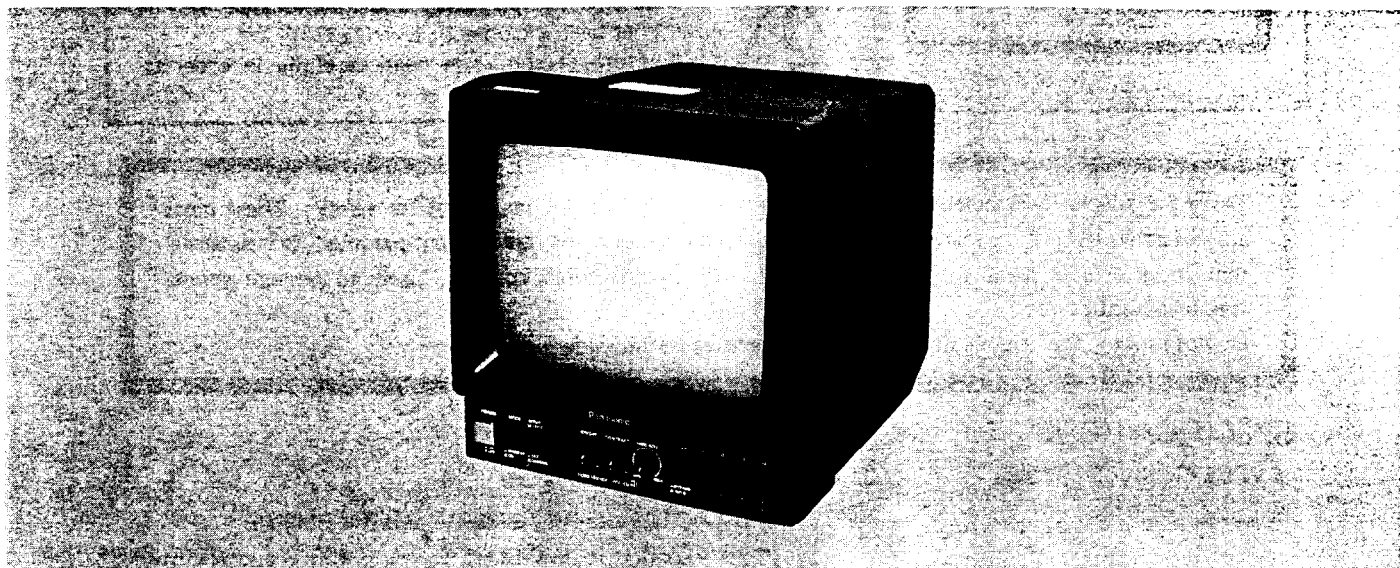


Service Manual

Video Monitor
WV-BM90

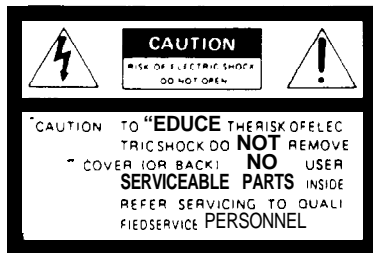


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Panasonic

Matsushita Electric Industrial Co., Ltd.,
Central P.O. Box 288, Osaka 530-91, Japan



This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.



This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by "⚠" mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacturer.

SPECIFICATIONS

o Video Monitor WV-BM90

Power Supply :	240V AC 50Hz for WV-BM90/A and WV-BM90/B 220V AC 50Hz for WV-BM90/C, WV-BM90/G and WV-BM90/F Approx.65W
Power Consumption :	
Camera Input :	1.0Vp-p/75 ohms, composite x 4 (BNC)
Video Input :	1.0Vp-p/75 ohms, composite x 1 (BNC)
Video Output :	1.0Vp-p/75 ohms, composite x 1 (BNC)
Power Supply for Camera :	Regulated current multiplex method
Camera Switching :	Manual/Auto (Sequence) With auto and manual bypass
Sequential Switching Interval :	Adjustable; 1 to 30 sec.
Resolution (Horizontal) :	750 lines at center
Sweep Linearity :	V: Less than 7% H: Less than 5%
External Control Connection Terminal :	SPOT MONITOR CONTROL IN x 4 RECOVER IN x 1 ALARM CONTROL OUT x 2 REMOTE OUT x 4 RESET OUT x 1
Camera Extension Input :	10 pin connector
Alarm Time :	Adjustable: 2 to 30 sec.
Dimensions :	230 (W) x 240 (H) x 270 (D) mm
Weight :	4.2kg

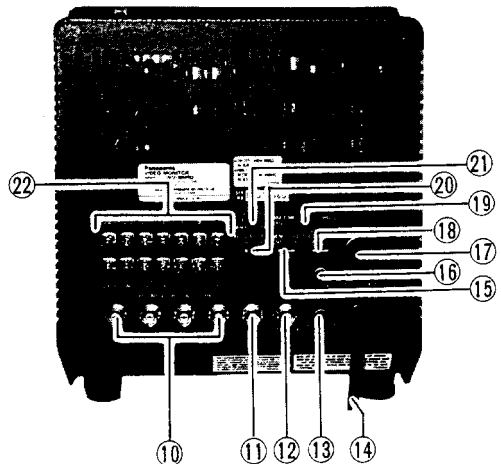
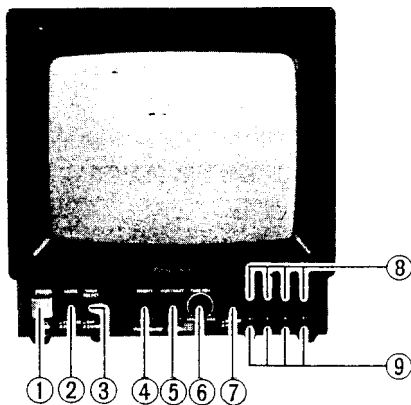
OPTIONAL ACCESSORIES

o Optional Accessory for WV-BM90

o Camera Extension Unit

WV-83

MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS



VIDEO MONITOR WV-BM90

1 Power Switch (POWER)

This is a push type switch which turns the monitor ON and OFF.

Push once and the switch remains down (■) for turning on the monitor and cameras,

Sequence and camera number indicator lamps light.

Push again, the switch comes up (■) for turning off the monitor and cameras, and the lamps go off.

2 Mode Selection Switch (MODE STANDBY/ON)

This selects the condition of the monitor as;

ON:

The picture of the camera will appear on the monitor.

STANDBY:

The picture of the camera will not appear on the monitor in the sequence mode, however the picture signal is provided at Video Output Connector (IO).

The picture of desired camera can be observed by selecting Camera Selection Switch (6).

3 Input Selection Switch (INPUT SELECT EXT/CAMERA)

This selects the condition of the monitor as;

EXT:

VTR playback picture connected to Video Input Connector can be observed.

CAMERA:

Camera picture connected to Camera Input Connector can be observed.

4 Bright Control (BRIGHT)

Turn this control clockwise to increase the picture brightness.

5 Contrast Control (CONTRAST)

Turn this control clockwise to increase the picture contrast.

6 Time Adjustment (TIME ADJ, MIN/MAX)

The sequential switching interval can be manually adjusted from 1 to 30 seconds by turning this knob.

7 Sequence Switch (SEQUENCE)

This is a push-push type switch which selects the cameras in sequential switching mode when the switch is pushed and its lamp lights. The switching interval can be adjusted by Time Adjustment (6) from 1 to 30 seconds.

8 Camera Selection Switches

These are push-push type switches which select the desired camera to observe picture and the lamp of the selected channel lights. When one of these switches is pushed on, the sequence switch goes off if the sequence switch has been turned ON.

9 Bypass Selection Switches (BYPASS/AUTO)

These select the condition of the monitor as;

BY PASS:

The picture of the connected camera will be skipped.

AUTO:

The channel(s) with no camera connection will be automatically skipped.

10 Camera Input Connectors (CAMERA INPUT)

The BNC type connectors are used to accept the coaxial cables from the specified cameras.

These connectors supply the DC power and vertical drive pulse to the cameras, and receive the video signal from the cameras.

Note:

- Be sure to connect only the specified cameras.
- Connect the camera after making sure that the monitor is off.
If the camera is connected while the monitor is on, the camera will not be functioned by activating the protection circuit for misconnection.

11 Video Output Connector (VIDEO OUT)

The BNC type connector is used to provide the video output signal of the camera for the additional monitor or video tape recorder.

The video output signal of the camera is provided at this connector even if the Mode Selection Switch (2) is set to the STANDBY position,

12 Video Input Connector (VIDEO IN)

This is an video input connector from a VTR for observing the playback picture.

When the VTR playback picture is to be shown on the video monitor, set the Input Selection Switch (3) to the EXT position and Mode Selection Switch (2) to the ON position.

13 Timing Output Connector (TIMING OUT)

This output connector provides the timing pulse signals for switching in the sequence operation for other system such as another Mini CCTV System or sequential switcher.

14 Power Cord

15 Timing Selection Switch (TIMING SELECT INT/EXT)

The timing pulses for the sequential switching interval can be selected as;

INT:

The timing pulses for the sequential switching interval are generated in the video monitor WV-BM90.

EXT:

The timing pulse for the sequential switching interval are synchronized with the external timing pulses fed to the External Timing Input Connector (16) from the time lapse VTR or another Mini CCTV System.

16 External Timing Input Connector (EXT IN)

This is an input connector for the external timing from the time lapse VTR or another Mini CCTV System

17 Camera Extension Input Connector (CAMERA EXTENSION IN)

This is a IO-pin connector for the Camera Extension Unit WV-63 for expanding the system up to 7 cameras and the informations are as;

- Pin 1: Video Input Signal
- Pin 2: VD Output Signal
- Pin 3: Ground
- Pin 4: Logic Signal for Sequence
- Pin 5: Logic Signal for Sequence
- Pin 6: Logic Signal for Sequence
- Pin 7: Logic Signal for Sequence
- Pin 8: Logic Signal for Sequence
- Pin 9: Logic Signal for Sequence
- Pin 10: Logic Signal for Sequence

18 Camera Extension Switch (CAMERA EXTENSION, ON/OFF)

This selects the condition of camera extension function as;

ON:

Camera pictures connected to the Camera Extension Unit WV-63 can be observed on the monitor.

OFF:

Select this position whenever the Camera Extension Unit WV-63 is not connected.

19 Vertical Hold Control (V.HOLD)

Locks in the picture of the monitor vertically.

20 Auto Reset Switch (AUTO RESET, ON/OFF)

This selects the condition of auto reset function as, ON:

The automatic reset function performs and the automatic reset time is set to approx. 60 seconds

OFF:

The automatic reset function is disabled.

21 Alarm Time Adjustment (ALARM TIME ADJ)

The alarm time can be manually adjustable by turning the control.

The alarm time can be set from 2 to 30 seconds (1 second step).

22 External Control Connection Terminal (SPOT MONITOR CONTROL IN/RECOVER IN/ALARM CONTROL OUT/REMOTE OUT)

• SPOT MONITOR CONTROL IN

The terminals of the Spot Monitor Control In are used to connect the intercom or alarm sensors for the spot monitoring by making a short circuit of terminal 1, 2, 3 or 4. When the Camera Extension Unit is used, the spot monitoring is proceeded for terminal 5, 6 and 7 of the camera extension unit.

If the terminal 1 is shorted by intercom or alarm sensors, the camera No.1 is selected and its picture is observed on the monitor.

The picture of the camera No.2, 3 or 4 (5, 6 or 7 when the Camera Extension Unit is used.) can be observed in the same manner.

Note:

The voltage of short circuit for the terminal should be 0 - 0.2 volt when the intercom or alarm sensor is activated.

• RECOVER IN

To reset the spot monitor picture of the desired camera and back to the sequence operation, supply the reset signal from the time lapse VTR to this terminal.

• ALARM CONTROL OUT

The terminals of the Alarm Control Out are used to connect the buzzer or chime for sounding when the terminals of the Spot Monitor Control In is (are) shorted by intercom or alarm sensor.

ALL MODE-GND Connection

The connected buzzer or chime will sound at both positions of the Mode Selection Switch (2) when the intercom or alarm is activated.

STANDBY-GND Connection

The connected buzzer or chime will sound when the Mode Selection Switch (2) is positioned at STANDBY and the intercom or alarm is activated,

• REMOTE OUT Connection

The terminals for the Remote Out are used to connect the Spot Monitor Control In on another monitor for the Spot Monitoring by short circuit of terminal 1, 2, 3 or 4 when the two video monitors are connected,

The RESET out terminal is used to connect the RECOVER input terminal on another monitor.

The terminals for the Remote Out are also used to connect the Remote In terminals on the panning control by short circuit of terminal 1, 2, 3 or 4 when the video monitor is connected with Remote Control Unit for Auto Panning Head.

The power rate of the alarm should be up to DC 24V, max. 100mA.

If the power capacity of the remote is less than 100mA at DC 24V, the remote load can be connected at the terminal of Remote directly.

If the power capacity of the alarm is more than 100mA at DC 24V, the relay circuit should be used for the remote load.

CONNECTIONS

Cautions:

1. Keep the Power Switch of the monitor, optional Camera Extension Unit and optional Remote Control Unit in the OFF position during connection.

If the power of these units are ON during connection, the camera will not function due to the protection circuit for misconnection.

2. Connect only the specified cameras WV-BL90 or WV-71. If other type of camera is connected, the Mini camera system will not perform due to the protection circuit for wrong camera.

OPERATING PROCEDURE

- SELECTION OF CAMERA

- Set the Power Switch (POWER) on the front panel to the ON position by pushing once.
The switch remains down (▲) keeping the monitor and camera ON, and green lamps for sequence and channel(s) which the Camera(s) is/are connected light ON approx. 4 seconds for you to confirm how many cameras are connected.
- Push the Camera Selection Switch for selecting the desired camera's picture and green lamp lights.

Note:

- The desired camera's picture can be seen on the monitor by pushing the Camera Selection Switch at the sequence mode.
- also, the desired camera's picture can be seen on the monitor by pushing the Camera Selection Switch.

Caution:

When the power switch of monitor is turned ON and OFF repeatedly in the short period of time, the camera may not be turned ON due to the operation of misconnection protection circuit.

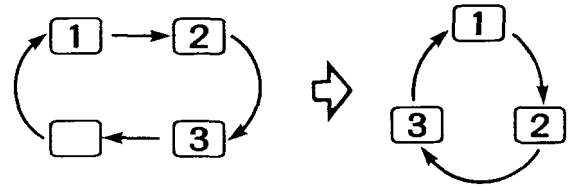
In this case, leave the switch in the OFF position for a few seconds before turning it ON again.

- SEQUENCE MODE (More than two cameras)

- Set the Power Switch (POWER) on the front panel to the ON position by pushing once.
The switch remains down (▲) keeping the monitor and camera ON, and green lamps for sequence and channel(s) which the Camera(s) is/are connected light ON approx. 4 seconds for you to confirm how many cameras are connected.
- Set the Mode Selection Switch (MODE) to the ON position.
- Push the Sequence Switch (SEQUENCE) to be sequential switching and green lamp lights.
- Adjust the Time Adjustment (TIME ADJ) to be desired sequential switching interval (from 1 to 30 seconds).

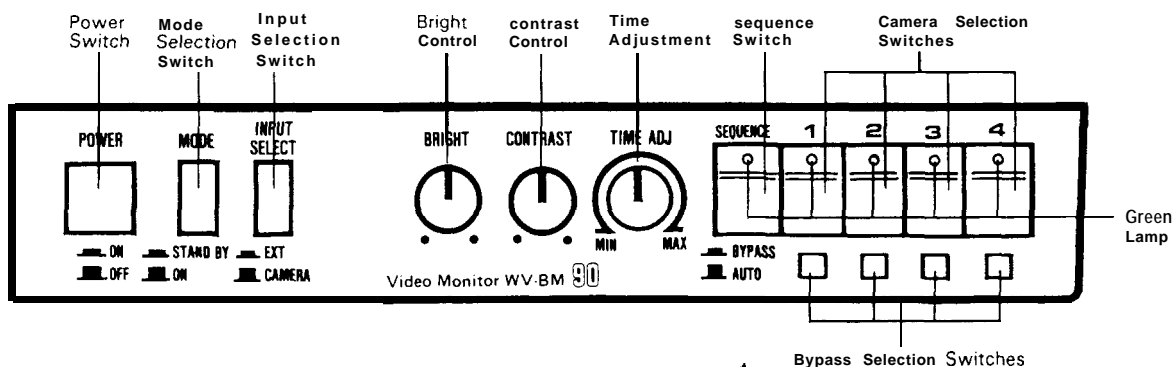
Note:

The sequential switching features the automatic bypass circuit by detecting the presence of the DC power for the camera so that the input connector with no camera connection is automatically skipped.



- STANDBY MODE — MONITORING PICTURE

- Set the Power Switch (POWER) on the front panel to the ON position by pushing once.
The switch remains down (▲) keeping the monitor and camera ON, and green lamps for sequence and channel(s) which the Camera(s) is/are connected light ON approx. 4 seconds for you to confirm how many cameras are connected.
- Set the Mode Selection Switch (MODE) to the ON position.
- Push the Sequence Switch (SEQUENCE) to be sequential switching.
- Adjust the Time Adjustment (TIME ADJ) to be desired sequential switching interval (from 1 to 30 seconds).
- Set the Mode Selection Switch (MODE) to the STANDBY position. The picture on the monitor will disappear, however the sequential switching is actually being carried and the picture can be observed on the additional monitor connected to the Video Output Connector.
- When the picture of the desired camera is observed/monitored, push the button of Camera Selection Switch for the desired camera and green lamp lights.
- By pushing the Sequence Switch (SEQUENCE) again, the picture on the monitor will disappear and back to the sequential switching in the STANDBY mode.



- **PRIORITY OF SPOT MONITOR CONTROL IN**

- The selection of the camera by Spot Monitor Control In is set as first come, first served.
- The Camera Selection Switch has a first priority against any selectional signal.

- **VTR PLAYBACK MODE**

Set the Power Switch (POWER) on the front panel to the ON position by pushing once.

The switch remains down (■) keeping the monitor and camera ON, and green lamps for sequence and channel(s) which the Camera(s) is/are connected light ON approx. 4 seconds for you to confirm how many cameras are connected.

2. Set the Mode Selection Switch (MODE) to the ON position.
3. Set the Input Selection Switch (INPUT SELECT EXT/CAMERA) to EXT position for observing the playback picture.

- **AUTOMATIC RESET SELECTION SWITCH FOR SPOT MONITOR CONTROL INPUT**

- The monitor has the built-in automatic reset circuit which is automatically reset the spot monitor control input signals such as intercom, alarm sensors etc. at approx. 60 seconds after input signal is received.
- The automatic reset circuit is functioned according to the spot monitor control input signals as;

1. **Alarm Senssrs Signal**

The selection of the camera by the alarm sensors signal is automatically reset after approx. 60 seconds and the selection of the camera is returned to the sequential switching.

2. **Intercom Signal**

(a) Intercom Communication

The selection of the camera by the intercom signal is being held during intercom communication and will be reset for the sequential switching after the intercom communication has been over.

(b) Intercom Calling

The selection of the camera by intercom calling signal only is automatically reset after approx. 60 seconds and the selection of the camera is returned to the sequential switching.

3. **Time Lapse VTR**

When the Time Lapse VTR is connected with Mini CCN System, the selection of the camera by alarm sensors/intercom is automatically reset after reset time set by the Time Lapse VTR and the selection of the camera is returned to the sequential switching.

CIRCUIT DESCRIPTION

1. Main Board

I - I Power Circuit

This circuit generates the regulated + 5V DC, + 12V DC and + 24V DC from 220V/240 AC.

1-2 Video Amplifier Circuit

The composite video signal fed to base of Q6 from control board through pin 1 of CN3.

The video signal from the emitter of Q6 is fed through VR8 (CONTRAST), amplifier Q7, Q8 and Q9 to cathode of CRT.

1-3 H.V Deflection Circuit

This circuit generates vertical (V) deflection sawtooth current for V scanning of the beam inside the cathode ray tube (CRT) and horizontal (H) deflection sawtooth current for horizontal scanning of the beam inside the cathode ray tube.

1-4 High Voltage Circuit

This circuit generates high voltages for cathode ray tube (CRT) electrodes.

The flyback pulse generated by horizontal (H) deflection circuit is supplied to the primary winding of the flyback transformer (FBT) in high voltage pack T3 to step up the flyback pulse to the necessary level. The boosted pulses obtained at the secondary winding of the transformer are rectified to generate high voltages.

2. Control Board

2-1 Camera Power Circuit

The video monitor WV-BM90 has four camera power circuit which supply the DC power to the specified cameras through the coaxial cable respectively. Since these four circuits are exactly same, the power supply circuit for camera-1 will be described.

This circuit consists of a constant current circuit, and a misconnection protection circuit.

• Constant Current Circuit

In order to compensate the difference of voltage drop due to the coaxial cable length between the video monitor and camera, this circuit applies the constant current to the camera regardless of coaxial cable length.

+ 24V DC supplied from Main board through at pin 8 of EI is divided by zener diode D2, VR1 (DC CURRENT ADJ) and R3 ~

R5. The divided DC voltage is supplied through operation amplifier IC1 (a) to base of impedance converter Q71 for controlling the camera DC power to steady state.

The variation of load current due to coaxial cable length is detected by R6 and R7 as a voltage change and the changed voltage is supplied to operation amplifier IC1 (a) which compensates the voltage differences between pins 2 and 3 of IC1. Therefore, even if the cable length is changed, current fed to detecting resistors R6 and R7 is kept constant and the constant current is supplied to the camera.

• Misconnection Protection Circuit

The video signal from the camera is multiplexed on the power line, the misconnection protection circuit protects the power circuit from an open or short circuit.

When the power switch on the video monitor is turned ON, Q1 is turned ON at beginning and low potential at collector of Q1 is supplied to pin 2 of operation amplifier IC1 (a).

At this time, approx. + 22V DC set from + 24V DC by dividing with D2, VR1 and R3 ~ R5 and supplied to pin 3 of IC1 (a) is compared with the potential at pin 2 so that the output at pin 1 of IC1 supplied to base of impedance converter Q71 is high level and Q71 is kept OFF.

At the same time, Q3 is turned ON momentarily and approx. + 4V DC set by zener diode D1 is supplied through Q3, R8 and D1 to the camera. In the camera, approx. 40KHz pulse is generated by the + 4V DC and multiplexed on the power line. This pulse is supplied to Q2 for turning it ON and Q1 OFF. Due to Q1 OFF, collector potential is increased and thus the output of IC1 (a) is decreased therefore, the impedance converter Q71 is turned ON and converts the impedance of power line from high to low. As a result, the DC power is supplied from the constant current circuit continuously through Q71.

While camera power circuit supplies constant current to the camera, voltage difference appears at both end of R6 and R7 so that the Q1 is turned ON and Q1 (CONTROL SUB BOARD) is kept OFF.

If this video monitor is connected to other CCTV cameras or products, no pulse is fed back to the starter circuit and Q1 (CONTROL SUB BOARD) is kept ON. Therefore, no DC power is supplied to the connected products in order to protect them.

When the coaxial cable is disconnected in the operating condition, no current is fed through R6 and R7, voltage drop of R6 and R7 reduces and Q1 is turned OFF. As a result, Q1 on the Control sub board is turned ON and potential at pin 2 of IC1 (a) decreases, pin 1 of IC1 (a) is increased and Q71 is turned OFF. In this way, the no DC power is supplied to the power line.

2-2 Video Processing Circuit

2-2-1 Camera Detection Circuit

This circuit detects whether camera is connected or not. This monitor has four camera detection circuits and these four circuits are exactly same, so that the camera detection circuit for camera-1 will be described.

When the camera WV-BL90 is connected to camera-1 IN connector CN101 and power switch of the video monitor is turned ON, approx. + 12V DC is supplied from the camera power circuit to the connected camera. At this time, + 12V DC is also supplied to Q4 for turning it OFF and Q5 OFF. The H level at collector of Q5 is supplied to pin 7 of IC6 and IC6 recognizes that camera-1 is connected.

When camera is not connected to the video monitor or the coaxial cable is disconnected in the operating condition, no DC power is supplied to power line since misconnection protection circuit functions. At this time, both Q4 and Q5 are turned ON, pin 7 of IC6 becomes L level and IC6 recognizes that camera-1 is not connected.

2-2-2 Camera Selection Circuit

This circuit selects the camera signal which is supplied to signal processing circuit for observing the selected picture on the monitor. Four camera selection circuits are existed on the monitor and are exactly same, so that the camera-1 will be described.

When camera-1 is selected by sequence mode or spot monitoring mode, pin 2 of IC6 becomes L level and the L level is fed to Q6 to turn ON Q6. Therefore the camera-1 signal obtained at Pin 3 of Q6 is supplied to signal processing circuit.

2-2-3 Signal Processing Circuit

The video signal from the camera-1 supplied to Q6 on the control board is mixed with the VD pulse which is sent through VD pulse generator Q12/Q13 and inverter Q5 and supplied to the camera for vertical synchronization.

The video signal with VD pulse is supplied through Q6 to clamp circuit Q20.

In the clamp circuit, horizontal (H) and vertical (V) blanking periods of video signal is clamped by the clamp pulse which is generated by sync separator Q19 and clamp pulse generator consisting of IC1(a)-(d).

The video signal is sent to VD erase circuit Q21 where the V.sync is added and VD pulse is removed by the VDE pulse. This signal is supplied to slicer consisting of Q22 -Q24 where low level of sync signal is clipped and the sync level is set to 0.3Vp-p.

The video INT/EXT switching circuit consisting of Q26 ~ Q29 selects either composite video signal entering VIDEO INPUT connector or camera video signal switched by microprocessor

IC6. When the input selection switch SW3 on the VR board is set to CAMERA position, pin 53 of IC6 sends low level to Q27 and Q29 for turning ON Q27 and turning OFF Q28. Therefore camera video signal is selected and supplied to Main board. When SW3 is set to EXT position, high level is sent to Q27 and Q28 and composite video signal externally enters to the video monitor is supplied to Main board.

The video output circuit consisting of Q30 ~ Q31 amplifies the camera video signal for setting it to specified signal level and compensates the frequency response. This signal is supplied to VIDEO OUTPUT connector.

2-3 Remote Control Circuit

This circuit supplies the camera selection signal and reset signal to the remote control unit WV-32 for auto panning head or another video monitor for remote control.

This circuit also supplies the alarm signal to the additionally connected buzzer or chime.

● Camera Remote Output Circuit

When the camera-1 is selected by sequence control for example, pin 2 of microprocessor IC6 becomes low (L) level during the sequence time set by VR9 (TIME ADJ) on the Volume board. This signal is supplied through C64 and R116 to Q54 and both Q54 and Q55 are turned ON at the decay timing of signal and negative trigger obtained at collector Q55 is supplied to connected unit.

On the other hand, when the camera-1 is selected by spot monitor control for example, pin 2 of IC6 becomes L level during camera-1 button is depressed and the L level is supplied to Q54 for turning both Q54 and Q55 ON and negative trigger obtained at collector Q55 is also supplied to connected unit for selecting camera-1.

The remote output circuit for the camera-2, camera-3 and camera-4 functions as same manner as camera-1 remote output circuit.

● Remote Reset Output Circuit

When sequence button is depressed while the video monitor is operated at spot monitor mode, pin 22 of IC6 becomes L level during the button is depressed. This signal is supplied to Q62 for turning both Q62 and Q63 ON and the negative signal/pulse obtained at collector Q63 is supplied to connected products through reset terminal.

● Alarm Standby Output Circuit

While the video monitor is operated at standby mode and spot monitor control signal is fed to the spot monitor control terminal, pin 54 of IC6 becomes L level. This is sent to Q51 to turn both Q51 and Q50 ON and the negative signal/pulse obtained at collector Q50 is supplied through standby alarm output terminal to connected buzzer or chime to ring it.

At this time, correspond camera signal is selected and observed on the monitor screen.

2-4 External Spot Control Circuit

The external spot control circuit contains camera1 -4 select circuits, busy control circuit and reset control circuit.

● Camera Select Circuit

When the spot monitor control 1 terminal is grounded for example, Q35 is changed from ON to OFF and H level at the collector is supplied to pin 44 of IC6 for selecting the camera-1 signal and the picture of camera-1 can be seen on the video monitor.

The camera-2, camera-3 and camera-4 select function same as camera-1 select.

● Busy Control Circuit

(In case Intercom system is used with this system)

When the two-wire intercom system is used with this system, the wires connected between a master unit and branch unit are also connected to the spot monitor control input 1 - 4 and the ground terminal respectively. In this system if the call button on the branch unit for spot monitor control input 1 is depressed, the potential at the base of Q35 becomes L level for turning Q35 OFF. As a result, H level at collector is supplied to pin 44 of IC6 and the picture of camera-1 can be seen on the video monitor.

At the same time, automatic reset circuit in microprocessor IC6 starts functioning, determines the automatic reset time at 60 seconds and reset to the sequence mode to spot monitor control.

However, the spot monitoring mode set by pressing the call button on the branch unit of intercom system should not be reset to the sequence mode during conversation. During the conversation, the call button is released and approx. + 6V DC (it should be less the + 12V DC) is fed through D16 to Q34 for turning Q34 ON.

Therefore the pin 39 of IC6 is kept L level and the sequential circuit in IC6 is not reset automatically during the conversation using intercom system.

If the phone is put down after finishing the conversation, the potential fed to Q34 becomes approx. 0.3V DC and Q34 is turned OFF. As a result, H potential is fed to pin 39 of IC6 and the sequential circuit in IC6 is reset to the sequence mode.

(In case Time lapse VTR is used with this system)

The time lapse VTR is used with this system, alarm control output terminal and recover input terminal are connected to the VTR. When the alarm signal is fed to the VTR, it starts recording. At this time, H potential is provided at recover terminal from the VTR and the H level is turns both Q32 and Q34 ON. As a result, L level at collector of Q34 is supplied to pin 39 of IC6 for inhibiting the automatic reset circuit in IC6 to keep the video monitor on the spot monitoring mode while the VTR is in recording mode.

● Reset Control Circuit

When the recover terminal is grounded externally, Q33 is turned ON and key matrix for sequence control of IC6 is achieved and the system is changed from spot monitoring mode to sequence mode.

2-5 LED Drive Circuit

When this monitor is operated in the sequence mode, pin 6 of IC6 becomes L level. It is supplied to Q49 for turning it ON and H level at collector of Q49 is supplied to sequence indicating LED 1 on the Switch board to light the LED. At this time, pins 2, 3, 4 and 5 of IC6 becomes L level sequentially and supplied to respective switching transistors Q45, Q46, Q47 and Q48 to turn them ON and the camera1 ~ 4 (LED 2 ~ 5) on the Switch board is lit.

