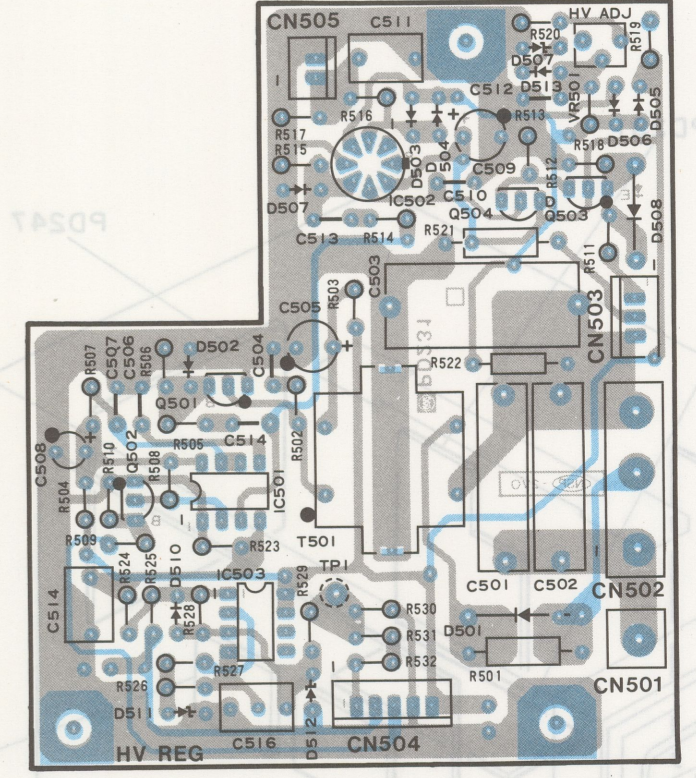
1-628-889-11 COMPONENT SIDE

PC-248 BOARD Serial No. 10001 -



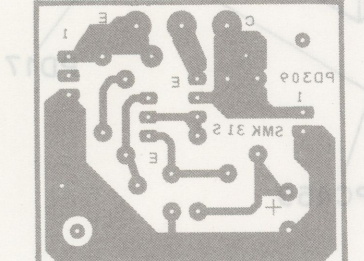
1-631-104-11 COMPONENT SIDE

PD-231 BOARD Serial No. 10001 - 10009



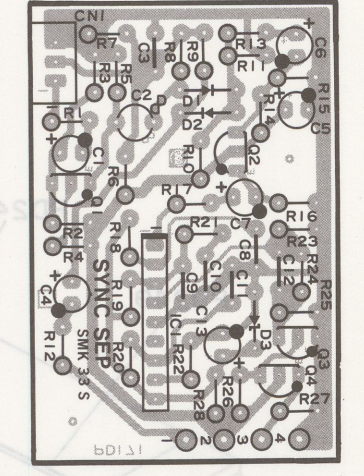
1-631-094-11 COMPONENT SIDE

PD-309 BOARD Serial No. 10101 -



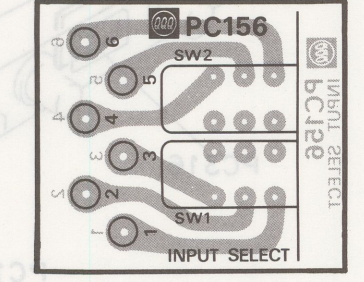
COMPONENT SIDE

PD-171 BOARD Serial No. 10001 -



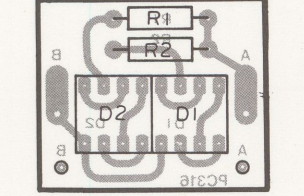
1-628-887-11 COMPONENT SIDE

PC-156 BOARD Serial No. 10001 - 10120



1-628-885-11 COMPONENT SIDE

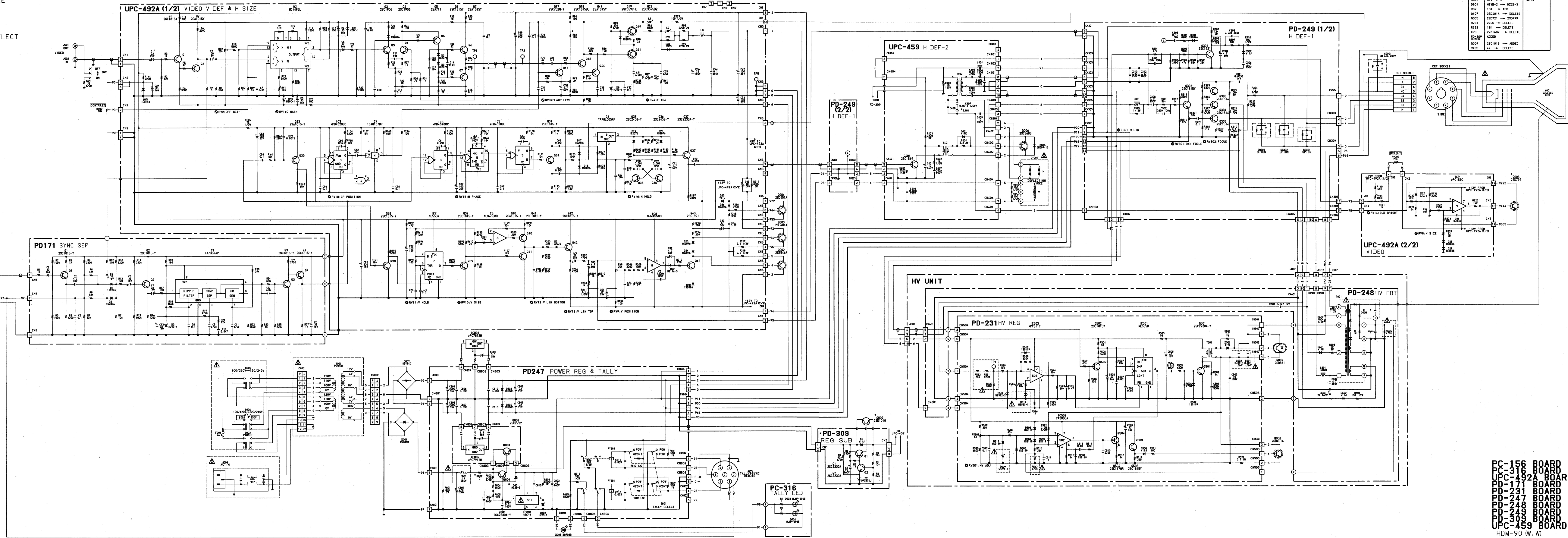
PC-316 BOARD Serial No. 10001 - 10120



1-628-886-11 COMPONENT SIDE

SCHEMATIC DIAGRAM

- UPC-492A BOARD VIDEO, V DEF & H SIZE
- PC-156 BOARD INT-EXT SYNC SELECT
- PC-316 BOARD TALLY LED
- PD-171 BOARD SYNC SEP
- PD-247 BOARD POWER REG. & TALLY SELECT
- PD-249 BOARD H DEF-1
- PD-248 BOARD HV FBT
- PD-231 BOARD HIGH VOLTAGE REG.
- PD-309 BOARD REG. SUB
- UPC-459 BOARD H DEF-2



CHANGE INFORMATION

REF. NO.	DESCRIPTION	QTY.
5000	5.9 → 2	10151
5001	H248-2 → H248-3	
5002	18K → 10K	
5003	28041A → DELETE	
5005	280721 → 280799	
5021	2700 → DELETE	
5022	18K → DELETE	
5023	22/160V → DELETE	
5009	28C1018 → ADDED	
5007	28C1018 → DELETE	
5008	47 → DELETE	

- PC-156 BOARD
- PC-316 BOARD
- UPC-492A BOARD
- PD-171 BOARD
- PD-231 BOARD
- PD-247 BOARD
- PD-248 BOARD
- PD-249 BOARD
- PD-309 BOARD
- UPC-459 BOARD
- HDM-90 (W. W.)

SECTION D SPARE PARTS

PARTS INFORMATION

1. Safety Related Component Warning

Components identified by shading marked with \triangle on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose parts numbers appear as shown in this manual or in service manual supplements published by Sony.

2. Replacement Parts supplied from Sony Parts Center will sometimes have different shape and outside view from the parts which actually in use. This is due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts." This manual's exploded view and electrical spare parts lists are indicating the parts numbers of "the standardized genuine parts at present." Regarding engineering parts and diagrams changes in our engineering department, refer SECTION E. CHANGE INFORMATION.

3. The parts marked with "S" in the SP column of the exploded views and electrical spare parts list are normally required for routine service work. Orders for parts marked with "O" will be processed, but allow for additional delivery time.

4. Item with no parts number and/or no description are not stocked because they are seldom required for routine service.

5. Abbreviation

REF.No.	DESCRIPTION	REF.No.	DESCRIPTION	REF.No.	DESCRIPTION
C	CAPACITOR	F	FUSE	RV	VARIABLE RESISTOR
CN	CONNECTOR	IC	IC	RY	RELAY
CP	COMBINATION	L	INDUCTOR	S	SWITCH
	CIRCUIT BLOCK	Q	TRANSISTOR	T	TRANSFORMER
D	DIODE	R	RESISTOR		

All capacitors are in micro farads unless otherwise specified.
 All inductors are in micro henries unless otherwise specified.
 All resistors are in ohms.

EXPLODED VIEW

CHASSIS ASSY

No.	Part No.	SP Description
1	A-7513-972-A	o MOUNTED CIRCUIT BOARD, UPC-492A
2	A-7513-970-A	o MOUNTED CIRCUIT BOARD, PD-231
3	A-7513-971-A	o MOUNTED CIRCUIT BOARD, PD-248
4	A-7513-917-A	o MOUNTED CIRCUIT BOARD, PD-171
5	A-7513-918-A	o MOUNTED CIRCUIT BOARD, PD-249
6	A-7513-919-A	o MOUNTED CIRCUIT BOARD, UPC-459
7	A-7513-920-A	o MOUNTED CIRCUIT BOARD, PD-247
8	1-533-048-XX	s HOLDER, FUSE
9	1-571-750-11	s SWITCH, PUSH (2 KEY) "SYNC SELECT INT/EXT"
10	1-628-885-11	o PRINTED CIRCUIT BOARD, PC-156
11	1-628-886-11	o PRINTED CIRCUIT BOARD, PC-316
12	▲1-546-081-11	o CATHODE-RAY TUBE, CRT
13	▲1-451-335-11	s DEFLECTION YOKE
14	1-526-837-11	o SOCKET, CRT
15	▲1-571-059-11	s SWITCH, PUSH (1 KEY) "POWER ON/OFF"
16	1-238-654-11	s RES, VAR, METAL 20K "CONTRAST"
17	1-238-653-11	s RES, VAR, METAL 10K "BRIGHTNESS"
18	1-563-132-11	s CONNECTOR, BNC "VIDEO IN/OUT"
19	1-563-132-11	s CONNECTOR, BNC "SYNC IN/OUT"
20	1-570-475-11	s SWITCH, SLIDE "VIDEO 75/OFF"
21	1-570-475-11	s SWITCH, SLIDE "SYNC 75/OFF"
22	▲1-570-173-21	s SWITCH, SLIDE (VOLTAGE SELECTOR)
23	1-509-166-11	s CONNECTOR, 7P MALE "TALLY"
24	▲1-540-081-11	s FILTER (GL-2030E) "AC IN"
25	3-697-056-01	s KNOB, VR
26	3-731-512-01	o HEAT SINK
27	3-731-513-01	o SPACER
28	3-731-514-01	o SHEET (2), INSULATING
29	3-731-517-01	o COLLAR, BUTTON
30	3-731-518-01	o SHIELD, NECK
31	3-731-519-01	o WASHER, 3MM NYLON
32	3-731-521-01	o CARD, TALLEY
33	3-731-524-01	o SPRING
34	3-731-525-01	o HEAT SINK (2)
35	3-731-528-01	o COVER, PC PLATE
36	3-731-535-01	o MASK (3), CRT
37	3-731-536-01	o PANEL
38	3-731-537-01	o ESCUTCHEON
39	3-731-541-01	o HEAT SINK (1)
40	3-731-544-01	o PANEL, FRONT
41	2-990-241-01	o HOLDER (A), PLUG
42		o PRINTED CIRCUIT BOARD, PD-309
43	▲1-449-720-11	s TRANSFORMER, POWER
44	8-719-907-03	s DIODE BD703G

ELECTRICAL PARTS LIST

PC-156 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-628-885-11	o PRINTED CIRCUIT BIARD, PC-156
S004	1-571-750-11	s SWITCH, PUSH (2 KEY) "INT/EXT"

PC-316 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-628-886-11	o PRINTED CIRCUIT BOARD, PC-316
D003	8-719-921-06	s DIODE HLMP-2965
D004	8-719-921-06	s DIODE HLMP-2965

PD-171 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-7513-917-A	o MOUNTED CIRCUIT BOARD, PD-171
3pcs	1-535-245-11	o CONTACT
1pc	1-561-207-00	o HOUSING, FEMALE 3P
C1	1-124-963-11	s ELECT 33uF 20% 16V
C2		s ELECT (NONPOLAR) 4.7uF 20% 50V
C3	1-136-165-00	s FILM 0.1uF 5% 50V
C4	1-124-963-11	s ELECT 33uF 20% 16V
C5	1-124-963-11	s ELECT 33uF 20% 16V
C6	1-124-963-11	s ELECT 33uF 20% 16V
C7	1-124-963-11	s ELECT 33uF 20% 16V
C8	1-136-165-00	s FILM 0.1uF 5% 50V
C9	1-102-824-00	s CERAMIC 470PF 5% 50V
C10	1-136-161-00	s FILM 0.047uF 5% 50V
C11	1-102-824-00	s CERAMIC 470PF 5% 50V
C12	1-102-980-00	s CERAMIC 270PF 5% 50V
C13	1-124-963-11	s ELECT 33uF 20% 16V
CN1	1-564-577-11	o CONNECTOR, BOARD TO BOARD 3P
D1	8-719-815-85	s DIODE 1S1585
D2	8-719-815-85	s DIODE 1S1585
D3	8-719-993-91	s DIODE HZ9C1
IC1	8-759-201-47	s IC TA7357AP
Q1	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q2	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q3	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q4	8-729-281-52	s TRANSISTOR 2SC1815-Y
R1	1-214-729-00	s METAL 1K 1% 1/4W
R2	1-214-777-00	s METAL 100K 1% 1/4W
R3	1-214-777-00	s METAL 100K 1% 1/4W
R4	1-214-697-00	s METAL 47 1% 1/4W
R5	1-214-731-00	s METAL 1.2K 1% 1/4W
R6	1-214-741-00	s METAL 3.3K 1% 1/4W
R7	1-214-765-00	s METAL 33K 1% 1/4W
R8	1-214-755-00	s METAL 12K 1% 1/4W
R9	1-214-755-00	s METAL 12K 1% 1/4W
R10	1-214-751-00	s METAL 8.2K 1% 1/4W
R11	1-214-753-00	s METAL 10K 1% 1/4W
R12	1-214-721-00	s METAL 470 1% 1/4W
R13	1-214-705-00	s METAL 100 1% 1/4W
R14	1-214-785-00	s METAL 220K 1% 1/4W
R15	1-214-777-00	s METAL 100K 1% 1/4W
R16	1-214-731-00	s METAL 1.2K 1% 1/4W
R17	1-214-705-00	s METAL 100 1% 1/4W
R18	1-214-781-00	s METAL 150K 1% 1/4W
R19	1-214-956-00	s METAL 470K 1% 1/4W
R20	1-214-767-00	s METAL 39K 1% 1/4W
R21	1-214-755-00	s METAL 12K 1% 1/4W
R22	1-214-747-00	s METAL 5.6K 1% 1/4W
R23	1-214-729-00	s METAL 1K 1% 1/4W
R24	1-214-741-00	s METAL 3.3K 1% 1/4W
R25	1-214-737-00	s METAL 2.2K 1% 1/4W
R26	1-214-739-00	s METAL 2.7K 1% 1/4W
R27	1-214-729-00	s METAL 1K 1% 1/4W
R28	1-214-711-00	s METAL 180 1% 1/4W