When this monitor operates at the spot monitoring mode, pin 6 of IC6 becomes H level and sequence LED is turned OFF. Since one of pins 41 ~ 44 of IC6 become L level, one of pins 2-5 of IC6 is L level, respective LED drive transistors (Q45~Q48) is turned ON, and LED of selected camera is lit.

2-6 System Control Circuit

All function of this monitor such as camera select, mode select are controlled by the microprocessor IC6.

When the power switch of video monitor is turned ON, + 5V DC is supplied to pin 33 of IC6. At the beginning, generated + 5V DC is fed to pin 1 of reset pulse generator IC7 and reset pulse obtained at pin 3 of IC7 is fed to pin 17 of IC6 for setting the IC6 to initial condition.

The pin identification and functions of the microprocessor IC6 is described in the table.

IC5 MN1 554CCL1

Pin Identification

Pin No.	Name	IN/OUT	Description
1	VSS	---	Ground
2	PO0	IN/OUT	Camera-1 Select/LED/Remote Control
3	P01	IN/OUT	Camera-2 Select/LED/Remote Control
4	P02	IN/OUT	Camera-3 Select/LED/Remote Control
5	P03	IN/OUT	Camera-4 Select/LED/Remote Control
6	PC2	OUT	Sequence LED Output
7	P10	IN/OUT	Camera-1 Power Select/Detection
8	P11	IN/OUT	Camera-2 Power Select/Detection
9	P12	IN/OUT	Camera-3 Power Select/Detection
10	P13	IN/OUT	Camera-4 Power Select/Detection
11	SYNC	---	Not Used
12	SIRQ	IN	Reset Signal Input
13	IRQ	IN	V. Sync Input
14	SBT	---	Not Used
15	SBO	---	Not Used
16	SBI	---	Not Used
17	RST	IN	Rest In
18	P20	IN/OUT	Adapter Voltage Detection
19	P21	---	Not used
20	P22	---	Not used
21	P23	IN/OUT	Discharge pulse
22	P30	IN/OUT	Remote control recover
23	P31	IN/OUT	Extension Select 1
24	P32	IN/OUT	Timing
25	P33	IN/OUT	Standby
26	P40	OUT	Key scan output-1 Alarm Time D/A output
27	P41	OUT	Key scan output-2 Alarm Time D/A output
28	P42	OUT	Key scan output-3 Alarm Time D/A output
29	P43	OUT	Key scan output-4 Alarm Time D/A output
30	P50	OUT	Auto
31	P51	OUT	V sync output
32	P52	OUT	VD output
33	V _{DD}	IN	VDD
34	PC0	OUT	Rest output output
35	PC1	OUT	Clock output
36	P53	OUT	Ring Counter output
37	P60	IN	Ring Counter input-2
38	P61	IN	Ring Counter input-1
39	P62	IN	Busy control
40	P63	IN	Recover Input
41	P70	IN	Camera-4 Interphone / Sensor Input
42	P71	IN	Camera-3 Interphone / Sensor Input
43	P72	IN	Camera-2 Interphone /Sensor Input
44	P73	IN	Camera-1 Interphone /Sensor Input
45	P80	IN/OUT	Sequence time
46	P81	IN/OUT	Alarm time control
47	P82	IN/OUT	External Timing Pulse Input
48	P83	IN/OUT	EIA/CCIR select
49	P90	IN/OUT	Key scan -1
50	P91	IN/OUT	Key scan -3
51	P92	IN/OUT	Key scan-2
52	P93	IN/OUT	
53	PA0	OUT	IN/EXT Video Select Output
54	PA1	OUT	Alarm standby output
55	PA2	OUT	Alarm all mode output
56	PA3	---	Not used
57	PB0	---	Not used
58	PB1	---	Not used
59	PB2	---	Not used
60	PB3	---	Not used
61	OSC2	OUT	Clock Pulse Generator
62	OSC1	IN	Clock Pulse Generator
63	XI	IN	Ground
64	XO	---	Not Used

ADJUSTMENT PROCEDURE

1 TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of WV-BM90.

- o Oscilloscope
- o Digital Voltmeter
- o Completely aligned Black and White Camera WV-BL90
- o Frequency Counter
- o Resolution Chart (YWV1400RB99)

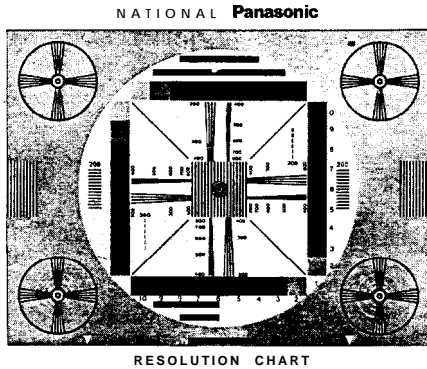


Fig. 1-1

2 DISASSEMBLY PROCEDURE FOR ADJUSTMENT

- Remove six screws holding the cover and remove the cover by pulling it backward.

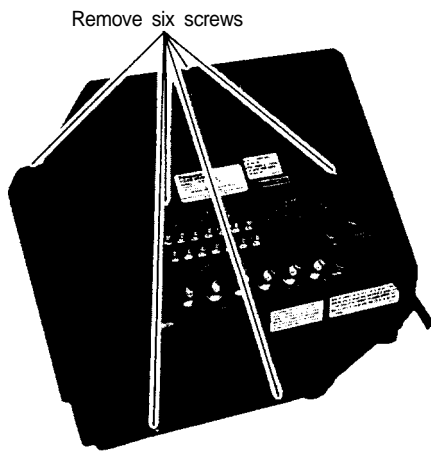


Fig. 2-1

3 CRT REPLACEMENT

- Remove the cover as previously described in section 2.
- Remove two screws holding the front chassis and slide back the chassis with PCB unit.
- Disconnect the anode cap.

Caution : Make sure that the anode voltage is completely discharged by directly connected between anode terminal and chassis.

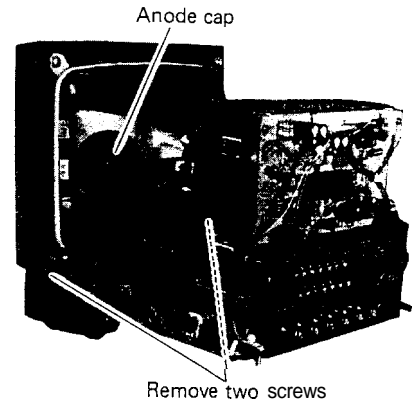


Fig.3-1

- Remove two screws holding the Control board assembly and open the direction of the arrow.

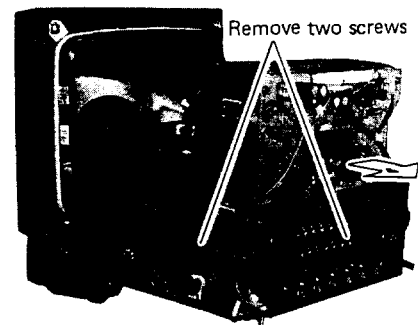


Fig. 3-2

- Disconnect the CRT socket by pulling it backward.
- Loosen the screw holding deflection yoke and convergence magnets assy and remove the yoke and magnets assembly by pulling them backward.

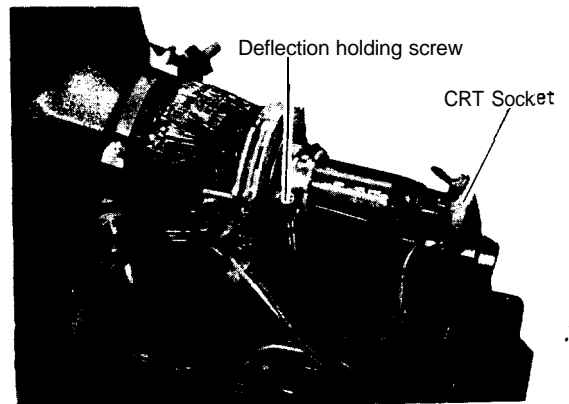


Fig. 3-3

- Remove four screws holding CRT and remove CRT.

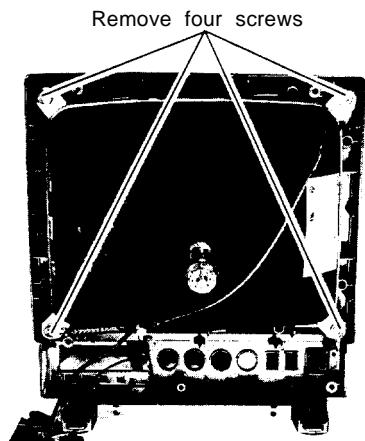
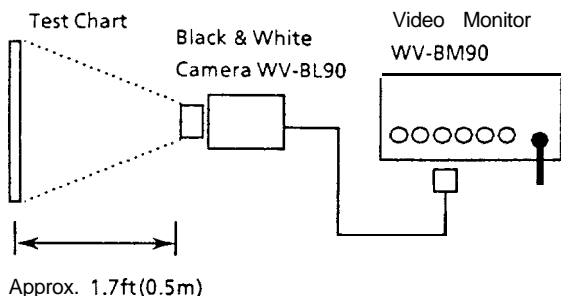


Fig. 3-4

4 CONNECTION AND SETTING UP FOR ADJUSTMENT

- Connect the coaxial cable between the VIDEO OUTPUT terminal of B/W Camera WV-BL90 and CAMERA INPUT connector 1, 2, 3 or 4 of Video Monitor WV-BM90.



5 ADJUSTMENT

(1) 12V adjustment

Test Point : **TP2(12V)** Main board
 Adjust : **VR1(12V ADJ)** Main board

- Disconnect all cameras from the Camera input connectors 1, 2, 3 and 4 on the rear panel.
- Turn ON the power switch.
- Connect the digital voltmeter to TP2.
- Adjust VR1(12V ADJ) for $12V \pm 0.1V$.

(2) DC current adjustment

Adjust : **VR1 (DC CURRENT)** Control board
 Observe : DC current meter

- Connect the DC current meter between the video camera WV-BL90 and CAMERA INPUT 1 connector of Video Monitor WV-BM90.
- Turn ON the power switch.
- Adjust VR1(DC CURRENTADJ) for $220mA \pm 7mA$.
- Confirm that the DC current of CAMERA INPUT connectors 2, 3 and 4.

(3) H hold, V hold coarse adjustment

Adjusts : **VR2 (SUB BRIGHT)** Main board
VR5 (H. HOLD) Main board
VR11 (V. HOLD) Control board

- Set the controls and switches on the volume board and Control board as follows.

Mode Selection switch : **ON position**
 Input Selection switch : **EXT position**
 Contrast Control : **Mechanical Center position**
 Bright Control : **Mechanical Center position**
 Vertical hold control : **Mechanical Center position**
 Horizontal hold control : **Mechanical Center position**

- Connect the completely aligned video camera WV-BL90 to CAMERA INPUT connector 1,2,3 or 4 of Video Monitor WV-BM90.
- Aim the camera at the resolution chart (YWV1400RB99).
- Turn ON the power switch.
- Adjust the VR2 (SUB BRIGHT) so that the raster will just appear.
- Adjust VR11(V.HOLD) and VR5(H.HOLD) so that the circle of the resolution chart on the Monitor screen becomes center position.

(4) Picture tilt adjustment

Adjust : Deflection coil

- Loosen the deflection coil holding screw.
- Turn the deflection coil until the raster on the monitor screen is straight.
- Carefully tighten the deflection coil holding screw.

(5) Centering adjustment

Adjust : Centering magnets
L8 (H. WIDTH) Main board

- Adjust the centering magnets until the raster comes to the center of monitor screen becomes true circle.
- Adjust L8 (H. WIDTH) so that the circle of the resolution chart on the Monitor screen.

(6) Vertical height and linearity adjustment

Adjust : VR4 (V.LIN) Main board
VR3 (V. HEIGHT) Main board

- Adjust VR3 (V. HEIGHT) and V. LIN VR4 so that the circle in the chart is nearly a true circle.

(7) Sub-brightness adjustment

Adjust : VR2 (SUB BRIGHT) Main board

- Set the controls on the volume board as follows.

Contrast Control : Fully counter clockwise
Bright Control : Mechanical Center position

- Turn VR2 (SUB BRIGHT) fully clockwise and then turn it back so that the raster will just go out.
- Turn VR8 (CONTRAST) at mechanical center position.

(8) H hold, V hold fine adjustment

Adjust : VR5 (H.HOLD) Main board
VR11 (V. HOLD) Control board

- Disconnect all cameras from the camera input connector 1,2,3 and 4.
- Connect the frequency counter to pin 2 (Yellow wire) of deflection coil and adjust the VR5 (H HOLD) on the Main board for $15.8\text{KHz} \pm 50\text{Hz}$.
- Connect the frequency counter to Pin 3 (Red wire) of deflection coil and adjust the VR11 (V HOLD) on the control board for $47.3\text{Hz} \pm 0.5\text{Hz}$.

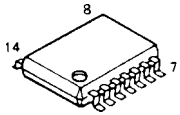
(9) Focus fine adjustment

Adjust : VR6 (FOCUS) Main board

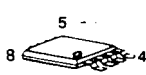
- Adjust VR6 (FOCUS) for best focus in the monitor.

APPEARANCE OF IC, TRANSISTOR AND DIODE

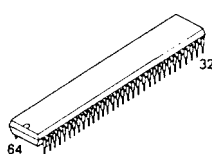
NJU74HCU04M
AN6554NS



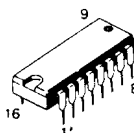
NJM2903M



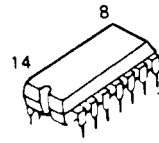
MN1 554CCL1



NPC1379C



AN6554NS



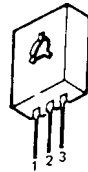
LQV3M9280G



NJM78L09A
M51951ASL



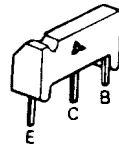
AN78N05



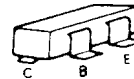
2SA1018



2SD973-QRS
2SD662-PQR
2SD636-QRS
2SB641-QRS



2SD601-QRS
2SB709-QRS
2SC2404CD
2SB710-QRS

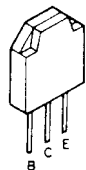


UN2217
MA1 51 K
MA1 53TW

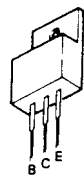


1 : NC
2 : Anode
3 : Cathode

2SC3451MNCA



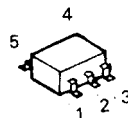
2SA772B



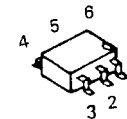
2SC1567-QR
2SC2258



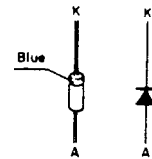
YWTC4S69F



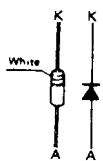
XN4501
XN4601
XN4401



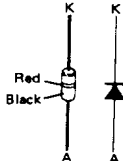
RD6.2JB2
RD5.1JSB2
RD4.7JSB2



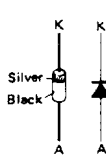
MA165



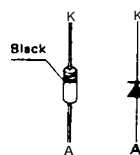
RU1P



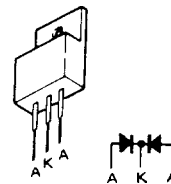
EM01Z
EU02Z



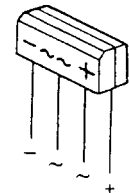
RD9.1ESB3
EM01Z
EU02Z
RD8.2ESB2T
YFRD33ESB4T
MA1 62TA



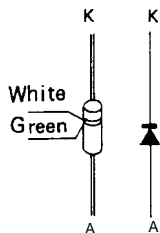
CTV- 12S



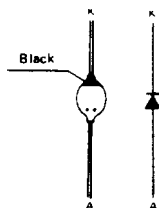
RBV402



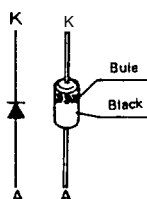
MA185



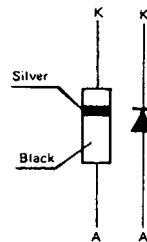
U06



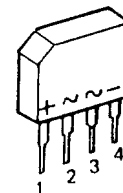
ERA22-06



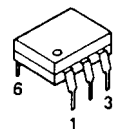
RU1P



RBV402

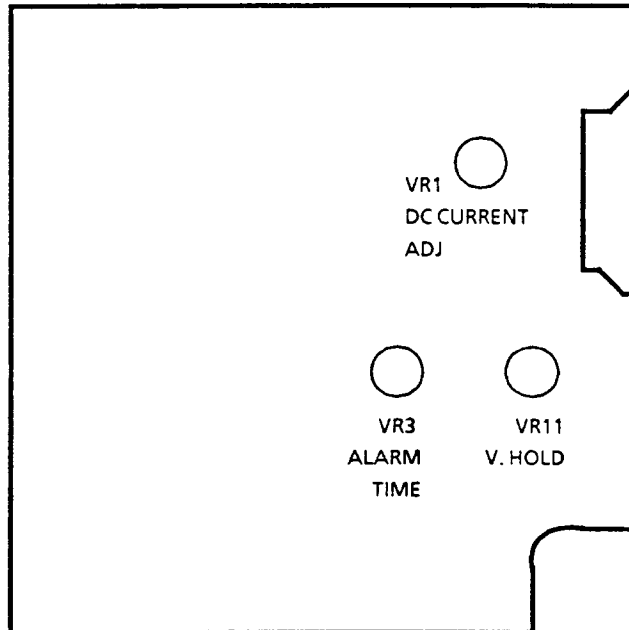


H11AV1A

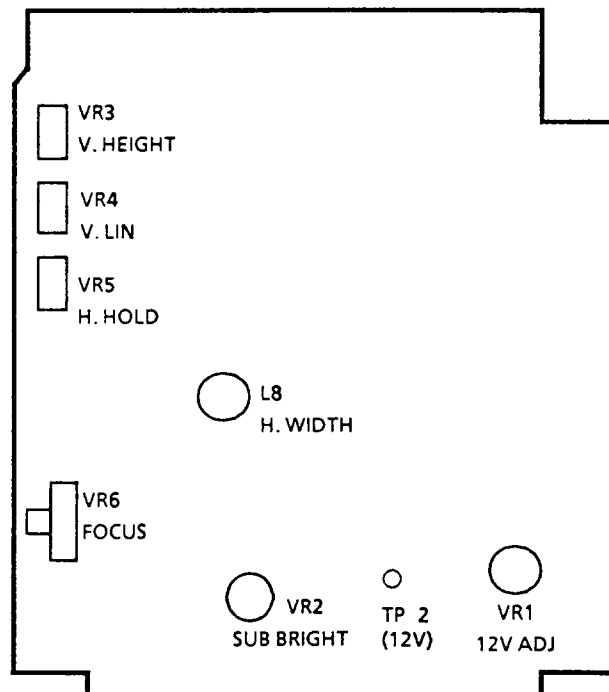


LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

CONTROL BOARD



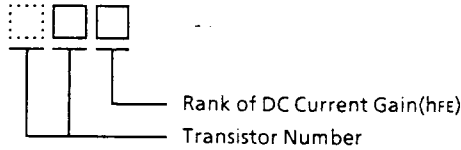
MAIN BOARD



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.



Transistor Number

(Chip Transistor)

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1A	2SB799
E	2SA1022	1B	2SB814
F	2SA1034	1C	2SB902
H	2SA1035	1F	2SK321
I	2SB792	1K	2SK316
K	2SC2778	1L	2SK247
P	2SD814	1M	2SJ84
Q	2SD813	1N	2SK199
R	2SC2480	1O	2SK198
S	2SC2405	1T	2SC3077
T	2SC2406	1X	2SC2845
U	2SC2404	1Z	2SD1030
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

(Small Chip Transistor)

Letter	Transistor No.
A	2SB1218
U	2SC3931
W	2SD1820
Y	2SD1819
E3	2SA1226
OS	2SB1219
UC	2SA1532
YU	2SC3938

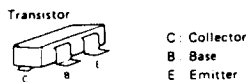
(Pair Transistor)

Letter	Transistor No.
5C	XN4601
5N	XN6501
5O	XN6401

Example :

WQ → 2SD602 - Q
 YQ → 2SD601 - Q
 1BS → 2SB814 - S

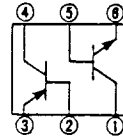
Appearance and Symbols



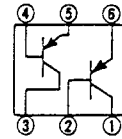
	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source



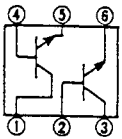
XN4601



XN6401

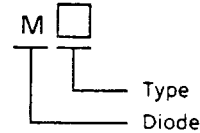


XN6501



2. Chip Diode

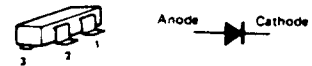
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

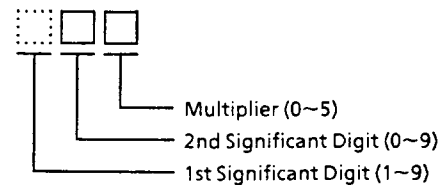
Appearance and Symbols



	1	2	3
MA28/MA28W/MA28T	-	Anode	Cathode
MA151K/MA152K	-	Anode	Cathode
MA151A/MA152A	-	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



Example : 330 → 33 × 10⁰ = 33 ohms
 561 → 56 × 10¹ = 560 ohms
 123 → 12 × 10³ = 12 ohms

Note : Zero ohm resistor (jumper chip) is colored red of green.

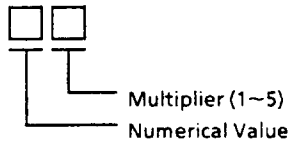
4. Chip Capacitor

The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

Example : 0.5 → 0.5 pF 2.5 → 2.5 pF
 75 → 0.75 pF 33 → 33 pF
 1 → 1 pF 82 → 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	O	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

*Letters i and O are not used

Example : A1 → $10 \times 10^1 = 100 \text{ pF}$
 N2 → $33 \times 10^2 = 3300 \text{ pF}$
 S3 → $47 \times 10^3 = 47000 \text{ pF}$

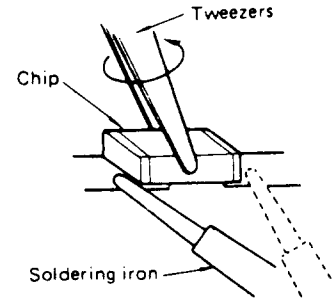
5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

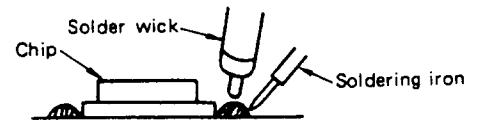
1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.

Note : Be careful not to damage other chips.

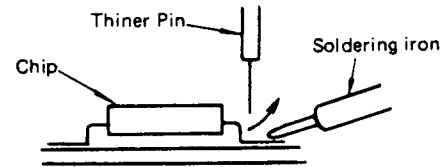


5-2 Removal (IC)

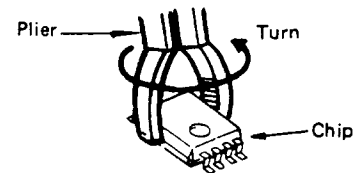
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thinner pin.

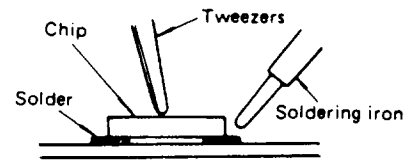


3. Remove IC turning it with plier.

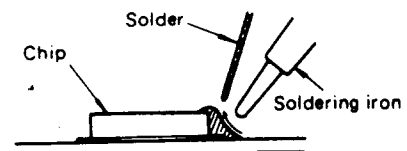


5-3 Mounting

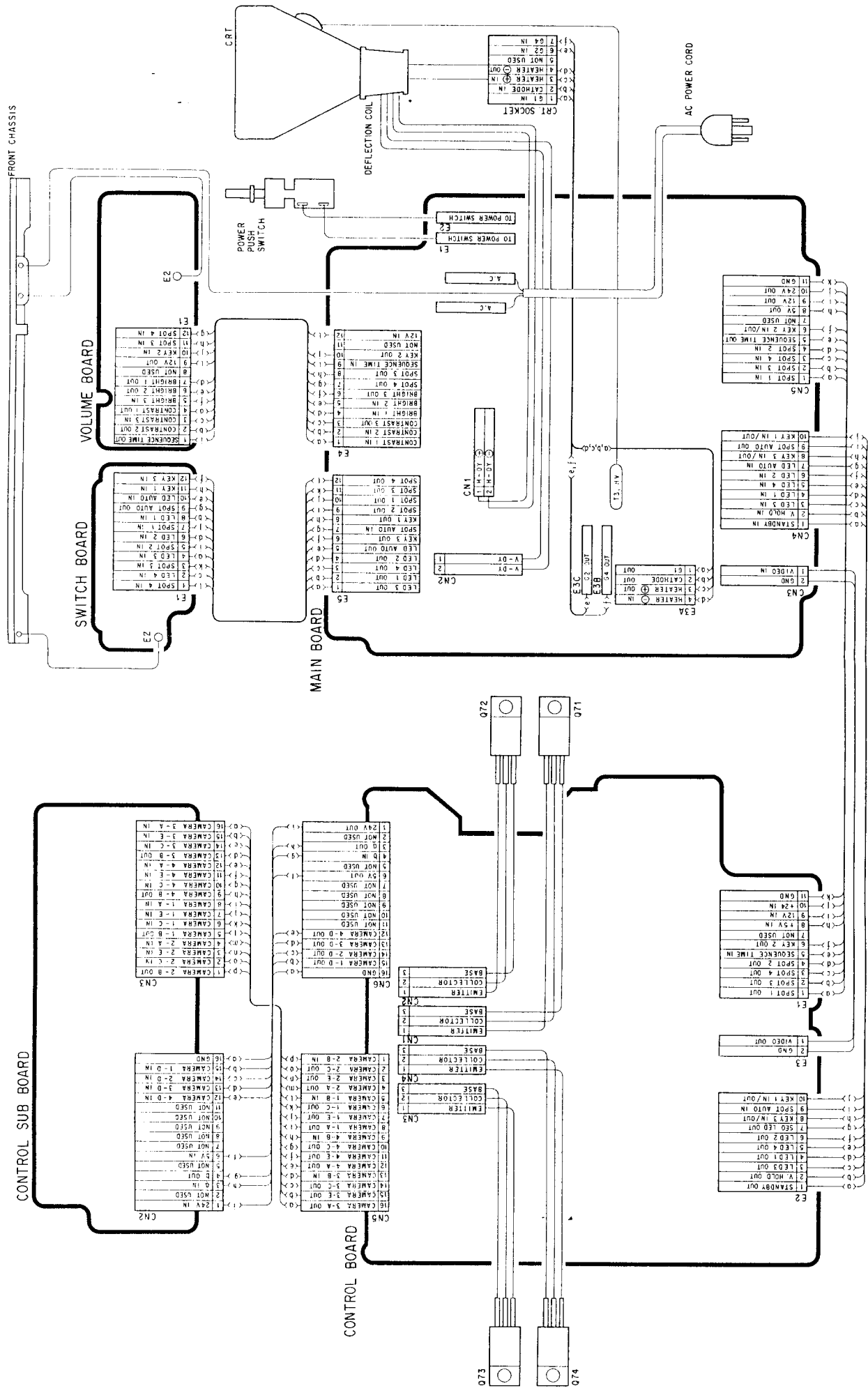
1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

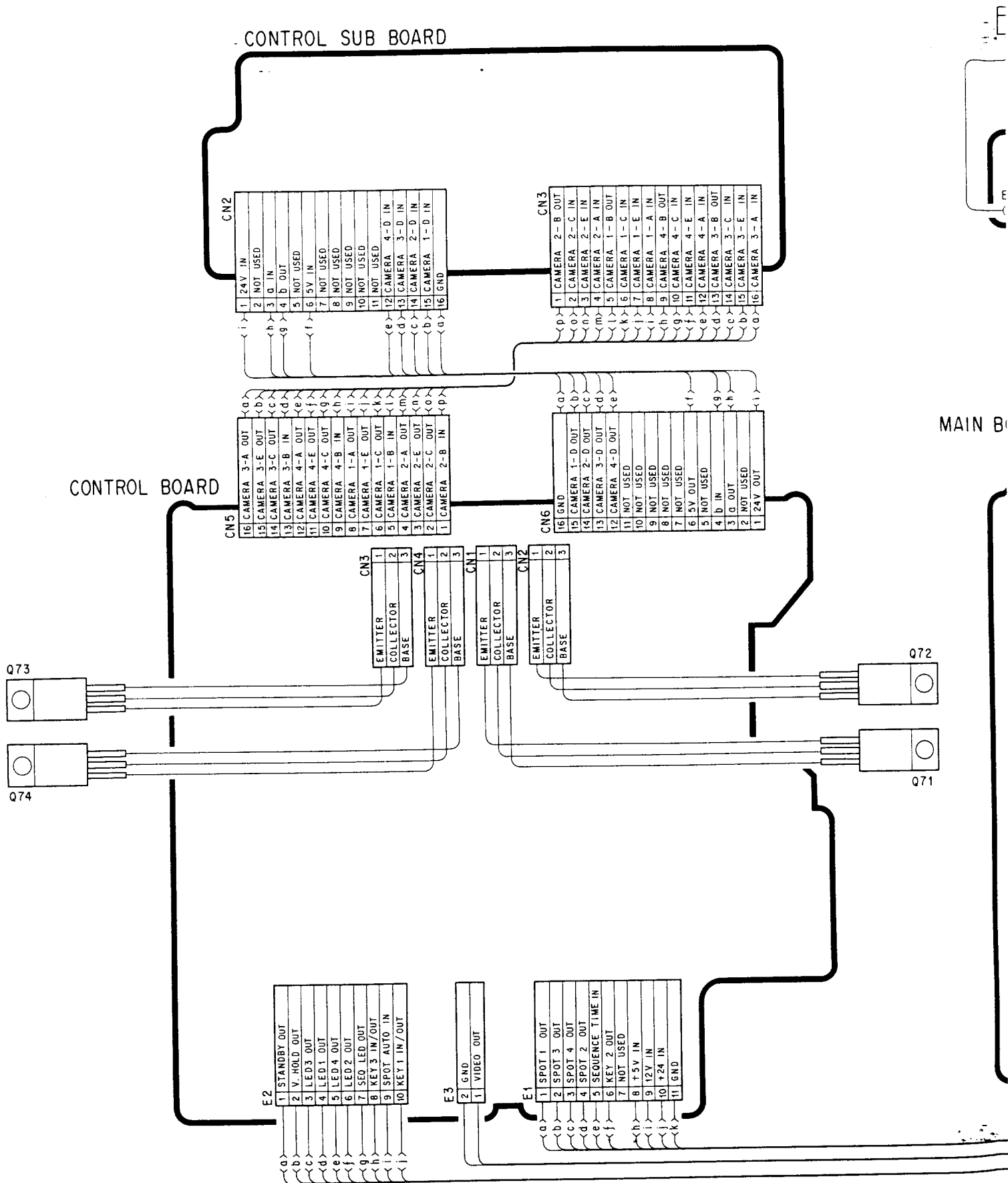


3. Solder both ends of chip (three leads for chip transistor).

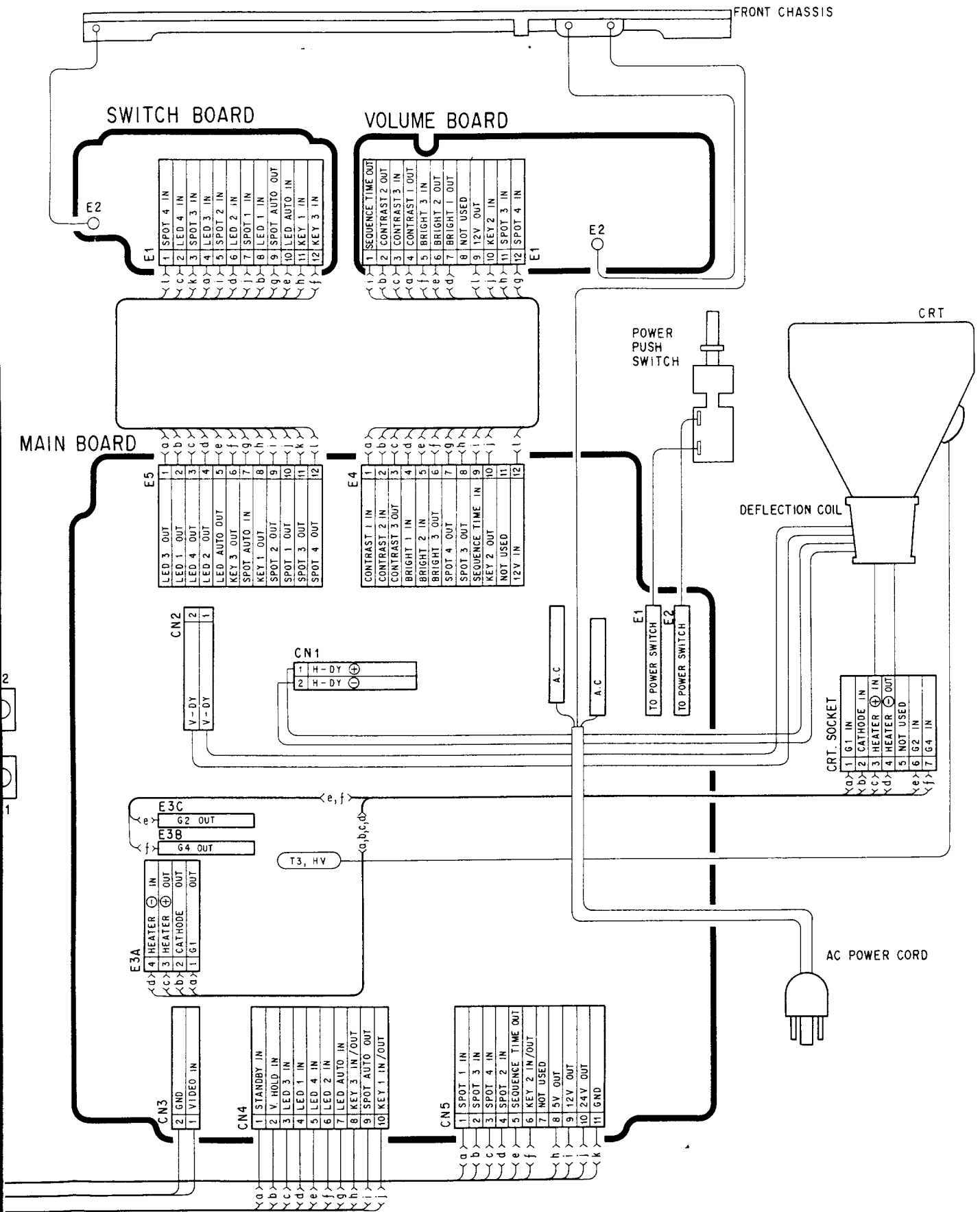


WIRING DIAGRAM

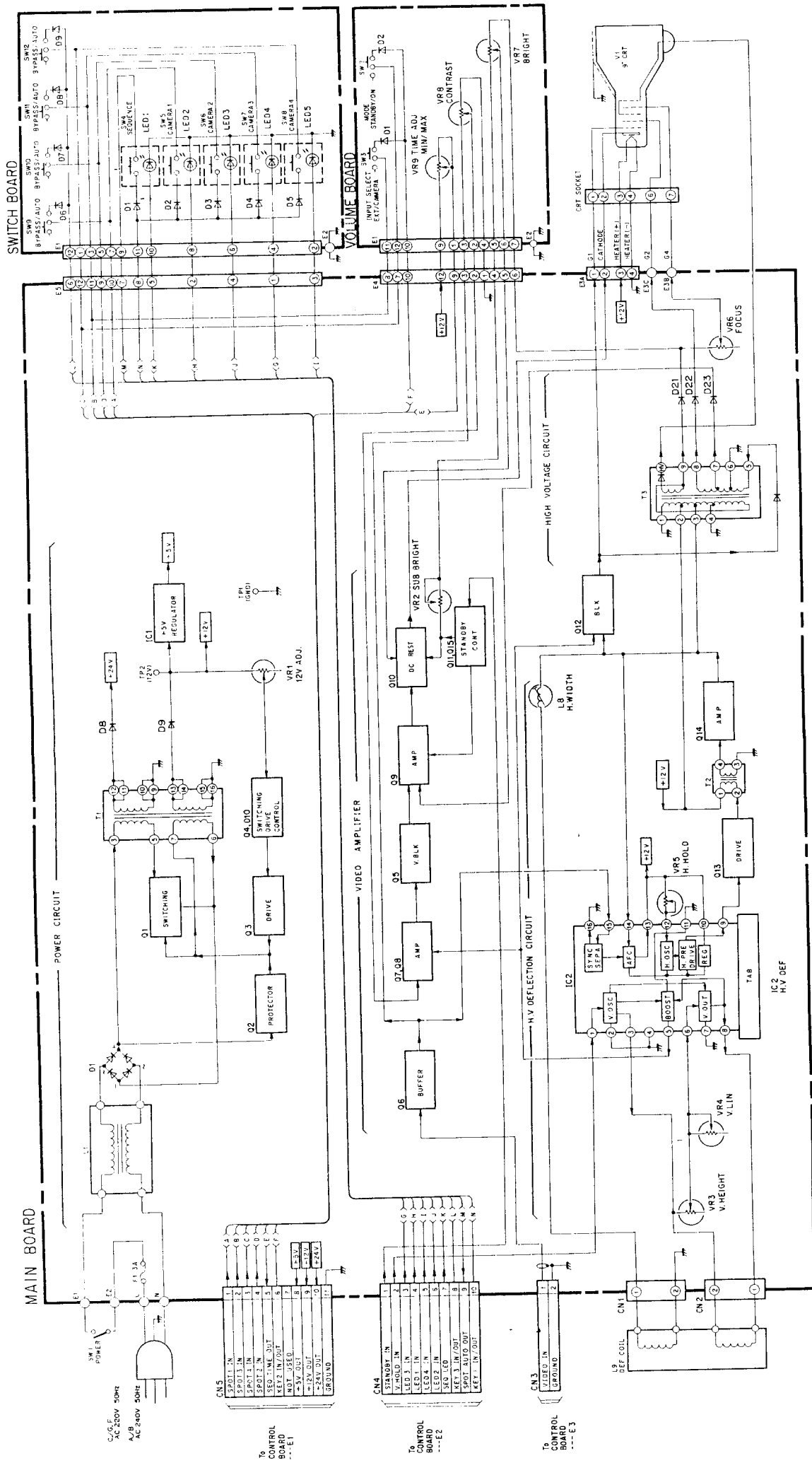




WIRING DIAGRAM

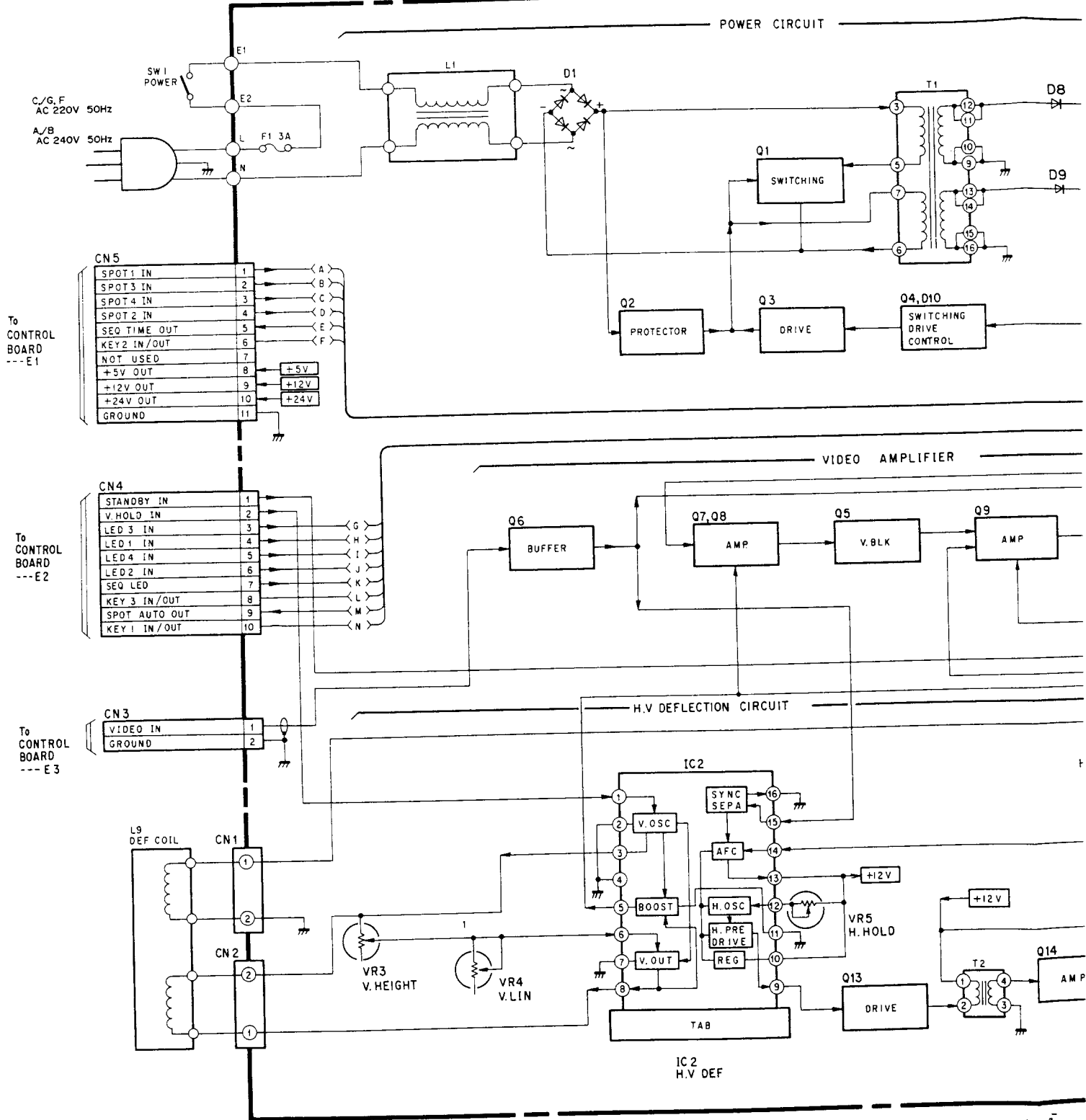


BLOCK DIAGRAM OF MAIN, SWITCH BOARD, VOLUME BOARD

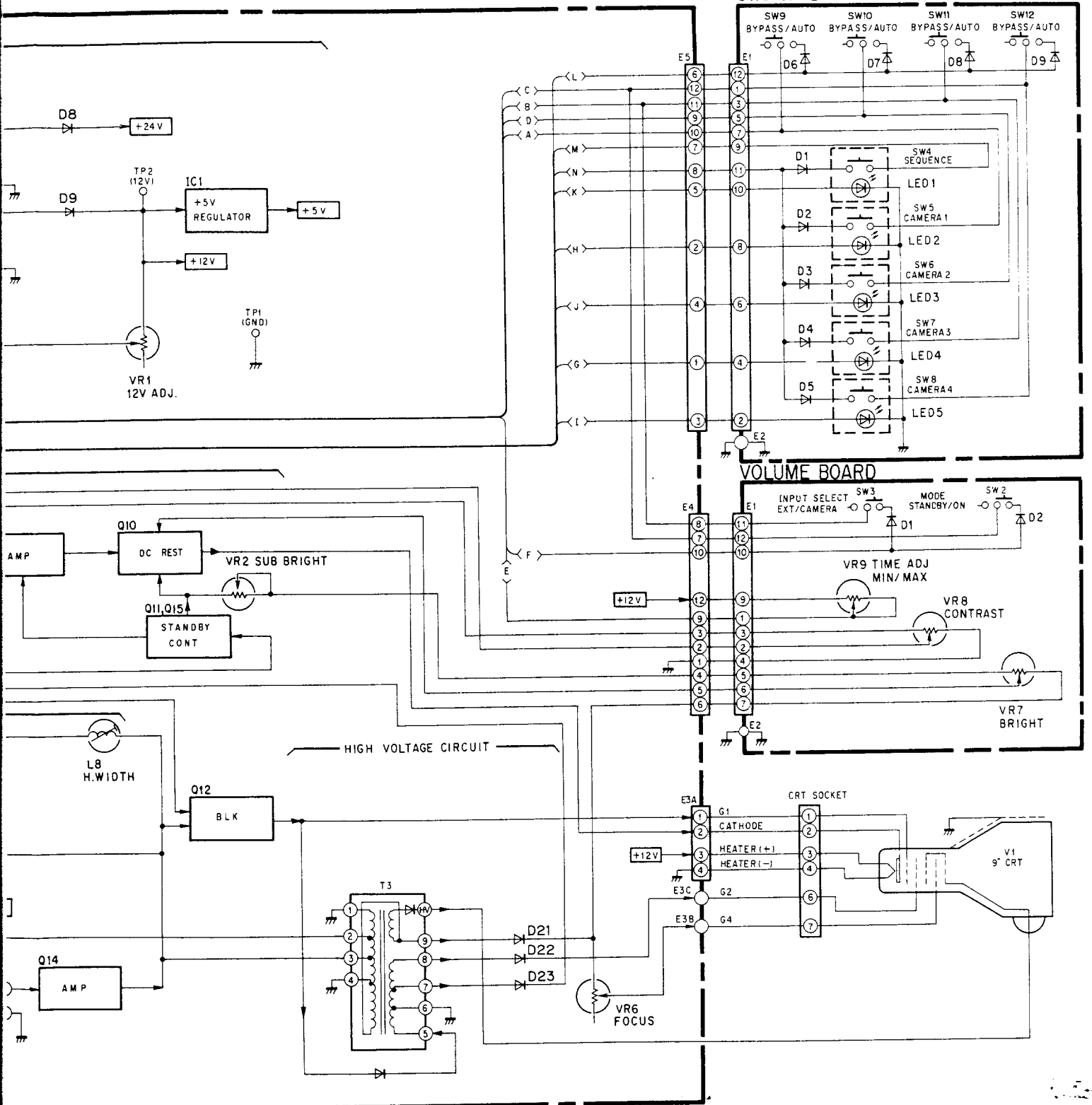


BLOCK DIAGRAM OF MAIN, SWI

MAIN BOARD



N, SWITCH BOARD, VOLUME BOARD



CONTROL SUB BOARD

	IC1
Pin 1	20.1
2	23.2
3	23.2
4	24.7
5	23.2
6	22.2
7	24.1
8	24.2
9	0
10	0
11	0
12	23.2
13	22.2
14	24.2

	B	C	E
Q1	5.5	23.1	5.5
Q2	5.3	5.5	5.5
Q3	0	0	0.2
Q4	6.3	0	0
Q5	0	4.5	0
Q6	0.6	0	0
Q7	5.5	0	5.0
Q8	0	0	5.5
Q9	0	0	0
Q10	4.9	0	5.5
Q11	0.7	0	0
Q12	0	0	0
Q13	5.5	22.2	4.9
Q14	5.2	3.6	5.5
Q15	0	24.1	0.2
Q16	4.9	5.5	5.5
Q17	0	0	0
Q18	0	0	0
Q19	5.5	0	5.0
Q20	5.2	0	5.5
Q21	0	0	0.1
Q22	4.9	5.5	5.5
Q23	0.7	0	0
Q24	0	19.8	0
Q71	23.4	10.9	22.7
Q72	24.6	0.7	24.2
Q73	24.7	0.7	24.1
Q74	24.5	0.7	24.1

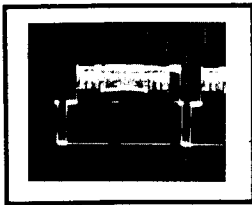
CONTROL MAIN BOARD

	IC1	IC2	IC3	IC4	IC5	IC6	IC7
Pin 1	5.5	12.1	0	0	2.4	0	5.5
2	0.1	0	5.4	0	0	0.1	0
3	0.1	9.1	0	5.6	5.6	5.5	5.5
4	0		0	0	0	5.5	
5	0.5		5.5	0	0	5.5	
6	5.1			*1.5	2.8	0.1	
7	0			0		4.6	
8	0			11.8		0	
9	5.4					0	
10	5.6					0	
11	0					4.1	
12	5.6					5.5	
13	0					2.8	
14	0					5.5	
15						0.4	
16						0.3	
17						5.5	
18						0.2	
19						0.1	
20						0.1	
21						0.1	
22						5.5	
23						5.5	
24						0.1	
25						2.2	
26						0.8	
27						0.8	
28						0.8	
29						0.8	
30						4.9	
31						5.5	
32						5.2	
33						5.5	
34						3.3	
35						3.2	
36						0	
37						0	
38						5.5	
39						5.5	
40						0	
41						0	
42						0	
43						0	
44						0	
45						5.5	
46						0	
47						5.5	
48						0	
49						5.5	
50						1.3	
51						1.2	
52						5.1	
53						0.1	
54						5.5	
55						5.5	
56						0	
57						0	
58						5.5	
59						5.5	
60						5.5	
61						2.6	
62						2.5	
63						0	
64						5.5	

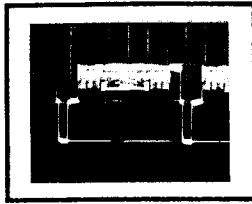
	B	C	E
Q1	24.1	24.6	24.6
Q2	24.6	3.6	24.6
Q3	24.6	3.6	24.6
Q4	24.6	3.6	24.6
Q5	5.5	0	5.5
Q8	5.5	0	5.5
Q9	0	0	0
Q10	0	0	0
Q12	0	5.5	0
Q13	5.5	0	5.5
Q14	5.5	0	5.5
Q19	5.2	0.3	5.5
Q22	3.1	5.5	2.5
Q23	2.6	5.5	2.5
Q24	0	0	0
Q26	2.5	5.5	2.0
Q27	0	0	2.6
Q28	5.5	0	2.6
Q32	2.7	0.2	2.7
Q33	0.6	0	0
Q34	0	5.5	0
Q35	0.6	0	0
Q36	0.6	0	0
Q37	0.6	0	0
Q38	0.6	0	0
Q39	0.1	8.8	0
Q40	0	9.0	0
Q41	3.1	0.1	0
Q42	3.3	0.1	0
Q43	0	5.5	0
Q44	0	5.5	0
Q45	5.5	0	5.5
Q46	5.5	0.1	5.5
Q47	5.4	0	5.5
Q48	0.1	5.5	5.8
Q49	0.1	5.4	5.5
Q50	0	0	0
Q51	5.4	0	5.5
Q52	0	0.1	0
Q53	5.4	0	5.5
Q54	5.5	0	5.5
Q55	0	0.1	0
Q56	5.9	0	5.5
Q57	0	0.1	0
Q58	5.0	0.3	5.5
Q59	0	0.4	0
Q60	5.6	0	5.5
Q61	0	0	0
Q62	5.9	0	5.5
Q63	0	0.1	0
Q64	0.2	1.5	0
Q65	4.8	5.4	5.5
Q66	8.8	0.2	5.5
Q67	0.1	0.2	0

	Pin.1	Pin.2	Pin.3	Pin.4	Pin.5	Pin.6
Q6	11.9	1.7	2.4	0	2.3	1.7
Q7	11.9	5.5	2.4	0	2.3	5.4
Q9	0	5.5	2.4	0	2.3	5.5
Q11	0	5.5	2.4	0	0	0
Q15	11.9	5.4	2.4	0	2.3	5.4
Q20	0	0.1	0	0	0.1	2.3
Q21	0	5.5	0	0	2.5	3.1
Q29	5.5	4.8	5.5	5.5	2.7	5.5
Q30	9.5	9.5	10.1	0	3.1	0
Q31	11.8	4.9	5.5	0	5.5	4.9
Q68	9.0	0.6	0	0	0	0

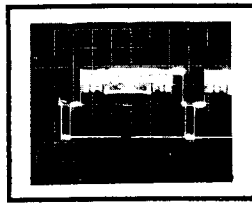
1. 0.2V/DIV 10μsec/DIV



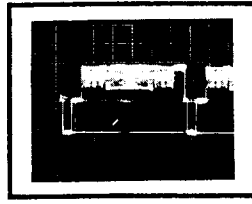
2. 0.2V/DIV 10μsec/DIV



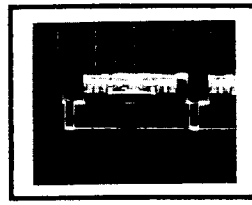
3. 0.2V/DIV 10μsec/DIV



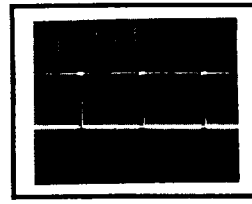
4. 0.2V/DIV 10μsec/DIV



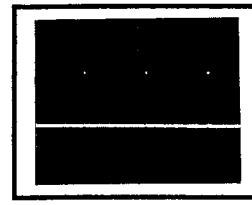
5. 0.5V/DIV 10μsec/DIV



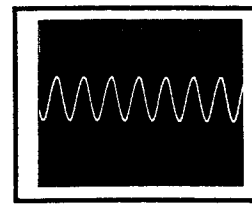
6. 2V/DIV 20μsec/DIV



7. 2V/DIV 20μsec/DIV



8. 2V/DIV 0.2μsec/DIV



CONTROL SUB BOARD

IC1	D4, E4, H4, F4
Q1	G4
Q2	G4
Q3	H5
Q4	H5
Q5	G5
Q6	G5
Q7	F4
Q8	F4
Q9	F5
Q10	F5
Q11	F5
Q12	F5
Q13	E4
Q14	E4
Q15	E5
Q16	E5
Q17	E5
Q18	D5
Q19	C4
Q20	C4
Q21	D5
Q22	C5
Q23	C5
Q24	C5
D1	G5
D2	F5
D3	E5
D4	C5

CONTROL BOARD

IC1	C8	Q66	C13
IC2	I12	Q67	A14
IC3	H14	Q68	F15
IC4	E8, E9	Q71	H1
IC5	D9	Q72	F1
IC6	E12, E13, E14	Q73	E1
IC7	C13	Q74	D1
Q1	G3	D1	G2
Q2	F3	D2	G3
Q3	E3	D3	C12
Q4	C3	D4	I7
Q5	H6	D5	I7
Q6	G7	D6	I7
Q7	G7	D7	I7
Q8	F6	D8	I7
Q9	F7	D9	I8
Q10	E6	D10	I8
Q11	E7	D15	H8
Q12	E7	D16	H10, H11, H12
Q13	E7	D17	D15
Q14	C6	D18	D15
Q15	L11	D19	C15
Q19	C7	D20	C15, D15
Q20	C9	D21	C15, D15
Q21	C9, C10	D22	C14, D14
Q22	C10	D23	C14, D14
Q23	C10	D24	C14, D14
Q24	C10	D25	H14
Q26	C10	D26	H15
Q27	C11	D27	H14
Q28	C11	D28	H14
Q29	C11	D29	H14
Q30	C12	D30	H14
Q31	C12	D31	H14
Q32	H9	D32	G16
Q33	H9		
Q34	H9		
Q35	H10		
Q36	H11		
Q37	H12		
Q38	H12		
Q39	H13		
Q40	H13		
Q41	H13		
Q42	H13		
Q43	H14		
Q44	H15		
Q45	F8		
Q46	F8		
Q47	F9		
Q48	F9		
Q49	F10		
Q50	F10		
Q51	F10		
Q52	F10		
Q53	F11		
Q54	F11		
Q55	F11		
Q56	F12		
Q57	F12		
Q58	F12		
Q59	F12		
Q60	F12		
Q61	F13		
Q62	F13		
Q63	F13		
Q64	D8		
Q65	C13		

CONTROL BOARD

CN6

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----

1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---

F
E
D
C

VR1
DC CURRENT
ADJ

VR3
ALARM TIME
ADJ.

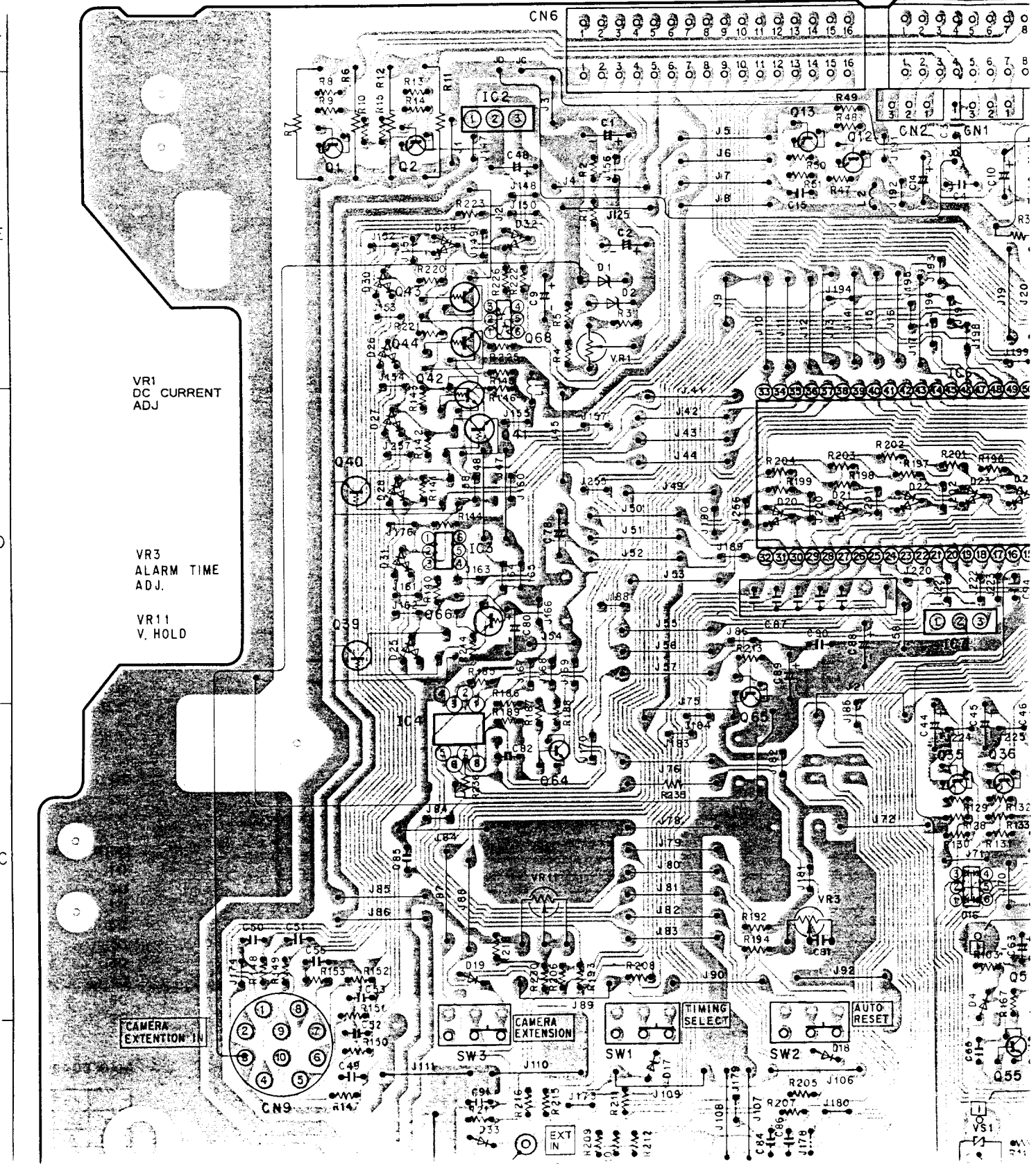
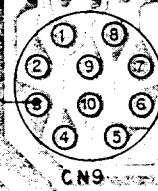
VR11
V. HOLD