 PD-231 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-7513-970-A	o MOUNTED CIRCUIT BOARD, PD-231
C501	▲1-136-929-11	s FILM 0.001uF 5% 1.5KV
C502	▲1-136-798-11	s FILM 0.0015uF 5% 1.5KV
C503	1-136-779-11	s FILM 10uF 5% 100V
C504	1-162-613-11	s CERAMIC 330PF 10% 500V
C505	1-124-477-11	s ELECT 47uF 20% 25V
C506	1-130-483-00	s MYLAR 0.01uF 5% 50V
C507	1-130-471-00	s MYLAR 0.001uF 5% 50V
C508	1-124-477-11	s ELECT 47uF 20% 25V
C509	1-124-477-11	s ELECT 47uF 20% 25V
C510	1-102-824-00	s CERAMIC 470PF 5% 50V
C511	1-136-177-00	s FILM 1uF 5% 50V
C512	1-136-165-00	s FILM 0.1uF 5% 50V
C513	1-136-153-00	s FILM 0.01uF 5% 50V
C514	1-136-155-00	s FILM 0.015uF 5% 50V
C515	1-136-173-00	s FILM 0.47uF 5% 50V
C516	1-136-177-00	s FILM 1uF 5% 50V
CN502	1-506-348-XX	o CONNECTOR, MALE 6P
CN503	1-560-061-00	o CONNECTOR, MALE 3P
CN504	1-560-066-00	o CONNECTOR, MALE 10P
D501	8-719-971-20	s DIODE V19G
D502	8-719-976-61	s DIODE 1SS119FS
D503	8-719-976-61	s DIODE 1SS119FS
D504	8-719-976-61	s DIODE 1SS119FS
D505	8-719-976-61	s DIODE 1SS119FS
D506	8-719-976-61	s DIODE 1SS119FS
D507	8-719-976-61	s DIODE 1SS119FS
D508	8-719-300-80	s DIODE RU-1C
D509	▲8-719-933-54	s DIODE HZS9A2L
D510	8-719-976-61	s DIODE 1SS119FS
D511	8-719-976-60	s DIODE HZS5C-1
D512	8-719-934-00	s DIODE HZS22-2L
D513	8-719-976-61	s DIODE 1SS119FS
IC501	8-759-700-81	s IC NJM555D
IC502	8-759-988-93	s IC CA3080A
IC503	8-759-131-11	s IC UPC311C
Q501	8-729-803-82	s TRANSISTOR 2SC3468
Q502	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q503	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q504	8-729-201-16	s TRANSISTOR 2SK117-Y
R501	1-216-353-00	s METAL 2.2 5% 1W
R502	1-214-729-00	s METAL 1K 1% 1/4W
R503	1-214-699-00	s METAL 56 1% 1/4W
R504	1-214-699-00	s METAL 56 1% 1/4W
R505	1-214-744-00	s METAL 4.3K 1% 1/4W
R506	1-214-739-00	s METAL 2.7K 1% 1/4W
R507	1-214-756-00	s METAL 13K 1% 1/4W
R508	1-214-747-00	s METAL 5.6K 1% 1/4W
R509	1-214-768-00	s METAL 43K 1% 1/4W
R510	1-214-720-00	s METAL 430 1% 1/4W
R511	1-214-705-00	s METAL 100 1% 1/4W
R512	1-214-713-00	s METAL 220 1% 1/4W
R513	1-214-729-00	s METAL 1K 1% 1/4W
R514	1-214-727-00	s METAL 820 1% 1/4W
R515	1-214-729-00	s METAL 1K 1% 1/4W
R516	1-214-761-00	s METAL 22K 1% 1/4W

(PD-231 BOARD)

Ref. No. or Q'ty	Part No.	SP Description
R517	▲1-214-956-00	s METAL 470K 1% 1/4W
R518	1-214-768-00	s METAL 43K 1% 1/4W
R519	1-214-717-00	s METAL 330 1% 1/4W
R520	1-214-748-00	s METAL 6.2K 1% 1/4W
R521	1-216-354-11	s METAL 2.7 5% 1W
R522	1-260-033-11	s CARBON 2.2M 5% 1/2W
R523	1-214-753-00	s METAL 10K 1% 1/4W
R524	1-214-753-00	s METAL 10K 1% 1/4W
R525	1-214-741-00	s METAL 3.3K 1% 1/4W
R526	1-214-729-00	s METAL 1K 1% 1/4W
R527	1-214-753-00	s METAL 10K 1% 1/4W
R528	1-214-952-00	s METAL 330K 1% 1/4W
R529	1-214-753-00	s METAL 10K 1% 1/4W
R530	▲1-218-370-11	s METAL 5.1K 0.10% 1/4W
R531	▲1-218-371-11	s METAL 6.2K 0.10% 1/4W
R532	▲1-218-372-11	s METAL 75K 0.10% 1/4W
RV501	1-237-502-21	s RES, ADJ, METAL 5K
T501	1-437-181-11	s TRANSFORMER, DRIVE (DT-298)

 PD-247 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-7513-920-A	o MOUNTED CIRCUIT BOARD, PD-247
C801	1-123-666-00	s ELECT 470uF 99% 200V
C802	1-124-046-00	s ELECT 10uF 20% 160V
C803	1-124-562-11	s ELECT 47uF 20% 160V
C804	1-124-618-11	s ELECT 2200uF 20% 35V
C805	1-124-618-11	s ELECT 2200uF 20% 35V
C806	1-136-159-00	s FILM 0.033uF 5% 50V
C807	1-136-159-00	s FILM 0.033uF 5% 50V
C808	1-126-233-11	s ELECT 22uF 20% 35V
C809	1-126-233-11	s ELECT 22uF 20% 35V
C810	1-136-159-00	s FILM 0.033uF 5% 50V
C811	1-136-159-00	s FILM 0.033uF 5% 50V
C812	1-136-159-00	s FILM 0.033uF 5% 50V
C814	1-110-258-11	s FILM 0.01uF 10% 250V
CN801	1-506-532-11	o CONNECTOR, MALE 5P
CN802	1-560-064-00	o CONNECTOR, MALE 6P
CN803	1-560-339-00	o CONNECTOR, 9P MALE
CN804	1-560-063-00	o CONNECTOR, MALE 5P
CN805	1-560-063-00	o CONNECTOR, MALE 5P
CN806	1-560-062-00	o CONNECTOR, MALE 4P
D801	8-719-921-12	s DIODE HZ2BLL
D802	8-719-110-80	s DIODE RD33ES-B4
D803	8-719-305-15	s DIODE GH3F
D804	8-719-305-15	s DIODE GH3F
F801	▲1-532-265-XX	s FUSE, 1A 250V
	1-533-037-XX	s HOLDER, FUSE
IC801	▲1-808-604-11	s IC HIC-1
Q801	8-729-803-82	s TRANSISTOR 2SC3468
R801	1-215-901-00	s METAL 33K 5% 2W
R803	1-214-874-00	s METAL 2.7K 1% 1/2W
R804	1-214-735-00	s METAL 1.8K 1% 1/4W
R805	1-214-728-11	s METAL 910 1% 1/4W
R806	1-216-438-11	s METAL 8.2K 5% 1W
R809	1-216-431-11	s METAL 560 1% 1W
R810	1-214-707-00	s METAL 120 1% 1/4W
R811	1-216-431-11	s METAL 560 1% 1W
R812	1-214-707-00	s METAL 120 1% 1/4W
R813	1-214-852-00	s METAL 330 1% 1/2W
R814	1-214-848-00	s METAL 220 1% 1/2W
R815	1-214-735-00	s METAL 1.8K 1% 1/4W
RY801	1-515-591-11	s RELAY
RY802	1-515-591-11	s RELAY
S801	1-552-573-00	s SWITCH, SLIDE

 PD-248 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-631-104-11	o PRINTED CIRCUIT BOARD, PD-248
C601	1-136-428-11	s FILM 0.047uF 5% 1KV
C602	1-136-425-11	s FILM 4.7uF 5% 250V
C603	1-124-340-00	s ELECT 22uF 20% 160V
C604	1-136-177-00	s FILM 1uF 5% 50V
CN601	1-560-066-00	o CONNECTOR, MALE 10P
D601	8-719-901-19	s DIODE V11N
D602	8-719-300-80	s DIODE RU-1C
L601	1-410-355-11	s INDUCTOR (VFC 4)
R601	1-216-369-00	s METAL 1 5% 2W
R602	1-214-913-00	s METAL 100K 1% 1/2W
R603	1-215-882-00	s METAL 22 5% 2W
R604	1-214-840-00	s METAL 100 1% 1/2W
R605	▲1-214-956-00	s METAL 470K 1% 1/4W
T601	▲1-439-373-11	s TRANSFORMER, FLYBACK