CAMERA
EXTENSION IN

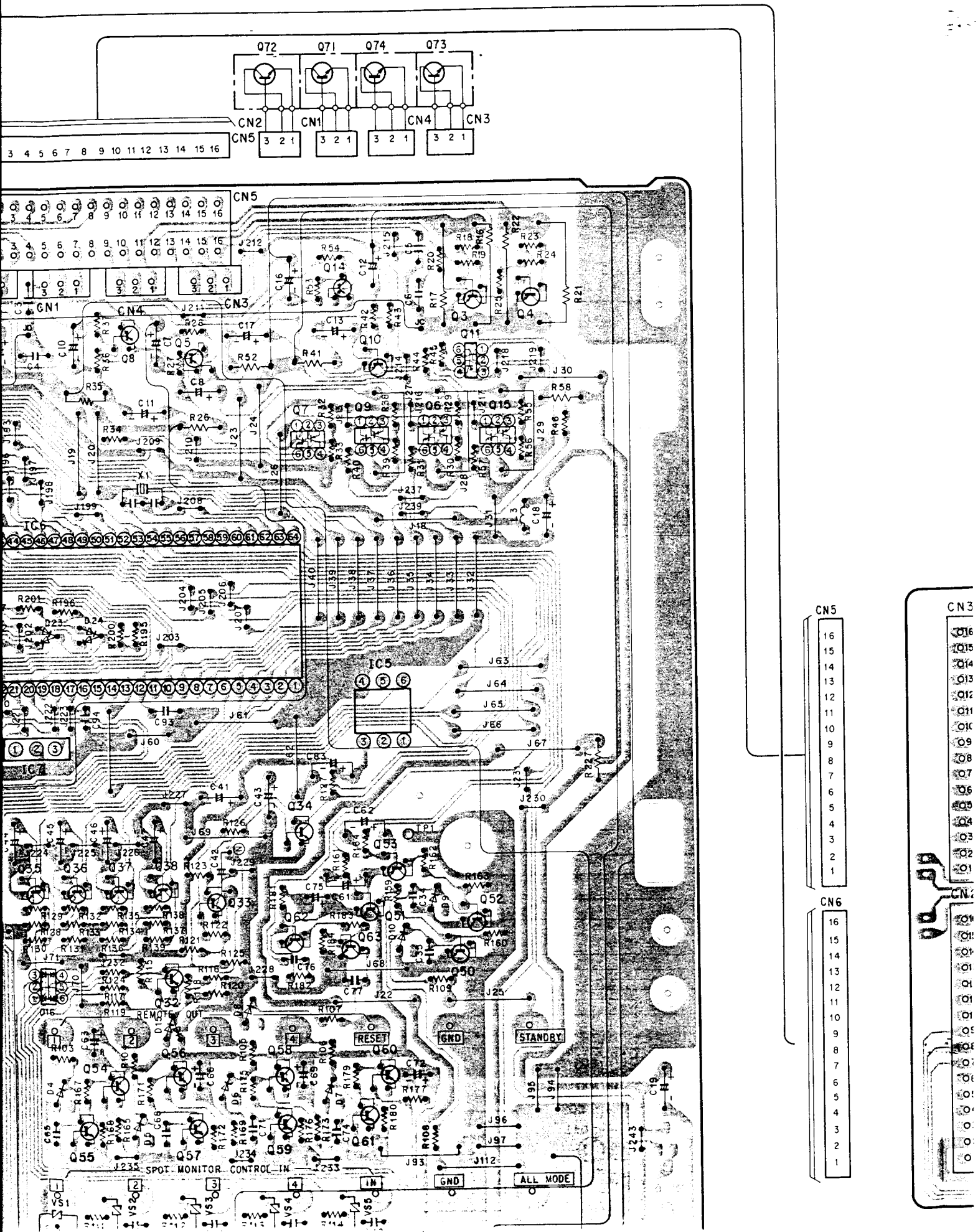
CAMERA
EXTENSION

TIMING
SELECT

AUTO-
RESET



CONDUCTOR VIEW OF CONTROL BOARD, CONTROL SUB BOARD



- CN5
- 16
 - 15
 - 14
 - 13
 - 12
 - 11
 - 10
 - 9
 - 8
 - 7
 - 6
 - 5
 - 4
 - 3
 - 2
 - 1

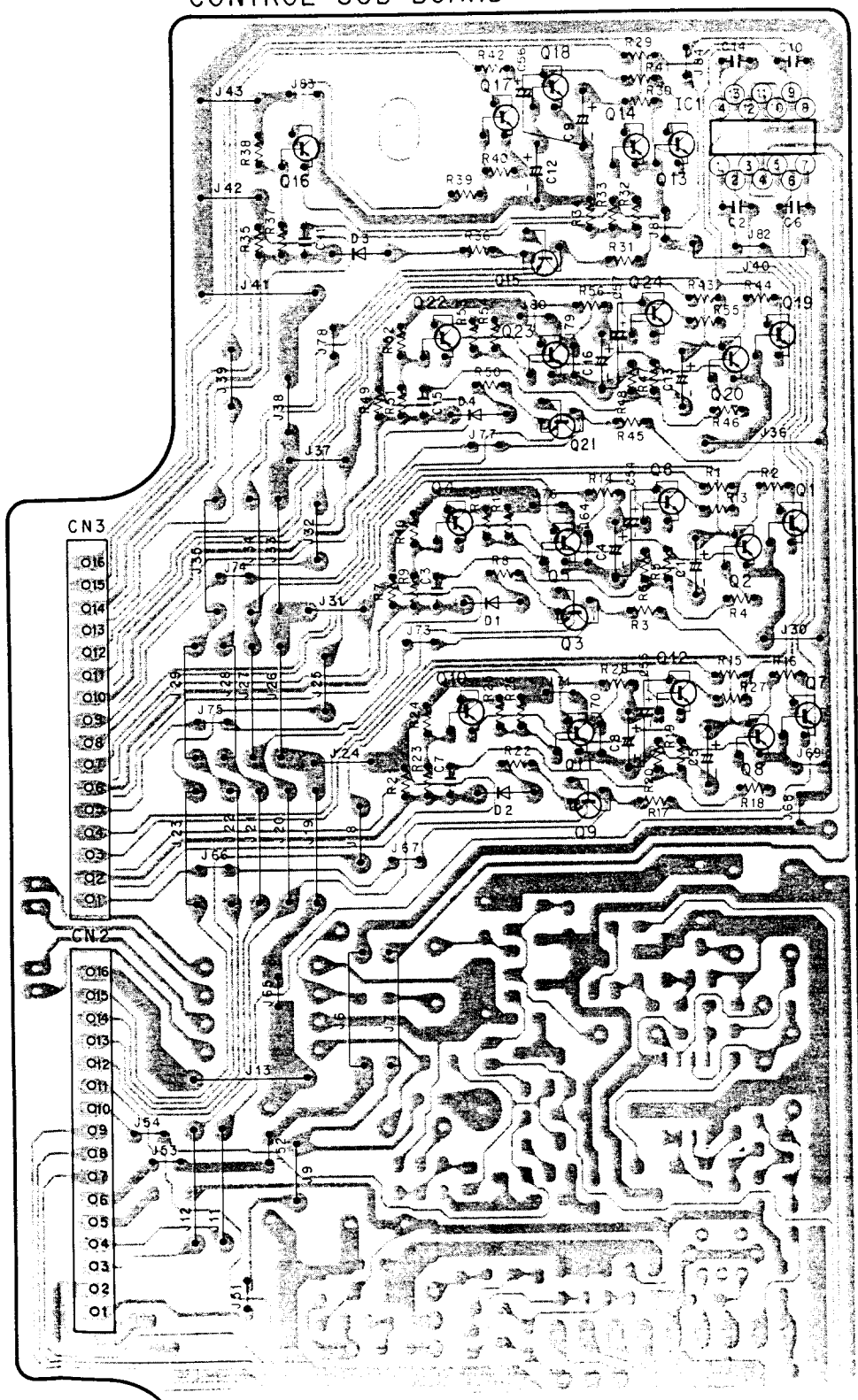
- CN6
- 15
 - 14
 - 13
 - 12
 - 11
 - 10
 - 9
 - 8
 - 7
 - 6
 - 5
 - 4
 - 3
 - 2
 - 1

- CN3
- 016
 - 015
 - 014
 - 013
 - 012
 - 011
 - 010
 - 009
 - 008
 - 007
 - 006
 - 005
 - 004
 - 003
 - 002
 - 001

CONTROL BOARD

IC1	A5
IC2	E2
IC3	D2
IC4	C2
IC5	D5
IC6	D4
IC7	D4
Q1	E2
Q2	E2
Q3	E5
Q4	E5
Q5	E4
Q6	E5
Q7	E5
Q8	E4
Q9	E5
Q10	E5
Q11	E5
Q12	E3
Q13	E3
Q14	E4
Q15	E5
Q19	A6
Q20	A5
Q21	A5
Q22	A4
Q23	A4
Q24	A4
Q26	A3
Q27	A3
Q28	A3
Q29	A3
Q30	A3
Q31	A3
Q32	C4
Q33	C4
Q34	C4
Q35	C4
Q36	C4
Q37	C4
Q38	C4
Q39	D2
Q40	D2
Q41	D2
Q42	D2
Q43	E2
Q44	E2
Q45	A4
Q46	A5
Q47	A4
Q48	A4
Q49	A4
Q50	C5
Q51	C5
Q52	C5
Q53	C5
Q54	C4
Q55	B4
Q56	C4
Q57	B4
Q58	C4
Q59	B4
Q60	C5
Q61	B5
Q62	C5
Q63	C5
Q64	C2
Q65	C3
Q66	D2
Q67	B2
Q68	E2
Q71	F4
Q72	F4
Q73	F5
Q74	F5
D1	E2
D2	E2
D3	A3
D4	C4
D5	B4
D6	C4
D7	C5
D8	C4
D9	C5
D10	C5
D15	C4
D16	C4
D17	B3
D18	B3
D19	C2
D20	D3
D21	D3
D22	D3
D23	D4
D24	D4
D25	D2
D26	E2

CONTROL SUB BOARD



CN5

16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

CN6

16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

VR1
DC CURRENT
ADJ.

VR3
ALARM TIME
ADJ.

VR11
V. HOLD

CAMERA
EXTENSION IN

To MAIN BOARD
---- CN5

To MAIN BOARD
BOARD ---- CN3

D

C

B

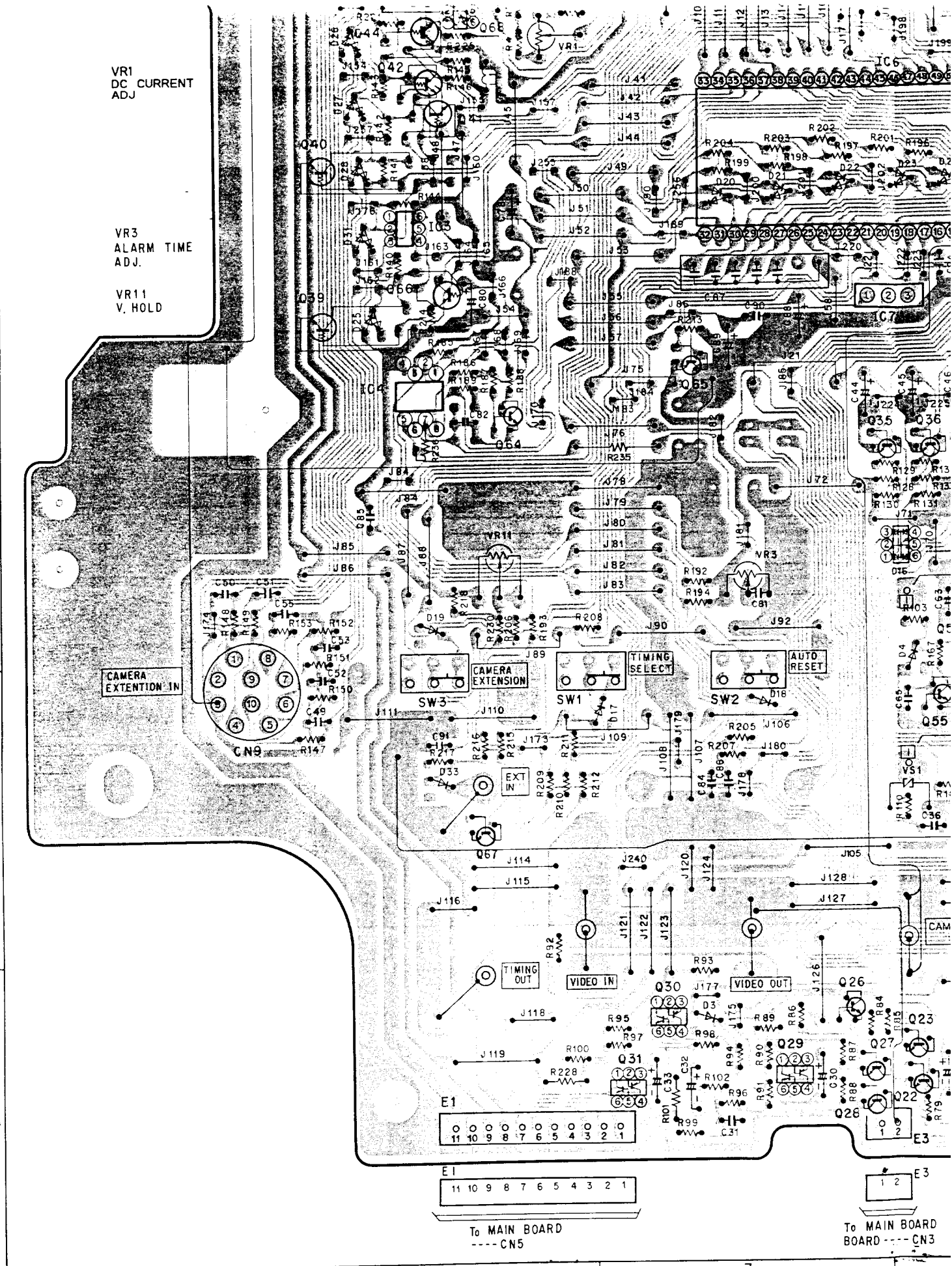
A

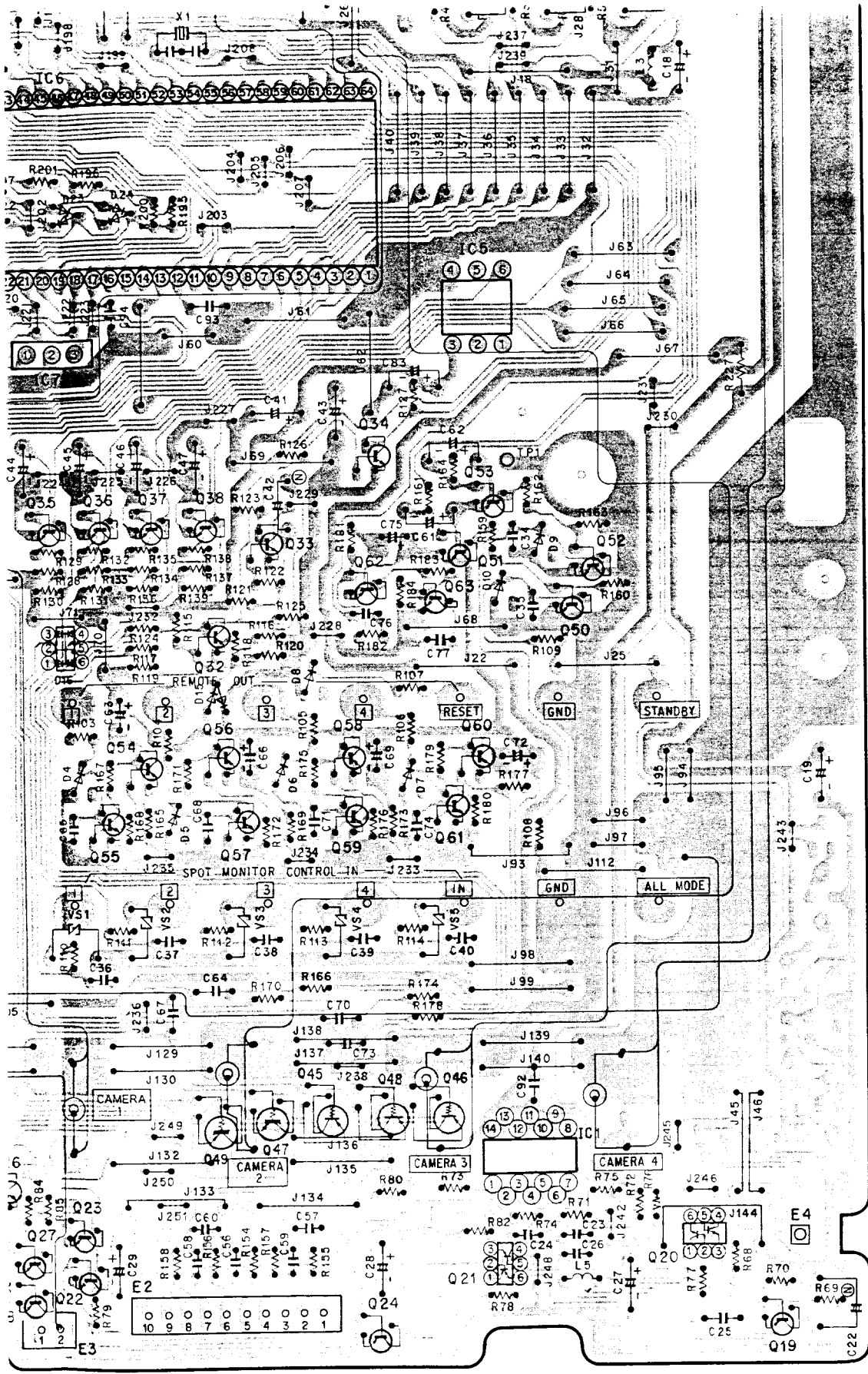
1

2

3

4



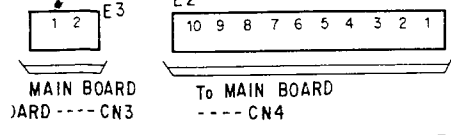


CN5

16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

CN6

16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1

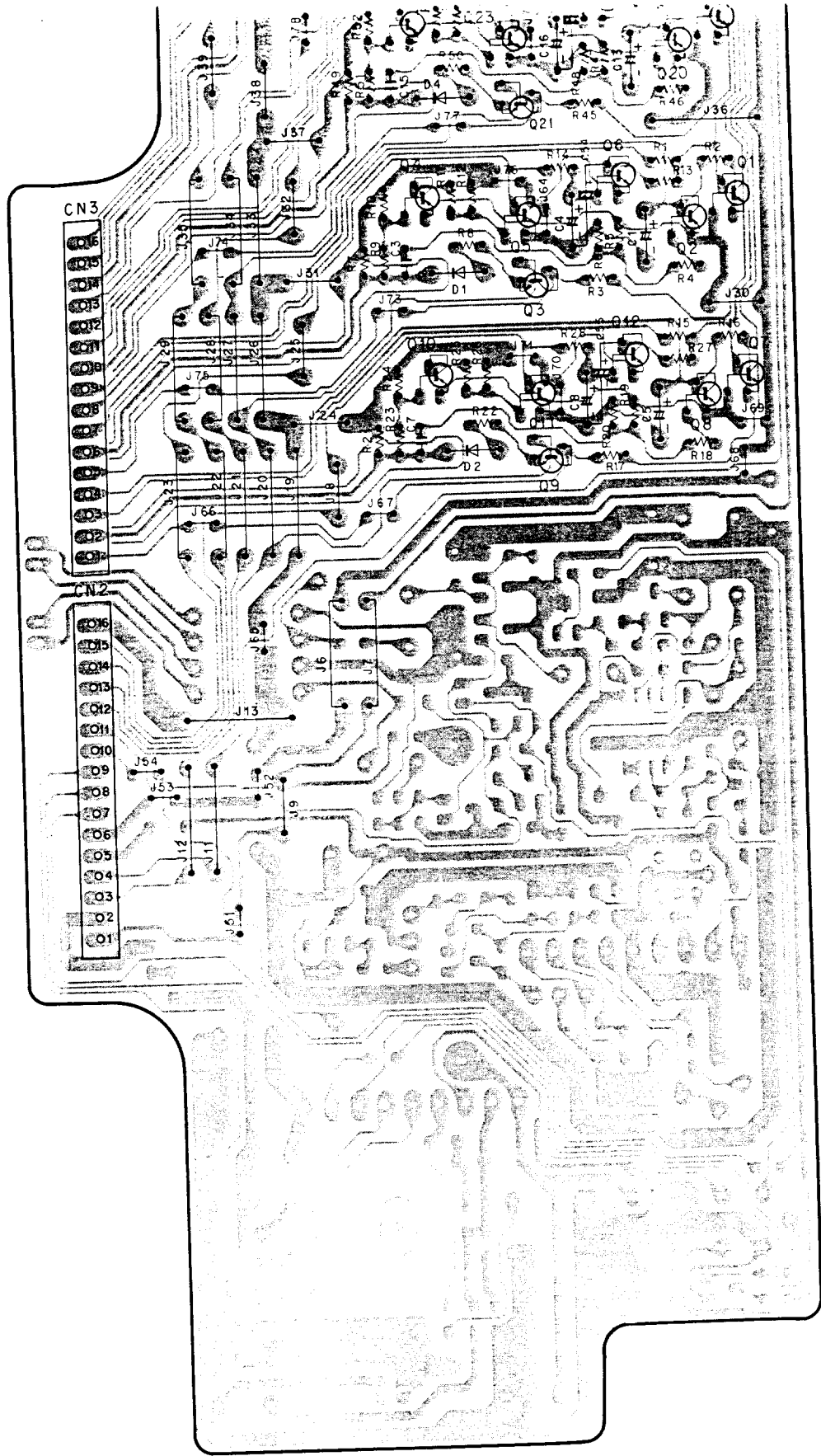


4

5

1

6



- CN5
- 16
 - 15
 - 14
 - 13
 - 12
 - 11
 - 10
 - 9
 - 8
 - 7
 - 6
 - 5
 - 4
 - 3
 - 2
 - 1

- CN6
- 16
 - 15
 - 14
 - 13
 - 12
 - 11
 - 10
 - 9
 - 8
 - 7
 - 6
 - 5
 - 4
 - 3
 - 2
 - 1

- Q38 C4
- Q39 D2
- Q40 D2
- Q41 D2
- Q42 D2
- Q43 E2
- Q44 E2
- Q45 A4
- Q46 A5
- Q47 A4
- Q48 A4
- Q49 A4
- Q50 C5
- Q51 C5
- Q52 C5
- Q53 C5
- Q54 C4
- Q55 B4
- Q56 C4
- Q57 B4
- Q58 C4
- Q59 B4
- Q60 C5
- Q61 B5
- Q62 C5
- Q63 C5
- Q64 C2
- Q65 C3
- Q66 D2
- Q67 B2
- Q68 E2
- Q71 F4
- Q72 F4
- Q73 F5
- Q74 F5
- D1 E2
- D2 E2
- D3 A3
- D4 C4
- D5 B4
- D6 C4
- D7 C5
- D8 C4
- D9 C5
- D10 C5
- D15 C4
- D16 C4
- D17 B3
- D18 B3
- D19 C2
- D20 D3
- D21 D3
- D22 D3
- D23 D4
- D24 D4
- D25 D2
- D26 E2
- D27 D2
- D28 D2
- D29 E2
- D30 E2
- D31 D2
- D32 E2

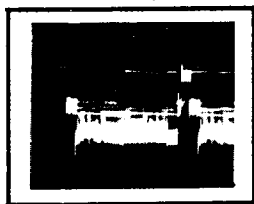
CONTROL SUB BOARD

- IC1 E8
- Q1 D8
- Q2 D8
- Q3 D8
- Q4 D7
- Q5 D8
- Q6 D8
- Q7 D8
- Q8 D8
- Q9 D8
- Q10 D8
- Q11 D8
- Q12 D8
- Q13 D8
- Q14 E8
- Q15 E8
- Q16 E7
- Q17 E8
- Q18 E8
- Q19 E8
- Q20 E8
- Q21 E8
- Q22 E8
- Q23 E8
- Q24 E8
- D1 D8
- D2 D8
- D3 E7
- D4 D8

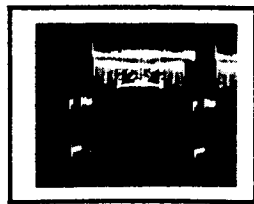
1. 0.2V/DIV 10µsec/DIV



2. 0.1V/DIV 10µsec/DIV



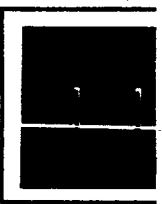
3. 0.2V/DIV 10µsec/DIV



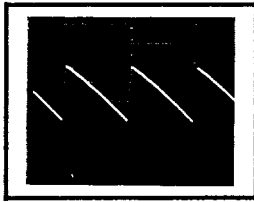
4. 5V/DIV 10µsec/DIV



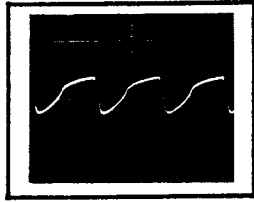
5. 5V/DIV 20µsec



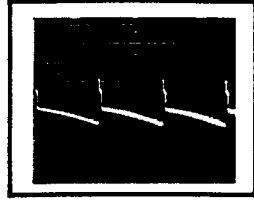
12. 0.2V/DIV 5msec/DIV



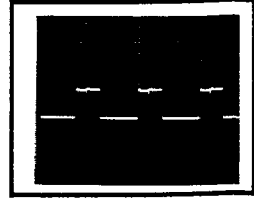
13. 0.2V/DIV 5msec/DIV



14. 10V/DIV 5msec/DIV



15. 0.5V/DIV 20µsec/DIV



16. 1V/DIV 20µsec



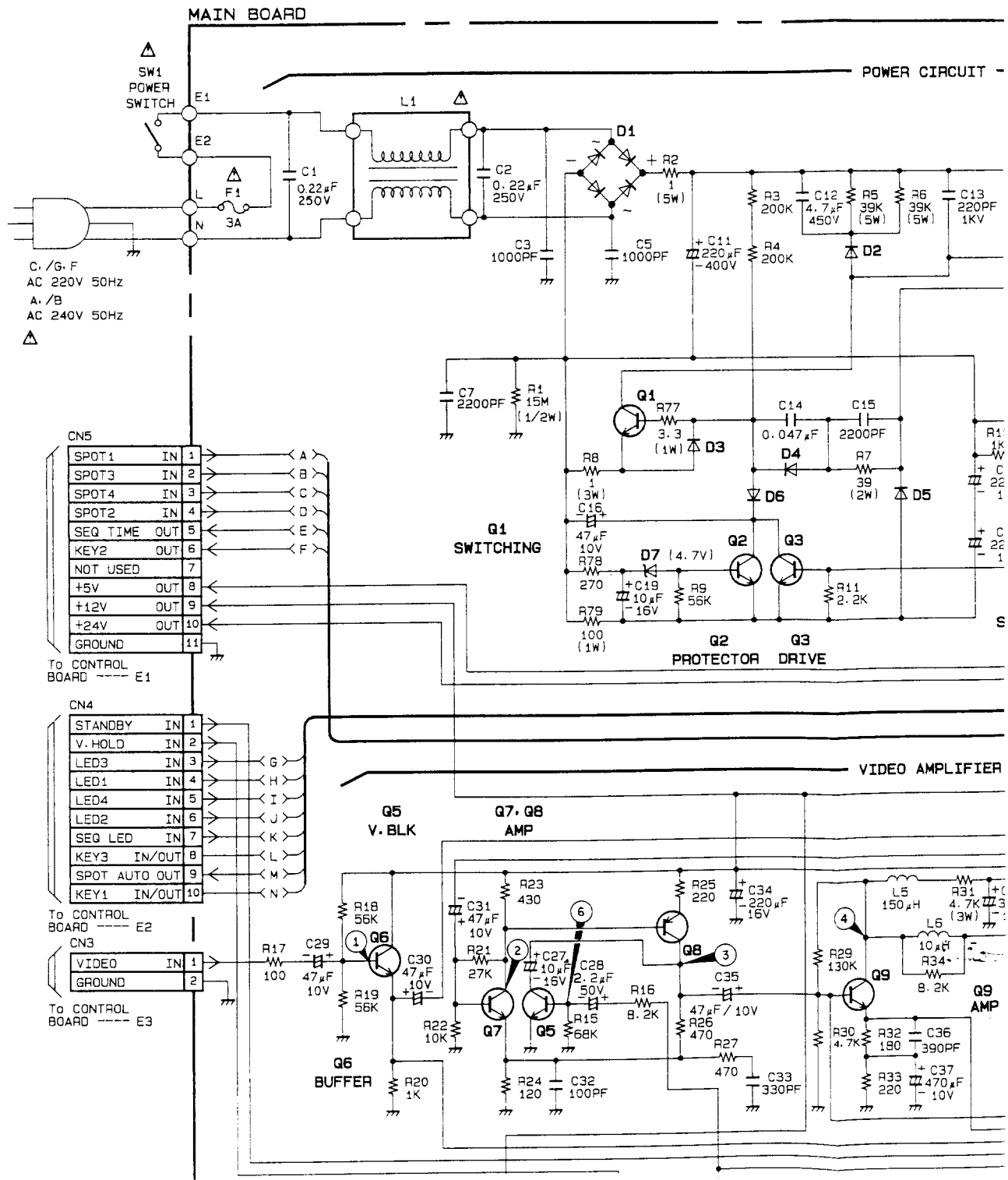
H

G

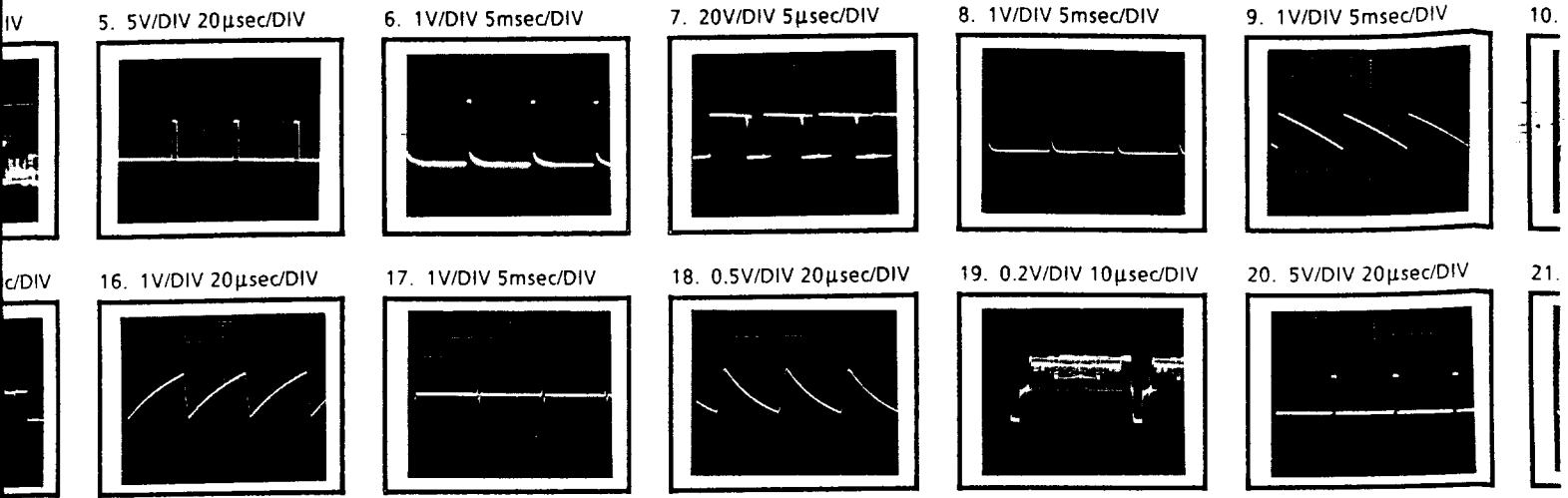
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E