 PD-249 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-7513-918-A	o MOUNTED CIRCUIT BOARD, PD-249
C301	1-136-420-11	s FILM 100PF 5% 100V
C302	1-101-880-00	s CERAMIC 47PF 5% 50V
C303	1-130-779-11	s FILM 0.15uF 5% 100V
C304	1-123-932-00	s ELECT 4.7uF 20% 160V
C305	1-130-569-00	s FILM 0.033uF 5% 250V
C306	1-136-425-11	s FILM 4.7uF 5% 250V
C307	1-136-421-11	s FILM 330PF 5% 100V
C308	1-130-568-00	s FILM 0.001uF 5% 250V
C309	1-136-165-00	s FILM 0.1uF 5% 50V
C310	1-136-209-11	s FILM 0.1uF 5% 630V
C311	1-136-794-11	s FILM 0.0033uF 0 1KV
C312	1-136-600-11	s FILM 0.47uF 5% 400V
C313		s FILM 0.82uF 250V
CN301	1-506-535-11	o CONNECTOR, 14P MALE
CN302	1-506-534-11	o CONNECTOR, MALE 11P
CN303	1-560-066-00	o CONNECTOR, MALE 10P
CN304	1-506-533-11	o CONNECTOR, MALE 6P
CN305	1-560-549-00	o PIN (WITH V CONNECTOR BASE) 3P
D301	8-719-815-85	s DIODE 1S1585
D302	8-719-300-80	s DIODE RU-1C
L301	1-459-925-11	s COIL, LINEARITY
Q301	8-729-321-62	s TRANSISTOR 2SC1921
Q302	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q303	8-729-321-61	s TRANSISTOR 2SC1514
Q304	8-729-321-61	s TRANSISTOR 2SC1514
Q305	8-729-321-61	s TRANSISTOR 2SC1514
R301	1-214-769-00	s METAL 47K 1% 1/4W
R302	1-214-738-00	s METAL 2.4K 1% 1/4W
R303	1-214-752-00	s METAL 9.1K 1% 1/4W
R304	1-214-775-00	s METAL 82K 1% 1/4W
R305	1-214-761-00	s METAL 22K 1% 1/4W
R306	1-214-751-00	s METAL 8.2K 1% 1/4W
R307	1-216-463-00	s METAL 12K 5% 2W
R308	1-214-872-00	s METAL 2.2K 1% 1/2W
R309	1-214-773-00	s METAL 68K 1% 1/4W
R310	1-214-840-00	s METAL 100 1% 1/2W
R311	1-214-771-00	s METAL 56K 1% 1/4W
R312	1-214-729-00	s METAL 1K 1% 1/4W
R313	1-214-952-00	s METAL 330K 1% 1/4W
R314	1-214-755-00	s METAL 12K 1% 1/4W
R315	1-214-962-00	s METAL 820K 1% 1/4W
R316	1-214-964-00	s METAL 1M 1% 1/4W
R317	1-214-943-00	s METAL 1.8M 1% 1/2W
R318	1-214-770-00	s METAL 51K 1% 1/4W
R319	1-214-726-00	s METAL 750 1% 1/4W
R320	1-215-929-11	s METAL 100K 5% 3W
R321	1-214-913-00	s METAL 100K 1% 1/2W
R322	1-214-929-00	s METAL 470K 1% 1/2W
R323	1-215-892-11	s METAL 1K 5% 2W
R324	1-214-864-00	s METAL 1K 1% 1/2W
RV301	1-230-969-11	s RES, ADJ, METAL 10K
RV302	1-226-114-00	s RES, ADJ, METAL 2M
SG301	1-519-502-11	s GAP, SPARK
SG302	1-519-502-11	s GAP, SPARK
SG303	1-519-502-11	s GAP, SPARK

 PD-309 BOARD

Ref. No. or Q'ty	Part No.	SP Description
		o PRINTED CIRCUIT BOARD, PD-309
C1	1-124-340-00	s ELECT 22uF 20% 200V
CN1	1-560-060-00	o CONNECTOR, MALE 2P
CN2	1-560-061-00	o CONNECTOR, MALE 3P
D1	8-719-300-80	s DIODE RU-1C
D2	8-759-157-40	s DIODE UPC574J
Q1	8-729-803-82	s TRANSISTOR 2SC3468
Q2	8-729-803-82	s TRANSISTOR 2SC3468
R1	1-214-911-00	s METAL 82K 1% 1/2W
R2	1-214-741-00	s METAL 3.3K 1% 1/4W
R3	1-214-729-00	s METAL 1K 1% 1/4W
R4	1-214-761-00	s METAL 22K 1% 1/4W
R5	1-214-753-00	s METAL 10K 1% 1/4W
R6	1-214-761-00	s METAL 22K 1% 1/4W

 UPC-459 BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-7513-919-A	o MOUNTED CIRCUIT BOARD, UPC-459
C401	1-124-046-00	s ELECT 10uF 20% 160V
C402	1-162-613-11	s CERAMIC 330PF 10% 500V
C403	1-124-046-00	s ELECT 10uF 20% 160V
C404	1-136-788-11	s FILM 0.01uF 5% 400V
C405	1-130-072-00	s FILM 0.022uF 5% 100V
C406	1-136-788-11	s FILM 0.01uF 5% 400V
C407	1-136-930-11	s FILM 0.0018uF 5% 1.5KV
C409	1-136-779-11	s FILM 10uF 5% 100V
C410	1-136-188-11	s FILM 0.068uF 5% 250V
CN401	1-560-066-00	o CONNECTOR, MALE 10P
CN402	1-506-348-XX	o CONNECTOR, MALE 6P
CN403	1-560-550-00	o CONNECTOR, MALE 4P
CN404	1-506-348-XX	o CONNECTOR, MALE 6P
D401	8-719-971-20	s DIODE V19G
L401	1-421-814-11	s COIL, CHOKE (LS-433) 2.35MMH
L402	1-543-639-11	s BEAD, FERRITE
Q401	8-729-150-52	s TRANSISTOR 2SC1505
R401	1-214-872-00	s METAL 2.2K 1% 1/2W
R402	1-214-864-00	s METAL 1K 1% 1/2W
R403	1-215-919-11	s METAL 2.2K 5% 3W
R404	1-216-373-11	s METAL 2.2 5% 2W
R406	1-216-433-00	s METAL 1.2K 5% 1W
T401	1-437-182-11	s TRANSFORMER, DRIVE(DT-299)
T402	1-424-177-11	s COIL, HORIZONTAL CHOKE

 UPC-492A BOARD

Ref. No. or Q'ty	Part No.	SP Description
1pc	A-7513-972-A	o MOUNTED CIRCUIT BOARD, UPC-492
C1	1-126-233-11	s ELECT 22uF 20% 35V
C2	1-126-101-11	s ELECT 100uF 20% 10V
C4	1-131-374-00	s TANTALUM 33uF 10% 10V
C5	1-124-477-11	s ELECT 47uF 20% 25V
C6	1-131-374-00	s TANTALUM 33uF 10% 10V
C7	1-130-483-00	s MYLAR 0.01uF 5% 50V
C8	1-130-483-00	s MYLAR 0.01uF 5% 50V
C9	1-161-063-00	s CERAMIC 0.1uF 20% 50V
C11	1-101-888-00	s CERAMIC 68PF 5% 50V
C12	1-130-483-00	s MYLAR 0.01uF 5% 50V
C13	1-102-947-00	s CERAMIC 10PF 0.5PF 50V
C14	1-130-483-00	s MYLAR 0.01uF 5% 50V
C15	1-161-063-00	s CERAMIC 0.1uF 20% 50V
C28	1-136-165-00	s FILM 0.1uF 5% 50V
C29	1-161-063-00	s CERAMIC 0.1uF 20% 50V
C30	1-124-927-11	s ELECT 4.7uF 20% 100V
C31	1-136-165-00	s FILM 0.1uF 5% 50V
C32	1-136-165-00	s FILM 0.1uF 5% 50V
C33	1-161-063-00	s CERAMIC 0.1uF 20% 50V
C34	1-101-888-00	s CERAMIC 68PF 5% 50V
C35	1-102-820-00	s CERAMIC 330PF 5% 50V
C36	1-124-340-00	s ELECT 22uF 20% 160V
C37	1-124-963-11	s ELECT 33uF 20% 16V
C51	1-126-233-11	s ELECT 22uF 20% 35V
C53	1-124-120-11	s ELECT 220uF 20% 25V
C58	1-136-165-00	s FILM 0.1uF 5% 50V
C59	1-130-473-00	s MYLAR 0.0015uF 5% 50V
C60	1-102-816-00	s CERAMIC 120PF 5% 50V
C61	1-108-792-11	s MYLAR 0.001uF 20% 50V
C62	1-101-888-00	s CERAMIC 68PF 5% 50V
C63	1-130-726-00	s FILM 0.0015uF 1% 100V
C64	1-101-361-00	s CERAMIC 150PF 5% 50V
C65	1-130-471-00	s MYLAR 0.001uF 5% 50V
C66	1-130-471-00	s MYLAR 0.001uF 5% 50V
C67	1-102-973-00	s CERAMIC 100PF 5% 50V
C68	1-136-165-00	s FILM 0.1uF 5% 50V
C69	1-109-561-00	s MICA 0.001uF 5% 100V
C70	1-109-561-00	s MICA 0.001uF 5% 100V
C71	1-124-927-11	s ELECT 4.7uF 20% 100V
C72	1-124-478-11	s ELECT 100uF 20% 25V
C73	1-124-478-11	s ELECT 100uF 20% 25V
C74	1-136-165-00	s FILM 0.1uF 5% 50V
C75	1-136-177-00	s FILM 1uF 5% 50V
C76	1-130-483-00	s MYLAR 0.01uF 5% 50V
C77	1-126-101-11	s ELECT 100uF 20% 10V
C78	1-136-173-00	s FILM 0.47uF 5% 50V
C79	1-126-233-11	s ELECT 22uF 20% 35V
C80	1-124-927-11	s ELECT 4.7uF 20% 100V
C81	1-136-422-11	s FILM 0.0012uF 5% 100V
C82	1-124-927-11	s ELECT 4.7uF 20% 100V
C83	1-124-910-11	s ELECT 47uF 20% 50V
C84	1-136-169-00	s FILM 0.22uF 5% 50V
C85	1-124-667-11	s ELECT 10uF 20% 100V
C86	1-130-994-11	s MYLAR 0.033uF 5% 50V
C87	1-124-478-11	s ELECT 100uF 20% 25V
C89	1-124-478-11	s ELECT 100uF 20% 25V
C90	1-130-994-11	s MYLAR 0.033uF 5% 50V

(UPC-492A BOARD)

Ref. No. or Q'ty	Part No.	SP Description
C91	1-130-471-00	s MYLAR 0.001uF 5% 50V
C92	1-124-120-11	s ELECT 220uF 20% 25V
C94	1-136-189-00	s FILM 0.1uF 5% 250V
C95	1-136-165-00	s FILM 0.1uF 5% 50V
C96	1-136-165-00	s FILM 0.1uF 5% 50V
C97	1-136-165-00	s FILM 0.1uF 5% 50V
CN1	1-560-060-00	o CONNECTOR, MALE 2P
CN2	1-560-065-00	o CONNECTOR, MALE 8P
CN3	1-560-339-00	o CONNECTOR, 9P MALE
CN4	1-560-062-00	o CONNECTOR, MALE 4P
CN5	1-560-230-00	o CONNECTOR, 12P MALE
CN7	1-560-061-00	o CONNECTOR, MALE 3P
CNI1	1-526-653-21	s SOCKET, IC (DP) 14P
CNI3	1-526-654-00	o SOCKET, IC (DP) 16P
CNI4	1-526-652-21	s SOCKET, IC (DP) 8P
CNI5	1-526-654-00	o SOCKET, IC (DP) 16P
CNI7	1-526-652-21	s SOCKET, IC (DP) 8P
CNI8	1-526-652-21	s SOCKET, IC (DP) 8P
CNI9	1-526-652-21	s SOCKET, IC (DP) 8P
D1	8-719-815-85	s DIODE 1S1585
D2	8-719-815-85	s DIODE 1S1585
D3	8-719-815-85	s DIODE 1S1585
D8	8-719-993-91	s DIODE HZ9C1
D9	8-719-815-85	s DIODE 1S1585
D15	8-719-956-28	s DIODE BR5628S
D17	8-719-815-85	s DIODE 1S1585
D18	8-719-815-85	s DIODE 1S1585
D19	8-719-815-85	s DIODE 1S1585
D20	8-719-815-85	s DIODE 1S1585
D21	8-719-815-85	s DIODE 1S1585
D22	8-719-110-18	s DIODE RD10ES-B3
D23	8-719-815-85	s DIODE 1S1585
D24	8-719-815-85	s DIODE 1S1585
D25	8-719-300-80	s DIODE RU-1C
D26	8-719-815-85	s DIODE 1S1585
D27	8-719-815-85	s DIODE 1S1585
D28	8-719-305-15	s DIODE GH3F
D29	8-719-305-15	s DIODE GH3F
D30	8-719-815-85	s DIODE 1S1585
D31	8-719-993-91	s DIODE HZ9C1
D33	8-719-993-91	s DIODE HZ9C1
D34	8-719-901-83	s DIODE 1S583
IC1	8-759-014-95	s IC MC1495L
IC3	8-759-208-17	s IC TC4528BPHB
IC4	8-759-201-04	s IC TC40107BP
IC5	8-759-208-17	s IC TC4528BPHB
IC6	8-759-708-05	s IC NJM78L05A
IC7	8-759-700-81	s IC NJM555D
IC8	8-759-945-58	s IC NJM4558D
IC9	8-759-103-86	s IC UPC151C
L1	1-411-113-11	s COIL, PEAKING 4.4uH
L2	1-411-113-11	s COIL, PEAKING 4.4uH
L3	1-410-355-11	s INDUCTOR (VFC 4)
Q1	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q2	8-729-173-38	s TRANSISTOR 2SA733-K
Q3	8-729-302-77	s TRANSISTOR 2SC1906

(UPC-492A BOARD)

Ref. No. or Q'ty	Part No.	SP Description
Q4	8-729-302-77	s TRANSISTOR 2SC1906
Q5	8-729-103-19	s TRANSISTOR 2SA1206-K1
Q6	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q7	8-729-173-38	s TRANSISTOR 2SA733-K
Q17	9-990-746-01	s TRANSISTOR 2SC752(G)TM-Y
Q18	8-729-281-54	s TRANSISTOR 2SC1815-BL
Q19	8-729-806-53	s TRANSISTOR 2SC3599-E
Q21	8-729-802-37	s TRANSISTOR 2SC3595
Q33	8-729-173-38	s TRANSISTOR 2SA733-K
Q34	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q35	8-729-119-78	s TRANSISTOR 2SC2785-HFE
Q36	8-729-119-78	s TRANSISTOR 2SC2785-HFE
Q37	8-729-803-82	s TRANSISTOR 2SC3468
Q38	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q39	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q40	8-729-173-38	s TRANSISTOR 2SA733-K
Q41	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q42	8-729-281-52	s TRANSISTOR 2SC1815-Y
Q43	8-729-321-62	s TRANSISTOR 2SC1921
Q44	8-729-173-38	s TRANSISTOR 2SA733-K
R2	1-214-755-00	s METAL 12K 1% 1/4W
R3	1-214-729-00	s METAL 1K 1% 1/4W
R4	1-214-741-00	s METAL 3.3K 1% 1/4W
R5	1-214-697-00	s METAL 47 1% 1/4W
R6	1-214-737-00	s METAL 2.2K 1% 1/4W
R8	1-214-723-00	s METAL 560 1% 1/4W
R9	1-214-722-00	s METAL 510 1% 1/4W
R10	1-214-729-00	s METAL 1K 1% 1/4W
R11	1-214-733-00	s METAL 1.5K 1% 1/4W
R12	1-214-709-00	s METAL 150 1% 1/4W
R13	1-214-709-00	s METAL 150 1% 1/4W
R14	1-214-705-00	s METAL 100 1% 1/4W
R15	1-214-742-00	s METAL 3.6K 1% 1/4W
R16	1-214-745-00	s METAL 4.7K 1% 1/4W
R17	1-214-101-00	s METAL 51 1% 1/4W
R18	1-214-746-00	s METAL 5.1K 1% 1/4W
R19	1-214-729-00	s METAL 1K 1% 1/4W
R20	1-214-705-00	s METAL 100 1% 1/4W
R21	1-214-697-00	s METAL 47 1% 1/4W
R22	1-214-737-00	s METAL 2.2K 1% 1/4W
R23	1-214-720-00	s METAL 430 1% 1/4W
R24	1-214-711-00	s METAL 180 1% 1/4W
R25	1-214-697-00	s METAL 47 1% 1/4W
R26	1-214-687-00	s METAL 18 1% 1/4W
R27	1-214-687-00	s METAL 18 1% 1/4W
R28	1-214-729-00	s METAL 1K 1% 1/4W
R29	1-214-687-00	s METAL 18 1% 1/4W
R30	1-214-702-00	s METAL 75 1% 1/4W
R31	1-214-729-00	s METAL 1K 1% 1/4W
R32	1-214-705-00	s METAL 100 1% 1/4W
R33	1-214-687-00	s METAL 18 1% 1/4W
R34	1-214-689-11	s METAL 22 1% 1/4W
R35	1-214-689-11	s METAL 22 1% 1/4W
R36	1-249-389-11	s CARBON 4.7 5% 1/6W
R37	1-249-389-11	s CARBON 4.7 5% 1/6W
R38	1-249-389-11	s CARBON 4.7 5% 1/6W
R39	1-214-737-00	s METAL 2.2K 1% 1/4W
R40	1-214-693-11	s METAL 33 1% 1/4W
R41	1-214-689-11	s METAL 22 1% 1/4W