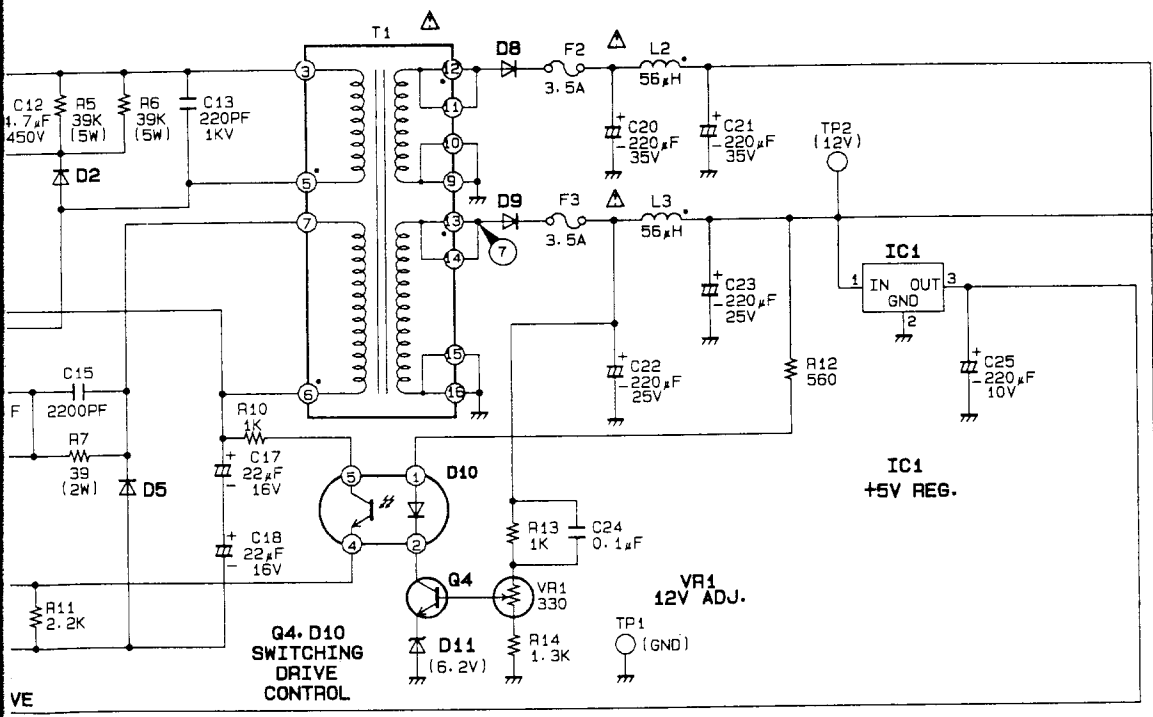
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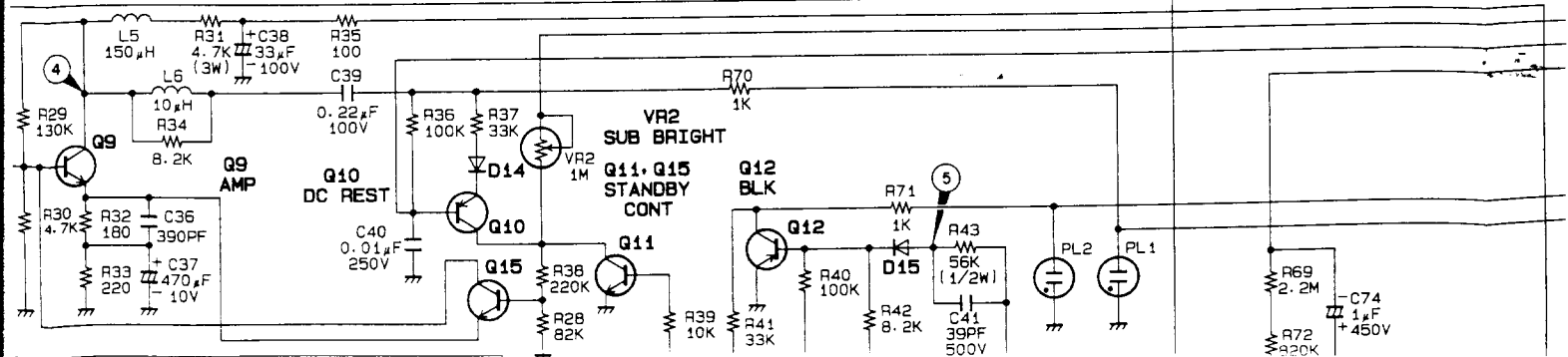
SCHEMATIC DIAGRAM OF MAIN BOARD, SWITCH BOARD, VOLUME BOARD



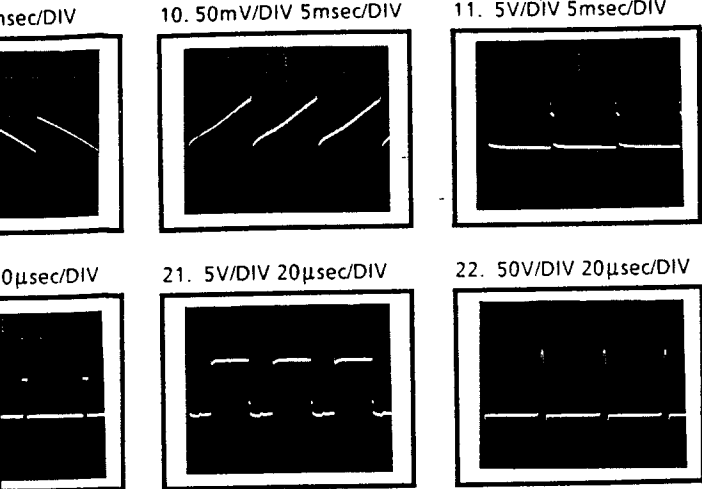
POWER CIRCUIT



VIDEO AMPLIFIER CIRCUIT



VOLUME BOARD

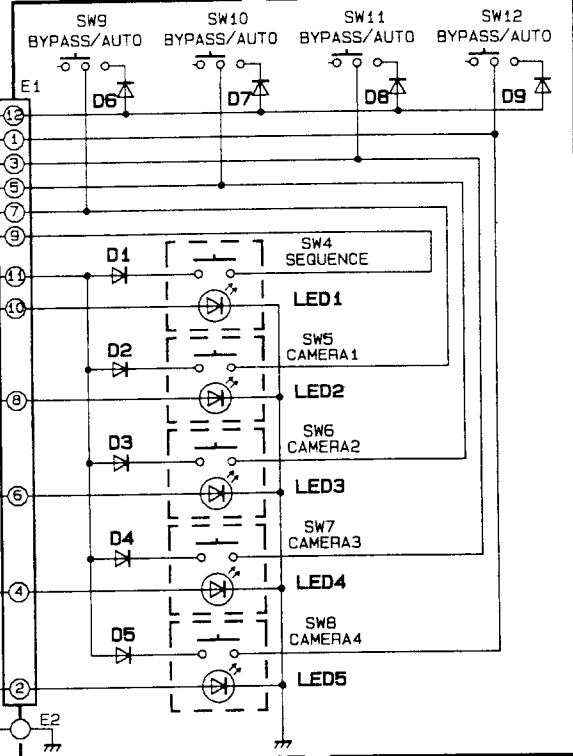


PRODUCT SAFETY NOTICE
 COMPONENT IDENTIFIED WITH THE "⚠" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY.
 WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED

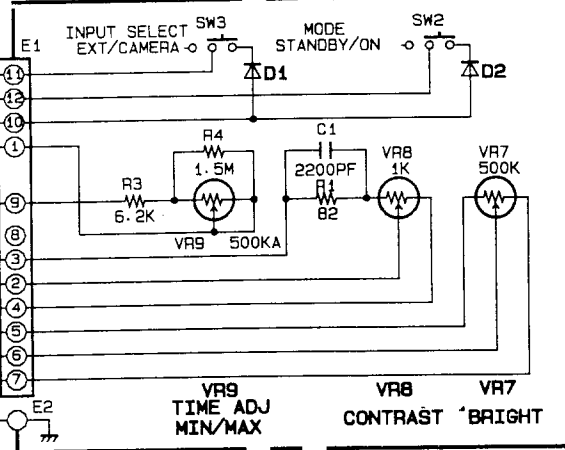
MAIN BOARD

- IC1 F6
- IC2 B4
- Q1 F3
- Q2 E3
- Q3 E3
- Q4 E5
- Q5 D3
- Q6 D2
- Q7 D3
- Q8 D3
- Q9 D4
- Q10 D5
- Q11 C5
- Q12 C6
- Q13 A6
- Q14 B6
- Q15 C5
- D1 G3
- D2 G4
- D3 F3
- D4 F3
- D5 F4
- D6 F3
- D7 F3
- D8 G5
- D9 G5
- D10 F5
- D11 E5
- D14 D5
- D15 B2
- D16 B2
- D17 B3
- D18 B6
- D19 B7
- D20 B7
- D21 B7
- D22 B7
- D23 B7

SWITCH BOARD



VOLUME BOARD



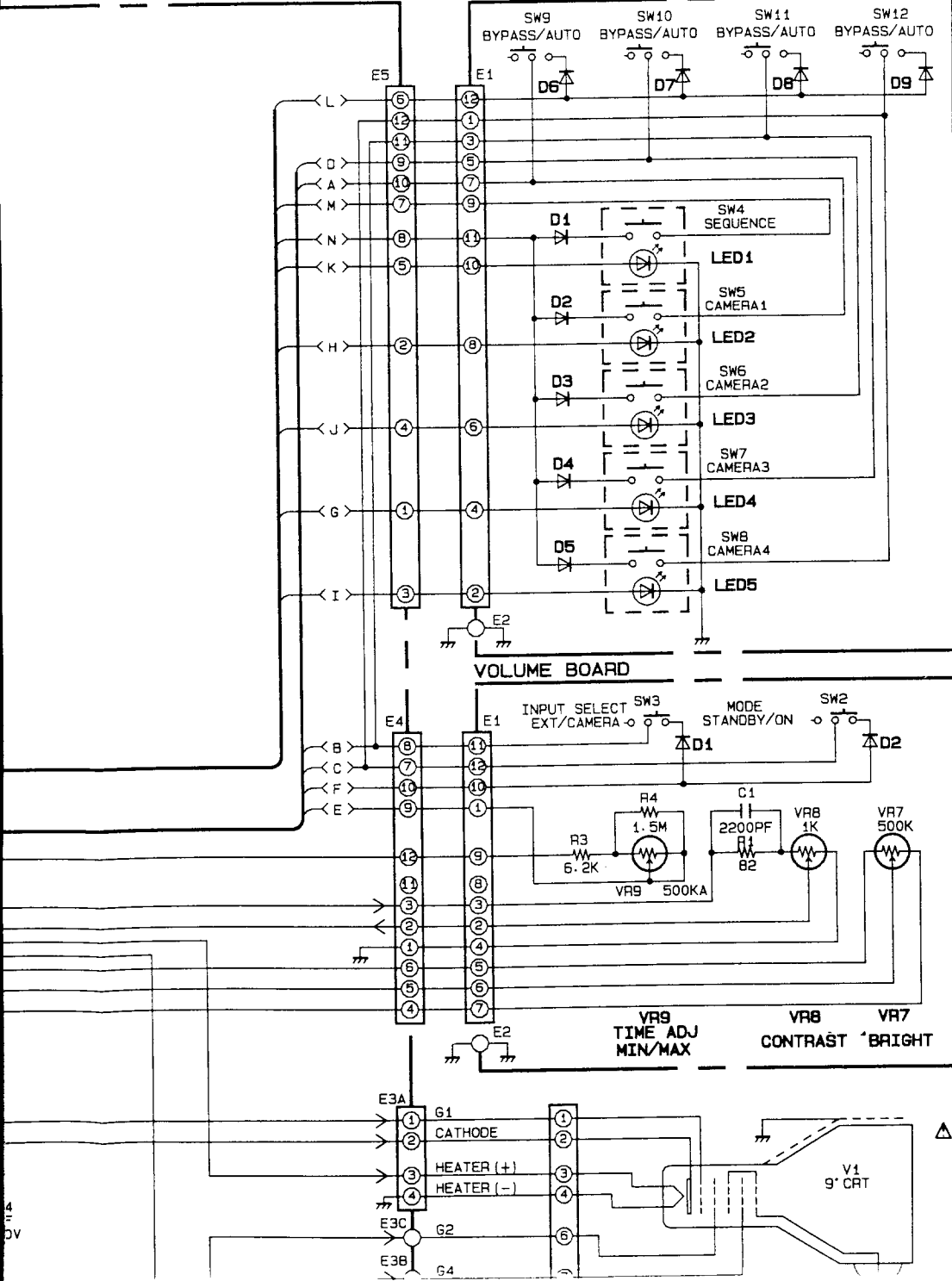
- D1 E9
- D2 E10

SWITCH BOARD

- D1 G9
- D2 F9
- D3 F9
- D4 F9
- D5 F9
- D6 G9
- D7 G9
- D8 G10
- D9 G10

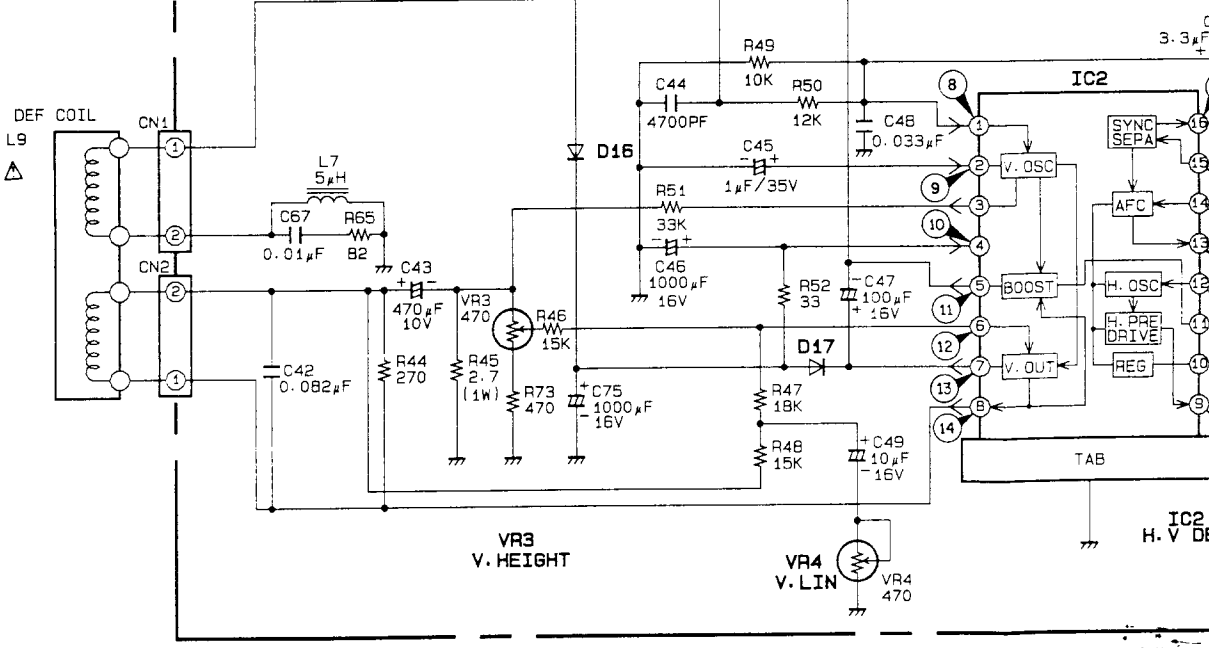
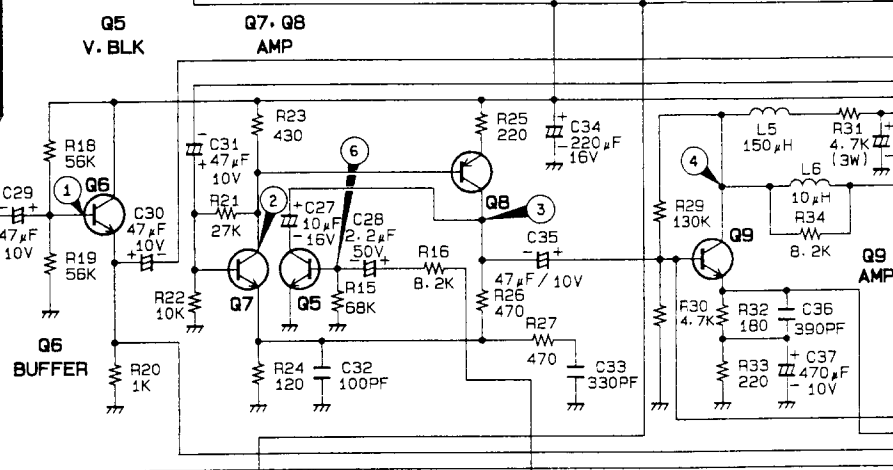
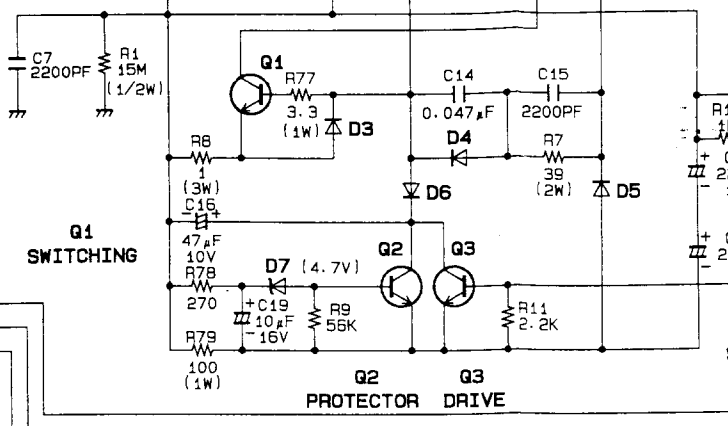
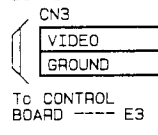
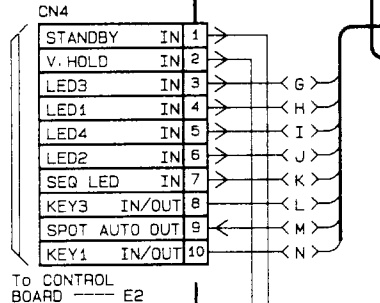
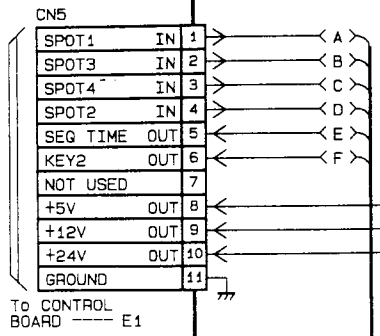
MAIN BOARD

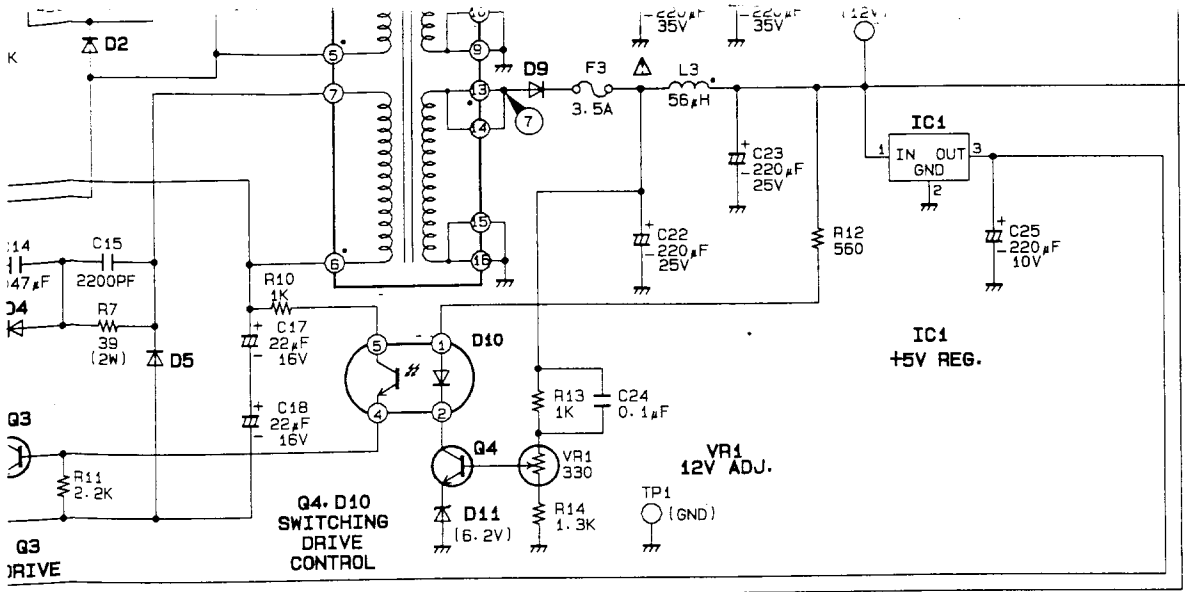
	IC1	IC2
Pin 1	12.0	5.3
2	0	6.9
3	5.6	3.5



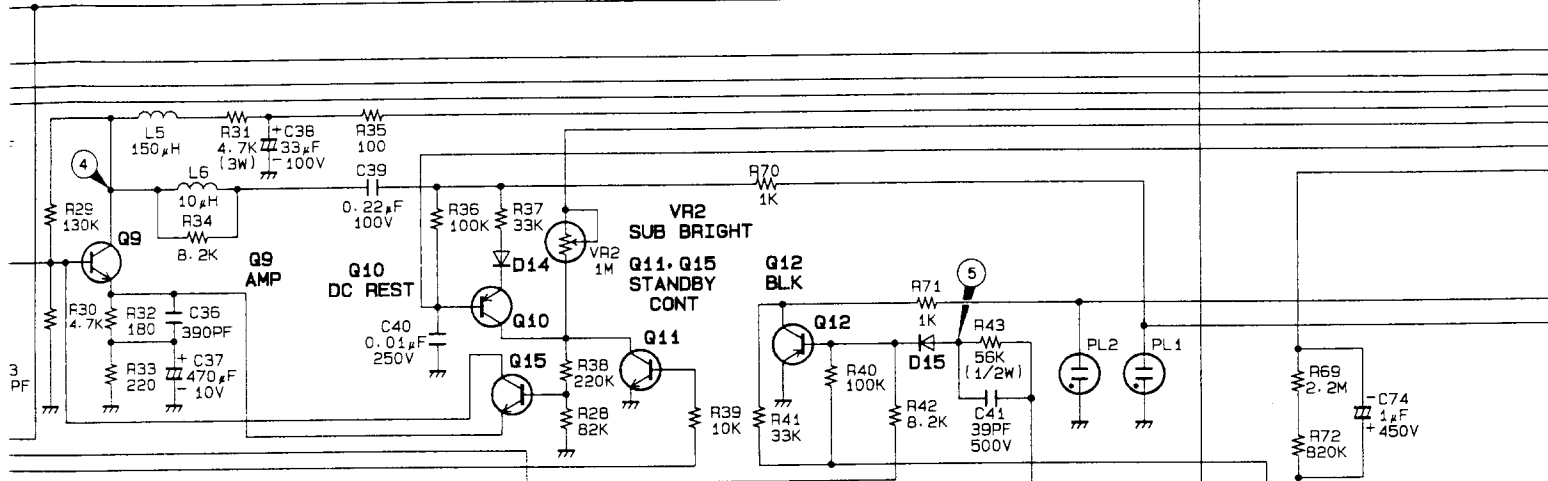
C. /G. F
 AC 220V 50Hz
 A. /B
 AC 240V 50Hz

F
 E
 D
 C
 B
 A

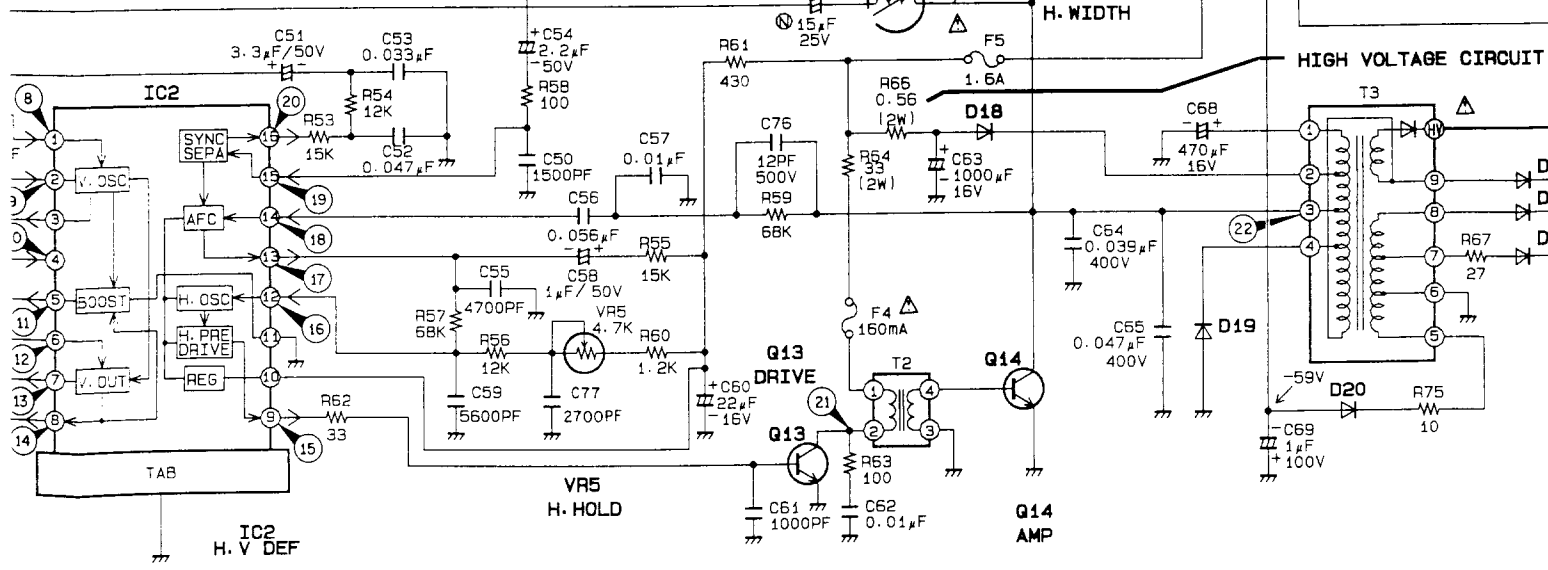




VIDEO AMPLIFIER CIRCUIT



H. V DEFLECTION CIRCUIT

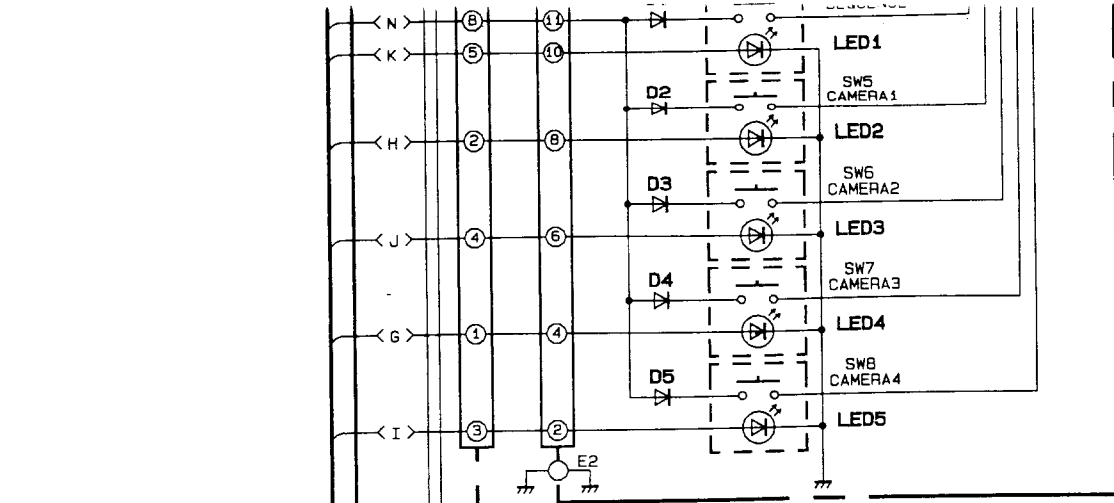


4

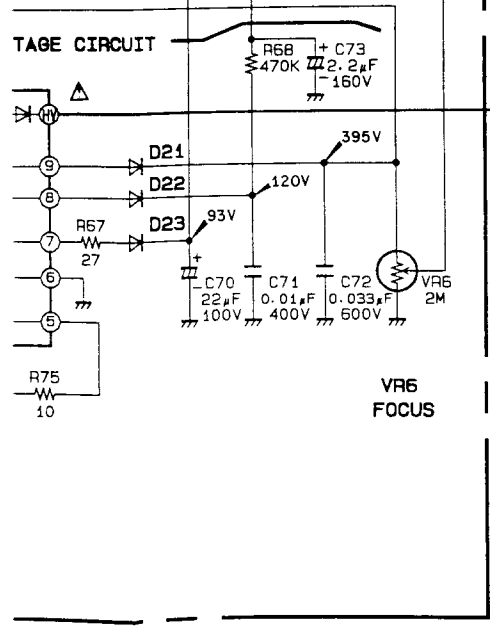
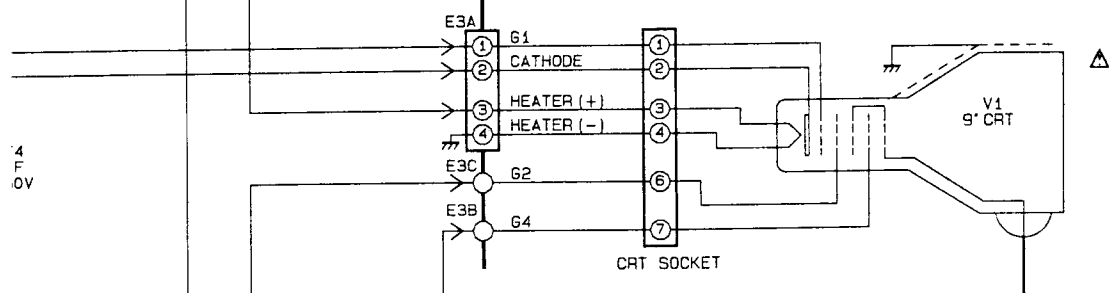
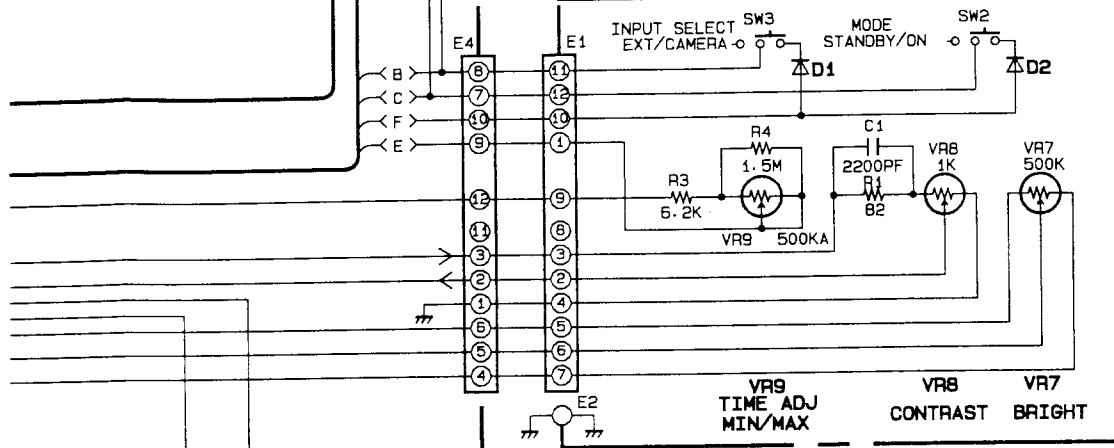
5

6

7



VOLUME BOARD



- Q15 C5
- D1 G3
- D2 G4
- D3 F3
- D4 F3
- D5 F4
- D6 F3
- D7 F3
- D8 G5
- D9 G5
- D10 F5
- D11 E5
- D14 D5
- D15 B2
- D16 B2
- D17 B3
- D18 B6
- D19 B7
- D20 B7
- D21 B7
- D22 B7
- D23 B7

- D1 E9
- D2 E10

SWITCH BOARD

- D1 G9
- D2 F9
- D3 F9
- D4 F9
- D5 F9
- D6 G9
- D7 G9
- D8 G10
- D9 G10

MAIN BOARD

	IC1	IC2
Pin 1	12.0	5.3
2	0	6.9
3	5.6	3.5
4		10.9
5		1.5
6		2.0
7		11.1
8		5.5
9		0.3
10		6.8
11		0
12		3.5
13		3.4
14		2.3
15		4.2
16		1.1

	B	C	E
Q1	0.1	-	0.3
Q2	-1.7	0	-1.8
Q3	-1.5	0	-1.8
Q4	6.8	10.6	6.1
Q5	-2.2	0.3	0
Q6	5.5	12.0	4.8
Q7	2.5	9.7	1.9
Q8	9.7	6.7	10.4
Q9	2.4	70.3	1.8
Q10	65.7	0.1	6.4
Q11	0.6	0	0
Q12	0.5	-9.8	0
Q13	0.2	9.2	0
Q14	0	18.3	0
Q15	0	2.4	1.8

8

9

10

CONDUCTR VIEW OF MAIN BOARD, SWITCH BOARD, VOLUME BOARD

MAIN BOARD

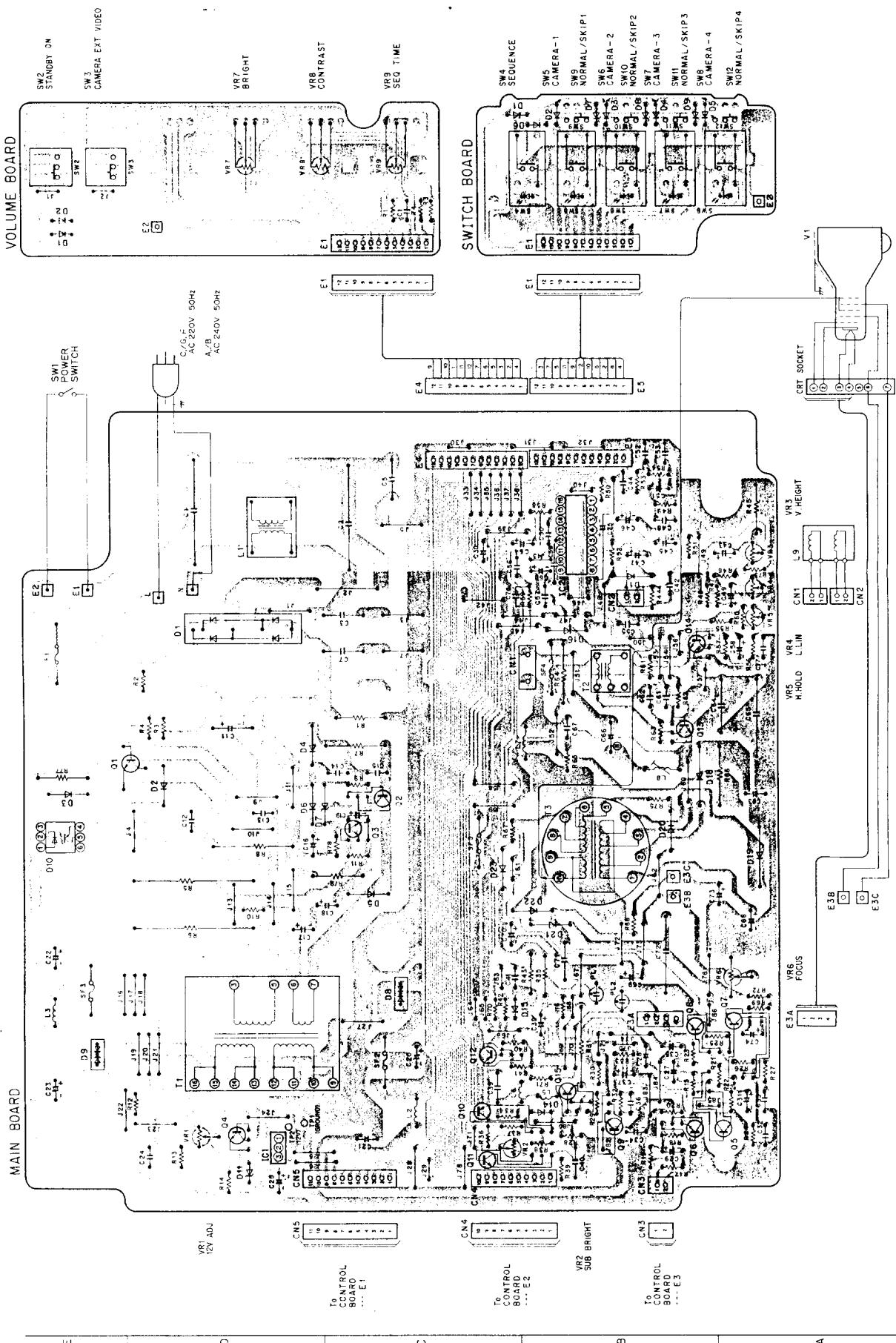
- IC1 D2
- IC2 B5
- Q1 D3
- Q2 C3
- Q3 C3
- Q4 D2
- Q5 A2
- Q6 B2
- Q7 A2
- Q8 B2
- Q9 B2
- Q10 C2
- Q11 C1
- Q12 C2
- Q13 B4
- Q14 B4
- Q15 B2
- D1 D4
- D2 D3
- D3 E3
- D4 D4
- D5 C3
- D6 D3
- D7 C3
- D8 C2
- D9 F2
- F2 E2
- E3 E3
- D11 D1
- D14 B2
- D15 C2
- D16 B4
- D17 B4
- D18 B3
- D19 A3
- D20 B3
- D21 B3
- D22 B3
- D23 C3

VOLUME BOARD

- D1 E5
- D2 E6

SWITCH BOARD

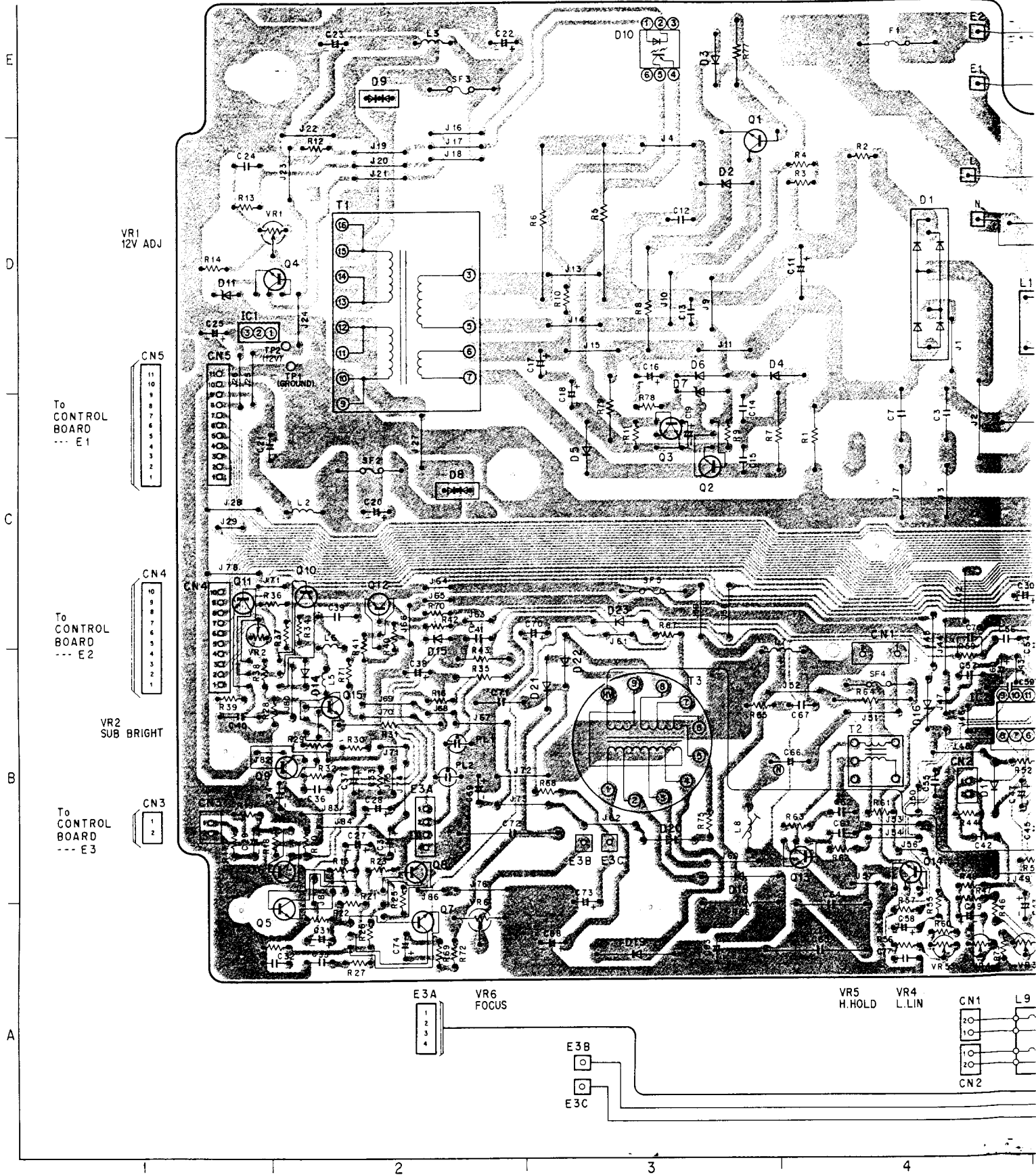
- D1 C7
- D2 B7
- D3 B7
- D4 B7
- D5 B7
- D6 B7
- D7 B7
- D8 B7
- D9 B7



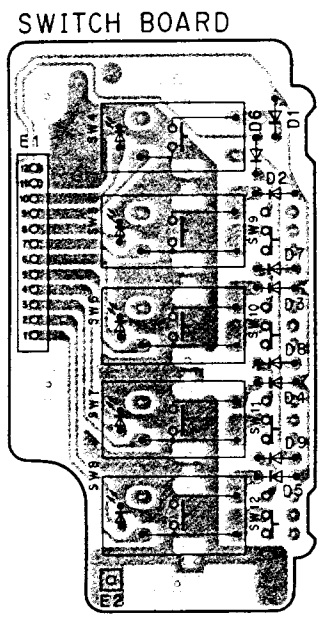
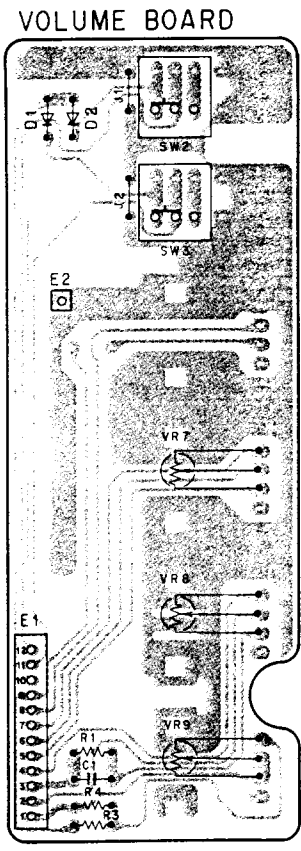
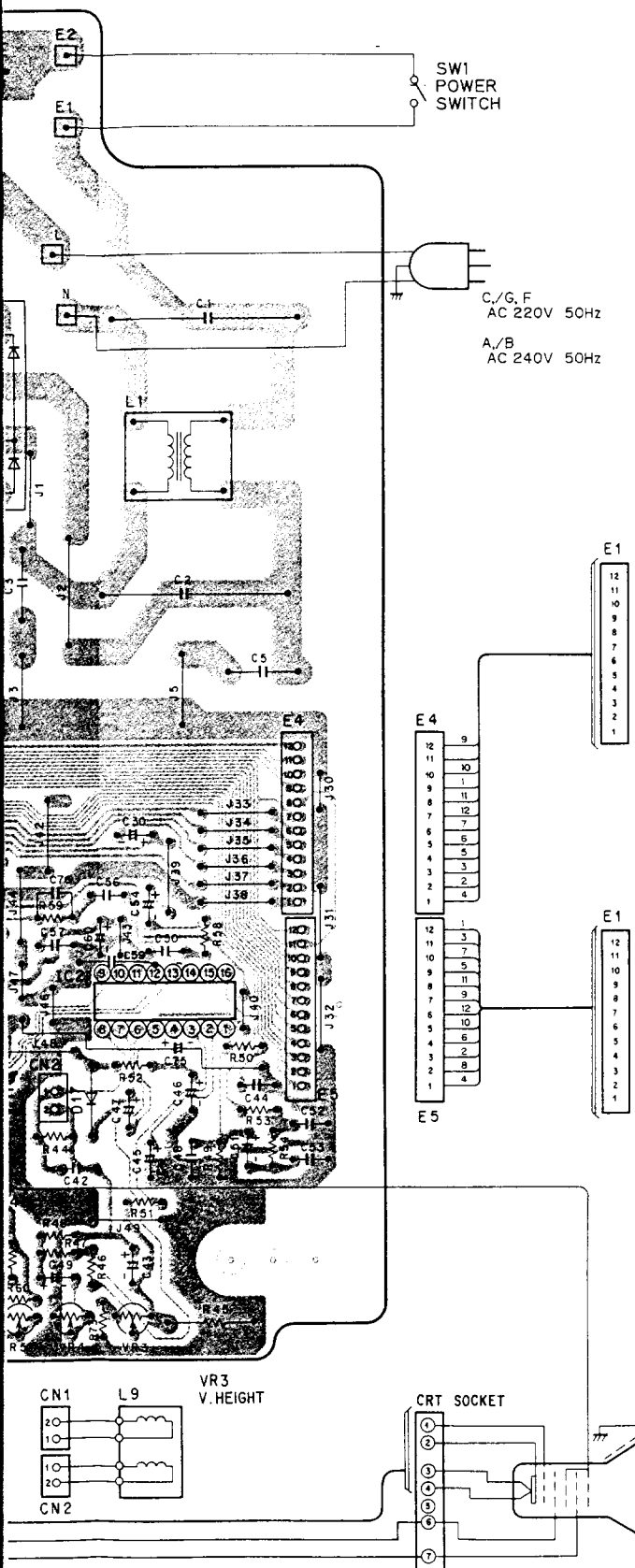
E 7
D 6
C 5
B 4
A 3
2
1

CONDUCTR VIEW OF MAIN BOARD, SW

MAIN BOARD



BOARD, SWITCH BOARD, VOLUME BOARD



MAIN BOARD

IC1	D2
IC2	B5
Q1	D3
Q2	C3
Q3	C3
Q4	D2
Q5	A2
Q6	B2
Q7	A2
Q8	B2
Q9	B2
Q10	C2
Q11	C1
Q12	C2
Q13	B4
Q14	B4
Q15	B2
D1	D4
D2	D3
D3	E3
D4	D3
D5	C3
D6	D3
D7	C3
D8	C2
D9	F2
D10	E3
D11	D1
D14	B2
D15	C2
D16	B4
D17	B4
D18	B3
D19	A3
D20	B3
D21	B3
D22	B3
D23	C3

VOLUME BOARD

D1	E6
D2	E6

SWITCH BOARD

D1	C7
D2	B7
D3	B7
D4	B7
D5	B7
D6	B7
D7	B7
D8	B7
D9	B7

REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
2. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
MISCELLANEOUS					
V1 L9 SW1 CN9	⚠ ⚠ ⚠ MI0908P4AUX YWYS34468T YWESB99682V YWS7502B607	Cathode Ray Tube Deflection Coil Power Switch CRT Socket Assy	M26 M27 M29	CLIP0534 YWHINGE4899 VAKA0669ANY	Support Support Rear Panel Assy for WV-BM90/ABCG Rear Panel Assy for WV-BM90/F Earth Lug
E1	⚠ YFKPGTSA25 HBS308A YWCE009908FA YVVM009908A YWCE009908FA	AC Power Cord for WV-BM90/A AC Power Cord for WV-BM90/B AC Power Cord for WV-BM90/C AC Power Cord for WV-BM90/G AC Power Cord for WV-BM90/F	M41 M42	YWVAKA0721AN YW-BCG-EM01 YWV7MA0319A4	Hight Voltage Caution Label for WV-BM90/G
			MAIN BOARD		
M1	YWV5BB0063C1	Front Escutcheon for WV-BM90/ABCG	PCB1 (NLA)	YWVKBBM90E1A	Printed Circuit Board Assy
M2	YWV5BC0063C1	Front Escutcheon for WV-BM90/F	IC1	AN78N05	IC
M3	YWV2KA0498D2 YWV6JC0034A4	Front Chassis Power Switch Button	IC2	YWUJPC1379C	IC
M4	YWV7QA1824A4	Sequence Label for WV-BM90/ABCG	Q1	2SC3461-LMCA	Transistor
M5	YWV7QA1857A4	Sequence Label for WV-BM90/F	Q2,3	2SD973-QRS	Transistor
M6	YWV2200DM03	Badge	Q4-7	2SD636-Q	Transistor
M7	YWV6JA0062A4	Button	Q8	2SB641-QR	Transistor
M8	YWV6JA0063A4 YWV5RA0226A4	Button Knob	Q9	2SC2258	Transistor
M9	YFV5LA0003A4	Rubber Foot	Q10	2SA1018A	Transistor
M10	YWV5EA0654A1	Cover	Q11	2SD662-PQR	Transistor
M11	YWV7MA0081A4	Earth Label for WV-BM90/G	Q12	2SA1018A	Transistor
M12	YFV7SA0249A4 YFV7SA0275A4	Caution Label for WV-BM90/ABCG Mis Connect Label for WV-BM90/F	Q13	2SC1567-RS	Transistor
M13	⚠ YWV7QA1855A4 YWV7QA1852A4 YWV7QA1853A4 YWV7QA1854A4 YWV7QA1856A4	Main Label for WV-BM90/A Main Label for WV-BM90/B Main Label for WV-BM90/C Main Label for WV-BM90/G Main Label for WV-BM90/F	Q14	2SD772B	Transistor
M14	YWV7MA0307A4	System Label	Q15	2SD636-Q	Transistor
M15	YFV7MA0099A4	Caution Label	D1	YWRBV604	Diode
M16	YWV411NUB01A	Caution Label for WV-BM90/ABCG	D2	RU1P	Diode
M17	YFV7SA0274A4 YWCS-XEGRB03A	UL Caution Label for WV-BM90/F X-RAY Label for WV-BM90/G	D3	EU02ZV0	Diode
M18	YWV7MA0015A4	Caution Label	D4	EM01Z	Diode
M19	YWV4JA0254A4	Earth Spring	D5,6	EU02ZV0	Diode
M20	YWV2HA0673A4	Shield Parts	D7	RD4.7JT1B2	Diode
M23	YWV2HA0635A3	Shield Parts	D8,9	YWCTU125	Diode
M25	YWSR-6P-4	Cord Clamp	D10	YWPC111	Diode
			D11	RD6.2JT1B2	Diode
			D14	MA185	Diode
			D15	MA165	Diode
			D16,17	EM01Z	Diode
			D18	YUDU06C	Diode
			D19	YWU06CF200	Diode
			D20-23	ERA22-06	Diode
			R1	ERC12ZGM156	Solid Resistor 15M ohms 1/2W
			R2	ERF5TK1R0	Carbon 1 ohms 5W

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R3,4	ERDS2TJ204	Carbon	200K ohms 1/4W	R62	ERDS2TJ330	Carbon	33 ohms 1/4W
R5,6	ERG5SJ393	Metal	39K ohms 5W	R63	ERDS2TJ101	Carbon	100 ohms 1/4W
R7	ERG2SJ390P	Metal	39 ohms 2W	R64	ERG2SJ330P	Metal	33 ohms 2W
R8	ERX3SJ1R0P	Metal	1 ohms 3W	R65	ERDS2TJ820	Carbon	82 ohms 1/4W
R9	ERDS2TJ563	Carbon	56K ohms 1/4W	R66	ERX2SJR56	Metal	0.56 ohms 2W
R10	ERDS2TJ102	Carbon	1K ohms 1/4W	R67	ERDS2TJ270	Carbon	27 ohms 1/4W
R11	ERDS2TJ222	Carbon	2.2K ohms 1/4W	R68	ERDS2TJ474	Carbon	470K ohms 1/4W
R12	ERDS2TJ561	Carbon	560 ohms 1/4W	R69	ERDS2TJ225	Carbon	2.2M ohms 1/4W
R13	ERDS2TJ102	Carbon	1K ohms 1/4W	R70,71	ERDS2TJ102	Carbon	1K ohms 1/4W
R14	ERDS2TJ132	Carbon	1.3K ohms 1/4W	R72	ERDS2TJ824	Carbon	820K ohms 1/4W
R15	ERDS2TJ683	Carbon	68K ohms 1/4W	R73	ERDS2TJ471	Carbon	470 ohms 1/4W
R16	ERDS2TJ822	Carbon	8.2K ohms 1/4W	R75	ERDS2TJ100	Carbon	10 ohms 1/4W
R17	ERDS2TJ101	Carbon	100 ohms 1/4W	R77	ERX1SJ3R3P	Metal	3.3 ohms 2W
R18,19	ERDS2TJ563	Carbon	56K ohms 1/4W	R78	ERDS2TJ271	Carbon	270 ohms 1/4W
R20	ERDS2TJ102	Carbon	1K ohms 1/4W	R79	ERG1SJ101	Metal	100 ohms 1W
R21	ERDS2TJ273	Carbon	27K ohms 1/4W	VR1	YWH1022A330	Variable Resistor	33 ohms
R22	ERDS2TJ103	Carbon	10K ohms 1/4W	VR2	YWH0651A1M	Variable Resistor	1M ohms
R23	ERDS2TJ431	Carbon	430 ohms 1/4W	VR3,4	EVND1AA00BQ2	Variable Resistor	470 ohms
R24	ERDS2TJ121	Carbon	120 ohms 1/4W	VR5	EVND1AA00BQ3	Variable Resistor	4.7K ohms
R25	ERDS2TJ221	Carbon	220 ohms 1/4W	VR6	EVMJ6U10KB26	Variable Resistor	2M ohms
R26,27	ERDS2TJ471	Carbon	470 ohms 1/4W	C1,2	ECQU2A224KN	Plastic	0.22 μ F 200V
R28	ERDS2TJ823	Carbon	82K ohms 1/4W	C3,5	ECKDNS102MBX	Ceramic	1000 pF
R29	ERDS2TJ134	Carbon	130K ohms 1/4W	C7	ECKDNS222MEX	Ceramic	2200 pF
R30	ERDS2TJ472	Carbon	4.7K ohms 1/4W	C11	ECES2GG221U	Electrolytic	220 μ F
R31	ERG3SJ472P	Metal	4.2K ohms 3W	C12	YWUPC2W4R7M	Electrolytic	4.7 μ F
R32	ERDS2TJ181	Carbon	180 ohms 1/4W	C13	ECKD3A221KBN	Ceramic	220 pF 300V
R33	ERDS2TJ221	Carbon	220 ohms 1/4W	C14	ECQV1H473JZ	Plastic	0.047 μ F 50V (TF)
R34	ERDS2TJ822	Carbon	8.2K ohms 1/4W	C15	ECQP1H222JZ3	Plastic	2200 pF 50V
R35	ERD2FCG101P	Fuse Resistor	100 ohms 2W	C16	ECEA1AF470	Electrolytic	47 μ F 10V
R36	ERDS2TJ104	Carbon	100K ohms 1/4W	C17	ECEA1CU220	Electrolytic	22 μ F 16V
R37	ERDS2TJ333	Carbon	33K ohms 1/4W	C18	ECEA1CU220	Electrolytic	22 μ F 16V
R38	ERDS2TJ224	Carbon	220K ohms 1/4W	C19	ECEA1CU100	Electrolytic	10 μ F 16V
R39	ERDS2TJ103	Carbon	10K ohms 1/4W	C20,21	ECEA1VF221	Electrolytic	220 μ F 35V
R40	ERDS2TJ104	Carbon	100K ohms 1/4W	C22,23	ECEA1EF221	Electrolytic	220 μ F 25V
R41	ERDS2TJ333	Carbon	33K ohms 1/4W	C24	ECQV1H104JZ	Plastic	0.1 μ F 50V (TF)
R42	ERDS2TJ822	Carbon	8.2K ohms 1/4W	C25	ECEA1AU221	Electrolytic	220 μ F 10V
R43	ERDS1TJ563	Carbon	56K ohms 1/2W	C27	ECEA1CU100	Electrolytic	10 μ F 16V
R44	ERDS2TJ271	Carbon	270 ohms 1/4W	C28	ECEA1HU2R2	Electrolytic	2.2 μ F 50V
R45	ERX1SJ2R7P	Metal	2.7 ohms 1W	C29-31	ECEA1AU470	Electrolytic	47 μ F 10V
R46	ERDS2TJ153	Carbon	15K ohms 1/4W	C32	ECCF1H101JC	Ceramic	100 pF 50C
R47	ERDS2TJ183	Carbon	18K ohms 1/4W	C33	ECQP1H331JZ	Plastic	330 pF 50V
R48	ERDS2TJ153	Carbon	15K ohms 1/4W	C34	ECEA1CS5221	Electrolytic	220 μ F 16V
R49	ERDS2TJ103	Carbon	10K ohms 1/4W	C35	ECEA1AU470	Electrolytic	47 μ F 10V
R50	ERDS2TJ123	Carbon	12K ohms 1/4W	C36	ECQP1H391JZ	Plastic	390 pF 50V
R51	ERDS2TJ333	Carbon	33K ohms 1/4W	C37	ECEA1AU471	Electrolytic	470 μ F 10V
R52	ERDS2TJ330	Carbon	33 ohms 1/4W	C38	ECEA2AU330	Electrolytic	33 μ F 100V
R53	ERDS2TJ153	Carbon	15K ohms 1/4W	C39	ECQE1224JF	Plastic	0.22 μ F 100V
R54	ERDS2TJ123	Carbon	12K ohms 1/4W	C40	ECQE2103JF	Plastic	0.01 μ F 200V
R55	ERDS2TJ153	Carbon	15K ohms 1/4W	C41	ECCD2H390J	Ceramic	39 pF 500V
R56	ERDS2TJ123	Carbon	12K ohms 1/4W	C42	ECQV1H823JZ	Plastic	0.082 μ F 50V
R57	ERDS2TJ683	Carbon	68K ohms 1/4W	C43	ECEA1AU471	Electrolytic	470 μ F 10V
R58	ERDS2TJ101	Carbon	100 ohms 1/4W	C44	ECQB1H472JZ	Plastic	4700 pF 50V
R59	ERDS2TJ683	Carbon	68K ohms 1/4W	C45	ECSF1VZ105	Tantalum	1 μ F 35V
R60	ERDS2TJ122	Carbon	1.2K ohms 1/4W	C46	ECEA1CS102	Electrolytic	1000 μ F 16V
R61	ERDS2TJ431	Carbon	430 ohms 1/4W	C47	ECEA1CU101	Electrolytic	100 μ F 16V