(UPC-492A BOARD)

Ref. No. or Q'ty	Part No.	SP Description
R78	1-214-777-00	s METAL 100K 1% 1/4W
R79	1-214-697-00	s METAL 47 1% 1/4W
R80	1-214-769-00	s METAL 47K 1% 1/4W
R81	1-214-735-00	s METAL 1.8K 1% 1/4W
R82	1-214-753-00	s METAL 10K 1% 1/4W
R83	1-214-697-00	s METAL 47 1% 1/4W
R84	1-214-705-00	s METAL 100 1% 1/4W
R85	1-214-850-00	s METAL 270 1% 1/2W
R86	1-214-705-00	s METAL 100 1% 1/4W
R87	1-214-742-00	s METAL 3.6K 1% 1/4W
R88	1-214-705-00	s METAL 100 1% 1/4W
R89	1-214-837-11	s METAL 75 1% 1/2W
R90	1-214-689-11	s METAL 22 1% 1/4W
R92	1-214-735-00	s METAL 1.8K 1% 1/4W
R94	1-216-459-00	s METAL 2.7K 5% 2W
R95	1-215-894-11	s METAL 2.2K 5% 2W
R136	1-214-737-00	s METAL 2.2K 1% 1/4W
R137	1-214-705-00	s METAL 100 1% 1/4W
R138	1-214-739-00	s METAL 2.7K 1% 1/4W
R139	1-214-757-00	s METAL 15K 1% 1/4W
R140	1-214-771-00	s METAL 56K 1% 1/4W
R141	1-214-729-00	s METAL 1K 1% 1/4W
R144	1-214-737-00	s METAL 2.2K 1% 1/4W
R145	1-214-824-11	s METAL 22 1% 1/2W
R161	1-214-771-00	s METAL 56K 1% 1/4W
R162	1-214-785-00	s METAL 220K 1% 1/4W
R163	1-214-753-00	s METAL 10K 1% 1/4W
R164	1-214-751-00	s METAL 8.2K 1% 1/4W
R165	1-214-744-00	s METAL 4.3K 1% 1/4W
R167	1-214-757-00	s METAL 15K 1% 1/4W
R168	1-214-727-00	s METAL 820 1% 1/4W
R169	1-214-759-00	s METAL 18K 1% 1/4W
R170	1-214-755-00	s METAL 12K 1% 1/4W
R171	1-214-753-00	s METAL 10K 1% 1/4W
R172	1-214-729-00	s METAL 1K 1% 1/4W
R173	1-214-729-00	s METAL 1K 1% 1/4W
R174	1-214-741-00	s METAL 3.3K 1% 1/4W
R175	1-214-777-00	s METAL 100K 1% 1/4W
R176	1-214-720-00	s METAL 430 1% 1/4W
R177	1-214-777-00	s METAL 100K 1% 1/4W
R178	1-214-777-00	s METAL 100K 1% 1/4W
R179	1-214-757-00	s METAL 15K 1% 1/4W
R180	1-214-777-00	s METAL 100K 1% 1/4W
R181	1-214-761-00	s METAL 22K 1% 1/4W
R182	1-214-723-00	s METAL 560 1% 1/4W
R183	1-214-727-00	s METAL 820 1% 1/4W
R184	1-215-999-11	s METAL 12K 2% 1/8W
R185	1-214-745-00	s METAL 4.7K 1% 1/4W
R186	1-214-749-00	s METAL 6.8K 1% 1/4W
R187	1-214-741-00	s METAL 3.3K 1% 1/4W
R190	1-214-721-00	s METAL 470 1% 1/4W
R191	1-214-753-00	s METAL 10K 1% 1/4W
R192	1-214-747-00	s METAL 5.6K 1% 1/4W
R193	1-214-711-00	s METAL 180 1% 1/4W
R194	1-214-753-00	s METAL 10K 1% 1/4W
R195	1-214-751-00	s METAL 8.2K 1% 1/4W
R196	1-214-747-00	s METAL 5.6K 1% 1/4W
R197	1-214-753-00	s METAL 10K 1% 1/4W
R198	1-214-753-00	s METAL 10K 1% 1/4W

(UPC-492A BOARD)

Ref. No. or Q'ty	Part No.	SP Description
R199	1-214-765-00	s METAL 33K 1% 1/4W
R200	1-214-713-00	s METAL 220 1% 1/4W
R201	1-214-765-00	s METAL 33K 1% 1/4W
R202	1-214-745-00	s METAL 4.7K 1% 1/4W
R203	1-214-721-00	s METAL 470 1% 1/4W
R204	1-214-745-00	s METAL 4.7K 1% 1/4W
R205	1-214-689-11	s METAL 22 1% 1/4W
R206	1-214-737-00	s METAL 2.2K 1% 1/4W
R207	1-214-745-00	s METAL 4.7K 1% 1/4W
R208	1-214-722-00	s METAL 510 1% 1/4W
R209	1-214-729-00	s METAL 1K 1% 1/4W
R210	1-214-729-00	s METAL 1K 1% 1/4W
R211	1-214-796-00	s METAL 1.5 1% 1/2W
R212	1-214-713-00	s METAL 220 1% 1/4W
R213	1-214-713-00	s METAL 220 1% 1/4W
R214	1-214-713-00	s METAL 220 1% 1/4W
R215	1-214-717-00	s METAL 330 1% 1/4W
R216	1-214-743-00	s METAL 3.9K 1% 1/4W
R217	1-214-800-11	s METAL 2.2 1% 1/2W
R218	1-214-800-11	s METAL 2.2 1% 1/2W
R219	1-215-920-11	s METAL 3.3K 5% 3W
R220	1-214-765-00	s METAL 33K 1% 1/4W
R221	1-214-756-00	s METAL 13K 1% 1/4W
R222	1-214-750-00	s METAL 7.5K 1% 1/4W
R223	1-214-753-00	s METAL 10K 1% 1/4W
R224	1-215-882-00	s METAL 22 5% 2W
R225	1-214-705-00	s METAL 100 1% 1/4W
R226	1-214-707-00	s METAL 120 1% 1/4W
R228	1-214-746-00	s METAL 5.1K 1% 1/4W
R229	1-214-840-00	s METAL 100 1% 1/2W
R230	1-214-727-00	s METAL 820 1% 1/4W
RV1	1-230-969-11	s RES, ADJ, METAL 10K
RV2	1-230-970-11	s RES, ADJ, METAL 20K
RV3	1-230-968-11	s RES, ADJ, METAL 2K
RV4	1-230-965-11	s RES, ADJ, METAL 100
RV8	1-230-969-11	s RES, ADJ, METAL 10K
RV9	1-230-970-11	s RES, ADJ, METAL 20K
RV10	1-230-968-11	s RES, ADJ, METAL 2K
RV11	1-230-971-11	s RES, ADJ, METAL 100K
RV12	1-230-972-11	s RES, ADJ, METAL 200K
RV13	1-230-967-11	s RES, ADJ, METAL 1K
RV14	1-230-971-11	s RES, ADJ, METAL 100K
RV15	1-237-518-21	s RES, ADJ, METAL 10K
RV16	1-237-518-21	s RES, ADJ, METAL 10K
RV18	1-230-969-11	s RES, ADJ, METAL 10K