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION
C48	ECQM1H333KZ	Plastic	0.033 μ F 50V	M21	YWV2HA0695A4	Shield Parts
C49	ECEA1CU100	Electrolytic	10 μ F 16V	M22	YWV2PA0335A4	Insulator
C50	ECQB1H152JZ	Plastic	1500 pF 50V	M31	YWV2HA0636A3	Shield Case
C51	ECEA1HU3R3	Electrolytic	3.3 μ F 50V	M32	YWV7DA0224A3	Heat Sink A
C52	ECQV1H473JZ	Plastic	0.047 μ F 50V (TF)	M33	YWV7DA0225A3	Heat Sink B
C53	ECQM1H333KZ	Plastic	0.033 μ F 50V	M34	YWV7DA0228A4	Heat Sink C
C54	ECEA1HU2R2	Electrolytic	2.2 μ F 50V	M35	YWV7MA0329A4	Fuse Label
C55	ECQB1H472JZ	Plastic	4700 pF 50V	VOLUME BOARD		
C56	ECQM1H563JZ	Plastic	0.056 μ F 50V (TF)			
C57	ECQB1H103JZ	Plastic	0.01 μ F 50V	PCB2 (NLA)	YWVKCBM90E1A	Printed Circuit Board Assy
C58	ECEA1HS010	Electrolytic	1 μ F 50V	D1,2	MA165	Diode
C59	ECQB1H562JZ	Plastic	5600 pF 50V	R1	ERDS2TJ820	Carbon 82 ohms 1/4W
C60	ECEA1CU220	Electrolytic	22 μ F 16V	R3	ERDS2TJ622	Carbon 6.2K ohms 1/4W
C61	ECKF1H102KB	Ceramic	1000 pF 50V	R4	ERDS2TJ155	Carbon 1.5M ohms 1/4W
C62	ECQB1H103JZ	Plastic	0.01 μ F 50V	VR7	YWK11K113B55	Variable Resistor 500K ohms
C63	ECEA1CGE102	Electrolytic	1000 μ F 16V	VR8	YWK11K113B13	Variable Resistor 1K ohms
C64	ECQF4393JZ	Plastic	0.039 μ F 450V	VR9	YWK11K113A55	Variable Resistor 500K ohms
C65	ECQF4473JZ	Plastic	0.047 μ F 450V	C1	ECQP1H222JZ	Plastic 2200 pF 50V
C66	ECEA1EW150Z	Electrolytic	15 μ F 25V	SW2,3	YWSPEA12F	Push Switch
C67	ECQB1H103JZ	Plastic	0.01 μ F 50V	E3-6	YW32BM7R5	Test-pin
C68	ECEA1CF471	Electrolytic	470 μ F 16V	SWITCH BOARD		
C69	ECEA2AU010B	Electrolytic	1 μ F 100V			
C70	ECEA2AU220	Electrolytic	22 μ F 200V	PCB3 (NLA)	YWVKDBM90E1A	Printed Circuit Board Assy
C71	ECQM4103KZ	Plastic	0.01 μ F 400V	D1-9	MA165	Diode
C72	ECQM6333KZ	Plastic	0.033 μ F 600V	SW4-8	YWAB12AB130G	Push Switch
C73	ECEA2CU2R2B	Electrolytic	2.2 μ F 160V	SW9-12	ESB64801	Push Switch
C74	ECEA2WU010	Electrolytic	1 μ F 450V	CONTROL BOARD		
C75	ECEB1CU102	Electrolytic	1000 μ F 16V			
C76	ECCD2H120JCS	Ceramic	12 pF 500V	PCB4 (NLA)	YWVKBBM90E2A	Printed Circuit Board Assy
C77	ECQB1H272JZ	Plastic	2700 pF 50V		YWVKBBM90F2A	Printed Circuit Board Assy
L1 Δ	YFELF18D650P	Coil				for WV-BM90E
L2,3	ELC12E009	Coil	56 μ H	IC1	YWNJU74HC04M	IC
L5	ELEPE151KA	Coil	150 μ H	IC2	YWNJM78L09A	IC
L6	ELEPE100KA	Coil	10 μ H	IC3	YWTC4S69F	IC
L7	ELH5L415	Coil	5 μ H	IC4	NJM2903M	IC
L8	YWTLH80707T1	Coil	10 μ H	IC5	YFLQV3M2760G	IC
T1 Δ	YWCNT139E03A	Power Transformer		IC6	MN1554CCL1	IC
T2	YWLA7701	Low Freq Transformer		IC7	M51951ASL	IC
T3 Δ	ETF30L10AY	Flyback Transformer		Q1-4	2SB709-QRS	Transistor
PL1,2	YWSA140D	Neon Lamp				
F1 Δ	XBA2C20ET0A	Current Fuse	2A 250V			
F2,3 Δ	SSFR3.5AF003	Current Fuse	3.5A			
F4 Δ	SSFR016AF003	Current Fuse	0.16A			
F5 Δ	SSFR1.6AF003	Current Fuse	1.6A			
CN1	521902A	Connector				
CN2	YWB2BXHA	2-pin Connector				
CN3	EMCS0250Z	2-pin Connector				
CN4	YWXXK2A1041	10-pin Connector				
CN5	YWXXK2A1141	11-pin Connector				
E11,12	YWSN5053	Fuse Holder				
E13	YWVEJA0004A4	Insulator				
E14,15	YW32BM7R5	Test-pin				
E16	YWTM028	Test-pin				
E20	YWVCP1230L23	Insulator				

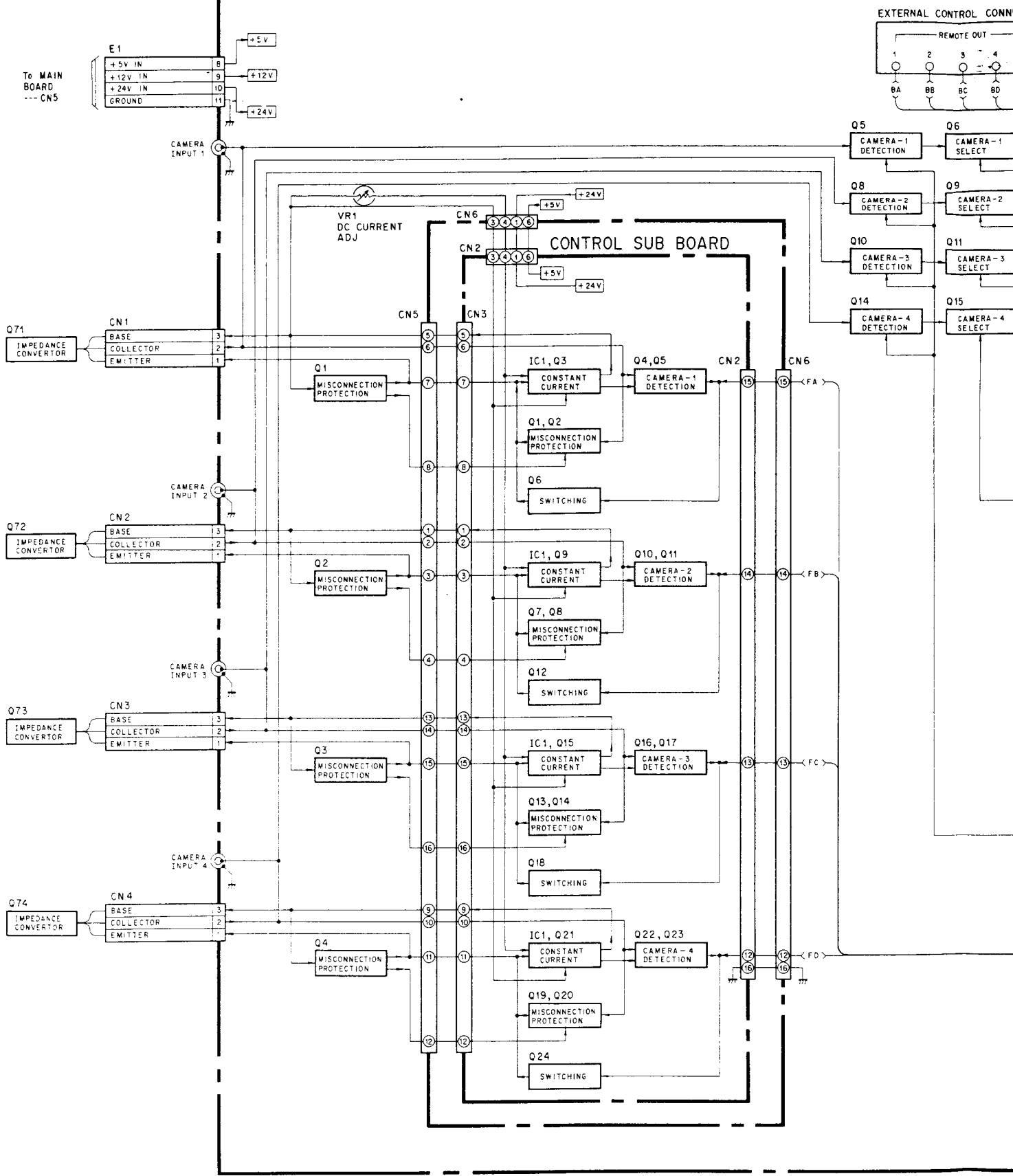
REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
Q5	2SB710-QRS	Transistor	R3	YF2116122JT	Carbon 1.2K ohms 1/16W
Q6,7	XN4601	Transistor	R4	YF2116302GT	Carbon 3K ohms 1/16W
Q8	2SB710-QRS	Transistor	R5	YF2116362JT	Carbon 3.6K ohms 1/16W
Q9	XN4601	Transistor	R6,7	ER050CKF10R0	Metal 10 ohms 1/2W
Q10	2SB710-QRS	Transistor	R8	YF2116223JT	Carbon 22K ohms 1/16W
Q11	XN4601	Transistor	R9	YF2116563JT	Carbon 56K ohms 1/16W
Q12	2SD601-RS	Transistor	R10	YF2116153JT	Carbon 15K ohms 1/16W
Q13	2SB709-QRS	Transistor	R11,12	ER050CKF10R0	Metal 10 ohms 1/2W
Q14	2SB710-QRS	Transistor	R13	YF2116223JT	Carbon 22K ohms 1/16W
Q15	XN4601	Transistor	R14	YF2116563JT	Carbon 56K ohms 1/16W
Q19	2SB709-QRS	Transistor	R15	YF2116153JT	Carbon 15K ohms 1/16W
Q20	XN4501	Transistor	R16,17	ER050CKF10R0	Metal 10 ohms 1/2W
Q21	XN4401	Transistor	R18	YF2116223JT	Carbon 22K ohms 1/16W
Q22,23	2SD601-RS	Transistor	R19	YF2116563JT	Carbon 56K ohms 1/16W
Q24	2SB709-QRS	Transistor	R20	YF2116153JT	Carbon 15K ohms 1/16W
Q26	2SD601-RS	Transistor	R21,22	ER050CKF10R0	Metal 10 ohms 1/2W
Q27,28	2SB709-QRS	Transistor	R23	YF2116223JT	Carbon 22K ohms 1/16W
Q29-31	XN4601	Transistor	R24	YF2116563JT	Carbon 56K ohms 1/16W
Q32	2SB709-QRS	Transistor	R25	YF2116153JT	Carbon 15K ohms 1/16W
Q33-38	2SD601-RS	Transistor	R26	ERDS2TJ820	Carbon 82 ohms 1/4W
Q39-44	UN2217	Transistor	R27	YF2116220JT	Carbon 22 ohms 1/16W
Q45-49	UN2117	Transistor	R28	YF2116562JT	Carbon 5.6K ohms 1/16W
Q50	2SD601-RS	Transistor	R29	YWR1220P393D	Metal 39K ohms
Q51	2SB709-QRS	Transistor	R30	YWR1220P103D	Metal 10K ohms
Q52	2SD601-RS	Transistor	R31	YF2116472GT	Carbon 4.7K ohms 1/16W
Q53,54	2SB709-QRS	Transistor	R32	YWR1220P393D	Metal 39K ohms
Q55	2SD601-RS	Transistor	R33	YWR1220P103D	Metal 10K ohms
Q56	2SB709-QRS	Transistor	R34	YF2116472GT	Carbon 4.7K ohms 1/16W
Q57	2SD601-RS	Transistor	R35	ERDS2TJ820	Carbon 82 ohms 1/4W
Q58	2SB709-QRS	Transistor	R36	YF2116220JT	Carbon 22 ohms 1/16W
Q59	2SD601-RS	Transistor	R37	YF2116562JT	Carbon 5.6K ohms 1/16W
Q60	2SB709-QRS	Transistor	R38	YWR1220P393D	Metal 39K ohms
Q61	2SD601-RS	Transistor	R39	YWR1220P103D	Metal 10K ohms
Q62	2SB709-QRS	Transistor	R40	YF2116472GT	Carbon 4.7K ohms 1/16W
Q63	2SD601-RS	Transistor	R41	ERDS2TJ820	Carbon 82 ohms 1/4W
Q64	2SD602-QRS	Transistor	R42	YF2116220JT	Carbon 22 ohms 1/16W
Q65	2SB709-QRS	Transistor	R43	YF2116562JT	Carbon 5.6K ohms 1/16W
Q66	UN2116QRS-TW	Transistor	R44	YWR1220P393D	Metal 39K ohms
Q67	2SD601-RS	Transistor	R45	YWR1220P103D	Metal 10K ohms
Q68	XN4501	Transistor	R46	YF2116472GT	Carbon 4.7K ohms 1/16W
Q71-74	2SA748-QR	Transistor	R47	YF2116103JT	Carbon 10K ohms 1/16W
D1	RD4.7JT1B2	Diode	R48	YF2116392JT	Carbon 3.9K ohms 1/16W
D2	RD5.1JB2	Diode	R49	YF2116222GT	Carbon 2.2K ohms 1/16W
D3-10	MA151K	Diode	R50	YF2116332JT	Carbon 3.3K ohms 1/16W
D15	MA153	Diode	R51	YF2116102GT	Carbon 1K ohms 1/16W
D16	MA124	Diode	R52	ERDS2TJ820	Carbon 82 ohms 1/4W
D17-19	MA151K	Diode	R53	YF2116220JT	Carbon 22 ohms 1/16W
D20-32	MA153	Diode	R54	YF2116562JT	Carbon 5.6K ohms 1/16W
D33	MA151K	Diode	R55	YWR1220P393D	Metal 39K ohms
VS1-5	ERZC05DK220	Znr	R56	YWR1220P103D	Metal 10K ohms
R1	YF2116222GT	Carbon 2.2K ohms 1/16W	R57	YF2116472GT	Carbon 4.7K ohms 1/16W
R2	YF2116103JT	Carbon 10K ohms 1/16W	R58	ERDS2TJ102	Carbon 1K ohms 1/4W
			R68	YF2116333GT	Carbon 33K ohms 1/16W
			R69	YF2116104JT	Carbon 100K ohms 1/16W
			R70	YF2116101JT	Carbon 100 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R71	YF2116472GT	Carbon	4.7K ohms 1/16W	R145,146	YF2116103JT	Carbon	10K ohms 1/16W
R72	YF2116221JT	Carbon	220 ohms 1/16W	R147-153	YF2116102GT	Carbon	1K ohms 1/16W
R73-75	YF2116472GT	Carbon	4.7K ohms 1/16W	R154-158	YF2116391JT	Carbon	390 ohms 1/16W
R76	YWR1220P302D	Metal	3K ohms	R159	YF2116562JT	Carbon	5.6K ohms 1/16W
R77	YWR1220P301D	Metal	300 ohms	R160	YF2116563JT	Carbon	56K ohms 1/16W
R78	YWR1220P182D	Metal	1.8K ohms	R161	YF2116223JT	Carbon	22K ohms 1/16W
R79	YF2116102GT	Carbon	1K ohms 1/16W	R162	YF2116562JT	Carbon	5.6K ohms 1/16W
R80	YWR1220P332D	Metal	3.3K ohms	R163	YF2116563JT	Carbon	56K ohms 1/16W
R82	YFR1220P122D	Metal	1.2K ohms	R164	YF2116223JT	Carbon	22K ohms 1/16W
R84	YF2116222GT	Carbon	2.2K ohms 1/16W	R165	YF2116473GT	Carbon	47K ohms 1/16W
R85	YF2116102GT	Carbon	1K ohms 1/16W	R166	YF2116393GT	Carbon	39K ohms 1/16W
R86	YF2116563JT	Carbon	56K ohms 1/16W	R167	YF2116562JT	Carbon	5.6K ohms 1/16W
R87	YF2116472GT	Carbon	4.7K ohms 1/16W	R168	YF2116563JT	Carbon	56K ohms 1/16W
R88	YF2116332JT	Carbon	3.3K ohms 1/16W	R169	YF2116473GT	Carbon	47K ohms 1/16W
R89-91	YF2116103JT	Carbon	10K ohms 1/16W	R170	YF2116393GT	Carbon	39K ohms 1/16W
R92	YF2116750JT	Carbon	75 ohms 1/16W	R171	YF2116562JT	Carbon	5.6K ohms 1/16W
R93	YF2116473GT	Carbon	47K ohms 1/16W	R172	YF2116563JT	Carbon	56K ohms 1/16W
R94	YF2116153JT	Carbon	15K ohms 1/16W	R173	YF2116473GT	Carbon	47K ohms 1/16W
R95	YF2116102GT	Carbon	1K ohms 1/16W	R174	YF2116393GT	Carbon	39K ohms 1/16W
R96	YF2116561JT	Carbon	560 ohms 1/16W	R175	YF2116562JT	Carbon	5.6K ohms 1/16W
R97	YF2116681JT	Carbon	680 ohms 1/16W	R176	YF2116563JT	Carbon	56K ohms 1/16W
R98	YF2116102GT	Carbon	1K ohms 1/16W	R177	YF2116473GT	Carbon	47K ohms 1/16W
R99	YF2116273GT	Carbon	27K ohms 1/16W	R178	YF2116393GT	Carbon	39K ohms 1/16W
R100	YF2116122JT	Carbon	1.2K ohms 1/16W	R179	YF2116562JT	Carbon	5.6K ohms 1/16W
R101	ERDS2TJ331	Carbon	330 ohms 1/4W	R180	YF2116563JT	Carbon	56K ohms 1/16W
R102	YF2116680JT	Carbon	68 ohms 1/16W	R181	YF2116473GT	Carbon	47K ohms 1/16W
R103-109	YF2116101JT	Carbon	100 ohms 1/16W	R182	YF2116393GT	Carbon	39K ohms 1/16W
R110-113	YF2116102GT	Carbon	1K ohms 1/16W	R183	YF2116562JT	Carbon	5.6K ohms 1/16W
R114	YF2116101JT	Carbon	100 ohms 1/16W	R184	YF2116563JT	Carbon	56K ohms 1/16W
R115,116	YF2116223JT	Carbon	22K ohms 1/16W	R185	YF2116223JT	Carbon	22K ohms 1/16W
R117	YF2116101JT	Carbon	100 ohms 1/16W	R186	YF2116273GT	Carbon	27K ohms 1/16W
R118	YF2116332JT	Carbon	3.3K ohms 1/16W	R187	YF2116153JT	Carbon	15K ohms 1/16W
R119,120	YF2116103JT	Carbon	10K ohms 1/16W	R188	YF2116220JT	Carbon	22 ohms 1/16W
R121	YF2116104JT	Carbon	100K ohms 1/16W	R189	YF2116223JT	Carbon	22K ohms 1/16W
R122	YF2116562JT	Carbon	5.6K ohms 1/16W	R192-194	YF2116223JT	Carbon	22K ohms 1/16W
R123	YF2116223JT	Carbon	22K ohms 1/16W	R195-199	YF2116102GT	Carbon	1K ohms 1/16W
R124	YF2116333GT	Carbon	33K ohms 1/16W	R200	YF2116114JT	Carbon	51K ohms 1/16W*
R125	YF2116103JT	Carbon	10K ohms 1/16W	R201	YWR1220P563D	Metal	56K ohms
R126	YF2116222GT	Carbon	2.2K ohms 1/16W	R202	YWR1220P273D	Metal	27K ohms
R127	YF2116223JT	Carbon	22K ohms 1/16W	R203	R1220P133D	Metal	13K ohms
R128	YF2116563JT	Carbon	56K ohms 1/16W	R204	YWR1220P622D	Metal	6.2K ohms
R129	YF2116562JT	Carbon	5.6K ohms 1/16W	R205-212	YF2116220JT	Carbon	22 ohms 1/16W
R130	YF2116223JT	Carbon	22K ohms 1/16W	R213	YF2116472GT	Carbon	4.7K ohms 1/16W
R131	YF2116563JT	Carbon	56K ohms 1/16W	R214	YF2116222GT	Carbon	2.2K ohms 1/16W
R132	YF2116562JT	Carbon	5.6K ohms 1/16W	R215	YF2116473GT	Carbon	47K ohms 1/16W
R133	YF2116223JT	Carbon	22K ohms 1/16W	R216	YF2116223JT	Carbon	22K ohms 1/16W
R134	YF2116563JT	Carbon	56K ohms 1/16W	R217	YF2116102GT	Carbon	1K ohms 1/16W
R135	YF2116562JT	Carbon	5.6K ohms 1/16W	R218	YF2116103JT	Carbon	10K ohms 1/16W
R136	YF2116223JT	Carbon	22K ohms 1/16W	R220,221	YF2116104JT	Carbon	100K ohms 1/16W
R137	YF2116563JT	Carbon	56K ohms 1/16W	R222	YF2116103JT	Carbon	10K ohms 1/16W
R138	YF2116562JT	Carbon	5.6K ohms 1/16W	R223	YF2116102GT	Carbon	1K ohms 1/16W
R139	YF2116223JT	Carbon	22K ohms 1/16W	R225	YF2116224JT	Carbon	220K ohms 1/16W
R140	YF2116562JT	Carbon	5.6K ohms 1/16W	R226	YF2116104JT	Carbon	100K ohms 1/16W
R141-143	YF2116102GT	Carbon	1K ohms 1/16W	R227,228	ERDS2TJ100	Carbon	10 ohms 1/4W
R144	YF2116224JT	Carbon	220K ohms 1/16W	R230	YF2116122JT	Carbon	1.2K ohms 1/16W

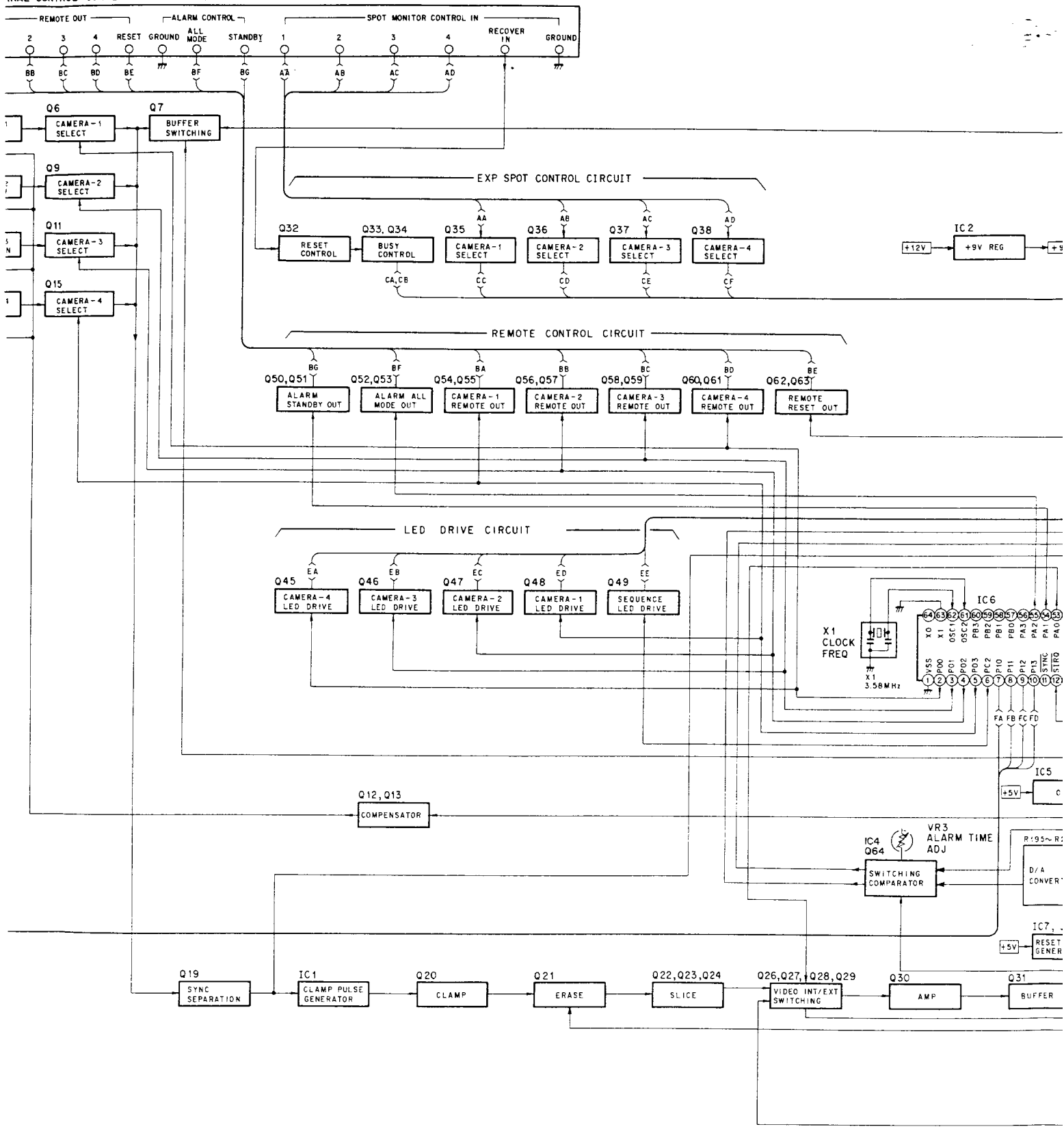
REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R235	ERDS2TJ472	Carbon 4.7K ohms 1/4W	C74	YF400222XKT	Ceramic 2200 pF
R236	ERDS2TJ184	Carbon 180K ohms 1/4W	C75	ECST1AY225ZR	Tantalum 2.2 μF 10V
VR1	EVND4AA00BQ2	Variable Resistor 470 ohms	C76	YW426105FZT	Ceramic 1 μF
VR3	EVUF2AE20B24	Variable Resistor 20K ohms	C77	YF400222XKT	Ceramic 2200 pF
VR11	YWK09K113B53	Variable Resistor 5K ohms	C78	ECEA0JS101	Electrolytic 100 μF 6.3V (SU)
C1	ECEA1VGE221	Electrolytic 220 μF 35V	C80	ECEA10V220T	Electrolytic 220 μF 10V
C2	ECEA1VU470	Electrolytic 47 μF 35V	C81	ECKF1H221KB	Ceramic 220 pF 50V
C3-6	YF426104XKS	Ceramic 0.1 μF	C82	YF400221CHJT	Ceramic 220 pF
C7	ECEA1EU471	Electrolytic 470 μF 25V	C83	ECEA0JU470	Electrolytic 47 μF 6.3V
C8	ECEA0JS221	Electrolytic 220 μF 6.3V	C84-86	YF400221CHJT	Ceramic 220 pF
C9	ECEA0JU470	Electrolytic 47 μF 6.3V	C87	EXFP6331MDW	Ceramic 330 pF
C10	ECEA1EU471	Electrolytic 470 μF 25V	C88	ECEA0JU470	Electrolytic 47 μF 6.3V
C11	ECEA0JS221	Electrolytic 220 μF 6.3V	C89	ECEA0JU222	Electrolytic 2200 μF 6.3V
C12	ECEA1EU471	Electrolytic 470 μF 25V	C90,91	YF400103XKT	Ceramic 0.01 μF
C13	ECEA0JS221	Electrolytic 220 μF 6.3V	C92,93	YF426104XKS	Ceramic 0.1 μF
C14	ECEA0JS101	Electrolytic 100 μF 6.3V (SU)	C94	YF400103XKT	Ceramic 0.01 μF
C15	YF400181CHJT	Ceramic 180 pF	L1	YFF3216E8R2K	Coil 8.2 μH
C16	ECEA1EU471	Electrolytic 470 μF 25V	L2	EL05518R2K	Coil 8.2 μH
C17	ECEA0JS221	Electrolytic 220 μF 6.3V	L3	YFF3216E8R2K	Coil 8.2 μH
C18	ECEA0JU101	Electrolytic 100 μF 6.3V	L5	YWF3216E100K	Coil 10 μF
C19	ECEA1CU470	Electrolytic 47 μF 16V	SW1-3	YFSSU012L9N	Slide Switch
C22	ECEA1HKNR22	Electrolytic 0.22 μF 50V	X1	EF0-FC3584A3	Crystal Oscillator
C23,24	YF400221CHJT	Ceramic 220 pF	CN5,6	YWV551316APB	16-pin Connector
C25	YF426104XKS	Ceramic 0.1 μF	J147-158	YF21160R00T	Jumper Resistor
C26	400131CHJT	Ceramic 130 pF	J160-171	YF21160R00T	Jumper Resistor
C27	ECEA0JU470	Electrolytic 47 μF 6.3V(SU)	J173-186	YF21160R00T	Jumper Resistor
C28	ECEA1CU100	Electrolytic 10 μF 16V	J188-240	YF21160R00T	Jumper Resistor
C29	ECEA1AU470	Electrolytic 47 μF 10V	J242,243	YF21160R00T	Jumper Resistor
C30	ECEA0JU470	Electrolytic 47 μF 6.3V(SU)	J245,246	YF21160R00T	Jumper Resistor
C31	YF400330CHJT	Ceramic 33 pF	J248-251	YF21160R00T	Jumper Resistor
C32	ECEA0JU471	Electrolytic 470 μF 6.3V	J255-257	YF21160R00T	Jumper Resistor
C33	ECEA1EU101	Electrolytic 100 μF 25V	J260	YF21160R00T	Jumper Resistor
C34-40	YF400222XKT	Ceramic 2200 pF	CN1-4	EMCS0350Z	3-pin Connector
C41	ECEA0JS101	Electrolytic 100 μF 6.3V (SU)	M36	YWV7DA0226A3	Heat Sink
C42	ECEA1CKN4R7	Electrolytic 4.7 μF 16V	M37	YWV7DA0227A3	Heat Sink
C43,44	ECEA1CU100	Electrolytic 10 μF 16V	M38	YWAC-256	Insulator
C45	ECEA1CU100	Electrolytic 10 μF 16V	M39	YWCLIP0239	Clip
C46	ECEA1CU100	Electrolytic 10 μF 16V			
C47	ECEA1CU100	Electrolytic 10 μF 16V			
C48	ECEA1CU101	Electrolytic 100 μF 16V			
C49-53	YF400222XKT	Ceramic 2200 pF	CONTROL SUB BOARD		
C55-60	YF400222XKT	Ceramic 2200 pF	PCB5 (NLA)	YWVKCBM90E2A	Printed Circuit Board Assy
C61	ECEA1AU220	Electrolytic 22 μF 10V	IC1	AN6554NS	IC
C62	ECEA1AU220	Electrolytic 22 μF 10V	Q1	2SD601-RS	Transistor
C63	ECST1AY225ZR	Tantalum 2.2 μF 10V	Q2	2SB709-QRS	Transistor
C64	YW426105FZT	Ceramic 1 μF	Q3	2SD601-RS	Transistor
C65	YF400222XKT	Ceramic 2200 pF	Q4	2SB709-QRS	Transistor
C66	ECST1AY225ZR	Tantalum 2.2 μF 10V	Q5-7	2SD601-RS	Transistor
C67	YW426105FZT	Ceramic 1 μF	Q8	2SB709-QRS	Transistor
C68	YF400222XKT	Ceramic 2200 pF	Q9	2SD601-RS	Transistor
C69	ECST1AY225ZR	Tantalum 2.2 μF 10V	Q10	2SB709-QRS	Transistor
C70	YW426105FZT	Ceramic 1 μF	Q11-13	2SD601-RS	Transistor
C71	YF400222XKT	Ceramic 2200 pF			
C72	ECST1AY225ZR	Tantalum 2.2 μF 10V			
C73	YW426105FZT	Ceramic 1 μF			