FRAME

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-526-837-11	o SOCKET, CRT
C001	1-131-350-00	s TANTALUM 3.3uF 10% 35V
C002	1-131-350-00	s TANTALUM 3.3uF 10% 35V
CN1F (to PC-492A BOARD)	1-561-206-00	o HOUSING, FEMALE 2P
	1-535-245-11	o CONTACT AWG22-28
CN2F (to PC-492A BOARD)	1-561-211-00	o HOUSING, FEMALE 8P
	1-535-245-11	o CONTACT AWG22-28
CN3F (to PC-492A BOARD)	1-561-491-00	o HOUSING, FEMALE 9P
	1-535-245-11	o CONTACT AWG22-28
CN4F (to PC-492A BOARD)	1-561-208-11	o HOUSING, FEMALE 4P
	1-535-245-11	o CONTACT AWG22-28
CN5F (to PC-492A BOARD)	1-561-359-00	o HOUSING, FEMALE 12P
	1-535-245-11	o CONTACT AWG22-28
CN6	1-535-047-00	s CONNECTOR, FASTEN AMP
CN7F (to PC-492A BOARD)	1-561-207-00	o HOUSING, FEMALE 3P
	1-535-245-11	o CONTACT AWG22-28
CN001F	▲1-506-586-11	o HOUSING, 12P
CN001M (to TRANSFORMER)	▲1-563-085-11	o CONNECTOR, MALE 12P
CN002F (to TRANSFORMER)	▲1-568-563-11	o HOUSING, FEMALE 9P
	1-568-565-11	o SOCKET, 9P
	1-568-566-11	o CONTACT AWG24-20
CN002M	▲1-568-564-11	o HOUSING, FEMALE 9P
	1-568-567-11	o CONTACT, AWG24-20
CN301F (to PD-249 BOARD)	1-562-983-11	o HOUSING, FEMALE 14P
	1-535-245-11	o CONTACT AWG22-28
CN302F (to PD-249 BOARD)	1-562-982-11	o HOUSING, FEMALE 11P
	1-535-245-11	o CONTACT AWG22-28
CN303F (to PD-249 BOARD)	1-561-212-00	o HOUSING, FEMALE 10P
	1-535-245-11	o CONTACT AWG22-28
CN304F (to PD-249 BOARD)	1-562-985-11	o HOUSING, FEMALE 6P
	1-560-548-00	o CONTACT AWG20-26
CN305F (to PD-249 BOARD)	1-561-667-00	o HOUSING, FEMALE 3P
	1-560-548-00	o CONTACT AWG20-26
CN401F (to UPC-459 BOARD)	1-561-212-00	o HOUSING, FEMALE 10P
	1-535-245-11	o CONTACT AWG22-28

(FRAME)

Ref. No. or Q'ty	Part No.	SP Description
CN402F (to UPC-459 BOARD)	1-509-896-00	o HOUSING(8MM PITCH), FEMALE 3P
	1-509-898-00	s CONTACT AWG18-24
CN403 (to UPC-459 BOARD)	1-561-668-00	o HOUSING, FEMALE 4P
	1-560-548-00	o CONTACT AWG20-26
CN404F (to UPC-459 BOARD)	1-561-431-21	o HOUSING,CONNECTOR(8MM PITCH)6P
	1-509-898-00	s CONTACT AWG18-24
CN502F (to PD-231 BOARD)	1-561-431-21	o HOUSING,CONNECTOR(8MM PITCH)6P
	1-509-898-00	s CONTACT AWG18-24
CN503F (to PD-231 BOARD)	1-561-207-00	o HOUSING, FEMALE 3P
	1-535-245-11	o CONTACT AWG22-28
CN504F (to PD-231 BOARD)	1-561-212-00	o HOUSING, FEMALE 10P
	1-535-245-11	o CONTACT AWG22-28
CN601F (to PD-248 BOARD)	1-561-212-00	o HOUSING, FEMALE 10P
	1-535-245-11	o CONTACT AWG22-28
CN801F (to PD-247 BOARD)	1-562-984-11	o HOUSING, FEMALE 5P
	1-560-548-00	o CONTACT AWG20-26
CN802F (to PD-247 BOARD)	1-561-210-00	o HOUSING, FEMALE 6P
	1-535-245-11	o CONTACT AWG22-28
CN803F (to PD-247 BOARD)	1-561-491-00	o HOUSING, FEMALE 9P
	1-535-245-11	o CONTACT AWG22-28
CN804F (to PD-247 BOARD)	1-561-209-00	o HOUSING, FEMALE 5P
	1-535-245-11	o CONTACT AWG22-28
CN805F (to PD-247 BOARD)	1-561-209-00	o HOUSING, FEMALE 5P
	1-535-245-11	o CONTACT AWG22-28
CN806F (to PD-247 BOARD)	1-561-208-11	o HOUSING, FEMALE 4P
	1-535-245-11	o CONTACT AWG22-28
D001	8-719-505-40	s DIODE S5VB40
D002	8-719-505-40	s DIODE S5VB40
D005	8-719-907-03	s DIODE BD703G
D006	8-719-976-62	s DIODE ERE09-15
DY001	▲1-451-335-11	s DEFLECTION YOKE (YS-32773D1)
F001	▲1-532-849-11	s FUSE (QSF-2) 2A 125V
	1-533-048-XX	s HOLDER, FUSE
F002	▲1-576-070-11	s FUSE, GLASS-TUBE 1A 250V
IC001	8-759-982-13	s IC NJM7812B
IC002	8-759-179-12	s IC UPC7912H
J001	1-563-132-11	s CONNECTOR, BNC MALE "VIDEO OUT"
J002	1-563-132-11	s CONNECTOR, BNC MALE "VIDEO IN"
J003	1-563-132-11	s CONNECTOR, BNC MALE "SYNC OUT"
J004	1-563-132-11	s CONNECTOR, BNC MALE "SYNC IN"

(FRAME)

Ref. No. or Q'ty	Part No.	SP Description
J005	1-509-166-11	s CONNECTOR, MALE 7P "TALLY & SYNC REMOTE"
J006	▲1-540-081-11	s FILTER (GL-2030E) "AC IN"
Q001	8-729-300-11	s TRANSISTOR 2SC2922
Q002	8-729-143-41	s TRANSISTOR 2SB546A
Q003	8-729-142-98	s TRANSISTOR 2SD401A
Q004	8-729-142-98	s TRANSISTOR 2SD401A
Q005	9-987-018-01	s TRANSISTOR 2SD799
Q006	8-729-821-96	s TRANSISTOR 2SC3685
Q007	8-729-287-10	s TRANSISTOR 2SD871
Q008	8-729-142-98	s TRANSISTOR 2SD401A
Q009	1-806-565-11	s TRANSISTOR 2SD1018
R001	1-214-837-11	s METAL 75 1% 1/2W
R002	1-214-837-11	s METAL 75 1% 1/2W
R003	1-214-840-00	s METAL 100 1% 1/2W
R004	1-214-840-00	s METAL 100 1% 1/2W
RV001	1-238-653-11	s RES, VAR, METAL 10K "CONTRAST"
RV002	1-238-654-11	s RES, VAR, METAL 20K "BRIGHT"
S001	1-570-475-11	s SWITCH, SLIDE "VIDEO 75/OFF"
S002	1-570-475-11	s SWITCH, SLIDE "SYNC 75/OFF"
S003	▲1-571-059-11	s SWITCH, PUSH (1 KEY) "POWER ON/OFF"
S005	▲1-570-173-21	s SWITCH, SLIDE "LINE VOLTAGE"
S006	▲1-570-173-21	s SWITCH, SLIDE "LINE VOLTAGE"
SG001	1-519-551-11	s GAP, SPARK
T001	▲1-449-720-11	s TRANSFORMER, POWER (PT-382A)
V001	▲1-546-081-11	s CATHODE-RAY TUBE, CRT (230CJB4)

PACKING MATERIALS & SUPPLIED ACCESSORIES

Ref. No. or Q'ty	Part No.	SP Description
1pc	▲1-506-411-00	s ADAPTOR, AC PLUG 3P-2P
1pc	1-508-366-00	s CONNECTOR, FEMALE 7P(XLR-7-11C)
2pcs	▲1-532-265-XX	s FUSE, 1A 250V
1pc	▲1-551-812-00	s CORD, POWER
1pc	▲1-556-760-11	s CORD, POWER (3 CORE)
2pcs	1-564-742-11	s CONNECTOR, BNC FEMALE
2pcs	▲1-576-045-11	s FUSE, GLASS-TUBE 2A 250V
2pcs	▲1-576-070-11	s FUSE, GLASS-TUBE 2A 250V
1pc	2-990-242-01	o HOLDER (B), PLUG

SECTION E CHANGED PARTS

NOTE: The number identified by making with) are matching with each serial numbers.

3) Serial No. 10101 and higher

PD-247 BOARD

OLD) D801 8-719-109-71 s DIODE HZ4B2
3) D801 8-719-921-21 s DIODE HZ2BLL
OLD) R802 1-219-104-11 s WIREWOUND 3.9 5W
3) R802 DELETE

PD-248 BOARD

OLD) C604 1-136-155-00 s FILM 0.015uF 5% 50V
3) C604 1-136-177-00 s FILM 1uF 5% 50V

PD-249 BOARD

OLD) C313 1-130-798-00 s FILM 1uF 10% 250V
3) C313 s FILM 0.82uF 250V
OLD) R302 1-214-735-00 s METAL 1.8K 1% 1/4W
3) R302 1-214-738-00 s METAL 2.4K 1% 1/4W

PD-309 BOARD

OLD) C1 NOT IN USE
3) C1 1-124-340-00 s ELECT 22uF 20% 20V
OLD) CN1 NOT IN USE
3) CN1 1-560-060-00 s CONNECTOR, MALE 2P
OLD) CN2 NOT IN USE
3) CN2 1-560-061-00 s CONNECTOR, MALE 3P

OLD) D1 NOT IN USE
3) D1 8-719-300-80 s DIODE RU-1C
OLD) D2 NOT IN USE
3) D2 8-759-157-40 s DIODE UPC574J
OLD) Q1 NOT IN USE
3) Q1 8-729-803-82 s TRANSISTOR 2SC3468

OLD) Q2 NOT IN USE
3) Q2 8-729-803-82 s TRANSISTOR 2SC3468
OLD) R1 NOT IN USE
3) R1 1-214-911-00 s METAL 82K 1% 1/2W
OLD) R2 NOT IN USE
3) R2 1-214-741-00 s METAL 3.3K 1% 1/4W

OLD) R3 NOT IN USE
3) R3 1-214-729-00 s METAL 1K 1% 1/4W
OLD) R4 NOT IN USE
3) R4 1-214-761-00 s METAL 22K 1% 1/4W
OLD) R5 NOT IN USE
3) R5 1-214-753-00 s METAL 10K 1% 1/4W

OLD) R6 NOT IN USE
3) R6 1-214-761-00 s METAL 22K 1% 1/4W

UPC-459 BOARD

OLD) R405 1-215-909-11 s METAL 47 5% 3W
3) R405 DELETE

UPC-492A BOARD

OLD) C84 1-136-173-00 s FILM 0.47uF 5% 50V
3) C84 1-136-169-00 s FILM 0.22uF 5% 50V
OLD) C93 1-124-929-11 s ELECT 22uF 20% 100V
3) C93 DELETE
OLD) R2 1-214-779-00 s METAL 120K 1% 1/4W
3) R2 1-214-755-00 s METAL 12K 1% 1/4W

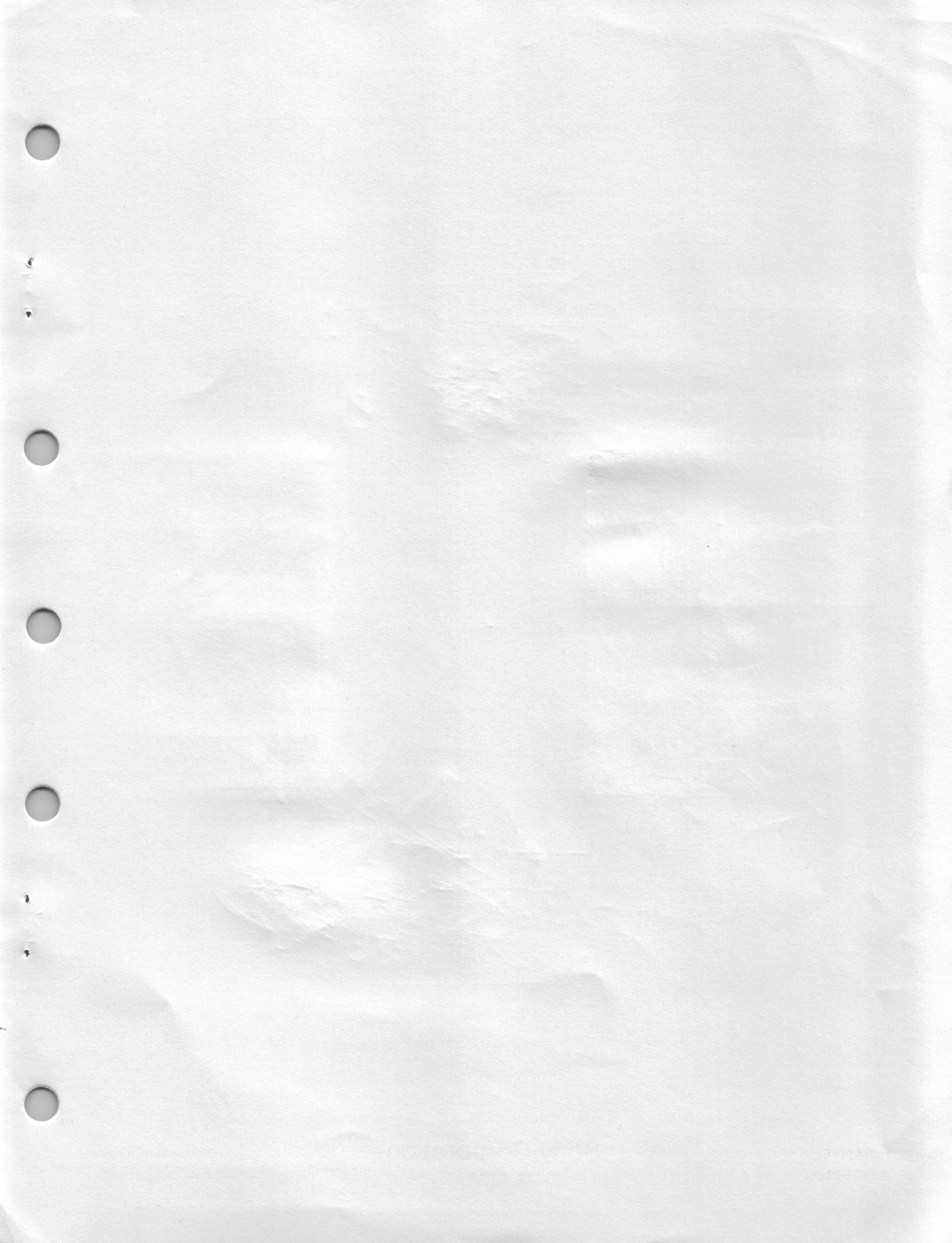
OLD) R31 1-214-723-00 s METAL 560 1% 1/4W
3) R31 1-214-729-00 s METAL 1K 1% 1/4W
OLD) R82 1-214-757-00 s METAL 15K 1% 1/4W
3) R82 1-214-753-00 s METAL 10K 1% 1/4W
OLD) R164 1-214-755-00 s METAL 12K 1% 1/4W
3) R164 1-214-751-00 s METAL 8.2K 1% 1/4W

OLD) R231 1-214-745-00 s METAL 4.7K 1% 1/4W
3) R231 DELETE
OLD) R232 1-216-440-00 s METAL 18K 5% 1W
3) R232 DELETE

FRAME

OLD) J006 ! 1-560-221-21 s AC INLET "AC IN"
3) J006 ! 1-540-081-11 s FILTER (GL-2030E)
"AC IN"

OLD) Q005 s TRANSISTOR 2SD721
3) Q005 9-987-018-01 s TRANSISTOR 2SD799
OLD) Q009 NOT IN USE
3) Q009 1-806-565-11 s TRANSISTOR 2SD1018



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