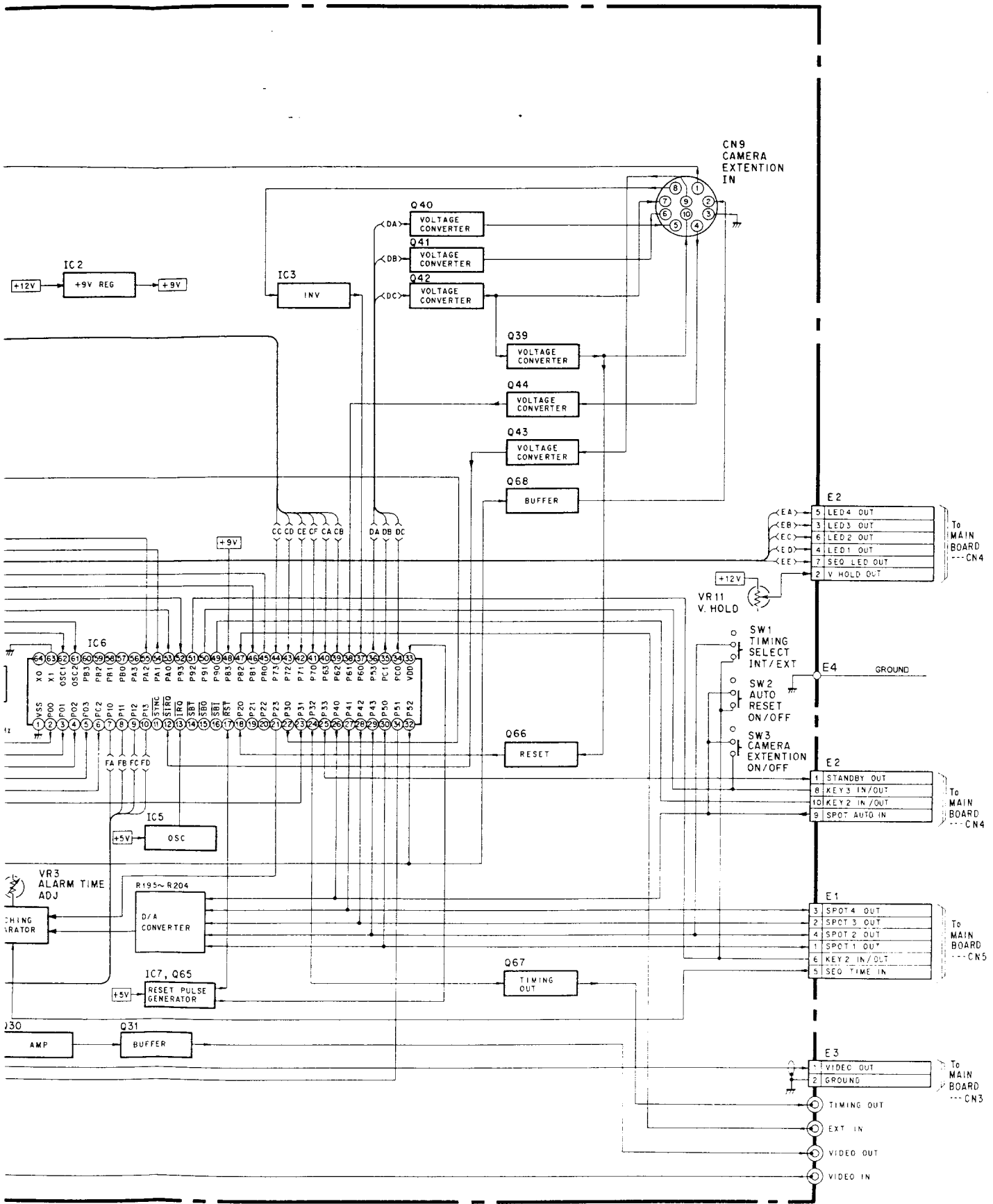
REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
Q14	2SB709-QRS	Transistor	R47	YF2116472GT	Carbon 4.7K ohms 1/16W
Q15	2SD601-RS	Transistor	R48	YF2116823JT	Carbon 82K ohms 1/16W
Q16	2SB709-QRS	Transistor	R49	YF2116103JT	Carbon 10K ohms 1/16W
Q17-19	2SD601-RS	Transistor	R50	YF2116102GT	Carbon 1K ohms 1/16W
Q20	2SB709-QRS	Transistor	M51	YF2116563JT	Carbon 56K ohms 1/16W
Q21	2SD601-RS	Transistor	R52	YF2116823JT	Carbon 82K ohms 1/16W
Q22	2SB709-QRS	Transistor	R53	YF2116223JT	Carbon 22K ohms 1/16W
Q23,24	2SD601-RS	Transistor	R54	YF2116563JT	Carbon 56K ohms 1/16W
D1-4	MA165	Diode	R55	YF2116564JT	Carbon 560K ohms 1/16W
R1	YF2116103JT	Carbon 10K ohms 1/16W	R56	YF2116563JT	Carbon 56K ohms 1/16W
R2	YF2116562JT	Carbon 5.6K ohms 1/16W	C1	ECEA0JS101	Electrolytic 100 μF 6.3V (SU)
R3	YF2116202JT	Carbon 2K ohms 1/16W	C2	YF400103XKT	Ceramic 0.01 μF
R4	YF2116101JT	Carbon 100 ohms 1/16W	C3	YW400473XMT	Ceramic 0.047 μF
R5	YF2116472GT	Carbon 4.7K ohms 1/16W	C4	ECEA0JS221	Electrolytic 220 μF 6.3V
R6	YF2116823JT	Carbon 82K ohms 1/16W	C5	ECEA0JS101	Electrolytic 100 μF 6.3V (SU)
R7	YF2116103JT	Carbon 10K ohms 1/16W	C6	YF400103XKT	Ceramic 0.01 μF
R8	YF2116102GT	Carbon 1K ohms 1/16W	C7	YW400473XMT	Ceramic 0.047 μF
R9	YF2116563JT	Carbon 56K ohms 1/16W	C8	ECEA0JS221	Electrolytic 220 μF 6.3V
R10	YF2116823JT	Carbon 82K ohms 1/16W	C9	ECEA0JU101	Electrolytic 100 μF 6.3V
R11	YF2116223JT	Carbon 22K ohms 1/16W	C10	YF400103XKT	Ceramic 0.01 μF
R12	YF2116563JT	Carbon 56K ohms 1/16W	C11	YW400473XMT	Ceramic 0.047 μF
R13	YF2116564JT	Carbon 560K ohms 1/16W	C12	ECEA0JS221	Electrolytic 220 μF 6.3V
R14	YF2116563JT	Carbon 56K ohms 1/16W	C13	ECEA0JS101	Electrolytic 100 μF 6.3V (SU)
R15	YF2116103JT	Carbon 10K ohms 1/16W	C14	YF400103XKT	Ceramic 0.01 μF
R16	YF2116562JT	Carbon 5.6K ohms 1/16W	C15	YW400473XMT	Ceramic 0.047 μF
R17	YF2116202JT	Carbon 2K ohms 1/16W	C16	ECEA0JS221	Electrolytic 220 μF 6.3V
R18	YF2116101JT	Carbon 100 ohms 1/16W	C54-57	ECEA1VU100	Electrolytic 10 μF 35V
R19	YF2116472GT	Carbon 4.7K ohms 1/16W	CN2,3	YW551216A	6-pin Connector
R20	YF2116823JT	Carbon 82K ohms 1/16W	J51-54	YF21160R00T	Jumper Resistor
R21	YF2116103JT	Carbon 10K ohms 1/16W	J64-71	YF21160R00T	Jumper Resistor
R22	YF2116102GT	Carbon 1K ohms 1/16W	J73-84	YF21160R00T	Jumper Resistor
R23	YF2116563JT	Carbon 56K ohms 1/16W	ACCESSORY PARTS/PACKAGING PARTS		
R24	YF2116823JT	Carbon 82K ohms 1/16W			
R25	YF2116223JT	Carbon 22K ohms 1/16W	M51	YWV8QA1753AN	Operating Instructions
R26	YF2116563JT	Carbon 56K ohms 1/16W	M53	XZB26X40C05	Polyethylene Bag
R27	YF2116564JT	Carbon 560K ohms 1/16W	M54	XZB50X63C05	Polyethylene Bag
R28	YF2116563JT	Carbon 56K ohms 1/16W	M55	YWT20X35C03	Polyethylene Bag
R29	YF2116103JT	Carbon 10K ohms 1/16W	M56	YWV9CA1270AN	Packaging for WV-BM90/ABCG
R30	YF2116562JT	Carbon 5.6K ohms 1/16W		YWV9CA1271AN	Packaging for WV-BM90/F
R31	YF2116202JT	Carbon 2K ohms 1/16W			
R32	YF2116101JT	Carbon 100 ohms 1/16W			
R33	YF2116472GT	Carbon 4.7K ohms 1/16W			
R34	YF2116823JT	Carbon 82K ohms 1/16W			
R35	YF2116103JT	Carbon 10K ohms 1/16W			
R36	YF2116102GT	Carbon 1K ohms 1/16W			
R37	YF2116563JT	Carbon 56K ohms 1/16W			
R38	YF2116823JT	Carbon 82K ohms 1/16W			
R39	YF2116223JT	Carbon 22K ohms 1/16W			
R40	YF2116563JT	Carbon 56K ohms 1/16W			
R41	YF2116564JT	Carbon 560K ohms 1/16W			
R42	YF2116563JT	Carbon 56K ohms 1/16W			
R43	YF2116103JT	Carbon 10K ohms 1/16W			
R44	YF2116562JT	Carbon 5.6K ohms 1/16W			
R45	YF2116202JT	Carbon 2K ohms 1/16W			
R46	YF2116101JT	Carbon 100 ohms 1/16W			

CONTROL BOARD

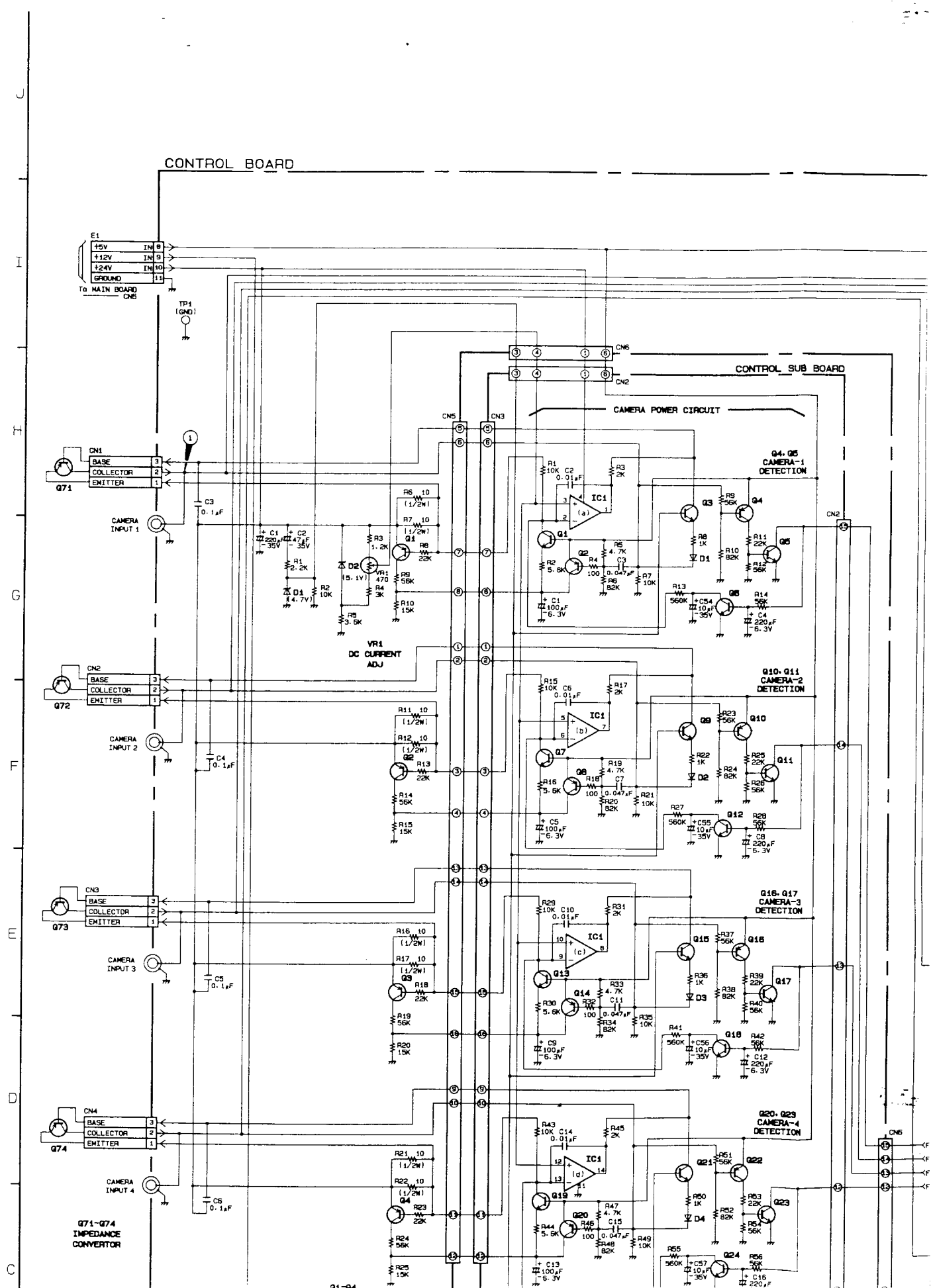


ANAL CONTROL CONNECTION TERMINAL



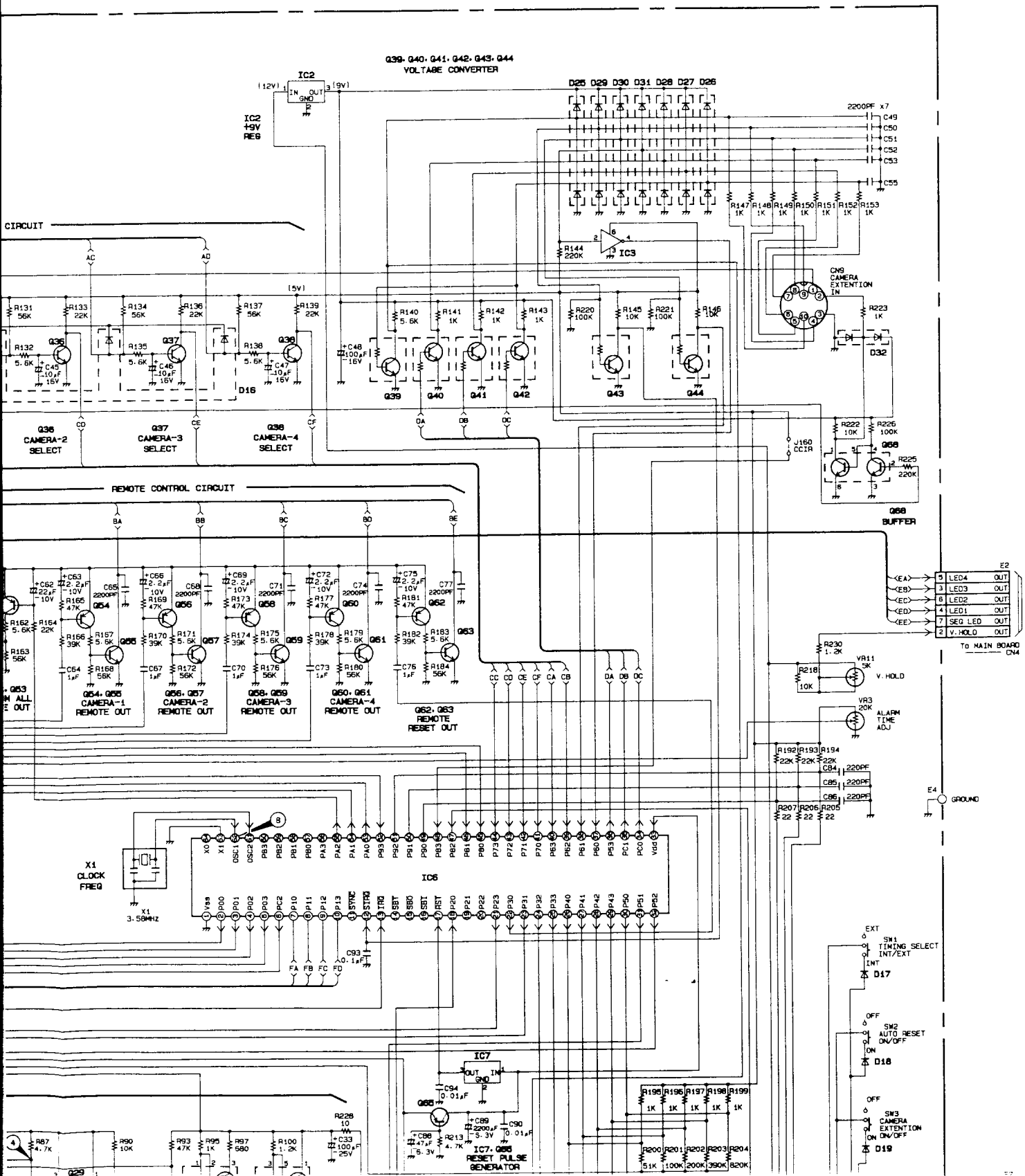


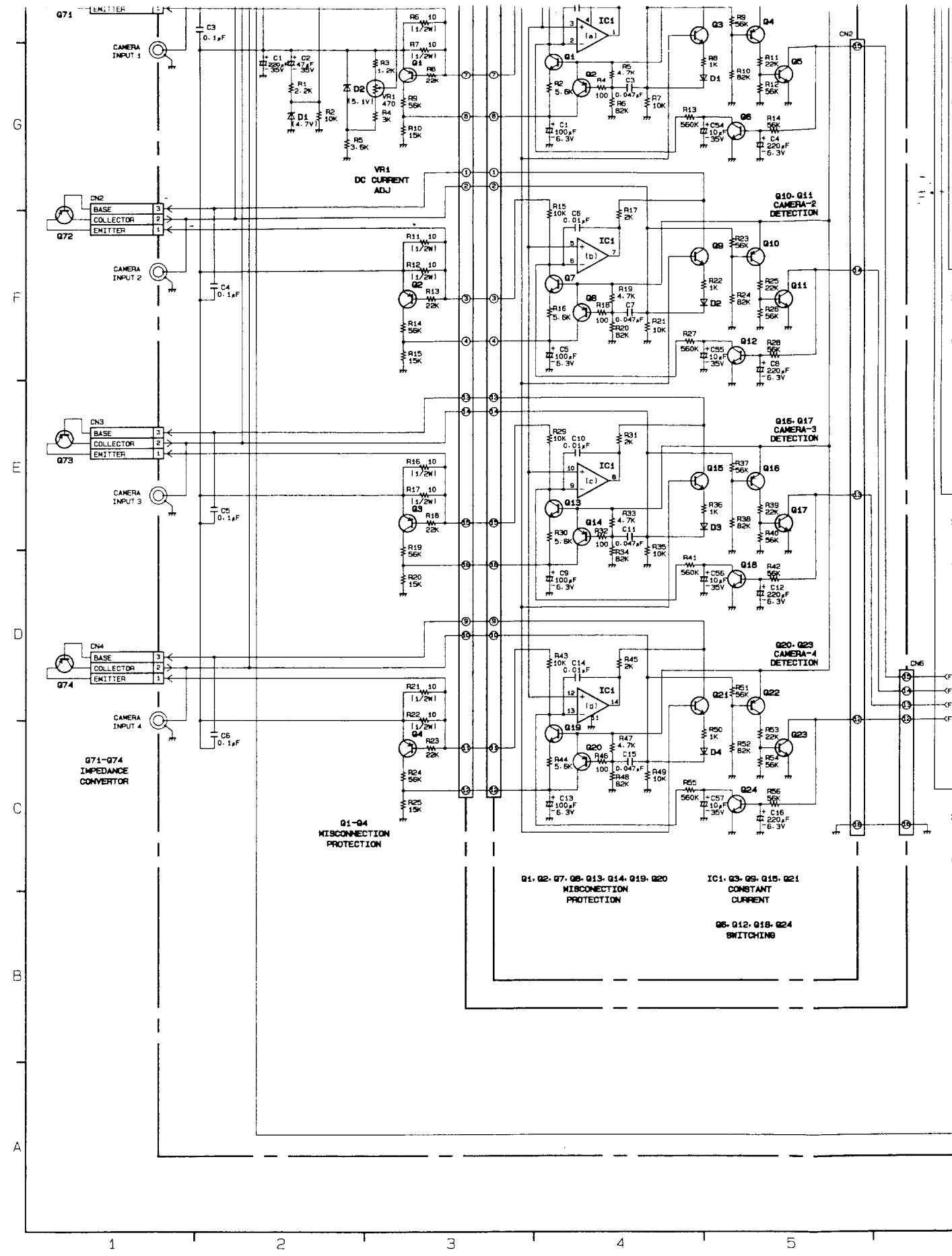
CONTROL BOARD

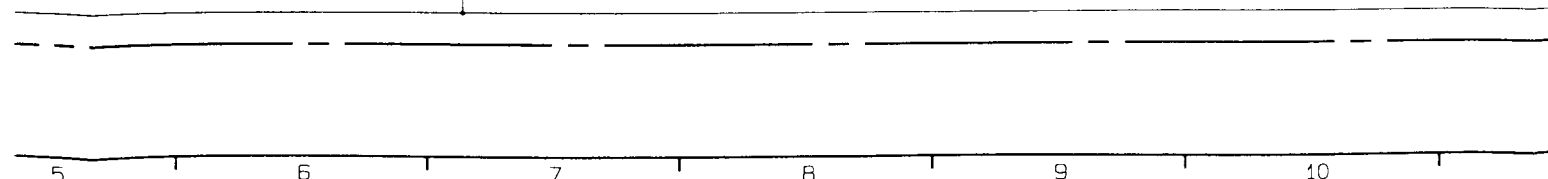
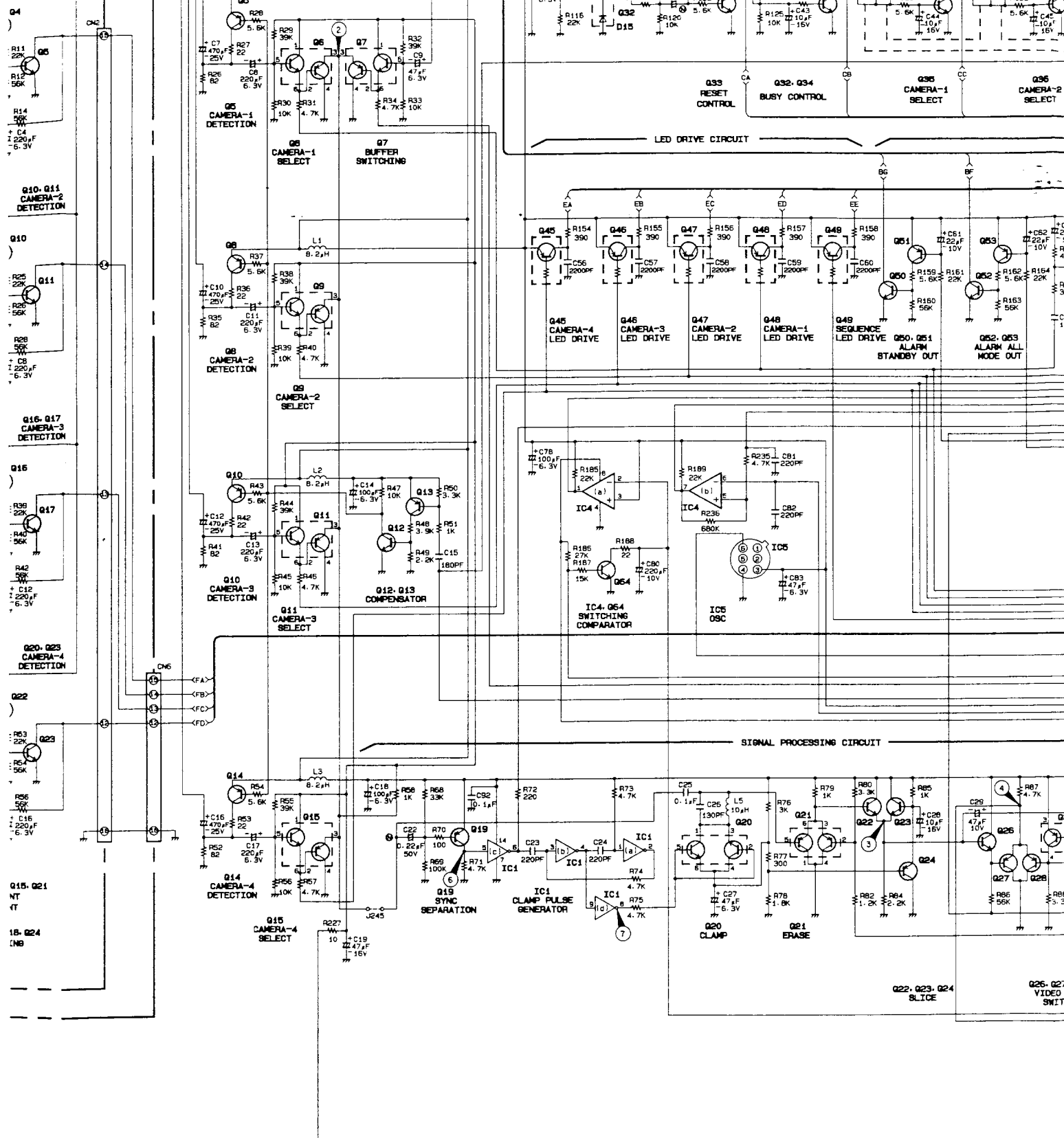


B BOARD

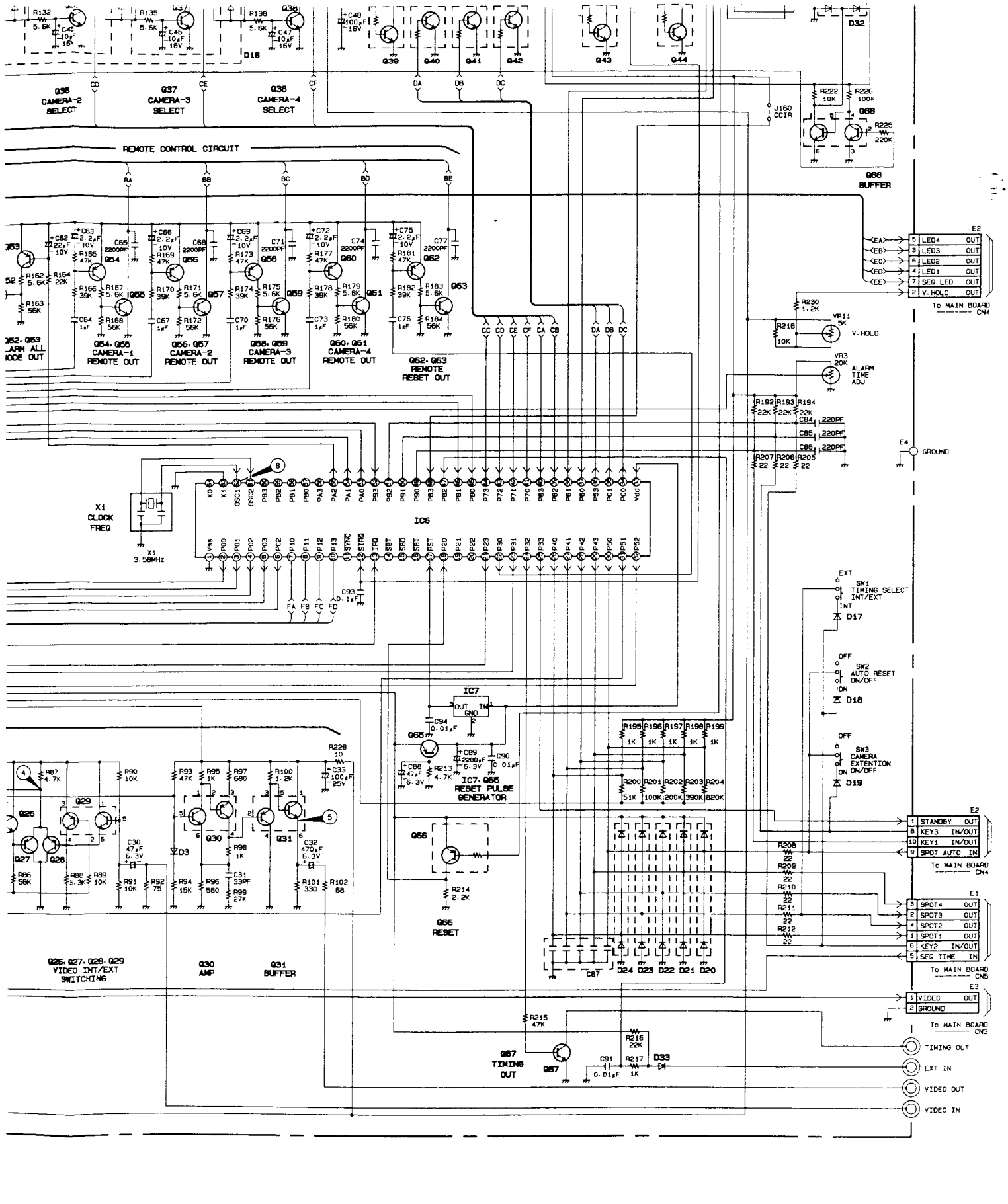
CNS
 Pin 1: Video Input Signal
 Pin 2: VD Output Signal
 Pin 3: Ground
 Pin 4: Logic Signal for Sequence
 Pin 5: Logic Signal for Sequence
 Pin 6: Logic Signal for Sequence
 Pin 7: Logic Signal for Sequence
 Pin 8: Logic Signal for Sequence
 Pin 9: Logic Signal for Sequence
 Pin 10: Logic Signal for Sequence







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